Below is a statement from the Indiana Federal Highway Administration Office and INDOT:

INDOT is currently using the National MUTCD 2003 edition.

The State does have a proposed INDIANA MUTCD that amends the National MUTCD 2003 Edition. The State and Division have agreed on the amendments. INDOT is currently working to adopt their version through the promulgation process. The FHWA Division will issue a letter of substantial conformance once the 2003 MUTCD with Indiana Supplements is officially adopted.

Essentially for locals this means you need to be using the 2003 National MUTCD on all projects.

Legal Authority
It is the intent, in the promulgation of this Supplement and the MUTCD, to meet the various requirements of the statutes of the State of Indiana. In particular, the following statutes are considered to be enabling legislation which allows for the promulgation of the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways: Indiana Code 4-22-2, 9-21-2, 9-21-3, and 9-21-4, and specifically in sections:

IC 9-21-2-1
Sec. 1. “The Indiana department of transportation shall adopt rules under IC 4-22-2 to create the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways.”

IC 9-21-2-2

IC 9-21-2-3
Sec. 3. “All revisions to the manuals described in section 1 of this chapter may be considered to become a part of the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways if the following conditions exist:

(1) The Indiana department of transportation concurs in the revisions.

(2) The Indiana department of transportation adopts the rules under IC 4-22-2 to make revisions a part of the manual.”

IC 9-21-2-4
Sec. 4. “The Indiana department of transportation may add control devices to the state manual in those areas where the federal standards are silent.” Indiana Supplement to Millennium Edition National Manual on Uniform Traffic Control Devices, with December, 2001 Revisions – Introduction Page 2 of 2

continued on page 18
Indiana LTAP

Indiana Local Technical Assistance Program (LTAP) was established by the Federal Highway Administration (FHWA). The purpose of the LTAP program is to translate the latest, state-of-the-art road, highway and bridge technologies into systems usable by local highway agencies. LTAP is funded by FHWA, the local agency distribution of the Motor Vehicle Highway Account and Purdue University. The Pothole Gazette is published quarterly by the Indiana LTAP office at Purdue University. It is distributed free to county, city or town road and street personnel, and others with transportation responsibilities.

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Director, Dr. John E. Haddock, Ph.D., P.E.
Program Manager, John A. Habermann, P.E.
Training Specialist, Richard J. Domonkos
Communications Specialist, Lisa W. Calvert

Vision Technology, Inc.
1435 Win Hentschel Blvd., Suite B100
West Lafayette, IN 47906-4150
Phone: (765) 494-2164
Toll-Free: (800) 428-7639
Fax: (765) 496-1176
Website: www.purdue.edu/INLTAP

Indiana LTAP Training Calendar
2007 - 2008

Concrete Pavement Workshop
November 8
University Inn
West Lafayette, IN

Road Scholar Core Course # 9
Bridge Basics
November 27
Indiana Association of County Commissioners Annual Conference
Sheraton Hotel and Suites
Indianapolis, IN

2008 County Bridge Conference
January 30-31
University Inn
West Lafayette, IN

2008 Stormwater Drainage Conference
February 28
University Inn
West Lafayette, IN

2008 Purdue Road School
March 25-27
Stewart Center
Memorial Union
Purdue University
West Lafayette, IN
On October 1st, 2007, Rich started as the Training Specialist for Indiana LTAP and will be responsible for building and managing the training calendar for LTAP as well as providing workshops for local government agencies. Rich was previously employed by the Lake County Highway Department for more than twenty years, and for the last ten years as the Mechanical Supervisor and Fleet Manager. He has worked closely with several agencies in Northwest Indiana on transportation related issues, as well as assisting LTAP with the snowplow and loader rodeo. Rich is looking forward to sharing his knowledge and experience with local agencies throughout Indiana and by assisting the development of efficient and safe transportation practices.

After spending the better part of this year as a temporary administrative assistant, Lisa has accepted a full-time position with Indiana LTAP as Communications Specialist. She received her B.A. in Communication Arts from Allegheny College in Meadville, PA and her M.A. in Production and Design from the University of Pittsburgh. She has spent much of her career working in the NY/NJ theatre and concert industry in Production Management. Originally from Bayonne, New Jersey, Lisa moved to Indiana last year when her fiancé (now husband) accepted a teaching position at Purdue. She looks forward to continuing to serve the LTAP community.

Erin is originally from Huntington Beach, CA. She earned her Bachelor’s degree in Civil Engineering with an emphasis in Structural Engineering from California Polytechnic State University, San Luis Obispo. She is currently working towards receiving her Master’s degree in Structural Engineering from Purdue University. After completing her studies, she plans to return to California to work full-time with an engineering firm in order to become eligible for her Professional Engineer’s license.

First Row: Joe Novak, Paul Berebitsky, Tom Robertson, Jim Olson, Gary Eaton, KD Benson, John Haddock, Jason Weiss
Second Row: Rob Roberts, John Habermann, Kumares Sinha, Walt Land, Gary Mroczka, Bill Haan, Barry K. Partridge
Third Row: Eric Conklin, Dan Keefer, Jerry Bridges
Fourth Row: William Flora, Tommy Nantung, Eryn Fletcher, David Whitworth, Jodi Coblentz, Karen Hatke, Shelley Haney, Jon Fricker, Bob McCullouch, Greg Ellis
Fifth Row: Mike Byers, Wes Shaw, Lisa Calvert, Phil Beer
Gravel roads can be less expensive to maintain than asphalt (hard surfaced) roads — but there’s a limit.

You might think that anyone living near a gravel road would be waiting anxiously for it to be covered with asphalt. For bedroom communities in rural areas, this may be true.

For farmers or others who need to drive heavy loads as the frost begins to move out of the asphalt surface, the resulting damage, and resulting higher maintenance and tax costs, may mean that gravel continues to be their surface of choice.

Paved roads can provide options to gravel in ways that are hard to quantify with dollars — including improved winter surfaces; improved safety from improved signage and delineation; safer surfaces with higher skid resistance; smoother surfaces that increase some users’ satisfaction; if the route does not carry heavy loads in early spring, reduced road and vehicle maintenance costs; redistribution of traffic away from gravel roads; and an increased tax base on adjacent property.

