THE DESIGN OF A RESIDENTIAL AREA OF VILLA TYPE

Basic Considerations, Principles, And Designs

By

Fuad
F.S. Ma'ayah B.A. Engineering

Beirut

American University

BSCE 1945.

INTRODUCTION

Of all things that contribute to the welfare of society, none is more important than the good quality of the homes in which people live. This does not mean that welfare depends solely on houses being strong enough to provide shelter against the elements, but also that they shall be agreeable enough in their environment to give reasonable satisfaction to other human wants.

The design of homes, together with their location, approaches, and surroundings, in well-arranged groups and neighborhoods, is one of the most important branches of the art of city planning. A home is more than a house; it is, in part, the creature of certain external qualities in its surroundings. It may for example, be well designed, have solid walls and good sanitation, and yet be a most defective home because of the presence in its neighborhood of ugly structures, congested streets and yards, untidy open spaces, and noxious uses of buildings. At one extreme, a fine mansion may become valueless for its purpose by the proximity of a fertilizing plant; and at another, a small home may lose much of its value by the introduction of a store or a billboard on an adjoining lot. These commonplace illustrations are mentioned merely to emphasize the fact that a home is not a detached unit but a part of a neighborhood, which in turn is part of a town; and that the good quality of the home usually depends at least as much on its surroundings as on its design and construction. Hence the vital importance of ground planning and control of the development of neighborhoods.

ELEMENTS IN THE NEIGHBORHOOD PLAN

The planning of neighborhoods should be the final operation after the broad planning of the city and after a study of the constituent elements of both the city and the neighborhood. As our object is the neighborhood planning, I proceed with its elements:

The four chief elements to be considered in the design of neighborhoods are the following in their order:

(1) Major and minor local streets and the related drainage and sewerage systems.

(2) Precise zoning of districts and organization of local centers.

(3) Sizes and distribution of permanent open areas.

(4) Sizes and shapes of blocks and lots.

The aims and effects should be to secure: the best economic use of the land in different situations; the proper apportionment of costs of local improvements to the value or cost of raw land to cost of building; the orderly spacing, grouping, and arrangement of buildings; a convenient and economical arrangement of streets to permit of ease and rapidity of movement for both vehicular and pedestrian traffic and to provide rights of way for public utilities and drainage; the preservation of agreeable natural surroundings about homes, and the provision of safeguards against future introduction of offensive uses in residential areas; the provision of adequate and properly distributed spaces for recreation; and the proper location of public and semi-public buildings in relation to the tributary population.

Major And Minor Local Streets

In making a neighborhood plan, the major thoroughfare and principal connecting street system, and the main drainage and sewerage systems, have to be regarded as predetermined and subject to modification only where study of details leads to suggestions for partial change. On the other hand, although the principal local streets which form the local connections for through traffic between the major thoroughfares should at most be only tentatively suggested in the city plan, they should be incorporated as definite proposals and receive primary consideration in the planning of neighborhoods.

Major local streets may be subdivided into: (a) principal local streets, namely, those, other than main thoroughfares, which provide for the main streams of local traffic through a district; and (b) secondary local streets, which provide through access for traffic in two directions but mainly for the purpose of serving the buildings that abut upon their frontages. The major and minor street system is the traffic circulation system of the neighborhood and constitutes the chief link between the city plan and the neighborhood plan. The system should be designed so as to serve the four major needs of economy, efficiency in local movement of traffic, safety for pedestrians, and development of property values. These four needs will be better served in proportion as the streets are aligned and arranged so as to discourage their use by traffic that does not originate or have its destination in the neighborhood.

Each street should be specially designed to suit the prospective character of the development on its frontages as well as the topographical conditions that affect both the street and the development.

In adjusting a street layout to natural conditions, every effort should be made

to conserve such features as fine trees, running brooks, and wooded or rocky glens. Any of these may justify a change in the direction of a street. Where curves are necessary or desirable they should be gracefully fitted to the ground and provide a clear view of at least 120 feet in either direction.

It is not proper to fix definite standards of width for streets. The prevailing practice in the past has been to prescribe for all streets in a city definite lines and uniform widths in a few categories based on maximum possibilities of traffic needs and building densities. The result has been to impose excessive burdens on communities for unnecessary street construction. It would be more desirable to provide for a greater variety of widths where the necessity for definite specifications arises. It is still better in the case of all secondary and minor streets for public authorities to suggest widths for guidance only and to leave the planning of each local street to be undertaken by the city planner, subject to approval by the city plan commission. The effect would be to permit each street to be related to topographical conditions and to a zoning classification that would result in giving a high degree of permanence to the development.

Cul-de-Sac Streets.

For effectiveness in preventing through traffic, obviously the cul-de-sac or dead-end street is the best type. It can be utilized to great advantage in providing access to groups of houses in the interior of large blocks at a saving of both street area and cost of public improvements compared with the usual through street, besides giving houses a desirable privacy and freedom from the noise of motor traffic. Cul-de-sac are undesirable only (a) when they are not a related part of the whole street design; (b) so long as the public authority objects to maintaining them; or (c) when they unduly lessen the convenience of access between parts of a neighborhood.

