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Transport and Traffic Networks Planning in the New Urban Communities

By

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Abstract:

The housing problem in Egypt is one of the main problems adopted by the Egyptian government in order to provide housing for every citizen, and then finding appropriate solutions has become a vital requirement.

One of the pillars of urban development in the Arab Republic of Egypt is the establishment of a group of new cities to serve as new urban centers for development outside crowded residential areas, as well as to be growth poles away from the narrow strip of the Nile Valley and the Delta in an attempt to get rid of air, audio and visual pollution arising as a result of the increase in the volume of traffic on Road network in crowded areas, and to reduce urban sprawl on agricultural lands.

The purpose of this research is to lay the foundations on which the expansion of the construction of new urban agglomerations depends, which are the foundations of the road network design, which take into account the proper and easy linking between the urban communities and the surrounding urban environment so that the levels of roads in them are graded based on the sizes and importance of the urban agglomerations through which they are interconnected.

Among these foundations is also the study of transport and traffic planning, which depends on the city's road network, where one of the new urban communities in the Arab Republic of Egypt was studied in an attempt to reach a unified method that can be used for any future urban community.

At the end of the results of this research, a set of recommendations and proposals were developed to contribute to the development of a sound planning for the new urban communities through which traffic fluidity and safety can be achieved on the city's road network and to eliminate all traffic problems arising from random settlements surrounding the urban environment as well as to reduce emerging air, audio and visual pollution resulted from the surrounding roads of these communities.

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1. Introduction

The concept of new urban agglomerations emerged to achieve several goals, for example: stopping urban sprawl on agricultural lands (random urban growth), which is considered one of the patterns of urban growth, which began to spread since the beginning of the sixties and became common in the seventies as a result of the unbalanced growth between the demand and supply segments. In the urban housing market and the increase in the volume of immigrants' arrivals to major cities, which led to the presence of land divisions without approved planning and the growth of nests on the axes of canals, railways and axes of archaeological areas in the absence of the authority of government institutions, which caused high rates of traffic accidents and various forms of Negative changes in social behavior due to the difficulty of urban city institutions controlling these random gatherings and their traffic.

One of the pillars of urban development in the Arab Republic of Egypt is the elimination of the disadvantages of random urban growth by establishing a group of new cities in desert areas or around some existing cities to serve as new urban centers for development outside crowded residential areas, as well as to be growth poles away from the narrow strip of Nile valley, (Wadi El-Nile) and the Delta in an attempt to reconstruct the desert and reduce urban sprawl on agricultural land.

The research will be exposed to the most important bases on which the expansion of the construction of new urban communities depends, which are the foundations of road network design, which take into account the sound and easy link between urban communities in the desert areas and the surrounding urban environment, so that the levels of roads in them are graded based on the volumes of traffic on them and the importance of urban communities. through which they are connected.

Among these foundations is also the study of transportation and traffic planning, which depends on the city's road network. The research will include a study of some urban agglomerations in the Arab Republic of Egypt as an attempt to reach general strategies that can be applied in any city whenever the urban conditions permit, where the research will present a study of the current situation of the regional and internal road network for some of the new urban communities of some coastal cities located in the Red Sea Governorate. The cities of the Red Sea are connected to each other by the coastal road that extends from Suez in the north to Shalateen and Halayeb on the Sudanese border in the south (the cities of Zaafarana, Ras Ghareb and Marsa Alam). Figure No. (1) shows the regional road network in the Red Sea Governorate.

