RES MILITARIS
REVUE EUROPEENNE D ETUDES EUROPEAN JOURNAL OF MILITARY STUDIES
Social Science Journal

Intelligent Transportation Strategy and its Role in Improving Services and Reducing Pollution in Baghdad

By

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Abstract

The intelligent transport system represents one of the modern tools in organizing and improving traffic by relying on communication techniques and modern technology, has been applied to a specific area of the city of Baghdad characterized by a lot of congestion, to know the level of service before and after the application of the intelligent transport system. The research reach that 79% need to implement the intelligent transportation system , that 21% is not needed, and that 10% of the movement is unstable to improve the level of service. the level of service for roads and intersections has improved, as most levels are within(A,B,C) . Traffic congestion is one of the causes of envionrmental pollution, as vehicles emit exhaust gases, and the domestic fuel is less than 9% of the amount of energy supplied, the flash point is about 6,5 higher and the octane ratio is about 7% less than the international standards. The research recommended the necessity of applying intelligent transport system in Iraq because of its effects to raise the operational efficiency of the public transport system, and to develop a structural map for its implementation according to an approved strategy that can be implemented in time stages.

Keywords :Intelligent transport, Traffic congestion , structural map,envionrmental pollution ,safety

Introduction

Transport is one of the most important economic sectors in the process of economic and social development by facilitating the movement of passengers and goods, as well as the detrimental effects of transportation on the environment ,the Global experiences have proven that the delay in solving transportation problems costs both the economy and the society a great losses and that cost represents waste that

-* Business Management – Management Information System will rise over time , as long as the negligence continues, so it is sure to shock them,

and its solution and implementation is less than cost of postponing it. If there are negative effects on the national economy, and if the problem of Iraq in this aspect is a complex problem, as there is no plan overgrowth of the transport system in Iraq with a steady increase in the number of vehicles entering Iraq , it is impossible to go back to these policies or to reconsider these policies

In general, this study aim to put some solutions to it through the applications represented by intelligent transportation systems, that they make use of computer technologies, communications, and control of a new whole in our challenge in the transport, such as improve safety, productivity, and public transport movement , ,although overcrowding, as the continuation of risk to the safety of passengers

Methodology of the study

This topic deals with the following

First: Study problem

Difficult problems including those related to the infrastructure of public transport and the increase in the number of driving vehicles, after accurate data on these vehicles and their specifications and sources of production, and violating the condition of availability and quality, and decrease in the use of public buses with increase in Private transportation, and this is what constitutes a real problem, as the number of vehicles in Baghdad is estimated to be more than (2,875,378)million.(**1**) or what constitutes its ratio (one car per two person), the number of vehicles in Iraq for the year 2020 is (8,103,304 million) of them (64,426) owned by the public sector only, while the private sector is owned (7,026,106)million or the ratio of the number of vehicles to the number of the Iraqi population approximately (per each 5) people in a car.

which leads to serious problems such as traffic jams with a (high) degree, especially in the hours of traffic on the bridges , main streets and intersections, this requires the use of intelligent technologies to increase the operational power of roads to wrap the roads and determine the distances between vehicles and other procedures

Second: Study objective

The study aims to the following :

1. Identifying the contribution of the intelligent transportation system to solving the understanding problem of transportation in Iraq, which is related to improving the operational efficiency of the public transportation system, Energy conservation and protecting the environment.
2. Implementing policies and integrated strategies for the intelligent transportation system in Iraq consolidation of purchasers of devices and equipment.

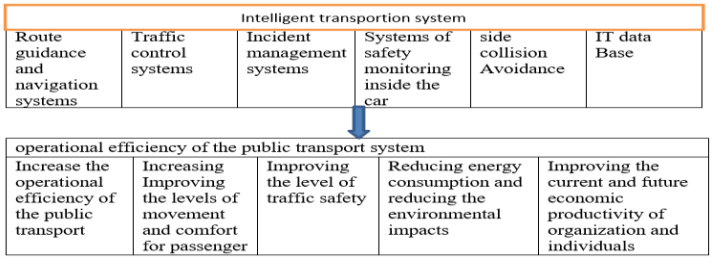
Third: Study importance

This study is important because it is one of the studies that seeks to solve the transportation problem in Bagdad through the application of intelligent transportation strategies.

