

# Quality Matters

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from the Quality Assurance Branch (QAB) of Highway Design



## Contractor coordinated utility relocation

Responsible for moving a project from inception to construction, project managers (PM), quickly learn that obstacles inevitably stand in the way of that path. Trying to get utilities clear prior to construction letting is a frequent frustration and, when not achieved, often leads to delays in construction and contractor claims.

In an effort to combat the delays and frustration resulting from utility relocation, District 5 decided to take an unconventional approach on the KY 61 widening in Bullitt County. In this experiment, district personnel tasked the contractor to take the lead in coordinating the relocations with the utility companies.

Leading up to construction, the highway design consultant compiled the relocation plans prepared by each utility company and included them “for information only” in the set of bid documents. A bid item was included to compensate the contractor for the coordination work.

Caroline Justice, the D5 utility section supervisor, said, “We were able to get the whole project to construction faster, and it also freed up KYTC utility staff to work on other projects.” She noted that this was possible because the contractor could do clearing and earthwork while the utility work was taking place simultaneously.

Similar to developing a set of MOT plans, developers of construction and relocation sequencing need to plan carefully to determine the feasibility.

For KY 61, KYTC combined two sections into one construction contract. One section was urban in nature and had numerous utilities; the second section was rural with few utilities, but had significant blasting and grading work. The contractor was able to work on the second section while utility companies relocated their facilities on the first section.

Another ingredient for success was the requirement that the contractor have someone on staff with utility experience to coordinate the utility work. It just so happened that Louisville Paving hired John Edwards, former QAB constructability reviewer and District 4 utility section supervisor. He filled a joint role as project manager and utility coordinator on the KY 61 project. He worked with utility representatives to resolve conflicts, to make field changes to the design when issues arose, and to adjust construction phasing as the project progressed.

Although not appropriate for every project, under the right conditions and with careful preparation, paying the contractor to administer utility relocation can help a project manager complete a project faster and reduce uncertainty in schedule and cost.

by: [Brent Sweger](#)

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# Flexibility creates exceptional designs

The expectation to deliver a context sensitive design often challenges new project managers (PM). Over-budget projects and negative impacts to environmental, cultural, right-of-way, or community resources are potential unwanted byproducts of efforts to meet all design guide minimums.

To achieve balance in engineering, environment, and economic needs, a PM would be prudent to consider using a value below a design minimum. A project in southern Kentucky is a notable example of this approach. To avoid the impact of relocating a

water line, the project needed a reduction of the minimum shoulder width from eight to six feet. The anticipated safety and performance effects were projected to be negligible; without this reduction, the project would have exceeded its budget.

When achieving a design minimum is not possible or judicious, design exceptions may be requested for approval. Chapter 704 of the Highway Design Manual (HDM) outlines the design exception process for KYTC. The HDM has been recently updated to reflect the changes to FHWA controlling criteria and changes to KYTC policy.

KYTC policy details 10 controlling criteria that must be met on all roadway projects with a design speed of 50 mph or higher unless there is an exception. This significantly expands the previous requirement's number of roadways in which controlling criteria are applied. Roads with a design speed less than 50 mph have only two controlling criteria.

There are three references that can be used to identify the minimums for the controlling criteria depending on the facility type; the AASHTO Geometric Design of Highways and Streets is the primary reference except on interstates and very low volume roads.

It is critical to justify and then document the need for an exception to the controlling criteria in the Design Executive Summary (DES). A new DES form can be found on the Division of Highway's [website](#). The PM should provide a written rationale to help reviewers understand the decisions that led to the recommended design.

Understanding the potential substantive effects on safety is recommended when

## Controlling Criteria for Design Speed < 50 mph

- Design Speed
- Design Loading Structural Capacity

deciding to use a design exception. The Highway Safety Manual is one tool that can be used to estimate the difference between the minimum standard value and what is being proposed. If needed, it is important for a designer to incorporate [mitigation strategies](#), such as warning signs or lighting, to abate the effect of the exception.

