

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

1. Assistant Prof. Ameerah Mohammed Ali Al- Hameed (Ph.D)⁽¹⁾
University of Babylon/ College of Education for Human Sciences
E-mail: drameeramh@gmail.com

2. Lecturer Firas sami Abdulaziz Alqatrani (Ph.D)⁽²⁾
University of Basrah/ College of Arts
E -mail: firm.alqatrany@gmail.com

Abstract:

The research deals with the study of one of the problems of urban transport in Iraqi cities, especially after 2003, which is the problem of traffic congestions through its application to the city of Hilla, the center of Babylon governorate. The study shows that there are factors that contributed to the worsening of the problem, including direct factors represented by increased urban growth of the population and the rise of the standard of living and the increasing desire to own a private vehicle for transport. Other indirect are the low area of urban transport use in the basic design as well as some procedural and behavioral factors for the executive authorities, traffic and population. The study has found that there are three geographical sites where traffic congestions increases in the north entrance of the city and the north-eastern entrance as well as the southern entrance to the city. The city of Hilla did not differ from the cases of other cities in terms of the times of daily traffic congestions, which were the hours of morning, afternoon and evening. However, the study showed that there are seasonal times when traffic congestions are increasing in the seasons of religious events due to their geographical location⁽³⁾. The research has come up with a set of solutions and recommendations.

Key words: Traffic jams, Hilla, the traffic problem, causes and remedies.

¹ University of *Babylon* (Iraq), College of Education for Human Sciences, Department of Geography, e-mail: drameeramh@gmail.com

² University of *Basra* (Iraq), College of Arts, Department of Geography & Geographic Information Systems, e-mail: firm.alqatrany@gmail.com

³ - The location of Hilla city, which is only 42 km east of the city of Karbala made it a passage for the visitors coming to visit the shrines of the grandsons of the Prophet Muhammad (peace be upon him) Imam Hussein and his brother Abbas (peace be upon them) in the city of Karbala, as well as an important route for the visitors who are visiting the shrine of Imam Ali (peace be upon him) is the cousin of the Prophet Muhammad (peace be upon him), where Hilla City is located 60 km north of the Najaf city

الاختناقات المرورية في مدينة الحلة (العراق): الاسباب والمعالجات

م.د. فراس سامي عبد العزيز الكطراي

جامعة البصرة / كلية الاداب

E -mail: frass.alqatray@gmail.com

أ.م.د. اميرة محمد علي

جامعة بابل / كلية التربية للعلوم الإنسانية

E-mail: drameeramh@gmail.com

المستخلص

يتناول البحث دراسة احدى مشاكل النقل الحضري في المدن العراقية خاصة بعد العام ٢٠٠٣، وهي مشكلة الاختناقات المرورية من خلال تطبيقها على مدينة الحلة مركز محافظة بابل والتي تبين ان هناك عوامل ساهمت بتفاقم هذه المشكلة، منها عوامل مباشرة تمثلت بزيادة النمو الحضري للسكان وارتفاع المستوى المعيشي وتزايد الرغبة بامتلاك مركبة خاصة للنقل وغيرها، وأخرى غير مباشرة تتمثل بانخفاض مساحة استعمالات النقل الحضري في التصميم الاساسي فضلاً عن بعض العوامل الاجرائية والسلوكية للسلطات التنفيذية والمرورية والسكان، وقد تبين من الدراسة ان هناك ثلاثة مواقع جغرافية تزداد فيها حدة الاختناقات المرورية هي المدخل الشمالي و الشمالي الشرقي والمدخل الجنوبي لمدينة الحلة، ولم تختلف هذه المدينة عن حالات المدن الاخرى من حيث أوقات الاختناقات المرورية اليومية التي تمثلت بساعات الصباح والظهيرة والفترة المسائية، غير انه ظهر من الدراسة ان هناك اوقات موسمية تزداد فيها حدة الاختناقات المرورية تتمثل بمواسم المناسبات الدينية نظرا لموقعها الجغرافي. وقد خرج البحث بمجموعة من الحلول التي من شأنها ان تسهم في معالجة هذه المشكلة.

الكلمات الافتتاحية : الاختناقات المرورية، الحلة، المشكلة المرورية، الاسباب والمعالجات.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

Introduction

The problem of traffic congestions⁽⁴⁾ is one of the problems experienced by Iraqi cities in general, including Hilla city, where the planning of the urban transport network and its efficiency in the city is a goal and a means, may affect the strength of its flow natural factors, the type of network available, the technical level and the financial situation of the transport supervisors (Wahiba, 1972, 202). Despite the advantages of comfort, speed, flexibility in door-to-door mobility, a sense of safety and even high status, especially in developing countries, it is not an effective means of transporting passengers, as every passenger is a private car on average. At peak hours, they cause about 11 times the traffic congestion caused by the bus (Bull, 2003, 23). Where the increase in the number of vehicles caused many problems within the urban space, (something missing in here) including traffic congestions, which reflect negatively on the performance of the city's functions in a civilized manner. The research included three topics, the first is to identify the direct and indirect factors of the occurrence of traffic congestions, the second is the geographical spatial and temporal distribution of the phenomenon, and the third is the proposed solutions to address the phenomenon at the level of urban planning of the city and the region.

