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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

THE IMPACT OF WIDER FRONTAGE DESIGN OF
LOW-COST DOUBLE STOREY TERRACE HOUSE
(LCDSTH) TO AIRFLOW AND NATURAL
VENTILATION IN MALAYSIA

BY

NURULASHIKIN BTE MD TAIB @ MD TALIB

INTERNATIONAL ISLAMIC UNIVERSITY
MALAYSIA

2007

“It is God Who made your habitations homes of rest and quiet for you...”

(Al-Nahl: 80)

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NURULASHIKIN BTE MD TAIB @ MD TALIB

A thesis submitted in fulfilment of the requirement
for the degree of
Master of Science in Built Environment

Kulliyah of Architecture and Environmental Design
International Islamic University
Malaysia

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ABSTRACT

This thesis presents the results of an analysis which was done to predict the impact of wider frontage design of low-cost double storey terrace house (LCDSTH) to airflow and natural ventilation in Kuala Lumpur. The existing LCDSTH has narrow frontage and deep plan which necessitates its internal planning with partitions to divide the spaces and arranged the rooms to have single-sided openings. These arrangements have extremely limited cross-ventilation potential and caused discomfort to occupants. Due to the availability of natural ventilation from the prevailing wind in Malaysia, the LCDSTH design could be manipulated to enhance the natural ventilation to flow into the living spaces and gives cooling effect to ameliorate occupants' thermal comfort. Predictions of the mean internal air velocity in the existing and proposed LCDSTH are used to identify the potential plan for improving thermal comfort. Computational Fluid Dynamic is chosen due to its capability in fluid dynamic studies. A specific software named FLOVENT is used to predict the internal air velocity by simulating the simplified building configuration of the existing and proposed model of LCDSTH. The outcomes of the simulated results are then compared using the graphic velocity vectors and contour from FLOVENT and also from the mean internal air velocity graph. The results show that although the proposed design with wider frontage, shorter depth plan and different building height in a staggered and checker board pattern position give the best solution as compared to the existing plan, it is not significant enough to provide to the most preferable air velocity values of 1.0 m/s for thermal comfort at every position of each unit in a row of LCDSTH. However, it does improve the performance of the mean internal air velocity in comparison with the existing double storey terrace house that has the design of narrow frontage and deep plan.

- (LCDSTH)
LCDSTH

LCDSTH

LCDSTH

FLOVENT

LCDSTH

FLOVENT

m/s1.0
.LCDSTH

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science in Built and Environment.

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Nurulashikin Md Taib @ Md Talib

Signature Date

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STOREY TERRACE HOUSE (LCDSTH) TO AIRFLOW AND NATURAL
VENTILATION IN MALAYSIA**

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My greatest appreciation to dearest husband, Muhayan & son, Atif Irfan for their encouragement, love, & will in sharing the joy of learning

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CONTENTS

Abstract	ii
Abstract in Arabic	iii
Approval Page	iv
Declaration Page	v
Copyright Page	vi
Dedication	vii
Acknowledgements	viii
List of Tables	xiii
List of Figures	xv
List of Abbreviations	xxi
List of Symbols	xxiii
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Background	2
1.2.1 The Importance of Natural Ventilation in Housing	3
1.3 Research Objectives	4
1.4 Research Questions	5
1.5 Research Scope	6
1.6 Research Methodology	7
1.7 Thesis Organization	8
1.8 Research Significance	9
1.9 Research Gap and Concept	10
1.10 Research Hypothesis	10
1.11 Thesis Outline	12
CHAPTER 2: NATURAL VENTILATION	14
2.1 Introduction	14
2.2 Basic Concept of Natural Ventilation	14
2.2.1 Functions of Natural Ventilation	18
2.3 Thermal Comfort	18
2.3.1 Factors Affecting Thermal Comfort	19
2.3.2 Air Movement in Relation with Human Thermal Comfort	19
2.3.2.1 Comfort Zones in Malaysia	20
2.3.3 Air Movement Required for Thermal Comfort	21
2.3.3.1 Air Movement in Kuala Lumpur	26
2.4 Mechanism of Natural Cross-Ventilation	27
2.4.1 Induced Wind in Cross-Ventilation	28
2.4.2 Air Movement around Building	29
2.5 Summary	33

