

SUBDIVISION OF LAND

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SUBDIVISION OF LAND

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CHAPTER I

PRELIMINARY STUDY AND INTRODUCTION

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CHAPTER I

PRELIMINARY STUDY AND INTRODUCTION

A. DEFINITION

"A subdivision is the division of a lot, tract, or parcel of land into two or more lots or divisions of land, for the purpose whether immediate or future of transfer of ownership or building development, including all changes in street or lot lines, provided however that divisions of land for agricultural purposes in parcels of more than 10 acres, not involving any new street or easement of access, shall be exempted."⁽¹⁾

B. PURPOSE

Subdivision of land is an enterprise undertaken either individually, collectively, or by the government with a view of providing better, healthier, and more comfortable places where people shall live, work or play and expected to give profitable financial returns to the promoter.

Subdivision of land becomes urgently needed as the population increases and older residential quarters become more and more congested and outmoded. With the present development of newer and more efficient means of transportation, people find it more convenient to live farther removed from the centers of manufacture and business. The demand for land subdivision, land that is hitherto purely agricultural will tend to increase.

(1) As defined by the American Society of Civil Engineers, 1939.

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Hence, investigation of land subdivision in connection with city planning and the collection of reliable data and well-digested opinion will bring great benefits: physical, financial, and sociological in the land subdivision for the future.

C. MAIN CLASSES

City land from the point of view of land subdivision may be put into three main classes:

- 1) land for industrial use
- 2) land for retail and wholesale business
- 3) land for residential purposes.

Subdivision of land for industrial use varies so much with the different requirements of industries that it is not possible to set down any rules for its laying out except those that are common to all planning that has to do with land. Some industries can be well accommodated on an ordinary city lot, whereas others require hundreds of acres, portions of it in large blocks undivided by public streets.

Retail business property also varies in its requirements, but not to so great an extent as property for industrial use. Except for new cities, city business buildings usually occupy land that was originally laid out for residential use. The business districts grow naturally by extending more and more into surrounding residential neighborhoods. The locations for business are determined largely by the street and transportation system, by street widths and grades, and by proximity to existing business centers.

Evidently, the principal field of land subdivision is residential property. In fact, when land subdivision is spoken of unqualified, it is ordinarily assumed that it refers to the laying out of land for dwellings. And hereafter, this shall be given major concern.

D. UNDERLYING PRINCIPLES

Some of the underlying principles of land subdivision generally accepted as being sound may be summarized as follows:

1) The plan for the subdivision of land should fit the topography, and give ^{due} ~~the~~ consideration to natural features.

2) Even if the land is relatively level, the plan should nevertheless have interest, good organization and design. The ^opoint of view that leads to a good arrangement on hilly grounds gives also a good arrangement on level lands.

3) The use that is to be made of the land should determine its general plan and restrictions. There is no plan that is best suited for all places; nor for the same place at all times. Merit is largely a question of fitness to the original purpose and adaptability to probable future changes.

4) Thoroughfares and other broadly related city planning features should first be located, and local streets, blocks, and lots laid down in conformity with them.

5) Standards of various classes of property, lot widths, depths, grades, etc... recognized by best authorities should be applied with skill and discrimination.

6) Due attention should be given to playgrounds, public

parks, parking places, and such other indispensable public features.

7) The interests of the promoters of the subdivision, of the prospective users or owners, and of the public in general should be harmonized as far as possible.

8) Consideration not only of immediate use, but also of probable subsequent use, administration, and maintenance should be thoroughly investigated.

9) The plan should consider already existing features and use them to the best advantage to minimize the overall cost.

10) In general, the character of the land to be subdivided should be such that it will not lend itself more profitably to productive agricultural purposes.

E. OUR CONCERN

Land subdivision as an organized science is still in its infancy in Lebanon, and well designed subdivisions are hard to find.

It is our concern in this essay to draw a set of suggested rules for land subdivision for the benefit of the promoters and designers of any such projects.

For this, standards recognized by best authorities have been studied and consulted with a view of adapting them to our needs in Lebanon. The compiled material is largely from foreign publications (refer to Bibliography), because data on this subject is hardly available locally. Whenever possible, Lebanese standards and specifications have been incorporated in the discussion, but it can not be sincerely claimed that the material

available was adequate for drawing up a code. Hence, this thesis will consist of two parts:

The First: is a general discussion on the subject.

The Second: is a set of suggested rules for land subdivision in Lebanon based on the preceding discussion and drawn up parallel to that prepared by The American Society of Civil Engineers in 1939.

C H A P T E R I I

ROADS (CLASSIFICATION AND DESIGN)

A. DEFINITIONS

B. CLASSIFICATION OF ROADS

- 1. ACCORDING TO THE WIDTH OF RIGHT-OF-WAY
- 2. ACCORDING TO TRAFFIC REQUIREMENTS

C. STREET SYSTEMS

- 1. THE RECTANGULAR SYSTEM
- 2. THE RADIAL SYSTEM
- 3. THE ORGANIC SYSTEM
- 4. MISCELLANEOUS

D. DESIGN OF ROADS

- 1. REQUIREMENTS
- 2. CAPACITY OF ROADS
- 3. WIDTHS AND CROSS-SECTIONS
- 4. OTHER CONSIDERATIONS

E. UTILITIES (LOCATION IN UNDERGROUND)

CHAPTER II

ROADS (CLASSIFICATION AND DESIGN)A. DEFINITIONS

A road or thoroughfare is an open way or track forming a means of transportation and travel between two points.

A highway is a road outside the city limits

A street is a road within the city limits

A roadway is the width of a road dedicated to vehicular traffic.

Right-of-way is the width of a road from property line to property line.

B. CLASSIFICATION OF ROADS

Roads are generally classified in two ways: 1) according to the width of right-of-way and 2) according to traffic requirements.

According to the width of right-of-way roads in Lebanon are classified as follows: (1)

<u>CLASS</u>	<u>RIGHT-OF-WAY</u>	<u>ROADWAY</u>	<u>REMARKS</u>
INTERNATIONAL	دولية 16 M.	10.50 M.	3 LANES at 3.50M. (2)
MAJOR ESTIVAGE	امطيان رئيسي 11 M.	9.00 M.	2 LANES at 3.00M.
MINOR ESTIVAGE	امطيان ثانوي 8 M.	6 M.	2 LANES at 3.00M.
LOCAL	اقلية 8 M.	6 M.	2 LANES at 3.00M.
SECONDARY	ثانوية 6 M.	3.50 M.	1 LANE at 3.50M.

(1) This does not apply to entrances to big cities.

(2) For the road between Beirut and Mudarij
4 Lanes at 3.50M. = 14.00M.

In a Public Works decree (No. 7208 issued on Oct. 28, 1946) the following widths of right-of-way for highways were specified:

First Category	International Highways	26 M.
Second Category	Estivage and Local Highways	20 M.
Third Category	Secondary Highways	16 M.

According to traffic requirements roads are classified as a) arterial

b) sub-arterial

c) local (minor or secondary).

a) ARTERIAL ROADS

These are roads for long distance movement and heavy traffic effluent from and influent to a town. The major consideration in their design is free, unobstructed, rapid, and continuous flow of traffic. The roadways must be kept free of obstructions and there shall be no frontages, no parking, no pedestrians and no cyclists. The junctions shall be reduced to a minimum in no case less than 1200 ft. apart,⁽¹⁾

It is accepted that lots alongside main arteries shall not have neither frontage nor direct vehicular exit to the highway. The only premises directly accessible from the artery shall be repair depots, restuarants, and filling stations, all of which must accomodate parking places on their own property. All bus stops must be embayed and passenger bridges or subways shall be provided at such stopping points.

b) SUB-ARTERIAL ROADS

Sub-arterial roads are an intermediate class of roads

(1) A.S.C.E. Specifications.

which serve to link up the main arteries with the various webs of minor roads. Whereas it is not as important (from a traffic point of view) as a main artery, nevertheless ease and continuity of flow of traffic require it to be designed on the lines of the arterial (as far as possible).

c) LOCAL ROADS

Local roads are tributaries to arterial and sub-arterial roads which are of local values, expected to serve limited areas only such as: residences, business centers, shopping districts, etc. Their character requires them to discourage through traffic to provide safety and quiet; hence ^{such} roads should not be made inviting, and if the topography so suggests, they shall be quite curving and meandering.