First: The problem :

1. Do Iraqi cities in general, including Hilla, suffer from the problem of traffic congestions?

⁴ - The word "*congestion*" is frequently employed in the road traffic context, both by technicians and by the public at large. Webster's Third New International Dictionary defines it as "a condition of overcrowding or overburdening", while "*to congest*" means "to overcrowd, overburden or fill to excess so as to obstruct or hinder" something: in this case, road traffic (Bull,2003,23). See (European Conference of Ministers of Transport, 2007: 13).

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

2. Are there any factors affecting the efficiency of urban transport in the city?
3. Is there a disparity in the distribution of bottleneck points within the urban space of Hilla ?
4. Do traffic congestions (peak times) in the city vary?

Second: The hypothesis of the study:

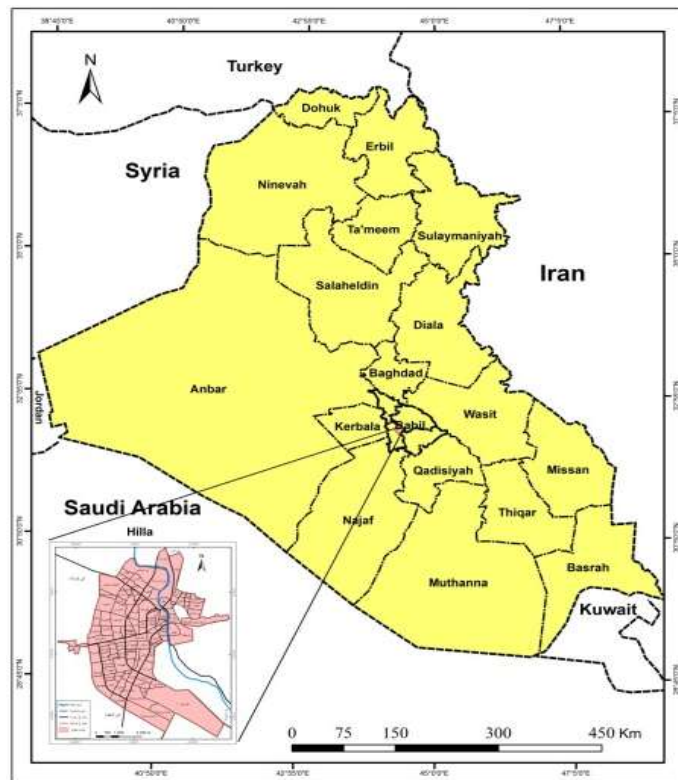
1. Cities suffer from the problem of traffic congestions, including Hilla City?
2. There are direct and indirect factors for the emergence of this phenomenon, which affects the urban traffic of the city.
3. The distribution of traffic congestions points varies in the five sectors of the city.
4. The times of traffic congestions in the city vary according to the hours of the day and according to the times of the quarterly time and annual events.

Third: The importance of the study: establishment of long-term solutions at the urban level of the city and long-term measures within the five-year or 10-year plans as well as the development of a strategic plan at the regional level.

Fourth: The boundaries of the study area: the center of the governorate of Babylon is the city of Hilla within its administrative boundaries, which is the center of the governorate of Babylon (fig. 1), which connects the center of Iraq to its south, while the temporal boundaries represent the data obtained from the Department of Traffic of Babylon and the field study in 2018/2019.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

Fig. 1: The Geographical Location of Hilla City for the Governorate of Babylon and The Republic of Iraq



Source: Republic of Iraq, General Directorate of Survey, Iraq Administrative Map, 1: 000000, 1998.

Fifth: The methodology of the study: the research relied on the descriptive method, which is concerned with the description and identification of the phenomenon, and the analytical method in order to reach results through which solutions to the problem can be developed.

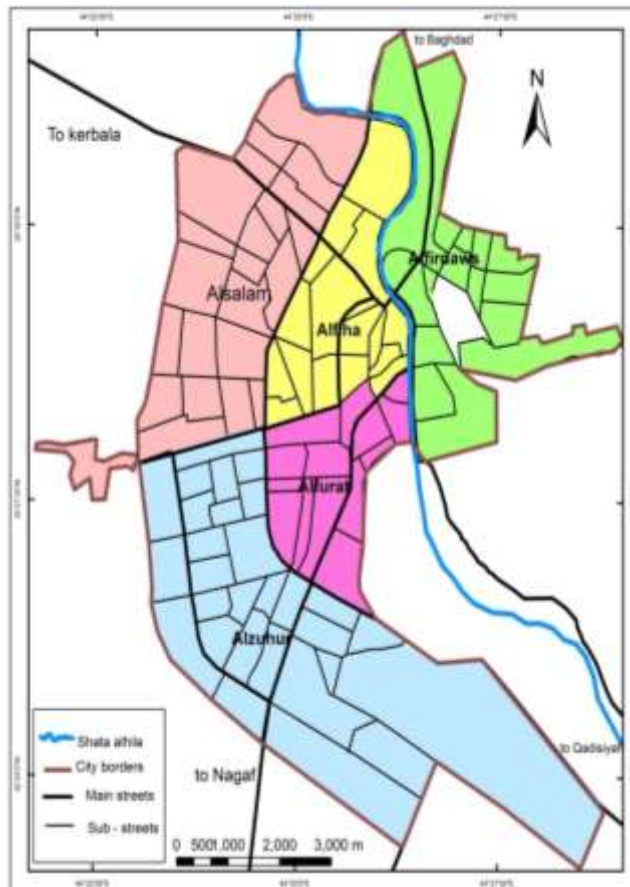
Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

Study Sample: 100 reconnaissance forms were distributed to determine the causes of their occurrence by identifying the most important variables in the questionnaire form.

