

RESEARCH PROBLEM STATEMENT

DATE: 09/15/2020	PROJECT AREA: Materials
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TITLE: Investigation of Ultra-Lightweight Concrete Properties for Transportation Structures

PROBLEM STATEMENT:
Reduced dead load of concrete is a desirable property for some transportation applications. For example, some historic bridges may require lighter deck materials to maintain an adequate factor of safety. Lightweight concrete can be made with a variety of manufactured aggregates, examples include expanded clay or shale, and recycled, foamed glass. It is important that concrete made with these materials delivers adequate strength and durability properties while reducing the dead weight of the concrete. The proposed work will compare concrete made with traditional lightweight aggregate (shale and clay) with concrete made of foamed glass, and propose lightweight concrete requirements for structural use. The proposed work will develop concrete mixes which achieve weights less than 125 pounds/cubic foot while maintaining adequate compressive and flexural strengths. Other properties of interest will be free shrinkage, creep, workability, surface conductivity, and alkali-silica reactivity. The work will result in requirements for lightweight concrete in Arkansas and recommendations on the best type of aggregate to achieve the stated properties.

- OBJECTIVES:**
- 1) determine available sources of lightweight aggregates near Arkansas
 - 2) design concrete mixtures with the aggregates from step 1 which reduce concrete weight while still achieving adequate performance relative to current ARDOT specifications
 - 3) compare all aggregates to make recommendations on the most feasible aggregate for situations where lightweight concrete is required in Arkansas
 - 4) recommend requirements for QA/QC testing of concrete made with lightweight aggregate

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:
The mixture recommendations and proposed requirements developed in this project will give ARDOT information that can be utilized if lightweight concrete was desired for the deck of a historic bridge or for any other application where less dead load is desired.

Estimated Project Duration: 24 Months
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Standing Subcommittee Ranking <u>6/8</u>	Advisory Council Ranking <u>27</u>	Statement Combined with Statement Number(s) _____
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