Roads in Lebanon from a traffic point of view are classified as follows:

- 1) Primary of which there are three
 - a) Beirut - Tripoli road
 - b) Beirut - Damascus road
 - c) Beirut - Tyre road
- 2) Secondary which are feeders to the primaries - such as the Baabda road feeding the Beirut - Damascus highway.
- 3) Local or roads which (as the name implies) serve only limited areas, such as streets.

PARKWAYS

A newly developed type of road which is not yet found in Lebanon is the parkway which is finding considerable favor

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among planners abroad. There^s are roads that are designed on the lines of the parks with park-strips on both sides laid out or afforested. The area need not be public property, but can be zoned for agricultural or forestry purposes. Usually commercial traffic and trucks are excluded from such roads to render them pure recreational.

Parkways are designed to make as little contact with ordinary roads as possible crossing them (whenever possible) at different levels. Therefore from a traffic point of view, a parkway is classed as an arterial road.

C. STREET SYSTEMS

While a city can not often be planned from the beginning, there are certain general principles which should be regarded in the laying out of street systems of a portion of a town or a complete city. It is essential to avoid being carried away by the mere pattern of lines on paper. Order, there must be, but a mental comprehensive visualization of the design must be fully grasped. From a town planning point of view the street systems are classified as follows:

1. The Rectangular or Gridiron System portrays streets that are mutually perpendicular. It might be of the checkerboard arrangement with square blocks or the gridiron with rectangular blocks. Many people seem to think of this system as a new development or modern improvement, but it is not. It was common in ancient Egypt, Babylon, and China, then afterwards in Greece, and France.

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This arrangement has its advantages of directness, simplicity, symmetry, and ease of fitting lots and buildings to it. However, care should be taken not to repeat it in any new scheme without thorough consideration, for it might turn out to be monotonous and dreary, unfit for accomodating diagonal traffic.

A variation of the rectangular street system is the Lineal System "in which all the governmental, business, commercial and industrial establishments would be located on one main street." Minor residential streets will run perpendicular to the main street about 1000 meters on each side with a continuous park at every end. The claimed advantages of this system are that everyone could live within walking distance from his work and plenty of recreational facilities are afforded. In his book "Planning The Modern City" Vol. I page 122, H.M. Lewis traces this system back to the Egyptians and comes out with the conclusion that if such a system has been known so long ago, and nowhere do we find it worked out satisfactorily, then "apparently, the lineal city had not proved satisfactory."

2. The Radial System is one in which streets radiate from and converge upon major focal points in the town plan. These streets get wider and wider as the distance to the focal point decreases. This system usually breaks the city into large blocks which are subdivided by minor streets that usually meet the main streets at right angles.

This system was first developed in Paris, France where the removal of the concentric walls of fortifications afforded

wide and spacious circular belt streets that joined the radiating streets cut for hunting parties. The radial system of streets is the most adaptable for heavy traffic and for congested areas. This is greatly true for cities already existing (Beirut is a good example) where a "careful examination of existing roads will frequently show how readily a system of radial and circumferential highways can be created by filling in a few gaps and cutting new streets for ^{short}~~long~~ distances."

The radial system can be used either in conjunction with the rectangular layout or with the circular layout as shown in the accompanying sketches.

From a traffic point of view, the rectangular plan "which looks so well on paper has many defects both as regards circulation and speed for it consists of a multiplicity of "cuts" or intersections of traffic streams." The radial combined with the rectangular is still less satisfactory. The best system adaptable to traffic is the radial combined with a circular layout, where circular thoroughfares encompass the center of the city. Mention should be made here that no perfect symmetry is required for this design so long as the general idea is followed, and circular is not used here in the strict meaning of the word. It merely indicates a belt street that is continuous around the city center.

3. The Organic Street Pattern this system might either represent an extremely unplanned condition and haphazard growth or it might represent studied irregularity such as in modern garden cities and landscaped subdivisions.

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Its name is derived from its "resemblance to a microscopic slide showing the cell structure of vegetable or animal tissues." As the name implies, the streets, in this system, are curving, meandering, discontinuous, of varying widths, with irregular open spaces at irregular intervals. About thirty years ago, there was this tendency in Germany of introducing deflections and offsets in streets at frequent intervals, for the express purpose of creating interest in the street pattern. Irregularity and curvature that might seem to be an awful nuisance on paper may not be even noticed by a pedestrian or motorist. A slight deviation from the straight line will furnish intersection points of interest where major buildings or important structures might be erected. It is only the street itself, and buildings on both sides that the passers-by will notice and not the slight deviations or irregularities that might be horribly conspicuous on a plan. On strictly local and unimportant residential streets (unimportant from the point of view of traffic), streets acquire additional interest by this treatment.

Perhaps, the most conspicuous and praiseworthy example of studied irregularity is in the street system of Essen, Germany. "The aim of the planner was to furnish, throughout the city, constantly new and varied vistas not only in respect to the houses and their relation to streets, but also to the width and arrangement of the individual street. The completeness with which this plan has been carried out is shown by the fact that the range of vision in the streets is as a rule limited to 650 to 1000ft."⁽¹⁾

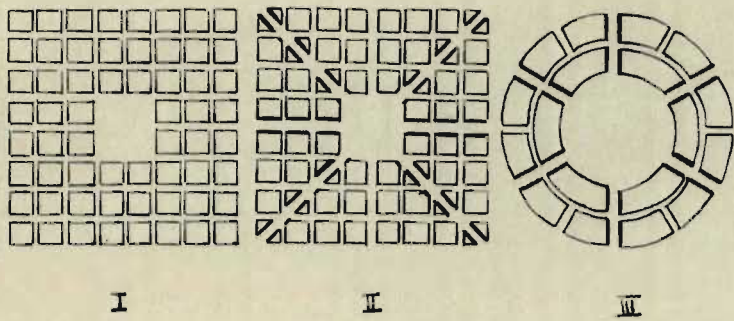
(1) From an article on the planning of

4. Miscellaneous. New street patterns are being constantly developed. Noulan Couchan of Ottawa proposed that major blocks in the town plan be divided into residential hexagons. This, he claims, has the advantage of good orientations for houses, safety, and ease of flow of traffic furnished by a wide angle of vision at intersections, fewer and shorter streets that are more economical, and reducing the number of junctions. The argument in favor of the residential hexagon is that the perimeter of a hexagon is less than that of a rectangle of the same area, thus reducing the percentage of area that goes in streets. The advantages of the hexagonal layout may be gained by other patterns that can avoid its shortcomings which lie mainly in the large number of odd-shaped lots.

Also there is the "Precinct arrangement" or "Triangular grid" which it is claimed, is safer, quieter, and more economical than most other systems.

Culs-de-sac: The cul-de-sac is a dead-end street which if properly designed may be very advantageous. It is effective in preventing through-traffic and can be used effectively for providing access to interior lots in larger blocks economically, besides giving houses privacy and quiet. However, dead-end streets should be limited in length (to a maximum of ^{two} ~~one~~ hundred meters) and should not be very inviting. The width must be enough to accommodate for the light traffic they are expected to handle (10 M. will be plenty). At the dead-end there must be a turning circle and a traffic island of adequate dimensions and shape.

STREET PATTERNS



- I. RECTANGULAR
- II. RECTANGULAR AND RADIAL
- III. CIRCULAR AND RADIAL

Result. In the attempt to lay out the street system for any new subdivision, the traffic requirements and topographical features should be fully considered and coped with. These requirements may call for any one of the street patterns described before, or for a combination of one and another. But whatever and whenever the subdivision is, the planner should not be drifted away by lines on paper, but by a visualization of the actual site, capable of producing a framework of streets of considerable continuity, unobstructed directness, ample widths, easy gradients, and good intersections.