The common demand that the grage be attached to the house or preferably incorporated in it, makes it necessary to build the pavements of cul-de-sac streets wider than is necessary for purposes of mere access to houses. Every cul-de-sace street should have wide turning places not less than 400 feet apart. In any closed place like a cul-de-sac street, the question of homogeneity of the residents is more important than in through streets. An uncongenial family in such a street will constitute a more objectionable element than it would in a street which is a public way.

Streets on Hilly Land The greatest difficulties and the best opportunities for interesting treatment arise in designing streets on hilly land. In order to obtain economy in constructing roads and sewers and in making excavations for the foundations of houses on hilly land, it may be necessary to design streets at right angles to the contours. This insures that houses facing one another may be on the same level, whereas on roads aligned with the contours the houses on one side are higher and those on the other side are lower than the road level, both of which conditions involve difficulties in development.

When any two streets connect in such a manner as to create an acute-angled lot the opportunity should be taken to add to the attractiveness of the street by reserving part of such a lot as a planted space and throwing part into the street to permit rounding of the corner. The reservation of such planting strips is especially desirable on hilly land where opportunity can be taken to make the reservation a means of adjusting the grade of the road to the grade of the lot.

The larger the lots the easier it is to fit the streets to topography, not only in respect to ground levels, but also in respect to preservation of natural beauty. The rectangular layout is wholly unsuited for hilly land and is not always best for level land, either for traffic or economy in development.

Even on level land, there may be obstacles to be avoided or beauties to be preserved which make it desirable to divert streets. On the other hand, curved streets or diagonals may, for purposes of ease of movement of traffic, be fitted to a difficult topography and yet lack adjustment to the lots so that the latter are difficult to approach or can be made usable only with much expense for removal of soil.

Streets running straight uphill, diagonals following contours, broken or dog-legged streets, and curved streets, all have their uses. The problem in design is to use any of these forms or combinations of them with intelligence and not to avoid them because on occasion they have been wrongly used. In practice the principle that applies is to do the thing that is most pleasing at the least cost, consideration being given to the effect of lot sizes and character of building on the finished development.

The cross and longitudinal sections of streets should be planned togetner. No definite principle can be laid down to govern the actual position of pavements and sidewalks in the street reservations. Normally, sidewalks are best placed next to the property line, but on occasion it may be desirable to let them follow an irregular line, in part adjacent to the property and in part lying within a planted strip.

The question of layout of streets to secure proper orientation of buildings increases in importance as the density of buildings increases. Where there is ample space about buildings at front and rear, orientation of the buildings may be largely ignored in the design of streets and sufficiently dealt with by design and variation in location of the buildings.

Detail in Street Design As has been indicated, there are two problems of design connected with streets, - the problem of designing the system as an organic structure and the problem of detailed design of each street as a composition of open space and abutting buildings. In the latter connection there are questions of scale, proportion, emphasis, and decoration that enter into the problem of securing a truly esthetic as well as a truly convenient arrangement. This problem is concerned with the disposition of surface uses of paving and planting as well as with relation of cross sections to heights and character of abutting walls of buildings and to axial considerations.

Details in street decoration are partly a matter of landscape treatment of the planted areas and partly a matter of design and control of public utility structures, within and adjoining the streets. Simplicity should be the keynote of street decoration, whether in planting or in structures. One fine tree in a street may give it more beauty than it might obtain from having half its surface covered with ornamental shrubbery. Too often the planting in a street has the effect only of emphasizing the rigidity of its horizontal lines.

The esthetic quality of a community depends to a large degree on the esthetic quality of its minor structures and standardized fittings, such as the treatment of curbs and gutters and the design of its lamp standards. There is vast wastage of public funds in cities owing to introduction into residential streets of the same types of construction and the same heavy materials as are used in main thoroughfares. The types of construction of curbs, channels, and paving that are most economical and most suitable for the locality, always allowing for the presence of good taste in design, are usually the most pleasing in appearance.

Organization of Neighborhood Centers. Public and semi-public buildings that normally are required to serve the needs of the population of a neighborhood comprise:

(1) A community hall and a library.

(2) Schools

(3) Churches

(4) A police and a fire station

(5) A post office

(6) A theater and other buildings devoted to commercial amusement.

The community hall, library, and perhaps the high school and post office, should be grouped together at a focal point in the local system of transportation. It is desirable to include the high school in this center to be given some distinction in their architecture. However, as it is necessary for the high school to have a large playground area, the desirability of its inclusion in the community group will depend on whether there is a sufficiency of open space adjoining it. If the local center adjoins a park, this will serve the double purpose of giving proper display and dignity of appearance to the whole group of buildings and the recreation space necessary for the school. The inclusion of the post office is also desirable to increase the size of the group of community buildings, but it may in some instances be more appropriately located nearer the railroad station or within the business district than the other community buildings.

