Calcutta Improvement Trust.

REPORT

BY REQUEST OF THE TRUST,

ON

THE CONDITION, IMPROVEMENT AND TOWN PLANNING OF THE CITY OF CALCUTTA AND CONTIGUOUS AREAS.

BY

E. P. RICHARDS,

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(ABBREVIATED.)

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MILAN.—The latest Official "General Plan for Regulating the Building and Extension of the City of Milan." Sanctioned July 12, 1912, in accord with the Italian Act of 1865.

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GLASGOW—Second city in the Empire. A very instructive Map (6 ins. to one mile.) Note fine tram service, city underground girdle-railway, ample railway and dock provision, good separation between marine and civic foci, also fairly good radial main road system.

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MADRAS (1).—Note comparatively good street system. Compare with Calcutta Map (enclosed loose.) *Both are to same scale.*

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RANGOON.—Scale 5 ins. Note superior road and street-system. Compare with Calcutta Map to same scale, and note terrible difference. Rangoon has 40 miles of 100 feet main roads, Calcutta, 1¾ miles.

Folio of Town, City, and Seaport Maps.

For Tramway and Transit Systems.

See first pages of the folio.

Remainder of folio contains very large number of town plans from Great Britain, America, France, Germany, Switzerland, Austria, Hungary, Italy, Spain, Russia, Turkey, The Balkans, Mediterranean, Egypt, the Near East and Far East.

Boston Improvement Report contains valuable maps. London Traffic Reports contain instructive plans, compare the scanty, scattered London intra-city road improvements with the comprehensive magnitudes of Paris.

ALBUM OF LARGE CONTINENTAL PHOTOGRAPHS.

These shew views of accomplished civic design in Berlin, Potsdam, Paris, Vienna, Budapest, etc., and will convey to members of the Trust who have not yet visited these cities some idea of the spaciousness and beauty attained by sound artistic town-planning. In addition, they shew examples of fountains, squares, tramline positions, etc.

ALBUM OF SMALL VIEWS.

These shew numerous examples of streets, roads, boulevards, squares, architectural control, arcading, public monuments, tramways, bridges, etc., mostly in French towns visited by the writer.

FILE OF EXTRACTS.

Contains a large number of classified slips, in covers. On these slips are typed opinions of eminent authorities. Subjects cover whole range of town planning. Special attention is drawn to the items "On the City Plan;" "New Act;" "Housing;" "Trams and Transit;" "Two-level Riverside Roads;" "Intra-city Road and Street Design;" "Land Policy;" and "General Policy."

REPORTS AND LITERATURE.

Trustees should not miss examination of the following :—

Proceedings of the All India Sanitary Conferences, 1911 and 1912, giving details of Tuberculosis in Calcutta (a terrible paper), Infant Mortality in Calcutta, Failure of Bombay Improvement Trust to combat slum-production, and the remedy, Town Planning by the Lex Adickes system, etc., etc.

Report of the Royal Commission on London Traffic, 1905.

Report of the London Traffic Branch of the Board of Trade, 1908.

Report (1912) of Birmingham Health Officer, Dr. John Robertson, M.D., B.Sc.

Pamphlet on Birmingham Town Planning, with coloured demarcation plans, by Henry E. Stilgoe, M. Inst. C.E., City Engineer of Birmingham. (Contains one of the best examples of town planning under the English 1909 Act).

G. O. authorizing a section of the comprehensive Birmingham Town-Planning Schemes.

The Housing of the Working Classes Act, 1890, (England) Part I of which is the basis of the Calcutta 1911 Act.

The "Housing, Town Planning, etc. Act," of England, 1909.

"Report on German Town Planning Enactments," by B. W. Kissan, Esq., I.C.S. (1913).

"Town Planning, In Theory and Practice." (Extracts from the 1907 London Conference).

"Town Planning Powers." Edited by Ewart G. Culpin, Secretary of the Garden Cities and Town Planning Association.

"Garden Cities of To-morrow," by Ebenezer Howard, founder of the movement.

"The Housing Handbook," and "Housing Up-to-Date," by Alderman W. Thompson, Chairman National Housing Reform Council.

"Practical Housing," by Councillor J. S. Nettlefold of Birmingham,

"The Garden City Movement Up-to-Date," by Ewart G. Culpin. (1914.)

"Housing of the Working Classes, 1855—1912," issued by London County Council.

"Der Städtebau" (Vol. 12), the best Journal of German Town Planning news. Mr. Horsfall wrote (to E.P.R.) of this copy, that 'the Calcutta Authorities certainly should be in possession of it.*

Publications of the Chicago Plan Commission, including the Children's School-book on Chicago re-planning. Very good indeed.

Architectural Control. One of the Paris Municipal Rule-books in actual use, note architectural elevation for certain roads, etc.

NOTE.—Trustees should be in possession of the best text books in the English language on Town Planning, such as Mr. Raymond Unwin's "Town Planning in Practice;" Mr. H. Inigo Triggs' "Town Planning, Past Present and Possible," Mr. H. Mawson's "Civic Art," etc.

The weekly, monthly, and quarterly journals on Town Planning and Municipal and Sanitary Engineering also contain much information of use to the Trust.

* I have had picture-titles roughly translated.—E.P.R.

ERRATA.

Page xv. Names inadvertently omitted from last par.—Mr. H. Inigo Triggs, A.R.I.B.A., and Mr. E. B. B. Newton, M Inst.C.E., F.S.I., F.G.S., etc.

,, 5, line 23, read *constructed.* Page 7, 4th par., 7th line, read *with* for without.

,, 12, 5th par., 4th line, delete word *area.* Page 20, 8th par. 1st line, read *detached.*

,, 22, 3rd par. 3rd line, read £15,000,000 for £30,000,000.

,, 26, 4th par., last line, read *west* for east. Prge 57, last head-line, read *Improvement.*

,, 80, 5th par., 3rd and 4th lines. read *thakur bati.* Page 108, last par., 4th line, read *form* for from.

Illustration facing p. 142, 1st line at foot of page, read *delapidated.*

Page 157, 7th line from bottom, read 1890-4 instead of 1900.

,, 160, 22nd line, read *1890* instead of 1900. Page 164, 14th line from bottom, read *unusually.*

,, 215, read *Scheme VII* for the two headings. ,, 216, read *Scheme VII* at top of page.

,, 247, read *Infant Mortality* at top of page; at bottom of table read *Inner 123½, Outer 82.*

,, 248, delete *Schemes and Estimates* at top of page.

,, 250, do. do. do.

,, 259, read *Mr. Bompas on Chawls, etc.*, for heading of page.

,, 260, read *Slum Remedy by Demolition* do.

,, 275, 16th line from bottom, read (*just*) for (first). Page 296, 4th par., 1st line, read *assess* for access.

,, 303, 5th line, read (143 + 42). ,, 389, 5th par., 1st line, read *sewage* for sewerage.

,, 390, last line 2nd par., read *parallelled* for first word.

,, 391, 4th par., 5th line, read *column* for column. ,, 393, 5th line from bottom, read *tuppenny-hapenny*

,, 394, 16th line from bottom, read *intellectual.*

Preface.

To the Chairman and Trustees for The Improvement of Calcutta.

GENTLEMEN,

In accordance with the promise I made in April last, to Mr. Bompas and yourselves, I now have the honour to forward herewith my General Report on the Improvement of Calcutta.

* * * * * *

It is now not quite eighteen months since the writer commenced duty (in Mid-September, 1912) as first Chief Engineer to the trust, and even taking into consideration the writer's physical breakdown and enforced departure from Calcutta, it may be thought that the time spent on this Report has been unduly long.

The writer desires to mention that one, among the most eminent of British Town Planners, said of an *ordinary* town planning project—"One should not put pen to paper until after a year's study of the town." In our case, the 'town' is represented by a population of one-and-a-quarter millions, and by an area of some 30,000 acres. In October, 1912, the writer gave the Trust a very brief preliminary Report on Calcutta and on work commenced before his arrival, and therein printed, that he *hoped* to give the Trust a general *outline* report three months hence—for it had been very strongly urged and re-iterated to him, that a complete *Main Road* Report on Calcutta finished by January, 1913, could be examined and approved by one of those called to India to plan the sandy open wastes outside Delhi. But these workers found themselves—fifteen months after they commenced work—still quite up to their own necks in their own problems; although it will be admitted these problems were made difficult of completion through excessive outside advice and controversy.

It is perhaps scarcely necessary to remind Trustees that the Trust started work in April, 1912, the engineering staff at the end of September, 1912, consisting of one English engineer (who became the writer's Deputy Engineer in October, 1912,) two Indian Surveyors, and one Indian Clerk.

This small staff, working hard, produced about one 'local scheme' per mensem during the six months before a Chief Engineer was appointed. Meanwhile very little investigation to determine on a general policy or general city scheme, or general programme of work and finance, had been undertaken: the idea being to leave most of this to the Chief Engineer, and thus get right to work on local schemes as quickly as possible, no doubt a very laudable intention.

Unfortunately, these six local schemes bore very much more work-fruit than had been anticipated by anyone. They had all been rapidly sanctioned and published, and had to proceed. As fast as staff was chosen and put on, it was absorbed by urgent local scheme-details and the interminable re-designing, investigation and preparation of replies to meet hundreds of scheme 'objectors'; there was also preparation of drawings and contracts, etc., for three large blocks of barrack-dwellings, etc., etc. The time of the Deputy Engineer was almost *wholly* absorbed by this local work, and in addition frequent reference to the Chief Engineer was of course requisite.

Meanwhile, the writer's investigations had already disclosed to him the serious fact, that the Calcutta Improvement Act of 1911 was almost useless for the great task set to the Trust. In Nov., 1912, or thereabouts, the writer was consulted (among many other things) as to the re-placing of the sole great bridge over the Hugli—between Calcutta and

Howrah. He found the matter was indeed extremely urgent, and also of the most paramount importance to the future improvement of Calcutta. It became very clear to him that the proposed new bridge as tendered for, would be *too narrow even from the first day it was opened to traffic.*

The writer at once had to deal with this vital matter, and place his views before the Trust, allocating them as Part I of the General Report, and he issued this in February, 1913. He may honestly say that meanwhile and subsequently he made a very great, but, of course, unsuccessful mental and physical effort to perform the impossible, e.g., to prepare and print in a few months, a first-class comprehensive town planning report on one of the great cities of the world, plus the draft of a Supplementary Act—and that too, for a city which is in a very much more than ordinary bad way—by lack of mere average civic bye-law control, let alone town planning.

The writer therefore asks the Chairman and Trustees to take into consideration the above serious difficulties, when they adjudge the apparently long period occupied in redeeming his promise. At the same time, he most freely admits, that he himself has also been much deceived by the time-needs.

Additional delays and difficulties (but also some advantages) have been caused by the writer's enforced absence from Calcutta—and he much regrets the Report is not more fully detailed, and more thoroughly illustrated.

All absolutely essential plans have however been printed and are bound up with each copy of the Report or will be found in the plan-roll or holder sent with each copy. The subject is enormous, the money concerned runs to six million pounds, yet to some this Report may appear to be *too large.* Mr. Charles C. Reade, the well known lecturer on town planning, speaking to the writer, remarked of the Report:—"The difficulty of this kind of Report is not what to put in, but what unavoidably *has* to be left out."

A preface is the first thing read, but the last thing printed—and gives an opportunity to make good any omissions:—

In the descriptive chapters, and on the plans, but little mention is made of contours. This is because Calcutta and district are both abnormally flat. It may be said that all land in and around Calcutta, very gradually slopes in general away from the Hugli banks, until at last a semi-swamp or true swamp-level is reached. The only interesting contour is that marking the limit of possible building-land, i.e., the edge of veritable swamp. Usually the contour is right outside all suburban land required in the next fifteen years. It is nearest to Calcutta on the East side, and may be observed on the writer's 'Census Map,' 'Destination of Areas Map,' and on the Comparison Maps of Calcutta-Madras-Rangoon, printed on one plan. The contour is however shewn almost completely on the 'Limit of Building Land Map,' sent with the exhibits. Only upon the East of Calcutta will there be serious limitation of expansion in the far future.

It has, perhaps, not been made quite clear enough in the Report, that the creation of a logical system of great intra-city roads will immensely relieve the existing lane-system of Calcutta from the traffic now squeezing through the lanes. The creation of numerous 20 feet streets, rather than main roads, has been advocated in Calcutta, but the only practical policy for improving the lane-system is set out in Chapter XVII *et seq.*

Attention is drawn to the large number of exhibits sent out with this Report. Members of the Trust should not miss examination of the chief items given in the printed list.

Reprints of several cuttings from valuable editorials in the Calcutta Daily Press, in especial, from the 'Englishman,' 'A. B. Patrika,' 'Statesman' and 'Capital,' have been inadvertently omitted. They bear very pointedly on Calcutta problems, and were collected by the writer before he left the city. The following item is specially important:—

"In the course of the circular on town planning which the Government of Bengal submitted some time ago for consideration by the Corporation, it is remarked that, generally speaking, municipalities outside Calcutta, Howrah and the mill areas are not expanding at a rate which would justify them in embarking on large schemes of acquisition. It is added that their finances would not usually permit of such schemes. But it might also be added that suburbs of Calcutta are not expanding at the rate at which the growth of the city warrants because transit facilities are so disgracefully inadequate. Instead of the natural outward growth fostered by tram and light railway arteries the interior of the city yearly becomes more dangerously congested. The Corporation evidently consider that the Improvement Trust having been formed *can deal with the problem of town planning in this city.** This is as it should be; there is no necessity for further discussion; the defects of the city are obvious enough; action is now required and we should like to see the Trust moving with rather more speed than it has displayed so far."

The important point is, that the Calcutta Improvement Trust *was not created under a Town Planning Act*, but only under a local Housing Act; in fact the Calcutta Act of 1911 is based almost word for word solely on Part I alone of the English Housing of the Working Classes Act of 1890—and this English Housing Act has itself been several times much amended since 1890. It may be said here at once, that *Calcutta and her suburbs cannot possibly be town planned, or controlled, or be moderately improved under the existing Improvement Act.*

It has been the writers duty to consider this great difficulty from all points of view and to find the clear solutions of this and all other serious problems that now confront Calcutta. Most of the difficulties can assuredly be well overcome by a Supplementary Act, but by no other means. This Act would confer the ordinary town planning powers. The report contains special information and also a draft for use in framing this Supplementary Act.

The writer has given a programme of much important work which can proceed while this absolutely essential Act is being obtained. He has also, he believes, *shewn the very best that could be done under the 1911 Act*, if Calcutta should, unfortunately, and unwisely, decide to abandon town-planning with all the great blessings it would confer on the city—both in the present and future.

By means of a Town-Planning Act as drafted in this Report, the Trust funds would be sufficient to deal moderately but comprehensively with the whole internal city, suburbs, and contiguous areas. Under the 1911 Act, only perhaps one-twentieth of the same area can be dealt with,† and that but imperfectly, and at ruinous cost. The whole question is, however, discussed fully in the Report.

There are no beauty-views among the Calcutta photographs in this report—although such could have been obtained—but when the writer left Calcutta he had only secured some photographs on the lines of proposed new road routes, some views of traffic, and of byelaw neglect, etc., nor had he secured the set of slum photographs that he had in his mind. A full photographic record of Calcutta at this critical period of her history should certainly be taken.

The writer takes this opportunity to thank very warmly the many who have assisted him in connection with this Report—in Calcutta, England, the Continent, and elsewhere, by advice, by information, by arranging inspections, by permission to reprint from their works, by gifts and loans of books, photographs, plans, reports and the like. Space will not permit of all, but the writer especially mentions Mr. T. C. Horsfall; Mr. Raymond Unwin, F.R.I.B.A.; Mr. T. H. Mawson, Hon. A.R.I.B.A.; Professor S. D. Adshead, F.R.I.B.A., (Prof. of Town Planning and Civic Design, Liverpool University); Mr. Councillor J. S. Nettlefold; Mr. Alderman Thompson; Mr. E. G. Turner, M.A., I.C.S. (Special Officer, Salsette Building Sites); Dr. John Robertson, M.D., B.Sc. etc. Health Officer, City of Birmingham; Mr. De Courcy Meade, M.Inst.C.E., City Engineer of

* Italics by E. P. R.

† i.e., 2,500 slum or slummy acres, and 10,000 acres of inner and outer suburbs.

Manchester; Mr. J. A. Brodie, M.Inst.C.E., etc., City Engineer of Liverpool; Mr. J. S. Brodie, M.Inst.C.E., Borough Engineer of Blackpool; Mr. J. Paton, Borough Engineer of Plymouth; Mr. A. B. M'Donald M. Inst.C.E., City Engineer of Glasgow; Mr. J. A. Crowther, Assoc. M.Inst.C.E., Borough Engineer of Southampton; The Presidents of Milan and Turin; Signor Angelo Pavia, 1st Div. Engineer, Prefecture of Milan; Signor Giovanni Masera, Chief Engineer to the City of Milan; Prof. Pasquale Ulivi of Brescia; Mr. Frederick Thrupp; Justice M. Pozzi, Civil Judge, Rome; Monsieur M. Bouvard, Chief Engineer and Director of Architecture, Roads and Parks, City of Paris; The Oberbürgermeisters (Lord Mayors) of Berlin and Cologne; the Chicago Plan Commissioners and their Managing Director, Mr. Walter D. Moody; The Boston Metropolitan Improvement Commission; Mr. Alfred Chandler, General Manager and Secretary of the Mersey Docks and Harbour Board.

The writer also gratefully acknowledges his indebtedness to the valuable pages of 'The Town Planning Review,' and further, for much help given by the Garden Cities and Town Planning Association, through Mr. Ewart G. Culpin, Secretary, Mr. Richard C. Taylor, Assist. Secretary, and Mr. Charles C. Reade, Lecturer.

The writer also takes this chance to thank the Chairman of the Trust, the Honourable Mr. C. H. Bompas, M.A., I.C.S., for obtaining and sending on promptly from Calcutta to England, various consignments of material and information that were very useful.

The writer desires further, to acknowledge his indebtedness for notes or plans supplied to him by Mr. Bompas and Members of the Trust, and Members of the Calcutta Chambers of Commerce and the Trades Association. He read and re-read and examined all these many times in the course of his work: for they were most useful, especially during the writer's earliest investigations, in which they saved time, and helped quickly to put him on the right scent. It is but common courtesy to acknowledge these notes, and let those who took such pains in the city interest know that their work has not been wasted or left unused so far as the writer is concerned.

I have the honour to be, Gentlemen,

Yours faithfully,

E. P. RICHARDS.

SECTION I.

GENERAL.

CHAPTER I.

INTRODUCTORY.

1. Objective of the Trust. 2. Purpose of the Report. 3. Problems dealt with in Main Road Report, Part I (already issued).

1. THE OBJECTIVE OF THE TRUST.

The general programme to be executed by the Calcutta Improvement Trust, as set out by Government, may first be glanced over :—

THE BENGAL ACT No. 5 of 1911 created the Improvement Trust and opens in this manner :

"AN ACT TO PROVIDE FOR THE IMPROVEMENT AND EXPANSION OF CALCUTTA.

"Whereas it is expedient to make provision for the improvement and expansion of Calcutta by opening up congested areas, laying out or altering streets, providing open spaces for purposes of ventilation or recreation, demolishing or constructing buildings, acquiring land for the said purposes and for the re-housing of persons of the poorer and working classes displaced by the execution of improvement schemes and otherwise as hereinafter appearing ;"

The Act extends over the Municipality of Calcutta; and can be applied, after sanction by Government, to any specified area in the neighbourhood of Calcutta municipality. Ratepayers and inhabitants of such areas have power to object prior to such extended application.

The following sections of the Act give particulars of the programme and work expected by Government from the Trust :—

"36. Whenever it appears to the Board, whether upon an official representation made under Section 37 or without such representation,—

When general Improvement Scheme may be framed.

(a) That any buildings in any area which are used, or are intended or are likely to be used, as dwelling houses, are unfit for human habitation, or

(b) That danger to the health of the inhabitants of buildings in any area, or in any neighbouring buildings, is caused by—

(i) The narrowness, closeness, and bad arrangement and condition of streets or buildings, or groups of buildings in such area, or

(ii) The want of light, air, ventilation or proper conveniences in such areas, or

(iii) Any other sanitary defects in such area.

and that the most satisfactory method of dealing with the evils connected with such buildings and the sanitary defects in such area is a general improvement scheme for the re-arrangement and re-construction of the streets and buildings, or some of them, within such area,

the Board may pass a resolution to the effect that such area is an unhealthy area, and that a general improvement scheme ought to be framed in respect of such area,

and may then proceed to frame such a scheme."

When Street Scheme may be framed.

"39. Whenever the Board are of opinion that, for the purpose of—

(a) providing Building Sites, or

(b) remedying Defective Ventilation, or

(c) creating new, or improving existing, means of communication and facilities for traffic, or

(d) affording better facilities for conservancy,

it is expedient to lay out new streets or to alter existing streets (including bridges, causeways and culverts), the Board may pass a resolution to that effect, and shall then proceed to frame a street scheme for such area as they may think fit."

Matters to be considered when framing Improvement Schemes.

"40. When framing an improvement scheme in respect of any area, regard should be had to—

(a) the nature and the conditions of neighbouring areas, and of Calcutta as a whole;

(b) the several directions in which the expansion of Calcutta appears likely to take place; and

(c) the likelihood of improvement schemes being required for other parts of Calcutta."

"41. Every improvement scheme shall provide for—

Matters which must be provided for in Improvement Schemes.

(a) the acquisition by the Board of any land, in the area comprised in the scheme, which will, in their opinion, be required for the execution of the scheme;

(b) the laying-out or re-laying out of the land in the area;

NOTE.—Underlinings are by the writer.

(c) such demolition, alteration or re-construction of buildings, situated on land which it is proposed to acquire in the said area, as the Board may think necessary;

(d) the construction of any buildings which the Board may consider it necessary to erect for any purpose other than sale or hire;

(e) the laying out or altering of streets (including bridges, causeways, and culverts), if required; and

(f) the levelling, paving, metalling, flagging, channelling, sewering and draining of the said streets, and the provision therein of water, lighting, and other sanitary conveniences ordinarily provided in a municipality."

Matters which may be provided for in Improvement Scheme.

"42. Any improvement scheme may provide for—

(a) the acquisition by the Board of any land, in the area comprised in the scheme, which will, in their opinion, be affected by the execution of the scheme;

(b) raising, lowering, or levelling any land in the area comprised in the scheme;

(c) the formation or retention of open spaces; and

(d) any other matters, consistent with this Act, which the Board may think fit."

"52. 1. The Board may frame schemes (herein called re-housing schemes) for the construction, maintenance and management of such and so many dwellings and shops as they may consider ought to be provided for persons of the poorer and working classes who—

(a) are displaced by the execution of any improvement scheme sanctioned under this Act, or

(b) are likely to be displaced by the execution of any improvement scheme, which it is intended to frame, or submit to the Local Government for sanction, under this Act.

2. Every re-housing scheme shall be submitted to the Local Government, who may either sanction it, with or without modification, or refuse to sanction it.

3. The Board shall not themselves construct dwellings or shops under a re-housing scheme, unless they are satisfied, after due enquiry, that no other person is willing and able to construct them and is prepared to construct, maintain and manage them under the control of the Board."

Projected Public Streets.

"63. 1. In regard to any area in the neighbourhood of Calcutta Municipality, the Board may, from time to time, prepare schemes and plans of proposed public streets, showing the direction of such streets, the street alignment and building line on each side of them, their intended width and such other details as may appear desirable."

Powers of the Board for facilitating Movement of Population.

"149. With a view to facilitating the movement of the population in and around the Calcutta Municipality, the Board may from time to time—

1. Subject to any conditions they may think fit to impose—

(a) guarantee the payment, from the funds at their disposal of such sums as they may think fit, by way of interest on capital expended on the construction, maintenance, or working of means of locomotion; or

(b) make such payments as they may think fit from the said funds, by way of subsidy to persons undertaking to provide, maintain and work means of locomotion; or

2. either singly or in combination with any other person, construct, maintain and work any means of locomotion, under the the provisions of any law applicable thereto; or

3. construct, or widen, strengthen, or otherwise improve bridges:

"Provided that no guarantee or subsidy shall be made under Clause 1, and no means of locomotion shall be constucted, maintained or worked under Clause 2, without the sanction of the Local Government."

The burden of responsibility placed on the Chairman and Trustees is therefore very heavy indeed, and they can truthfully be described as constituting—

(i) An important Sanitary Authority;

(ii) The Calcutta City Road-Board;

(iii) The Calcutta Housing and Re-housing Trust;

(iv) The Calcutta Suburban and City Extension Trust.

(v) The Calcutta Plan Commission.

2. THE PRINCIPAL OBJECTS OF THIS REPORT are,—

(a) To put forward a useful statement of the exact condition of Calcutta from the above five points of view, and thereby demonstrate the magnitude of the task and the very heavy responsibilities given by Government to the Trust.

(b) To demonstrate the insufficiency of the funds and powers given to the Trust to cope fully and adequately with that task.

(c) To shew what appears to be the best possible division and allocation of the Trust funds under the existing circumstances, i.e., in case no further funds or powers can be obtained. This also will include complete Main Road Schemes, Slum Remedy, Re-housing, Suburban Development, and a general policy and programme.

(d) To point out from the town-planning aspect what seems to be the best application of any further funds, should they be obtained.

(e) To place before the Chairman and Trustees the great saving of money and the very great advantage to the city, that can be obtained by means of a short Supplementary Act, which would give the Trust power to exercise (1) the Slum Repair System, and (2) ordinary Continental Town Planning powers, and (3) certain other powers.

(f) To set out what would seem the best possible allocation of the total Trust funds given by the 1911 Act, if the said Act be helped by a Supplementary Act.

(g) To fulfil the promise made by the writer to the Chairman and Trustees in April last that he would accede to their request, complete his report and give them his views on Calcutta Improvement, so soon as circumstances would permit.

3. REFERENCE IS NECESSARY TO THE MAIN ROAD REPORT, PART I., DEALING WITH HOWRAH BRIDGE AND TRAFFIC WIDTHS, ETC.

In addition to width of bridges, the following important subjects, which bear directly on matters discussed in this general report, were reviewed in the above preliminary report* :—

(i) Notes on road-widths, tramway tracks, and foot-paths in Calcutta.

(ii) Attributes of Calcutta traffic.

(iii) Motor traffic in Calcutta.

(iv) The rates of expansion of population, trade, and traffic in Calcutta and Howrah. [These were shown to be abnormally great].

(v) Definition of the city chief focus and notes upon what is there gradually taking place.

(vi) Railway changes likely to take place in and near Calcutta.

(vii) Calcutta Railway stations as important focal centres.

(viii) Notes on the future of Howrah and its close connection with Calcutta. Howrah regarded as part of Calcutta.

(ix) The consideration of Howrah Bridge as a very important part of the Calcutta general road scheme which is now put forward.

The above subjects will not therefore be re-discussed in this report, but will be mentioned or amplified where such is necessary.

*Prepared and issued in February, 1913 as a matter of urgent necessity in connection with the New Bridge over the Hugli.

CHAPTER II.

SHORT DESCRIPTION OF CALCUTTA:—ITS CHIEF EVILS, AND REQUIRED IMPROVEMENTS.

Maps—Physical—Climatic—Historical—Trade and Traffic Inlets and Outlets—
The built-up masses, their characteristics—Manufacting Areas—
Railway and Shipping locations—The existing road and street system, its chief defects—
Slum areas in the City—Parks and open spaces—Tramways—
Water Supply and Sewerage—Suburbs—Short list of improvements required.

A short survey may now be made of the general history, topography and condition of Calcutta, looking back a little to the past and also occasionally glancing ahead.

The folding map of Urban Calcutta should now be taken from its pocket in the report cover, and be spread out with the unfolded Census Map, Sociological Map, Map of the Existing Road and Street System of Calcutta, and the Tramways Map. The Traffic Map should also be taken from the pocket and opened for easy reference.

Among exhibits reference can be made to the 16″-to-the-mile big folding map of Urban Calcutta, to the "Map of the Country ten miles around Calcutta," to the River Hugli map giving sites of jute and cotton presses, to the large folding Sociological Map, and to the "Map of Calcutta and Suburbs."

Physical.

Calcutta has been built mostly on the left bank of the Hugli River, is situated in the giant delta of the Ganges, and occupies a south-central position in the interminably flat, marshy plain of Bengal. South-east from Calcutta the swampy and low-lying flat land extends 80 miles without a break to the sea; west, north and east for 80, 150 and 180 miles the same flat low-lying land extends from Calcutta without scarcely a single hillock appearing. This vast plain is composed mostly of the finest silt—an intimate mixture of fine sand and clay particles—underlaid deeply by saturated gravels.

The railways have been brought to Calcutta on hundreds of miles of embankments, almost everyone raised from the dug-out ponds and tanks that now border them on each side for mile after mile. Countless bridges convey the railways over the channels that intersect the delta. In old days the Calcutta site was well-nigh inaccessible by road, and the River Hugli was then, as it is still to-day, the greatest highway of trade.

The river at Calcutta varies from about 500 to 1300 yards wide, and from about 25 to 70 feet deep, according to tide and position—for the river is tidal and has a maximum range from this cause only of some 20 feet between high and low water, although the sea is 80 miles distant. So flat and low lying is the site of Calcutta, that a

really big marine wave, caused by an earthquake, would almost certainly reach and might well-nigh wipe out Calcutta. It has even been argued ironically that such would give town-planning an excellent chance. Exceptional high tides, especially when combined with river-flood, or with a strong, southerly gale cause flooding in Strand Road and other localities.

The Hugli is difficult and dangerous of navigation, but has very fine pilot, survey and dredging services.

The city on the east is bounded closely by actual swamp and salt lakes, and less closely by swamp lands on the south-east and south-west. Land along the river banks is higher in general than land half-a-mile away, and is very definitely higher than land one mile away. This is due to frequent ancient overflowings of the river. The flood-borne silt was caught and deposited in the grass and vegetation extending from each side of the river, and these tracts were thus raised above the general swamp-plain. The same phenomenon occurs, and has occurred on a big scale, in nearly all great deltas.

This site condition of extreme flatness and low level is a very grave disadvantage to any modern city.

Climatic Conditions.

The climate of Calcutta is moist and hot. The "hot weather" lasts from about March 15th to October 15th, when the prevailing wind is from the south, especially towards evening. For this reason, as Mr. Bompas shewed the writer, nearly all old houses in Calcutta are found to face south. From October 15th to March 15th, the prevailing wind comes from the Himalayas and the north-west, and assists in producing the "cold weather." Atmospheric saturation is nearly always very high at Calcutta, but is less during March, April and May. The monsoon conditions with heavy clouds and warm rain, last more or less continuously from about June 15th to October 15th, and cause the most unpleasant period of the year. The rainfall averages about 66 inches, and mostly falls between June 15th and October 15th.

Diurnal temperature in the hot weather during May and June normally rises on many days to 100-105 degrees Fahrenheit in the shade, and sinks to 80-85 degrees at night. In the cold weather day and night temperatures feel and vary much like those of a good English summer, but in reality are higher. The cold weather day temperatures lie roughly between 75 and 90 degrees, and the nights are generally cold and very damp and misty: the mercury getting down to about 53 degrees, and sometimes lower. This is not found to be a healthy period in Calcutta. Nearly every evening, by 9 p.m., a dense cold white mist rises and spreads over and from all the open and always saturated ground.

The climate is so moist, and the silty ground so wet and low, that good grass, most grateful to the eye, covers the great Maidan almost the whole year round, thinning and browning only in May and early June. Vegetation flourishes exceedingly, and after the rains, the great

delta plain round Calcutta becomes a sea of level brilliantly green rice-fields, broken only by dark palms and the tall reed-like jute crops. The climate of Calcutta, plus the crowded condition of the city, is trying both to Europeans and Indians, but especially to the former. Death rates are very high.

Historical.

*Calcutta, like Venice, owes her artificial and unnatural position to the ancient need of defence against enemies. In 1596 Calcutta was a village, having its site apparently close to that of the future Dalhousie Square. The first British Settlement took place in 1680, and in 1686, Job Charnock, as Governor for the East India Company, definitely founded Calcutta by occupying and fortifying the Calcutta and other villages. A small citadel, the old Fort William, was built in 1696 on and near the riverside, between the present Dalhousie Square and the jetties. The present centre of the city is thus almost identical with the ancient centre and starting point of growth. Again and again we find evidence of this permanency of city main foci. London provides another good example. The Mahratta (or Mahatta) Ditch, on the site of the present Circular Road, appears to have been made about 1740, as a defence against the Mahratta horsemen.

In 1757, Clive, representing the East India Company, commenced the new Fort William, at a point about one-and-a-third miles lower down the river bank; and by 1773 this great fortress and its cleared fire-zone, the Maidan, were both completed. Fort William is still the largest citadel in India. During these years of building, the East India Company rule gave way to a more imperial and directly British form of government under Clive: but Calcutta undoubtedly owes the fortress and the magnificent Maidan solely to British Commercial genius. Calcutta in 1772 became the capital of India.

The enormous flat plain, wherever not actual swamp, in early days began to be reclaimed and covered with rice and indigo, and thus added to the sources of a rich trade brought down to Calcutta by river.

The subsequent creation and focussing upon Calcutta, of railways in the Ganges Valley, and other railways; the discovery development and nearness of coal fields, the replacement of indigo by jute and cotton growing and manufacture, have far more than counterbalanced the difficulties of the Hugli navigation, and have made Calcutta the premier commercial city of India.

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* A valuable series of old plans preserved in the Imperial Library are well worth study. They include the following :—

Plan of the territory of Calcutta as marked out in 1742, shewing also military operations of 1756. Published under Act of Par. by A. Upjohn, in April 1794.

Plan of Fort William (the old fort) and part of the city of Calcutta. Surveyed by Lieut. William Wells (E I. Co.) 1753.

Outline trace of a Calcutta Revenue Land Survey Map, believed to be by Capt. Claud Martin, 1760-4.

Map of Calcutta by Lieut.-Col. Markwocd, 1784-5.

Map of Calcutta and Environs, from a good survey in 1792-3, by A. Upjohn.

Plan of Calcutta and Environs for the Lottery Committee, by Major J. A. Schalch, with additions by Capt. T. Prinsep, 1825.

But social progress, as regards the building and laying out of the city, creation of a normal network of streets, provision of main roads and good bridges, orderly extension of the city, creation of parks, control of buildings, beautification of the city,—these have all been badly neglected for generations.

We may now consider the city in more detail :—

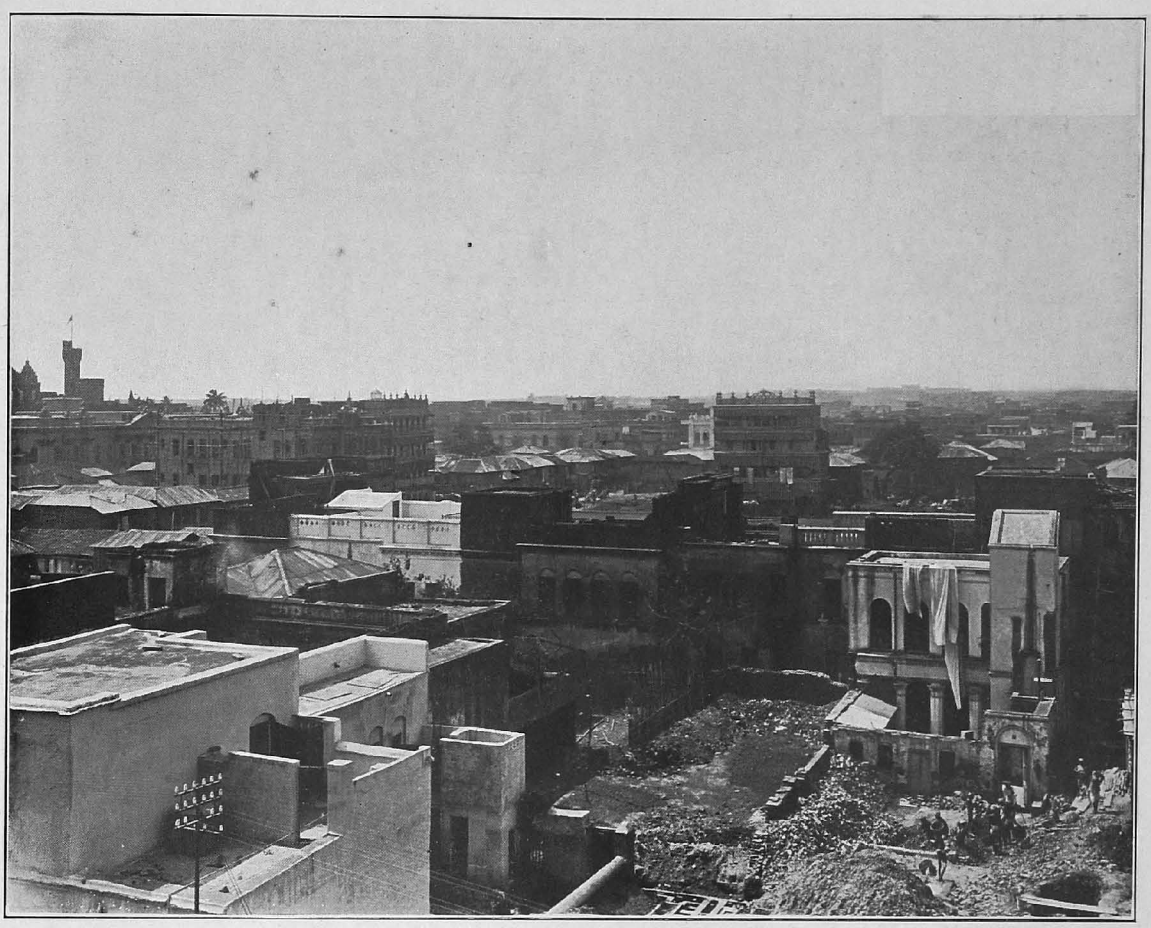
The City Mass Characteristics.

Dalhousie Square is about the centre of gravity of the city and is the main focus of business and administration, of traffic and tramways. It touches on the oldest fort-site, the first and original chief focus of growth. From Dalhousie Square the dense built-up city extends northwards for almost three miles to Cossipore-Chitpore; eastwards to Sealdah for one-and-a-half miles; southwards, with decreasing density the city curves round outside the east and south boundaries of the Maidan, through Ballygunge to Kidderpore; the south-east limit of the building area being about three and the south-west limit about four miles, from Dalhousie Square.

One of the next most salient features on the Calcutta map is Circular Road, girdling on north, east and south, the internal oldest and most densely built-up portion of the city: and forming with the Hugli and Tollys Nullah the ancient line of the Mahratta Ditch. Circular Road now forms perhaps the sole long, broad, nearly perfect example of a big city road in Calcutta. Unfortunately, it is in a very secondary position, and much of its comparatively small traffic is due to the absolute want of normal roads and routes for such traffic.

A straight line drawn from Howrah Bridge to the east end of Park Street (see black line on Slum Map), divides the mass of the city into two bodies of very different character. All that lies north and east of the line is of intense density, is almost streetless, and is served by an abnormally sparse set of right angle narrow main roads, which bound some nineteen huge blocks of property. These latter contain about 2500 acres of streetless property, arranged anyhow. This slum-like city mass, north and east of the Howrah Bridge to Park Street line—houses the bulk of the population of Calcutta and contains both the best and worst of the Indian residential quarters. In this section lie also the chief Indian markets, shops, bazaars, and places of business. Along the river north of the bridge, are the most important of the sacred bathing ghats, and there too is the greatest activity in light river-traffic and shipping.

In the past, this main section of Calcutta was shut in from free expansion by the Mahratta Ditch, and later by the Circular Canal forming an outer parallel; still later by the railway embankment; and always by the nearness of swamp conditions. It is now one of the densest city areas in the world, and contains on an average not more than twelve per cent. of open total space in squares, streets and passages. Portions contain only five per cent. in open space of all kinds, both public and private.



Typical view in the built up streetless mass of Calcutta. The proposed Central Avenue would cross from right (north) to left (south) in the foreground. View taken a little south of Sham Bazaar.



Typical View in the built-up mass of Calcutta: mud and bamboo bustee slum in foreground, enclosed by streetless better-class property.

Owing to the natural physical conditions, already described, the chief district-road-traffic enters Calcutta from the north and north-east; and that from the north-west, west, and a portion of the south-west—enters Calcutta by Howrah Bridge, i.e. it enters on the west centre pivot of densely built-up Calcutta. This concentration of road traffic on the north, north-east and north-west has assisted in some degree to produce the great density of the north half of Calcutta.

South-west of the same line drawn from Howrah Bridge to the east end of Park Street, we have in general quite different conditions. All around Dalhousie Square, and arranged in a moderately good street system, are built the chief British business houses, the Banks, the Exchange, the seats of Government, and the Public Offices. Following along the line, we find just south-west of it, the leading hotels and more European business premises, bringing us via Old Court House Street and Esplanade East, to Chowringhee—the combined Oxford Street, Piccadilly and Park Lane of Calcutta; this development along the Maidan edge continues southwards in a thin band along Chowringhee front and brings one to the Park Street area, the only section of all Calcutta that has a really decent street system. It is almost purely residential, chiefly European, with a sprinkling of Indian. A glance at the Sociological Map will shew the residential locations very clearly in a general way.

South-east of Park Street area is the huge undeveloped, thinly peopled suburb of Ballygunge, more and more water-logged and crammed with tanks, as one penetrates south, but yet a very promising area.

Bhowanipore, owing its existence and much denser population almost solely to the Chowringhee Tramway service, occupies a position south of Park Street area and the Maidan, and is an increasingly popular Indian residential district.

Due south of the race course, and extending to the Tollys Nullah Canal, is Alipore, an English-Indian residential suburb, likely to be shut in, injured, and encroached on, by the future railway and dock extensions of Kidderpore, and the working class dwellings they will bring in their train. Alipore is hardly in a sound position for development as a high-class suburb.

Lastly, on the left bank of the Hugli, we have Kidderpore, a straggling and vitally important industrial railway and shipping area, growing up fast, badly, anyhow, criminally undisciplined, and like every other suburb and section of Calcutta, choking and diseasing itself for want of order, plan, and direction.

Howrah remains to be outlined. It owes its original growth chiefly to the East Indian and the Bengal-Nagpur Railway passenger and goods termini at Howrah Bridge and Shalimar. Howrah has now become in reality the most important manufacturing district of Calcutta. It is also an increasing residential suburb. A glance at the traffic map will exhibit its great importance. Part I. of the writer's Main Road Report dealt pretty fully with Howrah and shewed the great importance of Howrah Bridge. The traffic map strongly confirms what was written.

Manufacturing Areas in Calcutta.

Examination of the Sociological Map will shew the two manufacting areas of Calcutta proper. They occupy the natural and usual position i.e. they are in close proximity to canals, railways and rivers. The largest is formed along and between the railways and canals of north-east Calcutta. It extends north in a broad band (sepia on Sociological Map) from south of Sealdah Stations, right up to the north limits of Calcutta. Still unbroken, it then turns west and continues south some distance down the Hugli bank. It is of horseshoe shape, with the arms of unequal length, having the end of the long arm on Sealdah, the curve on Cossipore Bridge, and the short arm finishing on the river bank near Aheeritolla Ghat. From the east, Cornwallis Street residential area is now being seriously eaten into by this growing manufacturing district; which deals mostly with jute, cotton, ropes, and flour manufacture.

The second manufacturing district of Calcutta lies along the river banks from Kidderpore westwards; these mills and their buildings and houses are more or less in the way of natural modern dock development. The factories deal mostly with cotton, jute, and cloth.

Howrah, for two-and-half miles both south and north of the bridge and along the river banks, has now a close succession of jute, cotton, flour, and rope mills, and has also one of the largest engineering works in India. Howrah is almost devoid of a decent street or road and is in much the same state as the other Calcutta industrial areas.

Just north of Calcutta, and outside the city boundary, (partly shewn on the Census Map) is Cossipore-Chitpore, almost wholly a manufacturing area, and containing a large number of jute mills. It is of course likewise in a state of chaotic growth.

Some evidence of a possible future manufacturing area is exhibited along Tolly's Nullah, between Alipore Bridge and the Boat Canal intake. It is a natural site for such a development, area, as likewise is South Alipore, now being laid out sparsely with good residential propcrty.

Railway and Shipping Locations.

The Railway and Shipping areas can readily be seen on the Sociological map, but a little description is perhaps required.

Calcutta is approached from the north by two great railways, one on each side of the Hugli, viz.: by the East India Railway (Howrah Terminus) on the west, and the Eastern Bengal State Railway (Sealdah Station) on the east side of the Hugli; these come in from the Ganges Valley. In addition, the E. I. Ry. brings traffic and passengers from Bombay, the west and north-west. The Bengal-Nagpur Railway comes into Howrah terminus from

the south-west, and the E. B. State Railway also connects Calcutta with Assam and the north-east of India, by its more eastward branches and the delta river services.

Sealdah sends a very important loop line round Southern Calcutta to the Kidderpore Shipping focus.

The two great railway passenger foci in Calcutta are the Howrah Terminus on the west, and the Sealdah-Beliaghata Terminus on the east. North and south there are at present no passenger stations of any importance whatever.

The goods stations of Calcutta are—for coal—mostly the Howrah Terminus Goods Yard and the Bengal-Nagpur Terminus at Shalimur: each of these discharges immense quantities of coal for shipping. The coal, as things stand, thus arrives largely on the wrong side of the river, and is taken over to Kidderpore docks in train-ferries or barges. A certain amount of coal is delivered direct to Kidderpore Docks by the E. B. S. Ry.

For the jute traffic, Howrah, Sealdah, the Cossipore Goods Yard and Kidderpore are large foci. Most of the raw jute is loaded on to ships at Kidderpore. The Port Trust Railway, running along the whole river front from Cossipore to Kidderpore, is a valuable adjunct to the shipping trade. The line is, however, unfortunately, tightly hemmed in along a very narrow strip, and there is at present no room for duplication or extra sidings north of Howrah Bridge; and south of the bridge the possibility of parallel extension and proper development of the river-quays appears to have been lost for ever—the heavy and new buildings of South Strand Road have been built far too near the river, and, in the case of the Bengal Bank, even the present building line has not been respected, and a serious permanent constricting of the important river-side road has been allowed. Along the Maidan quays could not be developed without serious injury to the best promenade in the city.

The duplication and parallel extension of the Port Trust Railway would greatly ease increasing traffic congestion along the river front. Perhaps the greatest railway want in Calcutta, as regards goods traffic, is a closer connection between Howrah and Sealdah. During the jute season, both railways and roads already become hopelessly congested for months.

There are two ocean-shipping foci at Calcutta. Both are on the left (east or Calcutta side) of the river. The first is at Kidderpore, where lie Calcutta's only docks: now become far too small, shallow, inconvenient and out of date for the very rapidly increasing trade.

The accommodation includes a small tidal basin of about one square furlong, one fine dock half-a-mile long by one furlong broad, and a second and narrower dock about five furlongs in length. In addition there are canal and barge docks. Unfortunately, the sole entry to the docks for all ocean ships is via the tidal basin; and dock No. 2 can only be entered via dock No. 1. Then again, Dock No. 2 has to be devoted almost solely to coal traffic.

On top of this the docks are cut into three by two old fashioned narrow swing bridges, so narrow that sometimes barely a couple of feet clearance is left between the side walls and the ribs of an entering or leaving steamer. The passage has to be negotiated with great nicety, i.e. with excessive slowness and precaution.

The main entrance-sill is also too shallow to permit free entry of large but moderately well-laden ships. Great difficulties were encountered when these docks were constructed some twenty years ago. More loading than unloading appears to take place at Kidderpore Docks.

The Port Trust, fortunately, are in the middle of extensive preparation to remove these disabilities. It is of very great importance that their schemes be in keeping with the city main road-schemes.

Heavy ocean-going shipping is unloaded all along the jetties and quays on the Calcutta side only, from Howrah Bridge nearly down to the Fort, but ships can only come alongside the quays for a little over half that distance, The press of shipping is so great, and the railway, quay, road and street accommodation is so defective, that many ships have to unload partly and then go down to Kidderpore Docks to have the process finished — a very poor and out-of-date arrangement. This is not solely due to congestion along the river front.

As already mentioned, the dock-sills at Kidderpore are not deep enough to permit free entry of numerous modern boats of only 6000 tons or so, until they have been partly unloaded. Naturally, the commercial community frequently complains of delay and congestion, but the Port Trust authorities are fully alive to the want of radical and great improvement, and they have some large schemes in hand or in contemplation, both as regards the river front and Kidderpore. It must be reiterated that these schemes should be in keeping with Improvement Trust schemes, and there should be that thorough co-operation between city, railway and port authorities which has produced up-to-date maritime cities like Hamburg, Amsterdam, Marseilles, Genoa, Buenos Aires, Boston, Cleveland, Albany, Buffalo, San Francisco, Liverpool and others.

Details of future dock, railway and shipping areas are given later on when dealing with traffic problems. The growth of shipping and trade has been so remarkable at Calcutta (30 per cent. per decade), that the strenuous efforts of the Port Trust and their continuous improvement works, have been temporarilly overtaken by the phenomenal rate of trade increase.

The Existing Road and Street System of Urban (built-up) Calcutta is shewn on the special map of that title, put up loose in the cover-pocket. This has been prepared by the writer to shew as faithfully and graphically as possible, in a handy manner, the present layout and the relative value of Calcutta traffic routes.

This map should now be unfolded for easy continuous reference. An extra wide binding has been provided on purpose to allow maps to lie out in view while readers make their way through the letterpress—the matter being heavy enough without the irritation of constantly turning back to refer to a hidden map.

A paper dated June 25th, 1912, written by Mr. Bompas, and delivered by him as a lecture, contains, in the writer's opinion, the most lucid and cogent analysis of Calcutta conditions, and the most valuable suggestions for the general improvement of Calcutta, that have yet been put before the public. The writer has found this document of great use from the first and much of his own work is largely the expansion and detailing of those suggestions. This lecture by the Chairman will later be drawn upon considerably, but the following extracts apply directly to the subject in hand.

"In talking of Calcutta we must first decide what we mean by the term: there is the old Calcutta under the original jurisdiction of the High Court, the boundary of which is the Circular Road; then there is the Calcutta of the Corporation, with its added suburban area; and then there is greater Calcutta, consisting of the Corporation area and the suburban municipalities of Cossipore-Chitpur, Manicktolla, Tollygunge, South Suburban and Garden Reach, with Howrah on the other side of the river.

"For some purposes, when we talk of Calcutta, we mean old Calcutta North and in particular old Calcutta North of Park Street; when we talk of congestion, of the solid masses of masonry buildings preventing proper conservancy, of the want of roads suited to modern traffic we think of the North of Calcutta proper; if we come to consider the future and to make provision for the future we cannot be bound by the purely artificial boundary of Corporation jurisdiction, we must look on Calcutta and surrounding municipalities as a unit."

"Calcutta was originally bounded by the Circular Road: it long ago outgrew those limits, but, unfortunately, no single authority was constituted to control that growth. A glance at the map of Calcutta and its suburbs shews that there is no relation at all between the street planning in the city proper and that in the suburbs: there is not a single road which starts in the centre of the city and runs out into the surrounding country: Chowringhee dies out in the thirty foot wide Russa Road. The road system of Bhowanipur, Ballygunge and Entally has no connection with that of Calcutta; Machua Bazar and Manicktolla Streets are, it is true, continued eastward in Narcoldanga Road and Manicktolla Road, but they are themselves quite inadequate to receive any heavy suburban traffic; further north the approaches to the Belgatchia and Barrackpore Roads are insufficient and even dangerous."

"The original limits of Calcutta proper were defined by the Mahratta Ditch, a defence against the anticipated inroads of Mahratta marauders. This ditch was filled up before the expiry of the eighteenth century, and became the Circular Road, one of the few satisfactory main roads now possessed by Calcutta, but one which does not assist in the most important movements of traffic. It was metalled as early as 1800."

"Lord Wellesley in 1803 appointed an Improvement Committee, one of whose duties was 'to ensure that the irregularity of buildings should be forbidden and that streets and lanes, which have hitherto been formed without attention to the health, convenience or safety of the inhabitants, should henceforth be constructed with order and system.'"

"The Committee's income was supplied by lottery profits, and in 1817 the Improvement Committee was merged in the Lottery Committee, which continued responsible for Town Improvement till 1836. This Committee signally failed to prevent the evils aimed at by Lord Wellesley, but, nevertheless, Calcutta owes to it almost all that is satisfactory in its system of roads. The Committee created the N. and S. Road, known successfully as Cornwallis Street, College Street, Wellington Street, Wellesley Street and Wood Street. It laid out the Strand Road along the river bank, and created Cornwallis Square, College Square, Wellington Square and Wellesley Square; Free School Street, Kyd Street, Colootolah Street, Amherst Street and Mirzapore Street are other important roads which we owe to the only authority which made any attempt at town planning in Calcutta."

"For twenty years after the abolition of the Lottery Committee in 1836, successive authorities were constituted and superseded and little effective work was done. In 1856 a Municipal Corporation was constituted and one of its first operations was to lay out Halliday Street. From 1852 to 1856 the law required that all new streets intended for carriage traffic should be fifty feet broad, but this wholesome provision was repealed in the latter year. The constitution of the Municipal authority was repeatedly revised, and in 1888 a Corporation was constituted with seventy-five Commissioners, of whom fifty were elected by the ratepayers, ten by certain public bodies, and fifteen appointed by Government, and a large area of suburbs to the east and south of the old Calcutta was included within its jurisdiction, the Municipal area being thus raised from 11,954 acres to 20,547 acres."

"Before this date the town proper had been drained and supplied with water: the filling in of surface drains and the laying of water pipes rendered it possible to open out many lanes and narrow roads, and it was claimed that between 1876 and 1888 the area of roads in the town had been increased by thirty-three per cent., but these additions in point of fact were almost useless for traffic purposes."

"The floating bridge across the Hugli had been constructed in 1873-4, and the only other improvement on a large scale undertaken between 1856 and 1888 was the construction of Harrison Road, seventy feet wide, running from the Hugli Bridge to Sealdah. This very important work was completed in 1893."

"The Lottery Committee and its successors having their jurisdiction in Calcutta proper, never looked beyond its boundaries.

Since 1888 the Corporation has paid attention to the added area; and it has given us the new sixty foot, road running through the fringe area; Lansdowne Road: Harish Ch. Mukerjee Road and Hazra Road: but the state of its finances has forbidden it from doing anything drastic in the way of road making in overbuilt areas."

" . . . the existing roads in Calcutta were of course made without any regard to the needs of modern transport and without any reference to the fact that Calcutta might even extend beyond Circular Road."

At a Meeting of the Trust held on June 12th, 1912, it was resolved that the Chairman should prepare a note to form the basis of a discussion as to the alignment of the roads to be constructed by the Trust. In response, Mr. Bompas put up another valuable, and more technical note, which has been of great service to the writer, and is used freely in this report. The following extracts bear on the subject in hand—The Existing Road and Street System of Calcutta—and should be read with the various plans handy for reference. Names of important existing streets are given clearly on the large coloured 'Slum Map' and on the 'Traffic Map' (in cover pocket).

"The North of Calcutta is ostensibly laid out on a true gridiron system but from the point of view of modern traffic the map is deceptive, as most of the streets are too narrow to carry modern traffic and cannot be regarded as main thoroughfares. Upper Circular Road, Cornwallis Street and the Strand Road as far as Nimtolla, are the only north and south roads which can carry a heavy traffic, while Harrison Road is the only adequate east and west road north of Bowbazar."

"There are three systems of laying out a city :—

(a) The Gridiron, as in most American cities.*

(b) The Zone system, as in Vienna and many Continental cities from which fortifications have been removed.

(c) The Radial system as in Paris, where there are a number of centres from which roads radiate.

"It is recognised that whatever system is adopted it is not satisfactory unless there are radial arteries for traffic from the centre of the town to the outskirts; in every large city many of the residents in the suburbs have business in the centre, and people can only be encouraged to migrate to the suburbs if they can reach the centre of the town easily and speedily."

"Calcutta is practically not provided with radials, though a glance at the map of the Maidan will show how roads are laid out when there is only the convenience of traffic to be considered. As traffic generally moves from and to the centre, it is by no means true that every long straight line of road will carry much traffic. Looking at the map of Calcutta it may seem a pity that Wellesley Street with its continuation Wood Street was not carried through to Lower Circular Road; but this

* Numerous Plans of American, Austrian and French Cities, including those of Vienna and Paris, will be found in the exhibit-folio of city plans. E.P.R.

is not really a defect. There is little through traffic along the line; the traffic from the north stops at Bowbazar, that from the south follows Camac Street and Park Street. So, at the first glance, it seems a sound idea to extend Amherst Street south to Park Street. This would be one way of opening up Wards 11 and 14.* I am convinced, however, that from the point of view of through traffic such a road would be almost useless and Wards 11 and 14 may equally well be dealt with otherwise."

"As the north of the City is the most densely populated so the flow from the north to the centre is the heaviest: in practice it is carried mainly by the inadequate Chitpur Road, because Cornwallis Street goes too far to the east of the centre and there is no diagonal westward."

"Of the eleven Tramway sections, Chitpur, Kalighat, Shambazar and Harrison Road carry by far the heaviest traffic; the average number of passengers carried monthly on those sections is

Chitpur	104,000
†Kalighat	104,000
Shambazar	92,000
Harrison Rd.	90,000

Naturally all traffic does not get to the physical centre of the town, which I take to be Wards 7 and 12: access to the river bank throughout its length is important and in particular the jute trade of Hatkhola has to be considered."

"The Port Trust are to carry out improvements along the river bank as far as Nimtolla and Aheeritolla Ghat. By these the traffic on the Strand Road will be much lightened."

"Traffic will always concentrate on the only bridge across the Hugli, the bridge is the approach to Calcutta from the west and one would naturally expect that from the bridge roads would radiate off to the different quarters of the town: but this is not at all the case: this defect should clearly be remedied."

"A north and south road through Wards 3, 5 and 8 will open up the insanitary centre of the town but from a traffic point of view, it is unnecessary to prolong this too far south."

"As it has been decided to lay out and develope Maniktolla, access to that suburb must be provided. The Corporation has recently laid out the fringe area and immensely improved it thereby: but they treated the area as an isolated one and made their main road run north and south parallel to Upper Circular Road: the fringe area, however, lies between Calcutta and Maniktolla and it is pretty clear that there will be a heavy east and west movement through this tract for which arrangements will have to be made: even if Gas Street, Maniktolla Road and Ultadinghee Road are of adequate width they end in nothing on the Calcutta side: some line of direct access from Maniktolla to the centre of Calcutta appears to be clearly necessary."

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* See Census Map for Ward Divisions.

† [Chowringhee-Russa-Road-Section E.P.R.]

In October, 1912, the writer presented a short preliminary report which describes the existing road and street system of Calcutta, and the following extracts are reprinted, and will now be made clearer with the help of the maps.

"I know of no other city road-plan that closely resembles that of Calcutta. The square meshes made by the existing network of roads are, I believe, unique in their great size. The network of other big cities is composed of meshes very much smaller. Calcutta, when compared with the average great city, possesses an abnormally low proportion of real roads and streets per square mile. Instead of being served by main roads, the city is served by streets, used as main roads; and instead of the property masses being each served by their own lot of streets, they are provided only with highly irregular lanes and passages—that have to serve as streets. If Constantinople * and some of the Chinese cities be excluded, it would be found, I think, that Calcutta contains a greater mileage of lanes and passages per square mile, than any other city in the world."

"There are only three real diagonal roads in the city, viz.: Park Street, Harrison Road, and Shambazar Road: the last is not much more than a big lane, and the two former urgently require traffic relief in some form. This lack of diagonals is very striking indeed."

"To recapitulate, Calcutta is a city divided into huge half-mile rectangles by narrow streets that should be nearly all main roads. The narrow streets are now Calcutta's great traffic lines. The ordinary usual street network enclosed by the usual chief roads of a city, are absolutely wanting in most of Calcutta. Instead, we have a major network made only of narrow ways, and each half-mile mesh is filled in with a tangle of wretched lanes, alleys, passages and footpaths, tortuously separating *pucca*†, *bustee*‡, sanitary and insanitary property of all kinds, and, unfortunately this property is set at every possible angle. I mention all these points now, in order to convince those who are making local suggestions, how large a view *must* be taken before minor works can properly be considered. The main questions in Calcutta are not concerned solely with traffic and increase of traffic, but include general city health and housing on a great scale, the laying out of new suburbs with their sewerage, water, and lighting systems, and the provision of bridges, parks, cemeteries and all adjuncts."

Re-examining the small map of Urban Calcutta which shews the existing road and street system of Calcutta, we notice the following striking defects :—

1. The maximum density of building and population concurs, unfortunately, with the least provision of roads and streets.

2. The city exhibits in general a rectangular system of main roads, the meshes being many times larger than those of any other city, i.e., the roads are far more widely separated than is normal.

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* [Also Cairo.] † pucca = good. ‡ bustee = bamboo mud-walled huts.

3. The roads forming the rectangular system are of very unequal width and traffic capacity, and there is no ordinary relation between width and position. For example, Chitpore Road, perhaps the most important of the north and south traffic routes, and the continuation of the very important Chowringhee, is miserably narrow, yet has to carry a heavier traffic than the 60 to 70 ft. wide Cornwallis Street, and the 80 to 100 ft. wide Circular Road. Some of the best roads are so placed that they carry but a small traffic.

4. There is a very great lack of diagonals. There are only two real diagonals in the whole city, viz.: Harrison Road (east end), and Park Street.

5. There is scarcely a single true radial direct route out of or into the main focus of the city. Such routes as exist or commence, end illogically; like Clive Street, which, from being 100 ft. wide, passes into two branches, the best one, Clive Row, 50 to 60 ft. wide, is quickly cut off at Canning Street; the other branch rapidly dies away into a 20 ft. highly congested lane. The Chowringhee route, zig-zags into the city heart *via* Esplanade East and Old Court House Street: and then runs butt into a church and the impenetrable slum. Lall-Bow-Bazaar is the only true radial route, and it is in consequence over-gorged for its width.

6. The north and south main road parallels—which normally should increase in width, traffic capacity, and nearness to each other, as they become closer to the river side—positively decrease in reverse ratio. This is a grave defect in a riverside port. Despite these difficult conditions, Calcutta traffic forces itself, so far as possible, into its natural channels; and in general the Traffic Map shews road traffic increasing in the following ascending order :—Circular Road, Cornwallis Street, Chitpore Road, Strand-Darmahatta Streets. The Road Map shews that the *traffic capacity* of these roads is in exactly the reverse order from what it should be.

7. The normal and vital riverside road of Calcutta Strand Road is comparatively very narrow indeed, and dies out suddenly in the middle of what should be its northern half. Two-thirds of the Calcutta Strand is almost entirely disconnected from the city behind it. Normally it should be connected at right angles by numerous roads running from it, direct into the mass of godowns and warehouses that always border every riverside port road in a broad band.

8. Detatched fragments of main road lie about the Map haphazard, the most startling objects being Halliday Street and Amherst Street. They tell forcibly of weakness and non-continuity of policy in the past.

9. The city main road inlets and outlets on the north are fairly well placed, but are constricted by hopelessly out of date bridges and approaches. On the north-east and east there are far too few outlets, and these are each troubled by the same inadequate type of bridge bottle-neck. The new grotesque exit at Sealdah from the city's present east central radial thoroughfare—Bow Bazaar—is a lamentable instance of recent total want of co-operation between government, railway, and city authorities.

The obstacles to free main-road extension, it will be seen, are chiefly the canals and railways on the north, north-east and east. On the south-west Kidderpore Docks and railway yards and their future extensions, offer an impediment that must be met fully, and be overcome.

On the west is the Hugli, the present sole route across this great natural barrier being the Howrah Bridge. A new and and very wide bridge is required to replace the existing 60 ft. structure, and a very real want is a second big bridge at Aheeritolla,

The facts—that Howrah is a big town of nearly two-hundred thousand people*, that it is Calcutta's greatest manufacturing district, and that it contains Calcutta's biggest railway terminus, have been so lost sight of: and the question of bridging and re-bridging has been left so long: and this only bridge has become of such enormous importance: that the stoppage of all traffic for even three days has now an alarming aspect. It will be an engineering miracle, to accomplish in one day, as has been suggested, the removal of the old bridge and the placing into working position and opening to traffic of the new bridge.

10. The above items relate only to main roads. A casual glance at the Calcutta plans shews instantly that the city, as a whole, actually possesses no streets. There are but two small areas in Calcutta having the normal street system which is found throughout the whole area of almost every city in the world.

The only maps that give a true idea of the streetless state of Calcutta are, first the big folding 16"-to-the-mile, and second, the coloured "Slum Map" produced from the large map by photography. This is an important point for those who are not aware of it.

The mass of lanes shewn on all the other official survey maps are fictitiously broad and connected, and have apparently been made so by the draughtsmen for convenience in writing in them their names. For example, on all the survey maps of Calcutta—except the big 16"-to-the-mile—Cotton Street will be found shewn almost as wide as Harrison Road, yet the one is but twenty feet wide, while the other is seventy feet and more.

Examining the Slum Map, it will be seen readily enough that there is a small though defective area containing streets just round and south of Dalhousie Square, and that the only other area resembling an ordinary city street layout is that south of Park Street.

This enormous lack of streets throughout the mass of Calcutta is a giant defect, and of extreme gravity.

* The population of Howrah is about the same as that of Bolton or Cardiff, and is greater than that of Aberdeen, Dundee and Oldham, while it is very much greater than the population of Southampton, Derby, Preston, Stockport, Brighton, or Birkenhead; and is double that of Northampton, Rochdale, Bournemouth and other great towns.

If we turn over the pages of the writer's exhibit-folio containing plans of American, English, German, French, Italian, Austrian, Russian, Swiss, Belgian, Dutch, Eastern, and far Eastern cities—we can find the awful streetless state of Calcutta rivalled only by the slum cities of Cairo and Constantinople.

It is hardly necessary to remind ourselves that normal cities are composed of streets, forming the unbroken small close mesh between many big main roads. The plan of Calcutta is composed of a dozen main roads, thrown down criss-cross and far apart, as it might be done by a child, from a handful of sticks; between these distant, narrow, over-burdened main roads, lie immense compressed streetless jumbles.

Quite apart from main roads, it would cost, to provide Calcutta with a fairly normal street system, such as is possessed by every western city or such as is possessed even by *Madras, not less than £30,000,000, apart from the cost of impossible re-housing problems that would arise. Remedial gradual measures during the next century will have to be the reform policy for this grevious state of things. The first want in the existing road and street system of Calcutta is seen to be that of more main roads, and secondly the logical working into a main road system, and the sensible inter-connection and improvement, of every useful piece of main road we already possess.

Slum Areas in the City.

Lack of a street system indicates its concomitant,—i.e., built-up Calcutta contains slum areas of an extent and a density undreamt of in European cities. The subject is dealt with in six chapters of this report, and it is sufficient at this point, to mention that there are 2,500 acres of streetless property in built-up Calcutta. The various slum blocks are found from Cossipore almost to Park Street, and from Sealdah to the Strand, and are separated from each other in most cases only by the main roads and the better buildings that line them. Judged even by a very low sanitary and housing standard, at least 800 acres of the above 2,500 acres, must be classed as rank slum.

Parks and Open Spaces.

The Maidan, forming a great park of 800 acres, occupies a south-west-west central position in relation to the city whole. It is a little larger than Hyde Park, London, and is perhaps the finest possession of Calcutta, and is so placed as to be fairly close and accessible to about one quarter of the inhabitants of the city. It is unhappily too far south to be of any daily use to the dense population of North Calcutta—nevertheless, it is a most valuable large city reservoir of open space and decently fresh air, and without the Maidan and the zone of modern buildings that bound it on north and east, Calcutta would be something of a hell.

* See the Plans.

With the exception of the Maidan, Calcutta is very badly off for Parks and open spaces. In the mass of built-up Calcutta there are but six open spaces worthy of much notice. The largest is Dalhousie Square, which measures between the building lines about 1000 ft. by 1000 ft., but the actual square is only about 800 ft. by 800 ft., and out of this the best and most central part is occupied by a very plain tank, almost certainly breeding mosquitos and serving no very definite purpose, but confining the public to the narrow strips that lie between the tank and the traffic-filled roads. The water area measures roughly about 650 ft. by 400 ft. This square can be immensely improved, beautified, and made far more valuable both to the public and to traffic, at a trifling cost—as will be shewn later on.

Four of the other noticeable city squares all lie at intervals along the east side of the long single north and south road known by so many parts and names :—Cornwallis Street, College Street, Wellington Street, Wellesley Street and Wood Street. The dimensions of these four squares vary between about 500 ft. to 700 ft., by 300 ft. to 500 ft. Three of them are very much occupied by plain colourless and useless tanks. No real skill or thought has been expended on their layout. Chitpore Road possesses a square at Beadon Street: and this has been rather nicely laid out, it measures about 500 ft. square. Several little open spaces, like Jorapuker Square, lie hidden in the dense built-up city mass.

The north half of Calcutta is very badly in want of a good sprinkling of green small open spaces to be used as playgrounds for children and sitting-out places for adults. The big Maidan—one, two or more miles away, or the usual 'town planning park' clapped down far away out in the suburbs, and containing on most days about half a child per acre—these would be of no service to the 600,000 people crammed into built-up northern Calcutta. The subject is dealt with more fully in its own chapter.

In southern Calcutta and almost touching the Maidan are the Zoological Gardens, about 800 yards by 400 yards in extent. They have been laid out with very great taste and skill, and are maintained in excellent order. After the Maidan, they form the most attractive and useful park in Calcutta. They are closely accessible by tram.

Three miles west of the Zoological, are the Botanical Gardens, situated far away in the southern extremity of Howrah, and almost inaccessible from Calcutta except by occasional ferry. These grounds are park-like, admirably cared for, and have been ably designed. They are full of solemn beauty, quiet, and dignity. Usually, the grounds are almost quite deserted; and they are at present of little or no value to the Calcutta populace: who are cut off from them by the lack of tramways over Howrah Bridge and by the lack of any tramway going nearer than two miles to the gardens. Then, also, the road from Howrah Bridge is an almost continuous four miles of dusty congested and hideous street and lane. By ferry there is some risk for children and some anxiety

for mothers, and the service also is very precarious and seldom. We must therefore reluctantly dismiss these noble glades as not being available for the people of Calcutta.

The only other park-like enclosure is that belonging to the Body Guard Lines, whose large exercise ground lies out to the south-east in Ballygunge; it is not of course open for public use.

Tramways.

The tramways of Calcutta do not belong to the city, but to a limited liability company.

The city (apart from Howrah) is served by about 31 miles run of 4ft. 8½in. gauge tramway route—mostly of double track, the cars being of the usual electric-driven, overhead trolley-pole type. The Tramways Map gives the various circulations. The main city focus of tramways is seen emphatically to be Dalhousie Square. The tracks and rolling stock are good, and there are plenty of cars, but the abnormal narrowness and scarcity of Calcutta roads is a great hindrance to the tram service, and the mileage works out to be only one quarter of that found in cities of the same size as Calcutta.

A glance at the Tramway Map also shews that on the north and east all the tram routes stop abruptly on the edge of the closely built-up city. The great south-east would-be suburban areas are absolutely devoid of any tram service, or of any main road able to take such a service; and it is only in a south direction that Calcutta tram routes run out into suburban areas in a manner resembling the normal of all other cities.

No tram route crosses the river by the Howrah Bridge; and the omission is of course most serious and one unprecedented in our day. Even Constantinople has its over-water suburbs connected up with electric tram tracks, which cross a floating bridge over the 150 ft. deep "Golden Horn." During the past twenty years this lack of tramway tracks and bridges into Howrah has much helped in the shocking and increasing building congestion of North Calcutta.

Howrah contains two tramway systems. Each starts from near the west end of Howrah Bridge. One branch proceeds to serve as much of north Howrah as the wretched main roads will permit, and the other branch performs a similar service in South Howrah. At present a large number of tramway passengers have to walk to and fro over the Howrah Bridge.

Despite the great difficulties under which tramways are worked in Calcutta, the passenger traffic increases steadily. The writer's Main Road Report, Part I, gives particulars and deals specially with the question of Howrah Bridge as a future great tramway route. The future of Calcutta tramways is discussed later on.

The length of roads and streets traversed by tramway track in Calcutta, as stated above, is only some thirty-one miles, and in Howrah we find but a little over four miles. These exceedingly low figures are in keeping with the abnormal lack of roads, the quite neglected condition of all suburbs, and the dense central congestion. No city to-day can hope to expand properly unless it is served by numerous fast radial tram routes. The normal tram-mileage found necessary and kept busy in all modern cities that are similar in position to Calcutta is rarely less than 60 miles, and often is very considerably more.

Water Supply and Drainage.

Calcutta possesses a good water supply, which has been obtained only by overcoming great difficulties, chiefly because of the unbroken flatness of country for so very great a distance all round the city. The largest water tower in the world has been a necessary consequence. Calcutta can be proud of her water supply.

Within Circular Road, and for some distance outside, especially to the south, Calcutta enjoys modern pipe sewerage. Very little or no work has, however, been done in the undeveloped suburbs. Owing to extreme flatness, but very much more on account of the sloppy and saturated subsoil, sewerage operations in Calcutta are very costly, difficult, and slow. On the north-east no sewerage extends beyond the Circular canal. Manicktola possesses neither sewerage nor land drainage. South of Sealdah Station and east of Circular Road, a fair amount of drainage has been done in Entally, and again to south-east and south, several lines of sewerage extend a considerable distance into Ballygunge. Alipore has been sewered to a fair extent. West Kidderpore is in need of sewerage. Howrah is but very partially sewered.

Manicktola, and the south portion of Ballygunge, of Alipore, and of ot Kidderpore, need land surface drainage in addition to sewerage. This need not be very costly ; the linking up and improvement of existing earth channels and the provision of tidal exit sluices, being all that is required to make large areas more habitable.

SUBURBS OF CALCUTTA.

North of Calcutta, in **Cossipore-Chitpore,** we find habitations and mills extending north, mostly along and near the Hugli, and for half-a-mile from the river edge : beyond this distance from the river, buildings are very scarce. The river facilities attract mills and works, and these cause house building ; then also the land near the river is higher, drier, and healthier.* As we leave the river, the land gets lower and wetter, and about one-and-a-half miles east and parallel to the Hugli, the main arm of the E.B.S. Railway, proceeding nearly due north, is found traversing land which is almost at swamp-level. The average population is only 23 per acre. Cossipore-Chitpore is likely to become the greatest jute market and northern railway sorting place of Calcutta

* Calcutta is so flat that practically no gradient or change of level is perceptible throughout the city. The difference of level between the highest and driest land, and the swamp land, is only about ten feet.

On the north-east of Calcutta, between Circular Road and the Circular Canal, lies the "**Fringe Area,**" forming a strip about two miles long and a quarter of a mile in width. This is being provided with a new central road 60 ft. wide, still under execution by the Corporation. This road will attract very little traffic, but is a good piece of road-work. Apart from this central road, and the various main roads that cut across it, the Fringe Area is largely a squalid, streetless, and planless strip, rapidly being built up on the usual bad lines.

Outside the Fringe Area, and enclosed by the Circular, New, and Beliaghata Canals, is the big triangle of **Manicktola.** The apex adjoins the north-north-east point of built-up Calcutta. The base runs out eastwards from Sealdah. It forms a roughly shaped right-angled triangle, with the square angle on Sealdah Station, the two-mile-long base extending due east, and having a two-mile vertical side reaching up to Chitpore. This area seems destined to become in part a great Indian residential suburb, the other, westward portion of it, is already being invaded by industrial enterprise. At present Manicktola possesses no sewerage, and the whole area is very low lying and undrained. It has no road or street system, but is cut from east to west by four outgoing roads, i.e., by the Ultadingi, Manicktola, Narkuldanga, and Beliaghata Roads. But each of these more or less comes to a stop at the New Canal, which forms the east boundary of the hypotenuse of the triangle: for beyond the New Canal lies swamp and salt lake.

The area of Manicktola is approximately two square miles. The average population is about twenty-five persons per acre, but nearly all the inhabitants dwell along the western (Calcutta) margin, and the south side bordering the Beliaghata Canal.

South of Sealdah and east of Circular Road **Entally** and **Beniapuker** compose wards 19 and 20,* and form roughly a square of one-and-a-half miles by one-and-a-half miles. The north side is made by the Beliaghata Canal, and the east by Lower Circular Road.

Entally, the north half of the square, is by nature almost as wet and low lying as Manicktola, and is crammed with tanks, but it possesses some drainage and sewerage. It is devoid of anything but a haphazard tracing of small roads and lanes. The population is rapidly on the increase: and in 1911, was already 41 per acre. The west part (nearest to Calcutta) is of course that most occupied. The east part merges into pseudo-swamp. The Kidderpore loop of the E. B. S. Railway intersects the area from north to south.

Beniapuker, the south half of the large square, and adjoining Ballygunge, is just a little higher and drier than Entally, and is in very much the same condition as regards drainage, roads, and population. The occupation per acre in 1911 was 46.

Ballygunge (Ward 21 on Census Map), is far and away the largest ward of Calcutta, and covers 2,067 acres. It is very low-lying, and its southern half is wet, full of tanks, and needs extensive surface

* See Census Map.

drainage. The better portion near to Calcutta, is higher and drier. The air of Ballygunge always seemed much fresher and sweeter, to the writer, than that of Alipore or any of the other suburbs. A thin good-class (European and Indian) residential development, with sewerage, water and lighting, has taken place along the Ballygunge Circular Road, the Store Road, the Old Ballygunge Road, and in the vicinity of the Body Guard lines. This is a very pleasant part of the Calcutta outskirts, but there is no access by trams, and only a very defective road system. Nor has any attempt been made at a street layout, let alone a main road system. The above mentioned roads, are really only tortuous and well made-up lanes.

Lansdowne Road, leading due south into Ballygunge, from a somewhat illogical point on the Circular Road, is a good piece of wide highway, and its prolongation would form a valuable parallel to the Russa Road. At present Lansdowne Road ends at Hazra Road, which is the only attempt at a central east and west highway in Ballygunge. Near the south boundary the suburb is crossed by the Dhakuria Road, which joins into the chief north and south route, i.e., the Gharia Hat Road, which is the continuation of the Old Ballygunge Road.

All the roads in Ballygunge are of far too narrow a width, and all are being permanently constricted by small buildings, erected right up to the road boundary; the main roads (or rather the best lanes) being practically the sole means of access to any piece of land, and, in consequence, they are the sole lines along which buildings can be erected at normal cost. The writer found, even so long after the rains as February, that most of the carefully mapped roads, shewn on the 6 in. ordnance, were really only tiny lanes, often not more than 6 ft. wide, and along which he frequently had to wade above his knees in water. It was impossible to explore them in a car.

Bhowanipore is mostly an Indian residential development at the south end of Chowringhee. The rapid and excellent tram service along the Russa Road and Chowringhee route has caused and permitted most of the residential growth in this ward. The land is fairly dry: due largely to the facility for land drainage given by the Tolly's Nullah Canal. Bhowanipore has been already built-over to a considerable extent, and carried in 1911 a population of 67 people to the acre. It is badly in need of re-planning, but, except by the pooling and re-distribution method, such would, it appears to the writer, be a most costly undertaking.

On the west border of Bhowanipore, along the Tolly's Nullah, we find some evidence of industrial occupation, this being a depot for country produce, rice, grain, etc., coming in by canal from the south-east canal system. A considerable road traffic between Calcutta and Tolly's Nullah is created by this country import and export. Bhowanipore covers 816 acres.

Alipore lies between Bhowanipore, the Maidan, the Boat Canal and the Calcutta Docks at Kidderpore. It is surrounded by navigable canals and bordered on two sides by heavy railway development, soon to be very much greater. The surrounding deep-cut canals keep Alipore fairly dry, but the south half is still rather wet and undrained in the vicinity of the Boat Canal. Occupied on the west by dock-areas, on the east by jails, clothing factories and country boat business: and hemmed in by an increasing growth of a non-high-class residential character—the central and southern portions do not seem to offer a very favourable future as a quiet retired suburb. The noise, smoke dust and working-class residence that will come with the greater railway development now in hand along the south border, will, it is to be feared, change the present peaceful and charming aspect of residential Alipore: and also send up the land values.

At present, there is a fairly good main road system and tram service, and these two factors are the chief causes permitting the recent erection of new high-class dwelling houses at Alipore. A street system, and rectification and provision of main roads is needed. Such would be a costly re-planning without any pooling and re-distribution powers.

Kidderpore, with Ekbalpore and Watgunge (Wards 24 and 25), the most south-westerly districts of Calcutta, are also three of the most important, as regards the future.

The docks have already been described. Road access to them, and the main roads of Kidderpore and Ekbalpore, badly need improvement, rectification, and re-planning, before it is too late. The whole district needs a thoughtful and far sighted re-planning, at once.

Sewerage and land drainage are required in the Kidderpore district, which is at present, rather notorious for malaria. Land near the river is fairly high for Calcutta, but gets lower as it recedes from the bank, and becomes wet and very full of tanks. The population of Ekbalpore (East Kidderpore) was in 1911, twenty-four to the acre, and of Watgunge (West Kidderpore) sixty to the acre. There is little or no street system in Kidderpore, and it appears to the writer that remedy by the acquisition and re-planning method is now absolutely impossible, on account of the great cost.

Southern Outlying Suburban Areas.

The direct Chowringhee and Russa Road route, and the Diamond Harbour route, both run southwards, along narrowing promontories of habitable land, to points about three miles south of the Maidan. Given full width and freedom from constriction these two big routes each offer special facilities for rapid 25-miles-an-hour tramway services to big garden suburbs of some kind.

It is only southwards and south-eastwards that Calcutta can develop freely and largely in a suburban way: because she is hemmed in by the river on the west, by comparative narrowness of habitable land on the

Howrah side, and by swamps to the north, north-east, and near-east. The Diamond Harbour and Russa Road routes are therefore likely to become of very great importance. Note that the only normal suburban tramway development of Calcutta is in this direction.

Howrah may be described as the largest manufacturing area of Calcutta, although not included in the official city boundaries. It forms along the Hugli, a loosely built-up town only about three-quarters of a mile wide but six miles long. Behind that three-quarter mile band is building land, which can be drained and sewered with less difficulty than is usual in Calcutta districts.

The population of Howrah in 1881 was 90,813; to-day it is 180,000, which is the same as that of Cardiff or Bolton, and is considerably larger than those of Swansea, Sunderland, Southampton, Plymouth, Norwich, Burnley, Brighton, and other 'great towns.'

Howrah has neither a decent main road nor a good street. It is only partly sewered, and is in general a disgrace to civilization; and steadily becomes worse and more congested. Genuine re-planning would only be practical by means of a pooling and re-distribution system.

Housing and Residential Conditions of Calcutta.

These are scandalously bad. An acute house famine prevails, and increases. It has prevailed during the last 30 years, and nothing has been done to remedy it. Europeans, Indians, and all castes, are affected. Rents are tremendous, and the accommodation given is all too small, and far too crowded.

Comfortable wholesome family life is being pushed right out of existence in Calcutta. It has already vanished to the extent of 45 per cent. The number of women in the city continually decreases in proportion to the population of men—always an indication of thoroughly bad housing conditions. Infant mortality and tuberculosis* stand at world records. The monstrous chawl, the flat, and the hotel are becoming the only places of residence for immense numbers of people. The poor are herded and forced into abominably packed slums. The barrack-chawl is the home of the next stratum. But all classes suffer. Nearly every European bungalow,† built for single families, and only of moderate size, has too many occupants. The original drawing rooms and reception rooms on ground floors are now the hot and close ground-floor bedrooms of a flat; and the original bedrooms upstairs now compose another uncomfortable and inconvenient flat. The rent will seldom be less than £25 a month for each half of the converted bungalow—which cost about £700 when built.

* Everywhere recognised as the truest index to housing conditions.

† or three storey villa.

Population and Distribution.

The Census and Sociological Maps will be necessary in examining the distribution and density of the population.

The total area within the city boundary covers 20,547 acres.

The total population within that boundary, numbered in 1911, **896,067** souls.

The Census returns also gave figures for certain suburbs outside the city boundary, and on the east side of the Hugli, as follows :—

SUBURB.	ACREAGE.	POPULATION.
COSSIPORE-CHITPORE	**2,048**	**48,178**
MANICKTOLA	**2,176**	**53,767**
*GARDEN REACH	**2,176**	**45,295**
Totals	**6,400**	**147,240**

* West Kidderpore.

With these additions, the Census returns give the following totals for "**Calcutta with Suburbs**" :—

TOTAL AREA ... **26,847** acres
TOTAL POPULATION **1,043,307**

But Howrah is not included, although it is in reality even more a suburb or part of Calcutta than is Cossipore.

From a comprehensive town-planning point of view, we must, without a shadow of a doubt, include Howrah as part and parcel of the Calcutta community. The total population of the area then becomes : 1,043,307 + 179,006 = **1,222,313—say one-and-a-quarter million people.**

The writer is not in possession of sociological and distribution figures relating to population outside the city boundary, but general ideas on their status will be given later on.

Inside the City boundary there were in 1911, **896,067** people ; and we may safely now assume this figure to have increased to not less than **900,000.**

The first striking fact is the unique preponderence of males over females. The 1911 Census records **607,674 males** and only **286,394 females** in the city. This extraordinary difference is caused by two main factors :—

1st, The very deplorable lack of family accommodation in Calcutta. The house famine is intensely acute. Nearly all the working class families* can afford but a single room in which they have to live, eat, sleep, propagate their species, and die. It is seldom a room of decent size, and usually it is ill-lit and badly ventilated and is in a slum or chawl. Often two families exist in one room Men—most especially in India, where family life and early marriage rules are so potent—would certainly bring their families to Calcutta, **if accommodation for them existed.**

2nd, In a lesser degree, a floating and temporary male population which is always present in Calcutta, attracted from the surrounding districts, and from India generally, by the high wages and abundant work.

Throwing light on this great housing evil, are the totals shewing that the 900,000 people live in 45,000 houses, i.e., the average number of people per house is 20. The average Indian house contains about twice as many rooms as an English house, so that for genuine comparison, the Calcutta housing squeeze is equal to about 10 people per house in Great Britain. The actual number of people per house in Great Britain is a shade over five, and the size of each family is a shade under five. If the present housing accommodation of England were untouched, but the population were doubled, then we would produce an over crowding and house famine about equal to that which now exists in Calcutta. These figures will be found discussed and verified in the chapters on Housing. Full allowance is made for barrack-dwellings, etc.

Family life is powerfully discouraged in modern Calcutta ; and as usual, lack of women goes hand-in-hand with an excess of vice.

The first thing, unpleasant thing, that usually strikes an Indian newly arrived in Calcutta, is the enforced mixture of castes, creeds, and races found in every street, and in nearly every dwelling-house or place.

Only an intense housing pressure could produce conditions so unnatural and repulsive to Indian requirements.

In all other Indian cities—except Bombay—we find fairly well demarcated separate Hindu, Brahmin, Mohammedan, Eurasian and European quarters. In Calcutta we find a large mixed Indian residential mass in North Calcutta, passing southwards into districts approximately Indian-Eurasian in Wards 11 and 14, and European-Indian in the Park Street area.

On the Sociological Map, purple shews Indian residential, and purple stripes the same in lessened density. Blue, and blue stripes indicate Eurasian localities, while green and green stripes shew where live mostly Europeans.

* The working classes form about 75 % of the population of Calcutta.

Density shews so clearly on the Census Map that little need be written. The average populations per acre do not convey an adequate idea of the worst over-crowding. For example, the black ward No. 8, shewn on the map, has an average of 255 people per acre, but over one-fifth of its area is occupied by the buildings and enclosures of the Medical College and chief Hospitals of the city. It is the old case of "the nearer the church the farther from God"—for the population of this tubercle-stricken slum-ward rises in parts to a density of over 700 per acre. It is considered an extremely bad and congested state of things in Europe if the population per acre reaches 180.

The average population per acre for Calcutta is only 44, and this again is deceptive, for the city area really falls under two large divisions :— (a) Congested with people and buildings. (b) Very little population, because undrained, wet, roadless and tramless, and disconnected from the city centres of business and trade.

Movement of Population.

This is an important consideration. We cannot do better than turn to Mr. Bompas, who has made a study of this subject. The following is quoted from the lecture that has already been drawn on for this report :—

"The movements of population in Calcutta as revealed by the last Census are interesting and should be carefully studied by every one who sets out to advise the Improvement Trust."

"If we draw a line east and west along the line of Kyd Street and Ripon Street* the character of the population on either side of the line is markedly different. North of the line the density varies between 130 and 237 persons to the acre. South of the line the density in no Ward exceeds 68 to the acre. I may mention that in London the population of Boroughs like Shoreditch and Bethnal Green is 169 to the acre ; in Chelsea it is 100 and in Kensington 75."

"Wards 1 to 6 constitute the extreme north of the town, with Machooabazar† as its southern boundary : these wards are thickly populated —130 to 227 to the acre—but at the last census they all showed substantial increases of from 8·7 to 14·5 per cent. But south of Machooabazar the case is different : in the whole of the rest of Calcutta inside Circular Road the census showed that the population was stationary or declining. The single exception was Puddopukur, which showed an increase of 6·7 per cent., this ward lies between Bowbazar and Dharamtollah : the population is 180 to the acre and the housing conditions are very unsatisfactory."

"This wide spread decrease in population is of course due, for the most part, to the improvement in sanitary conditions and in the class of buildings which has been erected in recent years. When a bustee is swept away and a residence of the better class or a warehouse created on the site, a less population is naturally accommodated. Nor is it difficult to ascertain what has become of the displaced population, for every ward outside Circular Road and south of Sealdah Station shows a substantial increase in

* See Census Map, the line lies between Wards 13-14 and 15-16. [E.P.R.]

† [See Slum Map. E.P.R.]

population, the percentage of increase being as high as 53·5 in Beniapukur and 28 per cent in Ballygunge. It is well known that there is an immense floating population in Calcutta composed of men who have come down to work, leaving their families in the districts. This floating population should be distinguished for many purposes from the permanent residents who have their families with them. The census figures for females help us to trace the permanent population. Of the six northern wards five give a total increase of 6,300 females, but Ward 5, which is notoriously unhealthy, with an increase of 4,336 males shows a small decline in females : the permanent residents are not increasing there. Similarly in the wards which form the centre of the town, while the population as a whole has declined, the loss of females is greater than that of males. On the other hand Entally, Beniapukur and Tollygunge show increases in females of 2,000, 5,300 and 2,700 respectively. These figures corroborate our previous conclusion that the permanent population is shifting to the north of the town and to the south-eastern suburbs. The loss of permanent population from the centre of the town is even greater than would at first sight appear because that loss is partly made good by an influx of male working population."

"But the boundaries of Calcutta are purely artificial and it is necessary to look beyond the suburban wards to the suburban municipalities : these increased in population very substantially : it is true that the south suburban merely added to its population 1,700 males, the number of women remaining stationary, but Cossipore-Chitpur showed an increase of 19 per cent., Manicktola 66, Garden Reach 40, and Tollygunge 45."

"The increase in these four municipalities amounted to 32,000 males and 20,000 females : figures which contrast strongly with those for Calcutta, where the increase was 38,000 males and only 4,300 females. These figures show that the class of population which brings its women folk to Calcutta is settling in the suburbs and not in the centre of Calcutta : in the centre we tend to have a population of single men : of the ever increasing crowd of labourers aud traders who visit Calcutta only temporarily."

"The Trust was created partly to provide suitable and healthy accommodation for the normal increase of population in Calcutta, and that increase we have found is settling in the suburban municipalities."

Race and Religion.

The two main divisions of race in Calcutta are characteristic of most Indian cities and will be shewn by the Religion Tables. The census returns give the following figures :—

CALCUTTA AND SUBURBS.
(Without Howrah.)

Of Hindu Religion	693,492
Of Mussulman Religion	298,986
	992,478

This figure accounts for all but 51,000 of the 1,043,307 total.

The other castes and creeds are numbered as follows :—

CALCUTTA AND SUBURBS.
(Without Howrah.)

Brahmo	1,560
Sikh	980
Jain	1,813
Buddhist	2,461
Zoroastrian (Parsi)	470
Christian	40,511
Jew	1,920
Animist	67
Confucian	1,047
	50,829

The general character of the Calcutta population may be termed Indo-cosmopolitan, with strong predominance of a complex and varied Hindu element, tempered again by the European and Mahommedan influences of the city. A number of different languages are spoken by the divisions of both the Hindus and Mussulmen. The Hindus are divided among many sects and castes, and the Mahommedans group themselves in two main sects.

HOWRAH.

The writer is not in possession of sociological and distribution figures relating to Howrah, but he frequently visited that suburb, and the following remarks will give a general sociological notion of the population.

Density is greatest along a line parallel to the riverside, and at a distance of about one quarter of a mile therefrom : the river margin being occupied very much more by industrial concerns than by residential property.

The band of closely-dwelt-on land is about half-a-mile wide, and extends for some three miles north and three miles south, on each side of Howrah Bridge. This peculiar long strip of occupation owes its position mostly to four causes :—

(a) The attraction of industrial activity to the Hugli margin, opposite and near to Calcutta, causes the length of the band.

(b) The industrial concerns prevent dwelling occupation along the actual river side.

(c) The industrial concerns have attracted a population in their immediate vicinity and, as it were, behind them (west of them).

(d) The land becomes lower and less drained as it recedes from the river margin, thus preventing a free development westward and causing congested building between the wet ground and the factories.

Very few Europeans reside in Howrah, and the population is almost solely of the Indian working classes. Hindus predominate in numbers over Mahommedans in the ratio of about two to one, just as in Calcutta, on the other side of the bridge. A considerable number of clerical people who work in Calcutta, live in Howrah and in the villages to the west, coming into Howrah by means of two useful and popular light railways. From Howrah these people have to walk or ferry into Calcutta.

In race and religion, the people of Howrah are divided proportionately very much as in Calcutta.

Vital Statistics.

These are examined and discussed in the various chapters on Slum Problems and Re-housing. In Indian cities it is difficult to obtain correct vital statistics. It will be sufficient at this point, to mention that tuberculosis is rampant in Calcutta, and that the infant mortality rates are enormous; and that such are only what must be expected in a city possessing 2,500 acres of streetless and congested property.

Financial.

This subject is dealt with in the chapters on Comparative Standards, Estimates, etc.,—as the object of this section is solely to give a correct general survey of Calcutta. The chief fact in the City Accounts is the very low revenue—at present only about ninety lakhs (£600,000) per annum.

Brief List of Improvements required to bring Calcutta up to a moderate standard of City amenity.*

These needs may be summarized as follows:—

(a) Urban built-up Calcutta requires about 21 miles of new wide main roads, and eight miles of widenings. These would bring the city fairly into line with a western city as regards main road provision and traffic facilities.

(b) Urban built-up Calcutta has no street system: 2500 acres are provided only with highly irregular lanes and passages. It would require the creation of about 110 miles of ordinary 30 to 40 ft. streets to bring Calcutta into line even with the old built-up sections of European cities.

(c) Of the 2,500 acres, not less than 800 acres are slums of a much worse type than anything in Europe, and they require removal or remedy.

* This is a list of requirements, A discussion of what is possible to be done of all this is one of the chief objects of the Report.

(d) 6,000 acres of suburbs inside the city boundary are growing up anyhow and require re-planning, roads, tramways, and development.

(e) 2,000 acres of land in Manicktola (outside the city boundary) need planning, sewerage, tramways, and development.

(f) 2,000 acres in Cossipore-Chitpore will one day become part of Calcutta. This area likewise needs re-planning at once.

(g) Bridge communication with Howrah needs radical improvement and augmentation. A second bridge is wanted, it should be at Aheeritola.

(h) Sixteen defective out-of-date existing road bridges over railways and canals need re-construction and widening, or replacement by new bridges of two or three times the existing widths. Approaches and gradients also need improvement. New bridges are needed at several points, such as at Halsi Bagan.

(i) The dense built-up city is remarkably short of open spaces. Northern Calcutta especially, is badly in need of a dozen good squares and playgrounds. A riverside promenade road would be as good as a park in North Calcutta, and would be of very great use for traffic and the increasing river shipping, and is perfectly feasible of execution. Radial parks coming into Calcutta from south, east and north, plus plenty of small squares, would, perhaps, be the best system for Calcutta—given plenty of money and powers. Nearly all existing squares can be much improved at trifling cost.

(j) Private and public-company housing enterprise needs every possible encouragement at Calcutta, not only by suburban and tramway development, but by the British and European loan systems.

(k) Calcutta and Howrah are short by 60 miles of the normal allowance of tramway routes. There are no roads for them: either in the city or suburbs.

CHAPTER III.

GENERAL PRINCIPLES THAT DIRECT CITY IMPROVEMENT AND EXTENSION WORK— CURRENT OPINION.

1. Traffic and Transit. 2. Building Congestion and Schemes. 3. Suburbs. 4. The City Regulating Plan.

CURRENT OPINION OF LEADING AUTHORITIES ON—Town Planning in General—re-design of street and road systems—Main roads, the first essential—what they are for—every city is the servant of its roads—Traffic circulation—Rapid tramway transit, a vital necessity to good growth—American opinion—example of Paris, London, Washington—Co-operation ensures successful re-planning—the Sanctioned City Plan forms part of any sound City Improvement Act—use of the City Plan in America and the great continental countries—Transit and the City Plans both vital to suburbs—Chicago opinion—Town Planning plans and projects are not kept secret in America or on the Continent—Most money today, in American, English and Indian cities, is needed for rectification in the badly built-up areas—Diagonal roads one of the greatest reforms needed in rectangular road systems, like those of Chicago and Calcutta—Radial system of main roads the most effective and economical—Every main road wide enough for double tram-tracks—Housing and Town Planning must not be separated—Housing problem is largely removal of residence from dear, costly, crowded land in city centre, to cheap land in healthy suburbs—Rapid transit is the key to this improvement—Decentralization of industries another factor—Rapid transit is not chiefly a financial problem, but is a social problem—Taxation of land-values universal in progressive town planning countries—We must not expect to see everything put right in five years, or in twenty years—Paris carried out her greatest plan unswervingly through fifty years.

We nearly all have some knowledge of town planning, but there can be no harm in briefly reminding ourselves once more of the general lines followed throughout the world. What follows is, of course, but a sketch outline.

First, the general city map is absorbed, and all existing conditions, physical, social, and industrial, are grasped. The past, present and future are considered from all aspects, and we are told that as regards re-design, pen should nor be put to paper uutil a year has been spent in preliminary investigation. The first improvement to be taken up is usually the main framework of the city—the main roads.

1. Principles that direct the improvement or creation of traffic routes, especially in the case of great riverside ports.

Invariably, the first area to be ascertained and carefully studied is the chief general focus or Mecca of the city. Usually, it is that locality which contains most of the important public and commercial business premises, the best shops, the most valuable property, and is the foci or focus of all tramway routes, and the greatest ganglion of large and busy roads and streets. Dalhousie Square and the Exchange may be taken as marking the centre of the present chief focus of Calcutta.

After this study, comes definition of secondary and special centres of activity. Sealdah and Howrah Station are good examples of important secondary foci or centres. After this, comes examination of suburbs, present and future, and of all the outgoing main roads.

In the case of ports, the riverside or main dock road is always a most important line, radiating traffic and activity landwards throughout its whole length, by means of numerous right-angle streets.

The city heart or chief focus should be connected freely by direct and wide main roads and by double-track tramway routes with :—

(a) all residential areas and suburbs,

(b) manufacturing areas,

(c) chief railway stations and bridges,

(d) every secondary city focus of activity.

(e) Further :—In the case of riverside ports, the city centre should especially be well connected with the main riverside road, and with the landing stages, wharves, warehouses, the customs and other depots.

(f) Good main roads and double tramway tracks should join up all shipping areas with the railway goods and passenger stations.

(g) A succession of main roads should run parallel to the quay side or river front. Their importance, and nearness to each other, usually decrease with their distance from the river or harbour side.

(h) When the cost of widening old streets, or of cutting new roads, is so great as to prohibit making them of the full open width desired, then "arcading" is frequently used as a cheaper and very successful method of gaining the same end.

(i) At every road junction plenty of room should be given for easy circulation of traffic.

In general, every well-planned city of our day exhibits a radiation of big roads and double tramway tracks, from its centre to minor centres, and right outwards into and through the suburbs. The plans bound up in the Folio of City Maps, should now be glanced over rapidly, with these points held in view. The maps of Paris, Berlin, and Vienna show good examples. The creation of a similar modern system of main roads in Calcutta, by utilising and improving what we possess, and by making new main roads where such are infallibly needed, is perhaps the greatest of the great tasks in front of the Trust, and upon what is done will depend increasingly the future commercial prosperity, social development, death rates, health and history of Calcutta. Reference to the map shewing the existing road system of Calcutta, and comparison of it with any well-known up-to-date city, will show instantly, the present remarkably unfortunate position of Calcutta both as regards City Main Roads and Street provison.

2. Principles followed in the Improvement of Congested and Insanitary Areas.

Areas that have been built up too densely and are devoid of normal road and street allowance have to be opened up, so as to give each dwelling or work-place, and even each window, a proper allowance of air, light, and

germ-killing sun rays; and, further, give the areas generally a system of airways and a normal supply of open street space, and room for children to take daily vigorous natural exercise close to their homes, and in safety.

Usually the first act of improvement is the creation, or the preparation for the creation, of streets.

But the positions of streets are determined by those of adjacent main roads, and in our case even these are extraordinarily few.

The first great act of improvement for the Calcutta Improvement Trust, in dealing with congested areas, is the determination of a general system of main roads; until the position of these has been fixed, it is not always possible to lay out any local improvement scheme for the very best results.

Each great main road is, itself, a first-class sanitary measure. It is a great airway and a new lung. Street schemes, improvement or demolition of bad property, re-plotting of building sites, and new building bye-laws, especially with a view to regulating the light angle and the maximum height, all follow after, and depend more or less strictly on the adjacent or through positions of main roads, whether the latter be new, or existing.

The actual processes of dealing with streetless slum areas are as follows:—

1. Remedy by total or almost total acquisition, total demolition, re-planning, and re-sale. This method is so costly and so inconvenient that everywhere it is being avoided as much as possible. Nevertheless, this frequently is the only course open.

2. Remedy by 'slum-repair,' i.e., by making or persuading owners to make their property sanitary and habitable, by removing obstructive buildings and opening up in a judicious and not expensive manner, by providing small open spaces where readily possible, etc. This system has worked and is working admirably in many cities of Great Britain.

3. Indirectly, the powerful encouragement of good building in suburbs and elsewhere lessens the pressure in slums, and causes the worst even to become unoccupied.

4. Re-housing either directly or indirectly is nearly always an unavoidable adjunct of reform work in streetless and congested areas. Especially so will this be the case in Calcutta. Barrack tenement dwellings appear to be an unavoidable expedient in the reform of backward cities. They produce a high death rate, and should be avoided as much as possible. The best re-housing is usually that accomplished by means of small contiguous family dwellings of one story, built on cheap land in the outskirts.

3. Principles that Govern the Provision of Residential Suburbs, for the Relief of Congestion, and for the Improvement of City Life and Health.

1. Quick transit for passengers between the suburbs and the city main centre and other centres, is a chief absolute necessity. In cities of under two millions this rapid transit depends far more on tramways and motor vehicles, than on railways. Efficient tramway and motor services depend on wide direct main roads.

2. Good street planning and execution, good drainage, water supply, and main thoroughfare work, of all suburbs, must be well in advance of building operations. This is accomplished round nearly all continental cities by means of the "City Building and Extension Regulating Plan,"* and by suitable town-planning powers to enforce it at little or no cost to the city. The city plan and full powers are absolute essentials to any city that desires well-planned suburbs.

3. Suburban regulations to preserve the suburbs as healthy, pleasant, popular, beautiful, and graduated permanent residential areas are vital. Those regulations must be directed chiefly to enforce the following principles :—

(a) Only residential buildings, schools, public buildings, and a limited number of shops should be permitted in a suburb.

(b) Location of each class of building must be defined.

(c) No manufactures, or offensive trades, objectionable undertakings likely to become a nuisance such as sewerage farms, must be permitted to come into existence in or near a suburb so as to injure or alter the character of the suburb.

(d) Special road and street bye-laws are required to obtain successful economical and permanent suburbs. Light cheap construction, but with good width must be the rule for quiet residential roads.

(e) The maximum number of houses per acre must be defined.

(f) Architectural control is an essential to success.

(g) The 'single family dwelling,' whether in separate houses, in pairs (semi-detached), or in blocks of not more than six—is the only successful and desirable form of suburban dwelling throughout the civilized world. Not more than 25 per cent. of the plots should be built over. All houses should have front gardens or space, of at least a fair depth.

(h) The direct development and encouragement of suburban residential building is usually best promoted throughout England and Europe by the systems of Government, Trust, or Municipal loans made to approved building societies with the dividend limitation of five per cent. or thereabouts.

* See that of Milan, in separate exhibit, shewing one of the finest and most comprehensive examples of modern suburban planning in Europe.

4. A City Plan is essential.

In America, Germany, and Italy, the "Official General Plan for Regulating the Building and Extension of the City" is designed in accord with all the above general principles of town planning, and further, with a keen eye to beauty and nobility.

The City Plan usually exhibits a complete civic design covering all un-built on land in a deep zone around the city. The period of future growth, which the plan will regulate and order, is estimated from 20 to 50 years. Germany inclines to 50 years. The Italian Royal decrees, authorizing city plans, usually fix the period at 30 years: before this period runs out, another and still more extensive plan is prepared and sanctioned for a further 30 years. In all continental countries, the City Plans can be modified and re-arranged by special decrees and supplementary acts, after due and satisfactory investigation that such is needful.

The "Plan for Regulating the Building and Extension" of a continental or American city exhibits the whole of the existing internal city plus the outside zone of vacant land for a depth of several miles. The Plan shows all present and future main roads, and frequently all future main streets and ordinary streets. All future suburbs, parks, open spaces, railway and dock alterations or extensions are planned out and clearly defined in detail. In the existing city will be shewn the future new roads to be cut through old congested districts, also all street widenings. On the larger-scale supplementary sanctioned City Plans will b found as a rule, the present or future building lines of every road, street and lane in the whole city.

The writer has secured one of the most excellent examples of modern town planning in all Europe, for the information of the Trust, viz.: the official sanctioned "Plan for Regulating the Building and Extensions of the City of Milan." (See the exhibit.)* This city is the great commercial centre of Italy, and, with its suburbs, the population is rapidily approaching a million. The plan should now be examined. The grey tinted zone shews the splendid planning which has already been accomplished (almost solely by mutual agreement, and at but small capital cost) between 1889 and 1912, under the previous City Regulation Plan. This exhibit is described later in the chapter on 'The City Plan.'

5. Legislation.

The main object of the bulk of continental town-planning legislation is to make the City Plan practicable, and economical of execution. This is the general principle of continental town-planning legislation. In Great Britain prior to 1909, no town-planning Act had ever been in existence: and legislation purely of that nature is thus still in its infancy in this country.

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* Translation of the Chief Engineers' report on the Milan City Plan, of the Royal Decrees relating thereto, and also complete translations of the whole Town-Planning legislative Acts of Italy and Prussia, have also been made for this report, in order to give a clear and practical example of the best Continental methods of obtaining a well-laid-out city at low capital cost.

The English Act of 1909, in its large provisions, is quite inferior to those of Scandinavia, Germany, Switzerland, Italy, and Austria, but the English Act has some good minor provisions : such as giving corporations power to regulate in suburbs the number of houses per acre, without compensation—a little power to preserve the status of suburbs and protect them from injuries by manufactories, etc. But the great main point of the whole city plan, with all interests considered, and the work to be accomplished mostly by mutual agreement without purchase of land except for public places, is but very partially thought out and touched on in the solitary English Act. This piece of legislation is also very slow and complex in its working.

The rest of all town-planning legislation is occupied with street widenings, reformation of slums, re-housing, and housing of the poor; in these minor respects, the English legislation is abreast of the times, and is even better than that possessed by America and several other countries.

The point of all the above is, that adequate Town Planning cannot be accomplished except with the necessary legislation, and such must cover the 'City Plan.'

CURRENT OPINION.

The following extracts give opinions of eminent authorities on various principles of town planning work. They will not of course be new to the Chairman and those members of the Trust who are well-read in town planning literature—but they seemed needful to make the report as useful as possible, and have also been selected as applying rather specially to the elucidation of Calcutta problems. The arrangement of all these items is difficult, owing to their mixed nature—and there is some reiteration—it is almost unavoidable in a town-planning report.

From The Town Planning Conference, 1909.—

Mr. WARWICK DRAPER (Chairman Executive Committee Garden City Association) said :—

"They would remember the story of the judge who, having wakened up, said, with some appearance of truth: 'Mr. So-and-so, you have addressed yourself twelve times to that point.' 'My lord,' said the pleader, 'I thought it was necessary.'"

CURRENT OPINION.

From "PRACTICAL HOUSING," 1910, Councillor J. S. Nettlefold.

"The first principle of Town Planning is to consider beforehand the constituent parts of a modern town, and then to arrange them in such a way that the result shall show an ordered harmony."

From "PRACTICAL HOUSING," Councillor J. S. Nettlefold.

"What Town Planning is meant to do is, firstly, to consider the problem of the town, its present position and requirements, and the

probabilities of its extension, in various directions within some fifty years; and, secondly, to make the best possible provision for present and future development."

RAYMOND UNWIN, in his text book "Town Planning in Practice."

"OF THE CITY SURVEY."

"The designer's first duty, then, must be to study his town, his site, the people, and their requirements. There is no need to fear that such a course will lead to commonplace designs, that it will check the flights of fancy, will subordinate the main effect to trivial convenience. The fancies of the man who can only work when his mind is free from the consideration of conditions are likely to be of little value, while the work of the one who, lacking high flights of genius, is yet able to grasp and provide for the needs of the case, will, at least, be safe and serviceable. In this work we cannot rightly say the practical considerations come before the artistic, or the artistic before the practical; they are interdependent, and must be worked out together. But there is this difference between them, that the practical considerations are often fixed, while the artistic expression may take varying form. Drainage will not run uphill to suit the prettiest plan; nor will people, to please the most imperious designer, go where they do not want to go, or abstain from going where they must needs go, and from taking generally the shortest route to get there. Lines of drainage and of traffic may indeed be modified, but only within fairly narrow limits; and the planner who pits the form of his plan against the forces which define these limits will but wreck his scheme."

"Before any plan for a new town or for a scheme of town development can with prudence be commenced a survey must be made of all existing conditions, and this survey cannot well be too wide or too complete."

"Seebhom Rowntree's survey of York, T. R. Marr's of Manchester, and Charles Booth's great survey of East London may be mentioned as examples of the sociological side of the survey; and, although such an exhaustive study could not always be made, it should be sufficiently thorough to enable maps to be prepared, based on the Ordnance Survey, coloured to indicate such matters as the degree of density of population in the different parts of the town and any insanitary areas, or areas of special poverty; the distribution of residential, business, and manufacturing areas, with such sub-divisions of each as may seem desirable; and the distribution of parks, public and other open spaces, and the extent of each. For examples of such maps refer to Rowntree's or Marr's books, above mentioned."

"In most towns there exists already much material of the nature of an historical survey. In connection with this there should be collected a series of maps, showing as completely as possible the past development of the town; and in addition plans should be prepared showing all public buildings, or places of historic value, general interest or special beauty; while a collection of photographs of these taken from points of view exactly indicated on the plans would have great value."

"There should also be available for the purpose of comparison and suggestion good plans of neighbouring towns and of towns in this country and abroad similarly situated to the one under consideration. The geological maps of the Ordnance Survey will be useful, and any other results of local geological investigations should be collected, together with statistics of wind and weather, from which diagrams showing the climatic conditions could be prepared."

"Where the town to be dealt with is at all a large one, there should also be a careful survey made of general traffic; statistics should be prepared of its distribution and of the relative intensity from different districts of the daily inward and outward flow of population. All existing traffic facilities should be tabulated and their capacities estimated, whether consisting of railways, tramways, water-ways, roads, subways, or bridges, and both proposed and desirable extensions noted, so that proper provision could be made for them in the new plan."

"Particulars of local industries and of those which show signs of increasing would be needed, with the nature of any special requirements, such as their dependence on water or railway frontage, and the area of land required per hundred employees."

"All existing drainage systems and water supplies, with the height and depth to which they are available and their capacity for increased use, should be scheduled."

"Any marked tendencies of town growth should be noted, with the indications afforded by them as to the most natural lines for future development."

"While the need for the survey of economic conditions will be generally acknowledged, it is to be hoped that the equal importance of such a survey as will enable the town planner to preserve the individuality of the town will not be lost sight of."

"To make this survey hardly falls within the province of the town planner. It should be made for him, and may very largely be the result of voluntary work on the part of the citizens, and the results should form the basis of his instructions. These results he must master, to the interpretation of them he must bring his experience and technical skill, and in the light of them he must make his own survey of the site; for no general survey can absolve the town planner from the duty of thoroughly studying the site upon which he is to work. Nor will he, if he approaches the work in the right spirit, have any desire to shirk this part of his duties; for he will regard all the requirements of the community and all the circumstances as togther constituting the kindly hand of necessity, guiding him into the right path. Any one to whom all these needs and conditions are so many irksome restraints preventing him from carrying out his own pet ideas had better leave this class of work alone."

"Having secured all the needful plans and preliminary information and suggestions, the designer will study the site for himself, comparing and cosidering it in connection with the information and suggestions, and judging for himself the relative importance of each point. He will also have to judge how far the various conditions and tendencies brought to his notice are likely to prove permanent and how far they are likely to undergo modification in the future; for although it is the present needs for which

immediate provision must be made, still in town planning, as in building, the work is of a permanent character and will remain through a long future, so that foresight must be combined with the realisation of past tradition."

"As the designer walks over the ground to be planned, he will picture to himself what would be the natural growth of the town or district if left to spread over the area. He will try to realise the direction which the main lines of traffic will inevitably take, which portions of the ground will be attractive for residences, and which will offer inducements for the development of shops, business premises, or industries. As he tramps along there will arise in his imagination a picture of the future community, with its needs and its aims, which will determine for him the most important points; and the main lines of his plan should thus take shape in his mind before ever he comes to put them on paper."

"An existing or probable railway station will at once give focus to the lines of traffic, and may be regarded as a centre from which easy access should be provided to all parts of the town or district, a provision the character of which will be affected by all existing highways or waterways. Existing bridges or points where the conditions are favourable for constructing bridges or subways over or under railways, rivers. or canals will suggest themselves as additional centre points in the system of roads, to which they would naturally converge."

"But while the problem seems to become more and more complicated, it is really solving itself; for every fresh need and every circumstance considered is a new formative agency, determining for the designer the lines of his plan; and his chief aim at first must be to determine and to keep clearly before him the right proportional importance of each and to give it due expression; and only when, on the ground, all these formative influences have been balanced, can the designer safely commence to draw out his design. There will come a stage when the main lines of the plan as determined on the site exist in a flexible condition in his mind, when he feels the need of something more definite. This is the time for his designing genius to seize upon the ductile mass of requirements, conditions, and necessities, and, anchoring itself to the few absolutely fixed points, brushing aside minor obstacles or considerations where necessary, modifying or bowing to the major ones as each case seems to require, to mould the whole into some orderly and beautiful design."

From RAYMOND UNWIN'S "Town Planning in Practice."

"First, the main centre must be determined upon, and the secondary centres selected in proper relation and proportion with it. Then the main framework of roads must be arranged again in proper relation and proportion to the main and subsidiary centres. The main lines of communications, from centre point to centre point, from the main centre to the surrounding suburb, from residential areas to centres of commerce or employment, should all have been provided by this main framework of roads."

H. INIGO TRIGGS, in his text book "Town Planning; Past, Present and Possible."

"The first step to be taken in dealing with city improvements is to endeavour to obtain more continuity of idea and effect in joining together and dealing with the important public centres; they should more often be

linked up and treated as an entire whole, instead of as a number of insignificant units. Then, all our larger towns should formulate schemes for bringing their suburban districts into closer union with the centres; much greater attention should be devoted to suburban extension, and from hygienic reasons every effort should be made to place the buildings farther apart and to make the open spaces more extensive the farther they are removed from the civic centre."

THOMAS H. MAWSON, in his text book on "Civic Art."

