HARVARD CITY PLANNING STUDIES

VOLUME I

AIRPORTS

Their Location, Administration, and Legal Basis

BY

HENRY V. HUBBARD, MILLER McCLINTOCK,
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ASSISTED BY

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VOLUME II

BUILDING HEIGHT, BULK, AND FORM

How Zoning Can Be Used as a Protection against
Uneconomic Types of Buildings on High-cost Land

BY

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VOLUME III

NEIGHBORHOODS OF SMALL HOMES

Economic Density of Low-cost Housing in America and England

BY

ROBERT WHITTEN AND THOMAS ADAMS

HARVARD CITY PLANNING STUDIES

III

NEIGHBORHOODS OF SMALL HOMES

LONDON: HUMPHREY MILFORD
OXFORD UNIVERSITY PRESS

Courtesy of The American Architect

An American Example at Flint, Michigan

An English Example at Welwyn

PLATE I. TYPICAL SMALL HOMES

NEIGHBORHOODS OF SMALL HOMES

ECONOMIC DENSITY OF LOW-COST HOUSING IN AMERICA AND ENGLAND

BY

ROBERT WHITTEN

AND

THOMAS ADAMS

CAMBRIDGE
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THE HARVARD CITY PLANNING STUDIES

INTRODUCTORY NOTE

As a contribution to the knowledge of certain closely interrelated problems of city planning and housing, this third volume of the Harvard City Planning Studies embodies the results of a research into less intensive uses on low-cost land, in contrast to the previous volume by George B. Ford devoted to studies of more intensive uses on high-cost land. Here is presented a study to determine how sparsely we may spread population and still meet the cost of complete city improvements and adequate housing. *What effects have lot size, open space, and block and street layout on the cost of the home?* How should the economic and social considerations involved be recognized in zoning and the control of land subdivision? Toward answering these questions, Mr. Whitten and Professor Adams, respectively for the United States and England, have assembled their facts and directed their conclusions, which must inevitably be of vital interest to realtors and home owners, as well as to city officials and housing experts.

The Harvard School of City Planning recognizes that these studies can scarcely do more than open the door to further research along the same lines, so great is the need for more logical bases for the residential growth of our cities and towns and so wide the opportunity for thoughtful study. The School, therefore, announces with satisfaction that Professor Adams has undertaken additional studies relating to home building on low-cost land, which will be published as a future volume of this series.

THEODORA KIMBALL HUBBARD
Editor of Research

HENRY V. HUBBARD
Chairman

HARVARD UNIVERSITY
SCHOOL OF CITY PLANNING
March 9, 1931.

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By

ROBERT WHITTEN
President, American City Planning Institute

CHAPTER I

INTRODUCTION

There seems to be increasing uncertainty in the field of community building as to what are the social objectives to be obtained and naturally much confusion as to the methods to be employed in obtaining them.

The apartment house is making inroads on the single-family dwelling, and seems to many to be the only solution of the housing problem for all but the families of higher income. Lot size and street improvement standards are being enforced which some are inclined to think are making it economically impossible for the families of lower income to own their homes.

The present normal street and block layout is challenged as inefficient and wasteful, — economically and socially. Radical changes in the neighborhood pattern are being advanced and in several instances, notably that of Radburn, N. J., are being put into successful operation.

The present study is an earnest attempt to get at the complicated facts of the problem and to suggest certain principles that should be applied in working out its solution. As a factual basis for the study, an attempt has been made to determine:

(1) The percentage of the total number of families that will be effective in creating an economic demand for houses or apartments in the various cost classifications.

(2) The extent to which houses are now being constructed in the lower cost classifications.

(3) The cost of the raw land and how such cost is affected by the value of the houses for which it is deemed suitable and by the normal number of houses to the gross acre.

(4) The present practice as to lot size, improvement cost, and improved lot cost; and the normal relation between the cost of the fully improved lot and the total cost of the house and lot.

(5) Present subdivision practice and the effect of density on acreage values and on lot values.

With this factual background the next step has been to set forth

certain standards of individual lot and community development deemed suitable for small-house urban areas.

It has been assumed that each lot should be adequate to permit access of abundant light and air to the house, and that there should be adequate open space on the lot or in the block to provide for planting and for nearby, short-time recreation. It has been assumed that each house should be served by a full complement of street improvements and public utilities. It has been assumed that the pattern of the individual lots, houses, blocks, and streets should be such as to make up a self-contained community or neighborhood unit, clustered about a school and a common or playfield as a community center and with provision for store centers and other community needs, including appropriate provision for lower-cost multi-family housing.

Finally, various lot, block, and community patterns have been carefully compared to determine their relative social and economic values, and certain results and conclusions have been derived therefrom.

CHAPTER II

THE EXISTING ECONOMIC DEMAND FOR SMALL HOUSES AND LOW-RENT APARTMENTS

BASIS OF THE SURVEY

The rents now actually paid are probably the best indication of the economic demand for different grades of housing judged from a cost or capital investment basis. No comprehensive data of this kind were available. It was found, however, that various public utility companies had for purposes of long-term planning made field surveys showing in many cities for each small district the number of families in each rental class living in single-family houses, in two-family houses and flats, and in apartment houses. These surveys were generously placed at our disposal.

In order to limit the work of tabulation and analysis as much as possible, it was determined to restrict the investigation to cities in the north-central and eastern states. This area includes the chief industrial centers and the greatest concentration of urban population.

Field surveys of recent date were of course not available for all cities. We were, however, successful in securing comparable field data from seventy-three cities, including a fair proportion in each of the five population groups of cities over 30,000. Field surveys were analyzed for twenty cities with a population of under 50,000, twenty-four cities of 50,000 to 100,000; twenty-two cities of 100,000 to 300,000, and seven cities of 300,000 to 1,000,000. No cities of over one million population were included except that the figures for Boston include the entire metropolitan district, which has a population of over a million. The cities included are believed to be fairly representative of the cities of the north-central and eastern states having a population between 30,000 and 1,000,000. The field surveys made by the various utility companies were careful house-to-house canvasses. Where the house was owned instead of rented, it was listed according to rentals of similar houses in the neighborhood. While this method is unreliable in detail, it is prob-

TABLE I

RENTALS PAID IN 1930

Percentage of Total Number of Families in Each Rental Class, as Estimated for 1930 by Type of Housing and by Groups of Cities

Groups of Cities	Percentage of Total Number of Families in Each Rental Class										
	$5.00 to $14.99	$15.00 to $24.99	$25.00 to $34.99	$35.00 to $44.99	$45.00 to $54.99	$55.00 to $64.99	$65.00 to $74.99	$75.00 to $84.99	$85.00 to $94.99	$95.00 and Over	Total
Group I											
Cities of 500,000 and Over											
Single-family Dwellings	9.8	21.7	19.8	13.1	9.0	5.7	5.2	2.8	2.5	10.4	100.0
Flats	20.3	31.4	22.6	12.9	5.7	3.1	2.8	0.5	0.2	0.5	100.0
Apartments	0.9	6.6	14.7	13.8	11.7	14.4	11.3	8.3	4.3	14.0	100.0
All Types	14.7	25.8	21.0	13.0	7.5	4.9	4.3	1.9	1.4	5.5	100.0
Group II											
Cities of 300,000 to 500,000											
Single-family Dwellings	5.0	19.2	17.5	16.2	11.5	6.6	5.5	3.7	3.3	11.5	100.0
Flats	7.0	20.0	22.0	23.3	13.6	8.2	3.0	1.8	0.6	0.5	100.0
Apartments	1.3	3.3	9.5	18.9	24.1	19.9	10.0	6.6	3.1	3.3	100.0
All Types	5.7	17.7	19.0	20.4	14.1	9.0	4.7	3.3	1.8	4.3	100.0
Group III											
Cities of 100,000 to 300,000											
Single-family Dwellings	6.7	18.7	22.4	16.4	11.8	6.2	4.8	3.5	2.9	6.6	100.0
Flats	9.0	31.1	31.5	16.1	7.4	2.8	1.1	0.6	0.2	0.2	100.0
Apartments	0.6	7.1	28.1	18.7	16.0	12.2	6.0	4.1	2.5	4.7	100.0
All Types	8.1	25.3	27.3	15.8	9.5	4.6	3.0	2.0	1.4	3.0	100.0
Group IV											
Cities of 50,000 to 100,000											
Single-family Dwellings	8.4	28.6	25.6	15.6	10.0	4.5	2.5	1.4	0.9	2.5	100.0
Flats	11.6	36.9	30.7	13.8	4.6	1.5	0.5	0.2	0.1	0.1	100.0
Apartments	1.8	12.6	27.5	26.6	13.6	10.3	3.8	3.0	0.5	0.3	100.0
All Types	9.0	30.7	28.2	15.6	8.1	3.6	1.7	1.0	0.6	1.5	100.0
Group V											
Cities under 50,000											
Single-family Dwellings	11.1	26.8	24.4	13.1	9.5	5.2	2.9	2.3	1.7	3.0	100.0
Flats	11.2	38.1	28.8	12.0	5.8	2.0	1.2	0.4	0.3	0.2	100.0
Apartments	2.5	9.3	18.7	17.2	13.7	13.9	18.6	2.7	2.7	0.7	100.0
All Types	11.0	30.0	25.5	12.9	8.4	4.4	2.7	1.7	1.3	2.1	100.0
All Groups											
Single-family Dwellings	8.5	22.6	22.0	14.7	10.2	5.6	4.4	2.7	2.2	7.1	100.0
Flats	14.2	31.1	26.5	14.9	6.9	3.3	2.0	0.6	0.2	0.3	100.0
Apartments	1.0	6.6	18.0	16.8	15.3	14.6	9.4	6.5	3.3	8.5	100.0
All Types	10.8	26.0	24.2	14.9	8.8	4.9	3.4	1.9	1.3	3.8	100.0

ably sufficiently accurate as applied to an entire city or to a group of cities for the purposes for which it is here being used.

Table VII [1] shows the percentage of families in each of ten rental classes as estimated for 1930 from field surveys by various utility companies. These data are given for seventy-three cities.

Table I [2] shows not only the percentage of families in each rental class for each population group and for all of the seventy-three cities, but also shows separately in each population group the percentages in single-family dwellings, in flats, and in apartment houses. The term "single-family dwelling" as here used includes in addition to the ordinary detached house the so-called semidetached house and the row house where each house is an individual unit on its own plot of land and is or can be sold separately. The term "flats" includes living quarters over stores, apartments in two-family dwellings where the families live one over the other, apartments in three-deckers and similar buildings, and all unheated apartments. Under "apartments" are included only multi-family houses where heat is furnished as a part of the rental. In all of the tables in order to place rentals in heated apartments on the same basis as rentals in dwellings and unheated flats, the rent in the heated apartment is reduced by an amount varying from $5 in the lowest rental groups to $25 in the highest rental groups.

Table II [3] gives by population groups for each rental class the percentage of families in single-family dwellings, in flats, and in apartments.

As indicated in Table I, 36.8 per cent of the families living in these seventy-three cities pay rents of under $25 a month, 24.2 per cent pay from $25 to $35 a month, and 14.9 per cent pay from $35 to $45 a month. Sixty-one per cent of the families pay rent under $35 a month. It is in providing adequate housing for this 61 per cent of the population that the chief housing problem consists.

While 61 per cent of all the families pay rent under $35, only 53.1 per cent of the families living in single-family dwellings pay under $35 a month, and 71.8 per cent of the families living in flats pay under $35 a month.

Table II shows that 47.1 per cent of the families in the seventy-three cities listed live in single-family dwellings, 47.7 per cent in two-family houses or flats, and only 5.2 per cent in apartment houses, as that term is here used. In the lowest rental class ($5 to $15) 37.0 per cent of the

[1] See Appendix I, Table VII, pp. 144–145.

[2] See Table I, p. 8.

[3] See Table II, p. 12.

FIGURE 1. PERCENTAGE DISTRIBUTION OF FAMILIES BY RENTALS PAID IN 1930

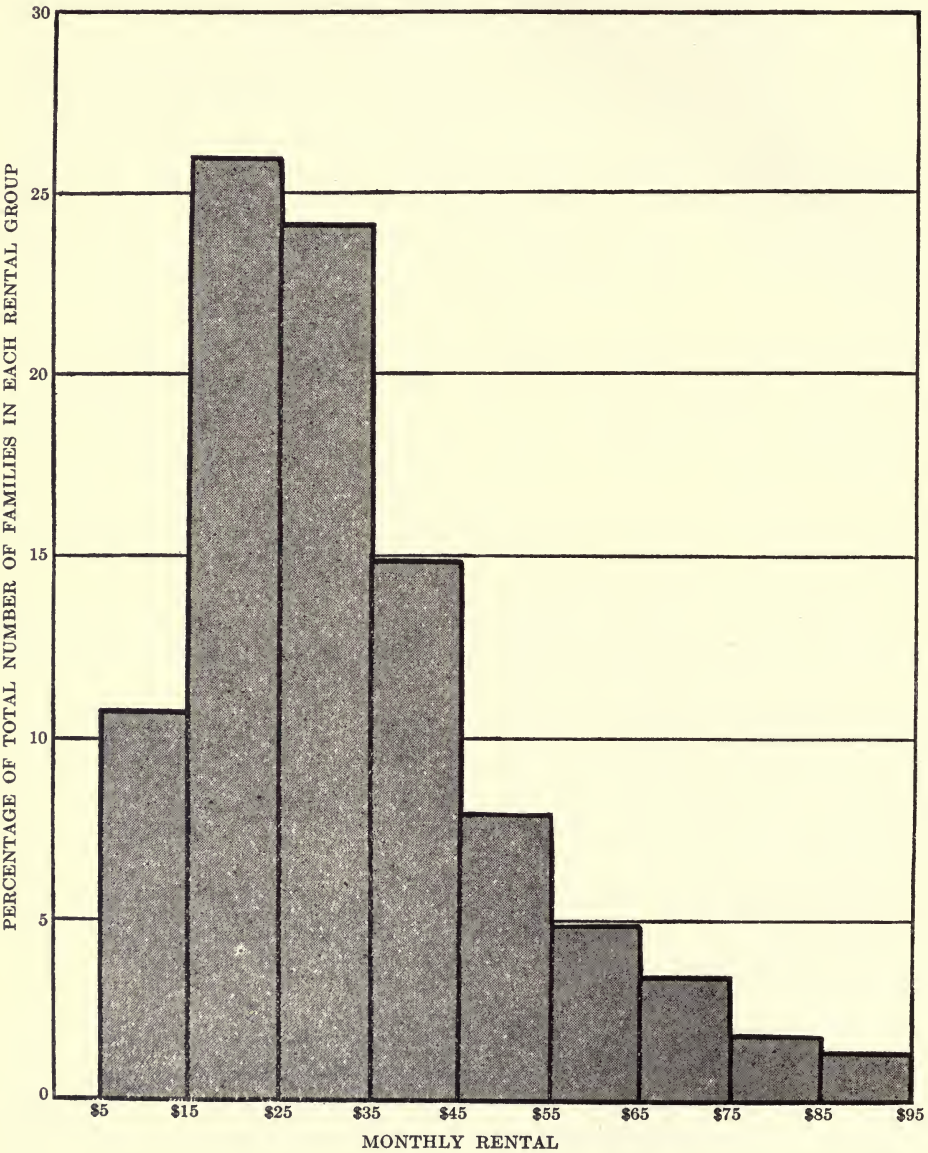


FIGURE 2. CUMULATIVE PERCENTAGE DISTRIBUTION OF FAMILIES BY RENTALS PAID IN 1930

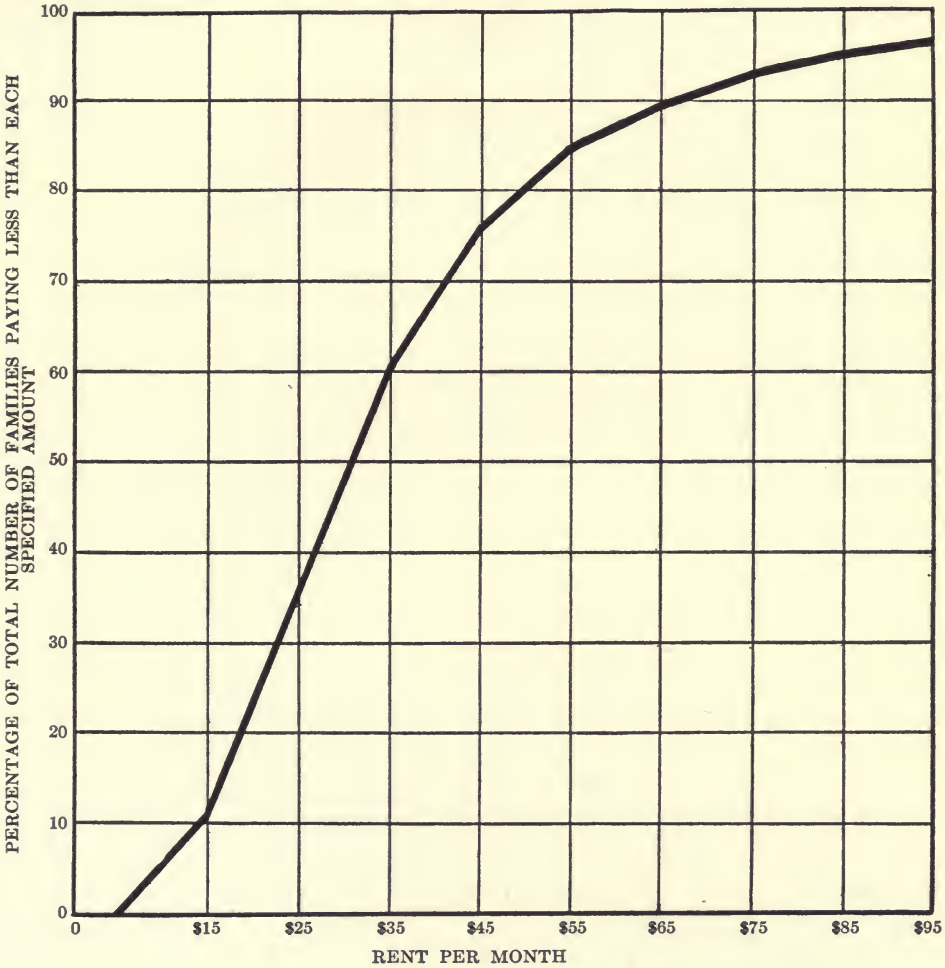


TABLE II

TYPE OF HOUSING OCCUPIED IN 1930

PERCENTAGE OF NUMBER OF FAMILIES IN EACH RENTAL CLASS OCCUPYING SINGLE-FAMILY DWELLINGS, FLATS, OR APARTMENTS AS ESTIMATED FOR 1930. BY GROUPS OF CITIES

GROUPS OF CITIES	PERCENTAGE OF FAMILIES IN EACH TYPE OF HOUSING IN EACH RENTAL GROUP										
	$5.00 to $14.99	$15.00 to $24.99	$25.00 to $34.99	$35.00 to $44.99	$45.00 to $54.99	$55.00 to $64.99	$65.00 to $74.99	$75.00 to $84.99	$85.00 to $94.99	$95.00 and Over	TOTAL
Group I											
Cities of 500,000 and Over											
Single-family Dwellings	28.4	35.7	40.0	42.6	50.8	49.4	50.8	60.2	73.1	80.1	42.3
Flats	71.2	62.7	55.7	50.9	39.6	32.5	33.3	13.3	8.6	4.4	51.5
Apartments	0.4	1.6	4.3	6.5	9.6	18.1	15.9	26.5	18.3	15.5	6.2
All Types	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group II											
Cities of 300,000 to 500,000											
Single-family Dwellings	29.7	36.5	31.1	26.8	27.4	24.7	39.8	41.5	61.6	85.7	33.7
Flats	67.7	61.3	63.2	62.4	52.7	49.5	35.3	33.1	18.5	5.8	54.6
Apartments	2.6	2.2	5.7	10.8	19.9	25.8	24.9	25.4	19.9	8.5	11.7
All Types	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group III											
Cities of 100,000 to 300,000											
Single-family Dwellings	39.7	34.5	37.0	45.3	54.6	58.6	73.3	76.6	86.2	90.4	45.1
Flats	59.9	64.2	58.4	49.6	38.1	29.9	18.0	14.5	6.3	3.2	50.4
Apartments	0.4	1.3	4.6	5.1	7.3	11.5	8.7	8.9	7.5	6.4	4.5
All Types	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group IV											
Cities of 50,000 to 100,000											
Single-family Dwellings	55.3	57.0	57.9	63.6	76.1	78.3	85.8	85.3	93.9	96.7	62.1
Flats	44.3	42.1	39.7	32.3	20.0	15.0	9.2	7.8	4.2	2.9	35.6
Apartments	0.4	0.9	2.4	4.1	3.9	6.7	5.0	6.9	1.9	0.4	2.3
All Types	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group V											
Cities under 50,000											
Single-family Dwellings	67.8	60.1	63.7	68.4	75.3	79.7	71.9	89.2	89.3	96.3	67.0
Flats	31.7	39.3	34.8	28.9	21.4	13.8	13.7	7.6	6.3	3.1	30.9
Apartments	0.5	0.6	1.5	2.7	3.3	6.5	14.4	3.2	4.4	0.6	2.1
All Types	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All Groups											
Single-family Dwellings	37.0	41.2	43.2	46.4	54.0	53.2	59.0	66.8	78.4	84.7	47.1
Flats	62.5	57.5	52.8	47.7	36.9	31.3	26.8	15.4	8.6	4.1	47.7
Apartments	0.5	1.3	4.0	5.9	9.1	15.5	14.2	17.8	13.0	11.2	5.2
All Types	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

families live in single-family dwellings, 62.5 per cent in flats, and 0.5 per cent in apartments.

In population group V, which included twenty cities having a population under 50,000, 67 per cent of the families live in single-family dwellings, 30.9 per cent in flats, and 2.1 per cent in apartments. For the lowest rental class in this group of cities 67.8 per cent live in single-family dwellings, 31.7 per cent in flats, and 0.5 per cent in apartments.

NUMBER AND PER CENT OF FAMILIES PROVIDED FOR IN THE DIFFERENT KINDS OF DWELLINGS IN 257 IDENTICAL CITIES, 1921 TO 1929, INCLUSIVE[1]

Year	Number of Families Provided for in —				Per Cent of Families Provided for in —		
	1-family Dwellings	2-family Dwellings[2]	Multi-family Dwellings[3]	All Classes of Dwellings	1-family Dwellings	2-family Dwellings[2]	Multi-family Dwellings[3]
1921 . .	130,873	38,858	54,814	224,545	58.3	17.3	24.4
1922 . .	179,364	80,252	117,689	377,305	47.5	21.3	31.2
1923 . .	207,632	96,344	149,697	453,673	45.8	21.2	33.0
1924 . .	210,818	95,019	137,082	442,919	47.6	21.5	30.9
1925 . .	226,159	86,145	178,918	491,222	46.0	17.5	36.4
1926 . .	188,074	64,298	209,842	462,214	40.7	13.9	45.4
1927 . .	155,512	54,320	196,263	406,095	38.3	13.4	48.3
1928 . .	136,907	43,098	208,673	388,678	35.2	11.1	53.7
1929 . .	98,202	27,372	118,623	244,197	40.2	11.2	48.6

[1] From the *Monthly Labor Review*, May 1930, p. 137.
[2] Includes 1-family and 2-family dwellings with stores combined.
[3] Includes multi-family dwellings with stores combined.

THE TREND TOWARD MULTI-FAMILY DWELLINGS

The trend toward apartment-house living is very strong. Between 1921 and 1929 the percentage of families provided for in multi-family houses in current new construction doubled. In 1921 multi-family houses accounted for only 24.4 per cent of all families provided for in new houses. In 1929 the proportion of the multi-family houses had increased to 48.6 per cent. During the same period the number of families provided for in two-family houses fell from 17.3 per cent to 11.2 per cent; and the number provided for in single-family dwellings fell from 58.3 per cent to 40.2 per cent. Between 1928 and 1929, however, the percentage of families provided for in single-family dwellings increased from 35.2 per cent to 40.2 per cent, while the number provided for in multi-family

dwellings decreased from 53.7 per cent to 48.6 per cent. The number provided for in two-family dwellings remained practically the same. This may or may not be indicative of a slowing up of the trend toward multi-family dwellings. The above is based on data compiled by the United States Bureau of Labor Statistics for 257 identical cities for the period 1921 to 1929 as shown in the accompanying tabulation.

AVERAGE EXPENDITURE FOR RENT

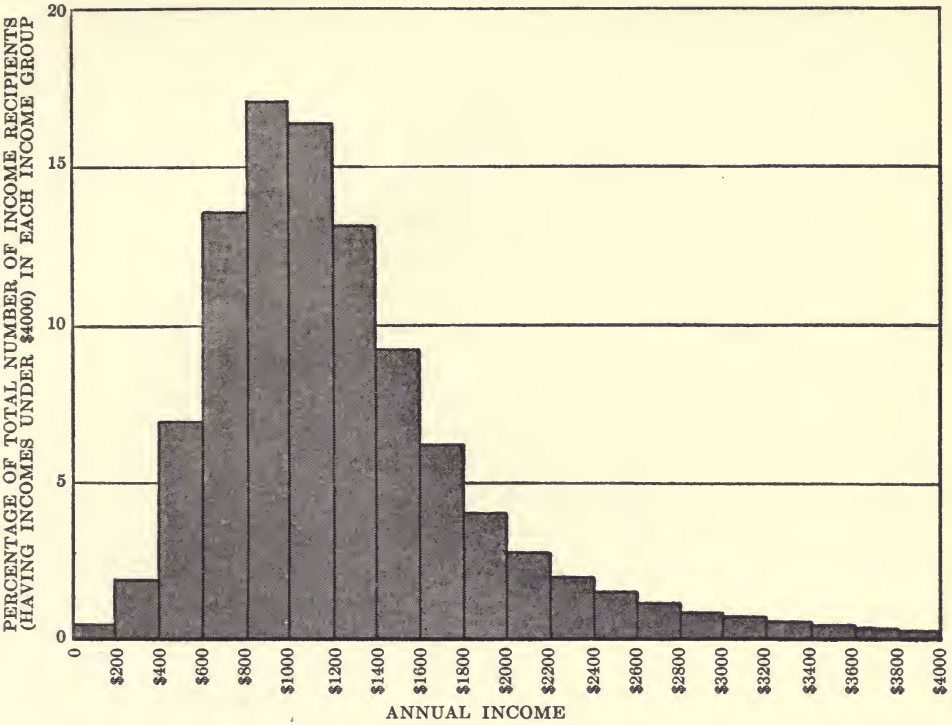
Data as to the average percentage of income spent for rent by the families of lower and medium income are not satisfactory. The United States Bureau of Labor made extensive investigations of family budgets in 1901 and again in 1918. In the cost-of-living index maintained by the Bureau of Labor Statistics, rent or housing is taken as consuming 13.4 per cent of the family income. This is based on the Bureau's cost-of-living study in 1918. On the other hand, the National Industrial Conference Board uses 17.7 as the percentage of the family budget represented by rent; this is based on the cost-of-living study made by the Bureau of Labor Statistics in 1901.

The 13.4 per cent seems quite low, especially if other than industrial workers living in rented homes are considered. Only a small proportion of owned homes seem to have been included. It is believed also that the investigation may not have given sufficient weight to the equivalent home-carrying and maintenance charges of families living in owned homes.

Some recent surveys of a small number of families made by the Bureau of Labor Statistics show a higher per cent for rent of housing. A study was made of the expenditure of 506 families of federal employees in New York, Baltimore, Chicago, and New Orleans having incomes of not over $2500. The average expenditure for housing was 19.3 per cent of the family income. A recent study by the same Bureau of the expenditures of 100 families of the Ford Company employees in Detroit earning an average of $7 per day and spending an average of $1720 a year shows an expenditure of 22.6 per cent of the income for rent or housing.

Numerous recommended budgets have been prepared taking 18 per cent to 20 per cent as the normal expenditure for rent. For the purposes of this study, we are assuming that rent will average 18 per cent of the family income. We are assuming that within the rental range covered by the study the percentage spent for rent will be constant regardless of the size of the income. This seems to be in accord with present

FIGURE 3.[1] ESTIMATED PERCENTAGE DISTRIBUTION OF PERSONAL INCOMES BELOW $4000 IN THE UNITED STATES IN 1918



data and conforms to the so-called Engel law of family expenditure, expounded by the German economist Engel about fifty years ago. Rent as here considered does not include the heating of the house or apartment. For comparison with the heated apartment about 23 per cent instead of 18 per cent should probably be taken.

In assuming that the average percentage of rental to family income is about 18, there is no thought that this percentage does or should hold true in any particular case or in relation to any small group of cases, nor is it a rule that should influence greatly the determination of a budget for a particular family. Each family's needs and wants are so different that this should lead to a different weighting of the rent factor. If 18 is the average, the rent of a particular family should normally vary within 25 per cent above or below this average. Though

[1] Redrawn from figure in "Statistical Methods Applied to Economics and Business" by Frederick Cecil Mills. New York, Henry Holt & Co., 1928, and reproduced by permission.

the ratio of rent to income will vary greatly in particular cases, it is not unreasonable to suppose that for large groups of cases within the same family-income class the average ratio will be found to be quite constant.

FAMILY INCOME AND INVESTMENT PER FAMILY IN HOUSING

Table III [1] shows for the seventy-three cities studied an estimated family-income distribution computed on the theory that rent does on the average consume 18 per cent of the family income.

It is estimated that rentals will average 10 per cent on the value of the leased property. In other words, the investment in housing will average ten times the annual rentals. In Table III is shown the estimated average investment per family in housing for each rental group, and also the percentage of total families occupying housing accommodations in each housing value group. Thus it is estimated that 10.8 per cent of the total number of families occupy premises having an average investment value of $1200; 26 per cent of the families occupy premises having an average value of $2400; 24.2 per cent, an average value of $3600; 14.9 per cent, an average value of $4800; 8.8 per cent, an average value of $6000; 4.9 per cent, an average value of $7200; and only about 5 per cent of the families live in apartments or houses having a value in excess of $10,000 per family. This then is the best estimate that it seems possible to make of the present economic demand for small houses and low-rent apartments. It is only an estimate and should not be taken too seriously, but it is based on a careful analysis of field surveys in seventy-three cities, and while probably faulty in detail, it is believed to be sufficiently reliable in its broader aspects to give a correct general view of the economic demand for housing in the various cost classifications.

Of the total number of families 47.1 per cent live in single-family houses.[2] Of the total number of families living in housing estimated to have an average investment value of $1200, 37 per cent live in single-family dwellings. What sort of houses these are is not known. It is assumed that they must either be small "shacks" on unimproved streets, or very old and very much depreciated houses originally built for a higher-income class.

[1] See Table III, p. 17.

[2] See Table II, p. 12.

TABLE III

ESTIMATED AVERAGE FAMILY INCOME AND AVERAGE INVESTMENT PER FAMILY IN HOUSING FOR EACH RENTAL CLASS

Rental Class	$5.00 to $14.99	$15.00 to $24.99	$25.00 to $34.99	$35.00 to $44.99	$45.00 to $54.99	$55.00 to $64.99	$65.00 to $74.99	$75.00 to $84.99	$85.00 to $94.99	$95.00 and Over	All Classes
Average Annual Rental	$120	$240	$360	$480	$600	$720	$840	$960	$1080	——	——
Estimated Average Family Income	$667	$1333	$2000	$2667	$3333	$4000	$4667	$5333	$6000	——	——
Estimated Average Investment per Family in Housing	$1200	$2400	$3600	$4800	$6000	$7200	$8400	$9600	$10,800	——	——
Percentage of Total Number of Families in Each Rental Class	10.8	26.0	24.2	14.9	8.8	4.9	3.4	1.9	1.3	3.8	100.0
Percentage of Total Number of Families in Each Class plus All Classes Below	10.8	36.8	61.0	75.9	84.7	89.6	93.0	94.9	96.2	100.0	——

TABLE IV

ESTIMATED COST OF NEW SINGLE-FAMILY HOME IN EACH RENTAL OR INCOME CLASS

Rental Class	$5.00 to $14.99	$15.00 to $24.99	$25.00 to $34.99	$35.00 to $44.99	$45.00 to $54.99	$55.00 to $64.99	$65.00 to $74.99	$75.00 to $84.99	$85.00 to $94.99	$95.00 and Over	All Classes
Estimated Average Family Income	$677	$1333	$2000	$2667	$3333	$4000	$4667	$5333	$6000		
Estimated Average Cost of New Single-family Home	(no estimate)	$3066	$4600	$6134	$7666	$9200	$10,734	$12,266	$13,800		
Percentage of Total Single-family Houses in Each Rental Class	8.5	22.6	22.0	14.7	10.2	5.6	4.4	2.7	2.2	7.1	100.0

CHAPTER III

THE PRESENT SITUATION AS TO THE BUILDING OF LOW-COST HOUSES

Are low-cost houses being constructed to supply the wants of the lower-income families? No direct answer can be given. Conditions vary greatly in different cities and in different parts of the country. It is hard even to give an unqualified answer for a particular city. In cities in which no building operator would undertake the building of houses to sell for, say, $4000, there are nevertheless many individuals with slim pocketbooks but with a strong urge to home ownership, who will buy lots and build some sort of house at a total cost for house and lot of less than $4000.

Inquiries were addressed to real estate boards and builders with a request for data as to whether houses were being built in the price group $2500 to $3999 or in the price group $4000 to $4999.

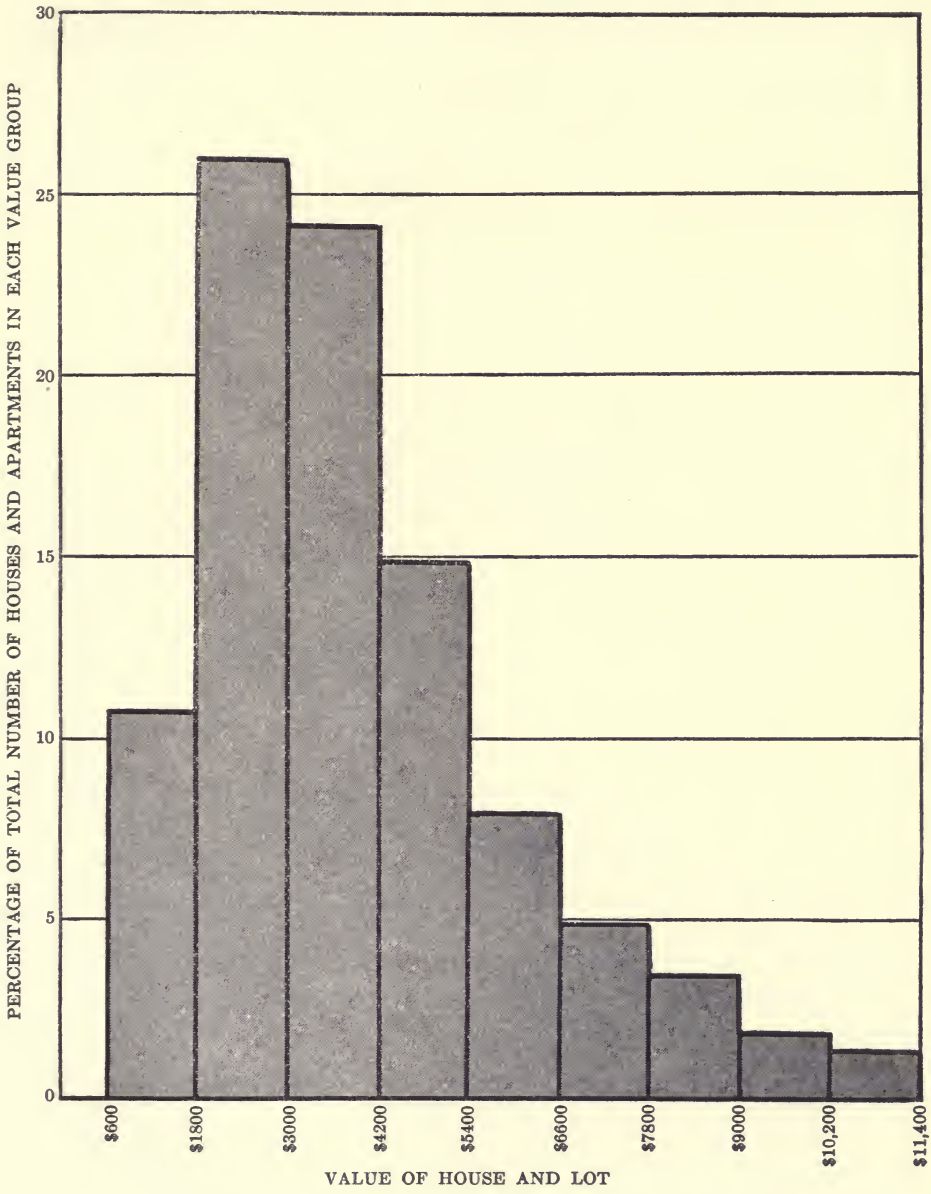
AMOUNT OF BUILDING IN DIFFERENT COST GROUPS

Of the sixty-two cities from which comparable replies were received,[1] 37 per cent reported the building of an appreciable number of houses in the $2500 to $3999 class, 18 per cent reported a few such houses being built, and 45 per cent reported no such houses being built. In the fourteen cities having a population of over 300,000, only 21 per cent reported the building of an appreciable number of houses in the $2500 to $3999 class, 21 per cent reported a few such houses, and 58 per cent reported none being built. In the forty-eight cities in the 30,000 to 300,000 population class, 42 per cent reported $2500 to $3999 houses being built, 16 per cent reported only a few being built, and 42 per cent reported none being built.

Among the cities in which these very-low-cost houses are reported are Berkeley, Calif., Denver, Grand Rapids, Hammond, Ind., Indianapolis, Joliet, Ill., Lincoln, Neb., Los Angeles, Long Beach, Oakland, Calif., Omaha, Pontiac, Portland, Ore., San Diego, Spokane, Tacoma, Springfield, Ohio, Wichita, and Windsor, Ont.

[1] See Appendix I, Table VIII, pp. 146–147.

FIGURE 4. PERCENTAGE VALUE DISTRIBUTION OF HOUSES AND APARTMENTS AS ESTIMATED FOR 1930



Of the sixty-two cities, 66 per cent reported the building of an appreciable number of houses in the $4000 to $4999 class, 16 per cent reported the building of a few such houses, and 18 per cent reported none being built. Of the fourteen cities having a population of over 300,000, 50 per cent reported the building of an appreciable number of houses in the $4000 to $4999 class, 14 per cent reported a few only, and 36 per cent reported none. Of the forty-eight cities in the 30,000 to 300,000 population class, 71 per cent reported $4000 to $4999 houses being built, 17 per cent reported a few only being built, and 12 per cent reported none being built.

Among the cities reporting the building of houses in the $4000 to $4999 class and not included in the above partial list of cities reporting houses in the $2500 to $3999 class are Akron, Baltimore, Dayton, East St. Louis, Fort Wayne, Madison, Wis., Minneapolis, Paterson, Peoria, Ill., Portland, Me., Richmond, Ind., Rochester, Salt Lake City, and Worcester, Mass.

Of the houses in the $2500 to $3999 class many are four- or five-room bungalows with the four-room type in the lead. Of those in the $4000 to $4999 class there are many bungalows but also many two-story houses. They have four, five, or six rooms, with the five-room type tending to predominate.

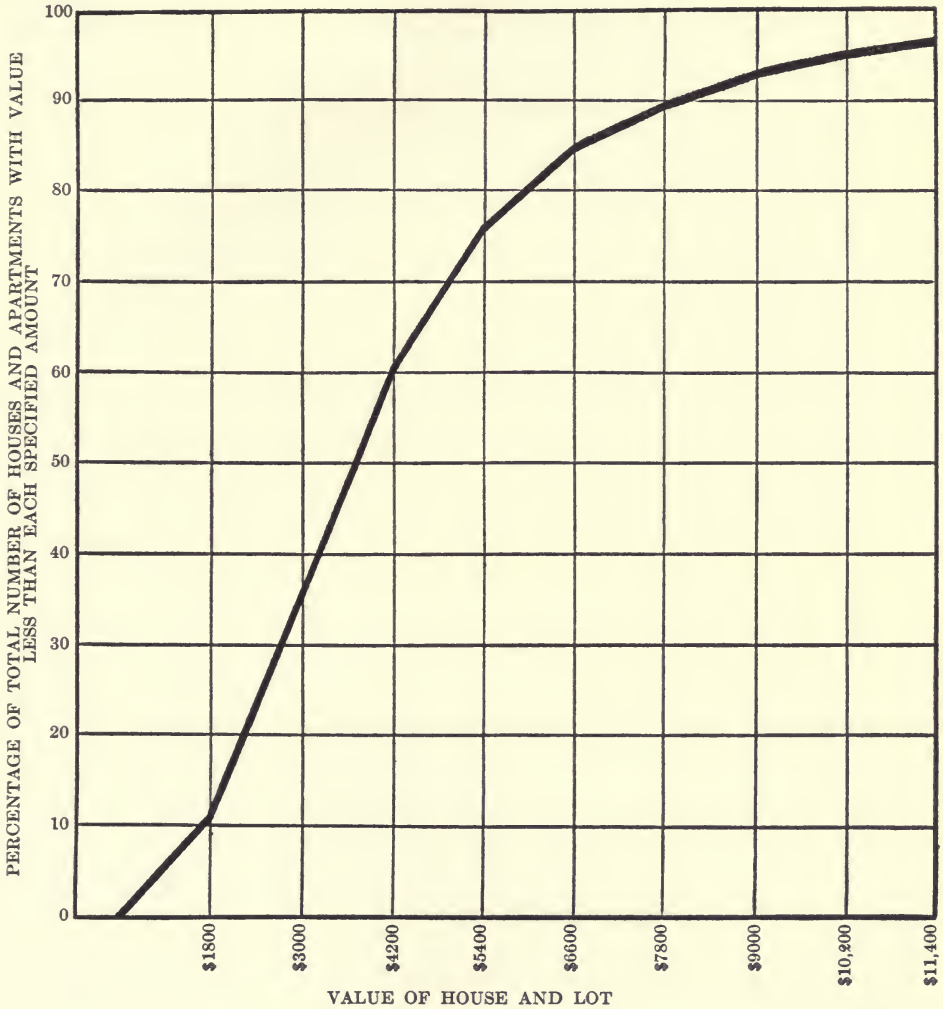
The average lot size for the $2500 to $3999 houses is 41 by 118 feet, and for the $4000 to $4999 houses it is 42 by 116 feet.

STREET IMPROVEMENTS

The houses in the $2500 to $3999 class apparently are being built with very little expenditure for street improvements. In only 18 per cent of the cities is it reported that the streets serving such houses are being fully paved. In 38 per cent partial pavement is reported, while in 44 per cent there is generally no pavement at all in such developments. No information is given as to sewers, but it is fair to assume that in most cases they are altogether lacking, or where they exist the assessments are to be assumed by the purchaser.

Better conditions as to street improvements are reported for the $4000 to $4999 houses. Sewers are reported by 73 per cent of the cities; 10 per cent report some of the houses sewered; and 17 per cent report no sewers. As to paving, 47 per cent report the streets fully paved; 25 per cent report partial paving; and 28 per cent report no paving.

FIGURE 5. CUMULATIVE PERCENTAGE VALUE DISTRIBUTION OF HOUSES AND APARTMENTS AS ESTIMATED FOR 1930



BUILDING SITUATION AS SHOWN BY PERMITS ISSUED

In order to obtain further light on the present situation as to the building of low-cost houses an attempt was made to secure from municipal building officials data as to the number of building permits issued in 1925 and 1929 for single-family dwellings in each cost group. Building permit data are not in general tabulated in such a way that the number of single-family dwellings in each cost group can be obtained. Officials in thirty-six cities, however, made a special analysis and tabulation of data to supply the desired classification for the purposes of this study.[1]

As supplied by the building officials the data relate to house construction costs as stated in the application for a building permit. In most cities the permit fee increases with the cost of the building and at least a rough check of the probable cost is made by the building department to prevent undervaluation. This tends to make undervaluation somewhat difficult and also to make overvaluation expensive. Some undervaluation is, however, probable. A number of officials estimated that undervaluation would average 10 per cent. For the purposes of this study it was necessary to convert the construction cost into an estimated total cost of house and lot. In order to estimate the full value of the house and lot, 14 per cent was first added to the permit value to cover probable undervaluation and overhead, and to the full construction cost of the house as thus estimated 25 per cent was added to cover the estimated cost of the improved lot. This is equivalent to adding 42 per cent to the permit value. This method of converting the permit values to total cost of house and lot values is open to criticism. The addition of 14 per cent for undervaluation and overhead including builder's profit is doubtless low in many cases. On the other hand the addition of 25 per cent to cover the value of the improved lot is undoubtedly high in many cases. In the case of the lowest-cost houses, where the house is located on an unimproved street, the estimated cost of house and lot may be high, but for the other classifications the method followed should give fairly reliable results.

In Table IX[1] both the permit value or construction cost and the corresponding estimated total cost of house and lot are shown at the top of the columns in which are listed the number of houses built. The building permit data and their interpretation as here attempted are doubtless faulty in certain cases, but the general or average results are

[1] See Appendix I, Table IX, p. 148.

believed to be reliable. They check in general and for the most part in detail with the information obtained from other sources.

The building permit data[1] confirm the results as to the building of low-cost houses contained in the replies received from real estate boards and builders in sixty-two cities and analyzed in Table VIII.[2] The building permit data cover but thirty-six cities, and the classifications under which low-cost houses are listed are "under $4260" and "$4260 to $5679" instead of "$2500 to $3999" and "$4000 to $4999." Of the thirty-six cities, 47 per cent show the building of a considerable proportion of houses in the under $4260 class; 20 per cent show a few such houses; and 33 per cent show none or only a few. For the $4260 to $5679 class, 64 per cent of the cities show the building of a considerable proportion of such houses; 24.9 per cent show only a few; and 11.1 per cent show practically none.[3] These percentages are in general close to those shown before (Table VIII) as drawn from the statements of real estate boards and builders. The cities in which the most activity is shown in the building of low-cost houses are Binghamton, N. Y., Canton, O., Fresno, Calif., Indianapolis, Kansas City, Kan., Kokomo, Ind., Lansing, Mich., Los Angeles, Lowell, Mass., Minneapolis, Philadelphia, Portland, Me., Portland, Ore., Richmond, Ind., Rockford, Ill., Saginaw, Mich., Salt Lake City, San Francisco, Springfield, Ill., Springfield, Mass., and Topeka, Kan.

Cities that according to the permit statistics are building few or no single-family houses at a cost for house and lot under $5680 are[2] Cincinnati, Detroit, Lakewood, O., Madison, Wis., New Haven, New York City, Paterson, Peoria, Ill., Schenectady, Troy, N. Y., Washington, and Wilmington, Del.

Other cities in which the building of only few or no single-family houses under $5000 in price is reported by builders are[2]: Altoona, Pa., Buffalo, Cleveland, Elizabeth, N. J., Evanston, Ill., Gary, Ind., Kansas City, Mo., New Bedford, Mass., Pittsburgh, Racine, Wis., and Waterbury, Conn.

HOME OWNERSHIP AND FAMILY INCOME

While the distribution of families according to rentals is probably a fair index of family-income distribution except for the higher-income

[1] See Appendix I, Table IX, p. 148.
[2] See Appendix I, Table VIII, pp. 146–147.
[3] The percentages are computed from an analysis of data contained in Table IX.

families, it is nevertheless difficult to translate the income distribution into demand for single-family houses in the various cost groups. We have little information as to the percentage of income that the home owner pays for housing. Most of the cost-of-living and family budget studies relate to industrial workers living in rented houses or unheated flats.

It is perhaps fair to assume that the family living in a new modern house which it owns pays considerably more in carrying charges and maintenance than a family of similar income living in an old and rented house. Home ownership is prized by many. The advantage of the new, up-to-date house in the new and more socially desirable and attractive location appeals to all. Families are therefore willing to pay more for these advantages. Many also are induced by clever salesmanship, installment buying, and ignorance of future burdens such as loan renewal commissions, taxes, street improvement assessments, and upkeep, to mortgage a much larger proportion of their income than is intended or reasonable.

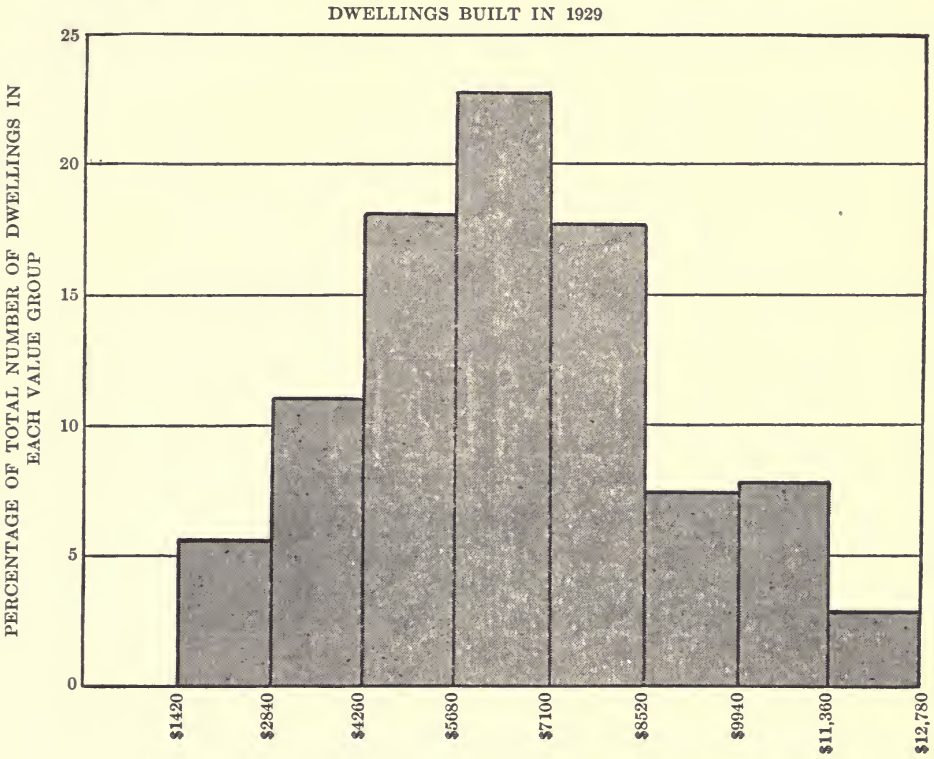
While therefore, as stated in Chapter II, 18 per cent seems a fair average ratio of cost of rental to income, we may perhaps assume that the demand for *new* houses is for the most part created by those who are willing or can be induced to spend an average of somewhat more, or, say, 23 per cent for carrying charges and maintenance. This increase of five points (18 to 23) means an increase of 27 per cent in the housing burden. This is doubtless more than the lower-income families should be required to spend, but it is probably a fair approximation to what is actually happening in so far as *new*, modern, or semimodern homes are concerned.

If now we take from Table I[1] the percentage of single-family-house families in each rental group and from Table III[2] the average family income corresponding to each such rental, and assume that the effective demand for new single-family houses is represented by those families in each income group that do spend about 23 per cent of their income for carrying charges and maintenance, and that the value of the new house will be ten times the annual carrying charge and maintenance cost, we then have the information shown in Table IV.[3]

In Table V[4] the percentage of single-family dwellings constructed in 1929 in each cost class is shown for thirty-six cities. In this table cities

[1] See Table I, p. 8.
[2] See Table III, p. 17.
[3] See Table IV, p. 17.
[4] See Table V, p. 26.

FIGURE 6. PERCENTAGE DISTRIBUTION OF SINGLE-FAMILY DWELLINGS BY ESTIMATED VALUE OF HOUSE AND LOT



showing little or no building of low-cost houses are grouped separately from those showing a considerable amount of building in the lower-cost classifications. The results are summarized.

HOUSING OF THE LOWER-INCOME CLASSES

In some cities where no low-cost houses are erected for sale by building operators, nevertheless the building statistics show permits issued for a considerable number of houses under $3000 in cost. Building officials in a number of cities report that most houses built at a cost under $4000 are built by the owners for their own use. Often they are of temporary character or only partially completed. They are often without modern conveniences. Some have no plumbing, furnace, or electric wiring. Some are erected in outlying areas without any street improvements.

