URBAN DWELLING ENVIRONMENTS: CUERNAVACA, MEXICO

by

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PREFACE

CONTENT: This study identifies and analyzes the low income dwelling systems of Cuernavaca, Mexico, on the basis of a survey and evaluation of existing housing types and their urban environments. The physical environments are described in terms of the layout design, land subdivision, land utilization and provision of utilities, services and facilities. The dwelling systems are analyzed at four levels: locality of the system, a selected segment of the locality, a selected block within the segment, and a typical dwelling unit. Based on this research a proposed project illustrates an alternative to government policies in regard to the development of existing low income settlements. The project demonstrates that considerable savings can be made over time by optimally redesigning the layout of unconsolidated settlements as a first step in the process of upgrading their physical environment.

APPLICATION: The comparative framework for analyzing and evaluating dwelling systems that is used in this research is intended to serve as a reference for studying and understanding urban environments. This work also provides a frame of reference for developing realistic public policies for low income housing, based on efficient design and popular participation.

DATA: The study is derived from field surveys carried out by the authors since 1972, and particularly during the Summer of 1975 in conjunction with architecture students from the University of Morelos; and from mentioned material and interviews with public and private agencies. The case study analysis is based on a methodology developed in the Urban Settlement Design Program under the direction of Horacio Caminos. The proposed project draws from the experience of SINAMOS, a decentralized agency of the Peruvian Government, and of the Comunidad Urbana Autogestionaria Villa El Salvador in Lima, Peru.

INTRODUCTION

Due to their geographic proximity, Cuernavaca has been dominated by Mexico City since the days of the Aztec Empire. Its urban development has thus traditionally been linked to that of the Capital. Today Cuernavaca is becoming an outlying resort suburb of the sprawling megalopolis. Although vastly different in scale, with Mexico City more than fifty times greater than Cuernavaca, there are important parallels in the patterns of their urban development and structure.

In the case of Mexico City, according to John Turner, there are two basic low income dwelling systems: The 'vecindades' or tenements, and the 'colonias proletarias'or speculative developments. During the first half of the Century, the central area tenements played a major role in absorbing the migrant currents to the city. Less than two decades ago, the constantly increasing demand practically immobilized the system. City center landlords began renting the interior of blocks for the construction of shanties, creating the 'ciudades perdidas' which also soon became saturated. A pattern emerged among the low income population settling in the city which included living in the central areas until a permanent job, and eventually a residence, were found.

With the saturation of the central and inner ring areas, the 'colonias proletarias' appeared on the periphery. The speculative developments provided large expansions of land for both the establishing population moving out from the city center and the incoming migrant currents. Predictably, the large demand for land in these areas generated uncontrolled speculation. With few options left, low income groups resorted to squatter invasions. Unable, or unwilling, to respond to the demand for very low and low income housing, the Public Sector has concentrated on producing moderately low and middle income

subsidized housing packages. They have hoped to solve the problem by simply forbidding any further development of tenements, ciudades perdidas and of course, squatter settlements.

Cuernavaca has developed by integrating to its urban structure a series of neighboring ejidos or rural communities and their agricultural lands. The process began after the Revolution of 1910-1920, but did not gain momentum until up to 15 or 20 years ago. Cuernavaca's agreeable climate and proximity to Mexico City made it a fashionable resort, propitiating the proliferation of residential subdivisions for upper class weekend homes. Vast portions of the periphery and inner ring were transformed into low density, high income residential areas. The expansion of these areas has consumed agricultural lands and forced the inhabitants of the rural communities into impoverished settlements on the outskirts of their villages.

As the low income dwelling systems in the city center became saturated, the limited availability of other options led to the appearance of squatter settlements. Land speculation for upper class residential areas effectively curtailed the development of low income subdivisions. Part of the incoming migrants were received in the peripheral settlements of the rural communities, while others invaded ravines and other public lands near the city center. The increasing demand for housing led low income groups into a struggle over lands being opened for urban expansion on the periphery. As a result of this process, close to 15% of the urban population lives in 'colonias proletarias' created by squatter invasions of developments intended for weekend residences.

The four basic low income dwelling systems that have been surveyed in this study are the following:

SHANTYTOWNS; Located in the central and inner ring areas. The shantytowns can be divided into two subgroups inasmuch as their land tenure situation is concerned: The squatter settlements located mostly in barrancas and on other public lands, and the small 'legal' clusters built on rented land, similar to the 'ciudades perdidas' in Mexico City. The shantytowns house mostly very low and low income groups that account for about 8% of the urban population.

VECINDADES; Located predominantly in the city center and inner ring. The system is largely made up of standard court yard tenements with one or two rooms and shared facilities. It also includes one or two story low income apartments with most, but not all, utilities in the unit. The 'vecindad' is one of the older basic dwelling systems and it serves mostly low and very low income groups. It accounts for some 13% of the population.

RURAL COMMUNITIES; Located in the inner ring or on the periphery. These urbanizing communities usually have two distinct residential areas: the original 16th Century town with predominantly low to moderately low income population, and the new settlements on the outskirts of the villages, with mostly low to very low income population. Although the rural communities tend to become fully integrated to the city, they constitute a distinct dwelling system and represent about 12% of the urban population.

COLONIAS PROLETARIAS; Generally located on the eastern and southern periphery of the city. The 'colonias proletarias' are divided into two groups: those created by squatter settlements, usually on privately owned land, and the low income 'fraccionamientos' or speculative subdivisions. The predominant income lev levels range from low and very low in the squatter

type 'colonias' to moderately low and low in the speculative developments. They account for near 27% of the population.

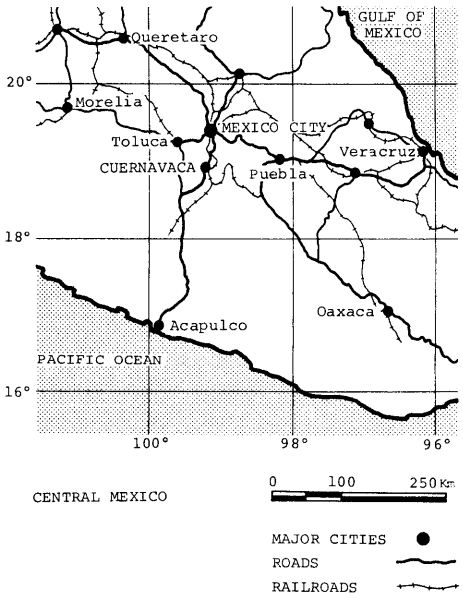
Two other dwelling systems of slightly higher income levels, which are included in the study, should be mentioned:

WALK-UP APARTMENTS; A system almost completely confined to the downtown area. This type is differentiated from the low income apartments included in the 'vecindades system. It has more than two stories with all utilities in all units, and it houses moderately low to middle income groups. Approximately 10% of the urban population lives this type of dwellings.

INSTITUTIONAL ROW HOUSES; These are mostly located in the inner ring and on the periphery. Although they are usually intended for lower income groups, the one or two story housing projects are only accessible to moderately low and middle income groups Until recently, they had been developed privately. The last few years have seen the appearance of the CIVAC combined public/private project and of the begining of public housing developments by INFONAVIT. This system houses about 10% of the metropolitan area's inhabitants.

The following typological survey and proposed project are carried out within the context of this hypothesis of the development and structure of Cuernavaca's urban environment.

URBAN CONTEXT
CUERNAVACA, MEXICO

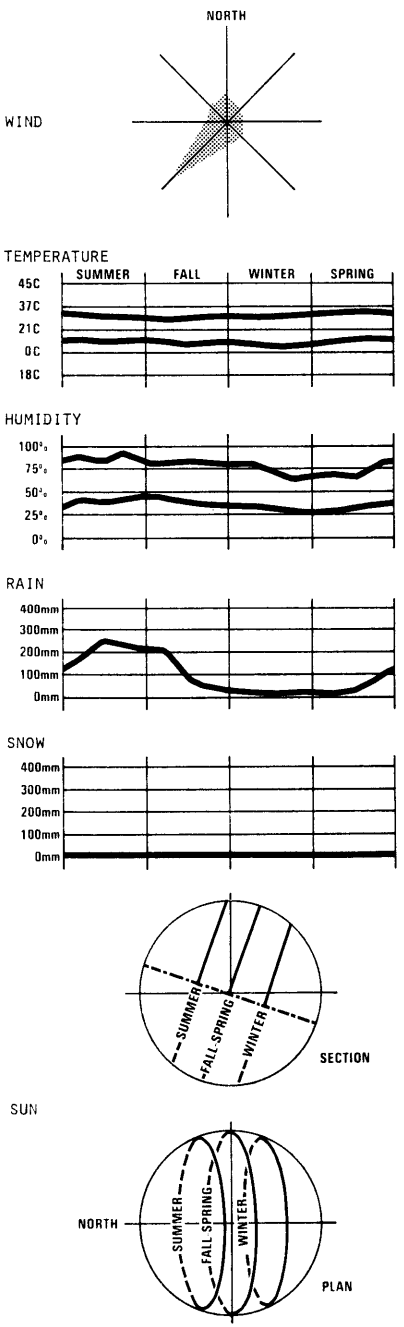


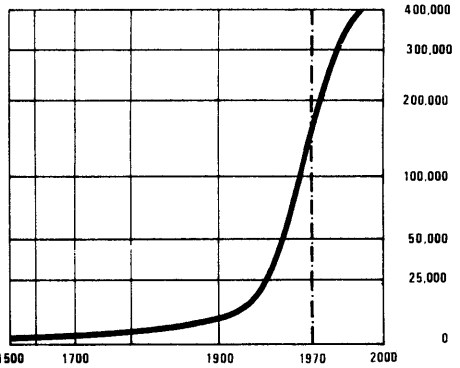
1. PRIMARY INFORMATION: The Cuernavaca metropolitan area is located over a mountain range, 70 kilometers south of the high plateau of Mexico City. It lies in a valley that slopes down from the Sierra de Ajusco in the north and which is bounded by a series of deep ravines or barrancas on the west and a chain of hills on the east. The city's altitude, ranging from 1850 to 1350 meters above sea level provide it with average temperatures of 17 to 23°C, in spite of its tropical setting at latitude 18°55' north, longitude 19°14' west. The rainy season from May to September has precipitations of between 60 and 240 mm. per month, often accompanied by electrical storms. The average total rainfall is of 1034 mm. per year.

2. HISTORY: Cuauhnahuac, or place near the woods, is said to have been founded by the ancient Olmec civilization. At the time of the Spanish conquest in 1521 it was the administrative center of the Tlahuica region, under the Aztec domination. The city became capital of the Oaxaca Valley Marquisate with which Cortes was rewarded by the King, and functioned as an important link between Mexico City and the port of Acapulco on the Pacific Ocean. After the war of independence in 1810, the region saw the development of large sugar cane plantations introduced by the Spaniards. The haciendas came to dominate the area, taking over the native rural communities and turning their inhabitants into slaving day workers. These are among the main factors that made the local based movement led by Zapata one of the most important currents in the revolution of 1910. At the height of the movement in 1915 the state of Morelos was autonomously run by a democratically organized native population, which not only supported a guerrilla army, but exported sugar and fed Mexico City as well. After the revolution, Cuernavaca began to grow rapidly, becoming a fashionable resort for upper income groups from Mexico City. As in most of the country, industrialization in the area began after World War II. The trend has been reinforced in the past few years by the federal policy of decentralizing the industrial growth of Mexico to surrounding cities.

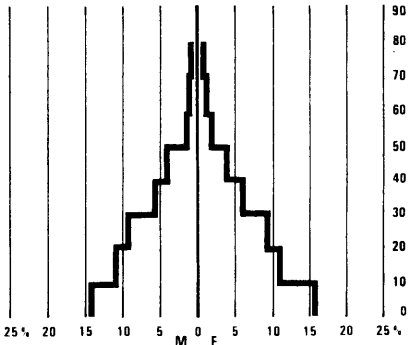
3. ECONOMY: Today, the economic structure of the Cuernavaca Metropolitan area is predominantly urban and industrial. Between 1950 and 1970, the labor force in agriculture decreased from 25.9 to 9.4% of the total, while that of manufacturing and services increased from 14.7 to 21.4% and 23.9 to 35.9%, respectively. The labor force in the city amounts to 39% of the population and

CUERNAVACA, 18° 55' N

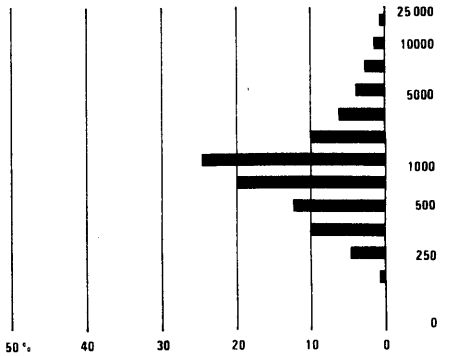




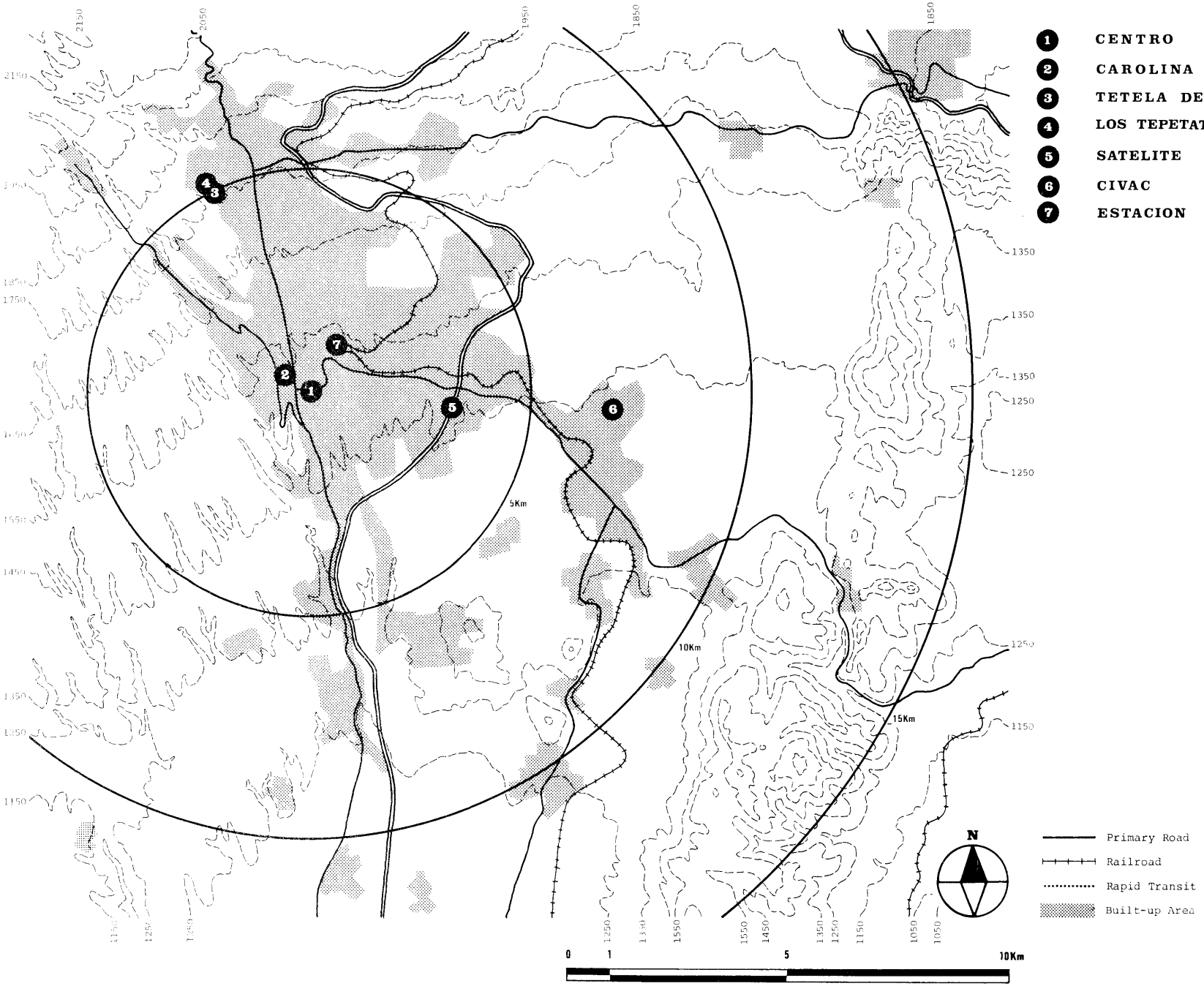
URBAN POPULATION GROWTH
horizontal: dates vertical: population
Source: Direccion de Estadisticas, S.I.C., 1973



URBAN POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Census, 1970; Population, 160,804



URBAN ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Census, 1970; Households, 31,139



URBAN TOPOGRAPHY AND CIRCULATION

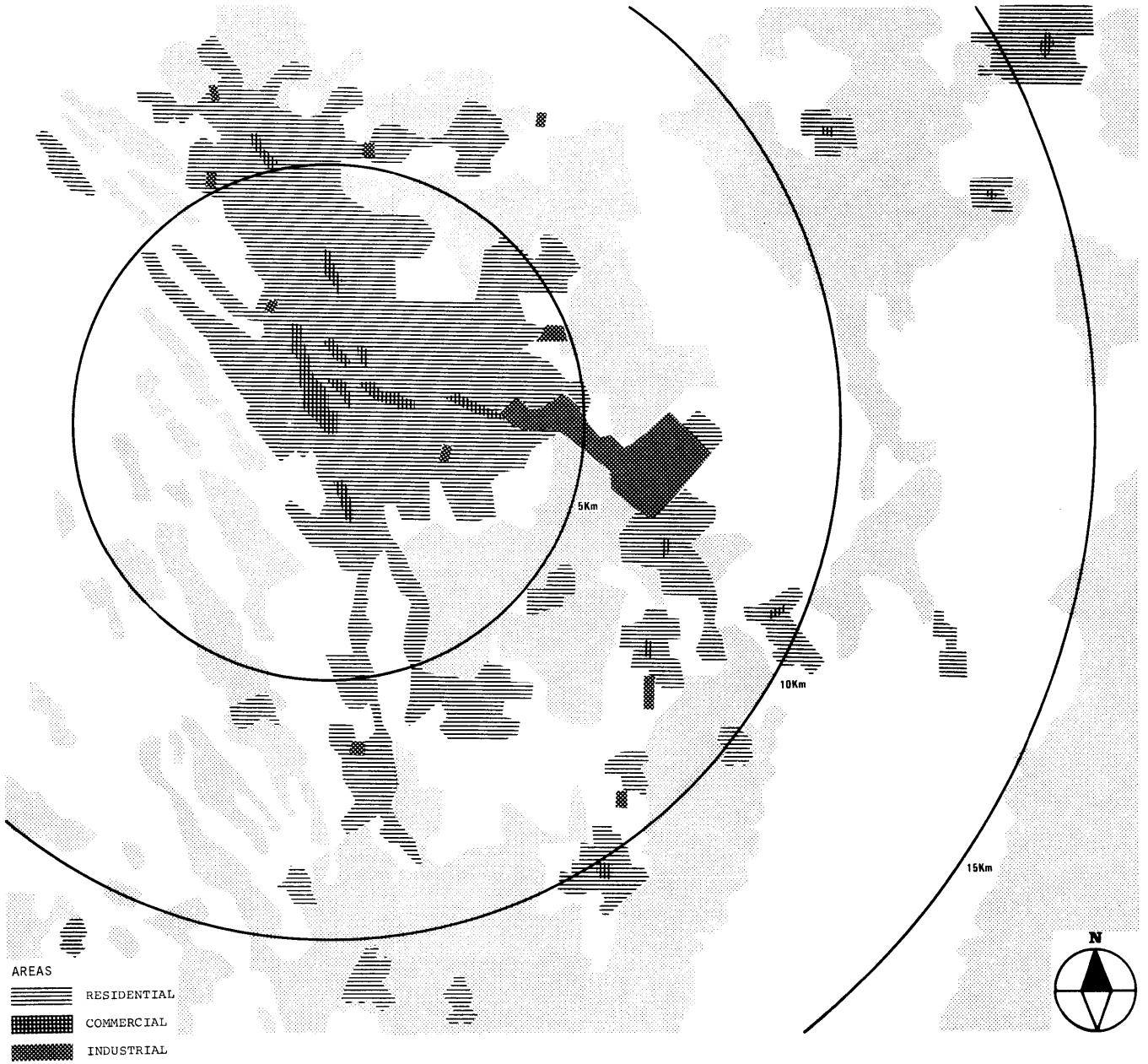
1: 125 000

it accounts for 35% of the economically active population in the state of Morelos.The overall make-up of the metropolitan area's labor force is as follows: agriculture,9.4%; mining, 0.5%; manufacturing, 21.4%; construction, 9.7%; and 8.4 % for others. This structure reflects the importance of industry and turism in the local economy. It is probable that the industrial sector will grow rapidly in the future: in a short period of time 38 industries have been built in the CIVAC industrial park, a joint government-private enterprise venture, and there are another 30 being planned.

A measure of the sustained relevance of tourism for the city is shown by the "floating" population which increased from 18,000 in 1950 to 45,000 in 1970.

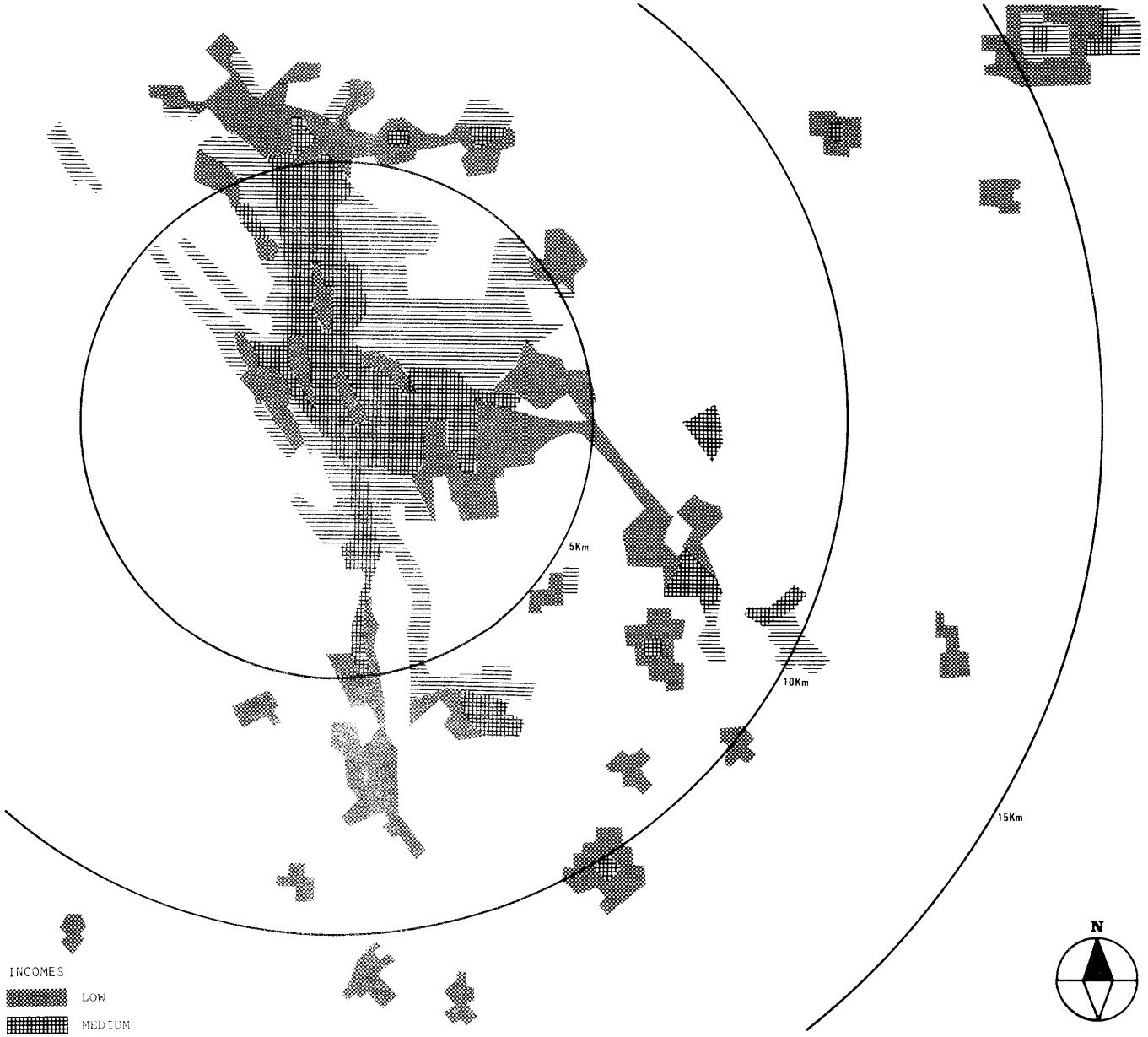
4. GOVERNMENT: Cuernavaca is the capital of the state of Morelos which with a surface of 4,941 Km2 or 0.25% that of the country, is one of smallest states in the Republic. The state is composed of 32 municipalities including that of Cuernavaca, which is by far the most important. In 1970 the municipality of Cuernavaca had 160,804 inhabitants, equivalent to 37.67% of total state population. The municipality is made up of 27 political wards and 6 additional municipal assistanceships in areas that are not fully integrated to the city. The city is governed by the municipality, whose president is elected every three years. The state governor, however, has an important influence in local affairs, particularly in as much as long range and State wide planning is concerned. state and Municipal officials are supposedly elected by all the adult literate population. They have uninterruptedly been members of the ruling Institutional Revolutionary Party.

5. DEMOGRAPHY: Between 1930 and 1970 the population of Cuernavaca increased more than 10 times, from 9,785 to 160,804. Cuernavaca's annual growth rate of 6.4% is higher than Mexico City's at 6.2% and almost double that of the country, at 3.5%. It is expected to decrease from the present levels for the decade between 1970 and 1980 to 3.6% between 1990 and the year 2000. According to these estimates, the Cuernavaca metropolitan area's population would reach 282,000 by 1980 and 583,000 by the turn of the century.



URBAN LAND USE PATTERN

1: 125 000



URBAN INCOME PATTERN

1: 125 000

However, if the effort to divert migrant currents from Mexico to secondary cities succeeds, the above figures are likely to be considerably higher.
As in the case of Mexico City with regard to the country, Cuernavaca has come to a predominant position in relation to the state of Morelos: 37.7% of the state's population lived in the Cuernavaca Metropolitan area in 1970. The density of population of the municipality was 657 inhabitants per square kilometer, versus 125 for the rest of Morelos. Only 57% of the city's inhabitants are native to the region, with the remaining 43% coming mostly from the states of Guerrero and Mexico. Over 54% of the population is under the age of 20.

6. SOCIO-CULTURAL: As in most of the country, the majority of the population in Cuernavaca is mestizo, a mixture of Spanish and Indian blood. A small proportion are migrants of Indian origin from the states of Guerrero and Mexico. About 90% of the population belongs to the Roman Catholic religion. In general, there are no major ethnic or cultural differences that are not tied to the divisions along class lines.
More than in other parts of the Mexico, the experience of the revolution lives with the people of Morelos. With the movement of population from the countryside to the city, Cuernavaca has seen the rise of one of the strongest independant labor movements in the country.

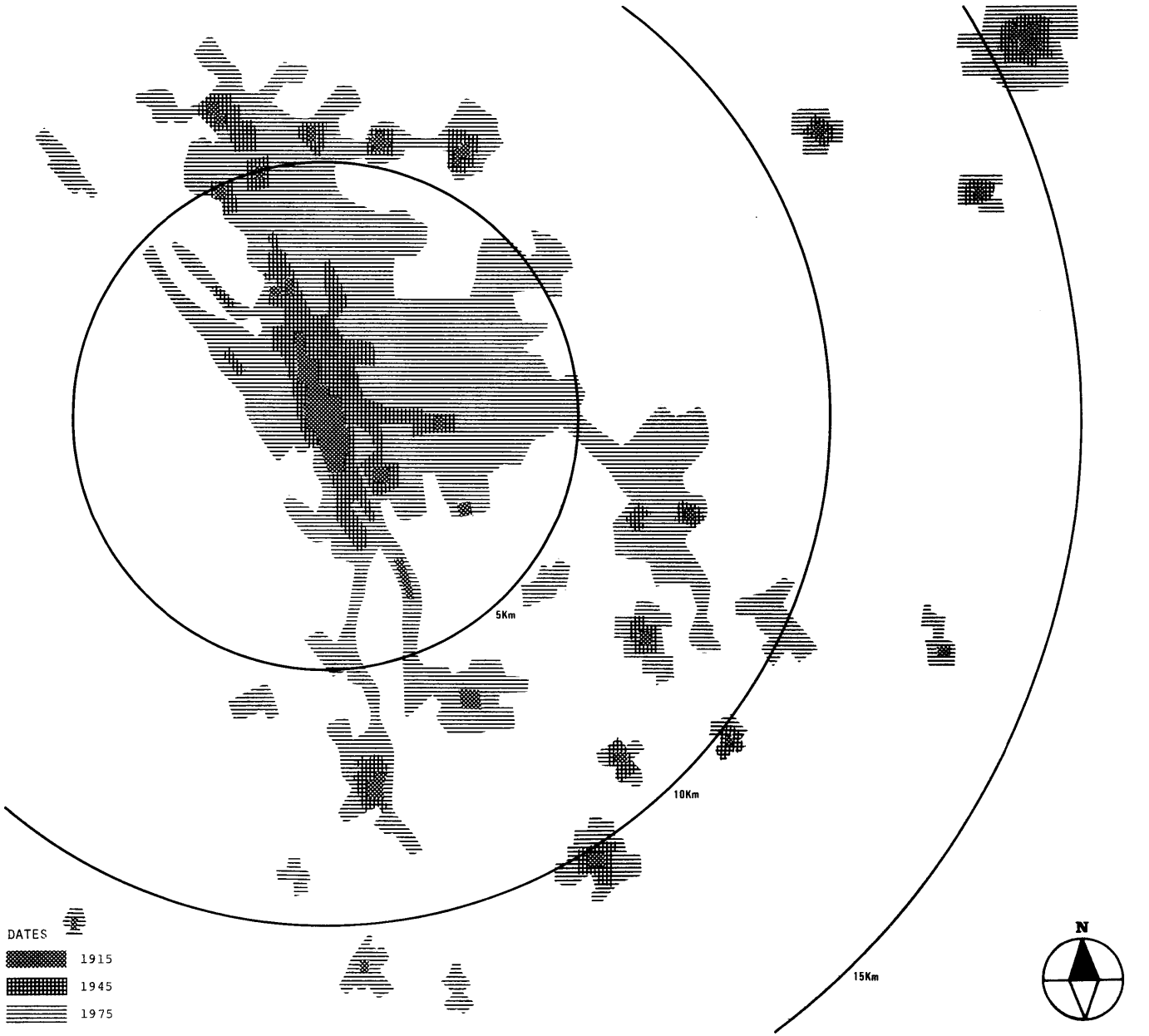
7. SOCIO-ECONOMIC: Ninenty percent of the city's working population have incomes of less than US$ 2,400 per annum. In 1970, aproximately 26% had incomes of less than $ 479 a year, while 57% made between $ 480 and $ 1,440. Around 20% of the economically active population was paid less than official wage minimums in 1970.
The lower income groups are mainly concentrated in three areas: in and around the city center, in low income tenements, or as squatters on federal properties; in rural communities around the city that have become part of the metropolitan area; and in the newer suburban working class neighborhoods. The upper income groups live in old high walled villas in the downtown area or in many of the more recent residential subdivisions, in and around the city.

8. HOUSING: From 1960 to 1970, the housing stock increased by 81.4%, to a total of 30,438 dwelling units. Of these, privately owned units accounted for 39.7%, up from 22.3% in 1960. The proportion of rented units decreased from 77.7% of the total in 1960 to 60.3% of those in 1970. More than half of all dwellings had three or less rooms: the number of one room units in 1970 was equivalent to 40% of the total, an increase of 25.8% over those in 1960. Two room dwellings increased 138.2% over the same period of time, coming to 27.1% of the total. Three and four room units amounted to 22.0%, up 189.1% from 1960. The remainder is made up of dwellings having 5 to 9 or more rooms. About 48% of all dwelling units are built of brick and concrete. The remaining 52% combine adobe, scrap material or other walls, with tile, tar carboard, asbestos or thatched roofs. The metropolitan area has higher densities per dwelling in relation to the state, with 37.7% of the population and only 28% of dwelling units.

9. URBAN GROWTH: The unplanned expansion of the city has almost always been at the expense of agricultural lands, including valuable irrigated areas in many cases. It has also had other negative ecological effects on the regional system: the exploitation of the forests for building materials and the production of charcoal has pushed the timber line several kilometers up the mountain side. Over the years, this process has resulted in changing rainy season patterns and the massive erosion of fertile lands to the northeast of the city.

URBAN CONTEXT SOURCES

Topography and Circulation: (accurate) Carta Topografica, Cuer. CETENAL,1973.
Land Use Pattern: (approximate) Field Surveys by the authors, 1973-1975.
Income Pattern: (approximate) IBID
Growth Pattern: (approximate) IBID
Climate: (approximate) CONSEJO TUTELAR DEL ESTADO, Thesis, Raul Sanchez Mora, 1971.
General Information: CENSUS, 1970, DIRECCION GENERAL DE ESTADISTICA, S.I.C.: VIVIENDA MAXIMA DE COSTO MINIMO, Thesis R. Busquets, J. Martinez, J. Montano, G. Rodriguez, 1974; CUERNAVACA, VISION RESTROSPECTIVA DE UNA CIUDAD, V. Lopez, 1966; INTEGRACION URBANA DEL PUEBLO DE TETELA DEL MONTE, Thesis, R. Chavez, I. Vargas, 1974.



URBAN GROWTH PATTERN

1: 125 000

CASE STUDIES

The following section contains case studies describing selected low income dwelling environments within the Cuernavaca Metropolitan Area. The seven cases were selected on the basis of income groups, housing type, location, and the percentage of population that each system houses. The case studies are represented at four levels.

LOCALITY: A locality is defined as a relatively self-contained urban area. It is generally confined within physical boundaries.

LOCALITY SEGMENT: All localities differ in size and shape; for purposes of comparison, a segment of 400m is taken from each locality.

LOCALITY BLOCK: Within each locality segment a typical residential block is selected in order to compare land utilization, (patterns, percentages, densities).

DWELLING UNIT: A typical self-contained unit for an individual, a family or a group, in each locality segment.

The case studies are arranged by locality as follows:

1. CENTRO: Walk-Up Apartments
   Private, Moderately low income, City Center

2. CAROLINA: Vecindades
   Private, Low income, Inner Ring

3. TETELA: Rural Community
   Popular, Low Income, Periphery

4. LOS TEPETATES:
   Popular, Very low income, Periphery

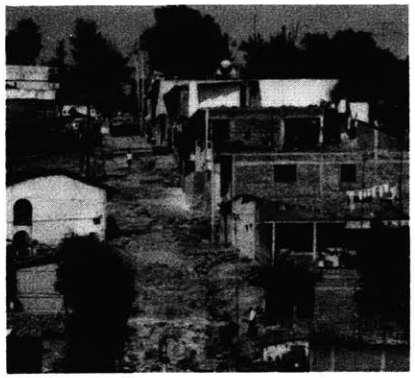
5. SATELITE:
   Popular, Moderately low income, Periphery

6. CIVAC, Institutional Row House
   Private/public, Middle income, Periphery

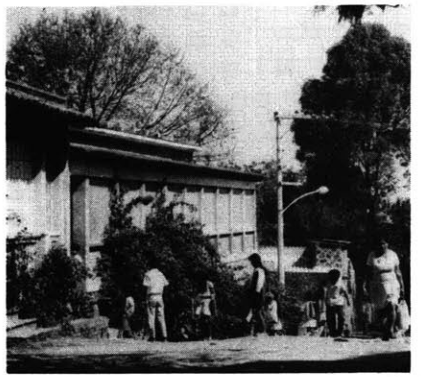
7. ESTACION:
   Popular, Very low income, Inner Ring

1 CENTRO

2 CAROLINA



3 TETELA



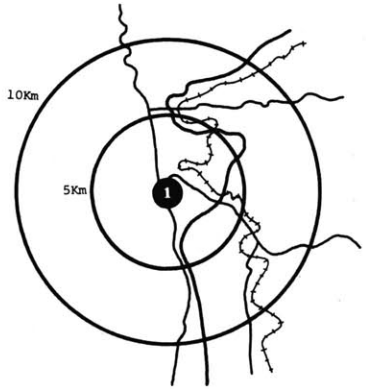
4 LOS TEPETATES

5 SATELITE

6 CIVAC

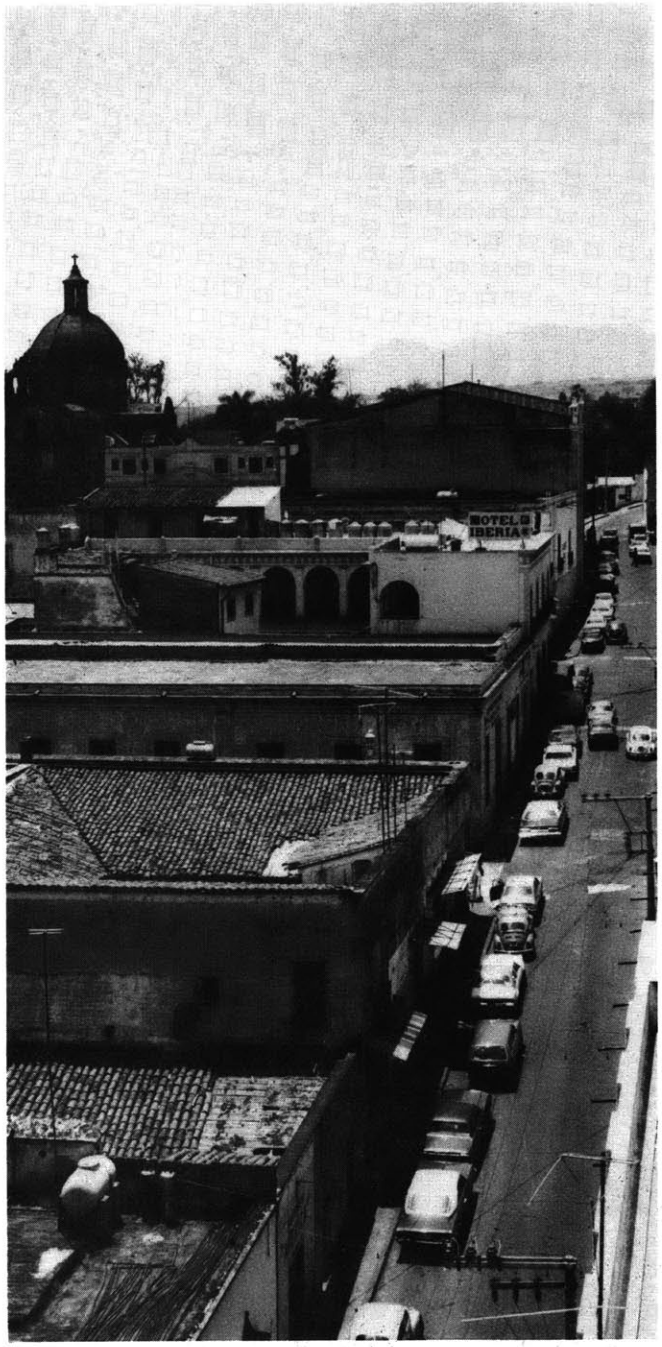
7 ESTACION

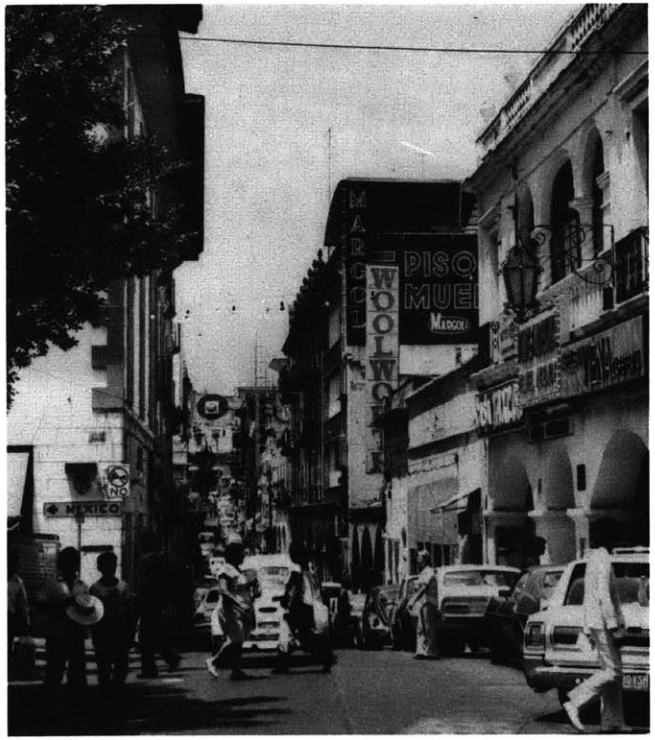
1 CENTRO

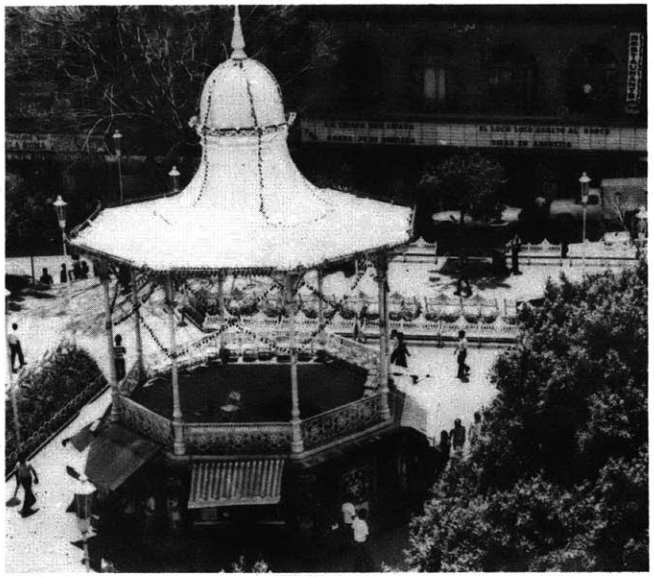


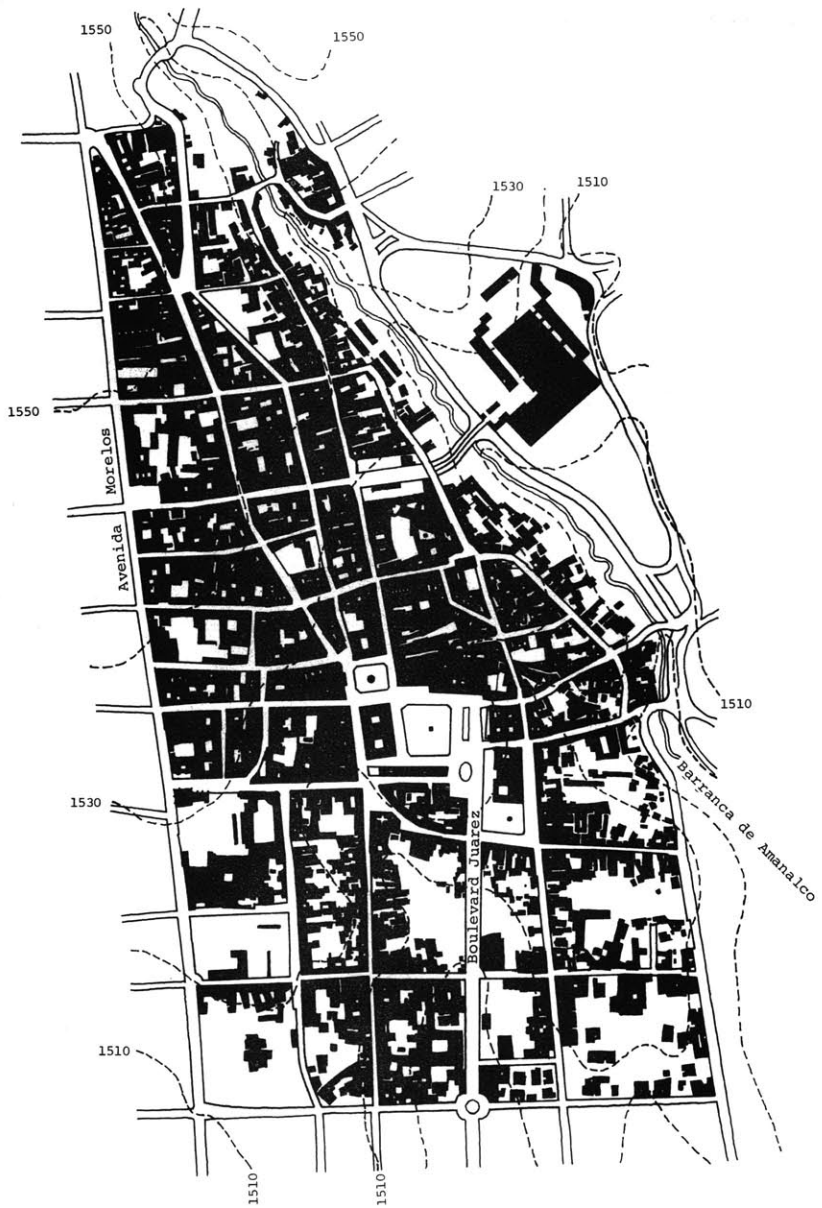
LOCATION: The Centro is the city's downtown business district and main commercial area. It is located on the site of the 16th. century city, on a broad hill that slopes down from north to south and covers a surface of some 84 hectares.

ORIGINS: The city of Cuernavaca as we know it today was founded by Hernan Cortes in 1521, on the site of the Tlahuica capital of Cuauhnahuac. In a characteristic gesture, Cortes destroyed the city's main temple and built himself a fortified palace on its ruins. Shortly thereafter, the construction of the cathedral and other civil and religious buildings that make up the city's urban environment today, was begun. During the three centuries of Spanish colonial rule, Cuernavaca functioned as the region's administrative and religious center. The local economy was based on the sugar cane industry introduced by Cortes. Many of the ingenios or sugar processing plants built around the city were still in operation at the beginning of the 20th. century. By the 19th. century the city had taken on important commercial functions and had become a fashionable resort that was made popular by the ill-fated emperor Maximilian, who built a vacation home nearby. Today, the Centro encompasses the old Cuernavaca. It has retained it's traditional administrative, commercial and recreational functions, the last of which have become increasingly important.









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LOCALITY PLAN

LAYOUT: The layout of 16th. century Cuernavaca was made, as much as the topography permitted, following the traditional spanish block grid, in keeping with the urban design specifications required by the 'Cedula Real' of Phillip the Second. Old Cuernavaca, or the area known as the Centro today, was originally defined by two relatively deep barrancas: that of Amanalco on the east and los Caldos on the west. The modern area of influence of the Centro has moved to the east to include the new central market, or Centro Comercial. Thus, the area is now defined by the avenida Morelos that runs along the top of the hill on the west, and crossing the barranca de Amanalco, by the far side of the vehicle dominated circuit that encircles the central market. The area is limited to the north by the point were the hill climbs to it's narrowest part, which is the site of the chapel of El Calvario. The boundary on the south is not physically defined but is signalled in a change of land use to a predominantly residential area.
The Centro's residential areas are made up largely of three dwelling systems: the large private residences of a few families, some of which are centuries old and take up the better part of a block; the center city tenements or vecindades, usually serving as a temporary residence for low and very low income groups that eventually move out to suburban working class neighborhoods; and the apartments, ranging from the small three or four story walk-ups for low income groups with which we are concerned in this case, to expensive suites for wealthy tourists or semi-permanent residents, located on the central squares.

Photographs, opposite page:

CENTRO: (left) The downtown area is characterized by it's 16th Century spanish grid layout and the traditional tile roofed dwellings with inner courts. (top) The congested Calle Guerrero houses much of the city's tourist and local commercial activities. Arcades provide shaded pedestrian circulation. (bottom) A kiosk with refreshment stands is located in one of the two central squares, in the middle of the commercial and business district.

LAND USE: The main functions of the down town area or Centro are administrative and commercial, and only secondarily residential. The business and administrative district is located around the two central public squares and includes local, state and federal agencies, banks, real estate brokers and business firms. The same area houses, hotels, restaurants, cafes, bars and movie theaters as well as the city's main commercial area which can be divided into two categories: local and tourist. The tourist commercial area is found mostly around the central squares and between these and the cathedral and avenida Morelos on the west, whereas the local commercial area extends from the central squares to the south and to north, all the way to the central market, across the barranca. The market is the heart of the city for the low income population. It is here that they travel to several times a week for their shopping, or for recreation on weekends: there are mechanical games all year round and it is the site where the circus is set up when it comes to town. The Centro has many of the community facilities that serve the rest of the city as well. They include public gardens, schools, hospitals, churches, a library and the museum, housed in Cortes' palace. There are also several lenguage schools for foreign students in the Centro.

AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES

KEY

- **Pk** Parking
- **P** Police
- **F** Fire Department
- **S** School
- **Ch** Church
- **R** Recreation
- **L** Library
- **Mu** Museum
- **H** Health
- **PO** Post Office
- **SS** Social Services
- **M** Market
- **G** Government
- Bus

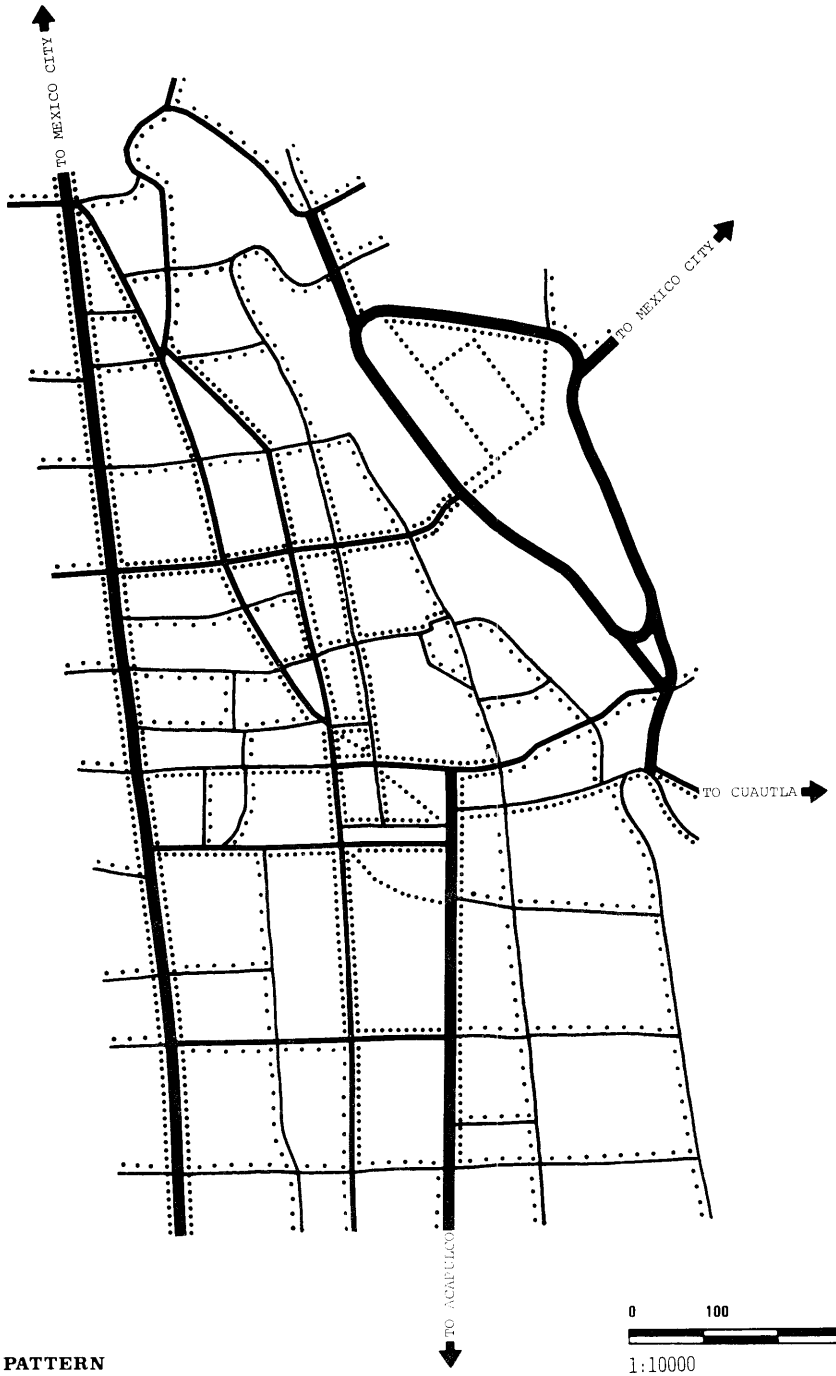
LOCALITY LAND USE PATTERN

N

0 100 500m

1:10000

CIRCULATION: The centro is bounded on the west by a minor artery, the avenida Morelos, which crosses the city from south to north. The eastern part of the downtown area is dominated by the circuit around the central market which operates as a distributor for traffic leaving or coming in, to or from the four corners of the city: the old and new highways to Mexico in the northwest and northeast, the road to Cuautla in the southeast and the highways to Acapulco in the south. The circuit is connected to the Centro by bridges over the barranca at three points. There is also a pedestrian bridge that joins the downtown commercial area with the central market. The central market functions as the primary urban bus terminal through which all lines pass as an intermidiate point in their routes. An inter-urban bus terminal connecting the city with other parts of the State is located behind the palace of Cortes. The bus lines going to Mexico City and Acapulco are also located in or near the Centro.



KEY

VEHICULAR

PEDESTRIAN

N

0 100 500m

1:10000

LOCALITY CIRCULATION PATTERN

POPULATION: Of all the localities surveyed, the Centro undoubtedly has the greatest variety of social groups, from very low income workers living in vecindades or tenements, to upper class merchants or retirees living in condominium apartments or old colonial homes. The group with which we are concerned in this case lives in the walk up apartments that are predominant in the downtown area. Their occupations include workers and technicians at one end of the spectrum, and professionals and business types at the other. The majority can be considered of low to moderate levels of income.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	234	16	14.6
DWELLING UNITS	1670	16	104
PEOPLE	10,000	16	625

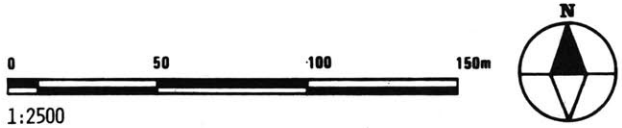
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	4.0	25
SEMI-PUBLIC (open spaces, schools, community centers)	1.0	6
PRIVATE (dwellings, shops, factories, lots)	10.2	64
SEMI-PRIVATE (cluster courts)	0.8	5
TOTAL	16	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 193 \text{ m/Ha.}$$

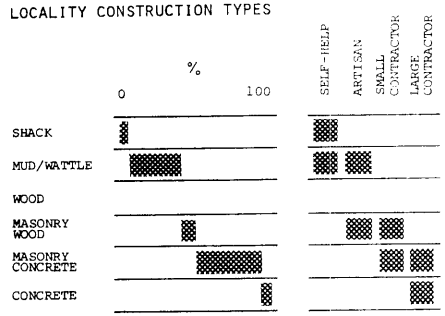
AVERAGE LOT AREA = $470 m^2$

LOCALITY SEGMENT AIR PHOTOGRAPH



LOCALITY SEGMENT PLAN

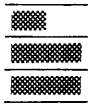
LOCALITY CONSTRUCTION TYPES



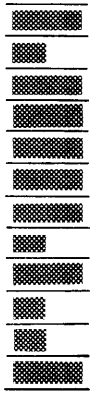
The chart shows (1) approximate percentage of each construction type within the total number of dwellings; and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

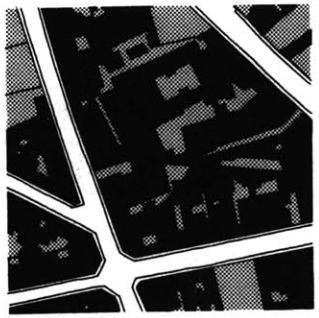


The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

LAND UTILIZATION DIAGRAMS

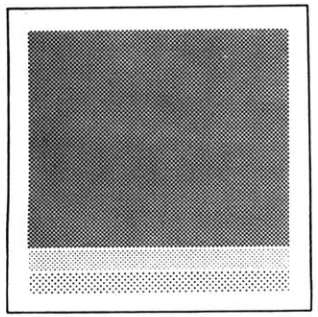
1 Hectare



PATTERN

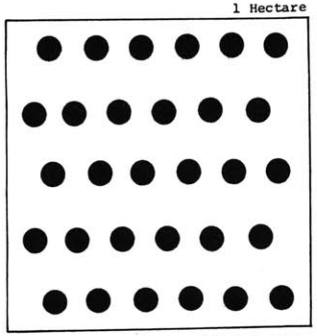
Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	

1 Hectare



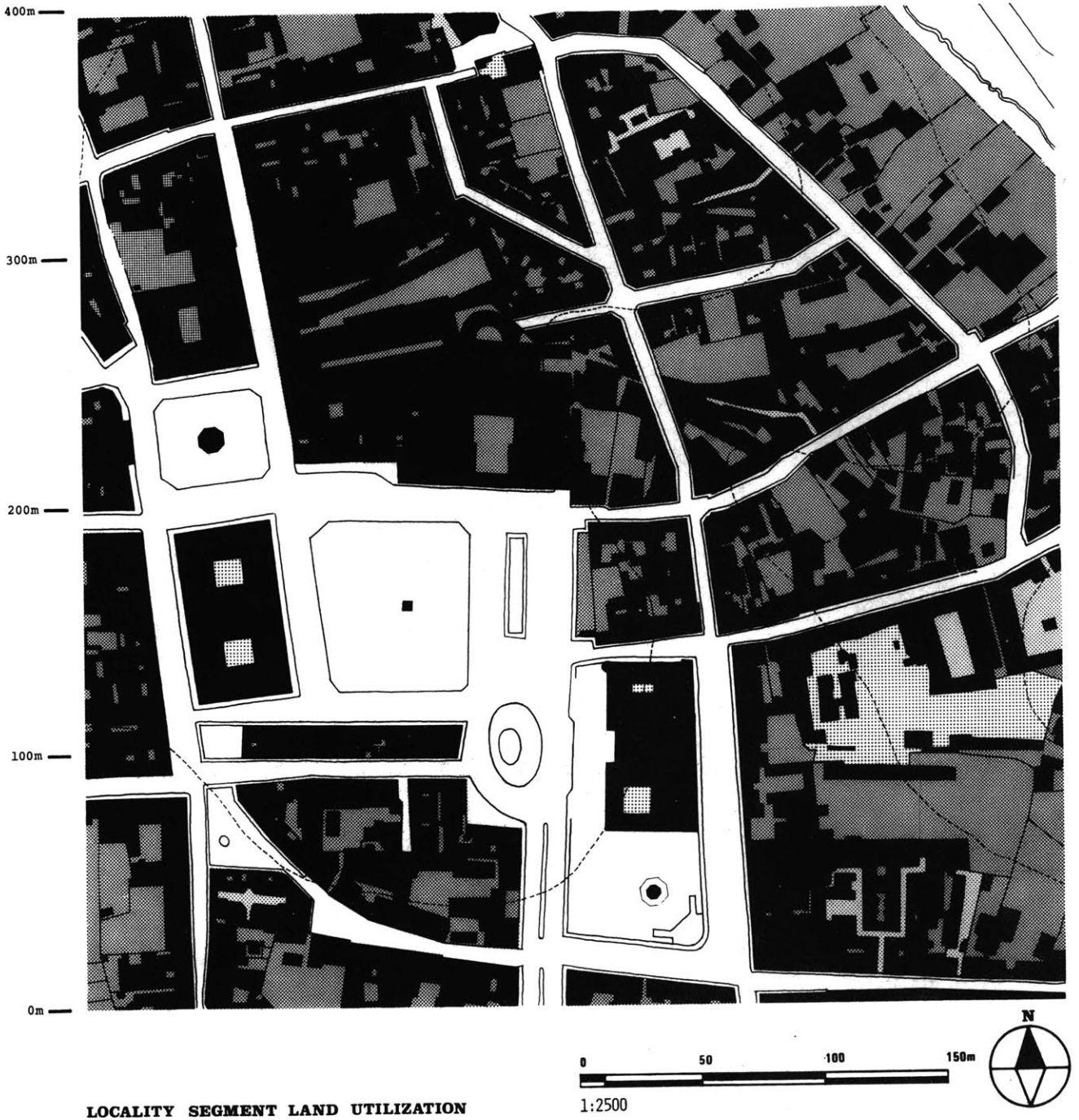
PERCENTAGES		
	Streets/Walkways	25%
	Playgrounds	6
	Cluster Courts	5
	Dwellings/Lots	64

1 Hectare



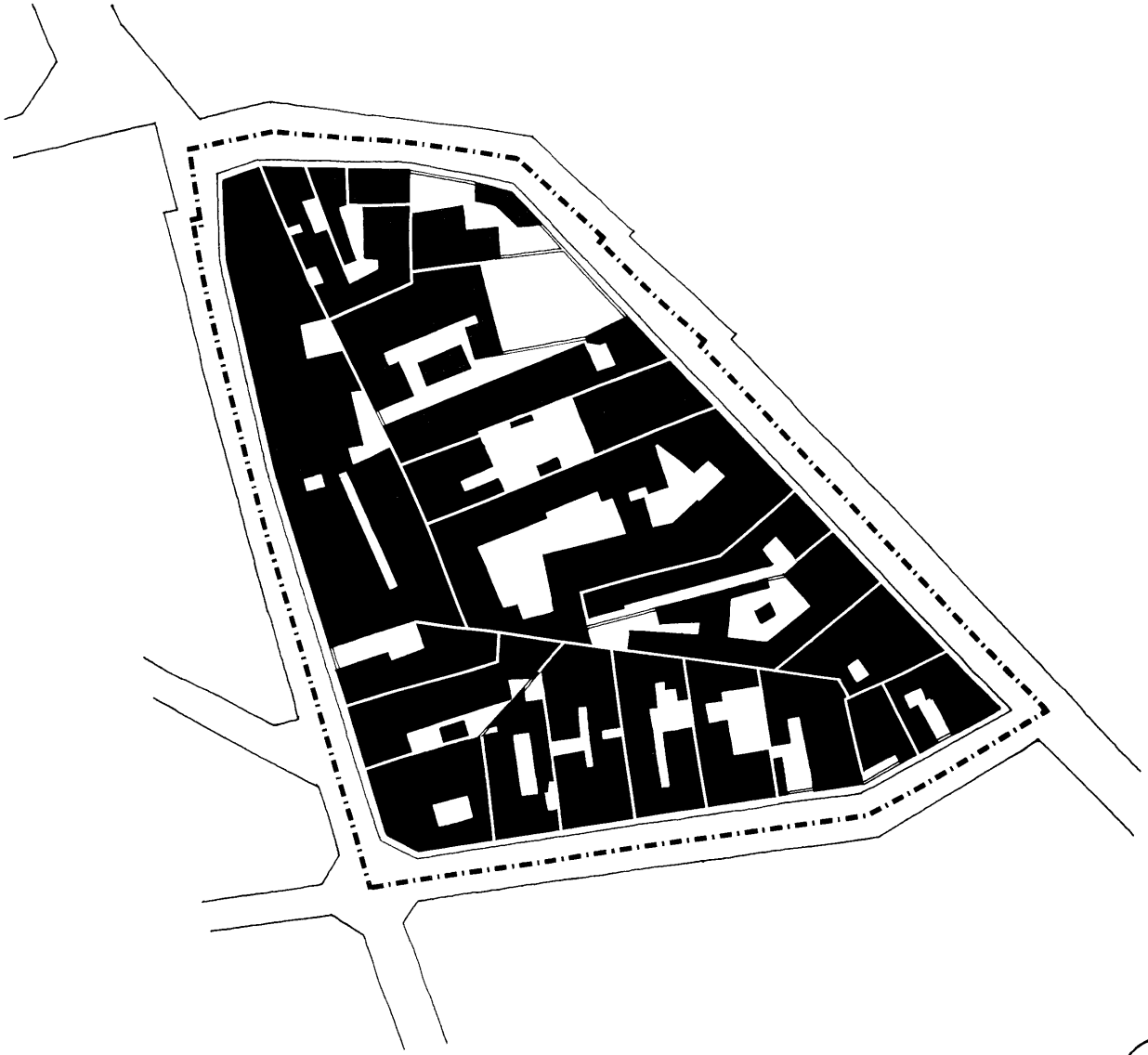
DENSITY Persons/Hectare 625

● 20 persons



1:2500

LOCALITY SEGMENT LAND UTILIZATION



LOCALITY BLOCK PLAN

1:1000

BLOCK: Although part of the original regular grid layout, this particular block's shape changes as it approaches the Barranca de Amanalco which is at an angle to the urban pattern. The street that bounds the block on to the west also serves the opposite dwellings that give on the barranca. The block is made up largely of 2, 3 and 4 story walk-up apartments with a few low income tenements and individual houses. In spite of large public spaces, the area has one of highest densities in the city due to the type of dwellings, number of floors and saturation of construction.

LOCALITY BLOCK LAND UTILIZATION DATA

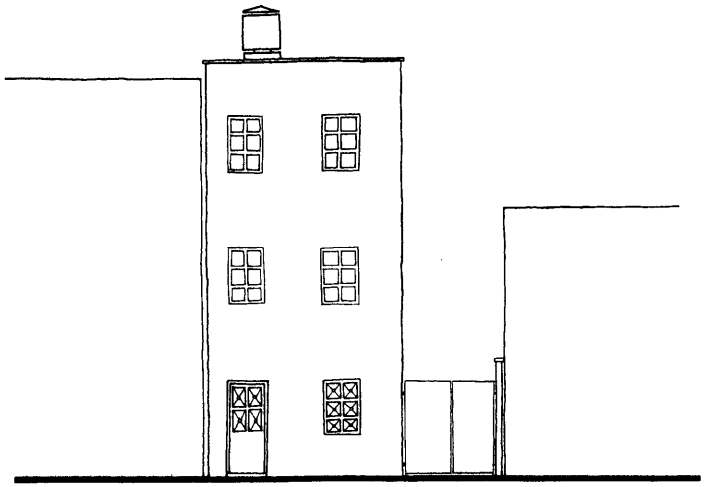
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	21	0.78	26.9
DWELLING UNITS	91	0.78	116.6
PEOPLE	546	0.78	700

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.18	23
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.53	68
SEMI-PRIVATE (cluster courts)	0.07	9
TOTAL	0.78	100 %

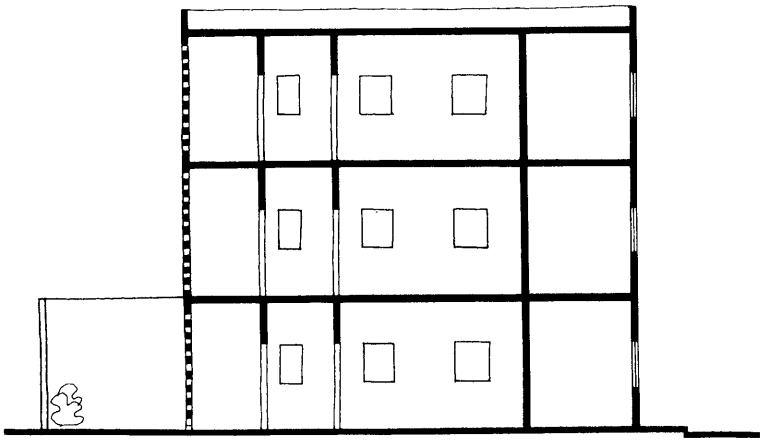
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 234 \text{ m/Ha}$$

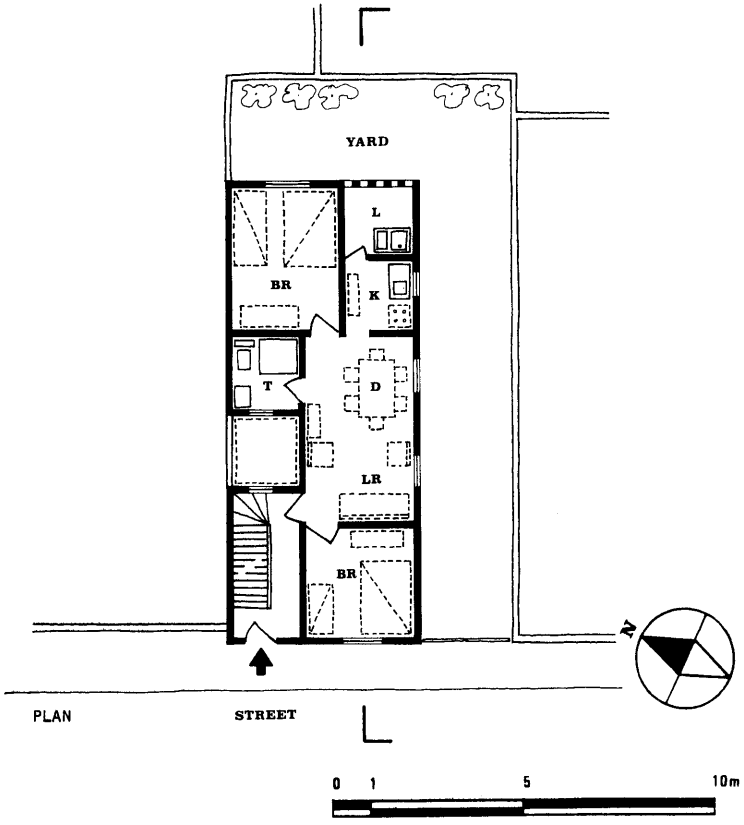
AVERAGE LOT AREA $= 288 \text{ m}^2$



ELEVATION



SECTION



1:200

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)

LOCALITY SOURCES

Plan:	*(accurate) Oficina Revisora de Catastro.*
Land Use Pattern:	*(approximate) Field Surveys by the authors, 1972-1975.*
Circulation Pattern:	*(approximate) Field Surveys by the authors; G. Flores, 1972-1975.*
Segment Plan:	*(accurate) Oficina Revisora de Catastro.*
Segment Land Utilization:	*(accurate) IBID*
Block Plan:	*(accurate) IBID*
Typical Dwelling:	*(approximate) Field Survey by the authors, 1975.*
Physical Data:	*(accurate) Field Survey by G. Flores, 1975.*
Photographs:	*CETENAL (aerial) 1970; The authors, 1975; C. Garduño,1976.*
General Information:	*IX Censo General de Poblacion 1970, Cuernavaca, Morelos; Field Survey G. Flores, 1975.*

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: Apartments
area (sq m): 72
tenure: Legal Rental

LAND/LOT
utilization: Private
area (sq m): 112.5
tenure: Legal Ownership

DWELLING
location: City Center
type: Semi-Detached/walk-up
number of floors: 3
utilization: Multiple: Family
physical state: Fair

DWELLING DEVELOPMENT
mode: Instant
developer: Private
builder: Small Contractor
construction type: Masonry, Concrete
year of construction: 1945

MATERIALS
foundation: Stone
floors: Concrete Slab
walls: Brick
roof: Concrete Slab

DWELLING FACILITIES
wc: 1
shower: 1
kitchen: 1
rooms: 3
other: Service Patio

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: Southern Mexican
place of birth: Guerrero
education level: University

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

MIGRATION PATTERN
number of moves: 2
rural - urban: 1970 (from Taxco)
urban - urban: 1972
urban - rural: -
why came to urban area: Employment

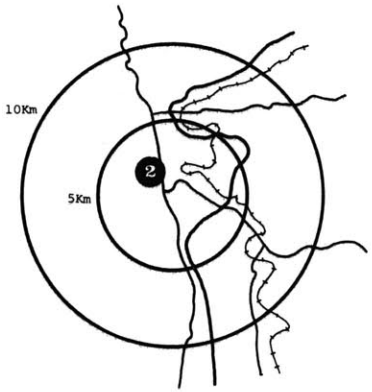
GENERAL: ECONOMIC
user's income group: Low Middle
employment: High School, Teacher
distance to work: 3 Km.
mode of travel: Public Transportation

COSTS US$
dwelling unit: $ 5,760
land - market value: $ 600,000/HA.

DWELLING UNIT PAYMENTS
financing: -
rent/mortgage: $ 50
% income for rent/mortgage: 15 %

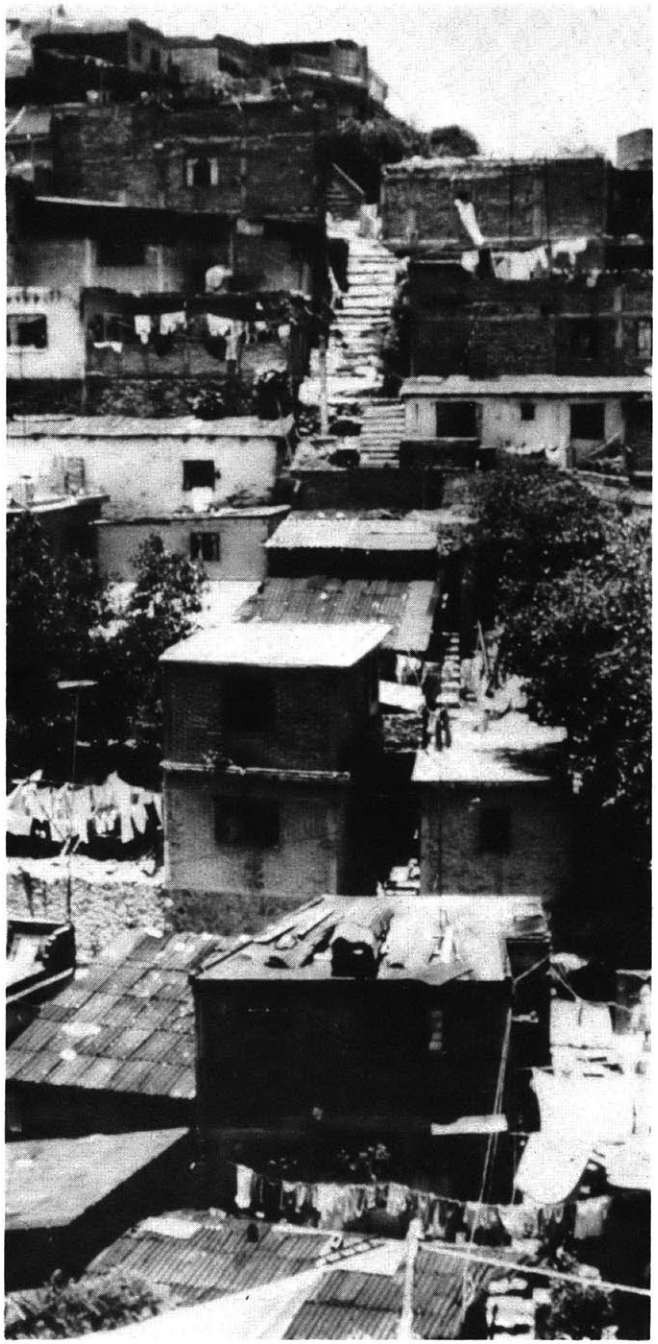
CENTRO: (left) Guerrero is lined with apartments and office buildings that have ground floors occupied by stores.
(top) View of Centro with market in background.
(bottom) Apartment building giving on to the barranca with a low income tenement at the back of the lot.

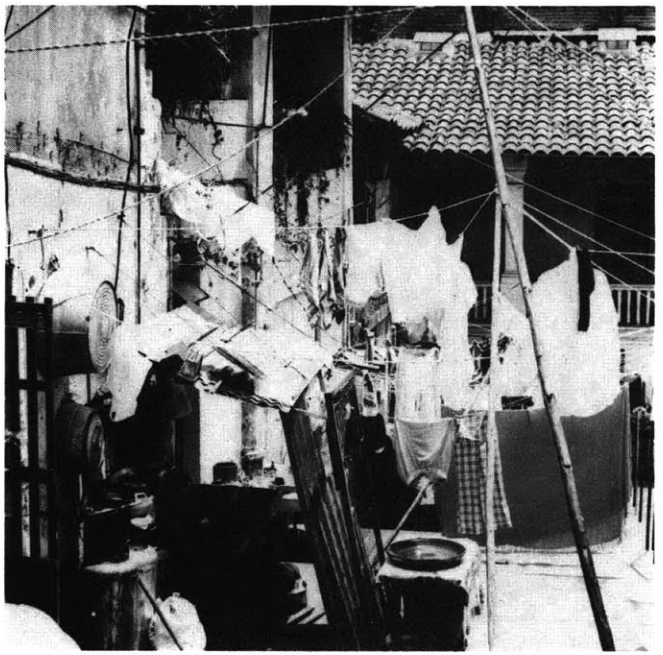
2 CAROLINA

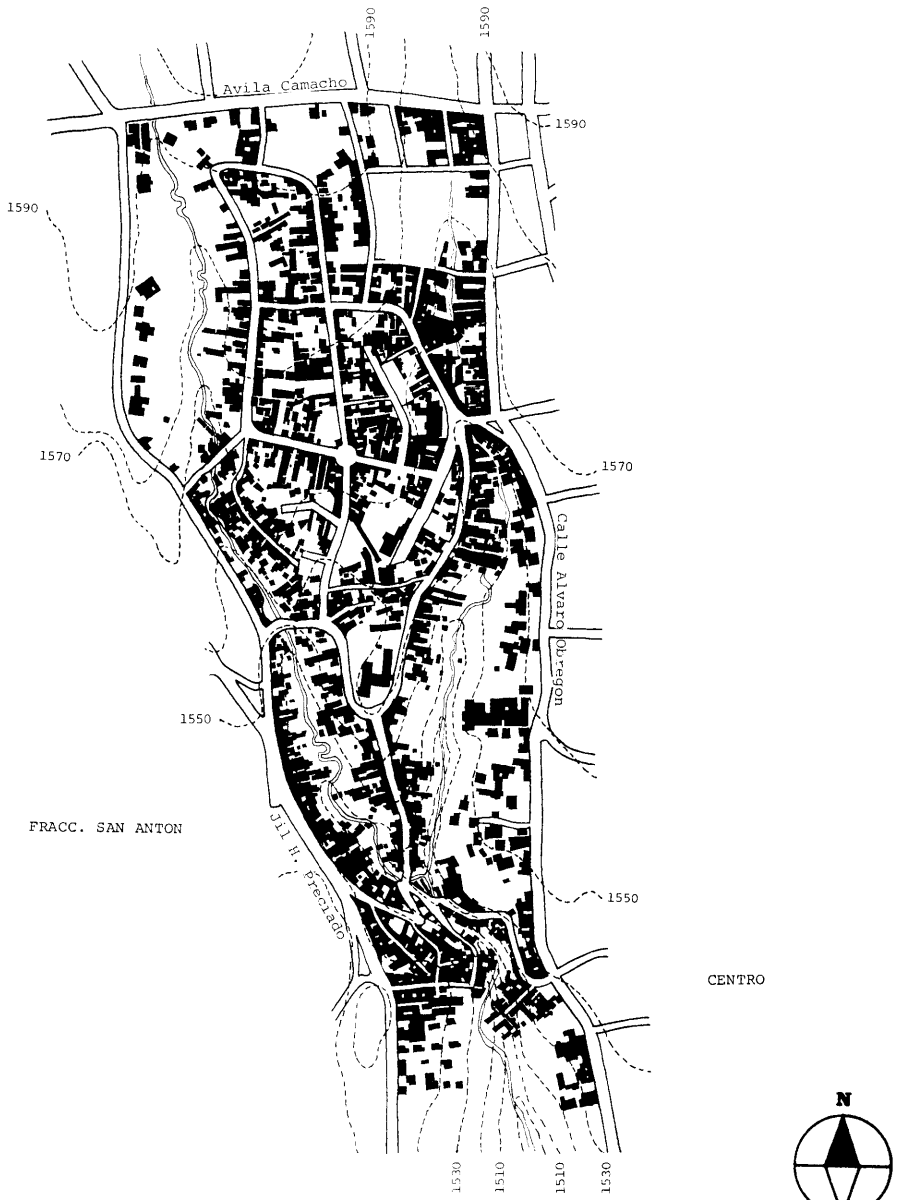


LOCATION: The Colonia or neighborhood of la Carolina is located about 2 Km. to the northeast of the city center and covers a surface of 45 hectares.

ORIGINS: Before the revolution the area now occupied by the Colonia was the site of the sugar cane hacienda of la Carolina. The State was held by federal troops from 1910 to 1915, when Zapata captured the city and broke up the haciendas. People who had fled or had been evacuated to Mexico City during the revolution were resettled in the area in 1920. The largely low income population organized into a union of settlers and paid 0.25 pesos per square meter plus 1,000 pesos for the land titles. The Colonia was formerly established as such in 1938 when the remaining land was aubdivided into 1000 square meter plots (25 x 100 m) and sold off.





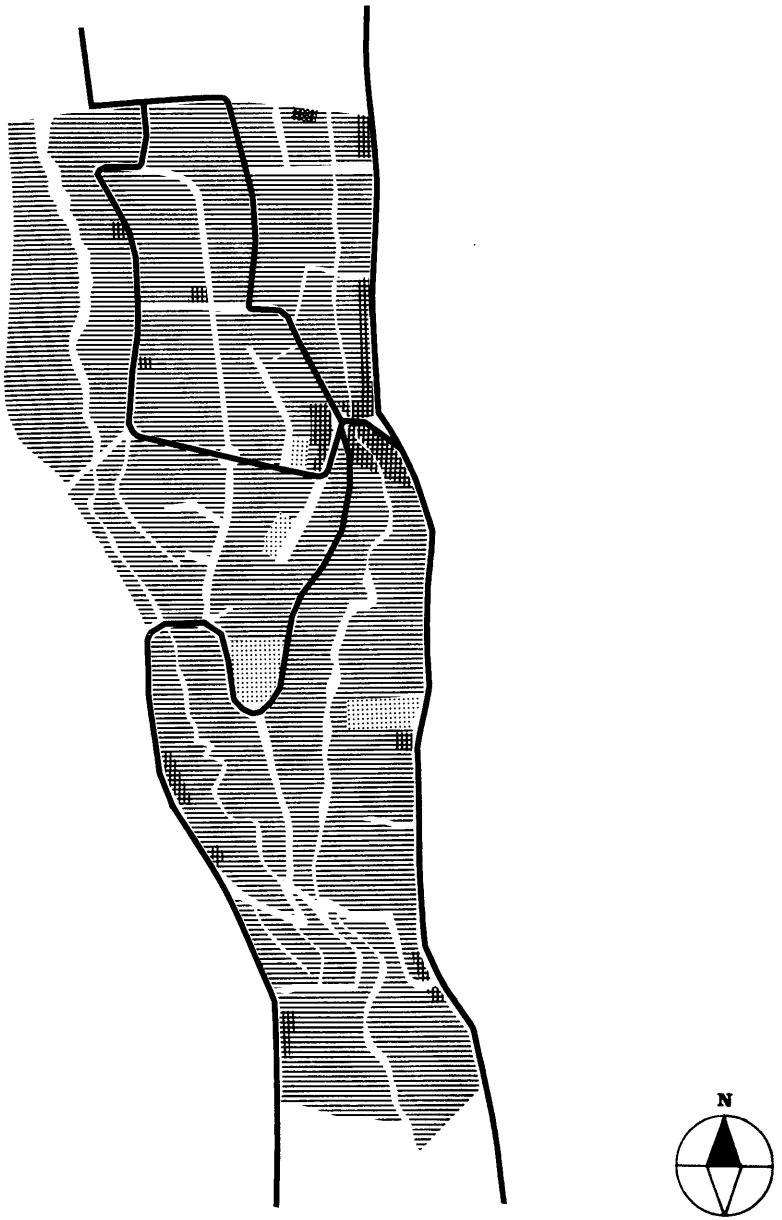


LOCALITY PLAN

LAYOUT: The layout of la Carolina is primarily determined by the topography of the site. The upper Carolina, to the north, is on a small hill bounded by two shallow barrancas that come together to form the deeper Barranca de los Caldos on whose steep slopes the lower Carolina was built. The upper part is flat enough to allow an approximation to the grid layout of the Spanish colonial block. As the value of the land increased, lots were subdivided and semi-private streets penetrated the blocks to serve them. The upper part is separated from the lower Carolina by the old hacienda road that follows the contour line along which a horse drawn trolley used to run, joining downtown Cuernavaca with the hill across the barranca. The upper part has a cross section in the shape of a W with roads along the hill tops and streams at the bottom of the barrancas, until they come together and turn into a V shaped cross section. This part of la Carolina has developed long and narrow lots running down the side of the barranca as far as permitted by the slope, usually encroaching on the federally owned right of way for streams. The streams are severely polluted by garbage and sometimes raw sewerage disposed of in the barrancas.

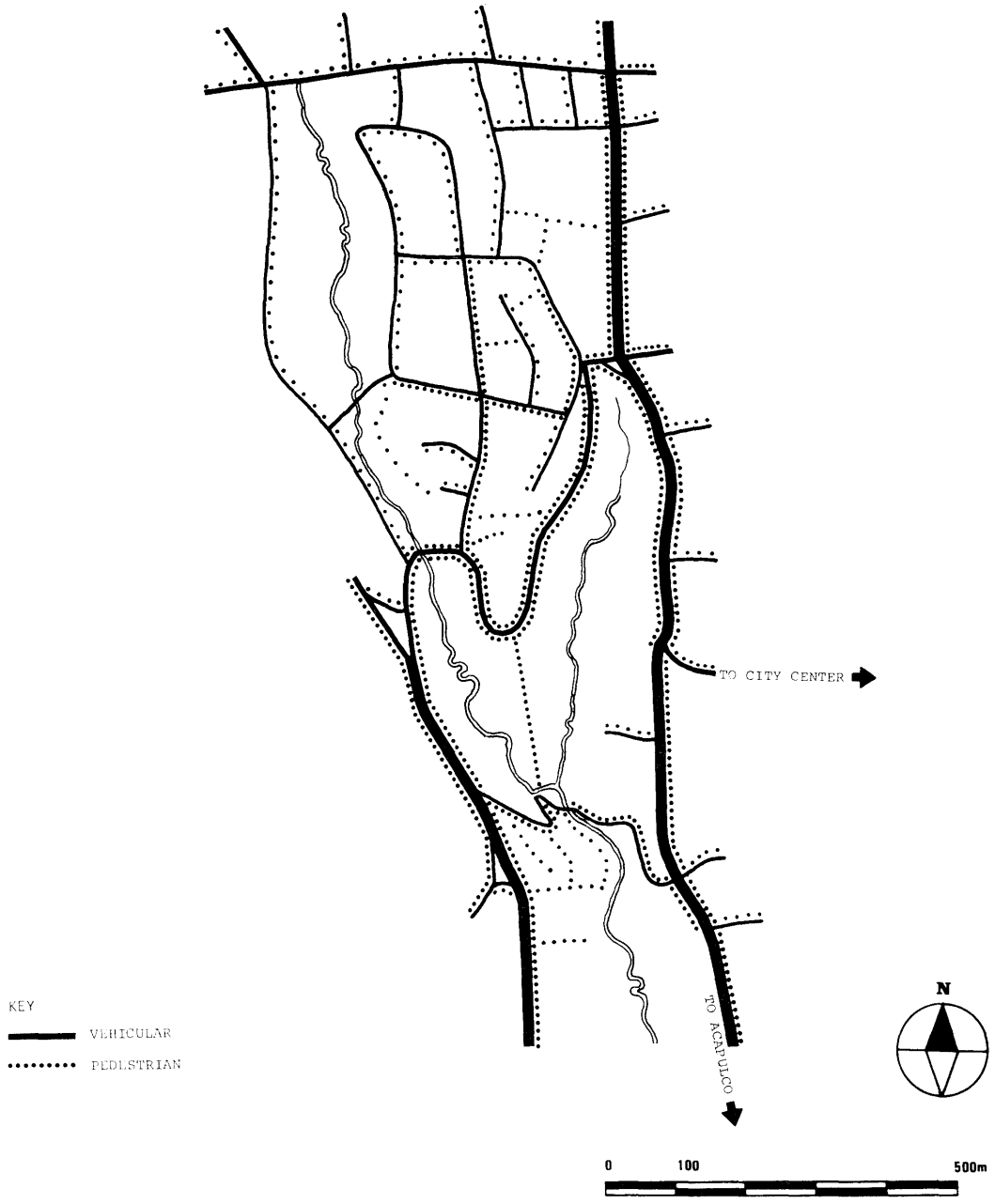
CAROLINA: (left) The high density organic layout that characterizes the area shows dwellings at different levels of development. Concrete slab roofs are used for laundry and storage due to lack of space on the saturated lots.
(top) The shared court of a tenement is semi-private safe space for multiple activities. It is used by children, for washing dishes and clothes, and for social activities.
(bottom) An old traditional spanish house, converted into a tenement. This is the original model for the vecindades. The ground floor arcade has been closed off to provide additional space.

LAND USE: La Carolina is primarily a low income residential area with one of the highest densities in the city. The area is surrounded by middle and upper income residential areas except for a border with the old city cementary and a rural community in the west, and the downtown commercial - residential area on the east. Most of the community facilities are located in the upper Carolina. The commercial area is concentrated along the streets that converge on the neighborhood market. In addition to this there are several small commercial and service shop dwellings scattered throughout the area. The city slaughterhouse has recently been relocated from the Carolina to the outskirts of the city.



LOCALITY LAND USE PATTERN

CIRCULATION: Two of the city's arterials that characteristically run along the hill tops between the barrancas from north to south bound the area of la Carolina. Although they are predominantly vehicular routes, they are also heavily used by pedestrians. Due to the topography of the area, there are basically only three streets that cross it from east to west: One that bounds it on the north where the barrancas just begin to develope; the old hacienda road that divides the upper and lower parts of the neighborhood, and is the main collector rood serving it; and a small street near the boundary of the locality on the south that functions as a collector for the lower Carolina. The area is served by buses which are operated from a terminal located on the top of the hill in the upper Carolina.



LOCALITY CIRCULATION PATTERN

POPULATION: The population of la Carolina is primarily made up of low and moderate income groups that inhabit vecindades, houses and apartments. There are, however, several middle and high income residences concentrated mostly in the northern part of the upper Carolina, and at several points along the locality's boundaries. The vecindades or low income tenements with which we are concerned in this case house very low to low income tenements with wh ch to low income groups. They are people who generally work in low skilled jobs near the city center although there are also construction workers with no fixed workplace and textile or autoworkers that travel every day to the industrial zone on the outskirts of the city.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	182	11.7	16
DWELLING UNITS	720	11.7	62
PEOPLE	4,320	11.7	370

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	2.2	19
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	8.6	73
SEMI-PRIVATE (cluster courts)	0.9	8
TOTAL	11.7	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 158 \text{ m/Ha}$$

AVERAGE LOT AREA = 520 m^2

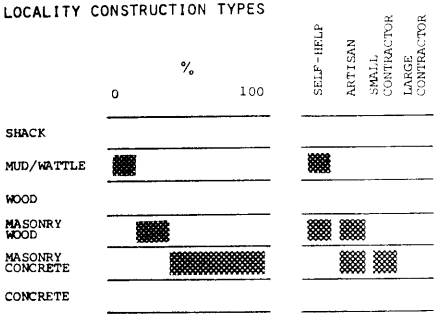
LOCALITY SEGMENT AIR PHOTOGRAPH

1:2500

LOCALITY SEGMENT PLAN

1: 2500

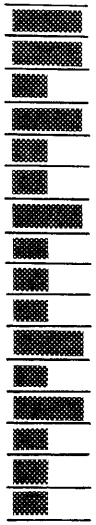
LOCALITY CONSTRUCTION TYPES



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 COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

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

Quality of information: Approximate

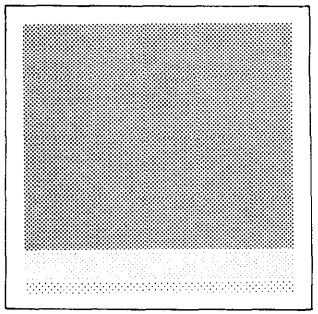
LAND UTILIZATION DIAGRAMS

1 Hectare

PATTERN

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

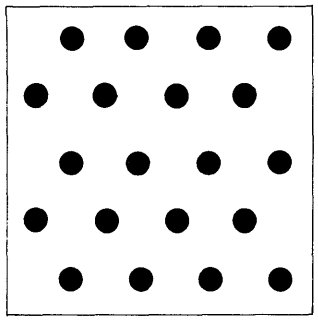
1 Hectare



PERCENTAGES

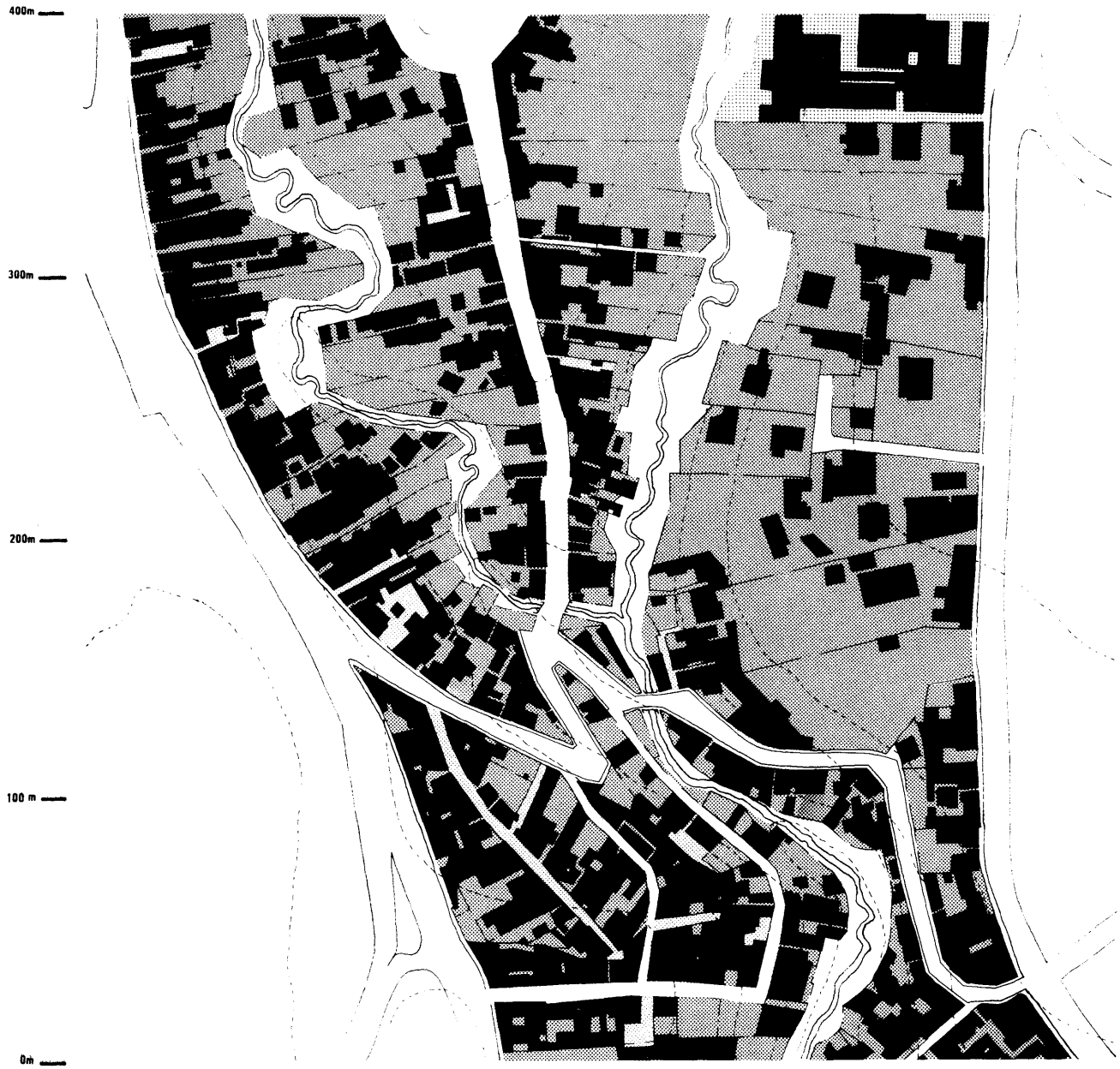
Streets/Walkways	19%
Playgrounds	-
Cluster Courts	8
Dwellings/Lots	73

1 Hectare

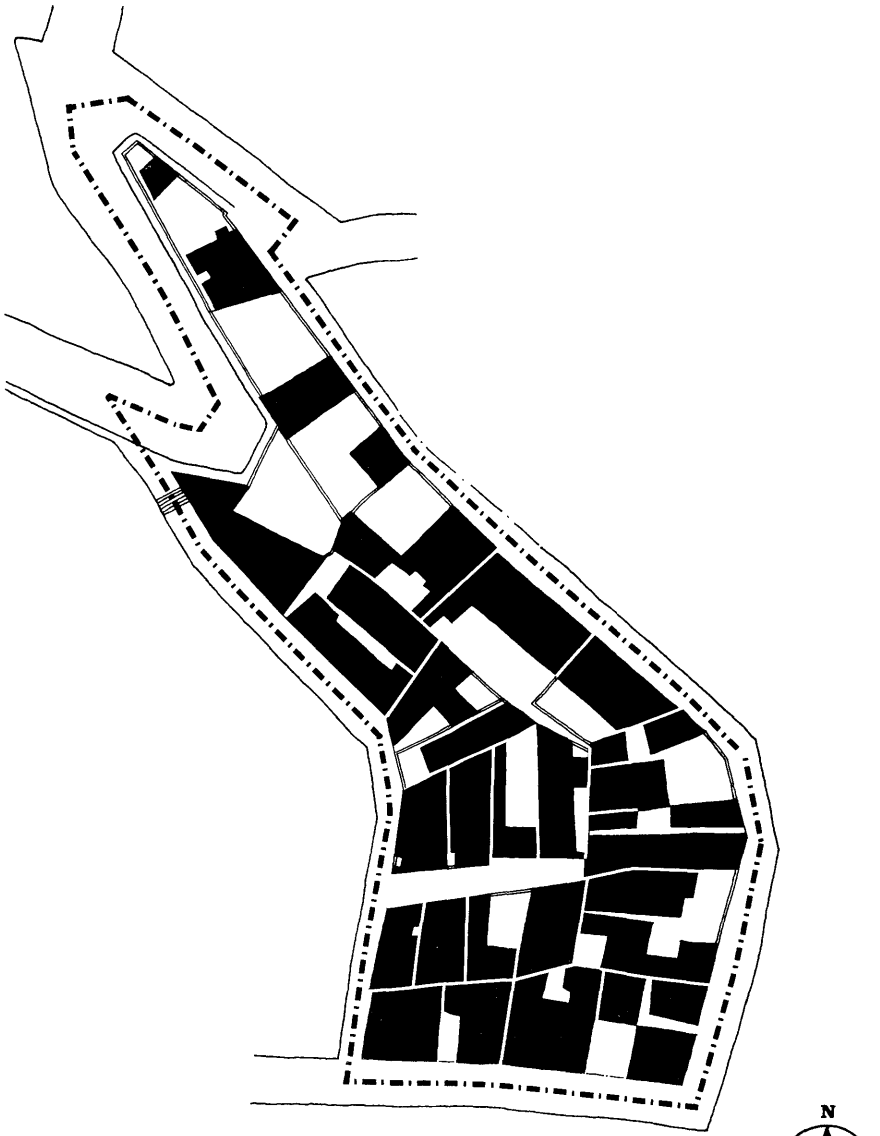


DENSITY Persons/Hectare 370

● 20 persons



LOCALITY SEGMENT LAND UTILIZATION 1: 2500



LOCALITY BLOCK PLAN

BLOCK: The peculiar shape of this and other blocks in the southern part of the locality obeys importantly to the topography of the side of the barranca on which they are built. In this case the block is served on the north by a road that zig-zags down and across to the opposite side of the barranca. The other three streets that bound the block are predominantly pedestrian. The block is made of several vecindades and individual houses. In many cases, owners live in dwellings adjacent to them. Many of the tenements were originally developed to house extended families, and continue to do so. As in many other blocks in the locality, this one has a cluster served by a short semi-private street that was developed when a large lot was subdivided.