Nearly half of our nation’s 4 million miles of road are unpaved, meaning we have about 1.5 million miles of roads without paving.

These roads serve a valued purpose in our roadway system, yet maintenance costs are significant.

Paved roadways can also be costly to maintain.

So, how can engineers and road authorities decide when it makes sense to upgrade a gravel road to a paved one?

**RESOURCES**

Maintenance logistics and costs are part of the decision-making process. Two key questions should be answered when developing a gravel road maintenance plan:

1. **What is the best way to maintain a gravel road?**
2. **When should the roadway be upgraded to a paved surface?**

Many factors affect the answers. Two newly published research reports, one by Minnesota’s Local Road Research Board and one from the South Dakota Department of Transportation, provide some direction and assistance.

Economies of Upgrading an Aggregate Road (2005-09), published by Minnesota’s Local Road Research Board, offers an analysis of county maintenance costs, practices, and traffic volumes for individual roads. This information helps to determine when to upgrade a road based on cumulative maintenance costs. The data presented in the report can be used by other states and localities, or it can be used as a resource to develop a similar methodology with local data.

The initial data collection included 16 Minnesota counties, broken into four regions around the state. It includes maintenance costs for both bituminous (or asphalt) and gravel roads, as well as the volume of traffic traveling over the roads. Baseline data was obtained from annual reports submitted to the Minnesota Department of Transportation’s State Aid Division from 1997 to 2001, and roads were grouped by funding source as County State Aid Highways, county roads (funded entirely by county funds), and township and municipal roads.

Four of the counties were analyzed further to develop typical costs per mile for a variety of surface options, including gravel and paved.

An accompanying figure illustrates the effect of traffic on maintenance costs per mile for Minnesota’s Waseca County. The roads are grouped by traffic volume and surface type along the bottom of the graph. An increase in traffic does lead to an increase in maintenance costs, especially for gravel roads. This is due to more lost gravel due to wear, and an increased need for blading and smoothing of the road surface.

Note that at a traffic volume of 200 average daily traffic, gravel road maintenance costs increase significantly. This level of ADT offers a possible threshold for when this agency might decide to pave a gravel road.

**ADAPTING THE DATA**

You will want to adapt the data from the study to your own roads to create a formula that you can use. The Minnesota report can be used to calculate your own maintenance costs per mile and is available online at www.lrrb.org/pdf/200509.pdf.

The report tells users to:

- Review the historical costs of maintaining paved roads for your agency and, if those costs are not available, review data for one of the four counties analyzed in the report to get an idea of what your costs might be.

- Compute estimated gravel road maintenance costs per mile for your agency.

For a proposed upgrade, develop a cost estimate in the same way a contractor would for any new construction project under consideration.

Evaluate this cost estimate to compare the alternatives and make a decision for each roadway segment under question.

By using the information presented in this
report, an agency can evaluate its typical maintenance and construction costs, and can identify the annual maintenance costs for a given type of roadway (whether it’s paved or unpaved), and the typical construction costs for a variety of surface projects.

SURFACING CRITERIA
The main objective of a second report, published by the South Dakota Department of Transportation, was to create a process comparing maintenance requirements for different surface types. The resulting data can help agencies pick the most economical alternative under a given set of conditions. Surface types include hot-mix asphalt, blotter, gravel, and stabilized gravel roads.

Many of the project elements were similar to the Minnesota project. However, the South Dakota project developed an easy-to-use computerized tool that lets an agency input local costs and treatments to fit their own conditions.

This computerized tool leads the user through a series of steps to:

- Input information about the road section, including the project limits and the average daily traffic count.
- Input the actual agency maintenance and construction costs, broken down by surface type.
- Estimate user costs, which are costs to the people who drive on the roads, and include vehicle operating and crash costs associated with a roadway surface type. These user costs can even be weighted to give them more or less importance in the analysis.

After the initial input variables are submitted, the computer program summarizes total costs for building and maintaining each roadway type.

The evaluator then inputs other non-economic factors that relate to all surface types, including growth rates for an area, housing concentration, dust control needs, mail route locations, truck traffic, and political considerations. The evaluator is allowed to weight each of the factors in the analysis.

This tool provides output that is easy to generate and understand. Costs can be computed for several alternatives. The program helps the user select appropriate input variables for a typical agency. Results are objective and help make a clear comparison for a variety of roadway surface types.

THE COMPUTERIZED TOOL
Like many agencies, South Dakota is willing to share. Their computerized tool is available for download from the South Dakota Department of Transportation’s Web site at: www.state.sd.us/Applications/HR19ResearchProjects/project_reports.asp.

Information can be downloaded in three forms:

- Full report: the complete report, with references, data, and research process fully outlined.
- User’s guide: a hands-on guide that introduces the macro-driven, Excel-based analytical tool developed to apply low-volume road management methods recommended under the project.
- Technical brief: developed to provide a step-by-step procedure for making road decisions among possible surface materials — hot-mix asphalt, blotter, gravel, and stabilized gravel.

The user’s guide outlines all steps required to download the software and populate the required fields with local data.

MAKING THE CHOICE
With the computer tool, the user inputs actual local costs for maintenance and construction activities. He or she also supplements those costs with road-user costs, such as crash data and quality-of-life considerations, as well as other non-economic factors. The computer program, once run, provides ratings for each surface type based on input variables. The user then selects one surfacing alternative over another, based on ratings and local priorities.

The results of both gravel road studies note that maintenance and construction costs vary considerably from one agency to another, and from one season to another. Traffic is a primary factor in deciding to pave or not to pave in many locations.

The Minnesota study found that gravel road maintenance costs per mile appear to increase considerably after roads start carrying over 200 vehicles per day. The South Dakota study found that paved roads are most cost-effective at ADT levels above 150 vehicles per day.

Information from both reports can be used to make locally informed decisions about paving a gravel road or maintaining it as a gravel surface. Thanks to the findings of both projects, local agencies can be better prepared to move forward in developing an efficient and appropriate maintenance and construction program.