While the use of each building will be a major factor in determining its design, every effort should be made to secure harmony and coordinated treatment of the elevations of community buildings in one center. The sites of public buildings should be selected at an early stage in the determination of uses, and the buildings that are intended to be erected in one center should be designed tog-

ether before the building of any one is undertaken.

The schools for younger children should be placed by themselves in open situations, away from main traffic routes and with adequate space for play. In many neighborhoods nursery schools should be erected for children not yet of school age.

Churches should occupy prominent sites and are appropriately erected on lots at the ends of streets. In such positions they provide good terminating features and secure the salience that is desirable in a public or semi-public building. Their sites should be ample enough to provide parking facilities and also to give suitable display to the buildings. Accessibility and wide high-way approaches are of major importance in selecting sites for fire stations, which should not be near schools, theaters, or other buildings where large numbers of persons congregate.

Sizes and Shapes of Blocks. A great assortment of data has been presented in city planning literature on the subject of block sizes and shapes. The factors of most influence over both sizes and shapes of blocks are the topographical conditions, the layout of the street system that is appropriate to traffic conditions, and the suitability of a given size and shape of lot to the prospective building development.

Obviously the variety of natural characteristics of sited and of types of street will create both the need and the opportunity for varying the sizes of blocks. Sizes are much influenced by the degree to which a plan consists of through or cul-de-sac street. Where through streets prevail, the length of blocks will be determined by the exigencies of cross currents of traffic, while their depth will be equal to the depth of two lots plus the depth of any space that may be reserved at the rear of the lots for local park area, or alley or easement. On the other hand, any general use of culs-de-sac in the interior of blocks will make it possible to have deeper blocks.

The method employed by the average subdivider in establishing block sizes is to group lots in blocks that fit in with his conception of how to derive the greatest profit. To some extent he is controlled by customary demands, by public regulation, and by considerations of social convenience and economy in providing local improvements; but these are all kept as subordinate as possible to his financial interest. In general, blocks should be as large as possible, subject to the necessities, of traffic convenience. In their larger sizes, blocks may be satisfactory in any shape, but in the customary smaller sizes oblong blocks are best. When the width of blocks permits it, interior play spaces or parks should be provided, but an effort should be made to make these spaces not less than two acres, so as to permit of some planting, to enable children to play without unduly affecting the privacy of the surrounding houses, and to justify the cost of some supervision. A block 500 feet square will permit of lots 100 feet deep on four frontages, with an interior space of over two acres.

Interior parks are specially valuable because they can be used by children without the necessity for crossing streets, but they require supervision, and the cost of this must be considered in deciding the question of their desirability. In a well-planned subdivision it should be practicable to provide rear space for recreation at little more than the cost of the bare land. Much space, probably from 20 to 40 per cent in average subdivisions, is now wasted in providing unnecessary street area that could be more profitably used for recreational space, thereby providing the latter at no cost for land and in a form which involves much smaller construction costs.

Areas, Widths, And Depths of Lots

The bare and unimproved lot is a piece of land forming a potential building site. But to become usable as an actual building site it must be "improved", which means it must be provided with satisfactory road access, water supply, and other utilities. It is this " improved " lot that is the basic element in the plan of the neighborhood and city. In considering sizes and widths of lots, attention is confined to minimum dimensions for the smallest houses.

There are two primary and overlapping considerations in fixing the widths, depths, and areas of lots for small houses in residential areas. These are: first, that they shall have the dimensions that are essential to provide adequate light and air for healthful occupation; and, second, that their cost will be within the means of those who require them as sites for homes. Granted that there is plenty of land in accessible localities in urban regions, there is no reason why both needs should not be met. Obviously lots should be planned to suit the types of building that are likely to be erected in a given location, rather than buildings planned to suit a predetermined shape and size of lot. In may subdivisions, however, it is the latter course that is followed, and lots are arranged without regard to the appropriate building development or to the appearance and healthfulness of the buildings to be erected.

Zoning and Neighborhood Units.

The organization of the neighborhood into its component functional parts or use zones must be made at the time when our ideas of the local street system are crystallizing. In preparing a plan for a new development we cannot make zoning fully constructive unless we coordinate it with a specific system of streets and public utilities. On the other hand, we must coordinate the streets with the zones and building densities in order to get economy in street construction. For examp-

le, if a street is purely residential in character and not required for through traffic, then the fewer the houses erected upon it the less the width of street required; and thus the wider the lot, the narrower the street reservation need be, down to a minimum of 40 feet. On the other hand, the wider the street the greater the cost per front foot of development, and therefore the greater the financial pressure for a higher building density. For architectural and hygienic reasons, as well as for financial reasons, variations in street widths should be adapted to variations in heights and densities of buildings and vica versa.

Homogeneity. One of the underlying considerations in zoning any area is the social standing of its population and the degree to which this involves protecting or maintaining some measure of homogeneity. In preparing a design the city planner should ascertain the extent to which the incomes and social customs of the prospective population will enable provision to be made for more than mere necessities in the matter of space about buildings and preservation of features of natural beauty.