Fourth :study Hypotheses

The application of the intelligent transportation system contributes to solving the problem of traffic jams and reducing exhaust emissions from vehicles in the city of Baghdad

Fifth :Study planned



Figure(1). *Explain the study planned*

Sixth: Methodology It

is based on a review of the basi theoretica concepts of intelligent transportation, and a

traffic survey to find out the traffic volume of the study area and the level of service , and then applying the congestion reduction index of 35% to the study area to know the level of service before and after the application of intelligent transport.

Theoretical framework

First : The concept of intelligent transportation:

The intelligent transportation system (ITS) has gone through a number of designations, including (IVHS) Intelligent Vehicle - Highway systems in the United States of America, as well as the RTI (Road Transport informatics) or Advanced Information and Communication technologies in transport In most cases, both names are combined in Japan(**2**) , considering that the new term is a more general term in view, but it is limited to the road and the vehicle only, as was the case previously, as this term expanded to include everything related to it Communication, Management and Others(**3**)

The Intelligent Transportation System (ITS) defines

It is a system that improves the safety of transportation and movement, reduces the environmental impact, and enhances productivity by integrating advanced means of communication that rely on informatics and electronic technologies intransportation infrastructures and vehicles. (**4**)

That they make use of computer technologies, communications, and control of a new whole in our challenge in the transport, such as improve safety, productivity, and public transport movement .although overcrowding, as the continuation of risk to the safety of passengers , as the increase in the scarcity in the budgets of the responsibilities of the transport . (**5**)

as defined by the researcher: It is integrating information and communication technologies, the Internet and smart devices (computers, mobile and electronics) in the transport management systems and its applications in order to ensure the integration of all kinds of systems finding solutions to problems traffic congestion high levels of pollution, decreased tripe time and energy consumption

Second :The Objectives intelligent transport Systems:

The main objectives include the following: (6) (7) (8) (9) (10)

1. -Increasing the operating efficiency of the transportation system and increasing capacity -increasing speeds and reducing stopping .
2. Reducing delays at transfer points between the transportation means (ATT).
3. Increasing the occupancy of private vehicles and increasing the use of public transport. - Raising the level of road network management by adopting the capacity of the road networks.
4. -Improving movement and comfort for passengers.
5. Freight management systems reduce the cost of car companies by 35% with the implementation of networks and information systems for commercial vehicles. -Reduce tripe delays between 5-40%.
6. –Increasing the level of safety .
7. -Improving the quality of the traffic safety .
8. Reducing the number of accidents 40%
9. -Reducing energy consumption and reducing environmental impacts .
10. Reduce from Coordination and integration of network operations, including its management and investment. -Improving adaptation to changes in system performance

requirements and technologies. - Intelligent transportation systems help to provide for a greater capacity of energy with greater efficiency, studies indicate that the combination of smart systems and new constructions is able to accommodate future traffic growth by providing capacity of **35%** which needs to be equipped to meet the same traffic demand through new construction only. (**11**)

Third : Functions of Intelligent Transport Systems

The intelligent transport systems are classified into a five of categories that are known among the concerned, as follows : (**12**) (**13**)

1. Advanced systems for the management of the traffic.
2. Advanced passenger Information Systems
3. Commercial Vehicle Operations Systems.
4. Advanced Public transport Systems .
5. Advanced Vehicle Control and Safety Systems for Vehicle

Fourth: Intelligent transport application requirements

A. Intelligent transport application:

To apply this technology, we need to adopt scientific methods to adapt the currently in use transport systems with the intelligent system : through the following :(14)

building advanced information centers: from road networks, such as railroad tracks, and aggregate flow movements, thus supporting the geographic information system that depends on the digital map is appropriate for this purpose, for example, the driver of vehicles needs information on the lanes and roads in the city.

the development of the technology of communications via satellite, for example, the global system for determining the location (GPS), which is one of the systems that a smart system needs, as it can be operated and communication voltage with an industrial.

Development centralized control systems : The needs of the intelligent system, for example, should rely heavily on the computer in the work of these centers and the mechanization of their functions, as well as equipping them with advanced systems of equipment and control, such as cameras, electronic media variables, message signs electronic variable

Teaching competencies of those who work in the field of center and transportation, and training me on this technique, and sending them to the countries that started implementing the smart system to attend the seminars and work in this field, in order to become qualified in dealing with the smart systemtechniques B.**Building a structural map - (ITS Architecture):** The structural map is the common framework for the interoperability of the intelligent transport system, which is known as It follows: (15)

1. Functions related with user services for intelligent transportation systems
2. 2.The natural machines or the sub-activities that lead to these functions.
3. 3.Data communication a information flow between sub-systems.
4. 4.Communication requirements related to information flow.

And see (16) that it describes how the components of the system interact with each other, And their operations combined to achieve the quantitative goals of the system, as they describe the operations of the system, as well as the role that performs each of its interrelated elements, information among its components. In order to analyze the maps, it is possible to find links and complementarities between the various activities on its way, as the responsibilities of transportation are divided into several ministries, such as transportation, defense, and

communications because of what is important in securing networks the communication between all the parties has improved, in addition to the private sector, as it owns companies of trucks, buses, and taxis ,.... . Therefore, it is possible from this map to establish a general framework that the concerned parties can carry out their work accordingly, an integrated vision from the flow of information between the regions , the structural map is subject to development based on changes that are taking place, which prompts the concerned authorities to have a unified future vision for the intelligent transportation system in Iraq that works on setting policies and guidelines that everyone is committed to in terms of purchases, equipment, supplies and operation at the branch level and at the general level , determining the specifications and qualities of vehicles and equipment, and compatibility with other relevant systems in the structural map.

Fifth:Challenges facing the transportation system in Iraq

A. The transportation system in Iraq faces major challenges, as it has not adopted a strategy to implement the intelligent transportation system, and its infrastructure has been worn out, and a structural map has not been developed to determine the courses of action of the intelligent transportation system.Add to that the lack of funds needed for this project, and through surveying the opinions of officer in the Baghdad traffic Directorate, the problems facing the transport sector have been identifieTable (1)

Table(1). *shows which problems face the transport sector in Iraq*

High	Middle	Low	Problems	Paragraph
X			Crowded Congestion	
X			Unorganized Parking	
	X		Traffic Accidents	Problems
	X		Length Of Emergency Response	
X			Pollution Level	
Available	Partially Available	No Available		
		X	Electrical Traffic Movement Management	Smart Applications
		X	Situation Management And Control	
		X	Transportation Demand Management	
	X		Emergency Vehicle Management Devices	
		X	Pollution Measuring Devices	
		X	Automated Safety Inspection Devices	
		X	Electron Collection Devices	
		X	Weather Sensors	
		X	Automatic Road Closing Equipment	
		X	Electronic Counters	
		X	Fish And Wireless Communication Networks	
		X	Electronic Guiding Panels	
		X	Variable Electronic Messages On The Roads	
		X	Electronic Locations	
		X	Geographical Information Systems	
	X		Camera	
		X	Electronic Shops	

Resources: researcher

B. Environmental hazards of gases emitted from automobile exhaust: Gasoline is one of the most prominent aromatic hydrocarbons that make up gasoline, which affects human health. Health scientists have divided these pollutants into five groups according to their type and their physiological impact on humans: (**17**) irritants, suffocating substances, narcotics, toxic substances and suspended solids. These gaseous pollutants emitted from automobile exhaust are harmful to human health, and the most dangerous of them is the dark smoke , which remains suspended in the air for long periods, causing a lot of exposure to ultraviolet rays from the sun, causing a photochemical reaction that results in the formation of what is known as fog. Iraq's prodction rate of gasoline was 28 million liters / day Specifications of gasoline used in fuel processing stations in Iraq .(18)

Table (2). *Comparng the Iraqi specifications for the fuel used in gas stations with international standards .(19)*

EPE (UE)	EPA (USA)	*Iraq	Specification
750	750	730	(Density)- (g/cm^3)
44	44	40	(Energyvalue)- (Mj/Kg)
45	45	48	(Flash point)-oC
0.02	0.03	0.07	(Sulfur content)- (wt.%)
90	92	85	(Octane Number)
14	14	2.1	(Viscosity) - (mm^2/sec)

