



KANSAS LTAP Newsletter

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Penny Wise, Pound Foolish

By Lisa Harris

Poorly maintained roads wreak havoc on the vehicles that use it. The U.S. Department of Transportation found that road deterioration increases the cost of vehicle ownership, repair, fuel and tire costs. They also found that these deteriorated roads accelerate the depreciation of vehicles in proportion to the roughness of the surface. At the same time, each passing vehicle increases the damages.

The maintenance needs of most local roads have been chronically underfunded. Billions of dollars of needed repairs on local roads go unfunded each year in the United States.

During lean economic times, it is tempting to delay road maintenance or to cut corners on maintenance and pavement design. While it is always a good idea to seek efficiency in spending taxpayer dollars, it is important for elected officials to understand the basic factors that contribute to a well-functioning road so they don't cut corners too far. Read the article below on what makes a "good" road.

As for the benefits of having good roads, a recent national report on road conditions and pavement preservation gets right to the



Everyone is pinching pennies now, but try not to lose sight of the big picture – and squander your community's infrastructure investments.



point: "Good roads cost less." They are also safer. In *Rough Roads Ahead: Fix Them Now or Pay Later*, the American Association of State Highway and Transportation Officials cooperated with TRIP, a national research group, to get the message out about how road deterioration accelerates with neglect. The best strategy for managing your infrastructure is to extend the service life of roads **before** they need major rehabilitation or replacement. As we reported in our last

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What Makes a "Good" Road?



Almost everyone thinks they know a good road when they see one, but looks can be deceiving. Learn what really makes a road a good investment for your community.

We have known how to build good roads for a long time. Archaeologists have found ancient Egyptian roads that carried blocks to the pyramids in 4600 BCE. Later, the Romans built an extensive road system using the same principles we use today. Some of these roads are still in service.

If you follow the basic concepts of road building, you will create a road that will last. The "ten commandments" of a good road are:

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Pound foolish *Continued from page 1*

issue, making basic road maintenance a “cut of last resort” has been a strategy for some of our counties in Kansas, like Butler and Leavenworth.

For road departments that lack the funds to maintain hard surfaced roads, the cost of rebuilding them is even further out of reach. Some of those communities are taking paved roads back to gravel. The cost to return a road to gravel is a fraction of the cost to rebuild a hard surface road. Additionally, gravel roads are cheaper to maintain. The trade

off in the situation is that gravel roads offer lower capacity, lower speeds, rougher rides and increased nuisances to the property owners that border the road.

What will your community’s strategy be?

Sources:

Road Funding Alternatives: Pay Now or Pay Later, Saginaw County (Michigan) Road Commission, 2009.

Rough Roads Ahead: Fix Them Now or Pay Later, AASHTO and TRIP, 2009. <http://www.roughroads.transportation.org>

Good road *Continued from page 1*

1. Get water away from the road
2. Build on a firm foundation
3. Use the best materials
4. Compact all layers properly
5. Design for traffic loads and volumes
6. Design for maintenance
7. Pave only when ready
8. Build from the bottom up
9. Protect your investment
10. Keep good records

1. Get water away from the road.

We can’t overemphasize the importance of good drainage. Engineers estimate that at least 90 percent of a road’s problems can be related to excess water or to poor water drainage. Too much water in any layer of a road’s structure can weaken that layer, leading to failure.

In the surface layer, water can cause cracks and potholes. In lower layers it undermines support, causing cracks and potholes. A common sign of water in an asphalt road surface is alligator cracking — an interconnected pattern of cracks forming small irregular shaped pieces that look like alligator skin. Edge cracking, frost heaves, and spring breakup of pavements also point to moisture problems.

To prevent these problems remember that water:

- flows downhill
- needs to flow someplace
- is a problem if it puddles.

Effective drainage systems divert, drain and dispose of water. To do this they use interceptor ditches and slopes, road crowns, and ditch and culvert systems.

Ditches should be protected from erosion by planting grass or installing rock and other erosion control measures. Erosion can damage shoulders and ditches, clog culverts, undermine roadbeds, and contaminate nearby streams and lakes.

Evaluate your ditch and culvert system twice a year to ensure that it works. In the fall, clean out leaves and branches that can block flow. In the spring, check for and remove silts from plowing and any dead plant material left from the fall.

2. Build on a firm foundation.

A road is only as good as its foundation. A highway wears out from the top down but falls apart from the bottom. The road base must carry the entire structure and the traffic that uses it. To make a firm foundation you may need to stabilize the roadbed with chemical stabilizers, large stone called breaker run, or geotextile fabric. When you run into conditions where you suspect that the native soil is unstable, work with an engineer to investigate the situation and design an appropriate solution.

3. Use the best materials.

With all road materials you “pay now or pay later.” Inferior materials may require extensive maintenance throughout the road’s life. They may also force you to replace the road prematurely.

Crushed aggregate is the best material for the base course. The sharp angles of the crushed material interlock when they are compacted. This supports the pavement and traffic by transmitting

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the load from particle to particle. By contrast, rounded particles act like ball bearings, moving under loads.

Asphalt and concrete pavement materials must be of the highest quality, designed for the conditions, obtained from established firms, and tested to ensure it meets specifications.

4. Compact all layers.

In general, the more densely a material is compacted, the stronger it is. Compaction also shrinks or eliminates open spaces (voids) between particles. This means that less water can enter the structure. Water in soil can weaken the structure or lead to frost heaves. This is especially important for unsurfaced (gravel) roads. Use gravel that has a mix of sizes (well-graded aggregate) so smaller particles can fill the voids between larger ones. Good compaction of asphalt pavement lengthens its life.