It has to be recognized that most people desire to live in places where they can associate with neighbors who have earnings and standards of education similar to their own. This attitude exists on the part of the average-income and the low-income groups as well as on the part of the highest-income groups. There exist also corresponding groupings on racial grounds. Thus there arises the need for establishing zones for types of houses that will accord with economic and social requirements. Homogeneity is promoted and maintained either by zoning regulations or private restrictions on property, or both. Zoning indirectly promotes segregation of different social classes through regulation of types of dwellings and spaces about dwellings. Private restrictions do the same thing more directly by prescribing

a minimum cost for houses and a minimum size of lot, with the primary object of enabling the vendor of the lots to capitalize the value of the security which he gives to a purchaser against poor building development.

Principal Zoning Requirements.

Cities should have not more than 50 per cent of their areas in private building land. When this ratio exists, supplementary requirements should be:

(1) Not more than 40 to 50 per cent of any residential lot should be built upon.

(2) All residential buildings should have an angle of light to every habitable room of not less than 45 degrees.

(3) In addition to restrictions of lot coverage and height, a specified number of square feet per family should be prescribed. Front and side yard spaces, though desirable, are not essential if houses are not more than two rooms deep and if ample space for light and air is provided in streets and rear yards. Where private building land exceeds 50 per cent of the total area of a neighborhood, the number of square feet per family should be proportionately increased.

(4) Where buildings are more than three rooms deep, the open space requirements for light and air should be met by side yards so as to secure the desirable angle of light for all rooms.

(5) Public open spaces, in the form of parks and playgrounds, should not be considered in determining the spaces that should be required about buildings on private lots for purposes of healthful occupation.

(6) Zoning should define the kind of use to be permitted rather than the kind to be excluded.

TOWN PLANNING SCHEME

Now that I have cast a general view on the importance of town planning its conditions and principles, I come to the application of these principles to a planning of the following piece of land.

A plot of land about 500m by 400m is to be divided into lots suitable for developement into a first class Residential suberb of the Villa Type. The following requirements are indicated:

1. Sub-division Plan: Scale 1:1000 showing the proposed town planning scheme with all roads, lots, public spaces, improvements, public utilities, drainage, etc.

2. Profiles and Cross sections: Horizontal scale 1:2000, Vertical scale 1:100

3. The Suberb: is to be bounded by a protective green belt 10m wide.

4. Streets in the Suberb: to conform to the general street plan of the locality, but reduce the connections to a maximum of 3 streets. Two connecting the lower part of the suberb with the down town district, and one connecting one of the sides with the adjacent area.

5. Sewers, Water mains, Culverts, grades and locations should be indicated.

6. Parks and Places, dedicated for public use should be indicated. Their area together with the area of the streets should be between 30-35% of the total area of the suberb.

7. The main features of such public spaces should combine a model primary school and a community centre with enough play-grounds for the students and the inhabitants of the suberb.

8. Lot Sizes should be between 600-800 sq. m. with a width of 15-25 m. maximum. As far as possible the sides of the lots should be perpendicular to the boundary line.

9. Blocks should have sufficient width to allow two tiers of lots of appropriate depth.

10. Major streets should have a width of 15m. and minor streets should have a width of 10m.

11. Use Alleys and Courts but provide turning places for vehicles.

12. Gradients in major streets not more than 6% and in minor streets not more than 9%.

13. Vertical Curves: Changes in streets grades to be connected by vertical curves of a minimum length of 5 times the algebraic difference in rates of grades in major streets and 3 times in minor streets.

14. Clear Visibility: measured along C.L. of road should be at least 60m. in major streets and 30m. in minor streets.

15. Minimum Radii of Curvature : at C.L. of roads to be 60m. for major streets and 30m. for minor streets.

16. Corners of property lines should be rounded off by an arc at intersections of streets. Radii of such arcs should have a minimum of 3m. for major and 1.5m. for minor streets.

17. Easements at least 2m. wide (1 m. on each side) on rear or side lot lines shall be provided for utilities where necessary.

