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Logan Alexander McKee, Jr.
PLANNED INDUSTRIAL DISTRICTS

A THESIS

Presented to

the Faculty of the Graduate Division

Georgia Institute of Technology

In Partial Fulfillment

of the Requirements for the Degree

Master of City Planning

By

Logan Alexander McKee, Jr.

June 1955
PLANNED INDUSTRIAL DISTRICTS

Approved:  

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Although space does not permit a listing, I would like to thank all those who through personal interview or correspondence contributed maps, facts, opinions, encouragement or other assistance. Thanks also to Miss Natelle Iseley, Architectural Librarian at Georgia Institute of Technology and to Miss Martha Moseley who did the final typing. I am grateful to my wife Margaret for much patience, encouragement and for most of the preliminary typing.
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SUMMARY

The purpose of this study of planned industrial districts is to analyze some of the factors contributing to the growth and location of industry as it is related to urban communities in this country, with the consequent development of planned industrial districts; and to analyze and evaluate this development, its problems and possibilities.

The methods used in gathering facts for this thesis were the study of existing literature, maps and brochures of various planned industrial districts, personal correspondence with industrial developers and others active in this field and field inspection of planned industrial areas in the Atlanta, Georgia, metropolitan region.

The evolution and success of planned industrial districts are explained as the results of certain trends in industrial location, among which are the increased mobility of market- and labor-oriented industry, larger consumer markets, the need of market-oriented industry for the advertising advantage of an attractive well placed plant, decentralization from overcrowded, expensive and unpleasant central city areas, and re-centralization of small plants to obtain "large plant" advantages, including extensive types of services and central facilities. Advantages to both the planned industrial district occupant and the community are discussed. A general method for determining the need for a planned industrial district in any particular locality is discussed.

Methods are mentioned for selecting and acquiring a suitable site, observing that access of the site to air transportation is becoming more
necessary. Physical preparation and improvement of a site for a planned industrial district are treated in detail, discussing examples and typical standards and stressing the prerequisite step of coordinating the development with the plans of local government. Wise planning and scheduling of development are emphasized as prime requisites for an industrial district developer's financial success.

The difficulty of financing the development of raw land for a district is noted, with the "industrial foundation" as a likely answer.

Varied facilities and services, including pooled or centrally operated ones are offered as part of a district's advantages. Among the many services offered by planned industrial districts, the financial service contained in the "package plan" is among the most popular and useful to small and larger plants alike. Maintenance of the district's restrictions is important in maintaining the value of the area to all concerned.

It is possible in the future for planned industrial districts to become even more useful than in the past. Among the possibilities are the use of various types of planned industrial districts to rebuild the usefulness of aging central city areas, to alleviate geographically localized chronic unemployment, to serve as the nucleus for new towns and to improve Civil Defense.
CHAPTER I
INTRODUCTION

Purpose of the Work.—The purpose of this study of planned industrial districts is to analyze some of the factors contributing to the growth of industry as it is related to the community in this country, with the consequent development of planned industrial districts; and to analyze and evaluate these industrial developments, their problems and the future possibilities of planned industrial districts.

General Importance.—There has been an unusual amount of attention given the art and science of industrial plant location in the past few years due to the great increase in numbers of new production facilities since World War II. Rapidly growing districts or areas planned ahead of time as land for industry are mentioned in almost every issue of business, industrial, railroad and community development publications (see Bibliography). It seems likely that this trend will continue as long as (1) national productivity per worker and overall production per capita in manufacturing and distribution continue to increase over the long run, (2) industrial plants, processes and machines continue to become obsolete and become replaced, and the decentralization tendency of small-and medium-sized plants continues, and (3) the advantages inherent in recentralization into planned districts remain.

Methods.—The methods used in this study were: (1) a review and analysis
of the existing literature; (2) an analysis of available facts (a) contained in this literature, (b) obtained from maps of various districts, (c) from personal correspondence with various developers and those connected with well-known planned industrial developments, (d) and field inspection of planned industrial areas in the Atlanta, Georgia, metropolitan region.
CHAPTER II

INDUSTRIAL LOCATION

A basic understanding of the principles of the process of industrial location is essential to an understanding of planned industrial districts, since planned industrial districts are a result of certain trends in the industrial location process. These principles and trends will be briefly described in this chapter to provide background for the chapters which follow. Detailed economic analysis and detailed explanation of industrial location, however, are not within the realm of this thesis.

Factors Influencing Regional Location of Various Types of Plants

New, Relocated and Branch Plants

Newly located plants can be divided into three types according to function within the parent organization: "new enterprises", "relocated plants" and "branch plants".

New Enterprises.—New enterprises are usually the small ones which grow from an idea, some skill and a small amount of capital. Such an infant industry usually locates in a low rent loft building in a central location. There, experienced labor, managers, and financial backers are available. There also transportation advantages make it easy to assemble these people and the raw materials for the operation, and to conveniently serve local customers. New plants do not usually make a conscious location decision
as to region or community, but merely as to the building occupied. Typical examples of such plants would be in the apparel and furniture industry.

Relocated Plants.—Relocated plants are set up to serve better the function served by a plant in an old location. They house an operation formerly located elsewhere. Examples are a local industry which moves to a suburb, or a textile manufacturer who moves his entire plant from New England to the Carolinas.

Branch Plants.—A new branch plant is one plant of a multi-plant company, which is added to perform operations which increase the production of the parent company. An example would be a du Pont plant to produce a new synthetic fibre, or a new plant for the further distribution of the farm machinery of a national manufacturer.

Plant Orientation

Definition.—The process of choosing the location for a plant is complicated by many factors, each varying with the particular industry. The choice of regional location, however, appears to be made upon the basis of the single most important advantage obtainable by a "good" location for the particular plant. By selecting the regional location upon the basis of this most important advantage, the industrialist assumes that he will include in this region communities and sites which will satisfy the other essential requirements of the plant. There are three of these major locational advantages: materials, labor, and markets. If the regional location for a plant is

selected upon the basis of materials or labor or markets respectively, it is said to be material or labor or market "oriented".

It should be recalled that typical or small "new enterprises" have not the freedom and do not usually make a regional orientation decision. Therefore the concept of regional orientation is generally applicable only to the largest of the new enterprises, to "branch plants" and to "relocated plants" of firms of more than local importance.

**Material Oriented Plants.**—A material oriented plant is one in which the cost to the plant of transporting the raw material relatively outweighs the cost of transporting the finished product and the cost of labor. Therefore these plants are usually located near their raw material resources. Plants of these industries are material oriented: agricultural products, hydro-electric power, forest products, minerals, natural gas and petroleum. These plants perform an operation in which either (1) the necessary materials are perishable or not economically transportable (such as plants processing raw milk, chemical plants requiring large quantities of cooling and processing water, and those requiring abundant low cost electricity or natural gas); or (2) transport costs of raw materials are an important part of total delivered costs. Here, although the materials are economically transportable, they are more expensive to carry than the finished product since it is a "weight-losing" process such as the refining of low grade mineral ores; or (3) it is important to increase the supply of materials (such as a strawberry cannery whose existence in a particular location often increases the amount of strawberries that local farmers produce).
Labor Oriented Plants.—A labor oriented plant is one in which the most significant part of the production-distribution cost is the cost of labor. The cost of transportation of the raw material and the finished product is a very small fraction in comparison. Therefore these plants are usually located near adequate labor resources. Plants of the following industries are labor oriented: apparel, machinery, shoes and textiles.

The plants which commonly locate near sources of labor perform an operation in which (1) transport costs are an insignificant part of the delivered cost of the finished product and (2) wages constitute a high proportion of production costs. Regions are selected for these plants by reason of the quantity, quality, and cost of the labor available.

Since labor costs are composed of factors such as basic hourly wage rates, fringe wage benefits, worker efficiency, absenteeism, labor turnover and labor disturbances, a mere geographic difference in basic hourly wage rates will not necessarily attract a labor oriented plant. For example, it is thought that the general North-South wage differential has not been, per se, the sole motivation for Northeastern textile mills moving south. While it is known that (until the differential disappears at least) the lower Southern wage rate is an important attraction, it is also known that there are other reasons for labor oriented textile plants coming south. One reason is probably that these plants are at least somewhat oriented to the growing southern market. Other reasons are the important labor advantages not directly involving the North-South wage rate.

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differential. One of these is the greater worker efficiency (in comparable job classifications) which is likely to exist because of a more serene and pleasant (often rural or small-town) living environment and the importance attached by the worker to a manufacturing job in such a labor surplus area. (Even though wage rates are lower than in the North, the Southern factory worker's monetary compensation is usually considerably more than that of farming, which often was his previous occupation. Besides, this type worker may value the easier indoor work, the regular cash income and the shorter hours of a factory job.) Accompanying the general job satisfaction is the further advantage to the Southern employer of less labor turnover and absenteeism, the likelihood of less pressure for unionization and less demand for "fringe" wage benefits such as retirement funds and paid holidays and vacations.

Market Oriented Plants.—A market oriented plant is one in which the cost of distributing the finished product outweighs the cost of labor and the cost of transporting the raw materials. Therefore market oriented plants are usually located near the market which they serve. Plants of the following industries are typically market oriented: automobiles, chemicals, and consumer electrical products. Market oriented plants perform an operation in which (1) the finished products are perishable or not economically transportable (as in ice cream and prefabricated houses factories); or (2) transport costs are an important part of total delivered costs and the finished product is more expensive to carry than the materials required, - a weight or bulk gaining process (as in automobile assembly plants, paint or farm equipment plants); or (3) service, con-
venience to the customer or regional loyalty is involved in achieving the desired level of sales (as in electrical appliance manufacture and repair, made to order paper boxes, and any consumer's item which achieves a certain consumer loyalty because the plant is one of those well known by reason of an attractive site, local advertising, or being a local employer).

The influence of market orientation appears to be becoming more important for many manufacturing industries. One of the main reasons for this is that the proportional cost of transporting and distributing certain types of finished products is increasing, and it has been found that this cost can be reduced by locating near the consumer. For example, the early stages of production in the automobile industry are centralized around Detroit, while various smaller decentralized assembly plants are located throughout the country in each major market area, usually at convenient distribution points such as Atlanta in the Southeast, where virtually the entire region can be reached over night by rail or truck.

Stages of Production.—The stage of production which a plant performs in relation to the finished product appears to have an influence upon its orientation. For instance, it can be observed that the earlier stages of production (processing after extracting or harvesting) are generally "material oriented", and the later stages (assembly, distribution) are usually "market oriented" or "labor oriented", or both.

Factors Influencing Community Location of Plants

The usual second step in deciding upon the location of a plant is to select the specific community. This decision is made by the industrial
locator after a study and prediction of (1) initial costs, (2) direct recurrent costs, and (3) effects of intangibles.

Initial Costs

The major initial cost is the payment for the plant building and a site graded and improved with driveways, rail spurs and utility connections. Because of local variations in prices for labor, materials, etc., these costs will vary from community to community. These costs can be converted into approximate annual costs by dividing by the probable length of life of the plant. They are seldom as important in the long run as the recurrent costs.

Direct Recurrent Costs

Direct recurrent costs are costs that persist through the lifetime of the enterprise. Typically they have always been the largest and most obvious. They can be computed and compared with accuracy.3

Transportation.—One of the most important direct recurrent costs is the total transportation cost of inbound materials and outbound products. Factors to be considered are the rates, the speed and the reliability of service, and the adequacy of available warehousing. Important in this respect is access to fast, frequent and reliable transportation (such as air freight or direct mainline rail service near a classification yard, involving a minimum of time in terminal operations like switching and classifying) which reduces the need for storage facilities. Also, if

possible a community should be chosen with the fact in mind that the quality of railroad service to the shipper usually improves as the length of the "line haul" which the railroad obtains from the shipments.

Labor.—A second of the recurrent costs involves labor. Factors that must be considered are both the employed and potential labor force, their skills and characteristics, stability, history of local labor-management difficulty, average turnover, wage rates and "fringe" benefits, housing availability and training facilities. It must be remembered in this respect that a comparison of basic hourly wage rates alone is not adequate to show which community has the most desirable labor force, since other factors are important enough to offset equal wage rates: fewer "fringe" benefits, lower rate of turnover, higher worker efficiency and higher worker reliability.

Utilities.—A third recurrent cost is that of utilities, especially power, water and gas. Care must be taken in arranging for supply of a heavy fuel-using operation solely upon natural gas, since the supply may become depleted in years ahead. The possibility must also be considered that the advantage of private wells or a private surface water supply may be greater than that of city water, especially for cooling and processing operations.

Overhead.—A fourth recurrent cost involved in selecting a community is plant overhead. This involves such things as rent or carrying costs of an initial investment, local ad valorem taxes (per dollar market value) and heating fuel (dollars per B.T.U.).
State Factors.—A final recurrent cost category is composed of state factors such as taxes, highway trucking regulations, workmen's compensation and insurance requirements.

Effects of Intangibles

The indirect costs of intangibles are becoming more significant influences upon the locational decision. Though difficult to measure, the effect of intangibles in reducing production-distribution costs and increasing volume of sales exists in substantial magnitude. The importance of these intangibles is possibly best expressed by Louis B. Lundberg, Vice-President of the Bank of America:

What happens in the community may effect the costs, the efficiency and the welfare of a business as much as anything within the four walls of the business....There is not a business - not a profession - in any community in America that does not share directly in dollars-and-cents profit or loss from the improvement or the deterioration in (1) the physical condition of the city's physical plant; (2) the quality of service rendered by the city and other governmental agencies; (3) the quality of service rendered by civic and social agencies; and (4) the availability of community resources and facilities to improve the physical, mental and moral health of the populace.4

Management may best gauge the probable value to a plant's operation of these factors in reducing the cost of production and distribution in any particular community through discussions with the local leaders and moulders of public opinion. These people are usually newspaper editors, professionals, leaders of industry, business, labor, and semi-public

Among the most important intangibles are the factors which influence the employees' health and happiness. These include the "unchangeables" such as geography and climate as well as the "changeables" of public and private services. Important "private" services which should be present in a community are: an adequate range of churches, clubs and semi-public welfare and community service organizations; and an adequate range of retail, service and other industrial types such as adequate numbers and varieties of professions, retail businesses and commercial recreation services.

Important "public" services are not only the ones that promote the public health and safety (such as fire and police protection, health and building inspection, zoning, subdivision controls and other ordinances), but also the services and service facilities that promote the public convenience, prosperity and general welfare (such as auditoriums, art museums, park and recreation programs). A well managed local government, with an active group making realistic plans for community development, is itself a valuable public service. The reasonableness of local ordinances, the adequacy of local government services, the stable and efficient management of local governmental affairs and the planning for the future of the

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5 To be useful enough to be considered advantageous to industry these services must be available for reasonable prices, i.e., the price that can be paid by the typical plant employee.

6 Industry will be most interested of course, in community ordinances that affect them most directly: local ad valorem taxes, fees, licenses and assessments, waste disposal and air and water pollution restrictions and the community's zoning ordinance and subdivision, traffic and street access regulations.
community are among the factors of primary concern in choosing a community. Important community services that may be furnished either by "private" or "public" sources include utilities, schools, medical, cultural, recreational, social welfare and financial services. Financial services which will make capital, credit, and rental buildings available to industry are particularly valuable.

Further community factors which, though intangible, affect plant operations are size of community, existing industrial structure of the community (number and type of existing, especially competing, industries), and the history of local labor-management relations.

Recent Trends in Choice of Community

A recent survey of 118 large manufacturing companies shows that branch plants seem to prefer smaller communities than formerly:

<table>
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<th>PER CENT OF PLANTS LOCATING</th>
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<th>After 1940</th>
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<tr>
<td>In City of Pop.</td>
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<tr>
<td>Over 100,000</td>
<td>47.0</td>
<td>34.3</td>
</tr>
<tr>
<td>10,000-100,000</td>
<td>31.7</td>
<td>36.3</td>
</tr>
<tr>
<td>Under 10,000</td>
<td>21.3</td>
<td>29.4</td>
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These figures may be interpreted to indicate that it is becoming more profitable to locate in small towns than formerly, and that smaller more scattered branch plants are more efficient in the aggregate for certain companies than fewer but larger plants. Small towns apparently offer many advantages to branch plants.

Small town advantages probably include wage and other comparative advantages of typical small town labor, including relative abundance because of the possibility of recruiting labor from nearby farms. An advantage for consumers' goods factories may be the public relations value of being a local employer and having an attractive estate-like site in a small "desirable" suburban town in a large and growing metropolitan market for the product. Another advantage of small towns may be the lack of congestion and the speed and ease with which truck shipments can be made, and the ease for employees of commuting from home to work when they live nearby. Reasons for choice of a non-suburban small town may be the natural amenity, the informal but more effective methods of social control and general human relations (existing in small plants as well as small towns), and the increased influence of plant management upon local government.

In view of the considerable small town trend of branch plant locations, the trend probably applies (to a slightly lesser extent) to relocated plants, although no known proof exists. If the small town trend applies to new enterprises also, it is to an even smaller extent, due to their more marginal nature, sensitive production relationships and greater dependency upon traditional large central city conveniences.

Factors Influencing Site Location of Plants

After a community has been selected, the next step is to select a site within or near it. While a completely new enterprise may find its choice restricted to the central part of the city, relocated and branch plants have many other alternatives. In weighing the merits of alternative plant sites, many factors must be considered (see Appendix A). The follow-
ing discussion is intended to provide a general grasp of some of the key factors. From the plant locator's point of view these key factors fall into three previously discussed categories: initial costs, direct recurrent costs, and effects of intangibles. However, since some factors overlap into more than one category, the importance of each of the several factors will be easier to grasp if discussed without regard to its three cost analysis categories.

Access to Transportation

Since transportation is so important in reducing costs in a competitive market for industrial products, adequate access to transportation is essential. It is desirable to have convenient access to railroads and highways for transporting materials, products and employees, and access to an airport for plant executives.

It is desirable for a site to be within the reciprocal switching limits of the community and within the less-than-carload (L.C.L.) pickup and delivery limits. It should be remembered that rail service may be more reliable when more than one railroad serves the site. To facilitate speed in shipping and reduce storage and warehousing needs a site ideally should be located near a classification yard, and located near a "main line". The plant should be served by a siding short enough to reduce the initial cost of track laying.

Good highway transportation is essential. Typically, most out-bound goods from small and medium sized plants travel by truck, so that the site should have good access to the main marketing routes. Tie-ups and delays in congested areas with inadequate roads can be costly.
Convenience with respect to mass transit (bus, etc.) lines is often important in obtaining labor, especially female and unskilled labor, since they are less likely to have automobiles. However, nowadays more workers travel by private auto than formerly.

Convenient access to a main airport is becoming more necessary, not only for executive travel, but also for quick shipment of special machine parts and shipment of certain light, high value products.

Labor Considerations

A desirable site will be conveniently located with respect to the residential area housing the bulk of the particular segment of the labor force to be employed. It is known that unemployed manufacturing workers tend to apply for work first in areas close to home, and that they do not "shop" for jobs extensively. Hence they tend to work close to their residence if jobs are available and the wages are adequate to permit them to maintain their previous plane of living. Even so, the commuting radius under "average" road and wage conditions extends as far as thirty miles.\(^8\) Plants located away from main roads and transit lines leading toward labor residential areas may be slightly handicapped. Due to congestion it is undesirable if the plant site is so situated that the labor force has to travel through downtown areas. A higher wage may be necessary to attract labor so situated. For these important reasons, the site should be selected so as to attract its labor conveniently, particularly for plants the value of whose product is composed largely of labor costs.

