T H E S I S

MAY 1948

TOWN PLANNING AND HOUSING SCHEME AT BASRAH

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By :

A L F R E D Y O U H A N A.

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T H E S I S

Eng. (525)

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This work is completed with the kind help of :

- Professor N. MANASSEH in "Town planning" ;

- Professor K. YEREMIAN in "Housing " ; and

- Professor I. RUBINSKY in "Air conditioning".

C O N T E N T S

Should be Double-Spaced

I - INTRODUCTION

Town planning is becoming more and more important from the engineering point of view as well as from the esthetic point of view. Science and modern improvements are serving humanity for a better and prosperous life. If we take a look at our every day life down town we see people working hard from morning till evening. Thousands of cars crossing the streets of the city to take in and out merchandise and food stuff as well as people to their works and back out to their residential quarters. A great amount of people are crowded at the market and business centers selling and buying their goods. Those people should have efficient means through which they can finish their tasks and return to their confortable homes safe.

The best way will be a good scheme of town planning. For the workers and employes who are working down town it should be arranged for them healthy, well lighted, and ventilated working places and offices. There should be wide side walks in order not to force some of the pedestrians in the street down off the curb at the most crowded hours of the day. There should be enough parking places for their cars as well as wide streets which can fit the modern cars in speed and size. Turning circles should be placed at the points where many streets meet so that the traffic at that point can turn the way it wishes without causing trouble or delay to each other. At places where fast traffic crosses a slow traffic or a railroad an elevated highway is necessary to prevent accidents or delay.

In the evening people will get out of their working places seeking other surroundings far from their work where they can breath fresher air and find amusement. Such a place can be the comunity center, or some other amusement places which are found betwen the business and residential quarter, or it may be in the residential quarter itself. These places should contain all the possible amusement means depending on the class of the zone it belongs to. At the residential quarters there should be enough public gardens and parks where the children will be able to play in their spare time and the adults walk around when they feel like walking. These gardens and

parks will have another effect on the city itself. They will make the place look nicer and will provide it with fresher air.

At night all the people will seek their homes. The house is the most important place in every ones life. No one can live without a house. It is the place where we rest, eat, sleep, wash, and pass a good time in it. Thus the house should be so arranged that it will give the most satisfaction to those who live in it. The house should be very healthy, having enough sunlight and good ventilation. The toilets should be well arranged so that they will be hyganic and will look nice and proper for those using them. The kitchen should be clean to assure the health of the people in the house. In the first class villa buildings air conditioning system is provided to make life at the house more pleasant. Every villa should be surrounded by a garden. This will add to the house more beauty and to those who lives in it a better enviorment.

II - THE PRESENT SITUATION OF TOWN PLANING AND HOUSING AT BASRAH.

Historical glance :

Basrah is an old city having an age of about 1700 years. That is why at present it is divided into two main parts, the old city called Basrah City and the new growing city called Ashar. Basrah City is very old with very narrow streets some of them are not even enough for a small car to pass through. There are no private or public gardens in it. The houses are built wall to wall. It was found that it was very difficult and expensive to pull down the houses and rebuild in their places a modern city with wide streets and nice houses applicable to the modern ways of living. That is why Ashar was founded. Ashar is three kilometers to the east of Basrah City along the shore of Shat-El-Arab river. This was at the begining of the twentheath century. There was no choice for the city in its growth except parallel to the river. That is why the city started to grow to the north and south. People at that time prefered the northern part because it was near the business centers in Basrah City. At that time there were no engineers to design the town. That is why we can still see in the town some narrow streets with few gardens.

Since 1930 people started to recognize the importance of creating a new, completely new, quarter for their residence and amuzment places. The only place which suited their requirements was by going to the south of the old Ashar town. This new zone is seperated from the old Ashar City by a creek 25 meters wide and connected to it by means of bridges. At this new zone you can see wide streets up to 40 meters in width. The minimum width of a street should be 7 meters which is used to connect houses to each other. Every house should be surrounded by a garden. The building line should be at least 2 meters away from the property line from all the sides.

Type of houses :

Due to climateic conditions in Iraq and the custom of the people there it is found that all the dwelling houses are of the detached house type. Even most of the commercial buildings are two stories high. This gives more charm to the city. Almost all the high class people are residing in this new zone. This increased the price of the land four of five times. The square meter is worth not less than 4 dinars. Villa type of building is very much favoured by most of the people, thus most of the new houses which are found there are of the villa type.