LOCALITY BLOCK LAND UTILIZATION DATA

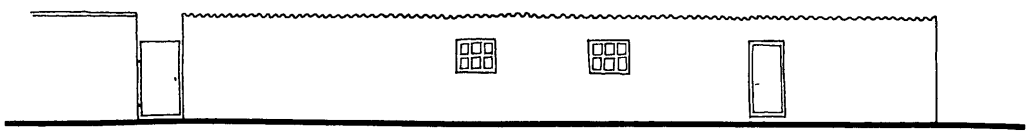
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	26	0.48	54
DWELLING UNITS	60	0.48	125
PEOPLE	320	0.48	666

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.12	25
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.32	67
SEMI-PRIVATE (cluster courts)	0.04	8
TOTAL	0.48	100

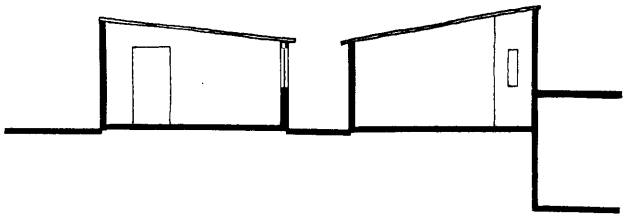
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 393 \text{ m/Ha}$$

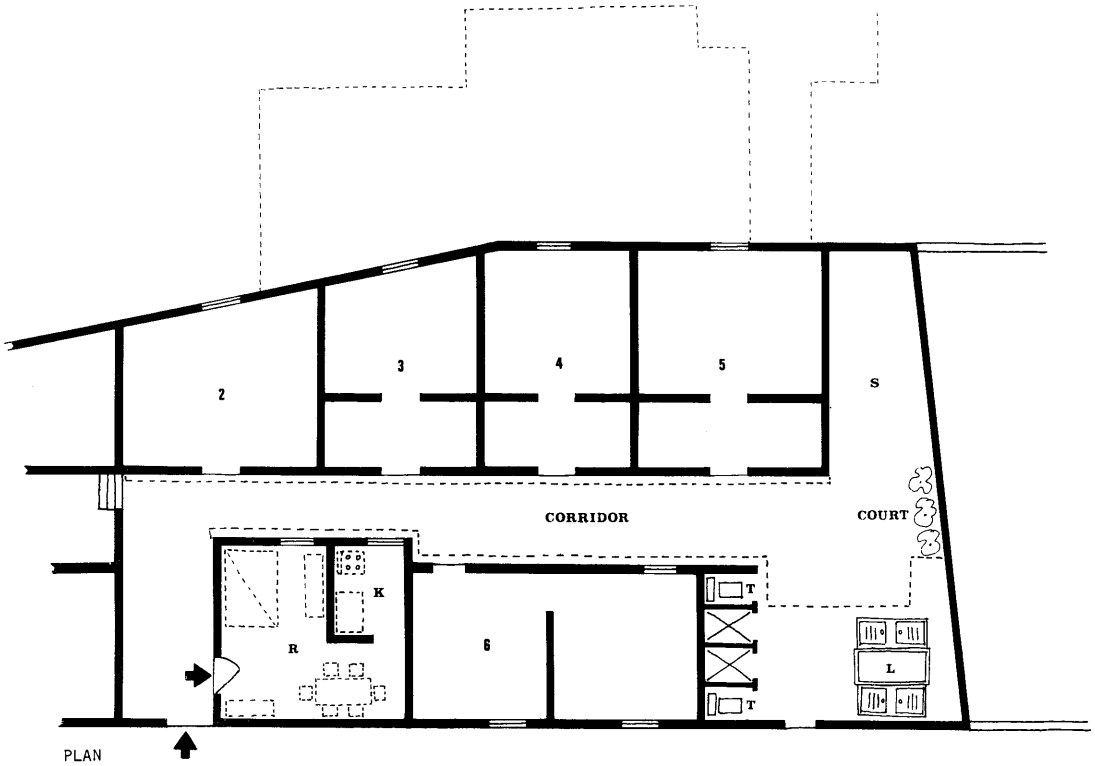
AVERAGE LOT AREA = 138 m^2



ELEVATION



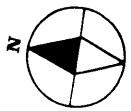
SECTION

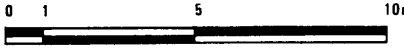


PLAN

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

LOCALITY SOURCES

Plan:	*(accurate) Oficina Revisora de Catastro.*
Land Use Pattern:	*(approximate) Field Surveys by the authors, 1972-1975.*
Circulation Pattern:	*(approximate) Field Survey by the authors, 1975.*
Segment Plan:	*(accurate) Oficina Revisora de Catastro.*
Segment Land Utilization:	*(approximate) Field Survey by the authors, 1975.*
Block Plan:	*(accurate) Oficina Revisora de Catastro.*
Typical Dwelling:	*(approximate) Field Survey by the authors and M. Pichardo, 1975.*
Physical Data:	*(accurate) IBID*
Photographs:	*CETENAL (aerial) 1970; The authors, 1973-1975.*
General Information:	*IX Censo General de Poblacion, 1970. Thesis by A. Rojas; Field Survey, G. Flores.*

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: Room
area (sq m): 25'
tenure: Legal Rental

LAND/LOT
utilization: Semi-Private
area (sq m): 236
tenure: Legal Ownership

DWELLING
location: City Center
type: Row / Grouped
number of floors: 1
utilization: Multiple: Family
physical state: Fair

DWELLING DEVELOPMENT
mode: Incremental
developer: Private
builder: Artisan
construction type: Brick, Wood
year of construction: 1960

MATERIALS
foundation: Stone
floors: Cement
walls: Brick
roof: Asbestos, Wood Beams

DWELLING FACILITIES
wc: 1, Shared
shower: 1 Shared
kitchen: 1
rooms: 1
other: Shared Laundry Facility

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: Southern Mexican
place of birth: Guerrero
education level: Primary

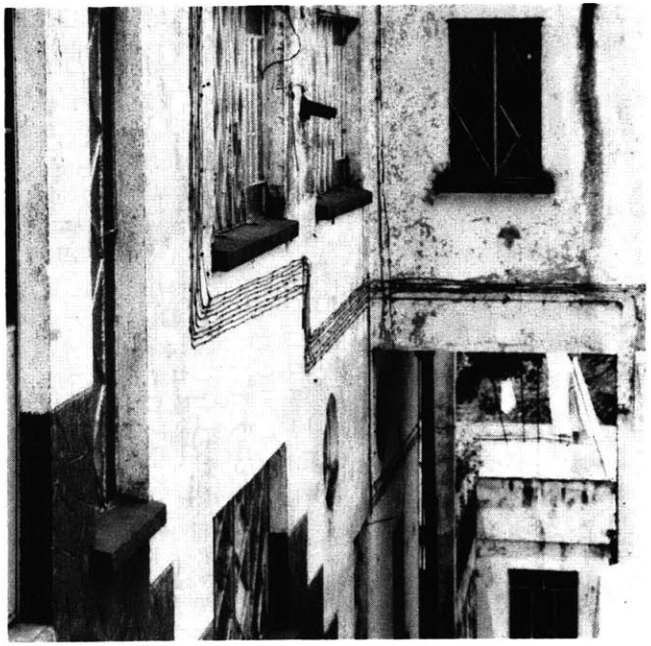
NUMBER OF USERS
married: 2
single: -
children: 1
total: 3

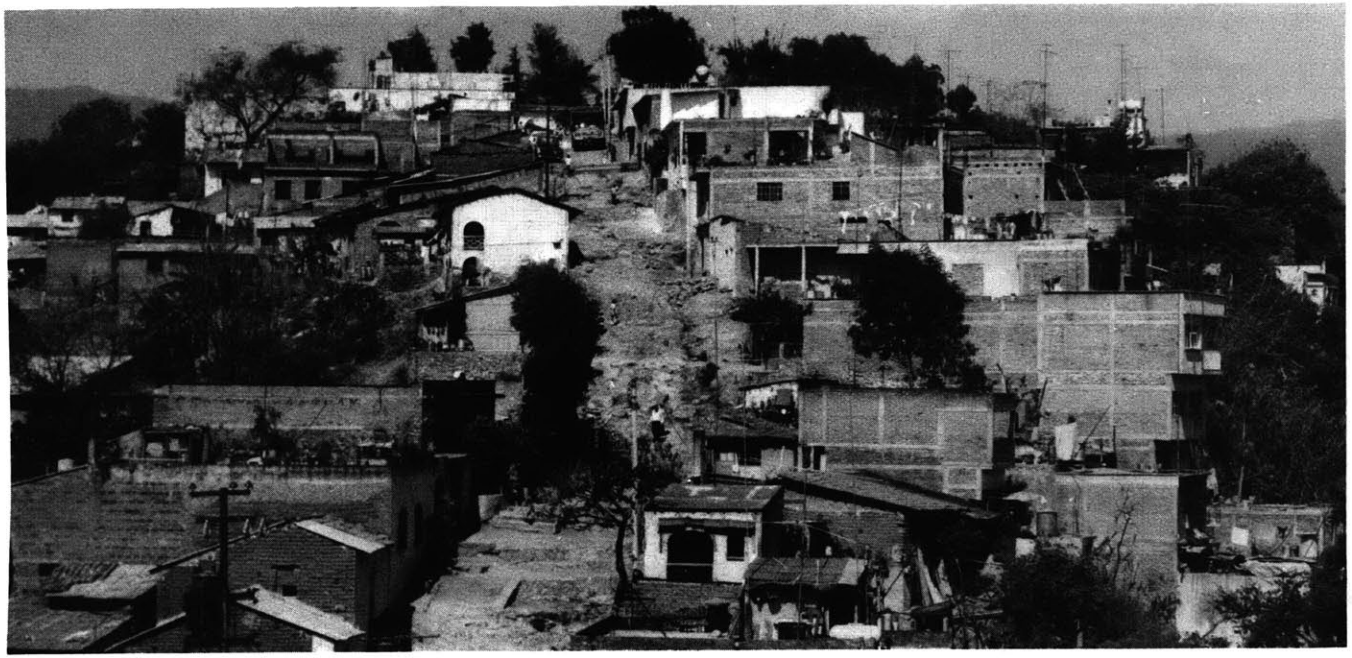
MIGRATION PATTERN
number of moves: 2
rural - urban: 1973
urban - urban: 1974
urban - rural: -
why came to urban area: Employment

GENERAL: ECONOMIC
user's income group: Low
employment: Electrician
distance to work: 2 Km.
mode of travel: Walks

COSTS US$
dwelling unit: $ 800
land - market value: $ 160, 000/HA.

DWELLING UNIT PAYMENTS
financing: $ 18 / Month
rent/mortgage: $ 18 / Month
% income for rent/mortgage: 15 %

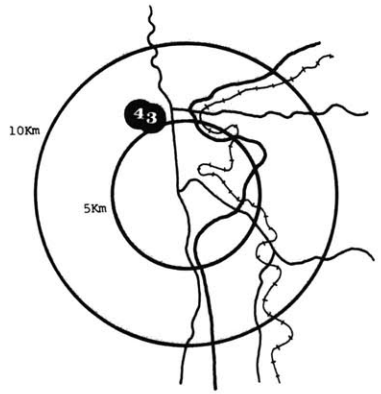




CAROLINA: (left) The sloping sides of the barrancas determine a particular stepped constructive solution. (right) Inconspicuos entrance of a vecindad that goes deep into the barranca.
(bottom) Hill between two barrancas shows traditional adobe and modern dwellings, both housing vecindades.

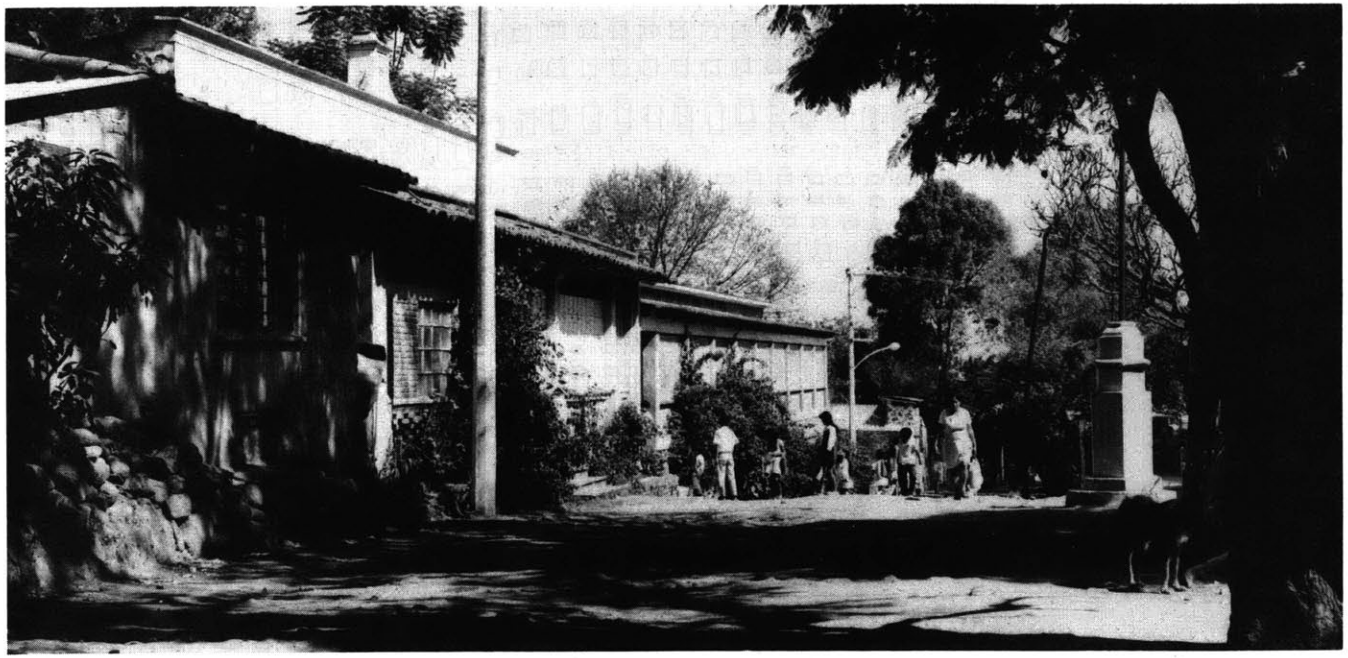
3 TETELA

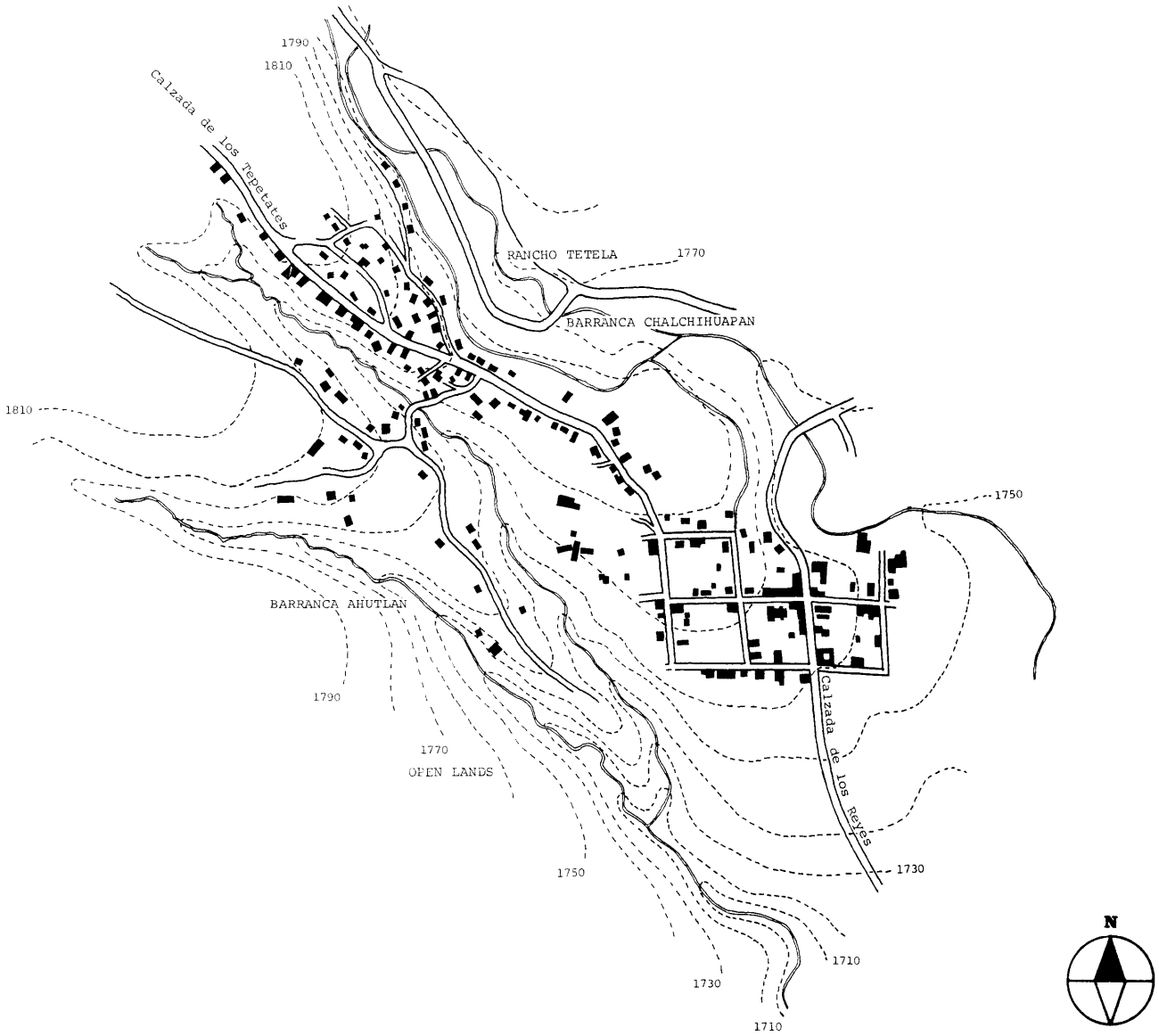
4 LOS TEPETATES



LOCATION: Tetela del Monte is a small agricultural community in the process of being integrated to the city and located about five kilometers from downtown Cuernavaca, on the western fringes of the urban area, it covers a surface of some 98 hectares.

ORIGINS: The community of Tetela existed long before the arrival of the Spaniards but it was not formally recognized by the Viceroy of the King until the year of 1553. For hundreds of years, although under the jurisdiction and within the economic orbit of Cuernavaca, the community led a largely independent social and cultural life that lasted well into the 20th. century. By the first few decades of the century the city of Cuernavaca had already grown to encompass two or three neighboring rural communities. After the second world war the trend accelerated to include another five villages. Among seven others presently undergoing this process is Tetela del Monte. Until up to thirty years ago its inhabitants lived in the old colonial town, working the ejido lands. Since then, absorbing part of the increasing migration to the city of Cuernavaca and allowing for its own growth, the village council permitted communal lands near the town to be settled by relatives and friends. Today the Colonia de los Tepetates covers a greater area and has a larger population than that of the old part of Tetela itself.





LOCALITY PLAN

LAYOUT: Tetela is bounded by two barrancas running from northwest to southeast. Old Tetela was laid out with the Spanish block grid on the gently sloping and almost flat top of the hill. It is bounded on the southeast by middle income residential areas of Cuernavaca that have gradually encroached on community lands. Los Tepetates was built further up the hill on a barren severly eroded surface that was useless for agricultural purposes. It sprawls into the barranca and over on to the next hill and is bounded on the northeast by agricultural lands, the football field and the town's cemetery . The organic layout of this part of Tetela responds to the topography and the gradual process by which it was built. Old Tetela has considerably larger lots and lower densities than those of los Tepetates.

TETELA: (top) View of main street with the village's school and kindergarden. The town's cool shaded streets and orchards contrast sharply with the dry dusty environment of Colonia los Tepetates.

LOS TEPETATES: (bottom) Children gather at the single community water tap from which they carry water home for everything from bathing to cooking and washing dishes. A few stores are to be found on this Calzada de los Tepetates.

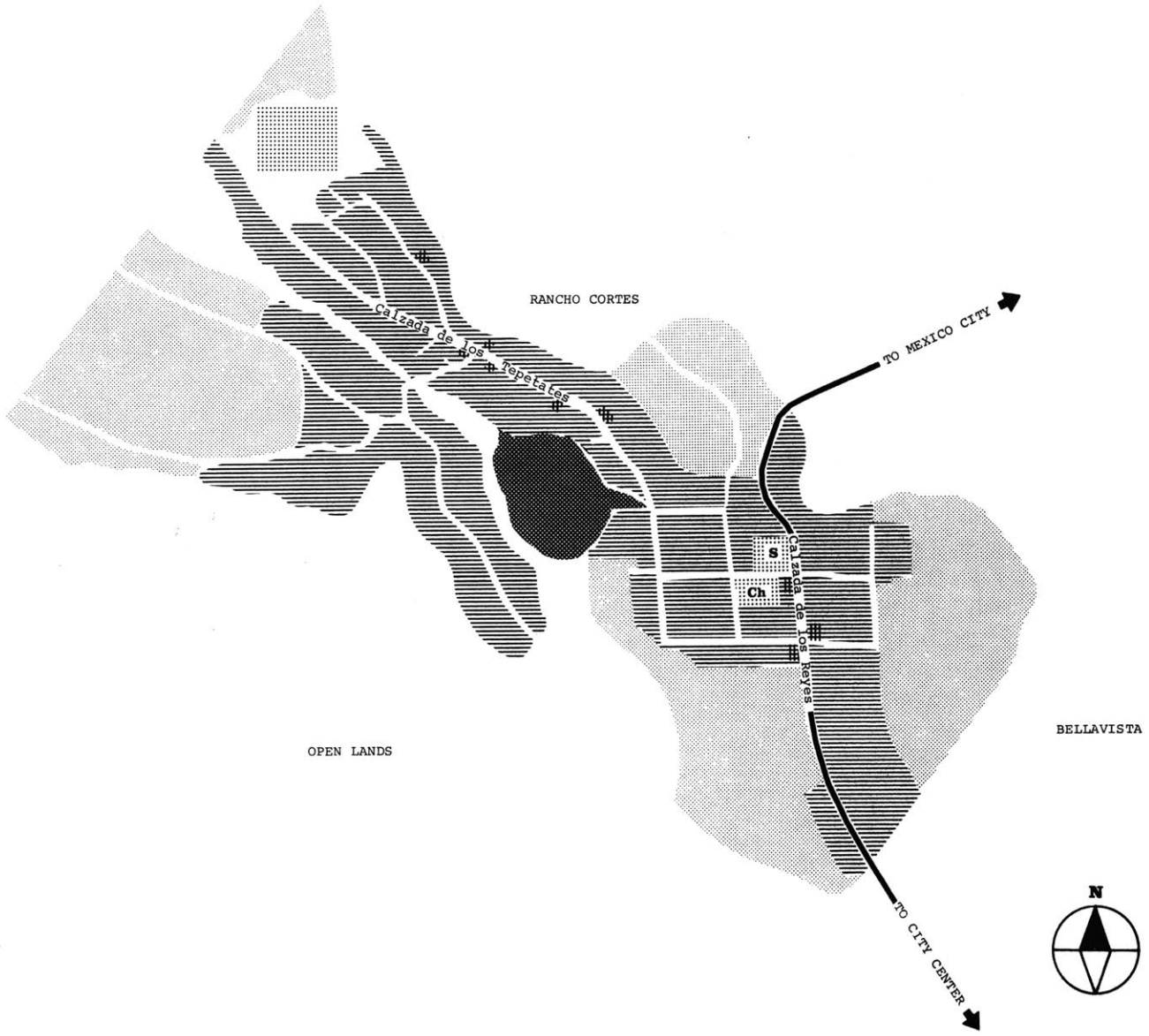
LAND USE: Of the total 274 hectares that belong to the Ejido, 50 hectares are for residential use. Much of the land around and within the residential area however, particularly in the old part, is used for small irrigated flower production plantations or orchards. Between the old and new residential areas there is an old fashioned brick and clay tile manufacturing plant. The contrast between the upper and lower areas is marked not only by the topography, vegetation and layout but by the community facilities and public utilities which are unevenly concentrated, for the most part, in the old town. As in most Ejidos, there are three categories of land tenure: Private, including most residential lots, orchards, plantations and industries; Ejidal, comprising the family plots of agricultural land; and communal, which includes the wooded areas at the northeastern tip of the Ejido and several waste areas, eroded due to indiscriminate consumption of wood for charcoal production. Except for a few upper income residences in and around old Tetela, the community is largely of middle low to very low income population. It is surrounded on three sides by upper and middle income residential areas and by open lands to the west.

AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES
- AGRICULTURAL

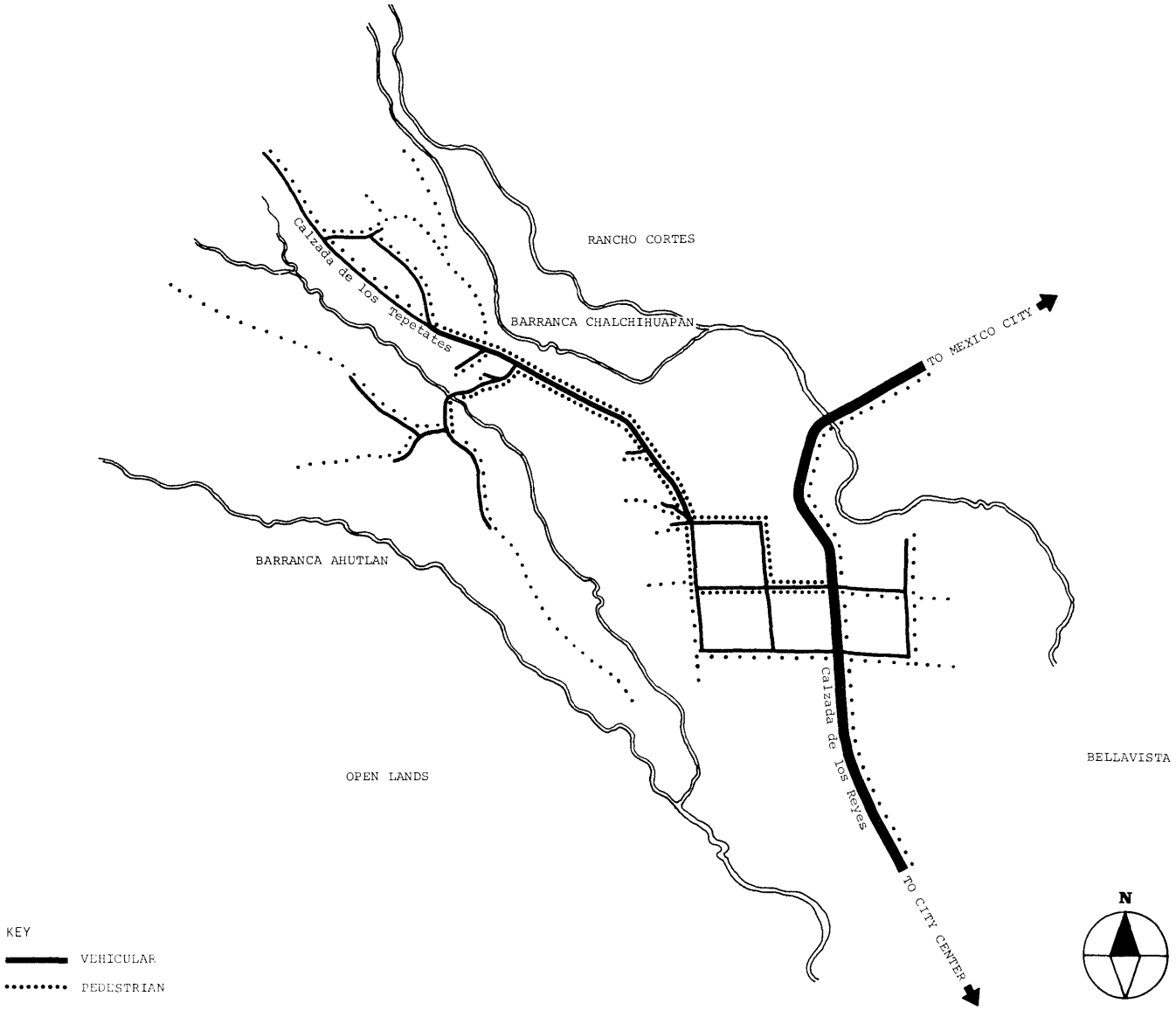
KEY

- **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



LOCALITY LAND USE PATTERN

CIRCULATION: The only access to Tetela is through a minor artery that serves several middle and upper income residential areas joining the downtown and northern metropolitan areas, and that crosses the old part of the community from north to south. It is along this route that a single bus line serves the area and communicates it with the central market downtown. A dirt road links the lower and upper residential areas and continues due northeast to service the agricultural lands. It is also used by pilgrims on their way to Chalma once a year. Within los Tepetates, a single bridge joins the two hills over a shallow barranca. All streets within the community are unpaved and heavily traveled by pedestrians as well as by a few vehicles.



LOCALITY CIRCULATION PATTERN

POPULATION: As in other localities surveyed, the population of Tetela is in the low to moderate income range, with a few middle and upper income families that have bought land in the town to build vacation homes. The difference between this and other low income groups centers around Tetela's situation as an autonomous rural community up to not too long ago: There are strong social and family ties among the community and a large proportion of the working population has jobs in and around Tetela. Most of these jobs are in the family ejido plots during the rainy season, in the poinsetta plantations and orchards or in the brick and tile factory. As the town becomes integrated to the city, however, these patterns tend to disappear.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	65	16	4.1
DWELLING UNITS	70	16	4.4
PEOPLE	420	16	26

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.4	9
SEMI-PUBLIC (open spaces, schools, community centers)	0.5	3
PRIVATE (dwellings, shops, factories, lots)	14.1	88
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	16	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 115 \text{ m/Ha}$$

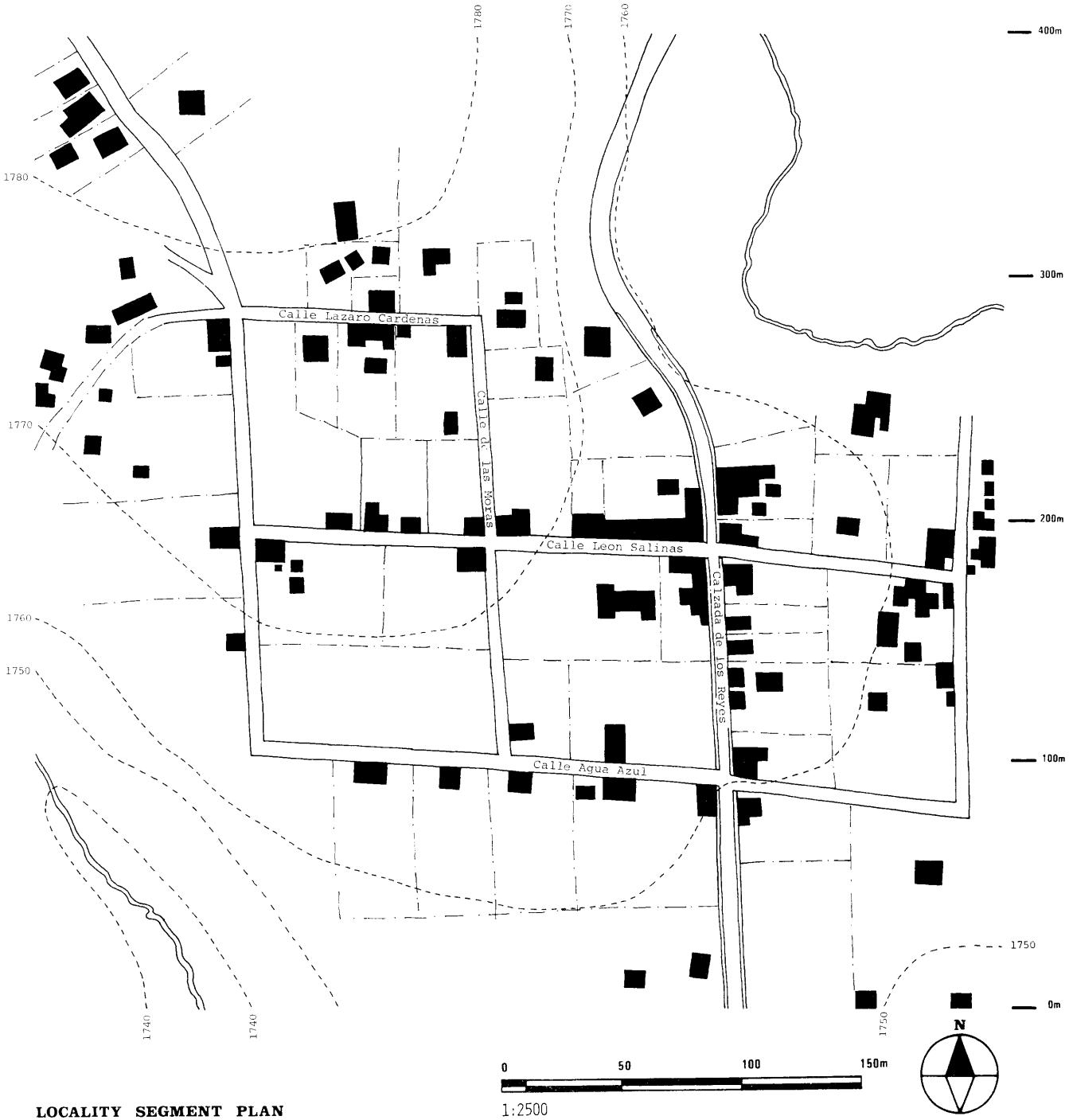
AVERAGE LOT AREA = 2000 m^2

LOCALITY SEGMENT AIR PHOTOGRAPH

0 50 100 150m

1:2500

N



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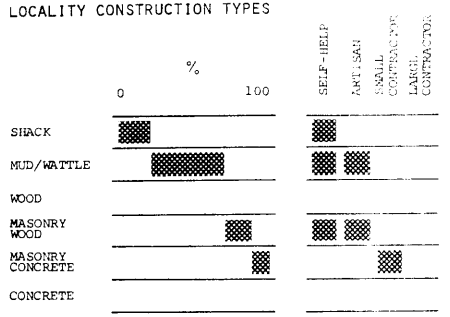
LOCALITY SEGMENT PLAN

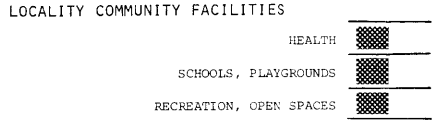
LOCALITY CONSTRUCTION TYPES



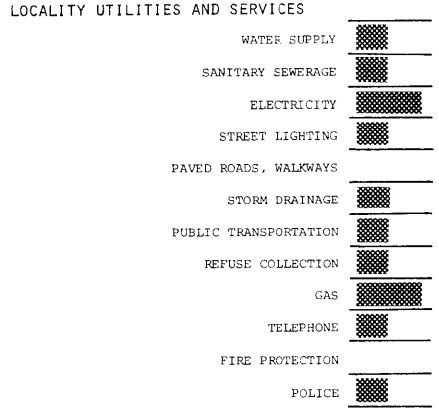
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produced each type.

Quality of information:

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

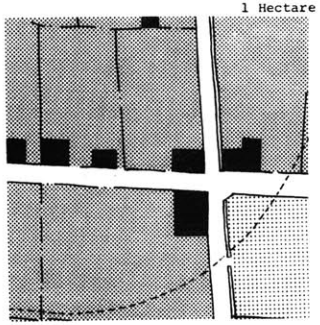


The chart illustrates the approximate availability of utilities, services and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

LAND UTILIZATION DIAGRAMS

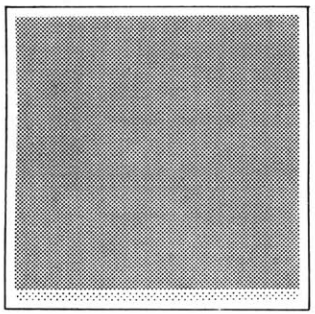
1 Hectare



PATTERN

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

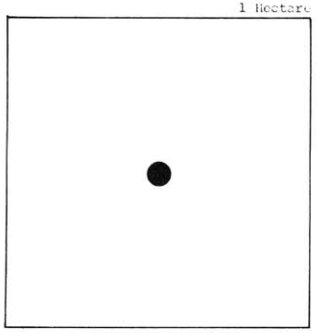
1 Hectare



PERCENTAGES

Streets/Walkways	9%
Playgrounds	3
Cluster Courts	-
Dwellings/Lots	88

1 Hectare

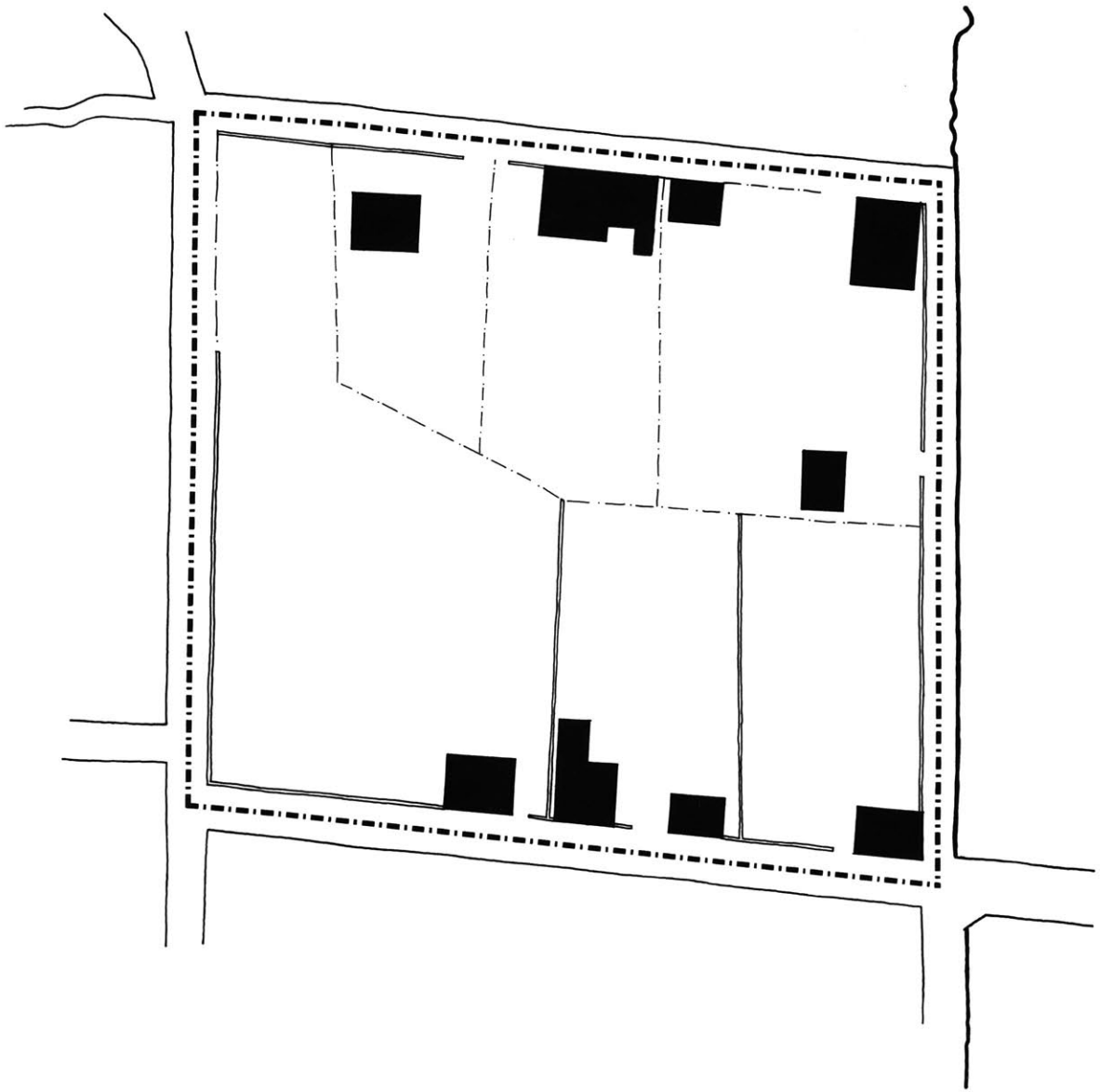


DENSITY Persons/Hectare 26

● 20 persons

LOCALITY SEGMENT LAND UTILIZATION

1:2500



0 10 50m

1:1000

N

LOCALITY BLOCK PLAN

BLOCK: The block, which was laid out in the 16th century, is of the classical Spanish Colonial type. Its slight diamond shape can be attributed to an error in going from the plans to the actual layout, since the topography would not affect the design. The block was probably divided into four equal parts which have in turn been subdivided into smaller lots over time. The lots are still relatively large and keep the traditional huerto or orchard of plum, peach and coffee bean trees in the back. A small irrigation ditch or acequia runs along one side of the street that bounds the block on the east, to provide water for orchards and dwellings. The dwelling type, consisting of detached adobe houses, is quite uniform: most units have two or three rooms, an open covered porch or corredor and sometimes two kitchens: one inside for most cooking on a gas stove and one outside for making tortillas over an open fire.

LOCALITY BLOCK LAND UTILIZATION DATA

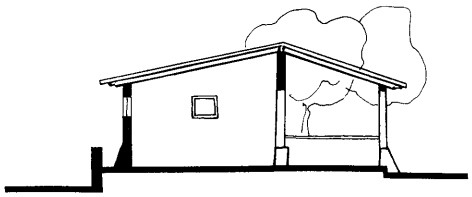
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	6	1.05	5.7
DWELLING UNITS	9	1.05	8.5
PEOPLE	54	1.05	51

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.12	11.4
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.93	88.6
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	1.05	100

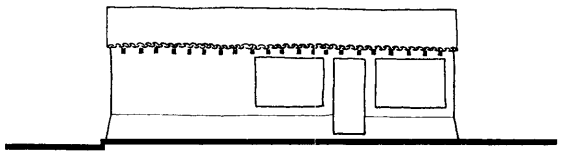
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 196 \text{ m/Ha}$$

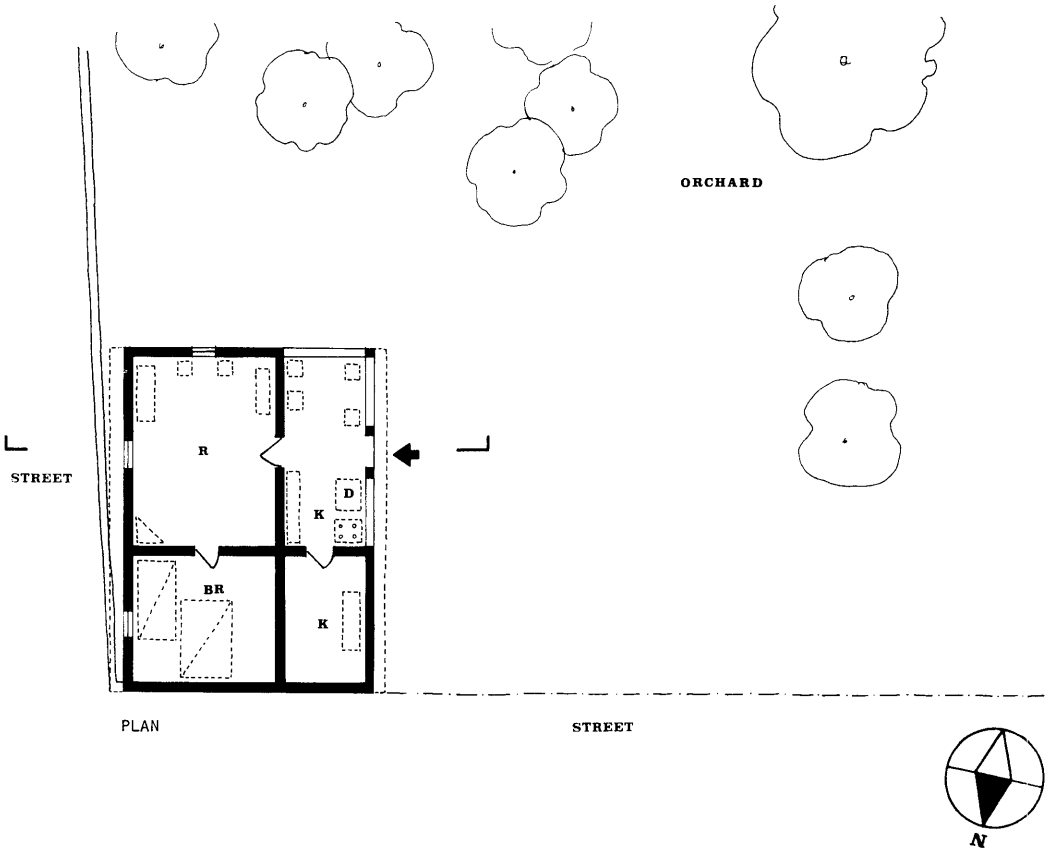
AVERAGE LOT AREA $\doteq 1550\ m^2$



SECTION



ELEVATION



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)

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: House
area (sq m): 60
tenure: Legal Ownership

LAND/LOT
utilization: Private
area (sq m): 1,400
tenure: Legal Ownership

DWELLING
location: Periphery
type: Detached
number of floors: 1
utilization: Single: Family
physical state: Poor

DWELLING DEVELOPMENT
mode: Instant
developer: Popular
builder: Self-Help
construction type: Adobe
year of construction: 1925

MATERIALS
foundation: Stone
floors: Dirt
walls: Adobe
roof: Wood Beams, Tile

DWELLING FACILITIES
wc: Latrine
shower: -
kitchen: 1
rooms: 2
other: Terrace

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: Central Mexican
place of birth: Tetela
education level: -

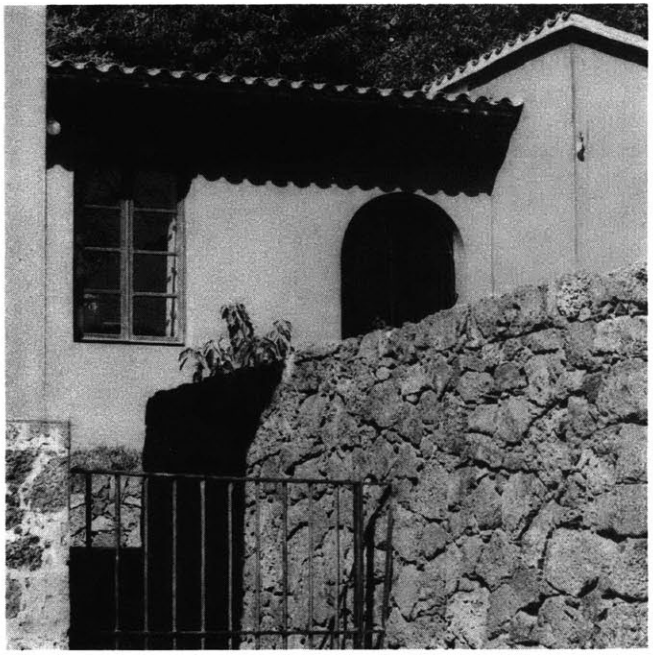
NUMBER OF USERS
married: 4
single: 1
children: 3
total: 8

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

GENERAL: ECONOMIC
user's income group: Low
employment: Agricultural
distance to work: 3 Km
mode of travel: Walks

COSTS US$
dwelling unit: 960
land - market value: $ 100,000/HA.

DWELLING UNIT PAYMENTS
financing: Popular
rent/mortgage: 0
% income for rent/mortgage: 0



TETELA: (top) Typical dwelling with it's cool verandah at the front of the house.
(bottom right) One of the upper income weekend residences that are moving into the villages.
(bottom left) Classes held outdoors or in private homes due to shortage of school space.

