ABSTRACT

Name of student: **Vaibhav Sheel** Roll no: **12807782**

Degree for which submitted: **Master of Technology**

Department: **Civil Engineering**

Thesis title: **Predicting transient temperature response of pavements**

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Month and year of thesis submission: **July 2017**

Rapid increase in population is leading to urbanization, which created a higher demand for construction of houses and pavements. Asphalt pavements typically have higher heat absorbtivity than concrete pavements making it a major contributor to urban heat island effect. This study aims to develop a simulation model to predict transient temperature response of pavements. The pavement and its surroundings are considered as a transient system experiencing three heat transfer modes. For radiation, heat fluxes coming from sun and atmosphere were considered, wind speed was considered to account for convection at the pavement surface and for conduction, fundamental heat equations were used. A finite difference method was used to solve the problem. The simulation model take inputs like location coordinates, wind velocity, air temperature, relative humidity, material properties of pavement layers and a panorama image from the point of study. The study uses a solar position algorithm and a clear skies model to estimate incoming solar irradiance. A novel approach was adopted to find shadows using a panorama image. Simulations using the newly developed model effectively predicted the temperature profile of the pavement at any given time and depth.