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"A New Agricultural
Settlement For Palestinian Refugees
On the Jordan River."

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Isam Ibrahim Nubani

May 26th, 1951

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" This Thesis is submitted to the Civil Engineering
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" I wish to acknowledge my indebtedness to Professor
N. Manassah for his precious directions which enabled me to
prepare this thesis. "

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Introduction

Three years ago, and in a period of three months, more than three quarters of the Arab people of Palestine were obliged to leave their homes and country, and to take refuge in the neighbouring Arab countries. The majority of these refugees did not find proper places to take shelter in, so they dwelt in caves and in old tents which were unable to resist the severe cold **of** winter and the unbearable heat of summer. This bad situation cannot go on like this forever. There should be serious thinking to find out healthy dwellings for these refugees to settle in until the time comes for them~~ne~~ to return to their country. This critical situation made me think to write about this problem for my thesis. A second important reason which made me choose this subject and make it an "agricultural settlement" and not an industrial or commercial one is the following.

The majority of the Arabs, all over the Arab world, live in villages, where they work in agriculture. These villagers are still living in a very bad environment which causes disease and unhealthy[?]. This unhealthy environment weakens the majority of the people and so weakens the strength of the nation. To have a sound and strong nation, a village should be planned according to modern planning, and houses should be properly designed to meet all health conditions. In this new village, every family

should have a house of its own. This will increase the love of the inhabitants for their village and consequently for their country.

In my opinion, and for many reasons which cannot be discussed in this thesis, the best place for this project would be in Palestine itself, near to the Arab-Jewish borders. But this is met by a difficulty which is due to the lack of proper agricultural land at the borders. For this reason, the Jordan valley with its highly good agricultural soil, and excess of water, is chosen as the best available place for such a project. The project will be made up of a series of villages close to each other. One of these villages, which is a typical village, is dealt with in this thesis. This village has an area of (750) donums and is planned to populate around (5000) persons. This amounts to an average of about (6000) persons, in a square Kilometer which is a good average. Inside the village there will not be any public agricultural land except the private gardens in houses. The public agricultural lands will be outside the village and are not shown in the plan.

Due to the conservatism of the people, the common arrangement and design of houses is adopted, which is the rectangular design. Buildings are mostly of the row type except in cases where irregular lots are found. The row system is chosen so as to economize materials as much as possible; and economy in such

a case is of prime importance. Houses and other buildings are to be built of the local building materials available in that region, ~~except the school~~ which is to be built of building materials other than the local ones, such as building stones, reinforced concrete. The village will have modern irrigation, watersupply, sewage, and electricity systems.

The subject will be dealt with from two points of view: the first dealing with the planning of the village and the second with the agricultural design and details.

Part 1

Planning of the Village

A- Description of land

This area lies just at the western bank of the Jordan river. It has an area of 750 donums other than the public agricultural land outside the boundaries of the village. This area is not yet utilized and nothing exists there except few old roads dating from the Turkish rule in Palestine. These roads are made use of in planning the area. The area is nearly rectangular in shape. Being on the bank of the river makes it more beautiful and increases the scenery of the village.

B- Subdivision of Land : Blocks and Lots

In the subdivision of land, care is taken to make use of the roads as much as possible. A major street (16) meters wide is planned parallel to the bank of the river and (50) meters away from it. This block between the river and this major street has an area of about (31) donums and is left as a common land to be used as a public natural park. The rest of the land is divided into (35) blocks most of which are rectangular in shape,

the rest being either trapezoidal or irregular in shape. The rectangular blocks are not equal in size but they all are composed of two tiers of lots. Width of rectangular blocks vary from 60 to 80 meters except that which contains the school and play-grounds. The long sides of these blocks are mainly on the (11) meters roads while the widths are on the (16) meters roads. (3) blocks are to be used as public parks and have a total area of (17) dunums. The business center, the civic center and the school with the play grounds will each be built on one block.