D. DESIGN OF ROADS

1. REQUIREMENTS

The requirements of a road are so liable to change that they can not be defined with any degree of "finality" at any one time. However a road may be thought of to accomodate for:

- a) traffic requirements
- b) safety
- and c) convenience

The balance between these factors will always be finely poised, and any disturbance will have unfavorable results.

2. CAPACITY OF ROADS

The capacity of a lane is understood to designate the number of vehicles that can pass a given point on it in one hour. The capacity of a road is the sum of the capacities of its lanes. But roads can carry overloads which increase driving hazards which tend to cut down the efficiency of a road. The capacity that should be used in the design of a roadway is one that approaches

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but does not exceed the critical point at which an excess in the volume of traffic handled results in a decrease in efficiency.

Formulas for the capacity of lanes have been worked out after tests, counts, and empirical studies; a mathematically correct formula is

$$C = \frac{1000 V}{P}$$

where

C = number of vehicles per lane per hour

V = running velocity in kilometers

P = average distance in meters center to center of moving vehicles.

If, however, a vehicle is subject to frequent stops, due to traffic crossing at grade, the capacity of a lane is greatly reduced and this reduction should be accounted for.

To design a new road the expected number of vehicles, i.e. the required capacity, should first be determined. This can be done, either by an actual traffic count, or by empirical formulae, or by a study of automobile registration, or by analogy with a similar satisfactory highway.

The running velocity should also be presupposed. Tests made show that "some speed between 17 and 27 miles per hour (probably about 23) is the most favorable, being the highest at which vehicles can conveniently and safely run in close succession. At higher speeds the intervals must be, for reasons of safety, increased and the number of vehicles accommodated thus reduced." The average distance center to center of moving vehicles is equal to the length of the car plus the safe stopping distance. The

required safe stopping distance is given empirically to vary between $\frac{V^2}{10}$ and $\frac{V^2}{12}$ in feet where V is in miles per hour.

Once P and V have been decided upon, C can be calculated and the number of lanes required will be equal to the required capacity over the capacity per lane.

3. WIDTHS AND CROSS-SECTIONS

Since the greater portion of the width of a street is devoted to its roadway, the predominant factor is determining the cross-section of a road should be the traffic requirements which the roadway will have to meet. The roadway is divided in lanes and if parking along the road is permitted, this also occurs in lanes. The width of the roadway is the sum of total of the widths of the required lanes (both for moving and stationary vehicles.) The width of the road is the width of the roadway plus the width of adequate sidewalks plus the width of grass plots. The width of a moving traffic lane has been generally accepted as 10 ft. or 3 M. for moving vehicles and 8 ft. or 2.50 M. for stationary vehicles.

Some of the points that seem to be very obvious and that, nevertheless, have been frequently disregarded are:

- 1) Heavy trucks require wider lanes than ordinary vehicle lanes.
- 2) Fast moving vehicles require wider lanes than slow traffic to furnish more "elbow room."
- 3) A parked car needs a narrower lane than a moving vehicle.
- 4) It is useless to widen a roadway unless a full lane

is provided.

5) An odd number of lanes will create a "disputed lane" which is a source of danger.

Once the roadway width has been fixed or decided upon the overall width of right-of-way could be determined. Whenever the subdivision scheme falls in a locality where the widths of roads and roadways have been previously fixed or standardized, it is evident that the design of road must be in conformity with these limitations. The width of roadway as a percentage of the total width of road varies considerably. In New York City, the Board of Estimate and Apportionment, by resolution of April 8, 1926 fixed the following widths:

<u>ROAD WIDTH</u>	<u>ROADWAY WIDTH (% OF ROAD WIDTH)</u>
less than 20 ft.	100% less curbs
20 to 50 ft.	60%
55 to 75 ft.	40% + 10 ft.
80 to 140 ft.	80% - 20 ft.

A less elaborate way is to specify three-fifths of the total width for roadway and one-fifth on each side for sidewalks and green plots.

4. OTHER CONSIDERATIONS

Some other points to be considered in the design of roads are

- a) grade
- b) visibility
- c) curvature
- d) intersections

- e) surfacing and finishing
- f) orientation
- g) setback and building lines
- h) alleys and crosswalks
- i) spacing of thoroughfares
- j) percentage of total areas

a) Grade

The only consideration as far as grade is concerned is the ease of flow of traffic. Specifications for grade are based upon the type of traffic to be handled, through the application of tests, common sense, and experience.

As specified by the Ministry of Public Works of Lebanon (Decree no. 805; Jan. 12, 1951), the maximum allowable grade is 6%. In exceptional cases this grade might be exceeded with the following limitations:

for a 10%	grade	maximum distance	=	125 M	preceded by	150M	of	4%	grade
"	"	9%	"	"	"	=	175 M	"	"
"	"	8%	"	"	"	=	250 M	"	"
"	"	7%	"	"	"	=	500 M	NOTHING	"

b) Visibility

Visibility is the distance along the center line beyond which vision is obstructed. The requirements for visibility are based upon the distance required for a car to come to a stop in case some obstacle comes in its way. This distance is a function of the speed of the car, the efficiency of its brakes and the reaction time for the driver to become aware of what is in front

of him (an average of two seconds.)

Obstruction to visibility is due either to horizontal or vertical curves. The following requirements have been specified by the American Society of Civic Engineers for the clear visibility to be conformed with in land subdivision:

300 ft. - for major thoroughfares, boulevards, and parkways.

200 ft. - for secondary thoroughfares

100 ft. - for minor streets.

(for the open country where higher speeds are desirable these values should be increased considerably.)

In case of changes in grade, a vertical curve should be introduced the length of which should be equal or greater than 3 to 5 M. times the algebraic difference in the rate of grade; the higher value being for major thoroughfares, boulevards, etc., and the lower one being for minor streets.

c) Curvature

Curvature is the reciprocal of the radius. For ease of flow of traffic, and for safety and convenience the following requirements are specified by the American Society of Civil Engineers to be complied with in land subdivision:

The minimum radius of curvature should be at least equal to:

300 ft. for major thoroughfares, boulevards, and parkways.

200 ft. for secondary thoroughfares

100 ft. for minor roads.

Also between two reversed curves there shall be a straight tangent of at least 100 ft. length. This tangent is inserted for

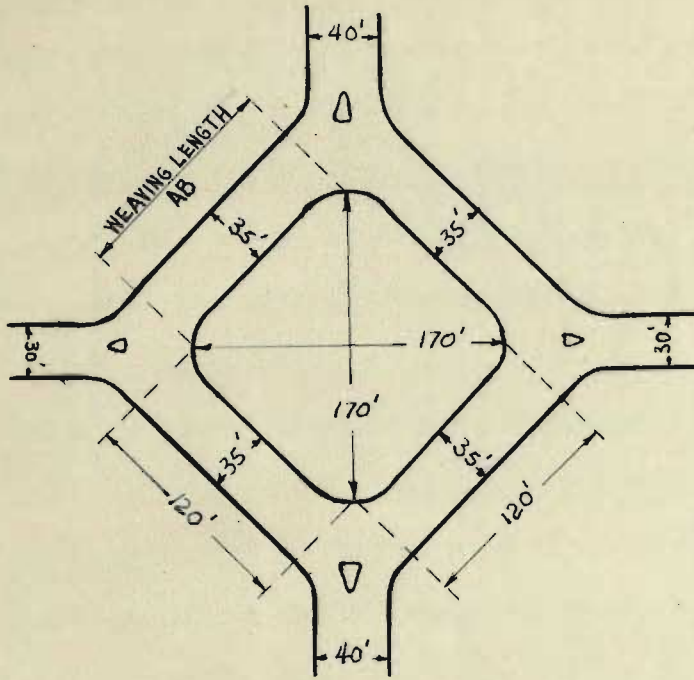
the comfort of passengers, and to give the driver enough time to start working his steering in an opposite direction.

d) Intersection

On Arterial and Sub-arterial roads. Science was first applied to intersections by the American specialist William Phelps Eno who found out that the chief difficulty of traffic movement arose from intersections and turning movements of traffic streams. He laid down the principle that a "dead-area" should, if possible be left at the center of each intersection around which the traffic movement will be in one direction only. This led to the roundabout movement which we know today, all direct cuts being done away with. Even though much has been learned about these roundabouts, finality of design has by no means been achieved yet. There is much to be experimented upon and developed in the future. The proportioning of roundabouts is a very delicate job for if they are too big they will result in a nuisance and a waste. On the other hand, if they are too small, drivers will tend to cross them at high speeds thus violating the end which they are there to serve or they might cause traffic jams in case of heavy traffic.

