

## High Value Research Projects -- 2010

### Submitter

Agency: *Kentucky Transportation Cabinet*  
Organization: *Department of Highways*  
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### 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 with others.)*

### Project Title, ID, Cost and Duration

Title: *Pavement Settlement Issues and Hydro-Geochemical Water Testing Results for the Cumberland Gap Tunnel*  
Report number: *KTC -10-03/KH58-07-1F (soon to be published)*  
Project cost: *\$121,390*  
Project duration: *2008-2010*

**Weblink** *www.ktc.uky.edu (soon to be published report will be available at this site) or contact cgraves@engr.uky.edu*

### Brief Summary

*Ground Penetrating Radar (GPR) surveys and Hydro-Geochemical Water Testing (HGWT) have been performed at the Cumberland Gap Tunnel to determine why the reinforced concrete pavement has settled in various areas throughout both tunnels. Approximately 7,300 total square feet of pavement surface has voids beneath it ranging from 0.05 to 40 inches in depth. Up to 1 million gallons of calcium deficient water flows through the tunnel's ground water collection system on a daily basis, dissolving the lime stone sub-base. If the pavement was to fail, its impact would impose an approximate 1.1 million dollars of daily users cost to the traveling public due to long and potentially dangerous diversion routes around the Cumberland Gap Mountain. There are several strategies outlined in this report to address both short-term and long-term remediation. It is proposed that grout material should be placed beneath the pavement structure (at an estimated cost of \$50,000 to \$100,000/year). For the long term it is proposed that approximately 2,800 lineal feet of pavement and backfill material be removed in both tunnels and replaced with an inert granite backfill and a new 10 inch reinforced concrete pavement be installed for a long-term remediation (estimated cost -- \$10,000,000).*