



Cairo University

A SIMULATION-BASED EVALUATION OF BRT SYSTEMS IN OVER-CROWDED TRAVEL CORRIDORS

By

Mona Abdallah Hanafy Mohamed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Civil Engineering - Public Works

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Under the Supervision of

Dr. Hoda Mahmoud Talaat

Dr. Noor Mohamad Elmitiny

.....
Associate Professor of Highways, Traffic
and Airports Engineering
Public Works
Faculty of Engineering, Cairo University

.....
Assistant Professor of Transportation
Planning and Traffic Engineering
Egyptian National Institute of Transport
(ENIT), Ministry of Transport

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Approved by the
Examining Committee

Dr. Hoda Mahmoud Talaat,

Associate Professor of Highway, Traffic, and Airport Engineering
Faculty of Engineering, Cairo University

Thesis Main Advisor

Dr. Dalia Galal Said,

Associate Professor of Highway, Traffic, and Airport Engineering
Faculty of Engineering, Cairo University

Internal Examiner

Prof. Dr. Ali Zine El Abidin Heikal,

Professor of Transportation Planning and Traffic Engineering
Faculty of Engineering, Ain Shams University

External Examiner

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2019

Engineer's Name: Mona Abdallah Hanafy Mohamed
Date of Birth: 08/10/1990
Nationality: Egyptian
E-mail: Mona_Abdallah2013@hotmail.com
Phone: +201032377340
Address: 22 Gesr El-Suiz Street
Registration Date: 01/10/2014
Awarding Date:/....../2019
Degree: Master of Science
Department: Civil Engineering – Public Works



Supervisors:

Dr. Hoda Mahmoud Talaat
Dr. Noor Mohamad Elmitiny
Egyptian National Institute of Transport (ENIT), Ministry of Transport

Examiners:

Dr. Hoda Mahmud Talaat (Thesis main advisor)
Dr. Dalia Galal Said (Internal examiner)
Prof. Ali Zein El Abidin Heikal (External examiner)
Faculty of Engineering, Ain Shams University

Title of Thesis:

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Key Words:

BRT; Bus-way; Exclusive Bus Lane; T-Way; VISSIM

Summary:

In this research, the proposal of encouraging a shift in travel modes was examined by introducing Bus Rapid Transit (BRT) systems in over-crowded travel corridors. A case study of Faisal Street was adopted. Faisal Street is a critical arterial that carries extensive traffic volumes in between Cairo/Giza and 6th of October City. A simulation model was developed using VISSIM for the study area; including Faisal Street, El-Harm Street and their interconnections. Four BRTs scenarios were created with different conflicts' treatments (vehicle/BRT, and vehicle/passenger conflicts). A wide range of results was reported for the impact of proposed systems on traffic operations on travel lanes varying from (80%) deterioration in overall travel time (Scenario-1) to (18%) improvement (Scenario-4). Such results highlight the potential of BRT systems in improving traffic operations in over-crowded traffic corridors, and the vital role of intersections/conflicts treatments in achieving successful operations.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mona Abdallah Hanafy Mohamed

Date: 31/10/2019

Signature:

Dedication

I dedicate this effort to my family. I also dedicate this thesis to my professors and colleagues.

I dedicate this research to every researcher interested in the field of research. I also dedicate this thesis to decision-makers that may help solve some traffic problems.

Acknowledgments

First of all, I want to thank Allah for helping me to complete this work successfully. Then, I want to thank my supervisors for their help and advice, despite their busy schedules. I am proud to complete this thesis under their supervision. I want to thank Dr. Hoda Talaat for her support, encouragement to complete my thesis, and being the first one who taught me the concepts of public transportation and bus rapid transit in the undergraduate, graduate courses, and while working on the thesis. I want also to thank Dr. Noor El-Metiny for his support, inspiration, patience on my questions, and being the first one who taught me the fundamentals of calibration of micro-simulation models.

I also want to thank Prof. Ali Zine El Abidin and Dr. Dalia Said for their valuable comments.

I also would like to thank PTV Group for offering me a free academic VISSIM license to complete my thesis.

I would like to thank my colleagues Eng. Ahmed Ashraf, Eng. Mohammed Saeed, Eng. Ahmed Bayoumi, and Eng. Abdulrahman Samaha for their support and help to learn the basics of VISSIM program.

