

ABSTRACT

This report summarizes the second part of an original FDOT sponsored project titled "Effect of Pumping on Concrete." The final report for the original project was completed in 1996. Both studies investigated the changes which occur in concrete due to the effect of pumping. The studies are important because the pumping of fresh concrete is gaining popularity due to economics and ease of construction. The detrimental and beneficial effects of pumping, if any, should be known so that they may be accounted for in design. Concrete samples were collected and analyzed from 11 FDOT construction sites before and after pumping, during the original project. In the second phase, an additional 62 samples were collected and analyzed. This report presents the combined results for 73 samples from both studies. Collection and testing of concrete were performed in accordance with the ASTM and AASHTO test methods. By testing samples before and after pumping, the changes in the properties of concrete due to pumping were determined. The tests used in this study were Air Content (ASTM C173), Slump (ASTM C143), Unit Weight (ASTM C138), Compressive Strength (ASTM C39), Rapid Chloride Permeability (AASHTO T277), and Water Permeability (FDOT). The test results were statistically analyzed to determine whether the changes caused by pumping were statistically significant. The air content and the slump of concrete decreased by about one percent and 13 mm (0.5 in) on the average, respectively, due to pumping. The unit weight and compressive strength of concrete were found to increase by about 24 kg/m³ (1.5 pcf) and 1.83 Mpa (266 psi), respectively, due to pumping. Pumping decreased the water and chloride ion permeabilities in the majority of tested samples. Results show that pumping does not have detrimental effects on concrete

properties. In many cases, it results in stronger, denser, and more durable concrete. It is suggested that pumping be continued as a means on concrete placement on FDOT projects with confidence