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14. Supplementary Notes

15. Abstract

Purpose and Need

Intrusion of water into the concrete matrix can act as a delivery mechanism for potentially harmful materials. These materials can accelerate corrosion of reinforcing steel in the concrete. Corrosion of the reinforcing steel occurs when chlorides, from deicing salts or cast-in-place chlorides, attack the steel. Steps can be taken to prevent corrosion of the reinforcing steel in concrete bridge decks. Coating the steel with a protective layer is an excellent means to prevent corrosion, but it does not prevent the absorption of water and the consequent freezing and cracking that may occur. To do this, researchers must find an acceptable concrete mix design that will lower the permeability of the concrete with no loss in strength.

Objective

This research project will investigate the use of fly ash and ground granulated blast furnace slag (GGBFS) as partial replacements for Portland cement in concretes designed for bridge deck applications in the State of North Dakota.

Scope

Identify the percentage of fly ash and GGBFS that can partially replace portland cement in the concrete matrix to increase durability while maintaining adequate strength to meet design parameters.

Summary

Based on the test results, the recommended fly ash replacement percentage for low permeable concrete is 38% and the recommended GGBFS replacement percentage is 35%. These results were incorporated into construction project IM-NH-8-029(050)062 located in Fargo, ND. The bridge decks were instrumented to monitor freeze/thaw cycles and the corrosion of rebar. Chloride ion intrusion into the concrete will also be monitored. The monitoring results will be presented in another research report which is scheduled to be completed in 2009.

16. Key Words	17. Distribution Statement	18. No. of Pages
High Performance Concrete Portland Cement Fly Ash Ground Granulated Blast Furnace Slag	No restrictions. This document is available to the public by request from: **University of North Dakota** **Department of Civil Engineering** **Dr. Charles Moretti** **Grand Forks, ND 58202** **Office: (701) 777-5150** **or** North Dakota Department of Transportation Materials and Research Division: 300 Airport Road Bismarck ND 58504-6005 Office: (701) 323-6900	105 19. File type/Size pdf/ 8.7 mb