Using GIS and Google Earth to Report Flood Damage to FEMA

John Remmert is a self-described “old guy.” A few years ago he would not have imagined himself using a GIS system to track road work, maintenance-related receipts and other road and bridge documentation. But seeing geo-referencing and Google Earth in action, and using it himself, has changed all that. He’s a convert. Remmert is saving the county a lot of time and money as a result.

When we asked Remmert to describe how these technologies are benefiting his county, he said “Wow... where to start?” (See the sidebar on page 3 for a few applications.) He said what really brought home the power of GIS, though, was using it to organize documentation for flood remediation in 2013.

Challenge: Managing and tracking paperwork

After a period of particularly heavy rains and subsequent flooding, the county qualified for FEMA funds for clearing debris and repairing damage to roads, bridges and culverts. Remmert said FEMA is very careful about reimbursing expenses and requires substantial documentation, which FEMA also audits. Required documentation for each location runs the gamut from multiple photographs taken at different times, to

Continued on page 2

Douglas County’s End of Day Trivia

Larry Wilson, assistant operations manager for Douglas County Public Works Department, mixes a little training and fun at the end of some of his crew’s work days. As the crew gathers to close out the day (about 3:10 for a workday that ends at 3:30) he will convene a “trivia” session, asking questions related to road work and some “off topic” questions to mix it up. He usually will give the crew members many opportunities to get the answer right, letting them know if they are getting closer to the right answer or not. The first person that says the right answer gets to go home early. It’s a good way to share information and build morale.
invoices to time sheets. The “paper trail” must show that the damage was caused by the flood and that the repairs were actually made.

Barton County had 50 different damaged locations, and staff needed to provide documentation for each of them. If they had submitted hard copies to FEMA, they would have “killed a forest,” said Remmert.

Solution: Geo-reference all the documents and create a virtual filing cabinet

Instead, they used a computer to file, organize, and report geo-referenced documents. The county scanned, created or received all kinds of documents related to the repairs (showing conditions before and after flooding, and during and after repair) and “filed” them electronically by the lat-long coordinates of the site. Then they could pull up a damaged site in Google Earth and see the physical location and all the files for that location, each of which could be clicked on to see a pop-up window with more detail.

For example, when looking in Google Earth at the location of a damaged culvert that needed replacement and debris cleanup at NE 70, NE 30 Road, the names of picture files could be seen for the structure six months before the flood, the crew cleaning debris at the location, and after clean-up. You would also see invoice files for crane rental and the new culvert, a photo of the crane working at the site, and a photo of the finished work.

To start creating the documentation, county personnel took photographs of each damaged location with a digital camera that also recorded its GIS coordinates. The photographs showed debris piled up, roads washed out, and structural damage. “When we dropped [the photos] into Google Earth, we could take a tour of the flood-damaged areas without getting into a truck,” Remmert said.

Staff took photographs of the repair work under way, as well. If a crane was rented to set a new culvert, they took a picture of the crane working at the job site. That came in handy when FEMA did their audit, and they could match it up against the invoice for the crane, which was also scanned and geo-coded to the location.

When crews did work orders, Remmert tracked those and then marked locations that had been remediated.

When the work was completed, the county photographed the location one last time, to document “after” conditions.

Barton County had a lucky break in pulling together their “before” documentation due to the fact that, six months before, Kirkham and Michael had done a bridge survey of 50 percent of their bridges, and the survey included taking geo-located photos. This provided the County with electronic images of those bridges before they were damaged by the flood.

The documentation came in handy for bridges on the federal aid system (FAS) too, Remmert said. “FEMA won’t pay for FAS bridges but we use the same documentation to submit to the state to get those fixed as well.”

Barton County kept records for a township that sustained damages too. “It was really quite easy,” Remmert said, “and we’re a lot better set up for that kind of thing than the township.”
Benefits of geo-referencing files

“The time savings are phenomenal,” Remmert said. “Think about the filing aspect. You might have the documents for a structure in several locations—an electronic photo in one place, a hard copy photo in another, the plans in another. Then you start adding in the documentation for repairs—the hard copy invoices for structures, materials, cranes, more pictures... you could end up with 35 documents per location, when all is said and done.”

Road and bridge documents can be filed any number of ways... by street number, 911 location, township location, bridge inventory number, etc., Remmert said. “Geo-coding the documents eliminates the guesswork and looking around. It’s all in one place by lat-long. It took me longer to photocopy time sheets than to assemble all the rest of the documents,” he said. “We could have scanned those, too, but we learned at a conference that FEMA prefers to see copies of the originals.”

FEMA audit and reaction

Remmert said FEMA wanted to monitor 10 percent of Barton County’s sites as part of a routine audit. A “site” for FEMA might be 3-4 locations in an area or along a particular road. The County’s Google Earth formatting benefited the FEMA audit process because FEMA is also Google Earth-based. When the auditor asked for supporting documentation, Remmert downloaded the spreadsheet of damages and the GIS-located documentation onto a zip drive which the auditor was able to open and use. The auditors didn’t have to look for an invoice to tie to a site; they just clicked on a site pop-up.

FEMA has three categories for reimbursement: cleanup, remediation and emergency call out. Each could be separated out.

