Progress Report
September 2005

FHWA POOLED-FUND PROJECT NUMBER: ***TPF5-(075)***

TITLE: Extending the Season for Concrete Construction and Repair – Phase II, Defining Engineering Parameters

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OBJECTIVE: To define the effect of the antifreeze admixtures developed in Phase I on the freeze-thaw durability of portland cement concrete. Develop guidance for using admixtures to enhance the service life of concrete in northern climates.

REPORTING PERIOD: 01 May 2005 through 01 September 2005

ITEMS IN THIS ISSUE:

- Progress since last report
- New industry guidance
- Looking ahead
- Phase III on the FHWA website

Progress since last report: All laboratory testing has been completed. Admixture dosage, cement factor, w/c ratio, and air voids were studied for their effect of freeze-thaw durability. As reported earlier, the data shows that admixtures improve the freeze-thaw durability of concrete when they are used at the approximate admixture dosage recommended in Phase I. Some mix designs were very resistant to frost damage. Further analysis of the data should help determine what contribution the admixtures had on this improvement. We are also re-examining the literature for any hints of these results in other studies.

Guidance: The new Cold Weather Admixture Systems (i.e., Antifreeze Admixtures) specification passed ASTM Section C09, Concrete and Concrete Aggregates, in June 2005. The specification is in final review by the Committee on Standards at ASTM for compliance with procedures. This specification is significant.

Work on ACI 306, Cold Weather Concreting, is continuing. Chapters 7-9 have been re-balloted at committee level for the second time. Chapters 1-6 should be sent out for balloting soon.

A new chapter on cold weather admixture systems was reviewed by ACI 212, Chemical Admixtures at its April 2005 meeting.

An Engineering Technical Letter (ETL) on cold weather admixture systems was submitted to the Air Force in September 2005.

Army manuals on Arctic Construction are being updated on cold weather concreting.

These are important advances that will one day allow antifreeze technology to find its way into general practice. Thanks to all of you for being a part of this developing success.

***Looking ahead**:* The final report for Phase II will be drafted once all data has been analyzed and the is literature reviewed. Writing should begin in the next month or two.

Phase III was proposed: Our proposal for Phase III to wrap up this study area is posted on the FHWA website. Please take a minute to review it to decide if you will support it. Briefly, we need to develop guidance for determining the optimum dosage of admixture to use at the jobsite. Phase I gave us a one-size-fits-all answer to cold weather. As we know, the recommended dosage to achieve the –5°C capability is not always necessary. Many times smaller dosages could do the job; both from strength gain and durability perspectives. The objective of Phase III is to develop a series of tables that allows one to select admixture dosage based on air temperature, mix design, thickness of concrete, and boundary condition. These tables will be incorporated into the March 2004 Guide we drafted for you. This phase will develop the criteria to optimize mixture design, economize materials costs, and better assure a desired outcome for the antifreeze admixture systems developed in Phase I.