This article was primarily drawn from information from Kathryn Knutson O’Brien at the SRF Consulting Group, Minneapolis, Minnesota.
2007 ROAD BUILDERS

These individuals have completed the 12 Core Courses and earned 300 credits to receive the degree of “Road Builder” in the Indiana LTAP Road Scholar Program.

Larry Abrams
Highway Supervisor
Owen County

Philip Amones
Highway Superintendent
Wabash County

Kem Anderson
Highway Supervisor
Shelby County

Allan Andrews
Assistant Highway Supervisor
Randolph County

Karl Bauer
Director of Public Works
Town of Porter

Steven Berg
Highway Supervisor
Dubois County

Steven Brook
Road Supervisor
White County

Jodi Coblentz
Engineer
Cass County

C. William Read
Engineer
Scott County

Tom Shannon
Highway Supervisor
Randolph County

John Stoll Jr.
Engineer
Vanderburgh County

ROAD BUILDERS NOT PICTURED:
Daniel Bennett, Assistant Highway Superintendent, Vigo County
Ryan Clark, Assistant Engineer, St. Joseph County
Neal Haeck, Highway Superintendent, Marshall County

CONGRATULATIONS!

photos courtesy of Jim Reid, Indiana Public Works

Pothole Gazette
Introduction

This is the third of four articles in a series geared to helping local agencies step through the process of improving safety on their roads and highways. In the first article, we talked about the reason for our safety efforts. Highway crashes are the number eight cause of death overall, and the number one cause of death for all people in age categories from 4 to 34. We also discussed what our first step should be: know your safety numbers. We should have in front of us a table of how many crashes, injuries, and fatalities occurred on our roadway system in the past few years.

Last time, in the second article, we looked at various ways to collect crash data and to analyze it to determine which locations we should focus on. These methods included both analysis from crash data (frequency, rate, or statistical variation) and more informal input from those that work with crashes, the general public, or public officials. We should also now have in front of us a table of how many crashes, injuries, and fatalities occurred on our roadway system in the past few years.

In this issue, we will jump head first, or maybe, to prevent injury, feet first, into the work of figuring out what to do at these locations.

The goal, or end result of this episode in our Road to Safety is for you to have a set of actions, or countermeasures, which will improve safety at some or all of the locations you identified as potential Locations of Safety Interest.

Get Ready to Get Your Feet Dirty

Although the main emphasis of this article in the series is to get out in the field to observe Locations of Safety Interest, before that is done there are a number of data resources to tap into first. We want to get a sense of the traffic, the present conditions, and the crashes. Information on all of these should first be gathered in the office.

For traffic data, if you know the daily traffic volume, that is helpful. Also, any information such as percent of trucks, “rush hours” (if any), major movements at an intersection (possibly due to a development or factory, etc.) would be helpful.

Any present conditions of the location could provide valuable input as well. Knowledge of recent construction or maintenance work that may influence the crash trend is helpful.

Getting the crash data is probably the most valuable endeavor to pursue. Ideally, a copy of all the crash reports would be most helpful. Take time to read these. They can prove most profitable. The narratives from police could give good clues to possible countermeasures. For example, a number of reports may say something like, “Driver 1 says he did not see the STOP sign.” If so, visibility of signs, particularly the Stop signs, would be something to pay close attention to during the field visit.

Almost all crash reports are written so that the person reading the narrative and viewing the drawing will be able to tell the direction of all vehicles involved and the nature of the crash. One of the most helpful steps is to place all the crashes for that location on a crash diagram. This can be a basic computer drawing (Figure 1, page 12) or simply a sketch of the location – intersection, curve, road segment, etc. – with arrows representing the direction of the vehicle(s) in the crash just prior to the crash. By placing a number of crashes on one diagram, trends for that location may show up.

Get Your Feet Dirty

There is a national expert on highway safety that used to be a traffic engineer for a large city. When getting to this step in the process, he used to tell his new employees to go out and listen to the intersection. It’s talking to you. Spend some time with it. Hear what it is saying. While this anthropomorphizing of something as non-living as an intersection may be a bit much to bear for the left-brain crowd which dominates the highway caretakers, what he is saying is true. If you want to know what is going on at a location, you have to get out of the office and into the field.

Now, by getting out in the field, we don’t mean driving by and looking at it, or even parking nearby and observing the location. You have to get out and walk around. So get out your safety vest and start continued on page 12
2007 Transportation Expo & Snow Plow Roadeo
On September 20, 2007, Indiana LTAP hosted the annual Snow Plow Roadeo at the Indiana State Fairgrounds. This year’s turnout was comparable to that of years past. In total, 15 agencies participated in the events with 19 drivers competing in the Single Axle competition, 14 drivers competing in the Tandem Axle and 17 driving in the Front End Loader competition. The City of Angola and The City of Fort Wayne ran neck and neck for Best Overall Agency. Fort Wayne broke the tie with a slightly faster time total.

Congratulations to all who participated and a special thank you to the vendors and volunteers who helped make 2007 a success. We hope to see everyone at the 8th annual Transportation Expo in 2008. Good luck to all the participants in the upcoming winter season. Here’s hoping for Dry Roads and Calm winds in the upcoming winter season.

BLACKOUT SIGNAL MESSAGE TO LOCAL GOVERNMENTS

In accordance with Indiana Code, the federal Manual of Uniform Traffic Control Devices (MUTCD), and INDOT operational policies; INDOT districts will no longer permit the use/installation of STOP signs at INDOT signalized intersections in response to unplanned power outages that are predicted to last less than 24 hours. Each INDOT district has developed operational procedures for power outages that are expected to last longer than 24 hours that may involve the placement of STOP signs, however each individual district plan will include provisions to insure that power is disconnected from the traffic signal prior to placement of any STOP sign, and insure that all STOP signs are removed prior to the restoration of power to the traffic signal. These policies insure avoidance of a conflicted message, consisting of the combination of a green signal and a STOP sign, from being displayed to motorist upon the unexpected power restoration and subsequent return to normal traffic signal operations. For additional information or assistance, please contact the nearest INDOT District Traffic Office.