At the FEMA close-out meeting, Remmert heard the state FEMA director tell a national FEMA rep who asked about documentation: “You have no idea how well this guy has this documented.” That was nice to hear, Remmert said, especially because using GIS had been, until recently, “a real stretch of technology for this old guy.”

For more information, contact John Remmert at (620) 793-1816 or highwaydept@bartoncounty.org.

Other uses for GIS in Barton County

Ever since student intern Dylan Dreiling set up their simple GIS system a few years ago (a system that uses spreadsheets and Google FusionTables to display spreadsheet data in Google Earth), Barton County has been discovering more and more ways to use the technology. For example:

- If the County helps other communities with storm cleanup, they can track that work in the same way as their own work, by location. It’s easy to pull up the documentation whenever you need it, Remmert said.
- Remmert attended a recent LTAP workshop on crash analysis, and is planning to map five years of crashes and identify the County’s most hazardous intersections.
- The County can create an on-screen collage of any work that has been done in a given area in 4-5 years. Remmert said this is virtually impossible to pull together from historical files.
- The County uses GIS-based software to manage signs. They have 4,800 regulatory signs on 400 miles of blacktop. They also have old aerial photographs scanned; Remmert said that comes in handy if anyone claims there used to be a stop sign at an intersection years ago and it was taken down. You can go back to an aerial photo for that location and tell quite plainly that one was not there. Same for culverts, Remmert said.
- The public works department has taken over the County cemetery and will be adding curb and gutter. To design the placement, the crew viewed the cemetery in Google Earth on a smart board and they drew on it to indicate where the curb and gutter will go. Photographs of the headstones are also being geo-located, and that information is given to the mortuary to decrease the likelihood of someone being buried in the wrong plot. (This did happen at least once in Barton County.) All the information is networked with a GoPro tablet, in real time. “You don’t want the mortuary getting that information two days later, after the person is buried in the wrong plot,” Remmert said.
- Remmert credits department head Dale Phillips with the advances they have made in using GIS for their operations. He said Phillips “is very much in tune with new technology and how it can be used to save time and money. We use it on a daily basis.”
Wilson started “trivia” more than a decade ago. He came up with the idea when he realized that he himself did not know many of the basic facts about his county and road work that he thought he should know, like miles of gravel road, for example. Or the number of lane miles the county maintains. Or how many people are employed in the public works department. He said: “When I became a supervisor, and I still did not know some of those things; well, then I really looked stupid.” So he started looking things up, and writing them down.

Pretty soon Wilson realized these same things would be good for his crew to know as well. So, every once in awhile they have a trivia session, usually on a Friday or a rainy day. Wilson said everyone on the crew participates—“because who wouldn’t want to go home early?” But they don’t have to participate.

Wilson said the trivia sessions work well in sharing useful information and having a little fun, with no impact on the county or the crew. “No time is lost; the crew is done for the day. Everyone is gathered and waiting to go home,” he said. There’s no negative for an employee, either—no one is put on the spot. Everyone elects to play. The employees don’t know the questions ahead of time, although some questions are repeated from previous trivia sessions. Wilson keeps hundreds of questions in a notebook, and adds to them.

The trivia questions have evolved over time. Wilson started with basic questions that he considers important to the job, and then he started mixing in other topics that are fun but not related to public works. See sidebar on next page for some examples of trivia questions.
“There’s no down side to doing this,” Wilson said. “It provides a teaching moment.” He has noticed that when he repeats questions from past trivia sessions, if crew members don’t know the exact answer (like how many counties in Kansas have a county-township road system), they guess closer each time. Each trivia session has maybe 20 questions, give or take.

Wilson is quick to acknowledge that he has support for this activity. “I am real fortunate that my management lets me do this,” he said. “The trivia exercise is a great idea,” said Douglas County public works director Keith Browning. “It helps the public’s perception of our department when employees know and can relate facts about the road system and the county in general. Having a well informed work force benefits everyone, and having a little fun at the same time can’t help but boost morale.”

Author’s note: I attended a trivia session on February 6 to see Wilson and his crew in action. It was great fun. There was a lot of camaraderie in the room—ribbing each other and cheering each other on. Wilson was kidded as well. Some winners swaggered out the door. There were many smiles and laughs. A lot of good information was shared, and all employees got to go home a little early—some earlier than others. What’s not to like about that?

Wilson is happy to talk with you about trivia and can be reached at (785) 979-0765. He might even give a trivia session at your location in exchange for a tour of your shop and a little travel money to get there.

How good are YOU at trivia? Try answering the questions below from Wilson off the top of your head. Turn to page 6 to see how you did. Have fun!

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Some Examples of Trivia Questions

1. How far does the bottom of a stop sign need to be from the surface of a road?
2. How far in advance should a stop-ahead sign be installed from a stop sign?
3. What does “MUTCD” stand for and what does its name tell you about it?
4. How can you tell the difference between a Type 1, Type 2, and Type 3 barricade?
5. What is the end of a duck’s bill called?
6. What is the name of the ball on top of a flagpole?
7. How can you tell what color eggs a chicken will lay?
8. What year was the first Mustang made?
Roads Scholar Update

Over the years most Kansas Roads Scholar graduates have been recognized at meetings of KCHA and APWA-KS. However, not all recipients can attend these meetings. Because of this, both associations are now offering the option to schedule a graduate recognition at the local government, with participation by an association representative and the jurisdiction’s elected officials. Allen County did this in 2013; see photo at right. When one of your staff members graduates, either KCHA or APWA-KS will contact you to see how you want to handle the recognition.

