

CHAPTER I

Community Development

The Future Growth of Cincinnati

The great fundamental question that affects the City Plan is:

How fast will Cincinnati grow?

How much will it grow?
and,

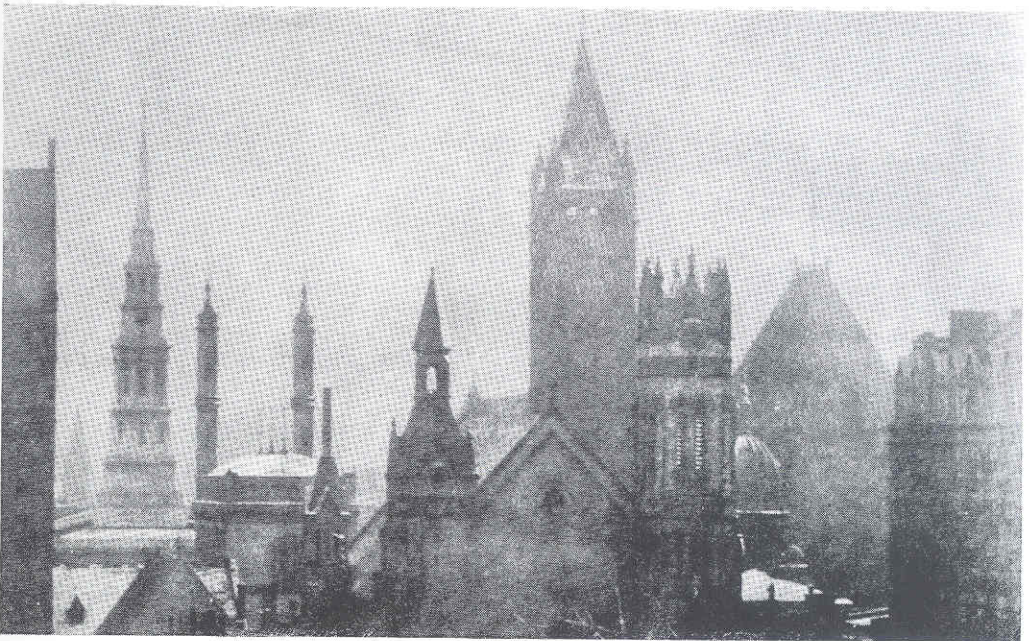
In what direction?

By Cincinnati, we mean metropolitan Cincinnati—that is, the whole surrounding region that is directly tributary to the city.

It is a well-known fact that Cincinnati has not grown, and is not growing, as fast as the average American city of its size. From 1910 to 1920 the population of Cincinnati increased only 10.4 per cent and from 1900 to 1910 it increased only 11.6 per cent. The increase in Columbus, Dayton, Cleveland and Toledo was three

and one-half times as great, while the increase in Youngstown, Canton and Akron was five to ten times as great. Indianapolis increased three and one-half times as fast, while the increase in Pittsburgh was about the same as in Cincinnati.

The great question is, will Cincinnati continue to grow at the gradually decreasing rate of growth which it has steadily adhered to for the last eighty years, or is it possible that it can take on a new lease of life and make a sudden spurt, like Detroit, Los Angeles or Akron? The only way to answer this question is to make a thorough analysis of the various contributory factors in Cincinnati, and comparatively with other cities to determine as nearly as it is humanly possible to do, the future growth of the city.



TOWERS FROM GARFIELD PARK
A City of many towers and spires, which add so much to its charm

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Each of the cities that has taken a spurt in its growth can point to some one outstanding factor that very obviously accounts for the abnormal growth. For example, in Los Angeles, it was brought about partly by the discovery of oil, and partly by a purely artificial real estate boom. It has already slowed down materially, for the real estate boom has now been transferred to the coast of Florida.

Detroit and Akron, one-industry towns, owe their abnormal growth to the accidental, stupendous development of the automobile industry. Bridgeport, Conn.; Gary, Ind.; Winston-Salem, N. Car.; Bethlehem, Pa., and Norfolk, Va., owe their great increase to the growth of their industries, as occasioned by the war.

Leaving out these abnormal increases, the average city of the size of Cincinnati has increased faster, but on an average not more than once and a half to twice as fast.

In order to visualize the normal growth of Cincinnati, of Hamilton County, and of the adjacent Kentucky counties, the accompanying Population and Growth charts were prepared, which show that normally Cincinnati will reach a population of about 525,000 by 1970 and will reach saturation with a population of 675,000 by about 2100. Hamilton County should reach nearly 650,000 by 1970, and should reach about 850,000 by 2100. Hamilton County plus the adjacent counties in Kentucky, should reach 800,000 by 1970, and nearly 1,000,000 by 2100.

Unless the growth of the Cincinnati metropolitan district is artificially stimulated, either by intention or by accident, the history of the growth of cities points very conclusively to the above population increase for 1970, and for the next century.

What are the possibilities of an artificial stimulation? In the first place, it must be evident to all that the possibility of an accidental stimulus, such as that which has accounted for the abnormal growth of nearly all of the American cities that have had over 50 per cent increase in population during the last ten years, is exceedingly remote in the case of Cincinnati. For Cincinnati, fortunately for its healthy growth, is not a one-industry town, as is Detroit, Akron, Gary or Bethlehem. The very fact of the wholesome diversification of its industries renders an excess of industrial growth impossible.

The fact that Cincinnati suffered no relatively large boom during the last war should prove that it presents little possibility of such a boom during any other war: again thanks to its diversified industries. The only possibility is that the Government might decide to locate some mammoth plant for war purposes in Cincinnati, but there are so many other cities that can offer fully as great inducements as Cincinnati for the location of an exceptionally large plant, that the chance for such a development taking place in Cincinnati is again small.



"THE BRIDGE"
Mural Decoration by H. H. Wessel at the College of Engineering, University of Cincinnati
Cincinnati's most inspiring Gateway

Courtesy of H. H. Wessel

The chance of an artificially stimulated real estate boom, such as that at Los Angeles or on the coast of Florida, is also out of the question, as Cincinnati, charming as it is as a place to live in, does not offer the unique and striking advantages on which the real estate promoter insists.

As an educational and art center, Cincinnati is growing far more rapidly than the average, but a study of the growth of other cities that are outstanding as educational or art centers, shows that beyond a certain point, even the greatest growth of that sort is bound to become lost in the general growth of the community, and can never be a predominant factor in a large city. Cincinnati has already passed beyond the point where even an exceptional educational or art growth can materially affect the total increase in its population.

It remains to be seen whether it is possible for a Chamber of Commerce, or for any group of business men or manufacturers to so artificially stimulate the growth of a community as to permanently affect the size of the metropolis. This question is the fundamental problem of the Industrial Survey now being conducted by the Cincinnati Chamber of Commerce. This survey will bring out facts and considerations which should lead to a far more conclusive answer to this question than is possible with the limited facts gathered in connection with the work on the City Plan. However, while awaiting the more conclusive answer of the Industrial Survey, a few general considerations affecting the city's growth are now in order, as it is impossible to make a City Plan without agreement on at least a general basis of growth.

It is always understood, however, in making a City Plan and Program for the next fifty years, that if by artificial stimulation or by accident, the growth of the city should be speeded up, the City Planning Program would merely be advanced to correspond.