(4) No indication or conflicting indications means the following:

(A) Vehicular traffic facing an intersection having a signal that displays no indication or conflicting indications, where no other control is present, shall stop before entering the intersection.

(B) After stopping, vehicular traffic may proceed with caution through the intersection and shall yield the right-of-way to traffic within the intersection or approaching so closely as to constitute an immediate hazard.


STOP signs shall not be used in conjunction with any traffic control signal operation, except in either of the following cases:

A. If the signal indication for an approach is a flashing red at all times; or

B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists.

(3) Indiana Department of Transportation Operations Memorandum Dated April 16, 2007\indotweb\content\OpProcedures\OpMemos\2007-05.pdf instructs the districts adhere to the policy described.

The AP (Action Plan) shall specifically state that no STOP SIGNS shall be erected at a blacked out signal except at those locations where the outage is projected to exceed 24 hours. When outages are expected to exceed 24 hrs., STOP signs may be installed at the intersection as determined by the District Traffic Engineer (DTE). The DTE shall direct district traffic personnel to turn off the main circuit breaker inside the controller cabinet prior to the installation of STOP signs at the intersection. The circuit breaker shall remain off until power is restored and the STOP signs are removed.
Highway-Rail Crashes: Working Together for a Solution
by Megan Tsai, INDOT Office of Communications

It’s a story that makes headlines far too often in Indiana communities – a driver is distracted, in hurry, or simply doesn’t see the train. The train and vehicle collide. Lives are lost.

While highway-rail fatalities are relatively rare – Indiana had just 13 in 2006 – they are extremely serious crash types where cars and trucks are always at a disadvantage. When highway-rail fatalities occur, they capture a great deal of attention from concerned citizens, public officials and the media.

After a highway-rail fatality occurs, emotional reactions and passionate public campaigns often ensue. There is frequently an outcry to install the safety countermeasure community members are most familiar with – flashing lights with gates – and questions raised about who is responsible for highway rail crossing safety.

The aftermath of a rail-crossing fatality can be a confusing time for local transportation organizations and public officials. The good news is a basic understanding of the jurisdictional issues surrounding rail crossings, the funding sources available for rail safety improvements and the effectiveness of low-cost safety measures can not only facilitate a quick and clear response if a highway-rail crash occurs, it can help prevent these serious crash types from occurring in the first place.

How serious is the highway-rail crossing crash problem?

Much progress has been made in reducing highway-rail crossing crashes over the past several decades; however these crashes remain a highway safety concern in Indiana and across the nation. Since 1977, when 884 highway-rail crashes occurred, collisions between trains and vehicles in Indiana have trended downward even as rail and highway traffic has steadily increased.

In 2006, highway-rail fatalities in Indiana declined 38 percent, from 21 fatalities in 2005 to 13 fatalities in 2006. Highway-rail crashes also declined 22 percent in 2006, from 174 crashes in 2005 to 136 crashes in 2006. In 2006, the number of highway-rail crashes and fatalities was at an all-time low in Indiana.

Highway-rail fatalities made up 1.4 percent of all Indiana highway fatalities in 2006. While rare, these crashes are extremely dangerous for motorists. Collisions between motor vehicles and trains generally result in a much higher proportion of fatalities and injuries than crashes between two motor vehicles.

Who is responsible for rail crossing safety improvements?

The responsibility of installing and maintaining warning devices is shared between railroad operators, local public agencies and the Indiana Department of Transportation (INDOT). On local roads, highway-rail crossings are the responsibility of the county, city or town with jurisdiction over the roadway. INDOT is responsible for rail crossings on state highways and U.S. routes. Routine maintenance of crossing traffic control devices, such as crossbucks and signals, is the responsibility of the railroad operator; while maintenance of STOP signs and pavement markings is the responsibility of the road owner.

What tools are available to improve highway-rail crossing safety?

Your starting point for highway-rail crossing safety analysis should be the Federal Railroad Administration’s Web Based Accident Prediction System (WBAPS). Generating a hazard index report for the highway-rail crossings in your city or county is quick, simple and free. INDOT recommends every local public agency run a WBAPS report for their community.

The WBAPS report takes a number of factors into account when generating a crossing hazard index, including the number of trains, the speed of trains, the number of tracks and volume of traffic on the highway. While hazard index is not the only means of identifying higher-risk crossings, improving safety at crossings with the highest hazard index will likely reduce highway-rail crossing crashes and fatalities in your community.

To generate a WBAPS report, take the following steps:

- Go to the Federal Rail Administration’s safety home page: http://safetydata.fra.dot.gov/officeofsafety
- Find the Accident Prediction – WBAPS link (link 8.05)
- Click By Location/Railroad then Next
- Select Indiana, choose either City or County, then Find City/County
- Select your location, and then hit Select at the bottom of the pop-up window
- Click Next
- Select ALL, then click Next (ensure pop-ups are not blocked)
- The system will generate a ranking of the rail crossings in your city or county, sorted by hazard index.
What can communities do to improve highway-rail crossing safety?

Now that you have your WBAPS hazard ranking report in hand, its time to take a look at what can be done to address the higher-risk crossings in your community.

It is a common misconception that installing flashing lights with gates is the only effective safety countermeasure available to improve rail crossing safety. While highly effective, at a cost of more than $250,000, the price of installing active protection is often out of reach for many towns, cities and counties. If the price of installing rail-crossing gates is not an insurmountable obstacle, consider installing gates with lights or an overhead cantilever at your highest-risk non-gated crossings. Upgrades to rail crossing gates, such as long-arm gates or four-quadrant gates should also be considered at locations where vehicles driving around crossing gates is a persistent problem.

There are many low-cost, high-impact safety measures local public agencies can take to address crossing safety and help prevent highway-rail crashes. Some of these safety measures can even be implemented using existing resources and personnel. A few low-cost safety measures include brush clearing to improve sight lines, enhancing signage, adding lighting, installing stop signs and improving pavement markings.

For a complete listing of countermeasures and detailed guidelines for how these countermeasures should be implemented, your best resource is the Federal Highway Administration’s Highway-Rail Grade Crossing Handbook, available online at http://safety.fhwa.dot.gov/xings/07010/index.htm.

