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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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.

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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
NOx	Nitrous Oxide
PM10	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