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IMPACT OF INDUSTRY ON SURROUNDING COMMUNITIES

by
Mohamed Mohamed El Barmelgui

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Landscape Architecture)
in The University of Michigan
1972

Doctoral Committee:

Professor Charles W. Cares, Chairman
Professor Douglas D. Crary
Associate Professor Leon A. Pastalan
Professor Stephen B. Preston

DEDICATION

To my parents, my wife and my son.

ACKNOWLEDGMENT

I would like to express my sincere appreciation to my doctoral committee: In particular, to Professor Charles W. Cares, Chairman of my doctoral committee, for his inspiration, guidance, valuable advice throughout my graduate studies, and for developing my interest in research areas; to Professor Douglas D. Crary for his most helpful suggestions provided during numerous discussions through all of the research, and his considerable assistance in the collection of Livonia data; to Professor Leon A. Pastalan for his deep interest and advice, especially in the methodology and the development of the several areas of the research; to Professor Stephen B. Preston for his valuable cooperation, guidance and encouragement.

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PREFACE

Industrial development has changed the traditional mode of living. Production, transportation, needs of daily life, and progress in science develop at a high rate. Social and cultural deficiencies have been created by the extensive dynamics of industry which later on caused the deterioration of the traditional form of the city with no corresponding accepted form for the physical design of new cities to meet the new conditions. The advanced technology of machines and mechanized industry with all their advantages and disadvantages have induced Planners, Architects and Landscape Architects to seek new theories and solutions for these and hitherto unknown problems.

However, physical planners can no longer limit their concern to merely the physical design of cities. It is necessary to go beyond, far beyond, into the wide ranges of cause and effect, of action and reaction, and into the reasons for force and, more particularly, into counterforce.

The many advancements in science and technology have given man the power to cause radical environmental changes. This power creates many opportunities for more individuals to obtain more of the necessities of life, but it also introduces new hazards.

Until the advent of steam power and the ability to roll steel, the problem of pollution, overcrowding, and widespread degradation of the environment were not as extremely dangerous as they are now. The problems associated with industrialization have now reached a level which threatens the quality of our life and possibly our ability to

survive. The answers to some of our problems may come from the same science and technology which has led to the creation of our problem.

Developing countries have neither received the full potential of the benefits of technology and science, nor have they yet suffered the loss of environmental quality which comes from sometimes ill-considered exploitation of our resources and from an unchecked private enterprise system.

We assume that development is possible within a framework of the control which provides answers to the following questions:

a. How can pollution, overcrowding and widespread degradation of the environment be avoided?

b. How and where is industry to be located?

c. How can industrial cities be designed with a minimum of undesirable impact of industry on residential areas?

Emerging nations have the opportunity to learn from the experience of the already developed countries, and should plan carefully for the future of their industrial cities to avoid the environmental problems which have accompanied industrial growth in certain industrialized nations.

Research raison d'être

The purpose of this research is to derive a comprehensive model for planning new industrial complexes within an emerging country in which more consideration will be given to associating residential areas with industry and to provide principles for the components of residential organization.

It is intended that this comprehensive model will be developed as follows:

1. Evaluation of how the existing environment in an industrial community within an emerging country, such as Egypt, differs from optimum standards, e.g., the community of Shubra of the Cario metropolitan area.

2. Evaluation of how the existing environment in an industrial community within a developed country such as United States differs from optimum standards, e.g., the community of Livonia.

3. Evaluation of how much Egypt could learn from the experience of the United States as a developed country in planning its own new industrial communities.

Approaches

The objectives of this research are to study the impact of industry on residential communities by the following approaches:

1. To determine the number of changes between past and present, and to evaluate the nature of these changes.

2. Evaluation of existing communities as to how existing residential organization differs from optimum standards which should be applied in the Shubra district, and to understand the many problems created by extensive dynamic developments of industry in the Shubra community such as excessive densities and population growth, failure to provide corresponding qualities of social and cultural amenities, and the lack of visual

magnetism of the community. Evaluation of the effect of technology on the physical planning of the city of Livonia, and to study how this is useful for planning new industrial communities.

3. To check other proposals in urban theories and practices to find which approaches were carried out and the degree of success.

4. To explore methods for resolving such problems as identified in item 2 above, and to provide planning and design principles for new complexes.

CHAPTER I. HISTORICAL BACKGROUND

This part compares the changes between past and present, and examines the progress of these changes.

> "How can we plan the future without knowledge of the present; and how can we understand the present unless we know the past out of which it grows? We must go back in order to look forward."
>
> -- Maxwell Fry

A detailed background study of the history of urbanization and industrialization has been explored, and it is intended here to present a brief resumé of the history of attempts at coordinating industrial activity with housing in Egypt and the United States. In some instances coordination has not been attempted but a record still exists which shows the juxtaposition of industrial and residential use.

The environment influenced man and his behavior in establishing his settlements in the past. Man also influences his environment by his activities in fulfilling his needs sometimes intentionally and sometimes as an unwelcome byproduct.

The more simple the society, the fewer complications and problems it has. Man's environment can be mainly characterized by energy, materials and social structure. In the past, man's dwellings offered shelter and storage facilities. Grouped dwellings provided a milieu for security, cooperation and social life.

The ancient Egyptian came upon new means of energy through the organization and concentration of manpower and a factory system. Progress brought not only the foundation of new industries and manufacturing, but also the organization of the factories. These employed hundred of workers and provided for their food, employment and housing. Standardization, specification and control of production were characteristics of that time. This theocratic society was molded on a belief in a second life, and the pyramidal social structure with the king and the priest at the top. The artistic tendencies of the common people led to a rise of the building industry, mainly in the fields of temple, pyramid and palace construction.

The Ancient Egyptian Conceptions
DESIGN CRITERIA

- clear zoning system in terms of the social levels
- geometrical design
- orientation of streets was usually east-west
- narrow streets were shaded with palms

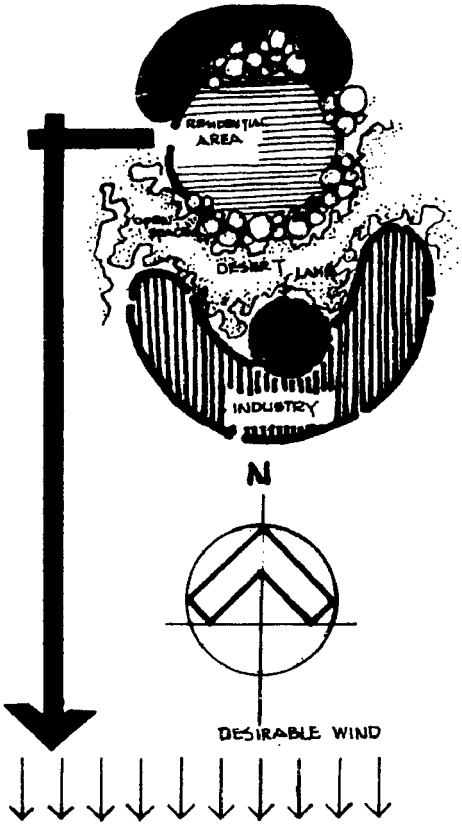


FIG. 1.1a RESIDENTIAL AREAS WERE LOCATED WITHIN WALKING DISTANCE OF INDUSTRY.

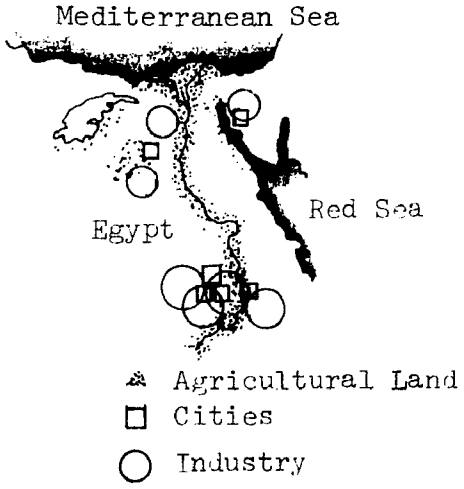


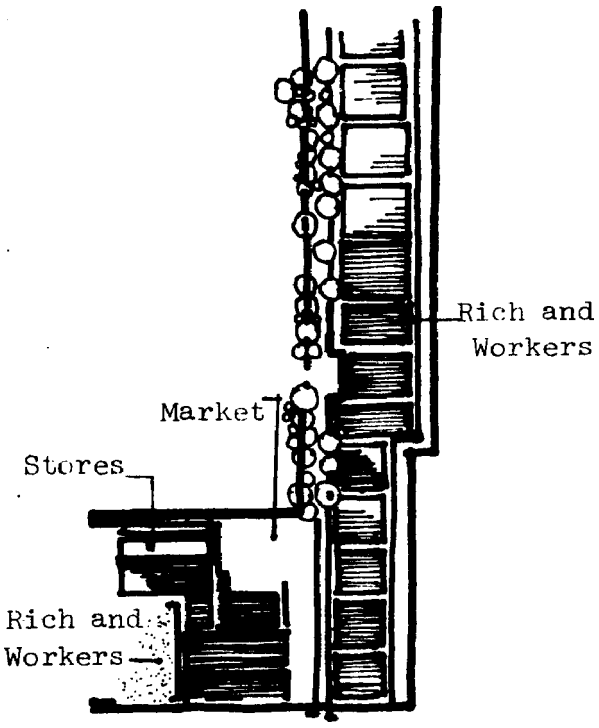
FIG. 1.1b MOST OF INDUSTRIAL CITIES WERE LOCATED OUTSIDE THE BORDER OF THE AGRICULATURAL LAND.

Housing was mostly preplanned. In the cities, some industries had their own quarters to provide their workers with living accommodations close to their place of work. (Fig. 1.1a, Fig. 1.1b).

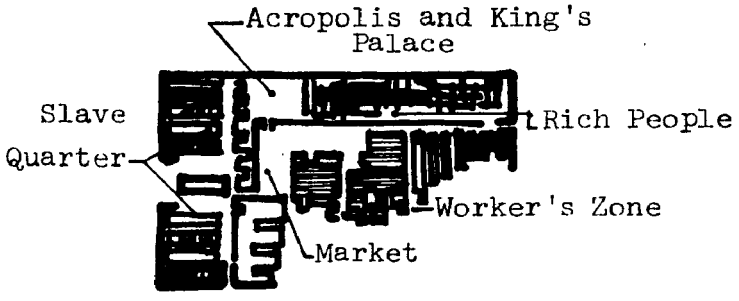
The Egyptian worker colonies, which were mainly for those of the building industry, were located near the different projects. General design principles were based on disciplined planning with the aim of housing the workers where they could be easily controlled or assembled at any time. The colony was separated from the surroundings by a thick, high wall with controlled entrances. An excellent example is that of the workers communal city of Khent Khaos of 2900 B.C.

The different sections of the colony were zoned in terms of the social structure as illustrated in Fig. 1.2. In the worker city of Tal-El-Amarna (Said, 1953) of (Fig. 1.3a,b) in 1375-1358 B.C., Egyptian workers and technicians had houses which occupied the northern and eastern parts. The slave workers who were in reality war prisoners, were housed in the western part facing the hot western wind. The chief of the workers had his house in the corner of the colony, thus controlling the entrance. The same zoning is clearer in the worker city of Illahun (Wolley, 1954) in 2100-1700 B.C.

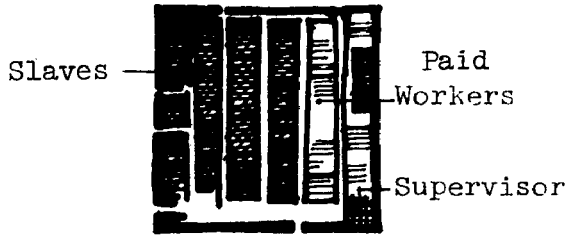
In all cases, the Egyptian street planning represented geometrical order and discipline. In the Khent Khaos colony shown in Fig. 1.2, the main street had double lanes with a wall in between. In Illahun, Fig. 1.2, the two main perpendicular streets went through the main sector of the city. The orientation of main streets was always east-west to give northern orientation to one side of the houses and shadow on the other side. In Khent Khaos (Wolley, 1954) the streets were shaded with palm trees, and main streets led to the center or to the market.



Kent Khaos: Worker's City



Illahun: East-West Orientation of Streets



Tal-El-Amarna: Geometric Pattern with Ring Road

FIG. 1.2 EXAMPLES OF ANCIENT EGYPTIAN CONCEPTIONS WHICH SHOW THE ZONING STRUCTURE OF MOST OF THE CITIES IN SOCIAL TERMS.

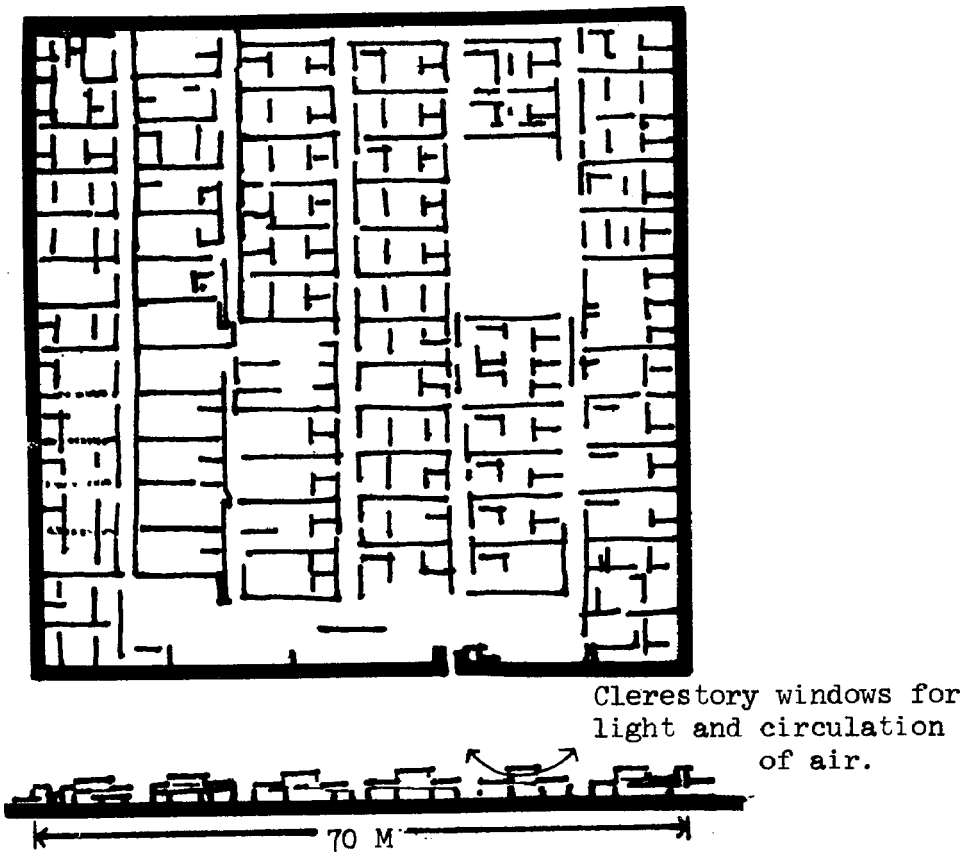


FIG. 1.3a DETAILED PLAN AND SECTION OF TAL-EL-AMARNA.

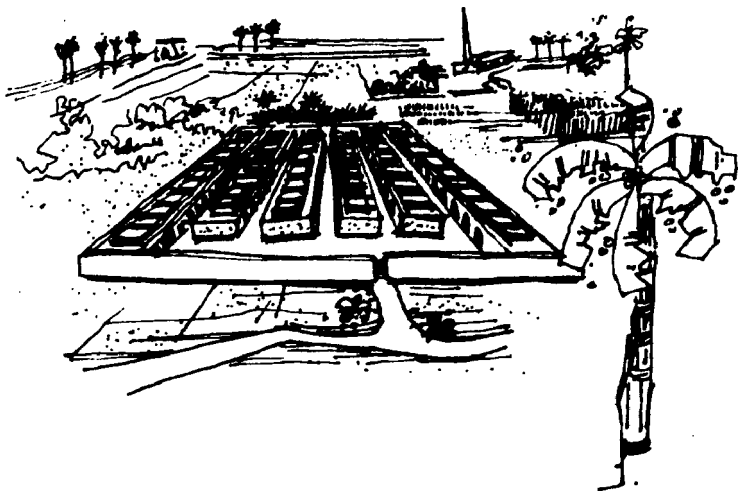


FIG. 1.3b BIRD'S EYE VIEW OF TAL-EL-AMARNA.

Concentrated blocks of buildings were always of a characteristic pattern. Climatic and economic conditions led to the use of one-story new houses with a clerestory and passage street in between them.

The built up area occupied about 70 to 85 percent of the total area of the city or colony. Gross population density was about 455 persons her ha.* Net population density in the center of the city was about 550 persons her ha. But these numbers rose to 840 persons/ha; 1110 persons/ha in the slaves quarters. The leading factors contributing to design were religion, climate and raw materials. This was reflected in the types of houses used, the changes in the general architectural composition and in the street patterns.

Social status influenced the zoning of the colony and the plane of the house. During the post-revolutionary period of Akhnuton, and the rights given to the women so as to equate with men, the housing plan changed to include larger bedrooms to allow a wife to share her husband's room. A living room was about 18 m^2 and bedrooms about 8 m^2 as shown in Figs. 1.4a,b. Mud bricks and burnt bricks were the main construction materials for the domestic building. Durable materials, i.e., stone, were only used for religious buildings to reflect the belief in eternity.

Originally, in Islam, the equality of all people led to a uniform horizontal standard of building and integrated city zoning. In later periods after the segregation of the different classes, some affluent quarters were created in Cairo, Baghdad and Damascus. Privacy, separation ow eomen, internal courts, gardens, baths and stores remained unchanged. The

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* One hectare (ha.) = 2 1/2 acres.

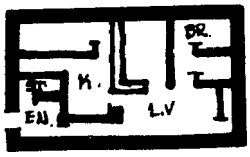


FIG. 1.4a PLAN OF HOUSE SIZE AND DESIGN FOR WORKER BEFORE REVOLUTION. (AKHNATON)

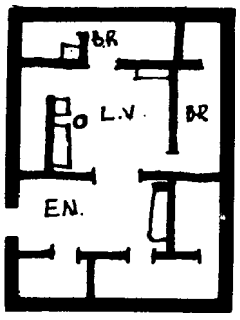


FIG. 1.4b PLAN OF HOUSE SIZE AND DESIGN FOR WORKER AFTER REVOLUTION. (1700 B.C.) (AKHNATON)

concentration of the buildings of the Islamic city in one block with narrow streets was alleviated by the insertion of Mosques in between. The big areas of the Mosques, their courtyards, and the places in front of them served as recreational areas. The spaces were the breathing organs of the city. (Figs. 1.5a,b and Fig. 1.6).

The housing of the paid workers was dependent on the working system. Industry had specialized quarters in the town centers. The workers did not live in the same place in which they worked. Living quarters of the workers faced inner courts and were approached through secondary lanes and were directed internally. Streets had no systematic pattern, and had dead ends. The Sahn of the Mosque served as a gathering place for each square of the quarter. The houses of the workers were categorized. The lower class workers lived either in small houses, in family groups gathered in one big house with a room for each male and his family, or sometimes with their master. Masters and craftsmen lived in proportionally larger houses.

The flourishing Islamic period led to the creation of complete industrial districts for the pursuit of certain types of industry such as weaponry, saddlemaking, coppersmithing, weaving and spinning in Cairo and other big Islamic towns. These quarters were called "suk" or market, as the products were manufactured and sold in the same place. Religious considerations, a need for privacy, and the hot climate all contributed to the separation of living quarters from places of work. They also created small streets of random pattern, dead end streets (Fig. 1.7) and quarter gates, and the courtyards onto which all the windows faced. Women lived in upper floors for privacy. The working system which was similar to that of the Guild system in the Middle Ages, classified the workers into

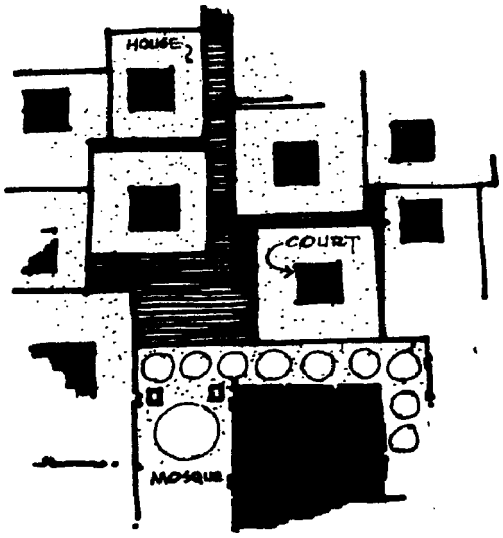


FIG. 1.5a CONCENTRATION OF BUILDINGS OF THE ISLAMIC PERIOD WITH NARROW STREETS WAS ALLEVIATED BY THE INSERTION OF MOSQUES IN BETWEEN.

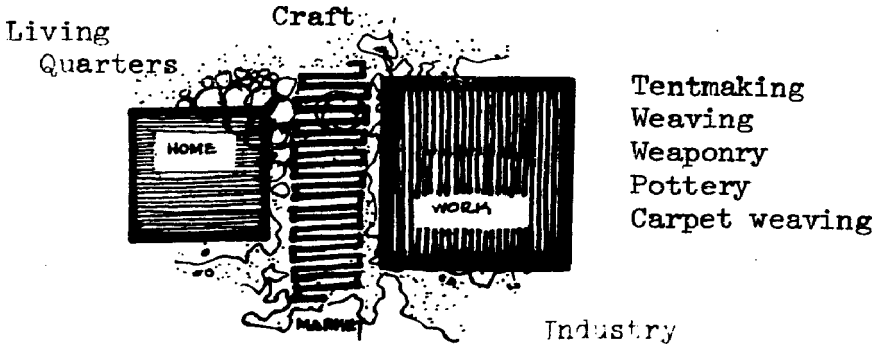


FIG. 1.5b LIVING QUARTERS WITHIN WALKING DISTANCE FROM INDUSTRY.

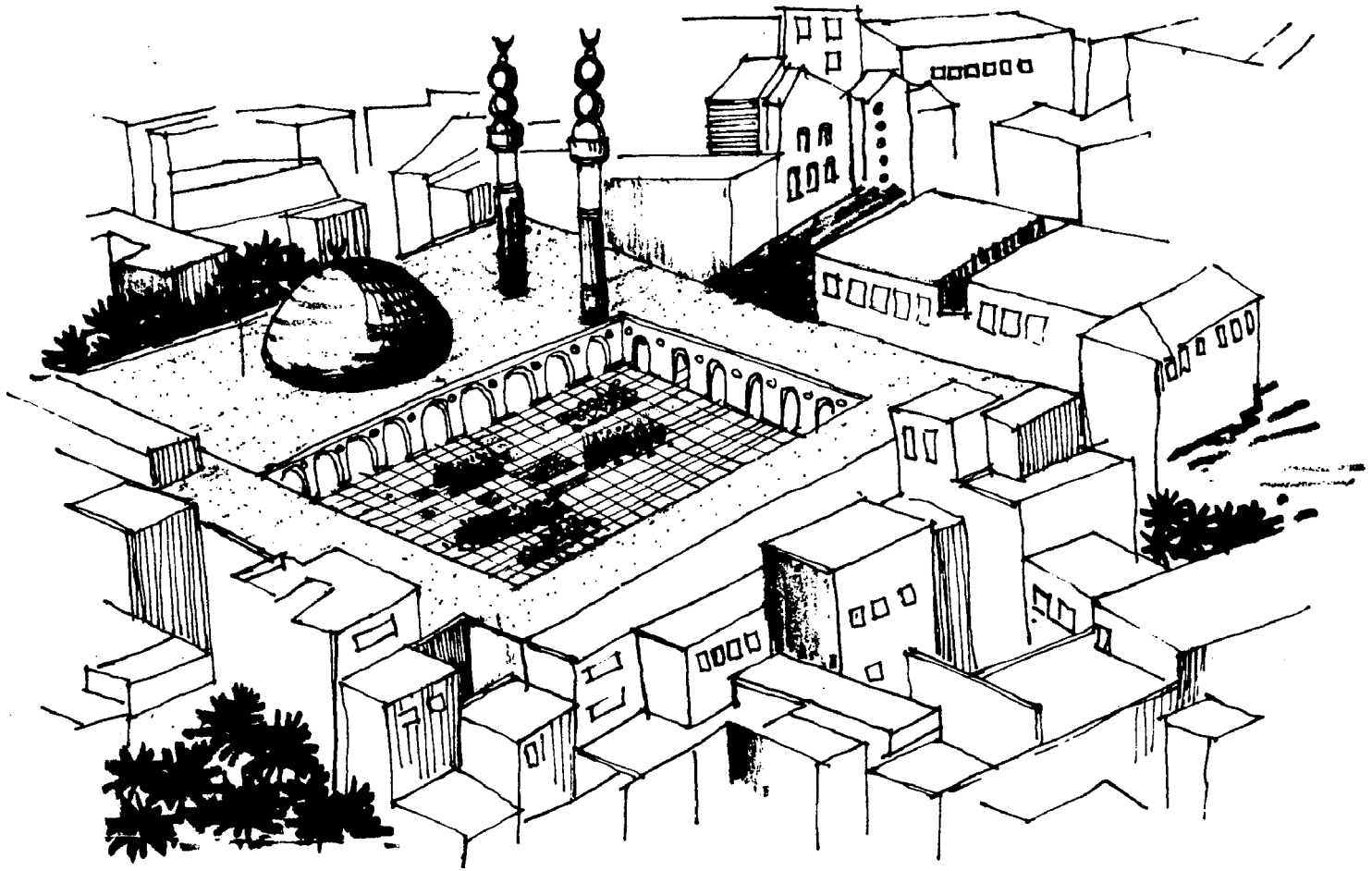


FIG. 1.6 THE COURTYARD OF THE MOSQUE. IT SERVED AS AN OPEN SPACE FOR RECREATION WITHIN THE CITY STRUCTURE.

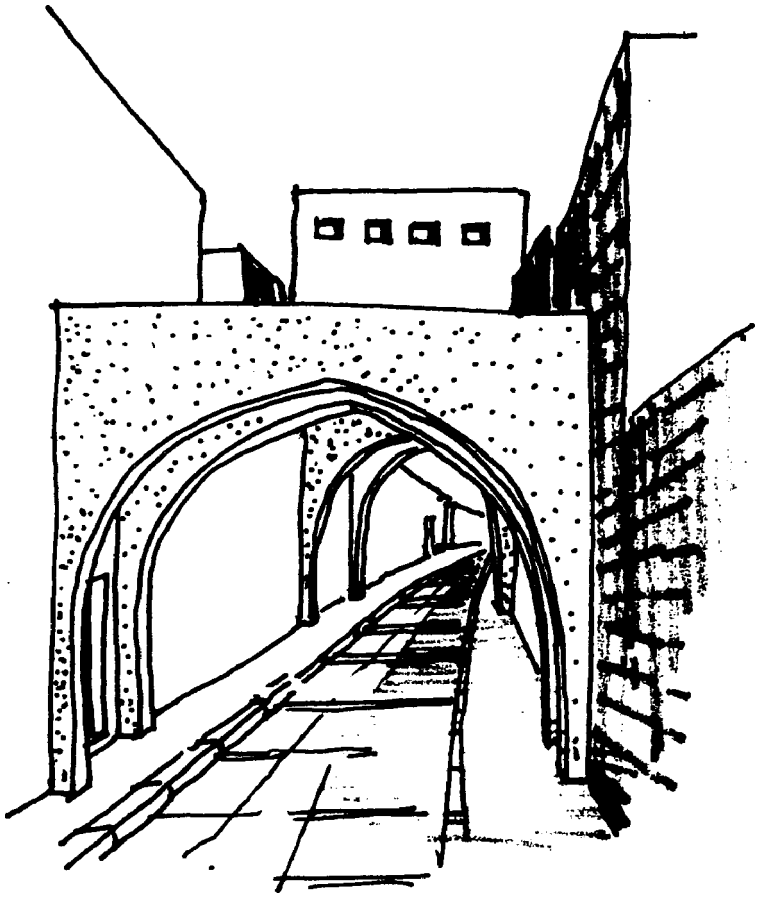


FIG. 1.7 ISLAMIC CITIES AND VISUAL TREATMENT OF THE STREET WHICH PRODUCED UNITY AND ENCLOSURE ATMOSPHERE. (8th CENTURY)

three categories: the master of the profession called ostor or Osta (teacher), the worker, and the soby (boy). The chief of masters examined the boys who finished their apprenticeship, controlled the quality of the products of his quarter, fixed the salaries and prices, and solved the working problems. This system led to the housing of the boys in their masters' homes, where they could help their masters not only in the work but also in the household. The masters and craftsmen were rich enough to afford comfortable houses equipped with all necessities.

The guild system was established as associations for the workers of the same profession. Elected officers for each guild were responsible for the rules organizing wages, working hours, and number of workers in each workshop. Standards and specifications for each industry and craft were laid down. Certain requirements had to be met by anyone desiring admittance to a trade before he was allowed to be an independent member.

First the applicant joined the profession as an apprentice "boy" as in the Islamic system, without payment, but receiving board and lodging and experience in the field he wished to enter. After seven years, the boy became a journeyman or a "workman" still working for a master workman but receiving wages. When his skill increased enough, he took his masterpiece to be examined by the Guild masters. The factors allowing him to be admitted to establish his own workshop as a master were the quality of his work, honesty, good personality, and the need of the city for one more workshop. The boy usually married the daughter of his master, inherited his workshop, and carried on.

The system of work and the size of the Middle Age city did not allow the rise of specialized industrial districts. Workshops and living

places were integrated. Usually the workshop occupied the ground floor with the stores behind it, and sometimes the second floor also. The master lived on the third floor and owned the house. The workers and the apprentices lived in the attic or in the workshop, where they received board and lodging. The city had been zoned in vertical sections as shown in Fig. 1.8. The house itself was small and had no corridors. Its small rooms were arranged successively behind each other, with small windows, and one entrance for the workshop and the dwelling. Internal stairs went directly from the inside of the workshop to the upper floors. Streets were narrow, dark, and muddy, with no sidewalks, landscaping or lights except on bridges. No garbage treatment plants existed, and the water wells mingled with the city sewage. (Figs. 1.9 and 1.10a,b)

The cities were separated from each other so that they were a half day's travel by foot. Large cities were about 125 acres and the smaller ones were about 10 to 15 acres each.

The growth of the industrial and trade guilds in the cities of the Middle Ages allowed the craftsmen and workers to take their orders from the lords who dominated the city life.

Specifications for working standards, procedures, wages, working hours, and number of workers were established for better production and working conditions. Perimeter city walls limited expansion of the city, and led to concentrations of crowded houses and to vertical growth.

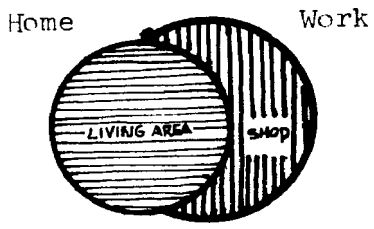


FIG. 1.8 CITIES HAD BEEN ZONED IN VERTICAL SECTIONS, WORKSHOP AND LIVING AREA WERE INTEGRATED.

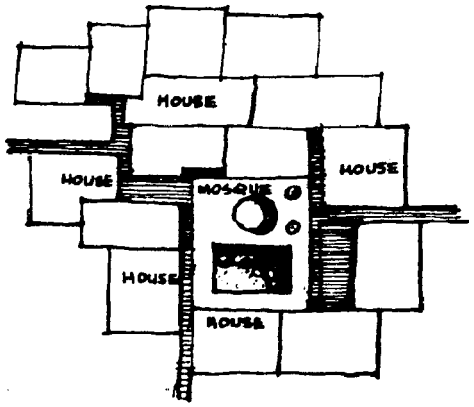


FIG. 1.9 DEAD-END STREETS WERE NARROW AND DARK, AND HIGHLY CONCENTRATED DENSITY.

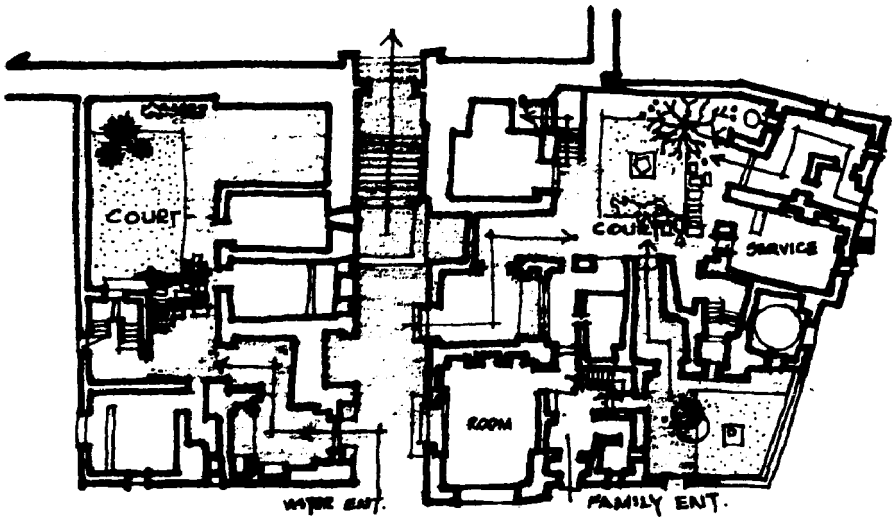


FIG. 1.10a PLAN OF ISLAMIC HOUSE (9th CENTURY).

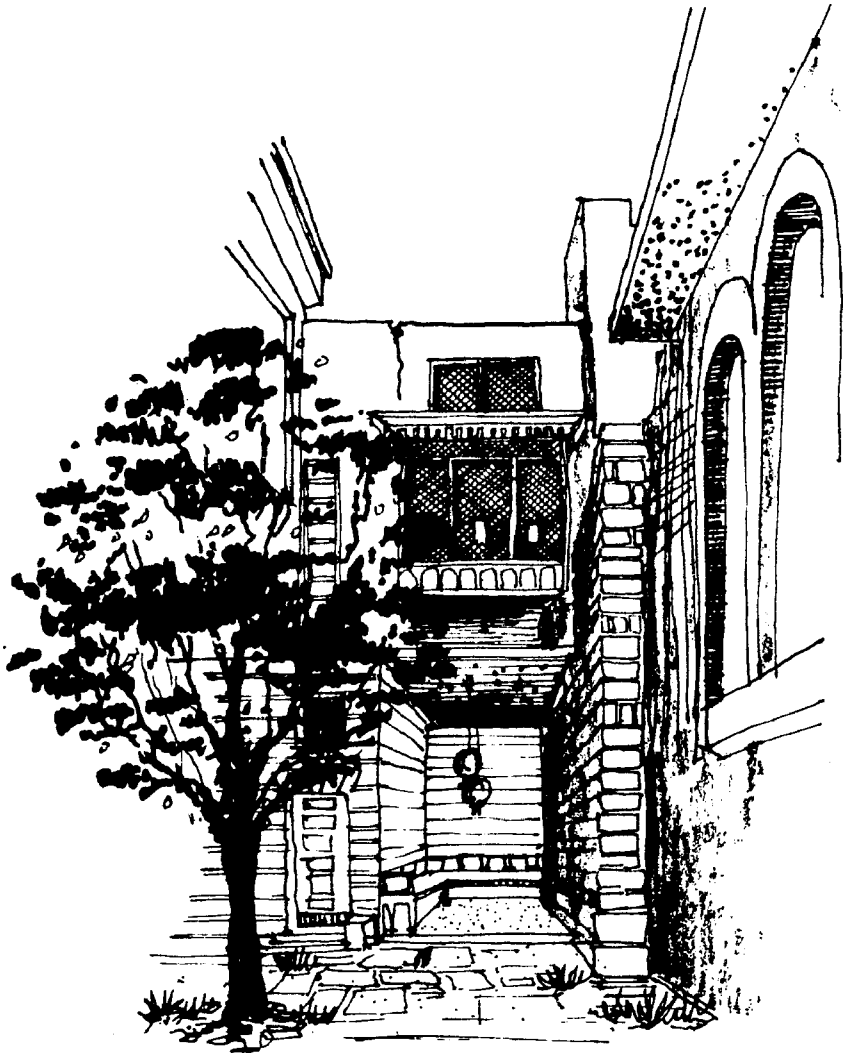


FIG. 1.10b VIEW FROM THE INTERIOR COURT OF THE ISLAMIC HOUSE.

Industrial Revolution

Man has always tried to improve his environment. Ikhnaton, the King of Egypt in the 18th Dynasty and the first reformer in history, led a social, political, religious and economic revolution. He turned the known symbols and concepts of life upside down. Unity of God, democracy in political life, and equality of rights between men and women were the principles of his philosophical call toward a new life and social progress. The organic design of the workers' city of Tal-El-Amarna was a product of his revolution. Everything in the plan of the city--its integrated zoning, its compositon, the plans and details of the houses, and even the distribution and size of the bedrooms--all reflected his philosophy.

Since then many changes have taken place. But the most significant changes have occurred in the last 260 years, and are still occurring at an ever increasing rate.

Just before the beginning of the industrial revolution, the manufacture of materials into finished products had been done by hand all over the world by craftsmen and their skilled workers. Their production included leather products, fine silks, metal products, furniture, glass, fine clothes and fabrics.

Domestic System

At this time the domestic system appeared. Merchants took risks and bargained with the women and girls, provided them with the raw wool and flax fibre and paid them per square yard produced. In turn, women spun and wove the cloth. Every women was happy to add profit to her

husband's income without any obligation of working time or place. Older girls aided their mothers in the work, while the younger children were looked after during short interruptions. Contractors could sell the products at prices assuring good profits without much personal effort (Fig. 1.11). The result was serious; many men left the farm and joined their wives in the new profitable work. People lived in their own homes. Work came to them.

Rise of the Factory System

The domestic system was brought to an end by inventions which appeared in the 18th Century. The spinning jenny, water frame, and the automatic jenny had increased production. The greatest influence happened after the invention of the steam engine which was successfully employed to run spinning and weaving machines.

Accuracy and efficiency of the invented machines left no chance for handwork to compete with them in either quality or quantity.

Thus, the domestic system came to an end. Machinery was expensive, large, needed shelter and required maintenance which could be afforded only by men with capital. Big factories and the class of industrialists appeared.

Men and women left their homes for the factory. They had enough work for the whole day, and no longer had to farm. That gave rise to the class of industrial workers. The free time left for the industrial workers was scarcely enough for rest and sleep. Thus they had to live near the factory.

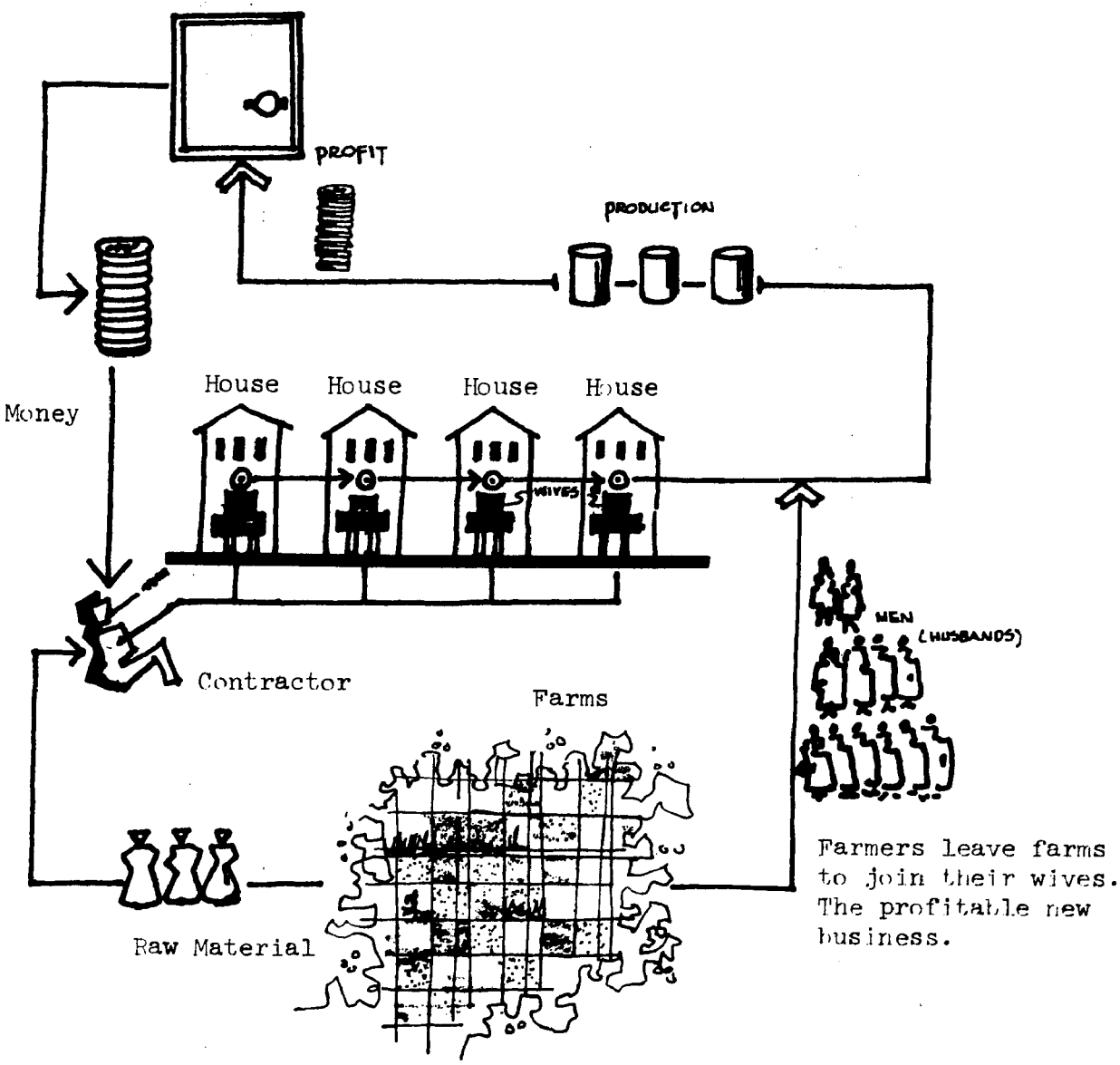


FIG. 1.11 THE DOMESTIC SYSTEM (PEOPLE LIVED IN THEIR OWN HOMES. WORK CAME TO THEM.)

The housing problem of the industrial workers became serious. The worst result was the domination of industry over its surroundings. People had to join the factories or starve. The only defense of agriculture against industry was to nationalize farming and to consolidate the small estates into big farms.

The advantage of mechanization was the great increase in efficiency, quantity and quality. The disadvantage was the monotony which did away with the pride of individual workmanship. Society was divided into two main classes--the capitalists who supplied money, and the workers who did the actual work.

The capitalists considered only their own profits. Logically, workers' housing was outside their plans. With the need to live near their work, slums began to rise. The industrial atmosphere changed into bad living status, worse working conditions, low wages, long working hours, carelessness, and absence of social and health services.

