THE INFLUENCE OF URBAN BUILT FORM ELEMENTS FOR OUTDOOR THERMAL COMFORT CONDITIONS

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DECLARATION

"I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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I certify herewith that, B. M. L Mendis , Index No 169181F of the 2016/2018 batch, has carried out research for the Master of Spatial Planning Management and Design dissertation under my supervision.

…….	……...
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ABSTRACT

Rapid urbanization lead built-up area expansion is one of the key challenges in present cities. Most of the cities in tropical countries, will be significantly affected by the urban heat which is caused by high-density built-form and exacerbated by climate change. This study discusses the impact of different built form elements to the outdoor thermal comfort of pedestrians/users with special reference to a given micro-climatic zone at Pettah in Colombo. The location for the case study was purposely selected which consists with highly urbanized and highly pedestrianized area in Colombo. For the Field measurements there were selected five different elements of built forms located under the same microclimatic condition. The first Location is an Urban Plaza, the second Location is a narrow, East-West canyon (i.e, Prince street), the third Location is a North – South Urban Canyon (i.e., 02nd cross street), the fourth Location is a wider, East-West Urban (i.e., Main Street) and the fifth Location is a Parking Precinct.

Field measurements of five weather parameters effects on the thermal comfort of pedestrians (i.e., Air temperature, Relative Humidity, Wind direction, Wind speed and the Surface temperature) were taken on the 27th March 2019 which is the time of the time of the year that usually records the highest temperature in the given micro –climatic zone.

Empirical data were analyzed and discussed the behavior of measured Air Temperature, Surface Temperature, Thermal Heat Index (THI) values and Thermal Heat Index Difference (THI Difference) of each Location. To study the influence of different urban forms and to explore the urban heat mitigation strategies in depth used the ENVI-met 4.1 computer simulation for selected five locations and Air temperature, Mean Radiant Temperature (MRT) and Predicted Mean Vote (PMV) data were analyzed.

As results the different built form elements indicates the different thermal comfort levels. Among all selected built forms, Urban canyons/ urban streets and Urban Plaza with More Green indicated sensible results according to the urban heat mitigation. Therefore, mainly highlighted the Urban Streets/ Urban Canyons which gives the urban shade and Urban Plaza comprises Trees with Larger Tree canopies are most considerable urban forms in city planning to mitigate the urban heat in an urban setting.

Key words: Different Built forms elements, Thermal heat Index (THI), Thermal heat Index Difference (THI Difference), Predicted Mean Vote (PMV), Outdoor thermal comfort.

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TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES