

**IDENTIFICATION OF EFFECTIVE CONTROL  
STRATEGIES FOR SIGNALIZED INTERSECTIONS  
DURING PEAK HOURS**

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Degree of Master of Science

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University of Moratuwa

Sri Lanka

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Thesis submitted in partial fulfilment of the requirements for the degree Master of  
Science in Civil Engineering

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## **DECLARATION**

I declare that this is my own work and this thesis 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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Date:.....

**A. Vajeeran**

The above candidate has carried out research for the Masters under my supervision.

.....

Date:.....

**Dr. GLDI De Silva**

## **ABSTRACT**

Traffic congestion during peak hours is one of the major issues in the Sri Lankan city centres. There are several identified reasons for the congestion. One of the major reasons for congestion is ineffective control strategy used at signalised intersections. In Sri Lanka during the peak hours most of the signalized intersections in city centres are controlled manually by traffic police officers. The objective of the study is to find out the effectiveness of the manual control by traffic police officers compare to traffic signals and the effectiveness of the traffic signal cycle time design for Sri Lankan conditions.

Four Junctions which are controlled by traffic police officers during the peak hours were selected for the analysis and data were collected. Traffic micro simulation software VISSIM has been used for the analysis and it has been calibrated and validated to local conditions before using it for the analysis. Junctions were modelled for three cases, existing posted signal time, updated traffic signal time, and traffic police phase arrangement and cycle time. For the updated signal case, signal times has been initially designed using Webster & Cobbe (1966) signal cycle time model and modified by simulating for several factorised cycle times to achieve optimum delay.

Out of the four junctions, three of them are not saturated and one junction is over saturated. When the junctions are not saturated, the signal times were updated and the updated signal times results lesser delays than the existing posted signal times. When the junctions controlled manually by traffic police the delays are lesser than the existing signal time case. But the updated signal times result lesser delay than the manual control when the junction is not saturated. When the junction is oversaturated, delays for manual control by traffic police result lesser delay than the existing signal times. Traffic police officers become effective when the junction is oversaturated as they allow risky merging movements to reduce the critical flows.

From the result it is evident that the delays for major road movements have no significant change for the two cases manual control and updated traffic signal design. But for minor road movements significant reduction of delay observed from manual control to traffic signal control. The maximum queue lengths on the minor roads also higher for the manual control than the updated signal control. Daily variation of traffic also affects the junction delays significantly as the fixed cycle time signals are used. Introducing vehicle actuated signals will be an effective solution for random arrivals of vehicles and daily variation of traffic than controlling the intersections manually.

*Keywords: Cycle time; Phase; Delay; Queue Length.*

## DEDICATION

*To my wife and Daughter*

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## TABLE OF CONTENT

Declaration .....	i
Abstract .....	ii
Dedication .....	iii
Acknowledgement.....	iv
TABLE OF CONTENT .....	v
LIST OF TABLES .....	viii
TABLE OF FIGURES .....	xi
1. BACKGROUND INFORMATION .....	1
1.1. Introduction .....	1
1.2. Objectives.....	6
1.3. Methodology .....	6
1.4. Outline of the thesis .....	7
2. LITERATURE REVIEW.....	8
2.1. Introduction .....	8
2.2. Types of Intersection.....	8
2.3. Intersection Control strategies.....	9
2.3.1. Three levels of intersection control .....	9
2.3.2. Passive control.....	9
2.3.2.1. No control.....	10
2.3.2.2. Traffic signs.....	10
2.3.2.3. Traffic signs plus marking.....	10
2.3.3. Semi Control.....	10
2.3.3.1. Roundabouts .....	11
2.3.4. Active control .....	11
2.3.4.1. Traffic signals.....	11
2.3.4.2. Grade separated intersections .....	11

