

AN ABSTRACT OF A THESIS
DEVELOPMENT OF HIGH PERFORMANCE STRUCTURAL
LIGHTWEIGHT PORTLAND CEMENT
CONCRETE

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With complicated architectural designs becoming more common, engineers are looking for new technology and advancements in old technology to help deliver these designs. High performance structural lightweight concrete (HPLWC) enables engineers to satisfy design requirements that ordinary concrete would not suffice. The objective of this research was to develop and model high performance lightweight concrete that could be used to overcome some of the design challenges engineers are faced with. This concrete must be both economical and practical enough for acceptance and implementation in the concrete construction industry.

A total of eight concrete mixtures were developed for plastic and hardened property testing. Four aggregate combinations were used to obtain various concrete densities, and two cementitious material combinations were utilized for each aggregate combination. Slump, air content, and unit weight were determined for each mixture before cylinders and flexural beams were cast. Compressive strength, flexural strength, splitting tensile strength, and static modulus of elasticity were determined for each mixture at an age of 7, 28, and 90 days. These data were plotted and compared to existing hardened property relationship models developed by third party organizations. New models were developed for data that did not correlate with an existing model.