

INDIA OF TO-DAY

VOLUME IX

TOWN PLANNING IN INDIA

By

J. M. LINTON BOGLE

Bachelor of Engineering (L'pool)
Assoc. Member, Institution of Civil Engineers
Assoc. Member, Town Planning Institute
Chief Engineer, Lucknow Improvement Trust

WITH A FOREWORD BY

RADHA KAMAL MUKERJEE

M.A., Ph.D., Professor of Economics & Sociology
Lucknow University

OXFORD UNIVERSITY PRESS
LONDON BOMBAY CALCUTTA MADRAS
1929

Printed by V. P. Pendherkar, at the Tutorial Press
211a, Girgaum Back Road, Bombay

and

Published by Humphrey Milford at the Oxford University Press
B. I. Building, Nicol Road, Bombay

FOREWORD

I have been honoured by the request of Mr. J. M. Linton Bogle to write a foreword to his manual. The subject of Town Planning is as ancient as man's congregation in villages and cities, but it has come into prominence within the last few decades because industrialism in its uncontrolled and haphazard growth has paid scant respect to anything except the mere accumulation of wealth. Thus a social disease has necessitated the study of the conditions of man's normal health and living. It is now realized that a programme of amelioration of the workers' living conditions is far more important than improving the conditions of work and of industrial management. For unremitting drudgery and hard toil, fear of unemployment and of the overawing authority of the Sirdar, are less far-reaching in their effects than living in gloomy cellars, which can offer no comfort or attractiveness to their tenants, but must rather suggest the thought of running away to liquor shops and brothels where there is more room space, more light and more company.

Our big cities such as Calcutta and Bombay, in their combination of chawls, bustees, flats and narrow gullies, have some of the worst slums in the world. An industrial city like Cawnpore, where sixty-four per cent of the population live in single room tenements as against six per cent in London, and where nearly half the number of children die within a year of birth, shows the social disaster of a rapid and pell-mell growth, and presents a challenge alike to the town planner and social worker.

Not only in our big cities but also in our small

industrial towns there is appalling congestion. The labourers suffer in health, vice and crime become rampant, and industries cannot expand because of inflated land values. Our rapidly growing jute, cotton, coal and railway towns show such a chronic house famine that family life becomes impossible. Some indeed are fast being converted into towns of single men. Everywhere there is a striking excess of males over females, and the industries suffer because of the floating nature of the population, and the resulting intemperance and lack of fixed habits.

Our ancient religious towns, our provincial capitals, our district towns and small trade centres alike present similar problems both of deterioration and improvement. Everywhere there is need of controlling expansion in accordance with a definite plan or programme. A planless muddle of factories, warehouses, railways and slums has led to terrible congestion. Yet, on the other hand, suburban development and the extension of tramways or light railway facilities might have solved industrial housing problems. What is more, labour villages might have been established, where every home would have a garden, giving opportunity of work and recreation to the women and children; the community life might have been revived in common chawdis, temples, tanks or canteens; and light railways, motor lorries or launches might have conveyed the labourers to their place of work.

It is for these reasons that we welcome Mr. Linton Bogle's manual of Town Planning, which describes clearly the principles and methods of town improvement adapted to the conditions of Indian cities, and which also lays down practical proposals in the form of rules, which might easily be assimilated into the existing bye-laws of the municipalities.

As long as we have no adequate and comprehensive Town Planning Act in force (though Indian public opinion must now demand one) we have to depend upon the Municipal Acts for carrying out measures of urban betterment. Mr. Bogle's rules, such as those that relate to the amount of open space which is absolutely essential; the distribution of the total open space specifically for children's playgrounds, sports grounds for youths, and parks; the width of roads and the height of houses in them; the number of houses on an acre of residential land, etc; all have been suggested after careful scrutiny and long experience of Indian conditions, and I believe it will save a large number of committee meetings if the municipal boards in different provinces adopt them as coming from an expert city engineer, who has spent a great part of his life in the improvement of *mohallas* and bazaars, the demolition of congested houses in chowks, and the opening out of playgrounds for Indian children. Mr. Bogle has shown how a very small municipality, with its limited funds, may effect improvement without large expenditure. While he is essentially practical he has a keen sense of the value of Indian domestic and communal ideas and traditions, which have found their expression in our architecture and city development, seen at their best in South India. There almost every house has an orchard, which receives the sewerage of the house that is the mainstay of a profitable vegetable garden. Every street is lined with shady trees and its width guaranteed by the periodical car procession. Every village has its central park, tank and temple. The tanks are sacred, the trees are sacred, and the temple, which is covered by dense rich foliage, perhaps gives the name and sacred distinction, to the village. It is from the temple that there radiates the impulse which uplifts every house so that each may become

itself the temple of God.

The beauty, orderliness and sanctity of the Indian village or city, fashioned and built in the form of the body of Vishnu or Garuda or of the sacred lotus, have now been eclipsed by the dust, dirt and smoke of a profit-making industrialism. Even in the sacred temple city of Madura we have some of the worst slums of India, on a site very near, and, strange to say, belonging to the temple of Minakshi, inhabited by workers employed in a neighbouring mill. Town Planning can no longer be left to religious convention or to social sanction. The evil of town deterioration is modern and must be dealt with by modern methods. These methods are for the first time placed here before the Indian public concretely, tersely, graphically, and by applying them we shall not only make our social and industrial adjustments both feasible and easy, by eliminating the ugly and anti-social aspects of industry, but may perhaps achieve the integration of life's activities and the expression of the creative impulses. Thus beauty may once more be restored to our towns not as ornamentation confined only to temples, tanks and gardens, but as one coherent vision that lives through all their parts.

RADHA KAMAL MUKERJEE

UNIVERSITY OF LUCKNOW

December 1927

CONTENTS

CHAPTER I

INDIAN TOWNS FROM A FRESH VIEW-POINT	.	1
--------------------------------------	---	---

CHAPTER II

THE HISTORY OF TOWN PLANNING	.	11
------------------------------	---	----

CHAPTER III

THE MEANING OF TOWN PLANNING	.	17
------------------------------	---	----

CHAPTER IV

THE WIDTH AND ARRANGEMENT OF STREETS	.	21
--------------------------------------	---	----

CHAPTER V

PARKS AND PLAYGROUNDS	.	31
-----------------------	---	----

CHAPTER VI

TOWN PLANNING AND PUBLIC HEALTH	.	36
---------------------------------	---	----

CHAPTER VII

THE ECONOMY OF TOWN PLANNING	.	45
------------------------------	---	----

CHAPTER VIII

THE PRACTICAL APPLICATION OF TOWN PLANNING		54
--	--	----

CHAPTER IX

HOUSING—PRESENT CONDITIONS	.	60
----------------------------	---	----

CHAPTER X

HOUSING REMEDIES	.	67
------------------	---	----

APPENDIX A—THE BOMBAY TOWN PLANNING ACT, 1915	79
„ B—THE MADRAS TOWN PLANNING ACT, 1920	89
„ C—MODEL BUILDING BYE- LAWS, UNITED PROVINCES MUNICIPALITIES' ACT, 1916	94
INDEX	101

LIST OF ILLUSTRATIONS

Hardwar: Aeroplane photograph showing narrow and crooked roads unsuitable for pilgrim crowds <i>facing</i>	8
Allahabad: Showing scattered distribution of public buildings and lack of small parks ...	9
Types of ancient Indian village plans from the Manasara	12
Madura: Plan of the streets round the Minakshiammam Temple	13
Plan of bania's typical house	19
Chicago: Sketch plan of central area showing lack of radial roads	22
Part of the plan for the new capital of Australia, showing radial, lateral and development roads	23
Diagram showing how to ensure light and air in honsees on narrow lanes	29
Lucknow: Aeroplane photograph of Chowk showing congestion of houses ... <i>facing</i>	32
Comparison of infant mortality in English and Indian towns	37

Boasganj Garden Village, Lucknow, showing space round buildings <i>facing</i>	39
Comparison of street widths in London and Calcutta	40
Town Planning Development of unbuilt-on land	48
Barudkhana Development Scheme, Lucknow	51
Typical town street, showing growth of encroachments <i>facing</i>	57
Types of Indian clerks' houses, New Delhi ...	70
Labourers' houses in Bombay and Lucknow ...	71
Lay-out for chawls on the Bombay Improvement Trust Estate at Naigaum	74

WHAT TOWN PLANNING MEANS

A DEFINITE PLAN of orderly development for the Town into which each improvement will fit as it is wanted.

NOT the immediate execution of the whole plan.

CARE and PRESERVATION of human life and energy, particularly child life.

NOT indifference to congestion and insanitation.

THE PROVISION of GOOD BUILDING SITES.

NOT the leaving of narrow and awkward shaped plots.

ENCOURAGEMENT of TRADE and increased facilities for business.

NOT the interruption of trade.

PRESERVATION of HISTORIC BUILDINGS, and buildings of religious veneration with all their traditions.

NOT the destruction of old landmarks.

THE DEVELOPMENT of an INDIAN CITY worthy of civic pride.

NOT an imitation of European cities, but the utilization of what is best in them.

HEALTH, PLEASANT SUR-
ROUNDINGS and RECREA-
TION for all inhabitants.

NOT merely expensive
roads and parks
available only for
the rich.

CONTROL over the FUTURE
GROWTH of the town with
adequate provision for future
requirements.

NOT HAPHAZARD
laying out of
buildings and
roads with resultant
COSTLY im-
provement schemes.

ECONOMY.

NOT WASTE.

GENERAL EDITOR'S NOTE

THE opinions expressed in this book are those of the author. No other person shares responsibility for them.

J. COATMAN

CHAPTER I

INDIAN TOWNS FROM A FRESH VIEW-POINT

In the great expanse of the Indian Empire, with its vast areas of agricultural and forest lands, the towns seem at first sight to be few and of little importance. Separated by wide distances and containing but a small proportion of the total population, they might appear to play a minor part in the life of the nation. Yet India has already over two thousand towns and twelve hundred municipalities; it has an urban population of over thirty-two million, and that population is steadily increasing. The movement of the population from the country to the towns has transformed the countries of the west from rural into predominantly urban nations during the last century. It has affected the agricultural countries such as France and America equally with their industrial neighbours. Although primarily due to the development of factory industries, yet it has other and more deep-seated causes, such as the need for wider opportunities of social progress, the awakening ambition brought by better education, the desire for more intense pleasures than the country-side can provide. In India, in spite of a traditional preference for the country, there has been a definite increase in the number of town dwellers during the last thirty years: and there is no doubt that the spread of primary education and the development of communications and industries will quicken the flow of population from the country to the towns.

Table I (see overleaf), taken from the *Census of India 1921*, shows the steady increase in urban population during the last thirty years.

. Besides the general increase in the number of people living in towns, there has been evident a marked tendency

Table I

GROWTH OF POPULATION IN TOWNS IN INDIA
1891-1921

Class of population	1921	1911	1901	1891
Total population	316,017,751	313,488,137	294,317,082	287,006,054
Urban population	32,418,776	29,702,063	29,200,247	27,171,241
Percentage of urban to total population	10.2	9.5	9.9	9.5

for the population to congregate in increasing proportion in the cities and larger towns, as compared with the towns below 20,000 inhabitants. The growth of the large cities at the expense of the smaller has been a marked feature of western countries during the last half century. Table II indicates that India is likely to be no exception to this rule.

‘It will be observed here [Table II] that while the towns with populations above 50,000 have increased by over sixteen per cent in the last decade the increase has been considerably less in those between 5,000 and 50,000, while the population of the towns between 10 to 20,000 has not even kept up with the progress

Table II

POPULATION OF DIFFERENT CLASSES OF TOWNS IN
1921 AND 1911

Class of towns	No. of towns in 1921	Population		Variation 1911-21 Increase	
		1921	1911	Actual	Per cent
Territory urban in 1921	2,313	32,418,776	29,702,063	2,716,713	9.1
Towns having in 1921					
I. 100,000 and over	35	8,211,704	7,075,782	1,135,922	16.1
II. 50,000 to 100,000	54	3,517,749	3,010,281	507,468	16.9
III. 20,000 to 50,000	199	5,925,675	5,508,944	416,731	7.6
IV. 10,000 to 20,000	450	6,209,583	6,163,954	45,629	.7
V. 5,000 to 10,000	885	6,223,011	5,936,513	286,498	4.8
VI. Under 5,000	690	2,331,054	2,006,589	324,465	16.2

of the general population of the country. The significance of these comparisons lies in the strong indication which they give of the gradual decadence of the medium sized country town and the growth of the larger cities and towns under the influence of commercial and industrial development. This is undoubtedly one of the most interesting and important features of the decade. We can study it best in the conditions of the Bombay Presidency and in the eastern provinces where industrial progress has been most prominent.' ¹

Quite apart from their size and number, towns play a part of great importance in the national life. From time immemorial the social and religious life of a people has been centred in its towns. Established at suitable centres of communication, they form the natural markets for the country's commerce; for their convenience and amenities they are chosen as the seats of government administration, and with their facilities for higher education and easy intercourse they draw together the intellectual life of the country classes.

Hence it is that towns have an added importance as the indicators of a country's development; for every change in the civilization or culture of the country has its first and most rapid effect on the towns: it is by them that the observer can best judge the prosperity of the country: they register most quickly each step in the national progress or decay.

If it were possible for one of the many travellers who visited India during the first half of the nineteenth century to see this country as it is to-day, he would be struck more than anything by the great changes in the towns.

The mail train, carrying him on his tour with a speed undreamt of in the days of the palanquin, would show him the country districts still substantially unchanged; men lifting water with the *charsa*, village women grinding the corn; the same crops sown on ground ploughed with the same wooden plough.

¹ *Census of India 1921*, Vol. I, pp. 65-66.

Only when the traveller stepped out of the railway station into a large town would he realize the changes that a hundred years have brought; for he would find that the material progress of a century, which had hardly affected the villager or his fields, had often entirely changed the character of the towns.

In India during the last century, owing to the increase in population, most of the towns have been forced to expand: modern methods of industry have produced the factory and the mill, and in the towns the old house industries of weaving or grinding corn have been replaced by machines or workshops, which distribute their goods by rail, and make increasing demands for labour from the population of the town. Swiftly moving vehicles and the increase in traffic have made the old lanes dangerous, and necessitated straighter and wider thoroughfares. Better standards of living demand larger building plots, more open spaces and improved sanitation.

All these developments have altered most of the towns in India beyond recognition. New towns have sprung up where before there were none, and old towns have fallen into disuse. Bishop Heber would find that the Cawnpore that he knew only as a small administrative station had become the foremost industrial town of India. In his *Narrative of a Journey through the Upper Provinces of India* he says: 'The city of Benares is certainly the richest as well as probably the most populous in India'. Now that the Ganges has lost its claim to be the highway of Indian commerce in the north, Benares, though still a centre of Hindu culture and learning, has lost its position as a commercial capital. Karachi was an unknown fishing village eighty years ago, and is now the third largest port in India. Jamshedpur, now a thriving industrial town with 60,000 inhabitants, was ten years ago a village with a population of less than 6,000. The coming of the railway, enabling goods to be taken direct to more convenient centres further west, took from Mirzapur much of its importance as a distributing market at the head of the navigable Ganges, and, in forty years, reduced its population by half.

These changes brought about by industrial progress

and advancing civilization, have been slower in the east than in the west, but that they form an important feature of this country's development is shown by the 1921 census. The rapid growth of commercial and industrial centres, the development of the mineral resources of Bengal, the Central Provinces and Mysore, and the desire of the cultivator for a good market close to where he grows his crops ; all these are drawing people together in convenient centres, and turning villages into towns and towns into cities.

But if the traveller were asked what he thought of all these changes ; whether he considered that municipalities had taken full advantage of their wider knowledge of public sanitation ; whether the increased prosperity was accompanied by a corresponding increase in standards of living and housing ; and whether town dwellers lived happier and healthier lives, there is no doubt that he would have to own himself disappointed. He like ourselves could point to lost opportunities everywhere ; here to a road jammed with traffic that twenty years ago could have been widened at little cost ; there to an area where houses have grown higher and lanes narrower till the ill-lit and ill-ventilated rooms offer a welcome to all forms of sickness and disease. In one *mohalla* houses have been constructed over the whole area leaving no room for playgrounds or open spaces. In another, offensive trades have been allowed to concentrate side by side with shops and houses.

The rapid growth of the towns has been uncontrolled. There has been no plan of orderly development, and instead of each addition taking the place best suited for it, and so fitting into a pre-arranged scheme for an attractive, healthy and prosperous town, towns have been allowed to develop haphazard, a wasteful mixture of good and evil.

But perhaps it will be pointed out that many towns in India already have attractive buildings, large parks, prosperous factories and wide roads. Are they not as good as can be expected ? Why should they not continue to expand as the demand arises ? They were good enough for our fathers and forefathers, why should they

not be good enough for us ?

The best answer to such questions is to examine the present towns and see if they are really satisfactory; if they are really as healthy, prosperous and attractive as they might have been; or whether they have not lost many chances of improvement, through lack of that foresight and control which would ensure that each change would be a change for the better.

Calcutta has a prosperous and dignified business centre of which it is justly proud; yet the same city, in its combination of chawls, tenements and narrow lanes has some of the worst slums in the world.

The visitor to Bombay admires its fine buildings set in beautiful surroundings, but let us hope that he does not know of its appalling infant mortality of over 600 deaths for every 1000 infants born.

The trade and prosperity of Karachi has increased enormously in the last decade, when its population has risen by forty-three per cent; but has this increase in industry been accompanied by a corresponding increase in housing facilities for workmen, or in the development of areas for factories and offices? The report of Mr. A. E. Mirams, Consulting Surveyor to the Government of Bombay, tells us that it has not; that the congestion in the old town, where forty-eight per cent of the population lives in single rooms, each occupied by six or more persons, is appalling; that the whole of this district is so shut in by warehouses and offices that expansion is impossible, and that fresh sites for warehouses and factories are urgently needed. No municipality could be satisfied with this, and Karachi has very wisely had the whole problem studied by an expert town planner.

Much the same can be said of smaller towns all over the country. In Titagarh, in Bengal, for instance, the rapid influx of labour for the jute mills, ninety per cent of which comes from outside the province, has resulted in great scarcity of housing accommodation, and the industries suffer from the resulting intemperance of the workmen and their lack of interest in their work—not surprising when their only ambition is to earn enough money to take them home again as quickly as possible.