POPULATION: Although much of the demographic overflow from Tetela has settled in Los Tepetates, the make up of its population is closer to that of other newer low income localities surveyed, due to the relatively large proportion of migrants. Many of the early settlers of Los Tepetates were granted agricultural parcels on community lands, but most of the population today works outside of the local economy. Typical occupations include agricultural day workers, potters, construction workers and a few plumbers and electricians. The overall income level is lower than that of Tetela. The social ties and cultural patterns that characterize the old town are considerably weaker here, as well. The differences between the two communities contribute to a deep and detrimental sense of rivalry.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	70	14.7	5
DWELLING UNITS	74	14.7	5
PEOPLE	700	14.7	48

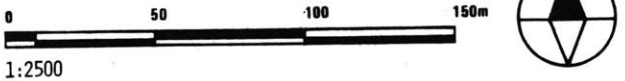
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	2.4	16
SEMI-PUBLIC (open spaces, schools, community centers)	0.6	4
PRIVATE (dwellings, shops, factories, lots)	10.7	73
SEMI-PRIVATE (cluster courts)	1	7
TOTAL	14.7	100

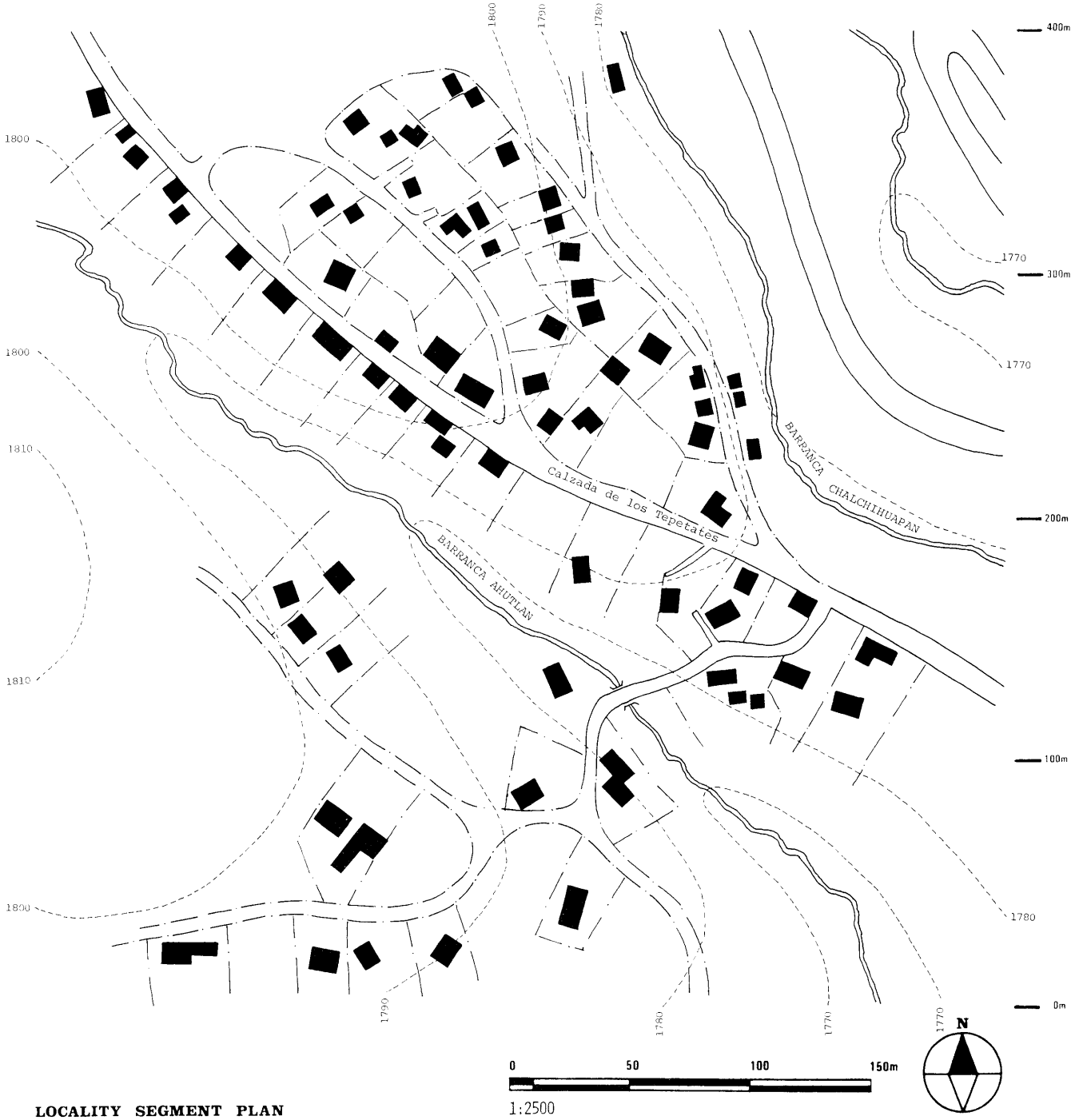
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 120 \text{ m/Ha}$$

AVERAGE LOT AREA = 1529 m^2

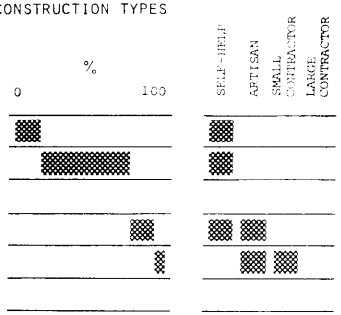
LOCALITY SEGMENT AIR PHOTOGRAPH





LOCALITY SEGMENT PLAN

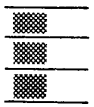
LOCALITY CONSTRUCTION TYPES



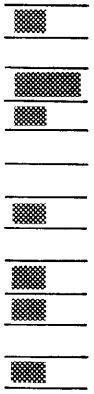
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

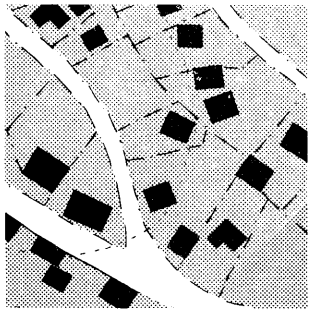


The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

LAND UTILIZATION DIAGRAMS

1 Hectare



PATTERN

Public: streets/walkways

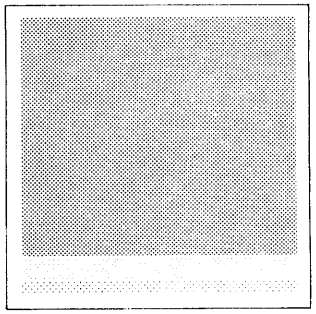
Semi-Public: playgrounds

Agricultural:

Private: lots

dwellings

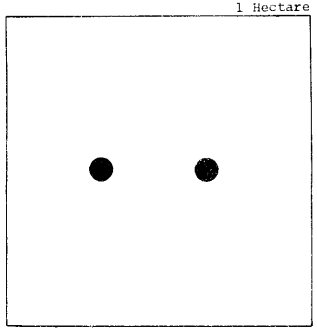
1 Hectare



PERCENTAGES

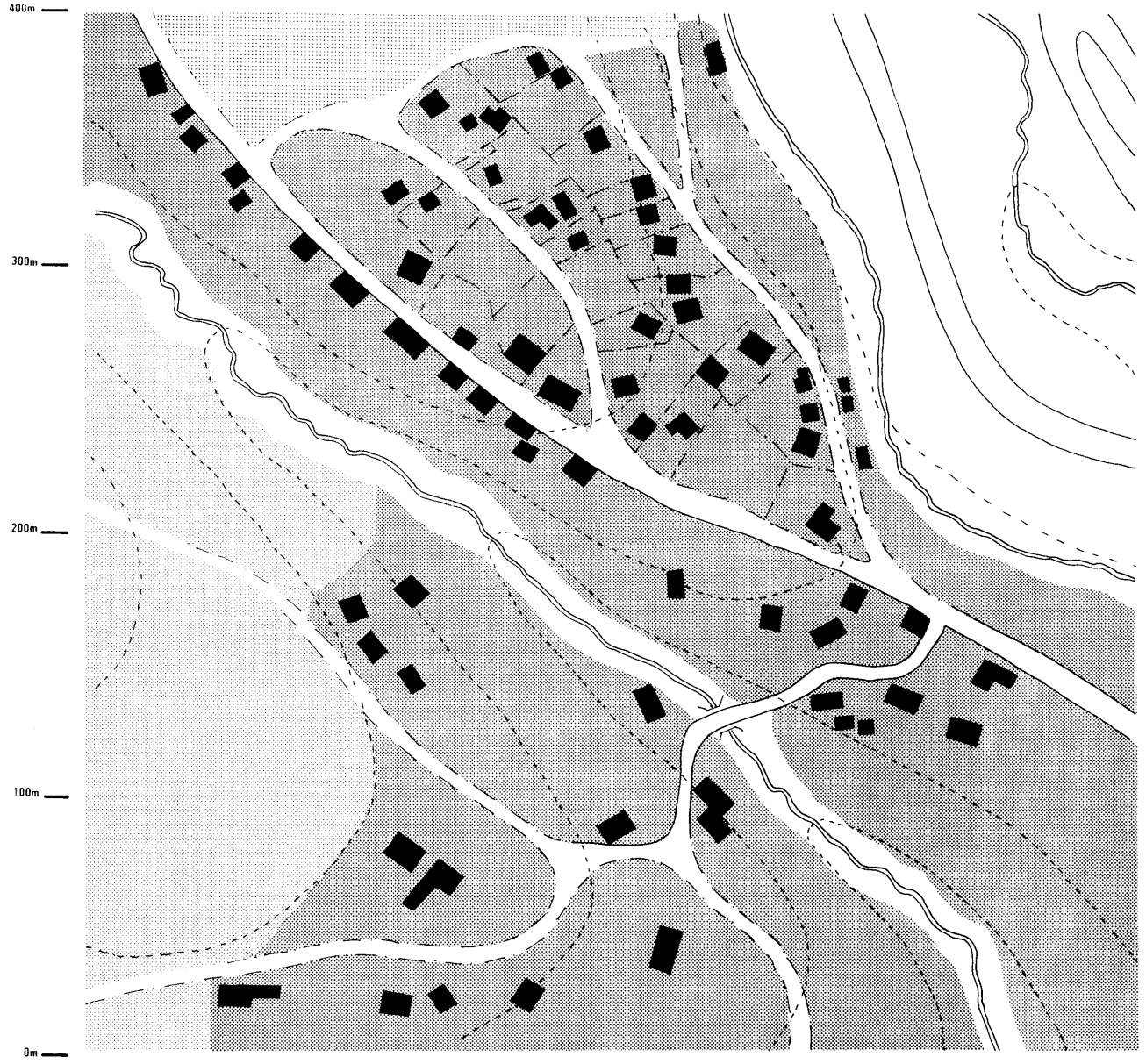
Streets/Walkways	16%
Playgrounds	4
Cluster Courts	7
Dwellings/Lots	73

1 Hectare



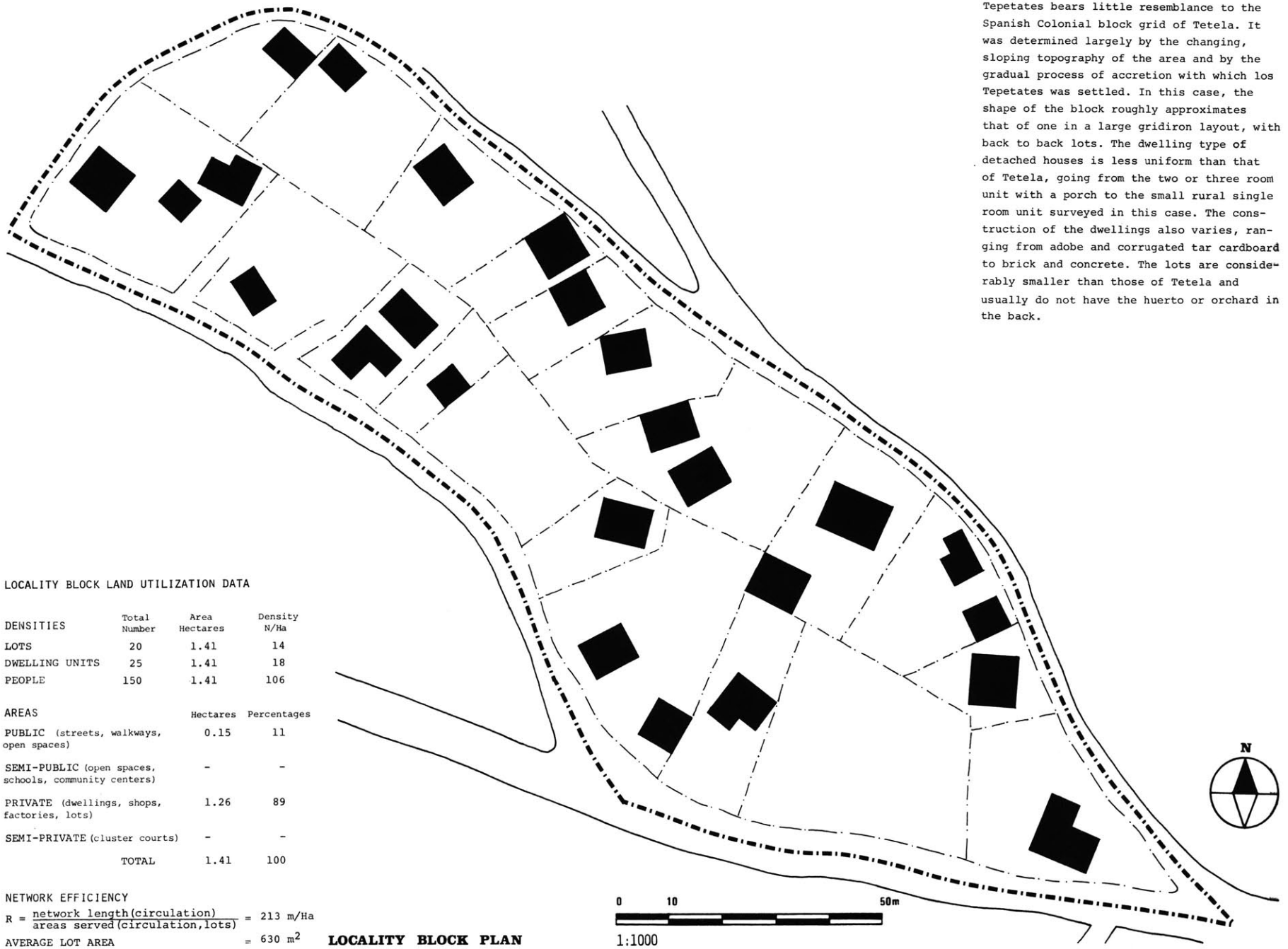
DENSITY Persons/Hectare 48

20 persons



LOCALITY SEGMENT LAND UTILIZATION 1: 2500

BLOCK: The organic, irregular layout of Los Tepetates bears little resemblance to the Spanish Colonial block grid of Tetela. It was determined largely by the changing, sloping topography of the area and by the gradual process of accretion with which los Tepetates was settled. In this case, the shape of the block roughly approximates that of one in a large gridiron layout, with back to back lots. The dwelling type of detached houses is less uniform than that of Tetela, going from the two or three room unit with a porch to the small rural single room unit surveyed in this case. The construction of the dwellings also varies, ranging from adobe and corrugated tar cardboard to brick and concrete. The lots are considerably smaller than those of Tetela and usually do not have the huerto or orchard in the back.



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	20	1.41	14
DWELLING UNITS	25	1.41	18
PEOPLE	150	1.41	106

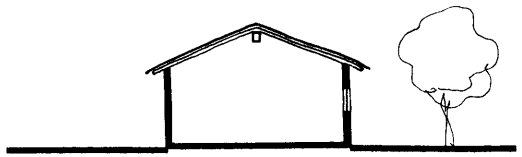
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.15	11
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	1.26	89
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	1.41	100

NETWORK EFFICIENCY

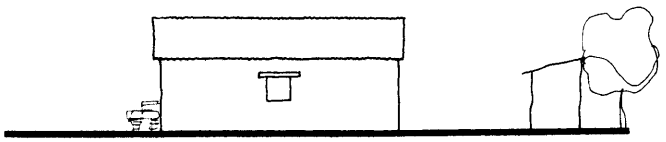
$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 213$ m/Ha

AVERAGE LOT AREA = 630 m^2

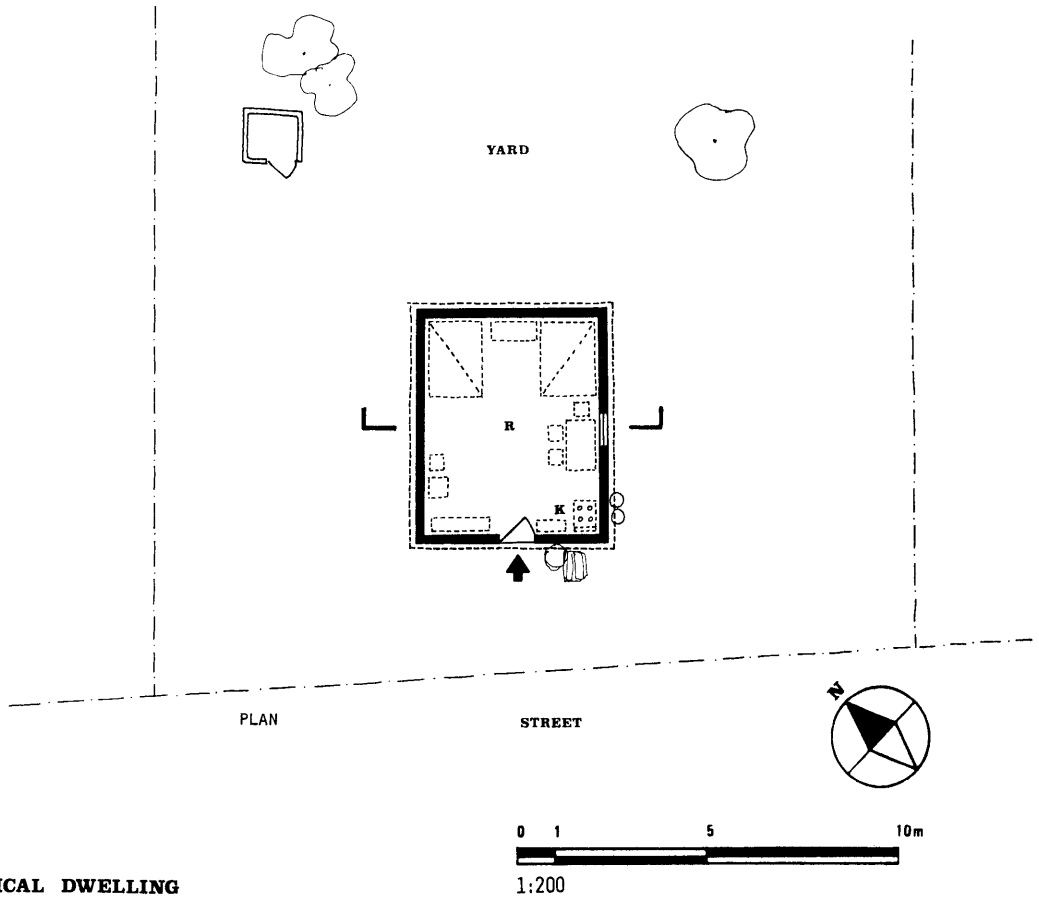
LOCALITY BLOCK PLAN



SECTION



ELEVATION



1:200

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)

LOCALITY SOURCES

Plan:	*(accurate) CETENAL Air Photograph, 1970.*
Land Use Pattern:	*(approximate) Field Surveys by the authors, 1973-1975.*
Circulation Pattern:	*(approximate) IBID*
Segment Plan:	*(accurate) CETENAL Air Photograph, 1970.*
Segment Land Utilization:	*(approximate) Field Survey by the authors, 1973-1975.*
Block Plan:	*(approximate) IBID*
Typical Dwelling:	*(approximate) IBID*
Physical Data:	*(accurate) IBID*
Photographs:	*CETENAL (aerial) 1970. The authors 1973-1975.*
General Information:	*Integracion Urbana del Pueblo de Tetela del Monte, Thesis R. Chavez, I. Vargas, 1974.*

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: House
area (sq m): 30
tenure: Legal Ownership

LAND/LOT
utilization: Private
area (sq m): 360
tenure: Legal Ownership

DWELLING
location: Periphery
type: Detached
number of floors: 1
utilization: Single: Family
physical state: Fair

DWELLING DEVELOPMENT
mode: Instant
developer: Popular
builder: Self - Help
construction type: Adobe
year of construction: 1970

MATERIALS
foundation: Stone
floors: Dirt
walls: Adobe
roof: Corrugated Cardboard

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

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: Central Mexican
place of birth: Tetela
education level: Primary

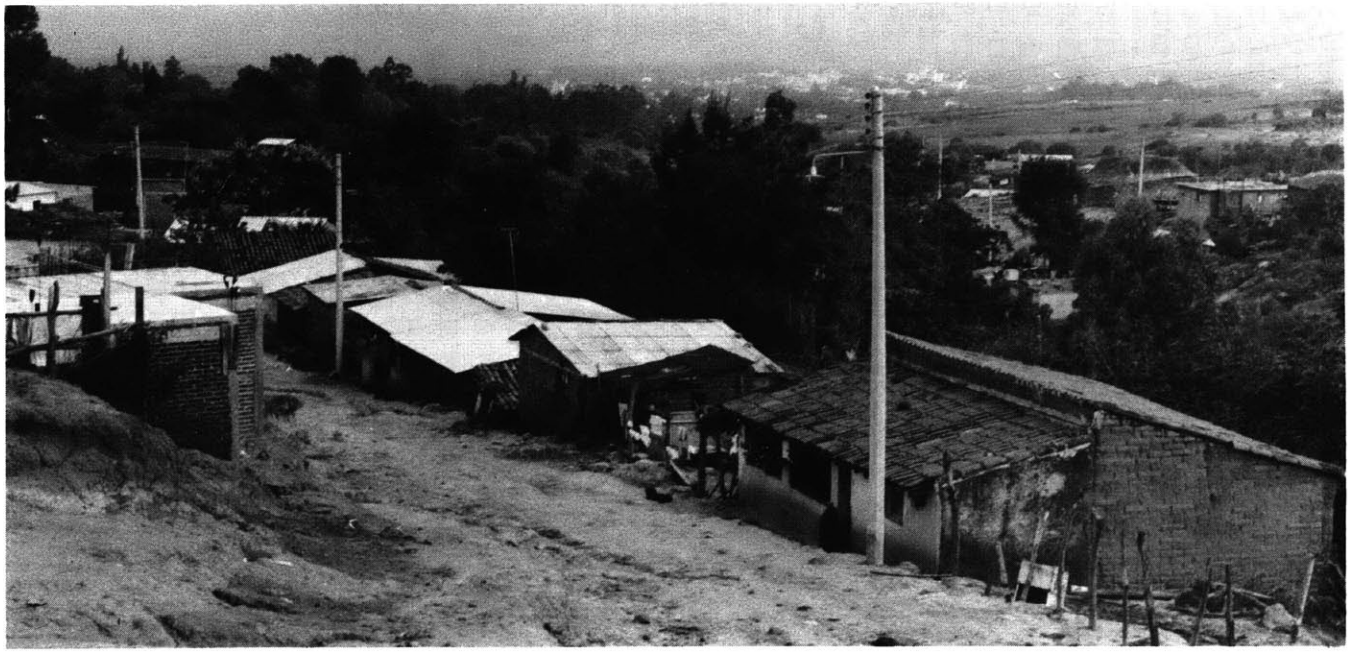
NUMBER OF USERS
married: 2
single: -
children: 2
total: 4

MIGRATION PATTERN
number of moves: 1
rural - urban: -
urban - urban: From Tetela, 1970
urban - rural: -
why came to urban area: -

GENERAL: ECONOMIC
user's income group: Very Low
employment: Agriculture, Construction
distance to work: 2 - 20 Km.
mode of travel: Walks, Bus

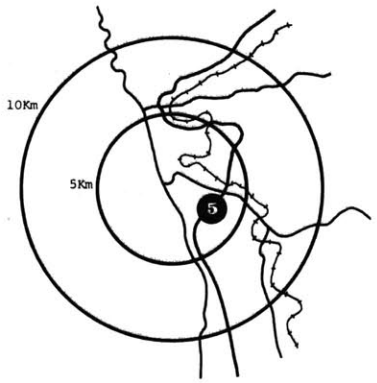
COSTS US$
dwelling unit: $ 480
land - market value: $ 100,000 / HA.

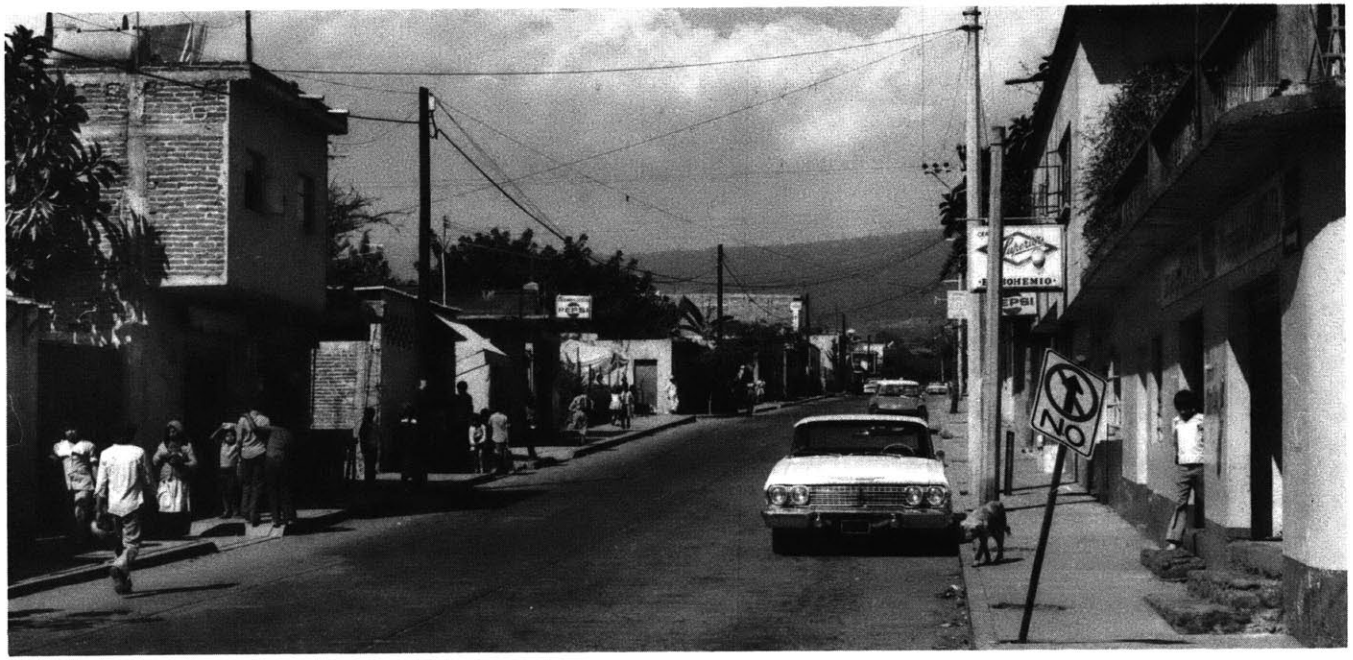
DWELLING UNIT PAYMENTS
financing: Popular
rent/mortgage: None
% income for rent/mortgage: None



LOS TEPETATES: (top) View of community perched above the tree covered Tetela, with downtown Cuernavaca lying in the distance.
(bottom) A typical adobe and cardboard roofed dwelling. The large barren lot denotes the absence of water.

5 SATELITE





LOCATION; The Colonia Satelite is located about three kilometers to the southeast of the city center and covers an area of some 100 hectares.

ORIGINS: The Colonia Satelite was developed in two stages on agricultural land belonging to the Ejido Chapultepec. The settlement of the older part of the Colonia began between 1960 and 1961 and that of the new part began six years later. In both cases the transactions carried out between the Ejidatarios of Chapultepec and the settlers were extralegal and it is only recently that the land tenure situation is being normalized by the new federal agency CoReTT. The development of the Colonia began at a time when other low income settlements were created by the invasion of lands originally intended as residential areas for weekend homes of upper middle and high income groups from Mexico City. Such is the case of the Colonias Antonio Barona and Flores Magon. All three settlements developed along the new Mexico-Acapulco highway that was just being completed through the area at the time.

LOCALITY PLAN

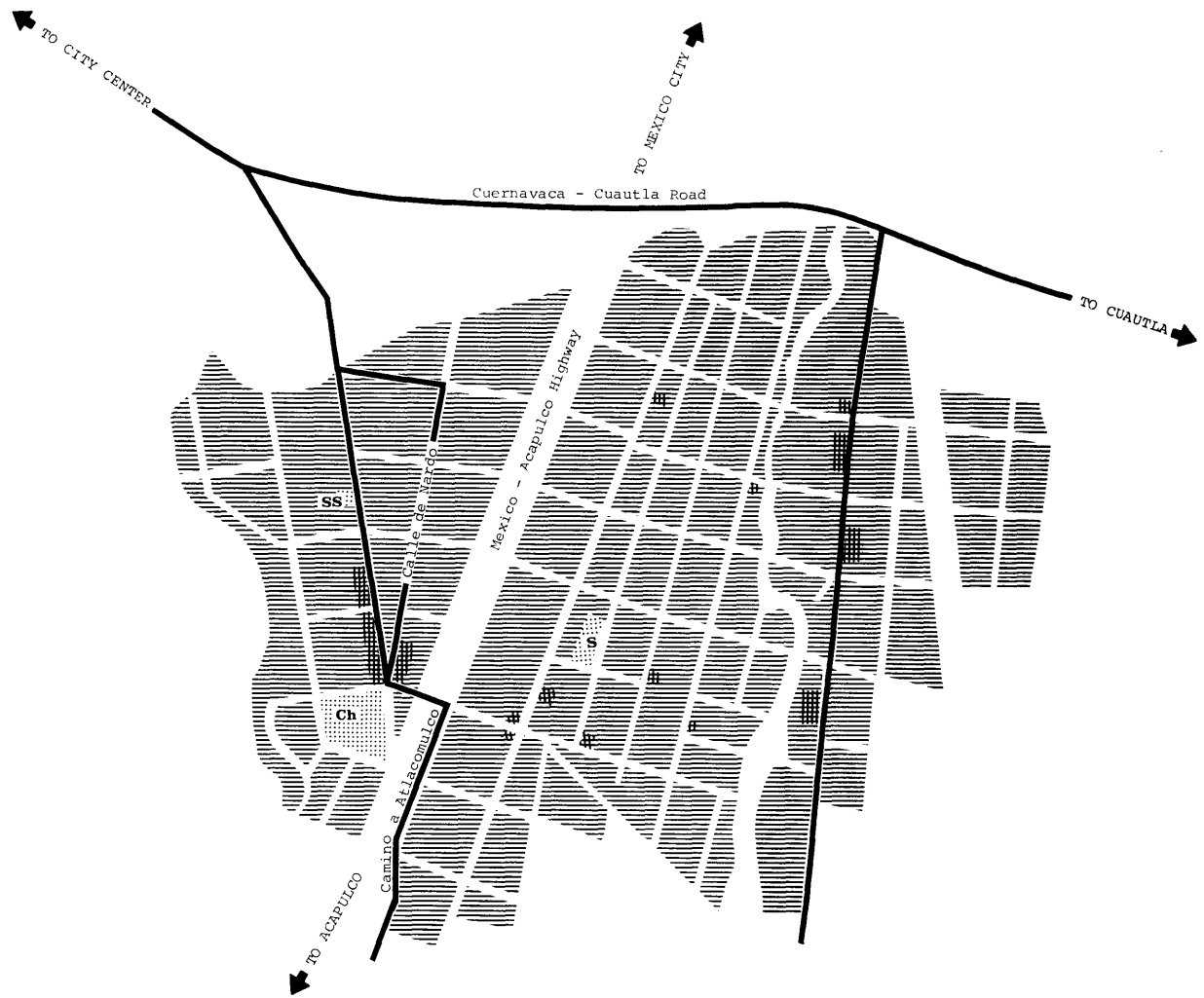
LAYOUT: The older section of Colonia Satelite is bounded on the west by the Canal Chapultepec and Apatlaco River which form a wedge towards the south with the Mexico-Acapulco highway. This section is bounded to the north by a middle income residential neighborhood and the ruins of an old hacienda. The bounderies of the new section are the Cuernavaca-Cuautla road to the north, the highway which divides the settlement to the west, agricultural lands to the east and the rural community of Atlacomulco to the south. A shallow barranca and a high tension line run through this section from north to south. The urban layout used in the old section was basically that of the spanish colonial block grid, adapted to the shape of the site. In the new section however, except for a strip of large blocks along the highway, a standard grid iron layout was adopted in order to provide smaller lots.

Photographs, opposite page:

SATELITE: (top) Main street of the older and more developed section of Satelite. This wide access to the Colonia is heavily travelled by both pedestrians and vehicles, and has developed the area's principal commercial nucleus.
(bottom) View of the locality's newer section showing dwellings at different stages of development, from cardboard roofed 1 room units to 2 story structures, usually on large lots.

LAND USE: The Colonia Satelite is primarily a low income residential area with medium to low density. The area is surrounded by low middle income neighborhoods on one side and by agricultural lands on the east. The agricultural lands are rapidly being developed into urban areas as the corridor between the nearby industrial area of CIVAC and the southeastern portion of the city expands. The old section is considerably more developed than the new one and it is here that most of the communal facilities are located. As usual in neighborhoods of this kind, there are several small stores and service shops scattered through the Colonia.

The comparatively very few community facilities and services are attributed in part to the legal situation in regard to land tenure in spite of the fact that much of the area is highly consolidated. The services that do exist, mostly in the old section, are due largely to the efforts of a popularly elected community improvement organization, which has also vied for the recognition and legalization of land tenure.



AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES

KEY

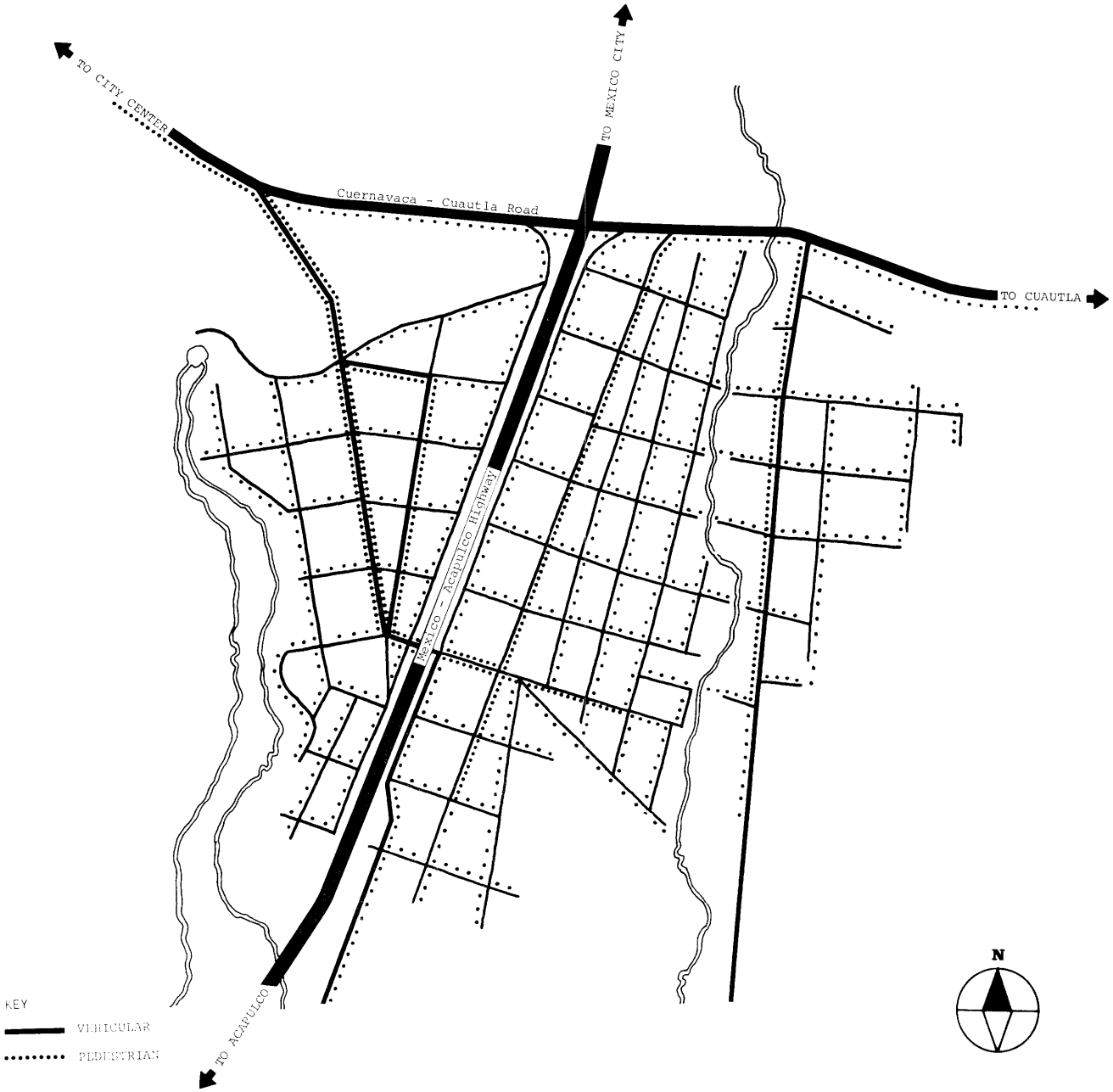
- **Pk** Parking
- **P** Police
- **F** Fire Department
- **S** School
- **Ch** Church
- **R** Recreation
- **L** Library
- **U** University
- **H** Health
- **PO** Post Office
- **SS** Social Services
- **M** Market
- **C** Cemetery
- Bus

LOCALITY LAND USE PATTERN

N

0 100 500m

1:10000



LOCALITY CIRCULATION PATTERN

CIRCULATION: The Colonia is served and connected to the city by the Cuernavaca-Cuautla road, along which the CIVAC industrial area is located further out of the city. The Satelite's intermediate position between the commercial area downtown and the nearby industrial zone make it a very good location for it's largely working class population. The Mexico-Acapulco highway has access limited to the point where it crosses the Cuernavaca-Cuautla road. Vehicular communication between both sections of the colonia is by the latter road and at other point under the highway. There is one pedestrian overpass which is seldom used. As in the case of other services, most streets in the old part are already paved whereas those in the new part are not. There are two bus lines that service the area on their way to and from the village of Acatlipa.

POPULATION: The population of Satelite is made up largely of working class moderately low income population. There is, however, a small percentage of both middle and low income groups, as well. Most of the settlers of Satelite were financially stable enough to afford a long term commitment in buying land in the area. This fact might put Satelite's average income level above that of other colonias proletarias that were created by lower income squatter invasions. The predominant employment types in the colonia include qualified construction workers such as electricians, construction foremen and carpenters. It also includes industrial workers, many of whom work in the CIVAC industrial complex nearby. In general terms, the inhabitants of the Satelite are more upwardly mobile than those of most other localities surveyed.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	172	16	10.7
DWELLING UNITS	210	16	13.1
PEOPLE	1,260	16	78

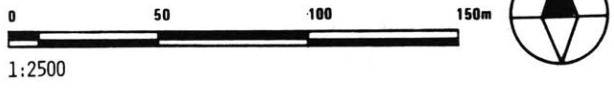
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	5.6	35
SEMI-PUBLIC (open spaces, schools, community centers)	2.6	16
PRIVATE (dwellings, shops, factories, lots)	7.8	49
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	16	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 207 \text{ m/Ha}$$

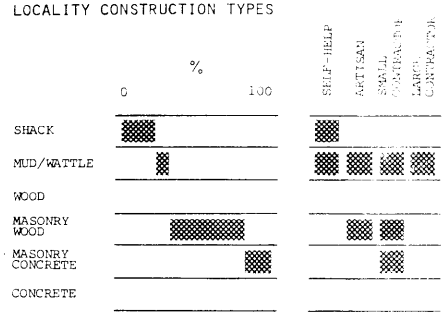
AVERAGE LOT AREA = 453 m^2

LOCALITY SEGMENT AIR PHOTOGRAPH



LOCALITY SEGMENT PLAN

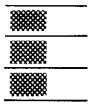
LOCALITY CONSTRUCTION TYPES



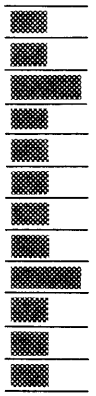
The chart shows (1) approximate percentage of each construction type within the total number of dwellings; and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

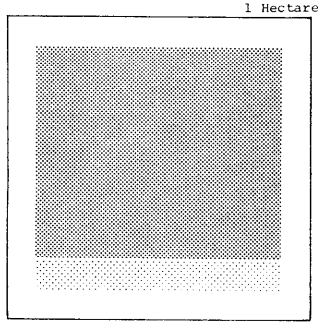


The chart illustrates the approximate availability of utilities, services, and community facilities at three level: NONE, LIMITED, ADEQUATE.

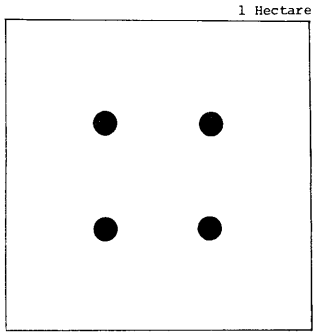
LAND UTILIZATION DIAGRAMS

PATTERN

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

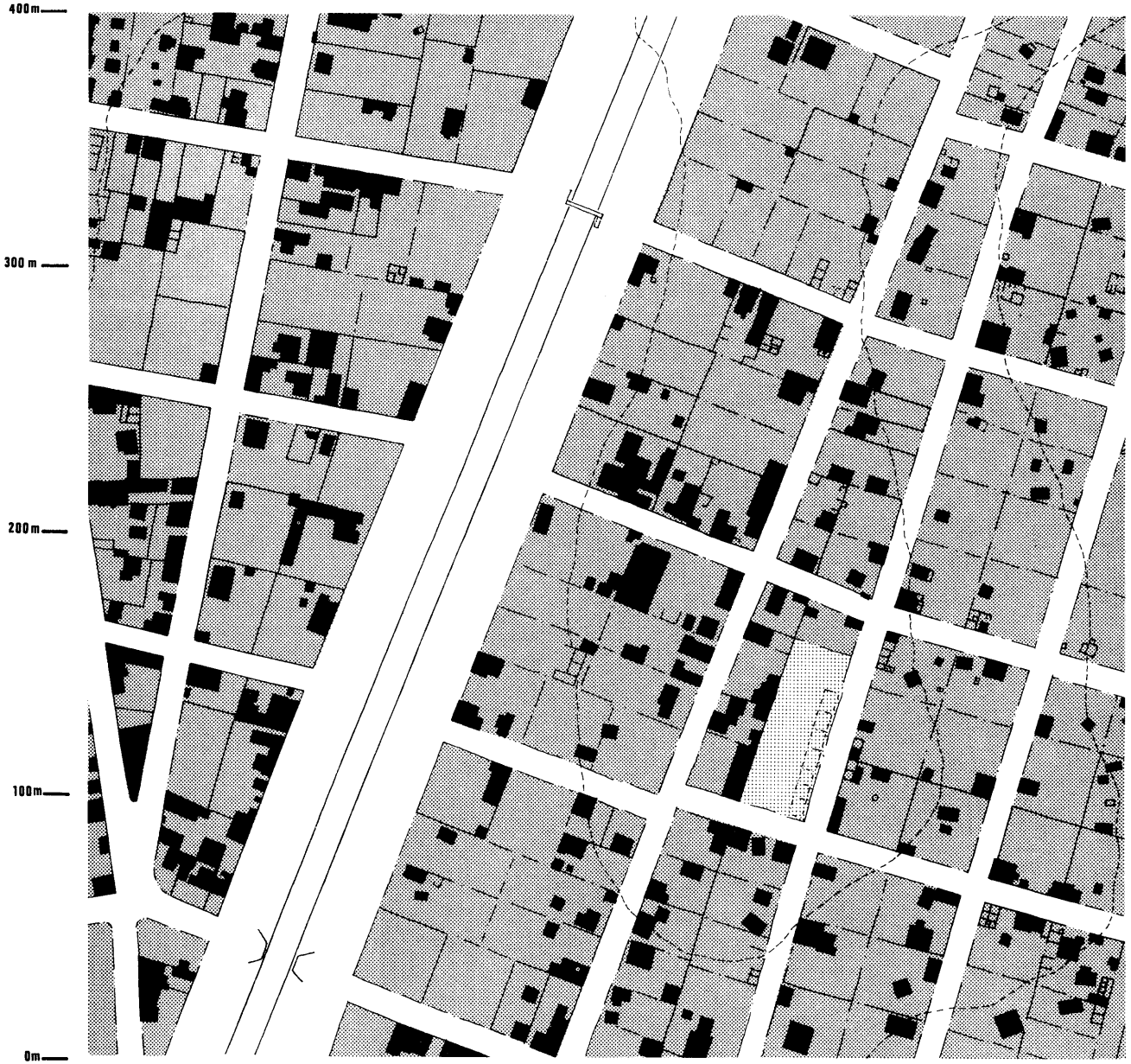


PERCENTAGES		
	Streets/Walkways	35%
	Playgrounds	16
	Cluster Courts	-
	Dwellings/Lots	49



DENSITY Persons/Hectare 78

● 20 persons



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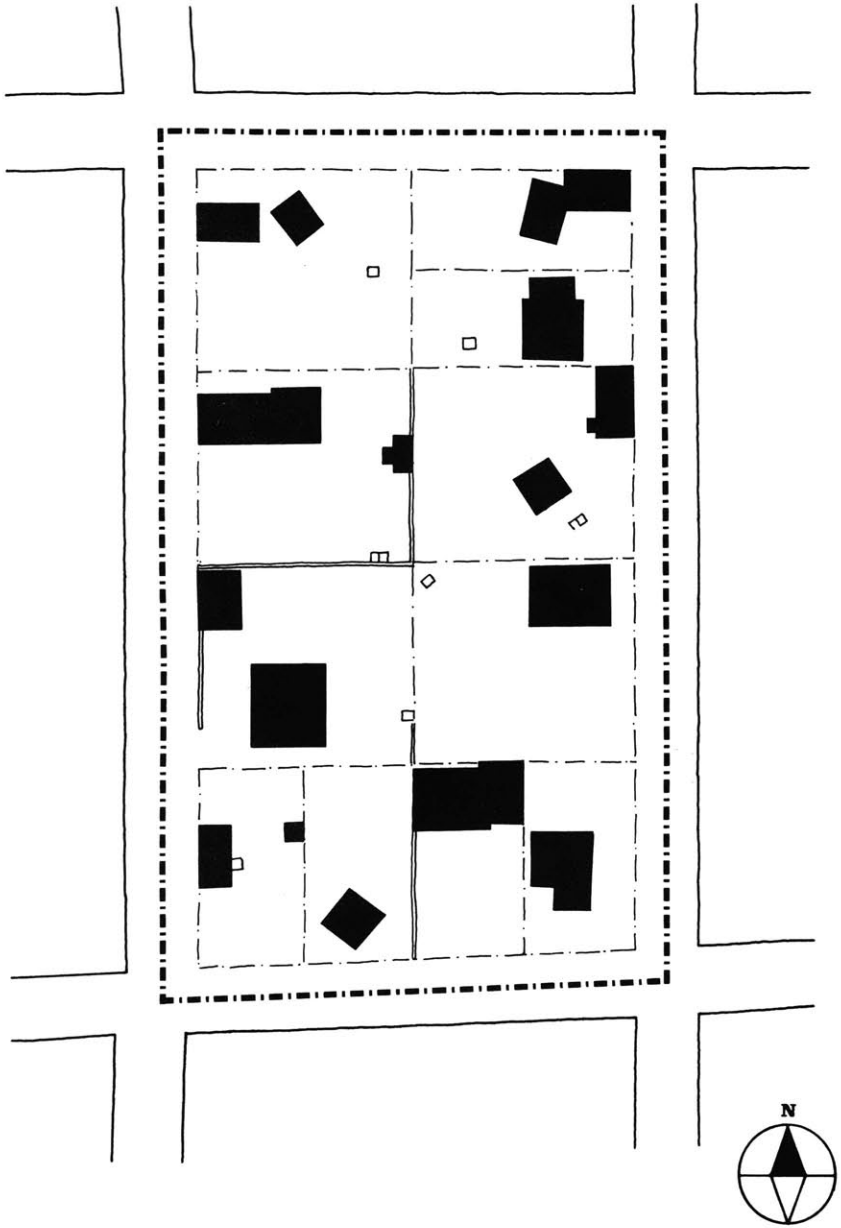
LOCALITY SEGMENT LAND UTILIZATION



LOCALITY BLOCK PLAN

BLOCK: The block is representative of those found in most of the peripheral colonias proletarias, regardless of their origin, whether developed privately or by a squatter invasion. In this case; however, the block was divided into relatively large square lots, resulting in high circulation per unit ratios. This situation that would eventually result in high utility network costs per unit is being remedied by the increasing value of land which is encouraging lots to be subdivided into smaller rectangular units. There are two dwelling types in the block: the smaller scattered shanties that serve as temporary shelters and the more permanent brick and concrete slab units with which we are concerned in this case. This situation denotes that the area is still undergoing a process of consolidation. The block will eventually be made up of mostly masonry and concrete dwellings. The shanties are often kept even after the completion of the permanent dwelling to house another family, store building materials or start a small shop.