\(^8\)Yaseen, op. cit., p. 111.
Utilities and Public Services at the Site

A good site location must be served by water, sewer and electric lines of adequate capacity or be within feasible extension distance of them. Gas mains are often necessary also. The proper placement of these utilities can reduce both initial and maintenance expenses.

The site is more desirable if, in addition to utilities, it is served by other public type services, such as adequate fire protection, police protection, street maintenance service and mass transportation lines.

Physical Site Characteristics and the Plant Structure

A good site should provide adequate space for future plant expansion, employee parking and landscape treatment. The site composition, shape and topography should be suitable for adaptation to rail, street, utility and plant design requirements including an adequate soil bearing capacity, a buildable slope, proper drainage, and the development of advertising or good will value through appropriate architectural treatment and landscaping. To make this evaluation it is desirable to draft preliminary sketches of the proposed plant along with any contemplated future additions to the plant. (It may be possible to adapt an already existing structure to fit these requirements.) It is noteworthy that in addition to suiting operating requirements, an attractive plant on an appropriately landscaped site may furnish the added benefit of good public relations.

Zoning and Other Community Legal Controls

Several site selection criteria, including zoning, are functions of the effect of community legal controls upon the specific site. If the
land is zoned, its availability for industry can easily be determined by inspection of the local zoning map. The zoning ordinance states which industrial types are allowed or prohibited on the site, and may impose restrictions upon height of buildings, area of site, size of yards required, and other considerations which will both determine the type of development on the site and will affect the future usefulness of this development.

If the land is outside the jurisdiction of zoning, the site and all neighboring areas should be thoroughly studied to determine the "most probable" as well as the "best" future land use. Both the best and the most probable future uses of surrounding land might be compatible with or detrimental to the proposed industry. Likewise, the effect of the industry upon the future surrounding uses might be detrimental and should be considered to prevent future law suits or ill will of neighbors.

Other Factors

Other community legal controls affect the desirability of the particular site for the prospective plant and its operation. Subdivision regulations or official maps may require that reservations be left on the site for streets or public buildings, and setback ordinances may prevent buildings being constructed near certain streets. Limited access regulations controlling a particular major street may prevent the prospective plant from having as many convenient driveways which, while this regulation may benefit through traffic, might cause the site to be less suitable for the particular industrial operation contemplated. The local planning agency should be consulted to obtain the benefit of their knowledge and
advice on these and other community land restrictions.

Other factors affecting the choice of a site include the number of
ownerships in which the site is held (since in purchasing land it is easier
to deal with a few parties than with many) and the price per acre.

Decentralization

The Trend Established

By observing the actual locations selected by plants in the last
few decades, certain trends have been discovered. The most important trend
in industrial location seems to be "decentralization". For various reasons
a national trend in industrial location away from the large city has been
taking place in industry since the turn of the century.\textsuperscript{9} This trend of
redistribution or differential growth of industrial location, favoring
outlying instead of central city locations, is called "decentralization",
and consists of two parts: "diffusion" and "dispersion" or "dispersal".
Diffusion is the relative trend of new industrial locations from the
central city toward the urban fringe or merely to the satellite towns.
Dispersion is the trend to a farther outlying location (possibly one
completely outside the metropolitan area).

Decentralization has been a noticeable trend in almost every size-
able industrialized community. For instance, according to a Chamber of

\textsuperscript{9}Coleman Woodbury and Frank Cliffe, The Future of Cities and Urban
The major motivating causes of this trend no doubt have been the desires
to achieve lower unit production costs and higher sales volumes through
placing each plant in the location possessing the optimum relationship
among the many factors which affect location. Other reasons may have
been unexplainable management preferences.
Commerce estimate, about eighty per cent of metropolitan Atlanta's industrial growth since 1945 has taken place in the area's new planned industrial districts, which are definitely decentralized locations with respect to the older industrial areas. In the two largest planned industrial districts forty-four per cent of the occupant plants are ones which have moved out of their old building in Atlanta to these new decentralized locations and forty-six per cent have moved to these districts from another region. Presumably most of the forty-six per cent were expansions of firms located in central locations in other cities, and hence most of these plants would be considered "decentralized" also.

Types of Plants Most Likely to Decentralize

Plants in Late Stages of Production-Distribution.—Plants engaged in the later stages of production and distribution of an ultimate product are the most likely to decentralize. Plants in these late stages are usually labor or market oriented or both. While it is perfectly obvious that many material oriented plants (for example lead ore smelters) have very little freedom of location (having to be near a supply of ore which is too heavy to economically transport), certain market oriented plants serving many markets (such as fabrication and distribution of consumers electrical goods) and labor oriented plants (such as certain textile products) tapping supplies of untrained labor have great freedom of location. There are many regions, communities and sites where they can successfully operate a plant. Such plants are likely to decentralize to be close to important new markets, to tap reservoirs of plentiful labor, to obtain the
advantages of diversification of risk through using many small plants instead of a few large ones, to obtain the operating economies of these small scale multiple operations for the parent company, to obtain better working conditions and living environment for their employees, to better train future company executives, and for other reasons.

Maturing Young Enterprises.—Not all newly established plants tend to decentralize, in spite of the fact that they are engaged in the late stages of production. Small "new enterprises" and marginal, technically immature industries tend to locate primarily in the central areas. However, after an incubation period in the shelter of the central city these growing young industries tend to expand their markets and perfect and standardize their techniques and products. They attempt to attain the lowest cost combination of labor and machines. This typically results either in their adopting new, more productive machines and reducing their quantitative labor needs or seeking more of equally competent labor at lower total labor cost per man hour. At this stage when they are able to considerably simplify production processes, or substitute machines and semi-skilled labor for highly skilled labor, and become fairly independent of large central city conveniences these plants can be said to have reached "technical maturity". They are then less dependent upon the intricate balance of proximity to previously trained labor, public transit, materials suppliers, financial backers and an intimately local market for their products upon which they had thrived and grown in the convenient central area.

By the time they become technically mature (becoming more efficient, non-marginal producers), growing plants find that increased demand for their product requires them to increase production beyond the capacity of
the old plant. When expanding operations, they may attempt to keep costs low by seeking cheaper (more abundant), -but trainable-, labor, more factory and site space, a less congested neighborhood, and a building properly designed for the new or modified process. Management will then tend to relocate its plant or build a branch plant rather than expanding the existing plant (even if such expansion is physically possible in old crowded quarters). These relocated and branch plants tend to be built in decentralized locations, where the new needs can be better met.

Prerequisites for Decentralization

The basic motivating causes of decentralization have been mentioned previously. For this motivation to actually cause the decentralization trend certain prerequisites had to exist. They are improved transportation, improved mechanization and labor saving, and improved management.

**Improved Transportation.**—The chief prerequisite for decentralization is improved transportation. Three important things are transported: "products", "power" and "people".

Transportation in the days of the Conestoga Wagons and horseback was conducive to centralization. A plant had to locate in a city at a point of intersection of the relatively few trade routes in order to obtain skilled labor and ample raw materials. As the plant grew the labor force and the compact city grew tight around it. In order to get the necessary power and conserve it, a plant had to locate close to the waterfall which generated it and had to be a more or less cube shaped structure to conserve the power which was distributed by the inefficient shaft, belt
and pulley system.

Transportation today has loosed the bonds that tied plants to these centralized locations. Products and materials now travel farther and faster and to more places than before by rail, truck, airplane, pipeline and wire. Power in more usable forms travels efficiently hundreds of miles by pipeline and wire, permitting widely scattered and decentralized plants. Transportation of power within the plant itself has also been revolutionized. Since numerous small scattered electric motors have replaced the old centrally operated and inefficient shaft and pulley system, it is no longer necessary to build plants in the shape of a cube to conserve power. The operation within the plant itself may also now decentralize into the form of an extensive, naturally lighted and ventilated, economically constructed, efficient and attractive one story building. People nowadays are more mobile also. Employees often travel up to thirty miles daily in their autos to work in little more time than it used to require to walk to the factory from their house in the "mill village".

These transportation improvements have made products, power and people more "accessible", have permitted substituting new scattered small plants for the obsolescent large centralized ones, have made them pleasant for the occupants, cheaper to construct though more extensive in area requirements, more efficient, and have allowed more choice of plant location.

Improved Mechanization and Labor Saving.—The second important prerequisite for decentralization was a virtual revolution upon the site and within the plant. It consisted of improved mechanization and materials handling, the
labor saving arrangement of production processes, and efficient routing of both materials and products. These developments allow the displacement of hand labor by machines, and require more floor space per worker. This means that mechanized and technically mature plants are less dependent upon the abundant trained labor supply of the central city and as a result can now locate in semi-rural areas. Because they are now economically able to locate farther out, and because of the desire for one story plants and the need for more land, plants gain advantages from leaving the built up central area of the city and moving to the outlying areas.

**Improved Management.**—The third important prerequisite for decentralization is improved management, which has made possible the delegation to other than the company's central manager of the authority and responsibility to make decisions and establish policies for each plant. This delegation is known as "decentralized management" and has helped make decentralized plant location possible. The advantages claimed for this management policy are improved labor efficiency and relations with management, better supervision and managerial control of operations, a better integrated organization, better trained replacements for top positions, and lower wages for management due to other incentives.

**Recentralization**

In addition to the decentralization trend, another most important trend in modern industry is "recentralization". New plants are at the same time de-centralizing and re-centralizing. In fact, for some plants it is practical to decentralize only if they can recentralize together.
with other plants into "planned industrial districts". Essentially, the reason for the trend toward recentralized decentralization is the desire of industrial management to retain the convenience of the city while still enjoying the lack of congestion, the amenities, prestige and other advantages of an outlying location.

Summary

The purpose of this chapter is to create an elementary, though necessary, understanding of the industrial location process, and to discuss developments and trends which have made possible and have caused the creation and useful function of planned industrial districts for newly located industrial plants in this country.

Newly located plants can be divided into three types: new enterprises, relocated plants and branch plants. Branch and relocated plants have the most freedom in selecting a location, and are the two predominant types considered in this thesis. The location decision of these plants can for convenience be divided into three steps: choice of region, choice of community and choice of site.

The decision in choosing a region is based mainly upon the influence of the single major cost factor involved in the plant's operation (materials, labor, or markets). A plant can thus be said to be material, labor, or market "oriented". Labor and market oriented plants, having the greatest freedom of location, are the types of most concern to this thesis.

The decision in choosing a community and a site should be made by considering the following cost factors: initial costs, direct recurrent costs, and effects of intangibles. The direct recurrent costs are by far
the largest and most important to the typical plant; however the effects of intangibles, especially since they have considerable effect upon direct recurrent costs, are becoming recognized as truly important considerations. Partly due to intangible factors, there are indications of a trend toward locating plants in smaller towns than formerly.

The decision in choosing a site for a plant is influenced by the same three cost factors as in choosing a community (initial costs, direct recurrent costs, and effects of intangibles). However, for convenience and clarity these factors were discussed under the following topics: access to transportation, utilities and public services at the site, physical site characteristics and the plant structure, labor considerations, zoning and other community legal controls, and other factors.

The most noticeable trend in industrial location is decentralization. Increasing numbers of plants are locating outside the densely built areas of cities in preference for the fringes and the outlying small towns where room is available for one-story structures and increased land requirements, and where other advantages are obtainable. The types of plants most likely to decentralize are plants in late stages of production of a product, since they are typically market and labor oriented, and therefore have the most freedom of location. Among these, the most likely to decentralize are (1) branch plants and (2) relocated plants of firms of more than local importance such as maturing young enterprises which have overcome their economically marginal status and which are on the threshold of relative independence from the convenience of the central city area.

Three major prerequisites were necessary for the evolution of the decentralization trend: improved transportation of products, power and
people; improved mechanization and labor saving; and improved management.

A second major industrial trend, recentralization, has followed decentralization. It is typified by the modern "planned industrial district", which brings the convenience of central areas to decentralized locations. The planned industrial district makes such locations feasible even for small plants which otherwise could not obtain the advantages of decentralization.
CHAPTER III

THE PLANNED INDUSTRIAL DISTRICT

Definition and General Explanation

A planned industrial district is a tract of land which is subdivided and developed according to a predetermined general plan. It is at least partially improved: certain streets, rail facilities and utilities are installed prior to the sale of sites. The area is made available to a group of different companies.

Types of Planned Industrial Districts

There are two types of planned industrial districts, depending upon the degree of planning and organization involved.

Site Sales Districts.—The first type district can be called a "site sale" district, since each site is sold outright, there being no provision for leasing sites from the developing organization. In addition to being at least partially improved according to a predetermined plan with streets, rails and utilities prior to sale and being made available to diverse industrial firms, restrictions are usually imposed upon all occupants. These restrictions often include control over "nuisance" characteristics of the industrial operation, over building design and setback, automobile parking, landscaping and other factors.

Operating Districts.—This other type of district is a much less common
type. It is often called an "operating" district, since all the sites are not sold, but some are retained, operated and leased by the developer. A further difference between the site sales and operating types is that the developer of the operating district furnishes as an integral part of his own organization certain financial, engineering or other professional services, and also provides certain central or pooled facilities and services to the occupants.

Types of Developers of Planned Industrial Districts

The type of district to be developed depends upon its developer. The "developer" is the person or group who obtains control of the land, decides upon the development plan and the restrictions, brings together the participants (the railroads, utility companies, local government, professionals, financiers, real estate firms, contractors and builders) who contribute money and services, and selects the industries which eventually occupy the district. The developer is the organizer, the "brains" of the development. It is his intimate knowledge of the industrial requirements that has allowed him to select the site and it is his ability to perform a variety of operations and negotiations that allow him to assemble the land, develop it and sell it. Essentially the developer is an agent for his industrial plant "customers" (who will occupy the district) in negotiating with those from whom they seek services. The developer performs all the time-consuming investigation of finding and acquiring adequate and protected industrial land, makes arrangements for serving the area with utilities and central services and makes arrangements with various participants for obtaining the "package plan" services needed.
There are three types of developers: (1) railroads, (2) private developers, and (3) semi-public groups.

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railroads</td>
<td>38 per cent</td>
</tr>
<tr>
<td>Private developers (contractors and real estate brokers)</td>
<td>25</td>
</tr>
<tr>
<td>Semi-public</td>
<td></td>
</tr>
<tr>
<td>Industrial foundations</td>
<td>5 per cent</td>
</tr>
<tr>
<td>Municipal govt. or agency</td>
<td>9</td>
</tr>
<tr>
<td>Chambers of Commerce</td>
<td>2</td>
</tr>
</tbody>
</table>

Combination of above 20 100 per cent

To judge from the number of cooperative districts known to be developed by the Missouri-Kansas-Texas Railroad, a large share of the "combinations" are railroad "sponsored" (they are usually "developed" by the owner in cooperation with the railroad sponsor.) Therefore the actual influence of the railroad is greater than shown by the above statistics.

Railroad Developers.—The railroad developed planned industrial district is likely to differ from other planned industrial districts because the railroad is primarily interested in obtaining freight to handle over its lines. The railroad developer is not interested in profit from sales of sites. He may even subsidize the sale of sites in order to get plants which are large rail shippers. For this reason railroad developed districts are occupied by heavy users of rail shipping. These districts are likely to be served by only one railroad, and to be located near the geographic end of the railroad's own trackage and adjacent to a classification

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yard. This arrangement gives the railroad the maximum ton-miles of linehaul traffic with a maximum of convenience in switching.

One of the advantages of a railroad developed planned industrial district is this convenience of railroad freight movements. An advantage to the community is the full-time promotional activity of the railroads' large industrial development departments.

One disadvantage of a railroad developed district is the lack of bargaining power which the occupant plant has in case of poor railroad service by the one and only railroad. Another is the lack of an alternate railroad shipping access in case of damage to the railroad by flood, tornado or other mishap.

The developing railroad may itself perform many of the functions and services usually provided by other organizations. Some of these are giving legal advice, financing the purchase, design, engineering and partial preparation of the land, and assisting the occupants in plant layout and design.

Private Developers.—The typical private developer is an industrial real estate firm or a building contractor. The real estate firm's principal interest is selling land. The building contractor's main interest is in constructing plants for the occupants. In either case the private developer will have more incentive to develop an "operating" district than will other developers. His main source of profit is from the sale of
land plus the sale of "package plan" services\(^2\) and various central services. He derives no indirect benefits as do the other two types of developers.

The following are some of the possible advantages of a privately developed district: (1) Space is usually provided for plants which do not require any rail service; (2) In many cases more than one railroad will be available, giving the occupant the advantage of having an alternate carrier and uninterrupted service; (3) Another advantage to the occupant is that certain central services are likely to be available. This is an advantage to the community also since it furnishes a better growing environment for young local firms.

**Semi-Public Developers**—The typical semi-public developer is an industrial "foundation", a "local development corporation" or a committee appointed by local government. The principal concern of the semi-public developer is to obtain industry which will broaden and stabilize the local economic base. For this reason profit from the sale of land or services is secondary, and if the "site sales" type of district will attract adequate industry there will be no attempt to offer the central services of an "operating" type district.

The following are some of the possible advantages of a semi-publicly developed district: (1) Since the developer's motive is the general wel-

\(^2\)"Package plan" services refer to the following, which when offered to the prospective occupant as a convenient group or "package" through the same organization comprise the complete "package plan": (1) assistance in financing the purchase or lease of land and buildings; (2) professional service, including legal, planning, architectural and engineering service; and (3) construction service.
fare, the development will usually have the cooperation of the local government and the broad support of the general public; (2) Financing the original stages of the development is easier than for a private developer; (3) Space is usually provided for non-railroad users; (4) Where possible there is more than one railroad; (5) A diversity of industrial types is encouraged.

Planned Industrial Districts in the United States

The U. S. Department of Commerce has recently completed a national survey which shows the following:

There are at least 122 planned industrial districts in the United States. Less than ten per cent are of the "operating" type. Planned industrial districts' sizes vary from less than 20 acres in densely built Chicago to over 1200 acres in sprawling Dallas. Eighty per cent of the districts have less than 500 acres. The average is 489 acres.

Planned industrial districts are located in 84 communities in 34 states. Slightly over half of the districts in the United States are located in communities of 100,000 or more population as shown by the following table:

<table>
<thead>
<tr>
<th>Population of Community</th>
<th>Number of Planned Industrial Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>500,000-1,000,000</td>
<td>6</td>
</tr>
<tr>
<td>250,000-500,000</td>
<td>20</td>
</tr>
<tr>
<td>100,000-250,000</td>
<td>27</td>
</tr>
<tr>
<td>50,000-100,000</td>
<td>12</td>
</tr>
<tr>
<td>25,000-50,000</td>
<td>13</td>
</tr>
<tr>
<td>10,000-25,000</td>
<td>9</td>
</tr>
<tr>
<td>Under 10,000</td>
<td>13</td>
</tr>
</tbody>
</table>

In view of the national decentralization trend previously discussed, it is probable that most of these districts have located in the outskirts of the metropolitan area. Approximately 84 per cent of the districts exercise control upon the occupants through restrictions controlling nuisances, building setback, construction and design, loading docks, parking facilities and landscaping and other factors. (See Table 1)

The type of activity performed by occupants of planned industrial districts is diverse, but shows a dominance of light manufacturing and warehousing, both local and nationally known. These plants are of a technically mature type employing a considerable amount of semi- and unskilled labor.