In many industrial complexes and centers where a great number of workers existed the problem of housing then was considered by the industrialists as a mere commerical necessity. The solution had been always based on how to gather the greatest number of the workers in the vicinity of the factory more than to solve the human question of how to offer the worker and his family satisfaction of their needs, comfort and security (Fig. 1.12).

In Egypt, 1816 saw the beginning of an industrial plan in Egypt. Industry had arisen mainly in Cairo, Alexandria and the Delta region. One of the existing examples of the industrial colonies of the workers and employees is that of the old Delta boroughs, now linked with the new colony of the new Delta boroughs.

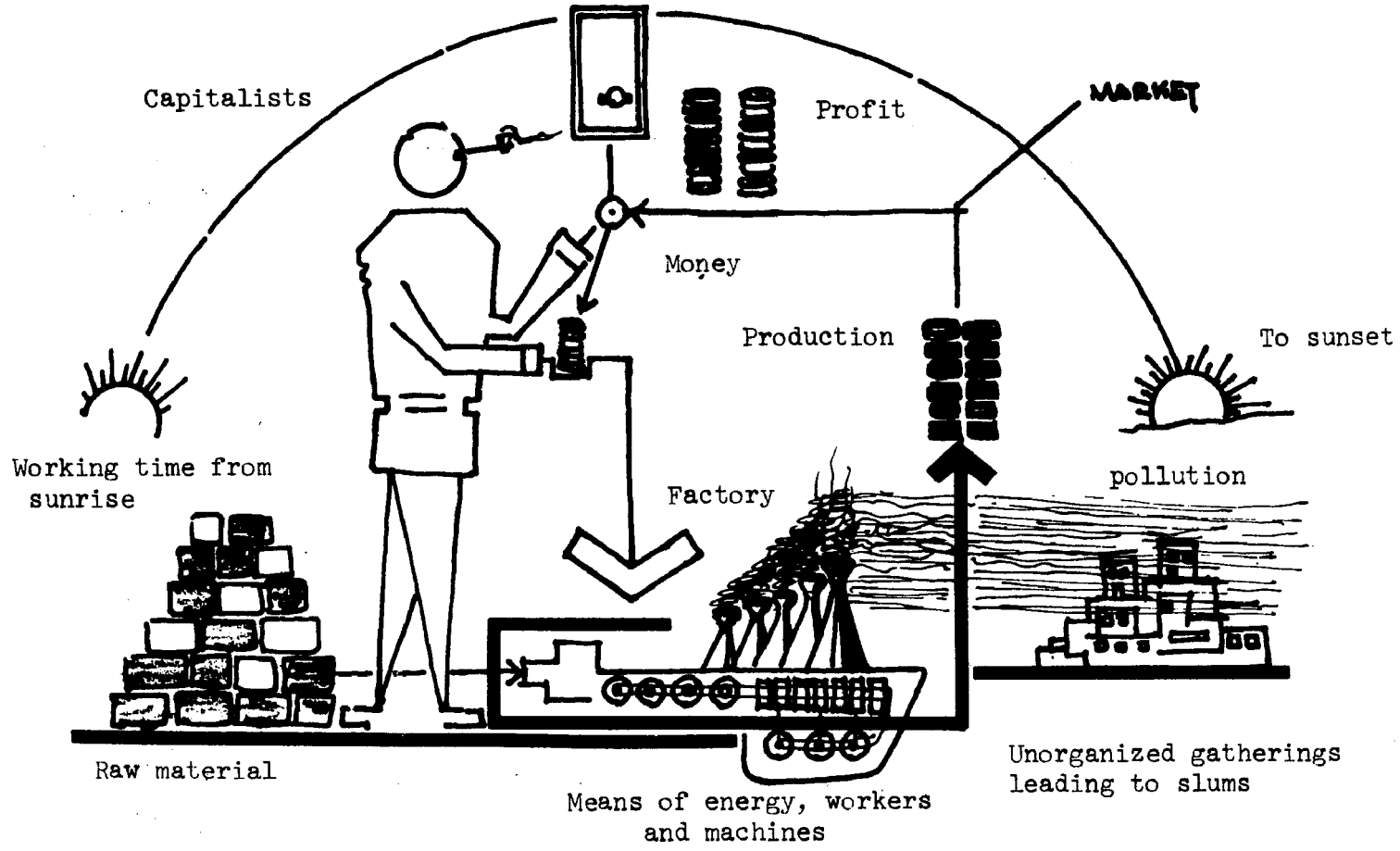


FIG. 1.12 PHILOSOPHY OF THE INDUSTRIAL HOUSING. FINANCIAL PROFIT WAS THE FOCAL AIM, THE RESIDENTIAL AREA WAS USUALLY IN THE VICINITY OF THE INDUSTRY. COMMUNITY SERVICES, SHOPS, SCHOOLS, HEALTH SERVICE, RECREATIONAL FACILITIES, AND MAINTENANCE OF THE RESIDENTIAL AREAS WERE NOT CONSIDERED.

The colony was usually in the vicinity of the works, a town or another colony. It depended on the neighboring shops, schools, health services and recreational facilities. This always created an economical unity between the colony and its surroundings, but a deep social split did not enhance human inhabitants.

The Egyptian colony was zoned with regard to professional status. Directors, engineers, supervisors, and workers were housed each in separate sections. The married and the single were always provided for separately. Streets had a geometric, checker-board pattern with a ring road encircling the whole colony. Mosque and church were usually the focal points of the colony.

In the United States the volume and the rate at which industry spread had been so great that whole new cities were created upon the growth of industry.

One of the industrial center patterns attempted is that of Lawrence, Massachusetts in 1830, composed of factories three or four stories high, administration buildings, and the housing quarters followed in sections for the supervisors and workers. The next zone was for the dormitories of the single workers and groups of the one-family houses for families with children. Directors and merchants had their own expensive houses of Greek architectural style.

Female workers had their own club and separate store. Another aspect of the industrial housing in the United States was the groups of gray wooden houses from 50 to 100 units each, mostly in western Pennsylvania and surrounding area. All the units were alike with outside toilets and treeless streets as shown in Fig. 1.13. Until 1933 these ugly industrial



FIG. 1.13 UGLY INDUSTRIAL COLONIES IN THE AREA OF WESTERN PENNSYLVANIA.



FIG. 1.14a CITY OF PULLMAN, ILLINOIS WITH NO VISUAL TREATMENT BETWEEN INDUSTRY AND RESIDENTIAL AREA.

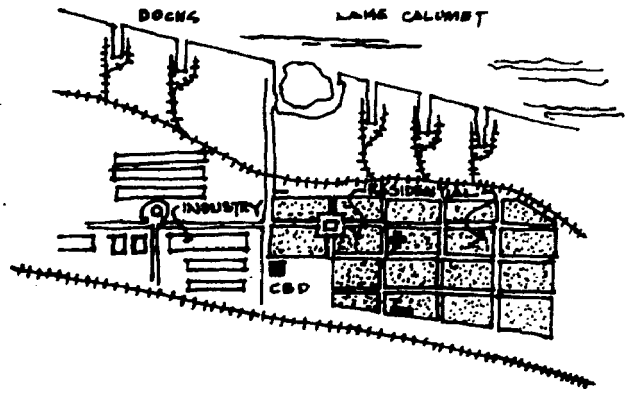


FIG. 1.14b PLAN OF THE CITY OF PULLMAN, ILLINOIS.

colonies were ruled by the coal and iron mines police. No outsider dared to enter except the doctor and the undertaker.

The first industrial town especially designed by an architect for this purpose was Pullman, Illinois illustrated in Fig. 1.14a,b. All houses were built of brick and stone. Parks, a town hall and porticoed square were provided.

Conclusions

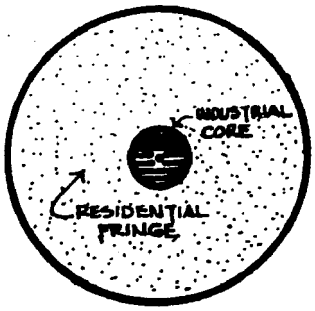
The previous historical section shows that two major changes occurred.

1. A change in science and technology which led to change in traveling distances between work and residential areas (Fig. 1.15), and

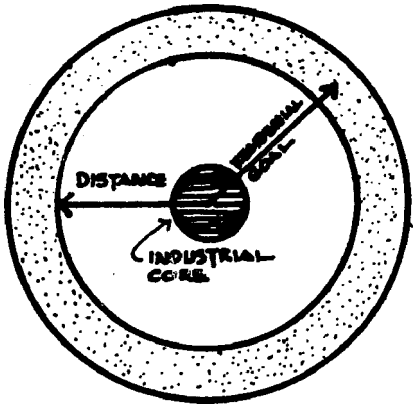
2. Creation of social and cultural deficiencies which resulted from crowded conditions.

However industry, like other land uses within cities, tends to exist in distinctive areas, but usually displays a more complex organization and dynamic growth than many other urban activities. This is because manufacturing is a dynamic process which included accessibility, production, and distribution.

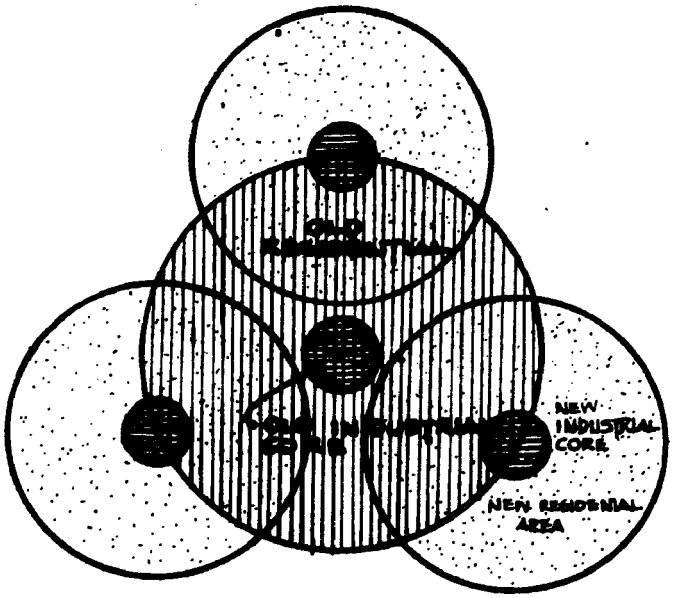
Accessibility, history of urban development, and external and internal economics which result from industrial groupings attract and influence the distribution of new industries and industrial communities within urban areas (Fig. 1.16). The use of these industrial communities and districts within large cities is most clearly seen in the largest urban settlements which also offer the greatest attraction for a wide range of industrial enterprises (Fig. 1.17). Greater London, for example, forms the outstanding manufacturing region in Britain, and in the same way,



Traditional



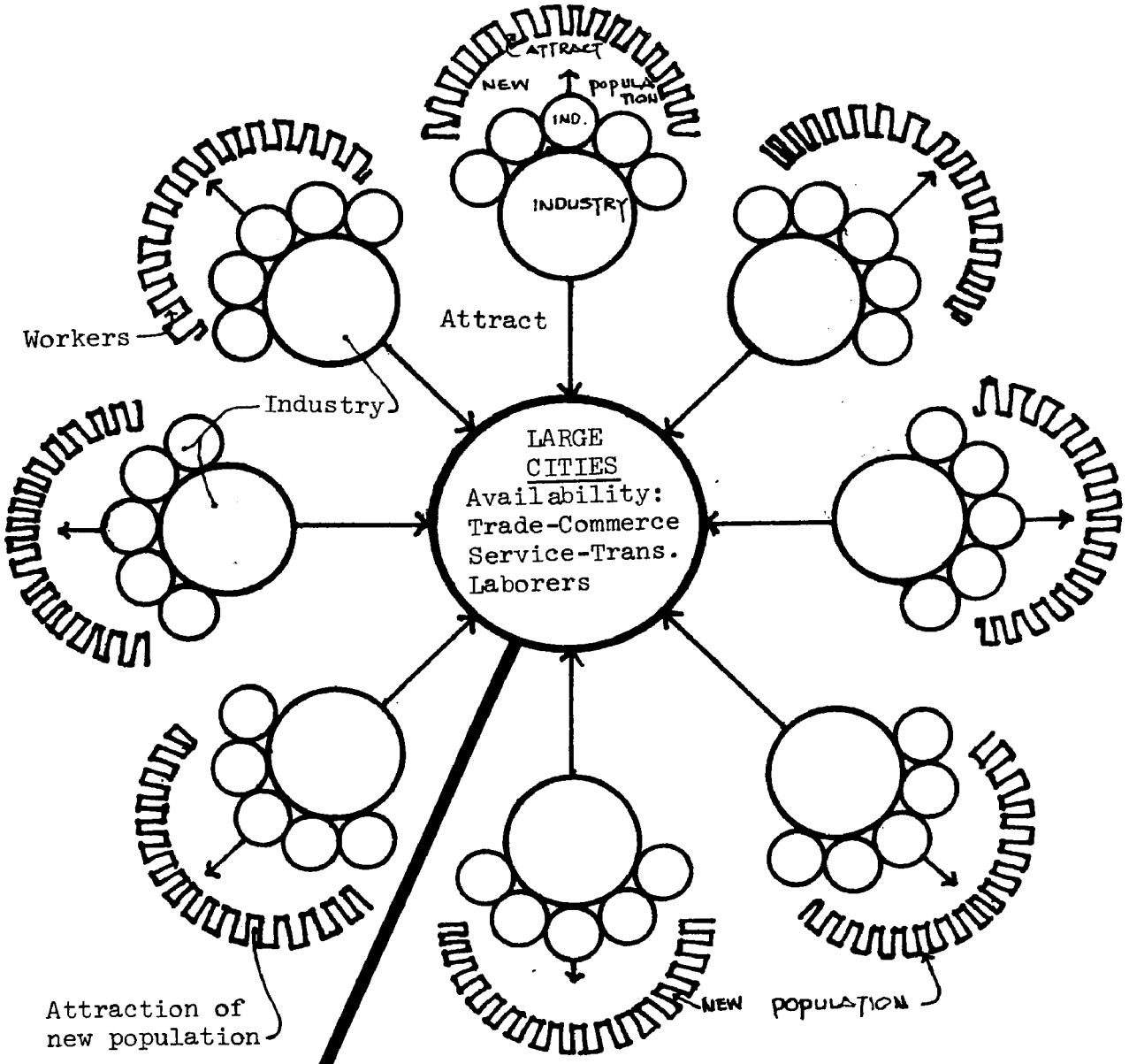
Traditional



Trend today:

- Distance greater to industry
- Service area inefficient

FIG. 1.15 CHANGES BETWEEN PAST AND PRESENT.



The magnet-like attraction leads to concentration and creates the following problems.

1-Crowding

2-Unstable Housing Conditions
- A. Social-cultural
- B. Zones of "blight"
- C. Slums
- D. Chaos

3-Pollution

4-Health Problems
- A. Sanitation

5-Transportation Problems

6-Destroying Natural Resources

7-Noise

FIG. 1.16 ATTRACTION OF URBAN AREAS TO NEW INDUSTRIES AND POPULATION.

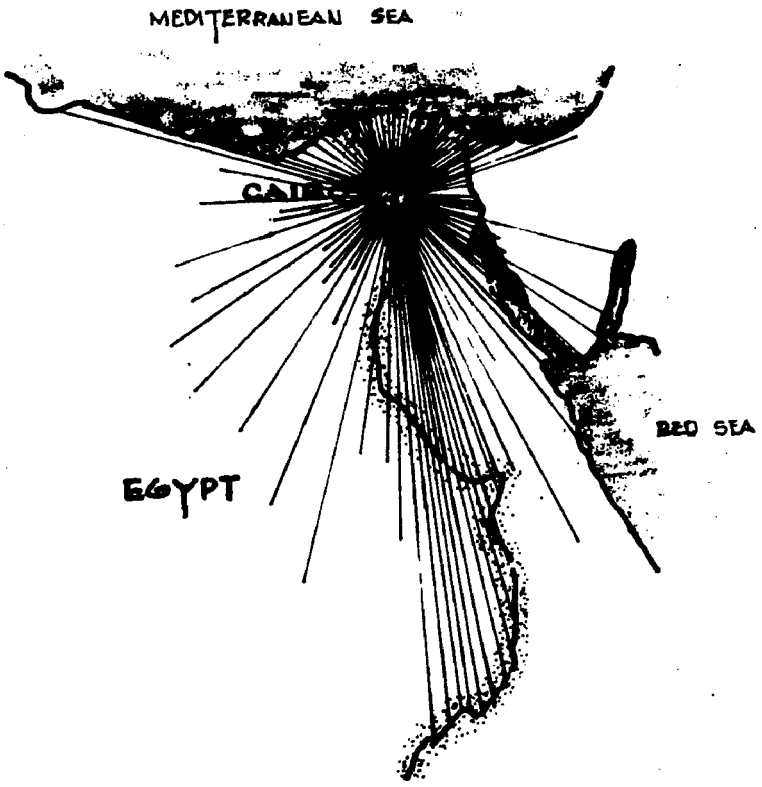


FIG. 1.17 THE ATIRACTION OF CAIRO METROPOLITAN AREA AS THE LARGEST URBAN SETTLEMENT OF EGYPT FOR INDUSTRY AND POPULATION.

Dublin of Eire. New York, Chicago, Detroit, Los Angeles and Pittsburgh are the most important industrial centers of the United States. Cairo, Alexandria and Aswan are the major industrial centers in Egypt. Most obvious is the concentration of large numbers of people and industries which leads to chaos within large cities, and creates many problems such as:

1. Crowding and the appearance of zones of blight, defined by urban sociologists as slum areas where delinquency and crime rates are high and slum attitudes previal, lead to the widespread degradation of environment.

2. The rise of transportation and communication problems are conducive to the "chaos of cities."

3. Emergence of various types of pollution and excessive noise levels. Such problems created by industry seem to promise to continue.

CHAPTER II. ANALYSIS AND CRITICISM OF CHOSEN INDUSTRIAL COMMUNITIES

"The visual survey...consists of careful and detailed field observations. It is a catalogue of visual assets and liabilities. The purpose of visual survey is to note the existing elements of landscape, sites and structures which might affect the future aesthetic character..."

-- Anonymous

"The heredity of a town we may take to represent the living patterns of its inhabitants, their customs, prejudices, way of life and character."

-- Gordon Logie
The Urban Scene (London)

At the present time the problem of development is the concern of both industrially progressive countries, such as the United States, and the more staid countries such as Egypt: the former is trying to keep up their rates of growth, while the latter is determined to initiate a proper development based on the experience of industrialized countries. Older nations, such as Egypt, in most cases, developed without planning--a matter that resulted in major complications which are still a matter of concern. Having the advantage of hind sight, the developing countries should be able to avoid many of the mistakes now plaguing the industrial nations. Actually, economic development gives rise to environmental change which is an inevitable counterpart of technological growth. Here the role of community design becomes an essential part of planning for economic development because of the interrelation of future changes in population, housing needs, services, recreation areas, and means of transportation with economic development.

We shall concern ourselves with the study of industrial communities in Egypt as an underdeveloped country, and the United States as a developed country. Planning in the United Arab Republic has been heading in the right direction of developmental planning since 1960. A program emphasizing industrial and residential construction is designed to double national income. Industrial development requires an adequately changed and modernized approach to community planning and building to provide suitable housing and social facilities for the emergence of the new society in the area under consideration. Coherent overall physical development plans are essential factors in stimulating the forces of progress.

2.1 East Shubra District and Description of the Sector

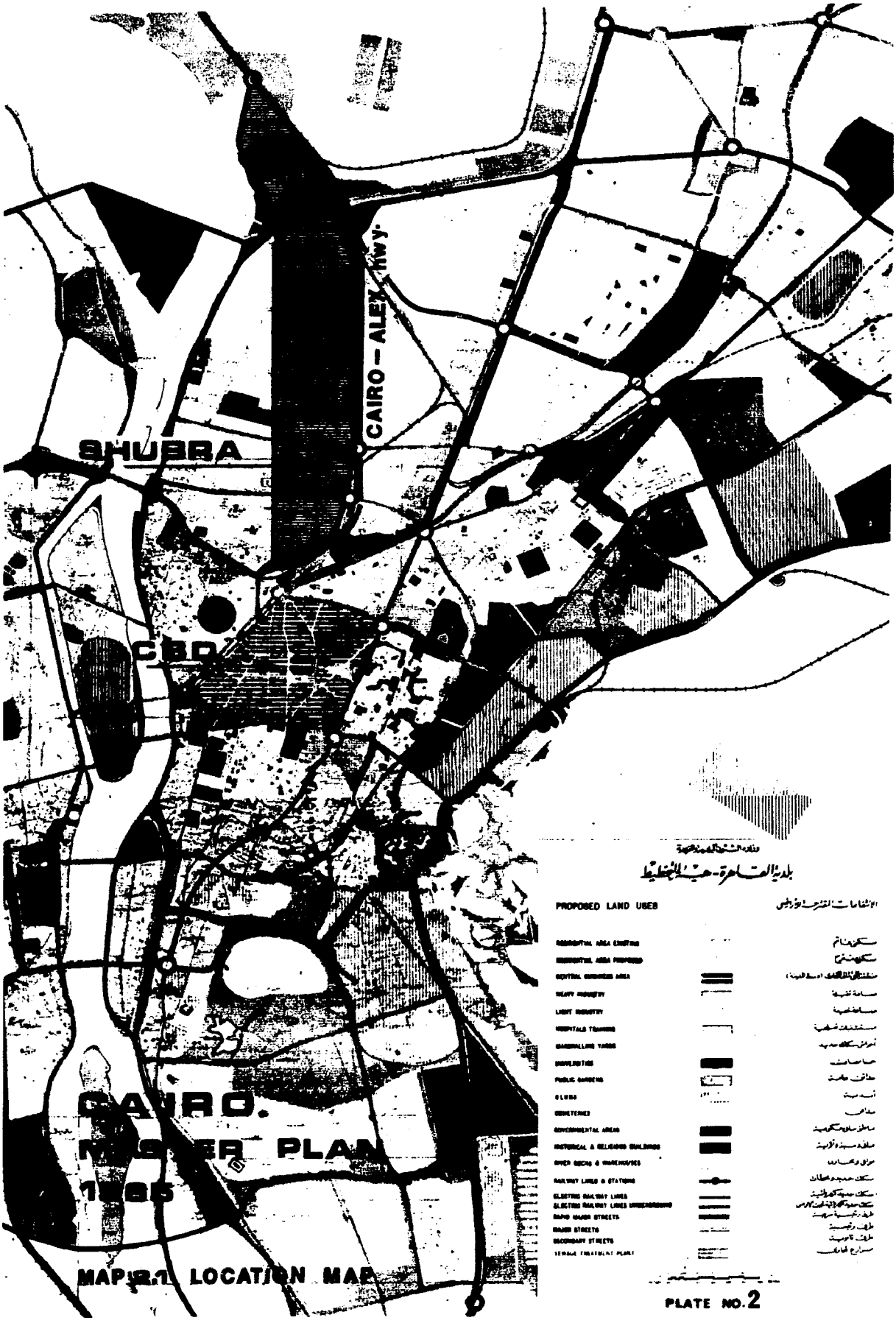
Shubra is one of the worst industrial communities in Cairo, in terms of providing adequate housing accomodations for the worker who lives there. The area, on the fringe of Cairo and in the vicinity of several large factories, provides housing only for the lower middle income class. The existing housing conditions and density are below standard for human needs of health and decency in most instances (lacking, along with adequate housing, sufficient educational and health services, open spaces,...,etc.).

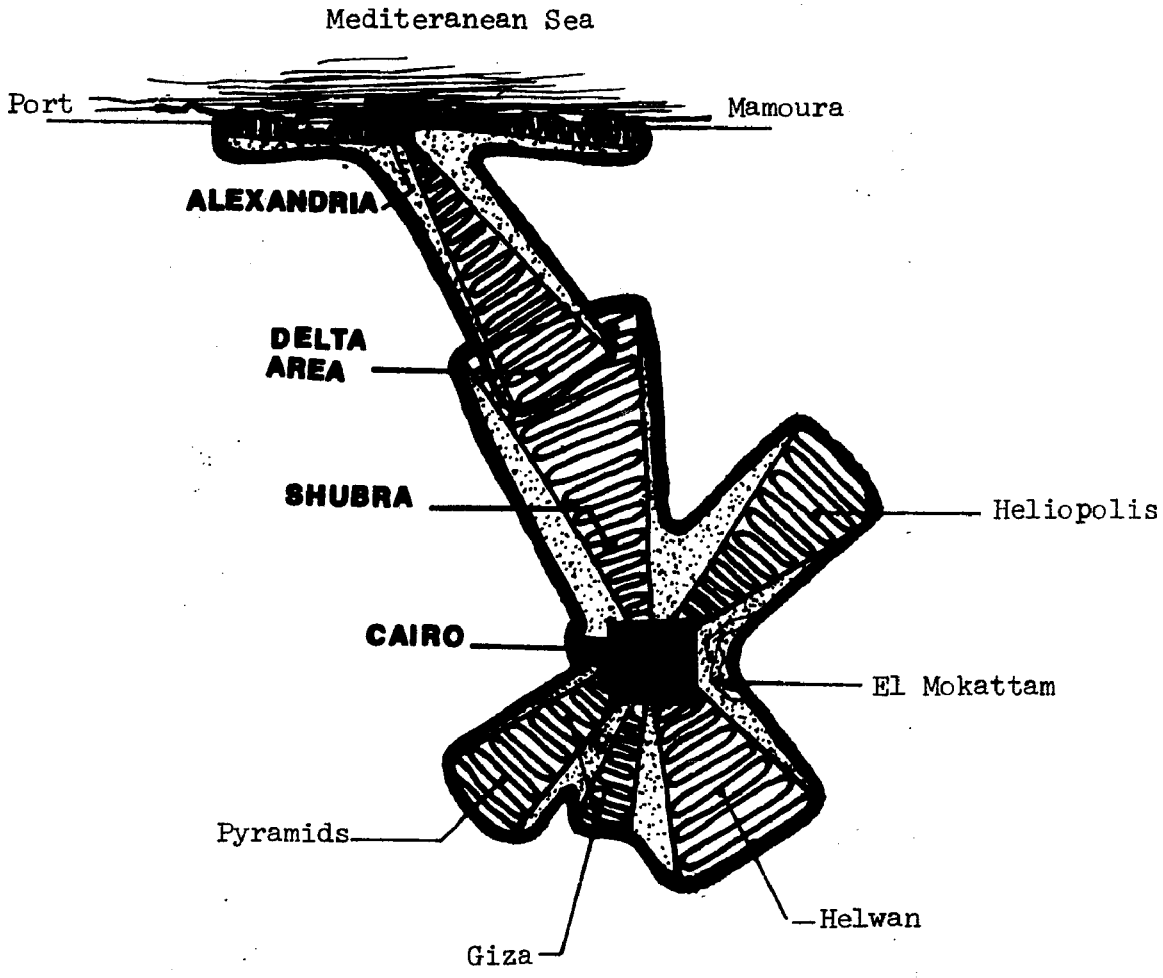
The area is situated along one of the major entries to Cairo. It is suitable for industrial locations, and should provide accomodation for inhabitants working in these industries (Maps 2.1 and 2.2).

The sector is located in the northern part of Cairo. Its southern side borders a wide strip of industrial use together with MISR Railway hangars. On a visit to the site, it was noticed that rebuilding procedure has already begun but the standard of the dwelling types, as well as the general arrangements of the blocks, do not meet acceptable minimum quality standards for modern planning.

A compromise was decided upon between the ideal and the practical, reasoning that the planners' task is not to be governed by, but to govern the living standards of those for whom they design. If progres is to be made, greater adherence to standards of quality are necessary.

Rapid advances during recent years in science and technology have created a need in commerce and industry for adjustments to match. Housing these new operations in facilities which might have once been acceptable is not necessarily wise, even if physically possible.


CAIRO – ALEX. hwy.
SHUBRA
CBD
CAIRO
MASTER PLAN
1985
MAP 2.1 LOCATION MAP
بلدية القاهرة - هيئة التخطيط
PROPOSED LAND USES
الاستعمالات المقترحة للأراضي
RESIDENTIAL AREA EXISTING
RESIDENTIAL AREA PROPOSED
CENTRAL BUSINESS AREA
HEAVY INDUSTRY
LIGHT INDUSTRY
HOSPITALS TRAINING
MARSHALLING YARDS
UNIVERSITIES
PUBLIC GARDENS
CLUBS
CEMETERIES
GOVERNMENTAL AREAS
HISTORICAL & RELIGIOUS BUILDINGS
RIVER BERTH & WAREHOUSES
RAILWAY LINES & STATIONS
ELECTRIC RAILWAY LINES
ELECTRIC RAILWAY LINES UNDERGROUND
RAPID MASS STREETS
MAJOR STREETS
SECONDARY STREETS
SEWAGE TREATMENT PLANT
PLATE NO. 2



Map 2.2 "Shubra" Lies in the Regional Vicinity of Two Dominant Sectors of Cairo and Alexandria.

Consider the spatial needs if automatic production lines are to be accomodated. Transportation convenience, contiguous space demands for storage, modern lighting, liaison with other cooperating agencies, proximity to governmental offices, etc., are only a few of the countless reasons why business in all fields--from sales to manufacturing--will prefer and demand premises tailored to their desires that are simply not available in established sections.

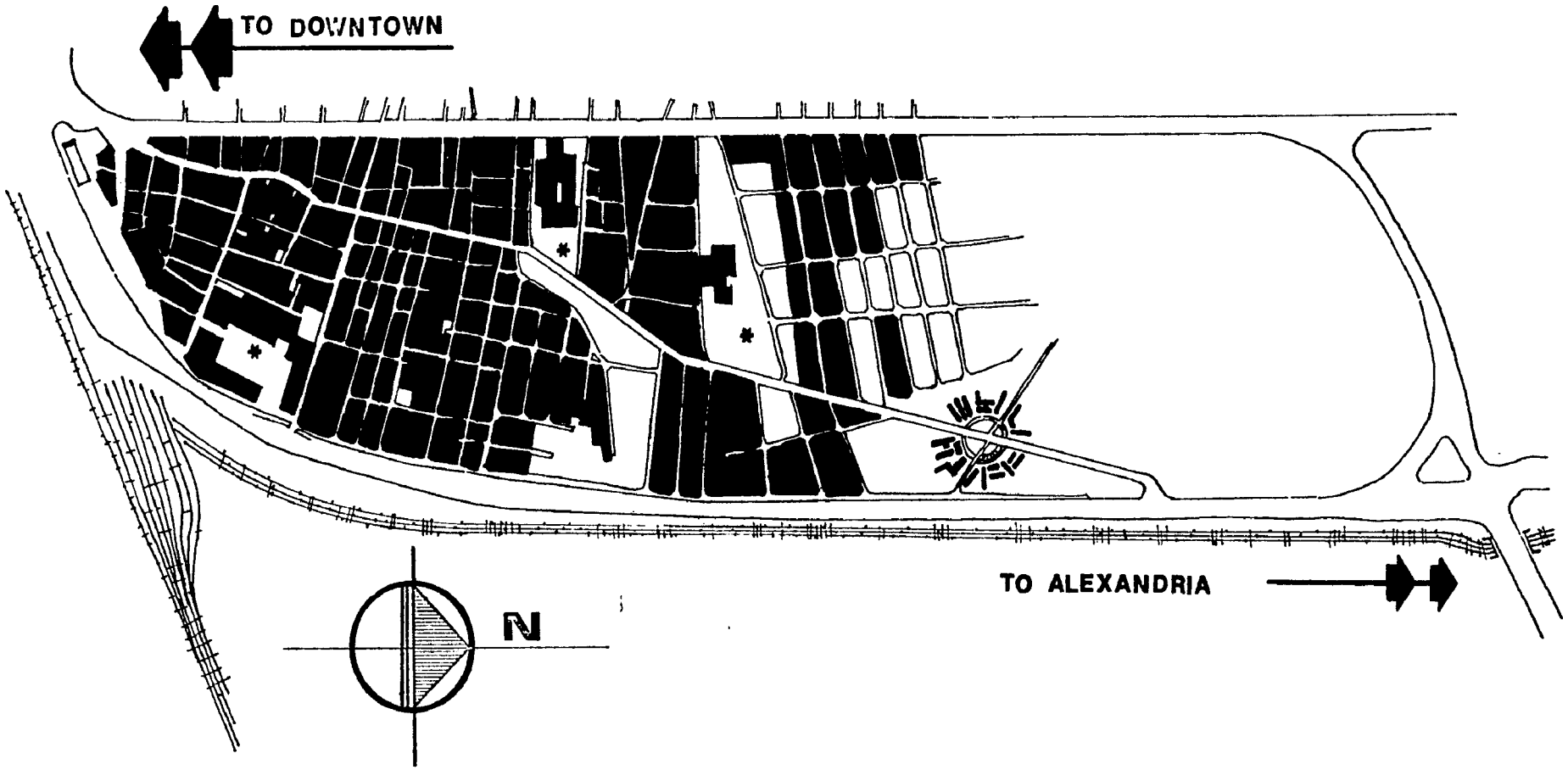
In fact, the visitor in the Shubra district today need only observe that physical deterioration and obsolescence pervade the sector. The visual evidence attesting thereto is overwhelming with even the first glance--and must be the first impression of any thoughtful and informed observer. It is commonly known that within its boundaries are structures worth viewing, and atmospheres worth examining (Fig. 2.1 and Map 2.3).

The insidious, irresistible powers behind the blighting forces which have attacked the sector with devastating success are the constantly accelerating population growth and immigration forces which the entire world is experiencing. There is no urban center anywhere that has successfully escaped the side effects of change and expansion--decline and decay at the core.

By comparison with the latest improvements in Cairo, it must be readily admitted that the Shubra district has the appearance of an unkempt slum. It is interesting to note, in passing, the following quotation which should be remembered throughout the pending investigation as a preface to the consideration of slums.



FIG. 2.1 EXISTING PHYSICAL CONDITION OF SHUBRA.



THE SHUBRA DISTRICT

MAP 2.3 SOLID AND VOID (Voids or open spaces are mainly streets)

*Areas of focal points.

> "Slums are a matter of culture as well as economics; if the people possess a taste of decency, no matter how mean their circumstance may be, they will improve their environments. If they lack culture, they will defile and degrade whatever place they occupy." (Higbee, 1960)

The combination of the wartime migrants, with their later followers from the rural areas, is the real cause of pressure in the present urban squeeze. These wartime migrants were in search of opportunities and new jobs, attracted by industry and the culture of the metropolitan center area,and thus contributed to the rapid growth in industry and technology.

They are also prime contributors to the decline of the older districts. Being ignorant of city life in general and city standards of health and disease, they were willing to work for less than a subsistance wage. They ignored the physical deficiencies in the shelters they occupied as they found their complaints were to no avail. The neglected repairs and maintenance, which neither owner nor tenant appeared to mind, turned quickly into blight and finally produced slums.

Urban growth in the city of Cairo has closely followed the universal pattern of increasing urban population. Its "worst district" is the Shubra district in the truest possible sense. The departure of the affluent, the shift of important businesses away from the sector, the presence of low income inhabitants (mostly migrants) in stupendous numbers, the disrepair of its buildings, and the multiplication of living units through internal fragmentation of dwelling places are already established facts of life in the district.

Excessive Population

The density of the population of Shubra has steadily increased and the standard of housing diminished until the entire sector is now overcrowded to the point of saturation, there being virtually no available housing. The residential sections of the area districts reek of poverty and ill health today, and represent a real burden to the municipality of Cairo. It is a situation that deserves to be called desperate.

In the geography of the entire city, the district is uniquely situated in such a way that it was, and still should be, an ideal residential area with solid land values. The fact that most of the real estate within the sector now belongs to the government through nonpayment of taxes is evidence by itself that land values were too low, ownership interest too lax, and living conditions too deplorable for the administration to overlook.

Population in the district reaches an incredible level of 610 persons per acre--incredible considering that the area contains dwellings that run only between two and three stories in height. The average district population density is 417 persons per acre, which is so large as to be almost unbelievable. The figure is misleading, as sixty percent of the district, after all, contains nothing but vacant land. The total population of the district is actually living on only 40 percent of its area, which indicates the true average density per habitated acre is much higher than shown. Table 2.1 representing the population density of one specific and designated area, discloses that the subject neighborhood is housing 417 persons per acre. The true average of population for a

Table 2.1

Number of Persons per Room and Density per Acre*

District	Population	Families	Rooms	Area in Acres	Average Family	Density	Average Room
East Shubra	138,080	29,562	46,615	332.3	4.7	417	3.0
1960 Census	94,294	21,952	30,896				

*Source: 1970 Census.

district, however, is better determined by using the total population for the sector. It appears from the census to be about 138,000 persons.

The area of the sector can be estimated as somehwere between 520 and 565 usable acres. Therefore, the actual average population density for the districts could be between 240 and 275 persons per acre. The probability is that the true figure is halfway between these extremes, or approximately 255 persons per acre. City planners throughout the World seek to achieve a maximum population density of only 200 persons per acre. It can be concluded that the sector is overcrowded by 25 percent over the desirable maximum.

Alternate Density Norms

There are three other ways by which population density can be stated and for which optimum norms are known: one is to find the average number of persons per room; another is to determine the average number of persons per household; and the third is to determine the number of rooms per household.

Desirable standards for these measurements of population density in the United States and most other major countries are (Gallion, 1963):

Desirable average number of persons per room: 1.0 to 1.1 persons

Desirable average number of persons per household: 3.5 persons

Desirable average number of rooms per household: 3.5 rooms

Since there are 46,615 rooms to accommodate 138,080 people according to Table 2.1, then the census shown that the actual average population density is about 3.1 persons per room. The census also reports

that there are 29,562 households into which the total population is divided, meaning that the actual average population density is 4.7 persons per household. Finally, using the census figures for total rooms divided by total households, it appears that the actual average number of rooms per household is only 1.58 (Fig. 2.2).

These calculations suggest that there are almost three times as many people per room in districts as there should be, the average household contains 37 percent more persons than it should, and the number of rooms in the latter should be doubled to meet optimum conditions. These certainly are impressive indications that housing in these districts are woefully inadequate but they fail, with strict accuracy, to tell the whole story. The situation is even worse than one might conclude from the foregoing.

Consider the fact that the census lists only 16,770 or so available dwellings. With a total population of 138,080 to share them, it is obvious that an average of 8.25 persons must actually live in each dwelling. To put it another way, there are 29,562 households within the 16,770 dwellings or an average of 1.77 households per dwelling. To double check the 8.25 figure, simply multiply the 1.77 households per dwelling by the 4.7 persons per household revealed by the census data, the answer comes out to be 8.3 persons per dwelling (see Table 2.2 and 2.3).

About 60 percent of the households, according to Table 2.2, are one-room habitations and that 70 percent of these are occupied by groups of three to eight persons. Some of the latter are known to contain <u>more</u> than eight persons. The most startling observation of all, though, is that only slightly more than one and one-half percent

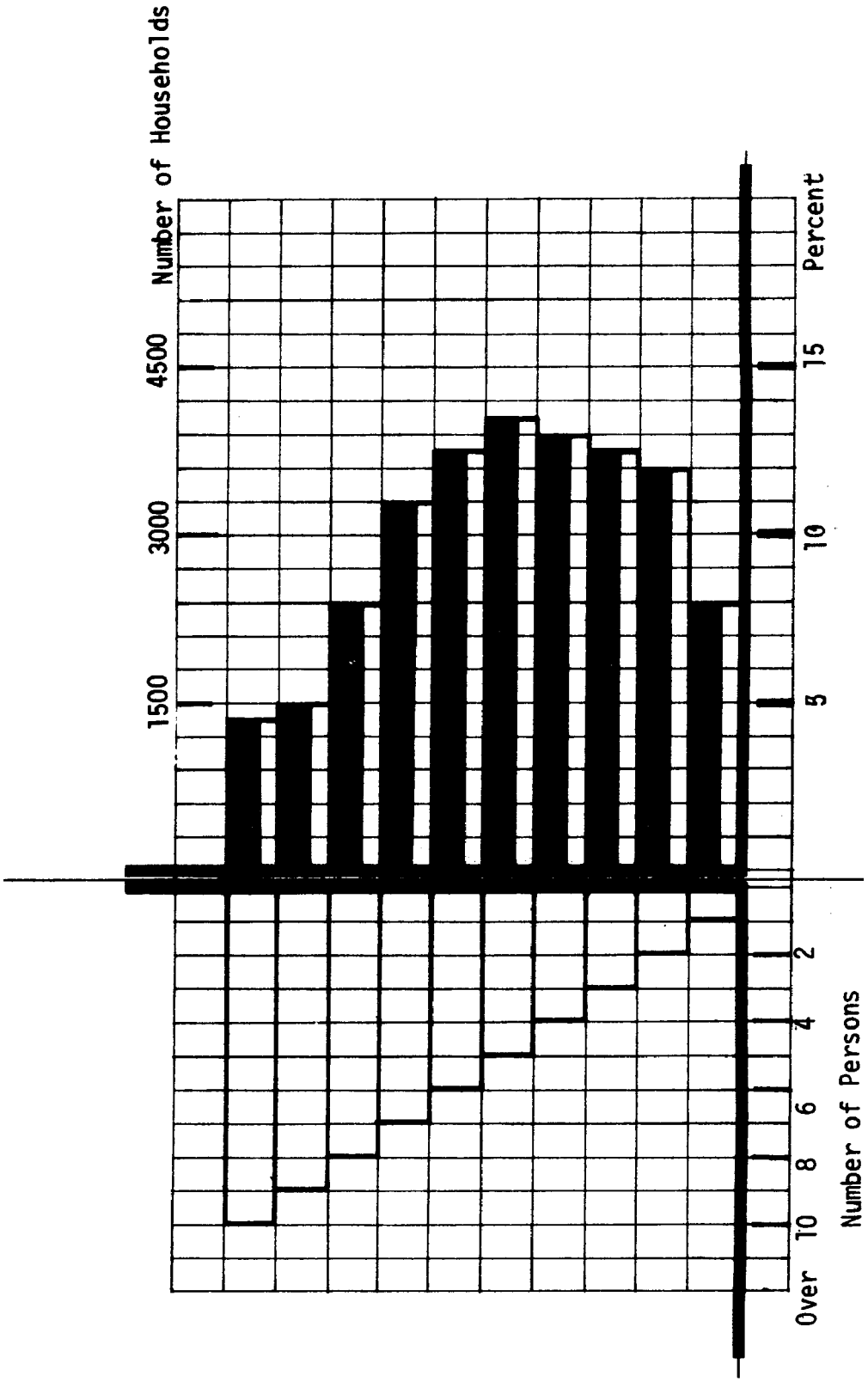


Fig. 2.2 Population Studies by Relative Distribution of Households.