Air conditioning :

Air conditioning is very much favoured in Iraq for the following reasons :

a)- The difference in temperature betwen summer and winter, night and day, and shade and under the sun is so great that it encouraged people to seek such a device to secure their confort.

b)- The cost of operating the mechinary is cheap. The cost of electricity is 7 fils per kilowatt-hour, and the price of 1 gallon of crude oil is 8 fils. There is plety of water and its price is very cheap too.

c)- The size of the small houses makes it easy to handle such a device.

d)- Money is not being considered an important item for those who can afford it compared with their confort.

Thus it is found that after a few years practically all the new houses which will be built will contain the air conditioning unit.

III - THE PROJECT

This project deals with a piece of land in the south of the new developing zone. Its area is about 19,600 square meters. The shape of the land is almost trapezoidal with the part at the north narrower than that at the south. The land as it stands today is bounded by two main streets. The street to the west has a width of 30 meters. The facade on that street is 212.50 meters. The street to the north has a width of 20 meters. The facade on that street is 75 meters. To the south there is the Manawee creek which is a municipal irrigation creek irrigating some of the interior lands. Due to the fact that all the lands at that place are being changed from an agricultural land to residential quarters, the municipality has decided on turning this creek into a street of 20 meters in width. It is going to transfer it next fall. On the East of the land there is a property line. (See plate I)

In this project this land is subdivided into lots with enough streets to connect the different lots to the main streets. A model villa is being designed to be built on it. Air conditioning is being discussed in brief. The economic point is being studied for the subdivision, building, and air conditioning.

IV - TOWN PLANNING

Streets :

To prepare the land for a residential place streets first must be fixed to have an inlet and outlet to the houses. Because the land is surrounded by three municipal streets this will reduce the area of streets within the land itself. The streets within the land will have a width of 12 meters. It is designed for two moving cars and one stationary car which will need a width of 7.75 meters. Thus the roadway will have a width of 7.75 meters and each sidewalk will have a width of 2.125 meters.

The grade of the land and its surroundings is almost level. 1/2 % grade will be all that can be given to the streets. The crown will be made 10 cms. so that the water will be drained to the side of the roadway where it will be collected and disposed off through the sub-surface drain pipe.

The roadway will be covered with an asphalt sheet. Its foundation will be a telford foundation. The stones used for the foundation of the streets will be a large size gravel which is found to the west of Basrah. The size of such stones is about 25 cms. Over the telford foundation some small size gravel is placed over to fill the empty spaces and make the surface even before applying the asphalt. The road is then well rolled and then a coat of asphalt is applied as a sheet asphalt.

The sidewalks will be paved with ordinary cement tiles used for sidewalk pavement. Trees are being planted in the sidewalks. The distance betwen the trees will be 7 meters. These trees will be irrigated by means of the municipal special watering carts.

The curb stone will be made out of a cement concrete blocks. The block is 15 cms. thick, 40 cms. deep, and 1.20 meters in length.

Sub-surface drainage :

The sub-surface drainage is accomplished by a concrete pipe drain. The pipe is placed under one of the curb stones. Its top is 30 cms. below the roadway. Because the rainfall at Basrah is very little the pipe will have a diameter of 20 cms. for the main drain pipe which is along the curb stone, and 10 cms. for the submain drain pipe which is accross the street. The slope of the pipe is 0.4 %. The submain drain pipe is placed at interwals not more than 25 meters apart. At these intervals an opening in the curb stone is made to take the water to the pipe. The main drain pipe will be connected to the municipal drain pipe which is in the street to the west of the land. At every deviation of the pipe a catch-basin is placed.

House drainage :

The house drainage is accomplished by a concrete pipe drain. The pipe is placed at the center of the streets. Its top is 1.20 meters below the crown. The drain pipe used is a circular pipe having a diameter of 25 cms. The slope of the pipe will be 1 %. The pipe will be connected to the municipal drain pipe which is in the street to the west of the land. Lots which are on the other main municipal streets will have their drainage connected to the municipal drain pipe. At every deviation of the pipe a catch-basin is placed.
(Note : See plate II for streets, sub-surface and house drainage.