The rectangular blocks are made of two tiers of lots with the depth of (30), (35) and (40) meters. The frontage of each lot is (10) meters. So, areas of rectangular lots are (300) (350), and (400) square meters. Between the lots, a footway 4 meters wide is left for the use of cattle and pedestrians. On the (300) square meters, single family houses of two bed rooms each are built while on the other lots, single family houses of three bed rooms each are built. In the trapezoidal and irregular shape blocks, rectangular lots as well as irregular ones exist. In the irregular lots, houses of different shapes and different sizes depending on the areas of the lots are to be built. The area of the blocks is (650) dunums, the rest of the area is for streets.

C- Streets And Street System

General Description: Streets in this area are of three kinds :

(20) meters (16) meters and (11) meters streets. Some of the new streets are built on parts of the old existing roads. The (20) meters street is the main thorough-fare which cuts the village nearly into two equal parts. This main thorough-fare is built on an old existing road. The business and civic centers are on this thoroughfare each on one side. The 16 meters street which runs near and parallel to the river is mainly used as a parkway for the village. The other streets are for the local use and not for traffic use. Area of streets is (100) donums which is (14%) of the village area. The streets are made wide for future developments. "The cost of congestion is greater than the cost of preventing it; therefore, when land is planned the public space in streets and open areas should be made fully adequate to potential needs of movement." (1)

(2) Street System

In this new development the rectangular, or gridiron, system is adopted. This is because it is the most common and it conforms with the habits and needs of people. Also, in the gridiron system, rectangular blocks and lots are easily gotten and this acquires a rectangular plan of houses which is most convenient to the people. "A city must be composed principally of the habitations of men, and straight-sided and right-angled houses are the most cheap to build and the most convenient to live in." (2)

(1) Design of Residential Areas P.105

(2) Planning the Modern city vol. 1 p.118

Because the area is purely a residential area, it is better to control the speed of traffic as much as possible. To maintain this control, staggered streets are mostly adopted, and this arrangement obliges the drivers to take care and reduce the speed when they reach the ends of such streets.

(3) Sections of streets

As I mentioned before, streets are of three major types; (20) meters, which is the main thoroughfare, (16) meters and (11) meters streets.

The main thoroughfare cuts the village into two parts which are nearly equal. All the through-traffic which crosses the village passes through it. The business and civic centers lie on it each on one side and this increases its importance. The roadway is only (12) meters which is about $\frac{3}{5}$ of the right of way. This roadway can hold (4) lanes of traffic, (2) parking, the other (2) moving lanes. The rest of the street is for the sidewalks, which are equal and each is (4) meters wide. On the sidewalks, and half a meter away from the roadway, a row of trees is planted each in a half a meter square basin, the spacing of trees being (10) meters. The rest of the sidewalk is tiled with concrete tiles (50x50) centimeters. The roadway is to be constructed of bituminous macadam pavements and is to have a crown of

(2) centimeters every meter. (See plate No. II)

The (16) meters streets are the major streets. The roadway is (9) meters wide. This roadway can hold (3) lanes, (one) parking, the rest moving. Side walks are each (3 $\frac{1}{2}$) meters wide and trees are planted in rows on each sidewalk in basins (50x50) centimeters and the spacing is (10) meters. This street is constructed of bituminous macadam pavements and has a crown of 2 centimeters every meter. (See plate No. II)

The (11) meters streets are the most common in this village and have a roadway of (6) meters, the rest being sufficient for the two sidewalks. This roadway can hold (2) lanes where one is for parking cars, the other for moving ones. These streets do not have trees on the side walks as in other streets. The streets are of bituminous macadam pavements. (See plate No. II)

(4) Intersections

" Intersections are the critical points and the most dangerous portions of the high way system"⁽¹⁾

If intersections are not properly designed, accidents will take place in excess. To get rid of this as much as possible, corners of the blocks are rounded off with a radius of curvature of (5) meters. This will furnish better visibility to the drivers.