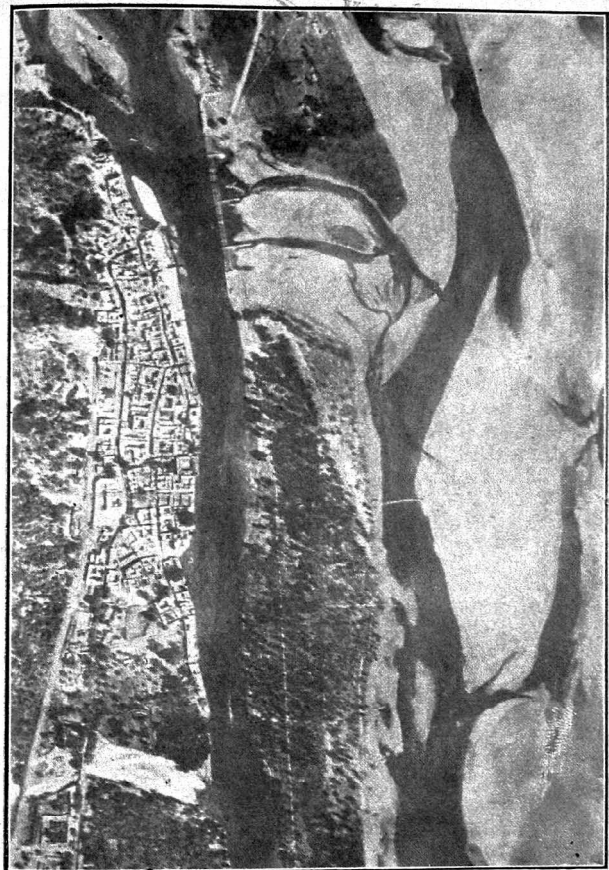
The sacred town of Hardwar is venerated by all Hindus; thousands of pilgrims visit it every year, and periodically, at times of *melas*, the number of pilgrims increases to hundreds of thousands. Yet the aeroplane photograph shows that it has kept the character of a typical small country town, with congested bazaar, and narrow crooked streets, totally unsuited to the passage of crowds, and with inadequate accommodation for the enormous influx of visitors.

The unsuitability of the streets of Hardwar for use by pilgrims has led not only to inconvenience but also to serious loss of life. On days when the influx of pilgrims is greatest the crowds striving to reach the sacred pools, or to pass through the bazaar, can only be controlled by barriers; and during the last two Kumbh Melas accidents have occurred through crushing at these barriers. In 1915 twenty-three lives were lost and in 1927 there were thirty-six deaths in such accidents, while there are many cases of collapse and injury in the narrow road approaches. The Government of the United Provinces and the municipality are now seriously considering the improvement of the town, and Hardwar is faced with an expenditure of ten lakhs in urgent street improvements before the next *mela*.

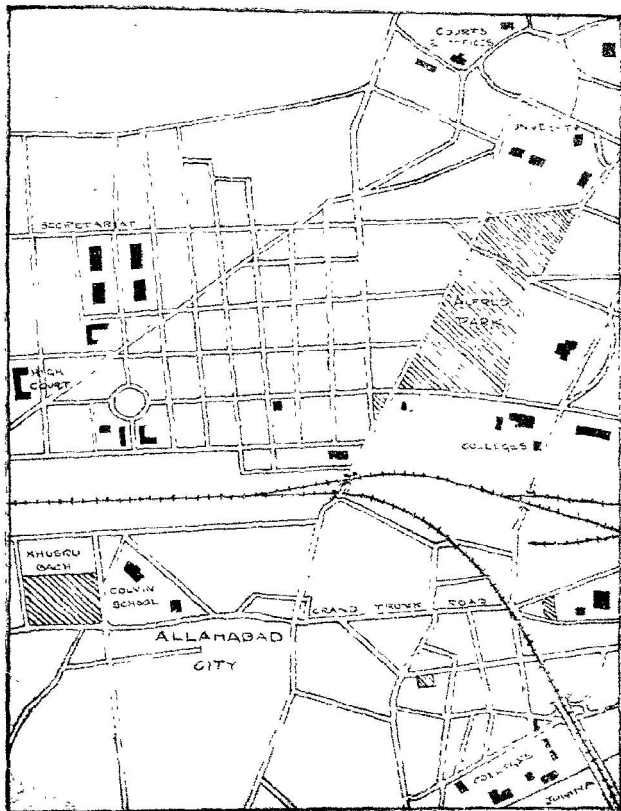
The lack of roads in the city of Benares is a great drawback to its health and convenience, while the town of Bahraich has a much greater mileage of roads than is necessary, and could effect much needed economy with a shorter road plan.

The plan of Allahabad shows how the public buildings and Law Courts are scattered all over the town, miles from each other and from the city where most of the clerks live. The factories are mixed up with the houses and are without good roads or railway sidings. One half of the town is cut off from the other by the railway and connected by only two bridges. Is there any good reason why the occupants of Civil Lines should have enormous compounds of six to eight bighas—far more than they want—while the houses in the city are packed together like sheep in a pen?

Is the magnificent Alfred Park of as much use to



HARDWAR : Aeroplane photograph showing narrow and crooked roads unsuitable for pilgrim crowds



ALLAHABAD—Showing scattered distribution of public buildings and lack of small parks

the town as would be the same area of smaller playgrounds all over the city? The Grand Trunk road is so narrow that vehicles are badly congested and there are daily accidents. It is evident, surely, that there are many alterations that would make Allahabad a better city and increase its health and prosperity.

With such conditions as these it is not possible to say that Indian towns are satisfactory or that their improvement is not necessary.

Every one can point to some need in the town that he knows best for which he can suggest a remedy. It may be the need for wider roads as in Calcutta, for open spaces for playgrounds as in Allahabad, for the control of building areas to avoid the congestion that is so harmful to Bombay, or the regulation of the various parts of the town to avoid confusion and to facilitate commerce and industry. It is rarely that improvements cannot be made in the appearance and dignity of the city by the organization of street junctions and public squares, or by well-designed street furnishings and ornament.

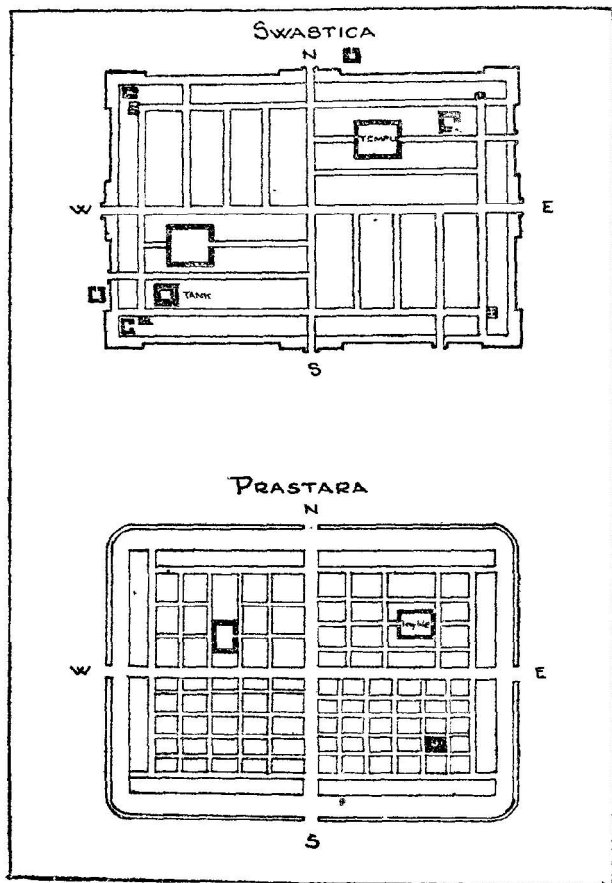
It is the study of these needs, some or all of which will be felt by every town, the control of changes and development in accordance with a gradual plan of improvement, and the application of simple principles so as to prevent mistakes in the future, that together form the science of Town Planning.

CHAPTER II

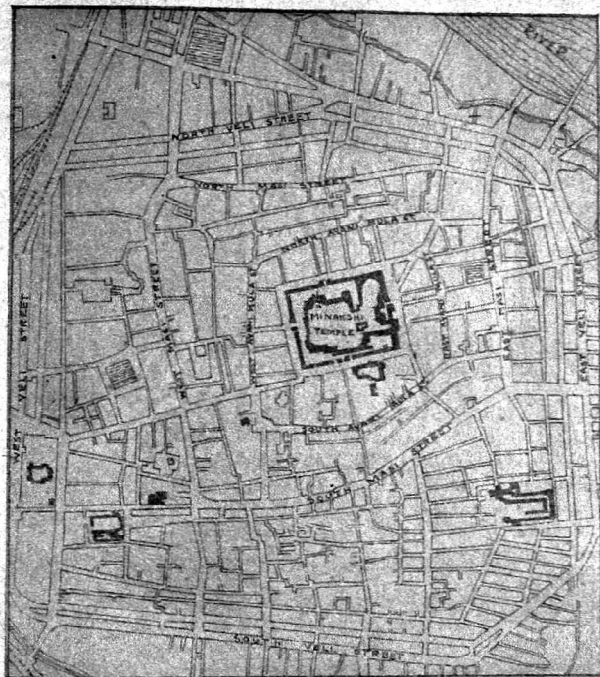
THE HISTORY OF TOWN PLANNING

The fact that Town Planning has come into prominence in India during the last twenty years has led many people to think that it is a new science. They find that the first Town Planning Act in this country was passed by the Bombay Government in 1915; they learn that Town Planning came to the fore in western countries at the end of the last century as the direct result of the rapid development of industrial towns; it is natural that they should be inclined to regard it as an innovation, perhaps even consider it a modern cure for a modern evil.

But this is not so. From the history of past civilizations it is evident that Town Planning is not merely a modern idea but has been a feature of all great administrations. No less than five thousand years ago the builders of the Illahūn Pyramid in Egypt laid out a town for the housing of the workmen and administrators and planned it with straight roads and different sized plots for different grades of employees. The highly developed Greek civilization at the time of Alexander the Great, and after, practised this science, and laid out many towns for the settlement of discharged soldiers or for the emigration of surplus population, some of which, such as Silene, have been excavated in recent years. This practice was followed by the Roman Empire in founding their colonies; and examples of their careful town planning can still be seen in France, England and Africa. Their towns were laid out in the style of a military camp, and their armies were accompanied by a *Prefectus Castorum* or Town Planner, specially appointed for this work.



Types of ancient Indian village plans from the *Manasara*



MADURA—Plan of the streets round the Minakshiammam Temple showing rectangular planning

By kind permission of Mr. H. V. Lanchester, F.R.I.B.A.

In India also the great civilizations of ancient times understood the principles of Town Planning equally with the most advanced science of modern Europe.

Since 1834 when Ram Raz published his *Essay on the Architecture of the Hindus* the western world has known that the planning of cities and villages was customary among the Indo-Aryans long before the time of Christ; and there is further abundant evidence of this in the old treatises on the manual arts, the *Silpa Sastras*. Kautilya, the minister of Chandragupta, in his wonderful manual of government, shows that the technical and social requirements of Town Planning were realized and understood under the Maurya dynasty in the third century B.C. The Greek traveller, Megasthenes, was greatly impressed with Pataliputra, the capital of the Maurya Empire, and described it as an elongated rectangle, the royal palace occupying a central position in a fine wooded park, laid out with fountains and fish ponds.¹ Madura, one of the most ancient cities of Southern India, known to the Greeks and Romans and mentioned in Ptolemy's Tables as the capital of the Pandian Kingdom, is described as having been planned with 'broad streets as wide as a river and houses on either side rising like trees on the banks of a river'.² The plan of the present-day town shows clear evidence of careful planning of the streets in the central area round the ancient temple, so as to provide good rectilinear building plots and convenient traffic routes.

Although the peculiar shortlivedness of Indian towns and the lack of excavations of ancient sites handicap the student, yet the old Indian treatises and such examples as are available lead us to suppose that the great intellectual governments of India in the past were as fully aware of the advantages of Town Planning as their contemporaries in Europe.

In India, as in Europe, the invasions of the Huns resulted in a period of degeneration of science and art.

¹ Binode Behari Dutt, *Town Planning in Ancient India*.

² C. P. Venkatarama Ayyar, *Town Planning in Ancient Dekkan*.

Cities became the only safe refuges against marauders, and their design depended almost entirely on the requirements of fortification. The inhabitants, with a natural reluctance to build outside the defences, crowded their houses more and more closely together as the population increased; the streets became narrower and more irregular, not only on account of the over-crowding, but also because they offered thereby greater resistance to attacks. Many towns in India to-day are still handicapped by the over-crowding of the houses and the narrowness of the lanes within the old walled area as a result of the lawlessness of that period.

With the establishment of the Mughal Empire, however, there was a revival of interest in the building arts, and the founding of cities became the favourite hobby of the rulers of the day. The Fatehpur Sikri of the Emperor Akbar, the Jaunpur of Kwaja Jahan, and the Jaipur founded by Raja Jai Singh in 1664, are examples of new towns, in which the founders adopted many of the principles of modern Town Planning.

The break-up of the Mughal Empire and the struggles of various rulers to establish independent kingdoms gave a set-back both to the founding of cities and the development of existing ones; the East India Company, with its energies fully occupied in successive campaigns and in the establishment of a stable government, either ignored the problems of town development, or else attempted to impose on their new possessions the unsuitable form of their western towns. It is only of late years, as towns have rapidly expanded as the result of the increased prosperity of the country, that India has again realized the value of Town Planning, and has turned its attention to the science that it utilized so successfully in the past.

In Europe, also, it is within the last fifty years that the greatest revival of this ancient art of Town Planning has occurred. Germany was the first country to pass Town Planning legislation over forty years ago, and has continued to apply and improve it ever since. England followed suit shortly after, and in England it is now compulsory for all municipalities of over 20,000 inhabitants to

prepare Town Planning schemes. Most of these authorities employ a specially trained Town Planning Assistant on their municipal staff, who prepares their schemes for them. The United States, Canada, Sweden, France and Australia have all adopted it, and have improved their existing towns or founded new ones in the light of its principles. Many universities in these countries have special courses in Town Planning and issue diplomas to those who have qualified for such work.

In India the Government of Bombay passed the first Town Planning Act in 1915,¹ and in 1920 the Government of Madras passed legislation applying Town Planning to all municipalities in the Presidency.² Within the last twenty years the principles of this science have been adopted in nearly every large city in India by either municipalities or Improvement Trusts.

Cairo and Khartoum have been town planned, Zanzibar has prepared a scheme, and Malaya, like Bombay and Madras, has a special Government Town Planner to advise municipalities or prepare schemes for Government.

Town Planning to-day is being applied with success all over the world; it has been tested in the past and proved its worth, and it is likely to be of even more importance in the future, if the present tendency to congregate in towns continues.

India has made a start in the right direction : she has the traditions of the past to encourage her and many fine cities of which to be proud. Still in the early stages of her industrial development, she can take advantage of the experience of western countries and profit by their mistakes. Surely it is worth the while of every one who has an interest or a responsibility in municipal government to see what Town Planning means and how it can be applied, and to find out whether it will not be of benefit to his particular town and those who live in it.

¹ See Appendix A, p. 65.

² See Appendix B, p. 75.

CHAPTER III

THE MEANING OF TOWN PLANNING

The meaning of Town Planning can be broadly summed up in the phrase, 'A way to make the town a better place in which to live'. This meaning is more particularly defined in the preambles to the various Town Planning Acts of different countries, in which it is described as the promotion of 'the health, comfort and convenience' of those living in their towns.

It has already been pointed out how each change in a nation's prosperity has its first and most noticeable effect on the towns. Houses are continually being rebuilt to meet new standards of living; fresh areas are developed as the town expands; roads require alteration to meet the needs of different and faster means of transport, and municipalities are striving to provide better housing conditions, and cleaner and more beautiful towns.

The object of Town Planning is to take advantage of this continual change, and to control it in accordance with a gradual plan of improvement so as to meet future needs, instead of allowing the town to develop haphazard.

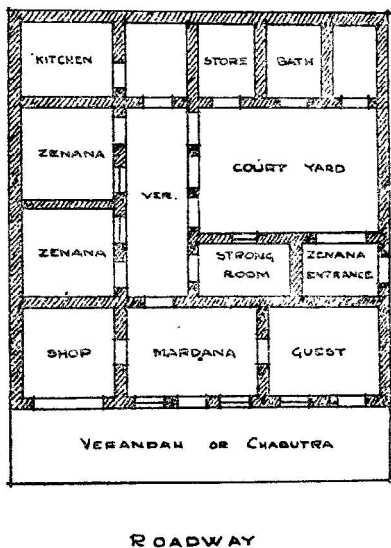
Every one in India knows how to build a house; the villager builds his own, the better classes employ *mistri*s or engineers, but all have a definite scheme, a plan for the house they wish to have. In most places the authorities require the submission of a building plan, but even if this is not done, the house is planned beforehand so that all the needs of the householder may be met in the finished building. In this way the builder provides a suitable shop or workroom for the business of the householder; a *mardana* or guest-room for friends or meetings; zenana rooms for living and sleeping, and a store room for food for the family or grain for the cattle. There is a courtyard for fresh air and recreation,

a verandah or *chabutra* as a cool place for sitting out in the evening, and proper passages giving access to all parts of the house. Each need is provided for, and in the well-planned house each room or portion has its proper size and position.

If we examine our towns, however, we find a very different state of affairs. Most of them have grown up without any governing plan or design; houses have been built at the whim of the land-holder, and factories and offensive trades mixed up with the houses; the roads are narrow and inconvenient and no space is left for fresh air and recreation. Surely a lesson in town building could be learnt from the simple rules observed in building a house.

For Town Planning is in principle merely the application to towns of the same rules that all adopt in building houses. Factories and mills, with their attendant smoke and dirt, would be grouped together, conveniently situated for railway sidings or road access, but away from residential houses; public buildings and offices would be in the centre of the town where they are easily accessible, near together to avoid long journeys from one to the other, and, like the guest-room or *mardana* in front of the house, adding dignity and beauty to the centre of the city. The areas for residential houses—the zenana rooms of the town—would be situated further out in pleasant surroundings. Grain markets, like store rooms, would be properly designed to be rat-proof and sanitary. Roads, wide enough to accommodate all traffic, would connect up conveniently all parts of the town in the same way that the passages and verandahs serve the occupants of the house. Wider roads would allow plenty of healthy fresh air and sunshine to reach the houses, which, for the same reason, would not be closely packed together. Parks and playgrounds, the gardens of the town, would be reserved and laid out for recreation and cool sitting out places. If proper planning is necessary for a house to be healthy, comfortable and beautiful, it is equally, if not more, necessary for a town.

This is the lesson that the rapid and uncontrolled growth of industrial towns has taught the countries of the



A typical bania's house well planned and convenient

western world. It has been taken to heart, with the result that these countries are determined to avoid the mistakes of the past, and legislation has now been passed by nearly every country in the world enabling municipalities to control town development.

In some cases quite new towns have been started, for which a definite plan was prepared, so that the roads should be adequate for the traffic of the fully grown town, and so that its inhabitants should be ensured health and comfort both at work and play. Letchworth, in England, is an example of such a 'Garden City', as they are called. Many big industrial firms have realized that their workmen do better work if they are properly housed, so, as well as having model factories, they have built garden suburbs according to Town Planning rules, where their employees can live in healthy and attractive surroundings.