5. Design for traffic loads and volumes.

Design for the highest anticipated load the road will carry. A road that has been designed only for cars will not stand



Ken Skoreth photos



These photos show the difference between an extremely thin base on very weak subgrade soil (top left) and a deep, good quality base gravel on a very sound subgrade (bottom left). The road above, in South Dakota, failed after just one year because of a very poor base. You cannot break basic rules of planning, designing and construction of roads and get long-term performance.



up to trucks. One truck with 9 tons on a single rear axle does as much damage to a road as nearly 10,000 cars.

Rural roads may carry log trucks, milk trucks, fire department pumper trucks, or construction equipment. If you don't know what specific loads the road will carry, a good rule of thumb is to design for the largest piece of highway maintenance equipment that will be used on the road.

A well-constructed and maintained asphalt road should last 20 years without major repairs or reconstruction. In designing a road, use traffic counts that project numbers and sizes of vehicles 20 years into the future. These are only projections, at best, but they will allow you to plan for traffic loadings through a road's life.

6. Design for maintenance.

Without maintenance a road will rapidly deteriorate and fail. Design your roads so they can be easily maintained. This means having:

- adequate ditches that can be cleaned regularly
- culverts that are marked for easy locating in the spring
- enough space for snow after it is plowed off the road
- proper cross slopes for safety, maintenance and to avoid snow drifts
- roadsides that are planted or treated to prevent erosion

- roadsides that can be mowed safely.

A rule of thumb for adequate road width is to make it wide enough for a snowplow to pass another vehicle without leaving the travelled way.

7. Pave only when ready.

There is nothing wrong with a well-built and well maintained gravel road if traffic loads and volume do not require a paved surface. Three hundred vehicles per day is the recommended minimum to justify paving.

Don't assume that laying down asphalt will fix a gravel road that is failing. Before you pave, make sure you have an adequate crushed stone base that drains well and is properly compacted. The recommended minimum depth of crushed stone base is 10" depending on subgrade soils. A road paved only when it is ready will far outperform one that is constructed too quickly.

8. Build from the bottom up.

This commandment may seem obvious, but it means that you shouldn't top dress or resurface a road if the problem is in an underlying layer. Before you do any road improvement, locate the cause of any surface problems. Choose an improvement technique that will address the problem. This may mean recycling or removing all road materials down to the native soil and rebuilding

everything. Doing any work that doesn't solve the problem is a waste of money and effort.

9. Protect your investment.

The road system can be your jurisdiction's biggest investment. Just as a home needs painting or a new roof, a road must be maintained. Kansas's severe climate requires more road maintenance than in milder places.

Do these important maintenance activities:
Surface — grade, shape, seal cracks, patch, control

dust, remove snow and ice

Drainage — clean and repair ditches and culverts; remove all excess material

Roadside — cut brush, trim trees and roadside plantings, control erosion

Traffic service — clean and repair or replace signs.

10. Keep good records.

Your maintenance will be more efficient with good records. Knowing the road's construction, life, and repair history makes it much easier to plan and budget its future repairs. Records can also help you evaluate the effectiveness of the repair methods and materials you used.

Good record keeping starts with an inventory of the system. It should include the history and surface condition of the roadway, identify and evaluate culverts and bridges, note ditch conditions, shoulders, signs, and such structures as retaining walls and guardrails.

Update your inventory each year or when you repair or change a road section. A formal pavement management system can help you use these records and plan and budget road improvements.

Source: Nelson, Tom. "The Basics of a Good Road," *Wisconsin Transportation Bulletin no. 19*, based on a fact sheet produced by the Vermont Local Roads Program. ■



What is a Traffic Impact Study and When is One Needed?

By Mehrdad Givechi

A primer for elected officials as they consider approving site plans.

Site planning is an in-depth analysis of a proposed development, one that integrates the building, site circulation, parking, and access to the public roadway system. Transportation aspects of site planning include, but are not limited to, analysis of the traffic impacts of the development, the adequacy of the access drives and the suitability of the on-site circulation and parking.

Developers and their consultants, state highway agencies, municipalities, counties, elected officials, and the general public all have significant roles and interests in the site planning process. While developers want to have a successful and financially sound development, they also have significant responsibility to ensure the public's health, safety and welfare at their particular site.

Government agencies and public officials have the responsibility to manage the development process in general. The site plan review and the approval process adopted by these agencies provides a mechanism to protect public health, safety and welfare. Appropriately written ordinances, policies, and/or guidelines are the most effective ways of addressing off-site and on-site traffic and other transportation aspects of any major land development or redevelopment.

Site planning process includes traffic considerations and more

Generally, the site planning process should include:

- A **financial feasibility study** to determine the demographic and geographic suitability of the project;
- A **Traffic Impact Study (TIS)** to estimate site-generated traffic and assess its impact on the public street system and on the ultimate development. A TIS also identifies on-site and off-site improvements that might be needed as a result of the development; and
- A **site plan review** that considers the relationship of the development to the surrounding roadway network,



Traffic impact studies help provide for a safer and more efficient street network.



the access location and design, interconnection and cross-access with adjacent properties, on-site circulation and parking. This review also should consider a variety of other site plan details including drainage, landscaping, utility locations, fire protection, loading docks and solid waste collection.

Because building location, on-site circulation and access are highly interrelated, traffic-related issues should be identified early-on, allowing better use of the site and the adjacent streets, and better planning for access and on-site circulation and parking. A preliminary traffic study prepared in conjunction with the market study will help avoid traffic problems that may limit the financial success of a proposed development. It is appropriate to begin the site planning and design process with tentative location of the buildings, a preliminary layout of the parking spaces and identification of the access locations.

When is a TIS needed?

Many local governments have established guidelines, policies and/or ordinances

that govern their site development and review process. Usually the requirement to perform a Traffic Impact Study is based on number of trips generated by the site, type and size of the development, and other development or area characteristics. See page 6 for examples of such guidelines from a few cities.

Generally, the suggested baseline for requiring a TIS is when a development generates 100 new trips to the adjacent street network during the peak-hour of either the adjacent street traffic of the development site.

