Statement No. 31

Arkansas Department of Transportation

Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 09/10/2017 | **PROJECT AREA:** Materials

TITLE: Use of Rice Husk Ash (RHA) in Flowable Fill Concrete Mix

PROBLEM STATEMENT:

Rice hull (RH) is one of the main agricultural residues obtained from the outer covering of rice grains during the milling process. RH constitutes 20% of about 700 million tons of paddy produced in the world. When burned, 20% of RH is transformed into about 27 million tons of rice hull ash (RHA) per year. Riceland Foods, a family farmer owned business in Arkansas, is the largest rice miller in the US with an annual production of about 100 million bushels. A significant portion of RHA generated by Riceland Foods is being treated as waste. RHA is a cementitious material, and Riceland's RHA contains about 75% silica in an amorphous form and has an extremely high surface area. RHA is also economically beneficial, but its performance as a construction material has been investigated very little. High silica content makes is probable pozzolanic material for concrete. AASHTO M321 also specifies RHA as a high reactivity pozzolan due to its high slilica content. The main objective of the proposed study is to assess the feasibility of the use RHA in producing low strength Flowable Fill Concrete, which is a self compacting, cementitious material used primarily as a backfill material in lieu of compacted-soil backfill. The proposed objective of this study will be achieved through laboratory investigation of its chemical, physical and mechanical properties. The field performance of the RHA-modified concrete will be demonstrated through its application in two selected test sites. The outcome of the proposed study is expected to be important in setting the direction of the sustainable use RHA in producing concrete and be significant cost saving for ArDOT. This project will also help local farmers to be economically sustainable as they are striving to find new markets for RHA.

OBJECTIVES:

The main objective of the proposed study is to evaluate the usage of RHA in concrete production. Specific objectives are given below:

1. Evaluate chemical, physical and strength properties of RHA modified concrete
2. Evaluate the effect of curing time and environmental conditions on strength properties and durability of RHA-modified concrete
3. Evaluate the optimum dosages of RHA as pozzolan in concrete construction
4. Evaluate field performance by backfilling two selected

FORM OF RESEARCH IMPLEMENTATION:

1. Performance data of Concrete prepared with RHA and guidelines to use it.
2. Mix design data and steps for preparing flowable concrete with RHA as a replacement of cement.
3. Organize a two-hour workshop on Flowable Fill Concrete for producers and users (ArDOT laboratory personnel)

Estimated Project Duration: 24 **months**

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Standing Subcommittee Ranking	Advisory Council Ranking	Statement Combined with Statement Number(s)
3 / 12	8 / 44	