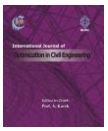
INTERNATIONAL JOURNAL OF OPTIMIZATION IN CIVIL ENGINEERING
Int. J. Optim. Civil Eng., 2017; 7(3):383-391



THE EFFECT OF TRAFFIC MANAGEMENT ON VMS SIGN AND PILOT SIMULATION OF AZADI STREET TO ENGHELAB SQUARE

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ABSTRACT

Today's, a common problem in cities is increasing delay and reducing the speed of traffic. On the other wise increasing costs of acquisition in urban area are not allow new routes and highways. Also construction of new highway or street such as Imam Ali highway and Sadr highway in Tehran lead to develop new applications (such as BRT lane ,…) And become quickly saturate and less efficient. Therefore traffic Management could be more effective in controlling traffic with lower costs. Variable message sign is one of these management solutions. For this purpose, two parallel streets ENGHELAB and JOMHORI are selected to study. The result of this research show that implementation of this variable message sign when accident occur and abstraction the road and using strategy of change way can reduce 100 sec/km of delay time and reduce fuel consumption to 400 lit/hr that it means saving about 667 thousand dollar in fuel consumption and delay time.

Keywords: traffic management; simulation; microscopic; VMS sign; accident; urban traffic area.

Received: 10 September 2016; Accepted: 22 January 2017

1. INTRODUCTION

Urban trips are due to people daily activates. This activity (work, shopping, education, entertainment and etc are doing in various ways such as walking, cycling, private car, bus and etc. Enlargement and population in city has resulted volume and need to trips to more than travel facilities in city. Therefore, it is necessary that trips managed in such away. First, don't do unnecessary trips. Secondly, use provided facilities optimally. The first is relative

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to travel demand management to reduce travel demand and the second is known supply management that doing some management measures to make optimum use of the facilities (supply) in system [1].

Traffic problem isn't unique to Iran, all industrial and non-industrial countries in urban are confront with this problem. However, attention to root and depth of this problem can develop strategies to improve transport conditions. One of these methods is management and monitoring with electronic device such as variable massage sign.

2. PROBLEM DEFINITION AND RESEARCH AIM

Today, importance of transportation, traffic system and number of vehicle problem in road of country and street of city are increase every year, this problem is need to solved by management, study and planning.

From few decades ago, we are experiencing era that existing technologies interact each other cause introduction new technologies and base on these technologies previous product are replaced by product with new capability. During this period of time technology such as information technology and communication and radio tracking technology are influenced by engineering science such as electrical, electronics, telecommunication and computer technologies and they result is developing new products and provide comprehensive services to consumer. Industry and science have been influenced by these technologies in past two decades, Auto industry and transportation especially in electronics section had capacity for change and development. Over the past few years, Modern information and communication technology are developed; designers and engineers create various usages and transform viewpoint of traffic strategy [2].

In this way, traffic management is a modernization method to solve traffic problem. traffic management aim is optimal use of existing network and road and increase road safety. This goal should be achieve without damage to environment. In other word, traffic management means use available facilities to increase productivity and protect public profits about road network [3].

According to population growth and increase vehicles every day Traffic management and variable message sign (VMS) is one of the best ways to reduce waste time and traffic congestion.

3. LITERATURE REVIEW

Previous studies said that traffic volume has direct relation with industrialization, because industry develop increase number and variety of vehicles and it cause to increase traffic. Increase effective capacities in urban roads are a major step to understanding and manage traffic flow. Traffic management had risen in the United States from 1930 and it expanded to other countries from 1950 [4].

Variable message signs are using in countries and they applied to manage and control traffic flow generally [5].

Knowledge about urban road network around study zone Enable designers determine

appropriate sign location and minimum require distance to change way before vehicle reach decision point. Also Sign massages provide opportunity and possibility to driver's reaction [6].

Driver's knowledge about traffic condition is a way to reduce unwelcome delay in big city. Also Studies have shown older people and men tend to change way more than others [7].