Here are updated numbers on the Program:
—Almost 300 individuals have earned a Level 1 certificate to date, and another 80 are actively pursuing this level.
—85 individuals have earned a Level 2 certificate to date.
—16 individuals have earned a Level 3 (executive skills) certificate, with 20 more people pursuing this level.
—21 counties, 7 cities and 2 townships are actively involved.

Below are the names and local agencies of the graduates in 2014. Congratulations to all!

<table>
<thead>
<tr>
<th>2014 Kansas Roads Scholar Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level I Technical Skills</strong></td>
</tr>
<tr>
<td>Johnson County – Rob Callahan, Joe Venneman</td>
</tr>
<tr>
<td>Leavenworth County – Keith Barnes, Fran Keppler, Jeff Lee</td>
</tr>
<tr>
<td>Lyon County – Travis Heins</td>
</tr>
<tr>
<td>Ottawa County – John Copple</td>
</tr>
<tr>
<td>Reno County – Harold Hester, Jr.</td>
</tr>
<tr>
<td>Woodson County – Pat Collins</td>
</tr>
<tr>
<td>City of El Dorado – Sue Austin</td>
</tr>
<tr>
<td>City of Goodland – Dale Davis</td>
</tr>
<tr>
<td>City of Lawrence – Carol Fittell, John Vannicola</td>
</tr>
<tr>
<td>City of Ottawa – Douglas Reinert</td>
</tr>
</tbody>
</table>

| **Level II Supervisory Skills** |
| Franklin County – Kirk Anderson |
| Leavenworth County – Doug Smith |
| Lyon County – Jim Brull |
| City of Burlington – Kevin Boyce, Richard Mason |
| City of Ottawa – Justin McCurdy, Chad Bentley, Steve Donahoo |
| City of El Dorado – Sue Austin, Jason Hughey, Brad Meyer, Rodney Reed |

Funding Opportunities for Locals

KDOT’s Bureau of Local Projects has recently updated their guide with a series of fact sheets describing potential funding and technical assistance opportunities for local governments. The guide lists over 20 programs designed to assist with transportation safety and infrastructure improvements. Each program’s fact sheet contains main points and information on eligibility parameters, how to apply, local match required, and the likelihood of funding.

Browse the guide to find out if your local government is taking advantage of all the programs it can. KDOT has made it easy for you by having all the basic information on these programs in one place. To access a copy, go to http://www.ksdot.org/Assets/wwwksdotorg/bureaus/burLocalProj/BLPD/BLPDDocuments/LPOGuide2013.pdf.

Trivia answers from page 5: 1 — 5 ft (7 ft in town); 2 — 750 ft; 3 — Manual on Uniform Traffic Control Devices. A book that provides uniform standards and guidance for installing traffic control devices in the U.S.; 4 — The number of boards: 1, 2 or 3; 5 — A bean; 6 — A truck; 7 — By the color of its ears; 8 — 1964.
How Much to Budget for Roads Scholar Training?  By Kristin Kelly

Are you interested in enrolling your staff members in the Kansas Roads Scholar Program but want to know how much it will cost? Here is your answer.

The cost for taking Roads Scholar classes depends on two things: 1) whether your county is a member of the Kansas Association of Counties (KAC), and 2) which entity is teaching a particular course (LTAP, KAC, or TASK).

KAC member-counties get a “member rate,” and the member rate is extended to cities and townships within those counties as well. If you don’t know if your county is a KAC member, call Dorrie at (785) 272-2585.

The member rate for program expenses for the Level I Roads Scholar is around $620, Level II around $1,090, and Level III around $1,035. For non-KAC-member counties and the cities and townships within them, and for consultants, program costs are higher, but still a good deal. See the charts at left to calculate costs. Registration fees cover instruction, materials, and lunch (for LTAP and KAC classes).

Note: There is a time limit of six years to complete each level from the date of application. Courses taken up to three years prior to the application date can apply toward that level.

The Kansas Roads Scholar Program is a program of the Kansas County Highway Association and the Kansas Chapter of the American Public Works Association, with support from the following partners: Kansas LTAP, Kansas DOT, the Federal Highway Administration, and KAC. The program delivers 29 different courses with around 200 hours of instruction to promote a skilled workforce for Kansas public works agencies. It is designed to increase knowledge of road and bridge management and maintenance procedures and improve technical, supervisory, and managerial skills. Enroll today! http://www.ksroadsscholar.org.

If you have any questions, contact Kristin Kelly at Kansas LTAP at (785) 864-2594 or kbkelly@ku.edu.