Table 2.2

Family Distribution According to Their Size and Number of Rooms[1]

No. of Rooms	Persons Per Family 1	2	3	4	5	6	7	8	9	10	11	12	13+	Total
1	1903	2537	2452	2235	2200	1825	1358	682	286	113	17	5	--	15,615
2	192	671	729	993	1044	1067	930	774	428	338	91	43	30	7,130
3	75	277	335	303	500	433	549	468	468	154	97	57	64	3,780
4	31	90	139	177	214	303	306	291	265	105	91	44	53	2,109
5	10	21	35	59	79	64	88	69	56	65	31	27	27	631
6	1	3	5	5	5	14	26	17	29	14	7	12	8	146
7	-	3	1	3	3	3	5	3	8	-	3	5	5	40
8	-	-	-	1	-	1	-	3	4	1	-	-	5	15
9	-	-	-	1	-	-	-	-	1	-	-	-	1	3
10	1	1	8	-	-	-	1	1	-	-	-	-	2	14
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	3	-	-	1	-	-	-	4
13 Over														-
Not shown	17	17	10	8	4	8	4	3	1	-	-	3	-	75
Total	2230	3620	3714	3785	4049	3718	3270	2311	1546	591	337	196	195	29,562

[1]Does not include people living in public institutions.

Table 2.3

Community Statistics: Comparison Between Existing Dwelling Units vs. Desirable Minimum Dwelling Units Per Population Structure

Families (Percent)	No. of Families	No. Persons Per Family	Total No. Persons	No. Bedrooms Per Unit	Required Units Per Family
20	5850	1-2	5850-11,700	1	5850
25.5	7500	3-4	22,500 - 30,000	2	7500
26	7770	5-6	38,850 - 46,620	3	7770
19	5580	7-8	39,060 - 44,640	4	5580
9.5	2865	9-10 over	25,785 - 28,650	5	2865
	29,565		132,045 - 161,610		29,565

Existing Dwelling units = 16,770

Number of households per dwelling unit = 1.77 households

of the total households contain at least the desirable number of 3.5 rooms per household. Conditions such as these are the inevitable breeders of community problems making a mockery of "averages."

Consider the further fact that the rate of population growth in the district is traveling an upward curve. The various tables, graphs, and other data from the 1970 census clearly demonstrate the arcing trend which can be briefly shown as follows:

1. The district grew so rapidly that, by 1960, it was accommodating three times the population it contained at the time of the first available census, while the available residential area remained essentially unchanged.

2. Between 1960 and the 1970 census, the district suffered an increase of approximately 43 percent in its population, while the available rooms rose only 34 percent (Fig. 2.3 and Map 2.4).

The final, disturbing fact is that "average" population density figures are seldom uniform througout the district, tending to vary with the physical characteristics of the area. The land covered by the small factories and slums surrounding them which cannot be used for good habitation is sizeable. Moreover, one out of every 12 households is occupied by only one person. Nonetheless, the uninhabitable area and minimum density quarters are counted when establishing "averages," and both conditions consequently force densities much higher than the mean throughout the rest of the sector.

Causes of Excessive Densities and Problems

East Shubra today possesses one of the greatest densities of all the sections in the city of Cairo, if not the greatest. Actually, no

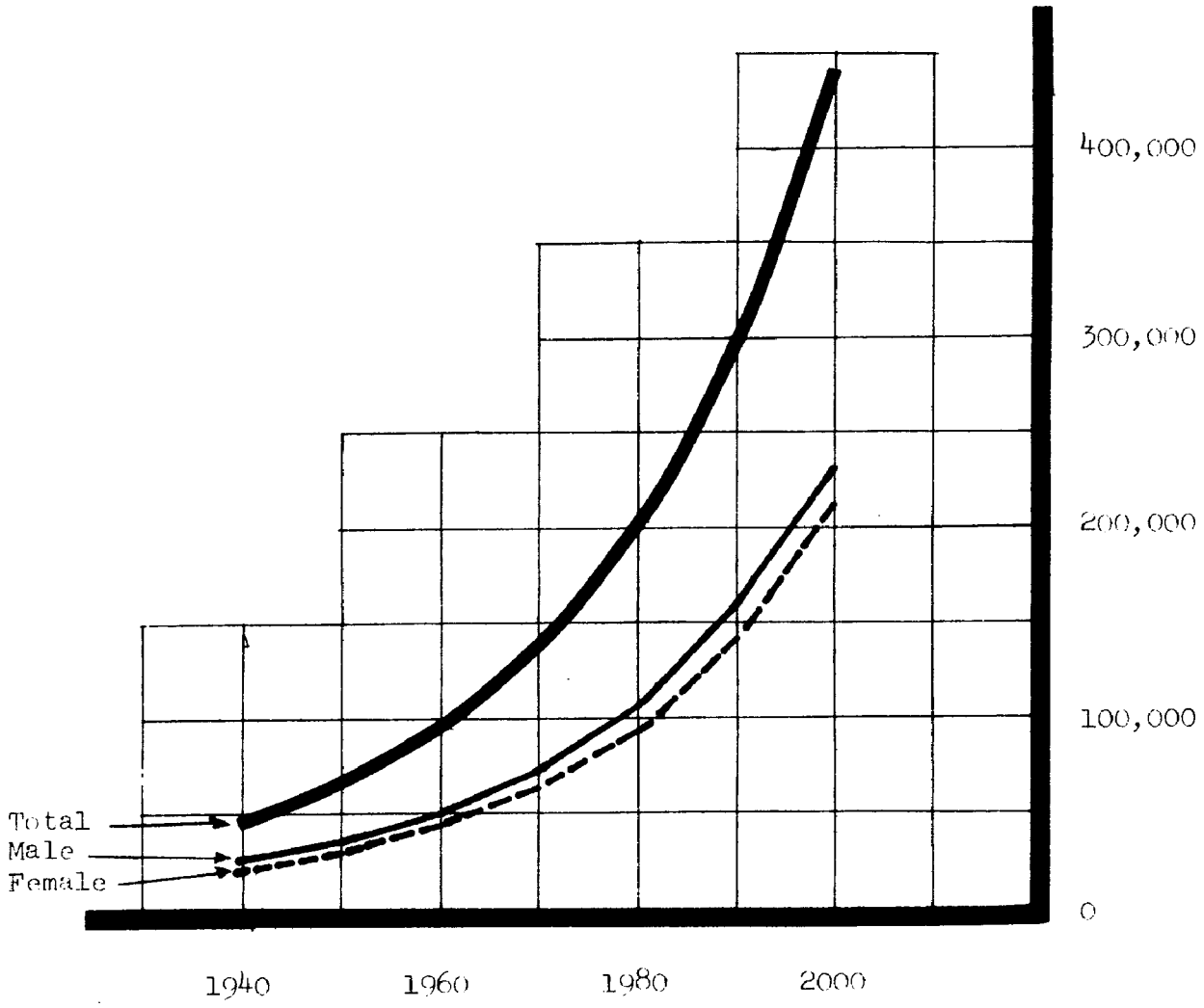


Fig. 2.3 Population Growth for East Shubra.

Method of Prediction: Assuming a growth at constant rate figured annually (Barclay, 1966).

$$P_T = P_o(1 + r)^N \quad , \quad \text{or} \quad \log PT = \log P_o + N \log (1 + r)$$

where P_o = Initial year,

P_T = Terminal year,

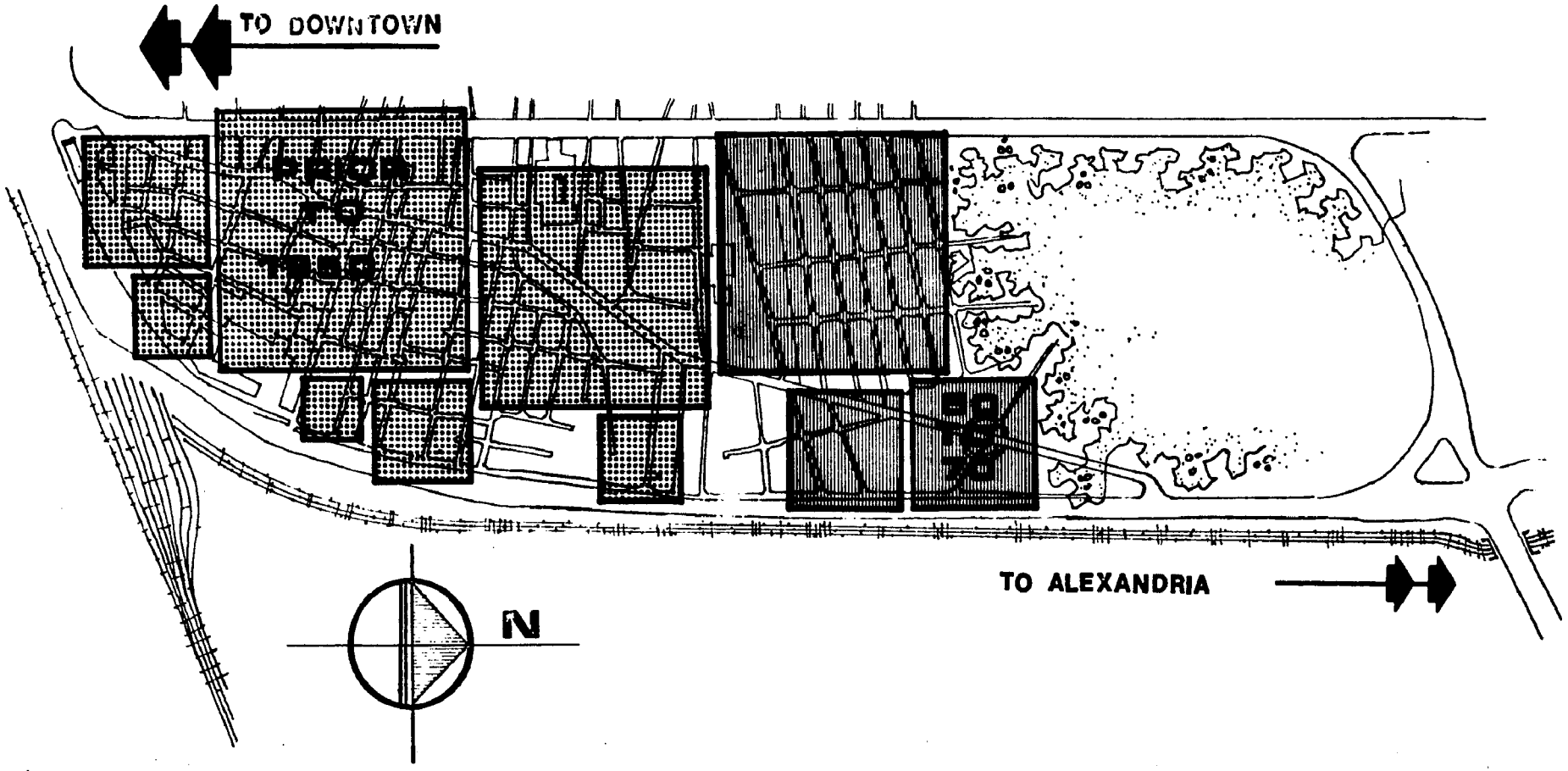
r = Annual growth rate and

N = Number of years between the initial and terminal years.

Therefore: $P_{1980} = 201,800$,

$P_{1990} = 298,200$,

$P_{2000} = 442,000$.



THE SHUBRA DISTRICT

MAP 2.4 STAGES OF DEVELOPMENT

major physical improvements or changes have occurred in the sector to accommodate the huge expansion in its population. Instead, it would appear that the sector has absorbed an unfair share, due to its previous over-population and lack of expandibility, of the influx of migrants who have poured into the municipality of Cairo* in search of urban benefits, probably attracted in particular by the concentration of governmental and industrial institutions within and on the edges of the metropolitan area. The population explosion within Cairo is of such size that it certainly cannot be explained away by the law of natural increases, i.e., an excess of births over deaths. The conclusion that immigration has been the key cause is inescapable. There are six main reasons why this situation exists and promises to continue:

1. Rapid natural growth of Cairo;

2. The excessive immigrations of marginal societies from rural areas to the metropolitan areas due to industry's magnetic force. The daily increase due to immigrations is considered to be 70 families per day;

3. Low income and lack of personal resources, encouraging over-crowding and doubling-up;

4. Economic and kinship ties which often mean that a basic unit of husband, wife, and offspring shares its space with grandparents, single uncles and aunts, fellow-workers, folks of similar origin, interests and background, intimate friends or the like;

5. Early marital age customs causing young wedded couples without full education or skills to depend on and live with one of the in-law families; and

*Cairo-born inhabitants number 2,079,434 out of 3,348,779 (total Cairo population per 1960 census).

6. Multiple wifehood, a very common occurrence among low income groups that fail to understand or choose to ignore the Koranic rules which make this practice permissible only under extremely special circumstances.

Shelter Conditions

The physical condition of average dwelling places is at least inhuman. Besides their extreme age, they are cramped, dark (sometimes windowless), odorous, dilapidated, and devoid of sanitary facilities. The interior construction is not even relieved by adequate open space outdoors, for the streets leading to the housing are only wide enough to permit pedestrian passage (Fig. 2.4 and Map 2.5).

The worst of the neighborhoods fill a 20-acre span of impossible slums. Here the streets are mere alleys, heavily shadowed, too narrow, rubbish-filled, and filthy. Its housing lacks all modern facilities, water service, sewage connections, and even electricity.

Birth Rates

Although this blames the attraction of industry for most of the population explosion in the East Shubra district, it would err in failing to mention the urban rate of birth. To begin with, the national birth rate in Egypt is one of the highest in the world; multiple wifehood, early marriage (meaning more years of probably fertility to the average couple) and prevalent conscientious objection to birth control methods combine to produce such a result.

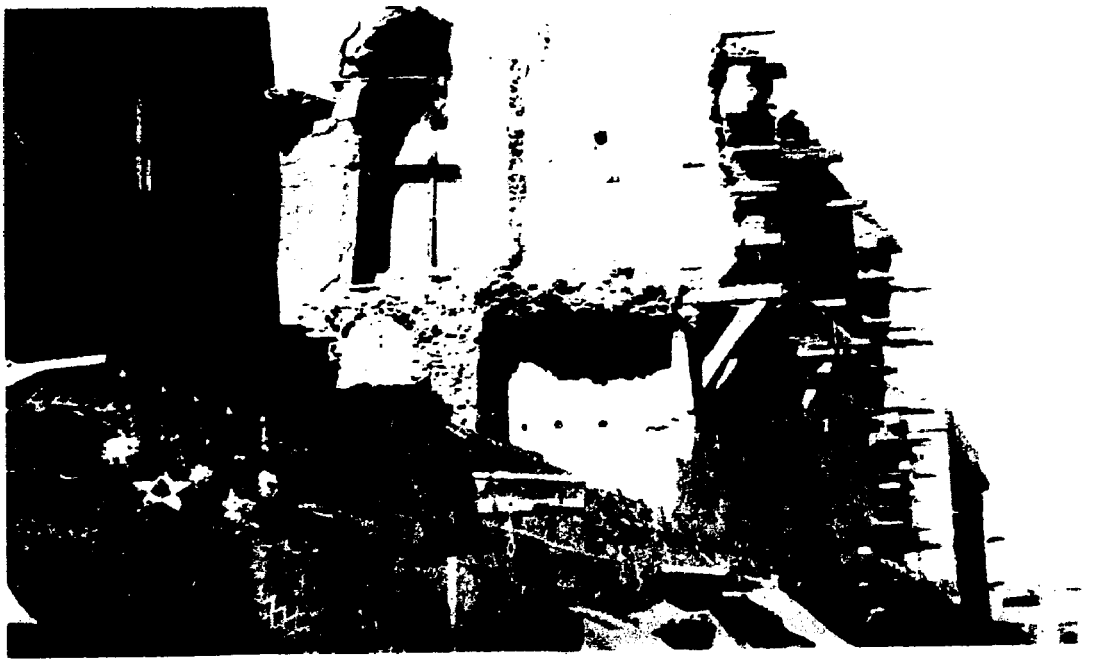
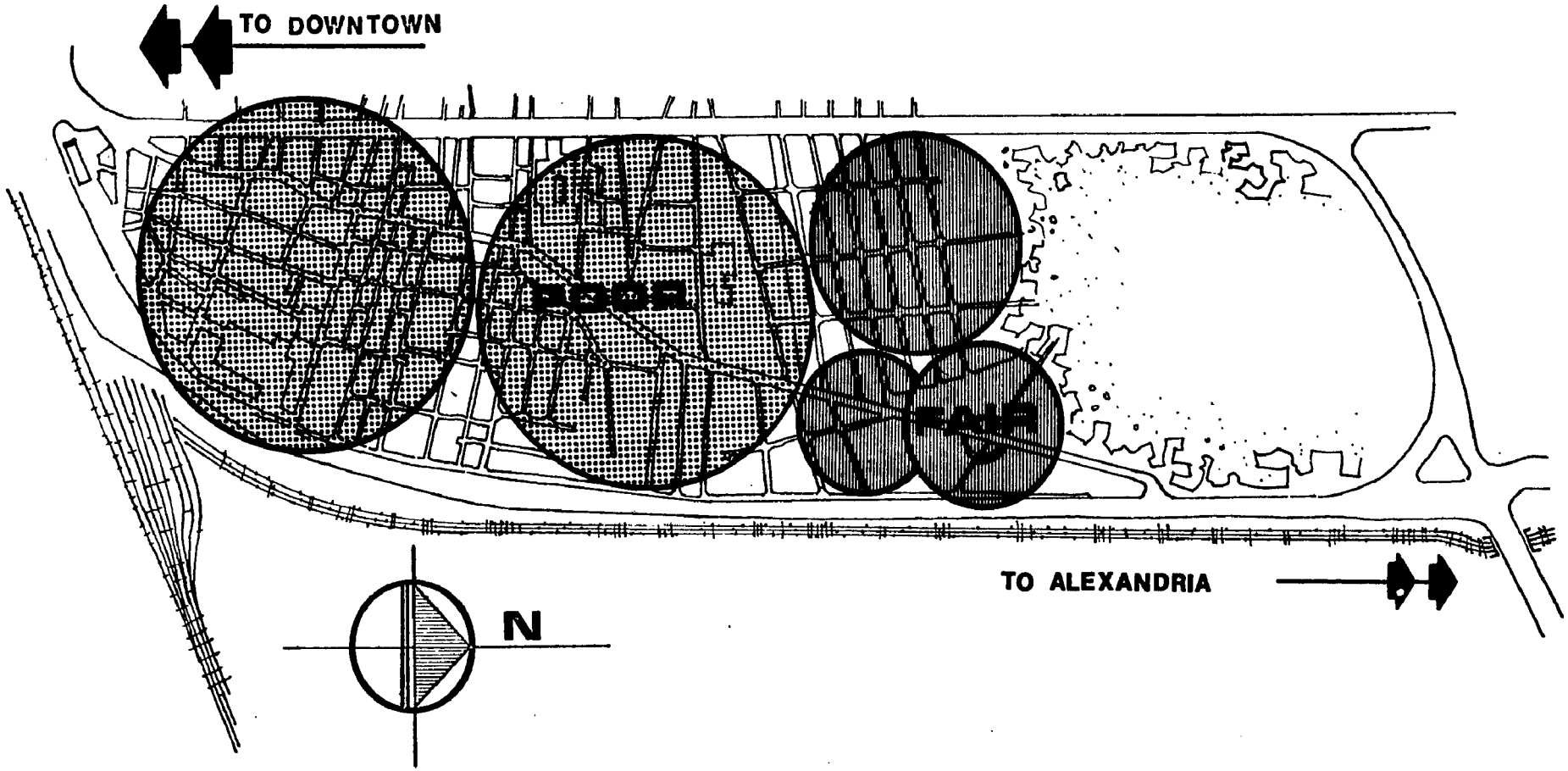




FIG. 2.4 BUILDING CONDITIONS FOR EAST SHUBRA.



THE SHUBRA DISTRICT

MAP 2.5 BUILDING CONDITION

Government Mistakes and Recommended Cures

It should be evident by now that the large urban centers have not paid enough attention in the past to their underprivileged citizens. If the governments throughout the World are upset over their swelling populations, they should be equally concerned over their own failure to understand and meet the needs of this growth.

While they were busy building trafficways, schools, stadiums, and the rest, provision of programs of civic indoctrination to be followed by free (or at least low-cost) socio-cultural and recreational activities--organized with this group as their only target--were overlooked by city officials in most urban centers (or were they considered at all?). As a matter of sad fact, they were never launched in the district where the need has been among the greatest; furthermore, there has been no noticeable increase in any municipal services being extended to the sector that corresponds to its population expansion.

The national administrators are not blameless either. They have followed the lead of private industry by centralizing their own institutions in large metropolitan areas.

In Egypt, for instance, Cairo and Alexandria are the only two locations worth mentioning for their industrial and governmental developments. Moreover, they have even been guilty on occasion of actively and aggressively fostering migration to urban centers with disastrous results as described. The cooperative formula needed instead at the national level to combat these urban perplexities has been all along (and still is) at least threefold.

1. Encouragement of private industry to locate outside of and away from established urban centers through attractive incentives as necessary (such as extending transportation media to remote sites, long-term loans at low level interest rates, tax moratoriums or reductions for specified periods, etc.).

2. Decentralization of appropriate governmental departments, distributing them through rural areas or at least moving them to towns and villages of small populations; and

3. Promotional campaigns directed to the underprivileged in the cities concerning rural living, the opportunities waiting there and the better way of life it provides to all of which the migrants have been blinded by the fictional glories of metropolitan existence.

Future Population Trend Predictions

Precise projections of future population growth in any locality are seldom very trustworthy. Too many factors are constantly at work that can alter the predictions. For example, trends in the district are already dependent on whether or not the municipality of Cairo adopts a comprehensive program for the sector that looks beyond industrial influences into sociology. With such a decision yet to be made, a study of past and present birth, death, and migration rates, growth and volume are of little value.

There are, however, several assumptions that can be made in general which may prove helpful to those concerned with the years ahead in the East Shubra district. When slum clearance arrives in the sector, all of the following alternatives are dependent, of course, on the government:

1. The fertility rate will probably not accelerate beyond its present level; it may even take an opposite turn if the government acts prudently in the solution of the present densities in the sector;

2. The mortality rate is apt to diminish as increased health information is disseminated; medical services are improved; and, presuming that replacement housing is provided and will be better than the present residential areas; and

3. The migration rate into the sector will certainly fall if only because there is absolutely no room left for additional newcomers, and steps could be taken to divert the flow of migrants away from Cairo and into other regions.

In efforts of this study to find and suggest answers to the population and housing problems of the sector, it will be further assumed that the sector must continue to shelter its present volume of inhabitants.

However, the criteria for success in solving this issue must include the following requirements:

1. Density must be reduced to no more than a maximum of 200 persons per acre and preferably less;

2. Density computations must include an allowance for five percent vacancy as a protection to sector citizens against repeating the serious pattern of decline with its vicious cycle of replacement; and

3. Density must also be reduced to the desirable standards previously quoted herein (persons per room, persons per household, and rooms per household) while remembering that some 25 percent of the population is sharing households by voluntary preference arising out of strong kinship.

Economic Difficulties

To evaluate the economy of the district, one must again turn to the 1970 census. It shows a total of 42,900 people in the labor force. Since 67 percent of them are listed as workers within the sector, 33 percent of them must hold jobs in other parts of Cairo. These figures tell a triple story. The first reaction must be that approximately three out of every four people in the district are dependent on someone else for sustenance. The second reaction is that, in a community of 138,080 inhabitants, a gross labor force of only about 28,740 persons appears to be miserably substandard and, furthermore, indicates the limited size of its local commerce and industry. The third reaction becomes the realization that some 14,160 workers out of the 42,900 total leave the sector daily and return to it at nightfall as only a place to lay their weary heads. The workday in Cairo is a long one, due to the afternoon siesta; these workers can neither spend much time in the district or think of it as a welcoming environment (Table 2.4).

There are no available statistical data about the average income of these workers or information on their average expenditures. Using a system of comparative values projected for other low income communities in Cairo, however, it can be concluded only that:

1. The average annual family income in the sector is about 240 Egyptian pounds ($576.00 per year).

2. The highest percentage of this income must be expended on food and the next highest amount on rental of a dwelling space.

Table 2.4

Classification of Employed Males and Females in the District of East Shubra

Sex	Agriculture, Fishing, Hunting	Mining	Industry	Construction	Public Services	Commerce: Retail-Wholesale	Trans.	Pers. Serv.	Non-Prod. Misc.	Unemployed	Total
Male	155	242	14,193	1289	252	10,552	1641	11680	610	6,963	47,577
Female	1	0	306	5	3	342	30	1351	257	41,565	43,860
Total	156	242	14,499	1244	255	10,894	1671	13,031	867	48,528	91,437

[1]Total employment is about 42,900 persons. Number of workers engaged (15 year and over) - 1970 census.

District Employment (Major Industries)

According to a 1970 social survey, that portion of the local work force employed within the district itself is distributed among 330 different shops and 15 trades. This survey also reveals the numbers of workers at each. It further discloses that the largest shop deals in native arts and crafts making products for domestic consumption, is located in the sector, and employs a maximum of five workers.

Textile, shoes, soap and metal industries are the four major industries headquartered in the sector as shown in Table 2.5 and Map 2.6.

Social and Cultural Deficiencies

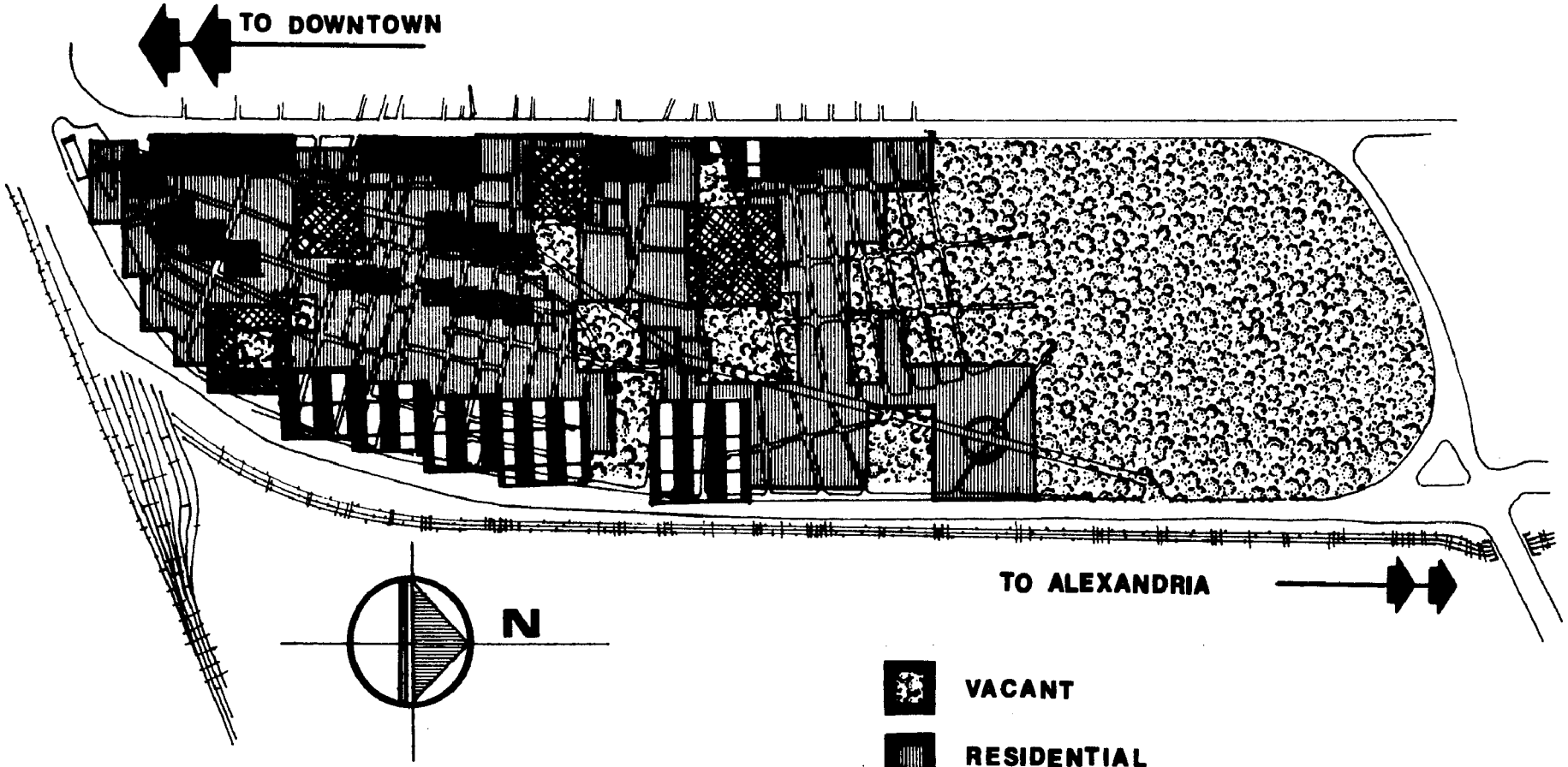
Education, recreation, health services, and social organization are all areas in which glaring deficiencies exist and correction is needed in the district today. It seems premature, therefore, to speak now in terms of loftier goals in the cultural realm than simply education itself with all the other problems awaiting solution in the sector. Purely for the record, at least for the moment, time is taken here only to mention that the sector lacks all forms of cultural outlets which the well-balanced community should enjoy.

According to school statistics of the sector in the 1970 social survey, there were only 23,230 pupils attending various classes as follows: 19,890 in the elementary grades, 3,380 in the preparatory grades (junior high), and 480 in the secondary grades (high school). The total number of schools serving the district was 60, providing 521 classrooms with approximately 45 students per room. Modern school programs in all of the

Table 2.5

Classification of Industry and Number of Workers

Industry Classification	Number of Institutions 5	10	20	40	60	80+	Total	Workers/Industry Percent
Textile	53	20	5	-	-	5	83	21.33
Food	12	31	8	7	3	-	01	21.11
Soap	5	4	3	1	-	4	17	11.29
Metal	75	8	4	1	-	2	90	18.06
Building	13	23	-	-	-	-	36	6.87
Shoes	35	9	1	-	-	-	45	6.32
Variety wares	8	7	1	-	-	-	16	3.27
Leather	16	4	-	-	-	-	20	2.44
Carpentry	16	3	-	-	-	-	19	2.18
Burlap	5	4	1	-	-	-	10	2.11
Painting	5	4	1	-	-	-	10	2.11
Paper	13	1	-	-	-	-	14	1.66
Chemical	2	2	-	-	-	-	4	0.59
Light Metal	1	1					2	0.43
Glass	1	1					2	0.23
Total	260	122	24	9	3	11	429	100.0



THE SHUBRA DISTRICT

MAP 2.6 EXISTING LAND USE

advanced communities of the World insist upon a maximum of 30 pupils per classroom for effective education--with a recommended optimum of only 25 pupils (Gallion, 1963).

Turning once more to the 1970 census discloses that there were approximately 23,400 children of school age in the area. This figure does not include all children to be considered because we are concerned here only with those of elementary education age of 6 to 12 years. With the subsequent arrival of compulsory education at the elementary level in Egypt, any present solution for overcrowded school facilities must also allow for that quantity, plus any future expansion. The 1970 social survey of the area further indicates that only 29 schools were then available with 246 classrooms to accommodate the extra enrollment. These figures force resignation to an average pupil load per classroom of over 100 students in these 29 schools (which also serve adjacent neighborhoods in addition to their own locality) (Fig. 2.5).

There were small numbers of play areas, some of them basketball and volleyball courts, and the rest were for other different play areas, all affiliated with existing schools. These were the outdoor recreational spaces available in the district for children. With upwards of 50,000 children to save from early disease right now--and many more to come--plus chronic illnesses and untimely deaths because of poor physical development in their youth, the responsibility for corrective action in this area is grave. It has also been proved irrefutably in urban communities of many nations that organized, vigorous athletic programs for the teenagers are powerful weapons against both delinquency and crime. "Children...seem out

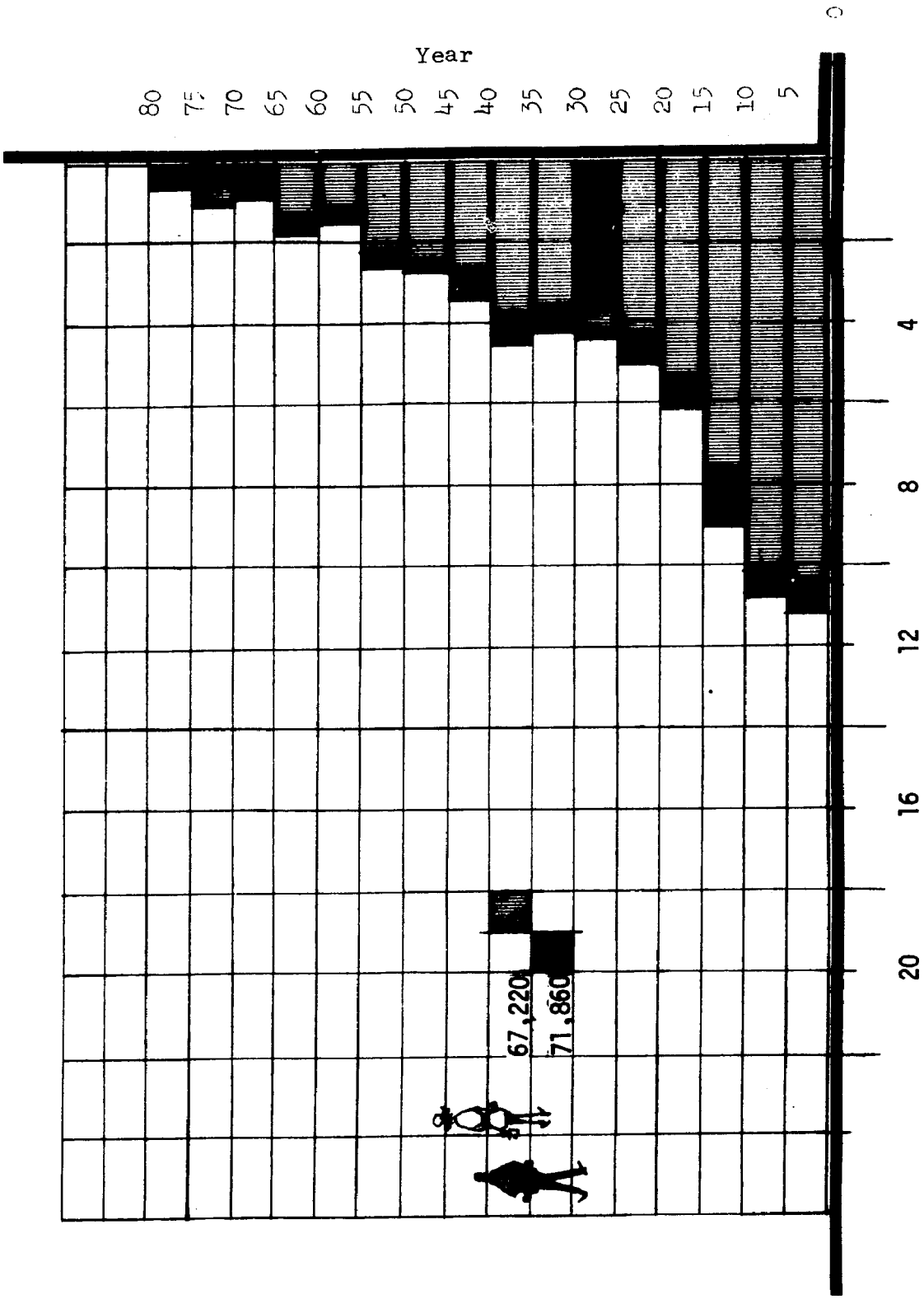


Fig. 2.5 Population Distribution by Age and Sex.

of place in cities or at least there do not seem to be places suitable to the needs of these members of society.... Books and academic lessons are not the only educational ingredients essential to the growth of the child's mind, body, and spirit.... The Greek adage of a sound mind in a healthy body seems to have been forgotten" (Higbee, 1960).

Adult recreation usually is less athletic than that of children. Their leisure-hour interest usually leans to social, political, and cultural indulgence instead.*

Nonetheless, there is no reason why parents should be kept from using the playfields and gynamiums of their children, once provided, for there always seems to be a certain percentage of adults that value regular participation in physical exercise, sports, and athletic games--whether informal or planned. Thus, provision of dual facilities in this area is not a problem for the sector.

Health services in the district are pathetic. Does anyone really care that there is only one outpatient clinic and two private small hospitals for care of eye diseases in this sector of 138,080 people? Even the latter, token facilities provide just 100 patient beds between them, mutually used by both interchangeably. They are equally overcrowded and understaffed. The hopeful ailing patients overflow the waiting room daily, and, in their unavoidable contacts with each other, thus virtually convert these modern symbols of health and cleanliness into exchange centers of disease. Need more be said about this deficiency other than to strive to attain a ratio of 4.25 hospital beds per 1000 population.

There are a few private social service agencies in the East Shubra district--small, underbudgeted, underfinanced, and dreadfully ineffective

*Personally observed through research.

compared to the need. The bulk of the people with personal problems rarely bother to approach them; long lines are tolerable but absence of results is not. And which of the local inhabitants, after all, does not have personal problems? As for setting up and conducting invigorating programs of social and cultural nature for the benefit of the citizenry, these offices lack both the authority and the staffs for such immense undertakings.

Adults have no clubs or organized activities of any kind in the East Shubra district. Fortunately, they seem to enjoy spending leisure hours in coffeehouses, for there is no other place to go anyway. Also, and fortunately, such establishments are all over the sector.

Generally speaking, however, the coffeehouses are not recreation centers by any means. They are simply a place where people of small income can while away an hour or two in conversation with their friends at a cost within their means.

The district, in its present state of neglect and decline, cannot fairly be considered a community in any true sense of the word. Not yet, at least. A true community is a place "in which children can be raised and educated to become healthy, decent human beings...beings in which the amenities of life, social intercourse, amusement, recreation and cultural advantages are procurable."

This chapter has attempted primarily to identify the major needs of the dying sector, to discuss them enough that their extent is appreciated and trace, when appropriate, their causes.

> "How can we plan the future without knowledge of the present; and how can we understand the present unless we know the past out of which it grows? We must go back in order to look forward."
>
> -- Maxwell Fry

2.2 City of Livonia and Description of the Community

The rapid growth of the Detroit area as a large urban settlement and the possiblity of rapid automobile access because of excellent roads results in the appearance of new communities along the good roads (Fig. 2.6). Livonia is one of these communities which has been created due to the favorable juxtaposition of the Detroit area and the excellent roadways. The leading edge of the urban growth of the Detroit area is now passing through Livonia.

Livonia is not a free-standing community, but an extension of the Detroit urbanized area. Its physical identity as a community is not because of special isolation from the region's great urbanized area, but through distinctiveness of development within the city limits. Except for signs stating the city limits, one would be unaware of the city and its boundaries: Plymouth Road, (M-14), the C & O Railroad, the I-96 Freeway (Schoolcraft Road), and M-102 (Eight-Mile Road) all leading eastward and becoming dominant links between Livonia and Detroit (Fig. 2.7).

North-South transportation corridors through Livonia are secondary to the East-West corridors.

The city lies on the northwestern edge of Metropolitan Detroit's urbanized area. The dominant man-produced regional feature of Livonia is the C & O Railraod Industrial Corridor. The extent to which I-96 and I-275 Freeways will become dominant is not yet certain, but indications are that they will be strong.

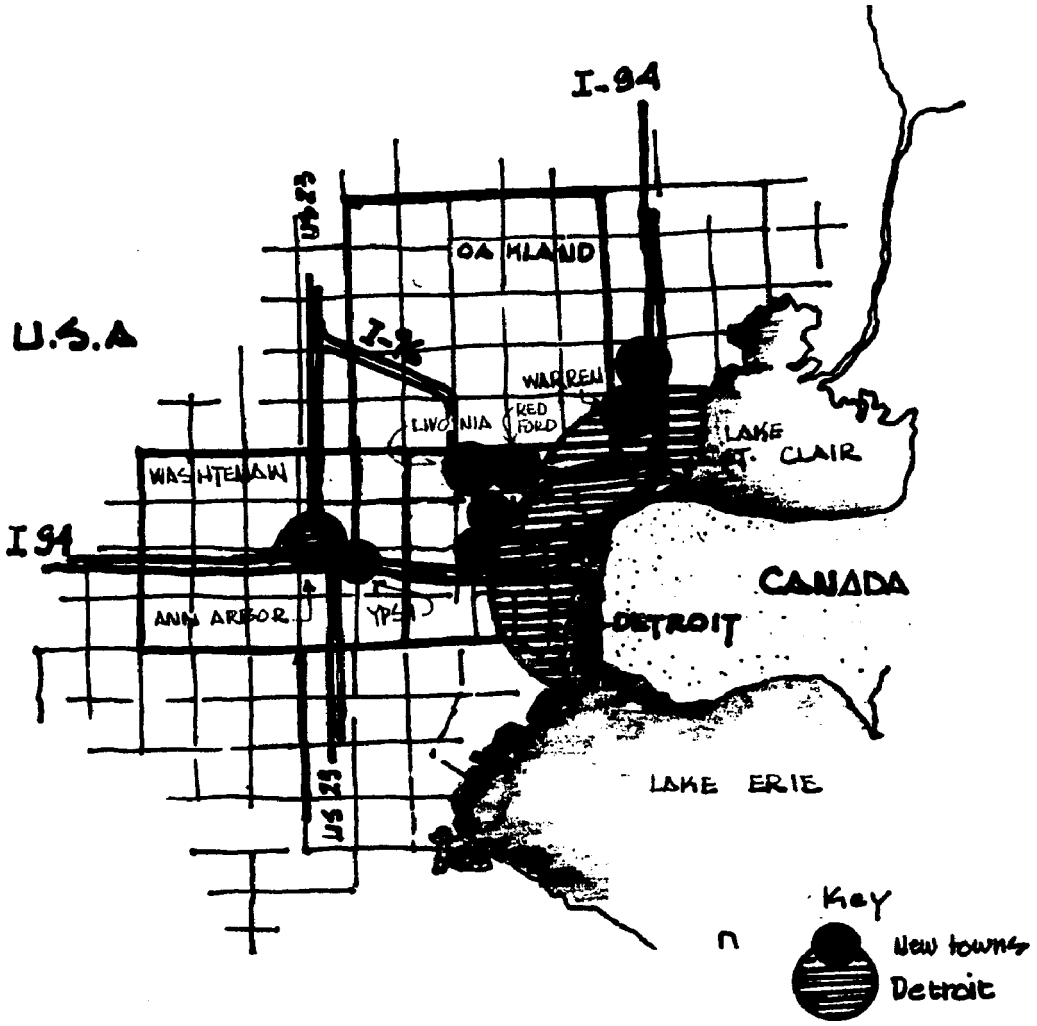


Fig. 2.6 The appearance of new towns along I-94 & I-96 (such as Livonia, Warren, and Redford).

