REGIONAL AND TOWN PLANNING

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IN PRINCIPLE AND PRACTICE

BY

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PREFACE

THIS book is based on a wide research and on the author's practical experience of the planning of towns * and regions, and of the design and construction of railways and roads, water supply and drainage, harbour and other public works. He has gained this experience at home and also abroad as an official in tropical and sub-tropical countries. It is also based on the author's thesis for the degree of Doctor of Philosophy in the Faculty of Engineering of the University of Glasgow, entitled "The Wider Applications of the Principles of Town Planning (Regional, National, and International Development Planning)."

The technical and economic aspects of development problems are examined, and an attempt is made to enunciate the underlying principles of planning and to show their application to towns and to regions, in the first place to the simplest case, that is, undeveloped territory; afterwards the modifications which may be necessary to deal with more or less developed regions are considered. The application of the same principles to planning on the larger national, imperial, or international scales is also dealt with. It is shown that one of the primary objects of planning on any scale is to establish an economic programme or policy of development based on a comprehensive and co-ordinated study of all the relative factors; and this generally means the striking of a balance of the considerations due to various, and perhaps conflicting, interests.

In its original form some of the material in the book was given by the author as a course of advanced lectures in town planning for the University of London in 1927.

References to and extracts from various books, government publications, reviews and newspapers are given throughout the text, and the author would now make due acknowledgment of them as well as of some of the illustrations, for the reproduction of which permission has been so kindly granted.

* The author planned the City of Khartoum (under the personal direction of the late Lord Kitchener), the City of Jerusalem (the scheme for which was officially approved by Lord Allenby), and the City of Alexandria.

It is hoped that the book may be useful to those engaged in the central and local government work of regional and town planning, as well as to students of the subject, and that it may also serve to widen the general interest in co-ordinated planning for the development of either towns, regions, or countries. The appendices and the bibliography of publications relating to this special study should add to the value of the book as a work of reference.

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Drimard, Dunoon,
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CONTENTS

PAGE

Preface v
List of Appendices ix
List of Illustrations xi

INTRODUCTORY

Definition of Planning 1
The Necessity for Development Planning 1
The Scope of the Study 6

GENERAL CONCLUSIONS

A General Statement of Principle (Town Planning) 8
Regional and National Planning 8
International Planning 10
General Remarks 12

PART I—THE UNIT OF PLANNING

Geographical or Physical Unit 13
Political Unit 14
Administrative Unit 14
Economic Unit 14
Commercial and Industrial Unit (Mineral and Agricultural) . . . 15
Unit of Community of Interest 15
Units of Town and Country 15
Regional Unit 16
National (and Imperial) Unit 16
International Unit 16
Limiting Size of a Unit 17

PART II—THE SURVEY

PAGE

The Survey 20
Population 23
Communications and Transport 28
Sea Ports and Harbours 29
Navigable Rivers and Canals 32
Railways 33
Roads 35
Transport Development in the Colonies (The Colonial Conference) . 36
Air Ports 40
Electricity for Lighting and Power 41
Commerce and Industry (Zones) 42
Minerals 45
Agriculture 46
Water Supplies for Towns and Power 50
Drainage (Town and Land) 53
Housing 56
Open Spaces 57
Examples of Surveys 58

PART III—THE PLAN

Town Planning 60
City of Alexandria Town Planning Scheme 60
City of Jerusalem Town Planning Scheme 63
City of Khartoum Development Plan 67
Schemes for the Provisional Towns of Egypt 71
A Comparison with Practice in England 74
Regional and National Development Planning 74
Regional and National Planning: their Relation to Town Planning . 74
Proposed National Development Planning Scheme for Scotland. . 74
National Development Planning in England and U.S.A. . . . 79
The National and Regional Development Planning Scheme for Egypt 81
Khartoum Province Regional Planning 85
Planning Schemes for Colonies (Undeveloped and Partially Developed Territories) 85
Principles of Planning 86
Preparation of the Scheme 92
(*a*) The Survey 92
(*b*) The Plan 94

Regional and National Development Planning—continued. PAGE
Regional Planning of Lands in Canada 95
The Planning of Australia 98
U.S.A. " Nation Plan " (Proposed by Mr. Cyrus Kehr) . . . 99
Imperial Development Planning 100
Suggested Scheme 102
The Imperial Conference 105
International Development Planning. 106
Suggested Scheme 106
World Plan proposed by Mr. Cyrus Kehr 107
The League of Nations 107
The Dutch-Belgian Treaty 109

PART IV—THE APPLICATION OF THE PLAN

The Utility of Regional, National, and International Plans . . . 112
Town Planning Procedure in Egypt, Palestine, and the Sudan . . 113
The Egyptian Laws of Alignments and Expropriation . . . 113
The Alexandria Building and Town Planning Regulations . . 114
The Development of Unbuilt Areas 116
The Improvement and Re-development of Built Areas . . . 117
Valuations—Betterment 119
The Jerusalem Town Planning Scheme Regulations . . . 120
The Khartoum Building and Town Planning Regulations . . 121
A Comparison with Procedure in England 122

LIST OF APPENDICES

I.—The National and Regional Development Planning Scheme for Egypt—List of Information for the " Survey " required from Various Government Departments 123
II.—Municipality of Alexandria—Building Regulations (translation) . 125
III.—Municipality of Alexandria—Regulation adding Certain Town-Planning Clauses 127
IV.—Form for Valuation of Land and Buildings to be expropriated—Egypt (translation) 128
V.—Jerusalem Town-Planning Scheme—Special Conditions for Building Permits 129
VI.—Khartoum Building Regulations (extracts) 130

VII.—List of Publications Consulted :— PAGE

Technical 133
Economic 134
Geographical 135
General 136
Publications by the author 136

INDEX 139

LIST OF ILLUSTRATIONS

FIG.				PAGE
1.	Population Curve for the Total New York Region			25
2.	Diagram illustrating the Law of Diminishing Returns			47
3.	City of Alexandria Town Planning Scheme—Plan of Ancient Alexandria		(facing)	60
4.	Do.	General Plan of Scheme	,,	60
5.	Do.	Boulevard and " Place " of the Mosques—Plan	,,	62
6.	Do.	Do. Do. View	,,	62
7.	Do.	The Station " Place "—Plan	,,	62
8.	Do.	Do. View	,,	62
9.	Do.	The " Place " of the Obelisks—Plan	,,	62
10.	Do.	Do. View	,,	62
11.	Do.	Details of Avenues, Streets, and Canals	,,	62
12.	Do.	Housing Scheme—Slum Clearance—Plan	,,	62
13.	City of Jerusalem Town Planning Scheme—View of Damascus Gate showing Shops which hide the Old Wall		(facing)	64
14.	Do.	Jaffa Gate showing Shops which hide the Old Wall	,,	64
15.	Do.	View from Old City of the Kedron Valley, Mount of Olives, and Gethsemane	(facing)	64
16.	Do.	View of Old City (Herod's Gate) and the Mount of Olives from Gordon's Calvary	(facing)	64
17.	Do.	General Plan (endorsed by Lord Allenby)	,,	66
18.	Do.	View of City from Mount of Olives	,,	66
19.	Do.	Detail at Jaffa Gate and Street Sections—Plan	,,	66
20.	Do.	The " Via Dolorosa "	,,	66
21.	City of Khartoum—Old and New—The 1910 Town Planning Conference Exhibit		(facing)	68
22.	Do.	Development Plan (prepared under the personal direction of the late Lord Kitchener by the author)	(facing)	70
23.	Do.	View taken from the Air	,,	72
24.	Typical Small Town in Egypt—Plan showing the Initial Principal Improvements		(facing)	72

FIG. PAGE

25. National Development Planning Scheme for Scotland—Diagram showing Relation between National, Regional, and Town Planning 75
26. Do. Diagram of the Scheme 78
27. National and Regional Planning Scheme for Egypt—Diagram of the Scheme 81
28. Do. Map of Regions 82
29. Do. Diagrams of Assumed Programme 83
30. Regional Development Planning of Colonies—Diagram showing an Ideal Lay-out of Communications (Inter-Regional) . 87
31. Do. Diagram showing an Ideal Lay-out of Towns and Communications (Regional). 88
32. Do. Diagram showing Areas to be reserved for Towns and Communications 91
33. Regional Development Plan of Lands in Alberta, Canada . . . 96
34. Diagram illustrating the Relation of Imperial, National, and Regional Development Planning 101
35. Imperial Development Planning—Diagram of Suggested Scheme . 103
36. Do. Imperial Air Routes projected—Map . . . 104
37. The Dutch-Belgian Treaty—Map of Proposed Canals . . . 109
38. Detail Plan of Street Improvement Work (Egypt) 119

REGIONAL AND TOWN PLANNING IN PRINCIPLE AND PRACTICE

INTRODUCTORY

DEFINITION OF PLANNING.—The science of planning is not an exact one, for, like economics, it deals with probabilities and tendencies based on observation of the past, from which certain broad principles can be deduced, and lines laid down, to guide and co-ordinate the future development of countries and regions as well as of towns.

The term " town planning " is much used to denote all stages or spheres of the work, and this is probably because the science began with the problem of the towns ; but one has adopted the term " development planning," as it appears to be a convenient general term to use in dealing with the wider spheres of work.

THE NECESSITY FOR DEVELOPMENT PLANNING.—Systematic planning for the future development of a country, and of its towns, is becoming recognised as an important factor in promoting the prosperity and health of the inhabitants and in conducing to progress on economic and approved lines.

Those who have been called upon to deal with the future growth of a city have found that, besides the usual civic survey, there is the necessity for a wider study of the regions beyond its boundaries which may contribute materially to, and may even determine, the future progress of the city.

It is now found that the survey of the region, and the planning scheme resulting from it, must be linked up with adjoining regional schemes ; and that they all probably contain elements of larger issues which are national in character, so that a national survey and scheme are evidently necessary to co-ordinate the regions which are embraced in the national economic unit.

The consideration of the national aspect may, it is thought, lead to the necessity of taking into account international questions which should

be co-ordinated. This is not so evident, perhaps, in an island like Great Britain as it is in countries where the frontiers are often merely arbitrary imaginary lines having no reference to physical or natural boundaries.

The necessity for planning has been indicated from many points of view by workers in various fields. From many sources which have been noted the following are quoted as being typical.

Dean Inge, delivering the Norman Lockyer Lecture on Scientific Ethics in London in 1927, is reported * to have said :

> "Within the last 150 years we have been committing a new crime. We have been utterly defacing the surface of the planet, ravaging its natural resources, destroying some beautiful species which, once gone, can never be replaced, and generally behaving like ill-conditioned savages. The vulgarity of the modern town discharges itself over the whole country. Hideous allotments and bungaloid growths make the approaches to any city repulsive, and what can we say of the reckless expenditure of coal and oil for the benefit of our spendthrift present generation? The approaching failure of the petroleum supplies will bring about great changes. . . .
>
> "It seems to me that science ought to advocate a return to much simpler conditions. A happy and healthy country would be inhabited—much more sparsely than England is at present—by a population mainly agricultural, with small towns well supplied with schools, colleges, and laboratories."

The foregoing may be an exaggeration, but there is a certain element of truth in it. By planning for the future we can probably prevent things from getting worse, and can, at least, attempt to make them better for future generations.

With regard to Scotland, the technical and economic papers, referred to in the text, on the proposed Mid-Scotland Canal, point out the reasons why the curve of industrial progress, which would affect all planning, may already be pointing downwards, while, again, the resolution taken by the Glasgow Chamber of Commerce to undertake research in this field shows that the matter is of immediate practical importance. The resolution taken at a meeting on September 19, 1927, is as follows :—

> "The directors remit to the Home Affairs Committee to make such inquiry as they deem to be necessary into the position of trade

* *The Glasgow Herald*, November 22, 1927.

> and industry in Glasgow and the West of Scotland, and into the possibility of stimulating it and of broadening its basis; and also to consider what means can be taken to bring before the general public the advantages of Glasgow as a manufacturing and trading city and a place suitable for the initiation and expansion of industrial and business enterprises; to appoint a sub-committee if so desired, and to report."

Another reference to the need for planning, especially on a national scale, is contained in a speech by the Minister of Health in October, 1927, at Manchester, in which he is reported * to have said:

> "Those who had worked at town planning and who saw what it might mean to the future, would not be content until every square inch of the country, from Land's End to John o' Groat's was the subject of town planning of some kind or another."

In May, 1925, in the House of Lords, the Earl of Balfour outlined a great scheme for the co-ordination of development throughout the British Empire, and the proceedings of the Imperial Conference in 1926, and of the Colonial Conference in 1927, to which references are made in the text, show the desirability of co-ordination in planning. Much, of course, is already being done.

The international aspect is put forward in a review † of the economic situation throughout the world by Sir Arthur Salter, head of the Economic Section of the League of Nations, who wrote that:

> "The main facts of the economic situation can indeed be very simply stated. The general level of prosperity depends on three essential factors: the resources of Nature; man's capacity to exploit them; and the existence of a system which enables the products of one person and one country to be exchanged with those of others. The first of these—the resources of Nature—have not diminished, and are adequate; the second—man's skill to exploit them—is constantly increasing, and is sufficient for a much greater prosperity than we enjoy; the third alone has had a setback. There are more impediments to international trade."

All these factors have an interest for the planner. They embrace, for example, international communications by land, water, and air, and the problems of developing and exploiting them on an economic basis.

* *The Morning Post*, October 18, 1927.
† An article by Sir Arthur Salter in the *Radio Times* of November 4, 1927.

Amongst the resolutions regarding "rationalisation," adopted at the International Economic Conference in 1927, were some which aimed:

"(1) At avoiding waste of raw materials and power;
"(2) At simplifying the distribution of goods;
"(3) At avoiding in distribution unnecessary transport, . . ."

The above is quoted from an official report * in which it is explained that by rationalisation "we understand the methods of technique and of organisation designed to secure the minimum waste of either effort or material."

The foregoing references deal principally with the necessity for planning, from an economic and sociological point of view, considered in its wider applications. The following has been selected as stating the technical aspect of what is involved, with special reference to planning regionally. It is taken from a paper † by Professor Abercrombie, in 1924, and one suggests that it is applicable to planning in general even on a national scale. He said:

> "Finally, it must be clearly stated that regional planning, at any rate for industrial purposes, is something much more definite than merely extended and combined town planning schemes under the Town Planning Acts. Though not going into so much detail, regional planning schemes must go into aspects quite outside legal town planning. The co-ordination of industry, the attempt to introduce a logical sequence into industrial locations, railway planning and the development of industrial "parks," dock designing and reclamations, and many other means of encouraging industrial expansion must be explored and the results embodied in the plan."

That the necessity for planning appears to have been recognised in the past, but unfortunately neglected, is well illustrated by the development of railways in this country, regarding which Mr. Trench, in his Presidential Address‡ to the Institution of Civil Engineers, in 1927, said:

> "The success of the Liverpool and Manchester Railway, opened in 1830, led to the promotion of railways all over the country. No general scheme of railway communication was ever formulated, and numerous disconnected railways were constructed to meet local

* *The Monthly Summary of the League of Nations*, dated June 15, 1927 (published by the League).
† *Planning Industrial Regions*, by Professor P. Abercrombie, M.A., F.R.I.B.A., P.P.T.P.I., at the Town Planning Institute Conference in 1924.
‡ Abstract of the Inst.C.E. Presidential Address in 1927, by Mr. E. F. C. Trench, C.B.E., M.A., B.A.I.

needs. Parliament was strenuously opposed to railway amalgamations, and encouragement was given to the construction of competing lines. However, in 1844 a Select Committee, presided over by Mr. Gladstone, declared that 'each new line should be viewed as a member of a great system of communication.' In accordance with the recommendations of that Committee, a special department of the Board of Trade was set up to report upon all railway Bills. Although some reports were made, the Government decided in the following year to leave railway Bills to the judgment of the Private Bills Committee.

"As the need for through services grew insistent, short and isolated railways began to coalesce; and despite the opposition of Parliament the first trunk lines were built up."

A further instance of the necessity for survey and planning work, on the broadest possible basis, is illustrated in an article * on a Report by the Imperial Shipping Committee issued in 1926, which said:

"There were many instances scattered over the world of port facilities provided by land authorities which had never attracted enough shipping to justify their construction. It was not sufficient to obtain statistics of the trade which might go through the port and the report of a consulting engineer as to the local conditions and the works required. In every case the matter should also be looked at from a broader standpoint, and there should be consultation with those whose business it was to consider the economics of shipping on the ocean."

The foregoing aspect appears to be just as important as the probably more obvious, but often neglected, necessity of planning the port development to accord with any neighbouring town and regional planning schemes.

As a final illustration of the desirability of comprehensive planning, from a technical point of view, one would refer to the Colonial Office report on West Africa,† by Mr. Ormsby Gore, in which he stated that:

"The development of Africa depends so largely on the extension of transport facilities that transport problems are of primary importance. . . . One of the first duties of all Governments in Africa is to plan and execute a continuous programme of transport development. Such a plan must be comprehensive. By this I mean that there must be no question of water transport, railway transport,

* Report by The Imperial Shipping Committee in 1926, article in *The Glasgow Herald* of July 28, 1926.

† Report by The Hon. W. G. A. Ormsby Gore, M.P. (Parliamentary Under-Secretary of State for the Colonies), on his visit to West Africa during the year 1926. H.M. Stationery Office.

> and road transport being regarded as watertight compartments. All three systems must be evisaged as one whole, and all must be based upon the sea."

A philosophical statement of the necessity for survey and planning work is contained in a treatise on Economics * by Mr. W. J. Weston, who says :

> "However laboriously we accumulate facts in order to form a judgment, however carefully we check our reasonings, we may be wrong in our deductions. For in this infinitely complicated society of ours we can never be quite certain that we have at our disposal all the material facts. A little disregarded circumstance may upset all our calculations. That, to be sure, is not a reason for making no calculations at all; it is, on the contrary, however, a very strong reason for trying to obtain command of a sufficient basis for our calculations."

THE SCOPE OF THE STUDY.—The scope of this study embraces, amongst others, such subjects as population, communications and transport, commerce and industry (minerals and agriculture), and the public services (water, light, and power supplies). For example, a trunk road, forming part of a proposed national system, which passes through a region or regions, would materially affect the planning of these regions, and, again, a national project like the suggested Mid-Scotland Canal from the Forth to the Clyde, already referred to, would vitally affect the development planning of several regions and of many towns ; and so would the opening-up of new coalfields or the working-out of existing ones.

It is evident, therefore, that to gain even an approximate idea of the future requirements of towns, which contain the greater part of the population in most countries and are the centres of development, it is necessary to make a wide study in directions which, at first sight, may not appear to have much to do with towns ; and that this should embrace the entire economic unit, that is, usually, the whole country. It is also evident that the results would be of a greater use to the community than merely the planning of their towns, for they would serve to guide and co-ordinate development in many other directions, and assist in making clear the whole economic position.

The natural sequence of town-planning work has been adopted in the following investigations, viz. the consideration of the " unit of planning," the " survey," the " plan," and the " application of the plan."

* *Economics for Business Men*, by W. J. Weston, M.A., B.Sc. Pitman, London, 1924.

Many Schemes and Reports have been examined and some of these are referred to throughout the text, but, as illustrations, the author has selected some of the planning schemes and works for which he has been responsible in practice. In dealing with the wider aspects, the National and Regional Scheme for Egypt, the proposed National Scheme for Scotland, as well as Schemes for the Colonies are described; and, considering the very widest application of planning, a reference is made to suggestions for Imperial and International Development Planning, which are studies not less desirable, but admittedly more difficult, than the narrower and more obviously necessary National, Regional, and Town Planning Schemes. Economic pressure, however, has already necessitated a consideration of planning on this vast scale. In dealing with Town Planning, special references are made to the interesting and historic Schemes for the protection of the City of Jerusalem, and for the development and improvement of Alexandria and of Khartoum; while, with reference to the practical application of Regional and Town Planning Schemes, the laws and methods of procedure in Egypt, Palestine, and the Sudan are examined and compared, more especially the laws relating to the improvement and redevelopment of built or "slum" areas, which is a matter much exercising local authorities in England, and legislation is being demanded to deal with this difficult and important matter. With regard to the "Survey" and its scope, references are made to regional schemes of water and light supplies and other public services.

Modern geography and economics would appear to be of great assistance to the planner not only in the "survey" but also in the work of "planning." As these sciences deal with existing conditions and the causes which have produced them, it is evident that they can usefully join hands with the science of planning for future development.

It has been necessary, therefore, to pursue a wide and varied course of reading with regard to many subjects which, in some aspect or phase, have a bearing on the subject of study, to note and compare the points of application, and from this to draw conclusions. References to, and extracts from, certain documents are made throughout the text, and a list of all the principal works consulted is contained in Appendix VII. It will be noted that these comprise Town, Regional, and National Planning Schemes, Government Reports, including those of the Imperial and Colonial Conferences, the publications of the League of Nations, books on town planning, economics, geography and sociology, technical journals, reviews, and newspapers.

GENERAL CONCLUSIONS

Throughout the text various conclusions are given, but the author thought it well to make the following statement of the general results of his investigations.

A GENERAL STATEMENT OF PRINCIPLE (TOWN PLANNING).—A statement of the principle and purpose of town planning on the most general lines, which, it is thought, might be applied equally to the wider spheres of regional, national, and international planning, would appear to be the following:

> The preparation of a plan or scheme of co-ordinated development and conservation with regard to the land in, and the natural resources of, any given unit (urban, regional, national, or international), so that future progress may be guided along economic lines, and in the best interest of the inhabitants; it being understood that all such plans or schemes are tentative in varying degree, and subject to revision and modification as necessity demands, or as conditions change and experience indicates.
>
> One of the primary objects of planning on any scale is to establish an economic programme or policy of development based on a comprehensive and co-ordinated study of all the relative factors; and this generally means the striking of a balance of the considerations due to various and perhaps conflicting interests.
>
> Co-ordination, in the planning sense, might be said to mean the elimination or adjustment of proposals found to be mutually destructive, conflicting, or uneconomic as a result of a comparative study of all the schemes or factors affecting development.

REGIONAL AND NATIONAL PLANNING.—The study of development planning should begin on broad lines with the requirements of a country as a whole, before regard is paid to the consideration of the needs of the regions into which the country may be naturally divided. The detail planning of towns, communications, and other branches of development should follow this general study.

In dealing with the regional and national aspect of any problem of development and its relation to other problems the wide view obtained will show essential modifications which are not obvious when a purely local need, or when only one class of development, is considered. The national scheme would include any provisions which may be necessary for the benefit of the country or community as a whole, and these provisions should be considered along with the special requirements of any region or

section of the country. It is the case that nearly all branches of development are interdependent in some measure, so that it is necessary, therefore, to study and co-ordinate them as far as possible.

The necessity for planning, from various points of view, has been duly examined. It may be objected that it is difficult, if not practically impossible, to estimate and provide even tentatively, for all the requirements of a future period; but it must be admitted that, even if a prearranged scheme is found to require modification and revision in the future, the results are bound to be better than haphazard development with its uneconomic consequences.

As an illustration of this, take the simple and common case of a main road which has been built up and is too narrow for present-day traffic. A little foresight a few years ago might have obviated the costly expropriation now required to widen the road. The same results occur, although not always so obviously, in other branches of development, such as in the lack of provision for the needs of a growing population in regard to transport, water supply, drainage, open spaces, and the requirements of industry, more especially as to suitable zones. The development of a harbour without reference to the interests and growth of the town connected with it is another example which, as described in the text, sometimes occurs to illustrate the need for comprehensive planning. A town cannot be planned on a proper basis unless a survey and scheme is made for the development of the region which surrounds it and contributes to its progress. The information thus obtained will indicate what development of the town is possible and probable, and how it may occur.

In a country like Great Britain, where the stage of development is advanced, changes are usually comparatively gradual, and, in general, they can be traced to such things as, say, the discovery of coal or the advent of more efficient means of transport like railways or the motor.

In countries where development is not advanced, as in parts of Africa, when large undertakings are carried out, such as railways, roads, or irrigation works, their comparatively sudden introduction seems usually to change the whole economic life of the region and to entail many other problems of development which need to be considered at the same time. For example, the construction of the great irrigation works in Egypt and in the Sudan, and also the construction of the railways and roads there and in other parts of Africa, has had this effect, and the standard of living of the people has been raised comparatively rapidly. In Egypt, for instance, where, until recently, the general conditions throughout the country were

somewhat primitive, most of the towns have now got good water supplies and some have electric light; the people have acquired the habit of travel, and the motor omnibus is now largely used between the villages and the towns.

Whether development be slow or fast, it is evidently essential that all phases should be planned in advance, so far as possible, on the understanding, of course, that the scheme is to some extent tentative, as unforeseen circumstances may necessitate its revision at some future time.

In England, owing apparently to the restrictions imposed by the system of local government, it has been necessary to follow the admittedly illogical course of beginning with the detail—that is, town planning—and working up to the general framework—that is, regional planning; and now, it seems, the desirability of national planning is becoming recognised.

A regional planning scheme having been completed, its immediate utility, as has already been mentioned, is to provide information for the preparation of the various town-planning schemes within the region. It will assist in determining the extent and nature of the development which may be expected, the provisions necessary for future traffic, the zones for various uses, the open spaces, and other matters which form the basis of the town-planning schemes.

It is evident that the regional schemes may also provide valuable information for other purposes, such as the development of industries and the planning of communications and the public services (water, drainage, light and power, hospitals, schools, etc.). Development in certain directions seems to be often retarded owing to a lack of information as to what is possible or probable in other directions.

In England at present there is no legislation concerning regional planning, and it is entirely voluntary on the part of a local authority to join any group undertaking it. Town planning, on the other hand, is now well provided for by legislation, except in the matter of re-planning built areas, regarding which further powers are urgently needed. In Egypt, Palestine, and the Sudan, from which countries examples have been referred to in the text, the existing laws and other conditions are helpful in the work of planning on either a town, regional, or national scale.

INTERNATIONAL PLANNING.—Two hundred years ago communities could live by themselves and their politics were those of the village pump. Nowadays, owing apparently to improved communications by land, water, and air, all the world is rapidly becoming so interdependent that the happenings in any one country probably have repercussions in

others. For example, according to Mr. Kingsley Martin, the bobbing of women's hair in Europe has ruined large numbers of Chinese workmen who used to make the now discarded hair-nets. The extreme national view of things is often opposed to international dependence, but it already appears to be evident that this limited view is, in many things, no more practicable than a return to the days when each tribe or town produced everything necessary for its own consumption. Economic science seems now to have established that it is in the mutual interest to co-operate on an international scale, and that all waste in the form of unnecessary duplication or restriction of transport facilities, or of retarded development of natural resources and other matters, is to be avoided.

For example, a uselessly competing railway, port, or road may appear to be good for a certain section of people for a time, but it may result in a bad thing, economically, for everybody in the long run. Again, a frontier many sterilise, or make for uneconomic development in, a large area of country both along and behind the frontier line. Some of the recently fixed European frontiers, it appears, cross and re-cross the existing railways, and the League of Nations has been instrumental in making working arrangements in some of these cases. It is reasonable to assume that had the frontiers in question been in existence before the railways, uneconomic location or alignment would have had to be adopted in their construction, or some of these railways might never have been built at all, to the great detriment of the areas now served by them.

One of the worst cases is where the frontier is the centre line of a navigable river. This may result in stagnation owing to disagreement between the countries concerned in the joint control as to how each bank is to be developed for trade and traffic purposes. Another example is the old frontier between Italy and Austria, which prevented the former country from utilising the water power in the Dolomite mountains for the development of her industries in the Plains, and relatively expensive foreign coal had to be used therefore. The recent change in this frontier, however, seems now to have enabled Italy to utilise this source of power supply.

Co-operation and co-ordination internationally, in certain directions and not only at the frontiers, appears, therefore, to be essential in order to obtain the maximum technical and economic advantage in the planning and execution of development. The view of officials at the League of Nations, to whom the Author submitted at Geneva a memorandum on the subject for the International Economic Conference in 1926, is that the foregoing will be fully recognised in time, but, with regard to

Europe, the question of frontiers is still too strong to admit of much general co-ordination.

GENERAL REMARKS.—It has been noted that the difficulties of co-ordinated planning are increased by Governments and their departments tending to work in watertight compartments, and by local authorities often taking a somewhat parochial view of their duties. Economic pressure and public opinion, however, appear to be gradually changing this, and the value of the work as an aid to the solution of many problems of the day is becoming recognised. If any objections to planning can be advanced, it is evident that they are neither technical, economic, nor logical objections.

It is suggested that it might be worth while, in some cases, to prepare an ideal scheme of planning, from a technical and economic standpoint, and that this scheme could then be modified, if necessary, to allow for what might be termed the human factor. The value of such a scheme might be that any departure from it could be measured and balanced against the gain or satisfaction by admitting the human or political factor.

It is the absence of co-ordinated planning schemes that makes it difficult for Parliamentary Bill Committees to decide, on evidence, the merits of any project for the construction of railways, harbours, water supplies, or the extension of local government boundaries. A perusal of the evidence given for and against such Bills, convinces one of this difficulty and of the comparative failure of the expert witness as a guide, as he must fight for his side.

It has been stated that it is difficult to forecast the future, and that therefore the practical utility of development planning is not so great as is claimed; but it is admitted that the alternative of leaving things to develop by chance is much worse, with its uneconomic and deplorable results which may be, perhaps, more obvious in regard to towns, but exist nevertheless in all other branches. It is merely common sense to make a survey of past and existing conditions, and from these to estimate possibilities and tendencies, and from that again to lay down probable general lines of future progress; always on the understanding that it is tentative, in some measure, and subject to revision as conditions change.

Such a study would tell us where development of any particular kind might be expected, and its probable extent, so that provision might be made for it as far as practicable; and it would enable us to take the necessary "bird's-eye" view of the whole, which is a difficult matter when the various branches of development are dealt with separately, for then the "wood" cannot be seen for the "trees."

PART I

THE UNIT OF PLANNING

THE first point which naturally presents itself for consideration is the unit or area which may be adopted for planning purposes. The investigations which follow demonstrate that they are numerous and interdependent, and that the co-ordination provided by a planning scheme is essential.

In the simple case of an individual house and garden it is necessary, for example, to consider access roads to it and to other houses in the neighbourhood; this leads at once to the community unit of the village and town. The towns, again, depend upon the regions which influence them, and these, in turn, are dependent upon the entire country.

With regard to the various applications of planning, an examination of the limits or boundaries of the planning units discloses that these may be *geographical or physical, political, administrative, economic, commercial and industrial* (*mineral and agricultural*), or merely the *limits of a community of interest*, or of *town and country*.

The above-mentioned units are dealt with in Parts II and III, but it is thought that the following short note on each may be useful for purposes of comparison :—

THE GEOGRAPHICAL OR PHYSICAL UNIT.—The first area of planning to be examined is that bounded by natural limits such as the sea, rivers, ranges of mountains, the desert and similar features which tend to delimit or so isolate an area of land that its development can be planned as a whole. This may be termed the geographical or physical unit.

Fig. 28 is a map of Egypt from which it will be seen that the country may be taken, for development planning purposes, as a geographical or physical unit, its boundaries being either sea or open desert which separate it from adjacent countries.

Scotland may be described as a similar unit, except in so far as its southern boundary is not, for planning purposes, an effective physical separation.

THE POLITICAL UNIT.—An examination of the boundaries or frontiers of some countries shows that these appear to have been fixed in a more or less arbitrary manner, for what were probably political reasons to a large extent. Such a country or area can be described for the present purpose as a political unit, and it may be necessary sometimes to adopt these political limits in development planning schemes, despite certain technical-economic disadvantages which perhaps exist.

From a planning point of view one of the best political limits, next to the open sea, would appear to be an imaginary line traversing a desert or waste area where development is unlikely to take place. Referring again to the map of Egypt (Fig. 28) it will be seen that the boundaries of the country fulfil the foregoing conditions being in the open sea and desert.

The boundaries or frontiers between some of the States of Europe, especially as readjusted in recent years, seem to provide unsatisfactory planning limits. This becomes evident in the control and development of any line of communication by water or rail which may be intersected by the frontier. In other cases the recent readjustment appears to be a technical-economic improvement. Further reference is made to this under the head of the International Unit, and also in Parts II and III.

THE ADMINISTRATIVE UNIT.—The limits of an area to be planned may, for administrative reasons, be determined by the boundaries of the administrative units of the country, such as the boundaries of a town or those of a district, or of a whole country or province. Such limits are very often arbitrary and do not conform to any physical or natural boundary.

In a regional scheme, prepared for an administrative unit, this defect may be overcome by co-ordination with any adjacent regional schemes.

THE ECONOMIC UNIT.—The usual economic unit may be stated to be an area within the limits of which the same fiscal system and laws are applicable. The unit would therefore be generally the whole country, the limits being the frontiers. Such an economic unit appears to be often artificial, but this cannot be avoided in the present state of international relations. From the development planning point of view it sometimes has technical-economic objections which are the direct result of the artificial restrictions imposed by the frontier.

Definitions of the ideal economic planning unit suggest themselves, such as, that which is self-supporting, or again, that which it is economic to plan as a whole.

Scotland and Egypt (Fig. 28) might both be considered as examples of units which it would be economic to plan as a whole, but the former is, of course, not a complete economic one.

THE COMMERCIAL AND INDUSTRIAL UNIT (Mineral and Agricultural).—The limits of an area to be planned might be determined by geological conditions and also by commercial and industrial considerations. Such a unit can be defined as the radius of economic influence of, for example, a navigable river, of a coalfield or of a focus of industry.

A commercial and industrial unit which refers to an area where the minerals have an actual or potential commercial value, might be described as a geological unit; and in the same way the term "agricultural unit" might describe an area in which the chief industry is agriculture.

The navigable rivers Clyde and Forth, the industrial belt of central Scotland with its coalfields, and the great agricultural areas to the north and south of this belt, provide examples of all the units referred to.

THE UNIT OF COMMUNITY OF INTEREST.—There is another unit which, it appears, might be adopted for planning purposes, and that is an area in which there exists a community or identity of interest.

This unit of community of interest may, obviously, be the same area as in some of the others described. There is, for example, a community of interest in the commercial and industrial unit as well as in those of the town and the country.

The industrial belt of central Scotland might be taken as an illustration of the unit of community of interest, and so might also the agricultural areas to the north and south. The valley of the Clyde is another example of this.

THE UNITS OF TOWN AND COUNTRY.—It is evident that for the purposes of planning most land might, in general, be divided into units of town and country.

The limits of that of the town might be the administrative boundary of the town, while that of the country might be defined as an area in which country pursuits and interests predominate.

The town unit is that generally adopted in town planning, in its most restricted sense, while the combined areas of town and country form a regional planning unit.

THE REGIONAL UNIT.—Any or all of the units of planning already dealt with may be included in a regional unit. This depends upon the limit fixed for the region, which, for example, may be physical, such as a watershed; geological, such as a coalfield; administrative, such as a county boundary; or it may be a combination of these with any of the other units.

It has been observed that it is generally the insufficiency of the town unit that necessitates the adoption of the regional unit, and, consequently, the taking of the first step in the wider application of the principles of town planning.

References to actual practice in England with regard to regional areas are made in Part II.

THE NATIONAL (AND IMPERIAL) UNIT.—A combination of all or any of the areas already examined may constitute a national unit, which is the second step in the wider application of the principles of town planning.

The map of Egypt (Fig. 28) shows that the regions taken together form the national planning unit, while Fig. 27 is a diagram showing the proposed scheme.

In the same manner it may be said that an Imperial unit consists of the planning units of the countries and territories within the Empire. The Imperial Conference and the Colonial Conference, held in London in 1926 and 1927 respectively, showed the desirability of planning on this scale. The Reports on these Conferences are dealt with in Parts II and III. Fig. 35 is a diagram of a suggested Imperial Scheme, while Fig. 36 is a map of the projected Imperial air communications, which is one phase of development.

THE INTERNATIONAL UNIT.—It is evident that a combination of the national units leads to the international unit. This would embrace the ultimate consideration of many problems of planning, and is the widest application of the principles of town planning.

The necessity for international development planning across frontiers is already recognised in Europe, and, for example, in such matters as communications and transit, the League of Nations has facilitated the establishment of satisfactory and economic arrangements. The Dutch-Belgian Treaty regarding the construction of navigable canals designed to give Antwerp better access to the Rhine (see Fig. 37), and the suggested arrangements between the United States of America and Canada regarding the

improvement of the waterway and the development of the power of the St. Lawrence River between Montreal and the Great Lakes are examples of international planning. The difficulties found in these examples are dealt with in Part III.

Some interesting notes on frontiers have been given by Mr. C. B. Fawcett,* who says that the usual classification of frontiers as "natural" and "artificial" may be better described as "zones of separation" and "zones of intercourse." He remarks that the valleys are the natural units and that if the frontier is along the centre of the river draining the valley, difficulties occur in development later on. He puts it that the ideal frontier is one which minimises all risks of friction and would usually be realised by zones of distinct natural barriers such as the following:

> *Natural frontiers.*—Sea, Desert, Mountains, Forest, Swamp. (Rivers are not good, as shown above.)
>
> *Artificial frontiers.*—(*a*) Pure astronomical lines following a parallel of latitude or a meridian of longitude; (*b*) Geometrical lines (straights connected by circular curves) or lines of reference.

LIMITING SIZE OF A UNIT.—The size of any unit appears to have a direct effect upon its efficiency, so that the element of size is one of importance to the planner. It is suggested that the survey should show whether a unit is efficient, and also whether any growth or addition to it would make it less efficient—that is, whether it has reached its limiting size.

In an article on "The Size of Universities," † Professor Bower said:

> "The size of structures, living or dead, is a factor of prime importance in determining their efficiency. In extreme cases its increase may even reach the limit of the possibility of effective existence. This is true, whether it refer to the mechanical structures of Man, such as bridges, churches, or ships; to the natural growths of organic life as seen in animals or plants; or to the social organisations of Man, including schools and universities. If the materials and the plan of construction remain the same, the difficulties of effective existence increase as the dimensions increase, imposing disabilities which are liable to limit, or finally to preclude success.
>
> "Examples that illustrate this may be taken from living objects: for instance, the gymnastics of a spider would clearly be impossible for an elephant, the underlying cause being that, other things being equal, the mass and weight increase as the cube of the linear dimensions, while the strength increases only as the square. Hence

* *Frontiers.* A Study in Political Geography by C. B. Fawcett. Clarendon Press, 1918.

† "The University of Glasgow," by Emeritus Professor F. O. Bower, Sc.D., F.R.S. Article IX in *The Glasgow Herald* of November 1, 1927.

> the gigantic and lumbering elephant must be supported on straight columnar legs, while the spider moves actively on disproportionately long spindles, placed at angles which appear mechanically ineffective for any but a relatively small body. . . .
>
> "Such effects are not only mechanical but also physiological. The interchange of material throughout the body, which is an essential feature of organic life, becomes an increasingly difficult problem as size increases. . . .
>
> "These facts may be read as an allegory in relation to the growth of human society. The same principle applies not only metaphorically but actually in physical, physiological, and intellectual practice to the social organisations of Man. The larger the social unit the more unwieldy it becomes, and the more difficult it is for any central influence to permeate the whole, so as to reach the ultimate individual. . . .
>
> "But there looms ever nearer in the growing unit, as in the growing organism, whether plant or animal, that point where inefficiency steps in, unless provided against by change of quality of material, or in its use. Sooner or later a drastic change of organisation must be made, unless some gradual adaptation has accompanied the growth."

The materials forming the structure of any unit are therefore important in determining its limiting effective size. A steel bridge reaches its maximum span, beyond which it could not carry its own weight, at some four or five miles, while a wooden bridge would be much less. The social and economic bonds, which are the materials holding a town together, appear to be of simpler elements than those which hold together a unit such as the British Empire.

The limiting size of a town has been variously stated as from 20,000 to 500,000 or 1,000,000 inhabitants. Many reasons have been put forward for such limitations, as, for example, that when the town is too large the cost per head of administration is unduly increased. Too small a town or village unit may also have drawbacks, as, in such a case, it may not be economic to install public services if these do not already exist in the neighbourhood. In a paper to the Manchester Statistical Society,* Dr. Norman MacFadyen

> "suggested that a proper economic unit of town life would be a town of from 30,000 to 50,000 people. He quoted the example of Letchworth, where at the present time the general mortality rate is

* *The Journal of the Town Planning Institute* for September, 1927. Extract from a review of the Paper

> 7·5 per thousand and the infant mortality rate 50 per thousand births. This is better than the figures for the rural districts of the country, which are 11·8 and 62 respectively."

This public health aspect appears to be worthy of attention.

In the case of Glasgow, a survey might disclose that the city is even already too large, and that any additional population would be more efficiently catered for in " satellite " towns.