In analyzing the various physical, economic and social conditions affecting cities' growth, occasion will also be taken

to show how each affects the City Plan itself.

The Relative Location of Cincinnati

Cincinnati is only 110 miles east of the center of population of the United States, which from the standpoint of business and industry is obviously a distinct advantage. Two-thirds of the population of the country live within 600 miles of Cincinnati. Cincinnati is nearer to the center of industry of the United States than any other community of its size. It is at the converging point of nineteen railroads, five or six of which are main trunk lines. It is the recognized gateway between the North and South, for the whole central part of the country. It is the coal center of the United States, one-half of the supply being within 400 miles. It is as accessible as any city, and with cheap rates, from the iron ore supplies of the country. It has all the building materials within 100 or 200 miles, including cement, stone, sand, gravel, brick, tiles and road stone. It is a large distributing point for most of the Southern lumber. In general, its location has great economic and natural advantages, that should assure at least a healthy, continuous growth. However, there is nothing new or exceptional in these conditions that would warrant any greater growth in the future than there has been in the past.

Natural Physical Conditions

The outstanding physical characteristic of Cincinnati is the rugged topography. The city is spread over rolling country, intersected by two quite deep and relatively narrow valleys. The railroads are bound to follow the valleys, and with their growth are monopolizing a large proportion of the valuable lands. Industry and general business logically follow the railroads, and therefore, in most cases are bound to locate in the restricted valleys. The only alternative is to locate in the "Basin," which is already filled with substantial buildings, which must be sacrificed in order to acquire the necessary plottage for industry or warehousing. Therefore, the choice of available sites for new or growing industries or general business is limited, and even

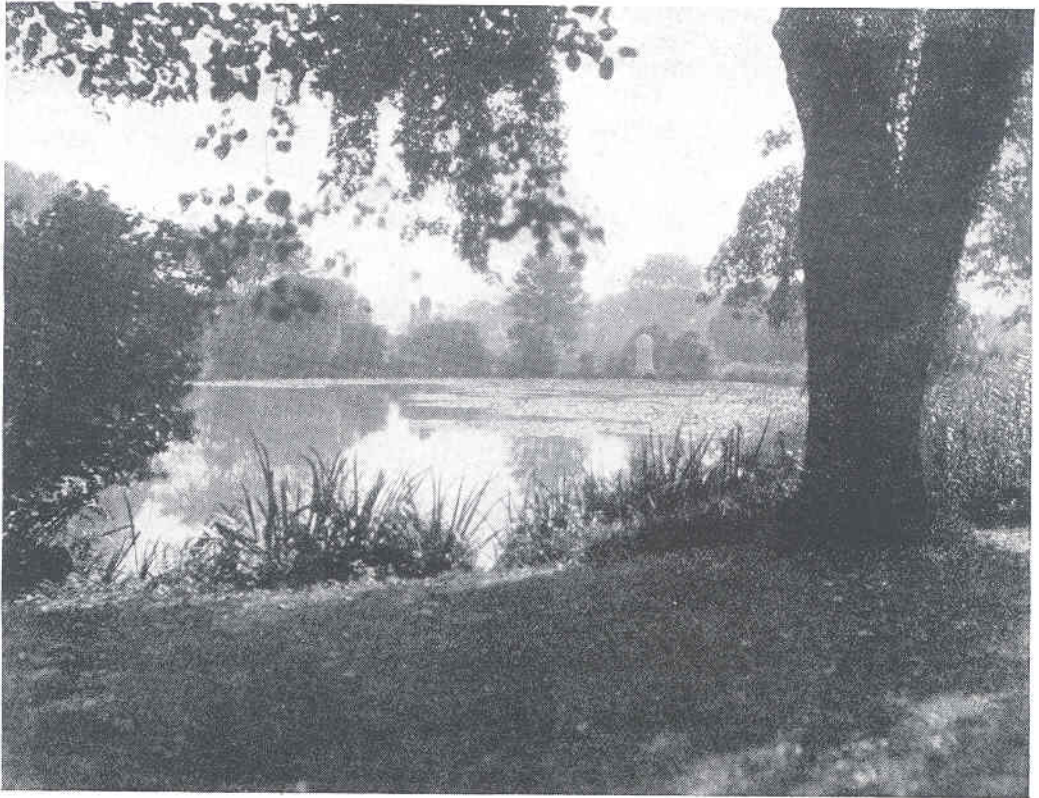
today new plottage of any considerable extent can only be acquired at least four or five miles away from the center of the city. This in turn means that the accessible labor market is correspondingly limited, although, fortunately, there is a large choice of sites available along the various railroads, which fortunately interchange trap cars, as well as full cars among themselves.

On the other hand, the variety of the topography and the elevation of the residential portions of the city above the industrial valleys, render them exceptionally delightful places to live in, all of which tends to put Cincinnati in the first rank among home cities.

Again, the rugged topography is a disadvantage from the City Planning standpoint, in that it forces the city to spread out abnormally and involves the city in exceptionally heavy cost for public works and public services, due to the unusual

distances that have to be covered and the difficulty of surmounting the steep slopes. This is the chief reason for a relatively high per capita cost of city government in Cincinnati in proportion to the results. From a City Planning standpoint, it presents the problem of so planning the future growth of the city as to avoid, or at least to counteract, these two setbacks to economic development.

The soil and geological conditions are excellent for building, the "Basin" being alluvial deposit and the hills limestone and shale. The only construction difficulty comes on the steep hillsides bordering the valleys, where in many instances the shale refuses to hold anything but the lightest construction. The glacial and alluvial soil throughout Hamilton and the Kentucky counties is better than the average for farming, lending itself especially to wheat and ordinary crops on the higher land and to corn in the river

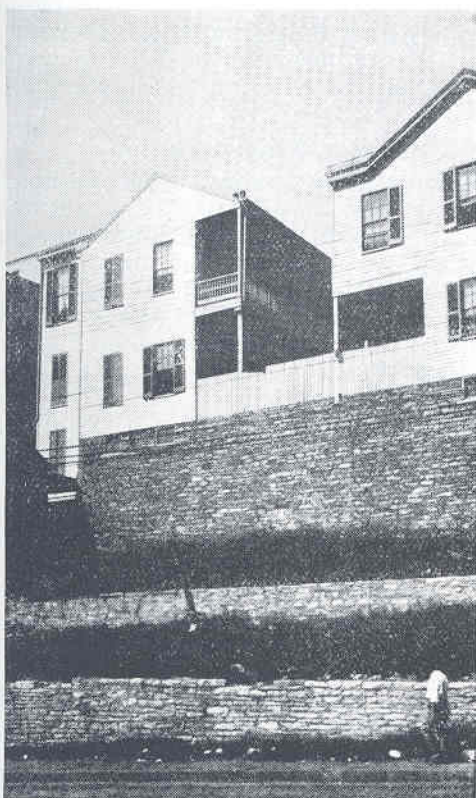


SPRING GROVE CEMETERY
A model for the parklike treatment of cemeteries

© Paul Briol 1924



BUILDING COLLAPSING AS THE SIDE HILL SLIPS
The steep side hills are often treacherous for buildings



RETAINING WALLS ABOVE MARTIN ST.
Often only costly walls will hold the hillsides

valleys. In fact, Cincinnati can almost be self-supporting from an agricultural standpoint, because as it takes seven acres under cultivation to support each inhabitant of the district, it would require an area about 100 miles square to support the eventual million population of the Cincinnati region. Nearly all this area is uniquely tributary to Cincinnati. This area has not begun to develop its possibilities.