But Town Planning not only shows what is desirable in the new town that its citizens may live in comfort under the best conditions; it also aims at gradually improving existing towns so that they may become more attractive and more efficient. Town Planning shows us the way to make roads convenient and adequate for traffic; to give houses sufficient light and air and to locate them in the best situation; to group the industries so that their work can be done most efficiently and without detriment to the town; to improve public health by providing a definite proportion of parks and open spaces, and to beautify the town by well-designed street ornaments and public buildings.

This is the way in which Town Planning can be of the most benefit to this or any other country, and this is the way in which its application will be considered in succeeding chapters.

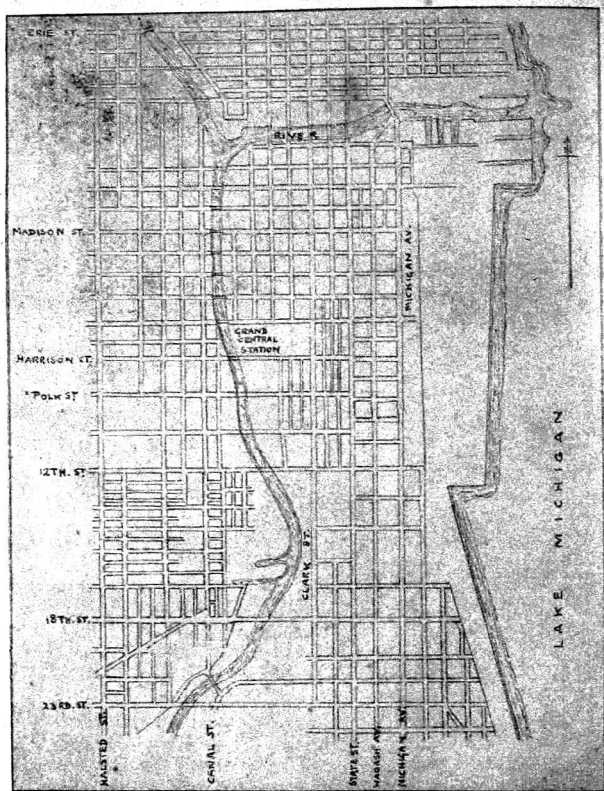
CHAPTER IV

THE WIDTH AND ARRANGEMENT OF STREETS

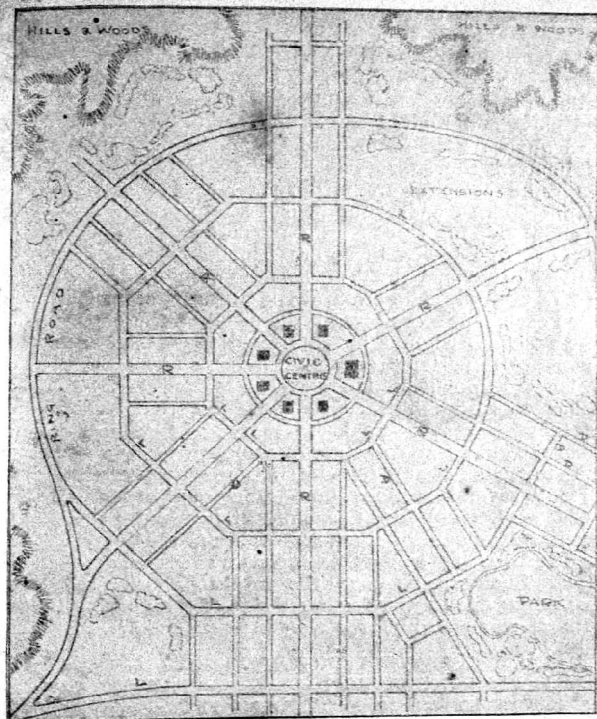
(Of the many parts that make up the structure of a town the street is perhaps the most important. The daily round of work and play, of food and sleep, is only made possible by the existence of the street. Streets provide the communications necessary for the circulation of traffic; they form the open public space essential in built-up areas for the administration of law and order; they furnish routes for the public services, such as the telegraph, the telephone and electricity; they enable drainage and water-supply to be laid to all parts of the town, and give the access necessary for the development of property. Clearly the efficiency of the town, as well as its character and beauty, will depend mainly on the design and lay out of the streets.)

(The natural growth of a town is from a small centre outwards in all directions, and this centre is usually the most important quarter where business, and therefore traffic, is concentrated. Here are situated the offices and public buildings, to which those living in the outskirts journey daily, and the markets and shops, whose employees add to the stream of traffic from the residential areas round about.)

(The first essential of a good system of roads is to provide for this traffic, and in the well planned town 'radial' roads lead out from the centre to the outskirts like spokes from the hub of a wheel.) Naturally the number of these radial roads is limited, as each can serve a fairly large area, and as in some directions the development of the town may be checked by an obstacle such as a river, railway embankment or canal; but for convenience and efficiency a certain number of radial roads are necessary, and it is the lack of them that is the chief cause of the present traffic congestion of American cities. The plan of Chicago shows that there is not a single radial road to the town centre from any of



CHICAGO—Sketch plan of central area, showing absence of radial roads



. Part of the plan for the new capital of Australia, showing the use of Radial Roads (R), Lateral or Ring Roads (L), and Development Roads (D)

These types of roads, though desirable in every town, cannot be laid out in such a geometric pattern as this, but will vary in position and alignment with the characteristics of each locality

its corners, so that traffic from these districts, instead of being able to take a direct line like a steamship, is forced by the road plan to pursue the indirect zig-zag course of a sailing vessel tacking up the wind. However suitable this chessboard road pattern may have been for the slow and limited traffic of Roman days, it is quite inadequate for the faster vehicles and larger populations of modern times. Radial roads from the city centre are quite essential in modern towns, (and the town planner's first endeavour will be to provide them, or to adapt existing roads for the purpose.)

(In large towns there are usually several centres of activity of various kinds, such as shopping centres, groups of Law Courts, public buildings or educational institutions, often each centre combines some or all of these purposes. These centres should be connected to each other and to the more important residential areas by through roads, which are known as 'laterals'. These lateral roads may either pass straight through the town from side to side, or they may join up areas more or less equidistant from the chief town centre, in which case they encircle the town and are called 'ring roads'. Calcutta has already several sections of a ring road in its Circular Road, while many towns, such as Vienna and Paris, have taken advantage of the removal of the old walled fortifications to construct encircling avenues in their place. Such roads have the additional advantage of enabling traffic to pass from one side of a town to another without going through the congested central area.

(Rule I. THE TOWN SHOULD HAVE A WELL DESIGNED STREET PLAN, INCLUDING RADIAL AND LATERAL ROADS, SO ARRANGED AS TO FACILITATE TRAFFIC FROM THE CENTRE TO THE OUTSKIRTS AND FROM ONE PART OF THE TOWN TO ANOTHER.)

(Between the radial roads and the laterals or beyond them, parts of the city will lie undeveloped unless traversed by other roads. These roads will not carry such heavy traffic, but will connect up the main roads and develop intermediate areas, and thus may be termed 'development roads'.)

(For them a rectangular plan is usually the most suitable in India. Most towns in this country stand on level plains, so that roads can be laid out at right-angles without any steep gradients to hamper traffic.) The inconvenience of curved or triangular sites, so evident in many western towns, is still more serious in this country, where the builder has not so much architectural experience, and where detached houses in open gardens are foreign to the Indian tradition. Also, crooked plots may be objected to on religious grounds, and cases have occurred where the market value of a housing area has been much increased by converting plots which were wider in front than behind, and so termed 'lion-headed', into their opposites, 'cow-headed' plots. The purchaser of a building plot in India is seldom literate, and still more seldom able to calculate areas. In his dealings in land, as well as in his subsequent building, he naturally prefers the simple rectangle to the more difficult curved or angular plots.

The tradition of the country, also, is in favour of the rectangular house, and therefore of the rectangular plot, and the preference for right-angled forms can be traced in courtyard and *serai*, in plot and square, from the houses of Taxila, the Buddhist monasteries and the palaces of the Mughals down to the present day. A rigid right-angled street plan is, of course, not desirable, even in the development of subsidiary areas, as it produces ugly and characterless streets, and, indeed, in the case of areas already partly built over, is seldom possible. But a rectangular plan adapted to meet the peculiarities of each site, and varied so as to preserve objects of beauty and interest, and to leave enclosed squares and open spaces, is usually the best way of developing urban housing areas in India.

Rule II. DEVELOPMENT ROADS CAN MOST CONVENIENTLY BE LAID OUT ON A RECTANGULAR PLAN, SUITABLY MODIFIED TO PRESERVE NATURAL FEATURES AND EXISTING PROPERTY.)

It is obvious that in most cases the established road plan does not meet this ideal, and conditions may render many immediate changes out of the question; but a

definite plan, based on these rules, should be prepared for the town, and the existing road system gradually brought into line with this plan as developments and rebuildings occur. In this way a town may avoid the necessity, in the future, of cutting new streets through built-up areas, an expensive method of improvement, as Calcutta is proving to-day.

When the direction of the roads has been decided, the question of street widths next faces the planner. There are likely to be congested streets already in the town, and the widening of these and the provision of adequate widths for new roads, to prevent such expense in the future, requires a knowledge of the relation of road widths to traffic.

The Traffic Advisory Board, after studying London's traffic requirements, laid down the following rules for street widths :—

Main Thoroughfares	...	...	100 ft.
Laterals	...	...	80 ft.
Local or Development Roads	...	...	60 ft.

and recommended that no road should be less than 40 feet wide. In the United States and Canada there is a very usual standard of 66 feet for the width of main roads, and in Europe it varies between 80 and 100 feet.

These widths are no doubt necessary in some of the larger towns in India, but for smaller provincial towns such great widths are neither necessary nor desirable. With the increasing motor traffic that is to be expected in this country, it is well to err on the wide side, but ratepayers are not likely to allow municipalities to expend large sums on the strength of their predictions of the future. Road widths must be assessed on the basis of present traffic, making due allowance for future needs.

It is only possible scientifically to determine the road width necessary for a certain amount of traffic by means of a traffic census. This takes into account the relative obstruction of traffic by allotting a unit of obstruction to each type of vehicle, and, by tabulating the number of vehicles per diem on each road, shows the resulting congestion. Wherever possible a census in this form should be made the basis of road width proposals.

If the experience and organization are not available for a census, it is still possible, by careful observation of the town, to discover which roads are congested and which are too large for the traffic they carry. It will be decided that on one or more roads the traffic is normal, the width of the road being just sufficient for the traffic it carries: taking this road as a standard the width necessary for other roads can be roughly estimated. If on the 'normal' road there are two more or less continuous lines of traffic, the width of the road will be found to be about 18 feet, and this gives us the basis of nine feet for each line of traffic for road widths in India. This is one foot wider than the unit width in Europe, and the difference is due to the ever present bullock cart, which is rarely less than seven feet nine inches across the axles and often nearly nine feet. (The width for other roads can then be determined from the number of lines of traffic, allowing nine feet width for each, and making a provision of not less than 25 per cent for future requirements. On main routes where traffic is likely to increase rapidly, and in the outskirts where land is cheap, this additional width for future needs should be increased to 50 per cent.)

This provision for the future is often a source of income to the municipality as, for example, in Lucknow, where the extra strips of land along Canning Street and Victoria Street are let out on garden leases at substantial rents.

(Rule III. THE WIDTH OF THE STREET SHOULD BE SUFFICIENT FOR PRESENT TRAFFIC ALLOWING NINE FEET WIDTH FOR EACH LINE OF VEHICLES, AND SHOULD ALLOW FOR FUTURE WIDENING BY AT LEAST FIFTY PER CENT.)

(For development roads narrow widths are much preferred in India. Narrow roads are shady and cool, they help to minimize the effect of the hot winds and dust of summer, and can accommodate the small amount of wheeled traffic necessary for the few houses they serve. When combined with tree-planted open spaces and enclosed squares, these roads need not be wider than eighteen or

sixteen feet or may have a ten feet carriageway only with a footway on one or both sides.

On crowded streets separate footways are essential. These footways lessen accidents by keeping the pedestrians out of reach of vehicles; they facilitate traffic by leaving the roadway free for vehicles; they reduce the dust nuisance,) the chief cause of which is undoubtedly the passage of vehicles over dusty *patries*; and, finally, the curbs and channels which separate them from the carriageway are of much value for proper drainage of the road surface.

(*Rule IV.* ON BUSY STREETS SEPARATE FOOTWAYS SHOULD BE PROVIDED, EACH NOT LESS THAN ONE-THIRD THE WIDTH OF THE CARRIAGEWAY.)

(One other aspect of road widths must not be forgotten. If houses are to be healthy and attractive fresh air and light must penetrate into all the rooms; this is not possible if the house frontages are on very narrow roads or lanes, especially if, as so often happens, balconies or *chajjas* project from the upper storeys and still further limit the ventilation of the narrow street.) At the All India Sanitary Conference in 1914 it was stated of Bombay that 'The insanitary condition of the congested areas of the city is due to the long foul narrow gullies between high houses whose only means of light and ventilation are the windows abutting on them'.

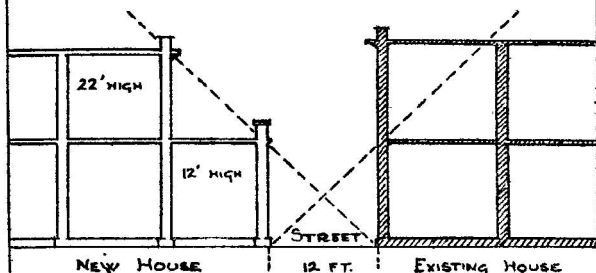
(Bombay is perhaps exceptional, but no town in India can be said to be blameless in this respect, and road widths must be made sufficient for health as well as for traffic.)

(The simplest method of enforcing this is by the inclusion in the bye-laws of the following rules)

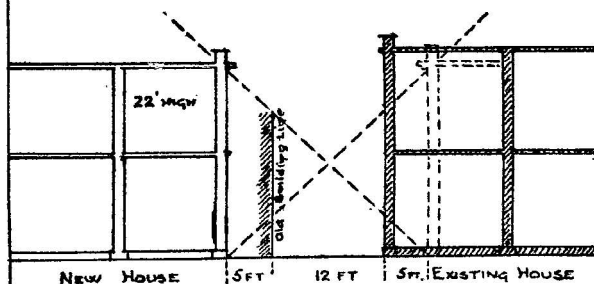
(*Rule V.* THE HEIGHT OF ANY BUILDING SHALL NOT BE GREATER THAN THE WIDTH OF THE STREET ON WHICH IT ABUTS.)

When houses with only one frontage, and that on a narrow lane, are rebuilt, under this rule the height of the front wall is limited to the width of the street. Should this be insufficient to construct a double storey

HOW LIGHT AND AIR CAN BE ENSURED TO HOUSES ON 12 FT. LANES



UNDER RULE V. BY SETTING BACK THE UPPER STOREY 10 FEET.



UNDER RULE VI. BY GIVING UP 5 FEET TO THE ROAD.

Diagram showing how to ensure light and air in houses on narrow lanes

house an upper storey may only be constructed if it is set back in the same proportion.

Where a lane is so narrow that this rule would not permit the construction of even a single storey of bye-law height, or where it is desirable to widen the lane for traffic purposes, the front of all new buildings must be set back so that the total width of the new road is not less than the height of the buildings.

(*Rule VI. ON NARROW LANES THAT HAVE TO BE WIDENED NEW BUILDINGS MAY ONLY BE CONSTRUCTED PROVIDED THAT THE FRONT WALL BE SET BACK TILL ITS DISTANCE FROM THE CENTRE OF THE ROAD IS NOT LESS THAN HALF ITS TOTAL HEIGHT.*)

The diagram on page 29 shows how (under these rules houses may be built on twelve foot roads so as to allow sufficient light and air to penetrate to all rooms. If these bye-laws were in force many householders would prefer setting back to limiting the height of their houses, and narrow streets would be automatically widened). 'Under the new Municipalities Act,' wrote Mr. Crosthwaite in 1916, 'the Boards will have power to make street bye-laws to regulate the height of buildings in a street and to secure adequate ventilation. The poorer classes will at first doubtless not understand the reason for this interference but there is not much use in spending lakhs of rupees on drainage, improvement schemes and conservancy if our bye-laws are so lenient that houses are allowed to be built on lanes three or four feet wide.'¹

(In any programme of town development the width and arrangement of the roads should take first place; if these are planned so as to be of suitable widths, to provide convenient routes for traffic, to ensure safety to street users, and to admit proper light and ventilation to all houses, municipal councillors will prove that their knowledge of Town Planning is worth many years of unsystematic experiment.)

¹ *Allahabad Municipal Report 1915-1916*, by H. S. Crosthwaite, I.C.S.

CHAPTER V

PARKS AND PLAYGROUNDS

(There is a saying among Hindus that the whole duty of man is to plant a tree, to dig a well and to beget a son.) We who live in this country and realize the inestimable benefit of the shade and peace of an Indian garden can appreciate the value of the tree and the well in its construction. (Gardens give us flowers for ornament and garlands, trees for shade and rest, space for exercise and children's games, and a place away from the heat of the house in which to sleep. It is not surprising that in conjuring up the vision of the perfect town, town planners should have chosen to call their ideal 'The Garden City'.)

(In Lahore a Garden City has recently been started by a co-operative society, and an area laid out for residential houses in an endeavour to provide ideal homes; this 'Model Town', as it is called, has for its first two bye-laws, (1) That every house shall have a garden; (2) That of the total area of the plot not less than two-thirds shall be garden and not more than one-third built over.) No better rules can be imagined for ensuring a delightful residential area, cool, attractive and healthy, and, where it is possible to enforce such rules, a municipality could not do better than adopt them.

(In the towns and villages of southern India the value of public and private gardens has been more fully realized) than in the north, where, whether in town or village, the small house seldom has a garden. It is only the rich who have means and space to construct gardens, and theirs are too often left unwatered and uncared for. In the south, however, helped by the more even distribution of rainfall and the strong social co-operation of Hindu community life (towns such as Madura, Tiruvannamalai and Chidambaram have constructed and maintained beautiful tank and temple gardens.) In the villages there is usually a *chawadi* or common garden, a sacred tank or a tree-planted open space round the local shrine,

where meetings of the village *panchayat* and religious and social gatherings are held; and each house in the village has its own garden behind the living quarters.

Unfortunately it will be a long time yet before every town house in India has its garden, if indeed it be possible for that time ever to come to an end. The closeness of the houses in the congested *mohallas*, the small size of many plots, the whole of which is required for living rooms, the high cost of land, all make separate gardens an ideal unattainable except by the well-to-do.