"Having once carefully composed the circumference of the subject and located the centre, from which we are to work, we can proceed to consider the relative working of the principles involved."

"Although it would be impossible to tabulate under so many hard-and-fast headings the essential qualities of a modern city, and the relative position of each, the following are the primary desiderata of paramount importance."

"Firstly, circulation, which may be said to represent two-thirds of the anatomy of the subject, having to do with transit facilities, whether above, below or on the earth."

"Secondly, hygiene, which may fittingly be likened to the lungs, sinews and muscles of a city."

"Thirdly, beauty, or the comely external presentment, including the expression, which must always be superimposed on the two first and more practical considerations."

By Professor S. D. ADSHEAD (Professor of Town Planning, University of Liverpool,) and one of the editors of the "Town Planning Review." (At the English Town Planning Conference, December 10th, 1909).—

"The very essence of Town Planning lies in the question of communication; whether a piece of ground lies by rail within ten minutes of the central district or half-an-hour, this fact will, no matter what the actual distance, enormously enhance, or otherwise, the value of that land. Therefore, I consider that at some early stage of development, the whole town and its suburbs should be considered altogether. The point is: How can this come about? We have, first of all, in a town, say, 400,000 inhabitants; we have a borough council, and then probably urban districts surrounding it on one side, and rural districts coming in on another. If the Town Plan is to be properly developed, every one of these councils must work in unanimity one with another, and I hope county councils will not exert that opposition which Mr. Bund rather anticipates."

"Having got your Town Plan covering this wide area, represented by numerous urban district and borough councils, it will next be found that the chief expense will fall on the surrounding urban and rural district councils through whose districts new roads will have to be made; while these roads, it will be contended, will be made probably for the greater benefit of the borough. I can see conflicts there. I can foresee that the roads will fall upon the urban and rural districts to the advantage of the borough who will obtain, or wish to obtain, the wide, fine traffic routes from its centre away out into the far suburbs."*

* The Calcutta Improvement Act foresaw these difficulties and has provided means to overcome them to a large degree.

H. INIGO TRIGGS in "Town Planning; Past, Present and Possible."

THE CIRCULATION OF TRAFFIC.

"The first essential to be considered in laying out the streets of a city should be that they conform readily to the requirements of the principal currents of circulation.

"Nothing is more paramount to the prosperity of a city than free circulation. The larger the area the more imperative it is that there should be ample facilities for the rapid circulation of traffic throughout the whole system of its streets, and in all schemes for street improvement, proper provision must be made not only for local requirements, but also for the through currents of traffic. It is these through currents which scattered improvements so often fail to benefit."

"In laying down, then, an ideal plan for town improvement, there should first be drawn up a comprehensive scheme, involving the production of two or three maps showing what the principal lines of traffic circulation have been at intervals of, say every two generations. A further plan might then be made showing the congested streets as at present, and from this information could be prepared the final scheme, allowing adequate provision for through traffic from point to point, it may be from the railway station to the docks, from one railway terminus to another, or connecting the great markets. These main arteries should be direct, broad, straight, and as far as possiole free from all steep gradients. At the focal points there should be open traffic spaces, and from these, other secondary streets should radiate. Although it is inadvisable to attempt to manufacture the picturesque element, which must be inherent in the site, and cannot be artficially brought about, yet in the planning of new parts or the alteration of existing parts of a city some definite scenic effect should be striven after, with streets having architectural relation to each other, either being focussed to some important centre, or having their vista closed by some monumental building."

From "Practical Housing," 1910, J. S. NETTLEFOLD.

"The provision of main arteries for through traffic is one of the very first considerations of town planners."

By PAUL WATERHOUSE, Warburton Lectures for 1912.

"Every town, however small its beginnings, and however large its developments is the 'subject of its own servants,' I mean its roads."

H. INIGO TRIGGS, in "Town Planning; Past, Present and Possible."

"In an interesting essay on the circulation of traffic in modern towns M. Eugene Henard* lays stress on the fact that a town's prosperity, being the result of the efforts of its inhabitants in all branches of human activity, depends enormously upon the facility with which traffic is able to circulate, and consequently the establishment of a rational system of circulation becomes one of the most powerful factors of public wealth."

* An authority in France on Town Planning.

From RAYMOND UNWIN'S "Town Planning in Practice."

CITY MAIN ROADS, GENERAL.

*"Roads are primarily highways for traffic. They serve also a secondary purpose in affording sites for buildings. They should therefore be considered in relation to both these functions, and in the order of their relative importance. For the roads in a town to satisfy their primary function of highways, they must be so designed as to provide generally for easy access from any point in the town to any other. But they should provide, in addition, special facilities for the ebb and flow of particular tides of traffic, such as that from the outskirts to the centre and back again which daily takes place in most large cities, or that across the town from a residential district to a quarter occupied by works, factories, or other places of employment, or to important railway stations, harbours, and other centres of industry."

By THOMAS H. MAWSON in "Civic Art."

"The most urgent consideration, however, is that of traffic: its character, whether raw material, manufactured goods for the factory, ordinary merchandise in everyday request, vehicular or train traffic, its volume and line of direction, and the points at which it becomes congested."

From "Chicago's Greatest Issue." An Official Plan.

"The easy and convenient movement of traffic facilitates business, while the chief concern of any city is the public health of its citizens,—its greatest asset."

From "Practical Housing," by J. NETTLEFOLD.

"This chapter began by reminding my readers that while the places where town-dwellers' work may be, and probably must be, in clustered districts, where light and air are restricted, yet their dwellings should preferably be on the open outskirts, and therefore we now have to consider how to get the people from their homes to their work and back again."

"For that purpose, the first requirement is wide main thoroughfares, and if forethought is exercised, it is comparatively easy and inexpensive to make these main thoroughfares pleasant and healthful; healthful, because they are wide, and therefore act as long ventiiators for the town, and pleasant as well as healthful, by planting trees, which are most useful, by their property of absorbing noxious gases, as well as being pleasant to the eye."

"In London, the greatest city in the world, the necessity for wide main thoroughfares was not recognised by public opinion until it was too late to provide them, except at overwhelming expense, due to the enormous cost of compensating the owners of the buildings that had to be demolished. In provincial towns it is not yet too late to provide for the wider distribution of our population, because expensive buildings have not yet been erected very far from the centre."

* Underlining by E.P.R. A great many of these extracts might well be underlined, only it would weary by over-emphasis.

*Report of the London Traffic Branch of the Board of Trade, 1908.

"The Importance of Arterial Roads."

"Of all the changes that have taken place in regard to London traffic since the Royal Commission concluded their labours, none is more remarkable than the increased use of the roads leading into the country. It was indeed foreshadowed in their report, but in 1905 it was not the accomplished fact that it has since become. The increase is almost entirely attributable to the growth of mechanical traffic, and is even more marked in vehicles used for commercial purposes than it is in motor cars of the ordinary type. Motor vans for the delivery of goods have come into general use, and are now employed in considerable numbers by carriers and by large dealers in furniture, provisions, and miscellaneous goods. Many of these vans make daily rounds of sixty miles or more, and serve customers in suburban districts at distancss of as much as twenty-five miles from London. The suburban depôts, from which goods were formerly distributed, have been, or are being, given up, and goods are now dispatched direct from the central warehouses to their destinations. Mails are sent by road to places as far distant as Brighton, Dover, Ramsgate, and Ipswich, and new uses for motor vans have lately been found in the conveyance of fruit from the farms to Covent Garden, and in the distribution of parcels."

"Motor traffic of all kinds shows every sign of becoming much larger in volume than it is at present, and new applications of mechanical traction to the conveyance of passengers and goods will almost certainly be found in the near future. Not for this reason alone is the importance of the roads so great. If the radiating roads were wider and more numerous than they are, tramways might be largely extended, and there is no reason except the insufficiency of road accommodation why a large proportion of suburban passenger traffic within eight or ten miles of the centre of London should not be carried by tramway and new districts should not be opened out. The speed which electric tramcars might safely attain on wide roads is little less than the average speed of suburban railway trains, and the cost of tramways is comparatively so small that they could carry passengers profitably at fares which railways could not afford to charge. There is as yet no visible prospect of the supersession of tramways by motor vehicles, but mechanical traction is making rapid progress, and unsuspected developments may easily take place, so that in any case the demand for wide and numerous roads is certain to be great whatever means of locomotion may ultimately prevail."

"Moreover, the housing problem is inseparably connected with locomotion, and from this, as from every other point of vtew, the question of the roads is of paramount importance and urgency. Every year that passes makes it more difficult to deal with, and adds to the cost which must ultimately fall upon the community. It is not that road widening and construction on a great scale need be entered upon at once. All that is required for the moment is that the subject should be thoroughly investigated, and measures taken without loss of time to arrest the further growth of new buildings and other obstacles to the construction and widening of roads which will be required in the future. But the requirements must be ascertained before measures can be taken to satisfy them, and the first and indispensable step towards securing this end is an enquiry followed by the preparation of a plan."

* [Included in the Exhibits accompanying this Report. E.P.R.]

* REPORT OF THE ROYAL COMMISSION ON LONDON TRAFFIC, 1905.

"FUNDAMENTAL DIFFICULTY IN THE WAY OF IMPROVING THE MEANS OF LOCOMOTION IN LONDON."

"The chief difficulty that stands in the way of improving the means of locomotion in London is the narrowness of the streets, and the fact that they were not originally laid out on any general plan. If the streets were of sufficient width and had been laid out on a regular plan, the congestion of vehicular traffic would practically disappear."

† MULFORD ROBINSON in his text book on "Width and Arrangement of Streets."

". . . all traffic streets have this much in common: they exist primarily to carry traffic and may be said to constitute the framework of the city. Their planning, as a class, should be prior to that of the minor streets; they should be, as we shall see in another chapter, direct, broad and of easy gradient, desirably also in many cases long and radial. Their function, as regards the travel they accommodate, is to shorten time between foci—commonly between the centre of the city and its outer zones. They are designed to do this by facilitating rapidity of movement and shortening distance."

By H. INIGO TRIGGS in "Town Planning; Past, Present and Possible."

"The filling in of secondary roads to the main network of thoroughfares should be aproximately rectangular, because the rectangle is the most convenient form of building block, and for the actual traffic requirement the diagonal system can always be resorted to. The radial form of arrangement is advisable for important focal points; town gateways, railway stations, the approaches to bridges and similar situations."

By MULFORD ROBINSON in "Width and Arrangement of Streets."

"1. That the primary purpose of such highways is to make it possible for the travel upon them to move safely and easily, swiftly and inexpensively."

"2. That the whole history of transportation has heen marked by a gradual increase in the size of the transportating unit, so that it behoves us to be generous in the provision of space."

"3. That as the travel upon such thoroughfares will be human travel, for the most part the daily ebb and flow of the tide between home and work, it will be well to make these streets, as far as practicable, pleasant ways of going."

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* [Included in the Exhibits accompanying this Report. E.P.R.]

† Mr. Mulford Robinson, author of "The Improvement of Towns and Cities," "Modern Civic Art," "The Call of The City," etc., is an eminent American authority on Town Planning. E.P.R.

"With these considerations in mind, the statement may be repeated that it probably is advisable to make all main highways wide enough to carry a double-track surface railroad,* and it is desirable that they offer the opportunity to put this on a distinct right-of-way. As a city grows, the tendency is to utilize all streets of this character for rapid transit, and to recognize this in the platting† is simply a commonsense look ahead. Track gauges differ somewhat, but in order to provide the right-of-way, it would be necessary as a rule to be able to set apart a strip at least twenty feet wide. The separate right-of-way though it may not always be granted, is desirable because it permits a quick movement of cars, and makes their operation possible at the minimum of danger and discomfort to other traffic. This acceleration of the street car movement is a matter of economic concern to the community, because it widens the zone of available residence for the city's workers, and, in doing this, gives market ability to increased areas of land for home sites."

"In any case, it must be foreseen that the traffic will grow faster than the city grows, and it will seem that to provide for two uninterrupted lines of travel in each direction, one for slowly moving and one for swiftly moving vehicles, would be generally a minimum for such main streets as are under consideration."‡

ROYAL COMMISSION ON LONDON TRAFFIC, 1905.

"BRIEF ACCOUNT OF MEASURES ADOPTED IN THE PAST FOR FACILITATING LOCOMOTION IN LONDON."

"The narrowness of the streets in some parts of London and the amount of traffic make it inexpedient to place tramways in them. As a consequence the tramway system of London is very imperfect; through communication by tramways cannot be provided, and termini are often placed in crowded streets, a most undesirable practice, which causes great congestion at particular hours, materially limits the carrying capacity of the tramways, and gives rise to serious risk of accident to persons and vehicles. There is no through communication by tramway between the north and south of Thames, or between the tramway systems of the east and west."

By MULFORD ROBINSON in "Width and Arrangement of Streets."

"To be practical, town-planning projects must be reasonable and considerate of all proper interests."

[Tramways] † Designing, plotting.

"‡ The author is aware that a report recently brought out, under the auspices of the Society of Technical Superior Officers of German Cities, expresses the opinion that very broad carriage ways do not appreciably distribute the traffic, even when the traffic is heavy. In proof of this it states that the traffic keeps its accustomed tracks, as shewn by the wearing down of strips of roadway surface, while the pavement between these tracks remains little used. With due deference to the source of this report, it should be pointed out that the finding is not, as a matter of fact, adverse to the value of broad carriage ways. The "little use" of "the pavement between"—by which one vehicle gets past another, on occasion—may make the whole difference between the efficiency and congestion of a highway. But it is true, that if the increase of width be not enough for another vehicle plus its clearance, the addition is not worth much. For example, five feet might be added to the width of a congested roadway without appreciably relieving the situation, since this space is insufficient to allow a vehicle to get by, or to accommodate an additional line of vehicles."

By MULFORD ROBINSON in "Width and Arrangement of Streets."

"The benefits which are sought by a scientific re-planning of cities and towns are, broadly, threefold. They lie in a bettering of those circulatory problems that have been created by indirect streets and congested traffic; in the improvement of social conditions in many directions; and in increasing the visible beauty and splendour of cities. Gains are anticipated in economy and efficiency, in comfort, and in looks."

By MULFORD ROBINSON in "Width and Arrangement of Streets."

"The re-planning of cities and towns, or their careful planning at the start, and the comprehensive platting of their outlying sections are concerned with all such conditions. For these plans have to do with the urban framework, as this is made up of streets and avenues and open spaces of one sort and another. They may be said to treat of the skeleton of the city, of that which gives to the city its constructional form; and they are expected to be determined by the needs not of districts only, but of the community as a whole. These plans have little to do with details, such as bill-boards, pavements, etc., but are intimately concerned, as has been already suggested, with the convenience of the streets for traffic purposes, with the proper location, and if possible the grouping, of public buildings, with the development of neighbourhood centres which shall become a moral and social force, with the location of parks and their accessibility to those who most need them, with economical housing, and with the attractive development of residential and suburban tracts."

From "Chicago's Greatest Issue. An Official Plan."

PARIS.

"The first real planning for a city* had its origin in Paris under Louis XIV, about 1700 A.D. In various commercial aspects Paris is a great deal like Chicago, being built upon a fertile plain extending indefinitely back from the Seine as the plain of Chicago extends from Lake Michigan. The cities are alike, too, in their great supply of building material, as well as in the breadth of landscape."

"†Paris in the day of Louis XIV was a crowded, congested city, but the architects selected by the great French king, foresaw the development of the splendid city now existing. They, therefore, went outside the walls of the compact city and laid out the plans upon which Paris has been built. The Madeleine, the Place de la Concorde, the great axial avenue from the garden of the Tuileries to the Place de L'Etoile—all existed on paper, decades before they were finally realized in the building of the city."

"The lesson for Chicago in this is that, as Paris increased in size, it grew according to a well-devised and symmetrical plan; and that the greater portion of the convenience, impressiveness and beauty of modern Paris was attained at no money cost whatever. Good sense and foresight made up the only price paid. It remains only to point out that Chicago has a similar opportunity to-day, and to show its citizens wherein that opportunity can be grasped."

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* [For more modern needs.—Many Greek, Roman and Mediæval Cities were of course very finely planned. E.P.R.]

† [Do not miss the plans in the splendid and instructive folio of Paris Improvement Works—1789 to 1889—included in the exhibits sent out with this report.]

"Modern Paris is largely a creation from the mind of Georges Eugene Haussmann, who became prefect of the Seine in 1853, after successful work in other French cities. His work tended toward providing adequate circulation of traffic within the old city, effected by cutting new streets and widening old ones, by sweeping away unwholesome rookeries* and opening up great spaces to disengage monuments of beauty and historic interest. He grouped the railway stations about the centre of the city, and opened up fine avenues of approach to them. He cut new streets wherever necessary, taking special care to create diagonal thoroughfares to shorten distances for all traffic. Haussmann is acclaimed by all the world as the greatest city builder of all time."

"The Plan of Chicago is a striking duplicate in many of its features of the lifework of Baron Haussmann. He worked to overcome for the people intolerable conditions which arose from the rapid increase in population. The Chicago Plan has the same general aim. When Haussmann began, Paris had half a million population. He left Paris working under a complete plan by which the city may be extended for a century without losing any of its convenience, healthfulness or other great metropolitan qualities. Haussmann's theory was that money thus spent made a better city, and that a better city was a greater producer of wealth. Experience has proven his theory right."

London.

"Now let us consider the experience of London in proceeding, as Chicago has so far proceeded, without any definite plan of growth. London, after the great fire of 1666, had a greater opportunity to build a city of convenience, economy and wealth-producing and conserving capacity, than ever was presented to Paris. And the occasion brought forth the man to bestow the great boon of good order upon the British capital in the person of Sir Christopher Wren, one of the world's greatest architects. Sir Christopher's plans contemplated a city with streets radiating from central points, with locations for public buildings at the end of long and pleasing vistas. These ideas, fixed on paper years before the French even conceived the plan of orderly development of Paris, were cast aside because of the perverse and stolid self-interest of some of the then citizens of London. The rebuilt London grew, haphazard, careless and contented, until the English people awoke in the latter half of the last century to find themselves facing expenditures of hundreds of millions of dollars to produce in their city the conditions necessary to the financial, physical and moral welfare of London's multitudes."

"In 1855, under the spur of Baron Haussmann's activity in Paris, the Londoners began to attempt to repair the errors of their city's past. To secure a small part of that which Paris had secured for nothing but exercise of foresight, they have undertaken project after project. Up to 1900 they spent $100,000,000 on these public works. Various commissions are at work on park and boulevard plans. London will spend millions upon

* Slums.

millions of money. Among the projects decided upon* is that of cutting through two great thoroughfares at a cost of $125,000,000 for land damages alone."

"The greatest experts in the United Kingdom, considering the condition of the people of London, gauging with truth the moral future of London's people, considering scientifically their future physical needs, hold it essential to the city's future that thus she must relieve herself of the burden and pressure of her increasing millions of population if the city's civilization is to be maintained."

London is widening and straightening her streets. To do it she is appropriating frontage that costs twice as much as it would have cost a few years ago. London must do these things regardless of money cost, agree the learned men, the publicists and the merchants of the world's greatest city, or by congestion of her streets and building areas be halted in her growth and progress, and eventually forced to decay and degeneracy."

WASHINGTON.

"In America the best example of a well-planned city lies in our national capital—Washington.† That city illustrates for us the success of wise provision for the future of a city. Washington was planned and founded as the capital of our nation, and it is of great sentimental interest to us to-day that the immortal Washington‡ himself had a large part in laying the plan which had made Washington a city of surpassing convenience and beauty."

"Under the direction of President Washington, and under his supervision, Peter Charles L'Enfant, a young French engineer, deliberately drew the plan of an entirely new capital city, designed to accommodate a population one-third greater than that of Paris of that date. Upon a rectilinear street system L'Enfant imposed a system of diagonal avenues of stately width converging upon focal points, designed as the location of important public buildings, statues or monuments commemorating historic events."

"This magnificent plan, designed for an area which then consisted of wide swamps and wooded hills, became the laughing-stock alike of foreign traveller and American citizen. But fortunately the plans were laid deep, the lands necessary for avenues, streets and parks were donated, and although the development of the city for three-quarters of a century was slow, we have to-day as result of the planning a stately and beautiful city instead of a straggling and ill-kept one. Washington has outgrown its original plan, but its spirit was maintained, and to-day works to cost $50,000,000 [£10,500,000] are in progress and strengthening the general scheme of L'Enfant."

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* [It was proposed by the Royal Commission in 1905. Nothing whatever has been done. The London reports are included in the Exhibits and are deeply instructive reading on the evil of having no City Plan. E.P.R.]

† See folio of City Maps (American selection). The design of this city bears strongly on the proposed scheme for Calcutta.

‡ Washington was by profession a civil engineer and surveyor.

Chicago.

From "Chicago's Greatest Issue. An Official Plan."

"In this great forward urge for orderly development of American cities, therefore, it is not to be expected that Chicago with her proud record of achievement, will stand still in the presence of her opportunities. The movement for better civic conditions is on throughout the world. The stirrings of the new impulse will not die out without accomplishment of the possibilities that lie before Chicago. The history of cities, both ancient and modern, has taught Chicago that its way to continued greatness and increased prosperity lies in making the city convenient and healthful for the ever-increasing numbers of its citizens."*

Royal Commission, London Traffic, 1905.

"Fundamental Difficulty in the Way of Improving the Means of Locomotion in London."

"It may be admitted that the wants of London as they exist in the present day could not, under any circmstances, have been completely foreseen in the past: but, in the absence of a powerful and enlightened authority controlling the whole area, private interests, and the rivalry and prejudice of public bodies, were allowed to stand in the way of Improvements that were obviously desirable, and that could have been effected at moderate cost and with a minimum of inconvenience to the public. The rejection of the plans of Sir Christopher Wren and Sir John Evelyn for the rebuilding of the City of London after the great fire bears witness, as was observed by the Royal Commission appointed in 1842, 'to the difficulty of effecting great and systematic changes in such a Metropolis' as London."

"When the question of improving the streets of London was taken in hand in the last century, the attention of the authorities was devoted to the removal of particular evils which could no longer be overlooked, rather than to the adoption of a comprehensive plan which would provide both for immediate and future wants. Even the streets that have been improved in comparatively recent times, are, as a rule, of insufficient width, and important thoroughfares are often narrower at one point than another."

Royal Commission, London Traffic, 1905.

"Brief Account of Measures adopted in the past for Facilitating Locomotion in London."

"Your Committee find that the requirements of the existing traffic of the Metropolis far exceed the present facilities provided for it; that the rapid increase of that traffic is constantly adding to the amount of inconvenience and loss thus caused that, enormous as the increase has been, it is and must continue to be kept seriously in check by the want of means for its natural expansion; and that it has become indispensable to make provision in this respect for the future on a great and comprehensive scale, and with the least possible delay."

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*This all applies forcibly to Calcutta, the greatest city of the East.

From "The Town Planning Review," July, 1911.

("Birmingham City Extension and Town Planning," by Councillor J. S. NETTLEFOLD, Chairman of the National Housing Council.)

"The success of town planning in this country depends upon :—

1. Complete co-operation between all concerned in the provision and supervision of housing accommodation. Neighbouring landowners must work together for their mutual benefit, instead of injuring each other as has so often been the case in the past ; the local authorities must recognise the fact that working men will not get, at the old rents, houses surrounded by gardens, allotments, playgrounds, and playing fields without charge to the ratepayers unless the old official bye-law methods are superseded by business-like give-and-take agreements between progressive landowners and enlightened public bodies."

"2. The next essential to success is foresight in the provision of better communications by road, rail, tram, and water, so as to bring more land in the market for building and other purposes. This will benefit the land-owning class as a whole, as well as the community. The price of undeveloped land now immediately adjacent to the limits of existing building will go down, but the price of other land farther out will go up, and the amount of land increased in value should considerably exceed that which is diminished in value."

"In order to protect the amenities of undeveloped districts, they must not be opened up by roads and trams until a town-planning scheme has been approved prescribing the number of houses per acre, open spaces, &c. And last, but not least, the pockets of the ratepayers must be protected by advance purchases of sites for schools, baths, allotments and other public purposes."

From RAYMOND UNWIN'S "Town Planning in Practice."

"In a large town there may be several existing stations, and, therefore, several such focal points to be considered ; often there will be a probability of new stations being required, and if so, suitable positions should be provided for them. It should be within the power of the town to secure that any future railway* falls in with such provision, and carries out its work in such a way as to complete the arrangement intended."

By H. INIGO TRIGGS in "Town Planning ; Past, Present and Future."

"At Cleveland, Ohio, a magnificent plan has been devised for grouping the principal public buildings. The city is singularly fortunate in that new public buildings for the government, the county, and the municipality were required at the same time, making a union of the various interests practicable as well as desirable. Like Washington, the city is also fortunate in that the railway companies are willing to work in harmony with the general plan."

* [Dock or Shipping project. E.P.R.]

ROYAL COMMISSION, LONDON TRAFFIC, 1905.

FUNDAMENTAL DIFFICULTY IN THE WAY OF IMPROVING THE MEANS OF LOCOMOTION IN LONDON.

"We give this as our opinion, because we consider that the merit of the street improvements of London, in regard as well to their utility and beauty as to the economy and convenience with which they can be carried out, must greatly depend upon their being executed with one intention, and as part of one well-considered scheme; and because we see no security for this, as they are left to originate with different Railway Companies, according as they may spring up, and without any other supervision than that supplied by Parliamentary Committees."

From "Practical Housing," by J. S. NETTLEFOLD.

"The economic soundness of town planning is due to the fact that union is strength, and division spells disaster. Here in England we are all at sixes and sevens, without foresight and without any attempt at general control of town development, whereas there is no business in which comprehensive control is more essential to success.

From "Chicago's Greatest Issue. An Official Plan."

"It is as necessary to build a city in accordance with a well laid out plan as it is in building a house, or in having a model for the making of a garment."

"In the twenty-five years ending with 1906 more than $222,000,000* of the taxpayers'† money were spent for extraordinary betterments and improvements. This colossal item affords startling evidence of what might have been accomplished toward the realization of a plan such as we are urging, had the city adopted an official plan a generation ago."

ROYAL COMMISSION, LONDON TRAFFIC, 1905.

IPROVEMENT OF THE MEANS OF LOCOMOTION AND TRANSPORT NECESSARY IN LONDON.

"We proceed to consider the first of the two questions upon which we have been directed by your Majesty to report: "As to the measures which the Commission deem most effectual for the improvement of the means of locomotion and transport in London by the development and inter-connexion of railways and tramways on, or below, the surface; by increasing the facilities for other forms of mechanical locomotion; by better provision for the organization and regulation of vehicular and pedestrian traffic, or otherwise

* £50,000,000 = Lakhs 7,500. † Chicago's taxpayers.

"The evils to be met are undoubtedly becoming more serious every year. There is great delay and congestion in the vehicular traffic inside London, and great difficulty in conveying passenger traffic each morning and evening into and out of the Metropolis. The population is becoming larger, and the number of those who live outside and come into London daily for their work is increasing, and will tend still more to increase, unless the natural movement from crowded centres to the more open country side, so desirable for economic and sanitary reasons, is arrested for want of facilities for locomotion. It is not only mitigation of the existing evils that is needed, but provision to meet the growing wants of the future and prevent a repetition of the mistakes that have been made in the past."*

"If consideration of money could be disregarded it would be easy to apply the remedy at once, by taking in hand a vast scheme for re-modelling the congested parts of the Metropolis—wide thoroughfares to connect all parts of London—tramways on a very large scale on widened thoroughfares—railways underground radiating in all directions into the country, and there meeting lines which should distribute passengers throughout the adjoining areas."

"These measures supplemented by strict regulations in regard to all future buildings would solve the problem, and there is no physical obstacle that could not be easily overcome by engineering skill: the difficulty is simply one of money."

"There can be no doubt that the cost of all improvements in London must be very heavy, even when land is comparatively cheap; in some districts, where the value of land is enormous, the cost is almost prohibitive."

By H. Inigo Triggs in "Town Planning; Past, Present and Future."

"Washington† has adopted an elaborate and comprehensive plan, prepared by a commission of experts, which will require many years for its completion and an enormous expenditure. A report recently published deals with the improvement and development of the city and suburbs by laying out the whole upon a large and comprehensive scale."

Report of the London Traffic Branch of the Board of Trade, 1908.

"Necessity for a Comprehensive Plan of Street and Road Improvement."

"Unlike foreign cities, which have been remodelled and developed upon well defined lines, the improvement of London, like its growth, has proceeded in accordance with no preconceived design. On this point the Royal Commission express their agreement with the suggestion of the Advisory Board of Engineers 'that street improvements should be under-

* [Applies exactly to present Calcutta conditions. E.P.R.]

† [Note this is the second City Plan for Washington. E.P.R.]

taken in conformity with a carefully considered plan, designed to meet the requirements of through traffic, which may be carried out over a long series of years.' The progress of a work of such magnitude, entailing as it does the expenditure of enormous sums of money, must neccessarily be slow. Moreover, no plan could be made either now or at any future time which could be regarded as definite and final. 'It stands to reason,' the Commission say, "that any plans, however skilfully devised, which aim at taking effect over a long period of time, may in some degree require modification in the light of experience, or owing to changes of conditions; the point is to secure that, in future, new streets shall be constructed and improvements in old streets shall be effected, not haphazard and piecemeal as hitherto, but in relation to the general needs of London, and in pursuance, so far as possible, of a fixed policy, which should be followed with persistent effort over a great length of time."

"These observations all point to the necessity of a plan which, as the Royal Commission remark, 'must of necessity involve prolonged and minute enquiry.' Nothing, however, has so far been done to prepare a general plan for future guidance.* Mr. Riley, the Superintending Architect of the London County Council, who appeared as a witness before the Royal Commission, has supplemented the evidence which he gave in 1903, with a memorandum, which is included in the Appendix. In regard to the preparation of a plan, he states that 'the need for steps to be taken in this direction is urgent, in order to prevent the creation of further obstacles to the future widening of existing streets, and to ensure that new streets may be laid out so as to co-ordinate with a general scheme.' Objections to such a plan have been raised on the ground that it would afford information which might lead to the creation of new interests, giving a fictitious and inflated value to properties that would have to be taken in the execution of improvements. Though the danger is not to be disregarded, means could doubtless be found to meet it, and it is hardly one that could be held to outweigh the advantages which have been found by experience to attend the embodiment of a comprehensive scheme of improvement in a well considered plan."

"Mr. Riley raises a further question as to who should be responsible for the preparation of a plan of this kind, and suggests that the duty would naturally devolve on the London County Council, The suggestion is one to which exception can hardly be taken. The Royal Commission expressed the opinion that the preparation of a comprehensive plan 'must be undertaken by those responsible for the work.' So far as the Administrative County of London is concerned, the London County Council alone possess the necessary equipment, whether in regard to their familarity with the needs and conditions of London, or to their command of an efficient staff of highly qualified officers. There is, moreover, the consideration that it would fall to them to carry out the work and to provide the necessary funds. No other body could approach the task with an equal hope of producing a plan which would either meet the necessities of the case, or command such a measure of assent as would ensure its being carried into execution. The County Council would doubtless, as suggested by Mr. Riley, consult the Metropolitan Local Authorities in the course of the enquiry which must precede the actual work of planning."

* [No plan has so far been prepared (1913) E.P.R.]

"In outer London the adoption of a definite policy in regard both to thoroughfares for through traffic and to the orderly development of building areas is, if possible, even more urgent than it is in the Administrative County, and in this case also the indispensable preliminary to improvement is a plan."

From "Practical Housing," by J. S. NETTLEFOLD.

"At present I would only remind my readers that each succeeding year new streets are being made and new buildings are being erected on the outskirts of every town that has the slightest pretension to prosperity. It is our business* to see that these town extensions are properly carried out, and the attempts already made in this direction, although very meagre compared with those in other civilised countries, owing to the absence of town-planning legislation, are yet sufficient to supply us with many valuable lessons as to how best to set out about our task in this country."

T. C. HORSFALL† in "Town Planning in Theory and Practice."

"The Scandinavian countries had already got town planning, and so had Switzerland, so had Holland and Belgium, Italy and Austria, and indeed all civilised countries except England, the United States, and France. Indeed France had town planning de facto, though not by virtue of such laws as existed in other countries. Paris had a splendid arrangement of wide streets. But the improvement of French towns, owing to the want of such laws, had been found to be so extremely costly that there was now a group of Members of Parliament who were pressing for the passing of a law which would give them the same powers of planning new parts of towns which German and other towns possessed. America had carried out town-planning to a certain extent, with that marvellous expenditure of energy and money which one expects from our American relations; and the arrangement of their parks and the way they connected them with each other by wide boulevards, was the admiration of all town authorities in Germany, which was pre-eminently the land of town critics. The inspection of a plan prepared for a small German town would show that the area for which the plan has been made exceeds by many times the area occupied by the existing town. Prussia deals with the matter in this way. It has an Act which is known as the Lines Act, July, 1875, 'The Street-lines and Building-lines for the making and alteration of streets and squares in towns and country places are to be decided on, in accordance with the public needs, by the Executive part of the Municipal Government in conjunction with the community or the Elected Members of the Municipal Goverment, subject to the agreement of the Local Police Authority. The Local Police Authority can demand the fixing of such lines, if this be needed for police reasons, of which the Authority is to judge.' Now this is the all-important part of the Act, which comes in paragraph 2.: 'Lines can be fixed for single streets and parts of streets; or, to meet the foreseen needs of the near future, can be laid down by means of building plans for larger areas.'"

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* [In Great Britain. E.P.R.]

† [Mr. T. C. Horsfall, author of "The Example of Germany," is one of the most eminent authorities in Great Britain on Housing and Town Planning. The recent English awakening owes much to his efforts and to his celebrated book published some ten years ago. E.P.R.]

"That phrase 'The foreseen needs of the near future,' is held in nearly all the German towns to mean the foreseen needs of the next twenty or thirty years. The town council prepared plans for very large areas. The last public plan, for instance of the town of Dusseldorf related to an area of nine square miles and it will be many years before that area will be filled with buildings. People in Berlin, a city which is getting closed in by surrounding towns, were now agitating for the laying out of a general plan for an area of twenty miles from the centre. They desire that all the main thoroughfares shall be fixed now, and that the details as to the filling up of the intervening areas shall be left for the future, and for the separate municipal authorities. They see that unless the area is to suffer they must have the main lines laid down at once. That law has not worked satisfactorily everywhere. It has given the town councils power to divide their towns into zones, into separate districts: manufacturing districts, residential districts, and districts of different kinds. In the town they try to keep the buildings low in those areas over which the prevailing wind has to pass in reaching the older parts of the town. But they have made the mistake of having all their roads in many towns far too wide, and these wide, expensive roads have led to the building of very tall houses. But now housing reformers in Germany see that they must have more houses of the English type. The two-storey house of England is as much admired by German housing reformers as the town planning of the German towns is by English housing reformers. The experience of Germany had led them to the conviction they must have narrower streets, and lower, and therefore cheaper houses. But what they are sure of is that they were perfectly right in securing an abundance of shrubberies and plenty of trees for their towns, and they desire to have even more of those good things."

"The Saxony Government in 1900 profited by the experience of the rest of Germany, and passed what is regarded as the best housing law in the world. You may find it convenient to consult the text of the most important parts of that Saxony law, which is given in a small book, 'The Example of Germany,' published by our Manchester Citizens' Association. It cost the Association 1s. 4½d. a copy, but they sold it for 1s." *

"He would say a word about the drafting of Bills. The Prussian Government means to have a greatly improved Housing Bill, and published a draft of its Bill two years ago and sent it to all those people who were most competent to form an opinion as to the proposals in the draft for their opinion. The Saxony Government did the same thing. They consulted all the engineers and all the architects in Saxony and modified their draft in accordance with the advice of those bodies, with the result that the Saxony law, though it dealt with highly controversial matters, was passed by a unanimous vote, first of the Lower and then of the Upper House. Why, on the contrary, should the English Government spring legislation of this great importance upon a startled community as they had? Why should we not have the text of the Government measure before us for our consideration? It seemed to him a dreadful mistake to bring either an Education Bill or a Housing Bill suddenly before a House of Commons, where you had what really you might regard as the fighting cocks of the nation—men who held that it

* [Now unfortunately out of print, but a number of extracts are given in the Honsing Chapters of this report. E.P.R.]

was their duty either to oppose or support. Let the Government get the opinion first of all of experts, of men in that room, for instance, and then modify their proposals so as to remove really justifiable objectons, and, then they might hope to be less set by the ears by abortive legislation, than they had been in the past.

"He would call their attention to the very important provisions of the building laws for Swedish towns passed in 1874. He believed there were many English people who would rather learn from Swedes than from Germans.* Section 9, of this very important law for every Swedish town says: 'For every town there shall be prepared a plan for the regulation of its general arrangements and of the buildings within it. The plan shall regulate not only the buildings but the streets, the markets, and other public places . . . . No building must take place in a town which contravenes the regulations of the existing plan, nor shall a town be extended into a district for which no building plan has been prepared.'"

"Then there is a provision in Section 4 for preparing a plan directly people want to build in a new district. Section 11:—'The town shall be carefully drawn on the scale of one-two-thousandth part of the actual dimensions. On the plan, or on a supplementary plan, particulars of the height and slope of all the parts of the ground shall be indicated by the use of appropriate means. The plan shall be accompanied by the necessary explanations,' and a copy of the plan and of the explanations must be sent to the Home Officer for preservation there. 'The town plan must be so prepared as to ensure, as far as as possible, that the requirements of traffic, in respect of ample space and convenience shall be supplied; that the light and air needed for health be provided, that the danger from fire shall be guarded against and that there should be the open spaces, the variety of construction and the beauty necessary for aesthetic reasons. For this purpose care must be taken amongst other things, that streets shall be wide and shall run in the directions most suitable for traffic; that large and suitable sites shall be provided for markets, harbours, and other places where there will be much traffic.' Then there is this: 'Wide promenades or boulevards, with shrubberies in the middle and roadways on each side or with other suitable arrangements, shall traverse the town, if possible in various places and in different directions.' Then this is important, 'Within a period of, at the latest, two years from the coming into force of this law there shall be prepared for every town in the kingdom a statement showing what parts of the district for which a plan has been prepared it is intended, in accordance with this law, to incorporate as a district of the town. The said statement shall, within the period stated, be submitted to the King for approval, together with a plan of the town, which must show clearly both the boundaries of the districts, and the degrees in which the various districts are covered with buildings.'"

* [We can also learn much from our old friends the Italians—who have had very perfect town-planning legislation in active use since 1865, and whose towns and cities are still the most beautiful of the whole world.—E.P.R.]

ROYAL COMMISSION ON LONDON TRAFFIC, 1905.

"MAGNITUDE AND IMPORTANCE OF THE PROBLEMS OF LOCOMOTION IN LONDON."

"One of the most important features of the problem of London locomotion is the movement of the population from the suburbs towards the centre every morning and back again in the afternoon and evening, so that, in any general examination of the means of locomotion and transport required to meet the wants of the public, the area taken into consideration must include the districts in which persons dwell, who, for the purpose of their work or business, move every day into and out of the central portions of the metropolis, and must be wider than that contained in the Administrative County of London."

NETTLEFOLD ON "PRACTICAL HOUSING," 1910.

"Those who put their faith in better and cheaper trams and trains for the complete solution of the Housing problem must have gone about with their eyes shut. One beautiful country district after another has been utterly ruined by this boasted panacea. True, we want good means of communication, in order to make it possible to spread the people out, but experience has abundantly shewn that without town planning this spreading out process will be carried out most unsatisfactorily. The rapid strides made in recent years by those concerned in the business of carrying people about has rendered town planning a desperately urgent question."

From RAYMOND UNWIN'S "TOWN PLANNING IN PRACTICE."

"Between site planning and town planning there is no line of demarcation, and the main principles which govern the one would also apply to the other; but there is none the less a considerble difference between the two, and it is convenient to treat them separately, because in site planning the first consideration will be the the arrangement of the buildings and the development of the site to the best advantage, whereas in town planning the first consideration must be the general convenience of the town, and the arrangement of the main roads. When the main roads have been laid down and the main traffic requirements have been provided for, the spaces left between these through roads can be developed more from the point of view of making the best of the sites for the buildings, and less from the point of view of public convenience."

From the REPORT OF THE COMMITTEE OF BIRMINGHAM CITY COUNCIL, ON HOUSING, 1906.

"The creation of new congested districts without the necessaries of healthy life now going on in large cities* can only be prevented so far as our city is concerned by obtaining power to forbid the erection of any new buildings except in accordance with a general plan for developing

* [Of England.]

all uncovered land within the city boundaries. For the preparation of this plan a special committee should be appointed, consisting of reprentatives from the Public Works, Health, Baths and Parks, Tramways, and Housing Committees, together with an Architect, Builder, Medical Man, Lawyer, *Surveyor and Estate Agent to be co-opted by the Council for their special knowledge of housing requirements and land development. This committee would in preparing such a plan, allow for the proper laying out of the undeveloped areas, and report their recommendations to the Council with regard thereto. The working of the town extension plan scheme † has already been described in your committee's report of October 24th, 1905, and is further explained in the information accompanying this report, more especially in the extracts from 'The Preparation and Execution of Official Building Plans,' by A. Abendroth."

Nettlefold on "Practical Housing."

(Of the City Plan.)

"1. 'Too late' is perhaps the most usual criticism; it is certainly the weakest. So far as existing towns are concerned, it is very difficult and expensive, although by no means impossible, to apply the principles of town planning, but the rapid extension of most large towns make the time very opportune for dealing with our suburbs."

"With patience and perseverance, town planning could effect great improvements in what already exists by drawing up a general plan of the alterations required, and obliging all future demolition and building to conform to it. This would entail many years of careful work, but would bring its own reward in time."

"No doubt it was the croakers saying 'too late' who prevented the execution of Sir Christopher Wren's great town plan for London, made in 1668 after the great fire. This was the great chance which came to London for creating grand thoroughfares—a chance which improved means of communication are now giving in a different way to our provincial towns. The missing of that great opportunity more than 200 years ago has cost Londoners collectively untold health and wealth and time. This wanton waste has become so familiar, that we are only slowly realising that it is entirely unnecessary, and ought to be avoided."

"Foresight and courage might have prevented a great deal of the extravagant congestion of traffic from which London still suffers, in spite of all the remedies applied."

"Sir Christopher Wren's plan of reconstruction 'to remedy the deformity and inconveniences of the old town' anticipated many of the ideas of present-day town planners. There were to be streets of three widths. The Exchange was to stand free in the middle of a piazza, and to be the centre of the town, from which the sixty-feet streets were to radiate

* [Borough Engineers are commonly called Borough Surveyors (an old title) in the Midlands. E.P.R.]

† [On the Continent.—E.P.R.]

to all the principal parts, the buildings to be contrived after the style of the old Roman forum, with double porticos, 'all churchyards, gardens, and unnecessary vacuities, and all trades that use great fires or yield noisome smells to be placed out of the town.'"

"I do not suggest that this plan would meet all modern requirements, but it is infinitely superior to what was done, and is a striking example of a great opportunity lost."

From "Gaining Public Support, etc.," by CHARLES H. WACKER.

"IMPORTANCE OF PROMOTORIAL WORK."

"Right at that point, gentlemen, we discovered that the creation of a perfect city plan is only the first step toward success in this country. We realize very shortly and very acutely that success in city planning means not only the application of architectural and engineering genius, but in America, where nothing is done by imperial decree, success involves educational and promotional work of the most painstaking and scientific kind."

"We saw that before we could widen streets, create parks, or develop railway terminals where they should be, we would have to take our proposition to all the people, to argue before the tribunal of public opinion, to prove our case there, and to awaken that interest in city planning which was necessary to bind to our cause the hopes and ambitions for betterment of a majority of the voters."

"Without hesitation, because we knew our plan was right, that it was basically sound, and that its adoption and completion would benefit every citizen of our city immeasurably, we tackled the tremendous task of arousing the interest and awakening the desires of our great cosmopolitan mass of two and a half milllions of people."*

From "Gaining Public Support, etc.," by CHARLES H. WACKER.

"In Europe the city planning architect has all the forces of the government at his back. In America he stands alone, and unless by proper promotive effort the American public can be brought to support him and endorse his ideas, no city plan can ever be realized."

"Enthusiasm is necessary. No matter how much merit there may be in a city plan, it is imperative that its promotors shall be at all times full of enthusiasm in advancing its claims to recognition and adoption. The city plan promotor who does not feel enthusiastic should do as Scarboro advised: 'Get out and rub up against some fellow who does.'"

"Optimism is another elemental necessity. Have the pessimists ever accomplished any very constructive work? Is it a sign of strength to doubt your own power and your own responsibilities? The optimist is the man who pushes forward himself, his business, and his community."

* [The Chicago Plan Commission have now given some hundreds of lectures in Chigago and have absolutely converted public opinion to the desired views. E.P.R.]

By H. Inigo Triggs in English Town Planning Conference, 1909.

"Hitherto the greatest obstacle to systematic town planning has been the difficulty of publishing settled plans. Such plans cannot be submitted to the public, for the very excellent reason that if they were to be published they would lead to an undue amount of speculation in the property affected, and would greatly add to the cost of the proposed improvement. But such secrecy is surely wrong in principle, and it would be of the greatest advantage if, when schemes of improvement looking many years ahead were drawn up and approved, such schemes were boldly marked on the ordnance survey.

In Paris* no secret is made of street improvements; their direction and extent are clearly marked on the large scale maps issued by the 'Service du Plan de Paris,' even though it may be twenty years before the changes can be carried out. Owners of property cannot sell the land scheduled, and must submit for approval plans of any alterations they propose to make to their buildings. It thus becomes impossible for any new building or costly alteration to be carried out upon land that will ultimately be required."

From "The Example of Germany," by T. C. Horsfall.

[On the City Plans in Germany.]

"To the preparation of these plans many town councils give an amount of thought and trouble which fills an Englishman, when he first meets with records of their work, with surprise, and with admiration. The whole subject has for years† received close study from a large number of able architects and engineers, as well as from members of town councils, and several important works dealing with the subject have been published, amongst the best known of which are books‡ by Professor Baumeister of Carlsruhe, and Mr. Stuebben. These eminent authorities are sometimes employed by town councils to revise and improve their building plans, or to prepare new plans. For example, the Town Council of Stuttgart, when preparing in 1901 for a large extension of the town, obtained long and elaborate opinions respecting the engineering and architectural problems involved, from their own architect and surveyor of buildings, from another eminent architect of Stuttgart, and from Professor Baumeister; opinions respecting the hygienic aspect of the work from their medical officer of health and from Professor Nussbaum, of Hanover; an opinion respecting the political-economical aspect of the work from Dr. Rettich, a member of the Town Council; and an opinion as to the artistic aspect from a committee consisting of four well-known able men. These opinions, with an introduction by the Mayor of Stuttgart, and plans shewing the suggestions made by the Town Council and their advisers, were all published in a volume to enable all the citizens, who cared to do so, to study all the proposals."

* [And in Italy and the whole Continent and America nothing is kept secret. E.P.R.]

† [Note that it is some ten years since Mr. Horsfall wrote this in his famous book. E.P.R.]

‡ [See exhibits "The Stadtebau," Translations in English have been written below most of the illustrations, so that they may be more intelligible to those who cannot read German. E.P.R.]

NETTLEFOLD on "Practical Housing."

"A special district is set aside for factories, presumably on the leeward side of the future town, and here are provided means for getting in cheaply and easily the raw materials required, and sending out the finished articles produced."

"On this plan is also shewn in skeleton, the future town divided into districts, according to the class of buildings allowed, and the various districts are carefully graded. High buildings close to each other are only allowed in the centre and on main arteries. In residential districts, buildings must be lower and more dispersed, the further they are from the centre of the city, or from main arteries."

NETTLEFOLD on "Practical Housing."

"Land, divided into plots among different owners, is considered* as a whole, and planned out in a suitable manner, regardless of the difference in ownership, provision being made for the necessary streets and open spaces, etc. A calculation is then made to ascertain what percentage of the whole land involved is left available for building sites, and each landowner receives back a percentage of his original holding equal to the percentage of the whole area available for building. The new plot is given as near as possible to the old plot, and the question of corner sites, etc., is carefully considered and taken into account. It is invariably found that the smaller plot of land returned is more valuable than the larger plot originally held. The smaller plot is convenient for building—the larger was not."

From RAYMOND UNWIN'S "Town Planning in Practice."

"If town planning is to produce the good results that are hoped for, the range of building bye-laws must necessarily be extended; it will not be practicable for a town plan to show everything that needs to be determined. The limitation of the number of houses to the acre; the reservation of sites for probable public buildings or other requirements; the proper distribution of works and factories; and many other similar matters, will need to be brought under some public control if towns are to be adequately managed, and developed along the best line."

From "Chicago's Greatest Issue. An Official Plan."

"In all growing cities it has been necessary, before building according to an orderly plan, to begin, at large expense, to correct the error of not having a plan to build upon when the city was founded. The longer this beginning has been delayed the greater has been the expense. To postpone it means multiplying the cost, besides a greater burden of discomfort and loss of business every day."

* [On the Continent. E.P.R.]

"Later on will be discussed the history of other cities in this work, and the tremendous cost they have had to pay for delay. But it may be said now that all these cities have found that no matter how great the labour or how large the cost, the result has always well repaid the necessary outlay."

From RAYMOND UNWIN'S "Town Planning in Practice."

"The conscious art of town building is practically a new one for us in England. We shall need to begin somewhat tentatively and at first we may well be content if we can produce order to replace the present chaos, if we can do something to restrain the devastating tendency of personal interests and to satisfy in a straightforward and orderly manner the obvious requirements of the community."

NETTLEFOLD on "Practical Housing."

"It is so infinitely easier to achieve the hygienic, artistic, and economic objects of town planning when starting with a clean slate, that one would like to see our overgrown towns done away with, and new ones built in their stead, if only this were possible. But our task is to improve existing towns as they are, and gradually, with infinite patience and perseverance, bring them up to what they ought to be. This will be an expensive and laborious, but not an impossible, undertaking."

From RAYMOND UNWIN'S "Town Planning in Practice."

"In America the tradition of a formal lay-out, usually on a rigid gridiron or checker-board pattern, has hitherto been little disturbed by any other style. Towns once started on this pattern have continued to grow to an enormous extent, until vast areas are covered by this regular, monotonous latticework of streets laid out in parallel lines, cutting up the building areas into rectangular blocks of equal size. The inconvenience and monotony of this arrangement are, however, now compelling the Americans to consider new systems. Diagonal streets are being arranged, and in some cases cut through the existing blocks, so that it will not be necessary on so many occasions to travel two sides of a triangle in order to go from point to point. The Americans, like ourselves, have hitherto been without municipal town planning powers, but the work of town improvement has been taken in hand by Commissioners, well supported, and much good is being done under the guidance of able men like Mr. Mulford Robinson and Mr. Day. Special attention is being devoted to the provision of parks to break up the monotony of the towns and provide breathing spaces, also to the arrangement of wide boulevards and strips of parkway to link up the parks and so provide walks and drives about the town, passing through belts of park or garden."

From RAYMOND UNWIN'S "Town Planning in Practice.'

"As a means of improving cities, a main framework of roads, having directions chiefly diagonal to this checker-board system, is being designed and superimposed, as it were, upon it.* In many towns these streets are being cut through at very great expense, to give access about the town in diagonal directions and to provide new thoroughfares of adequate scale in relation to the town itself. This system, as a means of town improvement applied to the existing parts of towns, appears to be inevitable."

From "Chicago's Greatest Issue. An Official Plan."

DIAGONAL STREETS.

"One great element in the saving of time and labour in the transportation of people and merchandise in cities, comes from the existence of diagonal streets, so traffic may, as we say, 'cut across' instead of moving always at right angles. Milwaukee, Blue Island, and Archer Avenues are examples of such streets. The plan, then, looks to developing such streets to their greatest usefulness. Also it means in time, the cutting of more such streets, particularly on the great west side of Chicago."

"Lastly, and most important, come the time and distance-saving diagonal streets. We all know their value. We all know that Chicago could not possibly be the huge city† it is to-day if it had not always had such streets as Milwaukee, Lincoln, Ogden, Blue Island, Archer and other avenues,—the straight aiming trails of the Indian‡ and the trapper,§—developed to aid in the handling of its people and its traffic. Usually cities are compelled to create these diagonals, always at great expense, but no matter what the expense, it is always found that these streets, when constructed, pay in convenience and time-saving, many times over what they originally cost."

"When we consider that at the present day it is necessary for people wishing to go from either the north or south to the west side of the city to travel long distances at right angles, we are forced to decide that this is wrong; and ought not to continue.

By RAYMOND UNWIN, F.R.I.B.A., Warburton Lectures for 1912.

"Let us contrast the growth of Cologne with what has taken place in Chicago, where a town of two million people has been developed at such a rapid rate that some still living can remember when there was only a settlement of a few hundred people there. This town has grown on a simple gridiron plan, if such can rightly be called a plan, dividing up the

* [This is also Calcutta's case. E.P.R.] † Chicago has double the population of Calcutta,
‡ Ancient aboriginals of America. § Shikaree.

land into rectangle building blocks, of much the same size whether the land is wanted for factories or shops, palaces or cottages. At first, no provision was made for open spaces, main wide roads were not then thought of, and the result has been the greatest aggregation of disorganised units of population that have ever been brought together. Chicago, which contains within itself a wonderful amount of public spirit backed by true American energy, is now seeking at enormous cost to rectify these mistakes and has indeed done great things already. It has secured a number of fine parks, and recovered and preserved long stretches of lake front; it has made and planted miles of magnificent boulevards and avenues, 'park ways' as they are called in America. You may ride in a motor hour after hour round Chicago and the whole of the time be travelling along its park-ways and through the parks and hardly leave them. This green girdle is indeed, a wonderful creation. They have, too, bought here and there one or more of these building blocks, and have laid them out as playgrounds for the children. Unfortunately, in the past, they have allowed the building blocks to be so covered with building that there is not enough space for air or light to reach to the rooms, much less for any garden space in which the children could play. They have now set themselves the task of providing a playground of some sort within half a mile of every child's home in the city."

By H. INIGO TRIGGS in "Town Planning; Past, Present and Possible."

"Broadway* has developed into the great business street of the city, and if it be true that 'the shopkeepers go where the travel is,' the value of the diagonal line for the purposes of traffic is well attested."

CHARLES H. WACKER, on "Gaining Public Support, etc."

"We argue that diagonal streets, which we want created for Chicago, are time savers, and that, to the extent that they save time in transportation of people and merchandise, they lengthen the lives and increase the profits of our people, We argue that orderliness is the best investment a city can make, and we prove the truth of our arguments."

"Our appeal, it must be understood, is not by any means entirely a commercial appeal. It is a practical appeal, first to secure the interest and the sympathy of a most practical people."

"Secondly, and in a larger way, our appeal is a human appeal, a moral appeal, an appeal to make Chicago better, not for the money that is in it, but for the sake of the higher mental, moral and physical people that a perfectly arranged city will produce."

"That is the kind of appeal worth while. It is the kind that wins in Chicago, and it is the kind that will win anywhere in America. Men in the mass will do more for ideals than they will do for dollars."

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* [New York chief diagonal road. E.P.R.]

From "Chicago's Greatest Issue. An Official Plan."

"The plan for new streets,* as laid out, is the most costly feature of the Plan of Chicago. But it will be found in Chicago, as in other cities, that such work brings about great increases in property values, caused by increased convenience and attractiveness. The cost will be many millions of dollars, but miles and miles of new street frontages, all of great commercial value, will be created. Sites worth millions, for the growing retail business of the city, will result."

"Other cities have faced the situation Chicago faces to-day. They have had crowded, narrow, insufficient, streets. They have tried for years to avoid cutting new ones. They have delayed, lost millions upon millions in trade, inconvenienced their own people for decades, and finally been forced to do, at a cost multiplied many times, that which they fought to avoid. So it will be with Chicago.† Unless the street changes are decided upon now, and the work started, Chicago will finally have to make them at a staggering expense. The work done, the result will be steady growth and prosperity for all in Chicago. Such prosperity Chicago can not have unless it becomes a convenient and pleasant place in which to live."

MULFORD ROBINSON in "Width and Arrangement of Streets."

"G. H. Knibbs, F.R.A.S., has noted that it is with a radial street system that 'the greatest area is reached with the least length of street.' . . . . "

" . . . circumferential streets will tend, in their turn, to be broad and nearly straight, between the radial or parallel highways. Naturally, we shall try to have them intersect those highways at the branching points so that they may serve the largest possible number of people."

"The first thing to recognise is that the problem with which we have to deal is a community problem. Some years ago, when the Royal Commission on London Traffic brought in one of its reports,‡ it stated that it found that the leading cause of the city's congestion was the absence of a central authority, charged with the supervision of the traffic arrangements of London as a whole. It noted that railways had been built, new streets opened out, and tramways laid down at local instance, to meet merely sectional requirements, and without regard either to the needs of the rest of the community or to the pressing claims of posterity. This condition which is at fault in London is general among cities. It obviously is so much better and more reasonable that new streets which are destined to be main lines of communication should be planned, not by the owner of the land in accordance with his conception of his own interests, but, having due regard for him, by the town, in accordance with the interest and needs of the whole population, that the matter requires no argument here. In German cities, in Belgian, in some Swiss, in Sweden, and in England, under the present town-planning law, such action is now taken."

* [Nearly all are diagonals. E.P.R.] † [and Calcutta. E.P.R.] ‡ [Vol. VII, 1905. E.P.R.]

"We shall assume the advisability of providing space for surface car tracks on all main highways."

"As existing and natural traffic channels, we may expect streets developed from country roads to remain important traffic thoroughfares. As a first step, then, we must widen and straighten these principal channels, as hydraulic engineers would do under the like conditions."

ROYAL COMMISSION ON LONDON TRAFFIC, 1905.

"MAGNITUDE AND IMPORTANCE OF THE PROBLEMS OF LOCOMOTION IN LONDON."

"Apart from the special delay at points of intersection, there is no doubt that the continuous growth of vehicular traffic is causing, and, unless some remedy is applied, will continue to cause, increasing congestion in the streets, with resulting slowness of movement. At places of great congestion, the vast volume of traffic which pours through the thoroughfares of London, is reduced to a walking pace,* the rate of movement being set by the slowest vehicles. The burden of delay falls on all passengers, but presses most heavily on the professional and working classes, and especially on those who have to proceed a considerable distance to their work or business every day."

From the translation in Mr. HORSFALL'S "Example of Germany": Dr. Henrich Roessler's great Address [or Report] on Town Planning Problems.

TRANSIT.

Speaking of the tasks which now await the town government, the report says :—

"The construction of suburban lines cannot be longer deferred, if due regard is to be given to the movement of population into large towns. The connection, now lacking between the town and the outlying districts, must be supplied by numerous radial lines. Far more important than the direct advantage, which the town† will gain by the construction of such lines is the social improvement which will result. The Old Town is more and more becoming only a business town. The clearest proof of this is that, while in the town as a whole, there was in the last decade an increase of 23·8 per cent. in the number of dwellings, in the Old Town the increase was only 6·7 per cent.; and, while the number of houses occupied by their owners increased in the New Town by 50·6 per cent., and in the suburbs by 9·3 per cent., there was a decrease of 5·2 per cent. in the Old Town. Naturally, this change has caused an increase of rents and of the price of land in the immediate neighbourhood of the Old Town."

"The object of the new lines will be to open out a wide district for building, and to provide rapid and convenient communication between that district and the Old Town where work is done. In this way it will be possible to create wholesome, small, and cheap dwellings, and to prevent

* [As in Strand Road, Chitpore Road, Canning Street and elsewhere in Calcutta. E.P.R.]

† [Frankfort, Germany, of which Dr. Adiches was President. E.P.R.]

undue increase of prices, and unsound speculation in land. It is from these social points of view that the proposals must be considered, and, indeed, in the next ten years, the task of the town, in relation to social matters, will be more comprehensive and serious than they have been hitherto."

Town Planning Review, July, 1912.

"Housing Problems" (Editorial).

"No one appreciates more thoroughly than the town planner the importance of good housing, but at the same time no one can appreciate more keenly than he the need of the basic preparation provided by town planning. To place Housing before town planning is to sew on your buttons before you cut out your cloth."

"We hope that we are misinformed by the daily press, and that the idea of separating housing from town planning is not receiving the serious consideration of the Government. Should, however, things have got so seriously adrift, one can only prophecy trouble in the operation of the Housing Acts."

"No one can object to, and, indeed all will welcome, the active interest shewn of late by the Chancellor of the Exchequer in this matter; nor can objection be taken to his action in inviting an expert committee to enquire into the conditions of housing and land tenure, knowing its interest in the latter and its close connection with the former; but we hope and trust, whatever the interest and support he may give to housing reform, that under no circumstances will it be separated from its co-ordinate subject town planning, nor be taken away from the precincts of the Local Government Board."

Royal Commission. London Traffic, 1905.

"Magnitude and Importance of the Problem of Locomotion in London."

"The figures we have just given, taken in connection with the present conditions of congestion of traffic in so many of the streets of London; the difficulties which persons residing in the suburbs experience in moving to and from their daily work, the overcrowding of houses in the central area and the impossibility of housing the working classes in that area at rents which they can afford to pay, are conclusive as to the necessity of dealing with the whole problem of London locomotion on a comprehensive plan, and with as little delay as possible."*

* [Eight years have passed but the comprehensive plan has not yet appeared. Meanwhile some 800,000 inhabitants have been added to London. E.P.R.]

By Professor BERESFORD PITE, F.R.I.B.A., in "Architecture and Town Planning."

"Only by a long prevision can this unnatural and exaggeratedvalue at t he centre be dealt with. The initial way of dealing with it is at once to lay out the main thoroughfares of a suitable width for a city of the larger rather than of a smaller size, and the initial increase of width in the thoroughfares will prove to be no extravagance but a convenience, even in the early stages. Extension will thus become easy. Overcrowding will thus be made impossible; and that which is common to all will become beneficial to all."

From T. C. HORSFALL'S "Example of Germany."

[TRAMWAYS AND SUBURBS.]

(Translation of the Prussian Decree of 19th March, 1901.)

"3. A further means, by which an improvement of the conditions of housing can now be obtained, is to make communication with the outlying parts of towns easier. Wherever, therefore, housing conditions are unsatisfactory, care should be taken to effect an adequate development of the system of communication in the town, and especially at the same time to give as many facilities as possible for the transit of work people and school children to and from the outskirts of the town. When the towns grant new concessions for street railways, tramways, etc., explicit conditions for securing these objects must be included in the agreement."

By H. INIGO TRIGGS, in "Town Planning; Past, Present and Possible."

[MOTOR TRAFFIC DEMANDS WIDER ROADS. E.P.R.]

"The first essential for the improvement of a city's suburbs is the provision of adequate wide lines of thoroughfare to connect the centre with the open country since the developement of tramways and motor omnibuses is resulting in a continually increasing proportion of the population being brought to their daily work by these means, and of all the changes that have taken place with regard to London traffic in recent years, none is more remarkable than the increased use of roads leading into the country. The increase is almost entirely attributable to the growth of mechanical traffic, and is even more marked in vehicles used for commercial purposes than it is in motor cars of the ordinary type. Motor vans for the delivery of goods have come into general use and are now employed in considerable numbers by all classes of trade. Moreover, this form of traffic will undoubtedly increase as mechanical traction improves. For this reason, and also on account of surburban tramways, the main arteries of traffic within eight or ten miles of every great city must be in the future much wider and more numerous."

"Questions of Policy in Housing Reform," (Calcutta) by D. L. MONRO.

"The greatest difficulty in the way is always the site values, and the latest and truest method indicated is a process of decentralisation of industry, and the promotion of rapid and cheap transit."

THE NEW YORK COMMITTEE ON CONGESTION OF POPLUATION.

"Rapid transit is not chiefly a financial problem; it is a social problem. It is a question not of dollars, but of human lives."

From "Practical Housing," by J. S. NETTLEFOLD.

"It is often said that improved means of communication and the taxation of land values will solve the housing problem without other assistance.

From "Practical Housing," by J. S. NETTLEFOLD.

". . . . The ultimate solution of the housing problem, by providing cheerful, healthy houses on the outskirts of big towns at reasonable rents."

"The complete success of this policy depends upon an efficient tramway system. Given good houses on the outskirts of large towns at reasonable rent, and quick cheap trams from the centre to the outskirts, a considerable proportion of those who now live in congested districts can move outside where land is cheaper and the air fresher. That means that for many working men the town will be brought to the country and the country to the town. How to deal with those who remain in the slums is too long a story to go into now, but by removing large numbers from congested city districts there will undoubtedly be more room for those who are left behind."

H. INIGO TRIGOS, in "Town Planning; Past, Present and Possible,"

"We are too apt to wait until the last moment before making our civic improvements, and then be surprised because they are so costly. These problems are largely a matter of time, and if authorities would only look a few years in advance it would be quite possible gradually to transform the character of their towns without incurring any serious expense. If they are unable to foresee the result of their schemes for more than twenty years hence, they ought not to be entrusted with the control of such important affairs."

CHAPTER IV.

COMPARISONS.

Importance of comparison—comparison essential to gain clear idea of city status and needs —comparisons odious but needful—position of Trust towards Calcutta public—average European's idea of Calcutta—harm done by mistaken public opinion—Chicago's plucky example—needful for all to know wants and conditions of Calcutta—thereby securing right public opinion.

Importance of Comparison.

"Perhaps the best guide for humanity in all its progress lies in observing the experience of others, studying the mistakes others have made, and analyzing the causes which led to failure on the one hand and brought success upon the other. This principle which has been absorbed by Chicago; and, in the work of city planning, the deepest and most careful study has been given to the struggle for better conditions in every great old-world centre."

"London, Paris, Berlin, Rome, Venice, Hamburg, Dresden, Budapest*—all the great cities of Europe, have been studied as through a microscope. The elements making for wealth in each have been adopted from Chicago, the elements of weakness of each have been classified that Chicago may avoid the difficulties that have hampered and prevented development of cities abroad."—From "How other Great Cities are Building," written and published by the Chicago Plan Commission.

"There is no subject which benfits by international comparison more than Town Planning."—"Town Planning Review," July 1912, on International Federation of Town Planners.

Comparison essential to gain correct estimate of status and needs.

Before we can fully understand, appreciate, and weigh-up the position of Calcutta, it appears essential that we should be conversant with what is good planning in all large commercial cities and seaports of the world. We should know what standards are in vogue and are contemplated in great modern cities; what widths are given to main roads, to major streets, and to small streets—also what allowance of main roads and streets per square mile, is required to produce a good city. We should know what the ordinary modern city requires in the way of tramways to prevent central congestion and carry people between their homes and their business; we should know what space is thought needful around buildings, and the accepted wise relation between heights of buildings and widths of roads, etc.

Comparisons are mostly odious, but in our case they are absolutely required; for the Trust is very much in the position of a surgeon, obliged to tell a possibly sceptical patient of very serious illness, that he must prepare to put his hand deeply into his pocket; that major intestinal operations are both urgent and unavoidable; and that a complete new mode of life and diet is essential to future existence and happiness.

* Plans of these cities are included in the folio of City Maps which accompanies this report.

Condition of Calcutta not sufficiently known.

The writer found that very many Europeons who lived in Calcutta possessed little or no knowledge of the dense back-blocks that compose three quarters of the city. Had it not been the writer's actual business to investigate the condition of the city, he too without doubt would likewise have remained unaware of the real position. Most of us have had no occasion to go about anywhere except in the Dalhousie Square, Old Court House Street, Chowringhee, and Park Street areas, which make a mere fringe along only half the west side of the built-up mass of Calcutta. Of the latter, most Europeans appear to have but glimpsed the front faces, in journeys to Howrah, or Sealdah, or to Barrackpore or Tollygunge.

One can walk day after day for hours in the lanes of North Calcutta, without meeting a single European. On the other hand, some know the city extraordinarily well: for example, Mr. Bompas has probably the most intimate all-round knowledge, of both Calcutta and Howrah, possessed by any one in India; and Mr. D. L. Monro and others have made close studies of Wards 10, 11, 13 and 14, and of the housing question and of reform in general.

The Trustees who have been on the Board for some time, are all remarkably well versed in study of the city, and Dr. Banks has a further very special personal knowledge of the city as regards plague, sickness and insanitation.

The great "dailies" and other publications of Calcutta are largely aware of the condition of the city, and it may be mentioned without invidiousness that *Capital* has made quite a study of certain traffic conditions. The same can be said of the Chambers of Commerce. But the point of all this is, that the general public of Calcutta are not conscious of the state of their city; it has never been put before them forcibly and clearly; they have no standard by which to measure: and this means (1) there is no strong public opinion in support of the Improvement Trust, and (2) quite mistaken opinions are held.

Favourable Public Opinion a tremendous help to the Trust.

We have all heard Calcutta described glowingly—and quite sincerely—as the fairest city of the east. This opinion arises from a civic patriotism that can be of great value, but the speakers are plainly unaware of the real conditions. Many Calcutta people are of that glowing opinion, which, unhappily, we know to be quite erroneous, and also harmful, for if undirected towards a keen desire for reform it creates a fool's paradise, and a public feeling that reform is not necessary. In other words, reform measures are looked on with suspicion, indifferenee, or with a positive and powerful hostility. It should be made thoroughly known that the city is in a most serious condition, and that only prompt, big, and concerted action will maintain our commercial supremacy, and save Calcutta and Howrah from becoming the largest slum in the world. Calcutta had a bad start—she has lagged and muddled for fifty years, and is now far behind other cities of the same size and importance.

Presently—it seems likely to happen before the Trust can get things put right—congestion of traffic and inability to handle it will begin to limit trade expansion, and to set an injurious bound to the activities of shipping and railways. The case will very soon be that produced by premises that have become utterly too small, cramped, and out of date for a good business. The shoe is already beginning to pinch sharper and sharper at Calcutta in the excessive and increasing cost of rent, living, dues of various kinds, and in delays of merchandise.

Bombay, but especially Karachi, are each deeply engaged in a tremendous effort which threatens Calcutta. Those cities are by sea some 2,000 miles and by land 1,300 miles nearer Europe than is Calcutta. In twenty years from to-day will Calcutta and its already congested streets and out of date insufficient accommodation be in a position to deal with 70 per cent. more trade? brought mostly in ships 100 per cent. bigger? and dealt with by a population of one-and-a-half millions?

Not unless she makes a tremendous unswerving effort. And, further not unless she is assisted generously by the Imperial Government. She is in real fact the capital of India—and it has been so far a rule throughout the world that the capital of an Empire shall be made fit and worthy by direct power of the imperial exchequer—Calcutta is the sole exception.

Fifty years' neglect of road, street, building, transit, bridge, dock and railway work in a big city cannot be wiped out, and new systems be created in twenty years by any half measures, in either finance, or construction. Calcutta should embark on a huge, enthusiastic, and determined agitation for more money, and she would get it. Chicago, only a few years ago, found she was arriving at a state mildly like that of Calcutta twenty years ago.* She stopped crowing at once about what she was. She did not hide or beome silent on her defects. They were trumpeted and lectured on publicly a hundred times a year. Nearly every school boy and girl in Chicago—bar infants—has attended those lectures, which were given in this spirit:—"We must determine that Chicago must no longer be a creature of chance. There must no longer be planless building, haphazard running of streets, insufficient light and air in our public ways, cramped and restricted park areas, badly arranged transportation systems, dirty and congested streets. We must work to a plan that stops waste of time, effort, money and labour in carrying on the work of our city and its industries. We must work to a plan that provides streets direct enough and commodious enough to care for all traffic quickly and economically. We must work to a plan protecting the public health in every possible way and promoting healthful and comfortable lives for all the future citizens of Chicago. In taking up this plan for future Chicago we must avail ourselves of all the information science can afford us. We can recognise, for one thing, that city life is more intense and nerve straining than life in the country. This means that our plan must aim to do away with unnecessary noises, smoke, dust, dirt, confusion and danger of accident on the one hand,

* See the Plans of Chicago, of course she has a perfectly regular street system, but she lacks diagonals and main roads, and her railway traffic grows prodigiously, and they have not only to allow free growth but even to increase the rate. A smothering of Calcutta's commercial traffic-growth has already set in, in certain directions, She can only just cope with her best crop—the jute. Delay in delivery already produces slower money return.

and on the other hand provide an increased means of out of doors life for the people, larger park areas, more playgrounds and greater opportunities of recreation and refreshment for the dweller in the Chicago of the future."

Chicago first got her plan, and then fully captured public opinion. Already she has created a wonderful park system, and is now putting the PLAN into execution on a gigantic scale, the cost being estimated at not less than 8,000 lakhs. Her population is just double that of Calcutta. She is now crowing splendidly about what she is going to *be*. There is no harm in that. She aims high and is intently bent on getting 'right there.'

The Chicago Plan Commission was originated by the members of the Commercial Club of that city.

The following is a quotation from the preface to the very interesting book for children of the upper forms, which has been issued to all Chicago schools:—

"It is becoming a recognized fact that the power, growth and advancements of a city is limited only by the measure of united civic interest of its people. The stronger and more vital the community spirit the greater and more influential the city. It is this spirit which gives Chicago its great world distinction,—an indomitable, living, throbbing love for the city, expressing a demand of its united people that the city shall deserve and achieve greatness."

"Conditions, then, demand that this new impulse of love for this city shall be fostered, and that our children shall be taught that they are the coming responsible heads of their various communities. We direct the national patriotic impulse into the paths of duty, and it is vital that we do the same with the new impulse for civic good. Conditions which make for good health, good order and good citizenship must be made clear to our children The needs and possibilities for expansion and development of community life under proper conditions must be outlined for the young, that effort under the urge of civic patriotism may be properly directed. Finally, our children must be led to recognize their duty of looking to the future, knowing that to be unmindful of the needs of days to come is to be unfaithful of obligations to themselves, their communities and their Creator."

"We have reached a time now when the citizen, to do his duty, must plan for the welfare of coming generations. It is necessary that the people realize, and that the young be taught, that the really great work of the world to day is that which foresees and builds for the future."

"This book is intended to convince the child that he owes loyalty to the city that gave him his education and offers him an opportunity to enter any one of her great fields of industrial or professional activity."

The daily, weekly and monthly publications of Calcutta, especially the Indian and vernacular papers can do a most valuable work for their city, by powerfully backing up the Trust, by giving first class reports and

and printing first-class illustrations from the popular lectures (which have already been inaugurated by Mr. Bompas) by giving prominence to all town-planning and improvement matters, by making these items interesting to their readers, and generally educating the mass of the public in comparative civic study.

It may not be out of place to suggest that a series ot racy analytical articles on great seaports, plus good illustrations, and without the humour cut ont, would go down well and have their effect. It is mostly by these means of propaganda that continental town-planning has become so finely developed, and so well recognized by every man in the street as a prime essential of our day.

Considering the state of Calcutta, it would only be civic common-sense to fill a column a week permanently, from the large floating literature printed weekly in Europe and America.

The German, the American, the Parisian, the Italian, the Switzer, willingly read columns of important matter on town planning in their daily papers. The writer has found personally that a high percentage of the ordinary continental men in the street, in the train, in the café, have a perfectly surprising and humbling knowledge of city design, and especially are warmly interested in their particular cities. One of the most interesting talks the writer ever had on town planning, took place in a train with a dried plum merchant going to Bordeaux.

At the present moment in Calcutta a large section of the public appear to need re-assuring that town-planning requirements will be strictly subordinated to their religious feelings ; and that no temple, takur bari, or mosque will be interfered with or removed, except with the free acquiesence and agreement of those concerned.

The long and patient negotiations of the Trust regarding the widening of Sham Bazaar Road, which has religious buildings on either side, should be made known, and be a guarantee to allay a mistaken religious fear and hostility. At the same time, interesting examples of removal and rebuilding of tombs and temples might be cited from the history of those great nations, the Egyptians, the Greeks, and the Romans, shewing how they were accomplished reverently, with the proper ceremonies. Modern examples of the necessary removal of churches and graves, abound in every large city of Europe. Yet the burial places of the West are much better cared for and respected than those of the East, as a general rule, and the laws against sacrilege in churches and places of worship are most strictly carried out. Dozens of other suggestions could be made for comparative articles that would build up an enlightened opinion in favour of big reforms.

CHAPTER V.

CALCUTTA COMPARED WITH OTHER CITIES.

Financial status of Calcutta— Main Roads and Streets per square mile—Standard road widths of British, American and European cities—Percentage of open space in cities—Tramway mileage found necessary—Status of Calcutta as a seaport.

The Financial Status of Calcutta.

The comparison of Calcutta with British and a few Indian cities, is shewn pretty clearly in the accompanying table.

Continental cities are assessed in most cases at a lower rate than British; within rough limits they appear to be assessed at from 10 to 20 per cent. less rateable value, and cost of living is lower. American cities, on the whole, are assessed at a higher value than British, so that the latter may be taken as a fairly good standard for comparison. Wages and cost of living are higher in America than in Britain.

The averages made from the statistics of Glasgow, Liverpool, Manchester and Birmingham are perhaps the most useful, as these are the four largest business cities of Great Britain,—excluding London, which is in a class quite by itself.

It will be seen that Calcutta rateable value is considerably less than half that of the British cities.* But the chief point to be observed is, the fact that people in the big Indian city only produce 12s. 9½d. per head against the average of 52s. 2d. per head in the four British cities. The Calcutta rate-revenue is less than one-quarter of the British city revenue. Added to this is the fact that the four cities all possess other large sources of revenue in their paying municipal concerns. For example, each owns its big tramway system and all plant.

We might expect improvement work in Calcutta to cost less than half what it does in Europe—and we might expect rents to be less than half, but this is not the case. Improvements appear to demand two-thirds of the European price, yet revenue per head is but about one-fourth of British municipal revenue.

One cause for these remarkable differences is the Calcutta 75 per cent. proportion of poorer and working class population, whose food-and-clothing-cost, and wages, are exceedingly small compared with those of European cities. But the anomaly of an almost European cost for buying up Calcutta property is not so easily explained. This cost appears

* It is approximately as 1 is to 2·6.

decidedly not based on assessed value of rentals—and yet that value, as a general ruling (plus a percentage for loss by compulsory acquisition), is the only sound, fair, reliable and genuine basis for improvement costs.

Much evidence was put before the Bombay Trust and Tribunal in their early years, proving how most exceedingly difficult it is, in Indian cities, to ascertain the true rentals, especially of large tenements, chawls, and bazaar properties (which play also so big a part in Calcutta). At Bombay, rents were found to be farmed out and re-farmed out beyond tracing. Tenants who gave genuine information, or who did not fall in with rent-farmers' instructions, were in danger of eviction in a city suffering from very severe house famine.

On the figures in the table, Calcutta is less rich than Bombay or Rangoon. The main point is, that she palpably has not financial power to carry out, unaided, the reformation of fifty years of neglect. The Government of India has departed from Calcutta—but the city remains, in fact, the capital of India. Every capital city of the world—bar Calcutta—appears to have been recognised as a national asset—something different from the ordinary great city—and has received repeated big financial help from the Imperial Exchequer. Calcutta is filled more than any other city of India, with people drawn from every part of that Empire—to the capital. Washington, Paris, Berlin, Vienna, Budapest, Rome, Madrid, St. Petersburg and Moscow, Yokohama, London, have all been state-aided in a more or less great and sufficient degree. In Delhi and the new capital of Australia that principle is clearly recognised as just and necessary. Calcutta has a 50 years' accumulated debt owing to her: and is in desperate want of the money.

Programmes of work are given later in this report, based (1) on the assumption that no more money than we have will be forthcoming. (2) That Calcutta—although it is late in the day—will be dealt with like other capitals. The accompanying table strongly bears out the real need for such help—and gives a fairly good idea of Calcutta's financial status. It is seen to be either very weak or very undeveloped.

FINANCIAL STATUS OF CALCUTTA.

FINANCIAL STRENGTH OF BRITISH AND INDIAN CITIES, COMPARED.

Name of Town or City.	Area in Acres.	Population of Rated Areas.	Official Rateable Value in £ sterling.	Debt in £ sterling.	Rateable value per head.	Produce of One Penny or 1 anna in the £. (Rs. 15).	Remarks.	Municipal Rates. Total tax on One Pound sterling of rateable value	Municipal Rates. Average approximate revenue produced per head of population
CALCUTTA ...	**20,547**	**896,067** Inside City boundary.	1911-12. **2,478,000**	**2,951,294**	£ **2.76**	£ **10,325**	1911-12 (Official.) **Revenue £649,251; Expenses £640,826.** Total Rate, 19½ per cent. of Rateable Value, or Rupees 9.6 per head.	1911-12. **3s. 11d.**	**Rs. 9.6** or **12s. 9½d.**
BOMBAY	—	979,445 Bombay is without real Suburbs.	3,217,000	2,796,510	3.28	13,404	Revenue £814,301; Expenditure £846,483. Total Rate 10⅛ per cent. of Rateable Value, or Rupees 10.9 per head.	*s. d.* 2 3½	Rs. 10.9 o 14s. 6½d.
MADRAS	—	518,660	about 1,176,500	406,423	2.27	4,902	Revenue £199,916; Expenditure £131,617. Total Rate 10⅛ per cent. of Rateable value, or Rupees 3.4 per head.	2 3½	Rs. 3.4 or 4s. 6½d.
RANGOON	—	—	—	1,275,470	—	—	Revenue £271,000; Expenditure £227,000.		Rs. 9-13.6 or 13s. 1½d
BIRKENHEAD... ...	3,850	131,000	£ 679,000	£ 2,227,000	£ 5.18	£ 2,829		*s. d.* 7 8	*s. d.* 39 8
BIRMINGHAM... ...	43,537	840,000	4,325,000	—	5.15	18,021		8 11	45 11½
BLACKBURN	7,431	133,000	558,000	—	4.12	2,350		8 0	32 10½
BLACKPOOL	4,244	60,000	543,000	2,156,940	9.05	2,262	Municipal trams and other concerns very remunerative. Residential sea-side town, very popular.	5 0	45 3
BOLTON	15,283	182,000	852,000	3,852,056	4.68	3,550		6 10	31 11½
BRADFORD	22,843	290,000	1,590,000	—	5.13	6,625	Expenditure £500,000, 1911-12. Profit on Municipal trams, 1911-12, £50,172.	8 6	43 7
BRISTOL	17,640	360,000	1,852,000	8,511,000	5.15	7,747		8 8	44 6
CARDIFF	8,095	184,000	1,154,000	3,533,000	6.22	4,868		8 3	52 4
HULL	9,359	278,000	1,278,000	3,345,000	4.60	5,325	This city owns its own telephones, its tramways have the lowest fares in Great Britain.	(1913) 9 7½	43 8½
LEEDS	26,242	450,000	2,132,000	—	4.74	8,967		approx. 9 4	44 3
LIVERPOOL	19,502	750,000	4,799,000	13,575,444	6.41	19,996	Estate property of the Corporation brings in £92,000 a year revenue.	8 11¼	57 3
MANCHESTER	21,646	720,000	4,657,000	—	6.47	19,404	Manchester Corporation contributed £5,000,000 towards the Ship Canal. Manchester and Salford are practically one close-bonded city.	8 5¾	54 10½
SALFORD ...	5,202	233,000	1,042,000	3,298,000	4.47	4,342		8 6	38 0
NEWCASTLE-ON-TYNE ...	8,452	266,000	1,663,000	3,210,000	6.21	6,929		6 6	40 4½
NOTTINGHAM ...	10,935	260,000	1,263,000	5,452,000	4.84	5,262		8 1	39 2½
PLYMOUTH	2,533	114,000	1,180,000	1,845,000	10.36	4,917		7 2	74 3
SHEFFIELD	24,347	454,000	1,999,000	9,692,000	4.40	8,329		9 2½	40 6
SOUTHAMPTON ...	5,817	120,000	643,000	1,008,000	5.36	2,679		8 4½	43 10½
STOKE-ON-TRENT ...	11,154	234,000	819,000	—	3.50	3,412	Approximate total rate.	10 6	36 9
ABERDEEN	—	165,000	944,000 gross valuation	—	5.72	3,933		6 9	38 7
DUNDEE	5,281	170,000	975,000 valued rental of property	—	5.74	4,062		6 6	37 4
EDINBURGH	11,416	322,000	3,329,000	3,556,000	10.34	11,771	1d. (one anna) in the £, produces £11,771 of revenue. A very finely planned city and very beautiful.	5 5	55 11
GLASGOW	19,183	1,020,000	7,308,000	—	7.16	30,450	Revenue from rates only in 1912, £780,000. Total revenue £1,086,202. Statutory borrowing powers up to £5,000,000. Corporation owns numerous paying concerns.	7 1 (6/2½-6/2 in certain outer districts	50 8
BELFAST	16,504	390,000	1,547,000	—	3.96	6,404	Centre of the ship-building industry in Ireland.	7 4 approx.	30 4
LONDON ... ... (The Metropolis, without suburbs.)	74,816	4,521,000	approximately 49,000,000	85,000,000	10.83	242,000	Metropolitan and City Police Disrrict, 443,424 acres, population 7,251,358 (I911.) Annual expenditure of L.C.C. £84,000,000. Sinking fund £33,000,000. Capital outlay on tramways £12,400,000.	Avg. L.C.C. 3 2 Boro. Rates of each dist. 7/6 to 10/8 'City Lon.' ex.	*s. d.* 115 3
British Averages excluding London		338,583	1,963,791	—	5.79	—			*s. d.* 44 3
Average of Glasgow, Liverpool, Manchester and Birmingham ...		832,000	5,272,000	—	6.30	21,970 *	* Note that this amount results from an average population which is 64,000 less than Calcutta's.		*s. d.* 52 2
CALCUTTA ... (repeated for convenience only.)	**20,547**	**896,067**	**2,478,000**	**2,951,294**	**2.76**	**10,325**		*s. d.* **3 11**	*s. d.* **12 9½**

Main Roads and Streets per square mile.

It is not sufficient or satisfactory, to make statements *en bloc* as to the condition of a city. Every statement should if possible, be accompanied by its proof and qualifications ; hence the tables in this chapter : which it is hoped will definitely assist a correct summing up of the position at Calcutta, before we consider the remedies. Unlike cost of living, rateable value, and the more complex financial aspects, road-and-street mileage presents a clear plain view of city conditions. Mileage of tram-route and percentage of open space, likewise measure very exactly, the progress or backwardness of cities.

The Calcutta figures, given in the following table, are averages resulting from a close examination over the whole urban city area. The English and Continental examples may be taken as fair and representative.

ROAD AND STREET MILEAGE IN URBAN BUILT-UP AREAS OF CITIES.

Calcutta compared with some average British Continental and American towns and cities.

Name of Town or City,	Approximate Mileage of Streets per square mile. MILES.	Approximate Mileage of Main Roads per square mile. MILES.	Approximate Total Mileage of Roads and Streets per square mile, MILES	Remarks.
		BRITISH.		
LONDON	28	4	32	Oxford Street area, selected as typical of much of London.
GLASGOW	32	3	35	
PLYMOUTH ...	27	3	30	
LIVERPOOL ...	29½	6½	36	
MANCHESTER ...	30 TO 50	9 (Wide enough for double tram track but narrow for mnin roads).	39 TO 59	Note that about half the streets are rather narrow. Manchester seems to have the closest mesh of any city examined by the writer. There is an immense mass of two-storey single-family residential building property in Manchester. [See the good maps in the Exhibits].
BIRMINGHAM ...	17	7	24	The Birmingham mesh although of exceptionally good and wide streets, is too large, and is in agreement with the large building blocks in which the 'courts,' (dead-end enclosed streets) are being opened up so vigorously by the 'Slum Repair' method.
SHEFFIELD ...	33	7	40	The Sheffield main roads are not wide enough, and a large percentage of the streets are only as wide as the minimum permitted when they were built, so that the total of 40 miles is not as good as it might seem, nor do the 7 English totals represent the traffic capacity of Continental city main roads.
Rough Averages ...	**29½**	**5½**	**35**	
		EUROPEAN CONTINENTAL.		
PARIS	22	8	30	
BERLIN (Old City) ...	24	6	30	
„ (of 20 years ago)	9	8	17	With the 17 miles total (all of very wide and fine roads), the building blocks have been found too large, as in Birmingham
VIENNA	25	6	31	
FRANKFORT ...	28	4	32	The small ancient central portion of the city is excluded.
LYONS	30	6	36	
DRESDEN	20	6	24	
BRUSSELS	24	7	31	
BORDEAUX... ...	24	8	32	
ROME (Modern) ...	24	8	32	The mesh has been found too big [24 miles of broad streets, all wide enough for double tracks.]
MILAN	20	8	28	
TURIN	32	2	39	Almost all good streets, many in central Turin are arcaded.
HAMBURG	20	4	24	Note, a large percentage of the streets are very fine, and wide enough for double tramway track, but the building blocks are too big, i.e., the street mesh is found to be too large, and too conducive to tenement buildings.
Rough Averages ... (Berlin excluded)	**24½**	**6**	**30½**	

Name of Town or City.	Approximate Mileage of Streets per square mile. MILES.	Approximate Mileage of Main Roads per square mile MILES.	Approximate Total Mileage of Roads and Streets per square mile. MILES.	Remarks.
AMERICAN CITIES.				
NEW YORK (New City)	27	Nearly all Streets are same width	Approxi. average 30	
„ „ (Old South portion) ...	34			
CHICAGO	20 to 27	ditto.	25	Where fewer, the streets are wider.
SAN FRANCISCO ...	22	5	27	22 miles of good streets, 5 mile of avenues.
ST. LOUIS	26	2	28	
CLEVELAND ...	22	4	26	
BOSTON	24	7	31	
BALTIMORE ...	45	Nearly all streets the same width	35	
NEW ORLEANS ...	24	4	28	
Rough Averages ...	**26**	—	**29**	It should be remembered that the average American street is equal in width to the average English main road.
INDIAN CITIES.				
RANGOON ...	18	12	30	12 miles 100 feet wide, 4 miles 50 feet wide. in every square mile
MADRAS (*a*) ...	33	2	35	(*a*) Georgetown, the densest part, has 15 miles of 15 to 25 feet streets, 18 miles of 30 to 40 feet, and 2 miles of broad road up to 100 feet wide.
„ (*b*) ...	30	6	36	(*b*) Triplicane, Mohammedan quarter. 30 miles of narrow streets, 6 miles of main road of of rather irregular width.
CALCUTTA ...	Streets about 20 ft. wide. **17·3** miles, and like Chitpore rd. **1·50** miles.	Good roads **3·90**	**7⅛**	In addition to this deplorable total of a little over 7 miles, there are about 16 miles per square mile of narrow zig-zag lanes. The innumerable passages of 6 feet to 2 feet in width are not taken into account. Like the lanes, they cannot possibly be regarded as roads or streets, and cannot enter into the above comparisons. The average for the city is raised a little by the Park Street area.

IMPORTANT NOTE.

It must be remembered that from 20 to 90 per cent. of the streets of British, Continental and American cities are wide enough for double tramway tracks. Those streets are equal in width to the Cornwallis Street route in Calcutta; and where necessary, twelve or more miles of double track can be put down in a single square mile of built-up area. In Calcutta, the maximum possible is only about four miles.

Standard widths of Main Roads and Streets.

Before we discuss the widths of new thoroughfares in Calcutta it will be well to note what road dimensions are found necessary and successful in other cities.

British Standards.

There are no definite standards. The minimum under the 1875 Act is 36 ft. Most British cities and towns in their bye-laws prescribe a minimum of 40 ft., but some fix it at 50 ft. In general, the non-surburban streets built up during the past 40 years in British towns and cities exhibit a width of not less than 50 ft. between the fronts of the houses, with of from about 3 ft. to 10 ft. of 'front garden' between the house door and the edge of the actual street boundary, the effective width being not less than 40 feet, and commonly about 45 feet, including two 6 feet to 8 feet paved foot-paths. No standards have yet been laid down for main roads. As an almost invariable rule, we find them too narrow; 50 ft. to 60 ft. main roads are commonest; 100 ft. roads are unfortunately rare. Numerous main roads of London do not possess an effective width of 60 ft. and but quite a small percentage exceed that width.

The 'Advisory Board of Engineers' co-opted with the Royal Commission on London Traffic (1905), laid down the following familiar scale, in these words :—

"Acting upon this view, the Advisory Board of Engineers have embodied in their report the following conclusions, among others, which are reserved for notice hereafter :

"(1) That new streets or widened streets should be laid out according to the following standard of widths from house to house, depending upon their importance, and the degree to which they are likely to attract traffic :—

Main Avenues	....	....	140 feet.
First-class Arterial Streets	....	....	100 ,,
Second-class Streets	....	....	80 ,,
Third-class Streets	....	....	60 ,,
Fourth-class Streets	...	....	50 or 50 feet.

"The width in each case includes footways on either side, and no street should be less than 40 feet wide."

"This standard of width is intended to be applied within London, and also in the suburbs."

"We agree in this conclusion, and are further of opinion that as land comes into use for building in any part of 'Greater London' provision should be made for an adequate width of streets, especially in connection with through traffic, and that the necessary powers should be given by Act of Parliament."

It is instructive to remember that the main avenues referred to and strongly recommended were to be from north to south and east to west through London. Nothing has been done. A new project is now on foot to make a great main avenue, the new western road, into London—but the width has now shrunk to 80 feet, which will be ridiculous for so tremendously important a route—if it ever be made. It should never be forgotten in comparisons, that London has a deep bed of clay beneath her, in which rapid transit tubes can be constructed with comparatively exceptional ease (though at great cost). London's underground rapid-transit system, and her suburban ordinary railway service, are the finest in the world. Calcutta is built on dangerous sloppy silt, with a very occasional thin bed of poor carbonaceous clay, and she is absolutely dependent on roads and trams. So far, these London tubes, the complete close net of excellent streets, the wonderful and courteous driving in the streets, and the shortness of the traffic units, have made things passable despite the lack of great main roads—but the tubes will certainly have to be tripled to relieve the new rapidly increasing traffic pressure.

The standard of width given by the Advisory Board is a good one, and was compiled very much from American and Continental practice. Under this standard, it may be mentioned that the big city of Calcutta possesses no main avenue, only one-and-a-half miles of first-class arterial streets, and about six miles of second-class streets, if we take in Harrison road and Circular road. The scarce arteries of Calcutta must nearly all be put under the headings 'third-class' and 'fourth-class streets.'

It is amusing and perhaps comforting, to remember that Oxford Street, London, hovers mostly in the second and third-class—but we must not forget that London, in every square mile, has some twenty-eight miles of excellently appointed good streets in addition to four miles of main roads—all fit for quite heavy traffic—while Calcutta has but three-and-a-quarter miles of very poor, narrow and obstructed streets per square mile.

The unbroken street network of London assists the enormous traffic to pass to and fro; but in a city without a street system, like Calcutta, double work is thrown on the roads serving as main traffic lines, so that third or fourth-class streets, like Canning street and Chitpore road, are gorged with important traffic, reduced to a crawl.

English towns and cities are mostly short of wide arterial thoroughfares. By far too many of them exhibit in a ragged constricting zone, forty years of 40 foot streets, the result of good bye-laws, rigidly enforced, that took no stock of main road needs, especially of big lines of suburban communication. At the same time numerous towns and cities of Great Britain possess many fine though irregular roads, general openness, and good suburbs, but it is hard to find an exemplary town plan among them. The maps of Liverpool, Glasgow, Edinburgh, Manchester and Birmingham shew fairly good systems of main roads, and excellent street systems. We may also remember to their honour that the plans of English and Scots cities shew steady improvement year by year, and during the past sixteen years, two-thirds of the great towns have spent an average of 144 lakhs per annum solely on the creation and widening of main roads and important streets. Continental cities have already arrived at the condition that English cities hope to possess in twenty years or so from to-day.

To-day the British towns seem to have become fully alive to the importance of main roads, and the next twenty years will see an immense amount of valuable and drastic reformation.

American Standards.

The city of Washington,* capital of the United States, the most beautiful large city in North America, and which exhibits perhaps the best example in the world of the combined grille and diagonal system, has been built under the following road and street regulations :—

Main thoroughfares	..	...	160 feet wide
Secondary ...	...	...	120 ,,
Local Streets ...	...	...	60 to 90 feet wide

The standard road and street widths in Central Washington, were until lately :—

Fifty feet minimum width for 'any strictly minor street.'

"All new highways shall be not less than 90 feet in width." These laws were found to be too drastic, and there is now a provision which allows streets to be made 60 feet wide on agreement that the building lines are kept 90 feet apart and that the street can be widened free of cost when required. This building line proviso has been used in parts of New York, and all erections have recently been put back in Fifth Avenue to the true building lines, 100 feet apart.

A general ordinance in force in the northern portion of New York where land still remains to be built on, requires that roads and streets shall be 100 feet, 80 feet, and 60 feet wide, according to specified positions.

In central New York the roads vary from about 70 feet to 150 feet wide. One hundred feet between the building lines of main roads is a common width. Unfortunately, New York is being fast ruined, as a good city, by the want of height regulation. The latest of tall buildings is over 700 feet high. Each of these enormous masses takes in a population equal to that of a little town ; in consequence, even these 100 feet wide streets are becoming sunless and highly congested, especially by foot traffic. The relation between building height and street width should always be proportional. This point it will be shewn, bears very markedly on some of our own problems. It will be discussed later.

Philadelphia present regulations proscribe the following widths : 120 feet, 100 feet, 80 feet and 70 feet for major roads ; 60 feet, 50 feet and 40 feet for minor roads and streets.

An examination of 46 big American towns and cities all on the grille plan,* shews that in two cases only, have 30 feet streets been allowed in the bye-law and in five cases 40 feet streets. Thirteen cities appear to fix 50 feet as the minimum width of a street, the rest go in for 60 feet or 66 feet as the minimum and normal width of all ordinary streets and roads. In consequence double-track electric tramways can be laid down most streets in American cities, and they u sually take full advantage of this foresight.

* See Maps in folio,

The best American practice now moves towards this standarization :—

Main thoroughfares ...	...	90 feet to 150 feet wide
Secondary thoroughfares	...	60 „ „ 90 „ „
Local streets ...	...	40 „ „ 60 „ „

A careful standardization made by Mr. John Nolen (Cambridge, Massachusetts, U.S.A.) was put forward at the 1911 National Congress of City Planning, and suggested the following standard widths :—

Average Main Thoroughfares.

Double car-track	20 feet
6 lines of vehicles, 3 each side (8 feet × 6 feet)	48 „
20 lines of pedestrians, 10 lines on each side walk, 2 feet each (20 feet × 2 feet) ...	40 „
Total	**108 feet**

Average Secondary Thoroughfares.

Double car-track	20 feet
4 lines of vehicles, 2 each way (8 feet × 4 feet)	32 „
Two 16 foot paths	32 „
Total	**84 feet**

Average Local Streets.

3 lines of vehicles (no trams)	24 feet
Two side walks each 12 feet	24 feet
Total	**48 feet**

To make the above complete, it would appear that "Great Main Thoroughfares and Boulevards," 150 feet or so wide, might have been added.

One after another, American cities exhibit the monotonous interminable 50, 60 or 66 feet grille, devoid of diagonals or true main traffic routes, though often ruled across with 100 feet or 150 feet main avenues that lack logical endings and beginnings. The grille system is the invention of the land jobber, working freely in open land naked of roads or buildings. It is the easiest plan for land sales. It is not town-planning, and its rectification forms the costliest item in every American city improvement scheme.

Continental Standards.

Large cities on the continent of Europe, especially those of France, Germany, Denmark, Holland, Switzerland, Austria and Italy, are in general, laid out in a much more commonsense and incomparably finer and more liberal and beautiful manner than are those of any other countries of the world. The width of streets and roads has been scientifically graduated.

The German Act of 1875, applied to Berlin, requires the following widths :—

Main thoroughfares, from 30 metres, say 98 feet, upwards.

Secondary thoroughfares, from 20 metres to 30 metres, say 65 feet to 98 feet.

Local streets from 12½ to 20 metres, say from 40 to 65 feet.

Hanover, Leipzig and Frankfort (Germany) :—

Main arteries ...	...	85 feet to 118 feet
Secondary arteries ...	...	50 ,, 80 ,,
Local streets ...	...	35 ,, 47 ,,

The exact width is settled according to respective position and probable future.

Dusseldorf (Germany) regulations define as follows :—

Main roads (ordinary)	...	85 feet wide
Secondary main roads	...	66 ,, ,,
First class streets ...	...	48 ,, ,,
Second class streets	...	33 ,, ,,

Paris :—

Champs Elysées avenue	...	230 feet to 260 feet
Great avenues	....	130 ,, 230 ,,
Larger type avenue or boulevard		about 115 ,,
Ordinary avenue or boulevard		,, 98 ,,
Minimum width for a traffic street		,, 65 ,,
Minimum width of a local street		,, 40 ,,

Turin :—

Great main avenues,	about 60 to 80 metres,	about	197 to 262	feet
Main avenues	,, 50 to 55 metres,	,,	164 to 180	,,
Larger avenues	,, 37½ metres,	,,	123	,,
Smaller avenues	....	,,	80	,,
*Ordinary numerous streets	....	,,	55	,,
Narrowest streets	....	,,	45	,,

The above examples are all very typical of both past and modern continental practice.

We may reprint from Mr. H. Inigo Triggs' text book, the following table giving widths of important European city roads in comparison with those of London :—

	FEET
Avenue des Champs Elysées, Paris	230
Reeperbahn, Hamburg	210
Unter den Linden, Berlin	190
Ringstrasse, Vienna	185
Belle Alliance Strasse, Berlin	160

* Often arcaded on both sides, giving them from 80 feet to 90 feet of effective width.

	FEET
Andrassy Strasse, Buda-Pesth	145
Avenue Henri Martin, Paris	130
Potsdamer Strasse and Friedrich Wilhelm Street, Berlin	110
Avenue de l'Opera and Parisian Boulevard	98
Whitehall, London	120-145
Victoria Embankment, London	120
Holborn Viaduct, London	90
Regent Street Quadrant, London	85
Piccadilly, London	75
Queen Victoria Street, London	70
Oxford Street, London	64
Cheapside, London	60
Princes Street & George Street, Edinburgh	100

Nearly every continental town and city possesses a good street system and some fine boulevards or avenues, and a hundred examples could soon be given.

The following may be of interest:—

				FEET
Brussels	Boulevard Waterloo		width about	280
,,	,, Du Midi		,,	230
Marseilles	Rue du Rome		,,	130
Milan	Venezia, Monforte, Vittoria and Romana Boulevards		all about	140
Stettin	Lindenstrasse, Friedrich Karl Strasse, and Kals Wilhelm Strasse		about	130
Turin	Corso Duca di Genova		,,	245
,,	Corso Vittorio Emanuele		,,	180
,,	Corso Regina Margherita	(3 miles)	,,	180
,,	Corso Umberto and others		,,	180
Amsterdam	Nieuwe Zijds Voorburgwal		,,	115
Rotterdam	Gondsche Singel		,,	190
Lille	Boulevarde de la Liberte and others (of great length)		about	110-130
Belgrade	Kralja Alexandra Uliza		about	130
Dortmund	Ringstrassen (Ostwal, etc.)		about	100-120
Dresden	Johann Georgen Allee		about	190
Cologne	Severinstrasse		,,	100
,,	Sachsenring		,,	190
,,	Hausaring		,,	170
,,	And many other fine streets			
Dusseldorf	Allee strasse		,,	170
Stuttgart	Johann strasse and most of Konig strasse, and others		,,	115
Basle	Kannerfeld street and continuation		,,	110
Zurich	Many fine roads		from about 80 to	110
Geneva	Boulevard Helvetique and others		about	98
Lyon	Avenue de Sax (South piece)		,,	80
,,	Avenue de Noailles		,,	90
,,	Avenue de Sax, central mile		,,	98
,,	Avenue Cour Gambetta		,,	82
,,	Avenue Des Ponts du Midi		,,	82

Widths of the most Important and Central Roads in Calcutta.

Name of Street.	Approximate average width between buildings, in feet.	Remarks.
*Chowringhee	100	opposite Grand Hotel
Chowringhee	100 (almost)	opposite Bengal Club
Chowringhee	80	opposite Harrington street; from this point Chowring-hee shrinks into the 30 to 40 feet wide Russa road
Bentinck Street	42	Bentinck street is the other disgraceful asphixiation of Chowringhee
Lower Chitpore Road	46	varies between about 30 feet and 50 feet
Upper Chitpore Road	....	
Esplanade East	111	is only 365 yards long
Old Court House Street	107½	500 yards long only
Dalhousie Square, East	112 (about)	300 yards long „
„ „ North	90 to 100	300 yards long „
„ „ West	100 to about 68	300 yards long „
„ „ South	80 to 75	300 yards long „
Council House Street	49	
Clive Row	54	
Clive Street	90 (only 360 yards of good road)	Opposite Exchange
„ „	100	Near Trust offices
„ „	50	100 yards beyond ditto
„ „	40	at Canning street
„ „	a little over 30 feet....	at Harrison road
Darmahatta Street	about 40 feet	behind the Mint
„ „	20 to 30 feet	remaining 900 yards
Strand Road, South	mostly 60 feet	At Bengal Bank, it is less.
„ „ North	about 63 feet	60 feet at Howrah Bridge, 80 feet at Mayo Hospital, 55 feet or so at Neemtolla
Harrison Road	71	varies from 69 to 77 feet
Howrah Bridge	effective, about 62 feet	at each entrance, only about 50 feet effective.
Canning Street	46	varies from under 40, up to 50 feet
Bow Bazaar	67	between Bentinck street and Wellington street it is mostly 60 feet, but in places is less than 50 feet
Lall Bazaar	about 72	
Lyons Range	„ 51½ ...	
New China Bazaar	„ 80	120 yards long only
Dharamtolla	„ 90	quarter mile only, next Sealdah station
„	„ 63	55 to 70 feet
Corporation Street ...	„ 48½	
Lindsay Street	„ 55 to 35	
Park Street	„ 66½	varies between about 50 feet and 80 feet

Except Chowringhee, all the good widths are of utterly insignificant length.

* Measured in each case from building-line to a point on Maidan ten ft. beyond western-most tram rail.

CALCUTTA ROADS AND STREETS NOT OF THE FIRST IMPORTANCE, BUT YET IMPORTANT.

Name of Street	Approximate average width between buildings in feet	Remarks
Circular Road	60 to 80 feet	between Sham bazaar and Beadon street
" "	80 to 90	Beadon street to Sealdah
" "	70 to 100	Sealdah to Ballygunge Old road
" "	mostly 80 to 90	Sealdah to Chowringhee Note that Circular Road width is obscured by the Municipal Railway and store deposits, etc., etc.
Sham Bazaar Street	31	
Sobha Bazaar Street	38½	
Grey Street	48	
Neemtolla	40	
Beadon Street	48¾	
Manichtolla Street	34	
Machua Bazaar	42	
Cotton Street	16½	
Koolootolla Street	44	
Mirzapore Street	43¾	
Free School Street	52½	
Cornwallis Street	69	
College Street	68	at one point, only about 55 feet wide
Wellington Street	62	is about 70 feet, opposite the square
Wellesley Street	67	
Wood Street	61	
Loudon Street	66	
Carmac Street	82	varies from about 65 to 95 feet
Theatre Road	67	

Open Space in Calcutta and other cities.

This table shews approximately that the cities of Europe and America usually possess some 40 to 60 per cent. of open space solely in streets and roads. The Calcutta average is about 13 per cent., and exhibits forcibly the streetless condition of the city.

Other cities possess from 300 to 400 per cent. more roads and streets. The total combined open space, in roads, streets, gardens, courts, etc., in the built-up areas of European and American cities (excluding parks and public gardens) averages roughly from 60 to 70 per cent. The Calcutta figure (improved by the Park Street area) is about 24 per cent. Without that area the figure sinks to about 18 per cent. This is congestion undreamt of in European and American cities. In Calcutta one can find solid blocks of 10 to 20 acres, in which the total combined open space of all kinds

is only 5 to 10 per cent., and the buildings will be from 3 to 5 stories high. The writer minutely measured up the street space in two London 'slums,' condemned for demolition. One was in Westminster, and gave 24.6 per cent., the other was in Whitechapel, and had 26½ per cent., in street area alone.

The property was mostly two-storey poor-class residential. The total open space was about 40 per cent. They were considered very bad areas indeed. In Calcutta, by a large section of the public, those areas would, it is pretty certain, be considered orderly, wonderfully well planned, and by no means insanitary. This is no exaggeration; and it is with no pleasure that the writer sets the fact down. It is done to draw attention to the true state of Calcutta, and the great need for educating public opinion.

Large-scale plans of these two London areas are forwarded with the report. Comparison of these plans with any 50 foot scale sheet of northern built-up Calcutta, will at one glance, shew the great superiority over Calcutta conditions, of these condemned London areas.

Continental Cities.

These have their old parts, in which total open space may sink to 40 per cent. Most of the European continental cities are rather more spacious as regards street and road-space, than are British—but in space per head per dwelling, Great Britain beats both America and the Continent.

AVERAGE OPEN SPACE OBTAINED IN BUILT-UP AREAS OF CITIES BY OPERATION OF ORDINARY BUILDING AND STREET BYE-LAWS.

Country or City.	Open Space in roads and steeets.	Open Space left on each Building Plots.	Minimum street width.	Height of Buildings.	Total combined percentage of open space attained in streets & building plots.
CITIES OF GREAT BRITAIN	Minimum of 28 %, Averageabout 40 %	Minimum of 33 %	36 to 50 ft. has been prevalent in Gt. Britain since 1875	Very various, depends on no angle, but on width of street though 45ft. is aimed at. In most of London about 80ft. is the maximum	Min. of about 61 %
CITIES OF AMERICA ...	About 50 to 60 %	Often too little 10 to 33 %	40 to 60 ft., 40ft. becoming general	Usually no limit, great evil is resulting from this in New York and elsewhere	Aver. about 70 %
MANNHEIM (Germany)	In City about 40% greater than in suburbs.	From 60 to 15 %, (the latter for corner buildings only, in Central Mannheim)	25ft.	from 5 storeys downwards, according to district	Aver. about 70 %, town nearly all new
MUNICH (Germany) ...	About 40 %	From 50 to 25 %, mostly 33 %	—	ditto	from 55 to 70%
COLOGNE (Germany) ...	—	25 to 65 %, according to district	—	from 5 storeys downwards, according to district	Appears to be about 60 %
FRANKFORT ...	About 40 %	Average 33 %	—	from 65ft. downwards, according to district	Average 60 %
DUSSDELDORF ...	—	33, 50 & 60 % as per district byelaws	33ft. next sizes are 48ft., 66ft. and 85ft.	As a rule from 66ft. downwards as per dist. byelaws. Height must not exceed width of street (a gen. law in most of Germany)	Appears to be not less than 60 %
MADRAS	About 40 %, remarkably good for India.	33 % rigidly enforced Note.--All buildings have to be built to a line 4ft. behind the street line, 8ft. is thus gained to the open space	20ft. for back access streets new streets 40ft.	Max. of 60ft. Street width 26ft., height 39ft. 40ft. × 40ft. over 40ft. wide bldg. shall not exceed street width in height	About 50 %
Calcutta... ...	**Omitting Maidan, about 13 % inside Circular Road**	**Aver. over large areas appears to be about 8 %**	**?**	**?**	About 24 %, inside Circular Rd., if Maidan be excluded. Park St. area brings the figure up to 24 %. In some parts blocks of 20 acres possess only 5 to 10 % in total open space of all kinds

The above figures are not exact, but they are sufficiently correct to permit of sound general conclusions. It will be understood, that to obtain these figures only approximately, requires a great deal of measuring and calculation; to obtain them exactly for our partciular purpose would only be a waste of time.

Tramway Mileage; Calcutta compared with other cities.

Tramway mileage, to-day, indicates in a very marked manner, the condition of a city as regards (a) Main road provision. (b) Suburban development. (c) Central congestion. (d) Wealth and business capacity.

The importance of tramways in large cities cannot be too thoroughly appreciated nor held too much in mind. Every city that has a poor tram system is suffering from severe congestion. Tramways may be regarded as the absolutely vital rapid-transit system for all cities of less than one and a half million people. Whether that system be worked by electricity and cars on rails as is now universal, or whether it be replaced by petrol cars on rails, single-unit self-propelled cars on rail or not on rails, will make no difference.

The system, the network of free and rapid routes, will remain vital to the progress of a city. Almost every single city of the West has recognised this truth in a very practical manner. In Great Britain, there are but few municipalities that do not own their own tramway systems. On the continent, most municipalities many years ago either put down their own tracks, or made very perfect arrangements with private tramway companies. The complete municipalisation of tramways in continental cities is now in very rapid progress. At the same time, some of the finest systems in Europe are run very ably indeed by great companies, as witness the 180 miles of Berlin.

In the following comparative table, the most interesting column is that which shews how many people there are for every mile of tramway route.

It will be observed that continental and American cities have about 40 per cent, more tramway route than British; which fact is due to superior town planning. Russia follows a long long way behind Britain and the other countries of Europe; and Calcutta is in a very bad way indeed. This in no way is the fault of the Calcutta Tramway Company—but is the fault of the city—for fully sixty per cent. of the required main roads and 75 per cent. of the streets are not yet in existence.

TRAMWAY MILEAGE OF BRITISH TOWNS AND CITIES COMPARED WITH THAT OF CALCUTTA.

Name of Town or City.	Population served.	Miles of Streets provided with Tramways, viz., Mileage of street-route whether double or single	Owned by	Approximate Population per Mile of Street route, about	Gauge.
ABERDEEN	165,000	30½	Municipality	11,100	4′ 8½″
BELFAST	386,000	42	,,	9,200	,,
BIRKENHEAD... ...	132,000	14	,,	9,400	,,
BIRMINGHAM... ...	900,000	69	,,	13,000	3′ 6″
BRADFORD	337,000	60	,,	6,600	4′ 0″
DUNDEE	165,000	15	,,	11,000	4′ 8½″
*GLASGOW	1,150,000	99	,,	11,600	4′ 7¾″
HUDDERSFIELD ...	150,000	30	,,	5,000	,,
LEEDS	500,000	58	,,	8,600	4′ 8½″
LIVERPOOL	817,000	64½	,,	12,700	,,
MANCHESTER	950,000	106	,,	8,960	,,
SALFORD	350,000	41	,,	8,500	,,
NEWCASTLE-ON-TYNE ...	300,000	31	,,	9,700	,,
NOTTINGHAM ...	260,000	20	,,	13,000	,,
OLDHAM	180,000	24	,,	7,500	,,
PORTSMOUTH ...	237,000	16	,,	14,200	4′ 7¾″
ROCHDALE	112,000	24	,,	4,250	4′ 8½″
SOUTHAMPTON ...	123,000	10	,,	12,300	,,
SHEFFIELD	456,000	40	,,	11,400	,,
	7,670,000	778		9,900	Average of British Towns & Cities
CALCUTTA ...	**1,043,730**	**31**	Company	**33,600**	**4′ 8½″**

Note, in addition to the enormously superior mileage, it must be remembered that practically all the above tramways are run with double-deck cars, while the Calcutta trams are only one-deckers. Almost all Continental tram-cars are of single-deck type. Note that all the British cities own and work their own tramways, and that practically all route is of double tract.

* Glasgow possesses a fine city passenger fast low-level railway with numerous stations.

TRAMWAYS & PASSENGER RAPID-TRANSIT LINES.*

SOME CONTINENTAL TOWNS & CITIES.

Comparison between Mileage and Population served.