I would like to thank Colonel Wael Mohamed Taher, Director of the Giza Research Center for his support and help in the data collection stage.

I would like to thank my dear husband for his continued support, encouragement, and patience during my work in this thesis.

Finally, I would like to thank my mother, my father, my brother and my sister for continuous care, support, and help me in the various stages of my work in this thesis.

Table of Contents

DISCLAIMER	I
DEDICATION	II
ACKNOWLEDGMENTS.....	III
TABLE OF CONTENTS.....	IV
LIST OF TABLES.....	VII
LIST OF FIGURES.....	IX
NOMENCLATURE	XI
ABSTRACT	XII
CHAPTER 1 : INTRODUCTION	1
1.1. BACKGROUND.....	1
1.2. TRAFFIC CONGESTION IN GCR	3
1.2.1. Traffic Congestion Cost	3
1.2.2. GCR Congested Corridors	5
1.3. PRACTICES FOR REDUCING CONGESTION IN THE PEAK PERIOD.....	6
1.4. PUBLIC TRANSPORT IN GREATER CAIRO REGION	7
1.4.1. Buses and Minibuses.....	8
1.4.2. Microbuses	9
1.4.3. Metro	10
1.4.4. Tram	12
1.4.5. River Bus.....	13
1.5. PROBLEM STATEMENT AND MOTIVATION.....	15
1.6. OBJECTIVE OF THE STUDY.....	15
1.7. ORGANIZATION OF THE THESIS	15
CHAPTER 2 : LITERATURE REVIEW	17
2.1. BRT SYSTEM	17
2.1.1. BRT History	17
2.1.2. BRT Systems in Comparison to other Transit Modes.....	19
2.1.3. BRT Definitions	21
2.1.4. BRT Features	22
2.1.5. Types of Exclusive Bus Running Ways	25
2.1.6. BRT Systems Planning and Design Criteria	28
2.1.6.1. Bus-Ways and Exclusive Bus Lanes	28
2.1.6.2. BRT Vehicles	29
2.1.6.3. BRT Stations	29
2.1.6.4. Fare Collection	30
2.1.6.5. BRT Criteria Summary	30
2.1.7. BRT Service Planning, Integration and Quality of Service	37
2.1.7.1. Service Planning.....	37
2.1.7.2. BRT Service Integration and Access.....	38

2.1.7.3.	Quality of Service	38
2.1.8.	Advantage of Exclusive Bus Lanes.....	40
2.2.	LITERATURE REVIEW OF MICRO SIMULATION MODELS	42
2.2.1.	Traffic Simulation Models	42
2.2.2.	Simulation Models Calibration	43
2.2.2.1.	Two Sample Kolmogorov-Smirnov Test (K-S Test).....	44
2.2.2.2.	Travel Time Accuracy.....	46
2.2.3.	Modeling BRT System within Micro Simulation Models	47
CHAPTER 3 : RESEARCH METHODOLOGY & DATA COLLECTION.....		49
3.1.	DEFINING THE PROBLEM	49
3.1.1.	Location of Traffic Congestion	49
3.1.2.	Timing of Traffic Congestion	49
3.1.3.	Causes of Traffic Congestion.....	50
3.2.	RESEARCH METHODOLOGY	50
3.3.	DATA SOURCES	51
3.4.	SOCIOECONOMIC AND LAND USE DATA	51
3.5.	FAISAL STREET CHARACTERISTICS	53
3.5.1.	Geometric Characteristics	53
3.5.2.	Traffic Volume Characteristics	54
3.6.	HARAM STREET CHARACTERISTICS	60
3.6.1.	Geometric Characteristics	60
3.6.2.	Traffic Volume Characteristics	61
3.7.	FAISAL/HARAM INTER CONNECTIONS	64
3.8.	FIELD SURVEY	70
3.8.1.	Traffic Counts on Side Streets (2017).....	70
3.8.2.	Observed Percentages of U-Turns Users (2017).....	70
3.8.3.	Observed No. of Lanes, Real Travel Time/Speed (2019)	74
CHAPTER 4 : BASE CASE SIMULATION MODEL DEVELOPMENT		76
4.1.	ROAD NETWORK GEOMETRY	76
4.2.	TRAFFIC DEMAND	76
4.2.1.	Corridor Traffic Volume	77
4.2.2.	Side Streets Traffic Volume	79
4.2.3.	U-Turns Usage	83
4.3.	SIMULATION MODEL CALIBRATION	84
4.3.1.	Observed vs. Modeled Travel Speeds	84
4.3.2.	K-S Test	86
4.3.3.	Travel Time Accuracy.....	86
CHAPTER 5 : THE BRT SCENARIOS		89
5.1.	BRT SYSTEM PLANNING AND DESIGN CRITERIA	89
5.1.1.	BRT Alignment.....	89
5.1.2.	Exclusive Bus Lane for BRT System.....	90
5.1.3.	BRT Vehicles	90
5.1.4.	BRT Stations	91
5.1.5.	Complementary Infrastructure Modifications	92