Necessity for and Advantages of Planned Industrial Districts

Since most advantages of the planned industrial districts are caused by fulfilling a corresponding necessity or need, needs and advantages will be discussed together.

To Industry

The Typical Old Type Industrial District.—The typical old industrial district is an unnecessary liability to every industry located within it. It is one of numerous small industrial areas scattered along railroad lines surrounding the central business district. Its plants are loft buildings crowded closely and intermixed with dilapidated residences which deprive the plants of land for expansion. There is often not the space necessary on the street or on the premises for loading or parking of trucks or cars.

The railroad lead tracks cross the streets at grade, causing costly
Table 1. Restrictions in Planned Industrial Districts

<table>
<thead>
<tr>
<th>Planned Industrial Districts (I.D.)</th>
<th>Location</th>
<th>Date Established</th>
<th>Land Use</th>
<th>Architecture</th>
<th>Parking</th>
<th>Front Yard or setback</th>
<th>Change</th>
<th>Restriction Comments</th>
<th>Miscellaneous Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRLIFT I.D.</td>
<td>Dallas, Texas</td>
<td>1956</td>
<td>No nuisance</td>
<td>Masonry or brick+</td>
<td>Not in front 100 ft.</td>
<td>25 ft.</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened by 12 ft. high fencing. Over 30 years.</td>
</tr>
<tr>
<td>BRAHMA I.D.</td>
<td>Dallas, Texas</td>
<td>1951</td>
<td>Commercial, District warehousing, approval of plans</td>
<td>To rear of setback line</td>
<td>Not in front 100 ft.</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>By consent of majority area in district any time</td>
</tr>
<tr>
<td>CLEARING I.D.</td>
<td>Bedford Park, Ill.</td>
<td>1959</td>
<td>Manufacturing, industrial or storage</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened with 12 ft. high fencing. Over 30 years.</td>
</tr>
<tr>
<td>CROPS I.D.</td>
<td>Kansas City, Kansas</td>
<td>1952</td>
<td>Manufacturing, -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened with 12 ft. high fencing. Over 30 years.</td>
</tr>
<tr>
<td>DAVIES I.D.</td>
<td>Dallas, Texas</td>
<td>1960</td>
<td>No nuisance</td>
<td>Masonry or brick+</td>
<td>Not in front 10 ft.</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened with 12 ft. high fencing. Over 30 years.</td>
</tr>
<tr>
<td>EVANDER I.D.</td>
<td>Fort Worth, Texas</td>
<td>1966</td>
<td>No nuisance</td>
<td>Masonry</td>
<td>Not in front 10 ft.</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened with 12 ft. high fencing. Over 30 years.</td>
</tr>
<tr>
<td>FITH J.I.D.</td>
<td>Wichita, Kan.</td>
<td>1960</td>
<td>No nuisance, Approval or heavy of plans</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened with 12 ft. high fencing. Over 30 years.</td>
</tr>
<tr>
<td>FINEST GRADE I.D.</td>
<td>Oklahoma City, Okla.</td>
<td>1958</td>
<td>Masonry steel</td>
<td>Shall be provided</td>
<td>100 ft.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bulk storage to be screened with 12 ft. high fencing. Over 30 years.</td>
</tr>
</tbody>
</table>

*Controlled by the district in each specific instance.
delays of both rail and truck shipments. In many cases the old processes are obsolete, the old plant buildings are inefficient, unhealthful and unsafe. Many nuisance and damage suits are brought by surrounding land users. Contrasting the old area with the new should reveal how the needs of the old are satisfied by the advantages of the new.

Qualitative Land Needs.—Probably the greatest industrial need which is met by the planned industrial district is the shortage of suitable land and buildings. In the central city land of the desired characteristics is not reasonably available and the available buildings are of improper design. Land in this area must be obtained at the expense of demolishing existing structures or accepting congested second-rate environment. In outlying locations land of the right type is also scarce, and available buildings are non-existent. Land in these areas is either unprotected (through lack of zoning) or is inadequate due to inaccessibility, flooding, residential intrusion, or other conditions. This land is especially unavailable for single small industries which cannot alone justify extension of roads and utilities. Planned industrial districts remedy the above mentioned land needs by furnishing suitable and convenient areas large enough to create their own environment and justify extension of ample roads and utilities. Planned districts may also remedy the shortage of buildings by furnishing properly designed plant buildings available for rent or lease.

Quantitative Land Needs.—Another basic need satisfied by planned districts is the added quantitative land requirement of recent years. As mentioned
in Chapter II, mechanization and transportation have increased floor area needs per worker, and have made possible the single story plant which requires more land. Decentralization has taken plants away from convenient city services and small contractors. Therefore added space in each plant is required for paint, carpenter and repair shops.

Added space is required for dispensaries, classrooms, cafeterias and recreation areas due to the increasing importance of worker efficiency. One of the largest land requirements is for truck loading and parking and employee auto parking. Since planned industrial districts tend to be built in outlying areas where such abundant land is economically available, planned industrial districts can answer this increased need for land.

Advertising Advantage.—A third need of industry (especially market oriented industry) which is satisfied by the planned district is the advertising advantage of a "desirable address". A part of this advantage is the advantage of considerate neighbors and sustained property values, the amenities of a small town together with the convenience of the central city.

Package Plan and Central Services.—An important advantage of a planned district is the availability of certain central services and facilities and the various services of a "package plan".

Collective Advantages.—An advantage which is sometimes obtained is the collective advantage of being one firm among a group of firms which produce similar, competing or complementary products or services. This group creates a "center" with an advertising advantage for the industries in it,
a shopping advantage for their customers and a service advantage for their suppliers.

In Atlanta's Peachtree Industrial Boulevard district, for instance, six of the 29 occupant plants manufacture or distribute farm equipment. Each has an advantage being near the others since they are served by similar suppliers and they serve similar customers. A supplier or customer visiting one of the plants in this area is much more likely to visit the others than if they had been scattered. This results in advantages for him in selling his wares or comparing the merits of competing companies' products. This improved competition results in advantages to all.

To the Community

The typical old type industrial district will be briefly discussed to show its detriment to the community as a contrast to the benefits accruing to the community from planned industrial districts, which benefits will then be discussed.

Typical Old Type Industrial District.—The typical old type industrial districts are not only a liability to industry itself, but also to the community. Their scattered nature causes unnecessary multiplication of the public utilities and facilities which serve them. The mixture of industrial plants, residences and other land uses creates slums and blight. The population of such a blighted area is highly unstable; anonymity and social distance are great. There are many threats to personality, health and safety. Physical and mental disease, social disorganization and crime
are common. The cost of health, fire and police protection are disproportionately high. The old area does not operate satisfactorily from the community point of view.

**Increasing the Efficiency of the City's Industrial Areas.**—One of the greatest needs from the city's viewpoint is to increase the physical efficiency of industrial areas. The planned industrial district answers this need by reducing the proportion per unit of industrial usage of the city's investment in heavy industrial roads and utilities. The physical design of the planned industrial district reduces congestion, and the circulation pattern in the district increases convenient accessibility. The design and the restrictions of a planned district prevent overcrowding of the land and overloading of public facilities.

**Improving the Community's Economic Base.**—A very obvious advantage of planned industrial districts is the broadening and stabilizing of the community's economic base. The advantages of a planned industrial district over the old-type industrial areas may attract industries which would not have located in the community, thus creating extra jobs, increasing the tax base and reducing cyclical fluctuations in the community's employment. "A community that has an industrial park already established, with suitable sites available and with men who will assume the problems of planning, construction and financing a building, is in a favored position when competing with other communities." ¹

In addition, the "leverage" of these industries may create desirable secondary and tertiary effects in local economic activity; that is, the money spent by wage earners in these industries may cause the creation and growth of service industries and retail businesses.

Improving Land Use and Zoning.—Another advantage of planned industrial districts to the community is the facilitation of improved land use and zoning. Larger tracts of more suitable land can be zoned for industry with less pressure for "spot" zoning by firms which, without the attraction of planned districts, would be left the alternative of selecting scattered less suitable sites. Well planned industrial districts will prevent the undesirable mixtures of land uses which cause blight and slums and their undesirable social-economic effects upon the community.

Protection from Bombing.—A final major advantage of planned industrial districts, since they are usually located in outlying areas, is protection of the occupant industries from bombs which might be aimed at the targets of the central city.

In summary, the needs of both industry and the community at large are satisfied by the planned industrial districts. They possess advantages in the form of improved physical convenience and efficiency, economic prosperity, health, safety, morals and general welfare.

Existing Local Need for a Planned Industrial District

Future National and Regional Industrial Growth

The local need for a planned industrial district is dependent upon more general national needs. Periodically published studies by the U. S.
Department of Commerce, National Industrial Conference Board, McGraw-Hill Publishing Co., F. W. Dodge Corp., Federal Reserve Banks and various utility companies show trends in national and regional industrial expansion, construction and needs for industrial land. If these studies show a probable continuance of industrial construction in labor or market oriented industries, which are primarily the types served by planned industrial districts, it would suggest the general need for planned industrial districts.

Local Studies to Determine Need

If national studies suggest the possible need for planned industrial districts in a particular region, local studies should be made to determine which particular community has a need for a planned industrial district.

Economic Base Study.—The first local study desirable is the "economic base" study similar to Cincinnati's master plan study "Economy of the Area", which analyzes the way the community makes its living. This study might be carried further to determine which type firms are potential occupants of a planned industrial district.

Study of Present and Future Industrial Land Use.—A second desirable local study is one of present and future industrial land use. Such a study should be based upon the economic base study and should predict the future needs for local industrial land, by type of use, amount and general location. The findings of this study should indicate whether an adequate local need exists for industrial sites which a planned industrial district could furnish.
CHAPTER IV

ACQUIRING AND PREPARING THE SITE

Site Selection and Acquisition

Selection of Suitable Sites

After the local need for planned industrial districts has been found to exist, various alternative sites must be weighed according to the "Factors Influencing Community Location of Plants" mentioned in Chapter II and may be selected by the systematic methods outlined in Appendix A. The site for a typical planned industrial district should have the following important characteristics. The land is: (1) held by at most a few owners, (2) fairly cheap, (3) located on the perimeter or outside of the central city, (4) large enough for several industries, (5) near enough to a railroad to warrant a lead track connection, (6) located on or near a through highway, (7) near enough to high tension power lines to warrant their extension, (8) located close enough to large water mains to justify their extension, (9) underlain by soil with adequate foundation conditions, and (10) located near enough to a residential area to obtain adequate labor. In addition, a factor of increasing importance is proximity to an airport. Several of these conditions can be observed in Figure 1. Studies to determine the existence of areas having these conditions have been made by local industrial dispersal groups in order

\[1\] See Appendix A.
Figure 1. Brook Hollow Industrial District, Region and Site Plan
to obtain new war plants by making possible Federal subsidies, and by local planning commissions in order to prepare realistic future land use plans.

Methods of Site Acquisition

After the site for a district has been selected upon the basis of the above criteria the developer can gain control of the land in various ways. The most obvious and probably most common method is purchase of fee simple title or obtaining an option to purchase, and the second method is that of obtaining voluntary cooperation of the landowners to sell when and to whom the developer recommends. Either of these methods is adequate to give the developer the assurance that he can proceed to make an overall plan for the district's development.

Planning the Site

After the site has been acquired, site planning can be initiated. Planning the site can be logically divided into two stages: coordination with local government ordinances and plans, and preparing the site plans.

In order to understand the contribution to the planning of the site that can be made by coordinating with the local government it is necessary to understand the function of the local government. The local government represents the community and acts on its behalf (1) to provide facilities and services (such as streets, water, sewers, police and fire protection) of which it is the most logical provider, (2) to establish rules and regulations (such as zoning, subdivision regulations, the official map, and traffic rules), and (3) to make plans (such as the master plan) for the growth and change of the community.
Provision by the developer of community type services and facilities is not usually feasible, functionally or economically. For instance it is wasteful for a subdivision, a planned industrial district or a neighborhood to provide its own complete water supply system or sewage disposal system because (even though it may be physically possible) the installation will not be large enough to be economic. Also such an installation may have been planned and designed better if it were part of a larger community, since a small area, under immediate economic pressure, does not consider what its proper function is in the metropolitan community. Provision of police, fire and transit also operate more efficiently on a metropolitan basis since they don't have to solve the inter-boundary coordination problems which several small entities would have. Many small duplicated community facilities usually cause waste, whereas single integrated facilities usually cause economy. Planned industrial district developers appreciate this fact since in several outlying developments they have directly or indirectly caused the creation of a local government in the region surrounding their planned industrial district.

Necessity and Purposes of Local Government Regulations.—To accomplish the positive purpose of providing service and facilities it is necessary to use the negative means of regulation. For example a planned industrial district's streets and utilities are community facilities, but are usually installed by private builders. To ensure proper functioning and economic service, the government imposes certain material, design and construction standards which must be met, and in the case of streets, imposes traffic rules for safe and economic use.
To provide adequate facilities and services it is also necessary to use the positive aid of planning. Continuing the example, streets and utilities are expensive and have a long life. Due to lack of foresight they sometimes are found to have been located improperly and designed for the wrong type or amount of use. To prevent this occurrence and to assure efficiency, the local government must use the intelligent foresight of a local planning body which is in touch with the trends and the needs and desires of the community.

Local Ordinances.—Analyzing the local ordinances is the first and most essential method of coordinating the planned industrial development with the local government. Conforming with these ordinances results in advantages to the planned industrial district as well as to the community.

The zoning ordinance is the first concern. Zoning is the legislative systematizing of the normal economic process of grouping similar and compatible uses of land by dividing a community into zones or "districts", each district permitting certain compatible uses; prohibiting others and imposing certain restrictions upon use, height and area which are intended to assure the "highest and best" use of land. Conformance with zoning is important to the community because it creates the essential element of predictability in community growth. With its aid the community can locate facilities and arrange services which will be economical and appropriate both now and in the future. Conformance with zoning is important to the planned industrial district because it will increase the efficiency and value of the district.

Conformity with zoning "use" requirements mean the following things
to the community and the planned industrial district developer. They may protect the industrial district from unpredictable invasions of residential development which will rob the district of its land for expansion, create an unsightly environment, lower the value of the land for industry and create hazards for the residents. The developer knows that by locating in a particular industrial zone his planned industrial site will have neighbors of a certain type only. He can then better plan the character of his industrial district. By showing through zoning that an area is for industrial use only the city can provide the appropriate heavy streets and utilities and be assured of their efficient use. The local government knows ahead of time that no schools will be needed in the industrial zones if residences are prohibited. It knows that it is providing both industry and other uses a more protected, attractive and efficient environment in which to operate.

Specifically, zoning "use" provisions place in each zone compatible uses, and place the most compatible zones adjacent to each other. They also may require off-street parking and loading areas for each industrial plant. These benefit the community by reducing congestion and increasing safety in the streets by allowing the streets to be used for moving traffic only. Streets can be made narrower and less expensive, and justice is done since each land user causing a parking and loading problem pays for his proportionate share of the solution. These requirements may benefit each industry by providing a sound criterion as to the amount of land to reserve for these purposes.

Zoning "height" provisions restrict the height of buildings in
each zone. They benefit the community and the industrial district by assuring healthfully adequate amounts of light and air for the occupants of each building, by reducing traffic congestion which the many occupants of tall buildings create, by providing safety from fire through keeping the upper stories within reach of local water pressure, and by providing safety from low-flying aircraft near airports. Another advantage, previously discussed, is that most industrial plants' operations become more efficient in plants of fewer stories.

Zoning "area" provisions require a minimum standard of area per lot or per capita. This provision allows the local government to predict the magnitude of the demand for streets and utilities and thus to extend streets of adequate width and utility mains of adequate dimensions, and assures the developer of a planned industrial district that service to his area will be satisfactory. The zoning "front-yard" requirement furnishes the advantages of healthfully adequate light and air to the buildings, makes each plant more healthful and efficient by reducing traffic dust and noises, and allows room for attractive landscape treatment. Front yards on corner lots also give the safety of "vision clearance" to street traffic. The "side-yard" requirement also furnishes the advantage of healthful light and air, and in addition it leaves adequate space for driveways giving access to rear parking lots. This space also gives room for access by the fire department and prevents fire from spreading to adjacent structures. Parking and truck loading space requirements, already mentioned, may be required to be a certain fraction of the floor area of the plant, or adequate for a certain fraction of the employees. Zoning
"density" provisions may restrict the number of employees per acre. The advantage of this is to give the city a standard for predicting the volume of traffic generated by an industrial zone, to provide adequate light and air per employee, and to reduce the congestion in the streets caused by employees' automobiles.

The subdivision regulations are the second local ordinance of concern to the planned industrial district developer. They require minimum standards for subdivisions of land and for the land's improvement. Their purpose is to assure developments of lasting usefulness, efficiency and amenity.

The subdivision regulations require that streets in each use (residential, commercial or industrial) area be of adequate design. The minimum width requirement assures the community that traffic will be provided safe and adequate space and assures the land owner that property need not be condemned in the future for street widening. The regulations as to minimum sight distances and maximum grades of streets reduce hazards to traffic, and lower the cost of operating vehicles. The limit upon grades benefits the developer by giving the lots which abut the street better access and by reducing the cost of preparing lots and constructing buildings. Requirements as to minimum radii and sight distances at intersections increase safety and the ease of vehicle operation and make the street pattern more efficient. An efficient street pattern is especially important in industrial areas where large volumes of freight travel by truck.

The subdivision regulations require that blocks and lots meet certain minimum standards. Smaller blocks require more streets
and utilities per acre. The minimum block size requirement benefits the community by reducing this cost which is especially high in industrial districts due to the heavy construction of the streets and the large size of the utilities. This saving may be passed on to the industries in the form of reduced taxes. Another advantage of larger blocks is that they reduce the traffic hazards and delays caused by numerous intersections. Shapes and arrangements of blocks are also regulated in order to connect with existing street patterns and provide adequate drainage through the street rights of way. This benefits the developer by increasing the usability of his land by reducing numerous special drainage easements. Subdivision regulations require that adequate utility easements be reserved and that utilities of ample size are installed where needed. This increases the long-term value and efficiency of the development which is so important to developers of planned industrial districts.

The official map is the third local ordinance of concern to the planned industrial district developer. The official map reserves certain exact areas for the future use of the community for major streets, and public buildings and areas. Its purpose is to promote efficiency and economy in government operations by reserving the most suitable areas for community facilities before they are developed for other purposes. The advantage of this regulation to the planned industrial district developer is that it serves to notify him that certain lands cannot be used for his development. If such areas are reserved within his district it obviously will alter his site plan and scheme for development. Major street reservations may increase the value of the developer's land due to improved access to major transportation routes. Recreation area reservations may
improve the environment and prestige of his district and may be used by employees of the industrial plants.