Sixth: The structure of the study: the study included three topics, the first identified the direct and indirect factors causing the occurrence of traffic congestions, the second topic the geographical spatial and temporal distribution of the phenomenon, and the third is about proposed solutions to address the phenomenon at the level of planning urban city, which consists of five sectors (Fig. 2).

Fig. 2: Administrative divisions of residential sectors and quarters in Hilla City 2019

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments



Source: Researchers based on: Hilla City Map, Hilla Municipal Directorate, GIS Division, 2019, 1:10000.

1 .Factors responsible for the occurrence of traffic congestions in cities:

The phenomenon of traffic congestions arises as a result of several factors and this problem becomes more complicated with the increase in time without developing the solutions to this problem, which increases in the severity of this traffic congestion, and in order to develop appropriate solutions at the urban level of the city and at the regional level we must identify the factors which contributes to the emergence of this problem in order to address it in the correct planning

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

methods, and within plans to address this problem, these factors are divided into direct and indirect factors that can be identified as follows:

1.1 Direct factors affecting urban traffic :

1.1.1 Population Increase and Urban Expansion: this is the increase in the population of the city and has been helped by several factors on this rise, represented by the annual natural increase of the population, the optional migration from the countryside to the city and forced displacement for security, political and agricultural reasons related to the underdevelopment of the structure and management of the agriculture sector and its declining level of performance as well as poor basic services, forcing residents to move to the city to seek jobs with a steady return and less effort compared to agricultural work, and to obtain basic human services such as municipal services and health and educational services available relatively better. The presence of these factors has helped to expand from the outskirts of the city, which is expected to continue to increase as the volume and quality of migration increases, . And the combined presence of these factors has helped to increase urbanization. The annual percentages, which reached the proportions, increased the area of the city significantly during the stages of its urban expansion, reached an area (16,709 hectares), with (97) residential quarters and three areas the largest (Tahmizyeh area) (Fig. 2) which includes the five sectors of the city, where the number of residential quarters increased from 38 quarters in 1987 to (60) quarters in 1997 97 to bring the number of (62) quarters to an increase in the population, which exceeded (452,875) in 2016 and rising to (64,326) in 2018 (Table 1).

1.1.2 Social factors: such as a personal desire and increased demand for vehicles led to a large flow of these vehicles, as well as characteristics of the family in terms of its size, lifestyle and the number of employees of school age, which significantly affect the number of trips and its generate as the density reflects the various activities and events (Al-Dulaimi, 2005, 83).

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

Table 1: Population in Hilla city and growth rate for years (1997-2007-2018)

Census ratio	Population (individual)	Time period	Increasing in Population (individual)	**Annual growth rates %	Overall growth rate	Number of residential areas
1987	198595	/	/	/		38
1997	257495	1987-1997	58900	2.7	3.3	60
2007	320767	1997-2007	85343	3.1		62
2018	643626	2007-2018	322859	7.3		97

Source: Table is the work of researchers / based on - Republic of Iraq, Ministry of Planning, Central Bureau of Statistics, results of the general census of the year (1987, 1997) and estimates of 2007, 2018.

1.1.3 State Policy: by opening of the Iraqi markets to international products without restriction or condition matched by a relatively constant supply in the number of streets and roads and the lack of projects that started their work but without complete completion and left without treatment, for example: a bridge of Mother's Round (*Filkat Al Um*), *Bab al-Hussein* bridge and *Bita* Bridge. As well as the closure of internal roads and close to government departments, which affected the movement of traffic within the quarters and sectors of the city and its main streets as accompanied by an increase in the demand for streets and roads by private vehicles, especially private vehicles because of their advantages of comfort and family and personal privacy is more flexible in mobility than public transport.

The flow of vehicles in Iraq in general and Hilla in particular has worsened after 2003 for several reasons, notably the commercial and economic opening that helped to enter cars without controls. The city's location helped to increase the huge flow of vehicles both within the city of Hilla and at the level of the governorates of Iraq as a whole. They are in the middle of the governorates of the Middle Euphrates, and the fact that the transport routes are a reciprocal relationship between the city and the neighboring countryside as it facilitates the process of trade as well as access or easy access to services. Therefore,

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

it is the basis in the process of regional development (al-Dulaimi, 2009, 88).

This leads to increase the level of the land need for the transport network to double its current size to accommodate the continuous annual increase in the number of registered vehicles that accumulate annually until (110452) (Ali, 2018) in addition to vehicles unregistered officially. Recorded vehicles numbers can be identified in addition to the mentioned weakness in the supply of the capacity of the current roads, they also suffer from poor quality and non-conformity to the specifications of international roads such as road capacity specifications and the number of lanes and the capacity of the single lane and the function of each road, and estimated the width of the streets of the local city. The main streets serving the city's sections also varied (from 30-80 m) and connect the five sectors, see Fig. 2.

1.1.4 The phenomenon of residential slums after 2003: As a result of financial, technical and political reasons due to the wars that Iraq has experienced, which caused the suspension of various urban development programs, which created large areas of empty land that were subjected after the fall of the regime in 2003 to overreach, building illegal informal housing on land with different uses, some of which are intended for proposed housing or as green areas or future roads and other public services. That has negatively affected the increase despite the increase in traffic pressure on the road network in Hilla city, as well as the difficulty in establishing expansion and urban projects for the transport network in that areas because of the difficulty of removing the trespassers for some humanitarian reasons and may be political or perhaps for fear of popular reactions, as in the trespassers in al-Basrawa quarter and trespassers in the Tink quarter in Nader III, as there are trespassers in the paradise sector near the railway.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

1.1.5 Increasing the number and size of random markets (shadow markets)⁽⁵⁾ and trade on sidewalks and squares and bypassing pavements dedicated to pedestrian traffic, which confuses traffic within the streets of the secondary streets and also on the main streets in the city center, including (The Great Hill Market) which has been closed for security reasons since 2008, after an explosion that claimed the lives of many shoppers, and other markets, including (Al-Tahmiyeh Market on 80th Street with Hilla Street - Kafel). This caused a tangle and large bottlenecks between cars with each other and with the sellers, buyers and owners of vehicles and large and small mobile wheels and others, and Allawi fish in the small side and the market at the intersection of Nader trespassers on pavements and state property...etc.

1.1.6 The severity of traffic congestion is related to the economic cost of the consumer (the user of the private vehicle): which is economical for him/her, as it can be used whenever she wants and at any time as desired, which increases the desire to own the personal car.

As well as increasing the privacy for the woman of Hilla, and her desire in driving the car and thus an increase in the number of special vehicles. This is considered an important factor in keeping up with the economic and social development as it plays a major role in accessing human resources⁽⁶⁾.

1.2 Indirect factors affecting urban transport:

1. Poor performance of the commodity transport and storage system within the city especially in the center business (CBD).

⁵ - The shadow markets mean those shops and commercial flats that emerged as a result of the exploitation of emergency people coming from the cities and hot governorate s north of Hilla city weak state measures in the application of the law and the lack of suitable jobs for them led to the exacerbation of this problem to a phenomenon that spread throughout the city the suit which caused the city's general appearance to be distorted.

⁶ - Abdul Aziz Mohammed Habib, Yousef Yahya Tamas, Geography of Transport and International Trade, Directorate of Books, Mosul University, 1989, p. 9.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

2. Accumulation of waste, ponds, sewage, waste of random markets, construction waste and various projects, especially within residential quarters.
3. Forced traffic inside densely populated residential areas due to congestion on the main streets and for security reasons as some local streets are closed, especially the residential quarters that include government institutions such as Al-Kiyada Street, Street of the Council of the Provincial, Court Street, and Passports Office Street and others.
4. Chaos in the spread of craft shops and industrial workshops within residential quarters adjacent to the streets, especially the street facing the Turkish hospital and along Tahmiyeh Street, which negatively affects the movement of vehicles, especially because there is no specific time for load and unloading vehicles that hinder movement, especially at times of morning rush.
5. Random digging of streets by residents to supply water pipes, sewage and others without accountability, especially new slums.
6. Chaos in crossing the streets without the places allocated to them to cross and the absence of regular crossings or pedestrian bridges.
7. The work of the random closure of the streets with bumps and concrete and non-concrete barriers in front of the entrances of government institutions and the headquarters of parties and officials and public figures for security or political reasons. The spread of security controls within the urban space, the unplanned and deliberate distribution of parking spaces and different specifications.
8. The owners of malls and large shops are not obliged to build a parking garage as it exceeds the street and increases waiting times, which negatively affects the traffic within the secondary streets in the city, including Al-Association Street, 40th Street, Imam Street, Nader First Street and others commercial streets.
9. The lack of other types of transport networks supporting road transport such as metro or bicycle transport, and if the latter is used, it is a negative phenomenon that does not rise as a means of solving the problem of urban transport within the city, which is the use of bicycles, whose owners lack the simplest best rules, which endangers their lives

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

and the lives of others, as accidents constituted a certain percentage of their users exceeding the limit of benefit.

10. For the length of the streets, there is an impact on the density of traffic, where this density is affected by the number of cars used for the road network during the twenty-four hours of the total length of these streets⁽⁷⁾, In addition to the transport network and the extent of its ability to absorb traffic, it is the artery through which traffic flows and the lack of other types of transport networks prevalent for road transport such as transport by metro or bicycle, and the use of bicycles, whose owners lack the simplest rules of optimal use, putting their lives and the lives of others at risk as accidents formed a certain percentage of users exceeding the limit of interest from them (fig. 3).

Fig. 3: A bicycle user does not wear a helmet and goes in the wrong direction reversing the traffic in one of Iraqi cities



Source: Field study picked up by researchers on 19-09-2019.

11. Economic factors, including, in particular, the most influential factors: cost, the nature of demand for public transport, which are the determining factors in consumer behavior (private vehicle user) and

⁷ - Maher Hussein Ali, Personal interview, Traffic colonel, Assistant director of Babylon governorate traffic, 26-11-2018.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

its preferences for private transport on public transport and for the following reasons:

A. The advantages of private transport, including privacy, flexibility, speed control, stops, directions, etc., outweigh the advantages of public transport from the private point of view of the consumer (vehicle user).

B. The cost factor between the public and private vehicles is for the benefit of private vehicles, except in the case of short-haul flights, it will be in the interest of the public vehicle.

C. The flexibility of income demand for public transport is high (flexible demand) or equal flexibility (minimum) while the flexibility of exchange demand is low (inflexible demand) or almost inflexible due to the advantages mentioned.

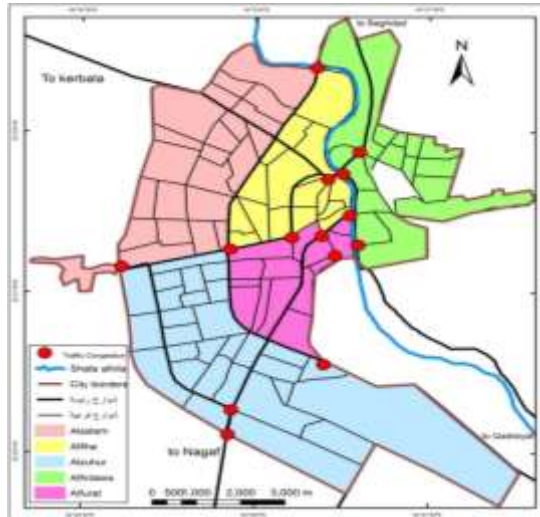
D. The consumer bears the direct operating cost, especially the variable ones, only from the total cost system on it and the fuel component remains the determining factor for the cost that determines the level of demand for the private vehicle, which is relatively low due to government support followed by the maintenance component of the vehicle. As a result, these causes, which increase the demand for the private vehicle, especially sedans, will increase the severity of traffic congestions while taking advantage of public transport will contribute to reducing them.

2 .Geographical spatial and temporal distribution of the areas of traffic Congestions in Hilla.

The spatial and temporal distribution of traffic choking points and the five sectors of the city vary, as we can identify these points and according to the field study (fig. 4) prepared for this purpose, as the intensity of traffic congestion in the city is at the following points:

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

(Fig. 4) Hilla Traffic Congestion Points 2018



Source: Researchers work editing the field survey of intersections in Hilla city sectors, 2018.

First: The northern entrance of the city, which is Bta bridge between Baghdad and Hilla, where the road that is crowded with cars in the entrance is the beginning of the control of antiquities (a link between Baghdad and the governorates s of the Middle Euphrates), which has two lanes of going and backing (fig. 5).

Fig. 5: Traffic congestion at the northern entrance to the city in the evening hours



Source: Field Study, 2018

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

Second: The entrance of the city north-east represents the Bab al-Hussein bridge, and is a bridge linking Baghdad and Hilla and connects the eastern side with the western side of the city, which has two lanes going and backing as well, fig. 6.

Fig. 6: Traffic congestion at the southern entrance to the city in the morning hours



Source: Field Study, 2018.

Third: The southern entrance, which is a rare intersection, which is the entrance to the city of Hilla, is a link between al-Qadisiyah and Babylon governorates. Babylon and Najaf governorate are the most honorable, which has two lanes going and backing as well (fig. 7).

Fourth: The entrance of the city southwest of the entrance of Najaf province, which increases the intensity of traffic jams beginning of the academic year 1/9 to the end of the academic year 1/7 where the road turns into one side of public transport and keep the other side of the transfer of students and staff at the university, (Fig. 8).

Fig. 7: Traffic congestion during daylight hours

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments



Source: Field Study, 2018.

Fig. 9: The Street linking Baghdad and the central and southern governorates



Source: Field Study, 2018.

Fifth: The central business district (CBD) in the city, where the wholesale markets and some government departments and banking offices and one of the important banks (Al Rasheed Bank) branch of the bridge. The area is linked to the eastern side of the city bridges are two Indians Bridge and Iron Bridge.

With regard to the purpose of the trip, from the Table (2), we note that traffic congestion becomes more severe on trips to work and schools, with a ratio of 45 percent. of sample size, shopping trips (30%) were formed of the sample size, tourist trips, especially seasonal ones, to tourist destinations reached (25%) from the size of the sample, thus

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

the trips causing traffic congestion are trips to work and schools and then come shopping trips to the city center in the second place and then recreational trips in holidays, public holidays and seasons according to the field survey form, and that is one of the most difficult problems. The city's daily encounters, especially in the hours of departure and return, as the peak hours of traffic congestions vary during the day as well; as traffic congestion in Hilla city increases in the morning and evening hours, according to the questionnaire distributed to a random sample, as it is confined in the morning between the hours (7-10) In the morning, its map is distributed at many traffic intersections and streets such as intersections (The Mother Around, Bitá Bridge, Bab al-Hussein, Nader entrance, near the university, the old governorate, etc.).