Name of City.	Population.	Approx. mileage of roads and streets traversed by tramways.	Approx. mileage of city electric railways.	Total mileage of both kinds.	Population served per mile of route, tramways only.	Population served per mile of route, both kinds.	Remarks
PARIS (Capital of the French Republic)	Urban 2,850,000 With subs. 3,300,000	Urban 165 with subs 320	— 60 With motor bus 100	— 380 With motor bus 480	17,003 With motor bus 10,300 — — trams. only	8,800 motor bus routes 6,800	Paris, inside the city boundaries, has about 100 miles of motor omnibus routes. She has also a ring railway of 20 miles traversing the exterior built-up areas, and having 30 passenger stations. Further, Paris has 40 miles of underground rapid-transit passenger track, with 120 stations all in central built-up Paris.
VIENNA (Capital of the Austro-Hungarian Empire)	2,050,000	145	— 49	— 194	14,200 —	10,600	Vienna possesses 34 miles of light electric passenger railway (Lokalbahn) that traverses all the inner suburbs, for which there are 30 small stations. Vienna also has an excellent city electric railway (Stadtbahn) mostly round central Vienna and provided with 30 stations.
BERLIN (Old City) (Capital of the German Empire)	2,072,000	179* *30 miles are in the outer subs. Almost all are at present owned by the Berlin Tramway Co.	— 31	— 210	11,600 —	9,900	In addition to an excellent tramway service throughout the city and suburbs, Berlin has a fine 4-track electric central railway, 10 miles long; also an electric ring railway 24½ miles, and the 'elevated and underground electric' 6½ miles long. There are also numerous motor bus routes of which the writer has no details.
HAMBURG (Fourth Seaport of the world)	953,000	102	— 30	— 132	9,300 —	7,200	Hamburg is the greatest seaport in continental Europe. In addition to a fine tramway service, she posseses two city electric railways the 'elevated and underground' and the 'Vebingsdung-bahn,' with a total track length of about 30 miles, and provided with some 40 stations in the city precincts.
DRESDEN ... ... (Important and ancient Commercial city of Germany)	550,000	40	—	—	13,700	—	The tramway system is backward, and numerous extensions are about to be carried out.
TURIN ... ... (Important Commercial city of Italy)	300,000	68	—	—	4,400	—	Turin has a splendid and rapid tram-service. 20 miles are worked by the municipality, 18 are intermunicipal and go straight out to the distant suburbs, 30 miles belong to the tram company. All work together well and there is an excellent inter-connection: some routes are used interchangeably by all cars. See also the first-rate Tramway Map of Turin, among the exhibits.
MARSEILLES ... (Principal Seaport of France)	500,000	99½	—	—	5,000	—	See large tramways plan of Marseilles.
LILLE ... ... (Important manufacturing town in N. France)	220,000	35	—	—	6,300	—	See the maps, also photo-album giving views of this admirably planned city. Considerable architectural control is exercised by the municipality, although most of the members are men employed in commerce. Although Lille has but one-fifth of the population of Calcutta, the rateable value is about two-fifths of Calcutta, while in tramway mileage the town is equal to the great city of Calcutta.

* See folio of City Tramway Systems, included in Exhibits.

Name of City.	Population.	Approx. mileage of roads and streets traversed by tramways.	Approx. mileage of city electric railways.	Total mileage of both kinds.	Population served per mile of route, tramways only.	Population served per mile of route, both kinds.	Remarks.
BRUSSELS ... ... (*Fr.* Bruxelles—Capital of Belgium)	705,200	Central Area - 49 inner subs. - 40 89 outer subs. - 30 119	—	—	7,900 5,900	—	The Brussels tramways are owned by two large companies, who work together amicably in the matter of inter-connection route times. Brussels is already a very fine continental capital, but is in the middle of great improvements involving the creation of new great roads and boulevards in central Brussels. The tramway service is excellent, and suburban growth is rapid and good. Note that there are numerous motor omnibus routes.
MUNICH ... ... (Capital of Bavaria, and a great commercial city)	604,000	Central & inner subs. - 48 outer subs. - 6 54	—	—	11,200	—	Munich is not as well off for rapid-transit as are most continental cities, partly because of physiological difficulties and the compactness of the central area, and partly because the city is in need of tramway extensions that have not quite kept pace with the growth of the city plan and suburbs. All the same, it is about 300 per cent. better off than Calcutta is as regards tramways.
BORDEAUX ... ... (France)	270,300	Central & inner subs. - 40 outer subs. - 12 52	—	—	5,200	—	Bordeaux is the fourth city of France as regards population, is an important seaport, and is noted for its great commerce, excellent site, noble appearance, and fine planning. The tramways are first-class. A universal fare of 10 centimes (less than 1 anna) is charged for any distance The plan is well worth studying (see folio).
BOLOGNA ... ... (Italy)	180,000	16½	—	—	10,900	—	Bologna is a rich and important commercial town of Italy; the plan is very admirable. The streets in the central area are rather narrow, but are nearly all arcaded, which adds some 40 to 60 per cent. to their effective width, gives good facilities for shopping in all weather, and makes the town beautiful and pleasant. The rather short tramway track appears to be due to the great economy in length of a radial system.
LIÉGE ... ... (Belgium)	180,000	30	—	—	6,000	—	Important and ancient manufacturing and commercial city of Belgium. The city is very compact, but very well planned, in a difficult site. Production of works is very great for the size of city. The revenue per annum is nearly half that of Calcutta.
ST. PETERSBURG ...	1,662,000	78	—	—	21,300	—	Russia in Europe stands as regards city amenities about half way between the West and the East. Russia is still a very backward empire and it is of interest to find her condition reflected very exactly in the tramway systems of her two great capital cities. They are about 100 per cent. or so better off than Calcutta as regards tramways, but come over 100 per cent. behind the cities of Europe proper. Enormous improvements to cost about ten million pounds in about 10 years are however in hand in St. Petersburg; and many other cities of Russia are following suit. Municipal Corporations are scarcely known in Russia, nor is the country yet fit for these institutions.
MOSCOW	1,536,000	81	—	—	19,100	—	
CALCUTTA and Suburbs	**1,043,307**	**31**	—	—	**33,600**	—	

CONTINENTAL AVERAGE.

Excluding Paris, Vienna, Berlin and Hamburg, which do not depend solely on tramways, the average equals one mile of tramway route for every .... 6,820 people

CONTINENTAL AVERAGE.

Including Paris, Vienna, Berlin, Hamburg, and also all forms of rapid-transit route except ordinary railways. Equals one mile of rapid-transit route for every .... 7,770 people

SUMMARY OF TRAM-ROUTE AVERAGES.

INDIA.

Name of Town or City.	Tramway provision Average population per one mile of route
Calcutta proper	29,000 people
Calcutta and Suburbs	33,600 people
Calcutta with Suburbs and Howrah	34,500 people

RUSSIA.

St. Petersburgh and Moscow	20,000 people

WEST CONTINENTAL EUROPE.

Average of nine great representative towns and cities, served by tramways. One mile of route per	7,220 people

BRITISH CITIES.

Average of nineteen large towns and cities of Great Britain. All tramway systems owned by the Municipalities. One mile of route per	9,900 people

AMERICAN CITIES.

The average may be taken at about one mile of route per	7,000 people

After looking at these comparative tables of roads, streets, tramways, open space, and road-widths, it seems clear that we in Calcutta are living in a city having so dwarfed a scale of amenity, that it is highly necessary to guard our sense of judgment and measurement, otherwise the sharp consciousness of Calcutta's real needs is likely to become dulled and ineffective. Unless we keep on our guard, we can, in the most easy and insidious manner, become used to the most evil conditions.

Detail questions of arcading, traffic, division of roads, position of tramways, width of footpaths, etc., etc., examined in other cities, will be discussed later on. The chief object of this chapter is to provide a scale of measurement for use in dealing with the needs of Calcutta.

SECTION II.

CITY MAIN ROADS.

CHAPTER VI.

Preliminary on Section II. of the Report.

Section II deals with finding out what is best and cheapest internal framework for Calcutta—Sharp unusual demarcation between city and suburbs—between land congested and land lightly occupied—Biggest problem and cost is new internal framework—Calcutta suburbs depend unusually on new city roads—Freer hand in suburbs and closer tied hand in city than occurs elsewhere.

Section II.—CITY MAIN ROADS.

In this section will be discussed the condition and the improvement of the main framework of Calcutta, i.e., the main roads; and in especial, the urban and central main roads of the built-up city. But right from the outset it must be understood, that all new roads, widenings, and all creative work suggested on the plans in this report, are to be regarded only as the great primary and vital main lines of a complete urban, suburban, and extra suburban, City Plan of Calcutta.

The case of Calcutta is one very unusual. In all modern cities the internal main roads are numerous, the internal planning and street system is fully developed, and thus the urban, the central, largely rules and determines what shall be done outside in the suburban, for the suburban is found round the normal city to be extensively penetrated by numerous arms of the developing and growing mesh of city streets and roads.

In Calcutta, there is no such general and proper connectton between city and suburbs. The cost and importance of the route of a new main road in the city, quite overshadows the position-value of any wriggly lane that at present does duty as a main road in the suburbs. In other words, Calcutta suburban planning depends to at least 60 per cent. on the new members of the internal city framework which we propose to add. In nearly every other city, suburban main road planning depends on the already existing and well developed road and street system of the city, and, also, there is practically only suburban planning to be done. Until the new Calcutta internal framework is decided, any suburban development can only be shewn in a suggestive and sketchy form.

It is only a few hours' work to take a map that we have studied to some extent, or say the plan of a well known English town, and upon it put down a number of the usual dotted lines running out nicely into and over the suburbs—and we have most of us done it at some time, and pondered, and perhaps bitten a pencil over it—but this is not modern town planning. The genuine value or rightness of those dotted suburban lines can not be estimated soundly in our case, until a fairly complete draft City Plan has been prepared, showing in especial every proposed urban main road closely in its inevitable place, also the future building lines of every existing real street in Calcutta: especially those that come near the margins of the built-up area. The suburban main roads in the city plan cannot be adjudged and determined on to any real extent until they are shewn in relation with definite sociological demarcations, future dock and railway developments, future parks, future ship canals if any, etc.

Nevertheless, it has been necessary, in the plans for this report, to shew by suggestive lines, a few of the really obvious future suburban main tramway roads, the routes being laid down from observation on the ground: in accordance with what the general large ruling conditions seem to demand: and also of course in agreement with the proposed internal main-road framework of the city. Despite the unusual severance between city and suburbs at Calcutta—the new internal framework of the city will yet depend considerably for its form and members, on the various suburban conditions that surround it, but less so than is usual.

The urban and surburban cannot of course be separated in any fundamental question. But at Calcutta, we have within certain limits, a freer hand in planning suburban main roads of the future. The average city is occupied almost wholly with suburban planning, but Calcutta's greatest problems are internal, and her suburban work is very much the simpler, easier, and less costly part of the work urgently required. For these and other reasons already given, it is convenient and proper first to consider the internal framework of the city. Secondly, the housing and congestion problems will be dealt with, and following upon those, we come to suburban development—yet these three are inseparable components, and form the Athanasian inseparable trinity of town planners.

CHAPTER VII.

CALCUTTA TRAFFIC PROBLEMS.

Traffic units—Foot traffic—Traffic route diagram—The two great problems—Traffic desires of Calcutta—Of the main focus—It is interpenetrated by the shipping area—Each suffers—General main lines of city traffic—What traffic is doing and would like to do—Budapest plan shews what we want in Calcutta—Remarkable parallel—General description of important Calcutta traffic flows and foci—Main focus reconsidered because of great importance and bearing on whole problem—defects of main focus detailed—Traffic intensities—Present day traffic only indicatory—Traffic increase—Special traffics—Jute—Strand shipping traffic—Kidderpore shipping traffic—Howrah bridge traffic—Factory traffics—Oil and seeds—Special motor and heavy traffics—Special foot traffics—Suburban passenger traffic—(a) by Tramway (b) ordinary Railway—Internal tram traffic its teachings—District Road Traffic—Present congested routes—Summary of Traffic needs.

Calcutta Traffic Units.

This subject was dealt with pretty fully in the writers' report on Howrah Bridge. The chief points were, that the great mass of Calcutta merchandise is conveyed in two-wheeled bullock-carts, drawn each by a pair of bullocks, and less often, by a single bullock. The speed is usually but two to three miles an hour. These are awkward vehicles, the total length averaging from point end of pole to back of cart, some 17 to 20 feet in length. The width over the hubs is rarely less than 7 feet 9 inches, and often, over the projecting axle-ends, it measures nearer 9 feet. A steam roller measures as a rule, from 6 feet 9 inches to 7 feet 3 inches over all. The present chief goods traffic unit of Calcutta is thus very long, and is also very wide indeed—a foot wider than that found in Glasgow, Manchester, Marseilles, New York, and most other seaports and cities. Evidence given in the Howrah Bridge report, shewed that bullock carts were likely to hold their own as the favourite goods vehicle in Calcutta. The chief reasons are their remarkably slight cost, the slight cost of bullocks and wages, and the ability of bullock-carts to go anywhere on tracks that could not be used by motor vehicles, and also, the great number of small traders, and small number of big firms in Calcutta business. Of the former none can afford to own motor wagons, though a Pickford system might be introduced.

At the end of 1910, only 17 heavy motor vehicles had been licensed at Calcutta, and in 1912 the figure stood at but 22, yet 1,790 motor cars and taxis had been licensed in 1912. In January, 1912, the motor traffic crossing Howrah Bridge was only $2\frac{1}{4}$ per cent. of the daily total of 13,300 vehicles. In 1912, there were 54 taxi-cabs plying in Calcutta, but the commonest vehicles are four-wheeled two-horsed gharies (cab), the one-horse four-wheeled cab, and the one-horse 'office jaun' or narrow box-like closed cab. All these vehicles are of normal width. In the best part of the city, motor cars now play a considerable and rapidly increasing part in the passenger traffic.

Foot traffic in the city is very great; and there are special reasons for this. The tramway system is quite inadequate, and trams delayed by traffic congestion and lack of circulation routes, are commonly too full to be boarded by more passengers. Then, the Indian is a very good walker, and the proportion of poor people is great. The narrowness of the roads and footpaths, the concentration of traffic in the few roads there are, the highly obstructed condition of footpaths, all force numerous foot passengers into the roadways; this may especially be observed all along Chitpore Road, at the Howrah end of Harrison Road, on the Howrah Bridge, in Canning Street, Machua Bazaar, Clive Street (north), Bow and Lall Bazaar Streets, Bentinck Street, Lindsay Street, and elsewhere. This causes further delay to vehicular traffic.

Traffic Route Diagram.

Thick black road lines on the diagram do not indicate traffic capacity; they shew traffic intensity. The fine arrow headed lines on the diagram are intended to shew the chief directions in which traffic would flow backwards and forwards if it were free so to do.

This will now be found very helpful. It is rough, but fairly correct, and the descriptions written upon it are supplemented by those on other plans. The diagram is printed on transparent paper so that, after a preliminary consideration alongside the plan of the existing road and street system of Calcutta—it can be placed over the Sociological Map, and traffic conditions will then be seen from a larger and more defined standpoint. Later on, as required, the diagram can be laid over the various urban road schemes, and will be found to help an approximate judgment as to the efficiency with which such schemes meet the traffic needs.

While the next two chapters are read, it will also be found very helpful if the following maps are spread out—Traffic Intensity, Existing Road System, Sociological, Tramways, Values, and Census Maps. It will be better to have the Slum Map and Scheme Maps out of sight—as at this stage they would only confuse the issues.

Examination of the diagram shews that the desires and needs of traffic are nearly all at wide variance with the existing Calcutta road system. Only in a few cases do we find the main roads coinciding with the true and natural direction-needs of traffic. Instead of making way like a steamer, straight ahead to the desired destination, Calcutta traffic is forced by the roads to pursue the indirect long zig-zag course of a sailing ship, tacking up the wind first one way and then the other way, at right angles. In addition we have seen that the main road system is composed of narrow roads, and that these again are deplorably few in number, and that the street and road system of Calcutta is short by 75 per cent. of that found needful in other cities. This brings us to the big problems in this section of the report. They may be put into two questions:—

(a) Which are and will always be, the chief directions along which Calcutta traffic will rightly and naturally desire to travel back and forth?

(b) What is the best and most economical main road plan effectively to meet those present and future needs?

Traffic Desires of Calcutta.

Traffic movements are determined by centres of activity. The largest flow is always into and out of the central heart or focus. Sometimes this is very clear and definite, as in the case of Moscow.* Sometimes it is much less prominent, as in the case of Liverpool—where a peculiar and huge secondary focus is createcd by the long line of great docks.

The Calcutta conditions are likewise not simple. The present main city focus lies round the Exchange, and the present central densest nucleus is shewn by the shaded oval on Traffic Diagram. Just west of this city main focus, and pressing into it, is a great focus of ocean shipping, in the form of a long riverside line of tightly packed quays, railways and warehouses.

Things are made still more complex by the position, just north of the city heart, of the greatest road-bridge focus in India, itself cut across by a big north and south route. Between Howrah Bridge and Chowringhee and passing in a distressful zig-zag right through the centre of the congested city focus, is a great traffic stream.

It may be said at once, that this great stream must be diverted from its zig-zag and inconvenient course, and be sent past in a smooth broad direct curve, more to the east, and otherwise, as will be suggested later.

Another inconvenient set of traffic currents that flow across the focus from west to east and vice versa, are those going to and coming from the said line of ocean shipping along the riverside. The city focus—containing the seat of government, the banks, the General Post Office, the great offices, the best shops—is much too cheek-by-jowl with its rough and ready shipping neighbour that uses practically nothing but the slow bullock cart—and the friction is becoming intense.

This unfortunate mutual interpenetration of the main focus, the shipping traffic, and a great bridge route, and the severe intersection of the civic focus by that route, produces complex disorders that do not seem to occur to anything like the same degree in any other big city of the world. The easing, separating and sorting out these three great objectives is one of the big problems. New York, Philadelphia, Albany, San Francisco, Baltimore, Singapore, Bremen, Hamburg, Mannheim, Genoa, Marseilles, Southampton, Liverpool, London, Manchester, Newcastle, Glasgow, Cardiff, practically all the world's ports, exhibit a separation sufficiently wide between the civic-business and the shipping centres, to allow each to develop and be freely active without mutual injury or friction. The central Calcutta shipping focus, if it is to expand at all, must now encroach southwards on to the best public gardens and the finest park posssesions of the city; and, if it were to develop freely and successfully, Government House, and the banks, Government Offices, and public buildings of Dalhousie Square and Clive Street, would all be absorbed and replaced by warehouses. There is a possibility of creating some further congested ocean shipping strip, by

* See remarkable plan of Moscow in Exhibit folio.

removing Howrah Bridge to a point further north. The effect would only be that of adding a small outbuilding to premises 200 per cent. too small for their job. The line of buildings along the South Strand Road are built along the natural site of the shipping trade riverside railway. Strand Road itself is but half of the minimum width that would be required.

As years go on it will become more and more inevitably apparent that the true solution is to move all but a definite amount of shipping work from Central Calcutta to Kidderpore. It would then occupy a position parallelled in most great seaports, and would be free to expand, and increase the wealth and power of the city.*

Before going into detail, we may take another general glance at the Traffic Diagram and Traffic Density Map. We see that there is a great radiation of traffic concentrating on Howrah Bridge, chiefly from the south-south-east, south-east, east and north-east, with the equal return traffic flows zig-zagging painfully out from the bridge in the reverse directions. It is a grave defect that there are no north-east or south-east routes to coincide with these great flows. Into the city main focus and its surrounding active zone, a second big consensus of traffic, pours from south, south-east, east, north-east and north. The chief flows come into the city heart from north-west (Howrah Bridge), the north, north-north-east, east, and south-south-east. They go out again of course, in the reverse directions, and the circulation, though continuous, is naturally mostly inwards in the morning and outwards at evening. This main focus traffic is far more largely of passengers, cabs and motor cars, than is that of Howrah Bridge.

It will be observed that Lall-Bow Bazaar Street is the only truly placed radial road meeting the direct wants of the city main focus of Calcutta.

At this point of our discussion, readers can get a most clarifying assistance by looking at the Calcutta Traffic Diagram put alongside the plan of Budapest, which city has a population of 900,000, forms in some important points of position a wonderful parallel with Calcutta, and is considered a model city as regards main road planning.

In this city we find a great railway focus on the east, closely answering to our Sealdah, and a railway plexus in the north replying to our Cossipore-Chitpore development (soon to be greater). The river Danube, not so much narrower than the Hugli, and very deep and swift, bounds the city bulk on all the west as at Calcutta, and Howrah is precisely represented by a big suburb west of the Danube. The heart of Budapest is protected from all but one through traffic line by means of a surrounding half circle of immensely wide roadway. From this focal band radiate the required big traffic roads in every direction. The magnificent east and west Rakoczy Avenue occupies the position of Lall-Bow Bazaar. The great Ulloi Avenue is their Chowringhee, but leads straight out of the main focus. Their Vaczi Avenue is our Chitpore road, and between that big avenue and the river are two other direct north-going roads, and then a very fine Strand Road.

* Those who may wish to gain good general ideas on port development will find much information in the report of the Boston Metropoliton Improvement Commission—included among the exhibits.

The traffic needs of Calcutta and Budapest are closely alike in relation to focal points, and if we put the transparent Traffic Diagram over the Budapest map it will give a very good notion of the ideal road system that would meet Calcutta traffic wants. [Howrah Bridge should be put on the Elizabeth Bridge of Budapest.]

Important, but less so than Howrah Bridge and the Exchange focus, is the Sealdah Railway Terminus, occupied chiefly with passenger traffic. It is well connected to Howrah by the Harrison Road, and is directly joined up to the city focus by Lall-Bow Bazaar—but the latter is already too narrow for the increasing traffic, and quite too narrow to serve also as a most important tram route, which is the present case. Duplication of Lall-Bow Bazaar is, the writer believes, necessary for both present and future needs of Calcutta.

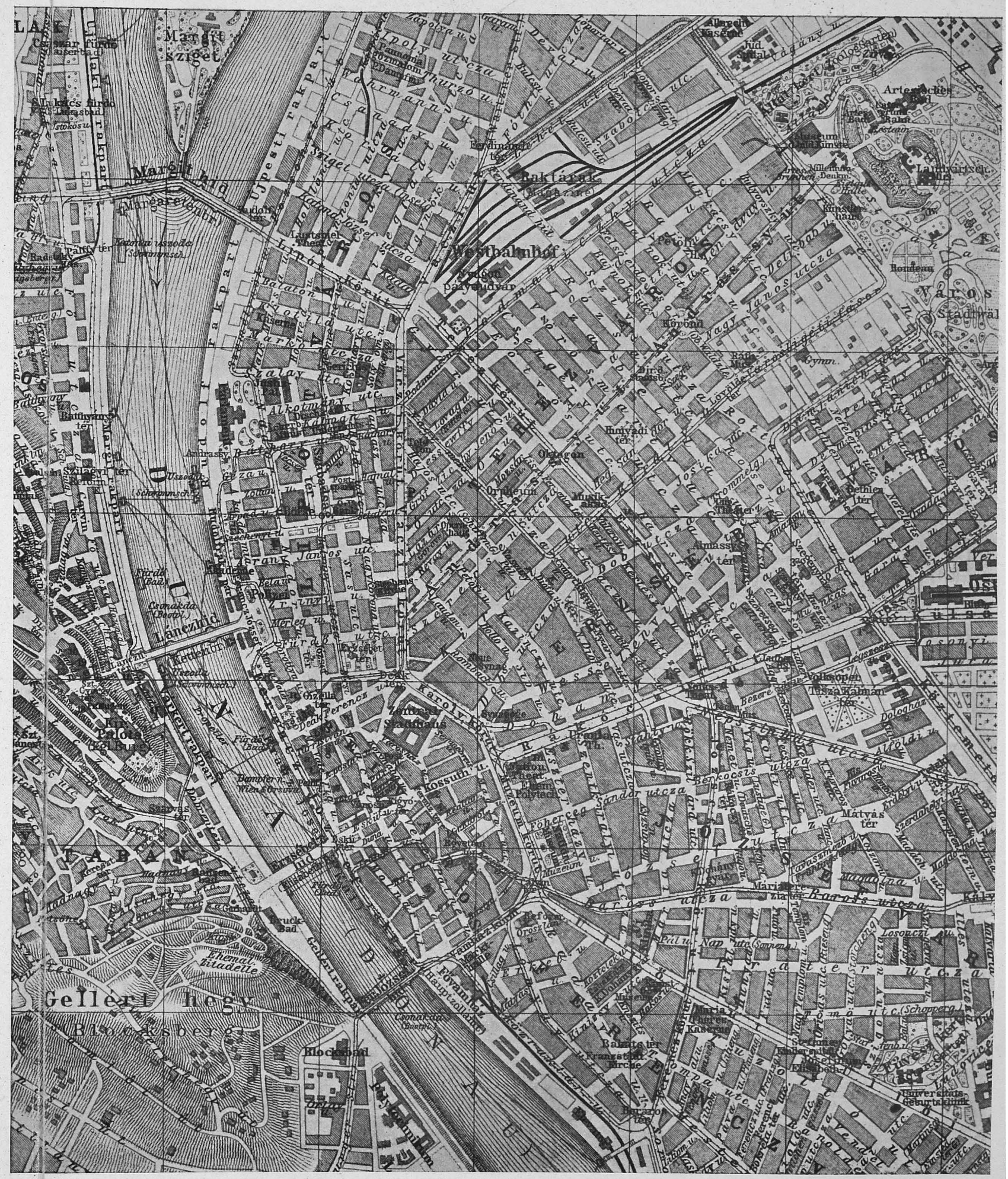
The Sealdah focus is not connected by any direct route either with the most important social section of Calcutta—(Chowringhee-Park Street area) nor with the great populous solid north-west blocks of Calcutta. These two omissions are not, at present, felt as a very great inconvenience. But all present-day Calcutta traffic is merely indicatory of what it is going to be. Looking far ahead in good time is the life-blood of town planning, and because the Sealdah missing diagonals, south-west and north-west, are not felt as a great need to-day, is an argument of no value in re-planning Calcutta. In addition to the big railway passenger focus at Sealdah, there is the Beliaghata main road, used for traffic of the jute mills and railway yards east of and around Sealdah.

At present there is a focus of jute activity and a jute mart just east of Aheeritolla Ghat and about a mile north of Howrah Bridge, at Hatkola; it is unconnected with the factories and railways by any ordinary convenient routes. It is noted now among the other foci, before special traffics are discussed.

Another local focus is the municipal market, which is mostly in need of approach routes from the east and south-east.

The Law Courts, just west of Government House, form a passenger focus larger than might be believed. There is a good approach route from the Park Street area and from directly east—but the larger number of people come there from the residential blocks of the north and north-east, and have no proper route, and those from Howrah station and bridge have to walk or drive through the horrible and steadily increasing congestion of the bridge debouchment and South Strand Road. There is no tramway over the bridge. At Madras, tramway receipts always fell some 20 to 25 per cent. as soon as the Presidency Law Courts closed for vacation.

Chowringhee and the Russa Road forms a very important passenger traffic route, but is much less important as regards merchandise. Bhowanipore supplies most of the tram passengers. Kidderpore docks and district from a big focus of traffic and merchandise, but are very imperfectly connected with Calcutta proper, more especially as regards direct passenger transit.



PLAN OF CENTRAL BUDAPEST

On same scale as the Calcutta 3-inch to 1 mile map, *e.g.* **same as "Existing Road and Street System of Calcutta,"** and all the small maps of Road-Schemes. The Budapest map shews the road and street arrangement which would have suited Calcutta, and towards which we must especially work as regards creation of new intra-city main roads. **Each Square** measures about 690 yards by 690 yards.

Important Considerations in the Main Focus. Definition, stability, the present and future; present great lack of ingress and egress.

After the above general sketch of traffic flows and foci, it is needful to consider the main focus in a closer manner.

The most valuable, active and important part of Calcutta lies between Howrah Bridge and Park Street where it joins Chowringhee. This forms a long awkwardly shaped main focal area. Inside it there are three hubs or intense spots :—the Bridge, the Exchange, the Grand Hotel. They may be taken respectively as the traffic foci, of merchandise, office-work and social life. On the Values and Sociological Maps this same area is shewn yellow, and the less valuable and active area behind and around it is coloured blue on the Values Map, as being of the second value. In the Traffic Route Diagram the shaded and dotted line demarcates generally the same area of greatest development, activity and value : and the outside line of dashes shews the likely growth of the city's richest area during the next few decades. The shaded oval in the diagram represents the central spot of Calcutta's business arena. It lies practically around the Exchange, a shade north of Dalhousie Square. This eye of the main focus is of proved stability. It is the ancient centre of Calcutta, and is to-day still the natural centre of gravity when viewing the whole city—that is if we allow the great weight as it were, of the Strand Road and Howrah, to balance the less intense activity that lies east of Dalhousie Square. This main focal point of Calcutta cannot extend south because of the Maidan, and because all south of Dalhousie Square, between the Square and the Maidan, is occupied by government offices, and is physically incapable of further business expansion, except to an alarming and hideous extent upwards. West, we have the river boundary, which itself first drew, and has since held too near it, the city main focus. Eastwards, we get further and further from the river, but absorption of lesser values can and will take place in that direction. Northwards, we keep by the ocean section of the river as far as the bridge, and we may expect the irrestible growth of the city focus to take place rather more northwards than eastwards.

The heart of Calcutta is practically permanent in position; the absolute centre tending to move only slightly eastwards and northwards. To-day, a heavy percentage of the traffic makes largely for the focal point marked by the Exchange, and a very heavy percentage of the whole foot and tram traffic of Calcutta flows in and out of the shaded oval area and its immediate vicinity.

Twenty or thirty years from to-day we may expect the traffic desires to be almost in the same directions—having removed but very slightly north and east.

Defects of Calcutta Main Focus.

In Paris, Berlin, Vienna, Budapest, Liverpool, and almost every city of the world, the percentage of main roads per square mile is greatest at the city centre. We find a close radiation of great roads and streets

leading in and out in every direction from and to the main focal point. But we do not find this at Calcutta. Let us try to leave the centre of Calcutta by the usual direct manner provided in other cities.

There is no route due north. Clive Row runs butt into Canning Street and stops. Clive Street in 100 yards or so going north dwindles from 100 feet wide to 40 feet, and then to 25 feet, and dies out in the wretched Darmahatta Street. The only great route north is the 45 feet Chitpore Road. To get into it we have to turn east and crawl away from our direction for one-third of a mile along the congested Canning Street, and then when we do get to Chitpore Road we find the north and south tram traffic squeezed down to a speed of six miles an hour—nor is there any room on the four or five foot crowded footways—except for overhanging shops, sacred cattle, and numerous encroachments.

We can by turning west out of Clive Street get north by Strand Road—until it fades away between the river and the Port Trust railway sidings: we must then try and get back by a fifteen feet lane into our old friend the Chitpore Road. There is no north road out of Calcutta's greatest business focus, yet a huge bulk of built-up city lies due northwards.

North-east there is no route whatever. We get in that direction by means of Lall Bazaar and Bow Bazaar (due east), or Clive Street or Clive Row (due north), Canning Street or Harrison (all due east), Chitpore Road (due north), Koolootolla, Machua Bazaar or Beadon Street (all due east), and so to Cornwallis Street (due north again). The actual distance from the Exchange to Cornwallis Square is one-and-a-half miles; by the nearest vehicular route it is almost two-and-a-quarter miles.

Eastwards, of roads going east, though well placed, especially for the future, Canning Street is so narrow as to have but a slow and comparatively small traffic capacity. The only genuine road proceeding east from the city heart is the Lall-Bow Bazaar route—it is admirably placed, and is an ancient route, but it is too narrow, and having no help it is frequently gorged not only with east traffic but especially with the great flow forcing its way in and out of the city from the north-east and back again.

South-east, south, and south-south-west: there are no properly articulated routes. South-east there is no route. We have Old Court House Street, quickly shoved off to the south-east by the Maidan—but the fine prolongation of Old Court House Road across the Maidan, due south, is devoid of the essential direct south-going tram route. The Strand Road continuation running south along the river, which should be a most important route to the south-south-west, is tramless and unused because—it is presumed—of luxurious sentimental reasons that Calcutta absolutely cannot afford to uphold. Every tram route is vital to a section of city. Almost every fine and beautiful avenue and promenade in continental cities has its tram routes—but the over-head equipment is invariably beautiful and artistic. The altogether undue massing of trams right in the city centre, in the small area of Dalhousie Square is considerably due to the lack of those two natural south-going circulation and traffic tram routes.



Typical view in Chitpore Road. Trams are normal 4 ft. 8½ in. gauge cars. Ordinary vehicular traffic usually much greater.



In Bentinck Street (the continuation of Chitpore Road), looking south into Chowringhee. Note double tram-track: two cars have just passed each other.

The writer was astonished when making his first run-round of each Calcutta tram route, to find that what he took to be the big south return artery from Dalhousie Square had ended up suddenly in a kind of deserted shrubbery near the Law Courts. The big crowd of south going tram passengers from the courts, to get home have either to go north to Dalhousie Square and then possibly change trams and perform evolutions, or else they must walk half-a-mile east, to get to a tram stopping station.

A glance at the small plan shewing the Existing Street and Road System will now be found very useful to clinch and shew clearly what is especially wrong with the centre focus of Calcutta and in general with all urban Calcutta. On this little map readers should remember that road thickness (in black line) represents ability to take traffic. Most British cities that need improvement lack their big roads in the suburbs—where land and property is fairly cheap. We are badly off in our Calcutta suburbs, but unfortunately we are worst off in our main focus; and it is on the way in to it, and out of it, that most money will have to be spent.

A word may be added about the Traffic Map. Traffic statistics have not been taken for a sufficiently long period, nor over the full area of the city. But it has, nevertheless, been possible to prepare a Traffic Map that is full of value and instruction in determining on the future road system, for diagramatically it ephasizes the main defects, and defines the city foci. We owe it to the personal efforts of Mr. Bompas that these valuable records were commenced so soon after the formation of the Trust. Had there been time and staff available, special maps would have been made shewing separately the jute traffic, Kidderpore traffic, bullock-cart traffic in the mass, tramway traffic, foot traffic, and railway goods and passenger traffics, etc. As it is, all vehicular traffic in roads has been totalled together; and the intensities given in the writer's map accompanying this report, are the maximum vehicular records per hour on fair average days, i.e., not on holidays, days of festivals, or at times of unusual and exceptional traffic, but on normal days.

Traffic Increase.

Present-day Calcutta traffic is but indicatory of what it is assuredly going to increase to during the next few decades.

In the Howrah Bridge report it was shewn in general, from the figures available to the writer, that Calcutta population is increasing at the rate of 17 per cent. per ten years: that Howrah population is rising at the rate of 33 per cent. per 10 years, and Howrah district at 13 per cent. per decade. Eastern Bengal railway passenger traffic rose 180 per cent. between 1901 and 1910. Goods traffic increased by 80 per cent. between 1901 and 1911. From 1906 to 1910 East Indian railway passenger traffic at Howrah station was flowing stronger and stronger at the rate of 33 per cent. per decade, and Bengal-Nagyum passengers to and from Howrah station had increased by 129 per cent. between 1901-1909.

Calcutta imports in the year 1910-11 were valued officially at £100,700,000, and exports at £100,500,000; these figures shew an increased value of 170 per cent. and 156 per cent. respectively since 1881, say about 57 per cent. and 52 per cent. per 10 years.

All these great increases have risen by steady growth, which continues. Vehicular traffic in Calcutta is rising at the extraordinary rate of of 32 per cent. per decade.

Calcutta thus has splendid possibilities, if she will but rise to them in the great manner they demand. At present, the speed of Calcutta traffic is steadily and most injuriously being decreased by lack of main roads and streets. The rate of decrease is fast rising.

Special Traffics. Jute.

The jute trade provides one of the most important vehicular special traffics of Calcutta and district. The movements of this traffic are exceedingly complex, and employ an enormous number of bullock carts and countless railway wagons.

In the year 1910-11, though not a very good year for jute, owing to excessive rain and floods—yet some 620,000 tons of the raw material only were delivered in the Calcutta 'trade block,' i.e. in Calcutta proper, in Howrah, and at Kidderpore. Six-hundred-and-twenty-thousand tons, put into ten-ton railway wagons (it is bulky stuff) would make a continuous solid goods train of approximately 260 miles in length, and it would need, to draw it, about 2,070 locomotives, one placed between every thirty wagons. An almost equal weight of jute (composed of both raw and manufactured) was exported in the same year.

The value of the jute that entered Calcutta in 1910-11 is put officially at over £10,000,000, and the value of the jute of all kinds exported was £23,000,000. This annual and rapidly growing mass of valuable merchandise is poured in and out of the railway yards, canals, and scanty streets and lanes of Calcutta almost wholly during the months of September, October, November, December and January—the average rate of arrival alone is equal to about 1¾ miles of goods wagons per day—say 4,000 tons a day, and when it gets to Calcutta some of it may be carted even three or four times. The results can not be imagined by those who have not seen it; and after seeing it one wonders why the city has not long ago made every effort to further and deal rapidly and well with a splendid trade of such magnitude and value.

The Honourable Rai Sita Nath Roy, Trust Member, wrote as follows in a printed note dated 26th September, 1912, which he submitted to the Board, and in which he is discussing the areas of the jute trade and closely allied areas:—

"It is well known that almost all the streets and lanes in Barabazar Jorabagan and Coomartuly are extremely narrow and tortuous with massive two to four storied structures abutting on them, which go to effectually shut out light and air from those streets and lanes. From

morning to 8 o'clock at night all these streets and lanes daily become dangerously and hopelessly congested, and the congestion is immensely intensified during the height of the jute season when the areas extending from Nimtola to Cossipur are a hopeless jumble and a confused mixture of carts, hackeries and other vehicles of sorts, and the result is, that the congestion causes interminable delays and adds to the transport charges and thereby hampers trade."

"The Chamber of Commerce has, in its letter to the Improvement Trust, very pointedly referred to the deficiencies of the traffic facilities of the city, and it points out that during the last fifteen years there has been an enormous growth in the trade of Calcutta (the aggregate trade of the city having risen from 91 crores in 1896 to 153 crores in 1910-11) and with this expansion there has been a corresponding development of street traffic. Though there has been this enormous expansion in the trade of Calcutta, the roads, streets and lanes through which this enormous traffic passes remain the same, and no attempt has been made in the last fifteen or twenty years to provide adequate traffic facilities by opening new roads and streets or by widening and straightening the present narrow and tortuous streets, and the result is, that the streets and lanes in the busiest quarters of the town are almost impassable during the busy hours of the day. It is well known that the Strand Road and the Chitpur Road are the only arteries of communication from the northern division of the town (including Chitpur, Cossipur, Baranagore) to the southern quarters of the town, extending so far as Bhowanipur and Tollygunge on one side and Kalighat, Alipur and Kidderpur on the other side. With the Strand Road completely blocked up by carts and hackeries, the Chitpur Road is the only one open to the public for going to the southern quarters of the town, and the result is that with the double line of tramway laid on, it always takes more than half an hour and occasionally an hour in driving from Baghbazar or Sovabazar to Dalhousie Square and the High Court. There can be no doubt that the Trust was created to open out . . . the congested parts of the town and to provide adequate facilities for the expanding trade of the town, and the only means of doing so would be to run broad new roads through the congested areas."

The jute traffic is a very confusing problem during one's first inspections. Hundreds of bullock carts, heavily laden with jute, are found moving slowly, jamming, stopping, and moving again, in every conceivable direction in the lanes and streets of the north half of Calcutta; the pressure increases as one nears Chitpore. The Circular Canal side-roads exhibit streams of vehicles moving in each direction to and from the few wretchedly narrow bridges. Every north and north-east country road on the outskirts of Calcutta is crowded with jute carts coming in and going out. The canal and its lock-basins are crammed and bunged up with barges of jute. The Hugli riverside from Cossipore to below Neemtolla is in somewhat the same state; and nearly every railway yard and siding in the north, at Sealdah on the east, and at Kidderpore in the south is filled with wagons of jute.

Only after many inspections, and with the help of the Chairman, the assistance of Bahadur Sita Nath Roy and some of the Calcutta merchants, and after talks with the railway officers, was the writer enabled to sort out the movements of jute into some kind of order.

There are several main points to bear in mind :—

(1) Jute is grown for a wide distance all round Calcutta (except southwards) in the great flat moist plain of the Ganges valley debouchment, but the bulk of it is grown in the eastern division of Bengal and in Assam. It is brought in mostly by train, by river and canal boats.

(2) On arrival and for months afterwards much buying, selling, re-buying and re-selling of the raw jute takes place.

(3) Most of it is prepared and pressed into bales for export to Europe by steamer. This preparation, cleaning and pressing is done in factories that line the west Hugli banks for miles above and below Howrah Bridge, and the east bank above Cossipore, and at Kidderpore. Another series of jute presses and mills occupy the north-east industrial area. A few presses are found in the Aheeritolla, Neemtolla, and Sobha Bazaar district, between Chitpore Road and Strand Road North—known as the Hatkola jute market.

(4) After pressing, etc., it is re-carted to the railways and shipping areas, but very often is re-carted to the jute mart, and from one warehouse to another—especially in north Calcutta. Very considerable dealing and speculation appears to take place in the material before it leaves Calcutta.

In and about the Cossipore Road railway goodsyard arrive about 700 tons per day during the season and this is mostly distributed at first within a half mile radius. The Chitpore railway yard receives about 350 tons a day which is mostly carted to stores and mills in the area between Barrickpore aud Cossipore bridges. Other raw jute, coming in daily by rail and canal is on arrival stored first in places alongside the canal, but some goes direct to Hatkola. Other jute from the country districts of Dasi and Madaripur, arrives at Ultadingi railway sidings and mills on the north-east border of Calcutta. The Sealdah mills receive another lot. Jute is carted backwards and forwards between the Hatkola jute market [Neemtolla Aheeritolla and Sobha Bazaar] and the north-east and east mills and railway depots.

There is also a defined jute traffic over Howrah Bridge, and also up and down North Strand Road.

To sum up, the greatest jute-carting foci and routes are, in descending order :—

North and South :—Between Cossipore-Chitpore and Hatkola Market area.

North-East to South-West, and East to West and vice versa :— Between Hatkola Market area, and the Canal Stores and north east passes.

South-East to North-West and vice versa :—Between Sealdah and Hatkola and Sealdah and Cossipore-Chitpore.

The needs of the jute traffic would be met most economically and effectively by a north and south Inner Strand Road, joining into a good Sham Bazaar-line north-east diagonal, and by a good riverside double-level road from at least Aheeritolla to Cossipore. After these new routes, and not so very much less in importance, would come an east and west road straight across from Hatkola to Halsibagan and over the Circular Canal.

The prolongation of Grey Street—as proposed by Bahadur Sita Nath Roy, on October 1st, 1912—would convenience the east and west traffic between Hatkola and Ultadingi.

There is a large movement on foot to move the Hatkola jute focus up to Cossipore. This change appears to be favoured by the railway companies, the traders and the merchants, in fact by everyone but Hatkola property owners, whose objections are of course quite natural.

The intense jute congestion in north Calcutta—through lack of a main road and street system, has forced home the need for removal of the Hatkola Market, which seems very likely to be accomplished. Such a change would greatly diminish the value and pressing necessity of east and west roads from Hatkola to Ultadingi—but the great need for new north and south routes, and for an effective Sham Bazaar diagonal remains unaffected, as their use will be very much less local, and will always meet great permanent traffic needs.

Gunny bags and jute cloth are manufactured in Calcutta, Howrah, and in many of the mills above mentioned, but the large majority of the raw material is only cleaned, sorted, prepared and pressed at the Indian mills, ready for export to Europe. Much of the baled up jute is taken almost direct from the railway wagons into the ship's hold, especially at Kidderpore.

Gunny bag exportation appears to form one of the traffics flowing from east and north to the ocean shipping focus adjoining the city main focus. Numerous carts laden with gunny bags may often be seen in Harrison Road traffic going west to their destination,

From the city shipping focus and making in all directions but especially to and from the north, north-east, east and south-south east, is a carting traffic of general merchandise being delivered mostly in the active business area of Calcutta, or carted thence from warehouses to the ships. In addition, a considerable amount uses Howrah Bridge.

The eastward traffic may be seen any day coming and going along Lall-Bow Bazaar; the favourite route between the Scots Kirk and the shipping being via Lyons Range and Fairlie Place. Some of this traffic uses Dalhousie Square from the Post Office to the Scots Kirk. A small and local amount of this slow and cumbrous traffic produces continual inconvenience by crossing the big stream of fast important traffic in Old Court House Street—in order to use Mangoe Lane, British Indian Street and Waterloo Street.

General merchandise, between Kidderpore and the city is carted in a steady stream between Kidderpore Docks and the Calcutta main area of activity (east side of it), and between Kidderpore Docks and Sealdah and the manufacturing areas.

Nearly all the bullock cart traffic uses the road across the Maidan, between Kidderpore Bridge and the junction of Chowringhee and Corporation Street, and thence it uses mostly Corporation Street, after that Dharamtolla, and least of all, Bentinck Street. A good Sealdah-Chowringhee diagonal would meet the Calcutta needs of much of this traffic, and would divert it from the important Corporation Street junction, where it is a great nuisance and hindrance to fast traffic and tram traffic. The diversion of some of this traffic via Circular Road is a practical possibility, and only increases the distance to Sealdah by about 500 yards.

From Howrah Terminus and Bridge, a continuous and immense **general merchandise traffic** pours into Calcutta at the rate of some 5000 bullock carts a day. About 20 per cent. of it appears to turn sharp south down Strand Road and have the long shipping focus as its objective. Some 30 per cent. goes south-east via Strand Road and thence through the city focus. About 30 per cent. proceeds forward off the bridge and goes up Harrison Road and is mostly disseminated to the north-east, but some reaches Sealdah. Only 20 per cent. of the bullock-cart traffic coming into Calcutta from Howrah appears to turn north as it leaves the bridge. This great stream of carts comes about 50 per cent. from Howrah Station and 50 per cent. from Howrah and district. The return streams are flowing in somewhat the same proportion. The writer has observed the following goods among the merchandise of the Howrah Bridge traffic.

From Howrah and district;—ground rice, rice, grain, oil seeds, grain of different kinds, timber wrought and unwrought, bricks, native wrought ironwork, rolled and manufactured iron work, native mats in bulk, oil, kerozine, rope, coir, jute, fruit, vegetables, plaintains, and many goods not nameable by the writer. From Howrah Station many of the same goods come into Calcutta, but hides, pulse, grain, oil seeds and spirits seem heavy items.

The return continuous steady stream of bullock carts going west over Howrah Bridge always contains a considerable percentage of empty carts, which indicates that much of the above material is consumed in the city.

Rape seed, linseed, ragi, mustard, wheat, grain, pulse, etc. Of these commodities about a thousand tons per working day are dealt with in Calcutta, in the production of oils, meals, flours, etc., for city and very local consumption. The chief factories are established between Circular Canal and Circular Road, from Sham Bazaar to Sealdah. They produce a heavy bullock traffic, a part of which plies to and from the mills between the west central and west portions of north Calcutta. This class of traffic also comes and goes between Howrah Station and district, and the mills. A small flow takes exports to the two shipping foci.

Much of this carted merchandise is used up in Calcutta and district; but a further mass appears to be fed almost direct to and from the mills by railway train.

About 1000 tons a day are exported, and the writer understands, because of internal trading, buying and re-selling, some hundreds of tons a day very often do not go on board ships direct from railway wagons, but are carted about, in the first instance along the same routes mentioned above.

The writer did not have sufficient time to gain much information about certain other trade materials of Calcutta—such as tea (80,000 tons exported), salt (400,000 tons), sugar (380,000 tons), etc., but these do not affect vehicular traffic to much extent, as they are shipped direct from the railway wagons, or via quay-side stores. Coal likewise is seldom seen in Calcutta carts. About 3,000,000 tons of coal were shipped from Kidderpore in 1910-11, mostly for consumption by homeward bound steamers.

From and to Sealdah railway focus, there is a general merchandise traffic—not very large—which appears to be mostly collected from and sent out to the north-east of Calcutta.

The Municipal Market and Indian Markets receive some bullock cart traffic from both Kidderpore and Howrah : that from Kidderpore is sufficient to make a noticeable traffic flow.

Fast special passenger traffics. Motor cars and cab, (gharries and jauns). There is a very marked stream of this traffic backwards and forwards between the Park Street area and the city-heart, via Park Street and the (diagonal) Mayo Road across the Maidan, which road joins into the Red Road (continuation of Old Court House Street). The 'in' traffic is quite intense between 9 and 10 a.m., and the return flow takes place mostly between 4 and 6 p.m, Park Street is not quite wide enough for its present-day maxima of traffic.

Along Chowringhee, from Bentinck Street at the north end, to Russa Road in the south, a considerable flow of motors and gharry traffic is always in evidence, but very little bullock cart traffic is visible. From Park Street to Bentinck Street, Chowringhee is frequently congested with motor and gharry traffic due to the attractions of this theatrical, hotel and shopping line. The vicinity of the markets is another cause.

There is a marked flow between the Dalhousie Square focus—and Chowringhee from Park Street to Bentinck Street. This flow has to travel either by the awkward right-angle Esplanade East, and slantingly cross the polished tram curves at Old Court House Street, or else it must use the right-angle route offered by Auchterloney Road, via the confused junction at Corporation Street. This right-angle route can easily be remedied by a new diagonal road made very cheaply across the Maidan, from near the Grand Hotel, straight for Auchterloney Monument, and beyond to the Red Road—but of this later.

There is a big flow of gharry and jaun traffic between north and north-east Calcutta—and the city focus in general, especially those parts occupied by the Exchange and vicinity, and the Law Courts. Traffic from north Calcutta in the morning mostly comes south down Chitpore Road as far as Lall Bazaar, down which it turns sharp west into Dalhousie Square, and is disseminated. The flow from north-east mostly comes in via Cornwallis and College street, turns down Bow Bazaar, and joins the congestion moving into Dalhousie Square: it is then distributed largely between the business houses and the law courts.

In Canning Street and Koolootolla, and in Harrison Road, we find much the same thing:—morning gharry traffic tacking painfully by right angles into the city focus. In the evening these streams are reversed and zig-zag out making to the north-east and north.

There is a considerable gharry traffic from and to Sealdah. A large stream zig-zags to and fro between Sealdah and Chowringhee. Another important flow is that to and from Dalhousie Square, using the direct but narrow and overworked Bow Bazaar and Lall Bazaar. A much smaller stream is fed by population residing in north Calcutta and using Sealdah station.

Between Howrah and Howrah station on the one side, and the Exchange focus, Old Court House, Chowringhee and Park Street areas on the other side, there is a big and very important gharry, cab, jaun, and motor passenger traffic. Some half of the people who visit Calcutta by rail arrive at Howrah, and great numbers of them use the route in question, which is the most important in Calcutta, and one of the worst arranged, most congested and most inconvenient.

It is the chief route between the great Calcutta business houses and the chief industrial section of the city; and between Government House and Howrah station. It is the mail route between both the General Post Office and the chief hotels of Calcutta—and Europe. There are seven right angles on it between the Grand Hotel and Howrah terminus. A hideous area of squalid scene, rag-festooned chawls, vehicular confusion and congestion, danger, noise, dust, and cruelty to animals, prevails permanently at the chief entrance to Calcutta. The great visitors to Calcutta always 'finish their journey by water'—they are ferried across in a nice decorated passenger steamer—because by road and bridge the finish would be such an awful revelation. Thus they miss seeing a bit of the real unimproved mass of Calcutta.

Between the golf course and residences of Barrackpore, and the European residential quarters of Calcutta, plies a fast motor traffic, which at present uses the Cornwallis Street and Circular Road routes. This traffic is not of much importance to the city. A similar traffic occurs between Tollygunge and the Park Street areas. Variation of this same traffic occurs through men going straight from the offices in central Calcutta to the two recreation grounds.

Suburban Passenger Traffic.

By tramway, the greatest is that carried via Russa Road and Chowringhee, from Bhowanipore Kalighat and Alipore, coming into central Calcutta in the morning and returning at evening. This route is doing nearly as much as it can, and especially needs relief by the creation of a direct Kalighat tramway and by new means of circulation, for at present it is scarcely possible to get cars either back from the city, or into the city, to meet adequately the morning and evening rush. Two new south routes are urgently needed, one proceeding direct to Kalighat via the Red Road, the other via the riverside and past the Fort.

The Kidderpore tram route is well patronized, and is used also by many Alipore passengers.

The two southward routes are the only Calcutta tramways that go into suburbs or carry suburban passengers in the normal manner found on such a great and comprehensive scale in other cities of a million people.

Howrah tram routes bring passengers to the west end of the bridge, and there dump them, to walk over and pay again, or else push their way along the inadequate footpaths.

The two light railways of the Howrah district each bring in a respectable crowd of passengers every morning and take them back at night. These passengers nearly all cross the Hugli by ferry, both above and below the Bridge, and then walk or tram mostly to the Law Courts and the business centre, going back at night. Fog and weather rather frequently delay the ferry service though otherwise it is good and the boats are clean, roomy and fast.

Internal Tram Traffic.—The great focus is Dalhousie Square, i.e., the main city focus. The largest number of passengers are carried by the Chitpore Road and the Chowringhee routes—the figures for 1912 being for Chitpore 6,069,853, and for Chowringhee, 5,620,185. But the Sham Bazaar service also uses Chitpore Road, and carried 6,037,013 passengers in 1912, and this is striking evidence for the great need of an additional and good north and south route in and out of the city heart—the tram figures are also the strongest evidence we have (as regards traffic) for the need of a proposed Central Avenue from Chowringhee to the north.

The route from the tram depot in Circular Road (south of Sealdah) proceeding past Sealdah station and thence to Dalhousie Square and the Law Courts via Harrison Road, is an important one, and was used by 5,543,554 passengers in 1912. It points strongly to the need for a better route parallel to Lall-Bow Bazaar Street.

The Sealdah route via Bow Bazaar carried 1,198,525 passengers in 1912. The route is narrow and congested at its east end, and there is difficulty in getting proper circulation of cars. The ordinary development of the Sealdah Terminus as a suburban inlet and outlet, and the development of suburbs, would swamp Bow Bazaar Street with traffic. Observation shews that if a better tram service were possible, and if it led to other points than solely to Dalhousie Square, then the passenger service would be doubled or trebled. At present, what cars there are, are unusually full, and can proceed only slowly, and as the distance between Sealdah and the main focus is only 1⅓ miles—a large stream of Indian people do the distance on foot. Morning and evening, the footpaths of Bow Bazaar are crowded with people—of whom many would tram if it were possible.

The Table shews how much tramways are appreciated and called for in Calcutta. Their use has gone up some 100 per cent. in tho last ten years—but without more main roads, their maximum possible service is now in near sight.

TOTAL NUMBER OF PASSENGERS CARRIED ON VARIOUS SECTIONS OF TRAMWAY SYSTEM.*

Sections.	1881.	1891.	1901.	1903.	1905.	1907.	1909.	1912.
SEALDAH	1,290,336	834,196	654,581	1,008.854	1,385,257	1,264,822	1,222,774	1,198,525
DHURMUMTOLLA ...	...	1,288,898	1,218,362	1,452,483	1,578,205	1,568,616	1,392,142	1,727,944
WELLESLEY	...	1,129,664	964,198	1,479,948	1,762,866	1,580,200	1,495,794	1,809,408
SHAMBAZAR	...	2,403,904	2,417,987	3,328,580	3,808,148	4,236,897	3,993,332	5,037,013
CHITPORE (*a*) ...	1,848,038	2,594,037	2,482,522	3,723,682	4,853,294	5,158,589	4,749,823	6,069,853
STRAND	...	481,184	445,287	859,460	1,070,107	781,250	689,115	917,483
CHOWRINGHEE† (*b*) ...	130,434	2.314,965	2,519,257	4,077,285	5,041,177	5,204,928	4,644,010	5,620,185
KIDDERPORE... ...	...	1,555,785	2,106,409	2,765,245	3,249,193	3,676,478	2,701,397	3,019,873
HARRISON ROAD ...	...	...	...	...	(*c*) 1,083,417	3,837,009	4,043,501	5,543,554
ALIPORE	...	...	...	...	...	(*d*) 149,642	1,980,373	2,613.635
BEHALA	...	...	...	...	...	...	576,519	695,569
HOWRAH 'A' (Bandhaghat)	...	...	...	...	...	...	584,557	847,124
HOWRAH 'C' (Sibpur) ...	...	...	...	...	...	...	613,004	969,367

(*a*) This Section opened to traffic 6th March, 1881. (*b*) Opened to traffic 15th Nov. 1881. (*c*) Opened to traffic 7th July, 1905. (*d*) Opened to traffic 2nd Dec., 1907.

† Goes to Bhowainpore and Tollygunge.

* Table supplied by courtesy ot the Calcutta Tramways Co., Ltd.

NOTE. — The Chitpore route is of course a disgraceful scandal, and the average speed of the cars for a distance of 3 miles is reduced by congestion to but 6 miles an hour.

By ordinary Railway. There appears to be no ordinary suburban traffic as we know it in Europe, England and America—for Calcutta really possesses not one developed suburb. A considerable morning influx and evening reflux of Indian passengers takes place at both Howrah and Sealdah termini. They travel mostly between Calcutta and the surrounding villages and small towns—and may be called ultra-suburban passengers. There is but half-a-dozen of what we may call suburban stations; and there are but two great railway termini. Manchester has twenty-six ordinary railway suburban stations inside the city boundary and four great termini. Glasgow has some forty-seven such stations and three big termini. Even Madras—half the size of Calcutta—possesses nine well patronized local stations inside the city boundary, and has in addition three large railway passenger termini.

Special Foot Traffics. One of the most defined streams is between Sealdah stations and Dalhousie Square via the Lall-Bow Bazaar route, and is composed largely of clerical people who work all day in the business and government centre. A similar stream uses Howrah Bridge and the Strand Road via Clive Street route, for a great many Indian people live in Howrah and district and work all day in the Calcutta centres.

A big foot traffic comes in and out of the Municipal market, chiefly to and from the east and south. The Indian market just north of the Municipal market has customers mostly from north, north-east, and north-west.

Specially large foot traffics of coolies and country people come in and out of central Calcutta via Chitpore Road, Beliaghata and Bow Bazaar, by the Bridge, and by Machua Bazaar.

There is a large foot traffic between Calcutta and Kalighat with Bhowanipore: it appears to concentrate along Harris Chandra Mukerjee Street—at the south end of the Maidan—and it tells the great need of the Red Road tram route.

A considerable foot traffic comes into Calcutta from the suburbs of Entally and Beniapuker. This foot traffic appears to originate chiefly with the markets as one objective and the city main focus and Howrah Bridge as another. There is no proper roadway to accommodate either this foot traffic, or the vehicular needs of the same route-lines.

District road traffic entering and leaving Calcutta is comparatively small, and will never be very great. On the east, south-east, south, and south-west the city is bounded by a vast swamp-region extending never less than 80 miles away. This cuts off all possibility of big country road traffic from east, south, and south-south-west. Only from the west do we get a very considerable road traffic and we can expect more and more. It will all have to come over Howrah Bridge—or bridges.

From the north and north-east we get and shall get more and more district road traffic. Perhaps over half of it will come from the east banks of the Hugli, north of Calcutta. A little may be expected to make its way from the west banks, via the proposed Bally Bridge (if this work is ever accomplished).

The internal traffic of Calcutta depends very little indeed on the surrounding district-roads. The merchandise and people that make traffic arrive in Calcutta by rail at Howrah and Sealdah, by ocean steamer at Kidderpore and all along South Strand Road, by river along North Strand Road, and by canal along the whole north-east quarter of the city, and likewise by canal in the south-west quarter.

The river Hugli first allowed Calcutta to come into being; and the river is still the main roadway, without which the city could not exist and increase. The railways form the other life-feeders of Calcutta, and the canals help in a smaller way. The district roads, in importance, occupy a position much behind the canals and railways.

The Traffic Map, and all observation, bears out these facts. The traffic coming in and out of Calcutta from a ten-mile zone is very much less than is found in most cities and their districts. This is due to the fact that Calcutta is built in the middle of an enormous swamp—and the great traffic routes to Calcutta through that swamp, are the Hugli and the railways and the canals—far more than the roads.

Present congested routes, and certain notes en passant. The Traffic Diagram and Traffic Intensity Map examined together, with the little map shewing traffic capacity (width) of the Existing Road and Street system of Calcutta, will enable readers to put their fingers on the most defective or over-burdened routes. Members of the Trust are fully aware of the position, but the maps will be found very useful during those discussions that proceed all remedial decision.

Proceeding from east to west, it is seen that Circular Road is wide, has a small traffic, and can be dismissed at once. Amherst Street is wide and has very little traffic. The long Cornwallis Street to Park Street north-and-south route is a good road, with a moderate traffic in no place too big for it, and in the south portion quite negligable. Halliday Street is a fragment of good road, doing nothing. Chitpore Road is serving as the main northward road of Calcutta, not only from the city heart, but also for the smaller normal traffic coming from Chowringhee. Chitpore Road is seen on the Traffic Diagram to be heavily beset by north-north-east and north-east traffic desires which it is endeavouring to cope with. It collects most of the traffic going to and from the north and north-east, and yet we see it is a miserably narrow road, averaging only 46 feet wide—the width of a neglected back street in a European city—*not* going in the desired direction, and going *past* the city focus.

Next we see that Darmahata Street, only about 35 feet wide for 900 yards, has nearly as much traffic as Chitpore Road, and a little more than Strand Road. It tells how urgent is the need of a good north and south road closely parallel to the Strand Road. The writer one day counted 260 bullock carts all jammed fast in this road, and on returning one hour later, most of them were still there.

Chowringhee is frequently congested between Kyd Street and Bentinck Street, but widening will be a simple matter.* The serious fault of all Chowringhee is the lack of street openings on the east side throughout its whole length. It is far too much of a continuous wall.

Bentinck Street normally does not carry much traffic. It gets rather congested in the early evening. But when a crowd gathers on the Maidan, or during a festival or other city event, then Bentinck Street—the sole direct road north from Chowringhee towards the big Indian residential areas—becomes for hours a dangerous, painful and scarcely moving jam.

Old Court House Street is from 100 feet to 108 feet wide, but has to carry a very heavy traffic. It is occasionally congested, and always very busy between 8 a.m. and 8 p.m. This fine bit of road suffers from the over great number of tram cars for which it is the sole route, and further because more than its share of traffic is focussed upon it through the lack of any other south-east route either into the city main focus or to Howrah Bridge. Its relief from through traffics and slow cross traffics, and its true functions will be dealt with further on in details of design.

Council House Street is fatally pinched by the new encroachment as it enters Dalhousie Square. At this point there is frequent congestion, increased by the incessant passage of tram cars, the constriction of Dalhousie Square west-side road, and the right angled crossing of bullock carts to and from the steamers. The writer has seen two accidents at this corner.

Passing in our review from north to south, we find Sham Bazaar Street doing what it can considering its lane-like width. In the jute season it is frequently jammed.

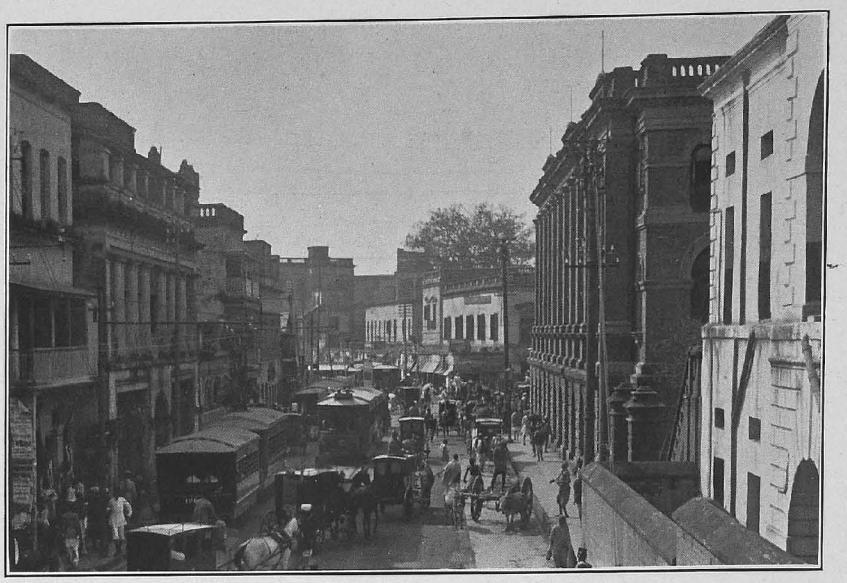
Grey Street is a fairly good street and carries a considerable traffic. It frequently becomes congested as it nears Chitpore Road. The continuation of Grey Street to the river side is Sobha Bazaar Street, which is often greatly congested.

Salch's Street is the narrow lane connecting Strand Road north with upper Chitpore Road, it suffers from almost chronic congestion.

Neemtolla Street is the only other real link between Strand Road and Chitpore Road, and it is frequently congested with more traffic than it can deal with.

Harrison Road for some distance from Howrah Bridge is scarcely equal to its present day traffic and is often congested. The footpaths (only 10 foot wide) are always badly obstructed and foot passengers interfere with road traffic. This west portion of Harrison Road is over-burdened with a mass of traffic that should be going and coming north-east and south-east by natural direct diagonal routes. The wretched bridge debouchment, ridiculous footpaths, sharp right-angle corners at the junction of Harrison Road and Strand Road, and the building of a new temple on one of the corners, all exhibit a gross neglect, lack of foresight, and

* By taking the tram tracks from the roadside and re-laying them behind the first row of trees. This will also make Chowringhee into a very beautiful and unique road, and a quieter road.



Chitpore Road: looking south towards junction with Bow Bazaar (left) and Lall Bazaar (right), Bentinck Street ahead. At this point Chitpore Road is widened to 50 ft. beside the Police Station.



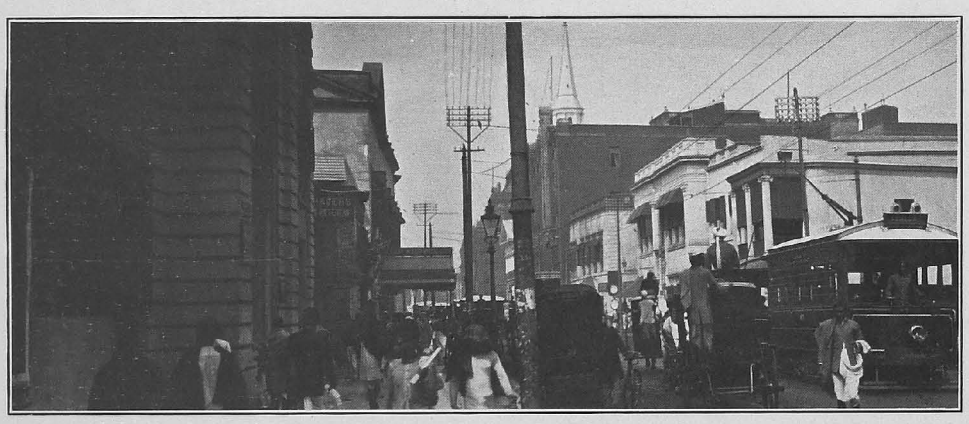
Howrah and the Bridge. Looking north-west across the Hooghly.



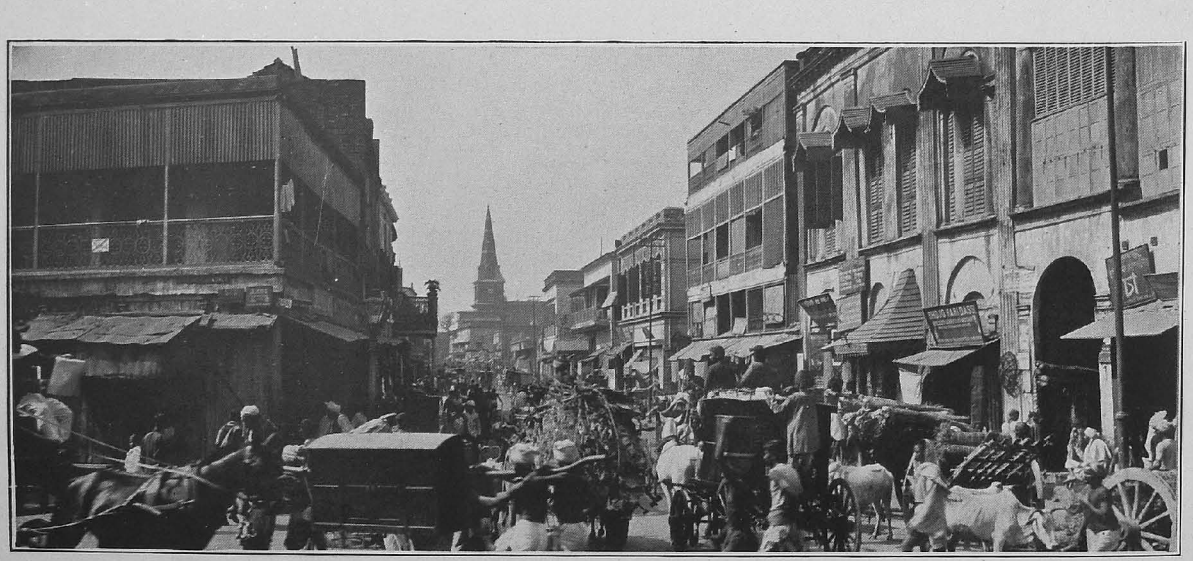
Chowringhee, opposite Grand Hotel. Maidan on right. Proposed new Ochterloney Road commences on right.



Looking east up Bow Bazaar Street, at junction of Chitpore Road (left) and Bentinck Street (right). Lall Bazaar is behind photographer. Typical site-cramming and architectural muddle on the corner.



Lall Bazaar Street: looking west into Dalhousie Square. Morning traffic.



Canning Street: looking west from junction of Chitpore Road, towards synagogue. Mid-day traffic.

hopeless ignorance of ordinary city traffic needs at such a vital spot. The resulting congestion is a continuous barbaric scrimmage. That is how it strikes the fairly well travelled outsider.

Canning Street is often desperately congested between Strand Road and Chitpore Road. It is daily crowded to excess by its two slowly moving lines of traffic, containing motor cars (all in their first gears) bullock carts (colliding fore and aft at each convulsive stoppage), gharries and cabs (filled with impatient pleaders and others)—and the whole sandwiched and inter-penetrated on each side by foot traffic forced off the narrow and obstructed paths. Canning Street is trying to be a chief north-east route in and out of the city main focus; it is also trying to be a main road for shipping traffic. Its relief is very urgent.

Lall Bazaar and Bow Bazaar. This should be the great east and west tramway route, but it is too narrow and too crowded with north-east traffic. The least extra traffic and it becomes congested. Lall Bazaar is daily congested: it is but 300 yards long, but upon an ordinary morning the writer has seen in it ten tram cars as aggregate, and a goodly collection of gharries, bullock carts and motors as matrix, forming an almost inert mass. This congestion is going to get very much worse before it is relieved. The true remedy is a parallel road from the Exchange (via New China Bazaar) to Sealdah.

Dharamtolla Street. This road is very illogically placed, and is so at variance with traffic wishes, that we are not surprised to find it doing comparatively little work. Its traffic is mostly local. But on festive days and when the Maidan is in general use by the people, then Dharamtolla becomes intensely congested, because it is one of the two roads by which north Calcutta folk can zig-zag to and from their homes.

Dharamtolla is used to some extent by Sealdah gharry traffic from the Chowringhee and market focus. Most of its traffic is connected with the markets—but it takes a little Kidderpore and South Strand Road bullock traffic. It carries a fair amount of traffic simply because Calcutta traffic has got to use the only roads there are for it.

The east (Sealdah) end of Dharamtolla is, however, a valuable quarter of a mile. It is 100 feet wide and bends towards coincidence with a natural traffic route between Sealdah and Chowringhee. That traffic is now intercepted considerably by Corporation Street, the close southerly parallel of Dharamtolla.

Corporation Street starts fairly well out of Chowringhee, but quickly thins down into a narrow road. Although at considerable variance with the direct natural lines required by traffic, yet Corporation Street is more favourably placed than is most of Dharamtolla Street, because it is nearer to the market hotel and shop focus of Chowringhee and strikes the latter at a better point. The nearness of these two parallels is a great mutual help to them. If one were absent we would have Bow Bazaar and Lall Bazaar conditions. Corporation Street does not seem to be congested very often, but it must be remembered that what we see to day is not what we have to plan for. Traffic throughout the city will infallibly continue to increase in volume and speed.

Lindsay Street is an important connection between the large market and Chowringhee. It is frequently crowded, and is very narrow for its work. If want of money will not allow of finer arrangements, then Lindsay Street is the weakest line of resistance for a Sealdah-Chowringhee diagonal.

Kyd Street. This short road is much used, but the writer has never seen it congested—if it led anywhere particular it would be more used—its value as part of a Chowringhee-Sealdah diagonal is dealt with further on in actual details of design.

Park Street. This road, the chief inlet and outlet of the Park Street residential area, is frequently crowded too much with fast traffic, most especially at its Chowringhee end. It is not wide enough for its present day work. The compounds* of the Park Street area are being steadily split up and in ten years from now we may expect to find a much larger number of houses per acre, and they are likely to have three or four stories each. The shops and hotels are eating into this residential area, the attack being made from the Park Street Chowringhee and Free School Street corners. Park Street will certainly have to carry double its present traffic solely from the area it serves—but it is also the only true diagonal road in built-up Calcutta, and it is almost certain that the next generation will see it used as one of the essential passenger rapid-transit routes to Ballygunge. At present it would be simple and inexpensive to widen it; but these economical conditions are now rapidly passing away. Already the Chowringhee end is being built up solid with expensive property.

Free School Street is scarcely up to its present day work, and is being made permanently narrow by the invasion of new tall and well built business premises and flats, which all bring more traffic.

SUMMARY OF NATURAL TRAFFIC DESIRES.

(1) From the city main focus (in general) traffic wishes primarily, in roughly equal quantity, to go and come north-east in a broad diffused stream, and south-south-east in a more concentrated stream. Secondly, and in not much less degree, traffic wishes secondarily to flow to and from due north, and due east. Those are the four great flows. Any new city main road scheme, to be effective, must provide new direct channels for those four flows, now travelling tortuously, slowly, and with steadily increasing friction.

From Howrah Bridge (east end) traffic sorts itself in general into three main streams and two lesser streams. The main Howrah Bridge streams are desiring to journey as follows:—

(i) South-south-east straight into and through the city heart and back again; this stream coincides with the main focus south-south-east stream making for and coming from the Chowringhee direction and, left alone, would, in due course, put far too much work on Old Court House Street.

* Large gardens.

(ii) East by south and east, into and from the big warehouse area of Cross Street, Armenian Street, Canning Street and Koolootolla —and on to Sealdah and back again.

(iii) North-east in general, from north-north-east to east by north—say into and out of, and right across, the whole north-east quadrant, formed by Strand Road and Harrison Road. This broad stream, diffused more and more evenly the further it is sampled from the bridge, coincides largely with the general north-east to-and-fro-desires of traffic dealing with the city heart—though these latter desire to use the more central degrees of the quadrant. In other words, north-east diagonals, well placed, will serve to alleviate and speed-up both north-east bridge traffic and north-east city main focus traffic—if skilfully inter-connected and combined.

The two minor Howrah Bridge streams worth any considerable attention are :—

(i) That turning sharp due south off the bridge to the shipping focus of Strand Road South, and vice-versa. At present this line is gorged with south-south-east and south-east traffic, which has no right there, does not want to be there, but has no other road south-east. It makes an exceptionally bad mixture of fast and slow traffic.

A south-east route will make an immediate and wonderful difference to Strand Road South, and its shipping traffic.

(ii) Due north and back again, up and down Strand Road North. There is not a big traffic at present, but the increasing trade of the city is going to make it much bigger. It is small because the splendid line of river front is roadless, quayless, and absolutely undeveloped to receive the river-boat shipping trade that should be there.

From Sealdah, it will be seen that the natural traffic desire is to go and come in two main directions, and in a third direction of rather less importance, viz. :—

(i) East to west from Sealdah and vice-versa, between Sealdah terminus (with Belgiaghata Road), and the intensively active main centre of the city.

(ii) From Sealdah to the south-west, and vice-versa, between (*b*) the Chowringhee social, market and shopping focus, and (*a*) the great railway terminus of Sealdah with the Beliaghata Road exit.

(iii) To north-west and vice-versa, between Sealdah terminus and the big blocks of Indian residential of north Calcutta.

Among other lesser desires of traffic is that across north Calcutta, from east to west and vice-versa between the factories and the river; and especially, as things stand to day, between Hatkola and the canal sides, and again between Hatkola and Cossipore-Chitpore.

The radial traffic round the market and Chowringhee focus must be remembered. Then there is the traffic on the one side between Kidderpore docks and on the other side the Calcutta Municipal and Indian Markets plus the Chowringhee big shops and stores.

The ocean-shipping line along Strand Road South produces one of the larger of the minor traffics. This line radiates bullock-cart traffic mostly in east and north-east directions, which inconveniently cuts across the city heart and the great current between Howrah Bridge and Chowringhee.

The merchandise traffic going south-east, between Strand Road South and the market focus, is of much less importance, and has an easy route.

From all the foregoing, it seems very clear and conclusive that as regards city roads, the very greatest needs of Calcutta are north-east and south-easterly diagonals from the Bridge and city main focus; a north road from the city heart, i.e., from the Exchange due northwards, between Strand Road and Chitpore Road; a new effective wide road east to Sealdah from the Exchange location; a normal riverside road north of Howrah Bridge; a new bridge across the Hugli with a sufficient width to meet the needs of the next 40 years; a decent and effective road between the eastern Railway Terminus of the city and the Chowringhee focus (with the Grand Hotel as its centre spot). These are the most important of the many new traffic channels required in central and built-up Calcutta.

CHAPTER VIII.

PROLEMS OF OLD AND NEW INTRA-CITY MAIN ROADS.

Chief difficulty in way of adequate road-work at Calcutta is want of money—The financial strength on which we can count—the main-road bill—main roads as basis of all reform—are more important and more urgent than any other reforms—the minimum cost for adequate main roads.

Concise enumeration of main rules in evolving a scheme for Calcutta—Details of great new roads urgently needed—the south-east diagonal from Howrah Bridge to Dalhousie Square—Armenian Church-Tiretta Baz. Diagonal, with Bentinck St. widening—Chitpore diagonal—Duplication of Lall-Bow Bazaar by the New Bow Bazaar, New China Bazaar Road, and allied questions—Creation of an effective North and South Road to and from main focus, viz.: the Inner Strand Road—importance of Clive Row—Manicktola Diagonal—Sham Bazaar Diagonal—The Central North and South Avenue—as a traffic route is much less important than Inner Strand Road and the foregoing roads—Chitpore Road widening—Strand Road North and New Riverside Road, narrowness of Strand Road Sonth solved by arcading—Harrison Road short Diagonal to Machua Bazaar, is best route to Manicktola future suburb—Sealdah to Chowringhee Diagonal—Prolongation of Amherst Street is only a sanitary measure—new East and West Road from Marquis Street via Wellesley Square to Circular Road is better alternative—south-east tram-routes from Howrah Bridge and city heart via Tiretta, south-east fork of Central Avenue, Wellington Street and Park Steeet—Chowringhee and a new short diagonal across Maidan via Auchterloney Monument to Red Road and Old Court House Street—Dalhousie Square Improvement—Diamond Harbour Road—The Garden Reach (Kidderpore) Road.

Chief Diffculties in way of adequate new Main Road-work at Calcutta.

Yet another important digression is unavoidable, before we can proceed to actual design. We must consider the cost-limit, for this factor rules everything, and we must of course design so as to get the best results for definite fixed amounts.

The amount of money required by the Trust to carry out the great task set by Government, could not reasonably have been known to anyone when the Improvement Act was passed. A great investigation forms, in fact, the first. business of the Trust, and it is obvious that the condition of Calcutta was indeed but very partially realized—for the sum total of £6,000,000 expended over 20 years, including all staff expenditure, and interest on loans for 60 years, etc.—appears to have been thought sufficient to convert Calcutta into a combined Paris-Liverpool.

Paris spent £40,000,000 in the resolute steady accomplishment of a scheme that took 57 years to complete. Forthwith she began on a continuation scheme, to cost some £35,000,000, and in the next few years she will spend £10,000,000, just on two great main improvement schemes—Washington, the finest city in America is spending £10½ millions on her new improvement scheme. Boston is following suit. Liverpool has been spending a million a year on dock improvements only.

The writer has not been able to obtain a copy of any estimate shewing how six millions was arrived at as a sufficient sum, and he presumes it was a bona-fide sincere guess made on quite insufficient evidence, which was all that was available* at that time. A very brief calculation will tell us what might be spent in Calcutta to bring the city at all into line with say Glasgow, or Hamburg, or Liverpool—as regards main roads, streets, open space and sanitation alone—but quite omitting dock, railway, tramway, suburban, housing, and park needs.

	* Net costs after recoupment.
New main roads, 21 miles	900 lakhs, say £6,000,000
New small streets, 40 feet wide, 127 miles lacking in built-up streetless Calcutta, at 20 lakhs per mile	2,540 lakhs, say £16,933,300
Clearing away and re-planning 498 acres of the very worst slum areas only, at a net cost of one lakh per acre	498 lakhs, say £3,320,000
Re-housing, on account of both new road work and slums, at the very least	100 lakhs, say £666,700
	4,038 lakhs, say £26,920,000

Six million pounds is the figure we have all been carrying in our minds as the total income of the Trust. The actual details are given in the valuable report of Mr. M. T. Gauntlett, on "A scheme for financing economically the Calcutta Improvement Trust." In tables Nos. 2 and 3, Mr. Gauntlett gave two estimates of income and expenditure. He shewed in those tables that works' expenditure might be 810 lakhs and 920 lakhs respectively, on stated income bases. The financial aspect, if gone into further at this point, would prevent readers passing clearly and easily from problem to design. Details of finance and estimates are therefore deferred to a subsequent chapter. But the working base must be given now :—

Considering the steady and rapid increase of the jute trade, and of Calcutta trade in general, the writer assumes that the income of the Trust (which is chiefly from the jute trade) may be based on a mean between tables 2 and 3, thus giving a total net expenditure on works, during twenty years, of $\frac{810 \times 920}{2} = 865$ lakhs, or say £5,800,000.

* Based on actual calculation with which these can be compared in the chapters on estimates.

Main roads are the vital basis of all great improvement work, not only at Calcutta, but in every city. The unprecedented congestion of most of built-up Calcutta, the vast housing problem, the great want of suburbs, the meagre tram-system, the delay, discomfort and serious strangling of the bread-winning city traffic—all are due primarily and directly to the lack of main roads.

The last and final opportunity that Calcutta will ever have, to create a road system, has now arrived.

If the total available improvement money of Calcutta is to remain at 865 lakhs, **then we cannot afford to spend much less than some 600 lakhs of it on main roads**. Any other policy will be a neglect of vital main issues, and will be a most grave mistake.

By means of a Supplementary Act, by gradual but unceasing remedial slum reforms of a particulatly economical but effective nature, by means of a city plan and the low-cost pooling and re-distribution system for suburban planning—the writer hopes to demonstrate clearly that the 300 lakhs balance of money available, can be laid out so as to make a much greater difference in the suburbs and housing detail conditions of Calcutta than might be imagined.

Under powers given to the Trust by Government in the existing Act—based almost solely on the costly system of buying up in toto, re-planning, and re-selling in toto—three hundred lakhs, would speaking mathematically be like putting a quarter-inch plaster on a two-inch sore. When the Act was in draft no evidence was available as to the magnitude of the work. Everyone was unavoidably in the dark, and it seems also that no one had studied the town-planning legislation of other countries, and of other cities which had already faced and overcome great improvement needs ; and there were many other and great difficulties in creating the mother Improvement Act of Calcutta—and like other mothers, she must have a son to help her.

Legislation will be discussed in a special chapter. The main point before us, is the preliminary fact necessary to road design in Calcutta, i.e., that with the utmost economy in effective design, the expenditure on the minimum of adequate main roads, will be somewhere between 550 and 600 lakhs. Money can be increased or decreased, but the minimum real needs of Calcutta are a fixed quantity. In our case they should form the true base of finance. Hence their discussion comes first.

A concise enumeration may now be set down of the main points or rules in evolving a new internal road scheme for Calcutta. The chief considerations that must determine those rules are :—

I. Needs of merchandise and business traffic, both foot and wheel, present and future.

II. Rapid transit and the suburbs.

III. Street, slum, housing, open-space and sanitation needs.

IV. Money.

Divisions Nos. I, II, and III are bound up inseparably as factors of one great problem—but in solving it, each factor must separately be examined and be weighed, and valued, as correctly as we can. The fourth factor, money, rules the lot. We have already done this balancing up to some extent as regards I, II, and III, and this has shewn that in selecting new road lines perhaps the most practical rules forced on our attention are these;—

(i) We must endeavour to meet the greatest number of traffic wants—both internal and external—with the shortest possible length of new main roads.

(ii) We must create our new roads as far as possible only in the cheapest property zones.

(iii) We must with our new main roads cut through and open up as much slum and streetless property as possible.

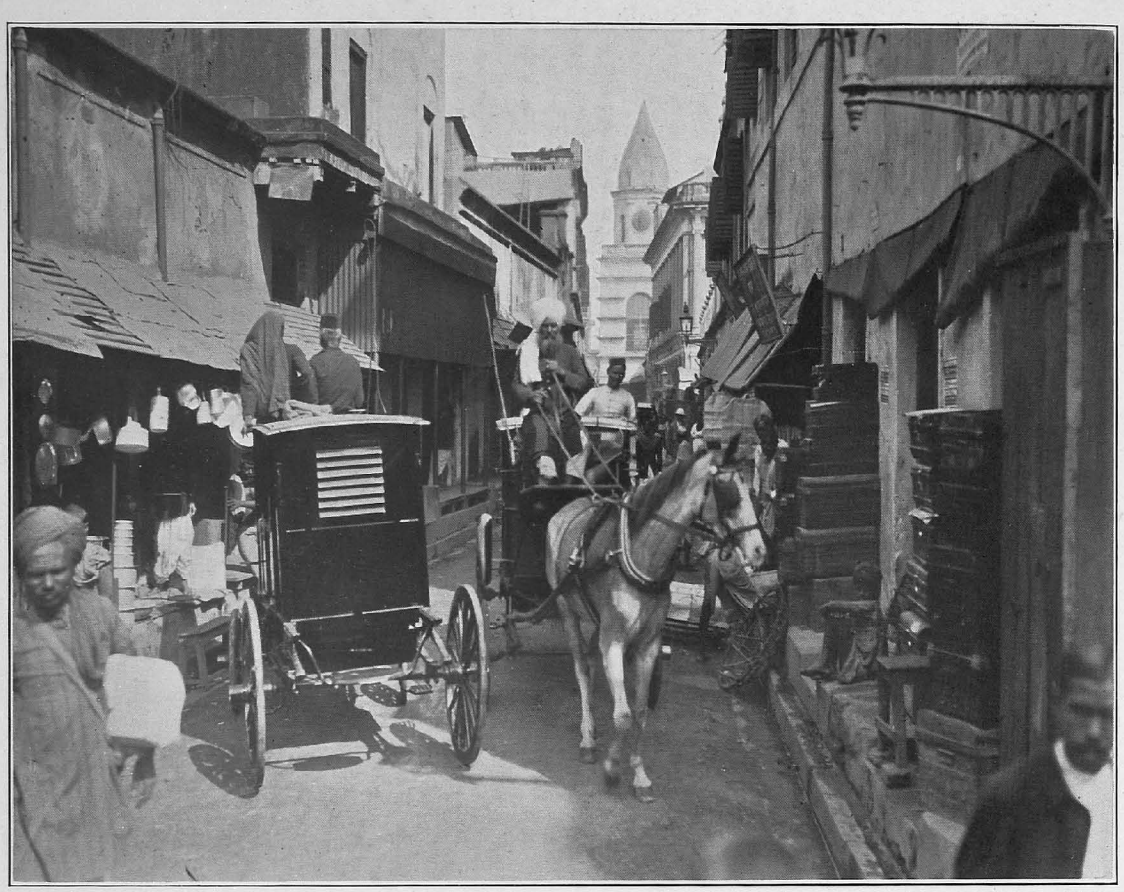
(iv) We shall have a freer hand in the suburbs, yet each result of the above three rules in combination, must be further qualified by respective suburban needs.

(v) In Calcutta, very much the best remedial value for money will be obtained by creating new and parallel roads rather than by widening existing roads. The sound policy is emphatically:—widen only where such is unavoidable; divert into new routes, or duplicate old routes wherever possible, and thus increase the present scanty mileage of Calcutta roads. Even in fine cities like Paris, duplication has been found to be a much sounder and more effective general policy than is widening. In Calcutta the conditions urging this policy are highly intensified; because of the abnormal lack of road and street mileage.

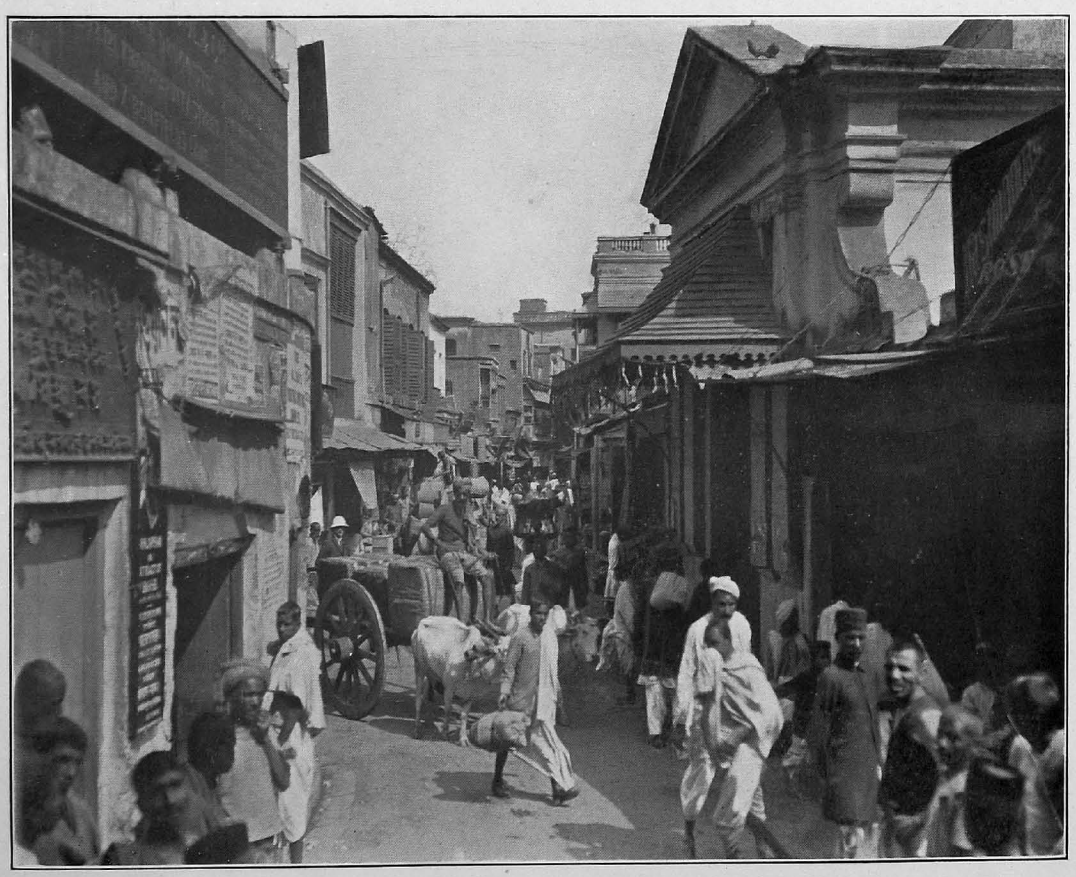
(vi) In fixing new road widths, the quite exceptional value to Calcutta of the arcading system, must never be forgotten. The subject will be dealt with in detail, in its proper place. It is enough at this point to remember that, by arcading, we can add 30 feet to the effective width of a new road, at little or no cost.

The position of Howrah Bridge.

The determination of the Calcutta Port Commissioners, that the new Howrah Bridge shall occupy the exact site of the existing bridge, is considered to be a stable factor in all problems and design with which this report is concerned. A change of bridge-site would of course necessitate radical changes of city main road design. A second bridge at Aheeritolla, if erected in the future, would fit in admirably with the proposed new main roads designed to meet the natural present needs of north Calcutta. Calcutta bridge-needs are closely discussed in the writer's report (Feb. 1913) on the width of the new Howrah Bridge.



Radha Bazaar Street: looking toward Howrah Bridge on line of proposed South-east diagonal therefrom. Note old Armenian Church Tower as a good vistral point in New Avenue where it will bend.



Another View further on towards bridge. Porch of Armenian Church on right.

Proposed New Main Roads in Built-up Calcutta.

The big obvious items that compose the most urgent needs of Calcutta will now be dealt with one by one. It will be easy for readers to follow these items if the Slum Map is now spread out, for it gives the names of both existing and proposed roads. The small Traffic Diagram will also keep us in mind of the chief traffic needs, and the direction to which each new road should conform. The little graphic plan of the Existing Road and Street System will assist in emphasing the areas that are most devoid of main roads, and will shew up the most striking defects that call for remedy.

A road south-east from Howrah Bridge to the Scots Kirk in Dalhousie Square. This will be called the "S.-E. Diagonal," (see Slum Map). It has at least eight great objects :—

1. To make a direct and good connection between the city heart and Howrah.

2. To complete the important Old Court House Street route in a logical and useful manner.

3. To form one only of the chief routes between S.E. Calcutta and Howrah terminus and town.

4. To be the tram route from Howrah to Dalhousie Square.

5. To relieve Strand Road South of non-shipping traffic.

6. To relieve lower Canning Street of south-east traffic.

7. To provide room for the proper growth and good building of great business offices in the city heart, and permit sound northward growth of the main focus.

8. To open up and bring light and air into what is now mostly congested slum property.

We have already discussed this route pretty fully.

A second south-east diagonal road, branching south-east at Armenian Church off the new Howrah to Dalhousie Square Road, just described—and proceeding from Armenian Church across Chitpore Road, through Tiretta Bazaar to Bow Bazaar Street. This road will be called the Armenian Church Diagonal. It is an essential road, and its functions are complex :—

In conjunction with a well-widened Bentinck Street and the connecting part of Lower Chitpore Road—the new diagonal will form the more and more pressingly required relief road to the Old Court House Street line. Much traffic from Chowringhee, south-east, and south by east Calcutta, will by preference use this new road to Howrah instead of increasing the traffic of Old Court House Street. The traffic of Old Court

House Street itself will be increased remarkably and quite enough by the high new buildings that are replacing the old two and three storey blocks. The number of vehicles to be accommodated, especially of waiting vehicles, will be trebled. On top of this there will a natural increase with the general city population increase. The increasing congestion of Old Court House Street is now being produced mostly by two special factors—

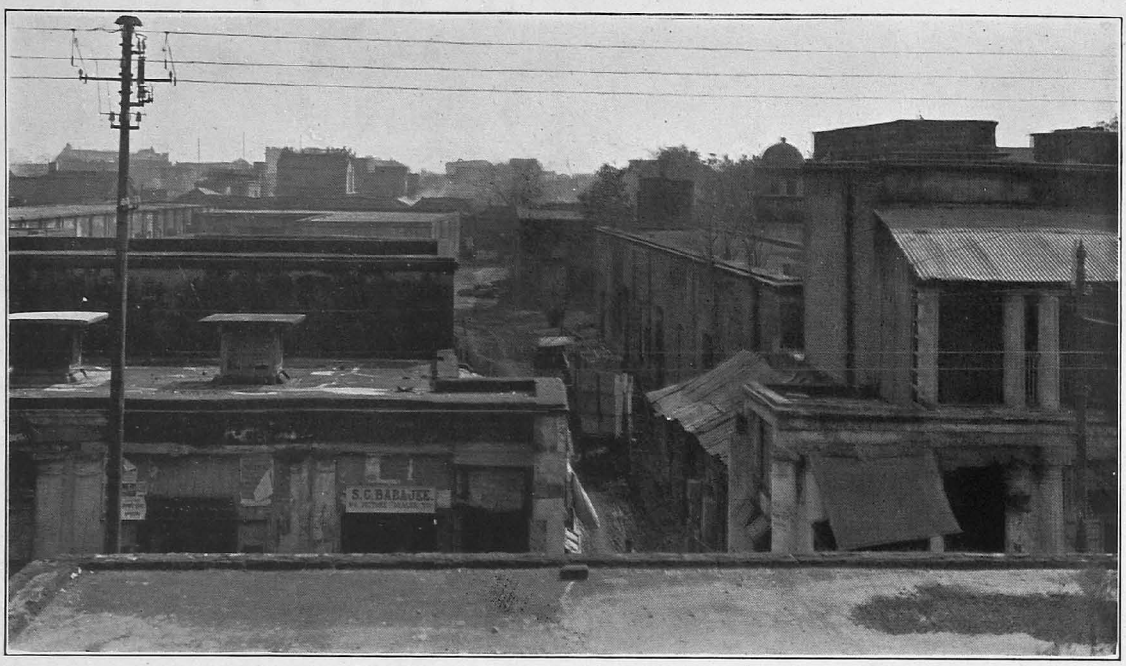
1. It is the most direct piece of road line between Chowringhee and Howrah, and Chowringhee and the city main focus.

2. There are but three river parallel north and south roads or streets in this most important locality ; all are defective and all much too far apart. Strand Road south is too narrow for its work. The Council House to Clive Street and Clive Row line is too far from Strand Road, and is cut off at Canning Street. Old Court House Street and its continuation in Dalhousie Square is doing the heaviest work, and if it alone were prolonged to Howrah Bridge, there would be a grave likelihood of attracting far too much traffic to it. Mission Row would be a valuable relief if prolonged to Chowringhee via Auchterloney Monument and the writer's proposed diagonal, but this prolongation would be a very costly bit of work ; nor would it be nearly as sound or effective a relief as that proposed. Bentinck Street and Lower Chitpore Road are at present quite disconnected from Howrah Bridge as far as Chowringhee traffic is concerned. They must be well widened, and then connected into the New Howrah Bridge Road (south-east diagonal) at Armenian Church : and will then form the natural and most valuable relief to Old Court House Street, for this new route will be quieter and, what will be more effective in taking traffic out of Old Court House Street, it will be a quarter-of-a-mile or so shorter, thereby being more direct, and, also it will avoid the right angles of Esplanade East. Further a most important point, it will divert and ease the great general traffic stream which is now flowing through the city heart, and which jostles with the true in and out city focus traffic, and with the unfortunately centred river traffic.*

The Tiretta prolongation of the Armenian Church diagonal, and its continuation south-east, will further intercept and convey traffic to the city focus and Howrah from south-east districts and Ballygunge, and of course back again.

A number of notes on minor details of the various problems are given further on—at this stage they might obscure main issues—but it may be mentioned here that the removal of the Scots Kirk would be very beneficial to traffic and the new South-East Diagonal. If it cannot be removed, it can easily be made into a fairly small island, and its projecting side porches will need cutting back and re-moulding by a good architect. The present site of this Church, and the 200 feet wide commencement of an 80 feet wide south-east diagonal behind it, would form a most valuable traffic and tramway sorting focus of the future ; for at and closely round this spot is offered the least resistance and the best placing for both north-east and east chief exits from the city main focus. In fact close study will shew that this is the one and only practical site for adequate inlet and outlet from and to the east, and north-east, and this brings us to the proposed—

* In a well planned city, traffic flows in and out of, but not *through* the main focus to any serious degree.



View east along cheap line of proposed New Bow Bazaar. Chitpore Road crosses in foreground. Chinese temple in left distance. Tiretta Bazaar area.



View east along line of proposed New Bow Bazaar. Bustee slum in foreground, Chinese temple on left.

Chitpore Diagonal. This is a short, rather costly, and highly essential length of road. The chief object is to supply a true, direct and very badly needed north-east road out of and into the main focus of the city. It will further, fully relieve Lall Bazaar from its present north-east traffic, especially of traffic from the north-east that has now to come along Chitpore Road and turn sharp to the west at the congested crossing of the Lall-Bow Bazaar with the Chitpore-Bentinck Street lines (i.e., at Lall Bazaar Police Station corner).

If we had plenty of money, or say even £7,000,000, then the Chitpore diagonal would naturally be continued north-eastwards across Harrison Road (coinciding with the proposed short Harrison Road Diagonal, which is all we can afford) and right on across Circular Road into Manicktola—but we must in the first case, cut our coat according to our very limited piece of cloth.

The Chitpore Diagonal is seen on plan to be continued right to the Exchange by means of the Existing New China Bazaar Street, which is 80 feet wide. At present this most valuable bit of 80 feet street is converted into two twenty-foot lanes, by reason of the double row of waiting cabs and motors, stacked at right angles to the road-length — right down the road centre. There is nowhere else to put them. But the correct very wide development of what will be the actually adjoining great South-East Diagonal, will give ample room for a great cab and motor rank, and will leave the fine New China Bazaar Street (at present almost a dead end gully) free to do its proper work. It is not likely to be over-burdended, for if the writer's design is carried out, then Lyons Range, very close and parallel to New China Bazaar, will also be brought into proper use, and instead of a single and more and more congested east route into the city focus (Lall Bazaar-Dalhousie Square North), there will be *three*.

Nor, must it be for a moment forgotten, in weighing up the effect of these new routes—that much north-east traffic now getting into Dalhousie Square, via Cornwallis Street and Chitpore Road, will find an easier and quicker route via the north-east diagonal, starting from near Howrah Bridge. Certain traffic from north-east and north would come down this road and enter smoothly into the city main focus, via the proposed direct road into the city heart. i.e., by the Inner Strand Road.

New Bow Bazaar. This is the proposed new road, parallel to and north of the present Lall-Bow Bazaar line between Dalhousie Square and Sealdah Terminus. The doubling of this great railway passenger terminus is now in hand, and the enormous and steady passenger traffic increase thoroughly justifies that doubling. If the proposed new railway bridge should be created at Bally, six miles north of Calcutta, as seems quite likely, then a further influx of passenger traffic—with its vehicular and tramway needs—will be added to the already important focus of Sealdah. The present Bow Bazaar is too narrow to do its work. It has grown, at its west end especially, into an important business street. It is narrowest where it carries most traffic and where it would be very costly and disturbing to widen it, i.e., throughout its western half.

This vital Lall-Bow Bazaar route is unaided by any other road. But its traffic and importance to Calcutta will steadily increase. The nearest parallel road north of it is the narrow and crowded Canning Street-Kooloottolla line, 700 yards away.

South of Lall-Bow Bazaar route there is no parallel road until we get to Dharamtolla, nearly 900 yards distant. These two parallels so far north and south of Lall-Bow Bazaar are quite unable to give help. They have their own traffic to carry and their own quite different functions to perform.

Lall-Bow Bazaar is at present the sole road for a large amount of east and west going tramway, bullock-cart, motor car, cab and foot traffic. It is the only direct route between (*a*) the main city focus and one of the two great railway foci of Calcutta, (*b*) between what will always remain an ocean shipping focus, and a great railway station, (*c*) between the combined city and shipping focus and an important combined country main road and factory district.

There is also some of what we may call legal traffic collected from north-east by Bow Bazaar. It is that desiring to enter the city centre from the region between Kooloottolla and Bow Bazaar.

Duplication of the Lall-Bow Bazaar route is forced on us as an essential item of any adequate main road scheme for Calcutta. The question at once arises, on which side of it shall be the new road? on north? or on south?

Observation, evidence, physical and traffic necessities, and economy, all shew that the north side is undoubtedly the better one for the new parallel. The chief reasons are these:

1. The most important east and west traffic desires affecting Lall-Bow Bazaar, lie distinctly north of it: the causes being that the centre spot of the main city focus, and the Howrah Bridge are both north of the Lall-Bow Bazaar line. Bearing strongly on these considerations is the fact that the city main focus cannot develop south, but can and will develop northwards. Thus a New Bow Bazaar, constructed parallel and a little north of the present route, will be a new direct east artery right into and out of the very centre of the future main focus.

2. Every internal city road should have its very exact and logical end and beginning. The logical end for the new east and west route we are considering, is distinctly found best in the proposed new and roomy traffic focus behind the Scots Kirk, and is continued in the valuable termination given by New China Bazaar. Traffic coming in from the east can on arrival go easily and directly to Canning Street, to Clive Street, to Howrah Bridge, to the General Post Office centre, to the Law Courts, or to any part of the shipping line—and of course vice-versa.



Old Court House Street: looking north towards Dalhousie Square. Scots Kirk spire on right, Synagogue spire in Canning Street to left. One of the best and most important roads in Calcutta: is frequently conjested: needs relief.



Another View: note want of architectural control. The new Kingsway, London, presents same barbaric individualism: no continental great city would permit such license.

Further, a new road between Dharamtolla and Bow Bazaar, (among other grave disadvantages of its only logical ending, i.e., the south-east corner of Dalhousie Square) would arrive on the south edge of the present main focus, and at a point where no further growth can take place, unless some-day, Government House grounds and the Eden Gardens were given over to business and shipping expansion, and it is pretty certain that Calcutta will never permit such a thing. The value of the big Old Court House Street traffic route is so enormously enhanced by the extreme scantiness of the traffic-route system—that we could not possibly afford to impede and chop across this great stream unless we received some remarkable and effective advantage in return. It is in fact imperative, not only to do nothing to deteriorate or injure this Old Court House Street traffic channel, but, also, it is imperative that we take measures (as already suggested) to prevent its further gorging in the future.

The following observation note was written at Calcutta immediately after the author had spent a whole fortnight of half days in standing at various traffic points all round outside and inside the Old House Court Street route during the maximum traffic hours :—

" The widening of Mangoe Lane is desirable, but is distinctly a very secondary consideration and not in the least primary ; there are moreover, other reasons of weight, against this widening. The traffic of Mangoe Lane, and of Waterloo Street and British Indian Street, is mostly quite local.

" The great flow of traffic north and south in Old Court House Street and in its continuation, Dalhousie Square East (side) is not local by 90 per cent. and will become greater every year. The opening of the South-East Diagonal to Howrah Bridge will be its perfect continuation and will still further increase traffic in this Old Court House Street route.* It cannot be widened, except for the short Dalhousie Square length (by putting the tramway inside the present railings of the Square). The convenience and speed of this fast and important traffic *must* be respected. To encourage a flow of traffic across it and into it at so strategic a point as the south-east corner of Dalhousie Square would be a most unsound policy.

" Continental planners have long recognised and applied the law, that traffic must be discouraged in certain streets and be encouraged in others. This is usually effected by logical planning, without, as a rule, necessity for police regulations.

" Most of the undesirable traffic of Mangoe Lane and Waterloo Street is due to shipping imports drawn in bullock carts travelling between Strand Road South and the Bentinck Street business area. Development of the riverside, west of Dalhousie Square, will increase this traffic, and though not desirable, yet that development is now being contemplated—and if carried out, police regulations should be issued to enforce the only proper route for this slow, unimportant and local traffic, i.e., via Strand Road southwards, thence along the deserted Esplanade West, round the

* Since writing this note, it has become quite clear to the writer, that the widened Bentinck Street and Armenian Church Diagonal form the essential new direct relief route to and from Howrah, for all Chowringhee and south-east through traffic.

Circular Road in front of the bush and tree-hidden Government House, and thence via Auchterloney Road (the latter relieved by the proposed Auchterloney Diagonal), and so to the widened Bentinck Street.

"A further strong reason exists, against the widening of Mangoe Lane and its development as a great east and west traffic route, and the consequent debouchment of a new great cross-traffic current at the south-east corner of Dalhousie Square—the reason is the complex, important, and unavoidably polished quadruple tramway crossing at this ('Manton's') corner: which is already the cause of numerous accidents.

"The Mangoe Lane development would make the crossing into a spot where innumerable vehicles would have to stop and start again, (*a*) to let north and south, and east and west traffic, flow alternately, (*b*) to let great numbers of trams pass and make their crossings in six directions."

What the writer put down then has held good in his opinion, and is confirmed by all further study.

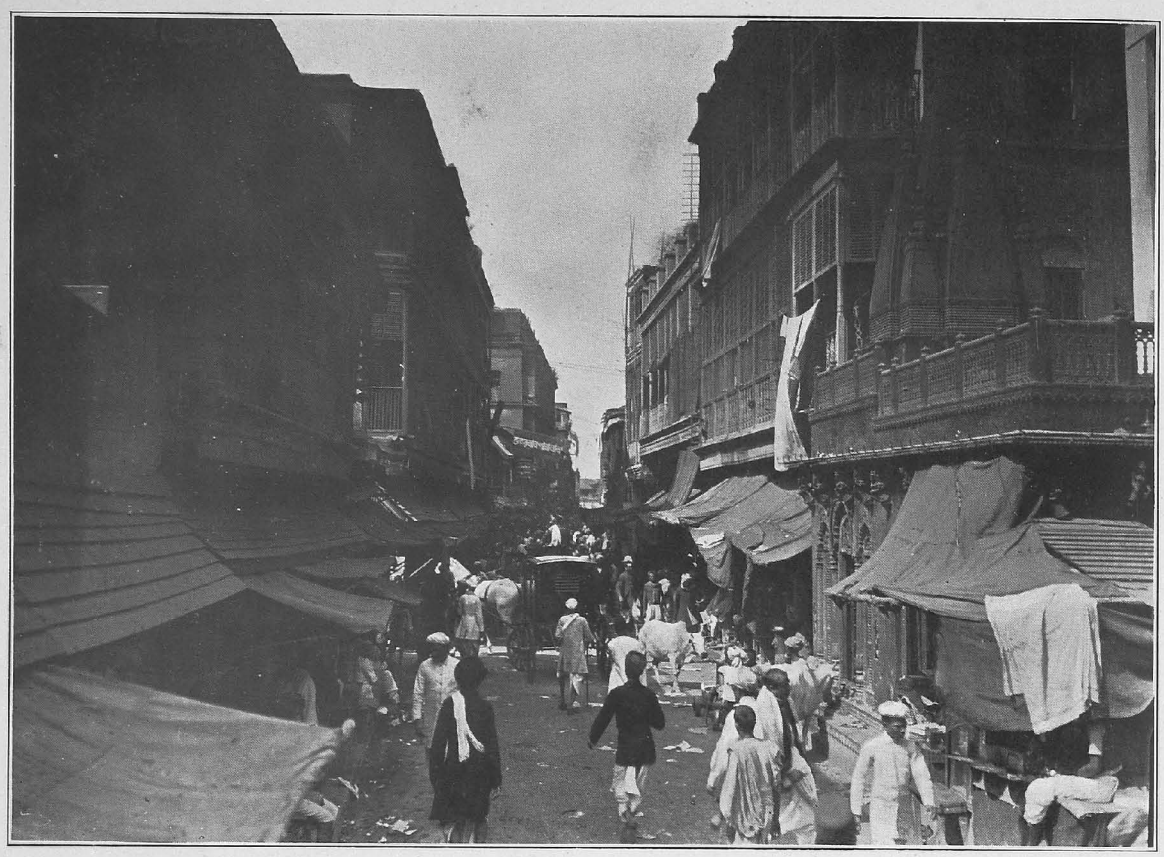
It is shewn in this report how excellently Dalhousie Square can be improved, and widened for greater traffic of the near future, by moving the tram rails and crossings inward. The great streams of traffic in the Square will thus be freed from all tramway points and crossings—but a Mangoe Lane development, on the west end of a new Lall-Bow Bazaar, would again put starting and stopping traffic over a number of points and crossings in their new site, at the south-east corner of the Square.

If Calcutta were normally planned there would be at least two large east and west roads between Lall-Bow Bazaar and Harrison Road, and two more between Bow Bazaar and Dharamtolla. We can only afford one additional east and west route in this locality: and in consequence it will carry much traffic, and its most effective and sound position is of great importance.

The proposed New Bow Bazaar would traverse some remarkably cheap property in its central position, and would also bring light and air to five of Dr. Crakes' slum blocks. Where the proposed Road passes the Eden and Lady Dufferin Hospitals, tar, macadam or wood paving should be used to diminish dust and noise.

Creation of an effective north-going road from the main focus, viz., The Inner Strand Road.* This obviously is a vital want. The line of the new road plainly lies somewhere parallel to and between the Strand Road and Chitpore Road; and we should bear in mind the law of river-ports that main roads parallel to the river possess value according to their river nearness, and our Inner Strand Road would on this ground only, be put nearer to Strand Road than Chitpore Road. But there are other factors; property nearer Strand Road is the more expensive to buy, and

* This name was early coined by the writer, to emphasize its position and locilise it readily in our mental visions of the new Calcutta.



Cross Street: the cab is turning down a much narrower street. Proposed Inner Strand Road would cross about middle distance beyond cab.



Armenian Street: typical of the better streets in Central Conjested Calcutta. Light angle about 70^0.

then too, every main road must have its logical beginning and end. In addition, vistral factors have their place—but very weakly in present Calcutta.

The writer made a most minute and lengthy examination on site and on plans to find the best and most economical start for the new road. He made half a dozen sketch plans. He closely investigated the interesting proposals of several members of the Calcutta Trades' Association, who shew on a map the new North Road as a continuation of Old Court House Street, with the Synagogue in Canning Street as an important vistral point. The Synagogue itself was to form an island in the new main road ; but this is wellnigh impossible, for a new and costly electric generating station has been built so as almost to adjoin the west side of the Synagogue. The vistral tower of the Synagogue is also on one corner of the building, and Mosques and the Roman Catholic Cathedral produce other local difficulties —these might be overcome, but major considerations will be found to put the Old Court House-Synagogue route out of question.

The writer prints in the Appendices, a short note on the interesting plan made by these public-spirited Trades' Association members. In the writer's opinion, the artistic needs of vistral planning, have, in this plan, been allowed to overshadow traffic and economic needs to their serious detriment, otherwise the plan shews some of the vital road-needs of the city, e.g., the Chitpore North-east Diagonal and the Sham Bazaar Diagonal. No South-East Diagonal to Howrah Bridge is however shewn, and this latter new road vitally affects the start of the new northward road.

Here it may be said that Calcutta conditions, the need of rigid economy, and the paramount urgency of traffic needs—all forbid absolutely in our city, except in but one or two cases, the luxury of vistral planning, i.e., creating new roads so that their vistas will be terminated by existing church towers, monuments and the like. We have very few artistic focal objects and it will be infinitely cheaper to create our new beauty as we go. This is dealt with in the aesthetic section of this report.

There are really only two sites allowed by economy and traffic where the Inner Strand Road may properly start to go north from the city main focus :—

(i) From the South-East Diagonal between Dalhousie Square and Howrah Bridge, and at a point in it just south-east of the old Armenian Church. See Plans of Schemes, 3, 4, 5, 6, and 7. But this is not the best starting point, for it does not strike home centrally into the main focus, and has other defects.

(ii) From the truncated end of Clive Row. This is a true central starting point right from the city heart. (See Plan of Scheme 9, recommended for execution). The writer has gradually become solidly convinced that the prolongation of Clive Row is the proper solution of the problem, and will give the fullest satisfaction, and by far the best value to-day and in the future for the money spent. To take

no advantage of the Clive Street and Clive Row projection northwards would be to waste and abandon what is a good possession capable of most invaluable development—for Clive Row is between 50 and 60 feet wide, is the Lombard Street of Calcutta, and is at present wasted as a broken spoke starting from the true hub of Calcutta.

From Clive Row the line of the Inner Strand Road is determined first by the relative positions of the Armenian Church and the South-East Diagonal. The writer, in Schemes 3, 4, 5, 6, and 7, designed the Inner Strand Road to pass just east of the Church, but has become convinced that this line (shewn dotted on Slum Map) is not the best: and that the new road should pass just *west* of the Armenian Church in a smooth traffic junction with the South-East Diagonal. This will permit the Inner Strand Road to function easily as a most important city and suburban tram-route between north Calcutta and Dalhousie Square—Clive Row passengers to get off at Armenian Church.

The need to keep the new road in the cheaper property zone is the first factor north of Armenian Church, and next, the Inner Strand Road must serve not only as a northward route, relieving Chitpore Road, but also it must relieve that road of some north-east traffic. To swing the new road too far west would discourage this traffic. Then again, a barrier with an aperture in the centre, is offered in Neemtolla Street by the big building of the Free Church Institution on one hand, and a large and valuable private building to the west of it. The Inner Strand Road should pass inevitably between these two big blocks and thus go on to meet the north-eastward Sham Bazaar Diagonal.

If we had money to spare, the Inner Strand Road should proceed right on north until it strikes the riverside and roadway, but rigid economy is essential: and thus causes the logical ending (and re-continuation) in the Sham Bazaar Diagonal.

The Inner Strand Road as designed will also pass right through the frightful Barrabazaar and Jorabazaar slums, and altogether will cut through about one-and-a-quarter miles of streetless congested property.

The writer's observation notes contain a mass of detail matter concerning the problems of this Inner Strand Road, and they are returned for reference.

A North-Eastward Diagonal Road from Howrah Bridge, which will be called the '**Manicktola Diagonal.**' The object of this road is to supply a pressingly needed diagonal north-east and vice-versa traffic route, right across and beyond the bulk of northern Calcutta, not only to give traffic direct facility to and from Howrah Bridge, but also to and from the city heart. At present such a route is absolutely wanting, and the increasingly evil results have been described.