Land Subdivision :

Because the land falls in a first class villa zone the minimum allawable area of the lot by the municipal regulation should be 625 square meters. This is a small area for a first class villa but

owing to the high price of the land the lots are designed to have areas betwen 670 square meters and 800 square meters. Most of the lots have areas more than 700 square meters. The most economical shape of a lot is that its depth should be twice the width. This is to reduce the percentage of area lost in streets for every lot. Due to the shape and dimension of the land, and the system of streets around and inside it the dimensions of the lots were not made such that the depth is twice the width but most of them are found to have almost a square shape.

If the streets inside the land were all made to run from east to west the area given to streets in such a case would have been 3060 square meters which is more than the designed one by about 25 %. There would have been more outlets to the main street to the west too which is more dangerous. If the streets inside the land were done to run from north to south the area given to streets would have been the same as the designed one but two of the northern lots would have been spoiled. Thus the designed system of streets is found to give the most satisfaction result. ✓

Every villa will occupy an area of about 200 square meter. Taking an average area of lot of 725 square meters the area which will be left from the lot as garden or open space will be 525 square meters. Thus the area which is left as garden and open spaces is a little more than 70 % of the lot. Enough space must be left betwen neighbours from all the sides in order not to block the views, light, or breeze of each other. In this case the facade of the villa on the street is 15 meters and its depth is 19 meters. The dimension of the lot is about 25 meters on the street side and 29 meters deep. Taking the side facing the street there will be 16 meters betwen any two building lines assuming that 2 meters will be left betwen the property line and the building line.10 meters will be left betwen the building lines from each side of the faces which are at right angle to the street. 10 meters will be left as a back yard betwen the building line and the property line making the distance betwen two adjacent buildint lines as 20 meters. Such distances are adequate keeping in mind that the buildings are of two stories.

23 lots are made out of this piece of land. See table I for their areas.

Economics of the land :

The most important item of any engineering project is the economic point of view. A thorough study of the economics of each branch of this project is needed.

The total area of the land as it stands today taken from the cadastre department of Basrah is 19,573 square meter. The present cost of the square meter as it is now is 4 dinars making the total cost of land at its present situation 78,292 dinars. The area given to streets is 2,900 square meters. This leaves 16,673 square meter as salable land for building purposes. The area of land given to streets is 15 % of the total area of the land.

Before paving the roads sub-surface drainage, house drainage, water supply, and electricity should be fixed in their places. The water supply pipes and the electricity poles and wires will be put in place by the electricity and water supply departments of Basrah free of charge.

The cost of the sub-surface drainage is 1.250 dinars for the main pipe and 850 fils for the submain pipe for every meter length of the pipe. There are 180 meters of the main pipe which will cost 225 dinars There are 70 meters of submain pipe which will cost 59.500 dinars making the total cost of sub-surface drainage as 284.500 dinars. The cost of house drainage is 1.750 dinars for the meter length of the pipe. There are 190 meters of pipe for house drainage which will cost 332.500 dinars. Thus total cost of sub-surface and house drainage is 617 dinars.

In paving the roads the following items should be considered :

a)- Grading;

b)- Soling and metalling;

c)- Surfacing;

d)- Sidewalks;

e)- Curb stones;

f)- Planting.

The price of grading, soling and metalling, and surfacing is 300 fils per square meter. There are 1912.50 square meters of rodway which makes the total cost of the roadway 573.750 dinars. The price of sidewalks are 250 fils per square meter. There are 987.50 square meters of sidewalks which makes the total cost of the sidewalks 246.875 dinars. The curb stone costs 600 fils per meter length of stone. The length of the curb stones on both sides of the streets is 425 meters which will make the total cost of the curb stones 255 dinars. The cost of planting all the streets is 75 dinars. Thus total cost of paving is :

	Dinars
- Grading, soling and metalling and surfacing;	573.750
- Sidewalks;.....	246.875
- Curb stones;	255.000
- Planting;	75.000
TOTAL	1,150.625

The total cost of the land and its preparation for building construction uses is :

	Dinars
- Land;	78,292.000
- Sub-surface and house drainage;	617.000
- Paving;	1,150.625
TOTAL ...	80,059.625

There are 16,673 square meters of saleable land. Therefore the cost of the square meter of saleable land is 4.800 dinars. 20 % of engineering work, profits, interest, expenses, etc.. is charged on town planning work. Thus the price of the square meter of saleable land will be 5.750 dinars.

Ofcourse there are some lots which are more expensive per unit area than the others. This depends on the position of the lot with regards to the surrounding streets.

