

CASE STUDIES OF LOW INCOME ENVIRONMENTS: CHIHUAHUA, MEXICO  
Surveys and a Proposal for Upgrading Settlements

by

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(1974)

SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE  
DEGREE OF  
MASTER OF SCIENCE  
at the  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
MAY, 1978

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Submitted to the Department of Architecture  
on May, 1978 in partial fulfillments of the requirements  
for the degree of Master of Science

ABSTRACT

Three settlements for low income people are described and evaluated in terms of land use, layout, utilities and community facilities. A revised layout for a better vehicular and pedestrian circulation is proposed with emphasis on community participation.

Horacio Caminos

.....  
Professor of Architecture, Thesis Supervisor

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## INTRODUCTION

Excessive public land causes several problems, for instance, when more streets and open spaces exist than are needed poor land use and bad physical control are the result. For the inhabitants the abundance of streets becomes an expensive and inadequate area and many times open spaces become rubbish dumps. For the public sector an abundance of public areas mean very expensive land to maintain and control. Provision of utilities, services and community facilities also becomes very expensive to provide.

In Chihuahua city, after 1950 many of the low income settlements have being developed on rocky and slope land. The adopted grid layout in those settlements provides more public land than desired. The installation of water and sewage networks is mainly being done by the inhabitants who constructed their own houses essentially by self-help construction techniques.

The objective of this study is to describe and

evaluate three low income settlements and to propose a revised layout for the Cerro de la Cruz and Rosario settlements. The proposal includes basic guidelines for the up-grading of the area in terms of layout, land use and population density. The proposal intents by the up-grading to direct the process of neighborhood improvement.

This study is derived from the experience of the author working with the Centro de Estudios Generales A. C. -- CEG -- and Productividad Local S. C. -- ProL -- Which are two groups of educators who have being involved in non-formal education projects. Field surveys were carried out during the summer and winter of 1977 by the author, students of social work, architecture, CEG and other institutions in Chihuahua providing complete Physical information. The inhabitants background of community work for neighborhood improvement and the CEG and ProL activities provide the opportunity to direct the process of neighborhood improvement.

# NATIONAL CONTEXT

## México

### 1. PRIMARY INFORMATION

Population	63 million
Annual Growth Rate	3.3%
Ethnic Groups	
Indian-Spanish (mestizo)	60%
American Indian	30%
Caucasian	10%
Religion	Roman Catholic
Language	Spanish
Literacy	65%
Life Expectancy	61 years
Area	1,978,750 sq. km.
Government	Federal Republic
GDP	US \$78.6 billion
GDP per capita	US \$1,267 (1976)
Official Exchange Rate	22.9 pesos=US\$1

### 2. PEOPLE

Mexico is the most populous Spanish-speaking country in the world and the second most populous country in Latin America (after Brazil). More than half of the people live in central Mexico. Many Mexicans migrate from areas lacking in job opportunities--such as in the underdeveloped southern states and the crowded central plateau--to the industrializing urban centers and the developing border areas of the northern states. Between 1960 and 1970, the population of the Federal District, which includes Mexico City, increased by 44 percent--from almost 5 million to 7 million. The northwestern region also had a sharp rise--61 percent as compared to the national average of 31 percent. Education is mandatory from ages 6 through 14 or until the primary education is completed. Primary enrollment from 1960 through 1972 increased from less than 5 million to 9.5 million. In 1970, nearly 70 percent of the population between 6 and 14 attended school. This proportion declined to 25 percent of the 15 to 19 age group. However, according to some sources, enrollments at the middle education level had quintupled since 1955. Estimates of such in-

creases suggest that enrollments will increase from 1.4 million in 1972 to as many as 2.5 million by 1980. The proportion of the 20 to 24 age group attending school dropped to 4.3 percent. Between 1959 and 1973, enrollments in institutions of higher learning increased from 62,000 to 307,000.

### 3. HISTORY

An advanced Indian civilization existed in Mexico prior to the Spanish conquest of the area. Major Indian cultures included the Olmeca, the Maya, the Tolteca and the Azteca. Cortes conquered Mexico in 1519-21 and founded a Spanish colony which lasted nearly 300 years. Independence from Spain was proclaimed by Father Miguel Hidalgo on September 16, 1810, and the republic was established on December 6, 1822. Prominent in the war for independence were Father Jose Maria Morelos, General Agustin de Iturbide, who vanquished the Spaniards and ruled as emperor for a short period; and General Antonio Lopez de Santa Ana, who controlled Mexican politics from 1833 to 1855.

The presidential terms of Benito Juarez (1858-71) were interrupted by the period of the empire. Archduke Maximiliano de Austria, who was established as Emperor of Mexico in 1865 by Napoleon III of France, was deposed by Juarez and executed in 1867. General Porfirio Diaz was President during most of the period between 1877 and 1880.

Mexico's drastic social and economic problems finally erupted in the revolution of 1910. Prominent leaders in this revolution were Francisco I. Madero, Venustiano Carranza, Francisco Villa ("Pancho Villa"), and Emiliano Zapata.

### 4. GEOGRAPHY

The topography of Mexico ranges from low desert plains and jungle-like coastal strips to high plateaus and rugged mountains. Beginning at the Isthmus of Tehuantepec in southern Mexico, an extension of a South American mountain range runs almost to Mexico City, where it divides to form the coastal Occidental (west) and Oriental (east) ranges of the Sierra Madre. Between these ranges lies the great central plateau, a rugged tableland 1,500 miles (2,400 km.) long and as much as 500 miles (800 km.) wide. From a low desert plain in the north, it

rises to 8,000 feet (2,400 km.) above sea level near Mexico City.

Mexico's climate is generally more closely related to altitude and rain fall than to latitude. Most of Mexico is dry; only about 12 percent of the total area receives adequate rainfall in all seasons, while about half is deficient in moisture throughout the year. Temperatures range from tropical in the coastal low lands to cool in the higher elevations.

### 5. GOVERNMENT

The constitution of 1917 provides for a federal republic with a separation of powers into independent executive, legislative, and judicial branches of government.

The executive branch is dominant. Executive power is vested in the President, who promulgates and executes the laws of the Congress. The executive also legislates by executive decree in certain economic and financial fields, using powers delegated from the Congress. He is elected by universal adult suffrage for a 6-year term and may not hold the office a second time. There is no Vice President; in case of the removal

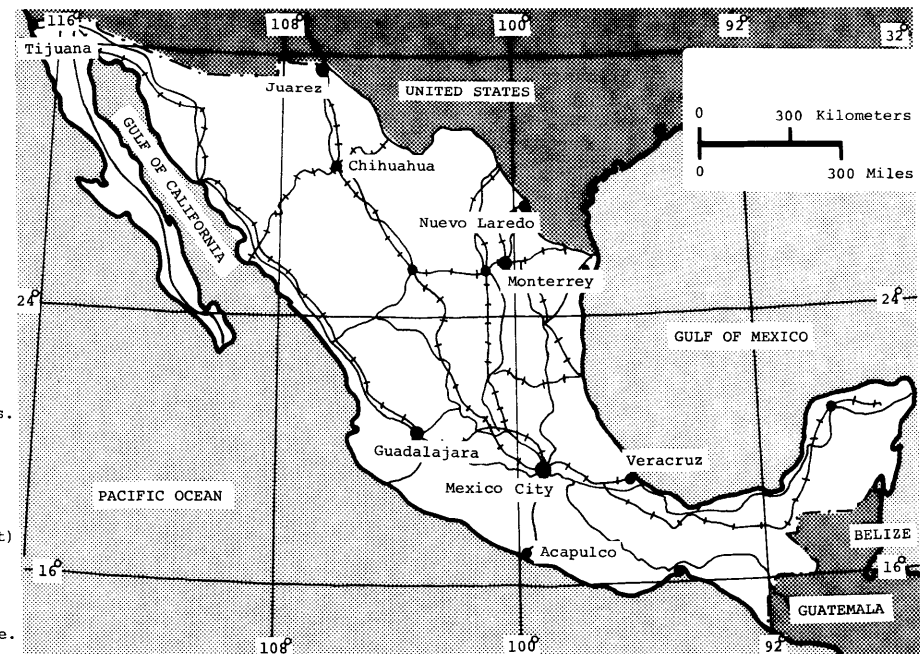
or death of the President, a provisional President is elected by the Senate.

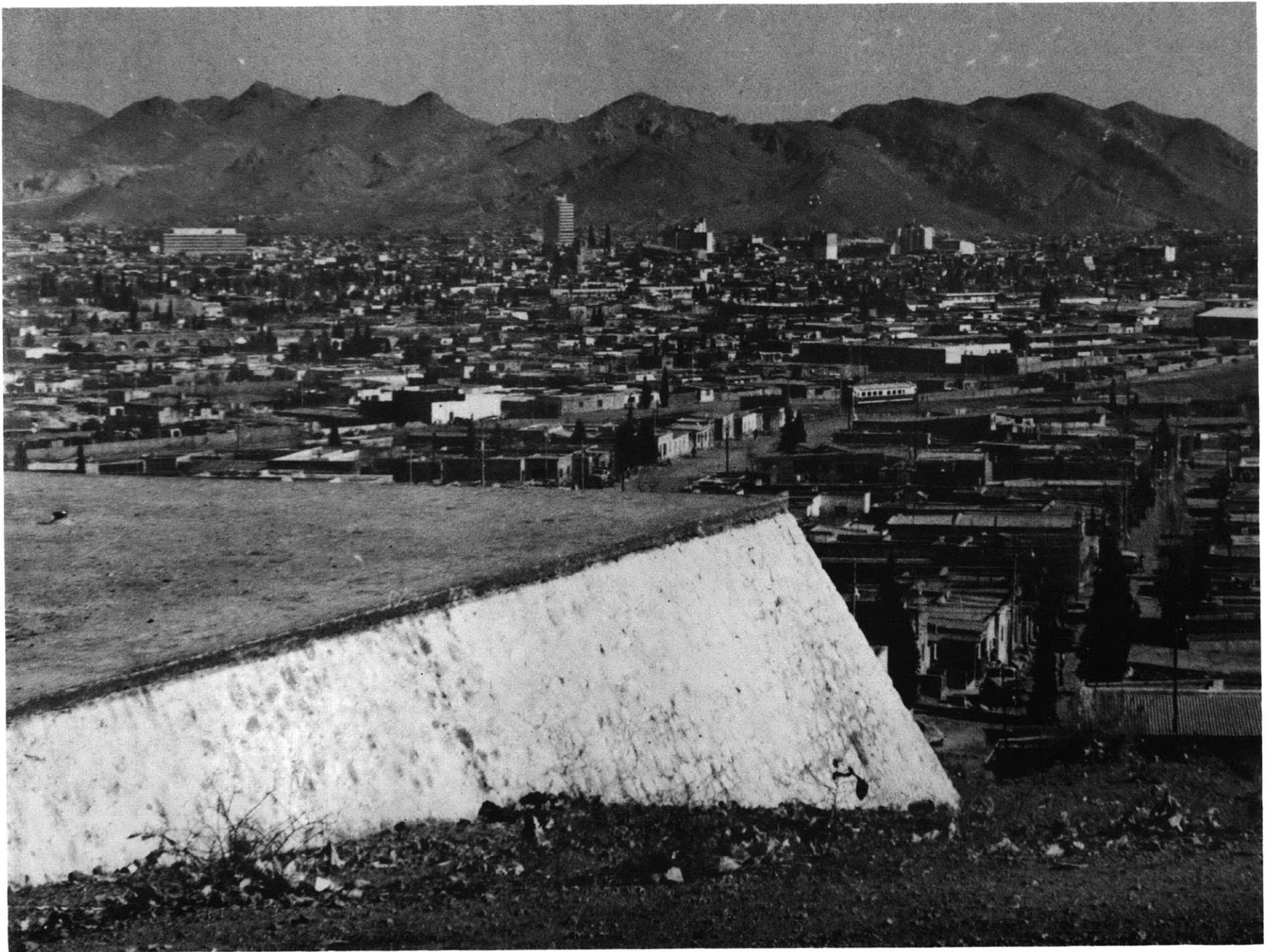
The judicial system consists of local and federal courts and a supreme court. Supreme Court Justices are appointed by the President and approved by the Senate.

Mexico has 31 States and a Federal District. Each State is headed by an elected Governor. Powers not expressly vested in the Federal Government are reserved to the States.

### 6. ECONOMY

Mexico is among the world's largest producers of silver, sulphur, lead, and zinc. Gold, copper, iron ore, and coal are also mined. Mexico has produced oil for decades, although not for many years in quantity sufficient for export. However, newly discovered oil fields will again allow her to become completely self-sufficient in the near future. Within the next 3 to 5 years, Mexico should have adequate refinery capacity to be able to export significant quantities of refined and processed petroleum products.





# URBAN CONTEXT

## Chihuahua, México

### 1. Geography

Chihuahua City is located in 28° 38' north latitude and 106° 56' west longitude. It is 1400 meters above sea level. Chihuahua is 1450 km. from Mexico City and 380 km. south west of El Paso, Texas. The city is bisected by two rivers, the Sacramento and the Chuiscar. Three dams and several wells collect the water of the Chuiscar River basin and wells along the banks of the Sacramento River provide most of the water for Chihuahua City. Smaller wells within the urban area provide the remainder of the water for the city. The average total rainfall is 330 mm per year which is concentrated in the months of July, August, and September. The temperature ranges from -4 C in winter to +38 C in the summer with 70% sunny days. The wind blows from the northeast 60% of the time and the humidity remains low.

### 2. History

Chihuahua, in the Indian Nahua language, means dry or sandy place. The Conchos and the Tarahumaras tribes inhabited Chihuahua in 1678 when the Spanish founded the mission of Nombre de Dios. Around 1706 a mission was founded on the banks of the Chuiscar River which was later to become the city of Chihuahua. The town prospered with the opening of the nearby silver mines in 1707, especially the Santa Eulalia mine. It was in Chihuahua that the prominent leaders of Independence--Father Hidalgo, Allende, Aldama, and Jimenez--were executed in 1811. During the French occupation of southern Mexico in 1864 and for more than two years during the presidency of Benito Juarez, the seat of power was established in Chihuahua. It was also in Chihuahua in 1910-20 that Francisco Villa ("Pancho Villa") was most active during the Mexican Revolution.