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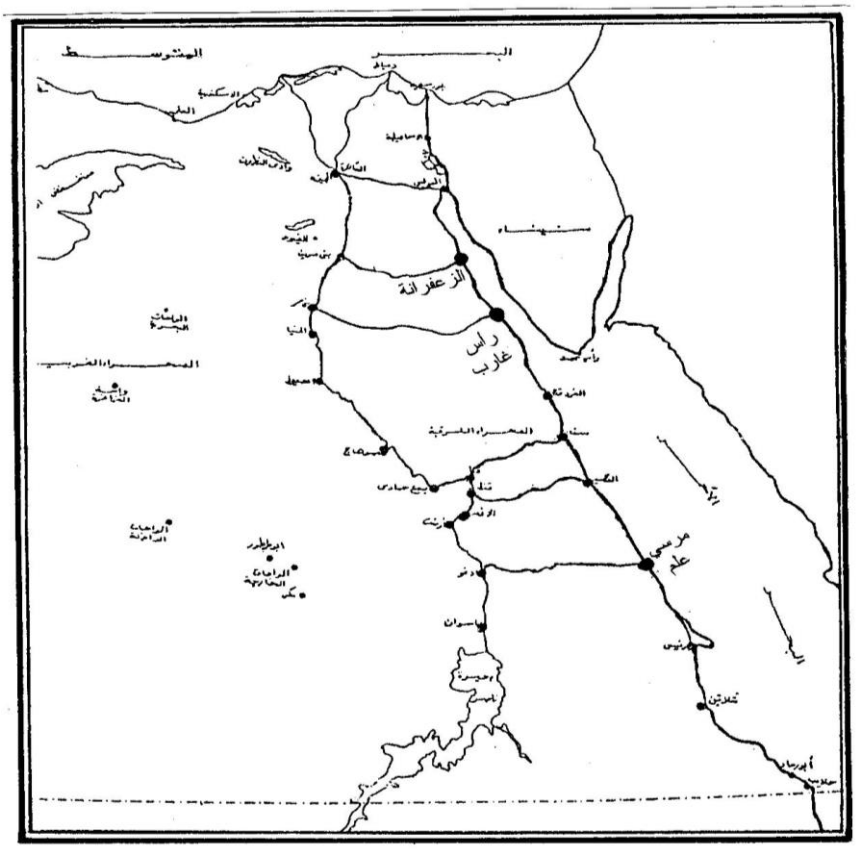

Figure No. 1: Regional Road network in the Red Sea Governorate

The cities of Zaafarana, Ras Ghareb and Marsa Alam suffer from the fact that their current road and transportation networks are insufficient and cannot help any urban development unless it is developed and completed [1]. The method and procedure of developing the roads and transportation network in those cities will be linked to all the economic and social characteristics of the population, and therefore the expected growth rates, the growth rates of the labor force, the resulting trips (traffic volume) and vehicle ownership rates.

This research will take into account all the stages necessary to study road, transport and traffic planning, which include:

- The current status phase of the regional and urban road network.
- The stage of estimating traffic volumes on the road network in the urban agglomeration.
- The stage of developing the necessary proposals to overcome the current shortcomings of the road and transportation network.

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2. Evaluate the Road and Transport Network in The Current Situation

2-1 Evaluation of the regional and urban road network

The coastal road is the first regional axis that connects the cities of Zaafarana, Ras Ghareb and Marsa Alam to the north and south, but this axis is defective because it penetrates the urban mass of those cities (in addition to its proximity to the beach, which makes it a future within the development areas, which will reduce its efficiency and level of service). Its course must be modified outside the future urban sprawl of those cities. The current internal road network lacks gradual planning (hierarchical gradient) and relies mainly on the coastal regional axis as the main internal traffic artery, where rapid and transit regional traffic mixes with slow local traffic, in addition to the multiplicity of entrances on that main arterial road, which leads to an increase in the accident rate. traffic significantly when the traffic increases. Therefore, it is necessary to separate the transit regional traffic from the local traffic and reduce entry and exit on the main arterial road except through intersections designed according to engineering standards appropriate to those cases, and the network also needs to plan a network of secondary and local roads to feed the current residential areas that lack internal roads [1].

