Riley County’s new “green” public works facilities are saving the county $$

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

Public buildings use a great deal of energy for lighting, heating, and cooling—and road and bridge facilities are no exception. Riley County Public Works took a county-wide initiative to reduce energy consumption and translated it into a state-of-the-art new “green” campus for maintenance activities, administration, and training.

The largest structures at the site are the training center/office building and the fleet maintenance shop for all county vehicles. There are also separate shops for individual crews. All told, there are 10 structures with storage yards totalling about 70,000 square feet on a 96 acre site.

Goals of the project
The county had several goals in designing its new facilities. They intended to use energy savings to pay for technology upgrades, incorporate renewable energy, reduce utility costs for operating county facilities, and provide an educational tool for the community and the state. They are meeting all of these goals.

Energy efficient features
Rod Meredith, the county’s assistant director of public works, outlined the main features of the training center/office building that save energy:
—Natural light. Use of skylights and large windows allowed the use of only half the light fixtures normally required for this type of facility.
—Energy efficient lighting. T-5 and T-8 fluorescent light fixtures and compact fluorescents were used extensively, and these require much less energy than the old-style T-12 fixtures. These fixtures, combined with natural light, reduced lighting costs up to 75 percent.
—Geothermal (ground source) heat pump. Forty-five wells, each 250 ft. deep, were installed to provide heating and cooling. A heat pump system circulates a

continued on page 2 ➤
Riley County’s green facilities, continued from page 1

What if the expected energy savings don’t materialize?

Riley County has this covered. They designed their system under a performance contract with Johnson Controls—an energy service company. Johnson Controls measures, verifies, reports, and guarantees energy cost savings for their projects. Expected energy and cost savings must pay for all project costs over the term of the contract, giving the company a strong financial incentive to design optimal performing projects. Fees charged by the company for services such as maintenance, project monitoring and measurement, etc., must be paid from the energy savings, as well. If the savings are not achieved, the company does not get paid. In fact, Meredith said “if Johnson Controls does not meet their numbers, they will cut us a check annually to make up the difference.”

A heat pump was installed in this facility, saving 15-20 percent over traditional HVAC.

—Central control system. The heating and cooling system in the operations facility and the floor heat in the main shop facility are integrated into a convenient central control system. Heating and cooling are turned down at night, saving another 15 percent in energy costs.

The fleet maintenance shop (photo on page 1) was also designed to be energy efficient. It contains:

—Natural light. Skylights, and windows along the upper walls and in doors, drive natural light throughout the shop. Only half the light fixtures normally required were needed.

—Energy efficient light fixtures. T-5 and T-8 fluorescent light fixtures were installed in the office area and in the shop areas. Energy usage is about 50 percent less than typical.

—Energy efficient heating and cooling. A heat pump was installed in the main shop facility and the floor heat. Scott said “if Johnson Controls does not meet their numbers, they will cut us a check annually to make up the difference.”

The county is researching further energy efficient features:

—is the most energy efficient heating system for large open facilities.

—Radiant overhead heat. A radiant gas system was installed overhead in the main shop. This is considered to be the most energy efficient heating system in the fleet maintenance building and some of the crew buildings.

—Roof-mounted solar photovoltaic panels that will convert sunlight directly to electricity for some of the lighting in the crew buildings.

More savings to come

The county is researching further energy efficient features:

—Solar hot water heating system to pre-heat the glycol/water solution used in the radiant floor heating system in the fleet maintenance building and some of the crew buildings.

—Small wind turbine (50-100 Kw) to power heating and cooling systems and supply hot water.

—Waste oil burner system. Approximately 10,000 to 13,000 gallons of oil are currently collected each year by the county. About half of that comes from the general public. Collected waste oil could be used to heat two of the crew buildings.

—Large wind turbine (650-750 Kw) to provide power to the grid with the potential to save 50 percent on all electricity costs. The county is
exploring local grant and partnership opportunities to pay for the system.
—Solar-powered lighting for parking lots and storage yards. The county is planning to test a variety of different brands.

**Leading the way**
The energy efficient facilities at Riley County began with a vision for the county to be a leader in implementing sustainability in the state. (See the vision statement adopted by the Board of Commissioners at right.) Then the county got to work. They identified sustainable technologies to help accomplish that vision, and they partnered with Johnson Controls to guide renewable energy system implementation and guarantee performance. Meredith is hoping other public works departments follow suit. “Conserving energy in our operations makes good sense, and it will save your county money,” he said. “We should have a template for energy conservation that any county or city could use.”

Riley County’s energy efficient facilities have received statewide recognition. In 2007 the county received the Governor’s Energy Efficiency Recognition Award from Kansas Governor Kathleen Sebelius. Riley County is proud of its new facilities, and staff would be glad to give you a tour. Call Rod Meredith at (785) 539-2981 for more information.

**Riley County vision:** “To help save taxpayer dollars by being a leader in the State of Kansas in implementing renewable energy efficient systems at county facilities.”