Climatic Conditions

Cincinnati is fortunate in having no very hot or no very cold spells, with an average temperature of 55° throughout the year, and an average temperature during July and August of $76\frac{1}{2}^{\circ}$, the cool nights averaging not over 70° . The thermometer gets below zero not oftener than once a year. There is little snow, and no deep snow. There are no long rains, and no particularly hard rains, yet there is an average rainfall of 38 inches per year. The climate is not damp—in fact, the humidity is nearly $1\frac{1}{2}^{\circ}$ below the average for the country. Cincinnati is also remarkably free from fogs. In fact some years it has no fogs at all. The average frost starts late—that is, after October 25th—and stops early—that is, about

April 14th. There is almost no hail. There are few wind storms relatively. In fact from the standpoint of industrial and living conditions the climatic tendencies are much better than the average, all of which attracts labor and helps industry.

wood and Oakley is blown away from the city, and the same is true of the industrial developments in the upper Mill Creek Valley. Therefore, in general, Cincinnati is fortunate in the prevailing direction and intensity of its winds.

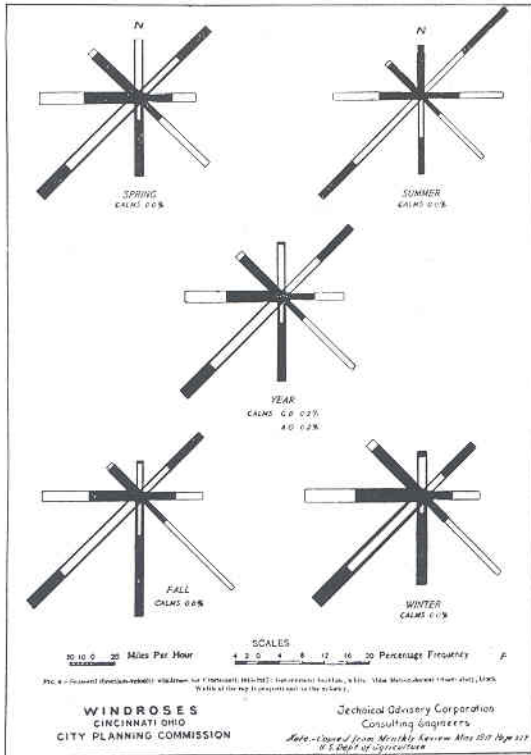
Water

Cincinnati uses water taken from the Ohio River, that is taken quite a number of miles above the city. Since the construction of the new City Water Works the water is exceptionally pure. The water is also exceptionally soft for Ohio, in fact, two and one-half times as soft as that of Dayton. This is excellent for industry as well as for the housewife, for it means that there is no boiler scale or scale formation in water pipes. Furthermore, there is unlimited well water in Mill Creek Valley, so that industries may carry their own supply at very little relative cost.

Adequate water supply also means cheap power, although with coal as cheap relatively as it is in Cincinnati, there has been little inducement to develop water power from the Ohio or its tributary rivers.

Water Transportation

Cincinnati, like many other great cities of the world, was started where it was, because it was at the junction of several principal waterways. The first settlers came down the Ohio and landed at the mouth of the Little Miami River. Until the advent of rail transportation, Cincinnati owed its growth largely to this converging water transportation. The Miami Canal through Hamilton, Dayton and Toledo again had considerable influence on the growth of the city. However, with the development of rail transportation, water transportation almost entirely died out. Today a large proportion of the coal arrives in Cincinnati by water. The same is to a certain extent true of bulky materials such as building material. Freight rates by water are from 1/4 to 1/15 corresponding rates by rail. There are daily packet lines up the river to Charleston, W. V., and down the river to Louisville. There are other lines with frequent sailings from Pittsburgh to New Orleans. Nevertheless, the fact that only



WINDROSES

Prevailing summer winds are south to west.

The accompanying windroses show that the prevailing wind throughout the year is from the southwest and that the predominating winds vary from west to southeast. The greatest velocity of winds is from the west and southwest. There is very little wind from the northwest, north or east, although somewhat more from the northeast. Thus the prevailing winds blow the smoke of the factories and railroads in Mill Creek Valley largely up the valley, and the same is true of the railroads and potential industries in the Little Miami Valley. The smoke from the railroads and industrial districts along the B. & O. Railroad and in Nor-

about 2,000 feet of water-front are actually used for water transportation indicates what a small part water transportation now plays in Cincinnati's development.

On the other hand, as affecting Cincinnati's future growth, it should be noted that the United States Government is building a series of dams across the Ohio River, which will raise the present six foot draft to a minimum of nine feet throughout the length of the Ohio River. This should have a material effect on the reawakening of river transportation.

The United States Army Engineers, after considering four alternate water routes from the Ohio River to the Great Lakes, have decided in favor of the route from Pittsburgh to Ashtabula. Nevertheless, it is conceivable that some day the State of Ohio will find it advantageous to reopen, in modernized form, the old Miami Canal from Cincinnati through Dayton to Toledo. The recent experience with the State Barge Canal in New York would appear to warrant such a potentiality.

An increase in river or canal transportation would help the growth of the city and would affect the character and rate of development of the City Plan.

Rail Transportation

The nineteen railroads entering Cincinnati all provide interswitching facilities, the switching limits having some 25 mile radius. These facilities include the placing of trap cars as well as full cars on any siding, while in addition 600 package cars leave Cincinnati daily, for designated points. Eighty-five team tracks and freight stations serve all parts of the community, while the L. C. L. motor freight service between freight terminals assures speedy handling of freight, and uncongested yards. The proposed improvements in railway freight routing and handling will vastly improve even the present relatively efficient system. Therefore, from the standpoint of rail transportation Cincinnati is, and will be, exceptionally well served. This is especially true when it is considered that Cincinnati enjoys the most favorable freight

rate to fully one half of the population of the United States.

These facts all speak well for the healthy growth of the city, but again the fact that they are not new in Cincinnati would mean that they should not cause any increase in the rate of growth.

Trolley and Motor Transportation

Each of the existing interurban street railways carries a certain amount of freight, but the total is very small in proportion to the aggregate handled through Cincinnati. Also various motor truck routes to the outlying towns augment somewhat the trolley total, but the amount of goods carried by both means of transportation, is insignificant in comparison with that handled by the railroads. While this form of transportation is increasing rapidly, it is felt that it will be so long before it reaches any proportions that its effect is virtually negligible in City Planning.

Agricultural Belt

As was pointed out above, a 50 to 60 mile radius around Cincinnati should supply the food wants of the whole region. The soil and climatic conditions are good, so that there is every reason why agriculture, including market gardening should be encouraged. It is here that the use of trolley freight, and particularly of the motor truck, should prove advantageous in bringing locally raised food stuffs quickly to the Cincinnati markets. The existence of such an agricultural belt should stabilize the city's growth, and it will affect the City Plan to the extent of requiring the development of a network of radiating and cross connecting thoroughfares throughout the Cincinnati region. The cost of living in Cincinnati is lower than the average for the country. This advantage can be maintained by a constant insistence on the maintenance of a well distributed system of good thoroughfares throughout the region.

