

## 6.0 SUMMARY

Sufficient strengths were obtained for all mixes. Only two types of mixes produced beams with durability factors acceptable for this study - the mixes made with air dry Haydite and air dry Idealite.

The effects of curing on plant mixed specimens were inconclusive because the mixes were made with saturated aggregate and the durability factors obtained from these mixes were too low to have much significance.

In order to produce concrete with acceptable durability, it is necessary to use air dried aggregate when mixing. This is a conclusion that can be drawn from this study. The Standard Specification 2403.04 (Paragraph A) states that "coarse aggregate shall be kept continuously and thoroughly wet for at least 48 hours before being used in the concrete". ACI Standards 1965 (ACI 614-59) states that the aggregate should be damp and implies that thoroughly wet aggregate will not give concrete with acceptable durability. The Standard Specifications were wrong and have been changed by Specification 624, "Special Provisions for Lightweight Concrete Bridge Units".

## LIGHTWEIGHT AGGREGATE USE IN STRUCTURAL CONCRETE

### 1.0 INTRODUCTION

The Iowa State Highway Commission has adopted a number of rigid safety requirements that the Bureau of Public Roads has set forth as standards for road construction. One of these safety requirements is the elimination of two piers on Interstate grade separations, thus leaving two long spans. These longer spans lower the ability of prestressed concrete beams to compete economically with steel beams. In an effort to be more competitive, the prestressing companies have been studying the use of lightweight aggregate in structural concrete.

### 2.0 PURPOSE

The purpose of this project is to determine which of the three lightweight aggregates proposed for use by Prestressed Concrete of Iowa, Inc., Iowa Falls, will produce concrete with sufficient strength and durability to be used by the Iowa State Highway Commission for structural concrete. The effects of curing on the structural concrete will also be studied.

### 3.0 MATERIALS

Three lightweight aggregates were used in this study. They were:

The Idealite was chosen for use by Prestressed Concrete of Iowa, Inc. because it had good durability and the least external deterioration after freeze and thaw. Although the Haydite had good durabilities, it was not selected because the ends of beams made with it crumbled badly during freeze and thaw cycles. The Materialite durabilities were too low for consideration.