What is true in the case of a town unit appears to be true, in some measure, of the larger units of planning. For example, the British Empire has been found too large to administer as a single unit, and the Report of the 1926 Imperial Conference, referred to in Parts II and III, shows that the material which holds it together has had to be changed to meet the results of its growth, this change being embodied in the name, " British Commonwealth of Nations."

PART II

THE SURVEY

THE fixing of the area to be treated as a unit for planning purposes is a matter of some difficulty, as has been shown in Part I. A national scheme might be taken as dealing with an economic unit, but the difficulty arises in dividing the country into regions. In this connection Mr. G. L. Pepler, of the Ministry of Health, in a Paper * on "Regional Town Planning," said:

> "It is not easy to say exactly what a unit should comprise. It may have a geographical basis, *e.g.* the Manchester region, which covers the watersheds of the Rivers Mersey and Irwell; it may approximately comprise the sphere of influence of one or more large towns, *e.g.* the Leeds and Bradford region or the London and Home Counties Traffic Advisory Committee, with a radius of 25 miles; it may have a geological basis, *e.g.* the Doncaster, Mansfield, and Kent coalfields; it may approximately represent the radius of influence of a focus of industry, such as a navigable river, *e.g.* the Tyneside and Tees-side regions; or it may represent what Mr. Adams has aptly described as a family of communities. The essential basis is that there should be, or ought to be, community of interest and of purpose.
>
> "Happy the region, such as the Kent coalfield, where most of what exists on the surface is pleasant, so that a start can be made on what is practically a clean sheet. In most regions, however, the pressing need for regional planning arises from the appalling muddle into which things have drifted, and particularly to the intolerable congestion at the centre, which is handicapping industry and business and making life burdensome."

In a Paper on "Regional Planning: The Preliminary Survey," † Professor Abercrombie gave a description of the nature and scope of this subject. The following extracts have been selected from it:

> "Having got your area the survey proper commences. This in its sub-divisions will follow the same lines as the more familiar

* "Regional Town Planning," by G. L. Pepler, F.S.I., P.P.T.P.I., at the Regional Planning Conference in Glasgow, June, 1926.

† "Regional Planning: The Preliminary Survey." A Paper by Professor P. Abercrombie, M.A., F.R.I.B.A., P.P.T.P.I., at the Regional Planning Conference at Birmingham in June, 1927.

Civic Survey of an individual place; but in the case of a Regional Survey it is even more necessary to emphasise that the survey and its framework is to be no procrustean bed to which every area must be forcibly fitted; on the contrary, it must partake more of the character of a chameleon, which preserving its essential principle changes its predominant colour according to its environment. . . .

"The prime consideration for the survey, then, is to seize upon the salient features of the region and allow these to govern the trend of its researches. . . .

"Detailed surveys, also, of individual places should be encouraged; it is quite possible that the regional surveyor, intent upon big things, may overlook small but vital points; or there may be a cumulative effect of small things which become of first-rate determining importance. Village surveys are examples of what I mean: matters of importance to the villager may easily be overlooked by the regional office. . . .

"Closely related to the Village Survey is the Survey of Rural Amenities. This has not been undertaken until recently with as great particularity as it should be. It is not sufficient to be determinded not to spoil the countryside: there must be a real Landscape Survey. . . .

"Allied again to the Landscape Survey, but having a more directly economic object, is the agricultural, or, more properly, the land cultivation survey. There are schemes where this becomes almost the predominate factor in development; for certain crops, fruit, hops, and market-gardening render land almost as valuable as for building—in large parts of Worcestershire and Kent this is the case. The reservation of land for open spaces should largely be based upon this survey, avoiding the highly cultivated places, in relation also, of course, to population requirements and suitability of land surface.

"A study of contours and geological formation is not likely to be neglected in any regional scheme; the variations of the earth's surface affect us in everything we do or try to do, whether it be drainage or roads or building or what not. . . .

"After this our survey is fairly plain sailing: wind and rain need not detain us long and we are ready to plunge into Population, Industry, Open Space, and Traffic."

In dealing with the Preliminary Survey for his proposed "Nation Plan" for the United States of America, Mr. Cyrus Kehr * says:

"Ten years or longer ago, while studying various highway and railway and city questions, I always observed that the particular

* *A Nation Plan—a Basis for Co-ordinated Physical Development of the United States of America with a Suggestion for a World Plan*, by Cyrus Kehr. Oxford University Press New York City, 1926.

matter under consideration was dependent upon other matters territorially outside of it; . . ."

Also, with reference to the same subject, he gives the following extracts from an address by Mr. Herbert Hoover (now President of U.S.A.) before the American Institute of Mining Engineers on August 26, 1920:

> "A problem of even more pressing importance than these is the whole question of transportation. Our inability to move the commodities which we create is stifling production. It is increasing the cost of distribution and has placed a tax on the American people in decreased production and increased cost of distribution greater than all the taxes imposed by the war. . . .
>
> "The time has arrived in our national development when we must have a definite national program in the development of our great engineering problems. Our rail and water transport, our water supplies for irrigation, our reclamation, the provision of future fuel resources, the development and distribution of electrical power, all cry out for some broad-visioned national guidance. We must create a national engineering sense of provision for the nation as a whole. . . .
>
> "The development of our transportation, fuel, power, and water under private initiative has been one of the stimuli that have created the greatness of our people. It has been easy to compass when the problems were more local and filled with speculative profits. There, however, arises a time when this haphazard development must be co-ordinated in order to secure its best results to the nation as a whole. This system has given us a fifty per cent. result; if we are to have one hundred per cent. we must have a national conception and national guidance. . . .
>
> "If in the first instance, through an agency of the central government, we could have adequate study and preparation of plan and method made of these problems of engineering development over the next fifty years, viewed solely in their national aspect, we would have taken the first step toward the adequate provision of an increasing standard of living and a lower cost of living for our descendants."

It is now proposed to examine, in their technical-economic planning aspect, some of the principal phases of development which should be co-ordinated in a general scheme of planning and must therefore be comprised in the survey. These are population, communications and transport, electricity for lighting and power, commerce and industry (including zoning), minerals, agriculture, water supplies for towns and power, drainage (town and land), housing and open spaces.

POPULATION

Population is one of the basic factors of development planning. All the elements which tend to increase or diminish the population must be examined along with the changes in its distribution owing to migration from one region to another, or from the country to the towns. An examination of the census returns over a period will yield much useful information, which by plotting in curves and as contour maps illustrating the distribution of the population and its changes, will assist in estimating the future population and its distribution. These estimates or forecasts should generally be looked upon as approximate in varying degree.

Sometimes the deductions made from statistics of this nature give rise to much controversy. It may be of use to refer to some interesting studies which have been made of this subject.

With regard to the population of the world, Professor J. W. Gregory, F.R.S., President of the Geography Section of the British Association in 1924, at Toronto, in his address prophesied that :

> "From 1906 to 1910 the population of the world grew at the rate of doubling in 60 years. If this rate were maintained the 6,600 millions of people which it is calculated is the most that the world can feed would be in existence in 120 years."

Then with regard to the distribution of the present population of the world, Sir Charles Close, late Director of Ordnance Survey, in his presidential address to the Geographical Association in London in January, 1927, estimated a density of world population of 14·6 individuals per square kilometre (0·38 square mile), omitting the frozen and desert places, taking the total world population at about 1,895 millions in 1924, and 1,957 millions in 1927. The densities of countries differed greatly, he found, being, per square kilometre, for England and Wales 251, Belgium 245, Italy 130, Germany 127, France 71, Scotland 63, Irish Free State 46, Spain 42, Russia 24, Norway 8, Japan 145, and Java 266 persons. Sir Charles pointed out that the population of Great Britain had multiplied by about 3½ times in 100 years, but he estimated that somewhere about 1949 the birth rate would equal the death rate. Referring to migration he thought that the Dominions, as a whole, could absorb annually about 5 per 1,000 of their total population.

In Egypt the population is increasing very rapidly, which fully justifies the large programme of development which has been and is being planned.

The excess of births over deaths per thousand per annum in Egypt is about 17·6 as compared with 10·2 in Great Britain.

In most countries the problems of central and local government as well as those of development planning, be it either national, regional, or urban, are very intimately bound up with the factors of increase and migration of the population. A study of current politics seems to indicate that one of the main problems in England is over-population, whereas in Australia, for example, according to a statement by the High Commissioner, the question is one of under-population. The local government difficulty seems generally to lie in the tendency of the people to flow towards the towns.

An interesting mathematical method of estimating future population appears to have been used in connection with the New York Regional Survey. It is described in a book * on the subject by Professors Raymond Pearl and Lowell J. Reed, from the Introduction to which by Mr. F. P. Keppel the following extracts are taken :

> " There are a number of methods of forecasting the populations of the future which are familiar to students of the subject, and which could be employed immediately with data already available. In these the future is predicted on the basis of population figures of the past. That is, the trend of past population changes is first determined, and this trend is then extended into the future. These methods come down in general to two types, and the difference between them is found in the procedures followed in extending the curve representing the future aggregates.
>
> " The more recent of them is one developed by Professors Raymond Pearl and Lowell J. Reed, of Johns Hopkins University. It begins by indicating several factors which should be taken into account in developing a mathematical formula for predicting the trend of future population growth in a fixed area. First, the area upon which the population grows is finite—the area has a definite size or upper limit. Second, since population lives upon limited areas there must be a definite upper limit to the number of persons who can live on that area ; that is, it is inconceivable that populations on particular areas can increase without limit.
>
> " Third, there is also a lower limit to population, which is zero—population obviously cannot go below that. Fourth, each epoch marking an advance in human culture and economy has made it possible for a given area to support more people. And, fifth, the rate of growth during each epoch, in so far as it has been observed,

* *Predicted Growth of Population of New York and its Environs*, by Raymond Pearl and Lowell J. Reed, the Johns Hopkins University—Plan of New York and its Environs—1923.

varies, being slow at first, then increasing in rate to a maximum, and then decreasing until almost a stationary aggregate of population is maintained.

"With these factors in mind Professors Pearl and Reed have developed a mathematical equation, aimed to make the known quantities of the past indicate what may be expected in the future. In other words, assuming that populations cannot grow on for ever and that they grow at differing rates at different periods of each epoch, a formula has been developed which is believed to express the fundamental law of normal population growth.

"It is realised, however, that the disturbing factors in population

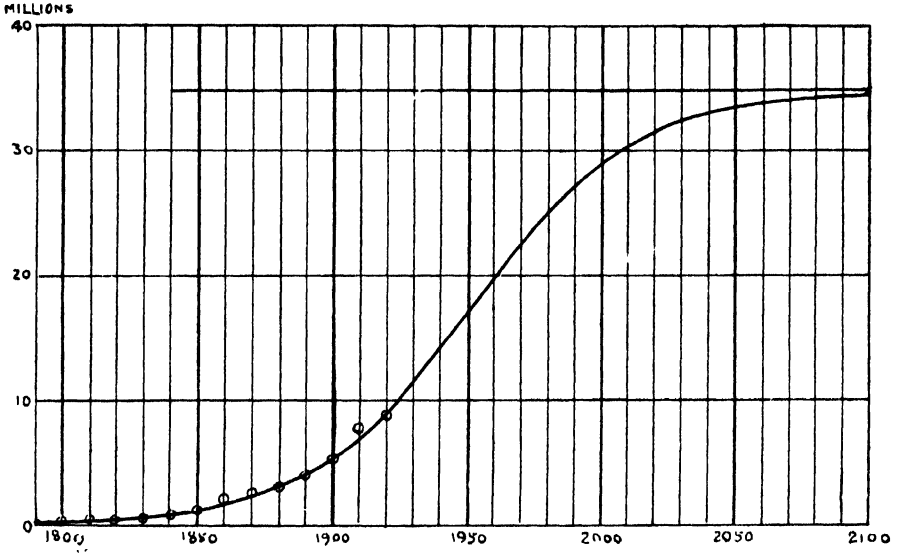

FIG. 1.—POPULATION CURVE FOR THE TOTAL NEW YORK REGION.

The small circles in the early portion of the diagram indicate observed population as recorded by census enumerations. The curve itself is determined by these values. The horizontal line which the curve approaches but does not meet is its upper asymptote, in other words, the predicted limit of population for the region.

From *Predicted Growth of Population of New York and its Environs*, by Professors Raymond Pearl and Lowell J. Reed. (Plan of New York and Its Environs. By courtesy of the Publishers.)

trends may have much greater effect in computing for smaller areas than for those of whole nations or countries. That is to say, the introduction of an unusually large manufacturing industry to a city, like the automobile industry to Detroit, for example, would be likely unexpectedly to modify future population figures for a city or city region to a greater degree than such disturbance would for a whole nation. At the same time, while such a sudden change may modify the course of the population growth, the result of such

> a disturbance, so far as existing evidence indicates, would be merely to throw the population trend to a new curve of the same type as the old one but having a different rate."

Fig. 1 is a diagram, taken from the book referred to, which shows the curve of actual and predicted growth of population in the whole New York Region between the years 1800 and 2100. The small circles in the early portion of the diagram indicate observed population as recorded by census enumerations. The curve itself is determined by these values. The horizontal line which the curve approaches but does not meet is its upper asymptote, in other words, the predicted limit of population for the region.

The equation of this curve is given as

$$y = \frac{256{\cdot}0527}{e^{-0{\cdot}0323002x} + 0{\cdot}0073368}$$

in which y represents population in thousands, and x represents time in years since 1800.

The form or type of the curve is interesting and the method would appear to be valuable, especially in the case of estimates to cover long periods of time. The author recently noted that a population curve for Edinburgh was of a similar type.

No study of population might be considered complete without some reference to the pioneer work of Malthus, who published his famous "Essay on Population," in 1798. The text of his teaching was that the food available, not the number of births, determines population. He made the statement, which is not to be taken too literally, that whereas crops increased in arithmetical progression, the population increased in geometrical progression. Population is therefore always close on the heels of subsistence.

The view of Malthus has been much criticised, but Mr. Carr-Saunders * says :

> "Nevertheless, in spite of all the contributions that have been made, it is now admitted that, so far as the essential features of his point of view are concerned, Malthus's view was correct."

In his book, *Human Migration and the Future*,† Professor J. W. Gregory makes some interesting observations on the migration problems within the Empire and also on the larger problem of international migration. With special reference to the immigration problem in Canada he remarks :

> "The railway system of Canada was built much faster than it was made effective by adequate immigration so that it has proved a

* *The Population Problem*, by A. M. Carr-Saunders. Oxford University Press, 1922.
† *Human Migration and the Future*, by J. W. Gregory. Seeley, Service & Co., 1928.

heavy burden to the Dominion. The railway deficit for the year 1920 on the Government Railways was 80½ million dollars; and despite severe economies and better trade it was still 41½ million dollars in 1925.

"This deficit has naturally modified the Canadian immigration policy, for the present policy of land settlement aims at the utilisation of the millions of acres of fertile privately owned but still unoccupied land that is within ready access of the existing railways; it discourages settlements which would require additional railway construction at an early date.

"The utilisation of the railway system was dependent also on the development of wheats, such as the Marquise, which can withstand the early frosts that were often fatal to the first grown varieties. The development of the great mining fields of Ontario, notably the copper and nickel fields of Sudbury, the silver and cobalt fields at Cobalt, and the goldfield at Porcupine, each in turn gave an extra stimulation to western settlement."

Again, in dealing with the immigration problem in Australia, Professor Gregory remarks:

"Australia has laid out railways which would be more profitable if it had a larger population. Some of the railways that have been built have ceased to run because the settlers who were expected to use them have not arrived. . . .

"It is, however, no use advising Australia to multiply its population even tenfold and increase its output of meat, wool, and wheat in proportion, unless there is an assured market for these materials. A tenfold increase in the quantity of wool might lead to such a fall in price that Australia would get less profit from a larger yield than she does from the present output. Australia is therefore naturally cautious in its immigration policy, so as not to jeopardise its industries by over-production."

With reference to the need for international study of the problem of migration he observes:

"The geographical problems that would fall within the scope of migration studies include the following: (1) what amount of population each country or section of a country might be expected to support, and therefore their capacity for immigration; (2) what is the optimum population, and whether a country requires for its attainment immigration or emigration, and to what extent; (3) how far the separate countries make full use of their own resources and area, and whether a country which suffers from local overcrowding could secure relief by the development of other parts of its own territory. (4) Another branch of investigation would be the needs of emigration from countries at present clearly overcrowded."

Before leaving the consideration of the aspect of population it may be of interest to quote one of the general conclusions of the League of Nations * given in a "Memorandum on Production and Trade, 1913 and 1923–1926," as follows:

> "By 1926, world production of basic raw materials and foodstuffs was about 17 per cent. greater than before the war, world trade about 10 per cent. greater, and world population about 6 per cent. greater.
>
> "The world is accordingly richer per head of population and there is a greater international exchange of goods."

COMMUNICATIONS AND TRANSPORT

It has been said † that "transport does not create trade—it is the servant of trade."

Of course the provision of transport facilities may permit of development which will create trade and traffic, such as in the case of a railway to carry iron ore from the mountains to the coast for shipment. In some instances the provision of additional transport may only compete needlessly with existing facilities, or it may only divert traffic. This would be desirable, of course, if the existing communications are uneconomic or obsolete.

From the planning point of view it is necessary to see that provision is made for communications and transport of the most suitable and efficient type, that they are sufficient for requirements and are capable of extension, for which due reservation of space must be made.

Reference has already been made to the haphazard way in which railways, for example, have developed in England, and to the difficulties of Parliamentary Bill Committees in getting at the technical-economic facts in order to judge the necessity for new railways, water supplies, changes in local government boundaries, etc. It is probably safe to say that if anything in the nature of regional surveys and planning schemes had been available when some of our railway lines were proposed, they would never have got the length of construction. For example, one line in the author's own experience was built and equipped with special sheds, loading banks and pens, in the expectation of a cattle traffic which, it was ultimately found, could not be diverted to it. Despite all inducements the beasts continued to travel by the ancient track over the hills, browsing by the way, and they

* *League of Nations, Monthly Summary*, dated May 15, 1928.
† *Ibid.*, dated June 15, 1927. "The International Economic Conference."

arrived in better condition at the market than if they had travelled by the railway, and only a few days later. This was immaterial, as time was no object. A regional survey, as it is now understood, would probably have indicated this result.

It never seems safe, therefore, to assume that because there is an existing or potential traffic you can divert it through new channels; and it would be wise to plan for such a diversion, only if the regional survey indicated that there are no apparent difficulties.

If complete schemes of communications are not available, the question of alignment appears to be the main difficulty for the regional planner in any proposals he may make. For example, in a country where there is an appreciable difference in level, the economic alignments of a railway, a road, and a canal will probably be very different, as the ruling gradient for the railway is, say, 1/100-150, for the road 1/20-30, while the canal must, of course, be level between the locks. Tramways or light railways, on the other hand, will follow the gradient of the road, and it may be, therefore, only a question of extra width to be reserved.

It may be necessary sometimes to consider the alternative of providing either rail or road transport. This matter is fully dealt with in Part III under the head of "Planning Schemes for Colonies."

The provision of adequate means of communication and transport is a vital necessity to the community. Their general lines should, as far as possible, be laid out well in advance of requirements so that they may be expanded in an economic manner to meet the growing and changing needs of the population, commerce, and industry.

SEA PORTS AND HARBOURS.—Sea ports being usually the chief traffic centres in a country their planning in relation to town and other development is a matter of considerable importance. The Imperial Shipping Committee, in one of their reports in 1926, made some valuable observations on the relation of ocean traffic to the development of new ports, which are of interest from a regional planning point of view. The following extracts are taken from an article * on the Imperial Shipping Committee's Report referred to. After noting the many instances of port facilities provided by land authorities which had never attracted enough shipping to justify their construction, and remarking that it was not sufficient to obtain statistics of the trade which might go through the port, and the report of a consulting engineer as to the works required, but that in every

* "Ocean Traffic—Development of New Ports," in *The Glasgow Herald* of July 28, 1926.

case the matter should also be looked at from a broader standpoint of the economics of shipping on the ocean, it proceeds to observe that:

> "Liner companies when planning or diverting the routes followed by their steamers, and tramp owners when guiding their ships on voyages which might extend over many months to many ports, must always have in mind a balance of considerations in which the conditions at any one port constitute but a single factor.
>
> "There were other important matters which had to be borne in mind. Such questions as the hours of arrival and departure and the catching or losing of tides at one port might have a bearing on the question of whether it was worth while or not to call at another port some distance away. To take another example, the nature and not merely the quantity of cargo offering might be of importance. An empty ship at the end of her voyage might look for heavy bottom cargo and fill up with lighter cargo at subsequent ports of call.
>
> "In short," the report adds, "the shipowner thinks in terms of ocean voyages and not merely in terms of ports, whereas some local authorities were prone to take a narrow view and to consider only their local facilities, which were fixed, while the ports to be visited by a ship were changeable at will. Much capital must often be sunk at a port and is irrecoverable, whereas a ship may, in some cases at any rate be diverted from a losing to a paying trade."

The economic lay-out for ports is considered, along with the general transport problem, in Part III, under the head of "Planning Schemes for Colonies." The most economic distance between principal ports is there given as 300 to 500 miles. In the case of intermediate ports for coasting traffic the most economic distance apart would be about 150 miles. The following calculations are put forward to justify these figures, and they are based on experience in the sub-tropical zone:

Deep Sea Traffic—using Principal Ports only.—Ship sails about sunset, travels all next day and arrives about sunrise the following morning, which is a 36-hours' run. Allow ship travelling at an average speed of 12 knots. Distance travelled is, say, 36×12 knots $= 498$ miles. Principal ports should therefore be about 500 miles apart where possible.

Coasting Traffic—using Intermediate Ports.—Ship sails about sunset and arrives about sunrise next morning, which is a 12-hours' run. Allow ship travelling at an average speed of 10 to 12 knots. Distance travelled is, say, 12×11 knots $= 152$ miles. Intermediate ports should therefore be about 150 miles apart where possible.

An examination of the maps of Africa, Australia, and other countries shows that the distance between the ports which have been developed are

on the average similar to the above. Of course the choice of site must be to a great extent governed by its suitability as a natural port, so that any attempt at regularity of spacing would be usually impossible.

The regional planning of the hinterland or region which a port serves is of primary interest in planning the development of the port, while, from a town-planning point of view, it is desirable that the development of the port and the town should be planned together in order to get the best results.

When the town-planning scheme for the city of Alexandria, Egypt, described in Part III (Fig. 4) was prepared, the plans of port and harbour extension, then available, did not cover the period of thirty to fifty years envisaged by the town plan. As it was very desirable to provide for all future access roads and open spaces which would be required for harbour purposes within the town limits, the author suggested that a harbour development scheme on the same lines as the town-planning scheme should be prepared. It was further suggested that the scheme should provide, so far as possible, for a future development of, say, fifty years; it should accord with the town plan, and all the interests of the Government and of commerce should be considered; also, that the scheme should not be limited to the planning of unoccupied areas, but should deal with the future use of certain parts of the harbour which were being utilised for purposes of a more or less temporary nature; while the piecemeal planning of development, as questions became urgent, was deprecated. Reference was made to the existence of ports throughout the world in which the absence of a scheme of planning has resulted in haphazard and partially considered development, entailing difficulty of access and in the transport and handling of goods, and that costly works have sometimes been carried out to repair these errors of the past.

It is satisfactory from a national and regional development planning point of view that a most comprehensive scheme for a fifty years' development of all the Egyptian harbours has been made by a special Commission.* The town plan of Alexandria now accords with the harbour plan.

The harbours of Egypt belong to the Government and the Commission referred to was able to deal with them as an economic whole and in relation to the future development of the country. The investigation regarding the future requirements of commerce and industry at the port of Alexandria disclosed the interesting fact that, while some groups appeared to have given little thought to future development, others gave definite and useful

* Sir Cyril Kirkpatrick, M.Inst.C.E., Dr. Luigi Luiggi, M.Inst.C.E., and M. Laroche.

information, and in the oil industry it was intimated that their probable requirements seventy-five years ahead had already been planned.

It is interesting to note that in dealing with port development in national economy, Mr. MacElwee * says :

> "It seems obvious that as the interior of the United States develops additional gateways must be developed rather than exerting continued effort to force most of the commerce through one gateway. . . . A port that develops beyond a certain point of saturation shows diminishing returns in economy of operation. The effect of attempting to jam through the port of New York half the commerce of the United States in the end must retard the growth of that commerce."

NAVIGABLE RIVERS AND CANALS.—The transfer of traffic from the ports to the interior is the next consideration. If water transport by river or canal is available it is one of the cheapest methods. It may be economic to improve a river and render it navigable from the sea to a city, even at considerable cost, as in the case of Glasgow. It may even be economic to construct a canal to a city, as in the case of Manchester.

In Egypt the Mahmudia Canal to Alexandria brings down a large part of the cotton crop from the interior and is a very important commercial waterway, although its primary object may be said to be irrigation. This canal discharges through locks into the harbour, and the canal port is situated in the basin above the locks. Fig. 11 shows some details of the proposed future extension of this canal port. The traffic in this part of the town is very much congested, especially during the cotton season, and an attempt was made in the town-planning scheme (described in Part III) to improve matters.

In Scotland there has been some controversy over the scheme for a Forth and Clyde Ship Canal which would, without doubt, considerably affect the regional and town-planning schemes of the most important part of the country if it were adopted. A number of Papers, dealing with various aspects of the project, are contained in the *Proceedings of the Royal Philosophical Society of Glasgow* for 1925-1926.

If it is decided to adopt such a scheme, which is one of national planning, the points of special interest for the regional planner would be the question of cross access by both fixed and opening bridges, and also the position of the wharves for loading and unloading goods which would be provided at intervals along the canal. It would be specially widened at such places

* *Port Development*, by R. S. MacElwee. McCraw-Hill Co. 1925.

to form commercial basins, and these would be focal points of industry which would have a town-planning interest.

When the centre line of a navigable river is an international boundary it appears to add greatly to the difficulties of development. The scheme to improve the waterway of the St. Lawrence River, prepared by the United States, is apparently not very acceptable to Canada; while the canals to connect Antwerp with the Rhine in Germany, crossing Holland, as proposed in the Dutch-Belgian Treaty (see Fig. 37), have been rejected by Holland. References are made to these international schemes in Part III, under the head of "International Development Planning."

In dealing with Waterways, Mr. Cyrus Kehr in his book* quotes as follows from Theodore Roosevelt transmitting to Congress the Preliminary Report of the Inland Waterways Commission in 1908:

> "The report rests throughout on the fundamental conception that every waterway should be made to serve the people as largely and in as many different ways as possible. It is poor business to develop a river for navigation in such a way as to prevent its use for power, when by a little foresight it could be made to serve both purposes. We cannot afford needlessly to sacrifice power to irrigation, or irrigation to domestic water supply, when by taking thought we may have all three. Every stream should be used to the utmost. No stream can be so used unless such use is planned for in advance. When such plans are made we shall find that, instead of interfering, one use can often be made to assist another. Each river system from its headwaters in the forest to its mouth on the coast is a single unit and should be treated as such. Navigation of the lower reaches of a stream cannot be fully developed without the control of floods and low waters by storage and drainage. Navigable channels are directly concerned with the protection of source waters and with soil erosion, which takes the material for bars and shoals from the richest portions of our farms. The uses of a stream for domestic and municipal water supply, for power, and in many cases for irrigation, must also be taken into full account."

The above is an excellent exposition of the case for comprehensive planning in development.

RAILWAYS.—The provision of railways is of primary importance from a regional planning point of view to link up the ports, the centres of commerce and industry, and the agricultural areas. Ample space for future development should be allowed, especially at the ports and other important points. A certain amount of uneconomic railway development has taken

* *A Nation Plan*, by Cyrus Kehr. Oxford Press, New York, 1926.

place in the past in Great Britain and elsewhere, the result being unnecessary competing lines which do not appear to justify their existence, as has already been referred to.

Railways are usually the most economical means of transport on land over long distances owing to their speed and the great loads which may be hauled over the heavy permanent way by modern rolling stock.

The transfer of goods between the railway and road transport is a problem which may in some cases have a bearing on town planning.

In developed countries to-day, the problem of the railways in regional and town-planning schemes is usually that of the extension of existing main or branch lines, and the provision of space at terminal points.

In undeveloped countries, where it is possible to start with a "clean slate" more or less, there are several principles which it is suggested might be followed with regard to the lay-out of railways and other means of communication. This is dealt with later in this Part under the head of "Transport Development in the Colonies."

With reference to the special case of city and suburban local transport an interesting contribution was made by Mr. W. C. Easton,* who summarised his conclusions as follows:

> "(1) The city housing problem could not be solved in accordance with modern requirements—not to mention playing fields—without a fast and frequent system of city local passenger transport.
>
> "(2) The required fast and frequent city local passenger transport could not be found on the city streets. If any one doubted this, the most effective, although hardly justifiable, method of proving it was to continue the endeavours to provide it on the streets.
>
> "(3) The only thorough solution was what was known as a tube service.
>
> "(4) The provision of a tube service, although distinctly expensive, was considerably less so than that of any other method."

The cost of a tube service, double track in tunnel, he gave as being from £850,000 to £1,000,000 per mile.

In dealing with the economic and other studies which should be the preliminaries of railway construction, Mr. S. C. Williams † observes:

> "A careful and considered estimation of the economic basis of any railway—which is necessary to an understanding of its position and value—should be also an actual preliminary to its promotion. For upon the best possible estimate of the nature and quantity of

* Paper on "City Traffic," by W. C. Easton, M.Inst.C.E., to the Institution of Engineers and Shipbuilders in Scotland. Report in *The Glasgow Herald*, of November 9, 1927.

† *The Economics of Railway Transport*, by S. C. Williams. Macmillan, London, 1909.

traffic which can be arrived at must of course turn the decision as to whether a line is to be built at all, and also the decision of its proper character within the limit of such variation as is in practice possible. The estimate of the probable traffic turns partly on the economic position of surrounding districts or countries, and partly on that of the district or country directly concerned, in as much as the traffic will ordinarily be of two kinds, that crossing the boundary of the district—export and import—and that within the district. Export traffic will depend upon the margin between prices at places of production within the country and the demand prices at the boundary; import traffic on that between supply prices at the boundary and the demand prices of different consumers within the district."

ROADS.—With the advent of motor transport the question of roads has bcome of considerable importance. Regional planning is concerned principally with the main arteries which will be required in the future to meet inter-urban (and industrial) traffic, and to connect up the secondary roads serving agricultural areas. Town planning is naturally chiefly concerned with the provision of adequate communications in the town, of streets sufficient for all future requirements, and open spaces as " lungs " and as " traffic centres " for interchange of traffic, say from rail to road, and also for " parking " purposes.

For example, a reference to the plan of the City of Alexandria Town Planning Scheme, Fig. 4, will show that in this long, narrow city, where the problem of communications was especially important, the long avenue, fifty metres wide, forms a main channel which will take a large part of the traffic in the future city. Near the end of this avenue there is a large square in front of the new railway station which provides a convenient centre for the interchange of rail and road traffic. Again, the proposed " Place of the Obelisks," which is near the terminus of the electric railway, forms another important traffic centre.

In *undeveloped countries* roads are sometimes too expensive, and other means of transport, such as by " roadless " vehicles, must be adopted. There still remains the necessity for planning the alignments of the roads which may be made in the future, so as to get a proper location for any bridges required at once. This is referred to below under " Transport Development in the Colonies," and also in Part III under the head of " Planning Schemes for Colonies."

The desirability of a regional survey was well illustrated in connection with the controversy on the Glencoe Road. The necessity for this road

as part of a main artery from the south to the north of Scotland was challenged on various points, including that of the destruction of the amenity of historic Glencoe. The discussions which followed seemed to show that nothing approximating to a regional survey had been made, and that the road had been studied principally from a topographical and financial point of view. Many points both for and against the scheme were put forward, and it was remarked that most of these would have been dealt with in the usual regional survey.

With reference to road widths, the only general rule which can be laid down is that, although the roadway to be constructed may be of a width just sufficient for the traffic of the immediate future, the width to be reserved between building lines should be sufficient to permit of widening the road later to meet all future needs, so far as they can be estimated.

With reference to the result of providing road motor transport in agricultural areas, Mr. G. R. Chatburn* remarks that the grand total of cost of production in farming is the cost of growing, the cost of transportation, and the cost of marketing. He notes that where transport is improved it may change the character and amount of farm production. Where the zone of profitable production was limited by horse haulage the area of the zone would be doubled by the adoption of motor trucks which can haul at half the cost and this without greater expense to the farmer. Again, the size of a farm could thus be somewhat lessened and the farmer make the same gross sum on his crop. The tendency would thus be to increase the rural population which can live on any given area.

This aspect is one to be remembered in dealing with extensive agricultural areas.

TRANSPORT DEVELOPMENT IN THE COLONIES (The Colonial Conference).—In undeveloped countries, where, as already remarked, a start can be made with a comparatively "clean slate," the planning of communications is one of the chief items in the scheme of regional development, and it is possible to lay down some general principles of planning.

The following extracts are taken from the report on West Africa,† already referred to in Part I, which contains much information on this subject, so interesting and useful from a regional planning point of view,

* *Highways and Highway Transportation*, by G. R. Chatburn, published by T. Y. Crowell Coy., New York, 1925.

† Report by the Hon. W. G. A. Ormsby Gore, M.P. (Parliamentary Under-Secretary of State for the Colonies), on his visit to West Africa during the year 1926. H.M. Stationery Office.

that one cannot do better than repeat it. The extracts are selected from various parts of the Report:

> "The development of Africa depends so largely on the extension of transport facilities that transport problems are of primary importance. Without transport facilities there can be neither adequate administration nor commerce. British West Africa provides some remarkable examples of the effects of transport development and equally of the stagnation due to the absence of transport."

After quoting examples of the influence of transport facilities upon development, and pointing out that the first duty of a Government should be to plan and execute a continuous programme of transport development by water, railway, and road, the Report proceeds:

> "Next in importance to the provision of harbour facilities for ocean-going vessels comes provision of terminal facilities at the ports. It is no use having a good harbour unless ships can be unloaded and loaded quickly and can turn round in the minimum possible time. There can be no doubt that wherever practicable deep-water wharves at which ships can tie up alongside are in the long run to be preferred to purely lighterage ports.
>
> "From the construction of harbours and port facilities we pass naturally to transport facilities from the ports to the interior. The cheapest and best form of such transport is by means of navigable rivers, and here again British West Africa is fortunate.
>
> "Where inland water transport is not available railways become essential for any traffic requiring to be brought from a distance. A railway can handle commerce at a price per ton mile far lower than any known means of road transport, except for very short distances and in very special circumstances, but it must always be borne in mind that a railway can seldom compete successfully with water transport.
>
> "Railways by themselves can only open up a very limited area of the country. Feeder roads to the railway system are quite as important as railways themselves, and the programme of road development should go hand in hand with any programme of railway development and should be considered in relation to it.
>
> "I should, perhaps, add one word as to the general policy of alignment of railways and roads in any comprehensive scheme for the opening up of an undeveloped continent which, though they may sound elementary, have not always been observed. Railways should run as far as possible straight inland from the selected ports. Main roads should run at right angles to them so that they do not tap the same country.
>
> "Naturally, however, while these should be the governing

> principles, they must be subject to the common modification that disconnected and isolated sections of railway or road are not economical and the various systems must be connected up. Short stretches of road to and from dead ends such as obtain in the Protectorate of Sierra Leone will never attract motor transport. Colonial railways cannot afford the isolation of their rolling stock or separate construction and repair shops, unless distance demand it."

Of course this general statement of principles is specially applicable to a region like West Africa, and some of them may require modification in other circumstances. For example, in the Egyptian Delta, which is intensely cultivated by irrigation, the alignment of the roads is largely determined by that of the canals on the banks of which they are constructed.

The problem of whether to provide a branch railway or a road as a feeder calls for special study, and in this connection the Senior Crown Agent for the Colonies, in a Memorandum,* submitted to the 1927 Colonial Conference, quoted a Report on the Federated Malay States Railway from which the following is an extract:

> " *Feeder roads or branch lines.*—Cases may occur where it will be necessary to consider the desirability of building either a feeder road or a branch line of railway, and the question of the relative economy of motor transport and rail transport will arise. It should be recognised that it is exceedingly difficult to reduce all the factors affecting these two forms of transport to a comparable basis. A railway is constructed, equipped, and operated by a single authority who controls and makes charges for all uses to which the railway is put. While, therefore, the total cost of operating a railway, including the cost of maintenance of way and structures, is fairly chargeable against the traffic transport, it is difficult to determine what proportion of the cost or road construction and maintenance is properly debitable to a motor service using such roads in conjunction with other users. A railway involves heavy constructional cost and requires special equipment. The interest on capital invested is, therefore, considerable, but the operating expenses are low. A motor road, on the other hand, does not involve such costly construction and equipment charges, but the operating expenses are higher. A railway service will, then, be more economical than a motor road service if the amount of traffic to be transported is sufficient to make the saving on operating expenses justify the cost of its special construction and equipment. There is, in fact, a certain critical volume of traffic, the transport of which can be performed with equal economy by a rail service or

* " Colonial Office Conference, 1927. Appendices to the Summary of Proceedings." H.M. Stationery Office, No. Cmd. 2884.

a road service; for a greater volume of railway, and for a smaller volume a road service would prove the more economical. It will be seen, then, that the question as to the relative economy of these two different forms of transport really involves a comparison between the critical volume of traffic and the amount which is likely to be offered."

It is evident that the determination of the critical volume of traffic can only be done by a study of the circumstances of each case, and that no general solution can be stated.

The following information regarding transport in Tropical Africa, which will provide a rough guide in this matter to the regional planner, has been extracted and tabulated by the Author from a Memorandum by the Mechanical Transport Sub-Committee of the Empire Cotton Growing Corporation, contained in the Colonial Office Conference Proceedings already referred to:

Form of Transport.	Cost of transport per ton-mile	Economic range of transport.
Railways—		
If run to full capacity	2*d.*	Unlimited.
Roads, using—		
Motor Lorries—½-ton load	1/6	25 miles.
Do. 3-ton load	1/6	50 do.
Without Roads (but with heavy permanent bridges over deep water) using—		
Motor Track-Tractors and Trailers—50-ton load	4*d.* to 6*d.**	100 to 150 miles.

In dealing with the economic length of haul for motor lorries (trucks), Mr. Chatburn in his book, *Highways and Highway Transportation*, already referred to, gives the following formula:

Let x = the number of miles where rail and truck charges balance.
m = motor truck charge per ton-mile (say 25 cents).
r = rail charge per ton-mile (say 5 cents).
t = terminal railroad charge; cost of collecting and delivering to the railroad plus the cost of removal from the railroad (say 6 dollars).

$$\text{Then } x = \frac{t}{m - r} = \frac{6{\cdot}00}{0{\cdot}25 - 0{\cdot}05} = 30 \text{ miles.}$$

Mr. Chatburn adds that under favourable conditions the difference in costs $(m-r)$ might be reduced to 12 cents, which would increase the

* This figure is given as an approximate estimate. It is so relatively low that it suggested the query as to whether a sufficient allowance for bridge construction and maintenance and other charges is included. From such inquiries as the author has been able to make, it appears that nothing has been allowed in the estimate for these charges.

length of haul (x) to 50 miles; this being the maximum motor transport haul which can profitably compete with railway transport, unless under special conditions and with certain classes of goods.

It must not be forgotten that animal carriage or traction still has an "economic radius of use," and Major-General Sir John Moore, F.R.C.V.S., discussing * transport costs, submitted that for ordinary trade purposes of towns and cities (in the distribution and cartage of goods) the horse is cheaper than the motor on a daily computation of work and working within a radius of from four to six and sometimes eight miles. This agrees with the author's practical experience of the collection of town refuse in Egypt by means of mules and carts compared with motor lorries.

In Part III, under the head of "Planning Schemes for Colonies," the principles of planning of communications, town and village sites and other matters are discussed, while the preparation of regional schemes, as well as the relative preliminary surveys, is explained. As the question of communications is of primary importance in undeveloped and partially developed territories, this aspect has been studied in some detail under that head, and further comparisons are made between the various systems of transport.

It is to be noted that the Proceedings of the Colonial Office Conference in 1927, already referred to, provide much useful information on the subject of development in general and transport in particular.

AIR PORTS.—The provision of air ports is a modern aspect of town planning which has occasionally to be considered. A reference to the Alexandria town plan, Fig. 4, and to the proposed commercial aerodrome may be of interest. This aerodrome, which was planned by the author in consultation with the air experts, was considered to be in many respects ideal, for it is situated near the centre of a town, on a site which is free from high obstructions in the vicinity; it is 1,000 metres square, is oriented to the prevailing north wind, and there is ample space available for hangars, repair shops, customs and post offices and the other appurtenances of a large commercial air port. In the Alexandria harbour plan space has been reserved for the slipways, hangars, etc., of a future seaplane station.