The content of a TIS varies depending upon the complexity of the proposed development. Not all proposed developments will need a full-blown TIS. Depending on the type and size of development, the TIS can range from a cursory review and letter of opinion from a qualified professional to a comprehensive analysis and report that includes the detailed study of the development, the area-wide transportation system and other approved or planned developments in the vicinity of the proposed development.



Who should conduct a TIS?

A TIS should be prepared under the supervision of a qualified and experienced transportation professional who has specific training in traffic and transportation engineering and planning, and preferably with several years of experience with TIS preparation. In addition, all transportation operations and design work stipulated in the TIS recommendations should be completed under the supervision of a qualified and experienced professional engineer in conformance with state and local professional requirements.

Most review agencies require that the TIS report be sealed and signed by a registered Professional Engineer (PE) or preferably a certified Professional Traffic Operations Engineer (PTOE), who is a professional engineer with specific expertise in transportation and traffic engineering. Review agencies should realize that if they mandate this, however,

Common uses for TIS reports

- To provide developers or designers with recommendations regarding site selection, site transportation planning and traffic impacts;
- To assist public agencies in reviewing the attributes of proposed developments in conjunction with requests for annexation, land subdivision, zoning changes, building permits, or other development reviews;
- To establish or negotiate mitigation requirements where off-site impacts require improvements beyond those otherwise needed. Although not yet widely practiced in Kansas, in recent years, such reports also have been used by public agencies as the basis of levying impact fees or assessing developer contributions to roadway facility improvements.

they will need to ensure that a PTOE is available for the review. Currently there are approximately over 10,000 registered Professional Engineers in Kansas and only 28 certified PTOEs statewide.

Regardless of whether your

community has a requirement for a professional's seal on the TIS report, detailed reviews should be carried out by individuals with adequate training and experience in traffic and transportation

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What's in a TIS Report?

A full-blown TIS report should, at the minimum, address the following:

- State the purpose and scope of the report and identify the study area of the project.
- State all assumptions used in analysis and make reference to and/or include all supporting documents used to prepare the report.
- Describe, in detail, proposed land use type(s) and size(s).
- Identify number, location and type of proposed access drive(s) to the development site.
- Provide a detailed summary of data collection efforts and results.
- Evaluate existing operating conditions of traffic within the study area, and identify any existing deficiencies (if any) from both capacity and safety point of views.
- Estimate number of trips generated by the development site.
- Identify most critical analysis period.
- Determine anticipated directional distribution of site-generated traffic.
- Intersection assignment of site traffic including through and turning movements.
- Evaluate "existing + site" traffic operating conditions within the study area to assess impact of the site traffic from both capacity and safety point of views.
- Internal circulation of site traffic and parking
- Need for turning lanes at proposed driveway location(s)
- Traffic control needs and warrants
- Determine anticipated future non-site (background) traffic volumes.
- Identify other "nearby approved" developments within the study area.
- Evaluate "existing + site + nearby approved developments" traffic operating conditions to assess cumulative impact of traffic for pre-specified target year.
- Recommend on-site and/or off-site road improvements for each traffic conditions separately (i.e. "existing", "existing + site", "existing + site + nearby approved developments", and "future long-term").
- Although not usually practiced in Kansas, it is useful to address percent contribution to off-site road improvements by individual development sites (i.e. proposed and other nearby development site), based on number of new trips each and every one of these development sites generate and add to adjacent street network primarily during critical peak-hour.
- Include findings and recommendations using nontechnical jargon to help public officials with their decision making.



Traffic impact studies

Continued from page 5

engineering and planning. In cases where multiple transportation agencies are affected by the proposed development, all such agencies should be offered an opportunity to review the TIS.

Although study preparers and reviewers sometimes will have different objectives and perspectives, all parties involved in the process should adhere to established engineering ethics and all analyses and reviews should be conducted in an objective and professional manner.

A few words of caution

Sometimes a TIS can cross the line into other areas of expertise or the political process. It's best to avoid that! Therefore, a TIS should NOT:

- Include cost estimates for needed improvements.
- Attempt to assign responsibilities for needed improvements.
- Discuss economic benefits of proposed developments.
- Include any information whatsoever regarding the highest and best use, or market value of the subject property.
- Be subjective.

Useful references for TIS preparation

There are a number of available tools (e.g. documents, software) to assist traffic engineers in conducting and/or reviewing a TIS report. These tools primarily include resources from the Institute of Transportation Engineers (ITE), federal publications and guidebooks, and federal and Kansas research reports. Contact me for specific suggestions for your needs.

For more information: Pick up the phone or come take a class

If you have questions about anything in this article, contact me at (785) 864-2593 or at mgivechi@ku.edu. Also, I will be teaching LTAP classes on preparing and reviewing traffic impact studies in the Spring and Fall of 2010. Check our *2010 Kansas LTAP Training Calendar* for details.

Mehrdad Givechi, PE, PTOE, is a traffic engineer with the Kansas LTAP. ■



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Sample Guidelines, Policies & Ordinances Adopted by Some Kansas Jurisdictions To Warrant a TIS

City of Olathe Warrants for a TIS

The necessity to review all land development applications from a transportation perspective as well as the wide variety of land use types and intensities suggest that multiple thresholds or triggers be established to warrant a transportation impact study. The following minimum study requirements and triggers are recommended for the City of Olathe.

All Applications:

Conduct a 7-step traffic study.

Development plan that generates 100 to 499 trips in a peak-hour:

Conduct a full-blown TIS (14-step study).

Development plan that generates 500 or more trips in a peak-hour:

Conduct a full-blown TIS, plus extend the study area in each direction along arterial streets serving the development site to at least the next intersecting arterial street.