Table 2: Percentage of trips and type of cars in the city for 2018

Trip type	Ratio%	Vehicle type	Ratio%
School	20	Taxis	50
Work	25	Public and private, big and small buses	22
Shopping	30	Work vehicle	20
Entertainment and tourism	25	Military rank and figures	8
/	100	/	100

Source: Researchers' work based on the questionnaire, 2018.

Secondly, in the evening, the peak is limited to 5-9 p.m., which includes, in addition to the morning intersections of the Assembly area, Bab al-Hussein and The Bitá Bridge, the busiest intersection in the evening.

Traffic congestions are also high and traffic is difficult on religious visits, especially in the 40th of Imam Hussein (PBUH) as the city is a link between the southern governorates and Karbala governorate s, where the period of closure of the streets extends to more than 25 days, see (fig. 10)

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

Fig. 9: Street 40 in the city of Hilla, which is one of the most important main streets, especially in the annual religious events, which closes for up to 25 days sometimes



Street No. 40 in the city of Hilla in the normal days



Street No. 40 in the city of Hilla in the season of the 40th anniversary of the visit of Imam Hussein (peace be upon him)

Source: - Field study.

Alforat TV, Eye on Babylon/ 40 Street, 7-9-2017, Iraq. DOA: 27-10-2019 Domain: <https://youtu.be/F4PBnVz04N4>

According to the field study, the most congested cars were private cars, including taxis, and by nearly 50 percent. of the total traffic congestion-causing vehicles, followed by small and large public and private buses (22%), then the load vehicles (20%), and finally, military vehicles and personalities (8%) (fig. 4), which distributes traffic congestion areas in the city.

Third: The effects of the phenomenon of traffic congestion within the urban space:

1 -Increasing the impact of traffic congestion in a manner commensurated with the fact that the consumer depends in his request for the special vehicle on the specific marginal cost of him only, as he did not take into account the cost and social damage resulting from the increase of one vehicle to the total vehicles in the street.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

2 -Bottlenecks cause health and psychological damage to passengers and users of vehicles, especially on the age of 60 years old and above, as studies have shown that 12% of them are expected to suffer a heart attack as a result of poor mood and environmental pollution (noise and air pollution from car exhausts), where the hours of going and return are moreover, nervous and stressful hours, especially for women and children, as well as the economic damage caused by the loss of time that causes waste of fuel, work, production and income.

3 -Confusion in the functional work of services and jobs within the urban space of the city will increase with no solutions to this problem.

4 -An increase in the rate of air pollution as a result of increased hours of operation of vehicles and their continuous cessation and smoke, which negatively affects human health.

5 -The negative impact on the degree of satisfaction of the population and the variation of that effect according to the purpose of the trip, the delay in time and the negative impact on the psychological and comfort which make dissatisfaction with the transport service weak, especially trips to work and schools.

3 .Proposed solutions to the problem of traffic congestion in Hilla city:

First: Planning treatments are at a local level (urban planning) and are through a number of measures :

1 .Draw a map of traffic congestion and develop appropriate solutions to reduce them, and this requires cooperation and coordination with other supporting entities such as the traffic engineering department of the municipality of Babylon governorate, which suffers from a weakness in financial support and allocations for the purchase of modern devices to be introduced in its work, including severe gauges bottlenecks.

2 .Addressing the shortage of administrative staff, whose work is characterized by the basic design division of traffic engineering

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

responsible for the planning of the traffic structure of (roads, squares, parking lots, traffic lights and non-light and light traffic lights and the provision of various devices, equipment and tools that have to do with the passage of I in dealing with the relevant support agencies such as the local government, the Directorate of The Passage of Babylon, the Municipality of Babylon governorate and others; . There is a permanent coordinating committee that will reduce the time, effort and cost to achieve efficiency and effectiveness in the work, peak hours of traffic congestion in Hilla city, morning and evening, and the most congested types of cars.

3 .Finding solutions to the challenges and determinants, natural and human, facing the process of expanding the use of land for the purposes of the transportation network in the future, which is the spread of agricultural land nature of land ownership, the spread of residential slums as it reached (47) residential neighborhoods (Hilla Municipal Directorate, 2018) and the difficulty of removing them while the future needs. Land use is estimated at eight to ten times the current, so limited land with a surplus of future demand will increase the problem of reducing traffic congestion .

4 .Finding an alternative standard for the cost of opportunity is economically unfeasible for infrastructure and traffic super-projects because the benefits of these projects only appear in the medium or long term and achieve significant external savings.

5 .Determining the pricing system is socially undesirable unless the standard of living is paid to low-income people who own private vehicles and specifically the middle class of society because the lower class can continue to enjoy the benefits and facilities of public transportation and the higher class of them are rich. Hence, they are able to afford any extra costs.