The new air port at Croydon, which covers 400 acres, appears to be one of the most complete in the world, with its huge hangars 300 ft. long and 150 ft. deep, its control tower and passenger accommodation, customs, medical office, workshops, etc.

* "The Horse as a National Economic Factor." Remarks by Major-General Sir John Moore, F.R.C.V.S., at the National Veterinary Medical Association Congress. Report in *The Glasgow Herald* of September 5, 1928.

It should be remarked that the Air Ministry in England issued in 1928 a Memorandum entitled "Notes on the Location and Size of a Model Aerodrome," * which contains much useful information to guide the selection of sites. It is prescribed that if possible there should be a run of 800 yards in any wind.

In the New York Regional Scheme the proposed aerodromes are to have not less than two runways at right angles, 2,000 feet long by 500 feet wide, while the seaplane channels are to be at least 3,000 feet long by about 800 feet wide.

Fig. 36 is a map of the Imperial Air Routes, as planned by the Government, which is referred to in Part III. It will be noted that both airship and aeroplane routes are shown.

It would appear that the airship is considered best suited for commercial purposes over the wide ocean spaces to connect up continents, and that the aeroplane is better adapted for use over land, while the seaplane or amphibian is more suitable for coast-line traffic.

The following comparative table of anticipated performances has been made by the author from information given in an address on "Empire Communications" to the Royal Empire Society by Commander Sir Dennistoun Burney, as reported in *The Times* of February 14, 1930. In this address the various types of aircraft in relation to the economic development of the Empire were discussed:

Type.	*Speed.* Miles per hour.	*Pay Load.* Tons.	*Commercial Range.* Miles.
Airship	90	30–50	3,500
Flying Boat	120	10	1,250
Large Land Aeroplane	110	4	600

It is to be noted that the three types do not compete, but are supplementary to each other, on similar principles to those already laid down for communications by water and on land.

Regional and town planners must follow the progress of this new and rapid method of transport, and be prepared to meet its requirements and any altered conditions which it may impose in schemes for future development.

ELECTRICITY FOR LIGHTING AND POWER

In Great Britain the advantages of electricity were early recognised and many independent generating stations were erected to serve areas determined sometimes by artificial and unsuitable local government boundaries. The

* Reprinted in the *Journal of the T.P.I.*, September 1928, Vol. XIV, No. II.

result is uneconomic, for these small stations have been doing the work which could be done by comparatively few large stations, placed where they could obtain the cheapest power either in the form of coal or water. By adopting this system, and with transmission lines all over the country, the rural districts could be supplied with cheap power; in this way industries might be encouraged and employment provided there, thus relieving the congestion in the cities, which is a great town-planning problem. The selection of suitable sites for industries and for the settlement of communities in garden cities or in any other manner throughout a region is a question for the regional planner.

The Central Electricity Board, which was formed under the Electricity Supply Act, 1926, has powers which should result in the foregoing changes being gradually realised.

This Act is a distinct advance in national and regional planning, and its result should be of great assistance to development planners in their schemes.

It is to be noted that the determining factors in selecting the generating stations are the cost of coal, and an abundant supply of water for condensing purposes, and also the possibility of extension.

All this electrical development is bound to react on the future distribution of industries and consequently of population throughout Great Britain, hence the need for co-ordination by regional planning.

In Egypt the conditions of electrical supply are different, and there the larger towns are comparatively far apart, so have their own generating stations. It is only in the case of water supplies that the central station to serve a region has been adopted for special reasons.

The question of street lighting has a town and street planning interest, for efficient lighting is important in these days of fast motor traffic, especially in the wider avenues. Trees often affect the lighting as they absorb the light and also cause shadows; while the spacing, height, and power of the lamps has to be studied, as well as the proper lighting of important street crossings. For street lighting it is desirable to have uniformity, and the author has found by experiment that this is usually better attained by the close spacing of comparatively small power lamps than by the wide spacing of high power lamps.

COMMERCE AND INDUSTRY (ZONES).

Several references have already been made to the necessity in the regional and civic surveys of ascertaining the future requirements of

commerce and industry, especially in the matter of areas or zones to be reserved for extensions to existing industries or for new industries; also the communications considered necessary, the port and other terminal facilities desired, and the space to be reserved at these places for various purposes.

With the supply of cheap electricity to all parts of Great Britain, industries will, it is thought, tend to move out from the congested city areas, so that the regional planning of suitable sites for them with adequate communications and residential areas, as already referred to, is desirable in order to guide and to encourage this development.

It is of interest to examine the fundamental principles of commerce and industry as they affect planning in some measure. In *Economics for Business Men*, already referred to, Mr. Weston says:

> "It is only rarely . . . that nations can really be said to trade. But, as in domestic trade, so usually in foreign trade, an individual exchanges with an individual, an Englishman with a Frenchman; and exchanges because both are benefited. Each gives what he wants less for what he wants more. Some difference, though, we may note between home and foreign trade.
>
> "This difference consists in the fact that, within the borders of a single political unit, the agents of production can be fairly easily redistributed as convenience and profit dictate. If the Tyne has decided advantages over the Thames for the building of ships, none in control of capital will establish a shipbuilding yard on the southern river; if a factory worker in Belfast learns that he can in Barnsley have access to better machinery and earn more, then he will be inclined to transfer himself and his family to Yorkshire. There is, in other words, within a country something like mobility both of capital and of labour so that the decisive reason why industries become localised—why making of calico takes place upon a stupendous scale in south-east Lancashire; why cutlery for the world is made at Sheffield—is the natural aptitude of the place for the particular industry. For natural aptitudes, 'land,' that is, cannot be transferred. It is, roughly at any rate, right to say that values in the home trade are decided by cost of production. . . .
>
> "So with trade that passes political frontiers. It is quite possible that, either because the gifts of Nature are unevenly distributed among regions or because labour is reluctant to travel far in search of those regions where their efforts would effect more, one country is, compared with another, a worse producer of many things. Yet if the inferiority is less pronounced in one thing than in another, still trade will be possible and profitable.
>
> "Thus, suppose this country resolves to grow its own sugar

as well as to forge its own steel. Then the knives resulting from twenty units of the labour-land-capital effort would exchange for the sugar that also resulted from twenty units of the composite effort. Cost of production would settle the value in exchange. Suppose, though, more sensible ideas prevailed and, finding that the knives could—even allowing for freight and other expenses—bring more sugar from Jamaica, we gave up the idea of growing sugar. . . . We might put it:

"England can get a dozen knives or 20 lbs. of sugar for twenty units of her productive power.

"Jamaica would have to use forty units of her productive power to get the dozen knives and then they would not be the trenchant Sheffield product, forty units of her productive power would give her, say, 30 lb. of sugar.

"Jamaica can afford to give any number of pounds of sugar up to twenty-nine, and still be a gainer, for the knives."

"England has a superiority of 100 per cent. in steel, of 50 per cent. in sugar. Let England produce the steel and Jamaica the sugar, and we have economic progress. For in each country the relation of Effort to Satisfaction will be less—the fraction $\frac{E}{S}$ will be lessened."

This economic statement deals with the cause and establishment of commerce and industry. With regard to the growth of industry, Sir Alfred Yarrow is reported * to have said: "There is a curve in every industry. Enormous growth in boyhood, and then a straight line when manhood is attained. After that there is no great increase." The curve is probably very similar in type to the curve of growth of population shown in Fig. 1.

As an example, it is interesting to note how the growth and decay of industries and commerce has affected the progress of the city of Glasgow. The *Scottish Geographical Magazine* of January 15, 1921, contains studies of the origin, growth, and development of the city, and in one of these Professor Gregory † said:

"Geographical factors have controlled each of the main stages in the development of Glasgow; its foundation as a prehistoric fishing village, its influence while a mediæval bridgehead, and its modern expansion as a Transatlantic port and industrial centre. With fine insight Glasgow was selected by St. Mungo as the chief centre for the Christianisation of the country, and by Bishop

* *The Morning Post* of October 6, 1927.

† "Glasgow and its Geographical History," by Professor J. W. Gregory, D.Sc., F.R.S., in the *Scottish Geographical Magazine*, of January 15, 1921. The Royal Scottish Geographical Society, Edinburgh.

> Turnbull, six centuries later, as the chief educational centre for Western Scotland. Subsequently, when political changes enabled Scotland to share in the rising Transatlantic trade, Glasgow became a port and was able to use to the full the rich mineral resources of the adjacent coalfields."

With regard to the future of Glasgow the same number of the magazine contains an interesting article by Sir Halford J. Mackinder, M.P., who said:

> "I have been asked to write a note on the future of Glasgow. It seems to me that on this subject there is only one thing which can be said with certainty, and it is that the geographical circumstances, which in the past have conduced to the growth of the city, would not in this twentieth century suffice to create anew in this locality a great centre of activity, if for any reason, whether of military defeat or economic strife, Glasgow were now to cease to flourish. . . .
>
> "It is necessary to invoke momentum from the past in order to explain the greatness of many of the oldest centres of urban life. Geographical analysis alone will not be enough without the inclusion of 'compound interest' on the original geographical capital."

The commercial community of Glasgow appears to be quite alive to the necessity of continually meeting conditions as they alter, and of establishing new industries to replace those which are decaying. It is evident that unless there is development in the future, any planning work would be futile. The Glasgow Chamber of Commerce has taken steps to make a regional survey of trade and industry and the possibilities of broadening its basis; the result of the survey should be of great utility in any planning schemes for the West of Scotland. The full text of the resolution of the Chamber, at its meeting on September 19, 1927, has already been given in the Introductory Chapter.

The aspect of "momentum" from the past which may carry on an industry is well illustrated, the author believes, in the case of the Staffordshire Potteries, which are now obliged to import their clay from Cornwall. It would evidently not be economic to remove the works to Cornwall at present. This is an aspect which the regional planner cannot neglect.

MINERALS.—Any reports regarding the presence and the working of minerals must be carefully studied as they have a great influence on the regional plan. Certain areas may be liable to serious subsidence due to the workings. Again, the ageing of a coalfield, owing to the proximity of which a region like, say, the Clyde Valley has prospered, may in time so increase the cost of coal and of steel that industry which, in the first place,

was attracted and developed by the cheap coal, may go off to new coalfields, say, in the south. Of course, there are other factors which tend to counteract this, but it is an aspect which should be taken account of in the national and regional planning surveys. It is useless, and might even possibly be harmful, to plan for a greater or more rapid development than all the factors indicate is ever likely to take place.

The East Kent Regional Planning Scheme,* referred to later, deals with the development which is expected to take place as a result of the opening up of the Kent coalfields. Some valuable recommendations are made in the scheme for the preservation of the natural beauty of the county, and regarding the selection of sites for new towns, as well as for the provision of the necessary communications and other matters.

The unequal distribution throughout the world of the raw materials necessary for industry, and the consequent discontent this produces amongst the nations, is a serious international problem for which the League of Nations seems to be trying to find a solution.

At the Empire Mining Congress, in 1927, Sir Thomas Holland, former Director of Geological Survey in India, urged the necessity for a survey of the mineral resources of the Empire, and the suggestion was adopted by the Congress.†

AGRICULTURE.—One of the fundamental problems is the cultivation of all suitable land to its full capacity in order to increase the food supply and to provide employment on the land; in this way the population may be spread out and so assist in relieving the congestion in towns. As food supply, as well as population, is an important factor in determining development, and therefore directly affects all our planning, it is proposed to examine the economic aspect of the problem. It is admitted that the amount of land suitable for cultivation is limited, and that, even by employing more and more intensive cultivation, the yield will eventually reach a point where it becomes unprofitable to put more expense in working the land, for the "law of diminishing returns" begins to operate. The diagram, Fig. 2, illustrates this law and speaks for itself. It is taken from *Economics for Business Men*, by Mr. W. J. Weston, already referred to, and the following are extracts from this book relative to the problems:

> "Suppose (referring to Fig. 2) that this composite unit of productive power means a production expense of 100*s.*; and suppose

* *East Kent Regional Planning Scheme*, by Professor P. Abercrombie and John Archibald. University Press, Liverpool, 1925.

† See *The Morning Post* report, August 23, 1927.

that a hundredweight of wheat can be sold for 25*s.*; then, until the curve of production falls below the 4 line, it will 'pay' the farmer to cultivate his soil more intensely. . . .

"There comes a point with the best land when the farmer would put more money into the land than he could extract from it; there is a point where the money spent on the land is balanced by the extra amount realised from the increase in crops; till this point—not, you note, of necessity last in time—is reached, any expenditure is more than repaid. . .

"If this law of diminishing returns were not operative we might get our crops, however great we needed them to be, from the best lands—from those most productive and nearest to the consuming population. We could have the rest of the land for our building sites, for the amenities of the chase, for the wide open spaces where

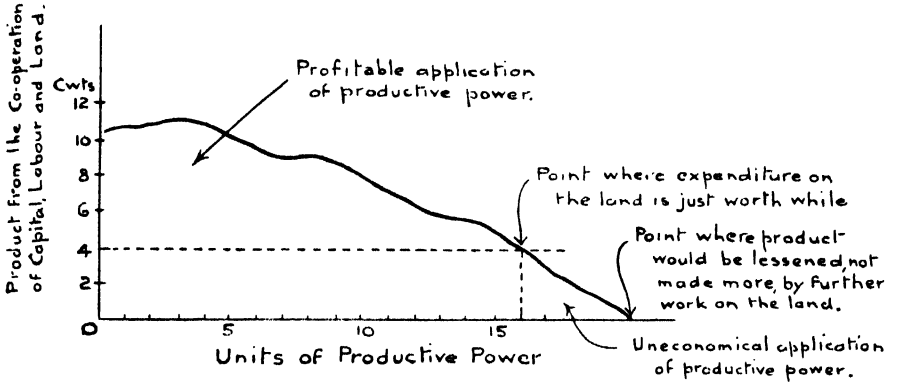

FIG. 2.—DIAGRAM ILLUSTRATING THE LAW OF DIMINISHING RETURNS.

From *Economics for Business Men*, by W. J. Weston. Pitman. (By courtesy of the Publishers.)

we could look into the face of heaven and breathe freely. As it is, we are obliged to have recourse to lands yielding their increase at even greater expense; the demand it is, mirrored as that demand is in the price people are prepared to pay, that settles how far cultivation must go, whether it will pay to drive the plough along the mountain side, whether it will be an advantage to stub up Thornaby Waste."

It is thought that in any survey for planning purposes, land which has a *potential* development value should be taken into account; that is land which, although it may not be economic meantime to cultivate, yet may be so utilised when conditions are favourable. Lands which can be reclaimed by drainage would, in many cases, be included in this category.

The question of *afforestation* on land which is adapted to it is now

receiving attention in Great Britain; it is an industry which, by providing work on the land, is helping to reduce the congestion of population in the towns.

The possibility of a world shortage of timber in the future is a problem which is already causing some alarm. In Canada, for example, it is said that rapid depletion of the forests is taking place, and no adequate planting of trees to replace those cut is being undertaken apparently.

The result of research in agriculture has a direct effect on *potential* development of land. It was intimated by Dr. J. H. Grisdale,* Canadian Deputy-Minister of Agriculture, that:

> "Canada is an outstanding example of what really intensive research can do, for by the investigation of the scientist, and the efforts of the practical farmer, new and better grades of wheat have been evolved, and the area of cultivation has been extending right up to 700 miles north of the United States border.
>
> "But we are going farther north still, and experiments are going forward with a view to shortening the time between seeding and harvest, as for every day we shorten this period we can extend the wheat belt by between forty and fifty miles. The effect of that, not only in Canada, but on the whole world, can be imagined."

A parallel result has been obtained in the Sudan within the author's practical experience. The experiments in growing cotton there at different seasons resulted in the discovery of a suitable time for planting; it was thus possible to develop the great plain of the Gezira, an area of over half a million acres. This fact has altered the whole future outlook of the Sudan.

An instance of the effect of intensive methods in agriculture upon settlement, and the consequent type of development to be planned, is recorded in the *Report of the Imperial Economic Committee* † as follows:

> "By encouraging the growth of the most suitable grasses, and by raising fodder crops, matters with which we deal later, and by adopting more intensive methods of production generally, the dairying industries of the Empire could support a far larger population to the acre. This would produce that closer type of settlement peculiarly acceptable to the migrant from the home country, who naturally prefers a relatively thickly populated area with the social life and the educational facilities which it provides."

* Report in *The Glasgow Herald* of November 20, 1928.

† *Report of the Imperial Economic Committee* (Fourth Report, Dairy Produce). H.M. Stationery Office, 1926.

As an indication of the primary importance and far-reaching influence of agriculture on development generally, and of the necessity for the study of agricultural economics and agricultural geography, the following extract is taken from the report of a committee appointed by the Empire Marketing Board : *

> " By a broad definition of the two terms, 'production' and 'marketing,' almost every aspect of argricultural economics may be viewed as belonging to one or other of these two phases.
>
> " There are, however, several subjects of research in agricultural economics which may be described as general. These subjects consist for the most part of studies of the agricultural aspects of certain general economic problems.
>
> " The importance of these will be readily grasped by merely mentioning some of them : transport, credit, monetary policy, taxation, insurance, history of agriculture (descriptive and statistical), the whole field of what is called in America rural sociology (involving questions of population, housing, standard of living, community or social life, and education), the general group described as land economics (including natural resources and utilisation, reclamation and settlement, tenure, rents and land values)."

All the foregoing aspects of agriculture, therefore, seem to be of material interest to the regional development planner.

In Great Britain the question of agriculture is one of many, but it is by far the most important problem in Egypt, which depends so largely on the cotton crop for its wealth. Schemes for the development of all the land available by draining and by irrigation have been prepared, and a programme for the next thirty years has been arranged, to proceed in a manner which will accord with the estimated future increase in the population. As the cultivation depends almost entirely upon the water from the Nile, the questions of the water available and the water necessary for the new areas, and the works required to control the flow in the Nile to provide this water, have been considered, and they are described in *Nile Control*,† by Sir Murdoch MacDonald, from which the following extract is taken :

> " The summer supply of water in the Nile is insufficient in nearly all years for the adequate irrigation of the cultivated lands at present dependent on it ; at the same time there is an insistent

* *Agricultural Economics in the Empire.* Report of a Committee appointed by the Empire Marketing Board, published by the Board in October, 1927.

† *Nile Control*, by Sir Murdoch MacDonald, K.C.M.G., C.B., M.Inst.C.E., Adviser, Ministry of Public Works, Egypt. Government Press, Cairo, 1920.

demand for expansion of cultivation into new areas now lying fallow for the want of water.

"This demand is due to the pressure of the rapidly increasing population, which has about doubled itself in the last forty years, while the increase in crop area has by no means kept pace with growth.

"The increase to-day is at the rate of about 200,000 souls per annum; and, as Egypt is solely an agricultural country, expansion must proceed at an equivalent rate until the limit is reached.

"Further control of the river is therefore now urgently required, both to prevent the heavy loss that occurs practically every year owing to the unavoidable restriction of crop, and also to provide additional water for development."

The combined area of all the Nile lands of Egypt available for cultivation totals about 7,300,000 feddans (acres approximately), of which 5,200,000 feddans are actually under cultivation. The effect of all this development in agriculture will have a reaction in many other branches of development which must, therefore, be considered along with it and co-ordinated to it. For example, the growth of the population and the greater area of cultivation means increased communications, new villages and other things which have been referred to in the National and Regional Development Planning Scheme for Egypt, described in Part III.

WATER SUPPLIES FOR TOWNS AND POWER

One of the most important questions regarding water supply, from a regional planning point of view, is the allocation of catchment areas for town water supplies and also for power purposes. As a region becomes more intensely developed there is a tendency to an uneconomic, and probably unfair, division of the available catchment area, so that some communities may be forced to obtain a supply from a great distance, or under unsatisfactory conditions. This is a matter which it seems might properly be considered in regional planning schemes in Great Britain, and, indeed, it has a national importance.

The technical-economic aspect has been well stated in a paper to the National Conference on City Planning in 1927,* by Mr. Nicholas S. Hill, Jr., New York City, in which he said:

"It is a common practice in the United States to regard water and sewerage works as municipal undertakings. This has resulted

* "Public Services which require Regional Planning and Control," by Nicholas S. Hill, Jr. Consulting Engineer, New York City, in *Planning Problems of Town, City and Region*, published for the Conference by W. F. Fell Co., Philadelphia, Pa., 1927.

in the multiplication of small local plants which are in close proximity in the more congested sections of the country. The practice is not alone uneconomical because of the greater expense of operating a number of plants where one or a few would do, but also because political subdivision lines have little or no bearing on the question of water supply or sewage disposal.

"With water-works it frequently occurs that local sources, which may be overburdened or unsuitable for potable uses, are utilised because the expense of going far afield is too great for a single community, whereas it would be perfectly feasible, by uniting with adjacent communities, to secure an adequate and satisfactory supply for all without undue burden or expense."

The periods of drought in recent years in England have induced the Government to examine the question of the water supplies of the country, and, with the idea of ascertaining the available supplies and their most economic apportionment and use in the future, the Ministry of Health issued, in 1928, a booklet on the subject of *Regional Water Committees*.* The following are extracts from the booklet:

"Demands are made from time to time for a national allocation of water resources. Any allocation which is to be of practical use can be made only after a great deal of investigation. The most practical course is that Regional Water Committees should be formed by which the needs of each of the districts in a region will be ascertained and a definite policy recommended for meeting requirements. These regional findings can then be brought together, modified where necessary in the general interests, and in this way a national policy formulated based on fact instead of surmise. . . .

"As already stated, the aim of the Committee should be to formulate a programme for meeting in the best and most economical way the present and prospective water needs of the area for a long period ahead. It is well that the programme should provide for measures in detail for twenty years ahead, and in broad outline for, say, fifty years ahead. This is a long forecast, but it is doubtful whether anything less is sufficient in water supplies, especially when it is remembered that large impounding schemes usually take not less than ten years for completion. . . . The first measure is carefully to ascertain the needs, present and prospective, in relation to the existing supplies. Account should be taken of the probable future industrial or housing developments in the several districts and of probable changes in the standard of consumption.

"As regards probable future developments, where town-

* *Regional Water Committees*, Ministry of Health. H.M. Stationery Office, 1928.

planning has been undertaken in a region or in a district, information can usually be obtained from that source."

In a paper entitled "Water Supply as a Factor in Town and Regional Planning," published in the *Journal of the Institution of Municipal and County Engineers* of February 4, 1930, Mr. G. L. Pepler, F.S.I., of the Ministry of Health, pointed out that the relation between town and regional planning and water supply could be divided into two main heads. The first aspect was protecting the source of supply by the reservation of open spaces in the required areas. The second point where the two sciences touched was distribution in which the lay-out and zoning proposals of the town planner were of interest to the water engineer, so that both should co-operate in the planning.

In Egypt and the Sudan the town water supplies are taken from the River Nile, or from the irrigation canals, and sometimes from deep wells. At Jerusalem the supply is from springs situated some miles from the city, but a part of it is still collected from the roofs of the houses during the rainy season and stored in cisterns.

The water supplied to the larger towns in Egypt is filtered by mechanical filters. The selection of the site of the works is important from the regional and town planning point of view. Whether the supply is taken direct from the Nile or from an irrigation canal, the intake and works should, for reasons of public health, be constructed well upstream beyond the limits for the future development of the town. The neglect of this precaution may entail considerable expense later on to remedy the error.

In the older parts of towns in Egypt, unless some town-planning improvements in the form of new streets, the widening of existing ones, and the opening up of dead-ends, have been carried out before the introduction of water supply or drainage works, it is very difficult, if not sometimes impossible, to carry out such works.

WATER POWER.—One of the great natural resources of some countries is water power and, as it is not unlimited, its development on economic lines is important. In parts of Great Britain there is a large available supply yet unused, but several important works have already been constructed, especially in the Highlands of Scotland. The proposals for the development of this source of power should enter into the regional planning schemes, for it affects much other development, and it makes industries possible in places where they could not otherwise exist.

In the United States the necessity for a national survey of water-power

resources seems to be recognised and in this connection, Mr. J. Bernard Walker, in an article * on conservation, states :

> " The demand for power is going up by leaps and bounds. There need be no fear lest the development of the potential water powers of the country will exceed the ability of our industries, our public utilities, and our private enterprises, to absorb every kilowatt as soon as it is put upon the wires. We must take the large view and think, not in terms of this or that municipality, or this or that corporation, however powerful, but we must think of the United States as a whole, and view its power requirements, not as those of to-day, but of the greater future which lies before the country.
>
> " The pressing need of the hour is to determine immediately what would be the best system of development for flood control, power development, irrigation, and inland navigation of every stream, river, and lake that contains promise of usefulness. Much of this work, of course, already has been accomplished ; but a vast amount of investigation, survey, etc., remains to be done."

As in the case of land, it is thought that the survey should take account of *potential* water-power supplies, which, although not economic to exploit meantime, can, however, be brought into use when conditions are favourable, or when the conservation of fuel is recognised as being necessary.

In hilly country there is usually no lack of fall to actuate the turbines, but one would not expect to find an installation in a flat country like Egypt. Yet in one of the large oases there a regional scheme of town water and electric lighting has been a practical possibility with the small fall of about 16 feet between a high-level and a low-level irrigation canal. The general project was prepared by the author.

DRAINAGE (Town and Land)

Regional and town planning should enter very largely into the preparation of town drainage schemes. By a study of the regional aspect it may be possible to avoid the overlapping of schemes and consequent waste of money, while the town-planning scheme will show what provision is to be made for the future, and, on the other hand, it may be necessary in some cases to make modifications in the town plan in the interest of the drainage scheme. For example, a low-lying site may be difficult to drain and might involve heavy pumping charges if developed as building land.

* Article on Conservation in the *Scientific American* (reported in *The Morning Post* of June 15, 1927). By Mr. J. Bernard Walker.

Where possible the whole natural basin or watershed to be drained should be treated as a regional or joint scheme. The same applies to the question of river pollution, for it is useless if one authority or manufacturer goes to the expense of high purification of effluent and another discharges impure water into the same stream. It is necessarily a regional matter.

In the paper entitled "Public Services which require Regional Planning and Control," already referred to under water supplies, Mr. Nicholas S. Hill states:

> "Sewers and sewage disposal works should be designed to accord with natural drainage areas and not with arbitrary political sub-divisions. It frequently happens that parts of two adjacent communities lie within a common drainage area. Under these circumstances, the economical thing is to install a sewerage system within this drainage area and carry the sewage by gravity to a common disposal plant rather than to build two systems or to force the sewage of one from its natural outlet into other drainage areas.
>
> "There are also many sections containing a number of municipalities in which the sewage problem can be treated as a whole to great advantage, and the depreciation of property which usually results from the installation of sewage disposal plants may be confined, if not to one, to a comparatively few areas, whereas if each municipality attacks the problem individually the sources of nuisance are multiplied."

In England, recently, land drainage and river pollution have been the subjects of official inquiries which have shown that a very unsatisfactory state of matters exists owing, apparently, to a lack of co-ordination between relative authorities and to the fact that the boundaries they administer are not watersheds.

In evidence before the Royal Commission on Land Drainage in England and Wales, it is reported * that:

> "Mr. A. T. A. Dobson, Assistant Secretary in charge of the Commercial and Tithe Division (including Land Drainage) of the Ministry of Agriculture and Fisheries, said that over 1,000,000 acres were urgently in need of drainage by reason of flooding caused by defective or obstructed arterial channels, and 467,000 acres were capable of improvement by means of small drainage schemes for the clearance of main ditches and other small watercourses. There were too many drainage boards in England and Wales. The present system lacked co-ordination and was neither efficient nor economical."

* Royal Commission on Land Drainage in England and Wales. Report of evidence in *The Times* of May 11, 1927.

It is evident that if the areas referred to were drained, and the land could be utilised, it would have a direct effect on the regional planning of development. The report of the Royal Commission referred to was issued in December, 1927, and it is recommended that each catchment area, where a drainage problem exists, should be provided with a catchment area authority, constituted mainly of representatives of the County and County Borough Councils in the area, which should have sole control for drainage purposes of the main channel of the river from its source.

With regard to river pollution, the Joint Advisory Committee of the Ministries of Health, Agriculture and Fisheries seem to have found a similar state of matters because the activities of the authorities concerned are confined to limited and artificial areas; and it appears to be agreed that the proper unit for administrative purposes is the watershed.

The drainage of the land in Egypt forms part of the irrigation problem and it has been so dealt with.

Again, in Egypt and the Sudan, owing to the dry climate and the nature of the subsoil, the construction of town main drainage systems has not been a pressing matter; which is fortunate, for they are comparatively costly, being usually about double the cost of a water supply installation per head of inhabitant. Several of the larger and low-lying towns in Egypt have now been drained, however. The main outfall to the sea at Alexandria is at the extreme westerly point of the eastern harbour (see Fig. 4), where there is a pumping station, while several sectional or secondary pumping stations are provided for at different points throughout the town and suburbs. The town plan was co-ordinated with the drainage scheme, and sometimes street improvement works, in the older parts of the town, had be to hastened in order to permit of the execution of necessary main sewers and other works which were being carried out by the municipality under the author's supervision.

In the absence of a sewerage system in most Egyptian towns the drainage is dealt with in private installations consisting of a liquefying chamber, either with or without a filter, and with a percolating pit. At Khartoum, where there is a municipal conservancy system, the great width of the streets and the very open development has so spread out the town that the cost of a drainage scheme, on which the author reported many years ago, was found to be prohibitive. The site of Khartoum is not ideal from a drainage point of view, for it is so low and flat that the tropical rains in summer are difficult to get rid of, especially if the river happens to be in very high flood.

HOUSING

One of the regional aspects of housing may be said to be the selection of suitable sites for garden cities or other centres in which new industries, as well as those which will migrate from the congested city areas, may be established with adequate communications, water, light and power supplies, and convenient dwellings for the people. One of the most pressing town-planning problems is the clearance of slum areas in the cities, to which a reference is made in Part IV. In Egypt the same problem exists, and a description of what is proposed at Alexandria may be of interest. In the report by the author on the Alexandria Town Planning Scheme it is stated that under the Municipal Housing Scheme it is proposed to build small houses to accommodate the " very poor." These houses are required to replace the " echeches " (hutments) or slum dwellings, which are recognised to be centres of infection in the city. There are several colonies of poor people who inhabit these hutments distributed throughout the city and suburbs, and it is the aim of the municipality that these shall be removed as early as possible and that no others shall be allowed to grow up. Many of the colonies are situated on private land, and it is difficult for the municipality to deal with these, but it was thought that if a commencement were made by building a municipal model colony in an area which had been cleared, it would be a great step towards the solution of the question. It is remarked that this problem is similar to that of slum areas with which European cities have to deal. The people who inhabit these hutments cannot, in most cases, afford to pay an economic rent for properly built houses. The plan, Fig. 12, shows a unit of a hundred houses which the municipality proposed to erect, and these units may be multiplied as required. It will be seen from the plan that each house consists of a room and a courtyard, or practically two rooms, and that each hundred houses has a complete sanitary installation, including wash-houses.

Judged by the standard of accommodation which is being provided in housing schemes—for example, in Great Britain—this scheme for Alexandria may be thought to provide a too restricted accommodation; but the conditions are not quite the same, so that a comparison is difficult. At any rate, the new houses in these slum areas will be many times better than the existing conglomeration of huts to which access is gained by narrow lanes, usually littered with refuse and abounding in smells which defy description, for it is practically impossible to keep clean such narrow, crooked, and unpaved lanes. Vital statistics for these particular areas in Alexandria are

not available, but they would doubtless compare very unfavourably with those for the other parts of the city. In this connection some interesting evidence was given by the Medical Officer of Health for Glasgow * in 1926. Referring to his slum clearance scheme he said :

> " Included in the scheme were 148 houses occupied by 653 inhabitants in an area measuring 1·50 acres, equivalent to 98 houses and 433 persons per acre. The number of persons per acre compared with 57 for the city as a whole. The death-rate was 25 per 1,000, compared with 14 for the city, and the infantile mortality was 148, compared with 107 for the city.
>
> " Statistics of respiratory diseases and phthisis also showed a considerable increase over those for the city. These were results one would expect from the conditions such as existed in this area. '

The provision of suitable housing is thus an important aspect of town planning. A town-planning scheme, however, does not necessarily imply a housing scheme, which really is, or should be, considered as being one of the subsequent detail developments like, say, road or drainage construction. This is not the place, therefore, to discuss types of houses, but with regard to tropical countries it may be of interest to remark that much may be learnt from a study of the native houses; these, however, generally require certain modifications to make them suitable types for Europeans to live in comfortably.

The reservation of certain zones for residential purposes is one of the main items in planning schemes.

OPEN SPACES

The reservation or provision of a sufficient area of agricultural belts, public parks, riverside parkways, coast walks, hill-top reservations or other open spaces in regional and town-planning schemes is important both from the point of view of amenity and the health of the inhabitants. Practice seems to differ, and considerable variations from the ideal of 1 acre to 200 persons are found; for example, in the Manchester Regional Scheme the allowance of open space is planned 1 acre to 500 persons, which is not considered sufficient.† It is obvious that these reservations should be co-ordinated, where possible, with any other areas to be reserved for public purposes such as catchment areas for water supply.

* Dr. A. S. M. Macgregor, Medical Officer of Health for Glasgow, giving evidence in support of the Glasgow Slum Clearance Scheme at the Scottish Board of Health Inquiry in 1926. Report in *The Glasgow Herald* of September 14, 1926.

† *The Town Planning Review* for October, 1927. Liverpool University Press.

It might be added that the planting of suitable trees in avenues and streets, especially in residential areas, is a matter which needs no commendation. In tropical countries the question of shade is important, and a great deal of planting is usually done. It is very desirable that many more trees should be planted in Great Britain than is now generally done, in streets or roads where the width permits of it.

EXAMPLES OF SURVEYS

There are now several published regional surveys which might be referred to as typical examples of how the information collected in the survey is shown on plans and tabulated or put in the form of diagrams for use in preparing the planning scheme. In England one of the most complete appears to be the East Kent Regional Scheme, already referred to, which has a geological basis and deals with a more or less complete unit. In this scheme the survey is dealt with under the following heads, which are extracted from the relative report :

I. Natural Features.
  A. Rainfall.
  B. Natural topography : contours and rivers.
  C. Surface and underground geology.
  D. Economic geology and surface values.
II. Agriculture and Vegetation.
III. Archæological.
IV. Administrative.
V. Population, Health and Housing.
VI. Industrial Survey : Coal, Ironstone, and other Economic Minerals.
VII. Communications.
  A. Roads.
  B. Railways.
VIII. Open Spaces and Natural Reservations.
IX. Canterbury, Sandwich, and the Old Villages.
X. The Seaside Resorts.

The interesting survey programme of the Niagara Frontier Planning Board, which is dealing with a region of about 1,550 square miles, is set forth in its report for the year 1925. In a review * of this report the scope of the investigations is given as under :

I. Relation of Region to the World at Large.
  (*a*) Flow of materials.
  (*b*) Problems of shipping, handling, and marketing ; rail and water transportation equipment ; terminal facilities.

* *The Journal of the Town Planning Institute* for July, 1926. Review of the Niagara Frontier Planning Board. First Report, 1925.

II. Fundamental Factors within the Region.
  (*a*) Food supply and markets.
  (*b*) Relation of Industry to source of raw materials, power supply, labour supply, and housing and transportation.
  (*c*) Relation of Labour to location of industries, transportation, recreation and amenities.
III. Possibilities and Problems of Growth of the Region.

The review referred to states that " the reasons given for planning this region were its power resources, its scenic advantages, and other potential possibilities as the inland gateway to the Atlantic Ocean and the natural gateway of the whole productive interior of the continent to the ocean."

The scope of the survey for the Scheme of National and Regional Development Planning in Egypt is referred to in Part III, and is given in detail in Appendix I.

PART III

THE PLAN

TOWN PLANNING

THERE is, fortunately, no need to make out a case for town planning, for it appears to be now generally accepted as essential to the proper development of towns.

In order to illustrate the principles of town planning, before proceeding to the wider applications, the author proposes to refer to the schemes which he had the privilege of preparing for the cities of Alexandria, Jerusalem, and Khartoum. These town-planning schemes represent widely different types, and a comparison of them is interesting and instructive; they are also regional schemes in so far that they were planned as complete units for the purposes for which they were designed, no account being taken of the existing municipal boundaries, the areas administered by the Provincial (County) Authorities being encroached upon so far as was necessary.

Alexandria, a seaport city and the commercial capital of Egypt, has a most complete scheme, for it deals not only with unbuilt areas, but also with the improvement of built areas, a desirable condition not yet fully attained in England owing to lack of legislation; Jerusalem, the capital of Palestine, is a mountain city of the greatest historical and religious interest, and the scheme was largely a protective measure for the ancient city; and Khartoum, the capital of the Sudan, is a desert city of recent growth under special circumstances which made it possible to provide for its development on a generous scale.

CITY OF ALEXANDRIA TOWN PLANNING SCHEME.—The City of Alexandria Town Planning Scheme was approved by the Alexandria Municipality and by the Egyptian Government in 1921, and it has since then served as a guide for the great extension of the city which has taken place recently owing to the prosperity of the country.

The aim of and the necessity for town planning, as already remarked, is now generally recognised, but it might be well to state it briefly in connec-

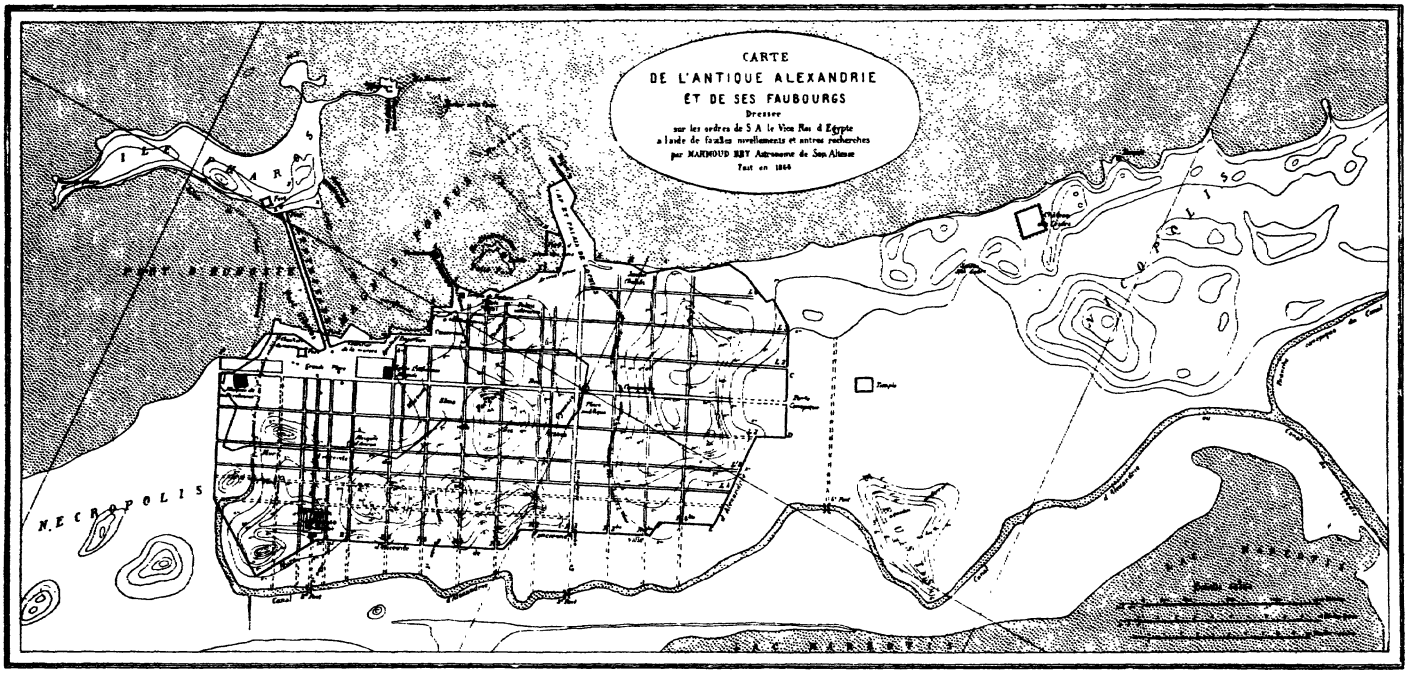

FIG. 3.

PLAN OF ANCIENT ALEXANDRIA.

Prepared in 1866, by means of excavations, levelling, and other research by Mahmoud Bey, Astronomer to His Highness the Viceroy of Egypt.