How can my community fund rail crossing improvements?

It is the local jurisdiction’s primary responsibility to make safety improvements at highway-rail crossings on local roadways. Communities frequently find improving rail crossing safety is not difficult, especially when local public officials have a strong commitment to safety. Even if there is minimal funding available, improvements such as installing new signage, improving pavement markings and clearing brush can be done inexpensively and can frequently be accomplished using existing personnel and resources.

INDOT has two funding sources for highway-rail crossing improvements on state and local roadways, however only one of those funding sources is discretionary – the Rail Grade Crossing Fund. Funding for this program is awarded through an application process. Projects eligible for funding under this program include adding signage, lighting, medians and pavement markings, and making sight distance improvements. Active warning devices, such as crossing gates and lights, are not eligible for funding under this program. The funding level for the Rail Grade Crossing fund in 2007 was $450,000. This program is administered by the INDOT Rail Office.

The second funding source is the Highway-Rail Hazard Elimination Program. This program pays for enhanced warning devices at about 30 of the state’s highest-risk public rail crossings each year, regardless of who has ownership of the roadway. This program is administered by the INDOT Office of Roadway Safety and Mobility and is sometimes referred to as “Section 130.” The distribution of these funds is determined exclusively by a comprehensive statistical analysis of crossing conditions and crashes. The long-running program’s firm reliance on crash data and risk indicators to determine project funding has played an important role in the continual decline of highway-rail crashes in Indiana.

Improving Highway-Rail Crossing Safety: The Bottom Line

While a local commitment to improving highway-rail crossing safety does require some thought, time and funding – it doesn’t have to cost a fortune. It is important for communities to remember that the safety of highway-rail crossings in your area rests largely at the local level. While INDOT is highly committed to improving highway-rail crossing safety in Indiana, we cannot achieve the desired level of safety alone. By working together, we can make Hoosier rail crossings safer for motorists, preventing serious injuries and saving lives on Hoosier highways.
walking. Walk to different approaches, different sides, and different views. Get your feet dirty.

What to Look For

When you are on location, you should look at all aspects of the road and its environment that influence safety. First, you can focus on those qualities, which would influence the types of crashes frequently experienced. If visibility of a STOP sign is suspect, check that out. If wet weather crashes are in high percentages, inspect the road surface for slick spots or polishing of aggregate. If drivers consistently say that they didn’t see the other vehicle, check sight lines and distances.

As for signs and pavement markings, the first thing to notice is if they meet the requirements of the Manual for Uniform Traffic Control Devices (MUTCD) (see cover story). An understanding of what is in the MUTCD is essential for any highway or traffic supervisor or engineer. This document is the standard for all public roads in the country. Training on the MUTCD is frequently offered by LTAP.

Beyond the requirements of the MUTCD, there may be improvements in signing or pavement markings that go beyond the basic standards. In certain situations, signs may need to be made larger or more retroreflective, or additional, supplementary signs or markings could be installed in order to call attention to a situation that the standard signing or marking does not fully cover. For example, the intersection with the STOP sign that seems

COUNTERMEASURE FOCUS

Of the over 43,000 annual fatalities on our nation’s highways, 55-60% of them are categorized as being a result of roadway departure crashes. This is when the vehicle leaves the roadway either off to the right, and off the pavement, or off to the left and crossing the centerline or median. Obviously, this type of crash is a huge focus when approaching highway safety. Since the roadway departure crashes are of a wide variety of reasons, counteracting them involves a wide variety of approaches.

Basically, there are two main components to reducing injuries and fatalities due to roadway departure crashes. First, there are countermeasures aimed at keeping cars on the roadway – rumble strips, centerline rumble strips, pavement markings, wider shoulders, etc. Second, understanding that vehicles will leave the roadway, it is important to reduce the consequences of leaving the roadway. Having adequate clear zones free of unyielding obstacles or steep slopes is essential. However, as you know from looking at your roads, having a “perfect” roadside is not possible in these days of limited budgets and restricted right-of-way. But, does that mean we give up and leave things as they are? Certainly not. What we need is a reasonable approach that will balance safety, time and budgets.

The area on which we wish to focus in this edition is trees. This brings another factor into our balancing act. Trees are aesthetic and people, in general, like them. Utility poles and most other fixed objects are usually not seen with the same, sometimes emotional, view. But we should remember that trees are the most commonly hit obstacle when a vehicle leaves the pavement. The problem is not a small one.

In roadside design training, there is a hierarchy of desired improvements when it comes to having an obstacle near a road. These are, starting with the most desired:

- Remove the obstacle
- Relocate the obstacle
- Reduce the impact with the obstacle (make breakaway)
- Redirect or shield the obstacle
- Delineate the obstacle

Since trees are living things, relocating amounts to removal and replanting with substitutes. Making trees breakaway is not possible. So we are left with removing the trees (with the option of replanting far off the road), shielding (as with guardrail), and delineating.
**Removing:** Instead of removing every tree within 30 feet of the roadway (the traditional “clear zone”), we need to focus on removing trees that are major hazards - constantly being hit - and those that are very near our roads. It is easy to spot them. They are the ones with the bark chewed up or removed from cars or trucks hitting them constantly. It should not take much research to know the locations of the trees of major concern. One can look at the crash data, simply listen to local people discuss road segments with trees too close to the road, talk to police or other responders, or just drive the roads and note the distances the trees are from the road.

As many reading this may well know, getting permission to remove a tree in the vicinity of a road may be difficult because it is wanted by a local landowner on whose property the tree is partly or wholly growing. Diplomacy is key. Talking with landowners in a reasonable manner is necessary in order to reach our goal of a safer roadside for the traveling public. You may want to share some of the sad and sobering statistics and ask them to become a partner in improving highway safety by allow the agency to remove the subject trees.

**Shield:** If a number of trees along the same stretch of road are too close, you may consider placing guardrail in front of the trees (with the necessary deflection room behind it). Guardrail itself can cause damage, but if it would be better that a vehicle hits the guardrail than runs into a tree, it may make sense.