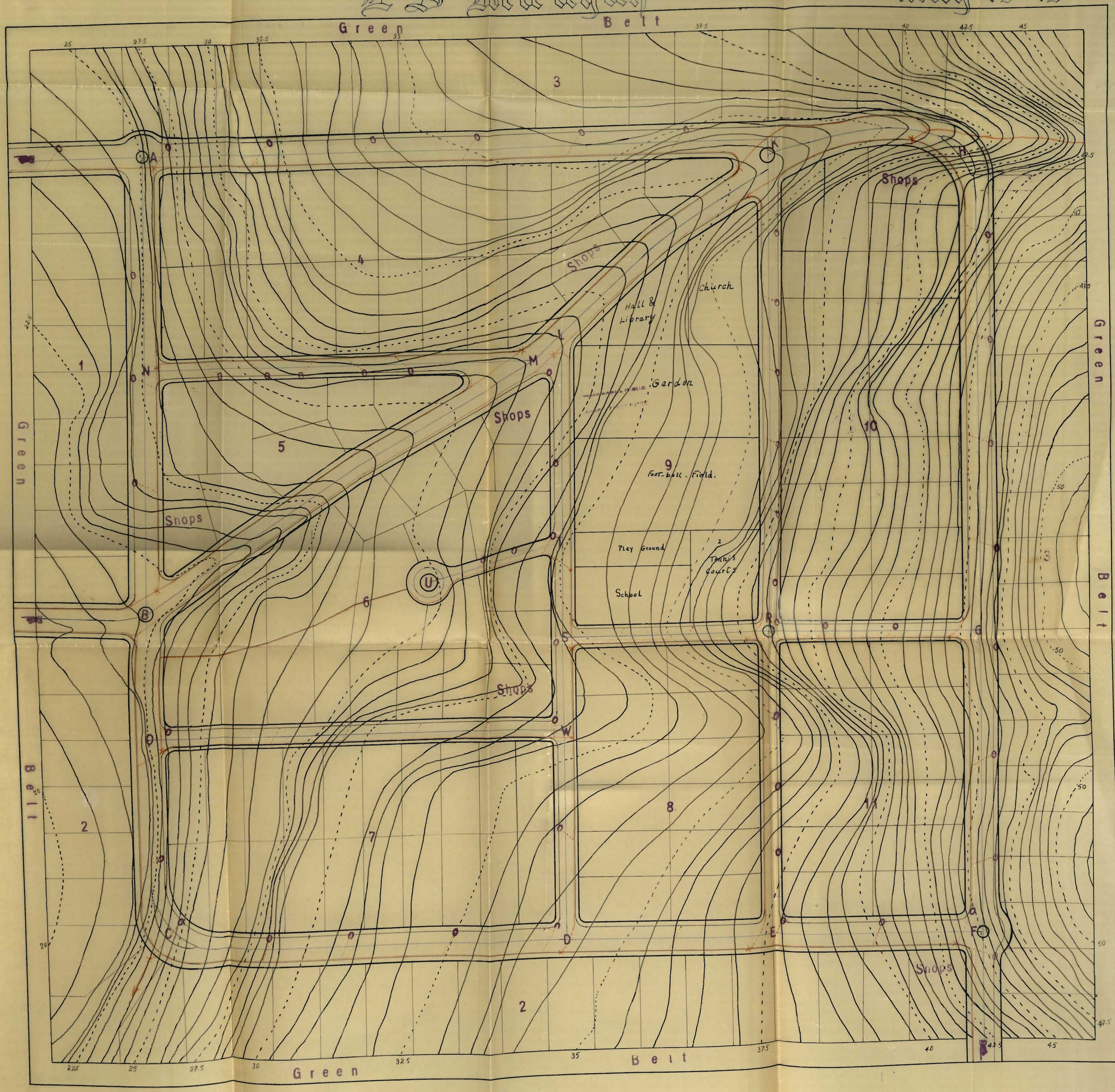
Manipulation

To use all the land boardering the green belt, I used one rows of lots all around, seperated from the interior blocks by a major street, which runs all along this row of lots. This arrangement beside economy in land area provides means to discourage all through traffic in neighborhood which should be the case in residential areas of this type There are two main thoroughfares from the East which connect the neighborhood with the down town district, and one from the South which connect the same, with another locality. These three major streets are the only streets which lead out of the neighborhood and are connected directly with circumferencial major streetsof the vicinty.

The lots which are bordering the green belt have a size of 20m. by 40m. and a frontage on the main street of 20m. So there is plenty of area for a villa, and a nice spacious garden in each lot. The remainder of the area, which is about 360m. by 320m. I have divided into eight blocks as shown in the plan. Seven of these blocks contain two tiers of lots and each block is surrounded by four streets, the major No. of lots are 20m by 40m. but some are a little less or more, depending on the section and shape of block, but never more than 900 sq. m. nor less than 600 sq. m.