V - HOUSING

The building which will be built on every lot is a villa type of a building. Every villa will be composed of two floors. In the first floor the reception and service quarters are found. In the second floor the bed rooms and their requirements are found.

The first floor is composed out of the enterance, a hall, salon, dining-room, maid's room, kitchen, pantry, toilet, arabic bath and W.C. A porch with a veranda are attached to the first floor. The second floor is composed out of four bed-rooms, two complete bath rooms, a hall, a veranda and two balconies. On the roof there is one room which will be used as a store for the beddings at summer time. At the north-west corner a garage is placed with two small rooms one used as a laundry room and the other one used as a store for fuel and gardening equipement. There are two stairs inside the villa one leading from the first floor to the second and the second one is leading from the second floor to the roof.

The external wall is a bonded hollow wall 30 cms. thick. 13 cms. are to the interior side and 14 cms. are to the external side with an air gap of 3 cms. The partition walls are done 15 cms. thick which will help in deadening the sound and eliminate the quick transmition of heat betwen one unit and the other. There are 24 steps in each stair with a height of each step 17 cms. This will make the height of each floor 4.08 meters and the clear height as 3.96 meters. There are 5 steps leading from the ground to the first floor with a height of 17 cms. each step. Around the building at the roof there is a parapet wall having a height of 1 meter. This will make the total height of the building from the ground to the top of the parapet wall as 10.01 meters. The stairs leading from the first floor to the second floor is curved. The radius of curveture from the rail is 1 meter. At the curveture and at 1/3 the width of the stairs from the rail the width of the steps is 30 cms. There will be 4 cms. of projecting tiles making the clear width of steps at that place 34 cms. The other steps in that stair which are not at the curves has a clear width of 34 cms. The steps leading from the second floor to the roof has a clear width of 31 cms. Exterior openings were reduced in width as much as possible

to economize on the air conditioning machine.

The dimensions of the different units are chosen so as to suite the satisfaction of those who are going to live in it. It is assumed that an Iraqi family is going to live in the villa. The normal size of such a family is 6 persons, the father, the mother and 4 children. The parents will use the south-east bed room and the 4 children will use the other 3 rooms. Two baths will be enough for the four bed rooms, each bath is used by two rooms. The size of the garage is 4 x 6.50 meters. Such large size is chosen so as to fit the modern or future cars.

The building materials:

Some of the most important materials used for the building construction will be mentioned here. The walls are brick walls which is the common material used for wall constructions in Iraq. The two kinds of brick will be used, namely the face brick used in the exposed faces of the wall and the backing brick used in the interior faces of the wall. The mortar used is a certain type of plaster of Paris which is found and used every where in Iraq under the name of (Jouss). The foundations are an inverted concrete T-beams which are poured over the sandy soil found in Basrah to a depth of about 1.50 meters from the surface of the ground. The slabs are made out of concrete. On the top of the roof's slab a layer of brick is placed 10 cms. in thickness in order to reduce the transmition of heat from roof. Gypsum plaster is used all over the interior faces of the walls. A bond gypsum plaster is used on the ceiling due to its high adhesive propertie. Tiles used are of the ordinary mozaic type except on the first floor hall, the baths and the stairs marble will be used.

Economics of housing:

The total cost of a complete villa is composed out of the following :

a)- Foundations;

b)- Building;

c)- Porch;

d)- Garage with the two rooms;

e)- Fences.

The foundations will cost 500 dinars. The square meter of floor of such a building will cost 15 dinars. There are 400 square meters of floor in the building making the total cost of the building 6.000 dinars. There are 45 square meters of porch area which will cost 150 dinars. The garage and the two rooms near it will cost 150 dinars. The surrounding fences will cost 400 dinars. Thus the total cost of the villa is a follows :

	Dinars
- Foundations;	500.000
- Building;.....	6,000.000
- Porch;	150.000
- Garage and the two rooms;	150.000
- Fences;	400.000
TOTAL.....	7,200.000

VI - AIR CONDITIONING

Air conditioning is taken as a brief item in this project. The main purpose of it here is to prepare the building to fit such a system and to determine the approximate size of a machine to fulfill the requirements needed by the occupiers of the villa. The necessity and advantages of air conditioning were given in previous pages.

The system is designed so as to supply the desired temperature for one floor, of the two floors, at a time. The maximum strain applied on the machine is at summer around two o'clock in the after-noon when the outside temperature is around 115°F. At such an hour of the day at summer the occupiers of the villa will be having their siesta in their bed-rooms.

