

URBAN DWELLING ENVIRONMENTS:

AHMEDABAD, INDIA

by

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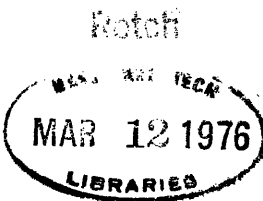
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URBAN DWELLING ENVIRONMENTS: AHMEDABAD, INDIA
Case Studies, Urbanization Alternative

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PREFACE

CONTENT: This research identifies and analyses different existing dwelling/land situations in Ahmedabad, India, on the basis of a survey, evaluations and comparison of eight dwelling systems in four localities.

The selected systems represent a range of residential development from very low to upper middle and high income in varying densities in popular, private or public sector.

Physical environment of each of these dwelling systems is described in terms of land utilization, layout, subdivision and provision of utilities and services. The dwelling systems are analysed at four levels: the locality of that system, a selected segment within the locality, a selected block of the segment and a typical dwelling unit through drawings, charts, graphs and photographs. Availability/provision and level of services for each dwelling system is presented in a comparative form.

A proposal has been prepared as an alternative model for an existing government project to emphasize the inefficient land utilization, and an attempt has been made to optimize the land utilization through efficient layouts from the inferences derived from the study/survey. It is expected to serve as an illustration of the guideline derived from the study of physical planning of the residential development.

PURPOSE: This study attempts to: a) identify and describe a representative cross section of existing dwelling environments in Ahmedabad city, illustrating their physical and socioeconomic condition; b) organize the different dwelling systems into a comparative framework to facilitate analysis/evalua-

tion; c) establish the relation between housing process and issues of land utilization; d) illustrate through the alternative, the importance of maximizing the utilization of land: a scarce resource.

APPLICATION: This study can be used as a reference source for the persons/agencies concerned with the development of residential areas in Ahmedabad. It discusses the fundamental problems and their root causes, each of which can be studied in greater depth for the formulations of a specific policy of growth and development of residential areas in Ahmedabad city.

DATA: This study is derived from the surveys carried out by the author in summer of 1973, and again in summer and fall of 1974. The information such as maps, charts and graphs have been collected from various sources, of which the major ones are studies by students at the School of Architecture in Ahmedabad, Town Planning Department of Ahmedabad Municipal Corporations, and mentioned bibliographic material.

The entire survey has been reconstructed by the author, due to lack of information from any single source, through maps, reports, studies, photographs and site visits, and hence the quality of information in locality and segment plans in some cases is approximate. However, the basic pattern, density and land use is a fair representation of the existing situation.

The dwellings/land situations have been analysed on the basis of a methodology developed in the Urban Settlement Design in Developing Countries Program, directed by Professor Horacio Caminos.

INTRODUCTION

Problems caused by urbanization in India are similar to those of many other developing countries of the world; the difference being in the urgency of the need to come up with a solution, owing to its enormous population of six hundred millions. 80% of the country's population is rural and derives its livelihood from agricultural sector. The remaining 20%, which is urbanized and is dependant on the industrial sector, constitutes a rapidly growing 120 million people. A large bulk of this population is concentrated in six major cities of India. The unbalanced urbanization has proved to be a big drain on the resources of these major urban centers. In the absence of definite state policies for balanced urbanization, large cities have grown larger attracting more capital and creating effective demand for social services of varying types which, in turn, have attracted more people. This process of expansion is accompanied by an increase in the cost of land, construction, transportation, and many other facilities and services that the community needs.

Migrants, sometimes 60 - 70% of the total population in large cities, enter the city at the lowest level of economic hierarchy. They do not contribute to the city's resources and cannot pay for the services, causing a general shortage and lowering of efficiency in all municipal services. This uncontrollable influx of rural population, not to the nearest town but to the biggest town, leads to a continuous deterioration of physical environment of the city and serious sociocultural consequences.

Increasing rate of migration, then, is the root cause of the shortage in the supply of dwellings and other urban facilities to urban population. In order to understand the nature of circumstances

that lead to such results, it becomes necessary to go deeper into the issues involved. Migration from rural areas to urban areas has its origins in the third decade of this century with the birth of the industries. Industries provided, through employment opportunities, an incentive to come to the city, in the hope of better future for many who wanted to get away from the semifeudalistic nature of the agrarian relations of that period. The process continued even after the independence, when the government refrained from fulfilling the promise (land for every tiller) it had made to the rural population, as it contradicted the interests of its financial supporters, the rural landlords. To cope up with the phenomenal growth in population in the late 1950s and early 1960s, the Government of India proposed and implemented an Intensive Area Development Program in an effort to increase the food production with heavy use of fertilizers, insecticides, and irrigation, in many parts of the country. With the already growing differences of consumption among the rural population, this marked the beginning of class polarization. The "Green Revolution" introduced in the middle sixties, accelerated this process forcing many small farmers to sell their land through competition, due to their inaccessibility to capital or credit for investment in the high yielding variety of crops and its supplementary requirements of fertilizers and irrigation facilities. Many other farmers sold their lands because of the sudden increase in its value. This phenomenon, in a very short period, created a large group of rural unemployed who could not sustain themselves in rural areas and hence migrated to the urban areas in the hope of employment or self-employment. In Punjab, where the production yield was recorded to be the highest in the world and which was contributing heavily to the

food requirements of the other states, the level of people living below the poverty line quadrupled between 1960-61 and 1967-68.¹

In the same year, on the national scale, 40% of the rural population and 50% of the urban population was below the minimum level of survival of 2250 calories per capita per day.² The immediate requirement of the nation, therefore, is adequate supply of food to reach all levels of income in urban and rural areas, and it is going to remain as the first priority for many years to come, as the population is expected to increase at the rate of 2.2% per annum, from the present 600 millions to 1 billion by the year 2000 AD and the economic growth remaining at 3.3% per annum.³

Housing investment, on the national scale, has a very low priority in the public sector investments. Among those having the higher priorities are agriculture, irrigation, power, transport and primary and secondary industrial sectors like steel, fertilizers, cement, oil, etc. On the family scale, housing is second only to food, and hence, squatting for years has become an economic alternative to housing market for the migrants. A squatter pays for his house either in terms of time for traveling to the employment center (if he finds employment), or labor of building a shanty from waste materials himself, or a risk of being evacuated from the land that he squats in. Security of a shelter becomes crucial for a migrant family in the face of unemployment, leaving them no other choice but to squat.

Statistically, in order to meet the present national housing shortage of 10.3 million units in the urban areas and 25.7 million units in the rural areas in the next five years, assuming a 20m² dwelling at U.S. \$25/m² cost, the government would require U.S. \$8 billion instead of the present U.S. \$0.7 billion.⁴ By the end of 1976, in the urban areas, 12 million dwelling units would be required to meet the shortage as against the supply of 0.2 million

units. Of these public efforts, dwelling units to which the lower income groups have a better access, will only be 28,000.⁵

These figures clearly indicate the hopelessness of the situation in housing in urban areas. Besides, the government's inability to provide for the required demand, the population with the capacity to pay for a house over a period of 20 years is also very limited as is evident from the following table.

T.1 ECONOMIC CAPACITIES OF DIFFERENT SECTIONS OF THE POPULATION TO PAY FOR A DWELLING UNIT ⁶

Section of Population	Capacity to pay for a dwelling unit over 20 year period
Lower 0-5%	U.S.\$ 92
5-10	158
10-20	273
20-30	386
30-40	515
40-50	607
50-60	855
60-70	1092
70-80	1447
80-90	2037
90-95	2958
95-100	5602 to 37500
Average of all sections	U.S.\$1110

It is quite clear from this that one cannot think of providing a complete dwelling unit for every household, since for 50% of the population a dwelling unit cannot cost more than U.S. \$600.

Ahmedabad, one of the six major cities of India, is about to reach a stage when it will not only be dif-

difficult but almost impossible to deal with the deteriorating dwelling environment, with its population close to 2 millions in 1976 and approximately 60% of

it occupying dwellings classified as substandard. The possibility of providing adequate living facility for everyone is far from being realized in the coming decade. In order to meet the housing demand by 1981 the city needs to build 21000 dwelling units per year instead of the present 5000 units per year.⁷

Assuming no major changes in the priority status of housing in the city and state budget, it becomes necessary to find methods of maximizing the utilization of available resources such as land and capital. The economic, cultural and social diversity of the population of Ahmedabad creates diversified needs with respect to the definition of adequate dwelling facilities. These needs are a function of the economic, cultural and social background of its inhabitants. To recognize/determine them for these different factions and make necessary changes/allowances in the pattern of distribution of resources is, obviously, the prime concern of the state government and the housing authorities. A comparative study of the entire range of the existing dwelling/land situations of various dwelling systems in Ahmedabad is seen as a contributing factor to understand the needs of each faction in relation to the other, and to serve as a basis in the formulation of future policies for residential development in the city.

It should be very clearly understood that the attempt of this study is to bring to the surface the issues involved in different options for different income groups. This should not be seen as a solution; for solution to the problems of urban India lies in the rural India and the efforts should begin there.

AHMEDABAD, INDIA

URBAN CONTEXT

1. PRIMARY INFORMATION: Ahmedabad, the largest city of Gujarat State, is situated about 350 miles North of Bombay, in Western India. Located at latitude 23°04' North, longitude 72°38' East, it is at an altitude of 52m above the sea level. There are no physical features defining its boundary, but Gandhinagar, the state capital, is in the North and few small towns and villages in the Eastern, Southern and Western periphery. The city is characterized by its hot dry climate. Summer temperatures go as high as 44°C, with hot winds resulting in occasional sandstorms. The four winter months are mild, with temperature not below 6°C and the Monsoon of the same duration brings an annual rainfall of 823mm. There is no snow in Ahmedabad. River Sabarmati running North-South through the city remains dry except for Monsoon months.

2. HISTORY: The origins of the present city date back to early 15th century, when there existed only a few fillages scattered around the Sabarmati river, which have long since been engulfed as a part of the Ahmedabad Metropolitan Area. These villages still maintain their original character and very little change is seen in the pattern of life of its inhabitants even today.

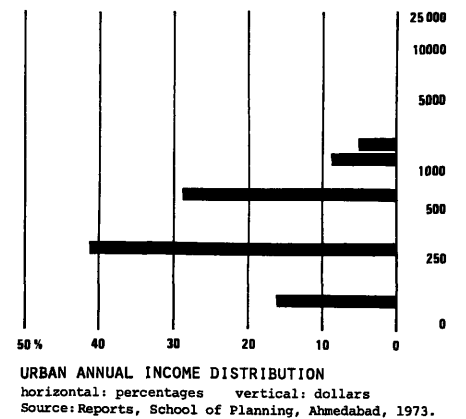
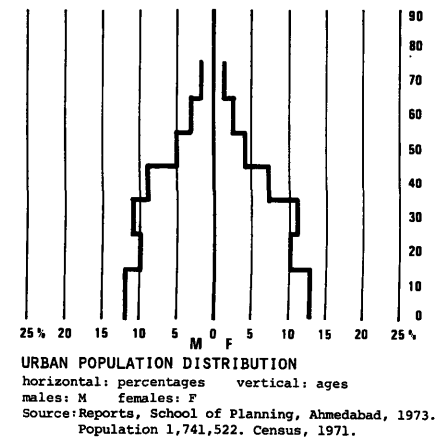
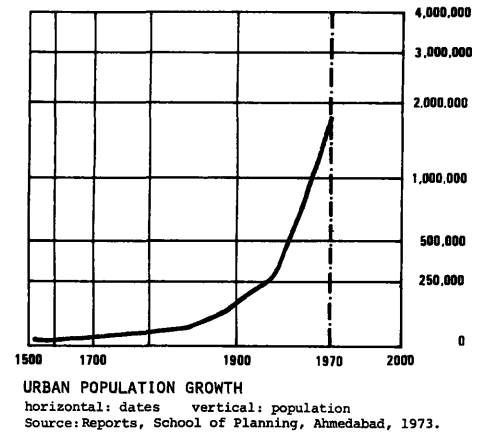
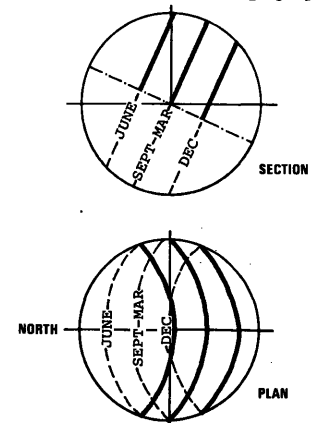
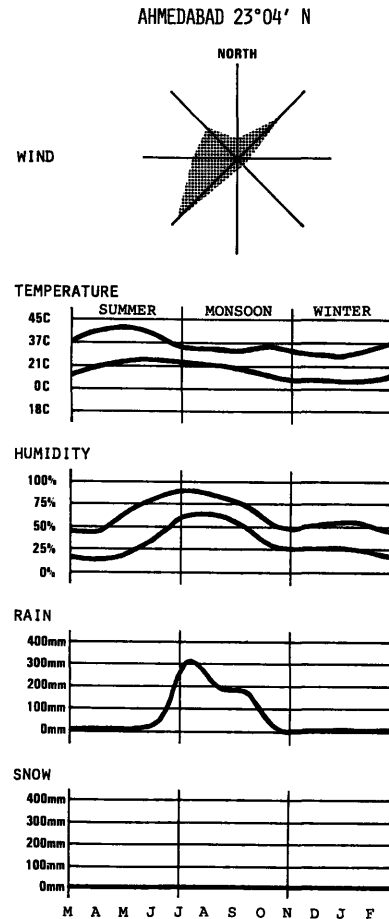
King Ahmedshah founded the city in the year 1411 AD. The royal palace, the fort wall demarcating the boundaries of the city, the main street connecting the palace to the main gate of the fort wall and, a mosque located on that street, were among the first structures of the city. The remaining area was then allotted to the courtiers and important community leaders to form their own clusters of dwelling units called "pols". The city's development, from its establishment to its peak, when it had 17 central squares, 80 bazaar streets and 370 residential zones, is spanned over a period of 350

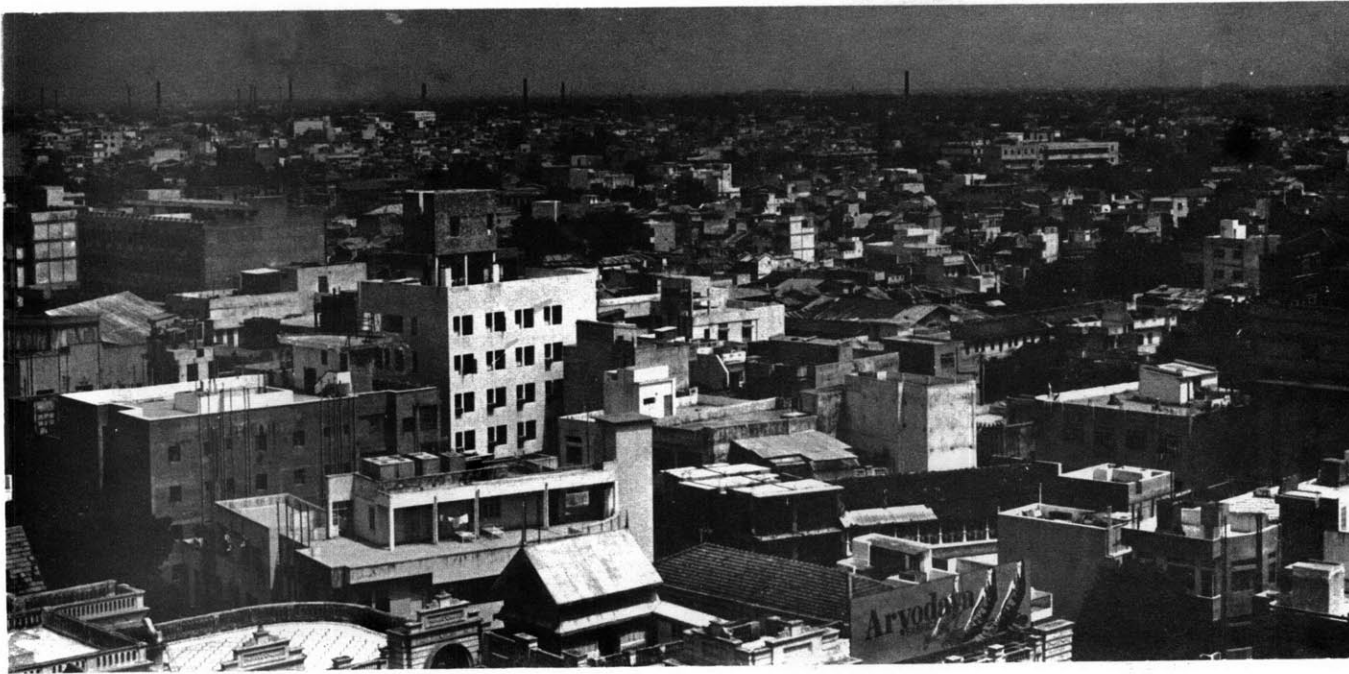
years. From the mid eighteenth to the early twentieth century, the ruling power of the city passed hands from the Mughals to the Marathas to the Britishers under the Bombay State.

The introduction of the textile industry in the early 1930s resulted into a 90% increase in the population of the city during that decade, due to the employment opportunity. The industrial development and consequential growth of commercial areas in the city created a necessity for a major street parallel to the existing one. Land acquisition and growing congestion within the fort wall caused a shift in the residential development. Construction of detached houses was noticed on the West of the river Sabarmati.

The growth of industries, and the subsequent increase in rate of migration, became the cause and beginning of the squatter settlements. The period between 1930 and 1960 was characterized by the growth of these settlements and "chawls", a privately developed settlement of rows of rooms with no access to any utilities on the one hand and, a movement to the suburbia by the high income population on the other. Construction of Nehru Bridge on the river, in the late 1950s, provided better access to the suburb and an already dense commercial area overflowed on to the other side of the river.

Birth of Gujarat as a separate state and Ahmedabad as its temporary capital was the event most responsible for its present growth. Transfers and other increases in the bureaucratic machinery brought about an urgent demand of housing for its employees, which resulted in the construction of many government housing schemes for all income levels scattered all over the western part of the city. Promotion to the small scale and other





industries, in order to attract the capital, created three large industrial estates namely Naroda, Odhav and Vatwa, in the Northeast, East and Southeast of the city respectively. More employment opportunities resulted in higher rate of migration and emergence of more squatter settlements which keep growing even today.

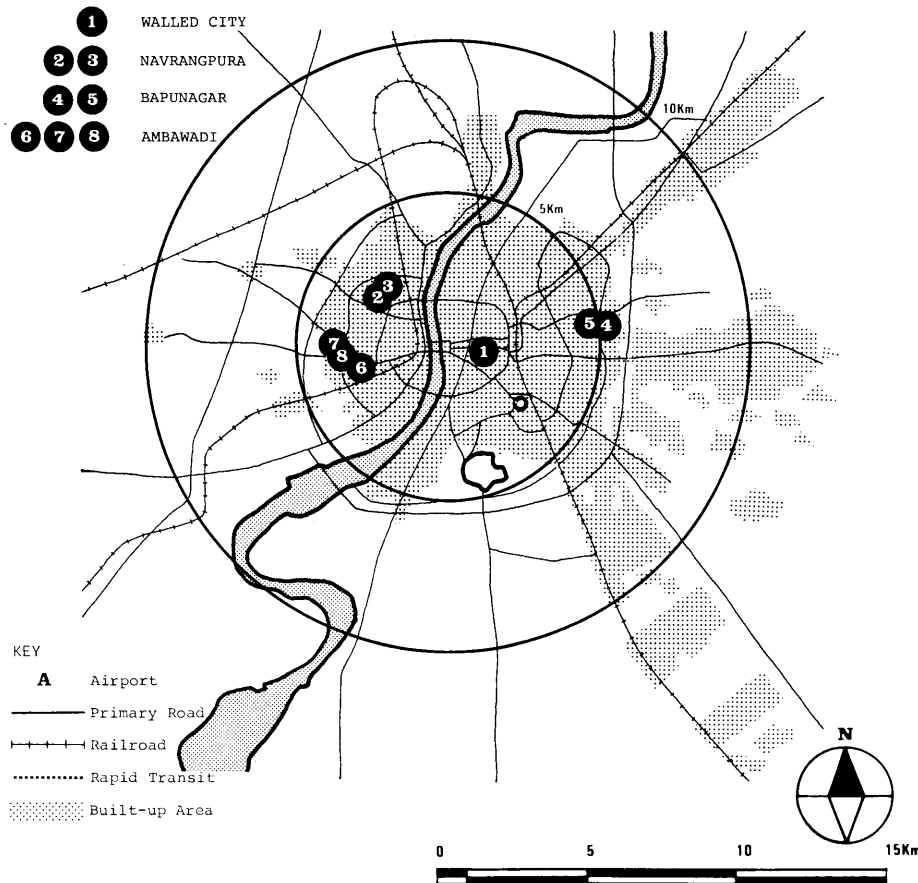
3. ECONOMY: Textile industry since 1930 and others such as plastics, pharmaceutical and many small scale industries, are the economic backbone of the city. In 1971, 28% of the total population was economically active, out of which female population was only 3%. A large section of the working population, about 50%, were employed by manufacturing industries; about 15%, by trade and commerce; and 6%, by transport and communications. Population employed in building construction constituted only 3% of the total labor force. Part of the non-working population is self employed in various forms, such as vendors, hand-cart pullers, etc.

4. GOVERNMENT: Ahmedabad had been the capital of the Gujarat State, the government of which is elected by the people in a system of parliamentary democracy, for 10 years before it was shifted to Gandhinagar. The affairs of the city are administered by the Ahmedabad Municipal Corporation. The Municipal corporates, headed by the mayor, are elected by the people of the city and are responsible for provision of services, issuing building license and inspection. Authorization of land subdivisions are made by the town development office.

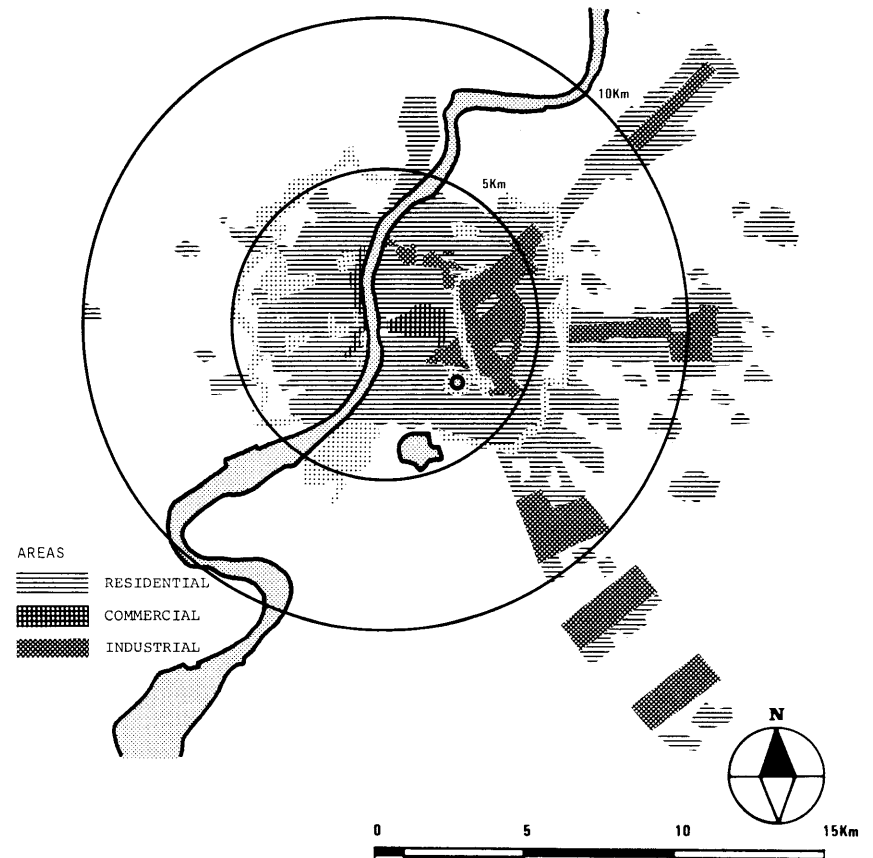
5. DEMOGRAPHY: The population of Ahmedabad Metropolitan Area in 1971 was 1,741,522 with an increase of 44.40% in the last decade. The present population is estimated to be closer to 2,000,000. Approximately 50% of the city's population was borne outside the city and belongs mostly to the lowest level on the income scale. Population within the working age between 16-60 years, constitutes 58% of the total. Of the rest, 3% are dependents over the age of 60, and 39% are children below 15 years of age.

6. SOCIOCULTURAL: Diversity of ethnic origins and groups is a characteristic of the city, and is evident from the difference in





URBAN TOPOGRAPHY/CIRCULATION 1:250000



URBAN LAND USE PATTERN 1:250000

living pattern, social customs, festivals, jewelry, etc. Each of these groups has its own hierarchy of defined social strata, and quite often higher economic mobility mean nothing to them, particularly among the strong caste based groups. Expression of this difference in ways of life is found in their dwelling environments through uses of areas and spaces of varying characters such as verandah, front yard, back yard, chowk (a centrally located open area where rooms/dwellings lead to a house/cluster). Groups arising out of common skills such as carpentry, masonry, etc., are concentrated in some areas of the city. As a result of this, most of the communities of the city are cohesive

and benefit from mutual dependency, in an effort to reduce their economic burden.

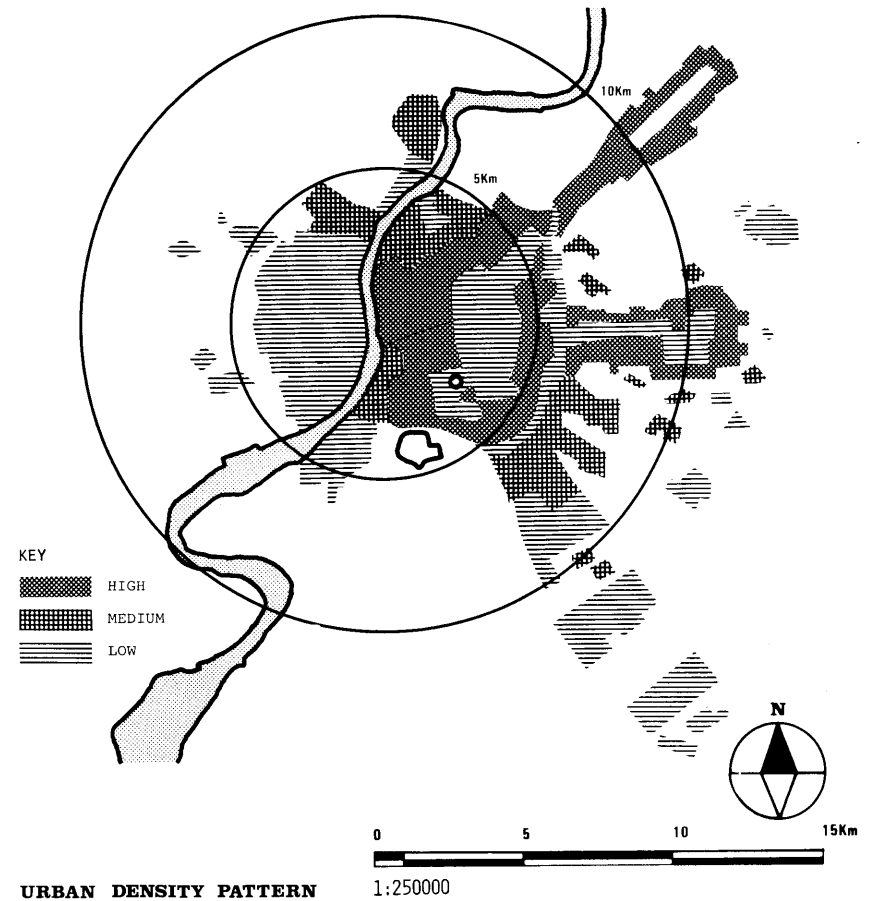
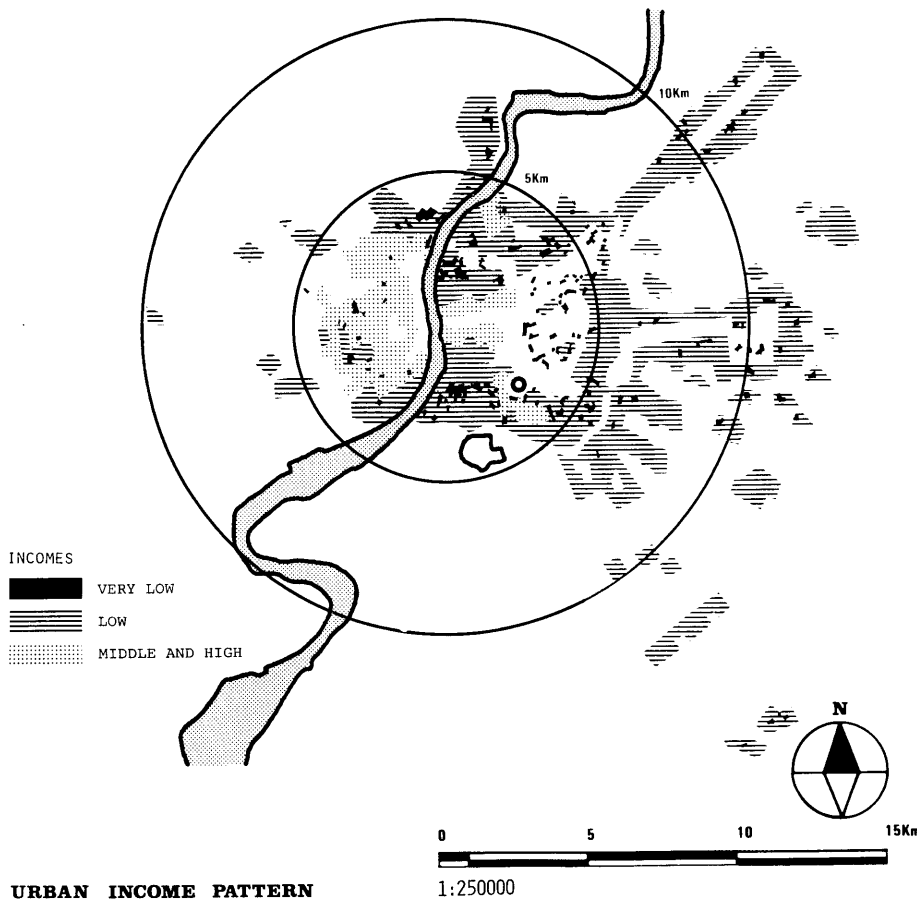
7. SOCIOECONOMIC: The very low and low income sector, which constitute about 60% of the city's population, are concentrated in the eastern part of the city where the industries are located, with some in scattered pockets of squatter settlements in the western part also. Of the total population of the city, only 5% earn more than U.S. \$1,900 per annum, whereas people earning between U.S. \$1,125 and \$1,900 are 9%; average annual income of 29% of the population is U.S. \$ 570, and the rest of the population earns less than that. With city's labor

force constituting only 28% of the total population, as compared to 41% of Gujarat State, much of the lower income population is self-employed. The western part of the river has a residential development for middle, upper-middle and high income people.

8. HOUSING: A large part of the very low and low income population of the city live in dwellings classified as substandard or unfit for human habitation. Almost half of these are self-built dwelling units in squatter settlements and the other half are chawls, with none or very limited provision of basic utilities. The state's allocation of financial investment in housing sector is very

limited and result in a poor supply of dwelling units. Approximately 5000 dwelling units are provided every year as against an estimated requirement of 21,000. This ever growing gap between the supply and the demand in housing sector increases either the density of the squatter settlements or their number in the city.

Apart from the limitation on the available resources, its utilization leaves much to be desired. Most of the public housing projects have very poor layout efficiency which increases the cost of development. Excessive circulation areas, unattended service alleys and undeveloped or poorly maintained public/semi-



public areas are common characteristics of such projects.

Government programmes consist mainly of completed dwelling units for very low, low and middle income groups with row houses or walk-ups as options. The basic unit cost, often, is not within the economic capacity of the intended user due to its completely developed state and are allotted as rentals rather than ownership tenure.

The shortage of housing affects both, the low and the middle income population but the latter with greater accessibility to the financial institutions are observed to be occupying

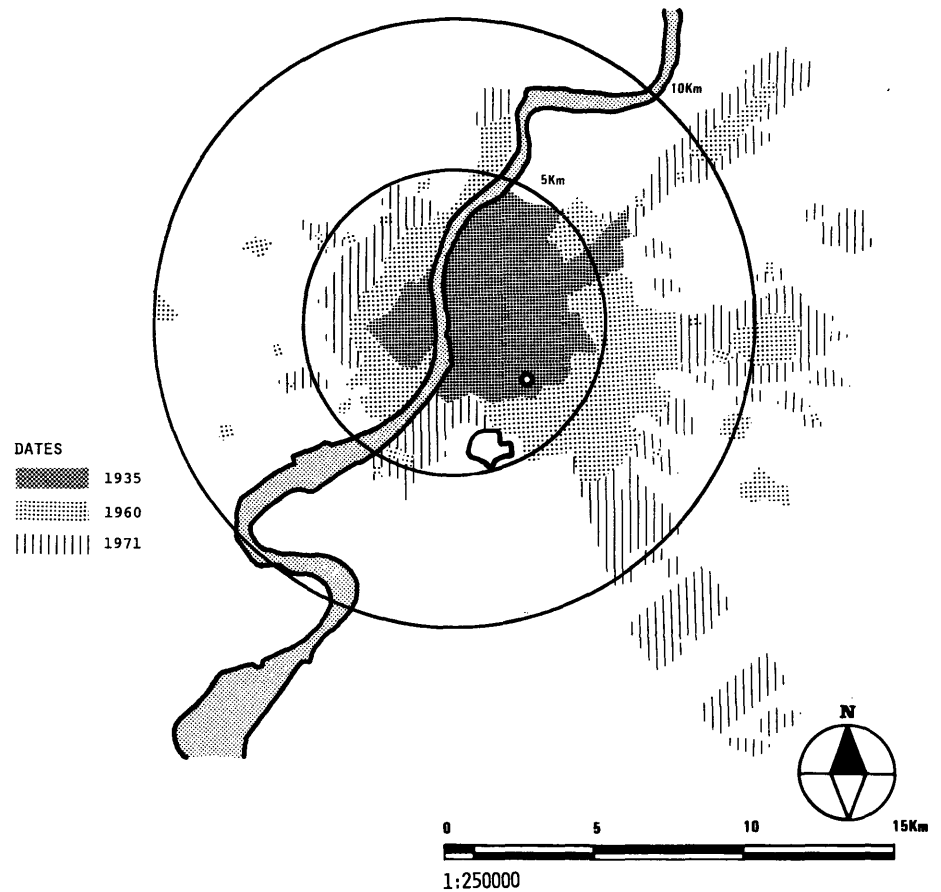
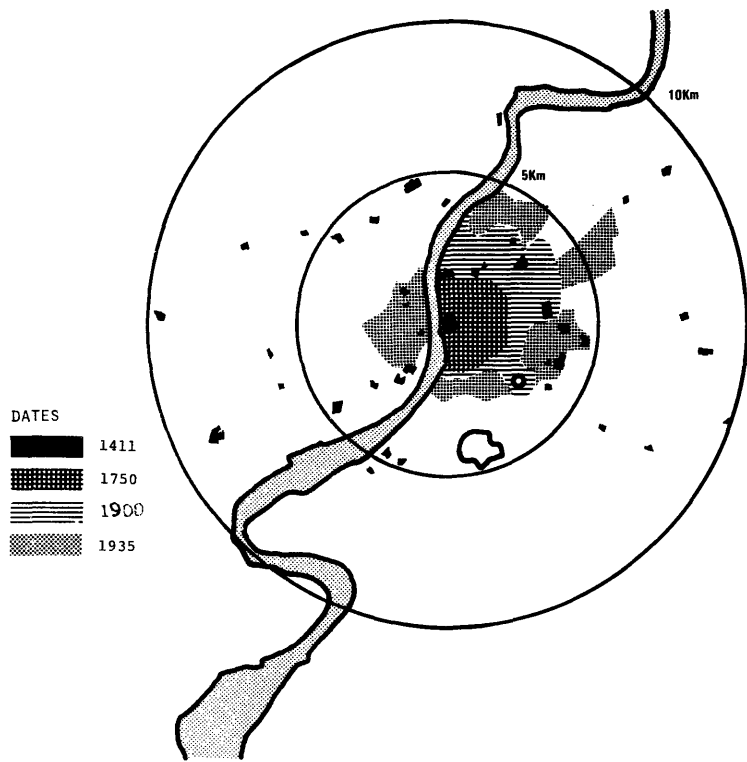
dwelling units intended for the former. Complexity of the multiple family system makes it easy for the middle income group to qualify as the low income group by claiming to have only one earning member per household and thus the public efforts in providing housing for the low income people fail to reach that population.

9. URBAN GROWTH: Ordinances and other controlling measures of urban growth have been in existence for a long time but have not been successfully implemented or enforced and as a result, the city's growth has been of a varied nature with mixed land use and mixed income residential development.

The chawls which sprung up as a necessary supplement to the industrial development represent the most dense type of development in the form of pockets within the industrial area. As a result of increasing pressure in the city centre, the high income group moved out into the suburbs across the river in 1930s and 1940s. Building bye-laws intended as a preventive measure against high density residential development with the help of set-back regulations, have created low density areas where provision of utilities and services has become a financial burden to the municipality. Squatter settlements, which also began in 1940s have been scattered all over the city depending on the employment opportunities for

men in the industries and for women in the middle class households.

Town planning schemes, introduced basically to have effective control over the infrastructure layout, have not proved to be very successful. Under these schemes city's undeveloped land was divided into smaller areas and a circulation network for it was planned on the basis of the lot characteristics, projected development plans and the existing infrastructure network. This effort is not adequately supported by effective controls at the scale of the cluster and the circulation area is often found to be improperly linked and in access of its need.



URBAN GROWTH PATTERN

As a measure to curtail the growth of the city a green belt was proposed on the municipal limits and no construction was permitted within a specific area. This did not prove to be an effective solution because of land speculation in the inner ring areas which pushed the developments beyond the municipal limits. As a result the city has underutilized services on the one hand and a demand for new extensions on the other.