The internal transportation network for each of the three cities is also flawed by the shortage in the number of parking spaces for vehicles, whether on the roadsides or in places designated for waiting, in areas where the demand for waiting is high. Also, the pedestrian paths along the internal network are unclear and undefined, and the pedestrian movement is considered random and unplanned, and this will cause an increase in traffic accident rates unless it is planned in the future with the urban growth of the city. According to what was seen during the field visit to one of the study areas, it became clear that the city of Ras Ghareb, in its current state, does not have a complete internal road network, nor does it have any acceptable hierarchy for this network.

2-2 Estimate the traffic volumes on the road network in the target year

This stage consists of studying transportation planning through four main elements:

1. Estimation of trips generated from the urban agglomeration.
2. Distribution of trips between the traffic departments in the city.
3. Separation of trips between means of transportation.
4. Allocation of vehicle trips on the city's road network.

Each of these elements will be discussed separately with an estimate of their impact on planning in the target year.

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2-2-1 Estimating the trips generated by the urban community

In it, the total trips generated from the city (and therefore from each section of the city) are estimated on the basis of what is called the active labor force in the city (meaning the number of residents who make 100% of the total trips), and the estimate of this percentage varies from one city to another based on the population and geographical studies of the city. Table 1 shows the percentage of the population that represents the active force in some new urban communities [2] & [3].

Table 1: The active force in some new urban communities

City	Al-Amal	15-th May	6-th October	New Minya	Residential Community (Helwan)	Marsa-Alam	Al-Zafrana	Raas-Garep
Population in thousands	٤٠٠	٢٦٠	٥٢٠	٢١٥	١٦٧	٩٥	٦٠	١٢٧
Active Power (%)*	٤٢	٥٨	٤٥	٤٣	٣٢	٣٢	٢٨	٣٧

**The percentage of the population was estimated on the basis of the age range from: 51-60 years*

The estimation of the active force in the city mentioned in Table (1) must be done carefully, given that it is the basis upon which the rest of the planning stages of transportation in the city are based, and sufficient data must be collected from the constituent sections of the city by making future projections based on a similar region (or the current region in the case of Studying the work of an extension to it outside the approved planning, as in the city of Zaafarana).

2-2-2 Distribution of trips between the city's departments

The process of distributing trips in the city is followed by the process of separating trips between the means of transportation that are expected to be available in the new urban agglomeration. These means are limited to the following: private car, taxi, public transportation, bicycle, and walking.

The distribution ratios of trips to means of transportation differed from one city to another depending on the type of this city, whether it was residential only or an integrated city (residential and industrial). Table 2 shows the distribution ratios of trips to means of transport in some new urban communities [4], [5].

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Table 2: Distribution of trips to means of transportation in some new urban communities

City Type/ Name / Transportation Tools	Residential			Integrated		
	15-th May	Extension of 15-th May	Residential Community (Helwan)	Al-Amal	6-th October	New Minya
private cars	٢٤	٤٠	٢١	١٠	١٥	٨
Taxis	-	-	-	٥	-	٤
Public transportation	٤٦	٥٠	٢٠	٣٥	٥٠	٤٥
Bicycle	٢٠	١٠	٤٧	٥٠	٢٥	٤٣
pedestrians	١٠	-	١٢	-	١٠	-

Table 2 shows several main points as follows:

- ✓ The increase in the percentage of private car use in residential cities only, because most of the trips generated in these cities are considered external trips, meaning that their end is outside the city.
- ✓ Taxi use is very low.
- ✓ The percentage of using public transportation is fairly close, as it falls between 40-55% of the total trips, with the exception of the new residential community in Helwan, in which the percentage of using the means of transportation reached 20% of the total trips, and City of Hope 35%, [6].
- ✓ The rest of the trips are allocated after the private car, taxi, and public transport on bicycles and pedestrians in varying proportions depending on the nature and type of the city and the places of work associated with the city. As a result, this percentage of bicycles was taken into account in the engineering planning stage of the road network in the new urban communities.
- ✓ It is also clear that the taxi did not receive clear attention when distributing trips, although it is considered one of the most important means of public transportation in the Arab Republic of Egypt. A study on the use of taxis within the Greater Cairo region, [7] reported that the use rate is 12% of the total trips for individuals. Of course, the rate of taxi use increases with the decrease in car ownership.