Proposed land use that deviates from the Adopted Comprehensive Plan:

Conduct a full-blown TIS, plus extend the study area in each direction along arterial streets serving the development site to at least the next intersecting arterial street, and conduct comprehensive studies using the proposed land use versus the adopted land use in the Comprehensive Plan.

Residential development with a density of less than four dwelling units per acre is excluded.

Shawnee County Warrants for a TIS

A TIS is required when at least one of the following warrants are applicable:

- A. Site generates over 2,000 vehicle-trips per day.
- B. Site generates over 200 vehicle-trips per peak-hour.
- C. Site generates over 100 vehicle-trips in the peak direction during the peak-hour.
- D. Primary trips generated by the site exceeds 10 percent of the existing volume of traffic on the street(s) providing access.
- E. Any land use providing service to the motorists (i.e. drive-up windows).
- F. Parking garages and off-street parking lots and facilities with at least 500 stalls for long term parking or 100 stalls for short-term/customer parking.
- G. Convenience store with gas pumps.

City of Lawrence Warrants for a TIS

Collection of Traffic Impact Data (TID) is required for all non-residential new developments or redevelopments and all residential developments of 11 or more lots or dwelling units. TID collection consists of a 7-step traffic study with the last step estimating the number of trips generated by the existing and proposed development on the site for a typical weekday and weekday peak-hours. When a development generates a net increase of 100 or more trips in a peak-hour, a full-blown TIS is required.



Help for Local Governments in Complying with New Federal Requirements for Signs

Adequately maintained traffic signs and pavement markings help improve highway safety, especially during the nighttime. The retroreflective properties of traffic signs bounce light from vehicle headlights back toward the vehicle and the driver's eyes, making the signs appear brighter and easier to see and read at night.

Because the retroreflective properties of traffic control devices deteriorate over time, agencies need to manage the maintenance of their signs and pavement markings. Recent retroreflectivity standards are set forth in the *Manual on Uniform Traffic Control Devices* (MUTCD) and compliance dates are coming up soon. Did you know that by January of 2012, all agencies must implement a sign maintenance program that addresses the nighttime visibility of their signs? [If not, see the cover story of the *Kansas LTAP Newsletter*, Winter 2009 issue, at www.ksltap.org.]

These resources are especially useful for agencies that do not have traffic engineering staff.

Kansas LTAP has a new resource to assist small and medium sized agencies without traffic engineering staff to meet the new federal requirements for maintaining traffic sign retroreflectivity. The *Sign Retroreflectivity Toolkit*, produced by the Federal Highway Administration (FHWA), contains a hard

copy guidebook (shown at right) and a stand-alone computer-based package on a CD that contains a great deal of information, resources, and automated features.

These tools offer a simple step-by-step approach to retroreflectivity compliance, suggested options for inspection procedures, and a budget estimating tool. These items are designed to assist agencies in making informed decisions before imple-



This new helpful guidebook (with companion CD) is available from Kansas LTAP. And it's FREE.



menting a retroreflectivity maintenance program while considering resource limitations. Order your free copy on page 15.

Adapted with permission from *Arizona Milepost*, 2009, Volume 4, No 1, a newsletter of the Arizona Local Technical Assistance Program (LTAP). ■

Kansas LTAP Staff Member Receives National Award



The National LTAP Association presents its NLTAPA National Program Achievement Award at its annual meeting. Last August, Kansas LTAP's Lisa Harris received the award, as did Gene Wilson, former director of the Wyoming LTAP.

The award was presented to Harris for "her leadership, dedication and contributions to the LTAP/TTAP program."

Harris served on the Executive Committee for the Association for six years and was its president in 2007. During her term as president the Association adopted a new governing structure and bylaws to improve continuity in leadership and increase the Association's capacity to accomplish its goals and sustain productive partnerships.

Recipients of the LTAP National Program Achievement Award are listed at www.nltapa.org, under "Resources." ■

Kansas LTAP



A Leg Up

Traffic Safety Primer for Local Elected Officials

Some things to think about before you seek traffic safety solutions.

Elected officials are viewed by the public as “people of action.” On a daily basis, elected officials are forced to make numerous decisions that have significant impact on the community they represent. The public expects a skilled elected official to collect information, weigh the consequences, and make the best decision for their community. Because of the broad nature of decisions that elected officials face, they frequently find themselves working in areas outside their “comfort zone.”

Traffic safety is one of those areas. There are even aspects of traffic safety that encourage a false sense of security for elected officials, such as:

- **Counter-intuitive nature:** Many traffic safety decisions are counter-intuitive. For example, installing a stop sign to control vehicle speed can actually increase vehicle speeds as drivers accelerate to “make up” lost time.
- **Roads are a public asset:** The vast majority of roads are in the public trust. Because of this, many people feel that they have an interest in deciding the operation and function of roads in their community, which is true to an extent. However, when the general public begins to dictate design and operation factors without an understanding of their impact, the chance is high that there will be negative consequence to safety.
- **Roads viewed as “commonplace”:** The public has come to view roads as an ordinary, simple feature of the landscape. This desensitization to the subtle design features of a road and the complex relationships that exist within roadway infrastructure lead to the belief that good, safe roads are “simple.” As you will see below, when it comes to road safety, it’s anything but simple.

Factors that may contribute to the number of crashes on local roads

Many local roads have characteristics that pose safety challenges different than state and interstate highways:

- **Lane width:** State highways and freeways typically have wider lanes than the local roads. In addition many of these higher “functional class” roads also have wide paved shoulders. Research has shown that wider lanes and shoulders result in a decrease in the number of crashes, but may also lead to an increase in speeds—a different problem.
- **Curve and grade geometry:** Contrary to state highways and freeways, local roads generally have more locations where geometric design exceptions have been made around curves and hills. Local roads often have sharper

Controlling Speeds

Speed Limits: Research has shown that drivers typically drive a speed that “feels” safe. Speed limits outside of residential areas are based on the 85th percentile speed –the speed that 85 percent of drivers do not exceed. Research has shown the 85th percentile speed to be near the optimum speed for safety. Traffic safety studies have also shown that driving too slow with respect to the average speed can put drivers at the same risk as driving too fast.