In 1961, 36% of the land within the city boundaries was under residential use, 2% under commercial use and 13% under industrial use. The rest constituted circulation areas, parks, playgrounds and undeveloped land. In the same

year the city had a gross density of 125 persons per hectare, developed area density of 250 persons per hectare and residential area density of 740 persons per hectare. Developed area for 1000 persons was 1 hectare.

Proposals for future growth have been prepared by public and private agencies and are under consideration of the Ahmedabad Municipal Corporation, however no action has yet been taken for their implementation.

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Case Studies

The following section contains case studies describing selected dwelling environments within the Ahmedabad Metropolitan Area. The 8 case studies are representative of all the major dwelling systems of the city. They cover the existing range of income groups and densities. Case studies are represented at four scales:

LOCALITY: A locality is defined as a relatively self-contained area in Ahmedabad. In general, it is contained within physical boundaries.

LOCALITY SEGMENT: All the localities differ in size and therefore an area of 400 x 400 meters is taken from each locality for the purpose of comparison.

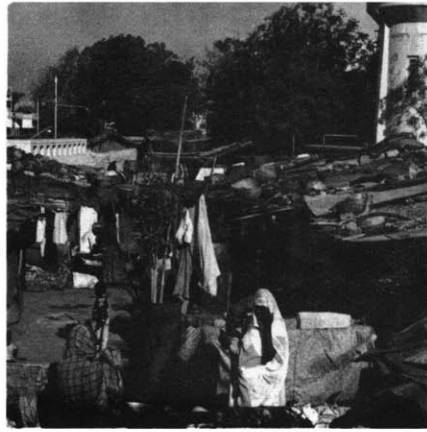
LOCALITY BLOCK: Within each locality segment, a typical residential block has been selected to allow comparison of land utilization (patterns, percentages and densities).

DWELLING UNIT: It is a typical self-contained unit for an individual, a family or a group within the locality segment.

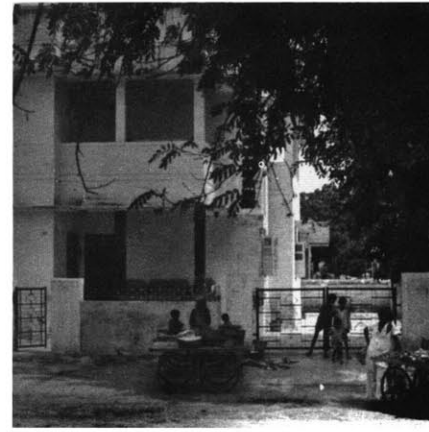
1. WALLED CITY
Private, Middle income, Traditional.
2. NAVRANGPURA (LAKHUDI)
Popular, Very low income, Squatters.
3. NAVRANGPURA (CO-OPERATIVE SOCIETY)
Private, High income, Houses.
4. BAPUNAGAR (ROW-HOUSES)
Public, Low income, Houses.
5. BAPUNAGAR (APARTMENTS)
Public, Low income, Apartments.
6. AMBAWADI (HARIJANWAS)
Public, Low income, Room.
7. AMBAWADI ('L'COLONY)
Public. Middle income, Houses.
8. AMBAWADI (NEHRUNAGAR)
Public, Middle income, Apartments.



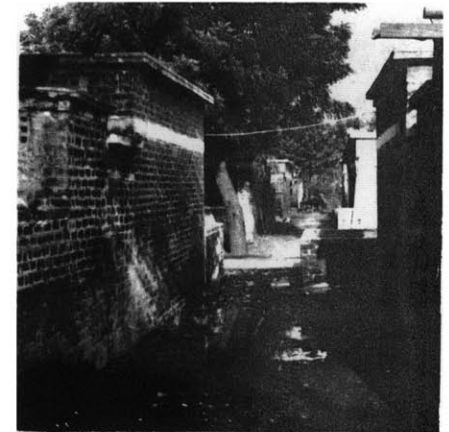
1. WALLED CITY



2. NAVRANGPURA (LAKHUDI)



3. NAVRANGPURA (CO-OP. SOCIETY)



4. BAPUNAGAR (ROW-HOUSES)

5. BAPUNAGAR (APARTMENTS)



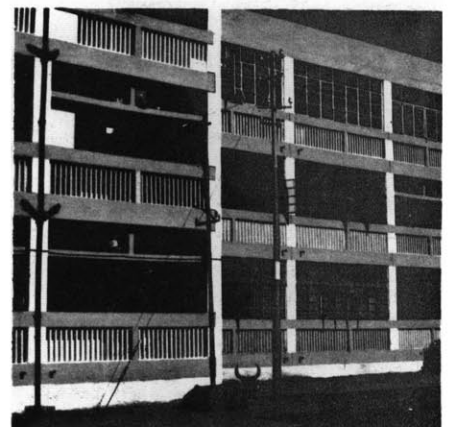
6. AMBAWADI (HARIJANNAS)



7. AMBAWADI ('L' COLONY)

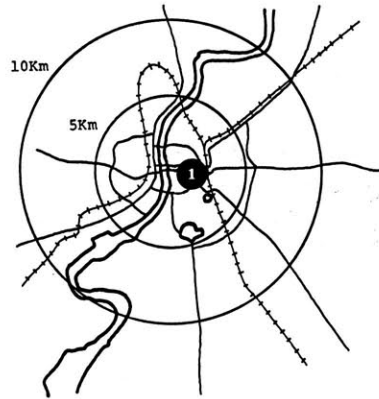


8. AMBAWADI (NEHRUNAGAR)



1 WALLED CITY, Ahmedabad

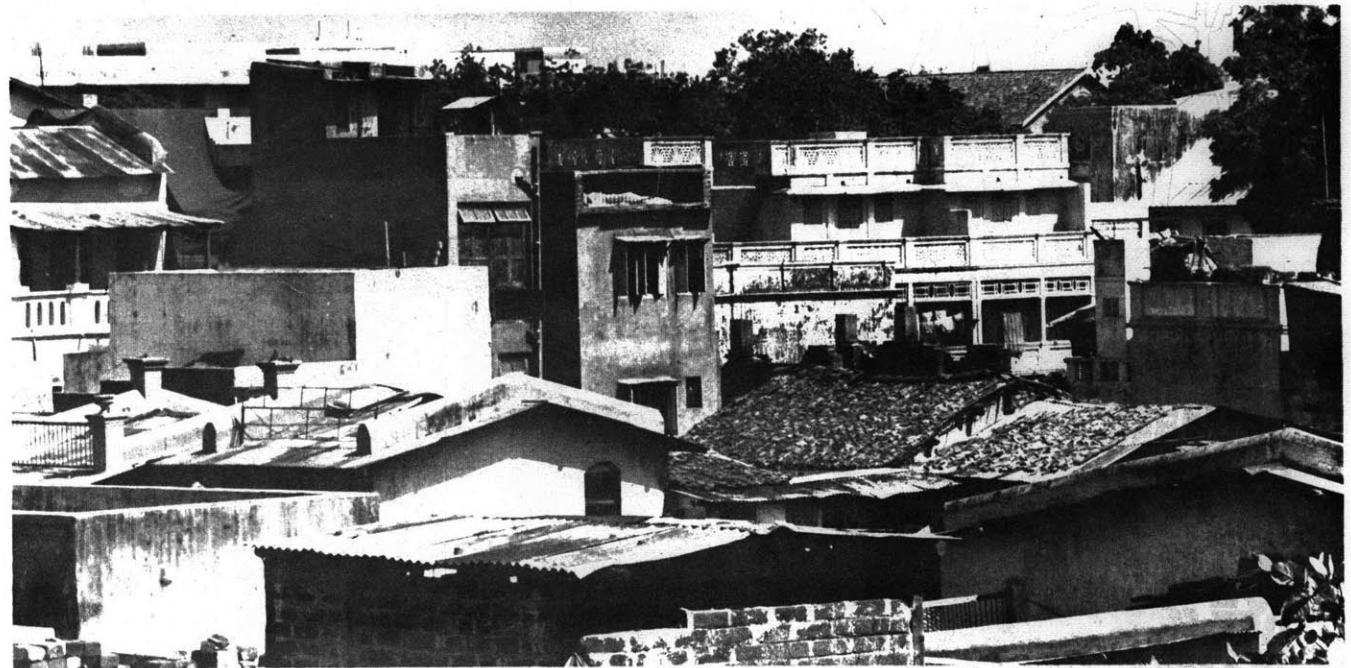
PRIVATE, MIDDLE INCOME, TRADITIONAL



LOCATION: This area, located on the east bank of the river Sabarmati, is the city centre and is bounded by a fort wall built during the seventeenth and the eighteenth century with eighteen gates on its periphery leading to various major transport routes of that period. It spreads over approximately 5 sq. km. of land. The chosen locality, bounded on the one side by the fort wall and a major road and, on the other by an extremely busy commercial street, covers an area of 160 hectares in the old city. Major railway line runs on the east of the locality connecting the city to Bombay on the South and New Delhi on the North for passenger and goods traffic. There are no open recreational areas in this locality, the city bus terminus borders it on the west fringe, a major hospital is located across the river and the university is at a distance of approximately 5 km.

ORIGINS: The origin of this locality dates back to 1411 A.D. when the city of Ahmedabad was established. The major road bordering the locality on the north was the connecting link between the King's palace located on the west and the main gate of the fort on the east. It was also the main commercial area of the city with a centrally located mosque in it.

WALLED CITY, Ahmedabad: (top) A view from the terrace.
(bottom left) Rush hour traffic in the city centre.
(bottom right) Main commercial area. (1974)





The residential areas which branch off from the main street were almost fully developed by the end of eighteenth century. The overcongestion of the main commercial street created a necessity for a parallel street appropriately called 'Relief road' in 1940's and the residents moved out of the fort wall to the west side of the river. Originally the areas within the fort wall were allotted to the King's courtiers and 'Pols' were allowed to be developed to provide residential accommodation to their respective armies, relatives etc. As a result of many political changes over a period of years these groups began to disintegrate and were replaced by castes and other ethnic origin oriented communities. In the last two decades the upwardly mobile middle and high income groups have moved out looking for better hygienic conditions, low noise level, more privacy and open area and streets that permit vehicular traffic. They are being replaced by lower middle and low income groups looking for central location at the expense of standard hygienic conditions on a rental basis.

LAYOUT: The entire residential area enclosed by the fort wall has grown organically over a period of 2-3 centuries. The original groups have disappeared and are replaced by the ones tied together by caste, religion, profession, business or craft and each of these are located near their predominant workplace in the commercial area of the city. The incremental growth of the 'pols' has resulted in a geometrically arbitrary pattern of streets governed by ancient cannons of street planning in India. Each 'pol' is a closed loop which terminates in the form of a 'Chowk'. The land subdivision is very irregular and in almost all cases the entire lot is covered by building construction. The houses are placed next to each other on the sides to avoid the heating of the walls by direct radiation and very close to each other in the front to create shaded streets as a protection against the hot dry climate. The reason for forming the looped streets was to protect the interests and privacy of different ethnic groups. Most of the 'Pols', even today, are protected by a gate that, when closed, makes them inaccessible from outside.

0 100 500m
1:10000



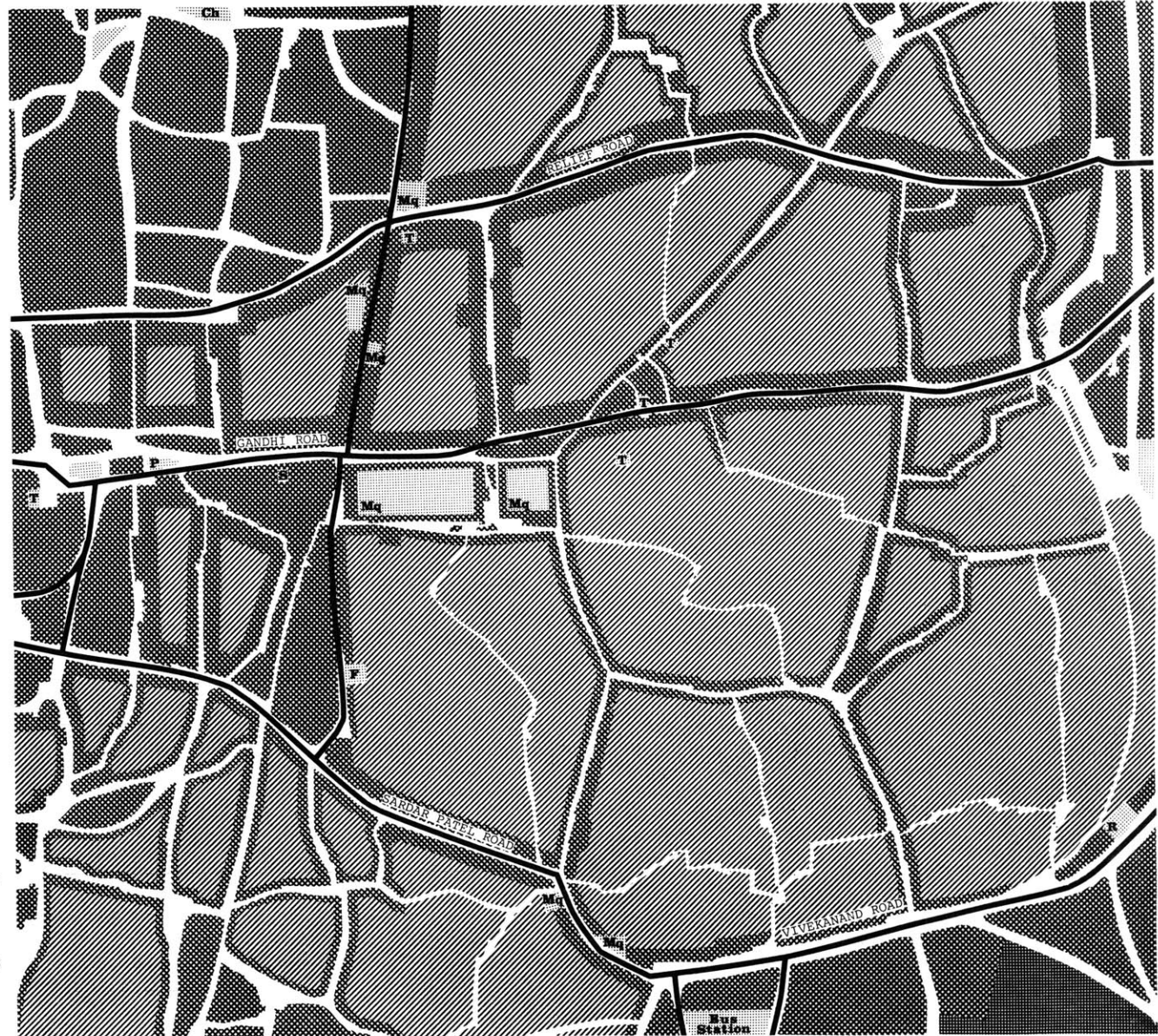
Each 'Pol' invariably has a place of religious worship which may be shared by two 'pols'.

LAND USE: The locality has reached a saturation point in mixed landuse of residential and commercial areas with commerce dominating the east and the west ends. The area on the west mainly consists of banking and business offices and the one on the east, goods and other wholesale trade centres due to the vicinity of the railway station. The streets connecting the two end are the major retail shopping areas. These also extend in the secondary streets for daily commodity shopping and godowns for retail stores on the main streets. There is a total absence of open recreational area or a park within this locality which is characterized by dense building masses. Most of the buildings in the central and eastern part of the locality are 3 to 5 stories high but highrise office buildings have sprung up in the northern and north-western part in the last decade or two. On the south-east periphery is the wholesale cloth market which marks the beginning of textile mills on its boundaries extending to the South and East. Wholesale markets for foodgrains, vegetables, fruits, timber, building materials etc. are also located either on the fringe or in the centre of the locality. There are no major hospitals in this area; however private nursing homes and consulting rooms are in adequate supply. The old city is also characterized by the presence of 12 to 15 cinema houses located close to each other creating severe traffic jams during the show hours.

The largest mosque of the city is situated in the centre of the main commercial artery and an auditorium is being constructed on the western border of the locality.

- KEY**
- Pk Parking
 - P Police
 - F Fire Department
 - S School
 - Ch Church
 - R Recreation
 - T Temple
 - U University
 - H Health
 - PO Post Office
 - SS Social Services
 - M Market
 - Mq Mosque
 - Bus
 - Rapid Transit

- AREAS**
- RESIDENTIAL
 - COMMERCIAL
 - INDUSTRIAL
 - OPEN SPACES



LOCALITY LAND USE PATTERN





CIRCULATION: The locality is surrounded by two major circulation arteries and a third one, the oldest, passes through it. The traffic varies enormously in speed and volume composed of pedestrians, bicycles, hand pulled carts, scooters, auto-rickshaws, motor cars and buses. It is one of the biggest problems of this locality. Relief road and Gandhi road were converted into one way streets going west and east respectively for all vehicles except bicycles and buses. This has resulted into tremendous traffic problems particularly due to the absence of adequate connecting links between the two streets. The entire area is dominated by slow moving traffic. The secondary roads which branch off from these two major streets meet the accesses of various pols. Each pol has an entrance gate, a chowk and several dead-end streets which are recognised by specific names based on their characteristics such as fronts of the houses facing each other, fronts of houses facing backs of the other houses and backs of the houses facing each other

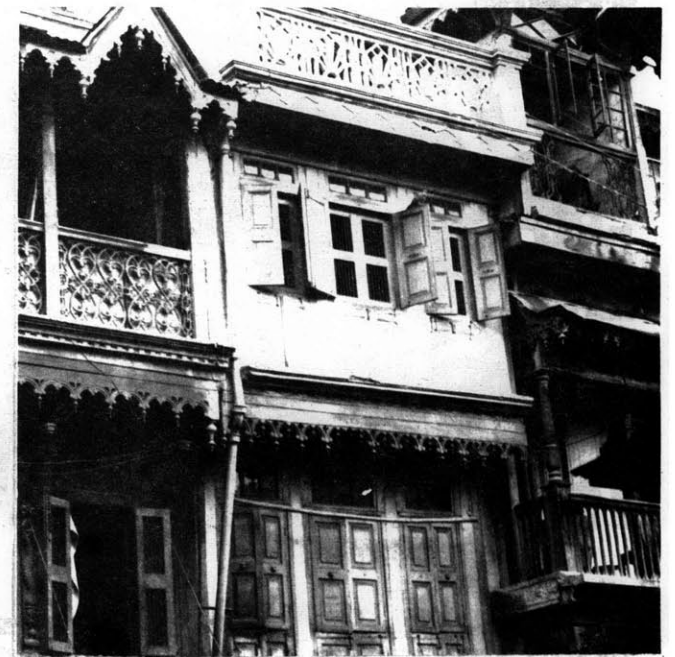
KEY

- VEHICULAR
- PEDESTRIAN



LOCALITY CIRCULATION PATTERN

POPULATION: No data is available for the population distribution of the locality. The estimated population of the houses within the fort wall is 450,000. In past, unlike today, most of the households had extended families. Many of its occupants have moved out and have rented their houses to middle income people; a majority of these are connected to the surrounding commercial area in one way or the other. There is a great degree of cohesiveness and social interaction resulting from the grouping based on common interest and ethnic origin. Income level is not a major criterion for segregation.



INCOME: No income distribution data is available but an approximate figure can be arrived at from various documents which show that about 60-70% of the total population has an average income of U.S. \$1200; about 15-20% U.S. \$2200 and about 7-10% U.S. \$450. The rest are either unemployed or temporarily employed. Average monthly rent of the house is approximately U.S. \$25.

WALLED CITY, Ahmedabad: (top) Secondary street; access to 'Pols' (1974).
(bottom left) View from the terrace (1974).
(bottom right) A typical street facade (1973).



LOCALITY CONSTRUCTION TYPES

	%		SELF-HELP	ARTISAN	SMALL CONTRACTOR	LARGE CONTRACTOR
	0	100				
SHACK						
MUD/WATTLE						
WOOD						
MASONRY WOOD						
MASONRY CONCRETE						
CONCRETE						

The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information approximate

LOCALITY UTILITIES AND SERVICES

WATER SUPPLY	
SANITARY SEWERAGE	
STORM DRAINAGE	
ELECTRICITY	
GAS	
REFUSE COLLECTION	
PUBLIC TRANSPORTATION	
PAVED ROADS, WALKWAYS	
TELEPHONE	
STREET LIGHTING	

LOCALITY COMMUNITY FACILITIES

POLICE	
FIRE PROTECTION	
HEALTH	
SCHOOLS, PLAYGROUNDS	
RECREATION, OPEN SPACES	

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: approximate

SELECTED BLOCK



LOCALITY SEGMENT PLAN

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	109	1.21	90
DWELLING UNITS S	123	1.21	102
PEOPLE	711	1.21	588

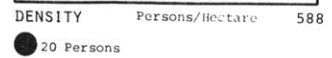
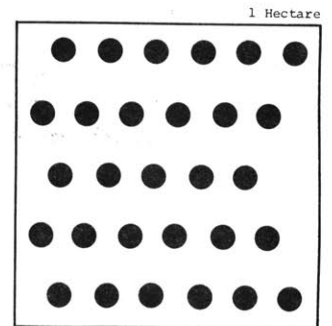
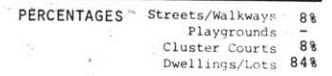
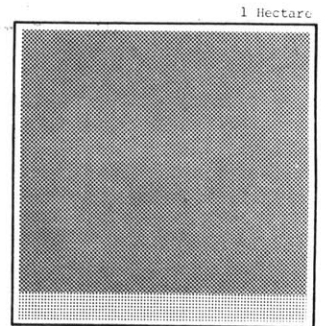
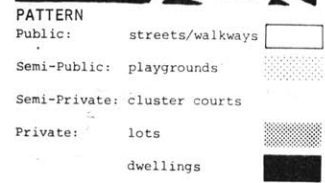
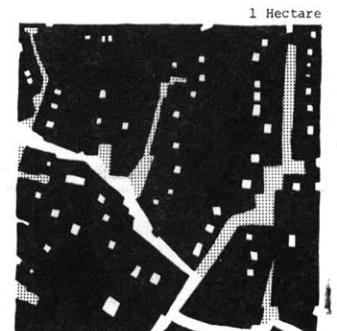
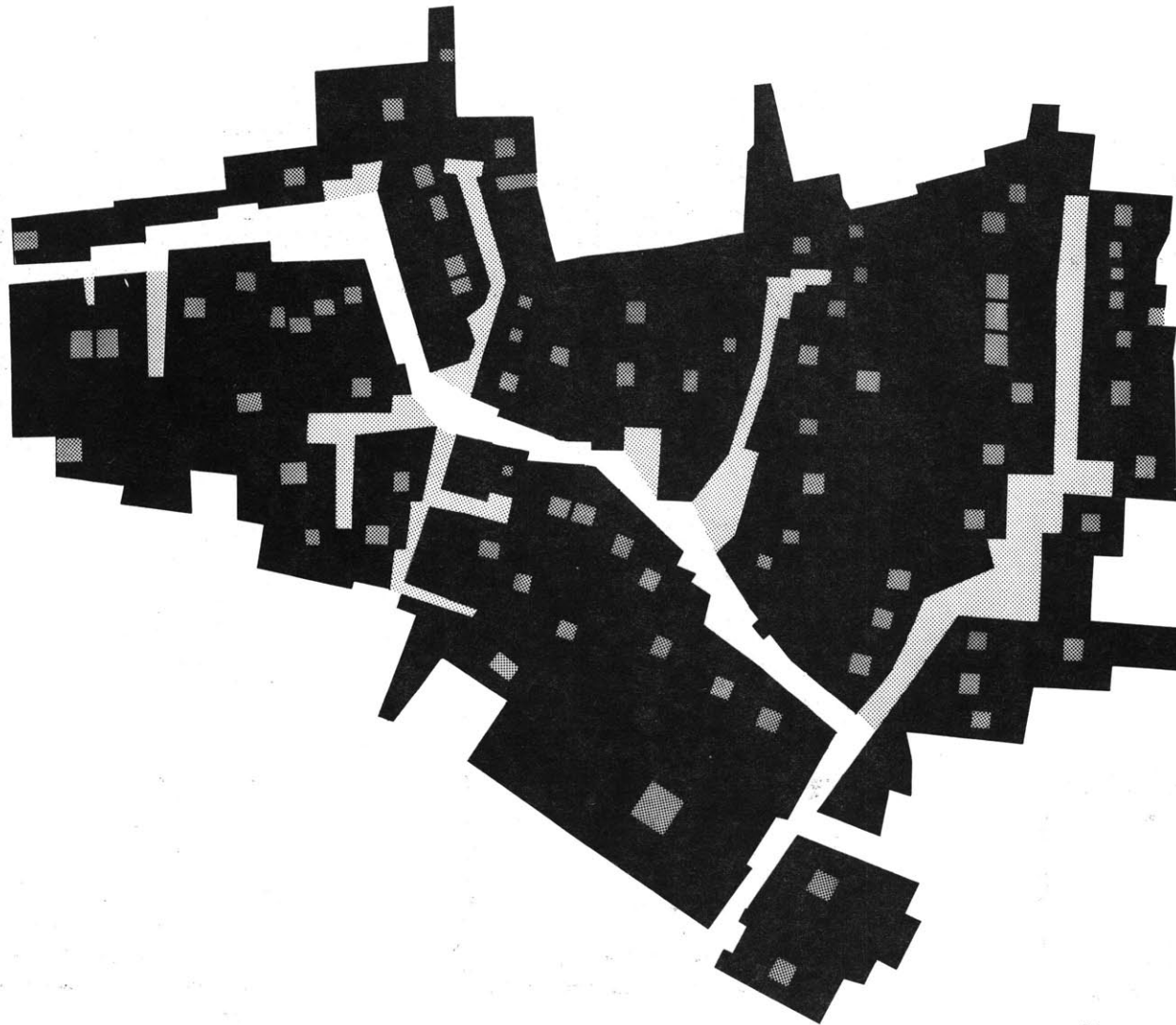
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.09	8
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	1.02	84
SEMI-PRIVATE (cluster courts)	0.10	8
TOTAL	1.21	100



1:1000

LOCALITY BLOCK PLAN

LAND UTILIZATION DIAGRAMS



1:2500

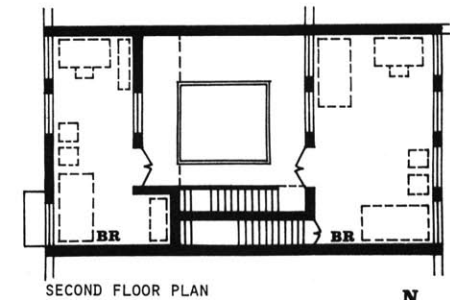
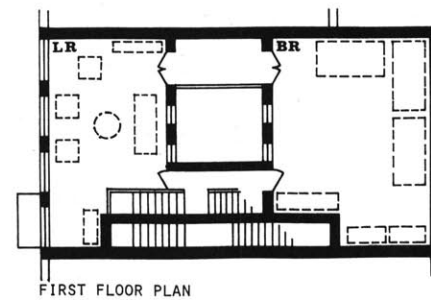
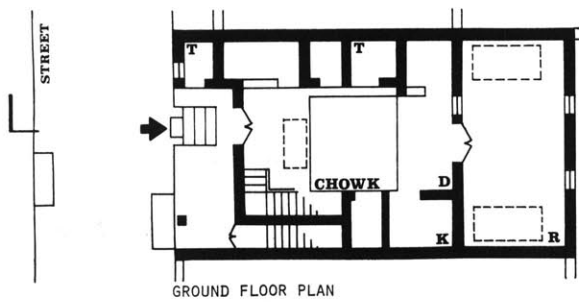
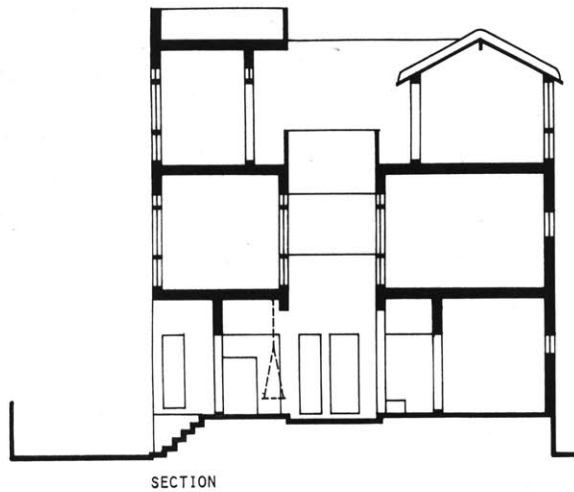
DWELLING ACTIVITY AREA CHARACTERISTICS

ENCLOSED	SEMI-ENCLOSED	OPEN
----------	---------------	------

COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			

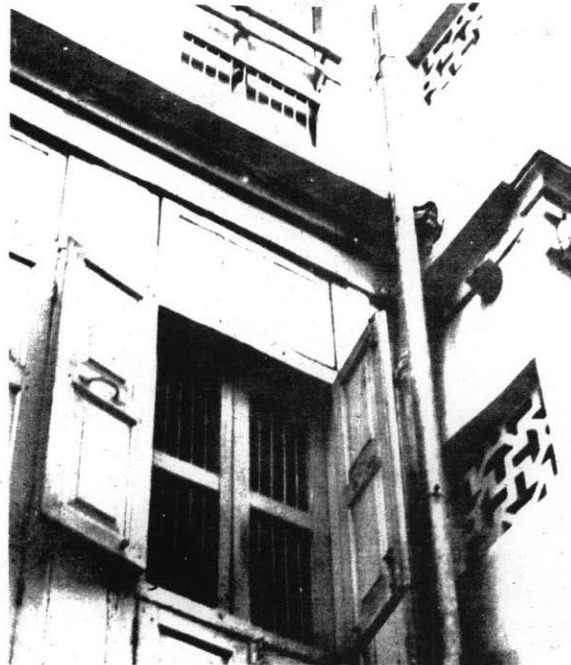
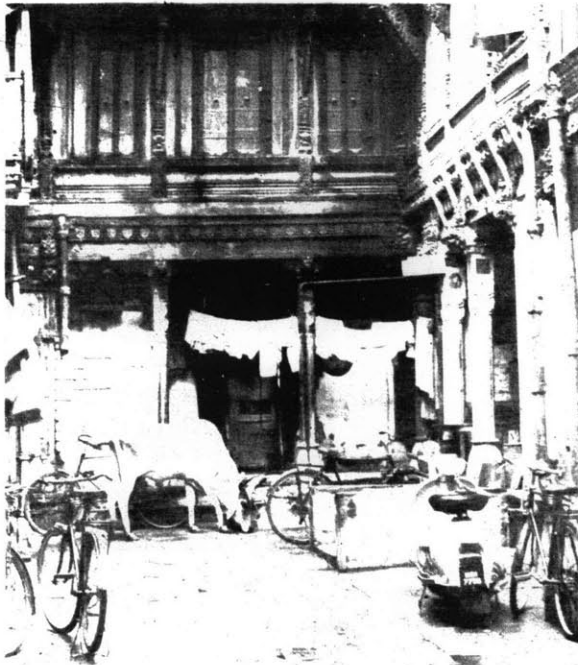
KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



1:200

TYPICAL DWELLING



PHYSICAL DATA (related to dwelling and land)

DWELLING UNIT
 type: HOUSE
 area (sq m): 152
 tenure: LEGAL OWNERSHIP

LAND/LOT
 utilization: PRIVATE
 area (sq m): 67
 tenure: LEGAL OWNERSHIP

DWELLING
 location: CITY CENTRE E
 type: ROW HOUSE
 number of floors: 3
 utilization: SINGLE
 physical state: FAIR

DWELLING DEVELOPMENT
 mode: INCREMENTAL
 developer: PRIVATE
 builder: ARTISAN
 construction type: MASONARY, WOOD
 year of construction: 1880

MATERIALS
 foundation: STONE
 floors: STONE
 walls: BRICK WITH WOODEN COLUMNS
 roof: WOOD

DWELLING FACILITIES
 wc: 1
 shower: 1
 kitchen: 1
 rooms: 5
 other: INNER COURT

SOCIO-ECONOMIC DATA (related to user)

GENERAL: SOCIAL
 user's ethnic origin: HINDU BANIA
 place of birth: AHMEDABAD
 education level: UNIVERSITY

NUMBER OF USERS
 married: 2
 single: 3
 children: 2
 total: 7

MIGRATION PATTERN
 number of moves: 1
 rural - urban: -
 urban - urban: BEFORE 1930
 urban - rural: -
 why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
 user's income group: UPPER MIDDLE
 employment: BUSINESS
 distance to work: 0.5 KM
 mode of travel: WALKING

COSTS
 dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS
 financing: PRIVATE
 rent/mortgage:
 % income for rent/mortgage:

WALLED CITY, Ahmedabad: (left) Dwelling unit entry (1973).
 (centre) Openings on upper floors (1973).
 (right) "Chowk" or court of the dwelling unit (1973).

CASE STUDY SOURCES

Plan: (accurate) Ahmedabad Municipal Corporation Office, 1973.
 Land Use Pattern: (approximate) Reports, School of Architecture, Ahmedabad, 1973.
 Circulation Pattern: (accurate) IBID.
 Segment Plan: (accurate) IBID.
 Block Plan: (accurate) IBID.
 Block Land Utilization: (approximate) IBID.
 Typical Dwelling: (approximate) IBID.
 Physical Data: (approximate) Field Survey, Nimish Patel, 1974.
 Socio-Economic Data: (approximate) Field Survey, Nimish Patel, 1974.
 Photographs: Nimish Patel, Parul Zaveri, 1974.
 General Information: Student Surveys and Reports, School of Architecture, Ahmedabad, 1973.

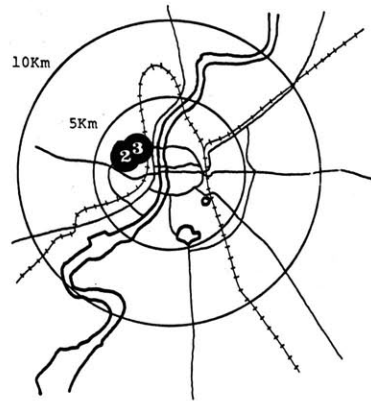
2 NAVRANGPURA, Lakhudi

POPULAR, VERY LOW INCOME, SQUATTERS

3 NAVRANGPURA, Co-op. society

PRIVATE, HIGH INCOME, HOUSES

Ahmedabad



LOCATION: Navrangpura is located in the north western part of the city on the west of river Sabarmati. It is not bounded by any specific boundaries except a railroad on its east. The city centre is approximately 5 km. away and university is at a distance of only 2 km.

ORIGINS: The entire area on the west of river Sabarmati began to develop in the second quarter of the century with the increase in pressure on the residential areas of the old city due to the economic growth of Ahmedabad. This locality has developed incrementally during the last four decades at a very slow rate of growth which has accelerated only in the last decade. Upper middle and high income groups occupy most of the land. However, squatter settlements dating back to the same period have formed pockets within it in the vacant undeveloped land. 90% of the detached dwellings are owned by the occupants.

NAVRANGPURA, Ahmedabad: A general view (1974).



LAYOUT: This is one of the areas in the city where land wastage is high because of the layout pattern which is largely governed by the set back regulations. Most of the lots are square in shape because of its greater efficiency within the framework of the existing building bye-laws but increase the service length per area served. Large pieces of land were bought and subdivided into smaller lots forming co-operative societies and hence the circulation network is arbitrary and inefficient. The houses are not more than two stories in height and result in making this a very low density area of the city. The squatters, on the other hand, are very dense organically grown settlements over a period of time without any controls and hence they usually follow the same layout pattern that its users had in their respective villages






LOCALITY PLAN





SELECTED SEGMENT

LAND USE: This is primarily a residential area adequately supplemented by the commercial requirements of its residents. It has two major secondary schools, many primary schools and a large recreational complex with a cricket stadium, tennis courts and a swimming pool located on its south east. Institutions for higher education are on its south-west border. Detached dwellings are growing very rapidly in the north western direction of this locality.

AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

KEY

- Pk Parking
- P Police
- F Fire Department
- S School
- Ch Church
- R Recreation
- L Library
- U University
- H Health
- PO Post Office
- SS Social Services
- M Market
- Mq Mosque
-  Bus
-  Rapid Transit



LOCALITY LAND USE PATTERN



CIRCULATION: The major approach to the locality is through the street running next to the recreational complex. It is also connected to the western part of the city through a major vehicular road running east-west by the squatter settlement. streets are used for both vehicular and pedestrian traffic although there are no sidewalks. Most of the internal streets of the co-operative societies are not paved and have no storm drainage resulting in occasional flooding during the monsoon months since the locality already is a low lying area. One of the streets of the selected co-operative society is blocked by a 2.5 m high wall to prevent it from becoming a public throughfare connecting the two main streets.