The essential feature of a roundabout island is the weaving length which is indicated AB in the accompanying figures. Sir Alker Tripp, a British traffic expert attached to Scotland Yard suggests the following weaving lengths based on his experience and research work:

120 ft. at intersection of two main roads in the country, well away from large towns.



A ROUNDABOUT AT AN INTERSECTION OF A 40-FT AND A 30-FT ROAD
IN THE OPEN COUNTRY

TAKEN FROM "ROAD TRAFFIC AND TOWN PLANNING"
BY TRIPP

180 ft. at intersection of two heavily trafficked
arterial roads in a suburban area.

300 ft. at similar intersection in centers of towns.

As regards the widths of road surrounding the island a working rule has been to take the sum of the total widths of intersecting roads and to divide it by their number. The diameter of the island (dead area) will range from 150 to 200 ft. for minor roads up to 500 to 600 ft., in congested areas of 300ft. weaving lengths. The shape of the traffic island can be a square, oblong, polygon, circle, or oval.

All curves should be rounded with a minimum radius of 30 ft. a smaller radius is not sufficient and a much greater one conduces to speed and is therefore undesirable. For the guidance of traffic, wedge-shaped islands should be provided at the mouth of the approach road which should be made to meet the roundabout in as nearly a right-angled junction as possible.

Intersections can also be dealt with by means of segregation of grades like the fly-over bridges and the clover-leaf systems, but these are too elaborate to be met in residential quarters, and as such will not be discussed here.

Intersections on local roads.

For whole systems of these roads, the idea of a general one-way traffic system seems attractive at first sight, a unidirectional flow at junctions being thus created. It is true that one-way roads are useful for making the best of a bad job already designed, but in newly designed town plans they should not be resorted to.

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Their drawback are that they conduce to speed and as such are dangerous, and that strangers driving along such roads find themselves lost. Moreover, the best traffic signals might be ambiguous or misleading. On the whole a two-way system in minor roads seem more favored, the two general limitations being:

1) that it shall provide no short cuts for through traffic, and

2) that it shall have no direct intersections. The junctions will probably be T - shaped and staggered. It should however be noticed that though staggered junctions are considered as being a sound design on minor roads, they might prove to be dangerous at high speeds and should be converted into straight cuts controlled by signals. At intersections lot corners shall either be rounded off by an arc or clipped by a chord. The American Society of Civil Engineers specifies a radius for such an arc from 5 to 10 ft., a chord being acceptable in business centers. In Lebanon it is specified that lot corners shall be broken by a chord whose length shall range from 3 to 5 M depending on the streets.

e) Surfacing and Finishing

The road must be finished to render it fit for vehicular traffic. Bituminous products (like Idealite and Aspel) has proved to be satisfactory in this part of the world. The roadway shall be given a crown or arching to provide for drainage ($\frac{1}{4}$ in. ^{2%} per ft. is good practice). The sidewalks must also be paved with adequate tiling materials. However, in a new subdivision, the sidewalks can be left unpaved as long as the population is still very scarce.

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f) Orientation of Streets

Recently architects and city planners have given more attention to the orientation of streets to insure direct sunlight for buildings, particularly for residential quarters, for every day of the year. The amount of direct sunlight which will reach a building depends upon the latitude of the locality, the orientation of the buildings and the height of the neighboring buildings. The orientation of the streets becomes more important in highly congested areas, but where low coverage is maintained and ample light and air provided around buildings, the exact orientation becomes of less importance.

g) Setback and Building Lines

Buildings lines are imaginary lines established either by the subdivider or by the planning authorities beyond which no buildings or structures shall be erected. The distance from the property line to the building line is called the "Setback". This is established in order to provide additional space in front of buildings for health and amenity and should not (as the case is in Lebanon) be done with the intention of acquiring private open area for a subsequent road development or widening. The street should be made wide enough, in the first platting, for the ultimate needs that can be foreseen.

h) Alleys and Crosswalks

Alleys furnish back-access to lots. They derive their importance from the tendency of many modern town planning projects to have the houses face upon alleys, thus rendering them "dignified front walks which lead past the gardens of the neighborhood."

The objection to alleys are that they become a dumping place for garbage and an additional expanse when it comes to paving them. However they become a necessity in countries like Lebanon where two entrances to the house are usually desirable. They should not be less than 6 to 7 meters in width and should be paved and kept clean. They might be used for accomodating for public utilities.

Crosswalks are pedestrian ways across blocks used to furnish shortcuts at intervals that should not exceed 100 to 125 M. The width should not be less than 2.50 to 3.50 M, with a grade below 20% unless steps of acceptable rise and tread are introduced.

i) Spacing of Thoroughfares

Ernest P. Goodrich has suggested a spacing varying with the type of neighborhood as follows: "The main thoroughfares in single-family residence districts should be spaced not to exceed 3000 ft. apart, 2000 ft, in two-family house districts, and 1,250 ft. in multi-family house districts. In industrial districts the main thoroughfares should not be spaced more than 750 ft. apart."

j) Roads as a percentage of the total area

For a subdivision project to be sound there is a certain percentage of the total area that must go into roads. That percentage is a point of equilibrium between adequacy of the road for traffic and its initial cost and maintenance.

If the road system is reduced in area below that point, evidently it will not be fully adequate for the traffic it might be expected to handle. If however, more area is put into streets the initial cost will be higher, so will the maintenance cost and the overall cost per unit area of usable lots be.

The value at which that percentage is fixed is not however very precise, since no exact limitations can be reached, but specifications are based on good practice and experience. Moreover, it varies considerable with the use for which the subdivision is intended. The residential districts blocks may be very long whereas in business districts they are relatively shorter thus requiring more area to be put into streets.

It has been generally accepted that for residential subdivisions, the minimum area that must go into streets should be at least 15% of the total platted area. When only 15% goes into roads, a minimum of 33% of the total area should go into roads and public parks and playgrounds, the usual value of the latter being 10%. Whereas great finality can not be set regarding this aspect of the subdivision, the above-mentioned requirements seem to be fairly adequate and shall be adapted later for the set of suggested rules for land subdivision.

E. UTILITIES (LOCATION IN UNDERGROUND)

"Among the very important ^{ncts} ~~adjustment~~ of the city street system are the various structures beneath the surface." Their importance is not so evident to the casual observer since they are out of sight; but this will not be so when street surfaces are torn out for repairing old or installing new pipes, sewers, or conduits. Almost always ^{our} ~~out~~ streets are "dissected" for one reason or another, that we have become accustomed to that state and indifferent about it. The repairwork is slow, costly, inconvenient and most uncomfortable both for motorist and pedestrian. All this,