Stop Signs Are NOT For Speed Control: Stop signs should not be used for speed control. Over 20 research studies have concluded that stop signs are not effective for speed control and in many cases increase the speeds between the signs.

Traffic Calming: Traffic calming techniques can be utilized to reduce speeds and mitigate some of the negative aspects of motor vehicle use on the pedestrian and bicycle users. Traffic calming techniques typically revolve around making physical improvements to transportation facilities or rely on education to change driver behaviors.

curves and steeper grades because the cost of correcting the geometric problem may not be feasible based on the number of vehicles that use the road.

- **Signing and paint striping:** Generally speaking, local agencies do not have the budgets necessary to maintain signs and pavement markings on local roads to the same level as higher functional class roads. In some cases, poor markings and a lack of signing can influence the number of crashes that occur.
- **Roadside obstructions:** Higher functional class roadways (freeways and highways) typically have a wide, relatively flat, clear area outside the driving lanes where drivers who run off the road can recover and get their vehicle back on the road or stop without causing a traffic crash. It is not uncommon for local roads to have little



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Not all crashes are preventable: This serious fender bender was caused by careless driving on a wet and slippery road.



if any recovery area or to have obstructions directly adjacent to travel lanes.

• **Number of driveways:** Research has shown that an increase in the number of crashes comes with an increasing number of driveways. Local roads are primarily for local property access, and as such, have a significant number of driveways. Higher functional class roads typically do not have as many driveways or have active “access management” programs to control driveway access.

Factors that influence the number of crashes on all roads:

Driver condition

- *Reflexes* – how quickly a driver can respond to a situation
- *Attentiveness* – Is the driver paying attention?
- *Experience* – A less experienced driver has an elevated crash risk.
- *Alcohol & drug use*
- *Driver aggressiveness* – Aggressive or frustrated drivers take more chances or are more likely to drive beyond their limit of control.

Human factors

- *Visibility* – How well can an object be seen? Humans have a cone of vision 15 degrees around the center of their focal point where items of interest will likely be noticed.
- *Expectancy* – Drivers use an understanding of past situations to lessen the mental workload of driving. For example, drivers in the Midwest expect that if they don't see a stop sign at an intersection they can proceed without stopping. In Western states this is not always the case—there are many uncontrolled intersections without any signs or traffic signals.
- *Consistency* – When designs for roads and traffic control are applied consistently in the same situation, drivers have an easier time driving which results in fewer crashes.
- *Workload* – When a driver becomes overloaded with driving inputs they lose the ability to process information. An overloaded driver is actually impaired for a short

period of time after the overload occurs. Overload situations include negotiating a complex, busy intersection, presence of billboards, etc.. Overloaded drivers may also suffer from a temporarily reduced field of vision (tunnel vision).

Vehicle characteristics

- *Handling characteristics* – Newer vehicles have improved handling characteristics that include reduced stopping distance due to anti-lock brakes, traction and skid control, and better cornering behavior. Older vehicles do not.
- *Maintenance* – Lack of vehicle maintenance such as poor brakes can lead to crashes, however the total percentage of crashes attributed to vehicle malfunction is very low – less than 5 percent of all crashes.

Roadway characteristics

- *Geometry* – how roadway features are designed has a major impact on safety. Everything from the radius of a curve, or the grade that a road takes through a hill, to the slopes leading into and out of the ditches can influence traffic safety. Geometric features should be reviewed whenever major road work is planned or when there is a high incidence of crashes at a specific location.
- *Maintenance* – Upkeep of roadside features such as shoulders and signs can impact traffic safety.
- *Surface condition* – Maintaining a smooth, high friction road surface can reduce the incidents of traffic crashes.

Environmental conditions

- Rain / snow / fog

Working with engineers

In seeking solutions to traffic safety problems in your jurisdiction, you will be working with engineers. Engineers are guided by federal, state and local regulations, national and state guidance, and professional engineering judgement in making recommendations. Engineers are trained to make technically sound recommendations that are legally defensible, conservative and based on data. As part of this training, engineers depend on a “language” that is precise, full of jargon and esoteric. Many engineers do not view translating technical information to nontechnical audiences as part of their job. This is common with people involved in technical fields. As a result, a barrier to communication can develop that separates engineers from nontechnical audiences. So if your traffic engineer tells you that the LOS is C at the peak-hour of the traffic generator, and you don't know what that means and how it may affect your decision-making, ask for clarification until you do!

Excerpted and adapted with permission from an instructional workbook entitled *What Elected Officials Need to Know About Traffic Safety (and What Your Constituents EXPECT You to Know)*, Michigan Local Technical Assistance Program (LTAP), December 2008. ■



KDOT Korner

There's a Right Way to Acquire Right of Way—Are YOU Doing it Right?

By Eric Deitcher



Don't be in the dark about right-of-way acquisition. Elected officials have an important role to play, and must stay committed to the process to ensure receipt of outside funding.



It is hard for me to believe that I have been with the Kansas Department of Transportation (KDOT) for over 10 years now, but it is true. In those 10 years I have gone from acquiring right of way for state projects to assisting our local partners in acquiring right of way, ensuring they are following state and federal guidelines when they are using state or federal funds.

Like I tell those that attend my workshop (“The Right Way for Right of Way”), the basis for acquiring right of way under the Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs, also known as “The Uniform Act”, continues to be to *treat people fairly*. In this article I will provide a few tips that you can do as an elected official to keep your right-of-way acquisition on track and not risk project delay or worse, such as forced payback of outside funding.

Stay on schedule; do what it takes

In working with our local partners at the county level, I have attended county commission meetings at which I have emphasized how important it is to keep projects on schedule. Too many times the county underestimates how much time the acquisition part of the project will take.