### Kansas Roads Scholar Level I Technical Skills Program

<table>
<thead>
<tr>
<th>Description/Workshop</th>
<th>Registration Fee</th>
<th>Presenting Agency</th>
<th>Schedule of Presentation</th>
</tr>
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<tbody>
<tr>
<td>Roads Scholar Level I Application Fee</td>
<td>$35</td>
<td>KS LTAP</td>
<td>Annually Spring</td>
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<td>Culverts and Drainage</td>
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<td>Risk and Liability Issues</td>
<td>$75</td>
<td>KS LTAP</td>
<td>Odd Years</td>
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<tr>
<td>Snow and Ice Control</td>
<td>$75</td>
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<tr>
<td>Road Maintenance</td>
<td>$75/each</td>
<td>KS LTAP</td>
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<td>Asphalt Road</td>
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<tr>
<td>Gravel Road</td>
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<td>KS LTAP</td>
<td></td>
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<tr>
<td>Concrete Street</td>
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<td>KS LTAP</td>
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<tr>
<td>Workplace, Job Site and Equipment Safety</td>
<td>$75</td>
<td>KS LTAP</td>
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<tr>
<td>MUTCD for Technicians</td>
<td>$55 Non-Kansas Public Employee</td>
<td>TASK Program</td>
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<td>Foundations in Customer Service Management</td>
<td>$65 KAC Member</td>
<td>KS Association of Counties</td>
<td>At least every other year</td>
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<td>City/County Government 101 X day</td>
<td>$65 KAC Member</td>
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<td></td>
<td>$91 Non-KAC Member</td>
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**TOTAL = From $620**

### Kansas Roads Scholar Level II Supervisory Skills Program

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<td>Roads Scholar Level II Application Fee</td>
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<td>Communication Skills for Effective Supervision</td>
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<td>Fundamentals of Supervision</td>
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<td>Managing Employee Performance</td>
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<td>$91 Non Members</td>
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**TOTAL = From $1,090**

### Kansas Roads Scholar Level III Executive Development Program

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<td>Fundamentals of Leadership</td>
<td>$140 KAC Member</td>
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<td>An Overview of Human Resource Management</td>
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<td>County/State Finances and Budgeting</td>
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<td>Odd years</td>
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<td>Effective Community and Media Communication</td>
<td>$140 KAC Member</td>
<td>KS Association of Counties</td>
<td>Odd years</td>
</tr>
<tr>
<td>Effective Management of Intergovernmental Relations</td>
<td>$140 KAC Member</td>
<td>KS Association of Counties</td>
<td>Odd years</td>
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<td>Asset Management and Cost Accounting</td>
<td>$75</td>
<td>KS LTAP</td>
<td>Odd years</td>
</tr>
<tr>
<td>Engineering Functions in Public Works</td>
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<tr>
<td>Project Planning and Management</td>
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<td>Odd years</td>
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<td>Legal Permitting and Regulatory Processes</td>
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<td>Local/State Project Coordination</td>
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<td>Available online <a href="http://www.kitap.org">www.kitap.org</a></td>
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<td>Level III Elective</td>
<td></td>
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**TOTAL = From $1,035**

Kansas LTAP Newsletter | Winter 2015
Kansas Bridge Load Rating Program Q&A  By Kent Anschutz and Michael Ingalls

There has been some talk among counties recently about the Kansas Bridge Load Rating Program—the third phase of statewide compliance with federal bridge requirements. Some question whether the benefits of the Program are worth the overall cost. This article will explain the rationale for the Program and address this issue and other questions. Aside from achieving compliance, the Program has been designed to save KDOT and local agencies time and money down the road, when load ratings need to be updated in the future. KDOT bridge engineers Kent Anschutz and Michael Ingalls answer questions about this new program. [—Editor]

Q: Why do local bridges need to be load rated? A load rating tells you what live load capacity you have on a bridge, considering certain types of vehicles and axle configurations that may travel over that bridge. A bridge is required to be load-rated on a fairly regular schedule to account for deterioration over time or when new vehicles are added to the state's or nation's legal trucks “library” that the load ratings take into account.

A current load rating (and an updated posting, if needed) will transfer risk from the owner of the bridge to the owner of any overweight vehicle that may cross a posted bridge.

Q: Why is KDOT requiring the load ratings? KDOT is not the agency requiring the load ratings (FHWA is), but KDOT is the agency given the oversight responsibility to make sure local structures have a current, qualifying load rating.

Q: What is a “qualifying” load rating? A legal, or qualifying load rating is recorded in the bridge file at your agency that lists input values and assumptions, includes calculations or analysis output, has load ratings for all mandated trucks, and is signed and sealed by a professional engineer licensed in Kansas, fulfilling the requirements stated in the Federal Code of Regulations.

Q: Have there been new trucks added to KDOT's library of vehicles? Not yet, but it is very likely a heavier truck will be added as a legal truck in the near future (perhaps 5-6 years). However, most load ratings done in the past (for local and state-owned structures) have never included the “Special Haul Vehicle” (SHV) load envelopes. These SHV loads are allowed on all structures throughout the state if the vehicles are not specifically excluded by Kansas Law.