2.3.4.3. Classification of Grade Separated Intersection .....	12
2.4. Traffic Signal Design .....	12
2.4.1. Overview .....	12
2.4.2. Phase design .....	13
2.4.2.1. Two phase signals .....	13
2.4.2.2. Four phase signals .....	14
2.4.2.3. Lost time .....	16
2.4.2.4. Effective green time .....	17
2.4.2.5. Lane capacity .....	17
2.4.2.6. Critical lane .....	17
2.4.3. Cycle time .....	18
2.4.4. Green splitting .....	19
2.4.5. Pedestrian crossing .....	20
2.4.6. Interval design .....	20
2.5. Signalized Intersection Delay Models .....	21
2.5.1. Overview .....	21
2.5.2. Types of delay .....	21
2.6. Vehicle actuated signals .....	22
2.7. Micro Simulation .....	23
2.7.1. Traffic simulation .....	23
2.7.2. Introduction to micro simulation .....	24
2.7.3. Introduction to VISSIM .....	24
2.7.4. Calibration of vissim software .....	25
3. DATA COLLECTION .....	26
3.1. Introduction .....	26
3.1.1. Kesbewa Junction .....	27
3.1.2. Maliban Junction .....	27



3.1.3.	Golumadama Junction .....	28
3.1.4.	Katubedda Junction .....	28
3.1.5.	Kohuwala Junction .....	29
3.2.	Geometric Data .....	30
3.3.	Traffic flow, turning movements, Vehicle Classified count and Queue Lengths .....	32
3.3.1.	Kohuwala Junction .....	32
3.3.2.	Katubedda Junction .....	36
3.3.3.	Maliban Junction .....	37
3.3.4.	Golumadama Junction .....	39
3.3.5.	Kesbewa Junction .....	41
3.4.	Intersection Control Data .....	44
4.	CALIBRATION OF VISSIM SOFTWARE .....	49
5.	RESULTS .....	54
5.1.	Overview .....	54
5.2.	VISSIM outputs for each junction .....	55
5.2.1.	Katubedda Junction .....	55
5.2.2.	Maliban Junction .....	59
5.2.3.	Golumadama Junction .....	64
5.2.4.	Kohuwala Junction .....	68
5.3.	Effect of daily variation of traffic .....	71
5.4.	Optimum Signal cycle time .....	72
6.	CONCLUSIONS .....	76
	References .....	80

## LIST OF TABLES

Table 1-1 Number of registered vehicles in Srilanka.....	3
Table 3-1 Kohuwala Junction Vehicle Flow Day 1 (Wednesday).....	33
Table 3-2 Kohuwala Junction Vehicle Flow Day 2 (Thursday) .....	33
Table 3-3 Kohuwala Junction -Manual classified count percentage .....	33
Table 3-4 Kohuwala Junction Vehicle Flow Day 3 (Friday).....	34
Table 3-5 Kohuwala Junction Peak hour Flows - Daily Variation .....	34
Table 3-6 Kohuwala Junction Turning Movements Day 1 .....	34
Table 3-7 Kohuwala Junction Turning Movements Day 2.....	35
Table 3-8 Kohuwala Junction Turning Movements Day 3.....	35
Table 3-9 Katubedda junction - Vehicle flow.....	36
Table 3-10 Katubedda junction – Turning movements.....	36
Table 3-11 Katubedda junction- Manual classified count .....	37
Table 3-12 Maliban junction vehicle flow .....	38
Table 3-13 Maliban junction – Turning movements.....	38
Table 3-14 Maliban junction – Manual classified count.....	39
Table 3-15 Golumadama junction – Vehicle flow .....	39
Table 3-16 Golumadama junction - Turning Movements .....	40
Table 3-17 Golumadama Junction – Manual classified count.....	41
Table 3-18 Kesbewa Junction – Vehicle flow .....	41
Table 3-19 Kesbewa junction - Turning movement .....	42
Table 3-20 Kesbewa junction - Current traffic signal phase and time.....	44
Table 3-21 Maliban Junction – Existing traffic signal phase and time .....	45
Table 3-22 Maliban Junction -Manual control - Phase direction, time and cycle time .....	45
Table 3-23 Golumadama Junction – Existing traffic signal phase and time.....	46
Table 3-24 Golumadama Junction -Manual control - Phase direction, time and cycle time.....	46
Table 3-25 Kohuwala Junction – Existing traffic signal phase and time .....	47
Table 3-26 Kohuwala Junction -Manual control - Phase direction, time and cycle time .....	47