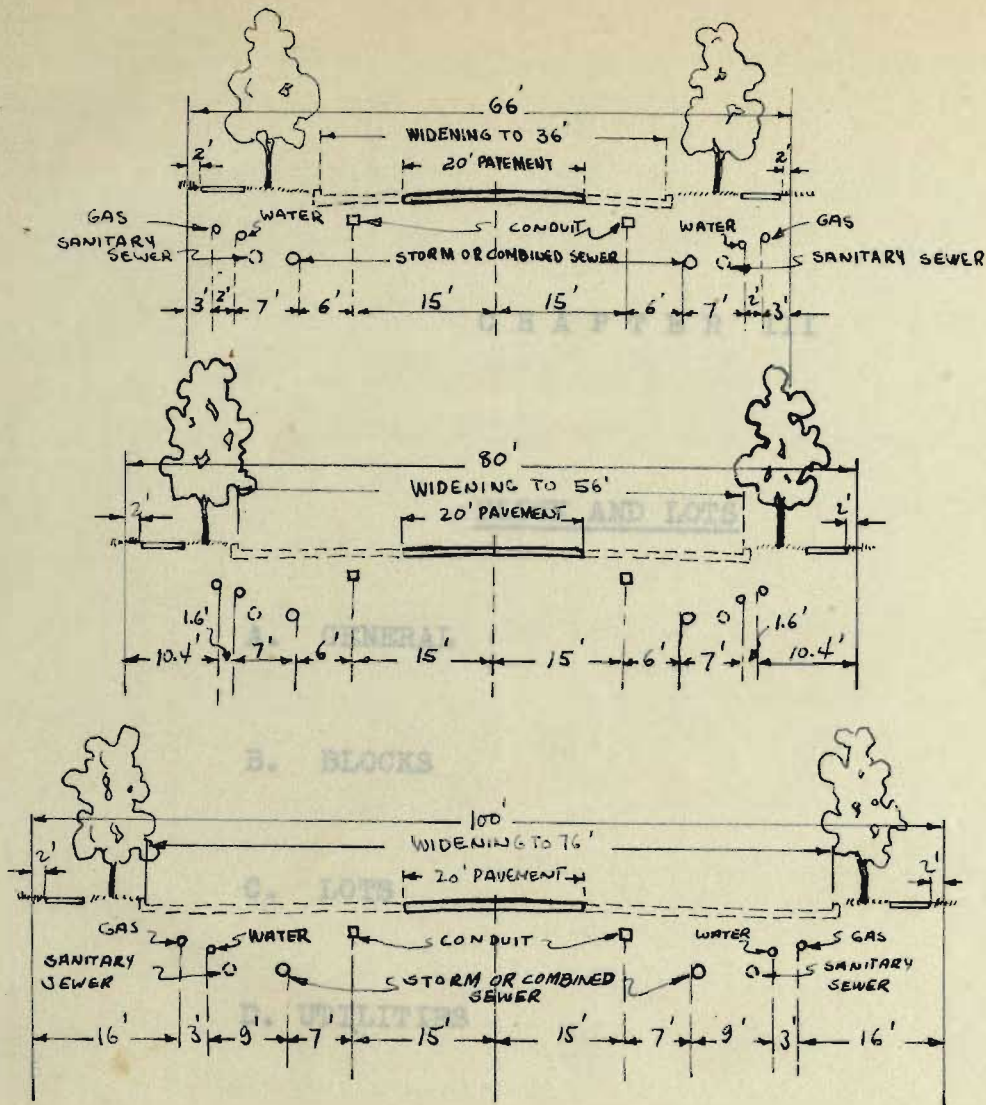
could be remedied by a farsighted design and some adequate knowledge of city planning.

Some solutions are to put some or all of these utilities under green spaces between sidewalks and property-lines, under sidewalks, along alleys, or in tunnels. It will seem best to have tunnels in which all the utilities are put, thus putting an end to the constant mutilation of the pavements. When well-built, these tunnels are an excellent solution, especially so when they are high enough, wide, roomy, clean, well-ventilated and well-lighted with an adequate number of convenient entrances. However, the cost would be enormous and would not be justified except for highly developed districts.

"In 1931 the City Planning Division of the American Society of Civil Engineers started a study of the location of underground utilities." A special committee prepared a report that was approved in 1939 which "advocated an official organization either in the city engineer's office or the city planning commission, which would keep an accurate record of all present underground utilities and make plans for the location of all future ones."

The location of underground utilities in undeveloped territory as recommended by this committee is shown in the accompanying drawings
(1)

(1) From "Planning The Modern City"
Vol. I, page 190, by H.M. Lewis.



LOCATION OF UNDERGROUND UTILITIES IN UNDERDEVELOPPED
TERRITORY, RECOMMENDED BY THE A.S.G.E.

REPRODUCED FROM "PLANNING THE
MODERN CITY" VOL. I BY LEWIS

C H A P T E R I I I

B L O C K A N D L O T S

A. G E N E R A L

B. B L O C K S

C. L O T S

D. U T I L I T I E S

CHAPTER III

BLOCKS AND LOTSA. GENERAL

It is evident that standardizing the sizes and shapes of blocks and lots is as inadequate as it is inconvenient. Every subdivision, as has been mentioned before, should fit the topography and character of the site, the type of structures it is going to accomodate presently or in future, and approach and utilities facilities.

It is the duty of the promoter of the enterprise to satisfy the public interest and the duty of the responsible authorities to see to it that ^ethat interests of the promoters of the subdivision and of the prospective owners are harmonized.

B. BLOCKS

"A great assortment of data has been presented in city planning literature on the subject of block sizes and shapes as if it would be of value in determining the most satisfactory dimensions for any given set of circumstances."⁽¹⁾

Nothing in the nature of specific rules can be set with great finality, owing to the mutiplicity of considerations such as topography, local habits, use, tastes, economic considerations, layout of the street system, types of structures, etc.

Sizes are greatly influenced by the street system and

(1) THOMAS ADAMS

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whether dead-end streets are used or not. Where through-streets prevail the length of blocks will be determined by the exigencies of cross-traffic, and the depth of a block will be equal to the depth of one or two lots, whichever it accomodates, plus the depth reserved at the rear for local parks, alleys, and easements for utilities. On the other hand if culs-de-sac are made use of, deeper blocks will be possible.

Even allowing that no set rules can be laid down there are some basic considerations which can not be overlooked for the public interest. In general, blocks should be as large as possible, subject to the necessity of traffic convenience; for the necessity of convenient access from one street to another makes lots of indefinite lengths highly undesirable. Cross-walks or pedestrian ways, can be used advantageously in such cases rendering excessive block lengths more tolerable. This is especially true when there is some economic consideration invloved; for the bigger the blocks, the smaller the percentage of the total area that goes into roads. This will diminish the initial cost and the maintenance cost and will furnish more area available in salable lots.

Business and retail shopping districts need a large percentage in street areas, more corner lots, more parking places, and shorter blocks than residential districts do. Apartment districts need shorter blocks and wider streets than high-class single-family and villa sites. In as well "garden apartments need deep blocks to permit grouping of buildings around interior gardens and space for offstreet parking." Following the same line of reasoning, wholesale districts will require deeper lots than retail

business districts; and industrial districts may require lots few hundred meters deep with special traffic facilities. Blocks in industrial areas should be large enough to accomodate units of 100 x 300 Meters or an equivalent area and should never be subdivided into small lots.

Good practice has shown it was best to lay out blocks with the larger sides parallel, as much as possible, to the major thoroughfares, resulting with fewer cross-streets and intersections. Thus in developing a tract of land, the major thoroughfares are located first, then minor streets are run parallel to them at intervals that will produce usable areas. The minor streets are joined to the major thoroughfares at intervals that are defined mainly by topography and traffic requirements. These distances define the length of blocks.

"According to recent studied of Henry Wright those blocks that approach most nearly to the rectangular or square appear to be the most economical." Interior parks are highly desirable because they can be used by children without the necessity for crossing streets.

Whereas great lattitude is permitted in choosing the size and shape for blocks, it has been recommended by experience that blocks should not exceed 400 to 600 meters in length, generally less. The width of the block will be such that it will accomodate for two tiers of lots plus the necessary easements in between. For ordinary residential areas the width of blocks is recommended between 50 and 100 meters.

C. LOTS

1) Size. Here, as well as in blocks, it is almost impossible to set rules and regulations for the size and shape of lots. There is such a considerable variety of factors that have to be considered that it is almost impossible to set down any standards with great finality.

However, we might say that there are two primary considerations in fixing the widths, depths, and areas for average lots in residential areas:

- 1) That they shall be of such dimensions capable of providing light, air, and healthy surroundings.
- 2) That they shall be within the financial capacities of the class of people for whom they are intended, and satisfactory to their tastes and desires.