Q: What is a SHV, and are they driven on local structures? The SHVs are essentially four load configurations that simulate real vehicles in a bridge load model. For local structures the most likely types of SHVs would be trash trucks, concrete ready-mix trucks, fertilizer tankers, oil field trucks, some tow truck configurations, etc. The SHVs in this class are as heavy as or heavier than the “H” or “HS” truck models and have shorter wheel bases which increase the loads impact on shorter structures. As the SHV models get longer, the same basic idea applies…the vehicle is shorter than the current rating trucks, but the total loads are essentially the same. Some military vehicles are also represented by the SHV load models.

Q: What is the “heavier truck” that may be added in the future? The trucking industry is currently lobbying to get a 90-96,000 pound truck as a legal truck instead of requiring a special permit. Right now a load that large would require a special permit and would be required to follow a special route (and likely a more indirect route). If it becomes a legal truck, it would be allowed to go on any road in the state and across any bridge in the state that was not posted below the legal limits.

Q: What is the current legal load limit? The legal limit varies based on the truck/trailer/axle configuration. This truck would likely be a new configuration. The current “Type 3S2” truck has a typical tractor with a two axle trailer with a legal limit of 36 tons, or 72,000 pounds. The new truck is possibly looking at a three axle trailer with a legal limit of 45-48 tons. This is a 25-33 percent increase over the current legal limits.

Q: Will all bridges be load rated using the same method? No. The Load Rating Program consultants and KDOT's Bureau of Local Projects (BLP) will enlist the help of the local public agency to determine which bridges in the county or city will receive a full analysis load rating. All other structures will receive a more conservative, simplified method applied to reduce the time spent and cost associated with load rating the structure.

Q: Why can't all the structures be load rated with the simplified method? Some routes will not be eligible for the simplified method. RS routes and functional classifications above a certain level will need a full analysis. Also, the simplified method will be more conservative, possibly leading to overly conservative ratings and postings, and maybe closures, too.

Q: Are all the bridges I own going to end up with lower postings or require closing? Probably not, but you may have to make some changes. The aim of this Program is to have sufficiently conservative ratings that are not divorced from
realism. This means there will likely be some lowered postings and some closures, but the ratings will not indicate the bridge needs to be closed if the bridge is currently carrying regular traffic consisting of loaded dump trucks, grain trucks, garbage trucks, etc. “Sufficiently conservative” means there will be a factor of safety in the calculations.

All bridges receive an Inventory Rating and an Operating Rating and are typically posted between those two numbers (see sidebar below). This program will seek to maintain those ratings at current levels for any structure receiving a full analysis if there is no sign of distress. For the structures rated with the simplified method there will be an additional factor of safety to offset the lack of analysis.

**Q:** What will this program cost and how long will it take? The program is continuing the funding levels used for the Kansas Local Bridge Evaluation Program, which is $5 million per year of federal funds. The program will take between 8-10 years at that funding level, so the total could reach $50 million.

**Q:** Couldn’t 50 million dollars be spent to replace bridges instead of using it to load rate old bridges? If the funds were not dedicated for this Program, they would be spread across all of the various federal funding programs (High Risk Rural Roads, Signing Projects, Geometric Improvements, Safe Routes to School, Rails to Trails, Trail Projects, etc.); it would not be used solely for bridges.

**Q:** Why is this going to cost so much? A majority of local bridges have not been load rated since the last state funded effort in the late 1980’s to early 1990’s. Many of the bridges should have had an updated load rating, or two, in the last 25 years. The FHWA memo (mandate) to load rate all bridges for SHVs was sent out in November 2013 (HIBT-10). In the memo, two dates were listed to have the load ratings completed by, on different bridge and traffic characteristics. Those dates are December 2017 for Group 1 bridges and December 2022 for Group 2 bridges. Most local structures fall into the Group 1 bridge category. The goal of this program is to finish by 2022, or as close to it as possible. Load rating 19,000+ bridges in 8-10 years is an expensive endeavor. Had the local structures been load rated consistently over the past 25 years in accordance with the federal regulations, the total costs would have been much lower.

**Q:** What happens if the heavier truck becomes legal in the near future? All structures that have a load rating that includes the new truck will be in compliance. Any structures that have not been load rated for the new truck will need to be load rated again to be in compliance.

**Q:** So, the LPA will have to have all those bridges load rated again using our own funds? Yes, but this brings up the secondary goal of the Program: to bring the local system more into the computer age. Once an electronic load rating model is built for a structure load rating, making adjustments for additional vehicles, or for additional degradation, is very simple and very efficient. In the future, load rating the structures for any new truck will take less time, and could be done by KDOT BLP if the model is built in a software package KDOT uses.

**Q:** What about the structures that received the “conservative, simplified” method? Those structures would need to be investigated on an individual basis, and the method would need to be re-applied for any new rating vehicle.

**Q:** What cost does the electronic load rating model add to the total cost of load rating the structures? In the first few years, as a model database of local structures is built, an average size structure’s model will take between two to four hours of time and money to create. As the model database expands, models can be reused and slightly modified for similar structures which will reduce the time to 30 minutes to 1 hour. After all 19,000+ bridges have been completed, the average rating model will have cost approximately $100-300 per bridge—as an investment in less expensive load ratings in future years.

**Q:** What will happen to the electronic model after the Program is finished? KDOT BLP will store the model. In the future, if a consultant is going to perform a load rating, they would need to contact KDOT BLP to gain access to the model, modify the model for current conditions, change the load ratings in the NBI database, and email KDOT BLP the updated model to store for future use.