(But it is the poorer classes, whose houses are small and who live in congested areas, who chiefly need the health that a garden gives. They cannot afford to provide gardens for themselves, and it is clearly the duty of the town to make provision for them. Small playgrounds for children must be distributed throughout the built-up districts, sports-grounds for hockey, football and tennis for the physical recreation of the city's youth, and parks and ornamental gardens for the enjoyment of older folks, for the beautifying of the town and for the use of the public on religious festivals.)

(*Rule VII. ADEQUATE PROVISION SHOULD BE MADE BY EACH TOWN FOR PLAYGROUNDS FOR CHILDREN, RECREATION GROUNDS FOR YOUNG MEN, AND PARKS AND OPEN SPACES FOR GENERAL USE.*)

Rule VII classifies the types of open spaces into three kinds, and it is important that park authorities should appreciate this, as each kind must have special characteristics. (Little children require only a small playground—a piece of land about the size of a tennis court is sufficient—and it should be level and open enough for kite flying: but these playgrounds must be numerous and evenly distributed through the denser *mohallas*, so that children do not have to walk far or be separated from their parents by any great distance.) (It has been found in America that if the playgrounds are more than a quarter of a mile from their homes the children prefer to play in the street with all its dirt and danger; and this is at least as applicable in India where playgrounds are not so attractive or well equipped.)



LUCKNOW : Aeroplane photograph of Chowk showing congestion of houses, on which is indicated open spaces as now cleared and under construction as playgrounds

(*Rule VIII.* PLAYGROUNDS FOR SMALL CHILDREN SHOULD NOT BE MORE THAN HALF A MILE APART.)

(The sports grounds for young men may be more scattered, but they should be so distributed that each residential centre has its ground within easy reach. A hockey or football ground requires an area of a hundred by fifty-five yards. In nearly every town there are low-lying grounds unsuitable for building and subject to flood in the rains—an advantage for football fields—which can be leased on low rents to sports clubs and be a source of revenue to the town.) In Lucknow the applications from such clubs are so numerous that the fields available have to be allotted in turn so that each club may have at least one day a week.

The third class of open spaces, parks and ornamental gardens, are a great asset to the town from the point of view of appearance and enjoyment. The larger parks are usually Government controlled, and many Indian towns, although sadly lacking in the more important smaller playgrounds, are well provided with these; with flower beds and fountains they are a delight to visitors and a favourite rendezvous on holidays and festivals.) Smaller ornamental gardens in squares or at street corners are a great improvement on the usual dusty rubbish-strewn waste land, and public spirited citizens living near by can often be persuaded to finance their construction in order to perpetuate their name and improve the approaches to their property.

But the construction of parks and playgrounds costs money, and municipal commissioners will want to know what amount of open space town planners consider necessary, and how they can find out what is desirable for their own town.

These questions have been the subject of investigation by experts for several years. In India, where the purdah system limits the recreation of older girls, but where the need for playgrounds for small children is greater than in temperate climates, the minimum of open space necessary to give every child or youth at least a chance of recreation is given in the following rule:—

(*Rule IX.* THERE SHOULD BE ONE ACRE OF OPEN SPACE FOR EVERY FOUR HUNDRED OF THE POPULATION.)

Sometimes a town has already sufficient open space in the form of large parks or maidans to comply with this rule, but, as we have seen, this is of little use to the bazaars and *mohallas* in the heart of the city. To be of the greatest benefit, therefore, this proportion of open space should be divided up as follows:—

(*Rule X.* OF THE TOTAL OPEN SPACE GIVEN IN RULE IX ONE-TENTH SHOULD BE IN THE FORM OF CHILDREN'S PLAYGROUNDS, TWO-FIFTHS SPORTS GROUNDS FOR YOUTHS, AND ONE-HALF PARKS OR LARGE RESERVATIONS.)

The Census of India, taken every ten years, gives accurate figures of the population of each ward or *mohalla*, and with these rules as a guide it is easy to determine where playgrounds are required and how large they should be. Possibly the cautious citizen, who calculates the total amount of recreation grounds from these rules, will be dismayed at the deficit that he is advised to make up, and will point to the cost. But when he considers that at least half of this area can be in such a form as costs nothing in lay-out or maintenance he will be reassured. Bathing-ghats, river banks or the beautiful tanks of southern India fulfil all the requirements of open air recreation; Ram Lila grounds are a source of revenue as well as being public playgrounds; and maidans for festivals and mango or guava groves bring in rent as well as form a part of the area reserved for the public open space. The chief cause of expense is in playgrounds for children, and these are not a luxury but a necessity. They are a prevention of ill-health and ill-humour, and imbue the youth of the town with physical fitness that will repay the town a hundred-fold in the future.

(Town Planning requires that the needs of the town in open spaces and recreation grounds shall be thought out.) It does not demand that these needs shall immediately be fulfilled, but it does claim that if they are met gradually

in accordance with a definite plan, by reserving land that will be necessary at a later date, or by seizing opportunities for cheap acquisition, the citizens of the town will be saved costly acquisition in the future, and will obtain a return in health and enjoyment out of all proportion to the cost.

(In fact it asserts that prevention is better than cure.)

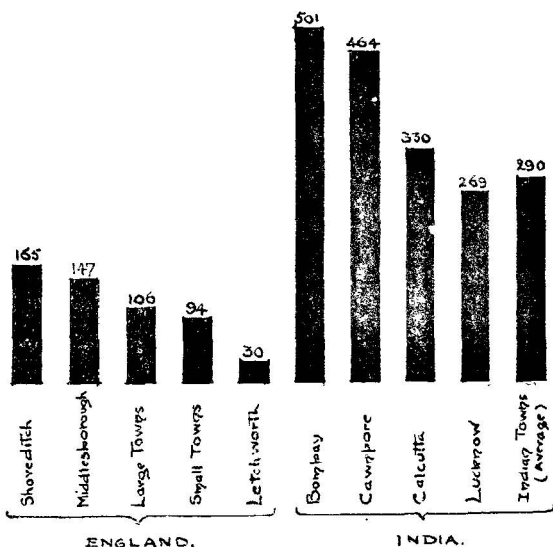
CHAPTER VI

TOWN PLANNING AND PUBLIC HEALTH

(Most of us are accustomed to think of the public health of a town in terms of sanitation and water supply. An ample and pure water supply and a proper drainage system are undoubtedly the first requisites for health in places where many houses are gathered together to form a town. This is especially true in India, where epidemic diseases are so prevalent; and where the contamination of water in wells or tanks, and the carrying of infection by flies and mosquitoes cause such diseases to spread with terrible rapidity.) But it has been found in those countries where good sanitation and water supply are almost universal and have been in operation for years, that there is still a marked difference in public health between individual towns apparently equally well equipped. For (if we compare the infant mortality—this being accepted as the best index of public health—of various English towns, we find) that it varies remarkably. The average infant mortality in provincial towns is about 100 deaths for every 1000 children born; in the industrial town of Middlesbrough it rises to 147 and in the slums of Shoreditch to 165, but in the garden city of Letchworth it is as low as 30. The figures for the general death rate in English towns tell the same tale. At the time when the death rate for Manchester, Wigan, Oldham and Liverpool averaged over 20 deaths per thousand per annum, the garden suburbs of Port Sunlight and Bournville had death rates of only 8.1 and 5.7 respectively, and Letchworth 4.8 and Bournemouth, a well laid out residential town, 12.5.

All these towns have pure water and elaborate sanitary systems, yet there is a marked difference in public health, and this difference is clearly most apparent in the case of the towns laid out according to garden city ideals.

DEATH RATE PER THOUSAND AMONG INFANTS UNDER TWELVE MONTHS OLD



TOWN PLANNING SHOWS HOW MANY
OF THESE WASTED LIVES CAN BE SAVED.

Comparison of infant mortality in English and Indian towns

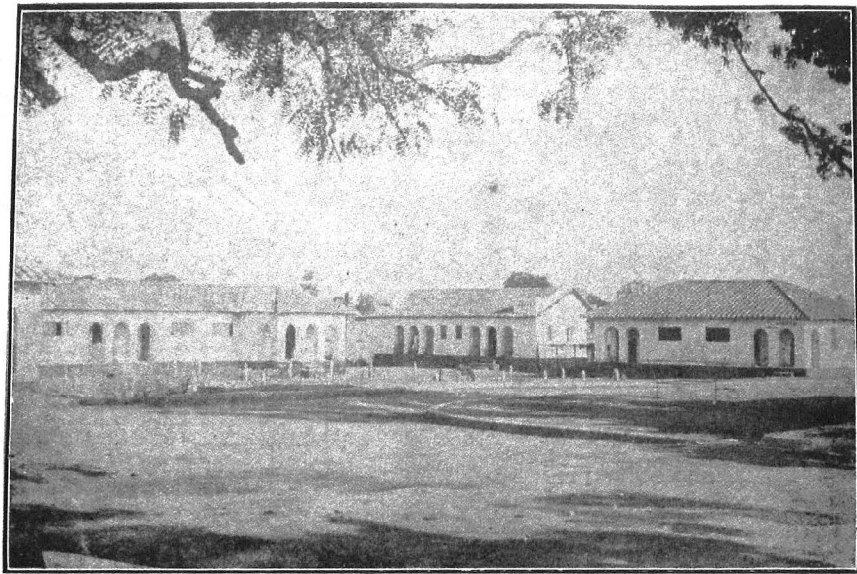
In Middlesbrough and Shoreditch houses are crowded together, and fresh air and ventilation are insufficient, while in Letchworth the number of houses to the acre is limited to twelve, and open spaces and gardens prevent the possibility of congestion.

Indian statistics also show the same evil effects of overcrowding; the conditions in Indian slums are described very vividly by Professor R. K. Mukerji in his *Comparative Economics*, and it is not surprising to find that in Bombay, where over seventy-six per cent of the population live in one-room tenements in *chawls* or *bustees*, the infant mortality for the last ten years has averaged over 500 deaths per thousand. Ahmedabad has a mortality of 350 and Calcutta 330, while Cawnpore, an industrial city that is particularly deficient in open spaces, has an infant mortality only slightly less than Bombay. In towns with more open space and better distribution of parks and houses the rates are lower, as is shown by Lucknow (269) and Bangalore (197), both of which have been described, perhaps somewhat undeservedly, as garden cities. There is a marked difference too between the health of the civil lines and that of the congested city wards in the same town. In Allahabad the death rate in the city in 1923 averaged 45.1, while that in the civil lines was only 10.2, per thousand.

(The health of the city, therefore, is found to be vitally affected by the closeness of the houses and the resulting effect on air and sunshine;) and in Europe it has been determined that physical deterioration begins when the number of people on each acre exceeds eighty or the number of houses exceeds sixteen.↗

↖ In this country owing to the purifying effect of tropical sunshine and torrential rains, and the fact that the houses themselves are smaller, houses can be more closely spaced without causing physical deterioration; but the figure adopted in Lucknow of twenty houses or one hundred people to the acre should be a maximum for all Indian towns that intend to have a healthy population.)

(Rule XI. THERE SHOULD NOT BE MORE THAN TWENTY HOUSES ON ANY ACRE OF RESIDENTIAL LAND.)



A view of the Boasganj Garden Village, Lucknow, showing space round Buildings

This corresponds to thirteen houses or sixty-five persons per bigha, and is not a limit to which any reasonable landowner can object.

In the development of new areas for housing, municipalities are fully entitled to demand, in the interests of the town, that this should be the maximum number of houses to the acre. But it will be pointed out that in many existing towns this figure is exceeded, that few towns can afford to acquire built-over land with a view to lessening congestion, and that, even if they could, there would be a natural and justifiable outcry against such interference with private property. How then can this congestion be lessened?

One method—the provision of adequate road widths—has already been referred to in Chapter IV. For proper traffic circulation one quarter of the total area is required in roads, and if this proportion is taken as the goal of a gradual scheme of road improvement, housing congestion will be automatically lessened as the scheme progresses.

The diagram (page 40) taken from Mr. Richards' report on Calcutta shows two congested areas in London and Calcutta: in the former the amount of open space in roads is twenty-eight per cent, in the latter only fourteen per cent. It is clear that the bye-law enforcing a forty foot width for all roads, which is in force in London, has alone effected a great advance on the congestion in Calcutta.

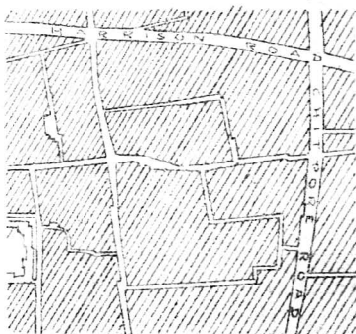
(In the centre of the town where business, shops and offices bring large numbers of people, the amount of road space in proportion to the built-up area must be greater than in the outskirts.) In the central area of New York, where the enormous 'skyscrapers' accommodate thousands of employees, fifty per cent in roads of the total area is not sufficient to prevent traffic congestion. (In residential areas the actual traffic requirements may often be met by only fifteen per cent in roads of the total area, and where factories occupy large plots the proportion of road space will be small. In the average town, however, traffic and public health will be provided for by keeping as open road area the proportion given in the following rule:—)

LONDON



28 % OF
TOTAL AREA
IN ROADS

CALCUTTA



14 % OF
TOTAL AREA
IN ROADS

Two equal areas in London and Calcutta showing how the lack of streets increases congestion of houses. In the London area the houses are double-storeyed; in Calcutta three or four storeys in height

*Reproduced by kind permission of the Chairman,
Calcutta Improvement Trust*

(*Rule XII.* THE PERCENTAGE OF OPEN SPACE IN ROADS SHOULD NOT BE LESS THAN TWENTY-FIVE PER CENT OF THE TOTAL AREA.)

Secondly, public parks, recreation grounds and playgrounds, the necessity for which has been shown in Chapter V, are a most valuable means of preventing too great density of houses. We have seen in Rule IX that for all townfolk to have a chance of recreation there should be one acre of open space for every four hundred of the population; this area, calculated on the more densely built-up wards of Indian towns, corresponds to about twenty per cent of the total area, and Rule XIII, which is given below, is really Rule IX in another form. By keeping this proportion open for recreation grounds, municipalities will at the same time make corresponding progress towards the limitation of houses to the acre.

Rule XIII. TWENTY PER CENT OF THE TOTAL AREA OF A BUILT-UP DISTRICT MUST BE KEPT OPEN TO MEET THE REQUIREMENTS OF RECREATION.

Finally there is another rule or bye-law already adopted in some form by most towns, which serves to prevent houses being too small and too closely packed together for health. This is the rule governing the minimum size of a building plot. Houses on very small plots, with only one or two rooms and without open space or courtyard, are insanitary and encourage disease and immorality. Overcrowding in rooms is worse than overcrowding of houses, and it can best be met by prohibiting the erection of houses on plots too small to allow of several rooms. If we examine the houses in a typical village it will be found that the average size of a plot is 1000 square feet, and that very few plots are less than 750 square feet. It is no hardship to demand, and it is a public duty to enforce, this minimum size for building plots in a town also.

Rule XIV. NO BUILDING SHALL BE ERECTED FOR RESIDENTIAL PURPOSES ON ANY SITE THAT HAS A TOTAL AREA OF LESS THAN 750 SQUARE FEET.

Bye-laws for a minimum building plot, though usually for a smaller minimum than here recommended, are in force in many municipalities, but what is not realized is that to be effective in preventing housing congestion they must be used in conjunction with Rules XII and XIII. If narrow lanes are allowed and no open spaces provided, it will still be possible—even if the minimum building plot is 750 square feet—to have as many as sixty houses to the acre or a population of three hundred persons, which is far more than is compatible with public health.

But if the requirements of road width and open space are taken into consideration, along with the size of the building plot and the maximum of twenty houses to the acre, they will be found to be the complement of each other, and to show us exactly how each acre of building land can be utilized to the best advantage.

Open space within the boundaries of the building plot is equally desirable, and usually a bye-law requires that not less than one quarter of the total plot shall be kept open in the form of courtyard or garden. Those municipal commissioners who are reluctant to enforce this rule in the face of the petitions of the poorer members of their electorate, may derive consolation from the fact that if the size of the plot is not less than 750 square feet, not only will no hardship be inflicted, but the householder will actually be benefited by the saving in the cost of construction.

Thus far we have dealt with the principle that light and air round buildings are essential for public health, and three rules have been given as examples of how that principle may to some extent be applied. Readers of Town Planning literature, however, will have found references to another practice known as 'zoning', which has a definite effect on the physical and mental health of a town. Zoning—or the reservation of districts for that purpose in the town life for which they are most suitable—means that those parts of the town, which by topography, facilities of communication or situation, are most fitted for the purpose of industries, residential areas or public buildings, shall as far as possible be restricted to that purpose.

When mills or factories are scattered all over the town among dwelling houses, they suffer from the impossibility of expansion, except at great cost and disturbance of private interests, and from the disadvantage of narrow bazaar streets unsuitable for factory transport. The houses round them are equally inconvenienced by the perpetual smoke and dirt from their works. For healthy living the working man must have clean air and clean food, and the proper grouping of mills and factories and their separation from the houses of the employees, is an important step in this direction. Communities carrying on offensive trades should not be allowed to establish themselves in the heart of the town, where they are a nuisance to their neighbours, but should be allotted separate districts with greater facilities for their business. Public buildings and large offices require ample grounds both for the health of their employees and also for the proper dignity of the buildings, while dwelling houses have the first claim on those parts of the town that are dry and healthy and offer those amenities that are so important in home life.

Rule XV. THE CONSTRUCTION OF RESIDENTIAL OR INDUSTRIAL BUILDINGS SHOULD BE RESTRICTED TO THOSE DISTRICTS MOST CONVENIENT FOR EACH, AND SUITABLE AREAS SHOULD BE RESERVED FOR OFFENSIVE TRADES, PUBLIC BUILDINGS AND OTHER MUNICIPAL PURPOSES.

Let it not be supposed that any one suggests rooting up established businesses and grouping them together in one spot, or limiting the prospective householder to plots approved by some haughty official; but if we can gradually and without hardship apply restriction to prevent haphazard mingling of mills and mansions, bazaars and bungalows, tanneries and tenements, it will be to the benefit of all.

Indian towns must realize more practically that *Public Health* means *Public Wealth*, and that sickness can best be prevented by fresh air and sunshine. The 'Open Air Hospital' of the doctors consists, in the language of the Indian townsman, of sleeping on the

verandah, sitting on the *chabutra*, kite flying in the playground or walking in the park. If we can provide each family with room for all of these, much money will be saved in prescriptions and hospitals, and the only people who will suffer will be the medical profession.

CHAPTER VII

THE ECONOMY OF TOWN PLANNING

To the reader of the preceding chapters it has, I hope, been made clear that Town Planning means the *orderly* arrangement of towns; that its object is to counteract the mistakes of the past and to put a stop to haphazard development in the future. In existing towns this object is obtained by the gradual improvement of roads, open spaces, housing areas and the distribution of buildings. Most people will agree that this is desirable and even essential if Indian towns are to obtain the maximum of productive energy, without which they cannot compete in the hustling race of modern industry.