Evidently also, the type of building that is going to be erected on a lot, should determine its characteristics rather than the building be designed to fit that particular lot.

The width of a lot is determined by the width and depth of the dwelling that is to be built upon it. The smallest house needs a façade of about 10 meters, so in no case can the width of lots at the building line be less than at least 15 meters.

The depth of a lot is the sum of the depths required for a front ^{ard} yard, (5 to 10 meters), the depth of the house (10 to 20 meters) and the depth of a backyard (10 to 15 meters), making it all in all 25 to 45 meters. More generous allowance will be made in case of first class and villa sites, but good practice has shown that a depth in excess of 40 to 50 meters is wasteful

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for ordinary dwellings, especially that the "lot depth is not so important because of actual use as it is for separating and obscuring the view of rear ends of buildings that occupy the opposite side of the same block."

2. Lot Shapes. There is one major consideration which should never be disregarded in subdividing blocks into lots. This is the purpose for which the lot is going to be subjected. As has been mentioned before, figures that might look so nice on paper may turn out to be an awful nuisance when it comes to actual use. The requirements that might be imposed on any subdivision as regards lots could be summarized as follows:

a) In general, for the sake of economy, the shorter side of the lot should be laid along the street. This is so, because it reduces the percentage of the total area that goes into streets. Exceptional to this is when the topography requires that the depth of lots be reduced, then the longer sides shall be laid out along the street.

b) Lots should as far as possible be of a regular shape. Acute intersections and too many corners ^{are} an awful nuisance. The rectangular shape seems to be the best.

c) The sidelines of lots should be as much as possible perpendicular to the street on which the lot fronts.

d) Lots of similar size and shape should be grouped together.

e) When the subdivider has in mind the further development of some part of the subdivision, there are many desirable features attainable in the design of both lots and buildings. Such

lots will not be treated like ordinary residential lots.

f) When the subdivision falls in a locality where ordinary small houses are not expected to serve the needs of the prospective residents, special lots should be provided for apartment houses with inside open spaces.

g) A relatively recent practice in subdivision design is "the development of internal areas and open spaces in the middle of blocks." This is ideal and is becoming very popular. Such central recreational areas seem to have worked excellently and the frequency of their provision in subdivisions depends upon the size of the subdivision, the anticipated population, the cost of the land and the size of other parks and recreational facilities provided. Parks and Playgrounds.

3) Usage. No definite standards can be put down regarding use allocation and distribution of area in any subdivision. But it is well to set some rough approximation based on experience with subdivisions that have worked out satisfactorily.

<u>Buildable Areas</u>	<u>Percentage of Total Area</u>
Residential	50%
Civil Center and Business Districts	2.5%
Light Industries	5%
	<hr/> 57.5%
<u>Open Areas</u>	
Local Streets and Commercial Open Areas	25%
Parks and Playgrounds	15%
Major Highways	2.5%
	<hr/> 42.5%

(These values are for subdivisions purely residential).
Whereas these values have their value for guidance in design, neither that which is theoretically correct, nor that which has proved to be practically sound can be taken as unalterable basis for any subdivision.

The area which will be actually occupied by buildings should not exceed, normally, 50% of the total buildable area.

4) Plots dedicated for Public Use. Lots dedicated for public use will fall in either of these categories

- a) parks and playgrounds
- b) business districts, shopping centers
- c) schools, civic centers, churches, etc.

Parks and Playgrounds.

"VERY MUCH ASLEEP IS THE CITY THAT IN THESE DAYS HAS NOT BEEN PROVIDED WITH A PARK OF SOME KIND." The need for parks and playgrounds in any community is so obvious that it can never be disregarded in any subdivision. Both parks and playgrounds serve ultimately the same purpose: the satisfaction of human wants in leisure time. Parks are thought of to accommodate places where one can sit, relax and enjoy nature, whereas playgrounds are places for play, exercise, and physical regeneration. The areas for parks and playgrounds should be selected on the basis that the most beautiful land scenery will be preserved for parks, whereas the most level sites are left for playgrounds. Generally speaking, land that does not adapt itself very suitably for buildings will be proper for being turned out into parks; for as difficult and undesirable slopes and wild rocky ravines are for building purposes,

they lend themselves wonderfully for park uses.

The location of parks should be where they interfere least with traffic and future expansion. They might be wedge-shaped narrowing down towards the center of the town, or they might be the shape of belts that encompass the town, or of an irregular shape like in hilly sites. Normally, parks should be bounded by streets rather than by lot lines, otherwise dwellings will back to rather than front upon them.

The total area of parks should not be less than 10% of the total area. Some town planners prefer to impose a limitation corresponding to the population rather than a flat percentage of the area. This also has its merits, but in undeveloped areas, the present trend of reserving 10% of the total area should be continued.

"Parks are always to be planned with reference to the types of recreation needed by the people of that particular neighborhood, as well as with reference to the general direction of the growth of the city."

As for playgrounds, the size and the location of the area depends very much on the type of games desired and on the people who are going to use them. Elaborate tables have been worked out for areas required for different types of playgrounds and it is advisable for the subdivider to refer to them, if necessary. The distance of the playgrounds from the neighborhood depends on the people to make use of them, whether children, elementary school boys, or adults.

As for schools, churches, shopping centers, parking places, etc., nothing definite can be set regarding them, but it will be

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well to consider that 2 to 3% of the total area shall be occupied by such public features.

D. UTILITIES

Utilities are considered to denote, other than the transportation system, the water supply, the sewage system, power, heat, light, and telephone.

All of these utilities should be provided for by the subdivider or his engineer and the work carried out to the full satisfaction of the Administration. No subdivision will be approved before adequate provisions are made for a satisfactory utility system.

The layout of utilities and their location in underground has been previously discussed; and recommendations given for the relative position of different utility items.

C H A P T E R I V

SUBDIVISION CONTROL

- A. GENERAL

- B. SUGGESTED ORGANIZATION

- C. CAPACITIES OF THE COUNCILS

- D. PROCEDURE

- E. ADMINISTRATION

CHAPTER IV

SUBDIVISION CONTROL

A. GENERAL DISCUSSION

The lack of control in the development of our cities, villages, and summer resorts is very evident and its evils are horribly conspicuous. Our cities grew around focal points of interest such as places of worship, industrial centers, amusement centers, etc., and have acquired the very destructive tendency resulting in congestion rather than promoting expansion. This tendency might be attributable to various factors some of which are:

- 1) That streets, in general, are laid down only after a locality becomes inhabited rather than before.
- 2) That people like and prefer to live close to their working places, because there is a lack of organized traffic facilities.
- 3) That people are afraid and reluctant to live far from populated areas and police centers.

From a town planning point of view the evils of this heterogeneity in development can be remedied to a great extent 1) by having proper and adequate regulations to control the haphazard growth of our cities and 2) by having these regulations strictly enforced with no discrimination.

The importance of such a control as a guide to the activities of the promoters and a safeguard for public interests can at no time be over-estimated.

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In spite of the fact that there is a growing awareness now in Lebanon regarding organization in town planning, little in the nature of rules or regulations has been set down yet. The general procedure followed presently in land subdivision is for the subdivider or his agent to submit the preliminary plot to the Municipality or Central planning Commission (*مجلس التخطيط*) where they will be studied. If deemed satisfactory they will be referred to the president of the republic for his approval, together with the recommendation of the commission.

It seems useless to try to point out all the evils about the present system as to delay, disorganization, favoritism, etc., however I would like to point out three technicalities which, to my mind, need more investigation.

1) That the final approval of any subdivision should come from the president of the republic. The disadvantage of this formality lies in that after the president approves of the project no changes could possibly be introduced because there is hardly anyone who has enough moral courage to admit his mistake before such high authority or ask him to withdraw his signature from one plot and put it on another.

2) That the preliminary plats are not exhibited publicly. Since the object of any subdivision is first and foremost to provide better places for people to live, work, or play upon, I see no point in disregarding the public opinion in the form of suggestions or comments. However well-studied any project is, there always will be some place for improvements. No human can foresee every possible angle of any project at any time. This is especially

so after one has become acquainted with the project for quite some time since he becomes familiar with its shortcomings subconsciously. Whereas a layman's opinion on the subject comes out in most cases to be of doubtful value, nevertheless it should be considered and coped with, if perfection is desirable.