TOWN PLANNING SCHEME FOR A RESIDENTIAL QUARTER of the VILLA TYPE by

E S Ma'ayah — **may 1945**



Scale 1:1000

Scale 1:1000

LONGITUDINAL PROFILE

of the

MAJOR CIRCUMFERENCIAL STREETS

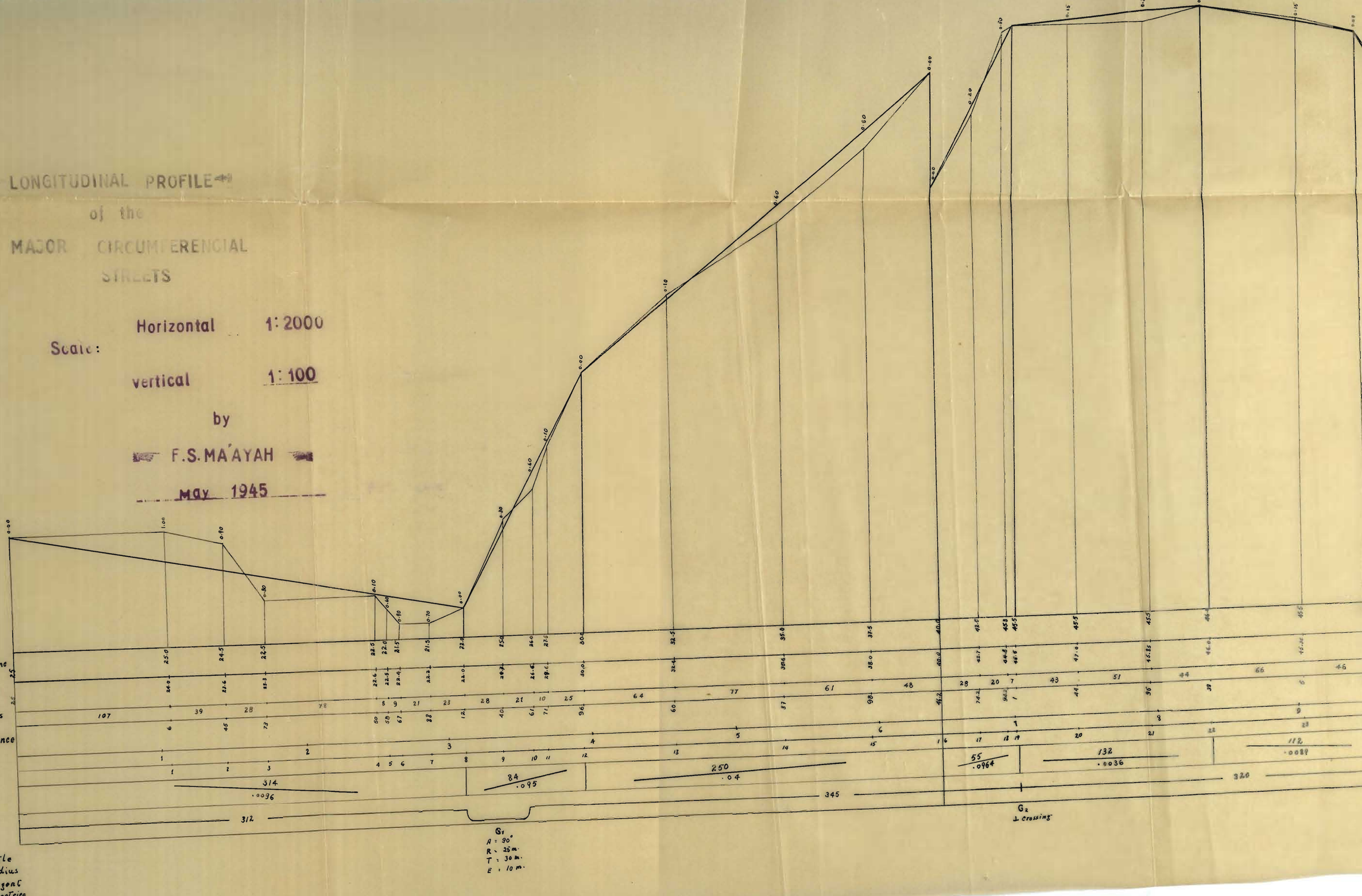
Scale: Horizontal 1:2000

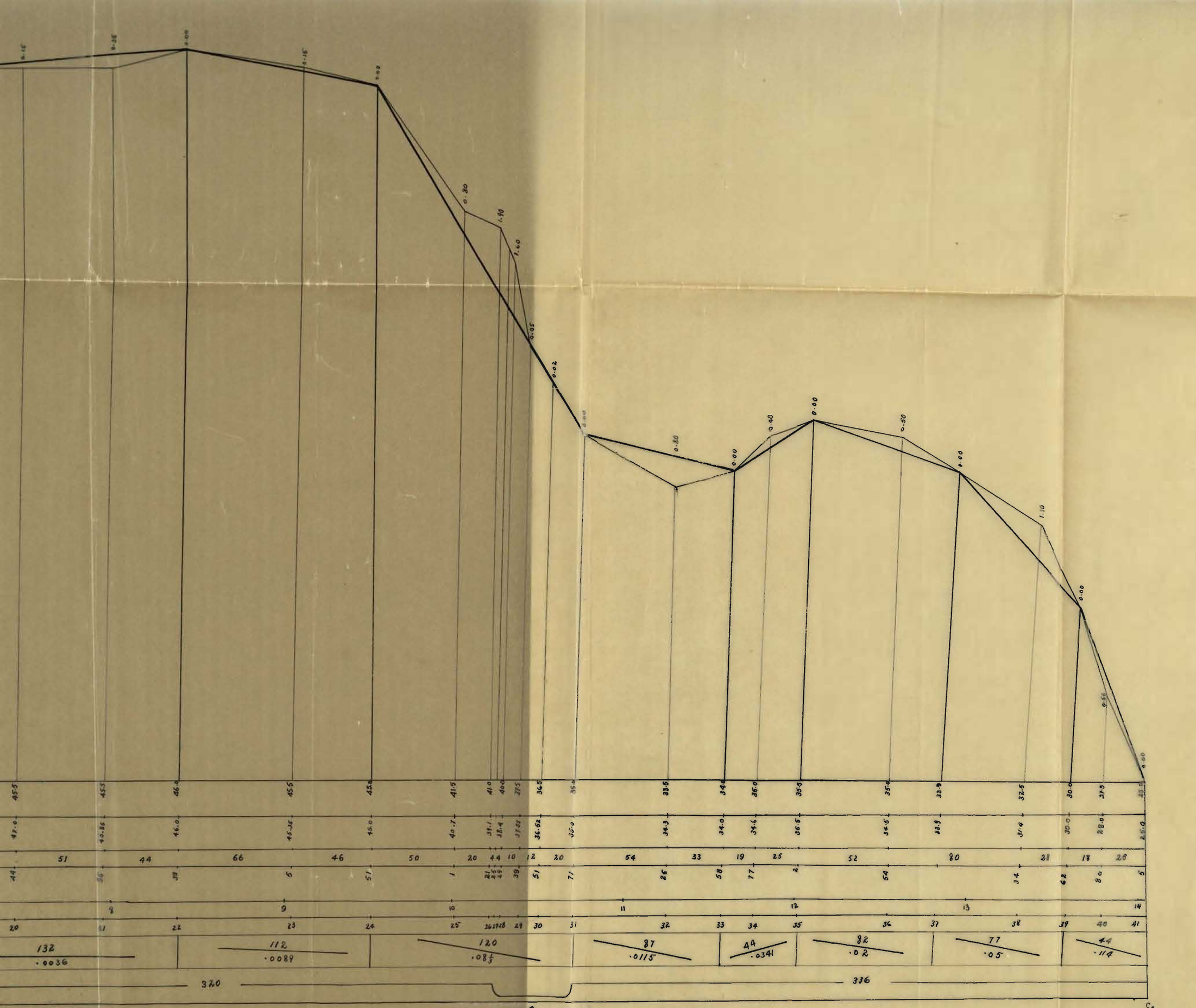
vertical 1:100

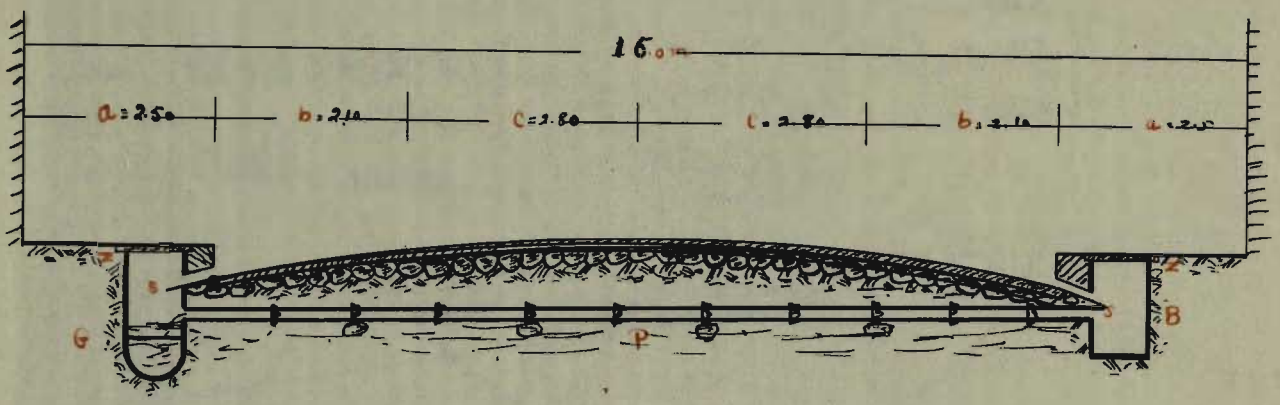
by

F.S. MA'AYAH

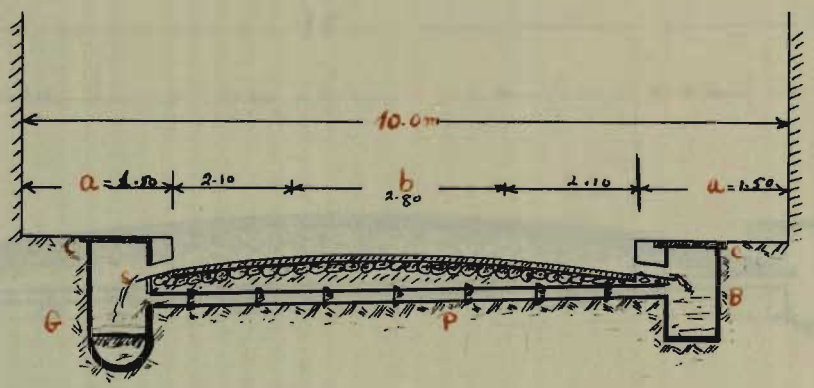
May 1945




0.30
1.80
1.60
0.05
0.04
0.50
0.00
0.40
0.00
0.50
0.00
1.10
0.00
0.56
0.00
45.5
45.5
46.0
45.5
45.0
41.5
41.0
40.0
37.5
36.5
35.0
33.5
34.0
36.0
35.5
35.0
33.9
32.5
30.0
27.5
25.0
41.0
40.85
46.0
45.85
45.0
40.17
39.1
38.4
37.05
36.62
35.0
34.3
34.0
34.6
36.6
34.5
33.9
31.4
30.0
28.0
26.0
51
44
66
46
50
20
44
10
12
20
54
33
19
25
52
80
28
18
26
44
36
58
5
51
1
21
49
39
51
71
25
58
77
2
54
34
62
80
5
8
9
10
11
12
13
14
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
132
·0036
112
·0089
120
·08⅓
87
·0115
44
·0341
82
·02
77
·05
44
·114
320
336
C3
Δ = 90°
R = 26m
T = 30m
L = 10m
C4
⊥ crossing



Major street.



Minor Street

Streets

There are two kinds of streets in the plan. The major, and the minor streets. The major streets are 15m. wide with 25m. side-walks 2.20m.parking along the curbx stones, and 5.60m. for two wayx traffic as shown in the figure. The grade varies from .3% to 11% as shown in the longitudinal profile of the major circumferencial streets. Minor streets are maid indide the district 10m. wide with 1.50m. side-walks 2.10m. parking along curb stones and 2.80m. for one way traffic. I made the streets rectangular layout and because such a layout does not encourage easy through traffic. Cars not interested to circulate in the district will naturally follow the major route and thus the vicinity will be spared the noise of traffic. Where there is a street crossing channelization platforms are provided to avoid accidents. The Radius of such platforms should not be less than 10m. so that cars may turn easily at a low speed. I have provided some open spaces for parking of buses and cars that make communication with down town.