CHAPTER 5: CFD SIMULATION	83
5.1 Introduction	83
5.2 The Scaled Models	83
5.2.1 The Existing Model of LCDSTH with Narrow Frontage And Deep Plan (EM)	85
5.2.2 The Proposed Model of LCDSTH with Wider Frontage and Shorter Depth Plan (PM)	88
5.2.3 The Openings	91
5.3 CFD Setting-up	94
5.3.1 Simulation Procedure	94
5.3.1.1 The Monitor Positions	94
5.3.1.2 The Solution Domain of Tests Models	99
5.3.1.3 The Grid System	102
5.3.2 Simulation Condition	110
5.3.2.1 The Site Condition	110
5.3.2.2 Wind Speed	111
5.3.2.3 Wind Profile and Atmospheric Boundary Layer (ABL) Generator	111
5.3.2.4 The Correction Calculation	112
5.3.2.5 Optimal Simulation Variables	113
5.3.3 Pilot Testing	114
5.3.3.1 Result and Finding of Pilot Study	116
5.3.3.2 Final Simulation Condition Adopted	116
5.4 Summary	118
CHAPTER 6: RESULTS, ANALYSIS AND FINDING..	119
6.1 Introduction	119
6.2 The Existing Model of LCDSTH with Narrow Frontage and Deep Plan (EM)	119
6.2.1 Results and Analysis for 0° Wind Direction	120
6.2.1.1 Discussion on the Distribution of the Mean Internal Air Velocity	122
6.2.2 Results and Analysis for 45° Wind Direction	126
6.2.2.1 Discussion on the Distribution of the Mean Internal Air Velocity	127
6.2.3 Summary of the Existing Model of LCDSTH with Narrow Frontage and Deep Plan (EM)	129
6.3 The Proposed Model of LCDSTH with Wider Frontage and Shorter Depth Plan (PM)	131
6.4 The Proposed Model of LCDSTH with Different Building Height in an Aligned Position (PM-A)	131
6.4.1 Results and Analysis for 0° Wind Direction	131
6.4.1.1 Discussion on the Distribution of the Mean Internal Air Velocity	133
6.4.2 Results and Analysis for 45° Wind Direction	136
6.4.2.1 Discussion on the Distribution of the Mean Internal Air Velocity	138

6.4.3	Summary for the Proposed Model of LCDSTH with Different Building Height in an Aligned Position (PMA)	139
6.5	The Proposed Model of LCDSTH with Different Building Height in a Staggered and Checker Board Pattern Position (PM-B)	141
6.5.1	Results and Analysis for 0° Wind Direction	141
6.5.1.1	Discussion on the Distribution of the Mean Internal Air Velocity	143
6.5.2	Results and Analysis for 45° Wind Direction	145
6.5.2.1	Discussion on the Distribution of the Mean Internal Air Velocity	147
6.5.3	Summary for the Proposed Model of LCDSTH with Different Building Height in a Staggered and Checker Board Pattern Position (PM-B)	149
6.6	Findings and Conclusion	150
6.6.1	Findings of EM at 0° and 45° Wind Direction	150
6.6.2	Findings of PM-A at 0° and 45° Wind Direction	152
6.6.3	Findings of PM-B at 0° and 45° Wind Direction	153
6.6.4	The Comparative Analysis and Conclusions	155
6.7	Summary	159
CHAPTER 7: CONCLUSION		160
7.1	Introduction	160
7.2	Thesis Summary	160
7.3	Thesis Conclusion	163
7.4	Limitations of Thesis	165
7.5	Recommendation for Future Research	165
BIBLIOGRAPHY		167
APPENDIX A:	CIS 1:1998	174
APPENDIX B:	FLOVENT version 5.1	181
APPENDIX C:	Validation Report	189
APPENDIX D:	Inventory	197
APPENDIX E:	Summary of Opening Sizes and the Average Percentage of the Opening Ratio and Effective Opening Ratio of the LCDSTH Investigated	241
APPENDIX F:	Pilot Study	242
APPENDIX G:	Simulated Data of Internal Air Velocity	246
APPENDIX H:	Seminar Paper presented by the author	256