—Use of natural light is the first of many energy efficient features in the training center/office building. A clerestory runs along the top of the roof and provides even more light to the interior. The community participates in maintaining the landscape through the volunteer master gardener program.

—The county will be testing different brands of solar-powered parking lot light fixtures with the aim to create further energy savings.

—Natural light streams down the hallway in the training center/office building. More light comes from the windows in the clerestory on top of the building and large windows on outside walls. High efficiency fluorescent fixtures provide even more savings.
Miami County cuts back on rock purchases by using erosion control practices on gravel roads

[Editor’s Note: NACE and LTAP have been informing their members and customers about a new manual that discusses the environmental effects of road and bridge work. JR McMahon has been adopting some of the practices in that manual in Miami County. Here’s one example of how they are using it.]

by JR McMahon

In Miami County we are using the Environmentally Sensitive Maintenance for Dirt and Gravel Roads manual (ESMD&G) to look at ways to prevent erosion and to validate our maintenance practices. Here’s an example of how we have changed our approach to blading, adapting advice in the manual to our conditions.

To blade or not to blade
In our county, we joke that our most frequently requested maintenance procedure is “blade my road” with our 2nd being “don’t blade my road.” On page 3-17 of the manual, this statement appears: “Blading or smoothing the road surface frequently to correct [distresses] will result in less intense efforts of reshaping or adding new material.” This must be important, as it has been boldfaced and underlined in the manual. Basically this sentence says I must blade the road on a regular basis or I will pay for it later.

We considered whether this statement is true in Kansas, and if not, what we could do to minimize road maintenance and the addition new road material.

Factors in effective blading sometimes available, sometimes not
First, for blading to be successful several factors must be present:
—motorgrader or like machine
—trained operator
—sufficient material (gravel, rock etc.)
—optimum moisture in the material
—a means to re-compact the material (i.e. roller).

In Kansas if you asked any road supervisor what percentage of time all the above are present when blading a road, the answer would probably be zero. Therefore, we start the process of blading a road with a built-in disadvantage. Can we overcome that disadvantage? Not completely, but we can try. Here is how we do it in Miami County.

1. Motorgrader. All counties have motorgraders, and they are usually the backbone of the department. They are versatile machines that do a multitude of jobs (blading, asphalt patching, snow removal etc.) Counties that have a replacement program for their graders and do a good job of keeping them serviced have solved problem number 1.

2. A trained operator. Of course LTAP provides a program for county and other local-agency workers to have a formalized training program. That, along with the written and DVD/video training materials, and some on-the-job training, allow a well-managed county to meet its training needs. Therefore, problem 2 is solved.

3. Sufficient material. In the Eastern part of our state, the material used for grading is usually gravel. This material is, for the most part, purchased from third party producers. (I believe Allen and Bourbon counties have their own quarries.) The rock must be of a certain specification and the county must have some sort of a quality assurance program, either internally or externally, to make sure the material is in fact what they purchased. The material is then hauled to the site and placed.

In Miami County we have a schedule for rock replacement: 150 tons per mile for maintenance-rocking and 450 tons for a complete re-rock. The County usually purchases 80,000 to 120,000 tons of gravel per year. This is down from between 120,000 and 150,000 tons per year.

If we are hauling around that much replacement rock, where is the material going? The answer is erosion. In our county we estimate that we lose 45 percent of the material through dust erosion, 45 percent through water erosion, with the remaining 10 percent absorbed into the sub-base.

Miami County combats erosion by having a dust control program on the high traffic roads (300 vehicles per day or more) and a ditching program that includes reseeding. We have also purchased “bullet tip” blades for our graders that allow for reseeding. We also purchased “bullet tip” blades for our graders that allow for the recovery of material that has been absorbed by the sub-grade. This has allowed us to cut our rock purchases by about 30 percent or $250,000 (not including savings in haul costs). The money saved pays for the dust control material. Therefore, the issues of problem 3 can be solved with a comprehensive program.

4. Optimum moisture.
Moisture in Kansas varies throughout the state (generally dry in the West, wet in the East). In Miami County (a high precipitation county) we estimate that we have optimum moisture only about 30 percent of the available blading hours. (Be advised that a contractor would...
not even be allowed to do any base work without the proper moisture content, yet counties press on.) This can result in blading being done when it is either too wet or too dry.

If it is too wet, it is really impossible to blade because the road will usually end up worse than when you started. Most counties, therefore, refrain from blading when it is too wet. The problem is when we try to accomplish the “Blading or smoothing the road surface frequently…” in periods with little or no moisture (i.e. “dry-blading”). Such blading may be more destructive than constructive. Potholes will become filled with dry loose material that does not stay, and loose rock on the road will either create dust under vehicles or will be kicked off into the ditches by fast-moving traffic.

Fortunately most county gravel roads have very low traffic and these problems are not as much of a concern. It is on the higher-count roads where it becomes an issue. In Miami County we provide routine dust control on higher volume roads and we have a policy of no blading on lower traffic roads in dry periods. This has been effective in reducing erosion. We could also provide a water truck to pre-wet the road prior to blading, but it would not be cost effective and I doubt if any county in the state does this. The issues in problem 4 can be managed, but never solved.