Cul-de-sac.

In block No. 6 I have made a cul-de-sac street because the block is larger in width than two tiers of lots and less than four complete tiers. So such an arrangement prevents through traffic and provides access to groups of houses in the interior of the block at a saving of both street area and cost of public improvements, compared with the usual through street division.

Drainage

Street MKMB was a bed of stream which is dry in summer,so to save in the area of the land used for residence and to make easier the arrangement of blocks I made this stream into a major street where the winter water in the stream passes through drains which serve both purposes of sewer and stream bed. This is the

main sewer to which all the drainage system is connected. I made the drains to run along the curb stones of one side of the streets and water collected on the other side of the stream collected in drains which are directly connected to the main drains every 30m. in the minor streets and 45m. in the major streets as shown by red ink in the main plan. All places marked are vents to receive the water from along the curb stones and connected to the main drains along the other side of the street. This arrangement saves both in length of drains and construction, since the quantity of water is not so great to require double system of drains. Places indicated by a red cross are provided with manwhole gates for inspection of drains in case of dirts blocking them.

The construction of the street in place of the stream requires the construction of culvert at H to provide entrance of water of the stream, into the main sewer. The area in the North West corner is planted with forest trees as it is not useful for any other purpose; besides, it gives a nice approach to the stream.. The lot in South East corner is left unbuilt and used for an exit to a drainage course which collects there. Trees are also planted there so as not to leave the area blighted.