Industry and Business

15.2 per cent of the total population is engaged in the over 3,000 industries located in Cincinnati. This is the same proportion as in Cleveland and in Milwaukee and Newark; while it is larger

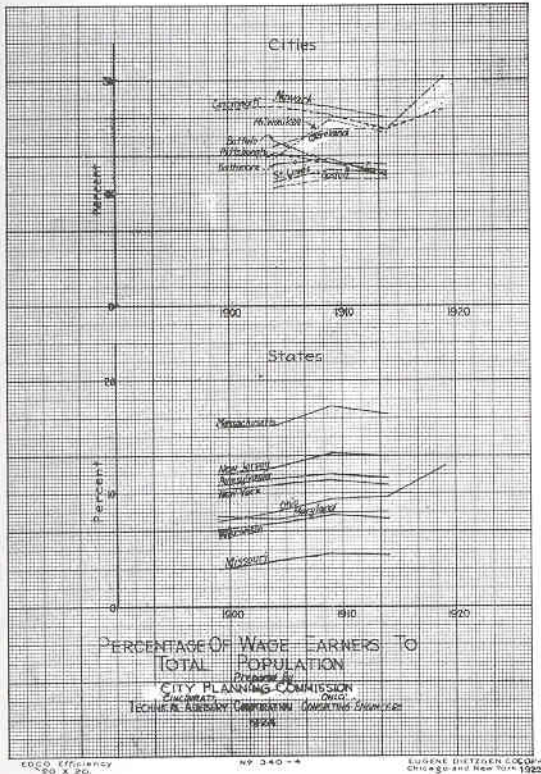
than the proportion in St. Louis, Baltimore, Pittsburgh and Buffalo. In fact, Cleveland is the only one of these cities that has had a more rapid growth.

In 1923, 722 acres, or 1.13 square miles were actually used by industry, in which were employed 112,000 workers at the

man extraction speaks well for the high quality of the immigrant labor. On the other hand, only 7.4% of the population is colored, which is very low relatively for a city so near the south. These facts mean that the quality of labor available is exceptionally high; therefore, it is not to be wondered at that Cincinnati ranks exceptionally high among cities for its good mechanics and high class operatives.

Coupled with this high quality of labor is the fact that wages and living costs are relatively low, which makes Cincinnati particularly attractive to the better class of industries. The natural upshot of these facts is that actual unemployment in Cincinnati is never severe relatively; so that the city is known as a place of steady employment. This healthy condition again augurs well for the continued growth of Cincinnati.

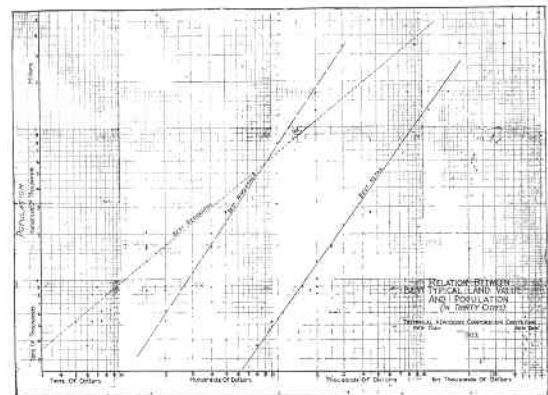
The census report of 1909 puts the relative average cost per primary horse power in Cincinnati at a lower figure than in any one of ten other corresponding cities, nearly one-half of the rate in Cleveland, for example, although its position is not quite as good today but still good. When one couples with this fact the fact above mentioned that no one city is better placed with respect to supplies of coal, oil, gas, building material, lumber and steel, it is again safe to assume that Cincinnati has a prosperous future and a reasonable growth ahead of it.



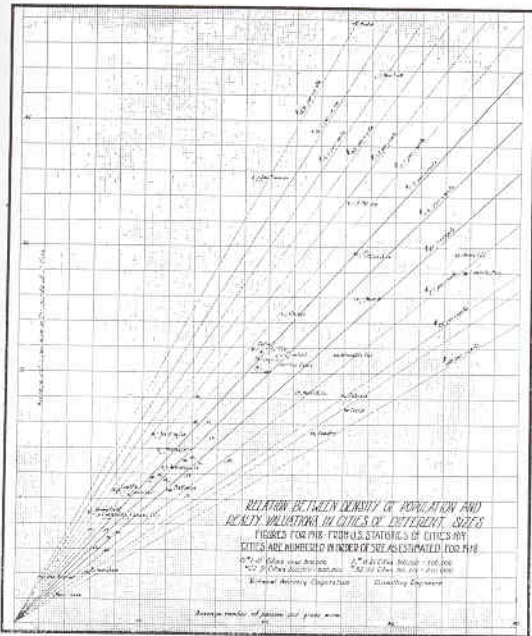
PERCENTAGE OF WAGE EARNERS TO POPULATION
Average and should be larger

peak in 1921, and in which about 85,000 are employed today. At the same time, about 35,000 more are employed in business and about 10,000 in the professions. These are healthy proportions, which again speak well for the continued growth of the city.

Another striking fact from the industrial standpoint is that less than 43,000 of the total population, that is, 11.7 per cent, is foreign born. This is one of the lowest percentages of foreign born in any large city in the country. In Cleveland, the percentage of foreign born is six times as great. Furthermore, the fact that 2/5 of the foreign born are of Ger-



RELATION BETWEEN BEST TYPICAL LAND VALUE AND POPULATION (30 cities)
Cincinnati is average

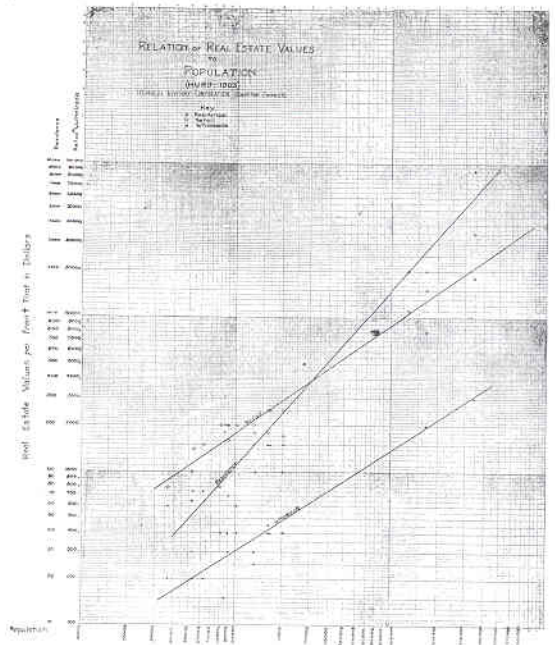


RELATION BETWEEN DENSITY OF POPULATION AND REALTY VALUATION IN CITIES OF DIFFERENT SIZES
They increase similarly

Real Estate

The property values in Cincinnati are relatively low for the same distance away from the center, as compared with other cities of about the same size. Only recently there has been a sudden increase in property valuations at the center of the city. However, it can be said that for the average home or small industry, land can be bought fully as cheaply in Cincinnati as it can in any similar city. These low land values are reflected also in the taxes, for even with the present reappraisal, the assessed valuations do not average much over 90 per cent of the actual valuations, while the tax rate in proportion to the size of the city is one of the lowest in the country. Of course, this low tax rate is at the expense of vitally needed improvements, all of which is thanks to the notorious Smith One Per Cent Law.