Another point I emphasize is to stay committed to a project until it is completed. I understand how commissioners might know an affected landowner quite well, and would hate to take a constituent to court to acquire the needed property. Unfortunately though, this has to be done sometimes. So when I say “stay committed to the project,” I mean understand that it includes even condemning your neighbor’s land if need be. There is a time in the negotiation process—if you can’t reach agreement on a price for the land—that you just have to take the next step in the eminent domain process and move on and file the petition to condemn. Again, nobody wants to condemn. It is expensive and time consuming, but sometimes that is what it takes to get the project built.

Recent changes in regulations

Over those years, the regulations for acquiring right of way have not changed all that much; however, a recent change in state law now requires ROW appraisals to be performed by either a licensed or certified appraiser. If you don’t have a licensed or certified appraiser on staff, you will have to hire one to do the appraisals.

Take advantage of free training

Last year KDOT partnered with Kansas LTAP to offer workshops

around the state to help educate our local government partners about understanding state and federal guidelines for acquiring right of way. TAKE ADVANTAGE of what KDOT and Kansas LTAP have to offer in training. When a right of way workshop is offered in your area, make a point to attend, and invite those who are involved in the process in your area to attend as well. As an alternative, I am always willing to come out and address any size group and to put on a custom training session to address right of way issues and tell you about other programs KDOT Local Projects has to offer. Just give me a call.

In the last year, Sarpy County in Nebraska was required to pay back \$6.9 million to the federal government because the Uniform Act was not followed for acquiring right of way on a particular project.

Why is this so important?

I cannot emphasize enough how important it is to acquire needed right of way following state and federal guidelines. In the last year, Sarpy County in Nebraska was required to pay back \$6.9 million to the federal government because the Uniform Act was not followed for acquiring right of way on a particular project. So we know the Federal Highway Administration can lay the hammer down, and did so very close to home.



Eric Deitcher is local liaison for the Kansas DOT’s Bureau of Local Projects. You can reach him at (785) 296-0413 or at EricD@ksdot.org. ■



A Quiz: Which Tasks Require an Engineering License?

By Lisa Harris



istockphoto.com

Road and bridge departments require many kinds of expertise, and some tasks require an engineering license. Do you know which ones? Take the quiz!

Requires an engineering license? (yes or no):

- Yes No Establish standards for improvement projects such as bridges, culverts and roads
- Yes No Contract administration
- Yes No Roadway and crossroad culvert design
- Yes No Bridge design for county crew construction
- Yes No Size crossroad culverts and bridges
- Yes No Prepare equipment specification and bids
- Yes No Bridge inspection and load ratings
- Yes No Right-of-way acquisition
- Yes No Advertise and lead projects
- Yes No Compute drainage areas and runoff rates
- Yes No Crash record keeping
- Yes No Determine structural repairs on bridges and culverts
- Yes No Prepare state & federal permit applications
- Yes No Negotiate consultant contracts
- Yes No Develop a pavement management system
- Yes No Review new developments (infrastructure design)
- Yes No Review plans
- Yes No Review drainage studies
- Yes No Maintenance of road network
- Yes No Traffic control policies
- Yes No Investigate traffic safety related complaints
- Yes No Traffic control plans for projects and detours
- Yes No Provide leadership for department
- Yes No Develop policies with elected officials
- Yes No Prepare budgets for projects
- Yes No Manage utility relocations
- Yes No Develop annual maintenance program
- Yes No Prepare equipment specifications and bids
- Yes No Keep records on crashes

See how you did on page 13.

The Kansas Local Technical Assistance Program (LTAP), in cooperation with the Kansas County Highway Association, created a reference card a few years ago that outlines road and bridge responsibilities and which of those tasks require an engineering license. We recommend that each local government have one or more copies of this card for easy reference.

The card contains many more tasks than are mentioned in this quiz. To order a copy of the card, turn to page 15.

Source: Mulinazzi, T., Gampa, C., and Russell, E., *A Study of the Duties of a County Engineer in the State of Kansas*, Kansas Department of Transportation, 2005. ■



Road Drainage Complaints and You

By Norm Bowers



Many rural residents think the road ditch is to improve drainage on their property. However, the ditch is there to improve drainage on the ROAD.



There is an old saying: “The only thing you need to know about drainage is that water runs downhill.” Water certainly runs downhill, but the rest of the saying is incorrect—because drainage is one of the more complicated issues, and there’s a lot to know. This article covers a few of those issues seen at the county level.

Ditches are for roads, not fields

The only reason a county needs a road ditch is to keep water off the road. A ditch collects precipitation that runs off the road, and maintains a more stable road base by draining water that could saturate the base. Also, where adjacent land slopes toward the road, the road ditch intercepts the water coming off the fields before it runs onto the road.

At some places where the road has been built up and is higher than the adjacent land, ditches are not needed. However, some adjacent landowners see the road ditch as a way to improve drainage on their field, or as an area to be landscaped, if in front of a house. So they may want the county to maintain ditches in front of their properties even if the roads don’t need them.

My first winter in county work was 1972-1973. The winter was continually wet, which was unusual for central Kansas. The bottom just fell out of the roads that did not have sufficient rock or where the roadside drainage was not adequate. We received a lot

of drainage complaints that winter, but the surprising part to me was that over half the drainage complaints did not involve road drainage. I found out that many rural residents think the road ditch is to improve drainage on their property, and that once any water runs into the road ditch or a culvert it becomes the county’s water, and any damage caused by the county’s water is the responsibility of the county. These perceptions are not true.

Surface water in Kansas belongs to the state. Also, the Clean Water Act gives the Corps of Engineers jurisdiction over work in channels below the ordinary high water line, so the federal government is claiming jurisdiction of the channels.

