Abstract

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Thesis title: **Development of a Semi-automatic System for Identification of Saturated Surface Dry (SSD) Condition for Fine Aggregates Under Controlled Environment**

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Identification of saturated surface dry (SSD) conditions is an important step in the estimation of specific gravity for aggregates. The recommended SSD identification techniques in pavement engineering guidelines typically involve manual intervention(s) to induce or detect the SSD condition, which can result in measurement errors. Furthermore, while the established techniques are relatively easy to implement for coarse aggregate, estimation of SSD condition for fine aggregates is relatively challenging owing to their smaller particle sizes. To address this issue, this study builds upon some prior work to automate SSD condition identification using change point detection from a time series of weight and images during the drying process of aggregates. The improvements proposed in the present study include: (i) automation in weight data acquisition, (ii) setting up and performing tests under controlled environment of temperature and relative humidity, (iii) use of improved algorithm to detect SSD condition (change point) simultaneously considering the weight and the image of the drying aggregates. To test the proposed approach, three different size ranges of coarse aggregate and four different size ranges of fine aggregate were taken from a single source. The results for coarse aggregates were consistent across trials and showed good agreements with the tests conducted by another standard test method. Also the

results for fine aggregates demonstrated internal consistency across trials. Finally, some observations pertaining to the challenges of continuous monitoring of aggregate drying under standardized environmental conditions are discussed.