Construction costs are correspondingly lower than the average, so that the purchase of land and the erection of a home or factory costs no more, and probably a little less, in proportion to wages, than in most other cities.



RELATION OF REAL ESTATE VALUES TO POPULATION
Cincinnati is not high for its size

Living Conditions

Enough has been said already to show that living conditions in Cincinnati are exceptionally attractive. In addition to the economic advantages that have already been indicated, it is true that socially Cincinnati is among the most interesting cities in the country. The splendid system of 88 public parks, covering 2,700 acres, one of the largest and best laid out systems in the world, alone speaks loudly for the leisure time possibilities. The 21 playfields, 24 playgrounds, 2 public golf courses, 23 swimming pools, 10 amusement parks, 7 theatres, 108 motion picture houses, 34 bowling alleys, 135 billiard parlors, 1 National League Ball Park seating 30,000 people, 7 private golf clubs, a public library with 22 branches, 26 stations and 171 school distributing points, 13 private libraries and 4 museums, all indicate the wide choice in recreation which the city offers.

In addition to all this, Cincinnati is recognized as one of the leading music and art centers of the country. The Conservatory of Music and the College of Music, each with over 1,000 students, the

Art School with over 500 students, the splendid Municipal University, the first of its kind in the country, offering a wide variety of university courses, the remarkable Symphony Orchestra, the famous local theatrical companies and the excellent libraries all combine to put Cincinnati in the front rank of cities where one can enjoy the amenities of life.

Cincinnati is one of the most beautiful of American cities. It has almost an old world charm in its setting among the picturesque surrounding hills, while Mount Adams, rising abruptly from the business center in the "Basin" has all the qualities of the hill towns of Italy. The city is never drab, but full of color and variety; even the limited slums are picturesque, and while there is still a marked housing shortage, only a very small proportion of the population has to live in unsanitary surroundings, for the residence sections of the city are exceptionally spread out. In other words, there are more open spaces in Cincinnati, in the residence districts even aside from the parks, than there are in most American cities.

Not only are the schools and recreation facilities among the best in the country, and not only are the churches and clubs fully as wide spread as they are in most cities, but the opportunities in general for the use of leisure time, either in physical, sensuous or intellectual enjoyment are quite a little more abundant than in most cities of the same size.

In social welfare work, Cincinnati also ranks among the first cities in the country for its Council of Social Agencies, its Community Chest, its housing relief and Americanization work are all outstanding. In other words, the community knows how to get together and act for the common good. It has a real civic and social conscience.

With all its charm, Cincinnati is an up-to-date and live city, with busy and clean cut business streets, just the combination of the practical and the attractive that should best serve to induce the stranger to sojourn and eventually to settle in Cincinnati. In other words, the future of Cincinnati is assured.

Effect on Population Growth

The death rate in Cincinnati, thanks to the work of the Health Department and health agencies, has been rapidly decreasing and is now about 14 per 1,000. The birth rate is about double. The tuberculosis death rate has been cut down one third in ten years, due to the effective work of the Anti-Tuberculosis Sanitarium and the Public Health Service. The typhoid death rate has been cut to virtually nothing, due the efficiency of the City Water Purification Plant.

The density of population per acre is relatively low, the maximum being about 153 people per acre, and this maximum is constantly decreasing rather than increasing.

The center of population is moving north. A series of careful studies shows that it is now just north of the corner of Vine Street and McMillan Street and that it is moving north along Vine Street.

The present distribution of the population of Cincinnati according to the 1920 census and the 1910 census and the 1900 census, is shown comparatively on a series of 48 sheets which accompany this report. On these 48 topographic sheets one black dot represents 25 people, or approximately six families, and the maps show just where the decrease and increase have occurred, as compared with the 1910 and 1900 distribution.

After a thorough study of growth tendencies in Cincinnati, and in many other cities similarly situated, a prognostication has been made and shown on the accompanying 48 population sheets, indicating the probable distribution of the population of Cincinnati about 1970, unless some unforeseen circumstance tends to advance the normal growth of the city.

From these studies it is apparent that the population of the "Basin" is bound to continue decreasing as it is supplanted by business and industry, and that the population of the western hills is bound to grow somewhat faster than that to the north and east of the city, thereby rounding out the city's development.

It may be interesting to follow through the extended series of calculations and analyses, on which are based the popula-

tion growth curves and the future distribution of population.

These studies are appended in full.

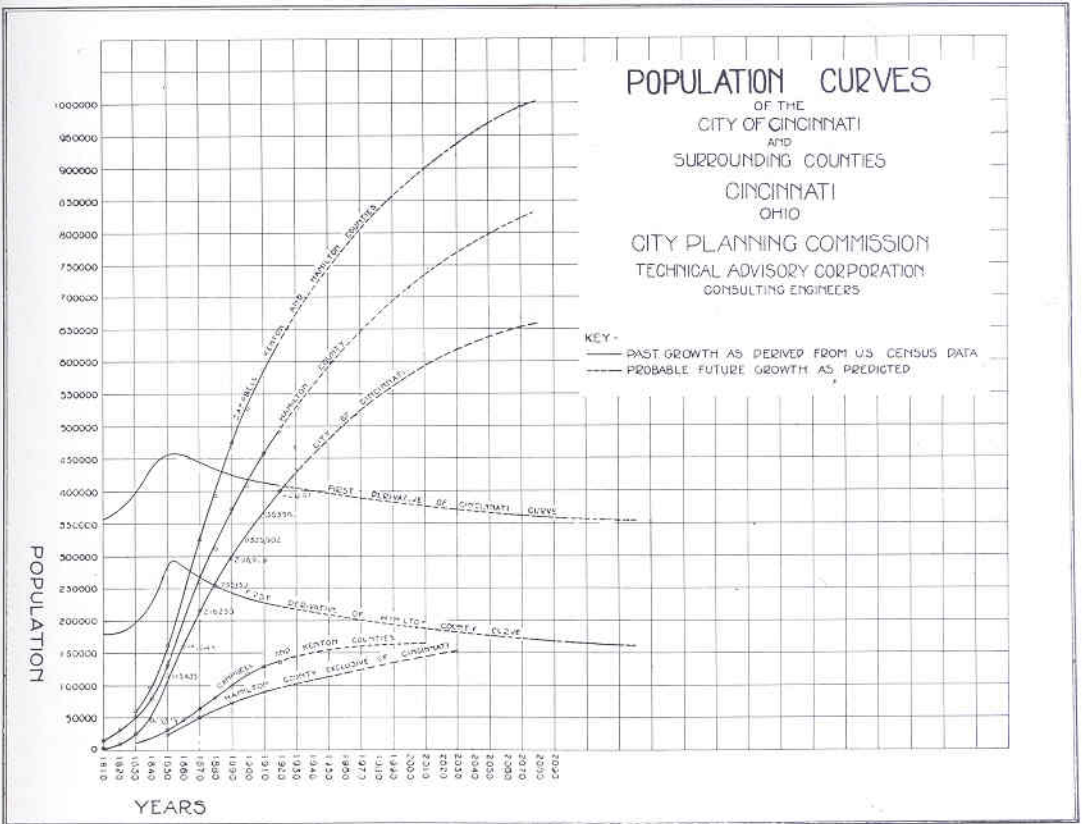
Method of Calculating Growth of Population

The population of a city as at present distributed, and as it will grow and be distributed in the future, is obviously the basis upon which scientific city planning must be formulated. Therefore, careful studies were made of the probable total future population of Cincinnati as a first essential of the Plan.