The chief special *local* points in determining the best line for this road are:

(i) The bridge site and property in vicinity.

(ii) The situation of the future Manicktolla suburb.

(iii) The more 'diagonal' (i.e., the more nearly north-east to south-west) is this road, the more will it facilitate general traffic.

We have to find the best compromise between these three local points, and also keep in mind the large general rules set out in this chapter.

The finest starting point would be the actual Howrah Bridge end, and considering the splendid opportunity for a magnificent treble exit from the bridge into a fine open traffic place, formed in combination with Harrison Road and the new South-East Diagonal to Dalhousie Square—continental city authorities would look at no inferior alternative. But we are faced with want of money, and also with a 12 foot square nearly new Jain temple in the way, and also with a new heavy five or six-storey building and a general gross and costly neglect of the bridge exit. We cannot put this right unless the Imperial Government comes to the help of its so long-time and up till but the other day, seat of rule.

The nearest economical starting point from the bridge lies diagonally across the Silver Mint Tank.

The importance of draining out of Chitpore Road a good percentage of north-east traffic at a point as far north as possible from Harrison Road, urges the utmost diagonality, and is one reason for the slight change in a more north-easterly direction. (See Slum Map).

From Chitpore Road the line of Manicktola Diagonal is biassed by the further need to preserve diagonality (north-east to south-west line) as this gives the new road a greater range of usefulness in north Calcutta: and will assist the new Central Avenue, Cornwallis Street, and Circular Road routes, in the same manner in which Chitpore Road is helped—but in a less degree. The final consideration is the area-bulk of Manicktola, the future suburb. The further north we take our crossing place in Circular Road, the less will Manicktola Avenue serve Manicktola (see Sociological, Census and Tramway Maps). Manicktola Avenne unvoidably strikes the suburban triangle of land far to near its apex to let the avenue be a highly important access road.

The further south that we cross Circular Road, the further would we move the Manicktola Avenue from the general traffic desires, directions, and needs of north Calcutta. The route laid down in Scheme IX (see Slum Map) seems to the writer, to be the sound and just compromise to meet all the above needs in a fairly effective manner. The north-east end of the new road is continued in the existing so-called Manicktola Road—for we must not forget that the most effective route into Manicktola will develop in Manchua Bazaar.

It will be observed that the proposed Manicktola Avenue would be cut through four-fifths of a mile of rank slum: and that almost its whole length of about one-and-a-half miles, passes through typical tangled-lane-areas of north Calcutta.

The Sham Bazaar Diagonal from Dum-Dum Bridge to Aheeritolla Ghat. The object of this road is to allow all north and north-north-east vehicular traffic entering or leaving Calcutta to sort, disseminate, and divide itself among the two great new north and south routes, and the three similar existing routes. At present no such natural distribution is possible, and the scandalous congestion of Chitpore Road is one of the results. Further, the Sham Bazaar Diagonal and its connections will form part of the valuable essential route needed between the north-east and the riverside: and will be of especial and immense value during the season of Calcutta's greatest trade—the jute.

Rigid economy determines the exact route. It would be best for the absolute convenience of north-north-east traffic if the new diagonal could form a straight line between Dum Dum Bridge and Aheeritolla Ghat —but, to avoid valuable property, the new diagonal is started from a point at the head of Cornwallis Street, and has thence a slight southward curved deviation from a straight line.

This southward sag also slightly shortens the Inner Strand Road, and brings the diagonal nearer to coincidence with the *general* traffic desires. Further, among minor points, it is a wiser policy, both from traffic, sanitary and financial points of view, to duplicate the existing Sham Bazaar Street, rather than widen it. The new route passes right through streetless congested property practically along its whole length of some one-and-a-third miles.

Widening of Lower Chitpore Road and Bentinck Street. The widening of Lower Chitpore Road northwards from Bentinck Street to that point where Manicktola Avenue will cross, is a most vital main road nccessity: most especially important is the length from Manicktola Avenue to the Chitpore Diagonal. For the said Avenue will without doubt eagerly pour some new traffic into this length of Chitpore Road; and will, vice-versa, draw traffic from the city via this Chitpore Road inter-connection, and moreover we *want* the Manicktolla Avenue to have these functions. This widened length of Chitpore Road will form part of the new and north-east essential radial from the city main focus, and the short Chitpore Diagonal will be a very popular route feeding into and out of the existing road.

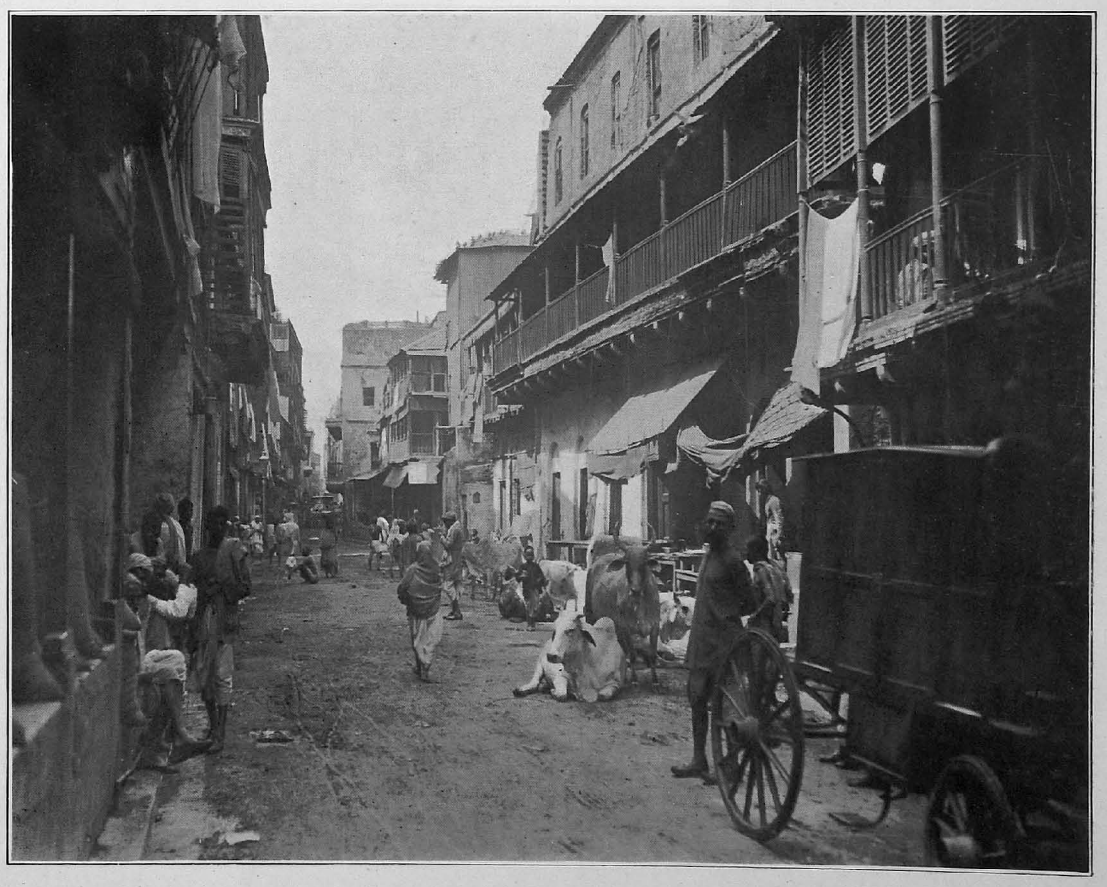
The remainder of Chitpore Road and all Bentinck Street southwards from the junction of Chitpore Diagonal, need widening to Chowringhee for a quite different purpose—viz., so that they can become part of the new fast and shorter route between Chowringhee and Howrah Bridge, and thereby relieve Old Court House Street and the city heart from through



Traffic in the lanes. Writer is at a point where proposed Manicktola Avenue crosses. (Jorasanko-Barrabazaar.)



Traffic in the lanes, (a jam), between Canning Street and Harrison Road. Note upward extension of planless slum in background.



In the slums. A better class 20ft. street passing into a 10ft. street: delagridated property. Sacred cattle on right and in middle distance: typical of property opened up by proposed Inner Strand Road and Manicktola diagonal.

traffic. By these widenings, much business and tram traffic will be expedited, and the fundamental need already stated will be effectively met, as likewise will be the future traffic increase.

Lall Bazaar Widening. Given the New Bow Bazaar route and the Chitpore Diagonal, this widening would not be required for to-day's traffic. But future traffic will demand it; for there is, and will always be, a certain amount of slow and heavy vehicular shipping traffic through Lall Bazaar, a mixed tram, motor, and shipping traffic needs much room, and further, every inlet and outlet into Dalhousie Square will not be found too wide in years to come.

At present, Lall Bazaar can be widened at comparatively low cost, but in ten years or less, from now, the cost will perhaps have doubled, or some insuperable obstacle may have arisen into being. The south side would be the better of the two, although the more costly. The corner formed by the West End Watch Company's building is very bad, and especially prevents tram, gharry, and motor drivers seeing ahead as they enter Dalhousie Square. It is a dangerous obstructive corner and causes continuous traffic dislocation and stoppage and is highly dangerous and annoying to innumerable foot passengers. The tram company have to keep a man stationed there permanently to flag drivers of cars and prevent collisions, and Sir Frederick Halliday finds it needful to keep two or three policemen on duty at this corner almost night and day. The corner of the above building (between Mission Road and Dalhousie Square) should be cut off, be well rounded off right back—as part of Lall Bazaar widening. Room and roundness and plenty of them, are the essential needs at all traffic junctions to-day, and yet more in the future. The creation to-day, of New Bow Bazaar, would very greatly relieve this corner, but the traffic increase of future (we hope highly prosperous) Calcutta years, will re-enhance the dangers and defects of this bad corner. (See diagram of drivers obscured vision-lines, among the writer's observation notes).

A New Riverside Road northwards to Chitpore and the widening of Strand Road North. The need of a proper riverside road between Aheeritolla Ghat and Chitpore Bridge is very great. Calcutta manufactories and warehouses densely occupy this piece of riverside and the immediate interior, but the ground is shared by dense blocks of Indian residential property, now being elbowed and shut in more and more by new jute and flour mills.

The proper riverside route is now occupied by brick-protected slopes and the muddy and shallow margin of the Hugli. Between the brick slopes (with occasional lengths of old retaining walls) and irregular walls of high buildings, is a narow strip of ground mostly occupied by the Port Trust Railway, and the Strand Road North is reduced to a mere 12 to 20 foot lane, and this is further obstructed by various unimportant and small riverside buildings. The railway needs double its present width to make it into a real live quick-working port railway, The important factory area adjoining, can make but little use either of the squeezed railway or the inaccessible river, and adds most of its traffic to the Chitpore constipation.

The writer carefully examined the whole shore-way several times during exceptional low tides, and is positive that no real engineering difficulty, nor any river-erosion danger exists to prevent the creation of a valuable double-level riverside road from Aheeritolla Ghat to Chitpore Bridge. In fact even a big reclamation, a quarter of a mile in width, could be made readily enough. Two old bogies have often been brought up in excuse for the sad state of the North Strand riverbank. The first is the conjectured presence—deep in the riverside mud—of large lumps of of old retaining walls, which latter were built without proper foundation many many years ago and have since broken up, slipped, and sunk out of sight.

At lowest tide, some lumps of brickwork can be seen, and they would offer resistance to screw piling—but screw pilingh as long passed out of date, for it is highly expensive, very clumsy, and slow to put down, and the number of piles per unit of area is most limited, nor has it the lateral firmness of the modern pile. The modern ferro-concrete pile has enabled the execution at low cost, of riverside and jetty work that was almost impossible thirty years ago.* The writer is of opinion that the fragments of retaining wall are not very numerous; and even if Calcutta must retain the old screw pile, the well-known Lobnitz plant plus gelgnite will soon clear a way for every pile.

The river margin is quite shallow and shelving for not less than 100 feet from the present brick slopes. Numbers of people can daily be seen bathing at a distance of 50 feet from the bottom of the brick slopes, and the jetties have to be run out 100 feet to give draft for shallow river craft.

The main flow of the river is a long way out from the shore, and this stretch of the river is no longer a genuine 'cutting edge.' There is no real reason why we should not go out into the river mud for a modest 50 feet or so, and with the width we have, construct a double level road: on the modern lines adopted years ago by other great riverside ports. A small toll could be charged to river craft, for the use of the lower road as a quay, which latter would be say 30 feet wide; and the upper road for traffic would be 50 feet wide, including one footpath. Room also could be given for an additional line of railway track. The lower road would be occasionally flooded during exceptional high tides, and this occurs with many low-level riverside roads, such as at Bordeaux, and Dusseldorf. The benefits of the double-level system are many. Loading and unloading operations are separated from moving road traffic: and, from the engineering and river training standpoint, the double-level structure takes less out of the river cross-section, is highly stable and resistant, is economical of filling and pile-lengths, and the outer row of ferro-piles have no serious outward bending stress put upon them, and can be used of great length to wipe out risk of erosion.

Strand Road South is indeed an important road, serving as it does on one side, a mile of ocean-shipping quay and warehouses, and on the other, a valuable line of solidly built shipping and other offices, etc.

* I have used both screw and ferro-concrete piles, also long timber piles. E.P.R.

Widening would greatly injure the latter and would be most costly and disturbing. Widening on the river-ward side is impossible. Every inch of room taken would further deprive the quays and railway.

The only solution appears to be first class deep arcading. By this means, done well, gradually, and inexpensively, solely by an arcading regulation, some 20 feet of effective width (and valuable shaded footpath in a hot and dusty road) would in due course be added to Strand Road South; the existing east path would be converted into new roadway, and the other footpath could be removed or narrowed.

At least one good connection between Strand Road and the New Inner Strand Road, is required in addition to the few we shall have. We could do well with half-a-dozen, but the money question again forces us to the absolute minimum. It appears to the writer that the cheapest and most useful new inter-connection between the Strand and Inner Strand Roads, can be obtained by widening Pathureea Ghat Street; and thereby we kill another bird with the same stone, for we would put a good wide road right through one of Dr. Crakes' slum patches. This connection is an essential, and will meet a great need, especially in the jute season. With this there would be also the new Sham Bazaar Diagonal and the Manicktola Avenue cross-cuts between Strand, Inner Strand and the Chitpore Roads.

The Central North and South Avenue, from Chowringhee to Chitpore Bridge. The principal factors in fixing the line of this road, are the positions of Chitpore Bridge, Halliday Street, and Chowringhee. The big bend eastward below Sham Bazaar Diagonal, is necessary to avoid the temples and rajah's palaces of Raja Nobo Kissen Street. Halliday Street is really rather too far east, and is not 70 feet wide, but we must use it for the sake of economy. The junction and forking at Bow Bazaar is made roomy enough to provide valuable cab ranks. It is best that the south-east fork should diverge slowly from Bentinck Street, and this length will provide much needed frontage for business development. As a vitally essential new roadway of to-day, this occupies quite an inferior position to the new roads already described: for, with the exception of the fast motor car traffic between Chowringhee and Barrackpore, there is practically very little traffic between Chowringhee and Chitpore Bridge. But there are two important lengths in the proposed road.

The first is the south-east fork going from where the Avenue meets Bow Bazaar, to Wellington Square. This fork completes the future Ballygunge to city-centre tram route, and in general completes and continues the important new routes from Howrah Bridge to the south-east.

The second portion of Central Avenue that is of considerable moment, is that lying between the proposed Sham Bazaar and Manicktola Diagonals. This length will be the valuable servant of much traffic between the north-east and the north suburbs, on one hand, and the city centre and business area with Howrah Bridge, on the other hand.

Turning our eyes to the future, we see that all the Central Avenue will, in due course, become a valuable and necessary roadway: but with the above-mentioned portions, if it were created to-day, it would not be found so valuable as any of the roads previously described. But the writer does not mean it is a non-essential road—far from it. Upon festive days, it will be the great valuable route for tens of thousands, between their houses in north Calcutta, and the splendid Maidan and the highly popular race-course. This Central Avenue must of course be a great and fast tram-route, and will help to quite do away with the disgraceful Chitpore tram-crawl.* It was suggested that no trams should use this road—but the only reason given was that the comparatively trivial motor car traffic should not in the slightest way be inconvenienced.

The Central Avenue and its forks would cut through about one-and-three-quarter miles of Dr. Crakes' bad areas, and to exclude tramcars on grounds that this road will be a sort of second Chowringhee or evening promenade, would obviously not hold good. It has become almost an axiom in town planning, that every great traffic road must be provided with trams. In our case it is a law of the Medes and Persians.

Harrison Road Short Diagonal and Machua Bazaar Widening. The object of this work is chiefly three-fold. First, it is to provide a direct route to and from the central mass of Manicktola and the city business arena. Machua Bazaar is the natural and most effective route for this very important purpose.

Secondly, the Machua Bazaar widening and the short Harrison Road diagonal, together open up and form the cheapest effective route in and out of the city focus, for a big population living mostly north of Machua Bazaar.

Thirdly, this route fills the great road-gap between Sealdah Station and Manicktola Avenue, and it is the best route we can afford as a natural continuation of the Chitpore Diagonal. If we had the money, we would join up the Chitpore Diagonal and the Harrison Road short diagonal. Instead, we must send traffic back and forth between them by means of a widened Chitpore Road, and the decent Harrison Road. The new route will also supply a good east and west connection between Howrah and Manicktola. This Harrison Road Diagonal cuts through a block of the worst kind of slum.

A Sealdah-Chowringhee Diagonal. The cheapest effective route can be created by joining up the 100 foot wide east end of Dharamtolla, with the junction of Lindsay Street and Free School Street. A finer and more widely-effective diagonal would be made by widening the west part of Kyd Street and then making direct for Dharamtolla (east end) as before—this route is shewn by dotted lines on the Slum Map: but it would of course be much more expensive. Estimates are given later for these and all the other proposed works or alternatives.

* I have sat on the front of a Chitpore Road tram-car and listened for three miles to the unceasing hammering of the car's bell during three-quarters of an hour.

The Dharamtolla to Lindsay Street route for the Sealdah-Chowringhee Diagonal includes the widening of a short piece of Lindsay Street.

The Sealdah-Chowringhee Diagonal is an essential main road. It cuts through slum and streetless property not shewn among Dr. Crakes' areas.

The Prolongation Eastwards of Marquis Street via Wellesley Square would economically create a valuable route to and from the market and shop focus, and would help to open up the streetless jumble between Circular Road and Free School Street. The want of such a route is felt now, and will be felt more and more. This one proposed road will be a meagre enough possession, but it is all we can afford. Note that this road is shewn dotted instead of solid, on the Slum Map. It should be solid.

Park Street Widening. This is an important route, as has already been pointed out under 'Present Congested Routes.' The road may be considered more readily in halves.

First, from Chowringhee to the Wellesley-Wood Street cross lane. This first length is the only natural main traffic channel for the Park Street residential area, covering four-fifths of a mile by three-fifths of a mile: and this area is steadily increasing in density of population: and already lower Park Street becomes uncomfortably congested with fast carriage and motor car traffic.

The debouchment into Chowringhee is peculiarly bad. Hall and Anderson's building on the south corner should be well cut off, and then the end of Park Street should be skilfully 'islanded.' At present, when Chowringhee foot passengers are prepared to cross the Park Street opening and look up Park Street, they do not know whether a rapidly approaching car is going to turn south down Chowringhee, or northwards up it, or across it (left) to Outram Road, or across it (right) to Bentinck Road. Every day one may see members of most respectable families (British and Indian), leaping about like cats at this horribly arranged crossing. If they did not, they would certainly be cut down, despite the best intentions of drivers—who all the same mostly rush out regardless.

Prolongation of Amherst Street. This as pointed out long ago by Mr. Bompas, is solely a sanitary measure, and is for the supply of normal street provision apart from traffic needs. A glance at the Traffic Diagram will show that such a prolongation does not coincide with any single defined traffic need.

The Chairman, in his note dated 25th June, 1912, wrote as follows:—"As traffic generally moves to and from the centre it is by no means true that every long straight line of road will carry much traffic. Looking at the map of Calcutta it may seem a pity that Wellesley Street with its continuation Wood Street was not carried through to Circular Road, but this is not really a defect. There is little through traffic along the line: the traffic

from the north stops at Bow Bazaar, that from the south follows Camac Street and Park Street. So at the first glance it seems a sound policy to extend Amherst Street south to Park Street. This would be one way of opening up Wards 11 and 14. I am convinced, however, that from the point of view of through traffic such a road would be almost useless, and Wards 11 and 14 may equally well be dealt with otherwise."

Through a mistake, the prolongation of Amherst Street is shewn in solid red and the prolongation of Marquis Street is shewn in dotted red lines, on the plan accompanying this report. The order should be reversed. The writer was so absorbed in the central and northern problems, that this quite minor road shewn in solid red escaped his attention until it was too late and plan-printing had been finished.

The New Auchterloney Diagonal across the Maidan, will cost very little indeed to construct, and in partnership with the Bentinck Road diagonal to Park Street will form a proper ending to the Old Court House Street route as regards the heavy traffic between Chowringhee and the city main focus. At present much of this has to use the awkward right angled Esplanade East, or Auchterloney Road, and the confused juuction opposite Corporation Street, crossed by two double sets of slowly diverging tram tracks, etc. The nuisance and confusion at this junction is a familiar sight on any evening, and oftener than not on any morning.

Should more money be available, the prolongation of Mission Row, by the removal of the Pathescope building, would finish in this proposed new road, at the island centred by the big Auchterloney Column. At present this column, hidden by trees, is only at its base visible from most of Chowringhee and Esplanade East; in the new road it would form a fine vistral object, and after passing it a second fine upward pointing pile would be a tower of the Law Courts. But apart from aesthetics, the new Maidan Road would be a valuable traffic channel, would cost very little indeed, and would interfere with nothing.

South Maidan Road. This would afford further relief to northern Chowringhee; at present a large consensus of motor cars and carriages assembles almost every evening in the Eden Gardens, just south of the Law Courts. Most of them appear to come, via Chowringhee, from the south of Park Street and the Grand Hotel neighbourhood: and from which there is no other route for much of this traffic save via the over-crowded North Chowringhee and Auchterloney Road. Theatre Road pours carriage and car traffic into Chowringhee, and the fine and beautiful Red Road and promenade along the side of the river are almost inaccessible, from Theatre Road except via Chowringhee. A cheap light traffic route from Theatre Road to the Red Road, would meet the above needs: and further would form an additional and very delightful and useful route between the city focus, and the south half of the extending Park Street area with Ballygunge. Traffic would also be diverted from the Park Street-Chowringhee corner, and out of north Chowringhee. At present the fine but deserted and disconnected Red Road is far too much adopted by motor car firms in hell-for-leather trials of the naked chassis, etc.

It is certainly better destined to become an important and charming direct route for cars and trams between Alipore, Bhowanipore, and the city; and further, the true route between (1) Theatre Road and Eden Gardens, (2) Theatre Road and the city.

Dalhousie Square Improvement, as regards the road widenings effected, and removal of the tramways, will be a comparatively inexpensive work, and would be found a very advantageous and popular work of remedy even to-day. It should in any case be done before the South-East Diagonal is completed. Aesthetic improvement does not concern this chapter. Improvement from the traffic point of view is what we are dealing with, but we may say that this square can be made very mnch more beautiful. Some of the immediate advantages of moving the tram-rails inwards would be as follows:—

Dalhousie Square East roadway would be made 22 feet wider. Eighteen polished tramway rail-crossings would be removed out of the traffic flow at the notorious Manton's corner. The net of tramway crossings in the roadway at Lall Bazaar entrance would be reduced by two-thirds, and the one-third left would be well placed. Valuable additional room would be given for cab and motor ranks.

Dalhousie Square North Roadway would be made 17 feet wider. The north-east corner by the Scots Kirk would be immensely improved, for the division and coalescence of traffic would take place comfortably from points 150 feet west and south of the Kirk, instead of right in front of it at one spot as at present. The cab rank would be moved west, and could hold a large number of vehicles.

Dalhousie Square West. The effective roadway would be widened at the constricted part from about 29 feet to 55 feet, and a great improvement would result in traffic ease and tram-working. Plenty of room would also be given for a valuable cab and motor rank, that is more and more required.

Dalhousie Square South roadway is not much effected. If the practically useless and very intrusive little Dalhousie Institute were removed, then valuable room for standing vehicles would be obtained. Every new big building in the vicinity of the Square means half-a-dozen additional standing gharries and cars: and more tramway and foot traffic.

Russa Road Widening. This narrow southward going main road can be seen best on the Tramway Map. The Trust has already for obvious reasons decided to widen this road for a distance of over one mile southwards from Circular Road, and the estimated cost of this length is included in the writer's final scheme of urban main roads. It may be pointed out again that this road is one of the most important of the few suburban tram routes of Calcutta. If money can be spared to make it into a boulevard, future generations will bless us.

Diamond Harbour Road. This has already been pointed out as the essential and sole direct highway between the city and a fine clear area in the south, capable of big unbroken development. The road needs widening and improving for a distance af one-and-a-half miles. At present this can be done at low cost. The most immediate and important matter affecting the vitality of this road, is the great zone of new railway extension, from east to west alongside the Boat Canal from Kidderpore Docks to near Russa Road.

Diamond Road will have to cross over this broad skein of new sidings arising from Kidderpore Railway development. See Sociological Map A first-class road-bridge is firmly demanded by the future. A maximum width of about 45 feet will it is to be feared, be proposed by those who put down the sidings—such a width would take present day traffic fairly uncomfortably, but a width of not less than 68 feet should be insisted on by the Trust. Further, the bridge should have easy grades of not more than 1 in 40, and should be designed to carry double tramway track and high-speed double-deck cars. This route and road is of great moment to future suburban development.*

Circular Garden Reach Road.† The importance of this road as the main trunk vehicular route between the docks and the city is obvious, At present it is very ragged and irregular, and is too narrow in many places even for to-day's traffic. These conditions are rapidly being fixed and made chronic by new buildings and works, erected not only by private persons, but also by public bodies, to whom good roads at Kidderpore should be a sine qua non.

The road needs aligning and widening, over a distance of about one-and-a-half miles. At present, this work can still be done economically. Circular Garden Reach is certainly destined to be a great tram route, if Calcutta progresses. The importance of this road is very greatly increased by the fact that its parallel sister-road nearer the river, i.e., Garden Reach Road, is very likely indeed to be done away with altogether.

If the new Kidderpore Docks are developed in the manner found most effective by practically every great modern up-to-date port, then we shall see the normal unbroken row of long narrow parallel docks, all running straight in from the river-bank, and each separated by the regular warehouse and railway jetties, and each of the docks would cut right through the existing Garden Reach Road. In fact, the writer, believing firmly that Calcutta has awakened, and will now advance rapidly on modern lines, considers Garden Reach Road beyond the present docks, as a dead road.

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* The President of Calcutta Corporation and Member of the Trust, the Hon. Mr. S. L. Maddox, C.S.I., I.C.S., asked for a report on this road, and the writer much regrets that pressure of work prevented him keeping his promise, except verbally.

† See Sociological and Tramway Maps.

This item brings to a conclusion the description of the chief main road-wants of Calcutta, which are all embodied in the writer's final scheme submitted herewith and shewn on the Slum Map, and on that of Scheme No. IX. Howrah needs will be discussed under Suburban Development.

The next chapter deals with Estimate Bases, after these follow the Estimates and Maps of eight various trial schemes, and also Scheme IX. Readers may feel it more convenient to turn straight on from these last chapters on traffic routes and problems to study the resultant schemes. Good sequence is often difficult to arrange in this kind of report.

The transparent Traffic Diagram, placed over any scheme, will assist in shewing how well, or how defectively, a scheme meets the city needs.

SECTION III.

SCHEMES & ESTIMATES.

CHAPTER IX.

ESTIMATE BASES.

Values Map—Colours indicate values of property—yellow costliest, blue next, green third, purple is cheapest.—Estimate Bases—Costs of new roads in Zone I on basis 1, New S.E. Diagonal is an example—Exaggerated estimates of this and other roads applied to writer's first Ideal Soheme—Costs of new roads in Zones I, II, III and IV—Costs of widening in each zone, and intermediates—Table of Estimate Bases for main roads 100ft., 80ft., 70ft., 60ft., and 50ft. wide.—Table of estimates for road and street-widening.

Values Map. The Values Map facing this page, gives a rough general idea * of the different values of property in Calcutta, or rather of values in all those parts of Calcutta that will be most traversed by new main roads. The environs of Theatre Road are scarcely affected, and no valuation has been attempted of this and other similar areas, and they are not coloured.

The general rule applicable to all cities, that the highest property-values are found in the main focus, is true of Calcutta. On the Values Map the main focus property is coloured bright yellow and will be called Zone I.

It must be clearly understood that every main focus of a city contains a high percentage of positively untouchable property, either on account of exceptional high value, historical association, or on other grounds. Dalhousie Square south-west and east and the wide part of Clive Street are Calcutta examples. The values under Zone I refer to property and sites that can still be bought, and be demolished or used.

By far the most formidable annual rise in value takes place commonly in the most rapidly developing parts of the main focus ; and then in the slightly cheaper but large areas that border closely on the main focus. These latter will be classed as Zone II, and are shewn by bright blue colour.

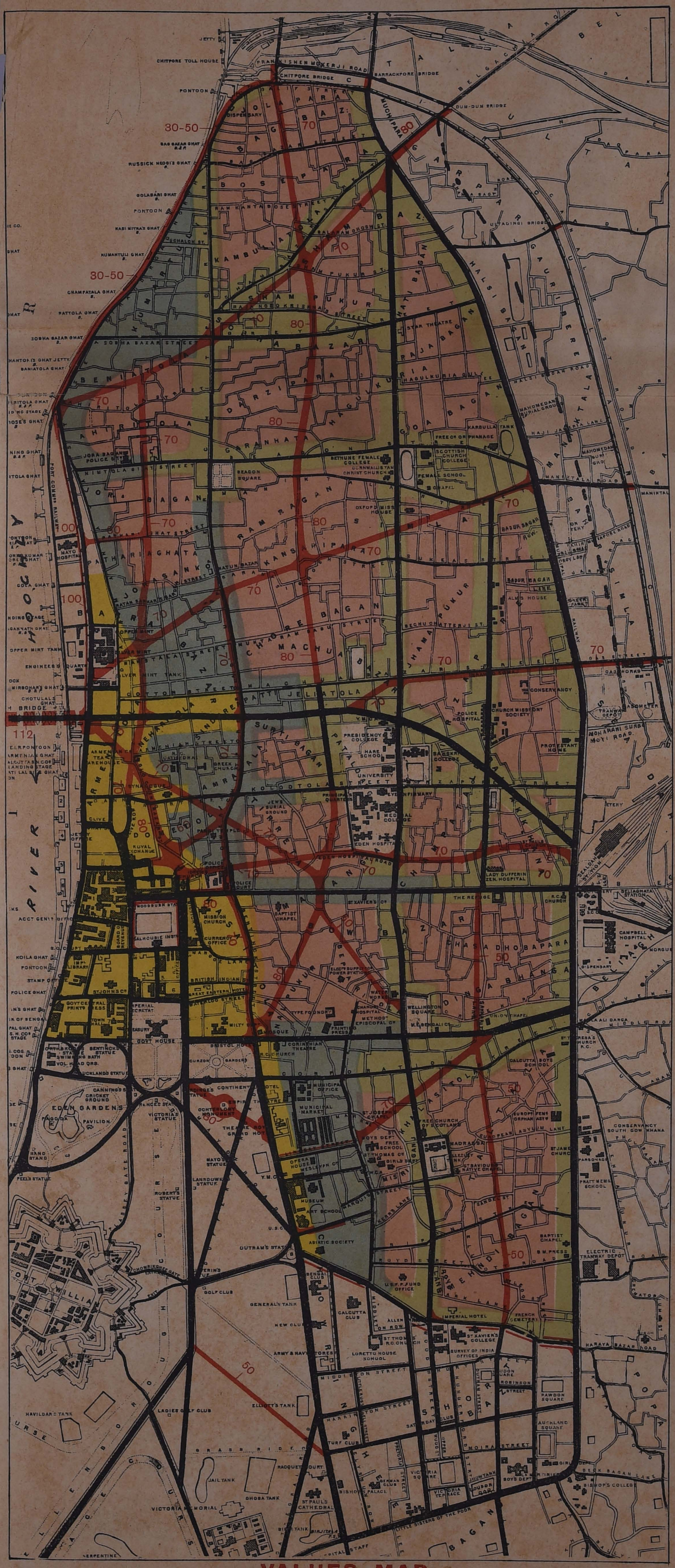
A third Zone of values is found generally to occur along the frontage of important main roads. In the case of Calcutta, this is very marked, owing to the great distance between main roads, and the almost entire lack of streets in the blocks bounded by those main roads. Zone III is coloured bright green on the Values Map.

Inside the half-mile rectangles bounded by the sparse main roads of Calcutta lie the cheaper built-up areas of the city. These rectangles cover about 2,500 acres, all streetless and containing some 800 acres of the rankest slum, but they also contain much fairly good residential property.

* A considerable loss of detail was unavoidable in re-producing a small handy copy of the writers original.

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



VALUES MAP.

Zone No. 1, Yellow. Zone No. 2, Blue. Zone No. 3, Green. Zone No. 4, Purple.
(Road-Scheme No. 9, recommended for execution, is superimposed in red.)

Zone 1 is the most costly. Zone 4 cheapest.

There are cheap and terribly squalid patches, such as that just north of Tiretta Bazaar, and also expensive areas such as occur in Ward No. 1. The cheap and dear patches approximately counter-balance each other, and the whole areas are coloured purple and classed as Zone IV on the Values Map.

It is quite unlikely that close and fairly exact estimates, within five per cent. will be possible before a large sample piece of main road work has been done in central Calcutta, and can be used as an up-to-date base.

The estimates in this report have, however, been given long consideration, and are believed to be all on the safe side. Each estimate base is set out as fully as possible and it will be a simple matter to make adjustment, in the light of better information, for later estimates that may be required on the same lines.

The exceptional knowledge of Calcutta possessed by the Chairman will enable him to criticize and if it be needed, adjust the bases accurately, and a good staff of clerks can then again in a few days work the estimates out.

Meanwhile the estimates in this report, which are believed to be on the safe side, are given as essentials for determining on a definite policy, for settling on a scheme of main roads, and on the general programme of work and finance.

It is still an unproved point, in Calcutta, whether or not a hundred-foot wide road can be made for less money per square yard, than can an eighty-foot wide road. This possible reduction has not therefore been counted on, and if the estimates err they will do so on the right side as regards this question.

The possibility of land lying fallow after acquisition, is taken into account in the estimates in every case, usually by making the recoupment rates rather low,

ZONE No. I, Basis 1.

Estimated cost of 100 feet, 80 feet, 70 feet, 60 feet, and 50 feet roads inside the main focus of the city, Zone I, coloured yellow on Values Map.

Calculated on the actual annual value in1913 at 25 years purchase, of all properties required for the South-East Diagonal Road, if made 80 feet wide; from Strand Road by Howrah Bridge, to the Scots Kirk in Dalhousie Square. Including rounded corners at Strand and Harrison Roads, a moderate open space by the Armenian Church, and the long widening out necessary behind the Scots Church. Length of road about 3,560 feet.

Total annual value of Properties to be acquired	...	Rs. 4.57.187
Say		4.57 lakhs
	Multiplied by	25 years
At 25 years purchase		114.25 lakhs

	Forward	114.25
Add 12 per cent. for wider recoupment area to be taken in, and not shewn on original plan. Say		13.70
		127.95
Add for cost of acquisition, law, road work, sewering, etc., 5 per cent. (Note : the most costly piece of Harrison Road required 4½ per cent.)		6.39
		134.34
Less recoupment at 50 per cent. Note : in the case of roads in the main focus, recoupment should be rapid, and considering the great demand for good frontages and sites in Zone I it would seem that all sites might be disposed of within two years of acquirement, the recoupment is therefore put at 50 per cent.		67.17
		67.17 lakhs
Then cost in 1914 of 3560 feet of 80 feet road in Zone I on basis 1, would be		67.17 lakhs

Cost of one mile of 80 ft. road in Zone I, 1914.

(i) $\frac{67.17 \text{ lakhs}}{3,560 \text{ feet}} = 18.87$ lakhs per 1,000 ft.

(ii) 18.87×5.28 (5,280 ft. in one mile.)

Then cost of one mile of 80 ft. road in Zone I .... 99.63 lakhs

Cost of one mile of 100 ft. road in Zone I, 1914.

Cost of one mile of 80 ft. road was		99.63
Add 25 per cent for extra 20 ft. width*		24.91
Cost of one mile of 100 ft. in Zone I		124.54

Cost of one mile of 70 ft. road in Zone I, 1914.

Cost of one mile of 80 ft. road was		99.63
Less 12½ per cent. for reduction by 10 ft. of width ...		12.45
Cost of one mile of 70 ft. in Zone I		87.18

Cost of one mile of 60 ft. road in Zone I, 1914.

Cost of one mile of 80 ft. road was		99.63
Less 25 per cent. for reduction of 20 ft. in width		24.91
Cost of one mile of 60 ft. in Zone I		74.72

Cost of one mile of 50 ft. road in Zone I, 1914.

Cost of one mile of 80 ft. road was		99.63
Less 37½ per cent. for 30 ft. reduction of width ...		36.36
Cost of one mile of 50 ft. in Zone I		63.27

From study of Calcutta property, it would seem that the above figures may be applied reasonably as a basis for estimating the costs of roads in the main focus, like the suggested South-East Diagonal, from Howrah Bridge

* No possible cheapening due to greater width is taken into account.

to Dalhousie Square. It has been shewn above, that if this road were made 80 ft. wide, with no open spaces, the cost would be about 67.17 lakhs or say £448,000 sterling. If made 100 ft. wide :

$$124.54 \text{ lakhs per mile} \times \frac{3,560}{5,280} \text{foot-thousands,}$$
$$= 23.58 \text{ lakhs per 1,000 ft.} \times 3.560.$$
$$= 83\ 94 \text{ estimated cost, 100 ft. wide.}$$

or say £559.544 sterling.

Certain estimates (for one of the ideal main road schemes which was shewn on a large 16 in. plan) were handed to the writer shortly before he left Calcutta. These estimates (among other excessive figures) make the net ultimate cost of the South-East Diagonal to be no less than 225 lakhs, or £1,400,000 sterling. Such figures are out of the question ; or perhaps the estimates were based on some faulty grounds of which the writer has no knowledge. At that time these estimates were certainly accepted as correct, and it is necessary to examine them.

The ideal main road scheme to which this net cost of 225 lakhs refers, shews the first 700 feet of the road from the Scots Kirk to be 200 ft, wide, and the remainder 100 ft. wide. The extra width was to provide room for cab-ranks and standing motors. If we add this 700 feet to the total length, we get 700 ft. + 3560, equal to 4260 feet 100 ft. road ; adding a little more to make a roomy junction with the suggested Inner Strand Road, then the total length expressed as 100 ft. road=4,300 feet.

On the basis of 25 years purchase of annual property values, etc., as set out for Zone I, basis 1, the cost would be 4,300 feet × 23.58 lakhs per 1,000 feet = 101.39 lakhs, instead of 225 lakhs ; or say £676,000, instead of £1,400,000. Considering the length, the actual route, the actual property, the present values, and the values in Harrison Road from Clive Street to Chitpore Road in 1900, the sum of 101.39 lakhs is known to be enough to accomplish the South-East Diagonal even on the grand scale suggested in the ideal scheme.

It may be remembered that the cost of the whole length of Harrison Road, in 1900, came to less than one quarter of the above estimate of 101.39 lakhs, and Harrison Road is about twice the length of the South-East Diagonal, even when 700 feet is added for excessive width, viz : Harrison Road is 8,700 feet long ; and the South-East Diagonal would be 3,560 feet, plus 700 feet for extra width = 4,260 feet.

To put it in another way, the estimates referred to, indicate that the cost of the far shorter South-East Diagonal would be no less than 9½ times the cost in 1900 of the whole of Harrison Road, which is over 1½ miles long. This seems quite impossible to the writer, and before leaving the cost of the South-East Diagonal, and the abnormal estimate of 225 lakhs, two other estimates may be given. It is possible that :

(1) The sum of 225 lakhs was arrived at in some way, by taking the street length of the road at 100 feet wide and then adding to this the cost of a piece of building land 100 feet wide by 700 feet long, as unremu-

nerative dead loss. Yet it should be noted that the length was given in those estimates as 4,500 feet, thus expressing extra width as extra length.

(2) It is likely, nay, fairly certain, that people would pay more for splendid sites on the 200 feet wide section—connected closely to Old Court House Street, Dalhousie Square, and the best part of Clive Street—than they would pay for sites on the 100 feet width between the finer wider section and Howrah Bridge. On the other hand this extra value at best could not be expected to pay for more than half the extra land and building taken in to get the extra 100 feet of width.

The cost may be calculated on each of these assumptions : in each case allowing the same extra cost for a little more open space at the proposed junction of the Inner Strand Road with this South-East Diagonal, ('Carmichael Avenue' on the large ideal plan referred to above).

(i) Assuming that the splendid sites on the 200 feet wide length will sell for no more than sites on the less finely situated 100 feet road, i.e., that the 700 ft. × 100 ft. of extra width is dead loss :—

Cost of 3560 ft. of 100 ft. road in Zone I, based direct on actual 1913 annual values at 25 years' purchase, etc., as in Basis 1, with recoupment at 50 per cent.

$=(\frac{3560}{5280} \times 124.54$ lakhs per mile)

$=(124\ 54 \times .674$ miles $= 83.94$ lakhs.

To this we add the dead loss of 700 × 100 ft. of land at 21.00 Rupees per foot (i.e. gross annual value of 573.091 square feet required for an 80 feet South-East Diagonal, was in 1913 worth 114.25 lakhs.

Then $\frac{114.25 \text{ lakhs}}{573.091 \text{ sq. ft.}}$ = almost exactly 20 Rupees per foot. Add one Rupee per foot (5 per cent. for acquisition, law costs, road making, etc., as in Basis 1.)

= 70,000 sq. ft. × 21 Rupees = 14,70 lakhs.

Then the total net cost of South-East Diagonal 100 feet wide with 700 ft. of 200 ft. width will be 83.94 + 14.70 = 98.64 lakhs, (or say £657,500 sterling, or only four-ninths of £1,400,000 (225 lakhs).

(ii) Net cost of 100 feet wide South-East Diagonal, taking it in two lengths of different widths, with less recoupment for the 200 feet wide length.

(*a*) Net cost of the portion 100 ft. wide, with 50 per cent. recoupment.

3560 ft. (total length.
700 ft. deduct 200 ft. wide portion
2860 ft. Total length 100 ft. wide portion.

Then, $\frac{2860 \text{ ft.}}{5280 \text{ ft. in one mile}}$ .54 miles × 124.54 lakhs per mile,

= .... 67.25 lakhs

(*b*) Cost of portion 200 ft. wide: with recoupment only at 10 per cent. more than for 100 ft. width, i.e. at 60 per cent.

Gross cost of 700 ft. of road as before (100 ft. wide basis) First we require the gross per mile of 100 ft. wide, with 50 per cent recoupment, in Zone I. This will be 124.54 × 2 = 249.08; then less 60 per cent. recoupment, this will equal 99.64 lakhs per mile net cost, or about the same as an 80 ft. road with 50 per cent. recoupment.

Then net cost of 700 ft. or .133 miles by 100 ft. in Zone I, 60 per cent. recoupment, = .133 miles × 99.64 13.25 lakhs

The net cost of 700 ft. × 100 ft. of land and buildings, without any recoupment, must now be added, as obtained in (i) i.e. 14.70

Brought forward 13.25

Total cost of 200 ft. wide portion 27.95

Then for (*a*) the 100 ft. portion of S. E. Diagonal, we have 67.25

and for (*b*) the 200 ft. wide portion 27.95

Total net cost on assumption (ii)... ... . lakhs 95.20

Or say £634,600 sterling, or less than four-ninths of 225 lakhs.

It will now be clear that to put down £1,400,000 as the cost of this South-East Diagonal, and similar figures for other work, was a mistake, and made the cost of the ideal scheme appear enormously greater than would be the actual fact:

NOTE that in the Ideal Scheme (No 1) submitted in this report, the net cost of a 100 ft wide S. E. Diagonal, with 700 ft. of it 200 ft. wide as above, has been set down at 99.6 lakhs, to be on the safe side: as is explained in the estimate bases.

ESTIMATE BASES FOR ZONE No. II.

(Coloured Bright Blue on the Values Map.)

Estimated costs of one mile of 100 feet, 80 feet, 70 feet, 60 feet, and 50 feet roads, in the central or more valuable parts of the city not situated in, but bordering on the main focus.

ZONE II. Basis 2.

Based on the cost of the most expensive portion of Harrison Road (from the centre of Clive Street to a point about 370 feet west of the centre of Chitpore Road, i.e., about 1,675 feet). Plus a rise of 35 per cent. in values since 1900, and with expected recoupment at only 45 per cent.

We hear of values going up 100 per cent. in ten years, and this seems true of a few exceptional sites right in the city heart. But this is Zone II, and present rents and assessable value are the genuine basis of the above 35 per cent.

Inspection of the large 16 in. map (1905), and on the ground (1912-13), shewed that this 1675 feet length of road was cut through high and closely built property, very similar to that of the present Armenian Street, Banstola Street and the like.

The remaining length of 370 feet was cut through bustee, and would pay for itself, as did the whole similar length from Chitpore Road to College Road likewise cut through bustee.

The net final cost in 1900 of the whole length, from Clive Street to Chitpore Road, viz., 1675 feet + 370 = 2045 feet, was 15.38 lakhs.

But this cost was really almost all expended on the built-up length of 1,675 feet, and the cost per mile of this expensive built-up portion was :

As 1,675 feet is to 5,280 (1 mile) so is 15.38 lakhs To 48.48 lakhs [per mile.

Say, net cost per mile of this 70 ft. portion of the most expensive piece of Harrison Road — 48.50 lakhs. The recoupment obtained was about 45 per cent. of the total gross cost.

Net costs of New Roads in Zone II.

Then as a basis of a 35 per cent. rise in values since 1900 (to be on the safe side), the net cost in 1914 of a 90 ft. road in Zone II, would be :—

70 FT. ROAD PER MILE IN 1914.

Net cost per mile in 1900	48.50
Add 35 per cent rise since 1900	16.97
Net cost per mile of 70 ft. road in 1914, Zone II, Basis 2	65.47

100 FT. ROAD PER MILE IN 1914.

Cost per mile of 70 ft. road in 1914	65,47
Add, say, 43 per cent for extra 30 ft. of width	28.1
Cost per mile of 100 ft. road in 1914, Zone II, Basis 2	93.62

80 FT. ROAD PER MILE IN 1914.

Cost per mile of 70 ft. road in 1914	65.47
Add, say, 14 per cent, for extra 10 ft. of width ...	9.16
Cost per mile of 80 ft. road in 1914, Zone II, Basis 2....	74.63

60 FT. ROAD PER MILE IN 1914.

Cost per mile of 20 ft. road in 1914	95.47
Deduct, say, 14 per cent. for 10 ft. less width ...	9.16
Cost per mile of 60 ft. road in 1914, Zone II, Basis 2	56.31

ZONE II. 50 FT. ROAD PER MILE IN 1914.

Cost per mile of 70 ft. road in 1914	65.47
Deduct, say, 28.5 per cent. for 20 ft. less of width	18.65
Cost per mile of 50 ft. road in 1914, Zone II, Basis 2	46.82

Note that these estimates for Zone II are on a basis of 35 per cent. rise in values since the construction of Harrison Road, and with only 45 per cent. of recoupment, because of the longer time that may be expected to lapse after acquisition in Zone II, before sites are sold or leased.

ZONE No. III, Basis 3.

(Coloured Green on Values Map).

Estimates for this zone are founded on the cost of the most expensive part of Harrison Road, as used in Basis 2, but with reductions of cost for less height, and for greater distance from the main focus. On the other hand, a rise in value has to be added. This rise is fixed at 30 per cent., instead of 35 per cent. as in Zone 2.

It will be observed that the chief use of this Basis 3 is, almost solely, to estimate values at those points where a proposed new road cuts across an existing main road like the less valuable part of Harrison Road, or like Dharamtolla, or Bow Bazaar.

In other words, these necessary high prices will fortunately only apply to very short lengths. Recoupment is at 45 per cent. as in Zone II, because sites in the green areas are in demand, and will include many good corner sites.

COST OF A 70 FT. ROAD PER MILE IN ZONE III.

The net cost per mile of the most expensive section of Harrison Road (70 ft. wide and 1,675 ft. long from Clive Street to a point 370 ft. west of Chitpore Road).

was	48.50
Deduct for less height than in Zone II, one storey, say 20 per cent., which is a low figure really; and for greater distance from city centre deduct 10 per cent., the total is then 30 per cent.	16.17
Value of Zone III when Harrison Road was made	32.33
Add 30 per cent. rise in value, to 1914	9.69
Net cost of 70 ft. road per mile, Zone III, 1914	42.02

Approximately, this is stating that the valuation of property in say, Mullicks Street, or Armenian Street, some 20 years ago was equal to the present value of average property fronting along the east half of Bow Bazaar, much of Cornwallis Street, and the north part of Upper Chitpore Road. It is an approximate and rough estimate, but is on the safe side.

We may now proceed—

ZONE III, Basis 3.

(Coloured Green on Values Map).

Net cost per mile of 100 ft. road	
Net cost of 70 ft. road	42.02
Add 43 per cent. for extra 30 ft. of width	16.93
Net cost per mile of 100 ft. road in Zone III, 1914 ...	58.95

Net cost per mile of 80 ft. road	
Cost of 70 ft. road	42.02
Add 14 per cent. for extra 10 ft. width	5.88
Net cost per mile of 80 ft. road in Zone III, 1914	47.90

Net cost per mile of 60 ft. road	
Cost of 70 ft. road	42.02
Deduct 14 per cent. for 10 ft. reduced width	5.88
Net cost per mile of 60 ft. road in Zone III, 1914	36.14

Net cost per mile of 50 ft. road	
Cost of 70 ft. road....	42.02
Deduct 28½ per cent. for 20 ft. reduced width ...	11.97
Net cost per mile of 50ft. road in Zone III, 1914 ...	30.05

ZONE No. IV, Basis 4.

(Coloured Purple on Values Map).

The base for Zone IV is founded on the cost of Harrison Road from College Street to Amherst Street, varied and increased by several important new conditions.

The old 16 inch map, and, also, inspection on the ground, shew that this piece of the road was cut for 1,663 feet through closely built brick buildings : of a fairly similar structure and character compared with those that would be cut through to-day by the Central Avenue, or by other comparable routes lying mostly in Zone IV.

But the demolished Harrison Road buildings were not so near a main traffic route as would be the buildings cut through by the Central Avenue and the like to day.

Nor were the Harrison Road buildings so high on an average, as are, to-day, most of those included in Zone IV (purple). Nor were they quite so closely built-up. On these considerations an addition to these particular Harrison Road costs must be made of not less than 33 per cent, it would seem, to be on the safe side.

The general rise in value* of Calcutta property, due to non-expansion of building areas and the increasing population, must also be added. Considering the average location of property classed under Zone IV, and the rise in rentals since 1895 to 1900, it would appear not too much to add 25 per cent. to Harrison Road costs. High rentals rise slower than low rentals, affected by the above conditions.

The average speed of recoupment is likely to be at a slower rate than that of Zones II and III; therefore, instead of 45 per cent. this may be put at only 40 per cent., to be on the safe side. Recoupment in this 1,663 feet of Harrison Road, was about 47.6 per cent., but this was due to the creation of good frontage sites rapidly taken up on the very important new Harrison Road.

The cost of one mile of 70 ft. road on Basis 4 can then be found, as follows:—

Gross cost of 1,663½ ft. 70 ft. wide from College Street to Amherst Street		7.20 lakhs
Recoupment up to about 1900 at 47.64 per cent. produced		3.43
Net cost of 1663½ ft. was		3.77
Bnt recoupment at only 40 per cent. would give a total: —as 47.64 per cent. is to 3.43 so is 40 per cent. to		2.88 lakhs
Then net cost of the 1,663 ft. of 70 ft. road with 40 per cent. recoupment would be ...	7.20 2.88 4.32	
Add as above for better position and greater height, etc. of Central Avenue type of property, 33 per cent.		1.44
		5.76

Then 5.76 lakhs for 1,663 ft. of 70 ft. road may be taken as the average cost in say 1900, of 70 ft. roads through property like that coloured purple, Zone IV, Basis 4. Then

Cost in 1900	5.76
Add 25 per cent. rise in value of rentals	1.44
Cost of 1,663½ ft. of 70 ft. in 1914	7.20 lakhs

Then net cost of one mile of 70 ft. road, in 1914, in Zone IV, on Basis 4:—

(1) Cost of 1,663½ ft.	7.20
(2) Cost of one mile = $7.20 \times \frac{5280 \text{ ft.}}{1663.5}$	22.84 lakhs

Cost of one mile of 100 ft.

Cost of one mile of 70 ft.	22.84
Add 43 per cent for extra 30 feet of width	9.82
Net cost of one mile of 100 ft. road in Zone IV, 1914	32.66 lakhs

* (Of rents, but very little, it appears, in assessable value, which latter is the sole sound basis in India, for improvement work purchases).

Zone No. IV, Basis 4 (Contd.)

Cost of one mile of 80 ft. road.

Cost of one mile of 70 ft.	22.84	
Add 14 per cent. for extra 10 ft. width	3.19	
Net cost of one mile of 80 ft. road in Zone IV, 1914		26.03 lakhs

Cost of one mile of 60 ft. road.

Cost of one mile of 70 ft.	22.84	
Less 14 per cent. for reduction of 10 ft.	3.19	
Net cost of one mile of 60 ft. road in Zone IV, 1914		19.65 lakhs

Cost of one mile of 50 ft. road.

Cost of one mile of 70 ft.	22.84	
Less 28½ per cent, for reduction of 20 ft.	6.50	
Net cost of one mile of 50 ft. road in Zone IV, 1914		16.35 lakhs

Note that there are patches of cheaper property included in Zone IV, such as in the slum area immediately north of Tiretta Bazaar, Lower Chitpore Road; or the similar patches in Ward 14 and Ward 5. These are counterbalanced by more expensive areas, and the above estimates are intended to be average net prices, applied to the areas coloured purple, which compose a large percentage of the city mass.

These estimate bases are given concisely in the Urban city road Estimate Bases Table, printed loose for convenience.

COST OF WIDENING STREETS.

Roughly, if sufficient recoupment land is taken, the cost of widening a 30 or 40 feet road on one side until it is double those widths, is found in most cities to be about half the cost of making a new road of the same width (60 to 80 feet) through similar property, i.e., right through the middle of property of the same height well provided with good streets.

But the high cost of widening important streets is greatly modified by the unusully high rate of recoupment. Sites on widened roads, if they are busy roads, are re-sold and leased quickly and at good prices.

The factor of vital importance in the above is the recoupment width, If a Trust or Corporation is only permitted to buy exactly the new narrow width to be added to the road, then the net cost of such widening is often equal to half the gross cost of making a new road through expensive property without any recoupment; for the shorn-off property is left in a mutilated condition, and results in cramped back area, small rooms, and great loss of value: and compensation then runs high. Widening under such defective conditions is most prohibitive, although much public money has been somewhat thrown away by this method: especially in England.

The present and past law for street widening in Paris does not permit of a recoupment depth being taken; on the other hand, the owner gets no compensation for buildings set back, for loss of size in building, for

loss due to removal, or for loss of trade. He is paid solely for the actual building value of the land taken into the roadway. Paris building plots are however generally very deep, and are not affected so much by widening as would be Calcutta plots.

But a new Paris Act has just been passed that will allow ample recoupment depth to be acquired when widening, and will also permit of full recoupment depth being taken in every new road or street scheme; this Act will come into force very shortly. Formerly, this power has not been held by the Paris Authorities, and the want has been felt more and more intensely as the values of property have risen higher and higher. The equity of recoupment depth, and its absolute necessity in public interests is now established throughout Europe and America.

Certain important and lengthy street widenings are essential if Calcutta is really to be improved. Unless full recoupment depth can be taken freely in Calcutta, and only a standard percentage of compensation be added to value assessed on rateable value, one or two generations must pass before the widenings can be completed. A remedy for this possible delay is suggested later on. Except in London and England, all countries and cities are obtaining or have already got, widening legislation on the above modern accepted basis.

In the above widenings, the width to be taken will vary roughly from 30 to 40 feet along one side only. As an approximate average, the existing depth of the frontage property in Calcutta may be taken at 85 feet: and the acquisition width required to take in two lines of property, i.e., the frontage buildings, and parallel line behind them, may be taken as about 160 feet. Let the average widening be taken as 40 feet. Then if the acquisition depth averages 160 feet the new plots will average 120 feet.*

This 120 feet will be a good saleable depth on roads widened to 60 or 70 feet, and is about the depth that would be taken for 60 or 70 feet roads. This depth encourages good building. To be on the safe side, the cost of these road widenings will be taken as equal to half the creation of a new 70 feet road in the respective value zones: but with somewhat better recoupment rates as explained above.

Widening by the Arcade method will be dealt with later on.

ESTIMATE BASES—COSTS OF ROAD WIDENINGS.

In Zone I (Yellow.)

Net cost of a mile of complete 70 ft. road with recoupment of 50 per cent.	87.18 lakhs	
	2	
Gross cost	174.36	
Deduct for recoupment at 55 per cent.	95.89	
Cost of complete 70 ft. road with recoupment at 55 per cent.	78.47	
Then cost per mile of a 30 to 40 ft. road widening in Zone I, will be taken as	$\frac{78.47}{2}$ =	39.23 lakhs

* From this, in many cases, a back-access passage can be deducted.

In Zone II (Blue.)

Net cost of a mile of complete 70 ft. road in Zone II, with recoupment at 45 per cent. was	65.47 lakhs
That is, 65.47 lakhs = 55 per cent. of the gross cost. Then gross cost equals, as 55 per cent. : 65.47 : 100 per cent.	119.04
Less recoupment at 50 per cent.	59.52
Net cost of complete 70 ft. road in Zone II, with recoupment at 50 per cent.	59.52
Then cost per mile of a road widening in Zone II, will be taken as ... ... $= \frac{59.52}{2}$	= 29.76 lakhs

In Zone III (Green.)

Net cost of a mile of complete 70 ft. road in Zone III, with recoupment at 45 per cent., was	42.02 lakhs
Then gross cost equals :—as 55 per cent. : 42.02 : : 100 per cent. :	76.40
Less recoupment at 50 per cent.	38.20
	38.20 lakhs
Then net cost per mile of a road widening in Zone III, will be taken as :— .... $= \frac{38.20}{2}$	19.10 lakhs

In Zone IV (Purple.)

Net cost of a mile of complete 70 ft. road in Zone IV, with recoupment at 40 per cent. was	22.84 lakhs
That is : 22.84 lakhs = 60 per cent. of the gross cost. Then gross cost = 60 per cent : 22.84 : : 100 per cent. :	38.07
Less recoupment at 45 per cent.	17.13
	20.94 lakhs
Then net cost per mile of a 30 ft. to 40 ft. road widening in Zone IV, will be taken as :— .... $\frac{20.94}{2}$	10.47 lakhs

Where the case seems to demand it, variations are made in the estimates, a mean being taken between the Zones.

The contents of this chapter are embodied in the two tables printed loose for easier reference and use.

CHAPTER X.

SCHEMES AND ESTIMATES OF CITY MAIN ROADS.

Future civic co-operation is the indispensible practical basis of Calcutra improvement, and of all schemes and estimates—Certain work to be shared—Corporation to do less urgent street widenings—Port Trust to improve Strand Road North, construct Riverside Road, and provide good roads over new railway developments at Kidderpore—Government to make Maidan Roads and acquiesce in tramway needs.

Nine Schemes and Estimates, are presented in best natural sequence. Preliminary brief notes on each Scheme—The Ideal, Scheme No. I—The Sub-Ideal, Scheme No. II—The Sub-Ideal cut-down, Scheme No. III—Scheme No. IX, the best practical Scheme to meet our financial resources.

CIVIC CO-OPERATION IS INDISPENSABLE.

All estimates and schemes depend on the future solid, commonsense, loyal and positively indispensable co-operation of every great authority in the city of Calcutta and suburbs.

There are only three administrations by which backward cities can be rectified and developed.

(i) By autocratic single-man rule, adequately financed,

(ii) By a single constituted body of men, adequately financed, and with full power given them over all other authorities and over all individual interests.

(iii) By means of genuine, full, and unselfish civic co-operation between all the authorities and interested bodies of a city, and sufficient money.

We have numerous successful examples of each form of civic control. But Calcutta has not yet settled on one of these three essential administrative systems.

The effective improvement of Calcutta can be obtained solely by the third method ; viz. : with the Improvement Trust (directly underGovernment) as the leading authority, plus the indispensible and whole hearted co-operation of other authorities whose work and scope affect the present and future of Calcutta : viz.:—in especial—

The Corporation of Calcutta.
The Port Trust.
The great Railway Companies.
The Tramway Company.
The great Merchants and Traders.
The Chamber of Commerce and the Trades Association.
The Press, and thereby the Public.

Including the Government of Bengal, the first five named are those most technically concerned. Both in the past and in the present, there has been, and there is, no real co-operation whatever. Co-operation for the good of the city is not a committee of half-a-dozen, each fighting selfishly, and oh, so short sightedly, for the special interests he represents. Such methods have now been abandoned, and put away as quite unbusinesslike and barbaric by practically all the great cities of continental Europe and America.

The Calcutta Improvement Trust has not got sufficient power or money to do its task unaided, in any real, lasting, or efficient degree: but with genuine co-operation of all parties, the power and vitality of the Trust will be profoundly enhanced.

It will be shewn as essential, that the present and future Corporation of Calcutta can assist best, and share in the honour and pleasure of creating the new Calcutta, and separate themselves from the past with its terrible record of apathy and neglect—by vigorous and faithful co-operation with the Trust in the important and vital matter of street widening, carried over a long period for financial and other good reasons.

The proper work of the Port Trust lies palpably in the improvement of Strand Road north, and in the construction of a riverside road, in making ample provision for future traffic over the Howrah New Bridge, and further in providing first class wide bridges over the new dock and railway developments affecting Diamond Harbour Road, Garden Reach Road, and other highways.

The great railway companies' duty to themselves and the city, will lie in abandonment of all miserable cheeseparing and selfish policy as regards over and under road bridges, in development of Suburban stations, in proper consideration of all other interests affected by their own development and the like. In this respect, the writer records with great pleasure that the E.B.S. Railway authorities were, when he was about to leave Calcutta, approaching him as regards new road bridges in a most proper and far sighted manner, very different from the prior unfortunate policy which produced the permanent dislocation between Bow Bazaar and Beliaghata Road.

The Imperial and Provincial Governments can give us great help by public pronouncement of their desire and will, that a thorough going co-operative policy shall in future absolutely transcend all other interests in the city of Calcutta and district.

The Provincial Government can give some useful actual help by constructing two new and cheap roads across the Maidan, and still more by acquiesing in the vital tramway needs of Calcutta.

SCHEMES & ESTIMATES FOR INTRA-CITY MAIN ROADS.

Altogether, nine schemes, and certain modifications, each with an estimate, are submitted. A folding plan exhibits each scheme. All costs are net, worked out on the estimate bases dealt with in the preceding chapter.

To enable a clearer and more rapid consideration of the different schemes and rather numerous figures and costs, the following points may be noted before reading this section.

Scheme I is an ideal layout composed from four originals, but is very much too expensive in both widths and number of new roads, to permit of execution ; yet it exhibits only about the same proportion of main roads per square mile that we find now existing in well-planned up to date cities.

Scheme II, the "Sub-Ideal," is almost exactly identical with Scheme I in the number of roads and street widenings, but both new roads and widenings are all reduced to their minimum width. The cost of Scheme II is quite prohibitive with our total resources of only £6,000,000.

Scheme III is the "Sub-Ideal" reduced, that is every road non-vital to the chief Calcutta needs has been struck out of the Sub-Ideal, or one road compromises between the functions of two roads in the ideal. Scheme III is practicable, and could be executed, and would leave a fair balance for work other than city main roads, but it is not the best scheme.

Scheme IX (recommended for adoption,) is the best of all the Schemes, and is the same as Scheme III (i.e., the "Sub-Ideal" reduced) plus certain slight alterations which nevertheless make very distinct improvements over Scheme III. The Improvement Trust Main Road bill in Scheme IX Final, amounts to 568 lakhs, say £3,780,000.

The writer has tried and calculated what appeared to be all reasonable and possible (and many impossible) alterations, re-designs and combinations of road systems for Calcutta, including also schemes based on quite radically different lines from the Ideal. The best of these trial schemes are embodied in Nos. IV to VIII.

The chief points to be noted as useful demonstration and investigation, in Schemes IV to VIII, are as follows :—

Scheme IV exhibits the financial and physical effects of variations in the North-East Diagonal, omission of Armenian Church Diagonal and substitution of Canning Street widening; prolongation of Inner Strand Road to its full extent, etc.

Schemes V, VI, and VII examine the result of the non-duplication of Bow Bazaar, variations at the south end of Central Avenue, and other problems. It is shewn that construction of New Bow Bazaar will be cheaper by 7 lakhs than widening the existing Bow Bazaar Street.

Scheme VIII, shews the logical design north of Harrison Road resulting from the omission of an Inner Strand Road (i.e., of a new road between Strand Road and Chitpore Road, Upper and Lower.)

The Table of Comparison at the end of Scheme VIII should be noted as proving definitely that the omission of an Inner Strand Road is not allowable, either from the standpoint of economical cost or effective road design. The inclusion of Inner Strand Road is cheaper by 16 lakhs than is the only logical though very inferior substitute that good planning could possibly permit.

After estimating costs of Schemes I to VIII, and examining all the variations both from financial and town-planning aspects, the writer was convinced that Scheme III contained the fullest measure of soundness. The final Scheme IX was then composed from Scheme III, the improvements being :—

(i) The prolongation and connection of Inner Strand Road to Clive Row, thus completing an Inner Strand Road from Aheeritolla via Dalhousie Square to beside Government House.

(ii) The prolongation of New Bow Bazaar to meet New China Bazaar.

(iii) Manicktola Avenue is cheapened by being commenced from Silver Mint Tank instead of from Meetbohor Ghat Street.

The small plans shew the proposed new roads as more or less straight red lines. In determining the exact lines of roads in Calcutta, these lines would be nearly all slightly curved and sinuous, to avoid as much as possible the great number of temples and mosques, and also to avoid blocks of high value property and the like. Those who desire curved roads in Calcutta, as being more beautiful and less monotonous, will have no cause for complaint in this respect. The Slum Map gives much more detail, and it is a reduced photographic copy of the great 16-inch-to-the-mile Map, and gives the true relative size of every existing road and lane. The small maps are photographed down from the six-inch to the mile survey, which it will be remembered gives quite erroneous value, width, and continuity to the lanes of Calcutta—and shews (for example) Cotton Street almost as wide as Harrison Road.

Some further explanation and notes are given with each scheme, and the writer asks forgiveness for any re-iterations. The remarks in question are largely taken from observation notes jotted down in Calcutta as they occurred, and it seemed wasteful to omit them, considering the enormous importance of the interests now at stake in the city. In presenting these schemes, the writer has sacrificed the original numerical order of the schemes to a greater convenience of sequence.

CHAPTER XI.

SCHEMES No. I., II., III., & IX.

Scheme No. I., The Moderate Ideal for Calcutta.—Scheme No. II., The Sub-Ideal.—No. III., The Sub-Ideal cut down.—No. IX., The Sub-Ideal cut down and re-considered. No. IX. is recommended for execution if present Trust Income cannot be increased.

SCHEME No. 1.—An Ideal Scheme.

[Plans at end of chapter should be unfolded as required.]

It is usual in replanning a city to make an ideal design, partly for what it teaches, and partly for use in weighing up the value of Schemes that come within scope of execution.

The writer has prepared several Schemes of an ideal type, and left behind him at Calcutta one of these Schemes plotted on a large sixteen-inch to the mile plan of Calcutta. This design is fairly in agreement with the final ideal Scheme now lying in front of him; and of which an estimate will now be given. A reproduction of much of this ideal design is bound up in the first annual report of the Trust; to this last design must be added improvement of Dalhousie Square, widening of Lall Bazaar, widening of Machua Bazaar from Central Avenue, and the widening of Bentinck Street. Also the addition of Gola Ghat Road, etc. Further, all roads shewn in blue or purple on the old design must be considered as red, that is, they are integral parts of this mild ideal of main roads genuinely wanted by Calcutta even to-day.

All that has been written in the foregoing chapters must be borne in mind. The lack of main roads and streets in Calcutta is so abnormal compared with other great cities, that, although this No. 1 Scheme is called "ideal," it would, if executed, still leave Calcutta short of the main road mileage possessed by those sister cities. It would also leave Calcutta still void of that close and regular net of 30 or 40 feet to 60 feet streets which permeates every European and American large town or city, and which assists immensely the flow of traffic, and mitigates the congestion of main roads. The Park Street area is the only example in Calcutta of a real street system, and this is one having a much more open mesh than is either permissible or usual in the dense part of a city. The suburbs are in a terrible mess, being without any street system whatever, and on top of this want of main roads and streets, we have a record area of slum, and a giant housing problem, all untouched.

Any Scheme that would put Calcutta in a few years, or in 20 years, into the forefront of cities would, as has been shewn, be of such enormous cost, and is so out of the question, that it must be classed as "Super-Ideal," or "Heavenly." These facts cannot be blinked.

To summarize this moderate ideal, Scheme No. 1 shews fairly complete access to and from the city and suburbs, and, internally, to and from

all focal centres; all focal centres are joined up; future development of the shipping, railway, business and residential areas are met very fairly well, and a complete tramway interconnection and extension is secured. The widths of main roads are fixed at the maximum to which Calcutta could ever possibly hope to attain, in case the city had the good luck to get a generous imperial grant on top of the present resources. The widths are nearly all below what is found in similar roads in modern up-to-date cities of over a million; the mileage is also below the average of great roads in European and American cities; indeed, it is far below that of Rangoon, which possesses 40 miles of 100ft. roads.

This ideal cannot therefore be considered extravagant, but only what might reasonably be desired.

These foregoing remarks are made solely that the real condition of Calcutta may be kept steadily in mind, and that the ideal scheme presented may be taken at its proper value.

This No. 1 Scheme is intended to embody the best we could ever possibly hope for. It could only be executed if the funds of the Trust were doubled, by a gift from the surplus of the Imperial Budget such as was made this year towards education, or by levy on the State revenues of Bengal, or other means.

The ideal main road layout shewn in Scheme No. 1 may therefore be taken as the Calcutta super-ideal very much boiled down, yet with retention of pretty good road-widths.

The best of the practicable schemes are composed from the Ideal Scheme No. 1, reduced and pared down to come within our resources. Road widths are necessarily curtailed, but, by arcading, we can overcome this defect in a very great degree; but the possibility of fine boulevards—such as we find in central Berlin, Vienna, Paris, Brussels, Marseilles, Turin, Washington, and so many cities—long ago departed from Calcutta, which is in this respect very comparable with London.

INTRA-CITY MAIN ROADS.

Scheme No. 1.—An Ideal Layout.

Mileage and Net Cost of New City Roads.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central Avenue to	4	.525		100	32.7	17.17	
Sham Bazaar	3	.025		100	58.9	1.47	
Central Avenue to Bow	2	.10		100	93.6	9.36	
Bazaar	3	.30		100	58.9	17.67	
	4	1.66		100	32.7	54.28	
Carried forward		2.61				99.95	

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		2.61				99.95	
Central Avenue	4	.50		100	32.7	16.35	
S.W. fork	2	.03		100	93.6	2.80	
	1	.04		100	124.5	4.98	
Central Avenue	2	.03		80	74.6	2.24	
S.E. fork	3.	.03		80	47.9	1.44	
	4	.44	3.68	80	26.0	11.44	139.20
Inner Strand	1	.44		60	74.7	32.87	
Road	2	.22		60	56.3	12.39	
	2	.42		80	74.6	31.33	
	4	.64	1.72	80	26.0	16.64	93.23
Jorabagan Short	2	.07		100	93.6	6.55	
Road	4	.20	.27	50	16.3	3.26	9.81
Mayo Hospital	2	.10		50	46.8	4.68	
Road	4	.08	.18	50	16.3	1.30	5.98
Old Court House	1	.20		100	124.5	24.90	
prolongation	2	.60	.80	100	93.6	56.16	81.06
Sham Bazaar	2	.52		80	74.6	38.79	
Diagonal, new road only	3	.05	.57	80	47.9	2.39	41.18
Central Diagonal	3	.14		70	42.0	5.88	
	4	.52	.66	70	22.8	11.86	17.74
Manicktola Avenue	1	.18		100	124.5	22.41	
(or N.E. Diagonal)	2	.38		100	93.6	35.57	
	4	.20		100	32.7	6.54	
	3	.35		80	47.9	16.76	
	4	.45	1.56	80	26.0	11.70	92.98
Harrison Road, first Diagonal	2	.12	.12	80	74.6	8.95	8.95
Harrison Road, second Diagonal	3	.18	.18	70	42.0	7.56	7.56
Hatkola Jute	2	.10		80	74.6	7.46	
Road (E. and W.)	3	.24		80	47.9	11.50	
	4	1.40	1.74	80	26.0	36.40	55.36
Gola Ghat Road	1	.07		60	74.7	5.23	
	2	.28		60	56.3	15.76	
	3	.16		60	36.2	5.79	
	4	.60	1.11	60	19.6	11.76	38.54
Carried forward		12.59	12.59			591.59	591.59

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		12.59	12.59			591.59	591.59
S.E. Diagonal from Howrah Bridge	1	.80	.80	100	124.5	99.60	99.60
Chitpore New Road Diagonal	1	.05		80	99.6	4.98	
	2	.40	.45	80	74.6	29.84	34.82
New Bow Bazaar	1	.06		80	99.6	5.97	
	2	.15		80	74.6	11.19	
	3	.05		80	47.9	2.39	
	4	.94	1.20	80	26.0	24.44	43.99
Ballygunge New Route, from Armenian Church to Circular Road (via S.E. fork of Central Avenue included above)	1	.02		80	99.6	19.92	
	2	.40		80	74.6	29.84	
	4	.24		80	26.0	6.24	
	3	.22		80	47.9	10.54	
	4	.51	1.39	80	26.0	13.26	79.80
Free School Street, North prolongation	2	.05		60	56.3	2.81	
	4	.12	.17	60	19.6	2.35	5.16
East Lindsay Street	4	.12		60	19.6	2.35	
	2	.02	.14	60	56.3	1.12	3.47
New Mission Row	1	.29	.29	60	74.7	21.66	21.66
Sealdah-Chowringhee Diagonal	2	.13		80	74.6	9.70	
	4	.23		80	26.0	5.98	
	3	.30		70	42.0	12.60	
	4	.50	1.16	70	22.8	11.40	39.68
New Amherst Street	3	.20		70	42.0	8.40	
	4	.63		70	22.8	14.36	
	3	.03		80	47.9	1.44	
	4	.54	1.40	80	26.0	14.04	38.24
Marquis Street Prolongation East	2	.05		50	46.8	2.34	
	3	.10		50	30.0	3.00	
	4	.40	.55	50	16.3	6.52	11.86
Maidan New Roads.*							
Mission Row Prolongation		.19	.19	60		.22	
Anchterloney Diagonal		.32	.32	80		.48	
Maidan South Cross Road		.51	.51	50		.43	1.13
Carried forward		21.16	21.16			971.00	971.00

* These costs are from estimates dealt with in the practicable schemes.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		21.16	21.16			971.00	971.00
Riverside Double Level Road.*							
Continuation of Strand Road north of Aheeritolla Ghat		1.02	1.02	80		8.64	8.64
		22.18	**22.18**			**979.64**	**979.64**
SCHEME No. 1—Road & Street Widenings.							
Upper Chitpore Road	4	.12		80	10.5	1.26	
	3	.24		80	19.0	4.56	
	3	.50	.86	70	19.0	9.50	15.32
Sham Bazaar	3	.19		80	proportioned.	3.61	
Widenings	3	.77	.96	80	19.0	14.63	18.24
Strand Road, North of Howrah Bridge	2	.50		100			
	1	.50	1.00	100	ditto	7.00	7.00
Schalchs St.	3	.06		60	16.0	.96	
	4	.08	.14	60	8.0	.64	1.60
Machua Bazaar	3	.50		80	19.0	9.50	
	4	.62	1.12	80	10.5	6.51	16.01
Canning Street and Koolootolla	1	.22		80	39.2	8.62	
	2	.40		80	29.8	11.92	
	3	.35	.97	80	19.0	6.65	27.19
Lower Chitpore Road (portion)	2	.85	.85	80	29.8	25.33	25.33
Bentinck Street	1	.45	.45	80	39.2	17.64	17.64
Lall Bazaar	1	.15	.15	80	39.2	5.85	5.85
Bow Bazaar from Lall Bazaar to Central Avenue	2	.27	.27	80	29.8	8.05	8.05
Mission Row	1	.16	.16	60	39.2	6.27	6.27
Carried forward		6.93	6.93			148.50	148.50

* These costs are from estimates dealt with in the practicable schemes.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		6.93	6.93			148.50	148.50
Free School Street	2	.80	.80	60	25.0	20.00	20.00
Lindsay Street	2	.25	.25	60	25.0	6.25	6.25
Kyd Street	2	.17	.17	80	29.8	5.06	5.06
Park Street	2	.25		80	29.8	7.45	
	3	.65	.90	80	19.0	12.35	19.80
Circular Garden Reach Road	3	1.60	1.60	100	19.0	30.40	30.40
Diamond Harbour Road	3½	1.55	1.55	100	14.8	22.94	22.94
Russa Road	3	1.25	1.25	100	proportioned.	24.00	24.00
		13.45	**13.45**			**276.95**	**276.95**

The total cost of this Ideal Intra-City Main Road Scheme would therefore be as follows:—

	Lakhs.
Creation of 22.18 miles of wide new main roads	979.64
Widening 13.45 miles of roads and streets	276.95

Other Main-Road Works.

(as per calculations given with Scheme IX.)

Dalhousie Square Improvement	2.26
Eleven Minor Bridge Widenings	5.50
One New Bridge at Halsi Bagan	1.20
Riverside Road and Strand Road Improvements	16.32
Total	**1281.87 lakhs.**

Say **1282 lakhs,** or about **£8,546,000 sterling.**

If we add to this a figure of about 300 lakhs, which will be required for suburban, housing, and other work—then the total money required for a very moderate ideal general improvement of Calcutta, but omitting a street system, would be some **1582 lakhs,** or **£10,546,000.**

It should be carefully noted that these figures provide for a pretty good main road system both in city and suburbs, and for general amelioration of the great slum areas by the " Slum Repair " system; and would permit Calcutta largely to undo her present intense congestion in perhaps

15 to 20 years—but she would still be short of a street system. The lanes would be joined up and improved, and the worst slums would be removed, but all North Calcutta would still be far behind other cities in the matter of streets. Nor have we provided for another Hugli Bridge at Aheeritolla.

SCHEME II.—The "Sub-Ideal."

This may be called the "Sub-Ideal" for Calcutta. It has almost the same framework as Scheme No. I., with almost every road and widening preserved, but nearly all are cut down to the minimum width. The writer made this modification in the course of cutting down various ideal schemes, and submits it for comparison with all the cheaper schemes.

It would be an excellent layout both for the present and future if by any possibility it could be executed, but with the Trust resources as fixed to-day, the Scheme is absolutely prohibitive in cost, small as it is, in comparison with the sums now being expended by other cities already very much better off than Calcutta in almost every respect.

SCHEME II.—The Sub-Ideal.

Mileage and Net Cost of City New Roads.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central Avenue	4	.525		70	22.8	11.97	
to Sham Bazaar	3	.025		70	42.0	1.05	
Central Avenue	2	.10		80	74.6	7.46	
to Bow Bazaar	3	.30		80	47.9	14.37	
	4	1.66		80	26.0	43.16	
Central Avenue	4	.50		80	26.0	13.00	
S.W. fork	2	.03		80	74.6	2.24	
	1	.04		80	99.6	3.98	
Central Avenue	2	.03		60	56.3	1.69	
S.E. fork	3	.03		60	36.2	1.09	
	4	.44	3.68	60	19.6	8.62	108.63
Inner Strand	1	.30		70	87.2	26.16	
Road	2	.75		70	65.5	49.12	
	3	.06		70	42.0	2.64	
	4	.64	1.75	70	22.8	14.59	92.51
Sham Bazaar	2	.35		70	65.5	22.92	
Diagonal	3	.80		70	42.0	33.60	
	4	.15	1.30	70	22.8	3.42	59.94
Central Diagonal	2	.08		60	56.3	4.50	
	3	.18		60	36.2	6.52	
	4	.59	.85	60	19.6	11.56	22.58
Carried forward		7.58	7.58			283.66	283.66

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		7.58	7.58			283.66	283.66
Manicktola Diagonal (or Avenue)	1	.22		80	99.6	21.91	
	2	.02		80	74.6	1.49	
	2	.33		70	65.5	21.61	
	3	.27		70	42.0	11.34	
	3	.08		70	42.0	3.36	
	4	.69	1.61	70	22.8	15.73	75.44
Harrison Road 1st Diagonal	2	.20	.20	70	65.5	13.10	13.10
Harrison Road 2nd Diagonal	3	.16	.16	60	36.2	5.79	5.79
Hacktola Jute Road	2	.12		60	56.3	6.75	
	3	.15		60	36.2	5.43	
	4	1.13	1.40	60	19.6	22.15	34.33
Gola Ghat Road	1	.07		50	63.3	4.43	
	2	.16		50	46.8	7.49	
	3	.47	.70	50	30.0	14.10	26.02
S.E. Diagonal from Howrah Bridge	1	.80	.80	80	99.6	79.68	79.68
Chitpore New Road (or Diagonal)	1	.05		70	87.2	4.36	
	2	.40	.45	70	65.5	26.20	30.56
Bonfield Street	1	.17	.17	50	63.3	10.76	10.76
New Bow Bazaar	1	.06		60	74.7	4.48	
	2	.15		60	56.3	8.44	
	3	.05		60	36.2	1.81	
	4	.94	1.20	60	19.6	18.42	33.15
Ballygunge New Route, from Armenian Church to Circular Road (via S.E. fork of Central Avenue)	1	.02		70	87.2	1.74	
	2	.40		70	65.5	26.20	
	4	.24		70	22.8	5.47	
	3	.22		70	42.0	9.24	
	4	.51	1.39	70	22.8	11.62	54.27
Free School Street North	2	.05		50	46.8	2.34	
	3	.12	.17	50	30.0	3.60	5.94
East Lindsay Street	4	.12		50	16.3	1.95	
	2	.02	.14	50	46.8	.94	2.89
New Mission Row	1.	.29	.29	50	63.3	18.36	18.36
Carried forward		16.26	16.26			673.95	673.95

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		16.26	16.26			673.95	673.95
Sealdah-Chowringhee Diagonal	2	.13		60	56.3	7.32	
	4	.23		60	19.6	4.51	
	3	.30		60	36.2	10.86	
	4	.50	1.16	60	19.6	9.80	32.49
New Amherst Street	3	.20		50	30.0	6.00	
	4	.63		50	16.3	10.27	
	3	.03		60	36.2	1.09	
	4	.54	1.40	60	19.6	10.58	27.94
Maidan New Roads.							
Mission Row prolongation		.19	.19	50		.20	
Anchterloney diagonal		.32	.32	80		.48	
Maidan South Cross Road		.51	.51	50		.43	1.11
Special Riverside Road.							
Continuation of Strand Road, No. of Aheeritolla Ghat		1.02	1.02	80		8.64	8.64
		20.86	**20.86**			744.13	**744.13**

Mileage and Net Cost of Street Widenings.

Upper Chitpore Road	4	.12		70	35.0	4.20	
	3	.24		70	16.0	3.84	
	3	.50	.86	60	16.0	8.00	16.04
Sham Bazaar	3	.19	.19	80	—	3.61	3.61
Strand Road, N. of Howrah Bridge	2	.50		80	proportioned & special		
	1	.50	1.00	80		6.00	6.00
Salch's Street	3	.06		50	13.0	.78	
	4	.08	.14	50	7.0	.56	1.34
Carried forward		2.19	2.19			26.99	26.99

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		2.19	2.19			26.99	26.99
Machua Bazaar	3	.50		70	16.0	8.00	
	4	.62	1.12	70	8.0	4.96	12.96
Canning Street and Koolootolla	1	.22		70	39.2	8.62	
	2	.40		70	29.8	11.92	
	3	.35	.97	70	19.0	6.65	27.19
Lower Chitpore Road (portion)	2	.85	.85	70	25.0	21.25	21.25
Bentinck Street	1	.45	.45	70	37.0	16.65	16.65
Lall Bazaar	1	.15	.15	80	39.2	5.88	5.88
Bow Bazaar, from Lall Bazaar to Central Avenue	2	.27	.27	70	37.0	9.99	9.99
Mission Row	1	.16	.16	50	30.0	4.80	4.80
Free School Street			Not widened.				
Lindsay Street	2	.12	.12	50	20.0	2.40	2.40
Kyd Street	2	.17	.17	60	25.0	4.25	4.25
Park Street	2	.25		70	25.0	6.25	
	3	.65	.90	70	16.0	10.40	16.65
Circular Garden Reach Road	3	1.60	1.60	80	16.0	25.60	25.60
Diamond Harbour Road	$3\frac{1}{2}$	1.55	1.55	80	12.0	18.60	18.60
Russa Road	3	1.25	1.25	100	—	24.00	24.00
		11.75	**11.75**			**217.21**	**217.21**

Summary and Remarks.

These figures shew that if Scheme II. were to be accomplished single-handed by the Trust, the cost would be:—

	Lakhs.
For City new roads	744.13
For road widenings	217.21
Carried forward	961.34

Brought forward	961.34

To this figure we should also have to add the following small items as a part of the main road bill:

Improvement of Dalhousie Square ...	2.26
Bridge widenings	5.50
One new bridge	1.20
	970.30
Add for other work as before	300.00
	1270.30

Say **1270 lakhs,** or **£8,466,000.**

Thus it is quite clear that even the Sub-Ideal must have a very great deal of mileage cut out of it before we get down to practicable schemes that can be done with the constituted resources of the Improvement Trust.

Before abandoning this scheme as it stands, the effect of co-operative help in doing the work should be considered. In view of the weak financial strength of the Trust for the immense task set, this co-operation becomes absolutely essential in the general interests of the Calcutta present and future community.

We may now consider what help and co-operation can be given.

Work that can be done by the Calcutta Corporation.

Non-urgent Road Widenings can be done by Calcutta Corporation. Widenings may be divided into urgent and non-urgent. It appears to the writer that the non-urgent should be undertaken by the Calcutta Corporation, the execution being spread over a very long period, or better—if it be possible—the execution to be fairly rapid, but done by means of a very long period low-rate special loan from Government.

Work that should be undertaken by the Port Trust.

This comprises the widening, on the west side, of North Strand Road for one mile, commencing from Howrah Bridge and terminating at Aheeritolla Ghat. From this point to Chitpore Bridge there is no communication or road worth considering, and the new riverside road already mentioned is badly needed. It is understood that a considerable portion of the property between Howrah Bridge and Chitpore Bridge, on the West side, is owned either by Government or the Port Trust. Further, this route is vital to development of the Port Trust, and is closely bound up with their railway and riverside present and future activity north of Howrah Bridge. During the jute season especially, the lack of a through riverside road between Aheeritolla Ghat and Chitpore Bridge causes intense congestion, delay and inconvenience, both to river shipping and the traffic dependent on it.

Work that may be undertaken by Government.

The need of certain new roads on the Maidan has already been pointed out. The Maidan is a part of the city, but belongs to Government,

and it seems fitting that the augmentation of traffic facilities on the Maidan should be allotted to Government funds.

The effect of the co-operation suggested may be examined at once by applying it to the Sub-Ideal Scheme No. 2. It will be found that the scheme is brought nearer the range of possibility.

In all the schemes submitted in this report, the allotments of work to authorities other than the Improvement Trust will be kept separate. Each scheme can thus be examined on the basis of single-handed execution by the Trust, or execution by co-operation, which latter is, however, the true solution of an important part of the financial problem.

SCHEME I.—Modified by Co-operative Help.

Urgent widenings to be done by Improvement Trust:—

	Lakhs.	
Sham Bazaar	3.61	
Machua ,, ...	12.96	
Lall ,, ...	5.88	
Bentinck Street	16.65	
Bow Bazaar (portion)	9.99	
Russa Road	24.00	**73.09**

Widenings to be done by Port Trust:—

Strand Road, N. of Howrah Bridge ...	6.00	
Portion of Upper Chitpore Road	8.04	
Salch's Street	1.34	**15.38**

Widenings to be done very gradually by Corporation:—

Upper Chitpore Road (portion)	8.00	
Canning Street and Kooloolotolla	27.19	
Lower Chitpore Road (portion)	21.25	
Mission Row	4.80	
Lindsay Street	2.40	
Kyd Street	4.25	
Park Street	16.65	
Circular Garden Reach Road	25.60	
Diamond Harbour Road	18.60	**128.74**

Work to be done by Port Trust:—

Riverside Road from Aheeritolla Ghat to Chitpore Bridge	**8.64**
Road Widenings	**15.38**

Maidan Roads to be done by Government of Bengal:—

Mission Row Prolongation	.20	
Auchterloney Diagonal	.48	
Maidan South Cross Road	.43	**1.11**

Then the division of costs would be:—

	lakhs.	
Calcutta Improvement Trust.		
New Roads	744.13	
Dalhousie Square	2.26	
Bridges (5.50 + 1.20 lakhs)	6.70	
	753.09	
Deduct:		
8.64 + 1.11	9.75	
	743.34	
Add:		
Urgent Widenings	73.09	
	816.43	
Add for other work than Urban Main Roads	300.00	
Total	**1116.43**	1116.43
Corporation of Calcutta.		
Non-urgent Widenings		128.74
Calcutta Port Trust.		
New Riverside Road	8.64	
Widenings	15.38	
	24.02	24.02
Government of Bengal.		
Maidan New Roads		1.11
Original total of whole scheme		**1270.30**

The sum required by the Improvement Trust under this Co-operative Scheme II. would thus be about 1116½ lakhs, or about £7,446,000. In fact, with unselfish and earnest co-operation, plus another £2,000,000, this really comprehensive and very effective Scheme II. would be brought right within possibility of execution. It may be remembered that the Imperial Government of India, some 18 months ago, were able, from a budget surplus of some dozen millions sterling, to give a quite unexpected grant of £2,000,000 towards further education that, though doubtless needed, can only benefit a minute percentage of the peoples of India. Development into a high-class residential area of the ancient sandy waste lands of Delhi will absorb many millions, perhaps 12 millions sterling—and Calcutta, the material capital of India, might indeed be spared a couple of million to help her great and pressing needs.

SCHEME III.

The Sub-Ideal with all Absolutely Non-Vital Roads and Widenings Cut Out, plus Certain Alterations Entailed in Road-Positions, etc.

[See plan at end of chapter.]

At this point, it is well to remind ourselves how closely limited to certain definite positions and directions should be any new roads made in Calcutta.

Repeated study of the city will prove there is no case at all for a marked difference in the lines of any half-dozen road schemes. All must largely conform to meet the four definite wants, viz:—

(i) Shorter, i.e. diagonal routes, that will relieve the present rectangular system.

(ii) Bi-section of each big roadless slum-block.

(iii) Facility for rapid transit into and out of the city centres and the city generally.

(iv) Relief of present congested traffic and provision for the future.

If possible, each new road should be so placed as to meet two, three, or all of these wants.

It will be impossible, without failing in one or more of these respects, to design a road scheme that differs essentially from the main lines of Schemes Nos. 1 and 2. Numerous costly details can, however, be altered, and should each be considered.

For example, the three N.E. diagonals shewn in Scheme No. 1 may be replaced by two, a serious reduction, but our finances demand the strictest economy, and a ruthless cutting down of the Ideal and Sub-Ideal.

The abandonment of a new primary road like the proposed Inner Strand or the New Bow Bazaar demands the widening of an existing road; such alterations and possibilities must all be examined, both financially and physically.

Yet, in whichever way one turns, and no matter how original and fresh one's ideas may be, the new road-routes will be found forced back steadily by facts, finance, and common sense, very much to those general main lines indicated fully in Schemes 1 and 2.

Scheme 3 is similar in all road widths to Scheme 2, the "Sub-Ideal," but in Scheme 3 every absolutely non-vital new road and widening has been more or less cut out or reduced, or one road compromises for two. The Central Avenue is reduced by using Halliday Street. The Manicktola Avenue is led out of Strand Road by a cheaper route. The proposed Maidan roads, of trifling cost, are retained. Canning Street is not widened, at least by the Trust. The preservation of the Armenian Church Diagonal and new Ballygunge route is, however, vital, as it will relieve Old Court House Street very much in the future.

The thinness of the Scheme is very apparent when compared with the ideal, or with the existing layout in other cities.* The omission of the Central diagonal is an obvious weakening; when the business focus has advanced further North of Howrah Bridge the want of this diagonal would be felt in years to come.

The cost of this cut-down Sub-Ideal may now be examined. It is brought down by these excisions right into the possibility of execution with the Trust funds. But it is very plain from Scheme III. how rigorously limited is the Trust by financial weakness.

This is, the writer believes, the best but one of all the schemes submitted. Scheme 9 is Scheme 3 slightly improved; the result appears to give the soundest and most effective compromise between the needs and problems of Calcutta and the limitation in meeting them due to lack of money. The roads of Scheme 3 are narrow in view of the future; at the same time, the future will bring an increasing street network into being, and this will help the main roads very much; and we can arcade them. By comparison, the traffic of Calcutta seems remarkably small for the population and trade concerned, although, jammed as it is to-day into main roads unusually narrow, it appears to the casual observer to be an immense flow. If the future traffic of Calcutta keeps comparatively low, that will be all the better for our exceptional case, but we cannot depend on this as a sound factor.

Should the estimates submitted, happily be found excessive, then the surplus would permit of this same Scheme 3 (or rather the improved Scheme 3, i.e. No. 9) with every road increased in width. The surplus would have to be very great, say 20 to 25 per cent., to make the creation of more roads permissible in addition to the wider roads: that is, to permit of a Scheme approaching the Sub-Ideal.

SCHEME III.

(The Sub-Ideal Cut Down.)

Mileage and Net Cost of City New Roads.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central Avenue	4	.525		70	22.8	11.97	
(to Sham Bazaar)	3	.025		70	42.0	1.05	
Ditto Sham Bazaar	3	.20		80	47.9	9.58	
to Halliday St.	4	1.18		80	26.0	30.68	
Ditto Halliday St.	2	.03		80	74.6	2.24	
to Bow Bazaar	3	.03		80	47.9	1.44	
	4	.27		80	26.0	7.02	
Carried forward		2.26				63.98	

* Look at Budapest plan, p. 108.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		2.26				63.98	
Ditto Bow Bazaar	1	.04		80	99.6	3.98	
to Chowringhee	2	.03		80	74.6	2.24	
(S.W. fork)	4	.47		80	26.0	12.22	
Ditto Bow Bazaar	2	.03		60	56.3	1.69	
to Wellington	3	.03		60	36.2	1.09	
Sq. (S.E. fork)	4	.42	3.28	60	19.6	8.23	93.43
Inner Strand	1	.23		70	87.2	20.15	
Road	2	.33		70	65.5	21.61	
	3	.05		70	42.0	2.10	
	4	.74	1.35	70	22.8	16.87	60.73
Sham Bazaar	2	.35		70	65.5	22.92	
diagonal	3	.80		70	42.0	33.60	
	4	.15	1.30	70	22.8	3.42	59.94
Manicktola	1	.10		70	87.2	8.72	
diagonal	2	.31		70	65.5	20.30	
	2	.04		70	65.5	2.62	
	3	.10		70	42.0	4.20	
	3	.03		70	42.0	1.26	
	4	.88	1.46	70	22.8	20.06	57.16
Harrison Road 2nd diagonal	3	.16	.16	70	42.0	6.72	6.72
S.E. Diagonal from Howrah Bridge*	1	.80	.80	80	99.6	79.68	79.68
Lower Chitpore	1	.07		60	74.7	5.23	
New Road or diagonal	2	.13	.20	60	56.3	7.32	12.55
Ballygunge New	1	.03		70	87.2	2.62	
Route (Armenian	2	.40		70	65.5	26.20	
Church to Bow Baz.)	4	.27	.70	70	22.8	6.16	34.98
New Bow Bazaar	1	.06		70	87.2	5.23	
	2	.15		70	65.5	9.82	
	3	.05		70	42.0	2.10	
	4	.94	1.20	70	22.8	21.43	38.58
Sealdah-	2	.17		70	65.5	11.13	
Chowringhee	3	.15		70	42.0	6.30	
diagonal	4	.36	.68	70	22.8	8.21	25.64
Carried forward		11.13	11.13			469.41	469.41

* Includes 700 ft. of road 160 ft. wide behind Scots Kirk : to provide extra traffic room and also essential space for motor and gharry ranks, and for a new tram-focus.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		11.13	11.13			469.41	469.41
New Amherst St.	3	.27		50	30.0	8.10	
	4	1.13	1.40	50	16.3	18.42	26.52
		12.53	**12.53**			495.93	**495.93**

Mileage and Net Cost of Street Widenings to be done by Improvement Trust.

Sham Bazaar	3	.19	.19	80	proportioned special	3.61	3.61
Machua Bazaar		1.12	1.12	70	as in Scheme II.	12.96	12.96
Lall Bazaar		.15	.15	80	ditto	5.88	5.88
Bentinck Street		.45	.45	70	ditto	16.65	16.65
Russa Road	3	1.25	1.25	100	say 19.0	24.00	24.00
		3.16	**3.16**			63.10	**63.10**

Mileage and Net Cost of Street Widenings preferably to be done by Calcutta Corporation.

Lower Chitpore Road (from Lall Bazaar to Manicktola diagonal)		.80	.80	70	as in Scheme II.	21.25	21.25
Kyd Street (portion)	2	.17	.17	70	25.0	4.25	4.25
Park Street		.90	.90	70	as in Scheme II.	16.65	16.65
Diamond Harbour Road	$3\frac{1}{2}$	1.55	1.55	80	12.00	18.60	18.60
Circular Garden Reach Road	3	1.60	1.60	80	16.00	25.60	25.60
		5.02	**5.02**			86.35	**86.35**

Then the total cost of Scheme 3 will be as follows:—

To be Expended by Improvement Trust.

	Lakhs.
Creation of City new main roads	495.93
Urgent street widenings and widenings already in hand	63.10
Improvement of Dalhousie Square	2.26
Bridge widenings	5.50
Total expenditure by Improvement Trust ...	566.79

Brought forward	566.79
Gradual widenings by Calcutta Corporation	86.35
Port Trust Work (Strand Road widened to 80 feet only)	15.38
Government work (Maidan roads, but Mission Row prolongation omitted)	.91
Total Main Road Bill Scheme III.	**669.43**

Say £4,462,000 sterling.

On Mr. Gauntlett's calculations of Improvement Trust Revenue with increase at 1 lakh every five years, the total expenditure is given as 810 lakhs. On this basis, the above main road work would leave a balance of, say, 810 less 567=243 lakhs for other purposes.

If we take the revenue increase at 2 lakhs in every five years (Mr. Gauntlett's third table), the balance would be 920 less 567=lakhs 353.

The proposed widening work of the Corporation, if extended at the worst over 20 years, would probably cost 100 lakhs, or 5 lakhs a year.

It is work of vital importance to the city, and might well be done in 10 years or less, as part of the product of any general new municipal works' loan. For similar work at home, the British Government (Local Government Board) is generally quite willing to advance money at $3\frac{1}{2}$ per cent. up to 60 years.

This would be by far the best method for the Calcutta Corporation if they will decide to give loyally and unswervingly their much needed help to the enormous task of the Improvement Trust.

A special street widening loan, backed up by the Improvement Trust, should be regarded favourably by Government; and if the money were lent on the English Government terms, the widenings could be accomplished without much disturbance in from 6 to 12 years; and the cost, spread over, say, 40 years, would not be felt.

The benefit and help gained would be very great, and would make it possible for the Trust, despite limited financial strength, to carry out a very fairly comprehensive main road scheme, with sufficient balance for the other important work. If the Corporation are unable to do any road widening, then it appears certain that a much humbler, that is, an ineffective and unworthy general road scheme will have to be adopted; for the total cost of Scheme 3, if done single-handed by the Improvement, would be 670 lakhs; leaving the balance for other work short by 100 lakhs if we assume that about 865 lakhs is the total possible works' expenditure of the Improvement Trust, and that the estimates submitted are substantially correct.

Total Mileage of Main Roads in Scheme 3.

New Roads created by Improvement Trust	12.53
Streets widened ,, ,, ,, ...	3.16
,, ,, by Calcutta Corporation	5.02
New Road created by Port Trust	1.02
Road widened by Port Trust	1.21
,, created by Government	.91
	23.85

SCHEME III. MODIFIED.

Not recommended; the modification is made solely in the course of necessary investigation.

In this modification the S.E. Diagonal is made to terminate at Lall Bazaar Police Station, instead of at the Scots Kirk, Dalhousie Square.

This, with a widened Bentinck Street, would make the best possible route between Chowringhee and Howrah Bridge and Station, and would be a first-class permanent relief to Old Court House Street; but the important focus round the Exchange would be deprived of the benefit of a new open space for motor and gharry ranks, new tram focus, public conveniences, etc., now badly wanted. Canning Street would be less benefited, and the Ballygunge new route (or Tiretta diagonal) would have to be replaced by a widening of the west end of Bow Bazaar; and the new route of the S.E. diagonal would cut through much good property.

The Lower Chitpore diagonal is very little altered; New Bow Bazaar terminates as before, and its importance as a tram route is enhanced.

In the estimates, allowance is made for space at the junction of Inner Strand Road, and for a circus where New Road Bazaar and the Chitpore diagonal form a radial point.

Scheme 3 Modified.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
S. E. Diagonal, from Howrah Bridge to Lall Bazaar Police Station	1	.45		80	99.6	44.82	
	2.	.40	.85	80	74.6	29.84	74.66
Lower Chitpore Diagonal, from Chitpore Road to Scots Kirk	1	.15		60	74.7	11.20	
	2	.15	.30	60	56.3	8.44	19.64
Bow Bazaar widening	2	.27	.27	80	29.8	8.05	8.05
		1.42	**1.42**			102.35	**102.35**

The following adjustments are required to get the new total for Scheme 3 modified:—

For S.E. diagonal deduct (79.68-74.66)	3.02
For extra cost of Chitpore diagonal add (19.64-12.55)	7.09
,, ,, ,, ,, Bow Bazaar widening add	8.05
	18.16
	3.02
Extra cost of terminating S.E. Diagonal (from Howrah Bridge) at Lall Bazaar instead of at Scots Kirk, Dalhousie Square	**15.14**

The extra cost (£100,000) caused by this modification, and the advantages gained are very much too doubtful to merit so great an extra expense; and the writer abandons this modification as unsound.

SCHEME IX.

Composed of the Sub-Ideal (Scheme II.) cut down (Scheme III.), with subsequent improvements and alterations.

Recommended as the Best Scheme Possible under all the Limiting Conditions.

[See plan at end of chapter.*]

This Scheme is composed almost entirely from Scheme III. (the Sub-Ideal cut down), but with certain alterations, additions, and distinct improvements.

Scheme IX. has been selected as the best possible, only after further consideration of all the prior schemes (Nos. 4, 5, 6, 7, and 8) and modifications, and after making further trial and calculations of radically different systems, such as would be made by using only one great diagonal from Sham Bazaar right to Howrah Bridge, or placing New Bow Bazaar between Bow Bazaar and Dharamtolla, or terminating the S.E. diagonal at Lall Bazaar instead of at Scots Kirk, etc., etc. The sketches of the Chairman, the plan sent in by some thoughtful and intelligent members of the Trades Association, and all other suggestions were again carefully re-examined by the writer before fixing on what he believes to be the most highly efficient scheme.

Scheme IX. appears to him clearly to be the best obtainable for the money. It fulfils all the varied requirements so far as its limited nature permits; and it is the most clean-cut and well-balanced of all the practicable designs. The weakest points of the design, as shewn on plan, are:—

(i) Narrowness of the roads in view of future traffic increase, but this disadvantage can be overcome by arcading regulations, applied in especial to those lengths of the new roads that will be in the present and future main focus.

* Also Values Map and Slum Map.

(ii) Lack of a central diagonal across Northern Calcutta.

(iii) Lack of an east and west road between Aheeritolla and the east.

(iv) Financial inability to prolong Inner Strand Road to the new riverside road.

(v) Lack of a new bridge at Halsi Bagan.

(vi) Lack of a perfect N.E. diagonal out of the city focus, i.e., a portion of the diagonal required between Chitpore Road and Harrison Road 2nd Diagonal, is missing.

(vii) The general thinness of the scheme is great compared with the main-road systems of good cities.

(viii) Numerous bad right angle corners at important existing road crossings are left untouched. To-day they could mostly be bought up very cheaply, and be well rounded back.

Scheme IX.

Estimate of Cost of Scheme IX.

Composed of the Sub-Ideal cut down (Scheme III.) with some Additions, Alterations, and Improvements.

Mileage and Net Costs of New Intra-City Main Roads to be executed by the Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central Avenue	3	.10		70	42.0	4.20	
to Sham Bazaar	4	.48		70	22.8	10.94	
Central Avenue,	3	.30		80	47.9	14.37	
Sham Bazaar to	4	1.07		80	26.0	27.82	
Halliday Street							
Central Avenue,	2	.04		80	74.6	2.98	
Halliday Street to	3	.03		80	47.9	1.44	
Bow Bazaar	4	.25		80	26.0	6.50	68.25
Central Avenue, S.W.	1	.08		80	99.6	7.97	
fork to Chow-	2	.06		80	74.6	4.48	
ringhee	4	.38	2.79	80	26.0	9.88	22.33
Central Avenue, S.E.	2	.06		60	56.3	3.38	
fork to Welling-	3	.04		60	36.2	1.45	
ton Square	4	.38	.48	60	19.6	7.45	12.28
Carried forward		3.27	3.27			102.86	102.86

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		3.27	3.27			102.86	102.86
Inner Strand Road to S.E. Diagonal	1	.30		70	87.2	26.16	
	2	.42		70	65.5	27.51	
	4	.60		70	22.8	13.68	
Ditto, Clive Row prolongation	1	.09	1.41	70	87.2	7.84	75.19
Sham Bazaar Diagonal	2	.22		70	65.5	14.41	
	3	.43		70	42.0	18.06	
	4	.68	1.33	70	22.8	15.50	47.97
Manicktola Avenue or N.E. Diagonal (via Silver Mint Tank)	1	.09		70	In Govt. land, should be given free. Cost of const. only.	.19	
	1	.05		70	87.2	4.36	
	2	.36		70	65.5	23.58	
	3	.13		70	42.0	5.46	
	4	.65	1.28	70	22.8	14.82	48.41
Harrison Road 2nd diagonal	3	.16	.16	70	42.0	6.72	6.72
S.E. Diagonal from Howrah Bridge*	1	.80	.80	80	99.6	79.68	79.68
Lower Chitpore New Road (or diagonal)		.20	.20	60	as in Scheme III.	12.55	12.55
Armenian Church to Bow Baz. diag.		.70	.70	70	ditto	34.98	34.98
New Bow Bazaar prolongation		1.20	1.20	70	ditto	38.58	38.58
New China Bazaar	1	.048	.048	80	99.6	4.78	4.78
Sealdah to Chowringhee Diag.	2	.04		70	65.5	2.62	
	3	.30		70	42.0	12.60	
	4	.16	.50	70	22.8	3.65	18.87
Marquis Street prolongation east	3	.08		50	30.0	2.40	
	4	.32	.40	50	16.3	5.22	7.62
Amherst Street prolongation		1.40	1.40	50	as in Scheme III.	26.52	26.52
		12.698	**12.698**			504.73	**504.73**

* Includes 700 ft. of road, 160 ft. wide behind Scots Kirk to provide extra room for traffic, and also essential space for motor and gharry ranks, and tramway relief-focus.

Scheme IX.—Continued.

Mileage and Net Cost of Street Widenings to be done by Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs
Sham Bazaar	3	.19	.19	80	Proportioned special	3.61	3.61
Pathureea Street	2	.12			29.8	3.58	
	3	.10	.22	60	19.0	1.90	5.48
Lower Chitpore Road (from Lall Bazaar to Manicktola Diagonal)	2	.80	.80	70	25.00	21.25	21.25
Machua Bazaar	—	1.12	1.12	70	as in Scheme II.	12.96	12.96
Lall Bazaar	1	.15	.15	80	39.2	5.88	5.88
Bentinck Street	1	.45	.45	70	37.0	16.65	16.65
Russa Road	3	1.25	1.25	100	19.00	24.00	24.00
		4.18	**4.18**			89.83	**89.83**

Mileage and Net Cost of Street Widenings to be done gradually by Calcutta Corporation.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Lindsay Street (portion)	2	.17	.17	70	25.00	4.25	4.25
Park Street		.90	.90	70	as in Scheme II.	16.65	16.65
Diamond Harbour Road	3½	1.55	1.55	80	12.00	18.60	18.60
Circular Garden Reach Road	3	1.60	1.60	80	16.00	25.60	25.60
		4.22	**4.22**			65.10	**65.10**

The total net cost and apportionment of Scheme IX. as above will thus be as follows:—

To be Expended by Improvement Trust.

	lakhs.	lakhs.
Creation of City main roads	504.73	
Urgent street widenings and widenings already already in hand	89.83	
Dalhousie Square improvement	2.26	
11 Bridge widenings	5.50	
1 New bridge (Halsi Bagan)	1.20	
Total	603.52	603.52

Co-operative Work.

Widenings by Calcutta Corporation	65.10
Port Trust work described on p. 196	16.32
Government of Bengal (Maidan Roads)	.91
Total City Main Road Bill under Scheme IX. unmodified	**685.86**

On Mr. Gauntlett's Table III. the Trust expenditure on works is estimated at lakhs 920, and the above expenditure on city roads would leave a balance of over 300 lakhs (say £2,000,000) for suburban and slum work. But it is safer to take the mean between Mr. Gauntlett's income tables II. & III., which would give us a total works' expenditure of 865 lakhs, or say £5,800,000. We must, therefore cheapen Scheme IX. as it stands above, in order to leave 300 lakhs for other work.

There is only one omission that can be made without serious injury to the efficiency of the scheme, and that is to omit the prolongation of Amherst Street, and save 26.52 lakhs. And there are two permissable reductions—i.e., make Central Avenue 70ft. wide throughout its whole length. (i) This would effect a saving of 75.44 lakhs minus 66.14 lakhs, equal to 9.30 lakhs. (ii) Widening in Park Street can be confined without real loss of effectiveness to a length of .65 miles, and gives a saving of about 4.76 lakhs. The total saving by these three means would then be 26.52+9.30+4.76, equal to 40.58 lakhs.

The total works expenditure of the Improvement Trust on Intra-City Main Roads would then be:—

	lakhs.
Scheme IX. total, including Amherst Street prolongation, and 80ft. Central Avenue	603.52
Deduct	40.58
Improvement Trust total Main Road Bill under Scheme IX. final	**562.94**

Say £3,753,000.

This would, on the 865 lakhs mean calculation, leave **302** lakhs, or say **£2,013,000,** for suburban, slum and housing work. If the jute trade continues to rise in value even at a less speed than during the past decade—then there is little doubt that we can count on nearer 2½ millions sterling. But it is best to estimate on the safe side.

If co-operation cannot be effected, or failing that if the Trust cannot get more money to replace co-operation, then, indeed, a very serious state of things would result, because any scheme of less value than Scheme IX. will be inadequate, and Calcutta will lose for ever her final opportunity to create a main road system, and thereby effect her salvation; and there is little doubt that the blame would be laid by posterity on the Calcutta Improvement Trust—and posterity would take no cognizance that the task set to the Trust single-handed, was beyond the purse given them to do it.

In this final Scheme IX., it will be noticed that the Corporation share is but 65.10 lakhs; and at the same time the writer has not forgotten that the Corporation is, under the Act, to contribute 7 lakhs a year. Seven lakhs, or say £44,000 a year, is a pitiable total contribution by a great Corporation to the greatest need its own city has ever had.

Details of various work-costs used in the foregoing and subsequent Estimates of Schemes.

Dalhousie Square Improvement.

It will be wise to add the whole cost of reconstructing the tramways in Dalhousie Square, although it may be held that the Tramway Company should pay part of this expense. A portion of the rails can be re-used, also the broken-up concrete has considerable value in Calcutta. New concrete underbed is allowed for in this estimate, though a sleeper bed would be cheaper and quieter. The writer estimates the cost of 4,000 feet of complete straight double track, with overhead equipment at:—

	Rupees.		
2 lakhs per mile	1.51.000		
Extra for 3 sets of double crossings at Rs. 7.500 each	23.500		
Extra for 1 lot of curves	1.500		
Removing existing tracks	15.000		
Making up roadway	20.000		
	2.11.000		
Add cost of altering interior of Square ...	15.000		
Total cost of Dalhousie Square Improvement to meet heavier traffic	2.26.000	or	lakhs 2.26
Say £15,065.			
Proportional cost to main roads for widening Sham Bazaar, now in hand by the Trust, say 1,000ft. in Zone 3, .19 miles x 19 lakhs			**3.61**

lakhs.

Proportional cost to main roads of Russa Road widening now to be done by the Trust. Say 1.25 miles of widening in Zone 3, 1.25 x 19 lakhs, say **24.00**

Bridge Widenings.

Further should be added to main road account, contributions to the widening of eleven road bridges, i.e., Chitpore, Barrackpore, Dumdum, Ultadingi, Manicktola, Narkuldanga, Beliagata, Kalighat, Zeerut, Kidderpore, and Hastings bridges; which will each cost on an average not much less than half a lakh each **5.50**

New Bridge Over Circular Canal.

If we add a new bridge over the Circular Canal at Halsi Bagan, the cost would be about 1.20 lakhs.... ... **1.20**

The total of minor bridge work would then be (5.50 + 1.20) **6.70**

Improvement work that should be done by the Port Trust.

Double-level Riverside Road 50ft. upper and 30ft. lower. From Aheeritolla northwards for 1,800 yards at Rs. 480 (£32) per yard, based on Hennebique or other ferro-concrete pile system 8.64

Note.—The Upper Road would be at existing level. The Lower Road, used as a quay, would occasionally be submerged during very high tides. This type of double road is very much used now at riverside ports, especially in Europe.

Short widening from end of Chitpore Bridge, to commencement of Riverside Road, .21 miles with little or no recoupment, but in very cheap property and waste land, at 8 lakhs 1.68

Strand Road 25ft. widening (west side) from Howrah Bridge to Aheeritolla Ghat, as part of any general wharf and warehouse scheme; one mile, mostly in one-storey old property, and with land already acquired, at say 6 lakhs net 6.00

16.32

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



City Road-Scheme No. I.—The Ideal.—Note that this is very far from a free ideal, but is one conforming to physical and financial limitations and the best possibilities that Calcutta could ever hope to obtain. Scheme No. II. is the same framework as No. I., but with all road-widths cut down to the minimum.