A research has been done between Osaka and Tokyo in Pacific Ocean ring. In these research methodologies and applied cases such as traffic information system with variable message sign and then they recorded result of various message in various place to choose best condition [8].

Another point in traffic management is speed limit and change speed to stable traffic flow some researches was done about speed and this fact are appear [9].

One of the important points in traffic management is the time of displaying information in variable message sign. It is indicated that with increasing in time period, reaction frequency change from logarithmic to power mode [10].

The minimum sight distance for a vehicle with speed of movement 90kilometers per hours is about 300 meters [3].

The panels are mounted differently. In gateway condition panel installed on both sides of the road by piers and it located on roadway completely supported. In second condition, it installed by piers in shoulder of road. And in third condition, panel install cantilever and it supported by pier on shoulder of road [3].

Variable message sign (VMS) can call changeable message sign (CMS) or dynamic message sign (DMS). VMS can use lonely or piece of control and traffic management in road or zone. A common usage for VMS is in traffic management and especially at accident time. VMS can use permanent or temporary [11].

4. RESEARCH PROCESS AND OPERATION

4.1 Choice traffic strategy

Intelligent transportation system is the generic term for the combined use of communication technologies, Control and information processing system for transportation. Its use will save lives, save time, Money, energy and environmental benefits. Telecommunication relative to transport is a term use in Europe for some technologies used in ITS field [3].

Method used in this paper is gathering all the parameters such as the type and the number of vehicle and traffic light cycles and for simulation use microscopic method. Finally, AIMSUN and traffic management scenario in this software are use in simulation and VMS is a piece of traffic management. In this paper accident and close a line for 30 meters studied and condition with VMS and without VMS compare together.

4.2 Software selection

One of the newest and most useful methods in Transportation Engineering developed in recent years is traffic simulation software. Due to researches has done on the driver's behavior in different countries, Driver's traffic behavior could categorize into several sections that include car following, lane changing, gap acceptance and route choice and Each of these behaviors developed models and these models are use in different software simulator.

There are several software for traffic simulation that we can model with them. These software include: Get-ROM (Getram), Synchro, Netsim, Vissim and Vissam, Torus, Auto Turn [12].

SYNCHRO software is use in issues like capacity analysis, synchronization and optimization of intersections, intelligent light, drawing distance-time, traffic simulation and contrast to the controller [12].

Netsim Software is software of Traf Company, it provided and operation by USA federal road office, this program is a microscopic stochastic simulation model that it model vehicles performance on the street network [12].

VISSIM software is a microscopic software to analyze and modeling street network, intersections, public transportation system, parking management and etc [12].

Auto run software runs in AutoCAD or land area and in reality it adds a menu to these programs. This program has variety vehicles codes of word such as AASHTO (2001) and AASHTO (2004) and it has capability to simulate. For simulating in first stage we should provide intersection or interchange plan for check arch dimensions and size, ramps width and other parameters and also this software use for optimize design plan and provide an animation of vehicles moving [12].

TORUS software is an advanced software work in AUTOCAD or land area and used to design squares. This software using AUTOTURN to optimize design based on vehicles move and reduces design time and also it can design sight distance according to proposed speed and design vehicle [12].

GETRAM software is microscopic software that it presents macro result. AIMSUN software is new version of GETRAM software. AIMSUN software is able to simulate macroscopic, microscopic and mesoscopic simultaneously. However, other simulator such as CORSIM is able to simulate just one of these models. The software usage includes: impact analysis infrastructure projects (interchange, tunnels, squares and etc.), environmental studies, economic studies of road and pay toll, control even and odd zones, ban area, design street network and support system for public transport and also definition of complex strategies for traffic management in network like accident, road barrier, traffic redirection based on traffic volume and etc. some of AIMSUN output data is fuel consumption, traffic, pollution, network speed, number of stops per given time, density, travel time on network and delay [13].