5.1.5.1.	Modifications to Existing U-Turns.....	92
5.1.5.2.	Multi-Story Parking Lots	92
5.2.	BRT SCENARIOS	94
5.2.1.	BRT System (Scenario-1)	94
5.2.2.	BRT System (Scenario-2)	97
5.2.3.	BRT System (Scenario-3)	99
5.2.4.	BRT System (Scenario-4)	102
5.3.	CAPACITY & DEMAND ANALYSIS	105
CHAPTER 6 : SIMULATION RESULTS.....		115
6.1.	SIMULATION RESULTS	115
6.2.	OUTPUTS ANALYSIS	117
6.2.1.	Average Travel Time	117
6.2.2.	Speed Distribution.....	120
6.2.3.	Accommodated Demand	123
6.2.4.	Pedestrian Crossing	126
6.3.	LOS EVALUATION	127
6.3.1.	Travel Lane Evaluation	127
6.3.2.	BRT Lane Evaluation.....	128
6.4.	DISCUSSION	128
CHAPTER 7 : SUMMARY, CONCLUSIONS AND RECOMMENDATIONS..		130
7.1.	SUMMARY	130
7.2.	CONCLUSIONS	131
7.3.	RECOMMENDATIONS AND FUTURE STUDIES	133
REFERENCES		137
APPENDIX (A).....		142
APPENDIX (B).....		148
APPENDIX (C).....		149

List of Tables

Table 1-1: Comparison between Different Types of Public Transport	14
Table 2-1: Summarize the BRT Criteria.....	31
Table 2-2: List of the Eight Countries that Got the Golden Rating.....	39
Table 2-3: Characteristics of Some Global Systems	40
Table 2-4: The Kolmogorov-Smirnov Table of the values of $c(\alpha)$	46
Table 3-1: Future Population Trend of GCR.....	51
Table 3-2: Summarize the Mean of the Traffic Count Data for the El-Mashabek Station..	54
Table 3-3: Equivalent Factor from Different Vehicles to Equivalent Vehicles	55
Table 3-4: Total Equivalent Vehicles at El-Mashabek Station	55
Table 3-5: Average Modal Split at El-Mashabek Station	55
Table 3-6: Trucks Volume and Percentage of the Trucks on Faisal Street	56
Table 3-7: Traffic Influencing Events during Survey Periods	60
Table 3-8: Traffic Volume on Haram Street	63
Table 3-9: Data from the Effective Streets on Haram and Faisal Streets (2012)	65
Table 3-10: The Traffic Volume Measured on the Side Roads (2017)	70
Table 3-11: The Vehicles Percentage Using the U-Turn in Faisal Street	71
Table 3-12: Real Travel Time and Speeds on Faisal & Haram Streets at Peak Hours (A.M & P.M.) (2019)	75
Table 4-1: Average Observed Travel Time and Speed on Faisal and Haram Streets at Peak Hours (AM and PM) 2019	78
Table 4-2: Types Category of Links in the Study Network	79
Table 4-3: Types of Side Roads in the Study Network	80
Table 4-4: The Measured Traffic Volumes on these Streets and the Split Ratio for Each Direction	82
Table 4-5: The Ratio of Vehicles Using the U-Turn in Faisal Street	83
Table 4-6: Calibration Model with Travel Time	87
Table 5-1: The Different Methods of Handling Conflicts for each Scenario	105
Table 5-2: Vehicles Type and Characteristics	105
Table 5-3: BRT Corridor Capacity Scenarios	106
Table 5-4: The Signal Phases	107
Table 5-5: The Proposed Time for Different Signals Types	107
Table 5-6: Corridor Capacity of each Scenarios	108
Table 5-7: The New Percentage of the Modal Share in Faisal Street.....	108
Table 5-8: No. of Equivalent Vehicles Shift to BRT	109
Table 5-9: Boarding Passengers Calculations at each Station for each Scenario.....	110
Table 5-10: Alighting Passengers Calculations at each Station for each Scenario	112
Table 5-11: Pedestrian Crossing Method at BRT Stations for each Scenario.....	114
Table 6-1: Comparing the Average Travel Time between Various Scenarios.....	119
Table 6-2: Percentage of Average Travel Time for the Various Scenarios of the Travel Lane	119
Table 6-3: Percentage of Difference in Speed from the Current Situation	120
Table 6-4: Estimated Demand versus Accommodated Demand	124
Table 6-5: Pedestrian Crossing Method at BRT stations for each Scenario	126
Table 6-6: Urban Street LOS.....	127
Table 6-7: LOS Evaluation of Travel Lane for each Scenario	127
Table 6-8: LOS of BRT Depend on Travel Time.....	128