= 100 FT WIDE, = 70 FT WIDE, = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



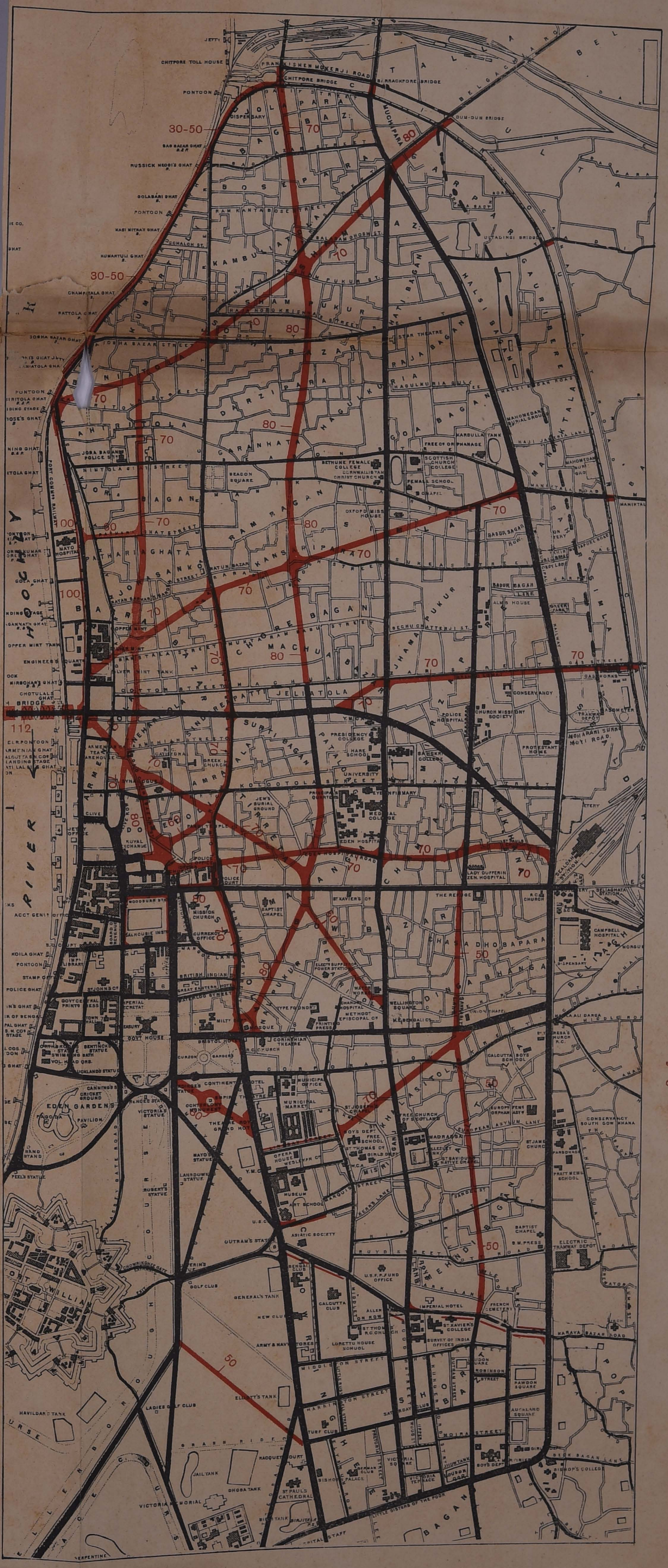
CITY ROAD-SCHEME No. III.—The Ideal and Sub-ideal have been cut down until no routes but of the first importance are left. The two Maidan roads would cost very little, and are therefore retained. All roads are reduced to minimum width.

=100 FT WIDE, = 70 FT WIDE, = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

URBAN CALCUTTA.

Scale 3 inches to 1 mile.


30-50
30-50
70
80
70
80
70
80
70
80
70
70
70

SUMMARY OF ESTIMATE BASES.

ALL COSTS ARE NET.

(1.) Creating New Main Intra-City Roads under the 1911 Calcutta Act.

LOCALITY.	Road 100 feet wide.			Road 80 feet wide.			Road 70 feet wide.			Road 60 feet wide.			Road 50 feet wide.		
	lakhs per mile.	lakhs per 1000 ft.	Sterling per mile	lakhs per mile	lakhs per 1000 ft.	Sterling per mile	lakhs per mile	lakhs per 1000 ft.	Sterling per mile	lakhs per mile	lakhs per 1000 ft.	Sterling per mile	lakhs per mile	lakhs per 1000 ft.	Sterling per mile
ZONE I. Yellow	124.54 (124.5)	23.59	£830,000	99.63 (99.6)	18.87	£664,000	87.18 (87.2)	16.51	£581,000	74.72 (74.7)	14.15	£498,000	63.27 (63.3)	11.98	£422,000
ZONE II. Blue	93.62 (93.6)	17.73	£624,000	74.63 (74.6)	14.13	£496,000	65.47 (65.5)	12.39	£437,000	56.31 (56.3)	10.66	£375,000	46.82 (46.8)	8.86	£312,000
ZONE III. Green	58.95 (58.9)	11.16	£393,000	47.90 (47.9)	9.07	£321,000	42.02 (42.0)	7.96	£278,000	36.14 (36.2)	6.84	£241,000	30.05 (30.0)	5.69	£200,000
ZONE IV. Purple	32.66 (32.7)	6.18	£218,000	26.03 (26)	4.93	£173,000	22.84 (22.8)	4.32	£152,000	19.65 (19.6)	3.72	£131,000	16.34 (16.3)	3.09	£109,000

1 or Street Widenings made under the 1911 Act.

LOCALITY.	Widenings between 30 and 40 feet increase.		20 to 30 ft. widenings approx.	10 to 20 ft. widenings approx.
	Net cost per mile in lakhs.	Net cost per mile in sterling,	Net cost per mile in lakhs.	Net cost per mile in lakhs.
ZONE I.	39.23 (39.2)	£262,000	35.00	30.00
ZONE II.	29.76 (29.8)	£198,000	25.00	20.00
ZONE III.	19.10 (19.0)	£127,000	16.00	13.00
ZONE III½....	14.80	....	12.00	....
ZONE IV. ...	10.47 (10.5)	£70,000	8.00	7.00

E. P. RICHARDS, M.INST.C.E., ETC.,

August, 1913.

NOTE—Under a Town Planning Act, based as usual on the principles of betterment and special assessment, the above costs would be reduced by from 20 to 50 per cent. The Calcutta 1911 Act is really only Part I of the English Housing Act, 1890.

Improvement work that can be done by Government.

Maidan New Roads.

Auchterloney New Road:

1700 feet run of eighty-foot road-making (32 miles) at Rs. 28	47,600
Mission Row Continuation across Curzon Gardens to Auchterloney Monument:	
1000ft. run (.19 miles) of sixty-foot road-making at Rs. 21	21,000
Allow for altering Curzon Gardens	1,000
Maidan South Cross Road from:	
Theatre Road to a point about 400 yards South of Dufferin Statue, 2700ft. (.51 miles) of 50ft. road-making, fairly light constructions, at Rs. 16	43,200
	1,12,800

Say **1.13 lakhs.**

Without Mission Row = .91 lakhs.

CHAPTER XII.

SCHEMES IV., V., VI., VII., & VIII., WITH THEIR MODIFICATION.

Note that none of these Schemes are recommended for execution. [For plans, see end of each estimate.]

Scheme No. 4.

With Two Modifications.

Scheme No. 4 is part of the physical and financial investigation that is necessary to find out what is the best scheme. The design is very inferior to that of Scheme IX. The Armenian-Church-to-Tiretta Bazaar Diagonal is omitted, and Canning Street has in consequence to be relieved by a costly widening. Machua Bazaar is depended on as the sole route to Manicktola, and the shortened N.E. Diagonal is shewn formed in two portions.

Scheme No. 4.

Mileage and Net Cost of New Main City Roads to be made by Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Avenue	3	.025		70	22.8	11.97	
	3	.025		70	42.0	1.05	
	1	.07		100	124.5	8.71	
	2	.10		100	93.6	9.36	
	3	.35		100	58.9	20.61	
	4	1.63		100	32.7	53.30	
	4	.35		80	26.0	9.10	
	3	.08		80	47.9	3.83	
	4	.09	2.72	50	16.3	1.46	119.39
Sham Bazaar Diagonal	3	.80		80	47.9	38.32	
	4	.12		80	26.0	3.12	
	2	.35	1.27	80	74.6	26.11	67.55
Central Diagonal	3	.08		80	47.9	3.83	
	2	.16		80	74.6	11.93	
	4	.41	.65	80	26.0	10.66	26.42
Meerbohor Diagonal	1	.08		100	124.5	9.96	
	2	.07	.15	100	93.6	6.55	16.51
Inner Strand Road	1	.23		80	99.6	22.90	
	2	.56		80	74.6	41.77	
	3	.05		80	47.9	2.39	
	4	.71	1.55	80	26.0	18.46	85.52
Carried forward		6.34	6.34			315.39	315.39

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		6.34	6.34			315.39	315.39
S.E. Diagonal & open spaces expressed as length	1	.80	.80	100	124.5	99.60	99.60
New China Bazaar	1	.06	.06	80	99.6	5.97	5.97
New Bow Bazaar	1	.06		80	99.6	5.97	
	2	.15		80	74.6	11.19	
	3	.05		80	47.6	2.39	
	4	.94	1.20	80	26.0	24.44	43.99
Harrison Road 1st diagonal	2	.10	.10	70	65.5	6.55	6.55
Harrison Road 2nd diagonal	3	.16	.16	70	42.0	6.72	6.72
New Amherst Street	3	.075		50	30.0	2.25	
	4	1.125		50	16.3	18.33	
	3	.15	1.35	80	47.9	7.18	27.76
Sealdah Diagonal	2	.14		80	74.6	10.44	
	3	.05		80	47.9	2.39	
	4	.41	.60	80	26.0	10.66	23.49
New Mission Row	1	.29	.29	50	63.3	18.35	18.35
		10.90	**10.90**			547.82	**547.82**

Mileage and Net Cost of City Main Roads to be done by Improvement Trust.

Dalhousie Square Improvements	2.26
Proportional cost to Main Roads of widening Sham Bazaar ...	3.61
Proportional cost to Main Roads of widening Russa Road ...	24.00
Widening eleven bridges	5.50
The speedy widening of Machua Bazaar is of great importance to the development of Manicktola, and it will be the best course for this work to be done by the Trust. The cost is estimated at lakhs	19.10
Improvement Trust Total, Scheme IV., Main Roads only ...	**602.29**

On the calculations of Mr. M. T. Gauntlett, the financial expert, and taking an average of 865 lakhs between his tables Nos. 2 and 3, this sum of 602 lakhs would leave the Trust a balance of some 263 lakhs available for slum improvement and rehousing, suburban development, etc.

Mileage and Net Cost of Street Widenings preferably to be done by Calcutta Corporation.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Machua Bazaar widening	2	.12		70	29.8	3.57	
	3	.52		70	19.0	9.88	
	4	.53	1.17	70	10.5	5.56	19.01
Canning Street widening	1	.31		70	39.2	12.15	
	2	.30		70	29.8	8.94	
	3	.14	.75	70	19.0	2.66	23.75
Kyd Street widening	2	.17	.17	80	29.8	5.06	5.06
Park Street widening	2	.25		80	29.8	7.45	
	3	.65	.90	80	19.0	12.35	19.80
Circular Garden Reach Road widening	3	1.60	1.60	100	19.0	30.40	30.40
Diamond Harbour Road widening	3½	1.55	1.55	100	14.8	22.94	22.94
Mission Row widening	1	.16	.16	60	39.2	6.27	6.27
		6.30	**6.30**			127.23	**127.23**

If Machua Bazaar be done by the Trust, then the amount would be reduced by 19.01

108.22

And mileage is reduced by 6.30 less 1.17 = **5.13** miles.

The complete estimate for Main Road work under Scheme No. IV. will then be as follows:—

	lakhs.
Money to be expended by the Improvement Trust ...	602.29
Cost of road widenings to be done in, say, next 15 years by the Corporation	108.22
New Maidan Roads to be done by Government ...	1.13
Strand Road widening and new riverside road to be done by Port Trust	16.32
Total Main Road Bill under Scheme No. IV.	**727.96**

SCHEME IV.

Cheaper Alternative No. 1.

New Main Roads.

The following economies could be made without reducing the effectiveness* of the Scheme to a very perceptible extent:—

(i.)	Reduce the 100 feet width of the Central Avenue to 80 foot widths, i.e., make it 10 feet wider than Harrison Road. It is never likely to carry more traffic than the West end of Harrison Road at the present time. The importance of the Central Avenue as a main traffic route has often seemed to be exaggerated, in the writer's opinion. The net economy effected would be	lakhs. 18.41
(ii.)	Make Sham Bazaar Diagonal the same width as Harrison Road, i.e., 70 feet instead of 80 feet. The net economy effected would be	8.30
(iii.)	Reduce the Central Diagonal from 80 feet to 70 feet wide. The net economy effected would be	2.92
(iv.)	Reduce the Meerbohor Ghat diagonal from 100 feet to 80 feet wide. The net economy would be	3.33
(v.)	Make the Inner Strand Road 70 feet wide, same as Harrison Road, i.e., 70 feet instead of 80 feet. The economy effected would be ...	10.51
(vi.)	Make the S.E. diagonal 80 feet wide instead of 100 feet wide, but preserving considerable cab-rank spaces behind Scots Kirk and some space by Armenian Church. This effects a considerable economy (as the whole road is in Zone 1)	19.92
(vii.)	Reduce New Bow Bazaar from 80 feet to 70 feet wide, which would still allow it to be a great tramway route to the Ballygunge and Entally suburbs. The economy effected would be ...	5.41
(viii.)	New Amherst Street, reduce the length, 80 feet wide, to 70 feet wide, saving	.88
(ix.)	Make the Sealdah diagonal 70 feet wide instead of 80 feet wide. It would still effect its purpose of relieving Corporation Street and Dharamtolla, and be a valuable new tram route. The economy effected would be	.88
	Total Economy effected	**70.56**

* At same time, be it remembered, this scheme is already far from the best: but all these alternatives with the various schemes are a part of that thorough investigation required to get at the best.

Then total of Scheme No. 3 Modification No. 1, New Main Roads only will be:—

	547.82 lakhs.	
	70.56 ,,	
	477.26	477.26

To this we must add the same extras as for Scheme No. 4 proper:

Dalhousie Square Improvement ...	2.26	
Sham Bazaar widening	3.61	
Russa Road widening	24.00	
Bridge widenings	5.50	
Machua Bazaar widenings	19.10	
	54.47	54.47

Total to be spent by Improvement Trust on Main Roads Scheme No. 4, Modification No. 1 ... ... **531.73**

Say **£3,544,000 sterling.**

Again using Mr. Gauntlett's two tables, then 531.73, say 532 lakhs, from our total of 865 lakhs, would leave 333 lakhs, available for slum reform and rehousing, open spaces, suburban development and contributions (if any) toward Corporation street-widenings, tramway subsidies (if required), etc.

	lakhs.
The net cost of road widenings to be accomplished in, say, 10 years by the Corporation would be as before, without Machua Bazaar	108.22
And work to be done by the Port Trust would cost ...	16.32
And the Maidan New Roads, to be done by Government	1.13
Add to these the money to be spent by the Trust ...	531.73
And the Main Road Bill for Scheme IV. Modification No. 1 amounts to	**657.40**

SCHEME 4.—MODIFICATION No. 2.

More economies beyond those set out in Modification No. 1 will further reduce the effectiveness of the Scheme, but in view of the financial conditions, they must be analysed and considered, and are as follows:—

Reductions of Improvement Trust Roads.

(i.) Make the S.E. Diagonal 70 feet wide, same as Harrison Road, instead of 80 feet wide. This would make a reduction on the estimates of ...	9.92
(ii.) Make the Inner Strand Road 60 feet wide, instead of 70 feet wide. The estimates would be reduced by	10.59
Carried forward ... ... Lakhs	20.51

Brought forward		20.51
(iii.) Omit New Mission Row; this would make a reduction of		18.35
Total reduction to Trust	Lakhs	38.86

Then the Complete Bill for Main Roads under Scheme 4, Modification 2, will be as follows:—

	lakhs.
Improvement Trust Main Roads under Scheme 3, Modification No. 1	531.73
Less reduction, Modification No. 2	38.86
	492.87

Thus leaving, say, 865 lakhs less 493=372 lakhs of Trust money for purposes other than Main Roads in the City proper.

Corporation street widenings	108.22	
Less Mission Row ,, ...	6.27	
	101.95	101.95
Port Trust		16.32
Government		.91
Total Main Road Bill under Scheme 4, Modification No. 2		**612.05**

Mileage of New or Widened Roads.

Scheme 4.

The mileage of City Main Roads that would be accomplished under Scheme 4 would be as follows:—

	Miles.
Created by the Improvement Trust	10.90
Widened by ,, ,, ,, ...	2.61
Widened by Calcutta Corporation	6.30
Created by Government	1.02
Widened by Port Trust	1.21
Created ,, ,, ,, ...	1.02
Total mileage	**23.06**

Scheme 4.

Modification No. 1.

Same as in Scheme 4 proper, but with reduced widths, and less Mission Row and prolongation across Maidan, 23.06 less (.16+.29+.19)	**22.42**

Scheme 4.

Modification No. 2.

Created by Improvement Trust	10.90
Widened by ,, ,, ...	2.61
Widened by Calcutta Corporation	4.97
Created by Government	.83
Widened by Port Trust	1.21
Created ,, ,, ,, ...	1.02
	21.54

Note that the work in Scheme 4 and each modification includes widening of 11 bridges and improvement of Dalhousie Square.

Note also that Scheme 4 and its modifications all possess very serious defects.

SCHEME V.

The chief points to be observed about this Scheme in comparison with Scheme 3, or Scheme IX., are as follows:—The abandonment of New Bow Bazaar, and, instead, the widening of Bow Bazaar and Lall Bazaar, and the widening of Canning Street. Also the widening of Bentinck Street and Lower Chitpore Road to Harrison Road (relieving the Old Court House Street route); and the omission of the New Mission Road project. Armenian-Church-Tiretta-Bazaar Diagonal is logically retained, to assist in relieving Canning Street, Bow Bazaar and Lall Bazaar, Old Court House Street and Dalhousie Square. It also puts a big road through a mass of bad roadless slum. The short Chitpore diagonal is retained to provide the much-needed N.E. inlet and outlet from the City centre.

The weakest points of Scheme V. include the imperfect N.E. Diagonal, the reduced widened length of Chitpore Road, the omission of New Bow Bazaar, and the non-prolongation of Clive Row. The street-widening bill for Calcutta Corporation is also double that in Scheme IX.

The rest of Scheme V. is similar to Scheme IV., Modification No. 1.

Scheme V.

Mileage and Net Cost of New Main City Roads to be made by the Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central Avenue	4	.525		70	22.8	11.97	
	3	.025		70	42.0	1.05	
	1	.07		80	99.6	6.97	
	2	.10		80	74.6	7.46	
	3	.35		80	47.9	16.76	
	4	1.63		80	26.0	42.38	
Carried forward		2.70				86.59	

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



CITY ROAD-SCHEME No. IV.—This Scheme has fewer roads than Scheme III., but of greater width. Note variations of N.E. diagonal from bridge, and a possible variation of Sealdah-Chowringhee diagonal. Canning Street is widened in lieu of a relief diagonal. Machua Bazaar is chief route to Manicktola. Wellington-Park Streets become likely important tram route.

= 100 FT WIDE, = 70 FT WIDE, = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		2.70				86.59	
	4	.35		80	26.0	9.10	
	3	.08		80	47.9	3.83	
	4	.09	3.22	50	16.3	1.46	100.98
Sham Bazaar diagonal		1.27	1.27	70	As in 4 Mod. 1	59.25	59.25
Central Diagonal		.65	.65	70	ditto	23.50	23.50
Meerbohor Diagonal		.15	.15	80	ditto	13.18	13.18
Inner Strand Road		1.55	1.55	70	ditto	75.01	75.01
S.E. Diagonal		.80	.80	80	ditto	79.68	79.68
New China Bazaar		.06	.06	80	ditto	5.97	5.97
Harrison Road 1st diagonal		.10	.10	70	ditto	6.55	6.55
Harrison Road 2nd diagonal		.16	.16	70	ditto	6.72	6.72
New Amherst St.	3	.075		50	30.0	2.25	
	4	1.125		50	16.3	18.33	
	3	.15	1.35	70	42.0	6.30	26.88
Sealdah Diagonal		.60	.60	70	As in 4 Mod. 1	22.61	22.61
Tiretta Bazaar Road	1	.18		70	87.2	15.69	
	2	.20		70	65.5	13.10	
	4	.32	.70	70	22.8	7.29	36.08
Lower Chitpore Diagonal	1	.05		70	87.2	4.36	
	2	.13	.18	70	65.5	8.51	12.87
		10.79	**10.79**			469.28	**469.28**

Scheme V.

Mileage and Net Cost of Street Widenings to be done by the Improvement Trust.

Machua Bazaar widening	As in Scheme IV. Mod. 1.		1.17	1.17		19.01	19.01
Carried forward			1.17	1.17		19.01	19.01

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		1.17	1.17			19.01	19.01
Bentinck Street	1	.45	.45	70	39.20	17.64	17.64
Bow Bazaar	2	.60		80	29.80	17.80	
	3	.45	1.05	80	19.00	8.55	26.35
Lall Bazaar	1	.15	.15	80	39.00	5.85	5.85
Sham Bazaar		.19	.19	80	As in 4 Mod. 1	3.61	3.61
Russa Road		1.25	1.25	100	ditto	24.00	24.00
		4.26	**4.26**			96.46	**96.46**

Scheme V.

Mileage and Net Cost of Street Widenings to be done by Calcutta Corporation.

Canning Street		.75	.75	(As in IV., Mod. 2)		23.75	23.75
Lower Chitpore Road	2	.55	.55	70	29.80	16.39	16.39
Short length of Dharamtolla	3	.22	.22	70	19.00	4.18	4.18
Kyd Street	2	.17	.17	70	29.80	5.06	5.06
Park Street		.90	.90		As in 4 Mod. 1	19.80	19.80
Circular Garden Reach Road		1.60	1.60		ditto	30.40	30.40
Diamond Harbour Road		1.55	1.55		ditto	22.94	22.94
		5.74	**5.74**			122.52	**122.52**

Then the total cost of Scheme No. V. without any modification would be:—

To be Expended by the Improvement Trust.

Creation of new main roads	469.28	
Widenings	96.46	
Dalhousie Square Improvement	2.26	
Bridge widenings	5.50	573.50

Then on the mean between Tables No. 2 and 3 of Mr. Gauntlett's calculations, 865 less 573.50 leaves 291.5 lakhs for purposes other than City main roads.

To obtain total main roads bill for Scheme IV., we now add:—

Widenings by Calcutta Corporation to be done over a period of 10 years or more		122.52
Port Trust Work		16.32
Government, Maidan Roads		.91
Total Main Road Bill, Scheme V. ...	Lakhs	**713.25**

It is to be feared that lakhs 122.52 would be much more than the Corporation finances could bear as their share of the City improvements. On the other hand, if the cost of widenings are added to the work of the Improvement Trust, then the scheme would be much too costly for the present resources of the Trust [apart from its defects of design].

Scheme V.

Modification No. 1

The object of this modification is to cheapen Scheme IV. with the least possible injury to its effectiveness. It should be kept in view that we are considering, mostly, the result of abandoning New Bow Bazaar, which is the proposed parallel to the Bow-Lall-Bazaar line. The present Bow Bazaar and Lall Bazaar line is fed by traffic coming and going largely to and from Sealdah and to and from the North-East. It is essential to any good main road scheme for Calcutta that the Bow and Lall Bazaar line either be relieved of some present and future traffic, or else be prepared to take greater traffic. If relieved, it will be found best in every way, as has been shewn already, to do this by a parallel on the north side, i.e., by New Bow Bazaar. The only other course is to widen Bow and Lall Bazaar. This is only a reminder. The problem was fully discussed in Chapters VII. and VIII.

We may consider economies that can be made in Scheme No. V. merely as investigation. We can note the effect of:—

(i.) Abandonment of the Tiretta Bazaar Road.

(ii.) ,, ,, ,, Lower Chitpore Diagonal.

(iii.) ,, ,, widening short length of Dharamtolla.

These immensely reduce the (already weak) value and balance of the Scheme.

The economy obtained for the Trust would be:—

(1)	Omission of Tiretta Bazaar Road	36.08
(2)	,, ,, Lower Chitpore Diagonal	12.87
		48.95
	And for the Corporation	4.18
		53.13

The total cost of Scheme No. V. with Modification No. 1 would be:—

To be Expended by Improvement Trust.

Creation of new main roads	420.33	
Widenings	96.46	
Dalhousie Square Improvement	2.26	
Bridge widenings	5.50	524.55

Leaving out of 865 lakhs the sum of 330 lakhs for purposes other than City main roads.

To obtain total main road bill, we add as before:—

Widenings by Corporation	118.34
Port Trust Work	16.32
Government	.91
Total, Scheme V. Modification No 1	**660.12**

Say **£4,040,000.**

Scheme V. Unmodified.

Main Road Mileage that would be added to the City.

New Roads created by Improvement Trust	10.79 miles.
Streets widened ,, ,, ,, ...	4.26 ,,
,, ,, by Corporation	5.74 ,,
Created on Maidan by Government	.83 ,,
Widened by Port Trust	1.21 ,,
Created ,, ,, ,, ...	1.02 ,,
	23.85 miles.

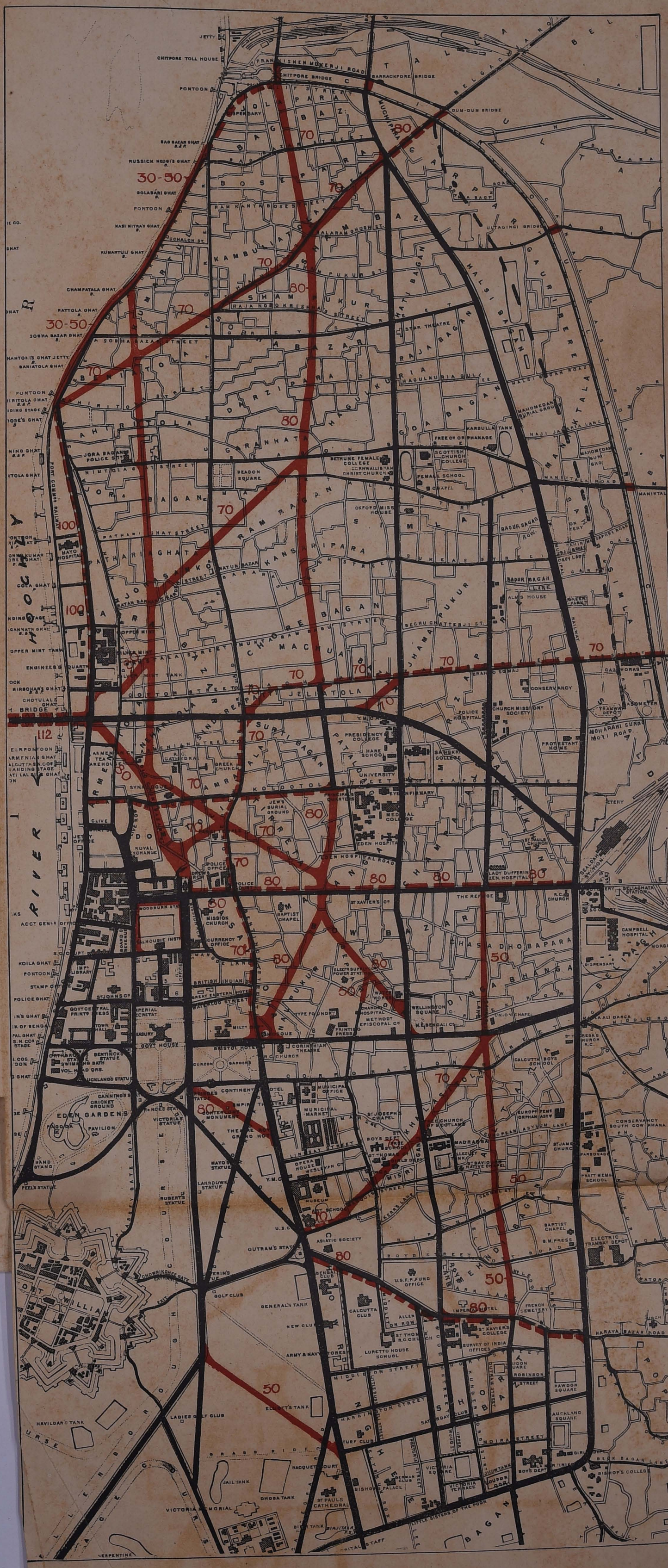
Scheme V.—Modification No. 1.

Mileage.

New Roads created by Improvement Trust	9.91
Roads widened by Improvement Trust	4.26
Roads widened by Corporation	5.52
Created on Maidan by Government	.83
Widened by Port Trust	1.21
Created ,, ,, ,, ...	1.02
	22.75 miles.

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



ROAD SCHEME No. V.—New Bow Bazaar expandoned, Lall and Bow Bazaar widened, with other resulting necessities.

= 100 FT WIDE, = 70 FT WIDE, = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

SCHEME VI.

This is the second scheme based on widening of the Lall Bow Bazaar line, instead of creating a parallel New Bow Bazaar.

The new features are the re-arrangements at the South End of Central Avenue, the widening of only a short piece of Lower Chitpore Road, and abandonment of Armenian Church diagonal. One of the Harrison Road diagonals is also omitted; and the Central diagonal is combined with the Meerbohor Ghat diagonal.

The N.E. exit from the Main focus of the city, i.e., the Chitpore Road diagonal, is retained. The Chandney diagonal, from Bow Bazaar to Wellington Square, is new, and is necessary to this scheme. The North End of Inner Strand Road is shortened.

One of the many weak points of Scheme VI. is the lack of a complete route to the N.E. from Howrah Bridge. Against this might be set the fact that, owing to the nearness of swamp-land, and the consequently dying-out of Manicktola area at the end of a N.E. route, this route is not so vital as it might seem at first glance.

The chief weakness is the lack of a diagonal route from Howrah Bridge to Bentinck Street and on as far as Central Avenue. The omission is, of course, solely on the ground of financial inability. This omission would leave Old Court House Street and the city heart to become more and more injured by excessive through traffic.
importance.

Beadon Street becomes of more importance.

The more we thin things down, and the more we depart from the ideal, the more difficult does it become to know which roads to sacrifice, and which to retain or modify.

The object of reproducing the schemes' estimates and plans that compose this chapter is so that readers can for themselves go through the investigations necessary before we can arrive at what seems best, viz., at Scheme IX.

Scheme No. VI.

Mileage and Net Cost of New Main City Roads to be made by Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central (North to South) Avenue	4	.525		70	22.8	11.97	
	3	.025		70	42.0	1.05	
	3	.15		80	47.9	7.18	
	4	1.25		80	26.0	32.50	
Carried forward		1.95				52.70	

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		1.95				52.70	
	3	.03		80	47.9	1.44	
	4	.58		80	26.0	15.08	
	2	.05		80	74.6	3.73	
	1	.08	2.69	80	99.6	7.97	80.92
Chandney diagonal	2	.07		60	56.3	3.94	
	3	.03		60	36.2	1.08	
	4	.40	.50	60	19.6	7.84	12.86
Sham Bazaar		1.27	1.27	70	As in other schemes	59.25	59.25
Central diagonal	1	.10		70	87.2	8.72	
	2	.33		70	65.5	21.61	
	4	.09	.52	70	22.8	2.05	32.38
Inner Strand Road	1	.23		70	87.2	20.15	
	2	.33		70	65.5	21.61	
	3	.05		70	42.0	2.10	
	4	.74	1.35	70	22.8	16.87	60.73
S.E. diagonal		.80	.80	80	As in Scheme IV.	79.68	79.68
Harrison Road 2nd diagonal only		.16	.16	70	ditto	6.72	6.72
Lower Chitpore diagonal	1	.05		60	63.3	3.16	
	2	.13	.18	60	46.8	6.08	9.24
New China Bazaar prolongation	1	.06	.06	80	99.6	5.97	5.97
Sealdah diagonal	2	.14		60	56.3	7.88	
	3	.05		60	36.2	1.81	
	4	.41	.60	60	19.6	8.03	17.72
New Amherst Street	3	.075		50	30.0	2.25	
	4	1.125		50	16.3	18.34	
	3	.15	1.35	60	30.0	4.50	25.09
		9.48	**9.48**			390.56	**390.56**

Scheme No. VI.

Mileage and Net Cost of Street Widenings to be done by the Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Sham Bazaar		.19	.19	80	As in Scheme V.	3.61	3.61
Machua Bazaar	3	.20		70	19.0	3.80	
	4	.60	.80	70	10.5	6.30	10.10
Lower Chitpore Road	1	.06		60	39.2	2.35	
	2	.27	.33	60	29.8	8.04	10.39
Bentinck Street	1	.45	.45	70	39.20	17.64	17.64
Bow Bazaar and Lall Bazaar		1.20	1.20	80	As in Scheme V.	32.20	32.20
Canning Street		.75	.75	70	As in 4 Mod. 1	23.75	23.75
Russa Road		1.25	1.25	100	ditto	24.00	24.00
		4.97	**4.97**			121.69	**121.69**

Scheme VI.

Mileage and Net Cost of Street Widenings preferably to be done by the Calcutta Corporation.

Kyd Street	2	.17	.17	60	25.00	4.25	4.25
Park Street	2	.25		70	25.00	6.25	
	3	.65	.90	70	16.00	10.40	16.65
Circular Garden Reach Road		1.60	1.60	100	As in other Schemes	30.40	30.40
Diamond Harbour Road		1.55	1.55	100	ditto	22.94	22.94
		4.22	**4.22**			74.24	**74.24**

Scheme VI.—Summary.

Then the total net cost of Scheme VI., without any modification, would be as follows:—

To be Expended by Improvement Trust.

	lakhs.
Creation of new Main Roads	390.56
Widenings	121.69
Dalhousie Square Improvement	2.26
Bridge Widenings	5.50
	520.01

Then, on Tables 2 and 3 of Mr. Gauntlett's calculations, 865 less 520 leaves 345 lakhs for purposes other than City Main Roads.

To obtain total Main Road Bill for Scheme VI. unmodified, we now add:—

Widenings by Calcutta Corporation	74.24
Port Trust Work	16.32
Government (Maidan Roads)	.91
Total Main Road Bill, Scheme V.	**611.48**

Scheme VI.—Modification No. 1.

(i.) By the addition of a Manicktolla diagonal (varying from 70 feet to 60 feet wide) instead of the Meerbohor and Central diagonal. This would somewhat help the missing balance and comprehension of the scheme.

(ii.) Canning Street widening to be done gradually by the Corporation, and not by the Trust.

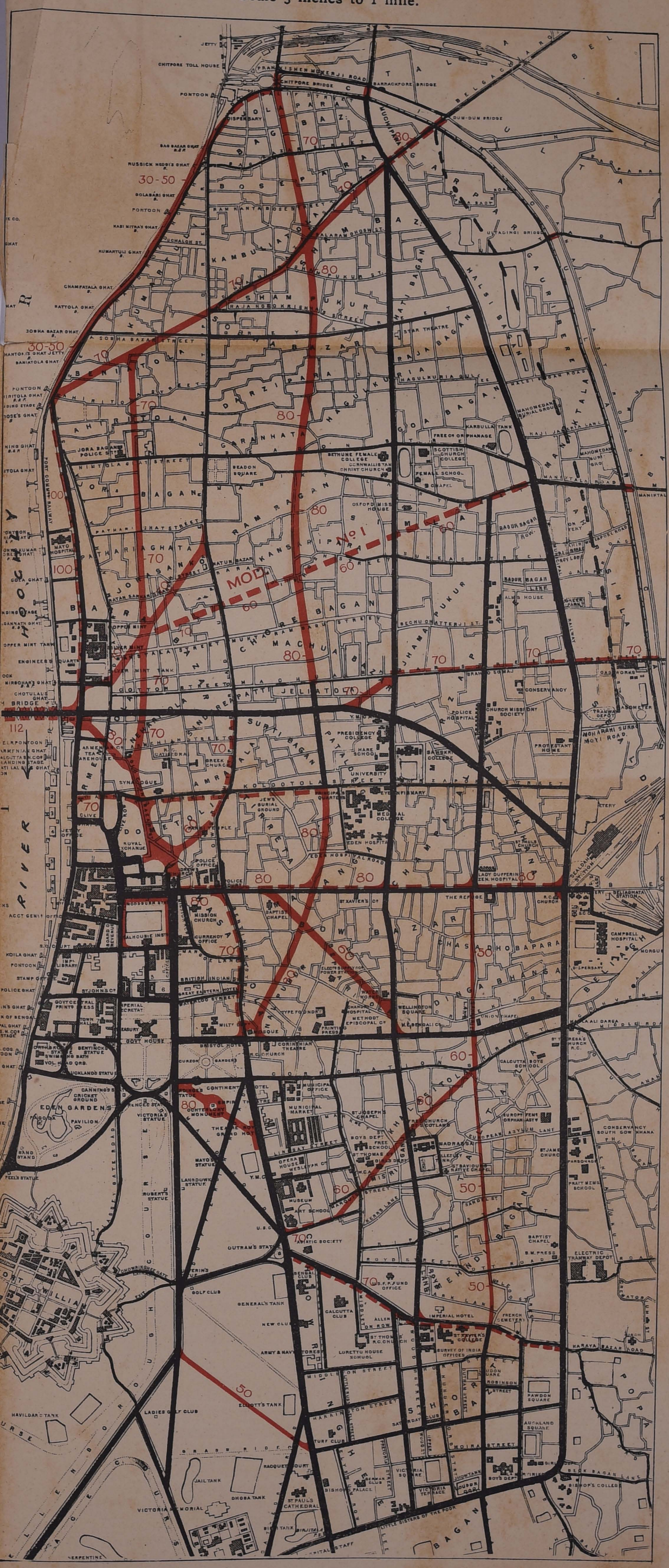
Scheme VI.—Modification No. 1.

Manicktola diagonal	1	.10		70	87.2	8.72	
	2	.31		70	65.5	20.30	
	2	.04		60	56.3	2.25	
	3	.05		60	36.2	1.81	
	3½	.03		60	27.9	.84	
	4	.93	**1.46**	60	19.6	18.22	**52.14**

	lakhs.
The cost of the Manicktolla diagonal is then estimated at	52.14
Deduct from this the cost of Canning Street widening ...	23.75
Addition to Scheme V. unmodified	**28.39**

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



City Road-Scheme No. VI.—A second Scheme, based on the abandonment of New Bow Bazaar and the widening of the Lall-Bowbazaar line. N. E. Central diagonal is combined with Meerbohat diagonl. Tiretta Bazaar diagonal and S. E. fork of Central Avenue are combined. One Harrison Road diagonal is omitted.

= 100 FT WIDE, = 70 FT WIDE, = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

The net apportioned Costs of Scheme No. VI. Modified would then be:—	lakhs.
Improvement Trust, 520.01 + 28.39	548.40
Corporation, 74.24 + 23.75 (Canning Street)	97.99
Port Trust	16.32
Government	.91
Total Main Road Bill, Scheme VI. modified ...	**663.62**

The amount left for other work to be done by the Improvement Trust would be on our previous basis ...	865.00
	548.40
	316.60

Scheme VI.—Unmodified.

Main Road Mileage that would be added to the City.

	Miles.
New Roads created by Improvement Trust	9.48
Streets widened by ,, ,, ...	4.97
,, ,, ,, Corporation	4.22
Created on Maidan by Government	.83
Created by Port Trust	1.02
Widened ,, ,, ,, ...	1.21
	21.73

Scheme VI. Modified.

	Miles.
New Roads created by Improvement Trust	10.94
Streets widened by ,, ,, ...	4.22
,, ,, ,, Corporation	4.97
Created on Maidan by Government	.83
Created by Port Trust	1.02
Widened by ,, ,, ...	1.21
	23.19

SCHEME VII.

This is the Third Scheme based on the widening of Bow Bazaar. The chief object of this scheme is to examine the effect of a third variation at the South end of the Central Avenue. The Scheme is planned in accordance with this re-arrangement, which consists of forking the Central Avenue from the end of Halliday Street, instead of from Bow Bazaar. This makes full use of a Bentinck Street widening, and would necessitate the formation of a roomy traffic circus at the present junction of Lall Bazaar and Bentinck Street, by the Police Station.

Canning Street would be a good deal relieved by this arrangement, and also by the Lower Chitpore short diagonal, which is retained in this Scheme. The relief of Canning Street allows it to be placed in the list of less urgent road widenings that might be carried out over a long period of years by the Corporation, but the widening bill is very heavy.

The weakest points of the Scheme are those inherent to a non-duplicated Bow Bazaar, and still more to a non-relief of the city main focus and Old Court House Street of through traffic to and from Howrah Bridge. Too great a traffic concensus would be directed upon Lall Bazaar. The omission of Clive Row prolongation accentuates the defects. Business disturbance due to the heavy widenings in Canning Street and Bow Bazaar would be severe, if not prohibitive. By the omission of the S.W. fork of Central Avenue the proper business development east of Bentinck Street is made impossible. The mileage of new main roads and of business frontage would not be increased in good proportion to the money spent. Notwithstanding all these faults, the Scheme is worth examination for what it teaches us.

Scheme VII.

Mileage and Net Cost of New Main City Roads to be made by the Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central N. & S. Avenue	4	.525		70	22.8	11.97	
	3	.025		70	42.0	1.05	
	3	.15		80	47.9	7.18	
	4	1.25		80	26.0	32.50	
	2	.05		80	74.6	3.73	
	3	.05		80	47.9	2.39	
	4	.33	2.38	80	26.0	8.58	67.40
Inner Strand Road		1.35	1.35	70	Same as Scheme VI.	60.73	60.73
Sham Bazaar Diagonal		1.27	1.27	70	ditto	59.25	59.25
Manicktola Avenue		1.46	1.46	60 to 70	ditto Mod. 1	52.14	52.14
Harrison Road Second Diagonal		.16	.16	70	As in Scheme VI.	6.72	6.72
S.E. Diagonal		.80	.80	80	As in Schemes V. & VI., etc.	79.68	79.68
Lower Chitpore Diagonal		.18	.18	60	As in Scheme VI.	9.24	9.24
Carried forward		7.60	7.60			335.16	335.16

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		7.60	7.60			335.16	335.16
New China Bazaar Prolongation		.06	.06	80	ditto	5.97	5.97
Eden Hospital Diagonal	2	.07		60	56.3	3.94	
	3	.03		60	36.2	1.08	
	4	.28	.38	60	19.6	5.49	10.51
Chandney Diagonal	1	.06		60	74.7	4.48	
	3	.05		60	36.2	1.81	
	4	.59	.70	60	19.6	11.56	17.85
Sealdah Diagonal		.60	.60	60	As in Scheme VI.	17.72	17.72
New Amherst Street		1.35	1.35	50 to 60	ditto	25.09	25.09
Sukea Street Prolongation	3	.03		50	30.00	.90	
	4	.03	.06	50	16.30	.49	1.39
		10.75	**10.75**			413.69	**413.69**

Scheme VI.

Mileage and Net Cost of Urgent Street Widenings to be done by the Improvement Trust.

Sham Bazaar	.19	.19	80	As in Sch. V.	3.61	3.61
Machua Bazaar	.80	.08	70	As in Sch. VI.	10.10	10.10
Bentinck Street	.45	.45	70	ditto	17.64	17.64
Lower Chitpore Road	.55	.55	70	As in Sch. V.	16.39	16.39
Bow Bazaar	1.05	1.05	80	ditto	26.35	26.35
Lall Bazaar	.15	.15	80	ditto	5.85	5.85
Russa Road	1.25	1.25	100	As in all Schms.	24.00	24.00
	4.44	**4.44**			103.94	**103.94**

Scheme VI.

Mileage and Net Cost of Street Widenings preferably to be done by Calcutta Corporation.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Canning Street		.75	.75	70	As in 4 Mod. 2	23.75	23.75
Kyd Street		.17	.17	60	As in 6	4.25	4.25
Park Street		.90	.90	70	ditto	16.65	16.65
Circular Garden Reach Road		1.60	1.60	100	As in all Schemes	30.40	30.40
Diamond Harbour Road		1.55	1.55	100	ditto	22.94	22.94
		4.97	**4.97**			97.99	**97.99**

Scheme VII.—Summary.

The total net cost of Scheme No. VII., without any modification, would be as follows:—

To be Expended by Improvement Trust.

	lakhs.
Creation of New Main Roads	413.69
Widenings	103.94
Dalhousie Square Improvement	2.26
Bridge Widenings	5.50
	525.39

Then on the mean between Tables Nos. 2 and 3 of Mr. Gauntlett's calculations, 865 less 525.39 leaves 340 lakhs for other purposes than City Main Roads.

To obtain total Main Road Bill for Scheme VII. unmodified, we now add:—

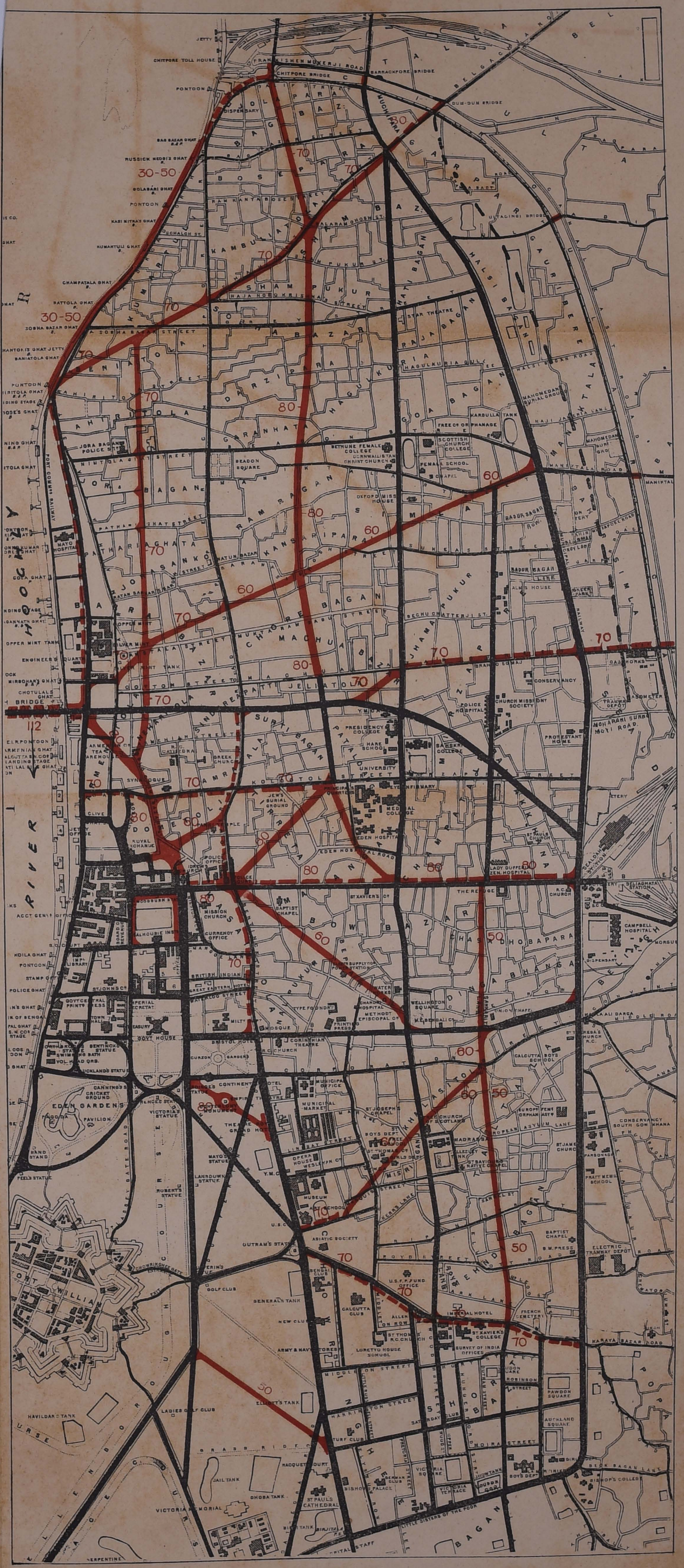
Widenings by Calcutta Corporation	97.99
Port Trust Work	16.32
Government, Maidan Roads	.91
Total Main Road Bill, Scheme VII.	**640.61**

Scheme VII. Modified.

Scheme VII. does not lend itself to anything but slight modification. The following slight economies might be made:—

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



City Road-Scheme No. VII.—A third scheme based on widening of Lall-Bow Bazaar line. Variations and cheapenings at South end of Central Avenue, Lall Bazaar opened out and becomes big traffic circus.

= 100 FT WIDE, = 70 FT WIDE, = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

(i.) Omit Sukea Street prolongation.

(ii.) Omit widening the portion of Lower Chitpore Road between Lall Bazaar and the short diagonal from New China Bazaar and the S.E. diagonal.

The cost of Scheme VII. modified in this manner would be:—

To be Expended by Improvement Trust.

	lakhs.
New City Main Roads, 413.69—1.39	412.30
Widenings, 103.94—6.00	97.94
Dalhousie Square	2.26
Bridge Widenings	5.50
	518.00
Widenings by Corporation	97.99
Port Trust Work	16.32
Government, Maidan Roads	.91
Total City Main Road Bill, Scheme No. VII. modified	**633.22**

Scheme VII.

Main Road Mileage that would be added to the City.

	Miles.
New Roads created by Improvement Trust	10.75
Streets widened by ,, ,, ...	4.44
,, ,, ,, Corporation	4.97
Created by Port Trust	1.02
Widened ,, ,, ,, ...	1.21
Created on Maidan by Government	.83
	23.22

The Modified Scheme VII. would contain (23.22-.28.) = **22.94** miles.

SCHEME VIII.—UNMODIFIED.

SCHEME VIII.—MODIFICATION 1.

SCHEME VIII.—MODIFICATION 2.

Important Notes.

The Effect of Omitting Inner Strand Road.

It is found that the omission entails more cost than is gained. Three N.E. diagonals being required instead of two—otherwise no effective scheme can be designed with Inner Strand Road omitted. The Inner Strand Road with two diagonals would cost 16 lakhs less than the alternative, i.e., three diagonals and Chitpore Road widened along its whole length.

The Effect of Omitting New Bow Bazaar.

It is found that to widen Bow Bazaar would cost 7 lakhs more than to duplicate it with a New Bow Bazaar.

Scheme VIII.

This needs more careful examination by readers. The object of this design is to consider chiefly the physical and financial effects of omitting the Inner Strand Road from a general scheme.

The omission would be dead against the sound policy of duplication, and would produce tremendous business disturbance. It would strongly accentuate the importance of the Bentinck-Street-Chitpore-Road-line. This highly defective route would have to be improved by costly widenings throughout, or by a combination of widening and arcading. The widening of Strand Road or Darmahatta Street north of Howrah Bridge would also be made very urgent by the omission of the Inner Strand Road. The cost of roads north of Harrison Road is given separately, with and without the Inner Strand Road.

Scheme VIII. without modification includes on the South side of Harrison Road: Duplication of Bow Bazaar, i.e., New Bow Bazaar, as an integral part of the scheme; Lall Bazaar is widened; the Central Avenue bifurcates at the South End of Halliday Street—one branch goes to Lall Bazaar Police Station junction, the other past Eden Hospital to the Wellington-Street-Bow-Bazaar Junction; Bentinck Street is widened as the continuation of Chowringhee, and also to relieve the City Main focus and Old Court House Street route of increasing through traffic to Howrah Bridge. Lower Chitpore Road is widened by the Trust from Lall Bazaar to Harrison Road. The rest of Chitpore Road is dealt with by the Corporation.

Scheme VIII. unmodified includes to the North of Harrison Road: Sham Bazaar, Central, and Manicktola diagonals; the Machua Bazaar route to Manicktola; and the Central Avenue. Note that no Inner Strand Road is provided, and that Chitpore Road has to be widened throughout its whole length.

Scheme VIII. Modification 1 includes, as before, New Bow Bazaar and Lall Bazaar widening. But the forking of Central Avenue takes place from the old position on Bow Bazaar, one branch going to Chowringhee and one to Wellington Square. Bentinck Street, relieved by the Central diagonal S.W. branch, is not widened, but this alternative is quite inadmissible on grounds of good planning. Nor is Lower Chitpore Road widened from Lall Bazaar to Lower Chitpore diagonal.

Scheme VIII. Modification 2 is based on both the omission of the Inner Strand Road and New Bow Bazaar. The separate tables of cost, regarding these omissions, shew that they would be financially unsound, as well as being bad design. The Central Avenue is forked from the end of Halliday Street, as in Scheme VI. unmodified.

Scheme VIII.

Mileage and Net Cost of New City Roads.

North of Harrison Road.

Inner Strand Road Omitted.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Central Avenue to N. End of Halliday Street	4	.525		70	22.8	11.97	
	3	.025		70	42.0	1.05	
	3	.15		80	47.9	7.18	
	4	1.25	1.95	80	26.0	32.50	52.70
Sham Bazaar diagonal		1.27	1.27	70	As in other Schemes	59.25	59.25
Central diagonal	2	.17		70	65.5	11.13	
	4	.25		70	22.8	5.70	
	2	.05		60	56.3	2.81	
	3	.10		60	36.2	3.62	
	4	.19	.76	60	19.6	3.72	26.98
Manicktola Avenue	1	.07		70	87.2	6.10	
	2	.34		70	65.5	22.27	
	4	.27		70	22.8	6.16	
	3	.10		60	36.2	3.62	
	4	.68	1.46	60	19.6	13.33	51.48
Harrison Road 2nd diagonal		.16	.16	70	As in other Schemes	6.72	6.72
		5.60	5.60			197.13	197.13

South of Harrison Road.

S.E. Diagonal		.80	.80	80	As in other Schemes	79.68	79.68
Lower Chitpore diagonal		.18	.18	60	ditto	9.24	9.24
New China Bazaar prolongation		.06	.06	80	ditto	5.97	5.97
Carried forward		6.64	6.64			292.02	292.02

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Brought forward		6.64	6.64			292.02	292.02
Central diagonal	2	.05		80	74.6	3.73	
S.W. fork to Lall	3	.05		80	47.9	2.39	
Bazaar	4	.33	.43	80	26.0	8.58	14.70
Eden Hospital diagonal		.38	.38	60	As in Scheme VII	10.51	10.51
Chandney diagonal		.70	.70	60	ditto	17.85	17.85
Sealdah diagonal		.60	.60	60	ditto	17.72	17.72
New Amherst Street		1.35	1.35	50 to 60	ditto	25.09	25.09
Sukea Street prolongation		.06	.06	50	ditto	1.39	1.39
New Bow Bazaar	1	.06		70	87.2	5.23	
	2	.15		70	65.5	9.82	
	3	.05		70	42.0	2.10	
	4	.94	1.20	70	22.8	2.14	19.29
		11.36	**11.36**			398.57	**398.57**

Scheme VIII.—Continued.

Includes New Bow Bazaar, whole of Bentinck Street and Chitpore Road widened, omission of Inner Strand Road, with Central Avenue forked from Halliday Street.

Mileage and Net Cost of Street Widenings to be done by the Improvement Trust.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
North of Harrison Road.							
Sham Bazaar		.19	.19	80	As in other Schemes	3.61	3.61
Machua Bazaar		.80	.80	70	,,	10.10	10.10
Carried forward		.99	.99			13.71	13.71

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
South of Harrison Road.							
Brought forward		.99	.99			13.71	13.71
Lower Chitpore Road		.55	.55	70	As in other Schemes	16.39	16.39
Lall Bazaar		.15	.15	80	,,	5.85	5.85
Bentinck Street		.45	.45	70	,,	17.64	17.64
Russa Road		1.25	1.25	100	,,	24.00	24.00
		3.39	**3.39**			77.59	**77.59**

Mileage and Net Cost of Street Widenings to be done preferably by the Calcutta Corporation.

North of Harrison Road.							
Chitpore Road	1	.05		about 70	39.2	1.96	
	2	.60		70	29.8	17.89	
	3	1.14	1.79	70	19.0	21.66	41.51
South of Harrison Road.							
Canning Street		.75	.75	70	As in other Schemes	23.75	23.75
Kyd Street		.17	.17	60	,,	4.25	4.25
Park Street		.90	.90	70	,,	16.65	16.65
Circular Garden Reach Road		1.60	1.60	100	,,	30.40	30.40
Diamond Harbour Road		1.55	1.55	100	,,	22.94	22.94
		6.76	**6.76**			139.50	**139.50**

Scheme VIII.

Modification No. 1.

Includes New Bow Bazaar, whole of Chitpore Road widened, Bentinck Street not widened, Central Avenue forked from Bow Bazaar to Chowringhee and Wellington Square, and Inner Strand Road omitted as before.

Name of Street.	Zone No.	Length in Miles.	Total length.	Width in feet.	Net cost in lakhs per mile.	Amounts in lakhs.	Total net cost in lakhs.
Deductions from Scheme VIII. unmodified.							
Work not to be done under VIII. Mod. 1.							
Bentinck Street widening						17.64	
Tiretta fork of Central Avenue (S.W. Fork)						14.70	
Eden Hospital diagonal (S.E. fork of Central Av.)						10.51	
Chandney diagonal						17.85	
Total deduction						60.70	
Additions to Scheme VIII. unmodified.							
Work to be done under VIII. Mod. 1.							
Central Avenue from Halliday St. to Bow Bazaar	2	.03		80	74.6	2.24	
	3	.03		80	47.9	1.44	
	4	.24	.30	80	26.0	6.24	9.92
Central Avenue S.W. Fork	1	.05		80	99.6	4.98	
	2	.03		80	74.6	2.24	
	4	.42	.50	80	26.0	10.92	18.14
Central Avenue Wellington Square fork	2	.03		70	65.5	1.96	
	3	.04		70	42.0	1.68	
	4	.41	.48	70	22.8	9.35	12.99
						41.05	41.05

The saving effected by Modification No. 1 of Scheme No. VIII. is, therefore, 60.70, less 41.05 = **19.65 lakhs.**

If Bentinck Street were widened, then the saving would only be about 2 lakhs.

Scheme VIII.

Modification No. 2.

Includes omission of both Inner Strand Road and New Bow Bazaar. Forking of Central Avenue from Halliday Street as in original Scheme VII. Bow Bazaar is widened, Lall Bazaar remains widened as in VII. unmodified and in VII. Modification I., and all other Schemes.

Deduction.

	lakhs.
New Bow Bazaar	19.29

Addition.

Bow Bazaar widening	26.35

The increase in cost of Scheme VIII., with Modification 2, would be, 26.35 less 19.29=**7.06 lakhs,** say **£47,060.**

The writer thus estimates that the cost of widening Bow Bazaar would be 7 lakhs, or £47,000, greater than constructing the 70ft. wide relief road, New Bow Bazaar.

The policy of constructing New Bow Bazaar in preference to widening Bow Bazaar is thus cheaper, and, of course, incomparably better in benefit to be reaped. It has, however, seemed wise to work out several schemes based on or including the widening of Bow Bazaar, so that clearer views may be obtained by examining from all sides these problems of Calcutta city main roads.

Scheme VIII.

Unmodified.

The total net cost of Scheme VIII. unmodified would be:—

To be Expended by Improvement Trust.

	lakhs.
Creation of New Main Roads	398.57
Widenings	77.59
Dalhousie Square Improvement	2.26
Bridge Widenings	5.50
	483.92
To this figure of 483.92 we now add:—	
Widenings by Calcutta Corporation	139.50*
Port Trust Work	16.32
Government, Maidan Roads	.91
Total Main Road Bill, Scheme VIII.	**640.65**

Scheme VIII.

Modification No. 1.

Net total cost:—

Improvement Trust.

	lakhs.
Creation of New City Roads	396.56
Widenings	59.95
Dalhousie Square	2.26
Bridges	5.50
	464.27
Widenings by Calcutta Corporation	139.50
Port Trust	16.32
Government	.91
	621.00

* Note that the great increase in this figure is due to the widening of Chitpore Road (41.50 lakhs) allotted as preferably Corporation work, in this trial Scheme [not of course recommended].

Scheme No. VIII.

Modification No. 2.

Net total cost:—

Improvement Trust.

Creation of New City Roads	379.28
Widenings	103.94
Dalhousie Square	2.26
Bridges	5.50
	490.98
Widenings by Calcutta Corporation	139.50
Port Trust	16.32
Government	.91
	647.71

Scheme VIII.—Continued.

Table for Comparison of Cost of New Roads and Widenings North of Harrison Road, with (a) Inner Strand Road retained, or (b) omitted.

(a) With Inner Strand Road Retained.

Inner Strand Road	1.35	70	As in Schemes 6 & 7	60.73
Central Avenue	1.95	70 to 80	ditto	52.70
Sham Bazaar diagonal	1.27	70	,,	59.25
Manicktola diagonal	1.46	60 to 70	As in Schemes VII. & VI. (i)	52.14
Sukea Street prolongation	.06	50	,,	1.39
Harrison Road 2nd diagonal	.16	70	,,	6.72
Machua Bazaar widening	.80	80	,,	10.10
	7.05*			**243.03**

*To this mileage, for true comparison, we must add miles 1.79 of present Chitpore Road, which would become a secondary main road. The mileage would then be 7.05 of primary main roads + 1.79 miles of secondary. Total **8.84.**

(b) With Inner Strand Road Omitted.

Central Avenue	1.35	70	as above	60.73
Sham Bazaar diagonal	1.27	70	,,	59.25
Manicktola diagonal	1.46	60 to 70	,,	52.14
Central diagonal	.76	70 to 60	As in Scheme VIII.	26.98
Harrison Road 2nd diagonal	.16	70	as above	6.72
Sukea Street prolongation	.06	50	,,	1.39
Machua Bazaar widening	.80	80	,,	10.10
Chitpore Road widening	1.79	70	As in Scheme VIII.	41.51
	7.65			**258.82**

The retention of Inner Strand Road is thus 15.79 lakhs or say £105,000 cheaper.

From this table the view becomes still clearer and more definite that any sound and economical scheme of main roads north of Harrison Road should certainly include the Inner Strand Road, because (reminder)—

(i.) An imperatively needed present and future traffic facility is obtained; i.e., a true North road from the main focus.

(ii.) An unwholesome area of congested and streetless business and residential property and slum would be cut through and opened up for a length of one mile or more.

(iii.) Immediate and future traffic relief would be given to Strand Road (north half), Darmahatta Street, and the whole of Chitpore Road.

(iv.) The distance between the present parallels of Chitpore and Strand Roads is three or four times more than the normal distance found proper and effective in other cities, and this distance should at least be halved; otherwise an intolerable condition will not only be unremedied, but will become incapable of remedy, except at a future enormous cost and inconvenience. In other words, the omission of the Inner Strand Road would be a grave defect in any design for the comprehensive improvement of built-up Calcutta.

(v.) The sound financial policy of constructing the Inner Strand Road appears to be beyond cavil, for the cost of the road works out on the writer's estimates at £100,000 cheaper than what appears to him is the only logical alternative, i.e., widening the whole length of Chitpore Road, and providing three instead of two N.E. diagonals from Strand Road. Note that the table of comparison is made out quite irrespective of any division of the work between the Improvement Trust and the Corporation. As a matter of fact, even if an Inner Strand Road cost 16 lakhs *more* than its alternative, the expenditure would be fully justified on the sole grounds of rapid-transit, and trade-traffic needs. But the opposite is the case.

(vi.) By the construction of the Inner Strand Road the City gains 1⅓ miles of new main road. Every mile gained in built-up Calcutta will prove of inestimable value in the future. Every mile lost to-day will be felt more and more intensely; and will become more and more costly and difficult to obtain in the future. The right policy in Calcutta is to create the missing primary main roads, and let most present roads take their true position, as secondary main roads. That means we avoid widening except where truly unavoidable.

Note that the arguments in favour of the Inner Strand Road are fully discussed in the Chapters on Traffic and City Main Road problems.

Scheme VIII.

(Inner Strand Road Omitted.)

Main Road Mileage that would be added to the City.

Scheme VIII. Unmodified.

Roads created by Improvement Trust	11.36
Streets widened by ,, ,, ...	3.39
,, ,, ,, Calcutta Corporation	6.76
Road created by Port Trust	1.02
,, widened by ,, ,, ...	1.21
,, created by Government on Maidan	.83
	24.57

Scheme VIII. Modification 1.

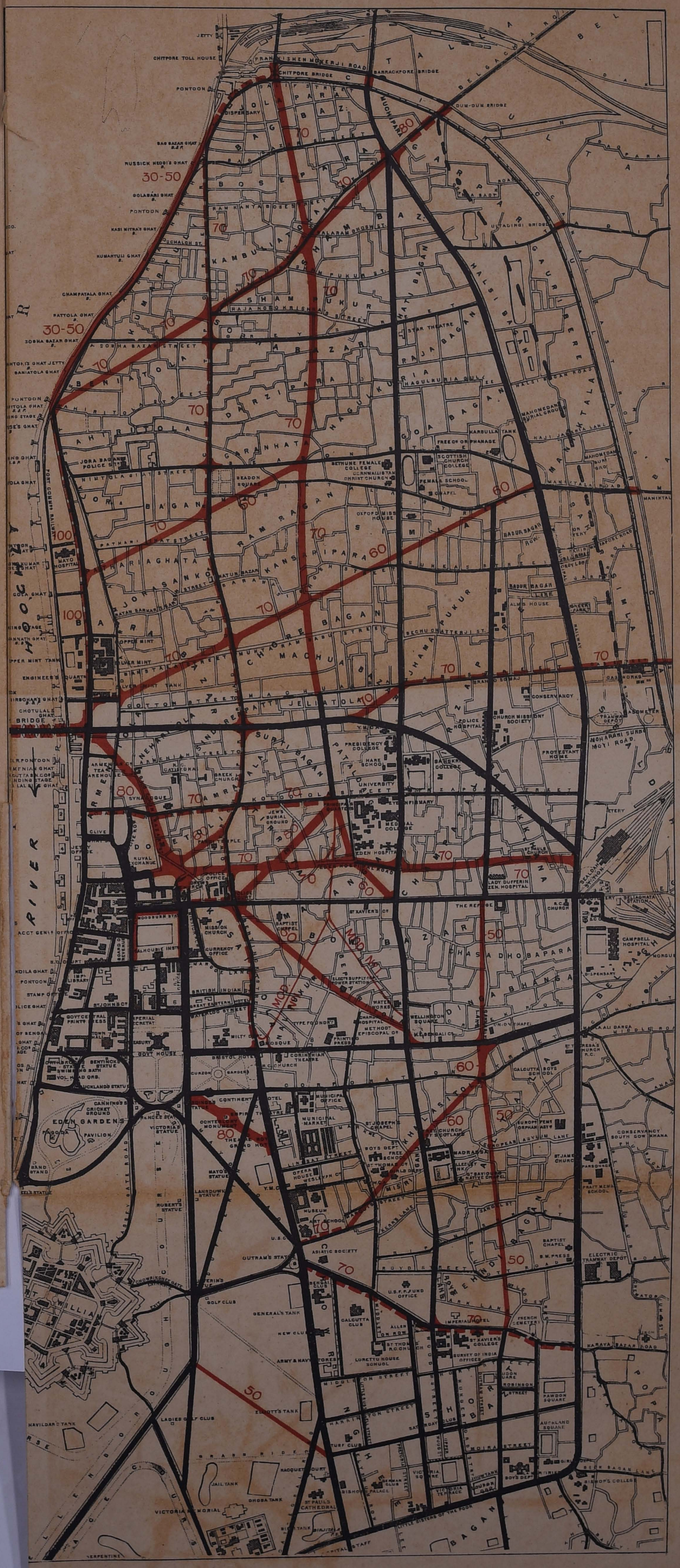
Roads created by Improvement Trust	11.13
Streets widened by ,, ,, ...	2.94
,, ,, ,, Calcutta Corporation	6.76
Road created by Port Trust	1.02
,, widened by ,, ,, ...	1.21
,, created by Government on Maidan	.83
	23.89

Scheme VIII. Modification 2.

Roads created by Improvement Trust	10.16
Streets widened by ,, ,, ...	4.44
,, ,, ,, Calcutta Corporation	6.76
Road created by Port Trust	1.02
,, widened by ,, ,, ...	1.21
,, created by Government on Maidan	.83
	24.42

URBAN CALCUTTA.

Scale 3 inches to 1 mile.



CITY ROAD-SCHEME No. VIII.—Shews the only logical and effective main road layout, North of Howrah Br.-Sealdah Line, if Inner Strand Road is omitted. This layout would cost 13 lakhs more than the far superior layouts which include an Inner Strand Road. Note variations S. end of Central Av.

▬ = 100 FT WIDE, ▬ = 70 FT WIDE, ▬ = 40 FT WIDE.

Width (traffic capacity), is shewn by thickness of line.

SECTION IV.

CALCUTTA SLUMS, INSANITARY CONGESTED AND STREETLESS AREAS, AND THE BEST MEANS AVAILABLE FOR THEIR IMPROVEMENT, WITH ESTIMATES OF COSTS.

THE CONDITIONS.

Chapter XIII.—Sanitary and Sociological Survey of Calcutta, and great extent of Calcutta Slums.

Chapter XIV.—Origin of Calcutta Slum Areas.

Chapter XV.—Some Evil Results of Streetless Areas and Slums.

THE REMEDIES.

Chapter XVI.—Remedy under existing Act solely by acquisition-demolition and re-sale is impossible. With estimates.

Chapter XVII.—Remedy by the " Slum-Repair " System. With estimates. [XVII. is a double-chapter.]

Chapter XVIII.—Housing and Re-housing in connection with Slum-Remedy, with estimates. Summary of suggested Slum-Remedy Programme, with estimates.

CHAPTER XIII.

SANITARY AND SOCIOLOGICAL SURVEY, AND GREAT EXTENT OF CALCUTTA SLUMS.

Preliminary—General and Sanitary Survey—Dr. Crake's valuable work—Definition of slum—Open space in European slum is 150 per cent. greater than in Calcutta slum—Extent of Calcutta slum—Slum areas not included in Dr. Crake's survey.

Preliminary.

The writer trusts he will not be accused for writing some hard things of Calcutta—it must be clear that he has no alternative; one of the chief objects of the report being to put forward a useful, true and comparative statement of the present condition and needs of the City. We must all agree that until the whole condition of a city is known fully from all aspects, it would seem impossible to estimate the cost of reform, and impossible to prescribe intelligently the best general policy of reform, the best allotment of improvement money, and the soundest programme of work. From the personal point of view, the writer will always feel a very sincere and deep interest in the welfare and improvement of the City, in which he has strong faith; and it is his necessity—but not his pleasure—to analyse and describe the present serious defects of Calcutta.

Sanitary and Sociological Survey, and Great Extent of Calcutta Slums.

The first need for improvement operations in such areas is, of course, a general and sanitary survey; preferably one dealing with buildings as regards character, height, age, stability, internal condition, yard space, refuse bins, outhouses, washing arrangements, sanitation, sanitary fittings, and house drainage; also giving the population per acre, per house, and per room, and examining the existing open space in roads, streets, lanes, passages, courts, yards, and gardens; also describing the existing provision of lighting, sewerage, and of water supply both external and internal. Sociological details as to races, castes, and occupations are very desirable. Statistics of death and disease, especially analysis of tubercle and child mortality, are most valuable.

The Improvement Trust is not in possession of a complete survey as outlined, but a sufficiency of information* is contained in the "Report on the Sanitary Condition of the Northern Portion of the City of Calcutta (Wards I. and III. (West Part) and Wards V. to XI.)." This survey was made for the Trust in 1911 by Dr. H. M. Crake, M.D., D.P.H. It was Mr. Bompas who first saw that such a survey was needed, and the work was put in hand by Government, in answer to his requisition.

The chief results are given in discussion and figures that define the percentage of insanitary houses in specified areas. The survey covers a large part of Calcutta north of Dharamtolla, but does not deal with the

* The writer has contributed some further information, and also the Sociological Map, which will be found helpful and should be spread out in view while this section of the report is read. The red boundary line on Sociological Map defines the area examined by Dr. Crake.

whole city, nor with the great slum area lying south of Dharamtolla. The red boundary line on Sociological Map defines Dr. Crake's Survey. The Slum Map shews Dr. Crake's areas in colour.

In the north of the city, the survey does not include Ward 2 (Aheeritolla and Kumartolla), Ward 4, and the East part of Ward 3, all of which contain insanitary houses, and are absolutely lacking in any street system. Only brick buildings were examined, the time for the survey being limited, and the task one of great extent and great difficulty. Altogether 14,332 brick buildings were each surveyed and reported on, and the report should be of very much value to the Improvement Trust, for it is the only attempt that has been made to define and classify Calcutta slums.

On the Slum Map are shewn in colour the worst of Dr. Crake's insanitary areas, viz.:

Containing 30% or more of insanitary houses, coloured red.
,, 25 to 30% ,, ,, ,, ,, pale yellow.
,, 20 to 24% ,, ,, ,, ,, blue.
,, 15 to 19% ,, ,, ,, ,, sienna.

On this same plan the writer has shown City Main Road Scheme No. IX. (recommended for execution), for, as already mentioned, the positions of new main roads and existing slum areas have a very distinct connection with each other.

These coloured areas do not shew the numerous insanitary houses dotted over the whole city. Nothing is shewn of the great areas containing less than 15% of insanitary houses. (See Soc. Map red boundary of area examined by Dr. Crake.)

Out of 14,332 houses examined, 18.7% were found to be totally insanitary or nearly in that condition, and only 18.2% were found to be sanitary, even though judged by the exceedingly low Calcutta standard of what is a sanitary house.

It may be pointed out at once that Calcutta unfortunately possesses a far higher percentage of slum area than can be found in any city of Great Britain, or in any city of the two Americas, or in any city of the whole Western Hemisphere. Calcutta is only equalled in lack of streets and excess of insanitary areas by perhaps Cairo, Bombay, and Constantinople, and is exceeded by Canton and Pekin.

Definition of "Slum."

There is another point in this comparison to be considered before a clear idea can be held of how Calcutta stands as regards slum areas.

In Great Britain, Europe, and America, the English expression "slum" means generally a group or a few acres of city dwelling-houses which are, from the Western ideal:—(i.) Internally badly designed, not in good condition, with woodwork ruinous or rotten, lacking in up-to-date standards as regards window area, having insufficient cubic space per head in rooms, having dark unventilated staircases, damp floors and walls, or no

proper bath and water closet accommodation, but only outside privies, and not sufficient of those; (ii.) externally, provided with streets too narrow, or with short dead-end streets called courts (anything less than 20ft. wide is considered very bad), having back-space of cramped area, or no back-yards, or no wash-houses, or having privies too near to the dwelling-house, and, in general, all house property that has less than about 20% of open space in streets, plus 20% in combined back-yards, gardens, and street area, is classed as very bad "slum." Ordinary Western non-ancient good built-up city contains about 40% to 60% of street area alone, and seldom less than 30% of total space in front of, behind, or around all buildings.

Open Space in European and Calcutta Slum.

Under European slum standards, Dr. Crake's slum areas would be multiplied by over 100% (see figures later on), and a very high percentage of the whole of Calcutta north of a straight line drawn from Howrah Bridge to the east end of Park Street at Circular Road, would, without any shadow of doubt, be classed as very bad slum if it were reproduced in London, Birmingham, Glasgow, Paris, Brussels, Amsterdam, Berlin, Vienna, Milan, Rome, New York, or any great modern city of Europe and America. Much of Northern Calcutta contains only from 9% to 12% of total open space, which is an appalling figure, and the buildings are generally twice the height of London, Birmingham, and Liverpool slums. This fact of the much greater height of Calcutta slums magnifies the insanitary conditions. London and English city slums, of which we have heard so much, and which are steadily being cleared away at great expense, are commonly but two stories in height, and all are provided with an incomparably better street system than we find anywhere throughout Calcutta, excepting only in the small Park Street area. In the exhibits accompanying this report are fair examples of bad London slums. Since the maps in question were printed these slums have been either cleared or marked down for demolition, yet they contain the following percentages of open space in street area alone:—

Sheet No. vii. 93 has 25.52% open space in street area alone.
Sheet No. vii. 58 has 26.6% ,, ,, ,, ,, ,, ,,

but they are condemned chiefly on account of their small back space, their internal dilapidated state, and their lack of up-to-date sanitary fittings.

In addition to this street area, these slums contain from 10 to 20% of open space in back yards, courts, etc. The *total* open space area in the worst Calcutta slums of 10 to 20 acres in one patch *is only about* 5%, and in almost all Northern Calcutta the street area rarely exceeds 12%. To ascertain these facts the writer has made a large number of calculations dealing with nearly all Calcutta. One example may be given. The figures have been checked, and may be relied on. The big built-up rectangle enclosed by Harrison Road, Cornwallis Street, Grey Street, and a portion of Strand Road and Darmahatta Street, measures almost $1\frac{1}{4}$ miles from North to South, by almost 1 mile from East to West. It contains about 735 acres, or about 2227 bigas, taking the Bengal biga at $\frac{1}{3}$ of one acre. The open space contained in roads,

streets, and passages not less than 8 feet wide, including the longitudinal halves of Harrison Road, Cornwallis Street, Grey Street, and the other western boundary roads, is only 9.87%: or about 150% worse, in street area alone, than any bad European slum-area. The condition of the worst patches in the sample 1 mile by 1¼ mile block is seen to be strongly accentuated when we consider that this is a big section of a city, and not one of the small patches of slum found in Western cities, and which, not only have 25% of street area, but are surrounded by better areas having probably 30 to 40% of street area plus 33% of back area: and, further, are mostly of two-storey dwellings instead of three and four storey dwellings such as are found in Calcutta. Nor is any European slum allowed to be over-crowded to an extent even approaching the condition now existing in Calcutta.

The percentage of total open space of all kinds in the 15 acres covered by Slum Improvement Scheme No. 1, now in hand, is but 6½%, a figure most damning and disgraceful to the city. In the West this figure would be considered absolutely appalling and unprecedented.

To aid in grasping the extent of land covered by dwellings already ascertained to be insanitary or congested in Calcutta, the writer calculated the area of the Maidan in comparison with the acreage covered by Dr. Crake's coloured patches.

The total area of built-up city examined by Dr. Crake works out on the writer's check measurements at about 1790 acres. Of this area, about 784 acres, or nearly 44%, appears to be crowded tightly by houses of which from 15% to "over 30%" are insanitary, viz., there are 784 acres of what may be called "bad slum," judged even by the very low Calcutta standard of what are sanitary conditions.

The proportions work out as follows:—

Colour on 16" to 1 mile large plan. Exhibit No.	Percentage of houses classed as "insanitary."	Acres.
Coloured sienna	15% to 19%	222.7
Coloured blue	20% to 24%	265.5
Coloured pale yellow	25% to 30%	147.3
Coloured red	30% and over	148.8
		784.3

The whole area of the Maidan, i.e. the great area enclosed by Chowringhee, Esplanade Row East, Government House Grounds, Esplanade West, the Hooghli, Lower Circular Road and Cathedral Road; and including Curzon Gardens, the whole racecourse, and all tanks, but excluding only the Fort:—works out to 783 acres. The red area, containing over 30% of insanitary houses, would alone cover 9-10ths of the whole racecourse enclosure, including the grandstand and land behind it.

These figures, which have been checked, should enable readers to grasp the magnitude of the bad property problem in Calcutta. They also illustrate the tremendous piece of valuable work done by Dr. Crake. It should not be difficult to imagine the great sweep of the Maidan, nearly a 1000 yards by 4000 yards of open space, packed tight with high insanitary dwellings.

Slum not included in Dr. Crake's Survey.

But, unfortunately, not even these figures convey at all a sufficient impression of the extent or nature of slums or bad streetless areas in Calcutta. The following other built-up blocks of the city, either not examined or not coloured by Dr. Crake, are all served only by passages and gullies, instead of by streets, are quite devoid of anything approaching normal open space, light, air, traffic and tram access, and have been built anyhow:—

(1) The area for 600 feet on the west side of Bentinck Street (is better than most of what follows).

(2) 60% of the area bounded by Chitpore Road, Canning Street, Clive Row, Clive Street, Lyons Range, and the Lall Bazaar Police Station buildings.

(3) 80% of the area bounded by Canning Street, Mullick and Amratola Streets, Armenian Street, and Old China Bazaar.

(4) 80% of the great triangle bounded by Upper Chitpore Road, Strand Road, and Neemtolla Street.

(5) 50% of the area south of Neemtolla Street as far as Pathureea Ghat Street.

(6) 60% of the great area bounded by Upper Circular Road, Harrison Road, and Cornwallis Street. The remaining 40% contains Amherst Street, one of the very few wide and pleasant residential streets in all North Calcutta, and laid out with some regard to beauty and tree-shade.

(7) 80% of the great wilderness enclosed by Free School Street, Dharamtola, Circular Road, Elliot Road and Royds Street.

(8) Very considerable portions of the Fringe Area and of Kidderpore would without hesitation be classed by European practice as slum, or rapidly on the way to that condition.

Unless we apply a standard very far indeed below that of all other great modern cities, the above detailed areas must undeniably be classed as slum, and this is chiefly shown by their miserable streetless condition. Left to themselves, they will wholly develop into "bad slum."

"Not very far away from the imposing front of Chowringhee and the free air of the Maidan, we find such conditions of huddled discomfort, such stunting of young lives, such struggles of respectable and cleanly poverty against an invading sea of physical and moral foulness*, as (shall I venture to say it) the majority of our comfortable classes have not dreamt of."—Re-printed from "Questions of Policy in Housing Reform (Calcutta," by D. L. Monro.

Walking recently through London slums in process of rebuilding and reform in Kennington, under the supervision and design of Professor S.

* *i.e.*, in the great block, ¾ of a mile by ¾ of a mile, enclosed by Dharamtolla, Circular Road, Royds Street, and Free School Street—which block is not included in Dr. Crake's areas. [E.P.R.]

D. Adshead, F.R.I.B.A.—and upon other days in Whitechapel and Bethnal Green—the writer felt how thankful Calcutta might be if "London slum" could replace the awful Calcutta variety. The Kennington slum in Calcutta would be considered very decent property, and quite splendid as regards street provision; and it would have a death-rate of only one-third or even one-quarter of the most solid mass of Calcutta.

Calcutta, inside the area enclosed by Circular Road and the River Hooghli, contains no less than twenty-two blocks of residential property, each having no street system, and served internally only by tortuous lanes, passages, and fragmentary lengths of narrow street. The average size of each block is 100 acres. The smallest is about 20 acres, and the two largest about 270 acres each. The total area is about 2,200 acres, and can perhaps best be comprehended in the form of 22 squares of closely-built-up streetless property, each square measuring about 2,100 feet by 2,100 feet, or 700 yards by 700 yards, and they cover over 3 square miles. If we include areas outside Circular Road, then we get a total of 2,500 acres of streetless property.

Conditions like these can be found elsewhere only in Bombay, and in Cairo and Constantinople (both dry cities), and Pekin, Canton, Mukden, and other Chinese cities. On a very much smaller scale they occur in Delhi and other Indian cities.

Some of the greatest Western slums appear to have been in Glasgow, many years ago. Their total area of about 90 acres is still spoken of with awe in British municipal circles—in Calcutta a single one of our 22 blocks would beat the Glasgow record hollow, both in area and intensity.

CHAPTER XIV.

ORIGIN OF CALCUTTA SLUMS.

Two Chief mutual-acting causes—Want of byelaws and enforcement—Want of main roads and trams—Wonderful beneficial effect of good byelaws strictly enforced—Great Britain finest example in the world—Normal byelaws produce street-system and also good house-building and interiors—Calcutta still without byelaws or enforcement—Slum still growing in built-up Calcutta—Mr. Munro's confirmation of writer's statement.

The origin of these great evils must now be considered in detail. Why do they exist in European cities, much older than Calcutta, to only 10% of the Calcutta intensity?

There are two primary reasons:—

(i.) Calcutta has been built without regard for any normal building and street byelaws, which may or may not have been in official existence.

(ii.) The great scarcity of internal main roads, and lack of efficient suburban main roads; hence people cannot easily and rapidly get into and out of the city, and have been forced to live right on top of their work. Suburbs have been unable to develop.

Want of Bye-Law Control.

(i.) Because all these other cities have had building byelaws, and have strictly enforced them, during the past 40 to 150 years.* In British cities the erection of slum property really ceased from the year 1875, when the chief Public Health Act was passed. From that date new streets had to be not less than 36 feet wide:—

> " Every person who shall lay out a new street which shall be intended for use as a carriage-road shall so lay out such street that the width thereof shall be *thirty-six* feet at the least."
>
> " Every person who shall construct a new street which shall exceed *one hundred* feet in length shall construct such street for use as a carriage-road."
>
> " Every person who shall lay out a new street which shall be intended to form the principal approach or means of access to any building, but shall be intended for use otherwise than as a carriage-road, and shall not exceed in length one hundred feet, shall so lay out such street that the width thereof shall be twenty-four feet at the least."

Under the 1875 Act, no rebuilding can be done without setting back frontage on existing narrow streets, and no compensation is paid.

Most of the towns and cities of England made byelaws that exceeded and often improved on the above requirements, and enforced minimums of from 40 feet to 50 feet widths for all streets.

What a gigantic difference such byelaws would have made in Calcutta! (that is, had they also been enforced, and not been " exempted " out of existence).

Town planning was, however, quite neglected in the English Act, and the byelaws, everywhere most strictly enforced, have produced immense city areas, composed solely of a network of streets 36 to 50 feet in width, but without wider main arteries or public open spaces. The byelaws have given good space, light, air, and excellent sanitary conditions

*In some cases, byelaws in some form have existed from antiquity.



Example of inadequate bye-laws. A large new building is to be crammed into the open space and has been commenced. Writer is standing on a new main wall. A narrow passage will be the only source of light and air to about 100 existing dwelling rooms (mostly 1 family, 1 room.) Light angle about 80^0.



Another View: note on skyline, new stories being added to the slum-mass. Note slit-passages between chawls on right hand.

to the suburbs, and to the cities in general, and have made the English death rates by far the lowest in the world; but they have produced great monotony, and have permitted suburbs to grow up without sufficient parks, without open spaces, public ground, without main roads and traffic facilities, and without any thought for architecture and beauty. Suburbs have not been preserved as suburbs, areas have not been set apart for manufacturies, and so on.

Nevertheless, it is almost solely due to these admirable though limited byelaws, and their strong enforcement, that London, by far the greatest city in the world, mostly composed of the smaller dwelling houses, and with a population seven or eight times that of Calcutta, had a death rate in 1912 of only 13.6 per 1,000, and that the whole United Kingdom had a rate of only 14.6 per 1,000*. German towns have a considerably higher death rate than English towns, and it has been quite clearly proved that this is due to the German workman and his family living in high tenements and flats, instead of our separate houses, two stories high, that compose the mass of the English cities. *This is mostly the result of making the street net rather too big in the mesh.* The recent first English Town Planning Act (1909) is an immense advance on what has been, but is hardly to be compared with German, Scandinavian, Dutch, Belgian, Austrian, Italian, and Swiss enactments to produce good town-planning. The English Act was promoted by Mr. John Burns, President of the Local Government Board, and he has already indicated that this Act will be the forerunner of others, or will be amended.

On the Continent very good Belgian Town Planning and Building Acts were passed in 1858 and 1867, and Germany and Prussia passed important Building and Planning Acts in 1875, 1881, 1892, 1896, 1902, and again this year. But most Continental towns have been building with skill and forethought for 100 years, especially the greater towns of Italy, Austria, France and Germany. The Italian Act of 1865 especially gives and inculcates really comprehensive city extension powers.

One chief point for Calcutta about all these acts and their byelaws is that they have all been and are being strictly enforced.

Calcutta appears until recent years never to have possessed any street byelaws worth the paper they were printed on, or else never to have enforced them. The byelaws in existence in 1912 were preposterously inadequate. Slum was being made higher and higher, the twisted lanes and gullies that compose 80% of the access mileage of Calcutta were everywhere being made deeper and deeper, more and more permanent, with higher and costlier buildings. Dwellings (chawls) were being erected which contain hundreds of dark and airless rooms; land was being crammed tighter and higher; suburbs and semi-suburbs were still being built absolutely higgle-de-piggledy. Quite 250,000 people were in 1912 living in houses that, under any ordinary bye-laws, would be condemned and closed as " unfit for human habitation " (to use the English and Continental byelaws expression). Harrison Road in 1912 illustrates the inadequate byelaws of Calcutta. This comparatively new 70 foot road was only finished about 20 years ago. Most of the buildings that line it have been built since the road was cut. It goes right through the dense city for $1\frac{1}{4}$ miles. From end to end it will soon present almost unbroken walls of high buildings on each

* Note. 1913 figures for Great Britain were not available.

side, cut across only by five streets, i.e., by Mirzapore, Amherst, College, and Halliday Streets, and by Chitpore Road; it is also cut across by the narrow track of Clive Street, and by various dark slit-like lanes (see photos) that are also known in Calcutta as "streets." Roughly, a distance of from 400 to 650 yards separates each side street or road opening worth any consideration as such.

The average limit in England, on the Continent, and in America, is usually not much greater than 150 to 250 yards. Many of the existing English byelaws allow no new road or street to be built solid for longer than 150 yards before a side street opening, at least 40 feet wide, is provided. No openings have been left in Harrison Road for the ordinary normal side streets, and provision for such trifles as new main roads has never even been thought of. If Calcutta is going to be provided with a *street* system, as well as a main-road system, then cuts will have to be made some day, at enormous cost, through these high east to west walls, which now shut in and render even more airless than they were, the rank slums of Burra Bazaar and the not much better property of the Armenian-Tara-Chand-Dutt Street-line. One can stand deep down in these crowded places when the wind blows strongly far overhead from North-West or South (the two prevailing winds) and observe cloths, etc., 60 feet above, being blown about, but down below no breeze whatever can be felt, and the air has a damp, hot, stagnant smell. Large chawls and buildings full of dwelling-rooms have been built all along Harrison Road, and frequently a side space of only a few feet in width separates them. These huge side spaces make dark passages of great depth (see photos), and their walls are full of the windows of dark and airless dwelling-rooms; the ground floor often being occupied by the fronts of cave-like, dimly-lit bazaars, and the space from top to bottom between the opposite walls is frequently so hung across with the clothes, mats, rags, and bedding of the poor that the sky is scarcely visible. Byelaws that permitted such buildings and bad arrangements were hopelessly inadequate or were not enforced. Street and building byelaws appear to have been a dead letter in Calcutta during the past 50 years. Collections of mud huts, tightly packed together and intersected only by paths and passages, have been replaced on the same sites by small brick dwellings, and these again by high dwellings. Buildings are now being made higher in lanes so narrow that for hundreds of yards the walls are protected by sheets of iron to prevent the brickwork being cut away by the hubs of the bullock carts scraping and squeezing along the wretched traffic-channels. Encroachments on to, and robberies of street widths, have gone on almost unchecked; building laws have not been in existence, or if in existence no authority has protected them. No house byelaws appear to have been exercised. Out of 14,332 of the city dwelling-houses examined, 2,680 are condemned as totally or almost totally insanitary, 9,044 are not sanitary, and but 2,608 are passed as "sanitary." This is a most shocking record; and do not forget the low Calcutta standard of what is "sanitary."

These 11,724 insanitary houses contain in a most accentuated form every defect prevented by the enforcement of an ordinary set of byelaws. The writer believes that an examination of the whole of the city and suburbs must bring to notice not less than another 3,000 of these insanitary houses. Dr. Crake remarks in his report: "Some of the most insanitary buildings exhibited within a very limited area every imaginable sanitary defect that has ever been described."



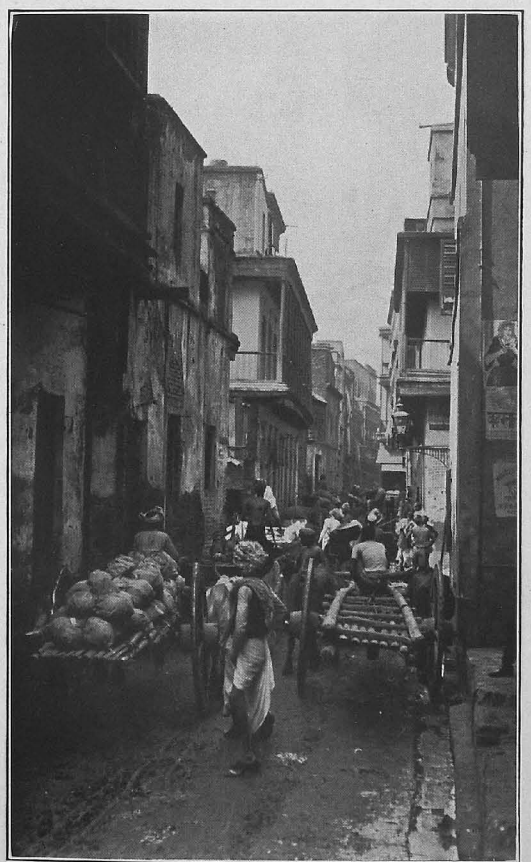
Harrison Road, near Howrah Bridge, looking east. Width 70ft.



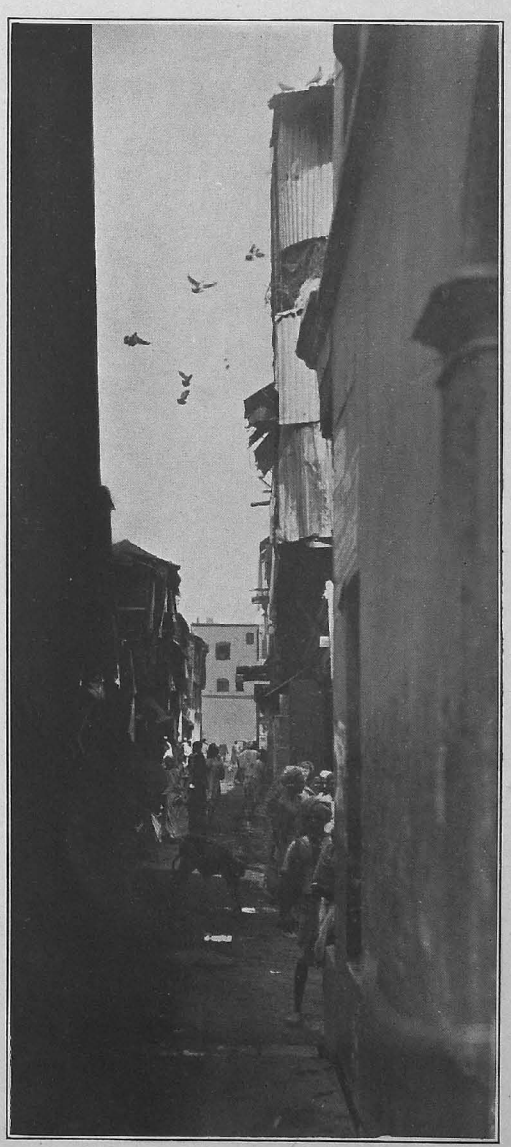
Behind Harrison Road, Cotton Street. This street is the first parallel behind view shewn in above photo.



Harrison Road portion of the great wall of new buildings. No street openings left into the slum-mass behind it.



Traffic in the slums.
A fairly typical 'street.'



In Barrabazaar slums: looking north along approximate line of proposed Inner Strand Road. An 8% total open space area.

One primary cause of streetless and slum areas in Calcutta has thus been the lack of building and street byelaws or their enforcement. Bye-laws would have *enforced* the production of a street-mesh, and *enforced* the spreading out of the houses over twice their present area.

(ii) The second cause of almost equal strength lies in **the want of main roads.** Had there been good main roads, that is, good rapid-transit lines between the inside and outside of the city, the inducements to extend slum upward and to crowd as much building as possible on each square foot of land would have been greatly weakened, because (chiefly by means of tram-way rapid-transit) suburban development would have taken place, the population would have been spread over a greater area, and this would have prevented the present intense pressure in he central parts of the city.

A minor cause interconnected with the lack of main roads is the failure to overcome sufficiently the canal, river, and railway barriers that surround Calcutta. The number of bridges is quite insufficient, and those pitiably narrow bridges there are, have prevented easy and rapid traffic, and the difficulties they present have weighed in the scale against occasional weak and indecisive ideas for better transit. Every difficulty has its weight and its effect.

The fact that Calcutta is surrounded on three sides by low-lying only partly-drained land, and on the other side by a river very difficult to bridge, has doubtless accentuated general crowding of the drier land. Had preparatory work been going on during the past 25 years in the low-lying areas, one of the most serious present suburban problems would not be in front of us to-day.

Nevertheless, the chief direct cause of the 15,000 insanitary houses and 2,000 and odd streetless acres of slum in Calcutta has been the lack of street and building byelaws, and their enforcement. These byelaws would have compelled the development of surrounding areas, and would have forcibly spread the existing houses over quite double the acreage they now occupy, but with lack of byelaws has mutually operated lack of main roads and tramways.

Fifteen-thousand insanitary houses equal numerically 33% of the total houses of Calcutta, but the case is badly worsened when we remember that it is *this* 33% which is so frightfully over-crowded with tenants.

Mr. D. L. Monro, in his correct and judicious manner, writes thus of Chandney, and Chandney is by no means one of the worst parts of Calcutta:—

"Judged by any standard of decency, or of saneness, those solid areas in Chandney are condemned. Measured by the newer building regulations of the city (and these, in the light of modern ideas of sanitation, are very far from ideal) they are amazing."

"We are leaving undone things which ought to be done. The inhabitants of the city are overcrowded, the thoroughfares are congested with traffic, because the authorities have left things undone. You cannot get outside the circle of the Mahratta ditch without passing through some narrow passage—Watgunge, Russa Road, Ballygunge Road, Shambazaar, Chitpore Road. We are in the net, big and little fishes alike. Ten years ago there was great talk of city improvement, five years ago the improvement scheme was the Great Calcutta Joke, to-day we have our Improvement Trust in being. And those decent poor people are asking for room to live."*

* "Questions of Policy of Housing Reform." By D. L. Monro.

CHAPTER XV.

SOME EVIL RESULTS OF STREETLESS AREAS AND SLUMS.

Calcutta slums the greatest disease-breeding radial centre in India—Evils arising from congestion and bad housing—Overcrowding—People per house in British, Madras, Calcutta Houses—The figures corrected for genuine comparison—Dr. Crake's terrible discoveries in Calcutta slums—How slums deteriorate children—Death rates have direct ratio with congestion—Calcutta rates roughly corrected for purposes of comparison—Tuberculosis rampant in Calcutta—Infant Mortality in Calcutta and other cities—Frightful waste of money caused by slums and their remedy.

General.

It may be expected that a few inaccuracies and mistakes would be unavoidable in the great inspection organised by Dr. Crake, but those who have walked much in Calcutta slums, and in far less congested areas of other more fortunate cities, will not be surprised at his appalling figures.

The writer, during six or seven months, walked some 600 miles in and about these streetless areas, and was profoundly impressed by their sad, dirty, intensely ugly, ramshackle, and degraded aspect; by the disorder, irregularity, and grave defects of the buildings; by the inhabited dens; by the innumerable weakly men and women, ricketty children and sick babies, the interminable coughing and expectoration, the depressed unsmiling faces; the stagnant heat and polluted over-used state of the air in those countless dark, unventilated, narrow passages; daily so thronged in parts with every kind of people, that clean and unclean are obliged to jostle closely and breathe and re-breathe each other's direct emanations. It is certain that the Calcutta congested areas must constitute a great disease-breeding radial centre, perhaps the greatest in India.

It is a matter for medical men to investigate, but the death-rate among the 260,000 to 300,000 slum dwellers must be enormous, if it were known.

Where populations live under bad conditions it is known frequently to produce labour-shortage, undue wage rates, and high rates for weakly and inefficient labour. Lack of living accommodation at Calcutta, and consequent exorbitant rents for bad housing, and the lack of homes and women, oblige the Calcutta employer to pay 50 to 100 per cent. more for his labour than he would if Calcutta had been well laid out, if Howrah and Manicktola were great suburbs for the working classes, with workmen's fast tram services over a wider Howrah Bridge, and another bridge at Aheeritolla; if three rapid tram-routes ran due south into non-wasted suburbs, etc., etc.

Because of her immense streetless areas, congestion of traffic is likely to rise to a point where Calcutta's shipping, railways, and trade will be distinctly injured, before the creation of new roads will bring relief.

Cholera, plague, and the terrible epidemics of India cannot effectively be fought in property like that which composes most of Calcutta, and

this, again, inevitably causes from time to time severe physical and financial losses to the community—quite apart from the enormous personal losses, the demoralizing terror, the lasting sorrow, the injurious untimely bereavement caused by each of these visitations.

From the humanitarian aspect, it is a maximum evil that human beings should pass their lives and propagate our species in slums. We all know that to live in a slum steadily lowers the whole moral and physical tone of men, women, and children, prevents and destroys their happiness, and breeds among them discontent, sedition, anarchy, vice, misery, sickness, pain, and death. Disease, crime, intemperance, and insanity are, of course, well known to be absolutely and directly bound up with slum results. A city which produces slum is damaging the whole community and race.

Remarks by the Saxon* Minister of the Interior.

(addressed to Municipalities)

[Translated by Mr. Horsfall in his "Example of Germany."]

"It is not necessary to show more fully that these conditions, whether they spring from early times or later, must be improved, and that the need for improvement must be regarded as very urgent. For, in proportion as the housing conditions are insufficient, the general working and disease-resisting power of the population is weakened, the outbreak or spread of certain serious diseases, especially typhus, consumption and syphilis, is promoted, morality and contentment are undermined, intellectual training is lowered, and at the same time the economic success of the individual citizen and the general welfare of the community are endangered and injured."

Tens, nay, hundreds of thousands of originally decent-minded and strong-bodied country people and their children and descendants are being *un*-educated, and being rapidly deteriorated in every way, by living in the immense slums of Calcutta—attracted there by city life and high wages. They are more or less quite unconscious of what is happening to them. Further, they spread disease and deterioration far and wide. We can judge better the general evil condition of Calcutta dwellers, and the gravity of the slum and housing problems, after considering the following facts:—

Overcrowding.

The last census figures give the occupied houses in Calcutta, exclusive of suburbs, as being 44,297, and the population of these houses as 896,067. This gives an average of about 20 persons per house. Then we have 2,680 × 20 = 53,600 unfortunate people living and crowded into houses "totally or very nearly totally insanitary"; and 9,044 × 20 = 180,880 people living in very unhealthy houses. As a matter of fact, the figures are nearer double, because it is in these very houses that occurs the maximum overcrowding.

Then, again, there are other parts of Calcutta, such as that south of Dharamtolla, which contain numerous insanitary houses, and which do not appear at all in the above results. But even on these very conservative

* [Saxony is a great province of the German Empire. This address was made some 15 years ago].

figures, 53,600 + 180,880, we get 234,480 or 26% of the population of Calcutta proper living in the ascertained condemned houses.

The figure of even 20 persons per house exhibits the frightful overcrowding, and the prevalence of that most unwholesome of all the world's dwelling-houses—the chawl.

Let us examine the average number of people per inhabited house in English cities, compared with Calcutta and Madras.

PERSONS PER INHABITED BUILDING.

Name of City.	Population in 1911.		Persons per Building.
Birmingham	840,202		4·75
Liverpool	746,421		5·57
Manchester	714,333		4.86
Sheffield	459,916		4.65
Leeds	445,550		4·37
Bristol	357,048		5·30
West Ham	289,030		6.52
Leicester	227,222		4·42
Bradford	288,458		4.08
Hull	277,991		4·57
Newcastle	266,603		8.13
Nottingham	259,904		4·38
Stoke-on-Trent	234,534		5.06
Salford	231,357		4·99
Portsmouth	231,141		5·13
		Average	**5.12**
Madras	**(59,595 houses)**	**518,660** ,,	**8.7**
Calcutta	**(44,297 houses)**	**896,067** ,,	**20.23**

The table needs explanation before true comparative analysis can be arrived at.

It may be taken as certain that none of the above inhabited British houses would be classed as insanitary by the Calcutta standard, and even by the very high English standard of what is sanitary, the percentage will not now be much over 2%, if that.

The average number of rooms in inhabited houses of all kinds, including hotels, in Great Britain is calculated to be not more than six; and their average size will be at the least one and a half times the size of the average Calcutta inhabited room, but we will leave this factor out.

Although so many Calcutta people live in big chawls, yet, considering the large number of one-or-two roomed little houses and huts, and the small number of hotels in Calcutta, we are, the writer

believes, well on the right side if we assume the Calcutta average inhabited dwelling to have not more than twice the rooms of the English dwelling. Then, comparing Calcutta housing with English housing conditions, and taking the two occupations as 20 and 5 per house, and the sizes as 2 and 1, the comparison per house of the same size would be:—

Calcutta	10
England	5

That is, the Calcutta population is seen on this conservative and modest estimate to be crowded 100% more than those of English great towns; and crowded into dwellings and conditions that are quite 300% more insanitary.

All this is to exhibit the result of building without any effective bye-laws; and to shew the true state of Calcutta.

In confirmation of these tables and remarks in this report, the following from Dr. Crake's report may now be quoted:—

"OVERCROWDING: As is well known, a very large proportion of the population live in houses which are over-crowded. . . . . One could not help being struck with the extremely over-crowded condition of many of the large tenement houses in the Bara Bazaar section. Here one actually finds rooms subdivided by partitions, and whole families occupying the resulting tiny dens. A great deal of the insanitary property is overcrowded simply because a considerable portion of it is so horrible that it is abandoned, the inmates all crowding into two or three upper rooms.

"The following figures give a vivid picture of the overcrowding which occurs. They were taken in Circle III. Ward VIII., and refer to a population of 4,242 crowded into an area of 6 acres, the density of the population reaching the appalling figure of 707 per acre."

Dr. Crake's Table.

Average Sleeping Space per head.	Minimum Sleeping Space per head.	Number of Persons with sleeping space per head.		
		Below 100 cubic feet	100 to 200 cubic feet	200 to 300 cubic feet
* 129 cubic ft.	48 cubic ft.	1243 †	1169	219

* One hundred and twenty-nine cubic feet is of the same bulk as a box measuring inside, 5 ft. by 5 ft. by 5 ft. 2 ins. One hundred cubic feet would equal a box 5 ft. by 5 ft. by 4 ft., and 48 cubic feet would equal a box 5 ft. by 3ft. 1 in. by 3ft. 1 in.

Deterioration of Children.

The great difference between children reared in dense, congested cities, and in well-planned suburbs, has been closely gone into in Great Britain, and the following figures show on a small scale what is happening on a giant scale in the incomparably larger and more unhealthy slums of Calcutta and Bombay:—

† If we give an average cubic space of so much as 80 cubic feet per head, the insanitary result would be about exactly the same as making 1243 people all sleep in one room measuring only 33 yards × 33 yards, × 10 ft. high. The floor space to each person would be 6 ft. long × 1 ft. 4 ins. wide, *i.e.*, the floor would be a mass of touching human beings. Only by lowering the ceiling to be but 5 ft. high, and by doubling the floor area, could we give each person 6ft. × 2 ft. 8 ins. of floor space.

Deterioration of Children.

I—Shewing Grave Physical Deterioration caused directly by Slum Conditions and Overcrowding.

Statistics from Glasgow (population over one million), that used to be one of the most overcrowded and slummy cities in Great Britain, much of the slum property being three and four stories high. Since these figures were obtained, prior to 1907, very great improvements have been made, and practically all slums have been obliterated.

Average Size and Weight of 72,857 Glasgow School Children in relation to the Number of Rooms composing their Homes:

The family living in one room.	Average height of each child.	Average weight of each child.	The family living in three rooms.	Average height of each child.	Average weight of each child.
Boys	46.6ins.	52.6lbs.	Boys	50.0ins.	60.6lbs.
Girls	46.3 ,,	51.5 ,,	Girls	49.6 ,,	59.4 ,,
Living in two rooms.			Living in four rooms.		
Boys	48.1 ,,	56.1 ,,	Boys	51.3 ,,	64.3 ,,
Girls	47.8 ,,	54.8 ,,	Girls	51.6 ,,	65.5 ,,

The report (Blue Book of the Scotch Education Department) states: "It cannot be an accident that boys from two-roomed houses should be 11.7lbs. lighter on an average than boys from four-roomed houses, and 4.7 inches smaller. Neither is it an accident that girls from one-roomed houses are, on the average, 14lbs. lighter and 5.3 inches shorter than the girls from four-roomed houses."

It must be remembered that poverty and insufficient feeding explain part of these differences, but, in the light of other investigations, we may put down some 75% of the effects to want of light and air, and of space to play in.

Death Rates Depend on City Conditions.—They Vary in Ratio with Congestion.

In considering the average city death rates of Bombay and Calcutta, in comparison with the death rates of fairly similar cities, a most remarkable divergence from the average is noted. The average general death rates of Bombay and Calcutta are extraordinarily small, if we take into account that they are certainly no better off in *general* sanitation, and are *very* much more crowded and over-built than Alexandria, Madras, Moscow, Bucharest and other cities. Cairo has a far better climate than Calcutta. Madras and Cairo are both undergoing main drainage. When this is finished their death rates will drop, probably, 40%.

The explanation appears to lie in the different modes of ascertaining death rates. The writer understands that Calcutta and Bombay totals do

not include the deaths of people who have resided in the city for less than a certain period. The question of still-birth also affects the Calcutta statistics.

Then, again, we understand that a large unknown number of people who have fallen sick in Calcutta and Bombay leave the cities and die in villages outside.

In these pages the whole of the vital statistics that relate to other cities than Bombay and Calcutta are compiled from all deaths taking place inside the boundaries of those other cities, and they include still-born children as deaths.

The unusual difficulties of collecting vital statistics in India have been discussed but recently by Dr. Charles Bentley, the Special Dep. San. Commr. of Bengal; and by Dr. Bipin Bihari Brahmachari, L.M.S., of Cossipore-Chitpur, by Major T. G. N. Stokes, I.M.S., and others. These difficulties are indeed very considerable.

After giving the average city death rate of Bombay as 35.6, the H.O. of Bombay, in his able report of 1911-12, adds these remarks:—

"To ascertain the net mortality it is necessary to exclude all deaths of people newly arrived in the city and not belonging to it; and to include on the other hand all deaths among those who, belonging to it, died elsewhere."

"The corrected deaths for the year, therefore, work out to (34,961 + 5—635) 34,331, giving the corrected ratio of 35.05 per 1,000 of persons living."

The additional 5 deaths in the above calculation *were all that could be ascertained as having died outside the city.* It would seem quite possible that even 1,000 or 2,000 or more people might have left the city and died shortly afterwards of sickness contracted there.

Let us now examine Calcutta mortality on the ordinary basis, so far as available figures permit.

CALCUTTA INFANT MORTALITY IN 1911,

Calculated in the ordinary way, i.e., including still-births, as in Bombay and the West:—

1911: Total births 19,515; ordinary deaths 4,911; still-born infants 2,156; total 7,067.

Out of 19,515 born, 7,067, or over one-third died, giving an infantile death rate of **362.1,** which is almost the same as that of Bombay, *as we would certainly expect.*

Without these 2,156 still-births, the infant death rate would be the official figure, viz., **251.**

The Birmingham death rate, including still-births, was **111.**

CALCUTTA AVERAGE DEATH RATE IN 1911-12.

Calculated in the Ordinary Way, i.e., to Include Still-Births, as in Bombay and the West.

The 1911-12 official death rate of 27.2 per 1,000 on a population of 896,067 gives about 24,373 deaths. To these we now add 2,156 children born dead (or very nearly dead), =26,529 deaths, as taken in other cities in respect of infant deaths.

The 1911 official death rate of Calcutta then becomes increased as follows:—

As 896,067 : 1,000 : : 26,529 : **29.6.**

But there is a further increase necessary to bring the Calcutta figure into line with those of all other cities except Bombay, i.e., by the deaths of people who had not resided long enough in the city to be included in the official death rate. The only figure the writer can find (being away from Calcutta) is the mention of 494 people "dead within one week of entering Calcutta." And on top of this is the known difficulty of collecting vital statistics in India; and then, again, the fact that a considerable number of people made ill by residence in Calcutta do certainly leave the city because it is so unwholesome, and then die elsewhere. Considering all the peculiar circumstances of Calcutta, the evidence of its deplorable condition, and the closely-known facts of other cities, it seems unwise to put the real effective death rate of Calcutta in comparison with world-cities at anything less than 35 per 1,000.*

Any city containing a very high percentage of slum, and a very low percentage of open space in streets, will, of course, have an excessive death rate. We may now examine, as far as they allow, the death rate of Bombay and Calcutta, in comparison with those of cities built under good byelaws.

It cannot be known yet whether in the remote future a well-built and sanitary tropical city, having people as educated in hygiene as those in the present European cities, will have a death rate as low as a similar city in a temperate clime. But all we know points out that it may have even a less death rate, because of the powerful germicidal action of the sun in India, and of the ability for all classes in that country to live all the year round with doors and windows wide open. Cold is a great killer in temperate climates; the death rate rises as the temperature goes down. It causes also the closing up of doors and windows during half or more of the year, and thus increases tuberculosis; for example, Russia, a very cold country in winter, has about the highest death rate in Europe from tuberculosis; Austria, another cold country, is a close second. Cows have to be kept indoors for months, and they develop and spread tuberculosis.

Tuberculosis is the most indicatory disease of slum conditions, and is bred most in places that lack sufficient light, sunlight, and air. It is, of course, rampant in Calcutta, despite the better climatic conditions mentioned above. The purdah system exists throughout India, and does not explain the record tubercle rate of Calcutta. The general slum conditions of Calcutta seem very clearly to be the true factor.

* Since going to press with this report, the writer has seen the 1912-13 Report of the new H.O. of Calcutta, Dr. Crake, and read with great interest these remarks: "The deathrates given above are of course crude or unconnected, and though of great value for purposes of comparison with those of previous years, cannot be compared with those of other towns" . . . . . .And again—"If Calcutta had a normal population as regards age and sex distribution, it would undoubtedly, as Dr. Pearse pointed out some years ago, have a much higher deathrate."

BRITISH DEATH RATES.

General and Tuberculosis.

Name of City.	1912. General Deathrate per 1,000.	1912. Pulmonary Tuberculosis Deathrate per 1,000.
London	15.00 (1911)	1.35
Birmingham	14.1	1.28
Glasgow	17.7 (1911)	1.32
Liverpool	17.7	1.49
Manchester	16.2	1.53
Sheffield	14.3	1.22
Leeds	14.3	1.28
Bristol	13.6	1.09
Edinburgh	16.0	1.26
West Ham (London, E.) ...	14.2	1.13
Bradford	14.5	1.26
Newcastle	15.7	1.33
Nottingham	14.4	1.17
Portsmouth	12.9	1.13
Leicester	13.6	1.24
Bolton	15.9 (1911)	1.00
Averages	**15.0**	**1.255**

INDIAN DEATH RATES.

Death Rate from All Causes per 1,000 of Population, and Tuberculosis Death Rate, 1911-12.

Calcutta.

City death rate	27.2*
Females only	35.8
Males only	23.1
Tuberculosis (phthisis).	
Females only	3.3
Males only	1.7
Average (whole city) ...	**2.3**
Ward VII. females ...	**6.8**
,, VIII. ,, ...	**5.5**
,, X. ,, ...	**5.4**
,, XIV. ,, ...	**4.7**
,, XX. ,, ...	**4.4**

* Uncorrected, appears to the writer to be not less than 35.00.

Bombay.

City death rate	**35.6**
Tuberculosis.	
("Tubercle of lung and other Tubercular diseases.")	
Females only	1.02
Males	.41
Average	.62
" Respiratory diseases, including phthisis."	
Average	10.94

In each case the figures are extracted from Health Officer's Annual Reports.

During the 1911 official year there were, in Calcutta, no less than 2,060 deaths from tuberculosis, and the disease is fast increasing. The figures are terrible. The much higher death rate among Calcutta women points unmistakably to general slum conditions throughout the city.

The women are indoors all day, and get the full effects of Calcutta's record overcrowding of buildings, of the wretched rooms, and the abnormal lack of light and air. A big percentage of the men work in the open air on railways, along the Hooghly side, and in the streets. The purdah system is in all Indian cities, but they do not display any marked excesses in female death rates. The Calcutta tuberculosis death rate is 84% above the average of the above 15 towns, which are in a country whose climate is much more favourable to tubercle than is the climate of India.* But their rates are going down, while Calcutta's is rising faster than anything ever before recorded in tuberculosis.

Death Rates and City Density.

Numerous statistics shew that the percentages of illness and death in over-crowded areas are very much greater than those in healthy suburbs, and open, well-built cities.

The next tables are compiled from the 1912 Report† of the Health Officer to the City of Birmingham (Dr. John Robertson, M.D., B.Sc.).

Birmingham has now a population inside the city boundary of 851,000. For administrative purposes the city is divided in four quarters. Each quarter has an outer and an inner zone.

The inner zones are the most densely built up, and are those containing the slummy areas now under improvement. It should be remembered that conditions in the worst Birmingham slums are incomparably better than those in Calcutta slums, and it should also be kept in mind that the areas of Birmingham slums are mere trifles compared with those of Calcutta and Bombay. The mortality rates are likewise fractional compared with those of the two Indian cities.