TABLE V

PERCENTAGE OF SINGLE-FAMILY HOUSES BUILT IN 1929 IN EACH COST CLASS

Cost Class	Under $2840	$2840 to $4259	$4260 to $5679	$5680 to $7099	$7100 to $8519	$8520 to $9939	$9940 to $11,359	$11,360 to $12,779	$12,780 and Over	Total
Percentage in 14 Cities showing little Construction in Lower Cost Classes	0.2	1.5	5.6	21.8	22.8	15.2	10.0	7.3	15.6	100.0
Percentage in 22 Cities showing considerable Construction in Lower Cost Classes	8.8	14.6	29.2	22.0	10.0	5.3	3.3	2.0	4.8	100.0
Percentage in all 36 Cities	5.6	11.0	18.1	22.8	17.7	7.3	7.8	2.8	6.9	100.0

TABLE VI

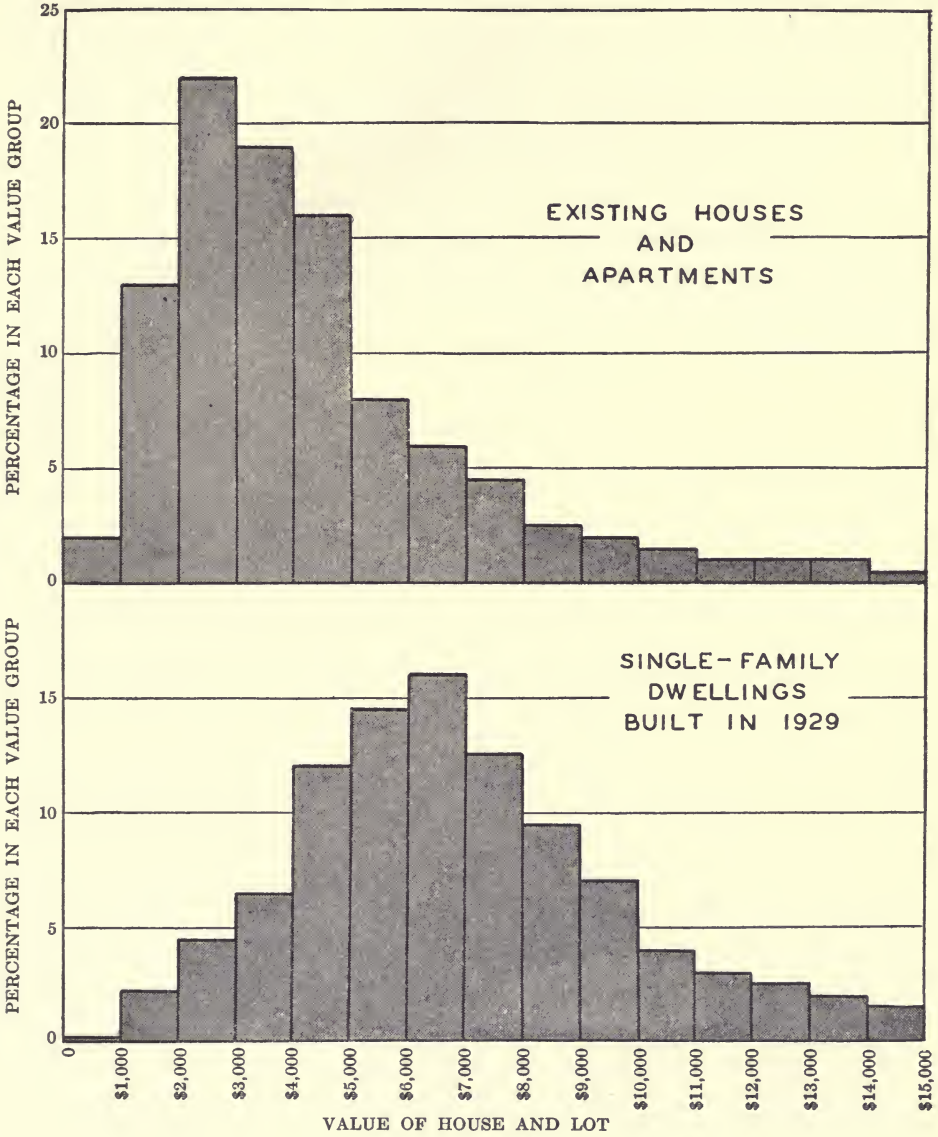
SUMMARY COMPARISON OF DEVELOPMENT SCHEMES

	600×250-ft. Block Fig. 10	920×320-ft. Block Fig. 9	920×480-ft. Block Fig. 11	270-ft. Hexagonal Block Fig. 12	920×920-ft. Block Fig. 13	Neighborhood Unit		Radburn Type	670-ft. Hexagonal Block Fig. 17
						Dwelling-house Section Fig. 14	Apartment Section [1] Fig. 14		
No. of Lots per Gross Acre . . .	6.70	6.55	6.44	6.75	6.85	6.68	9.46	6.63	6.59
Gross Area per Lot, square feet . .	6500.	6646.	6764.	6453.	6357.	6522.	4605.	6570.	6498.
Percentage of Area in Lots . . .	76.9	48.2	46.7	46.3	49.2	48.3	21.1	61.6	47.6
Percentage of Area in Parks . . .	0.0	27.6	27.4	28.7	25.0	27.4	40.6	17.0	36.1
Percentage of Area in Garage Space	0.0	6.2	8.7	6.6	8.3	5.7	8.4	0.0	0.0
Percentage of Area in Streets . .	23.1	18.0	17.2	18.4	17.5	18.6	29.9	21.4 [2]	16.3
Park Area per Lot, square feet . .	0.	1837.	1853.	1857.	1589.	1789.	1871.	1115.	2382.
Cost of Street Improvement per Foot of Lot Width	$11.92	$9.78	$9.06	$9.28	$8.31	$8.29	$14.59	$8.02	$7.85
Cost of Street Improvement per Lot	476.80	391.20	362.40	371.20	332.40	331.60	180.33	360.90	314.00
Cost of Park Improvement per Lot	0.00	92.80	93.60	93.60	80.00	90.40	94.55	56.25	120.00
Cost of Raw Land per Lot . . .	224.00	228.80	232.80	222.00	218.80	224.40	160.43	226.35	227.60
Lot Improvement Costs	360.80	252.60	257.60	242.80	252.00	250.00	78.61	306.00	258.80
Total Cost per Lot	$1327.20	$1208.00	$1183.20	$1162.00	$1104.00	$1120.40	$642.47	$1187.10	$1150.40

[1] Residence areas only (data refer to families or apartments instead of lots).

[2] Includes area of walks between culs-de-sac.

FIGURE 7. COMPARISON OF PERCENTAGE VALUE DISTRIBUTION OF EXISTING HOUSES AND APARTMENTS WITH PERCENTAGE VALUE DISTRIBUTION OF SINGLE-FAMILY DWELLINGS BUILT IN 1929



In a number of cities new low-cost houses of some kind are being built to meet the wants of the lower-income classes. In most cities, however, the housing needs of the lower-income groups are not supplied except in very small part by the construction of new houses. They are either being taken care of in two-family houses and flats or they are using the older, less modern, and more undesirably located single-family houses that have been left by owners able to afford better and more up-to-date quarters. Especially during the past few years there has been a strong drift toward the suburbs. Many families have left their old homes in the more closely built-up parts of the city and moved to newer and more attractive surroundings. This migration has made available many houses for purchase or rental. The larger houses have sometimes been converted into multi-family houses, or used for that purpose without reconstruction.

CHAPTER IV

COST OF ACREAGE WHEN RIPE FOR BUILDING DEVELOPMENT

VALUE OF SUBURBAN LAND

The value of raw land when ripe for subdivision and development is fundamentally dependent on the same general factor that creates land value for other purposes: that is, a capitalization of income or satisfaction derivable from the highest use for which the land is suitable. Elements in the value of a tract of suburban land are:

(1) Value for agricultural purposes.

(2) Value for country estates.

(3) Value for various open development uses, such as golf courses, parks, institutions, airports, heavy industries, etc.

(4) Value for subdivision and sale and use for house sites.

The value of acreage will certainly not be less than its value for open development purposes. If acreage is to be purchased for subdivision into building lots, the cost of the acreage plus the cost of development and marketing cannot normally exceed the total sale value of the building lots. The sale value of the lots in turn, though dependent on many factors, is fixed within certain limits by the economic status of the families that will buy the lots and build homes upon them.

BASIS OF DATA

An investigation was undertaken to determine the acreage values in tracts of land ripe for subdivision and building. Questionnaires were sent to leading subdividers located in northern states east of the Rocky Mountains. Of the questionnaires returned forty-one contained information that could safely be utilized for comparative purposes.[1] These forty-one replies were from twenty-three cities. Ten of these cities from which comparable data were secured had a population over 300,000, and thirteen had populations between 30,000 and 300,000.

[1] See Appendix I, Table X, pp. 149–151.

Information was requested under three different headings:

(1) Acreage suitable for high-cost residence development (cost of house and lot $12,000 and up).

(2) Acreage suitable for medium-cost residence development (cost of house and lot $6000 to $9000).

(3) Acreage suitable for low-cost residence development (cost of house and lot $5000 or less).

Under each of these headings, in addition to the value per acre, information was requested in relation to:

(*a*) Distance of tract from built-up area.

(*b*) Distance from center of city.

(*c*) Distance from transportation line.

(*d*) Availability of water, gas, electricity, and sewers.

ESSENTIALS IN LAND RIPE FOR DEVELOPMENT

It was explained that the tracts for which information was desired were those ripe for immediate large-scale building operations; that the tracts should normally be close to existing built-up areas; and that the extension of water, gas, electricity, and sewer lines should be obtainable without excessive costs. It was stated that the raw-land cost should not be based on "boom period" prices, but on the going prices in periods of normal building activity. It was also explained that the acreage values should, if possible, be based on tracts level enough to be developed without excessive grading, or that an estimate for the cost of rough grading should be added to the acreage cost.

ACREAGE VALUES

In computing average acreage values for the cities listed in Table X,[1] Philadelphia has been omitted. In Philadelphia the acreage value for houses costing $5000 or less is given as $20,000 which is just twenty times the median acreage value for the other cities. It seems, as indicated below, that the raw-land value for low-cost houses in Philadelphia is influenced by the greater density of housing normal to the Philadelphia row-house type.

For tracts suitable for development with houses costing $12,000 or more, the average acreage value for thirty-six tracts located in twenty-one cities was $3146, and the range of value was from $1250 to $6000. The median acreage value for cities of 300,000 and over was $3750; for cities under 300,000, the median value was $2500.

For houses costing $6000 to $9000 the average acreage value for thirty-

[1] See Appendix I, Table X, pp. 149–151.

five tracts located in twenty cities was $1828, the median value $1750, and the range in value was from $900 to $3510. For the cities having a population over 300,000, the median acreage value was $2000; for cities with a population under 300,000, the median acreage value was $1500.

For houses costing $5000 or less, the average acreage value was $1049, the median acreage value, $1000, and the range from $500 to $1900. The same median, $1000, also holds true both for the group of cities under 300,000 and for the group over 300,000.

Confirmation of acreage values as obtained from subdividers and given in Table X is contained in data, secured from thirty-eight builders in twenty-five cities, of houses costing from about $4500 to $7500, as shown in Table XI.[1] It should be noted, however, that while the builders are reporting acreage values for $4500 to $7500 houses, the corresponding data from the subdividers relate to land for $6000 to $9000 houses. For these classes of houses the average acreage value as given by the builders is $1822 and as given by subdividers is $1828. For cities over 300,000, the average acreage value given by the builders is $2455, and as given by the subdividers, $2206. For cities under 300,000, the average acreage value reported by the builders is $1450, and by the subdividers, $1549.

Table VII[2] shows that there is a clear relation between the normal type and cost of house for which a tract is most suitable and the value of the raw land. For each individual city, and for the groups as a whole, the average and median acreage values are more for the $6000 to $9000 class than for the $5000 class, and more for the $12,000 class than for the $6000 to $9000 class. In fact, these median values vary almost proportionately with the average values of the houses for which the tracts are most suitable. For all cities the median acreage value for tracts in the medium-cost class was 1.75 times the median value in the low-cost class; and the median value in the high-cost class was 3 times that in the low-cost class. For cities under 300,000, the median value for tracts in the medium-cost class was 1.5 times the median value in the low-cost class; and the median value in the high-cost class was 2.5 times that in the low-cost class.[3]

The value of acreage is of course dependent on the profit that can be made from its subdivision and sale. This must in turn depend on:

(1) The cost of grading, drainage, and street and lot improvements.
(2) The cost of marketing.
(3) The current sale price of lots of the most suitable kind.

[1] See Appendix I, Table XI, pp. 152–153. [2] See Appendix I, Table VII, pp. 144–145.
[3] See Appendix I, Table X, pp. 149–151.

(4) The number of such lots per gross acre.

The value of the improved residence lot is in general fixed within narrow limits by the value of the typical house for which the lot is most appropriate. As will be shown in Chapter V, the value of the improved lot is usually about 25 per cent of the value of the building, or 20 per cent of the total value of house and lot. Thus a $15,000 house may have a $3000 lot; a $7500 house, a $1500 lot; and a $4000 house, an $800 lot. Unless there is a proportionate increase in the size of the lot, the cost of the improvements, and the overhead, it is reasonable to suppose that the subdivider can afford to pay more for the raw land from which can be produced lots that will sell for $3000, than for the raw land from which can be produced lots that will sell for $800.

As indicated above and shown in Table X,[1] acreage values in tracts suitable for high-cost houses are normally about 2.5 times the values in tracts suitable for low-cost houses; and acreage values in tracts suitable for medium-cost houses are 1.5 times the values in tracts suitable for low-cost houses. These relations are normal, however, only for the usual types of lots in tracts that are ripe for immediate building and adjacent to existing built-up areas. It applies to tracts suitable for lots 40 to 50 feet wide for low- or medium-cost houses, and to tracts suitable for lots 60 to 80 feet wide for high-cost houses. It does not apply to suburban high-cost houses on larger lots or to row houses on 15 × 80-foot lots. The suburban high-cost houses on very large lots will mean lower relative acreage values; and the row houses on very small lots will mean very much higher relative acreage values.

This is illustrated in the case of Philadelphia, where a builder of row houses selling for $5450[2] reports acreage values of $18,500; and a subdivider[1] in the same city reports acreage values in tracts ripe for development with low-cost row houses at $20,000. These values for land suitable for development with medium-cost houses on 35- to 50-foot lots are striking when compared with acreage values of $2000 to $6000 in other cities of over 500,000.

It is evident that for low- and medium-cost houses acreage values in tracts ripe for building tend to increase directly with the housing density customary to a particular city. Smaller lots do not necessarily mean cheaper houses. The development of a district in smaller lots may result in such a great increase in acreage values that the 15-foot lot will cost as much as the former 40-foot lot.

[1] See Appendix I, Table X, pp. 149–151. [2] See Appendix I, Table XI, pp. 152–153.

CHAPTER V

PRESENT PRACTICE AS TO LOT SIZE, IMPROVEMENT COST, AND IMPROVED–LOT COST

Names of builders of low-cost houses were obtained in many cities, particularly in the eastern and north-central states. These names were supplied in most cases by the building superintendent or by the real estate board of the city. A questionnaire was mailed asking particulars as to lot size, raw-land cost, improvement cost, and sale price for a typical small house costing from $3600 to $6500. Information in comparable form was furnished by thirty-eight builders in twenty-five cities.

RESULTS OF QUESTIONNAIRE

Of the twenty-five cities, nine were in the group having a population of more than 300,000 and sixteen in the population group of 50,000 to 300,000. The information is listed and analyzed in Table XI.[1] The data for Philadelphia are for row houses and are not included in the following averages.

The houses concerning which information is given range in cost (house and lot) from $3750 to $7750. The average value is $5688. The average for the nine cities with a population of 100,000 to 300,000 is $5403. Houses selling for $4500 are listed in four cities. In nine cities the houses listed are $6500 or more in price.

The average lot size is 44 by 117 feet and the average number of lots to the gross acre is 6.1. The median lot size is 45 by 120 feet. For the three cities of 500,000 to 1,000,000 the average lot is 38 by 102 feet and there are 7.6 lots to the gross acre. In San Francisco lots 33 by 100 feet are listed; and in Cleveland lots 35 by 100 feet. For the five cities in the 300,000 to 500,000 class, the average lot is 41 by 129 feet. In Chester, Pa., the lots listed are 25 by 120 feet with ten lots to the gross acre; and in Philadelphia the lots are 15 by 78 feet with twenty-six to the gross acre. For the most part, however, the lots listed are 40 feet or more in width and a considerable number are 50 feet in width.

[1] See Appendix I, Table XI, pp. 152–153.

The average value of the improved lot is $1150 and the range in cost is from $500 in Denver to $1800 in San Francisco. The improved lot value averages 20.2 per cent of the price of the house and lot. This ratio of lot cost to cost of house and lot varies from 11.1 per cent to 26.9 per cent, with a tendency to cluster about 20 per cent, except in the large cities. The average lot cost and the average percentage of lot cost to price of house and lot, in each population group, are as follows:

Population Group	Average Lot Value	Percentage Relation of Average Value of Lot to Average Price of House and Lot
500,000–1,000,000	$1683	25.7
300,000– 500,000	1234	21.9
100,000– 300,000	1028	19.0
50,000– 100,000	1023	17.7
All groups	1150	20.2

Street improvements average $437 per house or an average of $9.93 per front foot. This normally includes sewers, grading, sidewalks, and paving of some sort, and in many cases the cost of water mains. In a few cases, however, paving and sewers are omitted. The cost per foot for improvements in the cities over 300,000 in population is $12.28 while in cities of 50,000 to 300,000 it is $8.85 per foot. This is probably largely due to the higher improvement standards maintained by the large cities.

Of the $1150 which is the average cost of the lot, $437 or 38 per cent is for street improvements and $299 or 26 per cent is for the raw land, leaving 36 per cent of the value of the lot for miscellaneous expense and profit.

A questionnaire to subdividers as to lot sizes, improvement costs, and sale prices for typical subdivisions intended for small houses brought returns from twenty-nine subdividers located in twenty-four cities. The results are analyzed in Table XII.[1]

The average lot size reported is 46 by 121 feet, which is very close to that reported by the builders, 44 by 117 feet.[2] Improvement costs reported by the subdividers average $518 a lot, or $11.26 a front foot, as against an average of $437 a lot, or $9.93 a front foot, as reported by the builders.

[1] See Appendix I, Table XII, p. 154.

[2] See Appendix I, Table XI, pp. 152–153.

The average sale price of the lots is $1645 as against an average improved lot cost of $1150 reported by the builders. This is an increase of 43 per cent. It is doubtless partly due to the inclusion of subdivisions intended for somewhat higher-cost houses than those reported by the builders, and also to somewhat higher costs for street improvements. Probably a considerable portion of the difference, however, is due to the cost of marketing and the necessity of earning a separate profit on the production and sale of the lot, while in the case of the subdivider who is also the builder, there is no marketing cost for the lot, as such, and only one profit, — that on the completed house and lot.

In order to check information obtained from other sources as to the normal relation between cost of improved lot and total cost of house and lot, inquiries were sent quite widely to subdividers and real estate board officials. Information was asked also in relation to the size of lot and as to whether sewers were in and streets hard surfaced. The replies received, in so far as they relate to medium-cost houses ($6000 to $9000), are included in Table XIII.[1]

For all cities the average per cent of improved lot cost to total cost of house and lot is 18.1.[1] For cities of 500,000 and over, it is 20.2 per cent. The average lot size for all cities is 49 by 125 feet. The average lot size for cities of 500,000 and over is 42 by 127 feet. The ratio of lot cost to total cost is somewhat higher in the larger cities where the narrower lots prevail. This is doubtless due to higher improvement standards and higher acreage values. An inspection of the separate items in all population classes discloses no correlation between width of lot and ratio of lot cost to total cost.

Further confirmation of the general relations disclosed by the above studies are available through the courtesy of Mr. James Taylor of the United States Department of Commerce. The Department in 1929 made a field study of small-house construction in a selected list of cities throughout the United States. From data supplied by the Department a tabulation[2] has been made for twenty-three detached houses having an average sale price of $5731. The lot size averages 45 by 119 feet. The average lot value is $1103 and the percentage of average lot value to average sale price is 19.3. For five houses located in cities of over 500,000 population, the average sale price is $6318; the lot size, 41 by 102 feet; the average lot value, $1520; and the percentage of lot value to sale price, 24.1. For ten houses in the population group of 100,000

[1] See Appendix I, Table XIII, pp. 155–157. [2] See Appendix I, Table XIV, pp. 158–159.

to 300,000, the averages are: sale price, $5303; lot size, 48 by 131 feet; lot value, $988; and percentage of lot value to sale price, 18.6.

The Department studies also contain data for six row houses having a sale price of from $3990 to $6500, with an average of $5339. These row houses are located in Philadelphia, Camden, Baltimore, and Washington. The average lot size is 15.7 by 90.7 feet; the average lot value, $1044; and the percentage of lot value to sale price, 19.6. It is interesting to note that the lot values for the small lots of the row houses are not lower than those of the lots of approximately three times the size in cities of not over 300,000, though materially lower than the lot values for small houses in cities over 500,000. However, the difference is by no means proportional to the difference in the size of the lot. While, as stated above, in cities of over 500,000 the average lot size is 41 by 102 feet, and the average lot value, $1520, for the row houses the average lot size is 15.7 by 90.7 feet and the average lot value $1044.

For the small house the normal depth of the lot in many cities is 120 to 130 feet. In eastern cities it is often about 100 feet. In cities where the old lot depths were 150 or 165 feet the tendency has been to reduce lot depths in new subdivisions to 120 or 130 feet. In some cities where the normal lot depth for small houses is still 120 or more feet, there is a tendency to reduce to around 100 feet.

The normal width of lot for the low-cost single-family detached house is still 50 feet in many cities. In many cities it is 40 feet, and in others about 45 feet. A few of the large cities have a normal lot width of 30 to 35 feet.

The normal lot density varies from about 5 to the gross acre to about 8 to the gross acre. The average lot density for low-cost houses is about 6 to the gross acre. The net lot area varies from about 4000 square feet to about 6000 square feet, while the gross lot area varies from about 5400 square feet to about 7500 square feet.

COSTS PER FRONT FOOT FOR IMPROVEMENTS

Costs per front foot as given by builders and subdividers for many cities average $10.46. This total is made up of the following items: sewers, $2.38; grading, $1.13; paving, $4.64; curb, $1.11; sidewalk, $1.05; planting strip, $0.15. In addition to the above, twenty-six cities reported an average cost per front foot for water mains of $1.18. The basic data from which these averages are drawn are not strictly comparable. The net result is probably low. Possibly $11.50 or $12.00 a

front foot can be taken as a normal or median figure when all costs, including engineering, are included.

But there are enormous variations in improvement costs due largely to special sewer and drainage problems and to varying municipal standards. Often the municipal standards for sewers are based on the possibility of the dwellings being later replaced by stores and apartments. The character and width of paving are often based not on the traffic of a purely local dwelling-house street, but on its possible use for general traffic. Improvement standards based on these considerations sometimes result in a doubling of the improvement costs normal to a local dwelling-house street. Where this happens the construction of the low-cost house on a 40- to 50-foot lot is made an economic impossibility. The purchaser of the small home who innocently assumes the responsibility of paying the huge assessments and carrying charges for a standard of street improvement that he does not need, finds himself swamped.

In some cities the complaint is voiced that the municipal improvement standards have made the small house uneconomic and the only place such houses can be built is outside the city limits, where the municipal standards do not apply.

The reason for high standards, in a section that is subject to conversion to a more intensive use, is apparent. Such conversion is constantly going on in certain parts of all cities. But it should be possible so to design and restrict neighborhood units that they will not be subject to conversion and change, — at least within the life of the houses and improvements to be installed.

CHAPTER VI

PRESENT SUBDIVISION PRACTICE AND EFFECT OF DENSITY ON ACREAGE VALUES AND ON LOT VALUES

SUBDIVISION PRACTICE

In some communities there is little subdivision of land except in connection with a current demand for sites for actual building operations. In such communities there is no market for residence lots to be held for purely speculative purposes. Much of the subdividing is done by builders who sell completed houses or build on contract with the lot purchaser. Other subdivisions are laid out and sold off either to individuals who expect to build within a short time or to builders who buy for immediate building operations. Of course under such conditions subdivision and building fluctuate sharply with the demand for new homes and this is dependent on growth and business conditions. In good times building is active and in times of depression home building is at a standstill.

The above situation in so far as it relates to building is typical, but in so far as it relates to subdivision is most exceptional. In the typical American city in "boom times" lots are put on the market and sold solely because many people think they can make money on a resale. At such times the demand is almost unlimited and a feverish subdivision activity results. The fever runs its course but the convalescence is long and the after-effects lasting.

Such limited data as are available indicate recurring periods of subdivision activity at intervals of fifteen to twenty years and give some indication of a recurring major period at intervals of thirty-five to fifty years. The most complete statistical study of this subject has been made by Ernest M. Fisher who states: [1]

> It has been said that the subdividing of land for urban uses is in response to a market for the lots created rather than to meet a need for additional urban territory. This tendency had led to periods of

[1] "Real Estate Subdividing Activity and Population Growth in Nine Urban Areas," by Ernest M. Fisher. *Michigan Business Studies*, July, 1928. Our Figure 16, p. 74, is reproduced by permission from this study.

> intense activity in subdividing, characterized by a speculative market, followed by severe market depressions of considerable duration, during which subdividing has been practically at a standstill. . . . It is natural that rapid growth of a city should lead to excessive even though unwarranted optimism regarding its immediate future particularly when there is no statistical or other form of definite measure by which justifiable optimism may be gauged. Such an excessive optimism leads to the platting of excessive areas, many parts of which may wait for years upon the growth of the population and the consequent need for the area in urban uses. . . . The pronounced cyclical movements in the data suggest at once that they are influenced by conditions outside of the subdivision situation itself. The general business cycle is doubtless the most important of these.

Some good occasionally results from excessive subdivision during "boom periods." In Denver the price of lots is lower perhaps than in any other city of similar size, due, it is said, to overexpansion many years ago. The present buyers of home sites are profiting by the losses suffered by the speculators caught in the collapse of the "great boom."

CORRELATION OF SUBDIVISION AND BUILDING

Ideally, land subdivision and house building operations should be closely correlated. There is great economic and social loss where land subdivision and building are as completely divorced as they are in many fast-growing American communities. In periods of rapid expansion the efficient sales organization of the subdivider is able to dispose of lots improved or unimproved to "would be" home owners at prices much in excess of their actual value for building purposes. The worker is often induced to buy on monthly payments a lot costing with street improvement assessments $2000, when half that amount is all that he should pay if he is to have a home within his means. A two thousand dollar lot is appropriate for an eight or ten thousand dollar home. It is entirely out of scale for the five or six thousand dollar home.

Results are usually much better when the subdivider is also the builder. He realizes that the price of the completed house must be such that the monthly carrying charges will not be in excess of ability to pay. This makes it necessary to keep down lot and street improvement costs to a minimum. Of course when times are good and the demand for *new* houses is greater than the supply, the builder is able to dispose of new houses for more than their true or permanent value. In general, however, competition among builders keeps prices down to a reasonable basis

and the excessive sales cost for the lot, as distinct from the completed home, is largely saved.

The realtor who acts as sales agent for a subdivision usually takes 25 per cent of the sale price of the lot as his sale commission. Thus the lot costing $1200 to produce sells for $1600. A large proportion of the money that might go toward the purchase of a home is diverted by high-powered sales methods into the purchase of land and the building of streets in areas not yet ripe for building and into the payment of the costs of expensive sales organizations. If all this money could be devoted to operations and work essential to the actual construction of homes, a marked improvement would result.

HOUSING DENSITY, AND LAND AND LOT VALUES

It is usually assumed that the cost of the lot for the small house can be reduced by decreasing the size and especially the width of the lot. This will mean more lots to the gross acre and usually a reduction in the improvement cost. As applied to a particular plot of land it will undoubtedly result in economy in the production cost of the lot and this will correspondingly decrease the cost of the completed house and lot. In a given case with a given cost for the raw land, an increase in the number of houses to the gross acre may be the only solution to the problem of providing houses at a given cost.

On the other hand if the problem is not that of the individual tract of land but that of determining the normal size of lot for the low-cost houses of a city or state, it is not at all clear that a reduction in the normal width of the lot, say, from 45 feet to 30 feet, will produce any reduction in the cost at which the small house can be produced and sold.

An almost certain result of an increased normal density is an increase in the value of the raw land. The value of raw land suitable for subdivision for the building of small homes will tend to vary directly with the number of such houses to the gross acre normal in the community. This increase in raw land value may not be sufficient to take up all the economy due to the smaller lot — a small part may be shared by the subdivider and a small part by the builder; but the part that actually sifts through to the home owner is usually so small as to be negligible.

It is much easier to increase housing density than to lower it. With the density customary and normal to low-cost houses in a community there is a corresponding level of raw-land values. To decrease the density without an increase in the cost of the lot will usually require a decrease

in the prevailing acreage values. Such a decrease in acreage values will tend eventually to result, provided the lower density is consistently enforced. The adjustment, however, is likely to be very difficult and trying for all concerned.

On the other hand a change to greater density is easy and insidious. It starts usually with a sharing of the benefits from the economy of the smaller lot between the builder and the home owner, and ends when the smaller lot becomes the normal type with a more or less complete capitalization of the saving effected by the smaller lot in the price that must be paid for raw land.

The normal lot width for the small low-cost house varies greatly in different communities. In Philadelphia it is 14 to 16 feet for the row house; in Chicago, 30 feet for the detached house; in Denver, 37½ feet; in many cities, 40 feet, and in many other cities 50 feet. There does not seem to be any close correlation between the size of the lot and the cost of the lot. In fact, for a low-cost house *of a given value*, the normal value of the improved lot appears not to vary greatly whether the width is 14, 25, 30, 40, or 50 feet.

We find that the small 14-foot lot in Philadelphia and the small 30-foot lot in and around Chicago cost about as much as the 40- or 45-foot lot in other cities. Is this due to the higher land values or are the higher land values due to the greater housing density? This question cannot be answered satisfactorily from data at hand. It seems, however, that the amount of money that will be paid for the lot for the low-cost house is rather closely limited to a sum between one-fifth and one-third of the construction cost of the house. The total cost of the house and lot is limited by the incomes of those who are to buy or rent it. The construction cost being fixed and the improved lot cost being roughly limited between one-fifth and one-third of the construction cost, the only way to increase the amount available for land is to decrease the cost of street improvements and the lot overhead by reducing the width of the lot. In other words in a given case there is just about so much money that can be expended for the improved lot.

Assuming that lot sizes normal in the community will permit but six houses to the gross acre and that the normal cost of the improved lot for a $6000 house is $1200, then if the cost for street improvements is $600, and the lot overhead $400, the cost of the raw land cannot exceed $200 per lot or $1200 (6 times 200) per gross acre. Assuming the above conditions, but with narrower lots and ten houses to the gross acre, then if the

cost for street improvements is $450 and the lot overhead $300, the cost of the raw land may be $450 (1200 minus 750) per lot or $4500 (10 times 450) per gross acre. While if the customary development is a row house on 15-foot lots with twenty-six houses to the gross acre, then if the cost for street improvements is $300 and the lot overhead $200, the cost of the land may be $700 (1200 minus 500) per lot or $18,200 (26 times 700) per gross acre.

The tendency in any normal type of medium-cost housing will be for the cost of the improved lot to equal from one-sixth to one-fourth of the cost of land and building. With new and denser housing modes acreage and lot values will tend upward until somewhere within this range of ratio of improved lot to total cost a balance between conflicting requirements is found.

CHAPTER VII

REQUIREMENTS FOR LIGHT, AIR, AND OPEN SPACE

SPACE, FRONT AND REAR

Aside from the special needs of outdoor recreation there are several factors that largely influence the most desirable spacing and orientation of dwellings. They are, somewhat in the order of their importance, as follows:

(1) The access of light.
(2) The access of air.
(3) The access of direct sunlight.
(4) The access of the prevailing summer breeze.
(5) Space for trees and vegetation.
(6) The securing of an appropriate setting for the building and of interesting views from the windows of the building.

The last factor, setting and view, is not amenable to standardization and not readily controllable.

The other five factors are usually fairly well provided for in the typical suburban subdivision of good-to-medium class. The most important single element in maintaining a fair standard of light, air, sunlight, breeze, and vegetation is that there should be a minimum ratio between height of dwelling and width of open space, front and rear. In practice this minimum ratio in acceptable developments is roughly 1 to $2\frac{1}{2}$ or 1 to 3. For example, a typical small-house development will have 50-foot streets with the houses about 25 feet in height and set back about 15 feet from the street line, thus giving a spacing of 80 feet between houses, front to front. With lots 100 feet deep and houses 30 feet deep, there is a space of 110 feet between houses back to back. This gives a ratio of height to open space of over 1 to 3 in the front and of over 1 to 4 in the back. For larger two-and-one-half- and three-story houses with a height of 30 to 35 feet and a front yard 25 feet deep, the normal distance between houses front to front is about 100 feet or slightly less than a ratio of 1 to 3; the lots are normally about 120 feet deep and this leaves a space, back to back, of about 110 feet.

For the small one- or two-story house 70 to 80 feet between buildings, and for the larger two-and-one-half- and three-story house, 90 to 100 feet between buildings seem just about to fit reasonable requirements for light, air, and vegetation. These distances maintain an angle of light of 18.5° to 20°. This angle of light assures the possibility of good light in the building, front and rear, no matter how the streets are oriented. It permits a free circulation of air and, providing the house is oriented toward the prevailing summer breeze, the best possible through-ventilation. Moreover, good direct sunlight is assured to the windows both front and rear if located on a north and south street and to all the south windows if located on an east and west street. In fact, in any orientation direct sunlight will be received on one or both façades throughout the year in any latitude up to about 48° North. At 48° the sun at noon at the winter solstice is just 18.5° above the horizon, and the length of a shadow cast by a building is approximately three times the height of the building. A 1 to 3 ratio is, therefore, no more than is necessary to secure sunlight on the entire south façade of a building at noon at the winter solstice at 48° North Latitude. Seattle, Paris, and Vienna are not far distant from the 48th parallel.

New York City, Pittsburgh, Cleveland, Chicago, Omaha, and Salt Lake City are not far distant from the 41st parallel. In that latitude the sun at noon at the winter solstice is 25.5° above the horizon and the length of a shadow cast by a building is about twice the height of the building. Therefore, if in the case of dwellings on east-west streets the distance front and rear between buildings is kept at two-and-one-half to three times the height, sunshine will not only reach the entire south façade of each building, but will also flood a considerable portion of the open space between the buildings. This will insure sunlight for the sidewalk on the north side of the east-west street. South of about 35° North Latitude the sun is so high above the horizon that a ratio of 1 to 2 is adequate to secure sunshine during the winter months. Nevertheless for the purpose of securing access of air and through-ventilation during the hot months, the 1 to 2½ or 1 to 3 ratio is to be preferred.

Considering the requirements for light and air only, the width of the open space between houses front and rear should be two-and-one-half to three times the height of the house. The minimum depth of the lot should, therefore, depend on the height of the houses, the width of the street, and whether the lots are arranged back to back as in the ordinary block. At least 70 feet front and rear between houses will be required

for the two-story house and 80 to 100 feet for the two-and-one-half- or three-story house. Where, however, the house has the required open space on its front and on one side (as in the case of a corner house) the rear space may be governed by the requirements of the side yard in so far as access of light and air is concerned.

SIDE YARDS

The question of minimum width of the side yard for a dwelling, detached or semidetached, needs to be considered separately from that of width of open space, front and rear. For the dwelling only two rooms deep the distinctive purpose of the side yard is that of affording access to the rear yard, reducing the fire hazard, and giving an appropriate setting to the building. It also supplements the front and rear open spaces in giving opportunity for light, air, sunshine, prevailing summer breeze, and vegetation. Assuming adequate front and rear open spaces and assuming that the dwellings are not more than two rooms deep or more than two stories in height, a side open space between dwellings of about 10 feet seems reasonable as a minimum requirement.

If, however, the dwelling is three rooms deep, the side space should not be less than the height of the building above the window sill on the first floor. In other words, a window in a room lighted solely from the side yard should be insured a 45°-angle of light. This will require a space between buildings of from 10 to 30 feet, depending on height. For a one-story bungalow the side yard should be not less than 10 feet. For a two-story dwelling the side yard should be from 16 to 20 feet.

Under the above standards, taking into consideration access of light and air only, a small one-story detached house 20 feet in width can be built on a 30-foot lot; a small two-story house, on a 40- to 50-foot lot; and a small two-and-one-half-story house, on a 50- to 60-foot lot. A double house two stories in height would require a 60- to 70-foot lot.

SPACE FOR THE GARAGE

Even for low-cost housing, space for the storage of the family car is almost as essential as space for the house itself. The installment plan and the second-hand car make the necessary original outlay for car ownership almost negligible.

The usual space for the garage is in the rear yard where it takes up considerable room, decreases the value of the rear yard for other purposes, and is very unsightly. More economical of space and often more

desirable in other ways is the building of the garage as a part of or attached to the house. Another method is the segregation of all the garages in an interior-block garage space. Attached to the side of the house the garage will occupy 10 feet in width of the side yard space. Located in the rear of the lot the garage with its approach will occupy about 10 feet of the width and 20 feet of the depth of the lot in addition to the area taken by the driveway. Segregated in an interior block community garage space it will occupy together with its approach a space 10 feet by about 35 feet.

SPACE FOR HOME PLAY AND FOR GRASS AND TREES

Even with adequate playgrounds located within a quarter of a mile of each house, the street will still be the place for short-time, near-by play, unless on-the-lot or interior-block play space is provided. Such near-by space is especially needed for the children of pre-school age. It should be available also for the short-time, out-of-door needs of the children of school age and of adults.

Space adjoining the house is also needed for grass, trees, and other growing things, and also to give opportunity just to be out-of-doors amid agreeable surroundings.

Space for all the above purposes may be provided on each lot; but for the low- or medium-cost house it can probably be provided more economically and effectively in an interior-block play-park arranged for the common use of all the houses in the block. The amount of space desirable for the interior-block play-park cannot be stated precisely in terms of space per family or in terms of minimum length or width. It should be large enough to allow a border of planting and to provide an interior greensward having a minimum width of possibly 50 feet. However, 150 or 200 feet is obviously better.

SPACE IN CONNECTION WITH APARTMENT HOUSES

The above space requirements have been stated with reference chiefly to small detached single-family houses, but the principles apply as well to the small or suburban apartment house. The buildings should be but two rooms deep and each apartment should be a through apartment. The space between buildings front and rear should be two and one-half to three times the height of the building. The interior-block play-park should be not less than 200 feet in width.

CHAPTER VIII

PLANNING AS AFFECTING IMPROVEMENT COSTS AND COMMUNITY VALUES

ECONOMY IN STREET LENGTH IN RELATION TO LOT FRONTAGE

In the normal residential subdivision with the normal rectangular street pattern and the blocks 600 feet between cross streets the cost for street improvements (grading, sidewalks, sewers, paving, etc.) is 50 per cent or more in excess of the unit cost per foot of lot width. This increase is due to the cost of these improvements within street intersections and along the side frontages of corner lots.

Every rectangular block must have an improvement length in excess of the sum of the lot widths within the block. There are, first, the four intersections. With 50-foot bounding streets each of these four intersections adds 50 feet to the length of street utilities or a total of 200 feet for the four corners of the block. Then there are four corner lots each of which has a side frontage. The deeper the lot the greater the length of this side frontage. With lots 100 feet deep, there are in each block four 100-foot side frontages or 400 feet. This with the 200 feet in the intersections makes a total of 600 feet of excess improvement for each block. With 125-foot lots this total is increased to 700 feet and with 150-foot lots to 800 feet.

In the ordinary block 600 feet long with lots 125 feet deep there are 1900 feet of street improvement length and 1200 feet of lot-width frontage, or in other words 1.58 feet of street improvements for every one foot of lot width. If the street improvement costs are spread evenly over the principal lot frontages each lot will have to pay 58 per cent in excess of the cost of the improvements directly in front of it.[1]

If the lots are deeper or if the block length is reduced, this ratio of improvement length to lot-width frontage increases. If the lots are made shallower or the blocks longer, the ratio is decreased. In other words the ratio of improvement length to lot-width frontage varies directly with the depth of the lots and inversely with the length of the

[1] See Figure 8, p. 49.

block. It also varies directly with the width of the streets bounding the block.

The term "improvement ratio" will be used in the following discussion to indicate the ratio between street length and the sum of the widths of the lots located on one side of the street. In the case of a normal block it is assumed that the length of the bounding streets measured along their center lines is identical with the length of the improvements, one-half the cost of which will have to be borne by the lots in the block. The other half of the cost will be borne by lots on the other side of the bounding streets in adjoining blocks. In this case, therefore, the improvement ratio is the length of the bounding streets measured along their center lines divided by the sum of the lot widths within the block. In case, however, we are considering the improvement ratio not of a simple block but of a large block containing culs-de-sac or of an area including several blocks, to make the figures comparable with figures obtained as above stated we will have to double the street length, if we are including the lots on both sides of the street. Thus in a block with a single cul-de-sac lane the improvement ratio would be obtained by taking the length of the bounding streets plus *twice* the length of the cul-de-sac divided by the sum of all the lot widths.

The improvement ratio as here used is a rough method of measuring the comparative economy in street improvement costs of different street and block layouts. It is not conclusive as there are various ways in which economies in utility design may be effected. In assuming a uniform improvement cost based on length of improvements, the possibilities of economizing on end-street utilities or on cul-de-sac lanes are alike disregarded. Moreover, the method used in measuring the improvement length is open to some criticism. It is not quite accurate to include 50 feet as the improvement length at each of the four corners of the rectangular block having 50-foot bounding streets, since this includes 25 feet in the two bounding streets only when measured along the center line of each street. This method is therefore sufficiently accurate for the subsurface structures laid near the center line, but is a partial duplication for curb, sidewalk, and pavement. If the pavement is 27 feet wide, the length of pavement within the intersection is not 50 feet but 36.5 feet.

All this shows that however useful the improvement ratio may be as a rough test, an accurate comparison of street improvement cost must be based on a detailed plan, showing utility locations, sizes, and depths, and pavement widths and types.

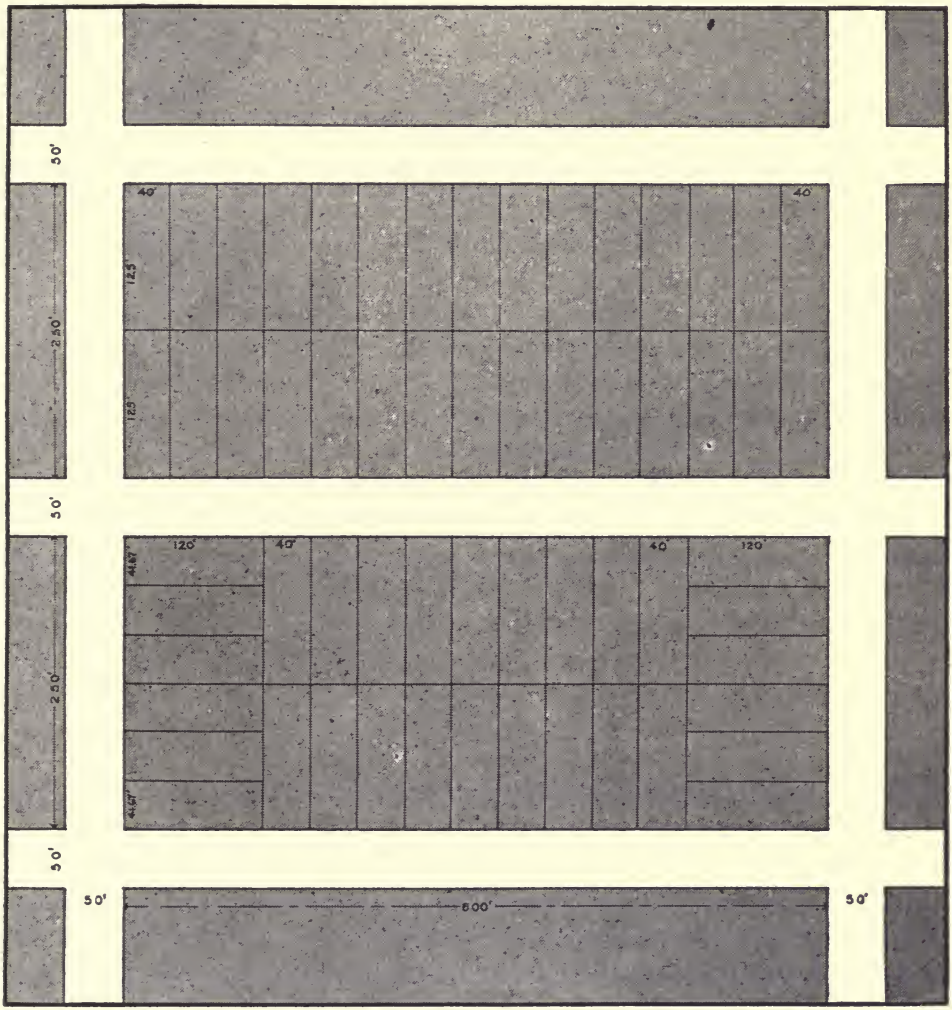


FIGURE 8. THE NORMAL 600 × 250-FOOT BLOCK

Two methods of arranging the lots in the normal block.

THE SQUARE, THE HEXAGON, AND THE CIRCLE

A rough measure of layout efficiency with reference to street improvement costs is the ratio of street improvement length to the sum of the lot widths and not the relation of perimeter length of block to included area.

The perimeter of a square is shorter than the perimeter of any other rectangle of equal area. The perimeter of a square, however, equals 1.128 times the perimeter of a circle of equal area and 1.075 times that of a hexagon. It might be assumed that the cost of street improvements per lot would therefore be less for a circle than for a hexagon, and for the hexagon less than for the square, and for the square less than for any other rectangle of equal area. This, however, is not necessarily true. For example, an area of 360,000 square feet may be included in a square 600 feet on a side or in a rectangle 900 feet long by 400 feet wide. The square will have a 2400-foot perimeter and will give frontage for 40 lots, each 50 by 100 feet. The 900 × 400-foot rectangle will have a 2600-foot perimeter but it will have 44 instead of 40 lots. The improvement ratio will be 1.27 in this case as against 1.30 in the case of the square block. If, however, the square is made large enough so that a number of interior block lots can be given frontage by the use of culs-de-sac as shown in Figure 13,[1] the improvement ratio may be bettered in comparison with that of a rectangular block of equal area.

The hexagon, as shown in Figure 12,[2] has a good improvement ratio. Though it has six corners instead of four, each encloses a 120° angle instead of a 90° angle; and it is possible to utilize the corner frontage so that the excess improvement length will be less for the six corners of the hexagon than for the four corners of the rectangle.

METHODS OF BETTERING THE IMPROVEMENT RATIO

The improvement length per lot can be reduced in various ways:

(1) By reducing the width of the bounding streets.
(2) By increasing the length of the block.
(3) By increasing the width of the block and fronting lots on the cross street.
(4) By reducing the depth of the lot.
(5) By using the cul-de-sac to give access to lots in the interior of a large block.

[1] See Figure 13, p. 65.

[2] See Figure 12, p. 63.

1. REDUCTION OF WIDTH OF BOUNDING STREETS

The lot and block lengths remaining the same, the improvement ratio (improvement length divided by the sum of the lot widths) will be affected slightly by increasing or decreasing the width of the bounding streets. In many municipalities the local residence streets are normally 50 feet in width. This width might by special planning be reduced for minor streets but in general it is not practical with the normal rectangular layout to reduce below the 50-foot width.

2. INCREASING THE LENGTH OF THE BLOCK

The street width and lot depth and block width remaining constant the improvement ratio will be reduced as the block length is increased. If the ratio is 1 to 5 for the 600-foot block it will be 1 to 25 for a 1200-foot block. The improvement length instead of being 50 per cent in excess of the lot width frontage will be but 25 per cent in excess. By doubling the length of the block the excess percentage is reduced one-half.

With the general use of the motor vehicle, the considerations that led to the acceptance of the 600-foot block as suitable in residence sections are changed. The 800- or even the 1200-foot block is not unduly inconvenient for the motor vehicle. For the pedestrian 1200 feet is certainly excessive unless a footpath is provided about midway across the block.

Increasing the length of the block offers an effective and obvious method both of reducing the cost of street improvements and of effecting a saving in the use of land for street purposes. Its importance has been fully illustrated and emphasized by Mr. Henry Wright.[1]

3. INCREASING THE WIDTH OF THE BLOCK

The street width, lot depth, and block length remaining constant the improvement ratio can be reduced by increasing the width of the block, thus creating additional lot frontage along the ends of the block without increasing the amount of excess improvement length at the four corners. In proportion as the total lot width frontage in the block is increased, the improvement ratio is reduced.

Increasing the block width while maintaining the same lot depth will result in a long rectangular interior block open space without street frontage. If this interior block space can be utilized effectively for more lots by means of a cul-de-sac lane, for a community play-park, or

[1] See " Some Principles Relating to the Economics of Land Subdivision," Paper No. 1, 1930 series, American City Planning Institute.

for a community garage space, the broader block may have a distinct economic or community value.

4. REDUCING THE DEPTH OF THE LOT

Other factors remaining constant the improvement ratio can be reduced by decreasing the depth of the lot. This will directly decrease the length of side lot frontage. The depth of the lot is normally responsible for two-thirds or more of the total excess improvement length. In the 300 × 600-foot block with lots 150 feet in depth the improvement ratio is 1 to 66. In the 200 × 600-foot block with lots 100 feet deep the improvement ratio is 1 to 50. In the 250 × 600-foot block with lots 125 feet deep the improvement ratio is 1 to 58.

Garage space is now a necessity in connection with even the smallest house and this tends to fix 100 feet as about the limit below which it is not feasible to reduce lot depths in the ordinary lot and block layout.

If space for the garage can be found elsewhere than in the rear of the lot, it will be entirely practical, in so far as this factor is concerned, to reduce the lot depth for the small house to 80 feet or even less.

Space in the rear yard is also useful to a limited extent for play and recreation purposes. It gives a sun yard and space for little children's play.

By broadening the block and shortening the lot, a large interior-block space can be created that may be used in part as a block play-park and in part for a community garage group.

5. THE USE OF THE CUL-DE-SAC TO GIVE ACCESS TO LOTS IN THE INTERIOR OF A LARGE BLOCK

The very wide and long block gives a low improvement ratio but creates a large central area that, if not required for garage or play-park space, will be wasted unless it can be given street frontage and be divided into lots. This can often be done quite economically by the use of the cul-de-sac.

First let us consider the improvement ratio of the cul-de-sac itself. The cul-de-sac has two corners with the resulting side-lot frontage and street intersection improvement costs. With a 50-foot boundary street, a 40-foot wide cul-de-sac, and an 80-foot lot depth, the amount of excess improvement length is 250 feet. This consists of 200 feet of boundary street and 50 feet (2 × 25) for the intersection. The 200 feet of boundary street should be increased by 10 to 25 per cent depending on the improvement ratio for the frontage on the boundary streets. As a partial offset to this excess frontage the cul-de-sac will have at its far

end three or four lots that do not require frontage. In general, unless the cul-de-sac creates 600 feet or more of lot frontage it will not be advantageous in keeping down the improvement ratio for the block as a whole. To secure any considerable economy in improvement cost the lane of the cul-de-sac should be at least 240 feet long, and for convenience of access to the houses, the lane should probably not exceed 360 to 400 feet in length.

Though the cul-de-sac, unless about 240 feet in length, is not particularly economical in its improvement costs, it is a method by which the very large block can be utilized with greatly reduced improvement costs as compared with a number of ordinary-size blocks of equal area and furnishing the same total of lot frontage and the same number of lots per gross acre.

The improvement ratio for the cul-de-sac cannot properly be considered by itself. The entire block is a unit. The lots in the cul-de-sac have to bear their proportion of the excess improvement length created at the four corners of the block as well as at the two corners of the cul-de-sac.

ADVANTAGE OF NORMAL BLOCK FOR SEWER LAYOUT

The ordinary block layout with lots fronting on the streets on the long side of the block only has certain advantages in the economical design of sanitary sewer lines. If the natural slope of the ground is parallel with the block length, the sanitary sewers will not have to be laid in the end streets, thus saving considerable length of sewer as compared with the larger block with houses facing on all sides. The culs-de-sac also complicate the sewer problem for both sanitary and storm sewers. The sanitary sewer serving the cul-de-sac must have a minimum grade of about one per cent and this sometimes increases the depth and cost of the sewers throughout the area.

THE INTERIOR-BLOCK COMMUNITY GARAGE

The private garage located on the rear of the lot takes yard space that might advantageously be used for garden purposes. The unsightly garage rows are a great injury to the amenity of the neighborhood. The cost of constructing garage driveways on each lot 80 feet or more in length seems a foolish waste. It will add immensely to the appearance of the block as well as effect a considerable saving in driveway cost to segregate the garages in well planned clusters in the interior-block open space created by widening the block and shortening the lots.