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3. Vehicle Ownership

The expected car ownership is estimated in the target year (2020) using one of the following methods, [3]:

(1) Compound annual increase: $Q_2 = Q_1 (1 + R) n$

Where: Q_2 *= car ownership in the target year after (n) from the base year,*
Q_1 *= car ownership in the base year, and*
R = the annual rate of increase in car ownership based on data from previous years.

(2) Composite curve model: $X = Constant \times 0.05\ n$

(3) World Bank model: $Q_2 = 0.059\ d + 5.32$

Where: d = average annual per capita income in US dollars.

Table 3 shows the expected population and car ownership of some new urban communities in the target year (2030 AD), [8].

Table 3: Population and car ownership in some new urban communities in 2030 [4], [5]

City	Al-Amal	15-th May	6-th October	New Minya	Residential Community (Helwan)	Marsa-Alam	Al-Zafrana	Raas-Garep
Population (in thousands)	٤٦٠	٣٢٠	٦٥٥	٢٤٠	٢١٥	١٢٠	٧٥	١٤٥
Private car ownership (Car/1000 people)	٣٣	٤٢	١٣٠	٢٢	٣٨	٢٣	٢٠	٢٥

Table 3 shows the extent of the variation in the assumptions of car ownership due to several factors:

- Different method of expecting car ownership.
- Expectations of the average per capita income in the new urban community.
- The location of the new city in relation to the existing urban communities and the need for owning a private car.
- It was also noted that the use of private car ownership was limited to estimating the needs of demand for parking spaces only, without linking this ownership to the number of private car trips.

And since the number of private car trips is related to the total number of cars in the city, on the basis that the number of car trips does not exceed the number of cars during rush hour and is not less than a minimum, given that a certain percentage of private car owners will use it during rush hour and can be represented This is mathematically as follows:

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Number of private car trips during rush hour = Number of private cars owned by individuals x (m)

Where: (m) = a coefficient that depends on the use of the private car and its value is between (a minimum and a valid one).

This minimum can be set either by collecting actual data on a region similar to the region under study, or by assuming a certain value based on the experience of the planner (50%), for example. Assuming that the aforementioned relationship has been considered in the new urban communities, Table 4 shows the value of coefficient (m) [1], [3], [6].

Table 4: The relationship between the number of private car trips and the number of private cars owned by individuals during the morning rush hour

City	Al-Amal	15-th May	6-th October	New Minya	Residential Community (Helwan)	Marsa-Alam	Al-Zafrana	Raas-Garep
Private car ownership (Car/1000 people)	٣٣	٤٢	١٣٠	٢٢	٣٨	٢٣	٢٠	٢٥
No of Private car	٨٧٥٠	٧٢٥٠	٧٧٥٠	٤٣٧٥	٢٦٢٥	٢٠٠٠	١٣٧٥	٢٥٠٠
No of private trips	١٥١٠	٥٨٧٥	٦١٢٥	٣٦٢٥	٢٠٠	١٠٦٢	٧٥٠	١١٢٥
a coefficient (m)	٠,١٧	٠,٨١	٠,٧٩	٠,٨٣	٠,٠٧	٠,٥٣	٠,٥٥	٠,٤٥

Table 4 shows that the values of the coefficient (m) range from 0.79-0.83 in residential societies and decrease to less than 0.2 in integrated societies that include workplaces and education in addition to housing. Assuming that the morning rush hour trips represent 85% of the total morning trips, the values of the coefficient "m" become 0.93-1.0 in residential communities and about 0.20 in integrated communities (meaning that only 20% of the total number of private cars are used during the morning period).

