

Executive Summary, Research Readiness Level Assessment, and Technology Transfer

Effect of Moisture Condition on Concrete Core Strengths

Research Objectives

The main objective of this in-house investigation was to determine the magnitude of the difference between the strengths of moisture cured and sealed plastic bag cured cores. The Department launched this investigation to examine if there is a major strength difference between the moisture cured and sealed plastic bags cured specimens for drilled cores in Nebraska.

Research Benefits

This research confirmed that the current NDOT practices meet ASTM C42 requirements.

Principal Investigator

Wally Heyen, PCC Engineer

Lieska Halsey, Assistance
Material Engineer

Assistance

David Hansen, Research
Engineer

Background

The strength of the concrete measured by tests of cores is affected by the amount and distribution of moisture in the specimen at the time of testing according to ASTM C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, "There is no standard procedure to condition a specimen that will ensure that, at the time of test, it will be in the identical moisture condition as concrete in the structure."

According to ASTM C42, it is current practice to allow the cores to remain in a sealed condition with a plastic bag or non-absorbent containers for at least 5 days prior to testing unless otherwise specified by the engineer. Currently, Nebraska Department of Transportation (NDOT) follows the ASTM C42 with the exception of all cores obtained for compressive strength testing must be stored immediately in a moisture cured room until the required 28-day testing; after being delivered in a sealed bag.

Conclusion

The main purpose of this study was to determine if there would be any major differences between curing methods of cores taken for acceptance testing from a highway slab on a project. The comparison provided data to determine the effect of the moisture gradients created by these different curing treatments on core strength and core permeability. The strengths were measured of moist cured cores and sealed plastic bag cured cores from the day cores were obtained (14, 21 and 26 days) until they reached 28 days. Permeability was also measured at 26, 28 and 32 days. According to ASTM C42, it is current practice to allow the cores to remain in a sealed condition with a plastic bag or non-absorbent containers for at least 5 days prior to testing unless otherwise specified by the engineer. Currently, Nebraska Department of Transportation (NDOT) follows the ASTM C42 with the exception that all cores obtained for compressive strength testing must be delivered to the PCC Lab in a sealed bag, un-bagged and stored immediately in a moist cure room until the required 28-day testing. The findings from this study show no significant difference in strength nor in permeability between curing concrete core samples in bags versus storing them in a moist room.



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Interested in finding out more?
Final report is available:
[HERE](#)

NDOT Recommendations Based Off of Research Project

The DOT will continue placing the cores for compressive strength in plastic bags immediately after taking the sample. The cores will be transferred from the project to the Central Lab in Lincoln. Upon arrival, the plastic bags will be removed and the cores will be placed in the cure room until the required testing date.

- *As provided by Wally Heyen , Lead TAC Member*

Research Readiness Level (RRL) Assessment Level 5: Standard Practice

Research/Technology fully implemented and understood. No follow-up is necessary.

RRL 5

Technology Transfer

Webinars/Presentations

- Association General Contractors (AGC) -Paving Committee-2019
- Nebraska Department of Transportation Project Manager Conference-2019
- Nebraska Concrete & Aggregates Association (NC& AA)- 2019

**This brief summarizes the In-House Research Project
“Effect of Moisture Condition on Concrete Core Strengths”
Nebraska Department of Transportation Research Program**