Where the lot for the small house is laid out 125 feet in depth in order to provide space for the garage, it would be possible to reduce the lot depth to 100 or even to 80 feet if the garage could be provided for elsewhere. This reduction in lot depth will afford a substantial saving in street improvement costs. Where lots are 125 feet in depth there is a total of 500 feet of street length on the sides of corner lots that must be paid for by the lots in the block. By reducing the lot depth to 80 feet, this 500 feet of side lot frontage is reduced to 320 feet. The saving in street improvement cost, plus the saving in driveway cost and plus the saving in lot area, taken together make possible a much improved block and lot layout with interior-block play-parks and community garages at no increased cost to the small-home owners.

THE INTERIOR-BLOCK PLAY-PARK

The large block with a large interior play-park has advantages over the normal block and lot layout for a small-house development. The block play-park can be used by small children, by children of school age, and by grown-ups. It should have tennis and handball courts maintained by a block club. It will supply the demand for near-by, short-time recreation, but it is not intended to take the place of the more efficiently supervised and more intensively utilized school playgrounds and athletic fields. It will take the place of the street in front of the house and of the small and cluttered yard in the rear of the house as the place for "home" play.

The interior-block play-park should be large enough so that its edges can be attractively planted. This will keep the play space farther from the houses and give each house a pleasant park-like outlook.

The question of maintenance offers the chief problem in connection with the interior-block play-park. Past experience with such parks has not in general been satisfactory. No one has been responsible for their supervision or maintenance and in some cases they are considered a handicap and liability rather than an asset to the neighborhood.

The city park department cannot be expected to take over and maintain an isolated small playground of this type. However, if in future developments the block play-park instead of being the exception becomes the rule, it is probable that the municipal authorities will see that it is in the public interest to provide for their maintenance and limited supervision from public funds. The municipality now maintains, cleans, and lights the local streets. The small local parks are not quite so necessary

as the local streets, but they are quite essential to good living conditions. As there is no way in which their maintenance can be otherwise secured, it is clearly a proper public function to maintain them.

It is unwise to wait for the maintenance problem to be settled before going ahead with the laying out of block play-parks. Unless they are laid out at the time the land is subdivided it will be forever too late to secure them. Provided such parks are wisely planned, it seems probable that the future will provide a way in which they will be efficiently and permanently utilized.

STUDY OF VARIOUS BLOCK AND NEIGHBORHOOD TYPES

In the following pages several methods of improving block, lot, and neighborhood planning will be considered and compared with each other and with the normal block-and-lot type. They will all be placed on a strictly comparable basis from which their physical construction costs and community values can be accurately weighed and appraised.

All the types compared will assume development for small single-family detached houses of about the range of density of houses to the gross acre that this study (See Chapter V) has shown to be normal in present practice. The densities will vary for the most part between six and seven houses to the gross acre. Six families to the acre is now the normal density for low-cost houses and the trend is probably toward somewhat higher densities.

For the purpose of comparison the present ordinary rectangular lot and block layout is assumed to be a block 600 feet long and 250 feet wide, with lots 40 × 125 feet (as in Figure 10[1]). It is also assumed that the block will be bounded by 50-foot streets, one-half the area and improvement costs of which will be chargeable to the lots of the block. This particular layout gives the block, including its half of the bounding streets, a gross area of 195,000 square feet. There are 30 lots to the block, each having a net area of 5000 square feet and a gross area of 6500 square feet. There are 6.7 lots to the gross acre.

In all comparisons the acreage value of the raw land is assumed to be $1500. This is the price shown to be normal for small-house developments in cities of 30,000 to 300,000 population (See Chapter IV). It is assumed that this price covers the cost, if any, of rough grading and clearing.

In estimating improvement costs under all schemes, the following unit costs are used:

[1] See Figure 10, p. 57.

Storm sewers, 12″, $2.25 per lineal foot.
Sanitary sewers, 8″, at an average depth of 8 feet or less, $2.00 per lineal foot.
Concrete pavement, 7″, $2.25 per square yard.
Bituminous macadam pavement, 7″, $1.80 per square yard.
Curb integral with pavement, 55 cents per lineal foot.
Cobblestone gutter, 25 cents per lineal foot.
Walk, 23 cents per square foot.
Finished grading, 75 cents per cubic yard.
Seeding, 25 cents per square yard.
Trees, $8.00 each.

The above unit costs are average for the many cities from which information was received. The sewer costs vary so widely with varying soil and drainage conditions that the average figures here used are of little value in estimating costs in a particular case. This does not, however, greatly affect their value for the purpose here used.

Separate storm and sanitary sewers are assumed in all schemes. Sanitary sewers are of course assumed on all frontages on which lots face. In the usual 600-foot block (See Figure 10[1]) it is feasible for all the houses to face the streets along the long side of the block and in that case no sewer may be needed in the end streets. Often, however, houses do face one or both of the end streets, and sometimes the grades will require the placing of sanitary sewers in one or both of the end streets. For the purposes of this study a sanitary sewer has been assumed in only one of the two end streets of the 600-foot block.

The location of storm sewers varies with the particular layout, but for the usual 600-foot block (See Figure 10[1]) and the 920 × 320-foot block (See Figure 9 [2]) a storm sewer is assumed on every third street parallel with the block length and on two out of every three blocks in the end streets.

In all the schemes a 7-inch concrete pavement 27 feet wide is assumed in the 50- and 60-foot streets. The cul-de-sac lanes are 40 feet wide (except in the Radburn type) and have an 18-foot wide bituminous macadam pavement with a cobblestone gutter. The walks in the culs-de-sac are 4 feet wide.

In all schemes the cost of rough grading is assumed to have been discounted in the price paid for the raw land. The finished grading is

[1] See Figure 10, p. 57.

[2] See Figure 9, p. 57.

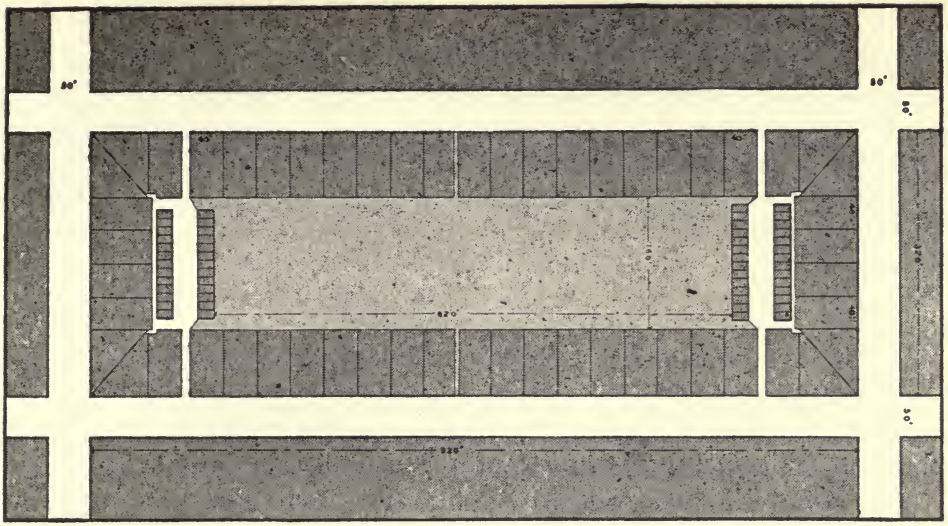


FIGURE 9. THE 920 × 320–FOOT BLOCK

The size of the block is increased and the lots are shortened, leaving an interior open space for the garages and for a play-park.

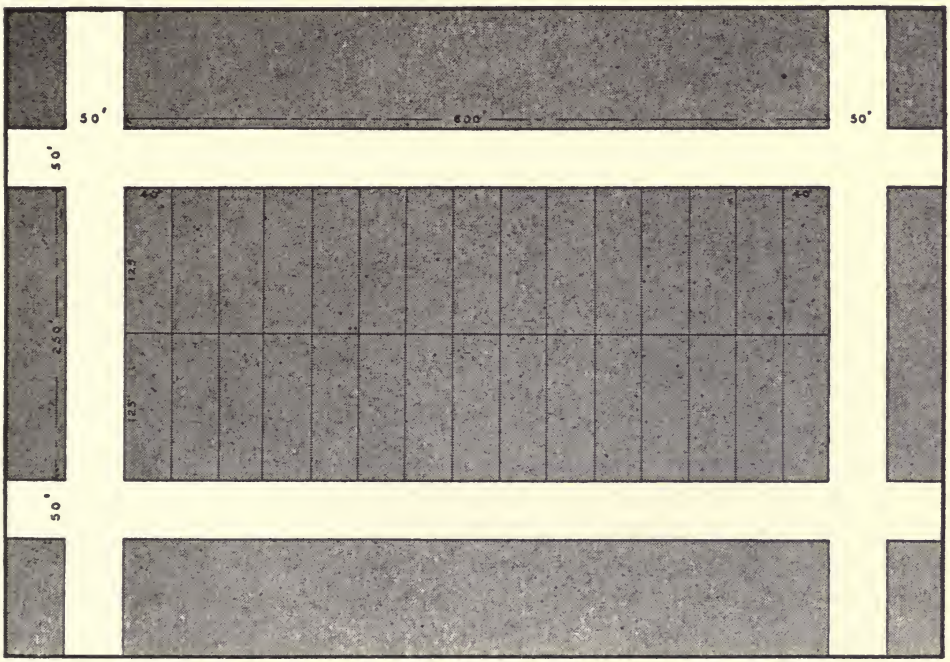


FIGURE 10. THE 600 × 250–FOOT BLOCK

The present normal lot-and-block layout.

estimated for an average cut of six inches. Trees forty feet apart are assumed in the planting strips and around the play-parks.

To the street improvement costs, 10 per cent is added to cover surveys, contour map, planning, engineering, supervision, and contingencies.

The cost of play-park improvement covers merely grading, seeding, and tree planting. It does not include the full cost of park or playground development.

Where the large blocks require interior walks to provide a passage across the middle of the block or between the heads of the culs-de-sac, the cost of such supplemental walks is included as a part of the street improvement costs.

The cost of lot improvements includes grading and seeding the lot, house walks, connections to sewer, water, and gas mains, and the cost of the driveway. In the schemes in which the garages are located in the interior of the block the driveway cost included is the total cost of driveways and turning space for the block divided by the number of lots to the block.

To the production cost of the improved lot, including land cost, street improvement cost, park cost, and lot improvement cost, 25 per cent is added to cover interest, incidentals, marketing, profit, and all overhead. The resulting cost of the improved lot is probably close to the result in actual practice where lots are produced and small houses built without the intervention of the subdivider as such.

DETAILED COMPARISON OF DEVELOPMENT SCHEMES

The essential features of eight development schemes are summarized in Table VI.[1] In the apartment-house section of the neighborhood scheme there is a density of 9.46 families to the gross acre. For all of the other schemes the density varies from 6.44 families to 6.85 families. All of these seven schemes are therefore on practically the same basis as to density and as to the cost of the raw land. Fifteen hundred dollars an acre has been assumed as the cost in all cases.

The 600 × 250-foot Block. In the 600 × 250-foot block 76.9 per cent of the area is in lots and 23.1 per cent in streets. In the dwelling section of the neighborhood unit only 48.3 per cent is in lots, while 18.6 per cent is in streets, 27.4 per cent in play-parks, and 5.7 per cent in group garage spaces. In the Radburn-type super-block, 61.6 per cent is in lots, 21.4 per cent in streets, and 17 per cent in parks. On the

[1] See Table VI, p. 26.

other hand in the apartment-house section of the neighborhood scheme only 21.1 per cent is in lots, while the streets take up 29.9 per cent, the play-parks 40.6 per cent, and the group garages 8.4 per cent.

The cost of street improvement per lot is considerably more for the 600 × 250-foot block than for any of the other schemes. For the dwelling-house section of the neighborhood scheme the cost of street improvement per lot is $331.60. However, the cost of street improvement per family in the apartment-house section of the neighborhood scheme is but $180.33. The cost of park improvement is around $90 per lot for most of the schemes, but in the Radburn-type scheme, owing to the smaller park area per lot, park development amounts to but $56.25 per lot, while in the 670-foot hexagonal block, because of the somewhat larger park area per family, it is $120 per lot. The cost of the raw land per lot is around $225 in all of the schemes.

The total cost of the improved lot varies from $1327.20 in the case of the 600 × 250-foot block to $1104 in the case of the 920 × 920-foot block. The improved-lot cost per family in the apartment section of the neighborhood scheme is $642.47. The 920 × 920-foot block in addition to saving $223 in the cost of the lot provides for the setting aside and improvement of 25 per cent of the area of the block in play-parks.

The 920 × 320-foot Block. In order to illustrate the advantages of a wider and longer block a plan has been prepared showing a 920 × 320-foot block with 40 × 80-foot lots and a large interior play-park and garage space (See Figure 9[1]). In order to offset the inconvenience of the longer block for pedestrians, a walk is provided across the middle of the block.

The block has a gross area of 358,900 square feet or 8.2 acres. There are fifty-four 40 × 80-foot lots. The gross area per lot including common open space is 6646 square feet or 6.55 lots to the acre. The common open space in the center of the block is 160 feet wide and 760 feet long.

Seventy feet off of each end of this central open space is used to provide a space for a one-car garage for each of the fifty-four houses in the block. The cost of surfacing the approaches to the private garage groups is estimated at $38 per lot. The cost of building a driveway to the garage in the 600 × 250-foot block is estimated at $124 per lot.[2] It is clear, therefore, that the private garages can be grouped as suggested with economy in the total cost of development and with great

[1] See Figure 9, p. 57.

[2] See Appendix I, Table XV, pp. 160–161.

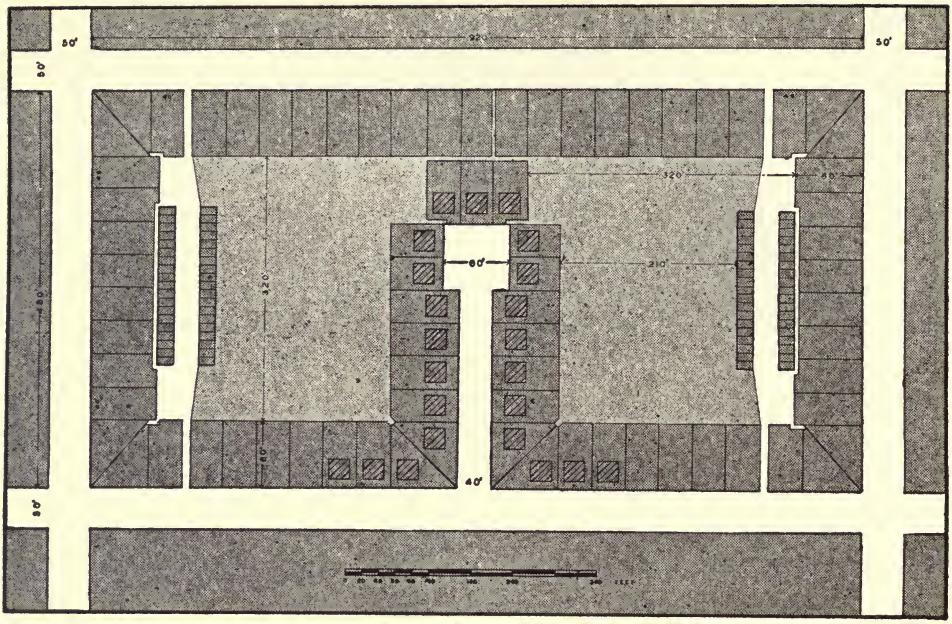


FIGURE 11. THE 920 × 480–FOOT BLOCK

The block width is further increased and part of the interior area thus created used for additional lots, access to which is given by a cul-de-sac.

improvement in the attractiveness of the block and in the efficiency of the rear yard space.

The interior block play-park is 160 feet wide and 620 feet long. It has an area of 99,200 square feet or 27.6 per cent of the gross area of the block. The area in the play-park is only 5000 square feet less than the area that is secured by reducing the depth of the lot from 125 feet, as shown in Figure 10[1], to 80 feet, as shown in Figure 9[2].

For the 54 lots in the 920 × 320-foot block the street improvement cost amounts to $391.20 per lot. For the 30 lots in the 600 × 250-foot block the street improvement cost amounts to $476.80 per lot. The saving per lot in the case of the 920 × 320-foot block is $85 or 21.9 per cent.

The 920 × 480-foot Block. In the 920 × 480-foot block (See Figure 11) a cul-de-sac entering from one side of the block affords access to fifteen lots in the interior of the block. The two play-parks located on either side of the cul-de-sac lots occupy 27.4 per cent of the gross area of the block. The private garages are grouped in two interior block garage areas. The area of the block is divided as follows:

[1] See Figure 10, p. 57.

[2] See Figure 9, p. 57.

	Square Feet	Per Cent
Lots	240,000	46.7
Play-parks	140,800	27.4
Garage space	44,800	8.7
Streets	88,500	17.2

As shown in Table XV,[1] the street improvement cost for the 920 × 480-foot block is slightly less than for the 920 × 320-foot block and more than for the 920 × 920-foot block. The total cost of the improved lot is $79 more than in the 920 × 920-foot block and $144 less than in the 600 × 250-foot block.

The 270-foot Hexagonal Block. The advantages of the hexagonal block have been shown by Mr. Noulan Cauchon, Canadian Planning Engineer, in his paper before the City Planning Division of the American Society of Civil Engineers (*Proceedings*, Part 1, page 784, May, 1927). Figure 12[2] shows a typical hexagonal block layout with interior play-park and garage space. Each of the six sides of the hexagon has a length of 270 feet. The block has a gross area of 5.33 acres. The interior play-park has 1.53 acres or 28.7 per cent of the gross area. There are 36 lots. The gross area per lot is 6453 square feet each. The density is a trifle less than for either the 600 × 250-foot block or the neighborhood unit, and a little more than for the 920 × 920-foot block. The gross area of the hexagon is divided as follows:

	Per Cent
Lots	46.3
Play-parks	28.7
Garage space	6.6
Streets	18.4

The street improvement costs are about $1 per foot of lot width more than for the 920 × 920-foot block or the neighborhood unit, and 50 cents less than for the 920 × 320-foot block.[1] The total cost of the improved lot is substantially the same as for the lot in the 920 × 480-foot block. In the street improvement cost there is a saving of 28 per cent as compared with the 600 × 250-foot block.

[1] See Appendix I, Table XV, pp. 160–161.

[2] See Figure 12, p. 63.

It seems that the hexagon may be utilized with advantage in certain cases. The practical handicap to its general use is that the existing property lines are for the most part rectangular and it is difficult, though by no means impossible, to stamp the hexagon pattern on the existing rectangular tracts without considerable waste.

The 920 × 920-foot Block. The 920 × 920-foot block shown in Figure 13 furnishes a very economical layout in improvement costs and provides 25 per cent of the gross area in play-parks.

A cul-de-sac is located at the center of each side of the block. Footpaths connect the heads of the culs-de-sac for the convenience of the pedestrian. There are four play-parks, each 210 by 280 feet. Most of the houses will overlook the play-parks.

A space seventy feet in width at one end of each of the four interior block open spaces is set off for a double row of garages to furnish space for a one-car garage for each house. The area of the block is divided as follows:

	Square Feet	Per Cent
Lots	462,400	49.2
Garage space	78,400	8.3
Play-parks	235,200	25.0
Streets	164,900	17.5
	940,900	100.0

The improvement ratio for the 920 × 920-foot block is 1 to 176, and for the 600 × 250-foot block, 1 to 58. This indicates a theoretic advantage in probable improvement costs of 34.4 per cent as compared with the 600 × 250-foot block. Owing largely to the economy in improvement costs of the culs-de-sac, the saving of the 920 × 920-foot block is even greater than that indicated by the improvement ratios. The estimated cost of sewers, grading, paving, curbs, walks, and planting strip for the 920 × 920-foot block amounts to $8.31 per foot of lot width, while the corresponding cost for the 600 × 250-foot block is $11.92.[1] The actual improvement cost is therefore 43.4 per cent greater for the 600 × 250-foot block than for the 920 × 920-foot block.

The Neighborhood Unit. Figure 14[2] shows one way in which the block patterns heretofore described may be combined into a self-contained

[1] See Appendix I, Table XV, pp. 160–161.

[2] See Figure 14, p. 69.

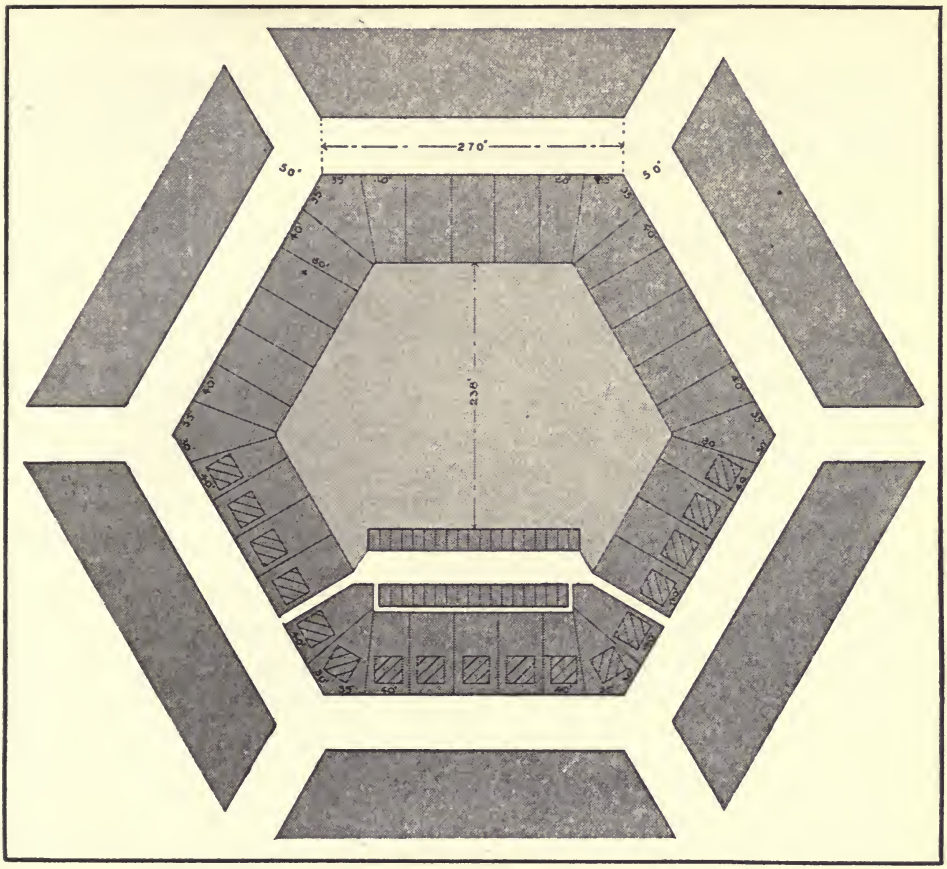


FIGURE 12. THE 270-FOOT HEXAGONAL BLOCK

The less acute angle at the corners makes possible a reduction of the waste frontage of the corner lots.

neighborhood. The area, measured to the center of the bounding streets, contains 206.6 acres. It is 3000 feet square.

In the center of the area there is a large play-field and school site containing an area of 13.6 acres. It is surrounded by portions of four 920 × 920-foot blocks each with four culs-de-sac and three smaller play-parks. There is a 60-foot street, one lot-depth from the periphery of the dwelling-house area.

The two business areas are on or near the boundary streets on two opposite sides of the large block. The apartment houses occupy all the frontage on the bounding streets other than that occupied by business.

In the rear of the apartments is an interior-block open space 235 feet wide.

The bounding streets are planned as express roads 200 feet in width with complete separation of grades at the express-road crossings. The entire area of the 3000-foot square unit is apportioned as follows:

	Acres	Per Cent
Dwelling lots	53.79	26.0
Apartment-house lots	17.15	8.3
Private garage areas	13.58	6.6
Play-parks	65.73	31.8
Business lots	5.50	2.7
Interior streets	22.87	11.1
Bounding streets, one-half	27.99	13.5
	206.61	100.0

The neighborhood unit provides for the housing of 1562 families; 746 in single-family dwellings and 816 in apartments. Thus 47.8 per cent of the families are provided for in single-family dwellings. It has been shown in Chapter II[1] that in cities in the north-central and eastern states about 47 per cent of the families live in single-family houses. While this percentage will vary considerably in different cities, the percentage for the neighborhood unit is close to the average.

In the dwelling-house section of the neighborhood unit there is a density of 6.68 families to the acre.[2] In the apartment-house section this density is 9.46 families to the acre. The apartment density is comparatively low because of the 200-foot width of express road on which the apartments front and the 235-foot width of open space in the rear of the apartments. In computing this density the area occupied by the stores, the loading and garage space in the rear of the stores, and the streets in front of the stores, are not included.

In the apartment section there are 1871 square feet of play-park area per family while in the dwelling-house section there are 1789 square feet of play-park area per family. In the apartment section the play-park area occupies 40.6 per cent of the gross area of the section while in the dwelling-house section the play-park area occupies but 27.4 per cent. The apartment-house lots occupy 21.1 per cent of the area of the apart-

[1] See Chapter II, p. 7.

[2] See Table VI, p. 26.

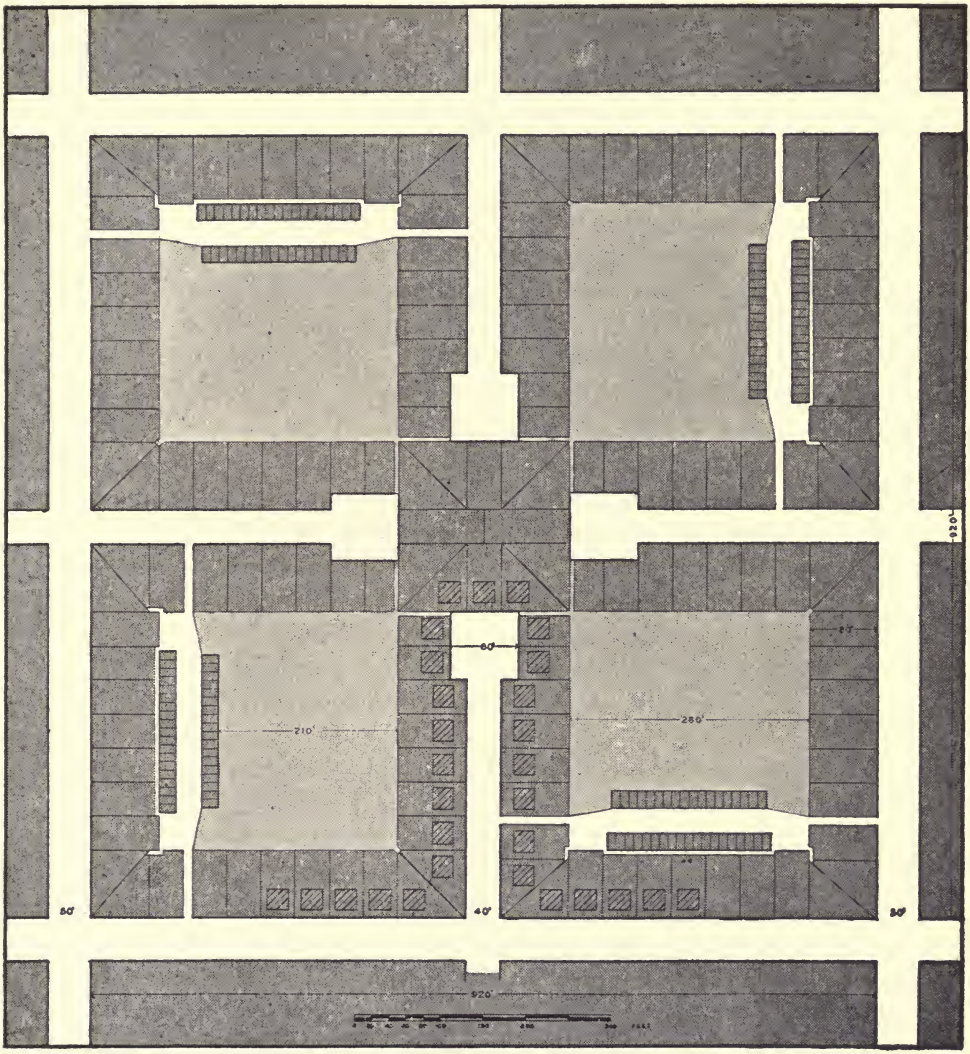


FIGURE 13. THE 920 × 920-FOOT BLOCK

The width of the block is still further increased and four culs-de-sac are used, making four interior play-parks which are connected by walks leading from the heads of the culs-de-sac.

ment-house section while the dwelling-house lots occupy 48.3 per cent of the area of the dwelling-house section. Streets occupy 29.9 per cent of the apartment-house area and but 18.6 per cent of the dwelling-house area.

The frontage devoted to business is based on one foot of business frontage per family. This is about equal to 25 feet of business frontage per 100 persons and is considered an adequate allowance for neighborhood stores where it can be assumed that the entire area will be actually devoted to business use and none of it held vacant or used for apartment houses, churches, etc.

An analysis of the improvement costs in the neighborhood scheme is shown in Table XV.[1] For the dwelling-house lots the total cost of the improved lot is $1120.40. For the apartment-house section the total lot-cost per family housed is $642.47. This includes the cost of improving the service roadway of the express highway on which the apartment houses front but does not include the cost of constructing the central roadway for through traffic nor does it include the cost of building the grade separations.

Although in the apartment-house section the street improvement cost per foot of lot frontage is almost double that in the dwelling-house section, the street improvement cost per family in the dwelling-house section is almost double that in the apartment-house section. This reduction in cost per family in spite of the increased cost per foot of frontage is of course due to the greater density of families in the apartment area. The net result is that the cost of the apartment lot per family housed is only a little more than half the cost of the dwelling-house lot. This is important as the lot cost per family housed in the apartment should not bear any larger proportion to the investment in the apartment than the cost of the dwelling-house lot bears to the total cost of the house and lot. With this low average lot-cost per family it should be possible to provide the apartments at rentals that will be within the means of most of the families unable to afford a single-family house in the dwelling-house section of the neighborhood unit.

Radburn-type Super-block. The Radburn-type super-block is shown in Figure 15.[2] The super-block here illustrated is forty-two acres in area. Practically all the lots are located on the culs-de-sac. The culs-de-sac are thirty feet in width and are used as service streets rather than house frontages. The houses really front on the interior gardens and parks. The walks are not located on the streets or culs-de-sac but

[1] See Appendix I, Table XV, pp. 160–161.

[2] See Figure 15, p. 71.

between the culs-de-sac and in the narrow park strip extending through the center of the block.

The garages are attached to the houses and approached by a short driveway extending from the cul-de-sac lanes. This location for the garage is in many respects preferable to segregation in an interior-block space as proposed in the other schemes. It requires, however, a greater width of lot, normally 45 feet instead of 40 feet as in the other schemes.

This scheme of development as applied at Radburn is attractive and economical and has a number of advantages in its use of street improvements. It involves considerably higher cost for maintenance of park ways as they become the principal frontage and means of access to the dwelling.

The 670-foot Hexagonal Block. The hexagonal block shown in Figure 17[1] is 670 feet on a side. A cul-de-sac is located at the center of each side but unlike the 920 × 920-foot block the heads of the culs-de-sac do not meet in the middle, thus leaving a hexagonal open space in the center connected by narrow park strips with the principal open spaces. In this way all of the park spaces are connected, making a very attractive layout. In order to take advantage of this feature garages are attached to the houses instead of being located in the park area. The gross area of the block is divided as follows:

Lots	47.6 per cent
Play-parks	36.1 per cent
Streets	16.3 per cent

Due to the hexagonal shape the percentage in streets is extremely low, and as the number of lots per gross acre is about the same as in the other plans, — 6.59, — the percentage of area in parks is high. The scheme of improvement is somewhat similar to that of the Radburn type. There are no walks in the culs-de-sac, which are paved with eighteen feet of 6-inch concrete having a dish-shaped cross-section.

The frontage on the culs-de-sac is, as in the Radburn type, really the rear of the houses. The walks are along the edge of the park strip and the front of the house is toward the park.

Despite this somewhat more expensive arrangement, the street improvement cost for this type of block is lower than for any other type: $7.85 per front foot or $314 per 40-foot lot. However, the cost of improving the larger park area, 2382 square feet per family, and the additional cost of driveways bring the total cost up to slightly more than that

[1] See Figure 17, p. 77.

for the 920 × 920-foot block. The total cost is $28.76 per front foot or $1150.40 for a 40-foot lot. If the lots were given an average width of 45 feet, which would be more desirable with the garages attached to the houses, the density would be 5.89 families per gross acre and the total cost per lot would be $1278.45. The park area per family with the 45-foot lot would be 2675 square feet. Figure 18[1] shows a method by which 670-foot hexagonal blocks may be combined to make a neighborhood unit somewhat similar to that shown in Figure 14.[2]

Relation of Lot Cost to Cost of House and Lot. Improvement costs and standards will normally vary with the total housing costs per family. If the completed house and lot will sell for $9000 it will normally have a higher improved-lot cost than one selling for $5400. The range of lot cost may be $1500 to $1800 in the former case and $900 to $1080 in the latter. This difference will be due:

(1) To difference in raw land cost. Land suitable for the building of the higher-cost houses will normally cost more than that suitable only for the less costly houses.

(2) To difference in the type and cost of lot improvements, play-park improvements, and, to a more limited extent, of the street improvements. The entire environment must be made more attractive for the higher-cost house.

(3) To difference in the size and more especially in the width of the lot. This carries with it increased land and lot and street-improvement costs.

In the various schemes and patterns studied it has been assumed that they are to be used for lower-cost houses and therefore while it has been assumed that they will be served with complete utilities the assumed planting and lot and park development has been kept at a minimum. It has been assumed that a more complete park development and its permanent maintenance should, especially in these lower-cost developments, be a municipal charge.

In the costs of the improved lot used in comparing the various schemes, the cost of certain improvements on the lot — grading, seeding, driveway, walk, and sewer and water connections — have been included. These costs are often included with the cost of the house rather than of the lot. They have been herein included with the lot, so that the total effect of placing the garage in the rear yard, in the side yard, or in a garage group in the block interior, can be accurately compared, also so as to compare the cost of grading and seeding the deeper

[1] See Figure 18, p. 79.

[2] See Figure 14, p. 69.

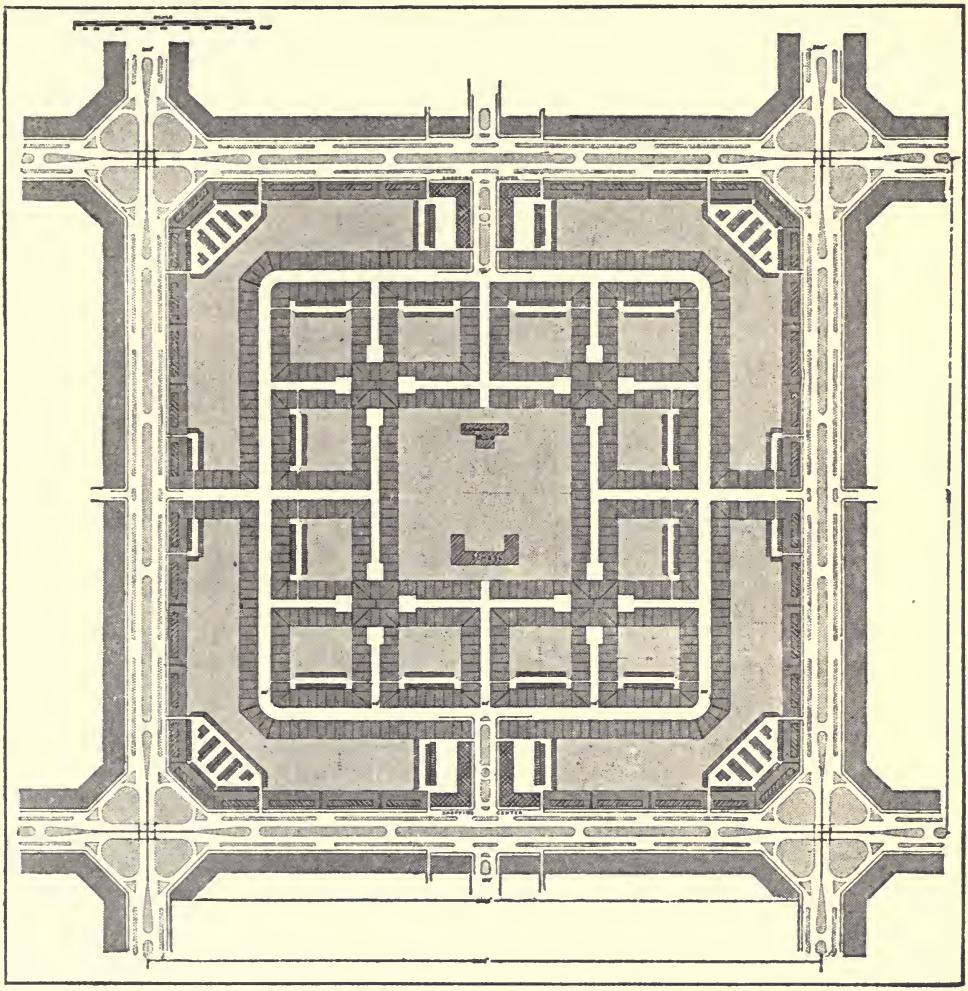


FIGURE 14. A NEIGHBORHOOD UNIT ADAPTING THE 920 × 920-FOOT BLOCK

Parts of four 920 × 920-foot blocks are combined and a 395-foot strip is added around the outside. The unit is bounded by 200-foot express highways on which apartment houses front. Local business centers are provided at two of the four entrances to the unit. The large park in the center provides sites for a school and for a community building.

lot with the cost for the shallower lot plus the cost of improving a proportionate part of the play-park area.

The fact that these lot-improvement costs are included should be borne in mind in judging the lot costs shown in the various schemes. This fact should also be borne in mind in estimating the cost of the house. Instead of assuming that a building appropriate to the lot will cost four or five times the cost of the lot it will be safer to assume that the building will not cost more than $3\frac{1}{2}$ to $4\frac{1}{2}$ times this enlarged-lot cost. On this basis the following tabulation showing the normal range of the cost of the fully improved lot in relation to the cost of the house and lot has been prepared for use in judging the normal cost of the house that can be appropriately built in connection with the improved-lot costs shown by the various development schemes.

Cost of House and Lot	Normal Range of Cost of Fully Improved Lot
$3000	$ 450 to $ 675
3500	625 to 775
4000	725 to 900
4500	825 to 1000
5000	900 to 1100
5500	1000 to 1225
6000	1100 to 1325
6500	1175 to 1450
7000	1275 to 1550
7500	1350 to 1675
8000	1450 to 1775
8500	1550 to 1875
9000	1650 to 2000

Reduction of Lot Cost by Reducing Lot Width. If, in order to make low-cost housing feasible, it is necessary to reduce the lot cost as shown in the neighborhood scheme (See Figure 14[1]) this can be done in various ways, the most obvious being that of reducing the lot width. This will reduce the cost per lot for the raw land and it will reduce proportionately the cost per lot for street improvements.

By using the double house on the 60-foot lot, instead of single houses on 40-foot lots as in the neighborhood scheme,[1] the cost of the improved lot (30 feet) can be reduced from $1120.40 to $892.27. This might be desirable if the demand were for four-room houses that could be constructed for about $3200, making the cost for house and lot about $4100.

[1] See Figure 14, p. 69.

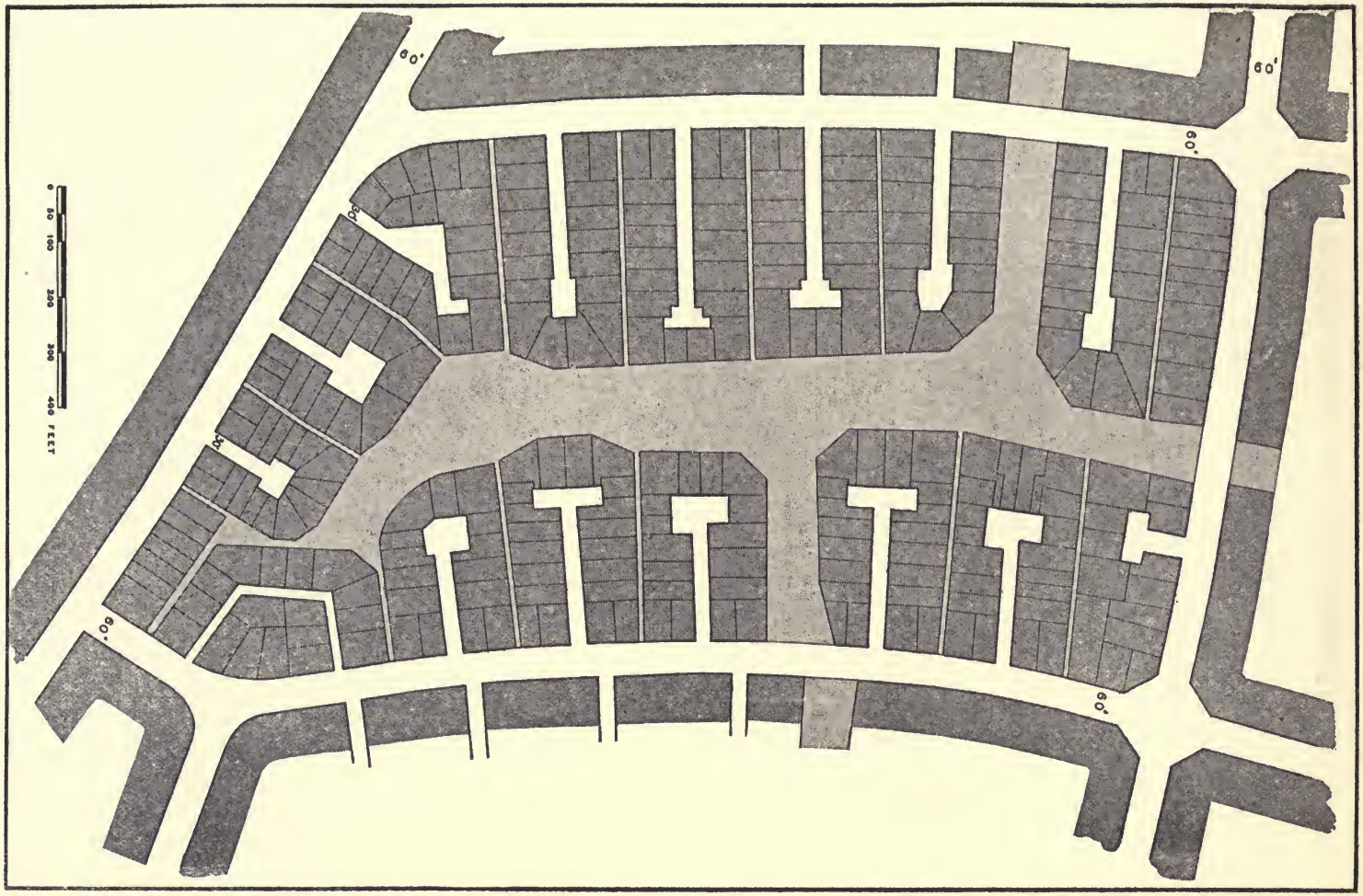


FIGURE 15. A RADBURN-TYPE SUPER-BLOCK

This block is adapted from an actual block at Radburn, with certain changes necessary to make it comparable with the others.

The double house on the 60-foot lot has advantages over the detached single house on the 30-foot lot, the chief of which is that it gives more space between houses.

As between decreasing the size of the lot and decreasing the size of the play-parks, one advantage of the former method is that a considerable minimum length and breadth of play-park are required for efficiency and amenity, regardless of the number of families immediately served. Then, too, densities may increase and the row house or the apartment house may take the place of the detached house. In this event the generous play-park areas now set aside will no more than meet minimum requirements for these greater densities.

Effect of Increasing Width on Lot Cost. If the lot in the neighborhood scheme (See Figure 14[1]) were made forty-five feet wide instead of forty feet and the garages were placed at the side of the house as in the Radburn scheme, the cost per lot would be $1275.56 instead of $1120.40. The space used for garages in the neighborhood scheme would be thrown into the play-parks and the attractiveness of the parks materially increased. The density would be reduced from 6.68 families to the acre to 5.93 families to the acre. The park area would be increased from 27.4 per cent to 33.1 per cent. The $1275 lot would be appropriate for a somewhat higher-cost house, — probably a house costing (for house and lot) from $5800 to $6800 instead of from $5000 to $6000 as in the case of the $1120 lot. If the lot instead of being made forty-five feet wide as in the above example were made fifty feet wide, the cost of the improved lot would be increased from $1120.40 as in the neighborhood scheme to $1395.63. This would normally mean a house and lot costing from $6500 to $7500.

Effect of Acreage Value on Lot Cost. While $1500 an acre has been used in the various schemes in estimating the cost of the raw land, it is realized that in the vicinity of large cities it may not be feasible to obtain land at this price. In some places it will be impossible to get acreage suitable for immediate development at a cost under $3000 or $4000 an acre. An increase in acreage cost from $1500 to $3000, while a doubling of the raw-land cost, adds 25 per cent to the cost of the improved lot in the case of the neighborhood scheme (See Figure 14[1]) and 21.1 per cent in the case of the 600 × 250-foot block (See Figure 10[2]).

In order to maintain the same improved-lot cost with the higher raw-land cost we can increase the density sufficiently under a given scheme

[1] See Figure 14, p. 69.

[2] See Figure 10, p. 57.

to offset the increase in the unit cost of the raw land. This can be done in the neighborhood unit scheme, for example, by decreasing either the size of the lots or of the play-parks. One method would be to have double houses on 60-foot lots instead of single houses on 40-foot lots. This would increase the density by one-third and thus more than offset the assumed increase in the cost of the raw land. It would also decrease by 25 per cent the cost per lot for street improvements. By using double houses on 60-foot lots for 80 per cent of the houses in the neighborhood scheme [1] the average cost of the improved lot with land at $3000 an acre would be no more than with all 40-foot lots and land at $1500 an acre.

If suitable land can be bought for $1000 an acre instead of $1500 an acre, the cost of raw land is reduced by one-third and the cost of the improved lot under the neighborhood scheme (See Figure 14) is reduced 8.3 per cent. By increasing the width of the lot to 43.6 feet with its attendant improvement costs, the cost of the improved lot will be about the same as with the 40-foot width and the $1500 per acre cost.

Decreasing Cost of Lot in Normal Lot-and-Block Layout. The comparison of the various schemes shows advantages over the usual 600 × 250-foot block layout as to both improvement costs and community values. All of the schemes compared are on about the same basis as to density or number of lots to the gross acre. It is, of course, possible to reduce improvement costs for the usual lot-and-block layout by increasing the density, — that is, by reducing the size of the lots. If the lot depth is decreased from 125 feet to 100 feet, thus also reducing the width of the block from 250 feet to 200 feet, the cost of the improved lot will be reduced from $1327.20 to $1187.46. The number of lots to the gross acre is increased from 6.7 to 8.0. If now the length of the 200-foot block is increased from 600 feet to 920 feet, the cost of the improved lot is reduced to $1127.25 or very nearly the cost of the improved lot in the dwelling-house section of the neighborhood scheme. In the neighborhood scheme, however, 27.4 per cent of the area is set aside and improved for play-park purposes, while in the 920 × 200-foot block there would be no park area. There would also be a density of 8.26 lots to the gross acre, instead of 6.68 as in the neighborhood scheme. It is probable also that if this greater density should become the normal density for houses in the community, it would result in such an increase in acreage values that the saving temporarily experienced in lot costs would be absorbed in the increased value of the land.

[1] See Figure 14, p. 69.

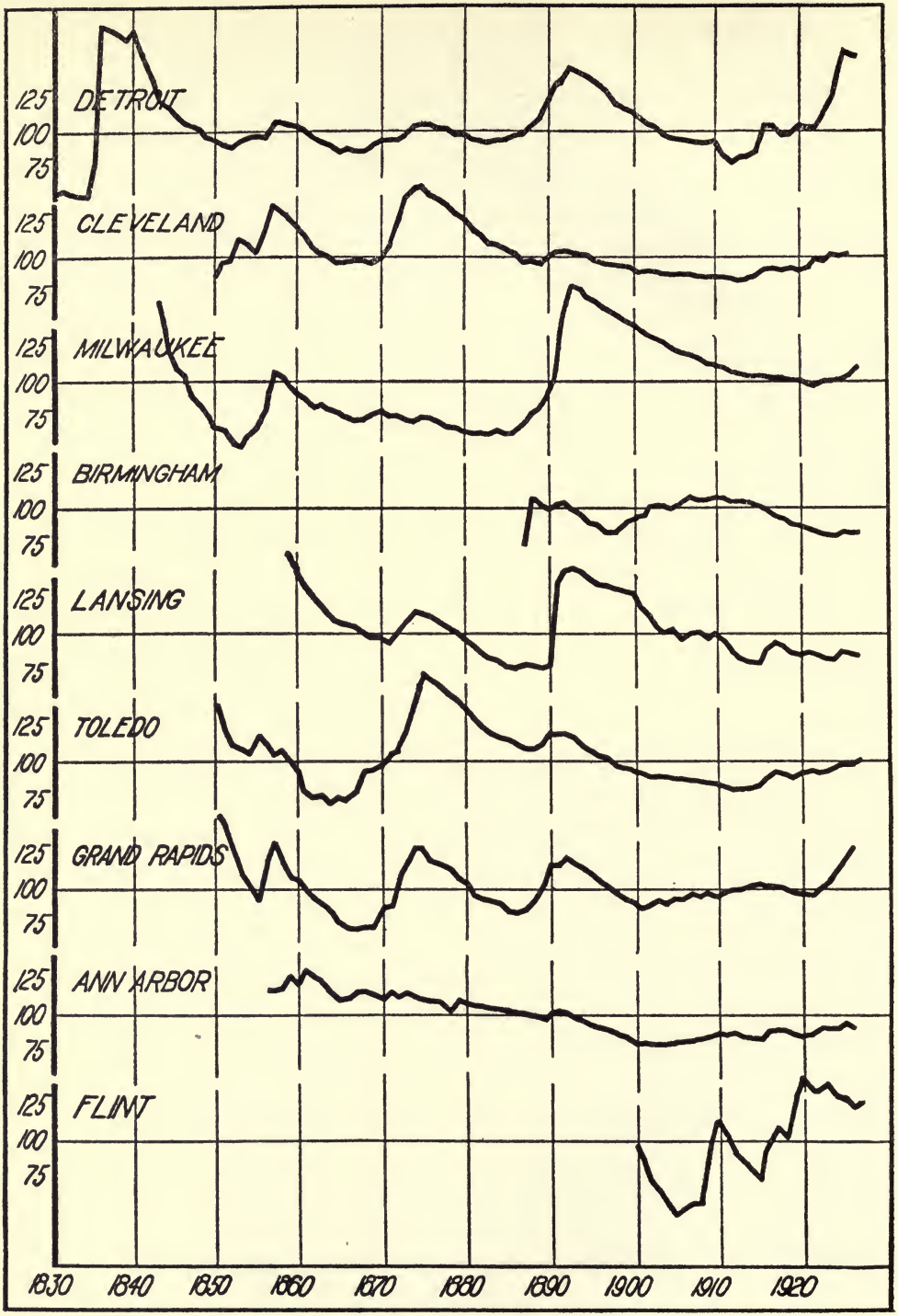


Figure 16. Percentage variations of actual ratio of lots to population from the typical or median ratio in nine urban areas (See page 38).

CHAPTER IX

SUMMARY AND RECOMMENDATIONS

Brief summaries of the survey findings as stated in the preceding chapters are here repeated for purposes of convenience of reference:

SURVEY FINDINGS

In the seventy-three cities surveyed, 36.8 per cent of the families pay rents or live in quarters rated under $25 per month. Twenty-four and two-tenths per cent of the families pay from $25 to $35 a month, and 14.9 per cent pay from $35 to $45 a month. Sixty-one per cent of the families pay rent under $35 a month. It is in providing adequate housing for this 61.0 per cent of the population that the chief housing problem consists.

Forty-seven and one-tenth per cent of the families in the seventy-three cities surveyed live in single-family dwellings, 47.7 per cent in two-family houses or flats, and only 5.2 per cent in heated apartments. In the lowest rental class ($5 to $15) 37.0 per cent of the families live in single-family dwellings, 62.5 per cent in two-family dwellings and flats, and 0.5 per cent in heated apartments.

It is estimated that the expenditure for rent or housing will average 18 per cent of the family income. It is estimated that rentals will average 10 per cent on the value of the leased property. In other words, the investment in housing will average ten times the annual rental.

Thus, it is estimated that 10.8 per cent of the total number of families occupy premises having an average investment value of $1200, 26 per cent of the families occupy premises having an average value of $2400, 24.2 per cent an average value of $3600, 14.9 per cent an average value of $4800, 8.8 per cent an average value of $6000, 4.9 per cent an average value of $7200, and only about 5 per cent of the families live in apartments or houses having a value in excess of $10,000.