But what of the cost? The business man, on whose shrewd common sense the efficiency of municipal administration chiefly depends, will point out that road widenings, the construction of parks or playgrounds and the limitation of the number of houses to the acre cost money. Zoning, or the reservation of areas for special purposes, may involve the municipality in claims for compensation, and in any improvement scheme there may be land to be compulsorily acquired. How can an adequate return be obtained on this initial outlay, and what is the best method of obtaining it?

The first, and in this country, the most usual method of recouping the cost of municipal improvement is by surplus acquisition. More land is acquired by the local authority than is actually required for the execution of the scheme, and the extra land is sold for building plots at such increased rates as are justified by the improvement. This method has the merit of simplicity, but it also has disadvantages; the wholesale acquisition of land and dehousing of the population is naturally unpopular, and such disturbance is not desirable if it can be avoided; also it requires a large initial capital expenditure not

always possible to small municipalities with a limited income.

The second method is the 'betterment' system. It is generally admitted that when the value of any property is increased as the result of a municipal improvement, the local authority has a moral right to call upon the owner of that property to contribute towards the cost of the improvement. Under the English Town Planning Act, 1925, local authorities are given powers to levy a betterment or improvement rate on all properties whose value has been increased by a Town Planning scheme, up to a maximum of fifty per cent of the increased value. The Bombay Town Planning Act gives a similar power to municipalities in that Presidency, in addition to enabling them to pool and redistribute plots.

This method is also popular in America, where it sometimes takes the form of a frontage rate, levied from the owners in proportion to the length of their frontage on the new road or other improvement.

Thirdly the improvement may be carried out by funds derived from a general tax on the whole of the tax-payers, and the municipality may be satisfied with the return it obtains in the general improvement of trade, traffic facilities or public health of the town.

Any one of these three methods or a combination of more than one of them may be suitable for different improvement schemes. For the construction of a small playground it will not be possible to obtain much return by either acquisition or betterment, and the cost may have to be borne by the general municipal income; for a new main road surplus acquisition will often give the best return, and for the development of new housing areas, the system of 'betterment'. A small municipality may find extensive acquisition impossible; a rich authority may wish to avoid the loss of one half of the increment which 'betterment' involves.

In considering which method to adopt we must start by noting the clear difference between Town Planning in built-up areas where land is already developed, and in land outside or adjoining the built-up areas, which is as yet undeveloped but likely to be so in the near future.

Clearly in the latter case an opportunity is offered for control of future development at a small cost; in the former a greater initial cost is probable, though, if properly designed and economically executed, the return in health, efficiency and income is certainly assured.

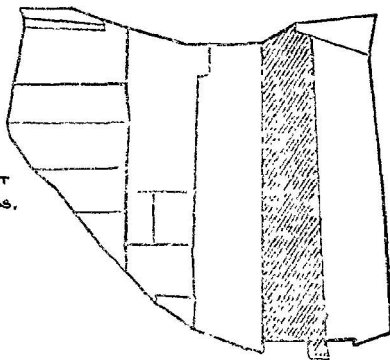
Dealing first with the case of land not yet built over, the development of such areas can be carried out under a Town Planning Act such as is in force in the Bombay and Madras Presidencies to the benefit of the landowners by at least fifty per cent of the increased land value, and without cost to the local authority; for the latter receive the land required for roads free of cost and recoup the costs of construction from the remaining fifty per cent of the profits. With the kind permission of Mr. A. E. Mirams, the Consulting Surveyor to the Government of Bombay, I am able to give an illustration of a Town Planning Scheme prepared by him and carried out by a municipality in the Bombay Presidency. The illustration on page 48 shows the area of undeveloped land before the scheme was prepared. The area is without roads, the plots are long and narrow, and distributed in a way quite unsuited for building development except at excessive cost in road construction. These plots were valued by the Town Planner to Government, before the preparation of the scheme, at Rs. 13,739. He then prepared for the municipality the lay-out shown in the illustration referred to above, in which provision is made for wide roads, playgrounds, and the sub-division of all land into suitable plots. The resulting improvement in the well laid out and attractive area, with adequate roads, gave an estimated value of the plots, after completion of the scheme, of Rs. 98,752, and this even though the plots were smaller owing to the exclusion of the land required for roads. The total expenses of the scheme, including road construction and value of the sixteen per cent of the land taken by the municipality, amounted to Rs. 41,497, and the Act provides for the owners of the plots to contribute to or bear the whole of these costs in proportion to the benefit they receive, in the following words:—

‘The costs of the scheme shall be met wholly or in part by a contribution to be levied by the local

AN EXAMPLE OF DEVELOPMENT BY TOWN PLANNING

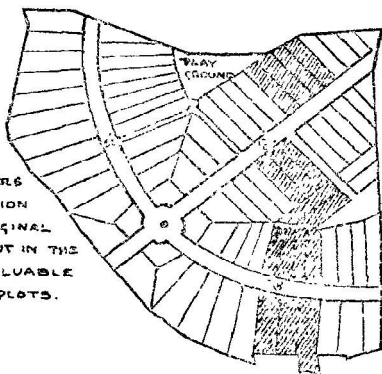
PLAN I

AN AREA
BEFORE
PLANNING.
PLOTS LONG
IRREGULAR
AND WITHOUT
ROAD ACCESS,



PLAN II

THE SAME
AREA AFTER
DEVELOPMENT,
DISTRIBUTED
AMONG THE
SAME OWNERS
IN PROPORTION
TO THEIR ORIGINAL
HOLDINGS, BUT IN THE
FORM OF VALUABLE
BUILDING PLOTS.



The owner of the shaded plot in Plan No. 1 receives in exchange the building plots shown shaded in Plan No. 2, all of which front on to pukka roads

*Reproduced by kind permission of Mr. A. E. Mirams, F.S.I.,
Consulting Surveyor to the Government of Bombay*

authority on each plot included in the final scheme calculated in proportion to the increment which is estimated to accrue in respect of such plot by the Tribunal of Arbitration; provided that no such contribution shall exceed half the increment estimated by the Tribunal of Arbitration to accrue in respect of such plot.'

In this case the increment estimated to accrue on the plots by development is Rs. 85,013 and the costs Rs. 41,497 or forty per cent, so that the whole of the costs can be recovered under the Act from the landowners, who will still benefit to the extent of fifty-one per cent, while the cost to the local authority will be nil. This example shows how, by taking advantage of the actual increased market value of the land in an improvement scheme, the improvement can be carried out without cost to the local authority. It may not always be possible to recoup the whole cost, yet it is certain that by accepting the principle of sharing the betterment between owners and municipality and working under a Town Planning Act, local authorities will be able to control the future development of all unbuilt areas without any appreciable cost.

The financial position in relation to Town Planning in built-up areas is entirely different. Here the first cost of the scheme will be very much greater, acquisition and compensation are almost inevitable, development costs are increased by the need for drainage, water supply and the public services. But even in this case an adequate financial return can generally be obtained.

For improvements in built-up areas the method of surplus acquisition is usually adopted; the land not required for the improvement can be laid out efficiently so as to bring in the maximum return, and the outlay recovered by the sale of plots. By this means the Churchgate Street improvement scheme in Bombay was carried out and a narrow street widened from thirty to seventy feet, not only without cost, but with a profit to the municipality of nearly Rs. 200,000.¹ The Russa Road

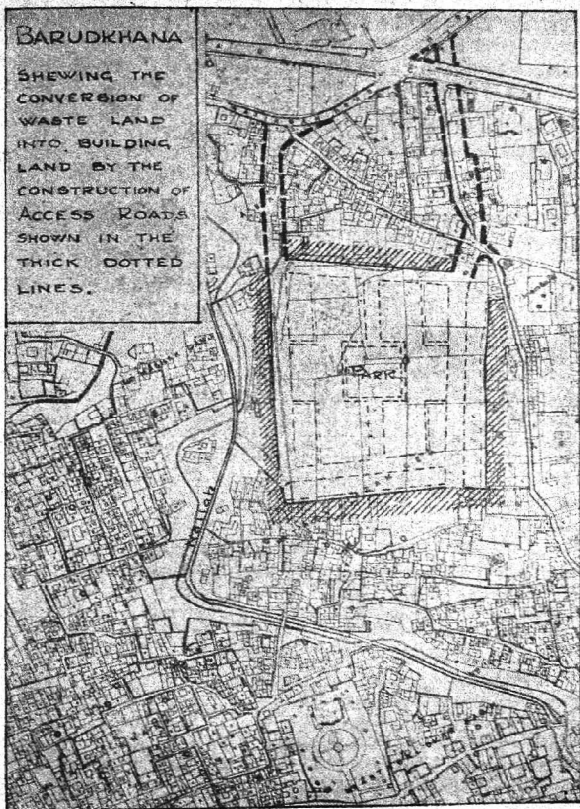
¹ W. R. Davidge, *T. P. R.*, Vol. X, No. 4.

widening scheme in Calcutta is another successful example of this method, and in the provinces Lucknow has constructed its new main lateral—the Sanitary Road—right through the heart of the city, and practically the whole of the cost has been recovered by the sale of the valuable sites abutting on the new main road.

The scheme prepared for Ahmedabad, by Mr. A. E. Mirams, the Government Town Planner of Bombay, for a wide road through the city was estimated at the heavy cost of Rs. 52,78,200, yet by the acquisition of a margin of additional land it is estimated that the sale of surplus lands and materials will bring in Rs. 58,18,700 and that the scheme will pay for itself.

Development schemes for the opening up of areas in the city, undeveloped owing to lack of approach roads, can usually be made self-supporting. The lay-out for the Barudkhana scheme in Lucknow shows how this area, which had lain undeveloped for many years owing to its being entirely cut off from all roads, was laid out and two main approach roads constructed at a cost of Rs. 73,246; although a large park and two small open spaces were provided yet the return by sales of plots amounted to Rs. 92,820, and the whole area was made available for building purposes without any expense to the city.

If the local authority wishes to avoid the heavy first cost of much acquisition, it is possible for it to reduce the cost of the scheme to a minimum, even in built-up areas, by again adopting the system of betterment. Calcutta is considering the advisability of doing this in its Burra Bazaar improvement schemes, where the initial cost of acquisition would be enormous. This method is particularly suitable for local improvements, where property cannot be acquired, such as a small park in a congested area, which unquestionably improves the properties fronting on it, or in the case of houses facing a narrow road which is to be widened on the opposite side. It may be combined with acquisition in such a way that cheap insanitary property is cleared away and replaced by good building sites, while large pukka houses are allowed to remain on payment of a fair betterment contribution.



Barudkhana Development Scheme, Lucknow

Apart from the actual financial return on Town Planning schemes that can be obtained by these methods, there are most important economic advantages in increased efficiency and health. That the neglect of Town Planning in the past has produced a colossal waste of public money is beyond question. It is estimated that in the course of fifty years no less than £25,000,000 has been expended by British local authorities in the work of street widenings, and that most of this could have been avoided by the foresight and provision for future needs that Town Planning affords. The waste in public health is even greater. In England and Wales in 1925 the actual returns of the National Health Insurance system, which by no means covers the whole population, showed that 20,500,000 weeks of work were lost in that year through sickness; who can doubt that in India, where public health is markedly inferior, the annual loss must be many times greater. Proper housing and healthy environment bring ample return in a decrease of sickness and an increase of productivity; in the lessened need for hospitals, dispensaries and poor relief, and in the welcome decrease in crime, prisons and police.

If a nation desires to secure a high measure of public health it is obvious that it must pay for it. 'For public health is purchasable, and public expenditure on national health is like a long term investment. It yields interest with absolute certainty, a thousandfold, but only in the course of years and sometimes in the course of generations—yet without this investment the nation is bankrupt.'¹

India is a country of poor people, but it would be false economy to say that the towns of India are too poor to be able to afford remedies for their ills. Much of the work can be done by one or other of the methods given in this chapter at little or no cost; and for the rest, the value of the gain in mental and physical vigour, increased efficiency and productivity is proved by the examples of those successful industrial firms such as

¹ *Report of the C. M. O., Ministry of Health, England and Wales, 1923.*

Lever Bros., Cadburys and Krupps, who have housed their employees in model towns and proved their convictions in hard cash.

CHAPTER VIII

THE PRACTICAL APPLICATION OF TOWN PLANNING

India is not one country but many countries, each with its different climate, customs and character; and in these many countries the towns themselves differ widely. They may be industrial, administrative or market centres, capitals of provinces, sea-ports or great centres of pilgrimage. The object of preparing a Town Plan is not to mould each of these towns into a standard shape; the same plan would obviously not be suitable for all and would result in ugly monotony, as well as failure to meet the particular needs of the town. Town Planning, while maintaining all that is good and eliminating all that is bad, must preserve the individuality of each town, and emphasize those characteristics that give it beauty and interest.

With such diversity of character it is evidently impossible for anyone to lay down hard and fast rules that can govern satisfactorily the development of all or even the majority of towns. The problems of each town require separate consideration and treatment, and it is obvious that those best acquainted with a town can best appreciate its needs. The rules given in this manual embody the opinions of men who have studied this subject for years, and are based on principles of Town Planning that have proved their value all over the world; moreover they have been adapted to meet the average conditions of Indian towns. But the measure of their success will rest in their judicious application and amplification to meet particular local conditions. The municipal physician must first study the symptoms of the town's disease before prescribing treatment, and the first step towards Town Planning must be the careful study of

the town. This study must be definite, the gathering together of facts and figures covering every branch of municipal activity, not the personal opinions and predilections of the influential, each of whom will first want improved that part of the town in which he lives. Such study is best done by means of a 'civil survey', of which Allahabad has furnished an excellent example. This survey gathers together detailed information as to density and distribution of population, houses and lands, mortality and public health, industries and traffic, and shows up by the clear light of comparison those *mohallas*, roads or areas that are in most need of alteration.

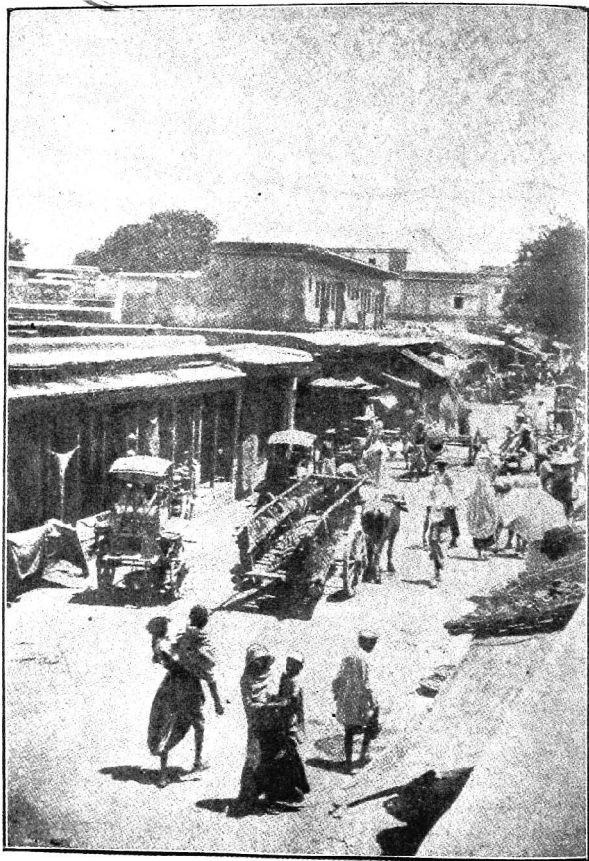
When this study has been made, municipal commissioners can then with confidence prepare the Town Plan. Though it may be convenient to record many of the proposals on a map in the form of a plan, the Town Plan itself will really be a *programme* of orderly development, a programme which may spread over many years, but which will provide for future needs as far as they can be seen, and will ensure that each improvement as it is wanted and carried out will fit into a comprehensive scheme. In the preparation of this Town Plan, municipalities should receive the free assistance of the Government Town Planner, who, with his expert knowledge and experience, can be of the greatest assistance; and in those provinces or states where there is no such official, municipal commissioners should press their Government to provide one, if only to give the smaller towns some share of the money that has been freely given for improvements in the great cities. After thorough discussion and consideration by the Municipal Board, those improvements which are considered most practicable and desirable will be embodied in the Town Plan. Those that are likely to be necessary in the future, though not at present possible, will also be included, and all of them will be correlated so as to form a harmonious scheme to bring the town as near as possible to the Town Planning ideal. The best method of financing each work will be determined, and the proposals arranged in order of urgency. When this is done the time will have arrived when the municipality can begin to take up schemes, and for this

purpose it may be convenient to form an Improvement Committee of the Municipal Board, by which the executive work can be more quickly and efficiently carried out.

This committee, and the board itself, will at once be faced with the question, Under what powers can our proposals be carried out? How can we overrule unreasonable objections, resort to acquisition where necessary, or obtain the financial advantages of the principle of betterment?

First let us see what is possible under existing legislation. Municipalities Acts, that give powers to local authorities to do much of the work that comes within the scope of Town Planning, are already in force all over India. In the United Provinces Municipalities Act, 1916, Section 8(1) empowers a municipal board to make provision for 'laying out, in areas whether previously built upon or not, new public streets and acquiring land for that purpose'; also for 'constructing, establishing or maintaining public parks, gardens,....dharamsalas....bathing-ghats, tanks and other works of public utility'. It provides for reclaiming unhealthy areas, for making a survey or taking a census, and for securing suitable places for the carrying on of offensive trades. It even authorizes a board to adopt any measure 'likely to promote the public safety, health or convenience'. These wide powers enable municipalities to widen or lay out new streets, to provide parks and playgrounds, to segregate offensive trades and even to prepare a civic survey; most of which will probably be necessary in any Town Plan. Many municipalities have already taken advantage of these powers and have effected excellent improvements by the method of acquisition which the Act adopts, and municipalities that are applying Town Planning can start by utilizing these powers to carry out portions of the general programme.

The Municipalities Acts also give powers to the boards to frame their own bye-laws, and many of the rules given in Chapters IV, V, and VI can be embodied in suitably framed regulations. The United Provinces Act enables the board to make bye-laws prescribing the type or description



A typical town street showing encroachments starting as *chapras*, and the confusion and danger caused by absence of footways

of buildings which may or may not be erected in any prescribed area; to control the height of roofs and rooms, the number and height of the storeys and any other matter affecting the ventilation and sanitation of buildings. Encroachments can be removed by the board, and, in order to widen a street, it can require owners to set back their houses, when rebuilding, to a prescribed line. The revision of the bye-laws may well be made the first definite action of the Improvement Committee. But it is of no use to have good bye-laws unless they are strictly enforced, and even in the case of existing bye-laws there is almost always room for improvement in this respect.