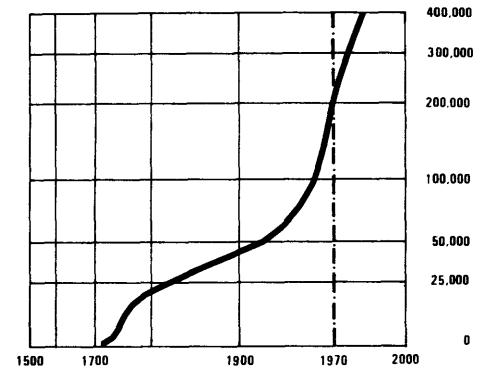
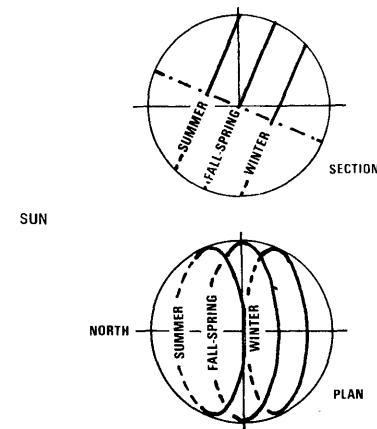
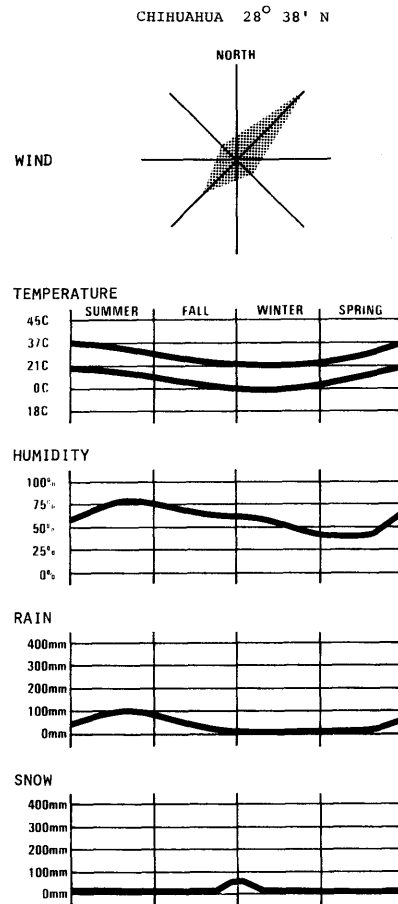
### 3. Economy

Since the Spanish colonization in the

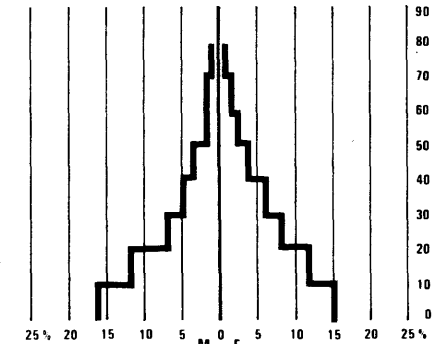
state of Chihuahua the main economic resource has been mining. In 1972 the state of Chihuahua produced 20% of the total national mining produced of lead, copper, silver, and gold. Other important economic activities include: agriculture, cattle, and lumber, which represents 36% of the labor force. The U.S. assembling industries called "maquiladoras" of electronic devices and other products for the U.S. market are also becoming important sources of employment, especially for young women. In 1974, ninety-three of those industries employed 19,100. People called "wetbacks" or "es-paldas mojadas" come to the border and cross illegally hoping to find jobs in the U.S. In 1973, 239,100 were deported to Mexico and through the Chihuahua border but only 31% had been living in the state for the previous 12 years. In 1973, 10% of legal border importations and 4% of legal exportations crossed via Chihuahua's border. The city has become the link between producing and consuming centers which is reflected in the 17% of labor force working in commercial activities. Industrial production provides jobs for 20% of the labor force and, in comparison, the growth of the city required 9% in construction jobs. As usual, the demand of services in the city is higher than other activities and provided jobs for 31% of the labor force in 1975.

### 4. Government

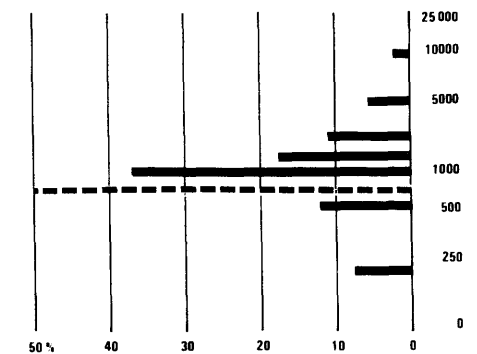
In 1561 the States of Durango, Chihuahua, Sonora and the western States of Coahuila and northern Sinaloa were called Nueva Vizcaya by Francisco de Ibarra. Nueva Vizcaya was the first political division of the area, which was subdivided into smaller areas called "provincias" or provinces. In the 17th century, Nueva Vizcaya was comprised of 12 provinces which prospered from the discovery of mines and the eventual foundation of new towns. During the 18th century, the states began to divide until, in 1823, the area now called Durango separated from Chihuahua and, in 1824, the Province of Chihuahua became a state with the new political organization. The governor of the state is elected to serve six years. The state is subdivided into 67 municipalities, each one governed by a president who serves 3 years. The city is governed by the municipal president but also Federal and State authorities have strong influence in the city.



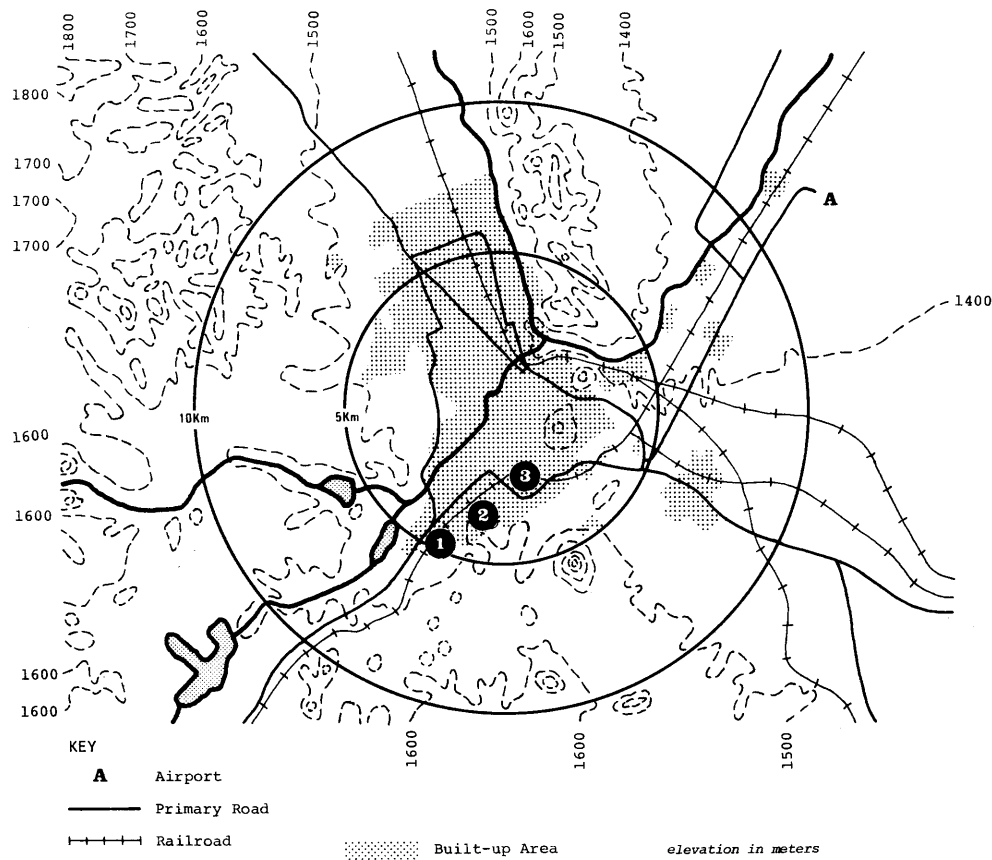
URBAN POPULATION GROWTH  
horizontal: dates vertical: population  
Source: Departamento de Economía del Gobierno del Estado



URBAN POPULATION DISTRIBUTION  
horizontal: percentages vertical: ages  
males: M females: F  
Source: Census 1970; Population 257,027



URBAN ANNUAL INCOME DISTRIBUTION  
horizontal: percentages vertical: dollars  
Official Minimum Wage -----  
Source: Census 1970; Households 62,606



### URBAN TOPOGRAPHY AND CIRCULATION

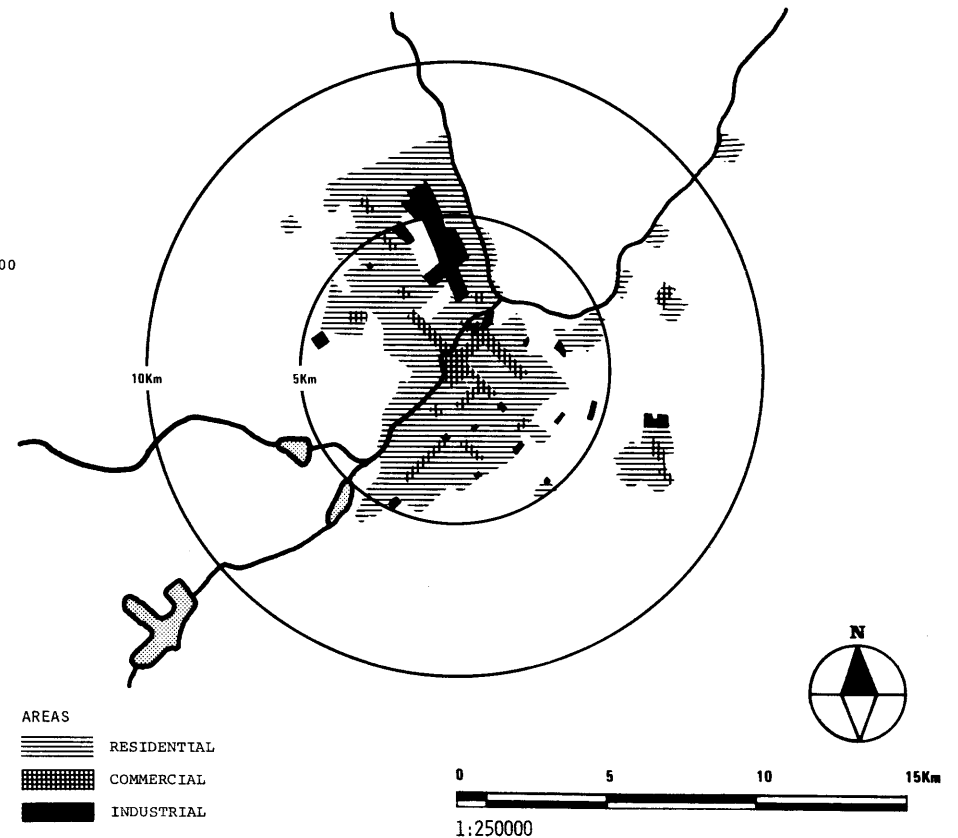
#### 5. Population

The population of the state in 1930 was approximately 500,000 and has tripled to 1,612,525 in 1970. On the other hand, the 1960 rural population was 43 percent compared to the declining population in 1970 (35 percent). Those who have migrated to the state have come from the States of Durango (33 percent), Coahuila (18 percent), Sinaloa (12 percent) and Sonora (11 percent). From 1950 to 1960 the migration gave a positive balance of 65,600 people, but between 1960 and 1970, a negative migration of 66,800 was evidenced. People migrating from the state moved to Mexico city (19 percent), Sinaloa (12 percent) and Sonora (11 percent). In 1970, the birth rate was 38.8, the death rate 7.7 per thousand, and the infant mortality rate was 65 per one thousand births.

In terms of education, in 1970 13 percent of the population was considered illiterate. 25 percent of the population under 7 years have no chance of attending education institutions. Primary education is possible for only 87 percent of the population. For the municipality, it was estimated that 34 percent of the population live in rural areas, 22 percent in suburbs and 44 percent in urban areas. Social structure is based on incomes, approximately 2.5 percent of the population have incomes of 9,600 U.S. P.A. and 20 percent of the population have incomes lower than 400 U.S. P.A.

#### 6. Topography and Circulation

The city lies on a gently sloping area bounded at the east and south by a narrow



### URBAN LAND USE PATTERN

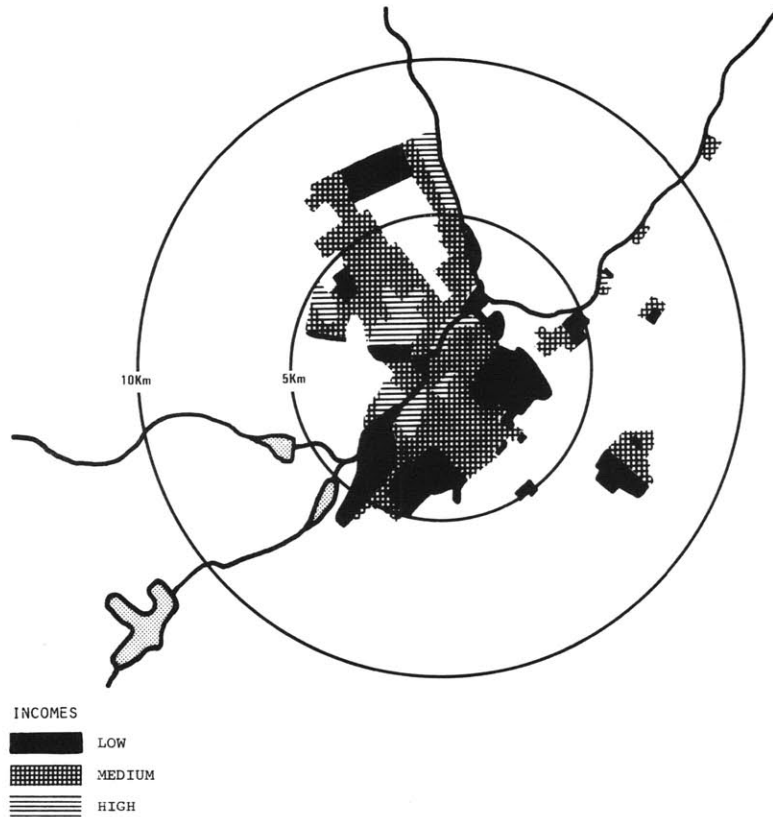
chain of hills 400 m. high. The built-up area extends on sloping land to the southern and western boundaries. To the north the city extends through the Sacramento River valley (10 km. wide) which runs north to south. The Chuviscar River crosses the city from southwest to northeast and intersects the Sacramento River on the eastern part of the city. The city is connected by highway, railroad and airplane to Juarez, Monterrey and Mexico City; by highway and railroad to Ojinaga and Cuauhtemoc, and by unpaved road and airplane to the forest lands. The city's circulation network provides a peripheral highway which circumvents the actual built-up area and connects the approaches to the city. The interior network provides some freeways and secondary streets. The new city is being developed

by the "car culture" in which many new, wide, straight streets are provided despite the location, site topography or inhabitants' income. The city public transportation is comprised by four private bus companies which run 18 hours a day, and provide 80 percent of the city's requirements.

#### 7. Land Use

The old city became the main commercial district and the houses in the area are gradually being transformed for commercial purposes. Major arteries linking the commercial district with residential areas are the axes where commercial activities extend to new neighborhoods. Approaches to the city are gradually surrounded by warehouses.