Additionally, for projects on the NHS, FHWA has explicit documentation requirements spelled out in their [May 5, 2016 memo](#).

It should be noted that the controlling criteria are different than the values in Exhibits 700-01 to 700-04 of the HDM. These exhibits are titled Common Geometric Practices and are guidelines rather than absolute standards. A deviation from these values that are not part of the controlling criteria are considered a variance. Documentation for variances, including mitigation strategies, should also be included in the DES.

Bottom line: a PM is allowed great flexibility in meeting the objectives of a project. Well thought-out design exceptions and variances allow a PM to find the needed balance.

by: [Shawn Russell](#)

## Controlling Criteria for Design Speed ≥ 50 mph

- Design Speed
- Lane Width
- Shoulder Width
- Horizontal Curve Radius
- Superelevation Rate
- Stopping Sight Distance
- Max Grade
- Cross Slope
- Vertical Clearance
- Design Loading Structural Capacity

## Upcoming Training:

### ■ InRoads I V8i SS4

1/24/2017 » 1/27/2017  
Frankfort From 8:00 am to 4:30 pm

### ■ 6th Annual Bridge Seminar Day

2/1/2017  
Lexington From 8:00 am to 5:00 pm

### ■ MicroStation I for Civil Professionals

2/21/2017 » 2/24/2017  
Frankfort From 8:00 am to 4:30 pm

### ■ Highway Capacity Analysis using HCM 2010/HCM 6th Edition with HCS 2010/HCS7

2/28/2017 » 3/2/2017  
Frankfort From 9:00 am to 4:00 pm

### ■ 2017 KSPE Annual Convention

4/19/2017 » 4/21/2017  
Covington

*KYTC employees should register through **Kevin Martin** for all classes.*

*Consultants will only need to register through **Kevin Martin** if the class is held at KYTC. Otherwise, consultants should contact the [Kentucky Engineering Center](#).*

*All times are local.*

# Monitoring traffic in work zones

As I-65 was being widened in District 4, multiple crashes caused countless hours of delays to drivers. To help address these recurring issues, the district implemented the iCone, a work zone monitoring technology that prompts faster response and clearance of work zone incidents.

At first glance, the iCone looks like a conventional construction barrel. However, closer inspection reveals speed detectors, communication equipment that sends real-time data, and a solar panel to power it all.

For each direction approaching the work zone on I-65, four iCones were placed at 2.5 miles spacing. When vehicle speeds dropped below a certain threshold, the iCone alerted construction personnel of a potential incident, allowing workers to detect, locate, and respond to a crash or incident quickly.

A variable message board placed in advance of the work zone can be remotely controlled to notify the travelling public of incidents or lane closures. When the low speed threshold is triggered, an automatic message is activated

warning drivers to recognize upcoming traffic queues and to slow down. Timely notification and quicker clearance of crashes not only reduce road user costs caused by delays, but also help reduce the likelihood of secondary crashes.

In addition to promoting real-time incident response, the iCone can collect and store analyzable speed and incident data. Law enforcement can strategically use this information to place iCones within or approaching a work zone where speeding occurs. Furthermore, the iCone can be used to identify problem areas where modifications to work zone traffic control may be needed.

Data collected by the iCone can be compiled from multiple projects to improve the implementation of traffic control under different scenarios. Data can also be used to determine where this type of work zone monitoring is most suitable and cost effective.

District 4 personnel were pleased with their iCone experience; a future enhancement is to couple iCones with cameras that could



be used for incident verification and data validation. KYTC has plans to use iCones on the upcoming I-75 widening project in Rockcastle County.

by: [Anthony Norman](#)

## Standard drawings

## Rumble strips

Each year the Highway Safety Improvement Program (HSIP), within the Division of Traffic Operations, submits a report on the effectiveness of Kentucky's safety countermeasures. The 2016 report shows that rumble strips have a 65:1 rate of return. That's right! For every \$1 that KYTC spends on rumble strips, the Cabinet helps Kentucky's motoring public save \$65 in crash costs.

In Kentucky, approximately 67 percent of highway fatalities are the result of roadway departure crashes: crashes in which a vehicle

crosses an edgeline or a centerline or leaves the traveled way. Kentucky installs rumble strips to alert distracted motorists when they are leaving either their lane or the traveled way.

In an effort to install rumble strips as consistently as possible across Kentucky, KYTC has updated rumble strip standard drawings and has released new sepia drawings. A new bid item for edgeline rumble strips (ELRS) has been created, so there are now three different rumble strip bid items. The drawings are available and effective for the February 2017

letting.

The new drawings include a handy rumble strip decision matrix. Using factors such as pavement, lane, and shoulder width, the matrix supplies a recommendation on whether to use an ELRS or shoulder rumble strip.

A ten-foot gap must be placed every 60 feet, allowing bicyclists to make a turn safely or to go around debris on a shoulder. Additionally, to help accommodate ADA users, standard drawings include a five-foot setback of rumble strips prior to the radius of an intersection without a marked crosswalk and a five-foot setback from a marked crosswalk.

Mike Vaughn of the HSIP sums it up: "Because of their effectiveness at preventing run-of-the-road crashes, we want to place rumble strips on as many high-speed roadways as possible. These new drawings allow us to do so with more consistency to their application while accommodating bicyclists and pedestrians."

by: [Mike Vaughn & Brent Sweger](#)

Updated Drawings	
002, 003, 004	Centerline rumble strips
005	Shoulder & edgeline rumble strips
New Drawings	
006	Edgeline rumble strips for two-lane roadways
007	Shoulder rumble strips for two-lane roadways
008	Rumble strips for multi-lane roadways & ramps

## New

# PCR data available

After nearly a two year hiatus, the Post Construction Review (PCR) program was given a fresh start in early 2016. Currently, we are completing the second cycle of annual reviews, visiting all districts to discuss completed construction projects. With each review, findings are logged into the PCR database. Over the years, this data has been collected and is now available on the [QAB website](#). The data is presented in a spreadsheet format that allows sorting and filtering by category, topic, or county. Sensitive information—such as project numbers, consultant, and contractor—has been intentionally omitted from the data set. If you have a chance to use this data, drop us an [email](#) to let us know how it helped!

by: [Brent Sweger](#)

*Don't forget to set up quantities for*

# Temporary construction entrances

Since January 2013, KYTC's policy is to pay for aggregate and filter fabric to construct temporary construction entrances (TCE) as outlined in [Construction Memo \(CM\) 01-13](#). The memo indicates a one-time payment for temporary construction entrances placed at locations approved by the engineer. The project manager should estimate and include quantities for aggregate and filter fabric in the bid items. Since the basic objective of TCE is to keep mud within the project limits and off public roadways, the KYTC Section Supervisor and contractor should work together to ensure the entrance is long enough to clean construction traffic tires. Additional materials needed to maintain the TCE, as well as removal of a TCE when no longer needed, are considered incidental to the initial payment.

by: [Bob Jones](#)

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# Reapproval of ET plus

As of January 2016, KYTC has [reapproved](#) the use of Trinity ET Plus (Guardrail End Treatment Type I) on KYTC projects. In late 2014, KYTC banned the use of ET Plus due to manufacturing revisions to the system. After the manufacturer retested the revised

system, KYTC has once again approved its use in Kentucky. We mention this as a reminder that any special note added to a project banning the ET Plus System should be removed from the plans.

by: [Bob Jones](#)

2016 Standard Drawings are [here](#) effective as of the June 24, 2016 letting. As a result the Sepia List just got significantly shorter! Be sure to update plans accordingly.

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