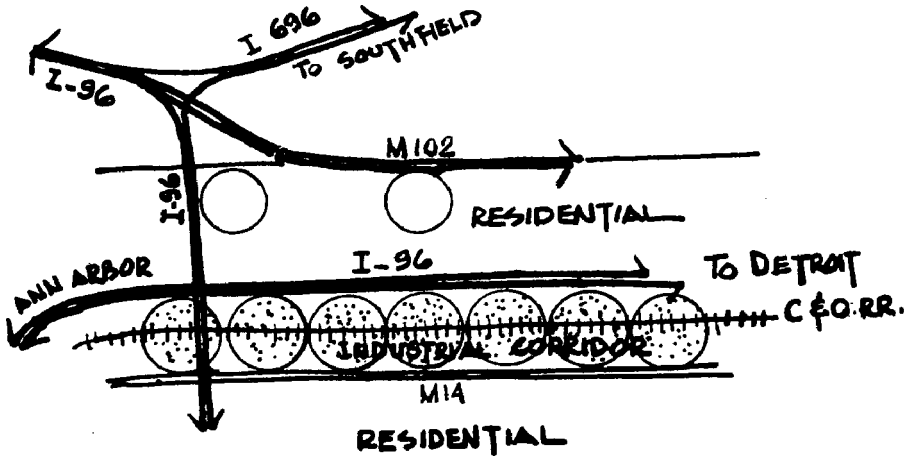


Fig 2.7 Major Orientation elements of the City of Livonia

Table 2.6

Population Growth of Livonia and Selected Areas

Area	1940	% Change 1940-1950	1950	% Change 1950-1960	1960	% Change 1960-1970	1970
Wayne County	2,015,623	20.8	2,935,235	9.5	2,666,297	0.0	2,666,751
Detroit	1,623,452	13.9	1,849,568	-9.7	1,670,144	-9.5	1,511,482
Livonia	8,728	100.9	17,534	280.7	66,702	65.1	110,109

Source: U.S. Census of Population

Except for the River Rouge there are not outstanding natural features. The community history of growth of Livonia is different from that of such surrounding communities as Farmington and Northville, both of which are still freestanding communities with urbanized centers already recognizable. These communities are all old, established long before the region's great suburban growth.

Excessive Population

Livonia is still in the greatest period of growth. Between the 1940 census and that of 1950, Livonia's population increased 100.9 percent, and 280.7 percent from 1950 to 1960 as shown in Table 2.6.

The population of the city has increased approximately 13 times between 1940 and 1970 (see Fig. 2.8).

Wayne County has reached the point of stable population, while the population in the Detroit area is now decreasing because of the rise of new industrial communities in the region's suburban areas such as Livonia and others. There are three major factors which suggest why Livonia is growing so rapidly:

1. Magnet-like action due to the attraction of industry and the metropolitan area.

2. Geographic location.

Most of the townships and other closer-in areas of Wayne County are built up. Livonia has been experiencing major residential and industrial growth spreading out from Detroit and built-up suburbs.

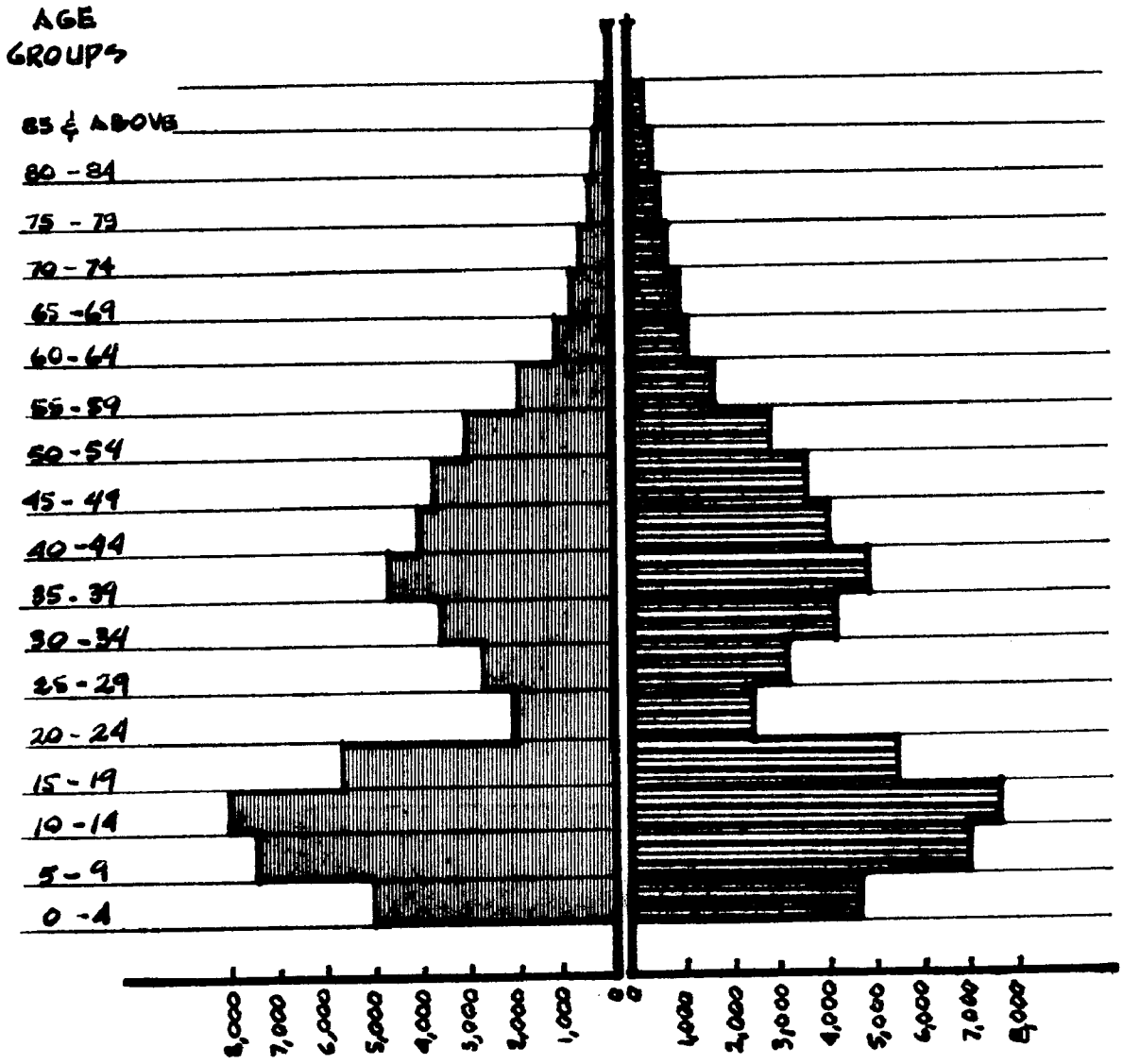


Fig. 2.8 City of Livonia population age groups by sex 1970

KEY

FEMALE

MALE

Livonia's readiness for development coincides with a condition of high demand for industrial sites and the current prosperous economy.

3. The type of housing existing in Livonia is the type of housing which people prefer to own and in which they enjoy a style of housing pointed toward the labor force and favorable taxation.

There are some other factors which influence the growth of Livonia's population. Livonia's 36 square mile area is a small part of the large metropolitan area, and occupies less than two percent of the Detroit area to which it is irrevocably tied. Therefore, Livonia's future growth is extremely dependent upon growth factors of the whole region. The region's economic growth rate is another factor. The region's economy is rapidly expanding, providing more job opportunities than the local population can fill. Outsiders migrate into the region to fill these jobs and bring along their families to live.

Population Densities

Livonia's growth certainly depends to a great extent on the durability of the metropolitan economy. Many experts predicted that the greater Detroit's economy will continue to expand at or near the same percentage as it has in the recent past. Since Livonia lies directly in line with the northwesterly expansion pattern of the metropolitan area, then the pressures of rapid urbanization and population growth are expected to continue in Livonia until the city is completely filled.

However, Livonia today possesses one of the greatest growth rates of all sections in the Detroit Metropolitan area. The city is exceeded only by Warren in numerical growth. Physical improvements are matching the hugh expansion of Livonia population.

From the 1970 census there are approximately 110,000 persons living in the city. The area of the developed land within the city is estimated to be 19,454 acres. The residential areas occupy only 7,324 acres of the total developed land (Table 2.7).

Applying the three methods of measuring the optimum density (see Section 2.1) it may be concluded (from the 1970 Census of Housing and the 1970 Livonia Statistical Data book) that:

--- the average number of persons per room (see Table 2.8) 0.5 to 1.0 persons

--- the average number of persons per household: 3.95 persons

--- the average number of rooms per household: 4.0 rooms

Table 2.7 City of Livonia (1970 Existing Land Use Inventory).

Land Use	Acres Used	% of Total	% of Developed Land (minus agriculture and vacant lands)	
Single Family Dwelling	7,206.3	37.0	53.3	
Two Family Dwelling	32.9	0.2	0.2	
Three and Four Family Dwelling	2.2	0.0	0.0	54.2% Residential
Five to Eight Family Dwelling	7.6	0.0	0.1	
Nine or more Family Dwelling	65.0	0.3	0.5	
Hotel, Motel or Tourist Home	12.4	0.1	0.1	
Agriculture	1,032.0	5.3		
Extractive & Industrial Non-Manufacturing	361.7	1.9	2.7	
Manufacturing	1,083.7	5.6	8.0	
Transportation, Communications & Utilities	177.1	0.9	1.3	16.6% Industry,
Commercial	503.0	2.6	3.7	Commercial
Personal, Business & Professional Services	115.8	0.6	0.9	
Local Government	102.4	0.5	0.8	
Other Government	24.6	0.1	0.2	
Public Schools	1,092.5	5.6	8.1	
Private Schools	70.0	0.4	0.5	
Public Museums and Libraries	8.0	0.0	0.1	
Churches	458.5	2.4	3.4	
Cemeteries	425.9	2.2	3.2	29.2% Public & Quasi-
Hospitals & Convalescent Homes	77.0	0.4	0.6	Public
Non-Profit Membership Organizations	12.9	0.1	0.1	
Outdoor Public Land Recreation	1,066.6	5.5	7.9	
Outdoor Private Land Recreation (for profit)	424.1	2.2	3.1	
Indoor Private Recreation	40.4	0.2	0.3	
Flood Plain Lands & Private Non-Profit Recreation	74.9	0.4	0.6	
Subdivision Parks, Community Centers & Swimming Clubs	70.6	0.4	0.5	
Vacant Land	4,906.4	25.2		
Total	19,454.5*	100.0%	100.0%	

*Total excludes approximately 3,500 acres of land that is in streets.

Source: City of Livonia Planning Department.

Since the average number of persons per household is 3.5 persons, it can be concluded that the existing average number of persons per household in Livonia is higher by 12.5 percent over the desirable maximum.

Future Population Trend Predictions

Projections of future population growth in Livonia are readily available. The accuracy of the predictions are subject ot question as there are too many uncertain factors affecting the predictions. With an accurate prediction yet to be made, a study of the past and present of Livonia's population trends are of value (Table 2.8). Livonia has increased at a rapid rate since 1950 when the Township of Livonia incorporated as a city.

However, there are several assumptions that can be made in general which may prove helpful to those concerned with the years ahead in the City of Livonia.

1. Since 70 percent of the City's land area is already developed and a substantial amount of the parcels of land still vacant will be difficult to develop because of location, size and dimensions (Map 2.7), the city should purchase the remainder of the land to retain the right of developing this area only for community facilities, improvements and natural resources to avoid overcrowding in the future.

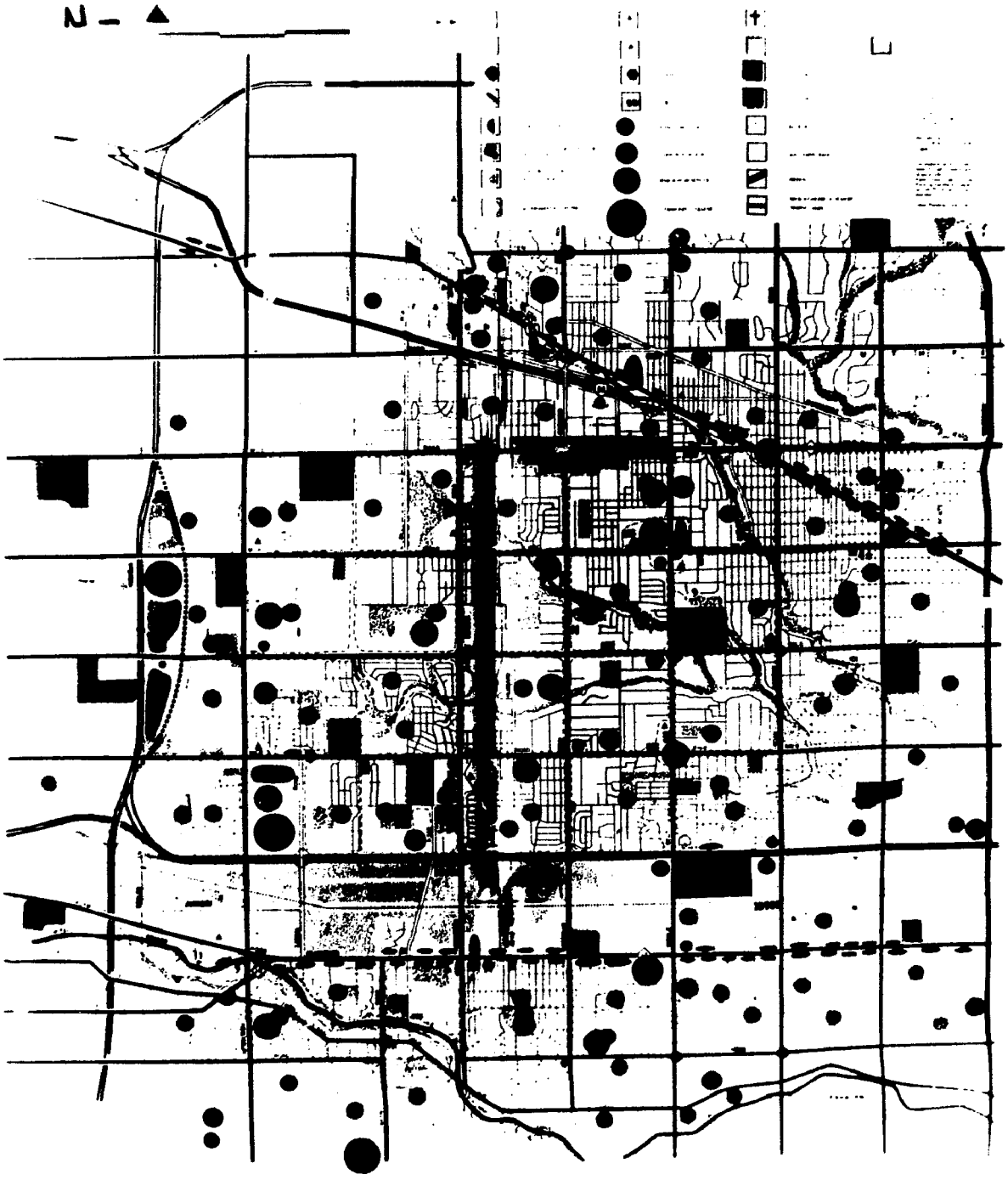
2. The migration rate into the city will certainly fall if for no other reason than there will be not land left for additional newcomers.

Table 2.8

Livonia's Population Growth[1]

Year	Population	Percent Change
1900	1,460	---
1910	1,365	-6.5
1920	1,608	+17.8
1930	3,192	+98.5
1940	8,728	+173.4
1950	17,534	+100.9
1960	66,702	+280.4
1970	110,100	+64.5

1. Source: U. S. Bureau of Census and Livonia Planning Department, 1970.



Map 2.7 City of Livonia proposed general development plan

Source: City of Livonia Planning Department.

3. A regional study of industrial locations should be considered to reduce the concentration of industry in now occurring areas along the C & O corridor, and encourage private industry to disperse outside of and away from established urban centers.

The city has in recent years "held the line" on most existing low density, single-family zoning districts that are based on the Planning Commission's land use plan, and has not changed the zoning upon petition by developers for higher density districts. Consequently, many developers have gone to other communities to build their higher density housing. If the existing zoning districts of Livonia remain, the effect will be to slow down population growth and assure low population densities.

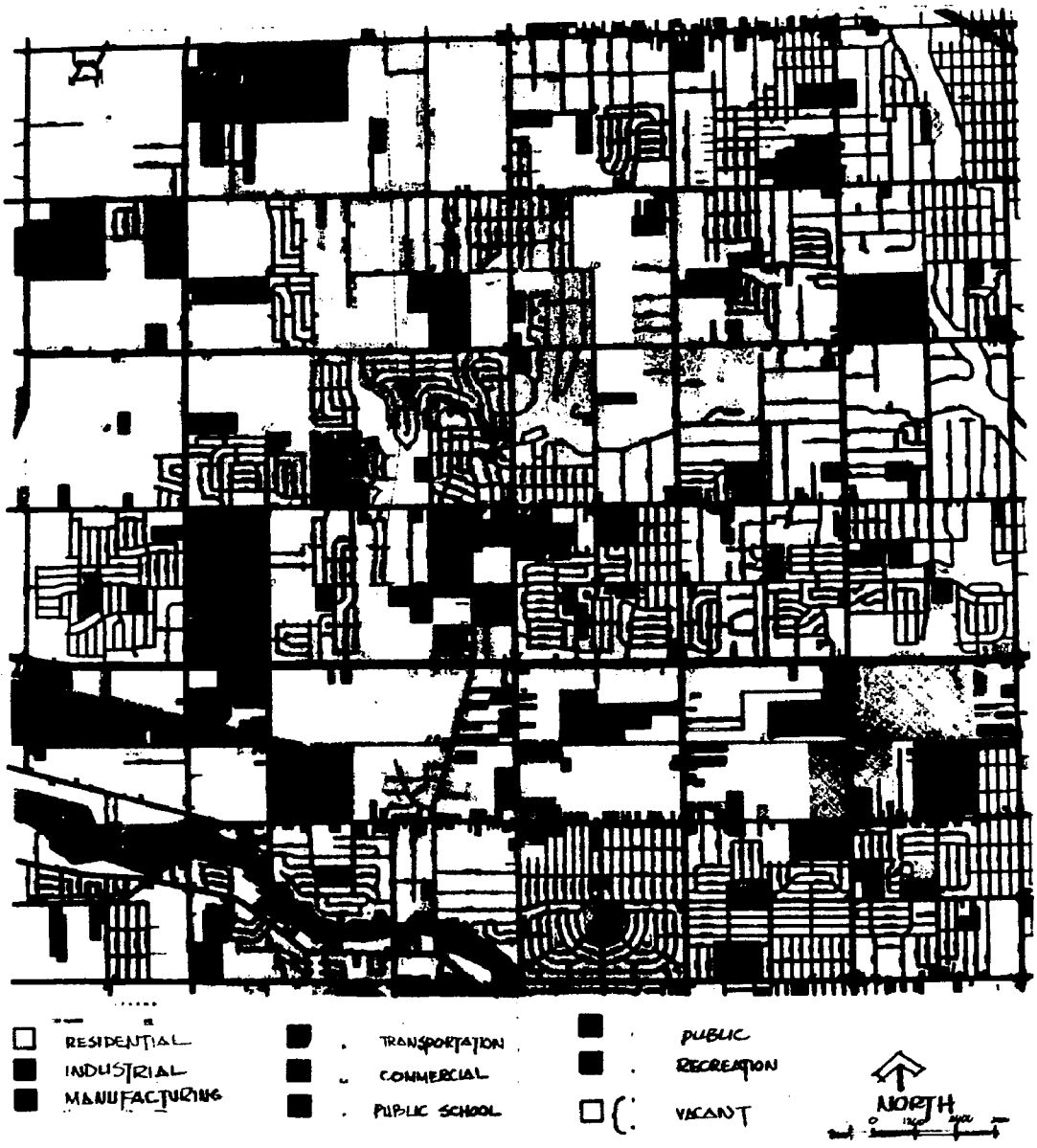
Because of the limited vacant land area left in Livonia, in the near future the City will become completely developed or saturated in urban-type land uses. It is estimated that by 1985 the city should be nearing this saturation point with only a few of the most inaccessible or least useable lands still remaining undeveloped.

Maximum population at saturation point can be estimated two ways:

1. Based on the capacity of the vacant land, there are two alternates:

a. The lowest forecast is based on the Planning Commission's general land use plan which proposes an extensive park and open space plan with 500 to 700 more acres proposed for purchase (Map 2.8). It is based also on the maximum dwelling unit capacity obtainable on vacant land under existing zoning regulations. Except in those areas where the generalized land use plan proposes nonresidential land uses.

b. The highest forecast is based on past dwelling unit density trends in an area, and projecting those densities on nearby vacant land



Map 2.8 City of Livonia existing Land Use Plan.

Source: City of Livonia Planning Department.

presently in a residentially zoned classification with no further purchase of park land.

However, these projections are based on an average factor of 4.0 persons per dwelling unit for single- and two-family dwelling units, and an average of 2.5 persons per dwelling unit for multiple-family dwellings.*

Accordingly, Livonia's population can be projected as 142,000 persons as the lowest forecast or 169,800 as maximum growth by 1985 (Map. 2.9).

2. Based on the past trend of the population since growth in Livonia has been transitory, there must be a starting point, a period of some continuance, and an end. An essential point to remember is that, after examining nearby communities such as Detroit and Wayne County, Livonia is smaller than them. Their population growth did not always occur as an increasing factor, and it did not last forever (see Table 2.6). However, in a very much idealized form, the cyclical nature of growth of Livonia can be illustrated in Fig. 2.9. The prediction based on the following mathematical formula of the logistic curve of growth (Farley, 1970) estimates that Livonia will have a population of 140,000 by 1980.

$$Y = \frac{k}{1 + e^{a+bx}}$$

$$k = \frac{2Y_oY_1Y_2 - Y_1^2(Y_o + Y_2)}{Y_oY_2 - Y_1^2}$$

$$a = \log_e \frac{k - Y_o}{Y_o}$$

$$b = 1/n \log_e \frac{Y_o(k - Y_1)}{Y_1(k - Y_o)}$$

*Factors are substantiated from actual Livonia School Board Census, 1969.

In demographic research Y is often used to indicate population size and x for time. There are three empirically fitted constants: a, b, and k, of which k represents the upper limit of the function. As a result, the first forecast based on existing vacant land and the last forecast based on population trends are very close and realistic.

Housing Conditions

The physical condition of the majority of Livonia dwelling places is acceptable. The vast majority of Livonia residents live in well-maintained homes of ample size in sound neighborhoods. While 90 percent of the homes were in sound condition in 1970*, there are scattered severe housing problems* in approximately 26 neighborhoods out of the 36 neighborhoods existing in Livonia as shown in Fig. 2.10 (Livonia Systematic Housing Code, 1970). None of these areas are "slums." Almost all of them could be regarded to be attractive and moderately priced.

Housing problems for low- and moderate-income families are intensified by an overall shortage of housing. Because there are few vacancies, sound housing seldom "filters down" to those of low income. Low and moderate income families frequently have large families. In addition, relatively little public housing has been built for the poor, and almost none for those of moderate income. Many families are over-crowded, and some share dwelling units.

The census lists approximately 28,138 available dwellings with a total population of 110,109 to share them, it is obvious that an average of 3.92 persons must actually live in each dwelling.

---

*Enumeration districts having 10 or more substandard units or 8 or more dilapidated units, according to 1970 census.

A	2,080	A	1,400	A	360	A	4,310	A	4,969	A	5,800
B	2,360	B	1,680	B	3,640	B	5,420	B	3,900	B	5,760
C	4,120	C	3,000	C	5,640	C	5,935	C	5,165	C	6,260
D	2,030	D	1,350	D	340	D	4,230	D	4,785	D	5,700
E	285	E	145	E	280	E	3,150	E	2,965	E	5,325
										7 MILE RD.	
A	2,000	A	5,625	A	5,280	A	2,480	A	5,800	A	4,590
B	3,310	B	5,725	B	5,480	B	2,680	B	5,320	B	5,090
C	4,270	C	5,885	C	6,360	C	3,100	C	6,400	C	5,250
D	1,900	D	5,525	D	5,230	D	2,430	D	5,700	D	4,450
E	345	E	2,380	E	1,075	E	1,875	E	3,965	E	4,100
										6 MILE RD.	
A	2,950	A	5,880	A	5,040	A	2,980	A	3,515	A	3,990
B	4,200	B	5,920	B	5,040	B	3,000	B	3,515	B	3,940
C	4,200	C	5,920	C	5,120	C	3,740	C	4,315	C	4,550
D	2,900	D	5,780	D	4,940	D	2,330	D	3,465	D	3,890
E	1,780	E	5,350	E	4,930	E	2,600	E	2,600	E	3,300
										5 MILE RD.	
A	6,960	A	4,190	A	4,430	A	6,845	A	5,520	A	6,890
B	7,200	B	4,375	B	3,730	B	6,895	B	5,540	B	6,910
C	7,200	C	4,375	C	3,730	C	6,980	C	6,000	C	6,910
D	6,860	D	4,140	D	4,380	D	6,745	D	5,420	D	6,790
E	5,870	E	3,410	E	1,715	E	6,520	E	5,050	E	5,180
										I-96	
A	--	A	--	A	--	A	--	A	--	A	--
B	660	B	--	B	620	B	--	B	--	B	1,580
C	1,570	C	--	C	620	C	--	C	--	C	1,640
D	--	D	--	D	--	D	--	D	--	D	--
E	320	E	130	E	700	E	330	E	180	E	1,430
								(M-14)		PLYMOUTH RD.	
A	4,250	A	4,810	A	4,305	A	9,515	A	7,600	A	7,770
B	4,410	B	4,810	B	4,845	B	9,515	B	7,600	B	7,840
C	4,410	C	5,070	C	5,365	C	9,795	C	7,740	C	7,940
D	4,200	D	4,760	D	4,255	D	9,415	D	7,500	D	7,670
E	3,420	E	4,060	E	3,460	E	8,940	E	7,365	E	7,500
										JOY RD.	

NEWBURGH | FARMINGTON | MERRIMAN | MIDDLEBELT

1985

Legend	City Total	According to:
Forecast A	142,000	Vacant Res. Land (with proposed park)
Forecast B	152,600	Vacant Res. Land (without park)
Forecast C	169,800	Res. Trend Predictions
Forecast D	140,000	Population Trend Predictions

1980

Existing E Population	110,109

Map 2.9 Population Growth by Neighborhood.

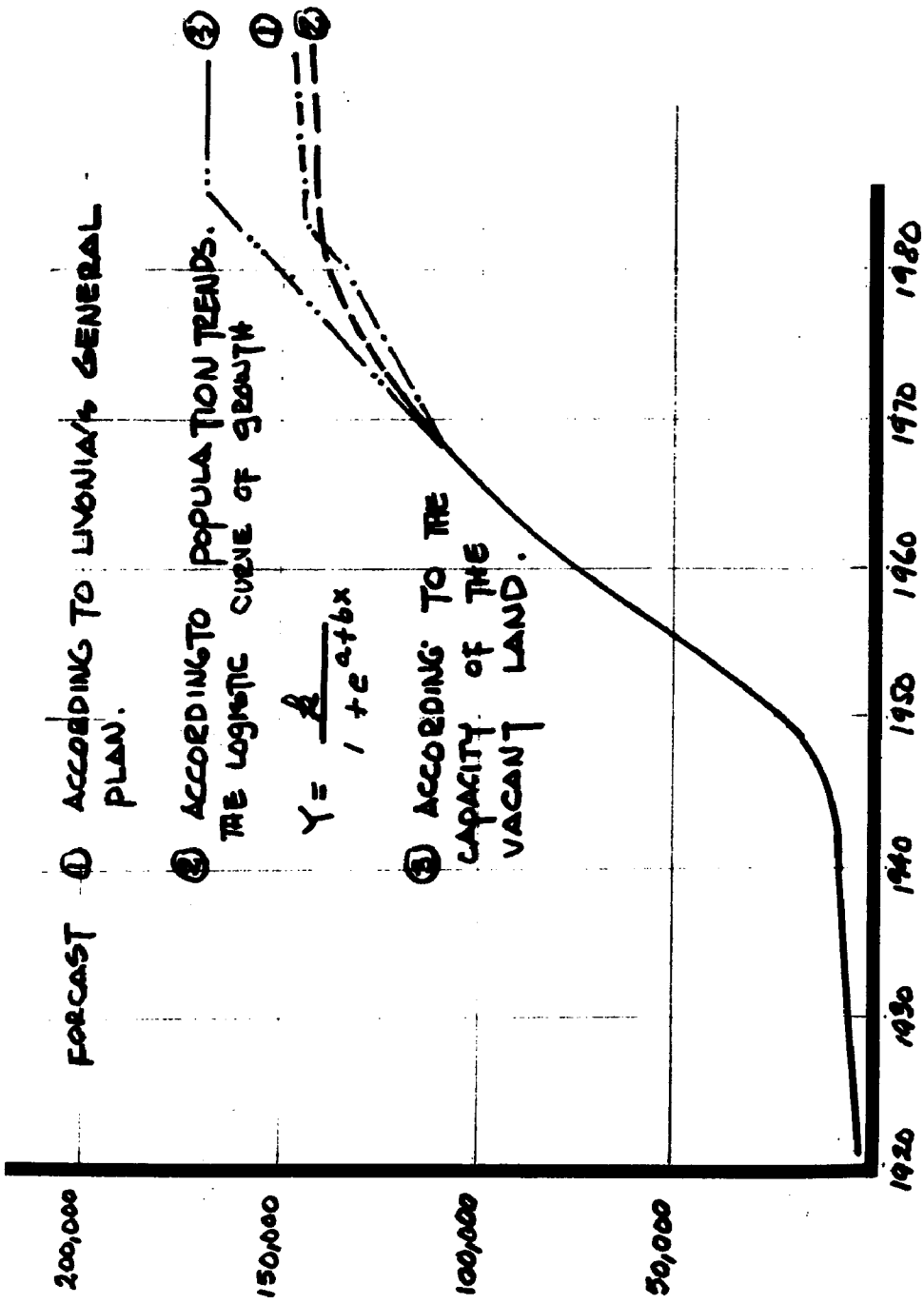


Fig. 2.9 Livonia's population growth (The Logistic Curve)

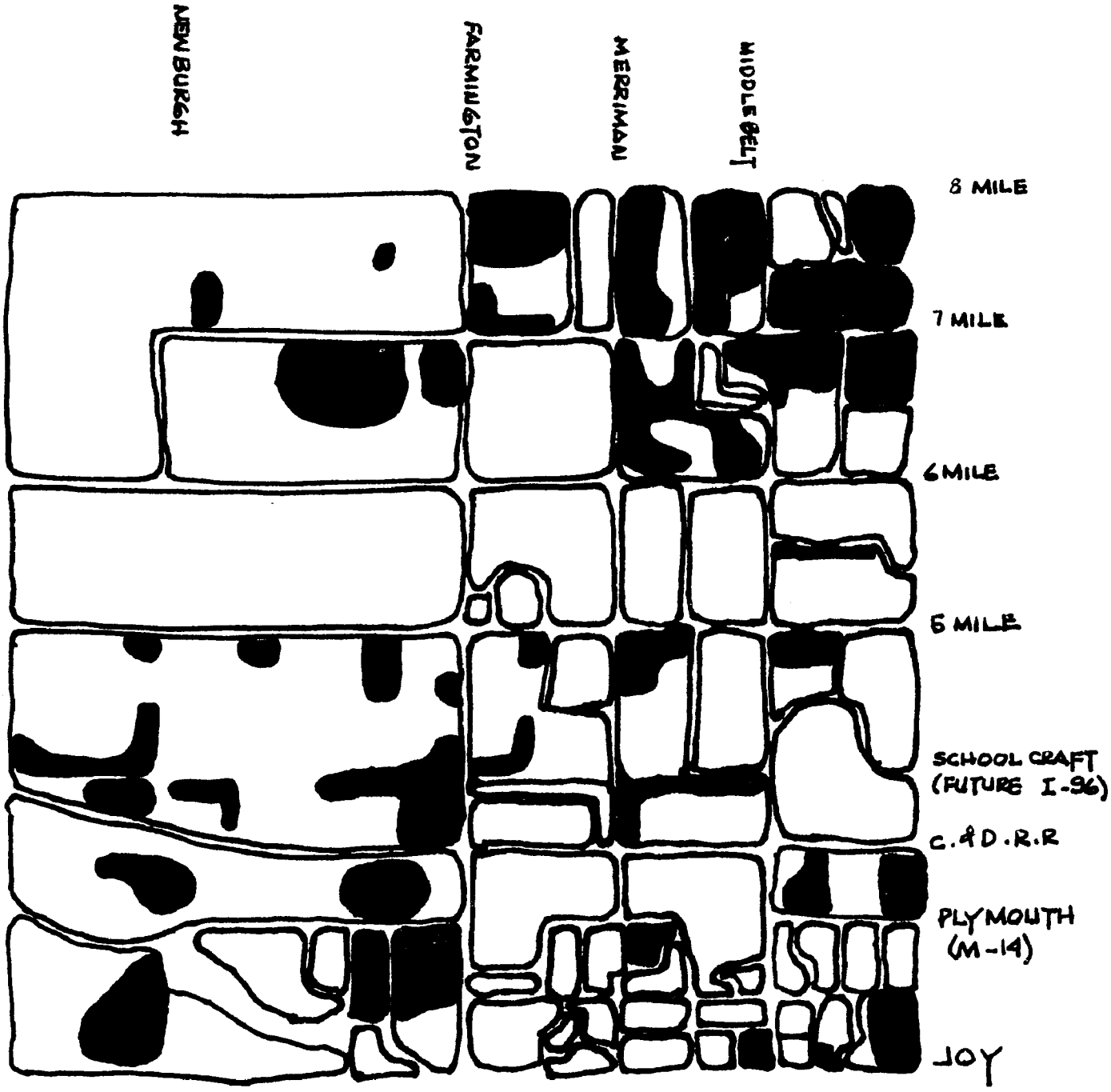


FIG. 2.10 HOUSING DISTRICTS HAVING TEN OR MORE SUBSTANDARD UNITS.

KEY

DISTRICT BOUNDARY

AREAS IN WHICH MOST OF THE SUBSTANDARD UNITS ARE LOCATED

To put it another way, there are 29,400 families in the 28,138 dwellings for an average of 1.05 households per dwelling. In conclusion, there is a shortage of 1,262 housing units in Livonia.

Existing blight areas are found primarily along section line roads, reflecting the area's early pattern of settlement which was built long before Livonia was incorporated as a city. Housing developments in some post-war, single-family developments, inadequate original construction and poor maintenance have created a unique but serious and spreading form of blight. Deterioration has been so rapid that some of the areas which were considered sound a few years ago are seriously deteriorated today or have been cleared through the normal course of real estate development as part of larger industrial, shopping center or subdivision development. This is particularly true of old developments that are still part of one ownership. However, in cases where the ownerships have been split up over the years, acquiring and clearing such properties will not likely take place through private operations. A governmental program is the most appropriate tool for such areas. These early pockets of blight were built on scattered lots in gridiron subdivisions. Since the houses were individually built on a lot-by-lot basis over a period of years, public improvements such as street paving and sewers were not initially installed. While public water and sanitary sewers are not installed, there generally remains a need for storm sewers, paved streets, curbs and gutters, sidewalks, street trees, and other facilities. The modest valuations of these houses suggest limitations on what can be accomplished through specially assessed improvements. However, marketability of the older houses has decreased in the face of market competition from newer, modestly-priced housing with complete facilities.

A new formula should be determined for upgrading these areas so as to include selection of those deteriorated houses not suitable for conservation and rehabilitation, based on thorough building inspections and cost estimates, clearance of such houses, code enforcement and rehabilitation for other houses that are economically feasible for such treatment, sale of some cleared lots for new housing, sale of other cleared lots to abutting homeowners in order to increase the size of their lots, enclosing landscaping, storm drainage, street paving, and other neighborhood improvements.

The volume of single-family residential areas that make up the bulk of the city form a stable element. Their particular style is of exceptional quality as far as building condition but not as site organization is concerned (see series of Figs. 2.12a,b,c,d,...,etc.). There are approximately 26,967 single-family dwellings, 88 two-family dwellings, 5 three- and four-family dwellings, and 62 nine or more family dwelling units which contain 1,011 units (see Table 2.9) (City of Livonia Land Use Inventory, 1969).

Economic Conditions

For a general look at the economy of Livonia, one must again turn to the 1970 Census and Statistical Data Book of Livonia. It shows the following three facts:

1. There are 53,767 people in the labor force age grouping (over 18 and under 62). According to the 1970 census, only 25,996 people out of 53,767 people are heads of families.

Table 2.9

Numbers and Types of Existing

Dwelling Units

Type	Units
Single-family dwellings	26,967
Two-family dwellings	88
Three- and four-family dwellings	5
Nine or more family dwellings	1011 (62)
Hotel, Motel or tourist	385 (5)



FIG. 2.11a CROWDED MOBILE HOME PARK LOCATED AT THE PERIPHERY OF LIVONIA ON JOY ROAD.



FIG. 2.11b SUBSTANDARD UNITS RESULTING IN DETERIORATING NUCLEI NEAR SLUM CONDITIONS ARE SCATTERED IN APPROXIMATELY 26 NEIGHBORHOODS.



(a) Mobile Home Park.



(b) Expensive Home.

FIG. 2.12a,b A HIGH CONTRAST IS OBSERVED BETWEEN MOBILE HOME PARKS AND EXPENSIVE LARGE HOMES IN THE AREA.



(c) Old-Style Development.



(d) Modern Development.

FIG. 2.12c,d REPETITION OF THE OLD DEVELOPMENT TREND, SUCH AS CROWDING SMALL LOTS, AND MONOTONY DUE TO THE USE OF ONE DESIGN OVER ALL OF THE SUBDIVISION IS THE GENERAL CHARACTERISTIC OF DEVELOPMENT TODAY WITH LACK OF FOCAL POINT.



FIG. 2.12e LIVONIA CITY HALL AND OTHER PUBLIC AND GOVERNMENTAL BUSINESS OFFICES ARE FORMING TEMPORARY LANDMARKS AT FARMINGTON AND FIVE-MILE ROADS.

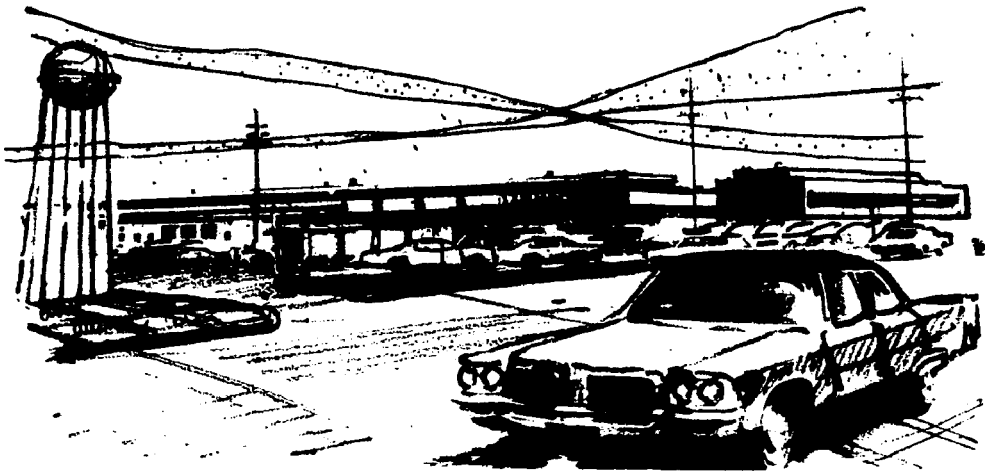


FIG. 2.12f A WATER TOWER AND THE FORD PLANT ARE MAJOR GENERAL CHARACTERISTICS ALONG PLYMOUTH ROAD (M-14) AND THE INDUSTRIAL CORRIDOR.

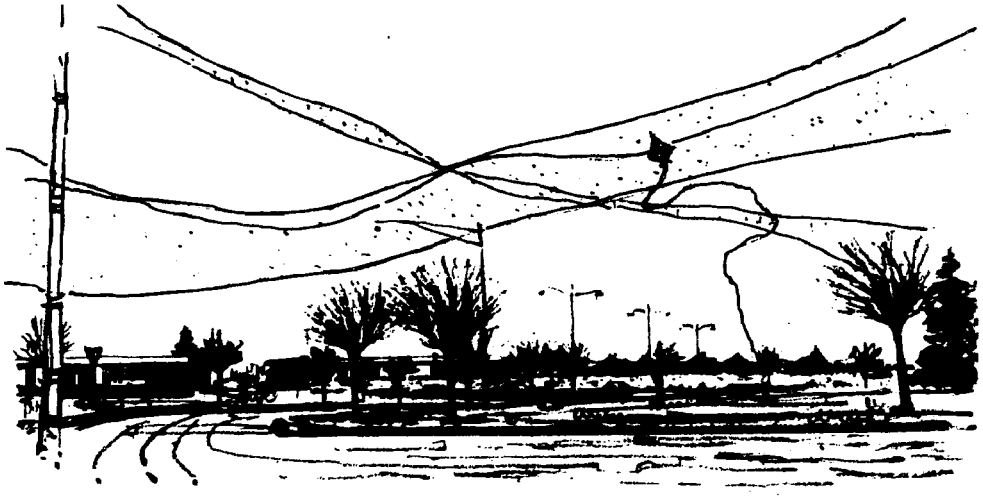


FIG. 2.13 PUBLIC AND GOVERNMENTAL BUILDING AT FARMINGTON ROAD.

2. A total of 34,762 are employed in Livonia, 70 percent of the total employees are manufacturing employees in the labor force (Table 2.10). Sampling* of employment in some industrial establishments of Livonia indicates that the great majority of employees reside outside the City, with the largest single representation from Detroit. Not more than about 20 percent of the industrial employment in Livonia resides within the City.

Three conclusions are possible from these figures. The first conclusion must be that approximately three out of every four people in the City are dependent on someone else for their subsistence. The second conclusion is the realization that some 6,952 employees out of the 25,996 total leave the city daily and return to it at night. The workday for these people is a long one, due to a 9-hour work time and traveling distance. These employees can neither spend much time in the community nor think of it as a welcoming environment. The third conclusion is the realization that some 27,779 employees out of the 34,762 total come to the city daily and leave it at the end of the working day. Since, the general development plan will provide industrial land to accommodate between 30,000 to 35,000 jobs in industry, the impact of growing employment upon future transportation facilities will be important.

There are no available statistical data about the average expenditures of these employess, but there are some available statistical data about the average income. Using the available data, a system of comparative values

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*Data obtained from the City of Livonia Planning Commission Department.

Table 2.10 Manufacturing Establishments - 1970

Type of Establishment	Number of Establishments	Number of Employees	% of Total Mfg. Employees
Machinery	29	1,650	6.89
Chemical	10	200	0.83
Tool & Die and other Metal Fabrication	76	1,950	8.15
Food and Kindred Products	8	4,068	17.00
Concrete, stone, clay & glass products	4	160	0.67
Primary metals	4	177	0.74
Automotive Parts	16	14,287	59.70
Printing and Publishing	13	318	1.33
Plastic Products and Moldings	9	282	1.18
Wood Products	5	266	1.11
Fence, storm windows, doors and screens	4	52	0.22
Miscellaneous Manufacturing	21	523	2.18
Total	199	23,933	100.00
Services		10,338	
Government employment		491	
		34,762	

Source: City of Livonia Industrial Coordinator: City of Livonia Treasurer's Office

projected for other similar communities, and interviewing people, it can be concluded that:

1. The average annual family income in the sector is about $10,000. (Table 2.11).

2. The highest percentage of this income must be expended on transportation, taxes, mortgages or rental of dwelling space, and food.