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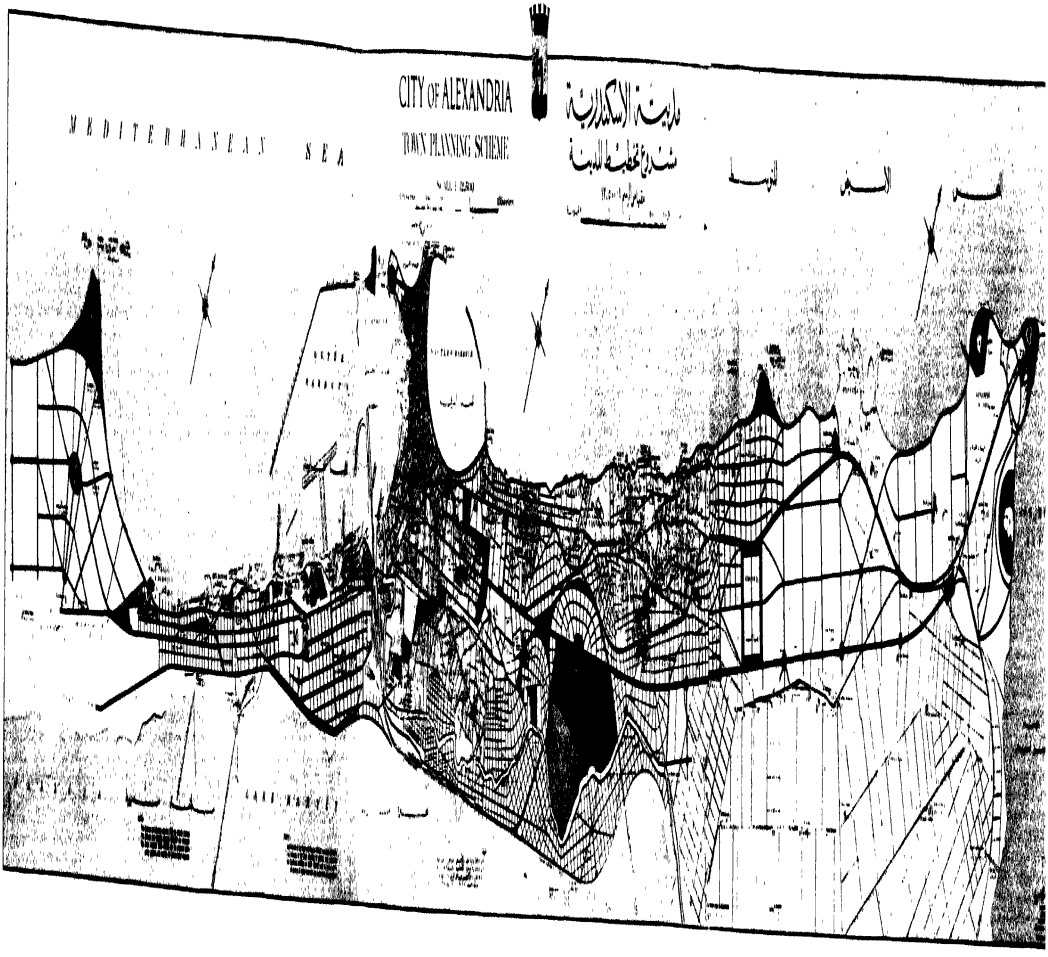


FIG. 4.

CITY OF ALEXANDRIA TOWN PLANNING SCHEME.—GENERAL PLAN.

(Prepared by the Author.)

tion with this scheme. In the author's official report * it is explained that the main point to be noted is that this scheme for Alexandria provides a programme on which the city may be improved and developed on preconceived and approved lines and not allowed to grow in haphazard fashion with objectionable results. The disadvantages of not having a town plan are apparent, in the too narrow streets, inconvenient alignments, congested areas and similar unsatisfactory features both in the city and in the suburbs. The resulting direct loss to the town is incalculable in the prejudice to the health of the inhabitants and the depreciation in the value of property. By town planning these unsatisfactory results may be largely avoided. It was remarked that the scheme is to some extent a general programme, and that many details remain to be worked out as further development takes place in future years.

In preparing this scheme for Alexandria it was necessary to make a civic survey of the city, due consideration being given to the historical and archæological problem as well as to the requirements of commerce and industry and to convenience and well-being of the inhabitants. In considering these objects one must, so far as possible, unite the ideal with the practical in such matters as the opening up of congested areas, the provision of public parks and " places " (squares), the planning of main avenues for the aeration of the city, and to facilitate communication between the various quarters of the city and the suburbs.

Before proceeding to a description of the town-planning scheme which deals with the present and the future city, it might be interesting to examine the plan of the ancient city. The city of Alexandria was founded by Alexander the Great about the year 332–331 B.C., the town planner being one Dinocrates, and in the reign of Ptolemy II (285–246 B.C.) Alexandria had become quite a large and beautiful city. This Ptolemaic city (Fig. 3) appears to have been regularly laid out on a " grid " principle, giving long, straight avenues and streets communicating with the gateways in the walls surrounding the city. The two principal streets intersected near the centre of the town and were about 35 metres wide, and aqueducts passed under the streets carrying the water supply to numberless cisterns. The city was surrounded by a wall, but near the close of the Ptolemaic epoch large residential suburbs had grown up to the east of the city along the coast.

It is said that the buildings and streets of the city were of white marble

* *City of Alexandria Town Planning Scheme*, by W. H. McLean, M.Inst.C.E., Engineer-in-Chief, Municipality of Alexandria. Published by the Egyptian Government Press, Cairo, 1921.

which had a dazzling effect in the sun. In excavating pipe trenches the remains of marble pavements have been discovered.

It is interesting to take this "grid-iron" plan, which was doubtless the design initiated by that great soldier Alexander, and to note its similarity to the plan of Khartoum (Fig. 22) which, more than two thousand years later, was initiated by that other great soldier the late Lord Kitchener. There is a legend that Alexander sat on a gilded throne at the intersection of the two main streets (which still exist, but on a less grand scale) and directed the laying out of the city. This extreme personal interest on the part of Alexander is only legendary, but one knows that Lord Kitchener took a very personal and effective interest in the planning and laying out of Khartoum, although not perhaps in such a spectacular fashion.

Of the ancient city of Alexander and of Cleopatra little now remains but a few columns, statutes, and some broken masonry to tell of its grandeur and magnificence. An Arab city succeeded the Ptolemaic city and endured through the Middle Ages, and from it the modern city has sprung.

Fig. 4 is the general plan of the City of Alexandria Town Planning Scheme which shows the modern city and the future city. It will be seen from this general plan that the city is planned to extend along the coast from Abu-Kir on the east to Agami on the west, and covers an area rather more extensive than that which was occupied by the Ptolemaic city and its outlying suburbs. It is interesting to note that the population of the Ptolemaic city and that of the future city as now planned will very probably be about the same, *i.e.* one million. The inhabitants of the ancient city within the walls were doubtless very much over-crowded according to modern ideas. The length of the future city as planned will be about 22 miles, with a maximum width of about 3 miles and a minimum width of less than a mile.

Alexandria is the commercial capital of Egypt, and the result of the census of 1917 showed a total population of 444,617, of which 84,706 are non-Egyptians.

The city is built on the sandy ridge along the sea-coast between the sea and Lake Maryut. The proposed extensions have been planned along this ridge, for even when the lake is eventually lowered or pumped dry the land reclaimed will be more suitable for agricultural purposes than for building.

The following are some of the main proposals of the scheme, of which several have already been carried out, to the great improvement and embellishment of the city:

1. The provision of a "Champ de Mars" in front of the Râs el Tîn Palace, connected by an avenue 40 metres wide to the proposed "Place

CITY OF ALEXANDRIA TOWN PLANNING SCHEME

Boulevard and "Place" of the Mosques.

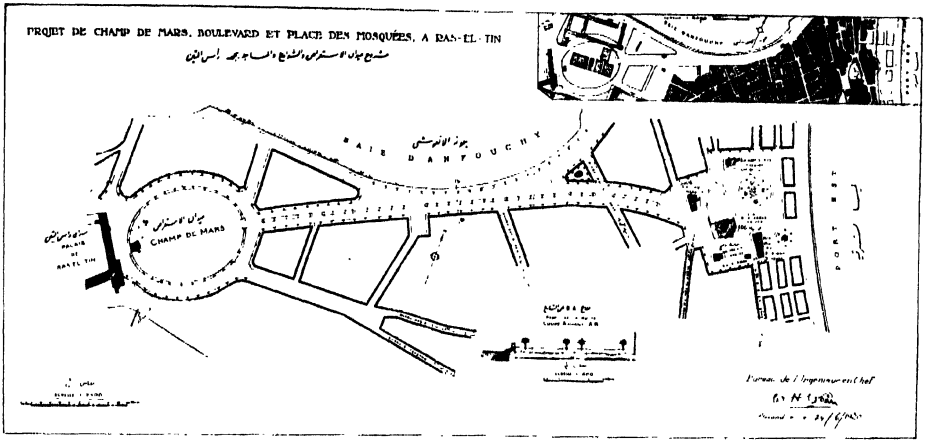
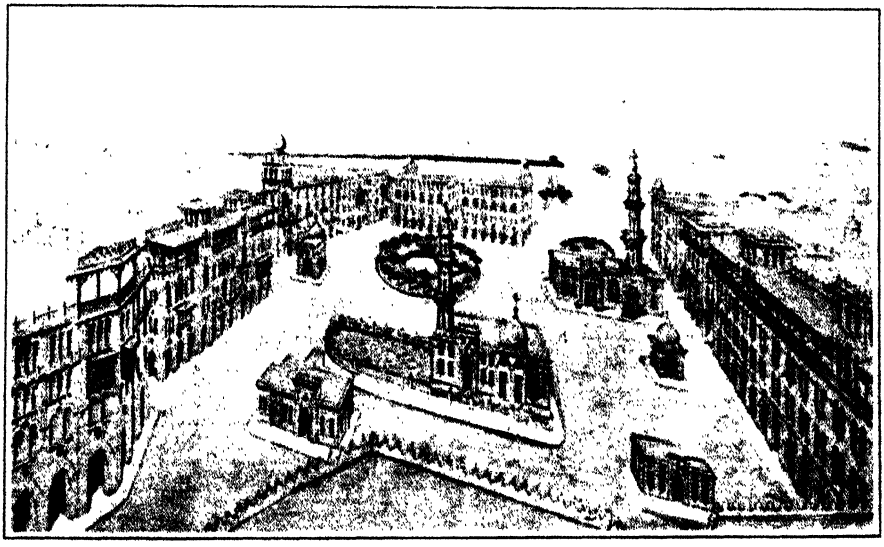


Fig. 5.

Plan.



Projet de la Place des Mosquées Sidi Abou El Abbas, Sidi El Boussiri Sidi Yacout

مشروع ميدان مساجد سيدى أبو العباس وسيدى البوصيرى وسيدى ياقوت

Fig. 6.

View.

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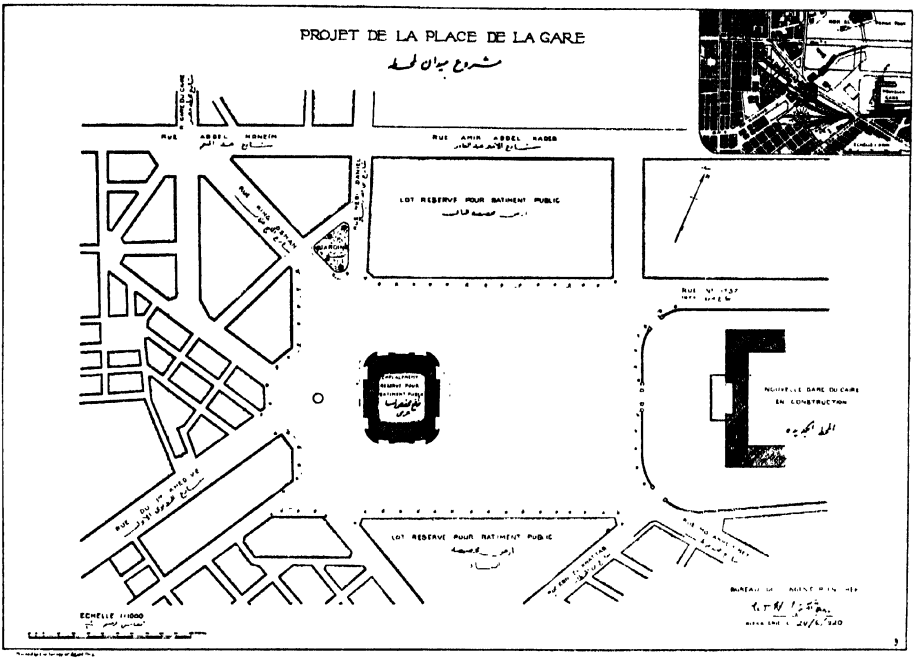
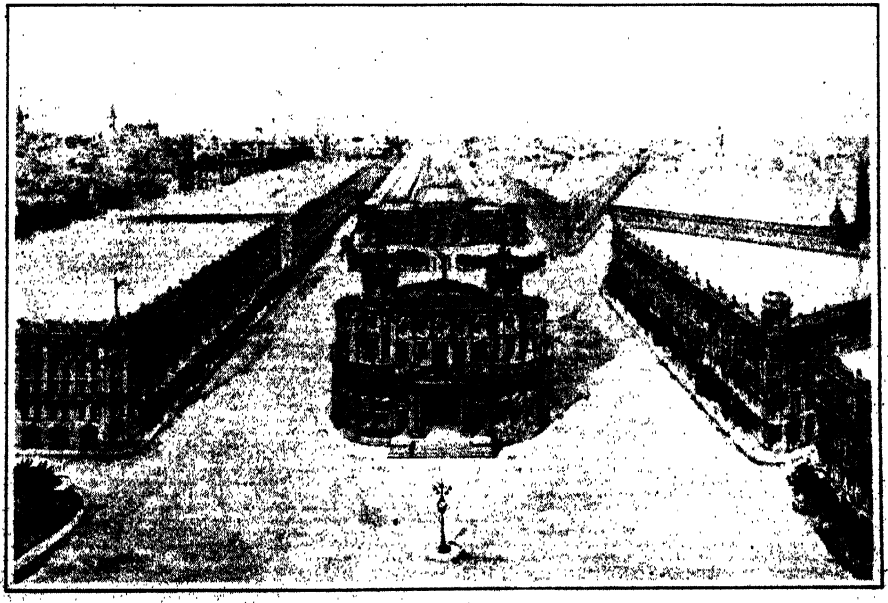


FIG. 7.
PLAN.



PROJET DE LA PLACE DE LA GARE. — مشروع ميدان المحطة

CITY OF ALEXANDRIA TOWN PLANNING SCHEME

The "Place" of the Obelisks.

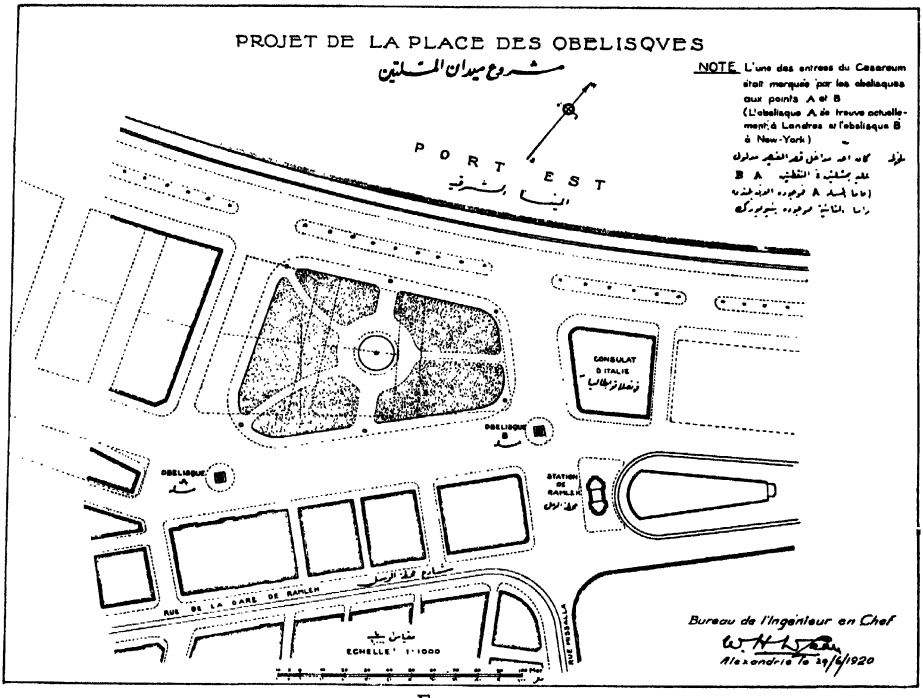


Fig. 9.
Plan.

Projet de la Place des Obélisques. — مشروع ميدان المسلتين

Fig. 10.
View.

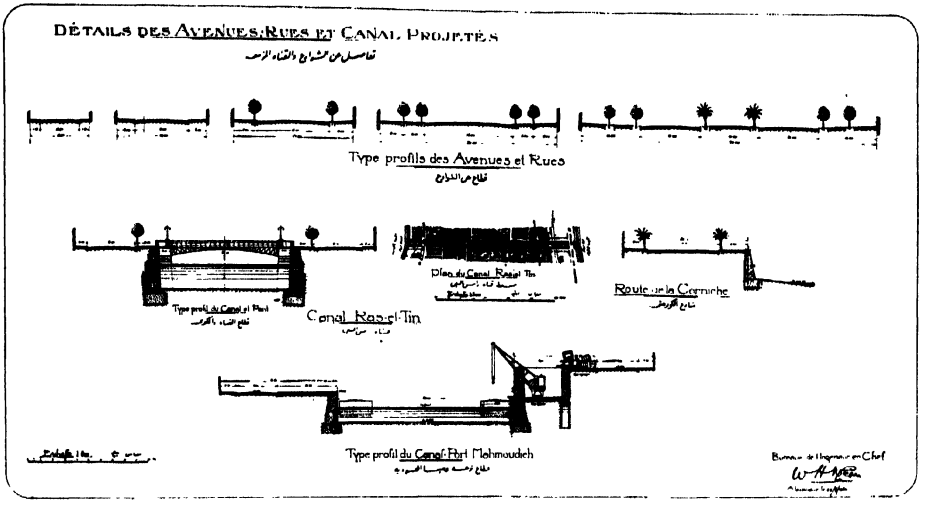


FIG. 11.

DETAILS OF AVENUES, STREETS AND CANALS.

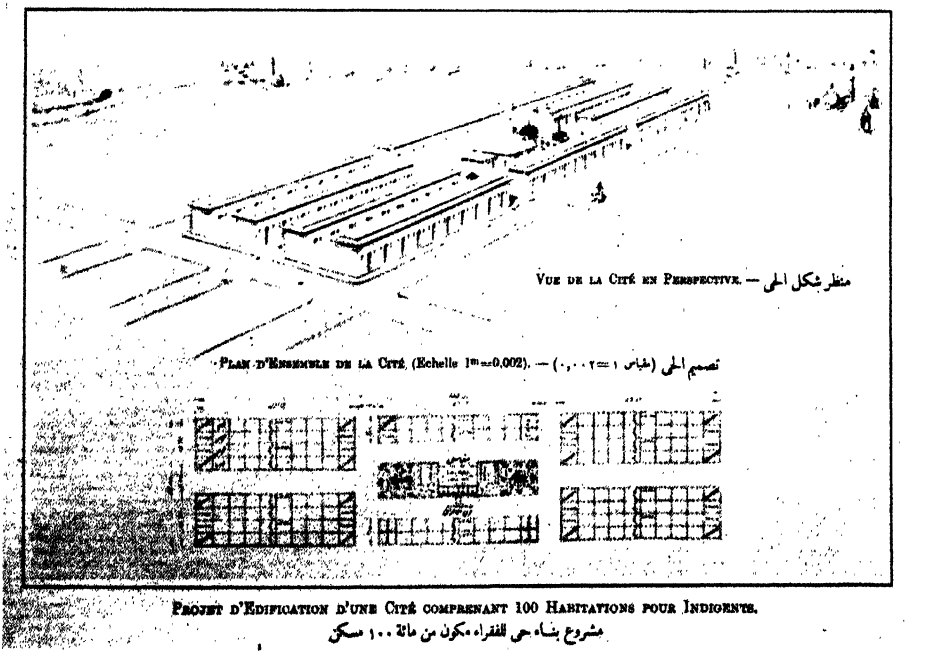


FIG. 12.

HOUSING SCHEME: SLUM CLEARANCE.

(square) of the Mosques" (Figs. 5 and 6). This opens out a congested area.

2. The area in front of the Egyptian State Railways new station to be a "Place" in which a public building may be erected. This square will be one of the principal traffic centres (Figs. 7 and 8).

3. The "Place of the Obelisks" on the quays of the east harbour at the extremity of Rue Missalla to include the sites of the two obelisks which marked the entrance to the Cæsareum built by Cleopatra. Of these two obelisks, which are known as Cleopatra's Needles, one is now in London and the other in America. It was suggested that their ancient sites might be suitably indicated on the ground by means of obelisks or columns, and that perhaps the original obelisks may some day find their way back to Alexandria. This proposed square is shown in Figs. 9 and 10.

4. An avenue 40 to 50 metres wide, running eastwards from the city to Abukir, as shown on the general plan (Fig. 4).

5. The extension of the Corniche Road eastwards from the city as far as Abukir. This will be a very fine promenade along the sea front, about 10 miles long. The type cross-section is shown on Fig. 11.

6. Reservations of sites for public parks and open spaces, public buildings, archæological research, and general public utility requirements are proposed.

7. In the older and more congested parts of the city between the two harbours it will be seen from the general plan (Fig. 4) that several new avenues and streets are proposed.

It should be noted that 20 metres has been adopted as a minimum width for main streets and 10 metres for secondary streets.

The provision of parks, gardens, and squares throughout the city and its suburbs was studied and, where possible, the sites proposed to be reserved for these purposes are unbuilt areas or areas only partially occupied by buildings belonging to public administrations. It was considered essential for the well-being of the inhabitants of the city that the public gardens and open spaces should be situated within a reasonable distance of their homes, and so distributed as to decrease the congestion of buildings and improve the aeration of the town.

CITY OF JERUSALEM TOWN PLANNING SCHEME.—The City of Jerusalem Town Planning Scheme was prepared in 1918 by the author at the request of the military authorities in Palestine for the municipality of Jerusalem. The primary object of the scheme was the protection

and preservation of the ancient city and its environs, and in this it has proved successful.

The author's official Explanatory Note * on the scheme, submitted to the military authorities in 1918 observes that the city of Jerusalem stands on a picturesque site in a mountainous district and is composed of a mediæval walled town and of a modern town stretching principally to the north and west of the old town.

It is noted that the present walls of the city were reconstructed in the year A.D. 1542, and it is unlikely that many of the existing buildings inside the walls were erected before that date, although, doubtless, they are of the same type as those which existed in remote times, customs changing but slowly in the East.

The old city is most picturesque and full of interest from many points of view. There are comparatively few modern buildings within the walls, but it is remarked that many of these are unhappily out of harmony and out of scale with their surroundings.

It was observed that the modern town had been allowed in the past to develop much too near the old city walls, more especially on the north and west sides, with the result that the walls are sometimes hidden or dwarfed by buildings which are quite out of scale with them and with the old town (see Figs. 13 and 14).

It was also remarked that in modern times the erection of several large and conspicuous buildings had been permitted on prominent and unsuitable sites in the vicinity of the old city and on the Mount of Olives (see Figs. 15 and 16).

Most of the foregoing undesirable development, both within and surrounding the old city, had taken place in comparatively recent times, and it was apparently the direct result of there having been no community of interest under the Turkish regime. Each nationality and religious community seems to have competed with the other for the possession of sites near the Holy Places on which they erected such edifices as they pleased, perhaps demolishing interesting old buildings in the process.

History of the Scheme.—Soon after the occupation of the city in December, 1917, the military authorities realised the necessity of exercising some control over building operations both within and around the city. Owing to the improved conditions following upon the military occupation

* *City of Jerusalem Town Planning Scheme.* The complete scheme was in a special dossier prepared for the War Office containing the Explanatory Note, relative plans and other documents. H.M. King George graciously accepted a copy of this dossier, a duplicate of which is in the British Museum.

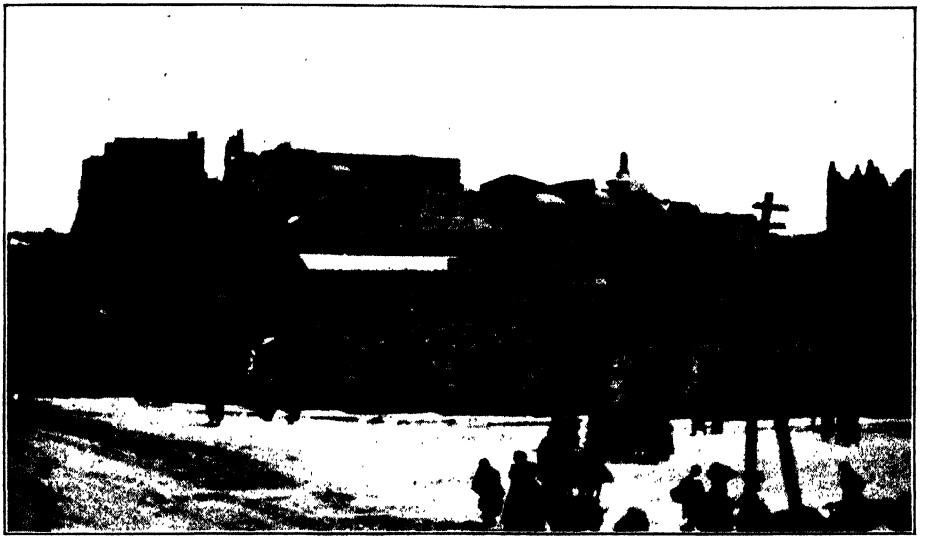


FIG. 13.
THE DAMASCUS GATE.
Showing shops which hide the Old Wall.

FIG. 14.
THE JAFFA GATE.
Showing shops which hide the Old Wall and also the Clock Tower.

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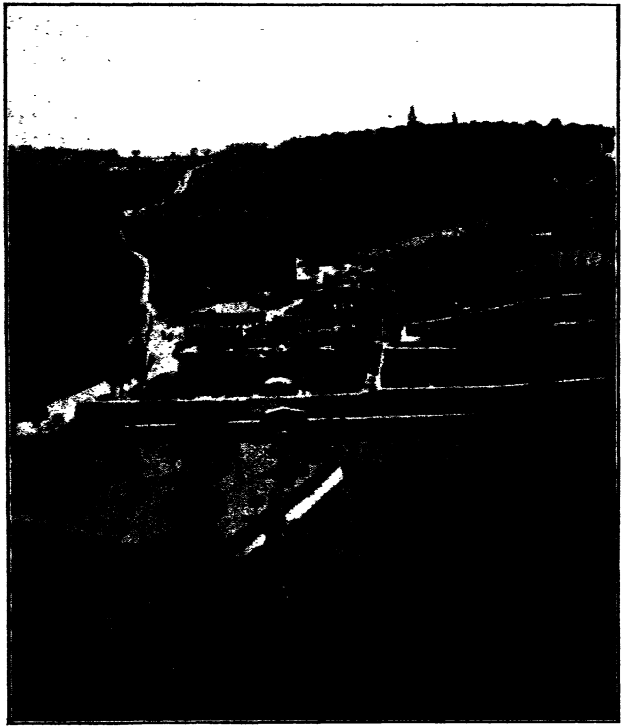


FIG. 15.

VIEW FROM OLD CITY OF THE KEDRON VALLEY, THE MOUNT OF OLIVES AND THE GARDEN OF GETHSEMANE.

(By Courtesy of The American Colony, Jerusalem.)

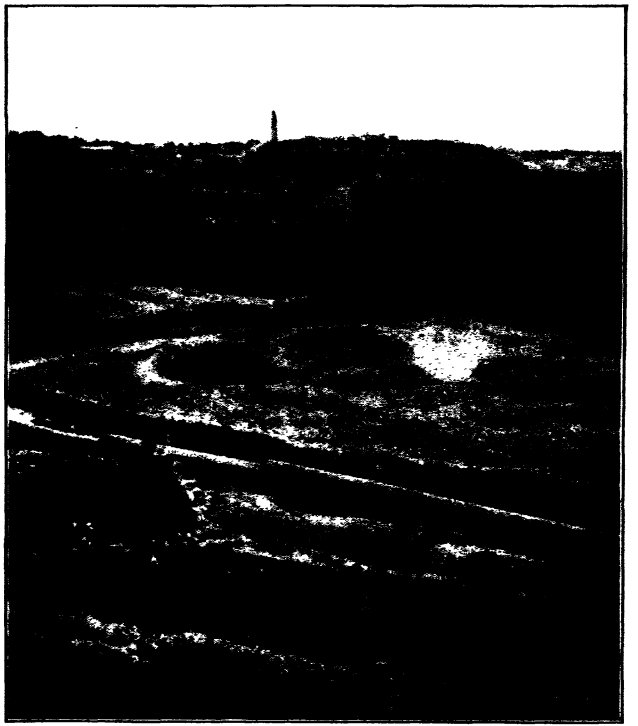


FIG. 16.

VIEW OF OLD CITY (HEROD'S GATE) AND THE MOUNT OF OLIVES FROM GORDON'S CALVARY.

(By Courtesy of The American Colony, Jerusalem.)

of the country, it was feared that there would be hasty and uncontrolled building operations in the city, and that the obvious errors of the past would be continued. As already remarked, very little repair work had been done for several years, and many of the older buildings were in danger of being either demolished or of being carelessly restored, especially in the old city; and also it was thought that building operations might soon be commenced in the modern town on a large scale.

It was at this stage that the author was asked by the military authorities in Palestine, through His Excellency H.B.M.'s High Commissioner in Egypt (General Sir F. R. Wingate, Bart.), to proceed to Jerusalem and report and advise upon what measures should be taken to institute the necessary control of building operations and town development. The author arrived at Jerusalem in March, 1918, and began the study of the scheme on the ground. At his suggestion a proclamation was issued on April 8, 1918, requiring that no person shall demolish, erect, alter or repair the structure of any building in the city or its environs within a radius of 2,500 metres of the Damascus Gate until he has obtained a written permit, the penalty for contravention being a fine not exceeding £200. The full text is contained in Appendix V. A set of provisional regulations or conditions for the issue of such permits was at once prepared and also a provisional plan indicating the restricted areas. The necessary general control was thus obtained.

The scheme, in its final form, was submitted to the municipality of Jerusalem, after which it was formally approved by the Commander-in-Chief at Advanced General Headquarters in Palestine on July 22, 1918.

Fig. 17 is the general plan * of the scheme endorsed as approved by Lord Allenby (then Sir E. H. H. Allenby), the Commander-in-Chief. This plan also has the signature and official seals of the Military Governor (Sir R. Storrs) and the approval of the municipality of Jerusalem, signed by the Mayor and stamped with the seal of the city.

Description of the Scheme.—The official Explanatory Note, in giving a general description of the scheme, remarks that it may be briefly stated that the Town Planning Scheme is designed to preserve the mediæval aspect of the old city and to surround it by a belt of land in its natural state, so far as practicable; and, further, that any structures which may be erected within a belt situated beyond this area shall be in harmony and in scale with the old

* This copy of the general plan, along with a model in relief of the scheme, was exhibited at the Royal Academy in 1919. They are now in the Museum of the Palestine Exploration Fund in London, and a signed duplicate copy of the plan is at the Chancery of the Order of St. John of Jerusalem, while another copy is in the Imperial Institute, London.

city. The modern city to be allowed to develop freely outside the above zone on the provisional general lines indicated.

The scheme is indicated on the general plan (Fig. 17) as follows :

I. *Old City within the Walls.*—Mediæval aspect to be preserved. New buildings may be permitted under special conditions.

II. *Area between City Walls and blue line.*—No new building to be permitted and the area to be eventually a clear belt in its natural state.

III. *Area between blue line and dotted blue line.*—Buildings may be erected only with special approval and under special conditions rendering them in harmony with the general scheme.

IV. *Area outside dotted blue line (to north and west).*—This is the area planned for future development. The plan shows the alignments of future streets and open spaces and the improvements of existing streets.

It will be noted that the *blue line* embraces the Hill of Calvary (according to Gordon), and continues eastwards across the Valley of the Kedron (see Fig. 18), where it turns southwards along the slope of the Mount of Olives and includes the Garden of Gethsemane ; it then skirts the village of Siloam and the Pool of Siloam, passing westwards, following the line of the ruins of the ancient wall, round the base of the Mount of Zion and up the Valley of the Hinnom on the west side of the old city. The *dotted blue line* is drawn to include the Mount of Olives and the village of Bethany.

It was remarked with regard to the outer belt of land surrounding the old city that the majority of the new buildings to be permitted in this zone would be of the native type. This type has a domed masonry roof, a mode of construction which has probably been evolved owing to the difficulty of procuring suitable and sufficient timber for roofs. A similar type of roof, built of mud bricks, is adopted by the native in Upper Egypt and the Sudan where timber is also very scarce.

The official Explanatory Note described some interesting restorations proposed to be done when funds became available, and suggestions were also made as to the repair of private buildings. The principal proposals were :

(1) The restoration of the moat and the walls between the Jaffa Gate and the Tower of David which were demolished to provide an entrance for the German Emperor in 1898 (see Fig. 19).

(2) The removal of the shops next the city walls at the Jaffa Gate (see Figs. 14 and 19).

(3) The removal of the Clock Tower above the Jaffa Gate (see Fig. 14). (This has now been carried out and a great improvement has resulted.)

(4) The removal of the shops at the Damascus Gate (see Fig. 13).

(5) General repairs to the city walls and gates.

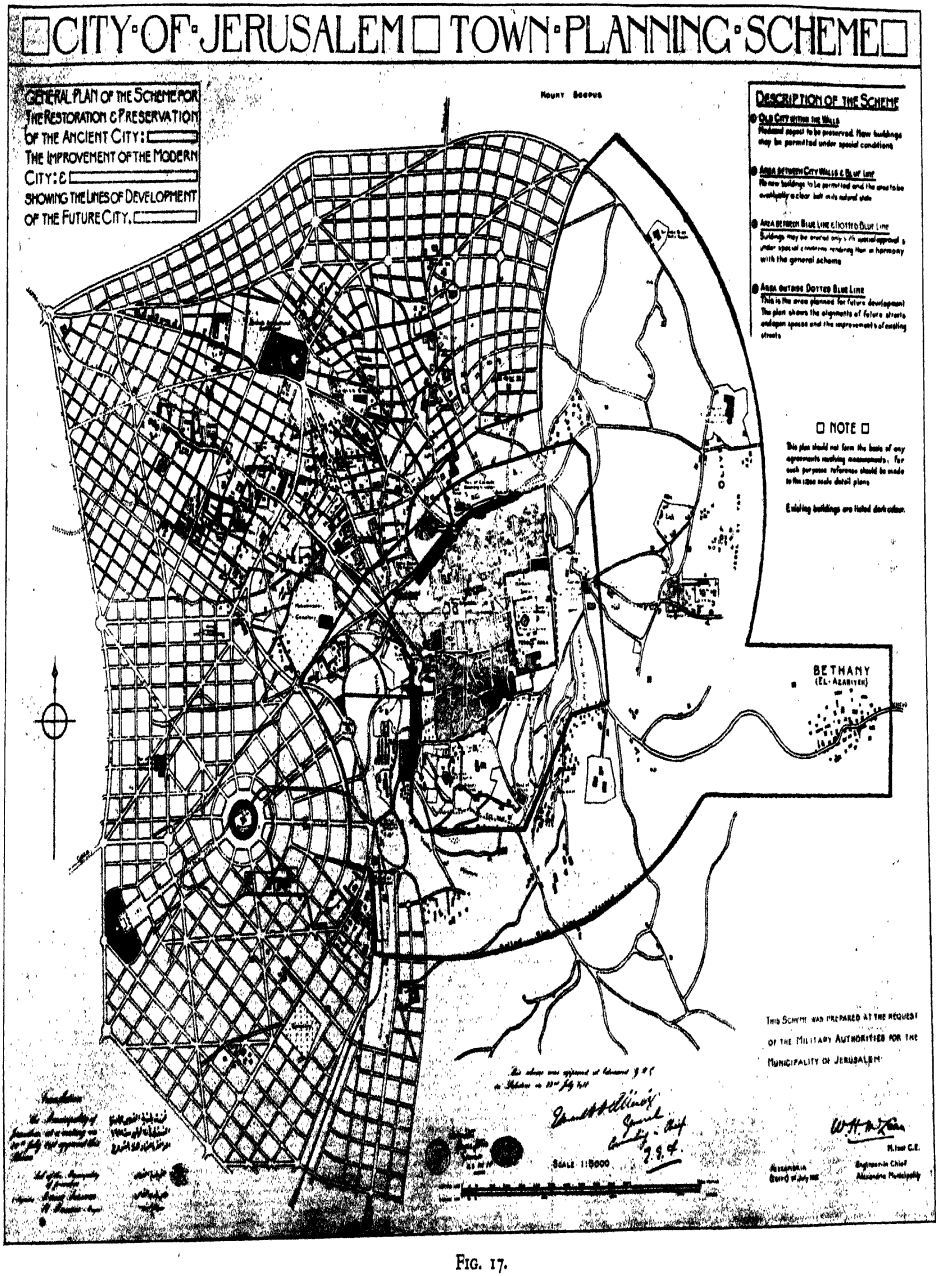


FIG. 17.

GENERAL PLAN OF SCHEME.

(Endorsed by Lord Allenby.)

Note.—This plan, prepared by the Author, was exhibited at the Royal Academy in 1919, and is signed by General Allenby as approved at Advanced G.H.Q. in Palestine on 22nd July, 1918; it has also the Hebrew and Arabic seals of the Military Governor and the approval, in Arabic, of the Municipality with the seal of the City appended.

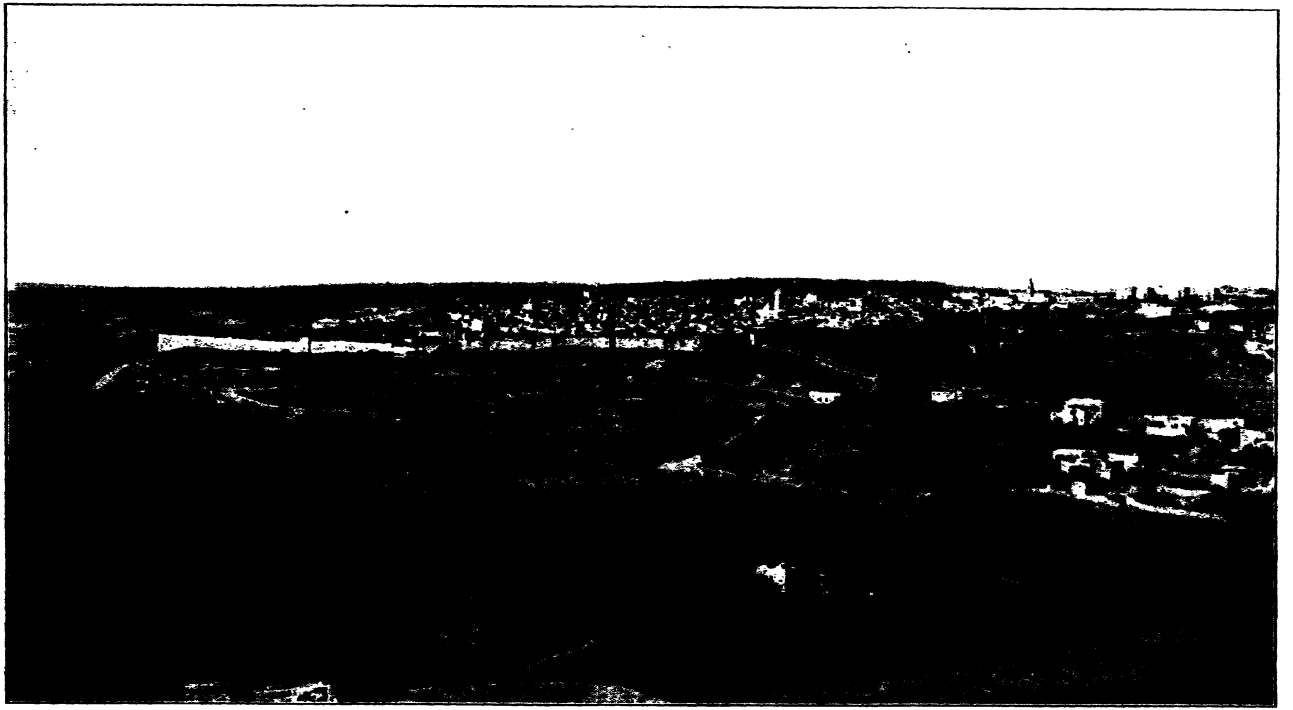


FIG. 18.
VIEW OF JERUSALEM FROM MOUNT OF OLIVES.
(By Courtesy of The American Colony, Jerusalem.)