The harm that is done through slackness in enforcing them is great, and grows worse with every case condoned or leniently dealt with. The encroachment that starts as a *chabutra* rapidly becomes a *chappra*, the *chappra* a *pukka* verandah, and the verandah a shop. When it is too late it is realized how much harm has been done in narrowing and congesting the street, and in depriving the living quarters behind of light and ventilation.

But even the best bye-laws have their limitations, and when the Improvement Committee starts to lay out roads, to control the development of new areas by rearrangement of plots, or to provide open spaces for playgrounds, they may find that bye-laws are inadequate, and that acquisition under the Municipal Act is too expensive. If such an act as the Bombay Town Planning Act, 1915, is in force they have an excellent alternative. This Act, which can be obtained for the outlay of one anna, is well worth a careful perusal. It empowers the municipality to lay out an area, obtain free of cost a percentage of the land for roads and open spaces, and recoup much or all of their construction costs from the betterment to owners.

Similar Town Planning Acts should be in force in every province, and, where they are not, municipal commissioners should use all their influence to obtain their early enactment. If Governments are willing, to finance the expensive operations of cities under the Town Improvement Acts, there can be no reason for them to deny to the smaller towns the infinitely cheaper benefits of a Town Planning Act, which can be operated by the

municipal board itself. Government is not likely to oppose the application of an act, similar to the Bombay Act, which applies only to land in the course of development, or to land which appears likely to be used for building purposes, and by it the future extension of the town can be made to conform to a definite plan.

But, especially in larger towns, there will often be urgent need of improvement in built-up areas, and to enable municipalities to take up these schemes and to get full value from their Town Planning programme, the Town Planning Act should make provision for the necessary powers to do this also. The Madras Act does this, and empowers municipalities to carry out schemes for 'the opening up of congested areas, demolishing of obstructive buildings, laying out or altering streets, providing open spaces for ventilation or recreation, and acquiring land for the said objects', and for the rehousing of the poorer classes displaced by the execution of the scheme.

Let municipal commissioners then adopt and strictly enforce an up-to-date code of bye-laws; let them take advantage of the powers of acquisition and improvement already possible under the Municipalities Act; let them press for the application to their towns of the wider powers of a Town Planning Act, and let them foster the enthusiasm of those who realize that service in the welfare of the city is the true test of citizenship. They will find that they can substitute, to their common profit and pleasure, the benefits of orderly development for the drawbacks of disorderly stagnation.

In this manual an attempt has been made to show that the object of Town Planning is the well-being of the community as a whole; to emphasize the need for a policy and a plan to give unity to the efforts of successive and often politically opposed municipal boards; and to formulate rules that may serve as a basis for this unifying policy.

The preparation of a Town Planning scheme does not imply, as is sometimes supposed, an intention to cover the whole of the land in question with buildings or to make a somewhat elaborate housing scheme, nor does it necessarily involve the local authority in immediate

expenditure on works of any kind.

'Its object is to provide that development, if and when it takes place, shall be in accordance with a plan which has been prepared in the interests of the community as a whole, industrial and commercial as well as residential, landowners as well as tenants, and thus help to secure for the future, so far as reasonable foresight can do so, the welfare and prosperity of the district and its inhabitants.'¹

Town Planning is too big and too individual a science to be reduced to mathematical rules. Houses and towns are as variable as human beings, and bye-laws to govern all aspects of town life would be as impossible as standard food for all men. The essence of Town Planning is not the multiplication of bureaucratic rules, but the application of principles to promote healthy, pleasant and efficient Town Life in the light of common sense and reason.

¹ *Town Planning in England and Wales—Ministry of Health Circular.*

CHAPTER IX

HOUSING—PRESENT CONDITIONS

The needs of the town have been considered in preceding chapters from several particular points of view; firstly from that of the street user in terms of traffic, then from that of the child to whom recreation is both a pleasure and a right, and lastly, from that of the public health officer in his fight against disease and physical deterioration. All these aspects of town life have as their common background the houses of the inhabitants. It is the surroundings of the houses, the means of access to and from them, and the light, air and open space round them that have been considered in relation to the general Town Plan. Houses form the material of which the town's structure is composed, and in any programme for the general betterment of the town the provision of good houses must take a prominent place. Healthy and convenient houses benefit the citizens as much as a healthy and convenient town, and the standard of housing influences for good or bad the whole standard of civic life. It is for this reason that Housing and Town Planning should go hand in hand and in many countries legislation regarding both is combined in a single Act.

What sort of houses are to be found in the average Indian town, particularly among the poorer classes who make up the great majority of the population? How far do they fall short of the minimum standard necessary for man's needs, light, air and space for health of the body, comradeship, security and recreation for health of the mind, and what practical remedies are there for the improvement of present conditions?

In most of the towns of India the standard of housing of the labourers is far below that necessary for physical and moral health. Not only are the houses packed too closely together, but families are crowded either in too few rooms or in small rooms without proper ventilation.

There are exceptions to this rule, of which Jamshedpur is an example, but an examination of almost any town in India will reveal numbers of the poorer classes living in *bustees* or *chawls*, in conditions clearly unfit for human habitation. These conditions are worst in those towns which have grown most rapidly of recent years, and in which commerce or industry shows most likelihood of future expansion.

In Bombay the early builders were short-sighted enough to allow cotton mills to be erected on what has now become the very heart of the city. In Cawnpore, the extension of the town has been prevented by a circle of railways without any adequate bridges or crossings giving access to the outskirts. In Karachi, the small densely populated area adjoining the docks and harbours is so shut in by warehouses and offices that it is incapable of expansion. In Ahmedabad, mills have been sited haphazard all through the town and with their railway sidings have obstructed its growth in all directions. In this way towns have been unable to expand naturally and have become terribly congested in certain areas.

Of Bombay, Mr. Hallam Murray writes: 'The mass of human beings, with hardly a stitch of clothing on their bodies, is terribly overcrowded, especially in the poorer classes. The over-crowding is most dense in the gigantic lodging houses or *chawls* in which a large percentage of the population lives. A single *chawl* five to seven storeys high with its steep narrow stairs leading to a nest of small rooms, each inhabited by a whole family and opening on to a long dark narrow passage, may contain from five hundred to a thousand inhabitants. Every known rule of sanitation is disregarded in these houses which have the largest population to a square mile of any city in the world. Here in September 1896 a terrible visitation of the plague made its first appearance in India since the time of Aurangzeb and devastated Bombay, previously regarded as one of the healthiest of oriental cities.'¹

In Bombay sixty-six per cent of the total population

¹ H. Hallam Murray, *High Road to Empire*.

¹Table III

OVERCROWDING AND INFANT MORTALITY IN
BOMBAY IN 1921²

Tenements	Average No. of occupants per room	Percentage in each tenement of		Infant mortality per 1000 births registered
		Births	Infant deaths	
1 Room	4.03	76	87	828
2 Rooms	2.11	10	6	322
3 Rooms	1.60	2	1	191
4 Rooms	1.30	1.5	1	133
Road side	...	.1	.1	485
Hospitals	...	10	6	190

¹ Adapted from *Labour and Housing in Bombay*, by A. R. Burnett-Hurst, M. Sc.

² It will be observed that the infant mortality decreases in inverse proportion to the number of rooms occupied by each family.

occupy single room tenements, while in the worst section of Bombay, the Sewri section, this figure rises to ninety-six per cent with an average of five persons per room. The effect of this on the health of the occupants is shown by Table III, taken from the annual report for 1921 of the Health Officer, Bombay, which shows the relation between the number of persons per room and the death of infants.

The conditions in Karachi are even worse than in Bombay. Practically half the population lives in rooms each accommodating six or more persons, and no less than 5,162 people are herded into rooms at the rate of twenty or more persons per room. Nearly 23,000 people live in rooms each occupied by from five to nineteen persons.¹ What must be the effect of such conditions during an epidemic of an infectious disease, and how terribly they foster tuberculosis, physical degeneracy and crime!

A sanitary and sociological survey of the northern portion of the city of Calcutta was made by Dr. H. M. Crake in 1911. In this area there were over 14,000 houses, the whole of which were examined as regards their height, age, stability, internal conditions, courtyard space, washing arrangements, sanitation, refuse disposal and house drainage.² 'Of the whole of the houses examined less than twenty per cent were found to be sanitary, even judged by the exceedingly low Calcutta standard of what is a sanitary house.' More than eighteen per cent were found to be totally insanitary and unfit for human occupation, and the houses between these two extremes were more or less defective.

The Calcutta slums have another unenviable characteristic, namely their great height. Many of the chawls in the Burra Bazaar are four storeys high and some of them, as on Harrison Road, are five or even six storeys. Compared with the slums of London, which are generally

¹ Adapted from *Report on Improvement of Karachi*, by A. E. Mirams.

² Adapted from Report of E. P. Richards, M. I. C. E., to Calcutta Improvement Trust.

only double storeyed, how much greater is the overcrowding, and how much less the light and air in the lower storeys. There is no regulation in Indian towns limiting the height of houses, and the effect on delicate mothers of climbing these long flights of stairs is reflected in a general weakening of physique.

These evils are not confined to the larger towns only, nor to the industrial towns of northern and seaboard India. Professor Radha Kamal Mukerjee thus describes some of the slums of southern India.¹ 'The squalor, the degradation and the poverty in the slums of Calcutta and Bombay are far outstripped in the slums of Arlapet in Bangalore, and Perambur in Madras. In the Panchama slum near Binny's Mill in Bangalore, the standard size for a room has been eight feet by six feet, the height at the apex being five feet. The door being two feet by one foot, I could squeeze myself with difficulty into the room, to learn to my surprise that the denizens were three adults and two children and also a dog. The husband, the wife and the mother-in-law, as well as the children, were huddled together like beasts'

'Whether in Calcutta or Bombay, Cawnpore, Bangalore, or Poona, Ahmedabad or Madras, you are confronted in the *bustees* and *chawls* with living human misery, the dirt and disease of hell incarnate. Everywhere the standard size of a kennel is adopted, eight by six by five feet, and very often the side walls of the thatched shed admit both cold and rain. Everywhere there are unsymmetrical blocks of hundreds of these mud dens or thatched sheds, the living places of two or three thousand souls, where there is the most appalling congestion, every inch of ground space being utilized to the utmost. In too many of these huts father and mother, son and daughter-in-law, grown-up men and women, live and sleep together in the same room, mixed with chicks and dogs and

¹ Adapted from *Principles of Comparative Economics*, Vol. II, by R. K. Mukerjee.

ailing babies that are not better treated than the live stock.'

'The tragedy is, however, deeper when we see the rise of some of the most sordid slums of India in one of our most beautiful ancient temple cities. In Madura, in Ponnagran, for instance, not very far from the temples of Minakshi and Sundareswar, there have developed some slum dwellings indescribable in their filth and squalor.'

Before attempting to prescribe a remedy for the evils of overcrowded and insanitary houses, we must first examine the causes which have led to the present conditions. In the first place, congestion is due to the lack of control of the growth of the town, and to the location of industries and railways without reference to the need of housing space for their employees. Secondly, the general ignorance among the poorer classes, due to lack of elementary as well as of civic education, has added greatly to the difficulty of enforcing an adequate standard of sanitation in house building. Although the proportion of literates in towns is naturally higher than in rural areas, yet the average for Indian cities in 1921 was only 3·7 per cent for males, or 2·5 per cent for the whole population, including females. There has been as yet little attempt to educate the poorer classes in domestic sanitation, by means which would be intelligible to them, such as cinematograph or posters, with the result that they have practically no idea of elementary hygiene. Congestion has also been caused by the absence or non-enforcement of bye-laws regulating the width of the streets, the size of the house plot, and the number and size of rooms. Model bye-laws have been issued by all Local Governments in this country, by means of which municipalities can control new buildings in respect of the size, height and ventilation of rooms, the size of house plots, and open space within them, as well as the width of the street on which they abut. The Model Building Bye-laws for the United Provinces are given in Appendix C.¹ The enforcement of such bye-laws

¹ See p. 94.

would do much to prevent the construction of insanitary houses.

Two other causes peculiar to India have increased the difficulties of housing in towns. In all the more important industrial and commercial cities there is a large class of floating immigrant population, coming both from the country round and from more distant parts for temporary employment in the industries. This floating population consists mainly of single men, who reside in the city only until they have earned enough high wages to enable them to return to their villages with money for their immediate needs. The family man who remains in the town has to make the best of a standard of housing, which has been lowered by the competition of these immigrants, for whom a single room in a tenement is more or less adequate. Another cause of overcrowding is the system of inheritance, almost universal in India, under which each son receives an equal share of the property of the father, and which has led to the subdivision of houses into portions below the minimum size for healthy habitation. This, combined with the joint family system, whereby each member of the family contributes to a common fund, and with the natural preference for living in close proximity to other relations, has resulted in great overcrowding in houses which in the first instance were more than adequate.

CHAPTER X

HOUSING REMEDIES

The brief survey of present housing conditions given in the preceding chapter shows that the difficulties in the way of raising the standard of housing of the poorer classes are particularly formidable in India. Lack of planning, resulting in over-development of the land in the centre of the towns, has created slums as bad as can be found in any country in the world. The relative price of land in the city *mohallas* as compared with the outskirts, is higher in India than in European towns. Ignorance of the elementary rules of sanitation in daily life is greater, while the lowering of the standard of accommodation due to immigration, and the sub-division of houses, add special difficulties to the Indian problem not to be found elsewhere.

Practical remedies for existing housing evils must take into account these fundamental causes, and provide means for preventing their recurrence in the future, or for neutralizing their ill effects.

A study of the distribution of houses in the average Indian town points to the first remedy for overcrowding. There is in every town, especially near the boundary, a considerable area free from buildings, and there is also a considerable area grossly overcrowded. In the town of Allahabad the population is concentrated in the three wards of City, Katra and George Town, while in between large areas lie practically undeveloped. Moreover the houses of the rich are on the outskirts on cheap land, while the poor people live in densely populated districts where land is very dear. If the population, now overcrowded in the slums, were evenly distributed over the whole area, there would be plenty of room for every one, and the poorer classes would be given the first essential of economic housing—cheap land.

This redistribution of the population can be made possible by the construction of roads to give access to undeveloped areas, and, in the case of districts on the outskirts, by providing cheap means of transit, either by the extension of tramways or by motor bus services.

In addition to cheap land, cheap building and cheap finance must be made possible if the poorer classes are to be provided with suitable houses at the low rent which is all they can afford. Here 'co-operative housing' provides a means, which is being increasingly adopted in India, of building at low cost. Members of co-operative societies obtain the benefit of the purchase of building materials by the society at wholesale prices; cheapness in fittings can be obtained by standardization, and the labour and supervision costs are reduced by the voluntary work of the members. Cheap capital should always be available to such societies, either by loans at a low rate of interest from the state, whose duty it is to encourage good housing, or from employers to whom benefit will accrue from the better housing of their employees.

When the construction of labourers' houses in suitable areas has been made possible by these means, the municipality, the Housing Society or the private builder will be faced with the question of what type of house to build. What is the minimum accommodation that should be provided, what are the requirements for public health and convenience, and what natural preferences has the house dweller from habit and custom?

As in the case of Town Planning, past experience furnishes the best basis on which to work in designing the house.

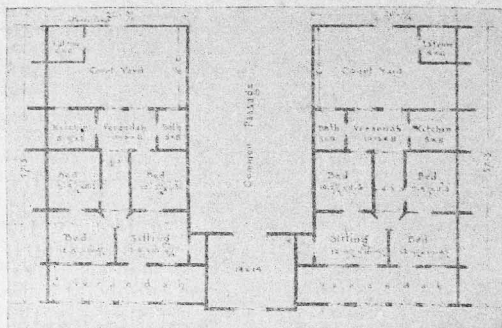
The type of house most suited to the Indian climate and customs has already been determined by centuries of experiment and evolution. The traditional Indian home, to be found in every part of the country, both town and village, contains a small courtyard with a sitting room opening on to it, which is also the bed room for the men, and an inner room for the women, and a few small store-rooms. Usually there is either a verandah or *chabutra* for the men on the outside, and a cook-room in the courtyard for the women. This traditional type

of house is excellently suited to Indian needs, and gives us a suitable standard for housing in the suburbs of the towns. In the first place it has a compound or courtyard, which will ensure light and ventilation. It is only one storey high, and, although in towns this may have to be increased to two storeys, it gives us the standard at which we should aim. It has at least two main rooms showing the minimum for decency and health. It is not entirely surrounded by other houses, but is either semi-detached or has open space at the back serving to increase the through ventilation and to provide a separate entrance for the sweeper.

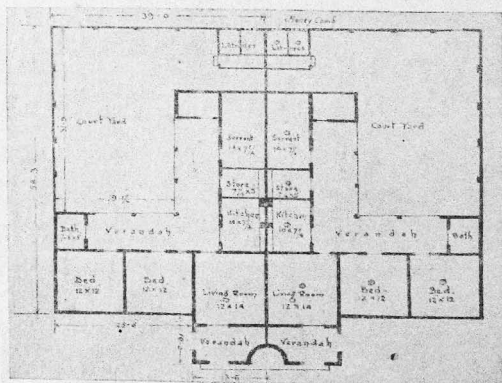
The illustrations on pages 70 and 71 show types of houses for clerks or labourers which have been built in New Delhi, in Lucknow and in Bombay. It is interesting to note how closely, especially in Delhi, they follow the traditional pattern of the country. In all cases they are provided with compounds or gardens, with a minimum of two rooms, and with some length of verandah or *chabutra* for a sitting out place.

In controlling the construction of such houses for the poorer classes, municipalities will be wise not to aim at too great perfection at once. There is no need to insist on costly methods or materials, and the cheapest materials available locally, which are consistent with sanitary building, should be allowed. Mud walls are cool in the hot weather and warm in winter, and are not objectionable if combined with a minimum framework of brickwork. The house builder should be able to construct this of third class bricks in mud at low cost, or the municipality could themselves do the work, recovering the cost from the tenant. This framework should consist of a brick plinth carried down from one foot above to one foot below ground level, together with square piers of brickwork with alternate bricks projecting on those faces where future walls will join them. The plinth will save the walls from damage when rain water floods the streets, and will help to make the house rat-proof. The pillars will strengthen the building, fix the positions for doors and windows opposite each other, so as to give plenty of ventilation, and by defining boundaries, will

TYPE OF INDIAN CLERKS' HOUSES. NEW DELHI

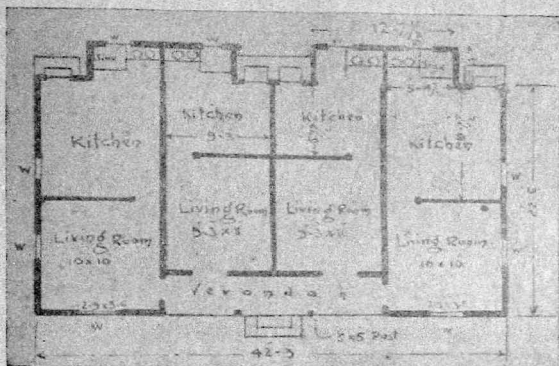


Type E in Blocks of 4 or more Quarters
with connecting archways between Blocks

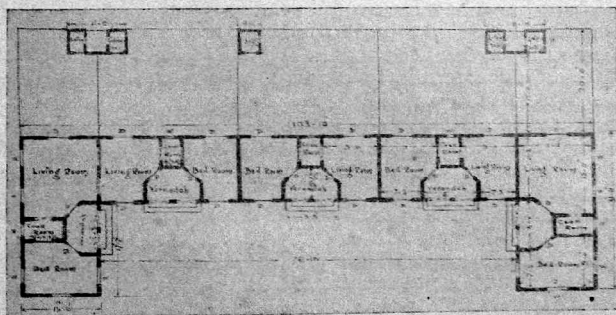


Type D Semi-Detached Quarters
From designs by C. G. Blomfield, F.S.I.