Social and Cultural Deficiencies

Education, recreation, health and social services in Livonia are all areas in which deficiencies exist and correction is needed. Some of the existing facilities are located in neighborhoods and subcommunity service areas. Other facilities require centralization which requires early site acqusition. Planned clustering of schools, parks, and libraries with local shopping, institutions and multiple-housing can enhance the community core.

According to city school statistics, in the 1970 social survey (Livonia Public Schools, Child Accounting Department) there are only 31,455 students residing in Livonia and 6,615 students residing outside Livonia attending various classes as follows: 20,253 in the elementary grades, 9,531 in the junior high grades, and 8,286 in the senior grades. The total number of schools serving Livonia was 48 as shown in Table 2.12.

Referring once again to the 1970 Census of Population, it discloses that there were approximately 21,524 children of school age in the area. This figure does not include all children to be considered because we are concerned here only with those of elementary education age--6 to 12 years. With the subsequent arrival of compulsory education at the elementary level, any present solution for existing school deficiency must allow for that quantity, plus any future expansion.

Table 2.11

Family Income Distribution--1969

Income Range	Livonia		Ann Arbor		Detroit	
	No. of families	Percent of total	No. of families	Percent of total	No. of families	Percent of total
$0-$2,999	1,029	3.5	4,284	15.3	69,528	13.7
3,000-4,999	1,088	3.7	2,464	8.8	52,273	10.3
5,000-7,999	3,263	11.1	4,312	15.4	111,142	21.9
8,000-9,999	5,145	17.5	3,248	11.6	84,245	16.6
10,000 and over	18,875	64.2	13,692	48.9	190,313	37.5
All families	29,400	100.0	28,000	100.0	507,500	100.0

Table 2.12

Livonia Public Schools: Growth* and Existing Deficiencies

Grade	1950	1960	1970	Estimated Less No. Residing Outside Livonia	Estimated No. of Pupils of school age	Estimated Deficiencies
Number of elementary schools	7	25	35	(20,253-4,471) = 15,782	21,524	5,742
Elementary school enrollment	1805	11791	20253			
Numerical increase	--	10986	8462			
Percent increase	--	610%	77%			
Number of junior high schools	0	5	9	(9,531-691 = 8840	8840	--
Junion high school enrollment	572	3382	9531			
Numerical increase	--	2810	6149			
Percent increase	--	490%	220%			
Number of senior high schools	1	1	4	(8,286-1,453 = 6833	6833	--
Senior high school enrollment	417	2250	8286			
Numerical increase	--	1833	6036			
Percent increase	--	440%	270%			
Total school district enrollment	2794	17423	38070	31,455	97	--
Numerical increase	--	14629	30647			
Percent increase	--	510%	176%			
Estimated Deficiencies						5,742

- Excluding adult education and trainable mentally handicapped students

*Source: Livonia Public Schools, (Child Accounting Department).

There are several hospitals in Livonia and the surrounding communities. However, the desirable standards and needs for health services per thousand population in any community in Michigan is 4.26 general hospital beds per thousand population.* The total hospital beds in Livonia was 208 which works out at about 2.4 beds per thousand population of its existing population. Future hospital and medical facility requirements should be provided to meet existing deficiencies in such facilities.

Recreation

There were only 15 small parks in the 36 neighborhoods containing play areas, some of them with outdoor swimming pools, picnic areas, softball diamonds, natural ice-rinks, and kiddie playgrounds. There was only one municipal golf course. These were the outdoor recreational spaces available in Livonia for children (upwards of 40,000). It can be observed that open space in Livonia is a two-edged sword. Any increase in lot size does not necessarily increase livability and comfort for the family. To some extent increase in lot size is an unduly expensive and inefficient way to obtain the amenities of suburban living. Through the trend of increase in lot size in recent years, huge numbers of acres have been absorbed and converted to urban and suburban uses at an even faster pace. The recently proposed parksites acquisition program would satisfy the major land requirement of athletic active recreation uses, but most of the proposed sites are small and scattered without considering a large community park to serve the whole community. There is no doubt that consolidation of land from individual lots into neighborhood, community open space is economical and attractive.

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*Source: The Hill-Burton state plan for hospitals. (The figure does not include facilities needed for long-term care, mental hospitals, public health centers, diagnostic and treatment centers, and rehabilitation facilities.

2.3 Approaches to and Solutions of Urban Theories and Practices in Industrial Cities

The advance of technical progress has attracted the attention of architects, planners, landscape architects and sociologists to the necessity of laying down new principles for the newly arising environments which involve men and machines in the same enclosure. The aim of these principles has been to provide for the needs, comfort and security of the residents. As machines changed from an element of simple construction and complicated form to a compound of complicated construction and simple fluid form so did the design of the factories and the residential communities. The factory changed from a mere wall-and-ceiling shelter for machines and employees against climatic conditions to disciplined, complex structures. Its developed structure is now based upon many complicated conceptions of technical organization, nationalization, and provision-production, transportation factors integrating with the new human aspects of social services and public relations.

The industrial centers, previously simply a facility for shelter, have now reached the stage of complexity. Modern design should include not only houses, but also all the necessary elements required by the employer and his families and, most importantly, connection between this complex and the factory. All this is planned in terms of location, transportation, connections, provisions, and future growth and extension considerations as an organic structure.

The following are some theoretical and practical examples of the evolution in treatment of and approach to the problem.

Ideal Industrial City by Nicholas Ledoux. One of the earliest trial designs for a pure industrial center is the project of 'La Saline de Chaux (1775). Ledoux designed three plans for Chaux. All of these designs include the industry, public and residential buildings with their gardens. The site was in open country-side between two villages with two overland perpendicular roads at the center of the town.

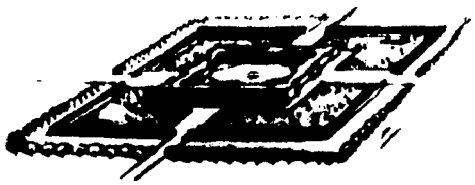


Fig. 2.14a The industrial center design is one of the earliest trials by Claude-Nicolas Ledoux.

The first version of his plan was the quadrangle buildings concept which was arranged as a 1,000-foot square formed by tree-lined avenues. The second concept was the ellipse form, while the later concept was a semi-ellipse with roads radiating into the surrounding countryside. The semiellipse was prepared by him for better orientation. Ledoux had shown an imagination broad and progressive enough to create a design of an industrial complex with all its necessities already in the early dawn of the machine age.



Fig. 2.14b The ideal industrial city of gun foundries by Ledoux.



Fig. 2.14c The semiellipse concept of industrial city by Ledoux.

Garden City by Sir Ebenezer Howard (1898).

Sir Ebenezer Howard concentrated his solution of the problem (Fig. 2.15a,b,c) by creating his "Garden City" in the fresh air of the country where opportunities of profitable industry, propsects of advancement, and pleasant forms of social life which were more attractive than those found in great cities and towns. His design could be considered as shifting most of the residential complexes into the green surroundings outside, thus not limiting himself in reality with practical restrictions of areas and dimensions. Howard's idea of the "Garden City" is that the town and the city together are more attractive than either one by itself. The functional relations between the central city and its surrounding garden cities were also depicted, as well as the overall concept of a garden city and its internal layout. The determination of the Garden City population of 30,000 was the start of a series of logical city planning principles.

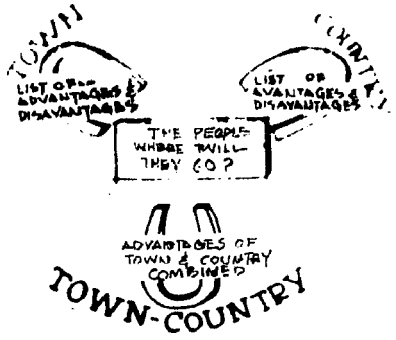


Fig. 2.15a Ebenezer Howard's diagram of the "three magnets".

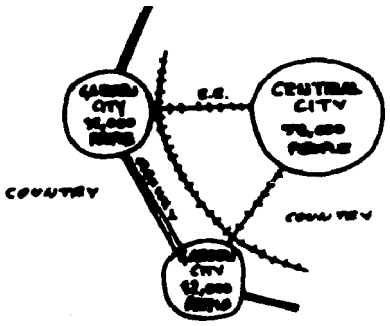


Fig. 2.15b Howard's central and garden cities.

The Garden Cities Association was formed in 1899 and the first garden city, Letchworth, was established in 1903; and the second, Welwyn, in 1920.

The main features of Howard's scheme were:

1. Purchase of a large agricultural area within a ring fence.
2. Planning of a compact town encircled by a wide rural belt.
3. Accommodation for residence, industry and agriculture.
4. Preventing the extension of the town from encroaching upon the rural belt.
5. The rise in the land values to be secured for the town itself.

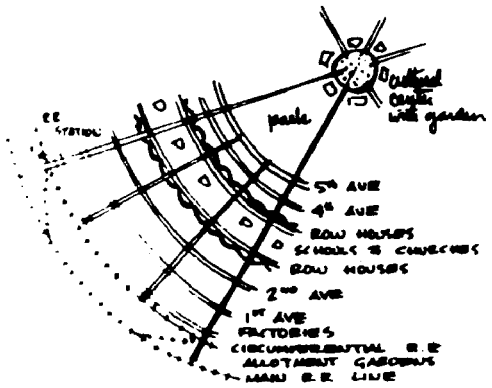


Fig. 2.15c Ebenezer Howard's schematic daigram of garden cities.

As Howerd showed that reasonable rents would be amply sufficient to pay a return on the expenditure leaving a considerable surplus, he attracted many people interested in the question of industrial housing. In garden cities, good houses could be cheaply provided for low income families. Thus manufacturers and industrialists began to establish their works on the outskirts of cities and in country villages to escape the high costs, chaos and bad working conditions of the over-burdened cities.

Garden Cities Statistics

Town	Letchworth	Welwyn
Year	1903	1920
Area increased to	3820 acres 4550 acres	2380 acres 5070 acres
Distance from London	35 miles	20 miles
Population	32-35,000	50,000
Industries	Engineering Corset making	Engineering Breakfast foods Printing
1951	20,322 pop.	18,314 pop.

La Cité Industrielle by Tony Garnier.

Garnier presented his theories for an industrial city of 35,000 inhabitants in a form of linear city, with the industrial zone located at the end of a strip (Fig. 2.16). The residential part was linear with long narrow lots running east-west, and buildings separated by wide open spaces. Separate levels provided for pedestrians and flat-roofed houses had roof gardens and ample open spaces. His plans of the houses were very advanced for the time with rational grouping of industrial, administrative, residential and activities buildings. Glass and concrete beams and columns were his

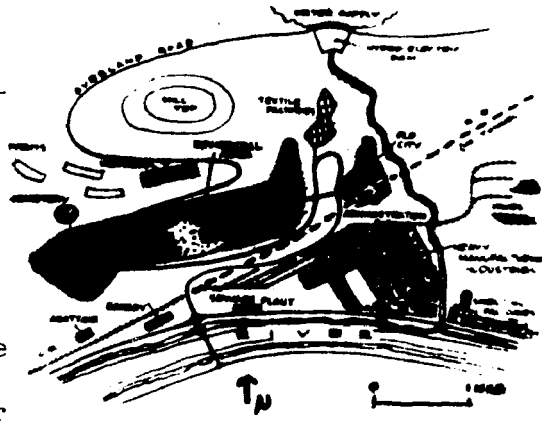


Fig. 2.16 Tony Garnier's La Cité Industrielle.

materials. His forms and simple designs were outstanding forecasts of the future.

Garden City by Raymond Unwin 1922. Unwin suggested a zoning method to divide the town into distinct sections: residential circumference surrounding a commercial center, industry on one side, radiating satellites on the other, and recreational areas in between. Fig. 2.17 shows a detailed section of the garden city, the different positions of the elements in relation to each other.

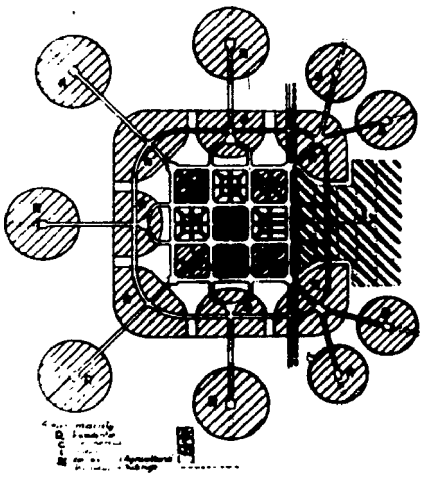


Fig. 2.17 Garden City by Raymond Unwin.

The Industrial City of the Future by Adolf Rading, 1922. Rading suggested an ideal plan for the industrial city of the future with allowance for further industrial development and requirements. Railways divided the city into four main sections. A thickly populated town in the city center, industry on two sides, and the protected agricultural areas lying diagonally on four sides. This study had been suggested for the city of Breslau and the surrounding area within 60 km, (Fig. 2.18). Neighboring villages were included in the design.

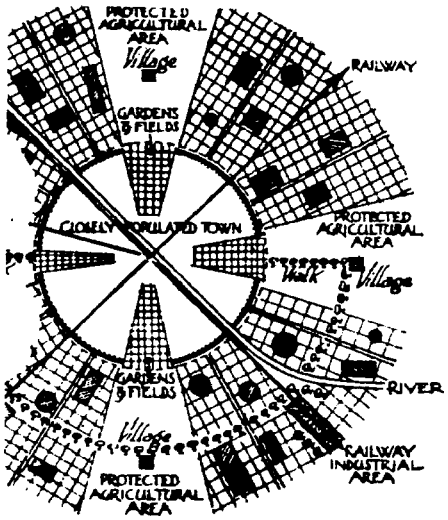
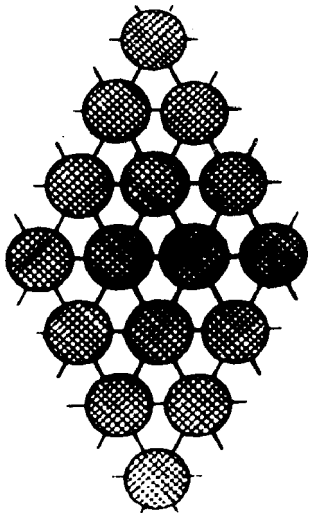


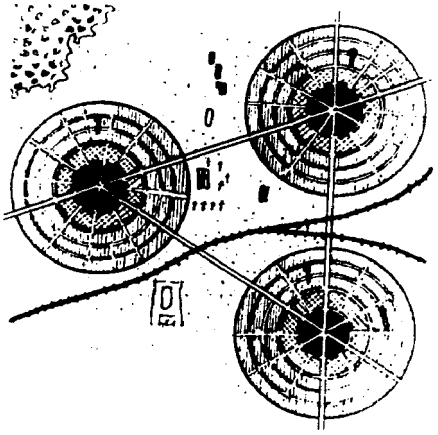
Fig. 2.18 Adolf Rading Industrial City of the Future.

Industrial City of Uniformly Distributed Units by Eric Golden. Golden developed a network system of connected cells equal in importance and each having its own core in 1926. His suggested cells were 2 km. in diameter and capable of accommodating a population of 100,000. The core consisted of business, industry, and administration activities. Sports fields and green areas lay in between the different cells. He developed complete parts of a city near each other with railways in between (Fig. 2.19). Each part was of a different population volume and had its own industries or crafts.

The Industrial City of the Social-Topographic Consideration by Gaston Bardet, 1939. Bardet developed his theory based on statistics and social-topographic studies (Fig. 2.20). He crystallized the structure of the existing cities. Each quarter-section and community had its own characteristics,



(Total Concept)



(Detailed Structure)

Fig. 2.19 Industrial city of uniformly distributed units by Eric Golden.

which lead to different planning schemes in each case. Thus his theory has remained and had to be developed to suit the practical conditions in each situation.

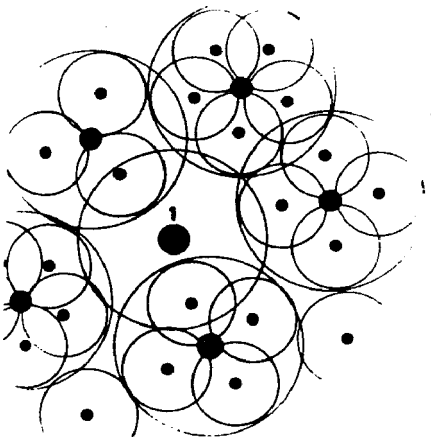


Fig. 2.20 The city of the social-topographic consideration by Gaston Bardet.

The Linear City by Soria Mata. Mata put forward a theory of the linear strip city where each family had a parcel of 4000 sq. ft. with private garden and all necessities. The parcels were stretched 165 ft. on each side of the main road which he proposed to extend from Brussels to Peking in an elevated system on columns. A strip part of this theoretical project had been executed between Chamartin and Barrio de la Concepcion' in Spain. It is a linear town 4 miles long, with 1000 one-family houses and 6000 inhabitants. An example of Mata's work is the Linear City of Madrid (Fig. 2.21), which offers in turn a strip town connecting other existing towns and villages by a tram line (1924).

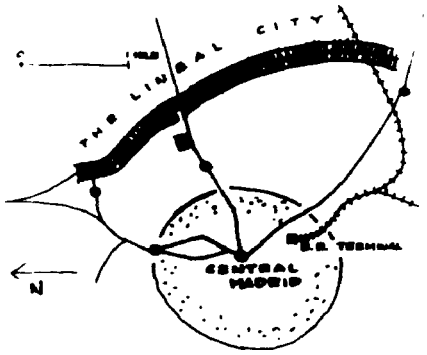


Fig. 2.21 The linear city of Madrid by Mata.

The total area of the city was divided into one-fifth for housing and four-fifths for agricultural production. There was one house for each family with front and

back gardens. Economical construction and installations, as well as streets, were orthogonal. Advantages of living near the tram existed only for those near the stations.

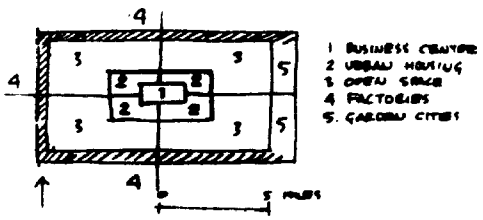


Fig. 2.22a Voison and zoning of Paris by Le Corbusier.

The Linear City by Le Corbusier, 1935. Industrial development and its problems not only required the creation of new theories for industrial communities but had a direct influence upon the design of cities. Le Corbusier tried to offer a master plan for the city of Paris and other French cities which considered industry and the technical development of transportation (Fig. 2.22a,b). The linear city of Algeria was an attempt to avoid the difficulties of the compact solutions.

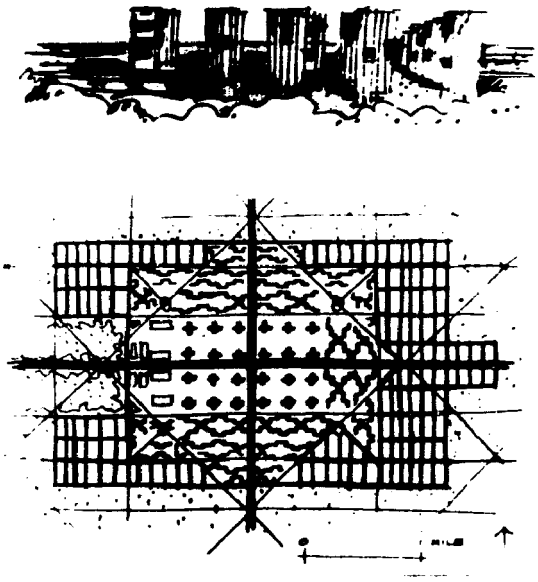


Fig. 2.22b Paris and the plan for city of three million people by Le Corbusier.

The Broad Acre City by Frank Lloyd Wright. Wright invented his "Broad Acre City" to mix the industrial, agriculatural and civic components in one unique environment by combining the advantages of the whole. A complete integration with nature and surroundings. It afforded distribution of the small farms inside the composition.

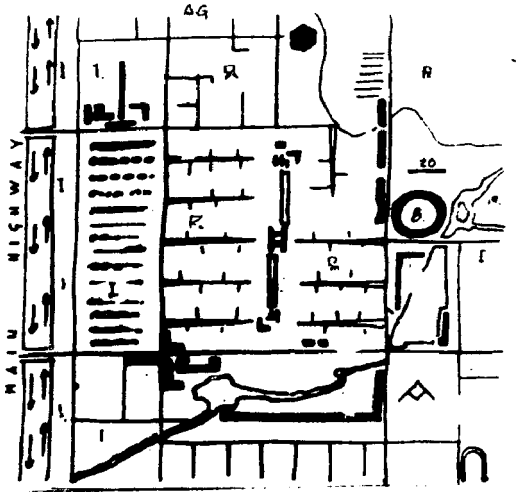
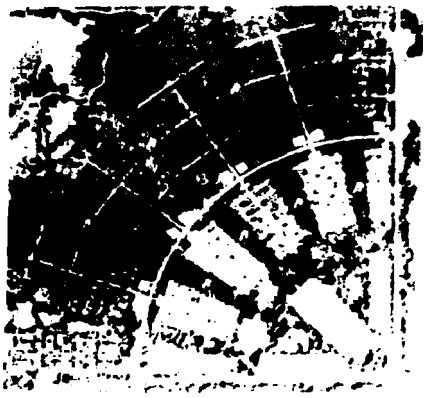


Fig. 2.23 Frank Lloyd Wright's Broadacre City.

The Industrial City by Hilberseimer. Hilberseimer tried to design a relationship between industry and its residential areas with respect to wind direction. The idea in itself is sound and an application of it is evidenced in the master plan of Chicago and shows its advantages. But its application is restricted to the industrial areas with conditions already existing. Many other factors may outweigh the wind and smoke factor. Besides, the spread of the use of electricity and diesel machines leaves this factor with secondary importance. (Fig. 2.24).



Fig. 2.24 Careful attention provided for the prevailing wind, smoke and industry's disturbances by L. Hilberseimer.



Industrial Linear City by Berthold Lubtekin. Lubtekin developed the principles of an industrial linear city with parallel zones of transportation, industry, residences, green areas, and communication (Fig. 2.25). A green belt 1,650 ft. wide separates the residential area from the industrial zone.

Milijutin applied the principles of Lubtekin in the design of the new industrial city of Stalingrad. He laid

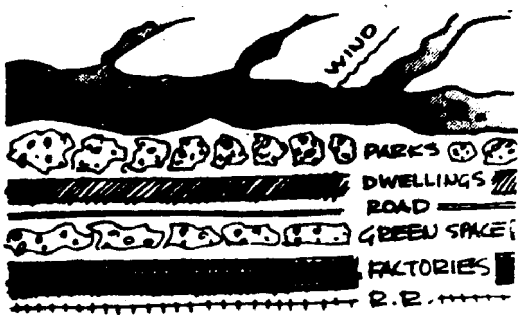


Fig. 2.25a An industrial linear city based on linear communication by B. Lubtekin.

down a linear plan 42 miles long for a population of 200,000. Industry is on one side of the railroad line and the highway on the other side. The business area follows the residential area. A green belt is on the periphery as well as between the different zones and industry (Fig. 2.25).

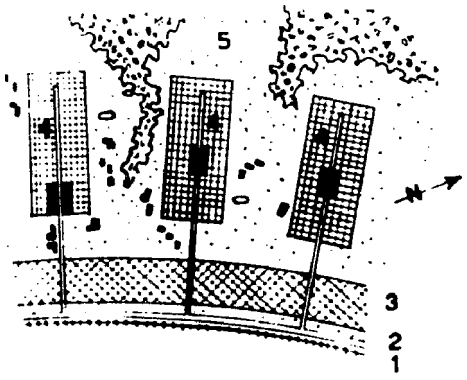


Fig. 2.25b The linear city of Kammstadt, B. Lubtekin.

The Plan for the Valleys by I. L. McHarg, (1963). McHarg designed his proposed plan for the valleys of the Baltimore region to reduce the uncontrolled growth and conserve the natural resources of the valley. His final aspect of the plan contained some vague devices which represent the concept of an accumulation of power. A timid sequence of both private and public actions, including the acquisition of new power, is shown. His major propositions are

- The area is beautiful and attractive.
- Development is inevitable and must be accommodated.
- Uncontrolled growth is inevitably destructive.
- Development must conform to regional goals.

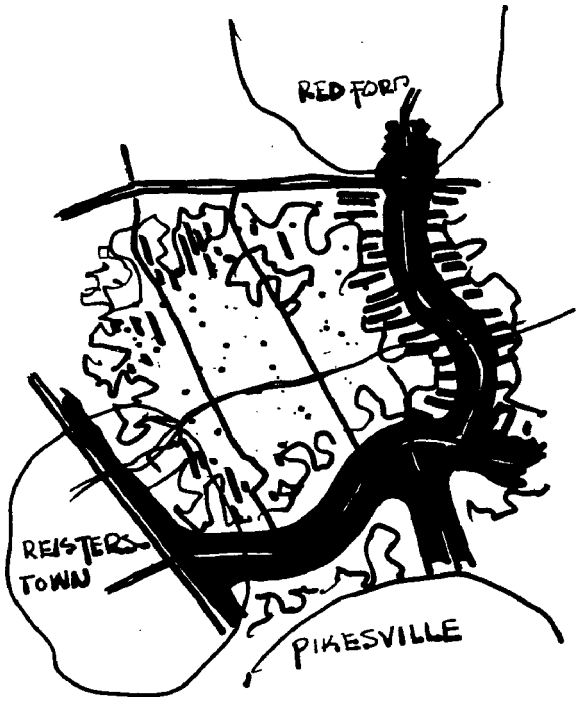


Fig. 2.26 Plan for the valley by McHarg.

- Observance of conservation principles can avert destruction and ensure enhancement.
- The area can absorb all prospective growth (110,000 people).
- Planned growth is more desirable than uncontrolled growth, and more profitable.
- Public and private powers can be joined in partnership in a process to realize the plan.
- The valley should be prohibited to development save by such land uses as are compatible with the present pastoral scene. These would include agriculture, large estates, low intensity use, institutional open space, parks and recreation, public and private. (Fig. 2.27a,b).
- Industry and other land use should be located uphill.

The plan is designed to accommodate the appropriate share of regional growth.

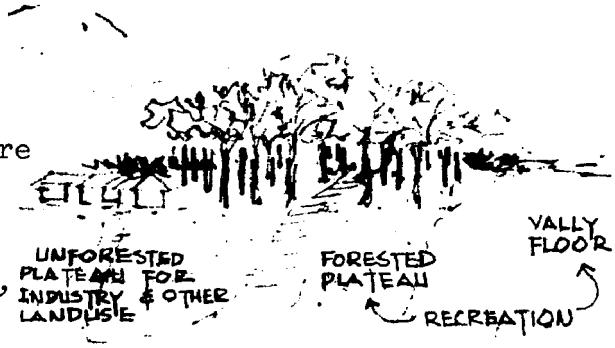


Fig. 2.27 View for the valley by McHarg.

The vastness of the past and current urban problems due to the dynamic growth of industries, which has changed the traditional mode of living, confounded the mind of architects, planners, and landscape architects as well as the contribution of the sociologists, geographers, economists, engineers, agronomists, politicians, ecologists, demographers, social anthropologists, etc., to set new theories and solutions for the industrial city. Alter all, it is the physical city which is the result of all planning and consulting efforts, whether dealing with economy, sociology, or transportation. It is the physical city in which we have to live, and which we must design and plan carefully to satisfy the human needs. However, the complexity of the problem has generated a complexity of languages, and the physical design has raised some doubt as to its usefulness. But there is no doubt as to the expenditure of energy in behalf of a vital human problem.

With the rise of the industrial problems, a new era began for all vital human concepts which have been evaluated parallel with the later industrial revolutions. The traditional design principles collapsed and have been replaced by new aesthetic principles, new theories in city planning, and architectural and physical planning as follows:

The Impact of Industry on Architecture and Physical Design

1. Functional planning and design based on logical principles and real practical necessities.

2. Simplicity of the design, and disappearance of ornaments and purely decorative non-functional features. No more obligations of symmetry or units imposed by other classical principles.

3. Technical development in the field of building construction, and rationalization of the building process to save material, effort and time.

4. Creation of new material, new ventilation systems, heating, air-conditioning, lighting, and insulation installations in the area of building construction.

5. Efficient structural potentialities to meet the growing need for wider spans, the increase of dead and live loads, bigger spaces and huge volumes, and reduction of industrial nuisances and dangers.

6. Means of transportation have been invented and introduced to handle transportation of the raw material, the mobility of the industrial employment population, and the distribution of the finished material.

7. The origin of prefabrication on a wide scale to fulfill the need for short-time building construction.

In the face of accelerating industrial progress, many changes occurred in the art and physical design of the city. Moreover, architectural design potentialities have inserted themselves into the design and the forms of many industrial centers. Many examples resemble the reflection of such architectural concepts such as the design of the Tony Garnier, Walter Gropius* and the unique example of Eric Menhelsohn which shows clearly the relationship between the form of building, its appearance and its function. However, industrial progress has broadened all planning measures to regional scope and inserted the complicated factors into regional organization. It is no more a matter of how to place an industry near a city. The question has become how to mold the whole region so that it

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*The Bauhaus school in Germany in 1924.

may act as an organic living unit with all functional necessities. Human aspects, in parallel to the technical factors mentioned, have to form the skeleton of our regional planning measures and principles.

CHAPTER III. SEARCH FOR A PROPER APPROACH

"The primary purpose of the city is to provide adequate living and working accomodations for its population because the city must be formed into an appropriate place in which to live; human considerations have a dominant position in this formation."

Eliel Saarinen

"The City"

At this point after examining Shubra and Livonia, we must be aware of the fact that the unorganized industrial agglomeration usually possesses within its boundaries a vast, diverse collection of maladies that deserve diagnostic investigation, plead for early attention, and demand immediate correction and action.

Consider the fact that "urban renewal" is the immediate application of comprehensive planning in which all powers of government cooperate with private and civic enterprises to better meet the needs of modern society, with special reference to obsolesence in the city.

In brief, the proper solution for any blighted industrial sector, such as Shubra and areas in Livonia, is urban redevelopment through the wholesale clearance of these areas and their reconstruction according to a long-range comprehensive plan, and probable change of use, occupancy, and circulation.

Since we are also faced with collective problems of people--people who individually move in many and various orbits of life and culture--, we must always remember that people are human beings attempting to live. We cannot hope to produce successful planning principles, and processes without considering their independency, compatibility, development and organization in the community sense.

Planning principles may be the essential "clues" to a proper solution as well as a general framework within which a sound, realistic approach can be developed to avoid such problems in the future for designing new industrial cities or redeveloping existing communities. But there are several indispensable conditions we must acknowledge

beforehand lest our pyramiding concept may later prove to be founded on a quicksand base. Our knowledge of the regional impact, which is presently planned for the attraction of industry, crowding and concentration of problems, forces us to consider it in the strata of our planning principles (Fig. 3.1).

Planning Principles

The proper approach must be a "planning principles and process" approach whose scope will be a combination of the following regional, physical and sociological advancements.

Regional Scale

The most fundamental geographical fact about the United States is that a large percentage of the land is agricultural. The most vital phenomenon is the concentration of industry and urbanization in the largest metropolitan areas, which still offer the greatest attraction for a wide range of industrial enterprises (Murphy, 1966) (Fig. 3.2). This concentration creates the most incredible problems, and leads to "chaos cities" (see Fig. 1.16). As a result of these problems, people escape from the crowded cities to the surrounding agricultural land hunting for scattered large individual lots, privacy, clean air, wide open space, unlimited view, beautiful natural surroundings, low cost land, etc. The unorganized escape leads to unprepared physical growth of cities and widespread degradation of the environment.

In contrast, the most fundamental geographical fact about Egypt is that 96 percent of her territory is desert (Fig. 3.3). Into the remaining four percent are now crowded some 33,000,000 people. The overriding

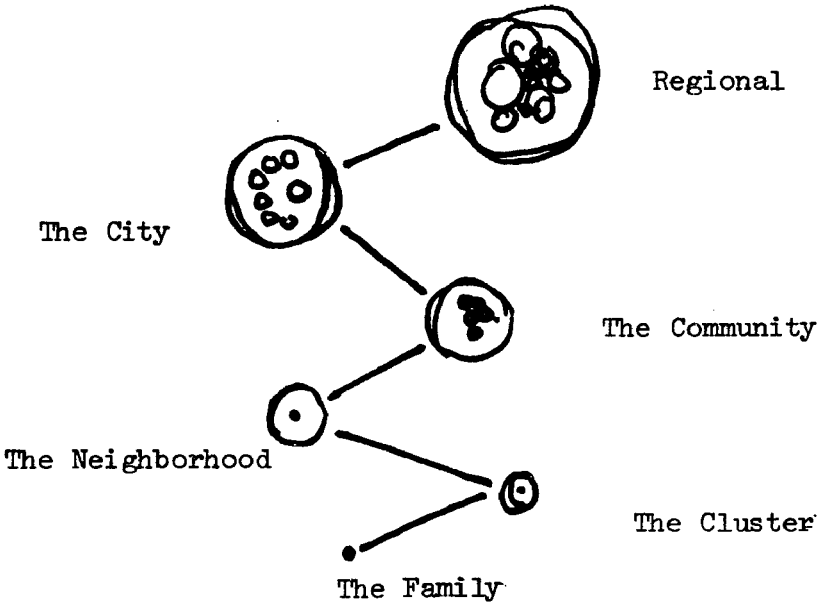


FIG. 3.1 THE PYRAMIDING CONCEPT OF OUR PLANNING PRINCIPLES.

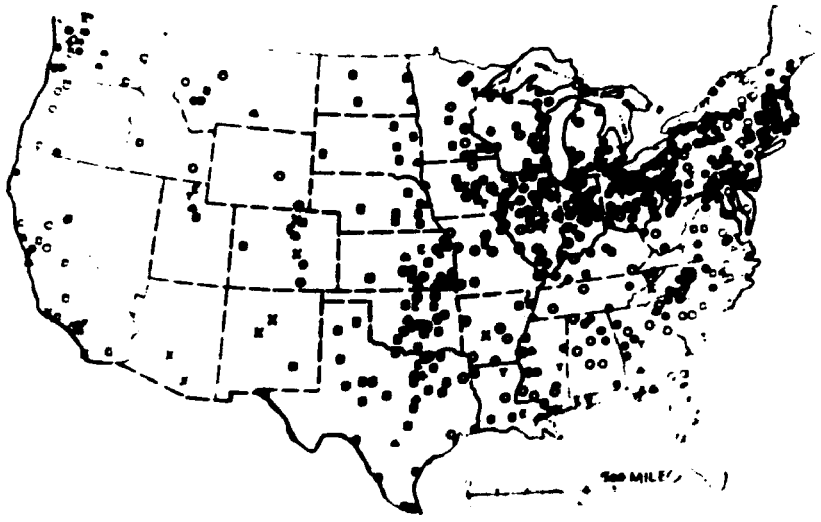


FIG. 3.2 CONCENTRATION OF INDUSTRY AND URBANIZATION IN METROPOLITAN AREAS.

problem facing Egypt is the pressure of urbanization and excessive growth of population upon limited resources. The attraction of Cairo and Alexandria and their industries causes the destruction of the most fertile land of the Nile Delta (see Fig. 1.17 and Fig. 3.4). To avoid such problems in the future, planning principles should be applied to the general regional development such as encouragement of private industry to locate off, and away from, established urban centers through attractive incentives and a general regional development plan; possible future developments along established or new major axes of transportation, as it is on these that the maximum use can be made of new technological inventions, and more and more people will want to remain in close touch with the overall system by locating close to these axes; in the case of Egypt or similar countries with limited resources, industry should be evacuated to the desert (The existing and proposed agricultural land should be totally protected and cleared of industry and its residential areas, e.g., there are about 16,000,000 persons scattered around the boundary of agricultural land and in the desert nearest to existing water sources. These villages comprise the environment where most of the industrialization program should be executed); and location of new industrial centers should be conditioned by geography and topography and the use of the environment.

Water resources sometimes provide the best means of transportation for the majority of goods, and will supply settlements and industry with the required quantities of water.

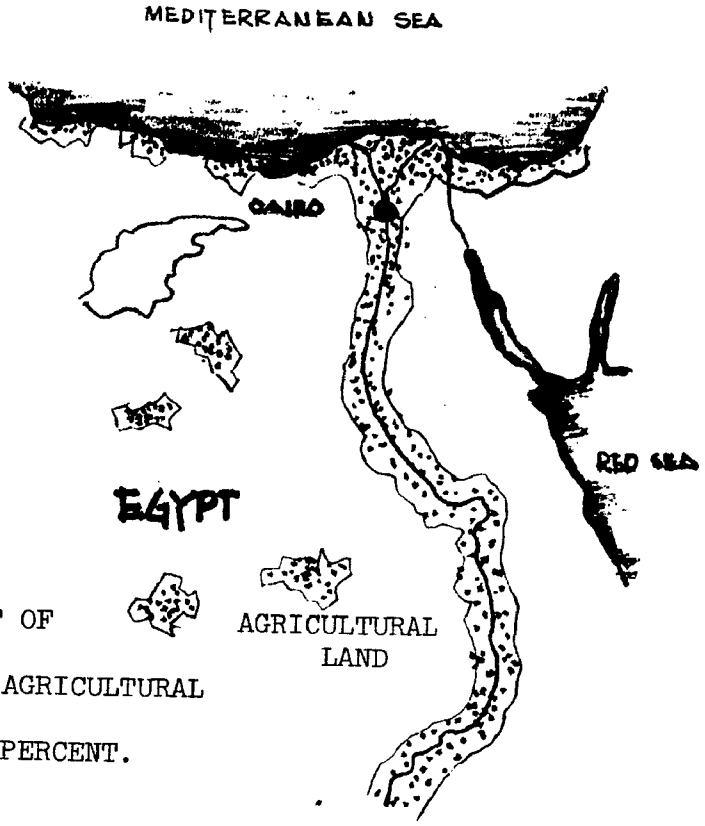


FIG. 3.3 NINETY-SIX PERCENT OF EGYPT IS DESERT. AGRICULTURAL LAND IS ONLY FOUR PERCENT.

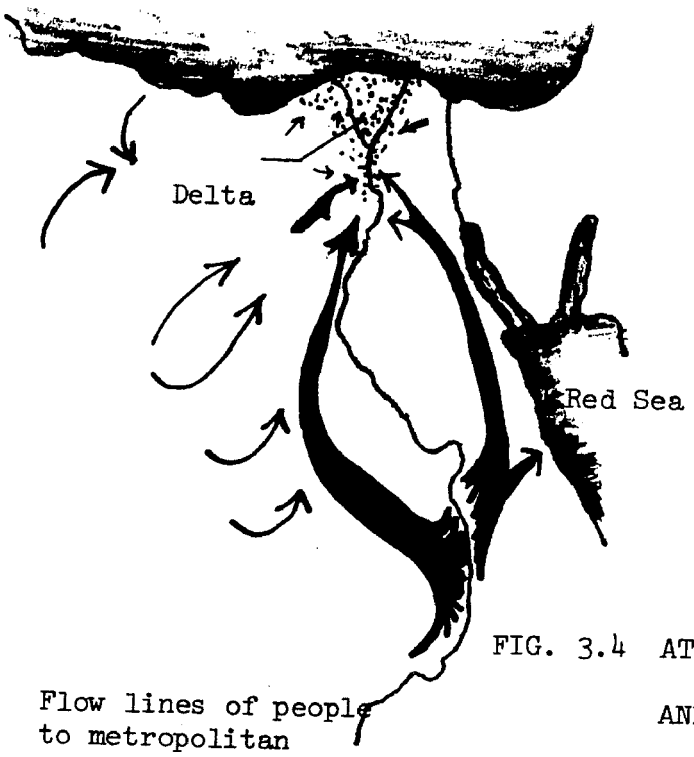


FIG. 3.4 ATTRACTION OF METROPOLITAN AREAS AND THEIR INDUSTRIES CAUSES THE DESTRUCTION OF THE MOST FERTILE LAND OF THE NILE DELTA.

Areas of aesthetic value are usually areas of high quality landscapes and topographical features, which enable more and more people to enjoy their environments; and areas with an optimum climate where outdoor living conditions will be pleasant for the better part of the year, and indoor living conditions will be maintained at an optimum without very high cost.

However, the future urban systems will have irregular forms as the interplay of the previous forces vary from place to place. Generally, the future urban cities will consist of major urban areas interconnected by urban corridors due to the attraction between large settlements. These corridors should be built up of new towns connecting large settlements to each other.

City Scale

The shape of the industrial city is such that wide areas are going to be developed as urban systems. The structure of the city should be hierarchical with the bigger units subdivided in a rational way into units of lower order. This can be facilitated by a corresponding proper structure of the networks from transportation to utilities to natural environment infiltrating the city. The quality in human settlements has to be achieved at every level: from the whole settlement down to the smallest unit represented by the single house and even the living conditions inside a room. For the whole settlement, quality will depend mainly on proper transportation and communication systems, proper distribution, and proper utility networks.

The problem is not one of conflict between man and the machine. Since man always controls the machine the problem lies in the use of the machine, and man can make a greater and better living environment for himself and efficient use of the machine by separating his living environment from the machine. Henry S. Churchill said:

"A city plan is the expression of the collective purpose of the people who live in it, or it is nothing."

However, in industrial cities both industry and residential organizations influence each other in terms of distance between the means of transportation, the layout of the industrial city (the planning concept and the form of the city), and growth and future expansion, and human amenities, human needs, and the characteristics of the residential area.

Considering the above factors, and to achieve high quality design potentialities, we should analyze the following factors:

Distance Between Industry and Residential Areas

Industry should be located within minimum desirable distances to the residential organization to avoid the appearance of slums due to the fraction of the dynamic growth of industry and all types of industrial disturbances. There are many variables which can influence the distance between industry and residential areas such as

- Light Industry: Light industries are those engaged in the manufacture and assembly of relatively small components and/or products. Some processing of the raw materials is often involved. The products

of light industry are infinite in number. It usually does not influence its surroundings, nor change environment. The use of electric motors up to 10 h.p. is predominant, with the power delivered from the local power station. The use of solid or heavy fuel energy is almost absent. Heavy transport facilities and railway junctions are not essential. An area from 3000 up to 15000 sq. ft. represents the size of a light industry facility. It can thus be easily located near residential areas.

- Medium industry: Medium industry includes all factories using heavier machines, but not depending for their existence upon being placed on the spot with regard to raw materials or power resources. Medium industries need to be located near the populated places. Higher salaries paid by the medium industries create a stream of mobility from the lighter industrialized sections to the heavier ones. Air conditioning, light control and automatic operation of whole groups of machines, allow the medium industries to avoid the climatic local site restrictions which were design obstacles in the past.