Blocks

There are 5 blocks with one tier of lots between the green belt and t he major circumferencial streets. All these lots are kept for houses with the exception of 6 lots preserved for shoping. The rest of the lots are planned for villa houses of one family each. The shoping places should comprise Grocery shops, butchers, barbers, hair dressers, farmacy, petrol station,etc... Shops essentials for daily house-maids requirements and emergency requirements such as medicine etc. The second floor buildings of thes shops may include

a doctors clinic, a dentists clinic, an office of a lawyer, an Engineers office, clubs, and police station etc.

Where necessary easements 2m. wide on rear or side lot lines shall be provided for utilities, where the municipality has the free use to construct sewers or other requirements.

The Community Centre

The community centre is an essential part of a residential quarter. It should contain a model primary school, for the children of the quarter; Tennis courts for the use of the community members; a public garden for recreational use of the community on large; a Hall and a Library. All the above I have provided for in my plan. I have provided an area of 50 by 25 m. for the primary school with 15 by 40 m. of play ground; an area of 40 by 30m. for 2 Tennis courts; also a football field for the school and the community 80 by 40 m. The public garden is also 80 by 40 m. which is put near the community church where people finishing their Sunday morning prayer may go to it and spend the rest of the morning, or the after noon. A church is also provided on the community centre

T The Hall and the Library are also near the church wher people may also after church go to spend some time in reading or attending some lecture or other thing in the Hall.