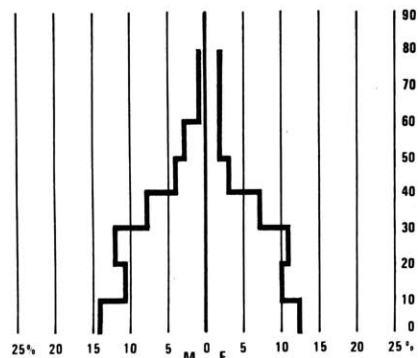


KEY

- VEHICULAR
- PEDESTRIAN

LOCALITY CIRCULATION PATTERN

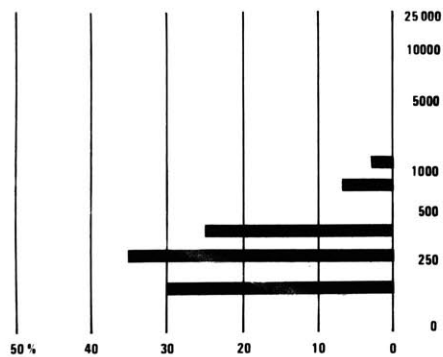




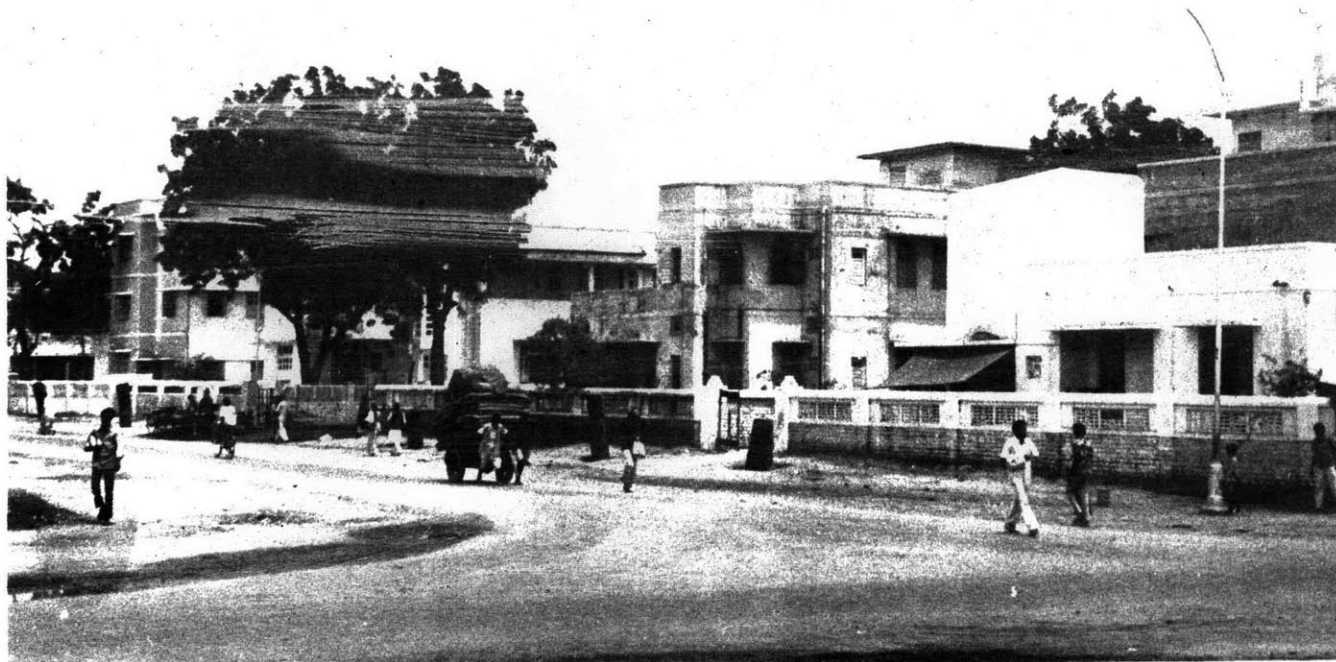
LAKHUDI POPULATION DISTRIBUTION
 horizontal: percentages vertical: ages
 males: M females: F
 Source: Reports, School of Planning, Ahmedabad, 1973.

POPULATION: No data is available for the population distribution of the upper middle and high income people. Most of the squatter population is employed by the industry but some are self employed. The women work as house servants in the high income families.

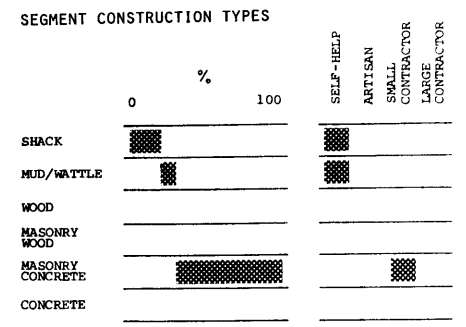
INCOME: There are two distinctly different income groups. The upper middle and high income group whose average annual household income is U.S. \$3000 and the very low income group whose income is less than U.S. \$450 per year.



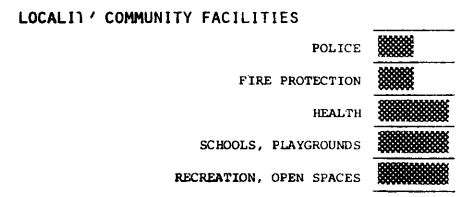
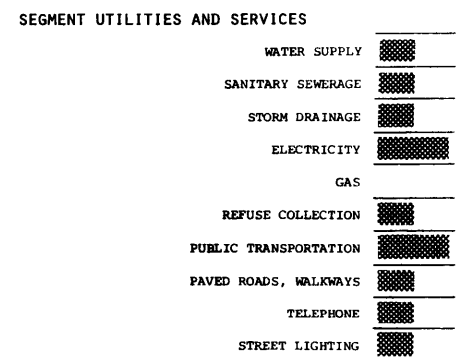
LAKHUDI ANNUAL INCOME DISTRIBUTION
 horizontal: percentages vertical: dollars
 Source: Reports, School of Planning, Ahmedabad, 1973.



NAVRANGPURA, Ahmedabad: (top) Lakhudi settlement from an elevation (1974).
 (bottom) Co-operative society from the main road (1974).

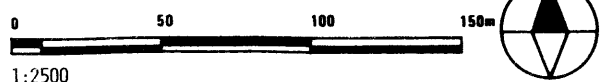


The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.
Quality of information: approximate



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.
Quality of information: approximate

[Dotted Pattern] SELECTED BLOCK



LOCALITY SEGMENT PLAN

1:2500

LAKHUDI LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	1.47	-
DWELLING UNITS	170	1.47	116
PEOPLE	835	1.47	568

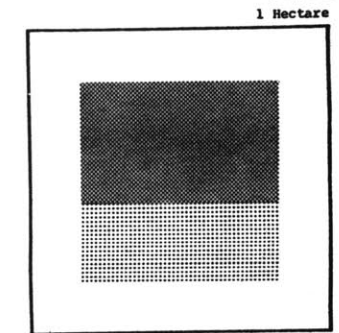
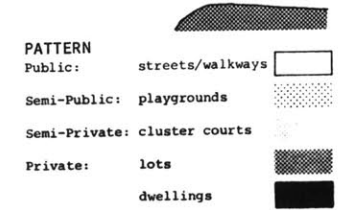
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.84	57
SEMI-PUBLIC (open spaces, schools, community centers)	0.25	17
PRIVATE (dwellings, shops, factories, lots)	0.38	26
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	1.47	100



LOCALITY BLOCK PLAN

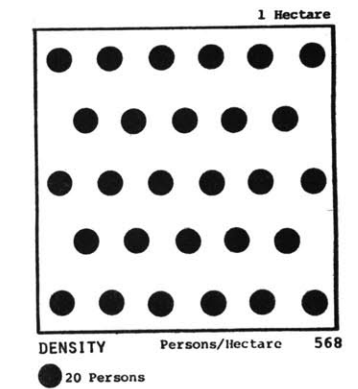


LAND UTILIZATION DIAGRAMS



PERCENTAGES

Streets/Walkways	57
Playgrounds	17
Cluster Courts	-
Dwellings/Lots	26



LOCALITY BLOCK LAND UTILIZATION

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
 type: SHANTY
 area (sq m): 12
 tenure: LEGAL OWNERSHIP

LAND/LOT
 utilization: PRIVATE
 area (sq m): N.A.
 tenure: EXTRALEGAL OWNERSHIP

DWELLING
 location: INNER RING
 type: SEMI-DETACHED
 number of floors: 1
 utilization: SINGLE
 physical state: POOR

DWELLING DEVELOPMENT
 mode: INCREMENTAL
 developer: POPULAR
 builder: SELF HELP
 construction type: SHACK
 year of construction: 1970

MATERIALS
 foundation: COMPACTED EARTH
 floors: EARTH
 walls: MUD, WOOD
 roof: CORRUGATED IRON SHEETS

DWELLING FACILITIES
 wc: 1 PER 17 FAMILIES
 shower: NONE
 kitchen: NONE
 rooms: 1
 other: OPEN PLATFORM

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
 user's ethnic origin: HINDU, RAJPUT
 place of birth: NEIGHBOURING STATE
 education level: INCOMPLETE PRIMARY SCHOOL

NUMBER OF USERS
 married: 2
 single: -
 children: 3
 total: 5

MIGRATION PATTERN
 number of moves: 1
 rural - urban: 1970
 urban - urban: -
 urban - rural: -
 why came to urban area: EMPLOYMENT

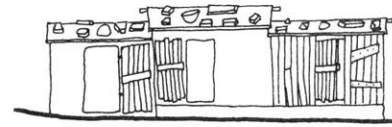
GENERAL: ECONOMIC
 user's income group: VERY LOW
 employment: PEON
 distance to work: 4 KM
 mode of travel: BICYCLE

COSTS
 dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS
 financing: SELF FINANCED
 rent/mortgage:
 % income for rent/mortgage:



SECTION



ELEVATION

DWELLING ACTIVITY AREA CHARACTERISTICS

	ENCLOSED	SEMI-ENCLOSED	OPEN
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COOKING	summer			
	monsoon			
	winter			

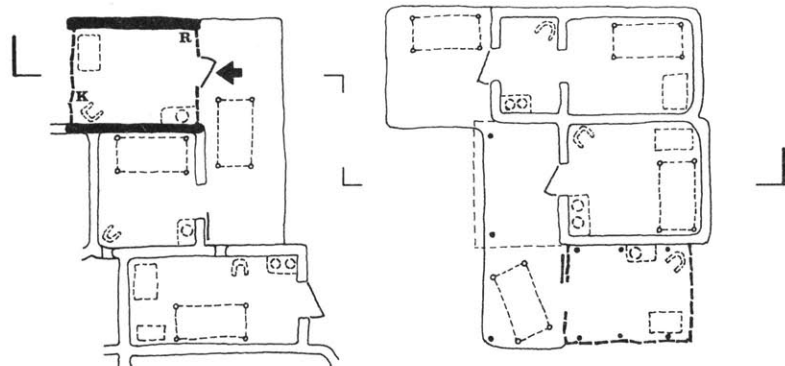
SLEEPING	summer			
	monsoon			
	winter			

LEISURE	summer			
	monsoon			
	winter			

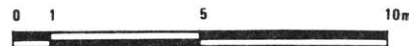
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



PLAN

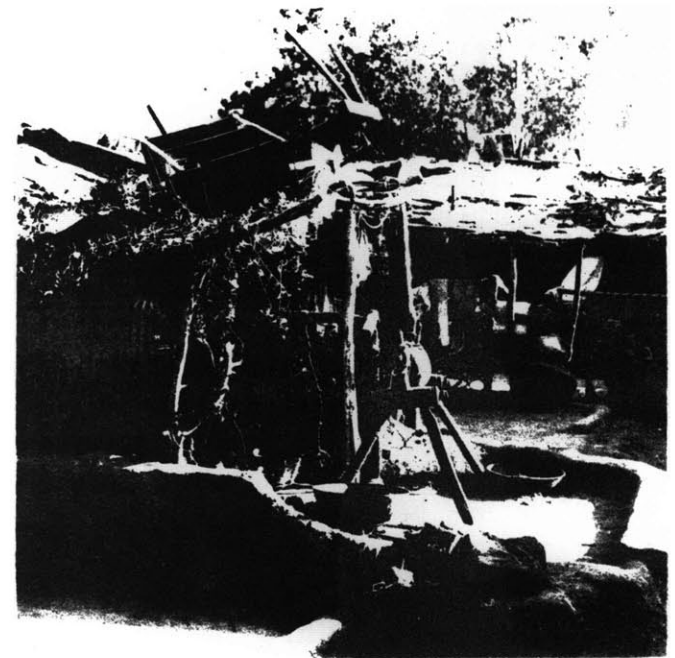


1:200



TYPICAL DWELLING

LAKHUDI-NAVRANGPURA, Ahmedabad: (top left) A general view (1974).
 (top right) Frontyards og dwelling units (1974).
 (bottom left) A dwelling unit (1974).
 (bottom right) Cooking area inside the dwelling unit (1974).

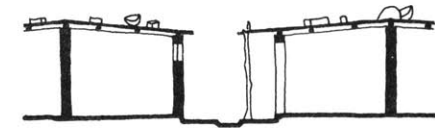
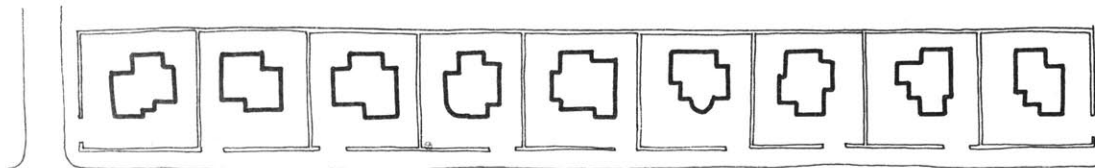


CASE STUDY SOURCES

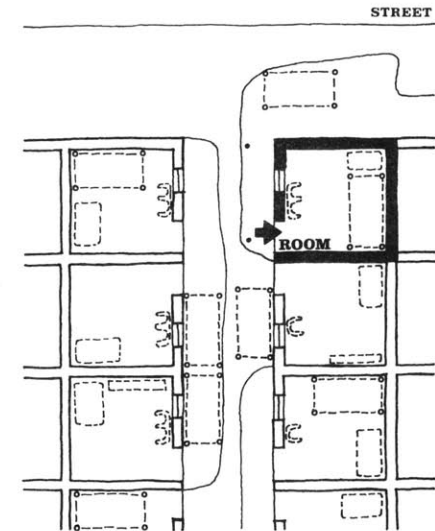
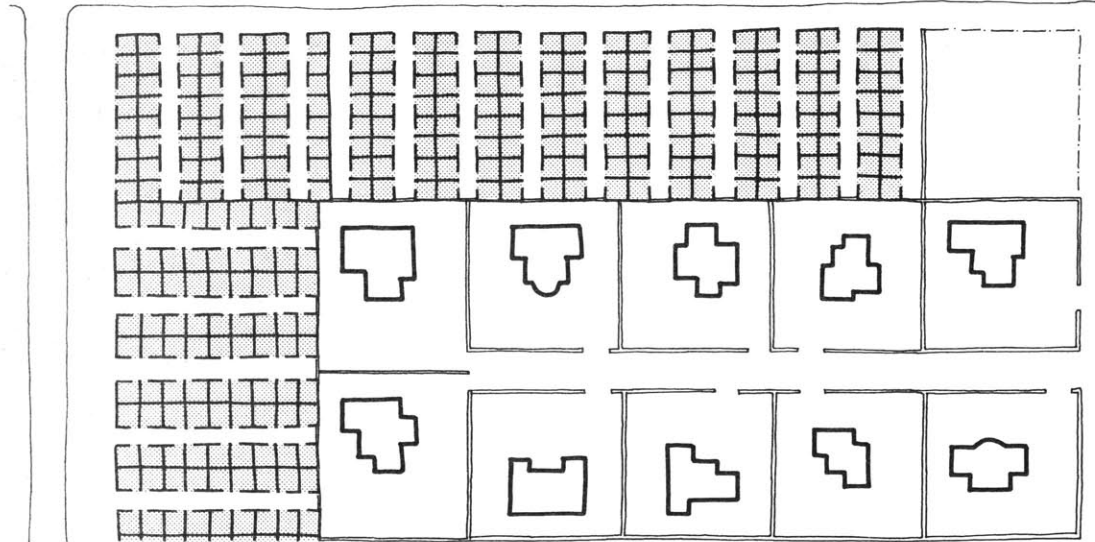
- Plan: (approximate) Ahmedabad Municipal Corporation Office, 1974.
- Land Use Pattern: (approximate) Reports, School of Planning, Ahmedabad, 1973.
- Circulation Pattern: (approximate) IBID.
- Segment Plan: (approximate) Field Survey, N. Patel, 1974; A. Desai, A. Chavda, V. Chavda, 1975.
- Block Plans: (approximate) IBID, Reports, School of Planning, Ahmedabad, 1973.
- Block Land Utilization: (approximate) IBID.
- Typical Dwellings: (approximate) IBID.
- Physical Data: (approximate) IBID.
- Socio-Economic Data: (approximate) IBID.
- Photographs: Nimish Patel, 1974, Vidyadhar Chavda, 1975.
- General Information: Reports, School of Planning, Ahmedabad, 1973.

CHAWL

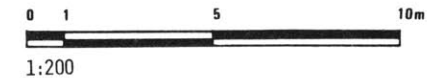
SIMILAR DWELLING SYSTEM



SECTION



PLAN



BLOCK PLAN

This dwelling type represents the most dense residential development in the city. Such developments, scattered mainly in the industrial areas, began as a necessary residential requirement for the growing industrial sector of the city. Small pockets of land were subdivided into lots and dwelling units of approximately 3 x 3 meters were constructed in a row with a 2.5 meters passage separating the two rows. The back to back arrangement of the dwelling units leaves only one side as a source of light and ventilation inside the dwelling. This results in very poor light condition within the enclosed area which is filled with smoke during the winter and monsoon season due to indoor cooking.

The provided enclosed area is extremely small for the average family size in this income group and with very little area available to them outside the dwelling, the inhabitants often make use of the roof for sleeping. Minimal circulation area is left between the two rows and the rest is raised in the form of a platform as an extension of the dwelling unit.

The basic dwelling unit is made of brick walls with galvanised iron sheets as roofing material held in place mainly by brick bats and other heavy objects on top of it.

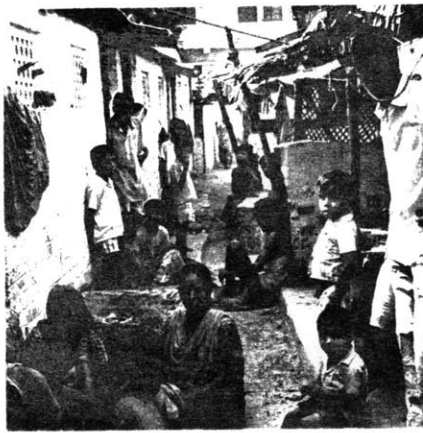
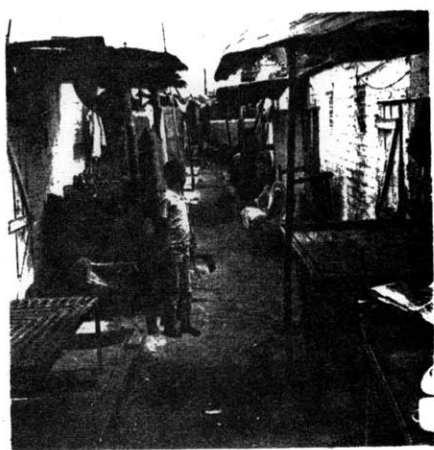
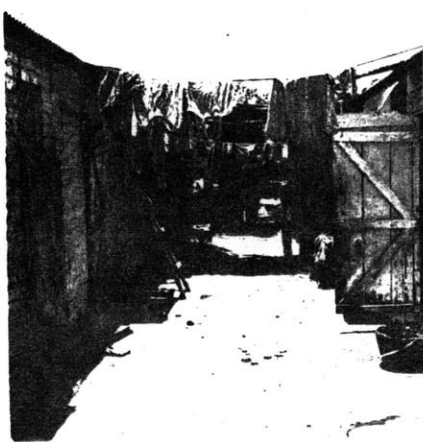
Many such settlements are without any basic

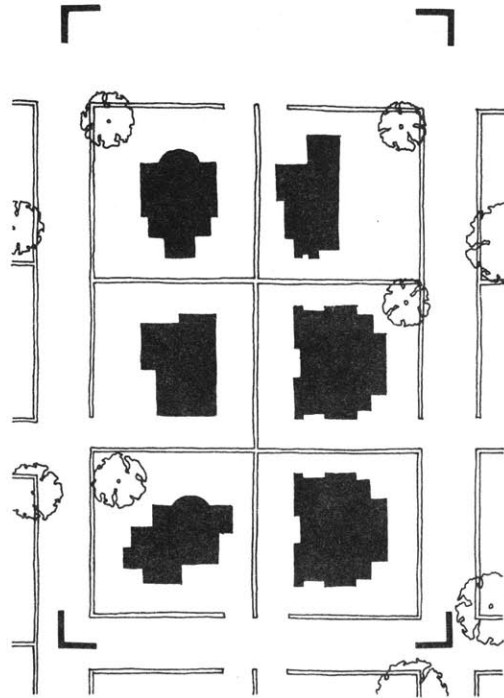
services such as water and sewage. People occupying such dwellings use nearby fields or vacant lots as toilets and a community water tap in the vicinity for their cooking, washing and bathing needs. Wherever these services are provided, they are overutilized and often create serious social problems due to the already inadequate water supply of the city network.

In 1971, approximately 555,000 people or about 30% of the city's population was inhabiting 1100 such settlements. Most of the population in this dwelling system is either temporarily employed by the industries or are self-employed.

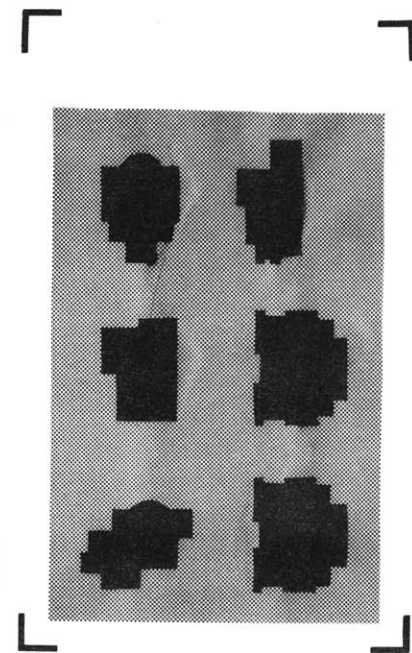
SOURCES

Block Plan: (approximate) Field Survey, A.Chavda. V.Chavda, 1975
 Typical Dwelling: (approximate) IBID.
 Photographs: IBID.
 General Information: IBID, Reports, ASAG, Ahmedabad, 1973.





LOCALITY BLOCK PLAN



LOCALITY BLOCK LAND UTILIZATION

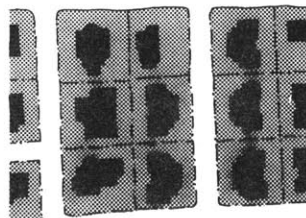


CO-OP. SOCIETY LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	6	0.42	14
DWELLING UNITS	8	0.42	19
PEOPLE	42	0.42	100

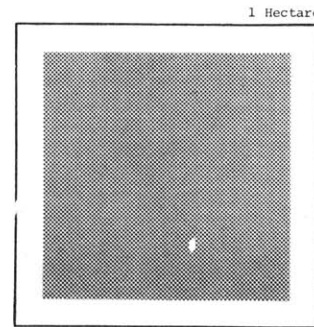
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.13	31
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.29	69
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.42	100

LAND UTILIZATION DIAGRAMS



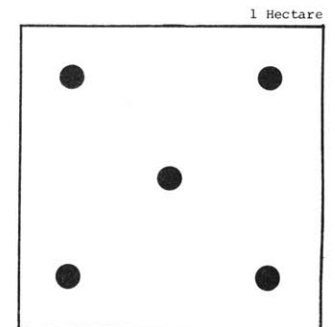
PATTERN

Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	



PERCENTAGES

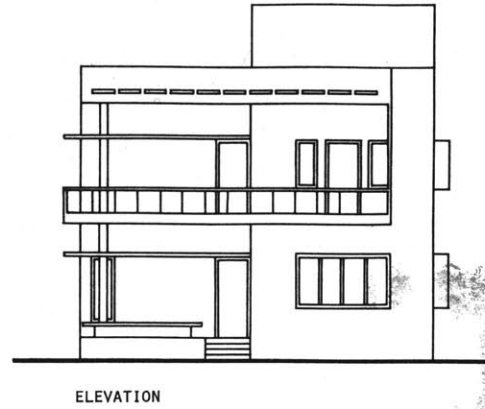
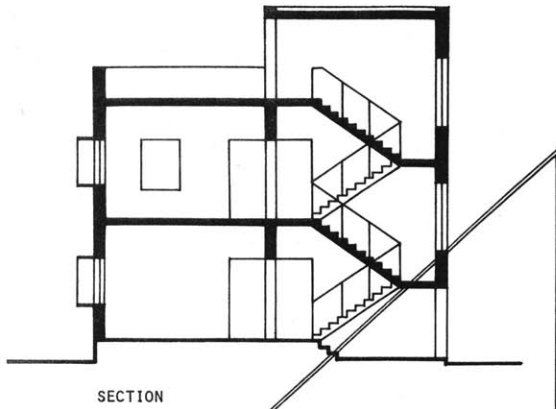
Streets/Walkways	31
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	69



DENSITY

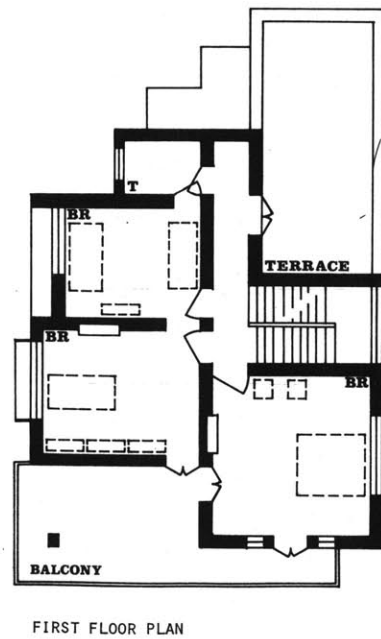
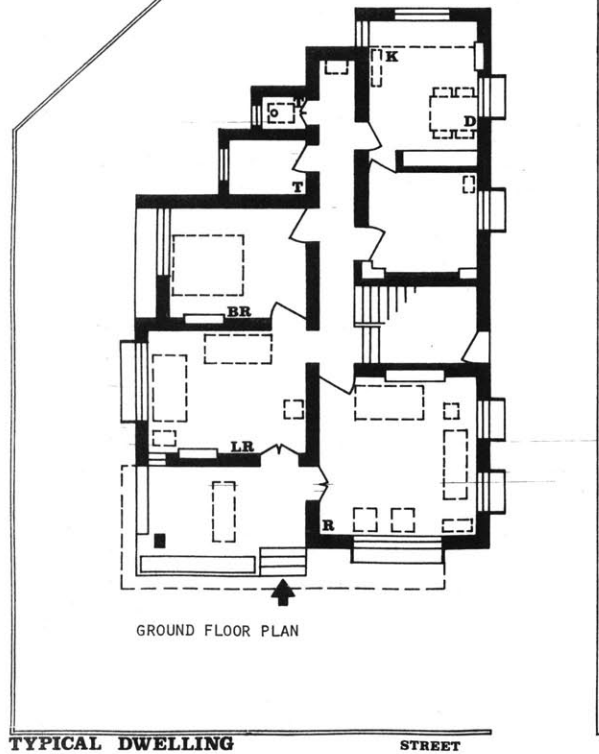
Persons/Hectare	100
	20 Persons





DWELLING ACTIVITY AREA CHARACTERISTICS

		ENCLOSED	SEMI-ENCLOSED	OPEN
COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			



KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
 type: HOUSE
 area (sq m): 210
 tenure: LEGAL OWNERSHIP

LAND/LOT
 utilization: PRIVATE
 area (sq m): 375
 tenure: LEGAL OWNERSHIP

DWELLING
 location: INNER RING
 type: DETACHED
 number of floors: 2
 utilization: SINGLE
 physical state: GOOD

DWELLING DEVELOPMENT
 mode: INCREMENTAL
 developer: PRIVATE
 builder: SMALL CONTRACTOR
 construction type: MASONARY, CONCRETE
 year of construction: 1962

MATERIALS
 foundation: CONCRETE
 floors: CONCRETE
 walls: BRICK
 roof: REINFORCED CONCRETE

DWELLING FACILITIES
 wc: 2
 shower: 2
 kitchen: 1
 rooms: 5
 other: TERRACE



SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
 user's ethnic origin: HINDU
 place of birth: NEIGHBOURING DIST
 education level: SECONDARY SCHOOL

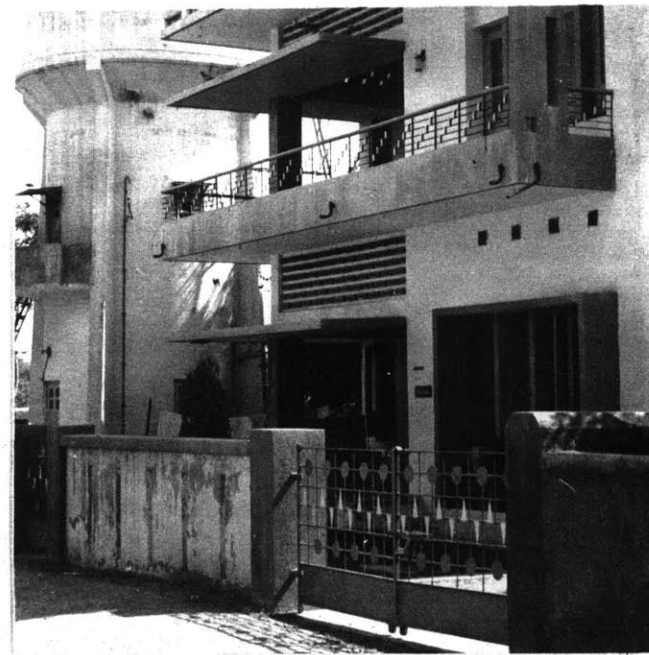
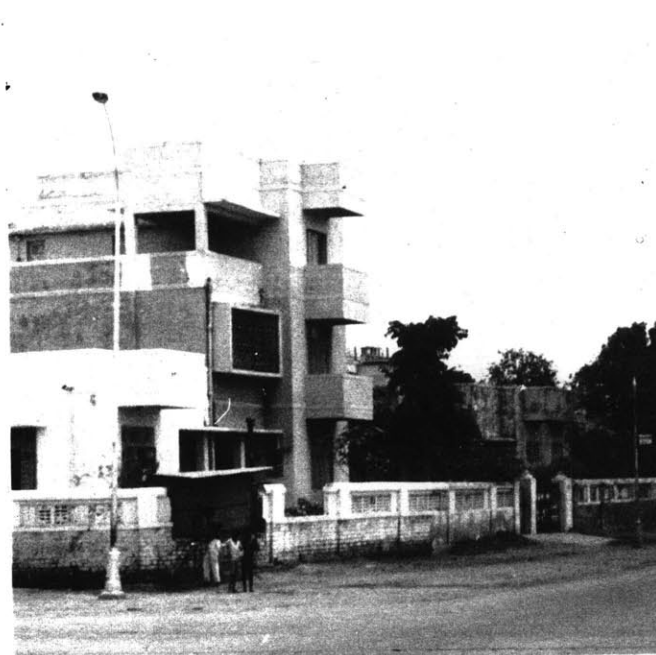
NUMBER OF USERS
 married: 4
 single: 1
 children: 1
 total: 6

MIGRATION PATTERN
 number of moves: 1
 rural - urban: 1940
 urban - urban: -
 urban - rural: -
 why came to urban area: BUSINESS

GENERAL: ECONOMIC
 user's income group: HIGH
 employment: BUSINESS
 distance to work: 6 KM
 mode of travel: MOTOR CAR

COSTS
 dwelling unit: \$12000²
 land - market value: \$10-15/m²

DWELLING UNIT PAYMENTS
 financing: SELF FINANCED
 rent/mortgage:
 % income for rent/mortgage:



CO-OP. SOCIETY-NAVRANGPURA, Ahmedabad: (top) Access to the dwelling units (1975).
 (bottom left) A corner dwelling (1975).
 (bottom right) Entry to the dwelling unit (1975).

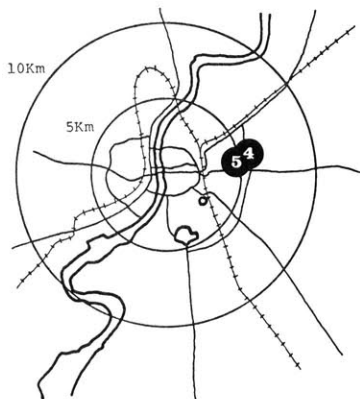
4 BAPUNAGAR, Row Houses

PUBLIC, LOW INCOME, HOUSES

5 BAPUNAGAR, Walk-ups

PUBLIC, LOW INCOME, APARTMENT

Ahmedabad



LOCATION: This area, developed by the Gujarat Housing Board to provide housing for low and middle income people, is located near the industries and other employment centres of the city. It is approximately 5 km to the east of the city centre. It is bounded by two major roads running east west on northern and southern boundaries with a major ring road running north south through its centre. Bordering the locality in the south west is the Malek Saban stadium.

ORIGINS: The development of this area dates back to 1950s when the state housing board stepped up its efforts to provide adequate residential facilities in the industrial area which was developing so fast. These dwellings were built under the middle income and low income group housing schemes over a period of 10 to 15 years. Such developments are still being carried out today in other parts of the city or state using the same dwelling design.

BAPUNAGAR, Ahmedabad: (top) View from the Ring road. (bottom) A view of the assembly of vendors at the junction of two primary streets which serves as a market place every evening (1974).



LAYOUT: This layout system, basically grid-iron, has separate accesses for circulation and services resulting in enormous waste of public land and creation of very poorly maintained and hence unhygienic back alleys. All the apartment blocks are located on the 40 meter wide road passing through the centre of the locality. The rest of the dwellings are single storied row houses grouped either in the blocks of 8 dwellings each facing the paved road or in the blocks of 2 dwellings each facing the other blocks





SELECTED SEGMENT





LOCALITY PLAN

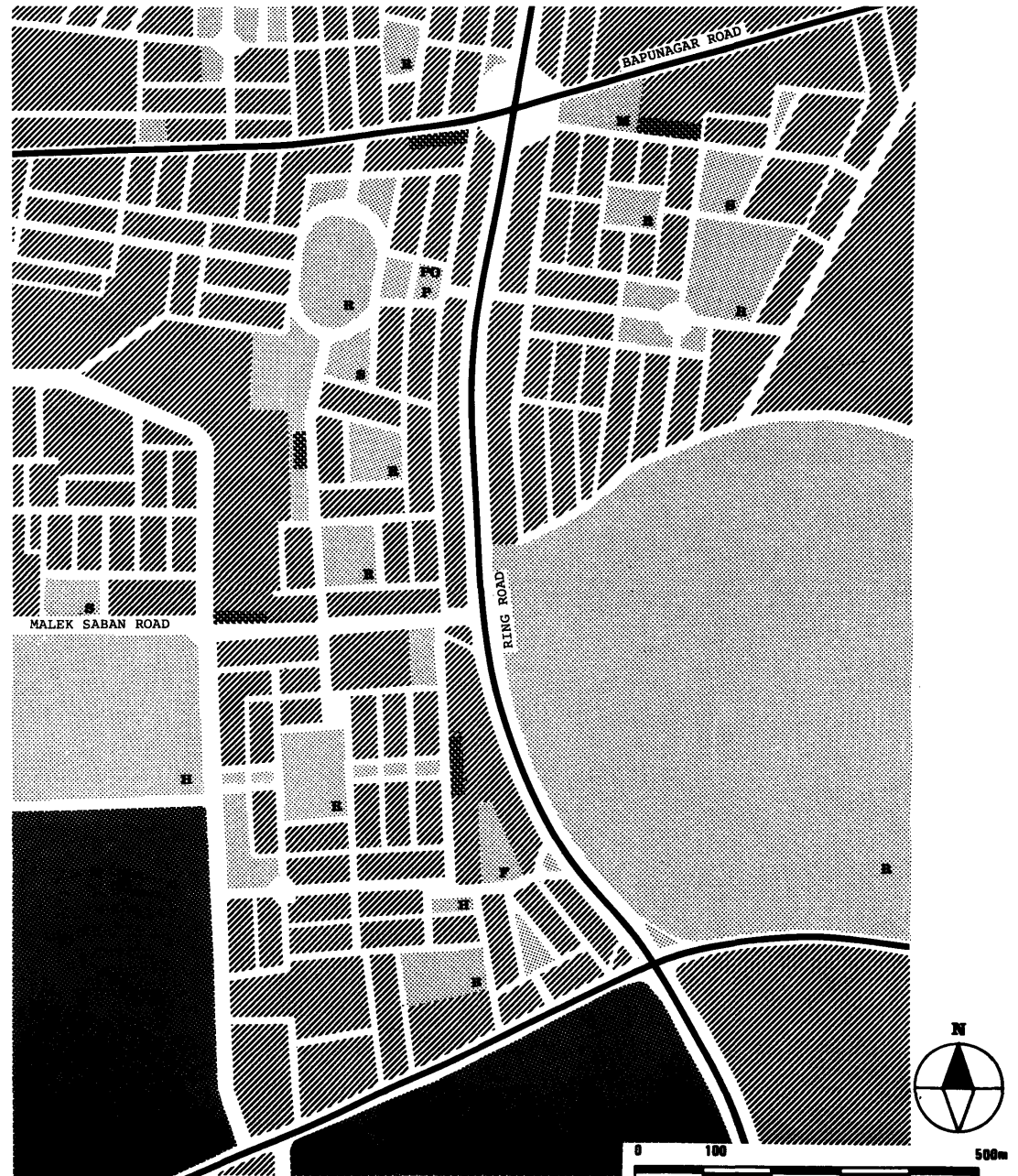
LAND USE: This is a residential development with industrial area in its vicinity. Most of the textile mills are located on the Northwest, West and Southwest of the locality, but new industrial development is growing very rapidly in the Northeast and East of the locality, making the ring road a major transport route. There is a hospital in the locality and many open areas lables as "playgrounds"; very few of these have been developed as playgrounds. Supporting commercial facilities are located within the locality, and a major vegetable market place is in the Southwest of it, on the Odhav road.

AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

KEY

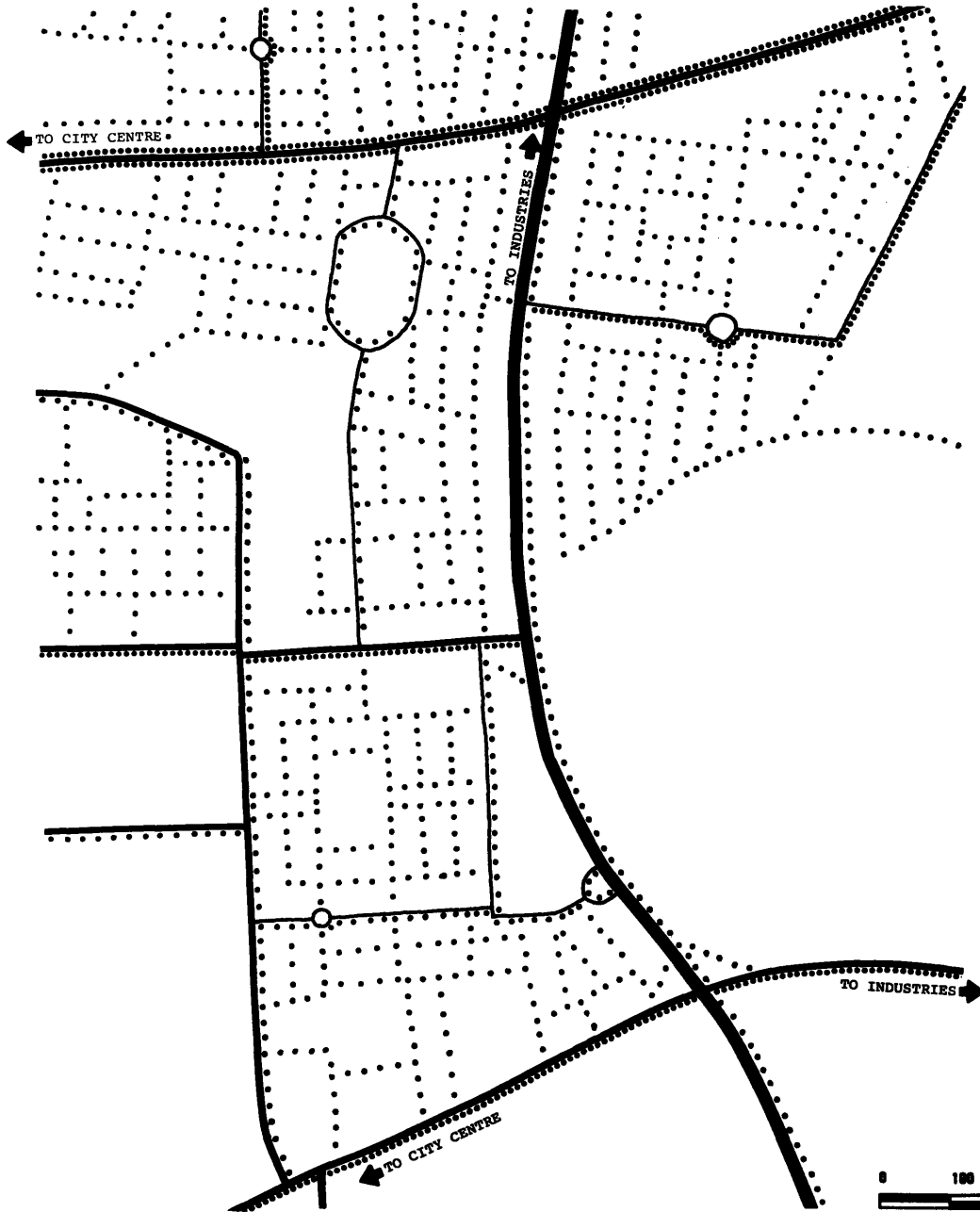
- Pk** Parking
- P** Police
- F** Fire Department
- S** School
- Ch** Church
- R** Recreation
- L** Library
- U** University
- H** Health
- PO** Post Office
- SS** Social Services
- M** Market
- Mq** Mosque
-  Bus
-  Rapid Transit



LOCALITY LAND USE PATTERN

0 100 500m
1:10000

CIRCULATION: Odhav road and Bapunagar road are the major approach roads to the site, connecting the city center on the one hand and the new industrial development on the other. The ring road passing through the site is expected to be used for heavy vehicular traffic transporting goods. At present, however, there is very little vehicular traffic on that road. This being an industrial area most of the population belongs to the very low and low income groups and, therefore, the major means of transportation is either bicycle or feet, for which the roads are very wide. Barring the main roads, all the other streets have predominantly pedestrian traffic.



LOCALITY CIRCULATION PATTERN



1:10000

POPULATION: No data is available for the population distribution of this locality but an approximate figure can be arrived at on the basis of various documents. Among the children male and female distribution is 25% and 14% respectively whereas among the working population of ages between 15 years and 60 years the male female distribution is 34% and 23% respectively. 3% of the total population are the dependents. The literacy rate in this locality is very low.

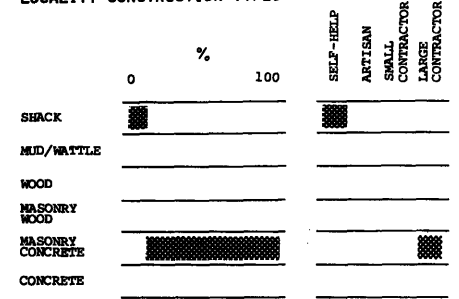


INCOME: No data is available for the income distribution of this locality but a majority of them belong to the very low income group earning less than U.S. \$450 annually and the rest belong to the low income group earning between U.S. \$450 and 900 annually. The average rent in this locality is U.S. \$3 per month.

BAPUNAGAR, Ahmedabad: (top) A general view of the row-houses (1975).
(bottom) A general view of the apartment blocks (1975)



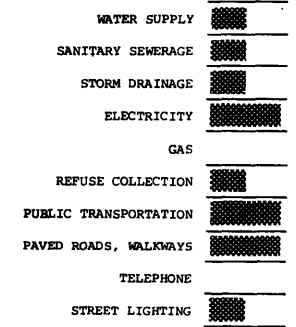
LOCALITY CONSTRUCTION TYPES



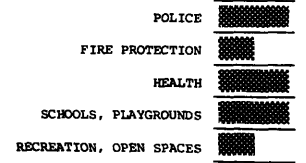
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



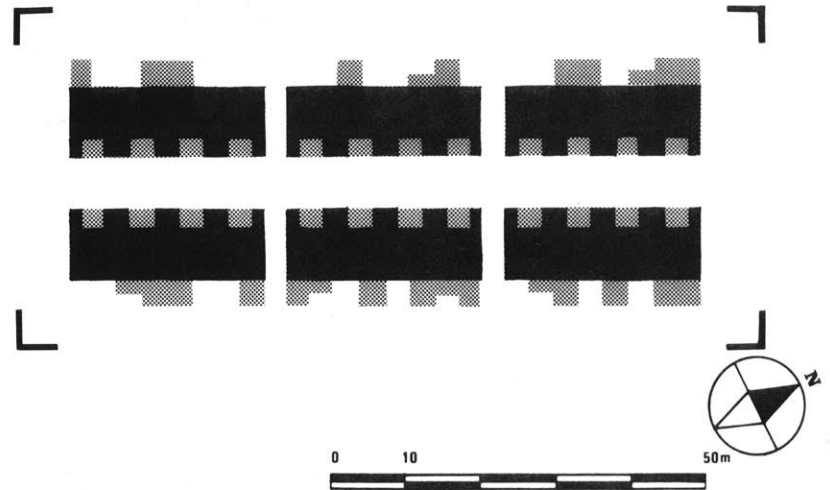
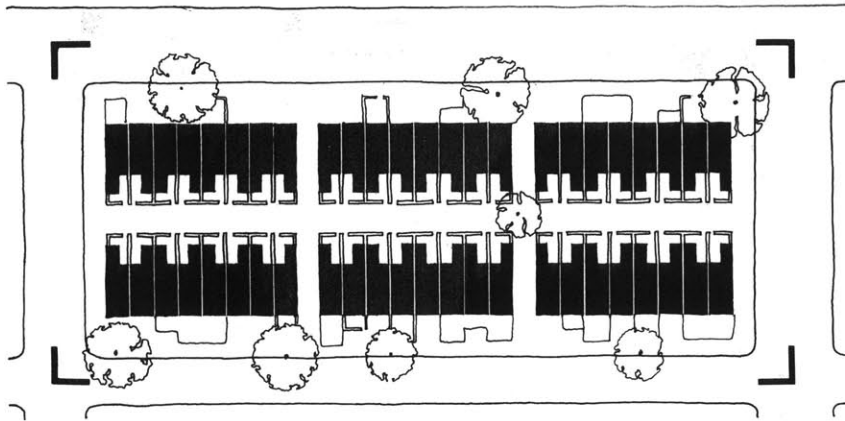
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: approximate

LOCALITY SEGMENT PLAN



SELECTED BLOCK



LOCALITY BLOCK PLAN

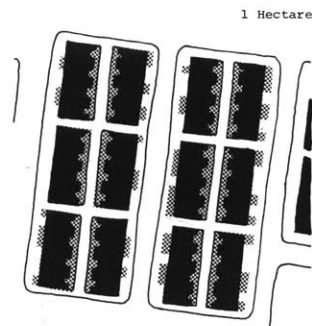
LOCALITY BLOCK LAND UTILIZATION 1:1000

ROW-HOUSE LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	48	0.43	112
DWELLING UNITS	48	0.43	112
PEOPLE	300	0.43	698

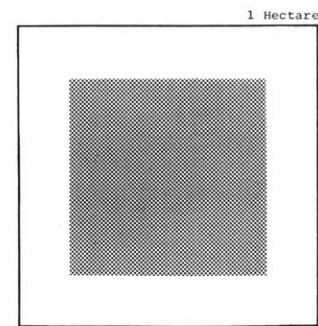
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.24	56
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.19	44
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.43	100

LAND UTILIZATION DIAGRAMS



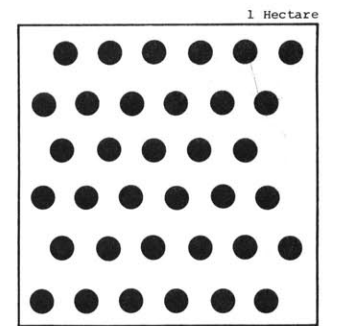
PATTERN

Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	



PERCENTAGES

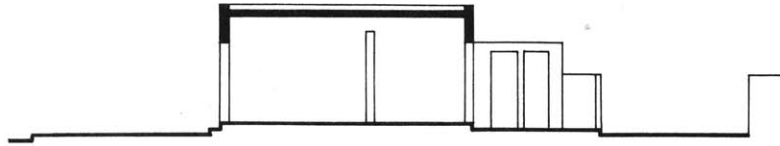
Streets/Walkway	56
Playground	-
Cluster Courts	-
Dwellings/Lots	44



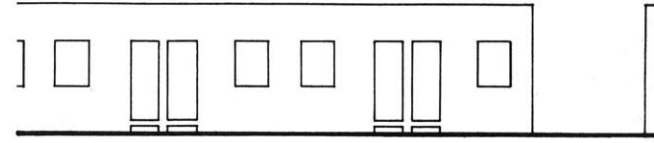
DENSITY

Persons/Hectare	698
●	20 Persons

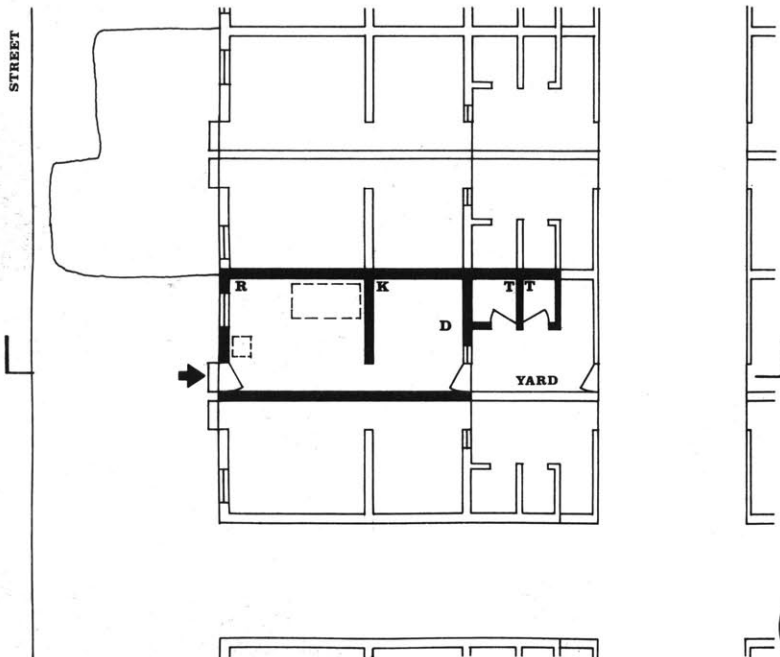




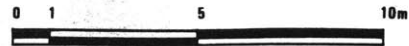
SECTION



ELEVATION



PLAN



TYPICAL DWELLING

1:200

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)

DWELLING ACTIVITY AREA CHARACTERISTICS

		ENCLOSED	SEMI-ENCLOSED	OPEN
COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
 type: ROOM
 area (sq m): 26
 tenure: LEGAL RENTAL

LAND/LOT
 utilization: PRIVATE
 area (sq m): 35
 tenure: LEGAL RENTAL

DWELLING
 location: PERIPHERY
 type: ROW/GROUPED
 number of floors: 1
 utilization: SINGLE/MULTIPLE
 physical state: FAIR

DWELLING DEVELOPMENT
 mode: INSTANT
 developer: PUBLIC
 builder: LARGE CONTRACTOR
 construction type: MASONARY, CONCRETE
 year of construction: 1960

MATERIALS
 foundation: CONCRETE
 floors: CONCRETE
 walls: BRICK
 roof: REINFORCED CONCRETE

DWELLING FACILITIES
 wc: 1
 shower: 1
 kitchen: 1
 rooms: 1
 other: -



SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
 user's ethnic origin: HINDU
 place of birth: PAKISTAN
 education level: SECONDARY SCHOOL

NUMBER OF USERS
 married: 2
 single: 1
 children: 4
 total: 7

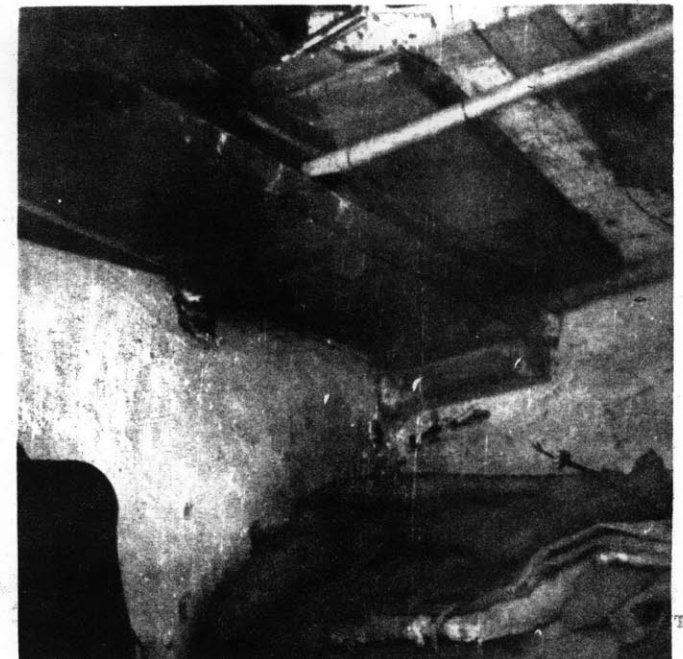
MIGRATION PATTERN
 number of moves: 1
 rural - urban: -
 urban - urban: 1947
 urban - rural: -

why came to urban area:

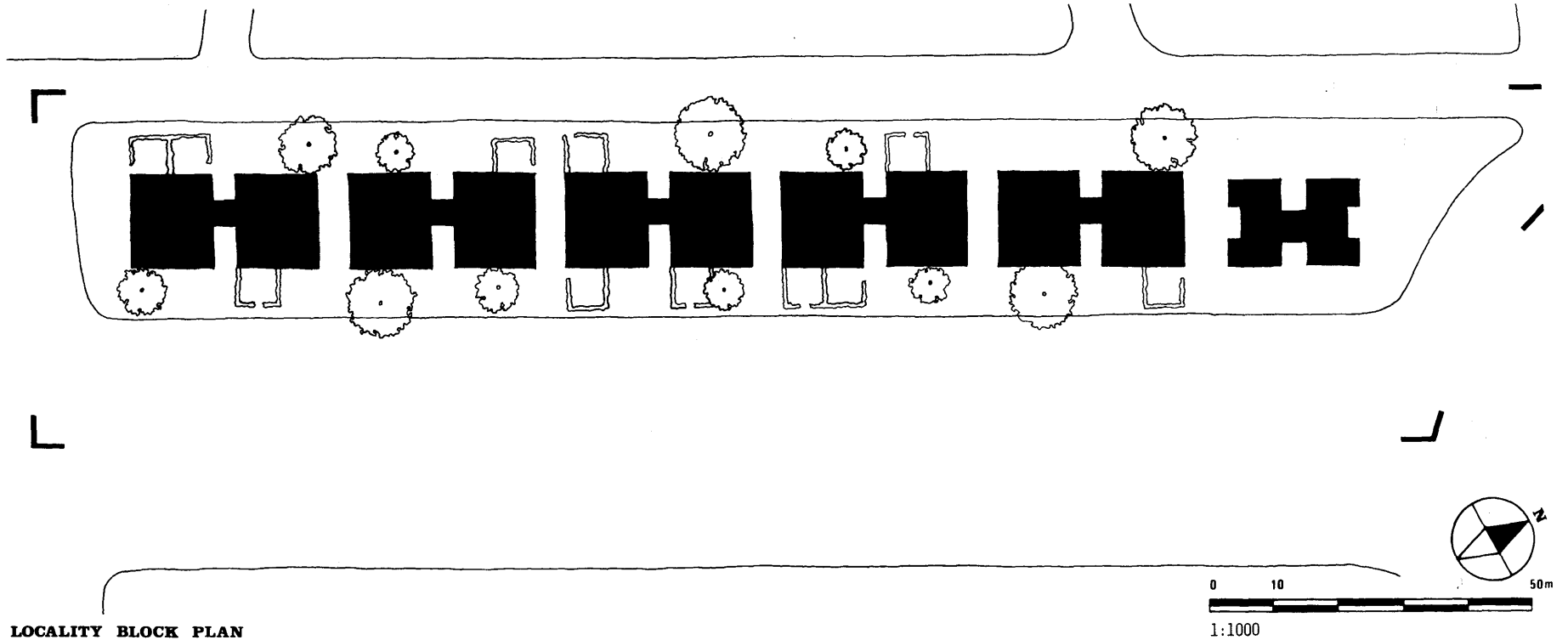
GENERAL: ECONOMIC
 user's income group: VERY LOW/LOW
 employment: INDUSTRIAL WORKER
 distance to work: 2 KM
 mode of travel: WALKING/BICYCLE

COSTS
 dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS
 financing: PUBLIC SUBSIDIZED
 rent/mortgage: \$2-3/MONTH
 % income for rent/mortgage: 15%



ROW HOUSE-BAPUNAGAR, Ahmedabad: (top) Back alley (1975)
 (bottom left) A semi-enclosed cooking area in the rear court of the dwelling unit (1975).
 (bottom right) Self-made storage elements within the dwelling unit (1975).

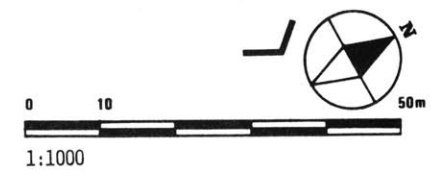
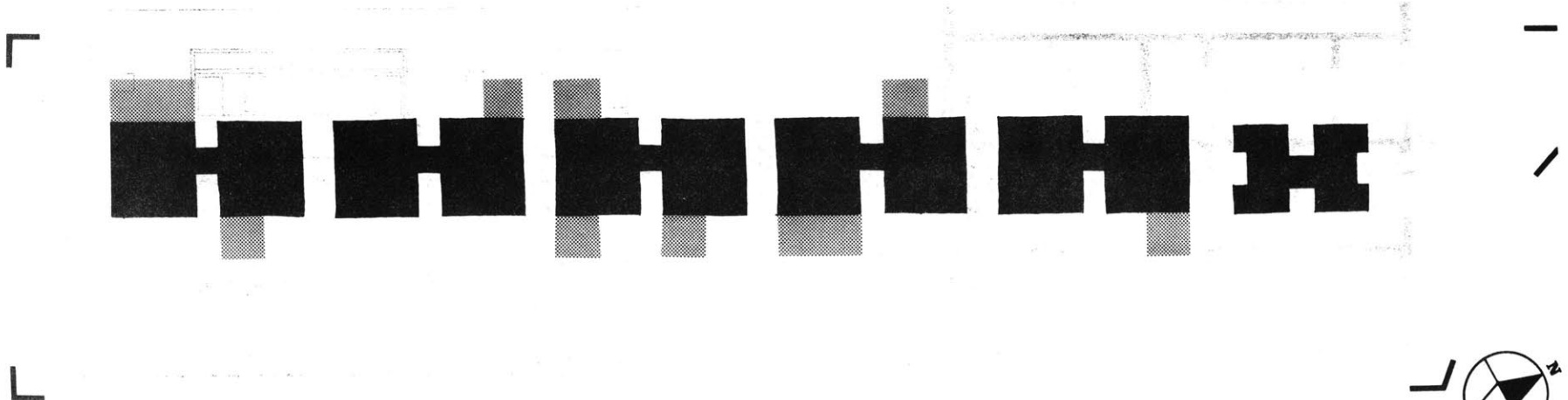


LOCALITY BLOCK PLAN

WALK-UP LAND UTILIZATION DATA

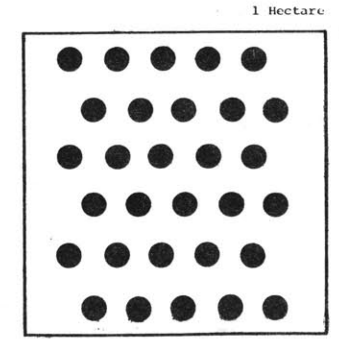
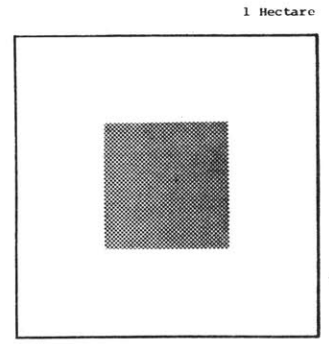
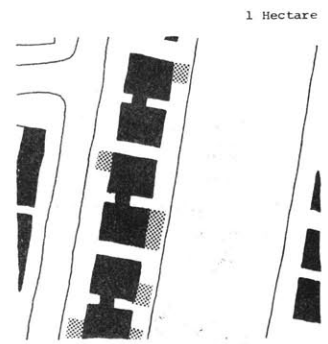
DENSITIES	Total Number	Area Hectares	Density N/Ea
LOTS	-	1.25	-
DWELLING UNITS	132	1.25	106
PEOPLE	805	1.25	596

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.03	82
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.22	18
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	1.25	100



LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS



PATTERN

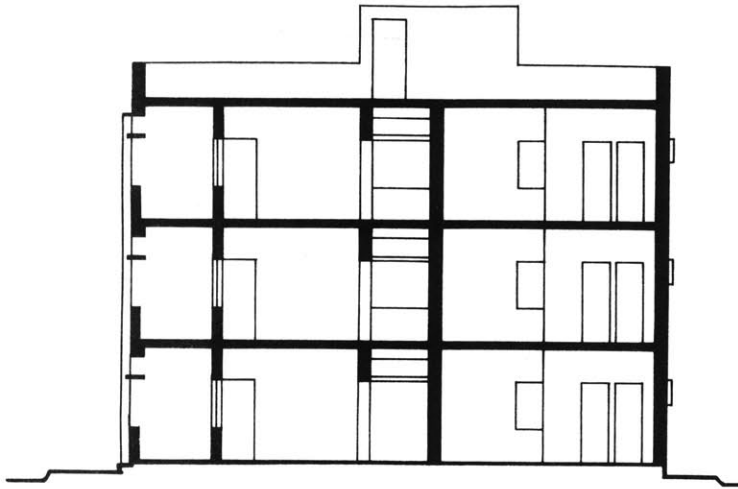
Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	

PERCENTAGES

Streets/Walkways	82
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	18

DENSITY

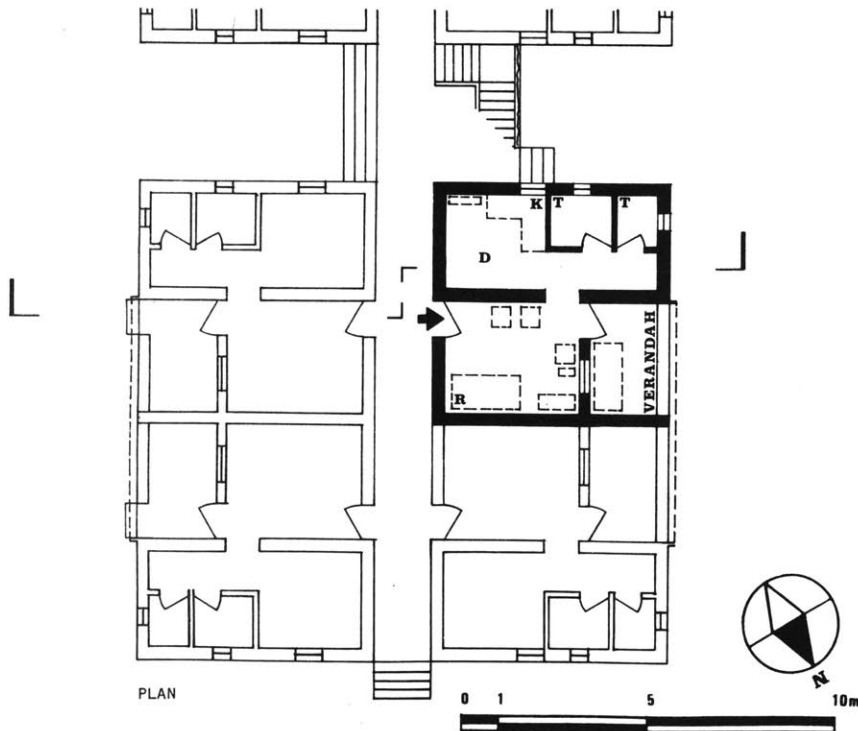
Persons/hectare	596
	20 Persons



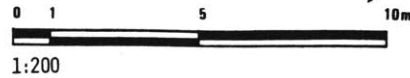
SECTION



ELEVATION



PLAN



TYPICAL DWELLING

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)

DWELLING ACTIVITY AREA CHARACTERISTICS

		ENCLOSED	SEMI-ENCLOSED	OPEN
COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			



PHYSICAL DATA (related to dwelling and land)

DWELLING UNIT
 type: APARTMENTS
 area (sq m): 40
 tenure: LEGAL RENTAL/OWNERSHIP

LAND/LOT
 utilization: PUBLIC
 area (sq m): N.A.
 tenure: LEGAL RENTAL/OWNERSHIP

DWELLING
 location: PERIPHERY
 type: APARTMENTS
 number of floors: 3
 utilization: SINGLE/MULTIPLE
 physical state: FAIR

DWELLING DEVELOPMENT
 mode: INSTANT
 developer: PUBLIC
 builder: LARGE CONTRACTOR
 construction type: MASONARY, CONCRETE
 year of construction: 1960

MATERIALS
 foundation: CONCRETE
 floors: REINFORCED CONCRETE SLAB
 walls: BRICK
 roof: REINFORCED CONCRETE

DWELLING FACILITIES
 wc: 1
 shower: 1
 kitchen: 1
 rooms: 1
 other: VERANDAH

SOCIO-ECONOMIC DATA (related to user)

GENERAL: SOCIAL
 user's ethnic origin: MUSLIM
 place of birth: AHMEDABAD
 education level: PRIMARY SCHOOL

NUMBER OF USERS
 married: 4
 single: -
 children: 3
 total: 7

MIGRATION PATTERN
 number of moves: NONE
 rural - urban: -
 urban - urban: -
 urban - rural: -
 why came to urban area: -

GENERAL: ECONOMIC
 user's income group: LOW
 employment: INDUSTRIAL WORKER
 distance to work: 1 KM
 mode of travel: WALKING

COSTS
 dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS
 financing: PUBLIC SUBSIDIZED
 rent/mortgage: \$3-4/MONTH
 % income for rent/mortgage: 15-20%

APARTMENT-BAPUNAGAR, Ahmedabad: (top) Extension of household chores outside the dwelling units for the ground floor occupants (1975).
 (centre) Corridor (1975).
 (right) Use of verandah for storage (1975).

CASE STUDY SOURCES

Plan: (accurate) Gujarat Housing Board, Ahmedabad, 1973.
 Land Use Pattern: (approximate) IBID.
 Circulation Pattern: (approximate) IBID.
 Segment Plan: (approximate) IBID.
 Block Plans: (accurate) IBID, Field Survey, A.Desai, 1975.
 Block Land Utilization: (approximate) IBID.
 Typical Dwellings: (approximate) IBID.
 Physical Data: (approximate) IBID.
 Socio-Economic Data: (approximate) IBID.
 Photographs: G.Patel, A.Desai, 1975, N.Patel, 1974.
 General Information: Reports, School of Architecture, Ahmedabad, 1974.

**6 AMBAWADI,
Harijanwas**

PUBLIC, LOW INCOME, ROOM

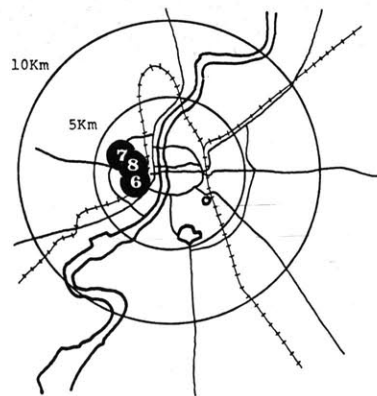
**7 AMBAWADI,
'L Colony**

PUBLIC, MIDDLE INCOME, HOUSE

**8 AMBAWADI,
Nehrunagar**

PUBLIC, MIDDLE INCOME, APARTMENT

Ahmedabad



LOCATION: This area, located on the west of the river Sabarmati, is in the south western part of the city. It is bounded by two major vehicular roads and a railroad forming a triangle. The city centre is about 5 km. in the east of the locality and the university is about 3 km. in the north.

ORIGINS: The locality, although a very old residential part of the city, has developed mainly after the creation of Gujarat as a separate state. The 'Sachivalaya' or the Secretariat of the government was temporarily located in the then newly built polytechnic on Dr. V. Sarabhai road in the north western part of the locality.

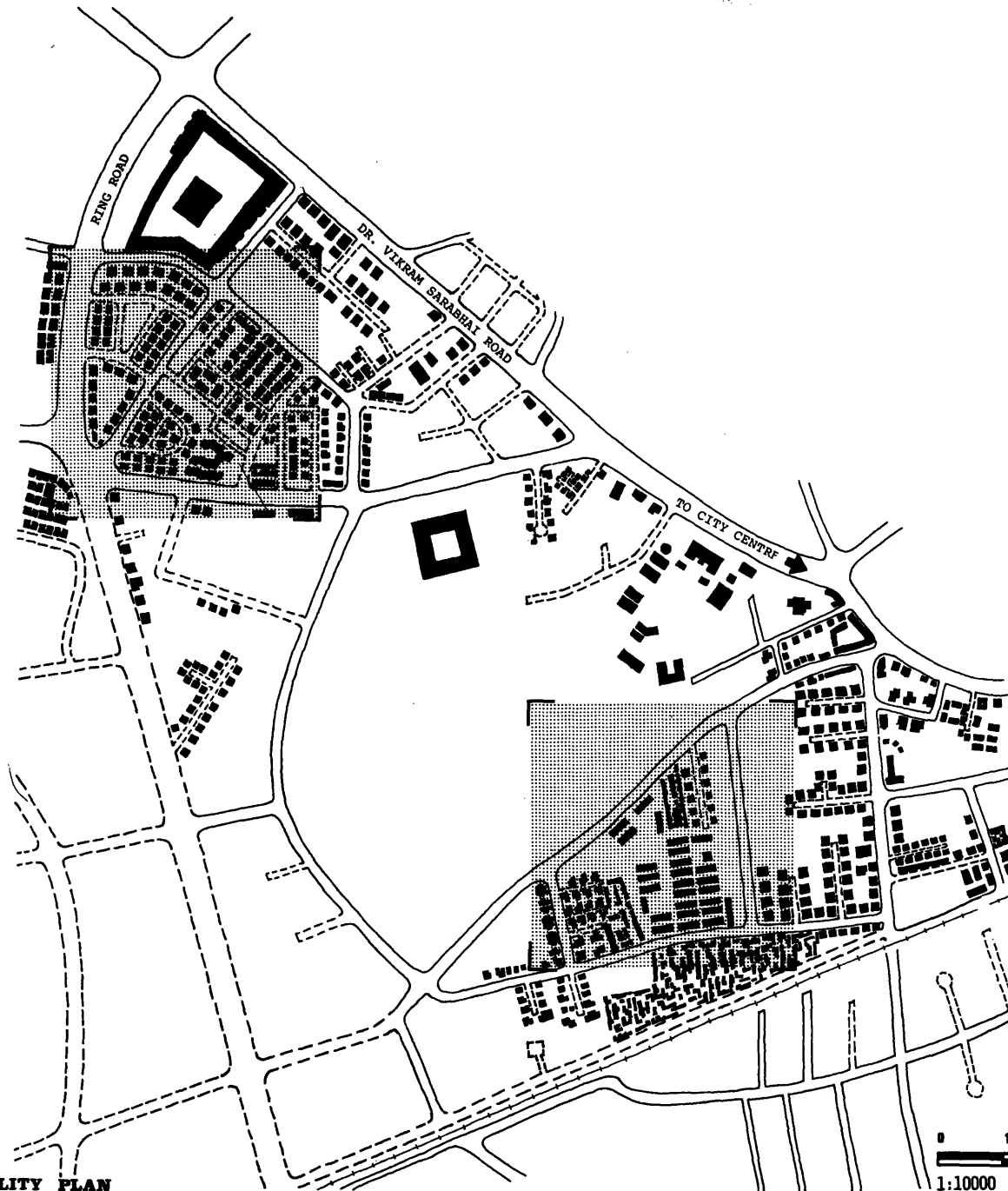
AMBAWADI, Ahmedabad: (top) A general view of the mixed income group residential developments (1974). (bottom) A view of the middle income residential area from the Ring road. (1975).



The establishment of a very large scale educational complex has also played a major role in its development. Pockets of squatter settlements exist here as in Navrangpura as a necessary supporting element to the upper middle and high income population. 90% of the detached and semi-detached houses and apartments are owned by the occupants.

LAYOUT: There is no consistency in the pattern of layout because of the subdivision of larger lots into smaller lots by various agencies for a variety of uses, the main being government housing projects for its employees, co-operative societies, private apartments, squatter settlements and different institutions. The arbitrary layout, owing to the existing building bye-laws, has resulted into wastage of land and inefficient service network systems.

 SELECTED
 SEGMENT







LOCALITY PLAN



LANDUSE: A large portion of this locality is occupied by one of the largest educational institution of the city comprising of primary and secondary schools, a Fine Arts college, a Physical education college and agricultural fields. The rest is predominantly a residential area with its ancillary commercial facilities with the exception of 'Panjrapol', an institution for sick and abandoned animals in the northern part of the locality.

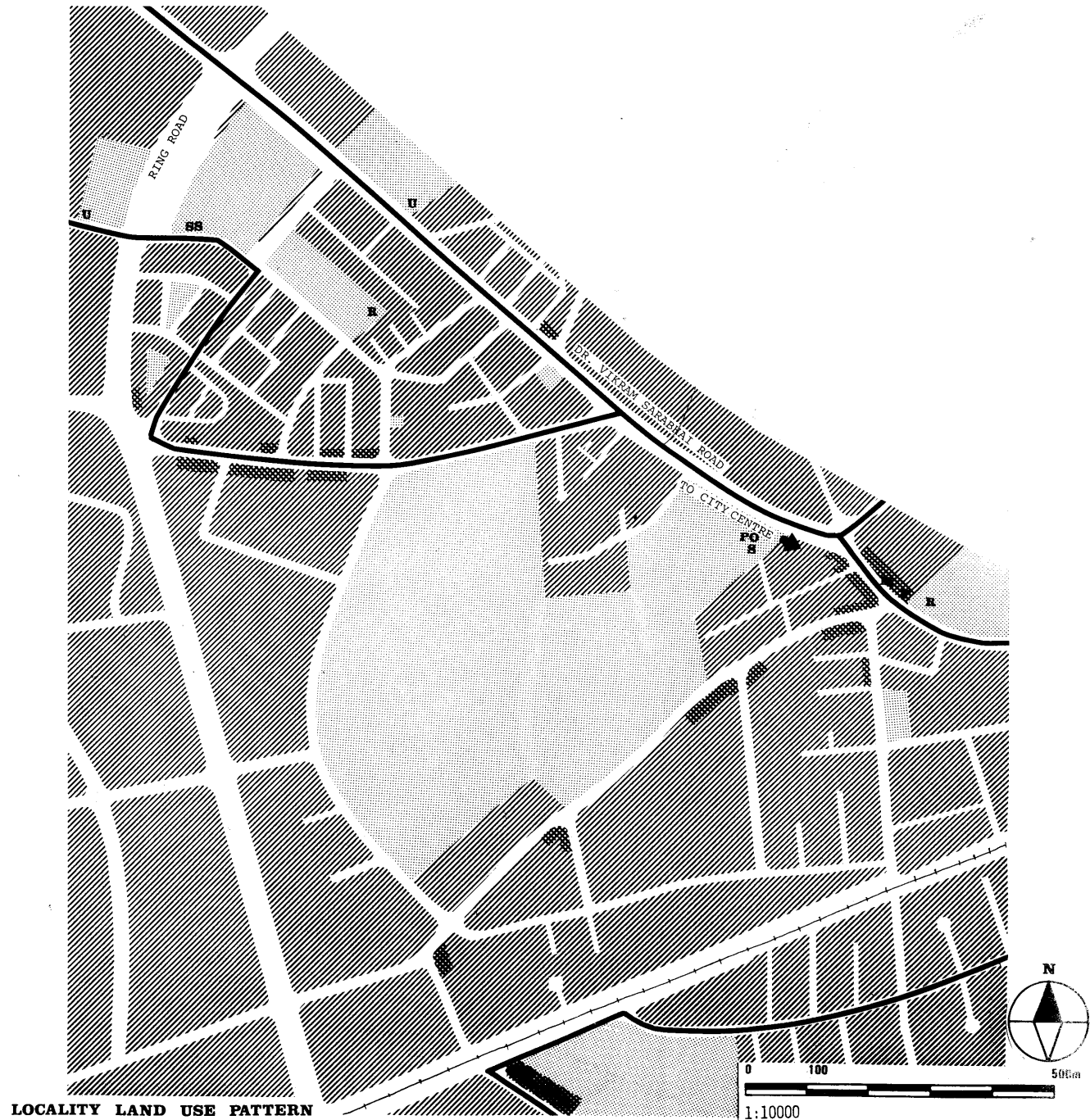
'Rabaris', a community earning their living by selling milk to the neighbouring areas occupy a small but dense area in the south eastern part of the locality with their animals. Future development is taking place in the south west.

AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

KEY

- Pk** Parking
- P** Police
- F** Fire Department
- S** School
- Ch** Church
- R** Recreation
- L** Library
- U** University
- H** Health
- PO** Post Office
- SS** Social Services
- M** Market
- C** Cemetery
-  Bus
-  Rapid Transit





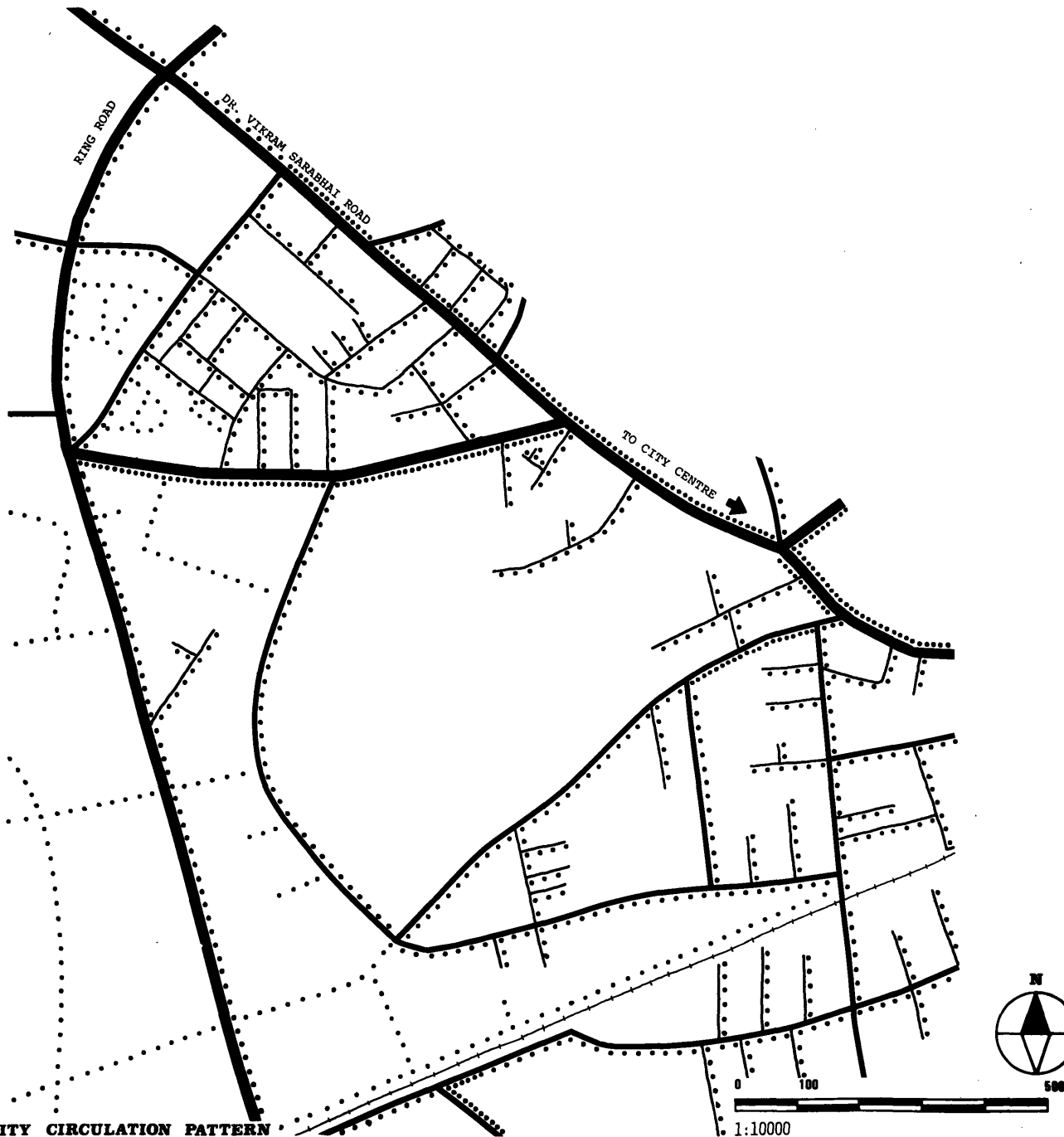
LOCALITY LAND USE PATTERN

1:10000

CIRCULATION: Dr. V. Sarbhai road running on the north east of the locality is the main link to the city centre and is used heavily by vehicles and pedestrians. The 40 mt. wide ring road in the north west has very little traffic on it. Almost all the streets, barring the major ones have a predominant pedestrian traffic. The internal roads of the co-operative societies and the apartment blocks are often not paved and have no storm drainage. The circulation network is arbitrary owing to reasons arising from the mode of development.

KEY

-  VEHICULAR
-  PEDESTRIAN

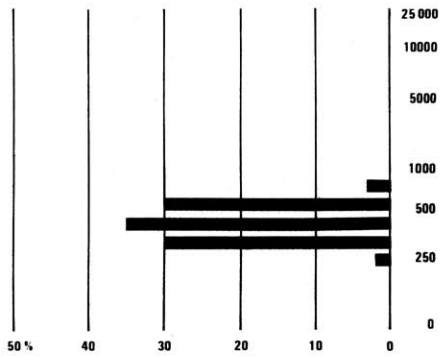


LOCALITY CIRCULATION PATTERN

1:10000

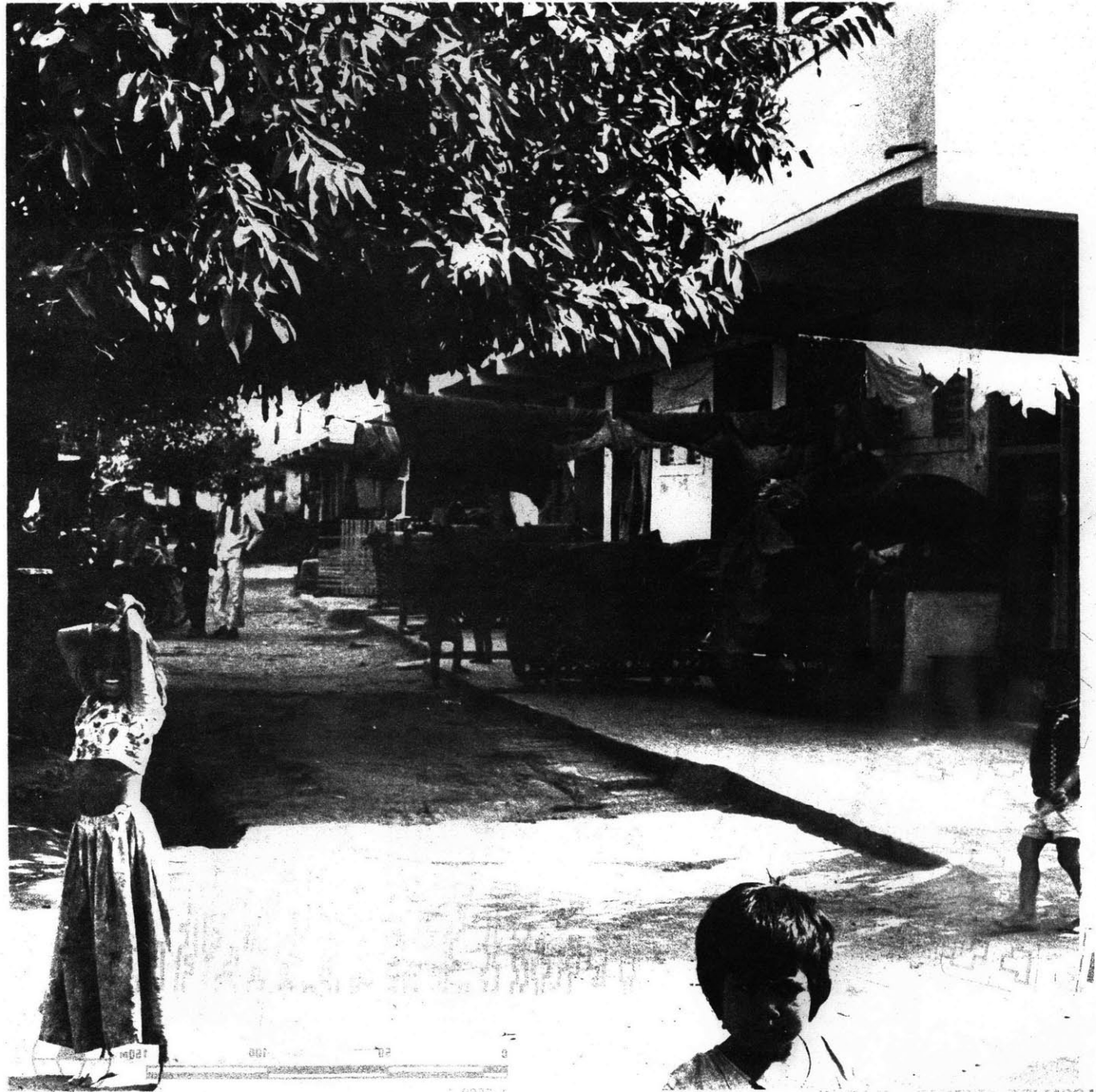
POPULATION: No data is available for the population distribution of this locality segment. Most of it comes under the category of scheduled castes and tribes and a majority of them are employed by the municipal corporation of the city and the rest work as skilled labourers in the building industry. The population of the squatter settlements surrounding the housing project also has similar employment trends.

INCOME: Average annual household income was estimated to be U.S. \$480 in 1970. Average rent in the housing project is U.S. \$2-3 per month.



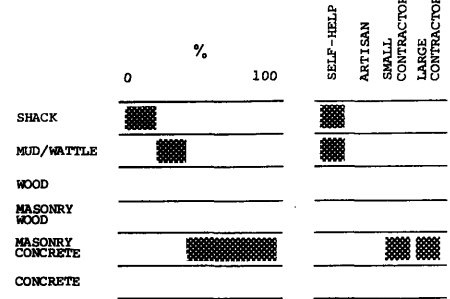
HARIJANWAS ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source Reports, School of Architecture, Ahmedabad,
1971, 1975.

HARIJANWAS-AMBAWADI, Ahmedabad: Living pattern of the ground floor occupants (1974).





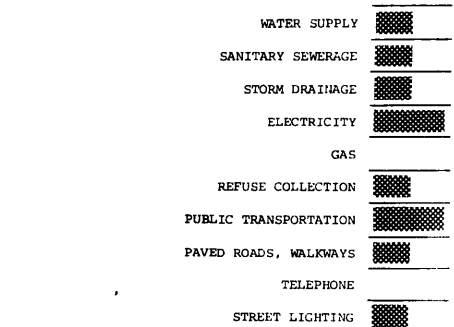
SEGMENT CONSTRUCTION TYPES



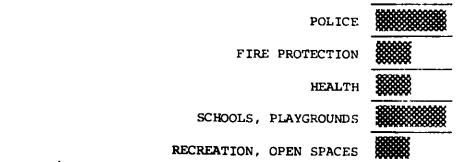
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: approximate

SEGMENT UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: approximate

LOCALITY SEGMENT PLAN 'A'

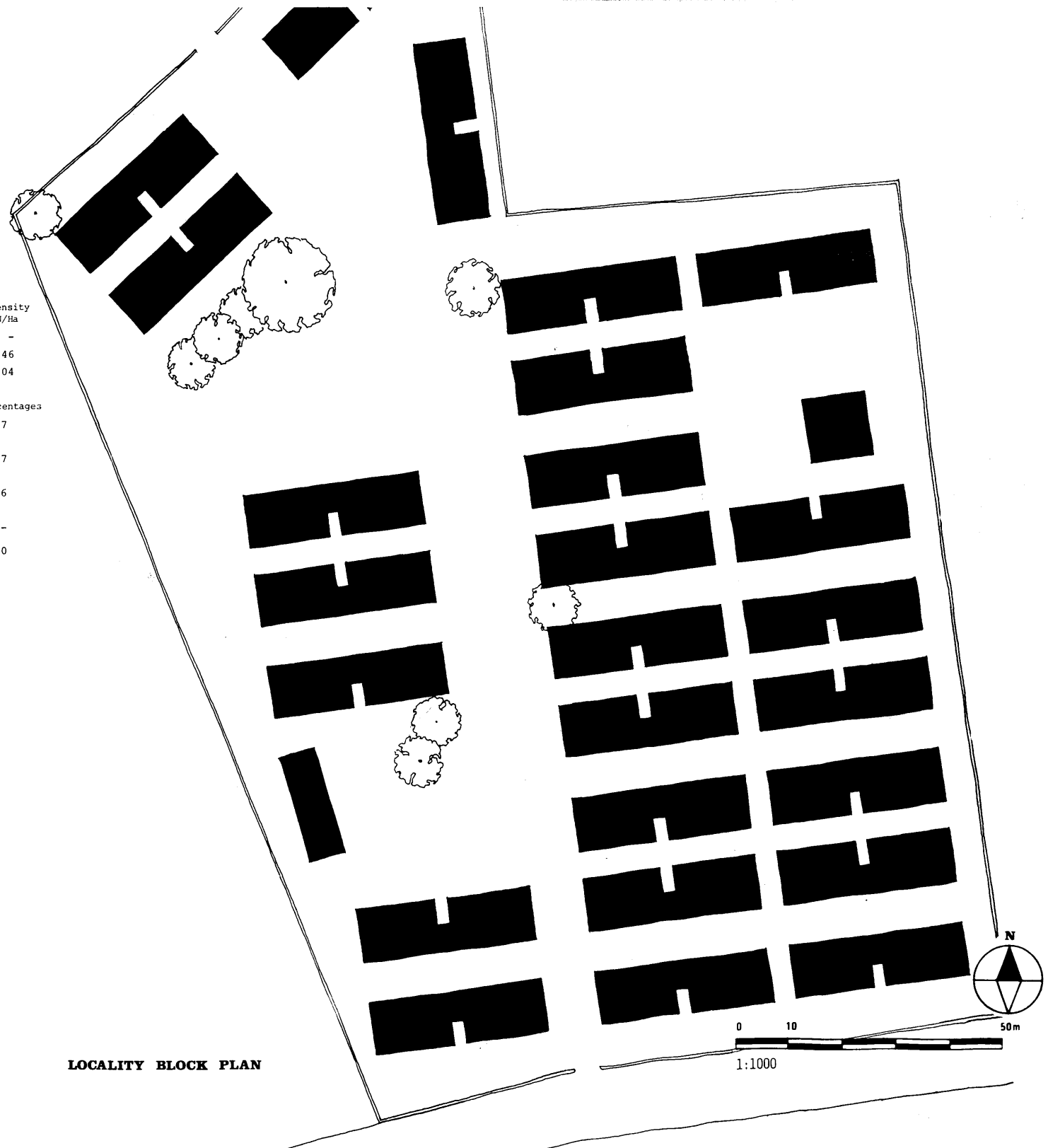


██████████ SELECTED BLOCK

HARIJANWAS LAND UTILIZATION DATA

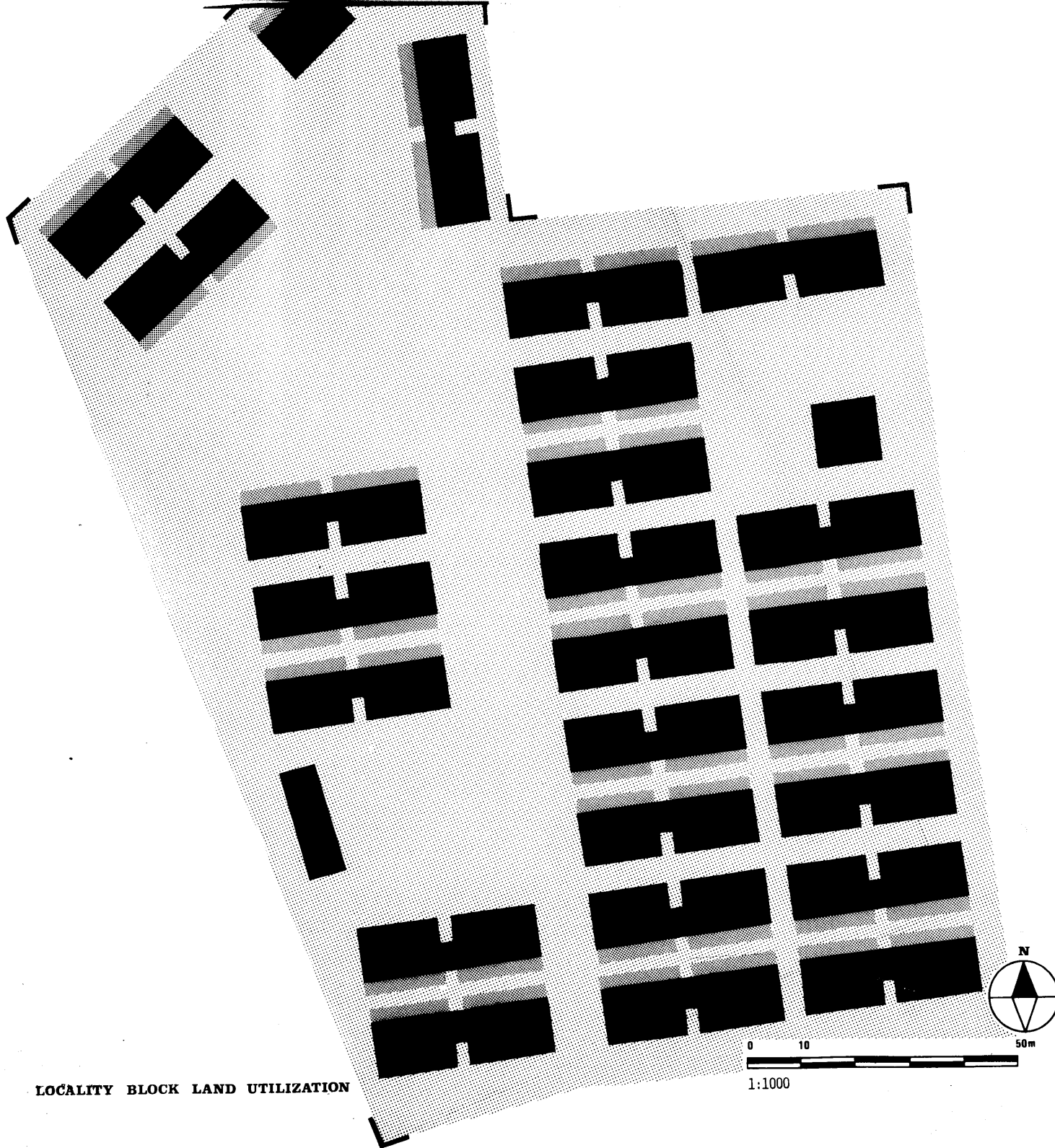
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	2.76	-
DWELLING UNITS	680	2.76	246
PEOPLE	4150	2.76	1504

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.19	7
SEMI-PUBLIC (open spaces, schools, community centers)	1.59	57
PRIVATE (dwellings, shops, factories, lots)	0.98	36
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	2.76	100

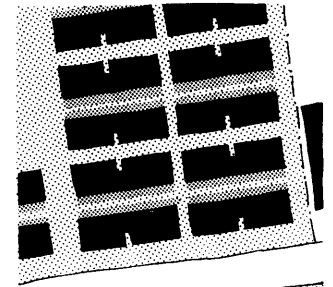


LOCALITY BLOCK PLAN

LAND UTILIZATION DIAGRAMS



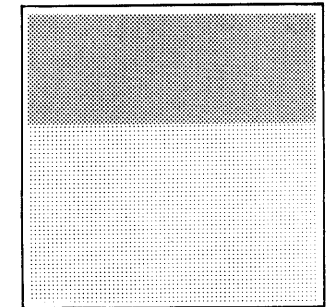
1 Hectare



PATTERN

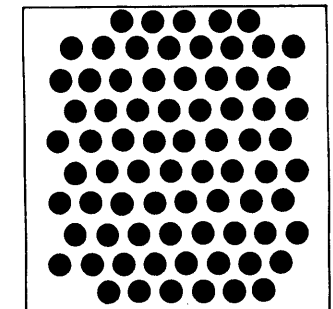
- Public: streets/walkways:
- Semi-Public: playgrounds:
- Semi-Private: cluster courts:
- Private: lots:
- dwellings:

1 Hectare



PERCENTAGES	Streets/Walkways	7
	Playgrounds	57
	Cluster Courts	-
	Dwellings/Lots	36

1 Hectare

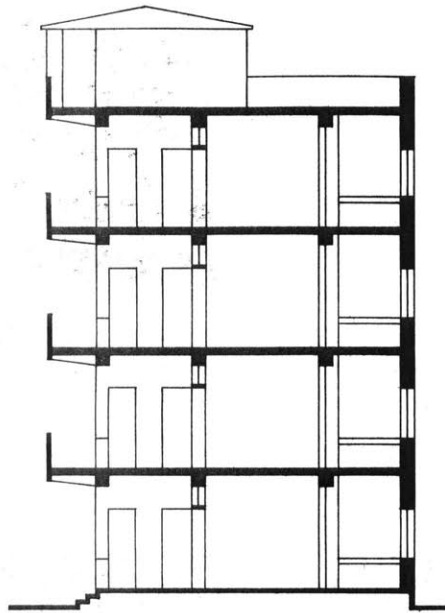


DENSITY Persons Hectare 1504

● 20 Persons

LOCALITY BLOCK LAND UTILIZATION

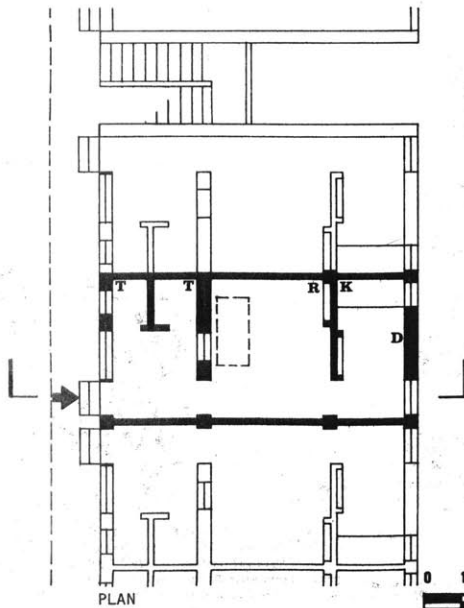
1:1000



SECTION



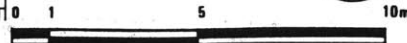
ELEVATION



PLAN

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



1:200

TYPICAL DWELLING

DWELLING ACTIVITY AREA CHARACTERISTICS

		ENCLOSED	SEMI-ENCLOSED	OPEN
COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			



PHYSICAL DATA (related to dwelling and land)

DWELLING UNIT
 type: ROOM
 area (sq m): 32
 tenure: LEGAL RENTAL

LAND/LOT
 utilization: PUBLIC
 area (sq m): N.A.
 tenure: LEGAL RENTAL

DWELLING
 location: INNER RING
 type: ROW/GROUPED WALK-UPS
 number of floors: 3
 utilization: MULTIPLE
 physical state: FAIR

DWELLING DEVELOPMENT
 mode: INSTANT
 developer: PUBLIC
 builder: LARGE CONTRACTOR
 construction type: MASONARY, CONCRETE
 year of construction: 1962

MATERIALS
 foundation: CONCRETE
 floors: REINFORCED CONCRETE SLAB
 walls: BRICK, BRICK COLUMNS
 roof: REINFORCED CONCRETE SLAB

DWELLING FACILITIES
 wc: 1
 shower: 1

SOCIO-ECONOMIC DATA (related to user)

GENERAL: SOCIAL
 user's ethnic origin: HINDU, HARIJAN
 place of birth: NEIGHBOURING DISTRICT
 education level: NONE

NUMBER OF USERS
 married: 2
 single: 1
 children: 3
 total: 6

MIGRATION PATTERN
 number of moves: 2
 rural - urban: 1955
 urban - urban: 1962
 urban - rural: -

why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
 user's income group: VERY LOW
 employment: MUNICIPAL WORKER
 distance to work: 4 KM
 mode of travel: BUS

COSTS
 dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS
 financing: PUBLIC SUBSIDIZED
 rent/mortgage: \$2-3/MONTH
 % income for rent/mortgage: 10%

HARIJANWAS-AMBAWADI, Ahmedabad: (left) Back alley (1974).
 (centre) A general view of the walk-ups (1974).
 (right) Extension of the dwelling unit into the corridor (1974).

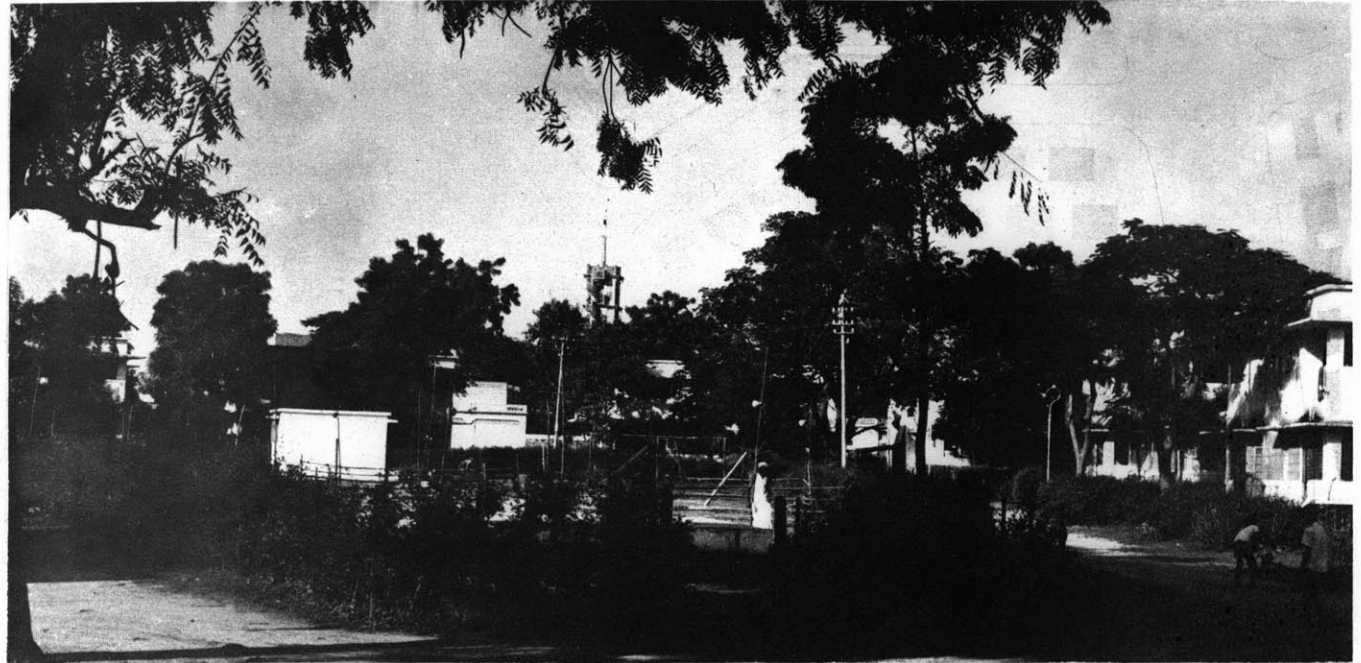
CASE STUDY SOURCES

Plan: (approximate) Student Surveys,
 School of Architecture, Ahmedabad, 1973.
 Land Use Pattern: (approximate) IBID.
 Circulation Pattern: (approximate) IBID
 General Information: IBID.

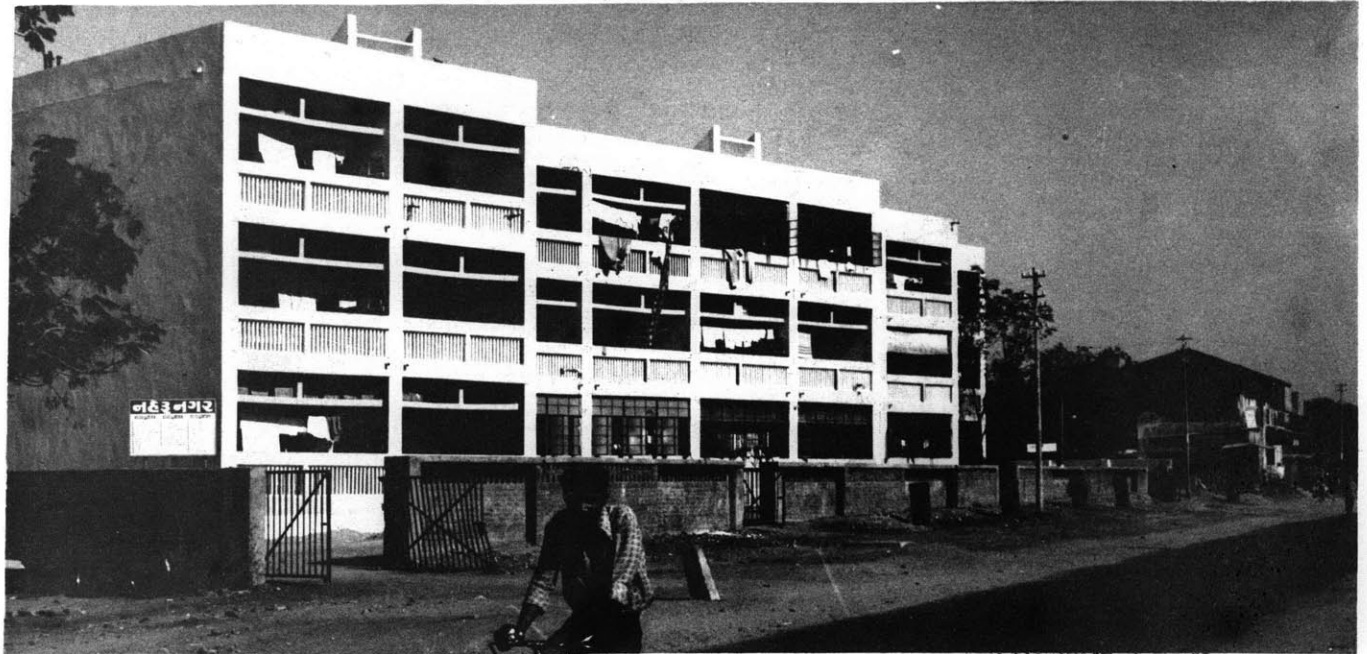
LOCALITY SEGMENT 'A' SOURCES

Segment Plan: (approximate) Student Surveys,
 School of Architecture, Ahmedabad, 1973.
 Block Plan: (approximate) Field Surveys,
 P.Zaveri, N.Patel, 1974
 A.Desai, A.Chavda, V.Chavda,
 1975.
 Block Land Utilization: (approximate) IBID.
 Typical Dwelling: (approximate) IBID.
 Physical Data: (approximate) IBID.
 Socio-Economic Data: (approximate) IBID.
 Photographs: N.Patel, P.Zaveri, 1974
 V.Chavda, 1975.

POPULATION: No data is available for the population distribution of this locality segment. Occupationally it can be divided into three major groups namely the government servants, the businessmen and the professionals. The literacy rate among them is fairly high. There are scattered pockets of squatter settlements.



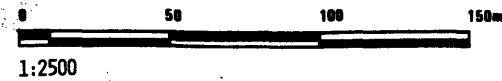
INCOME: No data is available for the income distribution of this locality segment but an approximate figure can be arrived at from various sources which show that a majority of its population can come under the category of middle and upper middle income group with average annual household income of U.S. \$1400.



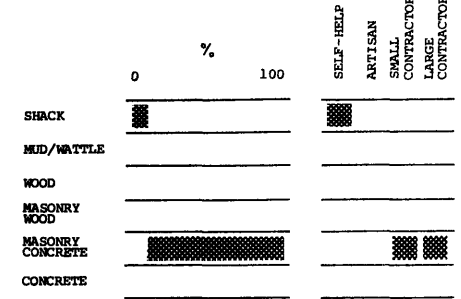
AMBAWADI, Ahmedabad: (top) Playground in the 'L' Colony (1973).
(bottom) A view of Nehrunagar from the road (1974).



LOCALITY SEGMENT PLAN 'B'



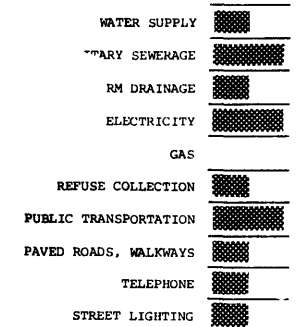
SEGMENT CONSTRUCTION TYPES



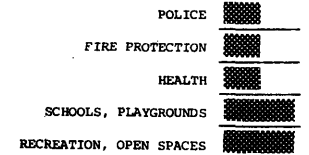
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: approximate

SEGMENT UTILITIES AND SERVICES



SEGMENT COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

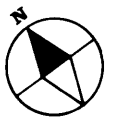
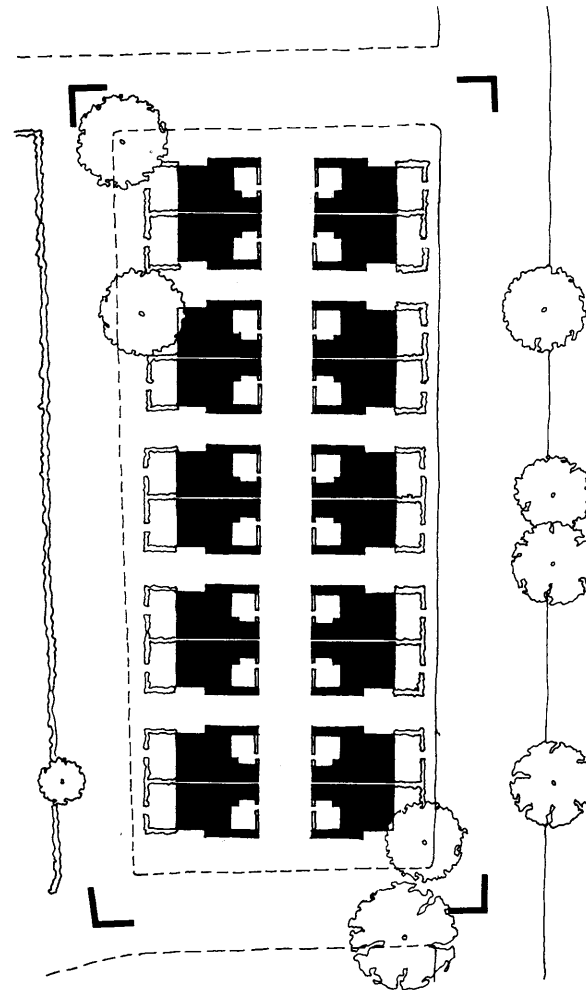
Quality of information: approximate

█ SELECTED BLOCK

'L' COLONY LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	20	0.63	31
DWELLING UNITS	40	0.63	63
PEOPLE	215	0.63	341

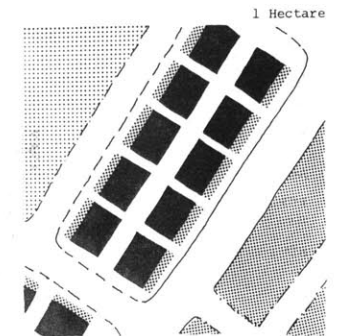
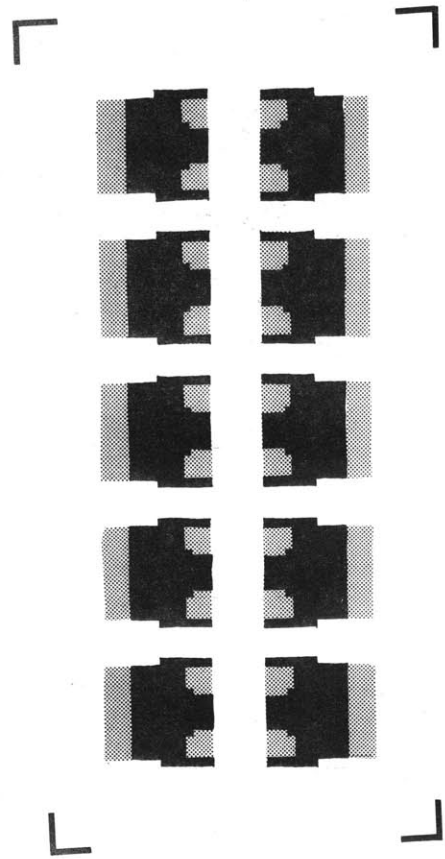
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.44	70
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.19	30
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.63	100




1:1000


LOCALITY BLOCK PLAN


LAND UTILIZATION DIAGRAMS





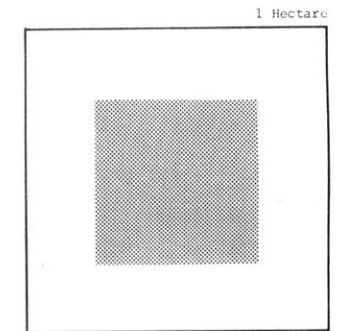
PATTERN

Public: streets/walkways 

Semi-Public: playgrounds 

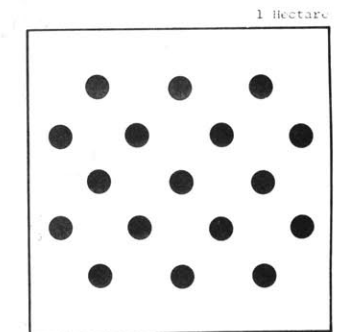
Semi-Private: cluster courts 

Private: lots 
 dwellings 



PERCENTAGES

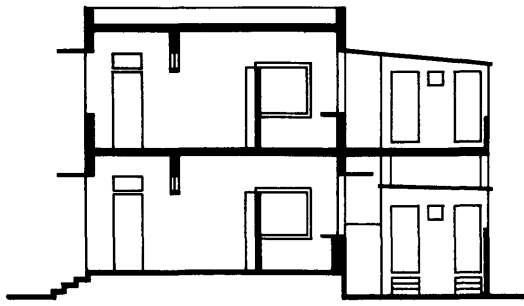
Streets/Walkways	70
Playgrounds	-
Cluster Courts	-
Dwellings lots	30



