

FACT SHEET



RESEARCH PROJECT TITLE

Evaluation of the Surface Resistivity Measurements as an Alternative to the Rapid Chloride Permeability Test for Quality Assurance and Acceptance

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MORE INFORMATION

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Since its creation by the legislature in 1986, LTRC has grown to national prominence through its efforts to improve transportation systems in Louisiana. The center conducts short-term and long-term research and provides technology assistance, engineering training and continuing education, technology transfer, and problem-solving services to DOTD and others in the transportation community. The center is largely supported by funding authorized by the Federal Highway Administration.

Concrete Testing Device Provides Substantial Savings

November 2011

WHAT WAS THE PROBLEM?

Current practices require a permeability test, ASTM C1202: "Standard Test Method for Electrical Indication of Concrete's Ability to resist Chloride Ion Penetration," for structures with potential salt water intrusion. The test is run at 56 days of age and typically requires a day of sample preparation and another day of actual testing. The in-house facilities with adequate testing equipment are limited and this test is fairly expensive for contractors.

Louisiana is currently in the process of adopting the new Load and Resistance Factored Design (LRFD) service life requirements statewide. This will require permeability testing for all concrete structures.

WHAT WAS DONE?

A new surface resistivity device has been recently developed. This device is capable of reliably predicting permeability values of ASTM C1202. Replacement of ASTM C1202 with the surface resistivity device will result in a quicker, cheaper, user friendly and non-destructive solution for the permeability testing for LRFD service life requirements.

WHY SHOULD YOU DO IT?

An LTRC study performed side-by-side comparisons between ASTM C1202 and the new surface resistivity meter. The correlation between the test methods at 56-days was excellent ($R_2 = 0.89$). A great correlation also existed between 56-day ASTM C1202 and 28-day surface resistivity measurements ($R_2 = 0.87$). The results of the study show the surface resistivity device is capable of reliably predicting the permeability values of ASMT C1202.

WHAT ARE POTENTIAL FISCAL IMPACTS?

A preliminary cost benefit analysis was completed by the research team to determine the effect of implementing the surface resistivity technology. The state is expected save about \$101,000 in the first year of implementation in personnel costs, while contractors are expected to save around \$1,500,000 in the first year. As the LRFD requirements are adopted statewide, the savings will increase exponentially. Implementation of the device began with the I-10 Twin Spans and Caminada Bay bridges.

Advantages of the surface resistivity devices include:

- **Quicker sample preparation and testing time**—surface resistivity sample preparation and testing time require about 10 minutes, while ASTM C1202 requires about two days.
- **Ability to predict 56-day results at 28-days**—quality control/assurance time is reduced by half.
- **Non-destructive**—the sample already collected for compression quality control/assurance can be tested for permeability prior to other testing.
- **Portable**—the surface resistivity devices are a self-contained hand held unit. The state can supply each district with a meter instead of shipping samples to central labs equipped for ASTM C1202.
- **Lower initial cost**—the surface resistivity device costs \$2,800, while ASTM C1202 equipment ranges near \$18,000.
- **Lower operating cost**—the reduction in technician hours will save the state money. Contractors purchasing meters instead of private testing will save money, the savings are expected to pass to the state as well.