There is a clear relation between the normal type and cost of house for which a tract is most suitable and the value of the raw land.

Acreage values in tracts suitable for high-cost houses are normally about 2.5 times the values in tracts suitable for low-cost houses; and acreage values in tracts suitable for medium-cost houses are 1.5 times the values in tracts suitable for low-cost houses. These relations are

normal, however, only for the usual types of lots in tracts that are ripe for immediate building and adjacent to existing built-up areas.

They do not apply to suburban high-cost houses on large lots or to row houses on very small lots.

For low- and medium-cost houses acreage values in tracts ripe for building tend to increase directly with the housing density customary to a particular city. Smaller lots do not necessarily mean cheaper houses. The smaller lot may result in such a great increase in acreage values that the 15-foot lot will cost as much as the former 40-foot lot.

For the small house the normal depth of the lot in many cities is 120 to 130 feet. In eastern cities it is often about 100 feet. In cities where the old lot-depths were 150 or 165 feet the tendency has been to reduce them to 120 or 130 feet. In some cities where the normal lot-depth for small houses is still 120 or more feet, there is a tendency to reduce to around 100 feet.

The normal width of lot for the low-cost single-family detached house is still 50 feet in many cities. In many cities it is 40 feet, and in others about 45 feet. A few large cities have a normal lot-width of 30 to 35 feet.

The normal lot density varies from about five to the gross acre to about eight to the gross acre. The average lot-density for low-cost houses is about six to the gross acre. The net lot area varies from about 4000 square feet to about 6000 square feet, while the gross lot area varies from about 5400 square feet to about 7500 square feet.

Costs of street improvements per front foot, including grading, sewers, paving, curb, sidewalk, and planting strip, average $10.46.

There are, however, enormous variations in improvement costs due largely to special sewer and drainage problems and to varying municipal standards. Often the municipal standards for sewers are based on the possibility of the dwellings being replaced later by stores and apartments. The character and width of the paving are often based not on the traffic of a purely local dwelling-house street, but on its possible use for general traffic. Improvement standards based on these considerations sometimes result in a doubling of the improvement costs normal to a local dwelling-house street. In some cities the complaint is voiced that the municipal standards have made the small house uneconomic and the only place such houses can be built is outside the city limits, where the municipal standards do not apply.

Ideally, land subdivision and house-building operations should be closely correlated. There is great economic and social loss where land subdivision and building are as completely divorced as they are in many fast-growing American communities. In periods of rapid expansion the efficient sales organization of the subdivider is able to dispose

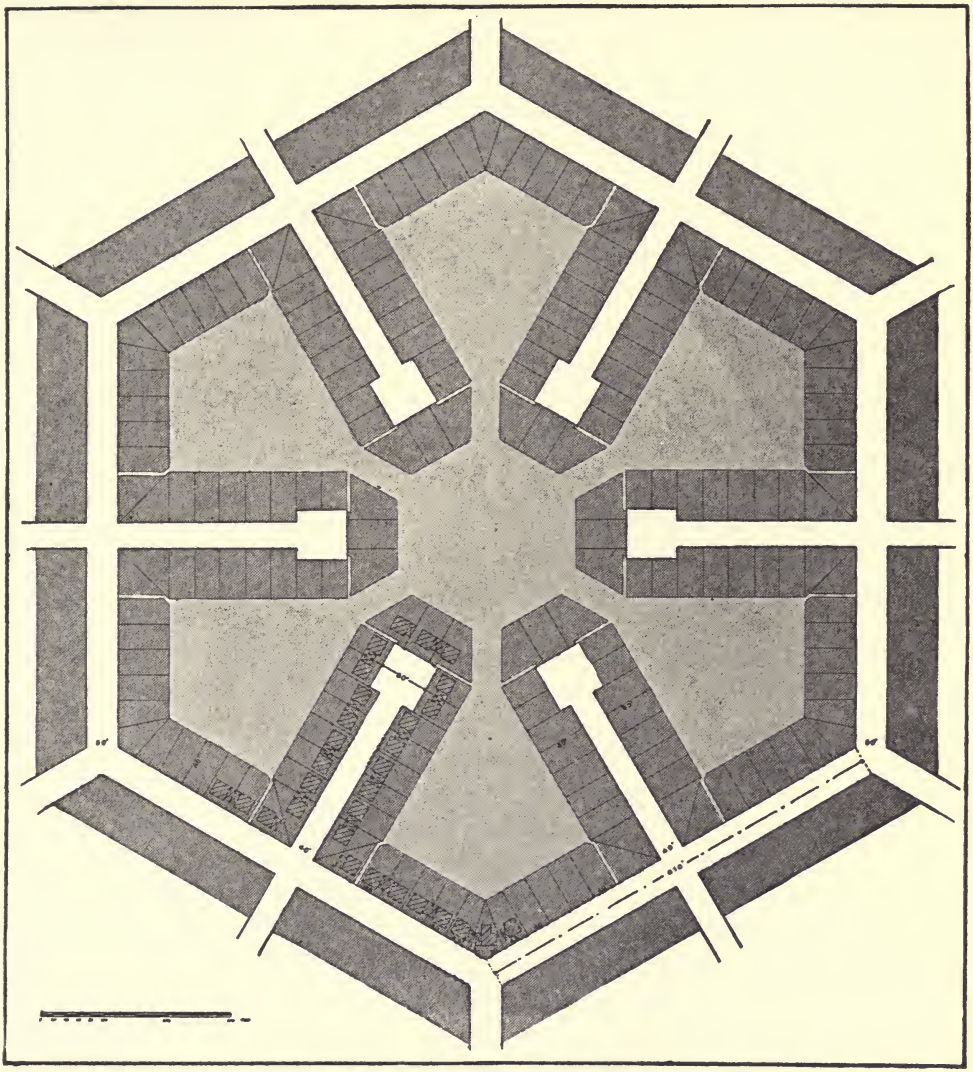


FIGURE 17. THE 670-FOOT HEXAGONAL BLOCK

The Hexagonal Block is made large enough to permit the introduction of six culs-de-sac. Garages are planned to be attached to the houses and, as in the Radburn plan, the houses on the culs-de-sac have a double frontage. The vehicle access is from the culs-de-sac, while the pedestrian access is from a system of paths in the interior parks.

of lots improved or unimproved to "would be" home owners at prices much in excess of their actual value for building purposes. The worker is often induced to buy on monthly payments a lot costing with street improvement assessments $2000, when half that amount is all that he should pay if he is to have a home within his means. A two thousand dollar lot is appropriate for an eight or ten thousand dollar home. It is entirely out of scale for the five or six thousand dollar home.

Results are usually much better when the subdivider is also the builder. He realizes that the price of the completed house must be such that the monthly carrying charges will not be in excess of ability to pay. This makes it necessary to keep down lot and street-improvement costs to a minimum. Of course when times are good and the demand for *new* houses is greater than the supply, the builder is able to dispose of new houses for more than their true or permanent value. In general, however, competition among builders keeps prices down to a reasonable basis, and the excessive sales cost for the lot as distinct from the completed home is largely saved.

RECOMMENDATIONS

Any satisfactory pattern of lots and blocks for residence purposes must be such as will fit into a neighborhood grouping. The aim should be to create a self-contained neighborhood, and not merely to provide sites for houses.

The large blocks in Figures 9, 11, 12, 13, and 17 show a first step in community or block organization in the provision of interior-block garage spaces and play-parks. Figure 14 shows one way in which these large blocks can be organized into a community or neighborhood, with opportunity for a full community life.

The self-contained neighborhood unit should have its own public school, playfield, and local store center. It should as a rule be bounded by traffic streets, but should have no general traffic streets cutting through it. The local streets should be so laid out as not to invite through traffic. Normally two or more types and densities of housing should be provided for in the locations most suited to them.

Zoning and platting control of the unbuilt area should be concerned not so much as has been the general practice with the size, shape, and use of the individual lot as with that of developing self-contained communities in which all community needs will be taken care of. The block pattern is in many respects more important than that of the lot, and the neighborhood pattern more important than that of the block. It is the block pattern that will largely control economy in street costs and in the creation of neighborhood play-parks.

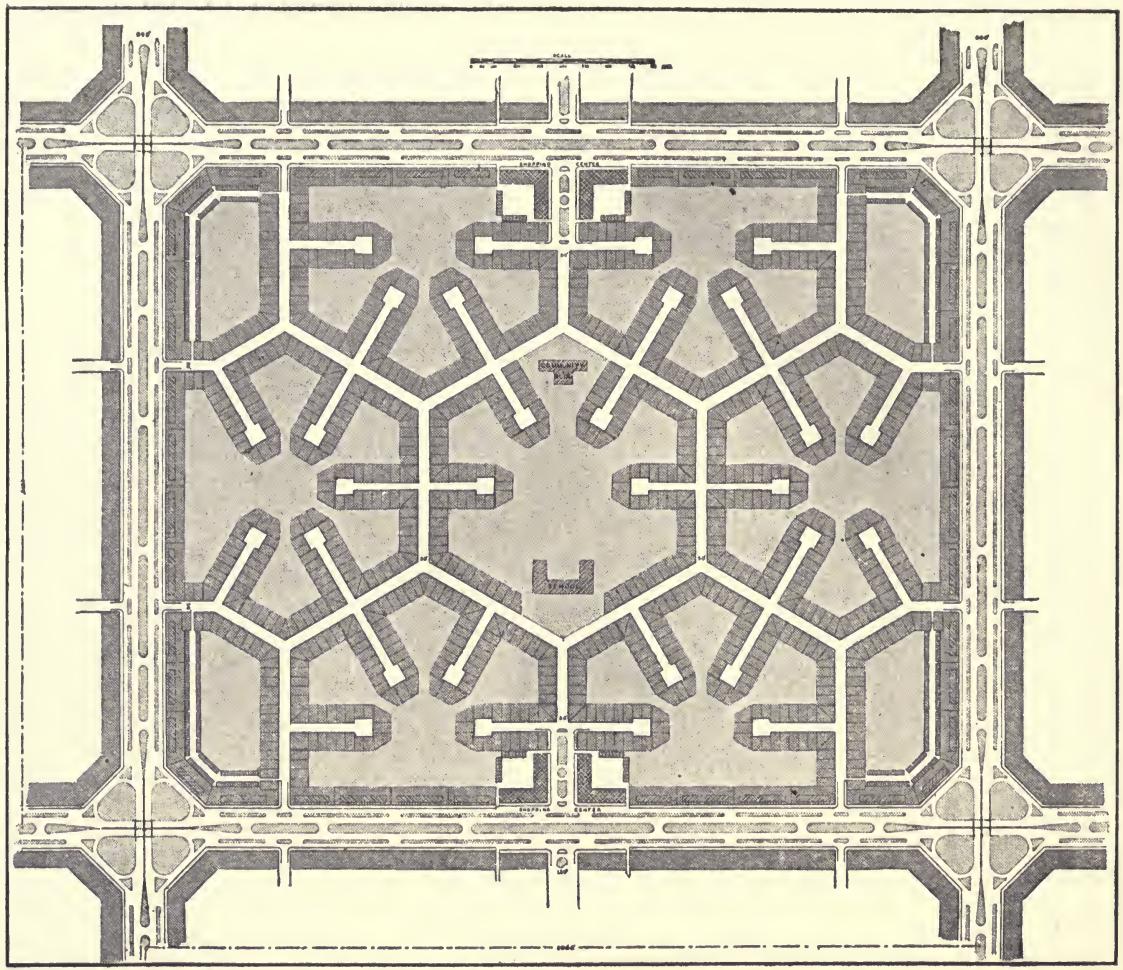


FIGURE 18. A NEIGHBORHOOD UNIT ADAPTING THE 670-FOOT HEXAGONAL BLOCK

This neighborhood unit is similar to that shown in Figure 14 except that it is made up of parts of 670-foot hexagonal blocks.

Zoning and platting and street-construction control should be one and indivisible. It is fundamental that at the time the raw land is cut up into streets and building lots, the completed community or neighborhood unit should be visualized with all its characteristics and requirements. It is almost as essential that there should be neighborhood parks as that there should be local streets. Substantial savings in street improvement and permanent maintenance costs can be effected by scientific block and neighborhood planning.

The present ordinary street and block pattern for residential neighborhoods is wasteful in its street and utility construction requirements, and lacking in provision for neighborhood requirements. From 15 to 40 per cent of the money expended for street improvements can be saved by careful planning. From 15 to 30 per cent of the gross land area now inefficiently used or wasted can be devoted to interior-block and neighborhood parks without any additional cost for land. The saving that can be effected in street and lot-improvement costs is more than adequate to pay the cost of park development and other community betterments.

By using longer and wider blocks, street and improvement lengths can be reduced and large interior-block areas created. By using culs-de-sac or closed-end lanes, a portion of this interior area can be used for house lots with great economy in the use of land for streets and in street improvement costs. The area saved from the streets and from the unnecessarily deep rear yards can be combined in attractive play-parks.

The saving in street length effected by careful planning will mean a considerable saving to the city for water mains and other improvements paid for directly in whole or in part from general funds, and will effect a very much greater annual saving in expenditures for the maintenance of streets and utilities. The cleaning, repairing, and reconstructing of 25 to 50 per cent more paved street surface than is necessary with good planning, is a very important item in municipal finance. It will be much wiser to spend an equal amount in the development and maintenance of the interior-block play-parks that should be a normal feature of community life.

In the neighborhood unit it is essential to assume that lot values will remain permanent and will not increase with the growth of the city. If land values increase, taxes will increase and the size of lot formerly economically suitable to the income of the owner will become an economic burden. By planning for permanence rather than for convertibility and by permanently restricting the land by deed and by zoning to the type

and intensity of use for which it is devoted and is most suitable, it should be possible to alter the present tendency to change to a more and more intensive use, with increasing land values but depreciated building values and with a sacrifice of all community values.

In determining lot and housing standards consideration should be given to the probability of a continuance of the trend toward higher wage and living standards. The benefit of the doubt should be given to the wider rather than to the narrower lot, to the larger rather than the smaller play-park area, and to the lower rather than the higher housing density.

The trend toward higher housing densities should be resisted. It is easy to increase density, but very difficult to lower it after the higher density has become normal to a community. The higher densities create correspondingly higher acreage and lot values. The density cannot usually be lowered without decreasing the existing land values. This is always difficult and generally impractical.

With present normal densities (5 to 6.5 houses to the acre) it is entirely feasible by careful planning to provide generous play-parks and other community features without increasing the cost for land. The danger is that with the economic urge for more lots to the acre, density will so increase that there will be little leeway for the securing of desirable community features without disrupting the scale of land values that will have been produced by the greater density.

The present normal density of about six houses to the gross acre for low- to medium-cost houses is a reasonable density and one making feasible the provision of a liberal percentage of play-park area. If it is found to be necessary to increase this density to around eight houses to the acre, it should be accompanied by a requirement of at least 20 per cent of the gross area for play-park purposes. If by the construction of row houses the density is increased to twelve or more families to the acre, the percentage devoted to park and play areas should also be increased.

Considering the requirements for light and air only, the width of the open space between houses front and rear should be two and one-half to three times the height of the house. The minimum depth of the lot should, therefore, depend on the height of the house, the width of the street, and whether the lots are arranged back to back as in the ordinary block. At least 70 feet front and rear between houses will be required for the two-story house, and 80 to 100 feet for the two-and-one-half- or

three-story house. Assuming adequate front and rear open spaces and assuming the dwellings are not more than two rooms deep or more than two stories in height, a side open space of about 10 feet between dwellings seems reasonable as a minimum requirement.

Even with adequate playgrounds located within a quarter of a mile of each house, the street will still be the place for short-time, near-by play, unless on-the-lot or interior-block play space is provided. Such near-by space is especially needed for the children of pre-school age. It should be available also for the short-time, out-of-door needs of the children of school age and of adults. For the low- or medium-cost house the required open space can probably be provided most economically and effectively in an interior-block play-park arranged for the common use of all the houses in the block. The amount of space desirable for the interior-block play-yard cannot be stated precisely in terms of space per family or in terms of minimum length or width. It should be large enough to allow a border of planting and to provide an interior greensward having a minimum width of possibly 50 feet. However, 150 or 200 feet is obviously better.

The private garage located on the rear of the lot takes yard space that might advantageously be used for garden purposes. The unsightly garage rows are a great injury to the amenity of the neighborhood. The cost of constructing garage driveways on each lot eighty feet or more in length seems a foolish waste. It will add immensely to the appearance of the block as well as effect a considerable saving in driveway cost to segregate the garages in well planned clusters in the interior-block open space created by widening the block and shortening the lots.

Of the seventy-three cities studied, 61 per cent of the total number of families live in houses, flats, or apartments, the investment value of which does not exceed $4000. In many cities no considerable number of houses are being constructed within this limit of cost. In many cities where a considerable number of such houses are constructed, they are either not modern in their appointments or they are not served by some essential improvements such as sewers or paving. Even the $4000 house will only be within the reach of perhaps one-third of the 61 per cent of the total number of families whose housing demands range up to and include the $4000 mark. It seems probable, moreover, that for these lower-income families the small garden-type apartment may be a more practical solution of housing needs than the individual house.

An increasing number of families either from choice or economic

necessity will, if available, take a two-, three-, or four-room apartment rather than a four-, five-, or six-room house. Any neighborhood unit for low-cost housing should normally provide for a considerable proportion of the families in small apartments. These apartment buildings, however, should be built on the edges only of very broad blocks, with large interior-block play-parks.

In the seventy-three cities studied, only 47 per cent of the families live in single-family houses. On this basis a neighborhood unit should provide for about 53 per cent of its families in smaller and less expensive quarters, probably in two-, three-, and four-room apartments. The percentage of apartment dwellers from choice will vary in different communities and in different sections of the country, but it is at least clear that with present wage standards, living costs, and housing costs, it is impossible to build good single-family houses for the 36 per cent of the families who can spend for housing (not including heat) not over $300 a year.

In permitting or encouraging the apartment house in connection with the neighborhood unit, care should be taken to permit no greater density of families in the apartment area than is economically required. Any density that will result in a material increase in land values should be avoided. The increased land values will tend to thwart the purpose of securing low-rent apartments. The apartment buildings should be but two rooms deep and each apartment should be a through apartment. The space between buildings front and rear should be two and one-half or three times the height of the building. The interior-block play-park should be not less than 200 feet in width and should occupy not less than 33 per cent of the gross area.

ECONOMIC DENSITY OF LOW-COST HOUSING IN ENGLAND

By

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PREFACE

One of the most important phases of the housing problem is how to build new houses for the large proportion of families whose joint incomes range from $1750 to $3000 per annum in American cities, and from $800 to $1600 per annum in English cities. This proportion does not include those families who are unable to pay an economic rent for reasonably good accommodation, and whose problem requires social re-adjustment on broader lines than is involved in building or improving houses. And yet a great part of the self-sustaining majority of the population cannot afford new houses under present conditions. They are able to obtain accommodation only in what may be called "used" houses. The question of the improvement of these used houses is another important phase of the housing problem.

In connection with both the problem of building new houses and improving old houses there is need of more knowledge of underlying economic conditions. This is particularly so in regard to the costs of land development and the necessity or otherwise of the unhealthful densities of building that are allowed to prevail in large cities. This knowledge must be built up from the study of concrete facts and definite figures relating to both house-building and land improvement in different countries. Always bearing in mind the essential difference between American and foreign conditions, there are valuable lessons to be derived from the comparative study of housing in different countries.

This report deals with the elements of cost that enter into the building of houses for the groups of lower income in England. The facts it presents will have a value in studying any phase of the housing problem as well as important phases of city planning in the United States.

The areas which have been the subject of study are not neighborhoods in the broad sense that connotes some definite section of a city with its own community life. They are parts of neighborhoods or parts of towns, with sufficiently well-defined boundaries to enable them to be studied as units of development, and having their costs so well known that every element in them can be classified with a high degree of accuracy.

T. A.

Cambridge, Massachusetts
December, 1930

Adams, Thompson and Fry, London, Architects

PLATE II. LOCAL STREET AT KEMSLEY, KENT

CHAPTER I

INTRODUCTION

The objects of this study have been, first, to give a summary of housing policies and developments in England before and after 1914, and second to show as a result of inquiry into specific cases the densities that are considered to be socially desirable and economically practicable in urban areas in England.

GENERAL CONDITIONS

To obtain a proper understanding of the economics of the house or of the development of neighborhoods of houses, we must have some knowledge of the basis of national or state policy and law under which houses are erected and housing schemes are developed. This is so in a special degree in those countries where there is state-aided housing, with the ramifications which this involves in connection with overlapping and sometimes conflicting public and private enterprise. This report, therefore, begins with a brief but comprehensive summary of housing legislation and conditions in England, prepared with the assistance of Mr. William Loftus Hare. This summary will give the student of the data presented later in the report the background necessary to understand the character and progress of housing legislation and the extent and influence of government aid in England. This background must be kept in mind in any consideration of comparative conditions in America and England.

STUDIES OF CONCRETE CASES

The main object of the study, however, has been to obtain information regarding concrete cases. In seeking accurate information it has been necessary to confine investigation to those places that have been developed more or less scientifically. This has meant that studies had to be confined to a few selected areas. Data are given regarding five of the chief housing enterprises of the London County Council. These comprise the following projects.

(1) Bellingham
(2) Castelnau
(3) Downham
(4) Norbury
(5) Becontree

The particulars of costs and rentals in these schemes are taken from the reports of the County Council, and the description of conditions given in these reports has been confirmed by investigation on the ground.

In eight cases special detailed investigation has been made. These consist of neighborhood developments in the following places.

(1) Letchworth Garden City (four areas)
(2) Welwyn Garden City (two areas)
(3) Kemsley Industrial Village (one area)
(4) Lambeth, London (one area)

In comparing American and English conditions it is essential to bear in mind certain differences in language. For instance, in England it is customary to use "plot" instead of "lot," "layout of estates" instead of "subdivision," and "leveling" instead of "grading."

The problem to be specially studied was put to the writer in the form of this question: How thinly can an urban population under English conditions be spread and still meet the cost of complete development of the land, of public services, and of adequate housing?

FACTS OBTAINED AND ANALYZED

Information respecting costs of housing, obtained in the study, is summarized in this report and deals with:

(1) The cost (exclusive of cost of land) of building an adequate 4-room, 5-room, or 6-room house for families in the groups of lower or medium income.
(2) The relation of the cost of the three elements of (*a*) lot, (*b*) local improvements, and (*c*) building.
(3) The size of the lot necessary to admit sufficient light, air, and sunshine to the house.
(4) The size and cost of the lot and the house, and the character and cost of such public services as streets and sewers which may be provided without imposing too heavy a burden on the class of persons for whom they are designed.
(5) The cost of street developments, of sewerage, and of other public utilities under different systems of planning.

OMISSION OF WATER AND LIGHT SUPPLY IN ESTIMATES

As it is considered that the supply of water, electricity, gas, and similar commodities should be self-supporting, it has been thought to be unnecessary to consider their cost in working out the estimates in this report. The fact that these commodities are supplied by semipublic agencies does not lessen the fact that they are usually supplied on a commercial basis. At the present time a great part of the water supply in particular has been taken over by the municipalities but it is recognized that such undertakings should pay for themselves. This is certainly so in English cities, and the question of the cost of water and light has therefore been ignored in the present studies.

COMPARISON BETWEEN AMERICAN AND ENGLISH CONDITIONS

One difficulty that has presented itself in making studies has been to ascertain what is the best type of house to investigate in regard to cost. Great differences exist between the cost of houses of the same size and there is a wide variation between the houses built and used by the groups of lower and medium income.

It became obvious, before going far with this study, that no accurate comparison could be made between American and English incomes. Therefore there is considerable difficulty in making comparisons in regard to cost of the different elements that enter into the building of a house. Money has a different value in the two countries and a comparative study of housing conditions to be really satisfactory would have to be based on an economic investigation of a great many complicated facts. In the studies made in England the writer has confined himself to workingmen's houses except in one case at Letchworth, where one development relates to houses for the better-paid professional classes.

In considering what should be sufficient light to give a good standard it has been assumed that no dwelling for occupation should be more than two rooms deep for the main building. If parts must project outward in front or rear, these projections should be so limited in depth and width as to prevent any living rooms being dependent on indirect light. It is also assumed that the main front and rear walls of every building should have an angle of light of not less than 45°; that is, the open space in front and rear should have the same depth in feet at right angles to the walls as the height of the walls. This should be an absolute minimum; a desirable condition is to have an angle of light of 27° by requiring that

the space opposite a building shall be twice as deep as the height of the building.

In England as in America there are complications in regard to the provision of public utilities and the manner in which the costs of these are distributed. This is one reason why it has been necessary to obtain accurate and detailed data of all the costs involved in building and development. It is always necessary to bear in mind the distinction between the methods of taxation that prevail in England and in America. Local taxation in American cities is based on the capital value of the land. This capital value represents what the assessor regards as its market value for the most productive purpose for which it can be used. Its market value may vary from fifty per cent to one hundred per cent of its real value, and the greater part of the value may be a potential value for future use and not a value based on existing use. In England local taxation is called "local rating." Local rates are paid on the estimated annual value of property after deductions for repairs, etc. The assessors decide what is the net annual value and it is on this that the local taxes are levied. The basis of the local taxation is the existing income from the property. There is a distinct connection in England between local rates and housing. To get at the full rent of the house all the annual costs including rates need to be pooled and the only safe way in estimating rents is to include rates. A satisfactory house could not exist without the services provided by the municipalities, such as sewage disposal, public roads, policing, scavenging, etc. Thus, the estimate of rental value should include the cost of these necessary services. It is obvious that one of the difficulties in comparing different conditions arises from the different quality of the municipal services. In one place they may go far beyond what they do in another place in efficiency and provision for healthfulness.

In the English inquiry it has been necessary to limit the study to areas near to and within London where precise information is available. One of the inquiries relates to the London Borough of Lambeth. This Borough is separated from the central Borough of Westminster only by the River Thames. As examples of housing in outlying communities, figures have been obtained for a number of areas in the garden cities of Letchworth and Welwyn and in the industrial village of Kemsley. It is necessary to take these figures with caution in comparing them with cities and towns of large size.

Letchworth is a self-contained town 34 miles from London, having

many industries and about 15,000 inhabitants. A small part of its population travels daily to and from London. Welwyn is of the same character as Letchworth with about half the population; but a greater part of its residents commute to London which is seventeen miles distant. Kemsley is an industrial village in the county of Kent lying near to other small towns but constituting an independent unit of development. For comparative purposes with American conditions the areas selected in England would be typically as follows.

Lambeth as an inner residential suburb of a large city

Welwyn as a combined commuting and industrial town seventeen miles from a large city

Letchworth as a self-contained industrial and residential town of 15,000 people, and

Kemsley as an industrial village centered around one plant.

CHAPTER II

SUMMARY OF HOUSING LEGISLATION AND CONDITIONS IN ENGLAND

Prior to the Great War the large majority of houses in England were built by private enterprise. Since the War both the national and the municipal governments have become involved in extensive schemes and enormous costs for subsidy of houses. But it should be borne in mind that municipalities have had experience of building and owning houses in England for many centuries. Powers were given to municipal authorities in the reign of Henry VIII "to rebuild the house property in the towns which had fallen into disrepair and confusion, owing to the wars of succession and such property in a considerable number of cases fell into the hands of the local authorities." [1]

PUBLIC HEALTH AND HOUSING ACTS

Lord Shaftesbury in the fifties first impressed the English people with the importance of better housing as a means of improving moral and social conditions, but it was not until 1890 that the first effective Housing Act was passed. The Public Health Act of 1875 was, however, an important contribution to housing and sanitary reform. This act — with subsequent amending acts — has since been the charter of sanitary improvement in England. It made the municipal authorities responsible for securing proper sanitary measures in their areas. An Artizans and Labourers Dwellings Act was also passed in 1875 which gave the power to towns having a population of 25,000 and over of acquiring property for the purpose of dealing with unwholesome areas.

ROYAL COMMISSION ON HOUSING OF 1884

In 1884 a Royal Commission was appointed to inquire into the housing of the working classes, and of this Commission King Edward VII (then Prince of Wales) was an interested member. The Commission recommended *inter alia* that

[1] "Housing," pp. 12 and 13. By Alden and Hayward. London, Headley Brothers, 1907.

(1) Municipal authorities should be made responsible for securing that no premises be allowed to exist in an insanitary state.
(2) There should be more efficient supervision and inspection of the sanitary conditions of dwellings.
(3) Municipal Councils should have greater facilities for erecting workmen's dwellings.
(4) Vacant sites (not taxed in England except for brief period since 1909) should be taxed on 4 per cent of their selling value.
(5) Municipal Councils should have more power to acquire land compulsorily for erection of houses.
(6) Cheap government loans should be made available for housing schemes.

BUILDING BY-LAWS IN BRITAIN

One result of the British public health legislation of 1875 and subsequent years, worthy of note, was the securing of comparative uniformity of building by-laws throughout the whole country. Under these acts, model by-laws dealing with buildings, and with sanitation and local improvements suitable for urban and rural districts, respectively, had to be framed by the government department — the Local Government Board, now the Ministry of Health. The Board had to approve all local building and sanitary by-laws, and distributed its model regulations as an indication of what it would approve. Associations of Municipal Councils and officers were consulted with regard to the regulations which, when finally drafted, represented the considered views of the experts of the central and municipal governments. These by-laws were adopted by the majority of Councils all over the country and thus there was established a general and nearly uniform code suited to the different requirements of urban and rural districts.

The by-laws were concerned with the cleansing of streets, the removal of house refuse, the cleansing of privies, cesspools, etc., the prevention of nuisances, the regulation of common lodging houses, the width and construction of streets and pavements, the character of building materials and form of construction used in buildings, open space around buildings, ventilation, drainage, the submission of plans for new streets and buildings, etc. Those relating to buildings sought to secure the following objects:

1. Prevention of damp through defects of site or improper construction.

2. Adequate air space within and surrounding the dwelling.
3. Prevention of fire, and sound and safe construction.
4. Adequate means of ventilation, and proper drainage and sanitation.

There has been a great deal of controversy in England as to the inadaptability and lack of elasticity of the by-laws during the forty years that they have been in operation, but on the whole they have met with approval and secured satisfactory results in connection with sanitation.

The Ministry of Health gives a draft model set of by-laws to any Council wishing to adopt by-laws; the Council fills in the blanks, and submits the completed draft to the Ministry for revision and finally for confirmation. When the by-laws are once confirmed, they cannot be altered at the will of the Council, but only after approval of the Ministry on good reason shown.

As long as the central authority frames its model form in consultation with properly accredited representatives of the municipalities, and the uniform code is the result of the combined and deliberate views of both the central and the municipal bodies, no objection can be taken to this method on the ground that it is an interference with local autonomy. On the other hand, the uniformity of regulation is a great gain, since it also creates a uniformity of standard and prevents the backsliding and indifferent Local Authority from having a lower standard than its progressive neighbor.

Moreover, the benefit of having the expert guidance of a central authority, with its knowledge of mistakes and practical difficulties of application, is very considerable. Local Authorities, without this guidance, would develop their code of by-laws as a result of separate and isolated experiences. When a code consists of one general by-law with numerous later amendments, it becomes unwieldy in bulk and consequently difficult if not impracticable to enforce. The building code of an English city consists of one small pamphlet accessible to and easily understood by every citizen.

REGISTRATION OF COMMON LODGING HOUSES

Among the provisions of the Public Health Acts were those requiring all municipal authorities to control common lodging houses. Under Sections 76 to 88 of the English Act of 1875, common lodging houses have since had to be registered, and those that are not suitable are not regis-

tered and are prohibited. Regular inspection has had to be made to secure that conditions are sanitary, that air space is adequate and water supply ample, and that no overcrowding is permitted. In 1898 there were ninety-one convictions in Manchester for not sweeping or washing floors and forty-seven for overcrowding, showing that the Act was carefully administered. Underground dwellings were also prohibited under the Act.

THE ACTS OF 1890, 1899, AND 1900

Under the Housing Act of 1890, unhealthy areas — *i.e.*, areas declared by the Health Officer to have houses unfit for human habitation — could be cleared of houses and an "improvement scheme" carried out. Fair market value had to be paid for the property destroyed and the result was that few clearance schemes were carried out, owing to the prohibitive cost of acquiring the slum property. Part II dealt with small slums and provided for periodical inspection, closing, and demolition of insanitary dwellings, removal of obstructive buildings, and reconstruction of small unwholesome areas.

Part III of the Act gave Municipal Councils power, if adopted, to acquire land compulsorily for building new houses. This land could be leased to industrial companies, landowners, private companies, builders, or workingmen, or used for building schemes by the Councils. Money for housing schemes could be obtained from the Public Works Loans Commissioners or on the issue of bonds on the security of the rates (taxes) with the consent of the Local Government Board. The period of repayment had to be less than sixty years. The principle on which this part of the Act was based in providing for the acquisition of land for housing schemes as a preliminary to the lending of public money for building is proved by experience to be sound.

The Housing Act of 1900 amended the Act of 1890 to enable Councils to acquire land for housing schemes outside their own areas.

SMALL DWELLINGS ACQUISITION ACT, 1899

As already stated, this Act has had for its object the advancing of money by the Government and through the Municipality to persons desirous of acquiring their own homes. County Councils, County Borough Councils, and other municipal authorities have had the power to adopt the Act and make advances to residents or intending residents of the houses to be acquired. Houses on which advances could be made

had to be of a value not exceeding $1920 [1] (the cost of erection in 1899 would be about 50 per cent less than at the present time), and had to be in good repair and in a sanitary condition. The extent of the advance was limited to four-fifths of the market value and in any case not to be in excess of $1440. The repayment of the advance had to be secured by the amortization of the property to the Local Council with right of redemption by the borrower. The rate of interest had not to exceed one half of one per cent above the rate that could be borrowed by the Public Works Loan Commissioners. Repayments could be spread over a period of thirty years. Punctual payments of principal and interest had to be made at regular periods and houses had to be kept in good condition. The owner had to reside in the house, but could transfer his interest if he desired to move.

The Act afforded an alternative method of acquisition to that available through the channel of the ordinary building society, and the rate of interest at which money could be borrowed for many years after it was passed (3¼ per cent) and the long period permitted for repayment made it seem on the surface to be — as its promoters heralded it to be — a great and beneficent measure of reform. The Municipalities, however, did not show much disposition to use the Act, while purchasers of small houses have, in any case, preferred to use their local building societies with their elasticity of administration, their helpful advice, and their willingness to advance even more than four-fifths of the value of house and land where they are satisfied with the character of their client, even though the rate of interest charged was 4 and 5 per cent.[2]

In spite of the attractive terms offered, the Act has nearly been a dead letter, one district alone having used it to any extent. According to figures supplied by the Public Works Loan Commissioners, the amount sanctioned for loans under the Act up to March, 1916, was $391,048, about half of which was spent between 1913 and 1916.

OBJECTS OF ACTS PASSED PRIOR TO 1900

The English acts up to 1900 had four objects in view: first, the prevention of overcrowding and nuisances in existing dwellings, and the enforcement of sanitary and building by-laws; second, the demolition or

[1] For convenience and simplicity of calculation the English penny is taken, in this report, to be equivalent to 2 cents, and the English pound sterling to be worth $4.80. The present value is about $4.86.

[2] The growth of Building Societies in England is shown by the fact that new capital increased to about $1,500,000,000 in 1929 as against about $317,000,000 in 1914 and $296,000,000 in 1900.

alteration of unwholesome dwellings; third, the acquisition of land at a reasonable price and building of new houses; and fourth, the lending of government money at a low rate of interest to enable persons to purchase their own houses.

The first of these objects has been carried out with some measure of success and has greatly improved the sanitary conditions and durability of dwellings, but has left much to be desired in regard to the provision of air space around dwellings and the general amenity of their surroundings. Comparatively little slum clearance has been effected, because of the expensive character of this class of improvement. Experience before the War showed that it was no solution of the housing problem to replace the insanitary slum with the sanitary barracks or "rookeries," sometimes called model tenements. But some of the tenement buildings erected under the Housing Acts in London as in other large cities have been of a comparatively wholesome type, as well as a success from a financial point of view.

When the erection of dwellings in the crowded centers of cities, where land is dear, is absolutely essential, it is usually necessary to erect tenement dwellings, but the English view is that the utmost limit should be placed on the investment of public money in this type of housing. Where such dwellings are permitted, they have to comply with stringent regulations regarding height and density and be comparatively fireproof.

INFLUENCE OF GARDEN CITIES

When in 1909 the Housing, Town Planning, etc., Act was passed, a new direction was given to housing reform by linking it up with town planning. This liaison between housing and town planning originated mainly with the idea propounded by Ebenezer Howard for the creation of Garden Cities. An actual demonstration of his idea was begun in 1903 with the foundation of the first Garden City at Letchworth, Hertfordshire, thirty-four miles from London, on a site of 3800 acres acquired for the purpose. The area of the site has since been increased to 4500 acres. The cost of acquisition was about $192 per acre.

The principles and methods on which it was formed included (*a*) the purchase and planning, combined with common ownership, of a large agricultural estate for the establishment of a new town; (*b*) the attraction to the town of industries and the building of houses for workers with ample space about them; and (*c*) the preservation of an agricultural belt of land surrounding the town. Dividends on the original capital invested

were restricted to 5 per cent and all surplus profits were to be used for the benefit of the community.

The story of Letchworth, if it were here told in full, would begin with a survey of "prehistoric" conditions at the end of the last century. Three village parishes, sheltering 277 persons, have been transformed into a flourishing town of nearly 15,000 residents, dwelling in 3630 houses and cottages, situated upon twenty-two miles of roads. Of the resident population 4000 work in 100 factories and workshops or serve in 160 shops. There are eight schools and seventeen churches, while sport and rest have 278 acres reserved to their use in twenty-three open spaces.

The town pumps its own water supply, makes its own gas, generates electricity for itself and its neighbors. There are a hospital, many health services, a library, a museum, a swimming bath, and several literary clubs. Several public halls serve the intense politicians and — as the Letchworth *Directory* tells us — there are establishments where American visitors can be served with certain beverages, legally. Otherwise, the town endures a limited local option persistently and happily.

Another Garden City has been established at Welwyn also in Hertfordshire but seventeen miles nearer to London than Letchworth. It has attracted many industries and achieved substantial growth.[1]

The revolution in public opinion which followed the discussion and demonstration of the Garden City schemes is indicated by the fact that an average density of twelve houses to the acre is now accepted as a reasonable and economic density of houses in all areas being developed since 1909. An explanation of certain economic factors involved in this change is presented in the final chapter.

It is now proposed to give a brief account of the following matters as they are concerned with Housing in Great Britain.

I. The Legislation
II. The Accomplishment in respect to Housing by this Legislation
III. Unhealthy Areas

LEGISLATION

Particulars will be given hereafter of the relatively small housing accomplishment by Government resulting from the Housing, Town Planning, etc., Act of 1909[2] and during the war period of four and a half years, and we now give a short account of the effects on housing of

[1] For description see "The Building of Satellite Towns," by C. B. Purdom.
[2] Later known as The Town Planning Act.

Cul-de-sac Square at Welwyn

Cul-de-sac Street at Welwyn

PLATE III

the amended Act of 1919 which was passed in an atmosphere of great generosity and national enthusiasm.

The duty of preparing housing schemes and of carrying them out was laid upon "Local Authorities," which in England consist of the London County Council for London, Metropolitan Boroughs, County Boroughs, Urban District Councils, and Rural District Councils. These were requested to make a survey of their housing needs, and to report to the Ministry. After the preparation of schemes and the adoption of a new standard as to housing accommodation (cubic feet per house and density of houses per acre) and the approval of the schemes by the Ministry, a Local Authority was to let contracts to builders, house the tenants in their respective areas, and draw the rents therefrom. The total annual cost of the scheme was put against an annual income, and the whole of the loss was to be paid from time to time by the Government.

In the same year the Additional Powers Act was passed to give a lump sum subsidy of $1161.60 to private builders of houses.

These two laws of 1919 are known as the Addison Acts, and during the year 1922 as the cost of the house construction and the consequent heavy subsidy were so great, fresh building under the provisions of these Acts was terminated. It should be remembered that the principal 1919 Act included provision for town planning more extensive than that of 1909: namely, every Local Authority with a population of over 20,000 persons was required to adopt the provisions of the Town Planning Act, while other Local Authorities might do so, voluntarily. It may be here stated that, at the time of writing, the town planning schemes in preparation are in number, respectively, mandatory 411, voluntary 457. These figures demonstrate the popularity of town planning in Britain. A goodly number of the houses built under the Addison Acts naturally fell into town planning schemes, and many of the large towns began to be increased in their urban areas, while some extended their boundaries.

In 1923, with the change of government, the Housing, etc., Act was passed, and, continuing the general obligation on Local Authorities, it made fresh financial provisions for their assistance. A fixed subsidy of $28.80 per annum for twenty years was to be given to the Local Authority erecting an approved house in an urban or rural area. The like amount was also given to builders erecting houses for private persons who could show that they would not be able otherwise to build a house. The Act contained provision for the reduction or termination of this subsidy at certain stated periods, and the subsidy was some time later reduced to

$19.20 per annum, and in 1929 it was withdrawn altogether as it was believed that the type of person being served by this Act had received almost all the assistance that was necessary. This housing law is known as the Chamberlain Act.

With the further change in government was introduced the Housing (Financial Provisions) Act, 1924, under which the provisions of the Chamberlain Act were continued, but further efforts were made to help poorer persons and to build houses in rural areas for the workers there. Strict clauses were drawn to insure that the subsidy proposed should benefit the working classes by the fixation of a relatively low rent. The subsidy per dwelling was $43.20 per annum for forty years for Local Authorities and to builders by private enterprise. After some controversy, as with the Chamberlain Act, this subsidy was reduced to $36 at which it now stands for both categories.

Under the same enactment a subsidy of $60 per annum for forty years was given for houses built in rural parishes, and this again was reduced to $52.80, where it now stands in both England and Scotland.

This law is known as the Wheatley Act.

ACCOMPLISHMENT

It would be convenient to state here the accomplishment of the several Acts referred to above.

	Act	Houses
(*a*)	Between 1890 and December, 1909	9,423
	Between 1909 and 1918, including the war period	13,477
(*b*)	Under the Addison Act by Local Authorities	174,637
	Under the Addison Act by Private Builders	39,186
(*c*)	Under the Chamberlain Act by Local Authorities	36,633
	Under the Chamberlain Act by Private Enterprise, approximately	400,000
(*d*)	Under the Wheatley Act by Local Authorities	286,740
	Under the Wheatley Act by Private Enterprise	4,192
	(Included in this Act there have been erected in rural parishes, houses as follows: —	
	By Local Authorities	18,080
	By Private Enterprise	1,607

(*e*) The Acquisition of Small Dwellings as above said takes place under several Acts, and the figures issued officially to March, 1930, show that 145,724 houses have received grants or guarantees to assist in their acquisition.

(*f*) During the pre-war and post-war periods, unassisted private enterprise was active, and the remarkable output in both periods is not generally known. From 1900 to 1914, about 1,000,000 working-class houses and 400,000 middle-class small houses were built by unassisted private enterprise. During the war period, building of private or municipal homes was entirely stopped but the Government undertook, as in America, the erection of some housing schemes for the purpose of accommodating munition workers. Townships at Gretna and East Riggs in Scotland, Well-Hall and Roehampton near London, resulted from this effort. The Scottish development was remarkable for its thoroughness, and it was considered unfortunate that after the war no good use was made of the new towns.

From 1919 to March, 1930, unassisted private enterprise has accomplished the totals of 388,564 houses rated at $124.80 or under, and 149,054 houses rated above that figure.

(*g*) The grand total for post-war small houses in England, Wales, and Scotland is 1,439,400, assisted and unassisted.

(*h*) The cost of house building has been a matter of some anxiety to the government and the Local Authorities, and steady efforts have been made in a number of ways to keep it down. At the beginning of the Addison operations houses built under the principal Act cost on an average $5184 each, owing largely to the absence of control over the cost of building material and labor in the period immediately following the war. In 1923 the parlor house came down to $1958.40 and the non-parlor house to $1680 largely owing, it is believed, to the reduction of the government contribution. With the introduction of the Chamberlain subsidy, followed by the Wheatley subsidy, the cost went up per house to $2337.60 and $2131.20 respectively. At the time of writing it is $1886.40 and $1656 respectively, which again follows the reduction and partial withdrawal of the government subsidy on September 30, 1929.

(*i*) It is difficult to estimate precisely the financial commitments of the State in respect to government housing, but the following figures can be confidently given up to September, 1920:

Subsidies payable under the 1919 Act, not less than	$1,920,000,000
Subsidies payable under Additional Powers, 1923 and 1924 Acts	660,100,078
	$2,580,100,078
Subsidies *paid* under all Acts for England, Wales, and Scotland	$396,583,540

(*j*) According to the Annual Reports of the Ministry of Health, the average rent for houses built by the Addison Act is $2.28 per week, and the Chamberlain and Wheatley Acts $2.40 per week. Rates levied by the Local Authorities vary somewhat, and are added to these figures.

Since the war there have been several Acts restricting the rising of rents for houses belonging to Local Authorities or private persons, and an acute controversy has occurred, and has not yet subsided. Private interests desire the restriction removed so that they may undertake building which will, they think, yield them an economic return; on the other hand, tenants and especially the poorer class are protected by the Acts against a rise in rent.

UNHEALTHY AREAS

The foregoing paragraphs deal with the building of new houses, but a very large part of the British problem consists in getting rid of old, worn-out, and unhealthy house property. It is perhaps a curious fact that in almost every category of manufactured goods and mechanical constructions, it is realized that they wear out, and means are taken for their disposition at the appropriate time. But in respect to houses, though it has always been known that they, like everything else, must wear out, yet little or no foresight was exercised, so far as can be traced from the early part of the 19th century onwards, as to how to deal with worn-out houses when the time of their economic and physical death should occur. Even in spite of the experience of seventy-five years of slum study, it may be boldly said that no thought has been given to the question which will face the country in sixty or eighty years' time, when the life of a million and a half cottages, lately built, comes to an end.

Houses built for the accommodation of the working classes in large towns in Britain during the 19th century, and even during later decades of the 18th century, still stand, and are now surrounded by large areas of houses slightly larger and somewhat superior to them. They are further penetrated and overshadowed at every conceivable opportunity by factories, warehouses, workshops large and small, breweries, gas works, tanneries, and railway stations, from which termini overhead railway bridges run in every direction. All these modes of industrial penetration make these dwellings less and less desirable, lower their value, and make them not worth keeping in proper repair. As the value of the house depreciates, the value of the land increases for possible industrial purposes. Further than this, the hard wear of the working

classes reduces the houses in many cases to a condition known in the popular term "slums." The houses are dirty, infested with vermin, and deficient in sanitary conveniences which modern standards demand.

Estimates have been made from time to time as to the number of such houses and of the population inhabiting them, and there may easily be more than a million houses of this class which are unfit for habitation, and as many as three or four million persons in them. Besides this, there are certainly millions of people living in overcrowded areas in houses that are not actually unfit, but that cannot properly provide for three or four families the accommodation and convenience that was originally intended for one.

The figures supplied by the Ministry of Health describe the progress since the issue of Orders for Improvement Scheme, which follow upon minute and very numerous demands upon the owners to make good defects which are observed by the inspectors. Throughout the period from 1919 to March 31, 1930, only 10,217 unhealthy houses had been officially demolished requiring the re-housing of 78,071 persons, and 10,639 houses have been completed to effect this. The general opinion is that this small result is due to the fact that the authorities dare not condemn and demolish slums because there is as yet not sufficient alternative accommodation. New legislation has been proposed in an endeavor to meet this case.

CHAPTER III

ELEMENTS IN HOUSING COSTS AND DISTINCTION BETWEEN TYPES OF HOUSES

The planning of land in advance of development is essential to secure sound social conditions, which connote sound economic conditions. In considering how essential such planning is we have to bear in mind the distinction which exists between different elements in the house:

(*a*) The site, consisting of the land on which the house stands.

(*b*) The services or local improvements of the land necessary for purposes of access and proper sanitary conditions. These include streets and sewerage as part of the cost of the house, and water supply, lighting, etc., as self-supporting services.

(*c*) The building.

When it is said that the solution of the housing problem depends on the solution of the land question, this means much more than that the cost of land is an element in the cost of the house. As a matter of fact the cost of raw land in England is a small percentage of the cost of a dwelling as the figures in the appendices show. The reason why land and its development have such an important bearing upon housing is because of the difference between the costs which result from wasteful and haphazard development and those which are the result of well conceived planning.

The planning of subdivisions for residential purposes has to be dealt with not only in relation to topography but so as to serve a multitude of essential needs in the most economic way. The adjustment of the street system to the levels of the land is only one feature out of many which have to do with economic development. Without this adjustment costs of road-making, sewerage, etc., may be double what they should be and may entirely outweigh any saving in buying cheap land or in cutting it up in the largest number of uniform-sized lots.

The economies which can be obtained by good planning include the following:

(*a*) Planning of streets so as to avoid unnecessary grades, lengths, and widths of street. (Great saving can be obtained by adjusting the

street system to the actual needs of traffic as well as to the topography instead of planning it on a uniform pattern.)

(*b*) Utilizing the land that is least adaptable for building for the purposes of providing public open spaces, which should never be less than 10 per cent of any area. (These open spaces would be partly used for attractive landscape features and partly for playgrounds. In meeting modern social demands it is necessary to provide such spaces.)

(*c*) Adjustment of the quality, in terms of materials, of the building to the density, character, and situation of the lots within the general scheme. (More durable construction is necessary in some cases than in others, and in proportion as the buildings are built higher and more densely on the land the construction should be more durable.)

PLANNING AND CONSTRUCTION OF DWELLINGS

In the planning and construction of dwellings for groups of low income there has not been sufficient study given in comparison with that which has been devoted to more expensive forms of building. There is room for a great deal of investigation of the most economic methods of building workingmen's dwellings. It is true that much has been done in experimenting with different materials: brick, cement, wood, steel, etc. It is true also that architects have been studying problems of planning small houses for many years. The need is not so much for new materials as for scientific study of all the elements in planning and construction.[1] In England there is more distinction between requirements in the matter of materials, thickness of walls, etc., between two-story cottage houses and tenement dwellings than is the case in America. This distinction has been such as to help in making the smaller type of dwelling more popular because of being cheaper per room. It has also meant that there has been more experimentation in the building of small houses. On the whole, however, it has not been found that great economies can be effected by using other than the conventional materials of brick and slate, for walls and roofing respectively. Probably any cheapening in the cost of building, subject to the maintenance of the same standards of durability, depends more on improving the methods of using these two materials than it does on the invention of methods to use other materials. In parts of England tiles are much more appropriate than slates and have advantages which counterbalance any slight

[1] See Monograph on Housing, by the author, including appendix by W. Grosvenor Atterbury, being part of Volume VI of the Regional Survey of New York and Its Environs.

increase of cost of using them: only tiles are used at Letchworth Garden City. The cheapest quality of both materials is unsatisfactory and variations in cost between them are largely the result of different qualities.

TYPES OF DWELLINGS

There are three common types of dwelling in England, of which the most popular form is the two-story cottage house erected in groups. In the centers of cities and many suburban districts what is known as the "flat" dwelling, which corresponds to the apartment or tenement dwelling in New York and may be commonly called the multi-family dwelling, is prevalent. The tendency for this type of dwelling to increase in English cities is not so pronounced as it now is in American cities. On the other hand in all parts of the country there has come into existence a bungalow type of house which seems to be a compromise between the multi-family and the cottage dwellings. A bungalow has the advantage of being a detached single-family house. In that respect it is more attractive to many people than the cottage in a group or row. On freehold land it is more salable because of its detached situation. It also has the advantages of the flat in that its main rooms are all on one floor. The general increased cost and difficulty of getting domestic service is an important factor in the increasing popularity of the bungalow for those who are comparatively well-to-do. There are also in London many two-family houses, — that is, two-story flats, — and one of the types which has come into being as a result of converting old four-story houses is called the "maisonette," usually comprising two dwellings of two stories each in a four-story building.

The matter of chief interest in this study is in connection with the building of the cottage type of dwelling. This still remains the most extensively used type of house for workingmen. Multi-family buildings are being erected only where the high prices of land and long-established crowded conditions make it necessary. Under normal conditions for new development both government agencies and private enterprise are developing the great number of housing estates with groups of cottage dwellings. It is this type that has been a subject of investigation in this report and is dealt with in succeeding chapters. One of the reasons why the cottage or small villa type of building has remained popular is the fact already alluded to: that this has been found to be the most economic type when all the factors are taken into consideration and it is decided that an average of twelve houses to the acre is a reasonable density for purposes of health and general welfare.

Small Row Houses bordering Front Open Space at Letchworth

Medium-sized Houses at Letchworth

PLATE IV

CHAPTER IV

TYPICAL HOUSING SCHEMES IN LONDON

Before presenting detailed data for the neighborhoods that have been specially investigated, a brief description will now be given of housing enterprises that have been or are being carried out by the London County Council.