*(USAEPA-) United States -Environmental Protection Agency
*(EPE- UE) European Pollutant Emissions)(European Union

C.Intelligent Transportation System Implementation Strategy: As awhole, and according to the researcher's vision, it is necessary to take into account the priorities and importance when applying the intelligent transport, it is being modified according to the capabilities and vision of the specialists. as follows :

1. Applications that help in solving problems related to crowding, such as task park management, and measuring the level of pollution and waste emissions it takes to apply (1-2) years .
2. Applications that solve a temporary problems such as automated road closures of the road and providing information on the road situation about the weather ,Radar is installed on the outside it take to apply (2– 4)years .
3. Application that secure the link to satellite , and international traffic, which contributes to automatic vehicle inspection , such as collecting electronics, buying documents, paying taxes for electronics, weighing trucks while in motion with the use of automated vehicle identification techniques and distinguishing violating trucks , it take to apply (1 -3) years.

***The practical aspect*:**

The practical aspect includes knowing the criteria required to implement the intelligent transportation system, developing a methodology for the possibility of implementing the system and applying it to the study area.The study was applied in the main streets in the city of Baghdad, where the number of cars reached ((2,875,378) million .

The application of the intellegent transport system in the city requires the following:

1. Traffic volume:It takes an hour to know the traffic flow.
2. Calculate the annual average daily traffic volume (AADT): It can be obtained from dividing the number of vehicles during a whole year by 365 days, calculated (vehicles / day) . It is calculated according to the following formula: **(19)** DHV:Design hourly traffic Volume =(Factor *AADT).

The value of the factor = 10-20%, 10% for urban roads.

K: its value – 15- 10% depending on the type of road, 12% for urban roads

The value of the coefficient (K = 0.14) is adopted in the research.

3. Determining the level of service (LOS): It is the condition of the traffic flow on the road, and it is expressed as the percentage of road occupancy (Traffic volume / road capacity), if the ratio is close to 1, it means the road is crowded, and if the ratio decreases, the service level will improve.

The service level is divided (F-A) and A represents the ideal situation for the level of service, while the E level brings the traffic volume to its capacity, and F represents Forced flow condition, and service level is extracted using (HCS 2010) program.

4. Comparing (AADT) and (LOS) with ITS standards and showing the applicability of order or not.
5. When the system can be implemented, the main and secondary control centers in the city are identified.
6. Study the application of the intelligent transport system in reducing the level of congestion and improving the level of service on the transport network by adopting the index of congestion is 35 % for traffic volume.
7. The research deals with part of an area of the city of Baghdad in the Bab Al-Moadham area of an area with traffic congestion most of the hours during official working hours

One of the most important criteria that must be met to implement the intelligent transportation system in the city is: (21)

1. Traffic exceeds 1,100(vehicles/hour) in each lane.
2. The service level of the road is at level (C).
3. A road that meets a threshold of annual average daily traffic volume (AADT) of not less than:(22)

For aroad with 8 lanes and more than 67,200 vehicles per day. For a 6-lane road, 50,400 vehicles per day. For a road with 4 lanes, 33,600 vehicles per day.

For a two-lane road, 15,800 vehicles per day.

The research focuses in the study area on 4 main intersections in the Bab Al-Moadham area with the streets extending from and entering it, according to the following :(Figure 2):

1. The intersection of Bab Al Moadham Square
2. The Jumhuriya Square intersection
3. The Sarafiya bridge intersection
4. The intersection of the College of Art.