6 .Promoting public transport instead of the benefits of private transport that benefits the consumer itself, and does not solve the problem of traffic congestion, while the advantages of public transport contribute

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

to solving this problem with a focus on mass transportation through the construction of a metro in Hilla city.

7 .The imposition of a price on vehicles every hour with a nominal amount increases in time as in some countries, which is linked to the nature of demand for waiting facilities is a demand derived from the demand for vehicles. Therefore, any increase in their pricing will reduce even a little of the demand on the street, i.e. the flexibility of demand is not high.

8 .Improving the city's road network which is not diversified according to the functions and global characteristics of the roads making it a major cause of the phenomenon of traffic congestion.

9 .Strengthening the work of the traffic engineering department of the municipality of Babylon from administrative problems due to administrative red tape and the lack of modern equipment in their work to modernize and develop the transport network, with weak horizontal and vertical coordination with the relevant government departments as well as weak financial allocations

10 .Strengthening the work of the Traffic Engineering Department of the Municipality of Babylon from administrative problems due to administrative red tape and the lack of modern equipment in their work to modernize and develop the transport network, with weak horizontal and vertical coordination with the relevant government departments as well as weak financial allocations for the development of their work and objectives In addition to this, there is the lack of administrative staff and incompetence due to the loss of specialization in traffic engineering.

11 . Raising awareness of the importance of public transport, which is linked to the economic aspect and which offers a partial solution that is only complete in partnership with non-economic solutions.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

12 .Opening axes that will reduce the severity of traffic congestion at the north and north-east entrance of the city on the eastern side of the city.

13 .Open closed streets for any reason to reduce the severity of traffic congestion in the city center with key active roads.

14 .Furnishing the streets with engineering and traffic supplies and signaling plates, and organizing the entry of carrying cars at times that do not represent working hours and peak hours; morning or evening.

15. Activating traffic laws and applying them strictly to violators with the need to re-establish market holidays and spread the traffic culture.

16 .The deployment of fixed and mobile cameras is one of the solutions that do not cost large amounts of money in the intersections and streets of the city and link them to controllers from inside traffic offices and managers where the mobile camera monitors the places of congestion and traffic congestion in any street or intersection from the city. Thus the notice will reach the traffic control units, which in turn will drive their motorcycles and reach the places of irrigated suffocation and diagnose the cause and who is responsible for repairing the damage caused by all these bottlenecks.

17. Introducing a single and double system for car plate numbers to go down the street as a time solution if necessary.

Second: Long-term strategic solutions to address the problem of traffic congestion in cities

1 -Encouraging investment in waiting facilities.

2 -Gradually removing government subsidies from fuel.

3 -Attention to academic and field studies to solve traffic problems.

4- Establishing civil society institutions concerned with traffic and traffic safety.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

5 -Using modern urban planning methods to overcome the natural and human determinants of land use for transport in the city, with the need to adopt the use of different modern techniques.

6 -The establishment of separate bus transport lines.

7 -Attention to training courses specialized in traffic engineering to improve the efficiency of the transport network.

8 -The establishment of service complexes, malls, places of entertainment and games outside the cities.

9 -Establishing public and private parking for buildings that are constructed.

10 .We believe that the pricing system for waiting facilities can be effective, efficient and socially desirable in the city if the following conditions are met:

(a) The price should be combined and fixed in all waiting areas, even at peak hours of traffic congestion, in order to prevent motorists from roaming the streets in search of cheaper parking spaces, which increases the congestion, as it is preferable to rely on the pricing process based on the size of the car only so that the fee is available. It is also believed that the imposition of the fee should be at 1 o'clock in waiting and not all day. (1000-500) IRQ dinars is to be charged for each hour of waiting.

(b) It is necessary to have a relatively low fee value at the beginning to cover administrative and operational expenses, the most important of which are rents, and then accompanied by successive continuous increases taking into account the social cost, and the value of the upper fee limit depending on the factors affecting the flexibility of the price demand. For waiting facilities so that they remain flexible until the fee rate is equal to the maximum annual returns with the annual interest rate returns on the capital in banks so that private investment in these projects is economically viable.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

(c) Using the system of taxes and fees on private vehicles to finance the budget of the Traffic Department in Hilla as a financial source to help overcome the scarcity of government financial disciplines, with the need to emphasize that these revenues are not used as government subsidies or subsidies to others.

Results:

1. One of the direct causes of traffic congestion in the city is the increase in population and urban expansion, which is the increase in the population of the city continuously, and several factors helped this rise represented by the annual natural increase of the population and the voluntary migration from the countryside to the city and forced displacement from the governorates (Baghdad - Anbar - Diyala - Salah al-Din - Mosul north of Babylon) after 2014.
2. The social factors cause of this phenomenon, including personal desire and increased demand for vehicles led to a large flow of these vehicles and characteristics of the family in terms of size, lifestyle and the number of workers who are of school age.
3. State policy towards the opening of Iraqi markets to international products unconditionally offset by a relatively constant supply in the number of streets and roads and tarry projects that began their work but without the completion of fully and left untreated.
4. The spatial distribution of traffic congestion points varies on the five sectors of the city . We can identify these points and according to the field study prepared for this purpose, where the intensity of traffic congestion is at five points, very severe, then less severe and less and less...
5. Temporal variation in the times of traffic jams per day and during the seasons, especially in religious visits.