(1) Planning The Modern City Vol. I p. 171

Another thing which is done to reduce accidents is channelizing the traffic by building circular islands where four streets intersect, and other islands of different shapes at the entrance of each street. (See plate No. I) The diameter of circular islands vary from (15) to (10) meters. Although the traffic at this time will not be excessive, yet it is better to foresee the future trends and furnish what is necessary right at the beginning.

D- Parks:

This village, being an agricultural village lying on the bank of the Jordan river, is full of very beautiful scenery. In spite of this fact, public parks are planned to increase the beauty of the village and will be some how recreational places where people can see one another and get acquainted to each other in places other than houses. Such parks are found all over the village. The largest of these parks is the one lying between the (16) m. Parkway ^{and the river}. This park will be a natural park, Other than this park, there are (3) more parks with a total area of (17) dunums. These parks are not natural parks. All parks are in such a position which makes them easy to reach. The total area of parks in the village is (48) dunums which is about 6.7% of the total area of the village.

E- Business and civic centers

" Business and retail shopping districts need a large percentage of street area, short blocks, more corner lots, and more space for parking than residential districts." (1) The business and shopping center need not be a large one because what the village needs only is a shopping place for clothes, groceries etc... The area of the business center is $(8\frac{1}{2})$ donums. Lots in the business center are small in area and rectangular in shape the area of each lot being (80) or (100) square meters. In the block there are (6) meters roads the area of which amounts to about $(29\frac{1}{2}\%)$ of the area of the block. These roads are mainly for use inside the business center. This business and shopping center is located on the (20) meters thoroughfare.

The civic center is located just opposite to the shopping center on the other side of the main thoroughfare. It has an area of (6) donums. This center is to contain the general library, the health facility, the police station, the mosque and the municipality. A (6) meters road divides the block into two equal lots and on the sides of this road there is a (10) meters wide parking place. The rest of the block is left as private gardens for the civic center.

F- Playgrounds and School

The inhabitants of this village are about five thousand

(1) *Planning the Modern City* Vol. I p. 152

persons. Assuming that the percentage of the people at school age is fifteen percent, this means that (750) persons are at school age. This does not require more than one elementary and one secondary school. To economize as much as possible, a combined elementary-Secondary school is sufficient for the village. The playgrounds are located in the same block with the school. "The school site should be sufficiently large to accommodate playground facilities. The location of playgrounds adjacent to elementary school buildings, and playfields adjacent to high school buildings makes for more efficient use of these facilities, and simplifies supervision."⁽¹⁾ The area of the block is (22) donums and it is not far away from the center of the village. The area of the school is only $1\frac{1}{4}$ donums and the rest is left for the playgrounds.

The playgrounds contain two basket ball fields and a football field. Each basket ball field is (16x30) meters in dimensions and the football field is (55x130) meters. These fields are used by the public also.

(1) planning the Modern city vol. 1 p.235

Part 11

Architectural Design And
Details

A- Introduction

In the previous discussion, the problem was treated from the point of view of planning. Because the thesis is a combination of both town planning and architectural design, some of the architectural details will be dealt with, along with the materials used in building such a village.

The village, as I said before, is purely a residential area. Most of the blocks and lots are rectangular in shape. Lots have (10) meters frontages while the depths vary from (30) to (40) meters. The rest of the lots are irregular in shapes and differ in areas. Due to this variation in shapes and areas of lots, three different types of houses are chosen for this village. The first two types are in rows and are of the same nature but they differ in size, while the third type, which is to be built on the irregular lots, is of different nature and size and not of the row type.

The row type of buildings is mainly chosen because of its economy on walls, openings and foundations. The problem of economy in such a project is of prime importance but not

to the point where other important things are sacrificed for economy.

B- Building Materials

In the Jordan valley, most of the known building materials such as cement, steel, masonry etc. are expensive. Due to this, and because such materials are not near at hand, the people will not have the choice of the building materials mainly because of their poor financial situation. As a result to all this, local building materials which are cheap and easy to get and manufacture will be used. Such building materials are mostly mud with straw for walls, some wood and cement for roofs and foundations, some juss (Plaster of Paris) for plastering. These local building materials are to be used in building houses, the mosque, the library, the health facility the business center and the police station. The school is to be built of stone masonry and reinforced concrete foundations and slabs.