4. Road Network Current Shortcomings Overcome Proposals and Estimate Its Traffic Volumes

4-1 Necessary proposals for planning the road network in the new urban communities

(Ras Gharib city as a case study)

The proposed planning of the regional and internal road network must achieve the following objectives:

- Provide sufficient capacity in the road network to meet the transportation needs of the city at a good level of service now and in the future in the target year.
- Achieving adequate safety for road users, including pedestrians and cars.
- Planning for public transportation to meet the current and future requirements for passenger trips while achieving comfort for users of public and private transportation and goods transportation.

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- That the costs of construction, maintenance and operation of these networks be as low as possible and achieve safety and comfort as well as preserving the environment from pollution and noise.

4-1-1 Design standards and specifications for the proposed road network

To achieve the flow of traffic within the new urban agglomeration, it is proposed to create a hierarchy of the road network, on the basis of which the internal roads of the city will be re-planned with engineering characteristics consistent with the degree that is determined for each road according to its location and its continuity as a path within the city, as well as the land uses around it [9], [10]. The science of road design has witnessed remarkable progress in the modern era, with regard to street planning within cities, as international standards have defined a functional sequence for road networks as follows:

a) major roads.
b) Collecting roads.
c) Local roads and service roads/routes.

It was taken into account in choosing this job sequence to achieve the best ability of these roads to absorb future traffic, as well as the possibility of construction in different stages according to urban growth rates.

The main functions of these methods can be summarized as follows:

a) Main roads

The construction of these roads aims to serve the continuous traffic between the different residential neighborhoods (as well as the tourist villages) in addition to the different uses on both sides of them. These roads have the ability to accommodate and transport relatively large traffic volumes. It has two service lanes in each direction to serve local traffic as well as waiting.

b) Collecting roads

This class of roads includes all the paths that connect the main road network and the local road network. The main function of these roads is to collect traffic from within the tourist neighborhoods and villages, and the combined roads carry about a third of the traffic within the city.

c) Local roads and service roads

It includes all other types of roads within the residential neighborhoods and is to serve the local traffic. Figure 2 shows the proposed road network for one of the urban communities in the city of Ras Ghareb in the Red Sea Governorate. Table 5 also shows the design principles and criteria for the road network within the urban community.

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Table 5: Design criteria for grades of different roads according to the hierarchy. [1], [2], [8].

Engineering design elements	Road network hierarchy		
	Major road	Collecting road	Local road
Design speed km/h	٧٠	٥٠	٣٠
Average walking speed km/h	٥٠	٣٠	٢٠
Minimum stopping distance (r)	٨٠	٥٠	٣٠
The coefficient (k) for the vertical convex curves	٢٤	١٠	٨
The coefficient (k) for the concave vertical curves	٢١	١٢	١٠
Minimum radius of horizontal curves (m)	١٥٠	٧٥	٣٥
Maximum elevation rate of horizontal bent back (e) %	٦	٦	٦
Minimum transition curve length (m)	٦٠	٤٥	٤٥
Cross slope of pavement %	٢	٢	٢
Minimum turning radius at intersections (m)	٢٥	١٢	٨
longitudinal slope %	٤	٤	٤
Min. longitudinal slope %	٠,٣٥	٠,٣٥	٠,٣٥