3) That there are no specific rules or regulations in any municipality regarding subdivision of land. No municipality has so far made any effort along the line of standardizing its town development.

Article 71 of the Legislative Decree No. 61/LE (Aug. 30, 1940) might be considered as the "Enabling Act" bestowing power unto the municipalities to control building development. It states that "Municipal Councils in towns of ten thousand inhabitants or more and in summer resorts can, through deliberations of power approved by the president of the republic and in conformity with the existing laws, specify the following:

- 1) the maximum height of buildings,
- 2) Zones "non-edificunte" where no building is allowed,
- 3) use of construction materials for faades of buildings,
- 4) the setback,
- 5) the area of coverage.

The Municipal Councils can not however specify the above-mentioned items, in case no town planning scheme for the locality has been previously established, and approved by the president of the republic."

This practice, however, tends to widen the gap and create heterogeneity among our cities. A better practice would be to

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divide all urban land into zones. For any one zone class, the regulations and limitations will be the same for every town in the country. However, every municipality will be at liberty to fix the limits of its zones and to choose the classes of zones into which the town will be divided.

B. SUGGESTED ORGANIZATION

The purpose of this paragraph is to point out one way in which good and reliable subdivision control could be attained through government efforts. The discussion is based on the results of studies (still unpublished) by Prof. N. Manassah of the Engineering School, A.U.B. For a satisfactory subdivision control the following steps are suggested:

- 1) Before any town planning activities, including land subdivision, can be undertaken in any place, the locality has to be declared subject to town planning development through a decree issued by the president of the republic, subsequent to a recommendation from the Central Planning Council (to be discussed later). After such a decree is issued, the Central Planning Council will proceed to lay down a town planning scheme for the locality in question, the procedure after which land subdivision will be considered. Evidently, the subdivision should be in conformity with the plans worked out by the Central Planning Council, otherwise it would be denied approval. The land registry, moreover, is not authorized to carry out any transfer of ownership transactions, unless the subdivision has been approved.

- 1) There should be three town planning commissions formed as follows:

a) The Municipal Planning Council charged with the control of town development subsequent to the presidential decree mentioned before.

In the absence of a municipal council in the locality considered, the administrator will call a Local Council consisting of:

- The administrator or his representative - chairman,
- the district engineer, representing the Central Planning Council,
- the district engineer, representing the Public Works,
- one representative from the ministry of Public Health,
- the mukhtar (sheriff)
- two members from the locality itself.

b) The Muhafaza Planning Council created by a decree by the prime-minister and attached to the ministry of the Interior, consisting of:

- The administrator - chairman,
- one representative from the Central Planning Council,
- one representative from the ministry of Public Health,
- the district engineer, representing the ministry of Public Works,
- one expert appointed by the Central Planning Council,
- one expert appointed by the Muhafaza.

c) The Central Planning Council also created by a decree by the prime-minister and attached to the ministry of the Interior, and consisting of:

- The chief engineer of the Central Planning Council(with other engineers, if necessary),
- the director of public works,

the director of public health,
the director of education,
the director of finance

C. CAPACITIES OF THESE COUNCIL

The capacities of these councils shall be specified as follows:

1. The Local and Municipal Planning Councils shall be entitled and required to
 - a) study the applications for permits for building development and land subdivision.
 - b) give out permits for satisfactory plats.
 - c) supervise building development (or tearing down of buildings), road construction, subdivision of land, etc.
 - d) study the complaints and suggestions submitted to them, and refer them (when necessary) to the Muhafaza Planning Council.
 - e) study the conditions and trends in their localities, and put down schemes for future development.
 - f) submit these schemes and recommendations to the Muhafaza Planning Council for study and approval.

2. The Muhafaza Planning Councils shall be entitled and required to
 - a) study the suggestions or complaints referred from the Municipal or Local Planning Councils.
 - b) study the projects and recommendations submitted by the Municipal or Local Planning Councils.
 - c) refer these projects ^{or complaints} (if necessary) to the Central Planning Council endorsed with its own recommendations.

d) see to it that no land subdivision or transfer of ownership shall be carried out, unless approved by the Muhafaza Planning Council. Hence the land registry will not be entitled to carry out any transaction involving land subdivision unless that subdivision has been previously approved.

3) The Central Planning Councils shall be entitled and required to

a) orient the activities of the Muhafaza Planning Council, and of the Municipal or Local Planning Councils.

b) prepare schemes for future development in virgin lands.

c) study the schemes and projects submitted by the Muhafaza Planning Council and give its own recommendations

d) study the complaints or suggestions referred to it by the Muhafaza Planning Council and give its own decisions.

e) appoint a permanent representative in every Muhafaza who shall automatically become a member in the Muhafaza Planning Council.

D. PROCEDURE

The procedure to be followed in subdividing a certain lot, tract, or parcel of land, by the engineer, the subdivision^{der}, or their agent shall be as follows:

1) A preliminary plot (scale 1 to 1000 or less) shall be prepared in conformity with the rules and regulations referred to hereafter.

2) This preliminary plot shall be submitted to the Municipal Planning Council two weeks before its meeting with a written application for its approval, subsequent to the preliminary studies,

and prior to the location surveys.

3) Together with the original plot, seven blue prints of it should be included.

4) Also a vicinity sketch (scale 1 to 5000 or less) shall be submitted showing the exact boundaries of the subdivision, all neighboring subdivisions and premises, all major thoroughfares and right-of-way, all features that have been platted by the Central Planning Council, in short: the vicinity sketch shall be adequate to show the location of the subdivision with relation to its neighborhood, and any existing or platted town planning features that might have some bearing on the nature of the subdivision in question.

5) Longitudinal sections with tentative grades (^{vertical} scale 1 to 100 or 1 to 200 depending on the grade) shall be included.

6) Cross sections (appropriate scale) shall be included, taken at proper intervals, showing roadway, grassplots, sidewalks, location of utilities, etc.

7) A receipt shall be given for all material submitted. The Planning Council will not receive or consider any map unless submitted in conformity with these regulations.

E. ADMINISTRATION

The POWER bestowed unto the planning councils to control private property is derived from Article 81 of the Legislative Decree No. 61/LE (Aug. 30, 1940) concerning building development in Lebanon.

This article states that all contraventions made against the present regulations (referred to in the same decree) and against any texts for their application shall be controlled by the agents of the municipal police, the commissioners and agents of police, the gendarme, all sworn agents of the Public Works, or technical municipal offices, and in general by all qualified and sworn agents.

The PENALTY for any contravention shall be levied by competent courts and collected in the same manner as government taxes.

All DISPUTES between the owners and the Central Planning Council shall be referred to competent courts and settled in conformity with the Code of Civil Law.

C H A P T E R V

SUGGESTED RULES FOR LAND SUBDIVISION IN LEBANON

THESE RULES ARE BASED ON THE PREVIOUS DISCUSSION AND ARE PREPARED SIMILAR TO THOSE PREPARED BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

CHAPTER V

SUGGESTED RULES FOR LAND SUBDIVISION IN LEBANON

A. GENERAL

1) No subdivision shall be undertaken in any locality that has not been declared yet subject to town planning development.

2) The subdivision shall be in accordance and conformity with the schemes prepared by the Central Planning Council for the development of the locality and shall provide for all previously platted features.

3) A preliminary plat (scale 1 to 1000 or less) shall be prepared in conformity with the rules and regulations listed below.

4) This preliminary plat shall be submitted to the Municipal Planning Council two weeks before its meeting with a written application for its approval. The original plat shall be included together with seven copies or blueprints.

5) A vicinity sketch (scale 1 to 5000 or less) shall be submitted with the preliminary plat showing the location of the subdivision with relation to its neighborhood, and any existing or platted town planning features that might have some bearing on the nature of the subdivision.

