

AN ABSTRACT OF A THESIS

PERVIOUS CONCRETE PASTE COMPOSITION

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Pervious PCC is recognized as a sustainable solution to stormwater management issues. However, currently the paste used in pervious concrete is predominantly Portland cement. Portland cement poses several threats to the environment that must be evaluated. Estimates have revealed that the production of one ton of Portland cement will, in return, release approximately one ton of CO₂ into the atmosphere. CO₂ is recognized as a greenhouse gas that is believed to contribute to global warming. Replacing percentages of Portland cement with a variety of cementitious materials that are byproducts of industrial processes will greatly improve the environmental quality of the mixture. Capitalizing on the use of wastes will also contribute to the best use of a nation's landfill space. Researching various paste compositions reveals the effectiveness of replacing various percentages of the Portland cement with byproduct cementitious materials. In turn, it improves the environmental qualities of the already "green" pervious concrete. A total of 31 preliminary mixes were cast and analyzed. The control used for the analysis was taken as the average of three control mixes. The remaining 28 preliminary mixes were completed by only altering one aspect of the paste composition at a time. The first five mixes altered the paste by making slight adjustments to various chemical admixtures. Four tertiary mixtures were designed which used three different materials to make up the cementitious component. In the remaining 19 mixes, the composition of the pervious paste was gradually altered by increasing the amount of fly ash or slag in 12.5% increments.