Traffic regulations are the fourth local legislation of concern to the planned industrial developer, offering benefits both to him and the community. Access limitations may affect the number and spacing of streets in the district which can intersect the boundary roads. Speed limits may affect the length of radii and width of pavement at corners and curves. Curb-cut restrictions may prohibit driveways within a certain distance from intersections, in which case the size of corner lots may be affected.

Thus it is seen that coordination with the local government by following its zoning, subdivision, official map and traffic regulations may alter the plans for a planned industrial district by requiring minimum standards which benefit the community-at-large, improve the usefulness of the planned industrial district to the community, and increase the efficiency and value of the industrial district itself.

Local Plans.--The second essential method of coordinating the planned industrial development with the local government is by coordinating with local plans for future development. These local plans give expression to the goals of the community and propose methods for achieving them. These plans are embodied in condensed form in the comprehensive "master plan". Further studies of important aspects of the master plan become a part of the master plan and become important parts of the community's guide for future development. The master plan and the master plan studies, done by the local planning body, are adopted by them and certified to the local
government legislative body. These plans thereby become the official guide of the planning body's staff in their own work, and through them affect the nature of private development which takes place in the community.

One of the most important plans is the "future land use plan". It is a guide to the type and location of future public and private development. It differs from zoning by not having the status of legislation. The most significant difference is that it shows improvements to the zoning plan which may be necessary at present because of an obsolete zoning ordinance or that may be advisable in the future due to foreseen changes. These changes are vitally important to the developer of a planned industrial district, who hopes to sustain the efficiency and value of his development as far into the future as possible. He may obtain the value of planning for these changes by consulting with the local government's planning staff and obtaining information of trends in use of various areas from the data collected and studies made by the local planning staff.

Another plan which is important to planned industrial district developers is the major street plan. It differs from the official map by showing approximate future street routes only. The developer will be wise to study this plan so that he will be prepared to make a reservation for any future streets through or adjacent to his area, and to design his development plan accordingly.

The plans for public lands and facilities is the third plan important to the planned industrial district developer. The local planning
staff is required to advise him, upon review of his subdivision plot of
the acreage of any reservations for parks or buildings which may be re-
quired in his development.

Although a particular local government may not have all the plan-
ing legislation, and the local planning staff may not have a complete
comprehensive plan, the planning staff is always available and usually
able to advise and assist a developer in planning his area. The developer
can benefit greatly from this service. Both the negative ordinances and
the positive plans of the community have a direct bearing upon the design,
development and success of a planned industrial district.

Site Preparation

After deciding what type industry the site is to attract, after
acquiring the site and after coordinating with the local government regu-
lations and plans, the next phase in preparing the site is the conversion
of the raw land into improved, completely salable sites for industry. It
should be understood that some of these steps overlap and take place si-
multaneously, but an attempt has been made to place them in some logical
sequence. Therefore the following steps or elements will be discussed in
the order in which they are normally considered.

Zoning Changes.—As previously mentioned, the zoning ordinance should be
checked to see that the site is properly zoned before it is acquired. How-
ever, if the developer is already in control of land which is one of the
only sites possible for a local planned industrial district, it may be
desirable for him to attempt to get it re-zoned. It is quite possible
that a good planned industrial district site will be improperly zoned due to an obsolete zoning ordinance or for other reasons. As an example of re-zoning, in Bloomfield, Connecticut the Bloomfield Industrial Development Committee (the developer) chose a planned industrial district site which had almost all the necessary conditions except proper zoning. The existing industrial zone extended 800 ft. into the area from the adjacent railroad line. It was desirable to extend the zone to an average of 2000 feet depth into presently vacant area to obtain a usable planned industrial district site. This zoning change was accomplished and the resulting planned industrial district has become highly successful and completely compatible with surrounding land uses.

Another case in which re-zoning may be desirable is that in which the site chosen is in a lower grade industrial zone of a type permitting uses which might be harmful to or incompatible with the planned industrial district type development. If the zone allowed nuisance type industry, but the areas adjacent to the planned industrial district were not yet so developed, it might be feasible to re-zone surrounding areas to allow non-nuisance industry only. If the zone allowed residences and there were no extensive residential developments present there, it might be feasible to zone the planned industrial district and the area around it to exclude residence.

Private Restrictions.—After possible zoning changes, the developer should consider private restrictions. Private restrictions are less broad in scope than zoning restrictions (being confined to the area developed). The advantages of private restrictions over zoning restrictions are that
they can regulate in more detail the things which zoning regulates and that they can regulate things which zoning cannot regulate. The purpose of private restrictions is to protect the developer's and the occupants' interests by assuring the appropriate development and use of each site. The three types of private restrictions in use are deed covenants, lease agreements and informal methods. Deed covenants are the most detailed and rigid restrictions of the three.

A deed covenant is an interest by the developer or others in the land of the purchaser in the form of a contract or promise by the purchaser to do or not to do certain things with respect to the land. The covenant normally "runs with the land" and obligates all subsequent purchasers for a specified length of time, until changed by the owners (if permitted in the covenants), or until changed by court decree. The basis upon which a subsequent purchaser can be bound by the promise of the original purchaser is that either there still must exist a "connection of interest" between the developer and the subsequent purchaser or that the covenant concerns an easement in a common facility which is necessary for properties other than that of the one particular purchaser. If these conditions cease it is possible that the covenants may be deemed unreasonable and void by a court judgement.

Provisions sometimes included in deed covenants for planned industrial districts are the following. "Use" provisions typically prohibit: any of the property being used for offensive or nuisance industry (sometimes including a list of prohibited types); for living quarters; for signs and billboards except "for sale" signs or advertising signs under a certain size which mention only the name of the occupant firm or the
product produced on the premises; and at least one developer prohibits dealing with any other than one particular railroad, (namely the developer); open storage of bulk materials or products forward of the front building line or unscreened by fence or landscaping. Use provisions typically require: that occupant industries be of a certain type (sometimes including a list of permissible types); that parking space be provided for one-third the number of employees and that adequate truck loading area be provided, both to be located to the rear of the front building line; that all areas not used for the building or for parking or loading space be landscaped. The use provisions sometimes retain for the developer: the mineral rights to the property; the right to control usage of certain streets prior to dedication to the local government; the right of "reclaimer" or "recapture" of the property if building construction is not started within a certain length of time (usually one to three years) after purchase.

"Height" provisions customarily prohibit buildings over one or two stories or at most $15$ feet excluding tanks, towers, chimneys, etc. This provision is especially important when the district is located near an airport.

"Area" provisions typically require front yards of $75$ feet on major streets and $25$ feet on minor streets; side yards of $15$ feet (minimum for light and air and access in case of fire). Maximum building-to-lot area ratios are sometimes specified.

Other provisions reserve to the developer the right to assess properties for their proportionate share of the cost of extension and repair of streets and utilities; specify that the property be subject to all
taxes, assessments and governmental charges, and liens and encumbrances created by the owner; specify the length of life of the covenant (usually 25 to 30 years from a fixed date or from the date of the sale of the property, longer in the larger districts due to slower occupancy); and specify that the covenants may be changed by a vote of the owners of from 50 to 75 per cent of the acreage ranging from "any time" to a time at the expiration of the covenants. Change of deed covenants in planned industrial districts does not seem to be the rule since few covenants permit change for 25 to 30 years except for unanimous agreement among all the owners, a virtual impossibility. This disadvantage has been recently overcome by at least one developer, whose covenants state that they may be changed at any time by a vote of the owners of a simple majority of the acreage. This provision is extremely important in compensating for the developer's lack of foresight. For instance 30 years ago the use of trucking as a major factor in plant operation was not foreseen, therefore provision for off-street loading docks would be absent from the typical covenant. However if a truck loading provision had been included in this covenant originally it would have prevented much improper construction which has taken place in industrial districts during the construction boom of the last several years.

A possible modification of the change-by-owners-of-a-majority-of-the-acreage provision would be a provision permitting change of the covenant by a majority of the "owners and tenants". This would be reasonable

\[2\]This rigidity with respect to necessary change is one of the disadvantages of deed covenants compared to zoning, which may be amended or revoked at any time by the city council.
since the long-term tenants would have as much of an interest in the environment which the district furnishes them as would the owners. In fact, as previously mentioned, many of the tenants are market-oriented branch plants of national firms. These plants rely heavily upon a desirable address and propitious environment, as protected by deed covenants.

The main enforcer of the deed covenants is the developer. In the case of a violation of one of the covenants the developer usually gives the violator due notice and specifies a length of time in which he must correct the violation. Then if the violation persists, he may take any action (such as confiscation or demolition of an offending accessory building for example) permitted in the covenant and may take the issue to court to obtain an injunction against the violator. Any owner bound by the covenant may also sue in case of a violation, but his incentive is not usually as great as the developer's. The developer knows that an accumulation of violations throughout the district will have an overall adverse affect on the district, while the individual property owner is likely to overlook all violations except those near his property. Thus covenants are better enforced by the developer while his interest remains.

But, after the district's property is all sold (especially in a non-operating or a land-sales type of district) the developer's interest is diminished and his enforcement will become lax or non-existent.

To overcome this disadvantage another method of enforcing deed covenants has been used in planned residential developments, but no example is known in planned industrial developments. This method, after the first few years of the customary control by the developer, provides for self-government and control of the district's restrictions by the occupants,
(similar to municipal council-manager government).

A board of trustees (analogous to a city council) is periodically elected at large from among the occupants. They hire a permanent administrator (analogous to a city manager) one of whose responsibilities is to enforce the deed covenants. This method of enforcement retains in later years the advantage of overall vigilance and enforcement which in the typical development the developer tends to neglect. Even with this advantage of continuous enforcement, enforcement methods are slow, expensive and cumbersome court processes. Perhaps this disadvantage of difficult enforcement is the reason for reliance upon zoning and other restrictions.

Zoning is much easier to enforce than are deed covenants. Zoning restrictions are enforced by the local government. The usual method of preventing zoning violations is through review by the building inspector's staff of plans prior to construction. This policy of review of plans is similar to the deed covenant method. However, the abatement of a violation once it occurs is easier under zoning than it is under deed covenants. A zoning violation may be prosecuted by the developer or by another private property owner claiming damages, or by the local building commissioner or local government council. In the latter two cases the court process is of no direct expense to the developer or property owner damaged, and may bring speedier results.

Much study would be justified to find which provisions are more feasibly handled through zoning than through deed restrictions. It also may be feasible and desirable to zone planned industrial areas as restrictively as controlled under the usual deed covenants. This would
increase enforceability and relieve planned industrial district developers and occupants from much trouble and expense. A trend in this direction is already evidenced by the rather strict zoning requirement excluding residences and other uses from certain industrial zones.

The second type of private restriction in use in planned industrial districts is the lease agreement. Lease restrictions usually control the same type thing controlled by deed restrictions. They, like zoning, are easier to enforce than deed covenants. It is comparably easy to assure compliance with lease restrictions, since non-compliance subjects the tenant to eviction and since there is no question that the tenant is legally bound by the restrictions, as there often is with deed covenants by the time that the property has changed hands several times after the original date of the covenant.

The third type private restriction commonly used in planned industrial developments is the "informal" method, usually supplemented by zoning. These informal methods are of four general types: sale policies, occupant associations, correspondence, and developer-builder controls.

By sales policies is meant the process by which the developer chooses the types of plants which he will encourage to buy or lease property or buildings in his district. The developer usually studies the type of operation and other characteristics of a plant in enough detail to see whether the plant would be a nuisance or would detract in any way from the character of the area. By correct selection of the original few occupants the precedent is set which determines the character of the development. In talking with the plant management the developer may require unwritten agreement to certain standards, or the developer may want to approve in detail
the prospective occupant's plans. He judges for himself whether the management will cooperate in good faith in respecting the agreed-upon standards. The mutual understanding between the developer and the occupant and the pressure of opinion of neighboring plants is usually adequate to sustain the high quality of the development.

After the first few occupants have set the character of the environment in the method above, another method may be a feasible supplement. An association of occupants may be formed, similar to the North Dekalb Industrial Association of Atlanta's Peachtree Industrial Boulevard District. Such an association may be a self-policing body with respect to enforcement of restrictions among its members. It may also assist the developer by making investigations and recommendations regarding the operating characteristics of prospective occupants.

The third informal type private restriction is agreement by personal correspondence in non-legal language upon certain general standards.

The fourth informal type private restriction is developer-builder control. This may be exercised by developers who require that all construction be done by the developer's own organization. Such a planned industrial district would usually be of the "operating" type, making money from the construction service. Since the developer builds all the structures, he is able to control their design and their layout on the lot. Of course the operating methods and maintenance conditions of the structures and lots and other provisions cannot be controlled this way, but it furnishes perfect architectural control. A possible disadvantage would be lack of diversity in architectural style, but Clearing Industrial
District of Chicago which practices this method of control claims that this has not occurred in their district.

In summary, the purpose of all restrictions upon planned industrial district development are the same: to assure the appropriate development of each site which furthers the interests of the developer and the occupants by increasing the usability of the district and the desirability of its industrial environment. There is no one perfect method of control but perhaps the methods which appear promising enough to warrant further use are those with democratic control, ease of enforcement and built-in flexibility to meet the unknown conditions of the future.

Provision of Varied Sites.—The next major step to be considered in the site plan is the provision for a variety of sites. This is important to industry because the site requirements of each plant vary. Variety gives a plant freedom to find the site with the lowest long-run average of operating expense and amortization of original capital cost. Variety is important to the developer and also to the community, because with a variety of sites available both the planned industrial district and the community should be able to obtain more industry.

Variety of site size and shape is the first and most obvious type of variety. Even though the plants are all "light" industry, their need for space varies considerably. For instance a wholesale produce terminal may require more land than a clothing factory. It may also require a site of a different shape. The produce terminal may prefer a long rectangular strip of land for a long loading dock and transit shed, while the clothing factory would prefer a square plant and a more square site so that various
hand operations could be better coordinated.

There are three methods by which the developer can provide variety of site size and shape. The first is by dividing the area into "tailor-made" sites only as needed to fit the choice of each plant as it comes along. This provides the greatest choice of shape and size, but involves the risk of having odd-shaped or unusable (and therefore ill-maintained and unsightly) areas left over. Such a method may in the long run prevent the optimum use of all the acreage and facilities. For instance it may be discovered after occupancy by several small firms upon the first-improved part of the district, that the equivalent of two ideal large sites is occupied and that as the development proceeds, no large sites with all the same advantages will be obtainable anywhere in the district. It also might be found that the extension of separate streets, rails and utilities to each small plant site as it is carved out will cause duplication and not be as economical as the setting aside of a special previously planned area for small plants and another for large.

The second method of obtaining variety of size and shape is by originally plotting the entire district into lots of a standard width (Figure 2). The depths, of course, vary from block to block depending upon the street-to-lead-track distance. Variety is obtained for an occupant by choosing the block of lots with the depth needed, then combining as many standard-width lots as necessary.

A third method used to give shape-size variety is to originally plot the entire district into lots of various sizes (Figure 3 top and bottom), placing large ones and small ones in the places most appropriate
Figure 2. Trinity Industrial District, Dallas, Texas
Figure 3. Top: Willow Springs Industrial District, Oklahoma City, Oklahoma
Bottom: Oklahoma Industries Industrial District
to provide for the most optimum use of the land as well as it can be for-
seen. If the planner or developer who plots the planned industrial dis-
trict in this manner makes a mistaken estimate of the relative demand for
large and small sites, some of them may remain unused. On the other hand,
if he estimates correctly, the land will be put to its most efficient use.

Variety of location is the second type of site variety which the
district must offer. For instance a home appliance factory doing most of
its shipping by truck might need to be abutting a main highway more than
a plant doing most of its shipping by rail. Two elements are involved in
variety of site location within the district.

The first element in variety of location is convenience. A site
must be convenient to whatever is most important to the particular plant,
particularly rail facilities versus highways. The proximity of a rail
classification yard might make a rail location in one part of the planned
industrial district more attractive than another location to a heavy rail
shipper. For another plant, proximity to the local consumer market might
make a highway location in one part of the district more attractive than
another location in the district on the same highway.

The second element in variety of location is "goodwill". Market
oriented branch plants of certain nationally advertised consumers' products
can obtain an advertising advantage, local "goodwill" and an increased
local market for their goods by locating in a prominent location such as
on a hill or adjacent to a freeway where they can be seen by consumers
passing by.

Variety of cost is the third type of site variety necessary. A
small local industry cannot afford the price of the choice locations
because they do not obtain a proportionate increase in either convenience or goodwill merely through an especially convenient or prominent site, since their volume of shipping is small and their small specialized market may include very few of the general public passing by. Obviously plants' needs for cheaper land vary and should be provided for by corresponding variety in the planned industrial district.

Variety in topography is the fourth type of site variety. Besides the desire for a goodwill advantage due to topography (a hilltop location etc.), some plants' operations may require a particular type topography. For instance, a hillside location might be desirable for a plant whose operations had to flow by gravity and which wanted to avoid a multi-story structure. Plants covering a large area and handling heavy products might prefer large, perfectly flat areas such as found near airports and river floodplains, where rail facilities can be designed most efficiently. Many plants found in planned industrial districts, covering small and medium amounts of area seem to prefer gently rolling land which gives them the goodwill advantage of interesting architectural and landscaping possibilities while still retaining the possibility of good railroad access. (See Figure 4 for an example of the extremely rough topography in the Peachtree Industrial Boulevard District, Atlanta, Georgia.)

In summary, there are four important types of site variety needed in a well-balanced planned industrial district. They are size and shape, location, cost, and topography. By having a variety of each, the planned industrial district developer and the community will benefit by being able to obtain more diverse types of industry. The industries will benefit by
Figure 1. Peachtree Industrial Boulevard District,
Atlanta, Ga.
being able to choose the most advantageous site for their particular needs.

**Balanced Transportation.**—After determining the variety of sites desired, the planner or developer should consider a balanced transportation or circulation system for the district. The essential parts of this system are the railroad and the street patterns.

The general characteristic of the rail pattern is that it is divided into two parts, "leads" and "spurs". The location of the leads depends upon the desired site shapes and sizes, since it is common for a lead to be built as one boundary to two or more sites. The most common pattern followed by leads is the "middle of the block" method whereby a lead enters a long rectangular block from the narrow end and travels parallel to the long sides (Figures 2 and 5). The spurs may branch from this lead either at right angles (Figure 3 top) or parallel ("common spurs") (Figures 2 and 6). A second pattern is the "diagonal square" method whereby the lead enters the corner of a large square block and travels diagonally across it (Figure 7 top). Spurs branch off at 45 degree angles. A third pattern is the "interlaced" method whereby the rail leads run parallel to and alternate with cul-de-sac or dead end streets (Figures 7 middle and 8 top).

The advantages claimed for the "diagonal square" over any method

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3A "lead" is a track which is built on railroad owned property up to the boundary of each of (usually) several industrial plants. A "spur" is built on each industry's own property from the lead track to the plant. Likened to a tree, the lead track is the trunk, the spur tracks are the branches, and the industrial plants are the leaves.
Central Manufacturing District

Chicago, Illinois
Figure 6. "Common Spur" Pattern of Rail Access
Rail-dominated district, such as early Clearing Industrial District (p. 114), has large plants, high densities, frequently uses more than one spur track per plant and makes relatively little provision for trucking as part of industrial process.