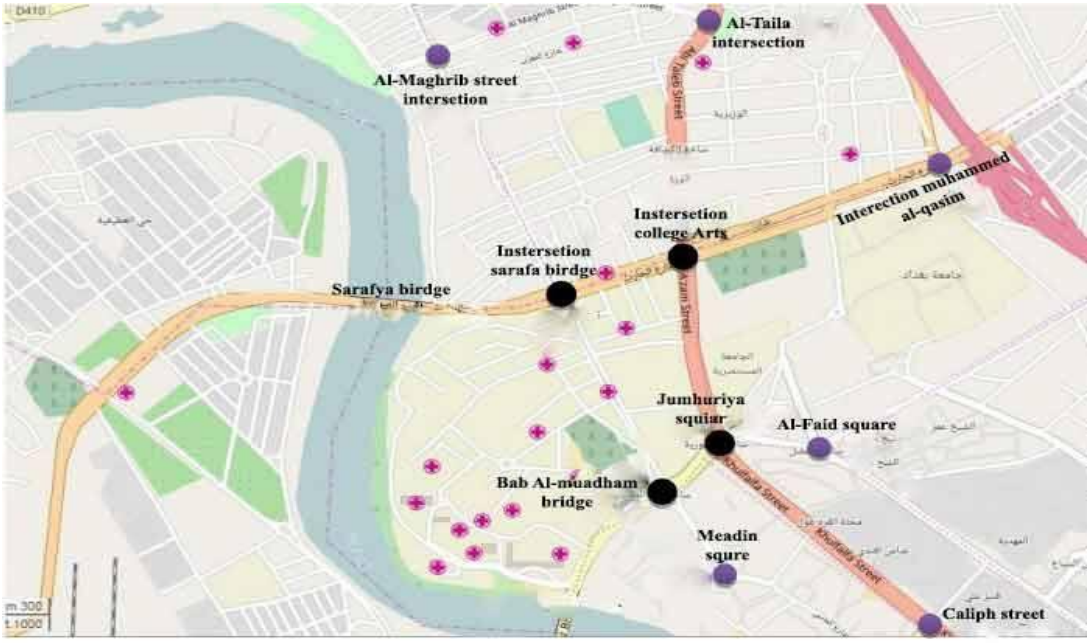


Figure (2) *The location of the study area*

These main intersections are connected to a group of secondary intersections leading to and starting from the study area, which are :

1. Al-Talia theater intersection.
2. Al-Maghrib Street intersection.
3. Muhammad Al-Qasim Expressway intersection.
4. Al-Fadl Square intersection.
5. The intersection of the Meadin square.
6. The intersection of Caliphs Street. There are two streets, the first extending from the intersection of the Sarafiya Bridge to the Sarafiya Bridge, and the second street extending from the intersection of Bab Al Moadham Square to the Bab Al Moadham Bridge

Testing study

The application of the intelligent transportation system requires testing the study area and comparing it with the standards of the intellegent transportation system that he mentioned and according to the established methodology, the system was applied for the period from 11/2 to 11/3/ 2022 and for the morning and evening periods, and the counting of cars was conducted by manual method **.** to determine the possibility of applying the system or not and according to the following (Table 3)

Table (3). *average traffic volume for the study area*

Item	Intersection Name	Time	(Vph)	LOS	AADT	Comparison with Standards	Desistion
A.	intersection of Bab Al-Moadham Square						
1.	From Bab AlMuadham Intersection to Bab Al Muadham Bridge .	7:30-8:30 1:2	1412 1960	B C	10086 14000	1100 Exceed (Vph) □ Vehicle/hour Los=C	The system is allowed

