

# QUALITY MATTERS

from the Quality Assurance Branch (QAB) of Project Development



We're a resource for YOU . . .

- **Constructability** Reviews (with a combined 75 years' construction experience) available to attend project team meetings, review plans, and provide timely input
- **Value Engineering** Reviews in accordance with 23 CFR Part 627 and FHWA guidelines
- **Post Construction** Reviews aid decision making on future projects based on construction comments from construction personnel about completed projects
- **Geospatial Lessons Learned Database** stores data from all three QAB programs, allowing the user to search, filter, and map useful information as related to an issue or a specific project.

LOOK FOR US ON THE 5TH FLOOR of TCOB, email, or call (502) 564-3280

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Constructability Reviewers

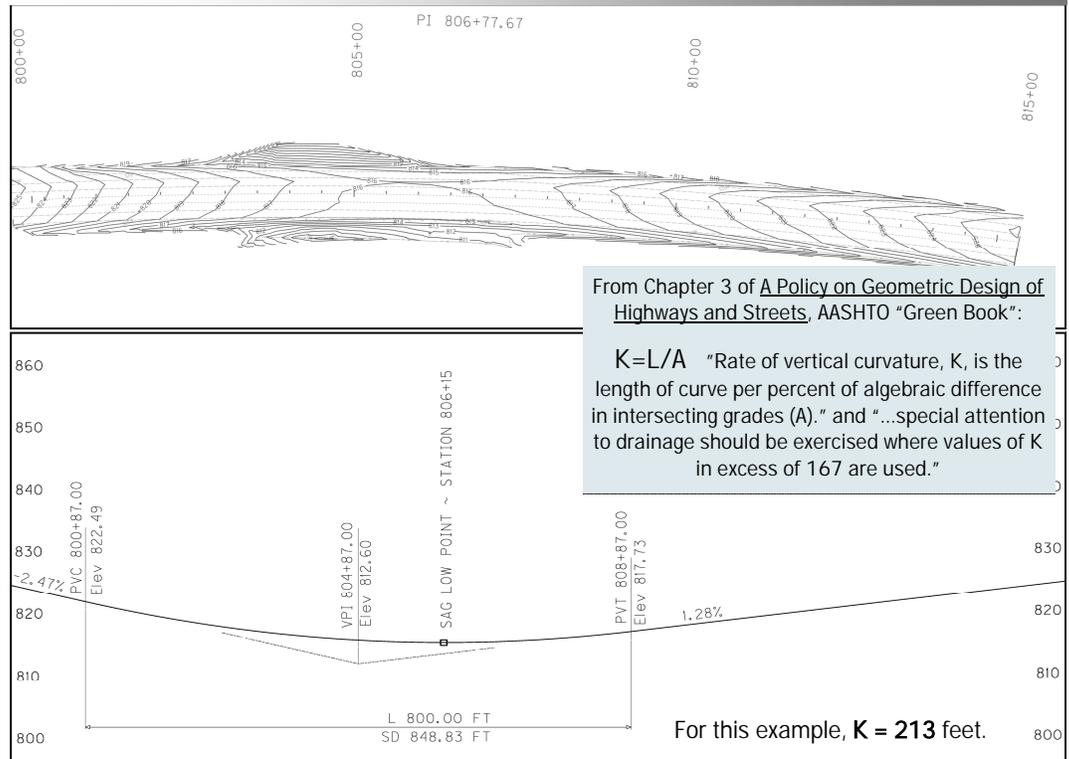
**Byron Johnson, P.E.**

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**Gary Raymer, P.E.**

\* CONGRATULATIONS to Boday and Brent for recently earning SAVE International accreditation and becoming KYTC's first Advanced Value Specialists (A.V.S.)!

## WHAT'S WRONG WITH THIS PICTURE?



From Chapter 3 of A Policy on Geometric Design of Highways and Streets, AASHTO "Green Book":

$K=L/A$  "Rate of vertical curvature, K, is the length of curve per percent of algebraic difference in intersecting grades (A)." and "...special attention to drainage should be exercised where values of K in excess of 167 are used."

For this example, **K = 213 feet.**

By Boday Borres,  
Quality Assurance Branch Manager

A picture speaks a 1000 words, but even if you don't notice the flat spot above, you'd feel it if you drove this road during a rain event. The potential for hydroplaning on this surface is a **major safety issue.**

### A + B + C = DISASTER

In this example, a combination of elements created a disastrous situation.

**A:** sag vertical curve

**B:** the horizontal curve is slight, and superelevation, as constructed, was too flat (contrary to plan details)

**C:** K value in a critical range

**D:** The result? An area of negligible cross-slope where ponding water is most dangerous - on a high speed, high volume roadway.