Infant mortality and the tuberculosis death rate are the two best known general indicators of the housing conditions of cities.

CITY OF BIRMINGHAM.

Table shewing the Direct Relation between Death Rates and City Densities.

		Average Death-rate per 1,000.	Average Infant Mortality per 1,000 births.	Measles Death-rate.	Pulmonary Tuberculosis.	Bronchitis and Pneumonia.
North-West Division	Inner	20.2	142	1.65	2.12	3.78
	Outer	10.8	86	.36	.75	1.83
North-East Division	Inner	17.8	141	1.51	1.54	3.85
	Outer	11.8	90	.53	.98	1.97
South-East Division	Inner	14.1	102	.34	1.45	2.18
	Outer	10.6	83	.09	.99	1.63
South-West Division	Inner	13.6	109	.44	1.30	2.17
	Outer	10.0	68	.09	.75	1.43
Average for whole City		14.1	111	.67	1.28	2.46

* Dr. Kailas Chunder Bose, C.I.E., L.M.S., at the All India San. Conf. 1911, read a paper entitled "The Spread of Tuberculosis in Calcutta." He writes: "Within the last 20 years it has taken a strong hold on Calcutta and from the rate at which it has been spreading, it is no exaggeration to say that at no distant date it will be a very serious problem." The full effect of turning almost a whole city into a slum has yet to be felt at Calcutta. The writer calculates that the deaths will have risen to 2,600 per annum by 1920. In fact, Calcutta is going to become the most notorious city in the world, for tuberculosis. This is the terrible physical price yet to be inflicted, for her long and dreadful neglect. Deaths in 1880 numbered 454; in 1890, 743; in 1901, 1,064; in 1904, 1,608; and in 1911, 2,060. Dr. Bose points out the only true remedy—"radically remove the structural defects of the city." We have seen what a big and long job that must be; meanwhile, tuberculosis is going to become epidemic. No city was ever more in need of money, and plenty of it.

† See exhibits.

Note that " Inner " areas are the more crowded areas.

In 1912 Birmingham suffered from a severe epidemic of measles.

If the figures could be obtained, the mortality of, say, Barrabazaar would be found to exceed that of the Park Street area by, probably, 300 per cent.

INFANT MORTALITY.

" **Infant mortality,** which varies almost arithmetically with housing conditions."—Ald. Thompson in " Housing Up-to-Date."

City of Birmingham, 1912.

Infant Mortality exhibiting Direct Ratio between Death Rate and City Density.

" Inner " Means Central Portions of City. " Outer " Means Less Closely Built-up Outer City.

City Division.	Zone.	Average Deaths per 1,000 Births in 1912 in each zone.
North-West	Inner	142
	Outer	86
North-East	Inner	141
	Outer	90
South-East	Inner	102
	Outer	83
South-West	Inner	109
	Outer	68
Averages of Totals	Inner	82
	Outer	123½

Average for whole City of Birmingham 111

*Infant Mortality in English Counties of about the Same Population. Average of Six Year to 1904.

Durham. Conditions very over-crowded judged by English standards. 156 deaths per 1,000 births.	Essex. Condition not over-crowded. 115 deaths per 1,000 births.	Durham has 3 deaths to every 2 in Essex.
Northumberland. (Over-crowded). 152 deaths per 1,000 births.	Sussex. (Not over-crowded). 95 deaths per 1,000 births.	Northumberland, 8 deaths to 5 in Sussex.

* Prepared from details in Alderman W. Thompson's " Housing Up-to-Date."

Infantile Mortality per 1,000 Births in Large Towns, 1912.

Name of City.	Death-rate.	Name of City.	Death-rate.
London	91	Bradford	99
Birmingham	111	Hull	101
Liverpool	125	Newcastle	101
Manchester	122	Nottingham	118
Sheffield	107	Stoke	127
Leeds	102	Portsmouth	83
Bristol	103	Salford	130
West Ham	102	Leicester	109
Average of 16 Cities and Towns			108

Indian Infant Mortality.

Calcutta, 1911-1912.

Division of City.	Death Rate. Without Still-births.	With Still-births.
Ward V. ...	391	577
,, II. ...	317	
,, VII. ...	324	481
,, XIII. ...	374	
,, XXIV. ...	309	
,, XXV. ...	357	
Whole City of Calcutta Average, 1911-12	**251**	**362.1**

Bombay, 1911.

Division of City.	Death Rate.
Dhobi Talao*	308
Kamathipura*	419
Nagpada*	402.5
Whole City of Bombay Average, 1911 ...	**379.8**
Bangalore, S.I., 1911-12	**267.83**

NOTE.—It is understood that still-births are counted as deaths in Bombay, as in almost all other cities. They are not counted in Calcutta. The writer has made the necessary correction. It should be noted that the enormous infantile death rates of Calcutta and Bombay are not due solely to the general slum conditions existing throughout these cities. The factors of (1) wrong treatment of mothers during confinement; (2) wrong treatment of infants, both tell heavily. See the deplorable accounts in the useful paper on Calcutta by Dr. Rai Kailas Chandra Bose, Bahadur, C.I.E., L.M.S., All India San. Con. 1912.

The following Calcutta figures, given by Dr. Bose, appear undoubtedly to include still-births under the headings "Premature Birth," and perhaps also under "Debility at Birth." With these additions, the death rates in Wards V. and VII. appear to indicate the highest recorded infantile mortalities in the world.

* Great slum areas like those of Calcutta, population of these three areas = 97,000.

Infant Mortality in Calcutta.

Ward No. V. (Jorasanko and Burrabazaar).

	1907	1908	1909	1910	1911
Births ...	725	725	810	663	756
Deaths ...	432	450	462	448	436
Balance living	293	275	348	215	320
Death Rate per 1,000	**595**	**621**	**580**	**675**	**577**

Ward No. VII. (Armenian Street and Radha Bazaar District).

Births ...	318	385	810*	307	345
Deaths ...	197	169	215	155	166
Balance living	121	216	595	152	179
Death Rate per 1,000	**619**	**439**	**265**	**505**	**481**

It is interesting to remember that Ward No. VII. was not included in Dr. Crake's areas. The figures above seem to bear out fully the writer's statement in Chapter XIII. that 80% of this area can be regarded only as slum.

GENERAL SICKNESS AND DEBILITY.

The incalculable amount of sickness and debility caused by the Calcutta slums and the overcrowded and streetless condition of the city as a whole, produces indirectly, but not less certainly, a great amount of financial loss, and will produce great losses for generations to come.

Alderman Thompson, in his "Housing Up-to-Date," writes of Sheffield, and zymotic or preventable sickness and death:—

The statistics show that the cases of sickness last on an average 18½ days. Now, taking Lord Playfair's basis, and reckoning only one death per 1,000, and assuming the loss in wages from the cases of sickness to be two shillings a day, it means that Sheffield, with over 400,000 population,† sustains an annual loss in wages of over £25,000 through preventable sickness. This is equivalent to over 4d. in the £ on the rateable value of the whole of Sheffield, to say nothing of doctor's bills, personal suffering, and other losses."

The Calcutta loss is many times greater.

Another financial loss, direct, and of enormous size, is that incurred in the cost of even but a very partial and incomplete remedy of insanitary areas. The giant slums of Calcutta have largely caused the need of an Improvement Trust, and of the coming expenditure of millions of money that might have been spent so infinitely better in the ennoblement and adornment of a city already well built, in a second and third Hugli bridge, in new docks, in finer railway facilities, in magnificent quay and railway accommodation alongside the river, instead of the present crowded-up meagre "strip of annoyance."

* This figure is so far from the average that, if correct, it would appear to be due to some abnormal cause.

† 1906.

Many other city communities have been sinners in the same way as Calcutta and Bombay, but only to 10% or less of the neglect shewn in these two largest cities of India.

The subject of slum-evil needs the pen rather of a doctor and a sociologist than of an engineer; and much more detail, and a full medical knowledge is required, to throw complete light on and shew up clearly the intense evil wrought by slum conditions.

" Dr. L. Haden Guest, in ' Nash's Magazine ' for September, reckons that tuberculosis costs the United Kingdom annually 60,000 lives. This is a preventable disease, but prevention would require the extinction of slums. ' Kill all the bacilli in the world, but leave one slum untouched,' he says, ' and consumption can spring up again and spread over the world out of that slum.'*

" Phthisis and overcrowding advance in the same ratio."

The awful increase of tuberculosis at Calcutta, and the impossibility of fighting it with success, are both going to bring home the truth of these words in a most terrible manner. Much more money, to permit of rapid and big action, is the only real means by which tuberculosis can be checked in Calcutta.

* Quoted from " Questions of Policy in Housing Reform " (Calcutta), D. L. Monro.

CHAPTER XVI.

DIRECT REMEDY BY TOTAL OR ALMOST TOTAL ACQUISITION, DEMOLITION, AND RE-SALE; WITH ESTIMATES OF COST.

Trust has full legal powers for this method only—which is absolutely prohibitive in cost—and going out of use in the West—All Dr. Crake's red areas need demolition, also much of his yellow, blue, and sienna areas—to these must be added areas not examined by Dr. Crake—Tables of total areas—But we have not money enough to demolish even 10% of the worst—Every acre demolished entails costly re-housing—Even moderately good re-housing on slum-sites is a heavy dead loss—Chairman's remarks on demolition cost—Demolition for new roads will alone tax all our re-housing resources—we cannot afford to demolish more than 40 acres—these will be in the worst of the worst patches.

The Calcutta Improvement Trust have full powers under the 1911 Act (Sec. 36 et seq.) to acquire by means of a "General Improvement Scheme," any slum area in Calcutta which they regard as being an "unhealthy area" on the following counts:—

(a) "that any buildings in any area which are used, or are intended "or likely to be used, as dwelling-places, are unfit for habita- "tion, or

(b) "that danger to the health of the inhabitants of buildings in any "area, or in any neighbouring buildings, is caused by:—

1. "the narrowness, closeness and bad arrangement and "condition of streets or buildings or groups of buildings "in such area, or

2. "the want of light, air, ventilation or proper conveniences "in such area, or

3. "any other sanitary defects in such area,

"and that the most satisfactory method of dealing with the "evils connected with such buildings and the sanitary defects "of such area is a general improvement scheme for the re- "arrangement and re-construction of the streets and buildings, "or some of them, within such an area."

" The Board may pass a resolution that such an area is an " unhealthy area, and that a general improvement scheme ought " to be framed in respect of such area,"

" and may then proceed to frame such a scheme."

Sections 40, 41, and 42 further define the work that may be done.

40. "When framing an improvement scheme in respect of any area, " regard shall be had to—

(a) " The nature and conditions of neighbouring areas and " of Calcutta as a whole.

(b) " The several directions in which the expansion of Cal- " cutta appears likely to take place, and

(c) " The likelihood of improvement schemes being required " for other parts of Calcutta."

41. " Every improvement scheme shall provide for:—

(a) " The acquisition by the Board of any land in the area " comprised in the scheme which will, in their opinion, " be required for the execution of the scheme,

(b) " The laying out or re-laying out of the land in the said " area.

(c) " Such demolition, alteration or re-construction of build- " ings, situated on land which it is proposed to acquire " in the said area, as the Board may think necessary,

(d) " the construction of any buildings which the Board " may think it necessary to erect for any purpose other " than sale or hire.

(e) " the laying out or alteration of streets (including " bridges, causeways and culverts) if required, and

(f) " the levelling, paving, metalling, flagging, channelling, " sewering, and draining of the said streets, and the " provision therein of water, lighting, and other sani- " tary conveniences ordinarily provided by a Muni- " cipality."

These sections of the Calcutta Act form a close parallel with Part 1 of the English Housing Act of 1890, much has, in fact, been copied word for word from the old Act.

A " General Improvement Scheme " under the above sections of the Act is now in preparation for the slum that lies more or less between Tara Chand Dutt Street, Ram Prosad Shaha Lane, Lower Chitpore Road, Syed Salley's Lane and Halliday Street.

An estimate for the almost total acquisition and demolition, for compensation to gas and electric supply companies, and for roadmaking, sewering, and complete re-construction of the area, less recoupment by resale of land, gave a net cost of about 20 lakhs for 14 acres, and the Chairman considers that this is excessive, and that the sounder net figure for this and similar work is more likely to be about 1 lakh (£6,666) per acre.

Much of the English, American, and Continental slum has been done away with by the acquisition-demolition method, but the cost has, of course, been enormous, and other methods more indirect are now more popular. The writer has recently received figures relative to the cost of buying up 45 acres of slum in a large English city. " The total cost of acquiring this 45 acres, including law charges, parliamentary expenses, construction and improvement of streets, compensations, etc., amounts to £1,700,000." The letter mentions that " no-one so far has been bold enough to attempt " to publish the actual cost to the ratepayers of these 45 acres. It is not surprising that the total demolition method has well nigh gone out of use.

On the basis of 1 lakh per acre for the net cost of the Chitpore-Halliday Scheme, and allowing something more or less than this figure, according to the position of the property areas affected, the financial possibilities of the clean-sweep system in Calcutta may now be examined. The result will be alarming, for this is the sole method allowed by the Calcutta Improvement Act.

CALCUTTA AREAS THAT REQUIRE DEMOLITION.

The Chitpore-Halliday Scheme covers one only, of Dr. Crake's red patches shewn on the writer's Slum Map, and is only one of those numerous areas that were found to contain over 30% of totally or almost totally insanitary houses. It possesses but 5% of total open space in street and passage areas, and perhaps some 6½% in total open space of all kinds.

(a) We may assume safely that all the other red areas ought certainly, if money were available, to be acquired, demolished, sold, and rebuilt under good bye-laws.

(b) But to the areas defined by Dr. Crake we must add acreage for bad patches that occur in areas not examined by him.

Estimated Cost of Remedy by Clean Sweep Method.

Calcutta Slum Areas containing over 30% of Insanitary Houses, and having only from 5 to 10% of Street and Passage Area.

(i.) Defined by Dr. Crake.

(ii.) Added by the writer.

Location.	Approximate area in acres.	Estimated net cost per acre in lakhs.	Total net cost in lakhs.
Lot (i.) (Dr. Crake).			
1. On West Side Chitpore Road, about halfway between Harrison Road and Neemtolla Street	10.1	.90	9.09
2. On East Side Chitpore Road, and cut through by Muddun Mohun Chatterjees Lane ...	21.9	.90	19.71
3. Between Burtola and Banstola Streets	6.9	1.20	8.28
4. Between Harrison Road and Cotton Street	4.2	1.30	5.46
5. Between Machina Bazaar and Moonshee Sudderoondeens Lane	12.8	1.00	12.80
6. Between Harrison Road and Machina Bazaar, west of Halliday Street	13.7	1.00	13.70
7. Between Harrison Road and Machua Bazaar, east of Halliday Street	14.3	1.00	14.30
8. East of Halliday Street	13.6*	.90	12.24
9. On North Side of Harrison Road, East of College Street ...	6.5	.90	5.85
10. The Chitpore-Halliday block, Improvement Scheme (No. 1)	14.4**	1.00	14.40
11. On West Side Lower Chitpore Road, between Canning Street and Harrison Road	1.8	1.10	1.98
12. On North Side Bow Bazaar, between College Street and Amherst Street	3.2	.80	2.56
Carried forward	123.4		120.37

* Tank area deducted from area coloured on the plan.

** Dr. Crake's coloured area reduced to actual size of the improvement scheme in hand.

	Approximate area in acres.	Estimated net cost in lakhs per acre.	Net cost in lakhs.
Brought forward	123.4		120.37
13. On East Side of Wellington Street	25.4	.75	19.05
	148.8		139.42
Lot (ii.).			
14. East and South of Taltola Bazaar, in the area south of Corporation Street, about ...	12.0	.75	9.00
15. In Ward 2, North of Gopee Kristo Lane and Brindabun Bysacks Street, about ...	9.0	.80	7.20
	169.8		155.62

But the above table deals only with *red* areas.

The pale yellow areas of Dr. Crake's report cover approximately 147 acres, and contain from 25% to 30% of insanitary houses. Most of this yellow area is very little better than the red, and contains just about the same wretchedly insufficient allowance of light, air, and street space. Upon a reasonable basis, we may assume that under the acquisition and demolition system three-quarters of this property would have to be bought and pulled down. The net cost, at an average of .85 lakh an acre, would then be $(.75 \times 147) \times .85 = 93.75$ lakhs.

Dr. Crake's blue areas, containing from 20% to 24% of insanitary houses, measure on the large plan about 265 acres. Investigation of sample patches shewed that the general insanitary conditions are still little, if any, better than the red areas, i.e., the street space is still under 10%, and often all the combined space in streets, passages, courts, and backyards, etc., does not reach 10%. But the houses are a little better. Under the acquisition-and-demolition system we cannot count safely on less than 50% of total demolition being necessary to effect reform. These blue areas are not quite as valuable and central as the red and pale yellow, and we may fairly assume the average net cost in comparison at 8-10ths of a lakh per acre. The net cost of reforming 50% of the blue areas would then be .8 lakhs $\times \frac{265 \text{ acres}}{2}$ = say 106 lakhs.

The sienna coloured areas measure about 223 acres and contain from 15% to 19% of insanitary houses. The deplorable 10% or less of open space in streets and passage-streets still holds in these areas. But the number of insanitary houses has sunk considerably.† Under the sole means of improvement by acquisition and demolition, quite a quarter of these areas would have to be acquired to effect reform. The net cost of buying, re-plotting and selling would then be probably 75-100ths of a lakh per acre, as the property is still further removed from the most intense and expensive areas of the city; and the bill would then be $\frac{223 \text{ acres}}{4} \times .75$ lakhs, say 41.81 lakhs.

† Judged by the Calcutta Standard of Sanitation.

The foregoing can now be seen best in a table:—

A Moderate Estimate of the Total Areas of Only the Worst Slum, and Net Cost of its Reform by the Demolition System.

From areas Examined by Dr. Crake (in acres).	Approximate additional acres of worst slum.	Total acreage, say,	Net cost per acre in lakhs.	Total cost of reform without re-housing in lakhs.
Red, 148.8*	21.00	169.80	.75 to 1.20	155.62
Yellow, 110.25	11.00	121.25	.85	103.06
Blue, 132.50	13.25	143.75	.80	116.60
Sienna, 55.75	5.57	61.32	.75	45.99
447.30	50.82	**498.12**	——	**421.27**

Say 421¼ lakhs, or £2,808,000.

The net cost of acquiring, demolishing and re-selling *only the worst half of the bad slum areas of Calcutta* would thus alone be equal to nearly half the total sum given to the Trust to remedy all slums, create a new main road system, replan and develop all suburbs, encourage good housing, ditto re-housing, augment rapid-transit, create new parks, etc., etc. But, worse still, the above demolition of 500 especially crowded acres would dishouse some 180,000 or more people, and no money would have been spent for their re-housing; nor could the 500 re-planned acres, if properly re-built, provide room for more than some 70,000 people at the outside.

The figures are rough, but soundly based, and amply bear out the Chairman's opinion and foresight, in his report to Government on Scheme I., in which he wrote in March last, "If this estimate" (1 lakh an acre) "prove correct, the Trust will soon find, as has been found elsewhere, that general improvement schemes are too costly a remedy for insanitary conditions to warrant wholesale adoption."

Even a sum of 200 lakhs would (the writer believes he can demonstrate) be very much more than the Trust could justly and wisely afford to spend in clearing insanitary areas by wholesale demolition and resale; which is, nevertheless, the sole means of reform provided in the Act. Nor will the existing acute house famine, and the gigantic re-housing problems that would arise, permit us to use the demolition system in Calcutta, except in a very small degree.

Total demolition requires not only its own heavy capital absorption of about 1 lakh an acre,† but has been accepted generally as an urgent need for the construction of barrack-tenements or other buildings to re-house the displaced. In few Calcutta slums would we displace less than 300 people per acre, and in some portions the figure might reach 600 and even 700 per acre.

* As corrected by later measurements, &c.

† or more; it must not be forgotten that Slum-demolition raises the rents and value of the slum left standing.

Practically all the numerous English Housing and Improvement Acts give powers of demolition on the understanding of immediate or simultaneous re-housing schemes being carried out, either upon the cleared sites or in the immediate vicinity. The 1890 Act allows more free action if special reasons can be proved. The Calcutta Act fortunately possesses more elasticity and foresight as regards these particular points, and states in Clause 52, " The Board may " frame re-housing schemes, and, further, the Trust are at liberty if they build to put up new accommodation wherever they may think fit. In England it has until rather recently been accepted that the new dwellings shall be on, or very close to, the cleared slum site; the worst British slums have, however, not contained over 200 people per acre.

But the point is, that even a small percentage of Calcutta slum cannot be pulled down and depopulated without causing grave extra congestion in other slums, unless re-housing by direct or indirect means has been accomplished *in advance*.

Thus, to the net cost of acquisition, demolition, and resale of land in Calcutta slums—such as in Improvement Scheme No. 1—must be added a second heavy cost for re-housing. But further, if these cleared sites are rebuilt under good bye-laws, going without compromise for a proper supply of light and air, for a proper height-limit, and a 45° to 55° angle, then but half or less of the present population can be re-housed on the cleared sites.

SLUM DEMOLITION—HOUSING ENTAILED ON CLEARED SITES.

Before summarizing this section on the remedy of slum by total demolition, it is in place to consider first the question of housing a percentage of population (whether the original slum dwellers or others does not matter) on the cleared and re-planned slum-sites.

The capital cost of re-housing by means of " tenement " or barrack dwellings (chawls) erected on the site of cleared slums, is everywhere in the world very great, seldom remunerative, and usually a heavy dead loss. *It can only be made to pay by re-crowding the land with high and unhealthy buildings.*

For examples of cost,* during some fairly recent years, under Part 1 of the English Act of 1890, sixteen provincial towns and cities of England and Wales spent £789,036 (say 118 lakhs) in capital outlay on " mainly block-dwellings, tenements and flats," *all built on the sites of demolished slum.* The annual rents received amounted to £32,213, working expenses include rates, taxes, water, lighting, insurance, repairs and maintainance, superintendence and sundries, and total to £15,538 per annum, leaving a net official return on capital outlay of only 2.41%. To this table, however,

* From Tables in Alderman Thompson's Housing Books.

Alderman Thompson, who is a very keen investigator of municipal accounts, adds this remarkable footnote:—

"N.B.—In most of the above cases land is only charged to capital outlay at housing valuation"; (!) and in a later remark, he writes, "Reference has been made on more than one occasion to the fact that it is the practice of many municipalities in connection with re-housing schemes to charge to the dwellings' account only the value put upon the sites by the Council's valuer, instead of their actual cost. The vagaries that are possible under the present system are easily seen from a study of the comparative figures of the Brightlingsea Building Site (E. London) acquired for re-housing purposes."

Cost of acquisition of site	£12,000
Commercial value of site	2,150
Housing valuation of site	1,000
Value charged to Housing Scheme	*nil(!)*

The return on the above capital outlay of 118 lakhs is, therefore, not really 2.41%. There is no return at all, but, instead, a tremendous loss.

In our case the net cost of clearing and re-selling the land (for Improvement Scheme No. 1) plus roadmaking, etc., is taken at 1 lakh per acre; if we did not re-sell it, but built barrack dwellings on cleared slum sites, as would certainly have to be done in this and very many cases, then the capital outlay on sites alone would be the gross cost of buying them and clearing them, plus street work, etc. We could not hope to acquire land and do this for much less than an average cost of 3 lakhs per acre: that is on the accepted basis of 3.3 lakhs gross plus roads, etc., less 70% recoupment = 1 lakh net.* It seems then, quite conservative, to estimate that sites only, for tenement dwellings erected on cleared slum in Calcutta would cost about 3 lakhs per acre. The re-housing would cost an additional $1\frac{1}{4}$ lakhs per acre.

If but 20% of merely the red areas defined only by Dr. Crake were utilized for the total re-housing on slum sites to be done in Calcutta, the capital cost of sites alone would be:—

$$\frac{149 \text{ acres}}{20\%} = \text{Acres } 29.8 \times 3 \text{ lakhs} = 89.4 \text{ lakhs.}$$

And the tenement dwellings themselves for this comparatively very small clearance would require for construction a capital outlay of another $1\frac{1}{4}$ lakhs per acre (total site and minimum open space for three-storey buildings):

Lakhs $1\frac{1}{4} \times 29.8$ acres	37.2 lakhs.
	126.6 lakhs

Say £844,000.

*70% recoupment seems rather optimistic to the writer. Many of the slums concerned are not in the valuable business areas. 70% recoupment means only one thing, *i.e.*, the cleared site to be crammed with 70 ft. chawls. This is explained in Chapter XVIII.

If the buildings were of the ordinary type, and the rooms were let at rents within reach of the " poorer and working classes " (Calcutta Act) the above expenditure would be a dead loss, and probably entail a serious annual cost over very many years to pay off the capital loan. In addition, some 10,000 or more people would be crowded again on only 30 acres of land, which means the death rate among them would still be very high, and the infant mortality rates would still be disgraceful, and only 1-17th of the very worst slums would have been reformed.

The writer has made the above calculations as an essential part of slum problem investigation in Calcutta, and gives them for what they are worth, but the Chairman has already pointed out much the same thing in his Annual Report for 1912, where he deals with the barrack dwellings now being erected by the Trust near Wards Institution Lane, where land is cheap compared with that of Dr. Crake's areas. Mr. Bompas's remarks are valuable, and it will be well to reprint them here for reference:—

" The housing problem in Calcutta is of supreme importance: the figures of the last census show that much of the improvement in the health of Calcutta is only apparent: the sanitary measures of the Corporation result in the removal of bustees, and the population which occupied the bustees does not find healthier accommodation in the same locality, but moves on to even more insanitary bustees in the suburban wards or in the adjacent suburban municipalities. The Board do not anticipate, nor do they desire, that the chawl should become the usual dwelling for the poor of Calcutta, but it may be suitable to some classes of its heterogeneous population, and especially to those who come here for work, leaving their families behind. It is difficult to see what other class of building can be erected by the capitalist where land costs more than Rs 600 a cottah: on really cheap land, it is possible that good results could be obtained by arranging for the construction of sanitary bustees, the Board merely laying out and draining the site and controlling the class of hut erected.

"The dwellings under construction are in Wards Institution Lane in the fringe area of Ward No. 4. It is not anticipated that the residents dishoused by any of the schemes hitherto notified will occupy, in any large numbers, these dwellings when erected, but a considerable population will undoubtedly be displaced, e.g., by General Improvement Scheme No. 1. Persons displaced will largely find accommodation in the immediate neighbourhood of their present dwellings, displacing a corresponding population which will tend to move outward to the suburbs. The Re-housing Scheme* will, it is hoped, receive a population indirectly dishoused by the operations of the Trust, and which would otherwise have been compelled to live in the extremely insanitary accommodation which is all that is at present available in the fringe area. The Board has not so far decided to embark on a policy of re-housing, which would involve a financial loss. Its first endeavour will be to ascertain whether sanitary dwellings cannot be constructed so as to yield a moderate return on the capital invested. All experience shows that this cannot be done where land is expensive. A public authority may be able to borrow money more cheaply than a private capitalist, and may, therefore, be content with smaller returns on the

* Ward's Institution Lane.

capital invested, but, nevertheless, expensive land is found to increase the capital cost so much that rents to be remunerative become higher than can be paid by the poorest classes."

Summary of the Position as Regards the Demolition System of Slum Reform.

(1) The legal power to remedy slum areas by total acquisition, demolition, re-planning and re-sale is given very fully by the Calcutta Act. Financial power is not given.

(2) The acreage that calls for remedy is very great, and the net average cost of the above method of improvement is not likely to be much less than 1 lakh an acre, quite apart from re-housing.

(3) An economical estimate of the worst parts of Dr. Crake's areas alone, gives the following acreage and cost; it includes all red areas, but only relates to the most highly congested patches of the other classes.

Acreage of slum, all containing 10% or less of open space in streets and passages.	Percentage of insanitary houses on the very low Calcutta standard.*	Average net cost per acre after acquisition demolition etc., and re-sale.	Total net cost in lakhs.
148.80	over 30%	.98 lakhs	145.82
110.25	25% to 30%	.85 ,,	93.75
132.50	20% to 24%	.80 ,,	106.00
55.75	15% to 19%	.75 ,,	41.81
447.30 acres		Average **.85** lakhs	**387.83** lakhs

This would leave untouched 337 acres of Dr. Crake's 784 acres. In addition, there are very bad areas with 10% or less of space that call for total demolition, and were not examined by Dr. Crake. These are roughly and very economically estimated by the writer as follows:—

Additional Very Bad Areas Calling for Total Demolition.

With over 30% insanitary houses	...	...	21 acres.
Having 25 to 30% ,, ,,	...	...	11 ,,
,, 20 to 24% ,, ,,	...	...	13 ,,
,, 15 to 19% ,, ,,	...	...	6 ,,
			51 ,,

Had the whole city been examined and defined on the standards applied, then the total acreage of very bad slum calling for wholesale destruction would be, on these estimates, 447 acres + 51 = 498, and the total of bad slum, coloured red, yellow, blue, and sienna, would be not less than 784 + 51 = **835** acres. The cost of reforming the worst 498 acres would be £2,808,000, if done by the only means under the existing Act.

* In Calcutta thousands of tall houses are considerd 'Sanitary' that stand in 10ft. wide 'streets' and produce a terrible death-rate.

(4) The expenditure of a net sum of £2,800,000 on demolishing only the worst slums is palpably quite beyond the financial powers given to the Trust, and the demolitions would produce such a house famine as could not possibly be coped with.

(5) It will only be possible to employ on a very small scale the acquisition-demolition system of slum remedy. It is not possible in Calcutta to buy up and put right the results of 50 years of grave neglect.

(6) A cheap, gradual, and quite different policy is the only policy that can be contemplated.

(7) A special examination will be required to determine which are the very worst areas, viz., those that are most difficult of improvement by any other means than total demolition. The Chairman put his hand on one of the very worst when he selected the area for the first General Improvement Scheme to be undertaken by the Trust: but this one bit covers 15 acres.

(8) Every Calcutta demolition must entail re-housing work in advance, otherwise the existing acute house famine will be made desperate.

(9) For the purpose of completing the general programme of work, the writer has made a preliminary selection of the very worst bits, which will give an idea of the limited allocation to be made for the total acquisition, demolition, and re-planning of Calcutta slums, and re-sale of cleared sites.

(10) It will be remembered that one of the important factors in fixing routes of new city roads in Calcutta is that as many as possible great slum-blocks shall be cut through. In carrying out Main Road Scheme No. IX., the slum and streetless acreage that would be re-constructed and made into either " good city " or open space in new roads amounts to some 268 acres, based on the purchase of proper recoupment and re-plotting widths for each main road.

Thus, with 563 lakhs of main road money we effect a considerable slum destruction, and this effect should be carefully borne in mind when considering the big bill for main roads. At the same time, it brings us face to face with the extreme gravity and severity of the re-housing problem; for, on a basis that a population equal to 50 per cent. of the displaced people will be re-housed in new dwellings on each side of the new roads, the writer calculates that a population of not less than 24,000 will be removed permanently from the site and from each side of the new roads in Scheme IX.; and these 24,000 must be considered quite apart from population displaced by slum-reform done apart from new main road work.

In the estimates at the end of these chapters, on slum, is set down and explained a sum of £400,000, or say 60 lakhs, for demolishing 40 acres of the worst of the worst slum, and ensuring thereon new buildings of a fairly good type. To this total demoltion bill is also added a sum of 9 lakhs (£57,500) for 2 acres of cleared slum rebuilt by the Trust, with exemplary chawls.

CHAPTER XVII.

PART I.

REMEDY OF CALCUTTA SLUMS BY THE SLUM-REPAIR SYSTEM.

Remedy by the 'Slum-Repair' or 'Slum-Mending' System is the sole practical method for Calcutta—it does not increase the house-famine—Valuable example set by Birmingham —Procedure by Slum-Repair System—Copy of the notice served on owners—The owners share of the reforms—The Trust's share of the work—Writer's visit to Birmingham—Good and cheap slum-repair work done there under Dr. Robertson—Statistics of Birmingham and English slum-repair work.

Remedy of Calcutta Slums by House-Repair and the removal of buildings obstructive to air and space, light and access, known as the 'Slum-Repair' or 'Slum-Mending.'

This is the only practical method for dealing with most of the red, and all of the other slum areas of Calcutta. It has been shewn that Calcutta has allowed an enormous extent of slum area to come into existence and that the cost of removing only the worst of it by demolition would, on a modest estimate, exceed 400 lakhs; further, that every lakh of this demolition expenditure would mean an additional two to three-and-a-half lakhs to be spent on re-housing; either by means of tenements on the cleared slum sites or in tenements or dwellings erected elsewhere. The cleared sites, whether rebuilt by the Trust or by the private chawl-builder, would not hold as many people as before: and, if good ordinary sanitary conditions as to light and air are enforced in the rebuilding, then the cleared slum sites would provide for not more than half the number of inhabitants, and in many areas for but one-third.

The house-famine in Calcutta is likely to become more acute merely through the destruction of slum and other property required for new main roads. Both the financial and physical aspects therefore strictly enforce a very gradual improvement of Calcutta slums: and the only method is that known in Europe as 'Slum Repair.' It was first used successfully and on a large scale by the Corporation of Birmingham (population in 1912: 851,000.) That city had slum problems of a very much smaller and milder nature than those now existing in Bombay and Calcutta, yet the difficulties were intrinsically the same, viz.:

(i) Total demolition was very costly indeed.

(ii) Total demolition had already begun to produce a most acute house-famine and grave overcrowding.

Birmingham now possesses perhaps the most extensive area of 'reformed' slum, in any English city,* and the work of this city may be taken as the most valuable example of what should be done in Calcutta.

* Excepting perhaps London.

The lead of Birmingham has been widely followed elsewhere. Slum-repair was first made fully legal and applicable in England by means of Part II (non-compulsory) of the 'Housing of the Working Classes Act,' of 1890, which will be summarised later on.

The working process of this system has been admirably described by Mr. Councillor J. S. Nettlefold, of the Birmingham Corporation, in his familiar and widely read book—'Practical Housing.'

Alderman W. Thompson, Chairman of the National Housing Reform Council, has also produced two most valuable and well-known works in his 'Housing up to date' and his 'Housing Handbook,' in which he deals closely with the Birmingham slum-repair work and strongly advocates its use elsewhere.

These three books have a great reputation in England, and should be in the hands of every member of the Calcutta Improvement Trust (They are sent out with the Exhibits.)

The writer has specially visited Birmingham in order to see the more recent work and gather first hand information. He is convinced that this method is the sole means of salvation for two-thirds of present built-up Bombay and Calcutta.

Prodecure in Birmingham. The Owner's Liability.

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.

* The 1909 Act has further simplified this proceedure: power being entirely in the hands of the Civic Authority.

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 shews any inclination to meet the wishes of the Authority.

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

The following is a copy of the Birmingham Circular sent to owners when notice to repair is served on them. With it is also sent another circular expressing the willingness of the Corporation and its officers to see them and explain what repairs are necessary.

The writer has added a few foot notes to explain local expressions in the first circular.

(*Copy of Circular*).

Repairs to Old House Property.

"1. Where houses are too close together and there is no current of air in front of or around them, one or more houses should be removed in order to let light and air into the remainder. Compensation is paid for the removal of such obstructive buildings.

When out-houses are found within a few feet of the doors and windows of dwelling houses, these should be removed, and if necessary, a house should be demolished to make room for new out-houses.

2. In the matter of out-houses in crowded courtyards and other old property where yard space is limited, there should be

One ash-bin to every two houses.
One wash-house to every four houses.
One W.C. to every two houses.

3. Unpaved common courtyards should be paved except in cases where it is evident that gardens are appreciated and kept tidy and wholesome.

4. With regard to the houses themselves—

(*a*) When quarry* floors have to be taken up because quarries are broken or the floor is damp, the floor should be relaid on concrete. It is essential to have a solid floor to prevent damp arising into the house from the ground underneath.

(*b*) Damp-courses should always be inserted† except when a house is evidently dry.

* 'Quarries' are small thick red earthenware tiles, about 6 in. by 1 in, laid in mortar.

† Impervious course in the house-wall; damp cannot rise in the wall above the 'damp-course.'

(*c*) All dirty wall papers should be removed, no matter how many layers there may be, and the plaster, where necessary, made sound and good.

(*d*) Insanitary brick settles or sinks, which always cause damp, and bad smells, should be removed, and an earthenware sink with water supply provided, so that tenants may be able to wash without having to go to the yard tap.

(*e*) Handrails should be provided to staircases.

(*f*) Filth,‡ when found between floors and ceilings, where it is always highly dangerous to health, should be removed and floors and ceilings thoroughly repaired.

(*g*) Roofs should be repaired in such a manner that unless some accident occurs they will keep out the rain for some years to come.

(*h*) Windows should be made to open top and bottom, and the woodwork made weather-proof. [New and larger windows are very frequently put into the old houses. E.P.R.]

(*i*) Doors should be made weather-proof.

(*j*) Match-boarding§ should be removed from walls where it is found to hide damp or harbour‖ filth.

(*k*) Where fresh paint is required, two coats should be put on.

(*l*) Brickwork should be raked (joints scraped out and re-made with motar—E.P.R.) and pointed where necessary, and where unsafe pulled down and re-built.

(*m*) Ventilated food cupboards or pantries should be provided to all houses.

(*n*) Cellars should be filled in where it is found impossible to prevent them being a cause of damp, and bad smells."

The specifications, supplied free to owners, are each different and apply solely to the exact work required in or around each particular house. It is remarkable that one-sixth of the repair work has been done without any notice, by amicable arrangement between the owners and Corporation, and further, that the Department has 'often been specially thanked by property owners for the trouble taken and consideration shewn' in advising them; re-arranging details of repair so as to lessen cost of reform, etc., or giving extra time to effect repairs, etc.

To the list of owners' work detailed in the circular the following may be added as work commonly done by owners in Birmingham, or relating especially to Calcutta:—

Replace pail or earth closets (latrines or privies) with water closets or modern Asiatic water closet appliances* and provide proper complete house drainage with vent-shafts, intercepting traps and inspection chambers as usual.

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‡ 'Filth,' means in the above, dust, mud and droppings off boots, or rags, paper, debris, etc.

§ Thin soft-wood boarding.

‖ 'Harbour'—protect or permit accumulation of, dust and dirt.

* The writer designed and put into successful use at Madras simple appliances that would be very useful in Calcutta slum reform work: particulars could be obtained from the Hon. Mr. P. L. Moore, C.I.E., I.C.S., President of Madras Corporation.

Provide proper water supply and taps to each house or tenement in order to promote cleanliness and discourage storage of water in unsuitable places and receptacles.

Remove insanitary water-cisterns.

Provide good rainwater spouting and down-pipes or repair old work, and prevent dampness in walls and wet ground.

Provide extra or larger windows; and sufficient through ventilation light and air-way into courts, staircases, landings, rooms, pantries for food, etc.

Food store places to be separate from living-room and ventilated from outside.

Every house shall have proper personal washing accommodation (wash-houses are only for use in washing clothes.)

Clean down, paint or whitewash and keep painted or whitewashed, or else hard-plaster, all walls liable to soiling, and all interiors of water closets.

Remove all decayed, defective, or dirty plaster from walls and ceilings. Replaster with hard and smooth plaster, or whitewash, distemper, or paint same.

Make dry and sound all damp floors by means of concrete or suitable paving, and by raising, or by other means.

Each common staircase shall be lighted and ventilated permanently at each floor level, or by through ventilation so as to break the common air connection.

The Corporation's* part in Slum-Repair and Improvement.

1. Demolish houses unfit for habitation if owner refuses to make fit.

2. *Buy*, and demolish houses and buildings that are obstructive; such as those that close up the end of a street or passage, constrict a passage, or jut out and prevent through and free access of air and light, and produce a bad light angle of less than 45 per cent., or such as darken the windows of other dwelling houses.

3. Buy up and demolish a small well-chosen percentage of houses and old buildings as so to open up and improve those that are left, to annul back-to-back conditions, and give a real supply of light and air.

4. Pave smoothly and imperviously and drain all public space liable to become damp, muddy or dirty. Replace macadam with tar-macadam or with setts. Pave all spaces suitable for children to play about in.

5. Preserve a considerable number of the sites of the obstructive buildings as small open spaces, and if possible part-plant with trees and

* In our case, it will be the Trust's share of the work.

grass and provide with seats. The object is chiefly to provide play-grounds for children and also sitting out places for adults, and to brighten up the general conditions.

6. Close off opened-up courts and play-places by means of a low dwarf wall, and very open railings, leaving entrance for foot traffic, but not for vehicles: thus making valuable safe play-places for children and babies under their mothers' eyes.

7. *Forbid absolutely all occupation or semi-occupation of dwelling houses by animals, sacred or otherwise.

8. Forbid the juxtaposition of dwelling houses with stables, byres, cattle stalls, manure pits and the like.

9. Buy up repairable houses from owners too poor to repair. Repair same and re-let, so as to prevent house-famine conditions. Very successful work of this kind has been done in London and Glasgow.

10. Advance repair-loans at low interest to house owners, and recover same gradually. Security being obtained by temporary mortgage on land or houses concerned. The object being not to make any profit, or any loss, but to get work accomplished.

Notes on Visit to Birmingham. Slum Reformation.

The writer was received by Dr. John Robertson, M.D., B.Sc., the very able and well known Health Officer of the city of Birmingham, who explained to him the origin of the Birmingham slums. From about 90 to 100 years ago, the original nucleus of the city began to expand very rapidly owing to great industrial activity. There were no bye laws of any note affecting the areas in which the expansion took place. Not much had been thought out in those days regarding proper housing conditions, but the Birmingham manufacturers had good ideas as to street widths, and nearly all the streets were made about 50 feet wide, but the mesh was made too big, and in consequence, the building blocks are too big, so that interior building was encouraged.

The outsides of the blocks formed by the over-large meshes of good streets, are composed of continuous two-storey dwelling houses, which each contain from two to four rooms. The interiors of the blocks are reached by short narrow passages called 'court entrances' which pierce through the outside rows of small houses that form the four outsides of each block.

The 'courts' inside the blocks were, before reformation, really small dead-end streets, or cul-de-sacs, averaging perhaps 100 feet long by 20 feet wide, and faced all round by small two-storey dwelling houses. An English slum 'court' is in fact a court yard, usually about

* The writer has seen in Calcutta, two men sleeping, one man working, and a large cow sleeping, all together in one little room about 10 feet by 9 feet, having no window, and only a doorway. The man working was a dhobie, and was ironing clothes. The cow was at the back of the room.

100 feet by 20 feet*, surrounded on all sides by the fronts of small houses of two storeys, about 24 feet high to the eaves, and frequently built back-to-back with houses of other courts. Back-to-back houses usually have one downstairs living room and one upstairs bedroom, each about 12 feet by 12 feet, by 9 feet or 10 feet high.

The usual entrance to a typical 'court' is by means of a 3 to 4 feet wide passage, made beneath one (or two) of the small houses, arched over, and covered by an upstairs dwelling-room or bedroom.

Accompanied by Dr. Robertson, the writer inspected a considerable area of reformed courts and slum, and afterwards visited some in process of reform and some still untouched.

The effect of removing obstructive buildings, opening up one or both ends of courts to the nearest street, enforcing repair of the property, paving the surfaces of yards and open spaces, providing excellent and durable but cheap wash-houses and up-to-date water closets, planting of trees, and putting light ornamental railings and gates to prevent ingress of vehicular traffic on to the paving—all produce a very good result, which is most striking, pleasing, and highly satisfactory. More especially when the small cost of the work to ratepayers is considered, and also the fact that this method avoids most of the suffering, inconvenience, and extra overcrowding entailed by the total demolition method. The light angle in the reformed slum appeared never to be worse than 45 degrees and much more frequently better, often only 30 degrees.

The extensive street system in which the slum blocks occur is really very good. Nearly all streets appear to be from 50 to 60 feet wide, and as they contain mostly two storey buildings, the light angle is generally from 25 degrees to 30 degrees.

The writer was especially impressed by the healthy, bright and clean appearance of the children and women, and by the freshness of air and abundance of light in the reformed areas, when compared with the conditions in areas not yet touched.

One clothes' wash-house is provided for every four houses, one rubbish bin and one up-to-date water-closet for every two houses. These water-closets, bins, and wash-houses, are all put as far away as possible from the houses and are numbered to prevent disputes between tenants. The average number of people in each house, including children, is about four-and-a-half.

One very good point about the slum-repair system is, that it provides numerous roomy paved surfaces, not accessible for traffic, and yet at the doors of the houses, and in consequence of great service to children and healthy child-life. The writer observed numbers of healthy children at play in these safe spaces, and in most cases the house doors stood open aud the youngsters were within sight and call of the mothers. The same would be a great godsend for Calcutta children.

* Not often less than 15 feet wide, and rarely having a worse light angle than 55 degrees.

When the rapid extension of Birmingham began, most of the building land was let on long leases of 99 years, and in consequence many of these leases are now very near their end. This latter fact has often caused owners to neglect their dwelling-house property, and this has much assisted in the creation of slum conditions. On the other hand, as Dr. Robertson pointed out, the fact of short remaining lease periods has made cheaper the cost of removing buildings that prevented free access of air, and that made the light and sunshine angle higher than 45 degrees.

One very interesting result of the slum improvement work in Birmingham is that owners of unrepaired slums have more and more unlet houses on their hands, because the people will no longer put up with slum conditions, but leave to go either to the improved areas, or to the better accommodation provided directly or indirectly through the extensive workmen's suburban suburbs, now growing rapidly.

Apropos, the beautiful garden suburbs for artizans and the working classes, are likewise, at Birmingham, having a marked effect on the ordinary builder; he is building better, the architecture is better and there is more garden and space to each dwelling, because he finds the garden suburbs are strongly educating and attracting the worker.

Particulars are given in the following table* of the slum repair work done in Birmingham under Part II, of the 1890 Act, and the 1903 and 1909 Amending Acts.

Public Health and Housing Department.

City of Birmingham Slum Improvement Work.

Year	Reported. Houses	Reported. Properties	Made Habitable. Houses	Made Habitable. Prop's	Demolished. Houses	Demolished. Prop's	Magistrates Closing Orders. Houses	Magistrates Closing Orders. Prop's	Demolition Notices. Houses	Demolition Notices. Prop's
1903	304	85	155	32	34	19	65	19	51	15
1904	1119	143	242	37	127	33	233	31	36	6
1905	793	98	330	38	230	43	327	41	61	7
1906	596	87	370	49	117	26	199	25	143	13
1907	806	120	262	41	422	64	679	102	157	24
1908	650	79	494	69	257	43	184	24	164	30
1909	521	70	381	54	216	45	220	34	54	9
1910	609	72	277	46	291	59	173	27	41	10
1911	278	49	202	30	163	37	360	51	71	11
1912	926	135	300	44	349	36	727	106	209	37
Totals	6602	938	**3013**	440	**2206**†	405	3167	460	**987**	162

This table shews the effectiveness and thorough practicability of the 'slum-repair' system of improving insanitary residential areas in dense cities. Other cities of Great Britain are engaged in similar improvement work, but Birmingham is cited as a good typical case.

*From the 1912 Report of the Medical Officer of Health of Birmingham, Dr. John Robertson, M.D., B.Sc. (Included among the exhibits).

† Owing to good suburban development, good rapid-transit (trams), and consequent house-building activity, Birmingham is able to stand this amount of demolition without causing house-famine.

During the seven years ending 1905, in which the slum-repair method began to become more popular, the following houses were dealt with in England, outside of London :—

Houses reported as unsatisfactory	33,746
Houses repaired and made sanitary by owners	17,210
Closing orders granted by Magistrates	4,220
Demolition orders granted and executed	748

In addition, the various Corporations and Town Councils bought and demolished a great number of obstructive buildings in relation to the above work of slum improvement, and further, most cities in Great Britain have had power for 40 years and upwards, to close insanitary houses, that are 'unfit for human habitation' in the opinion of the Medical Officer of Health.

CHAPTER XVII.

PART II.

REMEDY BY SLUM-REPAIR METHOD. DETAILS. EXTRA POWERS REQUIRED BY TRUST. THE RULING LIGHT-ANGLE. ESTIMATES WITH STAFF-COST.

Neither Trust nor Corporation possess power to exercise Slum-Repair methods of reform —Supplementary Act is essential—Supplementary Acts are common events in other cities—Special Staff is needed—Method of staff-working—The light-angle is a ruling factor in the work, and largely fixes what measure of reform, and what reduction of death rate shall be undertaken—Calcutta and Bombay should not go by each other—should follow example of more advanced cities—just as England follows Continental ideals in main road planning, and Continent follows England as regards better housing—With slum repair must go slum-prevention—height limits and real bye laws are needed to check the horrible chawl conditions now rapidly worsening Calcutta—Staff details—Costs and Estimates.

Slum-repair methods of reform.

We must now determine as exactly as possible what actually is to be done, how it is to be done, and what money we can spend.

At present the Calcutta Improvement Trust has insufficient powers to exercise the 'Slum-repair' method; and the existing scope of the Trust in dealing with slums is practically the same as that given to English Authorities by Part I of the 1890 Act.

So far as the writer knows, the Corporation of Calcutta is also without sufficient legal powers to undertake slum repair: besides this, slum reform was one of the special objects of Government when creating the Improvement Trust, though it had not then been realized that the want of city main roads is one of the two root-factors which have made Calcutta a terribly congested city.

In succeeding chapters of this report, the writer has suggested that the Trust, or better the Trust and Corporation in strong co-operation, obtain a Supplementary Act, and he has endeavoured to shew that such an Act is absolutely essential; and that without it, the Trust will be able to reform neither internal Calcutta nor the extensive suburbs, and that their best efforts as regards slum improvement and suburban development and re-planning, will affect but one twentieth of the great slums now urgently calling for reform. Nor will it be possible to plan and lay out in advance, more than one-thirtieth of the future suburbs, and in consequence they would continue to grow up as a new mess and additional future slum-land.

Supplementary Act is essential.

Supplementary Acts are quite common events in the past and present of English, German, Italian and other municipal work. For example, the Derwent Valley Water Act of 1899 authorising the construction of works

estimated at £7,000,000 (over 1,000 lakhs) was strenuously fought out between the Corporations of Sheffield, Leicester, Derby, Nottingham and several smaller towns; and the interests of thousands of landowners, and of railway, canal and quarry owners and others were affected. The Act emerged at last from the Parliamentary Committee after a great contest, some of the best heads in England being engaged in the work.

The Board was constituted and the work commenced. It was then found, as has so often naturally been the case, that the Act needed amplification, that alterations and also further powers were needed. It was decided to promote a Supplementary Act. The original contests had cleared the ground, the original Act was itself as good as a well-fortified base for a successful sally, and the Supplementary Act was obtained without much difficulty: and proved of very great service.

The chief needs in a Supplementary Act for Calcutta Improvement are set out in the last chapters of this report.

As regards these further powers to deal with the streetless areas and slums of Calcutta, the following points may be mentioned and discussed at once.

Special Staff needed and method of working.

Powers to exercise 'Slum-repair' would have to provide for a special staff. The services of a first rate European medical officer and two English first-class building surveyors would be required, with a full staff of assistants.

After or during medical inspection, building surveyors would note what was needed in each reported house or group.

The inspection card used by surveyors working under the Birmingham health officer is as follows:—

HOUSE INSPECTION CARD.

	B*	
Situation	Rooms	Rent
Cleanliness	L**	
Lighting	Ventilation	B
Dampness of walls and floors	Woodwork	B
Plaster	Cellar	
Brickwork	Water Supply	
Food Storage	Paving	
Air space round dwelling	Out-buildings	
Drainage	Closet Accommodation	
Refuse removal		
Any special cause of 'representing' (reporting).		
Action to be taken now:—		
Date		

Inspector's Signature,

* B Bed Room.
** L Living Room. .....

The property and areas condemned by the medical officer (in co-operation with the Chairman of the Trust when necessary,) would then be closely investigated by the doctor's reconstruction staff, who would prepare proposals, plans, and estimates for removal of obstructive buildings, opening up, etc., and would carry out demolitions, pave public areas, plant trees, etc., and, very important, would advise owners, prepare specifications of work required of them and supervise its execution. The doctors' department would of course work hand-in-hand with the Trust's engineering department, most especially as regards the general policy and plan of new street and old lane interconnections and improvements, i.e., the gradual accomplishment of a street-system.

The notices would, it is presumed, be served as usual by the clerical staff of the medical officer.

A general standard for the work to be done should be comprised in any Supplementary Act.

The Light-angle is a ruling factor.

The 'light-angle' is one of the leading factors in slum-reform.

The great English Public Health Act of 1875, aimed at obtaining a minimum diagonal of 45 degrees between the building line (at ground level) on one side of a new street and the skyline formed by eaves on the other side. The general rule throughout continental bye-laws, is, that the width of the street directly determines the maximum height of its buildings, viz., 40 feet high in 40 feet streets, 60 feet high in 60 feet wide roads, and so on. In other words, the 45 degree angle, with very slight modifications, is almost universally applied on the Continent in fixing maximum heights of buildings.

The actual angle obtained in streets built since 1875 under English bye-laws is rarely higher than 36 degrees, which is very admirable, and means that even the narrowest streets in the building areas (now covering an immense extent of city acreage) are about 40 feet wide and about 28 feet high to the eaves (two stories). The majority of the poorer residential streets built since 1875, in all English cities are nearer 50 feet wide between the building lines; and a small bit of garden or enclosure in front of each house reduces the actual total width of road and footpaths to the regulation width of from 36 feet to 40 feet. Thus the skyline angle in the majority of these streets is as low as 30 degrees. This fine low angle (with its two storey single family dwellings) is reflected in the English death rates, easily the lowest in the world.

I understand that the angle of 63½ degrees is supposed to be applied in Calcutta to façades full of dwelling rooms, when any angle whatever is used.

The angle of the new passage-streets, shewn in course of formation in the 1912 Calcutta photograph in chapter XIV will be over 80 degrees.

It has been pointed out that an angle of 45 degrees has been aimed at, and more than obtained, in new streets made under and subsequently to the English Act of 1875, and in general throughout civilised Europe.

As regards new buildings on old streets, the 1875 Act bye-law is as follows :—

"Where a new domestic building may be intended to front on to a street laid out before the confirmation of these bye-laws, and of a less width than 24 feet, the person who shall erect such building shall provide in front thereof an open space, which measured to the opposite side of such street throughout the whole line of frontage of such building, shall extend to a distance equal at least to the width of such street, together with one half of the difference between such width and twenty-four feet. No angle is specifically mentioned, and, in 1875, the provincial cities to which the bye-law applied were in general, not in the habit of building anything higher than three stories. This bye-law is meagre enough, but let us apply it to the case shewn in the photograph.

Assuming the present width of the old psssage round the new building site to be about 6 feet wide, then the new passage would have to be 6 ft. + $(\frac{24 \text{ ft.} - 6 \text{ ft.}}{2}) = 15$ ft.

But such horrible contraventions of sanitary building as those shewn in the photograph were not known in England, and would have been prevented by public indignation.

Under the 1875 Act, the bye-laws do not mention light angles, but imply and obtain them in this regulation as to back space for domestic buildings :—

"If the height of such building be fifteen feet, he shall cause such distance (width of open space) to be fifteen feet at the least.

"If the height of such building be twenty-five feet, he shall cause such distance to be twenty feet at the least.

"If the height of such building be thirty-five feet, or exceed thirty-five feet, he shall cause such distance to be twenty-five feet at the least."

In these cases, the angle varies from 45 degrees to 55 degrees, and refers to back space, and as two back spaces usually meet in English building, the 55 degrees is a fairly seldom occurrence since 1875.

Side space is rarely in question in Europe, owing to the universal practice of continuous frontage.

No one pretends that these 1875 bye-laws are still up-to date, and numerous cities and towns of England have drafted and obtained Government sanction for better sets of bye-laws; but, had the 1875 Act bye-laws been applied to Calcutta and Bombay, and been enforced, these two great slum cities, as we know them to-day, would not exist, and their real death rates would probably be 80 per cent. less than they are to day.

Calcutta and Bombay should not follow each other.

Considerable harm seems likely to occur, from Calcutta following as good the example of Bombay, and vice versa, from Bombay taking Calcutta as an up-to-date example.

Because a 63½ degree angle enters officially into the Calcutta bye-laws, a 68 degree angle for façades full of single room family dwellings, is being advocated for Bombay: yet the frightful condition of Bombay is very much the same as that of Calcutta.

The following are quotations from a lecture by the Hon. Mr. J. P. Orr, C.S.I., I.C.S., Chairman of the Bombay Improvement Trust, delivered at the Bombay Sanitary Association, on 27th June, 1912.*

"An unobservant stranger driving through the main streets of Bombay† may form the opinion that there is nothing very wrong in the lighting and ventilation of Bombay houses; but he must leave the main streets and walk into the side streets and gullies, and the deep houses running back from them in order to get an idea of the conditions under which the poorer classes of the community live. Front rooms are mostly well lighted and ventilated, but a very large proportion of back rooms and side rooms on all but the topmost floors are grossly insanitary from various causes, but chiefly through defective lighting and ventilation."

It is unfortunate that side rooms and back rooms are more numerous in Calcutta than are front rooms.

Mr. Orr then describes some of these houses :—

"The mere perusal of these notes and study of the plan attached, and of the model of these four houses on view in the Improvement Trust Office cannot give the reader an adequate idea of the sad conditions of life in these four chawls; fully to apprciate them, he should visit the chawls and inspect each room. The internal passages, even in bright weather, are so dark that one stumbles over children squatting in them. The external gullies are so foul smelling, that one is not surprised to find the windows opening into them all shut. One hears sounds and, lighting a match, sees on the walls and floors signs of spitting which shew how tuberculosis is spread in these dark foul dens. And yet these chawls have been built so as (first) not to break any provisions of the Municipal Act and old bye-laws: and that they are at any rate up to the average of chawls in the neighbourhood, may be gathered from the fact that the owners are able to keep them occupied at rent varying from Rs. 3.8 to Rs. 5 per room."‡

"This state of affairs is found not only in Old Town and New Town, but as a glance at the survey plans will shew, in large areas all over the city, differing from the Old Town and New Town only in that the house sites have not been so regularly laid out, so that there are many bends and awkward corners in the intermediate gullies, which are consequently in an even more hopelessly insanitary condition than those of Nagpada, and must be a most dangerous source of infection to all who live in the dark rooms which abut on them."

Mr. Orr writes very earnestly and forcibly. His paper is a most valuable contribution, and would be of great service to those who may draft standard rules for slum reform in Calcutta. What he writes of Bombay

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* See Exhibits.

† (or Calcutta.—E.P.R.)

‡4s. 8d. to 6s. 8d. per room, per month, a very high price for India. Calcutta conditions are much the same

might be repeated almost word for word about Calcutta. The writer received Mr. Orr's paper only after this section of his own report had been written, and all references to this paper are additions and intercalations. Mr. Orr's paper is published in Vol. II of the Second All India Sanitary Conference (of November, 1912) Simla, price Rs. 2. (See Exhibits.) He advocates slum-repair and reform work in Bombay very much on the lines of Part II, of the 1890 English Act and its Amending Act of 1909.

It was, however, a great surprise to the writer to find that an angle of 68 degrees was advised as the ruling factor of the work, on the ground that a 63½ degree angle "has long been enforced upon Improvement Trust Estates, and which is also now enforced under Municipai Bye-laws all over Calcutta, and in most of the important towns in England."—the writer has made enquiries at Birmingham and elsewhere, and has received much confirmation that no 63½ degree angle is mentioned in any English bye-laws except in the 20 year old London Building Act, and that the maximum angle aimed at is 45 degrees. The slum conditions resulting from the application of 63½ degrees or 68 degree angles applied round dwellings are only found in the worst slums of the most tightly built-up old city centres of Europe and America, now all in rapid process of improvement; and the writer thinks a mistake has been made, for 68 degrees would legalise the further production of slums, and would make permanent an excessive death rate

As regards the 63½ degree angle mentioned in the London Building Act of 1894, it relates solely to back yards, and the manner of its application doubles the width obtained by single application of the angle. It applies to cases where the back of two rows of dwellings are opposite to each other. The angle is measured from the centre line of the open space between the buildings, and there are thus *two* 63½ degree angles between the façades.

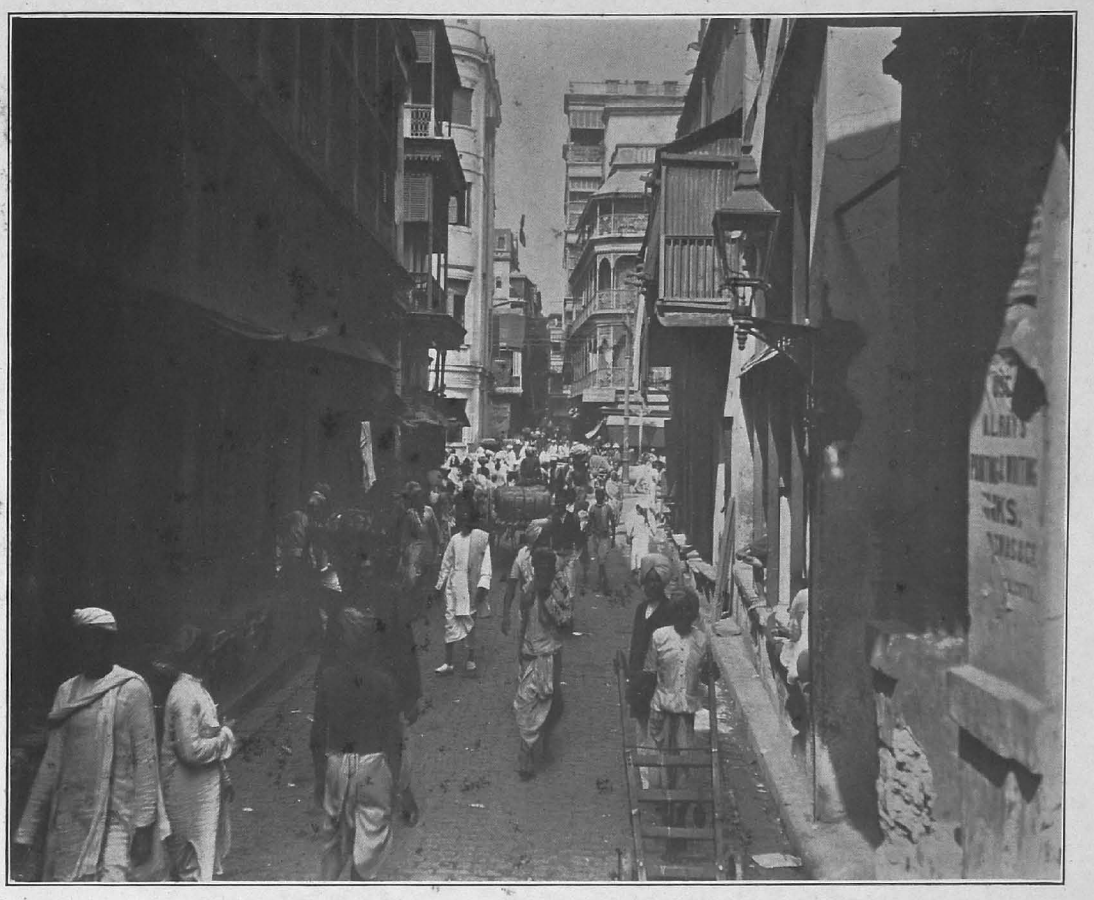
The point for Calcutta is, that in slum-reform work, the minimum ordinary standard angle should be 45 degrees, which is quite bad enough; and the minimum under unavoidable circumstances, should never be greater than 55 degrees, but this last is very retrograde and backward compared with the angle obtained in all up-to-date cities of the world. Birmingham is letting light into her reformed slums at from 30 to 45 degrees.

The slum conditions of Bombay and Calcutta are iike a desperate disease, and to apply a 63½ degree or 68 degree rule will, it seems to the writer, only be playing with the disease. The mere fact that the *reform* angle is put at 68 degrees points to the very terrible condition of the slums in question.

We cannot afford ut ordinary remedies, at least, must be applied. At the same time, in comparing the two cities, it may be pointed out that Bombay is built on a series of islands that very seriously prevent her expansion. Calcutta on the other hand has much flat land in the vicinity that is already, or can be made, fit for building on.

Height limits and real Bye-laws are needed.

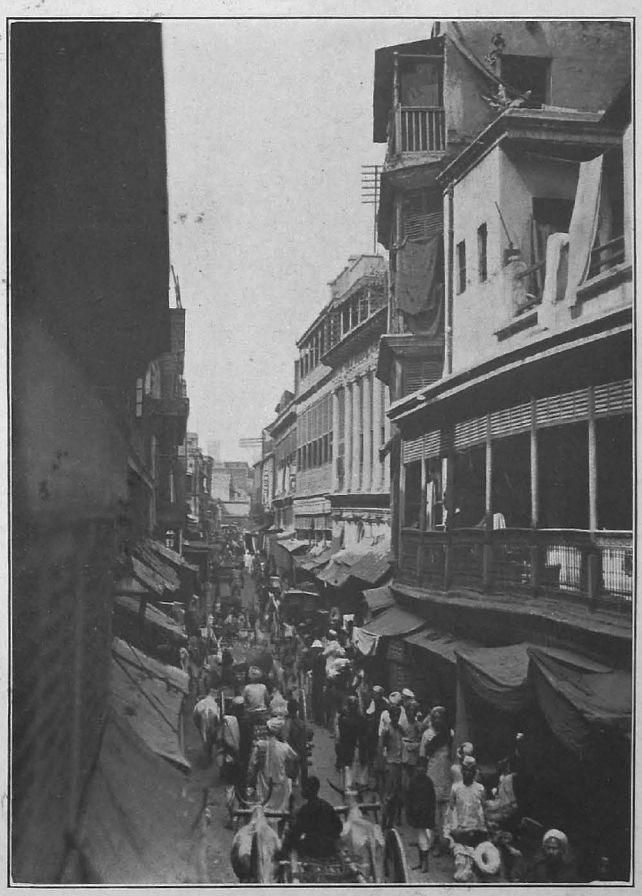
The standard of improvement in Bombay with its greater limitations and difficulties, should not be taken as good enough for Calcutta.



Typical 'Street' opening from Harrison Road: looking north. Harrison Road crosses in middle, tram standard marks centre. Light angle between fairly new buildings, about 80°.



View through gully-passage between comparatively new chawls in Harrison Road. Taken at noon on bright day: standing in Cotton Street and looking towards Harrison Road. Shops line each side of ground floor: numerous living rooms face into this crevasse. Light angle 85°.



Cotton Street, another view, looking south. Writer stands at crossing point of proposed Inner Strand Road.

If it may be said without offence, it seems plain that both Calcutta and Bombay should not look to each other for guidance and example, but should rather draw experience from the far more highly advanced cities of other lands. American and English cities are both taking their town planning ideals from the cities of Germany, Italy, and other countries : not from each other. Germany and Italy have taken their new ideal of 'one family one dwelling' from England.

It is perfectly well known in Europe and America that the death rate has a direct relation to the light angle. The higher the angle the greater is the foulness of the air, the greater is the misery, and ill health ; the higher is the death rate : and the lower is the type of citizen produced.

Abolishment of Chawls.

An important point in framing any bye-laws for Bombay and Calcutta, would be the total abolition of the chawl as it now exists, and as it is proposed to be erected on the cleared site of the Chitpore-Halliday Scheme.

At present it usually has four external sides all crammed with dwelling rooms. The front rooms are fairly well lighted, sometimes they are even well lighted and ventilated ; but the back rooms are almost always badly vitiated by a 63 degree to 80 degree light angle, and its accompaniment of no real air space. The external side rooms are worse, and are often scandalously dark and unfit for habitation, and look out into one of the deep dark slits that separate chawls. The internal court is often from 50 to 60 feet deep, and is really a deep stagnant air-well. It is of no real use for ventilation purposes, and has a light angle often of 70 degrees. It is as a rule full of doors and windows.

The object of the chawl in shape and design is to make for its owner, absolutely as much money as possible per square foot of land and per cubic foot of building.

It is the only kind of new building that can house poor people on dear land at a high profit.

The chawl only benefits its owner ; and that at a gross permanent loss of public health, happiness, and moral welfare : and at the immediate cost of about 350 per 1000 of all children born in chawls.

The four-sided chawl must go if Calcutta and Bombay really mean business, and it must be replaced by what has been found the only sensible dwelling-system in the building areas of great cities, i.e. the contiguous building system, in which efficient air, space, light and ventilation is given by doing away with all side windows, side rooms, and side gullies and passages, and having only front rooms and back rooms. Where internal courts are allowed, they are very large, and really do admit light and air. Ninety-five per cent. of the buildings of Continental, English and American cities, in their building areas, are arranged contiguously. This system quite does away with the possibility of the long deep dark insanitary house of

India; it makes impossible the 70 ft. slit-separated chawl, and makes essential a good thick regular network of proper streets. Among the exhibits, the plans of poor parts of London shew clearly the advantageous effect of contiguous building in the central areas of cities.

The chawl and its varieties are all slum dwellings. The big tenement buildings of America and the Continent, especially of Berlin, are glorified chawls, often handsome and well built, but they produce the increase in death rate over the English death rate, and the Germans and Americans have begun vigorously to prevent their further development. The recent supplementary town-planning decree granted to Milan (Italy) includes compulsory development of the single-family dwelling, and condemnation of tenements, and every variety of tall flat.

Slum sites re-sold for housing purposes under the present bye-laws of Calcutta, can only be made to pay highly, at the expense of public health, i.e., by cramming them with high chawls.

One simple way of obtaining some improvement is to put a strict absolute height limit for building on every area re-sold by the Trust.

Absolute height limits are urgently required in *all* parts of Calcutta. Height limits constitute a simple means of preventing bad conditions being made worse. The higher the buildings, the more people are crammed on to each acre, the more congested are the streets, and the higher is the death rate. The writer has not included a height-regulation-plan in this report, but the production of such a plan is a fairly simple matter, and among the exhibits are some admirable examples from Cologne, Vienna, and elsewhere.

New powers then, are required by the Trust and Corporation, first by the Trust, who would in due course hand them on to the Corporation.

The chief requirements of fresh power to deal effectively with the enormous slum problem of Calcutta and prevent the existing further growth of slum and over-building both in Central and Suburban Calcutta are:—

(1) Power to exert vigorously the 'slum-repair' system.

(2) Altogether better buildings-and-street byelaws that will promote contiguous building, abolish the chawl, and obtain a good light angle.

(3) Suitable height limits over the whole of Calcutta and suburbs.

(4) Suburban control.

In the estimates given at the end of these chapters on slum reform it is shewn that 'slum-repair' will be required in at least 650 acres, and that the cost, with staff, works out at about 98½ lakhs, or say £657,000.

If we had the money, we could easily spend twice this amount, with twice the benefit.

Details of staff needed may be given at once.

Allocation of Trust Funds to Slum-repair work in Calcutta, Proposed Health and Housing Staff. Establishment Expenses, 12 years' work.

Staff (*a*) Medical.	LAKHS.
One British Medical Officer (young preferably, to stand the work in the slums.) Average pay during 12 years, Rupees 1,500 per month, × 144 months	2,16,000
One Typist-clerk for notice work and correspondence. Rupees 120 × 144 months	17,280
One Clerk for notices and records, etc. Rupees 100 × 144 months	14,400
Staff (*b*) Building Survey Staff.	
Two first-class experienced British Building Inspectors to be in charge under Medical Officer, of the actual work, average pay, Rupees 750 = 1500 × 144 months	2,16,000
Two good draftsmen for making plans of obstructive buildings, interiors, and proposed improvements, etc., at Rupees 150 = 300 × 144 months	43,200
Eight Indian Building Inspectors, four under each European inspector, to supervise repairs, sanitation, demolition, new paving work, etc., at Rupees 150 = 1200 × 144 months	1,72,800
Two Typist-clerks (one for each chief inspector) for correspondence, specification, and contract work, records, etc., at Rupees 120 = 240 × 144 months	34,560
Twelve good able bodied Peons, at Rupees 14 = 164 × 144 months, say	23,600
Allow for office rent, stationery, printing, educational prints and pamphlets, reports, etc.	50,000
Allow for legal advice, court expenses and contingencies	50,000
Total Lakhs	8,37,840

Say 8½ lakhs or say £57,000.

If this staff, or the prices, are cut down, then the work done will be correspondingly affected, and there will be a constant procession of men leaving the service of the Trust, and a constant accession of new and inexperienced men. The work will be very arduous, very unhealthy, and very unpleasant; but it will be exceedingly beneficial to the city, and is the sole practical method of Calcutta slum improvement on a big scale. The writer estimates that with such a staff, a big hole would be made in twelve years in the 600 odd acres concerned—if reform were not finished by then, the Calcutta Corporation might well take over the remaining work to be done by the trained and experienced staff.

Dr. Robertson of Birmingham has given the writer valuable assistance in discussion of slum-repair costs, and in obtaining various analyses of Birmingham costs, and thus enabling the writer to calculate the probable cost of Calcutta slum-repair. It is of interest to know that Dr. Robertson has visited Calcutta and penetrated into the great slum areas known to comparatively so few Europeans. It was agreed between the writer and Dr. Robertson that slum-repair in Calcutta will be much more expensive than in Birmingham, because of the greater height and density of the buildings. The cost of slum-repair work in Birmingham has been so far about £600 per acre including staff and all expenses. The writer estimates that a moderate effective measure of slum-repair in Calcutta will cost about £900 per acre without staff costs.

There are many serious aspects to be considered in slum-repair work, the most important being perhaps the speed of accomplishment. The house famine in Calcutta is far more acute than it has ever been in any English city—and in consequence slum-repair work and the temporary or permanent closing of bad houses will depend very much on progress with housing outside the slums. This fact is also an additional argument alongside others pointing to the absolute impossibility of dealing with Calcutta slums by the demolition system. Yet this is the only method contemplated in the Calcutta Improvement Act. The following quotations are given from a large collection made by the writer :—

From the "Housing Handbook,"—Alderman THOMPSON. *

'ALL THE WORKING CLASSES AFFECTED : NOT MERELY THE POOREST POOR.'

"It is plain, therefore, that a very large increase in the supply of all kinds of sanitary housing accommodation for all grades of workers in all parts of the country, is the only measure likely to have a material effect in lessening the evil. Other alternatives have been tried and found to be mere expensive tinkerings with or repetition and aggravation of existing bad conditions. Many persons advocate demolition of insanitary areas and closing of unhealthy premises as the first and proper steps to be taken. They would be, however, decidedly injurious to the welfare of the poor, and detrimental to continued action in the same direction, until some proper provision is made for rehousing the persons thus displaced."

'DEMOLITION IS COSTLY : AND USELESS WHERE THE HOUSE FAMINE PREVAILS.'

"It is now notorious that the closing or demolition of houses under secs. 32 to 39 of Part II of the Housing of the Working Classes Act, 1890, and the clearance of insanitary areas under Part I, of the same Act, by restricting still more the already inadequate accommodation, have tended to increase overcrowding in other houses, to force up rents, and to scatter up and down among the dwellings of the industrious poor elsewhere, all the bad elements, habits and diseases, moral and physical, that

* Chairman of the National Housing Council. He writes thus of conditions that are well nigh idyllic, compared with those of Calcutta.

are generated and fostered in the worst slums. Hence, while the plague s pots have disappeared, and the disease has lessened, in local intensity, the general sanitary condition of the district as a whole has not materially improved for any length of time."

"Another, and absolutely fatal, objection to continued precedure with improvement schemes under Parts I and II of the Act of 1890, is their enormous cost. Apart altogether from the usefulness or otherwise of doing their duty in this respect, local authorities dare not do one-tenth of what is considered necessary for fear of overwhelming the already much burdened ratepayer. The Metropolitan Board of Works spent £1,500,000 in merely pulling down old houses. The London County Council is spending £1,114,800 in clearing insanitary areas, at a cost of from £50 to £70 per head of persons displaced, or from £300 to £500 for each family. Manchester has spent £152,623 in displacing 2,635 persons: Greenock £127,500; Douglas £80,000; Dublin £50,000. Swansea's schemes have cost £3,288 per annum, and Wolverhampton's nearly £7,000. Liverpool, in ten years, has diminished accommodation by pulling down 4,200 houses and only building 830."

"It need scarcely be added that the expenditure of these large sums of money in buying up slum property* has greatly increased the value of the remaining slums, which will cost more to deal with in their turn, and it has encouraged the development of a new industry, viz: the buying up of property in insanitary areas in order to reap a rich harvest of compensation from the municipal pocket."

* For demolition schemes.

CHAPTER XVIII.

HOUSING AND RE-HOUSING MORE ESPECIALLY IN DIRECT CONNECTION WITH SLUM REMEDY.

1. **Re-housing required in Central areas on sites of demolished slums**—Such housing is an expedient only, but is essential in the gradual improvement of backward cities—Block-dwellings are not productive of good citizens—their day is over in all advanced cities—Trust must set good example by building a few exemplary chawls—the greatest good will be obtained by by re-selling cleared slum sites subject to strict building bye-laws—this is very essential but will cost us half-a-lakh an acre—Details of building bye-laws—the present new chawls of Calcutta are a disgrace to any city—they must not be allowed to go on making more bad conditions—Some housing opinions.

2. **Re-housing by purchase, renovation and re-letting of old substantial buildings in the slums**—Has been successful in past in English and Scottish cities and would be valuable in Calcutta—is only an expedient—with full development of suburbs and tramways these buildings become empty—experience at Glasgow, and Camberwell (south London).

3. **Housing and Re-housing by rows of cheap contiguous single-family dwellings on cheap land**—This is the best means at Calcutta of decently re-housing the 'poorer classes'—Madras work and costs—Calcutta costs—to be on safe side writer allows for dead loss on land purchase for this valuable work—nevertheless he believes this form of housing will pay its own way.

4. **Housing by cottage flats**—would be valuable—but would be used mostly by Eurasian and better class artizans and people—will pay its own way—belongs more directly at Calcutta to suburban housing questions.

5. **Housing by suburban development**—is done effectively by comprehensive city-planning with main road and rapid transit provision—quickened by cheap long loans to good building societies.

(1.) Re-housing required in the central and built-up areas of the city, i.e. on sites of demolished slums.

"Housing Up to Date," by Alderman W. Thompson.
"The Housing Handbook," by Alderman W. Thompson.
"Practical Housing," by J. S. Nettlefold.
"Modern Housing," by James Cornes.

The writer forwards with this report, a very large amount of selected typed matter dealing with every phase of housing problems, especially as affecting Calcutta. Had there been time, these would have been printed in the report, or as appendices. They will be found among the exhibits in separate covers, each with a description title on the outside.

The finest continental book on Housing is the "Handbuch der Wohnungswesans" (second edition) by Prof. D. Eberstadt. (G. Fischer, Jena).

We have seen already that the Improvement Trust cannot possibly afford to do anything more than a small sample of exemplary chawl-building on cleared slum-sites, and in the previous chapter we have dealt with the

light-angle as regards slum-repair work. The housing work to be done by the Trust on two acres of cleared slum, and by private builders on 40 acres of cleared slum may now be discussed.

The older accomplished housing and rehousing schemes of Great Britain* include mostly "large tenement-buildings," resembling chawls, practically all have been built on or close to the cleared slum-sites, at a more or less heavy financial loss. These huge flats have been erected in compliance with the British Housing Acts, (and especially of Parts I, II and III of the 1890 Act,) which require that rehousing shall be accomplished on or close to the cleared site of a slum.

It may be said at once, that a strong, large, and very rapidly increasing body of opinion throughout Great Britain, is dead against the erection of any more of these 'tenements' and chawl-like barrack dwellings. Their day is quite over in England. It is seen most clearly not only in Great Britain but throughout Europe and America, that such dwellings do not make good citizens and are especially bad for children and family life, and further, that any policy of erecting dwellings in European and western cities at a loss, is to-day absolutely unsound. It is the policy of housing poor people on rich land. The revulsion from the tenement dwelling, with its appalling cost when on slum sites, its hideousness, its squalor, and its death rate, has played no small part in developing the town planning and garden suburb ideas throughout England.

So long ago as 1905, Mr. James Cornes wrote in the introduction to his big book—"It is evident that a new type of dwelling for the working classes is necessary, but it is, at present, exceedingly difficult to say how the great problem, which is well worth the attention of the leading architects of the present day, is to be solved."

In Calcutta to day, we are a long way behind the housing condition of English cities in 1905, and it has therefore seemed to the writer that improved tenement dwellings erected by private enterprise under Trust conditions, are an unavoidable expedient,† and must appear in due course on a proportion of the cleared slum sites of Calcutta. "We are in the transition stage between slum-land and better things" wrote Cornes, but in Calcutta we are right in the middle of a huge slum-land and have only just begun to make an experimental small move towards better things; and in our case what was said of public housing in other cities many many years ago is strongly and exactly applicable in the Calcutta of to-day. "Abundant justification has, however, been proved for municipal intervention (by tenement block building) especially in such densely crowded cities as London, Liverpool, and Manchester."

The block dwelling is an expedient, and seems to be an unavoidable necessity and stage, in the gradual improvement of Calcutta. The block dwelling is still doing its transition work in England, but it has ceased to be a necessity, and within ten years from to-day, we may expect to see them rapidly emptying of tenants by reason of the garden suburb, workmen's

* Britain is easily the first country in the world in all housing experiments, successful and unsuccessful, and is the best housed country in the world. Continental countries lead in town-planning.

† But the less we can do with, the better.

suburbs, and the more rapid transit that will then be in existence. The English Corporations will then very likely quite recoup their old losses by selling the tenement sites for business use.

In Calcutta that day is still a very long way off, and we must use the tenement building as an aid in relief of the housing famine, and as a necessity inseparable from new main road work in congested areas—but we have the opportunity to put up better chawls, and bring better dwellings into being by private enterprise, than have ever before been put up in India. In the long run we shall be amply justified. The death rate will be decreased, and when the grand-children of the present chawl dwellers at length live outside in the suburbs, then the value of the sites occupied by the improved chawls will in all likelihood very fully recoup the loss of their original creation. In any case, life is worth more than money. The cost of a far better type of chawl will not be felt in any way by the ratepayers of Calcutta, and the advice and exhortation of the Saxon Government Edict in 1901, to German towns, is sound and applies to Calcutta and every town.

"They (Corporations and City authorities) must abstain from dealing with their property on strictly commercial principles and seeking only to make profit, the gaining of which should be subordinated to higher aims."

It is our genuine *business* to set a good example. Example is effective, precept is not. The example of Birmingham and other authorities in erecting good and artistic cottage dwellings has had a quite unforseen result—it has automatically raised the whole tone of house building done by private builders in Birmingham, and the same has occurred elsewhere. We may reasonably expect the same result in Calcutta chawls, if the Trust does the required exemplary building.†

To-day in the most advanced cities of England, Belgium, Italy, Germany and America, only (1) Housing schemes that will support themselves, and (2) The 'single-family dwelling,' should be and are being considered by city authorities. But to-day, in Calcutta, we are by a long way not as far advanced as that, and we should even at a loss, provide on our cleared slum sites a certain minimum amount of really good and drastically improved chawl accommodation. We shall only be following and improving on the methods found necessary in years past by all the level-headed-authorities of English, German, Belgian and other towns and cities. The simplest, cheapest and most widely effective way of getting this better housing, is as stated already: —

(*a*) By leasing building land for private chawl builders—only on really good and strict conditions as to building.

(*b*) Paying for this better housing with a certain loss per acre in recoupment sales.

(*c*) In a smaller degree, by being prepared to get only two to three per cent* on money spent on the few exemplary-type chawls built by the Trust. This cost can be greatly lightened and far more work

† But the chief thing will be special byelaws, as will be shewn. We cannot leave anything to chance. Nor can we depend on possible enlightened action of private people.

* or nothing.

can be done, if powers are obtained to borrow 'housing-loans' from Government, for long terms at low interest, as is done so extensively throughout Great Britain, Germany, and Belgium.

Sites that have been cleared and resold by the Trust, would, if left without restrictions other than those in Calcutta building bye-laws, certainly be covered by new chawls of the existing bad type. They would no doubt, at the best, be built to give the very absolute minimum required in the defective city bye-laws as to light and air; and they might not with luck infringe the 63½ degrees light angle on two of their sides only. This improper chawl building will, unless the Trust stops it, certainly happen on the Chitpore-Halliday site—which is already being hemmed in to an increasing extent by crowded chawls that appear to be from 50 to 70 feet high.

The cleared site of this scheme is to be laid out with 40 feet streets. Then, if no height restriction is put on, we would in due course find a net of 40 feet streets, deeply sunk as it were between buildings 70 feet high. If the 45 degree rule is applied under the Calcutta Schedule XVII of March, 1911, then only from a level about 42 feet above the roadway would the general angle of buildings and walls begin to slope back. Looking down on the ineffectually improved and rebuilt site from a balloon, we would see the streets like deep trenches having but their upper sides sloped, and, in the middle of each big chawl would appear a dark square hole—this would be the internal well, supposed to supply an efficient amount of light and air to the interior mass of windows and doors. Separating the sides of these big blocks would appear dark slits, presumed to hide numerous dwelling rooms.

An altogether higher standard of chawl throughout the whole city is imperatively required in the best interests of the present and future inhabitants of Calcutta. No weak incompetent or interested quarter or half measures will do. The life, morale, and training of a million people will be affected in but the next ten years, by what is done. The minimum chief reforms should be:—

(i) **In 40 feet streets.** At least the 45 degree light angle to be applied throughout all streets, and at their corners.

(ii) Absolute limit of height to 45 feet; and then must not have more than four stories, top storey to be set back at 40 degrees, from the 40 feet height and level.

(iii) Chawl-wells and courts in no case to have a light angle of less than 50 degrees applied to every side.

If containing windows and doors that are the sole light and air supplies of dwellings, then the light angle to be not less than 45 degrees. Every well or internal court to have two gateless and doorless openings into them at the bottom, each opening to be not less than one-ninth of the court area.

(iv) All back space of chawls to be regulated in direct ratio to their height, the regulating light angle to be not less than 50 degrees.

(v) All spaces between chawl-sides that contain dwelling-room windows or doors, to have widths in direct ratio to their height, i.e., the regulating angle to be not less than 45 degrees.

The above regulations would produce decent well-lit and ventilated buildings, though by no means up to English standards for new work. Rule (v) would strongly promote contiguous building, and would largely do away with the well-court, and quite do away with the abominable slit-passage.

Taking the average cost of acquisition, demolition and resale at one lakh an acre, the writer has calculated that the extra cost incurred by the above much needed reform would be about half a lakh per acre: and that the population that can be crammed on to an acre by the present builders of new chawls in Calcutta would be reduced from 300 to 600 down to about 150. One hundred and fifty people per acre is quite far enough from the ideal, but is the best we can expect to get in built-up Calcutta. The loss of half a lakh would be the approximate reduced selling value of the land. To landlords it would represent £250 to £350 less rent per annum per acre. The Trust write this off by a sale loss of half a lakh an acre.

"Death rates rise and fall mathematicaily with the number of people per acre in towns."

The suggested reforms would give the children space to play in, and would reduce the number of children, so that they would not be over-crowded. The writer recollects going one forenoon into the court of a big new Calcutta chawl and finding about twenty small, sickly-looking children playing languidly in a gloomy semi-light. The paving was damp, and the square of sky was 60 feet above one's head, the air was still and stagnant, and all internal balconies round the deep well were hung with beds, rags, and very slowly drying clothes. The sunshine would only reach the bottom of this hole for about 1½ hours in the day in the tropical midsummer. The only opening into the place appeared to be the comparatively small doorway by which the writer had entered from a street far too busy and crowded to be a play-place for the unfortunate little children.

"The large chawls in Bombay of 4, 5 or 6 floors separated from one another by narrow gullies and containing 200 and 400 rooms with a population of several hundreds of people living under the most insanitary conditions as to air, space, and light and the presence of filth inside and around the rooms, constitute in themselves a source of danger to health, and when the outbreak of plague or other infectious disease occurs, either by being introduced by human agency or animal agency, dust or filth, the disease will spread rapidly amongst the inmates who are huddled together in a very limited area in contravention of all sanitary principles, and when once the disease gets its foothold it is difficult to displace.

"The occupation of chawls of many floors and rooms is opposed to the habits of the people of an Eastern city. The people cannot be supervised or regulated. Every room in a house is occupied generally by more than one family. All the refuse and water is thrown out into the streets and gullies; intercommunication between families when infectious disease occurs is impossible to control; isolation of an infectious disease is impossible."

" . . There are some 37,930 buildings in Bombay, 53 of these (each) contain 400 persons." *

The chawl-habit is growing fast in Calcutta, it should be nipped in the bud, or *at least, at the very least, be so carefully regulated as not to become another great evil.* The frightful example of Bombay should not be followed, but should be most perseveringly avoided.

The extra cost due to loss on re-sales caused by conditions as to height limit and better light angles, etc., is included in the estimate allocation at the end of the section on slum reform.

We may conclude these notes by quoting two or three from the hundreds of pronouncements made by experienced men, on tenement block-dwellings that are every one far and away better than the Bombay and Calcutta chawl.

"The width of the street should be the factor determining the maximum limit of height to which buildings can be constructed. If we get the street widths, we get—or should get—the building height limit automatically.

"The usual European regulation is that no building shall exceed such height that any part of it shall cross a line drawn from the middle of the street to the top of the building an angle of so many degrees. The angle varies in different cities, but is most often forty-five degrees."

MULFORD ROBINSON.

"GROWING FEELING AGAINST BLOCK DWELLINGS."

"Unfortunately the block type of dwelling is erected only too frequently, even in these new suburbs, although there is a world-wide tendency on the part of housing reformers to urge the abandonment, as far as possible, of this type of dwelling (which simply warehouses the people) in favour of self-contained cottages, or at least cottage flats."

"Dr. Fuchs, of Freiburg, a well-known German housing expert, only expressed the general opinion of the recent large International Housing Conference at Dusseldorf, when he warmly approved the stand being made in England against the block system, which has produced such injurious effects in continental cities."

"Mr. Robert Hunter, who has gained large experience as Secretary of the Chicago Tenement House Commission, is equally strong, in condemnation of the American blocks. He says in a recent letter :—

> "The sky-scrapers and the tall tenements are a creation of the devil. However they may be arranged, I can never see anything in them except a menace to the best family life and normal natural living among the people. I hope that you will do everything to prevent their growth in England."†

* Dr. J. A. Turner Executive Health Officer, Bombay, in his paper "Housing of the Working Classes in large cities in India."

† [They are knocked on the head all right in England.—E.P.R.]

"HOUSING LESSONS FROM OTHER COUNTRIES." (1903.)

"England has not very much to learn from either American or continental examples in the matter of the housing of the working classes, as a glance at the death and disease rates of the great cities in those countries will quickly show. There are, of course, several striking exceptions, especially in the case of Germany, but speaking generally, the standard of domestic sanitation and of housing accommodation is lower in foreign countries; the type of dwelling in many small towns, as well as in nearly all large cities, is almost wholly confined to blocks of four or more storeys, and the number of rooms per family * is consequently unduly small."

"Improved sanitation, wider streets, slum clearance, and suburban expansion have, it is true, lowered the death rates of these towns enormously, but in spite of their highly organised medical and scientific staffs, appliances and activities, most of these are less healthy than London, while in proportion to wages, rents are as high or even higher."

"The double-decker tenement houses of New York and Chicago, are dearer and more deadly than London slums."

"Housing Handbook," Alderman THOMPSON.

"It is because streets are so largely depended upon to furnish light, air, play-space for children, entertainment and diversion, that they have been so often made broader than the traffic required, in spite of the economic sacrifice involved. For these reasons well-meaning persons have acquiesced and even rejoiced in an action which costs tenants dearly. But tenement quarters on a wide street† are not a correct social or civic ideal. We must try to provide the individual home on a more livable street."

"*When the tenement can no longer be prevented, the city must step in and say that it can be erected on no truly minor street—as no high building should be*; that it shall not exceed in height the width of the widest street on which it stands; that it shall cover no more than 70 per cent. of the lot area—every room opening upon the street, or upon a yard of depth sufficient to insure adequate ventilation, or upon a court of which the length and especially the minimum width, increasing with the building's height, shall be such as to give good ventilation."

"In most cities, probably, the proportion of lot which may be built upon can be put even lower than 70 per cent. There will be other restrictions of course, but of less direct concern to the present subject. Our best hope must still be that the shallow lot, the lessened cost of developing tracts for humble homes, owing to narrow and inexpensive streets, and the improved transportation facilities, which a well thought out system of main highways can afford, will make tenements unnecessary (save in occasional instances.) and therefore unprofitable."

"Width and Arrangement of Streets," MULFORD ROBINSON.

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* In Calcutta, it is too often 'families per room.'

† At Calcutta the whole city is moving unchecked towards high tenements on *narrow* streets.

"OVER-CROWDING ON AREA."

"Not only in the United Kingdom, but in most of the great cities of the world the people are over-crowded on areas as well as in rooms. This arises in two ways. In the first place, especially in England, an inadequate amount of open ground space is left round each building; and in the second place, by means of piling up rooms several storeys high, light is obstructed and the air is polluted much more quickly than it can be removed or purified. The latter system prevails more in Glasgow and in continental cities than it does in London, and this partly explains why Paris, with only 14 per cent. of its population overcrowded in rooms, has a higher death rate than London with 20 per cent. overcrowded.* It is a very significant fact than in spite of strict supervision, careful structural sanitary arrangements, and a picked population, the death rates in model block buildings in London is often as much as 30 per cent. higher than the average of all classes of dwellings in the adjoining county of Surrey, while deaths from phthisis, scarlet fever, and diphtheria have often been higher in these model blocks than the average of London slums and overcrowded rooms and old houses all included."

"Housing Handbook" (1903), Alderman THOMPSON.

"An American view on housing," by G. B. Ford. "After the city has spent considerable money in curing a person from the tenements,† they send him back with the instructions to get as much sunshine and air, knowing all the time that this sunshine and air is almost impossible to find. Little wonder is it then that the person again becomes a charge on the public. If the people were properly housed, every one agrees that quite a lot of this expense could be reduced. Capitalise this reduction and apply it to forming garden suburbs, or the scientific improving of tenements, and would it not far more pay for itself purely as a financial proposition? The main thing that the city, as a city, can do to help this, would seem to be the providing of adequate transit and transportation. So and only so can the city decentralise its dwellers; so and only so can housing reform be made efective."

"Town Planning Review," January, 1911

(2.) Re-housing by purchase, renovation and re-letting of old but substantial buildings in the slums.

This system empowered by sec. 59 of the 1890 Act, is in use at present in London, Glasgow, and a few other cities. We may give two examples here.

The Camberwell system is a combination of the slum-repair method with purchase and re-letting of houses after renovation :—

Procedure of the Borough of Camberwell.‡ [1906]. (Reprinted here by kind permission of Alderman Thompson.)

* On Calcutta standards they would not be considered in the least over-crowded. What Alderman Thompson would say of Calcutta I cannot conceive.—E.P.R.

† Barrack and flat dwellings.—E.P.R.

‡ S.E. London.

"The Housing Committee's plan which offered the best hopes of success, and the only possible means of providing the very poor with housing accommodation, at the low rents they are able to afford was :—

1. To gradually purchase house property in the area by agreement, as opportunity offered.

2. To demolish the worst of the old houses, and rebuild good cottages or flats on the site.

3. To adapt and put other houses into sanitary repair, by expending on whitewashing and repairs what would be landlord's profit over and above the return on capital outlay, which of course the *Council would require to provide.

4. To let light and air into the narrowest and most shut-in streets by removing obstructive buildings and making new thoroughfares.

5. To remove nuisances from the yards, and to prevent filth accumulating on the surface of the street, by putting down easily cleaned asphalt.

6. To make the pavements wider and plant trees at the side of the roads.

7. To continue to let the houses out to the poorest class of tenants at a very low rental, and under better sanitary conditions.

8. To endeavour to reduce sub-letting to a minimum, by making the Council as far as possible direct landlord to every tenant, thus getting a higher rental return without any increase on the part of the tenant.

In pursuance of this policy the Council has acquired an interest of some kind or other in just 500 houses, at an average cost of about £100 for the freeholds and £160 for the leaseholds. The total loan expenditure on purchases so far has been about £60,000. and the amount spent on adaptation has been about £6,000, which works out at about £45 per house dealt with, or £6 10s. per room, thus bringing the total cost of each six-roomed house to £300 freehold or £50 per room.

It will readily be inferred from these figures that the Council has done only a minimum in the way of adaptation and structural repairs, and as most of the houses are very badly built it would be extremely difficult to do anything in the nature of really effective structural re-arrangement or improvement, except at a greater cost than building a new house. Hence the appearance of the adapted dwellings leaves a great deal to be desired, and the Council are somewhat reluctant to enforce strict rules as to cleanliness on the somewhat difficult class of tenants they have to manage. It can, however, be said for the social results of the scheme, that the Council are becoming the owners of the area without displacing the tenants, and that as regards surroundings and simple sanitary accommodation, the people are 30 per cent. better off without having their rents increased, while the frequent cleansing and the improved standard of sanitation—poor though it may be—is having its effect on other adjacent properties belonging to private landlords.

* Council = Corporation.

"The Council has also widened the present footways of Crown, Hollington, and Sultan Streets, taking up the old paving and substituting asphalte for footways and roadways, and planting trees along the footpaths. Beckett Street, long notorious for its 10 feet roadway and insanitary houses, has now a roadway double the width and good sanitary houses have been built. Baily Street, a new 40 feet road, is nearly completed, and will open up the neighbourhood.

"The houses on the north side of Beckett Street were so bad that they were demolished. They cost £1,050 for the leasehold and £1,700 for the freehold, and with £750 for the freehold of an adjoining block, a site was provided for the erection of four houses of six rooms and two sculleries, or 24 rooms and 8 sculleries, besides 18 flats of two rooms and a scullery, or a total of 60 rooms and 26 sculleries. The cost of building by direct labour wae £3,403 or £57 per room, and 6·16 pence per foot cube.

"Financial results.—Assuming the cost of acquisition and subsequent adaptation or repair of the 571 houses to average £300 per house, the total cost of acquiring the area will be about £170,000.

"The first purchase of property was made early in 1902, and during the first two years the accounts showed surplus balance in hand, owing to the fact that only a few loans had been taken up in respect of part of the purchases, and consequently only a small sum appeared for loan interest and redemption. Moreover, during the first year no expenditure was incurred out of revenue for repairs, these being capitalised and spread over five years. The following is a short summary of the accounts during the five years to 31st March, 1906 :—

Income.	£ s. d.	Expenditure.	£ s. d.
Gross Rental	16,210 3 6	*Working Expenses*—	
Less—		Rates, Taxes, Insurance and Water 3,813 12 5	
Empties ... 1672 12 0		Repairs 15 per cent. on gross rents 2,192 7 7	
Irrecoverable Arrears ... 699 17 0		Repairs Fund 779 8 0	
Allowances ... 120 12 2		Management and Sundries 1,153 13 1	
	2,493 1 2		7,939 1 1
Total Income	13,717 2 4	*Loan Charges*—	
Deficit	*1,589 0 11	Interest ... 2,835 0 7	
		Repayment ... 2,589 6 10	
			5,374 7 5
		Ground Rents	1,992 14 9
	£15,306 3 3		£15,306 3 3

Glasgow Workmen's Dwelling Co. acquired old property many years ago, and converted and improved it into fairly good tenements.

The effect of rapid-transit on this work is of especial interest in bringing home to Calcutta the paramount need of main roads for rapid-

* The deficits from previous years bring up the total to £4,470, and a rate of ½d. in the £ has been recommended to wipe this out, instead of keeping the amount in a suspense account until the gradual acquisition of the properties, and the expiration in 1909 of some temporary loans improves the finances and wipes out the deficit.

transit. As regards passenger rapid-transit, Glasgow is better off than any other provincial great city of Great Britain (see Map with exhibits,) and these municipal tramways and city railways of Glasgow have much helped to undo the old central congestion.

Reprinted from Alderman THOMPSON's "Housing up to date," 1907.

> "The Glasgow Dwellings Company, described on page 216 of the Handbook, do not report quite so favourably on the adapted property. For nine years the Company paid a dividend of 4 per cent. to its shareholders, but in 1905-6 the dividend was reduced to 3½ per cent., owing to an abnormal loss by unlet houses. There has been a general depreciation in the market for property of this kind and in this position, owing largely to the effect of rapid transit by electric cars, in redistributing the population mainly to the outside of the city. The amount lost in bad debts has increased for the same reason."

It appears to the writer that the difficulties of applying this system are rather great in Calcutta, though they are by no means insuperable.

A rent-collecting and supervisory staff will in any case be required to run the new chawls and dwellings put up by the Trust. This same staff could manage any renovated and adapted dwelling property bought by the Trust and re-let to tenants of the poorer classes. It would seem unlikely that companies can be formed in Calcutta, as in Britain, to do housing work of this class with dividend limited to 5 per cent., but it would be a noble field for the labours of philanthropic and wealthy Indian gentlemen and others, willing to find the capital and manage the business with recoupment at 5 per cent.

In the final estimates and work-programme at end of this report the writer sets aside 4 lakhs for this purchase and reletting work.

Mr. Thompson in his two books (which also accompany this report), gives some very useful information, facts, and photographs, in connection with this system.

It has the merit of requiring a moderate capital to house a large number of people decently, also it has the great merit of paying its own way. Another advantage is that the house famine is not made more acute by the permanent closing up or demolition of bad houses, and that people are not displaced. The writer is of opinion that this system is well worth the attention of the Trust, but that private enterprise to bring it into being must not be depended on in Calcutta.

Powers to borrow from Government for long periods at low interest will be required before this system can be used. The 1890 Act of England should be consulted in this case: see especially sections 25 and 59, also the Amending Act of 1909 (important, see Exhibits.)

The British Government Treasury has in years past advanced loans to local authorities, for housing, renovating and re-letting schemes, slum improvement, slum-repair work, etc., at these rates:—

Under the 1890 "Housing of the Working Classes Act."

Loan period not exceeding 20 years, 3½ per cent. per annum.
" " " " 30 " 3½ " "
" " " " 40 " 4 " "
" " " " 50 " 3¾ " "

The existing terms of loans are now as follows :—

To Local Authorities, for the purposes of the housing of the Working Classes Acts, 3½ per cent. per annum, for any period up to 80 years.

To approved private companies, building societies or private individuals (security by mortgage on the property,) the terms are at present :—

4 per cent. per annum where repayment does not exceed 40 years.

4¼ per cent. per annum, where repayment exceeds 30 years, but does not exceed 40 years.

British Municipal Sewerage and Water projects. Government Loans are on security of the local annual rates.

3½ per cent. per annum, if repayable in not exceeding 30 years.

3¾ " " " " " 50 "

50 years is the maximum for this class of loan.

The British Government (Public Works Loan Commissioners) also loan money to approved building societies and individuals for the purpose of adapting or building workmen's and artizans' dwellings on special terms, i.e.:—

If the dividend is restricted to 5 per cent. then the Government lends money at the same rates as to municipalities. The amount lent to societies and others now runs into many millions of pounds. The Calcutta Trust should be empowered to borrow from the Government of Bengal, or from the Imperial Government in a similar way. This is dealt with more fully later on.

(3) Housing and Re-housing of the poorer classes by means of cheap single-story contiguous single-family dwellings, built by the Trust or private companies. The capital to be provided preferably by long-term Government loans at a low rate of interest.

The writer is convinced that this should be the chief manner of direct re-housing done by the Trust. It appears to be a sound policy. Such dwellings will rent well, and *on fairly cheap land will pay their own way.* They are excellent for children and family life, are easily supervised, and have very low death rates.*

The importance of these dwellings is made evident when we consider the fact that some 75 per cent. of the population of Calcutta belongs to the 'poorer' and poorest classes.

The writer does not pretend there are no difficulties in the way But a difficulty is a thing to be overcome. Unremitting search, examination, and acumen will be required in the selection of each site, for immediate use in the next few years.

Housing of this kind is separated very distinctly into two classes :—

CLASS (1). Housing unavoidably done on dear land, to meet the absolute necessities of the next few years. This must be done at a heavy loss on land cost.

CLASS (2) Housing done on cheap land in permanently destined working class suburbs. This can be done without loss.

CLASS I.

Contiguous single-family Housing on dear land.

Vacant land with street access and sewerage is at famine ebb and at famine prices all round Calcutta. These very serious conditions are due to the grossest neglect, during five or six past decades, of the most ordinary civic development. The barrack-dwellings now being erected by the Trust in a typical wet, squalid, streetless, disorderly part of the 'Fringe Area,' between Circular Road and Circular Canal, are being built on land priced at Rupees 500 per cottah, i.e., at about Rupees 30,000 or £2,000 an acre; a terrible price.

The Garden suburb at Hampstead is built on land that cost between £400 and £500 per acre. Re-housing of people on Calcutta slum-sites would cost £18,000 an acre *for land only*. The only sound policy is to re-house by single-family contiguous dwellings, on the cheapest land we can get; but, until we have vigorously developed large areas of land by means of a city plan, we shall have to re-house at a loss quite 20,000 of those people who will be affected by new main road-work in the city. First, as regards the kind of structures proposed :—

Mr. Bompas inspected a large number of dwellings of this type built at Madras under the writer's supervision. These were nearly all built on land owned by the Corporation,* or on land sold to the Corporation at a cheap rate by Government, and their cost is difficult to compare with a Calcutta estimate.

The average Madras single-storey dwelling for the poorest classes is composed as follows :—

	Internal clear dimensions.
One living-room	12 ft. × 8 ft. × 13 ft. high
One cooking verandah	12 ft. × 5 ft.
One open paved yard	12 ft. × 10 ft.

One washing place and tap in yard with screen-wall.
One entrance, via yard.

The walls are of brick in lime mortar, roofs of well-burnt country tiles on teak, floors of concrete cement rendered, and the walls were cement plastered for four feet up, and above that were lime plastered.

* Madras Corporation has definitely set out on the splendid policy of holding and getting all land possible.

The average cost of constructing each dwelling, including road work and drainage, was Rupees 380. Bricks, cement, lime, and labour are cheap at Madras. On the other hand rents are much more than correspondingly low. The rent of a really large first-class private house for Europeans, plus a fine big compound, is only from Rupees 180 to 300 per month. The rent of a good average house in Georgetown, two or three stories high, and containing several families in comfort, is only Rupees 100. The rents of the above Madras dwellings for poorer classes were rarely more than Rupees 2 per month, and mostly were only Rupees 1 per month.

In Calcutta, for immediate needs, the writer estimates that land may cost four times, and construction may cost even twice the Madras price, but rents will be four times as high.

If purchase of sites can be done privately and quietly by some trustworthy person, it is certain that suitable open or waste land in the near outskirts can be bought for less than Rupees 400 per cottah. But we will make an estimate at Rupees 400 per cottah, i.e. at £1,600 an acre.

Estimated cost of re-housing 20,000 of the poorest classes by single family one-storey dwellings.

In India, it is seldom possible, nor is it often necessary from a sanitary point of view, to provide more than one room for a coolie-family, provided that the one room is on ground-floor, and has proper adjuncts for children, cooking, washing, and privacy. One can sleep in the open air all the year round in most of India. Big ventilation and light-openings into the one family room will be kept open night and day provided such are designed to be rain-proof. The dry-paved open yard and verandah will be used for much sleeping. Death rates in the Madras dwellings were most satisfactory. It must be remembered that we are housing the poorest classes of the community, in a non-wealthy land.

The writer proposes to make the dwelling room 12 feet by 10 feet, and take the population at four per house. This gives 5,000 dwellings. To provide a good yard and verandah, decent streets, and a light angle of about 25 degrees, some 700 square feet per dwelling will be required as the minimum. Any saving obtained in land purchase should be put into increasing this area.

The cost of each dwelling will be approximately,—

Construction	Rupees	550
Add 15 per cent. for supervision and interest during construction, say	,,	83
	,,	633
Add for street-work, drainage, water and lighting	,,	113
	Rupees	746

or nearly £50 each.

7,500 dwellings at Rupees 746 = Rupees 55,950,00, or £373,000.

These dwellings will let readily to-day at Rupees 5 per month; and with the profitable rents from a few small 'Trust' markets, and a considerable number of small lock-up bazaars, the returns will be equal to Rupees 6 per dwelling per month. But wages will rise considerably in Calcutta; and during the life of these proposed dwellings their average rents will most certainly be Rupees 6 to Rupees 8, without allowing for profits from bazaars or markets. But let us assume a very moderate figure to be on the safe side when asking Government for a HOUSING LOAN at say 3¼ per cent. for 50 years.

Assume an average rent from all sources, equal to only 5 Rupees 8 Annas per dwelling and let extra profits from bazaars be set against 'empties.'

Then the return would be 7500 × Rupees 66 per annum, or Rupees 495,000 (£33,000) on a capital of say 56 lakhs (about £373,000) which gives a return of almost 9 per cent. without land-cost.

We have now to access the dead loss to be paid off for housing, on dear land, this first 20,000 of very poor people. The writer is of opinion that diligent search, and a free hand given to the Trust's informal buyer, will enable 120 acres of land to be obtained at Rupees 400 per cottah. The likely localities in which sites should be sought are numerous, and include Howrah, Cossipore-Chitpore, the Fringe Area, Entally, Gobra, Kidderpore, and West Kidderpore.

The dead loss will then be equal to 120 acres at Rupees 200 a cottah, or £800 an acre dead loss = £96,000, or say, 14½ lakhs of Rupees. This big item of *immediate* re-housing work is so important that the writer allots a total of **24 lakhs** to it, in order to cover all serious possible contingencies, such as non-grant of Government housing loans at low rates, or unexpected and exceptional difficulty in getting land, or filling the innumerable tanks for small open spaces, to allow more rapid progress with intra-city main roads and slum repair.

CLASS II.

Contiguous single-family dwellings built on cheap land.

Much of the working class suburbs that will be obtainable by a Supplementary Act should be devoted to this highly necessary method of housing.

At Calcutta, whole square miles should in due course be covered by working-class suburbs. The poorest and coolie classes will form 80 per cent. of the future population. Those suburbs should be as pleasant and decent as money and skill will possibly permit. Cheap land will allow 100 square feet per dwelling, instead of 700. The former will permit of a 12ft. by 10ft. living room, a good verandah and yard, a decent street-width, a light angle of 25 degrees, and segregation of the dwellings into blocks of about eight houses, with occasional curved blocks.

The suburb in the writer's vision is a humble but healthy and pleasant one, the best we can afford to do for the huge numbers of low-wage day workers, now squeezed into the slums and damp mud huts. These workmen's suburbs will be within reasonably short walking distance of the industrial areas, and will be places of clean white-washed walls and red-tile

roofs, with curved roads, overshadowed by tall palms whose stems take up but little room on the street edge. As often as possible there will be play-places and little squares. The Destination of Areas Map, and the Suburban Development chapters give more particulars.

The general development and execution of the city plan will gradually cure the building-land famine, and the rating of vacant land to be obtained by the Supplementary Act is of far greater import than might appear. If this clause be omitted, it will come to be bitterly regretted, for such a law has a wonderful effect in preventing that deplorable land-speculation-evil which has spoilt and injured so many cities. Granted the Supplementary Act, it will be possible to house 200,000 people, without loss on capital, in orderly, attractive, and wholesome working-class suburbs. One of the great social boons to be obtained by this housing, will be the much to be desired influx of humble house-wives. Half the 700,000 working men of Calcutta are now living separated from their wives and children—because Calcutta is the most homeless city in the world. The social and physical dangers thus caused, are very evident. and very great. The city swarms with prostitutes, and much vice is prevalent.

(4) Re-housing by 'Cottage-flats.' (*a*) Built on cleared slum-sites of the less expensive type. (*b*) On fairly cheap land.

The writer mentions this type of dwelling, but is rather of opinion that it is not very practicable or suitable for Calcntta needs—except for the Eurasian people, who should not be left out. In Europe it is, however becoming much more successful than the barrack-dwelling, both as regards finance, moral and physical effects.

We shall pay such tremendous prices for land in central Calcutta that we cannot, unfortunately, afford to put up on it buildings of only two stories. Our financial power is too limited. The cottage-flat might be represented in India by a two-storied chawl of particularly good type, but not built in central areas. Before the writer left Madras, a scheme of cottage-flats for Eurasians had been prepared and seemed likely to be sanctioned.

Professor Adshead shewed me numerous excellent cottage flats in course of erection or finished, on the cleared sites of poor and delapidated old cottage property in Kennington, a dense part of South London. In many cases, each little flat (although half are upstairs) had its own back garden. They are designed for tenants rather highly civilized, and drawing good wages. One street of double-storey flats was occupied almost entirely by waiters.

We have to cater much more for an altogether 'poorer class' at Calcutta. We have to devote all our energy and finance to meet the most crying evils, and although something of the cottage-flat type would be very welcome in Calcutta, we must it seems dismiss it more or less as not being an essential of slum remedy, and must class it rather with suburban development *per se*.

The average European cottage-flat is occupied by well-to-do artizans, and the average revenue returned on a capital outlay of £796,800, in cottage flats built on slum sites by English, Scotch and

Welsh Corporations, was 3.76 per cent, and the figure includes the actual cost of land, i.e., the cost is charged to capital outlay and nothing is written off.

This compares indeed well with the above bogus tenement return of 2.41 per cent. and the hopeless fact that the land was nearly all written down to "housing value."

The cottage-flat, or a two-storey particularly good chawl, is more what we may hope to see used by artizans in Manicktola, Howrah, Entally, and Kidderpore—where it would be built on land very cheap indeed compared with the value of cleared slum sites, and will not come as a charge on our £6,000,000.

(5) Increased Housing by Suburban Development.

This method is not quite so closely and immediately connected with slum problems. We are considering in this chapter the immediate re-housing required to permit the gradual remedy of slums to commence, and to allow of slum demolition, and cutting of new roads through this class of property.

The suburban problems are discussed further on, but we may, however, remind ourselves here that the chief objects of suburban development are :—

(1) To ensure a proper lay-out and general planning of the city and its main roads.

(2) To provide better and cheaper residences for *all* classes, by opening up and making fit in all ways, large new areas of land for building. This cannot be done in Calcutta until a Town Planning Act is obtained and certain main roads have been created and have been supplied with rapid-transit in the form of tramways.

Suburban and semi-suburban housing development in Europe, especially in Germany, Belgium and Great Britain, is now, and has for long been very much encouraged by Government loans to approved building societies, and to local authorities. At Birmingham the Corporation has loaned money to approved building societies.

We will conclude this chapter by glancing through one only of the hundreds of similar selections sent on with this report .—

ROYAL COMMISSION, LONDON TRAFFIC, 1905.

The "Housing Problem" as affected by the facilities for locomotion (i.e., by main roads, trams and other transit.)

"The evils resulting from slow and imperfect means of locomotion appear to us to be quite as serious from a social as from an economic point of view. As an illustration of this branch of the subject, we propose to deal at some length with the question of cheap and rapid communication as it affects the housing of the working classes."

"The evidence before the Commission appears to have clearly established certain propositions:—

"(1) That the overcrowding in the metropolitan area, which is admittedly a most serious evil, is, generally speaking, greatest in the central area, and tends to diminish towards the circumference. According to Tables furnished by the statistical and other officers of the London County Council it appears that the population per acre in the central area of London is 148, in the rest of the county (excluding North Woolwich) 54, in districts adjacent to the County (including North Woolwich) 16.6, and in the rest of 'extra' London 2.5. In every case water and open spaces are excluded from computation. Upwards of a million-and-a-half people live in the central or most congested area. The overcrowding, speaking generally, increases or diminishes in accordance with the density of the population per acre. In these calculations a tenement is deemed to be overcrowded when the occupants exceed two per room. Whether this be the correct basis or not is immaterial for the present purpose; it is, at all events a reliable basis for comparison."

"(2) That the average weekly rents for workmen's dwellings are highest in the central and most crowded districts of London, and tend to diminish towards the suburbs. The statistical officer of the London County Council states that in the central area, the average weekly rent of newly-erected working-class houses is 3s. 2½d. per room,* in the rest of the county 2s. 4½d., and in 'extra London' is 2s. These figures can, of course, only be regarded as approximate."

"(3) That the price of land in the central districts of London makes it impossible to re-house the working classes within those districts at rents which they can afford to pay without a heavy loss to those who undertake the re-housing. Also that the price of land a few miles out is still sufficiently low to admit of re-housing, without loss, at rents which the tenants can afford to pay."

