

## High Value Research Projects -- 2010

### Submitter

Agency: *Kentucky Transportation Cabinet*  
Organization: *Department of Highways*  
Contact: *Jamie Bewley-Bird, PE (Research Coordinator)*  
Email: *Jamie.Bewley@ky.gov*

### Research Program

Sponsoring agency or organization: *Kentucky Transportation Cabinet and Federal Highway Administration (Research conducted by the Kentucky Transportation Center in the College of Engineering at the University of Kentucky)*

### Project Title, ID, Cost and Duration

Title: *Identify and Evaluate Potentially Defective Steel on the Combs-Hehl I-275 Bridges*  
Report number: *Report not yet available, but paper published to the Web site cited below.*  
Project cost: *\$1, 800,000*  
Project duration: *2008-2010*

**Weblink** *www.ktc.uky.edu (select High Value Research button) or contact thopwood@engr.uky.edu*

### Brief Summary

*In 2006, three cracked secondary splice plates were encountered on the westbound I-275 bridge. By May 2008 the cracks had grown, leading the Cabinet to replace them. Follow-on metallurgical investigation of the plates revealed that, while they met the chemistry of ASTM A 514 steel, their mechanical properties were out-of-specification. The risk posed by any brittle SCC-steel remaining on the two bridges generated significant concern and the Cabinet sought to identify it. Hardness testing was a viable means of separating the acceptable steel from any steel that was out-the-specification. The field testing was performed using ultrasonic hardness testing per ASTM E 1038, and GE/Krautkramer MIC 20 ultrasonic hardness testers in conjunction with 10 kgf probes. Final hardness evaluation was performed using the TeleWeld Telebrineller, a mechanical impact tester, per ASTM E 10. All ASTM A 514 steel on the two bridges was identified. There were 1356 separate plates/locations on the two bridges representing some 4,500,000 lb. of steel. Two locations on each plate were subjected to ultrasonic hardness testing and any plates having values > HRC 27 were further evaluated using the impact hardness test. Fourteen out-of-specification ASTM A 514 plates were identified, ranging in 4 thicknesses from 3/8" to 3/4". None of them were fracture-critical. In the future, metallurgical evaluations should be considered/performed on any cracked ASTM A 514 steel found on bridges.*