Title: Comparison of limestone powder to other SCMs in portland cement concrete

Problem Statement:
Limestone powder (LS) is fine material produced from limestone quarries that can be used as a partial replacement for portland cement (PC) with no loss in mechanical performance. Lately, some cement producers are blending LS with PC to produce portland-limestone cement (PLC) with 5-15% limestone. This change is largely due to a desire to reduce the environmental impact of cement production. It is likely that ARDOT will see cement producers include more LS in all of their cements in the near future. What is proposed here is a comparison of different cement systems (PLC, PC plus LS, PC plus fly ash, blends of PC, LS, and fly ash) in order to compare their physical properties (compressive strength, flexural strength, modulus, freeze-thaw resistance, shrinkage). Replacement rates of up to 50% will be considered in order to understand the total effects of these different blends on the properties of the concrete. A detailed literature review will be included to aid ARDOT decision making regarding allowing increased LS addition to PC or PLC cement in Arkansas concrete mixtures.

Potential Solution to Problem:
The technical approach will include the following stages:
1) detailed literature review on PLC and LS addition to PC
2) design of mixtures and evaluation of fresh properties
3) physical property determination (compressive and flexural strength, modulus, freezing and thawing, and shrinkage of mixtures)
4) comparison of local data with data from literature
5) develop recommendations to ARDOT regarding replacement of PC with other materials (fly ash, LS, PLC)

Matching funds from the Oklahoma/Arkansas Chapter of the ACPA are expected to be included in support of this work.

Estimated Project Duration: 24 Months
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