

Proposal for an SP&R Pooled-Fund Study

Phase II Extending the Season for Concrete Construction and Repair Defining Engineering Parameters

Objective

The objectives are to define how to improve concrete's resistance to damage from cycles of freezing and thawing in a deicing-salt environment and to develop a fast, reliable method for predicting thermal profiles—and thus, rates of strength development—as freshly placed concrete cures.

Background

Phase I demonstrated the practicality of using commercial admixtures as antifreeze admixtures for concrete. Two suites of admixture formulations were developed and evaluated under laboratory conditions for their suitability to field application. In four field trials from New Hampshire to Wisconsin, the admixtures made the concrete easy to work with and gain strength rapidly in cold outdoor conditions. The concrete made with these admixtures was able to fully cure at internal temperatures of -5°C , was as durable as normal concrete, and was cost competitive with conventional concreting techniques because no additional heat was required to keep the concrete warm. Phase I is on track toward delivering the tools to design, mix, place, and cure concrete in below-freezing weather. Work now needs to be done to define other benefits of using off-the-shelf admixtures, such as enhanced durability and thermal safety.

Benefits Obtained from this Study

Participants in this study will:

- Learn how various admixture doses affect concrete durability, especially concrete exposed to deicing salts, and how to design for longer service life.
- Reliably predict when the concrete will be strong enough to be placed into service, before actual placement.
- Use the concrete mixes developed in Phase I of this study.

How to participate in this Study

A consortium of stakeholders will fund this study, where each stakeholder contributes between \$10K and \$50K per year for up to three years. State DoTs are encouraged to direct their SP&R funds toward participation in this project.

Avoiding Frost Damage

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