WORK DONE PRIOR TO 1914

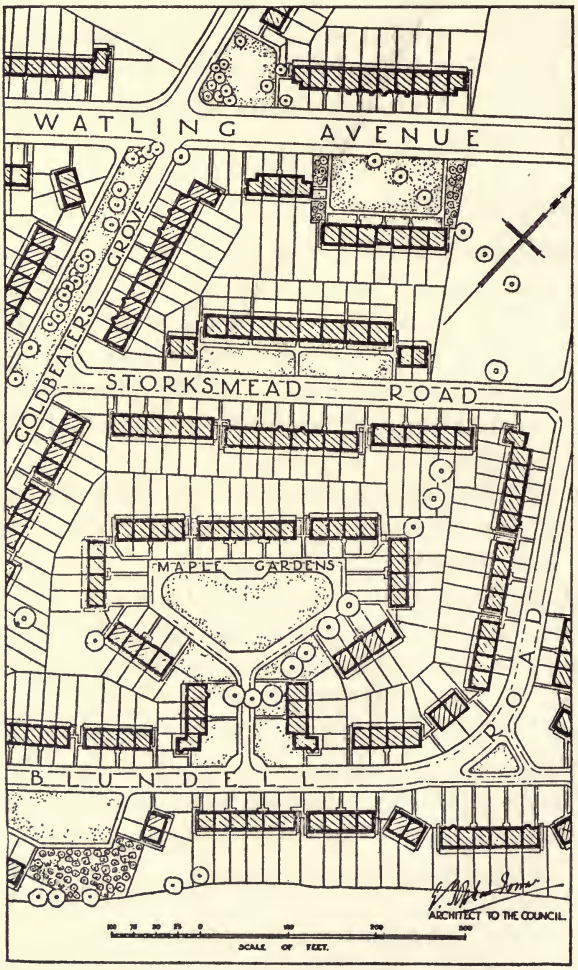
Housing conditions are often especially bad in the capital cities of older countries and possess features that are not typical of the ordinary industrial community. London, however, is rather a congeries of cities than one city. Its housing conditions have been the subject of comprehensive study for more than half a century, and before 1909 several important schemes had been initiated by the County Council and semi-philanthropic enterprise.

In common with all parts of Great Britain, progress in London housing improvement before the war was slow because of the lack of constructive legislation and effective administration.

Before 1914 the London County Council not only carried out expensive re-housing schemes but erected large numbers of cottages in the suburbs. Among the most interesting of its early tenement schemes, and one that shows tenement dwellings under the best advantages, is the development of Millbank Estate, Westminster, on the site of Millbank Prison. This site was acquired at a cost of about $14,000 an acre. The buildings were commenced in 1898 and completed in 1902, making provision for 4430 persons. The whole scheme was well designed and secured air space and durability of structure. In some respects, the best type of block dwellings is better from the point of view of health than the crowded rows of two-story cottages.

Twenty-three re-housing schemes were carried out by the Council in the post-war period. An example of one of these is that carried out for the Tabard Street, Grotto Place, and Crosby Row area. It comprises

18.47 acres, displaced 4593 persons, and involved a re-housing obligation for 2580 persons within the area and 1000 persons outside. The estimated cost of clearance and road works (exclusive of the cost of re-housing) was $1,311,840. The obligation imposed by the law to provide accommodation for those families who cannot be re-housed on the site is an indication of the extent to which it is recognized that the density of population must be reduced where it is excessive. In the above case the persons re-housed were about 56 per cent of the persons



G. Topham Forrest, Architect

FIGURE 20. WATLING ESTATE

Typical Layout by the London County Council.

Tabard Garden Area. View, before clearance, of Boss Court

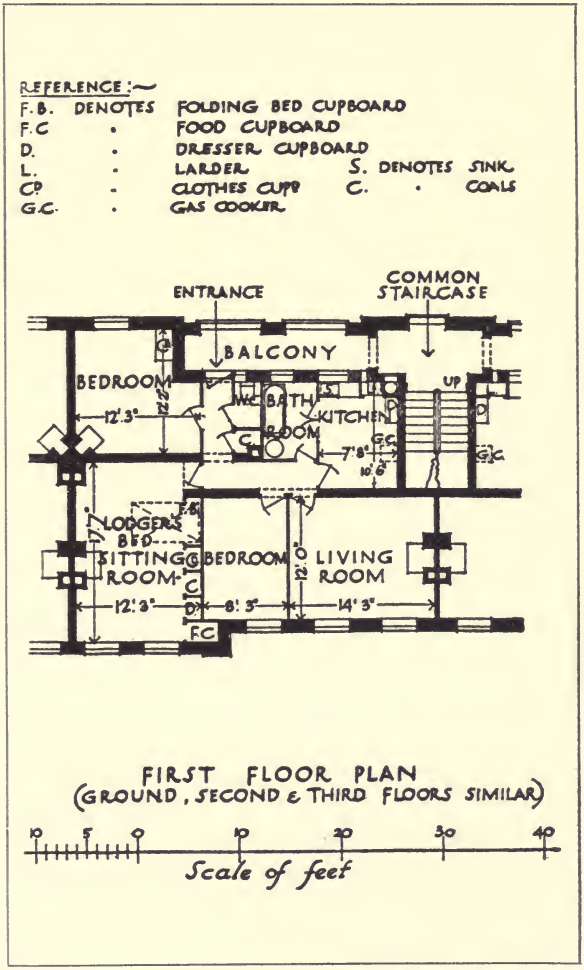
Tabard Garden Estate. Manciple Street

PLATE V. A LONDON COUNTY COUNCIL RE-HOUSING SCHEME IN CENTRAL AREA

displaced. Two illustrations are shown [1] of the Tabard Street area before and after reconstruction.

The Council also developed a number of suburban housing schemes. These were admirably planned and the houses erected were of unusually good quality. But compared to later schemes they had a high building density for cottage estates, due to the high price of land. The number

[1] See Plate V, facing p. 110.



Courtesy London County Council

FIGURE 21.

Typical Plan of Tenement with Extra Room Used for Lodger and Available for Family Use When Required.

of houses per acre ranged from twenty-five to thirty as against eight to twelve in the modern suburban developments referred to below.

DEVELOPMENTS SINCE THE WAR

In the last ten years the London County Council's housing activities have been very extensive. They have now under their control sixty-nine housing estates situated in and around London; their rent roll amounts to about $6,000,000 from 31,500 tenancies, including lodging houses. There are sixteen large estates of which eleven are composed of cottage property while all the remaining estates are composed of block dwellings of flats.

The Council have resolved to prepare eight schemes comprising a total area of 19,217 acres or about thirty square miles, and since the end of the war have erected 22,600 houses and flats containing 86,000 rooms in which it is estimated that over 100,000 persons have been provided with accommodation. Schemes are in progress to supply accommodation for a further 135,000.

These schemes may be divided into two groups: (1) Cottage estates, outside the five-mile radius of the center of London, and (2) Reconstruction of unhealthy districts in the built-up area.

The five following examples may be taken as typical of the former class of development: [1]

(*a*) *Bellingham, Lewisham.* This estate is situated seven miles from the center of London and is 252 acres in extent. At a density of 8.3 per acre, 2096 houses and flats have been built, the total cost of the land, development, and housing being approximately $11,270,000 or $5390 per house. They consist of a mixed type of development of houses of five rooms to flats of two rooms each, the rents, inclusive of rates and water rate, varying according to accommodation from $5.76 down to $3.00 per week.

(*b*) *Castelnau, Barnes.* This is a fairly recent development completed in 1927, five miles from the center of London. The land was purchased for about $2240 per acre. Houses of three, four, and five rooms have been erected and are rented at from $4.20 to $6.00 per week, inclusive of rates.

(*c*) *Downham.* One of the larger developments that has been carried out is eight miles to the southeast of London at Downham, near Bellingham. The density is 12.5 per acre and a system of mixed devel-

[1] For full description, see Housing Report of London County Council, 1928.

G. Topham Forrest, Architect

FIGURE 19. BECONTREE

Plan — in lighter shade — of 2770 acres being developed by the London County Council to house 24,000 families.

Proposed utilization of area

Industrial and commercial sites, 65 acres
Churches and schools, 140 acres
Houses, 1770 acres
Parks, 236 acres
Open cultivated belt, 375 acres
Connecting road and existing residence, 140 acres

opment similar to that of Bellingham has been pursued. The five-room houses rent at $4.80 a week and the two-room flats at $3.12 a week: the four-room type being in the majority.

(*d*) *Norbury, Croydon.* This comprises 28½ acres of land which were bought for about $2200 per acre, the development and erection costs amounting to $1,114,000.

(*e*) *Becontree.* A larger and more important scheme is being carried out at Becontree in the County of Essex. An area of 3000 acres, since reduced by sale of portions to 2770 acres, was acquired and planned. A new station had to be built. A plan of the estate and a summary of the utilization of the land are shown in Figure 19.[1] The types and grouping of houses are illustrated in Plate VI.[2] At the end of 1927, 12,130 houses had been built. When completely developed, accommodation will have been provided for 130,000 persons. It is noteworthy that this scheme involves a large expenditure by the London County Council for the purpose of removing a large part of its population outside its boundaries. This removal results of course in transferring taxable values to the outside area. The size and rents of the houses at Becontree are similar to those on other County Council estates. It is of interest to observe that part of the Becontree estate is set apart for industrial sites. The plant of the Ford Motor Company of England is being erected on one of these sites.

In the general development of all the County Council schemes the following extract from a manual prepared for the guidance of all those concerned in State-assisted developments has been observed:

> The greatest economy in lay-out will depend on full advantage being taken of all the opportunities which the site affords. The location of different parts of the scheme should first be determined, and reservations made for open spaces, shops, and other buildings serving a beneficial purpose in the scheme; these being grouped where possible to form a centre. The lay-out should, in addition to satisfying the utilitarian requirements, develop the order and individual character of a good design. By so planning the lines of the roads and disposing the spaces and the buildings as to develop the beauty of vista, arrangement and proportion, attractiveness may be added to the dwellings at little or no extra cost.
>
> Good exterior design in harmony with the surroundings and adapted to the site should be secured; on sites of varying character, each individual group of buildings will need to be carefully adapted to suit

[1] See Figure 19, facing p. 112. [2] See Plate VI, facing p. 114.

its position, and to take advantage of opportunities as to aspect, prospect, and levels which that position offers. By the choice of suitable local materials, and the adoption of simple lines and good proportion and grouping of buildings, with well considered variation in design and in the treatment of prominent parts, good appearance may be secured within the limits required by due economy.

The standards thus set have resulted in houses of all types having wider frontages and being more commodious than was the case in the pre-war schemes. The houses provide good, self-contained homes. The schemes have been carried out under severe adverse economic conditions and each of them has resulted in a considerable financial loss, paid for partly by the State and partly out of the local rates. The rents charged are normal for this class of property in order to keep the burden to the tenants within their ability to pay.

In the case of one of the London County Council Estates on which 1212 houses have been erected, we get a practical illustration of the valuable principle of mixed development. The land cost was $3360 per acre and part of it was subsequently leased for the erection of larger houses at a profit to the Council.

The suggestions in the Government Manual as to the minimum size of rooms have been complied with and are as follows:

Living room	180 square feet
Scullery	80 square feet
Larder, about	14 square feet
Coal store	15 square feet
No. 1 bedroom	150 square feet
No. 2 bedroom	100 square feet
No. 3 bedroom	65 square feet

Approximately the same sizes were proposed for houses containing a parlor, and for this room an area of not less than 120 square feet was suggested. All the houses have a bathroom either on the ground floor or on the first floor; all the dwellings are supplied with water, gas, and in some cases electricity; and the drainage arrangements are thoroughly sanitary. All the roads on the estates are paved.

The houses were erected under a "value-cost" contract, *i.e.*, the Council undertaking and bearing the actual cost of the work, and the Contractor being remunerated by a fee for his services. Under this

Courtesy of London County Council

Types and Grouping of Cottages at Becontree, London

Cottages at Watling Estate, London, showing Front Yards (See Figs. 23 and 24)

PLATE VI

arrangement economy is effected when changes in the layout during the progress of the work are necessary.

The approximate weekly rents charged on four of the examples of cottage development we have referred to, are as follows:

	2 Rooms	3 Rooms	4 Rooms	5 Rooms
Bellingham	$3.00 to $3.40	$3.50 to $4.60	$4.60 to $5.40	$5.26 to $5.76
Castelnau	——	$4.26 to $4.50	$4.50 to $5.50	$5.20 to $6.76
Downham	$3.05 to $3.25	$3.00 to $4.25	$3.50 to $5.00	$4.30 to $5.20
Norbury	——	$3.10 to $4.50	$3.55 to $5.20	$5.35 to $5.52

These rents vary between rather wide limits according to the average earnings of the occupiers in the neighborhood, and there is no marked difference between those estates outside the five-mile limit and the flats near the center of London, the rents being determined by the ability to pay. The limit is, however, fixed by Act of Parliament at a 40 per cent increase on the pre-war rent of similar accommodation in the neighborhood, and the rents are calculated on this basis.

The new buildings in the schemes for the Reconstruction of Unhealthy Areas usually take the form of flats (apartments) or maisonettes contained in buildings of four or five stories, the majority being of five. The following considerations have influenced this form of construction. In buildings of five stories it is frequently possible to provide, on the same site, sufficient accommodation for all the persons displaced by the clearance of the unhealthy area, at the same time allowing ample space about the buildings for light and air as well as for the necessary courtyards. With cottages a much smaller proportion of the displaced persons could be re-housed, and extra land would have to be found for housing the greatly increased surplus. Another advantage of the five-story building as against the cottage type for central crowded areas is that usually in such areas the surrounding buildings are lofty and the cottages would be overshadowed, with a greater deficiency of light and air per story than with higher buildings. Also the class of tenant in these areas has a preference for apartment flats, chiefly on the ground that they can be managed with greater ease.

The drawbacks often associated with multi-family dwellings — cramped, stuffy, and dark rooms and general lack of sunlight — do not exist in the Council's post-war schemes. Whereas the average number of rooms in the Council's multi-family dwellings estates used to be 250

or 300 per acre, this number has, on the recent reconstructions, fallen to an average of 175. The sizes of the living rooms and of the bedrooms have been increased; every flat has a bath, except in certain cases where two or three small flats share the use of a common bathroom, and the general dimensions are all on a larger scale.

The general arrangement of the multi-family dwellings has been modernized to suit the modern tenant's change in mode of living. In the architectural treatment of the buildings the aim has been to maintain an appearance of domesticity whilst keeping strictly within the bounds of economy. The materials used were brickwork for the walls, the floors being of steel and concrete, with boards in the living rooms and bedrooms, and composite flooring elsewhere; the roof is of timber covered with red tiles.

Many experiments with different materials and different construction have been tried, but in every instance the bids received for brick construction were lower than any other and no economical substitute has yet been found. Built in blocks of four or five stories, the cost of these dwellings works out at about $2256 per dwelling, or $365 per person housed, the limits being $1680 to $2400 each. To these figures must be added the cost of acquiring the site of the unhealthy area and of making any new roads or widening those already existing.

The greater part of the accommodation is provided by self-contained flats (apartments), and the normal type in buildings five stories high consisting of a living room 13′ 7″ × 12′ 0″ and three bedrooms 13′ 0″ × 9′ 0″, 13′ 0″ × 8′ 3″, and 13′ 0″ × 10′ 0″, and kitchen, bathroom, water-closet, larder, and coal shed with full equipment of bath, sink, gas cooker, etc. The rooms are 8′ 6″ high.

Where there are families who are unable to afford the rents charged for the normal type of dwelling, a simplified design is provided. These flats are not self-contained but each group of two or three forms a self-contained unit, every flat having its own scullery and water-closet and gas cooker, and larders are provided in the living room, while they share a wash house with bath tub and hot water boiler.

A third type of flat has a bed sitting room suitable for a lodger as it is found that there is a demand for this class of letting; the room is designed to allow the occupant a varying degree of independence as regards board and service except the preparation of hot dinners.

CHAPTER V

STUDIES OF SELECTED AREAS

Altogether eight areas were studied of which four were in Letchworth, two in Welwyn, one in Kemsley, and one in Lambeth. Three of the four schemes in Letchworth consist of workingmen's houses and one scheme contains single-family houses suitable for professional people of higher income. Full details of the cost of houses and land development are given in Appendix II;[1] information as to character and scope of the data is given in Appendix III;[2] the accommodations of the houses are described in Appendix IV;[3] some general data regarding Letchworth and Welwyn are contained in Appendix V;[4] maps of Letchworth, Welwyn, and all schemes together with sections of roads are illustrated in Appendix VII.[5] Illustrations of houses in all the five schemes of the four areas are shown throughout the report.

The following is a brief description of the different developments.

Letchworth

I. WESTBURY

This development was planned on a gently sloping site and allowed of a rectangular layout with two culs-de-sac. Rather narrower roads have been constructed here, somewhat reducing the development costs, and common drains to several groups of houses with fewer sewer connections have effected an economy. The houses vary a good deal in planning, but are all well designed and approximate very closely to each other in cost.

II. ICKNIELD WAY

This layout is situated near the western boundary of the Garden City and is a Council Scheme intended to house the growing number of working-class people coming to the town as a result of the growth in the number of factories. This part consists of two roads leading off the main road to the top of the hill where they join to form the apex of a triangle;

[1] See Appendix II, pp. 165–169.
[2] See Appendix III, pp. 170–172.
[3] See Appendix IV, pp. 173–175.
[4] See Appendix V, p. 177.
[5] See Appendix VII, pp. 185–199.

the road then continues down the far side of the hill which is to be the scene of a further development on similar lines.

The houses are all of the same type, built in blocks of four and two, and have been erected at a remarkably low cost. The setting back of some of the blocks round a grass "bay" gives quite a pleasing effect and relieves the monotony of the design. They are occupied by working-class people, employed locally, and the rents represent the highest obtainable from this class of tenant in Letchworth, — the Government subsidy amounting to about 42 cents per house per week. They are not a great architectural feature of the estate but are remarkably sound houses at a very low building cost.

III. JACKMAN'S PLACE

This scheme is near the factory district of the town, and the tenants are drawn from the local working-class people who require a good home. Except for the southern corner, the site is flat and a symmetrical layout has been successfully carried out. The house drainage system is a feature here, — sectional drains on the separate system; pipes laid in front and at the back of each block of houses necessitate very few sewer connections. A good deal of variety in the size of the plots will be noticed as it is found that some tenants prefer a small plot while others will not be content with less than 700 square yards.

The houses differ architecturally in many respects but the accommodation and cost of each type are similar, the inclusive rents varying between $3.60 and $4.80 per week or about 25 per cent of the weekly earnings of the tenant.

IV. GARTH

This development lies in the southwest corner of the Garden City overlooking the golf course, across which there are excellent views. It is intended for a good class of residential house, to be erected by the lessee of the land, and is the scene of an interesting layout.

The site slopes gradually toward the golf course, and the internal roads do not have carriageways right through but are connected by footpaths only. It has been found that this construction is popular with this class of house, affording, as it does, road access to each plot without having the disadvantage of through traffic and subsequent noise. Turning spaces are provided for vehicles calling at the houses. Another feature of this development is "The Glade" — a stretch of grass about 100 feet in width with a light road to carry traffic. This forms a pleasing

Cottages at Westbury, Letchworth

Group of Four Cottages at Jackman's Place, Letchworth

PLATE VII

approach to the houses served by the road, and the trees already growing on the site have been preserved.

The low development costs on the scheme are due chiefly to the economy in roads, few in number and light in construction, but also partly to the absence of a storm-water sewer, the water being either taken to a sump in the garden or run into a ditch. The house drains are above the usual length in many cases owing to the disposition of the houses on the plots.

The houses are occupied by the wealthier residents of the Garden City, some of whom work locally while others go daily to their business in London. The scheme is in an early stage at present, but the development costs indicate that it will be a financial success.

Welwyn

I. Ludwick Way

This scheme is situated on fairly high ground to the east of Welwyn Garden City and forms part of a larger scheme of development for houses costing between $1920 and $2880. Great use has been made of the cul-de-sac to give additional frontage and to lessen the road costs, and on these are erected the Class "A" or cheaper houses. These groups have pleasant approach roads, and ample turning space for vehicles is provided. The main road across the development runs at right angles to the contours to the top of the hill, giving easy gradients for the sewers which are taken down this road. It will be seen from the plan that the plots are squared and not taken to the boundary of the estate, the back land, 10 per cent of the total area of the unit, being devoted to allotments for the use of those residents whose time or gardening zeal allows them to grow some of their own vegetables. The space between the blocks of houses and the road is very lightly fenced or not fenced at all in some cases, an idea rather encouraged by the Garden City Authorities. The main road junction at the south end has been well designed, and all the roads are planted with trees and well lighted by electricity.

A separate system of drainage is in use at Welwyn, and the sewers are laid under the planting strip forming part of the sidewalk wherever possible, and the number of house connections to the sewer is reduced by the employment of common drains from one or more blocks of houses.

The houses are of two main types, — Parlor type "B" and Non-Parlor type "A," the bedrooms of the latter being smaller. They are

built for the working class of Welwyn and are occupied by men employed in local factories, from which they are about a quarter mile distant. The houses are of pleasing appearance, well planned, and cheaply but soundly built. They are not let at economic rents, and the burden of them is borne by the whole Garden City; the inclusive rents charged are the highest obtainable for this class of local tenant and represent roughly 25 per cent of the weekly earnings. It will be seen from the data that the land cost per house is under $140, including an allowance of $240 per acre as a proportion of the open space elsewhere in the town, — a generous figure in view of the area assigned for garden allotments.

The net density in this scheme approaches what is generally considered the maximum to allow for sufficient light and air, — *i.e.*, twelve houses per acre. Although the houses are built in blocks up to eight in a group, the average frontage per house is 32′ 6″; an economy in land costs might have been effected by reducing this figure and giving a greater depth than 116′ 0″ but the present scheme was found most suitable for the site.

II. DIGSWELL

This development is situated a short distance from the town center, to which it is connected by a bridge over the branch railway line. The site has a gradual slope to the southeast corner, and no special difficulty was experienced with the sewering. Two culs-de-sac or "closes" have been constructed and on these the trees already there have been preserved as far as possible to form a natural feature. The half acre of open space provided is to be devoted to tennis courts for the use of the residents, and separate garages are being built for those who may require them. The roads are all planted with trees, and the general appearance is very satisfactory.

The houses may be divided into four general types. In each cul-de-sac there is one type only, but on the main roads the houses are well mixed, and are pleasantly varied in design. The houses are built for the professional and middle-class resident, and are sold outright in most cases subject to ground rents of from $40.80 to $72 per annum, amounting to a capital value of from $7200 to $9600 per acre. Some of the residents living here work locally in banks, offices, etc., while a fair proportion go daily to London to their work leaving about 8 A.M. and returning about 7 P.M. For a worker who is content to make this journey five or six times a week to and from his work, these houses make good

Grade "B" Cottages at Ludwick Way, Welwyn

Grade "B" Cottages at Digswell, Welwyn

PLATE VIII

homes, cheap in comparison with similar accommodation in less pleasant surroundings nearer London.

Kemsley

The unit selected here lies to the east of the Industrial Village, on a gently sloping site. The estate is intended to house the workers at a neighboring paper mill, the proprietors of which bought the land and financed the development. Well constructed and wide roads are provided with ample open spaces.

The whole village is occupied by employees at the mill, and this fact must be borne in mind when comparing the rents and other data. The rates are lower than in other districts in consideration of the public services, which in other places are usually supplied by the Town Council, being put in by the developer of the land. The rather high development costs are due to the very good construction of the roads and to the generally high standard of the work.

The houses are of three types, comprising rooms as shown on the accompanying plans.

Lambeth

BLOOMFIELD

This Housing Estate, situated six miles from the center of London to the southeast, has been laid out on the site of a large private house and is at the top of a hill from which there are fine views toward the north and east. Owing to the steep inclination of the site, considerable difficulty was experienced with regard to the layout; the highest level is 316 feet and the lowest 217 feet above sea level. Methods used to reduce friction in the sewers on the steeper gradients add considerably to the development costs. The roads surrounding the estate were hard surfaced at the time of the development, and only three principal streets had to be constructed on the land: two of these roughly follow the contour lines, but the third, from north to south, is on the flatter upper portion of the site on the crown of the hill. Out of this road two squares or closes have been formed with pathways forming access to existing roads. On the lower road two more closes have been arranged. To allow for the fall of the ground the houses are built in blocks only up to a maximum of four. The cost of the foundation work for the houses has been very high. It will be seen that a combined system of drainage has been used.

It must be remembered, when comparing the figures on this scheme with those elsewhere, that the three boundary roads were already constructed and their cost has not been included in the development figures; this also applies to the strip of frontage to the northeast boundary road. A high price was paid for the land on account of this existing frontage but, as the site was to be used for housing purposes, the owners, the Ecclesiastical Commissioners for England, sold it to the Lambeth Borough Council at less than its market value. The costs of development generally on the estate were high, due to the steep slope of the ground.

The houses erected are of three main types, — Parlor type "B," Non-Parlor type "A," and Flats type "C," the flats being built in blocks of four, *i.e.*, two ground-floor and two first-floor flats. They are occupied by a somewhat mixed class of tenant, drawn from the lower and middle classes, and are let at rents which do not show an economic return on the money invested. The deficit is made up partly by a charge on the rates of about $9.60 per dwelling per year, and partly by the government subsidy.

SIGNIFICANT POINTS IN DISTRIBUTION OF COSTS

The figures given in the various tables in Appendix II [1] speak for themselves. It is necessary, however, to make certain matters clear and to point out a few significant features. It will be observed that for English houses the average house-lot frontage is comparatively high, varying in the case of Letchworth from 25′ 10″ for the smallest house to 253′ 10″ for the largest house. One explanation of this being above the usual average for actual frontage is that it includes flankage, or side lot lines. Various maps [2] show the proportion of house frontage possible on the lots as compared with the length of the side lines.

Two figures at the end of the statements [1] may cause some confusion because of the distinction which is drawn between "inclusive rent charged" and "economic rent — plus rates." The former is determined on the basis of what the Public Authority regards as the amount which the tenant can pay out of his income; for instance, in Westbury at Letchworth this averages $168 per year of which 25.7 per cent consists of rates (local taxes). It is obvious that this rent is insufficient to pay an economic return on the investment. The amount that would be necessary to do so is therefore shown and, in the case of Westbury, is seen to

[1] See Appendix II, pp. 165–169.

[2] See Appendix VII, pp. 185–199.

Grade "B" Cottages at Lambeth, London

Grade "A" Cottages at Lambeth, London

PLATE IX

amount to $247. The latter would be the true figure to compare with the return obtained under American conditions where housing is not subsidized.

In the two Garden City schemes it will be seen that the net density of houses per acre — *i.e.*, exclusive of roads — ranges from 8 to 12.3 except in respect to the expensive type of houses in Letchworth Scheme IV where it is less than one to the acre. In Kemsley the net density is 13.3, somewhat higher than Letchworth, but the gross density is about the same owing to wider roads. In Lambeth, which may be regarded as comparable in situation to Cambridge, Mass., in relation to the center of Boston, the density is of course much higher. There it mounts to 19.9, exclusive of roads, and 15.4 for the gross area. On the whole these densities are typical of other parts of England where a good average for houses per gross acre is 10 to 12 in small towns and in suburbs of large towns, and an average of 15 to 16 per gross acre is good for inner suburbs of large cities.

One of the significant facts brought out is the low cost of raw land. In the workingmen's schemes at Letchworth, Welwyn, and Kemsley, this is seen to vary from 2.4 per cent up to 5.7 per cent. Even in the case of Lambeth in London it does not exceed 3.7 per cent. Where the percentage rises much higher, as in the case of Letchworth Scheme IV, it is of course due to the very large lots; here the proportion is 9.5 per cent. It will be observed, however, that as lots increase in size, the cost of development is so reduced as to offset the higher cost of land and maintain the percentage spent on building. For instance, in Letchworth Scheme II the street and utility cost is 18.1 per cent as against 8.6 per cent for Scheme IV, while with the small workingmen's houses in Scheme II, there is spent 76.2 per cent on building as against 81.9 per cent in the case of the larger houses erected in Scheme IV.

CHAPTER VI

COSTS OF DWELLINGS AND LOCAL IMPROVEMENTS

THE COST OF BUILDING A FOUR-, FIVE-, OR SIX-ROOM HOUSE

All the houses in the schemes investigated, with the exception of those in Garth, at Letchworth, and the Class D houses in Digswell, at Welwyn, fall within the scope of the heading to this paragraph. They are all on two floors, are in most cases two rooms deep, are built of brick with tiled roofs, and have been designed by architects. The cheaper houses — *i.e.*, those built under the Government subsidy — have to comply with the requirements of the Housing Acts as to floor space, cubic capacity, and sanitary arrangements, and have all the essential features of a healthy home. It is hardly necessary to add that they are all connected to the public utilities comprising gas, electricity, and water, that they have an efficient drainage system, and that they are erected along the frontage of wide, hard surfaced, and well lighted streets.

The lowest-priced houses on the schemes investigated are those on Icknield Way, at Letchworth, erected at a total cost per house of $1608.[1] This represents about the minimum cost at which a house of this accommodation can be built in England to-day. The factors contributing to economy in this particular case were (1) that a large number of houses (100) were built simultaneously, thus reducing the transport and overhead charges; (2) that the houses were built in blocks of two and, in most cases, four (economy in outside walls and roofing); (3) that the site was sufficiently flat so that the house foundations were not expensive; and (4) that competitive prices were obtained from the contractors.

The houses, designed as they are for the working-class man, his wife, and, say, three children, provide a good home for the family, but the highest rent obtainable is $146 per year, inclusive of rates, or $102 per year, net. The economic rent would be, at 6 per cent on the total cost, $138 per year, net. The difference between the rent obtained and

[1] It has to be recalled that this and all other figures are based on $4.80 to the pound. At par this figure would be about $1628.10. At the present exchange rate, the prices would be increased a fraction of a cent per dollar.

Cheapest Type of Cottages at Icknield Way, Letchworth

Cottages, with Temporary Fences, at Jackman's Place, Letchworth

PLATE X

the economic rent is provided by the State. The houses were designed to obtain the subsidy.

The fact that the rent of, say, $3 a week, rates and water inclusive, is the maximum that the tenants of these houses can pay would seem to indicate that 20 per cent to 25 per cent of the family income is the most that can be spent in actually housing the worker. The rates cover the cost of the public services without which the tenant would not be willing to pay as high a rent as he does, and as it seems impossible to keep these below 25 to 30 per cent of the inclusive rent charged, and assure the occupier of a good water supply, gas, electricity, and well lighted streets, it is probable that the gross rent will always include the above percentage for local taxes.

Comparing houses in Jackman's Place, at Letchworth, with Class C houses at Bloomfield, at Lambeth, we see that for houses of the structural cost of about $2880 the rents at Letchworth are between $3.60 and $4.80, and at Lambeth $5. This difference is due to the reasons we will name. First, it will be noted that the land cost and, in the present comparison, the development costs, are greater at Lambeth than at Letchworth, and second, higher rates (local taxes) are assessed. That the London worker pays more for his house than the man outside, is either because he is earning more or because he is willing to spend more than 25 per cent of his weekly income in rent and rates. It is probably the former reason that is correct. The employer in London, where the opportunities for profit-making are greater by reason of position, concentration of a large number of people in a small area, or other reason, can afford to pay his workers better wages, and they in turn can expend a greater sum in rent. Again, the Londoner is probably content with less room in his house and garden than is the country dweller. For instance, a wealthy man in London does not mind having less garden space than that which is regarded as essential in a house occupied by a poor man in the small town. In this respect it may be mentioned that the workers occupying the small houses at Letchworth and at Welwyn are, in many cases, Londoners who want more garden space than they can obtain in London in order to insure healthier conditions for their children.

HOUSES AT DIGSWELL, WELWYN

The houses erected in Digswell, at Welwyn, which are offered for sale may be said to represent a good investment for the purchaser.

For the accommodation provided facing pleasant roads the price at which they sell is low, and the terms on which they may be bought are reasonable, *e.g.*, 6¼ per cent is charged by most building societies to-day. The houses on this development were built by a subsidiary concern of the parent company, and the usual builder's profit is lower than is customary since a return on capital is taken by the improved ground rents (*i.e.*, annual charge for leases) created by the development. It is these higher ground rents and better rate of interest on this part of the estate which enable the financial burden of the smaller property to be borne by the town.

Building costs to-day are about 50 per cent higher than in 1914 although lower than at the period immediately after the Great War; in some of the schemes investigated the houses were built at "boom" periods and the figures given are the costs at which the houses could be erected to-day.

SIZE OF PLOTS IN RELATION TO SOCIAL NEEDS AND FINANCIAL ABILITY

It is generally accepted in England that wherever practicable not more than an average of twelve houses to the gross acre (including streets and open spaces) is desirable to give light, air, and sunshine to dwellings.[1] It is considered that this density enables workingmen to have the space needed to restrict the depth of houses to two rooms and to a height of from two to three stories; that it enables all houses to have sufficient space about them to give to the front and rear of the buildings an angle of light in excess of 45°; and that it provides a reasonable amount of space for gardens and play in the house lots. Careful investigation and much experience have shown that any excess of building over this average is uneconomical where land values are normal in open areas and the planning and development of the land are carried out in advance of building. Higher densities up to eighteen or even twenty houses to the gross acre have to be permitted in the inner suburbs where land values render closer building necessary from an economic point of view. In the central areas apartments and tenements have to be erected with much greater densities, because of higher land values. But the optimum or desirable standard which is arrived at in order to get adequate light, ventilation, and room for recreation is twelve houses to the gross acre on the average. It is not found that the general adoption of this density adds to the cost of houses, when, as already stated, the character and cost of the development are adjusted to the density.

[1] See Chapter VII.

Grade "A" Cottage Group at Digswell, Welwyn

Grade "D" Houses at Digswell, Welwyn

PLATE XI

In the absence of any means for establishing a scientific basis for fixing densities to give the optimum of light, air, and sunshine, probably the English practice cannot be improved upon. Perhaps its economic aspect is the only one that needs to be discussed, because if it is financially sound it will probably be universally accepted as desirable on purely social grounds.

As already stated, the ratio of the land cost to the total cost of house and lot varies between 2 per cent and 9.5 per cent, but is usually, at any rate with the medium-cost houses, about 4 per cent when the cost of raw land, plus charges, is about $1200 per acre.

This gives a land cost per house of $120 when the density is about ten houses to the acre on the gross acre and thirteen on the net acre. In this case, each house would have 484 square yards of total area of which approximately 370 square yards would be net building area and 114 square yards in streets, etc.[1] There are several factors influencing the density figure. A land developer, with a view to the commercial side only, would be inclined to put as many houses as possible on his land without considering the necessity of obtaining ample light, air, and sunshine for all the rooms. Commercial land development in towns in the past has accustomed the working-class man to very limited space around his dwelling,—a backyard of a hundred square feet being in many cases considered a luxury. In modern schemes this is being altered, and on the areas investigated for this present inquiry the closest development is under twenty houses to the gross acre, including streets. In the Garden City class of development a maximum net density of thirteen houses per acre is normal, and for a worker who is earning $16.80 a week and spending 25 per cent of this on rent, the following calculations, which omit subsidies, show the factors contained in his expenditure.

25 per cent of $16.80 = $4.20 per week, or $218.40 per year.

Land cost at $960 per acre, plus $240 as proportion of cost of open space, with 10 houses on the gross acre and 13 houses net density.	$120
Development costs (all items) per house, say, ...	456
4-room house, structural cost, say, ...	2880
	$3456

At 6 per cent, a total rent of $207.36 per year.

[1] In English subdivisions, streets are narrower than in typical American subdivisions. Purely local streets and open spaces average about 25 per cent of the area developed. See Longstreth Thompson's "Site Planning in Practice," pp. 22 ff.

The weekly rent of $4.20 would have to include rates and water rent if an economic return were to be made. The developer would have to provide for these out of the $576 per acre allowed for cost of land and development if he had to obtain an economic return. An increase in any of the items shown will therefore have to include a corresponding decrease in one of the others, and it is not thought that the first figure of $120 for the land can be lessened at the present time. In the schemes investigated, for none of the houses of about $2880 structural cost is an economic rent obtained. They are all in receipt of the Government subsidy designed to help this housing difficulty.

It seems, then, that if the rents obtained under this calculation do not pay for the money invested, a further loss cannot be incurred by reducing the net density figure to under thirteen and thus increasing the land cost of $120 per house. It is not suggested that the difficulty be overcome by taking a lower return than 6 per cent, as investments at this return, offering very much greater security, can easily be obtained.

A reduction in the building costs would seem to offer a way out, and on Icknield Way, at Letchworth, houses with four rooms are being built for $1608; as the land cost per house is $120, we can compare this with the above calculation.

Land cost at $960 per acre and $240 per acre for open space, with 13 houses net density	$120
Development costs (all items) per house	379
4-room house, structural cost	1608
	$2107

At 6 per cent, a total rent of $126.42 per year.

If this rent is the most this class of tenant can afford to pay, he would be earning (if 25 per cent of his weekly salary is being thus spent) $9.72 per week. Very few workers receive so low a wage as this and we are thus led to assume that the rent paid represents about one-sixth of earnings.

As the land cost is generally about 4 per cent of the total cost of house and lot, any increase in this item will have a correspondingly small effect in adding to the rent; a halving of the size of the plot or a reduction of $60 in the total cost would only mean a saving of slightly over 6 cents a week. It does not seem, therefore, on financial grounds reasonable to reduce the size of the plot as long as land may be bought for about $960 per acre. At Lambeth, where this figure rose to $1824 per acre or nearly double, the land cost per house is only $132.96, the size of the plots being 243 square yards.

Group of Cottages at Road Junction, Jackman's Place, Letchworth

Cottage Group around Open Space at Westbury, Letchworth

PLATE XII

Another point in the determination of the plot size is the character of the tenant of the small house. Presumably a workman who is living in one of the Garden Cities or on a housing scheme outside the London area, does so from choice. It may be in some cases that the work for which a man is trained or suited is situated in the country and he must follow it to seek regular employment, but as a rule it will be found that the workers living outside London have a preference for more open and healthier conditions than can be obtained in London.

Many who choose to live away from a large city do so because they are fond of gardening and want sufficient space for this purpose adjacent to their homes. Individual tastes have to be considered in developing neighborhoods in several matters including that of varying the sizes and shapes of the plots in the different groups; but the sizes of plots, and therefore the density, are primarily affected by the amount which is calculated as reasonable for the tenant or purchaser to expend on the site of his house. It may be pointed out that under English conditions, as controlled by building by-laws, there is no danger of any building taking place on the rear of the plots.

What is regarded as a reasonable proportion of annual cost for a house to bear for land is arrived at by taking one per cent of the structural cost of the houses to be erected. For example, $25 would be a reasonable figure to pay annually for the lease of a site on which it was proposed to erect a house costing $2500. This annual payment is known as ground rent. Most ground rents on medium-priced land outside a large city will be found to approximate to the one per cent of the capital cost of the house, and those at Digswell, Welwyn, will be seen to do so. Taking a house in the Class "B" group, we see that for a structural cost of $3888 on the house, the tenant pays $38.40 per annum for the ground rent. Capitalized at 5 per cent on twenty years, purchase of this rent, we get $768 or nearly the cost of the land and development per house. As the houses erected are security for the so-called ground rents, and as it is usual for land to increase in value as development proceeds, the investment in this kind of property is well secured. Under these conditions 5 per cent is considered to be a reasonable return on capital. Where the larger houses are erected on a plot 600 square yards in area, the gross density is six and one-half houses per acre. Such houses are usually detached and have a strip of garden all around the house with about 400 square yards for a lawn or flower beds or just enough for one tennis court.

The higher the income of the purchaser or tenant, the greater will be the elasticity of the factors on which depend the density. Those members of the community who have substantial incomes, and are able, as a result, to have large gardens, are prepared to meet much higher land costs than the groups of lower income.

For example, it will be seen at Garth, Letchworth, that the ratio of the land cost to the total cost rises to 9.5, thus exceeding the street and utility cost ratio. This is because an owner who is spending, say, $12,000 on building a house, is willing to pay for a plot of an acre in size so as to ensure pleasant landscape surroundings for his home and a high degree of privacy. The fact that the land cost exceeds the development cost in this case is partly due to the large sites and partly to the economical arrangement of the street plan. The building cost in this case remains at the common figure of about 82 per cent.

TABLE SHOWING A GIVEN SUM TO BE SPENT ON THE THREE FACTORS OF A DEVELOPMENT, IN ORDER TO OBTAIN A RETURN OF 6 PER CENT AT VARIOUS RENTS

Weekly Rent in Dollars	Yearly Rent in Dollars	Total Cost in Dollars	Raw Land 5 to 7 Per Cent	Improvements, 15 to 17 Per Cent	Building, 78 Per Cent
3.00	$156.00	$2600.00	5 per cent 130.00 – 156.00	17 per cent 442.00 – 530.40	$2028.00
3.60	187.20	3120.00			2433.60
4.20	218.40	3640.00	6 per cent 218.40 – 249.60	16 per cent 582.40 – 665.60	2839.20
4.80	249.60	4160.00			3244.80
5.40	280.80	4680.00	7 per cent 327.60 – 364.00	15 per cent 702.00 – 780.00	3650.40
6.00	312.00	5200.00			4056.00

TABLE SHOWING THE COST OF LAND PER HOUSE AT VARIOUS DENSITIES

Density per Acre	Raw Land Cost per Acre					
	$720.00	$1200.00	$1680.00	$2160.00	$2400.00	$4800.00
25	28.80	48.00	67.20	86.40	96.00	192.00
20	36.00	60.00	84.00	108.00	120.00	240.00
15	48.00	80.00	112.00	144.00	160.00	320.00
12	60.00	100.00	140.00	180.00	200.00	400.00
10	72.00	120.00	168.00	216.00	240.00	480.00
9	80.00	133.34	188.86	240.00	266.66	533.30
8	90.00	150.00	210.00	270.00	300.00	600.00
7	102.86	171.32	240.00	308.58	342.86	685.70
4	180.00	300.00	420.00	540.00	602.40	1200.00
1	720.00	1200.00	1680.00	2160.00	2400.00	4800.00

Large Houses at Letchworth

Type of Driveway, Letchworth

PLATE XIII

COST OF STREETS, SEWERS, ETC., IN RELATION TO COST OF HOUSE AND LOT

The costs of development in any scheme will depend to a large extent on the site; a steep site will always be more expensive for street and sewer construction, and will add to the cost of building as a result of more expensive foundations.

On the schemes selected for this inquiry the lowest development costs per acre are those at Garth, Letchworth, where they are only $1305.60. This is a somewhat exceptional layout and only suited to an expensive class of house with large gardens. A more usual scheme for the small house is that at Jackman's Place, or Icknield Way, Letchworth, where the figures are about $3840 per acre. For this sum, a high standard of sanitation, good road construction, and pleasant streets have been attained, and this figure will be found to apply to most developments of this class on flat sites to-day.

The road costs — *i.e.*, curb, gutter, roadway, and footpath — have to reach the standard set by the Municipal or County Authority which, when development is complete, takes over and maintains the streets as public highways. This standard varies locally, but the authority always insists that the road be properly hard-surfaced on a good foundation, that it be curbed, and that adequate and well laid footpaths (sidewalks) be provided. Roads of about forty feet in width cannot be constructed at less than $6 per lineal foot, and the cost frequently exceeds this. As the frontage per house on some of the Letchworth schemes is about thirty feet, the road costs per house are about $192. This is only a rough figure and will be found to vary in practice between rather wide limits. The use of culs-de-sac and narrow driveways on any development scheme helps to reduce the road costs. Roads that have to bear nothing heavier, as a rule, than private cars, tradesmen's vans, and other light vehicles may be of less substantial construction than through-traffic roads.

The sewering system again will vary in cost, depending largely on the gradients available; at Bloomfield, Lambeth, this item was very expensive owing to the methods of construction that had to be adopted to overcome the effects of the steep slope. On a fairly flat site and when use is made of common drains, — *i.e.*, when two or more houses have the same connecting drain to the main sewer, — the lowest cost at which foul sewers may be laid efficiently will be about 48 cents per lineal foot.

In this case the storm sewer is kept separate and involves additional cost.

It may be mentioned that on all the schemes investigated, with the exception of that at Lambeth (where the combined foul and storm sewerage system is in operation, as it is all over the London area), the separate system is used. It is found that, on smaller developments, economy at the sewage disposal works is achieved by reducing the amount of foul sewage by treating it separately from surface water.

The street and utility costs bear a fairly constant proportion to the total cost of house and lot: it will be found to average about 13.6 per cent of the whole.

With regard to gas pipes, water pipes, and electricity lines, these have been ignored in arriving at the development costs, as they are either paid for in the rates or in some other way. In the case of gas and electricity sewers, the companies are generally willing to put these in for the developer free of charge, recovering their expenditure on the sale of the service supplied.

With water mains the position is sometimes different. If an estate or subdivision is situated a long distance from the nearest water main, the developer will probably be required to pay a proportion of the cost of laying the main between the estate and the existing main. When the water company is assured that all the houses are erected and will be occupied, they will install their main to supply the estate; or, in some cases, the developer pays the cost of laying the mains to all the houses first, and when the houses are all occupied and water is being consumed, the water company repays the developer the cost of laying the mains.

With regard to the Garden Cities the position is simplified by the fact that the developer of the land has control over such public services as water supply, and the water mains are installed as the houses are built. Incidentally it may be mentioned that both Letchworth and Welwyn Garden Cities derive a large part of their revenues from the supply of electricity, gas, and water. These enterprises are more profitable than the sale of the land for building.

There are two main methods of assessing the road costs against the benefited property. In the case of Garden Cities, County Council Housing Schemes, and many private developments, no extra charge is made as the cost is included in the price of the lot and house. In other cases, the method employed is to charge the occupier with the cost of

Street Planting for Small Cottages at Welwyn

Bungalow Type at Welwyn

PLATE XIV

half the road width for the length of his lot, the corner lot tenant paying for two frontages in most cases, in consideration of which corner lots are usually purchasable at less than interior lots. In American cities the extra street costs which have to be paid in respect to corner lots result in concessions being given to the owners under which they are permitted to build on a higher density than on the interior lots.

CHAPTER VII

THE GENERAL PROBLEM OF PLANNING RESIDENTIAL NEIGHBORHOODS AND CONTROLLING BUILDING DENSITIES

The primary reason for selecting the neighborhoods in Garden Cities for special study in this report has been stated to be that it is for these neighborhoods that the most accurate data are available. There are two other reasons. One is that these neighborhoods have been carefully planned as parts of community developments, and it is only where this planning is done that all the elements that enter into the cost of houses, and the desirable amenities that go with houses as homes, can be properly studied and related. A third reason is that the town planning methods employed in Garden Cities have been responsible for what is, in effect, a revolution in public sentiment and practice in England in respect to housing densities.

CONSIDERATIONS IN NEIGHBORHOOD PLANNING

To understand the need and value of neighborhood and city planning (known as site and town planning in England) we have to appreciate the limitations of street planning by itself. Many people conceive of city planning as consisting of nothing more than a street plan or at most of a transportation, street, and park plan. The tendency to regard zoning as something distinct from or only distantly related to city planning is evidence of the existence of this point of view. One constantly hears it stated that what a particular community needs or desires is a zoning plan rather than a city plan, or vice versa. In a proper plan the two things — first, the facilities for circulation, and second, the control of land uses and building densities — are dealt with together. They are in fact so closely interrelated that they cannot be effectively dealt with separately. The two main essentials in city planning may be simply stated: to know the city in all its physical, economic, and social aspects, and then to make a plan which deals with functions and movement together.

Town planning in England is limited in its objectives, but it is comprehensive as far as it goes. It does not deal with highways, streets, and parks under one plan, and zoning under another. Its chief limitation is that it is almost entirely confined to unbuilt areas, and does not deal with related problems in built areas. It has the merit of not entering into details of local developments in respect to streets and buildings. This is left to site planning, — *i.e.*, to the planning of neighborhood units of which those dealt with in this report are examples. Now it is precisely in connection with this detailed form of local planning that we see the necessity for comprehensive architectural and engineering treatment, — such treatment as was given to the planning and development of village and neighborhood units by the United States Housing Corporation during the War.[1]

In comprehensive city planning a high degree of collaboration between the expert who prepares the plan and the municipal engineer who carries it out is essential to the successful application of the plan. In neighborhood or site planning there must be more than collaboration. The architect or landscape architect who is chiefly responsible for the design must also have a dominant influence in directing all the development, if proper effect is to be given to the plan. In the long experience of the writer in preparing plans, serious disappointment with results of planning has occurred only in those cases where his plan has been carried out by an unsympathetic architect or engineer, having neither the intelligence to follow the plan nor the initiative to improve it.

One of the worst results of such cases occurred in Ottawa, Canada, where the proper landscape treatment of a neighborhood development was followed by cheap and nasty design of the buildings, with bad economic as well as esthetic effects. A contrary example is that of Kemsley in Kent, one of the units studied for this report, where F. Longstreth Thompson had full technical control of the development. Money spent in making a landscape plan may be entirely wasted if those responsible for the financial control of a particular development seek to save money by putting the design of the buildings in the hands of an unsympathetic and mediocre subordinate. Such false economy is an indication of business incapacity, and it is not surprising that it is usually followed by financial failure.

It is well to draw attention to the foregoing experience because we have to face the fact that the financial as well as social success of neigh-

[1] See Report of U. S. Housing Corporation, Vol. II.

borhood planning, even more than of city planning, depends on either sympathetic collaboration of an architect and landscape architect, or supervision of the development by the one or the other. The place of the engineer as a further collaborator is strengthened rather than weakened by recognition of the above fact. But the primary and superficial idea that city and neighborhood planning is street and park planning must be got rid of before the city planner will be given more control over the carrying out of his designs, and opportunities for demonstrating to what extent the economy of land development enters into the economy of the home.

THE BROAD ASPECT OF BUILDING DISTRIBUTION

While, in England, experiments have proved that it is economically sound to limit densities of houses to ten houses to the acre in open areas, these experiments do not prove that it is sound to limit densities to this degree from a national or regional or even city-wide point of view. We have to look more broadly at the question to find what the effect of such limitation would be in spreading the population and in developing systems of transport. On the surface it might appear that to limit houses to ten to the acre instead of, say, forty is jumping from one extreme to another, and may produce an equally ill-balanced distribution.

As a matter of fact, however, the average city region has much less than an average of ten houses to the gross acre, even in the suburban areas that lie closest to the central districts. The London average probably ranges from six to eight in these suburbs. Let us take a glance at England as a whole.

The total area of England and Wales is 37,340,338 acres, comprising land and inland water. The population at the 1921 census was 37,886,-699, or about 1 person to each acre, and the number of separate families (houses), 8,739,197, each family comprising slightly over 4.25 persons.

In the ten years between 1911 and 1921 the number of families increased by 720,340, or at the rate of about 72,000 per year. The ratio of increase of population was less. The actual increase of persons was 1,816,207 which, at 4.25 persons per house, equals 427,342 houses. The disparity is probably due to the reduction of overcrowding and the lowering of the birth rate.

As a large part of the population is still overcrowded and growth may increase in future, we shall assume that the houses required each year will continue to increase in proportion to the increase of persons. As

a safe figure we shall assume that 960,000 houses will be required in each decennium as compared with the average increase in the past decennium of 720,000 houses. We find that eight houses or thirty-four persons is an average density in typical urban districts that are fully developed. On this basis the urban population must occupy much less than 1,000,000 acres; but we shall assume this as an approximate figure. A precise estimate is impossible, because the extent of rural as compared to urban occupation of land, and of potentially urban land that is not actually built upon, cannot be ascertained.

In 1911 the area of England and Wales used for agricultural purposes was 31,055,059 acres, but a great part of this was within cities and was potential building land. The figure, however, indicates that the total land under water and in unused mountain, marsh, and forest, after deducting 1,000,000 acres used for building, is in the neighborhood of 5,300,000 acres. Much of the agricultural land also is unsuitable for building. A fair assumption would be that a third of the total land in the country is not adaptable for building development. This leaves an area of about 24,900,000 acres. We shall again assume that one-fourth of this area will be required for business and industry, leaving the balance available for residence as about 18,675,000 acres.

We thus get these estimates:

	Acres
Land suitable for residence	18,675,000
Land occupied by dwellings in urban areas	1,000,000
Required increase of houses in each decennium	960,000
Housing area required, at 8 families per acre, in each decennium	120,000

Thus, at eight families to each acre, it will take well over fifteen centuries for England and Wales to occupy buildable land representing about half of their area, even assuming it will be practicable for them to have a concentration of about ten times the present population. Taking into account that the life of a house is not more than 100 years and the unlikelihood of the above increase, we see little cause for having any higher density than eight houses per acre in order to keep sufficient land open for building. At ten houses to the acre it will take nearly 2000 years, and at twenty houses nearly 4000 years, to build up little more than half of England. What is true of England with its small area of land in proportion to population is much more true of the United States.