Windows and doors are all made of quatrani wood which resists humidity and sun. The sizes of these openings are standardized as much as possible in order to reduce the cost due to mass production which is cheaper than unit production. Fine wiremesh will be used along with glass to prevent insects from entering the rooms through the windows.

C- Architectural Details

I- Houses

(1) Description

Houses, in this case, should be designed in the simplest form possible because of the lack of skilled labour and the lack of proper building materials. A refugee or a poor peasant wants a house which fulfills the following three conditions: Independence is satisfied by building one flat single family houses and avoiding apartment buildings. ^{beauty and health} In planning the houses adherence to the usual classical types is clear due to the conservative minds of the people. All houses in the rectangular lots are of the row type which economizes in the building materials.

The regular shaped buildings are either two-rooms or three-rooms buildings. Each house contains a kitchen, a bath and a W.C. combined, two or three bed rooms and a barn. The rest of the land is left as a private garden.

Type "A" houses: The unit house in this type is made of two bed rooms ^{each} (4.70x4.40) meters in dimensions and has a height of (3.60) meters. The two bed rooms occupy the frontage of the lot and they are (5) meters away from the street. The kitchen is (2.40x2.40) meters net and the bath is (2.40x1.40) meters net. The clear height of both the kitchen and the bath is (2.80) meters. The barn is (4.40x6.40) meters net.

This type of houses is built on the (300) square meters lots. The total area occupied by each building is (96.58) square

meters which is about (34.5%) of the total area of the lot. The rest of the land is left as private garden.

Each house has (4) (100x120) ^{cm} windows, (4) (20x210) ^{cm} doors one (50x120) ^{cm} window and (2) (70x210) ^{cm} doors. (See plate No. III)

Type "B" houses: The unit house in this type is made of

three bed rooms, a corridor, a bath and W.C. combined and a kitchen. The rooms are built (5) meters away from the street and occupy all the frontage of the lot. The rooms and the corridor have a clear height of (3.60) meters, while the height of the bath and kitchen is (2.80) meters.

This type is built on the (350) and (400) square meters lots. The total area built on is (122) square meters which is (32.1%) of the area in the (400) square meters lots, and (34.8%) of the area in the (350) square meters lots. The rest of the land is for private use as a garden. Each house has (7) (100x120) ^{cm} window and (3) (70x210) ^{cm} doors. (See plate No. III)

(2) General Details

Foundations -----

Foundations for these buildings are made of the continuous type and are of rubble masonry in cement mortar. The width of the foundation is (60) centimeters and the height is (30)

? Depends?

centimeters. The footing is (30) centimeters below the surface of the ground. A rubble masonry wall in cement mortar, (30) centimeters wide is built above the footing and extends (10) centimeters above the surface of the ground. No reinforcement is used due to the light loads carried by the foundation, the houses being one flat houses.

Floors

The floor of rooms is made up of two layers. The lower is a (10) centimeters stone or selected fill (quarry waste) layer, the other is a (7) centimeters cement layer. Tiles are not used because they are expensive.

concrete

Walls and Plastering

The walls are (30) centimeters thick and are made of mud mortar mixed with straw. This mortar is molded into rectangular blocks which are dried either in the sun or in ovens. The joints between the blocks are pointed with juss(plaster of Paris) to prevent water from entering through the joints and so spoil the wall. No exterior plastering is used. The interior plastering is also of juss (2) centimeters thick in order to give a good and clean white finish.

Openings

The openings of the buildings will all be made of quartrani wood being the best to resist humidity and heat. As I said

before, the openings are standardized to economize on the prices. The doors are (2.10) meters high except those of the barns. Windows are one meter above the surface of the ground.

Roofs

Due to the high prices of cement and steel, reinforced concrete slabs are not to be used in those houses. The roof is made of timber rafts, rush matting, mud, and earth.