LOCALITY BLOCK LAND UTILIZATION DATA

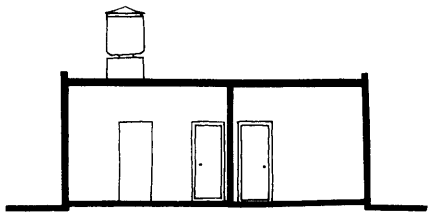
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	12	0.76	15.5
DWELLING UNITS	16	0.76	20
PEOPLE	96	0.76	124

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.15	20
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.61	80
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.76	100

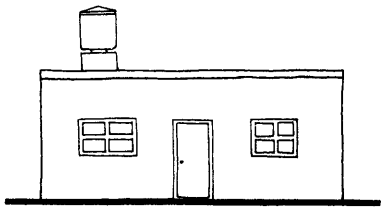
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 228 \text{ m/Ha}$$

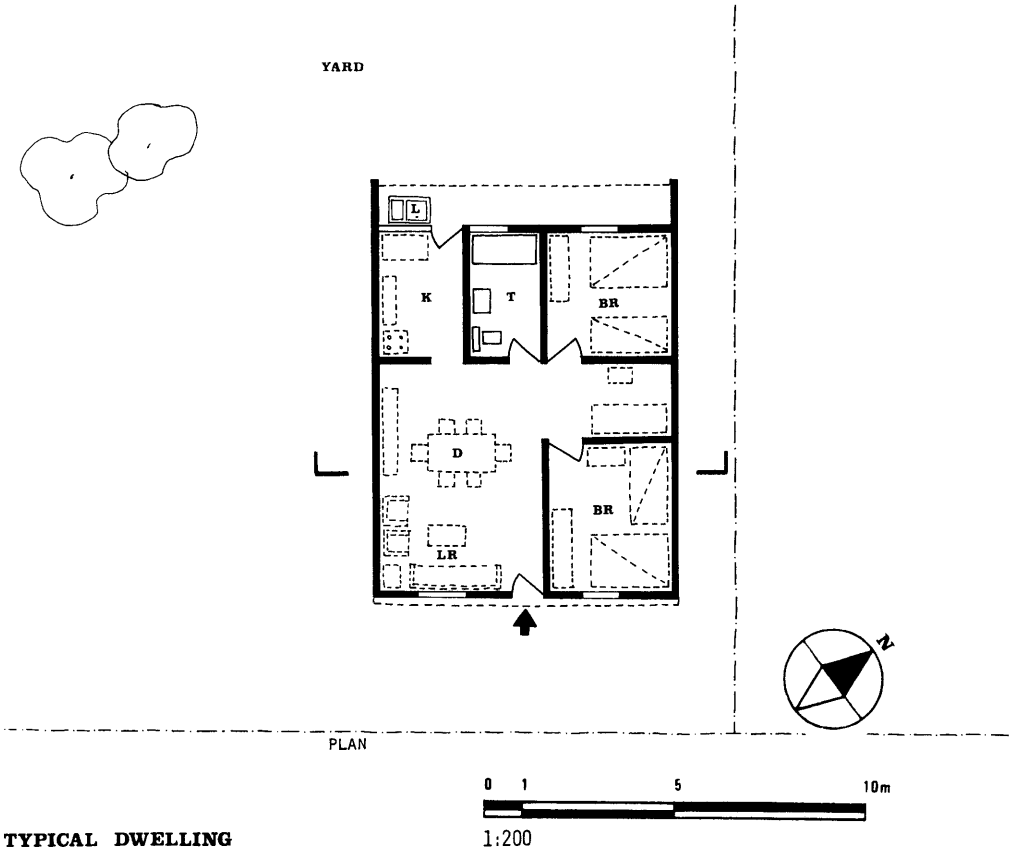
AVERAGE LOT AREA $= 508 \text{ m}^2$



ELEVATION



SECTION



PLAN

1:200

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)

LOCALITY SOURCES

Plan: *(accurate) Oficina de Obras Publicas Municipales, 1975. CETENAL Air Photograph, 1970.*
Land Use Pattern: *(approximate) Field Survey by the authors, 1975.*
Circulation Pattern: *(approximate) IBID*
Segment Plan: *(accurate) Oficina de Obras Publicas Municipales, 1975; CETENAL air photograph, 1970.*
Segment Land Utilization: *(approximate) Field Survey by the authors, 1975.*
Block Plan: *(accurate) Oficina de Obras Publicas Municipales, 1975.*
Typical Dwelling: *(approximate) Field Survey by the authors, T. Bautista and G. Engstrong, 1975.*
Physical Data: *(accurate) IBID*
Photographs: *CETENAL (aerial) 1970; C. Garduño, 1976; The authors, 1975-1976.*
General Information: *IX Censo General de Poblacion 1970, Cuernavaca, Morelos. Field Surveys; T. Bautista, G. Engstrong, G. Flores, 1975.*

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: House
area (sq m): 84
tenure: Legal Ownership

LAND/LOT
utilization: Private
area (sq m): 400
tenure: Semi-Legal Ownership

DWELLING
location: Periphery
type: Detached
number of floors: 1
utilization: Single: Family
physical state: Good

DWELLING DEVELOPMENT
mode: Incremental
developer: Popular
builder: Artisan
construction type: Brick, Concrete
year of construction: 1970

MATERIALS
foundation: Stone
floors: Cement
walls: Brick
roof: Concrete

DWELLING FACILITIES
wc: 1
shower: 1
kitchen: 1
rooms: 2
other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: Southern Mexican
place of birth: Guerrero
education level: Primary

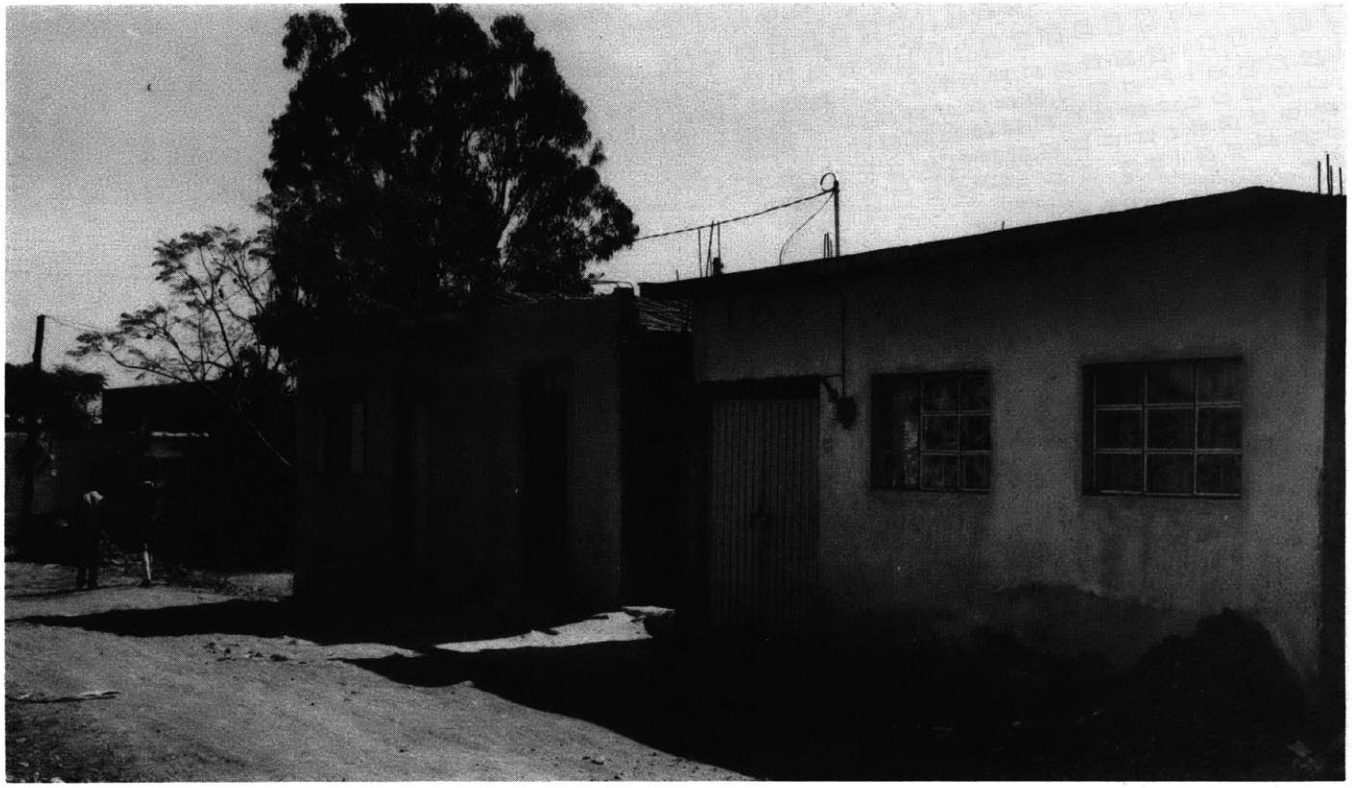
NUMBER OF USERS
married: 2
single: -
children: 3
total: 5

MIGRATION PATTERN
number of moves: 2
rural - urban: 1960
urban - urban: 1970
urban - rural: -
why came to urban area: Employment

GENERAL: ECONOMIC
user's income group: Moderate
employment: Textile Worker
distance to work: 3 Km.
mode of travel: Walks, Bus

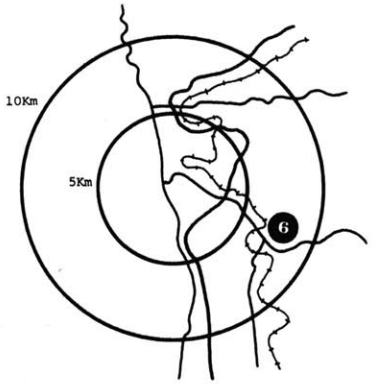
COSTS US$
dwelling unit: $ 4, 700
land - market value: $ 120, 000/HA.

DWELLING UNIT PAYMENTS
financing: Popular
rent/mortgage: None
% income for rent/mortgage: 0



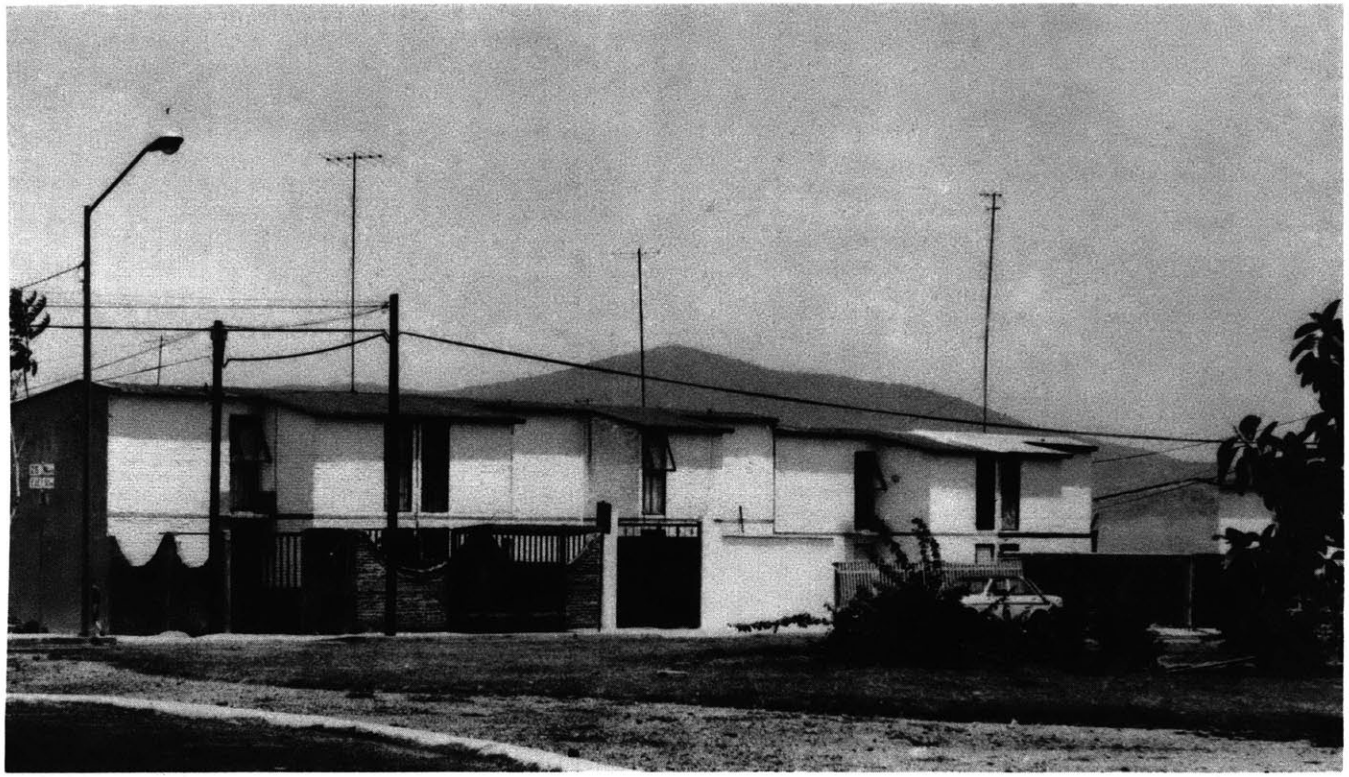
SATELITE: (top left) Few streets are paved due to excessive circulation areas.
(top right) The brick and concrete dwellings usually develop a 2nd. story, for which reinforced bars are left protruding from the concrete slab roof. (bottom)

6 CIVAC



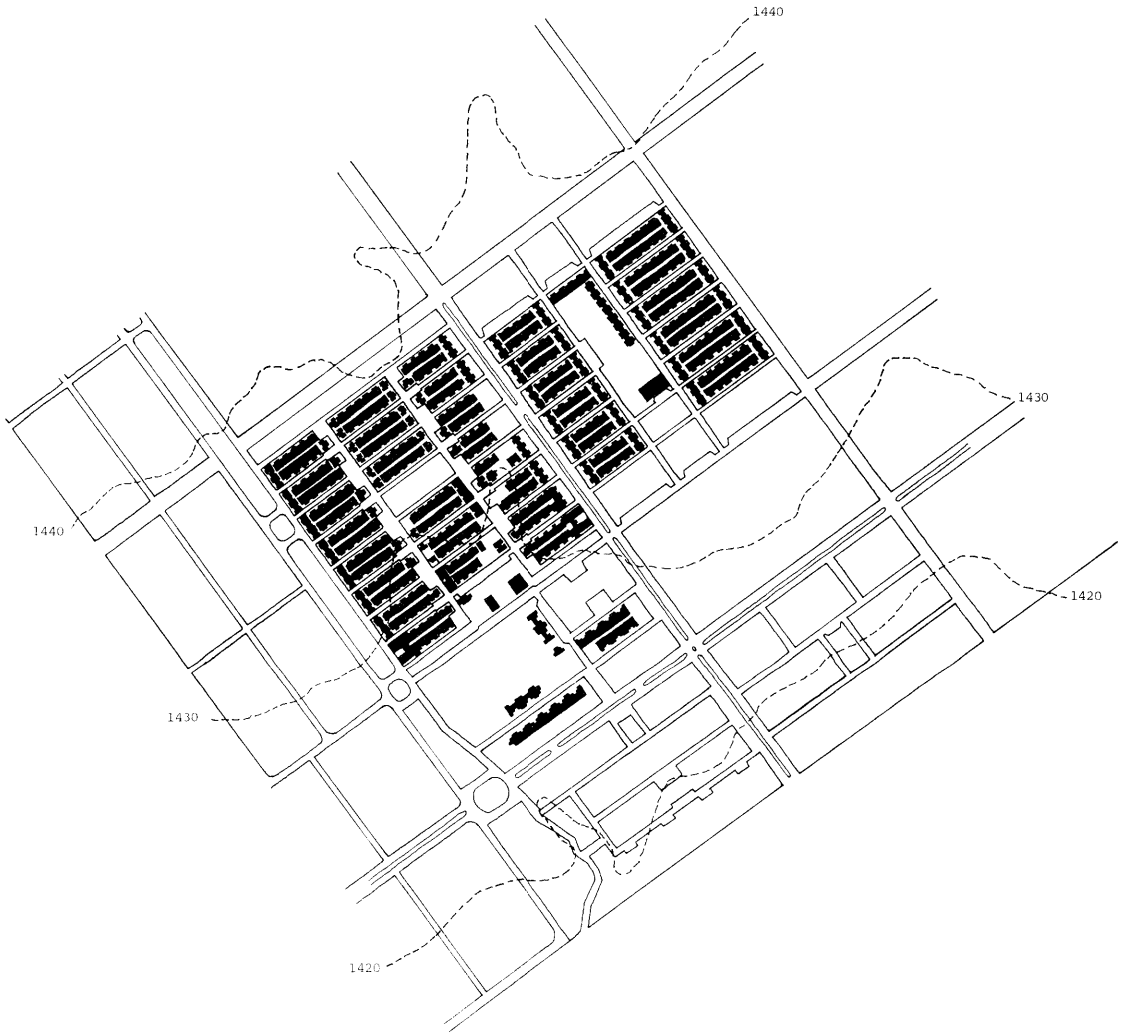
LOCATION: This locality is the residential component of an industrial development project known as CIVAC. It is located on the Cuernavaca - Cuautla road in the southeastern periphery of the city about 8 kilometers from downtown Cuernavaca.

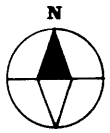
ORIGINS: CIVAC, or Ciudad Industrial del Valle de Cuernavaca, is a project developed jointly by the Federal and State governments with the participation of the private sector It was intended to serve as a promoter of industrial development in Cuernavaca and as a model for the decentralization of industrial growth from Mexico to the surrounding secondary cities, such as Toluca, Queretaro and Puebla. The housing component of CIVAC is representative of projects being undertaken by different government agencies . The project was built in 1968 on relatively flat agricultural lands expropiated from neighboring Ejidos. Although originally intended for low income groups made up of workers and technicians of the industries at CIVAC, the high costs of the dwellings has forced them to be put up for public sale, catering to a middle income professional and semi-professional market.



CIVAC: (right) Wide, paved, well-lit streets are characteristic of institutional housing projects; cost is often secondary to looks.
(left) The industrial zone is characterized by modern buildings with well tended gardens.
(bottom) The two story row houses that are so typical of institutional housing projects account for part of the units at CIVAC.

LAYOUT: CIVAC has a standard small gridiron layout which by responding to the need of providing small lots incurs in excessive network lengths per unit, thus substantially increasing costs. The community has two 16 hectare segments with a total of about 1,000 ready built dwelling units. The units consist mostly of one floor and several two story row houses, plus a handful of 3 story walk-up condominium apartments. As a planned development, there is an area reserved for the expansion of the residential component. The settlement has adequate services and facilities which are maintained and operated by PROCIVAC, a community organization. By means of a special legal arrangement, CIVAC pays only a fraction of its property taxes to the municipality of Tejalpa to which it belongs, keeping the rest to run the community. The residential area is bounded on three sides by existing and planned light industrial areas. The southeastern side is bounded by agricultural lands of the town of Tejalpa.

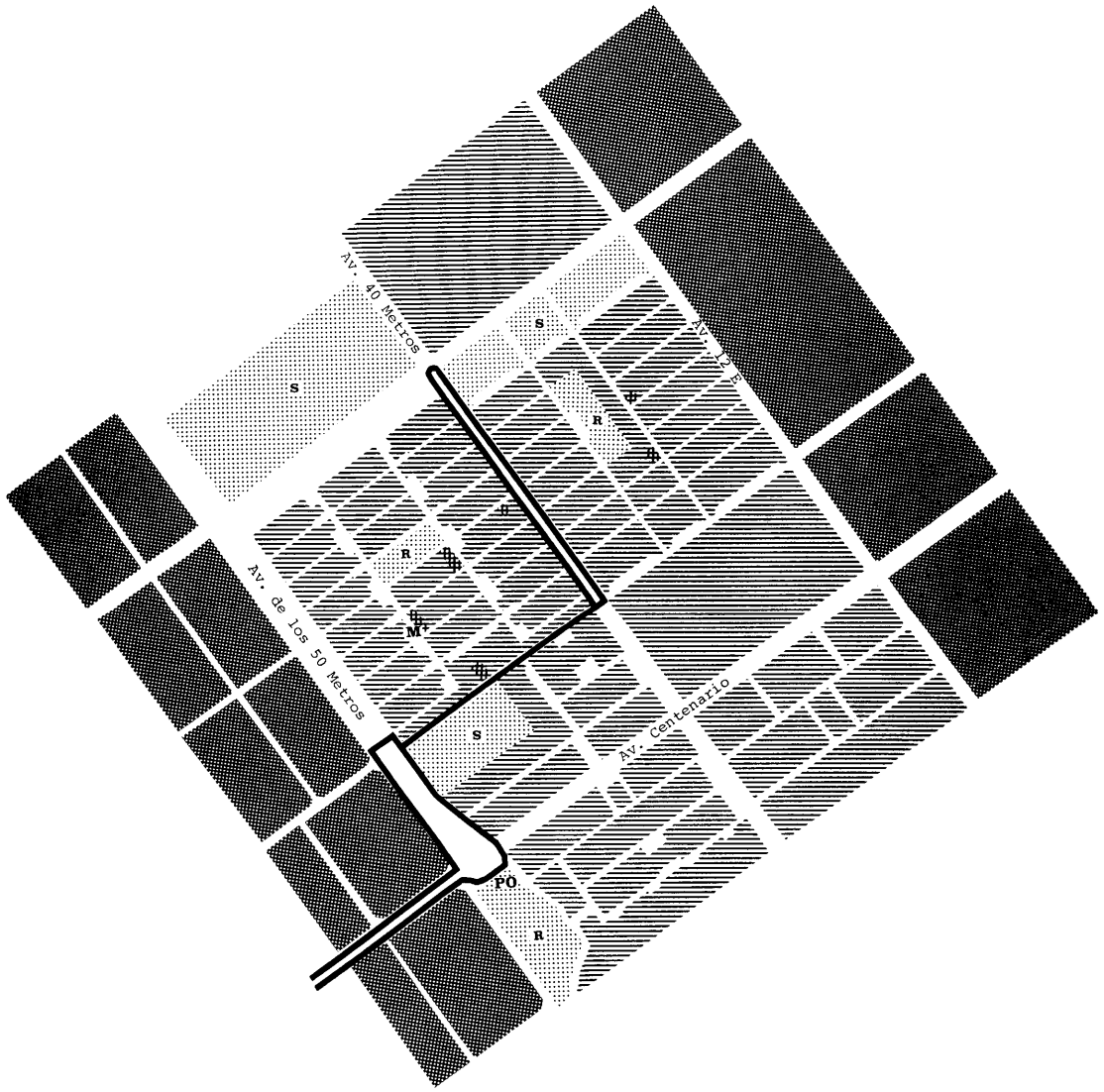




1:10000

LOCALITY PLAN

LAND USE: The primary use of the CIVAC housing component is residential. It accounts for 23% of the 420 hectares of the overall industrial development project. The settlement has complete community facilities that include playgrounds, kindergarden, a primary school, a secondary school, and a center for the community organization. The locality also houses a Regional Institute of Technology which serves the whole Cuernavaca metropolitan area. There is a small planned commercial area but several dwellings have been partially converted into small stores. Although the community is in the middle of an industrial development, it is not the only one in the area. Along with its industrial development, the southeastern periphery has seen the explosive increase of residential areas, particularly around the villages of Tlahuapa, Jiutepec and Tejalpa.



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

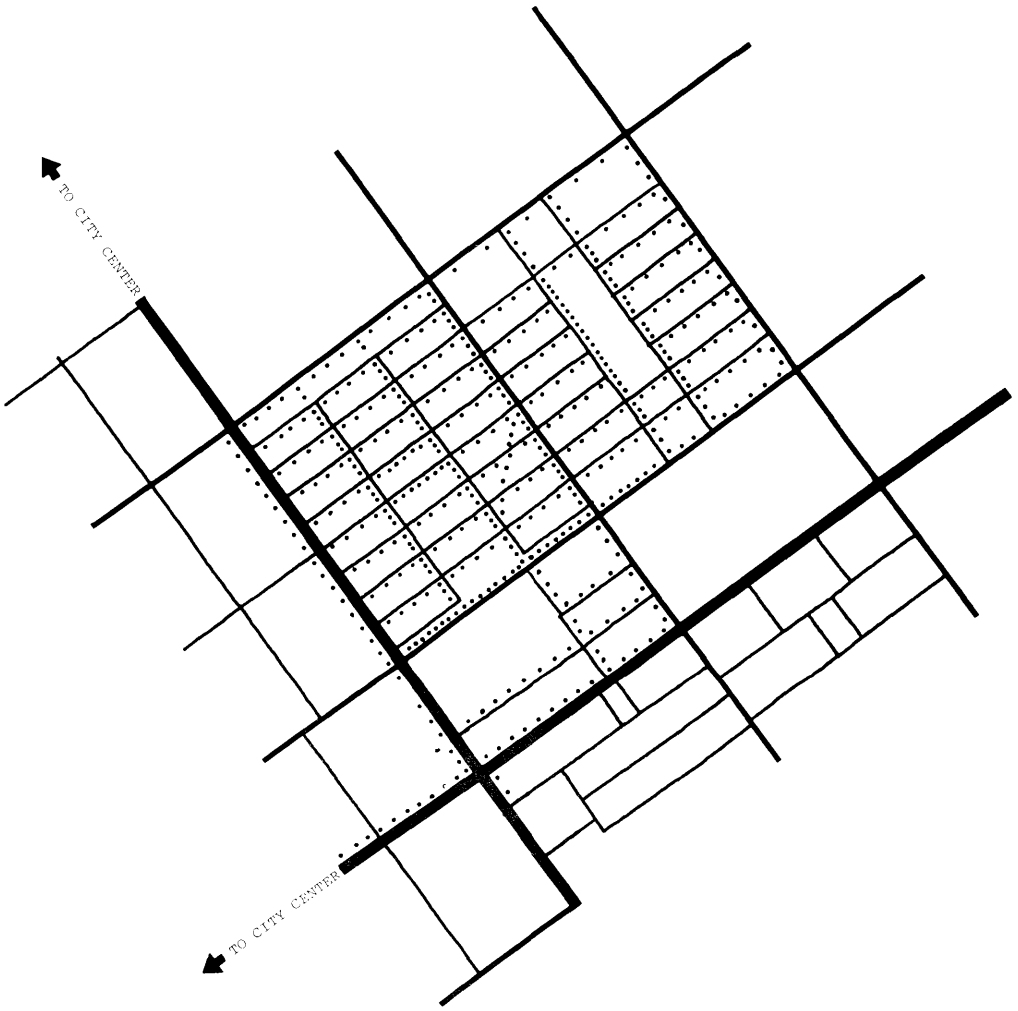
LOCALITY LAND USE PATTERN

N

0 100 500m

1:10000

CIRCULATION: The community lies 1.5 kilo meters from the Cuernavaca-Cuautla road and is communicated with it by means of a wide boulevard that also serves the industrial areas. The residential section is separated from the existing industrial area by another transversal 50 meter wide boulevard. The main streets within the settlement are asphalt paved but the secondary residential streets have a rough stone surface that contributes to reducing vehicular speeds. These streets are narrow (5m) and spaces intended for parking are located at the corners. They are seldom used, however, and cars are parked in front of the houses, encroaching on the sidewalks. A pedestrian pathway cuts through part of the community, following the topography of the site in order to allow adequate natural drainage. A single bus line runs between CIVAC and the central market in Cuernavaca.



KEY

VEHICULAR

PEDESTRIAN

N

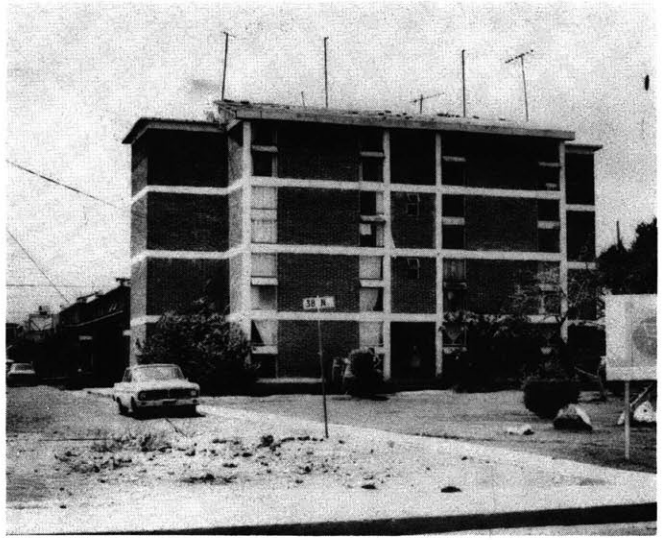
0 100 500m

1:10000

LOCALITY CIRCULATION PATTERN

POPULATION: As in many public housing projects, CIVAC was originally intended for a low income group of workers employed in the industrial zone. The workers that live there at present are moderately low income qualified technicians and account for a very small proportion of the locality's population. The bulk of the inhabitants are middle income semiprofessional types that usually do not work in the industrial area, but rather drive to Cuernavaca daily. Clearly, CIVAC has the highest income levels among the localities surveyed as well as the most evenly upwardly mobile social group.

CIVAC: (top) Secondary streets are of a rough style cobblestone, with natural surface drainage. (bottom) A store in the commercial area, and one of the few walk-up apartment buildings.



LOCALITY SEGMENT LAND UTILIZATION DATA

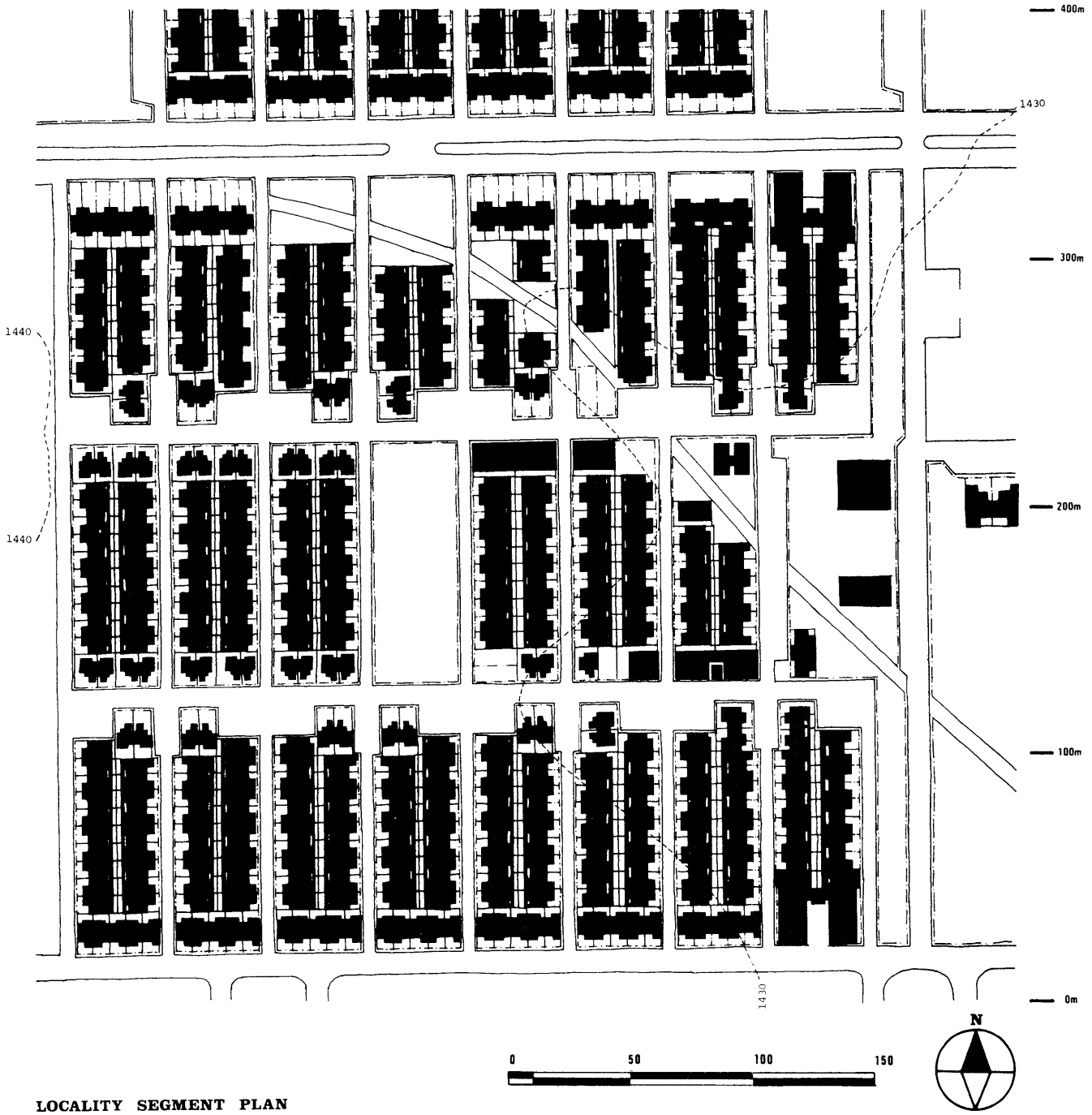
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	615	16	38
DWELLING UNITS	620	16	39
PEOPLE	3,720	16	232

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	4	25
SEMI-PUBLIC (open spaces, schools, community centers)	1.3	8
PRIVATE (dwellings, shops, factories, lots)	10.7	67
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	16	100

NETWORK EFFICIENCY

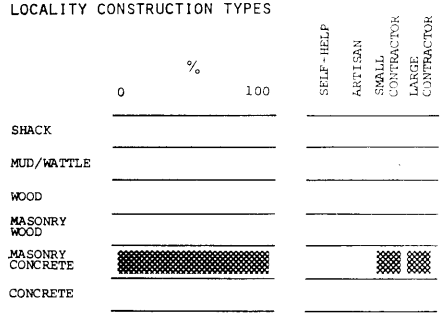
$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 302 \text{ m/Ha}$$

AVERAGE LOT AREA = 130 m^2



LOCALITY SEGMENT PLAN

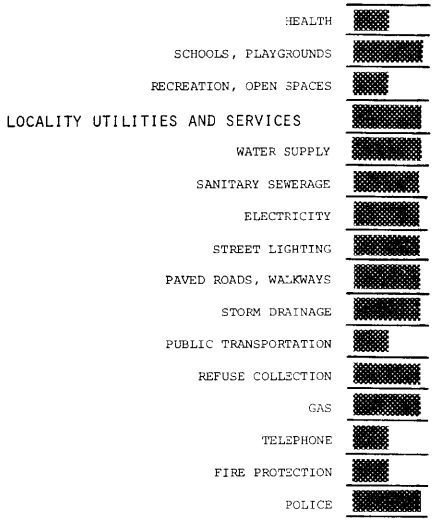
LOCALITY CONSTRUCTION TYPES



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 COMMUNITY FACILITIES



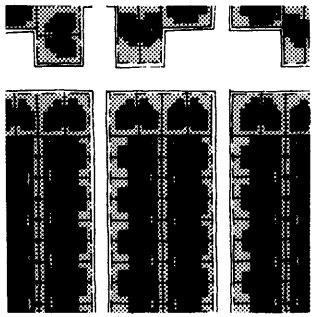
LOCALITY UTILITIES AND SERVICES

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

Quality of information: Approximate

LAND UTILIZATION DIAGRAMS

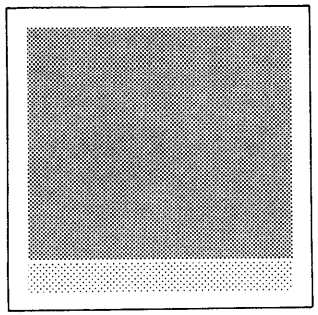
1 Hectare



PATTERN

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

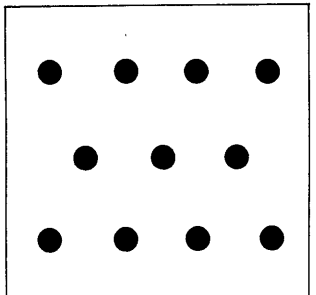
1 Hectare



PERCENTAGES

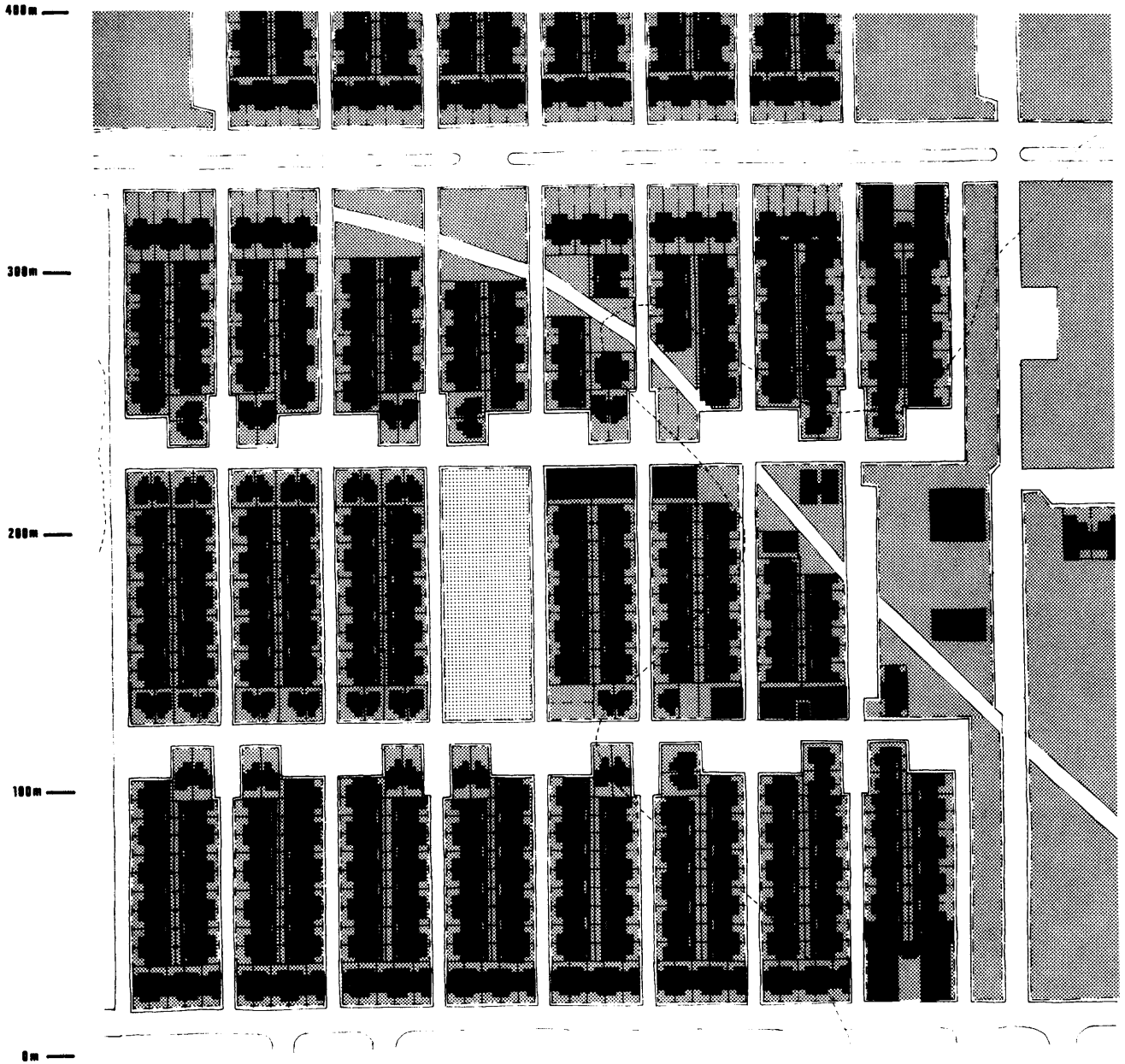
Streets/Walkways	25%
Playgrounds	8
Cluster Courts	-
Dwellings/Lots	67

1 Hectare



DENSITY Persons/Hectare 232

● 20 persons

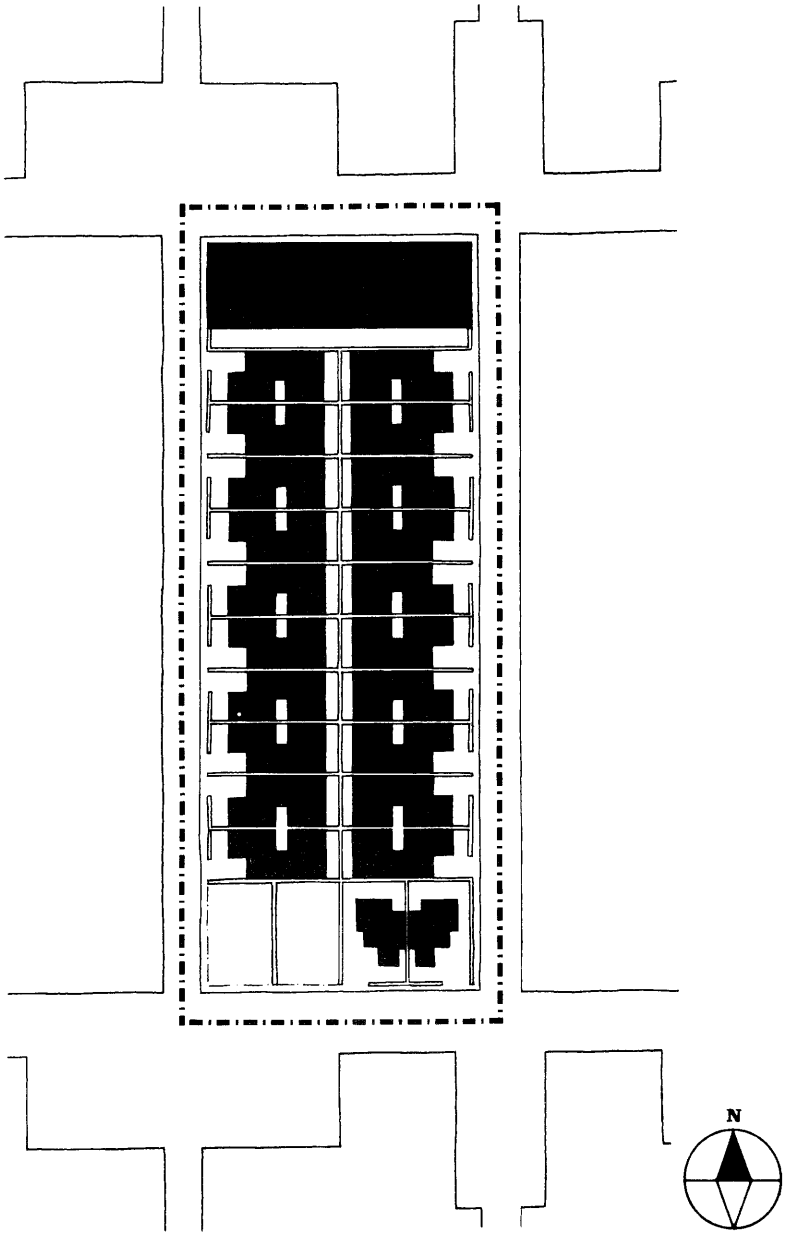


0 50 100 150m

1: 2500

N

LOCALITY SEGMENT LAND UTILIZATION



LOCALITY BLOCK PLAN

BLOCK: The block is typical of the standard small gridiron layout. Although the block is made up of relatively small rectangular lots, the frequency of the roads determines high circulation per unit lenghts and public area percentages. This situation is complicated by the areas reserved for parking, which as mentioned above, are not used for that purpose. On the other hand, the extent of construction coverage on the block allows relatively high population densities for single story dwellings. The dwellings are almost all identical and were built simultaneously by a large contractor. The group at the northen end of the block is made up of small stores that are part of the locality's commercial area. There are also a couple of two story row houses at the southern end of the block. The rest of the units, with which we are concerned in this case, have small gardens in the front and back that are practically useless, other than for ventilation and lighting. Most of them have had a third small indoor open area converted into a useful room.

LOCALITY BLOCK LAND UTILIZATION DATA

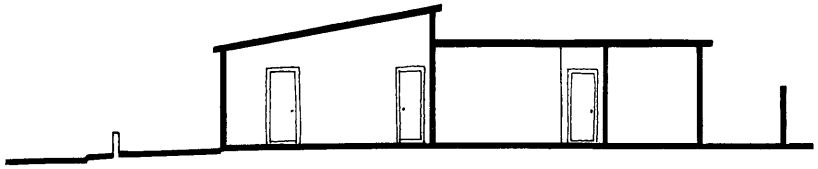
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	28	0.45	62
DWELLING UNITS	22	0.45	48
PEOPLE	132	0.45	293

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.08	18
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.37	82
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.45	100

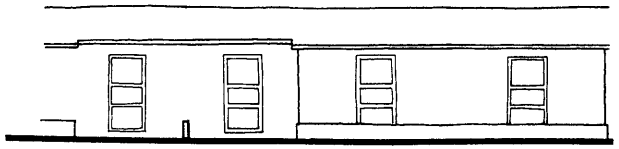
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 333 \text{ m/Ha}$$

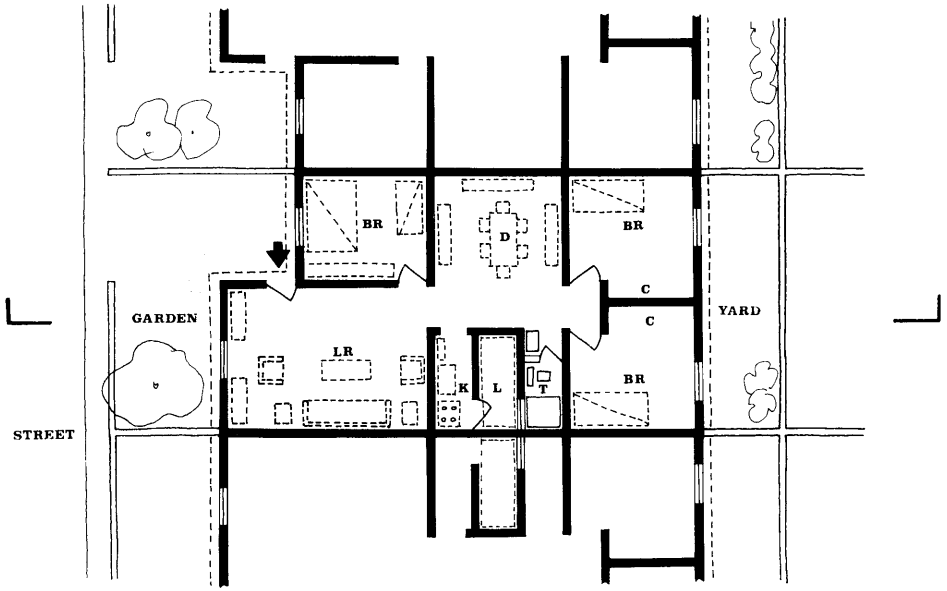
AVERAGE LOT AREA = 121 m^2



SECTION



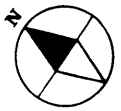
ELEVATION

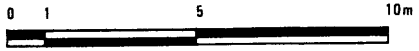


PLAN

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

LOCALITY SOURCES

Plan:	*(accurate) CIVAC, 1975*
Land Use Pattern:	*(accurate) IBID*
Circulation Pattern:	*(accurate) IBID*
Segment Plan:	*(accurate) IBID*
Segment Land Utilization:	*(accurate) IBID*
Block Plan:	*(accurate) IBID*
Typical Dwelling:	*(approximate) Field Survey by the authors, 1975.*
Physical Data:	*(accurate) IBID*
Photographs:	*CETENAL (aerial) 1970; The authors, 1975; C. Garduño, 1976.*
General Information:	*Oficinas de CIVAC (Ciudad Industrial del Valle de Cuernavaca), Field survey by the authors, 1975.*

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
- type: House
- area (sq m): 82
- tenure: Legal Rental

LAND/LOT
- utilization: Private
- area (sq m): 126
- tenure: Legal Ownership

DWELLING
- location: Periphery
- type: Row / Grouped
- number of floors: 1
- utilization: Single: Family
- physical state: Good

DWELLING DEVELOPMENT
- mode: Instant
- developer: Public/Private
- builder: Private
- construction type: Brick, Concrete
- year of construction: 1970

MATERIALS
- foundation: Stone
- floors: Cement
- walls: Brick
- roof: Concrete

DWELLING FACILITIES
- wc: 1
- shower: 1
- kitchen: 1
- rooms: 3
- other: Indoor Patio Converted to dining Room

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
- user's ethnic origin: Northern Mexican
- place of birth: Chihuahua
- education level: University

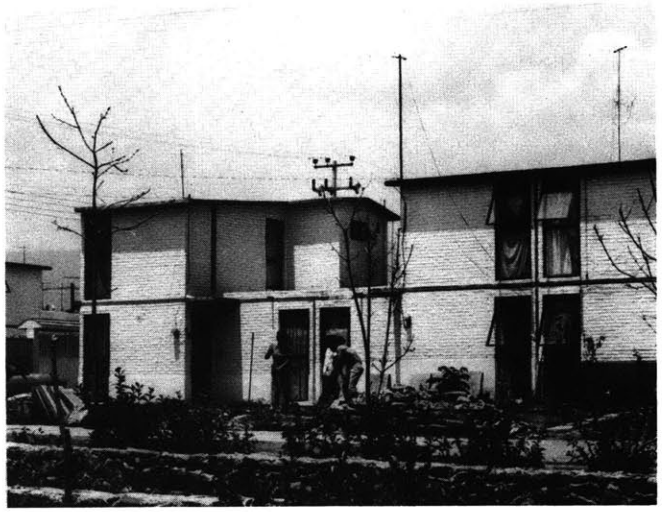
NUMBER OF USERS
- married: 2
- single: -
- children: 1
- total: 3

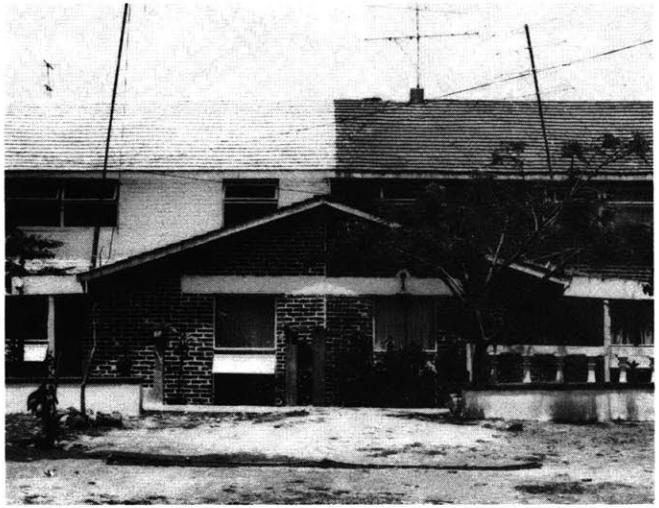
MIGRATION PATTERN
- number of moves: 2
- rural - urban: 1966
- urban - urban: 1974
- urban - rural: -
- why came to urban area: Employment

GENERAL: ECONOMIC
- user's income group: Middle
- employment: Agronomist
- distance to work: 30 - 90 Km
- mode of travel: Automobile

COSTS US$
- dwelling unit: 5,248
- land - market value: N.A.

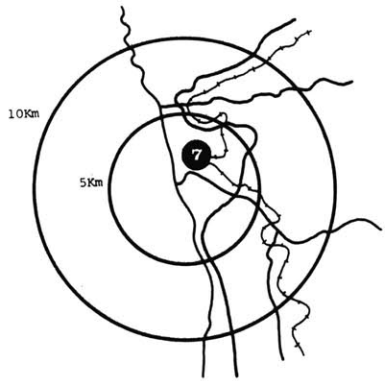
DWELLING UNIT PAYMENTS
- financing: Private
- rent/mortgage: $ 44 month
- % income for rent/mortgage: 6%





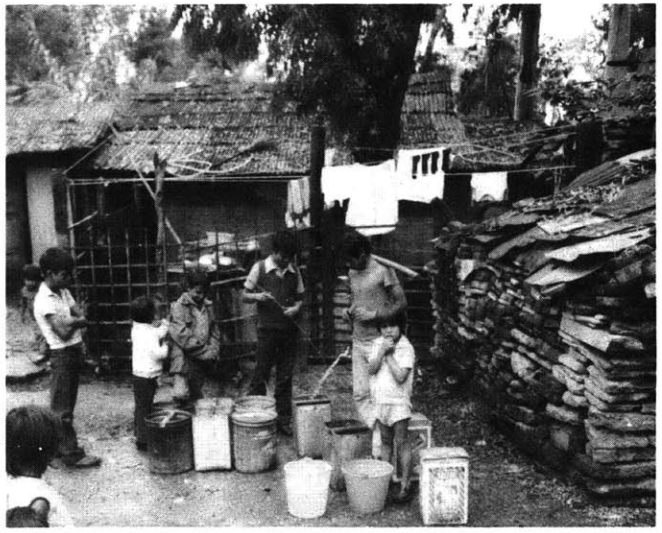
CIVAC: (top) Two types of two story dwellings, built on block ends.
(bottom) Single story row house with very small front garden which is used as a carport, disregarding the public parking areas.

7 ESTACION

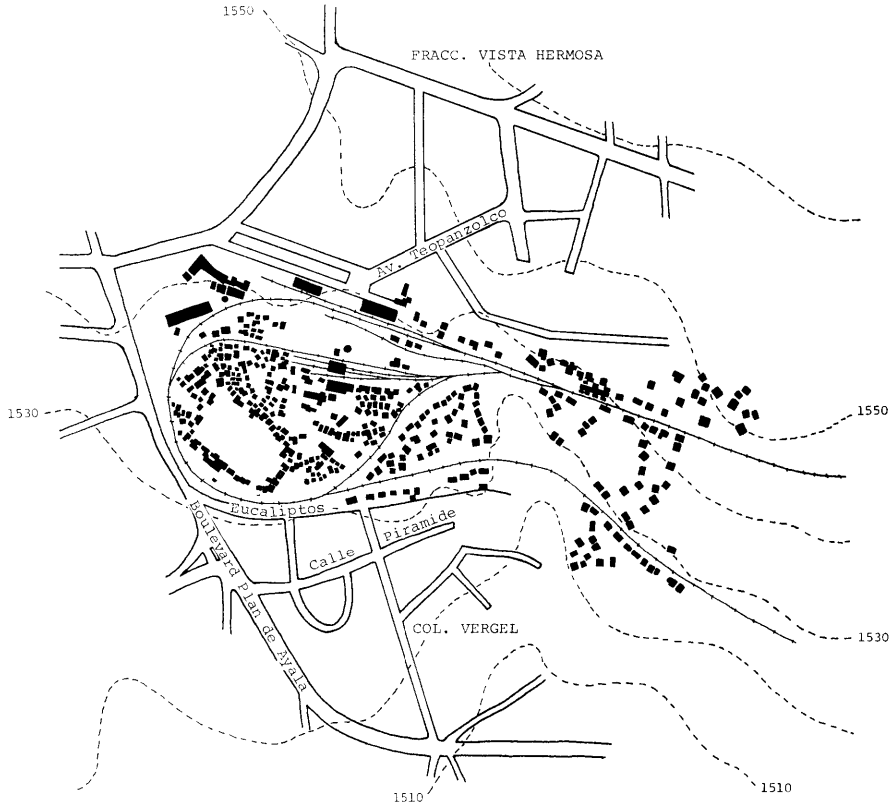


LOCATION: The squatter settlement known as la Estacion is built on public land, in and around the railroad yards of the local train station, about 2 kilometers from the city center.