LIST OF TABLES

<u>Figure No.</u>		<u>Page</u>
<u>No.</u>		
2.1	The probable impact of different air velocity	24
2.2	The annual percentage (%) of wind speeds and directions (1975 - 2004)	26
4.1	Kuala Lumpur Planning Area and the Growth Status Zones	76
4.2	The 10 areas which are in the 10 km radius from Kuala Lumpur City Centre	77
5.1	Summary of Mean Surface Wind Speed (Monthly) for 36 years (1969-2004)	111
5.2	ABL characteristic of different terrain roughness at Subang and Kuala Lumpur	112
5.3	Summary of mean Air Temperature (Monthly) for 38 years (1968-2005)	114
5.4	The variables that were identified in getting good agreement in the validation study	117
6.1	Air velocity distribution of EM at 0° wind direction	121
6.2	Air velocity distribution of EM at 45° wind direction	127
6.3	Summary of the Mean Internal Air Velocity Performance and the Percentage of Deviation from 1.0 m/s preferable air velocity for EM at 0° and 45° Wind Directions	130
6.4	Air velocity distribution at PM-A at 0° wind direction	133
6.5	Air velocity distribution at PM-A at 45° wind direction	137
6.6	Summary of the Mean Internal Air Velocity Performance and the Percentage of Deviation from 1.0 m/s preferable air velocity for PM-A at 0° and 45° Wind Directions	140
6.7	Air velocity distribution at PM-B at 0° wind direction	142
6.8	Air velocity distribution at PM-B at 45° wind direction	146

<u>Figure No.</u>		<u>Page</u>
<u>No.</u>		
6.9	Summary of the Mean Internal Air Velocity Performance and the Percentage of Deviation from 1.0 m/s preferable air velocity for PM-B at 0° and 45° Wind Directions	149
6.10	Summary of the Mean Internal Air Velocity Performance and the Percentage of Deviation from 1.0 m/s preferable air velocity for EM, PM-A and PM-B at 0° Wind Direction	156
6.11	Summary of the Mean Internal Air Velocity Performance and the Percentage of Deviation from 1.0 m/s preferable air velocity for EM, PM-A and PM-B at 45° Wind Directions	156

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1.1	The overall thesis organization	9
1.2	The difference between the existing and the proposed plan to pressure distribution and thus, the airflow in the building	11
1.3	The arrangement of terrace house in a staggered and checker board pattern by manipulating the building height	12
2.1	Single-sided ventilation ($W_{\max} = 2.5 H$)	15
2.2	Cross-ventilation ($W_{\max} = 5H$)	16
2.3	Stack effect	17
2.4	Proposed comfort zone by Md Rajeh (1989)	20
2.5	Proposed comfort zone by Abdul Malek (1992)	21
2.6	Proposed comfort zone by Adnan (1997)	21
2.7	Shows Olgyay's Bioclimatic Chart	22
2.8	All the investigations shown by the graph is showing the importance of air movement to thermal comfort	23
2.9	Szokolay attempt to reanalyse from ten sources A – O	25
2.10	The mechanism of cross-ventilation by air pressure difference	27
2.11	The positive vortex at high pressure of the windward wall and negative vortex at lower pressure at leeward wall	28
2.12	The relationship between air pressure and air velocity around the bluff body in two dimensional diagram showing the shear layer and wake region	29
2.13	1/3 air velocity flows to the top of building and 2/3 air velocity flows to the sides or to downward	30
2.14	The effect air flow at two buildings with lower height in front of the other taller one	31