The machine is small enough to be placed in the pantry. Fresh conditioned air is supplied to the different units by a special heat insulating pipes. The fresh air openings in these pipes are at a height of 2.20 meters. The excess air will leave the units thru the door and window openings. The water which cools the machine will leave it hot where it is pumped up to a height of 3 meters and then is allowed to drop through air so it will cool and will be reused in the machine. Such an insulation will be placed in the garden. The machine is supplied with a heating coil to heat the air in winter. The same air pipes will be used as those used by the cooling system. The machine chosen is a Chrysler Airtemp.

Size determination of the machine :

The heat transfered from outside the house to the inside is represented by : $H = AU\ (t_2 - t_1)$ (1) where :

H = total hea in B.t.u. per hour
A = Surface area in square feet
U = Coefficient of transmittance
t_2 = outside temperature
t_1 = inside temperature.

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(1) Refrigeration and Data Book, A.S.R.E., (Page 141)

The areas through which heat is transmited is :

Brick walls	=	2,190 square feet
Glass openings	=	280 " "
Concrete roof	=	1,640 " "

The values of the coefficient of transmittance (U) is :

Brick wall	= 0.3 B.t.u. per square foot per hour (1);
Glass	= 1.13 B.t.u. per square foot per hour (2);
Concrete roof	= 0.64 B.t.u. per square foot per hour (2);

t_2	= 115°F
t_1	= 75°F
$(t_2 - t_1)$	= 40°F

Therefore heat transmited is :

Through walls	= 2,190 x 0.3 x 40	= 26,300 B.t.u./hr.
Through glass	= 280 x 1.13 x 40	= 12,700 " "
Through roof	= 1,640 x 0.64 x 40	= 42,000 " "
	TOTAL	= 81,000 B.t.u./hr.

Heat which is created inside the building by the occupiers is taken as 400 B.t.u. per person per hour (3). There are 6 persons at the second floor at such a time which will create a 2,400 B.t.u. per hour. Therefore the total heat which must be removed by the machine is 83,400 per hour, or 1,002,000 B.t.u. per day. Every 288,000 B.t.u. is equal to 1 refregeration ton. Thus load on machine is 3.50 tons of refregeration. A 4.H.P. machine will be chosen for such a load. The machine will be controled to give a relative humidity of 55%. A dust filter is supplied wilth the machine to filter the air entering into the house.

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(1) Refregeration and Data Book, A.S.R.E. table 14 p.157
(2) Air Conditioning, Mayer and FITTZ, table XXIX B, p.286
(3) " " " " " page 106

Economics of air conditioning :

The cost of machine, air pipes, heat coil, humidifier, installations, etc.. is 1,500 dinars. This price is taken from the agent of the machine. The life of the machine is about 15 years. Thus the price per year is 100 dinars.

VII - CONCLUSION

A bare piece of land is thus changed into a first class villa place. There are 23 of such villas all having the same architecture. Keeping in mind the present situations of town planning and buildings in Basrah such a project will improve very much the above mentioned situations. As a matter of fact many of such projects should be completed in Basrah before it is brought up to the level of well planed towns. There are many of such bare lands surrounding this area. If some of them will be subdivided and built the price of building land and housing will drop very much in Basrah. Five dinars is very high price for a villa land and it should not be more than one dinar.

The villas built are for renting. The rent price is found as follows :

Land :

The price of land is 750 x 5.75 = 4,312.500 dinars.
4% interest is assumed on land making the rent value of land as 150.000 dinars.

Building :

The cost of building is 72,000.000 dinars.
7% interest and depreciation is assumed on the building making the rent value of building as 505 dinars

Air conditioning :

The cost of air conditioning system is 1,500.000 dinars.
8% interest and depreciation is assumed on the system making the rent value of the system as 120 dinars.

Therefore rent is :

	Dinars
Land;	150.000
Building;	505.000
Air conditioning system;	120.000
RENT	775.000

TABLE I

Lot N°.	Area in m^2
1	745.5
2	710.0
3	727.0
4	720.0
5	734.0
6	749.0
7	784.5
8	745.0
9	720.0
10	771.0
11	735.0
12	721.0
13	800.0
14	743.0
15	697.0
16	737.0
17	693.0
18	671.0
19	696.0
20	689.0
21	699.0
22	687.0
23	699.0