Drainage law regarding altering flow

The general drainage law in Kansas is that, at the property line, the land owner is not to change the course (location), current (speed), or content (volume) of water flow. So we need to think about this when we work on drainage. Violating the general drainage law is not a criminal violation, but a civil matter, so a person could be liable for damages caused by their actions. However, if you are doing something the land owner wants, no one will complain and the new drainage eventually will become the established drainage.

There are special considerations for bridges and culverts. If we put in a bigger bridge or culvert we are likely

making the flow more like it was before the road and bridge were originally constructed, and this is seldom an issue with the land owners. If we put in a smaller bridge or culvert, or raise the road, this may cause backwater upstream and may increase the velocity immediately downstream, so putting in a smaller structures should be done only where these factors will not be an issue. The Division of Water Resources (DWR) usually looks at these issues if the drainage area is large enough to require a DWR permit.

There are two things that you should never do without a US Army Corps of Engineers permit, which you could probably never get anyway. First, a ditch should not be deepened to drain a wetland. Wetlands are usually under federal jurisdiction. Second you should not divert water from a natural channel into a ditch. Once you do that, the ditch could be considered the natural channel and then it is under Corps jurisdiction.

Times have changed but drainage space limitations remain

When roads were opened in the 1800s, road ditches had not yet been invented. The only maintenance a road received was when a horse-pulled drag knocked down the ridges into the ruts and thereby smoothed the road. In about 1900, horse-pulled road graders started being used. The blade on these graders could be adjusted to put a crown in the road, and theoretically cut a little ditch. However, when the roads were opened, adequate right of way was not provided for large road ditches, as there was no thought at that time of road drainage or ditches.

Road ditches are not wide enough to handle much drainage. A grass waterway in a field designed by the Natural Resources Conservation Service (old Soil Conservation Service) might be 40 ft. wide, and a farmer may want us to capture this water in a road ditch that is 10 ft. wide at the top and 2 ft. wide at the bottom. That just won’t



work. You cannot control drainage in the limited right-of-way, even if you wanted to. But that doesn't mean that people won't ask.

Responding to drainage complaints

Let's imagine you are at home and the neighbor comes over and says water from your property is running onto his property and he wants you to do something about it. Assuming you haven't done anything recently to change how water flows, probably your answer will be that you didn't cause the problem, the water always ran that way, and if it is causing some problem he needs to do something about it on his property.

A county official really needs to take the same position at work as he or she would at home. That is, if you didn't cause the problem, it is not your problem to fix. That is not always a popular opinion, but a person could spend all day, every day working on drainage issues and not help the road conditions or traffic safety at all.

In eastern and central Kansas people don't want water running across their cultivated fields. I understand the problems that surface water causes: the erosion, sedimentation, and wet areas. I sympathize with the problems, but it is not the county's problem. We just happen to be close and easy to find.

The three main requests by adjacent

land owners are: 1) Make the ditch deeper to drain the wet spot in the field, 2) Construct a berm along the right-of-way line to keep water in the ditch, and 3) Change the location or remove a crossroad culvert to keep water from running across a field. These may be a good idea for the farmer, but usually a bad idea for the county.

Even though water runs downhill, property owners usually want water to run sideways along the property line in your ditch. There are a few obvious signs that you may be changing the course of drainage. Any time you have to dig a deep ditch in order to get the water to drain you are probably fighting the existing grade, which means you are basically trying to get water to run uphill. Anytime you build a berm to hold water in the ditch you are preventing water from running downhill, fighting the natural drainage.

Be careful when you do drainage work along the road that you do not change the natural drainage. Because if you do, then you become responsible for maintaining the changed drainage pattern. Mother Nature will consistently make you pay for changing the natural drainage by erosion, sedimentation and the need for ongoing maintenance to maintain the changed drainage. One thing is certain, once you change the natural drainage

When it comes to drainage, you as a county official really need to take the position ... that ... if you did not cause the problem, it is not yours to fix.

■ ■ ■ ■

the local land owners will expect you to maintain it forever, no matter the cost. Even though they may be the beneficiary, the public will have to bear that cost.

Norm Bowers is Local Road Engineer for the Kansas Association of Counties. He has twice monthly email messages on current road-related topics. Email Norm at bowers@kansascounties.org to get on the list to receive these messages. ■



Engineering license quiz *Continued from page 11*

Quiz answers are below.

Does this task need an engineering license?

- Establish standards for improvement for projects such as bridges, culverts and roads —Yes
- Contract administration —No
- Roadway and crossroad culvert design —Yes
- Bridge design for county crew construction —Yes
- Size crossroad culverts and bridges —Yes
- Prepare equipment specification and bids —No
- Bridge inspection and load ratings —Yes
- Right-of-way acquisition —No
- Advertise and lead projects —No
- Compute drainage areas and runoff rates —Yes
- Accident record keeping —No
- Determine structural repairs on bridges and culverts —Yes
- Prepare state & federal permit applications —Yes
- Negotiate consultant contracts —No
- Develop a Pavement management system —Yes
- Review new developments (infrastructure design) —Yes
- Review plans —No
- Review drainage studies —Yes
- Maintenance of road network —No
- Traffic control policies —Yes
- Investigate traffic safety related complaints —Yes
- Traffic control plans for projects and detours —Yes
- Provide leadership for department —No
- Develop policies with the commission —No
- Prepare budgets for projects —No
- Manage utility relocations —No
- Develop annual maintenance program —No
- Prepare equipment specifications and bids —No
- Keep records on crashes —No



RESOURCES

By Lisa Harris

SIGN RETROREFLECTIVITY TOOLKIT

Specifically designed for local government transportation departments that do not have engineering staff, but useful for any agency. Provides step-by-step advice for complying with the new federal regulations for sign retroreflectivity. Its basic language and many illustrations are particularly helpful. The Toolkit contains a hard-copy Guidebook and includes a CD with interactive resources.