ORIGINS: La Estacion is the largest and one of the oldest squatter settlements in Cuernavaca. It dates back to around 1940 when a small group of settlers, of which a few were railroad workers, asked the station authorities for permission to live on the railroad's unused property temporarily. In the years since, the population of the settlement has increased to over 600 families The squatters formed an organization that became affiliated to a national settler and tenant association which gave them an official personality and some prestige. The association has also given them legal advice enabling them to resist recent efforts of the railroad company to erradicate the settlement. The community is quite aware of the law by which they have a legal claim to the piece of land on which they have lived for 20 or more years. The community is aware of the value of the land that they are squatting on and they have stated that they are willing to move, but only to a conveniently located and fully serviced site.



LAYOUT: The urban layout of the settlement was determined by a gradual process of accretion. The area started building up near the railroad yard in the northeastern part of the settlement, then across the flat stretch encircled by a wide loop of tracks, and finally between the two sets of tracks towards the southeast. A factor that affected the development of the settlement is a shallow barranca were the dwellings, because of their makeshift construction, are difficult to build and consequently scarce. The community's water supply is hand carried from four public taps in and around the settlement. Most dwellings have latrines nearby, many of which are built over an open sewerage ditch which is connected to the municipal system. Electricity is mostly legally purchased but the meters have been concentrated on large switchboards at three points, from which each household must carry the power with its own lines.



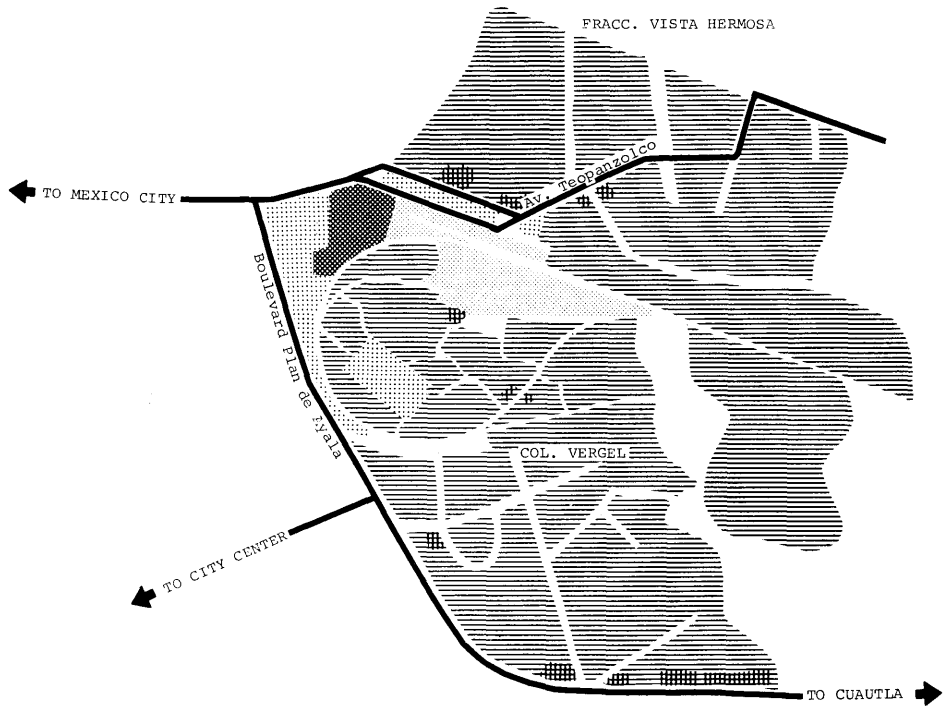
1:10000

LOCALITY PLAN

Photographs, opposite page:

ESTACION: (top) Built among tall eucaliptus trees, the settlement is hidden from view by the train station and track embankments. A garbage dump (in the left foreground) is located near the dwellings.
(left) The shanties are built of different materials. As in this case, cardboard, wood and scrap materials predominate.
(right) One of the few communal taps; it is the chore of children to carry water home for everything from washing to cooking.

LAND USE: Of the 8 hectares of land that belong to the train Station, only 14,700 m2 are taken up by its facilities. The rest is divided among public land, a small part leased to a couple of light industries, and the squatter settlement. The settlement itself is primarily a medium low to very low income residential area. There are five or six small stores and several shops among which those of tailors predominate. Within the settlement there is also a large soccer-field that belongs to the station and which is used as one of the sites of the city football tournaments; it provides the community with an excellent recreational facility. There are no other community facilities in the settlement but its prime location puts the squatters within walking distance of public schools, hospitals, the central market, and for that matter, of job oportunities. The area surrounding la Estacion is made up mostly of middle and upper income residential subdivisions. There are schools and small commercial areas nearby and the Melchor Ocampo public park is one block away.



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

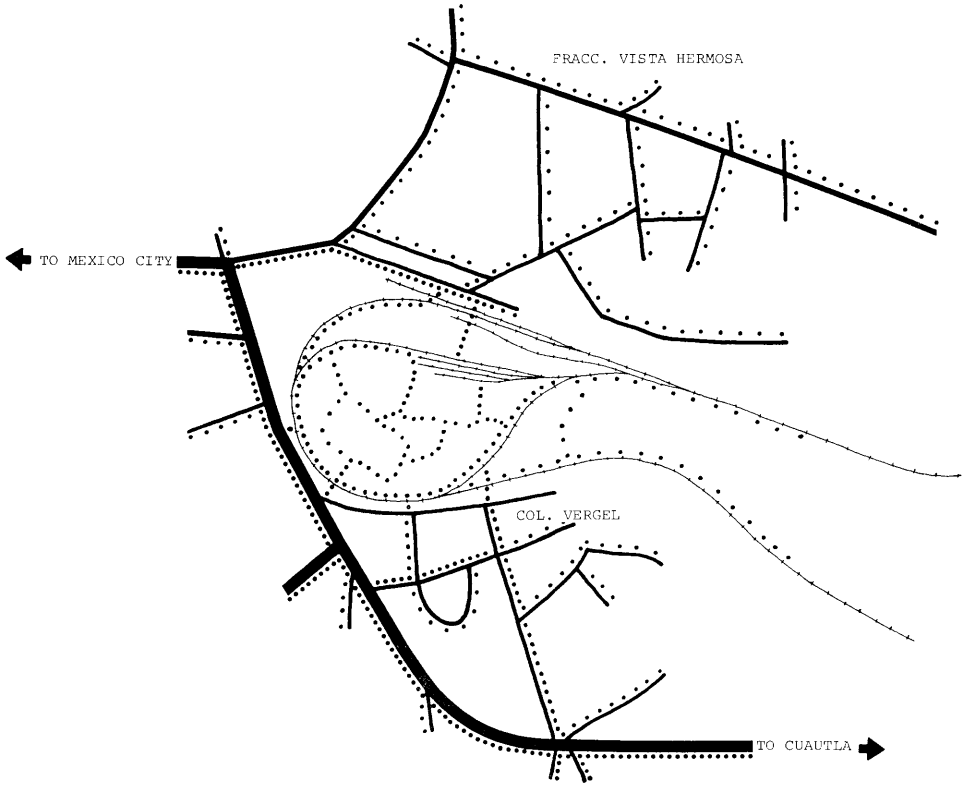
LOCALITY LAND USE PATTERN

N

0 100 500m

1:10000

CIRCULATION: The area of la Estacion is bounded on two sides by minor arteries. One leads to the residential subdivisions in the eastern part of the city, while the other communicates the northern part of the city with the downtown area and the road to Cuautla. Due to the embankment on which the railroad loop is built, however, the community is completely hidden from the view of these streets. Access to the settlement is through the train station and from different points along the streets that border the area. There is no vehicular circulation within the settlement. The tracks that are used several times a day by cargo and passanger trains, are also the main pedestrian thoroughfares. These branch off into the settlement through dozens of footpaths.



KEY

VEHICULAR

PEDESTRIAN

N

0 100 500m

1:10000

LOCALITY CIRCULATION PATTERN

POPULATION: The inhabitants of la Estacion are largely of very low income levels. The few exceptions are among those that arrived more than twenty years ago and who have managed to set up a small business to complement their income. In general terms, the people of the settlement are among the least socially mobile of all the localities and groups surveyed. For the most part, they are employed intermittently in low skilled jobs of the construction industry and in the services. Women wash clothes to help support their families. Overall, unemployment levels are higher than in most other communities. Chores such as cooking, washing and carrying water take up a great part of the day. In spite of the hardships of daily life, there is a strong sense of community and morale is high. The settlers are relatively well organized around the issue of their land tenure situation, although there is not a very high degree of political awareness.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	-	-
DWELLING UNITS	450	10.58	42.5
PEOPLE	2,900	10.58	274

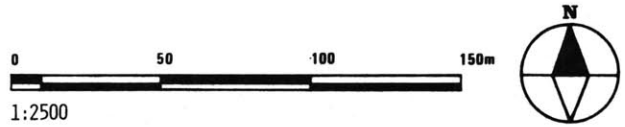
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.38	13
SEMI-PUBLIC (open spaces, schools, community centers)	0.53	5
PRIVATE (dwellings, shops, factories, lots)	2.12	20
SEMI-PRIVATE (cluster courts)	6.55	62
TOTAL	10.58	100

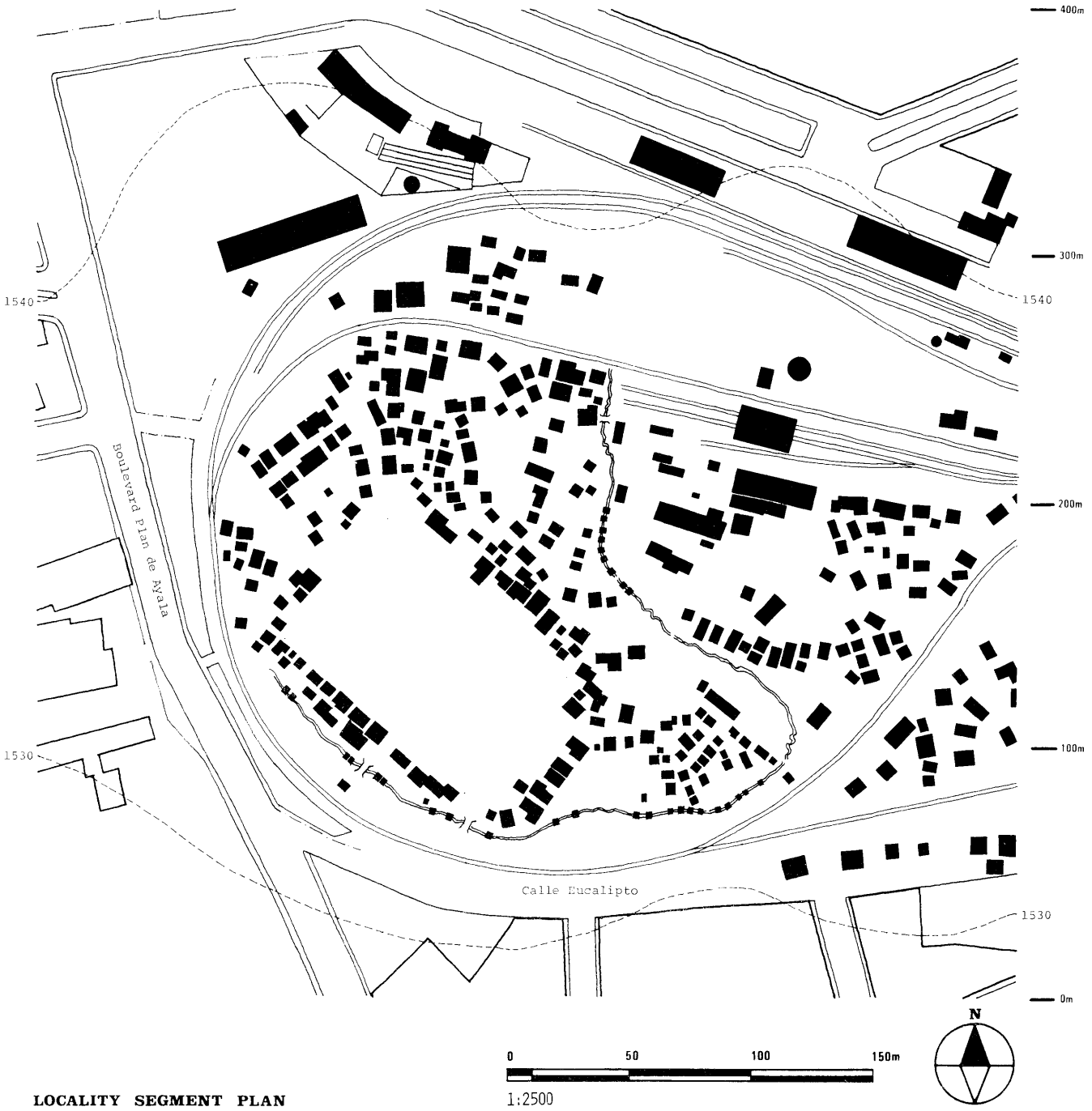
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 2.84 \text{m/Ha}$$

AVERAGE LOT AREA = 47 m^2

LOCALITY SEGMENT AIR PHOTOGRAPH

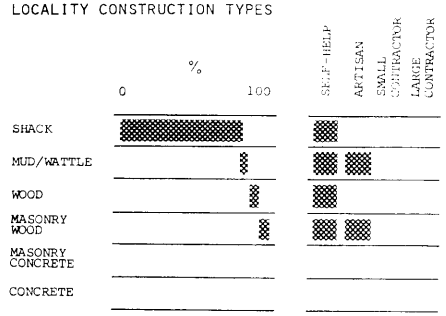




LOCALITY SEGMENT PLAN

1:2500

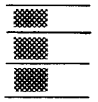
LOCALITY CONSTRUCTION TYPES



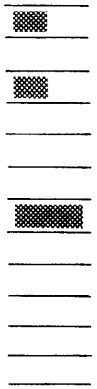
The chart shows (1) approximate percentage of each construction type within the total number of dwellings, and (2) buildings group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

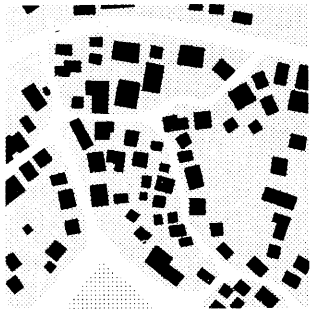


The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

LAND UTILIZATION DIAGRAMS

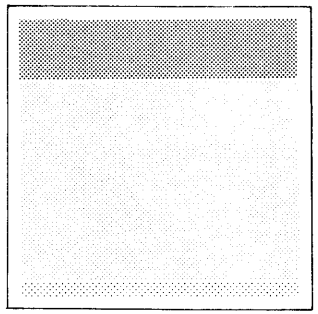
1 Hectare



PATTERN

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

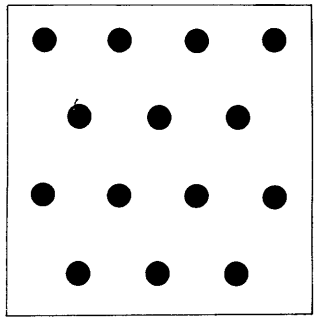
1 Hectare



PERCENTAGES

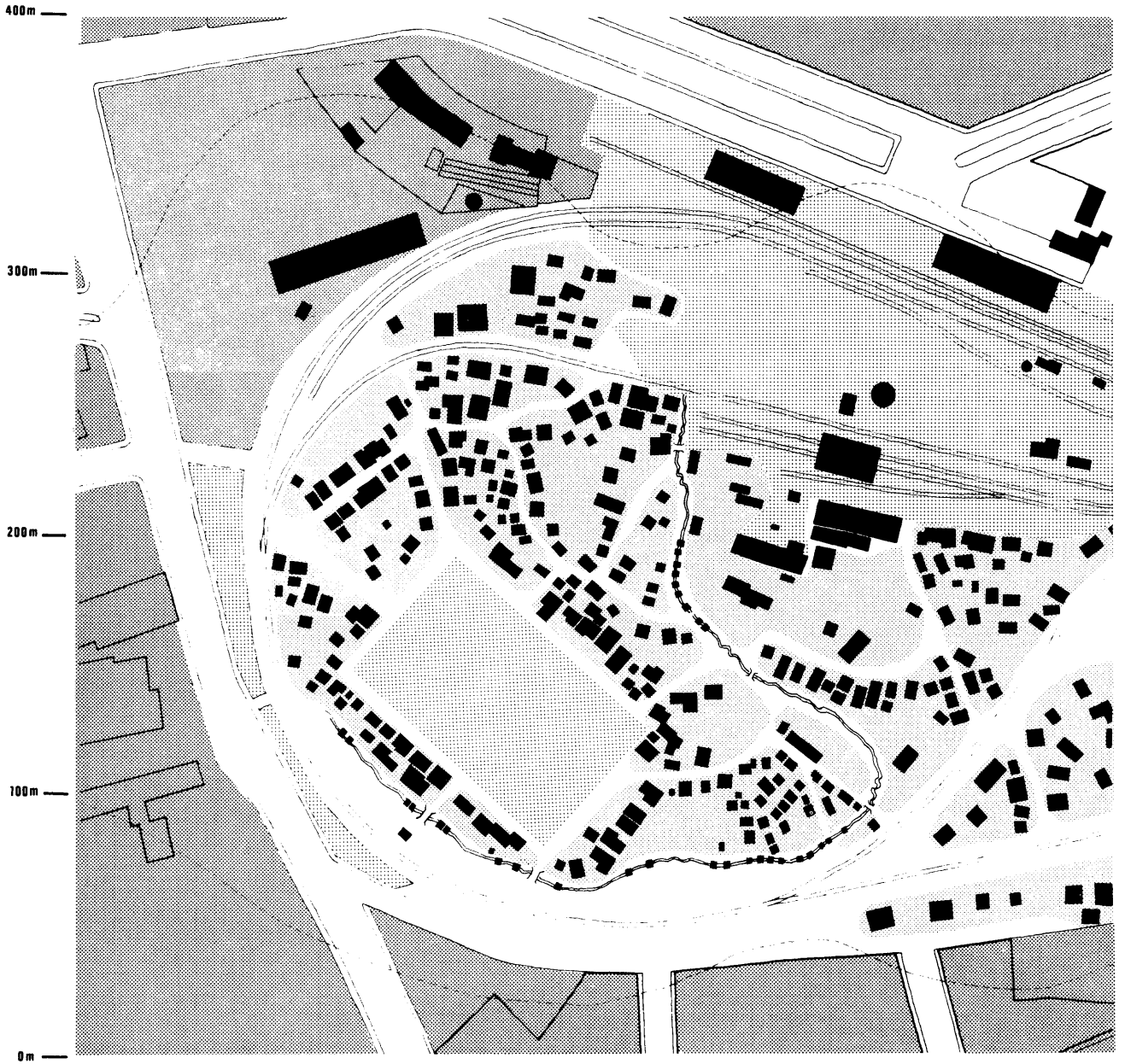
Streets/Walkways	13%
Playgrounds	5
Cluster Courts	62
Dwellings/Lots	20

1 Hectare



DENSITY Persons/Hectare 274

● 20 persons



LOCALITY SEGMENT LAND UTILIZATION

1: 2500

BLOCK: Although there are no clearly defined blocks in the traditional sense, shanties are grouped in clusters that are separated by pedestrian paths. Five of these quasi-blocks have been considered for the purpose of computing the data below. Due to the extralegal tenure situation of the land, lots are defined more by social territories than by bounderies. Thus, the land between dwellings has been considered as semi-private, with only the area covered by the shanties themselves computed as private. The public area of the paths and train tracks, which are used as a pedestrian thoroughfare as well, is relatively small. In general, the land utilization of the settlement is quite efficient. The dwelling type is uniform and varies mostly in size and occasionally in building materials. The shanties consist of one and sometimes two rooms when used also as a small store or shop, of which there are six in this section.

1:1000

LOCALITY BLOCK PLAN

LOCALITY BLOCK LAND UTILIZATION DATA

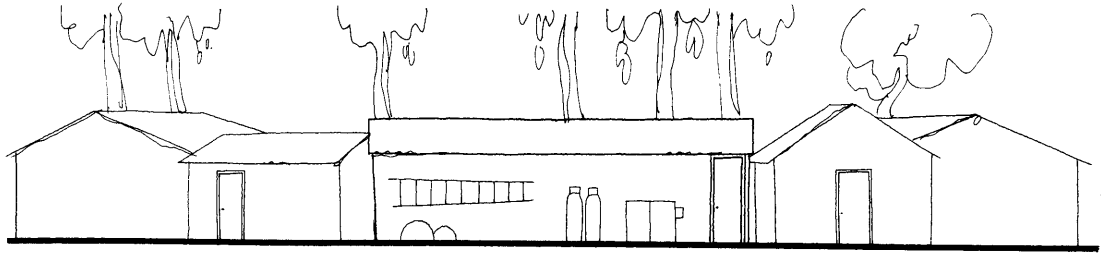
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	-	-
DWELLING UNITS	83	1.11	75
PEOPLE	493	1.11	448

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.16	14
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.28	25
SEMI-PRIVATE (cluster courts)	0.67	61
TOTAL	1.11	100

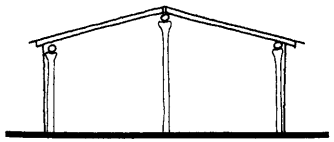
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 432 \text{ m/Ha}$$

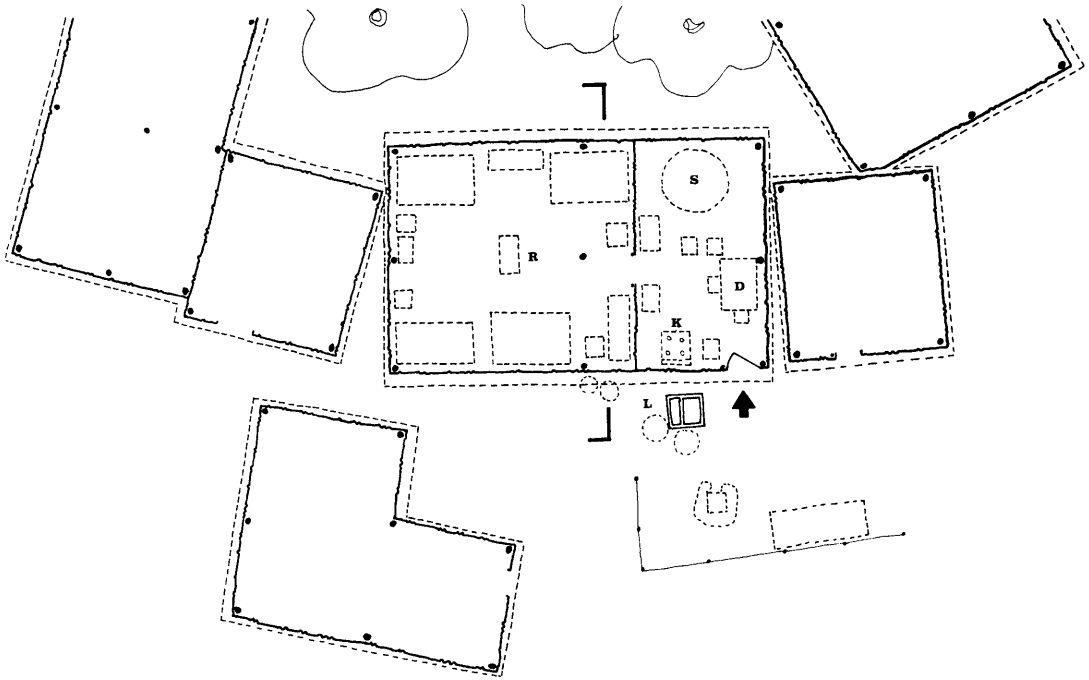
AVERAGE DWELLING AREA = $38.4 m^2$



ELEVATION



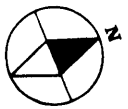
SECTION

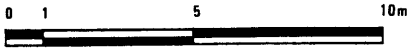


PLAN

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

LOCALITY SOURCES

Plan:	*(approximate) CETENAL Air Photograph, 1970. Field Survey, 1975.*
Land Use Pattern:	*(approximate) IBID*
Circulation Pattern:	*(approximate) IBID*
Segment Plan:	*(approximate) IBID*
Segment Land Utilization:	*(approximate) IBID*
Block Plan:	*(approximate) IBID*
Typical Dwelling:	*(approximate) Field Survey by the authors, 1975.*
Physical Data:	*(accurate) IBID*
Photographs:	*CETENAL (aerial), 1970. The authors, 1975.*
General Information:	*Confederacion Nacional de Inquilinos, A.C. 1975. Field Survey by the authors, G. Flores, M. Pichardo, T. Bautista, and G. Engstrong, 1975.*

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: Shanty
area (sq m): 60
tenure: Legal Ownership

LAND/LOT
utilization: Semi - Private
area (sq m): 90
tenure: Extra - Legal Ownership

DWELLING
location: Inner Ring
type: Grouped
number of floors: 1
utilization: Single: Family
physical state: Poor

DWELLING DEVELOPMENT
mode: Instant
developer: Popular
builder: Self - Help
construction type: Shack
year of construction: 1959

MATERIALS
foundation: -
floors: Dirt
walls: Corrugated Cardboard
roof: Corrugated Cardboard

DWELLING FACILITIES
wc: Latrine
shower: -
kitchen: Outside
rooms: 2
other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: Southern Mexican
place of birth: Guerrero
education level: Primary

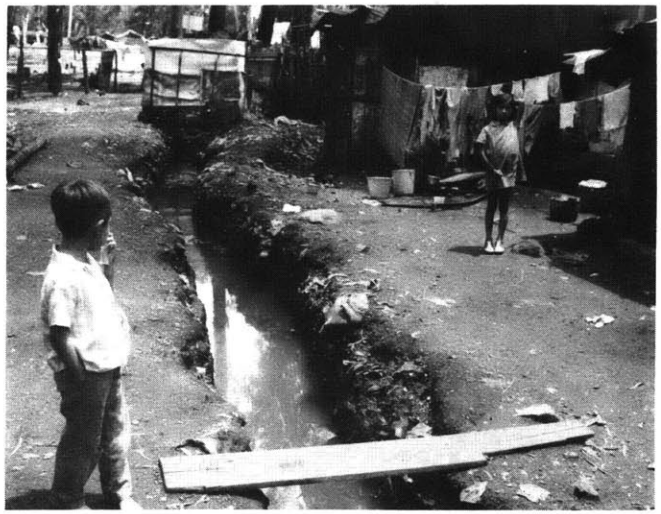
NUMBER OF USERS
married: 4
single: -
children: 4
total: 8

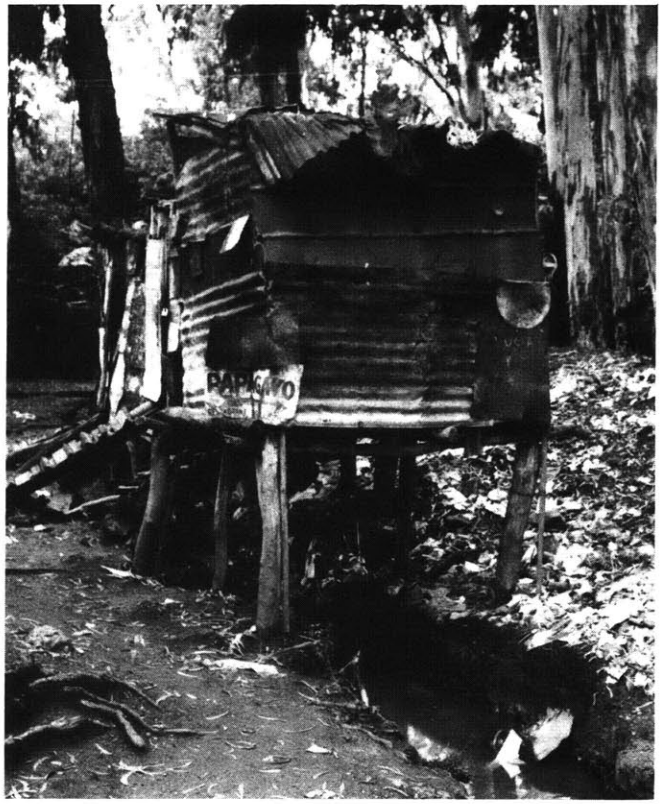
MIGRATION PATTERN
number of moves: 2
rural - urban: 1956
urban - urban: 1959
urban - rural: -
why came to urban area: Employment

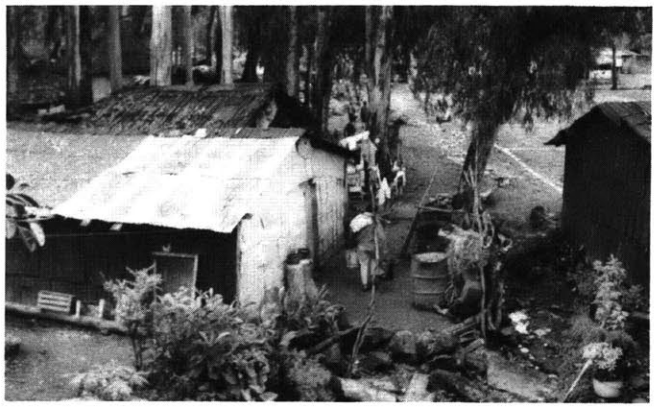
GENERAL: ECONOMIC
user's income group: Very Low
employment: Construction
distance to work: 1 - 15 Km.
mode of travel: Public Transportation

COSTS US$
dwelling unit: $ 240
land - market value: $ 50,000/HA.

DWELLING UNIT PAYMENTS
financing: -
rent/mortgage: 0
% income for rent/mortgage: 0







ESTACION: (left column) The open sewerage canal with individual latrines built directly over it.
(right column) Typical dwellings and a light meter post, (bottom), from where households draw their energy by individual lines.

EVALUATIONS

Existing dwelling types are the most valuable reference and source of information for formulating urban land policies and housing programs. Dwelling types provide a guide to basic questions of land use (for what?), distribution (for whom?) and subdivision (how?). They also raise more specific issues concerning population, incomes, densities and efficiency of land utilization as well as cultural patterns and social values.

Each of the seven case studies described above represent a basic dwelling type of the low income urban environments of Cuernavaca. A comparative overview of the dwelling systems is presented in the Evaluations, analyzing each case from a different angle. The following sections are included in the Evaluations.

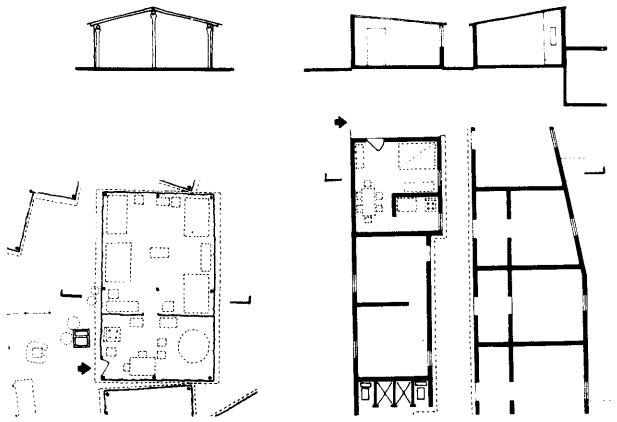
TIME/PROCESS PERSPECTIVE: Chart relating the case studies to their originating models.
PHYSICAL DATA MATRIX: a comprehensive summary of the data with comments.
COMMUNITY FACILITIES, UTILITIES, SERVICES MATRIX: a summary of the availability of facilities.
LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES: a graphic comparison of land utilization.

TIME/PROCESS PERSPECTIVE

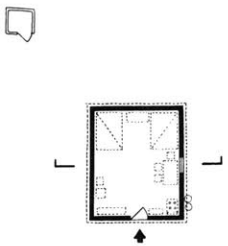
The case studies cover the range of income levels from very low to middle income. They are representative of dwelling types which originated, have developed, and are evolving in different ways.

In this evaluation, the dwelling types are arranged horizontally according to their income levels, and related vertically to their past, present and future conditions, in orther to see them in a broader time/process perspective. The chart permits the observation of users, densities and trends as they change over time.

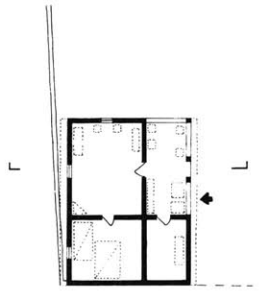
In general terms, walk-up apartments, vecindades and other city center types, such as shanties, are relatively static or increasing slowly, indicating the saturation of the downtown area. Of the dwelling types on the periphery, the semi detached and small rural houses are growing fastest, while the traditional rural house tends to disappear. This coincides with our hypothesis by which as Cuernavaca becomes a low density upper income resort area, the city expands at the expense of the rural communities, spawning squatter settlements and impoverished semi-rural slums.



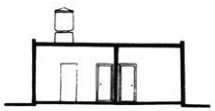
	TYPE/ SYSTEM	SHANTY SQUATTER SETTLEMENT	LOW INCOME TENEMENT VECINDAD
	Urban Layout	ACCRETION; grouped in clusters, growing organically; other solutions.	COLONIAL BLOCK; also in other layouts and in irregular topographic solutions.
PAST	*Origin*	UNIVERSAL; appeared with the growth of urban areas.	SUBDIVIDED SPANISH HOUSE; 16th Century; more recently designed and built ad hoc.
PAST	*Users*	VERY LOW; housed lowest income levels, recent migrants.	LOW/VERY LOW INCOME; extended families established migrants.
PAST	*Density*	MEDIUM; open urban spaces were more easily available, less crowded.	MEDIUM/HIGH; allowed numerous inhabitants by shaning space and services.
PRESENT	*Configuration*	ROOM; 1-2 rooms, semi-temporary construction, scrap materials; no services or utilities.	ROOMS; 1-2 rooms, built around shared court; 1-2 floors; shared utilities.
PRESENT	*Development*	POPULAR/INSTANT: built by self-help, developed incrementally if land tenure secured.	PRIVATE/INSTANT/INCREMENTAL; privately developed either instantly or incrementally often around owners dwelling.
PRESENT	*Users*	VERY LOW/LOW; in city center, lowest income groups; low income in peripheral settlements.	LOW/VERY LOW INCOME; services less extended families, more people working near city center.
PRESENT	*Density*	MEDIUM/HIGH; growth of settlements, decreasing urban land, increase densities.	HIGH; increasing land prices encourage smaller units, higher densities.
PRESENT	*Trend*	PROLIFERATING; Being saturated in city center; proliferating in the periphery.	INCREASING; in and around the city center, although not rapidly.
PRESENT	*Localities*	CITY CENTER; la Estacion, barrancas, isolated pockets; PERIPHERY; Barona, Flores Magon, Jaramillo, others.	LA CAROLINA; Centro, adjacent areas.
FUTURE	*Users*	VERY LOW/LOW INCOME; same groups, income increasing in more established peripheral settlements.	VERY LOW INCOME; will probably house lower income levels in most cases.
FUTURE	*Density*	HIGH/MEDIUM; in general, densities increasing in both cases.	HIGH/MEDIUM; densities will remain at present levels and might increase.
FUTURE	*Trend*	PROLIFERATING; existing settlements appearing on periphery.	TREND; will continue to increase and will probably appear in peripheral areas.

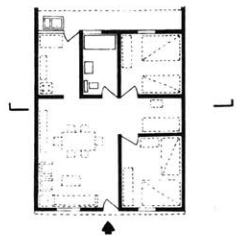


SMALL HOUSE
RURAL COMMUNITY

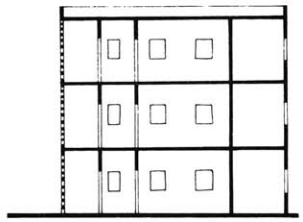


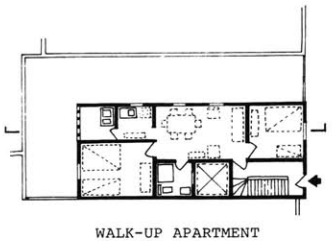
TRADITIONAL HOUSE
RURAL COMMUNITY



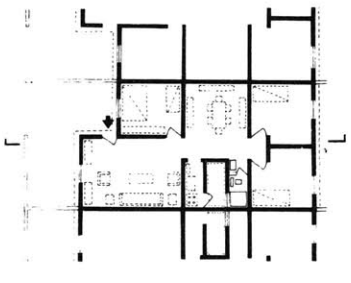


SEMI-DETACHED
COLONIA PROLETARIA





WALK-UP APARTMENT
CITY CENTER



INSTITUTIONAL ROW HOUSE
PERIPHERY

	ACCRETION; and spanish block; others sometimes.	COLONIAL BLOCK; in 16th Century villages; and irregular topographic solution.	GRIDIRON; standard gridiron layout; sometimes colonial block or others.	COLONIAL BLOCK; irregular topography solution, gridiron in a few cases.	GRIDIRON; standard small gridiron layout; occasionally others.	*Urban Layout*
PAST	NATIVE; spanish influence; the rural dwelling since 16th Century.	HYBRID; os spanish and native dwelling types; appeared in 16th Century.	LOCAL/UNIVERSAL; appears in 20th Century in modern version.	ROMAN/EUROPEAN; imported in 19th Century; first used in Cuernavaca about 1940's.	EUROPEAN; 19th Century; imported in 1920's and first used in Cuernavaca in 1960's.	*Origin*
	LOW/VERY LOW INCOME; peasants, migrants in urban areas, others.	MODERATELY LOW/MIDDLE INCOME; farmers, small merchants.	MODERATELY LOW INCOME; employees, ex-farmers, established workers.	MIDDLE INCOME; urban middle class, merchants, employees.	MIDDLE INCOME; professional types; sometimes used as vacation homes.	*Users*
	LOW; usually low densities due to scattered layout, large lots.	LOW; usually had very low densities due to large lots.	LOW; large lots, small dwelling units determined low densities.	MEDIUM; 3-4 floors with large yards or gardens, allowed medium densities.	MEDIUM/LOW, medium, single family units on medium sized lots.	*Density*
	HOUSE; 1, sometimes 2 rooms; outside kitchen, yard.	HOUSE; detached, 2-3 rooms; verandah, outside kitchen, orchard/yard; some utilities.	HOUSE; 2-3 rooms, 1-2 floors; with some utilities, yard or garden; often with store or shop.	APARTMENTS; rooms, halls, stairwells, up to five stories, with all utilities.	HOUSE; 2-3 rooms, one, sometimes 2 floors; small yard; full utilities.	*Configuration*
PRESENT	POPULAR/INSTANT; developed popularly, instantly; sometimes expanded eventually.	POPULAR/INSTANT; developed popularly; instantly, although often enlarged incrementally.	POPULAR/INCREMENTAL; popularly developed; built over 5-10 years by artisan, self-help.	PRIVATE/INSTANT; privately developed in most cases; built by small contractor.	PRIVATE, PUBLIC/INSTANT; first privately, then publicly developed; instantly, by large contractor.	*Development*
	VERY LOW/LOW; lowest income levels, often new migrants, agricultural works.	LOW/MODERATELY LOW; income level decreases due to impoverishment of rural classes.	MODERATELY LOW/LOW INCOME; predominantly upwardly mobile, established working class.	MODERATELY LOW/MIDDLE INCOME; movement of middle class to suburbs, aging buildings, allow for lower income levels.	MIDDLE/MODERATELY LOW INCOME; government projects allow lower income groups.	*Users*
	LOW/MEDIUM; generally low, due to large, scattered lots.	LOW; continued low densities, in spite of subdivision of large lots.	MEDIUM/LOW; smaller lots, 2 floors, increasing land values permit higher densities.	MEDIUM/HIGH; Higher buildings, greater lot coverage, smaller units, permitting higher densities.	MEDIUM/HIGH; smaller lots and units higher buildings and coverage allow greater densities.	*Density*
	INCREASING; mostly in urbanizing rural communities.	DIMINISHING; urbanization and new economic structure in villages wiping out type.	PROLIFERATING; one of the fastest growing systems; privately or by squatter invasion.	INCREASING; slowly, mostly in the downtown area.	PROLIFERATING; increasing private and specially public investments.	*Trend*
	LOS TEPETATES; Chamilpa, Ocotepec, Sta. Maria, Jiutepec, Tejalpa, others.	TETELA; Chamilpa, Sta. Maria, Jiutepec, Tejalpa, others.	SATELITE; Flores Magon, Revolucion, Barona, others.	CENTRO; Amatitlan, adjacent areas.	CIVAC; las Piletas, Bugambilias, Cuaunahuac, Teopanzolco, others.	*Localities*
FUTURE	VERY LOW/LOW INCOME; continued use by urbanized peasants, migrants.	LOW INCOME; continued impoverishment of urbanized rural population.	LOW/MODERATELY LOW INCOME; will tend to accept slightly lower income levels.	MIDDLE/MODERATELY LOW INCOME; will house more middle income as they come back to city center	MODERATELY LOW/MIDDLE INCOME; increasing public housing projects will continue to broaden market.	*Users*
	MEDIUM; densities increasing with growing land values; lot sizes decreasing.	MEDIUM; densities increasing with subdivision of lots, increasing construction.	MEDIUM/HIGH; smaller lots, consolidating settlements will increase densities.	HIGH/MEDIUM; densities will tend to increase as land values go up.	MEDIUM/HIGH; smaller units likely, with greater coverage, allowing increased densities.	*Density*
	INCREASING; on the periphery, in squatter/colonias proletarias.	DISAPPEARING; traditional cultural patterns succumb to urban development.	PROLIFERATING; will continue to proliferate on periphery, encroaching on agricultural lands.	PROLIFERATING; or increasing, in the inner ring as suburban areas are exhausted.	PROLIFERATING; promoted by government programs and demand by increasing middle class.	*Trend*

PHYSICAL DATA MATRIX

Category	Population per Category	% of Total Population	LOCALITIES	USER: 5 Income (Very Low / Low / Moderately Low / Middle / High)	DWELLING UNIT: 6 Type (Shanty / Room / Apartment / House)	7 Area ($50m^2$ or less / $51 - 100m^2$ / 101- or more)	8 Tenure (Legal Rental / Legal Ownership)	9 Rent/Mort. (20% or less of income / 21% or more of income)	LAND/LOT: 10 Utilization (Public / Semi-Public / Private / Semi-Private)	11 Area (m^2)	12 Tenure (Extralegal: rental / Extralegal: ownership / Legal : rental / Legal : ownership)	DWELLING: 13 Location (City Center / Inner Ring / Periphery)	14 Type (Detached / Semi-Detached / Row/Grouped / Walk-up / High rise)	15 No. of Floors (1 / 2 / 3 or more)	16 Utilizat'n (Single / Multiple)	17 Phy State (Bad / Fair / Good)	DWELLING DEVELOPMENT: 18 Mode (Incremental / Instant)	19 Developer (Popular / Public / Private)	20 Builder (Self-Help / Artisan / Small Contractor / Large Contractor)	21 Construct'n Type (Shack / Adobe / Wood / Masonry/Wood / Masonry/Concrete / Concrete)	22 Date (Year of Construction)	23 Den. (People/Ha)	Locality
A	12,800	8	1. Estacion							112												1959	625	1
B	19,200	12	2. Los Tepetates							236												1970	370	2
			3. Tetela							1,400												1925	26	3
C	36,800	23	4. Carolina							360												1960	48	4
			5. Centro							400												1945	78	5
D	43,200	27	6. Satelite							126												1970	232	6
E	16,000	10	7. CIVAC							90												1970	274	7
	128,000		TOTAL																					
	32,000	20	Middle-High Income																					
	160,000	100	TOTAL POPULATION																					

The physical data of the seven case studies of dwelling environments in the Cuernavaca Metropolitan Area is summarized in the physical data matrix and in the following comments. The physical data matrix permits a) a comprehensive view of the spectrum of low income dwelling types, and b) a comparison and determination of trends and patterns.

The population of the Metropolitan Area has been considered as that of the Municipality of Cuernavaca. Although not very accurate, it has been used en liev of more precise information. The percentages of population per category are tentative estimates, and included here only to provide an approximate reference.

(1) CATEGORY

(2) POPULATION PER CATEGORY: Approximate number of inhabitants in similar dwelling systems in the area.

(3) PERCENT OF TOTAL POPULATION:

(4) NAME OF LOCALITY: The seven case studies have been grouped in four categories, identifying different income groups, housing systems and selected physical characteristics. The categories shown were identified as follows:

Category/Income	Dwelling	Housing System
A Very Low	Shanty	Squatter Set.
B Very Low/Low	House	Rural Communities
C Low/ M. Low	Room/Apt.	Vecindades &
D M. Low	House	Walk-ups
E Middle	House	

Category A includes the areas of the inner ring squatter shanty towns, usually located on public land. It is equivalent to the ciudades perdidas of Mexico City. This category houses about 8 % of the metropolitan area's population. Category B includes the rural communities integrated or in the process of being integrated to the city and represents about 12 % of the total population. Category C. is made up of the center city low income areas with about 23 % of the population. Category D includes the peripheral low income subdivisions also known as colonias proletarias. The category includes 27 % of the metropolitan population. Category E includes public housing units and other similar moderately low to middle income private developments or fraccionamientos, with 10 % of Cuernavaca's population. The remaining of population is made up of middle and high income groups. Due to insufficient data, the number of inhabitants and percentages per each category are tentative estimates.

(5) USER INCOME GROUP: The income level is a basic indicator in the analysis of the dwelling systems. At the lowest income levels the dwelling unit represents a basic necessity, and when owned, a family's major capital asset, such as in the case of la Estacion or Los Tepetates. At upper income levels, a dwelling unit amounts to a commodity or status symbol as in the case of the weekend residences of Cuernavaca.

(6) DWELLING UNIT TYPE: Based on their phys-

ical characteristics, four types of dwelling units have been identified; SHANTY: very low income group, ROOM: very low to low income levels; APARTMENT: moderately low to middle (and high income not included in the survey); HOUSE: very low to middle (and high income, not included in the survey either).

(7) DWELLING UNIT AREA: Dwelling unit area is generally a function of the household's income. In the lower income groups (low and very low) the unit is of less than $50m^2$ and consists of one or two rooms in shanties, tenements or houses. Middle income groups live in units of more than $51m^2$ and two or more rooms in apartments or houses. The average dwelling unit areas range from $30m^2$ to about $100m^2$ in the categories studied.

(8) DWELLING UNIT TENURE: The lowest income levels usually have legal or quasi-legal ownership of their house, although not always of the land on which it is built, as in the case of the squatters at la Estacion. The low income levels legally own houses and rent apartments or rooms, respectively. The moderately low to middle income groups are in similar conditions, owing houses and renting apartments, although they also buy condominium apartments and rent houses. It should be noted that ownership of land and a house is a generalized aspiration from the very low to middle income groups but declines among the upper income groups for whom a dwelling does not always represent a comparatively major investment.

(9) DWELLING UNIT- PERCENT INCOME FOR RENT: In most cases, less than 20% of the household's income is put aside for rent or mortgage payments. The proportion of a very low income family's expenditures that covers housing is relatively small, computed over time, due to the large component of self-help labor and relatively inexpensive or readily available materials used, such as corrugated tar cardboard or adobe. The percentage increases among low income groups renting apartments or rooms in the center city and decreases again for the peripheral moderately low income colonias proletarias who build their houses incrementally. It is also comparatively lower for the middle and upper income groups.

(10) LAND/LOT UTILIZATION: The pattern of land/lot utilization reflects the utilization of the dwellings built on the land as well as it's tenure situation. Thus, in the cases where the dwelling is used by a single family (Tetela, Los Tepetates, Satelite and CIVAC) the utilization of the lot is private, independently of the household's income level. When the lot is shared by more than one family, the lot's utilization is semi-private. This is, to a certain degree, also the case of la Estacion. The difference consists in that due to extra-legal tenure situation , there are no defined lot bounderies. On the other hand, due to an important degree of control of the squatters over their settlement the circulation areas which would normally be public are considered as semi-public.

(11) LAND/LOT AREAS: Land/lot areas range from $130m^2$ in CIVAC to $2\ 000m^2$ in Tetela. The areas are measurable within clearly defined bounderies in all cases except that of la Estacion where the lots have undefined bounderies and are more like social territories, reflecting the extralegal tenure situation.

(12) LAND/LOT TENURE: The extralegal tenure exists only in the case of the squatter settlement of la Estacion. Indeed, after living on the land for more than twenty years, it technically belongs to the squatters. The situation nevertheless can be considered as extralegal ownership. In other cases, legal ownership predominates at very low and low as well as moderately low and middle income levels. Legal rental is the case for low, moderately low and middle income levels.

(13) DWELLING LOCATION: The city center is occupied by all income levels although very low to moderately low income groups predominate. The greater access to services and specially to job oportunities is a high priority for these groups. Lower income groups are also found on the periphery in the rural communities. More stable moderately low and middle income settlements are located on the periphery, as well as in which the inner ring has a combination of many income levels from very low to upper income groups.

(14) DWELLING TYPES: Both row/grouped and detached dwelling types are found throughout the income spectrum. The former group includes squatter shanties, low income tenements and institutional row houses. The latter serves very low and low income groups in rural communities, moderately low income population in the colonias proletarias and middle and high income groups in private residential developments. It is important to note that detached units in the colonias proletarias often become semidetached or row houses, as they are developed over time, depending on the lot size. Walk-up apartments are found only in the city center.

(15) DWELLING FLOORS: Most dwellings are single floor units for all income levels, although they often eventually develop up to two or three stories as land values and densities increase, particularly in the cases of city center and in the colonias proletarias. Whereas walk-ups are common in the downtown area, buildings of more than one story are unusual in the rural communities and are nonexistent in the city center squatter settlements, due largely to inadequate construction systems.

(16) DWELLING UTILIZATION: Dwelling occupancy fluctuates within the lower income groups but usually remains in the single family category above moderately low and middle income levels. Inversely, it can be said that in general multiple occupation tends to be the case towards the lower income levels, although this varies from one situation to another.