2.	From Bab Al Muadham Bridge to Bab Al Muadham Intersection	7:30 8:30 1:2	1798 1680	C C	12843 12000	1100 Exceed (Vph) □ Vehicle/hour Los= D	The system is allowed
3.	From Bab Al Muadham Intersection to Al Sarafiya Bridge Intersection	7:30 - 830 1:2	7o3 1200	A B	5022 8571	1100 Exceed (Vph) □ Vehicle/hour Los=C	The system is allowed
4.	From the intersection of the Sarafiya bridge to the intersection of Bab Al-Moadham	7:30 – 8:3 1:2	822 666	A A	5872 4757		The system is not allowed to apply
5.	From Bab Al Muadham Intersection to Al Maidan Square Intersection	7:30 – 8:30 1:2	613 522	A A	4378 3729		The system is not allowed to apply
6.	From the intersection of Al Maidan Square to the intersection of Bab Al Muadham	7:30 – 8:30 1:2	368 748	A A	2629 5343		The system is not allowed to apply
7.	From Bab Al-Moadham Intersection to Al-Jumhuriya Square Intersection	7:30– 8:30 1:2	2213 18oo	D C	15807 12857	Vph (exceeding 1100 vehicles/hour. □ LOS =D	The system is allowed to apply
8.	From the intersection of Al-Jumhuriya Square to the intersection of Bab Al-Moadham	7:30 – 8:30 1:2	1850 1902	C C	13215 13586	Vph (exceeding)1100 vehicles/hour. □ LOS = C	Allowed to apply the system
B.	intersection of Al-Jumhuriy						
1.	From the Al-Jumhuriy intersection to the intersection of the Caliphs Square	7:30 –8:30 1:2	2402 1724	D C	17143 12300	Vph (exceeding 1100 vehicles/hour. □ LOS = D	Allowed to apply the system
2.	From the intersection of the Caliphs Square to the intersection of the Al-Jumhuriy	7:30 – 8:30 1:2	1611 1500	C C	11507 10715	Vph (exceeding 1100 vehicles/hour. □ LOS = C	Allowed to apply the system
3.	From the intersection of the Square t Al-Jumhuriy to the intersection of the College of Fine Arts	7:30 – 8:30 1:2	2094 2638	D D	14929 18857	Vph (exceeding 1100 vehicles/hour. □ LOS = D	The system is allowed to apply
4.	From the intersection of the College of Fine Arts to the intersection of the Square Al-Jumhuriy	7:30 – 8:30 1:2	2826 2317	E D	20186 16550	Vph (exceeding 1100 vehicles/hour. □ LOS =	The system is allowed to apply
5.	From the intersection of the SquaretAl-Jumhuriy to the intersection of Al-Fadl Square	7:30 – 8:30 1:2	1983 2161	C D	14143 15429	Vph (exceeding 1100 vehicles/hour. □ LOS = D	The system is allowed to apply

6.	From Al-Fadl Square Intersection to Al-Jumhuriy Square Intersection	7:30 –8:30 1:2	2498 1717	D C	17843 12265	Vph (exceeding 1100 vehicles/hour. LOS = D	The system is allowed to apply
C.	sarafiya bridge intersection						
1.	From the intersection of Sarafiya Bridge to Sarafiya Bridge	7:30 – 8:30 1:2	1520 1590	C C	10771 11357	Vph (V) exceeds 1,100 vehicles/hour. LOS = C	Allowed to apply the system
2.	From Sarafiya Bridge to Sarafiya Bridge Intersection	7:30 – 8:30 1:2	1834 1347	C B	13100 9814	Vph (V) exceeds 1100 vehicles/hour. LOS = C	Allows application of the system
3.	From Sarafiya Bridge Intersection to Maghreb Street Intersection	7:30 –8:30 1:2	1633 1553	C C	11665 11093	Vph (exceeding 1,100 vehicles/hour. LOS = C	Allowed to apply the system
4	From the intersection of Maghreb Street to the intersection of the Sarafiya Bridge	7:30 – 8:30 1:2	1763 1511	C C	12593 10793	Vph (exceeding 1100 vehicles/hour. LOS = C	Allowed to apply the system
5.	From the intersection of the Sarafiya bridge to the intersection of the College of Fine Arts	7:30 – 8:30 1:2	2952 2773	E D	21085 19807	Vph (exceeding 1100 vehicles/hour. LOS = E	The system is allowed to apply
6.	From the intersection of the College of Fine Arts to the intersection of the Sarafiya bridge	7:30 – 8:30 1:2	2744 1858	D C	19600 13272	Vph (V) exceeds 1100 vehicles/hour. LOS = D	Allows the application of the system
D.	intersection of the College of Fine Arts						
1.	From the intersection of the College of Fine Arts to the intersection of the Theater Al-Talia	7:30 – 8:30 1:2	1520 1700	C C	10771 12143	Vph (exceeding 1100 vehicles/hour. LOS = C	Allows to apply the system
2.	From the intersection of the Theater t Al-Talia to the intersection of the College of Fine Arts	7:30 – 8:30 1:2	1809 1414	C C	12922 10100	Vph (exceeding 1100 vehicles/hour. LOS = C	Allowed to apply the system
3.	From the intersection of the College of Fine Arts to the intersection of Muhammad Al-Qasim Expressway	7:30 – 8:30 1:2	2545 3121	D E	18179 22286	Vph (exceeding 1100 vehicles/hour. LOS = E	The system is allowed to apply
4.	From the intersection of Muhammad Al-Qasim Highway to the intersection of the College of Fine Arts	7:30 – 8:30 1:2	3422 2958	E E	24443 21129	Vph (exceeding 1100 vehicles/hour. LOS = E	The system is allowed to apply