<u>Figure No.</u>	<u>Page No.</u>
2.15 The reverse air flow beyond the taller building	32
2.16 The gap between two buildings create Venturi Effect	32
3.1 A row of low-cost double storey terrace house at Taman Koperasi Polis 1	35
3.2 A typical front elevation and side elevation of a unit of low-cost double storey terrace house in Kuala Lumpur	36
3.3 A typical rear elevation of a unit of low-cost double storey terrace house in Kuala Lumpur	36
3.4 A typical type of opening and sun shading of a unit of low-cost double storey terrace house in Kuala Lumpur	37
3.5 Example of the 2-bedroom type of LCDSTH gained from the inventory	38
3.6 Example of the 3-bedrooms type of LCDSTH	39
3.7 Architectural elements that affect natural cross-ventilation in LCDSTH	43
3.8 Various air movement patterns affected by horizontal projection and the affect of vertical projection with various depths	44
3.9 Alternative design elements to captured air flows into a room	44
3.10 The shading area occur beyond building	45
3.11 The effect of length to eddy area at row building	46
3.12 The effect of orientation to eddy area at row building	47
3.13 The effect of height to eddy area at row building	47
3.14 Buildings in a row create calm air area at the pocket between buildings	48
3.15 Linearly arranged buildings protect or block subsequent buildings from potential air flows	48
3.16 Staggered arrangement enhances the potential of air flow around each building	49
3.17 The effects of inlet and outlet in cross-ventilated space in relation to perpendicular wind	50

<u>Figure No.</u>	<u>Page No.</u>
3.18 The effects of inlet and outlet in cross-ventilated space in relation to oblique wind	51
3.19 The effective opening size formula for natural cross-ventilation	52
3.20 The effect of opening position in building	52
3.21 The effect of control in opening	53
3.22 Air flow patterns through fixed and adjustable louvers glass window in sections view	53
3.23 Partitions could restructure wind pressure and modify the inertia of air movement	55
3.24 The influences of the length and depth of a space to the air flow pattern	56
4.1 Summary of the overall methodology used to predict the mean internal air velocity in LCDSTH	59
4.2 The summary of the Computational Fluid Dynamic (CFD) process	68
4.3 The location of types of residential in Kuala Lumpur area	74
4.4 The DBKL Planning Area Division	75
4.5 The basic form of one unit of LCDSTH	79
4.6 A block or row of LCDSTH with 10 units	79
4.7 The common basic form of the existing LCDSTH obtained from the inventory study showing the front elevation, side elevation and rear elevation	81
4.8 The common basic form of the existing LCDSTH obtained from the inventory study showing the ground and first floor plan	82
5.1 The summary of the building configuration to be tested	84
5.2 A row of EM which consists of ten (10) units	86
5.3 The elevations of EM in the simulation experiments	86
5.4 The common basic form of the floor plans obtained from the inventory and simplified floor plans purposely for simulation experiment	87
5.5 The model of 3 rows of EM that are used in the simulation experiment	87

<u>Figure No.</u>		<u>Page No.</u>
5.6	A row of PM-A and PM-B which consists of five (5) units of houses	89
5.7	The elevations of PM-A and PM-B in the simulation experiment	89
5.8	The proposed floor plans of PM-A and PM-B and the simplified floor plans of PM-A and PM-B purposely for simulation experiment	90
5.9	The model of 3 rows of PM-A in the simulation experiment	90
5.10	The model of 3 rows of PM-B in the simulation experiment	91
5.11	The openings at the elevations of EM	92
5.12	The openings at the elevations of PM-A and PM-B	93
5.13	The position of the monitor points at a unit of EM	94
5.14	The position of the monitor points at a unit PM-A and PM-B	95
5.15	The position of monitor points in the overall model of EM	96
5.16	The position of monitor points in the overall model of PM-A	97
5.17	The position of monitor points in the overall model of PM-B	98
5.18	The Overall Simulation modeling setting-up for EM at 0° wind direction	99
5.19	The Overall Simulation modeling setting-up for EM at 45° wind direction	100
5.20	The Overall Simulation modeling setting-up for PM-A at 0° wind direction	100
5.21	The Overall Simulation modeling setting-up for PM-A at 45° wind direction	101
5.22	The Overall Simulation modeling setting-up for PM-B at 0° wind direction	101
5.23	The Overall Simulation modeling setting-up for PM-B at 45° wind direction	102
5.24	The Grid at X-direction for EM	103
5.25	The Grid at Y-direction for EM	104