**INCOMES**  
 ■ LOW  
 ▨ MEDIUM  
 ▨ HIGH

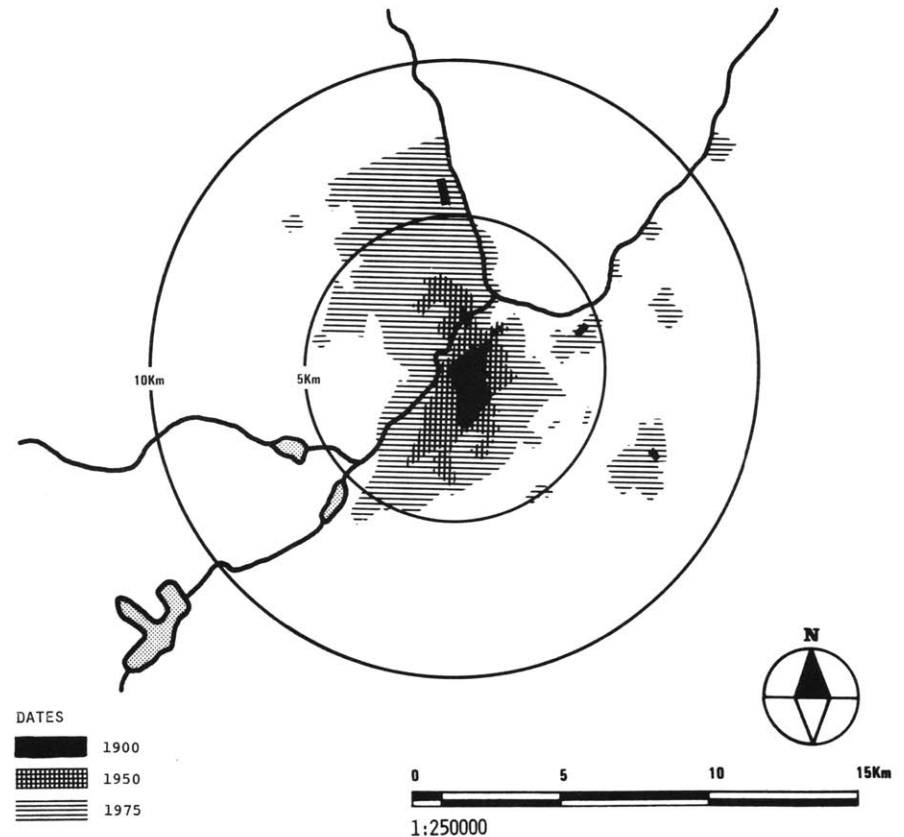
**URBAN INCOME PATTERN**

Gas and oil networks from central Mexico, railroad and highways are provided in the north of the city, where cement, steel, food, clothes and other industries are located; lighter industries are scattered throughout the city. Land value and land prices are estimated either based on availability of services, distance to commercial district or real estate agents' judgment. Air pollution is most evident in the winter time. During the night, solid particles from industries, house heating and cars combine with atmospheric and topographic conditions to develop a layer of smog on the lower elevations of the city and visibility is zero within 5 km. The Sacramento River and the Chuviscar River are also polluted, primarily by private wastes. At the intersection of both rivers, sewer mains dump

untreated sewage from the whole city and the effluent is used for irrigation of agriculture land.

**8. Urban Income**

Upper income people still live in the old city area, but high income settlements have been developed during the past 20 years, within the 5 km. circle. The exception is made of those farms located on the banks of the Sacramento River where the high income classes have weekend houses. Lower income groups live on slope areas where land value is lower because of the lack of utilities, services, and community facilities. An increasing demand of land for speculative housing, policies of brokers and lack of employment finally erupted in invasion of



**DATES**  
 ■ 1900  
 ▨ 1950  
 ▨ 1975

0 5 10 15Km  
 1:250000

**URBAN GROWTH PATTERN**

private land. Approximately 50,000 people in Chihuahua live in squatter settlements, the largest one--Colonia Villa--started in 1968 and now has a population of 40,000 people. Other smaller groups of squatters in the city are located along streams and on slope land. A few private companies own a large percentage of the land around the built-up area which leads to speculative development.

**9. Urban Growth**

Since the City's founding until 1900 the City had developed mainly on the south side of the Chuviscar River, due to the activities between Chihuahua--the urban area--and Santa Eulalia--mining center-- and also in part due to the rainy seasons'

floods which isolated the northern area. It was after 1950 when access across the river improved, allowing the growth of the city on the north banks of the river. Because natural boundaries on the south and better access, the northern part of the city is becoming larger than the southern, although most commercial activities, services, recreation centers and government offices are located in the old city.

The growth is uneven because of a lack of land use regulations and standards for development; the resultant urban sprawl has made the utilities and services difficult to provide. Generally water is scarce and the service is poor. Also, sewage disposal when provided, is plagued with frequent overflows.



## CASE STUDIES

The three localities presented in this section are located in Southern Chihuahua city. They represent a typical area of low income settlements in the city.

The case studies are presented 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 x 400m is taken from each locality.

**TYPICAL BLOCK:** A typical block is selected in order to compare land utilization.

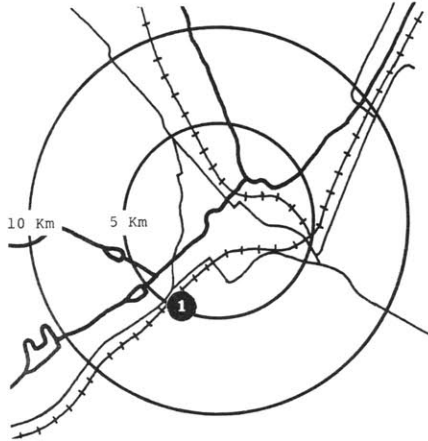
**DWELLING UNIT:** A typical self-contained unit for an individual, a family or a group, in each locality.

The case studies are the following :

1. MARGARITA MAZA-BUROCRACTICA  
Public, Middle low/ low income, Periphery
2. CERRO DE LA CRUZ  
Private, Low/ very low income, Periphery
3. ROSARIO-DALE  
Private, Middle low/ low income, Periphery

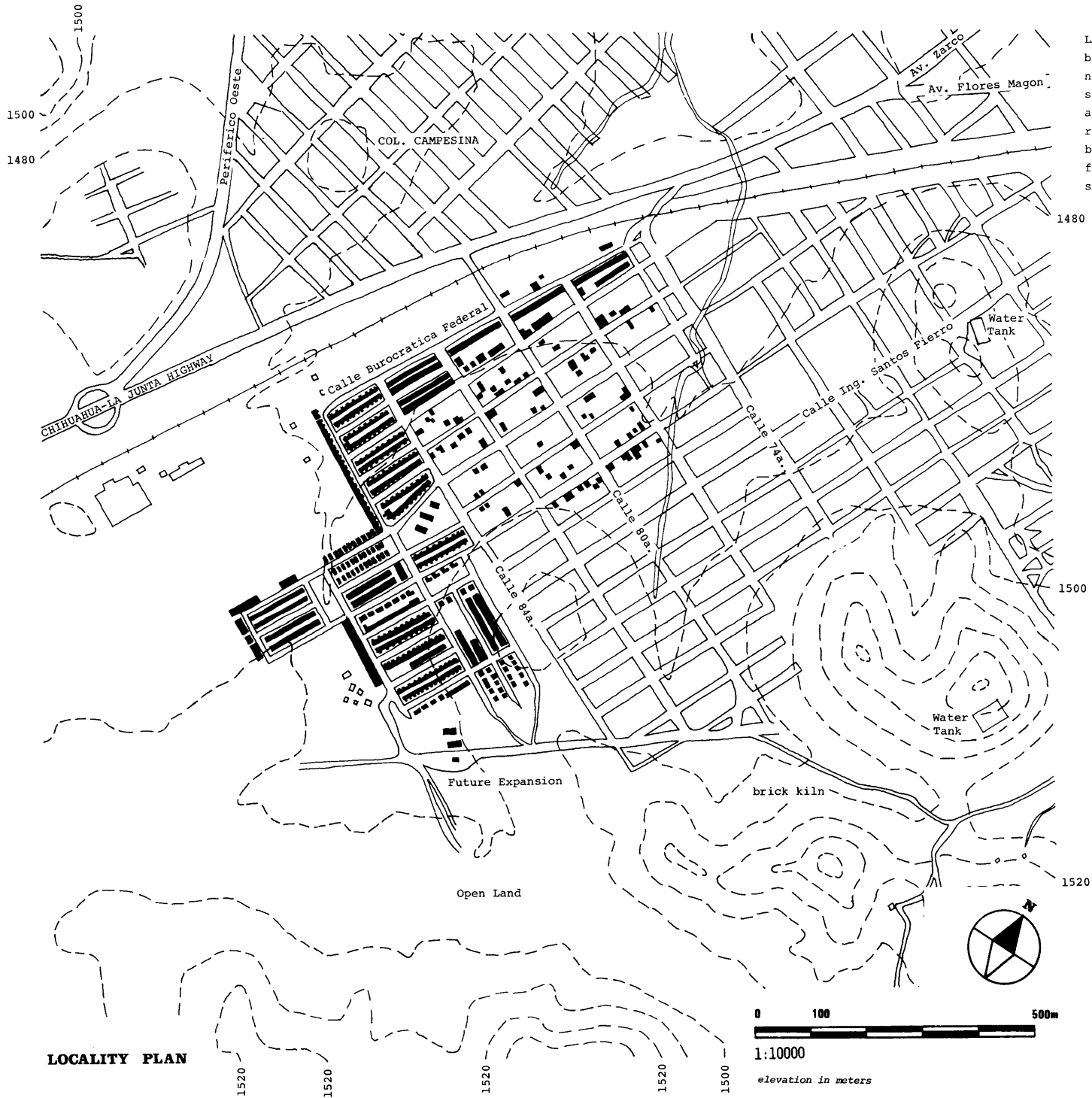
# 1 MARGARITA MAZA- BUROCRATICA

PUBLIC, MIDDLE LOW / LOW INCOME, DETACHED HOUSES



**GENERAL INFORMATION:** The Margarita Maza-Burocratica neighborhood is located on the southern part of the city. The settlement is bounded by the Chihuahua al Pacifico Railroad, a factory, open land and a quarter settlement on the north, west, south and east sides respectively. This neighborhood houses both a state government housing program--Burocratica I, Burocratica II--and a Federal Government Housing Program for Workers, INFONAVIT--Cuauhtemoc I, Cuauhtemoc II-- and covers an area of 30 ha. Of this area, 13 ha. have been totally developed with 473 houses and infrastructure. The remaining 17 ha. are partially developed with 147 houses and high percentage of empty lots. Cuauhtemoc I is the first INFONAVIT project in the city and was opened in 1973, Burocratica I was opened in 1972. The Cuauhtemoc II and Burocratica II were opened in 1976.









LAYOUT: A grid layout forming long narrow blocks 30 m. x 130 m. provides the circulation network mainly created on car circulation standards. Of the total area, 36 percent is attributed to circulation. The street widths range from 12 m. to 20 m. and link the neighborhood to the 80a. street, the only access from the Chihuahua-LaJunta Highway to the settlement.


LOCALITY PLAN

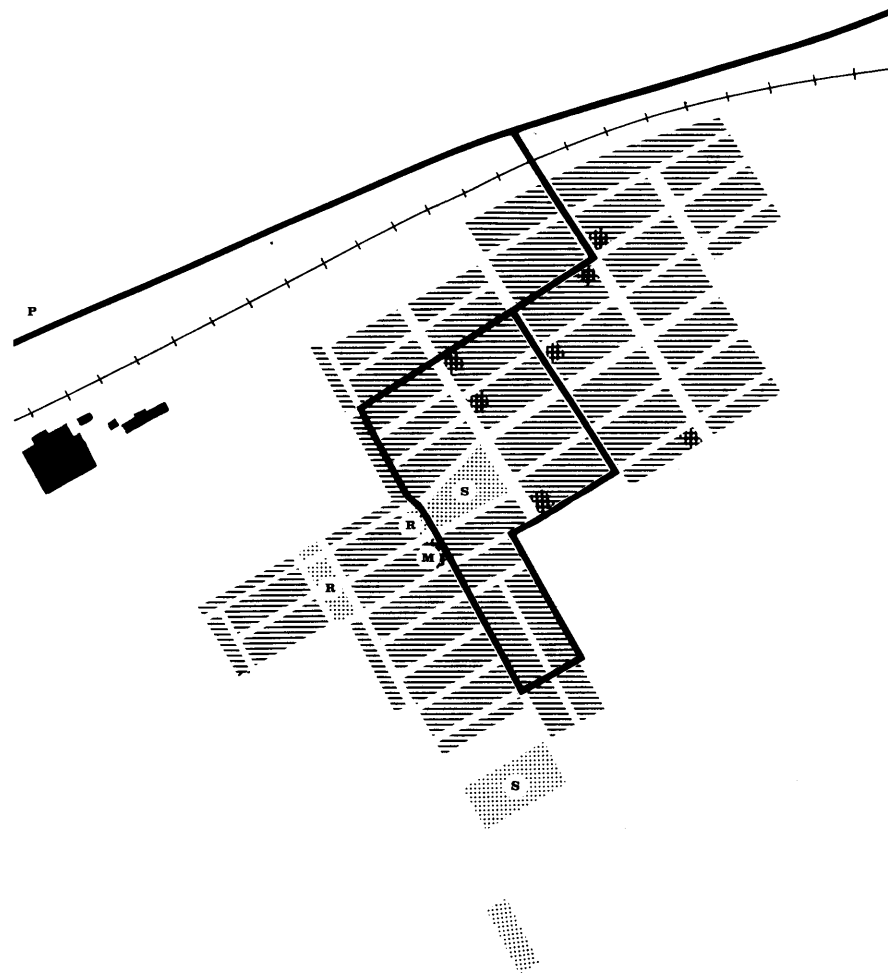
LAND USE: One central market was provided with the original design. However, another seven corner shops had opened by 1977. There are two primary schools and one house is being used for kindergarden classes. Two playgrounds are located within the neighborhood and flat open land on the south and north is used for baseball games. One community center has been provided for popular activities and one Health Rabies Control Center is located in the south, where future expansion of the settlement is planned. One taxi stand is located in the neighborhood and one public telephone is provided on the 84a. street. One existing bus line extended its service linking the area with another neighborhood and the commercial district.