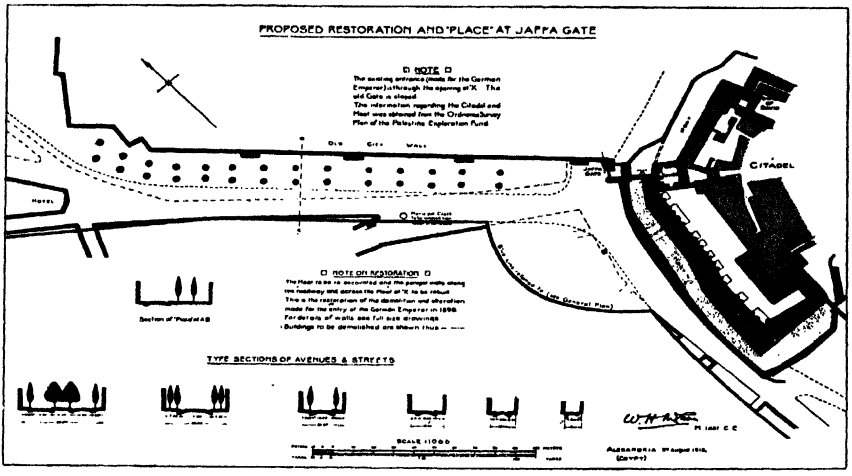


FIG. 19.

DETAIL AT JAFFA GATE AND STREET SECTIONS.

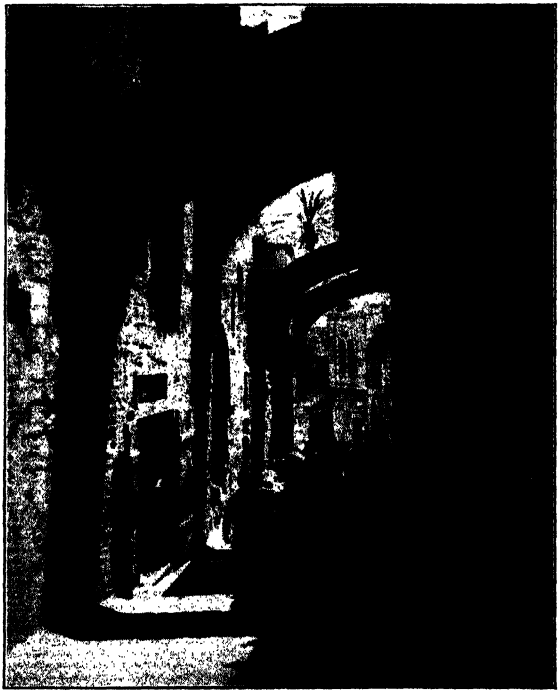


FIG. 20.

JERUSALEM—THE "VIA DOLOROSA."

(By Courtesy of The American Colony, Jerusalem.)

With regard to the repair of private buildings in the old city, the municipality was advised to give what technical assistance might be necessary in this work. A list of buildings of special interest to be made, and the municipality to give its attention to the maintenance of such buildings. It was pointed out that it might sometimes be found necessary to take over a building if funds are available.

The practice of using the graceful flying buttresses across the streets, for the mutual support of old buildings, as in Fig. 20 (Via Dolorosa), was to be encouraged, and also the use of the projecting window (Moushrabieh), preferably in stone, in the case of any reconstructions. The comparatively modern practice of inserting wooden struts instead of building the flying buttresses to be discouraged.

The planning scheme of improvement and development in the modern city, shown on the general plan, had to be largely tentative as the then available plans and contour maps of the city and environs, on which the work was based, were believed to be inaccurate. For this reason it is printed on the $\frac{1}{5000}$ scale general plan that this plan should not form the basis of any agreement involving measurements, and that for such purpose reference should be made to $\frac{1}{500}$ scale detail plans. The work of surveying the ground and preparing these detail plans was to proceed, and in time the modern city would be provided with sectional plans, on the $\frac{1}{500}$ scale, showing the existing buildings and street lines, and the alignments of proposed improvements and of future streets.

The survey of the ground has since been completed and new maps prepared, in the light of which the scheme has been revised and an excellent detailed town plan * for the development of the modern city has recently been made.

CITY OF KHARTOUM DEVELOPMENT PLAN.—Before proceeding to a description of the City of Khartoum Development Plan it might be of interest to consider the history of the city so as to understand how it came about that an entirely fresh start could be made in planning it.

Descriptions of old Khartoum and of the development of the new city were given in a paper by the author, read at the Town Planning Conference † in London in 1910, where it was remarked that from the accounts of the travellers, Petherick and Melly, who visited the Sudan in 1846 and 1850

* Town Plan of Jerusalem prepared in 1926, by Mr. A. C. Holliday, B.Arch., A.R.I.B.A., Civic Adviser, Jerusalem.

† "The Planning of Khartoum and Omdurman," by W. H. McLean, at the R.I.B.A. Town Planning Conference, London, 1910.

respectively, it appears that Khartoum had then become a place of considerable importance. They recorded the irregular construction of the town and the presence of narrow and winding streets which were quite impassable after rain. Here and there were spaces resembling squares, and the architecture of the houses was primitive. There were only a few European residents.

Sir Samuel Baker visited Khartoum in 1862, and he described it as a miserable, filthy, and unhealthy spot. The houses were built chiefly of mud brick, and the town had a densely crowded population of 30,000. He again visited it in 1870, and found the population had fallen to about 15,000, and the town in the same insanitary condition.

In 1880, Felkin, a medical man, records improvement in the sanitary arrangements, the existence of good houses and better class shops, and the erection of grand Government buildings and a large hospital.

Such, then, was the old Khartoum which was destroyed by the Dervishes when Gordon fell, in 1885, and remained in ruins until the reconquest of the country by Lord Kitchener in 1898. The plan of old Khartoum, shown in Fig. 21,* was prepared from information given by Slatin Pasha after his memorable and thrilling escape in 1895 from Omdurman, after twelve years' captivity there. This copy is signed by him. The photographs of old Khartoum are interesting.

The early development of the new Khartoum (Fig. 21) was described in the paper referred to, and it was noted that with the occupation of Khartoum and Omdurman the formation of a civil administration for the government of the country was immediately begun, while the municipality of Khartoum was established by order of the Governor-General in *Sudan Gazette*, No. 29, of November 1, 1901.

The general scheme on which the town has developed was initiated by Lord Kitchener before he left the Sudan, and the most striking feature of the plan is the diagonal streets which appear to have been introduced primarily for military purposes. Each crossing of these diagonals commands a considerable portion of the city. The diagonal streets are undoubtedly a useful direct communication between various points, but at the crossings they form awkward building plots, which are somewhat inconvenient in the business quarter of the town.

The general scheme of the planning is that the main avenues running parallel to the river intersect those running at right angles, forming rect-

* Fig. 21 shows the plans and photographs which were exhibited at the Town Planning Conference in 1910.

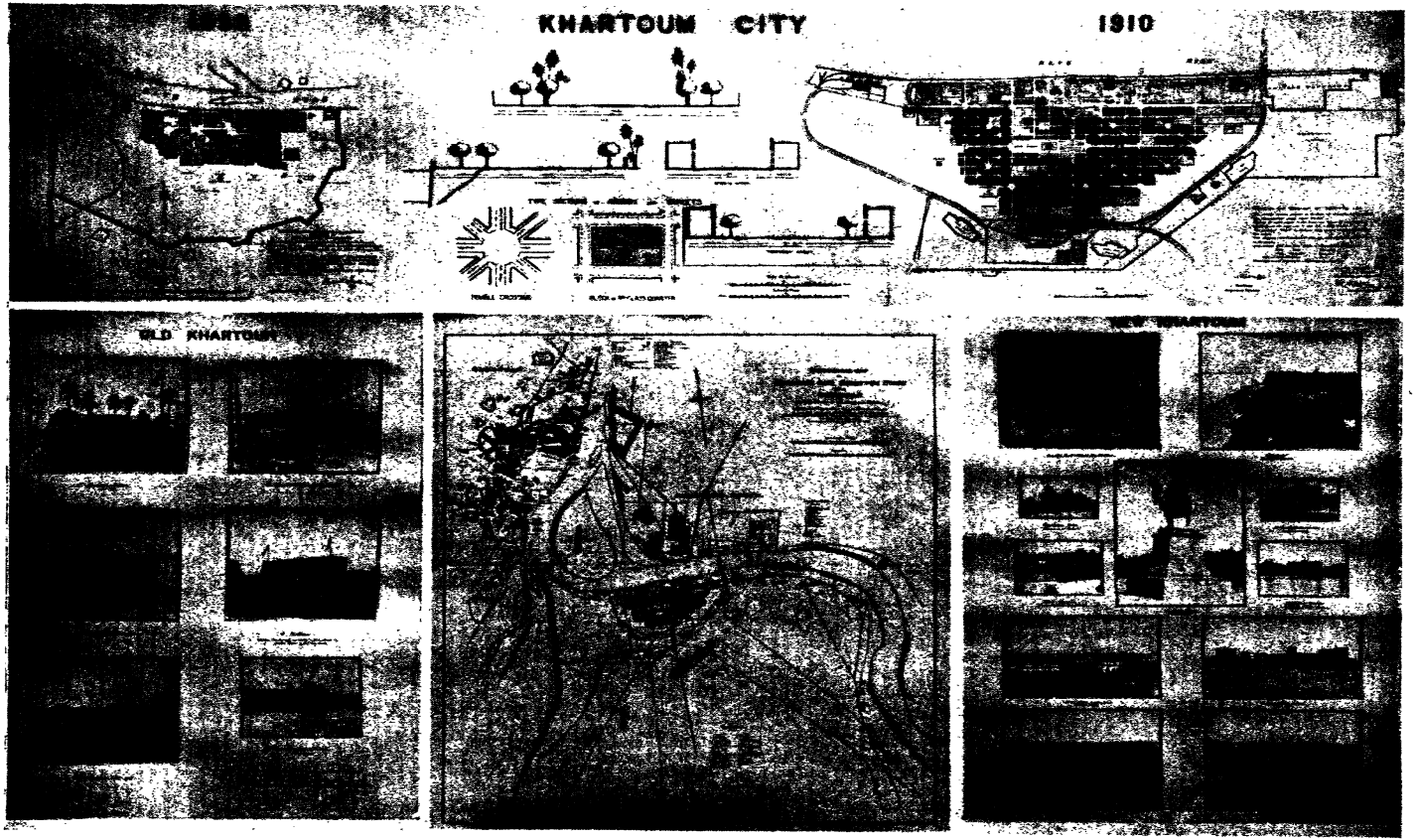


FIG. 21.

PLANS, ETC., OF THE OLD AND NEW CITIES OF KHARTOUM, PREPARED BY THE AUTHOR FOR THE R.I.B.A. TOWN PLANNING CONFERENCE EXHIBITION IN LONDON, 1910.

angles approximately 500 yards square. These rectangles are subdivided by three streets running each way parallel to the main avenues and by the diagonal streets connecting the intersections of the main avenues. All the land between the Embankment and Khedive Avenue is Government land, while that to the south, where hatched on the plans, is principally private property.

With the laying out of the Government land to the north of Khedive Avenue there was not quite such a free hand owing to the desirability of utilising and preserving what remained of the principal buildings and gardens of old Khartoum, and this accounts, to some extent, for the want of symmetry in the plan. The palm groves in the gardens form one of the most attractive features of the city.

Before passing to a consideration of the development plan * for the city which was prepared by the author at Khartoum in 1912, under the personal direction of the late Lord Kitchener (see Fig. 22), it will be well to review the conditions obtaining there, for Khartoum is a tropical desert city quite unlike the other two cities already dealt with, which have been planned on lines approximating to those adopted in Europe. The principles of town and house planning require certain modifications in the tropics, and the problems are intensified by the fact that usually a portion of the population are not in their natural zone, and are therefore not in adjustment with their environment. Special consideration and provision has to be made if this portion of the population is to enjoy even a fraction of the comfort of the native population who are adjusted—for example, by their skin pigmentation —to the climatic conditions. The civic survey in the tropics should, therefore, include statistics of the nationality of the population, so that zones may be arranged as far as possible suited to the requirements of the various sections of the population.

Descriptions of the conditions at Khartoum, and of the preparation of the development plan (Fig. 22), were given in an article † written by the author for the *Town Planning Review* in 1913. It is there explained that Khartoum, the capital of the Anglo-Egyptian Sudan, is situated at the junction of the Blue and White Niles, in north latitude 15° 30′ and about 1,260 feet above the level of the Mediterranean. The climate is a semi-arid desert one, there being a rainy season from July to September; but the

* "City of Khartoum Development Plan," by W. H. McLean, Municipal Engineer, Khartoum, 1912. The Fig. 22 shows a copy of this plan with an endorsement by General Sir F. R. Wingate, Bart., late Governor-General of the Sudan, to the effect that it was prepared by the author under the personal direction of Lord Kitchener.

† "Town Planning in the Tropics," by W. H. McLean, M.Inst.C.E., in the *Town Planning Review*, January, 1913. University Press, Liverpool.

annual amount of rainfall varies considerably, and in some years there may be only a few heavy showers. The maximum temperature in winter is generally over 90° Fahr., but the cool and dry north wind which prevails makes it very pleasant. The maximum summer temperature is seldom over 110° Fahr., but this with a prevailing south wind is often very trying, more especially during the occasional dust storms.

Owing to these climatic conditions it is desirable that Europeans should live in houses so arranged as to be exposed to the prevailing winds. Whenever possible, therefore, they are placed with a north and south exposure, and surrounded by gardens or open spaces, to permit of the free circulation of air. A house not so placed is most uncomfortable for a European to live in during a great part of the year. The natives, however, can live comfortably in much more crowded circumstances; so that owing to this and to the cost of land in the city, the houses in the native quarter are often built abutting and with courtyards (hooshes) in the centre of them.

Partly owing to these conditions, the streets, especially in the European quarter of the city, have been made of considerable width. Thus the wind has free access to the houses, which, as has been shown, is so necessary in the hot weather when "air movement" must be obtained either naturally or artificially by means of fans or punkas. Under certain conditions in the tropics it may be, of course, permissible, or even desirable, to adopt somewhat narrow streets.

The result of compliance with the foregoing conditions is that, for the number of its inhabitants, the city is spread over a comparatively large area, thus involving a greater expense in street making, conservancy, etc., than would be the case where the conditions allowed of a more compact town.

The plan (Fig. 22) was prepared in anticipation of the great development which has taken place, and to avoid the expensive muddle which results from the absence of a town-planning scheme well in advance of development. Reference to the plan will show that with the completion of the Blue Nile Bridge and the carrying of the railway into Khartoum City some new problems were introduced, and it was impossible to carry the old scheme of planning much further, so that new lines of development had to be considered. The determination of these was greatly facilitated by the fact that the greater part of the land surrounding the city was the property of the Government.

Referring to the plan, it will be seen that the areas or plots built upon are shown darkly shaded. It may be here remarked that for all practical purposes of town planning the whole of the area dealt with may be considered

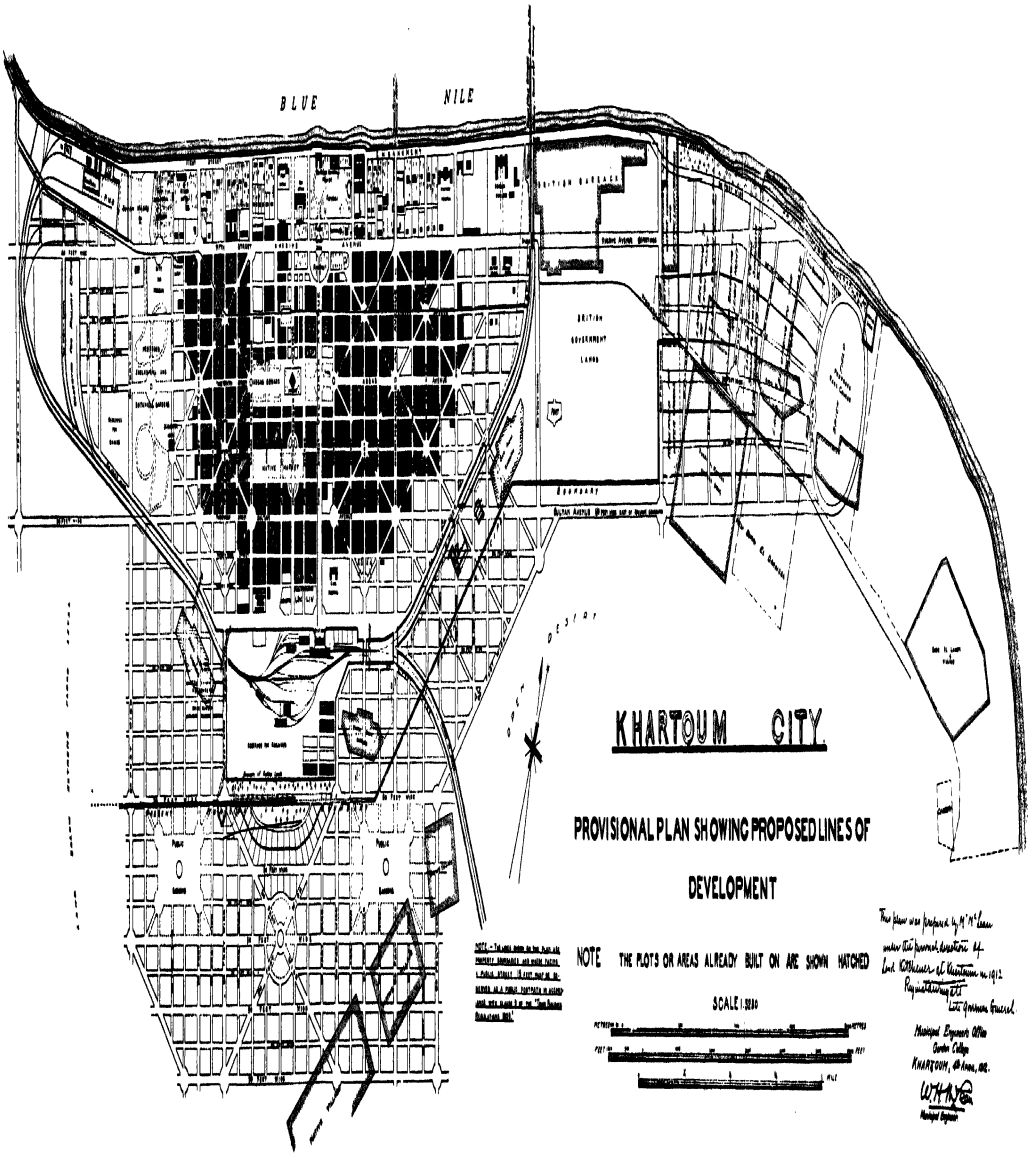


FIG. 22.

KHARTOUM DEVELOPMENT PLAN (ENDORSED "THIS PLAN WAS PREPARED BY MR. MCLEAN UNDER THE PERSONAL DIRECTION OF LORD KITCHENER AT KHARTOUM IN 1912—REGINALD WINGATE, LATE GOVERNOR-GENERAL").

[To face page 70.

as level. The lines shown on the plan are property boundaries, and the building regulations require that where fronting a street 15 feet shall be reserved as a public footpath.

It will be noted that the railway gave an opportunity for a girdle avenue round the city, and that the continuation of the diagonal streets provides convenient radial communication with the central area.

The only remark one might make regarding the general lay-out is that it was governed by the fact that it is necessary so far as possible to give the houses a north and south exposure. Khedive Avenue is extended at its full width of 150 feet and Sultan Avenue at a similar width. All other avenues are 120 feet wide and the secondary streets 80 feet wide. There are several conservancy lanes shown, which are of a width of 12 feet.

Fig. 23 is a recent view of Khartoum taken from the air, which shows one or two of the diagonal streets and also how the city has stretched southwards. The Palace is in the foreground, and Victoria Avenue (180 feet wide), which is centred on it, has the railway station at its south terminal. At its crossing with Khedive Avenue (150 feet wide), which runs parallel to the river, the Gordon statue is seen. The War Office is seen to the right of the Palace with the Kitchener statue in front.

SCHEMES FOR THE PROVINCIAL TOWNS OF EGYPT.—A great deal of work has been done in the provincial towns of Egypt in planning both for the development of unbuilt areas and for the improvement of built areas. As the value of property, especially in the smaller towns and villages, is relatively low, it has been possible, under the laws and procedure which are described in Part IV, to open up most of the old towns by cutting new streets through them. A description of the various types of towns, the conditions which produced them, and the programme of improvement and development, was given by the author in an article* written in 1917. With reference to the climate it was remarked that it varies considerably, Upper Egypt being hot and dry like the Sudan, while Lower Egypt has a temperature generally much lower, and there are occasional heavy rains in winter, the towns nearer the coast having the greater rainfall. In Alexandria, for example, the climate is like that of Southern Europe in many respects.

Types of Towns.—In dealing with the various types of Egyptian towns it was observed that the narrow streets and lanes in the older towns seem to

* "Local Government and Town Development in Egypt," by W. H. McLean, M.Inst.C.E., Engineer-in-Chief, Municipalities Section, Ministry of Interior, Egyptian Government, in the *Town Planning Review*, April, 1917. The University Press, Liverpool.

have been constructed partly with the idea of giving shade, but there is no doubt the great congestion has been contributed to in some cases by the limited amount of suitable building land. In the old days, and even yet where basin irrigation exists, towns during the inundation or Nile flood were practically islands in a flooded country, and their extent and height above flood-level was the growth of centuries. Many of the older towns are built on quite large mounds consisting wholly of the ruins of successive towns on the same site.

The types of towns met with vary considerably, but generally a town consists of two somewhat ill-defined zones, namely, a better-class quarter occupied by well-to-do classes of Egyptians and Europeans, and an inferior quarter, usually the older part of the town, occupied principally by the working classes and containing the bazaars. The houses in the former quarter are built chiefly of brick or stone plastered and ornamented in the style common in towns on the shores of the Mediterranean, while in the latter quarter the buildings are usually of an inferior class of brickwork or masonry with timber built in to strengthen the work; sometimes the top story is built simply of lath and plaster on a timber framing. The only interesting feature of these houses is the enclosed balconies (moushrabieh), which are often treated in a pleasing manner. The better-class quarter is in most cases an extension of the old town on the lower-lying agricultural land which was annually flooded before the introduction of perennial irrigation. The planning and development of this quarter generally presents no serious difficulty, and the usual European principles of town planning, with slight modification, can be adopted in most cases, especially in Lower Egypt. The especial interest attaches to the improvement of the older part of the town, and a description of the programme carried out in the smaller towns will serve to illustrate the work.

Such a town, before being taken in hand, is like a rabbit-warren with narrow winding streets, innumerable long blind alleys, and no public open spaces; the cemetery often near the middle of the town, the streets evil smelling and littered with garbage, and with stagnant pools (birkas) amongst the habitations.

Programme of Improvement and Development.—First in the programme of town improvement and development comes the establishment of "Tanzim," which is the service dealing principally with the amelioration of the alignment of existing streets and the opening of new ones. This service proceeds with the preparation of a general plan of the town, if one does not already exist, and it also makes large-scale plans of each street

FIG. 23.
KHARTOUM—VIEW FROM THE AIR.
(By Courtesy of Mr. Tarttelin)

FIG. 24.
TOWN PLANNING IN EGYPT—TYPICAL SMALL TOWN.
Plan showing the initial principal improvements.

[*To face page* 72.

separately. The laws and procedure for giving effect to these plans are dealt with in Part IV.

Street Planning.—On the general plan are shown the mosques, churches, and any buildings of a nature sufficiently interesting to be preserved. The Arab Monuments Committee has been consulted on several occasions, and with its assistance, in one case, it was possible to preserve from destruction and arrange for the proper maintenance of part of an interesting old street containing good examples of a picturesque style of domestic architecture.

As a rule, in the smaller towns, the mosques are the only buildings worth preserving, and an attempt is generally made to arrange for an open space in front and around them, and also to make them a feature in the street planning. If there are existing principal streets, it is usual to plan for their widening and straightening, and perhaps to improve their connection with the railway station, mosques, the market, and with any public buildings. Sometimes the town is badly congested and without any main street, then it is necessary to arrange for entirely new streets, generally one running through the town, say north and south, with, perhaps, another across it from east to west. Fig. 24 is a plan of a typical small town showing the principal improvements already carried out, the new streets being shown darkly shaded. The inhabitants readily appreciate that this procedure of opening up thoroughfares is beneficial to the town from a public health point of view, as well as facilitating traffic and causing an increase in the value of property in the neighbourhood of the improvements.

The amelioration of the secondary streets is next planned, and also the connecting up of the long blind alleys which abound in every town. The streets are all "decreed" by law to be of the widths planned, and any expropriation necessary for the improvements may be carried out at once or, as is more usually done, allowed to remain over until buildings on the land to be acquired are in a condition of ruin or until funds permit. Buildings which are affected by a "decreed" improvement may not be modified or repaired. In the case of the new streets referred to the expropriation is carried through at once, as such an improvement cannot generally be done "piecemeal" like the amelioration of an existing street.

The proper widths of streets in tropical and sub-tropical towns have been much discussed. In Khartoum a generous width was rightly adopted for the reasons already given. The ideal street section in a sub-tropical town would, it was thought, be one with a width of carriage-way just sufficient for traffic requirements and with footpaths wide enough to permit of shady

arcades in front of the buildings, and also, if possible, a row of trees between the arcades and the carriage-way (see Fig. 21). However, such a width as is necessary for this section is, as a rule, not practicable unless when planning a future extension in open land; and in dealing with the improvements of an old town widths of from 6 to 12 metres are usually adopted owing to the cost, and occasionally also owing to the fact that the inhabitants displaced by the improvements might have some difficulty in finding other accommodation or suitable land on which to rebuild.

A COMPARISON WITH PRACTICE IN ENGLAND.—The most striking feature about all this town-planning work in the Near East is the fact that the planning and execution of the improvement and redevelopment of built areas has been in progress for over a generation, whereas the planning of unbuilt areas there is comparatively recent.

In England these things have developed in exactly the reverse order. The difficulties of dealing with built areas are very great, as one has found by experience in the East, and they are of even greater magnitude in England; but it is to be hoped that the necessary legislation on the subject, which is now demanded in England, will be not long delayed.

The methods of procedure adopted in applying the schemes which have been described are fully dealt with in Part IV. The conditions and the laws obtaining in these Eastern countries have made it necessary and possible to go back in many cases to first principles and to adopt simple and direct methods to reach the desired result.

REGIONAL AND NATIONAL DEVELOPMENT PLANNING.

REGIONAL AND NATIONAL PLANNING; THEIR RELATION TO TOWN PLANNING.—Fig. 25 is a diagram prepared by the author to illustrate the relation between National, Regional, and Town Planning Schemes. It shows that a National Scheme would co-ordinate the Regional Planning Schemes, while the latter, in their turn, would co-ordinate the Town Planning Schemes. This diagram formed part of a Note * regarding a proposed National Development Planning Scheme for Scotland.

PROPOSED NATIONAL DEVELOPMENT PLANNING SCHEME FOR SCOTLAND.—In the above-mentioned Note it was explained that at the Glasgow Conference of Local Authorities and others

* Note prepared for the information of the Committee elected at the Regional Planning Conference of Local Authorities at Glasgow in June, 1926, by W. H. McLean, M.Inst.C.E., M.T.P.I.

on Regional Planning in June, 1926, the author had the privilege of making the suggestion which led to the resolution to create a Regional Planning Advisory Council for Scotland, treating the country as an economic whole, as against the setting up of an Advisory Council for the central industrial belt only as originally proposed. The Note was written, he explained, in the hope that it might be useful to his colleagues on the Committee elected to arrange the matter.

The resolution adopted at the Conference said that the Advisory Council shall co-ordinate and foster all movements looking towards this end (*i.e.* Regional Planning in Scotland), collect and publish facts regarding the economic, industrial, and social values in a regional plan or plans for

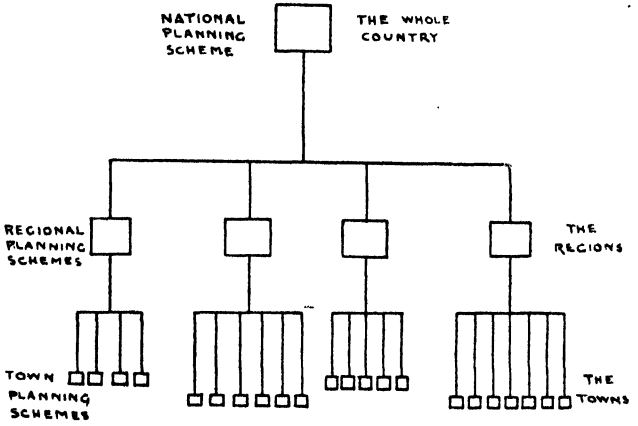


FIG. 25.—NATIONAL DEVELOPMENT PLANNING SCHEME FOR SCOTLAND.

The diagram illustrates the relation between National, Regional, and Town Planning Schemes. The National Scheme would co-ordinate the Regional Planning Schemes, while the latter, in their turn, would co-ordinate the Town Planning Schemes.

Scotland, and take such other action as may be found necessary or desirable for this purpose.

The work of the proposed Advisory Council, as the author understood it from this resolution, the Note continued, would entail in the first place a general "survey" of Scotland in order to ascertain its potentialities for development and to gain information regarding the wide range of factors contributing to or determining this development; and, in the second place, to study and co-ordinate the results of this "survey" with a view to ensuring that the country and its resources may be developed to the greatest economic advantage. This work would take the form of a National Development Planning Scheme.

The various regions of the country are to some extent interdependent in their future development, hence the desirability of having the general lines for the whole country fixed in advance in order to facilitate the co-ordination of the regional schemes which are to be prepared. The regional schemes may be considered as being the details of the national scheme in the same way that town planning and other schemes form the details of the regional schemes.

Besides the great industrial belt of Central Scotland, there are the agricultural areas to the south and also to the north which will provide part of the future food supply to the industrial belt. Again, there are the minerals and the possibilities of water-power development in the Highlands, both for local industries and for long-distance transmission of electrical energy to the industrial zone to augment the power supply from the coalfields. It was noted that any industrial development in the Highlands should, of course, be planned to avoid spoiling their beauty. The foregoing are illustrations of the interdependence of the regions.

The scope and general lines of the work to be done by the Advisory Council might, it was thought, be stated briefly as follows:

I. The Preliminary "Survey."—The collection of information of national importance on the wide range of subjects contributing to or determining development such as the undernoted:

(*a*) *Minerals.*—Geological reports and maps showing the coal, stone, and other minerals which are available for exploitation.

(*b*) *Water Power.*—Information as to the water power available, especially in the Highlands. (The recent schemes afford much information.)

(*c*) *Town Water Supplies.*—The sources of water supply which are available for the future needs of towns. (On the lines of the Ministry of Health Memorandum.)

(*d*) *Agriculture and Afforestation.*—Any schemes showing the possibilities of agricultural development and afforestation.

(*e*) *Population.*—Information regarding the growth and distribution of the population.

(*f*) *Communications and Transport.*—Any schemes of national importance for the development of communications and transport by rail, road, water or air. (Much information is now available.)

(*g*) *Electricity—Lighting and Power.*—The general proposals for electric lighting and power supply throughout the country. (The Central Electricity Board has now dealt with this matter.)

(*h*) *Industries.*—Information regarding the development of industries which are or may become of national importance.

(*i*) *Commerce.*—Information showing the general lines of the requirements of commerce as to future development.

II. The Preparation of a National Development Planning Scheme. —The information obtained in the "survey," it was proposed, should be studied and co-ordinated in its general lines, where possible, so as to form a comprehensive Scheme of National Development Planning containing a suggested outline of the future development of the country, as a whole, for a period of from thirty to fifty years. Most of the items included in the "survey" are interdependent in some measure, so that co-ordination is necessary to obtain the maximum economic advantage in development.

It is evident, for example, that the potentialities of the country must govern to a large extent the possibilities of its future development, and also that the planning of development in any one direction should be related to this limiting factor as well as to the proposals for development in certain other directions. Further, it is not economic to plan towns, communications and transport, harbours, power works, etc., for a greater or more rapid development than a comprehensive study of the factors contributing to development indicates is likely or is possible to take place.

For example, it was noted that the development of communications (railways, roads, waterways and ports) should be planned in relation to the estimated necessities of future traffic, which, in turn, will depend upon the estimated future changes in, or grouping of, the population, the estimated requirements of commerce, the possibilities of industrial expansion, and of agriculture. These factors react upon each other, so that they must be studied together. The basis, of course, is the potentiality or possibility of development of the country. For instance, the area of land for any specific purpose is limited, and this also applies to the minerals and to the sources of power as at present known. Only the national aspect of the general lines of each subject would be dealt with and the widest and longest view of development would be taken, based on a study of the facts and tendencies so far as they can be ascertained.

The National Scheme, it was observed, will supply the general framework for the regional schemes, which will require a more detailed and localised study by the Regional Committees in the manner already adopted in England and elsewhere, regarding such matters as communications, distribution of population (density and grouping), industrial development (zoning), agricultural development (reservations near towns), and public services (water, gas, electricity, power and sewage disposal), etc.

Although the immediate necessity for the National Scheme is the local government requirements as to regional and town planning, it was pointed out that the proposed scheme, being a general economic study of the future

development of the whole country, would have an interest for central government as well as for land owners, industrialists and others concerned in the development of Scotland.

Fig. 26 is the National Development Planning Scheme for Scotland in the form of a diagram, which shows graphically that various interdependent factors contributing to national development would be dealt with, and their estimated development, over a period of, say, fifty years would be co-ordinated.

The suggested minimum number of regions into which the country

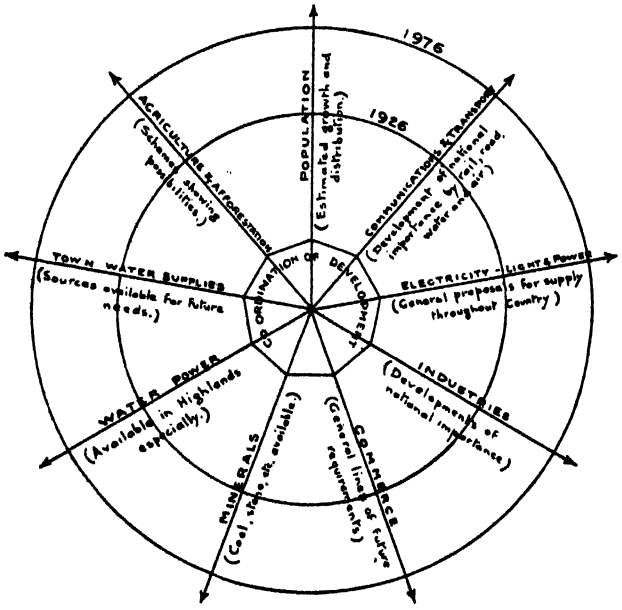


FIG. 26.—NATIONAL DEVELOPMENT PLANNING SCHEME FOR SCOTLAND SHOWN IN THE FORM OF A DIAGRAM.

The diagram shows graphically that various interdependent factors which contribute to National Development would be dealt with, and their estimated development over a period of, say, 50 years would be co-ordinated.

might be divided for the purposes of planning is ten, and they would be formed of groups of counties which have some community of interest, such as the valleys of the Forth, Clyde and Tay, and the agricultural areas in the south and in the north, and also the Highland area.

A map showing physical features, population density, towns and communications, prepared by the author, demonstrated that the population is naturally most dense in the valleys where the main line railways run. The population has evidently followed the railway development, and any

future survey will probably show that, as a result of modern road transport, the population density in the region of the main roads has become relatively greater. The National Electricity Scheme, which will be realised in the near future, will doubtless have a direct effect on all planning in the industrial belt of Central Scotland.

It may be remarked that the area of the map referred to, which is indicated as being the most densely populated, is also the region of the coalfields and the main industrial zone.

NATIONAL DEVELOPMENT PLANNING IN ENGLAND AND U.S.A.—The National Development Commission in England was short lived. It appears to have been occupied with planning which entailed the more or less immediate construction of works and large expenditure, so that its work was practically brought to an end in the interest of economy under the Geddes "axe." In the book *Britain's Industrial Future*,* whether or not one agrees with its politics, one must admit that the suggestion made to form a Committee of National Development is excellent, provided, however, that it concerns itself primarily with the making of a complete co-ordinated National Development Scheme, which, like a regional plan or town plan, would serve as a guide for development only when it becomes necessary. The matter should not be one of party politics, and any programme indicated in the scheme should have an economic basis. It is the fear of large expenditure becoming immediately necessary that makes the initiation of planning schemes often so difficult. The following is an interesting extract from the book referred to, relative to this proposal:

> "We put, therefore, in the forefront of our proposals a vigorous policy of national reconstruction embracing within its scope, *inter alia*, the rehabilitation of agriculture, still the largest of our national industries; an extensive programme of highway development; afforestation, reclamation, and drainage; electrification, slum clearance and town planning; and the development of canals, docks, and harbours. . . .
>
> "It will be obvious that the programme of national development outlined in this chapter covers a wider field than the activities of any one Government Department. It involves co-ordinated action by the Ministry of Agriculture, the Ministry of Labour, the Ministry of Transport, the Mines Department of the Board of Trade, the Central Electricity Board, the Forestry Commissioners, the Development Commissioners, and the Rural Industries Bureau, and necessi-

* *Britain's Industrial Future*, being the Report of the Liberal Industrial Inquiry. Ernest Benn, Ltd. 1928.

> tates the sympathetic and active assistance of the Treasury. We propose, therefore, that the direction of National Development should be placed in the hands of a Committee of the Privy Council, which might be called the Committee of National Development. This Committee would be directly responsible to the Prime Minister. Its duty would be to formulate a consistent and comprehensive policy for the development of national resources, and to co-ordinate the work of the Departments on which the executive duties would fall. It is obviously desirable that this Committee of National Development should take over the work now being performed by the Development Commission, whose work must, it is now evident, be backed by larger resources and carried through with the utmost energy on the greater scale envisaged in this book."

One notes a serious omission from the list of Government Departments to be co-ordinated—that is, the Ministry of Health which is the Department responsible for nearly all the comprehensive development planning work which has yet been done in England. One also gathers from the latter part of the above extract that the carrying out of works would be the chief concern; the planning work might therefore be subordinated and be only that which was sufficient unto the day. If this were so, then the work of tne proposed Committee would be greatly impaired, and its fate might be the same as its predecessor.

The Economic Advisory Council, whose duties are set forth in a Treasury Minute dated January 27, 1930, apparently envisages the making of a comprehensive study of National and Imperial development.

It is hoped that the Local Government Act (1928) will do much to dissipate the parochial spirit in Britain by the consequent widening of the areas of local government administration, and, incidentally, of regional and town-planning control.

National and regional planning appears to be envisaged by the legislature in U.S.A., as will be noted from the following extract from *A Standard City Planning Enabling Act* * published by the Government:

> "*Powers and Duties of the (Regional Planning) Commission.*—Any regional planning Commission is hereby authorised and empowered to make, adopt, amend, extend and add to a master regional plan for the physical development of the region. Such plan should be based on comprehensive studies of the present and future development of the region with due regard to its relation to neighbouring regions and the State as a whole and to neighbouring States."

* *A Standard City Planning Enabling Act*, by the Advisory Committee on City Planning and Zoning of the U.S. Department of Commerce (Dept. of Commerce, Herbert Hoover, Secretary). United States Government Printing Office, Washington (1928).

Reference might be here made to the *Regional Survey of New York and its Environs*, which has just been made under the direction of Mr. Thomas Adams, P.P.T.P.I. The region covers an area of 5,528 square miles, with a population of ten millions. Development for a period up to 1965 has been planned when it is estimated that the population will be double the present number.

THE NATIONAL AND REGIONAL DEVELOPMENT PLANNING SCHEME FOR EGYPT.—It might be of interest to refer to the National and Regional Development Planning Scheme for Egypt which was initiated by the author. In Egypt most of the public services are in the hands of the Government and the scheme was instituted for the following purposes:

(*a*) To provide an approved general outline or programme for the future development of the country, and to furnish information to the Government which would assist in dealing with social, financial, and other problems.

(*b*) To avoid, so far as possible, any uneconomic general development; to ensure that the resources of the country are employed in the best manner, and that essential phases of development are not neglected.