ROUGH ROADS AHEAD: FIX THEM NOW OR PAY LATER

This report examines the conditions of the nation's major highways, costs to preserve the highway system, added costs to motorists due to poor pavement, and state solutions to shore up their highways. American Association of State Highway and Transportation Officials (AASHTO) and TRIP, 53 pages, 2009.

REAL PROPERTY ACQUISITION FOR KANSAS HIGHWAYS, ROADS, STREETS AND BRIDGES

A concise brochure that outlines the steps involved in acquiring right of way in Kansas. Easy to understand and follow. Kansas DOT, 2007. 22 pages.

RIGHT OF WAY ACQUISITION GUIDE FOR LOCAL PUBLIC AGENCIES

This is an excellent and comprehensive workbook for acquiring right of way in Kansas. Includes relevant statutes, sample forms, and step by step instructions. Kansas DOT, revised March 2008. 174 pages.

ROAD & BRIDGE TASKS IN KANSAS

Reference card that shows which road and bridge related tasks must be performed by a licensed engineer.

CALENDAR

Visit our Web site for even more training calendar listings and to register for workshops. Go to <http://www.ksltap.org> and click on "View the LTAP Calendar."

ESTIMATING MATERIALS FOR MAINTENANCE PROJECTS ▲T

1/26 in Hutchinson
1/27 in Emporia
1/28 in Kansas City

ASPHALT ROAD & STREET MAINTENANCE

2/2 in Dodge City
2/3 in McPherson
2/4 in Manhattan
2/5 in Olathe

WORKPLACE, JOB-SITE, AND EQUIPMENT SAFETY ▲T

2/16 in Great Bend
2/17 in Wichita
2/18 in Abilene
2/24 in Emporia
2/25 in Lawrence

ROAD SAFETY ASSESSMENT

▲M-elective
3/3 in Pittsburg
3/18 in Hiawatha

GRAVEL ROAD & STREET MAINTENANCE

▲T
Weather Permitting
3/9 in Garden City
3/10 in Great Bend
3/11 in Salina
3/12 in Lawrence

MUTCD FOR TECHNICIANS ▲T

3/16 in Salina

TRAFFIC IMPACT STUDIES

▲M-elective
3/31 in Emporia
4/1 in McPherson

BASIC SURVEYING FOR KANSAS FOREMEN

4/6 in Ottawa
4/7 in Wichita
4/8 in Manhattan

KANSAS TRANSPORTATION ENGINEERING CONFERENCE

4/13-14 in Manhattan
(785) 532-5569

CULVERT, DRAINAGE & LEVEE MAINTENANCE ▲T

4/20 in Colby
4/21 in Hays
4/22 in McPherson
4/23 in Junction City

NATIONAL ASSOCIATION OF COUNTY ENGINEERS (NACE) ANNUAL MEETING

4/25-29 in Fort Worth, TX
<http://www.countyengineers.org>

KANSAS COUNTY HIGHWAY ASSOCIATION 2010 SPRING CONFERENCE

5/10-12 in Hutchinson

APWA KANSAS CHAPTER 2010 SPRING CONFERENCE

5/12-14 in Hays

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.

▲T = KS Road Scholar Program Level 1 — Technical skills required course.

▲S = KS Road 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."

▲M = KS Road Scholar Program Level 3 — Master Road Scholar required course.



LTAP TO OFFER NEW COURSE ON TRAFFIC IMPACT STUDIES

Kansas LTAP has created a new course on the process of preparing and reviewing a Traffic Impact Study (TIS) as part of a site development plan. It is an elective Level 3 Road Scholar course. See above for classes this Spring.

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FREE ROAD & BRIDGE RESOURCES

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



TRAINING GUIDES & REPORTS

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

Sign Retroreflectivity Toolkit

Hard copy guidebook and CD with additional tools. See description on page 14. Access at: http://safety.fhwa.dot.gov/roadway_dept/night_visib/retrotoolkit/ or request hard copy

Rough Roads Ahead: Fix Them or Pay Later

53 pages. See description on page 14. Download at: http://roughroads.transportation.org/RoughRoads_FullReport.pdf or request hard copy

Real Property Acquisition for Kansas Highways, Roads, Streets and Bridges

22 page brochure. See description on page 14. Download at: <http://www.ksdot.org/burLocalProj/default.asp> or request hard copy

Right of Way Acquisition Guide for Local Public Agencies

174 pages. See description on page 14. Download at: <http://www.ksdot.org/burLocalProj/default.asp> or request hard copy

Road and Bridge Tasks in Kansas

Laminated card. See description on page 11.
 request hard copy



EQUIPMENT

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

Turning Movement Counter Board DB-400, Jamar Technologies, Inc.

A basic model for recording turning movements at intersections. The board is lightweight and comes with its own case.

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

Can be used to do turning movement counts, classification counts, gap studies, stop-delay studies, speed studies, and travel time studies. The board is lightweight and comes with its own case.

Our resource catalog of reports and training videos is searchable online. Visit www.ksltap.org



REQUEST FORM

send materials indicated address correction add to newsletter mail list send 2009 Resource Catalog

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Kansas LTAP, 1530 W. 15th St. #2160, 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), under the umbrella of the KU Transportation Research Institute. Its purpose is to provide information to local government highway departments and their personnel and contractors by translating into understandable terms the latest technologies in the areas of roads, highways and bridges.

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

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KUTC Executive Director Pat Weaver
 LTAP Director Tom Mulinazzi
 Manager of Communications & Outreach Lisa Harris
 Contributors Norman Bowers, Eric Deitcher,
 Mehrdad Givechi

KUTC Resource and Education Staff

- Traffic and Hwy. Engineering Tom Mulinazzi
 Steve Schrock & Mehrdad Givechi
- Road Surface Mgmt./Soils Bob Parsons & Jie Han
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