**UNIVERSITY MALAYA**

# Original literary work declaration

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Title of Thesis ("this Work") : "CLIMATIC IMPACT ON URBAN HERITAGE BUILDING: CASE STUDY ON A BRITISH COLONIAL RESIDENCE – JKR 989 IN KUALA LUMPUR"

Field of Study : SUSTAINABLE, CONSERVATION

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11 November 2011

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11 November 2011

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# Abstrak

Malaysia adalah sebuah negara yang panas dengan purata suhu antara 24ºC dan 33ºC dan kelembapan relative antara 70% dan 90%. Oleh itu, faktor bahangan haba merupakan masalah yang paling serius dalam pembangunan terutama jenis kediaman. Walaupun penyaman udara boleh menyelesaikan masalah ini, namun ia banyak menggunakan tenaga elektrik dan juga menyebabkan masalah alam sekitar. Selain itu, kebimbangan 'sick building syndrome' telah membangkitkan kesedaran kepentingan pengudaraan semulajadi dalam bilik. Tindakan membuka tingkap adalah sambutan yang paling hangat dan mudah untuk mengawal bahangan haba di dalam bilik. Justeru itu, size tetingkap adalah sangat penting kerana jika size tetingkap tidak direka dengan betul, cahaya matahari akan menerusi secara langsung melalui tingkap dan menyumbang haba lebihan ke dalam bilik. Rumah tempatan di kawasan tropika perlu dilindungi dan dikaji untuk mengenal pasti strategi reka bentuk tingkap untuk pengudaraan semula jadi dan 'daylighting'. Kajian ini menyediakan penilaian prestasi reka bentuk tingkap di kawasan bandar dan penilaian kesan 'microclimate' terhadap keselesaan terma dalaman bagi penduduk dengan berdasarkan kajian di kediaman terpilih jenis 'British Colonial' di Kuala Lumpur, Malaysia. Hasilnya mencadangkan kediaman jenis British Colonial di Bandar perlu dilindungi dan reka bentuk tingkap optimum untuk kediaman di kawasan Bandar. Penilaian telah dijalankan berdasarkan pengiraan tetingkap nisbah dinding 'Window to Wall Ratio', pengukuran lapangan dan ujian simulasi yang menggunakan AIOLOS. Seni bina bangunan dan tingkap kediaman yang dipilih dianalisis dan data yang dikumpul daripada setiap rumah terpilih telah digunakan dalam pengiraan tetingkap nisbah dinding-'Window to Wall Ratio'. Pengesahan hasil tetingkap nisbah dinding 'Window to Wall Ratio' kemudiannya diperiksa oleh pengukuran lapangan dan simulasi dengan menggunakan perisian

AIOLOS. Penyelidikan ini menunjukkan bahawa keadaan haba kediaman yang dipilih adalah lebih tinggi daripada keperluan piawaian Malaysia. Di samping itu, bangunan yang sedia ada di sekeliling bangunan kajian mengenakan kesan mendalam terhadap ‘microclimate’ JKR 989 yang secara langsung mempengaruhi prestasi tingkap bangunan itu.

# Abstract

Malaysia is a hot and humid tropical country that has yearly mean temperature between 24°C and 33°C and relative humidity between 70% and 90% throughout the year. Thus, overheating is a paramount problem in residential buildings. Although air conditioning can solve this problem, it will consume a large amount of electricity and also causes environmental problems. Moreover, the concern of sick building syndrome has resulted in a resurgence of interest in naturally ventilated rooms. The action of opening a window is the most intuitive and simple response to controlling overheating in a room. Even so, if the window opening dimension is not properly designed, direct sunlight through the window will contribute by far the largest heat gain in houses. The survival of vernacular houses especially in the tropics should be reviewed to identify window design strategies that had been applied for natural ventilation and daylight. This study provides an evaluation on the window design performance in urban area and evaluation of impact of microclimate on indoor thermal comfort of the inhabitants based on case study on a selected British Colonial residences in Kuala Lumpur, Malaysia. The result suggests optimum window design for similar residences in urban area. The evaluation was conducted based on the calculation of window to wall ratio, field measurement, and simulation test using AIOLOS. Architecture and window design approaches of the selected residences were analyzed and the data collected from each residence were applied in the calculation of window to wall ratio. The validations of the window to wall ratio were then examined by field measurement and simulation using AIOLOS software. The research reveals that the thermal condition of the selected residence was higher than Malaysia standard requirements. In addition, existing surrounding buildings imposed a deep impact on the microclimate of JKR 989 which directly influenced the windows performance of the building.

# Table of Contents

# Table of Figures

# List of Tables

# List of Abbreviations

| | | |
|---|---|---|
| AL | - | Air Leakage |
| ASHRAE | - | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| CFM | - | Cubic feet per minute |
| CORE | - | Centre for Conservation Studies and Records |
| JKR | - | Jabatan Kerja Raya |
| LSG | - | Light to Solar Gain |
| PMV | - | Predicted Mean Value |
| PPD | - | Predicted Percentage Dissatisfied |
| RC | - | Resource Centre |
| SHGC | - | Solar Heat Gain Coefficient |
| UBBL | - | Uniform Building By Law |
| VLT | - | Visible Light Transmittance |
| WWR | - | Window to Wall Ratio |
| ZEB | - | Zero Energy Building |