**Delineation:** As a last resort, as an unproven, experimental approach, you could delineate the trees near the road by placing a 4-inch or 6-inch retroreflective band around the trunk or placing some other object marker on the trunk. This will make the tree more visible at night and guide motorists away from a tragic crash.

not to be seen, as discussed earlier, could have a supplemental STOP sign added on the left side, or a STOP Ahead warning sign could be added in advance of the intersection. A response to road departures at a curve, may be to install curve warning signs in advance and/or chevrons through the curve, or add pavement markings that highlight the curve.

The use of a good checklist would be warranted. This would step you through all the different road features that would influence the safety of that location. It is a nice tool to keep you on task and help ensure that you have looked at the important features while you are on site.

The goal of the field review is to select one or more proposed countermeasures, whether they are signs, lighting, pavement markings, or brush clearing, to improve or provide warning of the predominant problem. We want to address the issue that is likely contributing to the number or severity of the crashes.

**Resources to Help**

There are a number of resources that can be used in the field as checklists or can be used to get ideas for effective countermeasures.

Field review checklists can also be obtained from the LTAP Center. A nice set of prompt lists developed for road safety audits is also available on the FHWA website at [http://safety.fhwa.dot.gov/rsa/rsaguidelines/html/index.htm](http://safety.fhwa.dot.gov/rsa/rsaguidelines/html/index.htm). Use these checklists or prompts as a starting guide. Remember it is always OK to expand them or tailor them to your need as you perform more reviews.

A list of countermeasures can be found in a number of locations in literature. One of the most comprehensive places is in the National Cooperative Highway Research Program (NCHRP) 500 series reports. These are a series of topical publications that identify countermeasures for that particular issue, and how effective the countermeasure is expected to be. They can be found at [http://safety.transportation.org/guides.aspx](http://safety.transportation.org/guides.aspx). Some of the topics cover behavior (e.g. Reducing Alcohol-Related Collisions), some engineering improvements (e.g. Reducing Collisions at Signalized Intersections), and some have aspects of both (e.g. Reducing Collisions Involving Older Drivers). They can be downloaded for free from the site, or ordered for a fee.

**Assignment**

Now is the time to receive your next assignment. Get out and review at least three sites in your jurisdiction. To assist your record keeping you may want to develop a simple form to bring along (Figure 2). You should also bring a camera and video camera if available. Take several pictures of the conditions and also of vehicle behavior.

During your review, proposed improvements may be easily determined. It may become apparent that a more extensive infrastructure project involving road rehabilitation or reconstruction would be required. In those circumstances it is important to also consider immediate impact improvements like signing, clearing and/or marking. These improvements can be completed by the street or highway department within a few short weeks and can have an amazing impact on improving safety until the more extensive projects can be completed. Therefore on your simple form you may want to have an area that indicates “Immediate Countermeasure,” “Short Range” (6-18 months) and/or “Long Range Countermeasures” (projects that will need planning for design and funding).
Plan for the Future: As a final note on trees, it is also imperative to keep future problems from cropping up, literally. Having a plan to control tree planting near roads and a mowing strategy to keep “volunteer” trees from growing near the roads are important parts of keeping roads safe for the future.

Again, balance is the word. We need to make the roads safer and at the same time be sensitive to the aesthetics that are important to people. Diplomacy, negotiation and tact will go a long way to resolving some of those locations where trees are a safety concern.

On rural, two-lane roads of moderate to high speed limits, trees this close are obviously a concern. Note the signs of crashes are noticeable on the trunk.

On a low-speed city street, trees close to the road may not be as much of concern (although the condition of signs may be).

Trees along curved roads are particularly hazardous.
Let’s review some types of countermeasures that can often improve safety at “Locations of Safety Interest.” Immediate countermeasures like signing, and marking alert the driver to the existing roadway condition and can be implemented in short order. The additional information will allow the driver to make an appropriate reaction or response in a timely manner. Tree and brush clearing at intersections and curves will allow a driver to see further and again, allow them to make appropriate reactions.

Short range countermeasures like resurfacing an intersection approach or along a curve to improve the friction and allow vehicles to stop or stay on the road in wet weather conditions can be completed by your agency with a little planning. Another short range countermeasure may include contracting a clearing project on a heavily wooded stretch of roadway because the trees are too large for you agency to remove. Some other short range projects you may consider include:

- Side slope reconstruction to improve the recovery area outside the pavement
- Drainage improvements to reduce hazardous conditions caused by standing water
- Road rehabilitation to introduce appropriate amounts of super-elevation in a curve

Countermeasures requiring major construction and higher cost should be included in your agencies long-range plan and constructed as time and funding permit. These types of projects might include re-aligning an intersection, construction of a roundabout, or reconstruction of a roadway to reduce a horizontal curve. Sometimes it is difficult to fund these types of projects with the ever-increasing demands of your highway funding, but consider setting aside a percentage of the total funding for a future major safety improvement project. Consider applying for federal-aid safety funding. You may have to start small, but once you see the impact safety improvement projects have on reducing injuries and fatalities it will be tremendous.

**Conclusion**

After going through the steps laid out in this series of articles, we are now at the point of being able to implement countermeasures that will improve safety. Think about that. You can take actions that will reduce the number of crashes, prevent injuries and possibly save a life or two. That idea should get you interested in taking actions that will improve highway safety. We can influence the safety numbers.

Next time, we will look again at the whole process, and also discuss how programmatic safety improvements can help the safety of our roads and highways.

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**ON-SITE SAFETY REVIEW**

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**Countermeasures**

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**Figure 2**
Part 2 - Developing a Utility Control Program

Alan S. Kercher, P.E. - LTAP Center Consultant

Part 1 discussed the importance of implementing a comprehensive roadway quality control program, as well as, what are adequate pavement design standards. Another important element of a roadway quality management program is the implementation of a Utility Control Program. Part 2 will discuss why a Utility Control Program is necessary and a brief overview of key components.

There are many reasons why a municipality should have a utility control program. The following are just a few examples:

1. **Protect the Infrastructure**

   Not too many things can ruin a road quicker than poorly filled utility trenches. Cutting a pavement destroys the integrity of a pavement and creates a joint that allows water to penetrate into the pavement and subgrade below, leading to the potential for significant damage. Also, allowing a recently paved road to be cut for non-emergency work can be perceived by the general public as incompetence. Poor utility construction practices can lead to trench settlement and/or undermining of the surrounding pavement, and possibly damaging existing utilities or nearby buildings.

2. **Liability**

   The following are a few utility construction situations that are potential liabilities: improperly controlled work sites within a right-of-way, trenches not properly braced, damage to utility lines, and poor safety practices relative to pedestrian traffic (open trenches). Not only can construction personnel and the public be injured, but serious damage to the infrastructure can occur.

   It must be remembered that although someone else may be doing the work, they are still your streets and you have an obligation to see that they remain safe.

3. **Traffic Delays**

   Poor planning or poor construction practices can lead to needless traffic delays, especially during peak travel times. For example, it is not uncommon to observe a routine maintenance procedure that takes two hours, being performed on a main thoroughfare during rush hour. Such activities should be required to be performed during off-peak hours, whenever possible.

   After reading about some of the potential problems created by utility work, one might wonder why any utilities should be allowed within a right-of-way. Then again, one must realize that the general public demands the services provided by utility companies. Road right-of-ways provide a convenient location for utility lines, as well as, helping to hold down costs by reducing the amount of additional right-of-ways that would have to be purchased by the utility companies.

**PARTS OF A UTILITY CONTROL PROGRAM**

A comprehensive utility control program should include:

- An Ordinance
- Specifications
- Administrative Forms
- Review Process

**THE ORDINANCE**

The ordinance should describe the basic requirements as to how utility work within the right-of-way will be permitted. Items addressed in the ordinance should include:

- Definitions
- Permit Requirements
Several important items that require special mention are as follows:

1. Permit Requirement

Permits should be required for all work performed within the right-of-ways. Not only should utility companies and contractors be required to abide by the ordinance but also municipal sewer and water departments.

2. Emergency Situations

It should be stated what specifically constitutes an emergency and what the emergency procedures are. Also, the utility company must be required to substantiate that a true emergency situation existed.

3. Warranty

Poor trench restoration can lead to very expensive repairs. In order to protect the municipality (and ultimately the taxpayers) from potentially large repair costs, utility companies and contractors should be responsible for all pavement and trench repairs for a specified period of time. The taxpayers should not have to pay for shoddy work.

4. Safety

Simply stated, safety is paramount! Lives are at stake as well as liability for the municipality. The main hazards include trench cave-ins, striking existing utility lines, personnel working within a right-of-way, and traffic hazards for the traveling public. All trenching must be in accordance with OSHA requirements. Temporary traffic control must be in accordance with MUTCD standards. Safety violations should carry fines and possible denial of future permits.

5. Scheduled Maintenance

Too often roads are overlaid and shortly thereafter, someone is cutting a hole in the new road. In order to minimize this problem, the utility companies should be required to notify the municipality in advance of scheduled replacement, repairs or planned expansions. Likewise, when a municipality generates its annual paving program, or even better, a long range plan, it should notify the utility companies of these plans as soon as possible. A pavement management system is a great tool that can assist municipalities with long range planning.

SPECIFICATIONS

The goal of the specifications should be to restore the right-of-way to its original condition. Therefore, trench and roadway restoration must be properly performed. This is accomplished with thorough specifications and a good inspection program.

Important items to be covered in the specifications should include:

- Pavement Cuts
- Backfilling
- Pavement Replacement
- Temporary Restoration
- Trenching/Open Cuts
- Temporary Erosion Control
- Landscaping and Lawn Replacement

Items of special note include:

1. Backfilling

Poor trench compaction can quickly ruin a road in good condition. Poorly compacted utility trenches are expensive to repair and may be an ongoing problem for many years to come. Additionally, they are a traffic hazard that can become a liability nightmare. An alternative to standard backfilling with soil that should be considered is flowable fill.

2. Pavement Replacement

Asphalt pavements, at a minimum, should match the type and thickness of the existing pavement layers. In no case shall the surface course be less than one and one-half inches thick. Similar to proper pothole patching techniques, the existing pavement edge should be cut straight and vertical prior to replacing the pavement. All joints should be properly sealed after final compaction.

In areas where the utility cuts cover a significant portion of the pavement, the utility company should possibly be required to overlay a larger area to insure a smooth and longer lasting surface. Since specifications are typically revised from time to time, it is more convenient to keep the specifications separate from the ordinance (although the specifications must be referenced in the ordinance). This will allow for revisions to the specifications without having to go through the lengthy approval process necessary for an ordinance.

As required by the Town’s utility ordinance, the road shown above was repaved at no cost to the municipality.
FORMS

It is important to create a paper trail for administrative and legal purposes. The four basic types of forms which should be required are:

- Application Forms
- Permit Forms
- Inspection Forms
- Completion Forms

REVIEW PROCESS

No matter how much diligence goes into the development, it is extremely difficult to develop a perfect ordinance. This is especially true in the dynamic world of the utility industry where technology is constantly undergoing many changes. Therefore, the ordinance should be reviewed periodically to ensure that it is meeting the needs of everyone involved.

To foster a spirit of cooperation and good will, the review process should include the utility companies and contractors who must obey the ordinance, as well as, the general public which must live with the consequences (good or bad) of the ordinance.

MUTCD 2003 UPDATE cont’d

IC 9-21-4-1
Sec. 1. “A governmental agency in Indiana that is responsible for the signing, marking, and erection of traffic control devices on streets and highways within Indiana shall follow the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways.”

Revisions
Revisions to the Supplement will be accomplished as specified in Indiana Code 4-22-2. Generally any change to the Indiana Supplement need not be implemented immediately unless specifically so stated in the newly promulgated regulation. The policies and practices of the governmental agencies involved will determine the reasonableness in time in making any changes or additions as required by regulations in the use of traffic control devices as set forth in the Supplement and MUTCD.