Balanced transportation is provided in practically all new districts. Plants in general cover less area and use both trucks and railway cars. Flow is not always from railway to truck but may be reversed or mixed.

Auto-dominated district has some industries, such as research laboratories, which could very well get along without railroad. Employees’ parking is the dominant factor, although trucks and railways are necessary for some of the industries in an “Industrial Park.”

Figure 7. Patterns Recommended for Rail-Street Access by Architectural Forum Magazine, April 1954, page 107
Figure 8. One of the early Central Manufacturing District Developments in Chicago
with right angle spurs are lower construction cost and lower maintenance and operating cost due to a shorter total length of curved track. The same advantages inhere in "common spurs" over right angle spurs. The common spur pattern is superior to all of the others in another respect: the land at the rear of each site is more usable because of the absence of odd angles.

Due to the influence of topography, these perfectly geometric patterns are not always possible. If the terrain is irregular and it is not economically feasible to grade the site to the extent that would permit the use of these patterns, they must be altered appropriately. However, they should not be altered beyond certain generally accepted limits. The gradients of rail leads should be kept under two per cent and the radii of rail lead curves should be greater than 400 feet for the best operating conditions. For short distances on seldom-used rail spurs these rules are violated. If diesel switch engines are used the lead curvature may be reduced to 300 feet or less. A useful arrangement is the sinking of rail spurs to a level which allows the floors of the freight cars to be on the same elevation as the floor of the plant, permitting easy loading and unloading, and allowing the plant floor to be built directly on the ground. The spurs should be level enough at the loading dock and other sidings to allow a freight car to stand alone without rolling. Rail rights-of-way used vary from 17 feet for one track to 70 feet for multiple tracks. Thirty feet is better than 17 for a single track on level terrain since it leaves room for drainage ditches.

The second essential part of the circulation system is the road and street pattern. This consists of boundary and internal considerations.
Probably the most important boundary consideration as far as roads and streets are concerned is the problem of limited access. The boundary roads are often major arterial highways. It is necessary that these roads be kept free from the excessive interference of numerous intersections and plant driveways. For this reason it is necessary to prohibit direct access to plants and to require intersections with a boundary road to be further apart than eight hundred feet, and preferably over 1000 feet. Where this distance is too great to give access to every plant abutting the boundary road it may be necessary to build a parallel access road to serve them. Together with the problem of access to the boundary road from areas inside the district is the problem of access to the boundary road from areas outside the district. It is a matter of major concern to know the amount of "through" traffic (with origin and destination outside the district) which may travel the streets of the district if they are not properly designed. The assistance of the local government planning body and reference to the major street plan may be considerable help on these boundary concerns, as previously mentioned.

After considering the boundary traffic the next concern in the road-street system is the interior street system. Two basic street patterns are typical of planned industrial districts: the "grid" (Figures 1, 5 and 8) and the "cul-de-sac" (Figures 7, 9 top, 10 bottom). The grid pattern is made of rectangular blocks\(^1\) ranging in size from about 300 x 500 in

\(^{1}\)In the "grid" system a block may be defined as the smallest parcel of industrial land completely bounded by streets or roads. In the "cul-de-sac" system the block may be defined as the area covered by all the plants served between adjacent cul-de-sacs.
Figure 9. (Top) Improved Transportation Pattern Suggested for Lower scheme by Architectural Forum Magazine, April 1954, page 112
Figure 10. Fulton Industrial District, In the Planning Stage, as Depicted by Andre Steiner, Robert & Company Atlanta, Georgia
the old North Kansas City, Mo. Industrial district to about 1000 x 2000 in more modern districts. (See Tables 2 and 3.) The typical block size seems to range from 600 x 1200 to 1200 x 1200, about 20 or 40 acres respectively. This range of block sizes will provide for the smallest and largest sites demanded. The advantage of the grid street system is the convenience of access which it furnishes in all directions for traffic going within and through the district. The disadvantage is large street paving and utility expense per acre, the hazard and delay of numerous intersections, and topographic and drainage difficulties.

In imposing the grid pattern upon an area high land fills or cuts may be necessary, thus isolating certain areas from access and making it difficult to place gravity flow sewers in streets which cross natural drainage ways instead of following them.

The second basic street pattern in a planned industrial district is the cul-de-sac or dead-end street pattern. Its advantages are that it eliminates through traffic having no origin or destination in the area, reduces hazards and delays of street intersections, minimizes the expense of street paving and utilities per acre, conforms easily to topography and drainage-ways, and can be used to serve areas otherwise inaccessible (see lots number six and seven Figure 11). The disadvantages of a cul-de-sac system are that it limits access within the district itself, and reduces the number of access alternatives to and from areas outside the district. Access within the district is not important when the plants are large and independent, but when there are numerous small plants whose processes are interdependent or which depend upon the district's central
### Table 2. Site Characteristics

<table>
<thead>
<tr>
<th>Industrial District (I.D.)</th>
<th>Gross Area (acres)</th>
<th>Net Area 1</th>
<th>Streets Interior &amp; Hwys.</th>
<th>Streets % of Gross</th>
<th>No. Tracks</th>
<th>R.H. Grade</th>
<th>Gross Lot Depth in Feet</th>
<th>Rights of Way</th>
<th>Utilities in Special Casements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airline I.D.</td>
<td>256</td>
<td>185</td>
<td>72</td>
<td>9.2</td>
<td>3.6</td>
<td>3.1</td>
<td>290x1270</td>
<td>60'</td>
<td>10'</td>
</tr>
<tr>
<td>Bloomingdale I.D.</td>
<td>300</td>
<td>222</td>
<td>89</td>
<td>5.1</td>
<td>3.1</td>
<td>3.1</td>
<td>150x700</td>
<td>700</td>
<td>35'</td>
</tr>
<tr>
<td>Brook Hollow I.D.</td>
<td>1200</td>
<td>775</td>
<td>81</td>
<td>6.8</td>
<td>1.2</td>
<td>1.5</td>
<td>600-1200</td>
<td>700</td>
<td>35'</td>
</tr>
<tr>
<td>Central I.D.</td>
<td>1000</td>
<td>303</td>
<td>86</td>
<td>13.4</td>
<td>3.5</td>
<td>3.5</td>
<td>250x500</td>
<td>250</td>
<td>35'</td>
</tr>
<tr>
<td>Central I.D. (Industrial)</td>
<td>1000</td>
<td>303</td>
<td>86</td>
<td>13.4</td>
<td>3.5</td>
<td>3.5</td>
<td>250x500</td>
<td>250</td>
<td>35'</td>
</tr>
<tr>
<td>Southland Industrial</td>
<td>175</td>
<td>100</td>
<td>59</td>
<td>1.5</td>
<td>1.2</td>
<td>1.2</td>
<td>150x900</td>
<td>60'</td>
<td>10'</td>
</tr>
<tr>
<td>Trinity I.D.</td>
<td>700</td>
<td>550</td>
<td>76</td>
<td>13.6</td>
<td>5.6</td>
<td>5.6</td>
<td>600x350</td>
<td>500</td>
<td>10'</td>
</tr>
<tr>
<td>Victoria Industrial Add.</td>
<td>111</td>
<td>111</td>
<td>75</td>
<td>13.6</td>
<td>5.6</td>
<td>5.6</td>
<td>600x350</td>
<td>500</td>
<td>10'</td>
</tr>
<tr>
<td>Willow Springs I.D.</td>
<td>650</td>
<td>300</td>
<td>76</td>
<td>13.6</td>
<td>5.6</td>
<td>5.6</td>
<td>600x350</td>
<td>500</td>
<td>10'</td>
</tr>
</tbody>
</table>

1 Gross Area includes 1/2 area of boundary roads.
2 Net area excludes area of streets, roads, railroads, and waste or unsalable land.
3 Developed area. Ultimate area will be larger.

Cross Area includes 1/2 area of boundary roads.
Net area excludes area of streets, roads, railroads, and waste or unsalable land.
Developed area. Ultimate area will be larger.
Table 3. Occupancy Characteristics

<table>
<thead>
<tr>
<th>Name of Industrial District, (I.D.); Location; Orig. Development Date</th>
<th>Gross or Occupied Area</th>
<th>Developed Gross Approx. Occup. Site</th>
<th>Field</th>
<th>Per Acre</th>
<th>Density Employees</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Mfg. District; Chicago, Ill.; 1905</td>
<td>851</td>
<td>1,70</td>
<td>1,4 ac.</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Clearing Industrial District; Bedford Park, Ill.; 1899</td>
<td>2090</td>
<td>533</td>
<td>3.9</td>
<td>25</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Empire Industrial District; Atlanta, Ga.; 1918</td>
<td>183</td>
<td>128</td>
<td>--</td>
<td>11</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Fairfax Industrial District; Kansas City, Kansas; 1923</td>
<td>2000</td>
<td>--</td>
<td>--</td>
<td>11</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Greater Portland I.D.; Portland, Maine; 1966</td>
<td>110</td>
<td>--</td>
<td>2.8*</td>
<td>18</td>
<td>450</td>
<td>300</td>
</tr>
<tr>
<td>Harborside Industrial Park; Providence, R.I.; 1950</td>
<td>137</td>
<td>--</td>
<td>1.0*</td>
<td>24</td>
<td>300</td>
<td>--</td>
</tr>
<tr>
<td>Natick Industrial Park; Natick, Mass.; 1952</td>
<td>50</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Newton Industrial Center; Boston, Mass. area; 1918</td>
<td>166</td>
<td>--</td>
<td>3.5*</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>North Kansas City I.D.; North Kansas City, Mo.; 1903</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>19</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Old Hingham Shipyard I.D.; Hingham, Mass.; 1950</td>
<td>297</td>
<td>--</td>
<td>5.7*</td>
<td>8</td>
<td>440</td>
<td>--</td>
</tr>
<tr>
<td>Peachtree Industrial Boulevard I.D.; Atlanta, Ga.; 1945</td>
<td>1000</td>
<td>200</td>
<td>7.1</td>
<td>17</td>
<td>358</td>
<td>--</td>
</tr>
<tr>
<td>Thompson's Point I.D.; Portland, Maine; 1945</td>
<td>50</td>
<td>--</td>
<td>3.1*</td>
<td>8</td>
<td>700</td>
<td>--</td>
</tr>
<tr>
<td>Trinity Industrial District; Dallas, Texas; 1945</td>
<td>1150</td>
<td>660</td>
<td>1.5</td>
<td>10</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Hillington**</td>
<td>1220</td>
<td>1070</td>
<td>--</td>
<td>51</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Slough***</td>
<td>602</td>
<td>131</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Team Valley***</td>
<td>700</td>
<td>309</td>
<td>--</td>
<td>33</td>
<td>253</td>
<td>--</td>
</tr>
</tbody>
</table>

(Continued)
Table 3. Occupancy Characteristics (Continued)

<table>
<thead>
<tr>
<th>Name of Industrial District, (I.D.); Location; Orig. Development Date</th>
<th>Gross Area (acres)</th>
<th>Developed or Occupied Area</th>
<th>Per Approx. Gross Floor</th>
<th>Density Site Employees</th>
<th>Per Acre</th>
<th>Per Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trafford Park**</td>
<td>257</td>
<td>160</td>
<td>66.</td>
<td>190.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treforest**</td>
<td>248</td>
<td>177</td>
<td>17.</td>
<td>201.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welwyn**</td>
<td>313</td>
<td>165</td>
<td>58.</td>
<td>180.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on gross area
**British "industrial estates"
Figure 11. Fulton Industrial District, Showing Recommended Final Contour Lines
services (cafeteria, etc.), or upon common suppliers or customers, intra-
district access is important and cul-de-sacs could not be recommended.

The grid and the cul-de-sac street patterns are seldom used in a
pure form, due to the dictates of topography. In a grid system the blocks
are liable to vary in size and shape since some attempt is made to place
streets where the minimum of grading is required and where gravity-flow
drainage within the right of way is possible. For the same reason the
streets may be curved instead of perfectly straight. In a cul-de-sac
system some cross-streets and through-streets are likely to be provided
to improve access within the district and to and from the district. In
other words, topography and access requirements modify the two basic pat­
terns and cause the planner to use them in combination.

The following are good design standards used in planned industrial
district street systems. Slopes or gradients of industrial streets should
be limited to three per cent where possible. For short distances seven
per cent is permissible but may become a hazard in case of frost or snow.
Steeper grades are not desirable because of the increased trucking costs
in accidents, money and time. Rights-of-way within the district should
be from 60 feet for minor streets to 80 feet for major streets, and 100
or more if planned to carry outside "through" traffic. The pavement it­
self should be from $\frac{3}{4}$ to $\frac{4}{4}$ feet to allow for two lanes of moving traffic
plus one or two parking lanes. A twelve foot lane for moving traffic is
a minimum since trucks are eight feet wide and require two feet clearance
on each side. A parking lane of ten feet is ample for parallel parking.
However, it may be desirable to prohibit on-street parking. This factor
must be considered in determining the width of right-of-way and pavement
as well as the factors of widening necessary at intersections and curves, and shoulders wide enough to allow for utilities, sidewalks and landscaping. The minimum inside turning radius necessary for semi-trailer trucks at right angle intersections is 50 feet. This requires wider pavement and wider right-of-way. Pavements should be widened at curves as well as intersections. This should not require additional right of way. Sight distance is important to prevent collisions at intersections. Special diagonal "sight easement" might be made at intersections when the district's front yard restrictions are not adequate to give sight distance, as in Kansas City, Missouri's Fairfax Industrial District. Curbs and gutters may be used at intersections to prevent damage to street shoulders by turning trucks, but in parklike outlying districts only the crudest curbs of broken stone are commonly used, storm-water being handled in natural drainageways. Curbs and gutters are necessary, of course, in densely built districts to collect the rapid run-off of storm water from the paved and roofed-over land (exceeding 60 per cent of the gross area of the district in many cases). Another useful possibility in central districts and flat terrain where curbs and gutters are used is to depress the streets three feet to assist in collecting storm water. This also places truck floors on the same level as the floor of plant buildings. This makes truck loading easier and building cheaper since loading-dock floors can be built directly on the ground instead of elevated. Side-walks are provided in the densely built and central districts, but there is not enough pedestrian traffic to justify them in outlying districts.

A well-balanced transportation system for the planned industrial
district can be assured by a proper combination of the rail and street factors which have been discussed. Three main influences determine the pattern of street-rail relationships which finally crystallizes: governmental influences, topographic limitations and the necessary site variety.

Governmental influences have been discussed in a previous section, but as an example of the influence upon the rail-street pattern of coordination with the local government, the story of Bloomfield, Connecticut is outstanding. The developer (Bloomfield Industrial Development Committee) selected a potential site at the edge of town abutting the city of Hartford. The area was crossed by a railroad line, but the main problem was that of adequate road access. There was an east-west road, but none north-south giving access to Hartford and Bloomfield (Figure 12). The problem was discussed in detail with the engineers of the city of Hartford and the Metropolitan District Commission and the solution was coordinated with their plans. A suitable street (Granby Street) leading south to Hartford stopped just short of the site, but Hartford officials agreed to extend it to the city limit when those of Bloomfield likewise agreed to extend one of their streets (School Street) south bordering the site to meet it. It was the eventual intention of Hartford to develop this road as an arterial highway carrying commercial traffic to and from Hartford and connecting with the state highway system. As developed, this road fitted excellently into Hartford's and Bloomfield's plans and made an excellent east boundary for the planned industrial district. It was decided that a suitable depth for sites along this street would be 500 feet, so this determined the railroad pattern: A railroad lead was brought in to
be parallel to the highway and 500 feet away. On the north of the property (Figure 13) the city of Bloomfield was concerned about a possible adverse affect upon an adjacent residential development north of Cottage Grove Road. Therefore the developer paralleled this area with a 150 feet deep landscaped buffer strip, then by a 150 foot to 300 foot strip of commercial development. This buffer and commercial strip was separated from the industrial part of the district by a street paralleling the residential area and diverting commercial and industrial traffic from it. Parallel to this street two additional streets (extensions of the two streets paralleling the main railroad) were brought around to give the most usable site depths from the area remaining.

A second major influence upon the pattern of street-rail relationships is topography. As previously mentioned, certain operating factors impose practical limitations upon the gradients and radii of curvature of railroad tracks and trucking streets. Natural topography with gradients exceeding these limits may be crossed only by cutting or filling the land. Such a cut or fill may alter the rail and street pattern. For example, the undeveloped Southland Industrial District property in Atlanta was traversed by a new four-lane highway. At one point the earth fill supporting this road appears to be over thirty feet high and offers an obvious obstacle in access to the adjacent land. In another place the same road enters a deep "cut" which presents the same problem of access to adjacent land. In such cases where cutting or filling the site would be extreme and impractical, access might be obtained by serving these lots by both rail and road from the rear, an unusual method, involving extra grade
crossings, but workable.

The third major influence upon the pattern of street-rail relationships is site variety. This influence has already been partly discussed.

Regarding variety of size and shape, the depth of lots desired determines the rail-street distance in a flat-topography situation like that of Figures 1 or 2. A depth of 150 to 200 feet is typical for small plants, 300 to 400 for plants requiring a lot larger than an acre.

Variety of lot location may affect the street-rail pattern. For instance when certain parts of a district are set aside for non-rail-using plants (Figure 2 block 27; and Figure 3 top, block 4) streets are necessary but, of course, rails are not. When a heavy rail-using plant is located where the track that serves it crosses a busy road, the otherwise simple pattern must be complicated by a grade separation. If small sites are to be located in one part of the district and large ones in another (Figures 3 top and 4) it may be more feasible to serve one area with common spurs and the other with individual right angle spurs, or with any other combination which the planner might create by the exercise of imagination and experience.

The influence upon the rail-street pattern of furnishing a variety of lot prices may warrant the use of common spurs for inexpensive lots and individual 90° to 45° spurs for choice expensive lots, with the street pattern to correspond. Justifiable lot costs and savings through efficient design would also ordinarily prohibit the construction of a street

and a railroad track immediately parallel. Such a design would prevent
the use of sites between rail and street. It also would increase the
grade-crossing hazard to trucks using the road due to sight-angle hazards,
a short approach distance and a short turning radius. Finally, costs
usually prevent use of the rail-perpendicular-to-street pattern. It
is interesting to note how, due to safety (social cost factors) and
efficiency (economic cost factors), typical street-rail relationships
have changed over the years in the Central Manufacturing District of
Chicago. The pattern of individual spurs perpendicular to the streets
of small short blocks in the 1919 Kedzie Development (Figure 8) has been
changed to common spurs parallel to the streets of large long blocks in
the 1932 Crawford Development (Figure 5). This latter design is now quite
common in many districts. In addition to the direct saving in street and
rail installations, this change may be prompted by the increased importance
of trucking and the need for safety and time-saving through reduction of
the number of street-street and street-rail intersections.

To summarize the transportation balance, it consists primarily of
railroad considerations and road or street considerations. Pedestrian
traffic is negligible. The relative arrangement between rail and street
is determined by three major factors: Governmental influences, topography
and variety of lots.