## AREAS

	RESIDENTIAL
	COMMERCIAL
	INDUSTRIAL
	OPEN SPACES

## KEY

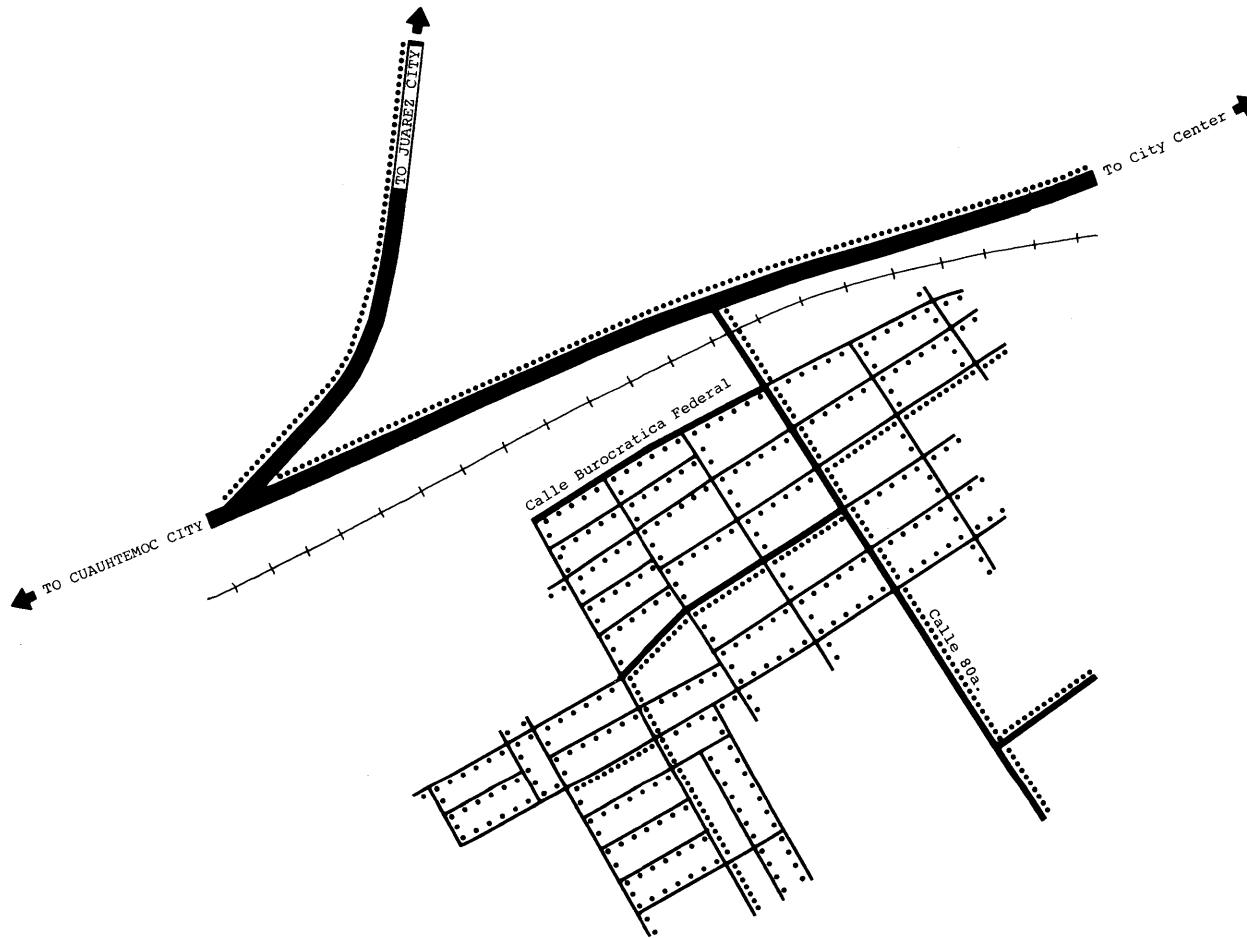
<b>Pk</b>	Parking
<b>P</b>	Police
<b>F</b>	Fire Department
<b>S</b>	School
<b>Ch</b>	Church
<b>R</b>	Recreation
<b>L</b>	Library
<b>U</b>	University
<b>H</b>	Health
<b>PO</b>	Post Office
<b>SS</b>	Social Services
<b>M</b>	Market
<b>C</b>	Cemetery
	Bus



LOCALITY LAND USE PATTERN

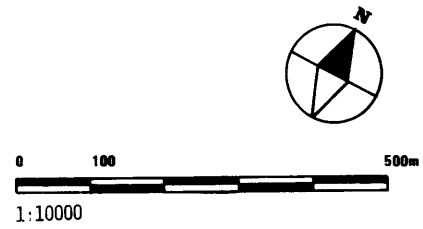


CIRCULATION: All the streets are paved and provided with paved sidewalks and most have a narrow unpaved strip for plants. Vehicular streets are mainly used by pedestrians and children either riding bicycles or playing. Private and commercial vehicles are secondary users of the streets. Trucks carrying either dirt or bricks from the surrounding brick kilns, use the 80a. street on their way to construction areas. The most important service to the community, but the least in frequency, is the public transportation which links the settlement with other settlements, the commercial district and several middle income areas.



KEY  
 ————— VEHICULAR  
 ..... PEDESTRIAN

LOCALITY CIRCULATION PATTERN



POPULATION: The inhabitants of the area are approximately 4,100 people. Most of the lower income class live in "Unidades Cuauhtemoc" and account for 65 percent of the population, composed of workers earning at least the minimum legal salary. The upper income class lives in the "Colonias Curocraticas" and is composed of state office employees. Their houses are longer and some different materials have been used than those used in the Unidades Cuauhtemoc. The settlement was constructed mainly in two stages--one in 1973 and the last in 1976--by private contractors who developed the project consisting of detached and semi-detached row houses made of brick and concrete. The houses were designed with little intent of needing modification by the inhabitants as of 1977, 44 percent of the houses finished in 1973 and 79 percent of those from 1976 had been modified by the families.

## LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	376	9.72	38.7
DWELLING UNITS	376	9.72	38.7
PEOPLE	1878	9.72	193.0

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	3.9	40
SEMI-PUBLIC (open spaces, schools, community centers)	0.75	8
PRIVATE (dwellings, shops, factories, lots)	5.07	52
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	9.72	100

## NETWORK EFFICIENCY

Network length (streets, walkways) = 330m/ha  
Areas served (total area)

400m —  
300m —  
200m —  
100m —  
0m —



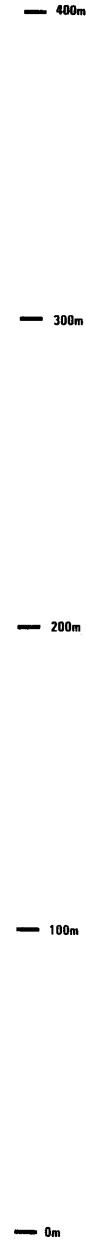
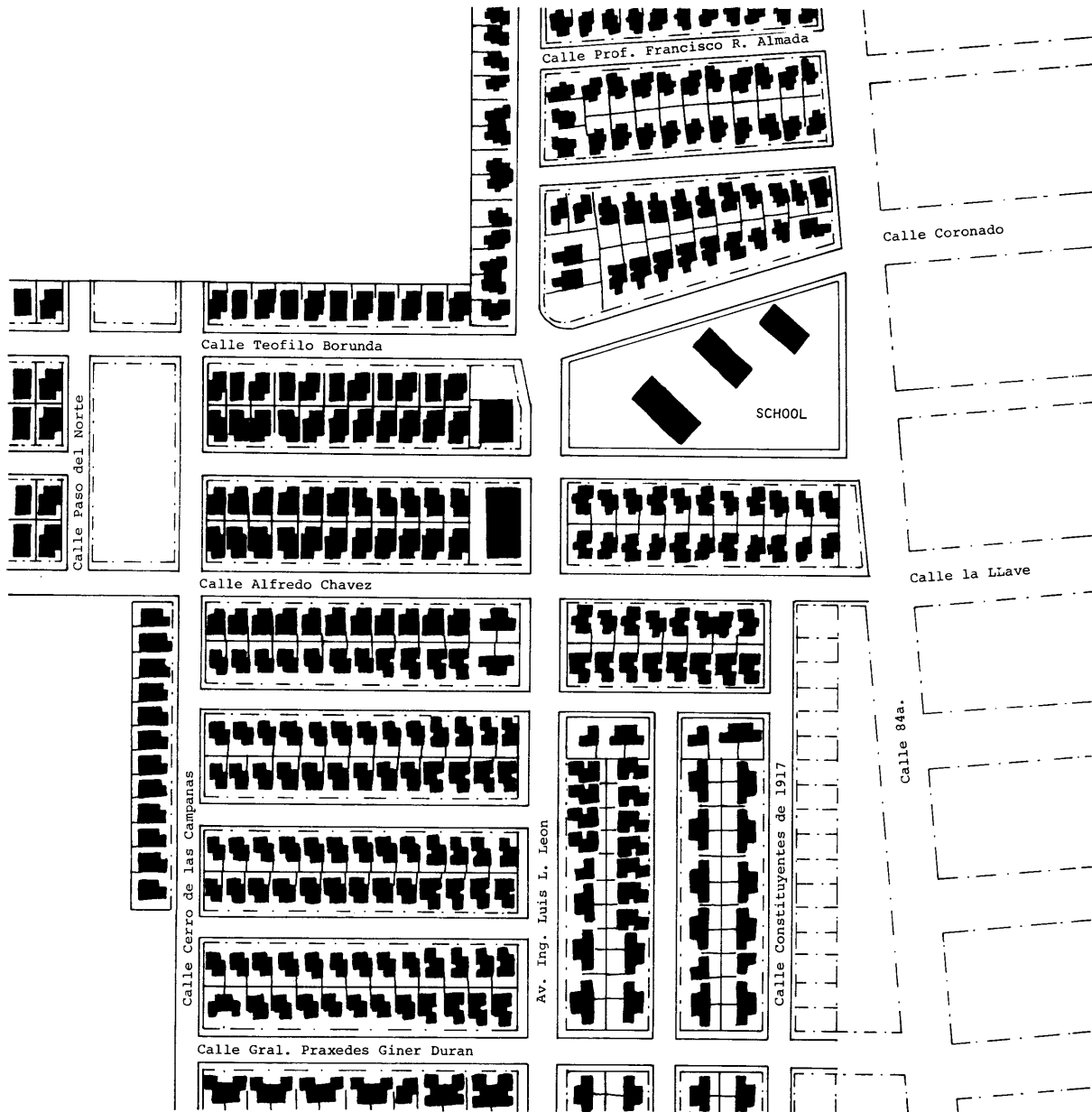
LOCALITY SEGMENT AIR PHOTOGRAPH

0 50 100 150m

1:2500







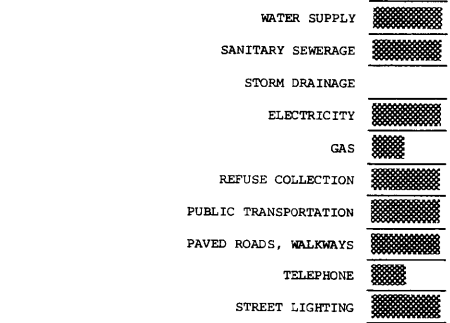
LOCALITY CONSTRUCTION TYPES

	%	SELF-HELP	ARTISAN	SMALL CONTRACTOR	LARGE CONTRACTOR
SHACK	_____				
MUD/WATTLE	_____				8
WOOD	_____				
MASONRY WOOD	_____				
MASONRY CONCRETE	_____	1	1	1	97
CONCRETE	_____				

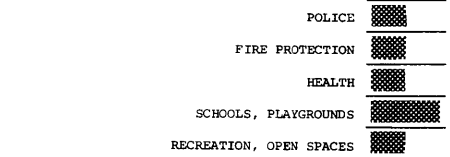
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) approximate percentage of dwellings built by each group.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



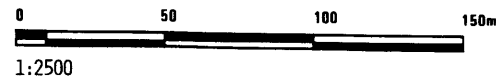
LOCALITY COMMUNITY FACILITIES



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

Quality of information: Approximate

LOCALITY SEGMENT PLAN



## PHYSICAL DATA

(related to dwelling and land)

## DWELLING UNIT

type: House  
 area (sq m): 59  
 tenure: Legal ownership

## LAND/LOT

utilization: Private  
 area (sq m): 135  
 tenure: Legal ownership

## DWELLING

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

## DWELLING DEVELOPMENT

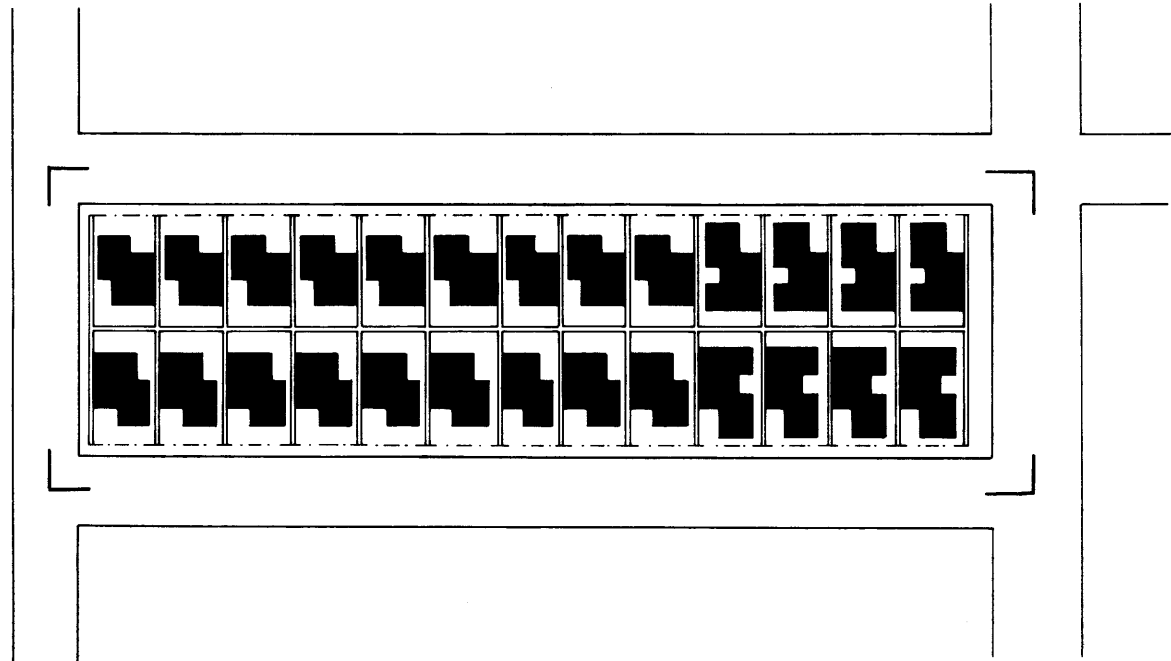
mode: Instant  
 developer:  
 builder: Public/private  
 construction type: Brick/concrete  
 year of construction: 1976

## MATERIALS

foundation: Stone  
 floors: Tile  
 walls: Brick  
 roof: Concrete

## DWELLING FACILITIES

wc: 1  
 shower: 1  
 kitchen: 1  
 rooms: 3  
 other: -

SOCIO-ECONOMIC DATA  
(related to user)

GENERAL: SOCIAL  
 user's ethnic origin: Northern  
 place of birth: Chihuahua  
 education level: Primary

## NUMBER OF USERS

married: 2  
 single: -  
 children: 5  
 total: 7

## MIGRATION PATTERN

number of moves: 1  
 rural - urban: -  
 urban - urban: 1  
 urban - rural: 1  
 why came to urban area: 1

## GENERAL: ECONOMIC

user's income group: Low  
 employment: Industry employee  
 distance to work: 8 km  
 mode of travel: Bus

## COSTS

dwelling unit: 9680.00  
 land - market value: -

## DWELLING UNIT PAYMENTS

financing: Public subsidized  
 rent/mortgage: -  
 % income for rent/mortgage: -

## LOCALITY BLOCK PLAN

0 10 50m  
 1:1000

## LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	26	.35	74
DWELLING UNITS	26	.35	74
PEOPLE	186	.35	532

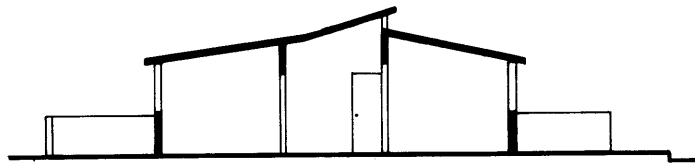
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.20	36
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.35	64
SEMI-PRIVATE (cluster courts)	-	-
<b>TOTAL</b>	<b>.55</b>	<b>100</b>

## NETWORK EFFICIENCY

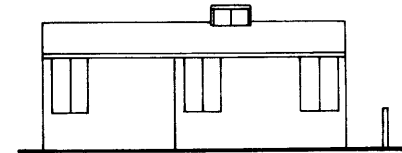
Network length (streets, walkways) = 273m/ha  
 Areas served (total area)

## LOTS

Average area = 135m<sup>2</sup>



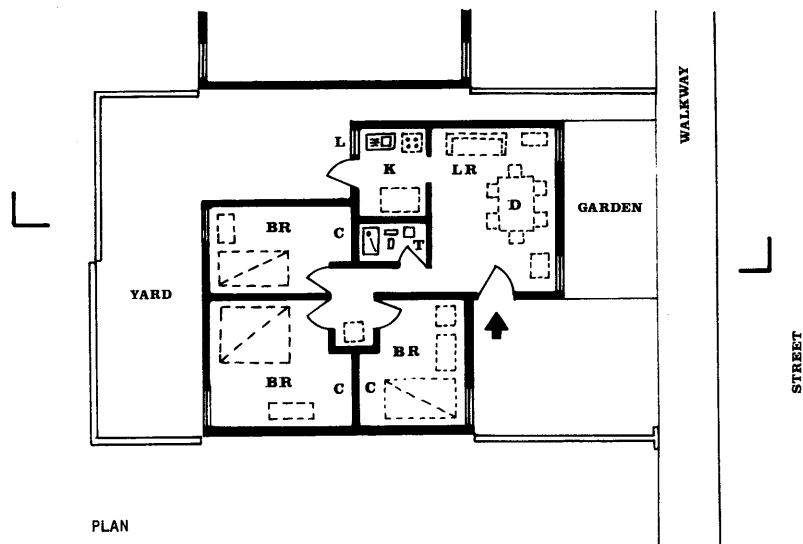
SECTION



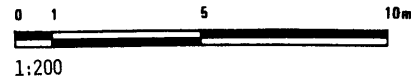
ELEVATION

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)



PLAN



TYPICAL DWELLING

NATIONAL CONTEXT SOURCES

- General Information: "Back Ground Notes Mexico"  
Department of State, U.S.  
Government Printing Office  
1975.
- "Housing and Urban Development  
in Mexico", U.S. Department  
of housing and Urban Develop-  
ment, 1977.