From KYTC Design Manual, HD 703, page 2:

**"Do not design horizontal and vertical alignments independent of each other. The coordination of these elements is to begin early in the design process."**

Remember:

- ✓ Keep superelevation transitions out of sags if at all possible, especially for widening projects and projects with more than 2 lanes.
- ✓ ALWAYS check "K" value in sags.
- ✓ Add NOTES to the plans emphasizing the importance of precise installation of pavement slope.
- ✓ Intensify the survey of existing ground elevations, especially in transition areas for overlay and lane addition projects. Increase the level of detail within the plans for proposed cross-slopes and final grade. Depending on the complexity, provide pavement development sheets.

**The right solution?** Mill the existing pavement, replane it to a steeper superelevation, and finish off with an overlay.

## To Shrink or Swell? (Both.)

By Rachel Catchings, Constructability Coordinator

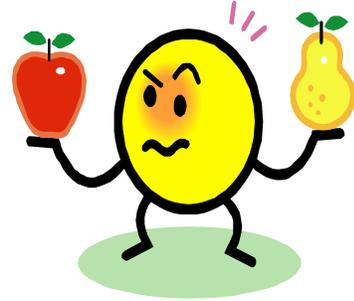
Since the issuance of Design Memorandum Number 05-02, shrink and swell factors have not been documented within the final plan sets themselves. To be clear, this policy still stands. However, shrink and swell estimates and calculations should be used when designing the proposed alignments in an attempt to balance the project's earthwork. The shrink/swell factors should be documented within the project file.

As designers continue to successfully balance embankment against excess

material, projects are increasingly susceptible to "flipping" from one appropriate bid item to the opposite. From straight yardage quantities, a closely balanced project may seem obviously suited to Roadway Excavation contract bid items. Applying shrink/swell factors may throw the project into a borrow situation (Embankment-in-Place bid items.) Post-letting, the implications of a project "flipping" like this are significant, resulting in delay and additional expense.

For example, a project appearing to have excess material at letting, may require borrow sites before construction is complete. Designers are reminded to

bring shrink/swell into consideration during the design process. If additional guidance is needed, the expertise of KYTC's Geotechnical Branch of Structural Design, the Division of Construction, and the Quality Assurance Branch of Highway Design may always be called upon.



## Lessons Learned

*the view from outside (inside Construction)*

By Nathan Wilkinson, GIS Coordinator

We've been continuing to grow and expand our Lessons Learned GIS Database since the last edition of Quality Matters. Just since March we've been able to add more than 50 additional Post Construction Review Fact Sheets to the Lessons Learned Database. We've also continued to actively apply the Lessons Learned Database as an educational tool and information sharing resource within the Cabinet. During the last few months the database was utilized to create customized maps, handouts, and presentations for the Division of Right of Way and Utilities as well as participants in the Project Development Academy. Currently we are working on presentations for Designers both in-house and consultants. **As always, additional custom materials are available upon request.**

The Lessons Learned Program continues to grow and evolve based upon our interactions with you and the insightful feedback you provide. During the past few months,

our Lessons Learned Database Coordinator, Nathan Wilkinson, has embarked upon his own personal learning experience. In an attempt to develop a more thorough understanding of

current construction methods and terminology Nathan has been serving a temporary apprenticeship as an inspector on the New Circle and Harrodsburg Road Double Cross-over Diamond Interchange project in District 7. His experiences on this project will continue to help him capture and report the issues as they are brought to light.

Mary Wade recently completed the 2011 Post Construction Review Cycle. As part of our ongoing efforts to improve the project development process and increase Cabinet wide communication, **the Lessons Learned Database will be used to share relevant findings during the FY 12 Post Construction Review season.** Presentations tailored to each individual Highway District should become a staple of these meetings as we look to the future.



Nathan Wilkinson, Geodatabase Coordinator, with Keith Walker, District 7 Construction, during a concrete pour on the Harrodsburg Road Project.



# Value Engineering

By Brent Sweger,  
Value Engineering Coordinator

The VE process has saved millions of dollars each year and improved projects with the recommendations that the project teams adopt. Additionally, innovations in project design or delivery are often identified. One of the innovative VE recommendations from a recent study was to modify the typical section of the road to use a 2+1 design.

This is a relatively new concept to the U.S.A., but has been used ex-

tensively on northern European rural roadways, functioning best where access is controlled and there are few major intersections.

Refer to the example pictured below. Three full lanes are constructed. Southbound traffic uses two lanes, and



northbound traffic uses one lane. After a mile or two, this alternates so that there is one lane southbound and two lanes northbound. This switch occurs intermittently at strategic locations, providing passing opportunities beyond those afforded from truck lanes.

The 2+1 improves the LOS by giving all drivers a place where they can feel safe to pass slower vehicles without having to cross the centerline.