5. A means to re-compact the material. To effectively recompact you need optimum moisture (see #4). Because this only naturally occurs about 30 percent of the time in our county and we don’t have a water truck for dry spells, having a roller to re-compact is not financially feasible. The traffic does the re-compaction. Again, due to low traffic counts it is usually not much of an issue. On the higher count roads loose material is more of a problem and can be addressed by the same means as mentioned in item 4.

Therefore, the issues in problem 5 can be managed but never solved.

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**Time for a new paradigm for maintaining roads**

by JR McMahon

The *Environmentally Sensitive Maintenance for Dirt and Gravel Roads* manual (ESMD&G) encourages local road agencies to consider a gravel road part of the surrounding natural area, not a foreign feature. This is a dramatic paradigm shift from the traditional Midwestern thought process of “man versus nature.” This also flies in face of the thought process of most engineers; that is, finding a problem and then engineering a cure for the problem. The manual essentially says let Mother Nature do what she does, and our maintenance practices should fit with that process.

Look in the ESMD&G on Page 5-1 (Section 5.2) and you will see the sentence, “Erosion prevention becomes our first line of defense.” This is the key to slowing the loss of sediment and road material. The question then becomes “What can I do as a road manager/engineer to prevent erosion on my road system?” This starts a conversation about how we blade roads, control dust, and manage roadside vegetation.

This means that if a stream floods and part of the road is submerged for a period of time, it is not a bad thing. The stream is doing what the stream is supposed to do; i.e., flooding out of its banks, backing onto low areas and thus slowing down the velocity, and then draining back into the bank area. We should not be building up the road and therefore conquering the stream but instead doing things to mitigate damage to the roadway and minimize erosion while it is under water.

While the bad news is that we need a paradigm shift to allow road managers and users to accept such a thought process, the timing is about a good as it is ever going to get. Everybody is talking “green” and needing to save money these days. But all trips start with a first step, and this one will need to start with a baby step. Luckily the process has already started. Norm Bowers (the Kansas Local Road Engineer) has been preaching about the use of temporary erosion control around bridge projects for years now. KDOT has also implemented many erosion-control programs on its projects.

What can you do to minimize erosion on your roads? You should be thinking about this. It will save your county money and it’s the right thing to do.

**One-size-fits-all does not work**

The bottom line is to have as many tools in your toolbox as you can (i.e. dust control, good road material, written maintenance activities) and avoid the one-size-fits-all approach; that is, blading a road on a pre-set schedule, whether the road needs it or not. Instead, drive your roads on a regular basis and look not only at the surface condition but also at the amount of dust. Can we as professionals mitigate the problem? Probably yes, but not without some change in our practices.

We basically do things the same way because that’s the way they were always done. In Miami County, due to the high price of materials, hauling and fuel, we have looked at reducing our blading and are trying techniques and practices to lengthen the time line between bladings. This may not work in all counties, but does in ours.

JR McMahon is director of public services for Miami County. He can be reached at (785) 294-4377.
Heavy loads and *asphalt* roads

[In our last issue, we ran an article on road stress under heavy loads. It provided information on how different types of heavy vehicles affect Portland Cement pavements. The information was compiled in Iowa, a state that has more concrete rural roads than we see in Kansas. I asked Tom Deddens, pavement/materials engineer for the Federal Highway Administration’s Kansas Division to provide similar information on stress to asphalt roads. His information appears below. –Lisa Harris, editor]

... by Tom Deddens, P.E...

First, a disclaimer. Estimating stress on asphalt is not a cut-and-dried process. The following estimated pavement thicknesses are simply that—estimates or representatives. They should not be construed to be absolute in any way. It should also be noted that vehicles typically regarded as heavy, such as large 4-wheel drive tractors and stilted field fertilizing/pesticide applicators (tarragators), were not considered heavy enough to be of interest, relative to loaded harvest vehicles.

The task of estimating the hot-mix asphalt pavement thicknesses required to support a variety of farm-related vehicles was undertaken using available information from various equipment internet sites. The information included in the chart with this article comes from readily available, published data in trade brochures regarding empty vehicle weight, ultimate weight capacity based on bushels of #2 corn weighing 56 lbs at 15 percent moisture, and available vehicle dimension data. No equipment supplier/manufacturers were contacted to obtain specific design information/parameters about specific vehicles in their inventory.

General assumptions were also made about the tire air pressure of various vehicles. High capacity truck tires were assumed to be pressurized to 120 psi on the high end, while high floatation tires were assumed to pressurized to 35 psi on the low end. In between, tires typically used in the field were assumed to having tire pressures on the order of 70 psi. Specific tire pressures used are not reported on the associated chart.