URBAN CONTEXT SOURCES

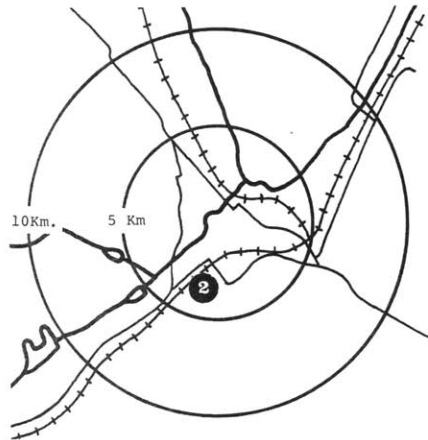
- Topography and  
Circulation: (accurate) Carta Topografica  
Provisional, Chihuahua,  
CETENAL, 1975.
- Land Use Pattern: (approximate) Field Surveys,  
1977-78.
- Income Pattern: (approximate) IBID
- Growth Pattern: (approximate) IBID
- Climate: (approximate) Boletin  
Meteorologico No. 10, Estado  
de Chihuahua.
- General Informa-  
tion: Census, 1970.  
Photograph: Margarita O. Robles, 1978.

LOCALITY SOURCES

- Plan: (accurate) CETENAL Airphoto,  
1974, TelMex Airphoto, 1975,  
INFONAVIT plans, field sur-  
veys, 1977-78.
- Land Use Pattern: (approximate) Field Surveys  
1977-78.
- Circulation Pattern: (approximate) IBID
- Segment Plan: (accurate) CETENAL Air  
Photograph, 1974, INFONAVIT  
plans.
- Block Plan: (accurate) INFONAVIT Plan.
- Typical Dwelling: (approximate) Field Surveys  
1977.
- Physical Data: (accurate) IBID
- Photographs: CETENAL (photogrammetry),  
1974. Gabriel Camara, the  
author 1977-78.
- General Information: (approximate) Field Surveys,  
1977-78.

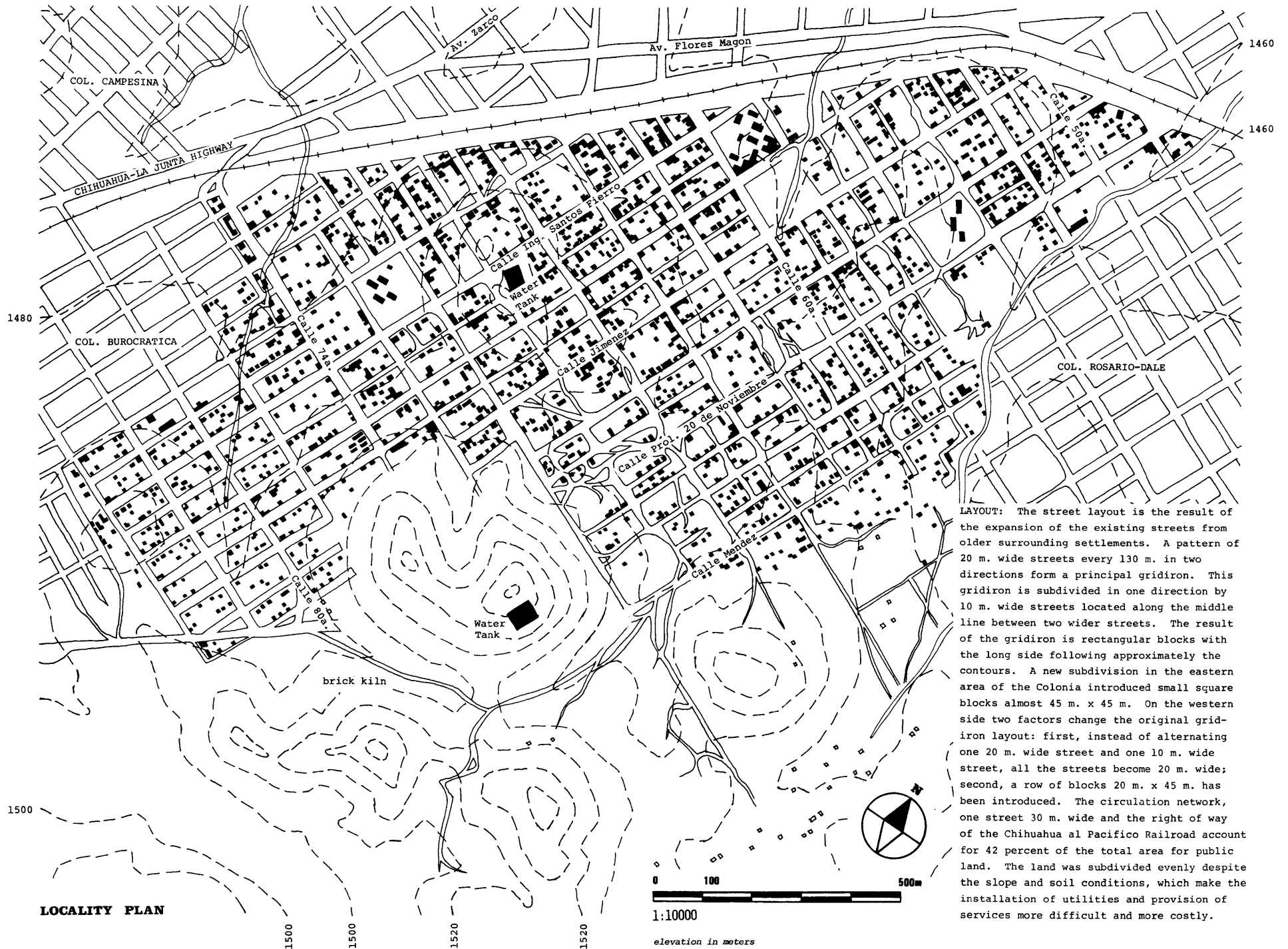
## 2 CERRO DE LA CRUZ

PRIVATE, LOW / VERY LOW INCOME, ROW HOUSES



GENERAL INFORMATION: The Colonia Cerro de la Cruz is located on the south side of the Chihuahua al Pacifico Railroad and its limits are defined by the Colonia Margarita Mazadale on the east and by open land on the south. In 1962 when the land was sold, neither utilities nor services were provided. Due to this situation, it was not possible to acquire legal tenure of the land. The speculative development covers 160 ha. of land on which slopes range from 10 percent to 30 percent. The streets are not poured and sidewalks have not been provided, but street lighting is already working.





LAYOUT: The street layout is the result of the expansion of the existing streets from older surrounding settlements. A pattern of 20 m. wide streets every 130 m. in two directions form a principal gridiron. This gridiron is subdivided in one direction by 10 m. wide streets located along the middle line between two wider streets. The result of the gridiron is rectangular blocks with the long side following approximately the contours. A new subdivision in the eastern area of the Colonia introduced small square blocks almost 45 m. x 45 m. On the western side two factors change the original gridiron layout: first, instead of alternating one 20 m. wide street and one 10 m. wide street, all the streets become 20 m. wide; second, a row of blocks 20 m. x 45 m. has been introduced. The circulation network, one street 30 m. wide and the right of way of the Chihuahua al Pacifico Railroad account for 42 percent of the total area for public land. The land was subdivided evenly despite the slope and soil conditions, which make the installation of utilities and provision of services more difficult and more costly.

LOCALITY PLAN

1:10000





elevation in meters



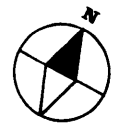
KEY

- Pk Parking
- F 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

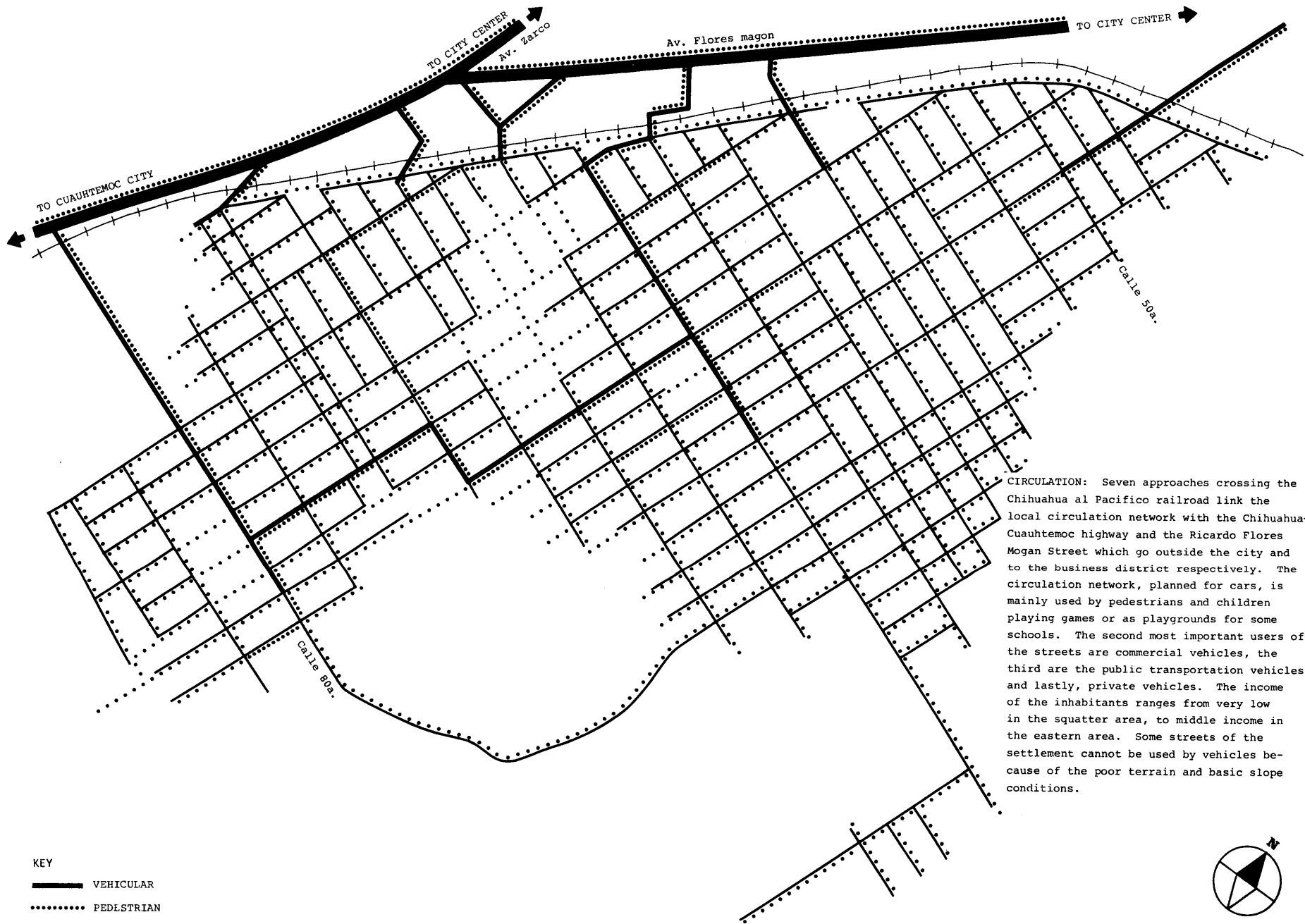
AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

LAND USE: The actual land use pattern is the result of gradual development. The settlement contains 7 schools and 2 churches, one play ground and one community center which are provided by the municipality. Approximately 60 corner shops serve the area, with the more prosperous shops selling tanked gas in the neighborhood. Two water tanks are located within the area, one water storage tunnel and one water well which are part of the city's water network. No heavy industry is located within the area, only some small workshops spot the settlement. To the south, the dry river beds provide dirt and places where brick ovens have been installed, providing some jobs for the inhabitants. Three public telephones have been installed. Two private bus lines provide transportation to the city center and to the University.



LOCALITY LAND USE PATTERN



CIRCULATION: Seven approaches crossing the Chihuahua al Pacifico railroad link the local circulation network with the Chihuahua-Cauahatemoc highway and the Ricardo Flores Mogan Street which go outside the city and to the business district respectively. The circulation network, planned for cars, is mainly used by pedestrians and children playing games or as playgrounds for some schools. The second most important users of the streets are commercial vehicles, the third are the public transportation vehicles and lastly, private vehicles. The income of the inhabitants ranges from very low in the squatter area, to middle income in the eastern area. Some streets of the settlement cannot be used by vehicles because of the poor terrain and basic slope conditions.

KEY  
 ——— VEHICULAR  
 ..... PEDESTRIAN

LOCALITY CIRCULATION PATTERN



POPULATION: There are 9,500 people in the area. Due to unemployment or subemployment their incomes fall below the minimum legal salary and they are not eligible for the public housing programs benefits. Many in Chihuahua's periphery came from the country to the city about 16 years ago hoping to find jobs, better health services or education for their families. As a result of their economic situation they settled in this speculative development on slope land and within proximity of the city. The self-sufficiency of the inhabitants has been proved through 16 years of improvements. Within the Colonia, 70 percent of the houses were self-constructed and 24 percent were constructed by artisans. The inhabitants have worked in the trench digging and back filling for the installation of water and sewage networks, which are already working in 80 and 60 percent of the total area respectively. Also, through the sector groups of the Colonia, they have worked to improve the schools and to acquire legal tenure of the land.