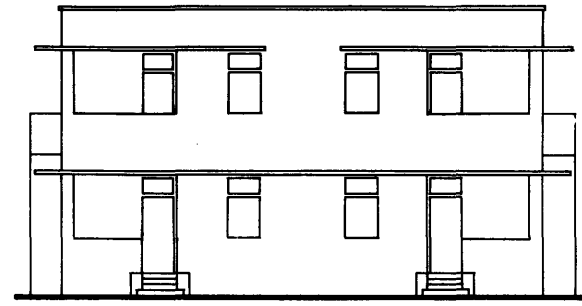
DENSITY

Persons/Hectare	341
20 Persons	

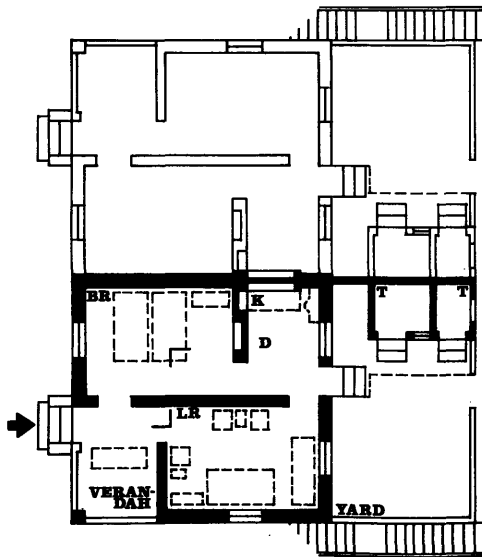




SECTION



ELEVATION



PLAN



1:200

- KEY
- LR Living Room
 - D Dining/Eating Area
 - BR Bedroom
 - K Kitchen/Cooking Area
 - T Toilet/Bathroom
 - L Laundry
 - C Closet
 - S Storage
 - R Room (multi-use)

DWELLING ACTIVITY AREA CHARACTERISTICS

		ENCLOSED	SEMI-ENCLOSED	OPEN
COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			

PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT

type: HOUSE
 area (sq m): 49
 tenure: LEGAL OWNERSHIP

LAND/LOT

utilization: PRIVATE
 area (sq m): 98
 tenure: LEGAL OWNERSHIP

DWELLING

location: PERIPHERY
 type: SEMI-DETACHED
 number of floors: 2
 utilization: SINGLE
 physical state: GOOD

DWELLING DEVELOPMENT

mode: INSTANT
 developer: PUBLIC
 builder: LARGE CONTRACTOR
 construction type: MASONARY, CONCRETE
 year of construction: 1961

MATERIALS

foundation: CONCRETE
 floors: CONCRETE
 walls: BRICK
 roof: REINFORCED CONCRETE

DWELLING FACILITIES

wc: 1
 shower: 1
 kitchen: 1
 rooms: 2
 other: VERANDAH

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

user's ethnic origin: HINDU
 place of birth: PAKISTAN
 education level: UNIVERSITY

NUMBER OF USERS

married: 2
 single: 3
 children: -
 total: 5

MIGRATION PATTERN

number of moves: 2
 rural - urban: -
 urban - urban: 1947, 1960
 urban - rural: -
 why came to urban area: -

GENERAL: ECONOMIC

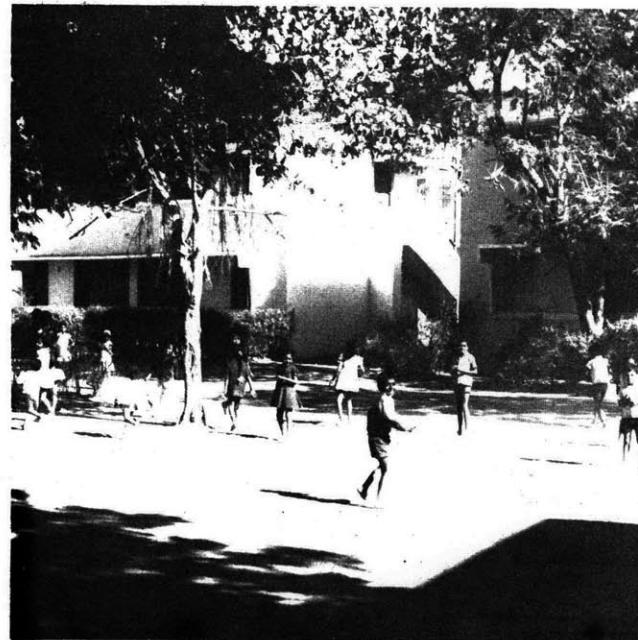
user's income group: MIDDLE
 employment: GOVERNMENT OFFICER
 distance to work: 25 KM
 mode of travel: BUS

COSTS

dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS

financing:
 rent/mortgage:
 % income for rent/mortgage:

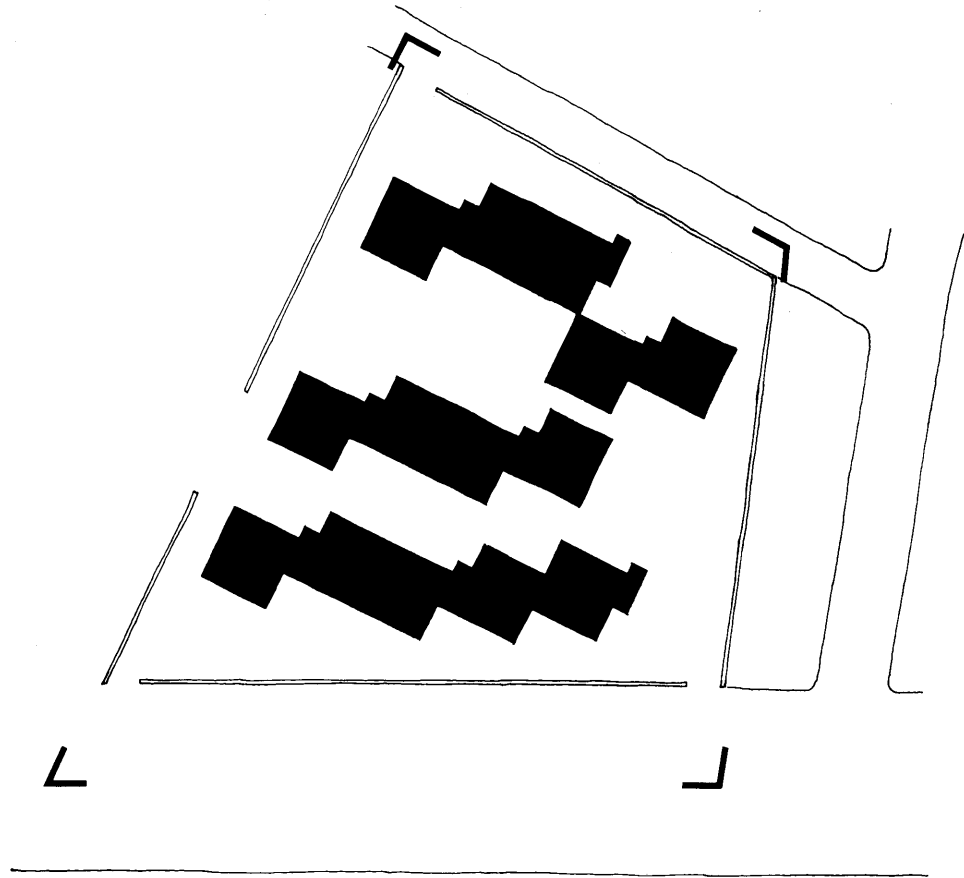


'L' COLONY-AMBAWADI, Ahmedabad: (top) A general view (1973)
 (bottom left) Excessive circulation area serving as a
 playground (1974).
 (bottom right) Use of verandah on the first floor as
 a room (1974).

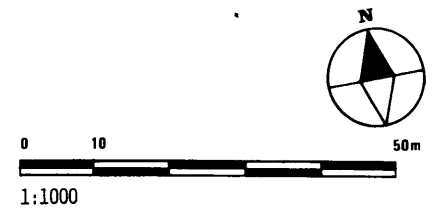
NEHRUNAGAR LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	0.54	-
DWELLING UNITS	42	0.54	78
PEOPLE	175	0.54	324

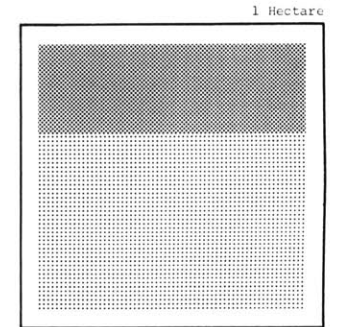
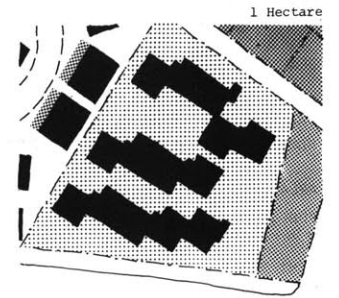
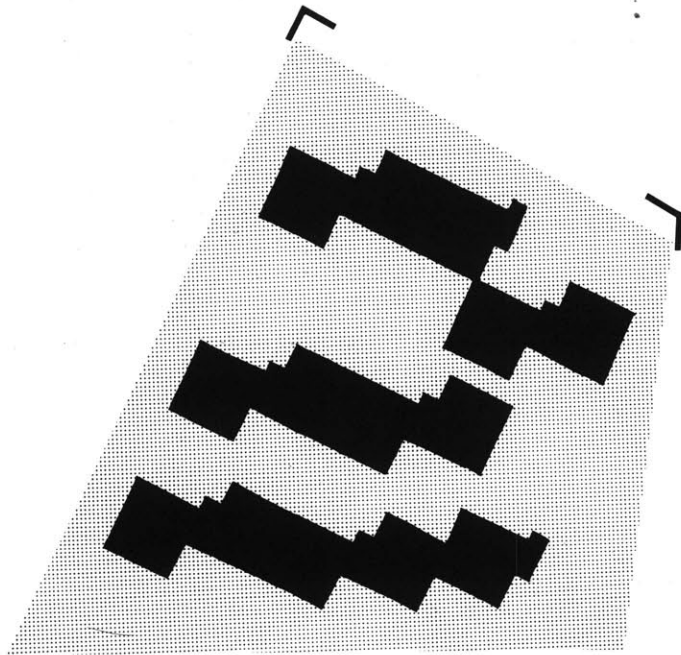
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.13	24
SEMI-PUBLIC (open spaces, schools, community centers)	0.28	52
PRIVATE (dwellings, shops, factories, lots)	0.13	24
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.54	100



LOCALITY BLOCK PLAN

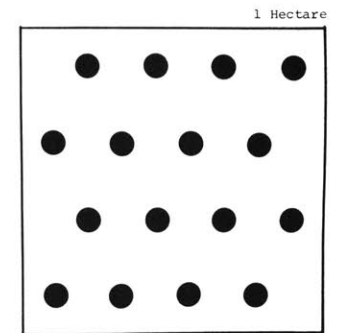


LAND UTILIZATION DIAGRAMS



PERCENTAGES

Streets/Walkways	24
Playgrounds	52
Cluster Courts	-
Dwellings/Lots	24



DENSITY

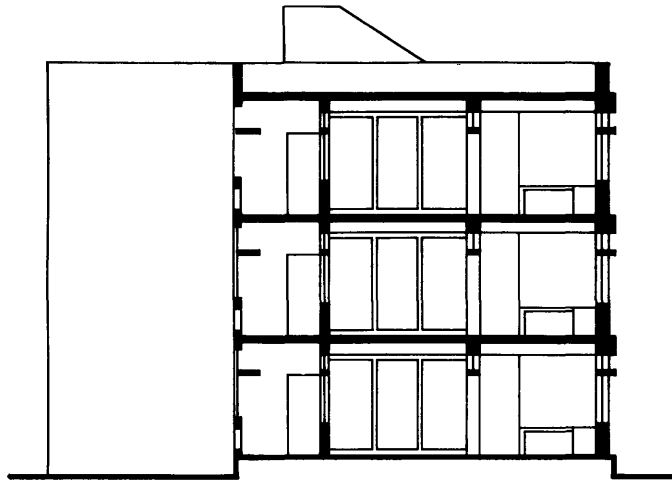
Persons/Hectare	324
-----------------	-----

20 Persons

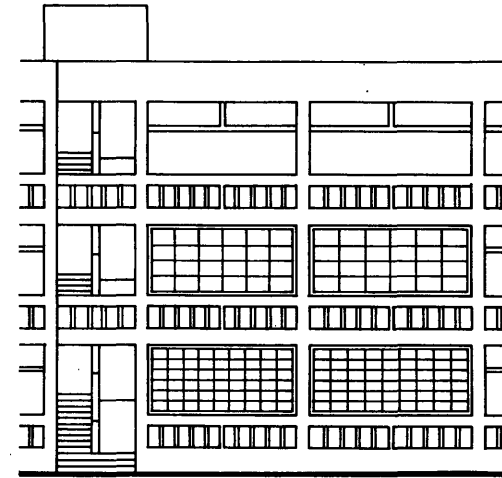


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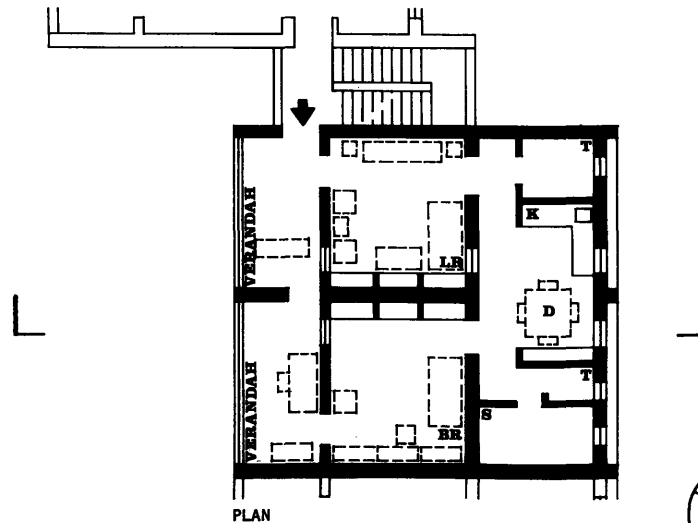
LOCALITY BLOCK LAND UTILIZATION



SECTION



ELEVATION



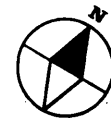
PLAN

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)

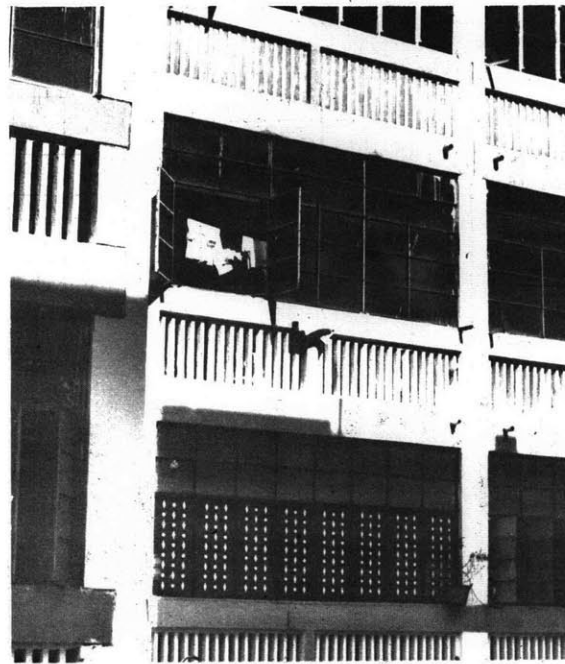
DWELLING ACTIVITY AREA CHARACTERISTICS

		ENCLOSED	SEMI-ENCLOSED	OPEN
COOKING	summer			
	monsoon			
	winter			
SLEEPING	summer			
	monsoon			
	winter			
LEISURE	summer			
	monsoon			
	winter			
HOUSEHOLD CHORES	summer			
	monsoon			
	winter			



1:200

TYPICAL DWELLING



PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT
 type: APARTMENT
 area (sq m): 90
 tenure: LEGAL OWNERSHIP

LAND/LOT
 utilization: SEMI-PUBLIC
 area (sq m): -
 tenure: LEGAL OWNERSHIP

DWELLING
 location: PERIPHERY
 type: WALK-UP
 number of floors: 3
 utilization: SINGLE
 physical state: GOOD

DWELLING DEVELOPMENT
 mode: INSTANT
 developer: PUBLIC
 builder: LARGE CONTRACTOR
 construction type: MASONARY, CONCRETE
 year of construction: 1964

MATERIALS
 foundation: CONCRETE
 floors: REINFORCED CONCRETE SLAB
 walls: BRICK
 roof: REINFORCED CONCRETE

DWELLING FACILITIES
 wc: 1
 shower: 1
 kitchen: 1
 rooms: 3
 other: 2 VERANDAHS, 1 PRAYER ROOM

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL
 user's ethnic origin: HINDU
 place of birth: NEIGHBOURING DISTRICT
 education level: UNIVERSITY

NUMBER OF USERS
 married: 2
 single: 2
 children: -
 total: 4

MIGRATION PATTERN
 number of moves: 1
 rural - urban: 1930
 urban - urban: -
 urban - rural: -
 why came to urban area: EDUCATION

GENERAL: ECONOMIC
 user's income group: UPPER MIDDLE
 employment: DRUG MANUFACTURER
 distance to work: 7 KM
 mode of travel: BUS

COSTS
 dwelling unit:
 land - market value:

DWELLING UNIT PAYMENTS
 financing: PRIVATE
 rent/mortgage:
 % income for rent/mortgage:

NEHRUNAGAR-AMBAWADI, Ahmedabad: (left) Access to the apartment blocks (1974).
 (centre) Facade of the apartments; the windows were installed illegally by the owners after occupancy (1974)
 (right) Use of the verandah for storage and as a room after the installation of the windows (1974).

LOCALITY SEGMENT 'B' SOURCES

Segment Plan: (approximate) Gujarat Housing Board, 1973.
 Block Plans: (approximate) Field Surveys, P.Zaveri, N.Patel, 1974, A.Desai, 1975.
 Block Land Utilization: (approximate) IBID.
 Typical Dwellings: (accurate) IBID.
 Physical Data: (approximate) IBID.
 Socio-Economic Data: (approximate) IBID.
 Photographs: G.Patel, 1973, P.Zaveri, N.Patel, 1974, A.Desai, 1975.



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by the author.

pp. 74-75

PHYSICAL DATA MATRIX

Category	Population per Category	% of Total Population	LOCALITIES	USER	DWELLING UNIT				LAND/LOT			DWELLING					DWELLING DEVELOPMENT					
				5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
				Income	Type	Area	Ten- ure	Rent/ Mort.	Utili- zation	Area	Tenure	Loca- tion	Type	No. Floors	Utili- zat'n	Phy. State	Mode	Devel- oper	Builder	Construction Type	Date	Den.
				Very Low	Shanty Room	50m ² or less	Legal Rental	Public			Extralegal Rental	City Centre	Detached	1	Bad	Incremental	Self-Help	Shack				
				Low	Room	51-100m ²	Legal Rental	Semi-Public			Legal Rental	Inner Ring	Semi-Detached	2	Fair	Instant	Artisan	Rud and Wattle				
				Middle	Apartment	101m ² or more	Legal Ownership	Private			Legal Ownership	Periphery	Row/Group	3 or more	Good	Popular	Small Contractor	Masonry/Wood				
				Upper Middle	House							High-Rise				Private	Large Contractor	Masonry/Concrete				
				High														Concrete				
																			Year of Construction	People/ha		
A	350,000	20	1. WALLED CITY						67										1880	588		
B	1,050,000	61	2. NAVRANGPURA (Lakhudi, Chawls)						N.A.										1970	568		
C	120,000	7	3. NAVRANGPURA (Co-op. Society)						375										1962	100		
			4. BAPUNAGAR (Row House)						35										1960	698		
			5. BAPUNAGAR (Walk-up)						N.A.										1960	596		
D	150,000	9	6. AMBAWADI (Harijanwas)						N.A.										1962	1504		
			7. AMBAWADI ('L' Colony)						98										1961	341		
E	50,000	3	8. AMBAWADI (Nehrunagar)						N.A.										1964	324		
	1,720,000	100	TOTAL POPULATION																			

The physical data of the 8 case studies of dwelling environments existing in the Metropolitan Area is summarized in the physical data matrix and in the following comments. The matrix permits: a) a comprehensive view of the spectrum of dwelling types; b) a comparison and determination of trends and patterns.

The population figures represent the inhabitants of similar dwelling systems in Ahmedabad Metropolitan Area.

(1) CATEGORY

(2) POPULATION PER CATEGORY: Number of people
(3) PERCENT OF TOTAL POPULATION

(4) NAME OF THE LOCALITY: The eight case studies have been grouped in five different categories, according to different income groups, housing systems and selected physical characteristics. The five categories shown were identified as follows:

Cat./Income	Dwelling type	Developer
A Middle/U.Middle	Traditional	Private
B V.Low/Low	Shanty	Popular
		Private
C U.Middle/High	House	Private
D V.Low/Low	Room/Apt.	Public
E Middle/U.Middle	House/Apt.	Public

Category A includes the traditional dwelling system representing 20% of city's population. Category B representing a majority of the city dwellers (61%), is formed by the very low income and low income groups in squatter settlements and chawls. Category C includes

the 7% upper income strata of the city; whereas categories D and E represent public housing projects for very low and low income groups (9%) and, middle and upper-middle income groups (3%).

(5) USER INCOME GROUP: The income level is taken as an indicator in the analysis of the dwelling systems. The role of a dwelling unit changes from a bare necessity to a commodity from lower income groups to higher income groups. The lower income group is too large to be provided with housing accommodation and hence a large proportion of it squats on the available undeveloped land near their employment centres. Lakhudi represents the lowest income group and the co-operative societies, the highest.

(6) DWELLING UNIT TYPE: Four types of dwelling units based on their characteristics are considered; SHANTY: very low income gro-

group; ROOM: very low and low income group; APARTMENT: low, middle and upper middle income group; and HOUSE: middle, upper middle and high income group.

(7) DWELLING UNIT AREA: Dwelling unit area is observed to be a function of household income and increases with it. Three major divisions are considered: a) less than 50 m²; b) 51 to 100m²; and c) more than 100m². The very low and low income groups fall under the first category whereas the second category absorbs middle and upper middle income people. Dwelling units of more than 100m² area are accessible only to the upper middle and high income group economically. The dwelling unit area ranges from 12m² of a squatter in Lakhudi to 210m² of a house in the co-op. society. It is seen that providing 2-3 storied walk-ups for occupants of one room dwelling results in very dense living conditions within the dwelling unit

Owing to its inability to extend into an open area.

(8) DWELLING UNIT TENURE: Three situations are found among the very low and low income groups: a) extralegal ownership/rental, generally a characteristic of fresh migrants in the existing pockets of squatter settlements within the city; b) legal rental; and c) legal ownership both of which require payment in the form of rent or mortgage to the government. In the middle, upper middle and high income groups only two situations exist: a) legal rental and b) legal ownership; the latter of which is a characteristic of the high income group whereas the former, a decreasing form of tenure, is found more among people with transferable employment.

(9) DWELLING UNIT-PERCENT INCOME FOR RENT: Only the upper middle and high income group is observed to pay more than 20% of their income as rent. Within the category of 20% or less of the income, the rents vary from 7.5% in squatters to 15% in middle income apartments.

(10) LAND/LOT UTILIZATION: A clear fact emerges from these case studies that wherever the lot boundary has been defined clearly the utilization remains private among all the income groups. In the single storied dwelling systems with undefined lot boundaries the dwelling is extended in the direction of the entry particularly in case of very low income group, who already have very little enclosed area to accommodate a usually large family whereas in the walk-ups for the same income group the utilization is semi-public/public increasing the land wastage. Similar land/lot utilization is also noticed in walk-ups and houses for middle and upper middle income groups.

(11) LAND/LOT AREA: When measurable, it varies from 35m² in the very low/low income row houses to 450m² in the high income co-operative societies. The lot area in squatter settlements, by use, can be regarded as between 18 and 35m².

(12) LAND/LOT TENURE: Extra-legal rental/ownership is found among the very low income group in settlements like Lakhudi. Legal rental is predominant in the very low, low and middle income groups (Bapunagar, Harijanwas and Walled city), and legal ownership

is frequent in the upper middle and high income groups. ('L' Colony, Mehrunagar and co-operative society).

(13) DWELLING LOCATION: The city centre is occupied by the upper middle and middle income groups, the former of which are gradually moving out making room for the latter to move in closer to their employment centres. The very low/low income groups are located mainly on the eastern periphery within the industrial area with some settlements in the form of pockets within the middle and high income residential development on the west of the river.

(14) DWELLING TYPES: Detached types are found among the very low income group and high income group with a difference in the size of the dwelling and the lot. The former is the projection of the migrant's rural counterpart whereas the latter is a derivation of the western model, the growth of which is permitted by the existing building bye-laws.

Semi-detached houses are found among the middle income groups through both private as well as public efforts. There is a large proportion of row/group houses in the very low income group through both public as well as private efforts (chawls) Walk-ups are found in both, very low/low income groups and middle/upper middle income groups. They prove to be a complete failure in the former case in terms of dwelling adequacy. Already limited by the area of the enclosure, the occupants are not able to extend their dwellings/activities outside the enclosure because of the height. There are a few high-rise apartments in the city occupied by the upper middle and high income people.

(15) DWELLING FLOORS: Detached and row houses among the very low/low income groups are single storied but apartments in the same income groups are 3-4 stories in height. The middle and high income people occupy two storied houses and three storied walk-ups.

(16) DWELLING UTILIZATION: Almost all the lower income population has situations of single/multiple dwelling utilization which sometimes increases the number of occupants per dwelling to 8. The middle/high income

group generally have a single family utilization.

(17) DWELLING PHYSICAL STATE: Physical state of the dwellings in the squatters is extremely poor due to their economic inaccessibility to proper materials. Tin, canvas and asbestos for roofing and thatch, wood and mud for walls do not withstand the climatic hazards, in particular, the rain. Public housing projects generally are poorly maintained dwellings due to undefined responsibilities. The upper income group occupies dwellings with good physical condition.

(18) DWELLING DEVELOPMENT MODE: All the publicly developed systems are instant developments whereas the traditional system has grown over a period of centuries. The squatters are continuously growing and the high income detached houses are developed incrementally after considerable speculation.

(19) DWELLING DEVELOPER: Popular development is found among the squatter population due to the limited resources of the migrants and their inaccessibility to the credit institutions, both private and public. The government, through various agencies and funds provides residential accommodation to the very low, low and middle income groups; and the high income group has the capacity to raise the necessary capital or credit for their dwellings.

(20) DWELLING BUILDER: A majority of the dwellings for the very low, low and middle income groups, developed either by public or private agencies, are built by large contractors because of the instant mode of the development. The traditional dwellings were built by artisans of that period. Self-help is the method used by squatters owing to their poor economic condition. They constitute about 30% of the total dwelling units in the city.

(21) DWELLING CONSTRUCTION TYPES: The popular development of the squatter settlements and the private development of chawls are clearly the ones with less permanent nature although the latter have brick walls. among the materials used in this category are, compacted earth for foundations and floor; mud, thatch, bricks, wood and tin or

asbestos sheets for walls; and , corrugated sheets of iron or asbestos, canvas, plastic and thatch for roof. The rest of the construction, barring the traditional, is of masonry concrete type with occasional use of concrete columns. The traditional system has wooden frame structure with brick infill and stone flooring. The roof is either terraced or tiled.




(22) DWELLING DEVELOPMENT-YEAR OF CONSTRUCTION: The oldest part of the city is the walled city the development of which began in the early part of 15th century and was completed by the end of 19th century. The public housing of Bapunagar was started in 1950's. Navrangpura and Ambawadi began to be developed in 1930's but picked up momentum only in 1960 when Ahmedabad became the capital of the newly founded Gujarat State.

(23) DWELLING DEVELOPMENT-DENSITY: Population densities, with the exception of the walled city, are indicators of the income group for each dwelling system. Samples were taken from small homogeneous areas that include the land of a group of dwellings and their circulation access. Higher densities are generally indicative of lower income groups occupying shanties/row houses/apartments and lower densities indicate higher income groups living in houses/apartments. The traditional system, by the nature of the dwelling design, has a high density but is occupied by middle and upper middle income people.

COMMUNITY FACILITIES, UTILITIES/SERVICES MATRIX

Category	Population per Category	% of Total Population	LOCALITIES	COMMUNITY FACILITIES					UTILITIES AND SERVICES									
				Police	Fire Protection	Health	Schools, Playgrounds	Recreation	Water	Sewage	Storm Drainage	Electricity	Gas	Refuse Collection	Public Transportation	Paved Roads, Walkways	Telephone	Street Lighting
A	350,000	20	1. WALLED CITY	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
B	1,050,000	61	2. NAVRANGPURA (Lakhudi, Chawls)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C	120,000	7	3. NAVRANGPURA (Co-op. Society)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
D	150,000	9	4. BAPUNAGAR (Row House)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
			5. BAPUNAGAR (Walk-up)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
E	50,000	3	6. AMBAWADI (Harijanwas)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
			7. AMBAWADI ('L' Colony)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
			8. AMBAWADI (Nehrunagar)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	1,720,000	100	TOTAL POPULATION															

The matrix illustrates the approximate availability of community facilities, utilities and services in the 8 dwelling environments. Three levels are indicated as follows:

-  No provision at all
-  Limited or occasional
-  Adequate or normal

The population figures represent the inhabitants of similar dwelling systems in Ahmedabad Metropolitan Area.

The matrix is indicative of a direct correlation between the level of basic services such as water supply and sewerage and the level of income. Correlation of such nature cannot be established in the provision of other services and facilities. Transportation and schools are facilities which rate adequate in all cases. Electricity rates adequate in all cases except squatters for economic reasons and due to the extra-legality of their tenure.

The following observations are made for different case studies and are arranged in terms of income groups.

VERY LOW/LOW INCOME: Community facilities such as fire, police, health for this income group vary with the area of development and result in inaccessible health facility for some of them due to their economic inability to accept services of private physicians. Recreation areas are often proposed but rarely implemented leaving large pieces of undeveloped, unmaintained land for a long period of time for people to squats on.

Basic services such as water, sewerage exist in all the public housing systems however, its distribution and maintenance leaves much to be desired. Paved

roads are found in row houses whereas grouped walk-ups hardly have any differentiation between circulation areas and other semi-public areas. The level of street lighting is poor in general and services such as telephone are not within the economic capacity of this group.

The case of the squatter settlements is very different. Most of them have to wait for years before they get any services because they do not have a legal possession of the land. The requirement of a legal title to the land for the provision of services prevents the municipality from

taking any positive action. Recently squatter settlements existing prior to 1972 were legalized and common water taps and latrines were provided but they are not enough in number for its users.

There is a lack of adequate storm drainage in areas of this income group which floods the area occasionally during the monsoon season.

MIDDLE/UPPER MIDDLE/HIGH INCOME GROUP: Similar pattern of distribution of community facilities is observed for this income group but facilities such as health and education are easily accessible because of the economic capacity.

Water supply is inadequate, in general, in the city. However some co-operative societies and high income apartments have individual or collective water tanks. Sewerage is adequate but is not very well maintained; co-operative societies and other private developments are required to bear 50% of the cost of provision of services and hence many services such as paved roads, storm drainage etc. do not exist. This is due to the incremental mode of development of this system.

Brief comments on each of the utilities/services are as follows:

POLICE: Police protection is in the form of a police station which is located in most of the localities. Its area of operation varies considerably in size and is, therefore, found to be inadequate in some localities.

FIRE PROTECTION: Fires are not very frequent and therefore the fire stations are located at greater distances from each other. Their number particularly in the western part of the city is very low.

HEALTH: Health facilities are generally available in all areas. Privately run facilities, although in vicinity, are often not within the economic capacities of the low income population.

SCHOOLS, PLAYGROUNDS: Public and private schools are scattered all over the city and education upto high school is free in public schools. All the schools are not adequately supported by playgrounds.

RECREATION: Feature films are a major recreational attraction among the entire population and cinema houses are adequately located all over the city. Open spaces, although provided for in all areas except the walled city, generally remain undeveloped.

WATER: Water supply, mainly from the tube wells, is restricted to 2-3 hours in the mornings and for the same period in the evening. Among the settlements with common water facilities this situation creates many social problems.

SEWAGE: The city has a water borne sewage network; however all the dwelling systems are not connected to it for economic reasons.

STORM DRAINAGE: Storm drainage, during the monsoon months, is often found to be inadequate and floods the low lying areas. Its absence is noticeable among the high income group dwelling systems where the lot owners are required to pay 50% of its cost.

ELECTRICITY: It is generally available if land tenure is legal but is very expensive. A majority of the low income population uses oil lamps.

GAS: There is no service network of gas supply for the city. It is supplied in cylinders and is very expensive as a cooking fuel. Cowdung is used as its substitute among the very low income group.

REFUSE COLLECTION: Most of the waste produced in the residential areas is organic and is burned from time to time either by individuals or by the public authorities. The city collects the refuse at a certain intervals, however, specific containers for their collection in the residential areas do not exist.

PUBLIC TRANSPORTATION: It is generally adequate in all the residential areas.

PAVED ROADS, WALKWAYS: Public residential developments often have paved roads but not walkways whereas most private developments have roads with compacted earth surface. Major city streets are paved.

TELEPHONE: Its supply is so scarce that it is very difficult to acquire even for the high income groups.

STREET LIGHTING: It is provided in most public developments but is not adequate. Private developments, even among the high income groups, are often observed to be without any street lighting. The city streets in general have poor street lighting.

**LAND UTILIZATION:
PATTERNS, PERCENTAGES, DENSITIES**

Different case studies are represented here in terms of land utilization (patterns, Percentages and densities) in a similar format to allow comparison for the evaluation of the physical layout of each system.

The criteria used in the evaluations of efficiency of physical layouts in the survey are:

- LAND UTILIZATION DISTRIBUTION

Proportions of public and private areas within the layout. This determines the maintenance responsibility, user control and functional efficiency. e.g. A high percentage of circulation area means higher cost of development per person and, therefore indicates an inefficient layout.

- LAYOUT

Lot configuration, blocks and circulation. This determines the infrastructure network. e.g. Certain layouts result in complicated infrastructure networks requiring excessive lengths of service lines and therefore higher cost per person.

- DENSITY

Number of persons and dwelling units per hectare. This determines the intensity of use. e.g. Low density means higher cost of development per person.

- OTHER RELATED PHYSICAL DETERMINANTS

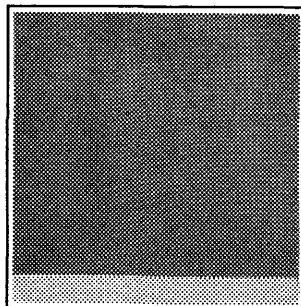
1 WALLED CITY

Private Middle Income Traditional

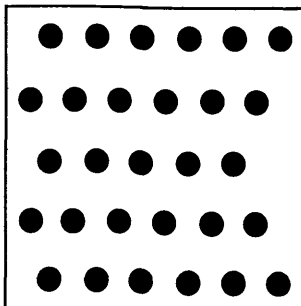
Low percentage of land for streets and walkways; high percentage of land for lots. High population density; deteriorating standard of services due to the layout pattern.



PATTERNS 1 Hectare



PERCENTAGES	Streets/Walkways	8
	Playgrounds	-
	Cluster Courts	8
	Dwellings/Lots	84



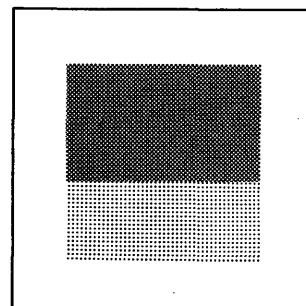
DENSITIES Persons/Hectare 588

● 20 Persons

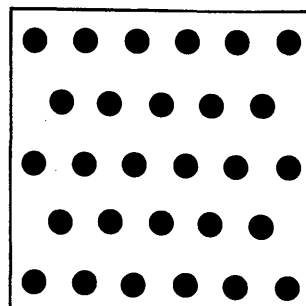
2 NAVRANGPURA LAKHUDI

Popular Very Low Income Squatters

Percentage of land for street not a true representation of the land utilization; high percentage of public land; high density; low percentage of dwelling area; extralegality of land/lot tenure, the issue.



PERCENTAGES	Streets/Walkways	57
	Playgrounds	17
	Cluster Courts	-
	Dwellings/Lots	26

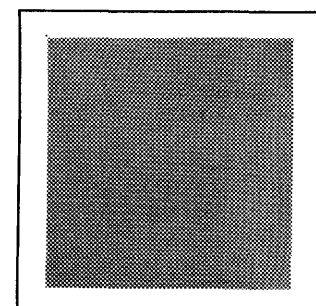
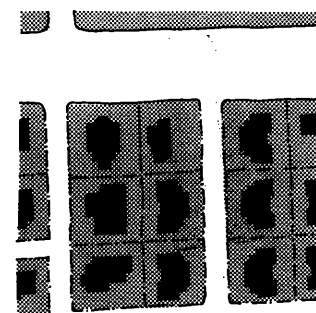


DENSITIES Persons/Hectare 568

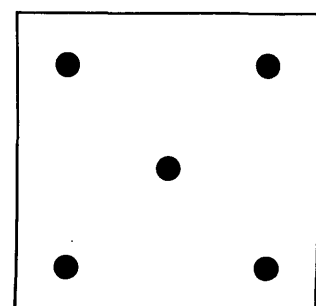
3 NAVRANGPURA CO-OP SOCIETY

Private High Income Houses

High percentage of land for streets and walkways; medium percentage of lands for lot. Despite these percentages, co-op society is burden to the municipality due to its low density and poor network efficiency.



PERCENTAGES	Streets/Walkways	31
	Playgrounds	-
	Cluster Courts	-
	Dwellings/Lots	69

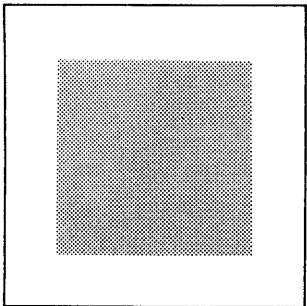
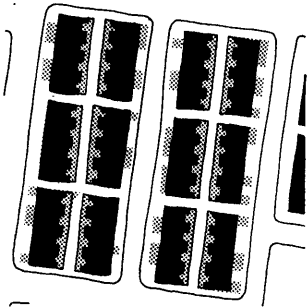


DENSITIES Persons/Hectare 100

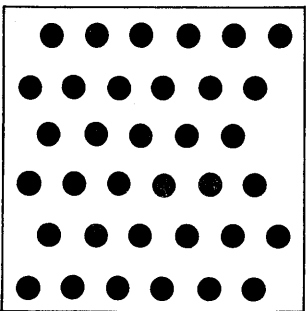
**4 BAPUNAGAR
ROW-HOUSES**

Public Low Income Houses

High percentage of land for streets and walkways; low percentage of land for lots; high density; poor layout with separate lines for circulation and services make Bapunagar a burden to the Housing Board.