Table 6-9: LOS Evaluation of BRT Lane for each Scenario.....	128
Table A-1: The Expected Increase in Traffic Volume on the Studied Roads from 2012 to 2019	142
Table A-2: K-S Test (From Giza to Faisal) [Before Calibration]	144
Table A-3: K-S Test (From Faisal to Giza) [Before Calibration]	144
Table A-4: K-S Test (From Giza to Haram) [Before Calibration]	145
Table A-5: K-S Test (From Haram to Giza) [Before Calibration]	145
Table A-6: K-S Test (From Giza to Faisal) [After Calibration]	146
Table A-7: K-S Test (From Faisal to Giza) [After Calibration]	146
Table A-8: K-S Test (From Giza to Haram) [After Calibration]	147
Table A-9: K-S Test (From Haram to Giza) [After Calibration]	147
Table B-1: Traffic Volume Demand for each Scenario	148
Table C-1: Average Travel Time Extract from Simulation Model	149
Table C-2: Average Volumes, Queue Delay and Speed for each Scenario	151

List of Figures

Figure 1-1: Egyptian National Roads Network	2
Figure 1-2: Phase 1 Major Corridors and Phase 2 Expanded Network Data Collection .	3
Figure 1-3: Distribution of All Estimated Costs for GCMA (Billion LE, 2010)	4
Figure 1-4: Faisal and Haram Streets Layout	6
Figure 1-5: The Model Share of Public Transportation Service in GCR	7
Figure 1-6: Example of Buses and Minibuses Operated in GCR.....	8
Figure 1-7: Different sizes of minibuses in GCR	9
Figure 1-8: The Layout of the Metro Network in GCR	11
Figure 1-9: Examples of the First, the Second and the Third Metro Stations in GCR...	12
Figure 1-10: Tram in GCR	13
Figure 1-11: River Bus in GCR.....	13
Figure 2-1: Relationship between MRT System Performances versus MRT Life Cycle Costs	19
Figure 2-2: Buses Vehicle Type	29
Figure 2-3: The Two-Sample Kolmogorov–Smirnov Statistic	45
Figure 3-1: The Traffic Congestion in Faisal and Haram Streets.....	49
Figure 3-2: The Variation Number of Registered Vehicles in Egypt during the Period from 2005 to 2014	52
Figure 3-3: Strategic Map for Giza Governorate.....	53
Figure 3-4: Typical Cross Section for Faisal Street with 32.00 m R.O.W.....	54
Figure 3-5: Traffic Volume on Faisal Street L6-1-Direction 1 (From Giza to Pyramids)	57
Figure 3-6: Traffic Volume on Faisal Street L6-1-Direction 2 (From Pyramids to Giza)	57
Figure 3-7: Traffic Volume on Faisal Street L6-2-Direction 1 (From Pyramids to Giza)	58
Figure 3-8: Traffic Volume on Faisal Street L6-2-Direction 2 (From Giza to Pyramids)	58
Figure 3-9: Average Modal Split, Faisal Street.....	59
Figure 3-10: Time Space, Faisal Street	59
Figure 3-11: Typical Cross Section for Haram Street with 42.00 m R.O.W.....	60
Figure 3-12: Location of Traffic Count Points on Haram Street.....	62
Figure 3-13: The Location of the Effective Side Streets and Existing U-Turns on Faisal and Haram Streets.....	64
Figure 3-14: The Code and Direction of Measured Distance on Faisal and Haram Streets	74
Figure 4-1: Road Network in Simulation Model.....	76
Figure 4-2: The Number of Registered Vehicles in Egypt during the Period from 2005 to 2014	77
Figure 4-3: Color Classification of the Side Roads	81
Figure 4-4: The Streets Location that had been Studied of Each Type	81
Figure 4-5: The Ratio of Vehicles Using the U-Turn in Faisal and Haram Streets	84
Figure 4-6: The Cumulative Distribution of the Observed and Simulation Speed [Faisal Street].....	85
Figure 4-7: The Cumulative Distribution of the Observed and Simulation Speed [Haram Street]	86