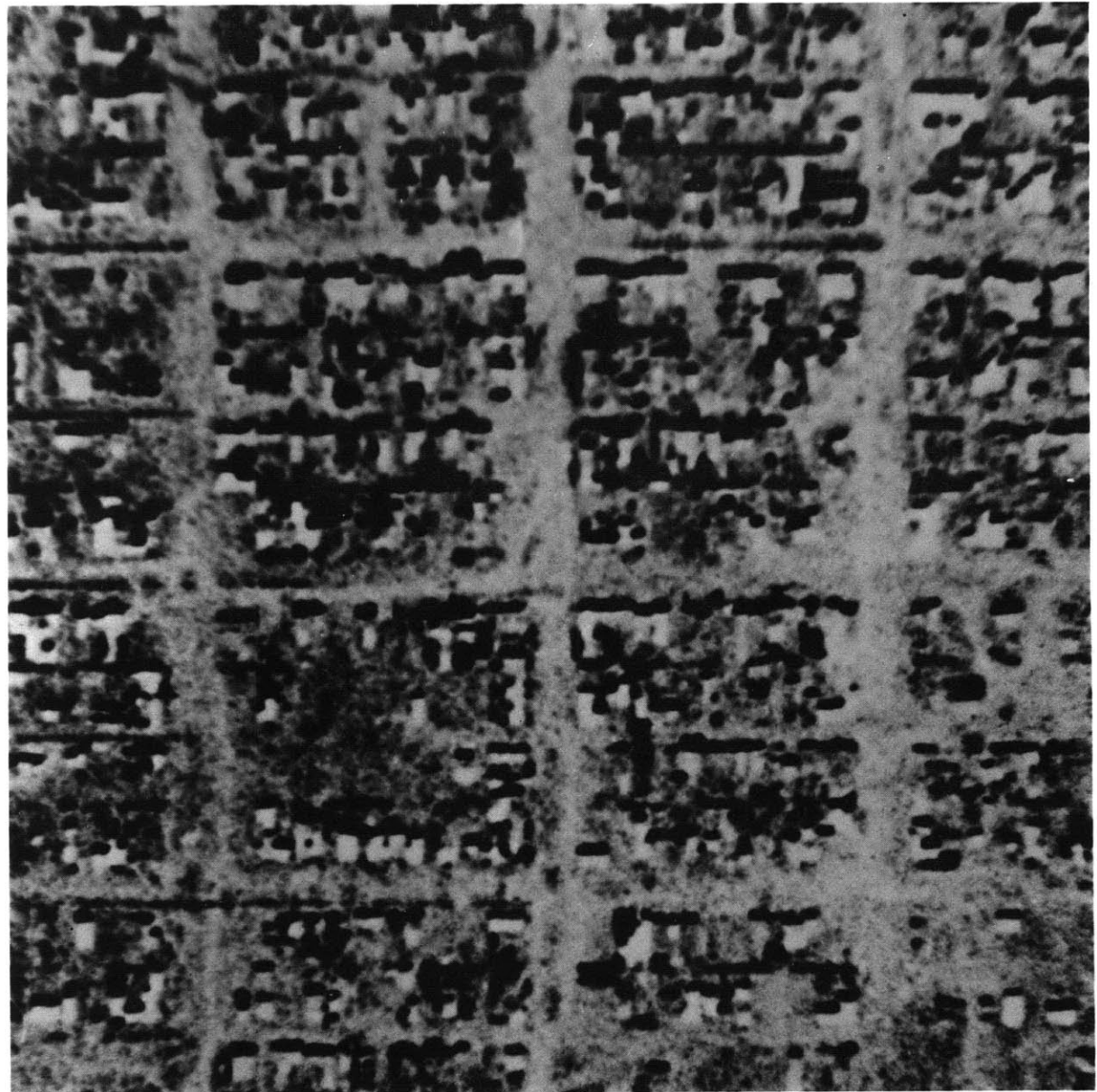
## LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	392	16	24.5
DWELLING UNITS	300	16	18.7
PEOPLE	2100	16	131.2
AREAS		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		7.16	45
SEMI-PUBLIC (open spaces, schools, community centers)		-	-
PRIVATE (dwellings, shops, factories, lots)		8.84	55
SEMI-PRIVATE (cluster courts)		-	-
TOTAL		16	100

## NETWORK EFFICIENCY

Network length (streets, walkways) = 250m/ha  
 Areas served (total area)

400m —  
 300m —  
 200m —  
 100m —  
 0m —



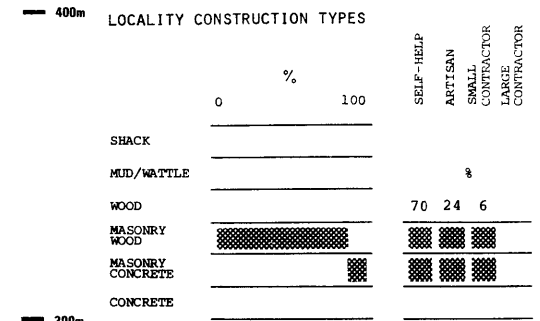
LOCALITY SEGMENT AIR PHOTOGRAPH

0 50 100 150m

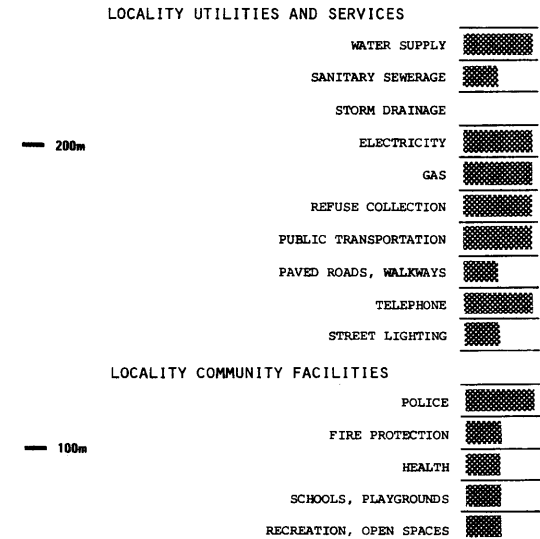
1:2500





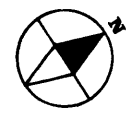


The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) approximate percentage of dwellings built by each group.  
Quality of information: Approximate



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

0m



LOCALITY SEGMENT PLAN

## PHYSICAL DATA

(related to dwelling and land)

## DWELLING UNIT

type: House  
 area (sq m): 42.5  
 tenure: Legal ownership

## LAND/LOT

utilization: Private  
 area (sq m): 200  
 tenure: Legal ownership

## DWELLING

location: Periphery  
 type: Semi-detached  
 number of floors: 1  
 utilization: Single  
 physical state: Fair

## DWELLING DEVELOPMENT

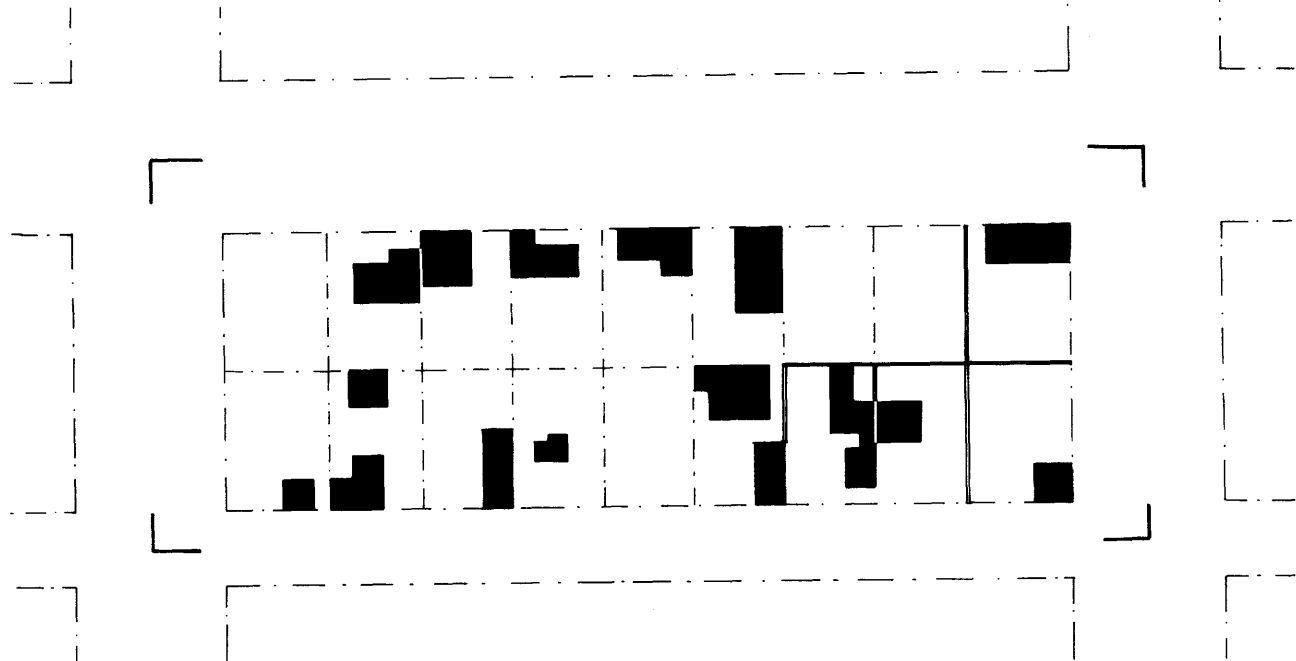
mode: Incremental  
 developer: Private  
 builder: Self-help  
 construction type: Adobe  
 year of construction: 1973

## MATERIALS

foundation: Stone  
 floors: Earth  
 walls: Adobe  
 roof: Wood/metal sheet

## DWELLING FACILITIES

wc: None, backyard  
 shower: -  
 kitchen: In the room  
 rooms: 2  
 other: Poultry



## SOCIO-ECONOMIC DATA

(related to user)

## GENERAL: SOCIAL

user's ethnic origin: Northern  
 place of birth: -  
 education level: Primary

## NUMBER OF USERS

married: 2  
 single: 2  
 children: 6  
 total: 10

## MIGRATION PATTERN

number of moves: 4  
 rural - urban: 1  
 urban - urban: 3  
 urban - rural: -

why came to urban area: Employment

## GENERAL: ECONOMIC

user's income group: Very low  
 employment: Construction employee  
 distance to work: 10 km  
 mode of travel: Bus

## COSTS

dwelling unit: -  
 land - market value: -

## DWELLING UNIT PAYMENTS

financing: Self-financed  
 rent/mortgage: -  
 % income for rent/mortgage: -

## LOCALITY BLOCK PLAN

0 10 50m  
 1:1000

## LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	20	.4	50
DWELLING UNITS	14	.4	35
PEOPLE	84	.4	210

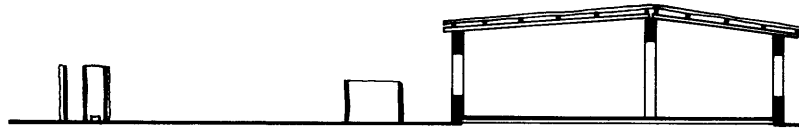
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.27	40
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.4	60
SEMI-PRIVATE (cluster courts)	-	-
<b>TOTAL</b>	<b>.67</b>	<b>100</b>

## NETWORK EFFICIENCY

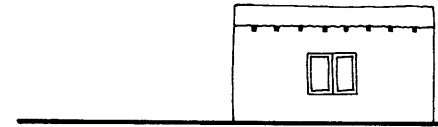
Network length (streets, walkways) = 273m/ha  
 Areas served (total area)

## LOTS

Average area = 216m<sup>2</sup>



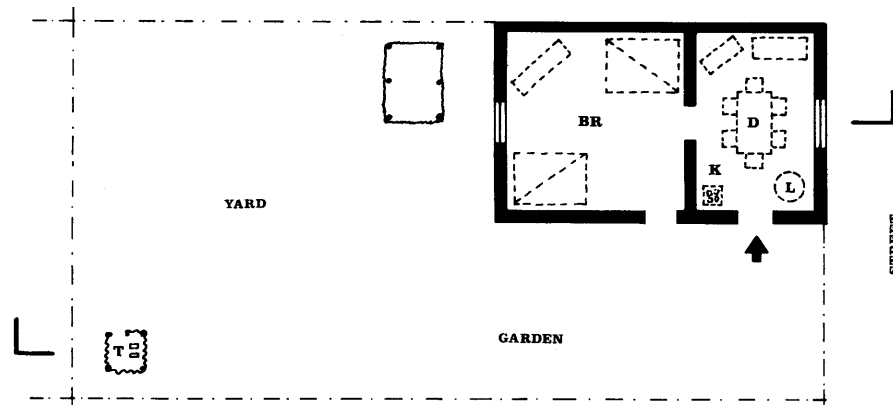
SECTION



ELEVATION

KEY

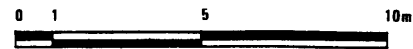
- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



PLAN

LOCALITY SOURCES

- Plan: (approximate) CETENAL Air-photo, 1975. Obras Publicas plans.
- Land Use Pattern: (approximate) Field Surveys, 1977-78
- Circulation Pattern: (approximate) IBID
- Segment Plan: (accurate) CETENAL Air Photograph, 1974, Obras Publicas Plans.
- Block Plan: (approximate) Obras publicas Plans, Field Surveys, 1977.
- Typical Dwelling: (approximate) Field Surveys 1977.
- Physical Data: (accurate) IBID
- Photographs: Clara Bargellini, Margarita Rbles 1977, 1978.
- General Information: (approximate) Field Surveys 1977.