(*c*) To assist the Government in judging the relative importance of and the necessity for various branches of development, and to provide the departments of the Government with a fuller knowledge of each other's proposals for the future.

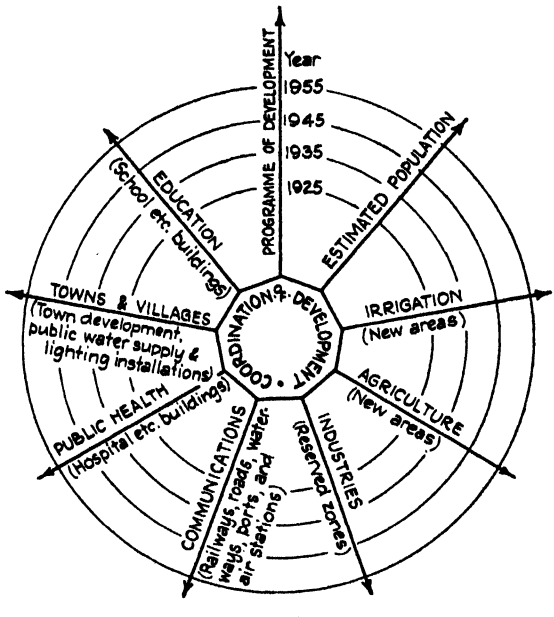


FIG. 27.—PROPOSED GENERAL SCHEME OF NATIONAL AND REGIONAL DEVELOPMENT PLANNING IN EGYPT SHOWN IN THE FORM OF A DIAGRAM.

The diagram shows that the scheme will deal with the development of the country in all the principal directions; that these will be co-ordinated; and that a programme of development will be indicated.

A description of the scheme was given in a paper * read by the author at

* "Note on a Proposed General Scheme of National and Regional Development Planning in Egypt," by W. H. McLean, M.Inst.C.E.—*Proceedings of the International Geographical Congress in Cairo in* 1925.

the International Geographical Congress in 1925. It was explained that in a country such as Egypt with a rapidly increasing population and where a great development may be expected in the future, it is especially desirable that the general lines of this development should be studied and co-ordinated.

The diagram, Fig. 27, shows graphically the scheme for Egypt, and it will be noted that it is proposed to deal with the development of the country in all the principal directions for an estimated future population, that these will be co-ordinated, and further, that a programme of development covering a period of at least thirty years will be indicated. This diagram is intended to emphasise the fact that nearly all branches of development are inter-dependent and that co-ordination is necessary. Fig. 28 is a map of Egypt showing the regions into which the country is naturally divided, and these would be taken as the units for the regional planning.

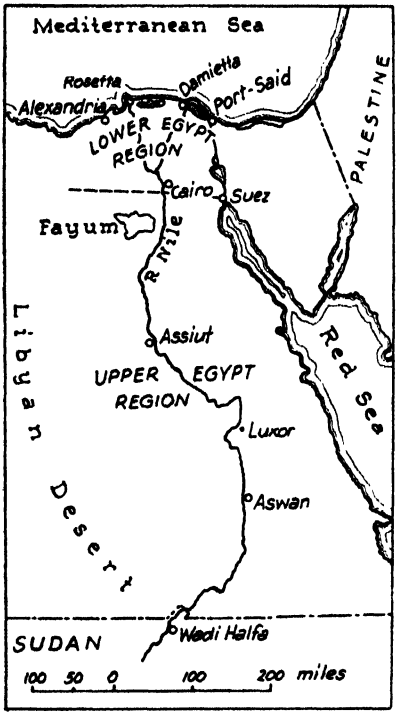


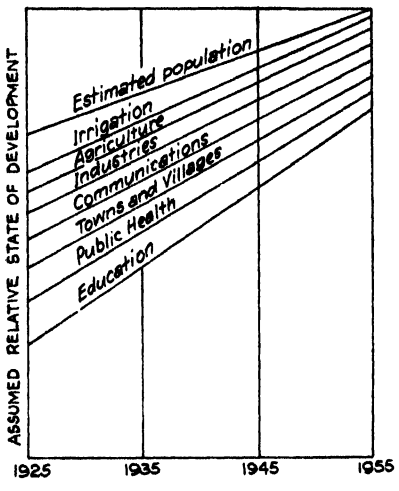
FIG. 28.—MAP SHOWING REGIONS.

The national aspect of the problem, it was pointed out, is first considered. For example, the entire network of the communications of the country and their proposed extensions must be studied together and taken along with the proposed irrigation extensions, and all of them referred to the needs of the estimated future population. The question of future traffic requirements and the development of the seaports as well as any special requirements for the defence of the country have also to be considered. A general higher standard of living must be foreseen and, for example, the fact that the people are not slow to avail themselves of any additional travelling facilities, such as by motor omnibus between the villages and the towns, shows that the desire for this exists.

Referring to the regional aspect of the problem and taking as an example the development of towns and villages, it was explained that one must consider their requirements as a whole over a large area. This involves a variety of problems such as the communications between the larger towns,

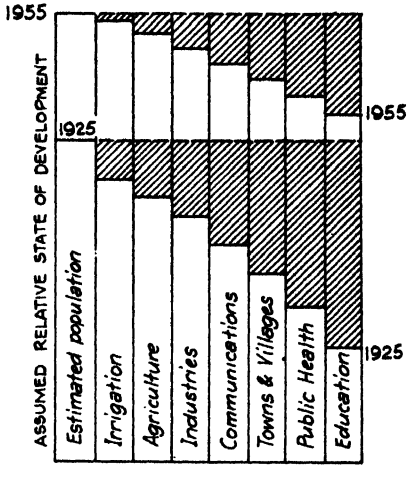
and also between the larger towns and the smaller or " satellite " towns and villages in their neighbourhood. The future population must be provided for, including the needs of those who will dwell in the areas which will be put under cultivation when the irrigation projects are carried out.

The relative claims for the development of rail, road, water and air transport must be examined and suggestions made in the common interest. The future extension of the main system of canals and of the railway and main road systems must be examined together in order to secure the maximum advantage and to avoid unnecessary duplication and consequent waste.



(*a*)

Note.—This diagram shows that some branches of development would be planned to progress more rapidly than others in order to meet the gradually advancing standard of living of an increasing population.



(*b*)

Note.—This diagram shows the assumed relative state of development in the years 1925 and 1955. It illustrates, for example, that education would be planned to make greater relative progress than other branches.

FIG. 29.—ASSUMED PROGRAMME OF DEVELOPMENT SHOWN IN THE FORM OF DIAGRAMS.

Air transport and the provision of aerodromes are factors to be reckoned with in considering the transport problem. There are also to be examined questions of central stations for public water supply and lighting and power and the grouping of towns for this purpose in the interest of economy.

The scheme should note the reservation necessary for industrial purposes, including areas for fisheries and quarries; and the questions of general education extension and of public health provisions must also be noted, as they involve a large capital expenditure in buildings and other works which ought to be taken into account in the programme for the general

development of the country. The relative claims for development of these divergent interests should be examined in making the proposed programme, which must have an economic basis. It would be obviously a mistake, for example, to spend all available funds on education or public health and to neglect irrigation or communications, and some continuous policy of development must be established so far as possible.

The foregoing are examples of the phases of development which need to be studied in preparing the proposed general scheme. It is evident that if this scheme provided even a mere outline which would indicate the general policy to be pursued, it would be of the greatest use to the Government, to the commercial community, and to the public generally.

The Fig. 29 (*a*) shows an assumed programme of development for a period of thirty years, and it has been prepared to illustrate that some branches would be planned to progress more rapidly than others in order to meet the gradually advancing standard of living of an increasing population. The diagram, Fig. 29 (*b*), shows the assumed relative state of development in the years 1925 and 1955, and it illustrates, for example, that general education should be planned to make greater relative progress than other branches, as it has only reached a relatively low standard.

It was laid down that in order to prepare the scheme it is necessary to make a "National and Regional Survey," and for this purpose to obtain from Government Departments and other sources such information as may be available. A list was drawn up of the information required from Departments such as the Survey of Egypt and Statistical Department (Ministry of Finance), the Egyptian State Railways and the Roads and Bridges Department (Ministry of Communications), the Municipalities Section and Public Health Department (Ministry of Interior), the Irrigation Service and the State Buildings Department (Ministry of Public Works), and others. The list embraced schemes, plans, statistics and reports dealing with future development. The full text is given in Appendix I.

The scheme to be based upon the information collected in the "Survey," the essential elements being selected and co-ordinated, and, where necessary, suggestions made modifying or amplifying these elements in the interests of the general scheme of planning.

After formal approval the scheme would serve as a guide for future development, on the understanding that it is subject to any modification which experience proved to be necessary or desirable.

H.M. King Fouad of Egypt has taken a gracious personal interest in this work, and schemes covering from thirty to fifty years' development have

already been prepared for Irrigation, Education, Public Health and Communications.

KHARTOUM PROVINCE REGIONAL PLANNING.—One of the earlier schemes of a regional nature of which the author had actual experience was made by a Committee formed to deal with the development of Khartoum at the time when the railway was carried across the Blue Nile to the city. It was seen that the conditions in, and the future development of, the three towns of Khartoum, Khartoum North, and Omdurman would be changed, and in 1909 the Governor-General formed a Committee to deal with the development of the Province of Khartoum as a whole. This Committee studied the requirements of trade and other interests concerned and examined the projects of the various Government Departments, and from this study was evolved a scheme indicating the lines of future development. This regional scheme was of great utility in preparing the town-planning scheme for Khartoum in 1911, already described.

PLANNING SCHEMES FOR COLONIES (Undeveloped and Partially Developed Territories).—Some of the Colonial Office Reports * dealing with the general development of Colonies, Protectorates, and Mandated Territories provide good examples of the regional "surveys" which are necessary for the preparation of planning schemes, and in some cases the reports are extended to indicate a scheme of development planning, but usually only in certain directions and covering a comparatively limited period. Reference has been made to these reports in Part II, under the head of "Transport Development in the Colonies," but it may be remarked that the necessity for complete development planning schemes appears to be recognised, for the Report on West Africa, for example, recommends the planning of a programme of transport development in which rail, road, and water transport must be co-ordinated and each considered in its relation to the others. Again, in East Africa, the desirability of co-ordinating the development of adjacent Colonies, appears to be recognised. A study has been made of roads, especially trunk roads connecting the main territories, of economic railway development, transport by road, lake, and river, air routes, wireless and postal services, and labour questions.

The construction of large works (communications, irrigation, etc.) in comparatively undeveloped countries tends to change the entire economic

* *Report of the East African Commission*, 1925. H.M. Stationery Office. *Report of the East African Guaranteed Loan Committee*, 1926. H.M. Stationery Office. *Report by the Hon. W. G. A. Ormsby-Gore, M.P., on West Africa*, 1926. H.M. Stationery Office. *Colonial Office Conference*, 1927—*Appendices to the Summary of Proceedings*. H.M. Stationery Office.

life of these countries in a relatively short space of time, hence the need for complete regional planning schemes. Like the Egyptian scheme, already referred to, these would provide an approved programme of development, ensure the employment of resources in the best manner, avoid uneconomic development, and assist the Government in judging the necessity for, and the relative importance of, the various branches. The 1927 Colonial Conference has done work as referred to in Part II, which is an important step in the direction indicated.

Principles of Planning.—In dealing with Colonies there are two categories of territory to be considered, viz. territory that is entirely undeveloped, and territory which has been partially developed. In the former case it is possible more or less to follow first principles, as a start can be made with a "clean slate," and there is probably no reason, except perhaps a topographical one, for following any line other than the most economic one. In the case of partially developed territory it will usually be necessary to depart from the ideal, in fact the more advanced the country the greater may be the departure from first principles owing to existing conditions; it is, however, sometimes advisable and economic to scrap existing work, or, say, to create a new port at a more suitable site instead of enlarging and developing an old one and its adjacent town. In the Sudan the new Port Sudan was created instead of developing the old port of Suakim, and in Egypt the old town and port of Damietta has been superseded by Port Said.

In opening up a new territory it is first necessary to study the economics of the matter and this involves a consideration of the nature and extent of the traffic; both potential and immediate future traffic must be examined. Also the question of marketing the products of the region, the labour available or which may be available, and all other aspects which may determine or affect the proposed development must be kept in view. The foregoing, as well as a study of the relative technical matters, constitutes what is known as the "survey," and the next step is to apply the results to the preparation of the "scheme" or "plan." A programme for the gradual realisation of the scheme may be included, as will be explained later when some of the above matters are dealt with in detail.

The most important questions in opening up new territory are usually those of communications and also town and village sites, so it is therefore proposed to consider them now in some detail. Much of the future prosperity of the colony and the well-being of its inhabitants will depend upon the initial planning of these things so that they may develop along proper lines.

Fig. 30 is a diagram showing an ideal inter-regional (or inter-colonial) general lay-out of communications. This lay-out provides the most economic and direct transport between the interior regions and the sea, and it is based on the "economic radius of use" of the different means of transport by land and water. Such a scheme can only be attained in some cases by co-ordinated planning between adjacent political or administrative areas. The lines of communication should be, so far as practicable, at right angles to each other. The idea underlying this principle is the avoidance

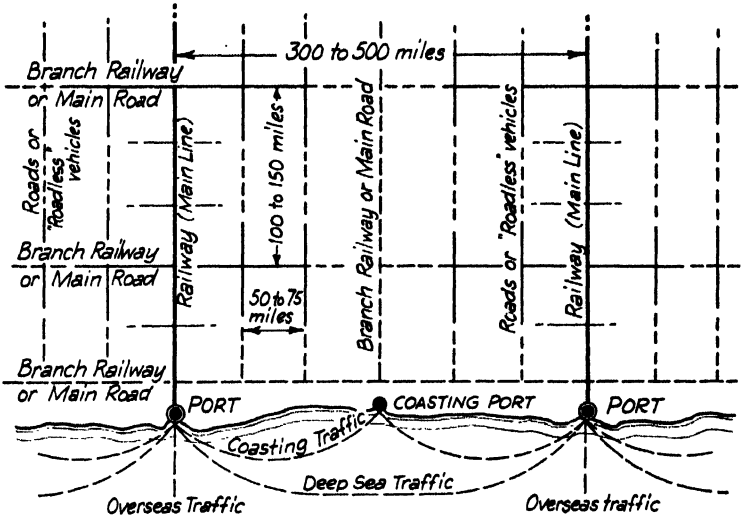


FIG. 30.—REGIONAL DEVELOPMENT PLANNING OF COLONIES; UNDEVELOPED TERRITORIES.
Diagram showing an ideal inter-regional (or inter-colonial) general lay-out of communications. This lay-out provides the most economic and direct transport between the interior regions and the sea. Such a scheme can only be attained in some cases by co-ordinated planning between adjacent political and administrative areas. The lines of communications should be, so far as practicable, at right angles to each other.

of any uneconomic or redundant lines of communication such, for example, as parallel lines of railway in too great proximity and/or roads tapping the same area of country.

It is to be remarked that while the object is to provide the most direct or shortest haul from the hinterland to the sea, water carriage being the cheapest form of transport, the economics of shipping must be considered, and the principal ports should be spaced, so far as practicable, at an economic and convenient distance for the calls of large vessels. This distance is approximately not less than 300 to 500 miles, as indicated on the diagram, Fig. 30. The Imperial Shipping Committee has reported* that the

* Report of the Imperial Shipping Committee, 1926.

economics of shipping and the relation of ocean traffic to the development of new ports are factors often overlooked, and that there are many instances throughout the world of port facilities provided by land authorities which have never attracted enough shipping to justify their construction.

Fig. 31 is a diagram showing in more detail the ideal regional scheme of communications and town and village sites in open undeveloped territory where there are natural resources in minerals, agricultural produce, etc., awaiting transport to enable the country to progress in an economic manner.

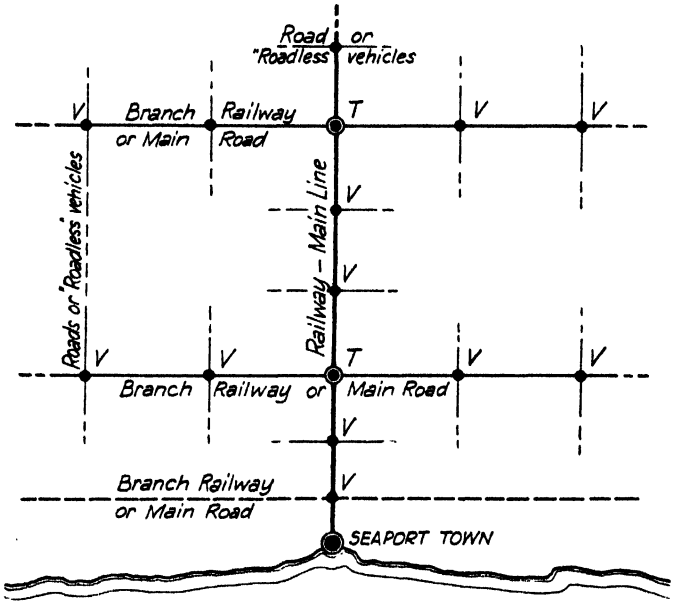


FIG. 31.—REGIONAL DEVELOPMENT PLANNING OF COLONIES; UNDEVELOPED TERRITORIES.

Diagram showing an ideal regional lay-out of towns and communications. Town sites are marked *T*, village sites *V*. A strip of land of a minimum width of 100 yards should be reserved along all the lines of communication shown. The Development Plan for any particular case should conform to this diagram so far as the topographical and other conditions will permit.

It will be seen that, physical conditions permitting, a main line of railway runs direct inland from the seaport where a town site is indicated. At right angles, if possible, to the railway there are branch railways or main macadamised roads acting as feeders, running parallel, say 100 to 150 miles apart, and at the junctions of these, there would naturally be towns. Again, at right angles, and at intervals of, say, 50 to 75 miles along all these principal lines of traffic, there would be secondary macadamised roads or, as an alternative, a service of " roadless " or cross-country vehicles. The points of junction of these communications would be the natural sites for villages,

as shown on the diagram. The regional development plan for any particular case should conform to this diagram so far as the topographical and other conditions will permit. Even with a service of " roadless " vehicles it may be necessary to build bridges to carry them at certain places, and these should, where possible, be built on the alignment of future roads. The complete future road system should therefore be planned before any permanent bridges are built. " Roadless " trains, if they are used for heavy loads, may be more economic in some cases than expenditure on macadamising roads to make them fit to carry ordinary wheeled motor traffic, especially where the immediate prospective traffic is light.

The Colonial Office Conference held in London in 1927 dealt fully with all aspects of transport in the Colonies, and it appeared to be thought that " roadless " trains taking, say, 50 tons might, in parts of Africa where the cost of roads or branch railways would be prohibitive, open up large tracts of land by enabling the produce to be taken to the main railway or to the coast at a reasonable cost. The present uneconomic head porterage would thus be superseded, and the man power set free for cultivation, etc.

It may be necessary sometimes to consider the alternative of providing either rail or road transport. The former starts with a mechanical advantage of about 8 to 1 as against the latter, and great train loads can be hauled. (The tractive resistance of a steel wheel on a steel rail is about 8 to 10 lbs. per ton, whereas the resistance of a vehicle on a good macadamised road is about 75 lbs. per ton.) The advantage of road over rail transport, on the other hand, lies principally in the fact that it is more mobile, and that it can pick up and set down both passengers and goods nearer to the points of departure and destination, thus obviating terminal expenses and delays. For short hauls this advantage seems to operate more decisively than in the case of long journeys, for which the railway is usually the most economic means of transport. As the actual decision in the matter may depend in some cases upon a detailed investigation of the amount of traffic expected and other circumstances difficult to estimate, the development planner may have to be content with making the preliminary general reservation of a strip of land to be used for future transport purposes, either a railway or a road. In comparatively flat countries the same general alignment would probably be suitable to provide the ruling gradients required for either means of communication in an economic manner. It is recommended that such strips of land should, if possible, be of a minimum width of, say, 100 yards along all the lines planned. This will prevent encroachments of buildings and allow space for drainage, ditches, etc.

In comparing the relative cost of transport by rail, road, " roadless " vehicles or by water, it is necessary for a Government to take account of all charges in each case. For example, a share of the construction and maintenance charges of roads and bridges must be taken account of in the road motor transport costs, and in the case of " roadless " or cross-country vehicles in the form of trains, which dispense with macadamised roads, it may be necessary to add an appreciable figure for heavy bridges over deep rivers and streams. In the case of transport by water it may be necessary to add a share of river channel improvement and maintenance works, quays, etc.

It is not the province of the development planner to consider the mechanical problems involved in any system of communications nor to examine the claims of the various types of vehicles. It might be remarked, however, that the present position with regard to the starting of a transport service in undeveloped territory is that track tractors and trailers or some other form of " roadless " train will probably be found the cheapest system until the traffic has increased sufficiently to justify the heavy initial capital expenditure necessary for railways or for macadamised roads constructed to carry the usual pattern of wheeled motor vehicles. The six-wheel type of vehicle, which will operate on earth roads, appears to combine some of the advantages of the track system and of the ordinary four-wheeled motor lorry.

Further, it must be recognised that no particular type will be suitable and economical everywhere. For macadamised roads the ordinary standard wheeled types of vehicle are, of course, suitable, but for running on soft sand or boggy cotton soil the track system seems to be adapted ; it does not appear, however, to be so satisfactory on rough rocky ground owing to the liability to injury of the flexible track.

It is to be noted that the working costs of vehicles running on soft or irregular ground must be more than that of vehicles running on modern roads, but the author has been unable to obtain any reliable figures as to the cost of transport by a system of " roadless " vehicles per ton mile, including all proper charges, based on actual practical experience under commercial conditions. There seems to be no doubt, however, that such a system would be adopted only as a temporary or pioneer service until the volume of traffic justified the expense of railways and roads, the change being carried out, if possible, in the gradual economic manner described later.

The report * of the Colonial Office Conference in 1927 contains much useful information on the subject of transport.

* *Colonial Office Conference*, 1927. *Appendices to the Summary of Proceedings*. H.M. Stationery Office.

It must not be forgotten that in certain places, and for some classes of work, traction or carriage by animals still has an economic radius of use.

Fig. 32 is a diagram showing in some detail the areas to be reserved for towns and communications. Diagram " C " shows the site of a seaport town, and it is to be remarked that the site selected for the port and harbour should be naturally suitable for the purpose and there should be a convenient adjacent area sufficient to permit of the full development of a town with industrial, commercial, and residential zones. The port and the town

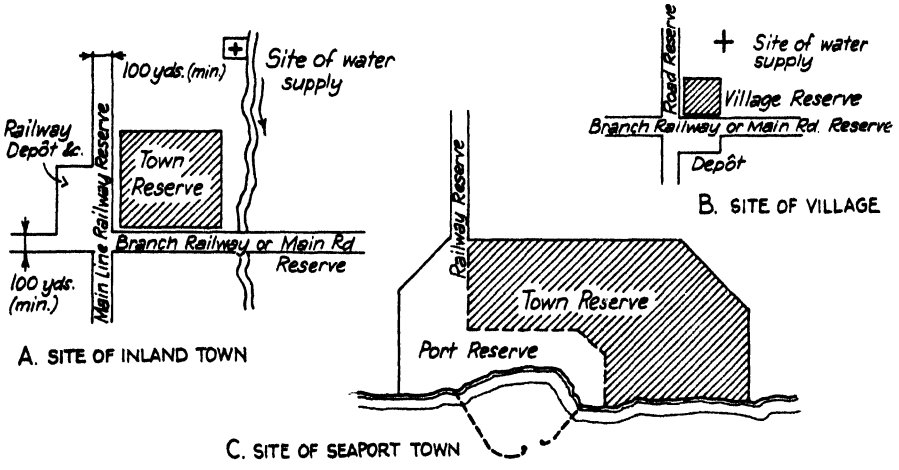


FIG. 32.—REGIONAL DEVELOPMENT PLANNING OF COLONIES; UNDEVELOPED TERRITORIES. Diagram showing areas to be reserved for towns and communications.

Notes.—Diagrams *A* and *B*.—The fixing of communication alignments and reserves should proceed with the selection of town and village sites so as to give the most economic line for the former compatible with the most suitable and hygienic sites for the latter, not low-lying, and near a source of water supply from a river, canal, or wells situated on the upstream side. Town sites should be adjacent to, but not astride, the main lines of communication. Diagram *C*.—The site selected for the port and harbour should be, so far as possible, naturally suitable for the purpose, and there should be a convenient adjacent area sufficient to permit of the full development of a town with industrial, commercial, and residential zones. The port and the town should be planned together so as to ensure proper access and other relations between them.

should be planned together so as to ensure proper access and other relations between them. Diagrams " A " and " B " show the sites of an inland town and a village. It is to be noted that the fixing of communication alignments and reserves should proceed with the selection of town and village sites so as to give the most economic line for the former, compatible with the most suitable and hygienic site for the latter. Additional communication areas should be reserved at these sites for depôts and other purposes of handling traffic as shown on the diagram.

The selection of the town and village sites is important as it directly affects the health and efficiency of the population, and even on purely economic grounds a bad site is seldom justified in the long run. In planning large development works for a territory this aspect is often treated as of secondary importance; for example, ports are sometimes placed without apparent thought being given to the suitability of the site for the town which must necessarily adjoin it. The points to be observed in the selection of town and village sites are generally that they shall not be so low-lying as to make drainage difficult or expensive, and that they shall, if possible, be near a source of water supply from a river, canal, or wells situated on the upstream side of the future town. Near the coast these conditions are often difficult to fulfil, and expensive works of water supply and drainage involving pumping are then necessary. The nature of the soil is an important factor in determining the site, and there should be sufficient area of land available for town extension without straddling the main communications.

Khartoum, which is on the Nile mud, is not an ideal town site, for example; while Omdurman on the opposite bank of the river and on higher and harder ground is a much more suitable one.

The Preparation of the Scheme.—The procedure in preparing the development scheme or plan for a territory may be briefly described under the heads of (*a*) " The Survey " and (*b*) " The Plan " as follows:

(*a*) *The Survey.*—The initial step in the survey is to ascertain what development is possible and probable in the territory under consideration. Information should be obtained as to the present state and future possibilities of agriculture and other industries, including mineral workings, etc.; also statistics of the population, including increase and migration, and of the labour available should be compiled. The survey should embrace a study of the communications and transport necessary to deal economically with the foregoing present and future trade requirements, and also the requirements of industry and population, including the selection of the most suitable routes for the lines of communication, and of the most convenient and healthy sites for any new towns and villages necessary to meet the future development of the territory.

The term " survey " in this connection simply means the obtaining of sufficient general information of the locality or territory to enable a general scheme of development to be prepared. What is understood by the engineering term " survey " would only be necessary when, for example, one or more of the lines of communication shown on the general or regional development plan are selected as a beginning of construction; surveyors

would then be employed to locate in detail the most economic line and to fix the sites of any bridges and their relative levels.

It is to be noted that for undeveloped countries, which have not been surveyed, the expeditious method of surveying from the air appears to be suitable. By this means it is possible to obtain comprehensive surveys to assist in the preliminaries of development and also in making the complete topographic and other economic surveys of the region.

The surveys which will generally be required for development planning purposes may be classified under the following heads :

Physiographic Surveys—the topographical, geographical, geological, and water supply aspects ;
Industrial and Commercial Surveys—the agricultural, industrial, and marketing aspects, including overseas markets and the economics of marketing ;
Population Surveys—the distribution, migration, and labour aspects, including relative sociological questions ;
Communications and Transport Surveys—traffic statistics ; existing provisions by land, water, and air, and also any development projects ;
Town and Settlement Surveys—suitable sites with regard to employment, main communications, health conditions, and water supply ;
Public Health Surveys—the aspects of climate and health conditions which might affect settlement ; and
Building Surveys—the existing provisions of public buildings such as schools and hospitals and buildings for administrative purposes.

These " development " or " economic " surveys should be made to include all information which would be useful in co-ordinating the development schemes in various directions such as Population (Migration), Agriculture, Industry and Commerce, Communications (Land, Water, and Air), Towns and Settlements (Selection of Sites), Public Health (Drainage, Hospitals, etc.), and Buildings (Administration, Education, etc.). In this way, for example, an agricultural survey would be of value from a comparative point of view not only in agricultural matters, but also in framing schemes, policies, and programmes in other directions such as communications which may be affected by the possibilities of agricultural development. Again, besides potential development, such as the possibility of growing any special thing, there is the other factor of marketing to be considered. This would determine when such development is economic and when any works incidental to it may be carried out. The commercial and marketing aspects may therefore affect the general scheme of development planning and the programme in several directions, such as the necessity for labour (migration), and the provision of transport and communications and other public works.

(*b*) *The Plan.*—In most cases it will be found that much of the information required for the above surveys already exists in various forms, and only needs to be collected. Then, for the purposes of preparing the scheme or plan, the matter affecting development could be extracted, and studied as a whole and co-ordinated.

The principles to be followed in the preparation of the development plan for a territory, based on the surveys, have already been referred to. The details of their application will depend upon the circumstances of each case.

In establishing any programme to be observed in carrying out the plan or scheme in accordance with the indications of the survey of actual or potential trade and industry and of the labour available, and in considering especially the aspect of overseas traffic, the position and extent of the hinterland to be developed are primary factors. Whether it consists merely of a strip along the coast, or whether it is situated some distance inland, or whether it is a combination of both are vital matters. The third case is the general one shown in Figs. 30 and 31.

When it is desired to open up an undeveloped territory gradually and in an economic manner the following programme for the provision of communications is suggested:

The port or ports, probably of the lighterage type to begin with, should be constructed in the first place, and, if the prospective traffic in the more or less immediate future justifies it, or if the hinterland is deep or distantly situated, the main line railway should also be constructed. It might, however, be advisable in some cases to begin by using a temporary service of " roadless " or cross-country vehicles running inland from the port, in fan-wise directions, so far as the bridges will permit. These bridges would, of course, be the permanent ones, over any deep water, ultimately required for the future railways or roads on the alignments indicated in the general or regional development plan of the territory.

When the main line of railway has been constructed, the " roadless " vehicles, if already in use, would be transferred to operate from the railway in a similar fashion to the above along the lines shown for future branch railways or main roads (Fig. 31), and also in fan-wise directions as far as any permanent bridges over deep water required for the future railways or roads will permit.

When the traffic has developed sufficiently to justify the construction of the branch railways or main roads, the service of " roadless " vehicles would be transferred to the lines shown for the secondary roads. The system of secondary roads to carry ordinary wheeled motor traffic would be

made in their turn when the development of the area and the resulting traffic became sufficiently intense to justify their construction, the " road-less " vehicle being then eliminated.

In this gradual and economic manner the whole system of communications for the territory would be constructed in accordance with the pre-conceived regional development plan. It is obvious that the programme would be designed to keep pace with the general economic development of the country, taking account of the needs of the population and the requirements of trade and industry.

The author in his research has remarked many instances of the disastrous results, financial and otherwise, that have followed from lack of " planning," but these are not always so obvious as in the case of one potentially rich country within the Empire where development has been pushed too far in advance of or without regard to economic requirements. There was apparently no programme or scheme of " planning " in the sense described above, with the result that there were, amongst other things, lengths of unnecessary railway line and quantities of unwanted hydro-electric power. For both these excess or premature developments there was little prospect of economic utilisation, and grave financial difficulties (heavy loan charges, etc.) had to be faced by the authorities.

Various countries provide striking examples of how lack of " planning " has resulted in defective developments such as uselessly competing railways, or railways on uneconomic alignments selected, apparently, with a view to injuring or excluding competitors; main roads running parallel with instead of at right angles to the railways, thus competing instead of co-operating with them as feeders; areas of country opened up in a wasteful manner, apparently with thought only of the " fat " parts and of the immediate future; minerals and raw materials also exploited in a wasteful manner and not in the interest of the region or the country as a whole; and the needs of the population not sufficiently considered in such matters as, for example, the selection of convenient, suitable, and healthy sites for towns which can be properly supplied with water and easily drained.

Some unfortunate results of the lack of comprehensive planning for development in Canada and Australia are referred to later.

REGIONAL PLANNING OF LANDS IN CANADA.—The map in Fig. 33 is part of a regional development plan of lands in Alberta, Canada, situated just on the U.S.A. frontier. This map shows the general lay-out of the land in " townships " and " sections," and is taken from the C.P. Rly.

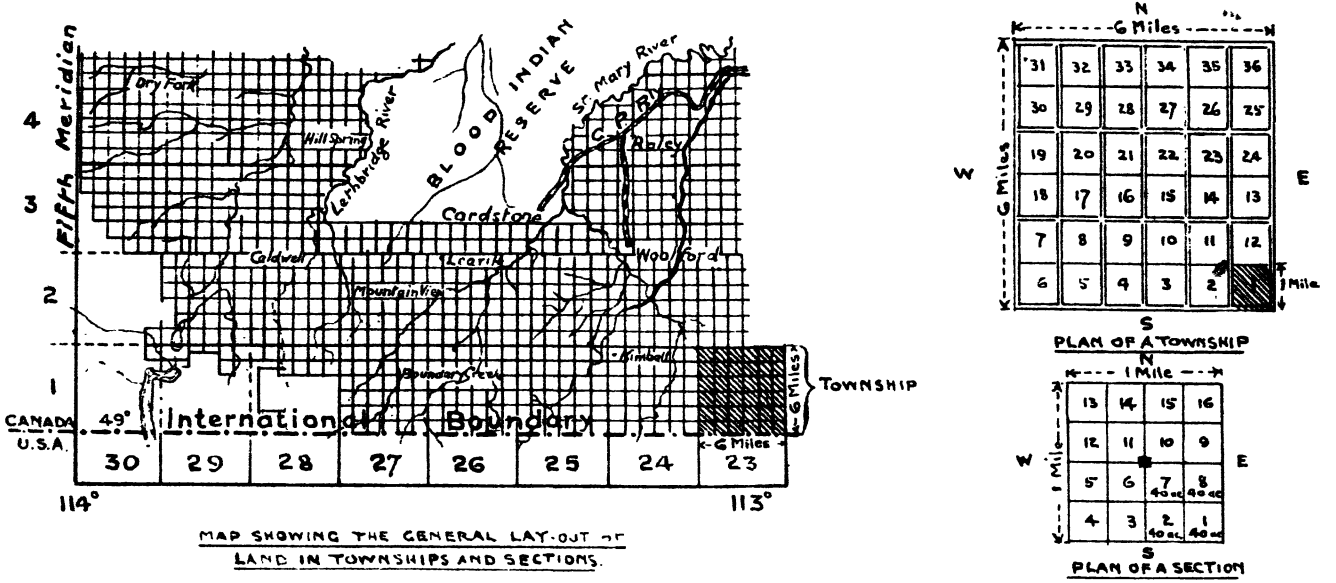


FIG. 33.—REGIONAL DEVELOPMENT PLAN OF LANDS IN ALBERTA, CANADA.

Note :—
The map is based on the C.P. Rly. Map of Southern Alberta. The diagrams of a township and section are based on the Dominion Lands Handbook (Dept. of Interior, Ottawa, Edition, April 5, 1927).

Note :—
Area of a section = 1 sq. mile = 640 acres.
Area of ¼ section (or homestead) *i.e.* plots 1, 2, 7, and 8 = $\frac{640}{4}$ = 160 acres.
Sections 11 and 29 are reserved for School purposes.
Buildings may be erected at centre of section if all are agreed.
Public roads shown by double lines.

Map of South Alberta ; the detail plans of a " township " and a " section," shown on the same figure, are taken from the Dominion Lands Handbook issued by the Department of Interior, Ottawa. The system of lay-out and demarcation is that generally adopted in desert countries such as the Sudan, of which the author has had experience, or in other open or prairie lands such as that under consideration. Under the conditions which exist it is difficult to obtain natural features to serve as boundaries or limits, so use is made of astronomical lines following a parallel of latitude or a meridian of longitude and to fix the intersections of such boundaries by means of pillars or posts built or driven into the ground. It will be seen, therefore, that the boundaries are truly oriented and it is evident that this arbitrary lay-out may sometimes be inconvenient as regards any natural features such as streams.

The necessity for planning across the international boundary will be first remarked. The continuation of the main roads over the imaginary frontier line, for example, would be a case for international planning.

A " township," as shown on Fig. 33, is an area six miles square and is divided into thirty-six " sections," each one mile square. Each "section" is again divided into sixteen parts, each containing 40 acres, and four of these, or 160 acres, is called a " quarter-section " or " homestead " (*i.e.* Nos. 1, 2, 7, and 8 on the figure). This is the usual holding. The author understands that the homestead buildings may be grouped at the centre of the " section " if the settlers agree, and in this way a small village community is created.

It is to be noted that " sections " Nos. 11 and 29 are reserved in all cases as " school lands." The lay-out of the roads is also shown on the figure and an allowance of land is made for all these roads.

With reference to the development which has already taken place in certain parts of Canada the author concludes, from an examination of maps and information obtained from various sources, that :

(1) There must have been some uneconomic development in the past; there are competing lines of railway running parallel ; feeder or branch lines exist within 20 miles of each other ; many dead-ends of railway exist which need connecting up ; and the National railways seem to have the disadvantage that there are long stretches through poor undeveloped territory.

(2) Only a strip of, say, 6 to 12 miles along the railways has yet been developed ; the question of long feeders, either roads carrying motor lorries or " roadless " vehicles, has not yet arisen, as there is still plenty of land along the railways.

(3) For the above reasons railway extension is not favourably considered at present.

It is interesting at this point to refer to a paper read by Mr. John Nolen before the American Society of Civil Engineers,* in which he remarked that in an address given at Montreal on "The Engineer and the Town Plan," the late Mr. James Ewing "showed convincingly how the natural resources of Canada have been wasted and the nation burdened with debt because the engineering was so often done from a narrow engineering viewpoint, in place of a broad planning point of view."

THE PLANNING OF AUSTRALIA.—One of the largest schemes of regional planning which has yet been proposed is that for Australia, regarding which the following extracts are taken from *The Morning Post* of February 5, 1927. Reference is made to a speech by Mr. Bruce, the Premier of the Commonwealth, in which he intimated the appointment of a Committee to do the work (the Great Eight, as the newspaper calls it). After pointing out that the scheme is nothing less than the planning of a Continent, the article continues:

> "Australia, which accounts for more than a fifth of the area of the whole British Empire, has an extent of two and a half million square miles. It is twenty-four and a half times the size of the British Isles, yet its total population of 6,000,000 is less than the population of Greater London.
>
> "Broadly speaking, this population is located around the fringe of the Continent. The absorptive capacity of the fringe is limited. It will be the task of the 'Great Eight' to take Australia in hand as a whole and 'lay it out' to the best advantage. It is 'town-planning' on a vast scale.
>
> "To all intents and purposes the 'Great Eight' will have a blank 'outline map' of the Continent, and they will have to fill in the roads, the railways, the great cities of the future in the places that seem best to them.
>
> "Nothing like it has ever been attempted before. New countries have developed on haphazard lines, and some of them have had to pay for it."

The genesis of this proposed scheme, which has not yet been undertaken on the national scale indicated, appears to be the economic desirability for emigration from Great Britain, for which Australia, if developed, offers a wide field. It is also becoming recognised in Australia that the Eastern nations may not consent to the country being left, indefinitely, so largely undeveloped and sparsely populated as it is at present. The question of

* *The Journal of the Town Planning Institute* for March, 1928. Extracts from "Town Planning in its Relations to the Professions involved."

markets, however, appears to be the chief factor in determining any programme of development which may be planned.

The necessity for some comprehensive plan appears to be evident, for the British Financial Mission to Australia reported, according to *The Morning Post* of January 10, 1929, that:

> "The Mission are unanimously of opinion that in recent years Australia has spent too much money unprofitably on development schemes which were undertaken without sufficient regard to the probable financial and economic results."

Again, in an article on Australia in *The Times* (*Annual Financial and Commercial Review*) of February 11, 1930, it is stated that:

> "In all States the recurring deficits are partly attributable to losses on non-paying branch lines (railway). Much of this construction has been ill-conceived and too far in advance of the actual needs of rural development."

As financial conditions have at present compelled Australia to slow down development, the opportunity will doubtless be taken to plan comprehensively for the future so that an economic programme of development may be prepared for use when circumstances permit.

