METHODS TO INCREASE DURABILITY OF REACTIVE ("D" CRACKING) COARSE AGGREGATE IN PORTLAND CEMENT CONCRETE

1.0 Introduction

The coarse aggregates used for Portland Cement concrete in southwest Iowa have exhibited a poor serviceability. This early failure is attributed to a characteristic commonly referred as "D" cracking. "D" line cracking is a discolored area of concrete caused by many fine, parallel hairline cracks. "D" line cracking is primarily caused by the movement of water in and through coarse aggregate with a unique pore structure. The presence of the water in the aggregates at the time of freezing causes the "D" cracking to occur and early failure.

By making the pore structure less permeable to moisture, it is thought the durability factor of the concrete should increase. By drying the aggregate before mixing and then mixing with the cement, the particles of cement should enter the outer pore structure, and upon hydration make the pore structure less permeable to moisture.

2.0 Purpose

The purpose of this project, R-259, is to determine a feasible way of coating coarse aggregate prior to and during the mixing operation in order to increase the durability of the freeze and thaw beams.

7.0 Summary

In Conclusion:

1) The durability results of mixing procedures 2 and 3 did not indicate a feasible way of coating the coarse aggregate prior to or during the mixing operation.

2) Mixing procedures 2 and 3 did improve compressive strength, but due to construction problems and the decrease in durability mentioned above, both procedures can not be utilized.