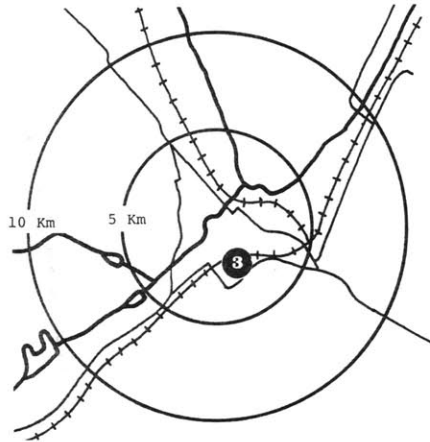


1:200

TYPICAL DWELLING

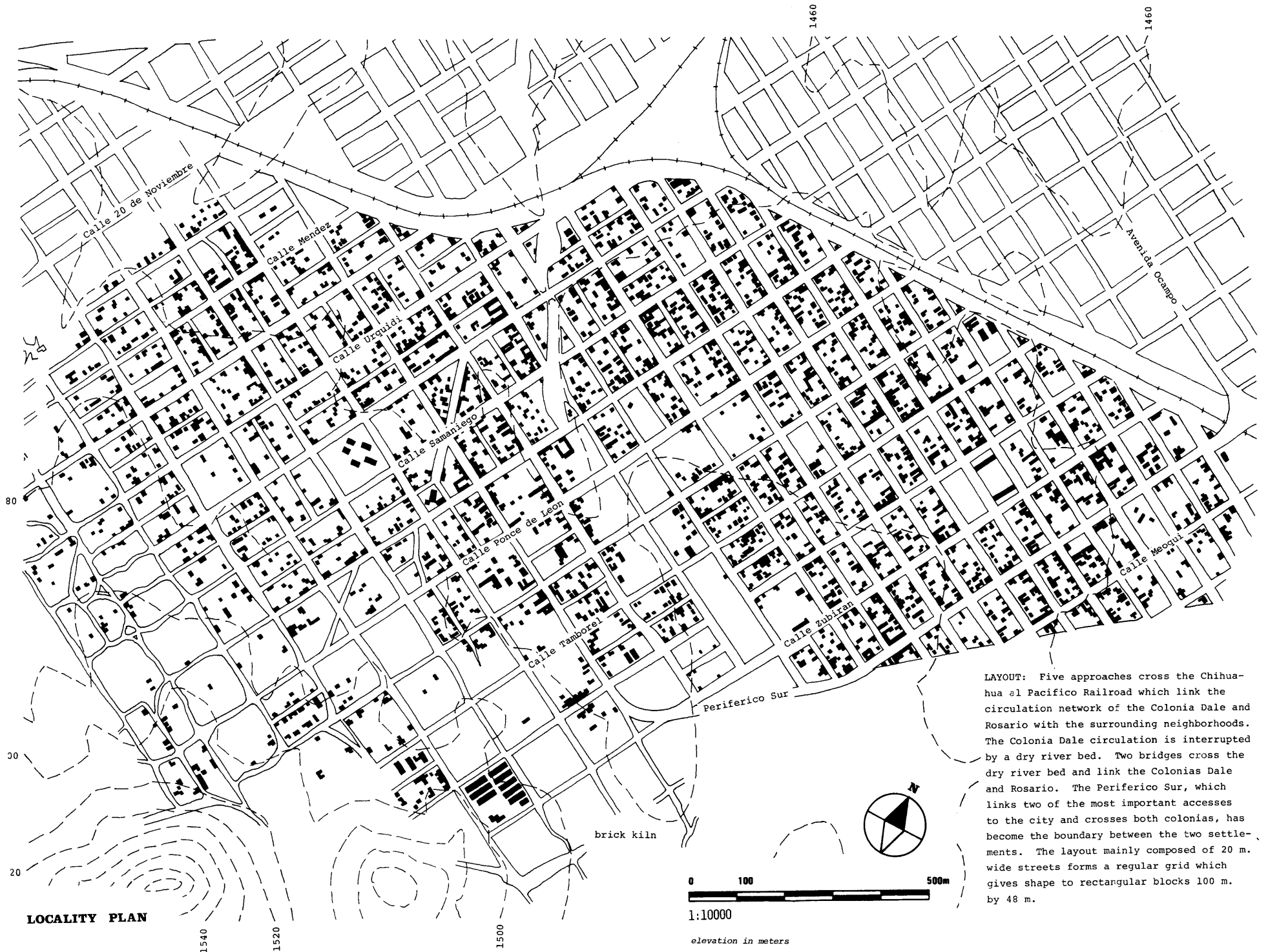
### 3 ROSARIO-DALE

PRIVATE, MIDDLE LOW/LOW INCOME, ROW HOUSES



GENERAL INFORMATION: The colonia is located to the South of the Chihuahua al Pacifico Railroad and its boundaries are defined by the railroad (north), the Cerro de la Cruz, to the west and open land and a cemetery to the south. The area of the settlement is 230 Ha. The Colonia Dale began in 1954 when the land was surveyed and sold by two companies which provided water and sewage networks in 70 percent of the area. The Colonia Rosario began in 1959. It is a transition of the middle and middle low income settlement--Colonia Dale--to low and very low income neighborhoods contained in the Colonia Cerro de la Cruz. The Colonia Dale is characterized by a high percentage of paved streets and also a high percentage in the provision of utilities and services which is not true in the Cerro de la Cruz. Colonia Dale is crossed by one dry river bed, has a 5 percent slope and rocky soil.





LAYOUT: Five approaches cross the Chihuahua el Pacifico Railroad which link the circulation network of the Colonia Dale and Rosario with the surrounding neighborhoods. The Colonia Dale circulation is interrupted by a dry river bed. Two bridges cross the dry river bed and link the Colonias Dale and Rosario. The Periferico Sur, which links two of the most important accesses to the city and crosses both colonias, has become the boundary between the two settlements. The layout mainly composed of 20 m. wide streets forms a regular grid which gives shape to rectangular blocks 100 m. by 48 m.

LOCALITY PLAN

1:10000

elevation in meters



LAND USE: There are two light industries within the neighborhood and brick ovens in the southern dry river bed. The most important shops are located along the 46 a. and Melchor Guaspe Streets. Other corner shops and pharmacies are located along the bus routes. Two private bus lines provide public transportation to the business district and the University. Taxi service is provided by two companies. There are 12 schools, 1 playground, 1 community center, and two churches. Lacking semi-public land, some schools close the streets with temporary fences for use as playgrounds. Particularly during summer many kids use narrower streets as playgrounds.

KEY

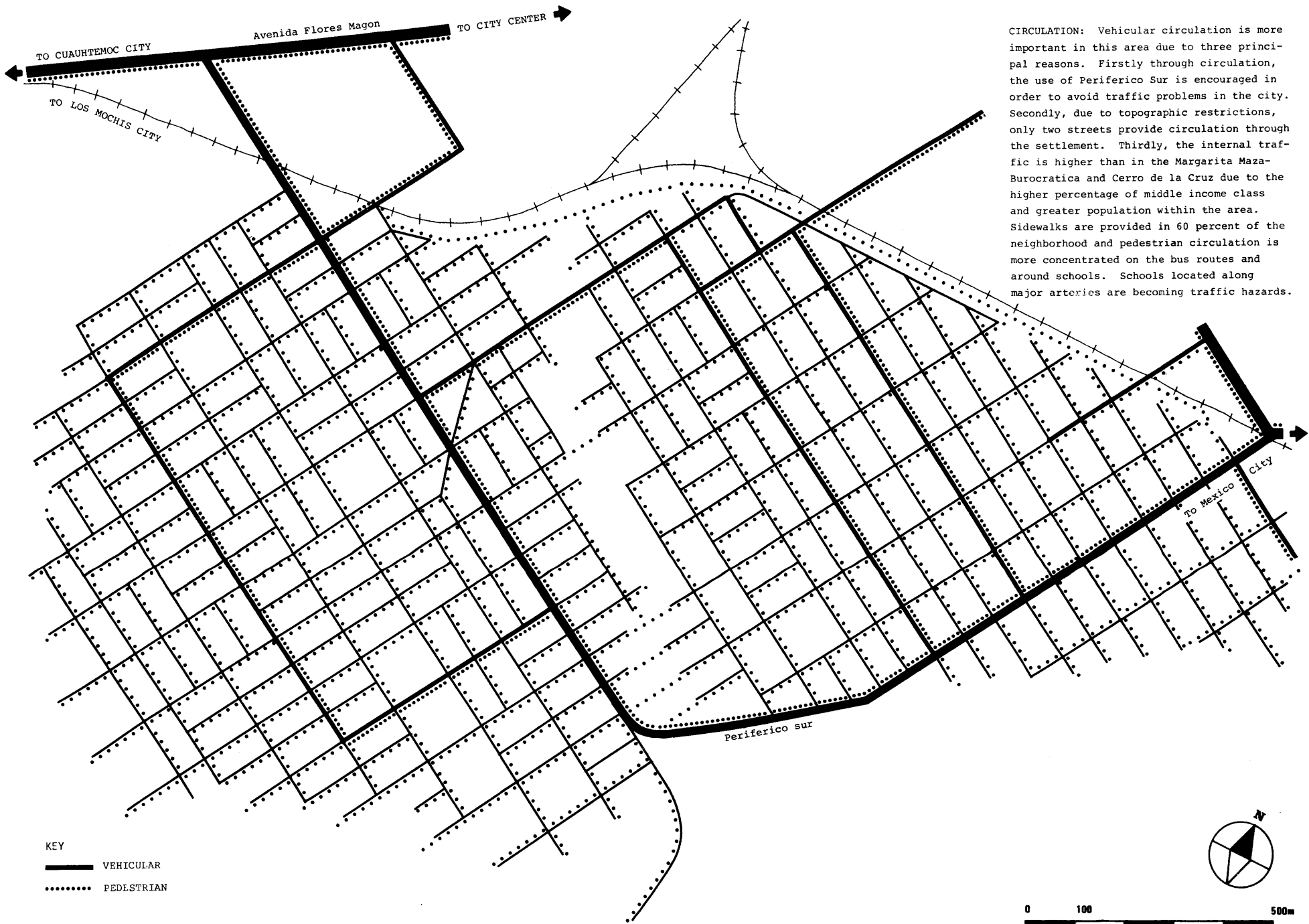
- Pk Parking
- P Police
- F Fire Department
- S School
- Ch Church
- R Recreation
- L Library
- U University
- H Health
- PO Post Office
- SS Social Services
- M Market
- C Cemetery
- Bus

AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES

LOCALITY LAND USE PATTERN





CIRCULATION: Vehicular circulation is more important in this area due to three principal reasons. Firstly through circulation, the use of Periferico Sur is encouraged in order to avoid traffic problems in the city. Secondly, due to topographic restrictions, only two streets provide circulation through the settlement. Thirdly, the internal traffic is higher than in the Margarita Maza-Burocratica and Cerro de la Cruz due to the higher percentage of middle income class and greater population within the area. Sidewalks are provided in 60 percent of the neighborhood and pedestrian circulation is more concentrated on the bus routes and around schools. Schools located along major arteries are becoming traffic hazards.

KEY  
 ————— VEHICULAR  
 ..... PEDESTRIAN

LOCALITY CIRCULATION PATTERN

0 100 500m  
 1:10000

POPULATION: The population of the settlement is 12,500 people. Most of them came from the country like those in the Cerro de la Cruz, but they acquire land with utilities and legal tenure of the lots. The housing is traditional to the area--adobe walls with a wood platform supported by wood beams and covered by a layer of muddy earth, narrow windows and high ceilings. Artisans build 72 percent of these houses, 22 percent were built by self-help and the remaining 6 percent were built by contractors. The population of the western and southern Colonia Rosario are the lower income class and are still working in the installation of water and sewage networks.

## LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	306	16	19.0
DWELLING UNITS	250	16	15.6
PEOPLE	1714	16	108

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	6.5	41
SEMI-PUBLIC (open spaces, schools, community centers)	.34	2
PRIVATE (dwellings, shops, factories, lots)	9.16	57
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	16	100

## NETWORK EFFICIENCY

Network length (streets, walkways) = 225m/ha  
 Areas served (total area)

400m —  
 300m —  
 200m —  
 100m —  
 0m —



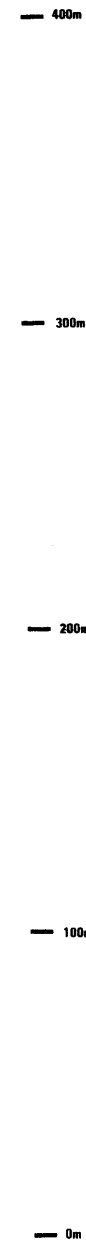
LOCALITY SEGMENT AIR PHOTOGRAPH



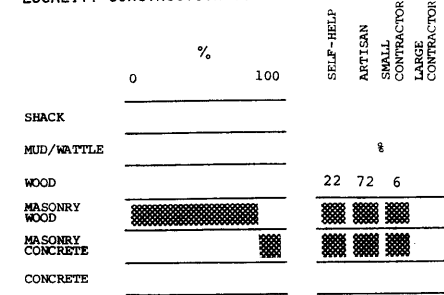
1:2500





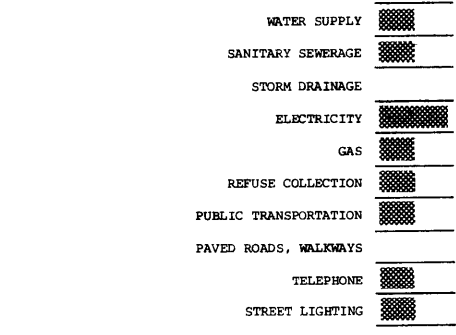


LOCALITY CONSTRUCTION TYPES

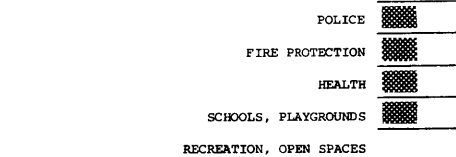


The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) approximate percentage of dwellings built by each group.  
Quality of information: Approximate

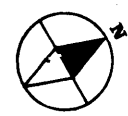
LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



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



LOCALITY SEGMENT PLAN

1:2500

## PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT  
 type: House  
 area (sq m): 140  
 tenure: Legal ownership

LAND/LOT  
 utilization: Private  
 area (sq m): 215  
 tenure: Legal ownership

DWELLING  
 location: Periphery  
 type: Row  
 number of floors: 1  
 utilization: Single family  
 physical state: Fair

DWELLING DEVELOPMENT  
 mode: Incremental  
 developer: Private  
 builder: Artisan/self-help  
 construction type: Adobe  
 year of construction: 1962

MATERIALS  
 foundation: Stone  
 floors: Cement/tile  
 walls: Adobe  
 roof: Wood beams, mud,  
 metal sheet

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

SOCIO-ECONOMIC DATA  
(related to user)

GENERAL: SOCIAL  
 user's ethnic origin: Northern  
 place of birth: San Andres  
 education level: Primary/high school

NUMBER OF USERS  
 married: 4  
 single: 5  
 children: 2  
 total: 11

MIGRATION PATTERN  
 number of moves: 2  
 rural - urban: 1  
 urban - urban: 1  
 urban - rural: -

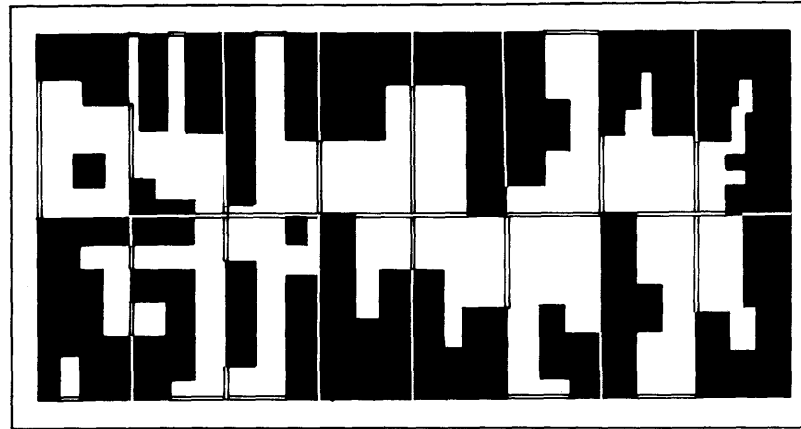
why came to urban area: Employment/school

GENERAL: ECONOMIC  
 user's income group: Middle low  
 employment: Agriculture/teacher  
 distance to work: 6 km  
 mode of travel: Car

COSTS  
 dwelling unit: -  
 land - market value: -

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

## LOCALITY BLOCK PLAN



0 10 50m

1:1000

## LOCALITY BLOCK LAND UTILIZATION DATA

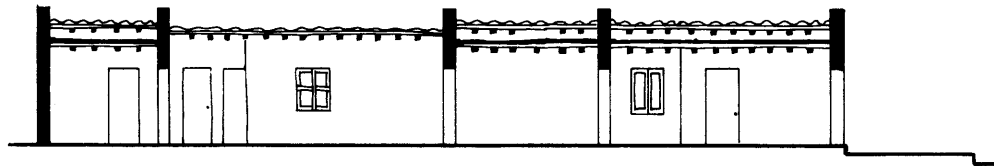
DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	16	.48	33
DWELLING UNITS	28	.48	58
PEOPLE	135	.48	282

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.33	41
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.48	59
SEMI-PRIVATE (cluster courts)	-	-
<b>TOTAL</b>	<b>.81</b>	<b>100</b>