High energy consumption, extensive consumption of water supply, and big waste discharge are characteristics of medium industry that should be taken into consideration during the design stage. An area of 15,000 to 40,000 sq. ft. is a representative size of a medium industrial complex, but it may increase sharply in the case of the automobile industry up to 250,000 sq. ft to 400,000 sq. ft. In the case of the textile industries or other manufacturing industries which integrate with each other in one big industrial complex, the area of the main industrial complex could exceed millions of square feet. As a result, medium industry should be separated as a work place from residential areas.

- Heavy Industry: The industry in this case is gigantic in size, type of machines, energy means, production and raw material consumption. It exists mostly where tremendous raw material resources exist, or where energy sources are adequate to generate the immense amount of power it needs. Heavy industry changes the appearance and even the whole structure of the region which it dominates. Totally new concepts introduce themselves into the means of life, transportation systems, and physical and psychological living standards.

The final concept which results from such a complex change is an integrated composition of many different indsutrial, civic, business, residential and recreational complexes to create an organic center.

The creation of a heavy industry in a region would not only change the structure of its environmental surroundings in the region; but will also upset the whole economical and social structure even far from the neighborhood regions. Heavy industry acts as a magnet attracting the population masses. The mass of the heavy industrial employees froms the main portion of the population of the region and its neighboring cities. Complete new towns could even be created, and many villages could be turned into towns or urban centers to accommodate the new population of the heavy industries.

Industry Disturbance Factors

- Odor: A large percentage of industries produce gaseous odors during production or through the production processes of tobacco, gelatine, fish, rubber, cellulose, fertilizers, chemicals, foods, drinks and perfumes.

The problem of odors can be solved by considering the prevailing wind directions and by fixing a minimum distance between each of these industries and the nearest residential areas.

- Noise: This kind of industrial disturbance is created either from the noise and vibrations of the machines themselves, or from the manufacturing process of the product. It can also be due to heavy transport equipment. The maximum bearable noise degree allowed is 30 to 42 decibels (phon) in houses, schools, offices and residential rooms. These values could be proportionately measured compared with the following noise values (Olson, 1960, and Humphreys, 1958):

100 dB in a metal factory,

90 dB in a carpentry workshop,

97 dB in a turbine station or a book-printing hall,

105 dB in a metal smelting factory,

122 dB in a hammer workshop.

Usually the sound would begin to be audible if it is of a 0 to 10 decibel value. A residential street has about 58 phons, and a typewriter or a ringing telephone bell have 70 decibels at a distance of three feet. Moreover, one should take the following points into account for design in terms of sound and noise. The sounds which are bearable in the morning are unbearable at night; and a strong sound, but far away, is of less influence than the weak one nearby. However, the nuisance of noise can be eliminated or reduced by using the sound insulation materials in the construction of the factory and the house, providing insulated

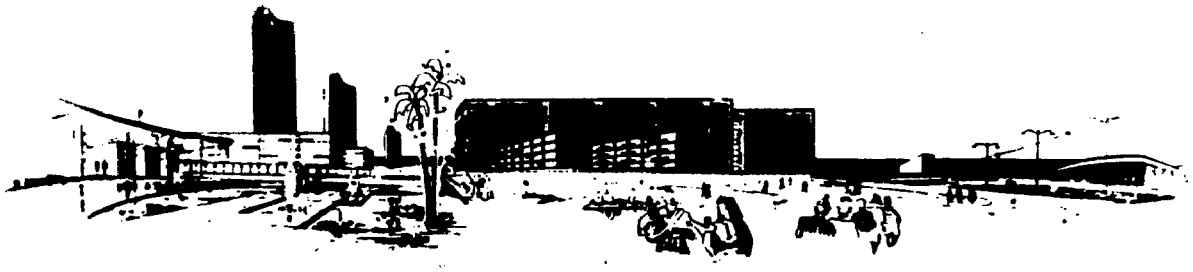
foundations for the machines, using sound absorbers for the machines of the factory and the transportation vehicles, maintaining enough distance between industry and the residential areas to decrease the noise value, and planting green belts between industry and residential areas or, if possible, locating the industry and its residential area with a stream of water or a river in between.

Air Pollution (Smoke, Ashes and Dust)

In general, a factory should be located on the side of the residential area downwind from the maximum prevailing wind. The location of industries in a deep valley should consequently be avoided. The use of electricity in light and medium industries lessens the danger to residential areas by smoke, which heavy industry as well as medium industry still produce. The destructive influences mentioned previously and the resulting effects on residential areas from industry, and after consulting with industrial health experts, Fig. 3.5 shows suggested minimum desirable distances that should be kept between industry and residential areas. Industry should be located downwind from residential areas, as shown in Fig. 3.5. Landscaping should be used to build a barrier between industry and residential areas. The function of this barrier is (a) to screen between the two components; and (b) to resist and reduce the flow of smoke, dust, ashes, and heat.

A selected site should be flat and not near a wide water surface (about 1 1/2 mile) based on the following meteorological factors.

In the case of a valley, differential heating occurs along the slope, or between valley floor and the adjacent plain. Up-slope



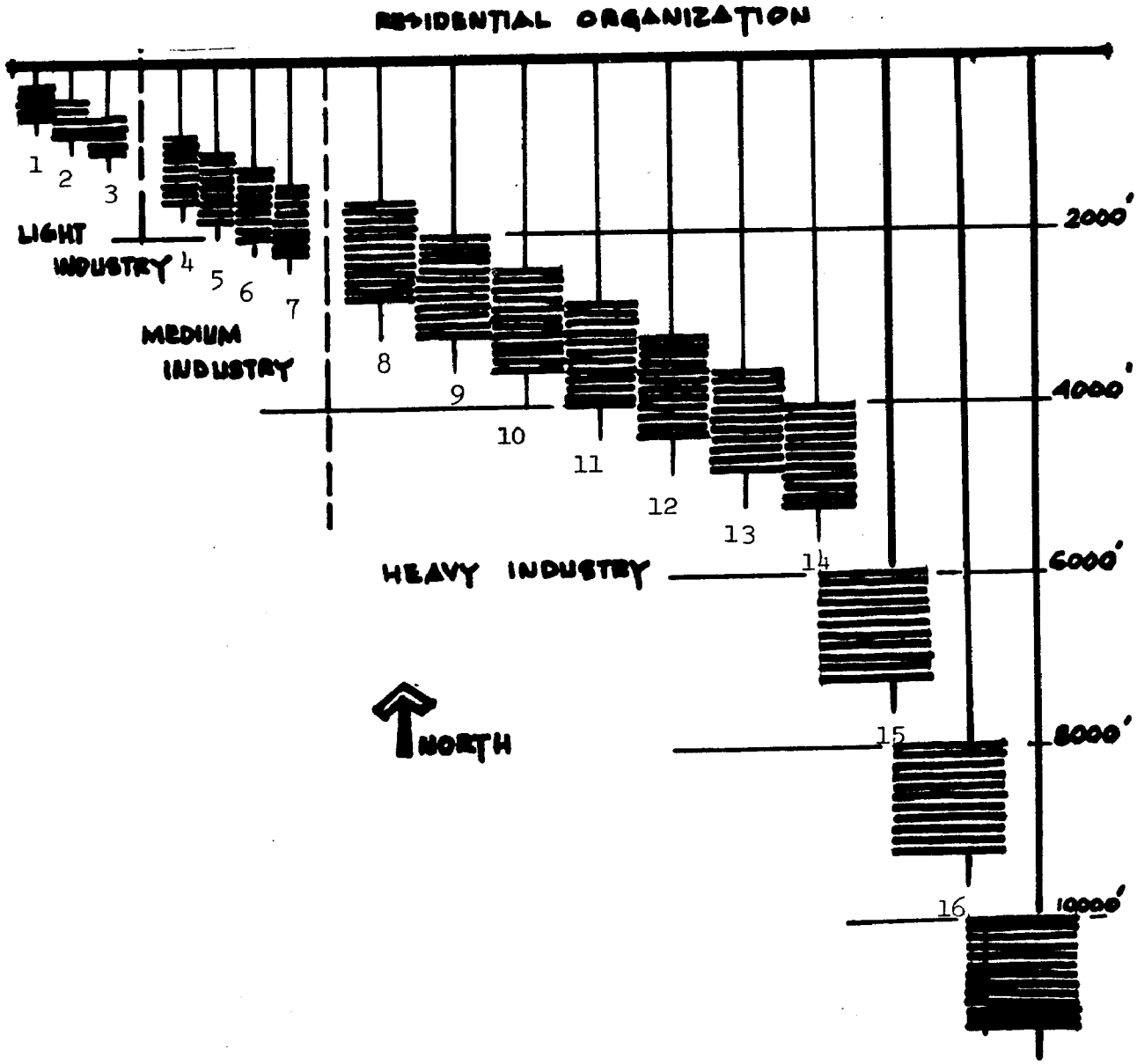


FIG. 3.5 DISTANCE BETWEEN INDUSTRIES AND RESIDENTIAL AREAS.

Fig. 3.5. DISTANCE BETWEEN INDUSTRIES AND RESIDENTIAL AREAS

LIGHT INDUSTRY

1. Printing, car repairing, measuring instruments, bakery, simple furniture building companies, laundries -- 200 ft.
2. Heating installations, dairy products, furniture, ceramics, iron works, sugar, chemicals, chocolates, gas-ovens, boat works, tobacco, cigarettes, coffee mills, wine vats, carpenter shops, sporting goods, boat-making -- 400 ft.
3. Light metals -- 600 ft.

MEDIUM INDUSTRY

4. Agricultural machines, large carpenter works and saw mills, lacquer, wax and candles, vinegar, food industries, paper factories, milking and agricultural machine factories, automobile works, brick-making -- 800 ft.
5. Cosmetics -- 1000 ft.
6. Soap, dyes and paints -- 1200 ft.
7. Fish industry -- 1400 ft.

HEAVY INDUSTRY

8. Preserved foods, iron smelting works -- 1600 ft.
9. Metal tanks, tar and asphalt products -- 2000 ft.
10. Lead factories, coal and charcoal industries -- 2400 ft.
11. Ship propellers, steel mills -- 2800 ft.
12. Iron construction works, ship-building -- 3200 ft.
13. Tin wares, accumulators, trailers and tractors -- 3600 ft.
14. Asbestos factories, bronze plants, copper plants -- 4000 ft.
15. Rubber factories, raw sugar factories -- 6000 ft.
16. Mineral oils, blast furnaces, and steel convertors, celluloid plants, internal combustion engines -- 8000 ft.
17. Hydrogeneration plants -- 10,000 ft.

*Distance has been estimated from personal experience and with the help of Dr. Larry Hecker of the Industrial Health Department.

and up-valley winds will develop in irregular terrain on sunny days with general air movement. At night, radiation from the ground surface leads to density currents in the form of down-slope and down-valley winds as shown in Fig. 3.6.

In the case of water surface, usually a breeze arises from the heating of the land near the shore at a faster rate than the water and may be regarded as a density current. It circulates from the water surface toward the land, often beginning in the forenoon and persisting until about sunset. Aloft there is a return flow from the land toward the water surface. At night, a corresponding circulation in the opposite direction (the land breeze) occurs as shown in Fig. 3.7. However, the height of the water breeze is usually about 2000 ft.

A third meteorological factor is the existence of areas with high temperature pressure. Due to the temperature pressure smoke usually settles toward the ground floor at certain heights from the ground (see Fig. 3.7).

Los Angeles, California is considered an excellent example of air pollution caused by the following factors (Fig. 3.8).

- the city is surrounded by mountains,
- the city is located on the sea shore, and
- the city is covered by a high temperature pressure.

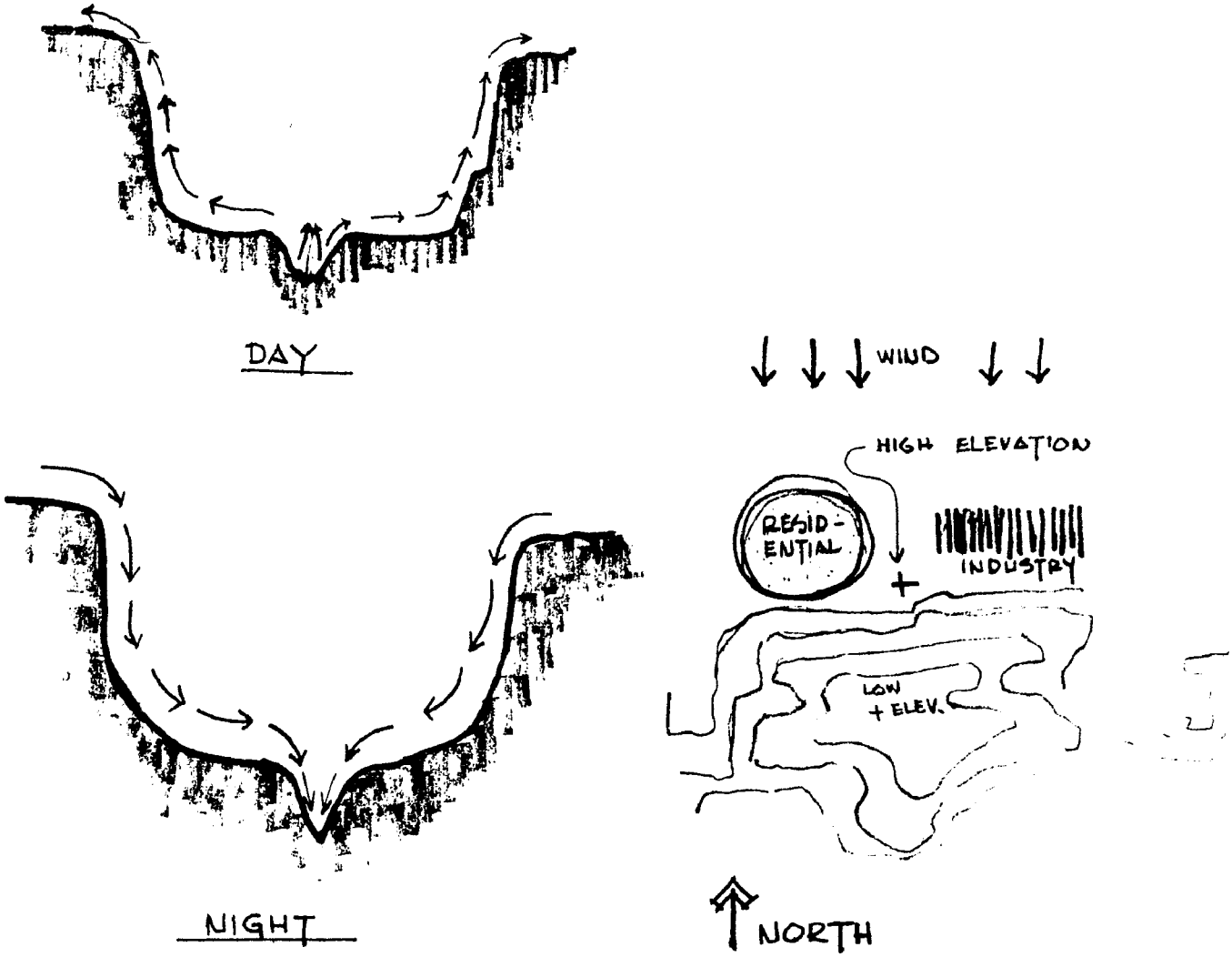


FIG. 3.6 SCHEMATIC ILLUSTRATIONS OF VALLEY-SLOPE; WINDS AND THE BEST LAYOUT OF INDUSTRY AND RESIDENTIAL AREA TO AVOID POLLUTION.

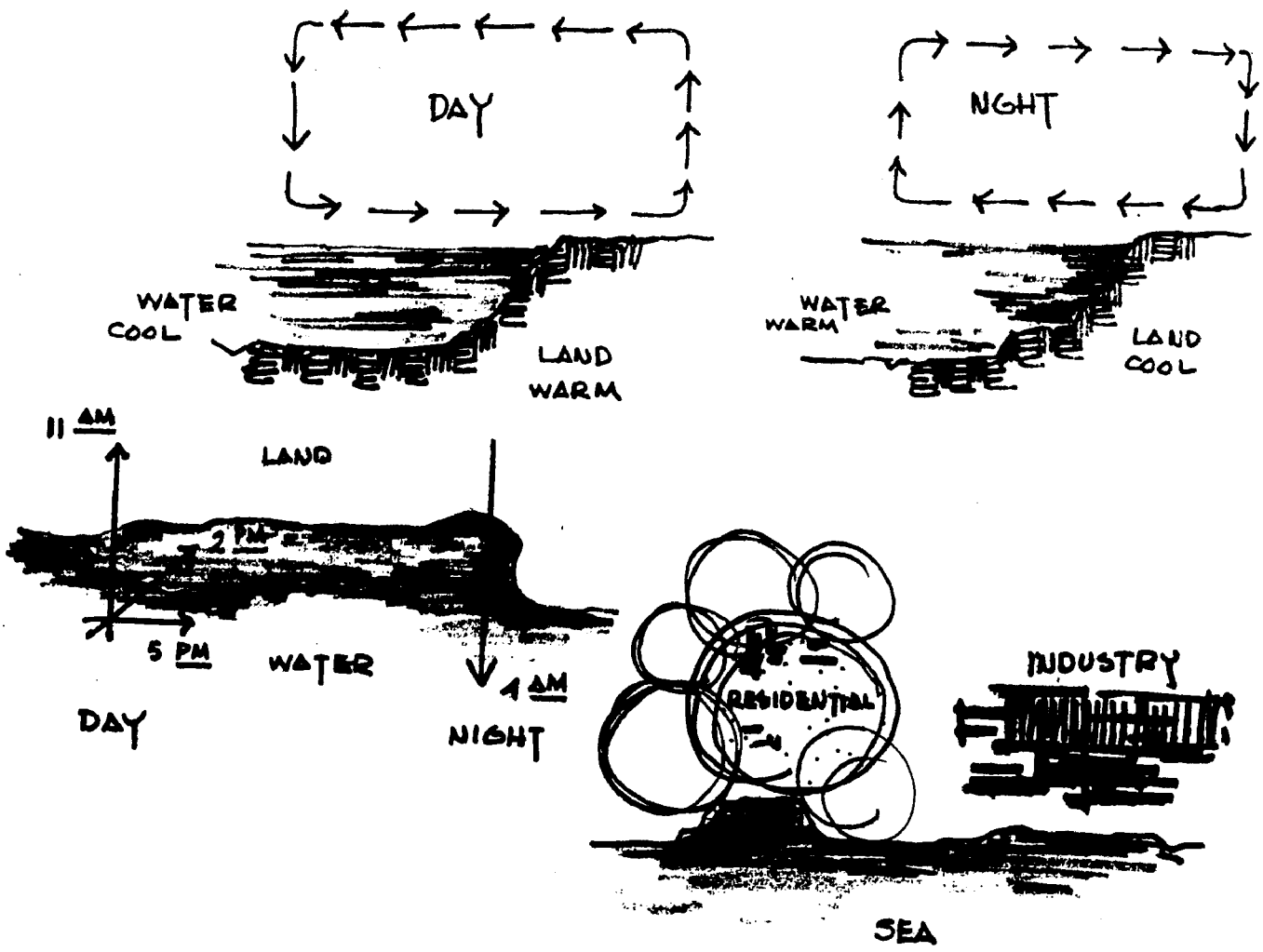


FIG. 3.7 SCHEMATIC ILLUSTRATIONS OF SEA BREEZE, AND THE BEST LAYOUT OF INDUSTRIAL AND RESIDENTIAL AREA TO AVOID POLLUTION.

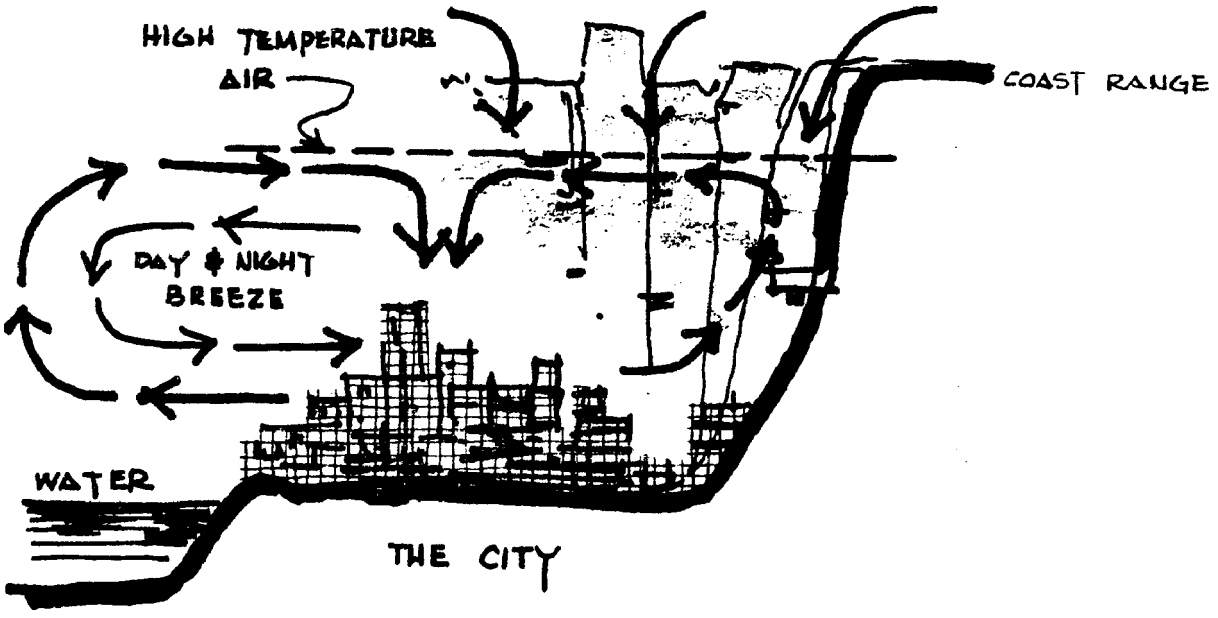


FIG. 3.8 CASE OF LOS ANGELES, CALIFORNIA.

However, if it is impossible to locate industry in the down-wind direction from the residential areas and, under the three conditions mentioned above, the pollution of air at a certain area could be calculated according to the height of smoke stacks, the speed of the wind, and the atmospheric dispersion.* The ambient air quality standard should not exceed the following (Federal Regulation, Vol. 36, No. 84, April, 1971), (Table 3.1).

To avoid an unlimited disturbance by heavy industries, some organizational devices should be used to substitute fossil fuel energy by nuclear power, hydropower, solar energy and other primary sources.

A comparison of the world population and probable cumulative energy demands by August, 1965 indicated the world's reserve energy of fossil fuel will be exhausted before the year 2000 considering world population growth trends. Following are descriptions of some future potential energy sources.

Nuclear Power

Nuclear power has been used by regular commercial services in several parts of the world. The known reserves of uranium and thorium

*As illustrated by Sutton's equation of atmospheric diffusion as follows: (Stern, 1962).

$$x(x,y,z) = \frac{Q}{\pi u c_y c_z x^{2-n}} \cdot \exp -(y^2/c_y^2 x^{2-n}) - \frac{(zth)^2}{e c_z^2 x^{2-n}} + \exp\ (-(2-h)^2/c_z^2 x^{2-n})$$

Table 3.1

Ambient Air Quality Standards

(Federal Reg., Vol. 36, No. 84, April 30, 1971)

Sulphur Oxides	Primary Health Requirement	Secondary according to quality of the life (environmental health)
a) annual arithmetic mean	0.03 ppm (80 μg So_2/m^3)	0.03 ppm (60 μg So_2/m^3)
b) 24-hr max.	0.14 ppm (365 μg So_2/m^3)	0.1 ppm (260 μg So_2/m^3)
c) 3-hr max.	--	0.5 ppm (1300 μg So_2/m^3)
Particulate		
annual geometric mean	75 $\mu g/m^3$	60 $\mu g/m^3$
24-hr max. (not to exceed more than one ounce per year)	260 $\mu g/m^3$	150 $\mu g/m^3$
Carbon Monoxides	(Note: not to exceed more than one ounce per year)	
8-hr max.	10 mg/m^3	10 mg/m^3
1-hr max.	40 mg/m^3	40 mg/m^3
Photochemical Oxidants	(not to exceed more than one ounce per year)	
1-hr max.	0.08 ppm (160 $\mu g/m^3$)	0.08 ppm (160 $\mu g/m^3$)
Hydrocarbons	(not to exceed more than one ounce per year)	
3-hr max. (6-9 a.m.)	0.24 ppm (160 $\mu g/m^3$)	0.24 ppm (160 $\mu g/m^3$)
Nitrogen Dioxide		
Annual arithmetic mean	0.05 ppm (100 $\mu g/m^3$)	0.05 ppm (100 $\mu g/m^3$)

Key: ppm = parts per million
μg = microgram = 1/100 gm
m^3 = cubic meter
mg = milligram

throughout the world are sufficient to supply the necessary energy, even with the anticipated increases in use, for about five hundred years (Furnas, 1963).

Nuclear power has two disadvantages that are yet to be overcome. The first is the problem of the safe disposal of the radioactive wastes that nuclear power plants produce. The second is that at present nuclear power is mostly confined to central power stations. It has also two advantages. It provides fresh water from the sea through its processing. It is also a source of energy which is free of air pollution. There are few nuclear power stations along the Red Sea shore in Egypt as compared to the huge number of nuclear power stations in the United States.

Hydropower

Hydropower is the major source of energy utilized today. It has no research and development problems to be solved. Its growth is expected to be regular and orderly. Water power contributes about one percent input of the world and four percent of the energy input of the United States. Besides providing an inexpensive source of electricity, it often aids in flood control and in helping to make rivers navigable. The total world hydroelectric power potential is estimated to be about ten times the present installed capacity. Even if this were fully exploited, the percentage contribution of the total world energy would remain small due to the rapid increase of this demand. While its contribution to the world's utilization of energy will never be great, it will always be important in those graphical areas where it is

available. In Egypt, there are several hydropower stations along the river Nile, Red Sea, Mediterranean Sea and include the High Dam and the Aswan Dam. There are several proposed stations and projects for the future such as Wadi El-Kaitara as shown in Fig. 3.8. In the United States, there are many hydropower stations along the Colorado River (Hoover Dam), Columbia River, Tennessee Valley Authority, Au Sable River, and the Mississippi River.

Solar Energy

The sun releases energy at a rate of about a million Q* every three seconds. It has been estimated that about thirty-two hundred Q reach the earth every year. If we could harness but a small amount of this energy, man's energy supply problem would certainly be solved. One of the chief problems of solar energy is that it reaches the earth at a very low potential. With the sun at its zenith at sea level, only about one-tenth of a watt per square centimeter falls on the earth. Large collectors are needed to achieve appreciable amount of power (about fifteen square feet for one kilowatt of heat or 150 square feet for one kilowatt of work utilizing a converter of 10 percent efficiency). The energy may be more concentrated by utilizing some type of focusing arrangement but this generally requires a cloudless day and a mechanism that allows tracking of the sun (Fig. 3.9).

Photochemistry is one of the frontier areas that offers some hope for the efficient storing of solar energy so that it may be used at a

*The energy demand is given in units of Q defined as 10^{18} B.T.U.

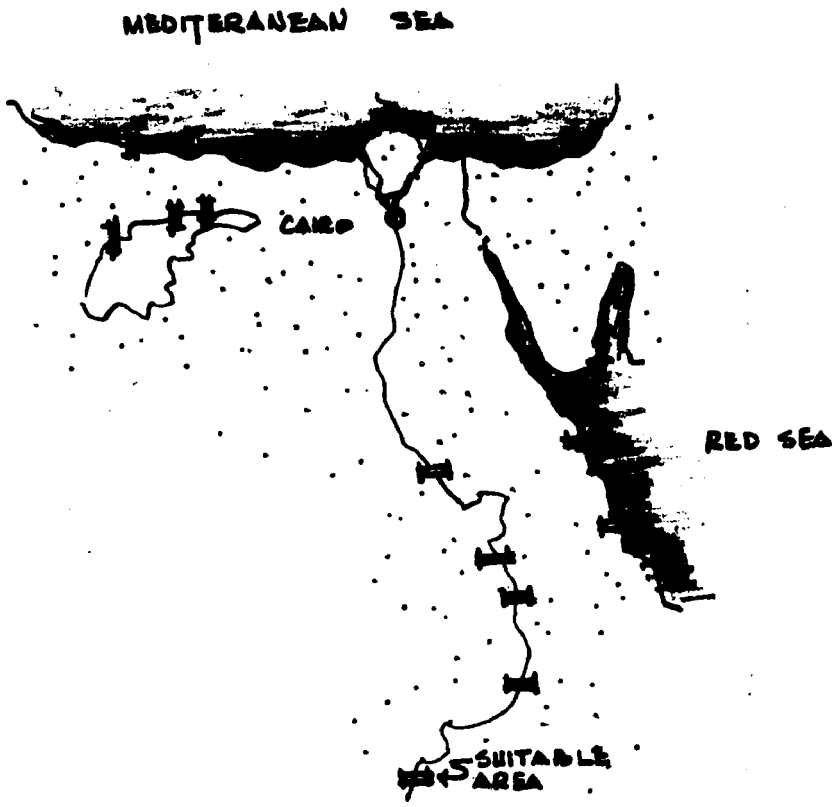


FIG. 3.8 EGYPTIAN GEOGRAPHICAL AREAS WHICH ARE SUITABLE FOR HYDROPOWER STATIONS.

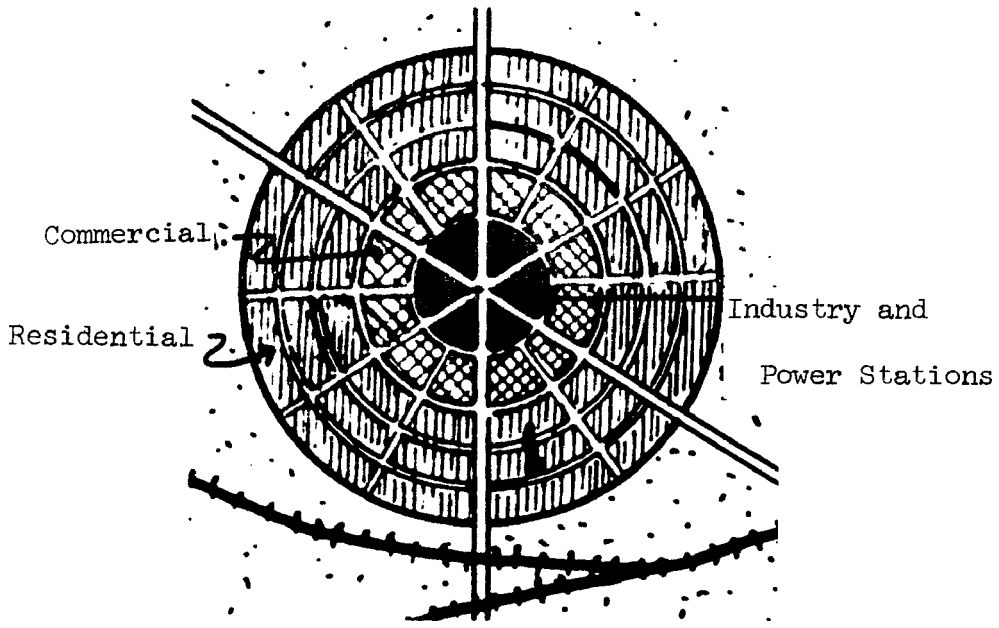


FIG. 3.9 THEORETICAL DESIGN FOR A SOLAR CITY.

later date. One of the goals of people working in this field is to find a suitable reaction that can be produced by the sunlight by the absorption of energy which can , at some later time, be reserved with the evolution of energy. One of the major problems in this area is that many endothermic, photochemical reactions reverse themselves so rapidly that the conversion of light energy into heat takes place without allowing any time for storage. Most reactions that have shown promise respond only to ultraviolet light.

The utilization of solar energy today in any direct form is all but nonexistent. Many of the satellites in orbit do obtain their instrumentation power (several hundred watts) from the Sun. There has also been a considerable amount of research on the use of the Sun for comfort heating of dwellings in sunny climates, as well as work in the development of small solar concentrators for use as domestic cookers in newly developing countries that are deficient in other primary energy sources.

Hopefully, in the near future, solar energy will be used in sunny countries such as Egypt and the Middle East countries. There is no doubt that it is the most desirable free source of power for such countries.

Some other pollution-free, natural sources exist such as the steam wells of Larderello, Italy. The wells are drilled to depths of 1800 to 2000 ft and deliver superheated steam at pressures from 71 to 390 lb per sq in gauge at temperatures of 290°F to 400°F. A rate in excess of 4,400,000 lb of steam per hour is obtained from 140 wells.

The steam also brings with it such chemicals as boric acid, borax, and ammonia. The only disadvantage of this source is concentration of industry in certain areas which create crowding.

We mentioned previously the industrial disturbance factors for residential areas and how we could plan to avoid these factors and provide a pollution-free living environment for human beings. Now the most important point is to analyze how we can obtain a clean and decent living environment. We should realize that the needs of the human beings who work and live in our industrial cities must take precedence over the insistent requirements of traffic, over the despoiling demands of industry, and over the callous public acceptance of rigid economy as the most consistent criterion for our street and utility layouts and for the development of our plazas, parks and other public facilities.

Lewis Mumford said, "The final test of an economic system is not the tons of iron, the tanks of oil, or the miles of textiles it produces. The final test lies in its ultimate products--the sort of men and women it nurtures and the order and beauty and sanity of their communities."

The following is the second stage of the suggested design principles for industrial cities.

Human Amenities, Needs, The Characteristics of the Residential Areas Within the Industrial City and Suggested Design Principles

In order to provide successful design principles, we have to analyze the components of the residential areas within the city.

- The family. The desirable standard for family composition can be stated and for which the following norms are known as mentioned before in Chapter 2, Section 2.1. The desirable average number of persons per room is 1.0 to 1.1 persons, while that for the number of persons per household is 3.5 persons, and number of rooms per household is three to five rooms.

Also, each should yield for public schools approximately 0.1 high school, 0.125 junior high, and 0.3 elementary school students.

The family is the most significant social unit, and we should adequately provide for it. A strong family planning program should be provided for all underdeveloped countries which have substandard families. In developed countries the desirable environmental features for the family should include: 1) parking spaces and desirable access by pedestrian walk and by automobile to the house within a desirable distance of the front door; 2) the front set-back distance should be enough to protect people from traffice, danger and other nuisances; 3) at least two major open views from two sides of the house, and secondary views from other sides, should be provided to obtain fresh air and sunshine; 4) privacy should be provided for body, mind, and spirit. Backyard open space for outdoor recreation should be enclosed for relaxing, gardening, dining, or play; and 5) the design of the house should include integration of indoor and outdoor living spaces, and contact with nature such as the use of soil, plants, water, rocks, and trees.

Since the human being is a member of the family and the family is the simple measurement of the city scale, we have to satisfy the family needs.

In order to design a housing program for entirely new cities, we should determine how many families for whom to provide shelter. The ideal situation is to provide adequate housing for all, to stimulate a rate of housing construction adequate for an expanding population, and to provide a decent home for all residents regardless of age, income or ethnic background, with maximum choice of rental or ownership, type and location. Any proposed housing program for a new industrial city therefore should consist of the following types.

Town houses to accommodate single families of more than seven persons per family and semi-detached houses for five to six persons per family. A significant proportion of these houses would be attached town houses grouped in small residential clusters. The cluster should not exceed more than the optimum inter-family social group which is twelve families per cluster. The families in such a cluster would have a unity of group goals and standards, but a diversity of individual status and interests. However, if more than twelve families are grouped together plan-wise, they automatically segregate into smaller social units of "clusters."

The desirable environmental features for a cluster are freedom from traffic friction, pedestrian inter-access, focal area of features (court-sitting area, children's sandbox, or play equipment), harmonious site with architectural character, and physical separation from adjacent clusters (Fig. 3.10).

Garden apartments could accommodate families of five to six persons per family. This type of housing complex should be scattered throughout the neighborhood unit with two- to four-story, walk-up structures grouped around common usable open spaces, which is the most dominant design feature of this housing type. The mixture of the garden apartments into the fabric of the area would meet a broader range of housing needs, especially for larger families with children who could not find quarters large enough in prefabricated model houses or small apartment buildings, and who could not afford housing in single homes (Fig. 3.11a).

Small garden apartments could accommodate mainly families of three to four persons per family, and could be designed and constructed as prefabricated model homes. This new method of assembly line housing construction and governmental financing tools may offer significant additional opportunities for low income families. A combination of prefabricated housing and new financing tools might enable many more families to become homeowners under a cooperative or condominium program (Fig. 3.11b).

Six-story apartments would provide housing for families with smaller space demands. They should be tied to the center of the neighborhood or the community and located within walking distance of shopping and neighborhood facilities (Fig. 3.12).

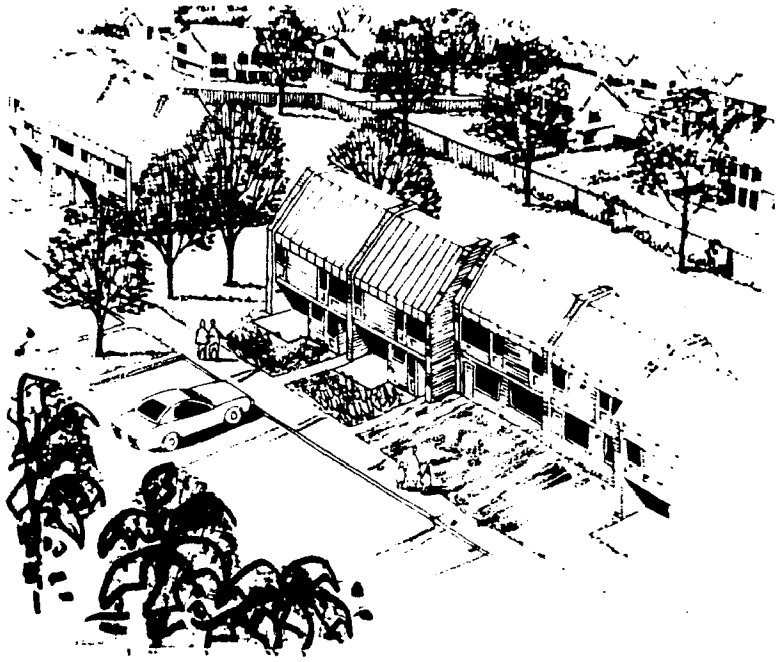


FIG. 3.10 TOWN HOUSES TO ACCOMODATE SINGLE FAMILIES.

Use of vegetation to provide a rich living environment, shaded areas for sitting and relaxing, and to reduce the temperature.

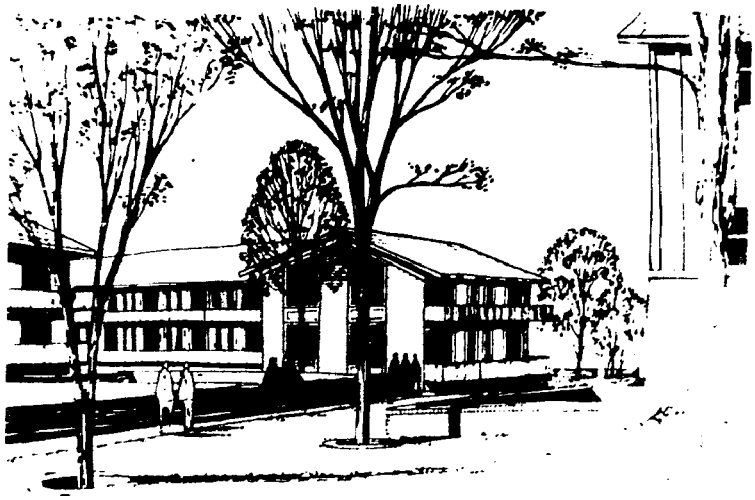


FIG. 3.11a GARDEN APARTMENTS, TO ACCOMODATE FAMILIES OF FIVE TO SIX PERSONS.

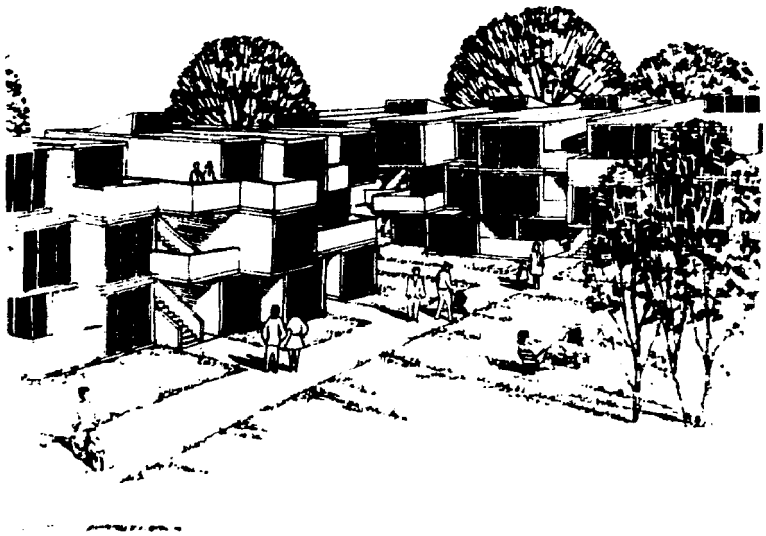


FIG. 3.11b SMALL GARDEN APARTMENT TO ACCOMMODATE MAINLY FAMILIES OF THREE TO FOUR PERSONS.



FIG. 3.12 SIX-STORY APARTMENTS TO ACCOMMODATE FAMILIES WITH SMALLER SPACE REQUIREMENTS.

High-rise apartment towers would be constructed near the town center or in some of the neighborhoods around the town center. Surrounded by garden apartments, the town apartments would probably be rented by young adults or older couples whose children have grown. These apartments might well house families who no longer need the space provided in town houses, but who want to remain in their present neighborhood so as to continue established friendships and interests. Located in the town center, this tall structure of possibly 13 stories would provide a visual focus and an architectural accent for the community (Fig. 3.13).

The unit of measurement for space in urban society is the individual. The common indicator for the organization of the space is the family. To satisfy their social needs, it is natureal that we should provide these families with well-planned neighborhoods.

The neighborhood unit is not some sociological phenomenon, it embraces no particular theories of social science. It is simply a physical environment, a school which is within easy walking distance from the home, an easy walk to the shopping center, convenient transportation to and from work, a well-equipped playground located near the home, facilities for recreation for the healthy development of minds and spirit. It has been our task to introduce the following principles in our design.