The chart also grossly depicts two subgrade stiffness conditions: 1) “hard”—intended to be representative of relatively hard and dry subgrade conditions typically encountered during the late summer or fall during harvest; and 2) “soft”—intended to represent soft and/or wet conditions typical of spring/thaw or spring/rain conditions. The reliability of the performance of the estimated pavement sections being in excellent or good category is only 50 percent.

The above assumptions were used as input parameters for a pavement design software program developed and marketed by the Asphalt Institute entitled the *Heavy Loads Program*. The program permitted the estimation of the pavement thickness required to support the subject vehicle for the indicated approximate number of vehicle movements over the subgrade surface. Again, the estimates are not set-in-stone data. But they do give a rough indication of what you might expect on your roads.

These estimates are based on currently available information. I have recently learned that the Minnesota DOT is participating in a three-year pooled-fund study about the effects of agricultural equipment on pavement life. The study is scheduled for completion in November 2010. The Iowa and Illinois DOTs are also participating in the study, as well as organizations representing agricultural businesses, equipment manufacturers and tire manufacturers. It will be interesting to see if the study’s findings change or affirm our current knowledge about the affects of heavy loads on pavements.

You can reach Tom Deddens at the FHWA Kansas Division at (785) 228-2544 x214, or at Tom.Deddens@fhwa.dot.gov.

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Nighttime no-plow policies save salt and promote crew safety

... by Lisa Harris ...

Anderson County, Kansas, has started a new policy to not plow or salt roads between 11:00 PM and 4:00 AM. The main reason for the policy is to save salt.

Lester Welsh, road supervisor, says the idea came from Coffey County, which has a similar policy.

The policy is flexible and allows Welsh to exercise best judgment to maintain roads during the night if conditions warrant. “The sheriff’s department will call me at home if conditions are getting bad,” said Welsh. Roads are maintained if they are icy and slippery, but not just snow-covered. “I would not expect someone who had to work late to drive home on icy roads,” he said.

Anderson County has not experienced much precipitation at night so far this winter, so crews would not have been out anyway. But they are ready to use the policy when needed.

Coffey County has had their policy for many years. Bob Strait, road supervisor, said that worker safety is the reason behind his county’s policy. “We like to have our guys off the roads at night,” said Strait. He explained that plowing can be blinding work—when headlights hit falling snow. Coffey County does not plow between 11:00 P.M. and 5:00 AM, but they too exercise best judgment and will bend the rules when needed to finish a route or if snowfall is particularly heavy. However, most times the policy is followed.

Coffey County has received no complaints about their policy. One reason might be that the county makes it a priority to plow the road to Wolf Creek Power Plant, a major employer in the area, before the workers arrive at 6:00 AM. Good policy tempered with common sense seems to be working for them.

Stormwater made simple

... by Richard Basore ...

Cities, counties, and townships often ask questions as to just what is needed when it comes to compliance with the Kansas Department of Health and Environment’s Phase II Construction Stormwater Program.

The Kansas Stormwater Program has three separate programs: 1) construction activity, 2) industrial sites, and 3) municipal separate storm sewer systems (MS4s). In this article I will focus on construction and maintenance activities of road and bridge departments.

Road construction activities

To put it in its most simple terms, any construction project or activity (including municipal projects) that will disturb one acre or more must comply with the rules in effect under the KDHE Kansas General Construction Permit that the state holds from the EPA. As with any program, there are some variances to whom the rules apply and even a few exceptions, which are discussed in a separate document (see page 15). At the end of this article I have listed Web sites where you can obtain information and forms regarding the Kansas Stormwater Program.

What’s the problem?

The main concern that drives the Construction Stormwater Program is the need to reduce and control the amount of sediment that construction activity will contribute to streams, lakes, rivers, etc. Sediment causes problems with water quality, it degrades fish and wildlife habitat, fills lakes and reservoirs thereby reducing their water storage capacity, fills road ditches with mud, and thus move with the sediment. Regardless of whether or not your project needs stormwater permit coverage, if you are doing work that is in a “waters of the US,” which is typically any waterway that exhibits an ordinary high water mark, you may need a 404 Dredge and Fill permit and a 401 Water Quality certification (i.e., a pollution prevention plan) from the US Army Corps of Engineers. A stream obstruction clearance may be required from the Division of Water Resources of the Kansas Department of Agriculture if the upstream drainage area equals or exceeds 240 acres.

Road maintenance activities

Maintenance that disturbs less than five acres is exempt, if the project is to maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

For example, if the project is to re-grade a roadbed, or clean out...
Stormwater made simple, continued from page 7

Implementing your SWPPP

If your project requires permit coverage and development of a SWPPP (storm water pollution prevention plan), remember that the SWPPP is the blueprint of what BMPs should be installed, where they are to be installed, and when they need to be installed. It is not a plan that is supposed to gather dust on a shop shelf, but rather the SWPPP is the plan for the local government staff or the hired general contractor to actually follow. It is the recipe or directions for success in controlling sediment runoff and protecting water quality for the project.