A curve was first prepared of the population of the city of Cincinnati from the year 1800 to 1920, and this curve was projected into the future on the basis of an analysis of the rate and of the acceleration in the rate of growth which occurred in the past. These two latter factors are comprised in what are mathe-

matically known as the first and second differential curves, respectively, of the population curve. The population curve shows that Cincinnati passed the period of maximum rate of growth about the year 1850, since which period the rate has been decreasing progressively. This fact is clearly illustrated by the shape of the first differential curve.

The original and the derivative curves were compared in detail with those of other cities now larger in size than Cincinnati, and with similar curves for larger districts around Cincinnati as a center, such as Hamilton County, what may be called Greater Cincinnati, which includes the Kentucky cities on the opposite side of the Ohio River, and finally of all the area included within a radius of fifty miles around Cincinnati as a center. The maximum rate of growth of Hamilton County was apparently reached about the



The growth of this city is slowing down.

year 1860, since which date there has been a progressively decreasing rate of growth.

The curves of these greater districts have also been compared with those of similarly large areas in other parts of the United States, such as the State of Vermont and the whole of New England.

Speaking in general terms, experience shows that the influence of cities of different size extends beyond their limits roughly in proportion to the population of each. Based upon this premise, a curve can be drawn between two such cities as Cincinnati and Columbus for example. Such curves are always circles which are concave toward the smaller city.

On the basis of this assumption, the zone of influence of Cincinnati was plotted. Its boundaries approximate with

fair accuracy a fifty-mile radius zone around Cincinnati, except toward the southeast, in which direction no large cities exist which can be considered in any sense competitive with Cincinnati. The natural boundary is therefore the Appalachian Mountains in that direction. That the value of the Cincinnati influence throughout that district can not be large is disclosed by the relative scarcity of railroad lines extending toward the southeast as compared with those which are operated toward all the other points of the compass. Because the theoretical zone of influence, as thus explained, so closely coincides with the fifty-mile zone, population studies were made only of the latter region.

Statistics as to the births and deaths which have occurred in Cincinnati during each of the past forty-eight years have also been obtained and growth curves



ONE OF 48 POPULATION, SCHOOL AND PARK MAPS

Shows where people will probably live in 50 years and locates schools and parks accordingly.

based upon an analysis of this data has been employed in analyzing the future population problem.

The difference between the total births and deaths each year since birth statistics were first collected by the Health Department, was computed and plotted. This showed a markedly decreasing tendency until 1921. This was caused by a striking decrease in the birth rate. A comparison of this birth-death data with the annual population increase increments, shows that there was a practically constant annual influx of population from the outside which was about twice as large in 1920 as was the increase due to the natural multiplication of population.

The studies of the actual past population of Cincinnati as compared with the smoothed growth curve, show occasional variations from the uniform growth curve, which have decreased almost uniformly as the city has grown. In 1840 the population was almost 20 per cent larger than that shown by the uniform growth curve. In 1850 the deviation was 7 per cent in the opposite direction. For the last three census dates the deviation has been 2.5, 1.1 and 0.75, variously plus and minus.

These variations are due to a spurt in growth which has usually been followed within a decade or two by a corresponding slowing down. On the basis of past experience, it is probable that the future may show deviations from the figures contained in the table above, but it is hardly to be expected that they will exceed five per cent.

The population of Cincinnati is estimated to be as follows. The figures are believed to be accurate within comparatively narrow limits, at least as far as the year 1970, or for the next fifty years.

The following table shows the probable future population:

Year	Population	Year	Population
1810	2,540	1910	363,591
1820	9,642	1920	401,247
1830	24,831	1930	425,000
1840	46,338	1940	450,000
1850	115,435	1950	478,000
1860	161,044	1960	500,000
1870	216,239	1970	523,000
1880	255,139	1980	543,000
1890	296,908	1990	560,000
1900	325,902	2000	577,000

Movement of the Center of Population

The center of the population in 1900 was 200 feet southeast of the intersection of Race Street and McMicken Avenue. Between 1900 and 1920 this center moved in a north-northeasterly direction by approximately one mile, and in 1920 it was about 200 feet southwest of the intersection of Euclid and Charlton Avenues.

Based upon the population distribution studies, the probable center of population for 1970 will be situated at the intersection of Vine Street and Nixon Avenue, approximately five-eighths of a mile north-northwest of the 1920 center of population.

The area considered for all three dates includes not only the present political area of the city, but also Norwood, St. Bernard and Elmwood Place as well.

Method of Distributing Population

Generally speaking, the following are the primary factors upon which the distribution of the population of a community has been found to be dependent:

1. Total increase of the population.
2. Zoning system.
3. Topography.
4. Distance from the center of the community measured along existing and proposed thoroughfares.
5. Time distance from the center of the community by existing and proposed transportation facilities.
6. Distance from main arteries and from transit lines .
7. Distance from local centers.
8. Present building tendencies.
9. Existing population tendencies.
10. Land values and their trend.
11. Distribution of schools and playgrounds.
12. Status of public services and of public utilities.

The order of the factors in the above list is only in a very general way the order of their importance, for their weight is so much dependent on local conditions, not only of the community as a whole, but of every single district within the latter which is treated as a unit for the purpose of distributing the future popula-

tion, so that the relative weight of the listed factors has to be considered separately for each district. Besides, there is another circumstance which renders it complicated and impractical to attach definite weights to each of the factors with regard to their relation to each other, namely, the interdependence of the factors themselves.

An individual analysis of the factors makes it clear that most of them are inter-related, the zoning plan, for instance, growing out, in part, of practically all the residual items of the list, the thoroughfare system being in some communities but a reflection of topographic conditions, existing building and population tendencies; the result of conditions brought about by land values, by distances from general and local centers, by the state of communication facilities and of public utilities, etc. Speaking mathematically, the formula which would determine the density of population for a specific district is in reality an indirect function; the twelve enumerated factors, the variables of the formula, being themselves functions of other mostly common parameters. Naturally, nothing would be in the way of listing the more simple but far more numerous basic factors, the parameters. Their practical application, however, for the purpose now under consideration would be most difficult and lengthy.

In order to determine the value of our formula in a specific case, a knowledge of the constants, exponents, etc., of each variable is imperative; in other words, we have to know in what way and to what extent each factor has a bearing upon the density of population of a particular district.