The neighborhood should be designed so as to provide adequate housing facilities for all families small enough to encourage participation

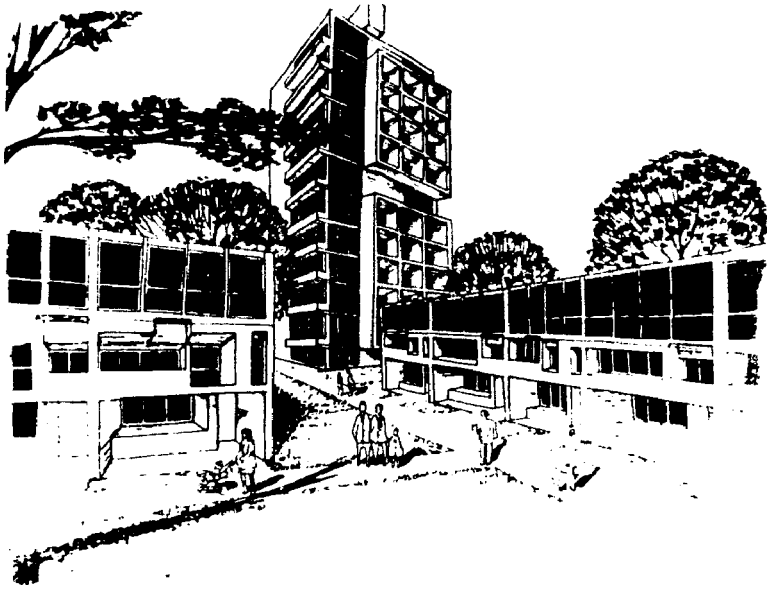


FIG. 3.13 HIGH-RISE APARTMENT SHOULD BE CONSTRUCTED NEAR THE TOWN CENTER AS A LANDMARK.

of all different size families. The optimum size of the neighborhood should be large enough to support at least the smallest educational unit (the elementary school), which is between 1,000 to 1,500 families per neighborhood. The educational unit with its recreation facilities should be located in the center of the neighborhood to serve as a focal point for the residences of the neighborhood. An adequate open space should be designed adjacent to the educational unit which should include all facilities such as an auditorium, religious buildings, parks and the neighborhood center. The neighborhood unit should be a vast park and the buildings are "planted" in it.

The green areas are shaded by the buildings and by trees. Schools have their playgrounds, their football, basketball, and volleyball courts and their gymnasiums in these parks. After school hours they are used by the public. The neighborhood center should include all daily and weekly shopping needs and services. The physical design of the neighborhood must be governed by factors such as a view of the street for each housing unit; avoidance of monotony in plan and in perspective; securing of sunlight, air, and view to each apartment (distance between two parallel blocks always more than twice the height of the higher block); uniform distribution of density throughout the neighborhood; safe residential streets laid out in short loops and cul-de-sacs; and all educational facilities should be located in open spaces with direct circulation from homes to school without crossing against the traffic.

The cultural and recreational community activities should be gathered around the educational and religious buildings. The third component of the city we should analyze is the community.

The community size usually varies from country to country according to the population structure of the country. The size of the community should be determined by its greatest need which is generally the high school and two junior high schools. Theoretically, the community should be composed of eight to ten neighborhood units, connected by parkways and an overpass or underpass to community facilities, (religious building, shopping center, and schools). The community should include a hospital, library, sports field, and shopping center. The preceding discussion of the three components of the residential area of the city leads us into "How to create a livable city."

The visual magnetism of the city must be designed as a temporal art, temporal science, and the temporal culture which controls the role of the designer to create order and liveliness in the city and to satisfy its function and the needs of the people. A city should not be cold, but rather emphasize liveliness, variety, and mixture. The urban design of the sector must be guided by the creation of sequential forms to present the viewer with richness and contrast, continuity and coherence, scaling, development, and dynamic balance through the design, creation of orientation to strengthen and clarify the viewer's image of the environment, and the creation of meaning to deepen the viewer's grasp of the meaning of the environment such as exposure of use, activity, exposure and accentuation of historic and symbolic landmarks, and the direction for changes in sequence should be explicit and visually treated, e.g., up and down, turns, high elevation, to a cross road underneath or to expose a view .

Design must also be guided by the attitude that form follows function. A city that functions well is visually satisfying. The following factors compose the major visual magnetism of the city we should analyze.

Orientation

One of the planning weapons available is judicious creation and allocation of open spaces throughout the city. To strengthen and clarify the viewer's image of the city environment, the design should be oriented so as to strengthen the image of the path itself by simple topographic alignment, clarity of turns (pivoting, alloting, marking, etc.), structuring into distinctive parts, directional differentiation, exposure of path and its goals (concavities, upgradients, etc.), continuity of path, and clarity of points and transition point, tying the path to the immediate environment by exposure and preparing for exits and intersections, fitting the road with the landscape for functional (orientation) and aesthetic (harmony) reasons, smooth continuity of line, blending of curves (horizontally and vertically), matching of horizontal and vertical alignment, fitting with and exposing the topography, avoidance of small dips and humps, marking the important parts of the road (turns, intersections) with significant elements of the immediate environment (landmarks, edges, etc.), and to clarify the image of the general environment of the city through exposure of elements

(as when landmarks[1] stand for whole districts), visual connection or intervisibility, and radiation of element characteristics upon parts of the road.

In studying pedestrian and vehicular circulation, the plan must not only concern itself with traffic movement but also improvement of approaches and points. However, the plan must anticipate the many and various points throughout the physical design of the city where people are likely to congregate in numbers whether afoot or otherwise, and provide them with sufficient open space for comfortable assembly and passage at all such locations intelligently sized in proportion to the reasonable need. These pivotal elements will range from large tracts for public park and school uses through marketing districts, all the way down to small, local and numerous playgrounds for the benefit of the young in proximity to their homes. Such wise and farsighted spatial orientation, of course, can be much more than simply functional with proper landscaping and outdoor furnishings.

The final plan should have order to create the conceptual life through the city and to emphasize district patterns. A city is a chaotic place and the role of designer is to create order and emphasize geometry and

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[1]Landmarks: external reference points, singular identifiable objects: a distinctive building, a statue, a sign, and a monument. Some landmarks are distant ones, dominating and seen over the top of smaller elements, seen only when approached, and singled out by their detail.

patterns. It should be stressed that too much order could be dangerous and boring.

Cohesive Design

The architectural composition of the houses and other architectural elements should create the feeling of enclosure and space on a human scale. The security and comfort of the individual should not be sacrificed to other factors.

The proposed design for any industrial city must include design criteria such as understanding development trends of the chosen area, recognition of the social problems of inhabitants, preservation of cultural tradition, evaluation of technical tradition, study of material resources, creation of humanitarian environment, and designing the physical form.

From the architectural composition point of view, the residential area of the industrial city is open to influences other than those affecting any normal housing project. The limitations, and also the future extension, of the residential area should decide the nature of its architectural composition. The factors which are common to the industrial residential areas rather than any housing project are the nature of the site, topography and location of industry; the type of housing--temporary or permanent; the use of local material for construction purposes; and expansion possibilities.

Street Patterns and Land Use Areas

Land use areas are a different aspect of the city. Traffic ways are the "blood vessels," and should feed and drain all parts of the city and provide them with the maximum opportunities for easy interconnection. Various types of traffic patterns should be used in proposed industrial cities to define the land use areas and improve the function of the city in providing good communications, facilities and industrial land use, and to provide unrestricted growth possibilities.

Peripheral roads should be provided to prevent as much as possible the entrance of too many motor cars into the residential zones. Thus all communication should be carried on around the neighborhood units. Parking and service cul-de-sac streets should open onto these roads.

Public transportation services should use this peripheral road system. Each peripheral roadway should be 30 feet wide (three lanes) in each direction (Fig. 3.14).

Every neighborhood must have its shopping center which should have a parking area behind it and service streets coming from one of the peripheral roads. Such cul-de-sacs should be 40 feet wide and a minimum of 66 feet right-of-way. These dead-end streets should be provided to deter fast traffic and crossing of through traffic in residential areas. The "cul-de-sac" system could be designed to fit the environment as organic design or geometric pattern as shown in (Figs. 3.15a,b).



FIG. 3.14 PERIPHERAL ROADWAYS. (Schematic Sketch)

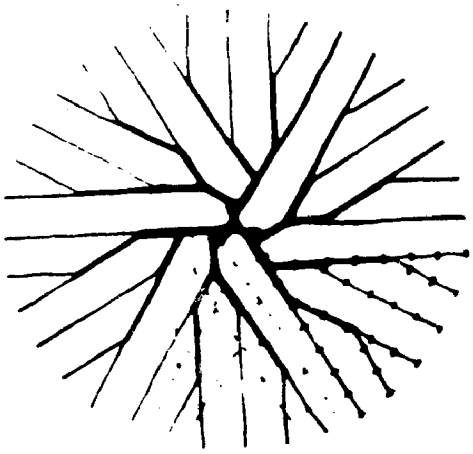


FIG. 3.15a AN ORGANIC TRAFFIC CONCEPT.

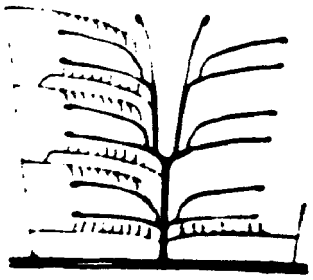


FIG. 3.15b "cul-de-sac" SYSTEM.

Foot and Cycle Paths and Pedestrian Overpasses

All the areas of the neighborhood should be covered by a net of foot and cycle paths, 12 feet to 16 feet wide, respectively. The same should be provided along the peripheral streets around the neighborhood units. Walking distances to shopping centers should not be more than 1,600 feet away from the residential areas. These pedestrian and cycle paths should be used in case of emergencies such as fire or accidents, but all the buildings should be easily reached from the streets.

CHAPTER IV. RECOMMENDATIONS

"An entirely new formulation is required, based on a knowledge of the natural and sociological minimum requirements; unobscured by the veil of traditionally imagined historical needs."

--Gropius

Rebuilding Our Communities
Chicago

There are certain goals and objectives common to all community planning; therefore our design principles should be applicable to all communities. It is logical to assume that people are concerned with and aspire to the attainment of a more efficient, convenient and attractive community. Applying our design and planning principles to Livonia and Shubra, we must be aware of the fact that the critical conditions caused by industry are more likely to appear in the undeveloped countries rather than the developed countries.

Consider all the facts on which we have touched by examining existing conditions of Livonia and Shubra, which could be described by the following statistics and land use data.

Summary of Existing Conditions

Land Use Data	Shubra	Livonia
Developed land	330 acres	18,350 acres
Total area	565 acres	23,000 acres
Possibility of expansion	yes	no
Demographic Characteristics		
Percent population growth (1950-1960 and 1960-1970)	35 and 40 percent	280 and 651 percent
Population	138,000	110,100
No. of families	29,560	29,400
No. of dwellings	16,770	28,138
No. of households/dwelling	1.77	1.05
No. of persons/dwelling	8.3	3.98
Annual income/family	$576.	$10,000.
Physical Condition	slums	acceptable

	Shubra	Livonia
Community physical condition	poor	acceptable
Community identification	none	none
Community Facilities		
Friction between industry and residential organization	100 percent	50 percent
Transportation system	poor	fair
Percentage of employees living and working in city to the total employees within the city	67 percent	20 percent

It can be seen that the people of Shubra are suffering now more than ever from the existing conditions and problems. It is clear that Livonia has grown faster. Due to advanced technology and people participation, it is in much better condition than Shubra.

Application of the Planning Principles to Livonia

Applying our design and planning principles to Livonia to obtain conceptual objectives to solve the few problems affecting this community, most of the problems could be solved according to a general comprehensive plan. Some of them are difficult to solve at the present time such as the volume of the transportation movement in and out of Livonia. As will be mentioned later, it is possible to avoid such problems in proposed new industrial towns in the United States.

Livonia is a city of great potential with a dynamic future. The city has undergone rapid growth and change due to the dynamic growth of industry. Population has more than quadrupled between the 1950 census and the 1970 census. This phenomenal increase in

population leaves only limited areas of undeveloped land, and creates an increased demand for more failities. Such a rapid growth also places a tremendous demand upon municipal services. Livonia will soon reach its capacity population with little land available within the city limits to allow for the physical expansion of supporting community facilities and services. A master plan for the city's growth and development must be judiciously developed and followed. The ultimate number of people that can be effectively supported by the current land area and present zoning regulations is about 140,000 persons.

For these reasons it is especially important that Livonia pay close attention to its future development and the conceptual objectives and needs. The following conceptual objectives and needs could be determined to meet our planning and design principles.

-- Separation of residential organization and industry to provide a strong visual treatment and barrier as shown in Fig. 4.1.

-- Residential areas should be formed into unified neighborhoods with clearly defined boundaries, with an integrated commerical area and school and park facilities, and encouragement of multi-family housing with large enough parcels for flexible site plans and maximum utilization of land as shown in Fig. 4.2.

-- The neighborhood commercial centers, consisting of two to five acres, or up to one percent of the neighborhoods land area, should provide daily convenience of goods for the immediate neighborhood and should be conveniently located. The neighborhood layout in Livonia needs a new approach.

-- Cluster subdivisions, multiples and improved multiple sites should be fitted into the neighborhoods. The neighborhood layout should reflect and enhance focal points of visual and social importance such as the community house, the school and shopping center. There should be an artful combination of varied densities, streets, and facilities which results in a townscape having a cohesive structure as shown in Fig. 4.2.

-- All elementary and most junior and senior schools should be located within walking distance of the neighborhoods. Combined school and recreation sites should be accessible from a collector street.

-- Generally, homes should not face onto heavily traveled roads. Institutional and social facilities, such as churches, and club houses, should be locally available. Local streets should reach arterials via collectors. Collectors should not encourage through traffic.

-- Clustering of houses and consolidation of open space into neighborhood parks and recreation areas should be encouraged. All neighborhoods, having substantial acreage yet to be developed, if deficient in the quantity, distribution, and utility of park land, should be zoned for a density of dwelling units per acre that would result in meeting such deficiency through the clustering of units and consolidation of open space into civic associations, public parks and recreation facilities. While the cluster approach should not be made mandatory, it is usually elected by the developer for reasons of inherent economies in cost of improvement.

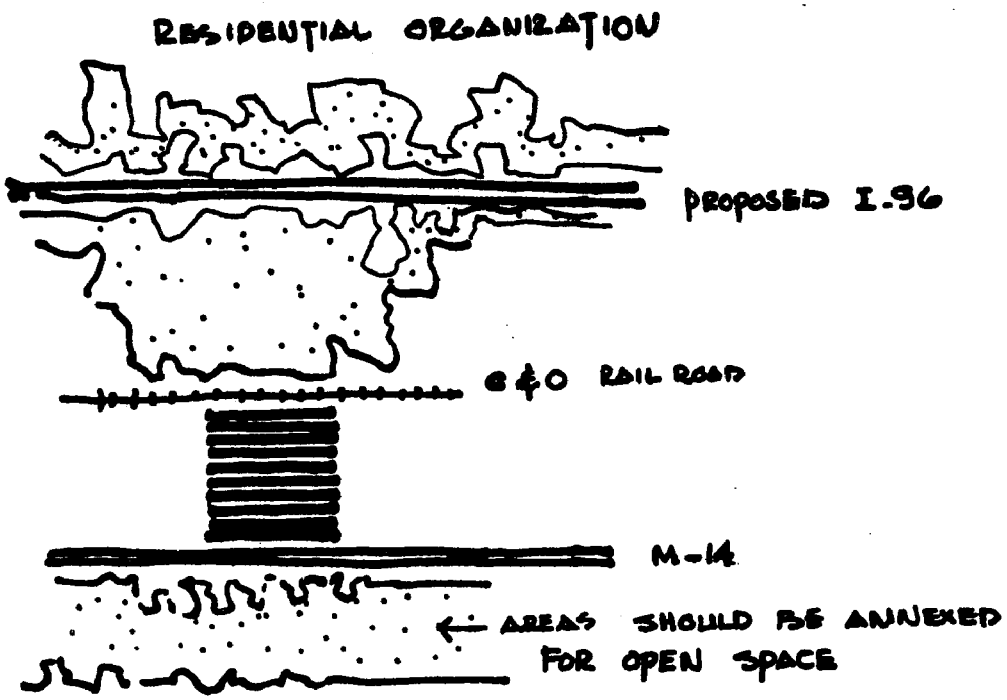


FIG. 4.1 SEPARATION OF RESIDENTIAL ORGANIZATION AND INDUSTRY.

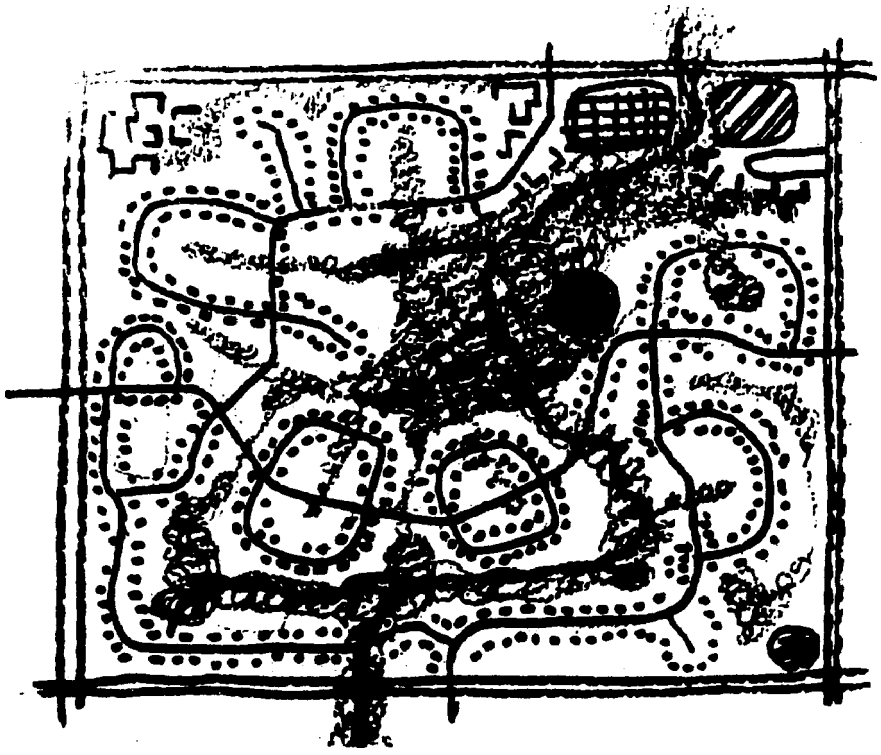


FIG. 4.2 POSSIBLE DESIGN OF CLUSTER SUBDIVISIONS.

-- Shopping facilities should be clustered into compact centers with mutual access points, rather than in strip commerical developments with individual access along highways. Strip commercial business areas should gradually incorporate into shopping center to provide advantages such as ample off-street parking, safe and convenient pedestrian movement, and building space arrangements according to the advanced principles of architecture and landscape design such as limited automobile access points from highways, consolidated parking, architectural harmony and subdued signs, adequate setback area of buildings, and coordinated site planning of layout, grades, landscape treatment and truck service. People are becoming busier, they want to get things done fast. Therefore commerical areas should be grouped rather than distributed in a linear strip. The commercial development, which has been started along Farmington Road in Livonia, follows the old trend of the linear strip without any planning guidelines and with individual access disturbing the traffic. It should be stopped and grouped in clusters.

-- Land should be set aside for general industrial purposes with a view to the expected market trends to allow opportunities for expansion of industrial firms presently located in the area. The appearance of this industrial corridor which is generally poor at the present time should be improved. Local residential streets should be separated from the industrial traffic to increase the safety and attractiveness of the residential area and provide more efficient

accessibility to the industrial area. Nonconfirming uses such as older dwellings and substandard units should be removed. Some of this removal should take place through the normal process of real estate development. Other cases will necessitate the utilization of condemnation powers given to the city for removal of nonconfirming uses under state zoning legislation. Urban renewal, including conservation and rehabilitation types of projects as well as clearance and redevelopment, should take place.

-- A parks and recreation system, meeting acreage and location requirements and offering a variety of activities to serve all age groups, should be developed. The park system would also serve as a buffer, where necessary, between incomparable land use. Increased reliance on the automobile as a mode of transportation has been both a cause and effect on the dispersion pattern in Livonia. This results in the doubling of the lot area per family, with travel distance greatly stretched out. Greater distances between home and work, home and shopping, and places of industry and commerce generate even greater increases in the amount of land needed for highways. The consolidation of land from individual lots into neighborhood and community open spaces is required to make Livonia economical and attractive. The consolidation of open spaces fits in with the cluster subdivision approach to residential development. Substandard units will be replaced according to new zoning into open spaces to offer beauty, utility and economy that cannot possibly be obtained by the individual homeowner. Moreover, economies in the extension of water, sewer, sidewalks, and residential roads preserve a greater portion of

the resident's housing budget which can then be used to improve the quality of the dwelling itself. An acquisition program should be implemented to satisfy the major land requirements for athletic and other recreation uses. The elements of this program should consist of continued acquisition through purchase and dedication of flood-plain and river-valley areas for conservation of natural beauty and satisfaction of flood plain impoundment needs; private development of open space facilities tied-in with development of cluster subdivisions and apartment developments; acquisition of key pieces of land to connect larger recreation and river valley sites permitting inter-connections for parkways, bicycle paths, and pedestrial trails; and, in some built-up neighborhoods, acquisition of local park sites through urban renewal. Flood plains provide open space as well as natural drainage. Livonia needs flood-plain zoning and public acquisition of open space as shown in Fig. 4.3. Although most of Livonia lies outside the flood-plain area, a higher percent of Livonia land lies in one or another of various watershed or drainage basins. General patterns of land use throughout the watersheds should be coordinated with flood plains. Rivers and streams need flood plains as their natural impoundments relatively infrequently and for short periods. It is logical, therefore, that these flood plains be utilized the rest of the time for other purposes compatible with the need dor passage of downstream water. Within flood plain areas, compatible land uses could include recreational areas such as parks, playgrounds, athletic fields, and golf courses; nature paths and bridle trails; gardening; and open space as an amenity to suburban living.

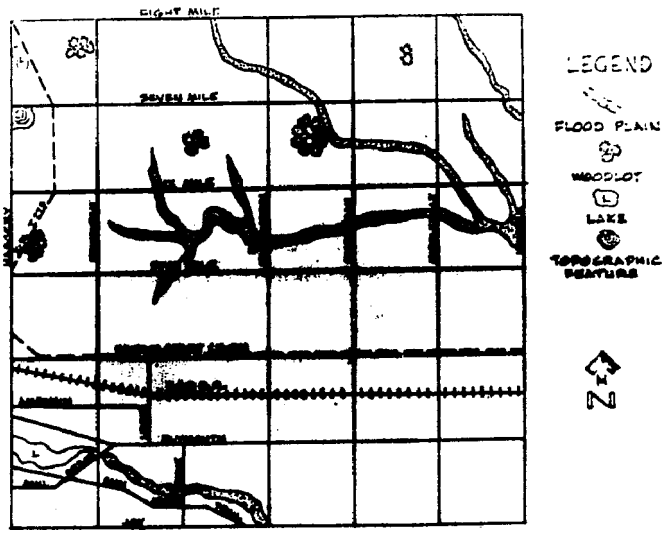


FIG. 4.3 FLOOD PLAINS PROVIDE OPEN SPACE AS WELL AS NATURAL DRAINAGE.

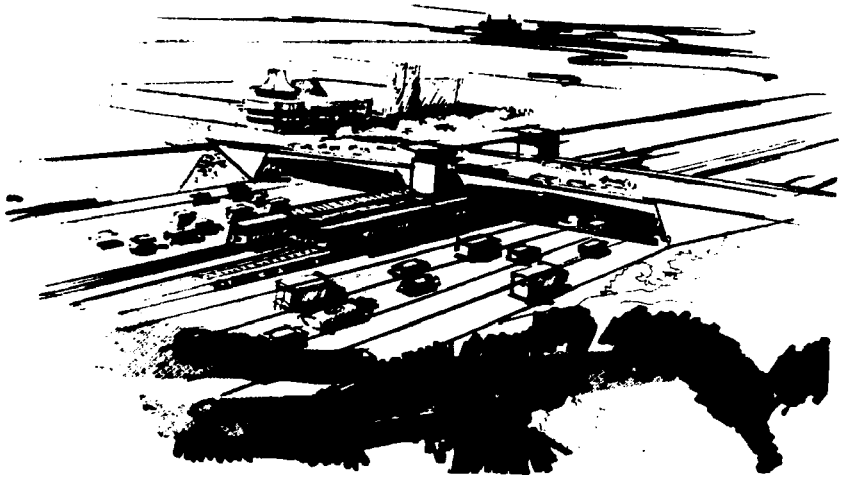


FIG. 4.4 POSSIBLE TREATMENT OF HIGHWAYS TO ABSORB EXITING.

Land adjacent to the flood plain area may have unique development potential. If the valley is treated as a pleasant scenic factor, homesites on or near its brim overlooking the stream may have high residential value. Instead of a deterrant to wholesome community growth, with a depressing effect on neighboring areas, the well-planned use of flood-plain areas can contribute a great deal to the community pattern of living.

-- The thoroughfare system should be improved to provide adequate facilities for the movement of both local and through traffic. Without proper planning, the increase in the volume of traffic and the lack of available land within the community may have a detrimental effect on the continued prosperity of the city. As mentioned in Section 2.2 of Chapter II, a total of 20,000 people plus approximately 25,000 people in the labor force, who are heads of families, leave the city daily and return to it at night. Also a total of 28,000 employees come to the city daily and leave it at the end of the working day. These figures indicate that the volume of the traffic in Livonia at peak hours in the morning and the afternoon is about 73,000 cars per hour, plus cars and trucks passing through Livonia from Detroit to Chicago and vice versa. Such a problem is very difficult to solve at the present time unless a very careful long-range plan of propaganda to encourage people to live and work in the same community is provided. (Fig. 4.4)

> "We spend more and more hundreds of millions of dollars to build more and more super highways to more and more remote distances so that more and more people may drive more and more rapidly until they come to the place where they must stop and wait and wait, longer and longer to get into the district where it is harder and harder and harder to move around at all!" (Frederick Bigger)

It is possible to avoid this problem in designing future industrial cities if the employer or the law specifies that the employee should reside in the same community in which he works. In order to achieve this goal the employer and the government should cooperate to share some of the financial cost of building the community and providing a well planned environment for living. It is to the benefit of the employer that his employees reside within a desirable distance from work and hus save their energy for work, and it is the government's responsibility to help these people to live in the same community so as to benefit from the taxes paid by their industrial establishments.

Livonia needs a symbol for its existence. Many of the modern community frustrations have come into being because a symbol of visual meaning of its life is missing. Inasmuch as no symbol is found in Livonia, there is no dominant center on which to focus life. The visual impact of the city is nearly void, or negative, because of the poor visual focal points of its physical environment . Since the total visual impression of a community conveys either beauty or ugliness, Livonia should change the visual image of its environment to convey a higher-level of aesthetic quality. The best way to achieve the establishment of a unique identity for Livonia so that it will be readily discernible from adjacent municipalities is to

modify the zoning ordinance to allow the existence of a unique poster for Livonia on all commercial signs within the city boundaries and the city and recreation areas (Fig. 4.5). A unique symbol for Livonia should be located as a landmark in each center in Livonia. Livonia should provide a higher quality of living for the residents by enhancing the desirability of their physical environment, such a proposed development of entrances, boulevards and parks should be capable of distinguishing Livonia from adjacent communities (Fig. 4.6). It is also recommended that the treatment of city right-of-ways, and the area between the curb and property lines should be used for aesthetic treatment and not for parking or other private uses. A major thoroughfare should be provided with strong orientation elements such as landmarks and signs. The municipal signs would add interest and distinction to the city and a unique quality of municipal structures will increase Livonia's image. Livonia has been fortunate in the design of most of its existing municipal structures. Their architectural caliber is of sufficient quality to be long-term assets to the city. The fire stations, libraries, indoor ice rinks, golf course clubhouse, sewer and water building, police stations and other structures have desirable architectural features and are an asset to the city.

In conclusion, Livonia's flat, uninteresting topography does not contribute to its beauty or its image. Beauty is often a complex, psychological factor dealing not only with pleasant visual qualities, but with man's ability to orient himself in space. The lack of

FIG. 4.5 A UNIQUE POSTER FOR LIVONIA SHOULD BE ADDED ON ALL COMMERCIAL SIGNS WITHIN THE CITY.

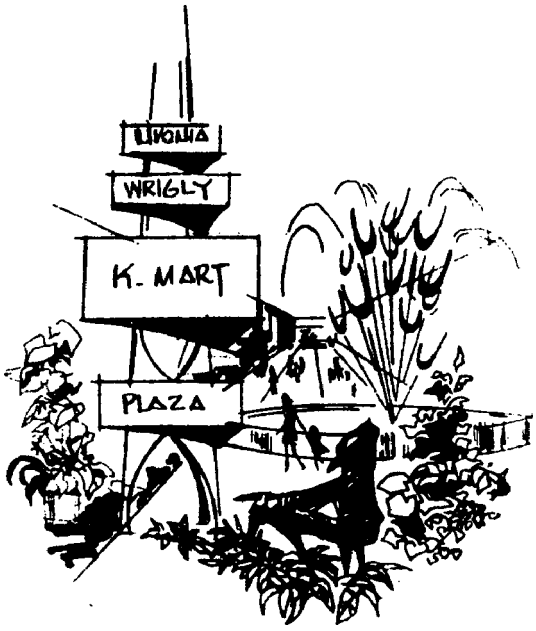


FIG. 4.6 POSSIBLE LOCATION OF ENTRANCE TO LIVONIA.

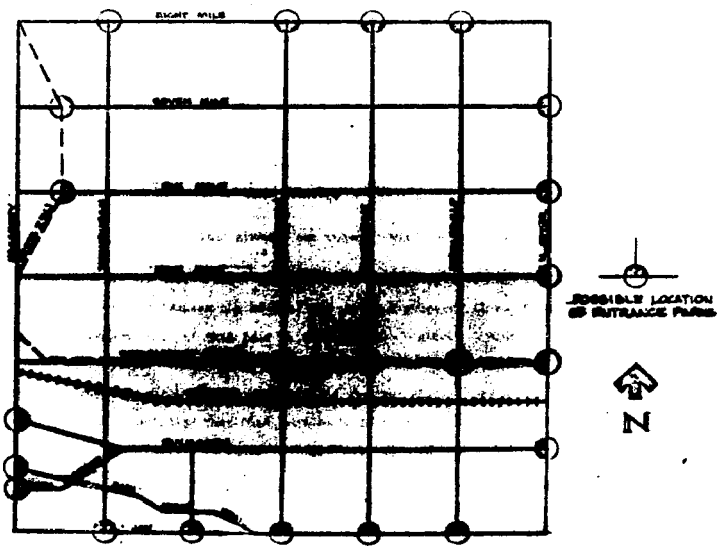
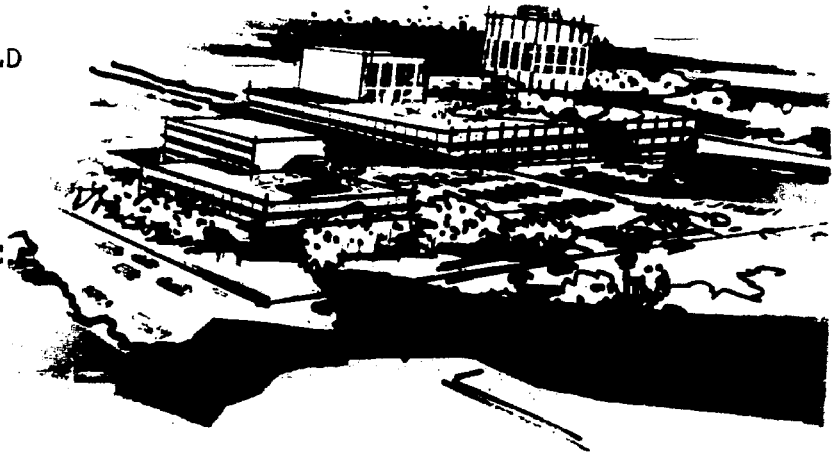


FIG. 4.7 HIGH-RISE BUILDING COULD INCREASE THE QUALITY OF LIVONIA IMAGE.



visual landmarks and one's inability to become oriented can psychologically disturb one's thought process. The most tangible means of orientation can be accomplished by the use of dominant features that enable man to orient himself better to his environment. Man's ability to orient himself generally conveys a subconscious impression of beauty; man's inability to orient himself tends to disturb his thought process and conveys a lack of orderliness and tends to leave an impression of ugliness. It is extremely important that some more impressive features and landmarks be created. These could fall into the category of taller buildings and features at strategic areas within the city. It is essential that the civic center convey a dominant visual impact. A multi-storied city hall and other related buildings outside of the civic centers, as well as a carrillon tower, could increase the quality of Livonia's image (Fig. 4.7).

Conclusions

Solutions to Livonia's many and diverse problems can come only through an orderly process of recognizing and analyzing them. The most logical vehicle to launch a systematic program of solving Livonia's problems is the preparation of an adequate and technically sound master plan; a master plan which recognizes all problems and encompases contributions from many disciplines. The master plan should recognize Livonia's physical, economic, and sociological problems as mentioned before in the conceptual objectives. New

sources of tax revenue through new legislation at the state and national level could provide much needed funds for the city. Every attempt should be made to explore new sources of income. Controlling the rate of residential development so it is closely coordinated with the expansion and building program of the city government program and schools could lessen Livonia's economic burden.

A comprehensive program of community identification and beautification will transform Livonia's image from an unattractive, undefinable entity to one of order and beauty. A dynamic center city area can be a catalytic force to create community pride and identification. Livonia's plan should attempt to solve these problems and other problems in a more comprehensive manner.

Application of the Planning Principles to Shubra

Applying the planning and design principles discussed previously to Shubra, one must be aware of the fact that Shubra possesses within its boundaries a vast and diverse collection of maladies that inspire dismay, deserve diagnostic investigation, demand clinical cures, and plead for early attention. None are more aware of these needs than the civic authorities who govern the municipality of Cairo. During the last decade there has been a growing concern at the administrative level over the ills of the district which become more desparate with every passing year.

Consider the fact that "urban renewal" is the immediate application of comprehensive planning, in which all powers of government cooperate with private and civic enterprise to better meet the principles and the needs of modern society with special reference to obsolete and obsolescent areas of the city. To meet these principles, the following conceptual needs and design criteria should be provided to the sector.

Conceptual Needs

1. Separation of residential organization and industrial land use to provide a strong visual treatment and barrier in order to satisfy human amenities and to avoid any friction between the dynamic growth of the industry and residential area.

2. Circulation improvement for both pedestrians and vehicles.

3. Adequate housing provision aimed at lowering population density to acceptable, minimum standard strata.

4. Slum clearance for removal of existing architectural liabilities.

5. Rehabilitation to correct obsolescence and deterioration in existing architectural assets.

6. Adequate public service facilities to include fire and police protection, schools, recreational areas and medical centers.

7. Social reforms to offer hope, meaning, and satisfaction to sector citizenry.

8. Adequate shopping accommodations sized and situated conveniently according to population centers and densities.

9. Cultural renewal to supply a sense of morale, awareness, and pride in their flourishing city to the inhabitants of reawakened, venerable, symbolic, and progressive Shubra.

Design Criteria

1. General practicality: administrative, legal guides and controls should be provided.

2. Optimum land use: reorganization and relocation of elements are required to avoid waste, congestion, disintegration, and detachment within the sector.

3. Visual magnetism: preservation of our traditional forms providing them with good orientation.

4. Selective conservation if it is possible.

5. Spatial orientation: sensible allocation of open areas for either assembly, passage, or site enhancement.

6. Cohesive design: architectural unity throughout the sector.

7. Climactic planning: proportional architectural composition with accelerating interest from sector perimeter to sector nucleus.

Finally, by such norms must a successful program of restoration in Shubra be judged.

Including all the obvious technical planning studies and surveys, there are other conceptual operations that should be considered.

1. Comprehenisve planning: develop a broad picture of recommedned future patterns for the sector.

2. Neighborhood analysis: provide a detailed analysis to determine level of treatment, reuse, recommended improvements and priorities of action.

3. Clearance by public acquisition, demolition and preparation for reuse of specific areas.

4. Rehabilitation by either the former owners or by public agencies.

5. Code modernization by revision and improvement of all regulations.

6. Code enforcement by public as well as citizen organizations; the levels of enforcement may vary, e.g., minimum improvement in areas scheduled for early clearance, maximum for areas not to be cleared.

7. Relocation of people or other activities to other (improved) locations.

8. Public housing construction to aid clearance and relocation in case the market is short of housing within the rent paying ability of the residents.

9. Construction and improvement of facilities by both city-wide and local services, public agencies, or private organizations.

10. Citizen participation is essential to create the impetus for renewal and to gain general approval (and sometimes financial aids) for the program.

Nature of the Solution

The right solution for Shubra certainly must embody many physical changes fashioned to suit a "Master Plan" of design, reconstruction, and renewal. However, the latter cannot depend on material considerations and statistics alone. We are faced here also with the collective problems of people--people who individually move in many and various orbits of life. We are concerned here with their combined group thought, conduct, heredity, habits, emotions, traditions, principles, morals, character, activities, needs, desires, and intelligence.

We must remember further that these people are human beings attempting to live. Therefore, we cannot hope to produce a successful "Master Plan" without also studying their interdependencies, compatibility, development and organization in the community sense.

In short, the proper solution must be a "Master Plan", the scope of which will be a combination of physical and sociological advancement.

The conceptual needs and objectives may be the essential "clues" to a proper solution as well as a general framework within which a sound, realistic approach can be developed, but there are several indispensable conditions we must acknowledge beforehand lest our pyramiding program may later prove to be founded on a quicksand base. The people who presently inhabit the sector, and our knowledge of them, force us to

realize that they are incapable of either instigating or executing--without outside help--any of the restorative processes we believe to be necessary. Conversely, however, and because these same people are both the ones who will be the more drastically affected and the ones to whome a majority of the benefits will accrue, they must be recognized as an integral cog in the mending mechanism. Hence, we can conclude that leadership, direction, guidance, and performance must originate beyond the limits of the sector. Moreover, we can conclude that preparatory indoctrination leading to a spiritual awakening of the Shubra populace must occur before the gears of restoration can be made to mesh with consummate efficiency.

At the outset of developing our approach, we must be equally conscious of the fact that Shubra for a long, long time has had no powerful, common theme with which to rally its residents into united group "togetherness." Therefore, no civic identity or community spirit exists within it today. Few there think in terms of security or social recognition, of affection for their environment, or pride in its existence.

In addition to social education (which can only pave the way), a unifying source of motivation is needed. We must devise a civic catalyst of such symbolic worth that the inhabitants of the sector will develop an intense feeling of belonging to a very privileged company and, thereby, a vigorous spirit of ambitious cooperation with the entire program. We must, then, find an inspirational emblematic

cynosure that will draw the people of the sector together and invite participation by all meaning of education and propaganda in our planning.

If we succeed in the latter effort, we can expect the people of Shubra to gradually interact, inter-communicate, and contribute to the restoration process. Gropius said,

> "An entirely new formulation is required, based on a knowledge of the natural and sociological minimum requirements; unobscured by the veil of traditionally imagined historical needs."

Our search has come to an end. All that remains is to present a theoretical "Master Plan" and meticulous program of restoration in Shubra.

The Right Application

We are about to assemble a master plan for the Shubra district that will fulfill all of the conceptual needs and objectives of the sector in an effective, practical and appropriate manner. It cannot be simply a blueprint for physical change, it must also supply a social and cultural program capable of building within the local citizenry a fervent desire to improve their own living conditions, employment potential, and ability to enjoy their rehabilitated surroundings.

The latter will remain unattainable unless we can simultaneously provide them with better employment possibilities and higher rewards for their labors. Therefore, the master plan must be prepared in such a way that a sound, local economy can be brought within the grasp of the people, individually and collectively.

Thus, rehabilitation of humans in Shubra becomes as important to us as renewal of its physical form.

It means that the master plan must be a thorough and human undertaking with primary attention to schooling and other educational facilities. Finally, it means that clearance and demolition must be judiciously--not haphazardly--accomplished so that the sector residents will not suffer the feeling that all of their familiar surroundings are being wiped away leaving them friendless and strange in a cold, new environment.

The Master Plan

General Practicality. There are no apparent obstacles to restoration in Shubra other than the foregoing. The present program of renewal in the sector is barely underway. The limited new construction there within the past two years, while of questionable value due to its type, location and usage, can probably be absorbed into and utilized by a restorative concept. Since it was not developed with the idea of a fully integrated, architecturally united sector based on blending contemporary with traditional, it does not, at first glance, appear to lend itself well to a comprehensive scheme for Shubra. If retained, it can be accepted only in a spirit of compromise. For the purposes of this study, let us consider such recent additions wholly expendable--if only because it would probably cost more to modify them in keeping with the balance of the program than to remove them from the scene entirely.

Laws are as easily amended and repealed as they are instituted. Present regulations which are either too narrow, too vague, or too ineffective for execution of a restorative program in Shubra can be readily changed, or replaced as required. Governmental management being established as a prerequisite to the success of the right solution in the sector therefore suggests no official resistance once civic authorities can agree that restoration must be adopted and implemented in Shubra.

While there are certain limitations upon the area of the sector by reason of both existing establishments, there are no consequential physical or natural barriers.

Optimum Land Use

The hyper-density of Shubra residences, which we hope to reduce as a part of the master plan to sensible levels, is measured and stated in many ways. Nevertheless, they all can be summed up in one sentence. Too many people live and work on too little land! Even if one were to demolish all the non-residential structures within the sector and replace them with housing of traditional form (which is fantasy, of course), it is probable that the occupancy per room and density per acre would still prove higher than comparable figures in average European and American cities.

The conclusion is, then, that the only way we can significantly and satisfactorily reduce the extreme rate of overcrowding in through a combination of the following methods.

1. Reduction of the sector population by drawing a portion of the residents away to other living sectors in and around Cario whether existing or created for the purpose, or drawing a portion of the residents away to other urban sectors of Egypt, remote from Cairo, where housing either exists of must be created for the purpose.

2. Construction of new housing within the sector on sites resulting from the demolition of expendable buildings.

3. Lateral expansion of the sector into whatever available open land may occur along its perimeter.

4. Internal rearrangement and shifts of land use within the expanded sector.

We cannot depend upon the ability of other Egyptian urban centers to absorb any notable proportions of Shubra within existing housing capacities. Even if the latter were to be expanded through construction of new facilities, this suggestion gains little acceptance. The necessary emigrating (which it is hard to believe would be voluntary) from Shubra raises grave complications from the socio-economic viewpoint. People must work to live, job placement in other cities would certainly be equally critical to the situation in Cairo and very easily could be far worse.

Maps showing the sector and its surrounding territory are quite revealing.

We see at once the Shubra is encircled on three sides by established urban areas of Cairo, fully developed and devoid of open land that might relieve sector expansion. The throttling circle is completed on the fourth side by agricultural lands.

Selective Conservation

The master plan must contain an evaluation process by which both slum clearance and rehabilitation can be effectively executed. This procedure should include the following steps.

1. Establishment of criteria by which to judge the relative merits of existing structures from both aesthetic and practical viewpoints if it is feasible.

2. Surveying the existing structures within the sector one by one, carefully noting their physical condition, geographic and environmental situation, visual quality, present usage and possible, alternate suitability--or adaptability--for other types of occupancy.