(17) DWELLING PHYSICAL STATE: The pattern of the physical state of the dwellings follows that of the incomes quite closely, and is generally reinforced by the tenure situation: owners who can afford it, generally maintain their dwellings in better condition than tenants do. This is not necessarily the case for very low and low income owners who either can't afford it, or have an insecure tenure situation, as in the case of squatter settlements.

(18) DWELLING DEVELOPMENT MODE: Although dwellings are usually developed incrementally at all low income levels, shanties and rural houses are considered as being developed instantly since they are practically fully completed when occupied by the users/builders. The only truly instantly built dwellings are walk-up apartments in el Centro and institutional row houses in CIVAC. On the other hand, the only incrementally developed units, strictly speaking, are those of the peripheral colonias proletarias, such as the case of Satelite, or the low income tenements, in la Carolina.

(19) DWELLING DEVELOPER: The popular developer is generally found at the lower income levels and in the peripheral colonias proletarias that are often of up to moderately low or even low middle income levels. These groups are characterized by their lack of access to the commercial or public financing. Efforts by government agencies to remedy this situation are negligible. Private development is found in the case of city center tenements and walk-ups. Institutional row houses are developed either privately as in the middle class residential neighborhoods, publicly as part of a government housing program, or as in the case of CIVAC, both privately and publicly.

(20) DWELLING BUILDER: The pattern of dwelling builders generally follows those of income group dwelling type and dwelling development. Lower income shanties and rural houses that are developed popularly are built largely by self-help. Privately developed moderately low income tenements or popularly developed moderately low income houses of the peripheral settlements usually require the work of an artisan. Walk-up apartments that are of moderately low to middle income levels and privately developed, are built by small contractors, whereas only institutional row housing projects are built by large contractors.

(21) DWELLING CONSTRUCTION TYPES: The construction types also follow income level and dwelling type patterns closely. Lower income shanties are built of semi temporary materials, including tar corrugated cardboard and scrap wood and tin. Adobe and tile roofs characterizes the traditional houses in the rural communities. These are probably among the least expensive and most environmentally adequate materials, although they are rapidly falling into disuse. Low income tenements, among other housing types, are built of brick walls with asbestos or sheet metal roofs. All other types are built or tend to develop towards masonry/concrete dwellings. Although not as climatologically adequate as

(continued on p.87)

COMMUNITY FACILITIES, UTILITIES/SERVICES MATRIX

Category	Population per Category	% of Total Population	LOCALITIES	COMMUNITY FACILITIES: Health	Schools, Playgrounds	Recreation	UTILITIES AND SERVICES: Water	Sewerage	Electricity	Street Lighting	Paved Roads, Walkways	Storm Drainage	Public Transportation	Refuse Collection	Gas (Tank)	Telephone	Fire Protection	Police	Locality
A	12,800	8	1. Estacion	■	■	■	■		■				■						1
B	19,200	12	2. Los Tepetates	■	■	▒	■		■	■			■		■			■	2
			3. Tetela	■	■	■	■	■	■	■	■	■	■	■	■	■		■	3
C	36,800	23	4. Carolina	■	■	▒	■	■	■	■	■	■	■	■	■	■	▒	■	4
			5. Centro	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	5
D	43,200	27	6. Satelite	■	■	▒	■	■	■	■	■	■	■	■	■	■	■	■	6
E	16,000	10	7. CIVAC	■	■	▒	■	■	■	■	■	■	■	■	■	■	■	■	7
	128,000		TOTAL																
	32,000	20	Middle-High Income																
	160,000	100	TOTAL POPULATION																

The matrix illustrates the approximate availability of community facilities, utilities, and services in the 7 dwelling environments. Three levels are indicated as follows:

□ No provision at all

▒ Limited or occasional

■ Adequate or normal

The matrix demonstrates the basic correlation between income levels and level of services provided, in the localities surveyed. However, variables such as location and tenure, among others, modify the initial relationship. Thus, Satelite has less services and facilities than its moderately low income levels would warrant. This results in part from an informal relationship with the city government, due largely to the settlement's extra legal tenure situation up till recently. On the other hand, la Estacion, in the lowest income range, enjoys certain services and facilities due to its proximity to the city center. By the same token, outlying CIVAC, which has the highest income levels of the survey, lacks facilities that correspond to a larger urban center and are not provided in the community. The following observations are made for the different case studies, arranged in terms of income levels.

VERY LOW/LOW INCOME: The basic dwelling systems at these levels of income are squatters and low income tenements in the city center, and the rural communities and some colonias proletarias on the periphery. In general terms, the localities near the city center are better off both due to the relative abundance of community facilities, and to the greater availability of service and utility networks. Thus, the peripheral rural communities and lower income colonias proletarias are particularly lacking in the costly water and sewerage networks, while being at disadvantage in terms of sharing centrally located community facilities, such as health centers, recreational facilities and high schools. On the other hand, the very low income center city squatter settlements usually suffer the most unsanitary environmental conditions due to their high densities and the almost total lack of basic utilities. The other very low income system of tenements is comparatively better off. Although they share common washing and sanitary facilities, they are located in consolidated, well serviced areas.

LOW/MODERATELY LOW INCOME: This group includes the rural communities, colonias proletarias and walk-up apartments. The loca-

tion of the system again determines a marked difference in the level of services and access to facilities. While the city center walk-up apartments usually are fully serviced the other two systems on the periphery have relatively lower levels. Water is usually collected at communal taps or bought from trucks while sewerage is practically nonexistant. As mentioned above, tenure or political situations are often a good excuse for the city government to put off developing utilities and providing services in those areas. The residents of peripheral areas travel to the city center frequently, mostly for shopping and occasionally for recreation. The outlying communities, however, as opposed to the city center squatter settlements and tenements, can expect to eventually be provided with most facilities and services.

MIDDLE INCOME: This group inhabits different dwelling systems, including the institutional row housing with which we are concerned in this case. Whether located in the inner ring or on the periphery, the institutional row housing projects have the highest levels of services and utilities of the dwelling systems surveyed. In the case of CIVAC, most of the utilities and services are efficiently administered by the local community association. As mentioned above, the limitations involve the lack of health and recreational facilities which are not provided in the community due to insufficient supporting population. Localities of this type nearer to the city center, such as Teopanzolco, Bugambilias or Cuauhnahuac, do not have this problem and only suffer water shortages and blackouts that are common throughout the entire city.

A brief description of the community facilities and service and utility networks follows:

COMMUNITY FACILITIES:

HEALTH FACILITIES: Provided by Social Security Institute, the municipality and the private sector. Most of the low income population who don't have permanent jobs must rely on the free, oversaturated and understaffed municipal hospital, or the relatively expensive private physicians. Most of these facilities are located in the city center.

SCHOOLS, PLAYGROUNDS: Provided by the federal and state governments or by the private sector. Only the former are attended by the low income population. The schools are crowded and unevenly distributed over the city, particularly in the periphery. Most have inadequate playgrounds.

RECREATIONAL FACILITIES: Consist primarily of soccer and other sports fields. These require little more than open space and are more or less evenly distributed over the city. Other facilities, such as circus and fair grounds, movie theaters and arenas, are all concentrated in and around the city center.

UTILITIES AND SERVICES:

WATER: The city water network is run by the local branch of a federal agency (SRH). Although the city has a pontentially plentiful water supply, the system is old and inefficient. Pressure fluctuates widely and water shortages during the dry season require dwellings to have roof top water tanks.

SEWERAGE: The system is operated by the municipal government and covers only limited areas in the city. Inadequate treatment facilities. The situation results in raw sewerage polluting the barrancas throughout the city.

ELECTRICITY: By far the most widely and efficiently provided utility. Operated by the CFE, a decentralized public agency. Metered except in isolated cases, even in squatter settlements.

STREET LIGHTING: More adequate in the city center than on the periphery. The service covers all localities except center city squatter settlements. Administered by the CFE.

PAVED ROADS, WALKWAYS: Network operated by municipality except in private developments. Limited coverage and poor maintenance. Constrains transportation, gas distribution and refuse collection.

STORM DRAINAGE: Consists mostly of surface drainage, aided by the hilly topographic system. Underground storm drainage found in parts of the center city and inner ring, operated by the municipality.

PUBLIC TRANSPORTATION: Provided by private bus companies that operate under equipped, outmoded fleets that link all points with the central market downtown. The market functions as the central terminal for all local bus lines, creating trafic jams and pollution in the environs.

REFUSE COLLECTION" Highly ineffective service provided by the municipality in selected parts of the city, at long intervals and loose schedules. Results in highly polluted barrancas. Inadequate treatment facilities or policies.

GAS: Tanks provided by private companies in trucks that only go into areas with reasonably decent roads, excluding many carry tanks to nearest roadside.

TELEPHONE: A limited service all over the city and nonexistant in many lower income communities, provided by a decentralized public/private monopoly.

FIRE PROTECTION: Considered here as a service, rather than a facility, since there is a single station located in the city center. Building materials allow few fires in the city, except in the shanty towns where fire department rarely intervenes. Operated by the municipality.

POLICE: Has been considered here as a service, rather than a facility, since posts are located only at entries to the city. Municipally operated, inefficient and often more repressive than protective.

(continued from p. 85)

the traditional adobe and tile, the brick and concrete slab roof dwelling is something of a status symbol among upwardly mobile low income groups.

(22) DWELLING DEVELOPMENT-YEAR OF CONSTRUCTION: The oldest dwellings among those surveyed, are in the rural community of Tetela, although downtown Cuernavaca has buildings that date back to the 16th century. The cronological order of dwelling construction follows that of the localities: Tetela Centro, Carolina, Estacion, Los Tepetates and CIVAC. The three most recent systems of squatters, colonias proletarias and institutional/row houses are those that are continuing to proliferate.

(23) DWELLING DEVELOPMENT-DENSITY: Population densities are intended as indicators for each dwelling system. To avoid distortions, densities are estimated on the basis of a selected representative segment, and include dwellings, lots, circulation areas and semi-public spaces. Contrary to the pattern in the case of Mexico City, the densities are not always higher in the low income areas and vice versa. This is in part due to the fact that rural communities such as Tetela and Los Tepetates that are not yet fully integrated to the city, still conserve the large lot pattern of traditional villages. The cases of la Estacion and Satelite are not completely representative of their respective locality types because the selected segments include larger than usual non-residential lands that tend to bring down the density. In la Estacion are included semi-public areas belonging to the train station, whereas the segment of Satelite has a large portion of public area devoted to the Mexico-Acapulco Highway. The density pattern tends to follow that of dwelling unit types: Lower densities correspond to houses whereas high densities appear in the case of walk-up apartments and tenements. It should be noted that in the cases, due to unavailability of information, the densities are not always precisely computed but rather approximately estimated.

LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES

The different case studies are represented here in terms of land utilization (patterns, percentages and densities) in a format that allows the comparison and evaluation of the urban layout of each dwelling system. The criteria used in the evaluation of the efficiency of the urban layouts are the following:

LAYOUT PATTERN: Lot configuration, blocks and circulation; they determine infrastructure network lengths; e.g. certain layouts have excessive network lenghts or are very complicated, resulting in higher costs per person.

LAND UTILIZATION PERCENTAGES: Proportion of public and private areas; they determine the maintenance responsability, user control and functional efficiency of a layout; e.g. a large percentage of land for circulation results in high costs of installation per person and extensive maintenance for the public sector, indicating an inefficient layout.

POPULATION DENSITY: Number of persons per hectare; related to the number and type of dwellings per hectare. This determines the intensity of land use; e.g. low densities mean higher cost of development per person.

None of the criteria above can be used alone or out of context without incurring in possible distortions. They are meant to be comprehensively employed and require of the reader's judgment.

1 CENTRO

PRIVATE LOW/MODERATELY LOW WALK-UP

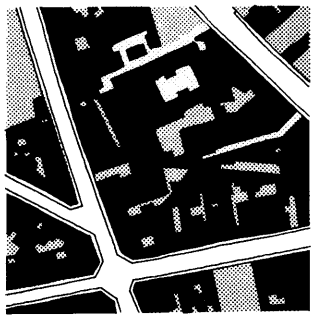
Medium high percentage of land for circulation, open spaces, due to central parks; medium high private, semi-private areas; high population density. Overall, a good system if made available to lower incomes.

2 CAROLINA

PRIVATE LOW/VERY LOW TENEMENT

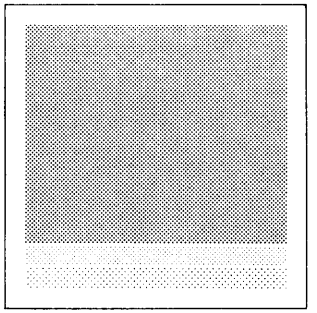
Low circulation and open spaces percentages; high private and semi-private areas; medium high population density; irregular layout makes networks expensive. A very good solution if more semi-public/open spaces provided.

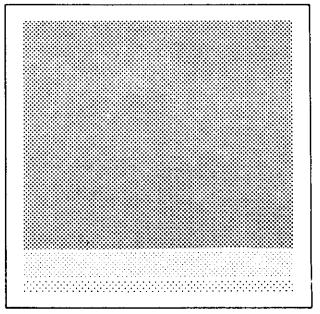
1 Hectare



PATTERNS

1 Hectare

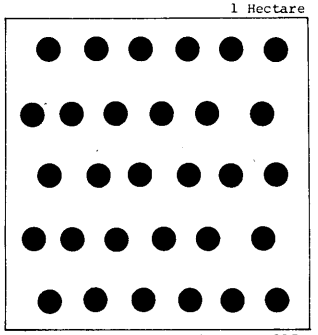


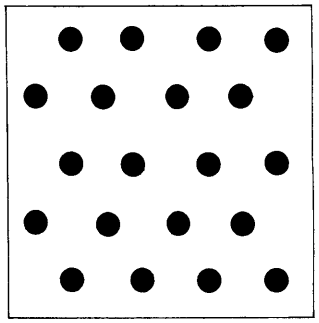


PERCENTAGES

	1	2
Streets/Walkways	25%	19%
Playgrounds	6	-
Cluster Courts	5	8
Dwellings/Lots	64	73

1 Hectare





DENSITY

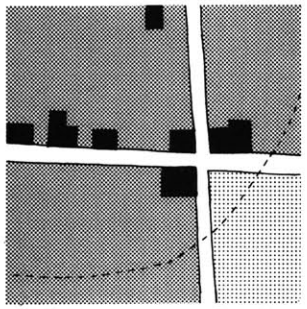
	1	2
Persons/Hectare	625	370

● 20 persons

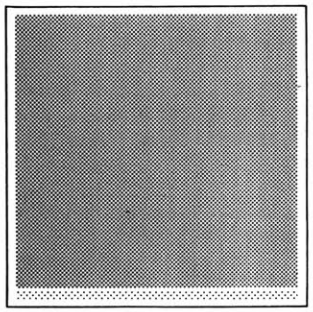
3 TETELA DEL MONTE

POPULAR LOW INCOME HOUSE

Very low circulation and open spaces percentages; high private area percentages; very low private population densities; low cost networks possible. An excellent layout if higher densities and adequate semi-public/ open spaces provided.

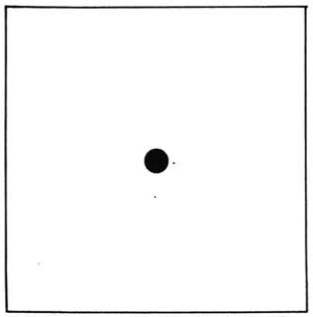


PATTERNS 1 Hectare



PERCENTAGES

Streets/Walkways	9%
Playgrounds	3
Cluster Courts	-
Dwellings/Lots	88



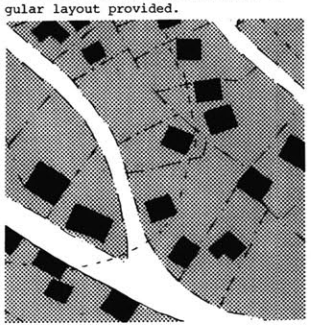
DENSITY Persons/Hectare 26

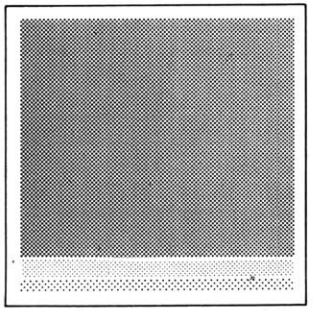
● 20 persons

4 LOS TEPETATES

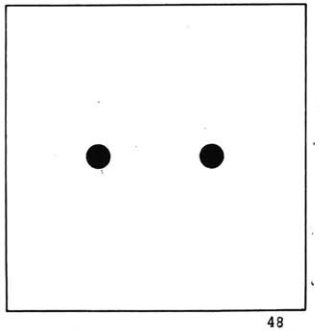
POPULAR VERY LOW/LOW HOUSE

Low percentages of circulation and open spaces; high percentages of private and semi-private areas; low population densities; irregular layout determines will make networks expensive. A better situation if adequate semi-public open spaces and a regular layout provided.





16%
4
7
73



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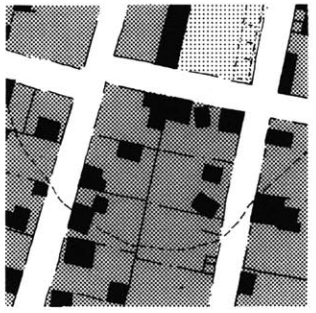
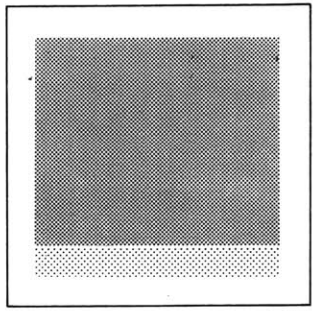
5 SATELITE

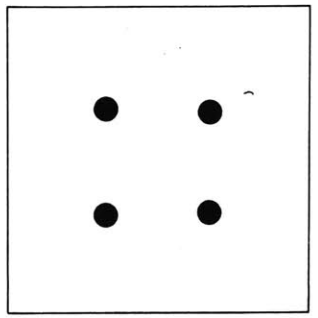
POPULAR MODERATELY/LOW/LOW HOUSE

Relatively high circulation and open spaces percentages; due in part to large highway, though; medium private land percentages; medium population densities. Excessive circulation per unit lengths do not make this solution a good one - could be improved by closing off every other street.





35%
16
-
49



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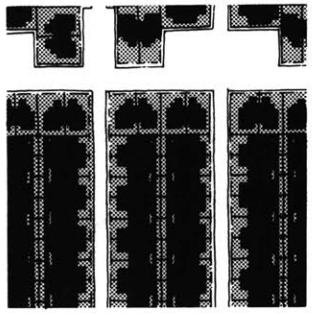
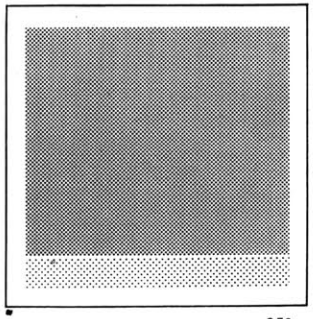
6 CIVAC

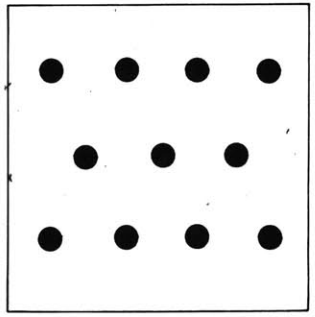
PRIV/PUBLIC MIDDLE INCOME ROW HOUSE

Medium high percentages of land for circulation and open spaces; medium percentage for private land; medium high density of population. Although small lots allow good densities, excessive circulation per unit lengths make networks costly.





25%
8
-
67



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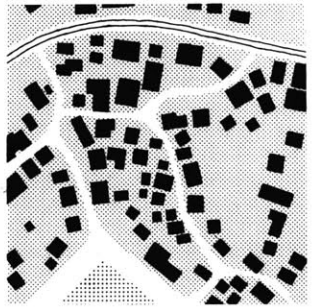
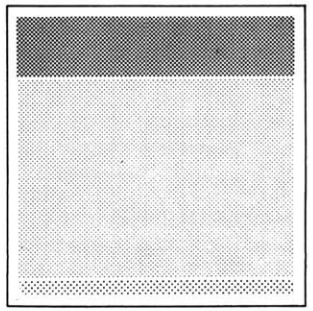
7 ESTACION

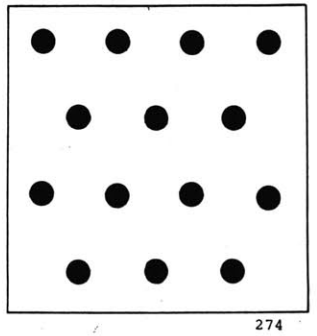
POPULAR VERY LOW INCOME SHANTY

Low percentages of land for circulation and open spaces; high percentages of semi-private and private land - private land considered only as that on which the shanties are built; medium high density. In general good land utilization but irregular layout would make utility network costly to install.





13%
5
62
20



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The struggle for urban land.
(top left) To secure the tenure of land they claimed had been legally purchased, settlers squatted in Teopanzolco in 1971. A few days later, a large developer claimed he was the rightful owner of the prime inner ring property.
(top right) Pressured by the developer, local authorities charged that the settlement violated the building code. After giving the squatters 72 hours in which to install adequate water and sewerage systems, the settlement was erradicated with support of the police and a military detachment.
(bottom) A family loads a truck with their belongings and the remains of their shanty as they prepare to move to a new location.

PROPOSED PROJECT

In view of the failure of traditional public sector policies to deal with the problem posed by the housing needs of low income groups, new approaches are being developed. Among them, the concept of sites and services offers a wide variety of possibilities.

Within this context, our proposal is concerned with reducing the cost of urban development by optimizing the physical design of settlements. Although applicable to the creation of new communities, this alternative is addressed in particular to the problem of existent low income settlements. It is our contention that although infrastructural networks can only be provided over an extended period of time, the initial optimization of the design of unconsolidated settlements can afford important economies in the long run.

According to this proposal, remodelling the layout would be the first stage in the gradual upgrading of low income unconsolidated residential areas, be they squatter settlements, speculative subdivisions or settlements on the fringe of the urbanizing rural communities. A policy based on these premises would allow the public sector to rationalize the development of low income settlements while reducing the cost of their urbanization. Such a policy, however, would succeed only in the measure that it permit the organized participation of the people in the impro improvement of their urban environment.

The case for which we have developed a project to illustrate this proposal sheds light on the importance of popular participation.

BACKGROUND

The Colonia Ruben Jaramillo was established by a squatter invasion of a few hundred families in April 1973, on what was intended to become a high income weekend residential development called Villa de las Flores. The squatters reclaimed the site on the basis that it had been illegally procured from the Ejido of Acatlipa with the help of a fraudulent State Governor. The Jaramillo's population was young and composed largely of low paid construction workers (28.9%) and landless peasants (17.9%). Most of them had come to the colonia from within or around the Cuernavaca Metropolitan Area, but were originally migrants from the neighboring state of Guerrero (48.1%). By early 1974 the original 300 or so families had jumped to over 1500.

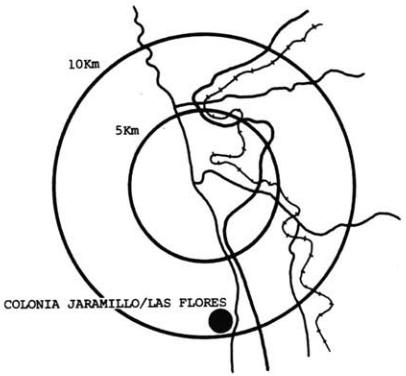
From the beginning, the colonia developed a strong and politized leadership which organized the community to begin to build a basic urban infrastructure through its own effort. Streets and future communal areas were levelled and cleared by hand, and a school and a health post were built of scrap materials and corrugated tar cardboard. Student volunteers from Cuernavaca and Mexico City staffed and operated the community facilities and helped design the urban layout. They educated the population on the need of boiling water taken from the stream and on building latrines that would not contaminate the water supply. The colonia also drew support from groups of teachers, artists and workers, and was fast becoming a revolutionary social experiment in self managed urban development.

In view of the example that the Colonia Jaramillo was setting, the state government decided to intervene. They offered to build facilities and install utilities in exchange for political control of the Colonia. When several attempts of this sort, and then threats, had failed, the army was ordered to encircle the settlement and capture their leaders. The community was under strict military control for several months. A new organization directly controlled by the state government was set up. All self management and mutual aid activities ceased, and students and other "agitators" were expelled. the community's participatory effort was de-activated. The government brought in a mobile subsidized food store and a new teaching and health staff; schools and a child care center were built of permanent materials. INDECO, a government agency, was charged with developing the urban infrastructure, and work on utility networks began immediately.

It is our contention that the government's approach was wrong on two counts: first, they failed to comprehend and capitalize on the powerful motivation of people taking the creation of their urban environment into their own hands; in second place, the heavily subsidized installation of public utilities and community facilities used in this case to subdue a political situation, will not be able to be replicated at any significant scale and will only generate false expectations.

A more adequate response would have been, provided that the community was already well organized, to supply the technical assistance necessary to redesign the layout of the settlement. A more efficient layout design would permit the eventual construction of utility networks at substantially lower costs per dwelling unit, while minimizing the expensive use of land for circulation. It is based on these assumptions that the following proposed project is developed.

SOUTH METROPOLITAN AREA



The photograph shows the transition between agricultural and urban lands at the southern tip of the metropolitan area. The irrigated agricultural lands are limited by the town of Temixco and the site. They extend to the south and east, past the town of Acatlipa. Non-irrigated areas lie to the north and west of the site. The characterisitic barrancas begin to shape the built up areas along the hilltops, as the urban area expands.

BASIC SITE DATA

The Colonia Jaramillo/Las Flores is located about 9 Kms. from downtown Cuernavaca, at the southern tip of the metropolitan area. The site is about 2 Kms. off the old Mexico-Acapulco road, between the towns of Temixco and Acatlipa. The irregular shape and topography of the site are characteristic of other settlements in Cuernavaca.

BOUNDARIES:

The site is bounded by property lines separating it from agricultural lands and the small residential area, and by a stream on the northeast. The agricultural areas on the south are year-round production irrigated lands while those on the northeast are productive during the rainy season only.

AREA:

The Jaramillo/Las Flores covers an area of 73.7 hectares, all of which is available for residential development. There is an adjacent unconsolidated settlement of about 18 hectares which belongs to Temixco and was settled before the appearance of the Colonia.

ACCESSES:

The site is communicated to the Mexico-Acapulco road by dirt roads at three points: the downtown area of southern Temixco, and the northern and southern parts of Acatlipa. A bus line, which also serves the two neighboring towns, already communicates the settlement with Cuernavaca.

TOPOGRAPHY:

The site is crossed by a small barranca, combining relatively flat terrain along the hill tops and slopes of more than 30% at some points, particularly along the northern part of the stream.

EXISTING STRUCTURES:

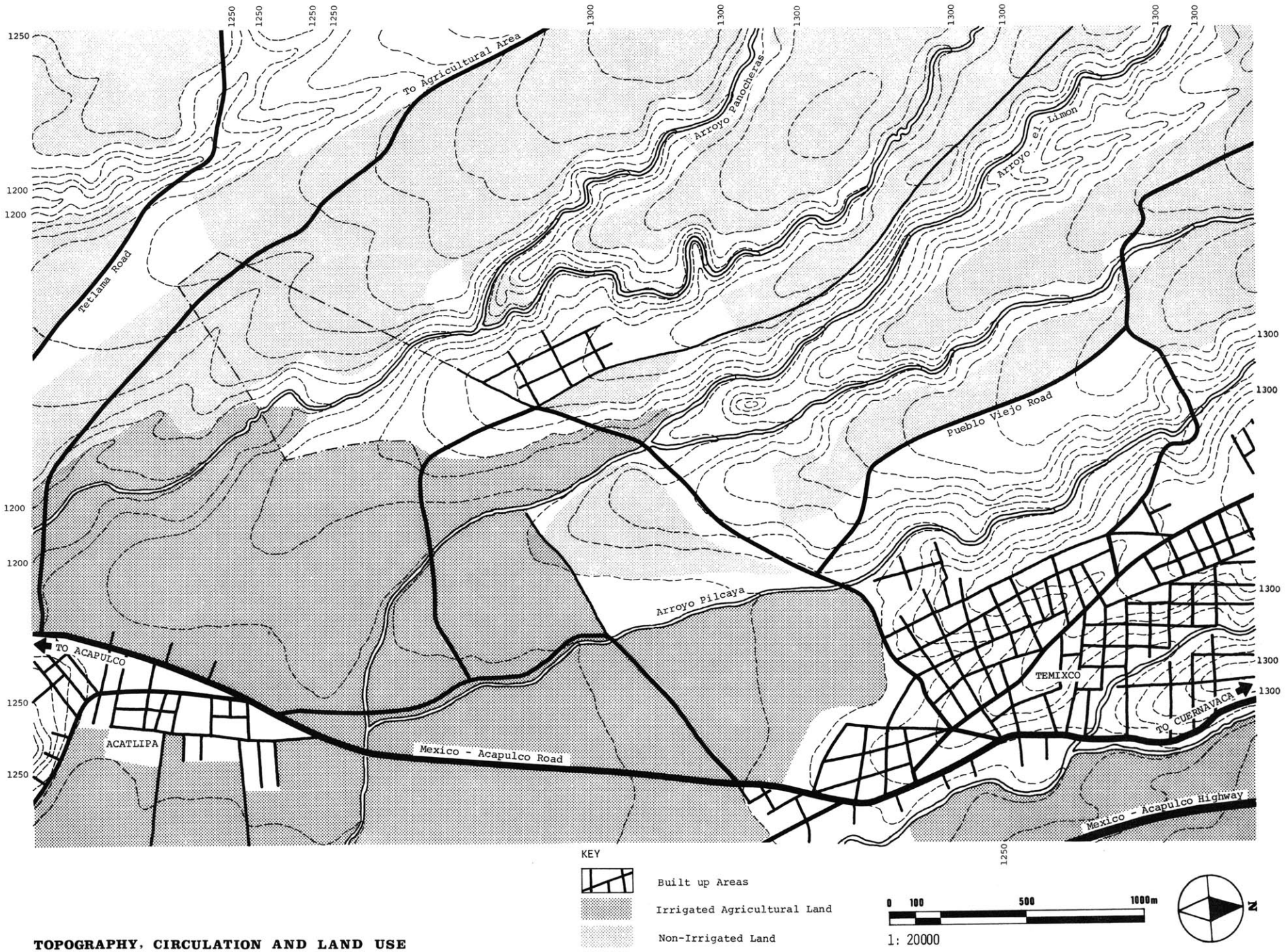
The settlement has a population of 8,100 inhabitants living in some 1,500 temporary unconsolidated dwellings. A large building intended as a club house is now used as a community center. It is located in the main communal area.

UTILITIES:

The site has full electrical service and two communal wells that provide a limited supply of water for the settlement. There are no water, sewerage or paved circulation networks. Adequate storm drainage is afforded by the site's natural topographic system.

OTHER FACTORS:

The proximity of the Colonia's northern section and adjacent settlement to Temixco will tend to propitiate the development of the areas between them.



TOPOGRAPHY, CIRCULATION AND LAND USE

PLANNING POLICIES/GOALS

The overall project, considerably larger than the original site, covers an area of 240 hectares. It is intended to be developed by stages, responding to the increasing low income demand. The basic constraints are the topographical characteristics of the area and the surrounding agricultural lands.

PRIMARY USE: RESIDENTIAL
- The project will be primarily for the residential use of the population occupying the original site, and for other groups on the adjacent proposed additional areas.
- The required supporting semi-public areas for community facilities are divided into two categories: The larger, centrally located settlement communal areas, and the several smaller urban unit communal areas.

TARGET INCOME GROUPS: PREDOMINANTLY LOWER INCOME
- The project is intended for the population occupying the original site, and for other low and very low income groups on the adjacent proposed additional areas.

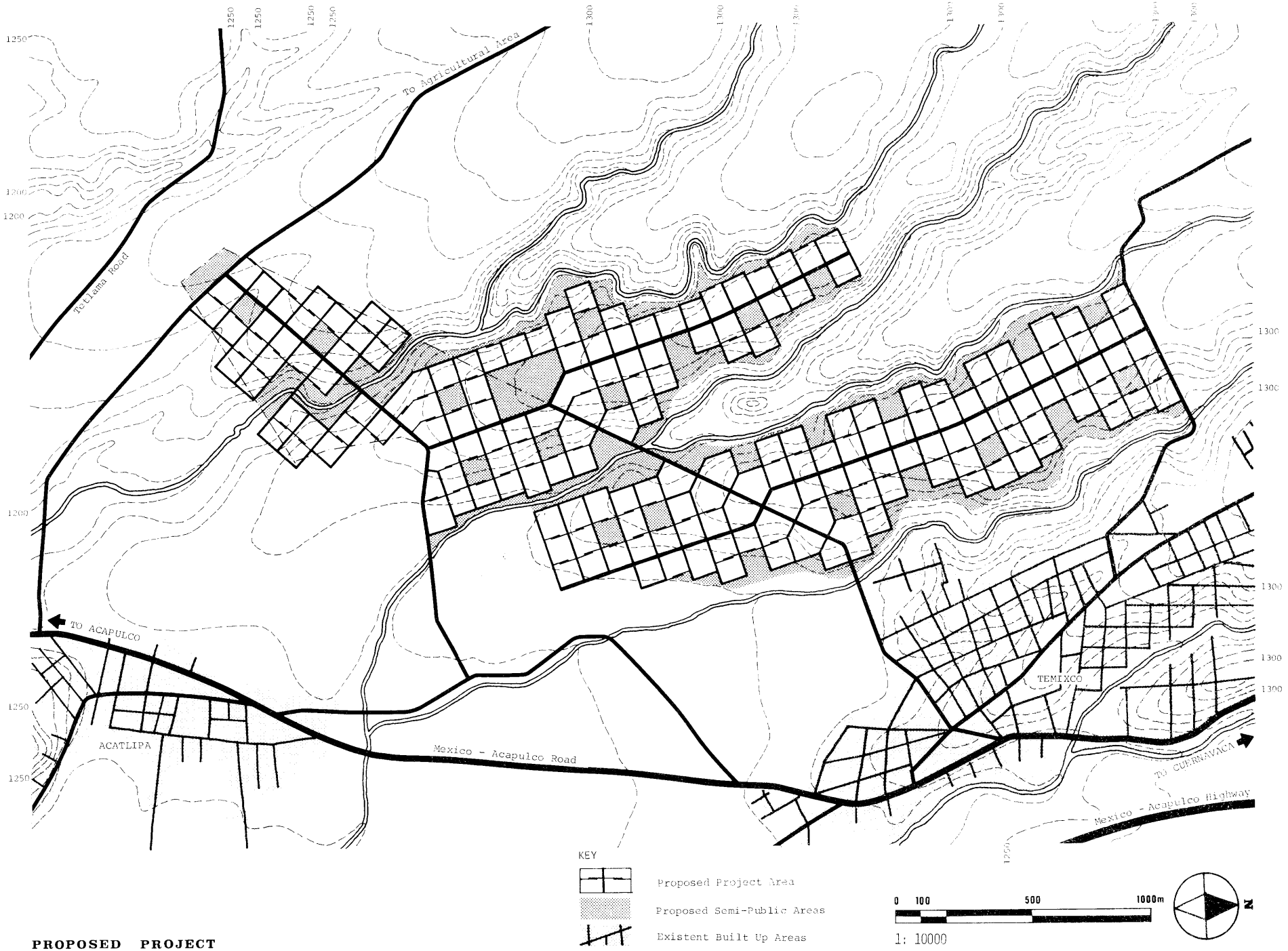
INTENSITIES OF LAND USE: LOW/MEDIUM DENSITIES
- The range of gross densities planned for is of between 100 persons/ha. initially, and 200 persons/ha. after several years. The low densities respond to the temporary shelters used in the beginning, but increase as the self-help dwellings become consolidated over time.
- The initial population of the original site and overall projects are 8100 and 24,000 respectively and 16000 and 48,000 at saturation.

LAND TENURE: USUFRUCT
- The project will be primarily planned for individual and condominium usufruct.
- Rental options, which will eventually convert to usufruct, will be provided by tenements for the very low income sector.

FINANCING: PUBLIC/POPULAR
- The site will be gradually developed by the community through collective labor equity with financing primarily by public agencies.
- The community savings and loan association and private agencies will finance urban unit communal projects.

NETWORKS: INTERNAL/EXTERNAL COORDINATION
- The internal circulation network will be connected to the regional system at different points. Pedestrian circulation will be predominant within the site.
- All utility networks, (water, sewerage and electricity), will eventually become interconnected with the regional systems.
- All infrastructure networks are designed to operate at two levels: minimum, at which they are self-sufficient, and standard, at which they become integrated to larger systems.

DEVELOPMENT MODE: INCREMENTAL, PARTICIPATORY
- The site will be developed incrementally and by stages.
- The development of the site stages will be incremental and participatory, relying importantly on self management, mutual aid, and self help. It will consist of three periods:
- Preliminary: Involves studies leading to qualification of the site as economically and physically feasible; if so planning leads to optimization of layout design. If not, settlement relocated.
- Initial: Ranges from remodelling of the unconsolidated settlements, through gradual construction of utilities, to the minimum level of services.
- Secondary: Period involving the gradual upgrading of utilities and facilities, until the standard level of services is achieved.
- Evaluation and revision of policies/design will be carried out as needed after every period of development.



PROPOSED PROJECT

EXISTENT LAYOUT

The existent layout on the original site is presented here as a reference for comparison with the proposed project.

The layout is of the standard gridiron type except where the site's topography determined an organic solution. The design of the layout evolved from the original settlement of the squatters through modifications made by the community itself first, and then by INDECO, the agency charged with the development of the Colonia.

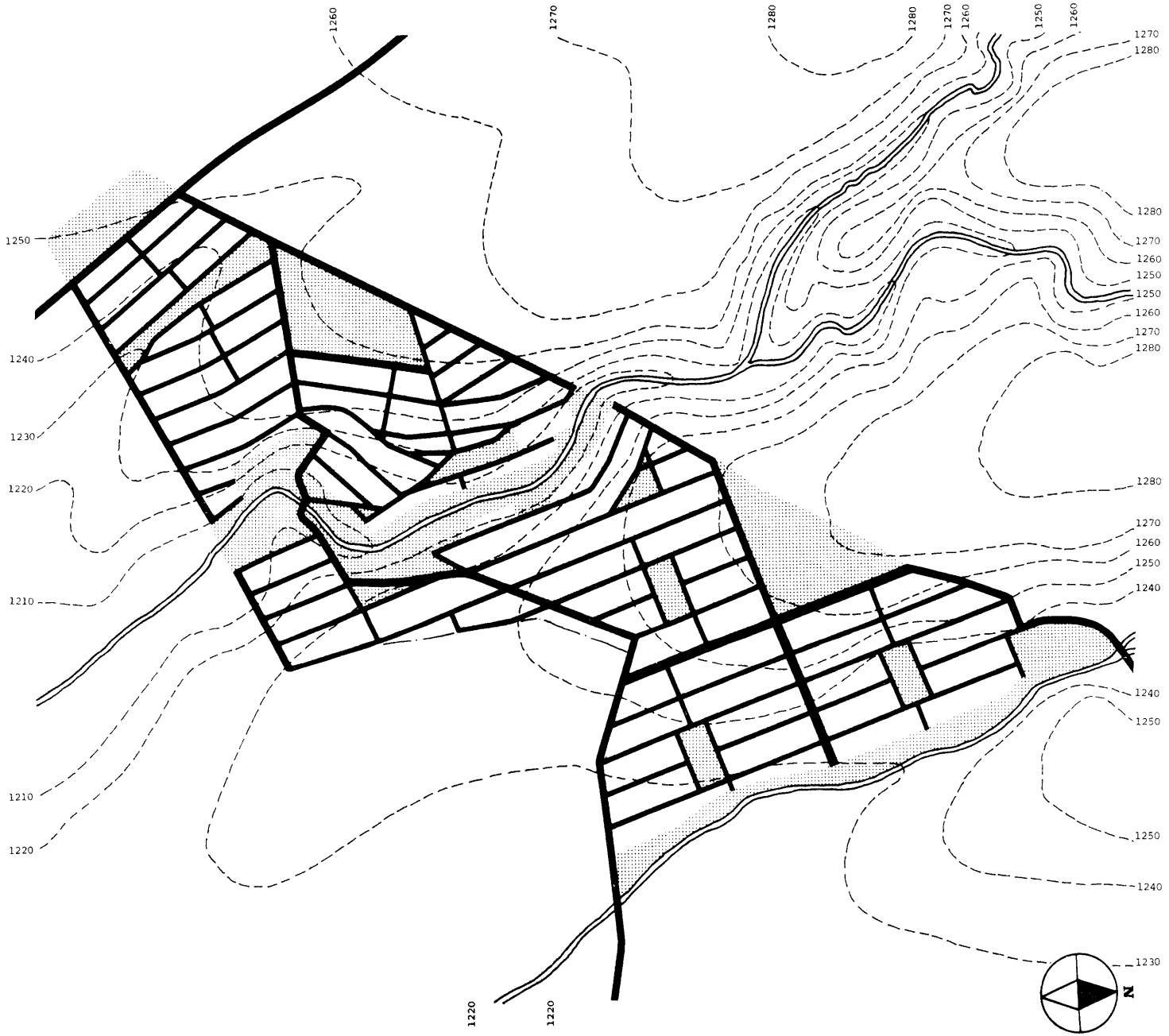
In the portion where the relatively flat terrain permitted the standard gridiron format, the basic problems are related to the excessive network lenghts and the limited flexibility of subdivision within the blocks. The organic design of the sloping areas has additional problems of costly network construction due to the irregularity of the layout. The semi-public areas are unequally distributed and do not allow a clear organization of the community around them. They include a cemetery at the southeastern end and a clear organization
large communal area in the northeast, where the existing ex-club house is located. The layout conforms strictly to the site's property lines and does not forsee the eventual expansion of the settlement. The unconsolidated condition of the settlement is a basic requirement for the optimization of the layout design.

Relevant data for the existent layout is as follows:

AREAS	Hectares	Percentages
Public	20.53	27.8
Semi-Public	15.47	21.0
Private	37.7	51.2
	73.7	100

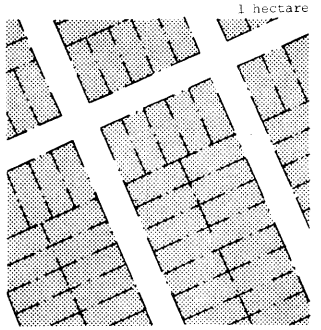
NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served}} = 219.8 \text{ m/Ha.}$$



1: 10000

EXISTENT LAYOUT



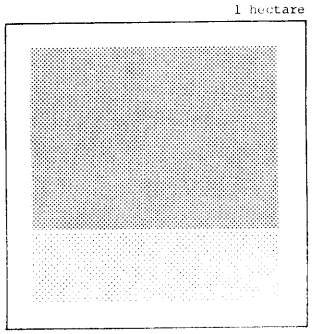
PATTERN

Public: streets/walkways

Semi-Public: playgrounds

Semi-Private: cluster courts

Private: lots

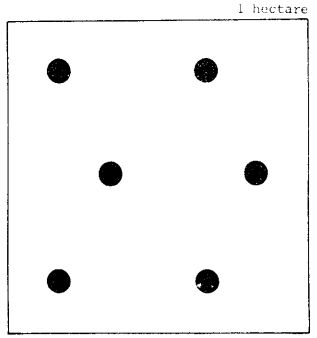


PERCENTAGES Streets/Walkways 37.8

Playgrounds 21

Cluster Courts -

Dwellings/Lots 41.2



DENSITY Persons/Hectare 110

20 persons

PROPOSED LAYOUT

The area of the original site is the first stage of the overall project. The size of the overall project (238 Ha.) was calculated taking into account the potential demand for low income housing sites over the next twenty years. The first stage is intended to house the existing squatter population. It eventually is expected to double to about 16,000 inhabitants. The total population of the new urban area would come to around 50,000 inhabitants by the end of the century.

The proposed optimization of the layout responds to the need of minimizing areas and length of circulation, while maximizing areas under the responsability of individuals or groups of users. The design, based on the traditional spanish grid layout, affords several advantages. In the first place, land utilization percentages are optimized: public areas devoted to circulation, which are costly to begin with and must be maintained by the public sector, are kept to a minimum. In the measure that these areas can be reduced, within specified minimum requirements, resources can be stretched to benefit more people. On the other hand, the optimized layout provides a high network efficiency. Lowering the ratio of circulation length per area served results in utility networks becoming accesible to low income groups sooner. Furthermore, the simplicity of the design facilitates the initial layout on the site and the eventual construction of infrastructural networks, even on the sloping areas.

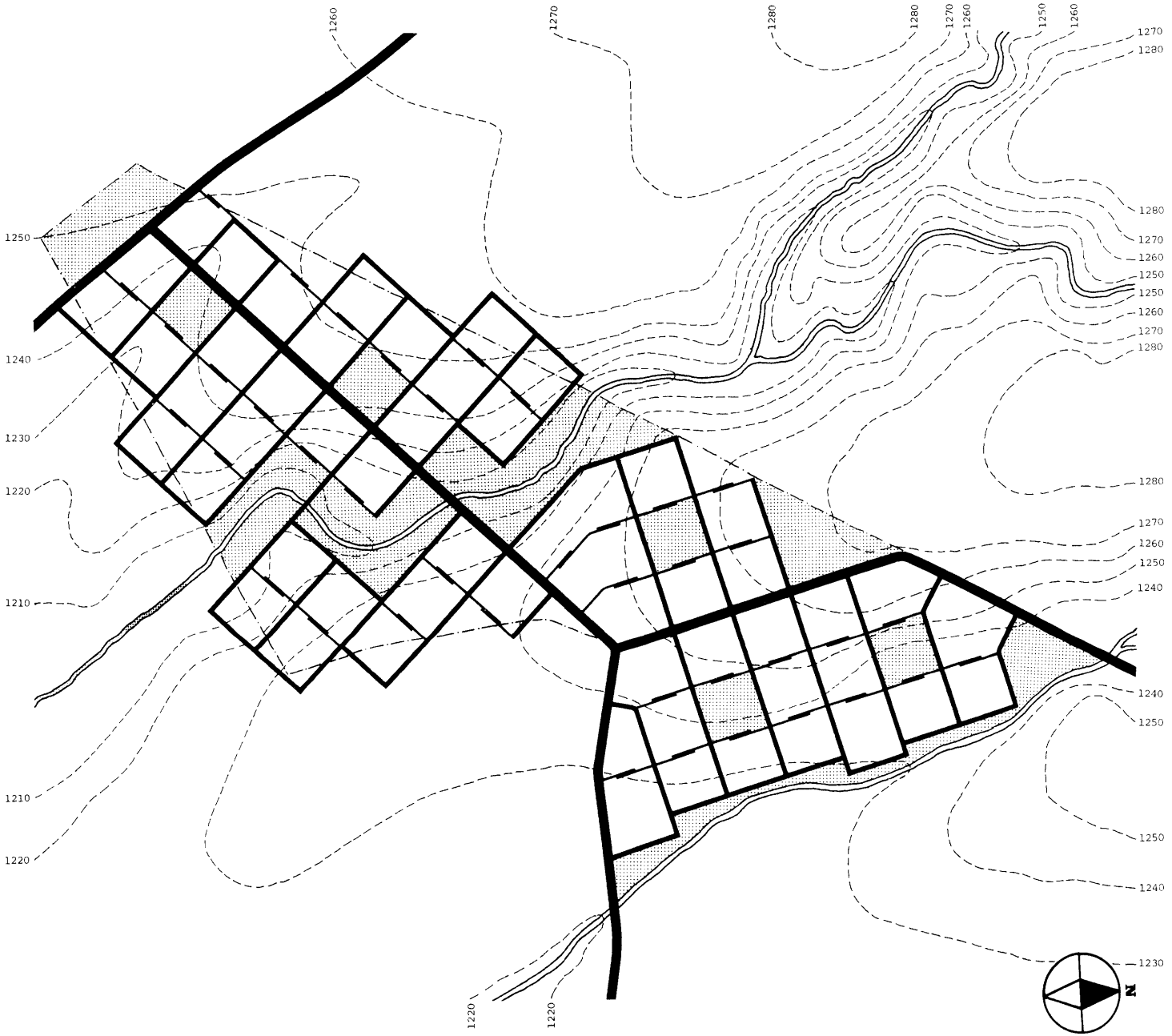
The distribution of the semi-public areas permits the organization of the settlement into urban units that reflect and reinforce the community's socio-political structure. Besides the individual urban unit communal centers, the layout preserves the existent cemetery and large communal area. Other semi-public areas under community control are located between private areas and the small rivers. They are intended both to provide recreational areas and to curtail the disposal of garbage in the barrancas.

The basic data for the optimized layout is the following:

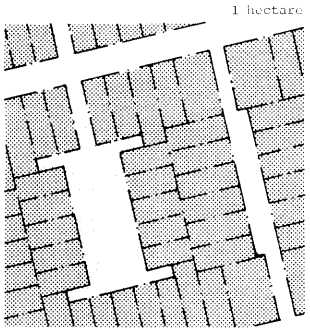
AREAS	Hectares	Percentages
Public	13.7	17.5
Semi-Public	18.3	23.4
Private, Semi-Private	46.2	58.1
	78.2	100

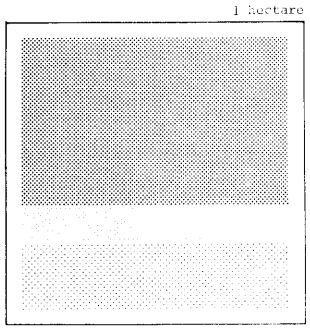
NETWORK EFFICIENCY

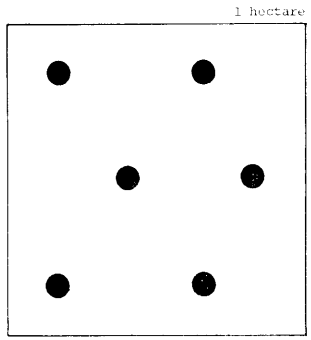
$$R = \frac{\text{network length (circulation)}}{\text{areas served (circ., lots)}} = 174.3 \text{ m/Ha.}$$



PROPOSED LAYOUT







URBAN UNITS/BLOCKS

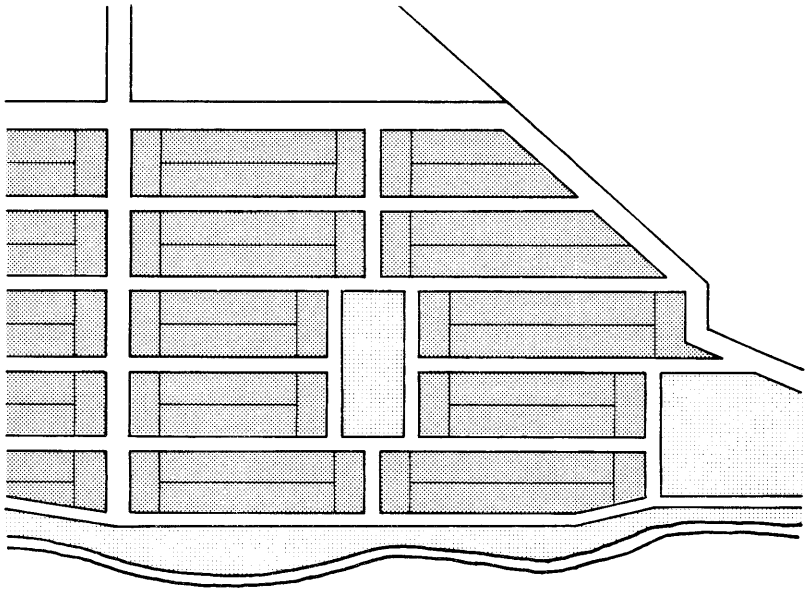
The urban planning unit is the basic organizational/ planning module in both the existent and optimized layouts. The urban unit consists of residential blocks arranged around a semi-public communal area. The urban unit permits the organization of the community at block, unit and settlement levels. This organization is important for the success of mutual aid and other collective efforts. The communal areas are intended for the construction of community facilities. Some facilities, such as kindergardens or playgrounds, are planned for every unit whereas schools or health posts would be shared by two or more, and located accordingly.