<u>Figure No.</u>	<u>Page No.</u>
5.26 The Grid at Z-direction for EM	104/ 105
5.27 The Grid at X-direction for PM-A	106
5.28 The Grid at X-direction for PM-B	107
5.29 The Grid at Y-direction for PM-A and PM-B	108
5.30 The Grid at Z-direction for PM-A and PM-B	108/ 109
5.31 Wind Rose Summary (1975 - 2003)	110
5.32 The position of monitor points at a row of test modeling consists of 5 units	115
5.33 The position of monitor points at elevations and sections	115
5.34 The overall solution domain of the testing model in the pilot study	116
6.1 Wind profile represented by vector plot for EM at 0° wind direction	120
6.2 EM represented by contour plot for 0° wind direction	121
6.3 The distribution of the mean internal air velocity of EM for 0° wind direction	122
6.4 The ground floor plan of M5 and its air velocity pattern	124
6.5 The air velocity distribution at M3 of row 2	125
6.6 Wind profile represented by vector plot for EM at 45° wind direction	126
6.7 EM represented by contour plot for 45° wind direction	127
6.8 The distribution of the mean internal air velocity of EM for 45° wind direction	128
6.9 The air velocity distribution at the corner of Row 1 and Row 2	129
6.10 Wind profile represented by vector plot for PM-A at 0° wind direction	132
6.11 PM-A represented by contour plot for 0° wind direction	132

<u>Figure No.</u>	<u>Page No.</u>
6.12 The distribution of the mean internal air velocity of PM-A for 0° wind direction	133
6.13 The air velocity distribution at M1 of Row 1 and at M1 of Row 2	134
6.14 Venturi effect occur between M2 and M3 and between M4 and M5	135
6.15 Wind profile represented by vector plot for PM-A at 45° wind direction	136
6.16 PM-A represented by contour plot for 45° wind direction	137
6.17 The distribution of the mean internal air velocity of PM-A for 45° wind direction	138
6.18 The air velocity distribution at first floor level	139
6.19 Wind profile represented by vector plot for PM-B at 0° wind direction	141
6.20 PM-B represented by contour plot for 0° wind direction	142
6.21 The distribution of the mean internal air velocity of PM-B for 0° wind direction	143
6.22 Wind profile represented by vector plot for PM-B at 45° wind direction	145
6.23 PM-B represented by contour plot for 45° wind direction	146
6.24 The distribution of the mean internal air velocity of PM-B for 45° wind direction	147
6.25 Air velocity distribution at first floor level	147

LIST OF ABBREVIATIONS

ABL	Atmospheric Boundary Layer
ASCE	American Society of Civil Engineers
ASHRAE	The American Society of heating, Refrigerator & Air conditioning Engineers
Atm	Atmosphere
BFC	Body Fitted Coordinates
B1	Bedroom 1
B2	Bedroom 2
B3	Bedroom 3
CFD	Computational Fluid Dynamic
CIDB	Construction Industry Development Board
CIS 1	Construction Industry Standard no. 1
CPA	Central Planning Area
DBKL	Dewan Bandaraya Kuala Lumpur
DKLSP 2020	Draft Kuala Lumpur Structure Plan 2020
EM	The existing model of LCDSTH with narrow frontage and deep plan
FEM	Finite Element Method
FVM	Finite Volume Method
GIS	Geographical information System
K	Kitchen
KPKT	Kementerian Perumahan dan Kerajaan Tempatan
LCDSTH	Low Cost Double Storey Terrace House

LD	Living-Dining
LES	Large Eddy Simulation
LW	Leeward
M1	Model 1
M2	Model 2
M3	Model 3
M4	Model 4
M5	Model 5
NHD	National House Development
PMV	Predicted Mean Vote
PA	Planning Areas
PM	The proposed model of LCDSTH with wider frontage and shorter depth plan
PM-A	The proposed model of LCDSTH with different building height in an aligned position
PM-B	The proposed model of LCDSTH with different building height in a staggered and checker board pattern position
SIMPLE	Semi-Implicit Method of Pressure-Linked Equation
UBBL	Uniform Building by-Law
WW	Windward