**This approach can significantly improve travel conditions over a two-lane road (by increasing passing opportunity) without the price tag of a four lane divided highway.**

Learn more about 2+1 design at the Congestion Toolbox website: [transportation.ky.gov/Congestion-Toolbox](http://transportation.ky.gov/Congestion-Toolbox)

Since April 2010, **eight** Value Engineering Studies across the state have been conducted:

East Nicholasville Bypass (US27)	Jessamine Co.	District 7	URS Corporation
I-65 Widening	Hart, Edmonson Cos.	Districts 3 & 4	VE Group, LLC
Owensboro Bypass (US60)	Daviess Co.	District 2	In-house (KYTC)
US127	Clinton, Russell Cos.	District 8	URS Corporation
US127	Clinton Co.	District 8	URS Corporation
US119	Letcher Co.	District 12	VE Group, LLC
US41A	Hopkins Co.	District 2	VE Group, LLC
US150	Nelson Co.	District 4	RH Associates/KYTC

## Tools for Applying Constructability Concepts to Project Development:

A 2011-2012 Research Project with Kentucky Transportation Center

With this research project, QAB Constructability aims to structure Constructability Review information to offer designers another problem solving tool. Nikiforos Stamatiadis, P.E., Ph.D. and Paul Goodrum, P.E., Ph.D., with UK graduate student and E.I.T., Emily Shocklee, will hit the ground running on the research project this fall.

Starting off, a database of constructability information will be built and project review information will be categorized. The finalized database will yield:

- **A User-friendly database** (for designers),
- A new, simpler review format (for Constructability Reviewers), and
- Opportunity for training tailored to a specific discipline or issue.



To find out more, contact Rachel Catchings, Constructability Coordinator.

# Post Construction Reviews:

## Common Threads

Issues **repeatedly** brought up at PCR Meetings:

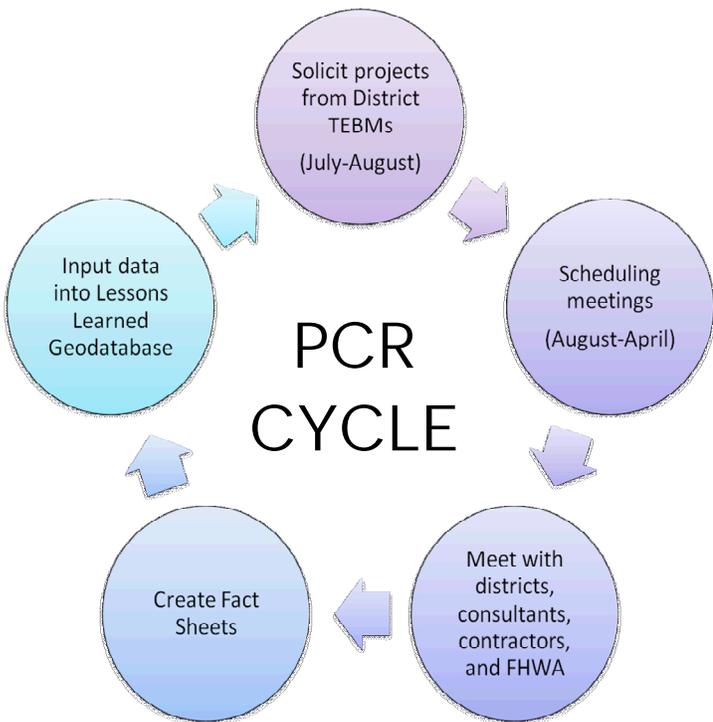
- \* Show any complicated phasing of traffic and partial-width construction on the cross-sections. Reviewing the temporary traffic configuration is worthwhile, especially where tie-ins or diversions will be necessary. Provide enough alignment (horizontal and vertical), typical section and cross-section information to ensure correct layout in the field.
- \* Superelevation transitions near a vertical sag (the same situation discussed on page 1) will be difficult or impossible to construct without flat areas and ponding of water on the roadway. If this can't be avoided, provide additional cross-sections and elevation information.

Try dusting off these useful bid items:

05950 Erosion Control Blanket. Consider using on steep back-slopes (2:1 slopes or greater).

20550ND Sawcut Pavement. Used at widening locations and lane additions, this produces a neat edge between the existing and proposed pavement and a higher quality finished project.

02599 Geotextile Fabric Ty IV and 00078 Crushed Aggregate #2's. Undercut stabilization quantities should be sufficient to allow for full width and depth of problem area.



2010-2011 Post Construction Review Cycle Summary		
District	Meeting	Projects
D-01	11-18-10	4
D-02	5-18-11	2
D-03	3-22-11	2
D-04	-----	0
D-05	2-15-11	1
D-06	4-21-11	4
D-07	4-12-11	3
D-08	3-08-11	2
D-09	9-30-10	2
D-10	1-13-11	3
D-11	1-27-11	4
D-12	12-02-10	3
<b>Total</b>		<b>30</b>

**2012 GOAL:**  
**FOUR PROJECTS PER DISTRICT**

## Coming Soon:

- KYTC Standard Specifications revisions are scheduled to go to print early in 2012.
- KYTC Highway Design Manual update is underway.
- Lessons Learned Database information **tailored** to each District and discipline—just ask Nathan!
- 2012 Post Construction Review Cycle—project suggestions are always taken year-round.