



UNIVERSITY TRANSPORTATION CENTER RESEARCH BRIEF

PROJECT TITLE: Investigation of the Relationship between Formation Factor and Water Content of Fresh Concrete

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INSTITUTION: SINGLE-INSTITUTION PROJECT

ESTIMATED COMPLETION DATE: JANUARY 2018

SPONSORS: THE PACIFIC NORTHWEST TRANSPORTATION CONSORTIUM, OSU

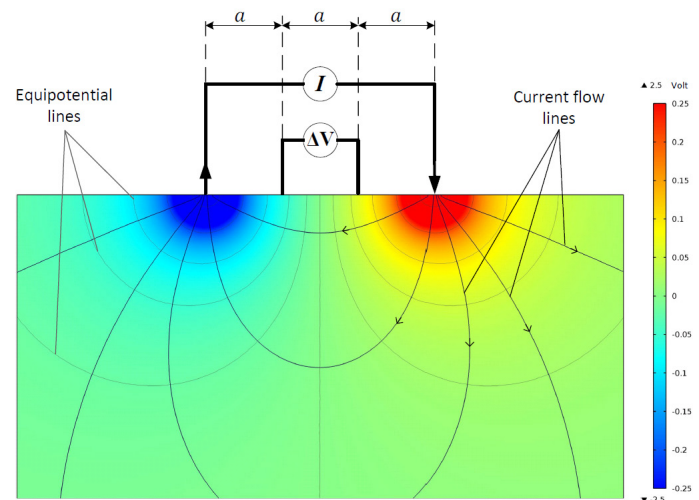


Background

Each year approximately 10 billion tons of concrete is produced, making concrete the largest manufactured product globally. The majority of this production is in the form of ready mix concrete. There are about 5,500 ready mixed concrete plants and about 55,000

ready mixed concrete mixer trucks that deliver concrete to points of placement. The quality control (QC) and quality assurance (QA) of this large operation have major economic, social and environmental implications.

Current protocols for assessing the quality of fresh concrete during construction do not provide information on critical parameters that are related to long-term durability of structures. Compressive strength tests are typically performed weeks after the placement of concrete, and they do not provide adequate information about the future performance of structures in terms of their durability because they mainly check if the desired mechanical properties are satisfied. Therefore, there is a need for improved and practical QC/QA protocols to (1) confirm that the fresh concrete delivered to the construction site is the concrete that is specified and



ordered, and (2) ensure that the delivered fresh concrete mixture will satisfy the performance specifications for long-term durability. Formation factor of concrete is a unique parameter that can satisfy both needs.

Research Project

Formation factor of concrete is directly related to critical performance indicators such as water-to-cementitious material ratio or porosity of concrete and provide information about both durability and mechanical performance of structures during their service life. The main objective of this research is to investigate the relationship between the formation factor and water content of fresh ordinary portland cement concrete. This research will establish the groundwork for the future development of an in-situ measurement device for measuring formation factor of fresh concrete mixtures at job sites for improved QC and QA protocols. These protocols will provide significant improvements in the quality of the concrete used in transportation structures.