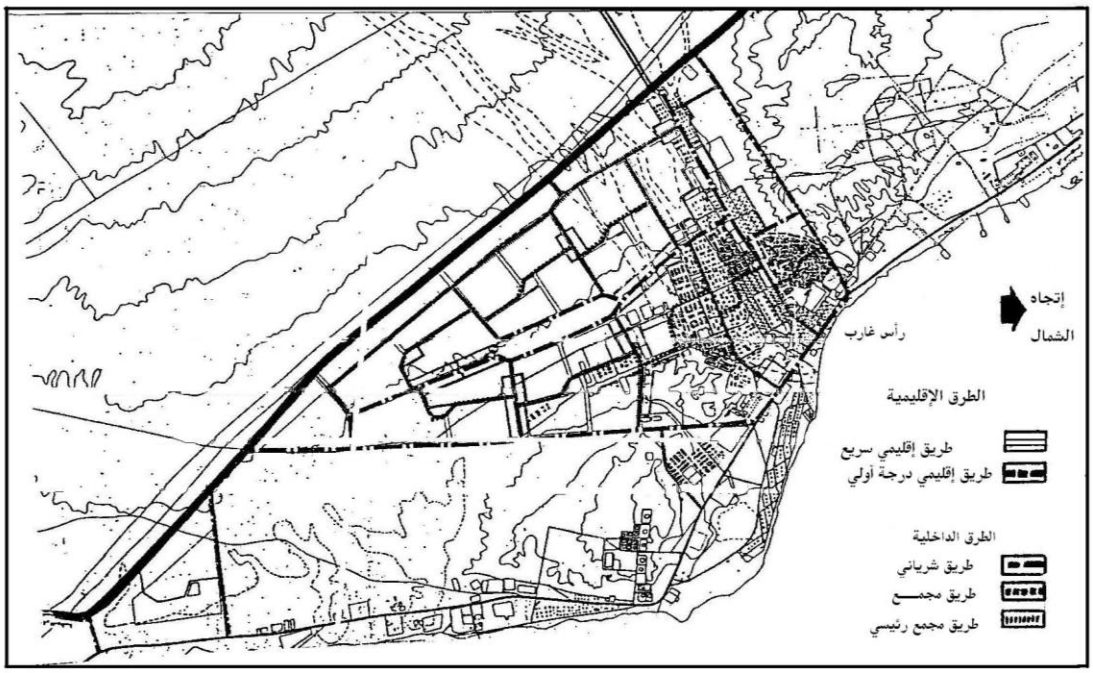

Figure 2: Proposed Road network for one of the urban communities of Ras Ghareb

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4-1-2 The expected practical capacity of the axes of the proposed (internal) road network

The practical capacity of the road controls the level of service it performs when using a certain volume of traffic for this road, and the practical capacity depends on the conditions surrounding the traffic from land use and respect for the right of way as well as the determinants and characteristics of traffic.

Table 6 shows the practical capacity estimates for the different grades of roads, which were determined after reviewing the conditions surrounding the axes of urban agglomeration roads.

4-1-3 Features of the proposed road network hierarchy

In light of the proposed network, which can accommodate the volume of traffic expected in the target year, in addition to the clarity of the contrast between its different degrees in a way that helps raise the level of traffic service for vehicle movement and is in line with the tourist style that will characterize the city. The proposed engineering sectors must have the following characteristics:

- ✓ It is not allowed to wait on both sides of the regional or arterial (main) roads and the internal combined, while it is allowed to wait on the local roads and service roads parallel to the arterial and combined roads.
- ✓ The need to provide public waiting areas near areas that generate waiting, such as commercial centers and services, in order to avoid the demand for waiting on the street.
- ✓ c. Providing pedestrian sidewalks with sufficient width to allow for securing movement and isolating it from the movement of vehicles on the main roads.
- ✓ Providing a lane for the double movement of bicycles along the right direction of the main internal artery, and when planning it, consideration should be given to studying its safety, especially at intersections.

Table 6: Expected practical capacity for the different grades of roads

Type and grade of road	Number of Lanes	Expected practical capacity (Private car unit/hour)	
		For one lane	for two lanes (Two directions)
Main road	٤	١٢٠٠	
Collecting road	٤	١٢٠٠	
Local road	٢		٣٠٠-500
Service road	٢		٢٠٠-300

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4-1-4 Models and specifications for planning proposed intersections

In order to obtain a balanced design of the road network, it must take into account the design principles that give a continuous flow of traffic, especially at intersections, where the intersection capacity is the governing capacity in the streets within cities, where the capacity of the intersection entrances directly affects the capacity of the road or street connected to the concerned intersection. A controlled traffic system has been applied at the intersection, which can increase the capacity of the intersection and thus the road capacity. The means of regulating traffic at intersections include the following:

i. *Using land signs to ensure directing traffic and pedestrian movement.*
ii. *Use of traffic lights and signs.*
iii. *c. Establishing traffic channels for each direction (islands).*

The traffic control system by creating islands is considered one of the highly efficient systems to raise the level of performance of the intersection, as the directions of each traffic movement are determined and separated from the rest of the directions. This is in addition to providing security for pedestrians by resorting to using islands as protection from vehicles. The area of any island shall not be less than 7.0 square metres, and a suitable width shall be provided for the circulation roads. Figure 3 shows a proposed model for a two-road intersection using islands in the canal solution to direct traffic.