The total increase of the population up to the date under consideration, that is, 1970, is dependent on the nature of growth of the community in the past and upon certain natural laws, the knowledge of which makes it possible to forecast the future course of growth. The total increment of population is the algebraic sum of the changes in the number of inhabitants in all the districts into which

the community has been divided for the purpose of this study.

The zoning plan, as already touched upon, reflects the effect of practically all the other factors, and in addition, of a large number of other elements, physical and social, which through the zoning plan enter into the distribution of future population. The direction of prevailing winds, the racial settlements are two examples indicating the large variety of these elements.

Zoning regulates the use of property, not only qualitatively but quantitatively also, as far as population is concerned, and determines the possible maximum density of population for each of the zoning districts serving in full or in part for the housing of the population. Therefore, the density of population under restrictions of the Zoning Ordinance for the different zones will have to be ascertained by building up an average block preferably, and a density so arrived at will serve as an upper limit in working out the saturation of each block in the different zones. It will be necessary to determine the average number of persons per family for the community previous to this investigation.

The topography of the land upon which the community is built underlies practically all the other factors, and its effect is progressively evidenced as the relative difference in elevations and the ruggedness of the land increases. We do not think it necessary to explain how this influence manifests itself in the case of each of the other factors. There is, however, a ramification of zones into different population density districts, due principally to topographic conditions, to which we would like to call attention.

Taking, for example, the single family districts in different parts of the community, we might find that the density of population, although all the districts might be saturated to the same extent, shows a considerable variation, 100 per cent not being infrequent. The reason can be found in the different types of development in the different single family districts, in the size of lots, this being in some relation to real estate values, and

the latter accruing, other conditions being equal, from topographic conditions. The criticism that the cognizance of present building tendencies (the latter offering beyond any doubt the truest picture of crystallization of the complexity of influences under which a certain neighborhood develops) makes this consideration superfluous, is perfectly justified as long as it refers to areas which have advanced far enough in their development so that the manifestations of such tendencies can be recognized. In the case of undeveloped areas, or in the very early stages of development, however, there is nothing but topography itself to guide in this subdivision of zones into districts with different types of development.

In general, it has been found that the density of population varies inversely with the distance from the center of the community. This fundamental law should be superimposed over all the other factors which affect the distribution of future population, and while usually zoning itself brings out the consistency of this law, it will be found clearly and uniformly in evidence along every radial thoroughfare.

The time distance from the center of the community by transportation facilities has a very definite relation to rents (which is but a different expression for real estate values) and thereby to the intensity of use of the land, in other words, to the density of population. Studies conducted at the time when the extension of the Brooklyn Rapid Transit was brought into operation, show that each additional minute of ride was balanced by a certain fairly definite reduction in the commuters' rent. Lower land values result generally in a more open type of development, characterized by a low density of population.

In general, the effect of the distance from main arteries and from transit lines, as well as from local centers, is the same as for the distance from the center of the community. This is more accentuated in the case of transit lines and of local centers than it is in the areas adjoining traffic arteries. As a matter of fact, the inverse relationship between

distance and density of population applies more consistently in the case of local centers than it does when the center of the entire community is under consideration, there being a falling off in the density of population close into the main center, caused usually by the spreading out of large scale business around such center.

Existing building tendencies determine the natural saturation of a given district. Building up an average block in conformity with such tendencies, and adjusting it according to the extent to which the district can be expected to become saturated within the given period, gives the basic density for the district. Needless to say, the maximum natural saturation density can not exceed the one determined by the restrictions of the Zoning Ordinance for the zones in which the district happens to be located.

Present population tendencies indicate the rate at which a given neighborhood is developing, or the rate at which a district of a definite type is being transformed into another type of district. Knowing the rate of growth makes it possible to forecast the state of development which will be attained in a district at a certain date and so the extent of its saturation can be determined. A knowledge of the increase or decrease of the population in a district and its rate can be obtained only by a comprehensive study of past conditions. This makes the preparation of population distribution maps for one or two previous census periods an absolute prerequisite of this study.

Land values are primarily functions of population depending solely on the number of persons who are desirous of the possession or use of the land, whether this desire be actual or potential.

The desirability of a piece of property, and thus its sound value, is in definite although variable relation to its return; the latter depending again on the use to which the land is subjected. It is not within the scope of this report to deal at length with all the numerous factors determining the best use which can be made of a piece of property nor with the com-

plex laws through which such factors beget their effect. We merely desire to point to the fact that land values as created by population and by physical conditions, have a decisive influence upon the future use of the land.

Neighborhoods well provided with educational and recreational facilities, with schools, parks, playgrounds, etc., attract population, while the lack or inadequacy of the same retard their development. On the other hand, the movement of the future population can be controlled to a certain extent by the distribution of schools and of playgrounds, by park and highway systems, and by improving transportation facilities and public utilities. Reciprocal relationship exists between all these factors and the distribution of future population, while the details of the school and of the playground program, the final plans for the extension of communication facilities and of public utilities, can be worked out economically and intelligently only when based on the completed distribution of the future population. It is necessary to have a tentative general plan for all these features of the City Plan in order to make such distribution reflect a conscious effort to guide the community's development along lines found to be most advantageous, and also to obtain the best possible projection of future population conditions.

The status of public services and of public utilities in a district exercises its influence on the development of the district the same as in the case of schools and playgrounds, except perhaps that its influence is more active.

The Technique of Preparing Maps Showing the Distribution of the Future Population

The following procedure has been found to be the best for the technical preparation of population distribution maps:

The community should be divided into fairly homogeneous areas of good size. This should be done on a large scale map, simultaneously comparing it with other maps, charts or records on which information regarding the factors is given. These maps cover: zoning, topography,

existing building tendencies, existing population tendencies, land values, the distribution of educational and recreational facilities, the status of public services and public utilities.

After the homogeneous areas have been outlined, the present population of each has to be determined.

For each district then follows a thorough review of the twelve factors, with a view to estimating their change in population for the time period considered. This can be done by devising a scale of relative choice (numerical or qualitative) for all of the factors, making notations during the review and expressing the estimates in percentages of the district's present population.

It is helpful to figure out the percentage of increase of the total population before proceeding with the estimates described above, this percentage being the weighted percentage of increase of all the areas or districts into which the community has been divided for the purpose of this study.

It is evident that the algebraic sum of the changes in population of all the districts so estimated has to be equal to the increase of the total population, but at the same time it is very probable that the first estimate will not attain this. It is customary to overestimate or underestimate the rate at which development proceeds and the zoning saturation; notwithstanding this fact, however, not only the two just mentioned factors, but all the others, should be subjected to a very careful reconsideration, and the whole estimating process repeated entirely independent from the first one. The result of this second estimate usually shows a deviation from the total increase opposite to the first one, in which case an average of the estimated percentages adjusted by the weighted distribution of the still existing difference will yield the ultimate figures for the population changes in the districts. It depends upon the magnitude of the differences whether two or more independent estimates will have to be made before one of them, or a combination of several, can be accepted as satisfactory.

The next step is the actual distribution of the future population (or the decrease of population) so arrived at within the districts. The factors will have to be constantly kept in view again during this process, and details, like uninhabitable steep hillsides, areas subject to frequent floods, parks, cemeteries, railroad rights-of-way, etc., carefully observed.