Utilities.—The utilities usually necessary in a planned industrial dis-
trict are water, electric power, gas, sanitary sewer and storm sewer.
The sizes vary with the number of plants and their requirements. How-
ever, Mr. H. Gifford Till, Director of Industrial Research and Development,
Missouri-Kansas-Texas Railroad, states that:

In no case should a water main of less than eight inches be installed...this should have two connections with the city's main water system in order to provide what is known as a loop.

The reason for the loop is to prevent dead-end lines on which the user at the end of the line gets low pressure when the other users in line ahead of him are tapping the supply at the same time.

For the water "available" (within at least 500 feet in an urban area which is adequately served by motor driven fire equipment) to an individual plant, a hydrant connected to a water line at least six inches in diameter is typically considered a necessity for volume in emergencies, and is so recognized by fire insurance companies in their rates. However, the actual plant connection itself may be considerably less than a six inch line.

An electric power substation of at least 5,000 to 10,000 kilo-volt-amperees ("KVAR") seems to be the practical minimum size of substation which should be in or near a typical planned industrial district. This substation should be able to deliver at least four or five kilo-volts ("KV") to the mains serving the district, although this varies upward. This power is then typically transformed down and fed to the industrial plant customer at 240 V.

Gas main sizes required depend upon the pressure used, but since the weightiest cost to the gas utility company apparently is the pressure, fairly large mains (six inches) and low pressures (about 25 pounds per

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\[6\text{Hill, op. cit.}\]
square inch) are typical minimum standards. E. O. Werba, Chief Engineer of Atlanta Gas Light Company has stated: 7

In some areas such as the Peachtree Industrial Boulevard we use 10" mains. In some of the smaller industrial areas, we have used 6" mains. Again the size depends upon the available pressure.

A two inch line typically connects the industrial plant with the main, being metered to furnish the plant up to five pounds per square inch pressure.

Sanitary and storm sewers should not ordinarily be combined, since the volume of flow in time of heavy precipitation may overtax the disposal plant and create sanitary hazards due to the necessity of by-passing the treatment plant. Cities seem to prefer separate storm and sanitary sewers, finding that though it is more expensive initially, it is cheaper in the long run.

The sizes of storm sewers depend entirely upon the particular area drained, the topography and the speed and amount of runoff not only from the area itself, but also from any areas uphill that drain across it. Such calculations can be made by a qualified civil engineer. Ordinarily no pipe smaller than six or eight inches is used.

Sanitary sewer sizes vary with the number of employees and the amount of waste disposal from particular industrial processes. This too is an engineering calculation, but generally no sewer main smaller than eight inches should be installed. While six inches may be presently

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7Letter to author from Mr. E. O. Werba dated Feb. 8, 1955.
adequate, future changed conditions may require eight inches. Since the
difference in the costs of the pipe is negligible compared to the cost of
the labor of installation, it is wise to be safe and install eight inch
mains the first time. Six inch pipe is the minimum advisable for plant
connections to these mains.

The location of utilities has a quite important effect upon the
appearance and the operation of the district. The common practice in
industrial as well as residential subdivision design is to place all
utilities in the street right-of-way. The advantage of this is that it
is easiest and cheapest from the usual installation, connection and main­
tenance standpoint, especially in the older districts where the distance
from the street to the plant is relatively short. The utilities can be
installed adjacent to or under the pavement and sidewalks before the pave­
ment construction and are easily accessible to maintenance vehicles later
if they need repair. A good arrangement is to have the sanitary sewer
and the gas line on one side of (but not directly under) the roadway and
the water alone (to prevent pollution) on the other. This allows repair
to be made without tearing up the pavement. The storm sewer is less
likely to need repair and can be located directly beneath the pavement
or preferably on the same side of the street as the water, but below it.
The electric power and telephone poles are typically placed adjacent to
the pavement, but detract from the appearance of the area. It is possible
to place the electric wires underground, but the cost may prove prohibitive
and it is not usually done.

Another location for all utilities, especially poles, is in the
railroad right-of-way as practiced by the Trinity Industrial District in
a ten foot utility strip bordered by one rail spur or siding on one side
and the lead track and other spur on the other side, (Figure 6). The
advantages of this are that it definitely improves the appearance of the
district, and hence the productivity and value of all properties therein.
One might think that electric and telephone companies' and city's utility
repair crews would be slightly inconvenienced by such an arrangement that
makes access to their lines more difficult and the cost of maintenance
slightly higher. Though this may be true, it cannot be reflected in the
rates charged for service since this would be discriminatory and illegal
under the state utility regulation, but it could be reflected unfavorably
in the quality of cooperation with the developer and service rendered his
area. Commenting on this, Mr. L. Storey Stemmons, General Manager of
Trinity Industrial District, Dallas, stated: "I do not believe that the
cost of maintenance is materially greater than if they (utilities) had
been located in the streets."

Where the customs and restrictions of modern planned industrial
districts make the distance from the rear of the plant building to the
rail easement shorter than that from the front of the building to the
street, the length of the rail easement utility connection would be the
shorter. Therefore the original capital investment in utilities would be
less, an advantage to balance against possible inconvenience of main­
tenance.

A modification of this plan is used by the original Clearing dis­
trict, which placed utility poles, but not drainage in the railroad rights-
of-way.

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8 Letter to author from L. Storey Stemmons, dated April 14, 1954.
Storm drainage offers a few problems and possibilities different from the other utilities. In some of the outlying districts where rough topography prevents extensive grading and utilization of the land, storm water is allowed to follow natural drainageways. The reasons that this is feasible are that the land is not intensively covered with buildings or paved areas (thus making the runoff more gentle), and the fact that land is cheap enough to allow these drainage areas to remain otherwise unused.

In the more intensively built areas water may accumulate in the sunken rail spurs and sunken truck driveways at the loading docks. Attention should be given these areas in designing the storm drain system. A possibility mentioned by Architectural Form Magazine is the design of flat roofs to retain and delay the run-off of storm water. This would be effective in reducing the size of storm sewers required in districts where building-to-site coverage is relatively high (60 per cent in some).

Scheduling the Development.—"Scheduling" refers to the plan for the sequence in which the various parts of the district will be developed. This "schedule" answers the questions "Which area will be developed first"? "How much of it? and How?" The answer depends upon the developer's expectancy of risk. To minimize risk the developer must make an accurate estimate of the need of his potential occupants and, if possible, of the sequence in which they will be attracted. If the area is large, even though several new plants are very likely to locate in the district, he

should proceed cautiously step by step. Tying up too much money in improved land may be risky, since it is impossible to predict how long it will take for the district to become fully occupied. On the other hand, if the demand for industrial land were good it would certainly be feasible to improve small well-located districts such as Clearing Industrial Districts' Montrose Manufacturing District (18 acres) and Central Manufacturing District's Kedzie Development (70 acres) all at one time, since they would soon be occupied.

The usual procedure in developing a large district is to develop part of it and reserve part of it (Figures 1, 3 top and 1H). The part which is developed is typically that part nearest the main road which will advertise the district and attract more occupants. The part of this area which is closest to existing rail and utility services would be the logical area to improve first, except that these original sites must offer adequate variety. If variety of sites cannot be offered in the area most logical for original rail and utility extension, then obviously the best compromise must be made.

Example.—An example of the processes involved in improving the site to make a planned industrial district is Atlanta's recently planned Fulton Industrial district. In 1950 the Fulton County Planning Commission recognized the industrial potentialities of their abandoned prison farm of over 1000 acres adjacent to the Chattahoochee River, just south of the County Airport and eight miles from the center of the city. Surveys were made by the planning commission staff and the area was zoned for industrial use.
Figure 11. Farmers Branch Industrial District, Dallas, Texas
Note Small Original Development Below Railroad Main Track
The County Commissioners appointed a Fulton County Industrial Authority Committee to develop the site. Located in the fastest growing market in seven southeastern states, at the fringe of the distribution hub of the Southeast, near the railroad and in the Atlanta reciprocal switching district, having abundant high grade labor, soft water in quantity and plentiful gas and electricity, this area needed only development and improved highway access to become an attraction to heavy "wet" (using processing water in quantity) manufacturing industry, as well as to the distributors. (Figure 15)

In designing the development several alternate solutions were possible. The topography was extremely rough and rolling on the side farthest from the river as well as low and subject to flooding near the river (Figure 16 bottom). The easiest solution would be to completely level the area and run a railroad lead track right down the middle of it with spurs branching off where needed. But this would involve an unreasonably expensive amount of grading, cause hazards and delays due to rail crossings at grade with streets, and reduce the size of lots. Another solution was to do an absolute minimum amount of grading, run the rail lead immediately parallel to the highway and branch off a spur wherever topography would allow, using primarily the flatter lowlands where plants could build with least grading. This was undesirable because of springtime flooding, the inefficient use of the site and the fact that the advertising or prestige value, hence economic value, of the district would be lowered by the random scattered arrangement of the plants, none of which would have the incentive to improve their environment since they
Figure 15. Locations of Peachtree Industrial District ("Chamblee District") and Fulton Industrial District ("River District")
Figure 16. Fulton Industrial District, A Planning Study by Robert & Company, Atlanta, of the Modification of Original Topography
could not be seen from the highway. The final solution proposed by the consultant, Robert and Company, Inc., a land planning, architectural and engineering firm, was a compromise. It involved the idea of doing a moderate amount of grading, building a dike-like ridge of earth along the river and running the rail lead along the top of the dike to keep it safe from flooding (Figures 16 top and 10).

The natural drainage runs were left but reduced in width by filling so that flood waters passing under the culverts in the dike would flood much less land than formerly (Figure 11). Approximately 60 per cent of the gross area from the dike to the highway has been made buildable for heavy industry, (not flooded and less than 10 per cent slope), or, excluding the probable area to be used for railroad right-of-way, park and public streets, 76 per cent of the net area has been made buildable.

Several trial studies were made by Mr. Andre Steiner, Robert and Company's land planner, to determine the optimum cut and fill (Figures 10 and 16). It can be observed (Figure 11) that the general procedure was to even out the ragged slopes, knobs and gullies by moving the contours so that an "almost good" site can be made a "good" site (large enough, accessible and slope less than 10 per cent) for this district's potential customers.

The gullies or natural drains seemed to be so spaced that they each offered logical boundaries between several of the sites. This is fortunate because it eliminates the need for filling them and hence the need for piping storm water. By keeping the original storm water-ways instead of piping and covering them, a lot of unnecessary fill was prevented and the original park-like green woodland character of the area
is retained.

One area of about 40 acres containing a hill too expensive to level will be maintained by the county as a public park (Figure 11, site 10). Centrally located, this is probably more valuable as a recreation area for the employees in the District and for the County than as an industrial site. It is contemplated that part of this non-industrial land will also be given over to a shopping center. This will no doubt be a later development, when sufficient employees work in and live near the area to create a demand for a shopping center.

Rail leads will branch off more or less at right angles from the main lead on the dike, approaching the sites along common site boundaries to prevent duplication. Short spurs from these leads will serve the peculiar requirements of each occupant. An attempt has apparently been made to keep railroad grades below three per cent and the curvature radii over 300 feet, though the preliminary plans show each to be slightly less ideal. An important feature of the rail layout is the underpass at the south of the area under the highway which will someday become a major circumferential of Atlanta's street system. To prevent over-investment in improvements, the rail line at first will be extended northward along the river to the southernmost few sites, the plan being to develop northward.

The district will be well served by streets. Since the sponsor is the county, cooperation in building roads and streets is easy to obtain. This cooperation is furthered because the boundary road (Highway 74) forms a part of a circumferential major street planned for the metropolitan area. Due to the existence of this road and a major radial road proposed for the
metropolitan area which will intersect the southern part of the district, the access to truck transportation should be very good. There are no railroad grade crossings to interfere with truck and auto traffic since the sites are practically all served by cul-de-sac type streets. The spacing of the cul-de-sacs (1200 feet minimum) reduces the street intersection problem to a minimum and yet gives ample accessibility to all sites. Since the industries are likely to be heavy ones, producing large volume of heavy, bulky products, there may be a larger proportion than average of the outgoing (as well as in-coming) freight handled by rail instead of truck. Due to the relative magnitude of rail freight, rail traffic seems to take precedence over truck traffic, a condition justifying even longer cul-de-sacs than those used, instead of a pattern of interconnecting streets which gives easy truck access from plant to plant. (This is the same argument used in justifying the long-dead-end-street system of Clearing, Chicago's rail-dominated district.) The widths of the street rights-of-way in Fulton Industrial District, 100 feet, should be ample for all traffic and parking likely to develop and a generous utility and landscape strip on each side. No sidewalks should be necessary in this district because the distance between plants and between the district and residential areas will be too great for walking.

The type of utilities will be water, sanitary sewer, electricity and gas. The size recommended for the water main is 20 inches at the north (source) decreasing to 10 inches halfway to the southern end. The sizes of gas and electric power lines will probably be determined by the private companies involved. The minimum size of sanitary sewer collector line will be 10 inches. Storm sewers are not needed, since this drainage
will be within natural drainage ways. The culverts in the dike are designed to handle storm water flowing into the district from outside on the unimproved wooded area to the east as well as water originating from rainfall within the district.

The location of electric and gas lines is not evident from the present general plan. Water and sanitary sewer lines are to be laid in the right-of-way of the public streets where possible. Beyond the end of cul-de-sac streets the water is shown as generally following alternate site boundaries, to prevent duplication. The sanitary sewers generally follow natural drainage ways. Since site boundaries follow closely the natural drainage ways, the water and sewer generally follow each other. An advantage of this is that each industrial plant can connect both their water and sewer lines from the same direction in a single easement. Since it is prohibited to build over easements, this one less easement means more land usable for buildings.

The design of Fulton Industrial District is desirably flexible. The variety of lot sizes, locations and services will give the potential occupant a wide choice. In several cases two or more lots can easily be combined if needed. Though development is planned to proceed from south to north, certain northerly sites not requiring railroad access can be immediately occupied. There should be little difficulty in re-plotting the area to obtain other lot sizes and shapes, if later desirable.

A minimum original investment is to be made in grading streets and placing utilities, so that in case of slow development, carrying charges on the capital invested will be a minimum. Since short cul-de-sacs are
to be built, the investment in streets will be much less than if a close
grid of checker-board or loop streets had been used. At first, water is
to be carried only along Highway Jk. Rails are to be extended only to
the first few southerly sites. Grading need not all be done at once.
The consultants recommended that the sewerage system be built a unit at
a time, located in a southerly or central location to be able to serve a
possible future extension of the district to the south.

In case of need for even more industrial land, the county owned
land to the south of the present development for more "wet" industry and
to the east of Highway Jk for "dry" industry can undoubtedly be developed
with no addition to the present basic highway, rail and utility pattern.
CHAPTER V

FINANCING AND OPERATING THE PLANNED INDUSTRIAL DISTRICT

While there are two types of finance necessary to planned industrial districts, the second, finance of the industrial buildings, as a part of the "Package Plan" properly belongs later in the section on "Promoting and Operating the District", and will there be discussed.

Financing the Development of Raw Land

This first type of finance is important because successful planned industrial developments require substantial amounts of capital for this phase. It involves the developer's obtaining enough capital to purchase and develop the land by grading and installing streets and utilities.

Difficulties with Conventional Methods

There are two difficulties with conventional financing methods which make this initial financing difficult to obtain. The first difficulty is that the mortgaging of raw land will provide only a very small fraction of the money needed to develop the entire district. For instance if the land could be mortgaged for 50 per cent of its value, this might be only adequate to develop a half to a sixth of the land, since the cost of development seems to vary from one to three times the value of the raw land.

The second difficulty is that a loan for developmental purposes is considered "speculative" by institutional investors.¹ They will not consider it.

¹Institutional investors are banks, insurance companies, university endowment funds, non-profit charitable trusts, government agencies, etc.
Three Possible Methods

There are three alternate financing possibilities which might be used for purchasing and developing the raw land.

**Developer's Own Resources.**—The first of these is the developing organization's own resources. These resources are sometimes adequate to finance the purchase and improvements to the land, especially if the developing organization is a local government or a railroad. When the developer's resources are limited (as is the case with many small private developers) he may, from profit from the sale of his first site, be able to keep the district graded and improved one or two sites ahead of immediate demand.

**Industrial Foundation.**—The second financing possibility is the reliance upon funds raised by the "industrial foundation" (or "local development corporation"). This is a particularly noteworthy type of financing organization, being relatively new and highly successful in obtaining funds to make this rather speculative type of loan. It is

> A corporation provided with funds by public subscription or donation, created for the purpose of encouraging the industrial development of the community by providing services of a financial nature to new or established industry.²

The purpose of foundations is to improve the economic base by increasing industrial payrolls in the community and by broadening the tax base. The typical industrial foundation does not seek to make profit, though several of them have done so. Four services offered by foundations are (1) buying,

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developing and selling industrial sites, (2) buying and building plants for lease or sale, (3) providing funds for loan to or investment in new and established industries for land, buildings, new equipment or working capital, (4) giving managerial, engineering and other counseling services to small business from the pooled knowledge of experienced businessmen and industrialists of the community.

While generally foundations have provided sites, buildings, and loans to single industries and enterprises, it would seem that foundations would be as willing to finance the developer of a planned industrial district as they would be to finance a speculative new industry. (In fact many of the foundations have themselves become developers and have established planned industrial districts.) The financial method used by industrial foundations would be a very feasible method of financing the developer in this initial land improvement stage.

The foundation raises its capital by a general campaign attempting to solicit the entire citizenry of the community or by a limited campaign addressed only to the business community. This is usually done by selling shares of stock in the foundation corporation. After investigating the responsibility and capability of a planned industrial district developer and being convinced of the soundness of his prospective development, the foundation may agree to take the risk and make some of their funds available to him.

The advantage of this method of financing land improvements is that the foundation is willing to take a greater risk than conventional institutional lenders by lending a higher proportion of the value of the improved land for a longer term at lower interest rates. Another advantage is
the broad public support and interest in the developer's planned industrial district which assistance by the foundation represents.

Municipal-Industrial Bonds.—The third financing possibility is the use of funds raised through municipal-industrial bonds. Under legislation in six states (Alabama, Illinois, Kentucky, Louisiana, Mississippi, Tennessee) municipalities may issue such bonds. The purpose of these bonds is to raise money to be used to attract and assist industrial plants and thereby to improve the economic base of the community. This assistance includes the acquiring and improving of land and the constructing of plant buildings for lease, rental or long term purchase. As the industrial plants pay back their obligation with interest, the bonds are retired.

It would appear that money raised in this manner could be used to a good purpose by assisting a responsible planned industrial district developer with a sound project. The advantage of this method of finance over conventional institutional methods is (as with the industrial foundation method) that such funds may be obtained for a higher proportion of the value of the improved land for a longer term at lower rates.