"An illustration of the loss incurred by re-housing the working classes in the central portions of London is furnished by some recent experiences of the London County Council."

"In connection with certain street improvements, especially the formation of the new street from Holborn to the Strand, now in course of completion, the Council was required, under the Authorizing Act, to build workmen's dwellings in place of those that were demolished. For this purpose they bought the Bourne Estate, close to the site of the improvement. The cost was £201,107, being the commercial value. They were obliged to write this sum down to £44,000, its value earmarked for Artizans' Housing, and to debit the balance to the cost of street improvements. This was necessary in order to admit of charging rents within the means of the families to be provided for. Even after this writing down, they have had to charge rents of from 9s. 6d. to 11s. a week for a three-roomed tenement, in order to reimburse themselves for this artificially-reduced outlay. The buildings erected will accommodate 2,640 persons, and there is therefore a loss of very nearly £60 per head of the persons re-housed, and the whole of this loss falls upon the rates."

* Usually three rooms for each family.—E.P.R.

"About the same time the London County Council purchased some land at Tooting, which is accessible by electric tramway,* as well as by railway, in order to build workmen's dwellings. They acquired it at a price which required no writing down, and are now letting three-roomed cottages at Tooting at rents from 7s. to 7s. 6d. per week; the Tooting scheme is self-supporting."

"The following figures will show how it is that the one scheme entails a heavy loss, and the other entails no loss at all :—

"On the Bourne Estate, actual cost of land for three-roomed tenement	£454	4	0
Cost of building, etc.	£307	8	6
Total	£761	12	6
"On the Tooting Estate, actual cost of land for three-roomed tenement	£28	15	0
Cost of building, etc.	£234	15	0
Total	£263	10	0

* In Calcutta we want main roads first, and then tramways on them.—E.P.R.

CHAPTER XIX.

SUMMARY OF SUGGESTED GENERAL POLICY AND PROGRAMME OF WORK AND ESTIMATES AS REGARDS SLUMS AND RE-HOUSING.

SUMMARY OF INFORMATION RE SLUMS GIVEN IN FOREGOING CHAPTERS.

CHAPTERS XIII, XIV & XV.

The Slums of Calcutta—(a) compared with those of Western cities, are very many times more extensive, (b) composed of buildings of about one-and-a-half to two-and-a-half times the height found in Western slums, (c) contain only one-quarter to one-third of the open space found in Western slums, (d) have an infant mortality about three times that of European slums, and appear to have the highest infantile death rate in the world, (e) also the highest *recorded* mortality for tuberculosis. (f) Overcrowding, in Calcutta slums, appears to be the worst on record.

Evils of Slums—(a) They are the chief producers and spreaders in the world, of crime, insanity, disease (especially tuberculosis); and are primary causes of racial, mental, and physical degeneration, unhealthy conditions of mind, discontent, sedition, anarchism, and unhappiness. (b) They are bad for trade, and cause high wages for the poor amount of work done by ineffective human beings. (c) Educatively, they do quite immeasurable harm, by inculcating permanently and forcibly in tens of thousands of young children, dirty and insanitary habits and ways of life, degraded and perverted ideals, and familiarity with hideousness, squalor, misery and vice, until these become a second nature. (d) In a word, they, of all causes, produce by far the highest percentage of all bad, weakly, and useless citizens. (e) They are highly destructive of wholesome family life, and destroy very many more babies and children than do all other destructive agents put together.

***Origin of Calcutta Slums is mostly two-fold.** (a) Lack of efficient byelaws and their rigid enforcement both in the past and present. (b) Lack of main roads for rapid transit to external areas, and lack of suburban land preparation. (c) Also failure to overcome artificial and natural city boundaries.

CHAPTER XVI.

Remedy of Slums by acquisition, demolition and re-sale is so excessively costly, and the areas for reform are so great, that only a small amount of the very worst can be dealt with by this drastic method, which is, nevertheless, the sole method possible under the Calcutta Improvement Act.

CHAPTER XVII.

Remedy on the big scale required is only practical and possible by "slum-repair." (a) by compulsory or willing repair and improvement of houses by their owners; and (b) by the Trust closing and demolition of hopeless property, the removal of obstructive buildings, linking up and opening out of lanes and streets, formation of many little open spaces, paving and planting work. Powers to do this work are required by the Trust.

* Most slums owe their origin to precisely similar causes.

CHAPTER XVIII.

Re-housing must be done in advance of, or at least hand-in-hand with slum demolition and repair, and the creation of city roads. The best re-housing methods appear to lie in (a) control of improved private chawl-building on cleared slum sites. (b) A small amount of exemplary chawl building by the Trust, on cleared slum sites. (c) Purchase, renovation, and re-letting of old solid buildings in the slums. (d) A large production by the Trust, of one-storey contiguous cheap family dwellings on both dear and cheap land. (e) Indirectly by cottage flats and suburban development.

COSTS OF SLUM REFORM IN CALCUTTA, WITH ESTIMATES.

(a) By demolition and re-sale, including cost of good bye-laws for re-building.

It has been shewn that the net cost of this work is about 1 lakh (£6,666) per acre. But for this sum the land would have to be handed back to the chawl-builder under the present bad bye-laws of Calcutta—and to make this costly land pay a good profit, the chawl-owner will build 70 ft. high on 40 ft. roads. This will *not* be slum-reform, for it will only substitute tall, unhealthy, hideous, and crowded chawls for the present squalor and congestion. To prevent bad building on cleared slum sites we must sell the land under strict building regulations. These will lessen the height and density of the new buildings, and the chawl-builder will get a less profit. He will give less for the cleared sites, and the Trust will have to accept a lower recoupment to gain a higher standard of new-built city.

To be on the safe side, and to permit the imposition of really good building bye-laws, the writer puts the loss per acre at half a lakh. In other words, as a Sanitary Authority, the Trust must pay 1½ lakhs net cost per acre for reform by demolition and re-sale.

Both on financial grounds and on social grounds, we cannot afford to use this most costly of all methods, except in a small degree. The writer allots 40 acres as the practical total for demolition. This should be distributed so as to capture the very worst of the worst bits of the great Calcutta slums. These 40 acres will to-day contain from 16,000 to 20,000 people, and the displacement even of this number is a serious matter. The reformed 40 acres should not hold more than 6,000, and even this (150 per acre) is a low sanitary and social standard.

Reformation by demolition and resale of 40 acres, will thus cost apart from any re-housing, 40 × 1½ lakhs .... **60 lakhs or £400,000.**

When we consider that we have over ten times 40 acres of *bad* slum, the hopelessness of remedy by demolition, with our quite inadequate finance, becomes sharply apparent. It is very questionable with the writer whether the above £400,000 would not do much greater good if it were all put into slum-repair work.

(b) Cost of Slum-repair work.

Some 300 acres of streetless built-up area will be destroyed gradually by the creation of the main roads, and their destruction is included in the main road bill for Scheme IX. Of this 300 acres, about

143 acres are included in the total 835 acres of 'bad slum.' In addition we reduce this 835 acres by 40 acres of total demolition and re-sale, plus two acres of the same not re-sold but built on by the Trust.

The minimum area for slum-repair treatment then equals approximately, 835 acres, less (143 × .42)

$$= \begin{cases} 835 \\ 185 \\ \hline 650 \text{ acres at } £900 \text{ per acres} = £585{,}000 = \text{say lakhs } 90 \end{cases}$$

To this we add cost of staff and legal expenses as already given $8\frac{1}{2}$

Slum-repair bill total .... lakhs $98\frac{1}{2}$

Note that this $98\frac{1}{2}$ lakhs (£657,000) is to spent in improving the living conditions of some 200,000 people, and in creating some resemblance to a street system.

(c) Cost of Re-housing in direct connection with Slum-reform.

We have already allocated 20 lakhs to be expended in recoupment loss on re-sales of 40 acres of demolished slum under good building bye-laws. That is, we have already set aside 20 lakhs towards better housing of the poorer classes.

Two acres of slum re-built by Trust, with exemplary chawls.

We next allocate the cost of buying, demolishing and re-building with superior exemplary chawls, two acres of the worst slums. It is so certain that no return can be obtained on the capital, that the writer puts the cost down as dead loss, i.e.

Two acres without recoupment at say $3\frac{1}{4}$ lakhs each .... $6\frac{1}{2}$ lakhs

Two acres of building site covered to about 50 per cent. with exemplary chawls, will cost $1\frac{1}{4}$ lakhs per acre .... $2\frac{1}{2}$,,

Say £60,000, or 9 lakhs

Single family contiguous dwellings for the poorer classes, built on cheap land.

As detailed in Chapter XVIII, 20,000 people decently housed, the allowance for this and for all possible contingences being .... **24 lakhs**
or say **£160,000**

Buying, renovating and re-letting old buildings.

As detailed in Chapter XVIII .... **4 lakhs**

Slum and Re-housing Programme. Estimate Summary.

(*a*) Demolition and re-sale of 40 acres, under street bye-laws	60 lakhs
(*b*) Slum repair of 650 acres	98½ ,,
(*c*) Demolition of two acres and Trust re-building with exemplary chawls	9 ,,
(*d*) Re-housing by purchase and renovation of old substantial buildings in the slums	4 ,,
(*e*) Single-family contiguous dwellings	24 ,,
Estimated total cost of slum and re-housing work, apart from slums destroyed by main road work	**195½ lakhs**

Say 196 lakhs, or £1,300,000.

Total area of streetless property proposed to be remedied.

(*a*) By main road work :—

157 acres 'good' slum (no street system)
143 acres 'bad' slum (5 per cent. or so of street space)

300	300	acres
(*b*) Demolition *per se*	42	,,
(*c*) Slum repair	650	,,
	992	acres

Streetless areas remaining untouched = about (2,200—992) say 1,200 acres.

Our main road bill for Scheme IX was 563 lakhs, and this sum plus slum and housing works brings the bill up to 759 lakhs, thus leaving us 106 lakhs (over £700,000) balance from the 865 lakhs total, for suburban work and the encouragement of small house-building, for parks and open spaces, new legislation, etc.

This section of the report may be closed with a quotation from the writings of a well known Calcutta citizen :—

"These remarks, if they serve no other purpose, will be an indication that in the housing problem, which is very much the same problem in all parts of the world, we have a very wide field for investigation and study, and I trust that the interest taken in it by this Society will lead to some good result, in the uplifting of the fair name of our city, and the betterment of our citizens. I may be blamed that I have made no mention of good work already done in the city ; I can merely say in reply (and those who have already tackled the work will agree with me) that the fringe of the problem has hardly been touched ; that larger and more comprehensive schemes are required ; that the site-value difficulty must be dealt with ; and that the Improvement Scheme, with its possibilities of co-ordination and combination, is Calcutta's grand opportunity for dealing with the housing problem."

Conclusion of "Questions of Policy in Housing Reform" (Calcutta), D. L. Monro.

SECTION V.

LEGISLATION & THE CITY PLAN.

CHAPTER XX

TOWN PLANNING LEGISLATION.

At Calcutta we have no power to control 16 square miles of Suburbs, now growing up anyhow.

Quite impossible under Calcutta Act, to control growth of Calcutta Suburbs—We could not with our present legislative power even purchase and re-plan one square mile of the ten that call for *prompt* action—We can control the whole suburban area of 16 square miles if we adopt Continental methods.

Continental and other Town-Planning Powers.

Italian law of 1865 and amendments is based on principle that private property must contribute to works of public utility, if such works raise the value of that property—Contribution is at rate of half the higher value caused by the construction of the street, road, park, or other work of public utility or benefit—Some of the finest city extensions in the world are and have been, carried out successfully under this Act, and at very small cost—German Town Planning Enactments—General principles of same—Best analysis in English language of German Acts has been recently done by Mr. B. W. Kissan, I.C.S.—Application of Lex Adickes at Bombay by Mr. E. G. Turner, I.C.S.—Writer presents translation of Lex Adickes for use in composing Supplementary Act—It should be read in conjunction with Mr. Kissan's published work—The English Housing and Town-planning Act of 1909—Swedish Acts—Calcutta Supplementary Act should assimilate and adapt certain principles taken from Italian, German, and English Acts.

The community of Calcutta, that is, Calcutta with Howrah and the suburban adjoining districts, viz.:—The Future Calcutta—comprises some 10,000 acres (nearly 16 square miles) of unplanned suburbs. The Calcutta Improvement Act allows no other means of planning and re-planning these suburbs, except by more or less complete purchase, the cost of which would with very good luck be reduced 50% by recoupment. The net purchase cost of the suburban areas that already call urgently for town-planning, at 50% recoupment, would run into an enormous and impossible sum. The method of town planning allowed in the Calcutta Act has nowhere been used with any success worth mentioning. Little tiny fragmentary bits of city and town suburbs have been bought up and re-planned, but the capital cost of such work is so enormous, and the ability to town-plan is so utterly limited, that this method has already become, or will very shortly become, absolutely defunct—except perhaps in those ancient German towns that long ago so wisely acquired enormous land-areas, when such were truly "dirt cheap."

It is no good even considering what could be done in and round Calcutta by this wholesale purchase and re-planning method. The capital cost of buying only one square mile of land in the average cheap undeveloped suburb, say Manicktola, would certainly not be less than, 640 acres (or 1 square mile) × 60½ cottahs (in one acre), × 200 rupees only, per cottah, = 640 × 60.5 × 200 = 77½ lakhs, or £506,000. But this does not include main drainage, roads, filling up of countless tanks, legal expenses, etc. With recoupment at the optimistic figure of 50%, the net cost* would be, say 39 lakhs, or £253,000. We have ten square miles that need town planning *to-day*, and six miles more that will need it in a few years, and the capital cost of re-planning them by the

* For land only.

only method given in the Calcutta Act would run to not less than £16,000,000. We have a balance of some £600,000 with which to replan the most urgent 10 square miles, and we can do it with this sum and the full aid of a normal town-planning Act.

It has of recent years been thought a grand thing in an English town if they had a "town-planning scheme" on the stocks. The scheme-plans usually shew a little patch or two of town-planning, equal to about 1-20th or so of the whole unplanned suburbs of the town.* It is seen now that such notions are quite ineffective, and the whole real trend of English town-planning is now moving into line with the Continental ideas of town-planning, viz.:—that the whole area of any city, including the whole of the outside suburban regions, must essentially be planned and controlled permanently by the civic authorities.

What a farce and a disgrace and acknowledgment of failure would it be at Calcutta—to spend all the money on one suburb, or, what it would really come to, on one half-mile or so of suburban land. Even while this solitary and only to be favoured thirtieth was being re-planned and set in order, the other 29-30ths would have moved on irresistibly one fatal step more towards the inevitable state of future slum, disorder, hideousness, gross mixture, congestion, and degradation. These conditions are all growing to-day with malignant speed in every Calcutta suburb. There is one method only of stopping it, and we need power to exercise that method. We require simply a sound adaptation of the urban and sub-urban planning powers used in Germany, Italy, Scandinavia, Austria-Hungary, and most European countries. Most of the cities using and benefiting by these powers are not particularly wealthy, and practically all Continental town-planning legislation is directed towards the creation, preservation, and execution of **the City plan** at a very low and modest capital cost. These invaluable results are obtained chiefly by legislation that permits or more commonly *enforces* mutual arrangements, agreements, land exchanges, and regulated payments between the civic authorities and the land and property owners. In more detail, the civic authority must by law prepare a complete tentative road and street plan *for all areas likely to be built on, right round the city*. Land owners cannot object to the plan *per se*, but they can object to its details. A high Government authority or council settles the disputes, if it be required to call in such higher authority. Land for open spaces is bought and paid for by the civic authorities. In the case of main roads, the extra width is bought and paid for (at regulated rates) by the civic authorities. Roads and streets for local access to property are constructed gradually, and only when they are required for use. The construction is done by and at the cost of the city, *but the property-owner pays back the cost of all work that benefits him, usually by gradual instalments*. Land between the roads has, of course, a less area than had the whole area before the roads were planned thereon, but it has a much higher value. Something of that higher value has to be paid to the civic authority that made the road.

In a large way, especially in Germany and Prussia, the land between the roads and streets is re-plotted by the authorities, who form it into con-

* *i.e.* planned only under the street and house byelaws, but not planned properly as regards destination of areas, great main roads, open spaces, parks, public sites, etc. English Suburbs closely resemble the Park St. area of Calcutta, minus narrow streets like Middleton Row and Elysium Row.

venient plots for good building, and it is then in so far as possible handed back to the original owners. In general, its size is less, but its value is greater. Re-planning of half-built suburban land is effected very much in the same manner, but is, of course, more difficult. As a rule, no property is bought unless it interferes unavoidably with an open space or a main road.

A striking thing about **the City Plan** is the fact that land-owners usually do not object, but often actually press and worry the civic authorities to hasten the preparation and sanction of the plans. Such has occurred recently at Milan.

The above is a rough and cut-down approximation of Continental methods, and at this stage readers would do well to examine the town plans sent with the report, especially the large plans of Milan, Turin, and those included in the Birmingham Report on Town Planning in Germany.

CONTINENTAL TOWN PLANNING LEGISLATION.

With the kind assistance of Prof. Ulivi of Pescia, Mr. Frederick Thrupp of Catania, Judge Pozzi of Rome, Signor Masera (Chief Engineer of Milan), and the help of several ladies speaking Italian, plus the writer's own humble knowledge of Italian, it has been possible to translate for this report every Italian Town-Planning Act of importance. The Act of June 25, 1865, alone contains 101 articles, and there are many short amending acts, very interesting and helpful Ministerial circulars, decrees, etc.

The German " Lex Adickes " and the amendment have also been obtained, with the kind help of Mr. T. C. Horsfall and others, and have all been translated for this report.

These Acts contain far too much matter to permit of reprinting here, and the writer proposes to give only a sufficient account of them to exhibit their value as a basis for the supplementary legislation that is essential to the future well-being of Calcutta. The translation of the Lex Adickes, which is not so very long, is printed in full.

With this report the writer forwards copies of the later English Housing and the sole English Town-Planning Act, also much information concerning German Acts, and also a copy of the admirable treatise on " German Town-Planning Enactments " by Mr. B. W. Kissan, I.C.S.

It is doubtful if complete printed copies of the above translations of the Italian Acts can be ready in time to send them out with the report, but if the Trust goes in for a Supplementary Act, it will give the writer much pleasure to furnish complete copies and add particulars of certain Italian and German bibliographia on legislation.

ITALIAN ACTS.

" The Law of Expropriation for the Purpose of Public Utility* or Works." 25th June, 1865.

This Act supersedes and abrogates all previous Italian Acts of the same nature. The Act applies to almost all public works, including national and communal (Corporation) existing and future roads and

* Or ' Public Benefit.'

streets, both urban and suburban, and to bridges, railways, navigable canals, draining of marshes, waterworks, and the like. Under this Act, the " Building Regulatory Plans " and " Extension Regulation Plans " of towns and cities of over 10,000 inhabitants—are all " Public Utility Works."

The Act first provides for the public declaration that a work (or extension plan, etc.) is of Public Benefit (di utilità pubblica) or Utility. " In order that certain public works (such as city plans) can be made possible of execution," they may be declared to be works of Public Benefit. That being accomplished, and the general (small-scale) plan published and sanctioned, civic and other public authorities then have the right to buy up any property required for the site or accomplishment of the work (shewn on the " particular " or large-scale plans)—such as for roads or streets. Such purchase shall be done as far as possible by friendly agreements and fixing of prices between the Corporation and the owner. The property of those who will not sell by " friendly amicable agreements " is valued " summarily " by from one to three expert valuers, who are appointed in a very quick and informal manner by " simple decree " of what we may term the local magisterial court. No legal process can then stop the valuers getting to business at once. Only three days' public notice of their intention is given. Owners need not be present. The property is valued. Appeal to civil courts is allowed with certain conditions. So far as the writer can judge, owners who refuse the offered price (indemnity) in the case of city extension plans are rare, and are considered to be not normal people: as the price offered is usually rather above market price. Leaseholders, tenants, mortgagees, etc., have to be indemnified by the owner out of his compensation-money.

The next and very important point is the principle of " higher value," or, as we call it, betterment. Any land or property which is touching on, adjoining, or near to a public work that benefits it, i.e., increases the original market value, is without option liable to a tax for " higher value." Up to fifty per cent. of this " higher value " may have to be paid for in one way or another by the owner. The maximum contribution for benefit is fixed at "*half the higher value resulting from the execution of the works of Public Utility.*" And the whole of it may be paid off at the rate of 10% per annum.

If one owned a field worth 300 Rs. a cottah, and the public work was a new street, passing, say, on and alongside of that field, one would be offered Rs. 300 a cottah for the land taken; and when the road had been made, if our land had risen in value to 350 Rs., then for the increased value, we would be liable to pay up to Rs. 25 a cottah for Higher Value, and that contribution, with those of other owners, would as a rule be found sufficient to pay for the new road: i.e., as a rule, to pay the interest and sinking fund on a municipal loan for the said public work. The contribution could be demanded from one at the rate of 10% of it per annum: but many owners prefer to pay outright. If the owner is really unable to pay his contribution, then part or all of his property is temporarily mortgaged or re-mortgaged to the authorities as security for ultimate payment.

The above are some of the great principles of this 1865 Act. In the 101 Articles that compose it, and in the amending Acts, the just interests of private people and owners are carefully protected, but at the

same time the public (communal and national) interests, are rigidly upheld. Fine town-planning, both of internal areas and of external suburban areas right round Italian cities, has already been accomplished under this Act, and numerous complete city plannings and complete extensions are being accomplished by its means to-day. (See the latest sanctioned Regulatory Plans of Milan and Turin, and note on them the previously planned and accomplished suburban zones.)

Very perfect and detailed procedure is set out as to declaration, plans, estimates, entry of engineers and architects on lands; for public inspection of schemes, general (preliminary) plans, final plans, friendly agreement, discussion, objections, notices, times, periods of completion, renewal of declaration, amendment of plans, protection of minors and others, payments of betterment, etc., etc., etc.

The following are translations or epitomes of some of the most interesting Articles in the 1865 Act, and important points are given word for word as closely as possible:—

TITLE I.—HEAD II.

Of the Declaration of Public Utility.

Art. 9.

The declaration must be made by law (i.e., compulsorily) in the following cases . . . . . .

2nd.—When *to make possible* the execution of a public utility work *it is necessary* to impose a contribution on the owners of the exact area and contiguous areas (for Higher Value).

Art. 10.

The declaration of public utility is made . . . . . for the construction and systematizing of the streets (and bridges), whether communal (corporation), or belonging to companies or individuals, or placed beyond the (present) inhabitable quarters (i.e. in the undeveloped suburbs).

Art. 14.

The term for completion of a utility work can be extended by Royal Decree.

Art. 15 (& 7).

Defines that "Engineers, Architects, and Experts" shall develop and compose the plans and reports for utility works.

Art. 16.

The same engineers, architects and experts (so far as possible) who drew up the plans and reported for the "declaration," shall also prepare the plans for final sanction and execution.

HEAD III. (Art. 16—23).

Of Disposal *(designazione)* of the Property for Expropriation.

Art. 23 (of Severance).

On the demand of proprietors, the remainders of property, buildings, and land, only partly marked (for purchase) on the plan of execution, shall be included in the property to be acquired by the Executors† (of the work), if such remainders are in such condition (or position) as to be no longer of use to the proprietor . . .

HEAD IV.

Of Compensation, and Method of Fixing Same.

Art. 26.

The Mayor (Syndic*), assisted by the Corporation (in full meeting), will receive proprietors when necessary, and "will arrange that the amount of the indemnity (purchase money) be amicably settled between the parties."

Note.—Promotors (private co-operating land owners) of town-planning schemes, etc., must present themselves similarly before the Mayor and Corporation.

Art. 31.

The Prefect** for the time being will form a list of the owners who did not accept the offered purchase-money, and who did not conclude any friendly agreement with the Expropriators (Authorities)—the list shall concisely indicate the property subject to expropriation. He will transmit the list to the Tribunal (Magisterial Court) of the district where the property is situated.

Art. 32.

Within three days of receipt of list, the Tribunal will nominate (by a simple decree without the necessity of summoning the parties) one to three expert valuers, charging the same to proceed to estimate the property . . . . .

Note.—A time is fixed in the decree by which the valuers are to present their report.

Art. 35.

"No opposition against the valuation decree can arrest or impede the operations of the valuers," etc., etc.

Art. 36.

"It is not necessary in order to arrive at valuation, that the interested parties should be cited, etc. Three days' public notice only is given.

Note.—The Act greatly befriends and assists the owner who is willing to come to terms by amicable agreement and negotiation with the

† Executors, = doers, corporation, ex-proprietors.

* The President of a city and corporation is known in England as the Mayor, or Lord Mayor; in Italy as The Syndic; in Germany as the Bürgermeister, or Oberbürgermeister.

** The Prefect is the chief administrator of a district and works hand in hand with the various Syndics: he is a kind of Super-Syndic.

Mayor (Syndic), and much time is given him; but the path of the litigious and obstructive owner is made very thorny and steep, and he is distinctly bustled along it.

Art. 37.

The cost of special valuation of opponents' property is debited on them if the valuation is less than 10% higher than the Corporation's offer.

Art. 40.

Compensation for severed property or "remainders," is fixed at "the difference between the exact price which the whole estate would have had *before* the work (road, etc.) was done, and the exact value which the untouched "remainder" will have *after* the work has been done.

Art. 41.

"{Whensoever / as often as}, through the execution of the public work (street, etc., etc.), a special and immediate {advantage / profit} is derived by the part of a property not expropriated, then this advantage or profit will be estimated, and the compensation will be accordingly reduced below that granted by Article 40, etc., etc. (41 is a long article).

Art. 42.

The additional value given to property through the execution of the public work (say the making of a new road) shall not be calculated to raise the amount of compensation to be paid to an owner.

Art. 43.

Buildings, plantations and improvements will not be allowed for in the compensation account, when, having regard to the time and other circumstances in which they were made or improved, it is proved that they were made with the object of gaining a larger compensation. . . . Constructions, plantations and improvements will be held to have been made with the object of getting larger compensation (indemnity) when they have been made after the publication of the notice of deposition of the plan of execution, in which the property is marked for expropriation.

Art. 44.

If the property is leasehold it is considered free (for expropriation, i.e., a leasehold is no barrier to acquisition). The Expropriator (Civic Authority, etc.) is not under any obligation to intervene in any dispute that may arise between the direct proprietor and the leaseholder, nor to incur any additional expense in the division of compensation between the one and the other.

Note.—Much more follows regarding similar points. Space compels me to omit much of great interest and value.

Art. 46.

An indemnity (compensation) is due to those owners who, through execution of the public work of utility, would suffer lasting damage caused by the loss or diminution of a right. (Note the application of this article is considerably narrowed by other articles.)

Heading V. deals mostly with money matters between owners and authorities, also the rights of mortgagees and third parties, and necessary procedure.

Heading VI. deals with property belonging to minors, exiled people, religious bodies, and so on, and to property generally which is in the hands of trustees.

Heading VII. treats of the option of return to owners of their property when such has not been required, although taken, or "marked down," for the original designs.

TITLE II.

Special Regulations.

Heading I. gives power, under certain conditions, for authorities and their contractors to obtain compulsorily from local land or quarries supplies of material for road work, etc.

Heading II. deals with public works done in emergency, such as overflow of river banks, etc.

Heading III. details arrangements to permit public works for military purposes.

Heading IV. covers some important articles, and deals with "Expropriation coupled with obligation to contribute."

Art. 77.

Whenever, in a decree (under this Act) declaring a work to be of public benefit, it is enjoined on proprietors of property, bordering on or close to the said work, to contribute to the execution of it on account of the greater value which these properties would acquire; and if in the said decree the amount of contribution and the rules to be followed in exacting it are not pointed out, then the following regulations shall be observed.

Art. 78.

The contribution of each proprietor shall be equal to half the higher value that results from creation of the work of Public Utility.

This contribution is payable in tenths in each year, and on the same (time) date as are paid predial (agricultural land) Government taxes.

Art. 79.

In the calculation for Higher Value (betterment, *maggior valore*) that property must be deducted which has already made compensation (contribution) by the indemnity due for the expropriation (i.e., property purchased for works (roads) is outside all betterment calculations).

Art. 80.

Owners charged with contribution may sell their property to the Exproprietor* at the value estimated under Art. 39. (Art. 39 states that the price shall be equal to the settled price which the property would have,

* Corporation or authority doing the work of public benefit.

in the opinion of the expert valuers, if sold by "free contract of purchase," apart from any present or prospective value added by the execution, or even contemplation, of public works of benefit.)

Art. 81.

"For making sure of the payment of the rate (tax, contribution), a mortgage on the Greater Value that the property has (literal trans.) acquired by the carrying out of the work of Public Utility, may be convenient to the Exproprietor. This mortgage must be inscribed (registered) in the manner and according to the terms settled by the civil laws for the preservation of mortgages.

Title II. Heading V. deals with expropriation of historical buildings and antiquities, etc. Even in these matters, the law impresses that compensation *must* be settled as a general rule and order, "by amicable agreement."

Of Plans for Regulating Building.

Title II. Heading VI. { Of the plan regulating building / *Dei piani regolatori edilizi* } is of much interest as it concerns the details of bringing into force a "Building Regulatory Plan"; which is one form and name of a "CITY PLAN," but relates more to internal city improvement than to suburban work.

Art. 86.

Communes (cities, towns, urban districts) which have a population of at least 10,000 inhabitants, may, for the public advantage, and (when such is) decided by actual need of providing for health and necessary inter-communications, make a Regulatory Plan, on which may be drawn-up *(tracciate)* the lines (building open space and street lines, etc.) to be observed in re-constructing those residential (or built-up) parts (of cities, etc.) which must be improved owing to bad positions (both position or condition of the buildings), or in order to obtain that object (i.e., "public health and better inter-communications").

Art. 87.

The projects of the Regulatory Plan must be published by the Syndic (Mayor or President of a Corporation or Urban Council) as per Articles 17 and 18, and must be adopted by the Communal Council (Corporation), which will deliberate on any opposition that may be made.* If the Communal Council rejects the oppositions, then the "Provincial Deputation" (Provincial Legislative Assembly) will be called on to give their opinion on the merits of the project, and also upon the opposition to it.

The Regulatory Plans must be approved (finally), according to Article 12, after examination by the Superior Council of Public Works, and also when necessary by the Provincial Council of Sanitation. In the decree (Royal decree) of approval a period of not longer than 25 years will be determined in which the work must be completed. (Note that it can be, and is, frequently extended by Special Royal Decree.)

* The responsibility of originating the City Extension and Building Regulatory Plans lies first with the Mayor.

Art. 89.

The Regulatory Plan having been decided on *(definitivo)*, then from the day of its Publication, owners of land and buildings (included in the plan) who may wish to make new constructions or re-build, or change those existing either by their own wish, or from necessity, must conform (in all new work or streets, etc.) to the model, design and layout of the Regulatory Plan. (Sanctioned for 25 years ahead, and no compensation is entailed by this powerful and essential clause.)

Art. 90.

Work done (by owners) in contravention of the preceding article will be destroyed, and the owner condemned to pay a fine not exceeding £40.

Art. 92.

The approval of the Plan of Regulation is equivalent to a declaration of Public Utility (Public Benefit), and gives power to expropriate property included in it, observing all the other powers and provisions of this law.

TITLE II.—HEADING VIII.

Plans of Extension.

This portion of the Act is likewise of great interest, as it deals particularly with "Plans of Extension" (of cities, *Piani di Ampliamento*). Note that one City Plan is often made to include both the Regulatory Building Plan and the Plan of Extension, and is sanctioned in one decree given under this Act. The Milan Plan sent out with this report is an example of such.

Art. 93.

Those communes (cities and towns, *communities*) where the actual necessity is demonstrated of extending areas so as to be habitable (or extending the inhabited parts), may adopt a "Regulatory Plan of Extension," on which shall be marked out the design (rule, norm. It. *le norme*) to be observed in the building of new edifices (houses, etc.) " in order to provide for the well-being and health of the inhabitants in the most sure, convenient, and orderly manner." To these Extension Plans are to be applied the dispositions in the preceding Heading.

Art. 94.

If, in order to carry out the Plan of Extension, the commune will have to proceed to the construction of Public Streets, then owners will be obliged to give up the necessary land (and property) without any other formality. The relative compensation will be fixed as per Articles 39, 40, and 41, except in the case of those owners who co-operate (with the Corporation) in the above work of systemizing and preserving roads and streets —such (owners who co-operate) are provided for in this special case, by local regulations (i.e., owners who co-operate, settle compensation by amicable arrangement with the Corporation. There are also some minor regulations attached to the Act affecting clauses in some degree. These are called " Codicils of Civil Procedure ").

This Act of June 25th, 1865, was given at Florence (Firenze) by King Victor Emmanuel. The Amending Acts are all fairly short, and do not alter the principle or tenor of the major Act. In addition, there are a number of Circulars from the Ministry of Public Works to the Prefects and Mayors of the urban districts and cities of Italy. All these Amending Acts and Circulars are for the purpose of putting more direct and decentralized power into the hands of Mayors and Corporations, and secondly, of clarifying, simplifying, and speeding-up the procedure. It would be interesting to print them, and they have all been translated, but too much space and time would be taken up.

The following notes may be given:—

Law No. 4613, of August 30th, 1868. On the Construction and Arrangement of Communal Roads (Main Roads).

Article I.

The construction and arrangement of Communal (City and Town) Roads is (made by this law) a compulsory obligation upon Communes (Corporations) in these cases (i.e., when the following works are required):—

(a) Those that are necessary to put the larger centres of population in the commune in communication with the head centre of the district and with the largest centres of population in the neighbouring communes.

(b) Those which are necessary for putting the greater centres of population of the commune in communication with the railways and gates (city exits), either directly or by joining them to other existing roads.

(c) Those that must serve to put in communication with each other the important (internal) parts of a town or city (commune).

Article II.

The approval on the part of the Prefect, of the project of construction and arrangement of (any) one of the roads, to which Article I. refers, is equal to a declaration of Public Utility. The Corporation (Commune) will not be compelled (in these cases) to deposit (pay into court) the value of the land to be expropriated, and a 10% deposit at 5% interest will give power to commence expropriation (and putting in hand of the main road work).

Note that any property benefited by a new main road made in its close vicinity is liable for "Higher Value" contribution thereto.

Royal Decree No. 6021, of September 1st, 1870, amplifies the short Act of August 30th, 1868, and gives more simple and direct means of operation to Municipal Councils.

Law No. 5188 (2nd series), 18th December, 1879, simplifies and modifies Articles 9, 10, 56 and 71 of the 1865 Act. It describes in especial the exact duties of Prefects, and gives more direct power to Corporations as regards "the construction and planning of communal streets placed outside the inhabited districts of associated and neighbouring towns or districts, also as regards bridges, cemeteries, etc. It also increases the powers of Mayors (Syndics) in case of sudden disasters to public works.

Law No. 196, of June 14, 1874. This simplifies and clears up many financial points affecting the 1865 Act. It further defines that one large-scale complete plan may be presented for sanction, instead of the original dual procedure, i.e., first the " general plan " (small scale) used to obtain declaration of utility, and second the " particular " plan (large-scale) shewing details. Under this 1874 Act one good plan is made legal and sufficient, " in order to save time and expense."

The Circulars of the Ministry of Public Works are admirable instructions to Prefects and the Mayors of Corporations. That of January 31, 1913, issued by Signor E. Sacchi, is a concise and exact list of the legal and official procedure to be observed in presenting a City Regulatory or Extension or other Project of Public Utility. It is sent out to assist Corporations and their officials, and prevent the delays caused by failure to comply with exact procedure under the Acts.

The following is a fairly word for word translation, made by the writer, of the actual Royal Decree by which the latest suburban town-planning project round Milan is sanctioned; and is also incorporated with the earlier sanctioned zonal and internal comprehensive town-planning schemes of Milan, now practically finished. The plan relating to this decree is that which will be sent out to Calcutta with the writer's report.

THE LATEST MILAN DECREE.
VICTOR EMMANUEL III.

By the Grace of God and the Will of the Nation King of Italy.

The Senate and the Chamber of Deputies have approved, and We have sanctioned and We promulgate what follows:—

Article 1.

The General Plan for Building Regulation and Extension of the City of Milan, designed and compiled by the Engineers Masera and Pavia, and signed by them on May 28th, 1910, is hereby approved.

A copy of this plan, counter-signed by the Minister who promoted (was responsible for) it, shall be deposited in the State Archives of Italy.

Article 2.

The General Plan (Piano Generale, see plan, E.P.R.) is divided into 3 zones.

The first contains the internal (central) part of the city, and is bounded by the line formed by the ramparts and the following streets:— Viale Elvezia, Via Cesare Cesarino, Via Bertani, Corso (avenue), Sempione, Via Massena, Via Giorgio Pallavicino, Via Alberto da Guissamo, and Piazza (place, square) Magenta.

The second zone extends outside of the first zone and beyond the limits of the (prior) Building and Extension Regulation Plan that was approved by decree on July 11, 1889, and was successively modified or amplified under the 1865 Act by other Royal decrees, dated 22/2/1891, 14/2/1892, 10/8/1893, 10/10/1895, 3/5/1896, 20/9/1899, 30/6/1901 and 18/8/1904.

The third zone extends for 50 yards beyond the outside of the most outer streets or roads included in Zone II.

Further, as regards the first (inner) zone, the detail plans relating thereto, and signed on May 15, 1902, by Engineers Masera and Pavia, are hereby allied to and incorporated in the other plans and projects sanctioned by this decree.

As regards Zones 2 and 3, the detail plans will before execution be approved successively (as required) by the Prefect of the Province of Milan, as per Art. 17 et seq. of the Law of Public Utility of June 25, 1865.

Article 3.

The following periods of completion are fixed for the projects shewn in the General Plan.

For the First Zone.

Periods fixed for work shewn in existing (already sanctioned) executive plans are hereby maintained.

For all other works in Zone I. and included in the General Plan, the period of completion is fixed by this decree to be 25 years: excepting only as regards part of the detail plan of Verziere and the Via San Pietro in Gessate and vicinity, which are approved by Royal Decree of 29 Apr., 1888. In this case the period of completion shall be that already assigned, viz., by April 29, 1913.

For the Second Zone.

The period of completion was fixed at 30 years by the previous decree, dated 11/7/1889, No. 6216. This will hold good except in the case of the railway stations and lines that are to be abandoned and re-built —as regards these, a completion period of 20 years is hereby ordered from the date of this decree.

For the Third Zone.

A period of 30 years is fixed, from the date of this decree.

Article 4.

In order to make it possible to execute the General Regulating Plan (of both city and suburban new roads and streets, etc.) the Corporation of Milan is given power to call on (require) the owners of the land bordering on or contiguous to the works, to contribute to their construction, in accordance with Articles 77, 78, 79, 80, and 81 of the Law of June 25, 1865, No. 2359.

Article 5.

In the 2nd and 3rd Zones (suburban and outer-suburban) the valuation of compensation for land required to form streets, squares and public gardens, shall be assessed (must be equal) at the mere (pure) value of the land (itself) considered independently of its future value for building purposes, and without taking into account the Higher Value which the approval or execution of the Plan (even partially) may have in raising the value of the land itself.

Article 6.

In executing and giving effect to the General Plan (and Scheme) the Corporation of Milan may take advantage of the special powers given by Art. 22 of the Law of June 25th, 1865, i.e., to extend for 40 metres into zone 2 or 3, the works included in zone 1.

Article 7.

Such local and private (quiet residential) streets are not shewn on the General Plan, but will be made between the boundaries of the plan itself (i.e., between the big main roads and avenues), shall be made so that the fronts of the buildings shall be not less than 6 metres back from the centre line of the street (i.e., no minor street shall be less than 12 metres wide, or say 39ft., E.P.R.). The design of the above minor streets shall be in keeping (co-ordinate) with the General Plan, and their details must obey the 'local regulations' (building byelaws of Milan).

Article 8.

The King's Government, in accord with Article 87 of the law of June 25, 1865, will have power to approve any modifications of the General Plan which are found to be for the benefit of the community of Milan.

Article 9.

States that after observance of the procedure under Article 87 of the 1865 Act, the further regulations (affecting the Plan) resulting from deliberations of Milan Corporation, the Provincial Administration, and the Council of State—will be ratified by a further Royal Decree.

These include limitation of industrial areas, municipal owned suburbs for the working classes, and regulations as to size of houses, houses per acre, etc., etc.

Given at San Rossore, July 12, 1912.

VICTOR EMMANUEL.

Summary of Italian Methods.

The Italian method of obtaining both urban and suburban comprehensive road and street planning, including street widenings, land for public gardens and squares, etc., may be summed up roughly in a few sentences:—Corporations and landowners, usually in friendly co-operation, prepare comprehensive road-schemes to permit orderly growth of the city in every direction. Owners are paid for all land and property taken. Compensation is assessed at the value the property and land has when taken, *quite apart* from any value given to it by either the proposed or executed works.* Any owner whose property value is raised by the contiguity of the new roads, contributes to the cost of them (*i.e.*, to the cost of buying the land and making the road, etc.). Owners have to contribute to the extent of half the Higher Value (betterment) caused by the new work. In practice, it is found that the contributions for betterment are sufficient to pay for purchase of land and construction of the road and street system; and to pay a large proportion of the cost of great avenues, main roads, public squares, gardens, and bridges. Owners often combine to press for-

* *e.g.*—property is assessed on its existing rateable value when taken.

ward the execution of Italian Corporation town-planning projects. Opposition does not appear even to be formidable. Mutual co-operation between owners and communal council is the general rule. The owners need not contribute at a greater rate than 10% per annum of half the full betterment assessment. Italian Corporations usually raise loans in the first instance to start their projects going. So soon as work starts, then betterment money begins to come in. Italian town planning is not optional, but is in practice compulsory for all urban communities of more than 10,000 people.

**With a good deal of help, the writer has been able to translate the whole of the big Report on the Milan Extension projects, made by Chief Divisional Engineer Angelo Pavia and Chief City Engineer Giovanni Masera. Space and lack of time forbid the presentation of a copy of this report to the Calcutta Improvement Trust. The work is of a very high order, and is full of instruction. In connection with the plan belonging to this report, and sent out to Calcutta—it may be mentioned that the estimated total net cost to the Milan ratepayers, of the whole of the work thereon shewn (the street widenings, roads, gardens, avenues, etc.), is only Liras 32,000,000, or about £1,280,000, or say 192 lakhs. Half of this is spent on street widening, and the big 2nd Zone will all be laid out at a cost of only £600,000.

These remarkable results are due to the superior legislation, and the superior civic culture and civic amenability of the Italian people, who seem mostly to recognise that town-planning is a necessary part of existence; they exhibit the same cheerful public spirit as regards the universal onus of bearing arms for national defence.

These notes on Italian town planning may be concluded by quoting the following from the Milan Engineer's report—(Estimate Section).

Expenditure in the city enlargement zones.

" The enormous increase in value of and advantage to the land, caused by the access given and organization obtained through new streets, are recognized by the majority of property owners, who (already) are urging (soliciting) the Corporation for the opening of them (new street-systems)—and have (voluntarily) made themselves responsible (have guaranteed) contributions (Higher Value taxes) which in many cases are most notable."

" Since the commencement of execution of the earlier City Regulating and Extension Plan approved by decree on July 11, 1889 (since then) to the end of 1908, the Commune (or Corporation) of Milan has concluded very many agreements (with property (or land-) owners; with the result that some 3,018,050 metres (760 acres, or the area almost of the Maidan E.P.R.) have become communal areas, to serve (be used up for) laying out of roads, squares and places (public gardens, etc.); with a compensation total of Liras 4,011,360 (say £160,000, or 24 lakhs); that is to say, the Community has obtained a great open surface of land in roads and squares, etc., not only without sacrifice, but with considerable gain."

** A few extracts regarding suburbs destined round Milan for single-family separate dwellings, are given in Chapter XXII. of this report.

GERMAN TOWN-PLANNING LEGISLATION.

Preliminary.

Of this legislation the finest analysis in the English language has been completed quite recently by Mr. B. W. Kissan, I.C.S., and is contained in his **' Report on Town-planning Enactments in Germany.'** The price is 1s. 8d., at the shop of any agent for the sale of Indian Official Publications (Thacker Spink, Calcutta; King & Co., 65, Cornhill, E.C., and others). The writer received an early copy of this report through the courtesy of Mr. E. G. Turner, also of the I.C.S.—but had, himself, before then helped to thrash out a translation of the celebrated Lex Adickes, and, as there is no other English translation it seems worth while printing it here for use in framing a Calcutta Supplementary Improvement and Town Planning Act. This translation should be read with Mr. Kissan's able short analysis in the other hand.

General idea of German Town Planning.

The idea is different from that used for Italian planning. In Prussia and Germany the basic idea seems to be pooling, planning, and re-distribution: done as follows:—

(a) The land is ' pooled,' theoretically collated and thrown into one lot.

(b) It is re-planned, shewn covered by new streets; this being done by mutual arrangement between land and property owners and the Corporations (Town Councils). The civic authority being the greater power as regards determination of the plan details.

(c) The land (60 to 65%) left between the streets is replotted to form good-shaped building plots.

(d) The new plots, which have a distinct relation in both size and position to the original old irregular properties—are given back to the owners. They are smaller in size, but higher in value.

(e) Land for streets is bought by the Corporation, and

  (i) the cost of land and road making, etc., and cost of the re-distribution, is afterwards recovered from owners in proportion to their frontage on streets.

  (ii) Or, owners voluntarily give up land for roads, and repay Corporation for road making, such owners contributing land for all the roads proportionally with the pooled area of his own property.

  (iii) Or, cost of roads would be repaid to Corporation on basis of the value instead of area, of owners' lots.

Mr. Kissan goes into all the points very thoroughly indeed, and his Report can be obtained with great ease in Calcutta. The Lex Adickes (pronounced Add-ic-kees) which is a pretty good example of a German law, takes its name from Dr. Adickes, who, when Mayor of Frankfurt-

on-Main, devised and promoted this law—which came into force on Jan. 1st, 1903, and applied solely to Frankfurt. On July 8th, 1907, one important clause was amended by a special Act of 1 section. On July 28th, the Lex Adickes was made Law for the town of Posen, and on June 3rd it was applied to Wiesbaden. It is now proposed to apply the law to the whole of Germany: and the writer includes in his exhibits a specially made translation of the new draft Town Planning Act for all Germany and Prussia. The Lex Adickes is rather too local, and is not comprehensive enough. It is complex as it stands, but can readily be simplified for Indian use, as has already been shewn by Mr. E. G. Turner. For India, every clause must be compulsory.

The title of the Lex Adickes may be literally translated as the

" Law concerning the Re=Survey (or re=planning) of Ground=Property in Frankfurt=on=the=Main."

Or as the " Law concerning the joining-up of building plots," etc.

Sections 5, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 26, 30, 35, 36, 37, 38, 45, and the Amendment of Article 13, are perhaps the most interesting and useful items.

[The " Lex Adickes."]

July 28, 1902.

PART I.

"Idea of the Re=Surveying." " Preparatory Process."

Section 1.—For more or less open spaces, within the Town District of Frankfurt a/M., for which the plotting-out of building estates has been definitely settled [for reasons of the public benefit, as well as of bringing about a suitable formation of building sites] the Re-Adjustment (Re-Survey) of Ground-Properties, belonging to different owners, may be effected in accordance with the following regulations:—

Section 2.—The Re-Adjustment (Re-Survey) can extend only to one single part of the Municipality (Re-Adjustment (Re-Surveying) Area). This area is to be confined in such a manner that the Re-Survey may suitably be carried out, and is not to be surveyed beyond the desired purpose. Hereby the following points have especially to be taken into consideration: (1) The features of the ground; and (2) streets already in existence, as well as those, the building of which has been decided upon. Certain properties, situated within the precincts of the Re-Adjustment Area, which are already built upon, or used for special purposes (such as Market Gardens, Nurseries*, Parks, &c.) may be excluded, wholely or in part, from the Re-Adjustment. Properties intended for the perpetual use of the State are, if demanded by the Authorities, to be excluded from the Re-Adjustment.

Section 3.—The Re-Adjustment may be effected:

1. On a motion of the Town Council;

2. On a motion of the owners of more than half of the Re-Adjustment Area (to be calculated by the Land Registrar), and if moved by more than half of the owners of the Landed Property. In the case of some property being owned conjointly by more than one owner in unequal portions, such calculation is to be determined according to the property rights of each individual owner.

* Young tree nurseries, E.P.R.

Interditions of Alienation do not hinder the Re-Adjustment. The motion has to be presented (in the case of No. 2) at the Magistracy. When in this case the Re-Adjustment Area is in such a manner bordered in, that the Community (according to Section 13) has to grant an indemnity in cash, the assent of the Magistracy is necessary.

Regulation I. 1 does not apply when the greater part of the Re-Adjustment Area is to be used by the owners themselves as a Market-Garden Establishment.

Section 4.—The Town Council (Magistracy), after previous resolution, having decided to move the Re-Adjustment (Section 3 I. 1), or having received the Motion of the Owners for a Re-Adjustment (Section 3 I. 2), has to notify the Government Board of Works of the intended Re-Adjustment of Ground Property. They have further, in case this has not already been done, immediately to draw up a schedule, in which the properties intended to be re-surveyed (re-adjusted) have to be specified separately, with the names of their respective owners, and their entries in Land Register. Herein must also be mentioned what percentage of ground the concerned parties have to waife (give up) for intended public roads and open places (Section 10, 2), and within what time such roads and places, as marked in the Plotting-out Plan, have to be finished. Attached to the schedule must be a plan, from which the position, dimension, subsequent covering with buildings, or any other special utilisation, can clearly be learned. This schedule and plan have to be publicly submitted for everybody's inspection. How this shall be done, the Town Council has to announce according to local usage, with the observation that any objections hereto have to be lodged within a clearly to be defined space of time of at least four weeks. The owners have to be duly informed of these proceedings. Should properties which comprise those mentioned in the last part of Section 2 be concerned, then the proper authorities have to be especially informed.

Section 5.—The Town Council (Magistracy) has, as far as this is possible, to settle *in an amicable manner* the objections raised, and then, without further delay, to send in the Motion for Re-Surveying (Re-Adjustment), together with all documents appertaining thereto, to the District Committee. The District Committee, after having received the report of the local Police Authorities,* may, in case noted Section 3 No. 2, and with the assent of the movers, decree that they shall defray the expenses of the proceedings wholly or in part.

This decision has to be conveyed to the Magistrate, to the Owners, and to all such persons (Section 57) who have taken part in the transactions. It has also to be published by the Magistrate in the customary manner, and with reference to tenor of Sections 7, 27, and 50.

Section 6.—A withdrawal of the Motion (Section 3) is only admissible before the decision of the District Committee (Section 5, 1).

In case of Section 3, T. 2, the motion may be withdrawn if desired by more than two-thirds of the owners of the Re-Adjustment Area.

The costs arising hereby devolve upon the withdrawing applicants, and are fixed decisively by the Magistrate. Payment or collecting of them according to the Administrative Regulations.

Section 7.—When an agreement concerning the Re-Adjustment has been brought about in legal form between the Owners and the Community (Section 3, T. 1) the introductory proceedings (Section 8) may be dispensed with, if desired by the Magistracy and such a majority of owners as is described in Section 3, 1, 2. If such an agreement concerns only a certain portion of the Re-Adjustment Area, the Regulations of Section 1 are applicable if the object of the Re-Adjustment can still be obtained, notwithstanding such limitations. The owners of the remaining properties have to signify their consent thereto, and must be assured that a subsequent

* In Prussia the Police administer the Building Bye-laws.

Re-Adjustment of their properties is not excluded. In such case, the properties of the owners outside of this agreement are to be excluded from the Re-Adjustment.

For the purpose of entering into such agreements (as mentioned above) the District Committee can fix a certain space of time within which the preliminaries of the Re-Adjustment Process may be suspended. The District Committee has to limit this time if the Town Council, or at least such a majority of owners which is described in the next section should demand it.

The decisions in cases of Sections 1 to 3 are made by the District Committee after passing the resolution, and are final.

PART II.

Re-Adjustment (Re-Surveying) Process.

1. Introductory Process. Re-Adjustment Commission.

Section 8.—When all legal preliminaries for the Re-Surveying Process are finally settled, the County President decrees its enactment and appoints a Commission for that purpose.

This Commission has to consist of two Government Commissioners, one of whom is to act as President, and the other as his deputy (Vice-President), and the following other members: At least one Building Expert, one Judge, one Government Surveyor, and a sworn Land Appraiser. Members of the County Council (Magistracy) cannot belong to the Commission.

Before the final appointment of the Commission, the County Council and the Owners may bring in motions.

The Members of the Commission are entitled to a reimbursement of their expenses, and to payments according to the regulations relating hereto. The Commission can form a quorum, if all its members have been summoned, and if the President or his Deputy and at least half of the other members are present. The decision is by majority of votes; at a tie the President casts the deciding vote.

The Commission is legally as well as privately represented by the President.

The documents of the Commission are public. The minutes and plan of allotment are considered legal documents. The Enactment and the Appointment of the Commission have to be published in the usual manner.

2. Entry of Re-Survey.

Section 9.—At the request of the Commission, the Land Registry Office has to enter into their books that the Re-Surveying has been enacted.

The Commission has to acquire a thorough knowledge of the Register and other main books of the Land Registry, for which purpose, if necessary, reliable copies or extracts have to be supplied at net charges.

Any subsequent entries into the Land Registry have to be notified to the Commission officially.

In case the special Land Register has not been formed yet, these regulations are applicable to other existing legal books, etc.

3. Re-Surveying Rules.

Section 10.—The properties to be re-surveyed are to be united into one bulk, into which bulk existing public roads and places have also particularly to be included.

From this total area the land required for public roads and open places has to be portioned off beforehand and assigned to the Community

or other bodies chargeable with their maintenance. Hereby the community or other maintaining bodies are indemnified for the inclusion of the existing public roads, etc., into the total area.

The remaining area is to be divided amongst the owners.

Section 11.—To all parties concerned (Section 57, 1 to 5) full compensation is to be granted according to Sections 12-21.

Section 12.—The allotment of the remaining area (Section 10, 3) has to be effected in justice and fairness, and if possible so that the total area is divided in the same proportion as the owners were interested in the original total area. The properties have to be re-plotted as much as possible to form rectangular lines to the roads and places;* and must be allotted to the owners in much the same local position as they were owned before the Re-Surveying. Particular sites already built upon, or such properties of a particular value as stated under Section 14 as far as they do not stand in public roads, etc., shall be retained by the original owners, provided another setting of boundaries should be found necessary.

If properties which have been thrown into the collated Re-Surveying Area be differently charged, or if several properties differently charged and belonging to one owner are to be thrown into this collated area, a new site (or plot) has to be allotted for every such plot or portion thereof.

Section 13.—If the land required for public roads and open spaces amounts to more than 30 per cent. above that already allotted for this purpose, the owners have to be indemnified with a sum of money.†

Section 14.—In addition to the claim of Land Allotment, the owners may further demand a money compensation:

1. For buildings, accessories or other appurtenances of the sites, thrown in. [thrown into the "pool."—E.P.R.]

2. For loss of value, appertaining to the properties thrown in as regards their individual natural characters, or the use that had already been made of them, provided that the allotted site is not sufficient compensation in itself.

3. For the loss of trade that had been carried on at the sites, such as factories, market gardens, nurseries, brickfields, potteries, &c., &c. An increase in the value of the property arising out of the Re-Adjustment is hereby not to be considered.

Section 15.—If collated properties are enjoined with rights, which according to Section 42, 1, 2, become void, and for which according to Section 20 compensation has to be given, the Commission may impose upon the owner the payment of a sum of money equivalent to the value of the rights enjoined by the property. This payment has to be made to the Community. Respite may, however, be granted to the owner, on his request, until the time of sale or building upon, at interest of $3\frac{1}{2}$ per cent.

Section 16.—Should the value of the (prospective) allotments (Sections 11—14) fall considerably short of the value of the pooled properties, the owners are entitled to further compensations. An increase in the value of the pooled property caused by the intended Re-Survey is not to be taken into consideration in respect of this article.

The allotted property is appraised according to the value which it will have when taken possession of.‡ (Sections 40—42).

Section 17.—Pooled properties (plots), the area of which is so small that they singly can only be exchanged for properties (plots) unfit (too

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* *i.e.* So as to form regular and rectangular building plots, E.P.R.

† The Amending Act of 1907 raises this 30% to 35 and 40%. Thirty per cent. is not a sufficient allowance.

‡ Immediately on re-distribution.

small) for building-purposes, are, if belonging to one owner, to be put together (to form one plot). If they are owned by more than one person they have, with the owners' common consent, to be combined in such a manner that sites fit for building purposes can be allotted in their place. The allotment deed has clearly to define the proportions of co-ownership. The Commission must endeavour to bring about a friendly agreement of the interested parties.

If properties combined in this manner are separately charged, and these charges have to be transferred to the allotted property (Section 42), the directions of Section 12, 2, are to be observed.

Section 18.*—If such an agreement, as described in Section 17, 2, cannot be arrived at, a full compensation in cash has to be given for the collated (pooled) property:—

1. On a motion brought forward by the Town Council if the area of the property is so limited that it can only be exchanged by a site unfit for building purposes, and if in this case the re-surveying might be considerably interfered with, or its purpose prevented.

2. On a motion brought forward by the owners if the area of the property, as a result of the Re-Surveying, would be decreased in such a manner as to render it unfit for building purposes.

At the adjustment of Compensation Claims, Regulation 3 of Section 16 is to be observed in such a way that the amount which the owner would have had to pay as his share of the Re-Surveying costs shall be deducted from the sum of indemnification.

Portions of the remaining area (Section 10, 3), which would correspond to those described in Section 12, may be excluded from the distribution amongst all the owners, and with their common consent be allotted wholly or in part to another owner or owners, who in this case will have to pay an indemnification. The Regulations of Section 16, 3, is here applicable.

Section 19.—The Commission, after having received the report of the Board of Works, decides upon the fitness for building purposes.

Section 20.—Interested parties whose claims become void (Section 42, ii. 3) or are modified by directions of the Commission (Section 25, i. 2), likewise tenants or farmers whose claims expire (Section 42, 4), have to be indemnified individually for losses they have suffered by the Re-Surveying, provided this indemnification is not contained in those referred to in Sections 14, 16, 18, 31.

Section 21.—All other claims for compensation not coming under this act have to be settled subject to law regarding expropriation of June 11th, 1874.

Section 22.—The Plan for plotting out of building estates must not be altered during the Re-Surveying Process without the sanction of the Commission. The latter may, however, to facilitate the Re-Surveying, present a petition at the Town Council that the plan may be modified, according to the regulations prescribed in the Law regarding the making and altering of streets, etc., of July 2nd, 1875.

Section 23.—The Commission, having considered the report of the Board of Works, decides within what time the roads and places of the Re-Surveying Area have to be ready for traffic and for building purposes. Hereby a preliminary completion may for the time being be accepted and considered sufficient. This space of time can be fixed differently for different portions of the Re-Surveying Area. After the expiration of the time fixed, the building license cannot be withheld because the completion of the roads, etc., has not been attained. In the case of Regulation Section

*See report by Mr. B. W. Kissan, I.C.S., re elucidation of these articles (17.18.19 etc.)

3, i. 1, the time-limit must not exceed the space of four years, without prejudice to any other arrangements made between the Community and the parties.

If the projected streets, etc., are not completed by the time of the Re-Surveying, and approaches and other means of access are required for the utilisation of the different properties, the existing roads, paths, etc., destined to be closed or re-made, may temporarily be kept open. Where this is not the case, the Community will have to see to the opening of provisional approaches, etc.

On a motion of the Community, this imposition may be dispensed with, and the interested owners be solely indemnified by a sum of money, if the provisory making of approaches would cause an excessively high outlay. This rule is not applicable where approaches to properties which are built on, or otherwise utilised and retaining their original ownership, should be impaired.

Section 24.—All necessary expenses, enumerated in Sections 13, 14, 16—23 devolve upon the Community.

Section 25.—To obtain the purpose of the Re-Surveying, the Commission can retain or alter existing praedial tithes, or impose new ones.

Other claims on properties, which according to Section 42 ii. 3 would become extinct, can be transferred by the Commission to the allotted property, if they can there be executed, without any material detriment to those entitled to them, and if they are not contrary to the purpose of the Re-Surveying.

Section 26.—The Dispositions and Regulations of the Plan of Allotment have to be decided by the Commission, in friendly agreement with the parties concerned. They should also endeavour to bring about agreements by which money-compensations are limited to the utmost, or rendered entirely dispensable.

They have further to pay attention that the proceedings are directed towards the really concerned parties. [Negotiated with the right parties. —E.P.R.]

Section 27.—When an agreement has been effected (Section 7, i.) the Commission is bound to the observance of its tenor. [Bound to observe and respect it.—E.P.R.]

When an agreement has been effected, according to Section 7, 2, the District Committee has to decide whether the object of the Re-Surveying can still be obtained in substance if it is limited to the properties relating to the agreement. If this is the case, and the owners of the remaining properties have agreed to such a limitation, and to a subsequent Re-Survey of their properties, the District Committee excludes the properties not concerned in the agreement from the Re-Survey. [i.e., although an agreement may relate only in part to the pooled area, yet such agreement shall have weight.]

The Regulation of Section I. is applicable to all properties concerned in this agreement.

Agreements concerning the Re-Surveyings made by owners of properties of a single block or several blocks have to be respected by the Commission, provided the whole Re-Surveying is not impaired hereby.

These rules and regulations are valid, although the agreements should (may) have no legal title.

Section 28.—If the Community, according to Section 13, has to grant a compensation, or if an allotment, according to Section 18, 3, is made, in consequence of which cases the interest of the Community would materially clash with the common interest of the owners, then the County President (or Governor) has to appoint a proxy or administrator. The whole of the owners, taken collectively, are so far considered a party.

This proxy or administrator has the position of a legal representative (or counsel). He may be chosen from amongst the owners. He is entitled to receive, besides his actual expenses, an adequate payment for his services. This amount is fixed by the Commission, and is to be paid by the Community. On his request, the Community has to advance a certain sum to the representative for incurring expenses, including legal charges.

The proxy or administrator receives an appointment.

Section 29.—Expenses which devolve upon the Community as compensation for special substantial benefits accruing to her [to the community —town or city] are not to be debited to the owners. This is especially the case of compensations mentioned in Section 13, Section 18, 3, and Section 21.

All other expenses devolving upon the Community, and alluded to in Section 24, Section 28, 2, Section 36, i. 2, have to be divided amongst the owners, if this is proposed in due form by the Town Council. Against this, however, as counter-account is to be placed and directly deducted:—

1. Compensations and other Payments to be made to the Community in accordance with Section 15, Section 18, 3, and Section 36, i. 2.

2. Compensations to be made by the Community according to Section 13 as well as those imposed in the case of an effected allotment (Section 18, 3).

Section 30.—The Apportionment (on owners) of the Re-Surveying expenses of the Community is made with regard to the individual benefit accruing to the individual owner by the Re-Survey, or, if this scale (manner) should not be suitable (expenses shall be debited), with regard to length of frontage, superficial dimensions, and the position and commercial value of the (re-) alloted property.

On a motion of the owner, the payment of the Re-Surveying Contribution may be deferred, at interest of $3\frac{1}{2}$ per cent., until the sale, or the cultivation, or building upon of the property (commences).

Should, at the Apportionment of the Re-Surveying Contributions, the value of allotments (new plots) made according to Sections 11—14 fall short in value against the property thrown in [be less than the value before pooling], the owner will not be included at the apportionment [will not be chargeable for contribution]. This is also the case regards owners to be indemnified according to Section 16.

Section 31.—If the total amount of payments enumerated in Section 29, ii. 1, 2, exceeds the amount of the Re-Surveying Expenses, it has to be returned by the Community to the owners under application of Regulations of Section 30, 1.

Section 32.—Motions, discussed in Section 15, Section 18, 1, Section 23, 3, Section 29, 1, 2, have to be brought in latest at the publication, and as a protest against the Plan of Allotment (Section 37).

Section 33.—Interested persons have to present their claims as soon as they can be made out, if possible to the Commission, or else to the District Committee. If this is neglected, the Commission or the District Committee has the right to charge the costs which may arise by a belated communication.

4. Framing and Settlement of Allotment Plan.

Under strict observations of all regulations contained in Sections 10 to 31, and 33, the Commission has to frame or devise a plan of allotment and a map. In this plan the former possessions, as well as the new distributions have to be clearly defined. The different properties have to be separately enumerated, with the extent of their dimensions and the names of their owners, all roads which are to be closed and new ones which, according to Section 23, have to be constructed, must be marked on the

plan. Also all arrangements and regulations set up and described in Section 25, 1, 2, all compensations proposed and considered in Sections 11—14, 16—24; as well as any additional charges, indemnifications, and Re-Surveying expenses (Sections 15, 18, 3, 29, 30, 33). It must also be clearly shown in the plan in what manner the regulations of Section 12, 2, Section 17, 3, have been fulfilled.

Section 35.—The Commission must confer with the interested persons about the Plan of (re-) Allotment and the Map.

All interested persons have to be invited to attend on the day of issue. The Community, the Owners, and all persons who have previously applied for admission are notified by summons, other interested persons are informed in the usual public manner and by notice to attend the meeting and to make good their claims. In the summonses references has to be made to the regulations of Sections 32 and 33, and the parties cautioned that in case they fail to attend, a decision will be taken without them as regards the plan of allotment, especially the allotment of properties, the fixing of indemnifications, charges, special compensations, and surveying expenses, etc., etc.

Every one interested in the proceedings may appear, at the appointed place and day, to guard his interests. An opportunity must be given to the Local Police Authorities* to keep in view their local interests at these proceedings. They must be informed of the place and day of meeting, and have the right to send a representative. All regulations in the plan of allotment, as far as they touch the local police-rights, are, as much as possible, to be settled in agreement with them.

Section 36.—The Commission has to resolve upon the Plan of (re-) Allotment and accompanying Map, especially upon any proposed alterations or additions, and, if necessary, to correct or complete the same in accordance with passed resolutions. Any agreements made by parties concerned about annulments, maintenance, or alteration of Rights and Privileges, must also be registered in the Plan of Allotment, so far as they are not contrary to the purpose of the Re-Survey.

Besides the President, there must be present at the taking of a resolution at least one member of the expert bodies enumerated in Section 8.

Section 37.—After the resolution has been passed, the Commission has to exhibit the Plan of Allotment and Map for everyone's examination, and to assign to the owners on the spot the allotted properties (which) the day herefore to be announced previously (were announced, published). The regulation of Section 4, 5, is hereby applicable, with this observation, that all objections to the Plan of Allotment must be addressed to the President of the Commission. A copy of the Plan of Allotment with Map is to be sent to the Community, and to each of the owners. The other interested persons, and those who have taken part in the proceedings, have to be publicly informed of the exhibition of the plan and proceedings. The time for raising objections begins for those parties mentioned in the preceding section with the receipt of the summons; for all others, with the publication of the proceedings.

In case the closing or shifting of public roads is to be considered, the Road Board must be informed of this. Objections hereto have to be considered with the Re-Surveying Process.

Section 38.—In case objections should be raised against the Plan of Allotment, the Commission must endeavour to settle differences by friendly discussions. If their efforts are not successful, all papers and documents bearing upon this matter, together with the report of the Commission, have to be sent to the District Committee. The latter decide about the objections, and their decision is final.

* Prussian 'Building Police' administer building byelaws.

If there are no objections, or if all objections are disposed of, then the settlement of the Plan of Allotment is arrived at by final decision of the District Committee.

A copy of these decisions, together with the settled Plan and Map, has to be sent to the County Council, to the Owners, and to the Administrator (Section 28). Other interested persons, and those who have taken part in the proceedings, have to be informed in the usual manner of the effected settlement.

The County Council sees to a public announcement of the same.

5. Legal Proceedings.

Section 39.—Persons raising claims for money compensations (defined in Sections 11, 13, 14, 16—23) against the accepted Plan of Allotment are at liberty to take legal proceedings. The plaint is admissible for two months after the commencement of the Re-Survey (Section 40, 1).

In the case of persons to whom the District Committee's Assignment Order has to be conveyed (Section 40, 1) this time-limit expires two months after receipt of the Assignment Order.

If, in the case of Section 13, an Administrator has been appointed, the claim has to be brought in by him against the Community, or by the Community against the Administrator. In all other cases it has to be made against the Community by the Owners and those persons enumerated in Section 57 ii. 1, 2, or by the Community against these persons named.

In cases of Section 15, legal proceedings can only be instituted by the Owner personally.

6. Execution of Plan of Allotment.

Section 40.—The execution of the Plan of Allotment cannot be delayed by any legal proceedings. It is effected by an Assignment Order of the District Committee, given after their final decision. In this Order, the day on which the rights of ownership, etc., are modified is to be clearly designated (" Day of Re-Survey ").

This day has to be fixed in such a manner that between the publication of the Assignment Order and the day of Re-Survey one clear month must have passed.

The Assignment Order can only be issued if it can be shown that all indemnifications (Sections 14, 16—23, 31) appointed in the Plan of Allotment have been paid or deposited by the Community. This Order may be issued at the same time with the Publication of the Plan of Allotment (Section 38, 2, 3).

Not only to the Magistrate, the Owners, and to the Administrator, but also to all other interested persons, or those who have taken part in the proceedings, notification of the Order of Assignment has to be given. The County Council has to see that the Assignment Order is published in the usual manner.

Section 41.—After the official publication of the Assignment Order, the Community acquires the right to construct all those roads and approaches (Section 23, 2) which according to the Plan of Allotment are decided to be opened.

Section 42.—After the official publication of the Assignment Order, the tenor of the Plan of Allotment becomes effective. Previous rights of possession become extinct. Collated (pooled and re-allotted) properties are freed from all charges and limitations, all entails are cut off, and all feudal tenures are abolished.

The Community or bodies whose duty it is to maintain the public roads and approaches become owners of those portions of the land which have been apportioned (Section 10, 2) for that purpose. If for properties which have been thrown in (to the pool) (Section 12) assignments of other

portions of land have been made, these assigned portions replace as regards ownership and other rights (i. 3) the former property. Excluded herefrom are, however, all hereditary rights (building rights), servitudes, right of repurchase and pre-emption, and all such easements that not solely consist in money or in kind, provided that it (is) should not be otherwise decreed in the Plan of Allotment. Money indemnifications, fixed according to rules of Sections 14, 16, 18, 23, 31, 39, represent in these cases the properties pooled. The same rule is also applicable where (Sections 14, 16, 18 1 2, Section 23, 31) agreements are concerned according to Section 36, i. 2).

Lease and Conveyance Contracts by which the thrown-in (pooled) property was leased or let to a Lessee or Tenant become void, if not otherwise stipulated in the Plan of Allotment.

Section 43.—On the application of the Commission the Land Registry Office has to cause entries to be made into the Land Register of all changes in vested rights and privileges which have taken place in consequence of the dispositions of the Plan of Allotment, and to cancel the Re-Surveying notice. It must also be entered if properties are according to rules of Section 15, 2, and Section 18, 3, to be indemnified, or, according to Sections 29, 45, liable to contribution. This application has to be accompanied by the necessary extracts from the Land Register.

The application has to be made without delay. In case there should be no Land Register for some properties, the above regulations are applicable to other existing official registers.

Section 44.—The Regulationsof Sections 37, 38, 47—49 of the Law of Expropriation of Ground Property d.d. July 11th, 1874, and Section 35, 41 of the Law, concerning forced sales and legal administrations, d.d. September 23rd, 1899, likewise the regulations about depositing and management of money indemnifications, are also applicable, according to judgment.

7. Additional Plan of Allotment.

Section 45.—In case the expenses of the Community are increased in consequence of the issue of lawsuits, the surplus has to be charged (after a previous application of the Community) to the Owners, in proportionate parts. This application has to be made not later than a month after the issue of the last legal proceedings.

If, on the other hand, the expenses are, by reason of the cause mentioned in Section 1, 1, reduced, the decrease in the amount has to be credited to the owners in comparison to their contributions. If hereat no agreement can be obtained, the County Council has to apply for the drawing up of an additional Plan of Allotment. This application may also be made by one or the other of the owners.

Expenses arising according to Section 23, 2, may also, if they have not already been considered (Sections 29, 30, 34), be disposed of in the additional Plan of Allotment.

The Regulations of Sections 16, 29, 30, 34—38 are here also applicable.

Section 46.—In case the value of the effected Assignments (Sections 11, etc.) minus the Surveying Charges (Section 45) does not equal the value of the thrown-in property (Section 16, 1, 2), the owner may legally claim exemption from the Surveying Charges, or reimbursement of his contributions paid. The claim has to be brought in within 3 months after the date on which the payment of the above charges was due.

Contributions not recoverable may be disposed of otherwise in a subsequent Plan of Allotment.

8. Delivery.

The Regulations to be observed at the delivery or serving of summonses, etc., are subject to the General Land Administration Law, d.d. July 30th, 1883, p. 195.

9. Special Regulations.

Section 48.—Payments which, according to the Plan of Allotment, have to be made to the Community, are subject to the Collecting Regulations at Municipal coercive proceedings.

Additional payments (Section 15), Compensations (Section 18, 3), and Surveying-Charges (Sections 29, 30, 45, 46, 2) are to be classed with ordinary taxes.

Section 49.—When the liability for the payment of above-mentioned charges has become extinct, the Community has to apply for the cancelling of the entries thereof from the Land Register.

PART III.

Final Regulations.

Section 50.—When agreements, as described in Section 27, have been made in perfect legal manner, and if the District Committee considers all such suppositions, as mentioned in Section 27, 2, to be existing, the District Committee may stop the proceedings, on an application of the County Council, and such a majority of owners as is mentioned in Section 3, 1, 2.

Section 51.—The District Committee is further empowered to discontinue the proceedings on the Council's application, if, according to circumstances (especially with regard to compensation claims, or the possibility of such claims being raised), there is reason to fear that the execution of the Re-Survey should prove unthrifty, or be attended by unproportionate costs devolving upon the Community, also if the execution of the Re-Survey should be found unnecessary for other reasons than those mentioned in Section 50. Before such a resolution is finally passed, all other persons interested in the proceedings shall be given an opportunity to discuss the matter. Such a motion is only admissible until the day of settlement of the Plan of Allotment (Section 38, 2). The Community has in case of Section 3, 1, to refund any costs, etc., incurred by the owners.

Section 52.—If the proceedings, according to Sections 50, 51, be discontinued, the Land Registry has, on an application of the District Commission, to cancel the Re-Surveying entry.

Section 53.—The Building Authorities, after having been informed of the intended Re-Survey (Section 4), cannot grant any permission for the erection of buildings on properties within the Re-Surveying area without having previously informed the County Council, and having heard their opinion. The permission may be refused, or made conditional, if the Re-Survey should hereby be impeded. No compensation can be given for this limitation of building rights.

Section 54.—The costs of the proceedings devolve upon the Community without prejudice to the regulations of Sections 5, 6, 33.

As regards costs, fees, stamp duties, etc., etc., the regulations of Section 43 of the Law of Expropriation of Ground-Property of July 11, 1874, is hereby applicable, if not otherwise decreed.

Section 55.—As regards covering of costs which devolve upon the Community, according to Sections 29, 2, Sections 45, 46, or costs of Re-Survey, which are to be treated as common taxes (Section 54, 1), the owners of the Re-Surveying area are in no way to be compelled to contribute towards the payment thereof.

Section 56.—All terms laid down in this law are exclusive.

Section 57.—Interested persons or persons concerned (Section 4-6) are, besides the Community, all Owners, the Mortgagees, Groundre Creditors, and all such persons who enjoy the usufruct of properties to be re-surveyed.

As persons concerned, according to Section 11, the following, besides the Community and the Owners and Administrator, have to be considered:

1. Those parties for whom rights have been reserved in the Land Register or any other such book.*

2. All those who have any other right or claim on some property to be re-surveyed, or on the right itself; the tenants or farmers to whom properties have been leased or let; and lastly in the case of forced sales or legal administration, the creditors.

Interested persons whose rights or claims have not been entered in the Land Register or any other such book have, on the demand of the Community, or of an Owner, or the District Commission, or any other Authority before whom the proceedings are brought, to prove or make out their claims. Before such proof has not been shown, they may be excluded from participation in the proceedings.

In a lawsuit in which the right of participation in the proceedings is the issue in law, both parties are considered as interested persons.

Section 58.—This law becomes valid on January 1st, 1903.

The Minister of Public Works is charged with putting this law in execution.

Given under our own hand and imperial seal at Sasonitz on board our yacht " Hohenzollern."

WILHELM.

July 28th, 1902.

AMENDMENT OF LEX ADICKES

regarding alteration of Section 13 of the Law concerning the Re-Survey of Ground-Property in Frankfurt a/M., d.d. July 28th, 1902.

The Section 13 of the Law concerning the Re-Survey of Ground-Property in Frankfurt a/M. is to be altered as follows:—

" If the land required for public roads and open spaces coming " under Section 3, 1, amounts to more than 35 per cent., and in case " of Section 3, 2, to more than 40 per cent. above that already allotted " for this purpose, &c., &c., &c."

Given at Bergen, July 8th, 1907.

(No. 35, 1907, p. 259.)

Law

regards Re-Survey of Ground-Property in the town of Posen.

The Law regards Re-Survey of Property in the town of Frankfurt a/M., d.d. 28th July, 1902, and its supplementary law regards alteration of Section 13 of the same, d.d. July 8th, 1907, applies in its full tenor also to the town of Posen.

Given at Swinemünde, July 28th, 1911.

(No. 23, 1911, p. 159.)

Law

regards Re-Survey of Ground-Property in the town of Wiesbaden.

*Note, the German Land-Register Book is a public record of land-holding. By its open and easy access in every town, land can be bought and sold more easily than stocks and shares. The result in Germany has been to allow enormous, artificial and highly injurious land-speculation. The price of land jumps up and falls down like shares of a new gold mine. This keeps land out of the house builders hands, E.P.R.

The Law regards the Re-Survey of Property in the town of Frankfurt a/M., d.d. July 28th, 1902, with its supplementary Law regards the alteration of Section 13 thereof, d.d. July 8th, 1907, applies in its full tenor also to the town of Wiesbaden.

Given Berlin, June 3, 1912. (No. 24, 1912, p. 179.)

It is pretty certain that the Lex Adickes, with modifications, will become law in numerous German and Prussian Towns.

Mr. E. G. Turner, I.C.S., Special Officer, Salsette (Island) Building Sites, Bombay, has published some short reports on the adaptation and actual application of the Lex Adickes to Indian town-planning. These papers are highly lucid and practical, and would be of very great use to those who may draft a Supplementary Act for Calcutta. The writer had the pleasure of meeting Mr. Turner in London and discussing points with him. Every member of the Calcutta Improvement Trust should peruse the following notes by Mr. Turner:—

In Proceedings of the First All-India Sanitary Conference,* 13th and 14th November, 1911.

Appendix 4.—Short Note on Town-Planning in Salsette Island.

Ditto, Appendix 5.—Note on Re-Distribution of plots and calculation of development tax in town-planning schemes.

Proceedings of Second All-India Conference (held at Madras), Nov. 11th to 16th, 1912.

Vol. II.—Town-Planning Notes.

An analysis of this last paper appears on pages 9 and 10 of Vol. 1, and is well worth re-printing here, as it sums up the German Lex Adickes method in a very clear manner.

TOWN-PLANNING.
CONGESTED AREAS, AND BUILDING BYE-LAWS.

Town-Planning.

" Mr. Turner, Special Officer, Salsette Building Sites, Bandra, read a paper on " Town-Planning " (Volume II.) in one of the rooms of the Government Maternity Hospital, where the President and the members of the Conference drove from the Council Chamber after the conclusion of the President's address. Mr. Turner illustrated his paper by exhibiting diagrams with the aid of lantern slides thrown on canvas."

" The following is a resumé of the paper."

" The lines on which town-planning work is being considered in Bombay is really a combination of the English principle of " betterment " and the German principle of redistribution.

Redistribution gives power to alter the shape of plots so as to render them more suitable for building plots. It is especially necessary in town-planning in a country where holdings are mostly small and irregular in shape. The power to cut plots from larger holdings and allot them to owners dispossessed of their fields by the advent of roads and other public sites, allows the capital cost of the scheme to be reduced by the value of the plot allotted. The owner of the holding from which the allotted plot is carved will have his contribution for betterment reduced by the cash value

* Obtainable from Supt. Govt. Printing, 6, Hastings Street, Calcutta.

of such allotted plot. The power to redistribute will be held in reserve and used as much or as little as is found expedient. The wishes of holders should be followed as far as consistent with the objects of the scheme. Examples are given in the paper by diagrams of various alternative redistributions of plots.

Betterment enforces contributions from owners towards the cost of a scheme in proportion to the extent to which their land is bettered by the completed scheme. It is reasonable that holders should contribute some portion of their betterment towards constructional and other expenses, but no more should be taken than is necessary for actual expenses. The proportion to be taken should be limited as in England to one-half, and if any more is required, it must be provided from other sources, general taxation, etc.

Credit and debit.—By a method of credit and debit, the amount of capital necessary to be raised is minimized. With each holder an account is opened, on the credit side of which will be the decrease in the value of his plot due to rearrangement, and on the debit side the portion of his betterment which is levied for expenses. The balance on the debit side will be levied from him; on the credit side paid to him. Instead of paying holders in cash for land they give up and afterwards levying a contribution from them, the difference of these two items will be levied from, or paid to, them, and so the amount of capital to be raised materially diminished.

Betterment.—Method of calculating.

This may be done, as in England, after all the constructional works have been finished. Under a system of redistribution of plots there are advantages in estimating at the same time as the original and final plots allotted are valued, i.e., before works are started. This allows of a set off being made in each account, and provides the local authority with an immediate security on which to raise loans. With a system of prevaluation power should be given to the majority of owners or to the local authority to demand a revised valuation after a fixed period.

Procedure.—(a) The local authority will publish a notification of intention to plan a certain area defined by boundaries and showing existing and proposed main roads.

(b) Owners will be fully consulted as to any redistribution that may be necessary.

(c) A block plan and scheme will then be prepared showing details and objections will be invited.

(d) After consideration and alterations, the local authority will submit scheme and objections received to the controlling authority.

(e) The controlling authority will appoint an independent arbitrator, to be an expert valuer, who will draw up the final scheme and plan as sanctioned.

(f) He will award compensation payable for extinction of rights or any property injuriously affected, and will calculate the dues leviable from every holder in accordance with his valuations.

(g) The local authority will then notify the final scheme and date from which it will take effect.

Transfer of rights.—So far as possible the rights of lessees or mortgagees of original plots should be transferred in the same or a conveniently modified form to new plots, and compensation paid to any one injuriously affected. Agricultural leases should not be transferred without consent of all parties. The arbitrator will decide questions of compensation for transference of rights, and decide what rights shall be transferred to the re-arranged plots. On the day the scheme takes effect the old rights will be extinguished, and the new rights take effect.

ENGLISH TOWN-PLANNING ACT (1909).

The sole English town-planning Act, apart from street and byelaw enactments, is that of December 3rd, 1909, known as the "**Housing, Town Planning, etc., Act, 1909.**" This Act is the thin edge of the wedge driven well in as regards future English town-planning legislation. The favourable public and parliamentary reception of this Act is due in the first place to the small body of English writers on town-planning, and to the vigorous advocates of better housing and congestion remedy. The welding and transmutation of these good influences into an effective Town-planning Act was accomplished by Mr. John Burns, the keen, able, and popular President of the Local Government Board.

Part I. of the above Act is mostly occupied with amendments and improvements of the English Housing Acts, especially as regards the 1890 Act; and it may be noted that some of these amendments should be embodied in slum-repair powers given by a Supplementary Act for Calcutta. Sections 54 to 67, and Schedules 3, 4, and 5 of the 1909 Act deal with town-planning. Work under this portion of the Act is optional, not compulsory. Town-planning schemes may be prepared by any Corporation, Urban or Rural District Council, and must then be submitted for criticism, sanction or disapproval, to the Local Government Board. The Local Government Board may, however, order an authority to prepare and execute a scheme. A gratifying number of local authorities have begun to make some use of the Act. The Local Government Board exercises close control of all projects, and its sanction is required to make any scheme become law. The Civil Courts (always the great preventers of town-planning, and always the upholder and friend of the obstructive and short-sighted person) are quite excluded from participation in English town-planning legislation. The single arbitrator for settling compensation or value of betterment, etc., is appointed by the Local Government Board.

The Act has hardly been in force long enough to judge clearly of its powers or effects; numerous points need definition; some authorities seem to be doing too little under the Act, and others by some means (mostly by mutual agreements between owner and authorities) are securing an amount of amenity that has, the writer believes, surprised even the President of the Local Government Board himself.

In general, the small and partial schemes presented so far shew that the idea of the orderly growth of the whole city or town has been quite missed. Birmingham is, however, a splendid exception, and is busy with practically the whole of her partially built-on or unbuilt-on areas. Great credit for this essential and comprehensive policy is due to Mr. Henry E. Stilgoe, M.Inst.C.E., City Engineer and Surveyor of Birmingham. A

copy of his widely-read paper, "**The Birmingham Town-Planning Schemes and Notes on the Procedure Regulations**" (with interesting plans) is sent out with this report.

The 1909 Act as it stands is no exception to ordinary English legislation. It is admitted to be highly intricate, and to lack definition. So far as the writer knows, only two schemes have been sanctioned up to date (December, 1913), and no actual town-planning work has yet been accomplished. Amendment of the Act is likely at an early date. At the same time, it has some remarkably strong points, and will be of very great service to English towns and cities. A brief synopsis may be attempted here of the principle powers:—

(1) Schemes may be put forward (for planning "land likely to be used for building purposes"):

(a) Voluntarily by a Local Authority (L.A.);

(b) By a L.A. under compulsion of Local Government Board;

(c) Voluntarily by land owners.

(2) As far as possible schemes should be arranged by mutual negotiations between owners and L.A.'s before submission for approval.

(3) Schemes usually include new main roads and streets, but may include only some roads, or only main roads. It appears that road-widenings for main traffic needs will be made and paid for by the Local Authority. Other roads and streets will be made and paid for by the Local Authority, but repayment has to be made by owners of land benefited. Such repayment will be assessed on either frontage or on "the degree of benefit accruing"* (frontage assessment at Birmingham must not exceed £3 10s. 0d. per yard). Repayment for road making appears to become due to the Local Authority when the land abutting on the new roads is brought into rating for other purposes than agriculture. At Birmingham, in the Local Government Board order approving the Quinton, Harborne and Edgbaston scheme, it is decreed that "The soil up to the middle line of such highways shall thereupon (after opening to traffic) be deemed to vest in the freehold of the owners of the land abutting upon such highways." But this scheme has been largely made possible by friendly agreements between owners, and between owners and the Corporation. The Act gives power for compulsory purchase of land (for roads and streets, etc.) when compulsion is required.

It appears that landowners are expected to give free of cost the land required for ordinary roads and streets. Further, that owners whose land adjoins the said new ordinary roads and streets must repay the Corporation for making them. Owners are expected to give up free of cost land required for arterial main roads, but the Corporation will pay extra cost of road-making, i.e., cost of widths over 50 feet.

In case land has to be bought up for streets and roads, or should other loss be sustained, then the L.A. can, apparently, put in force Section 58, 3, which empowers them to levy contribution from owners of affected property, at the rate of half the increased value caused "by the making of any town-planning scheme." (All very vague.)

(4) Compensation may have to be paid to " any person whose property is injuriously affected by the making of a town-planning scheme " (58.1); and 58.2 provides that compensation shall not be paid for work or buildings, etc., erected or done on a scheme-site after the date of application for sanction.

The Act provides (55.1) that " the Local Government Board may prescribe a set of general provisions or separate sets of general provisions adapted for areas of any special character) for carrying out the general objects of town-planning schemes "; and again in 55.2 it is laid down that " Special provisions shall in addition be inserted in every town-planning scheme defining . . . . and otherwise supplementing, excluding, or varying the general provisions," etc., etc.

This is a very wide net, and explains how regulation of the location of industry, and even of architectural control, are found introduced into tentative English schemes of to-day—for these things are not mentioned specifically in the Act. It is clear, too, under Section 55, that no compensation can be obtained for effects caused by these regulations, such as limit of houses per acre, height limits, proscription of character of buildings, (59.2). These special provisions are analogous to the special regulations found in the numerous decrees and bye-laws made under the Italian Town-Planning Act of 1865. A few more years' working of the English Act will doubtless find it crystallized into definite working order. At present it is still vague on many important points. We may now sum up its principles in a few words:—

The real onus of town-planning lies with Local Authorities, but they will be supervised and directed by the Local Government Board.

They are requested to town-plan, and do so as much as possible by amicable negotiation with owners.

Local Authorities will make the roads on owners' land, and owners will pay for them. For widenings and main roads, Local Authorities will bear cost of extra road construction. Owners may be called on to pay betterment at the rate of half the increase of value due to the town-planning.

People whose property is injured have power to get compensation, but limitation of the number of houses per acre, or of space about dwellings, or of industrial location, etc., etc., shall not be counted among reasons for compensation.

By the Special Provisions, most of the valuable and essential needs of effective town-planning can be obtained, i.e., permanent destination of areas for definite purposes—such as first class, second or third class residential, number and class of buildings per acre, industrial location, etc. This is indeed powerful and admirable.

In considering the English Act as an example for Indian legislation, there is one paramount difference to be borne in mind. English land is held mostly in big pieces; but Indian land is mostly divided into very small and innumerable holdings. Then again, English land and property owners are much more amenable to mutual negotiation, and to amicable agreement between themselves and their local authorities. The English Act has been drafted in accord with these conditions; but it is doubtful if it could be applied as it stands in India. It may be taken that the number of land owners, say per 10 acres, would be four times as many at Calcutta as, say,

round Birmingham, hence, though given the same faculty for amicable negotiation at each place, the Calcutta work would take at least four or five times as long. There is also another big point; the re-plotting of building sites does not appear to enter into the English Act—very likely and reasonably because the large size of the holdings makes this re-plotting unnecessary. But in Calcutta, re-plotting will in most cases be an absolute necessity of any effective re-planning in the suburbs and partly built-on areas.

The highly valuable and advanced Section 59, 1 and 2, which gives power to limit height and number per acre of buildings, should certainly be included in a Calcutta Act; also many of the special provisions used with the English Act would be valuable for the welfare of Calcutta.

SWEDISH TOWN-PLANNING LAWS.

The Law of 1874.

The following notes are taken from Mr. T. C. Horsfall's analysis, in " The Garden City " of February, 1908.

COLLECTION OF SWEDISH LAWS, NO. 25 A.D. 1874.

BUILDING-LAW FOR TOWNS, PASSED MAY 8, 1874.

(2) BYELAWS.—All possible improvements shall be effected in the Town Plan. The arrangements shewn in it shall be fully carried into effect. Regulations re sites of buildings shall be fully enforced, so that sites may be of adequate size. The plan for each site shall provide for a spacious and wholesome yard (open space belonging to each house). All such provisions shall be included in the Building Bye-laws as are necessary to ensure the suitable development of the town.

Section 9.

THE CITY OR TOWN PLAN.

1. For every town there shall be prepared a (one comprehensive) **Plan** for the regulation of its general arrangements, and of the building within it. The **Plan** shall regulate, not only the buildings, but also the streets, the markets, and other public places.

2. Town regulating plans now in force (1874) shall continue to be in force.

3. No building work which contravenes the regulation of the existing **Plan** must take place in a town, nor shall a town be extended into a district for which no **Building Plan** has been prepared.

4. Should the extension of a town into a district which is not included in its **Building Plan** become necessary, or, for some other reason, be desired, then a plan must forthwith be prepared for the said districts in order that no difficulty may be created by the erection of buildings before a **Plan** is prepared.

Section 10.

Questions re the **Town Plan** are dealt with by the Town Commissioners or by the Town Council (Corporation). The **Plan** decided on must finally be submitted to the King for examination, etc.

Section 11.

1. The **Town Plan** shall be carefully drawn to a scale of 1-2000 (i.e., 166⅔ feet to 1 inch, or about 31 inches to 1 mile—a fine big scale), etc.

Section 12.

1. The **Town Plan** must be so prepared as to ensure, as far as possible, that the requirements of **Traffic** in respect of ample space and convenience shall be supplied; that the light and air needed for health shall be provided; that danger from fire shall be guarded against; and that there shall be the open spaces, the variety of construction, and the beauty necessary for æsthetic reasons. For this purpose care must be taken, amongst other things, that streets shall be wide and shall run in the directions most suitable for traffic; that large and suitable sites shall be provided for markets, harbours, and other places where there will be much traffic; that wide promenades (or boulevards), with shrubberies in the middle, and roadways on each side, or with other suitable arrangements, shall traverse the town, if possible in various places, and in different directions; that as many as possible other public planted open spaces shall be provided in the town; that, on the one hand, the residential districts shall not be so large or so crowded with houses as to prevent the free passage of fresh air, or to interfere with the work of extinguishing fires; and, on the other hand, that in the said districts the building sites shall be of sufficient size to allow of the erection of commodious dwellings and the provision of open and well-ventilated yards; that, where this is found to be possible, lines of back-gardens shall be so arranged in the residential districts of the town that there shall be on each side of the gardens a line of building sites; and also that where this is found to be desirable and possible, there shall be front-gardens between the houses and the streets.

2. Under no circumstances shall the garden and yard area ever be built on. It is the duty of owners to keep all gardens in good order.

Section 13.

STREET WIDTHS.

New streets must usually be not less than 58½ feet wide. Under special circumstances short streets may be made not less than 39ft. wide, etc.

Streets in which houses are provided with front gardens, and in which at least 59½ feet separates the house building-lines, may have a roadway between garden fences of not less than 39ft. wide.

Section 14.

Incorporation with towns of their outside areas, has to be considered within 2 years of the passing of this Act (in 1874).

Section 15.

Relates to improvement of existing built-up areas of towns.

Section 16.

Safeguards harmonious and comprehensive planning of all districts round a town.

The writer was unable to ascertain the methods of finance under this Act.

The Swedish Law of August 31, 1907.

A translation of this Act was very kindly lent the writer by Mr. Raymond Unwin, but it arrived too late for re-printing. This 1907 Act amplifies and amends the Act of 1874, and the combined working of the two Acts is very analogous to a fusion of Italian and German methods. Sections 30, 31, 32, 33 and 34 enforce or confirm the principle of contribution for Betterment, not only as regards new roads in fairly open land, but also as regards street-widenings. The maximum contribution for street-widenings appears to be "a fourth part of the value of such land as is required for street-enlargement up to eighteen metres (say 59ft.) in front of his site."

AMERICAN LAWS.

America has little help to offer as regards general town-planning legislation. The cities of America have practically all been built, and are still being extended, by rigid preservation of the grille street-system The next few years are, however, likely to see the advent of many new laws. The most valuable examples we can cite from America are perhaps the "special assessment" laws. These clearly enforce the principle of contribution for betterment, when increased value is caused by public works, such as a new street cut through built-up property, or new parks, new squares, etc. The following is from a letter of Mr. Raymond Unwin to the writer:—

"Do you know of the special assessment which is coming to be used rather extensively in America in the Western States? For example in Kansas and Denver. In Kansas they have spent over two millions on parks, open spaces, playing fields, and other similar lands, and 83% of the cost has been levied by special assessment on the property, made as nearly as may be pro rata to the share in the benefit. They have found that property owners are now friendly to the process, and they have been able to prove by figures that the property which has been assessed has increased in value over the remaining property, which was not considered benefited, and not assessed, by an amount greater than the assessment."

The Chicago Plan Commission also sent the writer much information. The special assessment method is being used for effecting street-widenings.

In some states and cities (e.g. Ohio) a recoupment depth can be taken, and this is known as "excess condemnation." This recoupment depth principle is becoming law everywhere in the States.

In 1907, Pennsylvania obtained a law that allows acquisition of land and property within 200 feet of any (proposed) park, park way, or public playground. The laws most interesting for Calcutta are, however, the "ordinances" that obtain the gradual widening of costly streets at little or no cost to the community. Under these, an order is made in respect of each street (such as Chitpore Road). "After the confirmation and establishment of the said (new building) lines, it shall not be lawful for any owner or builder to erect any new building, or to re-build or alter the front, or add to the height of any building now erected, without making it recede so as to conform to the line established." Theoretically, no compensation is given for the effects of this law, but in actual practice "some owners have been allowed nominal damages." Mr. Mulford Robinson

says of these "ordinances"—"As a result, the widening of streets of enormous property value has now been practically secured, by this means, at almost no cost to the municipality.

It is a similar law, with less harsh modifications suggested by the writer, that will help us gradually to create a street-system in Calcutta; incorporating in the **City Plan** building lines for every street and lane in Calcutta.

SUMMARY.

From the above scanty notes on the planning laws of Italy, Germany, Sweden, America and England, it will be seen that—

(a) The idea of present and future orderly city growth is firm-rooted.

(b) That it is effected in general by complete sanctioned plans of the present and future main road and street net, plus provision for all public squares, gardens, open spaces, and public land-needs.

(c) The future road net is made bit by bit as required, in strict accordance with the sanctioned public plans. The construction work of the roads is done by and at the expense of the Civic Authority, who recover the cost little by little, or as may be, from benefited land owners. A common maximum of contribution is a sum equal to half of the new value which is added to the affected property by its conversion into accessible building land. The difference between its original value and new value being counted from its value as agricultural or inaccessible land, and its value as land provided with a road, i.e., between its value before a scheme was mooted, and its value on the day the new road is finished.

Where land is held in innumerable small and awkward shapes, a system of pooling and redistribution is super-imposed on the foregoing.

Main roads are paid for in part, and sometimes in whole, by the Civic Authority.

(d) Special regulations, both affecting the present and future, define the town or city into separate areas, which are each permanently dedicated to special sociological uses, as to industry and factories, to offensive trades; to high class, second class, and third class residence. Permanent limits to height of buildings are fixed for every area of the city and future city. The number of houses per acre is laid down. Permanent rules of architectural control are used to preserve and increase beauty and amenity, etc., etc.

(e) Street widenings, new roads cut through property, new squares, parks, etc., which improve contiguous property or districts, are part-paid-for by assessments for betterment on the property, land, or district affected.

(f) All effective Town-Planning Acts are so framed that they obtain good suburban planning at very small capital cost.

CHAPTER XXI.

SUPPLEMENTARY IMPROVEMENT AND TOWN PLANNING ACT REQUIRED FOR CALCUTTA.

Town Planning should embody best powers of Italian, German, and English Acts—Area covered by new Act to include local contignous districts—one Regulating and Extension Plan for all Calcutta and suburbs is a main point—Co-operation to be vitalized and made compulsory—Rating of vacant building land is necessary to check speculation, encourage building, and add to Trust resources—Land policy—Borrowing powers for housing and re-housing work—Borrowing powers for main land drainage, sewerage, water supply and lighting, to be separate from ordinary Trust funds, and to be secured on rates of district—Trust is in position of a Corporation—but without its powers.

City byelaws—for chawls—for suburbs—for the built-up city—must not be drawn up by inexperienced people—most Improvement and Municipal Acts of India are weak and vague—so far Improvement Trusts have not succeeded in India—they have not had enough power—Encroachments—Control of trams and rapid transit—Amendments and additions needed in the Calcutta Improvement Act.—Improvement schemes—betterment and contribution for higher value caused by Trust work is entirely missed in the Calcutta 1911 Act—suggestion for Calcutta betterment contributions—basis must be laid down clearly in Act—rates of payments—contribution for betterment caused by slum-repair, in practice the owner raises rents of bettered houses, and tenants have to pay or go—causes worse house famine—we need the power, but its exercise must be optional, in the discretion of the Trust—we must not increase the house famine—abundant advance housing would permit of betterment enforcement for slum-repair work—rates of betterment must be laid down clearly in new Act.—Compensation—it is not defined in the 1911 Act, is left entirely to Land Acquisition Acts, this procedure is quite unfit for town planning and improvement work—compensation must be a just compromise between rights of community and individual.—The position of Calcutta—the community has not financial power to treat individuals with rich generosity—considerable temporary annoyance, discomfort, loss, is unseverable from progress—every decision demands blood—compensation at Calcutta must be not more than the just compromise—the welfare of the community is of more value than that of the individual—to put right 50 years of neglect will entail some unavoidable hardship.

Suggested compensation details—must be settled on rateable valuation—for property taken in street widenings, new roads, and slum repair—compensation for setting back in old streets—for arcading in old streets—arcading in new streets—for property in suburbs and semi-suburbs—to mortgagees, leaseholders, tenants—legislation to ensure construction of intra-city roads and orderly growth of street-net—tremendous importance of the time-limit—defects in this respect of Calcutta (1911) Act—suggestions of what is needed.

Town Planning. Main lines of new Calcutta Act.

1. It should embody the powers requisite for true comprehensive city growth given by the Italian Acts; the pooling and re-distribution system of Prussia, which is so valuable for land held in small awkward plots; the special housing provisions of the English Act; the American use of special assessment areas, and the general betterment idea of all. Amicable agreement should be inculcated, but this, in India, *must* be backed up by absolute and compulsory powers—otherwise nothing would ever be done. An optional Act would be of no use. Full control of the destination of each area, and of building heights, houses per acre, etc., etc., must of course be included.

2. The extension powers must be better than those in the present (1911) Calcutta Improvement Act, i.e., the new Act must elimate all small municipalities, etc., contiguous to Calcutta. The new Act should extend Calcutta, and bring Howrah, Cossipore-Chitpore, Manicktola and South Kidderpore into their true position as integrals of the city of Calcutta.

City Regulating Plan.

3. The first result of the new Act to be the creation and sanction of a

REGULATING PLAN FOR THE BUILDING AND EXTENSION OF CALCUTTA AND SUBURBS.

This Plan would have as its base, Scheme IX, and would not only include Howrah and all suburbs, but also the future building lines of every street and lane in Calcutta. Sec. 63 of the existing Act appears to give this power, in a very limited sense, as regards any area in the neighbourhood of the Calcutta municipality.

Slum Repair.

4. Full powers to exercise the slum-repair system are required. The powers to devolve ultimately on the Calcutta Corporation.

Parts II and III of the English 1890 Housing Act, also the 1903 Act. and Part I of the 1909 Act form good working precedents for the new legislation required for Calcutta slum remedy.

Co-operation.

5. Limitation is required of the power of Railway Companies, Government Railways, The Port Trust, District Councils and Boards, Collectors, Government Departments, Military Authorities, Canal Authorities, Promoters, Companies or private individuals—to construct in, or around, or near Calcutta, without consent and acquiescece of the Improvement Trust, any work that would alter, injure, abut on, interfere with, diminish in value financially or sociologically, or otherwise, any of the sanctioned roads, streets, parks, open spaces, or suburbs in which the general welfare of the public and the policy and interests of the Calcutta Improvement Trust are bound up.

Projects for all such likely works should be submitted to the Trust, and be discussed and agreed on, or abandoned or altered in the best interests of Calcutta. General co-operation should be vitalized into a pronounced, paramount, and fixed policy in all dock, shipping, bridge, railway, light railway, canal and tramway enterprise inter-connected with Calcutta.

Rating of vacant Building Land.

Power is needed to rate all unoccupied building land, especially land which is being held back from development in order to secure exhorbitant profits. Land rating of this kind is almost universal in continental cities. The rates to constitute a new source of income to the Improvement Trust. We want every penny we are entitled to and can get.

*Rating of Vacant Building Land in Germany.

"One very important result of the efficiency and trustworthiness of German Town Councils is that the Councils are allowed to rate sites which have not yet been built on, on the amount for which they could be sold, and thus to keep down the pressure of rates on the poorer part of the population. This system of rating, which is so urgently needed in this country, was strongly recommended, in 1899, to those German Town Councils which had not already adopted it, by the Prussian Finance Minister. It has been adopted by Crefeld, Breslau, Aachen, Duesseldorf, Elberfeld, Charlottenburg, Kiel, Wiesbaden, and other towns. Berlin, which has not yet adopted it, is said to be about to do so. It is calculated that the introduction of the system in Halle will have these results:—One owner of building land worth £55,350, who now pays a rate of £1 14s. a year, will have to pay £137 a year. Another speculator holds land worth £72,300, He pays 13s. a year, and will have to pay £179. In Dortmund, a speculator who used to pay 3s. had his rate raised to £50 a year. When the new method of rating was begun in Breslau, in 1900, speculators in land had to pay an increase of rates of £15,250 a year. In Coeln (Cologne,) under the old system there were in one year 2,703 appeals against 21,292 assessments. Under the new system of rating land at its selling value,† there were only 174 appeals against 30,000 assessments."

See also numerous items on this subject sent out in the reference covers, with exhibits.

Land Policy.

7. It was first recognized by Germany that land acquisition by municipalities was a sound policy. German corporations have been ordered and encouraged by their Imperial Government to pursue this means of civic control—which has most favourable results in controlling building-land speculation, in providing amenities and better housing, and in lowering the rates. The same policy is now taking hold universally throughout the world. The Calcutta Improvement Trustees, both for their own direct purposes in the city interest, and also as mentors of corporation policy, need full powers to buy up quietly without notice, ceremony, waste of time, or revelation to speculators, any land in and around Calcutta which appears to them an advisable acquisition—for any purpose whatsoever connected with improvement.

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* From "The Example of Germany," by T. C. Horsfall.

† The (Prussian) Communal Rating Act of July 14th, 1893, leaves to each Town the decision as to the way in which land shall be rated. When the Prussian Government recommended the adoption of the system of rating land on its selling value, it prepared model bye-laws for the guidance of communities which desired to accept its advice. These model bye-laws are published in the "Preussisches Verwaltungs-Blatt," of November 4, 1899, copies of which can be obtained from Messrs. Puttkammer & Muehlbrecht, Unter den Linden, Berlin, N.W., at the price of ninepence each. According to the most recent information, nearly 80 towns, large and small, have introduced the new system of rating. It has just been officially announced, according to Soziale Praxis of February 11, 1904, that the Government of Hessen has given notice of legislation to substitute for the direct taxes now levied in the Grand Duchy, both for State and Municipal purposes a tax on the gross value of property and an income-tax. This will be the first legislation which imposes on all the towns and other communities of a whole country the duty of taxing and rating land on its market value. The system will give to the community in Hessen a larger share of the "unearned increment" than is obtained for it elsewhere.

Borrowing Powers for Housing Work.

8. The Trust requires power to borrow from the Imperial Government money for housing purposes on a great scale. Also power to recommend and obtain loans for approved societies or individuals who will undertake housing work, as is done with such success in Great Britain and all over the continent of Europe. Security to be by mortgage in the usual way. Loans to be given at the same rates and for similar long periods as are loans now issued by the British Government per the Local Government Board.

Borrowing for Main Land Drainage, Main Sewerage, Sewage Disposal, Main Water Supply, Main Road-work, and Lighting.

9. The Trust is in the position of a city Corporation, but it does not yet possess the ordinary borrowing powers. These are urgently needed in the best interests of Calcutta and also by the practical absolute needs of suburban development—(as for example, the land drainage and sewerage, etc., of Manicktola.) The Trust need the ordinary power of any ordinary corporation, i.e., power to borrow money on security of rates.

(1) for main land drainage, chief water mains, main sewers, and
(2) for road making, lighting, etc.—

at say 3½ per cent. for periods up to 60 years, as in England.

Security for main water and main sewerage and pumping stations to be on rates of the district. Security for road, street, and lighting work, and for street sewers and for street water mains to be on Trust ordinary funds; as the cost of the latter works are always recovered directly by contribution enforced by any ordinary town planning act: and for these works short loans and short periods are usual.

Government Loans for preliminary purchase of land required for road and street making are common with continental corporations. As has been shewn, these loans are recovered from the benefitted owners. The acquisition of these borrowing powers by the Trust would be of inestimable value to Calcutta, and are absolutely required by common practical necessity.

City Bye-Laws.

10A. In addition to very complete, up-to-date and carefully framed bye-laws for

(i) Chawls and other buildings erected on slum sites.
(ii) Suburbs,

the Trust also need full power to have a new set of bye-laws, for the whole city, drawn up by experts. The kind of committee to do this properly would be composed of the Chairmen of the Corporation and the Trust, two city engineers with experience in decently built cities, two first-class building inspectors with Indian experience, and an Indian house builder of first-class reputation. If the Chairman of the Trust were not one himself—a barrister would be added to this committee.

The object of the new bye-laws is mostly three-fold :—

(*a*) To stop further slum production.

(*b*) To obtain good new houses and interiors.

(*c*) To obtain minor-street bye-laws and ensure production of a street-net.

Each member* should have by him a copy of the English Model Bye-laws, for they are the best in the whole world as regards built-up areas—apart from suburbs.

To obtain successful enforcement of Calcutta bye-laws, they must be administered under the supervision of one strong man, in possession of high sanitary knowledge and ideals.

The Trust need power to define the building lines of every street and lane in Calcutta. This important work, so inter-connected with the future urban and suburban street and road-net—is being badly neglected, and what has been done shews no trace of organized working to a finished whole. Much money has been and is being wasted in haphazard and unimportant selections, frequently made at the instance of one individual.

Dr. J. A. Turner, Executive Health Officer of Bombay, wrote as follows in a paper on "Housing of the Working Classes in large cities in India," (read before the All India Sanitary Conference held at Madras, November, **1912**.)

> "In India at present the provisions of Acts and bye-laws for the improvement of towns, old or new, are so weak and ill-defined, the Municipal Acts and bye-laws are so inconsistant and cumbrous, as to render the work of improvement of insanitary areas extremely difficult."
>
> "The creation of improvement trusts in several cities in India has to some extent paved the way for a more serious and enlightened policy, but up-to-now, the work of improvement trusts has been tentative."
>
> "No attempt at town planning in the real sense of the word has been undertaken, and with the exception of the initial efforts of the city of Bombay Improvement Trust, very little has been done in the absence of town planning schemes to get at the bottom of the real evil, namely, the housing of the working classes and improvement of insanitary areas, because there is no financial return."

The Bombay Improvement Trust was created in 1898, and improvement scheme work started 15 years ago next November. The Act under which this premier "Trust" of India works is pretty identical with that of Calcutta.

The Bombay Improvement Trust has been and is still ridiculously hampered by lack of powers, by the timidity, the weakness, the incompetence, the amateurishness, and the lack of comprehension embodied in the Act and Acts under which it has to work; and despite the unremitting energy and patience of its chairman and engineers, there is little enough to shew for 15 years,† and in 1912, the Honourable Mr. J. P. ORR, C.S.I., I.C.S the present Chairman, writes .—

*Since going to press, the writer sees he has somehow forgotten one very important member of the Bye-law Committee. viz., a good architect engaged mostly in house-work.

† 'Scheme' planning at Bombay commenced in April, 1897—seventeen years ago, or three years short of the proposed whole life of the Calcutta Trust.

"The improvements made by the Improvement Trust in the few small sections of the city which they have been able to tackle are as a drop in the ocean to the rapid advance in insanitary conditions which is going on all over the city by virtue of the want of some check on extensions of buildings outwards and inwards . . . . "

At the same time we must not belittle the work done at Bombay. Considering the weak powers, and the strong obstruction, the amount of work done is very large indeed, and all honour is due to the Trust. In Europe, the shocking condition of Bombay and the necessity for a Trust would be attributed to inefficient municipal government in the past, and this view is supported by Mr. Orr's remarks above. The Bombay Trust controls but a small fractional part of the whole city area. The Corporation controls the other nine-tenths or more, and it is in these far greater areas that *new* bad work is being done, and that at a rate far quicker than the counter action of the hard pressed Trust.

This object lesson for Calcutta shews the paramount need for all building and street control of a city to be under one standard, and under one powerful authority. It shews also, that an Act which is mostly a copy of the old 1890 English Housing Act—Part I only, is of very little use for the improvement of Calcutta.

Architectural Control.

10B. In addition to the absolute architectural control that we must have over all suburban areas by means of ordinary town planning regulations—Calcutta also badly needs power to regulate architecture in her existing streets and roads. This is perhaps mostly an aesthetic question, except in the matter of (1) height, and (2) arcading—in these respects the whole of existing and future Calcutta must be placed under strict regulations. Except in the most highly important and communal roads (whether old or new,) a considerable freedom of design may be safely allowed—so long as the power to order arcading be preserved. One very important effect of arcading new roads in the central city is, *to increase their effective width precisely where such extra width is needed;* e.g., main roads should attain their maximum width in the centre of the city.

Encroachments.

10C. Power is required by the Trust to investigate and remove existing encroachments on roads, streets, and lanes. Calcutta suffers much from encroachments. Bow Bazaar for example was once a fine wide road.

CERTAIN AMENDMENTS OF CLAUSES IN THE CALCUTTA IMPROVEMENT ACT (Bengal, Act V,) OF 1911.

Improvement Schemes.

The definitions and mutual interpretations of 'improvement schemes, 'street schemes,' 'general improvement schemes,' and 'schemes and plans of proposed public streets,' are distinctly liable to tie the hands of the Trust and prevent comprehensive action. The general idea and actual working of a lot of little 'schemes' is much too local, too parochial, and too reminiscent of the limitations found in the older English Acts—and the whole occupies itself altogether too much with the demolition of slum—

and in Calcutta it has been shewn we cannot afford to demolish more than about 40 acres out of 450 of the very worst, and even that 11 per cent. will cost £400,000.

In fact wholesale slum demolition *per se* in Calcutta will perhaps be the least of the reform measures—the housing problems arising from unavoidable slum demolition for new roads will alone greatly tax the re-housing abilities of the Trust. This could not be foreseen when the Act was drafted—Dr. Crake had not made his survey, and the real condition of the city as regards extent of slums, enormous cost of slum clearing, traffic wants and great costs of new city roads—had not been very fully realized. Hence most of the Act is devoted to reform of segrated bad blocks by means of purchase and demolition; i.e., to the execution of small local schemes up and down the city.

Difficulty had already arisen before the writer left Calcutta, regarding the Russa Road widening scheme. In order to admit of free action to get the best results from the widening, especially as regards slummy and disorderly property lying behind the widening, a 'general improvement scheme' under the 1911 Act, was desirable; but danger to health of the inhabitants,' etc., (sec. 36) by reason of the disorderly buildings, etc., appeared difficult of proof—and it was thought that owners might bring civil action to restrain the Trustees if they tried to do the work under a 'general improvement scheme'—the work is therefore projected as a 'street scheme,' and it is held that this does not cover dealing with insanitary houses unless such fall right in the line of a new street. In addition, the power of the Trust to acquire a sufficient depth of property behind the widening is very vague, and may be upset by civil action. Depth is required for recoupment purposes, and also to enable proper rearrangement of building plots, back access, and improvement of the street-net.

The fine distinctions between 'improvement schemes,' 'street schemes,' and 'general improvement schemes,' need abolition; for as things stand, the Trust are too limited in their improvement work, and a successful civil action in the High Courts may at any time add grave limitations by making further definitions of what kind of area can, or may not, be dealt with by means of a 'general,' 'street,' or other variety of 'scheme.'

The writer remembers that questions were raised on Sept. 24, 1912, as to the precise meaning and scope of the above clauses; and trustees were themselves divided in opinion, as to whether we had power or not to buy land for building sites as part of a 'street scheme.' It was decided to get council's opinion—but one opinion may easily be upset by another, most especially in a High Court.

Control of Tramways.

Under sec. 149 of the 1911 Act, the Trust have power to subsidize rapid-transit: and further to provide new rapid-transit. From an engineering and tramways point of view, and taking into account the present road system, future road system, and present tram system and foci of Calcutta—it is pretty clear that there is neither practical room nor practical need for more than one tramway system in Calcutta.

The initial capital cost, also, of even a very small tramway system, is, all things considered, beyond the finances of the Improvement Trust. The more broken up is a system, the more inefficient does it become, and the more does it cost per car-mile.

Men and times change, and at present the Trust is not protected against the more or less gradual advent of a Tramway Board who might be inimical to the objects of the Trust. Such is not likely, but it is nevertheless a risk: although the true interests of the Calcutta Tramway Company and the Improvement Trust are undoubtedly one and the same.

If the Improvement Trust desires to safeguard itself against the above—then clause 101 of the 1911 Act requires a slight amendment. The Trust must not only be empowered to invest in Calcutta Tramway debentures or even ordinary shares, but a definite annual or bi-annual minimum should be fixed on. Or Government loans for this purpose, apart from Trust funds, could be arranged. The Trustees would be the stockholders for Government. In this, Government could again help at no cost.

