Arkansas Department of Transportation

Transportation Research Committee

**RESEARCH PROBLEM STATEMENT**

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<th>DATE: 09/10/2017</th>
<th>PROJECT AREA: Maintenance</th>
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**TITLE:** Mitigation of Sedimentation Issues in Box Culvert

**PROBLEM STATEMENT:**
Many box culverts in Arkansas have significant issues with sedimentation, which is partly related to erosive soils. According to the Section Head of Special Studies of the ArDOT's Environmental division, this is a statewide problem in Arkansas, but the severity of the problem is higher in some districts (Districts 1, 2, 3, 5, 7, and 10) than the others. Generally, flat graded inlet/outlet ditches tend to deposit sediment. Such sedimentation problems exist almost anywhere in flat and Delta lands in Arkansas. For instance, ArDOT District 10 has encountered such issues in many reinforced concrete boxes (RCBs) in the district. According to the District 10 Engineer, there have always been problems with short RCB’S (4’ or less) that gather sediment with little way of cleaning them out short of using shovels. Culvert sedimentation can start occurring immediately after the placement of the culvert. Many highway culverts become partially filled with sedimentation in a few years. This warrants ArDOT to undertake costly maintenance and clean-up efforts in coordination with the US Army Corps of Engineers (CoE) and Arkansas Department of Environmental Engineer (ADEQ). Culvert sedimentation often occurs due to the lowered flow velocity through large and flat bottomed culverts. The main goal of this study is to recommend a suitable design and maintenance plan based by exploring alternative design approaches based on regional characteristics such as substrate types (sand, silt, gravel, etc.), land usage, and slope, and by monitoring (short-term and long-term) of existing cases along with a few newly constructed ones. Before finalizing the project plan, the study will review the new approaches/tools developed by other state DOTs. For instance, Iowa DOT has developed self-cleaning box culvert. The proposed study is expected to a significant cost savings for ArDOT.

**OBJECTIVES:**
Specific objectives of this study are:
1. Conduct a thorough review of literature to understand alternative designs and maintenance plan
2. Develop effective design to minimize sedimentation
3. Construct a few test cases (culvert) to assess constructability
4. Monitor the performance of selected culverts (existing and test cases)

**FORM OF RESEARCH IMPLEMENTATION:**
2. Plans and drawings of the proposed design
2. One-day workshop to train ArDOT personnel on the proposed design

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<th>Estimated Project Duration: 24 months</th>
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**REVIEWER:** Davin Webb

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<th>Standing Subcommittee Ranking</th>
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Updated 7/20/2017