EFFECT ON COST AND CONVENIENCE OF TRAVEL, ETC.

The result of limiting density will be that cities will be spread over somewhat wider areas in better balanced proportions than at present, but its effect in increasing the cost of utilities, traveling, policing, etc., would not be so great as is sometimes assumed. If we take a town occupying ten square miles in an exact circle, its circumference would be one and two-thirds miles from its center. Assuming that in 100 years it spread beyond this circle so as to cover twenty square miles, the radius would have increased approximately five-sixths of a mile. If the density were restricted to ten houses to the acre, the effect would be, in an English city with normal rate of growth, to set the circumference of the development farther away from the center by an increased distance of 970 yards than with twenty houses to the acre. Therefore at the end of 100 years the difference between ten and twenty houses to the acre in this city, assuming even distribution in either case, would be that an extra distance of little over half a mile would have to be traveled. In practice, however, the smaller density permits a more even distribution of buildings, and a city will usually require the same spread of transit facilities and the same mileage of highway and street for twenty as for ten houses to the acre.

It needs to be borne in mind that the greater the density of population, and the more extended that towns become, the more the need arises for having a greater proportion of open space for public recreation, for as the open country recedes farther from the center of thickly populated areas there is the greater necessity for having permanently preserved lungs within them. These lungs should be provided by careful planning and not by the haphazard methods that have hitherto prevailed. The cost of drainage, sewerage, water supply, and lighting installations would not be greater with a well planned development of ten houses to the acre than with an unplanned development that permitted parts of a neighborhood to have twenty or thirty houses to the acre. As we have seen, the average usually remains the same in either case.

EFFECT ON LAND VALUES

One of the effects of restricting densities has been to reduce land values and profits from sale of land in certain places, without reducing the values and profits in the aggregate over large areas.

The history of land values in England during the last fifty years, since cities began to grow more rapidly, does not lead to the conclusion

that the value of land for housing purposes materially increases with the lapse of time, except in specially favored positions where transit facilities have been improved or special amenities have been provided. Considerable areas of land near large towns are valued at less to-day than they were twenty or thirty years ago.

Every owner holding up his land for an improved market expects that he will not be the last to sell for development. He does not base his present value on the average expectation of selling, but rather on the expectation that, due regard being paid to situation and locality, he will be the first of his kind to realize. When, however, we come to consider suburban owners as a whole, we find that if they were to debit themselves with the original prospective building value they placed on the land plus compound interest while they held it, more of them would sell at a loss than at a profit. This is so in English cities, although the English owner of land does not pay taxes on the capital value, while the assessed annual value, on which he does pay, takes no account of prospective building value.

A landowner with a large area of land may be able to sell his land at a much smaller price for ten houses than for twenty houses per acre and yet obtain more profit as a result, — given the same demand for housing accommodation in a particular neighborhood. In special cases this has been proved.

It has also to be remembered that no average bit of country forming the complete suburban area of a large city can all be covered thickly with houses without causing either considerable waste of money in filling up or excavating land, loss to the community by forcing upon them the provision of open spaces to provide lungs for the crowded areas, unhealthy conditions as a result of the development of marshy land, or some other condition which is economically unsound or undesirable in the interests of public health.

Many owners of hilly land find it to their advantage to have their land restricted to a small number of houses per acre when the owners of level sites adjoining are similarly restricted. Where a hilly site is in competition with a level site in the same neighborhood and it has no superior advantages, it may be assumed that its building value when improved would be the same. But it is conceivable that, in order to obtain the same number of houses on the hilly land as on the level land, so much would have to be spent on development as to make the transaction unprofitable.

One area, comprising over 600 acres, which the writer has in mind could not be planned in rectangular blocks to permit the higher densities, without involving considerable loss to the owners, and creating very steep gradients in the streets required for through traffic. In another small area of fifty acres the only possible way to secure the erection of twenty houses to the acre was to fill up a ravine of considerable depth which intersected it. If we assume that on such areas a limitation to ten houses to the gross acre, arrived at after careful planning of the area, would save the owners great expenditure in filling up and excavating land so as to adapt it for twenty houses to the acre, then, in making the comparison between the smaller and the larger number, the latter would have to be debited with a large extra cost of development. In general it will be found that the arguments in favor of limitation of houses are strengthened when large areas possessing typical variety of level and physical feature are considered, in preference to a selected and isolated level area capable of being completely developed without much physical change.

In other cases expensive measures have sometimes to be taken to remove the causes of flooding or to raise the foundations of houses above the flood level. In these cases if the preparation of a scheme and the limitation of the number of houses to the gross acre will encourage an owner to select the building areas which are least costly to develop, putting the houses close together on the higher land, and reserving the flooded land as open space so as to secure the average limitation required by restrictions, under a plan, he would be able to set against any loss of values of buildable land, not only the values due to the improved amenities of the houses erected, but also the saving of the extra capital expenditure that would otherwise have to be incurred in making the flooded land suitable for building.

Moreover, when land is covered to the extent of thirty or forty houses to the acre, the Public Authority must either already have provided, or shall require to provide on some occasion subsequent to development, open spaces, public parks, etc., adjacent to the developed areas. These open spaces have usually to be bought out of taxes paid by the owners of building land and the occupiers of houses in the district, and as they have often to be provided after a district is partially developed, they are usually expensive to buy and cannot be selected in positions which enable economies in road construction to be effected.

The average number of houses to the acre is reduced considerably in

a particular district when open spaces are included in an area, and this result is secured out of payments made by the owners and occupiers of houses and land. In many districts where thirty and forty houses are erected on the net acre of developed land, the open spaces, etc., bring down the average to less than half the number on the areas actually developed, and the owners of the developed areas are paying for the lowering of the average just as much as if they were subject to a scheme which limited the houses to ten to the gross acre and twenty to the net acre.

With a proper plan, parts of an area can be selected for open spaces in those positions where land is cheapest, where development is most expensive, and where considerable economy could be effected in road construction. Whatever economy is effected in this way will benefit the taxpayers and, directly or indirectly, every owner of land.

When we discuss limitation of houses to the acre it is impossible to separate it from the question of open spaces. A limitation of twenty on the net building acre may be as reasonable in one district for the purpose of amenity as a limitation of forty in another. In the one case the open space would be an integral part of the system of development, and in the other case it would be extra to development. But the average in both cases might be the same, and the owners in the last case might be paying as much for amenity as the owners in the first case. They may get larger prices for the land actually covered with houses, but these houses have to be burdened with the cost of amenities provided on areas adjacent to the built-upon area, just as they would be burdened with the cost of amenities provided as part of the scheme of development.

WIDTH OF FRONTAGES OF LOTS

When density is limited to ten families, and especially to eight or fewer families, per gross acre, the question of fixing a definite width of lot may become of secondary importance. Whatever frontage may be regarded as economically and esthetically desirable for small homes having an average of one-tenth of an acre in building lot, street, and park per house, can be provided without any difference in cost for wider as compared with narrower lots. The determination of the width can then be made by the planner in relation to the type of building, the services needed, and the character of open spaces provided, and not by the real estate developer in order to keep down his immediate costs.

In general a proper limitation of houses is necessary to secure proper

width of frontage and to prevent unsightly back additions. That is an advantage which may be gained from limitation although not a necessary corollary to limitation. Wide frontages considered by themselves increase length of roadway, sewers, water mains, etc., and therefore add to expense of development unless the width of road is reduced to make up for increased length.

When, however, a plan for a neighborhood is made in accordance with a pre-arranged limit of density, economies can be obtained in street location, width, and forms of construction that enable wider frontages to be given without greater cost than narrow frontages on an unplanned development. From the specific illustrations given in this report it will be seen that the cost of development does not greatly vary with width of frontage, but that the lot frontages are made wide or narrow to suit the types of building and the character of the open areas about them for services and gardening.

In England a private back garden (back yard) is preferred to a large fore-court (front yard) space, and the row of well built group houses to cheaper separate homes. These things have influenced the building of houses on narrow deep lots. The more general use of the motor car is now giving rise to a demand for space for a garage and consequently to wider frontages and greater popularity of detached bungalows and semi-detached villa residences.

APPENDICES

TABLE VII. RENTALS PAID IN 1930

PERCENTAGE OF TOTAL NUMBER OF FAMILIES IN EACH RENTAL CLASS. BY CITIES AND GROUPS OF CITIES. SINGLE-FAMILY DWELLINGS, FLATS, AND APARTMENTS COMBINED

CITY	PERCENTAGE OF TOTAL NUMBER FAMILIES IN EACH RENTAL CLASS										
	$5.00 to $14.99	$15.00 to $24.99	$25.00 to $34.99	$35.00 to $44.99	$45.00 to $54.99	$55.00 to $64.99	$65.00 to $74.99	$75.00 to $84.99	$85.00 to $94.99	$95.00 and Over	TOTAL
Group I											
Cities of 500,000 and Over											
BOSTON, MASS. (MET. DIST.)	14.0	28.0	24.4	13.9	7.0	3.2	2.7	6.8[1]	——	——	100.0
BUFFALO, N. Y.	12.7	23.6	20.2	20.0	9.0	4.7	2.8	1.9	1.0	4.1	100.0
PITTSBURGH, PA.	12.8	26.8	22.2	12.5	7.3	4.4	4.2	1.8	1.7	6.3	100.0
ST. LOUIS, MO.	19.7	24.9	15.8	8.5	7.6	7.7	8.0	7.8[1]	——	——	100.0
WASHINGTON, D. C.	12.0	20.3	18.3	12.0	8.1	6.2	4.4	18.7[1]	——	——	100.0
Average for Group I	14.7	25.8	21.0	13.0	7.5	4.9	4.3	1.9	1.4	5.5	100.0
Group II											
Cities of 300,000 to 500,000											
MINNEAPOLIS, MINN.	10.5	26.8	20.1	17.0	11.5	6.2	2.7	1.8	1.0	2.4	100.0
NEWARK, N. J.	1.3	9.3	18.0	23.6	16.4	11.6	6.6	4.6	2.6	6.0	100.0
Average for Group II	5.7	17.7	19.0	20.4	14.1	9.0	4.7	3.3	1.8	4.3	100.0
Group III											
Cities of 100,000 to 300,000											
ALBANY, N. Y.	4.1	20.3	23.7	16.7	9.5	7.0	4.9	3.7	2.4	7.7	100.0
BRIDGEPORT, CONN.	11.1	29.4	27.1	13.6	8.4	3.7	3.7	3.0[1]	——	——	100.0
DAYTON, OHIO	2.4	13.0	28.6	21.9	16.6	6.0	5.9	5.6[1]	——	——	100.0
DES MOINES, IOWA	11.0	21.2	18.3	15.7	13.9	6.1	5.3	8.5[1]	——	——	100.0
ELIZABETH, N. J.	0.6	8.1	16.8	21.2	14.8	10.9	7.4	6.3	5.2	8.7	100.0
FALL RIVER, MASS.	24.1	45.4	21.8	4.9	1.9	0.4	0.4	1.1[1]	——	——	100.0
FLINT, MICH.	9.3	29.1	24.6	17.1	11.2	5.4	3.3[2]	——	——	——	100.0
GRAND RAPIDS, MICH.	3.4	21.9	28.5	19.9	13.5	7.0	5.8[2]	——	——	——	100.0
HARTFORD, CONN.	3.0	13.5	21.6	21.0	15.6	8.4	16.9[2]	——	——	——	100.0
LOWELL, MASS.	17.2	39.8	28.2	7.2	3.3	1.0	3.3[2]	——	——	——	100.0
LYNN, MASS.	1.9	16.1	38.6	24.0	9.8	3.4	6.2[2]	——	——	——	100.0
NEW BEDFORD, MASS.	8.7	32.6	39.5	9.9	4.0	1.3	4.0[2]	——	——	——	100.0
NEW HAVEN, CONN.	6.0	22.4	27.4	17.1	10.3	5.2	11.6[2]	——	——	——	100.0
OKLAHOMA CITY, OKLA.	13.8	27.4	19.1	13.5	9.1	4.4	4.6	8.1[1]	——	——	100.0
PATERSON, N. J.	9.4	35.7	22.8	14.0	6.4	3.7	2.0	1.6	1.2	3.2	100.0
PROVIDENCE, R. I.	16.4	32.7	25.4	11.0	5.5	2.6	6.4	——	——	——	100.0
SPRINGFIELD, MASS.	6.0	25.4	36.9	15.2	7.6	2.3	1.6	5.0[1]	——	——	100.0
SYRACUSE, N. Y.	5.3	19.6	25.9	20.5	10.4	5.7	4.3	3.1	1.7	3.5	100.0
UTICA, N. Y.	10.5	23.8	23.3	17.8	10.6	4.2	3.0	2.2	1.4	3.2	100.0
WATERBURY, CONN.	4.6	27.1	34.1	15.7	7.8	3.3	7.4[2]	——	——	——	100.0
WILMINGTON, DEL.	14.5	34.7	20.1	12.0	8.0	3.5	7.2[2]	——	——	——	100.0
WORCESTER, MASS.	4.1	29.6	41.4	13.8	5.1	2.2	3.8[2]	——	——	——	100.0
Average for Group III	8.1	25.3	27.3	15.8	9.5	4.6	3.0	2.0	1.4	3.0	100.0

[1] Over $75.

[2] Over $65.

City	Percentage of Total Number Families in Each Rental Class										Total
	$5.00 to $14.99	$15.00 to $24.99	$25.00 to $34.99	$35.00 to $44.99	$45.00 to $54.99	$55.00 to $64.99	$65.00 to $74.99	$75.00 to $84.99	$85.00 to $94.99	$95.00 and Over	
Group IV											
Cities of 50,000 to 100,000											
Altoona, Pa.	12.2	42.1	31.4	9.1	3.2	1.1	0.4	0.5[1]	—	—	100.0
Binghamton, N. Y.	2.1	13.7	26.1	27.4	18.1	6.5	2.2	1.4	0.6	1.9	100.0
Brockton, Mass.	8.1	43.8	34.2	8.1	2.8	0.6	0.6	1.8[1]	—	—	100.0
Cedar Rapids, Iowa	5.6	21.1	24.1	19.8	14.7	4.7	4.5	5.5[1]	—	—	100.0
Chester, Pa.	12.1	25.5	28.1	19.4	8.8	3.5	1.3	1.3[1]	—	—	100.0
Evansville, Ind.	8.5	38.1	27.7	12.9	7.8	1.5	1.4	0.6	0.5	1.0	100.0
Harrisburg, Pa.	16.2	32.0	24.0	13.6	6.2	3.8	1.5	2.7[1]	—	—	100.0
Holyoke, Mass.	12.1	28.9	32.6	14.0	5.9	1.8	4.7[2]	—	—	—	100.0
Jackson, Mich.	3.4	34.9	29.6	15.1	9.8	4.1	3.1[2]	—	—	—	100.0
Kalamazoo, Mich.	4.5	28.6	27.9	14.8	10.6	6.5	7.1[2]	—	—	—	100.0
Lancaster, Pa.	6.2	16.9	26.3	19.9	10.6	10.6	9.5[2]	—	—	—	100.0
Lansing, Mich.	5.4	20.1	28.5	20.5	13.9	7.3	4.3[2]	—	—	—	100.0
Manchester, N. H.	15.2	42.0	26.7	8.4	4.1	0.8	2.8[2]	—	—	—	100.0
New Britain, Conn.	4.6	28.1	29.8	18.5	8.9	3.5	3.5	3.1[1]	—	—	100.0
Passaic, N. J.	6.6	32.7	23.9	15.4	7.0	4.9	2.7	2.1	1.4	3.3	100.0
Pawtucket, R. I.	13.6	34.5	34.3	11.4	3.2	0.8	2.2[2]	—	—	—	100.0
Pontiac, Mich.	5.7	27.7	31.2	16.3	11.0	5.1	3.0[2]	—	—	—	100.0
Saginaw, Mich.	4.3	38.4	30.6	12.6	8.1	3.6	2.4[2]	—	—	—	100.0
Schenectady, N. Y.	2.2	13.5	32.2	30.5	10.9	5.1	2.1	1.4	0.6	1.5	100.0
Sioux City, Iowa	11.5	25.2	25.9	17.4	10.2	3.3	3.0	3.5[1]	—	—	100.0
Springfield, Mo.	17.0	39.1	20.3	9.0	6.0	3.2	3.2	2.2[1]	—	—	100.0
Topeka, Kan.	7.2	25.0	21.3	14.8	10.8	6.9	6.7	7.3[1]	—	—	100.0
Troy, N. Y.	13.1	45.4	24.3	8.8	3.8	1.5	0.7	0.6	0.4	1.4	100.0
Woonsocket, R. I.	22.7	41.2	26.0	5.7	2.0	0.6	1.8[2]	—	—	—	100.0
Average for Group IV	9.0	30.7	28.2	15.6	8.1	3.6	1.7	1.0	0.6	1.5	100.0
Group V											
Cities under 50,000											
Ann Arbor, Mich.	2.1	11.7	18.5	15.9	15.8	16.2	19.8[2]	—	—	—	100.0
Appleton, Wis.	0.9	16.9	37.9	23.9	15.0	2.9	2.5[2]	—	—	—	100.0
Auburn, N. Y.	16.3	26.9	24.6	18.2	8.0	2.6	0.8	0.7	0.5	1.4	100.0
Battle Creek, Mich.	10.6	28.8	27.1	15.0	9.9	4.8	3.8[2]	—	—	—	100.0
Bay City, Mich.	26.7	43.3	16.9	5.3	3.5	1.8	2.5[2]	—	—	—	100.0
Benton Harbor & St. Joseph, Mich.	7.7	32.8	29.9	13.3	9.0	4.8	2.5[2]	—	—	—	100.0
Eau Claire, Wis.	7.7	29.4	32.6	15.7	10.3	2.4	1.9[2]	—	—	—	100.0
Fitchburg, Mass.	14.4	47.4	25.4	8.2	2.4	0.6	1.6[2]	—	—	—	100.0
Framingham, Mass.	4.1	24.6	33.7	17.9	9.7	2.9	7.1[2]	—	—	—	100.0
Haverhill, Mass.	10.0	33.6	33.3	11.4	5.8	1.7	4.2[2]	—	—	—	100.0
Joplin, Mo.	35.4	36.3	17.1	4.7	2.8	1.1	2.6[2]	—	—	—	100.0
Lewiston, Maine	12.0	38.3	31.3	10.4	4.3	1.0	2.7[2]	—	—	—	100.0
Madison, Wis.	0.5	5.4	15.4	18.4	21.0	13.6	9.4	6.0	4.2	6.1	100.0
Manitowac, Wis.	1.8	24.0	36.8	20.0	12.0	2.9	2.5[2]	—	—	—	100.0
Port Huron, Mich.	8.3	37.1	27.6	11.9	8.0	4.0	3.1[2]	—	—	—	100.0
Rome, N. Y.	15.0	29.5	20.6	12.5	6.4	5.5	3.5	2.5	1.5	3.0	100.0
Stamford, Conn.	2.1	12.6	18.5	15.5	12.4	8.8	30.1[2]	—	—	—	100.0
Taunton, Mass.	7.7	41.5	33.9	8.0	4.1	1.2	3.6[2]	—	—	—	100.0
Williamsport, Pa.	15.4	42.7	24.6	8.7	3.8	3.3	1.5[2]	—	—	—	—
Average for Group V	11.0	30.0	25.5	12.9	8.4	4.4	2.7	1.7	1.3	2.1	100.0
Average for All Groups	10.8	26.0	24.2	14.9	8.8	4.9	3.4	1.9	1.3	3.8	100.0

In computing the group averages the cities for which detailed distribution is not given beyond $65 or $75 are included. The distribution above these limits for these cities has been estimated on the basis of the other cities.

[1] Over $75.

[2] Over $65.

TABLE VIII

PRESENT SITUATION AS TO CONSTRUCTION OF LOW-COST HOUSES FOR SALE BY BUILDERS

Groups of Cities	Houses to Sell for $2500 to $3999					Houses to Sell for $4000 to $4999					
	Being Built?	Number of Rooms	Type	Lot Size	Paving?	Being Built?	Number of Rooms	Type	Lot Size	Paving?	Sewer
Groups I and II											
Cities of 300,000 and Over											
Baltimore, Md.	No	—	—	—	—	Yes	—	R	22 × 150[1]	Yes	Yes
Buffalo, N. Y.	No	—	—	—	—	Few	—	F	35 × 115	Some	Yes
Cincinnati, Ohio	No	—	—	—	—	No	—	—	—	—	—
Cleveland, Ohio	Few	—	B	35 × ?	Yes	Few	—	F	35 × 125	Yes	Yes
Detroit, Mich.	Yes	—	F	30 × ?	No	Yes	4	F	35 × ?	Some	Some
Indianapolis, Ind.	Yes	4	B	40 × 140	No	Yes	5	B	40 × 140	Some	Yes
Kansas City, Mo.	No	—	—	—	—	No	—	—	—	—	—
Los Angeles, Calif.	Yes	—	B	40 × 130	Some	Yes	—	B	50 × 150	Yes	Yes
Minneapolis, Minn.	Few	4	B	40 × 120	No	Yes	5	B	40 × 120	No	Yes
Pittsburgh, Pa.	No	—	—	—	—	No	—	—	—	—	—
Rochester, N. Y.	No	—	—	—	—	Yes	5	B	40 × 120	Yes	No
San Francisco, Calif.	No	—	—	—	—	No	—	—	—	—	—
Seattle, Wash.	Few	—	B	40 × 100	No	Yes	4–5	B	40 × 100	Yes	Yes
Washington, D. C.	No	—	—	—	—	No	—	—	—	—	—
Summary for Groups I and II	Yes 3 Few 3 No 8		B 5 F 1	Av. Lot 37½ × 123	Yes 1 Some 1 No 4	Yes 7 Few 2 No 5		B 5 F 3 R 1	Av. Lot 39 × 124[1]	Yes 5 Some 3 No 1	Yes 7 Some 1 No 1
Groups III, IV, and V											
Cities of 30,000 to 300.000											
Akron, Ohio	Few	4	B	40 × 100	No	Yes	5	B	40 × 100	No	Yes
Altoona, Pa.	No	—	—	—	—	Yes	4–5	B	30 × 120	Some	Yes
Berkeley, Calif.	Yes	4–5	B	35 × ?	Yes	Yes	4–5	F	37½ × 140	Yes	Yes
Birmingham, Ala.	No	—	—	—	—	Few	5–6	B	50 × 150	Some	Yes
Binghamton, N. Y.	No	—	—	—	—	No	—	—	—	—	—
Brockton, Mass.	Yes	4–5	B	55 × 110	No	Yes	4–5	B	55 × 100	Some	Some
Brookline, Mass.	No	—	—	—	—	No	—	—	—	—	—
Camden, N. J.	No	—	—	—	—	Few	6	B	16 × 100	Yes	No
Chester, Pa.	No	—	—	—	—	No	—	—	—	—	—
Dayton, Ohio	Few	4–5	B	40 × 125	No	Yes	5	F	40 × 125	Yes	No
Denver, Colo.	Yes	3–4	B	37½ × 125	Some	Yes	4–5	F	40 × 125	Some	Yes
East Orange, N. J.	No	—	—	—	—	Few	5–6	F	30 × 100	Yes	Yes
East St. Louis, Ill.	No	—	—	—	—	Yes	4–5	B	45 × 100	Some	Some
Elizabeth, N. J.	No	—	—	—	—	Few	—	F	25 × ?	Yes	Yes
Evanston, Ill.	No	—	—	—	—	No	—	—	—	—	—
Fort Wayne, Ind.	No	—	—	—	—	Yes	5	B	40 × 125	No	Yes
Gary, Ind.	Few	3–4	B	30 × 100	No	Few	4–5	F	30 × 100	No	Yes
Grand Rapids, Mich.	Yes	4–5	B	45 × 120	No	Yes	5	F	40 × 120	Some	Some
Hammond, Ind.	Yes	—	F	30 × 100	Yes	Yes	—	F	35 × 100	Yes	Yes

[1] Lot size of Baltimore Row House not included in average.

TABLE VIII — *Continued*

Groups of Cities	Houses to Sell for $2500 to $3999					Houses to Sell for $4000 to $4999					
	Being Built?	Number of Rooms	Type	Lot Size	Paving?	Being Built?	Number of Rooms	Type	Lot Size	Paving?	Sewer
Joliet, Ill.	Yes	4	B	40 × 120	Some	Yes	——	B	40 × 120	No	Yes
Lansing, Mich.	Few	4	B	40 × 120	Some	Yes	5	B	40 × 120	Some	Yes
Lincoln, Neb.	Yes	——	B	50 × 120	Yes	Yes	5	B	50 × 140	Yes	Yes
Long Beach, Calif.	Yes	5	B	45 × 120	No	Yes	5	B	45 × 120	No	No
Madison, Wis.	Few	——	B	40 × 110	No	Yes	4	B	40 × 110	No	Yes
New Bedford, Mass.	No	——	——	——	——	Few	——	B	40 × 80	No	Yes
Oakland, Calif.	Yes	4–5	B	40 ×?	Yes	Yes	5–6	B	45 ×?	Yes	Yes
Oklahoma City, Okla.	No	——	——	——	——	Few	——	B	50 × 140	Yes	Yes
Omaha, Neb.	Yes	3	B	50 ×?	Some	Yes	4–5	B	50 × 120	Yes	Yes
Paterson, N. J.	No	——	——	——	——	Yes	5	F	33⅓ × 100	No	Yes
Peoria, Ill.	Few	3–4	B	30 ×?	Some	Yes	4–5	F	35 × 125	Some	Some
Pontiac, Mich.	Yes	——	B	40 × 120	No	Yes	——	F	40 × 120	No	No
Portland, Maine	No	——	——	——	——	Yes	——	F	55 × 100	No	No
Portland, Ore.	Yes	4–5	F	50 × 100	Some	Yes	5	F	50 × 100	Yes	Yes
Providence, R. I.	Yes	4	B	45 × 90	No	Yes	5	B	45 × 90	Yes	No
Racine, Wis.	No	——	——	——	——	No	——	——	——	——	——
Richmond, Ind.	Few	——	B	40 × 150	Some	Yes	5	B	40 × 150	Yes	Yes
Saginaw, Mich.	Few	——	B	40 × 120	Some	Yes	——	B	40 × 120	Yes	Yes
Salt Lake City, Utah	No	——	——	——	——	Yes	5	B	45 × 125	No	Yes
San Diego, Calif.	Yes	——	B	40 × 125	Some	Yes	4–5	B	50 × 110	Yes	Yes
Sioux City, Iowa	No	——	——	——	——	Few	5	F	50 × 150	Yes	Yes
Spokane, Wash.	Yes	4	B	50 × 120	No	Yes	4–5	F	50 × 120	No	Yes
Springfield, Ohio	Yes	4	B	45 × 145	Some	Yes	——	F	45 × 145	Some	Yes
Syracuse, N. Y.	Yes	——	B	40 ×?	No	Yes	——	B	50 ×?	Some	No
Tacoma, Wash.	Yes	——	B	50 × 120	Some	Yes	——	F	50 × 120	Yes	Yes
Waterbury, Conn.	No	——	——	——	——	No	——	——	——	——	——
Windsor, Ont.	Yes	——	B	35 × 100	Some	Yes	——	B	35 × 100	Yes	Yes
Wichita, Kan.	Yes	——	B	37½ × 140	Yes	Yes	——	B	50 × 140	Yes	Yes
Worcester, Mass.	No	——	——	——	——	Yes	4–5	B	45 × 100	No	No
Summary for Groups III, IV, and V	Yes 20 Few 8 No 20		B 26 F 2	Av. Lot 41 × 117	Yes 5 Some 12 No 11	Yes 34 Few 8 No 6		B 25 F 17	Av. Lot 42 × 115	Yes 19 Some 10 No 13	Yes 30 Some 4 No 8
Summary for All Groups	Yes 23 Few 11 No 28		B 31 F 3	Av. Lot 41 × 118	Yes 6 Some 13 No 15	Yes 41 Few 10 No 11		B 30 F 20 R 1	Av. Lot 42 × 116[1]	Yes 24 Some 13 No 14	Yes 37 Some 5 No 9

Explanation:

Type of House
R = Row House.
F = 2- or 2½-story detached frame dwelling.
B = 1- or 1½-story detached frame dwelling.

Paving "Some" means either that some of the streets in the area in which the houses are being sold are paved, or that all of them are paved with a temporary pavement such as gravel or oil and cinders.

Sewers "Some" means that there are sewers in some cases.

[1]Lot size of Baltimore Row House not included in average.

TABLE IX

CONSTRUCTION OF SINGLE-FAMILY DWELLINGS IN 1929 AS SHOWN BY BUILDING PERMITS ISSUED

Permit Value	Percentage of Total Number of Permits Issued in Each Value Class									
	Under 2000	2000 to 2999	3000 to 3999	4000 to 4999	5000 to 5999	6000 to 6999	7000 to 7999	8000 to 8999	9000 and Over	Total
Estimated Full Value of House and Lot	Under 2840	2840 to 4259	4260 to 5679	5680 to 7099	7100 to 8519	8520 to 9939	9940 to 11,359	11,360 to 12,779	12,780 and Over	
Group A										
Cities building few low-cost houses										
Cincinnati, Ohio	0.0	0.7	4.1	13.3	19.4	22.5	12.1	7.0	20.9	100.0
Detroit, Mich.	1.0	1.2	7.3	24.9	44.9	9.8	4.3	2.1	4.5	100.0
Lakewood, Ohio	0.0	0.0	0.0	2.3	4.8	11.9	11.9	17.9	51.2	100.0
Madison, Wis.	0.4	1.3	9.3	35.0	27.4	10.6	5.3	4.9	5.8	100.0
New Haven, Conn.	0.0	1.4	11.0	6.7	9.6	8.2	11.0	19.9	32.2	100.0
Passaic, N. J.	0.0	0.0	0.0	0.0	43.2	9.8	7.8	9.8	29.4	100.0
Paterson, N. J.	0.0	0.0	3.2	58.4	20.8	4.8	4.8	1.6	6.4	100.0
Pawtucket, R. I.	0.7	3.8	17.7	33.7	11.5	14.6	8.3	4.5	5.2	100.0
Peoria, Ill.	0.0	4.0	4.7	13.0	14.0	39.1	11.8	5.9	7.5	100.0
Schenectady, N. Y.	0.4	2.0	7.8	24.7	32.2	22.4	5.9	3.8	0.8	100.0
Troy, N. Y.	0.8	1.6	7.4	18.0	25.4	15.6	9.8	5.8	15.6	100.0
Washington, D. C.	0.0	5.0	1.0	25.0	24.0	4.0	16.0	13.0	12.0	100.0
Wilmington, Del.	0.0	0.0	2.0	27.0	23.4	28.3	2.8	1.6	14.9	100.0
Queens Borough, N. Y. C.	0.0	0.5	2.7	23.5	19.8	10.6	28.3	3.8	10.8	100.0
Average for Group A.	0.2	1.5	5.6	21.8	22.8	15.2	10.0	7.3	15.6	100.0
Group B										
Cities building a considerable number of low-cost houses										
Binghamton, N. Y.	8.6	10.3	15.5	22.4	13.8	5.2	5.2	1.7	17.3	100.0
Canton, Ohio	1.0	4.0	30.8	27.8	13.0	4.7	5.7	2.0	11.0	100.0
Fresno, Calif.	5.4	26.5	38.1	17.7	4.2	2.7	3.4	0.0	2.0	100.0
Indianapolis, Ind.	11.8	22.8	21.2	13.7	8.4	5.5	3.4	3.7	9.5	100.0
Jackson, Mich.	0.0	0.0	60.8	18.8	14.1	0.0	0.0	6.3	0.0	100.0
Kansas City, Kan.	38.5	33.1	19.9	5.4	1.2	0.5	0.3	0.5	0.6	100.0
Kokomo, Ind.	16.4	23.0	29.5	11.5	9.8	1.6	3.3	1.6	3.3	100.0
Lansing, Mich.	0.0	9.6	42.7	23.8	12.3	6.0	1.9	1.6	2.1	100.0
Los Angeles, Calif.	16.1	34.6	23.6	8.9	4.6	2.2	2.6	1.1	6.3	100.0
Lowell, Mass.	4.6	18.2	18.2	31.8	9.1	13.6	4.5	0.0	0.0	100.0
Minneapolis, Minn.	6.9	25.3	39.0	11.4	7.1	3.6	2.0	1.5	3.2	100.0
Philadelphia, Pa.	0.1	1.8	35.5	42.8	11.0	3.7	1.8	0.7	2.6	100.0
Portland, Maine	2.5	8.3	22.3	21.5	14.0	14.8	9.9	1.7	5.0	100.0
Portland, Ore.	4.0	7.9	27.6	26.2	9.3	9.1	3.2	3.1	9.6	100.0
Richmond, Ind.	12.5	12.5	30.9	21.3	8.2	2.9	5.1	2.2	4.4	100.0
Rockford, Ill.	0.0	0.3	49.0	23.3	14.8	6.0	2.2	2.2	2.2	100.0
Saginaw, Mich.	28.1	34.2	23.4	7.6	2.9	1.0	0.8	1.0	1.0	100.0
Salt Lake City, Utah	3.5	5.0	39.5	26.8	8.3	5.6	4.0	2.8	4.5	100.0
San Francisco, Calif.	1.0	1.2	20.6	50.5	12.9	4.9	1.0	1.9	6.0	100.0
Springfield, Ill.	7.3	5.6	17.9	31.9	21.5	9.7	1.5	0.5	4.1	100.0
Springfield, Mass.	6.6	16.5	20.8	19.1	12.2	7.9	8.3	4.6	4.0	100.0
Topeka, Kan.	18.0	23.7	15.4	19.9	6.4	6.4	2.5	1.3	6.4	100.0
Average for Group B	8.8	14.6	29.2	22.0	10.0	5.3	3.3	2.0	4.8	100.0
Average for Groups A and B	5.6	11.0	18.1	22.8	17.7	7.3	7.8	2.8	6.9	100.0

TABLE X

ACREAGE VALUES IN TRACTS RIPE FOR SUBDIVISION AND BUILDING

City	Suitable for Houses, to Sell for $12,000 Up				
	Value per Acre A	Distance from Built-up Areas	Distance from Center of City (Miles)	Distance from Means of Transportation (Feet)	Are Utility Mains within a Reasonable Distance?
Groups I and II					
Cities of 300,000 and Over					
Baltimore, Md.					
Baltimore, Md.	$5000	Adjacent	3.5	0	Yes
Boston, Mass.	3500	½ mile	8.0	1320	Yes
Boston, Mass.	2250	Adjacent	10.0	3000	Yes
Buffalo, N. Y.	3750	Adjacent	7.0	2640	Yes
Chicago, Ill.	5000	Adjacent	6.5	2640	Yes
Chicago, Ill.	6000	Adjacent	7.0	0	Yes
Cincinnati, Ohio	4000	Adjacent	8.0	1000	Yes
Cincinnati, Ohio	4000	Adjacent	5.0	1320	Yes
Cincinnati, Ohio	3000	Adjacent	5.0	0	Yes
Cleveland, Ohio					
Detroit, Mich.	4500	Adjacent	5.0	0	Yes
Detroit, Mich.	4000	Adjacent	5.0	0	Yes
Kansas City, Mo.	3500	Adjacent	7.0	3960	Yes
Kansas City, Mo.	2000	½ mile	5.0	3960	Yes
Philadelphia, Pa.	9000	Adjacent	9.0	1700	Yes
Rochester, N. Y.					
Rochester, N. Y.	3000	Adjacent	4.0	0	Yes
Rochester, N. Y.	3500	Adjacent	3.0	600	Yes
Average Value	3800				
Median Value	3750				
Groups III, IV, and V					
Cities of 30,000 to 300,000					
Akron, Ohio	1500	Adjacent	3.0	500	Yes
Akron, Ohio					
Allentown, Pa.	3000	½ mile	2.5	900	Yes, except sewers
Canton, Ohio	1500	Adjacent	2.5	2000	Yes
Des Moines, Iowa	2000	Adjacent	3.0	600	Yes
Des Moines, Iowa	2500	Adjacent	5.0	900	Yes
Fort Wayne, Ind.	3000	Adjacent	2.5	600	Yes
Gary, Ind.	4250	Adjacent	3.0	0	Yes
Gary, Ind.	1250	Adjacent	3.0	0	Yes
Gary, Ind.	5000	Adjacent	1.5	600	Yes
New Haven, Conn.	2750	Adjacent	4.0	5280	Yes, except sewers
New Haven, Conn.	2500	½ mile	3.5	1000	Yes, except sewers
New Haven, Conn.	3000	Adjacent	3.0	900	Yes
Omaha, Neb.	4000	Adjacent	3.0	1320	Yes
Omaha, Neb.	2500	Adjacent	3.0	2000	Yes
Oranges and Maplewood, N. J.	2750	Adjacent	0.5	2640	Yes
South Bend, Ind.	3000	Adjacent	1.5	0	Yes
South Bend, Ind.	2000	½ mile	1.5	0	Yes
Springfield, Mass.	2000	½ mile	2.5	1000	Yes
St. Paul, Minn.	3250	Adjacent	4.0	0	Yes
Syracuse, N. Y.	2500	½ mile	3.0	0	Yes
Syracuse, N. Y.	2000	½ mile	3.5	1000	Yes
Average Value	2679				
Median Value	2500				
Average for all Groups	3146				
Median for all Groups	3000				

TABLE X — *Continued*

ACREAGE VALUES IN TRACTS RIPE FOR SUBDIVISION AND BUILDING

City	Suitable for Houses, to Sell for $6000 to $9000				
	Value per Acre B	Distance from Built-up Areas	Distance from Center of City (Miles)	Distance from Means of Transportation (Feet)	Are Utility Mains within a Reasonable Distance?
Groups I and II					
Cities of 300,000 and Over					
Baltimore, Md.	$ 1500	Close	4.0	1000	Yes
Baltimore, Md.	2000	Adjacent	3.5	0	Yes
Boston, Mass.	1750	½ mile	6.0	660	Yes
Boston, Mass.	1750	¼ mile	10.0	3000	Yes, except sewers
Buffalo, N. Y.	2250	½ mile	7.0	3960	Yes
Chicago, Ill.	——	——	——	——	——
Chicago, Ill.	——	——	——	——	——
Cincinnati, Ohio	2000	½ mile	8.0	1320	Yes
Cincinnati, Ohio	3000	Adjacent	5.0	1320	Yes
Cincinnati, Ohio	——	——	——	——	——
Cleveland, Ohio	2000	Adjacent	13.0	0	Yes
Detroit, Mich.	3500	Adjacent	5.0	0	Yes
Detroit, Mich.	3000	¾ mile	6.0	1600	Yes
Kansas City, Mo.	3000	Adjacent	7.0	0	Yes
Kansas City, Mo.	1500	¾ mile	5.5	3000	Yes
Philadelphia, Pa.	15000	Adjacent	7.0	1000	Yes
Rochester, N. Y.	1750	1 mile	5.0	2640	Yes, except sewers
Rochester, N. Y.	2000	1 mile	4.5	0	Yes
Rochester, N. Y.	2000	½ mile	4.0	2640	½ mile away
Average Value	2206[1]				
Median Value	2000[1]				
Groups III, IV, and V					
Cities of 30,000 to 300,000					
Akron, Ohio	1200	Adjacent	3.5	800	Yes
Akron, Ohio	1000	Adjacent	4.5	0	Yes
Allentown, Pa.	2500	Adjacent	1.5	0	Yes, except sewers
Canton, Ohio	——	——	——	——	——
Des Moines, Iowa	1000	½ mile	7.0	0	½ mile away
Des Moines, Iowa	1500	Adjacent	6.0	0	Yes
Fort Wayne, Ind.	1200	Adjacent	3.5	0	Yes
Gary, Ind.	1500	Adjacent	1.5	0	Yes
Gary, Ind.	900	Adjacent	2.0	2000	Yes
Gary, Ind.	3510	Adjacent	1.5	0	Yes
New Haven, Conn.	900	½ mile	6.0	2640	Yes, except sewers
New Haven, Conn.	1125	½ mile	5.0	1320	Yes, except sewers
New Haven, Conn.	——	——	——	——	——
Omaha, Neb.	1500	Adjacent	2.5	0	Yes
Omaha, Neb.	1500	Adjacent	3.0	0	Yes
Orange and Maplewood, N. J.	2250	Adjacent	0.5	2640	Yes
South Bend, Ind.	2000	Adjacent	2.0	300	Yes
South Bend, Ind.	1500	Adjacent	2.5	0	Yes
Springfield, Mass.	1400	Adjacent	3.5	0	Yes
St. Paul, Minn.	2000	Adjacent	4.0	0	Yes
Syracuse, N. Y.	1500	½ mile	4.0	2640	Yes
Syracuse, N. Y.	1000	½ mile	3.0	——	Yes
Average Value	1549				
Median Value	1500				
Average for all Groups	1828				
Median for all Groups	1750				

[1] Excluding Philadelphia.

TABLE X — *Continued*

ACREAGE VALUES IN TRACTS RIPE FOR SUBDIVISION AND BUILDING

City	Suitable for Houses, to Sell for $5000 or Less					Ratio A : C	Ratio B : C
	Value per Acre C	Distance from Built-up Areas	Distance from Center of City (Miles)	Distance from Means of Transportation (Feet)	Are Utility Mains within a Reasonable Distance?		
Groups I and II							
Cities of 300,000 and Over							
Baltimore, Md.	$ 1000	¼ mile	4.5	2640	Yes	——	1.50
Baltimore, Md.	875	½ mile	5.0	0	Yes	5.71	2.29
Boston, Mass.	1000	¼ mile	6.0	0	Yes	3.50	1.75
Boston, Mass.	1000	¼ mile	12.0	3000	Water and elect. only	2.25	1.75
Buffalo, N. Y.	1900	½ mile	7.5	0	Yes	3.75	2.25
Chicago, Ill.	——	——	——	——	——	——	——
Chicago, Ill.	——	——	——	——	——	——	——
Cincinnati, Ohio	1000	½mile	10.0	2640	Yes, except gas	4.00	2.00
Cincinnati, Ohio	1250	½mile	7.0	1320	Water and elect. only	3.20	2.40
Cincinnati, Ohio	——	——	——	——	——	——	——
Cleveland, Ohio	——	——	——	——	——	——	——
Detroit, Mich.	——	——	——	——	——	——	——
Detroit, Mich.	——	——	——	——	——	——	——
Kansas City, Mo.	1500	——	6.0	1200	Yes	2.33	2.00
Kansas City, Mo.	1000	¾ mile	6.0	3000	Yes	2.00	1.50
Philadelphia, Pa.	20000	Adjacent	6.5	1000	Yes	——	——
Rochester, N. Y.	1200	1 mile	5.0	2640	Yes	——	1.46
Rochester, N. Y.	1500	½ mile	6.0	0	Yes	2.00	1.33
Rochester, N. Y.	——	——	——	——	——	——	——
Average Value	1200[1]					——	——
Median Value	1000[1]					3.75	2.00
Groups III, IV, and V							
Cities of 30,000 to 300,000							
Akron, Ohio	1000	Adjacent	2.0	300	Yes	1.50	1.20
Akron, Ohio	——	——	——	——	——	——	——
Allentown, Pa.	——	——	——	——	——	——	——
Canton, Ohio	——	——	——	——	——	——	——
Des Moines, Iowa	——	——	——	——	——	——	——
Des Moines, Iowa	1000	Adjacent	4.0	1500	1500 ft. away	2.50	1.50
Fort Wayne, Ind.	600	1 mile	4.0	1000	Electricity only	5.00	2.00
Gary, Ind.	1500	Adjacent	3.0	0	Yes	2.83	1.00
Gary, Ind.	650	Adjacent	2.0	900	Yes	1.92	1.38
Gary, Ind.	——	——	——	——	——	——	——
New Haven, Conn.	——	——	——	——	——	——	——
New Haven, Conn.	550	¾ mile	6.0	3960	Electricity only	4.55	2.05
New Haven, Conn.	——	——	——	——	——	——	——
Omaha, Neb.	1000	Adjacent	2.5	1320	Yes	4.00	1.50
Omaha, Neb.	500	——	3.5	2000	Yes, except sewers	5.00	3.00
Oranges and Maplewood, N. J.	——	——	——	——	——	——	——
South Bend, Ind.	1500	——	2.5	600	Yes, except sewers	2.00	1.33
South Bend, Ind.	1100	Adjacent	2.5	0	Yes	1.81	1.36
Springfield, Mass.	——	——	——	——	——	——	——
St. Paul, Minn.	1250	¼ mile	3.5	1320	Yes	2.60	1.60
Syracuse, N. Y.	800	——	4.5	2640	Yes, except sewers	3.13	1.88
Syracuse, N. Y.	500	¾ mile	4.5	——	Water and electricity	4.00	2.00
Average Value	919					——	——
Median Value	1000					2.50	1.50
Average for all Groups	1049					——	——
Median for all Groups	1000					3.00	1.75

[1] Excluding Philadelphia.

TABLE XI

COST DATA FOR TYPICAL HOUSE LOT FOR LOW- OR MEDIUM-COST HOUSE IN VARIOUS CITIES

Groups of Cities	Type of House	Size of Lot	Price of House and Lot	Value of Improved Lot	Per Cent Lot Value of Selling Price of House and Lot	Cost of Street Improvements		Average Cost of Raw Land per Acre	Number of Lots per Acre	Cost of Raw Land per Lot	Cost of Raw Land Plus Improvements per Lot	Per Cent Cost of Raw Land Plus Improvements of Value of Lot	Per Cent Cost of Improvements of Value of Lot
						Total	Per Front Foot						
Group I													
Cities of 500,000 and Over													
Boston, Mass.	F	50 × 100	$6500	——	——	$650	$13.00	$ 3000	7.0	$429	$1079	——	——
Cleveland, Ohio	F	35 × 100	6000	——	——	500	14.28	1350	9.0	150	650	——	——
Cleveland, Ohio	F	40 × 120	6950	$1750	25.2	700	17.50	4000	6.0	667	1367	78.1	40.0
Philadelphia, Pa.[1]	BrR	15 × 78	5450	1890	20.0	238	15.86	18500	26.0	712	950	87.0	12.6
San Francisco, Calif.	F	33 × 90	7500	1800	24.0	230	6.90	3000	7.0	429	659	36.6	12.8
San Francisco, Calif.	B	33 × 100	5750	1500	26.1	330	10.00	6000	9.0	667	997	66.4	22.0
Average for Group I[1]		38 × 102	6540	1683	25.7	482	12.68	3470	7.6	457	939	55.8	28.6
Group II													
Cities of 300,000 to 500,000													
Buffalo, N. Y.	F	40 × 125	6500	1500	23.1	500	12.50	1000	6.0	167	667	44.4	33.3
Indianapolis, Ind.	B	40 × 150	5000	——	——	405	10.12	——	4.0	——	——	——	——
Indianapolis, Ind.	B	40 × 140	4950	900	18.2	473	11.82	——	5.0	——	——	——	——
Kansas City, Mo.	B	35 × 120	6000	——	——	543	15.50	1500	5.0	300	843	——	——
Minneapolis, Minn.	F	40 × 128	5600	1000	17.9	——	——	——	5.0	——	——	——	——
Rochester, N. Y.	B	45 × 120	6500	1300	20.0	550	12.22	1000	6.0	——	——	——	42.3
Rochester, N. Y.	B	45 × 105	5605	1405	25.1	405	9.00	2500	6.5	385	790	56.2	28.8
Rochester, N. Y.	B	45 × 140	4995	1300	26.0	600	13.33	1200	4.5	267	867	66.7	46.2
Average for Group II		41 × 129	5644	1234	21.9	497	12.12	1440	5.25	274	771	62.5	40.3
Average for Groups I and II[1]		40 × 118	5989	1384	23.1	491	12.28	2455	6.2	396	887	64.8	35.5
Median		40 × 120	6000	1405	23.4	500	12.50	2000	6.0	333	833	59.3	35.6
Group III													
Cities of 100,000 to 300,000													
Akron, Ohio	B	45 × 110	5200	1400	26.9	500	11.11	1000	6.0	167	667	47.6	35.7
Akron, Ohio	——	40 × 120	——	——	——	800	20.00	1500	7.0	214	1014	——	——
Akron, Ohio	B	40 × 120	4500	——	——	652	16.30	1000	6.0	167	819	——	——
Birmingham, Ala.	B	50 × 150	5500	1100	20.0	——	——	1250	4.0	313	——	——	——
Dayton, Ohio	F	48 × 140	7750	1500	19.4	531	11.06	1750	4.5	339	920	61.3	35.4
Dayton, Ohio	F	40 × 125	4500	——	——	400	10.00	1000	6.0	167	567	——	——
Denver, Colo.	——	50 × 100	4500	500	11.1	220	4.40	——	——	——	——	——	44.0
Denver, Colo.	Br	50 × 100	4600	615	15.0	250	5.50	——	——	——	——	——	40.7
Grand Rapids, Mich.	F	40 × 125	6500	1500	23.1	630	15.75	1500	5.5	273	903	60.2	42.0
Grand Rapids, Mich.	F	42 × 120	5800	750	12.9	150	3.57	500	5.0	100	250	33.3	20.0

[1] Philadelphia not included in averages.

TABLE XI — *Continued*

Groups of Cities	Type of House	Size of Lot	Price of House and Lot	Value of Improved Lot	Per Cent Lot Value of Selling Price of House and Lot	Cost of Street Improvements		Average Cost of Raw Land per Acre	Number of Lots per Acre	Cost of Raw Land per Lot	Cost of Raw Land Plus Improvements per Lot	Per Cent Cost of Raw Land Plus Improvements of Value of Lot	Per Cent Cost of Improvements of Value of Lot
						Total	Per Front Foot						
Portland, Ore.	B	50 × 100	$5000	——	——	300	$6.00	——	——	——	——	——	——
Portland, Ore.	B	50 × 100	5500	——	——	300	6.00	1000	6.0	$167	$467	——	——
Portland, Ore.	B	50 × 100	5500	800	14.1	250	5.00	——	——	——	——	——	31.3
Salt Lake City, Utah	Br	45 × 125	5850	940	16.6	390	8.66	3000	6.0	500	890	95.0	41.5
Salt Lake City, Utah	Br	50 × 110	6000	1450	24.2	455	9.10	——	——	——	——	——	31.4
Spokane, Wash.	B	50 × 120	3750	750	20.0	200	4.00	——	——	——	——	——	26.7
Syracuse, N. Y.	F	50 × 140	6000	——	——	——	——	1500	5.0	300	——	——	——
Average for Group III		46 × 118	5403	1028	19.0	402	8.74	1364	5.6	244	646	62.8	39.1
Group IV													
Cities of 50,000 to 100,000													
Altoona, Pa.	F	40 × 120	5500	1000	18.2	454	11.35	2000	6.5	308	762	76.2	45.4
Berkeley, Calif.	B	40 × 100	4500	1100	24.4	——	——	——	8.0	——	——	——	——
Binghamton, N. Y.	F	50 × 120	6500	1300	20.0	312	6.24	2800	5.0	560	872	——	24.0
Brockton, Mass.	B	60 × 120	6500	900	13.8	400	6.67	1350	5.0	270	670	74.4	44.4
Chester, Pa.	TF	25 × 120	6000	1000	16.7	240	9.60	1500	10.0	150	390	39.0	24.0
Lansing, Mich.	B	37 × 105	6000	840	14.0	395	10.67	1000	7.5	133	528	——	47.0
Saginaw, Mich.	——	50 × 100	5500	——	——	720	14.39	1000	6.0	167	887	——	——
Average for Group IV		43 × 112	5786	1023	17.7	420	9.77	1608	6.9	233	653	63.8	41.1
Average for Groups III and IV		46 × 116	5520	1026	18.6	407	8.85	1450	6.1	238	645	62.9	39.7
Median		49 × 120	5500	1000	18.2	395	8.06	1350	6.0	225	620	62.0	39.5
Average for Groups I to IV [1]		44 × 117	5688	1150	20.2	437	9.93	1822	6.1	299	736	64.0	38.0
Median		45 × 120	5678	1100	19.4	405	9.00	1500	6.0	250	655	59.5	36.8

Explanation:

Type of House
- R = Row House.
- Br = Brick House.
- TF = Two-family frame dwelling.
- F = 2- or 2½-story detached frame dwelling.
- B = 1- or 1½-story detached frame dwelling.

[1] Philadelphia not included in averages.