3. Allocation of the existing structures to either asset or liability classification according to the established criteria.

4. Investigation of the liabilities in order to discover which of them can be solved by simple elimination and which may deserve corrective action instead.

5. Replanning of the sector in order to conserve the assets, eliminate the expandable liabilities, and integrate the assets and corrected liabilities into a basic pattern.

6. Study of the replanned sector according to land and building usage so that coordination of and balance between various occupancies can be achieved, internal rearrangement and change of usage as may be desirable can be adopted on behalf of such coordination and balance, and new elements may be sensibly introduced as necessary to link and supplement the salvaged, existing structures in terms of housing, public services, shopping accommodations, circulation, and other such advantageous improvements.

7. Final replanning of the sector as required to guarantee that all of the conceptual needs and objectives have been fulfilled.

Visual Magnetism and Orientation

The design principles we have mentioned before should apply to the sector. Consideration should be given to the location of religious buildings to be seen from different directions, since Egypt is a highly religious country. The crescent of the mosque and the bell tower of the church should be used as land marks to create orientation of the sector.

Cohesive Design

True, there is much duplication and imitation in the buildings of the world; it is almost unavoidable. Not every attempt by every architect or planner to create an original concept is crowned with

success; as a matter of fact, such success if very rare. Hence, we can say that every building we see that displays duplication or imitation is, in a sense, a failure. Yet we accept, and even expect, such failures if only out of common human imperfection.

On the other hand, to demand duplication and imitation in the future development of Shubra is to demand architectural failures and to forbid architectural success. The master plan cannot adopt such an approach to new designs; it must insist upon positive social and technical standards, not negative ones. It must welcome and applaud originality, not condemn it.

The belief that traditional, historic influences upon the new architecture of any specific region must be respected is not, upon investigation, inconsistent with a positive program. Such influences cannot be divorced from architecture any more sensibly or successfully than they can be detached from any other art or from any other art of form of knowledge. There is a need for duplication and imitation in redesign of the sector as many of these buildings have special religious characteristics.

We cannot find a good reason for specific requirements of either style, character or materials if the new construction fulfills the foregoing criteria. On this subject, Professor Gropius said:

> "There is no need to emulate the 'atmosphere' of this or that period. New buildings must be invented, not copied. The great periods of architecture in the past have never imitated the periods of their forefathers...here should be no copying...in order to preserve an external 'cosmetic' uniformity. Unity should be expressed by adherence to the given spatial order of existing buildings, not by imitating their veneers; exterior conformity was never mandatory in the past."

Climactic Planning

The master plan must endeavor to clearly and physically define the limits of Shubra in all four directions of the compass without destroying the visual magnetism of the sector. It must develop one particularly official point of entry, i.e., a gateway which any visitor will consider conveniently accessible from the outer city and where they will be introduced to the heart of the sector. It must seek ways and means of exploiting the natural nucleus of Shubra, promoting it into a focal point of function and activity for the entire sector, easily recognizable and symbolically identified as such.

Adequate Housing Provision

Under the discussion of optimum land use, general thinking methods by which to redistribute the sector occupants and end overcrowding once sufficient land is found and made available for this purpose have been presented. But the right answer is not simply the construction of sufficient new housing units. We have also seen, while calling for preparatory indoctrination, that physical renewal must be accompanied by sociological renewal.

Therefore, it behooves us to think in terms of developing as we plan. The inhabitants can first learn to enjoy the benefits of a restored community life at a very localized level. Each of these clusters should contain a group of specific public facilities that can be mutually utilized by all of its immediate citizenry, the daily exposure to which will encourage common social interests and intercourse.

There is a series of principles to foster healthy, sociological renewal. A residential unit should be developed that provides housing for the population for which one elementary school is ordinarily required; its actual area depends upon its population density. Sites for schools and other institutions having service spheres coinciding with the limits of the residential unit should be suitably grouped about a central point or common. One or more shopping districts, adequate for the population to be served, should be laid out in the circumference of the unit, preferably at traffic junctions and adjacent to similar districts of adjoining neighborhoods.

At present, there are approximately 138,000 people living within the existing Shubra district and about 10,000 more in the next 15 years, but within the general area to which the master plan recommends expansion of the sector. There are nearly 450 acres of land in the former and to that we propose to add 450 acres to become the total net residential area of 900 acres. For all intents and purposes

our program can be said to concern itself with housing (including some future growth) up to some 150,000 people on approximately the 900 acres of ground as a net residential area, and 250 acres more for industry, public services and desirable activities.

With the annexed land, it is obvious that we can easily achieve a maximum population density of less than 160 persons per acre as a net residential density.

Circulation Improvement

The master plan would not provide the proper circulation, however, if it refused to recognize the fact that certain vehicular traffic with local destinations must be obliged as well. Therefore, a system of access roads must be designed and included that will carry such traffic into the sector, reaching all major segments thereof with equal convenience and ease. Such roadways must further enable emergency vehicles to service the entire area within Shubra especially for fire-fighting purposes. Study of the maps again discloses that such a system is indeed feasible without seriously disturbing or changing the proposed street patterns of Cairo's Master Plan 1965. Moreover, adoption of cul-de-sac and closed-loop techniques in the layout of the access roads promises effective discouragement of their use by through-bound motorists and truckers. Thus, we have essentially separated pedestrian passage from the motor car.

Finally, the master plan must accept with rigid determination the prohibitions of all on-street parking for vehicles of all descriptions.

Alternative Conceptions

Urbanization has turned the traditonal conceptions of life upside down. Production, transportation, needs of daily life, and progress in economy and science develop at high rates. The advent of machines and mechanized industry with all their disadvantages has driven us to create new alternatives to solve the sector problems.

We create these alternatives from all the further studies which are discussed herein. We have four possible alternative conceptions.

Alternative One: Implosion

Advantages: (Fig. 4.8)

1. More economical than other dispersal aspects.
2. No need for longer lines of utilities (sewer lines, water lines, etc.).
3. Conservation for agriculture lands.

Disadvantages:

1. Planning with an emphasis on population implosion and higher urban densities (more than 300 persons per acre).
2. Increases construction costs by using elevators.
3. Increases rent value per residential unit.
4. Increases transportation volume in the sector by concentrating it.

Alternative Two: Expansion

Advantages: (Fig. 4.9)

1. Easily achieve a maximum population density of less than 200 persons per acre (actually it is about 160 persons per acre).

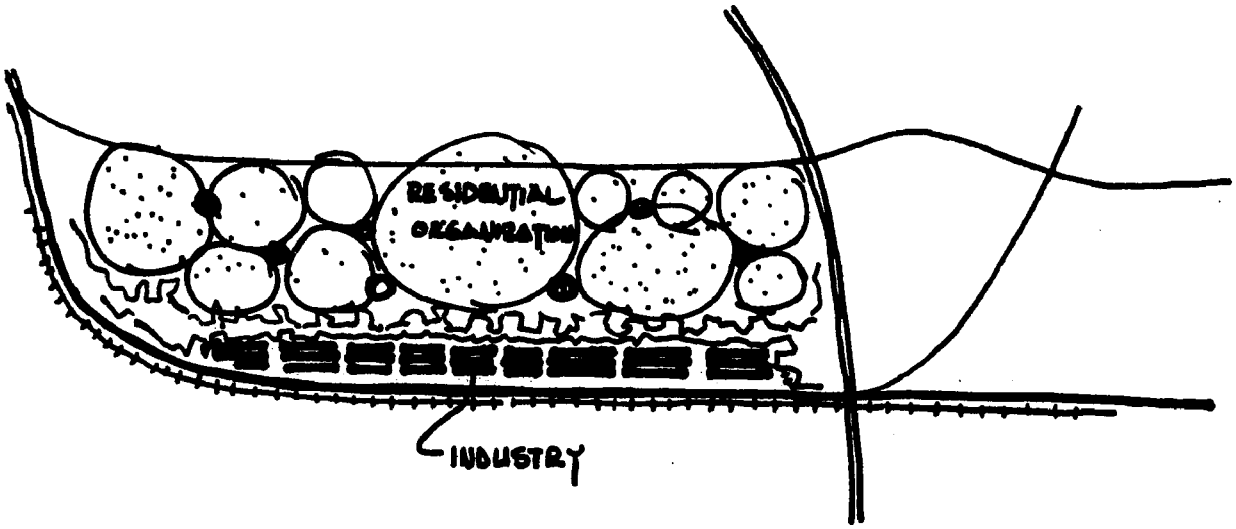


FIG. 4.8 ALTERNATIVE ONE-IMPLOSION.

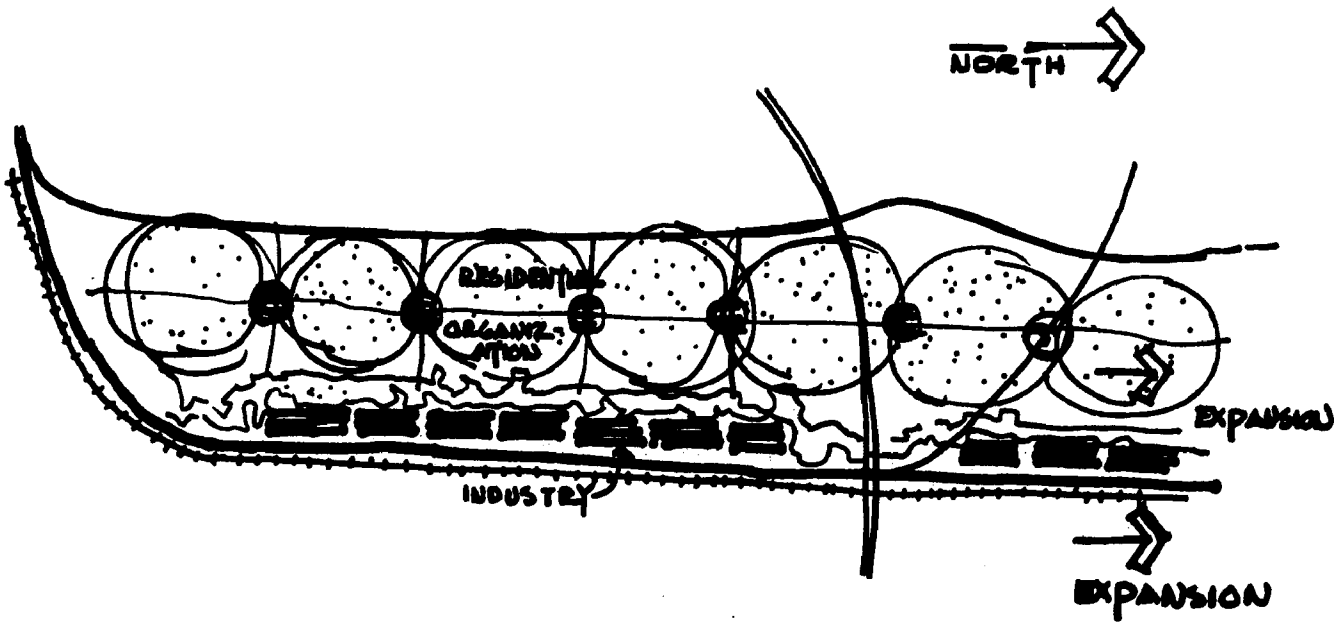


FIG. 4.9 ALTERNATIVE TWO-EXPANSION.

2. More desirable socio-economic aspects.
3. Easier work-home trips.
4. Reduces traffic to the metropolitan area.
5. Increases opportunities of jobs inside the sector.
6. Good relationship between residential area and industrial area.

Disadvantages: Minimum conversion of agricultural land to urban uses.

Alternative Three: Overflow

Advantages: (Fig. 4.10)

1. Same as alternative one.

Disadvantages:

1. Illogical solution for Cairo metropolitan area because it depends upon the ability of other Cairo sectors.
2. No new opportunities for jobs.

Alternative Four: Relocation (of industry)

Advantages: (Fig. 4.11)

1. Same advantages as alternative two.

Disadvantages:

1. Not in accordance with natural growth trends.
2. Bad accessibility to industry.
3. Bad growth possibility.

The Right Concept

Alternative two is recommedned as a right conception to solving the dilemmas of Shubra. Alternative one is another possible

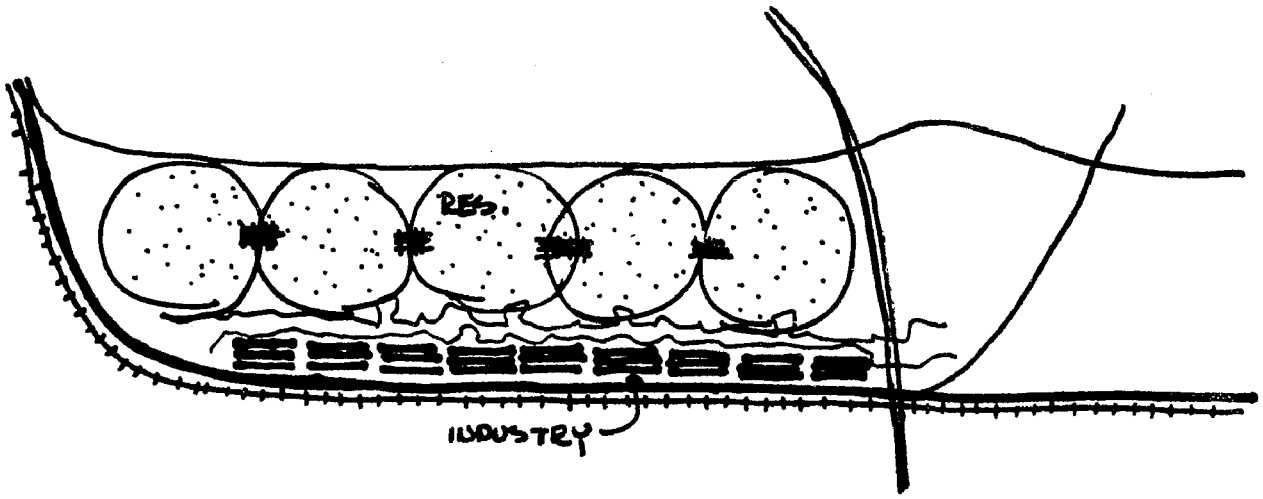


FIG. 4.10 ALTERNATIVE THREE-OVERFLOW.

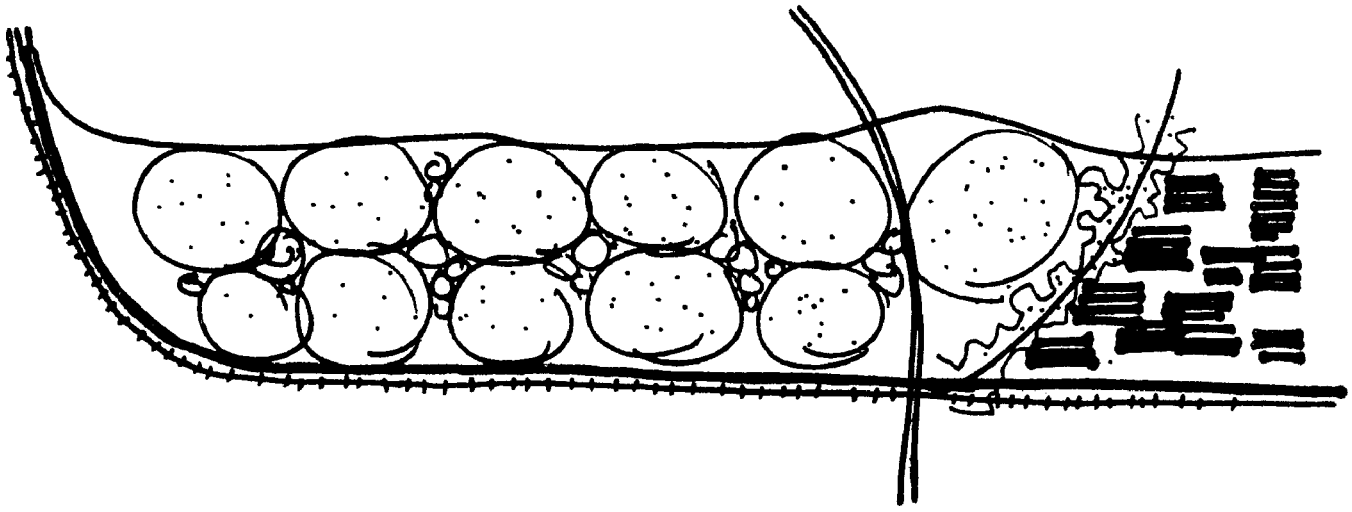


FIG. 4.11 ALTERNATIVE FOUR-RELOCATION OF INDUSTRY.

alternative, but it must be remembered that we are planning for the low income class. Alternative three is an unrealistic solution for this sector because we cannot depend upon the ability of other Cairo metropolitan sectors or other Egyptian urban centers to absorb any appreciable proportion of Shubra within existing housing capacities or existing land uses. Alternative four is a logical concept if it is decided there should not be future expansion after 45 or 50 years, but the continuous industrial development along the ring road will threaten to strangle the Cairo metropolitan area.

CONCLUSIONS

Implementation must follow the master plan for the sector. A long-range plan for the development of Shubra over the next 15 years must serve the anticipated population and economic growth.

It is essentiat that the residents of the sector understand the planning problems for Shubra. No matter how effective the legal and administrative procedures are which implement the plan, it will never be a success unless it is understood by and has the support of the public.

The master plan will require enormous funds that can be provided only over a long period, perhaps 15 years or more in duration. Since the needs of Shubra are already critical, one is encouraged to think in terms of staging the planning program so as to meet the more urgent demands. The following schedule of priorities is rpoposed only as a

starting point for deliberations on the subject, which remain open to both adjustment and improvement as may be dictated by more factual budgetary information than is available to this research.

1. The master plan for the sector must be implemented on a process of restoration by the appointment of a project coordinator for the master plan, and preparation and enactment of appropriate legislation to provide proper zoning, a building code, and positive design standards for the sector, i.e., to regulate the use of building, the amount of open space around them and, indirectly, the density of the population and distance between residential areas and industry.

2. Land acquisition in full for the entire master plan by the administration.

3. Evaluation of existing structures by a process of selective conservation.

4. Implementation of a program of preparatory indoctrination for the present inhabitants of Shubra.

5. Evolution and construction of both arterial by-passes around and access roads into the sector.

6. Planning and construction of adequate housing provisions as required.

7. Demolition of architectural liabilities in existing residential areas as new housing becomes ready for occupancy, and rehabilitation of architectural assets to remain.

8. Planning and construction of schoola as required.

9. Planning and construction of recreation buildings and provision of open spaces.

10. Planning and construction of religious and health service buildings.

11. Demolition of the existing commercial section and rehabilitation of architectural assets to remain.

12. Planning and construction of the civic center and sub-centers.

13. Relocation of small industries which lie inside the sector, and planning and construction of new industries on the east side of the sector.

It has been assumed through this research that the government must be not only the instigator of the master plan but also its manager and performer. Nevertheless, it could happen that private developers will become interested in executing certain portions of the program under either purchase, construction, or leasehold agreements with the municipality of Cairo, especially when the success of the master plan seems assured.

A compromise between the ideal solution and the existing possibilities has been reached. The constantly changing conditions of the Egyptian society has a great effect on the design of new projects. Life after ten years shall be no different from what is is now, so that one could not design the project for only the present social standards.

It is hoped that this study for the replanning of Shubra districts will be regarded as a small contribution to the progress of the well-being of society.

The various elements in the plan must be oriented according to the relationship of the district to the major urban complex. The residential neighborhoods must be grouped in the middle of the district with the commerical and business services in their hubs. Recreational facilities must be located at the periphery so that they can service neighboring communities. In the study of housing, a special consideration must be given to the human scale.

A feeling of belonging must be created in the communities through the study of solids and voids and the spaces between the different elements. The street pattern must be designed to avoid monotony and provide guiding landmarks for the inhabitants.

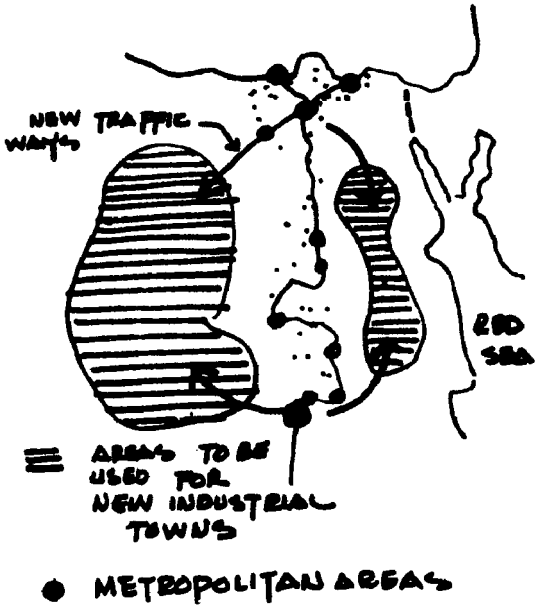
Today, Cairo is growing at a very rapid rate. The daily increase in the number of families is 70 families per day. The expected population figure in 1985 will be 14 million--almost three times as great as the present population figure of the Cairo metropolitan area.

Plans and recommendations must be formulated for future new industrial towns to receive a share of the population growth of Cairo.

A higher concept of planning should be promulgated that will help us to better realize to the fullest extent our human potential, and to seek and find for man a more keen and perfect relationship with his living organization and the place of his work.

As a conclusion to this study, it is essential that a theoretical design is provided fro a new industrial city in Egypt according to the proposed principles.

All industries would be redistributed outside the Cairo region. Since 96 percent of the Egyptian land is desert, new industrial towns should be built and/or reloacted in the desert. The agricultural land and the delta area should be totally cleared of industry.

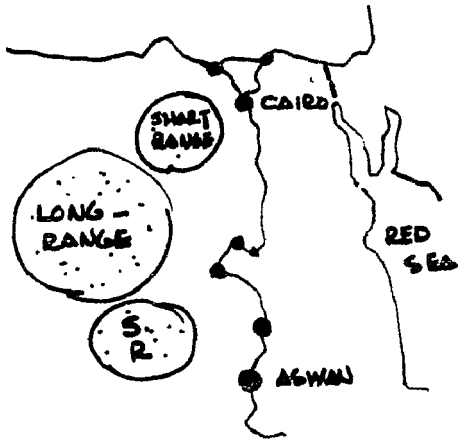


Industry should be located where it can attract the labor force to the oustide of the core of the metropolis, i.e., industry should be located near areas with potential labor forces to reduce the creation of the heavy population densities of Cairo's center, other centers and subcenters, and abolish the traffic chaos and congestion through the capital metropolis.

Industries and new industrial towns should locate according to the following phases:

Phase 1. Short-Range Planning

Proposed locations should be in the surrounding desert and not in the heart of the cultivated areas, yet within a desirable distance from existing labor force areas and the existing metropolis where it could be connected with the existing transportation system.



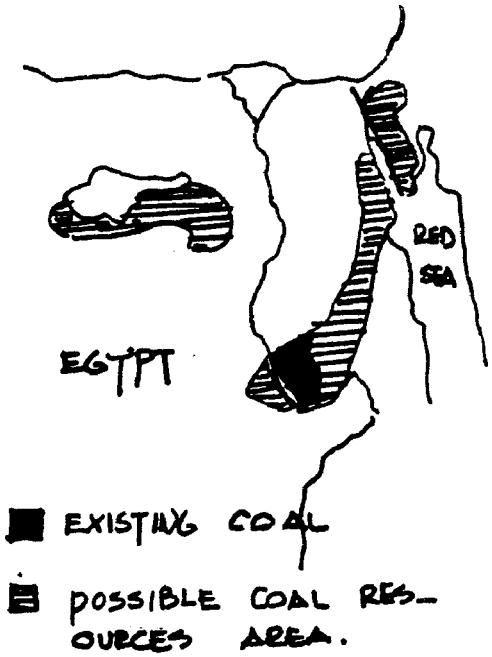
Phase 2. Long-Range Planning

Proposed locations should be distributed in the heart of the desert where energy sources and raw material are available, with new solutions for transportation problems.

Energy Factors

The main energy resource for Egyptian industry will influence industrial location.

1. Coal resources extend in a longitudinal strip from the Sinai Peninsula to Aswan, and in the southern parts of the Kattara depression.

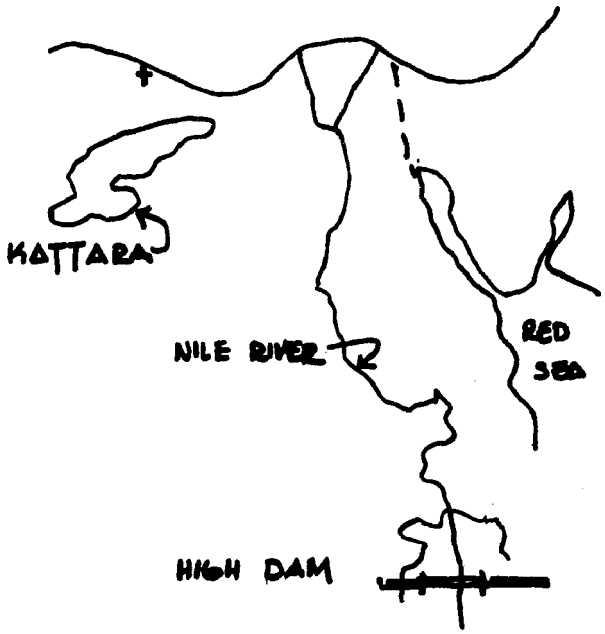


2. Petroleum (fossil fuel) resources are concentrated in the eastern desert and in Sinai. New explorations are being carried out in the western desert.



3. Hydropower resources in Egypt are concentrated along the Nile River and at a few stations along the Red Sea. The High Dam and Aswam Dam provide Egypt with more than 8,500,000,000 kWh. Also there are about ten proposed new hydropower stations along the Nile with 4,3000,000,000 kWh annually. The proposed Wadi El-Kattara hypropower station is expected to produce 2,340,000,000 kWh.

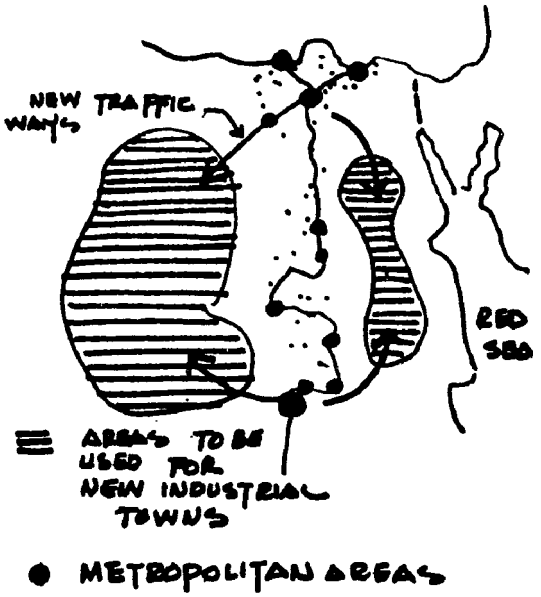
The lakes created by the High Dam and Kattara project will help in the establishment of salt industries and sand products.



4. An atomic power resource is located at an atomic research power station in Anchass near Cairo.

5. Other resources, such as wind, are still in the experimental stages in the eastern and western desert.

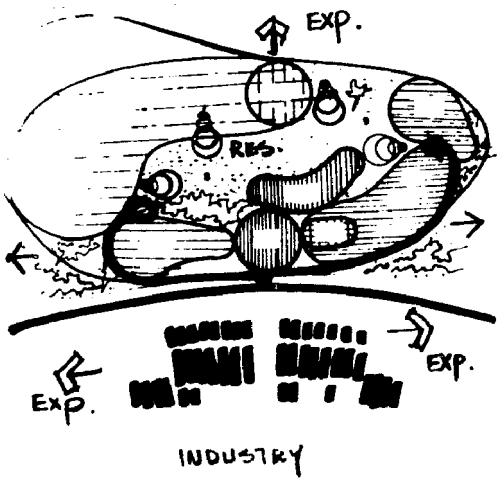
6. Solar energy can be used for direct heating and generating electricity. Solar energy seems to be the most desirable energy for Egypt inasmuch as it is free of pollution. It can also be obtained anywhere in Egypt.

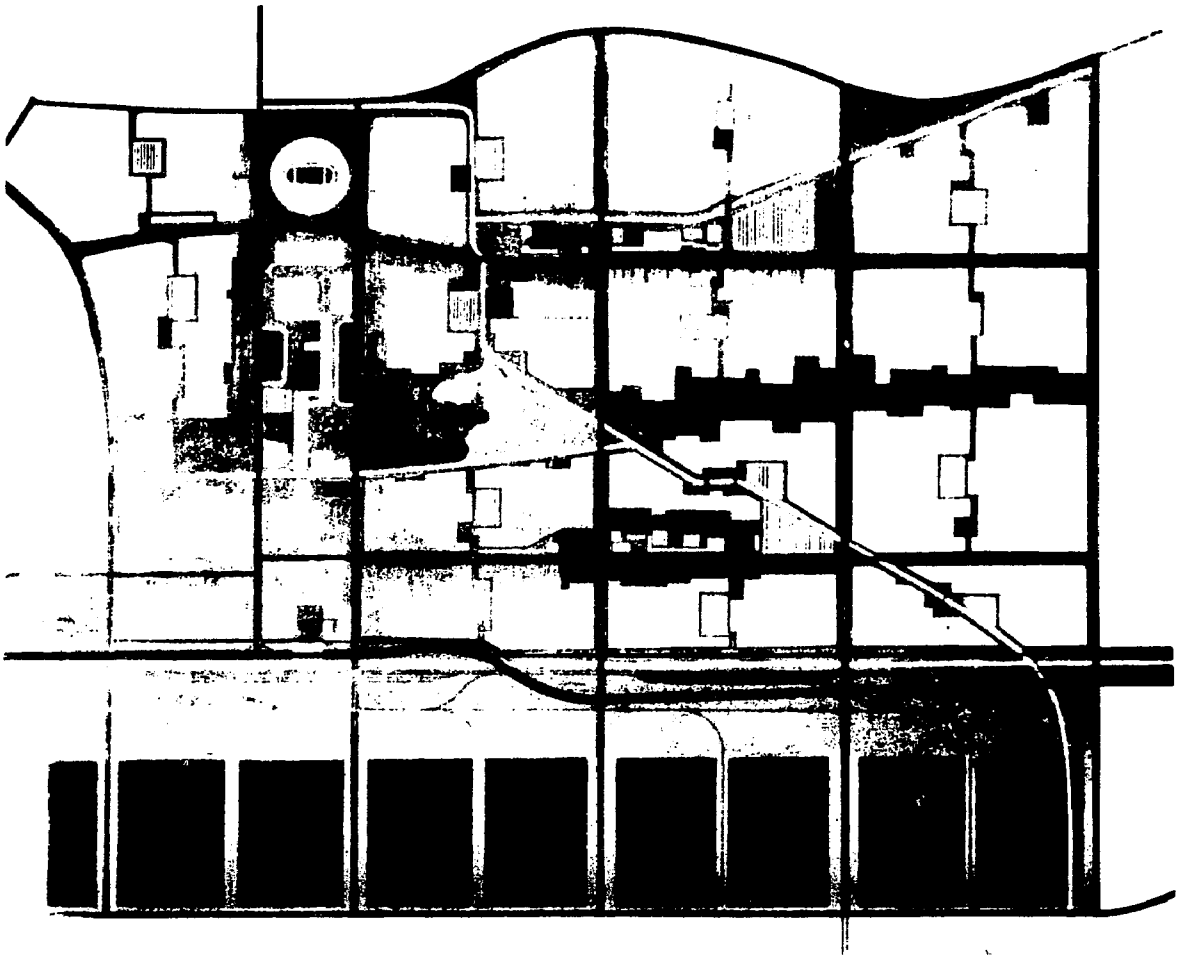


In accordance with the discussion of all of these factors, the drawing shows the proposed location for industrial towns.

The Theoretical Concept

Since the form of a city will be, at best, the studied expression of its varied functional organization, the industrial city should consist of two major components--industrial and residential areas. Industry should be located downwind from the residential areas, with a possible freedom of expansion from at least two sides. The drawing shows the location of industry in relation to the residential areas and the possiblities of industrial area expansion.



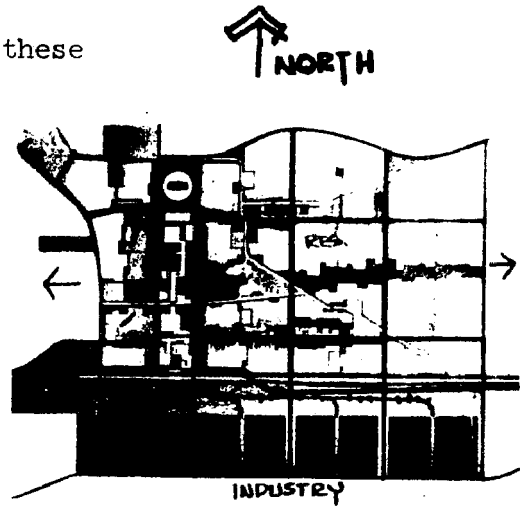


THE THEORETICAL CONCEPT.



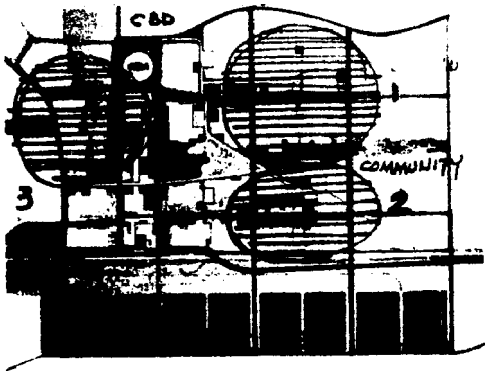
VIEW FROM PROPOSED DOWN-TOWN AREA.

The freeway and the railroad should be located between the industrial and the residential areas as man-made barriers with planted green belts parallel to them, which should be used as a buffer, screen, or windbreak. Suggested plant material for these purposes varies from one site to another according to the soil condition and their proposed function.

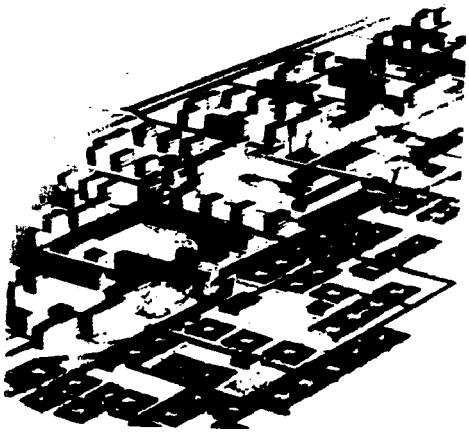


Industry should be zoned into four categories: (1) light; (2) mixed zone of light and medium industry; (3) medium; and (4) heavy industry. Light industry should be located across the man-made barrier (railroad and expressway) from the residential areas, followed by medium and heavy industry, according to recommended distances. Dust and smoke resistant plants should be used for the purpose of land-scaping, between the different categories of industry.

An economical population size for new industrial cities should be approximately 100,000 people per city. The residential area could consist of 3 to 4 communities, each of which should accommodate a total of 25,000 to 33,000 people. According to the standard with an adjustment to the population structure of Egyptian communities (estimated from the study of Shubra district), each community should contain from 6 to 7 neighborhoods. The neighborhood population should not exceed more than 6000 people.



THE CITY
(3 COMMUNITIES)

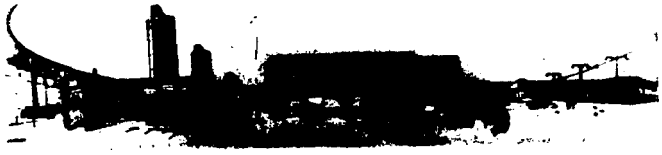


THE NEIGHBORHOOD

A general recreation area should extend through all communities with access to it from all community parks. A thoroughfare sidewalk should be furnished throughout this continuous open space.

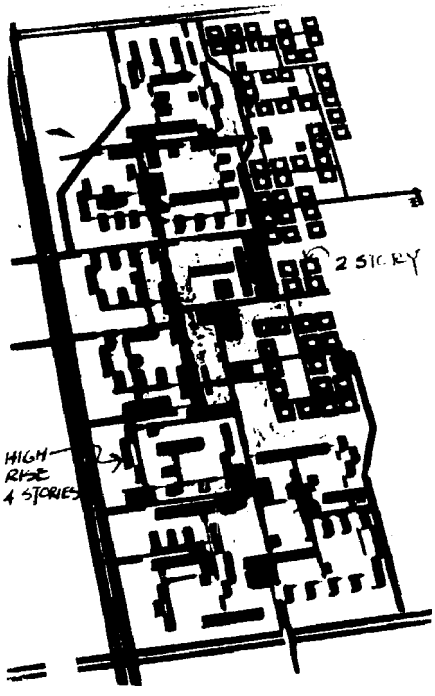
A civic center for the whole city should be provided within the center of the city at a convenient walking distance from each community. Subcenters for each community should be provided and each neighborhood should have its center for daily needs. A hierarchy through the design

of these centers should be clearly distinguished through the design of the whole city such as the use of high-rise apartments and towers around the city center to six-story apartment buildings around the community center and three to four stories around the neighborhood center or by the distribution of the density. Hierarchy throughout the space and the area should be used for each center.



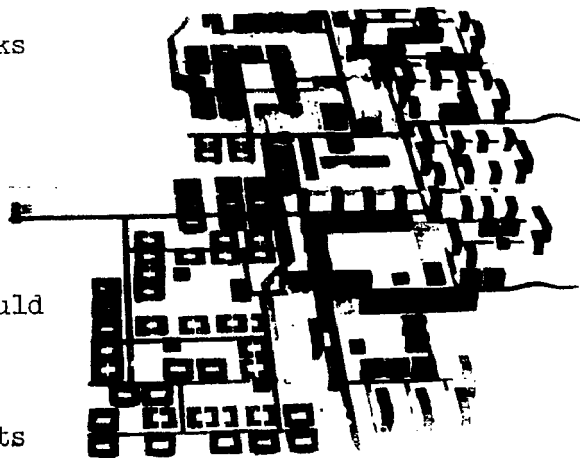
LANDMARKS SUCH AS TOWERS SHOULD BE USED AT CIVIC CENTERS.

The neighborhood design should follow the major plan in terms of the main thoroughfare plan of the vehicular and pedestrian movement to and from the general recreation areas, major center and subcenter. High-rise apartments should be located along community centers to allow an overview for other residential organizations. The ground floor of all apartment buildings should be left open to provide a view and to allow the circulation of air. The design should consider the climate by



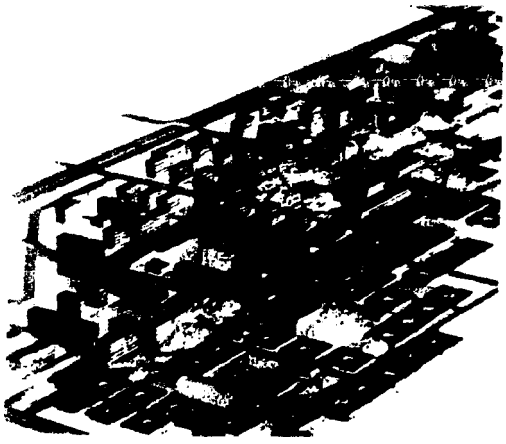
A TYPICAL NEIGHBORHOOD DESIGN.

the use of patios between buildings. Defined spaces should be created in the arrangement of the housing blocks to provide privacy and security for children's play areas, and it could help the orientation aspects. A nursery school and kindergarten should be located in these defined spaces.



DEFINED SPACES

Cultural and educational units with their recreation facilities should be located in the center of each neighborhood to serve as a focal point for the residences of the neighborhood. An adequate open space should be designed adjacent to the educational unit which should include all facilities such as an auditorium, religious buildings, parks and the neighborhood center. The neighborhood unit should be a vast park with the buildings "planted" in it.

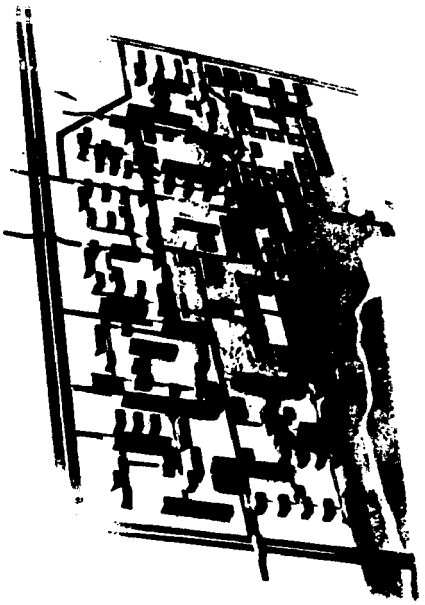


THE NEIGHBORHOOD CENTER

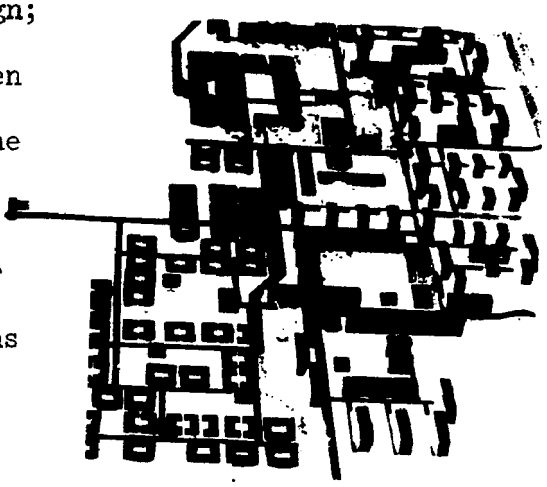


A VIEW FROM CIVIC CENTER TO THE NEIGHBORHOOD

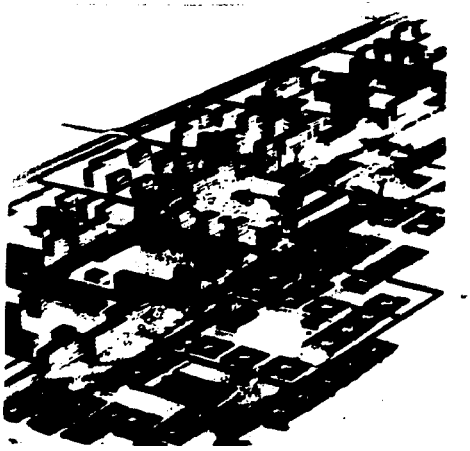
The visual magnetism of the neighborhood must be designed to provide creation of sequential forms such as the use of hierarchy through defined space from the large space which includes the elementary school and the neighborhood center to the smaller space which includes the nursery school. This arrangement will present the viewer with an aspect of richness and contrast, continuity and coherence, scaling, and dynamic balance throughout the design; creation of orientation to strengthen and clarify the viewer's image of the environment such as the use of the mosque minaret and church bell tower as landmarks to orient the directions through the neighborhood; and creation of meaning to deepen the viewer's grasp of the meaning of the environment.



THE PHYSICAL DESIGN OF THE NEIGHBORHOOD



The physical design should create order and liveliness in the city to satisfy its function and the needs of the people.



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