Common problems

The two most common stormwater problems found when inspecting a construction site, and the reason behind most complaints generated by the public or by neighbors and received by EPA, KDHE, and MS4 programs are these: 1) failure to install the perimeter BMPs prior to construction, or at all (!), or in the wrong place, or at the wrong time, or incorrectly; and 2) failure to maintain the BMPs.

And the most critical erosion and sediment problems encountered on most sites are related to BMP maintenance,…… maintenance,….. and oh yeah, MAINTENANCE !

For example, a sediment fence that has been run over by a truck or high loader, or is already full of trapped sediment, cannot work properly to trap more silt until it is repaired or cleaned out. Mud or silt washed or tracked onto a street or in the curb needs removal before it gets washed into a storm sewer and on into a waterway (or causes a wreck).

Proper BMP maintenance requires that:
1. Somebody is tasked with inspecting the BMPs on a frequent basis, and 2. They actually go out and walk around and do the inspecting, and 3. They tell someone to actually go fix it, clean it, etc, and 4. They follow up to see that whatever was wrong got fixed! and 5. They make a written report of the conditions found during the inspection, and any corrective actions taken, in your reporting log.

The Kansas permit requires that the BMPs on a construction site be inspected within 24 hrs after each rain event of ½ inch or more—even during weekends—and at least once a month.

So where is your rain gauge? This is Kansas, after all, and we all know if you move a mile or often just a half mile, the rain amount can vary a lot. You can't rely on what the radio said the airport got 10 miles away. Install a rain gauge at your work site and read it; then you'll know for sure!

Inspecting more often than once a month, while not required, makes a lot of sense. It's easy, and it helps catch BMP issues or maintenance needs while they are small and before the BMPs will be needed to work. Remember the purpose of a BMP is to be there, ready to perform, BEFORE it rains !!!!!

Inspect BMPs after each ½ inch or more rain to see if the BMPs performed—and if you need to add additional BMPs or make changes or repairs.

Other problems at work sites

Besides the installation of BMPs and their maintenance, other common problems encountered include:

• Concrete truck wash-out material being dumped in ditches or stream areas, or where it can run off site. You need to have a truck wash-out pit. Collect the material and dispose of it properly at the end of the project.
• Improperly sited fuel tanks, lubricants, or construction materials where any spills could run off site or into waterways. (What happens if the dozer accidentally backs into the diesel tank, or the truck driver drives off with the fuel hose still attached? Where will the diesel fuel go?) Post spill-reporting numbers where they can be easily seen.
• Improperly sited portable toilet, such that if damaged or tipped the contents would run off site or into storm sewer or waterway.
• Failure to seed disturbed areas within 14 days if they are not areas of current grading activity.
• Failure to stabilize soil stockpiles or mounds if they are not active.
• Poor, inaccurate, or non-existent record-keeping of self-inspections, BMP conditions, and repairs.
• Poor housekeeping of solid waste, i.e., construction debris, material wrappings, junk pallets, fast food
wrappers, etc., left to blow around or get off the site and accumulate in areas such as nearby roads, trees, streams, etc.

**Common sense tips for fixing problems or not having them in the first place**

A lot of construction stormwater management boils down to common sense. The ultimate objective is to reduce—as much as possible—the amount of sediment in the stormwater that discharges from the construction site. Period.

Stormwater controls are designed to control one of two things, 1) erosion, or 2) sediment transport. Controls for both are necessary.

- Route run-off water around your site so you don’t have to deal with it.
- Don’t disturb site areas until you are ready to actually do work there; the best erosion control is the natural vegetation existing before you started. Don’t grub out 40 acres if you are only going to start work on 10 acres. A side benefit is that by not denuding the whole site you are reducing the wind erosion and particulate dust that contributes to air pollution.
- Minimize the erosion on the site area; if it’s not eroding, you won’t need to capture the sediment—there shouldn’t be any!
- If there is erosion, then have controls to capture the sediment. You created it, you are responsible for it, and nobody else, including the fish, wants it!
- Install BMPs correctly. Sediment fence needs its bottom skirt plowed in “upstream.” The posts need to be on the downstream side, because just like with livestock, you are trying to fence the sediment “in.”
- Hay or straw bales make lousy ditch checks. They are rarely installed correctly (on edge, 2 stakes), they float up, allowing flow underneath, they rot easily, and they require extra maintenance/frequent replacement, etc. Even the EPA no longer recommends them for use as ditch checks.
- Ditch checks need to have their sides or “wings” higher than the middle to ensure that higher flows go over rather than around the device and cause erosion.
- Don’t park your equipment or fuel/lube tanks in a flood zone area or next to a creek. This includes overnight, and especially weekends.
- If you have equipment or vehicles that leak fuel, hydraulic fluid, etc., use a drip pan underneath them when parked (a kid’s wading pool works pretty well for this). Same if you’re doing field maintenance or repairs—catch the spills and drips. Have some absorbent pads or pillows on site to clean up spilled fluids; they are pretty cheap. And report any spills.
- And oh yeah, did I mention maintenance (again!) for the stormwater BMPs, once they are correctly installed?