The writer is of course not proposing anything new or untried, Permanent control of the Suez Canal in respect of British interests therein was obtained by purchase of stock on the part of an able British minister. Meanwhile the writer of this report desires it to be quite plain to readers that he has no complaint to make of the existing Calcutta Tramway Company. As one who has himself constructed urban tramway track, and was inspecting engineer of tramways to the Madras Government, he may say he is astonished at the goodness of the service in Calcutta; for the street and circulation difficulties presented must be almost without parallel, to say nothing of repair difficulties. He found the company was thoroughly prepared to work amicably with the Trust in their mutual interests.

As regards tramway extensions done by the company, the Trust appear to have full power to guarantee interest on capital cost of tramways and rapid-transit. This is a clause of great import to Calcutta development, for a good tram-service is vital to the improvement of Calcutta. No roads = No tramways = No suburbs = No house-room = No health = No happiness or progress. Financial stricture of Trust Funds allows the writer to set down a sum of only 5½ lakhs, or £36,700, towards this item. But this should guarantee full interest at 4 per cent. for five years on the cost of 12 miles, of new suburban double-track.

Contribution for Betterment and Higher Value.

The expressions 'betterment,' or 'higher value,' do not occur in the 1911 Calcutta Improvement Act. The just liability of owners to contribute in some degree towards those works that raise the value of their property is entirely omitted. This well-known principle occupies the most vital financial clauses of every successful Town Planning Act. In fact, without the practical application of this just and thoroughly accepted principle, no comprehensive town planning would to-day be possible in 99 out of every 100 cities. There are indeed but few communities in the world where one single trade can be penalized to produce some £4,500,000 sterling of improvement money. We can imagine the resentment if such a principle were saddled on the cotton trade of Manchester.

The willing acquiescence of the Calcutta Jute Factors and Merchants in this unique arrangement, the unselfish public spirit displayed. will ever do them very great credit. £4,500,000 for the good of the city, has to come out of their industry in the next 20 years. It is the recurrence of a fine tradition, for Calcutta was founded by a British Merchant.

Under the 1911 Calcutta Act, the Trust has to buy the land for any new access or other road or street in the 16 square miles of undeveloped suburbs. The Trust also has to pay the whole cost of sewering, lighting, water supply, and road making. The owner of a piece of land alongside or close to the new road finds his land has been forthwith increased by 50 per cent., 100 per cent. or 200 per cent. in value; indeed he found that the mere knowledge that the Trust decided to make the new road, had increased the value of his property. For this great personal benefit he pays (if he is not in the jute business) absolutely nothing. If any of his land was taken for the road, he will further have made a good profit—for under the 1911 Act, it seems plain that 'full compensation' will permit of the owner getting the increased price caused by the proposals of the Trust.

Such arrangements are quite in opposition to all practicable, workable, satisfactory and just town planning acts.

In the English Act, not only does the owner give the road-land up for nothing, but he also pays for the road making, sewering, etc., complete; but in the case of main roads, the municipality pay for the extra width and cost.

Since the English Private Street Improvement Act was passed over 20 years ago, the cost of every new road or street made in England has been borne by the owners who fronted on it. There are numerous hardships on owners under this Act, which embodies too rigidly the principle of owners' contribution; it is instanced here in support of the writer's criticism: and it has already been shewn how the Italians use the principle of contribution for benefit received, as the very foundation of their great Act of 1865.

The general fair contribution rate in Europe is held to be 'equal to half the increased value caused by the public work.' The date at which increased value is assessed may be that on which the road is ready for traffic, or it may be taken as the day on which building operations begin on a plot. Practice varies and each variation has its advantage. In the best practice, the amount of betterment is fixed so as not to make a profit for the community, at the expense of owners, but so as to cover just the cost of all street creation,* and also that share of main road work that should be borne by owners.

"PAYMENT, BY OWNERS OF LAND, OF PART OF THE COST OF IMPROVEMENTS WHICH INCREASE THE VALUE OF THEIR PROPERTY."

"The Town Council of Charlottenburg has passed a resolution to the effect that those owners of land, the value of whose property is increased by alterations made in the streets (such as the widening of streets) by the

* Including sewers and all other street necessaries.

Town Council, by the construction of open spaces, public parks in the town bridges, street crossings, etc., shall each according to the degree in which he derives advantage from the improvements, jointly defray not more than five-sixths of the cost of the improvements. The new ordinance applies to all public works which were still being carried on the 1st January, 1902, or have been begun since that date. Zeitschrift fuer Wonungswesen, July 10, 1903."

From Mr. HORSFALL's "Example of Germany."

A Supplmentary Act for Calcutta must of course embody this root principle of town planning and town planning finance. Considering the large sum which will be obtained from jute and terminal taxes, etc., and the stringency of hard cash in India, the contribution *might* perhaps be lowered to "**one-third of the higher value caused by any one or combined operations of the Trust, and assessed on the day of accomplishment,**" i.e. :—

[SUGGESTIONS.]

(i) IN THE CASE OF STREETS AND ROADS, higher value would be assessed and become due on the day when any affected land was made ready for house building purposes and occupation.

To get smooth working and avoid obstructive lawsuits, and to allow work to proceed quickly, the writer is convinced that, in India, the basis of higher value *must* be defined clearly by Act. European experience shews that a 100 per cent. increase in value of land is a very common betterment produced at once and directly by new street and road work done in undeveloped suburbs. Let us suppose a cottah of land is worth 200 Rupees then if the 100 per cent. increase basis were in force, and a new road had been created past this cottah of land, then the owner would be liable to contribution on 100 per cent. of Rupees 200=i.e., on Rupees 200 of increased value; and one-third of that would be Rupees 66-11-0, payable if necessary, in ten annual instalments, plus the interest for delay.

(ii) IN THE CASE OF STREET WIDENINGS, creation of public squares, parks, etc., the assessment on owners of the benefitting or opposite (untouched) side might well be due and be made, on the day the widening was finished for traffic, opposite to his or her respective property. The total value of the widening to be assessed at not less than a *minimum* table, approximately as follows :—

FOR STREET WIDENINGS.

For	10 ft. or less	increase,	20 per cent.	of rateable value before widening
,,	11-15 ft.	widenings	25 ,,	ditto.
,,	16-20 ft.	,,	30 ,,	ditto.
,,	21-25 ft.	,,	40 ,,	ditto.
,,	26-30 ft.	,,	50 ,,	ditto.

[etc., the table needs closer graduation.]

In this case, on a house with rateable value of £300, in a street widened 25 feet, the Trust would receive 40 per cent. of $\frac{£300}{3}$=£40 contribution.

Assessment bases must be fixed by Act and not left to the slow unworkableness and fearful costs of High Court and Tribunal ever-varying decisions.

The Supplementary Act would of course contain clauses regulating the payment of contributions by instalments when such were necessary. The minimum speed to be about 10 per cent. per annum of the debt, paid off as equal instalments of a sinking fund, including interest at 4 per cent. on the outstanding money : i.e., the debt should be paid off in ten years, by ten equal instalments.

The incorporation with new powers of the Trust, of this single principle of contribution—would entirely alter the financial position, and would ensure the conversion of Calcutta into a well planned city. In fact all these amendments and ordinary powers are absolutely essential to allow the Calcutta Improvement Trust to accomplish the great civic and social life-work set for it by Government.

Contribution for Betterment caused by Slum-Repair.

The justice of this principle is freely admitted. If the Trust buys and pulls down a bad old house, and thereby makes an open space which directly benefits the surrounding houses, it is clear that the power to enforce a contribution from property thus benefitted is just : and this power should be given in the Supplementary Act, but it must be an *optional* power. In practice, any such contribution enforced from a slum owner is directly recovered by him from his tenants. He simply raises the rents, and takes it out of those who cannot find anywhere cheaper to live. Those who are forced to leave because the rents are raised, have to pig in somewhere worse, and make other slums still more overcrowded.

On the other hand, there are some very good people who happen to be owners of slum property, and when the evils of their property are brought home to them, they have often helped the civic authorities in their work. Yet again, if housing be pushed along vigorously, it might be possible to levy contributions for slum betterment, without increasing the hardships of the poorer classes—and these facts shew that the above power should and can be made very elastic and optional of use, in the safe hands of the Trust.

The basis of contribution should be fixed by the new Act, in order to prevent any obscurity and consequent dispute and difficulty. The basis should be the same as for street widening work. The betterment caused by good slum-repair is often very considerable indeed, but life-and-health questions are more important than saving some money.

Compensation.

The subject of compensation is touched on in clauses 54, 55, 61, 62, 63, 64, and 77 of the Calcutta 1911 Act, but no chapter or clause is devoted to full definition of compensation, with all its needful important sub-divisions and limitations. The omission would appear to lay the Trust open to difficulty, obstruction and litigation.

In clause 69, it is decided that all acquisition and of course compensation, shall be made under the Indian Land Acquisition Act of 1894. It

has been generally admitted that the powers in this Act are in many ways quite unsuited for improvement work, and for municipal work. For example, in widening a street, there is no power to take anything but the exact width which will be thrown into the roadway.

All just compensation law for use in public improvement work must be a compromise between

(i) The rights of the community.
(ii) The rights of the individual.

In the Act of 1911, the benefit and rights of the present and future community of Calcutta are not cared for as much as the case justly demands. This no doubt shows a too-kindly over-concentration on the rights of individuals, and perhaps was due to the necessity for getting well home the thin edge of even an imperfect improvement wedge—in a very resistant mass.

The condition of Calcutta is so grave, and her speedy improvement is of such great meaning to the welfare of her present inhabitants and their children and grandchildren, that the community cannot to-day afford to treat individual interests with such generosity. Almost every regeneration and birth of a good thing necessitates some prior hardship, trouble, or pain. The regeneration of Calcutta will unavoidably entail some sacrifice. "Every decision demands blood." Shops, bazaars, businesses, stand in the way of reform. Many 'ancestral' homes, so dear to the Indian people, must be removed to benefit themselves, their children and race. Property must be altered. In some unavoidable cases, sacred buildings or places should be removed, as a duty, to re-consecrated spots, in purer and better surroundings.

The community has not enough money to pay individuals as generously as it would like to, for these trials and difficulties. Compensation must needs be fixed at the lowest just rate ; otherwise Calcutta cannot be improved, and a great sin will continue to lie at her doors—and as the English Scriptures say, and they came from the East—"The wages of sin is death."

Compensation Details.

1. For Property taken for Street Widenings, New City Roads, and Slum-Repair Work.

Rateable value is calculated all over the world mostly from rent. There is always (or should be) a distinct ratio between the rateable value and the rent of a property. It is very difficult indeed in India to ascertain what is the real rent being paid for a property. Reticence, fear, intrigue, intimidation by landlord, farming and re-farming of rents, natural inability to tell the truth, all create insuperable difficulties.

There is no doubt in the writer's mind, that much property in Calcutta is very much under-assessed for municipal rating—just as was found to be the case in Madras several years ago. But this evasion should be made to cut both ways. Property owners must receive compensation based on rateable valuation. Those who may have been over-rated get recouped by higher compensation. Those who have evaded full rating will receive less compensation than for full rated property. There is no way of settling compensation in India, except on basis of rateable value.

Compensation should be based mainly and strictly on the official assessed rateable value in the Municipal rate books, existing at time of acquisition, absolutely apart from any recent increased value caused by proposals of the Trust, at a purchase of twenty-five years.

The only additional allowances might be as follows :—

(*a*) In the case of genuine wholly-business premises, an addition of 30 per cent. for the compulsory removal entailed.

(*b*) Ground floor business and upstairs residential, an addition of 20 per cent. for the compulsory removal entailed.

(*c*) Solely residential, an addition of 10 per cent. for the compulsory removal entailed.

(*d*) Part residential and more than ground floor occupied by business, or vice versa, i.e., less than ground floor occupied by business; an additional per centage proportional between A and C, to be determined by resolution of the Board without appeal.

Provided that, in the case of business premises, one year's notice of acquisition-effect be given.

The community, in the general welfare of the city cannot afford to pay its individual members compensation for anything else, such as for "good will," possible loss of trade, etc.

In actual working, as regards business areas, it would always be the rule of the Trust to open new roads in the vicinity, before the acquisition came into general effect. For example, Central Avenue S.W. Fork would be made before Bentinck Street was widened, and the Inner Strand Road and South-East Diagonal should be made before Chitpore Road came to be widened.

Compensations made for setting back new buildings under the proposed Regulation Plan for the whole city.

It has been pointed out that a most important function of the Trust lies in decision and fixation of the future building lines of every street, road, and lane in Calcutta.

At present a great deal of Corporation money is spent on widening obscure and unimportant lanes and streets, and that without any defined objective, or orderly movement towards creating a complete and linked-up street and road system. This money should be laid out with exact forethought to accomplish the widenings settled on by the Trust, and in the order of execution laid down so far as possible.

The Parisian law of compensation for setting back new buildings should be adopted, e.g., No compensation is given for loss of building-room, loss of business-room, etc., but only for loss of land, and the land is assessed at market value, by vote of a little jury composed of men of good reputation, and it includes (the writer understood) two land owners of the neighbourhood, one valuer, one municipal engineer, one lawyer, and two municipal councillors.* The decision of this jury is final, binding, and

* This is I believe the exact composition, but the writer (at Lille) lost a note book with all details, and cannot swear to these figures.

absolute. Value should be based mostly on rateable value. This is very drastic indeed, and the writer proposes that an addition of 20 per cent. in cash be added. This would overcome reluctance to set back and re-build, and would speed things up more. On the other hand the power to order setting back on the above terms is required. One year's notice to be given. It is a power that cannot be used very much, because building plots are so small over most of Calcutta: yet it is a power most certainly needed by the Trust to give them the full and free action that is so essential in the public welfare.

In the case of Arcading Regulations.

Power to apply arcading regulations to the front of ground floors in either existing or new streets in order to increase the effective street-width, is an essential, and would be a most valuable acquisition.

(1) Existing Streets.

The order would apply to new buildings, and should also be applicable by the Trust to all buildings.

In this case, there is a genuine loss of ground-floor area. Compensation might justly be fixed at the following rates :—

For 1 storey buildings, 50 per cent. of the land value only.
" 2 " " 30 " " "
" 3 or more storey 20 " " "

(2) Arcading in New Streets or Roads.

In this case, no question of compensation need arise. Arcading regulations for say the proposed Chitpore Diagonal would be accompanied by the usual official illustrated "Architectural rules for property built in Chitpore Diagonal." Every buyer of the new plots would know the conditions of sale, English and Continental practice shews that arcading regulations may even increase the building value of land in a "regulated" new street.

Compensation for Property acquired in the Suburbs and semi-suburbs.

Compensation to be given on the same basis as in the built-up city, i.e., on rateable value plus additions for the forced removal or relinquishment. Agricultural land to be compensated for at rateable valuation, plus value of one year's crops—if the land be under cultivation.

Compensation to Mortgagees, Leaseholders, Tenants, etc.

The principle of the Italian Acts, which works well in practice, should be adopted, e.g., the Trust deals only with owners. Leaseholders, and tenants have to deal with the owner.

Legislation required to ensure the construction of the great intra-city roads, and orderly growth of Street-net.

New main roads created in the city (such as those proposed in Scheme IX) will benefit the present and coming generations, and countless generations in the future. The social and physical value of these roads

and the new street-net, will be too great and too lasting to be estimated. The possible temporary benefit of a few individuals in one generation must not be set against the enormous positive gain to the whole community and race both present and future. Legislation is required to secure the active working of this principle in Calcutta, although such legislation may cause some hardship to a few individuals, or even a few thousand individuals.

This protection of great present and future public interests is not embodied in the Calcutta Act of 1911, and the Supplementary Act should carefully remedy the defect.

Sec. 63. (4) of the 1911 Act, states of "projected public streets" for which plans have been prepared, "If any person desires to erect, re-erect, add to or alter any building or wall so as to make the same *fall* (?) within the street alignment or building line shewn in any plan so adopted, he shall apply to the Board for permission to do so."

And 63. (5), "If the Board refuse to grant permission to any person to erect on his land any building or wall *to project* (project from what ?) as aforesaid ('project' is not mentioned before), and if they do not proceed to acquire such land (and buildings ?) within one year from the date of such refusal, they shall pay reasonable compensation (in whose opinion ?) to such person for any damage sustained by him in consequence of such refusal."

63. (6) "When any building, wall or part thereof projecting across the street alignment or building line shewn in any plan adopted as aforesaid has fallen down (see 63. (4)) or been burnt down, or taken down, the Chairman may, by written notice, require the same (after its destruction ?) to be set back to or towards (one inch towards or entirely towards ?) such street alignment or building line."

63. (7) "When any building or wall is set back in pursuance of a requisition made under sub-section (6), the Board shall forthwith make full compensation to the owner of the building or wall (fallen or taken down, or burnt ?) that he may sustain thereby."

Let us suppose the Board have projected ten miles of streets and adopted plans for them—all practice shews that two, or three years are common periods taken up in the negotiations of such a work, before actual road making can begin. The Board are assured that the new layout is the best in the public welfare, but at the end of the year, hundreds of astute owners come forward, each with numerous prospective building work on top of the projected road-scheme. What will the Board do? Officially abandon the scheme but continue negotiations? Nothing can be kept secret in India, and the owner would soon have full information of the Board's real intentions. In fact, the arrangement proposed is unworkable, and the Trust's efforts would be stultified by uncontrolled individual interests.

With the exception of the one year's grace given in 63. (5) the writer cannot find in the 1911 Act any regulations that protect the communal interests from deliberate sharp practice on the part of individuals affected by projected roads, "improvement schemes," "street schemes," etc. Such sharp practice would be the rapid improvement, cleaning up, painting, altering and adding to, of property required for new city roads.

Another would be the prompt sale and re-sale at speculative prices (all in order) of property under notice, or known to be coming under notice for acquisition. Under the 1911 Act, such sales and bogus or unnecessary improvements might well be made the basis of such exhorbitant "compensations" that the work of the Trust, and benefit of the city, would be greatly limited, or, more likely, be absolutely prevented.

The main point is, however, that when once the lines of great roads have been laid down, property affected shall be valued as on the date of publication of the plan, and based on the rateable value of that date; and anything done to or with the property after that date should not be allowed to effect the Trust one iota, for 20 years: by which time they ought to have accomplished the work. In Italy the period is fixed at 25 to 30 years.

In the case of Calcutta, certain details regarding the above may be suggested, as helping to make a fair compromise between owners' and communities' interests. Property would be taken over from owner at very various periods after the publication of the plans. Let us take a case of acquisition ten years after publication of the plan of say the Central Avenue, or the widening of Lindsay Street. Compensation should be based on the rateable value at time of publication of plan, but with this main qualification and addition :—

The rateable value at date of plan was based on a definite block and extent of property. This definite property although not added to, but only kept in ordinary repair, may in ten years be earning much more rent than on the date of plan publication, but unless such increment of rent corresponds with an increment of assessed municipal rateable value, the increased rent will not be taken into account for compensation.

If, say six years after date of plan, the rateable value is increased 20 per cent. by the official assessor of the city, and such assessment is in force, and rates are being paid on it by the owner—then this new rateable value will be the base of compensation. But if the increased rent and assessment are due to additional building, structural alterations, or any other cause, then for compensation the rateable value at date of publication should hold good. These, or similar restrictions and methods of valuation, are considered fair in Europe, and have everywhere been found necessary to safe-guard and bring into being the orderly growth and improvement of cities.

Numerous further but minor amending clauses might be fully discussed, but the matter in this and the preceding and following chapters contains the gist of a good Supplementary Act for Calcutta.

Partition of house-interiors between litigants, by orders of High Courts.

This scandalous, well-nigh incredible, and most injurious infringement of the City Byelaws, *must be abolished for ever.* [See Appendices].

Cost of a Supplementary Act.

Judging by English costs, and what the writer knows of India, it would not be safe to put down very much less than £40,000 as the cost of getting a Supplementary Act on the lines set out. Such an Act would *richly* repay the city even if it cost £100,000 to get it.

The precedent given would also immensely benefit the future position of every large city and town in India.

In their Chairman, the Calcutta Trustees have an able and forceful barrister, well-read in town-planning, experienced in difficulties under the 1911 Act, intimate in knowledge of Calcutta, and thus peculiarly fitted to bring into being this absolutely vital *sine qua non.*

SECTION VI.

SUBURBAN PLANNING
AND
DEVELOPMENT
AT
CALCUTTA.

WITH ESTIMATES.

CHAPTER XXII.

SUBURBAN PLANNING AND DEVELOPMENT.

WITH ESTIMATES.

Planning.—Suburban Development is inseparable from the whole-city problem—Details of residential first and second class suburban planning—Garden Cities and Garden Suburbs—Zonal City Plans—Permanent destination of each area—Regulations to effect this—height-limit areas—relation of building site to open space per plot—Selection of Areas for each permanent use—general rules—suggested destination of areas at Calcutta—Demarcation of Manufacturing and Industrial areas—Residential Suburbs for coolies and the poorer classes—Residential Suburbs for the better-off classes—Residential Suburbs for Europeans and the well-to-do—Size of minor street mesh, its great importance—where large mesh is allowable—where small mesh is best—street and road widths—houses per acre—public open spaces and parks—details of best policy at Calcutta.

Procedure and means.—Supplementary Act rules all—Destination of areas—Main roads—minor street net—workmen's suburbs wanted first.

The Main Drainage Problem.—Great backwardness of drainage in suburbs—incompetent suburban municipalities—description of difficulties—two sole remedies only—Joint Sewerage Board or absorption of incompetent municipalities—whole Main Drainage of new Calcutta and Suburbs must be under direct control of one European engineer—details—Trust can also be a Joint-Sewerage Board—Normal finance of drainage—Calcutta Street Plan dominates sewer plan—intercepting sewers should lie from north to south and vice versa.

HOWRAH DEVELOPMENTS AND HUGLI BRIDGES.

DETAILS AND ESTIMATES OF WORKS' EXPENDITURE IN THE SUBURBS.

Maps.—'Destination of Areas' Map, 'Census,' 'Sociological,' 'Tramways,' and 'Values Maps are necessary in reading this section.

Suburban Development inseparable from the whole-city problem.

So closely inter-linked are all the inner and outer problems of Calcutta, and indeed of any other city, that close consideration of the inner largely solves the outer.

The primary suburban needs have already become clear. An ordered, carefully designed street-net, segmented by the future great main roads, must be designed for all Calcutta, and be created at a speed equal to the natural demand. Land-drainage, sewerage, water and lighting are essentials of the new streets and roads. Tramways are essentials. So likewise are strict regulations to preserve even in small details the permanent whole character of each area destined for suburban, semi-suburban, workmen's dwellings, manufactures, and other purposes.

Permanence is the keynote of successful suburban development.

Details of Residential first and second-class Suburban Planning.

The writer will not waste time by attempting analysis of an art which has been so ably developed, written of and illustrated, by many of the most eminent arhitects and town-planners in the world.

The English garden city of Letchworth is perhaps the most perfect, artistic, and effective example extant, of combined city and suburban planning *in the true comprehensive sense.* From this successful experiment has come the 'garden suburb,' of which the best example is at Hampstead (North-West London). Merely from these two examples, one might learn almost everything required for the sensible and artistic planning of residential suburbs in cheap land.

There is no doubt at all that the influence of the good work at Letchworth and Hampstead has already made itself felt throughout the civilized world, and has set an example which must be followed at Calcutta, as much as it is possible.

The writer sends out with his report, some of the best and latest of the large literature on the subject. Clear ideas should be held of the difference between 'garden city' and 'garden suburb.' It seems quite impossible that Calcutta can ever become a garden city, but garden suburbs can and should certainly become a big thing at Calcutta. "Garden Cities of To-morrow," by Ebenezer Howard, the creator of the idea and the movement, should be read by Trustees. "The Garden City Movement up to date," by Mr. Ewart G. Culpin (Secretary of the Garden City and Town Planning Association), will give clear definition between the meanings and possibilities of 'garden city' and 'garden suburb.' The planning of cities and suburbs requires the co-operation of architect and engineer. Details of architecture at Calcutta can well be left until actual planning commences, but the writer must now discuss those methods and large considerations that affect general policy and planning at Calcutta.

The rules of area destination permeate all effective Town Planning Acts: English details we know well but it may be useful to translate here a few extracts from the approved and sanctioned report of the Milan Engineers, Signors Pavia and Masera, on the sanctioned destination of areas at Milan.

"Regulations relative to detached dwellings with gardens, to be erected on destined areas" [at Milan].

A description is given of some 30 different areas, permanently set apart for 'small villas with gardens,' 'detached dwellings' (larger,) and 'private gardens' resembling the English allotment vegetable gardens for those of the working classes who live in houses that have no gardens.

Before describing these areas, the Engineers wrote in their report (since sanctioned in toto) :—

> "There is no shadow of doubt that separate family dwellings, with gardens, are the only kind of dwellings that can give those good conditions of light and air demanded by modern sanitary concepts; and further, that are in agreement with present day aesthetic and educative aims. It is desirable that this way of building dwellings be developed over vast zones—as for example is being done at Genoa."

The engineers then point out the necessity, both economical, and in fairness to land owners, of setting apart definite stated areas for this class of suburban development; and they proceed to point out the factors of selection. Then follow the (sanctioned) regulations, from which these items are translated :—

"Rules for detached houses with gardens for which the areas marked on plan are destined."

"Art. 1. Designs for detached houses on area .... shall, besides conforming to the city bye-laws, also conform to these rules :—

Art. 2. The houses and the whole of their adjuncts and accessories shall be in good taste, and be artistically designed. Materials used shall be in keeping with design. No detached house shall exceed three stories in height, counting the ground-floor as one. The ground floor shall be raised above road level by from 80 c.m. to 1 metre (say from 2 ft. 8in. to 3 ft. 9 in.)

Art. 3. Any detached building belonging to the house shall only be two stories high, counting ground floor.

Art. 4. The entire building plus any small outbuildings, but exclusive of rustic summer-houses, shall in no case cover more than one-third of the lot (building-plot.)

Art. 5. Each property shall be enclosed by an ornamental railing (strong and durable.)

Art. 6. Roof shall exclusively be covered with 'common channel tiles' (very artistic red pantiles), save only when other material is permitted because it is in artistic harmony with the whole house."

"Roofs and their accessories must be in artistic accord with the general character and embellishment of the suburb. The Corporation reserves the sole right to sanction any special case."

"Rules relative to detached dwellings with gardens, etc., to be erected on destined areas marked on plan (maximum of four stories.)"

"Art. 1. Designs for detached houses on these areas shall, besides conforming to the city bye-laws, also conform to these rules :—

Art. 2. Each house shall be liberally detached, with every side in full view. At least one front of the house shall be parallel to a street, and be not less than 10 ft. back from it.

Art. 3. Each house shall be separated by an open space of not less than 33 feet from any other, measured between plinths.

Art. 4. Under no circumstances will more than four stories be allowed, counting ground-floor as one.

Art. 5. The spaces between each dwelling shall be cultivated as gardens only." etc.

The City Plan of Calcutta.

Special attention is drawn to the absolute necessity for a comprehensive zonal plan, to cover and control the whole area round the city. The usual extent of the City Plan is fixed by taking in the whole surrounding areas likely to be built on during the next 25 to 30 years. This should certainly be the rule at Calcutta : and 30 years would be the safe period. From 15 to 20 years hence a second zonal plan, will very likely be required to cover a further prospective ring of building land. The Milan and Turin plans both shew two such successive city extension and regulation zones. The inner suburban zones, it will be observed, were planned some twenty-four years ago, and very considerable portions of the street-nets then laid down, have by now become reality.

During the last few years, these big Italian cities have obtained revised and enlarged city plans, with which are incorporated in each case, those of 24 years ago.

Permanent Destination of Areas.

The permanent destination of every area in the city and suburbs must be determined, and be settled and sanctioned, by means of the published city plan, with its decree of authorization. This is absolutely vital to all successful town planning, and is also necessary in justice to owners. Unprotected haphazard suburbs are sooner or later eaten into, or destroyed, or made into slum or wilderness. The writer well remembers fighting hard against the planting of a noisy ugly and smoky factory right in the middle of a good residential area. Residents and owners protested, but in vain. The whole of the surrounding property was financially, sociologically and hygienically injured. Such is always the result of free license given to individual interests. Countless once-beautiful and useful residential areas for various classes, have been ruined in the past for want of these regulations. In England, half the existing suburbs are in danger to-day.

It is of the most paramount importance that permanent destination of every area be determined once and for all, as far as it is humanly possible to see. At the time of re-extension plans, modifications can always be made when such seem wise and needful. Hand-in-hand with destination of areas go height-limits to buildings, limit of houses per acre, percentage of open space on each building plot, etc., etc.

Height Limits.

Height is ruled by width of street, by nature of area, and by percentage of the plot left open and unbuilt on. In the central city *devoted solely to business*, five to six stories are usually allowed on wide roads, though such is very far from a good sanitary ideal. Not more than two-thirds of the plots should be built over.

In Calcutta the want of height regulations is seen everywhere, perhaps especially of late in the shocking spoilation of Old Court House Street, now rising by hideous irregular jumps to a height of 80 or 90 feet. Drastic height limits are essentials of slum reform in Calcutta.

Outside the most central areas, approximately the blue areas on the writer's Values Map, the height should be not more than 50 feet or four stories in 50 feet streets, and not more than two-thirds of plot should be built over. In what we may call the inner mixed suburban residential areas the height should be cut down to a maximum of three stories, and not more than half the plot should be built on.

In residential suburbs the height is commonly fixed at two stories only, with but one-third of the plot built on. Three stories will be allowed when only one-fourth of the plot is built on. In areas set apart for industries and factories the limit should be two stories, but chimneys at Calcutta should be not *less* than 100 feet high.

Selection of Areas for each permanent use. General Notes.

Natural and existing conditions largely settle these questions. The following are general rules to be observed in designing the **Calcutta City Plan.**

Industrial areas have to adjoin docks, railways, rivers, canals, and main roads specially affected. Every effort should be made to put industrial areas where the noise, smoke, smell, and chimneys arising from them will cause the least inconvenience to the community. Sewage and refuse disposal areas also come under the latter rule.

The prevailing winds are an important factor in the problem. The Calcutta winds are from south and north-west. These two quarters should *not* be destined more than can possibly be helped, to industrial activity. The south wind blows from Mar. 15th to Oct. 15th, seven months; the north-west wind blows from Oct. 15th to Mar. 15th, five months. Manicktola and Kidderpore are both excellently placed for industrial destination as regards wind, canals, and railways; and they are naturally becoming great industrial centres, on the two latter counts.

Examination of the Destination of Areas and Sociological Maps will now be found helpful.

Howrah is naturally well placed for industrial enterprise as regards the river and railways, but, unfortunately, it is badly placed for the city as regards wind. During five months of the year, the dense smoke of Howrah is carried over and through Calcutta. It is now much too late to prevent this nuisance by means of area-destination and, in addition, the river-bank is essentially an area for industry: but the smoke nuisance in Calcutta badly needs attention. Every chimney in Howrah should be carried up at least 150 feet high. Many are not one-third of that height. Much mitigation of the smoke evil has been effected in England. Sheffield Corporation would give the Trust all details.

The new railway development along the south side of Alipore is very unfortunately placed as regards that suburb.

No further industrial development should be allowed along Tolly's Nullah, which bounds the East and North sides of Alipore.

Suburbs for the poorest workmen and coolies must, at Calcutta, be fairly close to the industrial areas in which they work.

Suburbs for artizans and the better-off classes. For clerical people, government minor employees, small tradespeople who run lock-up bazaars, for shop employees, Eurasians, and skilled well-paid artizans—for these, residential suburbs can be much further afield; but *must be provided with good tram service.*

For Europeans and well-to-do Indian people, the more outlying suburbs are those proper for them at Calcutta, *but once again, a good tram service is indispensable.*

Suggested Destination of Areas at Calcutta.

These are shewn on the Destination of Areas Map. Past haphazard development of the city, added to in a smaller degree by natural limitations

of position, have by now made it impossible to demarcate Calcutta anew in any very ideal manner. But it is still far from being too late to effect very great reforms by simple legislation ; reforms that will become more and more beneficial with every year of the future.

The demarcation of sociological areas is one of the first needs in preparation of the **City Plan.** The following is a short description of suggested areas for Calcutta :—

DEMARCATION OF MANUFACTURING AND INDUSTRIAL AREAS.

Commencing at the north-east of the map :—

(a) Cossipore-Chitpore. The west side next the Hugli, and for half-a-mile back from the river, to be an industrial area.

(b) In the south half of the area, a zone one-third of a mile wide alongside the Circular and New Canals, to be an industrial area.

Northern Calcutta.

(a) Between Circular Canal and Circular Road, as far south as Sealdah, to be an industrial area.

(b) Between Circular Road and Cornwallis Street, *no further industrial development or extensions to be permitted.*

(c) As regards the area between the Hugli and Chitpore Road, as far south as Howrah Bridge.

This is a natural site for industrial activity, *but all such development eats into existing residential areas, and so produces worse overcrowding.* The only solution appears to be a temperary rule, viz. : No new factory shall be commenced or built in this area during the next twelve years. The Trust shall further have full power to veto during the same period, the extension of any existing industrial factory or concern. No new warehouse, jute-press or the like shall be erected, and no existing press or warehouse, etc., shall be extended during the same period, except with free consent of the Trust. No compensation can be paid for effects produced by a refusal. [The Birmingham Town Planning Act has clauses of this kind.]

Manicktola.

(a) The long triangle of land enclosed by the Circular Canal, the New Canal (short piece) and the main line of the E.B.S. Railway, to be an industrial area.

(b) A strip of land three furlongs wide, along the New Canal (north-east side of it), from the E.B.S. main line to opposite the end of the Manicktola Main Road, to be an industrial area.

(c) The land which forms the apex of the great Manicktola triangle, and which is enclosed on the west by the E.B.S. Railway, on the east by New Canal, and on the south by Manicktola Main Road, to be an industrial area.

(d) and (e) The two triangles of land, lying just north-east of and south-east of Sealdah Terminus ; and bounded (d) by the E.B.S. main line, Kidderpore Loop and Municipal Railway ; (c) bounded by the E.B.S. south-going line, Kidderpore Loop, and Municipal Railway. To be industrial areas.

Land East of Sealdah Terminus.

A strip of land half-a-mile wide ; enclosing on the north Beliaghata Canal and two furlongs of margin ; and enclosing on the south, the minor east-going canal and the Municipal Railway—this area to be an industrial area.

South-west Calcutta.

(a) All land south and alongside the boat canal, for a distance of half-a-mile along the south side of the said canal, to be an industrial area (new dock railway sidings).

(b) All land between Shukay Lash Road and the existing docks, to be an industrial area.

(c) All land alongside the Hugli River, from the existing Kidderpore docks westward for four miles, and to a depth of two-thirds of a mile from the river margin, to be an industrial area. This land covers the natural future Port of Calcutta.

Howrah (approximate).

(a) All land between the Grand Trunk Road and the Hugli, as far southwards as the Civil Engineering College, to be an industrial area.

RESIDENTIAL SUBURBS FOR COOLIES AND THE POORER CLASSES.

It will be remembered that these must be close to the industrial areas. Many of these workers cannot afford even cheap tram fares, but they are mostly good walkers.

Cossipore-Chitpore. The whole of the eastern and southern portions not required for industrial development, to be allocated for working-class suburbs.

Manicktola. The block of land measuring about $1\frac{1}{8} \times 1\frac{1}{4}$ miles, bounded on the north by Manicktola Main Road, on the south by industrial land bordering the Beliaghata Canal, on the west by the Kidderpore loop line, and on the east by the New Canal—to be a suburb for the working classes. This block alone would hold 45,000 people, at only fifty to the acre.

Land East of Manicktola.

(a) Land east of the above Manicktola block, to be devoted to working-class suburbs in the distant future.

(b) Land east of the industrial zone bordering New Canal in north Manicktola, to be devoted to working-class suburbs in the distant future.

Land in Wards 19 and 20, i.e., south of Sealdah and the Beliaghata Canal, and east of Circular Road. Most of these two wards to be devoted to housing the working-classes, as shewn on Destination of Areas Map. *No further extension of industrial enterprise, or area, other than that already described, to be permitted in Ward 19.*

South-west Calcutta. A land-zone, half-a-mile wide, situated parallel to and south of the Boat Canal, and separated therefrom by the new railway *industrial* zone, to be devoted to workmen's suburbs.

Kidderpore All land south and west of that destined to industry, and shipping, will be suitable for working-class suburbs.

West Alipore. All land west of Diamond Harbour Road, and between that road and Shukay Lash Road, is suitably placed for working-class suburbs.

Central Alipore. The right destination for this area seems very uncertain. It is naturally well placed for *industrial* enterprise, but has been developed as a high-class residential area. It would seem best to preserve the *status quo*. The present class of residents are likely to move gradually to other districts, such as towards Ballygunge and Tollygunge, and they might well be replaced in due course by the better-off classes of Indian and Eurasian people.

Howrah (approximate). All land west of the Grand Trunk Road for say half-a-mile, is suitable for development as working class residential suburbs. That portion for half-a-mile north and south of Howrah Bridge is the most important, and would give good residence to the poorer classes who work in central Calcutta, or have to be dishoused therefrom.

RESIDENTIAL SUBURBS FOR SKILLED ARTIZANS, CLERKS, SHOPKEEPERS AND BETTER-OFF CLASSES.

These should lie mostly to the south and south-east of Calcutta, also west of present built-up Howrah.

Wards 19 and 20. Some of the land lying east of Circular Road and south of Sealdah, should be destined for these suburbs.

Ballygunge and Bhowanipore. The southern half, lying east of Lansdowne Road prolongation is very suitable for future suburbs of the second class. All land between Lansdowne Road and its projected line on the east, and Russa Road on the west, is suitable to-day for better-class suburbs.

Southward Land. Much land south of Ballygunge, Alipore and Kidderpore, and at present accessible only by Diamond Harbour Road and Russa Road, will need allocation to this class of suburb in the next two decades. The effect should be to ease north Calcutta of a very large number of better-class Indian residents, now living in very unhealthy environment. (See Map of Ultimate Land-limits—in Exhibits.)

RESIDENTIAL SUBURBS FOR EUROPEAN AND INDIAN WELL-TO-DO CLASSES.

At Calcutta, these classes represent but an insignificant percentage of the census. Reservation of the north-east quarter of Ballygunge appears to be suitable. It would be best made accessible by a new tram service via Circular Road, Park Street and Chowringhee. Certain areas at Tollygunge are also very suitable ; access would be obtainable by the Russa Road tram service. Southward land reached by Diamond Harbour Road will also be suitable in the distant future.

Segration of Castes and Races.

Eastern cities that are divided in separate areas for the various races appear to give the most orderly, peaceful and happy results ; and even the best architectural results. There seem no good reasons why the working class and second class suburbs should not be thus *sub-divided*. On the other hand there are many sound reasons pointing that this arrangement would be well liked, and would be a social advance on present Calcutta conditions.

THE STREET-MESH.

Size of Minor Street-Mesh and width of Streets.

This is a most important matter, and much depends on it. The Continent has for long not understood its significance, but they are becoming wide awake to it to-day. Their great mistake has been *making the mesh too big*, and also discriminating too little between main roads, traffic roads, traffic streets, and residential streets. The first factor in the street-net problem, is destination of areas,—for on this depends size of building-plot. Then again *size of building-plot, in connection with Bye-laws and height-limit, regulates the street-mesh for good housing work*, of each class, or for industrial purposes.

If the rectangular piece of building land between four streets, is too large, in any particular class of residential area (1) there is waste of land ; and the owner must try to recoup himself out of higher rents for houses. (2) If building bye-laws are weak, then the owner is likely to recoup himself by building high and solid all round the four street margins, *and then erecting high 'interior buildings.'* This has occurred very largely on the Continent, and is a very great evil.

The over-large plot and street-mesh are one primary cause of high tenement dwelling flats. (The other causes being (*a*) unrestricted wild and greedy speculation in land, (*b*) streets too wide and costly, (*c*) undeveloped building land).

Whenever the street mileage is *less than about 30 miles run per square mile in working-class suburbs, second class or 'inner' suburbs, and in central building areas, there is a strong incentive to produce 'interior building' and high building*, on the land-blocks : and there is also waste or misuse of land. In such cases, where the street mesh is too big, only the most powerful bye-laws rigidly enforced, can prevent innumerable bad results. Where the street-mesh has been too big, e.g., too few miles of streets per square mile of city; and all such cities exhibit in these bad areas the high many-storied dwelling house, or the interior 'court' or the hidden-away interior slum-block, or all of these evils.

The street-mesh of built-up Calcutta is the largest in the world.

Where Large-Mesh is allowable.

In designing the city plan, the street-mesh should be large in

(i) Areas destined and set apart for industrial purposes, and

(ii) In first class residential suburbs.

(iii) In high-class garden suburbs.

In these it may even be as low as 16 miles to the square mile, so long as building is restricted by permanent and thorough bye-laws.

Where a smaller Mesh is proper.

(a) In suburbs for the poorest working-class or coolies, destined for a good simple Indian type of small one-storey contiguous family dwelling, with very low rentals, about 34 miles per square mile will give good open and sanitary results.

(b) In suburbs destined for low-rent little single family detached houses, the mesh can be about 30 miles per square mile.

(c) In second-class suburbs, for the better-off classes, such as minor professional people, higher grade government employees, etc., the mesh can be reduced very suitably to about 25 miles per square mile.

Street and Road widths.

Street-*mesh* is of course closely inter-linked and modified by street *width*. The figures given above are based on rational average widths. Too great a width is as disastrous as too narrow a width. The former greatly raises the death rates, and sends rents up tremendously. The latter enormously raises the death rate, i.e. it gives insufficient open-space per head. The general rules to be followed, are :—

For Manufacturing and Industrial Areas,—big plots ; and wide roads to ventilate the buildings, and give good traffic-access.

For Residential Areas. Roads and streets to be as wide as land-values will permit, having a view to keeping rents low. Roads not liable to anything but light residential traffic, to be made in keeping with that condition, i.e., narrow macadam width in centre, tar-painted medium-width footpaths, grass occupying the remainder of cross-section, etc. The subject is very wide, and these are merely primary main rules to be followed in design of the City Extension and Regulation Plans for Calcutta.

Houses per Acre.

This needs careful definition, and requires much attention, for it bears on the questions of street-mesh, street-width, and building-plot. In unrestricted open land permanently destined for second-class garden suburbs, the number may be as low as ten single-family separate dwellings per acre, and yet yield a good dividend to the land owner ; and such a limit produces idyllic sanitary results, phenomenally low death rates, and magnificent babies and children.

Garden City and Suburb literature gives full details. There are large areas of Calcutta that should be destined for second class Suburbs with house-limits of 10 to 14 separate small dwellings per acre. But some 75% of the population of Calcutta is of tne poorest and coolie class. To provide these with good homes close to their work, we shall have to allot more than 14 per acre, and probably what would equal in building-mass, 20 English small dwellings per acre.

The future working-class suburbs of Calcutta are of most moment to-day, as they are the most urgently needed. The writer is positive that they can be made reasonably artistic and attractive, by building the contiguous single-family dwellings in blocks of about 8 homes each, with occasionally curved blocks. White-washed walls, and red-tile roofs, will be set off by the rich foliage of the tropics. The streets to be palm planted.

This bright cleanliness and order would indeed be a grateful change a *vita nuova* and a new moral power in opposition to the sad square miles of Calcutta's poorer dwellings—the depression of those endless, squalid, twisted, vitiated, deep and narrow lanes—the offence of dirty galvanized iron, rusting in mass, or in tattered fragments that move and scrape monotonously, high up in the hot germ-laden slum wind. What a change from those miles of tall decaying brickwork all horribly disordered, hung with ragged dirty screens of jute-cloth or caked with drying dung, and patched with leprous plaster often damp and slop-streaked in the frightful crevasses between the high walls—what a change from the mis-shapen brickwork that forms the base of tumble-down ruinous brick, bamboo and galvanized stories set one on the other like untidy hencoops close as they can stand—and cheek by jowl, those dejected leaning mud walls that always shew damp risings, often to the ragged thatch—and nowhere one clean, pretty house, with open space and light. Nowhere one decent healthy house with a handful of the poorer people in it.

The present Calcutta 'suburb' is indeed a disgrace. It is usually a growing higgle-de-piggedly mixture of uncouth brick houses and damp mud and bamboo huts, built in a mess of wet ground full of polluted tanks, a few sloppy tangled lanes and paths represent the street system. Ditches full of sewage abound, and dense mushy vegetation must everywhere be trodden through with care—for the commonest stench is of human excrement. Numerous people are bathing, washing and drinking, in the dirty brimful tanks. The writer well recollects an exclamation of the Chairman, during one of the patient interminable ante-breakfast explorations in Calcutta 'suburbs'—

'Oh! These morning walks!'

Those who know Calcutta know that the above are precise truthful descriptions of very large areas of the city and Howrah. The expression 'Sewered Ditches,' is one of the common street and lane names in built-up Calcutta—and points to the time when those areas were like the present 'suburbs'.

The existing sewerage-plan of Calcutta has to reflect the mazy plan of the lanes. Costly sewers zig-zag about in built-up areas that will certainly have to be drastically re-arranged.

To give Trustees an idea of 'houses-per-acre' it may be mentioned that the Park Street area contains between five and six large houses to the acre plus the servants' quarters and coach-houses in bulk, each of the English ten-to-the-acre houses would be very considerably less than one Park Street house, in fact often only one quarter the size. We may take the Park Street area as being built-up equal to twenty English small houses per acre.

Public Open Space and Parks.

It is, usually, a sound policy under any town-planning Act, to buy these as soon as the city plan has been prepared and sanctioned. Such is also fairer to the land owners, upon whom no avoidable burden or annoyance should be placed. America, Italy and other lands, recover 'higher value' from owners whose property is benefitted financially by park and open space work. When the Act in force is weak and insufficient, it is imperative to buy, as quickly as possible, land destined for public open spaces. As regards allotment and design of park areas there are several clear and accepted views :—

PARKS.

1. They should be as much as possible inside the occupied and built-up city area. Parks that are not very close to the homes of the people are of very little benefit indeed, most especially to children. The Maidan, for example, benefits North Calcutta in but a very trifling degree.

"Public parks on the outskirts are excellent for high days and holidays, but they are of no use for little children to go to by themselves on ordinary week-days."

"Practical Housing," Councillor J. S. NETTLEFOLD, 1910.

2. If possible all large parks should be placed radially to the city centre, especially in the case of what may be termed 'inner parks.' They should also if possible lie along the direction of the prevailing winds, as by this means they become channels for pure and filtered air leading into the central city. A true radial park gets wider as it gets further from the city centre.

The following are opinions of eminent authorities on park design :—

"All town planners who have seriously studied the development of park schemes are agreed that the radial principle is the best as it ensures an unbroken current of fresh air into the city, takes the least land where it is most expensive, and the most on the agricultural fringe, but most important of all, it ensures an expanding proportion of park as the population increases."

THOMAS H. MAWSON, F.R.I.B.A.
[Author of "Civic Art," etc., and recently chosen by the King of Greece, to plan the great extensions of Athens].

"A construction of radial, rather than of circumferential, parks and parkways is, generally speaking, to be preferred."

MULFORD ROBINSON, Professor of Town Planning (U.S. America.)

"The fault of this general plan of Vienna is the want of radial park or boulevard connection between the three park rings. These are quite separate, so that there is no continuous tree-lined way out into the country, except by way of the Prater and across the river to Lobau."

PATRICK ABERCROMBIE, "Town Planning Review," Oct., 1910.

"Where special circumstances have not determined the plan, it is clear that a series of parks placed radially is the more reasonable method. For one thing, they do not define the city area and exercise a restrictive influence within them. For another, they lead from the more densely populated areas out into the open country, thus encouraging a general exodus towards it . . . . This is a much more economical method than the ringstrasse,* as the land would extend into the open unimproved country where land could be obtained at agricultural values."

H. V. LANCHESTER, F.R.I.B.A.

RADIAL PARKS FOR CALCUTTA.

The most telling position for radial parks in Calcutta—(choice and size have to be grievously limited by hard facts)—are perhaps the following :—

(a) Commencing (see Destination of Areas Map) from the south side of Sealdah Terminus, and running due south alongside or parallel to the railway. Such would be accessible at once from the existing railway stations, would be in cheap land, and would offer a direct channel, into the densest mass of Calcutta, for incoming pure air during seven months of the year.

(b) Through Ballygunge, along a line closely approximate with and parallel to the line of Lansdowne Road.

(c) Via Alipore, see Map.

(d) In Howrah (very important), commencing from a point opposite to Aheeritolla (where some day there will most certainly be a big bridge,) and proceeding thence due north-west across the Grand Trunk Road, This would in time be the chief park for north Calcutta people, and it would provide a great north-west air channel directly affecting the dense mass of north Calcutta during the other five months of the year. These giant blessings for present and future Calcutta could be obtained easily enough if the Imperial Government would assist. The Government of Italy has recently voted £4,000,000 towards the improvement of Naples, which is only a provincial capital of Italy, Indeed there are plenty of good precedents. Calcutta's possible new parks are shewn in bright green on the "Destination of Areas Plan."

GARDEN SQUARES AND PLAYGROUNDS.

3. Squares, small open spaces, and gardens in the built-up areas of cities are generally admitted to be of very great value. In the Calcutta Extension and Regulation Plan, these small open spaces should be provided as abundantly as money will possibly permit—most especially in those areas destined for working-class suburbs. A glance at the Sociological Map, shews (by paucity of dark green patches) the deadly lack of open spaces throughout the densely solid mass of Calcutta.

* Circular park-way or broad boulevard.—E.P.R.

The cost of forming a moderate number of fair-sized open playgrounds and gardens in north Calcutta would, unfortunately, be enormous: i.e., probably from £15,000 to £25,000 for each open space of 200 × 200 yards. *Unless the Trust can get more money*, the best policy is to make numerous little open spaces in the course of slum-repair work.* These will do more for the children and people of Calcutta than would four new parks as big as the Maidan put down miles away from where they would be of use to-day and to-morrow. At the same time, get every cottah of park you can, even, if to-day, it seems to be in far distant suburbs.

The writer's proposed riverside double-level road, from Strand to Cossipore, would form a most valuable day and evening fresh-air promenade, and be in *easy* reach of 200,000 people. It should be provided with trees, seats, and pretty sun shelters. The better classes already have their fine riverside promenade south of the bridge, along the west side of the Maidan, and they have all the great Maidan park. The 800,000 in the north have nothing. Every Calcutta owner who gives a garden square to north Calcutta deserves the C.S.I. and the warmest gratitude of his fellow citizens.

The Town Planning Conference, the Guildhall Meeting, Oct., 1910.

"The Right Hon. John Burns,† :—He described London's 400 garden squares as the luckiest piece of town planning that had ever been done since the building of cities began. He said, 'inspired by enlightened self-interest, private owners had given London a priceless heritage in its squares' and that if planning were neglected at the beginning or badly done through timidity or lack of imagination, those responsible placed a burden for fifty or a hundred years upon progress and paid seven or eight times over for their lack of prescience and daring."

"Town Planning Review," October, 1910.

THE CITY PLAN.

For Regulating Building, Building lines, and City Extension.

PROGRAMME OF DESIGN.

The Supplementary Act, of course, rules all: and the absolute necessity of this Act is so clear to the writer, that he has confidence that it will be equally clear to the Trust; and he now proceeds to suggest briefly, the actual procedure of making the City Plan of Calcutta—as this work can and should proceed as briskly as possible during the prenatal period of the Supplementary Act.

Destination of Areas.

This should be done as closely as possible, but time should not be lost in trying to fix miles of precise boundary. Settlement of the general areas can be done without much difficulty.

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* or make their present funds go twice as far by means of a normal Town Planning Act, and betterment applied to open spaces.

† President of the British Local Government Board, and father of the English Town Planning Act.

Main Roads.

The Intra-City Main roads will be found, the writer believes, satisfactorily settled in the plans that accompany this report. These main lines will determine most main lines in the suburbs.

As regards the Intra-City Main Roads themselves, so soon as possible their plan should be sanctioned under the New Act. No more waste of money and buildings along their routes will then take place. Their safe and sure due creation will at once be secured instead of being steadily eaten away by rising cost and obstruction.

The next important factor, in the design is really good main intercommunication between working-class suburbs and industrial areas.

Half-Built Existing Areas.

Re-planning of these areas comes next, and it is needful for the Trust, in the Supplementary Act, to have power to apply either a Re-distribution method, or the Anglo-Italian method, in putting right the disorderly streetless new growths.

So soon as the divisional city plan is made for each area, it can, under the new Act, be published ; and it *will then from that date stop further growth of these city cancers*, now eating so rapidly into the welfare of the present and future community.

The Minor Street-Net. Certain further notes.

In addition to important factors of design already mentioned, there are others :—In planning minor residential streets, a sound compromise will have to be made between sunlight-directions, wind-directions, and residential traffic needs. Also, the best must be made of all the existing property on the ground, and the existing roads. Large tanks have to be filled or avoided. The best lines of street sewerage, in relation to main sewers, also have weight in the design. In fact, Minor-Street Design is not a thing to be done easily or well by the amateur. The following few points may be noted as especially affecting Calcutta minor-streets. North to south streets will as a rule be in opposition to the most economical street sewerage lines; yet, under tropical conditions, these streets get a fairer apportionment of sunlight, and at Calcutta, they will benefit from the two normal wind-directions. Provision for plentiful *air-movement* is a great need in tropical housing and street-planning.

The most urgent suburban development.

After stopping growth of further disorder in the half-built areas, the first suburbs for attention should be those for the working classes.

The best areas for earliest development are those already within reach of

(1) The existing main drainage systems of Calcutta ;
(2) That are nearest the present factory and slum areas.
(3) Within easy possibility of rapid transit.

For working-class suburbs, factors 1 and 2 are the more important at present. The Destination of Areas Map must also be respected, whether it be the writers', or a more detailed one made as soon as possible.

THE MAIN DRAINAGE PROBLEM IN THE SUBURBS.

It is a great misfortune that sewerage at Calcutta is a very slow, difficult and costly process. Most sewers, especially in the suburbs, will have to be laid in sloppy silt. No working-class dwellings can be erected in Manicktola until probably two years after the commencement of main drainage and land drainage works.

Cossipore-Chitpore and most of West Howrah are in the same backward state, and lack sewerage. The only area which seems suitable for *early* development on a big scale for working-class dwellings, is perhaps to be found in Ward 19; immediately south of Beliaghata Station, and south of the Municipal Railway beyond the Kidderpore loop.

Main Drainage of Howrah, Manicktola, Cossipore and Kidderpore West should be pressed forward as rapidly as possible—and it must be understood that sewerage, and main road and street-layout are very closely dependent on each other. Once again we are confronted by the horrible difficulty and mess into which Calcutta and the suburbs have sunk, through absolute disregard for the future. The city is desperately in need of building land development; but, for that, a city plan is necessary and as yet she has no powers to produce a city plan or to produce streets; *and on top of this is the very serious fact that there is scarcely any land suitable for working-class residence within reach of existing sewerage. Neglect of sewerage goes hand-in-hand with congestion.*

Until the Main Drainage of Manicktola and Howrah is well in hand Calcutta cannot develop in them either working-class or second class suburbs, Until main drainage has been provided for most of wards 19, 20, 21, 22, 23, 24, 25, and for West Kidderpore and Howrah, no real suburban development is possible. And sewerage at Calcutta is about as difficult and costly as anywhere in the world. Such sewers as have been laid in the suburbs up to date, are found to zig-zag about the wretched little lanes. Abandonment of the lanes and formation of a street system entails much re-sewerage.

Lack of prospective street and road layout, goes hand-in-hand with lack of sewerage. The whole of the built-up areas of Calcutta tail off rapidly at their edges into sewerless, streetless, sloppy areas, where nearly every lane-side ditch is full of stinking sewage. Howrah, with a fast growing population of over 180,000 is well-nigh devoid of any sewerage system; nor has it one decent street or road.

Cossipore-Chitpore, Manicktola, much of Ballygunge and Kidderpore are all more or less unsewered and also have no land drainage. Experience has shewn amply that the 'Municipalities' of Howrah, Cossipore-Chitpore, and Manicktola, have no ability whatever, financial or otherwise, to make a street, lay a sewer, or perform any real useful duty of a municipality. But main drainage and street-work is now essential in these areas, which are in full fact really parts of Calcutta. The time has come when one of two remedies *must be applied*:

(1) A Joint-Sewerage Board must be formed or else this function must be given to the Trust, or

(2) Howrah, Cossipore-Chitpore, Manicktola, and a strip of the 'Twenty four Parganas' must now be incorporated as city extensions of Calcutta.

Any modifications of these alternative administrative reforms must not be allowed to affect or injure the chief immediate objective, which is this :—

The Whole Main Sewerage and Street Sewerage of New Calcutta, her Suburbs, and her bordering present 'Municipalities,' must at once be put under direct control of one European Sewerage Engineer; with *European* experienced assistant engineers, separately in charge of Howrah, Cossipore-Chitpore, Manicktola, and the southern areas.

Chief control and direction of sewerage technique, design and execution, must of course rest with the Trust's chief engineer; who will further, direct all road, bridge, water, housing, and tram projects.

The main sewerage and sewage disposal, and certain main land-drainage of each area, will have to be financed in the normal manner, i.e., by government loans raised on security of the normal sewerage rates of each district: with the usual modifications.

The Calcutta Improvement Trust, when the writer left Calcutta, appeared to be regarded in part as a philanthropic body for providing indigent and incompetent local municipalities with free sewerage. The amount of money to be taxed out of the jute trade of Calcutta—viz., the chief income of the Trust—will *not* allow for main drainage of large areas—and such must *neccessarily* be financed by the method universally employed by all the world's towns and cities. The cost of local street sewerage must also be recovered in the ordinary normal manner, from owners of the agricultural land, which is by sewerage and streets converted into building-land. In England and other countries the 'private-street owners' of land abutting on every new street have to pay for the sewer. In Italy and other lands, the 'higher-value' contribution pays for the street sewer.

There is no reason why the Calcutta Improvement Trust should not be also the Joint-Sewerage Board. If the outside helpless 'Municipalities' now encumbering the suburbs of Calcutta are absorbed in the city, then the Trust will automatically become a Joint-Sewerage Board. *But they must have full powers to do their ordinary work.*

In flat cities, such as Calcutta, the road-and-street-layout quite dominates the sewer layout. In other words, given a road-and-street-layout the sewerage design can economically be fitted to it without any great difficulty at Calcutta. In hilly cities the case is different, and main sewers often have to diverge widely from the main road and street layout. The most economical results in main sewer design at Calcutta and Howrah will be obtained by placing the intercepting sewers mostly along north and south parallels; and the minor sewers should be posited mostly parallel to east and west lines

Howrah and Howrah Bridge.

Howrah, the greatest manufacturing suburb of Calcutta, and as big as Bolton, is connected to the city by one shaky floating wooden bridge. Howrah presents excellent opportunities for both working-class and second class suburban development. It represents the open land along 40 per cent. of the north Calcutta borders. Even to-day, with but one insufficient bridge, and the city tram-service cut in two by the same, dwellings at Howrah would eagerly be occupied by Calcutta people. But Howrah development is likely to be held back.

Consideration of a new bridge across the Hugli commenced officially with the appointment of a Joint Committee in July, 1909. It seems doubtful if a new bridge will be in existence by 1916: and the want of it will be felt very much by the City and Trust before that date. The transcending importance of this bridge, as the greatest main vehicular traffic way of the city, is well seen in the Traffic Intensity Map. A bridge of great width is demanded in the most positive manner possible, by the needs, present and future, of Calcutta-Howrah. This bridge is the most heavily used roadway in the Indian Empire.

EXPENDITURE IN THE SUBURBS.

Given the Supplementary Town Planning Act, the cost of suburban development will be financed as follows :—

Work to be done by Government loans raised on security of municipal district rates for sewerage, water and lighting; the said loans to be repaid out of rates:—

(a) *Main Drainage*, i.e., Main Sewers, sewage pumping and disposal, and land drainage.

(b) *Main Water Supply*, i.e., major mains, adjuncts, and proporional costs of filtration and pumping.

(c) *Lighting*. When a company supplies a city, street lighting is usually paid for by the Corporation, and recovered from ratepayers by a lighting rate. Lamp standards are usually the property of the Corporation. At Calcutta, all gas mains, and street lighting of new suburbs should be provided by the Corporation, at request of Trust, and be recovered by a lighting rate.

Work to be financed by Government loans raised on security of 'Higher Value' contributions to be made by owners of bettered land and property.

The said Higher Value contribution to be sufficient to cover the work of :—

(a) Street sewerage and street drainage.

(b) Formation of street carriage-way, kerbs, and footpaths, etc.

(c) Owners' proportional costs of sewers, drains, carriage ways and foot paths, in main roads. Usually, when a street is over 36 ft. wide, the extra width is a communal charge, and is not assessed on local abutting owners.

Work to be financed mostly from existing established funds of the Calcutta Improvement Trust
(i.e. out of the prospective £5,800,000.)

(a) All Main Road work, less proportion debited on benefitted owners. Purchase of building-property, etc., that interferes with main roads traversing the suburbs.

(b) Acquisition of land for open spaces, playgrounds, parks,* school-sites, etc., also filling of tanks to some extent for these purposes.

(c) Acquisition of land for working-class dwellings in the suburbs. Dwellings themselves not necessarily to be erected by the Trust.

(d) Purchase of property in the inner half-built suburbs, when such is needed for street adjustment. Much of this expense can and must be recovered by means of betterment contributions over special assessment areas as explained in legislative chapters, or by Lex Adickes methods.

Approximate distribution of Trust Funds in Suburban Re-planning and Development.

The balance of the £5,800,000 expenditure total, left after setting apart money for the intra-city main road and bridges, slum demolition and repair, re-housing, etc., was 106 lakhs, or about £707,000. If the jute trade continues to increase, as seems almost certain, then the tentative figure of £5,800,000 for works' expenditure will be augmented by from 10 to 20 per cent. And again, if the Trust obtain a Town Planning Act that embodies the main principles of such acts, then *very much more*, the financial stringency will be eased. Intra-city main roads would cost probably 150 lakhs less, etc., etc.

Under the present financial status, the writer sets apart £33,000 for cost of the New Act, £600,000 for the suburbs, £36,700 for augmentation of rapid transit, and £40,000 towards the local schemes taken up urgently by the Trust before any policy had been determined on. As regards these latter mixed local schemes (under the costly 1911 Act procedure), all slum demolition (and re-housing by private enterprise), and all road widenings are included in the foregoing estimates, but the new Act should be retrospective over these local schemes.

The distribution of suburban money is determined by the following large considerations:—

Zone A. Five square miles are covered more or less by inner half-built disorderly and streetless 'suburbs' that require urgent attention.

Zone B. Five square miles of almost unbuilt-on land need immediate planning and development, and preservation from mis-use.

* Under Italian and certain American laws (Kansas and Denver) up to even 83% can be recovered by 'special rate assessment' over the local district benefitted by parks and open spaces. The Supplementary Act suggested, includes this power.

Zone C. Six square miles of open land that should be in full development ten years hence, needs immediate preliminary planning, and protection from disorder and mis-use.

Only about 4 per cent. of the above areas could be rescued by the Calcutta Act of 1911, and that bit could only be re-planned at huge cost; and the writer now takes opportunity to rescind almost wholly, the far too optimistic statement printed on the Census Map and the Destination of Areas Map, in which he said "areas fairly practicable, under the Calcutta Improvement Act 1911, for development as garden suburbs, are cross hatched with horizontal lines."

Those areas really come mostly under Zone B above. When the map was made, the writer had not fully analysed the great legal and financial weakness of the Trust. For 'fairly,' please read 'slightly.'

We may now apportion the available prospective £600,000 as follows :—

Zone A. Five square miles of inner half-built suburbs, = 3,200 acres at £110 per acre = ... £352,000

Zone B. Five square miles of land needing immediate complete development = 3,200 acres, at £52 an acre, = £66,400, say £168,000

Zone C. Six square miles of land needing re-planning, main roads and protection, = 3,840 acres, at £20 an acre, =£76,800, say £80,000

£600,000

It will be remembered that most of this £600,000 is required for purchase of obstructive property, main road work (mostly paying for extra width not debitable on owners,) for open spaces and public lands. Once again, we see the great want of money, and the utter impossibility of suburban development under the 1911 Act—which, apart from its invaluable creation of an Improvement Trust—gives power almost solely for dealing with slum, and that only by the impossible demolition method.

The following table will enable those who think in Rupees to grasp easily the suburban figures given above :—

SUBURBAN AND FRINGE ALLOTMENT OF £600,000.

Zone.	Square miles.	Approximate allowance per acre in Rupees.	Allowance per sq. mile in £ sterling.	Allowance per sq. mile in Rupees.	Total in £ sterling.	Approximate Total in Rupees, lakhs.
				LAKHS.		
A.	5	Rs. 1650	£70,400	10.56	£352,000	52.80
B.	5	Rs. 780	£33,280	4.99	£168,000	25.20
C.	6	Rs. 300	£12,800	1.92	£80,000	12.00
	16	—	—	—	£600,000	90.00

These allowances are indeed scanty; but with ordinary town planning powers as regards finance of street making, street sewerage, etc., etc.; and with ordinary corporation powers as regards finance of main sewerage, water supply and lighting, etc., a great deal can be done with the above allotment—certainly 90 per cent. more than could possibly be done under the unaided 1911 Act.

SECTION VII.

FINANCIAL SUMMARY

AND

WORK PROGRAMME.

ÆSTHETICS.

CHAPTER XXIII.

FINANCIAL SUMMARY AND WORK PROGRAMME.

Allocation of the prospective £5,800,000 available under existing resources. Summary of Works Expenditure—Best allocation of any new funds—Two Hugli bridges are essential—General Programme of Work—Mr. Gauntlett's opinion on finance, and order of work as affected by finance.

Allocation of the prospective £5,800,000.

The last chapter brought the report to a close as regards allotment of the £5,800,000. Increasing value of land and property is a factor that can be controlled only by true town-planning laws. The writer believes the Trust will obtain these powers. Otherwise, the present value of the £5,800,000 would shrink and melt away quicker and quicker.

Many years will be taken up in making new intra-city main roads. Slum-repair and housing will proceed during at least the next twenty years. Suburbs should extend year by year as required.

The income of the Trust, as fixed, will come in slowly ; and without the holding-back power of a Town Planning Act, project after project would become more and more submerged and reduced by the rising land values, and by buildings erected irresponsibly or purposely on land wanted for the main road and street-net, and for parks and open spaces.

The disposal of the prospective £5,800,000, or 865 lakhs, may now be given in the following table :—

SUMMARY OF PROPOSED 'WORKS EXPENDITURE' TO BE MADE FROM ESTABLISHED FUNDS OF THE CALCUTTA IMPROVEMENT TRUST.

Description of Work.	Approximate. in £ sterling NET.	In lakhs of Rupees NET.
	£	
1. Intra-City Main Roads and Bridges, etc., as per 'Scheme IX Final'	3,753,000	563
2. Slum Demolition and good Re-building	399,900	60
3. Slum-Repair and Staff	657,000	98½
4. Re-Housing in exemplary Chawls on cleared slum sites	60,000	9
5. Re-Housing in renovated old buildings	26,000	4
6. Re-Housing in good contiguous single-family dwellings	160,000	24
7. Cost of Supplementary Act	33,300	5
8. Suburban control and development, open spaces and parks	600,000	90
9. Guarantees of interest on new tramlines that help Trust suburban developments	36,700	5½
10. Local schemes in hand, allowance for net costs not included in above items	40,000	6
Grand Total	**£5,766,500** or	**865 lakhs**

Best Allocation of any additional funds, Imperial Grants, etc.

If the Supplementary Act is obtained, then the Trust funds will be very appreciably increased by the reduction of costs for intra-city main roads, for street widenings, for street adjustments, for open spaces, for drainage and water work, etc. Any extra funds obtained in this manner should be applied to suburban development, and purchase of land for workmen's dwellings.

If an Imperial grant be given, as is so usual in other countries for precisely similar cases, and say it is one of £2,000,000, the best proportional allocation would seem to be as follows :

Slum-Repair. Better, more rapid and extended work, more demolition of bad houses, more street-net formation, and provision of more open spaces, with needful re-housing in single-family dwellings	30 per cent.	or	£600,000
Radial Parks	20 ,,	,,	£400,000
Outer Suburban development, Tramway guarantees, land purchase for housing	15 ,,	,,	£300,000
Fuller amendment of Inner half-built areas	15 ,,	,,	£300,000
Intra-city Main Roads. Prolongation of Inner Strand Road, a central North-East Diagonal, better Sealdah Diagonal, and rounding back of all shocking bad present street-corners, etc.	20 ,,	,,	£400,000
			£2,000,000

Additional Funds. Two Hugli Bridges are essential.

If the grant were £3,000,000, then most of the extra million should be used to make a new Hugli bridge at Aheeritolla. This would create a natural exit through the northern horseshoe-zone of industry, and would open up excellent new development for trade, traffic, tramways, suburbs, and parks. At present there is but one old bridge between the great city of Calcutta and her absolutely dependent great town of Howrah. There is very great want of a second bridge. Every expert who sees the Calcutta Map points his finger at this abnormal weakness, this grave neglect. Lack of normal bridging is a factor that has helped to spoil built-up Calcutta. This neglect has also caused the traffic pressure on the solitary and almost worn out-link to reach a most dangerous intensity. The facts are set out in the writer's report of Feb., 1913. on the width of the proposed new Howrah-Calcutta bridge—which is to replace the old bridge.

Programme of Work.

This has already been set out in detail, but the following is a summary of the position.

While the Supplementary Act is being drafted and obtained, the work to be pressed on most should be re-housing by contiguous family dwellings built on dear land: thus preparing the way for and making possible, the creation of intra-city main roads and slum-repair work.

During the same period, preparation of the City Plan as regards the half-built areas should be pushed forward, so that, as quickly as possible, very soon after the Supplementary Act is obtained, further disorderly growth will be stopped by Plan publication.

As regards intra-city new main road-work, the first new traffic-ways and widenings to be done should be those portions of them in and nearest to the city main focus, viz., the South-East Diagonal from Howrah Bridge to Dalhousie Square; the prolongation at least across Harrison Road, of Clive Row; and of New China Bazaar at least as far as Chitpore Road. The Chitpore Diagonal and the Armenian Church to Bow Bazaar Diagonal are equally urgent.

The rule should be (*a*) *fix all* lines of the whole intra-city Scheme IX as soon as possible by publication under the (proposed) Town Planning Act; (*b*) *create*, from the central focus outwards.

Mr. Gauntlett states the bearing of programme on finance in a very pregnant manner: and his chief remarks conclude this subject. They may be prefaced by the consideration that very few works of the Improvement Trust, if they be done well, can be *remunerative*.

For example, there is an erroneous idea that sites of property bought and demolished in the slums and central Calcutta, and for new main roads and elsewhere, will bring in a remunerative income. They might, *but only if they are allowed again to be overbuilt and overcrowded with high unhealthy new buildings*. It appears to the writer that remuneration would only be possible in the case of large areas of cheap land in the outer suburbs bought up to-day for future working-class and second-class suburbs. Ninety-five per cent. of all open land in and immediately contiguous to Calcutta cannot be bought and built on at a profit unless such building be done too high and too crowded.

Mr. Gauntlett's Financial Opinions on Programme of Work.

"1. The problem in this case is peculiar. The Trust is to receive an income, which is assumed to be 20 lakhs a year, for 60 years: also an initial grant of 50 lakhs: also returns from the properties created. I may remark that it would appear to be more probable, and, therefore, more correct to assume that the income will show a slight but progressive increase.

"Its actual works' expenditure is contemplated to last 20 years; thereafter the Corporation will take the place of the Trust, and the main expenditure will be the payment of interest and sinking fund contributions and repayment of loans.

"On these assumptions what is the best scheme of finance to be adopted?

"2. The general answer is simple from the financial point of view. There are three main heads of expenditure which may be put in the order of their relative importance:—

(*a*) Original works.
(*b*) Repayment of interest on loans.
(*c*) Establishment.

"The cost of (*a*) cannot be affected by financial expedients. Economy can be obtained on (*c*) by drawing up the programme of work so that the establishment is fully and continuously employed.

"3. If (*b*) is to be made as small as possible the annual expenditure must be regulated so as to borrow as little as possible. This can be effected by

"(*i*) keeping the annual expenditure on works as close as possible to the annual income;

"(*ii*) taking up first the works which will yield the greatest return at the earliest date.

"4.—It will be seen that (*i*) and (*c*) may be contradictory, and that from the financial point of view there must be a compromise. In this compromise (*c*) must be more important. It is useless having a highly paid Chairman and an influential Trust to control expenditure of, say, 20 lakhs per annum.

"At the same time the financial importance of (*i*) and (*ii*) has to be kept steadily in mind.

"5. I am fully aware that, in determining the rate of progress and the priority of schemes, other than financial considerations must be taken into account, but financial considerations must be given due weight and it is important that they should be put forward.

"6. There is one important point which I may mention at this juncture. It will be true economy to get each scheme fully matured with complete estimates before it is started. This will lead to economy of working and the slight delay will enable revenue to accumulate and postpone the date when a loan has to be raised.

"7. In preparing the programme then, the main financial considerations are—

"(*a*) to determine the average annual rate of expenditure which will keep the Chairman and his staff fully occupied.

"(*b*) to prepare complete estimates of each scheme before it is taken up.

"(*c*) to start with the most remunerative schemes.

"(*d*) to push on as quickly as possible with those adjuncts of each scheme which are necessary in order to make it remunerative."

It would seem evident that Mr. Gauntlett was under the impression that a considerable amount of work would be remunerative? i.e., would bring in a remunerative interest on the expenditure? We know now that such will not be the case. But the ordinary town planning powers, based as usual on the betterment principle, will change the financial conditions of the Trust from an increasing state of paralysing inability, to an active, real, and comprehensive measure of power.

CHAPTER XXIV.

ÆSTHETICS.

General.—Co-operation of engineers and architects needful to get good and finished planning—Public feeling towards art—Action and re-action between cities and their peoples.

Notes on Calcutta's Æsthetic Needs.—Curved and straight streets—Vistral planning—Boulevards—Arcades—Statuary—Statues on the Maidan—Squares and open places—Dalhousie Square.

CONCLUSION OF THE REPORT.

Engineers and Architects.

The training of architects is mostly artistic, and naturally they have looked at town planning very largely from the artistic and architectural aspects. British and American civil and municipal engineers have not as a rule had the slightest training in art or architecture; in consequence they design almost wholly from utilitarian motives—although very frequently, their highly trained senses of proportion, weight, and fitness, permit them unconsciously to give a certain clean balance and grandeur to their works.

Only a very small number of the books on city planning have come from engineers; this honour lies nearly all with the architects. We do not live in an age markedly artistic—the case is rather the reverse—and effectively to place artistic ideas before people who are inartistic, needs the combined strength of the engineer, artist and architect.

The mathematical mind of the engineer should deal with drainage, with railways, docks, quays, great walls, bridges, traffic, transit, and the more economic aspects of great roads, re-housing—and in general the more material, heavy and financial side—thus leaving the mind of the architect unweighted, and freer for devotion to the finer and more artistic work.

Close brotherly co-operation and mutual respect between engineer and architect is absolutely needful to obtain sound and beautiful results. In classic and mediæval times, if perhaps we except Archimedes,* the professions of engineer and architect ran very much in double harness. Up till yesterday the complex growth of need had brought great specialization, and made between these two professions a wide temporary gulf. But to-day, as regards town planning work, we see a very complete co-operation and oneness of purpose rapidly growing, between sociologist, doctor, artist, architect and engineer.

At Calcutta, the chief work of the artist and architect will be formulation of control rules for the architecture and arcades in every great new intra-city road; consideration and creation of vistral and other beauty; design of monuments and fountains in the large main roads and most

* Who specialized it will be remembered in engines of warfare.—[E.P.R.]

especially at their junctions and articulations—the production of artistic, harmonious, and delightful results in both present and future public parks, squares, and open places of Calcutta—the re-arrangement of existing statuary, the creation of order and dignity in the chaotic and so artistically wasted Maidan—determination of general architectural rules and regulations as regards the three classes of suburbs and in respect of improved chawls—also, very notably, the design of the bridge exits and debouchments of the new Calcutta-Howrah Bridge. Etc., etc.

The parks and boulevards of Paris, the graceful and perfect Pont Alexandra III, shew the fine achievement when artist, architect and engineer combine loyally to do good work.

Public feeling towards Art.

The day is now past, yet barely past, when the mere mention of the word 'art' raised grave doubt, suspicion, contempt, amusement or anger, in any civic council chamber of Great Britain—and the Empire. Ninety per cent. of the British and Indian public do not believe that art 'is of any use,' nor do they believe *in* art, unless they are put face to face with it. Then, like St. Thomas, they are convinced. But it is no longer the correct thing to disbelieve in art, and the 'correct thing' is one of the very greatest powers in the present human world. Well!—thought precedes action—and, strange fact, what commenced as self-hypnotization of our parents is ending in a national new feeling for art; an appreciation, especially by the younger, of civic beauty. At the same time, the British are not to be blamed too much for their long blindness. We have been busy giving the world steam, railways, great ships, electricity, telegraphs, sewerage, macadam hygiene, anesthetics, antiseptics, etc.

All art, architecture, painting, verse, prose, music, singing, law, order and civilization worth bothering about, has come ultimately to Europe and Britain via Italy, and so French cities have become elegant and beautiful before those of England.

Separated by great land-distance from Greece and Italy the literature of those countries reached us first—before other forms of art. We seem to have concentrated on this one art, and because of this, perhaps, we became supreme in literature and poetry among all living nations. A period of architectural renaissance seems commencing in the empire, and will perhaps replace the art of literature, now fast dying in this country just as was prophesied by Schopenhauer.

The point of all this is, that Calcutta should certainly have the very best artistic and architectural advice upon her re-planning. *That advice can be given only by men who have specialized in civic planning*—no amateur will do—it is a case of 'the tools to those who can use them.' The writer will now endeavour to indicate, slightly, the important relation that good architecture has with the spirit of races.

Action and Re-action between cities and their peoples.

This is a fundamental consideration as regards the effect of civic beauty or non-beauty, order or disorder, upon those born and bred in cities. The writer is not in any way competent to discuss this important matter, but



PONT ALEXANDRE III, PARIS.

A fine example of modern work in Central Paris. The bridge is 130 ft. wide; span 352 ft. The pylons at the four corners are each 75 ft. high, surmounted by bronze gilded statuary. Note the double-level road alongside the river. The bridge had not been open to vehicular traffic at the time when the photo was taken.

The new bridge over the Hugli at Calcutta—the most important road-bridge in India—offers an opportunity that would be neglected by no continental municipality, to create a noble and impressive entrance to the city.

he ventures to touch on it and raise thought in others. People undoubtedly express themselves and their states of mind by their cities. Cities again act very powerfully on their inhabitants—because cities constitute environment.

While Rome was conquering barbaric Europe, she was building splendid cities, well designed for the traffic needs of the day, and adorned with many of the noblest civic centres of which we possess records. Considering the extreme slowness of transit, the smallness of ships, the difficulties of intercourse and communication—so that 1000 miles meant 50 days' travel against our own 30 hours' travel—the civilization, projects, and wars of the Romans represent one of the greatest miracles of human organization, and in the supreme century of that civilzation, art had likewise risen to its greatest height. The finest periods of patriotism, energy and discipline among the Romans and Greeks coincided with their highest art periods. They were in a large sense noble peoples living amid the noblest works of art ever produced by human beings. There are forms and faces among the Greek and Roman statues that excel those of any living human beings of to-day—and we have no civic centres that compare with the time of Pericles.

The Roman city was four-square, straight in line, definite, fixed and clear cut. The civic centre in even a little colonial city like Pompei, was majestically ordered and designed. The Roman mind too, was clear-cut, mathematical, disciplined, and orderly. The great Roman roads of England and Europe, ruled straight across the map from objective to objective are most remarkable; and to view them *in extenso* to-day, 2000 years since they were made, proceeding onwards mile after mile without deviation, impresses one with a deep sense of law and order. The present day world owes practically all its law and order to Roman origin.

Between peoples and their cities we find great analogy.

The cities of England yield no smell or sight of sewerage. Every house has an hygienic supply of good water. The roads and paths are clean: every surface shews hard and good. The housing is very good. A dogged order prevails. In general the people move silently and earnestly—the orderly traffic obeys strict rules. Road difficulties are met by stricter rules—we are too engrossed to think of the road itself—we solemnly and carefully follow its windings, and exercise increasing care at corners, and wait in orderly, patient traffic-jams. Solemn order covers the miles of rule-made sanitary streets and houses—art and the wide view are far away from all this—which seems to represent the Britisher, expressing *his* particular self.

Bright and rigid handsomeness of town prevails in the martial empire of Germany. A very great sense of front architectural control and strict military discipline hides a considerable amount of bad tenement housing and social discontent.

Italian women are perhaps the loveliest in form and feature, and the most graceful, of any in the world. Many of their men likewise are exceedingly well set up and handsome. We find them living in the most beautiful cities and amongst the greatest art treasures in the world.

The average square-cut angular American face and figure, the love of plainess, the worship of the dollar, the startling exaggeration of language, the machine-madeness, also goes clearly enough with the plain unadorned grille (which gets right there quick—so far as planning trouble is concerned) and is in direct unison with the almighty awful sky-scraper, the 700 feet high building on the 100 feet wide road, the quick lunch, the huge advertisement painted on the rocks of fine mountains and the frank lack of all that subtle beauty of thought grown in ancient lands and cities. But the artistic perception of American people grows rapidly, and they seem likely to get quickly through the crude period, and then no-one-knows what may result in a nation so full of new blood and energy. It is remarkable that practical state measures for control of dollar-rule should coincide with the new American enthusiasm for beautiful civic centres and splendid parks.

Paris has the best lines of any great city in the world. The wide roads proceed direct from focus to focus and radiate out to every quarter of the earth—she is centuries ahead of other great cities. Her women are the best-dressed in the world. *La Mode* emanates from Paris. Likewise too, Paris has ever been in the vanguard of new great ideas. Violently she loosed the world from a thousand years of cassock-rule. Her tremendous fervours are reflected in her splendid buildings and the unparalled magnificence of her great roads.

Thus we see dimly the great depths of meaning and effect, in the built city, and the made road. They work on steadily towards an end, good or bad. It is our business in Calcutta to bring these facts home to the public.

Lastly in this respect there is the action and inter-action of capital cities and their empires. The capital and the great cities are to an empire very closely what the main focus and secondary foci are in the smaller unit of one city. Defect in the main focus of a city injures the whole of that city, by means insidious and not quickly detected. The crippling of say Madura, or Agra, or Jaipur, for want of money for improvements—would have but a local effect. The crippling of Calcutta would, *in due course*, affect all India more or less, and would very seriously injure Bengal and the Ganges valley. Calcutta Improvement is not a mere local municipal problem, but an Indian empire-problem.

NOTES ON CALCUTTA ÆSTHETIC NEEDS.

The Curved and the Straight Road, and Vistral Planning.

The curved road is more picturesque than the straight road, but less noble, and less simple and safe for rapid traffic. Ornament and beauty in the curved road is almost solely dependent on the architectural treatment of the buildings. In the straight road alone can be used those large and beautiful artistic works that give grandeur and finish to a whole road or avenue, and indeed, to a whole city.

At Calcutta the writer observed only two examples of a good close at the end of a straight road. Bow Bazaar has a good westward vista given by the lofty gate of white masonry that guards a portal of the Government grounds, but, unfortunately, trees have been allowed to obscure this fine gateway in a most non-artistic manner. The surmounting lion is quite hidden.

The Red Road and Old Court House Street are very well terminated by the Scot's Kirk. There are on the other hand, numerous most hideous terminations. The northward Chowringhee vista is closed and quite ruined by an ugly factory chimney and the delapidated back lane known as Bentinck Street. Cornwallis Street northward vista is painfully dominated by another big chimney which is central, visible, and prominent down two miles of road. Should an architect town-planner visit Calcutta, spare him the termination of the Howrah-Calcutta Bridge—let him 'finish his journey by water.'

The writer investigated 'focal view points' when fixing lines of new intra-city roads—and many are shewn by red circles on the Sociological Map. He found it absolutely impossible, on the strongest tactical and economic grounds, to use any of the passable existing objects, excepting only the tower of the old Armenian Church.

Columns and Fountains.

We must create our own beauty as we go. Lofty columns rising up in the centres of the great road junctions would be effective adornments if they were beautiful, and were crowned with fitting statuary—preferably of bronze-gilded, or bronze-polished.

Fountains, rising from great basins of white marble like those of Paris would be very delightful and popular in the roads of Calcutta. At the present moment there is not one public fountain in the whole city—and yet, in a hot land and vivid sunlight, few things are so exceedingly beautiful as the tall silver-dashing regal colnmn, part carried in rainbows beyond the huge trembling basin, to fall sparkling on refreshed foliage. Fountains are not effective for city adornment unless they are of large size. Columns and fountains offer the best ornaments for the junctions of Central Avenue with Bow Bazaar, Manicktola Avenue, and Sham Bazaar Diagonal.

In the office at Calcutta, are several drawings designed to give Trust members an idea of the fine effect of big columns, soaring up at important main-road junctions. The same sketches give ideas of the beautiful effects of architectural control in great roads. Saracenic and classical examples are given.

The writer happened upon a well-trained German architect in poor circumstances, and took the chance offered to obtain at little cost these preliminary and merely suggestive sketches for the Trust. The classical double columns, capped by a single abacus, and surmounted by Bengal tigers in massive sculpture, are likewise sketchy notions of the writer—who confesses freely to a mere amateurish knowledge of pure architecture. All street adornment for Calcutta should be designed by an architect learned in *civic* adornment, and civic planning.

Boulevards.

The time has long gone by when it was easy to create tree-planted boulevards in what is now built-up Calcutta. Practically our only chance lies in the new *radial* main roads where they traverse the suburbs. The

city plan will shew these external boulevards. Southward and south westward roads appear to offer the best, if not the only opportunities, for boulevard treatment. The most useful boulevards are those which are radial, i.e., those which are really great natural arteries.

The only other distinct form of boulevard is the 'ring-road' or 'ring-strasse' (street). Such is of little use, and will be but slightly used, *unless it is right in the central city.* The creation of outer ring-roads was, some ten years ago, considered rather important. Subsequent experience shews us that outer ring-roads are rarely worth the money spent on them.

Circular Road is the outer ring-road of Calcutta. Like almost every Continental example, it has been made along an old encircling line of fortifications, and like the *outer* girdle-roads of Continental cities—it leads nowhere particular and is of surprisingly little importance or value as regards traffic. It is, also, very much *too far out from the city centre* (and much too permanently damaged and uglified) ever to become a popular boulevard—this would only be the case if it were an *inner* ring-road, such as the Ringstrasse of Vienna. Circular Road is in fact in the position of the outer girdle of Milan—too far away from the great foci ever to become a boulevard of any value; for no boulevard of this kind is successful, or used, unless it possess shops, bazaars, theatres, cafes, etc. The only true inner boulevard or ring-strasse in Calcutta includes Chowringhee and Old Court House Street, these are close on the old lines of inner fortifications.

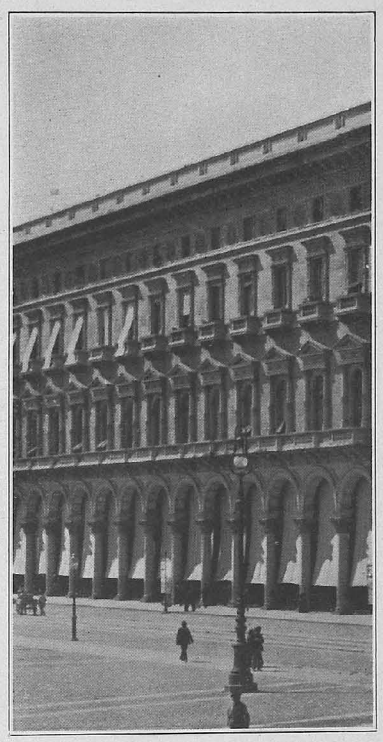
The idea once prevalent on the Continent, that outer ring-roads would also be valuable for traffic has likewise been quite given up. They are found to be deserted. Electric girdle-railways are the true need of people and traffic. The favourite and effective boulevard is always found on the site of old inner defences now included in the built-up centre, or else alongside the sea as at Madras and countless cities, or beside the river or great fashionable park, as at Calcutta. Circular Road. unfortunately, can never be a popular boulevard. At the same time, there is no reason why it should not be made into a pleasant road. To-day it has in places an unnatural traffic, which is due to the lack of a main road system.

Arcades.

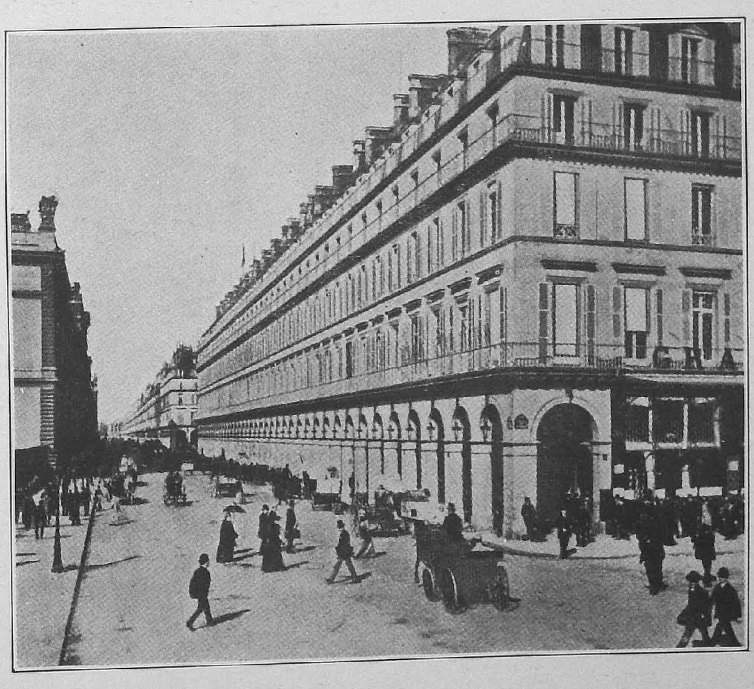
If we do not arcade, we lose 25 to 40 feet of width in every central new intra-city road.

Chowringhee should have been arcaded. The present numerous, unsightly, and porchlike coverings over the footpaths of Chowringhee and Old Court House Street are really gross and ramshackle substitutes for arcading. They shew how much arcades would be appreciated by the public. Old Court House Street might have been 130 to 140 feet wide. Arcades at Calcutta will give valuable and grateful shelter from the painful enervating sun of the tropics, and protection from constant rain during the long monsoon months.

From the traffic point of view, the extra width gained will be invaluable, and arcading is the sole means within our powers at Calcutta, of getting at very small cost, effective main road widths to meet the future needs. Arcades are exceedingly popular with continental shopkeepers and business people.



MILAN, ITALY. View of arcaded shop property, taken in heat of day. Crowds of foot-passengers are walking out of sight behind the blinds, which are drawn down to exclude heat, excessive light and dust. Note effect of architectural control.



RUE DE RIVOLI, a central Paris Road, arcaded on one side in order to gain greater effective width at very low cost. Note vehicles waiting all along outside arcade for people who are visiting the shops. Reproduced from "Town Planning: Past, Present and Possible," by kind permission of the Author, H. Inigo Triggs, Esq., A.R.I.B.A.



A Parisien arcaded business road (RUE CASTIGLIONE) with architectural control of buildings. Reproduced from a photograph taken some years ago. Traffic is now much greater and is almost solely motor traffic. The foot passengers (numerous) are walking along under the arcades, which are lined with the windows of shops and offices. By this system the effective width of an ordinary road is increased by from 24 to 40 feet. Tramways are often laid alongside each narrow external footpath.



TURIN, ITALY. View in central part of city, showing both sides of roads deeply arcaded. Majority of foot passengers are walking out of sight shaded from hot Italian sun. Effective width of this road is increased by 36ft. through arcading. Arcade property is much favoured by continental shopkeepers and business firms. Note typical small tramcar of continental cities.

Æsthetically, arcading done under good rules creates a most beautiful and ordered city. There is no valid reason why Calcutta should not come to be known as **The City of Arcades**. We all know the 'City of Palaces' to be a myth—and Kipling's 'City of Dreadful Night' to be much nearer the real thing—*at present*.

Statuary.

Excepting bronze statues—all fountains and monuments for Calcutta should be white to be effective. Bronze statuary unless treated in the ancient classic way by gilding or polishing or varnishing so as to display the beautiful and shining metal, is quite ineffective. In actual fact, the average bronze statue is a dismal and dirty object, covered with black and green oxides.

It is becoming more and more clear that the public no longer want statues of politicians or good elderly men, cased in sloppy frock coats, their legs in dreadful marble or bronze trousers that can never be re-creased. These objects are crudely out of keeping with flowers, beauty, peace, and have no proper place in restful and dignified artistic surroundings.

These degradations of art are perhaps only allowable in town halls, public lobbies, government office court yards, the entrance halls of parliament-houses and the like.

Wholly classic and allegoric statuary, including the martial and equestrian splendid fountains and memorials in white marble, gilded or polished bronze, are the fitting adjuncts of a beautiful city.

At Calcutta, how interesting to find commanding statues even of those two great leaders of Eastern belief—The Krishna, and the Prophet Mahomet. Or a delighful statue of Lakshmi, the Hindu Venus, holding her great basin, her parrot on her shoulder? It is certain She would please multitudes who pass with a proper apathy poor Lord some-one's stone trousers and General what's-his-name's horse—all three so exceedingly dirty with soot and oxide. We have not done well by these men. The upright commander and his horse should be in fullest view, clean and polished and bright, as they both were in life. It is the head and the heart of the good statesman we care to memorize—and his head and bust, beautifully and kindly throned among wreathing flowers, is sufficient, and is artistic.

The arrangement of statuary on the Maidan well might make an artistic or town planning angel weep. To the writer, it bears on it somehow the stamp of an efficient brother-engineer, free from all artistic cares —but this may be quite a wrong surmise. Evidence pointing to good unfettered engineering instinct would seem to be the strictly economical basis of site-selection, for each is very favourable indeed from the carting contractor's point of view. But possibly the question of a dry foundation, and, thereby, economy in concrete, has been a factor in site-selection?

The exceedingly fine equestrian statue of Outram—the best bronze in Calcutta—stands off the side of Chowringhee, on a far too low pediment, and in a waste of tram-lines, tuppeny-hapeny posts and chains, idiotic little flank walls, and park drainage ditches often full of vagrant paper. It cannot be seen from Chowringhee (as a fine vistral object) because of the side-tracked position of the site, the intervening branches of trees, numerous trolley-wire poles, etc.

Just before leaving Calcutta, the writer noticed some excavation going on in a quiet little offside spot on the deserted Outram Road, and thought to himself, 'ladies cloak-room or something for golfers'—later, he noticed granite and so on proceeding along the convenient road to the very convenient place of deposit—and, later, was astonished to find this the site for the new Curzon statue. To the outsider, the site seems absolutely haphazard—unexplainable.

The writer remembers the Dufferin statue is not set focally either for Dufferin Road, or else for Red Road—he forgets which; clearly it should have been focal to both. The memorial statue of Victoria the Good causes perhaps the most wonder. It is placed at a point one-quarter of the way round that dusty yet oil-drenched semi-circle of road, from which all view of Government House is jealously shut out by a jungle of tree and shrub. Standing and looking the same way as the august face of the statue, —the writer found the chief objective was the base of the Bristol Hotel. This site is obviously, even to an uneducated child, most inartistic, most illogical, and quite unworthy for the memorial of a great Empress, and especially for one so revered by the people of India.

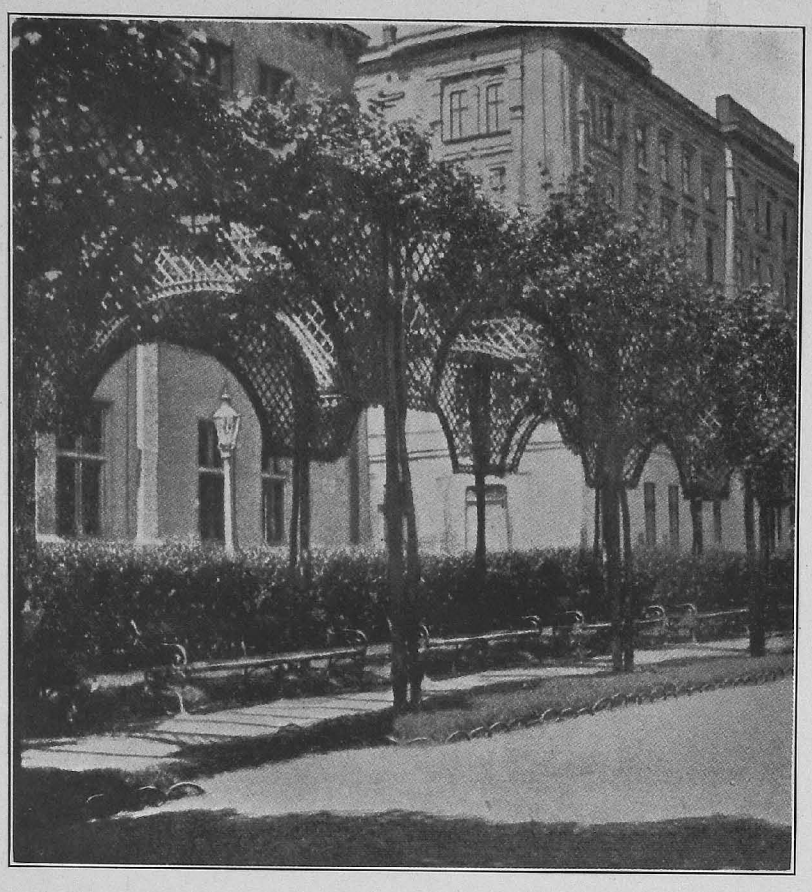
If Calcutta gets advice on the re-arrangement of the statues, roads, and creation of vistas (there are none yet) on the Maidan, the writer will await the verdict on the *status quo* with great interest. He believes the cold-blooded sarcasm of the expert will be as scorpions, compared with his own neighbourly and gentle complaints. Great memorials and the fine works of sculptors cannot be dumped on road-sides without grevious waste and loss. They require beautiful, or delightful, or majestic, or other suitable settings, just as great pictures need special frames, surroundings, and light-angles.

The Maidan is so wasted—as regards civic art and beauty—because it presents such splendid possibilities. Trees, grass, openness, are themselves beautiful, but when once these are enclosed by the handiwork of man, then his subtle skill must enhance, educate, and enoble the rustic wildness into a higher, more intellectural form of beauty. Such has not been done on the Maidan. Tanks remain as rectangular holes filled with water, the fine spire and form of the Cathedral is not used, Government House is not used, the partly-built Victoria Memorial Hall is at present 'off the track' of anything, scarcely one road is well begun or finished, or so placed as to obtain a fine vista, the riverside promenade lacks trees on the east side and finish on the west side. At comparatively small cost the Maidan could be made into one of the finest parks in the world. At present it reminds one of a garden, kept by a man who knows little of gardening, and still less of what a garden should be.

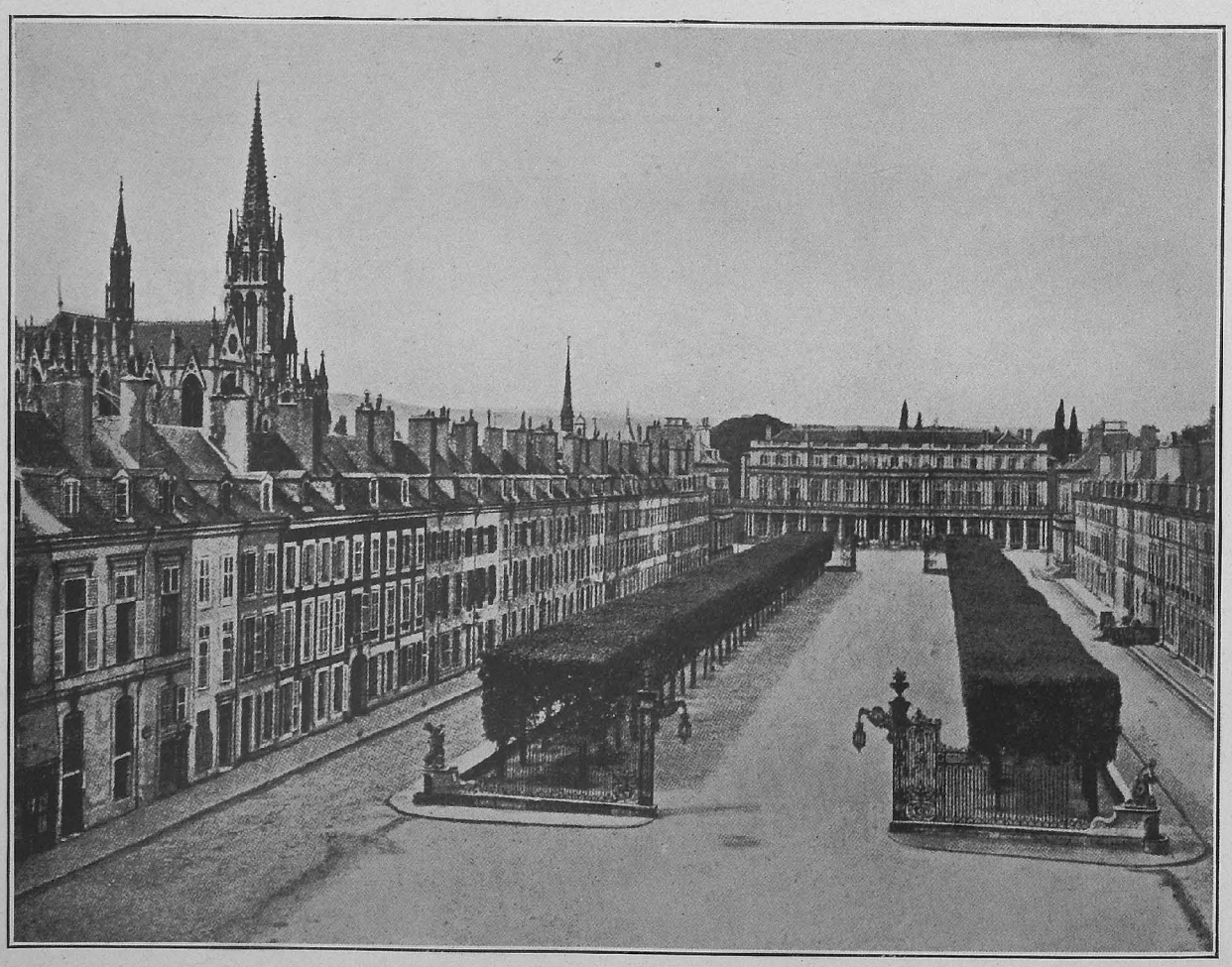
The writer offers his criticism as the average impressions made upon an observant person coming to Calcutta. He offers them in no ridiculous and contemptible spirit of cavil, but in the belief that they are required. The mere fact of an Improvement Trust, infers there is something to be improved, and means that criticism is demanded. The writer believes that he has merely voiced Calcutta public opinion.



A "tank" in a central Paris park (PARC MONCEAU)—a good example of French artistic treatment of small artificial ponds or lakes.



Re. preparing Dalhousie Square to receive future traffic. The photo shews the first stage in training suitable trees to make continuous formal shade-walks in architectural Squares. Creepers are useful during the first few years. The trellis-work is removed when the trees are sufficiently grown. This example is a corner of the Beethoven Square, Vienna. (Beethovenplatz.) Reproduced from "Town Planning, Past, Present and Possible," by kind permission of the author, H. INIGO TRIGGS, ESQ., A.R.I.B.A.



Formal shaded walks in an architectural Square. Note the beautiful ordered effect of this treatment. Imagine the same Square filled with ragged trees of various heights. In the above treatment, the central part is often composed of a grass lawn. (Place Carriére, Nancy, France.) Reproduced from 'Civic Art,' by kind permission of the author, THOMAS H. MAWSON, ESQ., Hon. A.R.I.B.A, and Lecturer in Landscape Design, University of Liverpool.

Squares and Public Places.

Calcutta Squares have already been described, but as a fuller example of 'place' needs, and treatment, we may discuss Dalhousie Square, the most important in the city. At present it is, both from an artistic and economic aspect, in a very neglected state. It can at but trifling cost be made useful, delightful, and very beautiful, despite the fact that the architectural walls of the square shew a great mixture of styles and orders.

Squares or 'places' may be classed into the

(a) Formal architectural place, with or without trees.
(b) The garden or recreation place.
(c) The traffic sorting place.

Combinations of these frequently occur.

At present, Dalhousie Square cannot be classed. It is not a formal architectural square, for it is much obscured by ragged haphazard trees, is spoiled by the dowdy-classic Dalhousie Institute, and by barbarities of the complacent telegraph engineers of government. (In numbers, insulators vie with flowers, and poles compete closely with trees.)

It is not a 'rest-place' for it lies open all round to street dust, and multiplex traffic is in full view all round the four sides. It contains no quiet sitting places. It is not a 'shade and tree place' for its paths are all unshaded, hot, and dusty. The lay out is chiefly an extremely awkward gravel road round a tank. It is not a beautiful little 'garden place' for 90 per cent. of what would be the best area is occupied by a leaden-hued sheet of dead water, usually fringed not by lilies but by smoke-scum; and possessing no claim to beauty—though with great circumspection and a special-pleading kind of photography—one can get a photo made pleasing by reflections. The brick balustrade round the tank has no beauty of its own, and much obscures the water view. The arrangement of the wide gravel paths, the grass and garden 'pats' were evidently done with a set square and compass.

"On diagonal XY, with centre P and radius Q, describe a 'bed'" plump in the middle of the foot-passenger stream. The present gravel paths are blocked by useless unbeautiful grass bosses, quantities of iron hoops are stuck in and all over the grass-pats, to keep people from taking the natural route. The rubbed-away corners are most offensive to the eye and the mind. Lord Francis Bacon in his essay "On Gardens" wrote of such beds and patches, "You may see as good sights many times in tarts."

Four ridiculous sets of toy squirts set in most insignificant basins act as 'fountains' at each corner. Until one has walked round several times and re-discovered each of these items (observing the naked bad plumbing has emanated from one mind), not until then are they associated with a design. Measuring the efforts of these squirt-fountains, the writer found the best jet rose 20 inches before it fell back exhausted. To adorn a great city's finest square, nothing could be more ludicrous than each of these four kutcha water-squibs.

Dalhousie Square is not a recreation place. Any evening one may see the children playing without enough room on scrimped bits of turf left by the set-square, and surrounded by streams of foot traffic proceeding along the dusty and aggravatingly indirect gravel routes. Dalhousie

Square is, however, a recreation place as regards Dalhousie Institute, for one sees ladies who are mostly past anything but croquet—discussing it (presumably), within the insufficient traffic-rubbed hedgerow that surrounds this filched piece of the Square. Croquet in Dalhousie Square is quite as improper as croquet in Trafalgar Square or the Place de la Concorde.

Since putting down the above notes, the writer was delighted to find that Lord Curzon and also the editor of that bright Calcutta journal "Capital," had made onslaughts on the waste and disfigurement of Dalhousie Square—which is at present, far too like a piece of jungle and a common tank dropped close in front of a palace.

Architectural squares need the formal but beautiful treillage, and the skilfully grown pleached foliage that gives shade and green and contrast, but does not obscure the sense of spaciousness and order, the stateliness, of a fine square—of fine architecture, in a great city. Calcutta needs the advice and the designs of a first-class architect skilled in civic design. Meanwhile, drawn on plans essentially for the *traffic* problems of Dalhousie Square—the writer has shewn how simply and cheaply a great transformation can be made. Architectural control, especially of the east sde, is urgently required.

Existing statues are not shewn to be moved, but their surroundings are altered—for, at present, these statues are like pictures without frames or finish. The marble statue of a turbanned rajah or prince, sitting cross-legged, smiling, and fingering his state scimitar, is an exquisite sculpture, the best in the square, but it deserves a more dignified setting than it has.

Street Details.

The details of corner-planning, position of tram-rails, forms for road-junctions, road-lighting, tree-planting, refuges and crossings, etc.—cannot be given in this report. There is, however, one item worthy of mention; every traffic-place or junction should be as large as possible; abundant space is the rule that gives the best results, both material and æsthetic.

The Calcutta Press evidently takes a keen interest in these matters if we may judge by the following cheery and observant note:—

"It is some years now since the Commissioner of Police decided to place signboards in the centre of most of our principal streets to guide the traffic. The idea has presumably met with some measure of success; the boards have certainly suffered less damage from the traffic and have inflicted less than it was generally supposed they would when first introduced. They have proved very acceptable to the parawallah.* Formerly, when on duty in the centre of the road this individual, who is so often tired, had to depend for support entirely upon his own legs. Now, he can embrace the post with his arms, curl one or even two legs around it and make himself comfortable. If these posts have proved satisfactory in assisting traffic the time has surely come when in a large thoroughfare such as Clive Street they might be advantageously replaced by permanent concrete structures. Two or three of them down the centre of Clive Street to divert traffic and provide refuges for pedestrians crossing the street would be a great improvement." †

* Indian Policeman. † from 'Capital'

CONCLUSION OF THE REPORT.

The writer asks that this report be not read as a full detailed treatise on the needs of Calcutta, but rather as a report on the general condition and needs of the city, on the general policy of reform, on the general legislative and financial aspects, and upon the main programme of work. A fair amount of detail has been given, but, as one of our best English planners remarked of this report—"The difficulty of this kind of report is not what to put in, but what unavoidably *has* to be left out.'

The writer will be sincerely grieved if these pages should unfortunately hurt the feelings of anyone, or give offence to any citizen in Calcutta, for he feels a great interest and belief in the welfare of Calcutta and her people, and such has supported him throughout this heavy piece of work. The verbal instructions given the writer were in these words:—"Write just what you think; we want your own independent views on Calcutta." The report has therefore been written as freely and fully as the case and conditions seemed to demand.

I have the honour to be, Gentlemen,

Yours faithfully,

E. P. RICHARDS.

APPENDIX I.

Another Special Clause Required in the Supplementary Act.

Total Abolition of 'Partition Suits.'

It was early pointed out to the writer, that Calcutta Bye-laws were very frequently set at naught by direct mandates of the law-courts. A common case is as follows :—

> A father dies and leaves his home to, say, four brothers, who are 'co-heirs.' They quarrel, go to law, and the house is ordered to be divided up between the four. The operation very likely costs three times the value of the whole house and the actual partition work. But it will also cost the health of all the people and children who live in the resulting dog-kennels.

Such orders of the court ignore all civic control, all bye-laws, all hygiene, all common sense.

If 'co-heirs' quarrel, the proper course is to sell the property and divide the money. So far as the writer knows, this iniquitous legal spoliation of the dwelling house is confined to Calcutta, and does not occur in Madras or Bombay, or anywhere else in the world.

It must of course be abrogated by any effective Supplementary Act for Calcutta.

Of this evil, Dr. Crake wrote in his report :—

> "PARTITION SUITS.—The curious system of actually dividing dwelling-houses amongst several co-heirs is a very potent factor in the production of insanitary property. It is quite common to come across what was originally a single dwelling split up amongst three or four relatives. Owing partly to the purdah system, but very largely to the bad blood engendered by the almost inevitable litigation which the partition involves, each co-sharer erects as lofty a masonry wall as he possibly can, so as to completely shut off his share from the rest. Though carried out with wonderful ingenuity, the result too frequently is that a noble mansion with spacious courtyards is converted into a number of mean little houses with totally inadequate open spaces, and most of the rooms imperfectly lighted and ventilated. Very often an unfortunate heir, can only reach his portion through a long tortuous passage, the partition having resulted in the formation of an insanitary "back-house."

APPENDIX II.

Present Means of Income of Calcutta Improvement Trust.

Reprinted from the 1911 IMPROVEMENT ACT BENGAL ACT V. of 1911.

(CHAPTER V.—TAXATION.—DUTY ON TRANSFERS OF PROPERTY.—TERMINAL TAX ON PASSENGERS.—Sections 82, 83.)

DUTY ON TRANSFERS OF PROPERTY.

(1) The duty imposed by the Indian Stamp Act, 1899, on instruments of sale, gift and usufructuary mortgage, respectively, of immovable property shall, in the case of instruments affecting immovable property situated in the Calcutta Municipality and executed on or after the commencement of this Act, be increased by two *per centum* on the value of the property so situated, or (in the case of an usufructuary mortgage) on the amount secured by the instrument, as set forth in the instrument.

(2) For the purposes of this section, section 27 of the said Indian Stamp Act, 1899, shall be read as if it specifically required the particulars referred to therein to be set forth separately in respect of—

(a) property situated in the Calcutta Municipality, and

(b) property situated outside the Calcutta Municipality,

respectively.

(3) For the purposes of this section, section 64 of the said Indian Stamp Act, 1899, shall be read as if it referred to the Board as well as the Government.

(4) All collections resulting from the said increase shall, after deducting incidental expenses (if any) be paid to the Board at such time as may be prescribed by rule made under section 86.

TERMINAL TAX ON PASSENGERS.

(1) Every passenger brought to or taken from any station in the Calcutta Municipality or the Howrah Municipality by railway, and

Every passenger brought to or taken from any landing-place in the Port of Calcutta, within five miles from Government House, by inland steam-vessel

shall pay a tax of half-an-anna in respect of each journey so made by him:

Provided as follows:—

(a) the said tax shall not be payable by any passenger brought from, or taken to, any place situated within a radius of thirty miles from Government House;

(b) the Local Government may, by notification, either—

(i) with the previous sanction of the Government of India, reduce the said radius to any distance less than thirty miles, in its application either to passengers generally either to passengers of any specified class, or

(ii) with the previous sanction of the Government of India, cancel proviso *(a)*, or

APPENDIX II.—Continued.

TERMINAL TAX ON PASSENGERS—Continued.

(iii) reduce the said tax to any lower rate, either in respect of passengers generally or in respect of passengers making frequent journeys;

(c) the said tax may, in the case of passengers taking suburban season tickets, be calculated at the rate of six annas *per mensem* for each such ticket, or at such lower rate as the Local Government may prescribe by notification.

(CHAPTER V.—TAXATION.—CUSTOMS DUTY ON JUTE.—Section 84.)

CUSTOMS DUTY ON JUTE.

(1) A customs duty shall be levied and collected on all jute exported by sea from the Port of Calcutta to any other port, whether beyond or within India, at such rate, not exceeding,—

(a) in the case of raw jute (including jute cuttings and rejections), two annas* per bale of four hundred pounds, and

(b) in the case of manufactured jute, twelve annas per ton of two thousand two hundred and forty pounds,

as the Local Government may prescribe by notification:

Provided that the said duty shall not be levied or collecten in respect of jute, whether raw or manufactured, exported under any contract which was made before the fifteenth day of August, 1911, and the existence of which was established to the satisfaction of the Customs Collector before the fifteenth day of September, 1911.

(CHAPTER V.—TAXATION.—CUSTOMS DUTY ON JUTE.—SUPPLEMENTAL PROVISIONS.—Section 85.)

Section 5 of the Indian Tariff Act, 1894, shall not apply to jute (whether raw or manufactured) passing by land out of Calcutta.

(CHAPTER VI.—FINANCE.—MUNICIPAL CONTRIBUTIONS.—Section 88.)

MUNICIPAL CONTRIBUTIONS.

(1) The Chairman of the Corporation shall pay from the Municipal Funds to the Board on the first day of each quarter, so long as the Board continue to exist, a sum equivalent to one half per cent. per quarter on the annual rateable valuation determined under Chapter XII of the Calcutta Municipal Act, 1899, as it stood on the first day of the last preceding quarter:

Provided as follows:—

(a) in the case of property vested in the Commissioners for the Port of Calcutta, the said percentage shall be calculated upon nine-tenths of the annual rateable valuation of such property, and

(b) if this Act is directed to come into force during a quarter, the amount of the first of such payments shall bear such proportion to the sum payable hereunder as the unexpired portion of that quarter bears to the whole quarter.

(2) If in any financial year the sums due to the Board under section 82 and sub-section (1) of this section aggregate less than seven and-a-half lakhs of rupees, the Chairman of the Corporation shall pay to the Board, from the Municipal Funds, such further sum as may be required to make up the said sum of seven-and-half lakhs of rupees.

One Anna is equal to one penny,—E.P.R.

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