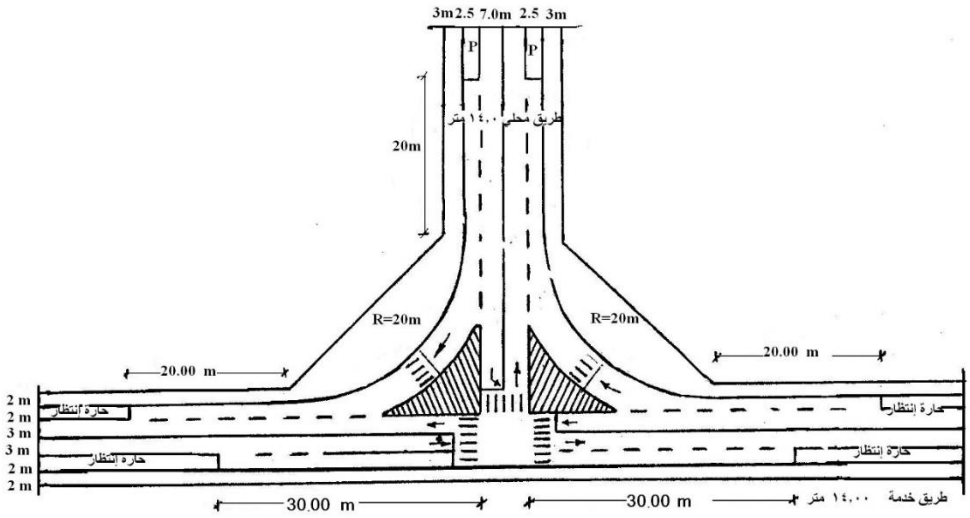

Figure 3 A proposed model for the intersection of two roads using islands in the canal solution to direct traffic

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4-2 Proposals for the method of estimating traffic volumes on the network

In order to reach the optimal method for estimating and separating traffic volumes on the road network, and based on what was mentioned in Item 2 and Item 3, the following method can be proposed in the stages of studying traffic planning.

4-2-1 Estimation of active power

In view of the importance of the active force ratio of the population because it is the basis on which the total number of individual trips is estimated, comprehensive studies must be carried out for the new urban community with the use of data from the Central Agency for Public Mobilization and Statistics to infer the development of the active force ratio at the level of the Arab Republic of Egypt and in similar societies.

4-2-2 Separation of trips between means of transport

It is clear that the separation of individual travel between means of transportation varies according to the type of city, whether it is residential or integrated. In the residential city, the percentage of pedestrian and bicycle trips decreases, and the use of private cars and public transportation increases due to the presence of workplaces outside the new urban community. It should also shed light on two types of transportation that did not receive a sufficient amount of distribution of trips, which are the taxi and the corporate bus. Studies [5] and [6] on the use of taxis and buses owned by government agencies and companies in the Greater Cairo region revealed that these two means bear 12% , 5% of the total passenger trips in Greater Cairo, respectively. Based on this, it is possible to propose rates for separating trips between means of transportation on some new urban communities.

Table 7: Relationship between (%) of different modes of transportation and the urban type of city

City type / Transport tool/mean	Residential	Integrated
private cars	١٥	١٠
Taxis	٢٥	١٥
Public transportation	٥٥	٥٥
bicycle	٥	١٠
pedestrians	-	١٠
Total	%١٠٠	%١٠٠

Table 7 shows that the percentage of pedestrian and bicycle trips for residential cities is small because walking distances, whether on foot or by bicycle, may be long and unattractive to individuals.