LABOURERS' HOUSES in BOMBAY and LUCKNOW



Set of 4 Workmen's Cottages, Antop Village,
Bombay Port Trust



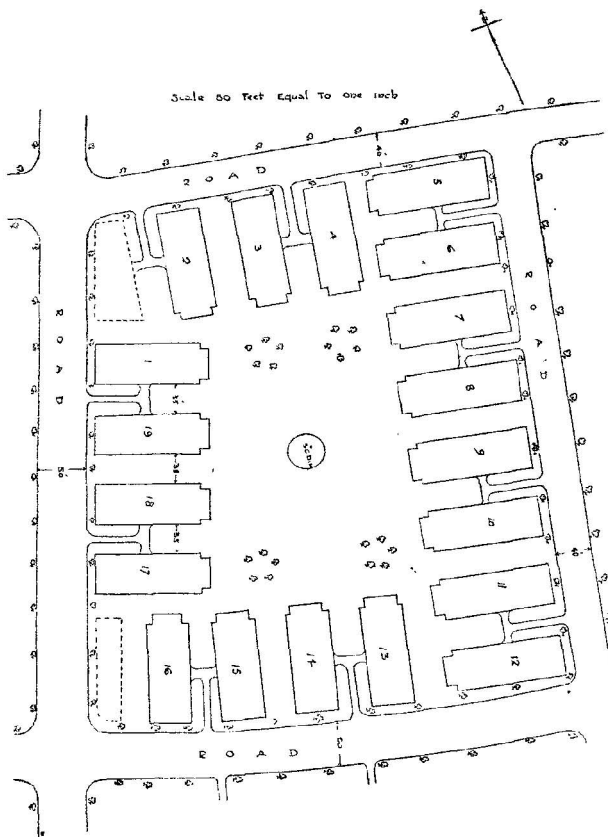
Block of 5 Labourers' Quarters, Boasganj Garden Village,
Lucknow

counter the general tendency to encroachment. A separate room for cooking should be made in the courtyard, or a portion of the verandah walled off, with a special outlet for smoke. The latrine should be at the farthest end of the courtyard, well away from the living rooms and the cook-room, and if there is a well, not nearer to it than the depth of the well. A platform for bathing and for washing should stand close to the latrine, and a *pukka* drain should run from it to carry off the dirty water and the rain water, either into a garden or into a *pukka* drain kept clean by the municipality. If the occupants are to be allowed to keep cattle, a separate cattle shed and yard should be insisted on, shut off from the living rooms by a continuous wall, and with only one connecting door into it from the courtyard. This type of house for the workers of the city must be the minimum standard that municipalities should endeavour to maintain in the future. These houses must be provided at such low rents that they can be occupied by the class whose conditions it is desired to improve, and cannot therefore be situated near the centre of the town. The most hopeful outlook for better housing in the future lies in the establishment of village suburbs within the city. Even now, as can be seen in Cawnpore, the labourers much prefer to live in a *bustee*, where they have some privacy, than in back to back tenements specially built for their accommodation, and they will pay higher rents in order to do so. Labourers' villages and community centres will provide them with the home life to which they are so attached; thus enabling them to maintain the social and religious customs on which village security and morals depend, and provide them with healthy surroundings within reasonable distance of the industries which offer such a favourable market for their labour.

While Garden Suburbs offer the best remedy for the housing of industrial labour, they cannot be expected to have any very rapid effect in lessening the congestion in existing slums. Municipalities will not be able to depend on the preference of the workmen for the 'new houses, a preference which will only grow gradually with experience, but will have to tackle simultaneously the

problem of their insanitary and overcrowded areas. Two methods are available and they may choose between them.

The first, the method of wholesale demolition of the worst areas, and their reconstruction in the form of *chawls*, is the method which has been adopted by most of the large municipalities or Improvement Trusts in India. It has the advantage of simplicity and speed, and undoubtedly results in improved sanitation, but it is open to serious objections. In the first place, it involves the acquisition of the whole of the property in the area to be reconstructed, the good along with the bad, and therefore penalizes the careful owner. Secondly, it causes great disturbance to a large number of the population, many of whom object strongly to the compulsory abandonment of their hereditary homes. It involves the heavy expense of the construction of permanent or temporary houses for the inhabitants of the area to occupy while the demolition and reconstruction is going on; for without these it is the general experience that the dehoused persons do not return to the reconstructed quarters, but find accommodation by adding to the congestion elsewhere. Finally, it entails a very heavy first cost in the acquisition of land and property, where it is most expensive, as well as in the construction of tenements or *chawls* to replace the demolished houses. This financial difficulty may even render this method impossible, as the Calcutta Improvement Trust have found in the case of the Burra Bazaar. Although the Trust was created primarily to remove or abate the congestion in that area, it has been able so far to deal with only a very small portion at Surti Bargaon, and has decided that the replanning of the whole of the Burra Bazaar by this method would involve such a huge cost that it is impracticable. The authorities who have constructed *chawls* to replace slums in Bombay, and elsewhere, have been so handicapped by the great expense of this method, that they have been unable to provide in the reconstructed quarters, that standard of accommodation, which is necessary for health and comfort. The illustration on the next page shows the lay-out for nineteen *chawls* on a portion of the Bombay Improvement Trust Estate at Naigaum. Each *chawl*



Lay-out nineteen chawls of eighty tenements each on the
Bombay Improvement Trust Estate at Naigaum

contains quarters for eighty families; they are four storeys high, and each family has only one room sixteen by ten foot, with a portion four foot square partitioned off for cooking. As there are over fifteen hundred families living on an area of about six and a half acres, the number of persons per acre will be approximately one thousand, which far exceeds all public health standards.

Such *chawls* offer reasonable living conditions only for the temporary occupation of those single men, whose presence we have noted in every industrial town. For families they cannot be said to provide a satisfactory remedy for slums.

It will be seen that the removal of slums by wholesale acquisition is a process involving great social and financial difficulties. Fortunately there is an alternate method of slum improvement, which has been adopted successfully in Birmingham, Paris and elsewhere, and which can be applied under the present powers in force in Indian towns. This method may be called the 'slum repair system', and consists in the repair of existing property, wherever possible, so as to bring it up to a sanitary standard. The local authority has an inspection of the whole area made by its medical officer, condemns such buildings as are insanitary, and presents the owners with the alternatives of either repairing them or having them left unoccupied on their hands. The procedure in Birmingham is summarized in Mr. E. P. Richards' report, as follows:—

1. The Medical Officer of Health reports to the Housing Committee that specified houses are unfit for habitation.

2. Notices are served on the owners, calling on them to make the houses fit (within three months is the usual period allowed).

3. Owners are invited to interview the authorities before spending any money on repairs or improvement. The object being to prevent owners spending money on repairs that cannot be accepted as sufficient, and to avoid useless expenditure through ignorance of precisely what is required. Written specifications and details of work

required are given to owners who apply for them, and the owner is assisted in every way as regards informing him, or arranging with him, what precisely *must* be done.

4. If negotiations with the owner fail, then an order is obtained from a magistrate (while sitting in open court), which authorizes the Corporation to close and shut up the house in question, and thus prevent its occupation by human beings, and cause the house to remain empty and earn the owner no rent until the repairs, etc., are executed.

5. If the owner does nothing, then, at expiry of notice, the Corporation after consideration informs him that a resolution has been passed that the houses be demolished, as being unfit for habitation, and the owner is invited to attend a meeting of the committee or council that has made the resolution, and there state his reasons, if any, why the houses should not be demolished.

6. If the authorities are satisfied with his reasons, the houses are allowed to remain standing, though closed to occupation. If no good reasons are given against it, then demolition is carried out by the Corporation.

In Birmingham and England generally, the owner is given every possible chance to put the property into a habitable state, and great patience is exercised if he shows any inclination to meet the wishes of the authority.

7. All repairs are done under the supervision of an efficient and trained Corporation officer.'

This 'slum repair' method is obviously far less disturbing to vested interests and to the population, and far more likely to meet with co-operation from such landlords as wish to make the best of their property, than wholesale acquisition. For the poorer municipalities it is very often the only feasible method. If the improvement of slums is carried out in this way according to a regular and strictly enforced standard, and if at the same time municipalities take steps to set up a new standard of housing in garden suburbs on the outskirts, they will be dealing with their housing problem in the most practical way, and moreover in a way that will supplement and assist the general town planning programme.

APPENDIXES

APPENDIX A

THE BOMBAY TOWN PLANNING ACT, 1915

(as modified up to 31st March 1921)

The more important sections of the Act are reprinted below. Special attention may be given to :—

Section 3—which shows the wide range of matters which can be included in a Town Planning scheme.

Section 8—which limits the area, in respect of which a Town Planning scheme may be made, to land in the course of development, or likely to be used for building purposes.

Section 12—which provides for the pooling and redistribution of plots, and

Sections 18 and 19—which show how the local authority may recover a part or the whole of the costs of the scheme from betterment contributions.

PREAMBLE: Whereas it is expedient that the development of certain areas should be regulated with the general object of securing proper sanitary conditions, amenity and convenience to the persons living in such areas and in neighbouring areas.

Section 1—gives the short title and extent of the Act, and

Section 2—is the interpretation clause.

Section 3—A town planning scheme may make provision for any of the following matters :—

(a) the construction, diversion, alteration and stopping up of streets, roads and communications;

(b) the construction, alteration and removal of buildings, bridges and other structures;

- (c) the plotting out of land as building-sites whether such land is intended to be used for building purposes in the immediate future or not ;
- (d) the allotment or reservation of land for roads, open spaces, gardens, recreation grounds, schools, markets and public purposes of all kinds ;
- (e) drainage, inclusive of sewerage, and of surface drainage and sewage disposal ;
- (f) lighting ;
- (g) water-supply ;
- (h) the preservation of objects of historical interest or natural beauty and of buildings actually used for religious purposes or regarded by the public with special religious veneration ;
- (i) the imposition of conditions and restrictions in regard to the open space to be maintained about buildings, the number, height and character of buildings allowed in specified areas, and the purposes to which buildings or specified areas may or may not be appropriated ;
- (j) the suspension, so far as may be necessary for the proper carrying out of the scheme, of any rule having the force of law, bye-law, act, or other provision which is in force in the area included in the scheme;

Provided that it shall not be lawful to suspend in any such area any Act of Parliament or, without the sanction of the Governor-General, any Act of the Governor-General in Council.

- (k) such other matter not inconsistent with the objects of this Act as may be prescribed.

Sections 4 and 5—deal with questions of disputed ownership and right of entry.

Section 6—(i) A local authority as defined in this Act

shall be deemed to be a local authority as defined in the Local Authorities Loans Act, 1914, for the purpose of borrowing money under that Act, and the making and execution of a town planning scheme shall be deemed to be a work which such local authority is legally authorized to carry out.

- (ii) Any expenses incurred by a local authority under this Act or any town planning scheme made thereunder may be defrayed out of its funds.

Section 7—defines a Notified Area.

Section 8—(i) A town planning scheme may be made in accordance with the provisions of this Act in respect of any land which is in course of development or is likely to be used for building purposes.

- (ii) Where it appears to the Governor in Council that a piece of land already built upon, or a piece of land not likely to be used for building purposes, is so situated with respect to any land which is in course of development or likely to be used for building purposes that it ought to be included in any town planning scheme intended to be made with respect to the last mentioned land, the Governor in Council may sanction the making of a scheme including such piece of land as aforesaid, and providing for the demolition or alteration of any buildings thereon so far as may be necessary for carrying the scheme into effect.

- (iii) The expression 'land likely to be used for building purposes' shall include any land likely to be used as, or for the purpose of providing, open spaces, roads, streets, parks, pleasure or recreation grounds, or for the purpose of executing

any work upon or under the land incidental to a town planning scheme, whether in the nature of a building work or not, and the decision of the Governor in Council as to whether land is likely to be used for building purposes or not shall be final.

Section 9—lays down the procedure to be followed by a local authority in the initial stages and invests the Governor in Council with power to sanction or refuse the making of a scheme.

Section 10—prescribes a time limit of twelve months for the preparation and publishing of a draft scheme.

Section 11—The draft scheme shall contain the following particulars:—

- (a) the area, ownership and tenure of each original plot;
- (b) the land allotted or reserved under clause (d) of Section 3, with a general indication of the uses to which such land is to be put;
- (c) the extent to which it is proposed to alter the boundaries of original plots;
- (d) an estimate of the net cost of the scheme to be borne by the local authority;
- (e) a full description of all details of the scheme under such clauses of Section 3 as may be applicable; and
- (f) any other prescribed particulars.

Section 12—(i) in the draft scheme the size and shape of every reconstituted plot shall be so determined as to render it, so far as may be, suitable for building purposes.

- (ii) In order to render original plots more suitable for building purposes the draft scheme may contain proposals

- (a) to form a reconstituted plot by the alteration of the boundaries of an original plot;

- (b) to provide, with the consent of the owners, that two or more original plots each of which is held in ownership in severalty or in joint ownership shall hereafter, with or without alteration of boundaries, be held in ownership in common as a reconstituted plot;
- (c) to allot a plot to any owner dispossessed of land in furtherance of the scheme; and
- (d) to transfer the ownership of a plot from one person to another.

Sections 13, 14 and 15—deal with the consideration of objections, the powers of Government to modify or refuse sanction to a scheme, and restrictions on building after declaration of intention to frame a scheme.

Section 16—(i) The costs of a town planning scheme shall include:—

- (a) all sums payable by the local authority under the provisions of this Act which are not specifically excluded from the costs of the scheme;
- (b) all sums spent or estimated to be spent by the local authority in the making and in the execution of the scheme;
- (c) all legal expenses of the local authority incurred in the making and in the execution of the scheme; and
- (d) any amount by which the total of the values of the original plots exceeds the total of the values of the plots included in the final scheme, each of such plots being estimated at its market value at the date of the declaration of intention to make a scheme with all the buildings

and works thereon at that date and without reference to improvements contemplated in the scheme other than improvements due to the alteration of its boundaries.

(ii) If in any case the total of the values of the plots included in the final scheme exceeds the total of the values of the original plots, each of such plots being estimated in the manner provided in clause (d) of sub-section (i), then the amount of such excess shall be deducted in arriving at the costs of the scheme, as defined in sub-section (i).

Section 17—For the purposes of this Act the increment shall be deemed to be the amount by which, at the date of the declaration of intention to make a scheme, the market value of a plot included in the final scheme, estimated on the assumption that the scheme has been completed, would exceed at the same date the market value of the same plot estimated without reference to improvements contemplated in the scheme; provided that in estimating such values the value of buildings or other works erected or in the course of erection on such plot shall not be taken into consideration.

Section 18—(1) The costs of the scheme shall be met wholly or in part by a contribution to be levied by the local authority on each plot included in the final scheme calculated in proportion to the increment which is estimated to accrue in respect of such plot by the Tribunal of Arbitration:

Provided that

- (i) no such contribution shall exceed half the increment estimated by the Tribunal of Arbitration to accrue in respect of such plot; and
- (ii) where a plot is subject to a mortgage with possession or to a lease, the Tribunal

of Arbitration shall determine in what proportion the mortgagee or lessee on the one hand and the mortgagor or lessor on the other hand shall pay such contribution.

(2) The owner of each plot included in the final scheme shall be primarily liable for the payment of the contribution leviable in respect of such plot.

Section 19—The amount by which the total value of the plots included in the final scheme with all the buildings and works thereon allotted to a person falls short of or exceeds the total value of the original plots with all the buildings and works thereon of such person shall be deducted from or added to, as the case may be, the contributions leviable from such person, each of such plots being estimated at its market value at the date of the declaration of intention to make a scheme and without reference to improvements contemplated in the scheme other than improvements due to the alteration of its boundaries.

Sections 20 to 28—deal with the transfer of 'rights', provide for payment of compensation for injurious affection and describe the methods of payment by or to the local authority. Payment by instalments is provided for.

Section 29—After a draft scheme has been sanctioned the Governor in Council shall appoint an arbitrator with sufficient establishment whose duties shall be as hereinafter provided.

Section 30—In accordance with the prescribed procedure the arbitrator shall—

(1) after notice given by him in the prescribed manner define and, where it is in his opinion necessary, demarcate the areas allotted to, or reserved for, the local authority, and the reconstituted plots;

(2) after notice given by him in the prescribed

ed manner determine, in a case in which a reconstituted plot is to be allotted to persons in ownership in common, the shares of such persons;

(3) fix the difference between the total of the values of the original plots and the total of the values of the plots included in the final scheme, in accordance with the provisions contained in clause (d) of sub-section (i) of Section 16;

(4) estimate the increment to accrue in respect of each plot included in the final scheme, in accordance with the provisions contained in Section 17;

(5) calculate the proportion in which the increment of the plots included in the final scheme shall be liable to contribution to the costs of the scheme, in accordance with the provisions contained in Section 18;

(6) calculate the contribution to be levied on each plot included in the final scheme;

(7) determine the amount to be deducted from or added to, as the case may be, the contributions leviable from a person, in accordance with the provisions contained in Section 19;

(8) provide for the total or partial transfer of any right in an original plot to a reconstituted plot, or provide for the extinction of any right in an original plot, in accordance with the provisions contained in Section 20;

(9) estimate in reference to claims made before him, after notice given by him in the prescribed manner, the compensation to be paid to the owner of any property or right injuriously affected by the making of a town planning scheme, in accordance with the provisions contained in Section 21 and subject to the provisions contained in Section 22;

(10) draw up in the prescribed form the

final scheme in accordance with the draft scheme:

Provided that

(i) he may make variations from the draft scheme;

(ii) any variation estimated by him to involve an increase of ten per centum in the costs of the scheme as described in Section 16 shall require the sanction of the Governor in Council;

Provided further that he shall make no substantial variation without the consent of the local authority and without hearing any objections that may be raised by the owners concerned; and that in the case of any substantial variation made by him the owners concerned shall have the right of appeal to the Governor in Council.