General recommendations:

1. Allocating local roads, sidewalks and building bridges for pedestrians and studied dimensions along the main streets, especially that connects the old city with new quarters.

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

2. Maintaining and paving the streets and making them more suitable for use in terms of furniture and traffic signs.
3. Installing and use cameras at crossroads and main streets of the city, in which traffic congestions are identified and alternative routes are established.
4. Closing the openings between the streets and making the streets with two lanes (back and forth) to reduce traffic congestions and compensated it by bridges linking the sectors of the city and the major road bridges.
5. Imposing fines on cars that stand on the main streets and multiply them in case of repeated violations by the violator.
6. Creating a plan for transport within the city and in coordination with the Department of Public Traffic and other security departments, to the organization of traffic, especially in religious visits.

Questionnaire form:

This questionnaire aims to provide a picture of the problem of traffic congestion for vehicles in Iraqi cities, including Hilla. It also aims to provide appropriate proposals and solutions to reduce this problem. Therefore, please cooperate in answering the form with explicit information. With all due respect...

Note: Choose one answer

- 1 .Who is responsible for planning and building traffic facilities and their various buildings of roads, bridges, tunnels, parking lots, light and non-light signals and traffic devices... Etc.? (1) Local government (2) central government (3) Hilla Municipality (4) Traffic Directorate (5) Traffic Engineering (6) All earlier mentioned
- 2 .What are the most peak hours for traffic congestion? (1) Am between (2 p.m.) between (3 p.m. and 3 p.m.)
- 3 .What are the most congested cars? (1) Saloon (2) buses of large and small types (3) large and small load cars (4) military travel (5) the travel of government figures

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

4 .What are the most appropriate solutions to reduce traffic congestion in your opinion? (1) The introduction of the individual and double system (2) the imposition of parking fees at 1 p.m. (3) removing government subsidies entirely from gasoline and imposing a carbon tax on it (4) restricting the import of all vehicles in the hands of the government while continuing the system of roofing old cars and increasing its effectiveness (5) the development of the structure of traffic and non-traffic infrastructure within international specifications (6) other ones, remember

5 .What are the most places in the city having the problem, remember them?

6 .What are the most intense journeys in the congestion? (1) when going to work and schools (2) when going to the city shopping center (3) when going to recreational attractions

7 .Does the continuous cumulative annual increase in private cars increase congestion and if yes, how much is the estimated ratio of private vehicles to the total vehicles in the city?

8 .If you support the imposition of a fee on waiting facilities on what basis do you think the amount of charge on cars (1) the size of the car (2) car type (3) car model (4) others

9 .Would you prefer the financial fee to remain constant per hour or increased at peak hours? (1) constant (2) variable with peak hours

10 .How much do you appreciate the need for a new land transport network? (1) € current twice as many (2) twice the current (3) three times the current (4) more

11 .Which way is the severity of traffic congestion measured? (1) 100 cars per minute measured from a fictitious line (2) more than 100 (3) less than 100

12 .Degree of satisfaction with transport within the city (from 1-10).

The answer was made by the senior management of the General Traffic Directorate in Babylon, namely, Brigadier General Zaher Hussein,

Traffic Congestion in the City of Hilla (Iraq): Causes and Treatments

deputy director of the General Traffic Directorate in Babylon II-Colonel Hussein Mohammed, official in charge of the western side of the city.

References:

1. **Al-Dulaimi**, Mohammed Delf Ahmed, Fawaz Ahmed Musa, Geography of Development, I1, Dar al-Furqan, Publishing and Distribution, Syria, 2009.
2. **Al-Dulaimi**, Raja Khalil Ahmad, Impact of Car Transport on the Construction and Physical Functional of Baquba City, Diyala University, College of Education, 2005.
3. **Alforat TV**, Eye on Babylon/ 40 Street, 7-9-2017, Iraq. DOA: 27-10-2019 Domain: <https://youtu.be/F4PBnVz04N4>
4. **Ali, Maher Hussein**, Personal interview, Traffic colonel, Assistant director of Babylon governorate traffic, 26-11-2018.
5. **Bull**, Alberto, **Traffic** congestion the problem and how to deal with it, United Nations, Economic Commission for Latin America and the Caribbean, Santiago, Chile, 2003.
6. **Abdul Aziz Mohammed Habib**, Yousef Yahya Tamas, Geography of Transport and International Trade, Directorate of Books, Mosul University, 1989, p. 9.
7. **Hilla Municipal** Directorate, GIS Division, Unpublished Data, 2018.
8. **Hilla Municipal** Directorate, GIS Division, 2019, Hilla City Map, 1:10000
9. **Republic of Iraq**, General Directorate of Survey, Iraq Administrative Map, 1: 000000, 1998.
10. **Republic of Iraq**, Ministry of Planning, Central Bureau of Statistics, results of the general census of the year (1987, 1997) and estimates of 2007, 2018.
10. European Conference of Ministers of Transport, Managing Urban Traffic Congestion, Transport Research Centre, OECD/ECMT, Paris, France, 2007.