Figure 5-1: The BRT Alignment on Faisal Street	89
Figure 5-2: Cross Section of Faisal Street after Exclusive Bus Lane for BRT System .	90
Figure 5-3: Articulated Bus	90
Figure 5-4: The Locations of BRT Stations	91
Figure 5-5: U-Turns Modifications based on Proposed BRT Stations.....	92
Figure 5-6: Locations of the Proposed Multi-Story Parking Lots	93
Figure 5-7: BRT System.....	93
Figure 5-8: At-Grade Intersection Downstream of Faisal Bridge (Scenario-1)	94
Figure 5-9: Handling U-Turn Movements and Pedestrian Crossing (Scenario-1).....	95
Figure 5-10: BRT System Layout (Scenario-1)	96
Figure 5-11: Ways to Handle Pedestrian Crossing (Scenario-2).....	97
Figure 5-12: BRT System Layout (Scenario-2)	98
Figure 5-13: Grade-Separation Downstream of Faisal Bridge (Scenario-3).....	99
Figure 5-14: The U-Turn under BRT Bridge (Scenario-3)	100
Figure 5-15: The Various Ways to Handle the Left Turn Movement and the Pedestrian Crossing (Scenario-3)	100
Figure 5-16: BRT System Layout (Scenario-3)	101
Figure 5-17: Grade-Separation Downstream of Faisal Bridge (Scenario-4).....	102
Figure 5-18: The Various Ways to Handle the Pedestrian Crossing (Scenario-4).....	103
Figure 5-19: BRT System Layout (Scenario-4)	104
Figure 5-20: The Signal Phases	107
Figure 6-1: Average Travel Time	117
Figure 6-2: The Average Travel Time along Faisal Street for (Travel Lane & BRT) .	118
Figure 6-3: Comparing the Travel Time between Various Scenarios	119
Figure 6-4: Color Code Map of Speed Distribution on Faisal Street for each Scenario ...	122
Figure 6-5: Comparing between Estimated and Accommodated Demand	125
Figure 7-1: The First Phase of the Fourth Line	134
Figure 7-2: Proposed Phase 1 Corridor in Giza.....	135
Figure 7-3: Observed Demand (Passengers per Hour per Direction) in Giza	136

Nomenclature

Abbreviation	Definition
AVL	Automatic vehicle Location
BRT	Bus Rapid Transit
BRTS	Bus Rapid Transit System
CTA	Cairo Transport Authority
CO	Carbon Monoxide
CAPMAS	Central Agency for Public Mobilization and Statistics
ENIT	Egyptian National Institute of Transport
FTA	Federal Transit Administration
FVO	Frequency and Visual Occupancy
GCMA	Greater Cairo Metropolitan Area
GCR	Greater Cairo Region
GDP	Gross Domestic Production
HOV	High Occupancy Vehicle
ITDP	Institute for Transportation and Development Policy
ITS	Intelligent Transport System
JICA	Japan International Cooperation Agency
K-S Test	Kolmogorov-Smirnov Test
MAPE	Mean Absolute Percent Error
MOEs	Measures of Effectiveness
NO _x	Nitrous Oxide
PM ₁₀	Particulate Matter
PPP	Purchasing Power Parity
RMSN	Root Mean Square Error
RRSE	Root Relative Squared Error
SITP	Sistema Integrado de Transporte Público or Public Transit Integrated System
TCRP	Transit Cooperative Research Program
T-Way	Transit Way
VOC	Volatile Organic Compounds