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With regard to other means of transportation, the increase in the percentage of trips in them is due to the consideration of buses by companies and agencies as a means of mass transportation that participates in bearing the percentage of of individual flights. As for the private car and the taxi, it is divided between them at a ratio of 2:3, respectively, on the basis that the taxi has become widespread as a mass transportation acceptable to most individuals. As for the integrated cities, the same method was followed, with the difference that the percentage of pedestrian and bicycle trips was increased to 20% due to the proximity of workplaces and education to residential areas, and the rest of the trips were distributed on the same basis as that of residential cities.

4-2-3 Car ownership

Private car trips must be linked to the number of cars owned by individuals on the basis of the formula previously mentioned in Clause [3], which is:

Number of private car trips during rush hour = Number of private cars owned by individuals x coefficient (m)

Therefore, there are two ways to achieve this equation:

- Assuming the value of car ownership using one of the models previously referred to in the third item of the research, then obtaining the value of coefficient (m), provided that the designer adjusts the value of car ownership or the number of private car trips if the value of this coefficient does not fall within certain limits (50%, for example The purpose of this step is to link the number of private cars to the number of daily trips or during the morning rush hour.
- Many of the aforementioned assumptions must be modified and updated when a number of new urban communities are completed so that the final status of the transport systems can be evaluated on the basis of actual data and compared with the theoretical assumptions set by the plan.

5. Conclusion

This paper dealt with the analysis of the transportation problem in the cities and new urban areas by studying the poor planning of the road and transportation network and how to predict the estimation of traffic volumes on them in the target year.

The research also dealt with the necessary proposals to overcome the current shortcomings of the road network and estimate the volumes of traffic on it, which should include the re-division of the city's roads in a functional sequence, with attention to the design of all intersections and the identification of parking spaces, according to studies and data on urban expansion projects for the city, whether they are residential or integrated on This should be implemented in stages, each stage achieving its purpose in terms of traffic flow and achieving the required liquidity.

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6. References.

1. The Ministry of Housing, Utilities and Urban Communities - the General Authority for Urban Planning - the general and structural plan for the cities of Zaafarana, Ras Ghareb and Marsa Alam - 2006.
2. The draft master plan for the new city of Minya - the General Authority for Urban Planning - December 2020.
3. Ali Zine El Abidine Salem Heikal: "Traffic Characteristics in the New Urban Communities". Arab Roads Journal - Third Issue - 1990.
4. The Arab Office for Designs and Engineering Consultations - Transportation and road studies for the extension of the city of 15-th May -2015.
5. New Urban Communities Authority website - General Authority for Urban Planning – 6-th of October City – 2021, http://www.newcities.gov.eg/know_cities/October/default.aspx
6. The new residential community in Helwan Suburb - transportation planning and traffic engineering. Engineering Group, Bazil - Nassar - 2015.
7. Inventory of passenger transport by service taxi within Greater Cairo - General Authority for Transportation Projects Planning - Ministry of Transport - Arab Republic of Egypt - 2015.
8. The Structural and General Plan Project for New Al-Amal (Hope) City: Transportation System Planning - The General Authority for Urban Planning and the Center for Development Research and Technology Planning -1982-2012
9. The draft structural and general plan for the city of Qena and its development according to the national plan to cope with the natural increase and the general plan for the development of the existing city until 2017.
10. The general and structural plan project and the design and construction of the road network for the new cities (Naja Hammadi and Bayad Al-Arab). Planning the road network and transportation system - the General Authority for Urban Planning - 2014.
11. The website of the New Urban Communities Authority - the General Authority for Urban Planning - May 15th City – 2021, http://www.newcities.gov.eg/know_cities/May/default.aspx.
12. New Urban Communities Authority website - General Authority for Urban Planning - New Minya City – 2021, http://www.newcities.gov.eg/know_cities/Minya/default.aspx.