56
-
44

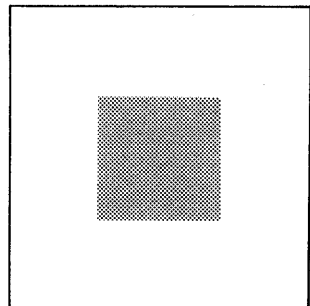
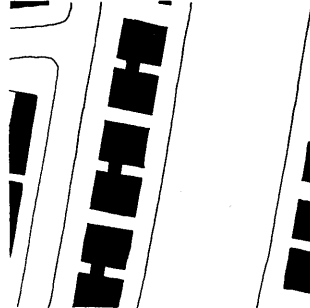


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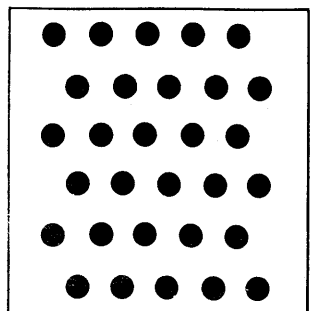
**5 BAPUNAGAR
APARTMENTS**

Public Low Income Walk-ups

Very high percentage of land used as streets and walkways, due to undefined lot lines/responsibility. Increase in density not substantial from row houses; inappropriate dwelling unit type.



82
-
18

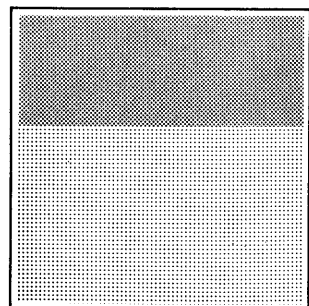
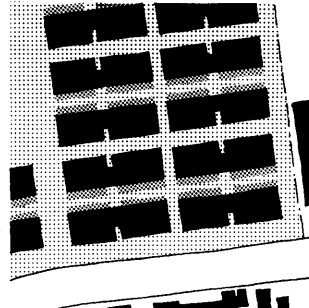


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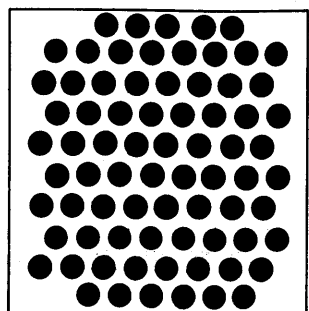
**6 AMBAVADI
HARIJANVAS**

Public Very Low Income Room

Percentage of land for street not a true measure of utilization; high percentage of semipublic land utilization; very high density; very small dwelling unit; inappropriate for this income group.



7
57
36

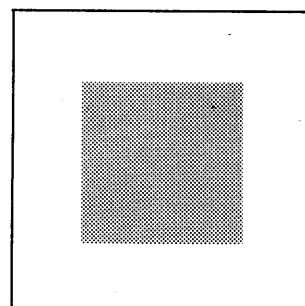
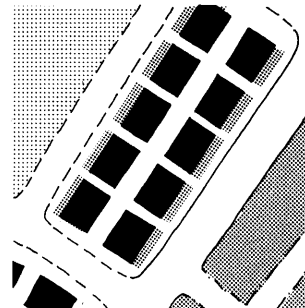


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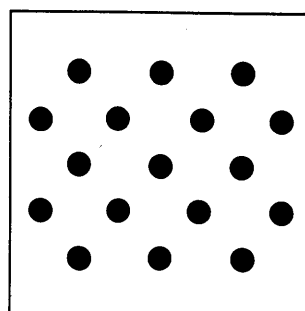
**7 AMBAVADI
L' COLONY**

Public Middle Income House

Very high percentage of land for streets and walkways; low density; poor layout with undefined responsibilities results in excessive public land. These factors make "L" Colony a burden to the Municipality.



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-
30

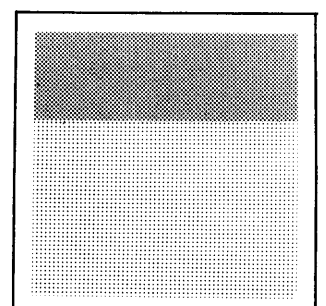


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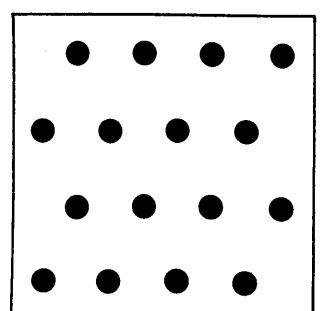
**8 AMBAVADI
NEHRUNAGAR**

Public Middle Income Walk-ups

Percentage of land for street not a true measure of the utilization in this case; low density; left-over semiprivate land not maintained; issue is effective use of available semiprivate level.



24
52
24



324

CRITICAL ISSUES

The foregoing study, encompassing the complete range of the existing dwelling environments of Ahmedabad, provides factual information in a comparative format. Different dwelling types used by different income groups are observed to have a variety of problems and adequacy/inadequacy of urban services.

It is also indicative of the fact that 60% of the city's population live in substandard dwelling units of poor physical state. The urgency of the dwelling needs of this large section of the population demands a substantial increase in the rate of its supply. With the given limited resources of the public sector, it becomes necessary to maximize its utilization for more people to benefit from it. Among the middle and high income dwelling options the public sector is observed to be spending heavily on the installation of utility lines and services in the absence of proper framework to control the residential development.

Various issues emerge from the analysis/evaluation of the dwelling systems and, although their nature may be similar, the cause and level of importance from the user's point of view vary according to the background of the respective occupants. Identification of these issues become crucial for the future policies governing the development of residential areas in the city.

The existing dwelling systems are divided in two broad groups namely:

- a) available options for very low and low income groups; and
- b) available options for middle and high income groups

The critical issues in each option are explained in greater detail to identify their cause.

A more detailed study of each of this issue in terms of existing and proposed social and physical development programmes can provide guidelines for better control on the growth of residential area in the city and optimize the public sector involvement with respect to the planning process and the financial investment.



OPTIONS FOR VERY LOW INCOME AND LOW INCOME GROUPS

SQUATTER SETTLEMENTS

Dwelling unit type: Shanty

Developer: Popular

EXTRALEGAL LAND/LOT TENURE:

Fifty percent of Ahmedabad's population is born outside the city and most of these migrants fall below the subsistence level on the income scale. Obtaining housing facility on a legal tenure of land/lot at the market level, for a fresh migrant of this income group, is obviously beyond his economic capacity. He can barely afford dwellings provided by the government as they are always complete units and not components. Apart from the cost, the supply of dwelling units cannot cope up with the demand leaving no other choice for him but to squat on an undeveloped piece of land. He succumbs to this in order to provide a minimum shelter and security to his family.

Singularly most prominent feature of these settlements is the lack or inadequacy of utilities/services. Whenever any meagre provision is made, it attracts more squatters resulting in its over-utilization and once again making it inadequate. The public authorities take minimal action in this direction due to legal complications arising out of provision of services without any legal title to the land.

The public authorities often seek an answer to this problem by demolishing their huts partially or totally, with no avail as the squatters return after a few days and rebuild their houses. Lakhudi was demolished twice in the last ten years and its inhabitants fined as many as 113 times U.S. \$0.80 per household for illegal encroachment of the public land. These actions do not curtail the growth of such settlements since efforts are not directed to the removal of the root cause, although legalizing these

settlements can provide them with basic services at minimum level.



CHAWLS (ROW/GROUPED ROOMS)

Dwelling unit: Room/shanty

Developer: Private

OVERCROWDING/CONGESTION:

Most of these settlements were developed during the fourth decade of the century, when the population of Ahmedabad was almost doubled over a period of ten years due to industrial growth. Developments of textile mills in particular, provided employment opportunities to many migrants and also offered this type of dwelling units as an optional residential facility. Efforts to accommodate maximum dwelling units, which were a supporting land use requirement for industrial development, in minimum area, resulted in situations of extreme congestion. The small dwelling units with very little open area in front, used mostly for circulation, restrict the families from extending their activities outside their enclosed area. Even with the provision of adequate utilities/services this type of developments should not be permitted.



ROW HOUSES

Dwelling unit: House

Developer: Public

LAYOUT MAXIMIZING AREA OF PUBLIC RESPONSIBILITY:

Unbalanced distribution of public/semipublic and private/semiprivate areas is a characteristic of public housing. More often than not, large pieces of land labeled as "garden" and "recreation area", development and maintenance of which is a public responsibility, remain undeveloped or poorly maintained for lack of resources. Elimination of these areas at the planning stage, if resources for their development are not adequate, is desirable. It will reduce considerably the public involvement in terms of time and money. Existence of such areas within a residential development, promotes undesirable process of squatting. Besides this, the separation of lines for circulation and utilities in the layout also increases the area of public responsibility which suffers from poor maintenance. On the other hand, area of undefined responsibility between the paved road and the dwelling unit is often converted into a platform fenced with cactus and used by the occupant as his front yard.

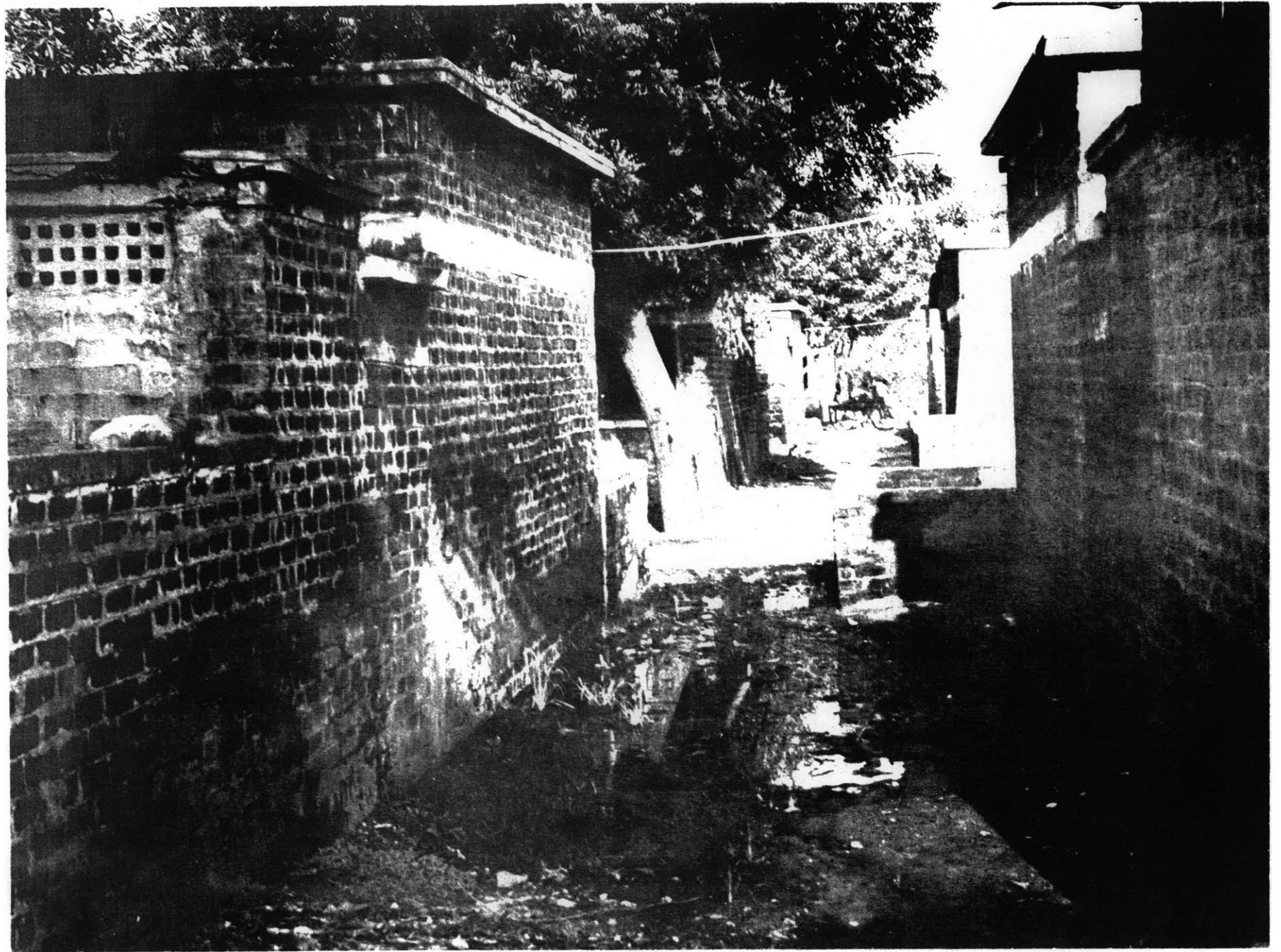
Efficiency in layout can be brought about by elimination of one such street for every two rows of houses served and the land saved can either be used in accommodating more dwelling units or more community facilities, whichever is desirable in the given situation.

LAYOUT CONTRADICTING THE LIVING PATTERN:

The houses facing each other are at a distance of 15m. This distance further separated by a public thoroughfare contradicts the basic cluster living pattern of its inhabitants, making this pattern of layout an

ineffective solution to their sociocultural needs. The activities of a dwelling unit with such a small enclosed area extend into the open in the direction of the socially interactive groups which, in this case, is the back yard where the utilities are located but is very poorly maintained. The physical layout groups the houses facing backs to each other, whereas traditional communal/social living pattern of this population requires grouping of houses with fronts facing each other.

For the population of this economic level with very little buying power, mutual dependency is the answer to many problems and, therefore, a cohesive cluster or a group of houses becomes a very important issue in its planning. Clusters promoting the social/communal interactions are more desirable and should be a major determining factor in the layout design.



WALK-UPS

Dwelling unit: Apartment

Developer: Public

INAPPROPRIATE DWELLING TYPE:

Multiple family structure is a characteristic of this population with an average of 6-6.5 persons per household. By the inherent limitation of this type of dwellings, an enclosed area of 40m² remains the ultimate size of the dwelling unit, since activities cannot be extended outside the dwelling unit in an open area, particularly on the first and the second floor. This puts a heavy strain on the sleeping and storage area inside the dwelling unit. Walk-ups, obviously are not the type of dwellings suited for the needs of this income level and should only be provided to the middle income population, with adequate living area within the dwelling unit.

PUBLIC LAND UTILIZATION OF THE LOT:

Lot lines are often left undefined in this option and leads to public land utilization of the open area surrounding the walk-ups. This area, as a result of ambiguity in the responsibility, suffers from poor maintenance. A clear definition of lot may also tend to leave the area in the similar state, because there is very little incentive among this income group to maintain an area which is not a part of their dwelling unit; dwelling unit generally is defined by the activity area in enclosed and open space.



WALK-UPS

Dwelling unit: Room

Developer: Public

INAPPROPRIATE DWELLING TYPE:

The critical issue in this option is the same as the previous one, except that the seriousness of the problem is aggravated by a further reduction in the area of the dwelling unit by $8m^2$. The corridor, invariably, is used as a part of the dwelling unit and overcrowding becomes evident during the nights due to the shortage of sleeping area. A walk-up type of dwelling ceases to be effective if the dwelling unit does not comprise of more than two rooms supported by other ancillary areas like kitchen, bath, w.c., etc., and should, therefore, not be used as an alternative for this income group.

POORLY MAINTAINED SEMIPUBLIC AREA:

Maintenance of semipublic area is a responsibility shared by both, the public and the group of people who make use of it. The level of maintenance of such an area, is generally observed to be very poor in projects of such a nature, due to inadequate public resources for its development. The income level of its inhabitants is too low to expect them to contribute towards the development cost involved. Walk-up therefore, as an alternative for the low/v. low income population, poses problems which have no solution except not considering it as one of the options.



OPTIONS FOR MIDDLE INCOME AND HIGH INCOME GROUPS

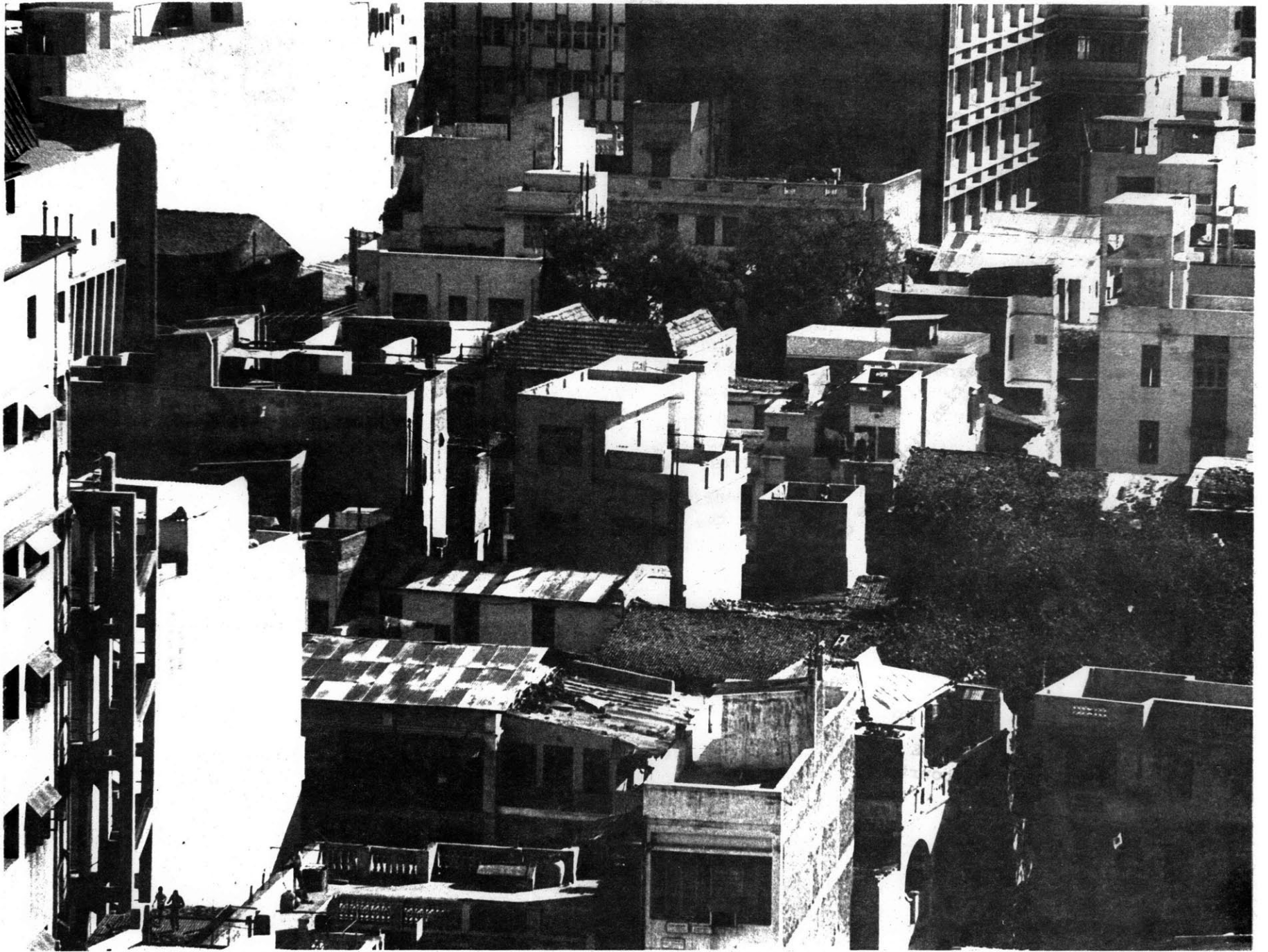
TRADITIONAL ROW HOUSE

Dwelling unit type: House

Developer: Private

INADEQUATE UTILITIES:

Inadequacy of utilities is a result of problems posed by the physical layout of this system, which was implemented centuries before the present service lines were laid down. Each house invariably has a water tank in the basement, where the rain water was collected for domestic use. The narrow streets make it difficult to use larger vehicles such as cars, and the population making frequent use of them gradually moves out of the walled city. For middle income population with a scooter as their only vehicle, this locality is very convenient, from the point of view of its location and easy accessibility to various community needs such as shopping, transportation, etc.



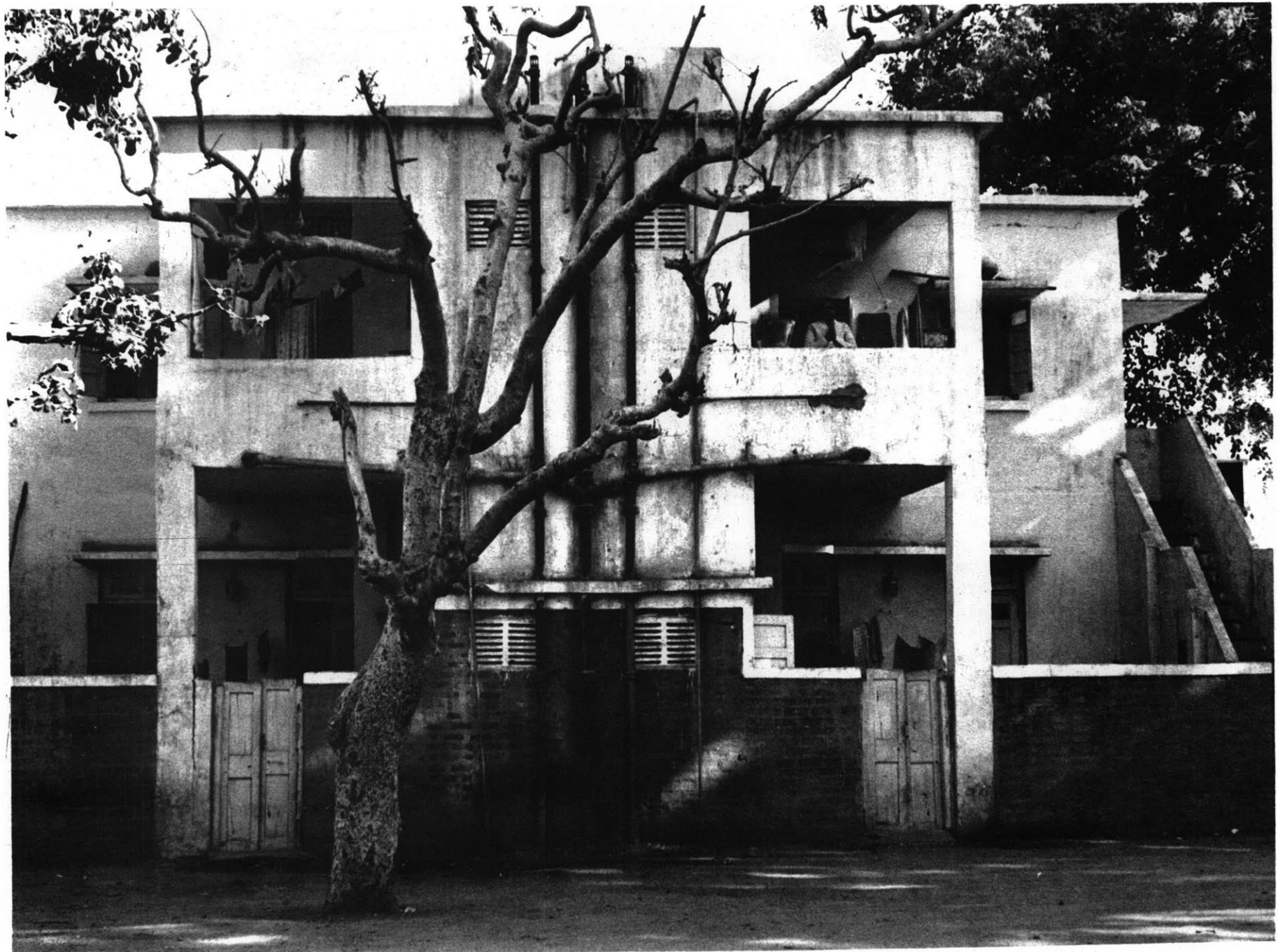
SEMIDETACHED HOUSES

Dwelling unit type: House

Developer: Public

LAYOUT MAXIMIZING THE AREA OF PUBLIC RESPONSIBILITY:

This option for middle and upper middle income group has problems similar to those of the row houses for low/v.low income group. Separate lines for circulation and utilities/services increase the area of public responsibility which the authorities are unable to maintain due to lack of resources. Reduction in this area through proper layout would lead to considerable improvement in the quality of physical environment. The entire public land lies generally unattended except for occasional cleaning of the sewers.



WALK-UPS

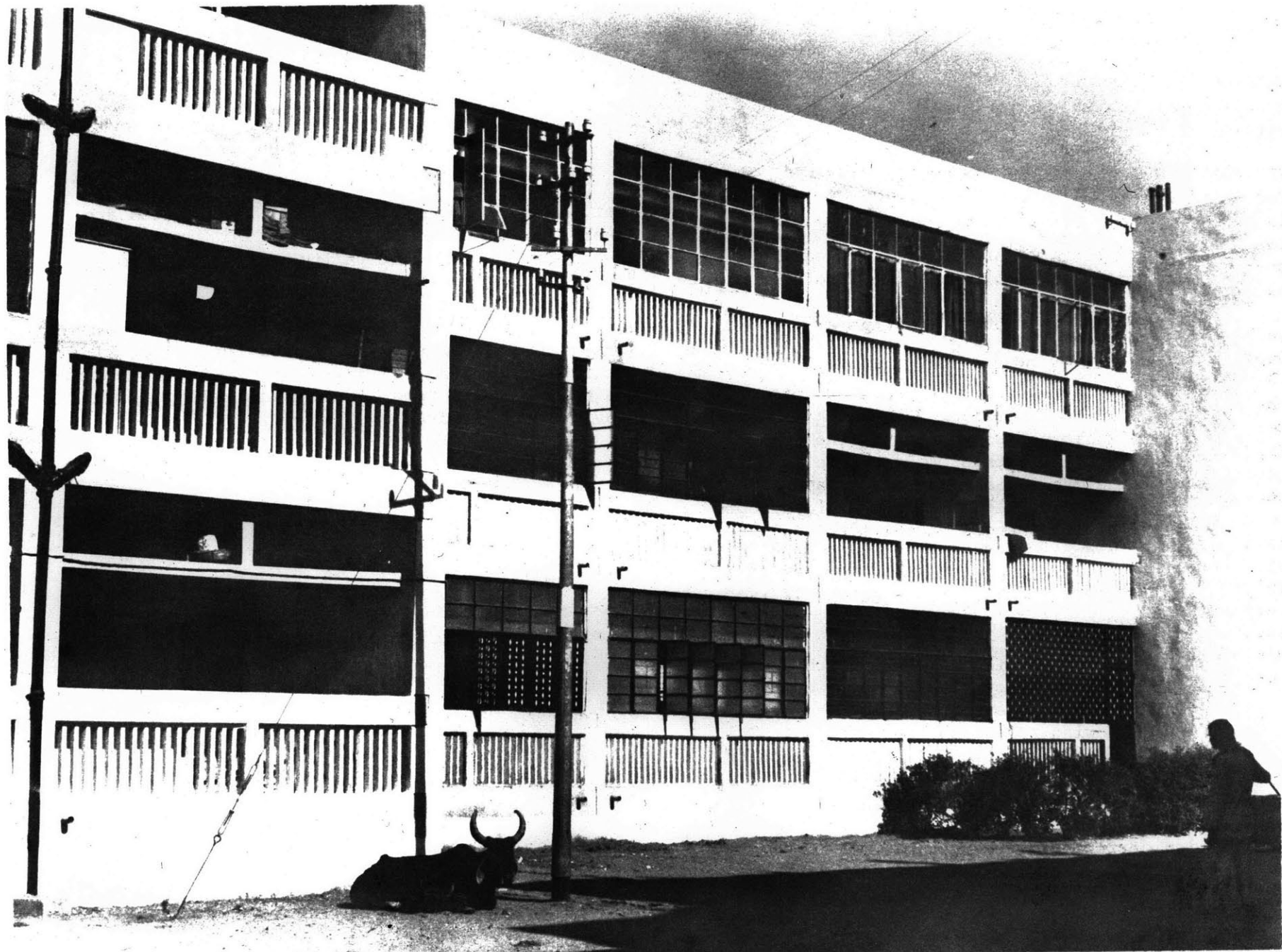
Dwelling unit type: Apartments

Developer: Public/Private

SEMIPUBLIC UTILIZATION OF THE SEMIPRIVATE LAND:

For this income group dwelling unit and its adequacy in terms of size, ceases to be an important issue. The difference between intended utilization of the shared land and the actual utilization of it is a major issue.

Very characteristic of the public development of this dwelling type is the left-over areas labeled and intended to be used for semiprivate/community use. The purpose of these areas is defeated by its character, and very often the utilization is semipublic. Privately developed walk-ups, on the other hand, have often proved to more successful in this respect because the area for community activities is located so as to become the activity focus of the lot. The level of maintenance of semiprivate area decreases with the increase in the number of people sharing it. In developments such as this, where the owners are responsible for the open area within the lot, its location in relation to the orientation of the walk-ups becomes a guiding factor for the layout of the apartment blocks.



DETACHED HOUSES

Dwelling unit type: House

Developer: Private

POOR NETWORK EFFICIENCY:

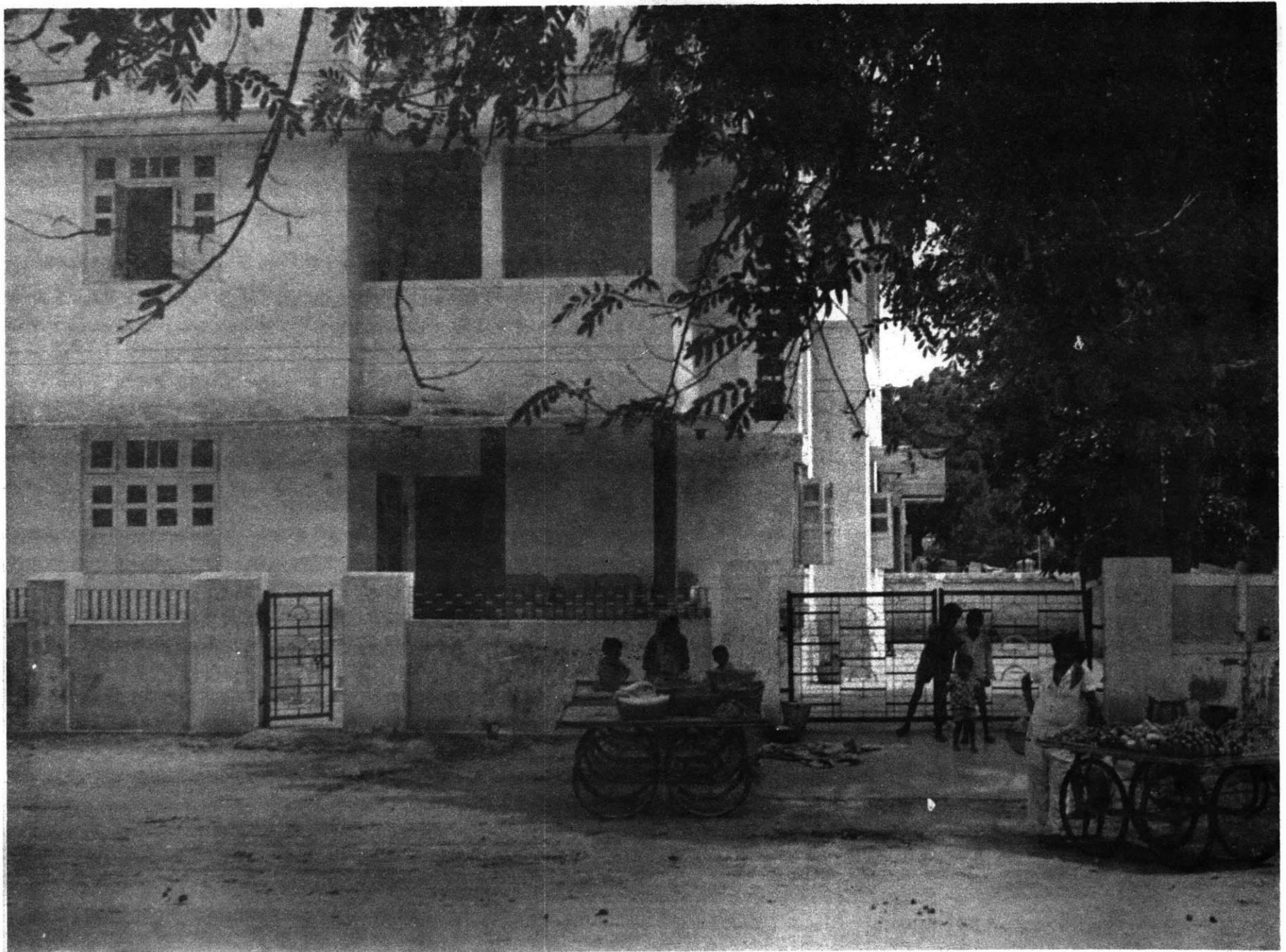
Detached houses type of residential development, largely a characteristic of western part of the city, is one of the most wasteful developments of the city because of the width/depth proportions of the lot. The square shape of the lot, as is generally found, increases the service length per area served resulting in very low density developments with excessive circulation areas. The 1:1 width to depth proportion can be attributed to the existing set back regulation imposed by the Municipal Corporation. These regulations, requiring a set back of 4.5m on the road side and 3m on all the other sides, result in approximately 15% reduction in the usable area if the width:depth ratio for a 400m² lot changes from 1:1 to 1:3. In 600m² lot, the reduction is close to 10%. This, of course, is not in the interest of the individual who intends to maximize the available area within the framework of the building bye-laws.

This inefficiency of service network, which puts an additional burden on the city's revenues, can be very easily improved by the restructuring of the building bye-laws and allowing row-house construction. This can also increase the efficiency of utilization of area within the lots.

UNDER-UTILIZED SERVICE NETWORKS:

Speculation of lot sizes varying between 400m² and 800m² is a widely practiced activity in the western part of the city. As a result, there is a very high ratio of undeveloped land to developed land as compared to the other areas. Services and utility supply lines continue to grow with the new develop-

ment, on the periphery, where the land values are lower than the inner ring areas. This increases the investment of the municipality and creates a contradicting situation where already provided for utilities/services are under-utilized and, at the same time, there is a demand for new extensions of service lines. Development of all the vacant lots within a given time period, if imposed, can contribute to reduce the load on the municipality as the provision of services.



Urbanization Alternative

INTRODUCTION

Rapidly growing industrial sector of Ahmedabad has not been able to keep pace with the influx of rural migrants. Its inability to provide employment to all the migrants has neither halted nor reduced their flow, for migration is more a result of 'push' from rural areas rather than 'pull' of the urban areas. The city authorities have neither the time nor the resources to cope up with the dwelling requirements of this section of population which contributes very little to its revenues. And whatever resources the city has are not very efficiently utilized as is seen from the typology.

The proposal undertaken here is intended to be a pointer to the agencies involved in the efforts to increase the city's housing supply. By recognising the limitations/potentials of the very low and low income groups and of the public sector it attempts to develop/define an approach to the problems of urban residential development. The site chosen for this purpose is not a vacant site but that of an already existing housing project of the Gujarat Housing Board (case studies 4 and 5). The possibility of comparative analysis/evaluation has been the main reason for this choice. It is further supported by the fact that the nature of land available to Gujarat Housing Board for residential development is very similar to this site.

The proposal focuses on the physical layout and land subdivision. These fundamental aspects of residential development are not only critical from an efficiency and amenities stand point but because they tend to be the most permanent feature of the city. The layout in public projects is a primary determinant of the public

commitments and also of the efficiency in terms of cost and functional viability of a development. The selected ~~selected~~ site is not vacant and therefore it is not possible to impliment this proposal on that site, however, the planning policies/goals and other considerations/options are applicable to any new development with the corresponding input of the site conditions.

It should be understood very clearly that this is not a solution to the problem of deteriorating urban dwelling environment, for its root causes are well beyond the domain of this profession, but only an indicator to various agencies involved in housing development to maximize the utilization of scarce resources.

BASIC SITE DATA

The site is approximately 5Km east of the city center, in the heart of the industrial area, next to Malek Saban Stadium. It is characterized by a 40m wide ring road running North-South through the site, and another 20m road running East-West also through the site. The highly irregular shape of the site is characteristic of most other development sites in Ahmedabad.

AREA:

The site covers an area of approximately 95Ha, all of which is available for residential development and its supporting areas.

BOUNDARIES:

The site is not bounded by any specific physical feature, but by the lot lines of private land and by roads. Bordering the site on Southeast is the Stadium, and Southwest, a hospital.

ACCESSES:

Major accesses to the site are through Odhar road, Ring road, and Bapunagar road. There are other minor streets passing through the site.

TRANSPORTATION:

Bus routes along the Odhav road and Bapunagar road connect the site to the city centers and the industrial area, and other minor employment centers.

TOPOGRAPHY:

The site is flat, without obstructive natural physical features.

LAND OWNERSHIP:

The land is owned by the Gujarat Housing Board, a public agency responsible for the very low, low and middle income housing developments.