There are, however, serious objections to this method and the legality of it is in doubt. The Florida Supreme Court recently declared that the use of such bonds was not a municipal purpose. The Investment Bankers' Association has stated that the use of municipal credit in aid of private industry is unwise, and objections to the method are raised by others in the terms of "socialism" and "state capitalism". A very real objection

seems to be that "these are commercial bonds with a fictional municipal veneer", and by being commercial bonds, involve more risk, justify a commercial rate of interest and threaten withdrawal of the federal tax-exemption privilege from municipal bonds. As an illustration of the risk involved, the failure of an enterprise aided by municipal bonds might conceivably result in default by the municipality in payment of the bonds unless taxes were increased. Certainly industrial development is a doubtful use of the power of taxation.

In conclusion, funds to finance the improvement of the site of a planned industrial district may be most feasibly obtained through the developer's own resources, through an industrial foundation or through municipal-industrial bonds. Any of these methods may furnish adequate financing, but the principle of municipal-industrial bonds is questionable.

Promoting and Operating the District

When the preparation of the site for the planned industrial district is completed, then the occupancy of the district is promoted and the operation of the district's facilities and services begins. Promotion depends upon operation, for unless the facilities of the district are well maintained and operated and the services well administered, promotion will be difficult. Promotion and operation take place simultaneously and continue as long as any unsold land remains in the district.

Promotion

Promotion, or selling, is the act of seeking industrial plants who will occupy sites within the area. The most common methods used are the

\[\text{Ibid.}, \ p. \ 6.\]
direct mail campaign distribution of descriptive and illustrative brochures
and pamphlets, the writing of personal correspondence to likely prospects,
billboard advertising on the district's main roads and railroads, advertising
in large city papers and personal interview with likely prospects
by the developer. Other methods used are advertising in national industrial
publications, and publishing and distributing the district's own
periodical news letter or magazine. Often the local chamber of commerce
will be of assistance in referring prospects to the developer. Perhaps
the best sources of prospective clients are provided by industries already
located in the district, and by industrial real estate brokers.
If the developer is a railroad, the developer will, of course, obtain
especially good promotion due to full-time industrial promotion and de-
velopment staffs located in its offices throughout the country. If the
sponsor or developer is a chamber of commerce, promotion should be es-
pecially good due to the chamber's great numbers of contacts.

After obtaining prospects, it is important to carefully select the
best among them, since they (especially the first ones) will set the pat-
tern which subsequent development will tend to follow. They should be
desirable occupants in every respect and should be prominently located
in order to advertise the district. Careful selection of occupants whom
the district is Financing in long term plant purchase is especially im-
portant due to the hazard of the return of the lot and building and the

5Robert Wrigley, "Organized Industrial Districts", The Journal of

6The developer usually contracts to pay the real estate broker a
proportion of the cost of land and buildings.
difficulty of re-sale. Since happy occupants are a good advertisement for
the district, occupants are selected only if the location and district
characteristics meet the firm’s particular requirements in the opinion of
the developer.

Operation

Operation of the district goes hand in hand with promotion. "Op­
eration" consists of operating the central services and facilities of the
district and managing the unsold land. It will be recalled that there are
two types of districts with respect to central type services and facili­
ties: the "site sales" type which has no central facilities and whose
developing organization furnishes no central services directly, versus
the "operating" type which has and does both. Both types may offer the
"package plan" services.

The Package Plan Services.—The package plan is an arrangement whereby a
prospective industrial district occupant (even in a site sales district)
can obtain the various services essential to his plant planning and design,
financing and construction through one instead of several organizations.7

The principal advantage of the package plan is that, by signing a single
agreement and thereby contracting for several diverse services at one
time, a potential district occupant can save himself time and money when
both are particularly precious.

7 These services are in addition to the services and conveniences
already common to most planned industrial districts (including good local
industrial location, proper zoning, access by road and rail, complete
earth grading, utilities installed and restrictions adopted). These and
the package plan services do not include the central services for daily
operation which are furnished by "operating" districts.
The success of many new enterprises\(^8\) depends upon the speed with which it is possible to start production. Long delays in the early stages, after the necessary capital has been raised, deplete capital resources and irritate stockholders.\(^9\)

Much valuable time is lost to a firm locating a new plant when executives, who may encounter only a few (at most) such decisions in their lifetime, have to study a new locality, check local governmental plans and ordinances, seek out the people with whom to deal regarding transportation and other commercial services which the new plant will require, negotiate for utility and street extensions, check building codes, and also have to obtain an architect and engineering firm, obtain building permits and let construction contracts. On the other hand, if such a firm, having selected the community and the general location for its new plant, can be assured that the necessary services are available or will be furnished through the package plan of a local planned industrial district, much in time, money and resources will be saved. A firm can often occupy its chosen site and building within sixty to ninety days after signing its contract with the district. Such a time-saving "package deal" serves to attract to the district many plants which could not be attracted without this valuable service.

Every district organization (which includes "operating" district organizations) does not offer all the services in the "package" as an

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\(^8\)This statement would also seem to pertain to the efficiency of already established, but expanding industries, i.e. "new plants" generally.

\(^9\)Wrigley, op. cit., p. 189.

\(^{10}\)The services may include detailed industrial location analysis, real estate service, site planning and architectural design, engineering, financial and construction services.
integral part of its own organization. Other service organizations may be affiliated with the district organization by being retained on a fee basis, through profit-sharing with the district or merely by working in conjunction with and being recommended by the district.

For example, it seems that the typical railroad or semi-public developer does not furnish plant financing and construction services from within his own organization since, (1) there are legal restrictions against it, or (2) he can obtain adequate types and numbers of plants without offering these services, or (3) since his purpose is to obtain freight volume or improved tax base, these alternate profit opportunities do not appeal to him.

The privately developed district, on the other hand, often will include within its organization an architect, an engineer, capital for financial assistance and sometimes even materials and personnel for complete construction services. This probably is because the motive of the private developer is private profit, substantially more of which may be obtained through offering these added services.

All planned districts, of course, offer industrial real estate service (suggesting an appropriate site for the client). A few districts claim that they offer a further refinement of this service: impartial and detailed plant location analysis and recommendation. Additional services are required to claim a "package plan". The number and level of additional services vary with the district, but are probably most highly developed in privately developed "operating district" organizations, such as Clearing Industrial District in Chicago, the district no doubt offering the most highly developed "package plan" services in this country.
The first and most basic element in a package plan is the service of financing individual industrial plants and sites (including driveways, rail spurs, etc.). Besides being the most basic element, it is one of the most profitable. Industrial properties located in planned districts are generally recognized by financiers to be an attractive form of investment. Many financiers believe, as Mr. Henry C. Lewis of the Prudential Insurance Company of America does, that "Location in a planned industrial area is definitely a plus factor"\(^{11}\) (in rating the desirability of an industrial mortgage loan). Regarding the purchase and subsequent long lease of industrial properties, Mr. Lewis states "definitely this type of investment is more highly regarded when the property is located in a planned industrial district." Thus do financiers recognize the value of property in a planned district.

Although such large "institutional" investors make some financial services available to individual industrial firms, it is only to firms of the best credit standing. The advantages of the industrial district's package plan financing services over such "institutional" financing are that smaller and lesser-known firms may obtain such financial service, mortgages are made for a higher per cent of the appraised value of the property, and types of financing are offered in the "package plan" which are not usually offered by the institutional investor.

Three types of financial service may be provided. The first is long-term purchase of plant and site. It is customary for the developer

\(^{11}\) Letter to author from Mr. Henry C. Lewis, Investment Analyst, Mortgage Loan and Real Estate Investment Department, Prudential Insurance Company of America, dated August 19, 1954.
financier or the local financier who is associated with the district to lend 75 to 80 per cent or more of the appraised value of the improved land and buildings (secured by a first mortgage) even to small and little-known companies. The term of payment seems to vary from 10 to 15 years (rarely to 25 years) at four and one-half to six per cent interest.

The second common financial arrangement is for long-term lease. Land and improvements built to order (within the limitations imposed by the district's restrictions and necessities for convertibility of the structure for possible future tenants) may be leased at an approximate annual eight to ten per cent of original value, approximately four to six per cent of which is for use of the land and building (interest) and three to five per cent to amortize the investment (depreciation). The length of lease varies from 20 to 30 years, often with the possibility of five year options which can extend the lease up to 60 years in all. The lease arrangement has been widely used by industrial district occupants, even by large national firms. Such an arrangement often frees funds which can be used to greater advantage within the firm as working capital. Another advantage of the lease arrangement has been the deduction (in the form of "operating expenses") by the tenant firm of the lease payments for the purpose of federal income tax calculation.

The third, but not so common, financial service is for rental or short term lease of buildings already constructed. The interest and terms of these arrangements vary, but would be expected to reflect the greater risk and instability of such an investment which necessarily deals with smaller, younger and less known industrial occupants. Buildings so rented
or leased are often referred to as industrial "hatcheries" or "incubators". Only the larger privately developed districts are known to provide such service.

Comparing such unusual financial services with financial arrangements offered by typical national institutional investors (insurance companies, etc.) reveals the value of the financial part of the package plan. It fills a need not served by these larger, traditional financiers. For instance, many of the larger lending institutions do not consider purchasing industrial buildings for the purpose of lease or rent to small or local firms. Those which consider such "leaseback" arrangements are leary of doing so for any but national firms of long established credit rating, whose management and operations are first thoroughly studied. Regarding long-term plant purchase through mortgage loans, many institutional investors are limited by law as to the proportion (typically 60 to 75 per cent) of the appraised value which they may lend. The large institutional investor, due to the volume of its funds and its opportunity to make larger and more choice loans, feels that it cannot as economically investigate all the financial and non-financial aspects\(^\text{12}\) and any resultant risk in lending to small and local firms as it can investigate the large well known firm of long established credit history. The large institutional investor may also rightly feel that due to the great number and diversity

\(^{12}\)Some of the financial and non-financial aspects which are criteria for the risk involved in an industrial real estate loan are the firm's recent operating margin, its national credit acceptance, the quality of its management, its labor relations, the nature of the industry and the firm's standing within the industry, the nature of its markets, its future prospects, the appropriateness of its location, and the resale value of the new plant.
of its shareholders, policyholders or contributors and due to their lack of articulation, and for their general good it must make more conservative investments. The lower risk is, of course, reflected in slightly lower interest rates and longer amortization periods for those to whom they do lend.

The industrial district developer-financier or the developer's local financier affiliate necessarily represents fewer financial resources than the large institutional investor. This more local financier is willing to take a greater risk on the money he lends to finance industrial firms because he knows better the value of the property and building in view of the local relationships between community, plant type and location, improvements, building, and the firm's management and operation if the firm is local. Therefore he does not have to rely so heavily upon a firm's long-standing credit rating as does a financier farther removed from the local scene. His shareholders are fewer, more articulate, more enthusiastic about attracting plants than in "blue-chip" security of investment. The district-financier himself is usually a specialist in and an expert judge of this type loan, and may have considerable local experience to rely upon. He may offer buildings built to order with "lease-back" arrangements for firms with little credit history, he may build buildings for lease prior to securing a tenant, and he may even consider short term lease or rental. In financing the long-term purchase of plants, he may purchase a mortgage for a larger proportion (typically 75 to 80 per cent, or even 90 per cent) of the appraised value than will the usual institutional financier.
The developer-financier may obtain the necessary funds for these loans from the district organization's own capital, from local banks, or (if the district organization or the particular firm being financed have a well-established credit standing) capital may be borrowed by the district from larger financial institutions. Of course, a combination of methods may be used. Perhaps a typical arrangement would be for the local developer-financier to borrow 50 per cent of the appraised value from an insurance company, 30 per cent from a local bank and to obtain the remaining 20 per cent from a local industrial foundation, miscellaneous local investors or his own funds.

The "investor-builder" is a specialized type of financier who often is affiliated with the district. Loans on industrial district property are his speciality. He is usually a building contractor who offers the added service of helping the occupant finance the purchase or negotiate the lease of the building which he himself constructs.

In summarizing the service of finance, basic to the package plan, it may be said that it is most important to young or small firms, often being the sole factor enabling these firms to obtain all the advantages of a location in a planned industrial district. The package plan financing service is of three types: long term purchase, long term lease and short term lease or rental. These financial services are not obtainable by most small firms from the typical institutional investors. The capital behind package plan financing is often obtained locally. The local shareholders which it represents are often willing to take a higher risk to accomplish their primary goal of attracting industry to the area, and the
The second major type of service offered (directly or through affiliates) by a district in its package plan for its occupants is that of various professionals. The first professional whose services can be utilized to advantage is the land planner (or site planner or city planner). In addition to his services to the developer in coordinating the development of the entire planned industrial district with the city, preparing the site plan and the deed restrictions, he can make a substantial contribution to the package plan by assisting the architect with the land planning of individual sites. The second professional whom some developers may retain to contribute (at least part time) to their package plan is the industrial engineer, who with the architect, would advise as to plant layout for efficient operation. The third professional is the architect. His services are available to design plant buildings and supervise construction. The fourth professional is the engineer. In addition to his services to the developer in originally calculating and supervising construction, utilities, earthwork, pavement and rail leads, he may assist the architect in designing structures. He may also design and supervise construction of utilities and driveways for individual sites.

The third important service included in the package plan is plant construction. Such service is seldom included as an integral part of the planned industrial district organization. However, when a part of the district organization, the following advantages may be claimed for it: the saving through large scale purchase of materials, the possibility of standardizing building construction (especially important for lease or rental
properties) so that structural alterations can be easily made for future growth or future occupants, and through the use of interchangeable parts. This service may be furnished, instead, through an affiliate organization, often an "investor-builder". Where there is no affiliated construction organization, the planned district's organization may offer the service of selecting through competitive bidding a competent contractor for each job, and may follow through with field inspection of his work.

In summary, the three vital "extras" offered to potential occupants as a "package" in planned industrial districts are finance, professional services and construction. These services make it possible for an industrial district to attract firms which it would not attract otherwise, thereby enriching both the developer and the community.

Central Facilities and Central Services.—The second part of district operation, ranking in importance with the package plan, but not occurring as frequently, are the central facilities and services of the "operating" type district which serve to assist plants in their daily operations. These are feasible only due to the large numbers and concentration of industrial plants. The services may include central watchman and janitor service, buildings and grounds maintenance crew, and sometimes in the larger districts stenographic pools, clinics, private fire or police department and arrangements for central purchase of water and electricity. At least two large operating districts operate their own private community type facilities (streets, utilities) maintenance. District-owned central facilities may include rental warehouses, outdoor recreation areas, district-pressurized sprinkler systems, and indoor recreation, dining and club facilities.
Central facilities located in the district, but usually under outside ownership, include less-than-carload-lot freight stations, testing and research laboratories, banks, post offices and cafeterias.

Maintaining the District's Facilities and Services

Maintaining Community Type Facilities.--Community type facilities, such as dedicated streets, are maintained by the city unless the developer maintains title to them, in which case he maintains them by assessing the occupants as provided in their deed covenants. When a district's lots are completely sold the developer usually will have no further interest in the district, and will dedicate the community facilities to the local government.

Maintaining Special Central Facilities and Services.—The special central facilities and services that are not owned and operated by the developer (i.e. branch banks and post offices, cafeterias, etc.) are perpetuated and maintained by their owners and operators as long as they are profitable. Others (central maintenance crew, club facilities, sale of centrally-purchased water or electricity, etc.) that are owned and profitably operated by the developer and his district organization, may continue to be so operated indefinitely. On the other hand, the developer might arrange from the beginning to include a share of them in the original price of each deed, so that when all the property is sold the central facilities and services are automatically disposed of. Lastly, he might sell them to an association comprised of the occupants or to any other organization interested in operating such facilities and furnishing such services.
Maintaining Restrictions.—The continued enforcement of private restrictions is an important factor in maintaining the district's advantages and sustaining its property values. Such enforcement is accomplished (after as well as before the district is completely occupied) by the methods discussed in Chapter Four.

The continued protection of zoning restrictions depends greatly upon the successfully continued enforcement of the private restrictions. If the character of the district has become degraded through lax enforcement of private restrictions, this change may be adequate to justify the area being dropped to a lower zoning category or justify amendment to the zoning ordinance. Since this would only lead to further deterioration of the industrial district, the value of retaining the district's private restrictions is obvious.

Summary.—Many of the services, facilities, and restrictions making the district a more valuable location for small and medium-sized industry must be maintained and continued in order to retain the value to each occupant of a location in the planned industrial district.
CHAPTER VI

CONCLUSION

The Future of Planned Industrial Districts

Industrial Districts Served only with Highways

It is feasible for certain industries to operate entirely without direct access to a railroad, as shown by certain small, light industries now successfully so operating. Trucking terminals, certain warehousing operations, and light industries of the type using rental buildings would be types particularly suitable for planned industrial districts located in "highway" districts without railroad access. Such districts would be most suitably located along or at junctions of the most important trucking routes.

Industrial Districts Serving Nuisance Type Industries

In view of the tendency for central city zoning districts and planned industrial districts generally to exclude nuisance type industry, one might seriously inquire "where if anywhere will plants of this type locate?" If they are individually large enough and can obtain utilities and other requisites, each can go alone to the open country side, but what will the small plant do? Nuisance plants will not be allowed either in the planned industrial district or in the central city, as they once were, and they cannot afford an inconvenient rural location. Shall they completely abandon their operations? Probably not. The small plant's
problems may be solved by cooperating with other small nuisance type industry in establishing an appropriately located planned industrial district meeting their requirements. Such a district might be located best on outlying land to leeward of the urbanized area.

"Operating" Type Districts

New industries should be encouraged and given adequate financial assistance. Except for certain local financial resources (such as industrial foundations and "operating" district organizations) money for financing industrial plants seems to be particularly scarce for small or local firms. The plant of this type firm is likely to be the technically immature (not fully mechanized and "automatic") type which could benefit from location in a planned industrial district, yet for financial reasons cannot afford it. Such a technically immature plant is likely to require plentiful labor and thus large parking areas, city-type convenience of service and thus location in a well-planned district, substantial operating capital and thus a need to save its funds through financial assistance in plant purchase, lease or rental. These three requirements call for a planned industrial district of the "operating" type. This type district or an industrial foundation is probably the most satisfactory provider of the service of plant finance. In spite of the fact that few of them exist, they are perhaps the only providers of plant financing services for small, local or technically immature plants. There are many such small firms crowding obsolete, inefficient, close-in industrial areas, which could

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1A nuisance may be caused by noise, odor, vibration, air or water pollution.
benefit from a move to a planned district, especially if lease or rental buildings were available. In the future, therefore, to promote more economical, efficient location and operation of many of its small industries, a community must have available adequate planned industrial districts of the "operating" type or adequate industrial foundations, or both, a combination of them, or an equally good substitute which will build small plant buildings for lease or rent as "hatchery" or "incubator" service for young and struggling firms. Thus, as conditions become more favorable for starting new industrial firms, the "operating" planned industrial district offering lease and rental buildings and other special services is likely to gain in favor.

Industrial Districts in Residential Areas

Small and medium non-nuisance industrial plants are not as incompatible with residential uses as they have been in former years. This is true of plants with technically mature operations (usually plants of nationally known firms of the automatic or "pushbutton" type which employ very little labor per unit of output) since they generate comparatively little employee traffic. It would seem that a planned industrial district consisting of such plants could be at least as compatible with surrounding residential areas as a cemetery, a museum, an electric substation or a hospital, all generally considered acceptable.