TABLE XII

COST DATA FOR TYPICAL HOUSE LOT IN A SUBDIVISION INTENDED FOR SMALL HOUSES

City	Size of Lot	Sale Price	Cost of Street Improvements		Per cent Cost of Improvements of Sale Price
			Total	Per Front Foot	
Groups I and II					
Cities of 300,000 and Over					
Baltimore, Md.	50 × 125	$1500	$450	$9.00	30.0
Boston, Mass.	60 × 100	2000	538	8.97	26.9
Boston, Mass.	50 × 100	1662	613	12.25	36.9
Buffalo, N. Y.	35 × 115	2000	664	18.97	33.2
Buffalo, N. Y.	35 × 115	1577	376	10.74	23.9
Cincinnati, Ohio	50 × 125	2000	500	10.00	25.0
Cleveland, Ohio	40 × 120	2000	950	23.75	47.5
Kansas City, Mo.	50 × 130	2500	588	11.75	23.5
Rochester, N. Y.	60 × 140	2000	853	14.22	42.7
Rochester, N. Y.	40 × 120	1800	600	15.00	33.3
Average for Groups I and II	47 × 119	1904	613	13.04	32.2
Groups III, IV, and V					
Cities of 30,000 to 300,000					
Allentown, Pa.	30 × 120	1500	318	10.58	21.2
Akron, Ohio	45 × 110	1500	700	15.56	46.7
Bridgeport, Conn.	50 × 120	—	344	6.88	—
Canton, Ohio	48 × 120	1920	720	15.00	37.5
Chatham, N. J.	50 × 125	1500	573	11.45	38.2
Flint, Mich.	40 × 100	1200	383	9.56	31.9
Fort Wayne, Ind.	45 × 120	2025	964	21.43	47.6
Fort Wayne, Ind.	40 × 125	1450	450	11.25	31.0
Gary, Ind.	40 × 125	1250	700	17.50	56.0
Gary, Ind.	40 × 150	895	395	9.88	44.1
Millburn, N. J.	50 × 150	2500	520	10.40	20.8
New Haven, Conn.	55 × 125	1900	297	5.41	15.7
Peoria, Ill.	50 × 100	1350	228	4.55	16.9
Sioux City, Iowa	50 × 150	1500	338	6.76	22.5
South Bend, Ind.	40 × 120	1395	495	12.38	35.5
Springfield, Mass.	60 × 125	1200	510	8.50	42.5
Syracuse, N. Y.	50 × 125	1350	260	5.20	19.3
Trenton, N. J.	40 × 100	950	220	5.50	23.2
Windsor, Ont.	45 × 100	—	450	10.00	—
Average for Groups III, IV, and V	46 × 122	1493	467	10.15	31.3
Average for Groups I–V	46 × 121	1645	518	11.26	31.5

TABLE XIII

RELATION BETWEEN COST OF LOT AND COST OF HOUSE FOR MEDIUM-COST HOUSES

Cities	Per Cent Cost of Lot of Cost of House and Lot	Size of Lot	Sewers?	Paving?
Group I				
Cities of 500,000 and Over				
Baltimore, Md.	20.0	50 × 150	Yes	Yes
Buffalo, N. Y.	18.0	50 × 120	Yes	Yes
Buffalo, N. Y.	20.0	35 × 125	Yes	Yes
Cleveland, Ohio	20.0	30 × 115	Yes	Yes
Cleveland, Ohio	23.1	40 × 165	Yes	Yes
Cleveland, Ohio	20.0	50 × 140	Yes	Yes
Cleveland, Ohio	20.0	45 × 155	—	Yes
Detroit, Mich.	16.7	40 × 100	Yes	Yes
Los Angeles, Calif.	25.0	55 × 150	Yes	Yes
Philadelphia, Pa.[1]	23.1	16 × 80	Yes	Yes
Pittsburgh, Pa.	20.0	40 × 100	Yes	Yes
San Francisco, Calif.	20.0	33 × 100	Yes	Yes
San Francisco, Calif.	20.0	40 × 100	Yes	Yes
Average for Group I[1]	20.2	42 × 127		
Group II				
Cities of 300,000 to 500,000				
Cincinnati, Ohio	16.7	—	—	—
Indianapolis, Ind.	20.0	45 × 150	Yes	Yes
Indianapolis, Ind.	20.0	45 × 150	Yes	Yes
Kansas City, Mo.	20.0	50 × 125	Yes	Yes
Kansas City, Mo.	16.7	60 × 130	Yes	Yes
Minneapolis, Minn.	18.0	45 × 128	Yes	No
Minneapolis, Minn.	13.0	50 × 128	Yes	Yes
Rochester, N. Y.	16.7	50 × 130	U. P.	U. P.
Rochester, N. Y.	20.0	45 × 130	Yes	Yes
Rochester, N. Y.	16.7	55 × 120	U. P.	U. P.
Rochester, N. Y.	13.0	50 × 150	Yes	Yes
Rochester, N. Y.	16.0	50 × 150	Yes	Yes
Seattle, Wash.	20.0	45 × 100	Yes	Yes
Average for Group II	17.5	49 × 133		
Average for Groups I and II[1]	18.9	45 × 130		

[1] Philadelphia not included in averages.
U. P. = In, but assessments not paid.

TABLE XIII — *Continued*

Cities	Per Cent Cost of Lot of Cost of House and Lot	Size of Lot	Sewers?	Paving?
Group III				
Cities of 100,000 to 300,000				
Akron, Ohio	23.1	50 × 150	Yes	Yes
Akron, Ohio	16.7	45 × 145	Yes	Yes
Akron, Ohio	16.7	50 × 140	Yes	Yes
Birmingham, Ala.	20.0	50 × 150	Yes	Yes
Camden, N. J.	21.3	50 × 125	U. P.	U. P.
Dayton, Ohio	16.7	40 × 125	U. P.	U. P.
Dayton, Ohio	20.0	50 × 150	Yes	Yes
Dayton, Ohio	16.7	40 × 150	Yes	Yes
Denver, Colo.	9.1	50 × 125	Yes	G
Denver, Colo.	16.7	50 × 125	Yes	Yes
Denver, Colo.	9.1	50 × 125	Yes	G
Elizabeth, N. J.	16.7	40 × 133	Yes	Yes
Fort Wayne, Ind.	20.0	45 × 130	Yes	Yes
Grand Rapids, Mich.	18.0	45 × 132	Yes	Yes
Grand Rapids, Mich.	23.1	40 × 120	Yes	Yes
Grand Rapids, Mich.	20.0	40 × 120	Yes	Yes
Long Beach, Calif.	28.6	50 × 125	Yes	Yes
New Bedford, Mass.	13.0	50 × 100	Yes	Yes
Oakland, Calif.	23.1	45 × 110	Yes	Yes
Oklahoma City, Okla.	20.0	50 × 140	Yes	Yes
Omaha, Neb.	16.7	50 × 120	Yes	Yes
Paterson, N. J.	14.5	40 × 100	Yes	No
Portland, Ore.	20.0	50 × 100	Yes	Yes
Portland, Ore.	16.7	50 × 100	Yes	Yes
Portland, Ore.	20.0	75 × 100	Yes	Yes
Portland, Ore.	23.1	50 × 100	Yes	Yes
Providence, R. I.	13.0	50 × 100	No	Yes
Salt Lake City, Utah	10.7	55 × 135	Yes	Yes
Salt Lake City, Utah	14.5	50 × 125	Yes	Yes
Salt Lake City, Utah	16.7	60 × 125	Yes	Yes
San Diego, Calif.	18.0	50 × 125	Yes	Yes
San Diego, Calif.	24.8	50 × 110	Yes	Yes
San Diego, Calif.	23.1	50 × 100	Yes	Yes
Syracuse, N. Y.	13.0	50 × 132	Yes	Yes
Syracuse, N. Y.	11.5	50 × 125	No	G
Spokane, Wash.	10.7	75 × 150	Yes	Yes
Tacoma, Wash.	23.1	75 × 120	Yes	Yes
Waterbury, Conn.	16.7	50 × 120	Yes	Yes
Worcester, Mass.	13.0	60 × 110	No	No
Yonkers, N. Y.	10.7	25 × 100	Yes	No
Average for Group III	18.1	51 × 123		

U. P. = In, but assessments not paid.
G = Gravel only.

TABLE XIII — *Continued*

Cities	Per Cent Cost of Lot of Cost of House and Lot	Size of Lot	Sewers?	Paving?
Group IV				
Cities of 50,000 to 100,000				
Altoona, Pa.	20.0	50 × 100	Yes	Yes
Altoona, Pa.	16.7	40 × 120	Yes	Yes
Berkeley, Calif.	20.0	50 × 110	Yes	Yes
Binghamton, N. Y.	20.0	50 × 135	Yes	Yes
Brockton, Mass.	16.7	65 × 130	Yes	Yes
Brockton, Mass.	9.1	60 × 120	Yes	—
Brockton, Mass.	16.7	80 × 150	Yes	Yes
East Orange, N. J.	16.7	45 × 110	Yes	Yes
East St. Louis, Ill.	15.3	50 × 120	Yes	Yes
Gary, Ind.	16.7	30 × 125	Yes	Yes
Hammond, Ind.	20.0	45 × 125	Yes	Yes
Lansing, Mich.	23.1	50 × 120	Yes	G
Lansing, Mich.	16.7	42 × 115	Yes	G
Lincoln, Neb.	18.0	60 × 142	Yes	Yes
Peoria, Ill.	20.0	40 × 150	Yes	—
Peoria, Ill.	13.0	40 × 125	Yes	Yes
Pontiac, Mich.	20.0	40 × 120	Yes	Yes
Portland, Maine	16.7	55 × 100	Yes	Yes
Racine, Wis.	13.0	40 × 120	Yes	No
Saginaw, Mich.	18.7	60 × 120	Yes	Yes
Saginaw, Mich.	20.0	55 × 120	Yes	Yes
Sioux City, Iowa	20.0	—	—	—
Springfield, Ohio	18.0	50 × 140	Yes	Yes
Wichita, Kan.	16.7	50 × 140	Yes	Yes
Average for Group IV	17.7	50 × 124		
Group V				
Cities under 50,000				
Windsor, Ont.	18.0	37 × 100	Yes	Yes
Libertyville, Ill.	23.1	50 × 150	Yes	Yes
Chester, Pa.	10.7	50 × 125	Yes	Yes
Richmond, Ind.	20.0	50 × 150	Yes	Yes
Brookline, Mass.	16.7	60 × 100	Yes	Yes
Evanston, Ill.	20.0	33 × 130	Yes	Yes
Joliet, Ill.	20.0	45 × 120	Yes	Yes
Madison, Wis.	20.0	45 × 120	Yes	Yes
Average for Group V	18.7	46 × 124		
Average for Groups III–V	17.8	50 × 124		
Average for Groups I–V [1]	18.1	49 × 125		

[1] Philadelphia not included in averages.
G = Gravel only.

TABLE XIV

DATA IN RELATION TO TYPICAL SMALL HOUSES FROM U. S. DEPARTMENT OF COMMERCE FIELD SURVEY

City	Sale Price	Lot Size	Lot Value	Paving	Curb	Side-walk	Water	Sewer	Gas	Elec-tricity	Per Cent Lot Value of Sale Price of House and Lot
Group I											
Cities of 500,000 and Over											
Detached Houses											
Boston, Mass.	$4400	50 × 70	$ 700	No	No	No	Yes	No	Yes	Yes	15.9
Los Angeles, Calif.	6350	45 × 120	1900	Yes	Yes	Yes	Yes	U. P.	Yes	Yes	29.9
Milwaukee, Wis.	7950	38 × 120	1800	Yes	Yes	Yes	U. P.	——	Yes	Yes	22.6
New York, N. Y.	4900	40 × 100	1600	No	Yes	Yes	Yes	No	Yes	Yes	32.7
New York, N. Y.	7990	32 × 100	1600	Yes	Yes	Yes	Yes	No	Yes	Yes	20.0
Average for Group I	6318	41 × 102	1520								24.1
Group II											
Cities of 300,000 to 500,000											
Detached Houses											
Indianapolis, Ind.	3950	35 × 135	600	Yes	Yes	Yes	Yes	Yes	Yes	Yes	15.2
Louisville, Ky.	5300	40 × 89	800	Yes	No	Yes	Yes	No	Yes	——	15.1
Louisville, Ky.	8000	50 × 120	1500	Yes	No	Yes	Yes	Yes	Yes	Yes	18.8
Minneapolis, Minn.	7350	50 × 128	1250	G	Yes	Yes	U. P.	Yes	Yes	Yes	17.0
Seattle, Wash.	2750	60 × 120	400	G	No	No	Yes	No	Yes	Yes	14.6
Seattle, Wash.	6500	——	——	No	No	Yes	——	Yes	No	Yes	——
Toledo, Ohio	6350	35 × 100	750	No	No	Yes	Yes	Yes	Yes	Yes	11.8
Toledo, Ohio	7000	——	1500	No	No	——	U. P.	U. P.	No	Yes	21.4
Average for Group II	5244	45 × 115	971								18.5
Average for Groups I and II	6061	43 × 109	1200								19.8

Explanation:
Yes = In and paid for or available without charge.
U. P. = In, but not paid for — assessments assumed by purchaser.
G = Gravel only.

TABLE XIV — *Continued*

City	Sale Price	Lot Size	Lot Value	Paving	Curb	Side-walk	Water	Sewer	Gas	Elec-tricity	Per Cent Lot Value of Sale Price of House and Lot
Group III											
Cities of 100,000 to 300,000											
Detached Houses											
Birmingham, Ala.	$7200	50 × 150	$1200	Yes	Yes	Yes	Yes	——	Yes	Yes	16.7
Dallas, Tex.	3975	50 × 150	1125	No	No	Yes	Yes	Yes	Yes	Yes	28.3
Flint, Mich.	3500	40 × 105	200	G	No	Yes	U. P.	No	Yes	Yes	5.7
Flint, Mich.	5400	50 × 100	1500	Yes	No	Yes	Yes	Yes	Yes	Yes	27.8
Fort Wayne, Ind.	5150	40 × 120	1250	Yes	Yes	Yes	Yes	U. P.	Yes	Yes	24.3
Fort Worth, Tex.	6500	50 × 151	1500	Yes	Yes	Yes	Yes	Yes	Yes	——	23.1
Oklahoma City, Okla.	4850	50 × 150	800	Yes	Yes	No	Yes	U. P.	Yes	Yes	16.5
Portland, Ore.	5500	50 × 105	1000	Yes	Yes	Yes	Yes	Yes	Yes	Yes	18.2
Spokane, Wash.	4150	50 × 125	400	G	Yes	Yes	Yes	Yes	No	Yes	9 6
Trenton, N. J.	6800	50 × 150	900	No	Yes	Yes	Yes	No	Yes	Yes	13.2
Average for Group III	5303	48 × 131	988								18.6
Average for Groups I, II, and III	5731	45 × 119	1103								19.3
Row Houses											
Baltimore, Md.	4916	15 × 98	1066	Yes	Yes	Yes	Yes	Yes	Yes	Yes	21.7
Camden, N. J.	5500	19 × 100	1500	Yes	Yes	Yes	Yes	U. P.	Yes	Yes	27.3
Camden, N. J.	6500	15 × 100	1500	Yes	Yes	Yes	Yes	U. P.	Yes	Yes	23.1
Philadelphia, Pa.	3990	15 × 75	700	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17.5
Philadelphia, Pa.	5750	16 × 80	1000	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17.4
Washington, D. C.	5375	14 × 91	500	G	No	Yes	Yes	Yes	Yes	Yes	9.3
Average for Row Houses	5339	15.7 × 90.7	1044								19.6

Explanation:
Yes = In and paid for or available without charge.
U. P. = In but not paid for — assessments assumed by purchaser.
G = Gravel only.

TABLE XV

COMPARISON OF IMPROVEMENT COSTS UNDER VARIOUS DEVELOPMENT SCHEMES

	600 × 250-ft. Block		920 × 320-ft. Block		920 × 480-ft. Block		270-ft. Hexagonal Block		920 × 920-ft. Block	
	Figure 10		Figure 9		Figure 11		Figure 12		Figure 13	
	Per Ft. of Lot Width	Per Lot	Per Ft. of Lot Width	Per Lot	Per Ft. of Lot Width	Per Lot	Per Ft. of Lot Width	Per Lot	Per Ft. of Lot Width	Per Lot
Street Improvements:										
Storm Sewers	$ .78	$ 31.20	$ .59	$ 23.60	$ .50	$ 20.00	$ .41	$ 16.40	$ .55	$ 22.00
Sanitary Sewers	1.33	53.20	1.25	50.00	1.20	48.00	1.12	44.80	1.23	49.20
Finished Grading	.54	21.60	.42	16.80	.40	16.00	.41	16.40	.39	15.60
Paving	5.19	207.60	4.11	164.40	3.76	150.40	4.10	164.00	3.27	130.80
Curbs	.82	32.80	.65	26.00	.57	22.80	.65	26.00	.48	19.20
Walks (Street)	1.72	68.80	1.36	54.40	1.32	52.80	1.35	54.00	1.22	48.80
Walks (Interior)	.00	.00	.14	5.60	.12	4.80	.11	4.40	.06	2.40
Planting Strips	.46	18.40	.37	14.80	.37	14.80	.29	11.60	.35	14.00
	10.84	433.60	8.89	355.60	8.24	329.60	8.44	337.60	7.55	302.00
10% for Engineering, etc.	1.08	43.20	.89	35.60	.82	32.80	.84	33.60	.76	30.40
Total	11.92	476.80	9.78	391.20	9.06	362.40	9.28	371.20	8.31	332.40
Park Improvements:										
Grading, Seeding, and Trees	.00	.00	2.11	84.40	2.13	85.20	2.13	85.20	1.82	72.80
10% for Engineering, etc.			.21	8.40	.21	8.40	.21	8.40	.18	7.20
Total	——	——	2.32	92.80	2.34	93.60	2.34	93.60	2.00	80.00
Lot Improvements:										
Grading	1.74	69.60	1.11	44.40	1.11	44.40	1.04	41.60	1.09	43.60
Seeding	.87	34.80	.68	27.20	.68	27.20	.60	24.00	.65	26.00
Driveways	3.10	124.00	.95	38.00	1.02	40.80	.86	34.40	.93	37.20
House Walks	.48	19.20	1.01	40.40	1.03	41.20	1.01	40.40	1.05	42.00
House Connections	2.01	80.40	2.01	80.40	2.01	80.40	2.01	80.40	2.01	80.40
	8.20	328.00	5.76	230.40	5.85	234.00	5.52	220.80	5.73	229.20
10% for Engineering, etc.	.82	32.80	.58	23.20	.59	23.60	.55	22.00	.57	22.80
Total	9.02	360.80	6.34	253.60	6.44	257.60	6.07	242.80	6.30	252.00
Cost of Raw Land	5.60	224.00	5.72	228.80	5.82	232.80	5.55	222.00	5.47	218.80
Total Direct Cost	26.54	1061.60	24.16	966.40	23.66	946.40	23.24	929.60	22.08	883.20
25% for Interest, etc.	6.64	265.60	6.04	241.60	5.92	236.80	5.81	232.40	5.52	220.80
Grand Total Cost	33.18	1327.20	30.20	1208.00	29.58	1183.20	29.05	1162.00	27.60	1104.00

TABLE XV — *Continued*

COMPARISON OF IMPROVEMENT COSTS UNDER VARIOUS DEVELOPMENT SCHEMES

	Neighborhood Unit Dwelling-house Section		Neighborhood Unit Apartment-house Section		Radburn Type		670-ft. Hexagonal Block	
	Figure 14		Figure 14		Figure 15		Figure 17	
	Per Ft. of Lot Width	Per Lot	Per Ft. of Lot Width	Per Family	Per Ft. of Lot Width	Per Lot [1]	Per Ft. of Lot Width	Per Lot
Street Improvements:								
Storm Sewers	$ .41	$ 16.40	$ 1.02	$ 12.61	$ .43	$ 19.25	$ .50	$ 20.00
Sanitary Sewers	1.13	45.20	2.56	31.65	1.24	55.67	1.19	47.60
Finished Grading	.42	16.80	.43	5.31	.37	16.44	.37	14.80
Paving	3.35	134.00	5.64	69.71	3.41	153.77	3.07	122.80
Curbs	.49	19.60	1.06	13.10	.25	11.21	.29	11.60
Walks (Street)	1.23	49.20	1.79	22.12	1.12 [2]	50.77 [2]	.60	24.00
Walks (Interior)	.10	4.00	.35	4.32	——	——	.71	28.40
Planting Strips	.41	16.40	.41	5.07	.47	20.94	.41	16.40
	7.54	301.60	13.26	163.89	7.29	328.05	7.14	285.60
10% for Engineering, etc.	.75	30.00	1.33	16.44	.73	32.85	.71	28.40
Total	8.29	331.60	14.59	180.33	8.02	360.90	7.85	314.00
Park Improvements:								
Grading, Seeding, and Trees	2.05	82.00	6.95	85.90	1.14	51.30	2.73	109.20
10% for Engineering, etc.	.21	8.40	.70	8.65	.11	4.95	.27	10.80
Total	2.26	90.40	7.65	94.55	1.25	56.25	3.00	120.00
Lot Improvements:								
Grading	1.09	43.60	1.10	13.60	1.26	56.70	1.04	41.60
Seeding	.66	26.40	.50	6.18	.72	32.40	.41	16.40
Driveways	.79	31.60	2.33	28.80	1.50	67.50	1.38	55.20
House Walks	1.01	40.40	1.07	13.22	.92	41.40	1.04	41.60
House Connections	2.13	85.20	.78	9.64	1.78	80.10	2.01	80.40
	5.68	227.20	5.78	71.44	6.18	278.10	5.88	235.20
10% for Engineering, etc.	.57	22.80	.58	7.17	.62	27.90	.59	23.60
Total	6.25	250.00	6.36	78.61	6.80	306.00	6.47	258.80
Cost of Raw Land	5.61	224.40	12.98	160.43	5.03	226.35	5.69	227.60
Total Direct Cost	22.41	896.40	41.58	513.92	21.10	949.50	23.01	920.40
25% for Interest, etc.	5.60	224.00	10.40	128.55	5.28	237.60	5.75	230.00
Grand Total Cost	28.01	1120.40	51.98	642.47	26.38	1187.10	28.76	1150.40

[1] Lots have an average width of 45 feet.
[2] No street walks. Item includes interior walks which replace street walks.

TABLE XVI

PRESENT PRACTICE AND REQUIREMENTS AS TO THE LOT SIZE FOR LOW- OR MEDIUM-COST HOUSES

	Normal Lot Size in New Sections		Lot Required in Platting		Lot Required by Zoning[1]		Recommended Lot Size[2]		Is There a Trend Toward Smaller Lots?[3]
	Width	Depth	Width	Depth	Width	Depth	Width	Depth	
Akron, Ohio	45	137½	45	—	4000 sq. ft.		47½	120	No
Allentown, Pa.	40	120	0	0	—	—	40	120	No
Altoona, Pa.	40	120	40	—	40	120	40	—	W and S
Arlington, Mass.	50	100	0	0	0	0	55	100	No
Baltimore, Md.	50	125	0	0	2723 sq. ft.		50	120	—
Belville, N. J.	40	100	25	—	25	—	40	110	Yes
Berkeley, Calif.	45	125	37½	—	0	0	40	120	W and S
Bethlehem, Pa.	40	110	40	100	40	100	40	100	No
Birmingham, Ala.	50	140	5000 sq. ft.		5000 sq. ft.		7000 sq. ft.		No
Boston, Mass.	50	100	0	0	0	0	50	100	No
Bridgeport, Conn.	50	100	—	—	40	100	50	100	—
Brockton, Mass.	60	100	50	100	50	100	55	110	No
Buffalo, N. Y.	32	115	0	0	—	—	—	—	No
Cambridge, Mass.	50	—	0	0	0	0	40	70	S
Canton, Ohio	50	120	4000 sq. ft.		4000 sq. ft.		45	125	No
Cincinnati, Ohio	40	120	40	90	40	90	40	100	W and S
Cleveland, Ohio	42½	120	40	120	4800 sq. ft.		50	125	No
Columbus, Ohio	40	120	0	0	4800 sq. ft.		40	120	W and S
Dayton, Ohio	45	140	5000 sq. ft.		0	0	40	140	No
Denver, Colo.	40	125	0	0	37½	125	50	125	No
Des Moines, Iowa	50	140	50	120	3000 sq. ft.		50	125	—
Detroit, Mich.	40	130	40	0	—	—	40	100	No
Duluth, Minn.	25	120	33	120	33	120	40	120	S
East Orange, N. J.	30	100	0	0	0	0	35	100	No
East St. Louis, Ill.	50	120	0	0	—	—	40	120	No
Elizabeth, N. J.	40	120	33	100	0	0	50	100	No
Englewood, N. J.	40	100	20	100	35	113	50	125	Yes
Erie, Pa.	40	120	40	100	—	—	40	110	No
Evansville, Ind.	45	120	40	120	2400 sq. ft.		50	100	W
Everett, Mass.	40	80	40	80	0	0	45	90	No
Fort Wayne, Ind.	45	125	0	0	4000 sq. ft.		40	125	W and S
Fresno, Calif.	55	150	50	150	50	150	50	150	No
Gary, Ind.	40	125	30	125	30	125	40	125	L
Grand Rapids, Mich.	40	125	40	—	5000 sq. ft.		40	125	Yes
Hammond, Ind.	40	—	37½	—	—	—	50	—	—
Hartford, Conn.	50	130	48	—	48	—	50	125	S
Haverhill, Mass.	60	120	50	100	0	0	60	120	No
Highland Park, Mich.	30	125	0	0	0	0	37½	125	No
Indianapolis, Ind.	50	140	40	120	4800 sq. ft.		50	140	No
Jackson, Mich.	66	132	40	—	4300 sq. ft.		66	132	No
Jersey City, N. J.	25	100	0	0	0	0	25	100	No
Joliet, Ill.	50	125	0	0	—	—	50	125	No
Kansas City, Kan.	40	120	5000 sq. ft.		5000 sq. ft.		50	100	No
Kenosha, Wis.	45	110	40	100	40	100	45	100	No
Lakewood, Ohio	40	120	40	100	5000 sq. ft.		50	130	No
Lansing, Mich.	50	150	38	—	2904 sq. ft.		40	132	No
Lawrence, Mass.	50	100	0	0	0	0	50	100	No
Lincoln, Neb.	50	130	50	0	0	0	50	120	No
Long Beach, Calif.	40	100	40	100	40	100	50	100	L
Los Angeles, Calif.	50	135	4800 sq. ft.		40	—	50	135	W and S
Medford, Mass.	6500 sq. ft.		0	0	5000 sq. ft.		6000 sq. ft.		W
Milwaukee, Wis.	50	120	40	120	2000 sq. ft.		40	120	No
Minneapolis, Minn.	50	—	50	—	6000 sq. ft.		5000 sq. ft.		No
Mount Vernon, N. Y.	50	100	25	—	40	—	40	—	W
New Bedford, Mass.	50	100	0	0	0	0	60	100	L
New Britain, Conn.	50	100	50	100	50	100	50	150	No
New Haven, Conn.	50	100	0	0	0	0	50	120	S and W
New Orleans, La.	40	120	0	0	0	0	40	120	No
New Rochelle, N. Y.	50	100	0	0	0	0	40	100	Yes
Niagara Falls, N. Y.	50	115	40	100	0	0	60	115	No

For footnote references and explanation of abbreviations, see p. 163.

TABLE XVI — *Continued*

	Normal Lot Size in New Sections		Lot Required in Platting		Lot Required By Zoning[1]		Recommended Lot Size[2]		Is There a Trend Toward Smaller Lots?[3]
	Width	Depth	Width	Depth	Width	Depth	Width	Depth	
Oakland, Calif.	45	100	40	100	40	100	40	100	W and S
Oak Park, Ill.	37½	125	50	125	35	125	50	132	Yes
Oklahoma City, Okla.	55	140	50	140	2500 sq. ft.		55	135	W and S
Passaic, N. J.	37½	100	—	—	45	100	37½	100	No
Paterson, N. J.	50	100	25	100	50	100	—	—	No
Pawtucket, R. I.	50	100	50	—	—	—	50	100	—
Philadelphia, Pa.	—	—	—	—	—	—	—	—	W and L
Pittsburgh, Pa.	40	100	30	100	4000 sq. ft.		4000 sq. ft.		W and S
Pontiac, Mich.	40	125	40	125	—	—	40	125	Yes
Portland, Maine	50	100	0	0	4500 sq. ft.		50	100	No
Portland, Ore.	50	100	50	100	50	100	67½	100	No
Providence, R. I.	50	100	0	0	45	100	40	100	No
Racine, Wis.	50	135	40	120	0	0	40	135	No
Reading, Pa.	40	100	40	80	0	0	40	100	No
Richmond, Ind.	60	150	0	0	—	—	60	150	No
Rochester, N. Y.	50	120	40	100	0	0	47½	130	No
Rockford, Ill.	50	135	4356 sq. ft.		4356 sq. ft.		45	135	S
Sacramento, Calif.	50	110	48	100	—	—	50	100	No
Saginaw, Mich.	47½	125	0	0	—	—	—	—	Yes
St. Joseph, Mo.	50	150	25	120	0	0	40	150	No
St. Louis, Mo.	35	120	35	100	0	0	40	100	W and S
St. Paul, Minn.	50	125	5000 sq. ft.		5000 sq. ft.		40	100	No
Salt Lake City, Utah	50	120	0	0	3000 sq. ft.		50	100	W
San Diego, Calif.	50	100	50	100	50	100	50	100	S
Schenectady, N. Y.	50	140	50	115	0	0	50	140	No
Scranton, Pa.	40	142	0	0	—	—	40	140	No
Seattle, Wash.	50	100	4000 sq. ft.		0	0	40	100	Yes
Sioux City, Iowa	55	125	5000 sq. ft.		5000 sq. ft.		55	125	No
South Bend, Ind.	40	120	4800 sq. ft.		4800 sq. ft.		45	125	No
Spokane, Wash.	50	120	4500 sq. ft.		4500 sq. ft.		60	100	No
Springfield, Ill.	40	157	0	0	0	0	40	120	No
Springfield, Ohio	50	140	45	140	—	—	50	140	No
Syracuse, N. Y.	50	125	50	125	50	125	50	100	S
Tacoma, Wash.	50	120	25	120	—	—	50	120	No
Terre Haute, Ind.	45	130	0	0	4000 sq. ft.		45	140	—
Toledo, Ohio	45	125	3500 sq. ft.		3500 sq. ft.		45	125	—
Topeka, Kan.	25	110	0	0	0	0	40	120	W and S
Tulsa, Okla.	50	135	50	122.5	50	122.5	50	140	W and S
Utica, N. Y.	50	120	—	—	—	—	50	120	No
White Plains, N. Y.	50	100	50	100	50	100	40	100	No
Wichita, Kan.	50	120	5000 sq. ft.		3000 sq. ft.		50	120	S
Wilkes-Barre, Pa.	40	110	25	100	25	100	40	110	No
Wilmington, Del.	30	100	2500 sq. ft.		2500 sq. ft.		25	100	No
Worcester, Mass.	60	125	50	100	0	0	60	125	W and S
Youngstown, Ohio	50	150	3500 sq. ft.		5000 sq. ft.		50	125	Yes
Average for cities specifying lot width and lot depth	45.9	119.0	40.7	109.2	41.7	109.0	46.2	115.3	W and S = 14 Yes = 9 No = 60 NR = 7 S = 7 W = 4 L = 3 W and L = 1
Average for cities specifying lot area	6500 sq. ft.		4397 sq. ft.		4081 sq. ft.		5500 sq. ft.		
Average for all cities	5472 sq. ft.		4434 sq. ft.		4289 sq. ft.		5334 sq. ft.		

[1] "The Lot Required by Zoning" is the lot required in the zone in which medium- or low-cost houses are generally built.

[2] "The Recommended Lot Size" is the size of lot believed to be desirable and feasible for low- or medium-cost houses by the official (City Plan Engineer, Zoning Engineer or City Engineer) answering the questionnaire.

[3] The question asked was "Is there discernible trend toward narrower or shallower lots?"

Explanation:

No = Means that no trend toward narrower or shallower lots was noted. This may indicate that either the trend is toward wider and deeper lots or that there is no discernible trend in any direction.

W = Means a trend toward wider lots. L = Means a trend toward larger lots.

S = Means a trend toward shallower lots. O = Means no requirement.

It should be noted that in many cases where there is no specific lot size requirement in the zoning ordinance there are often side-yard requirements which in effect limit the minimum size of lot.

TABLE XVII

UNIT PRICES OF STREET- AND LOT-IMPROVEMENT ITEMS

Compiled from Data Secured from City Engineers, Subdividers, Builders, and Other Sources

Item	Unit	Price
Finished Street Grading	Cu. Yd.	$ .75
Paving:		
6″ Concrete	Sq. Yd.	2.00
7″ Concrete	Sq. Yd.	2.25
6″ Bituminous Macadam	Sq. Yd.	1.60
7″ Bituminous Macadam	Sq. Yd.	1.80
Special Light Bituminous Pavement for Garage Areas	Sq. Yd.	1.50
Curb:		
Granite	Lin. Ft.	1.85
Concrete — Curb only	Lin. Ft.	.80
Concrete — With 18″ Gutter	Lin. Ft.	1.25
Concrete — Integral with and laid at the same time as concrete pavement	Lin. Ft.	.55
Cobblestone Gutter	Lin. Ft.	.25
Sidewalks — One course:		
Cement concrete 4–6″ thick	Sq. Ft.	.23
Seeding and Planting:		
Seeding	Sq. Yd.	.25
Trees	each	8.00
Sanitary Sewers, including Manholes:		
8″ Pipe at Average Depth of 8′	Lin. Ft.	2.00
8″ Pipe at Average Depth of 10′	Lin. Ft.	2.50
10″ Pipe at Average Depth of 8′	Lin. Ft.	2.25
10″ Pipe at Average Depth of 10′	Lin. Ft.	2.80
12″ Pipe at Average Depth of 8′	Lin. Ft.	2.55
12″ Pipe at Average Depth of 10′	Lin. Ft.	3.00
Storm Sewers, including Manholes and Inlets:		
12″ Pipe at Average Depth of 6′	Lin. Ft.	2.25
15″ Pipe at Average Depth of 6′	Lin. Ft.	2.40
Driveways — Concrete:		
When constructed individually	Sq. Ft.	.25
As a part of general plan	Sq. Yd.	2.00
House Connections:		
Water	Lin. Ft.	.65
Gas	Lin. Ft.	.90
Sewer	Lin. Ft.	.75

PART TWO

APPENDIX II

DETAILS OF COST OF HOUSES AND LAND DEVELOPMENT IN THE ENGLISH SCHEMES

WELWYN: SUMMARY OF DATA

	SCHEME I—LUDWICK WAY			SCHEME II—DIGSWELL				
			Percentage of Gross Acreage					Percentage of Gross Acreage
Gross Acreage of Unit	1,005,191 sq. ft.	23.050 acres		841,793 sq. ft.	19.325 acres			
Acreage used for Streets	151,530 sq. ft.	3.456 acres	15.1	142,510 sq. ft.	3.275 acres			17.0
Acreage used for House Lots	752,265 sq. ft.	17.269 acres	74.9	676,063 sq. ft.	15.519 acres			80.3
Acreage used for Parks and Playgrounds	101,396 sq. ft.	2.325 acres	10.0	23,220 sq. ft.	0.531 acres			2.7
	Type A	*Type B*	*Total*	*Type A*	*Type B*	*Type C*	*Type D*	*Total*
Number of Houses of Various Types	74	126	200	74	29	16	6	125
Lot Size for Each Type, in square feet	3534	3910		4130	6343	6979	10271	
Average Lot Size of Unit (approximate)	3770 sq. ft. = 419 sq. yds. = a lot 32′ 6″ × 116′ 0″			5408 sq. ft. = 601 sq. yds. = a lot 46′ 1″ × 117′ 4″				
	Type A	*Type B*		50′ 25′ 13′ close (footpath and grass)				
Street Widths, in feet	50′	25′						
Average Cost per Acre of Raw Land used for Development	$960			$960				
Total Length of Improved Streets in Unit	3609′			3395′				
Total House-lot Frontage (including side lot lines)	6478′	Average, 32′ 6″		5715′		Average, 46′ 1″		
Total Open Space Frontage	61′ (allotments)			25′ (entrance to garages)				
Gross Density per Acre	8.7			6.5				
Net Density per Acre	11.5			8.0				
Cost of Land, plus Charges, per House at $1200 per Acre (including proportion of cost of open space at $240 per acre)	$137.76			$184.32				
	Type A	*Type B*		*Type A*	*Type B*	*Type C*	*Type D*	
Structural Cost of Houses of Various Types (contract price of builder, including his profit and architect's fees)	$2040	$2448		$3288	$3888	$6240	$8400	
Cost of Street Improvements and Utilities apportioned per Foot of House-lot Frontage								
1. Curb, gutter, roadway, and footpath	$5.76			$5.56				
2. Sewer in street and connection	$1.92			$1.20				
3. Storm sewer	$ .96			$1.16				
Cost of Land and Development, per House	$614.40 (or $5342.40 per Acre) average			$835.20 (or $5428.80 per Acre) average				
Cost of Financing and Contingencies, per House	$192			$288				
Cost of Development, per Foot of House-lot Frontage	$14.40			$14.16				
Ratio of Land Cost, of Street and Utility Cost, and of Building Cost to Total Cost of House and Lot								
	Type A	*Type B*		*Type A*	*Type B*	*Type C*	*Type D*	
Land cost	5.2	4.5		4.4	3.8	2.6	1.9	
Street and utility cost	18.0	15.5		15.9	13.9	9.2	7.2	
Building cost	76.8	80.0		79.7	82.3	88.2	90.9	
Weekly *Inclusive* Rent charged	$3.60 (or $187.20 per year) $4.20 (or $218.40 per year)			Owned, not rented houses				
	Type A	*Type B*		*Type A*	*Type B*	*Type C*	*Type D*	
Percentage of Rates (Local Taxes) of above *Inclusive* Rent	30 per cent	25 per cent						
Economic Rent based on 6 per cent per year, on outlay plus rates	$227	$250		$316	$360	$529	$690	

	SCHEME I — WESTBURY			SCHEME II — ICKNIELD WAY		
			Percentage of Gross Acreage			Percentage of Gross Acreage
Gross Acreage of Unit	357,901 sq. ft.	8.219 acres		435,600 sq. ft.	10.00 acres	
Acreage used for Streets	58,645 sq. ft.	1.350 acres	16.43	68,444 sq. ft.	1.575 acres	15.75
Acreage used for House Lots	299,256 sq. ft.	6.869 acres	83.57	362,692 sq. ft.	8.325 acres	83.25
Acreage used for Parks and Playgrounds	nil	nil	nil	4,464 sq. ft.	0.100 acres	1.00
Number of Houses of Various Types	84			100		
Lot Size	3562 sq. ft. = 396 sq. yds. = a lot 42′0″ × 84′ 9″			3627 sq. ft. = 409 sq. yds. = a lot 25′ 10″ × 140′ 7″		
Street Widths, in feet	42′, 30′, 24′, 18′	Average, 26′ 6″		50	Average, 50′ 0″	
Average Cost per Acre of Raw Land used for Development	$960			$960		
Total Length of Improved Streets in Unit	3027′			1582′		
Total House-lot Frontage (including side lot lines)	3531′	Average, 42′ 0″		2582′	Average, 25′ 10″	
Total Open Space Frontage	nil			nil		
Gross Density per Acre	10.2			10.0		
Net Density per Acre	12.2			12.0		
Cost of Land, plus Charges, per House at $1200 per Acre (including proportion of open space at $240 per acre)	$120			$120		
Structural Cost of Houses of Various Types (contract price of builder, including his profit and architect's fees)	$2640 (average)			$1608		
Cost of Street Improvements and Utilities apportioned per Foot of House-lot Frontage						
1. Curb, gutter, roadway, and footpath	$4.80			$5.28		
2. Sewer in street and connection	$ .48			2.04		
3. Storm sewer	$ .94					
Cost of Land and Development, per House	$576 (or $5875 per acre)			$499.20 (or $4992 per acre)		
Cost of Financing and Contingencies, per House	$192			$192		
Cost of Development, per Foot of House-lot Frontage	$9.80			$13.40		
Ratio of Land Cost, of Street and Utility Cost, and of Building Cost to Total Cost of House and Lot						
1. Land cost	3.7			5.7		
2. Street and utility cost	14.3			18.1		
3. Building cost	82.0			76.2		
Weekly *Inclusive* Rent charged	$2.76 to $3.72 (average $168 per year)			$2.82 (or $146 per year)		
Percentage of Rates (Local Taxes) of above *Inclusive* Rent	25.7 per cent			30 per cent		
Economic Rent based on 6 per cent per year, on outlay plus rates	$247			$181		

	SCHEME III — JACKMAN'S PLACE		PERCENTAGE OF GROSS ACREAGE	SCHEME IV — GARTH		PERCENTAGE OF GROSS ACREAGE
Gross Acreage of Unit	720,133 sq. ft.	16.531 acres		2,333,410 sq. ft.	53.569 acres	
Acreage used for Streets	105,237 sq. ft.	2.431 acres	14.71	260,713 sq. ft.	5.981 acres	11.15
Acreage used for House Lots	614,896 sq. ft.	14.100 acres	85.29	2,072,697 sq. ft.	47.588 acres	88.85
Acreage used for Parks and Playgrounds	nil			nil		
Number of Houses of Various Types	173			46		
Lot Size	3554 sq. ft. = 395 sq. yds. = a lot 31′4″ × 113′ 6″			45,059 sq. ft. = 5006 sq. yds. = a lot 1.035 acres		
Street Widths, in feet	50′, 42′, 30′, 10′	Average, 24′ 4″		50′, 40′, 8′	115′ (glade)	
Average Cost per Acre of Raw Land used for Development	$960			$960		
Total Length of Improved Streets in Unit	3209′			6650′		
Total House-lot Frontage (including side lot lines)	5423′	Average, 31′ 4″		11,672′	Average, 253′ 10″	
Total Open Space Frontage	nil			nil		
Gross Density per Acre	10.4			0.858		
Net Density per Acre	12.3			0.966		
Cost of Land, plus Charges, per House at $1200 per Acre (including proportion of open space at $240 per acre)	$117.60			$1396.80		
Structural Cost of Houses of Various Types (contract price of builder, including his profit and architect's fees)	$2880			$12,000		
Cost of Street Improvements and Utilities apportioned per Foot of House-lot Frontage						
1. Curb, gutter, roadway, and footpath	$5.28			$2.44		
2. Sewer in street and connection	$ .72			$ .56		
3. Storm sewer	$ .72			nil		
Cost of Land and Development, per House	$513.60 (or $5341.40 per acre)			$2640 (or $2265.60 per acre)		
Cost of Financing and Contingencies, per House	$192			$480		
Cost of Development, per Foot of House-lot Frontage	$3.41			$4.80		
Ratio of Land Cost, of Street and Utility Cost, and of Building Cost to Total Cost of House and Lot						
1. Land cost	3.4			9.5		
2. Street and utility cost	11.8			8.6		
3. Building cost	84.8			81.9		
Weekly *Inclusive* Rent charged	$3.60 to $4.80 (average $218 per year)					
Percentage of Rates (Local Taxes) of above *Inclusive* Rents	26.6 per cent					
Economic Rent based on 6 per cent per year, on outlay plus rates	$272			Houses owned, not rented		

DATA IN RELATION TO A PART OF KEMSLEY VILLAGE

			Percentage of Gross Acreage	Population
Gross Acreage of Unit	352,503 sq. ft.	8.091 acres		360
Acreage used for Streets	69,104 sq. ft.	1.585 acres	19.58	
Acreage used for House Lots	258,600 sq. ft.	5.937 acres	73.37	
Acreage used for Parks and Playgrounds	24,859 sq. ft.	0.569 acres	7.05	

	Grade I	*Grade II*	*Grade III*	*Total*
Number of Houses of Various Types	36	28	16	80
Average Lot Size for Each Type, in square feet	2477	3613	4266	

Average Lot Size of Unit (approximate) . . . . . 3232.4 sq. ft. = 359 sq. yds. = a lot 35′ 10″ × 90′ 9″

Street Widths, in feet . . . . . 50′, 40′, 29′, 23′, average 46′ 1″

Average Cost per Acre of Raw Land used for Development $960

Total Length of Improved Streets in Unit . . . . 1809′ = 722′ of 50′-width; 469′ of 40′-width; 308′ of 29′-width; 310′ of 23′-width

Total House-lot Frontage (including side lot lines) . 2868′ Average, 35′ 10″

Total Open Space Frontage . . . . . 986′

Total Frontage used for Other Purposes . . . . . 1006′

Gross Density per Acre 10

Net Density per Acre 13.3

Cost of Land, plus Charges, per House at $960 per Acre (including proportion of cost of open space at $240 per acre) $120

	Grade I	*Grade II*	*Grade III*
Structural Cost of Houses of Various Types (contract price of builder including his profit and architect's fees)	$3033.60	$3484.80	$4128.00

Cost of Street Improvements and Utilities apportioned per Foot of House-lot Frontage

1. Curb, gutter, roadway, and footpath $7.34
2. Sewer in street and connection $4.66

Cost of Land and Development, per House . . . . $744 (or $7440 per acre)

Cost of Financing and Contingencies, 10 per cent . . $192

Cost of Development, per Foot of House-lot Frontage $15.84

Ratio of Land Cost, of Street and Utility Cost, and of Building Cost to Total Cost of House and Lot	*Grade I*	*Grade II*	*Grade III*
1. Land cost	3.2	2.8	2.4
2. Street and utility cost	16.5	14.8	12.9
3. Building cost	80.3	82.4	84.7
Estimated Rental Value (at 6 per cent per year and exclusive of rates)	$238	$265	$303

Note: This being an Owner's Scheme, information regarding rent and rates is not available.

LAMBETH: SUMMARY OF DATA

SCHEME 1—BLOOMFIELD

				Percentage of Gross Acreage
Gross Acreage of Unit	866,206 sq. ft.	19.894 acres		
Acreage used for Streets	195,981 sq. ft.	4.507 acres		22.7
Acreage used for House Lots	670,225 sq. ft.	15.387 acres		77.3
Acreage used for Parks and Playgrounds	nil			

	Type A	*Type B*	*Type C*	*Total*
Number of Houses of Various Types	220	46	40	306
Lot Size for Each Type, in square feet	2,080 sq. ft.	2,152 sq. ft.	2,833 sq. ft.	

Average Lot Size of Unit (approximate)	2,189 sq. ft. = 243 sq. yds. = a lot 26′ 4″ × 83′ 5″
Street Widths, in feet	50′, 40′, 25′, 20′
Average Cost per Acre of Raw Land used for Development	$1824.
Total Length of Improved Streets in Unit	6324′
Total House-lot Frontage (including side lot lines)	8065′
Total Open Space Frontage	nil
Gross Density per Acre	15.4
Net Density per Acre	19.9
Cost of Land, plus Charges, per House at $1824 per Acre (including proportion of cost of open space at $240 per acre)	$132.96

Structural Cost of Houses of Various Types (contract price of builder including his profit and architect's fees)	*Type A*	*Type B*	*Type C*
	$3024	$3460.80	$2894.40

Cost of Street Improvements and Utilities apportioned per Foot of House-lot Frontage	
1. Curb, gutter, roadway, and footpath	no data
2. Combined sewer in street and connection	$9.80
Cost of Land and Development, per House	$628.80 (or $9681.60 per acre)
Cost of Financing and Contingencies, per House	$240
Cost of Development, per Foot of House-lot Frontage	$16.56

	Type A	*Type B*	*Type C*
Ratio of Land Cost, of Street and Utility Cost, and of Building Cost to Total Cost of House and Lot			
1. Land cost	3.7	3.1	3.7
2. Street and utility cost	13.5	12.3	14.2
3. Building cost	82.8	84.6	82.1
Weekly *Inclusive* Rent charged	$5 (or $260 per year)	$6.12 (or $318.24 per year)	$5.40 (or $280.80 per year)
Percentage of Rates (Local Taxes) of above *Inclusive* Rent	28 per cent	29 per cent	27 per cent
Economic Rent based on 6 per cent per year, on outlay plus rates	$306	$351	$301

APPENDIX III

INFORMATION ON CHARACTER AND SCOPE OF DATA

Gross Acreage of Unit

The boundary of the unit investigated is marked on each plan and is taken up to the fence line or to the middle of the road. (See Appendix VII.)

Acreage Used for Streets

This includes the total width of the road from boundary fence to boundary fence; features at road corners and junctions are also included if in the nature of a roadway. Where houses front one side only to the street, — *i.e.*, where the boundary of the unit runs along the middle of the road, — costs and area are included only for half the road width.

Acreage Used for House Lots

Where there is a small area of grass between the house lots and the road, it has *not* been treated as a park or playground nor included in the street acreage; the area has been apportioned over the whole of the lots which front upon it. (See Icknield Way, Letchworth.) Separate garage sites at Digswell, Welwyn, are included in the house-lot acreage.

Acreage Used for Parks and Playgrounds

In this area are included open spaces of any kind other than house lots.

Number of Houses of Various Types

Separate types are indicated by different markings on the plans.

Lot Size for Each Type, and Average on Unit

These are separately calculated for each class and an average taken on the whole.

Street Widths

These are figured on the plans.

Average Cost per Acre of Raw Land Used for Development

The figure under this heading includes several items of expenditure usually met with in developing large areas of land, such as the following:

Cost of advertising; legal expenses in connection with the purchase of land; main trunk sewers and water mains (not directly chargeable to any particular part of the estate but benefiting the whole); loss of interest on capital during the period between the purchase of the land and collecting leasehold ground rents or price of plots; fees; and other smaller items.

Total Length of Improved Streets in Unit

The figures given do not include pathways in closes or culs-de-sac but do include entrance roads to these; the turning space and the total length of a road even if only one half is included in the area of the unit.

Total House-lot Frontage including Side Lot Lines

As the figure for this frontage plays an important part in the calculation as to cost, the method of its measurement should be clear, — the length of the boundary fence of this plot facing the road has, in all cases, been taken. Where the houses are set back with a grass plot in front, the frontage line adopted for measurement is the one behind the footpath. (See Westbury, Letchworth.) This, it will be seen, gives a greater depth to the plot than if the actual road-frontage or property line were taken. The same principle has been followed as in culs-de-sac.

Total Open-space Frontage

As the land at the rear of the plots is usually devoted to open spaces, land having road frontage being too valuable, cost of development generally consists of approach road only.

Gross Density per Acre

The number of houses in the unit divided by the gross acreage, including streets and other open areas.

Net Density per Acre

The number of houses in the unit divided by the house-plot or building acreage.

Cost of Land, plus Charges, per House, including a Proportion of Cost of Open Space

On each area selected as a unit for the data it will be found that there is either no open space or less than the usual area of playground per house (except in the case of Ludwick Way, Welwyn). The item of $240 for open space is therefore intended to cover a proportion of the cost of purchase and laying out of open spaces and other amenities of the whole estate; it is calculated on the gross density per acre. In Bloomfield, Lambeth, it will be noticed that no addition to the raw land cost has been made to cover a proportion of the open space. This has purposely been omitted as there is a large public recreation ground adjacent to the scheme, and it is reasonable to assume that the raw land cost enjoyed an increased value on account of this amenity.

Structural Cost of Houses of Various Types

Under this heading are included overhead charges in connection with the erection of houses, architects' fees, builders' profit, house drains up to connection with sewer in street, fences, etc.

Cost of Street Improvements and Utilities Apportioned per Foot of House-lot Frontage

The total cost of each item under this heading is divided by the total house-lot frontage. The figures shown include a proportion of the overhead and engineering costs. The character of the construction of the roads is shown in Appendix VII. The separate system of drainage is employed in most cases. It will be noticed that each house does not have its own connection with the sewer, and the use of common drains or sectional drainage reduces the cost under this heading. It was not found possible to separate foul and storm water drainage costs in Bloomfield, Lambeth, and in this respect it must be noted that a combined system of drainage is employed.

(The term "sewer" is used when the pipe is laid in the road; when it is behind the fence wall it is called a "drain.")

Cost of Land and Development, per House

In each case the figures given include the cost of financing and contingencies.

Cost of Financing and Contingencies, per House

This item is intended to cover loss of interest on capital employed in building during erection of houses, insurance, supervision, and other expenses borne by the developer, and is about 5 per cent on the cost of development.

Cost of Development, per Foot of House-lot Frontage

The cost of financing and development expenses are divided by the lengths of plot frontage.

Ratio of Land Cost, of Street and Utility Cost, and of Building Cost, to Total Cost of House and Lot

The total cost of house and lot is made up of (1) Land cost, (2) Development cost, including financing, (3) Building cost, — the ratio of each to the whole being shown. Where, however, there are several different types of houses, the total cost of house and plot has been varied only by an alteration in the building cost. In such cases the land and utility costs have been treated as the same for each type. This does not give a very accurate ratio for the following reasons: (1) The lot size would be largest with the most expensive type of house, thus affecting the density of the development and the land and utility costs per house. (2) A smaller house would probably permit a different layout and different construction of the roads; for example, at Digswell, Welwyn, Class D Houses could have been erected on a scheme of development similar to Garth, Letchworth, with a great saving in utility expenses.

