Research Office
Long Range Planning Division
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Research Project Title

Enhancing Freeze-Thaw Resistance of Tennessee Concrete Mixes through Improved Air Void Testing

Purpose of the Project

The purpose of the project is to: 1) evaluate the applicability of super air meter (SAM) and SAM number in Tennessee; 2) evaluate the consistency of SAM number measurements for Tennessee concrete mixes; 3) determine the threshold of SAM number for QA/QC purpose for Tennessee concrete mixes; and 4) provide guidance/recommendations on the acceptable parameters for TDOT concrete mixes if the SAM test method is applicable in Tennessee.

Scope and Significance

The scope of the research project includes: 1) to complete a synthesis of literature review on the latest advances in the SAM test method and SAM number and to conduct a state DOT survey on their acceptance criteria of SAM number for adequate freeze thaw resistance of concrete; 2) to test various concrete mixes across Tennessee in the laboratory and on the job sites for their SAM numbers, as well as other air void parameters, and the freeze-thaw resistance in terms of the durability factor from AASHTO T 161; 3) to conduct a statistical analysis on the consistency of the SAM number values, and correlate the SAM number to other air-void parameters as well as to the AASHTO T 161 durability factor; 4) to evaluate the applicability of SAM to Tennessee concrete mixes and the suitability of SAM number as a QC/QA tool for freeze thaw resistance, and to determine the acceptance criterion for the SAM number if it can be adopted for QC/QA purpose; 5) to make recommendations to TDOT specifications regarding applicability of SAM to TDOT mixes and the consistency of the SAM number.

Expected Outcomes

The proposed study will benefit TDOT in the following aspects: 1) a guideline on the use of SAM in Tennessee concrete mixes will be provided from this study if it is verified to be applicable. The guideline will provide guidance to TDOT technicians, staff, and engineers regarding how to apply this new technology and how to improve the resistance of Tennessee concrete to freezing and thawing cycles; 2) improvement in the freeze thaw durability of concrete with less or no cracking; 3) extended service life of concrete structures; 3) significant cost savings to TDOT due to reduced maintenance and rehabilitation activities.

Time Period

The time period for the project is from August 1, 2019 to November 30, 2020.

Contact Information

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