Spots representing 25 to 100 persons each can be used according to the scale of the base map and the desired detail of the study. The use of transparent paper over the map, showing the distribution of the present population, and on which the proposed thoroughfare plan, the proposed park and parkway system (or at least the new thoroughfare and parkway connections) and possibly the limits of business and industrial zones, are roughly sketched in, will greatly facilitate the actual distribution of spots.

**Births and Deaths in Cincinnati
Years 1874 to 1922**

Year	Births	Deaths	Natural Increase
1922	8,000	6,035	1,965
1921	8,133	5,712	3,421
1920	7,887	6,074	1,813
1919	7,080	6,382	698
1918	8,221	8,640	-581
1917	7,837	6,743	1,094
1916	7,880	6,735	1,145
1915	7,774	6,352	1,422
1914	8,074	6,428	1,646
1913	7,574	6,734	840
1912	7,780	6,453	1,327
1911	7,528	6,225	1,303
1910	7,263	6,330	933
1909	6,810	5,921	889
1908	5,966	6,450	-484
1907	6,041	6,414	-373
1906	8,108	7,195	913
1905	5,563	6,534	-971
1904	5,160	7,038	-1,878
1903	5,370	6,201	-831
1902	5,858	5,744	114
1901	5,208	6,155	-947
1900	5,548	5,412	136
1899	5,624	6,000	-376
1898	6,389	5,585	804
1897	6,867	5,565	1,302
1896	7,167	5,916	1,251
1895	7,112	6,096	1,016
1894	7,651	5,945	1,706
1893	7,766	6,092	1,674
1892	8,121	6,015	2,106
1891	8,383	6,635	1,798
1890	8,063	6,441	1,622
1889	8,340	5,992	2,348
1888	7,569	5,994	1,565
1887	7,085	6,490	595
1886	8,067	6,170	1,897
1885	7,958	5,973	1,985
1884	7,428	5,667	1,761
1883	7,956	5,916	2,040
1882	7,101	6,783	318
1881	7,819	6,101	1,718
1880	7,945	5,177	2,768
1879	7,832	5,290	2,542
1878	7,276	4,823	2,453
1877	7,170	4,428	2,742
1876	5,413	5,710	-297
1875	6,053	5,404	649
1874	4,695	5,321	-626

**Deaths and Population Density
Cincinnati, Ohio**

Year 1910

Wards	Area in Acres	Population	Density		Deaths per Thousand	
			per Acre	Deaths	per Thousand	Deaths
1	7,549	22,999	3.07	279	12.12	
2	1,438	19,786	13.75	186	9.41	
3	634	13,639	21.55	157	11.5	
4	272	12,024	44.25	210	17.45	
5	123.4	11,381	92.1	145	12.75	
6	414	10,134	25.5	113	11.2	
7	104	13,430	109.0	166	12.35	
8	296	10,603	35.81	124	11.7	
9	491	13,045	26.57	160	12.26	
10	155	14,616	94.4	176	12.02	
11	476	17,579	36.8	220	12.52	
12	901	16,807	18.65	144	8.57	
13	4,580	20,863	4.56	152	7.28	
14	386	15,287	39.6	203	13.3	
15	104	14,290	137.1	155	10.87	
16	157	16,264	103.5	232	14.29	
17	314	13,646	43.5	221	16.2	
18	204	14,965	73.25	151	10.1	
19	2,190	15,781	7.20	253	16.05	
20	2,425	15,873	6.53	200	12.61	
21	169	14,178	83.8	170	12.00	
22	830	12,473	15.02	133	10.67	
23	2,045	19,318	9.44	188	9.72	
24	4,270	14,610	3.43	176	12.02	

Relation of Wage Earners to Total Population

City	State	— 1914 —		% of Population.
		Population.	Wage Earners.	
Cincinnati		378,455	59,861	15.8%
Cleveland		655,134	103,717	15.8
	Ohio	5,164,009	510,435	9.9
St. Louis		721,376	85,058	11.8
	Missouri	3,337,623	152,182	4.56
Boston		711,575	78,894	11.1
	Massac'ts	3,560,792	606,698	17.05
Baltimore		628,621	73,769	11.75
	Maryland	1,357,072	111,585	8.24
Pittsburg		555,680	69,620	12.5
	Pennsylv'a	8,087,073	924,478	11.4
Buffalo		456,939	54,416	11.9
	New York	9,722,263	1,057,857	10.88
Milwaukee		407,173	61,839	15.2
	Wisconsin	2,453,144	194,310	7.95
Newark		374,293	63,084	16.85
	New J'r's'y	2,785,059	373,605	13.4

A comparison of Deaths per Thousand with Density per Acre shows that the death rate bears no relation to density of population.

During these fifty years the total population has increased from a little over 200,000 to a little over 400,000—in other words, doubled.

Meanwhile, births, deaths and natural increase have remained nearly constant, for as health measures have increased longevity, the increasing cost of living and city living habits have reduced the number of children per family.

All **bold-face** figures show a decrease since ten years before. This shows conclusively that the cities are increasing by loss from the rural sections plus some immigration.

Population of Counties Within 50 Miles Radius of Cincinnati

	1920	1910	1900	1890
Cincinnati, Ohio	401,247	363,591	325,902	296,908
COUNTIES—				
Hamilton (Cincinnati)	493,687	460,732	409,479	374,573
Clermont, Ohio	28,291	29,551	31,610	33,553
Brown, Ohio	22,621	24,832	28,237	29,899
Clinton, Ohio	23,036	23,680	24,202	24,240
Highland, Ohio	27,610	28,711	30,982	29,048
Green, Ohio	31,221	29,733	31,613	29,820
Warren, Ohio	25,716	24,497	25,584	25,468
Montgomery (Dayton)	209,532	163,765	130,146	100,852
Preble, Ohio	23,238	23,834	23,713	23,421
Butler (Hamilton)	87,025	70,271	56,870	48,597
Franklin, Indiana	14,806	15,335	16,388	18,366
Union, Indiana	6,021	6,260	6,748	7,006
Fayette, Ohio	17,142	14,415	13,495	12,630
Ripley, Indiana	18,694	19,452	19,881	19,350
Dearborn, Indiana	20,033	21,396	22,194	23,364
Ohio, Indiana	4,024	4,329	4,724	4,955
Switzerland, Indiana	9,311	9,914	11,840	12,514
Gallatin, Kentucky	4,664	4,697	5,163	4,611
Grant, Kentucky	10,435	10,581	13,239	12,671
Boone, Kentucky	9,572	9,420	11,170	12,246
Kenton (Covington)	73,453	70,355	63,591	54,161
Campbell (Newport)	61,868	59,369	54,223	44,208
Pendleton, Kentucky	11,719	11,985	14,947	16,346
Bracken, Kentucky	10,210	10,308	12,137	12,369
Carroll, Kentucky	8,346	8,110	9,825	9,266
Owen, Kentucky	12,554	14,248	17,553	17,676
Harrison, Kentucky	13,798	16,873	18,570	16,914
Robertson, Kentucky	3,871	4,121	4,900	4,684
TOTALS	1,284,498	1,190,772	1,113,024	1,022,808
NEW ENGLAND	7,400,909	6,552,681	5,592,017	4,700,749