The correct ratio will be found only in the case of different classes of houses when the lot size for the type approximates to the average lot size on the unit.

Weekly Inclusive Rent Charged (based on estimate of family income available for rent)

The weekly inclusive rent charged includes local taxes and water rates and it is assumed that the income is four to six times the rent. No costs for gas and electricity are included as they are paid for separately and are self-supporting services.

Basis for Calculation of Rates (Local Taxes)

The assessed annual value differs widely and may be 30 to 50 per cent of economic rent excluding rates. On this basis the "rates" or local taxes include water rates and amount to from $2 to $3 on every $4.80 of ratable value.

Economic Rent

This is taken at 6 per cent on the total costs of the land, the local improvement services, and the erection of the house. To the interest on these items there is added the estimated amount of the rates or local taxes.

APPENDIX IV

ACCOMMODATIONS OF THE HOUSES

LETCHWORTH

Scheme I. Westbury

Ground floor	Sitting Room	
	Kitchen	
	Scullery	
	Coal shed and Larder	
Second floor	3 Bedrooms	
	Bathroom	
	W. C.	

Some of the houses have no sitting rooms, and a few have 4 bedrooms.

Scheme II. Icknield Way

Ground floor	Living Room	16′ × 11′ 9″
	Bathroom	6′ × 6′
	Scullery	9′ × 9′ 6″
	Larder	5′ 5″ × 2′ 6″
	Coals under larder;	cycles under stairs
Second floor	3 Bedrooms	16′ × 9′
		8′ × 11′ 9″
		7′ 9″ × 8′ 6″

All the houses on this scheme are similar.

Scheme III. Jackman's Place

The houses have similar accommodation to those at Westbury, but are of rather better construction and have mansard roofs.

Scheme IV. Garth

These houses are good residential houses and are of widely varying sizes and planning. An average price has been taken.

All houses are of brick, of good modern construction, and have tiled roofs.

Scheme I. Ludwick Way

Class A Houses, Non-parlor Type

Ground floor	Living Room	13′ 7″ × 12′ 6″
	Scullery	9′ 5″ × 7′ 6″
	Bathroom	4′ 7″ × 6′ 10″
	Coal shed and Larder	
Second floor	3 Bedrooms	16′ 9″ × 9′ 6″
		10′ 8″ × 7′ 9″
		8′ 10″ × 7′ 6″
	Bathroom	

Class B houses are somewhat similar but have a sitting room in addition to the living room on ground floor, and slightly larger bedrooms. A few of the houses have only two bedrooms. Built of bricks, cement faced, and tiled, and of good modern construction.

Scheme II. Digswell

These houses vary greatly, but Class A and B houses have two sitting rooms, kitchen and scullery on ground floor, and three bedrooms and bathroom on second floor.

Typical accommodation and measurements of Classes A, B, and C would be:

Class A.	Ground floor	Living Room	13′ 6″ × 10′ 6″
		Dining Room	9′ 6″ × 9′ 0″
		Kitchen	8′ 0″ × 8′ 6″
		W. C.; coal shed and store outside	
	Second floor	3 Bedrooms	12′ 6″ × 8′ 0″
			10′ 6″ × 10′ 6″
			9′ 6″ × 8′ 6″
		Bathroom	
Class B.	Ground floor	Living Room	14′ 0″ × 11′ 9″
		Dining Room	10′ 8″ × 10′ 0″
		Kitchen	9′ 6″ × 7′ 0″
		Coal shed and store	
	Second floor	3 Bedrooms	14′ 0″ × 11′ 9″
			10′ 8″ × 10′ 0″
			9′ 7″ × 6′ 8″
		Bathroom and W. C.	
Class C.	Ground floor	Living Room	19′ 0″ × 12′ 0″
		Dining Room	12′ 0″ × 11′ 6″
		Kitchen	11′ 0″ × 8′ 0″
		Small hall, W. C., and fuel store	
	Second floor	4 Bedrooms	11′ 0″ × 11′ 0″
			12′ 0″ × 8′ 6″
			15′ 2″ × 11′ 3″
			11′ 6″ × 7′ 6″
		Bathroom, W. C.	

All houses in Classes B, C, and D have garages about 15′ 0″ × 8′ 0″.

KEMSLEY

Grade I.	Ground floor	Parlor	12′ 0″ × 10′ 0″
		Living Room	11′ 9″ × 11′ 6″
		Scullery, Coal shed, and Larder	
	Second floor	3 Bedrooms	7′ 3″ × 10′ 0″
			7′ 3″ × 10′ 0″
			11′ 11″ × 8′ 7″
		Bathroom	
Grade II.	Ground floor	Parlor	10′ 0″ × 10′ 2″
		Living Room	16′ 10″ × 11′ 3″
		Scullery, Coal shed, and Larder	
	Second floor	3 Bedrooms	12′ 3″ × 10′ 6″
			13′ 4″ × 9′ 1″
			10′ 0″ × 7′ 2″
		Bathroom	
Grade III.	Ground floor	Parlor	10′ 3″ × 11′ 0″
		Living Room	10′ 7″ × 17′ 0″
		Scullery	10′ 7″ × 9′ 4″
		Coal shed and Larder	
	Second floor	3 Bedrooms	16′ 5″ × 10′ 3″
			11′ 0″ × 9′ 4″
			10′ 7″ × 17′ 0″
		Bathroom	

LAMBETH

Bloomfield. The houses on this estate are of three types and vary slightly in detail but the average dimensions of the rooms are as follows:

Type A.	Ground floor	Living Room	15′ 0″ × 12′ 0″
		Scullery	12′ 6″ × 10′ 8″
	Second floor	3 Bedrooms	12′ 6″ × 10′ 8″
			12′ 6″ × 9′ 6″
			9′ 0″ × 8′ 7″

It will be noticed that the sculleries are of liberal dimensions and can be used for kitchens if so desired.

Type B.	Ground floor	Living Room	14′ 0″ × 12′ 5″
		Parlor	11′ 0″ × 9′ 0″
		Scullery	9′ 2″ × 6′ 7″
	Second floor	3 Bedrooms	14′ 0″ × 10′ 7″
			12′ 9″ × 11′ 2″
			10′ 9″ × 7′ 9″

Type C. These are flats and the accommodation on the ground floor is similar to that of the second and is as follows:

	Living Room	16′ 3″ × 11′ 0″
	Scullery	11′ 0″ × 11′ 0″
	3 Bedrooms	13′ 11″ × 10′ 5″
		12′ 9″ × 8′ 6″
		9′ 8″ × 7′ 6″

Each dwelling has a bathroom and there is a circulatory system of hot water from the range in the living room.

APPENDIX V

COMPARATIVE DATA ON POPULATION, ETC.

	Letchworth	Welwyn	Remarks
Population	15,000	9000	
Distance from London Terminus (Kings Cross)	35 miles	21 miles	
Cost of 3rd Class Quarterly Season Ticket	$36.54	$25.80	
Number of Trains per day	18	23	To London
Number of Season Ticket Holders	200	1100	
Number of Houses on Estate	3630	2200	
Number of Cottages under $2400 cost	2262 (62.3 per cent)	950 (43.2 per cent)	Weekly rented houses under $249.60 per year, inclusive
Number of larger houses (villas) $2400 to $4800 cost	1168 (32.2 per cent)	700 (31.8 per cent)	Monthly, quarterly, and yearly tenancies
Number of largest houses $4800 to $14,400	200 (5.5 per cent)	550 (25 per cent)	Owner-built on long leases, usually 99 years, but many houses from $3360 upwards in price are built on these leases
Proportion of workingmen's families to total population	68.0 per cent	47.5 per cent	Average weekly income about $16.80 per house

APPENDIX VI

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"With a view to testing this, two examples were investigated, one having 12 houses to the acre, the maximum number generally approved by the Ministry, with an average frontage per plot of 28 feet, and the other having 19.4 houses to the acre, developed on the old lines with continuous rows of houses of narrower frontage, average 17 feet.

"The result was rather surprising, for it showed that, in spite of the fact that the type of development on the lines adopted by the Ministry of Health provided 11 feet extra frontage for each plot, and gave an average size of plot for each house of 346 square yards, in place of 184 square yards for the old scheme, the estimated cost of carrying out the two schemes on the present basis of prices showed that the Ministry of Health type of development actually cost less per house than the old-fashioned method!"

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Ford, James. Housing report to the City Plan Commission of Newark, N. J. [Part of studies] by E. P. Goodrich and George B. Ford. Newark, N. J., 1913. 75 p. photographs, maps, tables.

Discusses lot units and housing.

National Conference on City Planning. Conference Committee. Report on "Best methods of land subdivision." (*In* Proceedings of 7th National Conference on City Planning, 1915, Appendix A, p. 247–273.)

Nolen, John. Land subdivision and its effect upon housing. (*In* Proceedings of 4th National Conference on Housing. Housing problems in America, 1915, p. 33–64; with discussion.)

The data used is that assembled by a Committee of the National Conference on City Planning.

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Robinson, Charles Mulford. Lot platting for humble homes, and factory removal. (*In* his City planning. New York, G. P. Putnam's Sons, 1916. p. 163–181. photographs, plans.)

Yeomans, Alfred B., *ed.* City residential land development; studies in planning; competitive plans for subdividing a typical quarter section of land in the outskirts of Chicago. Chicago, University of Chicago Press, 1916. 138 p. photographs, plans, perspectives, cross sections, tables. (Publications of the City Club of Chicago.)

Brown, Frank Chouteau. Gidea Park, a typical English "Garden City" development. (Architectural Review, Apr. 1917; vol. 5, no. 4, p. 73–82. photographs, plans, perspectives.)

Davison, Robert L. A check list of the principal housing developments in the United States. (Architectural Review, Apr. 1917; vol. 5, no. 4, p. 83–91.)

Davis, H. E. The Civic Building Company's development at Flint, Michigan. (Architectural Review, Apr. 1917; vol. 5, no. 4, p. 92–94. plans.)

Nolen, John. Industrial housing: better homes for less money: the economic advantages of better planning and of residential decentralization. Cambridge, Mass., Privately printed, 1918. 16 p. plans.

Swan, Herbert S., and George W. Tuttle. Planning buildings for daylight. (Architectural Forum, Nov. 1918; vol. 29, p. 117–124. diagrams, tables.) *See* Swan 1919 reference.

Unwin, Raymond. Nothing gained by overcrowding! How the garden city type of development may benefit both owner and occupier. London, Garden Cities and Town Planning Association, 1912. 24 p. photographs, plans, diagrams, tables. (Also later editions.)

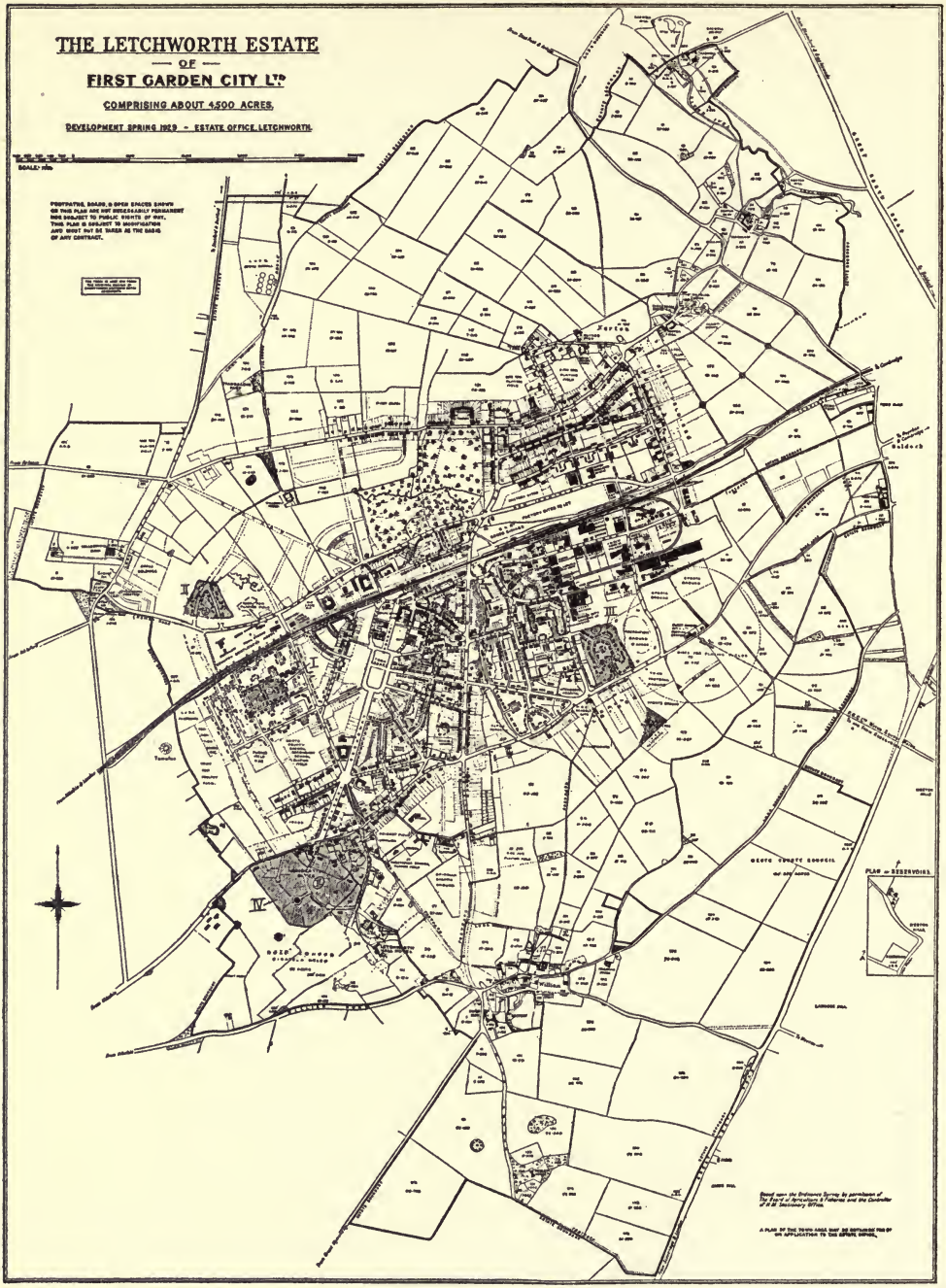
——— ———. Report. Proceedings of the National Advisory Town Planning Committee. London, National Housing & Town Planning Council, [about 1912]. 12 p. + 5 pl. plans, diagrams, tables.

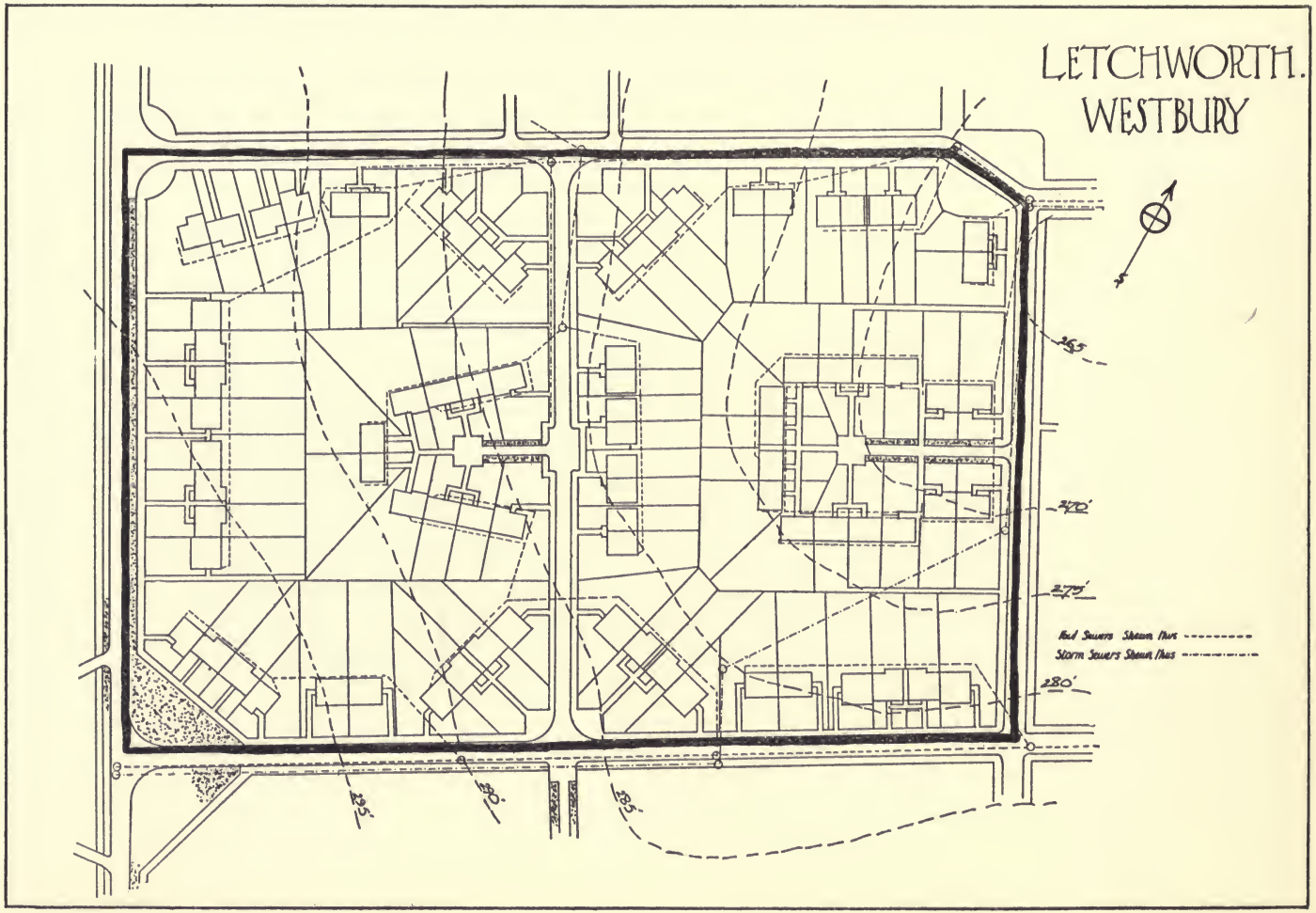
(*a*) Notes on the effect of limiting the number of houses to the acre under the Town Planning Clauses of the Housing and Town Planning Act.

(*b*) Diagrams illustrating the effect of limiting the number of houses to the acre.

APPENDIX VII

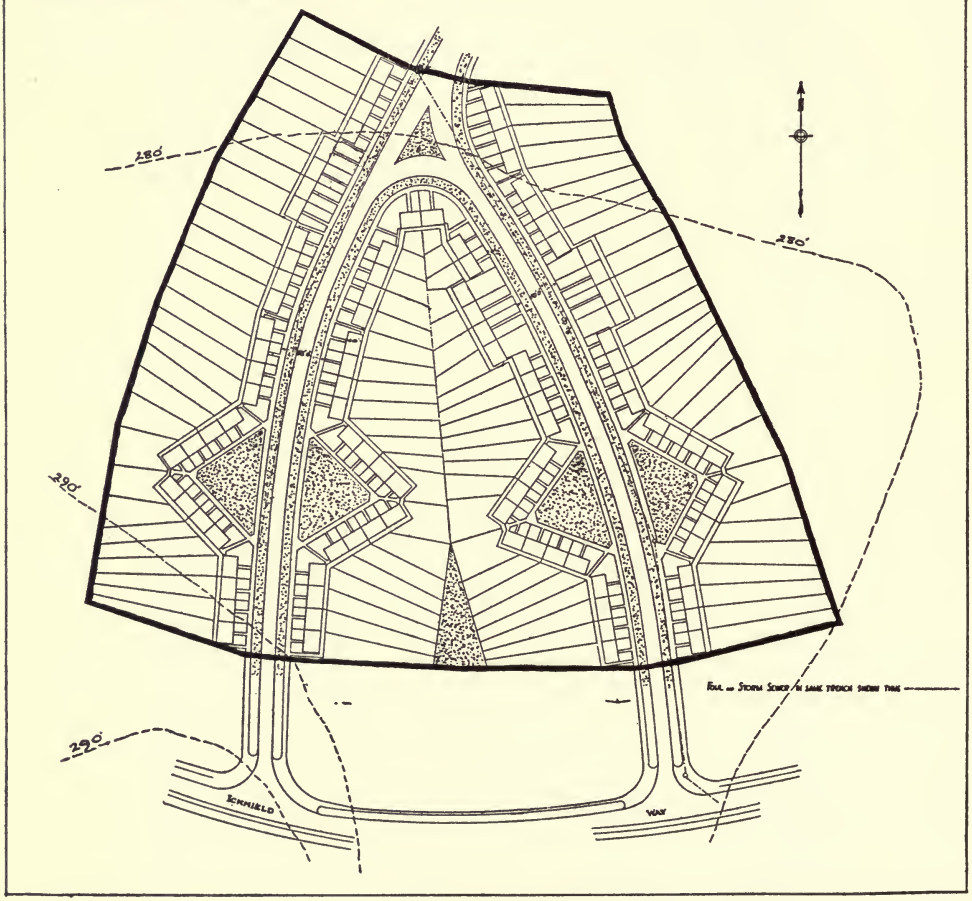
MAPS AND DIAGRAMS OF ENGLISH SCHEMES

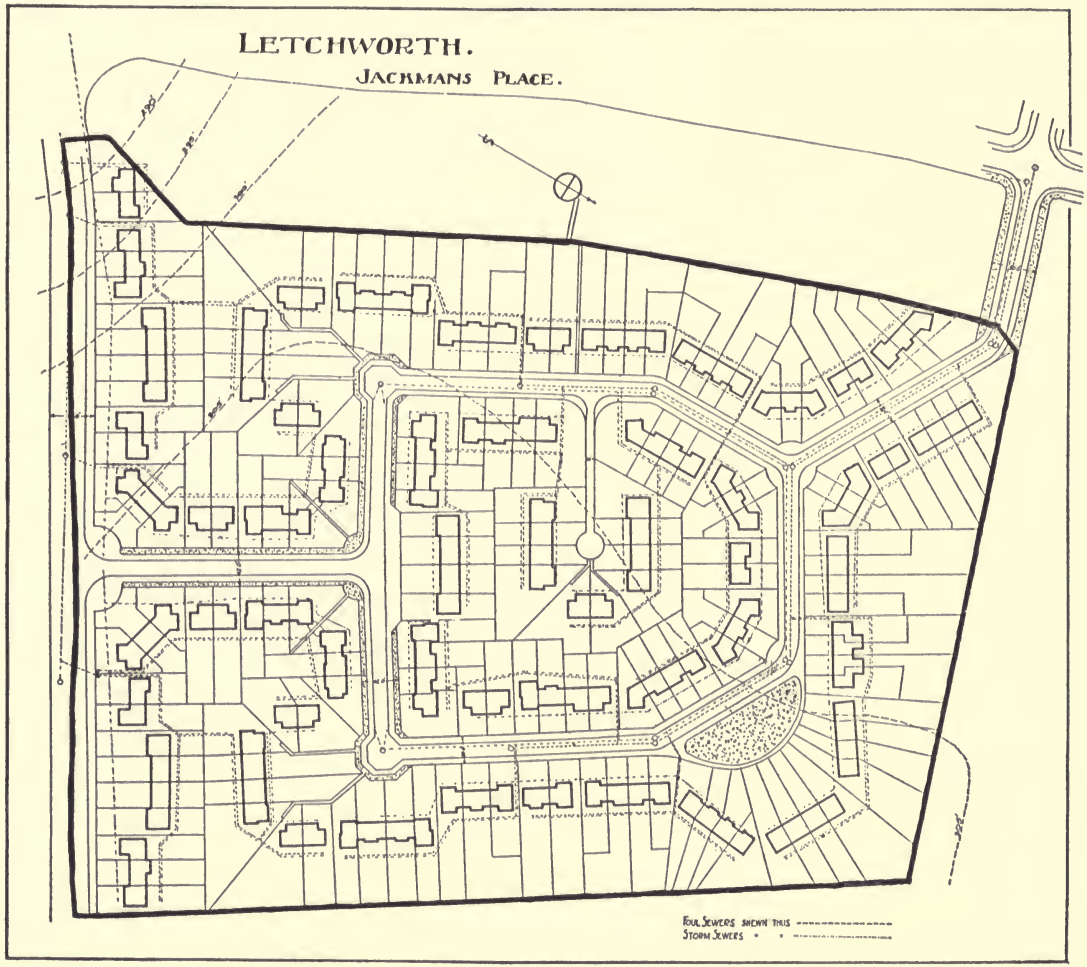

THE LETCHWORTH ESTATE
— OF —
FIRST GARDEN CITY Ltd
COMPRISING ABOUT 4,500 ACRES
DEVELOPMENT SPRING 1929 - ESTATE OFFICE, LETCHWORTH.
SCALE: 1/16
PLAN OF RESERVOIRS

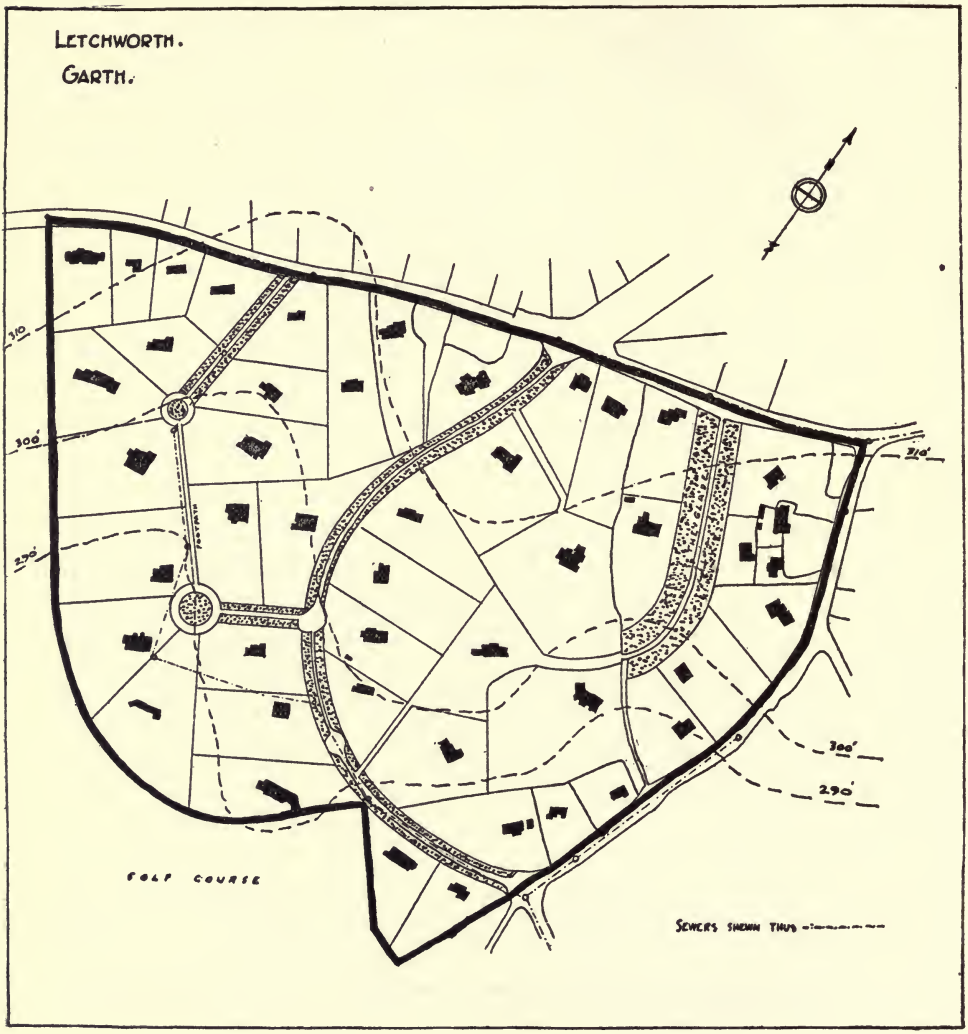

LETCHWORTH.
WESTBURY
N
265'
270'
275'
280'
Foul Sewers Shown Thus
Storm Sewers Shown Thus
225'
230'
235'

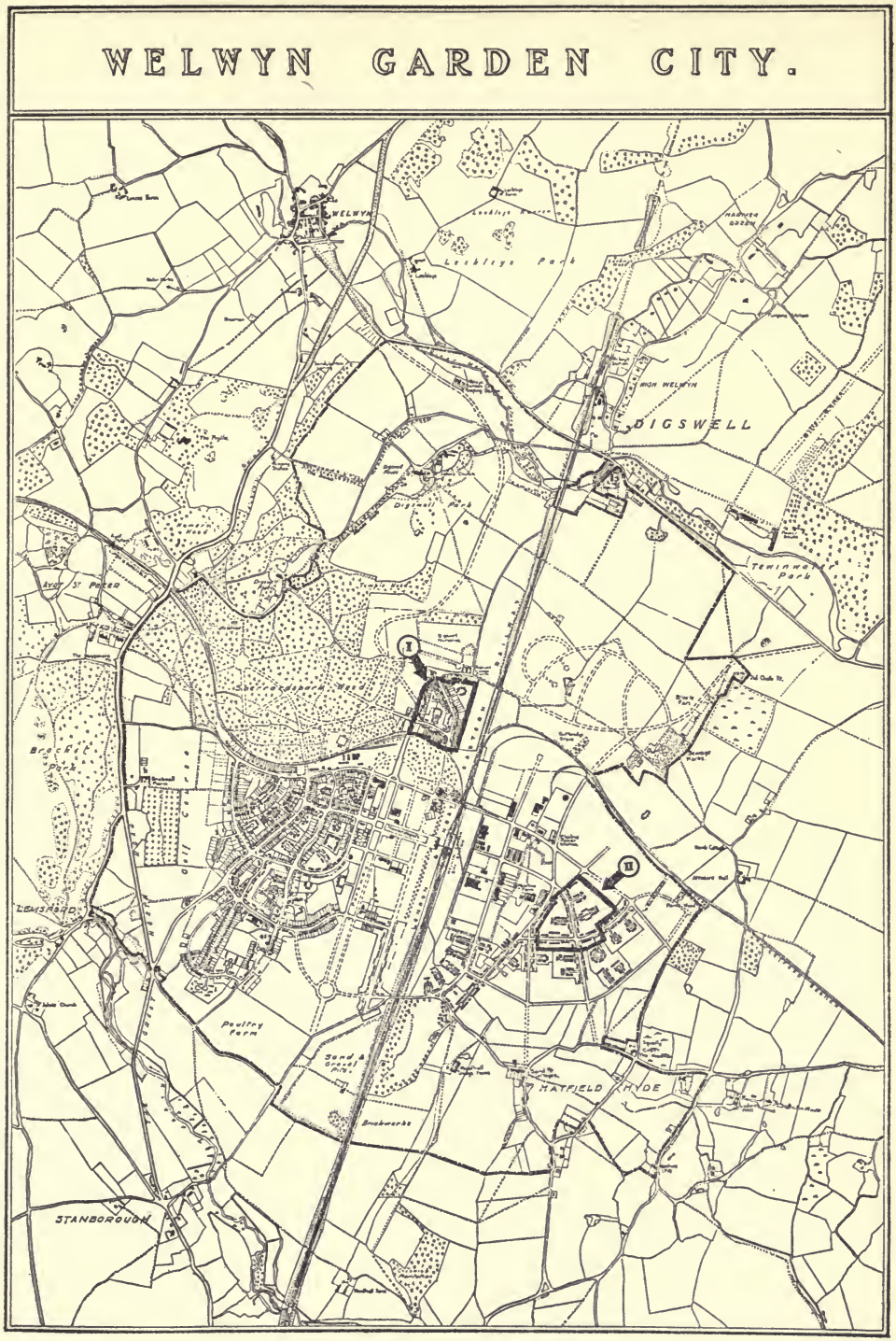
LETCHWORTH.

ICKNIELD WAY.

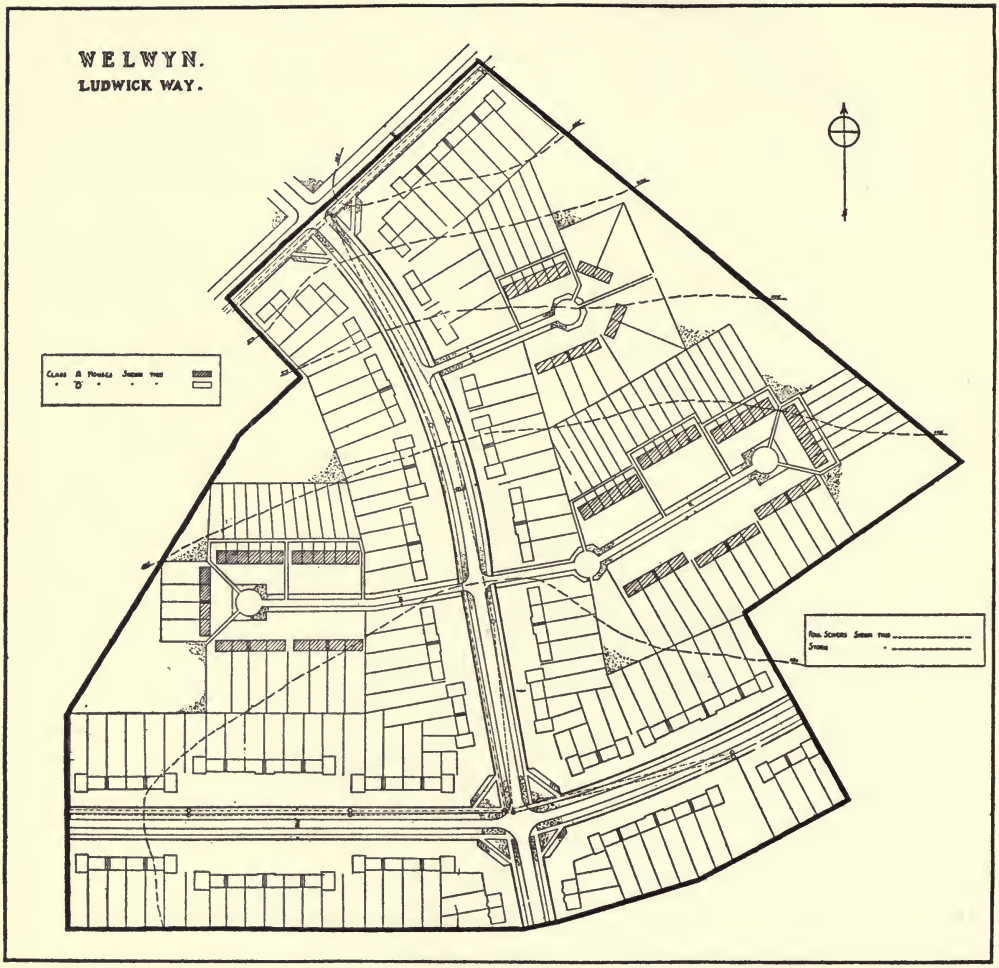


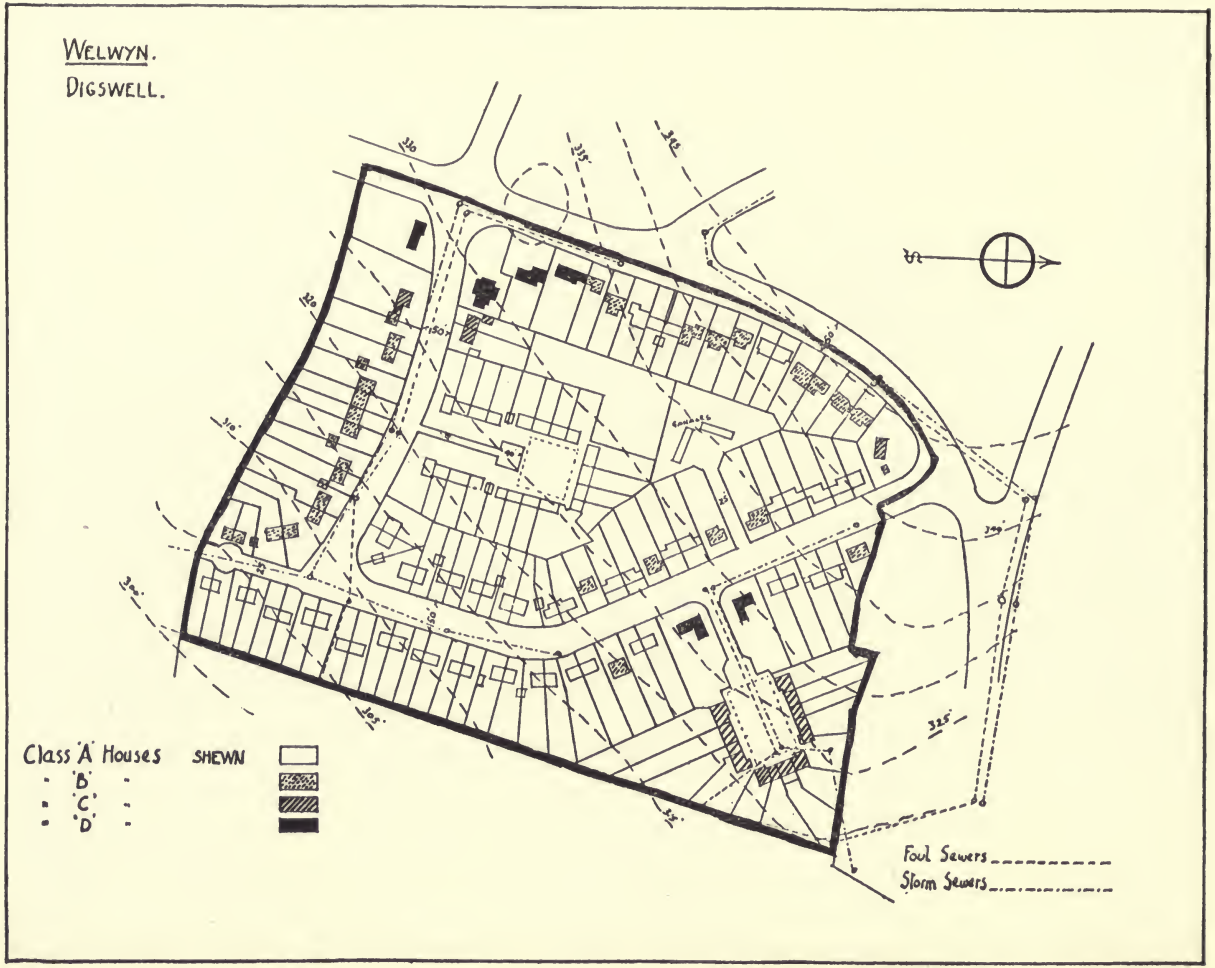

LETCHWORTH.
JACKMANS PLACE.
FOUL SEWERS SHEWN THUS
STORM SEWERS


LETCHWORTH.
GARTH.
310
300'
290'
210'
300'
290'
GOLF COURSE
SEWERS SHOWN THUS

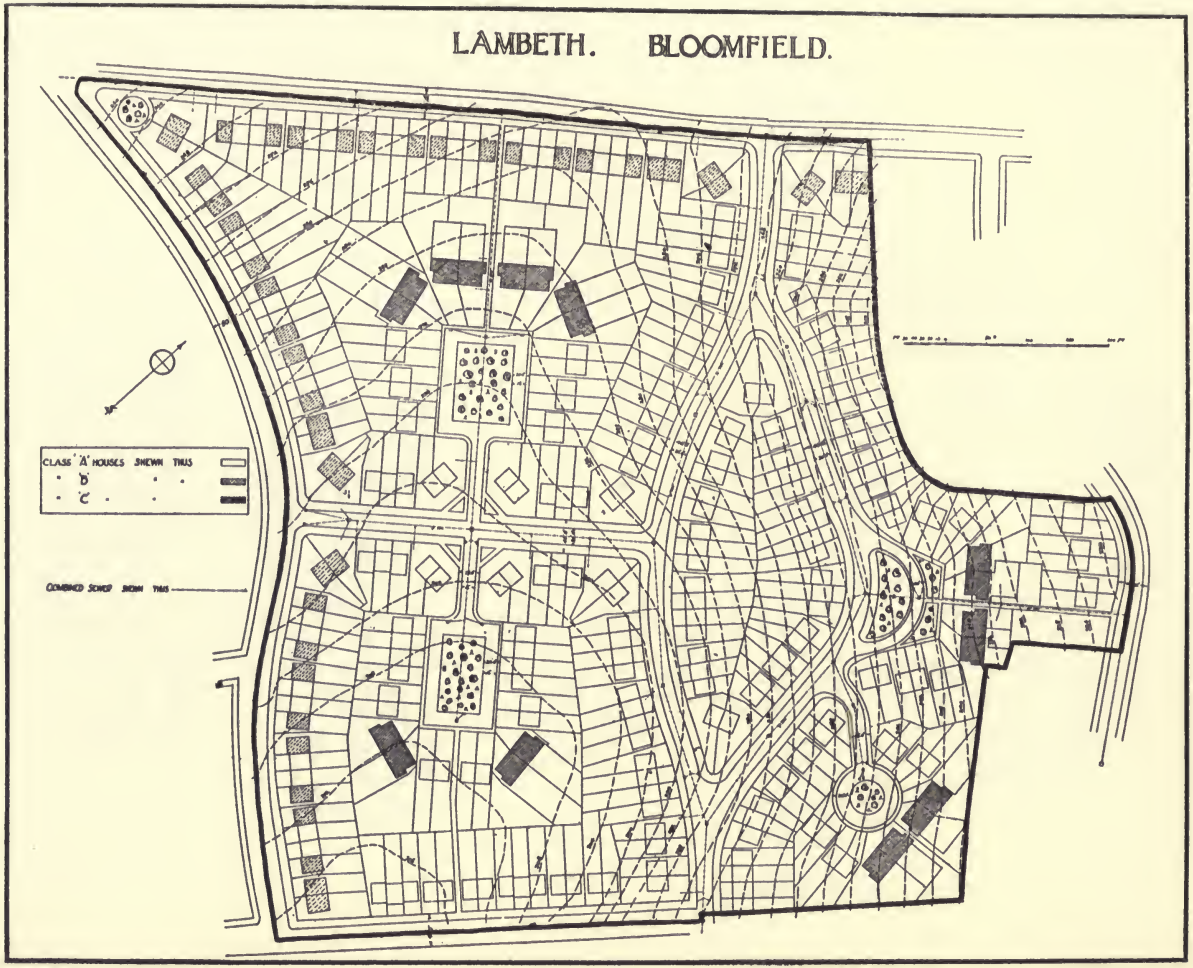


I. Digswell. II. Ludwick Way.

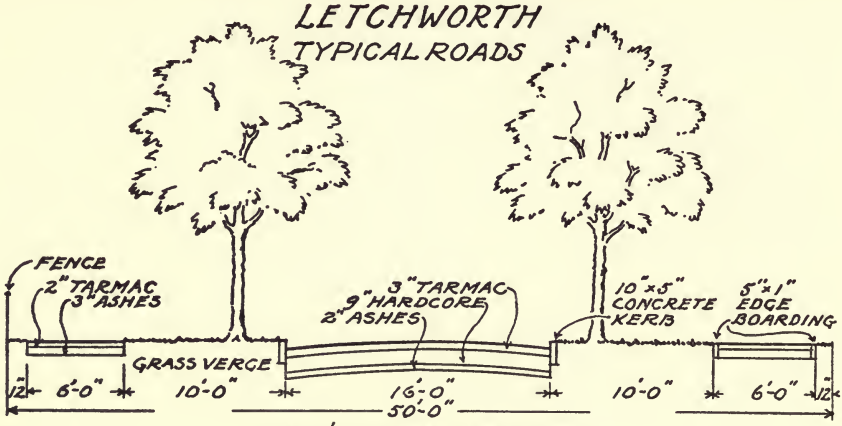

WELWYN.
LUDWICK WAY.


WELWYN.
DIGSWELL.
Class 'A' Houses SHEWN
'B'
'C'
'D'
Foul Sewers
Storm Sewers

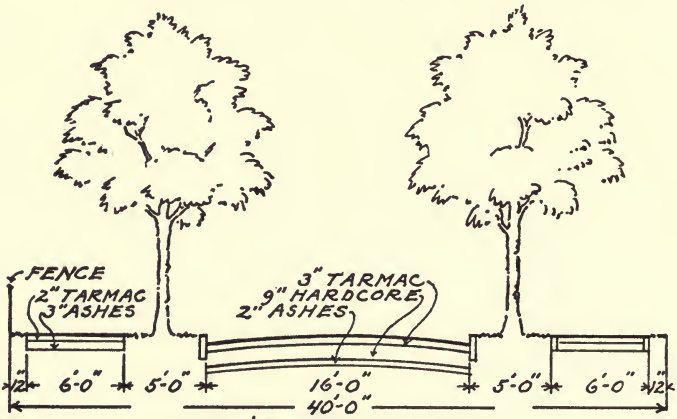

KEMSLEY VILLAGE.
GENERAL DEVELOPMENT PLAN.
Scale
Thomas Adams and Longstreth Thompson
Town Planning Consultants,
121 Victoria Street Westminster, London.


LAMBETH. BLOOMFIELD.
CLASS 'A' HOUSES SHEWN THUS
'B'
'C'
COMBINED SEWER SHEWN THUS

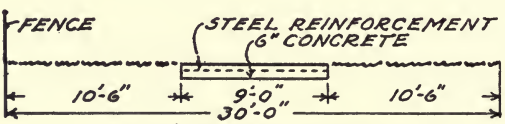
LETCHWORTH
TYPICAL ROADS



COST $44.80 PER YARD RUN

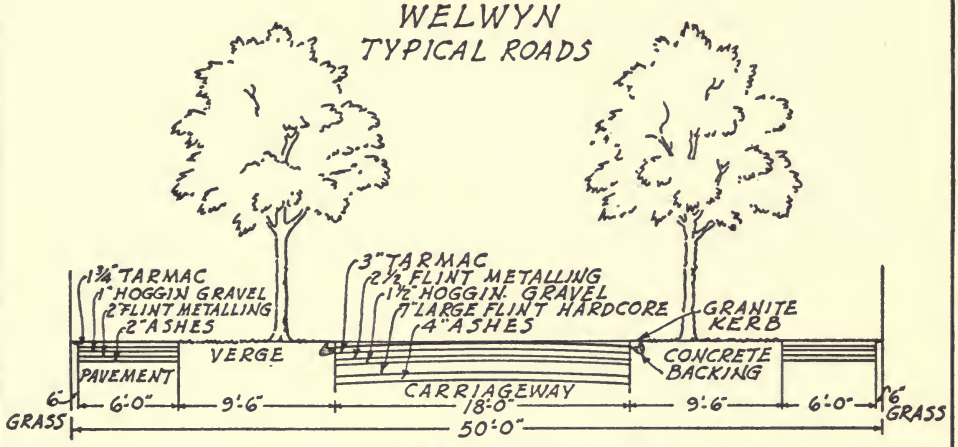


COST $32.64 PER YARD RUN

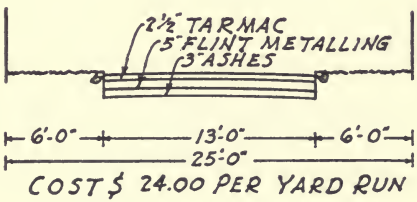


COST $4.80 PER YARD RUN

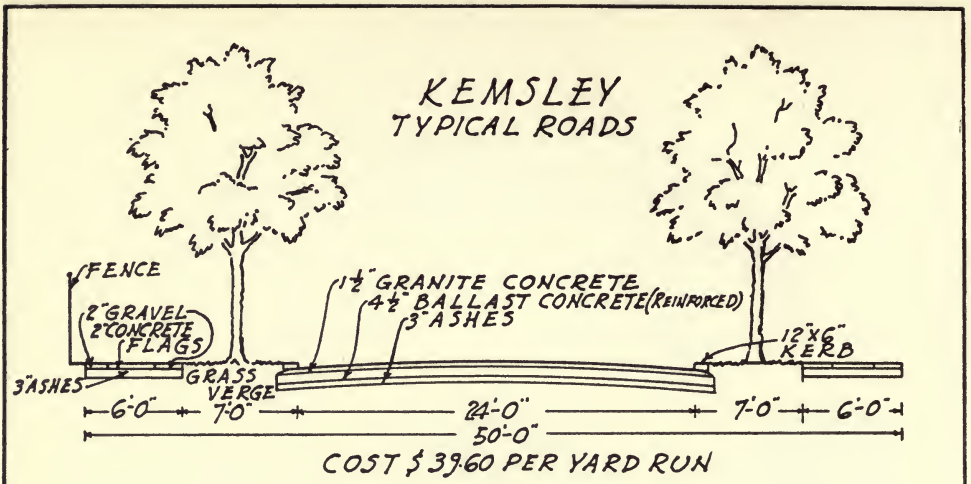
WELWYN
TYPICAL ROADS



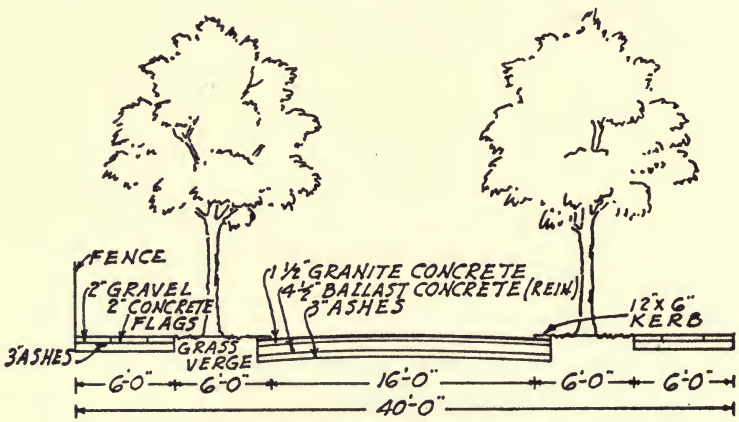
COST $ 44.40 PER YARD RUN



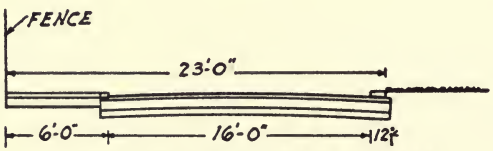
COST $ 24.00 PER YARD RUN



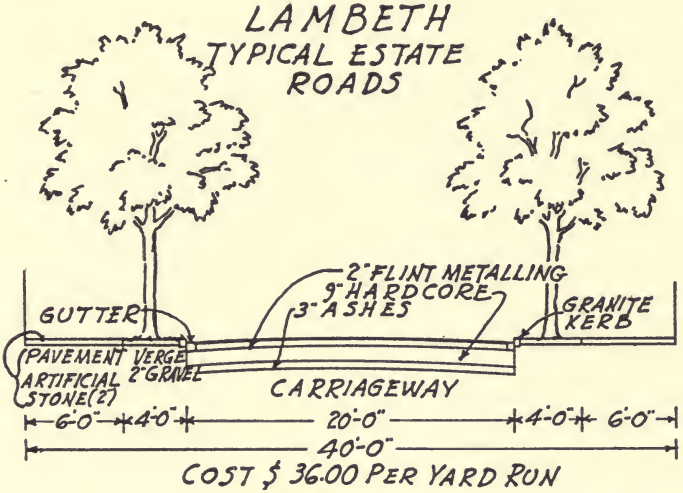
COST $ 39.60 PER YARD RUN

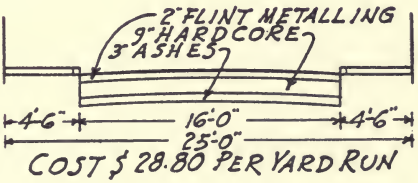


COST $ 33.60 PER YARD RUN



CONSTRUCTION AS FOR 40' ROAD
COST $ 24.00 PER YARD RUN


LAMBETH
TYPICAL ESTATE
ROADS
2" FLINT METALLING
9" HARD CORE
3" ASHES
GUTTER
GRANITE
KERB
PAVEMENT
ARTIFICIAL
STONE (2)
VERGE
2" GRAVEL
CARRIAGEWAY
6'-0"
4'-0"
20'-0"
4'-0"
6'-0"
40'-0"
COST £ 36.00 PER YARD RUN


2" FLINT METALLING
9" HARD CORE
3" ASHES
4'-6"
16'-0"
4'-6"
25'-0"
COST £ 28.80 PER YARD RUN

INDEX

References on pages 5 through 83, and 144 through 164, deal with conditions in the United States. References on pages 89 through 142, and 165 through 199, deal with conditions in Great Britain.