4.3 The study area

The study area is around AZADI Street between ENGHELAB Square and TOWHID Street; it has high volume of passengers and vehicles traffic. AZADI Street has more interchange and less width and margined parks have heavy traffic almost all day long. Always trouble such as accident or closing the route for any reason reduces traffic flow considerably and this reasons cause to choice this zone to study.

Figure 1. Azadi Street and Bastan Street intersection

4.4 Data collection and modeling

It is possible that the study be completed in one day. in this case, one of two methods will be counter person or counting equipment.

The most likely situation leading to a manual study is the traffic count. A traffic engineer is often faced with a problem requiring some detailed knowledge of existing traffic volumes, which are generally needed quickly. If we have less counter person then we use controller count. In controller count method one place count for 8 hours and another places count an hour to an hour the result of maximum count flow to total volume give peak hour volume. Another method of collecting statistics is the study of methods for multi-day. In this method flow rate does count for six days.it is possible that volume of each of the sites change significantly. In this case, control data is used to determine pattern of daily changes [14].

In past survey, data gathering of all input and output for a day and it present peak hour factor. According to simulation have done peak hour factor was introduced as examined data.

Table 1: Pedestrians Origin-Destination Matrix in the area Enghelab Square

	Peak Hour							
	Azadi	**Enghelab**	**Gharib**	**West Kalhor**	**East Kalhor**	**West Bastan**	**West Jomhouri**	**East Jomhouri**
Azadi	0	3478	0	55	0	56	0	441
Enghelab	3425	0	0	0	0	0	0	0
Gharib	565	1621	0	46	0	37	0	421
West Kalhor	0	0	0	0	0	0	0	0
East Kalhor	0	0	0	59	0	61	0	34
West Bastan	0	0	0	0	0	0	0	0
East Bastan	0	0	0	0	0	0	0	2981
East Jomhouri	0	0	0	0	0	0	0	0

5. COUNTING RESULTS

BRT bus sight distance was picked amount 2 min with a standard deviation of one minute.

ENGHELAB Street to AZADI Street and vice versa has Crowd Street of Tehran and these streets always have more delay for users. Perhaps one way to reduce delay in this street is use of variable message sign. In this study, AIMSUN software has been used to compare result of simulation with variable message sign when an accident occur in one lane and finally this result compare economically.