Table 3-27 Katubedda junction – Existing traffic signal phase and time.....	48
Table 3-28 Katubedda junction -Manual control - Phase direction, time and cycle time.....	48
Table 4-1 Calibration of Vissim Software parameters - Queue length comparison ..	50
Table 4-2 Validation of the calibrated parameters - Queue length comparison .....	50
Table 4-3 Calibrated Driving behavioural Parameters 1.....	53
Table 4-4 Calibrated Driving behavioural Parameters 2.....	53
Table 5-1 Katubedda Junction - Designed signal time for peak hour.....	56
Table 5-2 Katubedda Junction Delay results during peak hour- Existing traffic signal .....	57
Table 5-3 Katubedda Junction Delay results during peak hour- Updated traffic signal .....	57
Table 5-4 Katubedda Junction Delay results during peak hour- Manual control .....	58
Table 5-5 Katubedda junction Maximum Queue lengths during peak hour .....	58
Table 5-6 Maliban Junction - Designed signal time for peak hour.....	60
Table 5-7 Maliban junction Maximum Queue lengths during peak hour.....	61
Table 5-8 Maliban Junction Delay results during peak hour- Existing traffic signal	61
Table 5-9 Maliban Junction Delay results during peak hour- Updated traffic signal	62
Table 5-10 Maliban Junction Delay results during peak hour- Manual control .....	62
Table 5-11 Golumadama Junction - Designed signal time for peak hour .....	66
Table 5-12 Golumadama Junction Delay results during peak hour- Existing traffic signal .....	66
Table 5-13 Golumadama Junction Delay results during peak hour- Updated traffic signal .....	67
Table 5-14 Golumadama Junction Delay results during peak hour- Manual control	67
Table 5-15 Golumadama junction Maximum Queue lengths during peak hour.....	68
Table 5-16 Kohuwala Junction Critical flows .....	69
Table 5-17 Golumadama junction Maximum Queue lengths during peak hour.....	70
Table 5-18 Kohuwala Junction Delay results during peak hour- Existing traffic signal .....	70
Table 5-19 Kohuwala Junction Delay results during peak hour- Manual control .....	71
Table 5-20 Modified Signal Cycle times .....	72

Table 5-210 Delay results at Katubedda junction for different signal cycle times....	74
Table 6-1 Total delay during the peak hour for each junctions .....	76
Table 6-2 Average delay per vehicle for each junctions.....	76

## TABLE OF FIGURES

Figure 1-1 PTV VISSIM software startup menu .....	5
Figure 1-2 PTV VISSIM software working interface.....	5
Figure 2-1 Example of a 2 phase system .....	14
Figure 2-2 Example of a four-phase traffic signal arrangement -1 .....	14
Figure 2-3 Example of a four phase traffic signal arrangement -2 .....	15
Figure 3-1 Selected Junctions for the analysis .....	26
Figure 3-2 Kesbewa junction – map .....	27
Figure 3-3 Maliban Junction - map.....	27
Figure 3-4 Golumadama junction - map .....	28
Figure 3-5 Katubedda junction – map.....	28
Figure 3-6 Kohuwala Junction – map .....	29
Figure 3-7 Geometric Arrangement at Katubedda Junction .....	30
Figure 3-8 Geometric Arrangement at Maliban Junction .....	30
Figure 3-9 Geometric Arrangement at Golumadama Junction .....	31
Figure 3-10 Geometric Arrangement Kohuwala Junction .....	31
Figure 4-1 Driving behaviour parameters 1 .....	51
Figure 4-2 Driving behaviour parameters 2 .....	51
Figure 4-3 Driving behaviour parameters 3 .....	52
Figure 4-4 Driving behaviour parameters 4 .....	52
Figure 5-1 Turning movements at Katubedda junction during the peak hour .....	55
Figure 5-2 Katubedda Junction Vissim Model .....	56
Figure 5-3 Comparison of delay - manual control vs updated signal time .....	58
Figure 5-4 Traffic flow and turning movements at Maliban junction during the peak hour .....	60
Figure 5-5 Maliban Junction VISSIM model .....	61
Figure 5-6 Comparison of delay -manual control vs updated signal time .....	63
Figure 5-7 Golumadama Junction – VISSIM model .....	65
Figure 5-8 Turning movements at Golumadama junction during the peak hour.....	65
Figure 5-9 Kohuwala Junction Vissim Model .....	68
Figure 5-10 Traffic flow and turning movements at Kohuwala Junction.....	69

Figure 5-11 Variation - Total delay Vs Cycle time – Maliban Junction.....	73
Figure 5-12 Variation - Total delay Vs Cycle time- Katubedda Junction .....	74
Figure 5-13 Variation - Total delay Vs Cycle time- Kolumadama Junction .....	75