**Q:** What is the end game of having an electronic model? Consistently updated load ratings are a federal requirement. The electronic models will make it much easier and less expensive to update load ratings. A typical load rating performed on a structure would involve recon to locate plans (if they exist), a physical inspection to confirm condition ratings, hand calculations or spreadsheet calculations, and updating the load ratings in the NBI database. This program will now remove the future need for recon for bridges with or without plans. In the case where plans do not exist, a more thorough investigation at the bridge site or some major assumptions would need to be made to do a load rating. Under the

**Inventory Rating vs. Operating Rating**

All bridges receive an Inventory Rating and an Operating Rating and are typically posted between those two numbers.

An **Inventory Rating** is the load at which the controlling bridge component will not experience any load-induced damage. If loads are kept at or below the Inventory Rating Load, the bridge is said to have an infinite life in terms of load-induced damage.

An **Operating Rating** is the maximum load for which the owner is allowed to post the structure (as long as it is below legal loads). This is a load that will cause damage to the controlling component of the bridge (an abutment, an RCB ceiling, a bearing, the deck, a section or area of a beam, etc.). Repeated traffic at or above the Operating Rating Load will cause repeated and progressive damage, however minor, to that controlling element, and that reduces the future load carrying capacity of the bridge.
program, for these bridges, site investigations will be done very consistently and all assumptions will be consistent across the state. Essentially this means future load ratings will be less expensive. It should only take 30-60 minutes to modify the model. This will reduce the amount of time spent on future ratings, and will likely result in significant cost savings whenever a structure with an electronic model needs an updated rating.

KDOT is also developing a more concrete method to determine when a bridge must receive a new load rating. As structures age and degrade due to loads or the elements, a more consistent approach, and load rating a smaller number of bridges each year versus load rating all of the owner’s structures at once, is the desired outcome.

Q: What about the structures without the electronic model? Those structures will also need updated load ratings periodically. They will need to follow the normal process of investigation, hand or spreadsheet calculations, and updated ratings. An electronic batch of all plans available will be given to the LPA after all plans have been scanned, but if the bridge does not have plans, then there is no process to guarantee the assumptions that have been made during the Load Rating Program will be carried forward and reapplied to a future load rating for non-modeled structures.

Q: How do you plan to analyze and rate a bridge with no plans, especially a concrete bridge? The investigation over the first few years will categorize bridges into three basic groups: 1) bridges of all types with plans, 2) steel/timber bridges without plans, and 3) concrete bridges without plans. Engineers will do a cursory site visit to verify routine bridge condition ratings for structures with plans. Engineers will also visit bridge sites that do not have plans, but the investigation will be more extensive. Steel or timber bridges without plans will be relatively simple to measure as all primary load carrying components are visible and easily measured.

Concrete bridges with unknown reinforcement are a separate category. These structures will be set aside and categorized further. This is one area where 19,000+ bridges work in our favor. Research will be carried out to group the bridges into “like” structure types, spans, year built, etc. Our intent is to find plans for a structure in one county (or surrounding states) that are very similar to a dozen structures around the state without plans. As these groups are assembled, some groups of structures with no plans anywhere will inevitably occur. A combination load test/proof test will be carried out on a small sample of like groups and the data will be extrapolated to the structures not receiving the tests. This is the best method to obtain a reasonably conservative (not overly conservative) load rating while keeping costs as low as possible.

Q: Is there a provision to visibly “load rate” a concrete bridge without plans based on past performance as long as there are no signs of distress? Yes. If a concrete bridge with no plans has been in service for a lengthy period of time, has no signs of distress, and is carrying legal loads, the bridge essentially receives an in-service load rating of “capable of carrying legal loads.” However, this does not satisfy the requirements of the FHWA mandate of bridges receiving a new load rating including SHVs. This also will not work if the heavier truck is added to the legal loads in Kansas. Additionally, once the bridge shows flexure cracking or shear cracking, the bridge would need a calculated load rating.

Q: Over such a long period of time with 19,000+ bridges, how will you prioritize bridges to be load rated? In the first two years of the program, the worst of the local structures will be load rated whether they are in an urban or rural setting; that is, all the structures with the lowest sufficiency ratings and the lowest NBI condition ratings. The “ranking” of the bridges will occur based on risk after the first two years; higher traffic bridges in good condition and lower traffic bridges with lower condition ratings will be sorted and then split into roughly a 33 percent urban/67 percent rural groups. Essentially, after the first two years, this process will close in on the middle from both ends of the condition scale. The newest bridges on the local system will be the easiest to load rate, and these will be picked up on an as-needed basis to maximize efficiencies.

Q: Why are KDOT’s consultants coming again to scan bridge plans when they did that about five years ago for another federal bridge program? The load rating program will require files to be organized in a particular way and it is
KS LTAP Fact Sheets: Many Topics, Many Uses

By Lisa Harris

Need a traffic control primer for your commissioners? A refresher for your staff on regulations that pertain to your operations? A sheet on best practices in road maintenance? A handout for your crew for a safety talk? We’ve got you covered with Kansas LTAP fact sheets.