Sections 31 and 32—provide that the decision of the arbitrator shall be final except in the case of increment or injurious affection in which case it is subject to appeal to a Tribunal of Arbitration.

Section 33—(1) The Tribunal of Arbitration shall consist of a President and two Assessors.

(2) The President shall, in the City of Bombay, be a person who holds or has held office as a Judge of the High Court of Judicature, to be appointed by the Chief Justice; in the district of Karachi, by such Additional Judicial Commissioner as may be appointed by the Judicial Commissioner; and elsewhere by the District Judge.

(3) One of the Assessors shall be an impartial person to be appointed, in the City of Bombay, by such person who holds or has held office as a Judge of the High Court; in the district of Karachi, by such Additional Judicial Commissioner; and elsewhere by the District Judge.

(4) The other Assessor shall be the arbitrator.

Sections 34 to 39—deal with questions of procedure and with the powers of the Tribunal, and

Sections 40 to 43—with the notification and the effect of the final scheme together with the powers of the local authority to enforce the scheme after sanction.

The remaining sections deal with miscellaneous matters, among others for the preparation of a joint Town Planning Scheme by two or more local authorities.

APPENDIX B

THE MADRAS TOWN PLANNING ACT, 1920

Certain important sections of this Act are reprinted below. The Act, in addition to containing very similar town planning clauses to those in the Bombay Act, given in Appendix A, and applicable only to areas in the course of development, also provides for the inception and execution of Town Improvement Schemes in built-up areas. The sections which are reprinted deal with this, and provide for the creation of Town Planning Trusts for conducting important operations in such built-up areas where the Local Government think them desirable. The Act also creates the post of Director of Town Planning to enable all Municipalities in the Presidency to have free advice on town planning matters. It makes the preparation of town planning schemes compulsory for all municipalities with over 40,000 inhabitants and requires the creation of a Town Planning Fund separate from other municipal funds.

Section 6—(1) Whenever a municipal council proposes to undertake, in virtue of its powers under the Madras City Municipal Act, 1919, or the Madras District Municipalities Act, 1920, as the case may be, a scheme of town improvement in any area within the municipality which is already built upon, the Local Government, if they are of opinion that such improvement scheme will specially benefit the owners of buildings and land in such area, by notification in the *Fort St. George Gazette*, apply to such area with necessary modifications Sections 23 to 26, and Chapters V and VII of this Act for the purposes of such improvement scheme. In applying to such area the provisions of

Sections 23 and 35, the date of the notification under this sub-section shall be substituted for the dates referred to in Section 23 and in clause (a) of sub-section (2) and clauses (d) and (f) of sub-section (3) of Section 35.

(2) The Local Government shall, before issuing a notification under sub-section (1), give the owners of buildings and lands in the area affected an opportunity of showing cause why such notification should not be issued.

(3) From the date of publication of a notification under sub-section (1) property may be acquired and betterment contributions may be levied for the purposes of the town improvement scheme as though it were a town planning scheme made under this Act.

(4) A scheme of town improvement means, for the purposes of this section, a scheme providing for the improvement of a municipality by opening up congested areas, demolishing obstructive buildings, laying out or altering streets, providing open spaces for ventilation or recreation, and acquiring land for the said objects and for the rehousing of persons of the poorer and working classes displaced by the execution of the scheme.

Section 7—(1) The Local Government may appoint a person to be Director of Town Planning for the province and may assign to him from time to time such salary and establishment as they think fit.

(2) The cost of such officer and his establishment shall be paid out of the revenues of the Local Government.

(3) Municipal councils shall consult the Director on such matters relating to town planning, and in such manner, as may be prescribed. If any difference arises between the Director and a council on any matter so

prescribed, it shall be referred to the Local Government whose decision shall be final.

Section 8—The council of every municipality containing, on the first day of January 1922, a population, according to the last preceding census, of not less than forty thousand, shall, not later than five years after that date, prepare, print and submit to the Local Government, for their sanction, a scheme or schemes as respects all land within the municipality or in its vicinity in respect of which a town planning scheme may be made under this Act.

Section 30—(1) The receipts of a municipal council under this Act or any town planning scheme made thereunder shall form a separate town planning fund and all expenditure under this Act or any town planning scheme thereunder shall be defrayed out of such fund. No portion of the fund shall, except with the sanction of the Local Government, be expended for purposes not provided for by this Act.

(2) The moneys required, in the first instance to establish such fund, and any deficiency from time to time occurring in such fund by reason of the excess of expenditure over receipts shall, subject to such rules as the Local Government may frame in this behalf, be supplied out of the general municipal fund or out of moneys borrowed in pursuance of this Act.

(3) Separate accounts shall be maintained by each municipal council for its town planning fund.

Section 45—(1) When the Local Government, after consulting the municipal council, decide that the interests of town planning in any particular area will be best served by entrusting it to a special board, they may, by notification in the *Fort St. George Gazette*, constitute

such board to be called 'The [name of town or other area] Town Planning Trust' hereinafter referred to as 'the Trust'; and thereupon the duty of carrying out the provisions of this Act in such local area shall, subject to the conditions and limitations hereinafter contained, be vested in the Trust.

(2) The Trust shall be a body corporate and have perpetual succession and a common seal and shall by the aforesaid name sue and be sued.

Section 46—(1) The Trust shall consist of:—

(a) a chairman appointed by the Local Government;

(b) persons elected by the members of the municipal council or of other local authorities or both; and

(c) persons appointed by the Local Government either by name or by virtue of their office.

(2) The Trust may also include representatives of railway, tramway, or other transport companies, chambers of commerce, co-operative societies and similar bodies or associations, either elected or nominated by them.

(3) The Local Government shall fix the strength of the Trust, the number of trustees to be elected under clause (b) of sub-section (1), the local authorities by whom they shall be elected, the number of trustees to be appointed by the Local Government under clause (c) of sub-section (1) and the number of trustees to be elected or nominated under sub-section (2) and the bodies or associations by whom they shall be elected or nominated:

Provided that the number of trustees appointed by the Local Government shall not exceed one-third of the sanctioned strength.

(4) Each trustee shall hold office for five years.

Section 50—(1) When a Trust has been duly constituted, the provisions of Chapters I to VIII of this Act shall, within the area entrusted to it for town planning purposes, apply in full as though the words 'Trust' and 'chairman of the Trust' were substituted for 'municipal council' or 'council' and 'chairman of the council' or 'chairman'.

Section 53—(1) When the Trust created for an area has executed all schemes sanctioned under this Act, or so far executed them as to render its continued existence, in the opinion of the Local Government, unnecessary, the Local Government may by notification declare that the Trust shall be dissolved from such date as may be specified in this behalf in such notification; and the Trust shall be deemed to be dissolved accordingly.

(2) From the said date—

(a) all properties, funds and dues which are vested in or realizable by the Trust and the chairman respectively, shall vest in and be realizable by the municipal council and the chairman of the council, respectively; and

(b) all liabilities which are enforceable against the Trust shall be enforceable only against the municipal council; and

(c) for the purpose of completing the execution of any scheme, sanctioned under this Act, which has not been fully executed by the Trust, and of realizing properties, funds, and dues referred to in clause (a), the functions of the Trust and the chairman under this Act shall be discharged by the municipal council and the chairman of the council, respectively.

APPENDIX C

MODEL BUILDING BYE-LAWS UNDER SECTION 298 OF THE UNITED PROVINCES MUNICIPALITIES' ACT, 1916

The Model Bye-laws printed below have been framed by the United Provinces Government for the guidance of municipal boards when making bye-laws for the control of buildings, and were considered to be generally applicable to municipalities in that province.

1. The board hereby requires, with reference to sub-section (2) of Section 178, that notice be given in the case of all buildings wheresoever situated within municipal limits.
2. Every notice of intention to erect, re-erect or make a material alteration in a building or to make or enlarge a well shall be accompanied by plans, in duplicate, as prescribed in the following bye-law. Each such notice shall also be accompanied by a key-plan, showing the precise situation of the building.
3. The plans shall be drawn to a scale of not less than five feet to the inch. The scale used shall be marked on the plans; and the position of the north point relative to the site plan of the house shall also be clearly indicated. All plans must be signed by the applicant. They must show all details necessary to enable the board to judge as to the suitability of the proposed building. In particular, the following matters must be clearly shown on the plans:—
 - (a) The situation of the proposed building, relative to the streets or lanes adjoining it and to the adjoining houses or other properties, the names of the owners of the adjoining houses or other properties, together with the *chuk* and house

number, should always be given. The breadth of all adjoining streets or lanes must be shown. In case the breadth is not uniform the narrowest width should also be shown.

- (b) Gutters and down spouts should be clearly marked on the plans.
- (c) The position of, and full details regarding, all wells, drains, latrines, *sandases* and other sanitary conveniences, should be clearly given.
- (d) When sanction is required in respect of a well, the internal diameter and the distance from the nearest privy should be shown, and it should be clearly stated whether the suggested work is compatible with the conditions laid down in the bye-laws.
- (e) Each application in respect of a building should be accompanied by plans showing *inter alia* the following:—
 - (i) The ground floor and the position of the building relative to adjoining streets, properties and unoccupied spaces.
 - (ii) The first or upper floor and each additional floor.
 - (iii) The elevation of the building on the main frontage line.
 - (iv) At least one cross-section of the building.

All plans must be duly dimensioned. The height of the plinth must be stated in all cases. The dimensions of all walls and doors as also the height of the rooms, windows, or other openings must be given. All new work should be indicated on the plan by a distinctive colour; and a key to the colours used should be given on the plans. It should be stated whether the house is to be *pukka* or *kachcha* and of what material the outer covering of the roof will be made.

4. No mosque, temple, church or other sacred building shall be erected or re-erected unless the frontage is at least fifteen feet from the centre of the road on which it abuts.
5. All houses intended for human habitation must be *pukka* or *kachcha-pukka*, except in the following areas :—
6. Except in the areas mentioned in bye-law 5 above, the outer covering of all roofs must be made of tiles, iron sheets or other non-inflammable materials.
7. Every person who erects or re-erects a building which is within 100 feet of the sewer and the water main shall link the privies in such building with the sewer.
8. Every person who erects or re-erects a building the whole or any part of which is intended or used for human habitation shall, if so required, construct one or more privy in connection with or as part of such building.
9. All persons who erect or re-erect buildings must conform to the standard types of privies prescribed by the Board for (a) privies connected with the sewer, (b) servants' latrines for bungalows in civil lines and *ahatas* in the city, (c) privies on ground floors, and (d) privies on first and higher floors.

Sanction will not be given unless these plans and all the conditions imposed in respect thereof are adhered to ; when any deviation from these plans or conditions is proposed, the health officer will be consulted by the Public Works Committee before a decision is given.

10. The Public Works Committee will fix in each case the precise position of the privy or privies inside the house or compound.
11. All privies connected with the sewer must be properly tapped and the plumbing and pipe work must conform to the specifications prescribed by the drainage bye-laws.
12. All privies connected with the sewer must be

separated from any room used or intended to be used for human habitation by a masonry wall. Approach to a privy shall be through a tightly fitting door.

13. Every privy shall have a window opening directly upon the external air and of at least four square feet superficial area. This window shall be situated immediately under the platform of the privy. Sufficient ventilation shall also be provided to carry gases from the privy to the open air. In this bye-law 'window' shall mean an opening protected by wire netting or iron bars not closer than one inch to each other.
14. The platform of every privy shall be of non-absorbent material, such as glazed earthenware or smooth Portland cement not less than half an inch thick, so that no urine can penetrate. The whole privy shall, as regards both internal and external walls, be constructed of *pukka* masonry in lime.
15. The floor of a privy must be made of one or other of the following materials, to be selected by the owner: glazed tiles, stone cement or thoroughly well-burnt bricks plastered with cement not less than a quarter of an inch thick. The floor must be in every part of a height of not less than nine inches above the level of the surface of the ground adjoining the privy, and must be sloped on all sides of the drain.
16. The house drains through which waste or sullage water is likely to pass must be made of half round or whole earthenware glazed pipes not less than six inches in diameter properly laid upon a bed of concrete not less than four inches thick, where a house is connected with the sewer. In other cases the drain must be a *pukka* masonry cemented drain and all joints must be rendered tight with cement. These latter drains must be connected with the roadside drain, where a roadside drain exists within 100 feet of the premises.

17. The house shall be provided with iron gutters and down spouts to take all the rain-water which falls on its roof, *chajjas* or other projections. The gutters and down spouts shall be securely fixed and the latter shall discharge into the surface drains by an elbow piece, the orifice being not more than one foot above the level of the bed of the drain and discharging in the direction of the flow of the drain.
18. Every room intended for or used for human habitation must have at least two ventilating openings of a superficial area of not less than twelve square feet each.
19. When a house is used for dwelling purposes, not more than two-thirds of the total area of the site shall be built over. In the case of properties where there are shops below and houses above, this bye-law shall not apply to the storey occupied by the shops, but shall apply to all other storeys.
20. The lowest point of the plinth shall be at least one and a half feet above the highest point of the road opposite the house.
21. No rooms intended for or used for human habitation shall have a height of less than ten feet.
22. (i) The term 'storey' shall be held to mean a room or set of rooms in a building the floors of which are at or near the same level.
(ii) The height of a building shall be held to mean :—
 - (a) in the case of pent roofs, the greatest height to top of walls (excluding gable walls) above the level of the centre of the streets on which the building abuts ;
 - (b) in the case of flat roofs, the height to the top of the parapet above the level of the centre of the street.
(iii) No three-storeyed house, or any part

thereof, abutting on any street shall exceed in height one and a half times the width of the street:

Provided that, if a building, or one or more of its storeys, be set back from the edge of the street, the height of such building or portion that is so set back may be increased beyond the height otherwise required by this bye-law by double the distance that it is set back.

- (iv) The number of storeys shall not in any case exceed four and the aggregate height shall not exceed sixty feet, except with the special permission of the Public Works Committee.
- (v) If a building abuts on two or more streets of different width, the building shall be deemed, for the purpose of this bye-law, to abut on the street that has the greatest width.

23. No wells shall be sanctioned, except in [certain circumstances] unless they are *pukka* throughout. If built inside a house, the internal diameter must be at least three feet. No well shall be sanctioned within fifteen feet of a privy unconnected with the sewer.

INDEX

A

Africa, 11.
 Ahmedabad, 38, 50, 61, 64.
 Akbar, 15.
 Alexander the Great, 11.
 Allahabad, 8-10, 30, 38, 55, 67.
 America, *see* U. S. A.
 Aurangzeb, 61.
 Australia, 16, 23.

B

Bahraich, 8.
 Bangalore, 38, 64.
 Benares, 5, 8.
 Bengal, 6, 7.
 Birmingham, 75, 76.
 Bombay, 4, 7, 10, 16, 28, 37, 38,
 46, 47, 49, 61-64, 69, 71, 73,
 74.
 Bombay Town Planning Act, 11,
 16, 46, 47, 57, 58, 79-88.
 Bournemouth, 36.
 Bournville, 36.

C

Cairo, 16.
 Calcutta, 7, 10, 24, 26, 37-40, 50,
 63, 64, 73.
 Canada, 16, 26.
 Canberra, 23.
 Cawnpore, 5, 37, 38, 61, 64, 72.
 Central Provinces, 6.

Chandragupta, 14.
 Chicago, 21, 22.
 Chidambaram, 31.

D

Death rate, in England, 36; in
 India, 38.
 Delhi, *see* New Delhi.

E

East India Company, 15.
 Egypt, 11.
 England, 11, 15, 20, 52, 76.
 Europe, 14, 15, 26, 27, 38.

F

Fatehpur Sikri, 15.
 France, 1, 11, 16.

G

Ganges, river, 5.
 Garden cities, 20, 31, 36.
 Garden suburbs, 72.
 Germany, 15.

H

Hardwar, 8.
 Heber, Bishop, 5.
 Housing, in ancient India, 15;
 in present-day India, 60-66;
 remedies, 67-76; co-operative,
 68.

I

- India, *see* Town Planning,
Housing, Towns, *etc.*
Infant Mortality, in *England*,
36, 37; in *India*, 37, 38; in
Bombay, 7, 62.

J

- Jaipur, 15.
Jamshedpur, 5, 61.
Jaunpur, 15.

K

- Karachi, 5, 7, 61, 63.
Kautilya, 14.
Khartoum, 16.
Kwaja Jahan, 15.

L

- Lahore, 31.
Letchworth, 20, 36-38.
Liverpool, 36.
London, 26, 39, 40, 63.
Lucknow, 27, 33, 37, 38, 50, 51,
69, 71.

M

- Madras, 16, 64.
Madras Town Planning Act, 16,
47, 58, 89-93.
Madura, 13, 14, 31, 65.
Malaya, 16.
Manchester, 36.
Maurya dynasty, 14.
Megasthenes, 14.
Middlesbrough, 36-38.

- Mirzapur, 5.
Mughal Empire, 15, 25.
Municipalities, number in
India, 1.
Mysore, 6.

N

- New Delhi, 69, 70.
New York, 39.

O

- Oldham, 36.

P

- Pandian kingdom, 14.
Paris, 24, 75.
Pataliputra, 14.
Poona, 64.
Population, total, in India, 2.
" urban, " 1-3.
Population, urban, in India,
increase of, 1-3.
Port Sunlight, 36.
Purdah, 33.

R

- Raja Jai Singh, 15.
Ram Raz, 14.
Roman Empire, 11.

S

- Silene, 11.
Silpa Sastras, 14.
Shoreditch, 36-38.
Sweden, 16.

T

Taxila, 25.

Tiruvannamalai, 31.

Titagarh, 7.

Town Planning, science of, 10; not a modern innovation, 11; in ancient Egypt, Greece, Roman Empire, 11; India, 14; in modern England, Germany, 15; Australia, Canada, France, Sweden, United States, 16; in present-day India, 16 *et seq.*; meaning of, 17-20; object of, 17, 18, 20; width and arrangement of streets in, 21-30; parks and playgrounds in, 31-35; public health and, 36-44; zoning in, 42-43, 45; the economy of, 45-53; surplus acquisition in, 45, 49, 50; betterment system in, 46, 47, 49, 50; practical application of, 54-59; powers of local authorities in connexion with, 56-58;

connexion of, with Housing, 60, 68.

Towns, in India, number of, 1; growth of large, 2-6; decadence of small, 4; as social, religious, intellectual and administrative centres, 4; as markets for commerce, 4.

U

United Provinces, 8.

United Provinces Municipalities Act, 56, 65, 94-99.

U. S. A., 1, 16, 21, 26, 32, 46.

V

Vienna, 24.

W

Wigan, 36.

Z

Zanzibar, 16.