Richard Basore is a watershed field coordinator with the Kansas Department of Health and Environment in Wichita, Kansas. You can reach him at (316) 337-6014 or by email at rbasore@kdhe.state.ks.us.

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**Helpful Web sites**

- Kansas Stormwater Homepage and links to specific parts of the program.  
- Kansas Construction Stormwater home page and links to the NOI, forms, guidance documents for developing your plan, and other resources.  
- Kansas MS4 Stormwater Program fact sheet. This program applies to cities, towns, and urbanized areas in the state with populations of 10,000 or more.  
- EPA Stormwater Pollution Prevention Guidelines.  
- EPA’s Low Impact Development (LID) home page.  
  [http://www.epa.gov/owow/nps/lid/](http://www.epa.gov/owow/nps/lid/)
- KDOT’s Stormwater and Water Pollution Control page.  
A Leg Up

KDOT’s Bicycle Web Site: Give it a spin!

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

When a citizen or commissioner calls with a question about bicycling in your area, where do you turn? Some local governments have staff with expertise in these matters, but most in Kansas do not.

Kansas LTAP has several videos and publications on bicycling facility safety and design.* Another great place to get information is KDOT’s bicycling Web site: www.ksdot.org/burRail/bike/. The site includes:

2007-2008 Kansas Bicycle Guide. This includes much of the same content as the Web site, but in a downloadable form. The online Guide also features bicycle route maps for Kansas and PDFs of more detailed bicycle route maps for many cities in Kansas.

1995 Kansas Bicycle and Pedestrian Plan. This is a broad-based policy document that serves as a guide for KDOT’s bicycle and pedestrian transportation planning process and for future bicycle and pedestrian transportation program development in Kansas.

Kansas distance map and calculator. This map shows mileage for road segments between cities, and a handy online calculator if you want to calculate longer distances. I calculated the distance between Lawrence and Lakin; 364 miles. I’ll have to get in better shape for that ride!

Tourist information. This includes Web links for lodging at campgrounds, hotels and motels, and State parks.

Bicycle safety and education. Includes fact sheets on safe bicycling for children and for adults. Also includes a Safety Quiz that asks “How well do you know how to ride?” The quiz has questions about traffic rules for bicycles, and more.

Bicycle etiquette. This link takes you to the Bicycle Guide page, and the bottom of it has a section on rules of the road for bicyclists. This could be shared with your citizens through your typical PR channels.

Relevant statutes. KDOT’s Web site contains a list of bicycling statutes (and a separate list of pedestrian statutes).

Bicycling glossary. Don’t know what “click-shifting” is? What a “pannier” is? This section will help.

Bicycle and pedestrian Web links. This page can be useful to you if you need to do research on what other communities are doing to promote bicycle route connectivity and bicycle safety. In addition to listing local bike clubs in Kansas (there are eight of them), this page also provides links to national advocacy/interest groups, some of which provide a wealth of research and best practices on their own Web sites. (Bicycling.org is a good example.) Other State DOT bicycling programs are listed on KDOT’s site as well.

KDOT’s Bicycling Coordinator. Finally, the site provides contact information for Kansas’s Bicycling Coordinator, Becky Pepper. She can reached at (785) 296-8593. ■

KDOT issues revised Design Manual, Volume I, Parts A, B and C (Elements of Drainage & Culvert Design), Road Section

This edition supersedes all previous versions of the Design Manual (Parts A, B & C). Revisions are summarized in the front of each document.

The new design manual should be used for all KDOT projects to be field checked after January 1, 2009. The November 2008 Edition can be downloaded for free at http://kart.ksdot.org/. In the General Resource Downloads listings, Parts A & B are one document and are listed as the Road Design Manual. Part C is listed as the Drainage Design Manual.

Source: Norm Bowers’ twice monthly email to counties, December 26, 2008. ■

*Go to www.ksltap.org, click on the Lending Library link, and search for the word bicycle in the title search.
There are various kinds of culvert designs, depending on the terrain and the amount of water they are expected to carry. Some have several openings, others a single opening. They also differ in shape, width and length, and depth. However designed, there is one fundamental question when considering the environment: How does the culvert’s design affect the surrounding ecosystem? All too often the effect is negative, with the potential for long-term consequences for aquatic passage. This article will outline the major concerns and how local engineers and road crews can best address them.

Environmental concerns
Kris Lancaster, public affairs specialist with the U.S. Environmental Protection Agency Region 7, which includes Kansas, described the following three major environmental concerns concerning culvert design:

1. Culverts can impede aquatic species passage. If culverts are not designed properly they can become clogged with sediment and other debris. This includes having a diameter that is too narrow. Devices to keep debris from clogging culverts, such as grates, may actually hinder flows when the grates themselves become clogged. Sometimes the bottom of a culvert is not designed properly to be at an elevation to flush sediment and debris through it. There can also be other design factors that can result in sediment and debris build up in a culvert. Clogged culverts have reduced light through them due to obstructions. This can hinder aquatic species passage even if some water flow is maintained because many species will not travel through a passage where they cannot see light at the other end.