Go to http://www.ksltap.org, and in the left column, click on “Resources to Download.” Scroll down to find a complete list of the fact sheets. They are organized into four main categories:
- infrastructure/maintenance
- roadway safety
- worker/workplace safety
- administration and management.

The most recent fact sheets are listed first for each category. There are over 60 fact sheets and counting, with 2-3 added each quarter. Most are reprints of newsletter articles from Kansas LTAP, redesigned as stand-alone documents that aid in sharing the information with particular audiences. Some fact sheets were written with special funding from FHWA’s Resource Center, including three recent ones on sand and gravel maintenance, rock road maintenance, and local agency experience with high friction surface treatments.

Take a look and put them to good use at your local government.
In public works professions we develop data spreadsheets containing many types of information. We track crashes, monitor traffic data, keep maintenance records and quantify product consumption during winter storms, to name a few. The information collected is invaluable, but we need to efficiently organize the data into something useful.

PivotTables are a versatile feature of Excel, offering a powerful way to organize and quickly manipulate a lot of information without cumbersome, headache-inducing formulas. They are easy to update and they allow data to be summed, counted, or averaged quickly by dragging and dropping with a few clicks of the mouse.

At WICHway, KDOT's Intelligent Transportation System in Wichita, PivotTables help make sense of the massive amount of collected data. The information generated from PivotTables is used to create traffic incident and congestion index reports for Wichita’s major highways. Once created, these graphs and reports may be easily updated each month.

When information is requested by a council member, commission member, or the public, it is helpful to create a table in minutes showing how many signs were struck in a particular month or the average amount of product used in a winter storm. When comparing monthly data, yearly trends or analyzing traffic count data, PivotTables help us communicate by streamlining the data into meaningful information that is easy to visualize and understand.

Making these reports is as easy. Let’s walk through some simple steps to get you started in just minutes.

**Step One.** Organize your spreadsheet data. The data in your Excel spreadsheet must be organized in columns and include appropriately-named headings. Eliminate empty rows and columns and clean up any bad data. For this example, we have several thousand rows of crash/incident data over the course of one year.

**Step Two.** Create the PivotTable. In the insert ribbon at the top of the screen, choose Tables, then PivotTable. Excel will automatically select all of the data in your spreadsheet, outlined by the “marching ants” border; or you may custom-select the data you want from the activated dialog box. Next, select where you want to place the PivotTable (typically into a new worksheet) and hit “OK.” Once selected, a new worksheet and PivotTable box appears.

**Step Three.** Build the PivotTable report. To build your table, simply drag the fields you want in your report into the Report Filter area.

PivotTables help you communicate meaningful information generated from your spreadsheets—information people can understand and use.
In our example, we want to count the total incidents on four major highways in Wichita and filter out unwanted information. To accomplish this, we drag the highway field to “Row Labels,” and incident type to the “Values” area. The “Values” area identifies and controls the type of calculation summarizing your data. By default, the counting value is used, but other functions, including averages, sums, and basic statistics, are available by double-clicking the field button (or right click the field button) and selecting “Value Field Settings.” Lastly, the incident type field is placed into the “Report Filter,” filtering out unwanted data.

At this point, the PivotTable begins to automatically generate. From here, we may want to add additional fields to our PivotTable, make comparisons, or separate our data by month. It’s exciting to try different fields and functions and then watch the PivotTable dynamically update. PivotTables can be as complicated or simple as you need them to be.

A step further... The three steps above are just the beginning. Many of the basic Excel functions you’re already familiar with can be used to sort, arrange and format the data to your satisfaction. PivotCharts are a great way to illustrate the data from the PivotTables. PivotCharts include bar and pie charts as shown here, but line charts, scatter plots, and numerous other charts are also available.

Want to add more raw data to the spreadsheet? No problem! Individual or multiple PivotTables and charts in the workbook are easy to update after adding new data to the spreadsheet by using the standard refresh or refresh-all button.

If you’re looking for more information on PivotTables or have questions, videos and interactive tutorials can be found through a simple search on the internet. To see some examples of how TranSystems uses PivotTables, check out the “Reports” section at http://www.WICHway.org/wichway/Reports.

Chad Banka is a transportation engineer in TranSystems’ Wichita office and is the operations support engineer for WICHway, Wichita’s Intelligent Transportation System. WICHway is owned and operated by the Kansas Department of Transportation and is located in downtown Wichita. Banka may be reached at (316) 303-3000 or at ccbanka@transystems.com

Using Slicers

Slicers, new in Microsoft Excel 2010, are similar to traditional filters, but are easier to understand and visualize. Slicers are available for both PivotTables and PivotCharts and interactively filter the data using buttons that allow the user to quickly control the displayed data. To insert a Slicer, select the intended PivotTable, click “Options” from the PivotTable Tools ribbon, and select “Insert Slicer.”

In our example, instead of looking at the data for the entire city, we may want to look at a specific highway or compare a couple of options instead of using all the spreadsheet data. Using Slicers and a click of the mouse on the intended highways, the table updates instantly. Multiple Slicers may be used on a single table or chart, allowing the user to look at or analyze specific information with a click of the mouse, such as filtering to look at injury or animal crashes on just one highway.
**MORE**

By Lisa Harris

See download / ordering information on next page.