Figure 2. Simulated model in software and decision's locations

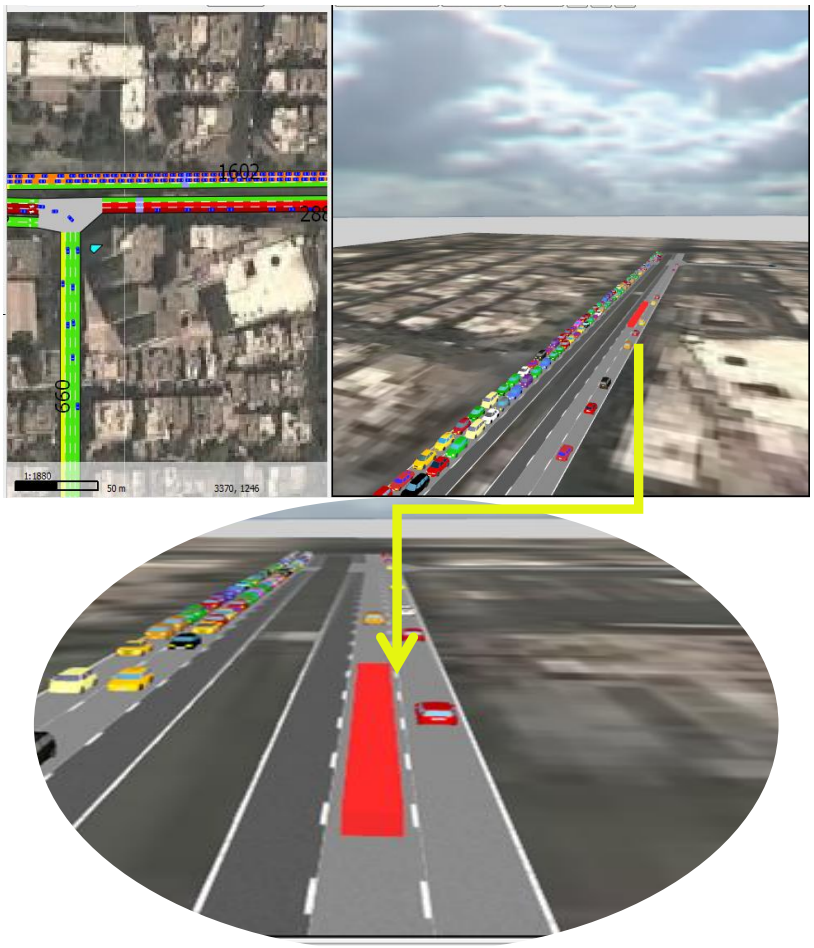

Figure 3. Accident's location after applied traffic strategy

In this way, change way policy is considering this strategy evaluated by using variable message sign. For example, an accident occurs in a line this line closed for 30 meter at 10 mints finally. Finally, the strategy of reduce speed at accident place and change way before accident place is important to reduce fuel consumption and delay time. This this information said by VMS and this condition compare with usual condition.

6. APPLY STRATEGY AND SOFTWARE RESULTS:

This model simulated five models and mean of simulation output compare to situation without notification and the result said in table 2.

After apply strategy of using variable message sign the following results were obtained. Analyzing and comparing the outputs indicate that the maximum stop time per vehicle by applying this strategy will reduce about 100 km/sec and approximately 17% we will reduce in delay time. Also, fuel consumption reduces 400 lit/hr. stop time increase 13 sec/km and total travel time will reduce 15%. The usual speed increase 2 km/hr. and traffic flow increase 300vehicles.

Table 2: Simulation output values in current status and applied strategy

Parameters	Unit	Without applied strategy	With applied strategy
Delay Time Car	sec/km	605.97	505.33
Density Car	veh/km	102.12	95.47
Flow Car	veh/h	8759	9126
Fuel Consumption	l	3516	3168.54
Harmonic Speed Car	km/h	18.46	20.29
Max Virtual Queue Car	vehs	4154	3805.67
Mean Queue Length car	vehs	176.64	173.18
Number of Stops Car		3033.14	2543
Stop Time Car	sec/km	584.47	571.69
Total Distance travelled Car	km	5297.65	6000.68
Total Travel Time Car	h	1122.35	1055.74
Travel Time Car	sec/km	672.25	571.69

However, in a year In the case of this problem, a congestion charge On any working day for any reason, such as busy or accident and suggest alternative routes, In just 10 minutes per day on weekdays and 265 days per year, Reduction occurs at the cost of wasted time Are about 31800 dollar if one person income 12 dollar consider. Reduce fuel consumption about 706 Thousand dollar in year. And fuel price based on fob Persian Gulf is 0.66 dollar.

$10^{10} \times 2.12\ 1058500 = \times 20079$

7. CONCLUSION

In most large and developed cities of word to promote and manage all happen and event use urban management. New technologies for remote monitoring and integrated structure in city

are traffic management. Management measures are providing to apply verity and incidents. In this regard, monitoring and overall all vehicles movements is so hard that only experienced engineers would be able to manage traffic one of the management tools for traffic control are variable message sign. According to study these signs have important role in traffic management such as traffic volume, increase efficiency, increase speed, reduced delay and it also increase level of satisfaction and have benefit for user.

1. Reduce amount of waste time about 100 second per kilometer in this study at 1 hour.
2. Reduce fuel consumption 348 lit per hour in accident time or traffic jam on study route.
3. Reduce density of vehicle by variable message sign and implement strategies on time to reduce traffic volume. Increase satisfaction condition base on reduce waste time.
4. Increase economic productivity, reduce accident burst due to knowledge about front condition and ultimately reduce traffic jam.