This “perched” culvert in rural Kansas would better allow aquatic passage if the bottoms of the pipes were buried below the stream bed.

2. Culverts can cause flooding upstream. If a culvert is perched (elevated above the stream bed – see photo above), species cannot navigate upstream or might not be able to survive a downstream drop depending on the distance from the bottom of the culvert to the stream bed downstream. Many species of fish are unable to negotiate a change in elevation of more than one foot.

Perched culverts do not allow for upstream passage. If a culvert is perched (elevated above the stream bed – see photo above), species cannot navigate upstream or might not be able to survive a downstream drop depending on the distance from the bottom of the culvert to the stream bed downstream. Many species of fish are unable to negotiate a change in elevation of more than one foot.

3. Culverts can cause downstream degradation. If culverts are perched, water can “plunge” from the new culvert to the stream bed below, resulting in stream bed scour. This destabilizes stream beds and banks, which changes downstream geomorphology, or the natural structure and path of the stream.

What to do?
Fortunately, there’s a lot of help out there for more effectively designing, constructing, and maintaining culverts to create less impact on the environment. The U.S. Army Corps of Engineers has regulations regarding permits for the construction of new or replacement culverts on “expected aquatic life use water or restricted aquatic life use water located in the Kansas Water Register.” [For more information on the Register, see http://www.kdheks.gov/befs/download/2004_WR_ALL_052405.pdf] Links to both of these resources, as well as all following resources can be found at the conclusion of this article.

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From roofs to roads

KDOT Korner

E ach year, the U.S. manufactures and disposes of an estimated 11 million tons of asphalt shingles. Most asphalt shingle waste comes from tear-off shingles from re-roofing, and the rest is waste from shingle manufacturers. These shingles are made of the same basic materials contained in asphalt, and some road departments are using ground-up shingles in their asphalt mixes—with good results. Missouri DOT has been using it on some of its projects, and KDOT is working on a spec for adding ground-up shingles to asphalt mixes. This article will describe the technology and how local communities in Kansas might put it to use.

Shingles in hot mix
The first step to recycling asphalt shingles is the removal of non-shingle waste. The shingles are then ground for future use. Currently, a substantial portion of asphalt shingle recycling involves mixing five percent ground-up shingles with hot-mix asphalt used in paving and cold patch materials. Researchers have found that using recycled asphalt shingles in hot-mix can actually improve the pavement’s performance by increasing its resistance to wear and moisture, and decreasing deformation, rutting, and thermal fatigue and cracking. A Minnesota study showed that hot-mix asphalt containing five percent tear-off shingles performed no differently than regular hot-mixes up to a decade later.

Besides improved performance there are also cost savings: Using hot-mix asphalt with five percent recycled shingle material can save $1 - $2.80 per ton of hot-mix asphalt.

Research on shingle recycling
Several states have conducted laboratory studies using recycled asphalt shingles in hot mix. In addition, Pennsylvania, North Carolina, and Minnesota have conducted field studies where portions of highways or trailways have been paved with asphalt containing recycled shingles and were monitored over time.

Use in other states
Several DOTs allow up to five percent manufacturer’s scrap in hot mix pavements, including Missouri. Ohio allows a “certain percentage of recycled material.”

Interest in Kansas
KDOT is considering developing a spec for using recycled shingles. Research and Materials Bureau Chief Rick Kreider spoke on this topic at the Fall 2008 Kansas County Highway Association meeting in Wichita. Kreider is excited about this technology for the state, and thinks it could be especially beneficial to local agencies in Kansas. This is because the smaller size of local road projects are a better match for the availability of the material in our area. It’s also a good way to use locally generated material on roads. A separate area would need to be designated in the community for shingle disposal.

Kreider said some asphalt plants in Kansas are interested in the technology, as well as some of the major pavement contractors in the state.

Other uses on roads
Besides use as a hot mix addition, the following are potential road-related uses for recycled asphalt shingles:
• Cold patch for pothole repair
• Temporary roads, driveways, and parking lots
• Aggregate road base, and
• Dust and erosion control at construction sites and rural roads.

Barriers to overcome in using shingles on roads
The primary barriers to recycling tear-offs are varying aggregate composition in the shingles, and contaminants—nails, wood, and asbestos. From the early 1960’s to the late 1970’s, some shingle manufacturers used asbestos in the production of the fiber matt contained in their shingles. Because recycling of asbestos-tainted materials is prohibited by federal law, processors must test shingle loads in accordance with state and local requirements.

Another barrier for advancing the use of tear-offs is that some state DOT’s spec only shingle manufacturer’s scrap in hot-mix asphalt, rather than tear-off material, because of its guaranteed uniform content.

In addition, some hot-mix plant operators are still resistant to adding shingles to their mixes, report some recyclers. The plant operators say that it is not economically feasible or they have enough recycled asphalt pavement (RAP) in their mixes already. Also, some plants often are not equipped to properly handle the shingles safely. (A grinder with a rotating magnet is needed to remove nails.)