A planned district consisting of young or technically immature plants (employing fairly large amounts of labor) can also be made compatible with residential uses if located along a major expressway so that the resulting traffic would not pass through and injure the neighborhood.
Such a district would be a particularly welcome neighbor to a residential area if attracting a large share of its labor from the same area, perhaps even within walking distance, thus reducing congested employee traffic and saving for the employee the expense and time-loss of long-distance transportation to work.

Thus it is possible to change zoning concepts to permit non-nuisance industrial districts adjacent to or among residential districts.

Industrial Districts in the Central City

The establishment of new planned industrial districts can alleviate one of the gravest urban problems of our time: conflicting land use and local congestion. Conflicting uses of land and the problems that results from them probably have been and still are among the most numerous and difficult problems of city planners. Traditionally, the most objectionable mixture of land uses is that of residential and industrial. Among the problems these traditionally conflicting uses of land have created are low land values, high costs of municipal operations, high taxes, inefficient industrial operation, unhealthy and unsafe living and working conditions, social disorganization and moral breakdown, and mass exodus ("diffusion") of many of the best residential and industrial uses to the suburbs and fringes to re-create again many of the same problems. Some of the factors causing these conditions are industrial smoke, odor, noise, vibration and glare, heavy traffic noise, dust and hazard, qualitative and quantitative shortage of land for industrial expansion, residential and recreational use.

With a view to correcting these problems by attacking their causes,
local planning agencies should attempt (1) to protect local amenities and to secure pleasant living conditions; (2) to secure a satisfactory relation of homes to work-places with a view to reducing the travel-time and traffic congestion so often resulting from the daily mass entrance to and exodus from the central city area; and (3) to provide for the specific needs of industry itself.\textsuperscript{2} These local goals may be approached by the wise use of the familiar planning techniques (especially zoning) together with such relatively new possibilities as "urban renewal", and planning on a metropolitan or regional scale. Planned industrial districts can play an important role in each possible solution.

Further use of planned industrial districts in the central city blighted areas which are demolished and cleared through urban renewal can considerably reduce both the existing and the future problems of land use conflict. Under the Housing Act of 1954,\textsuperscript{3} a clearance area need not be (as formerly) predominately residential either before or after redevelopment, to receive Federal assistance. Therefore, even areas predominately non-residential prior to redevelopment may be, if suitable, redeveloped to be predominately or completely industrial. This furnishes an excellent opportunity for use of the planned industrial district, as well as an opportunity for the central city to broaden its tax base and to move toward the three previously mentioned local planning goals.

Cities creating planned industrial districts through urban renewal


might well consider the creation of two special type areas within such districts: the "hatcheries" previously mentioned, and "centers" for competing or complementary industries. A "hatchery" area in the planned district would be designed to contain buildings for rental or short-term lease to new, small enterprises. This would encourage new industries to take place in central city areas where their relative advantage is usually greatest, and would furnish them modern buildings in environment far surpassing the ancient lofts in blighted areas so typical of "hatchery" enterprises. Such lease and rental facilities might also prevent young firms from building their own small plant buildings in the fringe and leaving the central city entirely, to the obvious detriment of the central city tax base.

The other possible development that should be included within the planned industrial districts created under urban renewal is the industrial "center". An industrial "center" in the meaning here intended is all or part of a planned industrial district which is occupied (1) by competing industries or (2) by industries whose operations complement each other (an industrial "family"). Both types of center would offer advantages not possible in an ordinary planned industrial district. The first type would offer indirect savings to all its industrial occupants due to the savings in shipping time created for their common suppliers, the sharpened competition caused by proximity and the "shopping" convenience created for their common customers. The second type "center" might consist of a "hen-and-chicks" type grouping of industries or a "family" arrangement possibly even including industrial "first-cousins". The processes and operations of these plants would be partially dependent,
one using by-products of another, or further processing another's product, or supplying another. The advantages of savings in shipping, executive and coordination time are obvious. In either type center, each occupant plant would share in the fame and prestige of the "center" and benefit immeasurably thereby. Centers might be established for industries such as electrical machinery, medical or optical goods, sheet metal, plastics, home appliances, farm machinery and many others.

Since the community redevelopment agency retains the authority to plan such an industrial district in accord with community needs and controls the sale of redeveloped land, it can adopt a policy of creating industrial "centers" of a land-use type extremely compatible for the industries inside and the neighboring land uses outside the district. Thus the planned industrial district can be put to work through the valuable tool of Urban Renewal to create the optimum in land use harmony, reduce nuisance and congestion and promote the three previously mentioned local planning goals.

Problems of Regional and National Concern and Their Solution

While predominant problems of old central cities are problems of national concern, perhaps those serious problems of a metropolitan or inter-city nature are the ones which extend most obviously into the realm of state or federal concern, since no single small political division can adequately deal with them. Three of the most enormous and pressing of these problems are the "fringe" or "diffusion" problem, the problem of civil defense and the problem of mass unemployment.
The "Diffusion" Problem.—"Diffusion", "suburb", "fringe" or "urban sprawl problem" are terms used to characterize the recent alarming diffusion of industry, population and commerce from older central city areas to areas outside.

Among the problems created by diffusion is the central city's problem of increasing per capita cost of public services. While the financially more fortunate population and industry move out to the fringes, central city blighted areas continue to grow and demand excessive servicing which must be paid for through funds obtained from a tax base which is declining. The many people working in central areas who live in the fringes continue to use central city facilities (streets, etc.) and yet pay nothing to maintain them. Many central cities are now on the road to bankruptcy. The need to prevent this catastrophe is of national, perhaps international importance.

The most notorious of problems created for the fringe itself by the diffusion trend are those of inadequate public regulation of land development, inadequate public service in the fringe and inadequate tax base in fringe residential communities to support such services. The problems of education, water supply, superhighways, sanitation and contagious disease control, fire and police protection, and the contagious degrading effect of low-grade land developments and substandard environment do not respect local political boundaries and do not permit economic service or efficient control within such narrow and artificial boundaries. These needs for public service and regulation can best be met by (1) coordinated planning between localities with adequate tax resources or (2) by an integrated industrial-residential metropolitan community as an alternative to separate
provision by each residential district or suburb. These unserved needs afflict a large proportion of our nation's population.

The Civil Defense Problem.—While the older central cities appear to be "diffusing" to increase the size of the fringes, much fringe population growth is also created by immigrants from rural areas and smaller towns. The combined result is to cause not only the fringe, but the entire metropolitan area to increase enormously. And the larger a metropolitan area becomes, the greater is the attraction for many types of industry, especially those requiring specialized services and specialized labor. So "the larger an area grows, the larger it is likely to grow". Such large aggregations of population and industry are extremely attractive targets for any enemy nation's bombs. There is a great need to disperse such large concentrations to prevent their very annihilation in case of war.

The Problem of Mass Unemployment.—In an international economy under many governments and consisting predominately of private enterprise, probably no wise policy or action on the part of government could prevent the fluctuations of the economic cycle. Inevitably certain regions will be more adversely affected than others by such fluctuations, and large and localized unemployment may result at certain times. In other cases local depletion of natural resources, or technological change may cause distressing localized unemployment. At such a time it is very difficult for labor to migrate to areas where they might find employment. There is a need for some answer other than pure government charity to solve such a problem.

Toward a Possible Solution.—The strategic use of well planned industrial
districts can contribute toward a solution of the three previously mentioned problems of national importance.

As a partial remedy for the "diffusion" problem faced by central city areas the planned industrial district created through urban renewal can attract industrial plants which would not otherwise locate in central areas. The convenience of such a district in the heart of the city is irresistible to many types of industry, especially if such a district is of the "operating" type, organized to provide the "package plan", and developed to include a "hatchery" and a "center" as previously discussed. Without such an area, the shortage of suitable land could preclude any substantial attraction of industry and dim hopes of ever bolstering the waning tax base.

To alleviate the problem, caused by "diffusion", of public service inadequacies in the urban fringe itself, the planned industrial district is already demonstrating encouraging possibilities. Under private, semi-public, or public development the well located, carefully planned and judiciously developed district will raise the tax revenue potentialities of fringe communities. With this source of revenue fringe communities will be more able to furnish themselves the necessary public services. However, as a more desirable and whole solution to the metropolitan "diffusion" problem, such planned industrial districts located in the same fringe areas can be made to benefit the entire metropolitan area if the fringe areas join with the central city to become a political part of the same metropolitan region to which they are already an economic part.

Whether part of the central city, the fringe community or the greater metropolitan region, planned industrial districts by their very nature
create not only a larger tax base for the region, but also improve the orderly development of land and help prevent the problems that arise from unplanned and mis-used land.

As an answer to the civil defense problem, semi-rural or outlying planned industrial districts are practically indispensable. A location in them is the only realistic alternative for many new small plants to location in large "target cities" already containing an overconcentration of industry and population.

As a partial answer to the problem of unemployment, the planned industrial district has much to offer. A district occupied by a diversity of industrial types will serve to stabilize the employment situation in its labor-market area, preventing local unemployment which might otherwise occur due to unbalanced dependence upon a particular industry or process, or due to fluctuations in segments of the economy upon which the locality is overly dependent. The planned industrial district may also be used as an alternative to worker mobility in furnishing employment for the unemployed. Since some industries can locate almost anywhere they find adequate labor, a planned industrial district in a labor surplus area would be the ideal location for a plant of this type.

Implementation of the Solution.—The use of the planned industrial district in achieving the above mentioned solutions to these problems must be assisted and guided by a formal statement of policy and methods from regional planning agencies and from federal agencies concerned (primarily the Housing and Home Finance Agency and the Departments of Commerce and Defense). Such policies might be as follows:
1. Encourage planned industrial districts (either privately or publicly developed) as an alternative to scattered or piecemeal industrial developments;

2. Redevelop blighted areas to furnish the proper relationship among various uses of land, encouraging redevelopment for industrial districts where suitable, to improve the tax base and help the central city finance the problems caused by "diffusion";

3. Encourage political integration of the diffused parts of metropolitan regions which are members of the same economic region in order that the entire region may benefit from the taxes of its industry which happens to be located in the "fringe";

4. As a civil defense measure, channelize the tidal wave of new industrial growth of the largest "target areas" and divert it out of range of direct bomb hits upon these areas;

5. Encourage removal from target areas of existing industry whose plant facilities are obsolete and fully amortized where this removal will not work undue economic hardship upon the central city;

6. Promote the future location of new industrial plants in area of chronic mass unemployment, as an alternative to wasteful charity or the hardship of worker mobility or both.

Methods which might be used to accomplish such a set of policies might be, respectively:

1. For local planning agencies to furnish upon request sound planning advice to local developers of industrial areas;

2. For a locality to avail itself of the powers of redevelopment for industry under the Federal "Urban Renewal" law;
3. For the federal government to make certain financial advantages available to cities on the condition that a single urban political unit exists to represent at least, say, 75 per cent of the metropolitan area as defined by the Federal Bureau of Census;

4, 5 and 6. For the Federal Congress to create a national industrial location board which would have the authority to control the exodus of and the admission of industry to overcrowded target areas by granting or withholding, as appropriate, certain federal income tax privileges or federal war contracts. This board might establish sites for new towns possibly 50 miles from target areas, and encourage location of new and removed industry in planned industrial districts^4 within such new towns or in other small and suitable semi-rural towns by the same methods above mentioned. The same methods would be used to encourage industries to locate in areas of chronic labor surplus.

The planned industrial district is an ideal nucleus for any small new towns created to solve the above problems in the future. New towns or "garden cities" already have been successfully tried in England. Examples are Letchworth and Welwyn. Such complete towns might be developed by and the unsold properties managed by a railroad or by a private developer and the community facilities turned over to the local government as in the North Kansas City (Missouri) Development Company's "Dynamic

^4 Each planned industrial district involved might be developed with federal assistance and to federal specifications by a local semi-public organization. On the other hand it would be entirely possible for such planned industrial districts to be as successfully developed by private organizations under municipal regulation as they have been in other areas in the recent past.
Triangle" (industrial, commercial and residential land development). As an alternative the development might be made by and the community facilities maintained by a semi-public body as at Letchworth and Welwyn, which were developed and managed by limited dividend corporations. The optimum population of such a town would probably be around 50,000. This is generally considered to be the size of city most likely to have optimum development of variety and adequacy in most of the following: physical community design, economic base, health conditions, public safety, municipal efficiency, education and communication, recreation, retail facilities, churches and voluntary associations, family life and psychological well being. It is also the maximum population considered safe from attack by modern bombs.

The Town of Letchworth, England was designed many years ago to have overall gross density of 7.8 people per acre. Since living nowadays is not as dense as formerly, possibly a goal of five people per acre should be the overall design density of any such new town. For a total population of 50,000 people this would require a town of 10,000 acres, an area roughly 4.5 miles in diameter. If 2,500 to 5,000 people are employed in the planned industrial district, and the density of employment is expected to be, say, ten employees per acre, the planned industrial district or districts should total 250 to 500 acres in size. The districts could be located conveniently within five to ten minutes drive from every part of town, and within walking distance of many parts of town. The "new town" is one of the most promising and practical developments for better living.

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to which a planned industrial district could be put.

Selected Problems for Future Study

In the course of this study, certain problems beyond the purpose of this thesis have arisen. Further research and analysis of these problems may point the way to improved operating conditions for industry, further prosperity, improved environment and generally better urban living conditions.

Rehabilitation of Aging Industrial Areas.—The possibility should be studied of renovating or "rehabilitating" declining industrial areas in a manner similar to that applied to declining residential areas through urban renewal. The purpose of rehabilitation could be to raise the value of the environment and the productivity of still usable industrial structures by selected and well-planned modification and repair of each. Standards for such rehabilitation need to be formulated.

Mutual Savings Inherent in Industrial "Centers".—Cost studies need to be made to demonstrate the total aggregate profits to all similar or complementary industrial occupants of the "centers" described in this chapter over the aggregate profits accruing to each industry located among industries of non-related types (in "ordinary" planned industrial districts).

Total Advantages of Outlying Planned Districts.—The difficult problem should be undertaken of attempting to analyze in dollars and cents the total operational advantage to a particular plant of an outlying planned district location compared to a centralized city location; considering shipping time, convenience for customers, suppliers and company executives,
advertising or prestige advantage of the location and value of the environment.

Compatibility of Light Industrial and Residential Uses.—Study of existing mixtures of residences and new light industrial plants (classified according to performance standards) might reveal a need for a change in existing zoning laws, which seem to be reflecting very little of the new attitude of tolerance toward a residential-industrial mixture. This study might include appraised valuations of adjacent property and attitudes of neighbors before and after the mixing occurred.

Method of Restriction of Industrial Districts.—The dilemma of "the best" method of restricting planned industrial districts, posed in Chapter IV, needs further study. Perhaps the combination of zoning, tenant selection and occupants' association, used by the developer of Atlanta's Peachtree Industrial Boulevard, would prove more practical in the long run than conventional deed covenants. Perhaps zoning alone would be adequate if especially restrictive provisions could be written for a "planned industrial district" zoning district. The legality and practicality of this should be investigated.

Summary

The evolution and success of planned industrial districts have been explained as the result of certain trends in industrial location, among which are the increased mobility of market- and labor-oriented industry, larger consumer markets, the need of market-oriented industry for the
advertising advantage of an attractive well placed plant, decentralization from overcrowded, expensive and unpleasant central city areas, and re-centralization of small plants to obtain "large plant" advantages including extensive types of services and central facilities. Advantages to both the planned industrial district occupant and the community were discussed. The general method was discussed for determining the need for a planned industrial district in any particular locality.

Methods were mentioned for selecting and acquiring a suitable site, observing that access of the site to air transportation is becoming more necessary. Physical preparation and improvement of a site for a planned industrial district were treated in detail, stressing the prerequisite step of coordinating the development with the plans of local government. Wise planning and scheduling of development were emphasized as prime requisites for an industrial district developer's financial success.

The difficulty of financing the development of raw land for a district was noted, with the "industrial foundation" as a likely answer.

Varied facilities and services, including pooled or centrally operated ones are offered as part of a district's advantages. Among the many services offered by planned industrial districts, the financial service contained in the "package plan" is among the most popular and useful to small and larger plants alike. Maintenance of the district's restrictions is important in maintaining the value of the area to all concerned.

The future offers many real and challenging possibilities through the proper use of planned industrial districts to benefit their developers
and their industrial occupants, to improve the quality of living in local communities, and through all these, to improve the status of our entire national society and economy.
APPENDIX A

PROCEDURE FOR IDENTIFYING POTENTIAL INDUSTRIAL AREAS

The United States Department of Commerce suggests the following steps in identifying potential industrial areas on a work map:

1. Using topographic maps of the entire marketing area of your city, indicate the location of all land having a slope of approximately 10 percent or less.

2. Using any available recent aerial photos of the metropolitan area and land use and zoning maps, plot on the work map all vacant areas which may be available for industrial use, and which have a slope of 10 percent or less.

3. Draw lines parallel to and about 1 mile from paved highways or railroads. These lines represent the approximate maximum distance from transportation facilities that industrial plants are normally located. Also plot on this map the areas served by freight-car switching service and the areas served by less-than-carload service.

4. Transfer from the utility maps to the work map the location of electric transmission lines, gas lines, water supply pipes, and sewage disposal systems.

In addition to plotting the location of industrial areas on the work map, a tabular summary should be made of the characteristics of each industrial area or tract. Numbering of industrial areas on the map to correspond with the tabular summary should be sufficient cross-reference.

The tabular summary of site characteristics should be made from the following checklist:

- Proper dispersion.
- Physical characteristics:
  - Size and dimensions.
  - Topography.

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1. *Industrial Dispersion Guidebook for Communities*, United States Department of Commerce, Domestic Commerce Series No. 31, p. 20.

2. Ibid., p. 21.
Subsoil bearing capability.
Amount of grading required.
Availability of adjoining land.
Net construction acreage.
Drainage conditions.

Labor proximity:
Immediate area of site.
Nearest community.

Services and facilities available:
Rail transportation:
Nearest rail line.
Length of siding required.
Limitations to siding construction.
Inside or outside of switching limits.
Service.

Highway transportation:
Nearest paved road.
Road access impediments.

Water transportation:
Availability to site.
Service available.
Public transportation, service schedules.

Utilities:
Natural or manufactured gas:
Distance to site.
Cost per 1,000 cubic feet.

Electric power:
Availability.
Rate schedule.

Water:
Quality.
Distance of site.
Cost per million gallons.
Limitations to quantity available.

Sewage disposal service:
Distance to site.
Capacity of main.

Existing structures on site:
Size.
Type of construction.
Bearing load per square foot.
Age and condition.

Police and fire protection.

Other site factors:
Local land use.
Zoning restrictions.
Types of manufacturing permitted.
Percentage of area to be occupied by covered structures.
Waste disposal and water pollution restrictions.
Taxes and special assessments.
Estimated cost per acre.
Number of ownerships.
Existing structures.
After the checklist has been compiled the Department suggests two final steps.³

To the work map and tabular summaries, add data concerning existing and potential industrial areas which were obtained in the canvass of local organizations engaged in industrial development.

When the map and tabular summary have been compiled, members of the technical staff should go into the field by automobile to check the tentative findings with respect to the industrial areas.

³Ibid., p. 20.
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