6) Shall be included also, longitudinal sections (profiles) of all roads with tentative grades (scale: Horizontal ^{1 to 1000} upon ~~the~~ ~~natural slope.~~) or less; vertical 1 to 100, to 1 to 200 depending upon the natural slope.)

7) Shall be included also cross-sections of all streets at adequate intervals and to a proper scale showing the roadway, the sidewalks, green plots, location of underground utilities, etc.

8) This application for tentative approval shall be submitted subsequent to the preliminary surveys and prior to the location surveys.

9) Thoroughfares, railroads, super-highways and any such broadly related city planning features should be located first and local streets, blocks, and lots laid down in conformity with them.

10) The street pattern shall be adequate to provide for free circulation safely and yet economically.

11) The blocks and lots resulting from any subdivision should be of practical usable size and shape.

12) One and only one principal building shall be allowed on any one lot.

13) The width of a block shall be sufficient to accommodate for two tiers of blocks (and for utility easements, if any).

14) Blocks shall not exceed 400 to 600 M. in length.

15) Double-frontage shall be avoided.

16) Dead-end streets shall not exceed 100 to 200 M. in length.

17) Crosswalks shall be provided at the center and entirely across blocks that exceed 200 M. in length.

18) The minimum rights-of-way for road shall be:

- 26 M. for international highways
- 16 M. for secondary highways
- 12 M. for local roads
- 6 M. for dead-end streets
- 6 M. for alleys
- 1.5 M. for crosswalks.

19) All dead-end streets shall terminate in a paved turning circle with an outside diameter of at least 16 M., and a traffic island of at least 5 M. diameter.

- 20) The minimum roadway widths shall be
- 18 M. for international highways
 - 12 M. for secondary highways
 - 6 M. for local roads
 - 4.5 M. for dead-end streets
 - 3 M. for alleys.

21) Sidewalks shall be provided on both sides of each road, and properly paved.

22) These sidewalks can be left unpaved as long as the subdivision remains uninhabited.

23) This maximum grade for roads shall be 6%. In exceptional cases this grade could be exceeded with the following limitations:

For a 10%	grade	maximum	distance	=	125M	preceeded	by	150M	at	4%	grade
" "	9%	"	"	"	=	175M	"	"	"	5%	"
" "	8%	"	"	"	=	250M	"	"	"	6%	"
" "	7%	"	"	"	=	500M	NOTHING				

24) All changes in grade shall be connected by vertical

curves whose length shall be at least equal to 3 to 5 M. times the algebraic difference in grade. The higher value is specified for major thoroughfares, boulevards, parkways and the lower one for secondary and local roads.

25) The clear visibility measured along the centerline shall be at least equal to

100 M for major thoroughfares, boulevards, parkways

60 M for secondary thoroughfares

30 M for local and minor roads

26) The minimum radii of curvature shall be at least equal to

100 M for major thoroughfares, boulevards, parkways

60 M for secondary thoroughfares

30 M for local and minor roads

27) In the open country where higher speeds are desirable the values specified for visibility and radii of curvature in items 25 and 26 shall be increased appreciably.

28) Between two reversed curves there shall be inserted a straight tangent whose length shall be at least equal to 30 M.

29) At the intersection of two local roads the property line at the corner shall be clipped off by a chord whose length shall be 3 to 5 M. and the sidewalk lines clipped off by a chord parallel to it.

At the intersection of two major roads or a minor road and a major road proper traffic islands shall be designed.

30) Lots

a) The size, shape, and orientation of lots shall be appropriate for their location and use.

b) The width of a lot for residential purposes measured at the building line shall be at least equal to 15 M.

c) The depth of a lot for residential purposes shall be from 25 to 45 M.

d) Every lot shall have direct vehicular exit to the street system.

e) No direct vehicular exist to major thoroughfares shall be allowed.

f) Lots shall be approximately perpendicular to the road on which they face.

31) Easements at least 2.50 M wide, 1.25 M on each side of rear or side lot lines shall be provided for utilities, if necessary.

32) Due consideration shall be given to open spaces dedicated for public use, such as parks, playgrounds, schools, etc. The percentage of the total area dedicated for public use shall be at least equal to 10% of the total platted area.

33) Where the subdivision is less than 10 hectares, the land dedicated for public use shall be combined with similar adjoining dedications.

B. THE PRELIMINARY PLAT

1) the preliminary plat shall be prepared in conformity with the above-mentioned regulations and will contain

- a) proposed name of the subdivision
- b) northpoint, scale, date
- c) exact boundaries of the subdivision to scale

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d) adjacent subdivisions or premises with names, names of owners, and approximate areas.

e) name of owner and subdivider and their addresses

f) existing sewers, watermains, culverts, or transmission lines with their location, size, and grade.

g) proposed sewers, watermains, culverts, or transmission lines with their location, size, and grade.

h) The street system and how and where it will connect to the present existing streets.

i) names, widths, and grades of all streets

j) lots dedicated for public use together with all conditions and limitations imposed by the subdivider.

k) one meter contours

l) the proposed name of the subdivision and streets therein shall neither duplicate nor approximate phonetically any ^{names} ~~means~~ of subdivisions or streets in the locality.

2) Tentative approval

a) The tentative approval of the subdivision is revocable at any time.

b) Tentative approval will be effective for only one year, unless the period is prolonged by the Municipal Planning Council. Subdivisions the final plat of which is not submitted within this period shall be considered annulled and treated like new subdivisions.

c) Upon tentative approval, the Municipal Planning Council will forward to the subdivider one copy of the preliminary plat signed, stamped, dated, and approved.

C. THE FINAL PLAT

1) The final plat shall be prepared in conformity with the above-mentioned regulations and shall be submitted within the prescribed delay to the Municipal Planning Council for final approval.

2) The original drawing and seven copies or blueprints are required.

3) The final plat shall be drawn to a scale of 1 to 1000 or less and shall show

- a) proposed name of the subdivision and its location
- b) north point, scale, date
- c) names and addresses of the owner and the subdivider
- d) the boundary lines with exact distances and bearings
- e) the exact location and widths of all streets existing

or platted, that intersect the boundary

f) the bearings and elevations shall be carried to the nearest bench-marks, monuments, or triangulation stations

g) the exact layout of the subdivision indicating: street and road names, widths, and grades, the length of all arcs, radii of curvature, internal angles, points of curvature, lengths and bearings of tangents.

All lot sides with lengths correct to the millimeter, bearings correct to ten seconds, and lot numbers.

The exact boundaries of all lots dedicated for public use with the limitations and purpose imposed thereon.

The setback and building lines.

The sewer system, water distribution, and power trans-

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mission lines with exact location, size, and grade.

One-meter contours.

All existing monuments, benchmarks, or triangulation stations.

h) together with the final plat the subdivider shall include the certification of the land registry (cadastre) to the effect that the indicated monuments, benchmarks, or triangulation stations are in their exact position and their characteristics correctly indicated.

i) the subdivision^{der} shall include also copies of contracts (if any) between him and any person (real or artificial) for the supply or development of any utility item for the subdivision.

j) the subdivision^{der} shall also include a written statement that all saleable lots shall have exactly the same dimensions and location as shown in the final plat.

k) If approved, a copy of the final plat shall be sent by the Municipal Planning Council to the land registry office.

l) The subdivider or his agent shall register the subdivision in the land registry office within ten days of the notification of the final approval, unless he gets a special permission for delay, otherwise the approval shall be considered annulled.

m) The subdivider shall be allowed to proceed with his location surveys from the moment of the notification of the final approval.

n) The final approval is revocable at any time.

D. CHANGES

Whereas these regulations should be conformed with almost always, the planning councils will have the liberty to modify any item, if it can be shown that extraordinary hardships arise in the way of strict compliance with it, provided that

- 1) The public interest is not sacrificed
- 2) Proper traffic facilities are provided

and 3) Provision for free circulation, light, air, and recreational facilities is made for the maximum anticipated population.

B I B L I O G R A P H Y

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TOWN PLANNING AND ROAD TRAFFIC

ADAMS THE DESIGN OF RESIDENTIAL AREAS

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