We conclude that most of the intersections and roads in the study area allow the application of the intelligent transportation system in order to exceed the standard of traffic

volume (Vph) for 1100 vehicles / hour, in addition to the level of service (LOS) within the standard (E, D, C), except for the road extending from the intersection Sarafiya Bridge to Bab Al-Moadham Intersection, and the road extending from Bab Al-Moadham intersection to Al-Midan Square intersection in both directions, which do not require the installation of an intelligent transportation system

Application of the intelligent transportation system in the study area

The research depends on reducing the highest traffic volume (Vph) of the road, whether in the morning or evening rush, by 35%, and its impact on the level of service (LOS), and comparing it with the reality of the situation to find out the change in the level of service for the road according to Table (4).

Table (4). *Traffic volume before and after the application of the intelligent transportation system for the study area*

The name of the intersection	**Before After the implementation of the Intelligent transportation system**				
0A.	intersection of Bab Al-Moadham Square	(Vph)	Los	(Vph)*35%	Los
1.	From the intersection of Bab Al Muadham to Bab Al Muadham Bridge	1960	C	1274	B
2.	From Bab Al-Moadham Bridge to the intersection of Bab Al-Moadham	1798	C	1169	B
3.	From the intersection of Bab Al Muadham to the intersection of Sarafiya Bridge	1200	B	780	A
4.	From the intersection of Bab al-Moadham to the intersection ofAl-Jumhuriy Square	2213	D	1438	C
5.	From the intersection of theAl-Jumhuriy Square to the intersection of Bab Al-Moadham	1902	C	1236	B
B.	Square Al-Jumhuriy intersection				
1.	From the Al-Jumhuriy intersection to the intersection of the Caliphs Square	2402	D	1561	C
2.	From the intersection of Caliphs Square to the intersection of Jumhuriy Square	1611	C	1047	B
3.	From the intersection of Jumhuriy Square to the intersection of the College of Fine Arts	2638	D	1714	C
4.	From the intersection of the College of Fine Arts to the intersection of Jumhuriy Square	2826	E	1836	C
5.	From the intersection of theJumhuriy Square to the intersection of Al-Fadl Square	2161	D	1404	C
6.	From the intersection of Al-Fadl Square to the intersection of theJumhuriy Square	2498	D	1623	C
C.	Sarafiya bridge intersection				
1.	From the intersection of Sarafiya Bridge to Sarafiya Bridge	1590	C	1033	B
2.	From Sarafiya Bridge to the intersection of Sarafiya Bridge	1834	C	1192	B
3.	From the intersection of the Sarafiya Bridge to the intersection of Street Maghreb	1633	C	1061	B
4.	From the intersection of Street Maghreb to the intersection of the Sarafiya Bridge	1763	C	1145	B

5.	From the intersection of the Sarafiya Bridge to the intersection of the College of Fine Arts	2952	E	1901	C
6.	From the intersection of the College of Fine Arts to the intersection of Sarafiya Bridge	2744	D	1783	C
D.	Intersection of the College of Fine Arts				
1.	The intersection of the College of Fine Arts to the intersection of Al-Talia theater	1700	C	1105	B
2.	From the intersection of Al-Talia theater to the intersection of the College of Fine Arts	1809	C	1175	B
3.	From the intersection of the College of Fine Arts to the intersection of Muhammad Al-Qasim Expressway	3121	E	2028	D
4.	From the intersection of Muhammad Al-Qasim Expressway to the intersection of the College of Fine Arts	3422	E	2224	D

We note from the above table that the level of service has improved for most of the intersections and roads in the study area, as most of the levels are within the level (A, B, C), which is considered subitle and appropriate on the roads, except for the road extending from the intersection of the College of Fine Arts to the intersection of Muhammad Al-Qasim Expressway, which is within the level of (D) As the traffic is unstable and the level of comfort is reduced.(figur 3)