Not all of the traffic control devices that appear in later revisions to the MUTCD will appear in the Indiana Supplement; however, local jurisdictions, at their own discretion, may utilize portions of the revised MUTCD providing such use is in accordance with the intent of the MUTCD and does not conflict with Indiana State law.

Reasonable time periods for changing existing installations to conform to this Supplement and MUTCD should normally be updated at the end of normal service life or as published, by the Federal Highway Administration, for the “Phase-in Compliance Periods”.

Interpretation of the Supplement
The Indiana supplement is in the same format as the Millennium Edition of the Manual on Uniform Traffic Control Devices (MUTCD). 1) Standards are denoted in Bold Large letters. 2) Guidance is denoted in Large letters (same size as standards, but not bold) 3) Options and Support are denoted in non-bold smaller letters. The Indiana Supplement to the MUTCD refers to Page, Section and Line number as denoted in the MUTCD. 1) The page is the page number of the Millennium Edition of the Manual on Uniform Traffic Control Devices, with the December 28, 2001 revisions. 2) The section number is the section number that the change refers to, or, if the change is to a figure, the section number is on the bottom of the page. 3) The line number is the actual line that is being modified. A line will be counted, and thereby assigned a line number, only if there is one or more letters or numerals in the horizontal display. Vertical spaces between lines (paragraphs, etc) are not counted as lines. Line count does not include the top line which contains the page number and year, nor does the line count include the very bottom line which contains the section number.

Changes or modifications to a line, or lines, of the MUTCD will contain the exact language as found in the MUTCD. Words or phrases that are being deleted are the letter style with strike-out. Words or phrases being added are the letter style with underline. Other modifications consist of additional Figures, Sign depictions and Tables.

Once INDOT notifies us of the promulgation of the 2003 National MUTCD with Indiana supplements, we will pass on the information to you.
RESEARCH ENGINEER
Indiana LTAP, West Lafayette, IN

The Indiana LTAP is currently seeking to add a Research Engineer to its staff of professionals. Research Engineer duties include developing, promoting, and conducting technology transfer programs to provide training and implementation of the best practices for the operation of local roads and streets in Indiana. This will include the development of training materials and coordination with town, city, county, state, and federal officials, and University staff to enable these programs to be effectively presented throughout the state. Research efforts will relate to these technology transfer activities. The Research Engineer also makes decisions regarding the identification, demonstration, and education necessary to persuade local officials to adopt new or more efficient procedures.

The successful candidate will have an M.S. in Civil Engineering and 5 years experience; or a B.S. in Civil Engineering and 10 years experience; he or she must also be a licensed professional engineer. Prior experience in engineering, planning, and/or education is desirable.

The Research Engineer is required to have strong oral and written communication skills along with knowledge of word processing, database development and management, spreadsheets, email, and the internet. An understanding of Indiana local government, knowledge and experience in state and local highway planning, design, operations, and maintenance is highly desirable.

Visit www.purdue.edu/hr/employment for job listing and click “how to apply”.

HIGHWAY ENGINEER
St. Joseph County

St. Joseph County, Indiana is currently accepting applications for a Highway Engineer. The Highway Engineer assists the County Engineer in the administration and implementation of federal and local infrastructure and capital improvement projects. The position requires a Baccalaureate Degree in Civil Engineering and Professional Engineer license in the State of Indiana.

For a job description and/or to submit an application or resume, please contact: St. Joseph County Human Resources, 227 West Jefferson Boulevard- 7th Floor, South Bend, Indiana 46601, Phone (574) 235-9547; or view our web-site at www.stjosephcountyindiana.com.

PROJECT ENGINEER
St. Joseph County

St. Joseph County, Indiana is currently accepting applications for a Project Engineer. Project Engineers are responsible for providing, maintaining, and overseeing public works infrastructure projects, including design, plan review, and construction inspection. The position requires a Baccalaureate Degree in Civil Engineering, approved Engineering Technology or Construction Management curriculum and Engineer-in-Training or Engineering Intern license.

For a job description and/or to submit an application or resume, please contact: St. Joseph County Human Resources, 227 West Jefferson Boulevard- 7th Floor, South Bend, Indiana 46601, Phone (574) 235-9547; or view our web-site at www.stjosephcountyindiana.com.

Advertise a job listing or equipment sales for free in THE POTHOLE GAZETTE

Send your information to lwc@purdue.edu or fax to (765) 496-1176

Visit www.purdue.edu/INLTAP

LTAP HAS A NEW WEBSITE!

Have you visited the LTAP website lately? We’ve updated our site to provide better service to the community.

♦ View our calendar of events!
♦ Register online for conferences and workshops!
♦ Request materials from our Resource Library!
♦ Check your Road Scholar status!
♦ Download publications and worksheets!
♦ Post a classified ad!

Visit us at www.purdue.edu/INLTAP
Dear Colleague:

We have recently been informed that members of the LTAP community have received tickets for a little known revision to the law. Effective July 1, 2007, IC 9-18-2-26 was revised so that dump trucks are now required to display their license plate on the front of the vehicle, not the rear of the vehicle as before. The Indiana State Police Commercial Carrier Division was contacted to verify the law change.

IC 9-18-2-26
License plates; display
Sec. 26.
(a) License plates shall be displayed as follows:
   (1) For a motorcycle, trailer, semtrailer, or recreational vehicle, upon the rear of the vehicle.
   (2) for a tractor or dump truck, upon the front of the vehicle.
   (3) For every other vehicle, upon the rear of the vehicle.
(b) A license plate shall be securely fastened, in a horizontal position, to the vehicle for which the plate is issued:
   (1) to prevent the license plate from swinging;
   (2) at a height of at least twelve (12) inches from the ground, measuring from the bottom of the license plate;
   (3) in a place and position that are clearly visible;
   (4) maintained free from foreign materials and in a condition to be clearly legible; and
   (5) not obstructed or obscured by tires, bumpers, accessories, or other opaque objects.
(c) The bureau may adopt rules the bureau considers advisable to enforce the proper mounting and securing of license plates on vehicles consistent with this chapter.

For more information visit: www.in.gov/legislative/ic/code/title9/ar18/ch2.html