(6)-(2x6^{''}) timber rafts are put on the top of the walls along the long direction of the rooms, on top of which (2x2^{''}) timber rafts are laid in the transverse direction and are spaced (50) centimeters center to center. On top of these (2x2^{''}) rafts, a layer of rush matting (2) centimeters thick is laid and above it a layer of mud with straw (3) centimeters thick. After this layer dries, a layer of earth with varying thickness to give a proper shape is put and on it a final layer of mud mortar with straw (5) centimeters thick is applied as a plaster to the roof. The total thickness of the roof varies from (40) to (45) centimeters.

(3) Barns

The barns are built of the same building materials as the houses. They are built at the back of the lots. They are built

11 - School

" School location is an important part of the city plan and must be related to the street system, the park and playground system, and the neighbourhood plan!"⁽¹⁾ The school is a combined elementary-Secondary school. It lies in a block which has an area of (22) donums and the distance between it and the farthest point in the village does not exceed half a kilometer. " The school site should be sufficiently large to accommodate playground facilities." ⁽²⁾ The block has other than the school two basket ball fields and football field.

The school has a "zee" shape and has an area of about (1½) donums. It is to be built of the usual building materials. Footings are of reinforced concrete, exterior walls of stone masonry(30) centimeters thick, interior walls of concrete blocks, slabs of reinforced concrete, and tiles are used for the floors.

The school building is made up of two flats. The first flat contains the administration which is made of the principal's room, the teacher's room, and a private toilet room in between. It also contains a book store and a waiting room near by, (7) class rooms, one laboratory room, a small storage room and a

(1) Planning the Modern City vol. 1 p. 233
(2) Planning the Modern City vol. 1 p. 235

janitor's room, a stair case room, the auditorium and a toilet room for students. The auditorium is only ($1\frac{1}{2}$) flats high. The second flat contains (13) class rooms and a toilet room.

Most of the class rooms are (6x7) meters. They are located on both sides of a (3) meters corridor. The height of each flat is (4.08) meters which is the height of two flights of stairs each (11) steps. The auditorium is (12x26.5) meters and its height is (6.10) meters. The stage is one meter higher than the floor and on both sides of it there is an actor's room. It is used sometimes by the public.

A clock tower is built right over the staircase room. It is (3.80x4.00x8.00) meters in dimensions. It is built for two main purposes: to serve the village being the only public clock, and to break the monotony of the building and have a contrast of direction. All classrooms are lighted properly. (For further details see plate No.4)

111- Combined Police and fire stations

These stations occupy one building which lies in the civic center on the main thorough fare. The building is an "L" shaped single flat building. It has an area of (355) square meters. Local building materials mentioned at the beginning of (part II)

will be used for this building. There is a parking place in front of it.

This building is divided into two parts: one for the police station, the other for the fire station. The police station has an area of (210) square meters. It has a gate (2.00x2.50) meters. This gate leads into a large hall which in turn leads into a corridor. The hall is used as a waiting hall. On one side of it there is the sergeant's office, and on the other side ~~there is the~~ ~~police men room on garage~~. This part contains other than this room a large bed room for at least (4) police men, a dining room, a bath and a W.C. combined, a large kitchen, a guard's room and a cell room. The dining rooms may be used as a ~~the~~ mess also. The kitchen serves both the police men and the prisoners. The cell room has four cells each (1.70x2.50) meters and are (50) centimeters away from the exterior wall. It also has two toilet rooms: one for prisoners, the other for the guard and other policemen. The kitchen has a separate door which opens to the exterior and which is used only for the kitchen.

The fire station occupies the smaller part of the building and has an area of (145) square meter including the area of the garage. It contains an office, a resting room for drivers and others, a storage room for equipment and petrol and a toilet room. The rest of the area is left as a combined garage for the fire and police stations. This garage has an area of (100) square meters

and has three (2.00x2.50) meters doors. (For further details see plate No. II)

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