UTILITIES:

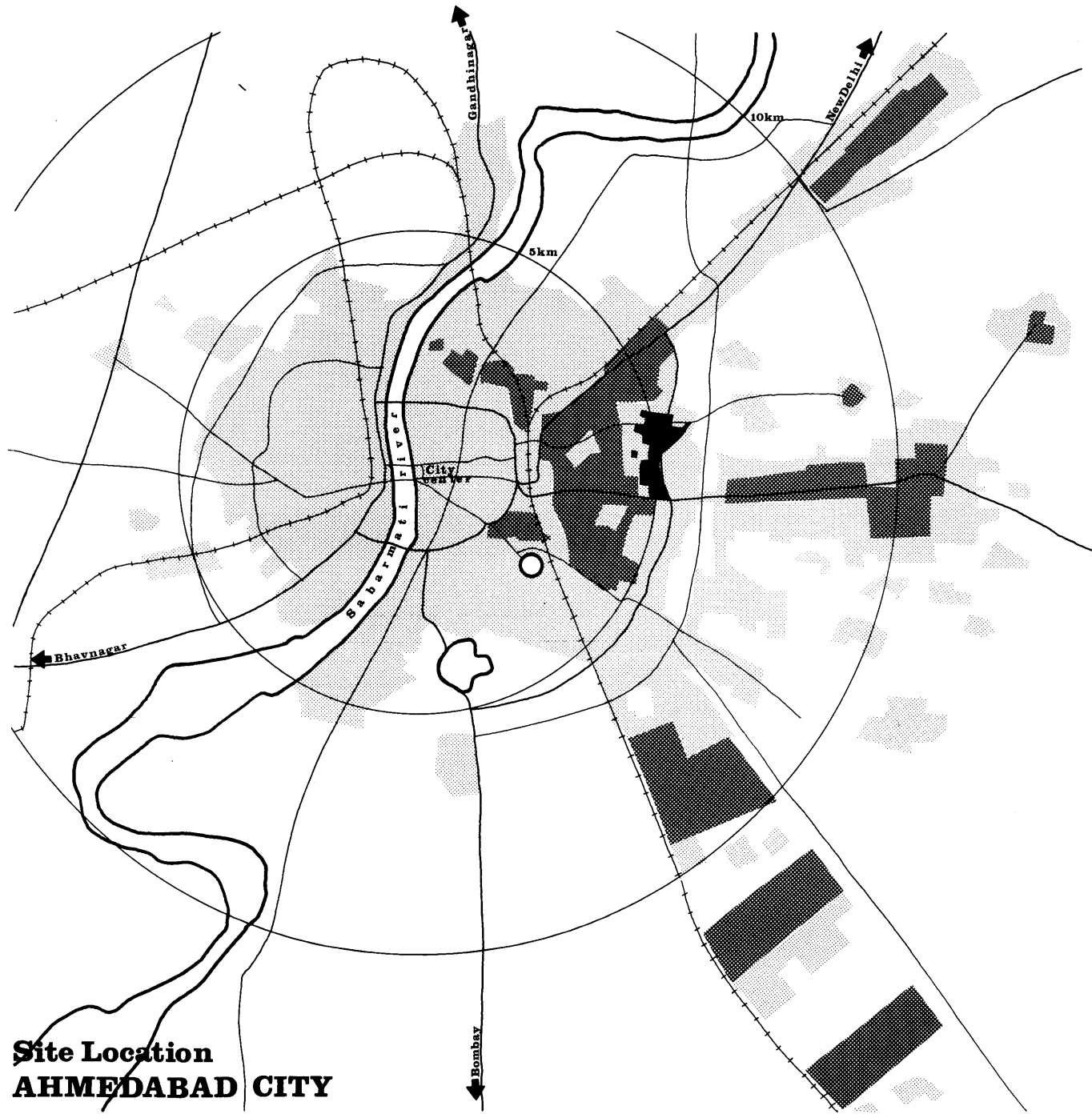
Existing water, sewer and electricity lines run in the major roads within the site and can be utilized for the proposed residential development.

EXISTING STRUCTURES, EASEMENTS, RIGHT OF WAY:





The site has two major roads cutting across in the North-South and East-West direction, and a minor road running East-West in the southern part of the site. This existing circulation network divides the site into four major divisions.

OTHER FACTORS:

Because of its location within the industrial area, the presence of smoke is inevitable and poses a serious problem during the winter months, as it is typical throughout the city.



Site Location
AHMEDABAD CITY

- KEY
-  SITE
 -  INDUSTRIES
 -  BUILT-UP AREA
 -  MAJOR ROADS



PLANNING POLICIES/GOALS

The policies/goals developed for the alternative proposal are as follows:

PRIMARY USE: RESIDENTIAL

- The primary use of the site will be residential.
- The required supporting land uses including schools, playgrounds, commercial facilities, will be provided. A large hospital is in the vicinity and, therefore, only limited health facilities will be included in the site. A large recreation area is already provided by the adjacent Malek Saban Stadium.
- The site will be primarily for the residential use of the industrial workers.

TARGET INCOME GROUPS: PREDOMINANTLY LOWER INCOME

- Development is aimed at a community for the very low and low income group. However, the area is also planned for the middle income group. The included income groups are:
 - Middle: U.S. \$80-200 per month
 - Low: U.S. \$40-80 per month
 - Very low: U.S. \$ less than 40 per month.

INTENSITIES OF LAND USE: MEDIUM/HIGH DENSITIES

- The range of gross densities planned for is between 400 to 600 persons/Ha. A high density is achieved through single storied row houses for the low/v.low income population; walk-ups for the middle income along the main roads have medium density.

- Approximate population at saturation: 7500-9000 dwelling units for 40000 to 50000 persons. This is approximately 2.5% of the existing Ahmedabad metropolitan area population.

LAND TENURE: RENTAL AND OWNERSHIP

- The site will be planned for primarily ownership properties.
- Vertical condominiums (walk-ups) as well as horizontal cluster condominium will be provided.
- Rental options will be provided for the very low income sector, which should gradually be converted into ownership properties.
- The cluster condominiums will allow flexibility in land subdivision.

DWELLING UNIT TYPES: WALK-UPS, COMPONENTS OF ROW HOUSES

- Development is aimed at a community for the very low and low income group. However, the area is also planned for the middle income group. The included income groups are:
 - Walk-ups will be complete minimal dwelling units for middle income groups.

FINANCING: PUBLIC, PRIVATE

- The site will primarily be developed by the Gujarat Housing Board; however, private investments will be encouraged, particularly for walk-ups.

CIRCULATION: INTERNAL/EXTERNAL COORDINATION

- The internal circulation network will be connected to the external network system at various points; however, the connection to roads with heavy vehicular traffic will be minimized.
- Pedestrian circulation will be predominant within the site.

UTILITIES

- All utility systems: water, sewer, storm drainage, and electricity, will be interconnected into the existing/planned city network.

DEVELOPMENT MODE: INCREMENTAL

- The site will be developed incrementally.
- The planning/design/development will include:
 - Initial study of the development: detailed physical and financial planning.
 - Initial project development: development of site, provision of services, and construction of different options in dwelling unit types.
 - Intermediate development: development of secondary streets by public and progressive improvement of site and service areas by users.
- Evaluation and revision of policies/design will be carried out as needed after every stage of development.

CIRCULATION PLAN

The existing pattern of circulation is a major determinant of the circulation network within the site. The proposed circulation provides the utility lines throughout the site by providing continuous access for maintenance and control, and is considered to be under public ownership.

The circulation layout is based upon:

- Recognition of the existing circulation pattern.
- Recognition of the predominant pedestrian mode of circulation within the residential development.

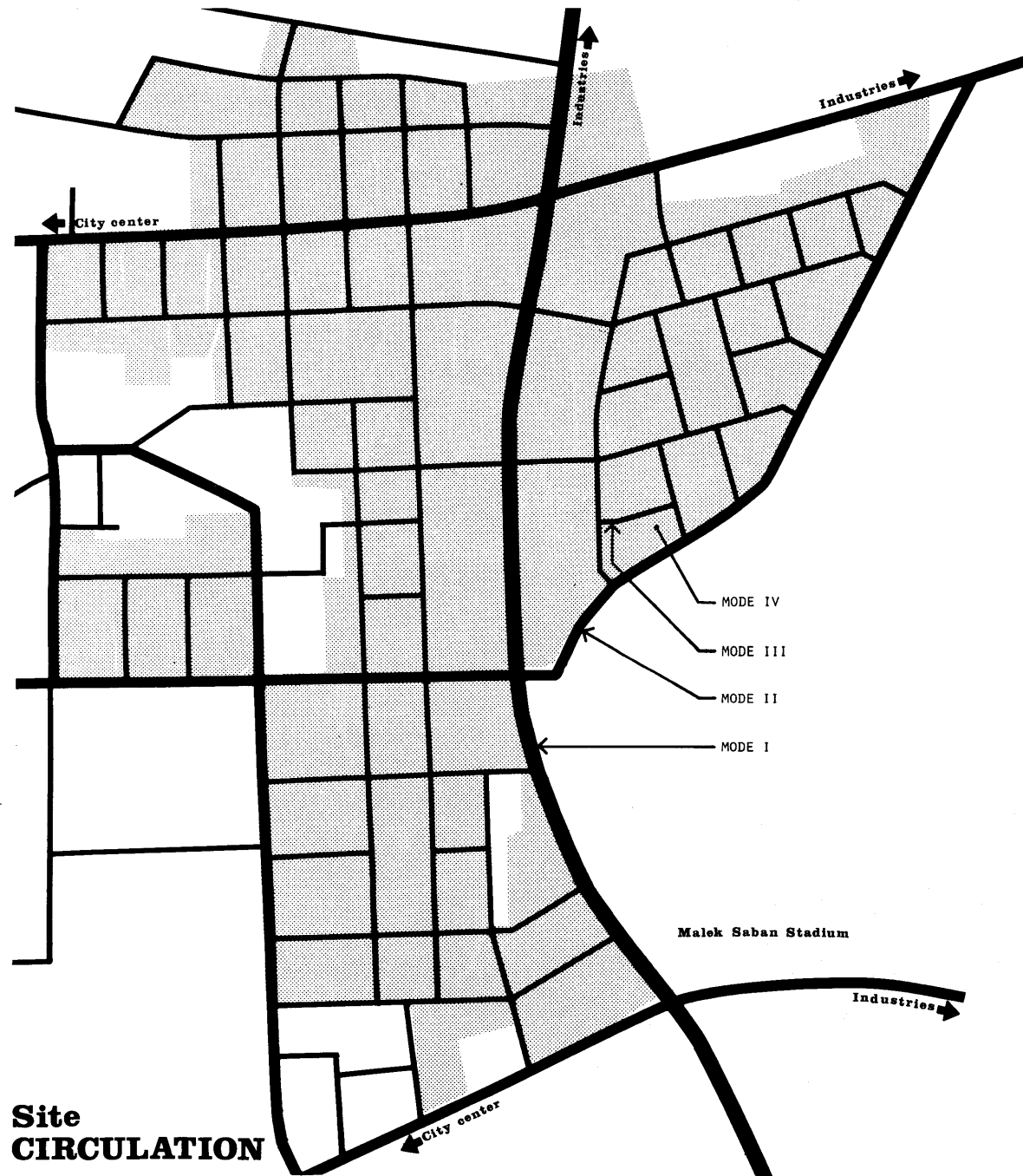
The following circulation modes are considered in the network:

MODE I: Existing ring road, expected to carry heavy vehicles for interstate transportation through the city. It will also be used by pedestrians and cyclists to and from the employment centers.

MODE II: Primary streets, connecting the site with the city center and industrial areas. The use is shared equally by pedestrians and vehicles with pedestrians dominant in number of users.

MODE III: Secondary streets, predominantly pedestrians and used mainly as accesses to the lots, cluster courts, and community facilities.

MODE IV: Exclusively pedestrian within the cluster courts.



**Site
CIRCULATION**



LAND USE PLAN

	Ha.	%
Gross area within the boundaries of the site	95	100%
PUBLIC LAND		
- Circulation (total length 16,700m)	18	19%
- Schools, playground, labor welfare centers, etc.	8	8%
PRIVATE LAND		
- Residential, commercial	69	73%

Smaller commercial developments for immediate shopping needs will be permitted/encouraged within each section of residential development.

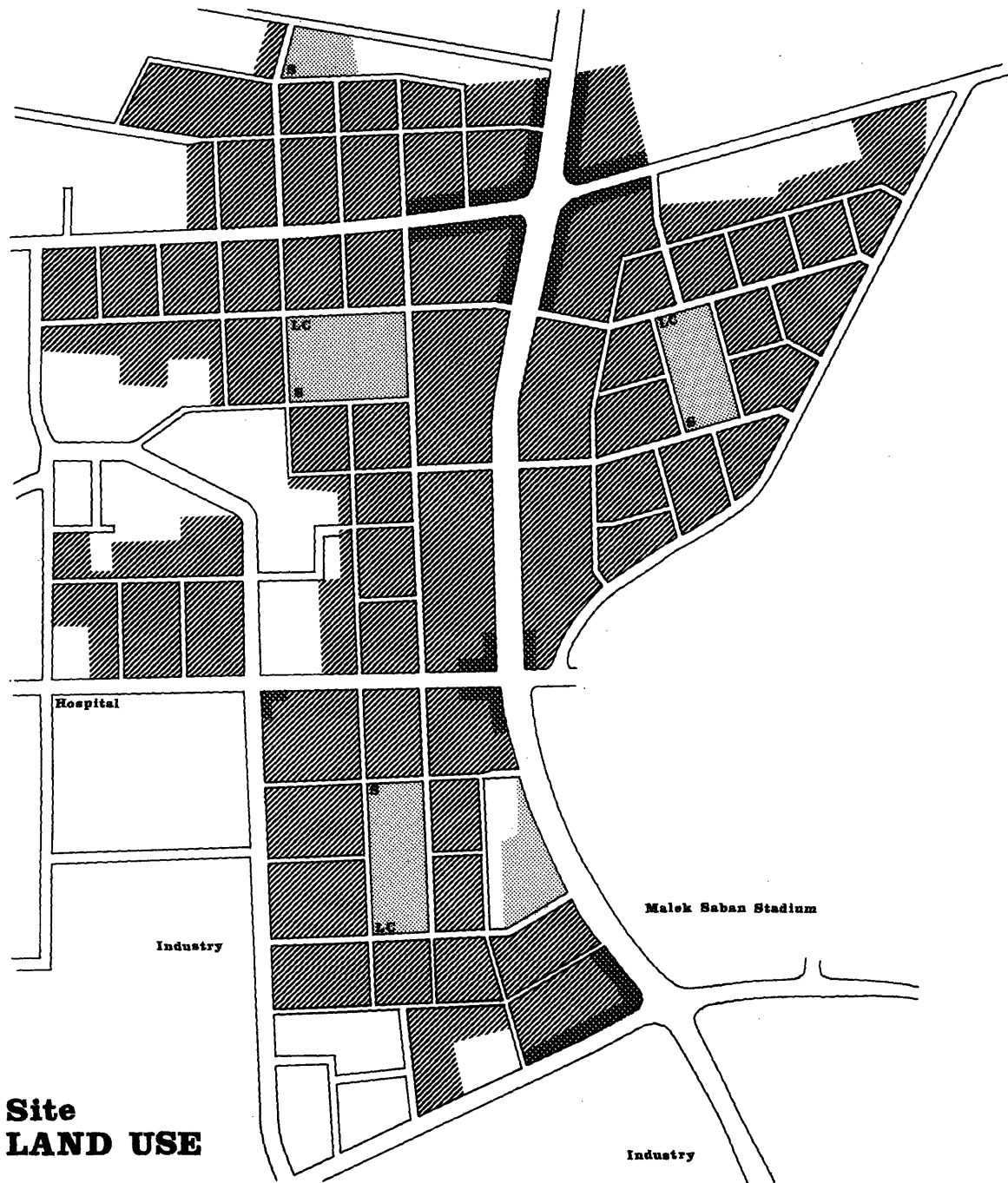
RESIDENTIAL AREA: Two major types of residential development is considered: a) Medium density walk-ups along the primary circulation routes expected to be developed for middle income group; b) high density lots and lot clusters along the secondary roads for low and very low income groups.

The site is divided by the existing circulation pattern into four major sections of different sizes and shapes.

The proposed land use plan shows:

SCHOOLS, PLAYGROUNDS, LABOR WELFARE CENTERS: Located in the center of most sections for easy accessibility. Open areas within these facilities are also intended to be used occasionally for religious, cultural or any other festivities. Health facilities within the site are reduced due to its availability in the vicinity. Malek Saban Stadium bordering the site on Southeast serves the purpose of larger recreation area for the neighborhood community.

COMMERCIAL AREA: Major commercial area is provided at the junction of ring road and Bapunagar road. However, some facilities are also provided near the Stadium, near the hospital and at the junction of ring road and the road bordering the site on South.



**Site
LAND USE**

AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  OPEN SPACES, COMMUNITY FACILITIES

- S** School, Playground
- LC** Labour Welfare Centre



BLOCKS, LOTS AND LOT CLUSTERS

BLOCK is a portion of land bounded and served by lines of public streets;

LOT is a measured parcel of land having fixed boundaries and access to public circulation;

LOT CLUSTER is a group of lots (owned individually) around a semiprivate common court (owned in condominium);

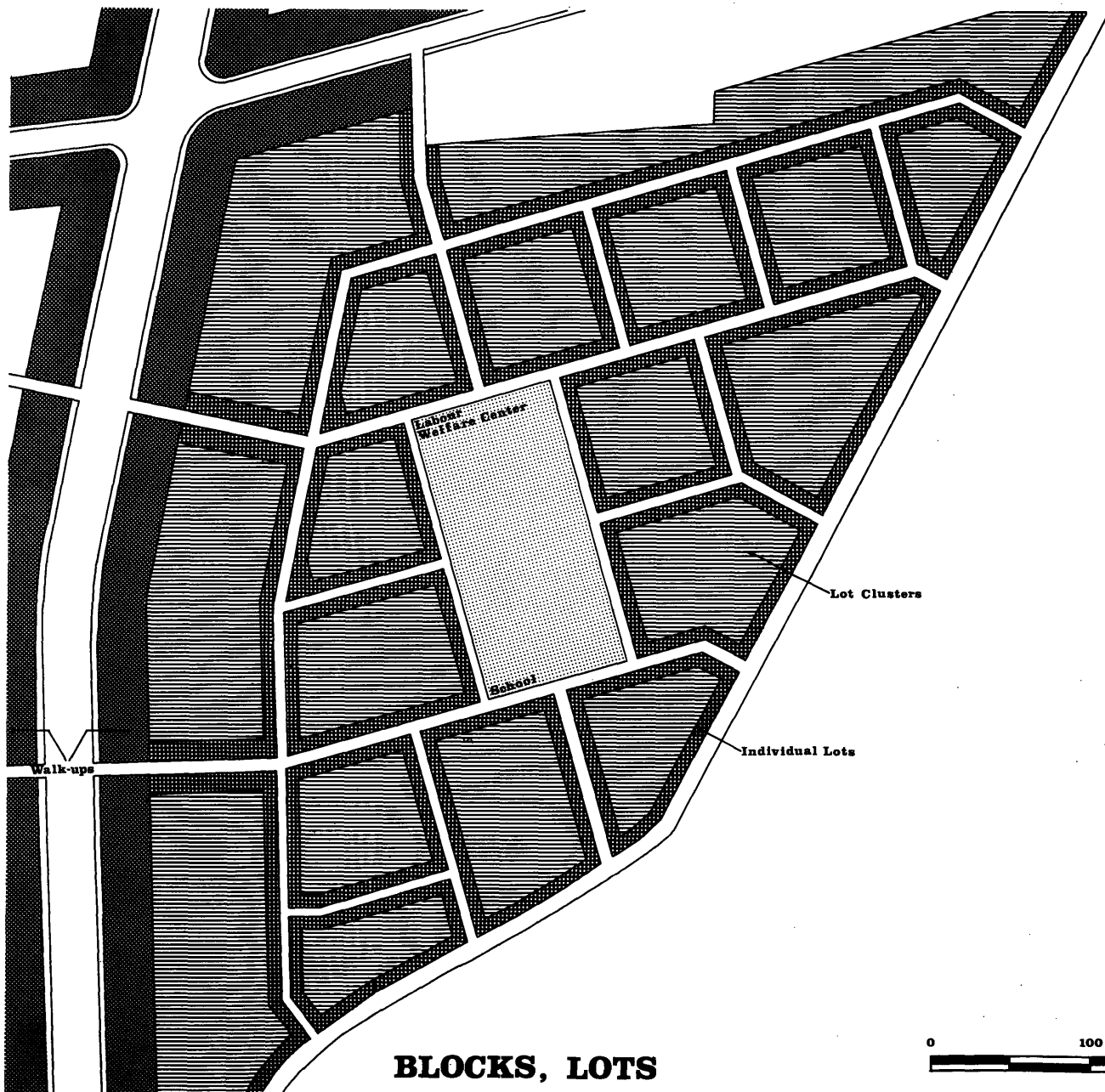
CONDOMINIUM is a system of direct ownership of a single unit in a multi-unit structure. The individual owns the unit in much the same manner as if it were a single family dwelling; he holds direct legal title to the unit and joint interest in common areas and the underlying ground (as in the case of walk-up apartments).





The proposal illustrates through physical layout of the following policy:

- Maximization of private ownership of land and private responsibility.
- Maximization of number of families that can be given a legal land/lot tenure through effective land utilization.
- Minimization of cost of development by providing dwelling components instead of dwelling units.
- Minimization of public ownership of land to reduce public responsibilities.
- Minimization of length of infrastructure per area served.

The average size of block is determined by the anticipated pedestrian mode of the circulation with corresponding street widths. An average block is 100m x 100m but varies in size and shape according to the site conditions/limitations.

Three major options are provided in the form of vertical condominiums, individual lots and horizontal condominiums for basically the middle, low and very low income respectively. The location of these within the residential development is determined by a variety of forces such as proximity to the major circulation network or to the community facilities, land values, etc. Large lots on the ring road, medium sized lots facing the secondary streets and small sized lots within the periphery formed by the large and medium sized lots, are the land sizes available to a dweller. Alternatives among each of these options are not within the scope of this study; however, flexibility of possible variation of land subdivision, particularly in the smaller lots to be occupied by the very low income groups, is provided for making changes/allowances for the prospective occupants. Traditional living pattern of common interest based groups arising out of mutual dependancy among the very low income group, is intended to be promoted through the layout based on the stated policies.



- KEY
-  LARGE LOTS
 -  MEDIUM LOTS
 -  SMALL LOTS
 -  COMMUNITY FACILITIES



LAND SUBDIVISION

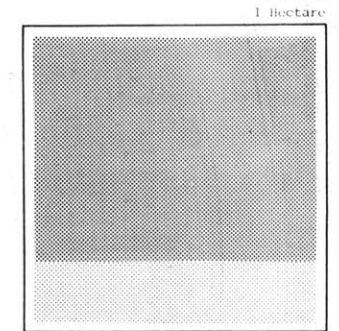
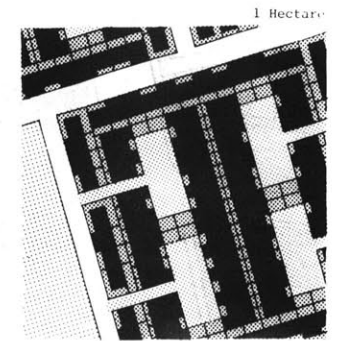
As an illustration of the stated policies, a detailed layout has been prepared for a residential development on the site, within the framework of the existing government programs of instant developments for the very low and low income groups. The lot sizes and the number of dwelling units in the proposed minimal cluster correspond to the presently provided number in the similar dwelling type for the same income level. It also shows possible variations in size and character of the semiprivate area of a cluster condominium to correspond to diverse requirements of different ethnic groups. It is intended to be a pointer to the inefficient land utilization observed in the existing government programs for housing, which contribute very little the urban dwelling environment and, on the contrary, increase the already unmanageable public responsibility.

LOCALITY BLOCK LAND UTILIZATION DATA

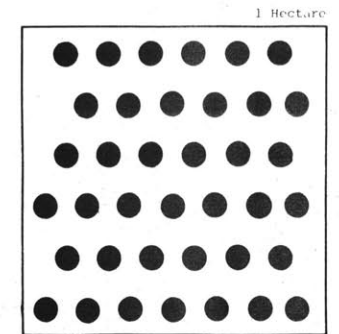
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	116	0.96	121
DWELLING UNITS	116	0.96	121
PEOPLE	700	0.96	760

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.11	11
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories lots)	0.68	71
SEMI-PRIVATE (cluster courts)	0.17	18
Total	0.96	100

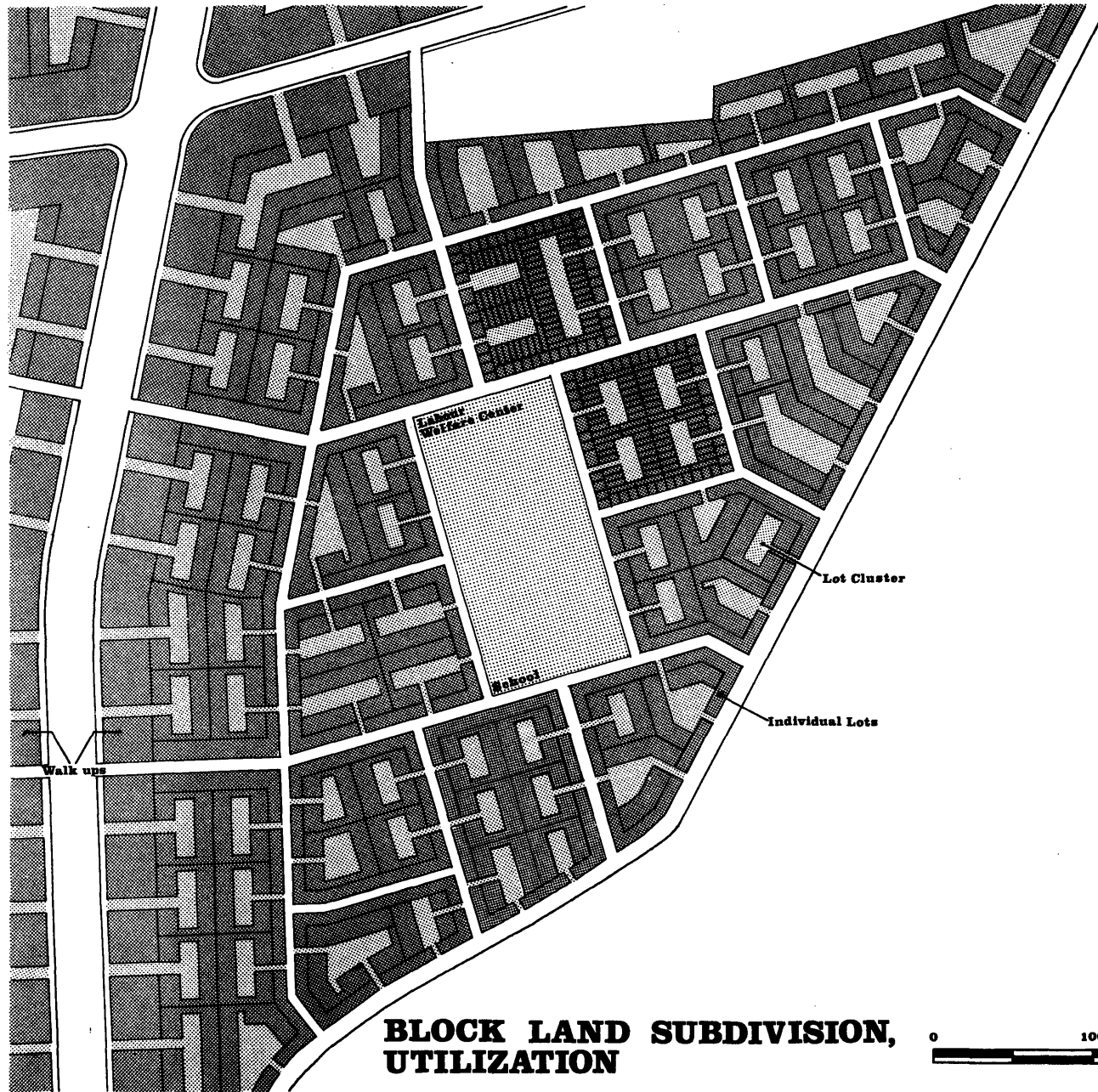
LAND UTILIZATION DIAGRAMS



PERCENTAGES	Streets/Walkways	11
	Playgrounds	-
	Cluster Courts	18
	Dwellings/Lots	71



DENSITY	Persons/Hectare	760
●	20 Persons	



BLOCK LAND SUBDIVISION, UTILIZATION

GLOSSARY

Definitions of terms which are generally understood/accepted and not essential to the presentation/understanding of the text are included in the Glossary.

The criteria for the preparation of the definitions have been as follows:

First Preference: definitions from "Webster's Third New International Dictionary", Merriam-Webster, 1971.

Second Preference: definitions from technical dictionaries.

Third Preference: definitions from the authors, used when existing definitions did not satisfactorily make clear with what meaning, extend and limits, terms were used.

COMMUNITY: the people living in a particular place or region and usually linked by common interests; the region itself, any population cluster.

DEVELOPMENT: gradual advance or growth through progressive changes; a developed tract of land.

DWELLING: The general, global designation of a building/shelter in which people live. A dwelling contains one or more 'dwelling units'.

DWELLING ACTIVITY AREA CHARACTERISTICS

Three different types of activity areas are considered based upon their characteristics

ENCLOSED: closed from all sides and the roof with openings for doors and windows in the walls.

SEMI-ENCLOSED: closed from top and atleast from one side with the rest of the sides open. The nature and size of this type of area differs in different dwelling systems as is seen from the drawings.

OPEN: open from top; may or may not be closed from the sides.

DWELLING CONSTRUCTION TYPES: Primary dwelling construction types and materials are grouped in the following categories:

Shack Roof: structure - rods, branches.
infill - thatch, mats, flattened tin cans, plastic or canvas sheets, cardboard, scrap wood, and/or mud.
Walls: structure - rods, branches, poles.
infill - thatch, mats, flattened tin cans, plastic or canvas sheets, cardboard, scrap wood, and/or mud.
Floor: structure/infill - compacted earth.

Mud and Wattle Roof: structure - wattle.
infill - thatch, flattened tin cans, or corrugated iron sheets.
Walls: structure - wattle.
infill - mud.
Floor: structure/infill - compacted earth.

Wood Roof: structure - wood rafters.
infill - thatch, flattened tin cans or corrugated iron sheets.

Walls: structure - wood frame.
infill - rough hewn wood planks.
Floor: structure/infill - compacted earth, wood joists, flooring.

Masonry/ Wood Roof: structure - wood rafters.
infill - corrugated iron or asbestos sheets, or terracotta tiles.
Walls: structure/infill - murrain, stone, brick, block or tile masonry without columns.
Floor: structure/infill - poured concrete slab on/off grade, wood joists, flooring.

Masonry/ Concrete Roof: structure/infill - poured reinforced concrete with tar and gravel, or terracotta tiles.
Walls: structure/infill - murrain, stone, brick, block or tile masonry without columns, or with columns for multi-story dwellings.
Floor: structure/infill - poured concrete slab on/off grade.

Concrete Roof: structure/infill - poured or precast reinforced concrete with tar and gravel, or terracotta tiles.
Walls: structure - poured or precast walls or frame.
infill - metal, wood, masonry, plastic.
Floor: structure/infill - poured or precast concrete slab.

DWELLING BUILDER: Four groups are considered:

Self-Help Built: where the dwelling unit is directly built by the user or occupant.
Artisan Built: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services.

Small Contractor Built: where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer; 'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes.

Large Contractor Built: where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex.

DWELLING DENSITY: The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). NET density is the density of selected, discrete portions of an area (ex. including only lots).

DWELLING DEVELOPER: Three sectors are considered in the supply of dwellings:

Popular sector: The marginal sector with limited or no access to the formal financial, administrative, legal, technical, institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular sector generally for 'self use' and sometimes for profit.

Public sector: The government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Public sector for service (non-profit or subsidized housing).

Private sector: The individuals, groups or societies who have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private sector generally for profit.

DWELLING FLOORS: The following number are considered:

One: single story; generally associated with detached, semi-detached and row/group dwelling types.
Two: double story; generally associated with detached, semi-detached and row/group dwelling types.
Three or More: generally associated with walk-up and high-rise dwelling types.

DWELLING GROUP: The context of the dwelling in its immediate surroundings.

DWELLING LOCATION: Three sectors of the urban area considered:

City center: the area located within a walking distance (2.5 km radius) of the commercial center of a city; relatively high residential densities.
Inner ring: the area located between the urban periphery and the city center (2.5 to 5 km radius); relatively lower residential densities.
Periphery: the area located between the rural areas and urban inner ring (5 or more km radius); relatively low residential densities.

DWELLING PHYSICAL STATE: A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; (the shanty unit is not evaluated).

Bad: generally poor state of structural stability, weather protection and maintenance.

Fair: generally acceptable state of structural stability, weather protection and maintenance with some deviation.

Good: generally acceptable states of structural stability, weather protection and maintenance without deviation.

DWELLING UNIT: A self-contained unit in a dwelling for an individual, a family, or a group.

DWELLING UNIT AREA: The dwelling unit area (m²) is the built-up, covered area of a dwelling unit.

DWELLING UNIT COST: The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit.

DWELLING UNIT TYPE: Four types of dwelling units are considered:

Room: A SINGLE SPACE usually bounded by partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen,

laundry, or storage room. SEVERAL ROOM UNITS are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation, toilets, kitchens).

Apartment: A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.). SEVERAL APARTMENT UNITS are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation).

House: A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.). ONE HOUSE UNIT is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available.

Shanty: A SINGLE OR MULTIPLE SPACE (small, crudely built). ONE SHANTY UNIT is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces).

DWELLING TYPE: The physical arrangement of the dwelling unit:

Detached: individual dwelling unit, separated from others.

Semi-Detached: two dwelling units sharing a common wall (duplex).

Row/Grouped: dwelling units grouped together linearly or in clusters.

Walk-Up: dwelling units grouped in two to five stories with stairs for vertical circulation.

High-Rise: dwelling units grouped in five or more stories with stairs and lifts for vertical circulation.

DWELLING UTILIZATION: The utilization indicates the type of use with respect to the number of inhabitants/families.

Single: an individual or a family inhabiting a dwelling.

Multiple: a group of individuals or families inhabiting a dwelling.

FINANCING: The process of raising or providing funds.

Self Financed: provided by own funds.

Private/Public Financed: provided by loan.

Public Subsidized: provided by grant or aid.

DWELLING DEVELOPMENT MODE: Two modes are considered:

Incremental: The construction of the dwelling and the development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site.

Instant: The formal development procedure in which all structures and services are completed before occupation.

LAND TENURE: The act, right, manner or term of holding land property. Types are categorized by how land is held and for what period of time. Legal definitions are established to determine the division of property among various owners, or the relationship between owner or occupier, or between creditor and owner; and between private owners and the public, and includes the assessment of taxes on private land rights and the regulation of land use through govern-

ment control. There are TWO BASIC FORMS of land tenure:
 Land Ownership: where the exclusive right of control and possession of a parcel of land is held in freehold.
 Land Tenancy: where the temporary holding of mode or holding a parcel of land is of another.

INFRASTRUCTURE: The underlying foundation or basic framework for utilities and services: streets, sewage, water, network, storm drainage, electrical network, gas network, telephone network, public transportation, police and fire protection, refuse collection, health, schools, playgrounds, parks, open spaces.

LAND UTILIZATION: A qualification of the land around a dwelling in relation to user, physical controls, and responsibility.

Public: User: anyone/unlimited
 (streets, Physical controls: minimum
 walkways, Responsibility: public sector
 open spaces

Semi-Public: User: limited group of people
 (open spaces, Physical controls: partial or
 playgrounds, complete
 schools) Responsibility: public sector and
 user

Private: User: owner or tenant or squatter
 (dwellings, Physical controls: complete
 lots) Responsibility: user

Semi-Private: User: group of owners and/or
 tenants
 (cluster Physical controls: partial or
 courts) complete
 Responsibility: users

LAND UTILIZATION: PHYSICAL CONTROLS: The physical/legal means or methods of directing, regulating and coordinating the use and maintenance of land by the owners/users.

LAND UTILIZATION: RESPONSIBILITY: The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users.

METROPOLITAN AREA: "an area in which economic and social life is predominantly influenced by a central city, to which it is linked by common interests though not often by common policies. The metropolitan area may have one city or more as well as outlying districts or satellite communities. No physical or legal boundaries mark its borders, but roughly speaking, these are the outer limits of commuting to or from the central city" (Abrams, 1971).

PERCENT RENT/MORTGAGE: The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income.

PUBLIC TRANSPORTATION: that segment of URBAN TRANSPORTATION which is available to the public without restriction. As public transport, it may also be regulated as to its operation, charges, and profits (Abrams, 1971).

TENURE: Two situations of tenure of the dwelling units and/or the lot/land are considered:
 Legal: having formal status derived from law.

Extralegal: not regulated or sanctioned by law.

Four types of tenure are considered:

Rental: where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land.

Lease: where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization). No cases of lease are shown in Typology.

Ownership: where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies.

Employer-Provided: where the users are provided a dwelling unit by an employer in exchange for services; i.e., domestic live-in servant. (Only one case is shown in the case studies.)

URBAN AREA: All developed land lying within the urban fringe (politically undefined development lying between the city and the country) including a central city and any of its satellite communities; it is not a political/governmental unit (Bartholomew, 1955).

URBANIZATION: the quality of state of being or becoming urbanized: to cause or take on urban characteristics.

USER INCOME GROUPS: Based upon the subsistence income per year, five income groups are distinguished. (The subsistence income per year in Ahmedabad was U.S. \$450 in 1971)

Very Low (below subsistence level) less than U.S. \$450 per year:

The income group with no household income available for housing, services or transportation.

Low (1 x subsistence level) U.S. \$450 per year: The income group that can afford limited subsidized housing (rental).

Middle (2 x subsistence level) U.S. \$900 per year: The income group that has access to public/private commercial housing (rental).

Upper Middle (5 x subsistence level) U.S. \$2250 per year:

The income group that has access to private commercial housing (ownership).

High (7 x subsistence level) U.S. \$3150 per year: The income group that represents the most economically mobile sector of the population.

The incomes considered are household incomes.

EXPLANATORY NOTES

QUALITY OF INFORMATION

The quality of information given in the drawings, charts, and description have been qualified in the following manner.

Accurate: when taken from reliable or actual sources
 Approximate: when deducted from different and/or not completely reliable sources.
 Tentative: when based upon rough estimation of limited sources.

QUALITY OF SERVICES, FACILITIES AND UTILITIES

None: when the existence of services, facilities and utilities are unavailable to a locality.
 Limited: when the existence of services, facilities and utilities are available to a locality in a limited manner due to proximity.
 Adequate: when the existence of services, facilities and utilities are available in/to a locality.

METRIC SYSTEM EQUIVALENTS

Linear Measures

1 centimeter = 0.3937 inches
 1 meter = 100 centimeters = 39.37 inches or
 3.28 feet
 1 kilometer = 1000 meters = 3,280.83 feet or
 0.62137 miles
 1 inch = 2.54 centimeters
 1 foot = 0.3048 meters
 1 mile = 1.60935 kilometers

Square Measures

1 square meter = 1,550 square inches or
 10.7639 square feet
 1 hectare = 10,000 sq meters = 2.4711 acres
 1 square foot = 0.0929 square meters
 1 acre = 0.4087 hectares

DOLLAR EQUIVALENTS

All income, cost and rent/mortgage data have been expressed in terms of U.S. equivalent;
 1 U.S. dollar = 8.00 rupees (August 1973).

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