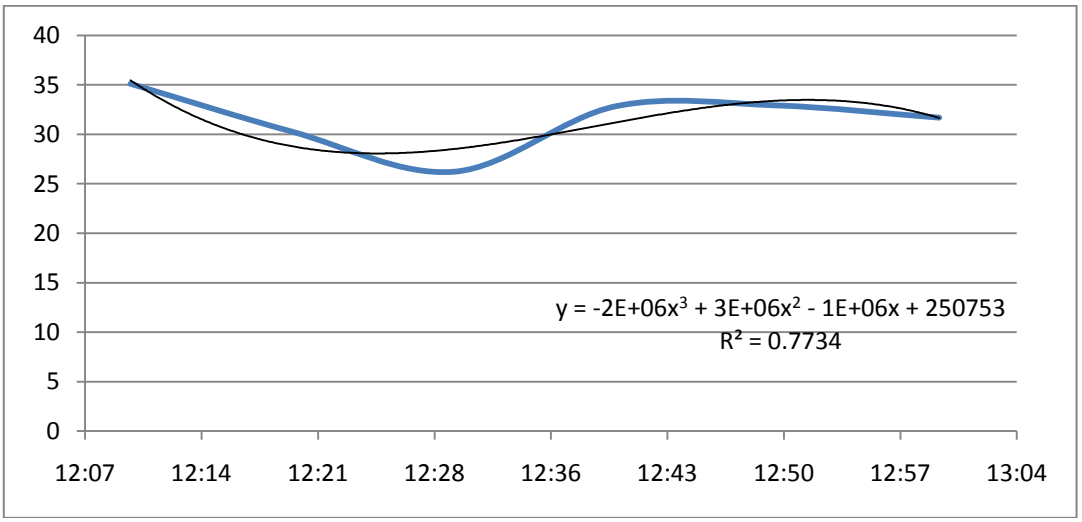

Figure 4. Simulated speed with applied strategy

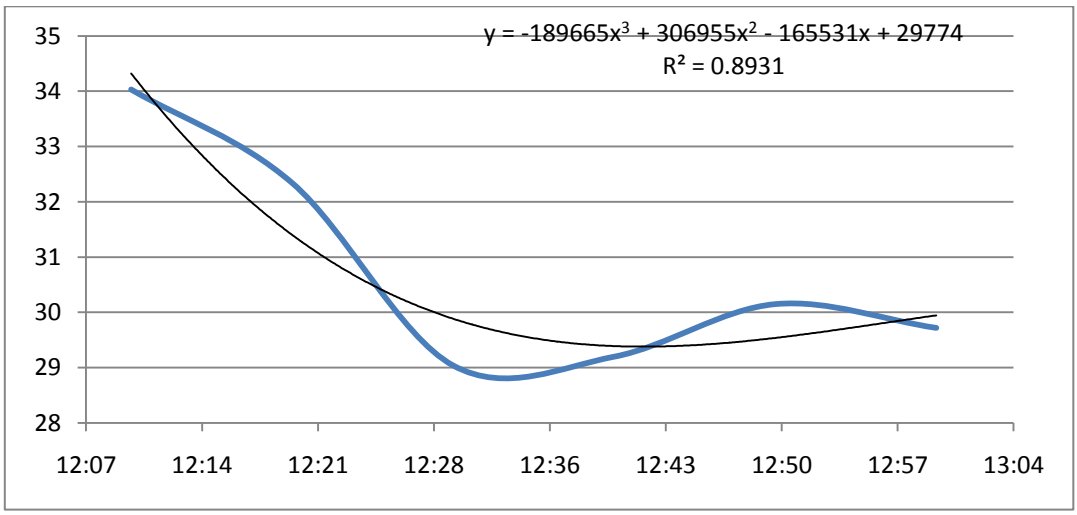

Figure 5. Simulated speed without applied strategy

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