The average lot area and initial population density of the existent layout, 160 m^2 and 110 pers/Ha respectively, are kept in the project in order to facilitate comparisons. The urban units thus house from 1000 to 2000 inhabitants. The difference between the two units is the size and shape of their blocks. The existent layout has the long narrow blocks that are characteristic of the grid iron format. This design results in excessive network lengths and allows very little flexibility as far as the size and shape of lots are concerned. Large lots are forced to have their longer side along the street which is quite unefficient.

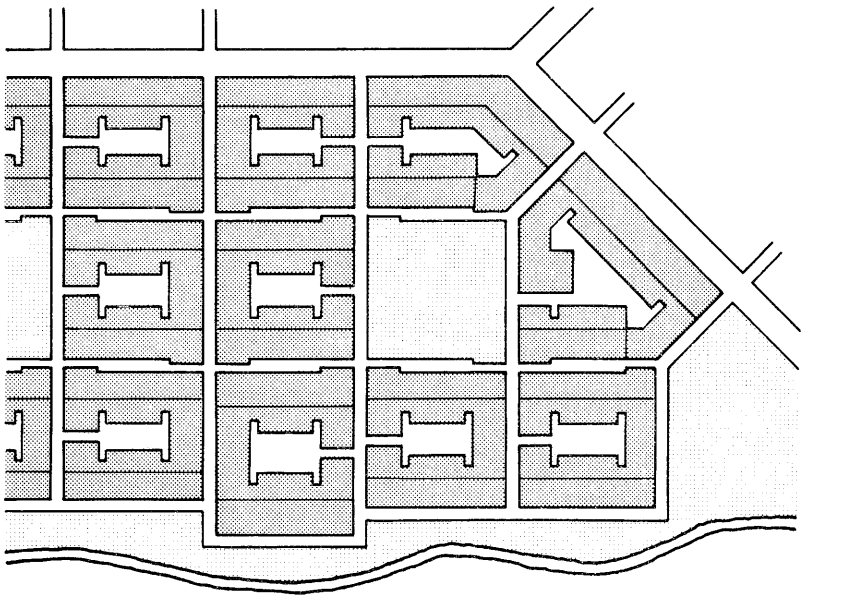
The blocks of the proposed layout are larger and due to their proportions, offer a greater flexibility of lot sizes and shapes. The subdivision of the block is achieved by means of a central semi-private area around which private lots are organized. The cluster can be considered as a horizontal condominium. The block is surrounded by two vehicular/pedestrian streets. The form of latter discourages through traffic while allowing the direct passage of utility networks. The blocks on the opposite page show two alternative subdivisions: one with approximately equal sized lots and the other with variable sized lots.

The following provides a comparative view of the basic data for both the existent and proposed blocks:

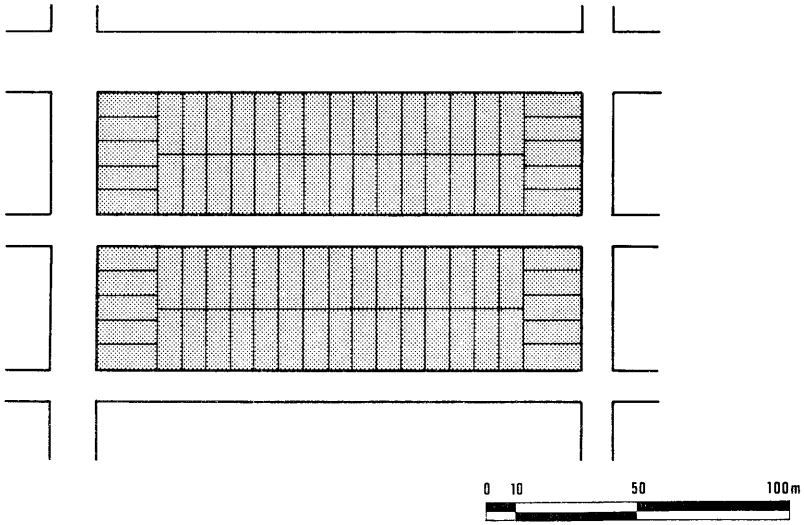
AREAS	EXISTENT		PROPOSED	
	Has.	%	Has.	%
Public	0.22	25.6	0.15	15.0
Private and Semi-Private	0.64	74.4	0.85	85.0
	0.86	100	1.00	100
$R = \frac{\text{length}}{\text{areas served}}$	=258.7 m/Ha.		200 m/Ha	
AVERAGE LOT AREA	=160 m^2		160 m^2	
POPULATION DENSITY	= 110 pers/Ha.		110 pers/Ha	



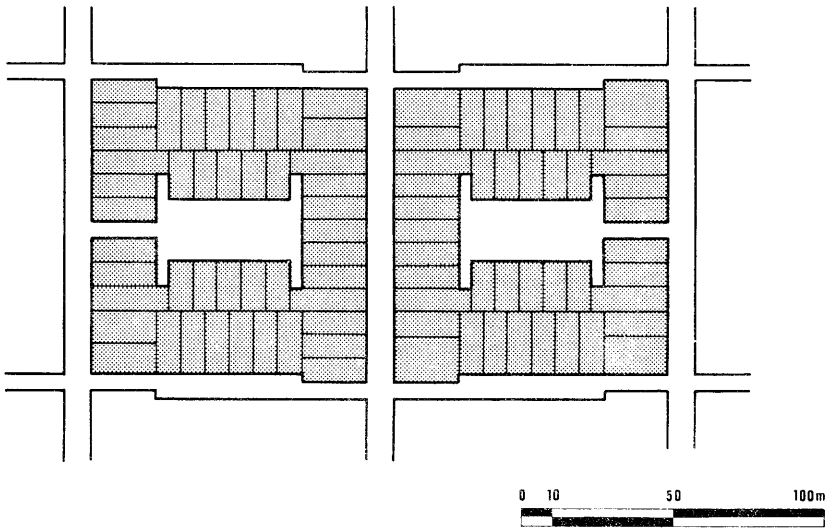
EXISTENT URBAN UNIT 1: 5000



PROPOSED URBAN UNIT 1. 5000



EXISTENT TYPICAL BLOCKS 1: 2500



PROPOSED TYPICAL BLOCKS 1: 2500

EVALUATION

The chart on the opposite page draws a comparison between the land utilization and network efficiency ratios of three selected case studies and the existent and proposed layouts. Based on the typological survey and putting the existent layout in the context of Cuernavaca's dwelling systems, the proposed project offers an optimum design solution.

The advantage of the proposed solution over the existent layout can be gauged in two aspects. On one hand, the percentage of public land used for circulation has been reduced. This minimizes the investment that will eventually have to be made for pavement and reduces the cost of maintenence for the public sector. At the same time, saleable (if that were the case) private areas, that are under the care and responsability of user/owners, are substantially increased. On the other hand, and perhaps more importantly, the ratio of circulation length to area served is considerably lower in the proposed project. The lower the number of meters of street per hectare, the greater the savings made in each one of the utility and service networks from water and sewerage to refuse collection and transportation.

The following table shows the differences in these two aspects between the existent and optimized layouts.

AREA	EXISTENT	PROPOSED
Public	27.8 %	17.5 %
Semi-Public	21.0	23.4
Private & Semi-Private	51.2	59.1
	100 %	100 %
$R = \frac{\text{circulation length}}{\text{areas served}} =$	219.8 m/Ha	174.3 m/Ha

Thus, the optimized layout reduces the public areas by more than 10% while augmenting private areas by almost 8%. The network length per hectare is approximately 40% lower in the proposed project. These figures appear to demostrate that the optimization of the layout of an existent or planned settlement can produce considerable savings when service networks are eventually introduced.

JARAMILLO/ LAS FLORES

TETELA R = 196 m/Ha.

The traditional spanish grid layout affords one of the lowest and thus most efficient circulation per unit ratios. In the case of Tetela however, areas for circulation and semi-public uses are often more limited than the required levels recommend. Lot areas are very high but eventually will be subdivided.

CAROLINA R = 393 m/Ha.

The organic layout of this settlement has a good relation of semi-private and private areas to public areas for circulation. Semi-public areas are less than adequate but network length per unit is a more serious problem. The irregular layout also makes the construction of infrastructural networks quite costly.

C I V A C R = 333 m/Ha.

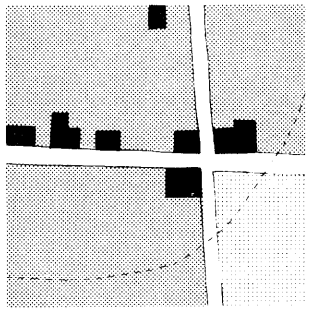
Although this standard grid iron layout has almost acceptable levels of public circulation area, much of this area is wasted on unused parking spaces. This fact, together with the excessive circulation lengths that are characteristic of these layouts, make the solution unefficient. Furthermore, semi-public spaces are insufficient.

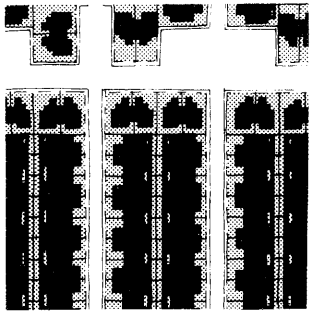
EXISTENT R = 259 m/Ha.

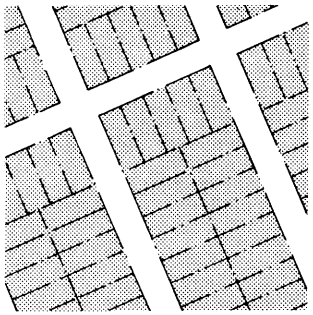
This layout is also of the standard small gridiron type. As for as the public vs. private ratios are concerned, this layout compares unfavourably with that of CIVAC. Semi-public areas are adequate but network lenghts are excessive. In the irregular parts, network construction is very costly.

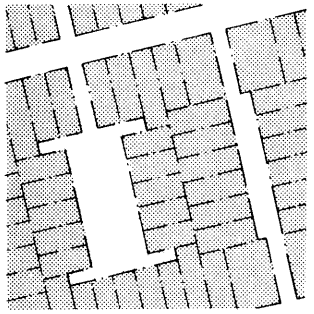
PROPOSED R = 330 m/Ha.

This layout draws on the efficiency of the spanish grid, while solving the subdivision of the large blocks into small lots by the use of semi-private areas. Land utilization responds to optimum proportions, while lengths are low and allow inexpensive network construction even in the irregular sloping areas.

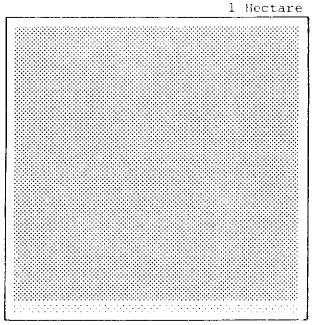


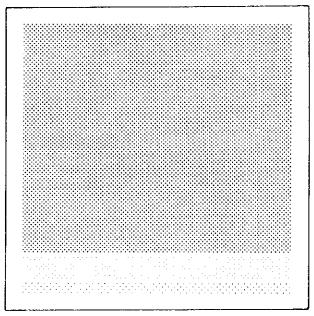


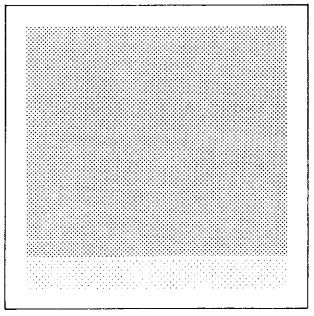


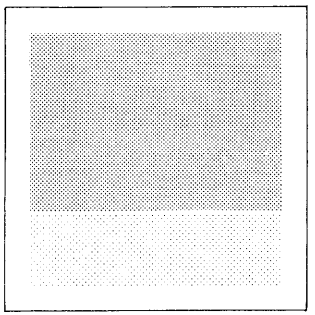


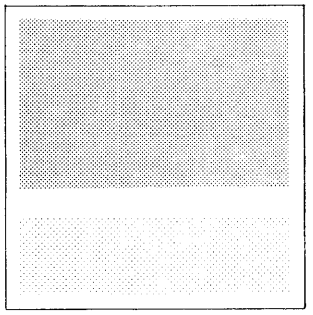
PATTERNS



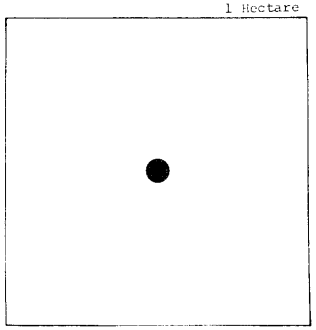


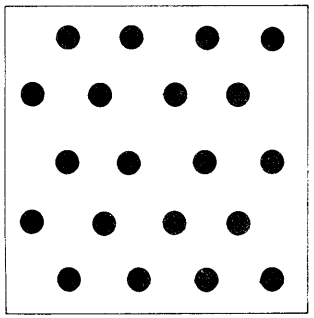


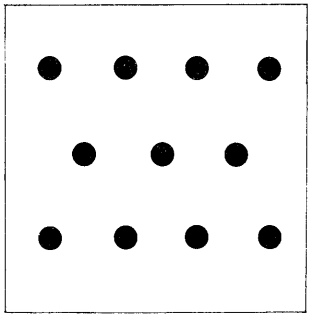


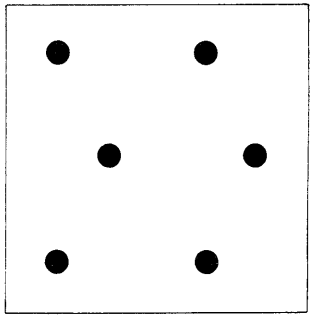


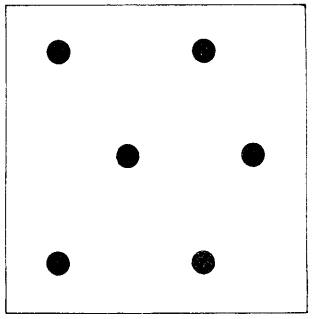
PERCENTAGES					
	Streets/Walkways	9%	19%	25%	27.8%	17.5%
	Playgrounds	3	-	8	21	23.4
	Cluster Courts	-	8	-	-	7.3
	Dwellings/Lots	88	73	67	51.2	51.8











DENSITY Persons/Hectare 26 370 232 110 110

20 persons

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, text books, or reference manuals.
-THIRD PREFERENCE: definitions from the Urban Settlement Design Program (U.S.D.P.) Files. They are used when existing sources were not quite appropriate/satisfactory.

Words included for specificity and to focus on a particular context are indicated in parenthesis.

Sources of definitions are indicated in parenthesis. (See also: REFERENCES).

ACCESSES. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems such as: waterways, airlines, etc.) (U.S.D.P.)

ACTUAL LAND COST. "(The cost of land is)...set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the users themselves in competition."(Turner, 1971)

AD VALOREM (TAX). A tax based on a property's value; the value taxed by local governments is not always or even usually the market value, but only a valuation for tax purposes. (U.S.D.P.)

AIRPORT DISTURBANCE. The act or process of destroying the rest, tranquility, or settled state of (the site by the annoyance of airport noise, vibration, hazards, etc.) (Merriam-Webster, 1971)

AIRPORT ZONING RESTRICTIONS. The regulation of the height or type of structures in the path of moving aircraft. (Abrams, 1971)

ALTERNATINC CURRENT (A.C.) (an electric) current that reverses its direction of flow at regular intervals. (ROTC ST 45-7, 1953)

AMENITY. Something that conduces to physical or material comfort or convenience, or which contributes satisfaction rather than money income to its owner. (Merriam-Webster, 1971)

AMPERES. Amperes (amp) are a measure of the rate of flow of electricity. It is somewhat comparable to the rate of flow of water (quantity/time). A steady current produced by one volt applied across a resistance of one ohm. (ROTC ST 45-7, 1953)

APPRAISAL. An estimate and opinion of value, especially by one fitted to judge. (Merriam-Webster, 1971)

APPROACHES. The main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context. (U.S.D.P.)

ASSESSED VALUE. A valuation placed upon property by a public officer or board as a basis for taxation. (Keyes, 1971)

ASSESSMENT. The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Keyes, 1971)

BACKFILL. Earth or other material used to replace material removed during construction, such as in culvert, sewer, and pipeline trenches and behind bridge abutments and retaining walls or between an old structure and a new lining. (DePina, 1972)

BARRIER. (A boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster, 1971)

BETTERMENT (TAX). A tax on the increment in value accruing to an owner because of development and improvement work carried out by local authorities. (U.S.D.P.)

BINDER COURSE. A transitional layer of bituminous paving between the crushed stone base and the surface course (to increase bond between base and surface course). (DePina, 1972)

BITUMINOUS. A coating of or containing bitumin; as asphalt or tar. (DePina, 1972)

BLOCK. A block is a portion of land bounded and served by lines of public streets. (U.S.D.P.)

BOUNDARY. Something (a line or area) that fixes or indicates a limit or extent (of the site). (Merriam-Webster, 1971)

BUILDING CODE. "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

BUILDING DRAIN. Lowest horizontal piping of the building drainage system receiving discharge from soil, waste, and other drainage pipes. It is connected to the building sewer. (ROTC ST 45-7, 1953)

BUILDING MAIN. Water-supply pipe and fittings from the water main or other source of supply to the first branch of the water-distribution system of a building. (ROTC ST 45-7, 1953)

CESS POOL. An underground catch basin that is used where there is no sewer and into which household sewage or other liquid waste is drained to permit leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)

CIRCULATION. System(s) of movement/passage of people, goods from place to place; streets, walkways, parking areas. (U.S.D.P.)

CLAY. A lusterless colloidal substance, plastic when moist (crystalline grains less than 0.002mm in diameter). (U.S.D.P.)

CLEANOUT. A plug or similar fitting to permit access to traps or sewer lines. Cleanouts are usually used at turns and other points of collection. (ROTC ST 45-7, 1953)

CLIMATE. The average condition of the weather at a particular place over a period of years as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)

COLLECTION SYSTEM. The system of pipes in a sewage network, comprised of house service, collection lines, manholes, laterals, mains. (U.S.D.P.)

COMBINED SEWER. A sewer that carries both storm water and sanitary or industrial wastes. (DePina, 1972)

COMMUNITY. The people living in a particular place or region and usually linked by common interests: the region itself; any population cluster. (U.S.D.P.)

COMMUNITY FACILITIES/SERVICES. Facilities/services used in common by a number of people. It may include: schools, health, recreation, police, fire, public transportation, community center, etc. (U.S.D.P.)

COMMUNITY RECREATION FACILITIES. Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, exercise, self-expression, or release from boredom, worry, or tension. (U.S.D.P.)

COMPONENT. A constituent part of the utility network. (U.S.D.P.)

CONDOMINIUM. Condominium is a system of direct ownership of a single unit in a multi-unit whole. 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 a proportionate interest in the common land and areas. Two types of condominiums are recognized: *HORIZONTAL:* detached, semi-detached, row/grouped dwelling types; *VERTICAL:* walk-up, high-use dwelling types. (U.S.D.P.)

CONDUCTORS. Materials which allow current to flow such as aluminum, copper, iron. (ROTC ST 45-7, 1953)

CONDUIT. A pipe or other opening, buried or above ground, for conveying hydraulic traffic, pipelines, cables, or other utilities. (DePina, 1972)

CONSERVATION EASEMENT. An easement acquired by the public and designed to open privately owned lands for recreational purposes or to restrict the use of private land in order to preserve open space and protect certain natural resources. (U.S.D.P.)

CONSTRUCTION BORING. A subsurface boring done at the planned location of all infrastructure and building footings and roadway sub-bases for design of foundation systems. (U.S.D.P.)

CONVEYANCE. The transfer of ownership (of land). (Merriam-Webster, 1971)

CORPORATION COCK/CORPORATION STOP. A water or gas cock by means of which utility-company employees connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)

COSTS OF URBANIZATION. Include the following: *CAPITAL:* cost of land and infrastructure; *OPERATING:* cost of administration, maintenance, etc.; *DIRECT:* include capital and operating costs; *INDIRECT:* include environmental and personal effects. (U.S.D.P.)

CURRENT (See: ALTERNATING CURRENT, DIRECT CURRENT). An electric current is a movement of positive or negative electric particles (as electrons) accompanied by such observable effects as the production of heat, of a magnetic field, or of chemical transformation. (Merriam-Webster, 1971)

CYCLE. One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)

DAM. A barrier preventing the flow of water; a barrier built across a water course to confine and keep back flowing water. (Merriam-Webster, 1971)

DEPRECIATION ACCELERATION (TAX). A tax incentive designed to encourage new construction by allowing a faster write-off during the early life of a building. (U.S.D.P.)

DESIGN. 1) The arrangement of elements that make up a work of art, a machine or other man-made object. 2) The process of selecting the means and contriving the elements, steps, and procedures for producing what will adequately satisfy some need. (Merriam-Webster, 1971)

DETACHED DWELLING. Individual dwelling unit, separated from others. (U.S.D.P.)

DEVELOPMENT. Gradual advance or growth through progressive changes; a developed tract of land (U.S.D.P.)

DEVELOPMENT SIZE. There are two general ranges of size: *LARGE:* may be independent communities requiring their own utilities, services, and community facilities; *SMALL:* generally are part of an adjacent urbanization and can use its supporting utilities, services, and community facilities. (U.S.D.P.)

DIRECT CURRENT (D.C.) (An electric current that) flows continuously in one direction. (ROTC ST 45-7, 1953)

DISCHARGE (Q). Flow from a culvert, sewer, channel, etc. (DePina, 1972)

DISTANCE. The degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest path adjoining them (paths of travel). (Merriam-Webster, 1971)

DISTRIBUTION (STATION). The part of an electric supply system between bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

DISTURBED SOIL. Soils that have been disturbed by artificial process, such as excavation, transportation, and compaction in fill. (U.S.D.P.)

DRAINAGE. Interception and removal of ground water or surface water, by artificial or natural means. (De Pina, 1972)

DUST/DIRT. Fine dry pulverized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster, 1971)

DWELLING. The general, global designation of a building/shelter in which people live. A dwelling contains one or more 'dwelling units'. (U.S.D.P.)

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. (U.S.D.P.)

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). (U.S.D.P.)

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 SEC-*

TOR: 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 for profit. (U.S.D.P.)

DWELLING DEVELOPMENT MODE. Two modes are considered: *PROGRESSIVE:* 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. (U.S.D.P.)

DWELLING FLOORS. The following numbers 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. (U.S.D.P.)

DWELLING GROUP. The context of the dwelling in its immediate surroundings. (U.S.D.P.)

DWELLING/LAND SYSTEM. A distinct dwelling environment/housing situation characterized by its users as well as by its physical environment. (U.S.D.P.)

DWELLING LOCATION. Three sectors are considered in single or multi-center urban areas. Sectors are identified by position as well as by the density of buildings as follows: *CENTER:* the area recognized as the business center of the city, generally the most densely built-up sector; *INNER RING:* the area located between the city center and the urban periphery, generally a densely built-up sector; *PERIPHERY:* the area located between the inner ring and the rural areas, generally a scatteredly built-up sector. (U.S.D.P.)

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 state of structural stability, weather protection, and maintenance without deviation. (U.S.D.P.)

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. (U.S.D.P.)

DWELLING UNIT. A self-contained unit in a dwelling for an individual, a family, or a group. (U.S.D.P.)

DWELLING UNIT AREA. The dwelling unit area (m^2) is the built-up, covered area of a dwelling unit. (U.S.D.P.)

DWELLING UNIT COST. The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit. (U.S.D.P.)

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). (U.S.D.P.)

DWELLING UTILIZATION. The utilization indicates the type of use with respect to the number of inhabitants/families. *SINGLE:* an individual or family inhabiting a dwelling. *MULTIPLE:* a group of individuals or families inhabiting a dwelling. (U.S.D.P.)

EASEMENT. Servitude: a right in respect of an object (as land owned by one person) in virtue of which the object (land) is subject to a specified use or enjoyment by another person or for the benefit of another thing. (Merriam-Webster, 1971)

EFFICIENCY. Capacity to produce desired results with a minimum expenditure of energy, time, money or materials. (Merriam-Webster, 1971)

EFFLUENT. Outflow or discharge from a sewer or sewage treatment equipment. (DePina, 1972)

ELECTRIC FEEDER. That part of the electric distribution system between the transformer and the service drop or drops. (HUD, Mobile Court Guide, 1970)

ELECTRIC SERVICE DROP. That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots. (HUD, Mobile Court Guide, 1970)

ELECTRIC TRANSFORMER. A device which changes the magnitude of alternating voltages and currents; generally from distribution voltages to user voltages; a distribution component that converts power to usable voltage. (TM 5 765 US Army, 1970; U.S.D.P.)

ELECTRICAL CIRCUIT. A closed, complete electrical path with various connected loads. Circuits may either be 'parallel' (voltage constant for all connected loads) or 'series' (voltage divided among connected loads). Parallel circuits are fixtures wired independent of each other, which are used in nearly all building wiring. (U.S.D.P.; ROTC ST 45-7, 1953)

ELECTRICAL FREQUENCY. The number of times an alternating electric current changes direction in a given period of time. Measured in cycles per second: hertz. (ROTC ST 45-7, 1953)

ELECTRIC GROUND. The electrical connection with the earth or other ground. (Merriam-Webster, 1971)

ELECTRICAL NETWORK COMPONENTS. It is composed of the following: *GENERATION:* produces electricity; *TRANSMISSION:* transports energy to user groups; *DISTRIBUTION STATION:* divides power among main user groups; *SUBSTATION:* manipulates power into useful energy levels for consumption; *DISTRIBUTION NETWORKS:* provides electric service to user. (U.S.D.P.)

ELECTRIC PHASE. May be either a single-phase circuit (for small electrical devices) or a three-phase circuit (for heavy equipment, large electrical devices). In single-phase only one current is flowing through the circuit with the voltage dropping to zero twice in each cycle. In three-phase currents flow through the circuit with the power never dropping to zero. (U.S.D.P.)

ELECTRICAL POWER. The source or means of supplying energy for use; measured in watts. (U.S.D.P.)

ELECTRICAL WIRING SYSTEMS. May either be single-phase or three-phase. *SINGLE-PHASE:* 2 hot wires with 1 neutral wire; *THREE-PHASE:* 3 hot wires with 1 neutral wire. (ROTC ST 45-7, 1953)

ELECTRICITY. Electrification: the process (network) for supplying (the site) with electric power. (Merriam-Webster, 1971)

EMBANKMENT (or FILL). A bank of earth, rock, or other material constructed above the natural ground surface. (DePina, 1972)

EROSION. The general process whereby materials of the earth's crust are worn away and removed by natural agencies including weathering, solution, corrosion, and transportation; (specific) land destruction and simultaneous removal of particles (as of soil) by running water, waves and currents, moving ice, or wind. (Merriam-Webster, 1971)

EXCRETA. Waste matter eliminated from the body. (U.S.D.P.)

EXISTING STRUCTURE. Something constructed or built (on the site). (U.S.D.P.)

EXPLORATORY BORING. Initial subsurface investigations (borings) are done on a grid superimposed on the areas of interest and on areas indicated as limited/restricted/hazard in the initial survey. (U.S.D.P.)

EXTERIOR CIRCULATION/ACCESSES (SITE PLANNING). The existing and proposed circulation system/accesses outside but affecting the site. These include limited access highways as well as meshing access to the surrounding area. Exterior circulation/accesses are generally given conditions. (U.S.D.P.)

FAUCET (also TAP). A fixture for drawing liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

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. (U.S.D.P.)

FIRE/EXPLOSION HAZARDS. Danger: the state of being exposed to harm; liable to injury, pain, or loss from fire/explosion (at or near the site). (Merriam-Webster, 1971)

FIRE FLOW. The quantity (in time) of water available for fire-protection purposes in excess of that required for other purposes. (Merriam-Webster, 1971)

FIRE HYDRANT. A water tap to which fire hoses are connected in order to smother fires. (U.S.D.P.)

FIRE PROTECTION. Measures and practices for preventing or reducing injury and loss of life or property by fire. (Merriam-Webster, 1971)

FLEXIBLE PAVEMENT. A pavement structure which maintains intimate contact with and distributes loads to the subgrade and depends upon aggregate interlock, particle friction, and cohesion for stability. (DePina, 1972)

FLOODING. A rising and overflowing of a body of water that covers land not usually under water. (U.S.D.P.)

FLOODWAY FRINGE. The floodplain area landward of the natural floodway which would be inundated by low velocity flood waters. (U.S.D.P.)

FLOW METER. A device to measure flow of water. (U.S.D.P.)

FLUSH TANK TOILET. Toilet with storage tank of water used for flushing bowl. (U.S.D.P.)

FLUSH VALVE TOILET. Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning. (U.S.D.P.)

FOOT CANDLE. A unit of illuminance on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot. (Merriam-Webster, 1971)

FUMES. Gaseous emissions that are usually odorous and sometimes noxious. (Merriam-Webster, 1971)

GAS. A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users. (U.S.D.P.)

GRADE. Profile of the center of a roadway, or the invert of a culvert or sewer. (DePina, 1972)

GRID BLOCKS. The block determined by a convenient public circulation and not by dimensions of lots. In grid blocks some lots have indirect access to public streets. (U.S.D.P.)

GRIDIRON BLOCKS. The blocks determined by the dimensions of the lots. In gridiron blocks all the lots have direct access to public streets. (U.S.D.P.)

GRID LAYOUTS. The urban layouts with grid blocks. (U.S.D.P.)

GRIDIRON LAYOUTS. The urban layouts with gridiron blocks. (U.S.D.P.)

GOVERNMENT/MUNICIPAL REGULATIONS. In urban areas, the development of the physical environment is a process usually controlled by a government/municipality through all or some of the following regulations: Master Plan, Zoning Ordinance, Subdivision Regulations, Building Code. (U.S.D.P.)

HEAD. (Static). The height of water above any plane or point of reference. Head in feet = (lb/sq. in. x 144)/(Density in lb/cu. ft.) For water at 68°F. (DePina, 1972)

HIGH-RISE. Dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

HOT WIRE. Wire carrying voltage between itself and a ground. (ROTC ST 45-7, 1953)

HYDRAULICS. That branch of science or engineering that deals with water or other fluid in motion. (DePina, 1972)

ILLEGAL. That which is contrary to or violating a rule or regulation or something having the force of law. (Merriam-Webster, 1971)

INCOME. The amount (measured in money) of gains from capital or labor. The amount of such gain received by a family per year may be used as an indicator of income groups. (U.S.D.P.)

INCOME GROUPS. A group of people or families within the same range of incomes. (U.S.D.P.)

INCREMENT (TAX). A special tax on the increased value of land, which is due to no labor/expenditure by the owner, but rather to natural causes such as the increase of population, general progress of society, etc. (U.S.D.P.)

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. (U.S.D.P.)

INSULATOR. A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)

INTERIOR CIRCULATION NETWORK (SITE PLANNING). The pedestrian/vehicular circulation system inside the site. It should be designed based upon the exterior circulation/accesses and land development requirements. (U.S.D.P.)

INTERVAL. A space of time (or distance) between the recurrences of similar conditions or states. (Merriam-Webster, 1971)

KILOWATT (kw). (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (ROTC ST 45-7, 1953)

LAMPHOLE. A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)

LAND COST. Price: the amount of money given or set as the amount to be given as a consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)

LAND DEVELOPMENT COSTS. The costs of making raw land ready for development through the provision of utilities, services, accesses, etc. (U.S.D.P.)

LAND LEASE. The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)

LAND-MARKET VALUE. Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax based value of the land; or 3) the present commercial market value of the land. (U.S.D.P.)

LAND OWNERSHIP. The exclusive right of control and possession of a parcel of land. (U.S.D.P.)

LAND SUBDIVISION. The division of the land in blocks, lots and laying out streets. (U.S.D.P.)

LAND TENANCY. The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)

LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and responsiblity. *PUBLIC* (streets, walkways, open spaces): user -anyone/unlimited; physical controls -minimum; responsibility -public sector. *SEMIPUBLIC* (open spaces, playgrounds, schools): user -limited group of people; physical controls -partial or complete; responsibility -public sector and user. *PRIVATE* (dwellings, lots): user -owner or tenant or squatter; physical controls -complete; responsibility -user. *SEMI-PRIVATE* (cluster courts): user -group of owners and/or tenants; physical controls -partial or complete; responsibility -user. (U.S.D.P.)

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. (U.S.D.P.)

LAND UTILIZATION: RESPONSIBILITY. The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)

LATERAL SEWER. A collector pipe receiving sewage from building connection only. (U.S.D.P.)

LATRINE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)

LAYOUT. The plan or design or arrangement of something that is laid out. (Merriam-Webster, 1971)

LEVELS OF SERVICES. Two levels are considered: *MINIMUM*, are admissible or possible levels below the standard; *STANDARD*, are levels set up and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight extent, value or quality. (U.S.D.P.)

LIFT PUMP. A collection system component that forces sewage to a higher elevation to avoid deep pipe networks. (U.S.D.P.)

LOCALITY. A relatively self-contained residential area/community/neighborhood/settlement within an urban area which may contain one or more dwelling/land systems. (U.S.D.P.)

LOCALITY SEGMENT. A 400m x 400m area taken from and representing the residential character and layout of a locality. (U.S.D.P.)

LOCATION. Situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster, 1971)

LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

LOT CLUSTER. A group of lots (owned individually) around a semipublic common court (owned in condominium). (U.S.D.P.)

LOT COVERAGE. The ratio of building area to the total lot area. (U.S.D.P.)

LOT PROPORTION. The ratio of lot width to lot depth. (U.S.D.P.)

LUMINAIRE. In highway lighting, a complete lighting device consisting of a light source, plus a globe, reflector, refractor, housing and such support as is integral with the housing. (DePina, 1972)

MANHOLE. An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection. (U.S.D.P.)

MATRIX (OF BASIC REFERENCE MODELS). A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)

MASTER PLAN. A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplations on the course its transportation, housing and community facilities should take, and making proposals for industrial settlement, commerce, population distribution and other aspects of growth and development. (Abrams, 1972).

MEDIAN BARRIER. A double-faced guard rail in the median or island dividing two adjacent roadways. (DePina, 1972)

MESHING BOUNDARIES. Characterized by continuing, homogeneous land uses or topography, expressed as: *LINES:* property lines, political or municipal divisions, main streets, etc.; *AREAS:* similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)

MICROCLIMATE. The local climate of a given site or habitat varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)

MODE OF TRAVEL. Manner of moving from one place (the site) to another (other parts of the urban context). (U.S.D.P.)

MODEL (OF URBAN LAYOUT). A representation of an urban residential area illustrating circulation, land utilization, land subdivision, and utility network of a specific layout and lot. (U.S.D.P.)

MUTUAL OWNERSHIP. Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)

NATURAL FEATURES. Prominent objects in or produced by nature. (U.S.D.P.)

NATURAL UNDISTURBED SOIL. Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)

NEIGHBORHOOD. A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)

NETWORK EFFICIENCY (LAYOUT EFFICIENCY). The ratio of the length of the network to the area(s) contained within; or tangent to it. (U.S.D.P.)

NEUTRAL WIRE. Wire carrying no voltage between itself and a ground. (ROTC ST 45-7, 1953)

NOISE. Any sound (affecting the site) that is undesired (such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster, 1971)

ODOR. A quality of something that affects the sense of smell. (Merriam-Webster, 1971)

OHMS (electrical). The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes. R = E/I. The practical mks unit of electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)

OPTIMIZE/OPTIMALIZE. To bring to a peak of economic efficiency, specially by the use of precise analytical methods. (Merriam-Webster, 1971)

ORGANIC SOILS. Soils composed mostly of plant material. (U.S.D.P.)

OXIDATION POND (LAGOON). A method of sewage treatment using action of bacteria and algae to digest/decompose wastes. (U.S.D.P.)

PERCENT RENT/MORTGAGE. The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income. (U.S.D.P.)

PIT PRIVY/LATRINE. A simple hole in the ground, usually hand dug, covered with slab and protective superstructure; for disposal of human excreta. (U.S.D.P.)

PLANNING. The establishment of goals, policies, and procedures for a social or economic unit, i.e. city. (U.S.D.P.)

PLOT/LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

POLICE PROTECTION. Police force: a body of trained men and women entrusted by a government with the maintenance of public peace and order, enforcement of laws, prevention and detection of crime. (Merriam-Webster, 1971)

POPULATION DENSITY. It is the ratio between the population of a given area and the area. It is expressed in people per hectare. It can be: *GROSS DENSITY:* includes any kind of land utilization, residential, circulation, public facilities, etc. *NET DENSITY:* includes only the residential land and does not include land for other uses. (U.S.D.P.)

POSITION. The point or area in space actually occupied by a physical object (the site). (Merriam-Webster, 1971)

PRIMER. A small introductory book on a specific subject. (U.S.D.P.)

PRIVATE LAND OWNERSHIP. The absolute tenure of land to a person and his heirs without restriction of time. (U.S.D.P.)

PRIVY. A small, often detached building having a bench with one or more round or oval holes through which the user may defecate or urinate (as into a pit or tub) and ordinarily lacking any means of automatic discharge of the matter deposited. (Merriam-Webster, 1971)

PROJECT. A plan undertaken; a specific plan or design. (U.S.D.P.)

PUBLIC CIRCULATION. The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community. (U.S.D.P.)

PUBLIC FACILITIES. Facilities such as schools, playgrounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies. (U.S.D.P.)

PUBLIC SERVICES AND COMMUNITY FACILITES. Includes: public transportation, police protection, fire protection, refuse collection, health, schools, and playgrounds, recreation and open spaces, other community facilities, business, commercial, small industries, markets. (U.S.D.P.)

PUBLIC SYSTEM (general). A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority. (HUD/AID, Minimum Standards, 1966)

PUBLIC UTILITIES. Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks. (U.S.D.P.)

PUMP. A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by suction or pressure or both. (Merriam-Webster, 1971)

REFUSE COLLECTION. The service for collection and disposal of all the solid wastes from a community. (U.S.D.P.)

RESERVOIR. Large-scale storage of water; also functions to control fluctuations in supply and pressure. (U.S.D.P.)

RESIDENTIAL AREA. An area containing the basic needs/requirements for daily life activities: housing, education, recreation, shopping, work. (U.S.D.P.)

RESISTANCE. The opposition to electrical flow. (Resistance increases as the length of wires is increased and decreases as the cross-sectional area of wires is increased). (ROTC ST 45-7, 1953)

RIGHT-OF-WAY. A legal right of passage over another person's ground (land), the area or way over which a right-of-way exists such as: a path or thorough-fare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land

occupied by a railroad, the land used by a public utility. Rights-of-way may be shared (as streets; pedestrians and automobiles) or exclusive (as rapid transit routes; subways, railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

ROADWAY (HIGHWAY). Portion of the highway included between the outside lines of gutter or side ditches, including all slopes, ditches, channels, and appurtenances necessary to proper drainage, protection, and use. (DePina, 1972)

ROW/GROUPED HOUSING. Dwelling units grouped together linearly or in clusters. (U.S.D.P.)

RUNOFF. That part of precipitation carried off from the area upon which it falls. (DePina, 1972)

RUNOFF-RAINFALL RATIO. The percentage (ratio) of stormwater runoff that is not reduced by evaporation, depression storage, surface wetting, and percolation; with increased rainfall duration, runoff-rainfall ratios rise increasing runoff flow. (U.S.D.P.)

SAND. Loose, distinguishable grains of quartz/feldspar, mica (ranging from 2mm to 0.02mm in diameter). (U.S.D.P.)

SANITARY SEWERAGE. The system of artificial usually subterranean conduits to carry off sewage composed of: *excreta:* waste matter eliminated from the human body; *domestic wastes:* used water from a home/community containing 0.1% total solids; and some *industrial wastes*, but not water from ground, surface, or storm. (U.S.D.P.)

SEMI-DETACHED DWELLING. Two dwelling units sharing a common wall (duplex). (U.S.D.P.)

SEPTIC TANK. A tank in which the organic solid matter of continuously flowing sewage is deposited and retained until it has been disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

SERIES CIRCUIT. Fixtures connected in a circuit by a single wire. When one fixture is out, the circuit is broken. Fixtures with different amperages cannot be used efficiently in the same circuit. (ROTC ST 45-7, 1953)

SETTLEMENT. Occupation by settlers to establish a residence or colony. (U.S.D.P.)

SEWAGE. The effluent in a sewer network. (U.S.D.P.)

SEWER. The conduit in a subterranean network used to carry off water and waste matter. (U.S.D.P.)

SEWER BUILDING CONNECTION. The pipe connecting the dwelling with the sewer network. (U.S.D.P.)

SEWERAGE. Sewerage system: the system of sewers in a city, town or locality. (Merriam-Webster, 1971)

SHAPE. Form/configuration of the site surface as defined by its perimeter/boundaries. (U.S.D.P.)

SHOPPING. (Facilities for) searching for, inspecting, or buying available goods or services. (U.S.D.P.)

SILT. Loose, unconsolidated sedimentary rock particles (ranging from 0.02mm to 0.002mm in diameter). (U.S.D.P.)

SITE. Land (that could be) made suitable for building purposes by dividing into lots, laying out streets and providing facilities. (Merriam-Webster, 1971)

SITE AREAS. Two types are considered: *GROSS AREA:* includes the whole site or the bounded piece of ground. *USABLE AREA:* includes only the portion of the site that can be fully utilized for buildings, streets, playgrounds, recreation facilities, gardens, or other structures. (U.S.D.P.)

SITE AND SERVICES. The subdivision of urban land and the provision of services for residential use and complementary commercial use. Site and services projects are aimed to improve the housing conditions for the low income groups of the population by providing: *a) SITE:* the access to a piece of land where people can build their own dwellings; *b) SERVICES:* the opportunity of access to employment, utilities, services and community facilities, financing and communications. (U.S.D.P.)

SIZE. Physical magnitude or extent (of the site), relative or proportionate dimensions (of the site). (Merriam-Webster, 1971)

SLOPE. Degree or extent of deviation (of the land surface) from the horizontal. (Merriam-Webster, 1971)

SMOKE. The gaseous products of burning carbonaceous materials made visible by the presence of carbon particles. (Merriam-Webster, 1971)

SOIL. Soil structure: the arrangement of soil particles in various aggregates differing in shape, size, stability, and degree of adhesion to one another. (Merriam-Webster, 1971)

SOIL INVESTIGATION. It is the process to find the soil structure and other characteristics. It may include the following stages: initial soil survey, exploratory boring, construction boring. (U.S.D.P.)

SOIL PIPE. The pipe in a dwelling which carries the pipe discharge from water closets. (U.S.D.P.)

SOIL SURVEY (INITIAL). An on-site examination of surface soil conditions and reference to a GENERAL SOIL MAP. It is used to reveal obvious limitations/restrictions/hazards for early planning consideration. (U.S.D.P.)

STACK. The vertical pipe in a dwelling of the soil-, waste-, or vent-pipe systems. (ROTC ST 45-7, 1953)

STANDARD. 1) Something that is established by authority, custom or general consent as a model or example to be followed. 2) Something that is set up and established by authority as a rule for the measure of quantity, weight, extent, value or quality. (Merriam-Webster, 1971)

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (HUD/AID, Minimum Standards, 1966)

STORM DRAINAGE. Storm sewer: a sewer (system) designed to carry water wastes except sewage (exclusively storm water, surface runoff, or street wash). (Merriam-Webster, 1971)

STREET LIGHTING. Illumination to improve vision at night for security and for the extension of activities. (U.S.D.P.)

SUBDIVISION REGULATIONS. Regulations governing the development of raw land for residential or other purposes. (Abrams, 1972)

SUBGRADE. The layer of natural soil or fill (compacted soil) upon which the pavement structure including curbs is constructed. (DePina, 1972)

SUBMAIN or BRANCH SEWER. A collector pipe receiving sewage from lateral sewer only. (U.S.D.P.)

SUBSISTENCE INCOME. The minimum amount of money required for the purchase of food and fuel for an average family to survive. (U.S.D.P.)

SULLAGE. Drainage or refuse especially from a house, farmyard, or street. (Merriam-Webster, 1971)

TAP (also FAUCET). A fixture for drawing a liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

TAX EXEMPTION. A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing in New York stimulated new construction in the 1920's; to ease its housing shortage, Turkey granted a ten-year tax exemption on new buildings). (Abrams, 1966)

TAX INCENTIVE. Favorable tax treatment to induce the beneficiary to do something he would not otherwise be likely to do. (U.S.D.P.)

TAX STRUCTURE - TAXATION. The method by which a nation (state, municipality) implements decisions to transfer resources from the private sector to the public sector. (U.S.D.P.)

TELEPHONE. An electrical voice communication network interconnecting all subscribing individuals and transmitting over wires. (U.S.D.P.)

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); *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. (U.S.D.P.)

TITLE. The instrument (as a deed) that constitutes a legally just cause of exclusive possession (of land, dwellings, or both). (Merriam-Webster, 1971)

TOILET. A fixture for defecation and urination, esp. water closet. (7th Collegiate Webster, 1963)

TOPOGRAPHY. The configuration of a (land) surface including its relief and the position of its natural and man-made features. (Merriam-Webster, 1971)

TRANSPORTATION. Means of conveyance or travel from one place (the site) to another (other parts of the urban context). (Merriam-Webster, 1971)

TRAP. A fitting that provides a water seal to prevent sewer gases and odors being discharged through fixtures. (ROTC ST 45-7, 1953)

TREATMENT WORKS. Filtration plant, reservoirs, and all other construction required for the treatment of a water supply. (ROTC ST 45-7, 1953)

UNIT. A determinate quantity adopted as a standard of measurement for other quantities of the same kind. (Merriam-Webster, 1971)

URBAN TRANSPORTATION. Means of conveyance of passengers or goods from one place to another along ways, routes of circulation in a metropolitan context. (U.S.D.P.)

URBANIZATION. The quality or state of being or becoming urbanized; to cause to take on urban characteristics. (U.S.D.P.)

USE TAX. The tax on land aimed primarily at enforcing its use or improvement. (U.S.D.P.)

USER INCOME GROUPS. Based upon the subsistence (minimum wage) income per year, five income groups are distinguished: *VERY LOW (below subsistence level):* the income group with no household income available for housing, services, or transportation; *LOW (1 x subsistence level):* the income group that can afford no or very limited subsidized housing; *MODERATE (3 x subsistence level):* the income group that can afford limited housing and rent only with government assistance; *HIGH (5 x subsistence level):* the income group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; *VERY HIGH (10 x subsistence level):* the income group that represents the most economically mobile sector of the population. (U.S.D.P.)

USUFRUCT. The right to profit from a parcel of land or control of a parcel of land without becoming the owner or formal leasee; legal possession by decree without charge. (U.S.D.P.)

UTILITIES. Include: water supply, sanitary sewerage, storm drainage, electricity, street lighting, gas, telephone. (U.S.D.P.)

UTILITY/SERVICE. The organization and/or infrastructure for meeting the general need (as for water supply, wastewater removal, electricity, etc.) in the public interest. (U.S.D.P.)

VALVE. A water supply distribution component which interrupts the supply for maintenance purposes. (U.S.D.P.)

VENT. A pipe opening to the atmosphere, which provides ventilation for a drainage system and prevents trap siphonage or back pressure. (ROTC ST 45-7, 1953)

VIBRATION. A quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc. (Merriam-Webster, 1971)

VIEWS. That which is revealed to the vision or can be seen (from the site). (Merriam-Webster, 1971)

WALK-UP. Dwelling units grouped in two to five stories with stairs for vertical circulation. (U.S.D.P.)

WASTE PIPE. A pipe (in a dwelling) which carries water from wash basins, sinks, and similar fixtures. (ROTC ST 45-7, 1953)

WATER SUPPLY. Source, means, or process of supplying water, (as for a community) usually involving reservoirs, pipelines, and often the watershed from which the water is ultimately drawn. (Merriam-Webster, 1971)

WATERSHED. The catchment area or drainage basin from which the waters of a stream or stream system are drawn. (Merriam-Webster, 1971)

WATERWORKS. The whole system of reservoirs, channels, mains, and pumping and purifying equipment by which a water supply is obtained and distributed to consumers. (Merriam-Webster, 1971)

WATT. Watts (w) measure the power of the flow of energy through a circuit. Wattage is the product of volts times amperes. Both watts and hosepower denote the rate of work being done. 746w = 1hp. (ROTC ST 45-7, 1953)

ZONING ORDINANCE. The demarcation of a city by ordinance into zones (areas/districts) and the establishment of regulations to govern the use of land and the location, bulk, height, shape, use, population density, and coverage of structures within each zone. (U.S.D.P.)

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EXPLANATORY NOTE

QUALITY OF INFORMATION

The quality of information given in drawings, charts and descriptions has been qualified in the following manner:

Approximate: when deducted from different and/or not completely reliable sources.
Accurate: when taken from reliable or actual sources.
Tentative: when based upon rough estimations 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 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	= 1,000 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 the U.S. equivalent;
1 U.S. dollar = 12.50 Mexican pesos (may 1976)
GNP per capita: US$ 744 (1972)