U.S.A. "NATION PLAN" (Proposed by Mr. Cyrus Kehr).—In dealing with the principles of his proposed U.S.A. "Nation Plan," Mr. Cyrus Kehr says: *

> "The composition of the framework of the Nation Plan will be triangular, the location and formation of the triangles being controlled by the location of the plan 'centers' or 'focal points,' already discussed. But the triangles will not be equal; for the topography of the national area will not permit equal spacing of the 'centers' or 'focal points.' A glance at a contour map showing hills, mountains, rivers, and lakes will make clear that such equal spacing is not practicable. Nor is equal spacing desirable.
>
> "Every center is to stand related to its neighbouring or surrounding centers. Between any given center and every one of those neighbour centers, such relation is to be intensified by the most direct and easiest communication. The chief factors of this communication will be a highway, a railway and waterway (when the latter is feasible). Theoretically every such communication should be on a straight line. . . .
>
> "When the Nation Plan has been prepared, the area immediately surrounding every 'focal point' will call for a city plan, and all

* *A Nation Plan*, by Cyrus Kehr. Oxford University Press, 1926.

areas in every triangle are to be treated *by local planning*, including cities, towns, and rural areas, and communication lines auxiliary to the communication lines of the Nation Plan."

In dealing with the co-ordination of highways, waterways, and railways, Mr. Kehr says:

> "Theoretically, the communication centers of the Nation Plan should be connected by highways, railways, and waterways, extending on straight lines and closely side by side on a common right-of-way. On account of unfavourable topography, the waterway will often be absent altogether; and in many cases topography or previous construction will render it impractical to bring the highway and the railway side by side on the same right-of-way."

The proposed triangular system is interesting and may be suited to conditions in U.S.A., but it does not appear to be applicable, as a general principle, to undeveloped countries which, the results of the author's research indicate, would be more economically developed, as a rule, according to the system suggested for colonies, that is the "grid" or rectangular system (Fig. 30).

It might be remarked that in dealing with planning highway systems, Mr. Chatburn,* who appears to advocate the "grid" system, says:

> "Ordinarily the units will be the same as the political divisions—that is, national, state, or local. A national system would include the whole U.S. and will comprise trunk lines paralleling each other across the country east and west and north and south, considering, of course, ruling points with a few branch lines of importance."

The ruling points would apparently be the large centres of population.

IMPERIAL DEVELOPMENT PLANNING

It will be observed that the foregoing matter refers to schemes which may be described as national or regional in scale, as they may deal with a colony or other territory as a whole like a national unit, or they may refer only to the development of a region or division of it. A large-scale application of national planning would be for a unit such as the Commonwealth of Australia, where it would serve to co-ordinate the State or regional schemes of development throughout the country. This point is of importance in Australia, where the political boundaries of the States are almost entirely

* *Highways and Highway Transportation*, by G. R. Chatburn. T.Y. Crowell Coy, New York, 1923.

artificial and do not follow physical features such as watersheds, which usually form the natural limits of regional schemes. The proposal to plan Australia has already been referred to. The Development and Migration Commission for the Commonwealth appears also to be working on the lines of national planning, which should assist in securing an economic result for the Commonwealth if the various States work together. The reports * of the Commission show that its work will be co-ordinated with Empire development, but, unfortunately, owing to present financial conditions, its activities appear to be more or less suspended.

A large part of England has already been planned regionally by groups of local authorities, and in time a national development plan will be achieved. This method of working from the particular to the general is, perhaps, not so illogical as it is held to be when one is considering a country like England which is so intensely developed compared with the territories overseas, and when one remembers that the work is being done largely through the medium of local government authorities.

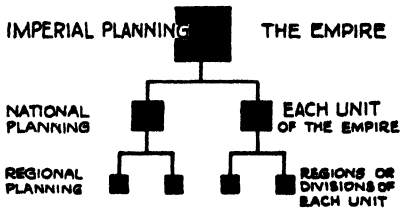


FIG. 34.—DIAGRAM ILLUSTRATING THE RELATION OF IMPERIAL, NATIONAL, AND REGIONAL DEVELOPMENT PLANNING.

Note.—An imperial development planning scheme would co-ordinate the general lines of national schemes for the Dominions, Colonies, and other territories, and these in turn would co-ordinate their respective regional schemes of development.

There seems to be no reason why the principles of "survey" and "planning" should not be applied to the problems of imperial development. These problems are, of course, very large, and the issue is not always so obvious as it is in the relatively smaller national and regional aspects of development.

Fig. 34 shows the relation of development planning on imperial, national, and regional scales. It illustrates that an Imperial Planning Scheme would co-ordinate the general lines of national schemes for the Dominions, Colonies, and other territories, and that these, in turn, would co-ordinate their respective regional or divisional schemes of development.

The author recognises that the suggestion to plan imperially may be thought impracticable on the ground that it would involve problems which are too large and varied to be easily planned, and forces too strong to be directed and controlled; but all this was said of both town and regional

* Reports of the Commonwealth of Australia, Development and Migration Commission. H. J. Green, Government Printer, Melbourne.

planning in their early stages some years ago, and they are now in general use. Questions such as migration within the Empire are making it felt, however, that the very widest study of the problems of development, as a whole, is necessary; and it is evident that the ultimate consideration of all such problems is imperial planning.

The auguments in favour of national and regional planning appear to be also applicable to planning on an imperial scale, for, here again, economic conditions indicate that it is highly undesirable to allow haphazard growth to continue. There should be co-ordinated and preconceived planning of the whole, in every direction, so far as is humanly possible.

It must be noted that while the principles to be observed in planning on all scales are, in essence, similar, the nature and purpose of the schemes will vary. At one end of the scale there is the primitive colony, which is necessarily governed by a more or less centralised bureaucracy, controlling, and perhaps executing, all important development work. At the other end of the scale there is the Empire, for which any scheme of co-ordinated planning would be intended merely to assist the co-operative efforts of the various units or Governments in promoting imperial development.

SUGGESTED SCHEME.—In a memorandum on the subject by the author in 1925 it was suggested that a scheme might be prepared to include any technical or other problem of imperial development which it is feasible to plan. These problems often involve large capital expenditure which necessitates the widest possible study and co-ordination to avoid premature, unsuitable, or uneconomic development. The scheme would deal only with the general lines or requirements of each branch of development from an imperial point of view, considered in its entirety and in its relation to other branches; it would be largely tentative and subject to periodic revision and such modification as experience proved to be necessary or desirable.

It was observed that the co-ordinated study of the imperial aspect of development-planning problems would sometimes show necessary modifications which are not obvious when only the purely local aspect is dealt with.

The main objects of the scheme would be to prevent, so far as possible by scientific and co-ordinated planning, any uneconomic or unsatisfactory development; to assist in ensuring that the resources of the Empire are employed in the best manner; and, by presenting various branches of development together in one scheme, to enable their relative importance and necessity to be more easily judged.

The diagram, Fig. 35, shows the suggestion in graphic form. It will be seen that the estimated future changes in and the migration of the population throughout the Empire, during the period under study (thirty years), would be taken into account in the estimation of development; that the agricultural, industrial, and commercial branches would be considered as well as the communications by land, water, and air, which would be necessary to meet the needs of the future. The requirements laid down for imperial defence would also be given effect to, in so far as they affect the scheme, and the whole would be co-ordinated and a general economic outline programme of development indicated.

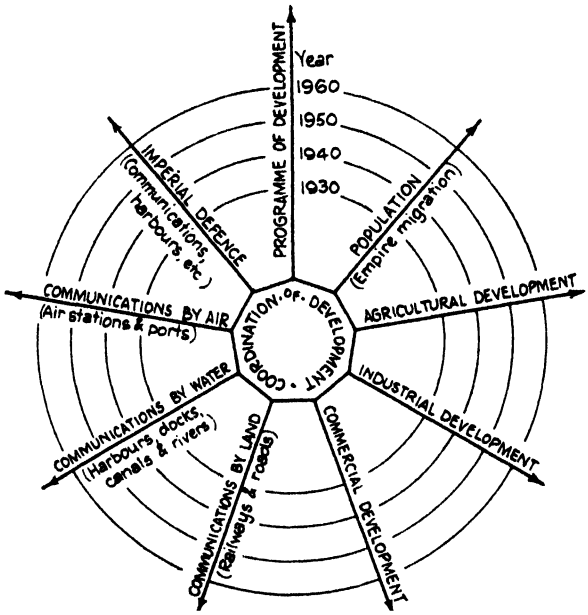


FIG. 35.—IMPERIAL DEVELOPMENT PLANNING SCHEME SHOWN IN THE FORM OF A DIAGRAM.

The diagram shows that the scheme would deal with imperial development in many directions; that these would be co-ordinated; and that a general economic outline programme of development would be indicated.

It will be seen from Fig. 35 that the suggested subjects of survey and co-ordinated planning include *Population* (*Migration within the Empire*); *Agricultural, Industrial, and Commercial Development; Communications by Land* (*Railways and Roads*), *by Water* (*Harbours, Docks, Canals, and Rivers*), *by Air* (*Air Stations and Ports*), *Imperial Defence* (*Communications, Harbours, etc.*).

Nearly all the above-mentioned branches of development are interdependent in some measure, hence the need for co-ordination. The question of migration, for example, is intimately connected with the developments which are found to be possible in the lands overseas. The results of research in agriculture, industry, and commerce will demonstrate their future possibilities, and these, in turn, will affect the nature and extent of the provision of future communications. Again, with the development of

the Imperial Air Routes planned by the Air Ministry, as shown on Fig. 36,* it is evident that, in the more or less distant future, the operation of air transport on such an extended scale may have an effect upon communications by water and land, and that this effect should be studied in considering the future requirements and development of new and existing seaports, harbours and towns, railways and roads, throughout the Empire. A survey has been made in order to select suitable sites for airship stations in Australia, Canada, in South Africa, and also in East and West Africa. It

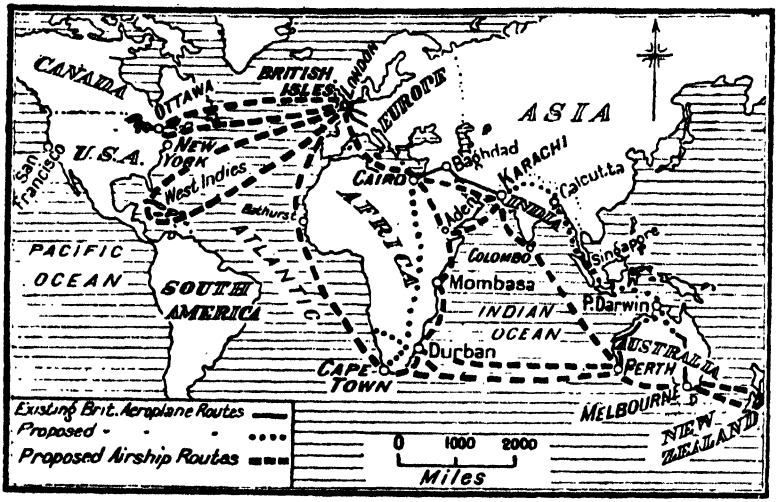


FIG. 36.—PROJECTED IMPERIAL AIR ROUTES.

The map shows the four long-distance airship routes proposed as part of the chain of Imperial air communications, and also the existing and proposed aeroplane routes.

[*By courtesy of the Editor of "The Morning Post."*

appears that suitable ground for these stations with their large mooring masts is not to be found near every port and town.

It has been stated by one writer † that for the development of the Empire three things are necessary, viz. "Men, Money, and Markets." It is evident that these things are intimately connected and that they react upon each other. The allocation and expenditure of the money in an economic manner are the primary objects of the suggested planning scheme which would take into account the actual and potential markets and also existing population and the possible changes by natural growth and migration. A great deal of survey and some planning work on an imperial scale have

* A map reproduced by *The Morning Post* from *An Approach Towards a System of Imperial Air Communications*, published by H.M. Stationery Office, 1926.

† *Sheltered Markets*, by F. L. McDougall, C.M.G. John Murray, London, 1925.

already been done by, and as a result of, *the Imperial Conference, the Colonial Office Conference, the Imperial Agricultural Research Conference, and by the Imperial Economic Committee, the Empire Marketing Board, the Imperial Civil Research Committee, the Imperial Shipping Committee, the Imperial Defence Committee, the Overseas Settlement Committee, and others dealing with Imperial communications, transport, and migration.*

The author is not aware that any attempt has yet been made to study collectively the information given, and the recommendations made, by the above committees as well as the information contained in the departmental reports of Dominion and Colonial Governments relating to development which have been prepared in recent years; and to note how the various proposals might react upon each other. The suggested scheme would involve the collection of all this information, and, after a comparative study of all matters affecting imperial development, to co-ordinate them in a comprehensive general scheme of planning which would be useful in many ways and serve to guide future economic policy and the allocation of expenditure.

The scheme, which would thus be largely based on a study of the results and recommendations of all the above-mentioned Government Committees and others might be prepared by a special committee (called, perhaps, the *Imperial Development Planning Committee*), whose membership might include a representative of each of these committees.

We are, without doubt, entering upon a period of great development within the Empire largely as a result of modern communications and transport and also of progress in public health matters, so that the vast natural resources may now be fully utilised, and the waste spaces made available for colonisation.

The scheme outlined above would provide that " bird's-eye " view of imperial problems which is desirable, and, being the result of co-ordination in planning for development, it might be expected to assist co-operative effort between the various units of the Empire in promoting that development.

THE IMPERIAL CONFERENCE.—In July, 1926, the Imperial Conference dealt with development matters, and the work which has been done since then by the Civil Research and other committees will doubtless in time be extended by future conferences to cover the complete co-ordination of all Empire development. The agenda of the 1926 Imperial Conference, it is interesting to note, was briefly as follows:

(1) Oversea settlement; (2) a general review of inter-imperial trade,

present and future, including a discussion of the work of the Imperial Economic Committee and the position of the Empire Marketing Board; (3) communications under which head is included the work of the Imperial Shipping Committee and the question of commercial air services; (4) research; (5) the exhibition within the Empire of Empire films; (6) the question of securing agreement as to the liability of State enterprises to taxation.

INTERNATIONAL DEVELOPMENT PLANNING

The arguments for planning might, it is thought, be used in favour of the study of the technical and economic aspects of international development, by applying the principles of national and regional development planning to the larger international problems. These larger problems of development are often the ultimate consideration of many questions of planning. For example, in dealing with a national scheme it is sometimes necessary to consider the international aspect of communications and other matters. The idea, therefore, might be expressed as the co-ordination of national schemes of development.

SUGGESTED SCHEME.—Such a scheme would deal with the technical and economic aspect of international development problems of: communications (by rail, road, water and air); ports (sea and air ports); water supplies (for irrigation, power and other purposes); towns and sanitation; industrial and agricultural requirements (including the distribution and use of materials such as fuel, and of electrical energy for power and lighting); etc. Many of these matters are interdependent and need to be co-ordinated.

One has in mind more especially such technical matters as the elimination of costly and unnecessary competing lines of communication, unnecessary rival harbours, retarded development owing to international jealousy, water supply control questions, etc. If the detrimental effects produced by lack of planning in these matters could be eliminated, even to some extent, all the world would be the richer.

A consideration of this, the very widest aspect of all development planning, desirable as it may be in theory and from the purely economic point of view, leads us perhaps beyond the limit of things which are practical meantime, for it would tend to eliminate frontiers.

Principal Jacks,* of Oxford, recently expounded the view that the hope of international unity lies more in economic than in political forces, and this

* "The Stevenson Citizenship Lectures," by Principal Lawrence P. Jacks, M.A., D. Litt., of Manchester College, Oxford, given in Glasgow University in 1926–7.

view is apparently becoming largely recognised, so that frontiers may have less significance in the more or less distant future.

WORLD PLAN PROPOSED BY MR. CYRUS KEHR.—In making a suggestion for a World Plan,* as he calls it, Mr. Cyrus Kehr, after referring to the desirability of " continent " planning, says :

> " But such planning of the continents separately for the best communication within themselves will not lead to the most effective results. Between the continents and the important islands there must be easy and economical interchange. Hence to the continent planning there must be added planning of the most convenient sea transportation lines connecting the seaports of the world.
>
> " The continent plan and the sea transportation planning will together constitute a World Plan. . . .
>
> " In connection with the World Plan, it must be recognised that all the natural resources of the entire world are not unlimited and inexhaustible ; and in that connection there should be formed a policy or program for world-wide co-operation for the conservation of the world's natural resources."

In dealing with " External Communications by Land " and the international aspect of his proposed U.S.A. Nation Plan, Mr. Kehr says :

> " External communication by land is limited to the international boundary lines between the United States and Canada and between the United States and Mexico. The plan should prescribe gateways at suitable points along those boundaries. These gateways should be chosen by co-operation of representatives of the countries interested, the way being then prepared for similarly planning those countries in relation with our plan."

THE LEAGUE OF NATIONS.—The author had an opportunity in 1926 of making a study in the League of Nations Secretariat at Geneva of what is being done there to assist economic development in the common interest, as, for example, in problems of international communications and transit and in public health matters. It appears to be quite possible that the League of Nations will one day be the means of a comprehensive economic scheme of International Development Planning being undertaken. The function of the League would probably be to co-ordinate the various national schemes in the general interest and to deal with difficulties as they arose. The 1926 International Economic Conference has helped to prepare the way for further research along the lines indicated.

* *A Nation Plan*, by Cyrus Kehr. Oxford University Press, 1926.

With reference to the League of Nations, Professor Roxby * recently said:

> "It is not altogether easy to teach the League as an abstract piece of machinery, but by teaching geography intelligently we show the necessity for the League and the kind of problems with which it has to deal.
>
> "The geography of to-day is essentially an attempt to visualise the world in which we live as a whole made up of inter-related and increasingly inter-connecting parts, which are becoming as inter-sensitive as the different parts of the human body. Geography goes to the heart of the problems of humanity to live collectively on a limited and very diverse planet, and it is with that problem that the League of Nations has to deal."

It is interesting to note a decision, taken at a Conference † in the League of Nations in 1927, which shows the international survey work already proposed to be done; it is as follows:

> "The Conference decided to transmit to the Advisory Committee a certain number of suggestions as to the kind of information which might be collected on ports and maritime navigation, railways, electric questions, road traffic and air navigation. This information should, it considered, bear upon agreements between States, bills published, acts and regulations in preparation; it should further include general data as to work planned or proceeding, statistics, etc."

An examination of the frontiers of Europe would show that in many cases these are not always along definite physical boundaries; it is evident, therefore, that the same co-ordination which is necessary between, say, the counties of England in matters of planning regionally is also necessary between the countries of Europe in planning nationally, if a full economic development is to be attained. Some of the European frontier changes made since the War appear to have economic disadvantages, while others are an improvement. A striking example where the change of frontier line has proved of great value to one State without apparently inflicting economic loss on the other is the following. The old frontier between Italy and Austria (in the Dolomite Mountains) had the effect of retarding development; the water-power in the mountains could not be utilised by Italy, as the power-stations would have been easily put out of action by

* "Geography and the League of Nations," by Professor P. M. Roxby, of Liverpool University, at the Conference of Educational Associations. Report in *The Glasgow Herald* of January 3, 1928.

† Third General Conference on Communications and Transit, held at Geneva in August, 1927. Report in the *Monthly Summary of the League of Nations* of October 15, 1927. Published by the League.

Austria in case of war between these countries. So Italy had to buy foreign coal at high cost for her industries in the Plains which were thus crippled. The new frontier has been pushed well into and over the mountains, and power-stations are now being built so that full economic development of the whole region is possible and is in progress.

THE DUTCH-BELGIAN TREATY.—It is proposed to refer further to the Dutch-Belgian Treaty as an example of projected large development

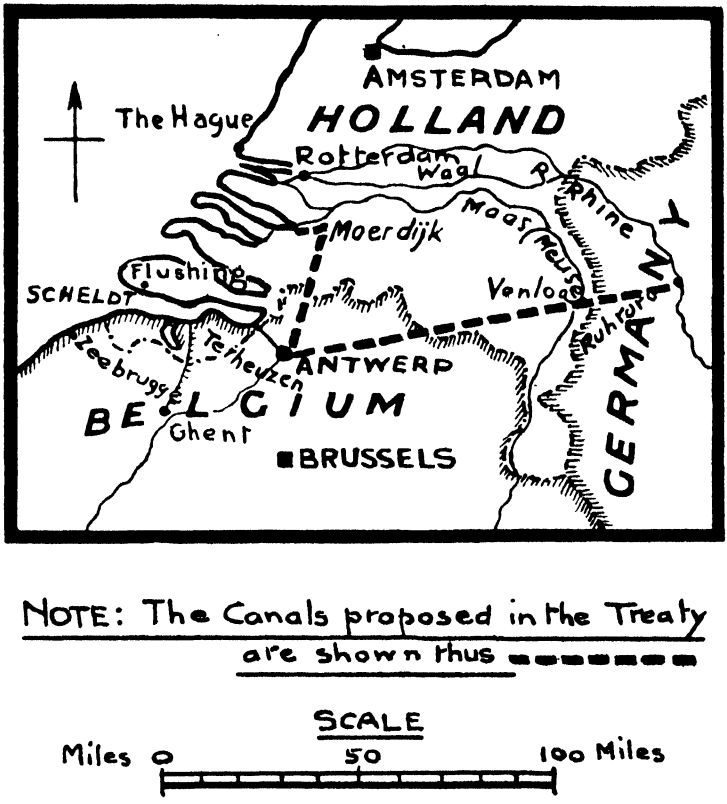


FIG. 37.—MAP ILLUSTRATING THE DUTCH-BELGIAN TREATY.
[*By courtesy of the Editor of "The English Review."*]

works which would traverse and affect three countries. It illustrates the fact that besides adjusting development along the region of frontiers, International Planning might be required to deal with large works which pass through several countries and affect their National Planning, so that

co-ordination is necessary. The following extracts from an article * on the Treaty will show the difficulties of the matter and the objections which resulted in its rejection. The good offices of the League of Nations do not appear to have been invoked in this case. Fig. 37 illustrates the article.

> " This treaty aimed at a revision of that of April 19, 1839, which regulates Belgium's free navigation on the Scheldt, contains stipulations concerning the waterways between the Scheldt and the Rhine, connecting Antwerp and the latter river, and lays down Holland's obligation to co-operate in establishing a new fairway through the Dutch province of Limburg, by a canal or a railway at Belgium's option, between Belgium and the German border. . . .
>
> " The economic objections (of Holland) have especial reference to the two canals. Neither of them is required in the interest of Holland, and both could only serve the purpose of giving Antwerp better access to the Rhine to the proportional detriment of Dutch ports.
>
> " The canal which through Dutch Limburg would give Antwerp the shortest possible connection by water with Ruhrort—a connection much shorter than the natural waterway from Rotterdam to Ruhrort—would not only tap the Rhine traffic to the detriment of the Dutch ports, but would also make the economic interests of Dutch Limburg lean towards Antwerp. It would, moreover, seriously affect the utility of the Meuse Canals, which the Netherland Government are at present constructing north of Maasbracht at a cost of forty million guilders. These latter canals are intended to facilitate the transportation of coal from the mines at Heerlen to Dutch harbours and to the northern provinces of the country. . . .
>
> " The other canal, *i.e.* that between Antwerp and Moerdyke, would also, by shortening the distance between Antwerp and the Rhine, threaten the position of Rotterdam and Amsterdam Like the Ruhrort Canal, it would have been of practically unlimited dimensions, and its end would have been in the gigantic docks which Antwerp is now laying out. By the advantages which it would possess of shorter distance than the present connection and the swifter navigation which its greater width would permit, the proposed canal would have given Antwerp a predominant position with respect to the German hinterland. . . .
>
> " The Dutch people ask what reasons there can be for sacrificing the natural advantage which Holland possesses in the situation of her ports by creating new artificial outlets to the Rhine in favour of the trade of Antwerp, since this port already flourishes on account of the natural advantages which it possesses and will retain at all times. . . .

* " The Dutch-Belgian Treaty," by " Diplomaticus," in *The English Review* of May, 1927.

> "Holland's keen interest in this treaty pending the decision has hardly been equalled in the parliamentary history of that country; whereas the daily Press of Belgium has not concealed the disappointment and discontent caused there by the rejection."

This sort of thing has undoubtedly been responsible for many wars in the past.

The author has been unable to find any detailed information regarding this Treaty, or whether, in connection with the proposed developments, there was any technical and economic information, such as would be furnished by national and regional planning schemes, available on which to base negotiations and decisions. One feels that if there had been, the result would probably have been less keenly felt, for it would belie any charge that it was based on a narrow national view which would seek either to advance or retard the development of the city of Antwerp.

With reference to the proposed waterway and power works in the St. Lawrence River, regarding which negotiations have been proceeding between the U.S.A. and Canadian Governments. One of the main difficulties in this international development seems to have been the existence of certain constitutional questions affecting Provincial and Federal rights on the Canadian side as to the St. Lawrence power development.

A report * on the scheme states that:

> "The main proposals are that Canada should construct and control the wholly Canadian section of the St. Lawrence shipway, including the new Welland Canal, at a total expenditure of approximately 315,000,000 dollars (£63,000,000), and the development of approximately 1,000,000 horse-power, this power development to be exclusively for Canadian use. On the other hand, the United States should construct the international section of the St. Lawrence River and complete the Upper lake channels to a depth of 27 feet at a total estimated cost of 339,000,000 dollars (£67,800,000).
>
> "The power development on the international section, it is estimated, would be 1,602,000 horse-power, to be shared equally by Canada and the United States."

As a further instance of the necessity for international planning reference might be made to Fig. 33, showing the lay-out of lands in Alberta, Canada, along the U.S.A. frontier which is here an imaginary astronomical line. It is evident that any development planning on the United States side of the line should be co-ordinated with the lay-out shown. The author has not been able to ascertain whether any attempt at co-ordination has been made.

* "The St. Lawrence Power Scheme." Article in *The Morning Post* of April 17, 1928.

PART IV

THE APPLICATION OF THE PLAN

THE UTILITY OF REGIONAL, NATIONAL, AND INTERNATIONAL PLANS

THE practical use of a regional plan in the preparation of the town planning schemes comprised in the region has already been dealt with.

The scope of the utility of national and international planning in the preparation of regional schemes, and in other matters, has also been indicated. In England there is as yet no legislation making regional planning compulsory, and it is entirely voluntary on the part of a local authority to join in, or to apply, any regional scheme.

Dr. Schmidt, in a paper * on the subject in the Ruhr, said :

> "The district for the Regional Planning Federation of the Ruhr Coal Mining Region is the only industrial territory, not only in Germany, but also in the whole world, that by law is vested with the requisite powers to carry through broadcast land planning in this sense of the word. Thanks to the successes of the Federation, the principles of the Federation law have become the basis of the Prussian Town Planning Bill, and the other manufacturing countries consider them with the greatest interest."

The application of any scheme of planning may, in some cases, involve the preparation of an economic programme of development or of work to be done (as in the case of the National and Regional Scheme for Egypt), which will guide the allocation of (Government) expenditure. With reference to economic programmes, the following extract from a paper † by Mr. Arnold Lupton is interesting and, although the example given

* "Country Planning in the Ruhr District," by Dr. Robert Schmidt, in the *Journal of the Town Planning Institute* for January, 1928.

† "The Coal Resources of the United Kingdom—Economy and Waste." An Address by Arnold Lupton, M.Inst.C.E., etc., in the *Proceedings of the South Wales Institute of Engineers*, Vol. XXXII, No. 2, 1916.

refers to machinery, it seems, to some extent, an economic statement which is applicable to things in general:

> "Some people are in such a hurry to make everything perfect according to their ideas of perfection: they do not allow time for the necessary changes. They see a steam-engine that is wasteful; they would pass a law to forbid the use of such an engine to economise the fuel, but they forget that it takes a great deal of fuel to make the steam-engine and that it may be that, at the present time, there are other economies more urgent than the expenditure of fuel upon making that new engine; they forget that the capital expenditure upon that new engine, in itself a good thing, may be actually a very bad thing if it is expended on an engine to effect an economy of, say, 10 per cent. upon its cost when the expenditure of that capital in another direction might effect an economy of 30 per cent. upon the expenditure, and that there is not unlimited capital available every day, and that there are great wastes going on in every department of life simply because there doesn't happen to be the capital available to make the expenditure to stop that waste. . . ."

With regard to the application of town plans; in the case of *unbuilt* areas the procedure seems to be now well established, and it is in the proposals to deal with the improvement of *built* areas that there appears to be greater difficulty, and legislation is urgently required in Great Britain for this purpose. It is thought, therefore, that a study of what has been done in some other countries in this matter might be profitable.

The practical application of town-planning schemes in Egypt, Palestine, and the Sudan presents many points of interest. One found that in Egypt the existing legislation required very little addition, and it already dealt fully with built areas, while in the Sudan a beginning was made with a "clean sheet" which simplified the matter considerably.

TOWN PLANNING PROCEDURE IN EGYPT, PALESTINE, AND THE SUDAN

THE EGYPTIAN LAWS OF ALIGNMENTS AND EXPROPRIATION.—The basis of all town-planning procedure in Egypt is the law of "Tanzim," or Alignments, and the Law of Expropriation, which are both administered by the Tanzim Service.

A translation by the author from the French original of the principal articles of the Alignments Law is as follows:

> 1. In the towns and villages where the Tanzim Service exists, or will be constituted by an order of the Ministry, no one can construct, make an

addition to or raise in height, strengthen, repair, or demolish for any reason or within any limit whatever, any house, building, boundary wall, balcony, verandah, or platform or other work bordering on the public street, without first receiving from the Tanzim Service a permit and the alignment. For interior or exterior painting no permit is necessary.

2. No person or persons can open public streets without authorisation and without having conceded free to the Government (or the municipality) the areas of land required for these streets.

They must conform to the plan which will be given to them by the Tanzim Service.

3. No authorisation is necessary to open a private street, but it must be closed at each end by a railing, door, or chain.

4. All buildings which the Tanzim Service shall decide as requiring to be repaired from the point of view of public security or that the building is in a state of ruin, must be repaired or demolished within the period of time fixed by the service.

A translation of the principal articles of the Egyptian Law of Expropriation for Public Utility Purposes is as follows:

1. The expropriation of buildings for public utility purposes can only be done by special decree.

2. The expropriation can be made not only of the buildings absolutely necessary but also of the whole or part of neighbouring buildings if their acquisition would better attain the public utility purpose in view.

3. Buildings of which a part only is to be expropriated must be wholly purchased if the proprietor demands this.

4. In the case of expropriation of a building the price shall be calculated without taking account of any increase of value resulting or which could result from the expropriation.

If the expropriation is only partial the price will be the difference between the value of the whole building and the value of the part which remains in the hands of the proprietor.

5. When as a result of the execution of a work of public utility the part of a building not expropriated is augmented or diminished in value, such augmentation or diminution shall be taken into account; but the sum to be deducted or added cannot exceed the half of that which is due to the proprietor in terms of article 4.

6. In fixing the price no account will be taken of buildings, plantations, or improvements as well as contracts of let or other thing if such have been done with a view to have an increase in the price, but the proprietor has the right to remove, at his own expense, all materials which can be moved without prejudice to the work to be done.

All such work will be considered as having been done with the above motive, without further proof, if it has been undertaken after the publication of the decree of expropriation in the two Official Journals.

THE ALEXANDRIA BUILDING AND TOWN PLANNING REGULATIONS.—There are as yet no building regulations in force in Egypt except for the Alexandria municipality, where provisional regulations

(see Appendix II) have been employed for some years. They are too brief to be quite effective, as they only provide that certain plans must be submitted for approval before any construction is undertaken. No technical clauses are included.

It will be seen, therefore, that the legislation was somewhat incomplete from a town-planning point of view. In dealing with the improvement of built areas, the powers under the laws of alignment and expropriation were quite ample, but in the development of unbuilt areas something more was required in order to make town planning effective. The author made a report on the matter, making certain proposals, and subsequently the Alexandria Municipality obtained the approval of the Government for a regulation (see Appendix III) to supplement the building regulations, which contained the following town-planning clauses under the head of "New Lay-out" (translation):

1. Certain quarters and streets of the town can be reserved by the municipality exclusively as residential.

2. At least one side of each block of land to be used for building shall front a public street.

3. All building land of which the area or the site makes it impossible to apply paragraph 2 in regard to existing public streets shall be considered as a new lay-out.

4. In all new lay-out for building purposes the proprietors must reserve for streets which will become public an area equal to one-third of the total area of the land to be laid out. Half the width of the existing public street or streets bordering the land to be laid out will be included in the calculation of the area (one-third) required to be left for public streets.

5. All lay-out plans (planning schemes) must be based on the alignments shown on the general plan of the city approved by the municipality on June 15, 1921 (City of Alexandria Town Planning Scheme), on which, however, the municipality can make modifications.

6. All plans of the alignments, centres, widths, arrangement, levels, etc., of streets must be approved by the municipality.

7. No construction can be commenced before the approval of the municipality has been obtained.

There are several other clauses regarding street planning and the widths of streets and footpaths. Reference might be again made to Fig. 11, which shows type sections of avenues and streets in Alexandria.

It will be seen that the regulations in Alexandria now contain all the necessary provisions for giving effect to the town-planning scheme, such as the proper laying out of undeveloped or unbuilt areas as well as for the improvement of built areas, the width and alignment of streets and footpaths, the area of street surface in relation to the total area of land; and in the case

of land belonging to the Government and the municipality, of which there is a large area, the sale for building purposes contains provisions limiting the height of the buildings and the area of the plot which may be built upon.

The regulations also contain provision for zoning, and certain areas may be reserved for purely residential purposes, whilst industries which are insalubrious are restricted to certain quarters. No control of the façades of buildings is attempted, but good and suitable architecture is encouraged by the municipality, which gives prizes to the architects of the three best buildings erected during the year, while the proprietors have their taxes on these buildings remitted for a year.

An examination of the practical working of the foregoing Laws and Regulations in Alexandria is instructive. Reference might be again made to Fig. 4, the general plan of the City of Alexandria Town Planning Scheme, which is the key plan of the whole work.

The programme adopted is that detail plans of each street to be improved in a built area are made to the scale of 1/200. On this plan the new alignments are shown, and any areas of land or parts of buildings to be expropriated are coloured yellow, and areas of land which may be sold are coloured red, that is areas " A " and " B " respectively in Fig. 38. The plans are decreed by legal process, and for the greater part of the city these detail plans of improvements now exist.

THE DEVELOPMENT OF UNBUILT AREAS.—The same procedure is adopted for *unbuilt* areas, except that, there being usually no difficulty with existing buildings, the decree plan includes several streets on the scale of 1/1,000. No great difficulty was experienced in getting proprietors to submit their detail planning schemes in conformity with the town-planning scheme for the city, as they soon discovered it was in their interest to do so. For example, it secured to them convenient through roads instead of the possibility of the " dead-end " roads which were often constructed under the old regime. Further, in return for the gift to the municipality of the land required for all public roads up to one-third of the total area of the land, the municipality undertook to have all such roads decreed, and even in some cases to macadamise them, when it considered this work to be necessary.

A great part of the unbuilt land has now been decreed in this manner, and the municipality has obtained gratis most of the land required for the public streets.

THE IMPROVEMENT AND REDEVELOPMENT OF BUILT AREAS.—As the question of the improvement or redevelopment of *built* areas is of special interest owing to its comparative difficulty, and to the recognised urgent necessity for further legislation on the subject in Great Britain, it might be useful to examine in detail this work in Egypt. Despite the fact that it has been in progress for over forty years, new difficulties and problems continually present themselves in practice.

Reference might be again made to Fig. 5, which shows the proposed Mosque Square and the Boulevard to Ras El Tin Palace at Alexandria, and also to Fig. 7, showing the proposed Station Square there, both of which projects have now been decreed. These schemes involve a considerable amount of improvement and redevelopment work in built areas.

There are two cases to be considered: (*a*) improvements not urgent which may be deferred; and (*b*) improvements which are urgent or which from their nature cannot be deferred.

(*a*) **In the case of improvements which may be deferred,** the decree plans may be in existence for many years without very much happening except that the parts of any buildings which are cut by the decreed alignment gradually assume a dilapidated appearance, for they may not be repaired or altered in any way and only painting is permitted. The object of the old alignment or "Tanzim" law was apparently to put that part of the building which is required for the street widening in a state of ruin as quickly as possible, so that it becomes necessary in the interest of public security to demolish it; and, that any new building replacing it must be erected on the new alignment, the municipality paying then only for the land taken into the street. It is, of course, only where an improvement is not urgent that this procedure is adopted. In the smaller towns, where the buildings are in great part of a light construction, the process does not take a very long time, but in a city like Alexandria, where there are many fine buildings of solid construction, it was felt that some modification of the law was desirable. The Alexandria Municipality, therefore, with the approval of the Government, issued in 1922 a regulation, of which the following translation is an extract:

> A proprietor of a building which is cut by the decreed alignment may be authorised to repair or alter his building under the following conditions:
>
> (1) He must renounce his right to any compensation for the value of the part of the building cut by the alignment at the time when the Municipality decides to apply even partially the alignment or any modified alignment, and in the latter case the limit to be that resulting from the alignment in vigour at the time of this engagement.

(2) He must demolish at his own expense, at the time of the application of the new alignment, that part of the building which is outside this alignment.

(3) He must agree with the municipality on the maximum unit price of the land to be expropriated, which price may be reduced at the time of the application of the new alignment, but it may not be increased.

The municipality reserves the right to prescribe for each case a maximum period during which it agrees not to apply the new alignment, but this maximum cannot exceed five years.

This method of getting over some of the difficulties which arise from a postponement of the less urgent improvements in streets containing good buildings has proved satisfactory.

(*b*) **In the case of improvements which are urgent or which from their nature cannot be deferred,** the formalities for expropriation and payment of compensation for both the land and buildings are completed at once. New streets constructed to open up a congested district appear in this category, for it is often necessary to complete them at once or at any rate to do the work in stages of convenient blocks between cross streets. Difficulties of access and in the application of the alignment arise, however, if the work is unduly delayed. But even in this case the work is often deferred, and it is seldom that proprietors attempt to force expropriation; they evidently prefer to enjoy the occupation of the building, even with the disability of not being permitted to repair it. It should be remarked that there is no power to acquire land beyond the limits decreed for the purpose of replotting and subsequent sale.

Reference might again be made to Fig. 24, which is the plan of a typical small town showing the initial principal improvements carried out. The work in this case was done all at one time. An inspection of the plan will show the large number of narrow roads which are "dead-ends." These were dealt with in the secondary road system.

Passing to a consideration of the application of a new alignment, it is found that the cases which occur in practice are the following:

Case 1.—Where a proprietor wishes to construct or to reconstruct on the alignment. This is the most common case.

Case 2.—Where a proprietor has been required by the municipality to demolish a building in a state of ruin in the interest of public security.

Case 3.—Where the municipality wishes to apply the alignment immediately.

In Case 1, where a proprietor wishes to construct or to reconstruct, the procedure is that he must make an application for a permit to

construct and for the alignment. If there is any land to be taken from him for street widening (see the area " A " in Fig. 38), the municipality informs him of the price to be paid. The proprietor generally agrees to the price so fixed, but if not, he can appeal to the Courts for a revision. If, on the other hand, there is a strip of the public street fronting his property, not required for the new street (see the area " B " in Fig. 38), the municipality may require him to purchase this, the price being fixed as already described. The sums so fixed are not paid until the walls of the building are at least one metre above the ground-level and their alignment has been verified.

In Case 2, where a proprietor has been required by the municipality to demolish a building in the interest of public security,

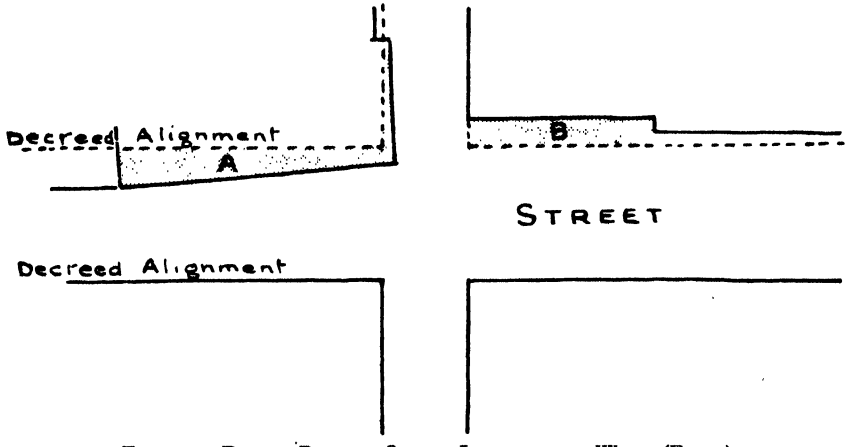


FIG. 38.—DETAIL PLAN OF STREET IMPROVEMENT WORK (Egypt).

the value of any land which is to be incorporated in the public street may be taken and paid for at once, the price being fixed as in Case 1.

In Case 3, where the municipality wishes to apply the new alignment immediately, it is necessary at once to expropriate the land and the buildings. A " decree of expropriation " must be made for each property, and the value of the land and buildings is fixed as in Case 1, the proprietor having the right to appeal to the Courts for a revision if he does not agree to the valuation.