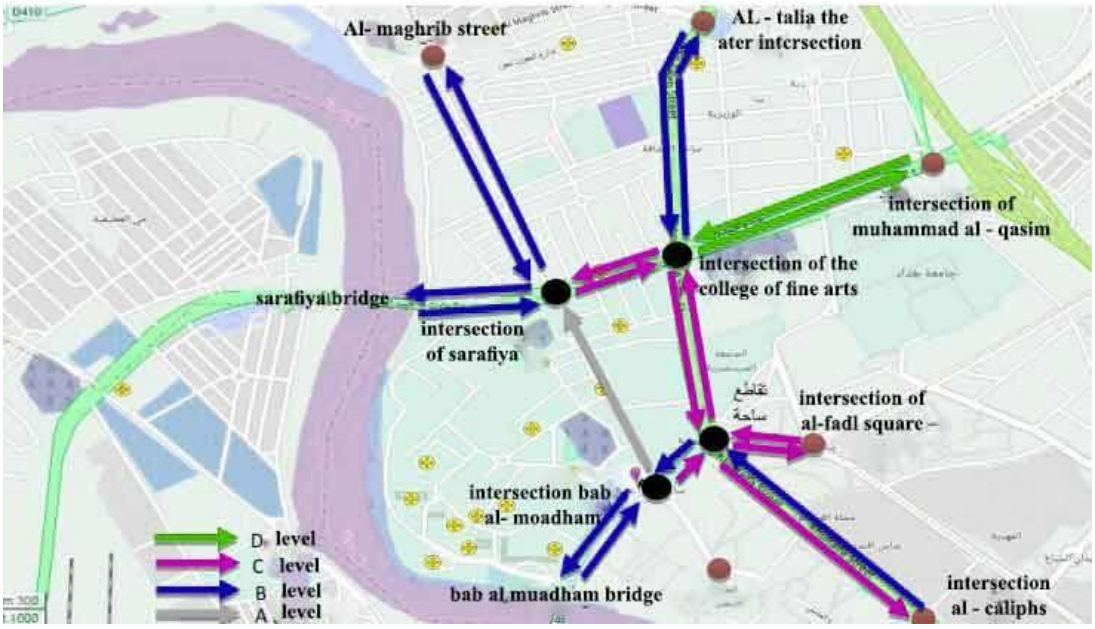


Figure (3). *Service levels after the implementation of the ITS*

The fourth topic: conclusions and recommendations

The first: Conclusions: The study concluded as follows

1. The research was applied to a part of the city of Baghdad according to American and European standards ,It was found that there is a need to implement intelligent transportion system because the area is characterized by a high traffic density, which contributes to reducing traffic congestion and improve movement.
2. The research reach that 79% of the research area can be applied to the intelligent transportation system While 21% do not need to apply the system, and 10% have

irregular movement and are within the leve (D)

3. Table (3) After the application of the intelligent transport system, there is an improvement in the level of service for roads and squares, as most levels are within(A,B,C)
4. Table (2) considers traffic congestion as a cause of environmental pollution, as vehicles consume large quantities of Larger stops at intersections and at bridges, and this means the release of quantities of car exhaust gas,Therefore the use of intelligent transport contributes to reducing exhaust emissions.
5. The research concluded that the characteristics of the fuel used in Iraq compared with international standards, as theWhereas, the domestic fuel is 9% less than the amount of energy generated, the flash point is higher by about 6,5 and the octane percentage is less than about 7% of international standards.

Second: Recommendations: The study concludes with the following

1. Establishing a structural map for an intelligent transportation system in Iraq, which is a basis for developing the specification and methods that are being the strategic framework , it is possible to integrate the activities of the various relevant authorities and to define policies within their framework.
2. The necessity of implementing the intelligent transport system to improve the operational efficiency of the public transport system.
3. Government in Iraq must be developed a strategy for sustainable transportation and reducing the level of environmental pollution and gas emissions from the use of vehicles, as number of vehicles exceeds(8,103,304) million.so we should apply the system to improve the operational efficiency of the public transport system.

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