**Township Book**

Written by Norm Bowers of the Kansas Association of Counties, this book is an essential guide for township trustees and staff in Kansas on road and culvert maintenance and signing responsibilities. Includes relevant statutes. October 2012. 115 pages plus a 43 page appendix.

**Making a Case for Written Policies... Why an Employee Handbook is Essential**

A thorough, well-written employee handbook that is accurate, complies with all government regulations, and is easy for employees to read, is a valuable communications tool for all local agencies, regardless of size. This tech sheet helps get you started. Cornell Local Roads Program. February 2015. 5 pages.

**Low Cost Solutions and Ideas**

Highlights homegrown solutions to problems encountered in the shop and field, developed by local agencies. These solutions were the winning ideas in competitions for creative, cost-effective ways of addressing the problem at hand. This would be a great resource to share with your shop and field personnel. [If you have solutions of your own to share or enter in a competition, contact Lisa Harris at (785) 864-2590.] National LTAP, February 2013. 135 pages.

**CALENDAR**

Visit our website for even more training calendar listings and to register for workshops. Go to http://www.ksltap.org and click on “View the LTAP Calendar.”

**TRAINING in 2015:**

- Traffic Impact Studies ▲L3-e 3/10 in Lawrence
- MUTCD for Technicians ▲L1 3/17 in Olathe
- Gravel Road Maintenance ▲L1 April 21 – Great Bend
  April 22 – Minneapolis
  April 23 – Lawrence
  April 24 – Fort Scott
- Systems Engineering for Signal Systems Including Adaptive Control (NHI class) ▲L3-e 4/8-9 in Lawrence
- Road Safety Assessment ▲L3-e 4/6 Webinar Part 1
  4/13 Webinar Part 2
  4/21 Webinar Part 3
  4/28 Webinar Part 4
- EDC Exchange: Road Diets (Roadway Reconfiguration) 4/9 in Lawrence and Wichita
- New Road Supervisor’s Training ▲L3-e (KCHA Pre-Conference Workshop) 5/13 in Manhattan
- MUTCD for Technicians ▲L1 5/26 in Topeka

**UPCOMING MEETINGS:**

- National Association of County Engineers (NACE) Annual Conference and Expo April 19-23, 2015 in Daytona Beach, FL. http://www.countyengineers.org/events/2015/Pages/default.aspx
- Joint Meeting — KCHA and APWA-KS May 13-15, 2015 in Manhattan, KS Contact Michael Spickelmeier at (913) 684-0470

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

▲L1 = KS Roads Scholar Program Level 1 — Technical skills required course.

▲L2 = KS Roads Scholar Program Level 2 — Supervisory skills courses are provided by the Kansas Association of Counties. Go to http://www.kansascounties.org and click on “Education Program.”

▲L3-r = KS Roads Scholar Program Level 3 — Master Roads Scholar required course.

▲L3-e = KS Roads Scholar Program Level 3 — Master Roads Scholar elective course.

**SYSTEMS ENGINEERING FOR SIGNAL SYSTEMS, INCL. ADAPTIVE CONTROL**

This is a two-day course aimed to identify the need for improved traffic operations and use systems engineering principles to implement traffic signal operational improvements. This course will provide a comprehensive view of what is required before, during, and after the implementation of a new traffic control system. Adaptive signal control is used as the example throughout the course. Aimed at professionals responsible for the planning, design, management or operation of traffic signal systems. Check the calendar above for dates and location of this National Highway Institute (NHI) class.

www.shutterstock.com / Carsten Reisinger
FREE ROAD & BRIDGE RESOURCES

Check off your selections, fill in the bottom portion, and return this form to:
Kansas LTAP Materials Request, 1536 W. 15th St., M2SEC Building, Room G520, Lawrence, Kansas 66045 or fax to 785/864-3199

GUIDES
You are free to keep hard copies, if available. Or you can download at the links provided.

Township Book

Making a Case for Written Policies...Why an Employee Handbook is Essential

Low Cost Solutions and Ideas

When it Comes to Mowing, Be Safe Out There
One of the Kansas LTAP fact sheets, based on a newsletter article from Spring 2013. Provides basic safety tips and dos and don'ts for mowing. Access at: http://www2.ku.edu/~kutc/pdffiles/LTAPFS13-movingsafety.pdf or check here ❑ for a hard copy

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

Safety Edge Paving Shoe. This Advant-Edge shoe attaches to a paver with a universal bracket, provided with the shoe. Several counties have borrowed this attachment and have reported good results.

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 in a case.

REQUEST FORM

Name ___________________________________________ Phone number ____________________________

Position __________________________________ E-mail address ________________________________

Agency ________________________________________________________________________________

Street Address _________________________________________________________________________

City __________________________ State ___________ Zip +4 __________________________

*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.
KANSAS LTAP

Let us help you find the answers to your transportation-related questions.

Kansas LTAP, 1536 W. 15th St., M2SEC Bldg., Room G520, Lawrence, KS, 66045  Call 785.864.5658
Fax 785.864.3199  http://www.ksltap.org

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

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

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