VALUATIONS—BETTERMENT.—The method of estimating the value of land and buildings in all these cases is done on a special form (see Appendix IV). This form provides for the betterment or depreciation (limited to 50 per cent.) which may result to the property from the applica-

tion of the new alignment, all in accordance with the Law of Expropriation. It also provides for compensation for the rebuilding of the new façade and other work in a building which has been cut, and for the loss of rent during reconstruction. If more than half of a property is taken, the proprietor can insist on the expropriation of the whole, or if the part of the land which remains is too narrow for use as a building site, say less than 13 feet, the same regulation applies. In fixing the percentage of betterment, the position of the plot and the increased proportion in width of the new street over the old one, are ruling factors. On the average the betterment ranges from 10 per cent. to 20 per cent., the figure of 50 per cent. permitted by law being rarely approached in practice in Egypt.

THE JERUSALEM TOWN PLANNING SCHEME REGULATIONS.—The procedure in Palestine, which is dealt with below, is that connected with the application of the City of Jerusalem Town Planning Scheme described in Part III. The regulations for this scheme are of a very special nature, and they were designed primarily to protect the Ancient City and its environs, and to preserve its amenities. They were drawn up by the author and formed part of his official report on the scheme, already referred to, and from which the following is an extract:

> "*Regulations.*—It was ascertained that the 'Règlement sur les constructions et les expropriations de Constantinople et des Villayets' has been applied to Jerusalem by the Turkish Government, but, on investigation, it transpired that these regulations had never been properly applied, and that they were evidently looked upon as merely a revenue-producing measure. In any case it would have been difficult to apply them properly owing to the absence of an even approximately correct plan of the town showing street alignments. A study of these regulations showed them to be satisfactory and quite suitable for the needs of Jerusalem in the meantime. In order to provide the special control envisaged by the town-planning scheme, in the Old City and the surrounding belts it was necessary to provide a set of conditions (see Appendix V), to be observed in issuing building permits under the Public Notice.
>
> "The conditions referred to are contained in the following articles:
>
> "Arts. I, II, and III refer to the Old City, and deal with the preservation of the ancient architectural features and street alignments and also the restriction regarding new constructions:
>
> "Art. IV refers to the future clear belt round the Old City, and deals with the restrictions regarding buildings therein; and Art. V refers to the belt surrounding the clear belt and deals with the 'special conditions' which are designed to render the buildings in harmony and in scale with the Old City and with the general scheme.
>
> "The regulations at present in force do not deal with the stability of the structure, but such regulations are not considered urgent."

A reference to the general plan of the scheme for Jerusalem (Fig. 17) will show the limits of the various zones described in the regulations.

It is interesting to note that the regulations regarding buildings and expropriation in Turkey, which were applicable in Jerusalem, contained a clause of which the following is a translation:

> "Proprietors must give gratis the land which is necessary for the widening of streets. If the part which is taken exceeds one-quarter of the total area of the land, it will be valued in accordance with the Law of Expropriation for Public Utility, and the price will be paid by the municipality to the proprietors."

The Turkish Law of Expropriation, referred to, makes provision for betterment ("Sharafia"), and to an unlimited extent. (In Egypt there is a limit of 50 per cent. as already described.) Owing to there being no limit, it usually happened that the betterment charged to proprietors covered, or even exceeded, the sum to be paid to them by the municipality for the land expropriated. It is provided in the law that the payment of the charges for betterment may be spread over a number of years.

THE KHARTOUM BUILDING AND TOWN PLANNING REGULATIONS. — The Khartoum Building Regulations, originally drafted by the author, are a simple set designed to regulate the type of building which may be erected in specified zones, the materials of which it may be built, and its strength. The proportion of the area of the plot which may be covered by buildings in the various zones, as well as their height, is also regulated.

For the purpose of creating zones the building regulations divide the city into strips running parallel to the river, all the land between the Embankment and Sirdar Avenue being first-class land, that between Sirdar Avenue and Abbas Avenue being second-class land, while all that to the south of Abbas Avenue is third-class land. The building regulations provide that all houses on first and second class land shall be of brick, stone, or concrete, while those in the third-class quarter may be of mud. Reference to the development plan (Fig. 22) will show these zones. It may be of interest to note that the proportion of the area of plot which may be covered by building ranges from half to three-quarters in the various cases specified in clause 26 of the regulations. Extracts from the Khartoum Building Regulations are contained in Appendix VI.

It should be remarked that the regulations are designed for a conservancy system, as there is no water-carriage system of drainage at Khartoum.

A COMPARISON WITH PROCEDURE IN ENGLAND.—A comparison with procedure in England has already been made with regard to certain phases of the practical application of town planning schemes. The point which has perhaps the greatest interest in England at present is the provision in Egypt for the improvement and redevelopment of built areas. In a paper * on "Redevelopment," Dr. Raymond Unwin, late of the Ministry of Health, with reference to the desirability for town planning control in built areas, said:

> "It seems clear from our discussion that the planning of built areas must not be separated from other branches of town development. The present want of any essential co-ordination between the clearing and rebuilding of slum areas, town improvement schemes, and town planning schemes, not only adds considerably to the difficulty of all of them, but tends to frustrate much of the good effect which each might produce."

The great difficulties which would be found in England in applying any system of town planning control of built areas are pointed out by Dr. Unwin, and it is interesting to note that some of these difficulties have been met, to a large extent, by the methods of procedure adopted in Egypt which have been described above.

* "Redevelopment—Nature and Scope of Control necessary," by Raymond Unwin, F.R.I.B.A., *Journal of the Town Planning Institute*, June, 1926.

APPENDIX I

THE NATIONAL AND REGIONAL DEVELOPMENT PLANNING SCHEME FOR EGYPT

LIST OF INFORMATION FOR THE "SURVEY" REQUIRED FROM VARIOUS GOVERNMENT DEPARTMENTS

MINISTRY OF FINANCE

SURVEY DEPT.

1. Copies of general plans of the country.
2. Copies of regional plans.
3. Copies of contour plans.

STATISTICAL DEPT.

1. Census records.
2. Population distribution.
3. Copies of any Reports dealing with general development.

BUREAU OF COMMERCE AND INDUSTRY.

1. Copies of any Reports or Statistics regarding the volume of traffic :
   (*a*) At the ports.
   (*b*) Inter urban.

MINES AND QUARRIES DEPT.

1. General plan of the country showing the existing Mines and Quarries, and also the areas reserved, or which should be reserved, for future development.
2. Copies of any Reports dealing with future general development.

STATE DOMAINS.

1. General plan of the country showing the areas of land belonging to the Government (only the larger areas need be shown).
2. Any areas reserved or which should be reserved for special purposes should be indicated on the plan.
3. Copies of any Reports dealing with the future use or general development of Government lands.

MINISTRY OF COMMUNICATIONS

STATE RAILWAYS.

1. General plans of the country showing the State Railways.

2. Any proposals for future extension or development should be shown on the plans.
3. Copies of any Reports dealing with future general development.

ROADS AND BRIDGES DEPT.

1. General plans of the country showing the existing main roads.
2. Regional plans of above, if available.
3. Any proposals for future extension or development should be shown on the plans.
4. Copies of any Reports dealing with future general development.

LIGHT RAILWAYS COMMISSION.

1. General plans of the country showing the Light Railways.
2. Any proposals for future extension or development should be shown on the plans.
3. Copies of any Reports dealing with future general development.

PORTS AND LIGHTS ADMINISTRATION.

1. General plan of the country showing the position of existing Ports.
2. Any proposals for the development of Ports at other points should be shown on the plan.
3. Copies of any Reports dealing with future development.

MINISTRY OF PUBLIC WORKS

IRRIGATION SERVICE.

1. General plans of the country showing :
   (*a*) Existing area under irrigation.
   (*b*) Any areas proposed in future to be irrigated, or which it would be possible to irrigate.
   (*c*) General indication of existing drainage and any scheme of drainage proposed.
   (*d*) The canals which are navigable.
2. Copies of any relative Reports and diagrams.
3. Any suggestions for the sites of new villages which may be necessary as a result of future development.

STATE BUILDING DEPT.

1. General plans of the country showing the distribution of public buildings (administrative).
2. Any proposals for future provision of public buildings to be shown on the plans.
3. Copies of any Reports dealing with future general development.

ANTIQUITIES SERVICE.

1. General plan of the country showing any areas reserved for research work, or for purposes of the Department. Only the larger areas need be indicated.
2. Any proposals for future general development should be shown on the plan.
3. Copies of any Reports dealing with future general development.

MINISTRY OF INTERIOR

MUNICIPALITIES, ETC., SECTION.

1. General plans of the country showing all towns having Municipalities, Local Commissions or Village Councils. Any proposals for the future should be also shown.
2. The general plans of the country should show the present distribution of town water supply and lighting installations.
3. Any proposals for the future regarding the provision of water supply and lighting installations should also be shown on the plans.
4. Copies of any Reports dealing with future general development.

PUBLIC HEALTH DEPT.

1. General plans of the country showing the distribution of the hospitals—those belonging to Provincial Councils and other bodies being specially indicated.
2. Any proposals for the future provision of hospitals, etc., should be shown on the plans.
3. Copies of any Reports dealing with future general development.

MINISTRY OF AGRICULTURE

1. General plan of the country showing areas under cultivation. Any proposals for future extension should be indicated.
2. Any suggestions for the sites of new villages which may be necessary as a result of future development.
3. Copies of any Reports dealing with future general development.

MINISTRY OF EDUCATION

1. General plan of the country showing the distribution of the schools—those belonging to Provincial Councils and other bodies being specially indicated.
2. Any proposals for the future provision of schools should be shown on the plan.
3. Copies of any Reports dealing with future general development.

APPENDIX II

(Translation by the author, from the original French.)

MUNICIPALITY OF ALEXANDRIA—BUILDING REGULATIONS

ARTICLE I

THE following measures and prescriptions will be applied provisionally pending the promulgation of complete regulations regarding roads and the control of buildings in the City of Alexandria.

No person can construct, enlarge, strengthen or repair, within the boundaries of the City of Alexandria, under any circumstances whatever, buildings, enclosure walls, balconies, footpaths or other work, before submitting the plans to, and obtaining the approval of, the Municipality, and before having received the alignment from the Tanzim Service in the case of work bordering on the public street.

The plans, to be submitted in duplicate, should comprise :

(*a*) Plans of each floor and elevations and sections to the scale of 1/100.

(*b*) A site plan showing the adjacent roads or buildings as well as the drainage arrangements, to the scale of 1/1000.

(*c*) Plans of floors and roofs to the scale of 1/100, showing the arrangement of chimneys ; dimensioned detail plans to the scale of 1/10 of floor beams or girders (their section and spacing), or other system to be employed.

(*d*) Detail plans to the scale of 1/10 of all other essential parts of the structure (columns, pillars, and sections of foundations).

The specifications of the work must also be submitted to the Municipality.

The Municipality will, within fifteen days from the date of submission of the plans and specifications, give its approval and the permit for construction and the alignment. In the case where the plans and specifications are not satisfactory, the Municipality will, within the same period, communicate its observations to the applicant.

No modification to the plans or specifications which have been approved can be made except with the written consent of the Municipality.

The agents of the Municipality will have free access at all times to the works and will note all inobservations of these regulations.

When it is necessary to enter an inhabited house the inspection shall only be done in presence of the chief of the Tanzim Service or his deputy.

In cases where work has been executed without first presenting plans, or if the plans are not approved, or where the work has not been executed satisfactorily, the Municipality may, by administrative procedure, stop the work.

In this case the procedure provided for in the Tanzim regulations should be immediately followed.

Contraventions of the prescriptions of these regulations are punishable by the penalties provided in the Tanzim decree of August 26, 1889.

Further, in the case where the work has been executed without first presenting plans, or if the plans are not approved, or where the work has not been executed satisfactorily, the tribunal will order any works or repairs which the municipal technical service may prescribe to be necessary from the point of view of public security or of public health.

In ordering the works which are to be done, the tribunal will prescribe that the building is not to be inhabited until the agents of the Municipality certify that the work ordered has been duly executed.

The tribunal will also order the demolition of work in cases where the technical service is of opinion that the work executed in contravention of these regulations constitutes a menace to the security of the inhabitants.

In this latter case the work may be executed by the Municipality at the expense of the proprietor.

The authorisation given by the Municipality as well as the approval of the plans and specifications and the control exercised by its agents, does not imply on

its part any responsibility ; this rests fully and entirely with proprietors and their agents.

ARTICLE II

The present regulation, which is not derogatory to existing laws and regulations, will take effect from the date of its publication in the Official Journal.

Alexandria, February 19, 1909.

APPENDIX III

(Translation by the author, from the original French.)

MUNICIPALITY OF ALEXANDRIA—BUILDING REGULATIONS

REGULATION ADDING CERTAIN TOWN PLANNING CLAUSES

ART. I.—The following provisions are added to the Building Regulations of February 19, 1909 :

I.—NEW LAY-OUT

(1) Certain quarters and streets of the town can be reserved by the Municipality exclusively as residential.

(2) At least one side of each block of land to be used for building shall front a public street.

(3) All building land of which the area or the site makes it impossible to apply paragraph (2) in regard to existing public streets shall be considered as a new lay-out.

(4) In all new lay-out for building purposes the proprietors must reserve for streets which will become public an area equal to one-third of the total area of the land to be laid out. Half the width of the existing public street or streets bordering the land to be laid out will be included in the calculations of the area (one-third) required to be left for public streets.

(5) All lay-out plans (planning schemes) must be based on the alignments shown on the General Plan of the City approved by the Municipality on June 15, 1921 (City of Alexandria Town Planning Scheme), on which, however, the Municipality can make modifications.

(6) All plans of the alignments, centres, widths, arrangement, levels, etc., of streets must be approved by the Municipality.

(7) No construction can be commenced before the approval of the Municipality has been obtained.

II.—PLANNING OF STREETS

(1) In determining the directions of new streets in lands to be laid out, the alignments of existing or projected streets, as well as those of artistic, historic or religious monuments, shall be for preference taken as a basis.

(2) The alignments of the façades shall be, as far as possible, straight and parallel.

III.—Width of Streets, Carriageways, and Footpaths

(1) The minimum width of a street which will become public shall be 8 metres.

(2) Streets of a greater length than 100 metres shall be at least 12 metres wide, and if the length is greater than 50 metres they shall be at least 10 metres wide.

(3) Streets which are prolongations of existing or projected streets shall be the same width as the latter unless the conditions prescribed below require a greater width.

(4) With the exception of the modification prescribed above, the widths of streets, carriageways, and footpaths shall be as follows:

Width of street. Metres.	Width of carriageway. Metres.	Width of each footpath. Metres.
8	5	1·50
8·50	5·50	1·50
9	6	1·50
9·50	6·40	1·55
10	6·60	1·70
(and for every additional 0·50 m. in width of street up to)		
20 and above	12 minimim	4 minimum.

IV.—Angles to be splayed or rounded

If at the junction of two streets the alignments of the façades form an angle less than 60 degrees the corner shall be cut off by a splay of not less than 4 metres in width perpendicular to the line bisecting the angle.

The splays prescribed above may be replaced by rounded corners with the special authorisation of the Municipality.

Art. II.—This regulation will take effect from the date of its publication in the Official Journal.

Alexandria, May 1, 1923.

APPENDIX IV

(Translation by the author, from the original French.)

MUNICIPALITY OF ALEXANDRIA

VALUATION OF LAND AND BUILDINGS

(To be Expropriated.)

For .....

To Mr. .....

Name of Street .....

LAND

Area in Square Metres .....

1. Value of the land calculated at £... per sq. m. ..... £.....
2. Betterment resulting from the new alignment (.....per cent.)... £.....
3. Depreciation „ „ „ (.....per cent.)... £.....

Total..... £.....

BUILDINGS

Number of Floors .....
Condition of Buildings .....
Area of Buildings, sq. m. .....

1. Value of the part of building to be expropriated in its actual state ..... £.....
2. Indemnity for rebuilding the façade on the new alignment..... £.....
3. Indemnity for non-utilisation during building operations ..... £.....
4. Depreciation resulting from the new alignment ..... £.....
5. Betterment „ „ „ ..... £.....

Total ..... £.....

TOTAL VALUATION ..... £.....

APPENDIX V

CITY OF JERUSALEM—BUILDING PERMITS*

CONDITIONS TO BE OBSERVED IN ISSUING BUILDING PERMITS IN THE OLD CITY AND IN SPECIFIED AREAS SURROUNDING IT

(Under Public Notice No. 34,† dated April 8, 1918, and the " Reglement sur les constructions et les expropriations de Constantinople et des Villayets.")

ART. 1.—*Within the City Walls* the existing architectural styles of all structures to be maintained, if approved by the Military Governor, in the execution of any reconstructions, repairs or modifications.

* This document formed part of the Town Planning Scheme prepared by the author in 1918.

† The full text of Public Notice No. 34 was as follows (in English, French, Arabic, and Hebrew):

"No person shall demolish, erect, alter or repair the structure of any building in the City of Jerusalem or its environs within a radius of 2,500 metres from the Damascus Gate (Bab El Amud) until he has obtained a written permit from the Military Governor.

"Any person contravening the orders contained in this proclamation, of any term or terms contained in a licence issued to him under this proclamation, will be liable upon conviction to a fine not exceeding L.Eg. 200.

" R. STORRS, *Colonel*,
" *Military Governor.*

"*Jerusalem, April* 8, 1918."

ART. II.—*Within the City Walls* no new constructions of any kind to be permitted except under special circumstances and with the special approval of the Military Governor.

ART. III.—*Within the City Walls* no modification of the existing alignments to be permitted except under special circumstances and with the special approval of the Military Governor.

ART. IV.—*Within the belt of land outside the City Walls situated between the said walls and the blue line shown on the General Plan* of the Town Planning Scheme no new constructions of any kind to be permitted except under special circumstances and with the special approval of the Military Governor.

ART. V.—*Within the belt of land situated between the blue line referred to in Art. IV and the dotted blue line shown on the General Plan* of the Town Planning Scheme buildings may be erected only with the special approval of the Military Governor and under special conditions rendering them in harmony with the general scheme.

The following are the " special conditions " referred to in this article :

(1) No building to be placed so as to appear on the sky line on the hills to the East (Mount of Olives) and to the South of the City.
(2) No building to be of a greater height than 11 metres above ground-level.
(3) Roofs to be constructed of and covered with stone or other approved material.
(4) No buildings intended for industrial purposes to be permitted.
(5) In general the approval to be given only for buildings which are an extension of the small villages embraced in this area and for special buildings to the North and West of the Old City.

August 5, 1918.

APPENDIX VI

EXTRACTS FROM THE KHARTOUM, KHARTOUM NORTH, AND OMDURMAN TOWN BUILDING REGULATIONS, 1914

(Originally drafted by the author.)

CLASSIFICATION OF LAND

ART. 4.—For the purpose of these Regulations land in the City of Khartoum is classified as follows :

(*a*) Government land ;

(*b*) First-class land, that is to say, all land not included in class (*a*) and lying between the river and the centre line of Sirdar Avenue ;

(*c*) Second-class land, that is to say, all land not included in class (*a*) and lying between the centre line of Sirdar Avenue and the centre line of Abbas Avenue (13th Street) and Abbas Square ;

(*d*) Third-class land, that is to say, all land not included in class (*a*) and lying south of the centre line of Abbas Avenue (13th Street) and Abbas Square.

Land in Khartoum North and Omdurman is classified as follows :

(*a*) Government land ;
(*b*) Third-class land.

Class of Buildings which may be erected

Art. 5.—(1) The outer walls of all buildings erected on first or second class land excepting boundary walls and outhouses not visible from the road shall be of stone, burnt brick or concrete, or of mud brick faced with burnt brick.

(2) No factory or workshop is permitted on first-class land or on second-class land without the leave of the Governor, and no extension of an existing factory or workshop on first or second class land shall be made without the consent of the Governor.

No Building to be commenced till Petition and Drawings are lodged and Permit obtained

Art. 6.—No person shall commence to erect or alter a building or other structure until he has lodged with the Governor a petition on the official printed form and suitable drawings in conformity with these Regulations, and has obtained a written permit and, if necessary, the alignment from the Governor.

No deviation shall be made from the plans as set forth in the petition and drawings as approved without the written permission of the Governor.

Footpaths

Art. 13.—A width of 15 feet (4·575 metres) outside the building line of each plot in the City of Khartoum shall be reserved as a public footpath, and the owner of each plot shall be responsible for the repair of the portion of the footpath, kerb and gutter in front of the building line of his plot whether the ground on which the footpath is situated is vested in him or not. And where the total width of the footpath exceeds the aforesaid reservation of 15 feet (4·575 m.), the proprietor shall be responsible for the repair of the full width from building line to kerb. For the purpose of this regulation the building line shall be held to mean the face of the buildings or boundary walls fronting on the street exclusive of any arcade which may be erected over the footpath.

Conservancy Lanes

Art. 14.—A lane intended to be used for conservancy purposes shall be at least 15 feet (4·575 m.) in width and shall run at this minimum width in a straight line through the entire length of the building block.

Access Lanes

Art. 15.—A lane intended for the purpose of access shall be at least 15 feet (4·575 m.) in width and without roof, and unless unavoidable shall not be constructed as a dead end lane.

Alignment

Art. 20.—All buildings shall conform to the alignment fixed by the Governor.

Height of Buildings

Art. 22.—The height of every building shall be determined as follows:

(1) In the front of the building a line drawn at an angle of 45°, with the horizontal in a vertical plane at right angles with the face of the building from any point at ground-level on the building line on the opposite side of the street on which the building fronts shall not intersect any portion of the buildings;

(2) In the rear of the building no portion of the building shall be intersected by a similar line drawn from the opposite side of the street or lane, if any, abutting on the back boundary of the hosh (courtyard) or site within or on which the building is erected. And if there be no street or lane abutting on the back boundary of the hosh or site as aforesaid, then the Governor shall have power to require that no portion of any building within such hosh or on such site shall be intersected by a line similar to that described in sub-section (1) hereof drawn from any point at a distance of 7½ feet (2·286 m.) outside the said boundary, such distance being measured on a direction at right angles to the boundary.

Proportion of Area of Plot that may be covered by Building

Art. 26.—In order to permit the free circulation of air not more than the following proportions of the area of a plot shall be covered by buildings:

In the case of a dwelling-house on first or second class land, not more than one-half of the area of the building plot shall be covered by buildings, and in the case of a dwelling-house on third-class land not more than two-thirds of the area of the building plot shall be covered by buildings;

In the case of buildings other than dwelling-houses not more than three-fourths of the area of the building plot shall be covered by buildings.

Space in Rear of Buildings

Art. 27.—The Governor shall have power to require that where the back boundary of a building plot does not abut on a street or lane no building shall be erected nearer to the said boundary than 7 feet 6 inches (2·286 m.). Suitable access to the space so formed behind the building shall be provided for cleaning purposes.

Arcades

Art. 47.—The owner of a building plot on first or second class land may be permitted to erect an arcade over that portion of the footpath in front of the building line of his plot which is his property. When no property in the footpath is vested in such owner he shall not construct an arcade over the footpath unless an easement be granted to him by the Governor. The width of the arcade shall be in general 15 feet (4·575 m.) from the building line to the outside face of the arcade.

All such arcades shall be specially approved in each case and full drawings submitted for approval. Arcades shall be in burnt brick, stone or concrete for the first storey and no woodwork verandahs will be allowed in their stead.

Permission to build arcades on third-class land shall only be granted where houses are built of burnt brick, stone or concrete.

APPENDIX VII

LIST OF PUBLICATIONS CONSULTED

(Some of which are referred to throughout the text)

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The Institution of Civil Engineers—Proceedings.
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INDEX

A

Abercrombie, Professor Patrick, reference to, 4
Adams, Mr. Thomas, reference to, 81
Administrative Unit of Planning, 14
Aerodromes—Alexandria, 40; Croydon, 40; Air Ministry Memorandum, 41; New York Regional Scheme proposals, 41
Afforestation in Great Britain, 47, 76
—— in Canada, 48
Agricultural Economics in the Empire, 49
—— Belts, 57
Agriculture in Regional Planning, 46, 76
Air Ports in Regional and Town Planning, 40, 104
—— Routes (Imperial), 41, 104
—— Surveys, 93
Alexander the Great, reference to, 61–62
Alexandria (Egypt) Town Planning Scheme, 7, 35, 40, 55, 60, 113, 114, 125–128
——, Town Planning and Building Regulations, 114, 125–128
——, Ancient City of, 61
Alignments, Law of (Egypt), 113
Allenby, Lord, reference to, 65
Amenity, protection of, 65, 120
America, National Development Planning of, 79, 99
Application of the Plan, 112
Arcades, regulation concerning, 132
Australia, references to, 27, 95, 98, 100, 104
——, National Development Planning of, 98
——, Development in, 99

B

Bibliography—Technical, 133; Economic, 134; Geographical, 135; General, 136; Publications by the Author, 136
Bower, Professor F. O., reference to, 17
Britain's Industrial Future (Benn), 79
British Association, 23
Building Surveys, 93

Building and Town Planning Regulations (Alexandria), 114, 125–128
—— —— —— —— (Jerusalem), 120, 129
—— —— —— —— (Khartoum), 121, 130
Buildings, height, control of, 121, 132
——, space in rear of, 132
——, façades, control of, 116
——, area of plot which may be covered by 121, 132
Built Areas, Improvement and Redevelopment of, 7, 74, 113, 117–120
Burney, Commander Sir Dennistoun, reference to, 41

C

Canada, references to, 27, 48, 95, 97, 104, 111
——, regional planning of lands in Alberta, 95
——, development in, 97
Canal, Forth and Clyde Ship, 2, 6, 32
——, Mahmudia (Egypt), 32
Canals, Dutch-Belgian Treaty regarding, 16, 33
—— and Navigable Rivers in Regional Planning, 32
Carr-Saunders, Professor A. M., reference to, 26
Central Electricity Board, 42
Chatburn, Mr. G. R., reference to, 36, 39, 100
City of Alexandria Town Planning Scheme, 7, 35, 40, 55, 60, 113, 114, 125–128
—— Jerusalem Town Planning Scheme, 7, 63, 64, 65, 120, 129
—— Khartoum Town Planning Scheme, 7, 67, 121
City and Suburban Local Transport, 34
City Planning Enabling Act, A Standard (U.S.A.), 80
Civic Survey, 61, 69, 93
Cleopatra's Needles, 62–63
Close, Sir Charles, reference to, 23
Clyde Valley minerals, 46
Coast Walks, 57
Colonial Office Conference, 16, 36, 38, 89, 90
—— —— Reports, West Africa (1926), 5, 36, 85
—— —— —— East Africa (1925), 85
Colonies, Planning Schemes for, 85–95
Commerce and Industry Zones in Regional and Town Planning, 42, 76
—— —— ——, fundamental principles, 43
—— —— ——, growth of, 44
—— —— ——, ——, in Glasgow, 44
Commercial Unit of Planning, 15
Communications and Transport in Regional Planning, 28, 76, 87, 90
—— —— in Surveys, 93
——, Feeder Roads or Branch Railways, 38
—— (Colonial), comparative statement of cost by railway and road, 39
Community of Interest, Unit of Planning, 15
Country and Town Units of Planning, 15
—— Planning in the Ruhr District (Schmidt), 112

D

Development, Surveys, 20, 58, 61, 69, 76, 93
—— (Potential) of Land, 47–48
Development and Migration Commission of Australia, 101
Development of unbuilt areas (Egypt), 116
Diminishing Returns, Law of, 46
Drainage (Town and Land) in Regional and Town Planning, 53, 92
—— in Egypt and the Sudan, 55
Dutch-Belgian Treaty regarding Canals, 16, 109–111

E

East Kent Regional Planning Scheme, 46, 58
Easton, Mr. W. C., reference to, 34
Economic Conference (International, 1926), 4, 28, 107
—— programmes of development, 83, 112
—— publications consulted, 134
—— regional lay-out of communications and town sites, 87
—— surveys, 20, 58, 61, 69, 76, 93
—— Unit of Planning, 14
Economics for Business Men (Weston), 6, 43, 46
Egypt, National and Regional Planning Scheme for, 7, 50, 81, 112, 123
Electricity (lighting and power) in Regional and Town Planning, 41, 76
Electricity Supply Act (1926), 42, 79
Elevations of buildings, control of, 116
Empire Development Planning (*see* under " Imperial ")
—— Mining Congress (1927), 46
—— Marketing Board Report, 49, 105
—— communications, 29, 41, 102, 104
England, development in, 28, 122
——, national development planning of, 79, 101
Examples of Regional Surveys, 58
Expropriation, Law of (Egypt), 113

F

Façades of buildings, control of, 116
Fawcett, Mr. C. B., reference to, 17
Forth and Clyde Ship Canal, 2, 6, 32
Frontiers, 17, 106, 108

G

Geographical or Physical Unit of Planning, 13
Geographical Association, 23
Geographical Congress (International), 82

Geographical Magazine (Scottish), 44
Geographical publications consulted, 135
Geography and the League of Nations (Roxby), 108
Glasgow Chamber of Commerce, proposed survey, 2, 45
Great Britain, development in, 28, 34
Gregory, Professor, J. W., reference to, 23, 26, 44
Grisdale, Dr. J. H., reference to, 48

H

Harbours and Sea Ports in Regional and Town Planning, 29, 87, 91, 94
Height of buildings, control of, 121, 132
Highways and Highway Transportation (Chatburn), 36, 100; Economic haul formula, 39
Hill-top reservations, 57
Hill, Mr. Nicholas S., Junr., reference to, 50, 54
Holland, Sir Thomas, reference to, 46
Holliday, Mr. A. C., reference to, 67
Hoover, Mr. Herbert, reference to, 22
Housing in Regional and Town Planning, 56
—— in Alexandria (Slum clearance), 56
—— in Egyptian towns, 72
—— in Glasgow (Slum clearance), 57
—— in Khartoum, planning principles of, 69, 70
Human migration and the future (Gregory), 26

I

Imperial Unit of Planning, 16
—— Development Planning, 7, 100; suggested scheme, 102
—— Shipping Committee Report, 5, 29, 87, 105
—— Conference, 16, 105
—— Air Routes, 41, 104
—— Economic Committee Report, 48, 105
—— Civil Research Committee, 105
—— Development Planning Committee (suggested), 105
Improvement and Development Programmes, 72
Improvements which may be deferred, case of, 117
—— which are urgent, case of, 118
——, details of execution of, 116–120
Industrial Unit of Planning, 15
—— and Commercial Surveys, 93
Industry and Commerce in Regional and Town Planning, 42, 76
—— ——, fundamental principles of, 43
—— ——, growth of, 44
Inge, Dean, reference to, 2
Institution of Civil Engineers, 4
—— of Municipal and County Engineers, 52

International Economic Conference, 4, 28, 107
—— migration, 27
—— Planning, 7, 10, 106; suggested scheme, 106
—— plans, utility of, 112
—— Unit of Planning, 16

J

Jacks, Principal Lawrence P., reference to, 106
Jerusalem Town Planning Scheme, 7, 63; history of, 64; description of, 65. regulations, 120, 129
Jerusalem, Old City, 64
——, Municipality, 65
——, Town Planning and Building Regulations, 120, 129

K

Kehr, Mr. Cyrus, reference to, 21, 33, 99, 107
Khartoum, Development Plan, 7, 62, 67, 121, 130
——, Old City, 68
——, Town Planning and Building Regulations, 121, 130
——, Province Regional Planning, 85
Kitchener, late Lord, reference to, 62, 68, 69

L

Land, potential development of, 47–48
Land Drainage (England) Royal Commission, 54
Law of Diminishing Returns, 46
League of Nations, 3, 4, 11, 16, 28, 46, 107, 108
Lighting of streets, 42
Local Government and Town Development in Egypt, 71
Local Government Act (1928), 80
Lupton, Mr. Arnold, reference to, 112

M

MacDonald, Sir Murdoch, reference to, 49
MacElwee, Mr. R. S., reference to, 32
MacFadyen, Dr. Norman, reference to, 18
Mackinder, Sir Halford, reference to, 45
Mechanical Transport in undeveloped territories, 89
Mid-Scotland Ship Canal, 2, 6, 32
Minerals in Regional Planning, 45, 76
Momentum in development, 45

N

National Unit of Planning, 16
—— Planning, General Conclusions, 8
—— and Regional Planning; relation to Town Planning, 74
—— and Regional Planning Scheme for Egypt, 7, 50, 81, 112, 123
—— Development Planning Scheme for Scotland, 74; survey, 76; plan, 77
—— Development Planning in England and U.S.A., 79
—— Plans, utility of, 112
Nation Plan for U.S.A. (Kehr), 21, 33, 99
New York Regional Survey, 24
—— —— and Its Environs, Plan of, 25, 41, 81
—— ——, Port of, 32
Niagara Frontier Board, Survey, 58
Nile Control (MacDonald), 49
Nolen, Mr. John, reference to, 98

O

Open Spaces in Regional and Town Planning, 57
Ormsby-Gore, The Hon. W. G. A., reference to, 5, 36

P

Parkways, 57
Parliamentary Bills Committees, 12, 28
Pearl, Professor Raymond, reference to, 24
Pepler, Mr. G. L., reference to, 20, 52
Photographic Surveys, 93
Physical or Geographical Unit of Planning, 13
Physiographic Surveys, 93
Planning, definition of, 1
——, of Industrial Regions, 4
——, necessity for, 1
——, general statement of the principles of, 8
——, disastrous results due to lack of, 12, 28, 30, 51, 54, 64, 95, 97, 99
Planning Schemes for Colonies, 85
—— —— ——, principles of planning, 86
—— —— ——, communications (inter-regional), 87
—— —— ——, town sites and communications (regional), 88–92
—— —— ——, rail and road transport compared, 89; " roadless " trains, 89–90
—— —— ——, preparation of the scheme, 92–95; the survey, 92; the plan, 94
—— —— ——, programme of development of communications, 94
Political Unit of Planning, 14
Population in Regional Planning, 23, 76
——, predicted growth of (New York Scheme), 24
——, problems of, 26
——, surveys of, 93
——, International migration of, 29

Port development (MacElwee), 32
Ports (Sea) and Harbours in Regional and Town Planning, 29, 87, 91, 94
—— —— ——, economic spacing of, 30
—— —— ——, planning at Alexandria, 31
Potential development of land, 47–48
Principles of planning, general statement of, 8, 57, 70, 86, 127
Programmes of development, 83, 112
Public Health Surveys, 93
Public Parks, 57, 63
Publications consulted—Technical, 133; Economic, 134; Geographical, 135; General, 135; Publications by the Author, 136

R

Rail and Road Transport; costs, 39; comparison between, 89
Railways in Regional Planning, 33, 87, 89
—— in undeveloped territories, 87–89, 94
——, economics of transport by, 34
——, tube services, 34
Redevelopment (Unwin), 122
Reed, Professor Lowell J., reference to, 24
Regional Planning—
agriculture in, 46, 76
air ports in 40, 104
commerce and industry in, 42, 76
communications and transport in, 28, 76, 87–90
—— in undeveloped territories, 36
disastrous results due to lack of, 12, 28, 30, 51, 54, 64, 95, 97, 99
drainage (town and land), 54, 92
East Kent scheme of, 46
Egyptian scheme of, 7, 50, 81, 112, 123
electricity for lighting and power in, 41, 76
general conclusions regarding, 8
harbours and sea ports in, 29, 87, 91, 94
housing in, 56
in relation to town planning, 74
in the Ruhr District, 112
navigable rivers and canals in, 32
New York scheme of, 24
of Khartoum Province, 85
of lands in Alberta, Canada, 95
open spaces in, 57
population in, 23, 76
railways in, 33, 87, 89
roads in, 35 (*see also* under "Streets")
schemes in undeveloped territories (*see* under "Planning Schemes for Colonies"), 85–95
the preliminary survey for, 20
the unit or area of, 16
the utility of, 112
water supplies, 50, 52, 76, 91–92

Regional Water Committees, 51
Regulations, town planning, etc., 114, 120, 121, 125–128, 129, 130
Reservations, Agricultural Belts, Public Parks, Parkways, Hilltops, etc., 57
Residential zones, 57, 91, 115
River pollution, 54–55
Rivers (Navigable) and Canals in Regional Planning, 32
Roads in Regional and Town Planning, 35 (*see also* under " Streets ")
—— in undeveloped territories, 35, 87–89, 94
——, lay-out principles and widths of, and reservations for, *see* under " Streets "
" Roadless " trains, 89, 90, 94
Roosevelt, Theodore, reference to, 33
Royal Philosophical Society of Glasgow, 32
Royal Institute of British Architects, Town Planning Conference, 67
Roxby, Professor P. M., reference to, 108
Ruhr, regional planning of, 112

S

Salter, Sir Arthur, reference to, 3
" Satellite " towns, 19
Scotland, National Development Planning Scheme for, 7, 74; regions for planning, 78
Scottish Geographical Magazine, 44
Sea Ports and Harbours, 29
Settlement surveys, 93
Sewers and Sewage Disposal, 54
Slum clearance, 7
St. Lawrence River Scheme, 33, 111
Storrs, Sir Ronald, reference to, 65, 129
Streets, lighting of, 42
——, area of, in relation to total area of land, 115, 127
——, diagonal, 68, 128
——, lay-out principles of, 68, 70, 127
——, widths of, 36, 63, 71, 74, 115, 128
——, planning of, 73, 115, 127
——, footpaths, 128, 131
——, sections, 63, 68, 73, 128
Suburban (and City) local transport, 34
Sudan, reference to development in, 48, 97
Surveys, regional, 20, 58
——, civic, 61, 69
——, national, 76, 123
—— from the air, 93
—— physiographic, 93; industrial and commercial, 93; population, 33; communications and transport, 93; town and settlement, 93; public health, 93; building, 93

T

Technical publications consulted, 133
Town and Country Units of Planning, 15
—— —— village sites in undeveloped territories, 88, 91
—— —— ——, selection of, 92
Town Planning—
commerce and industry in, 42, 76
communications and transport in, 28, 76, 87–90
drainage in, 54, 92
housing in, 56
in the Tropics, 69
open spaces in, 57
population in, 23, 76
principles, general statement of, 8
roads in, 35 (*see also* under " Streets ")
the civic survey, 61, 69
the plan, 60
water supplies in, 50, 52, 76, 91–92
Town Planning Conference (R.I.B.A.), 67
—— —— Scheme—City of Alexandria, 7, 35, 55, 60, 113, 114, 125–128
—— —— —— City of Jerusalem, 7, 63, 64, 65, 113, 120–129
—— —— —— City of Khartoum, 7, 67, 113, 121
Town Planning and Building Regulations—Alexandria, 114, 125–128 ; Jerusalem, 120, 129 ; Khartoum, 121, 130
Town Planning Institute, Journal of, 18, 41, 58, 98, 122
Town Planning Review, 57, 69, 71
Town types in Egypt, 71
Transport and Communications in Regional Planning, 28
—— —— in undeveloped territories, 35, 87–90
Transport development in the Colonies, 36, 87–90
—— by rail and road, radius of use and cost of, 39 ; comparison between, 89
—— by air, radius of use and comparative statement of, 41
—— by motor lorries, formula for economic haul, 39
—— by animals, economic haul, 40, 91
Trench, Mr. E. F. C., reference to, 4
Tree planting in streets, 58

U

Units of Planning, 13–17
Unit, limiting size of, 17
United States of America, references to, 21, 24, 25, 32, 33, 41, 53, 58, 81, 99, 111
—— —— ——, regional and national planning of, 52, 79, 99
Unwin, Dr. Raymond, reference to, 122

V

Valuations of Land and Buildings ; Betterment ; Expropriation, 114, 119, 128

W

Walker, Mr. J. Bernard, reference to, 53
Water Committees, Regional, 51
—— Power in Regional Planning, 52, 76
—— ——, U.S.A. national survey of, 52
—— Supplies (Towns and Power) in Regional and Town Planning, 50, 52, 76, 91–92
—— —— in Egypt, Sudan, and Palestine, 52
—— ——, catchment areas as open spaces, 52, 57
Waterways (Inland), Report of U.S.A. Commission, 33
Weston, Mr. W. J., reference to, 6, 43, 46
Williams, Mr. S. C., reference to, 34
Wingate, General Sir Reginald, reference to, 65
World Plan, proposed by Mr. Cyrus Kehr, 107

Y

Yarrow, Sir Alfred, reference to, 44

Z

Zones—Agricultural Belts, Public Parks, Parkways, Hill-tops, 57
——, Industrial and Commercial, 42, 91, 116
——, Residential, 57, 91, 115, 127
——, Jerusalem protective, 66, 129
——, Khartoum building, 121, 130

THE END