Resources on asphalt shingle recycling
For starters, Kreider recommends the Web site www.shinglerecycling.org. The site contains technical reports, fact sheets and literature on shingle recycling. The site was developed by

... by Lisa Harris . . . . . . . . . . . . . . . . . .
According to the Corps, all culverts must be designed to allow the natural passage of aquatic organisms, and the culvert design must mimic the natural shape and flow of the channel.

The Kansas Department of Transportation (KDOT) has developed Base Sheet BR025 showing KDOT’s preferred method of design for any box culverts with three or more openings.

Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont (Bates & Kirn, 2008) is a comprehensive and detailed manual that illustrates the various stages of various culvert designs from beginning to end. Special attention is given on how to least impact surrounding ecosystems.

The State of Washington has been a pioneer in the proper design and construction of culverts. The Washington Department of Fish and Wildlife developed a manual in May 2003 entitled Design of Road Culverts for Fish Passage. This manual is part of a series called Aquatic Habitat Guidelines. It was created by a group of several public agencies for use by land and property owners, developers, planners, designers and regulators interested in protecting and restoring various species of fish and wildlife habitat. Both of these are excellent sources to reference in the design and construction of culverts.

**Culvert best practices**

Susan Blackford, a biologist with the U.S. Fish and Wildlife’s Kansas Ecological Services Field Office, in Manhattan, Kansas, has outlined a few best management practices (BMPs) for designing culverts:

1. **A culvert should be designed to pass appropriate storm flows and debris or to survive overtopping.**

   The culvert designer must know the hydrologic characteristics of the flow volume, range and frequency in the channel in which the culvert will be placed to prevent failure of the culvert crossing.

2. **If possible, make the culvert a bottomless one.**

   A bottomless culvert is preferred because the crossing will contain the natural substrate of the stream and be able to adjust itself. This makes aquatic organism passage more likely to occur and sustains the sediment transport capability of the stream.

3. **If there must be a bottom on the culvert, bury it one to two feet below the streambed.**

   If you have any questions about these BMPs, you can reach Susan Blackford at (785) 539-3474.

Sources:

- Kris Lancaster, EPA Region 7, lancaster.kris@epa.gov.
- Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont (Bates & Kirn, 2007).
- Design of Road Culverts for Fish Passage, 2003 (Washington Dept. of Fish and Wildlife).
MINK8 Presentations on CD
Contains PowerPoint presentations from speakers at the 2008 “MINK” Local Roads Conference in St. Joseph, MO, in October 2008. Topics include bridge inspection fallout from the MN I-35 bridge collapse, MUTCD updates, roller compacted concrete, future of asphalt pavements, FHWA’s emergency relief program, FEMA regulations and pilot program, grappling with rising fuel costs, and sign retroreflectivity regulations.

Recycling Tear-Off Asphalt Shingles — Best Practices Guide
76 pages. An excellent and detailed publication on how to prepare and use ground-up recycled asphalt roof shingles in hot mix and in other road maintenance applications. Published by the Construction Materials Recycling Association in October 2007. http://www.shinglercycling.org/images/stories/shingle_PDF/ShingleBPG%202010-07.pdf

Kansas Environment 2008
17 pages. This is a “state of the environment” annual report for Kansas, and includes sections on the major environmental challenges faced by our state. Published by the Kansas Department of Health and Environment, 2008. http://www.kdheks.gov/environment/download/Kansas_Environment_2008.pdf

KDOT’s Temporary Erosion Control Manual
This manual is intended to give designers, contractors, installers, and inspectors the tools they need to implement practical and efficient stormwater pollution prevention plans (SWPPPs). Updated January 2007. http://www.ksdot.org/bur-consmain/Connections/swppp.asp

Need some training on temporary erosion control? Local governments are invited to attend a course on the topic offered by KDOT in February. Space is available at the Hays and Hutchinson sites. See the first listing on the calendar.

See our Web site for even more calendar listings. Go to www.kstap.org and click on “View the LTAP Calendar.”
Free Resources

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or fax to 785/864-3199

Publications and CDs
You are free to keep these unless otherwise noted.
Or you can download at the links provided.

Background on the Kansas Stormwater Program
2 pages. This is a companion piece to the article on page 7.
Written by Richard Basore, KDHE, in December 2008.
Download at: www.ksltap.org or ❑ request hard copy

MINK8 Presentations on CD.
See description on page 14. ❑ request CD

Recycling Tear-off Asphalt Shingles Best Practices Guide.
72 pages. See description on page 14. Download at:
or ❑ request hard copy

17 pages. See description on page 14. Download at:

KDOT’s Temporary Erosion Control Manual
See description on page 14. Download at:
http://www.ksdot.org/burconsmain/Connections/swppp.asp
or ❑ request hard copy

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❑ Turning Movement Counter Board TDC-8, Jamar Technologies, Inc.
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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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