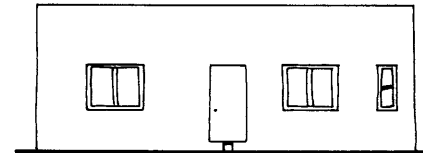
## NETWORK EFFICIENCY

Network length (streets, walkways) = 232m/ha  
 Areas served (total area)

LOTS  
 Average area =



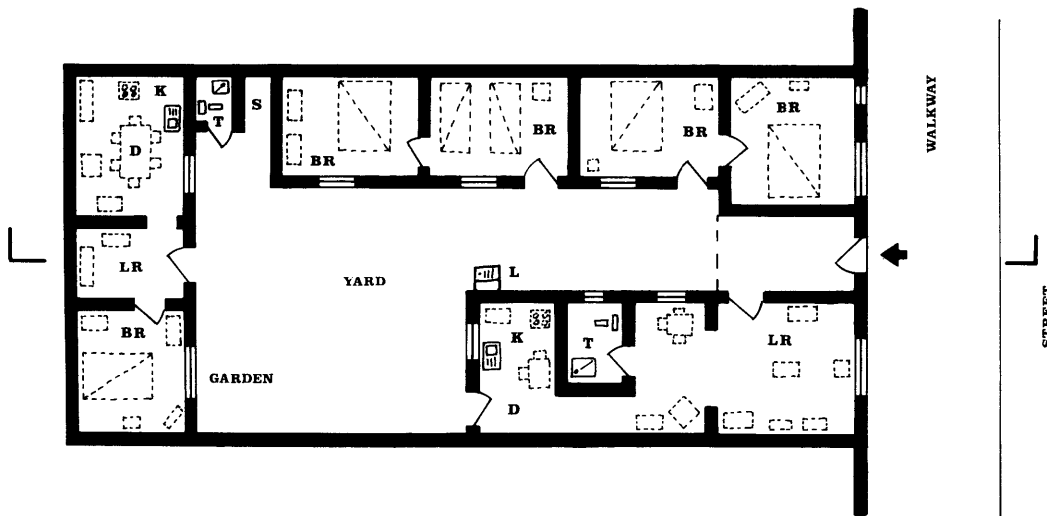
SECTION



ELEVATION

KEY

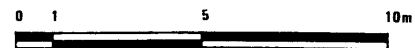
- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



PLAN

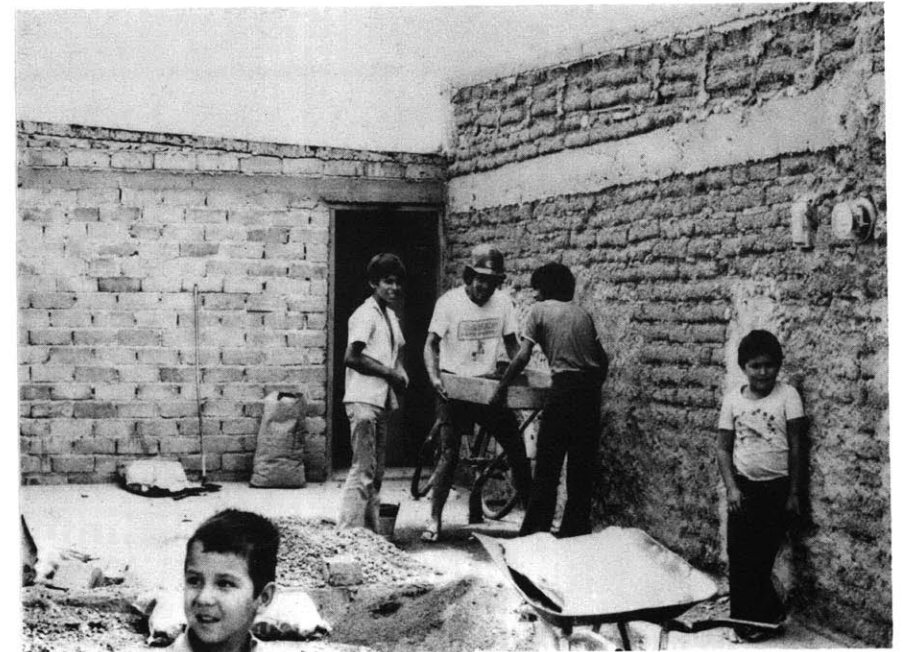
LOCALITY SOURCES

- Plan: (approximate) CETENAL Air-photo 1974, Obras Publicas Plans. Field Surveys 1977.
- Land Use Pattern: (approximate) Field Surveys 1978.
- Circulation Pattern: (approximate) Field Surveys 1977.
- Segment Plan: (approximate) CETENAL Air-photo 1974, Obras Publicas Plans.
- Block Plan: (approximate) IBID.
- Typical Dwelling: (approximate) Field Surveys 1978.
- Physical Data: (accurate) IBID
- Photographs: The author, 1978.
- General Information: (approximate) Field Surveys 1977-78.



1:200

TYPICAL DWELLING



## EVALUATIONS

The description and evaluation of existing urban dwelling environments provide basic information to formulate urbanland use policies and improve existing settlements.

Three case studies are summarized and evaluated in this section. The following sections are included in the evaluations.

**LAND UTILIZATION:** LENGTH CIRCULATION, PERCENTAGES, DENSITIES. A graphic comparison of land utilization.

**COMMUNITY:** Brief overview of neighborhood's improvements by the inhabitants.

**LAYOUT:** Comparison between the different case studies' layout.

**LAND UTILIZATION:  
LENGHT CIRCULATION  
PERCENTAGES  
DENSITIES**

**OLD CITY**

PRIVATE, LOW/MIDDLE INCOME,  
ROW HOUSE

The grid layout basically follows the contours and provides a good definition of major and minor arteries. The length of circulation and Public Areas are within desired limits. Private Area is higher than desired which is reflected in the absence of semi-public area. Desireable population density is achieved.

**1 MARGARITA MAZA**

PUBLIC, MIDDLE LOW/LOW INCOME,  
DETACHED HOUSES

As a result of the layout the length of circulation is very high and Public Areas become higher than desired. Semi-Public area and population density are within desired limits.

**2 CERRO DE LA CRUZ**

PRIVATE, LOW/VERY LOW INCOME, ROW HOUSES

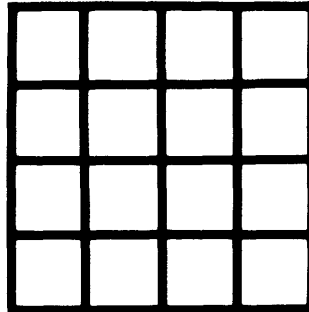
The grid layout is created by the enlargement of older neighborhoods' layout. The circulation length is higher than desired. Public Area is greater than needed and semiprivate area is very low. Population density is very low due to high percentage of empty lots.

**3 ROSARIO-DALE**

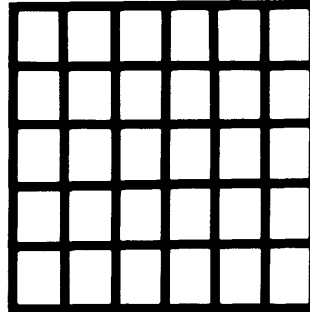
PRIVATE, MIDDLE LOW/LOW INCOME,  
ROW HOUSES

Circulation length is high and streets remain wider than necessary which results in a high percentage of Public Area. Provided semi-public area remains low and good population density is achieved.

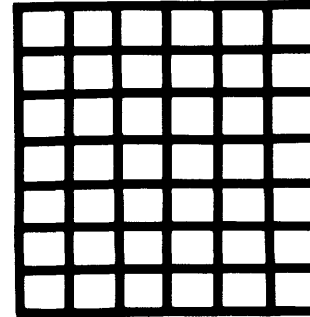
**CIRCULATION LENGTH:** The diagrams graphically indicate a comparison of the three case studies and the old city. Lot arrangement, blocks, and circulation determine length of infrastructure. All circumstances being equal, the longer the circulation the higher infrastructure cost.



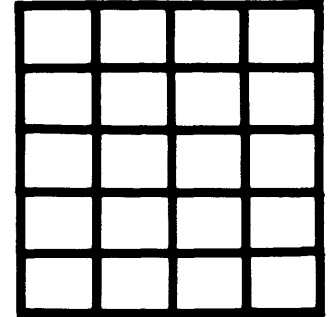
CIRCULATION 213m/ha



273m/ha

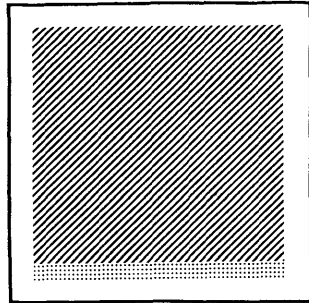


320m/ha

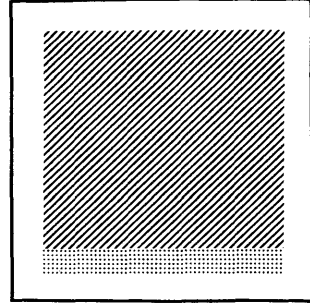


225m/ha

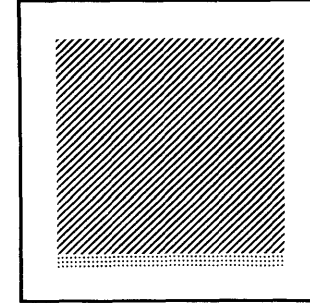
**LAND UTILIZATION PERCENTAGES:** The diagrams show percentages of land utilization for each case and provide comparison among the different case studies and the old city. User, physical controls and responsibility of the land are the considerations for the qualification of the land.



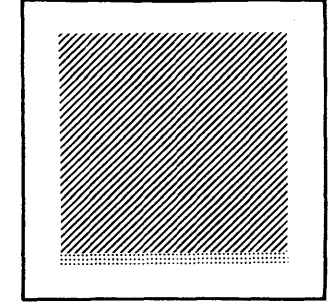
PERCENTAGES	Streets/Walkways	30%
	Playgrounds	4
	Cluster Courts	-
	Dwellings/Lots	66



36%
6
-
58

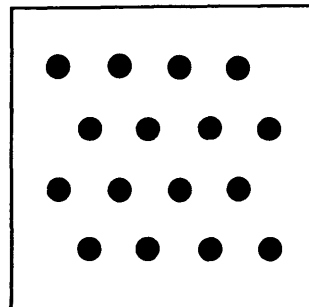


42%
3
-
55

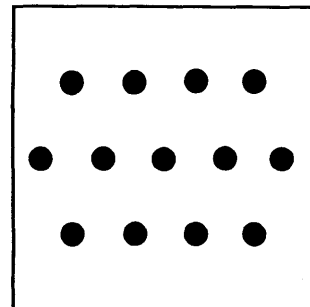


41%
3
-
56

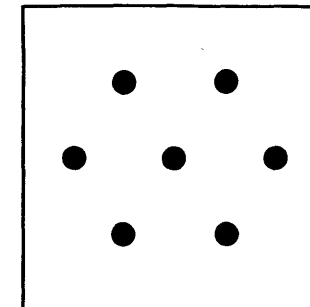
**POPULATION DENSITY:** Number of users per unit area determine the intensity of land use. Lower densities mean higher cost of development per person.



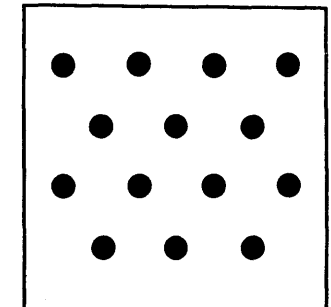
DENSITY Persons/Hectare 310



253



146



281

● 20 Persons

## COMMUNITY

**HOUSE CONSTRUCTION:** In the Public Development "Col. Margarita Maza-Burocratica" 100 percent of the houses were constructed by various contractors.

In the private development "Col. Cerro de la Cruz" which houses legal, illegal, and squatter settlements, 70 percent of the houses were self-help constructed, 24 percent were built by artisans and 6 percent by small contractors. In the "Col. Rosario-Dale" only 22 percent of the houses were constructed by self help, 72 percent were built by artisans and 6 percent were built by small contractors.

**MATERIALS:** In the Margarita Maza-Burocratica 100 percent of the houses are constructed of brick and concrete. In the Cerro de la Cruz settlement 86 percent of the dwellings are a mixture of traditional--adobe, wood beams and mud--with newer commercial materials--brick, corrugated metal sheet--; the remaining 14

percent are made of brick and concrete. In the Rosario-Dale settlement, 46 percent of the houses are constructed with local traditional systems, 24 percent are a mixture of traditional and brick and corrugated metal sheet, the remaining 30 percent are made of brick and traditional, corrugated metal sheet or concrete roofing.

**FINANCING:** The Margarita Maza was totally financed by a government program. While the Cerro de la Cruz and Rosario-Dale settlements are financed by private companies--land subdivision--and by the inhabitants--land development, house construction.

**WATER NETWORK AND SEWAGE NETWORK INSTALLATION:** The Margarita Maza and Burocratica settlements were instantly developed. Water and sewage networks were installed before houses were built. In the speculative developments Rosario and Cerro de la Cruz the land was plotted and

sold without utilities. With basic government help, such as cheaper materials and technical assistance, the inhabitants gradually are providing water and sewage networks in the area. The inhabitants of those neighborhoods provide the labor led by local leaders who organize the people in teams of 30 to 500 families and are the link of the settlement with the municipality. Every owner of a lot is responsible to dig and back fill the trench in front of his lot. From the beginning of the settlement in 1960 until 1975 the neighbors of the Cerro de la Cruz had completed 7,540 m. of trench excavation and back fill. There were 1725 m. of trench already dug out. The people of the settlement had contributed 78.5 percent of the total cost of the sewage network's installation and materials. Of this percent labor accounted for 59 percent. The remaining 19.5 percent was cash for materials and specialized labor. In 1977 in a period of 8 months, people of the Cerro de la Cruz and

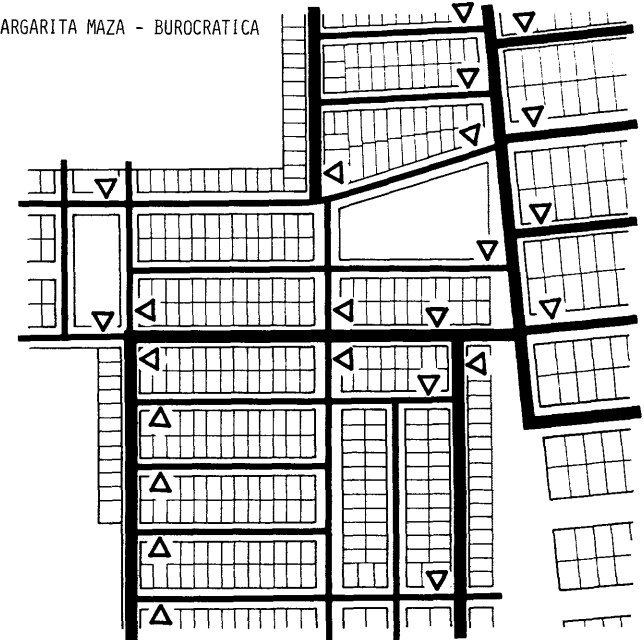
Rosario settlements dug out, back filled or both, 1804 meters of trench for a sewage network and 670 meters of trench for a water network. In the Dale settlement the land was sold with water and sewage networks servicing approximately 80 percent of the area.

**SCHOOLS:** Most of the schools within the neighborhood are run by the government and require community participation for their improvement. New glass, fences and classrooms are needed. A certain percentage of the money for these improvements have been provided by the neighbors.

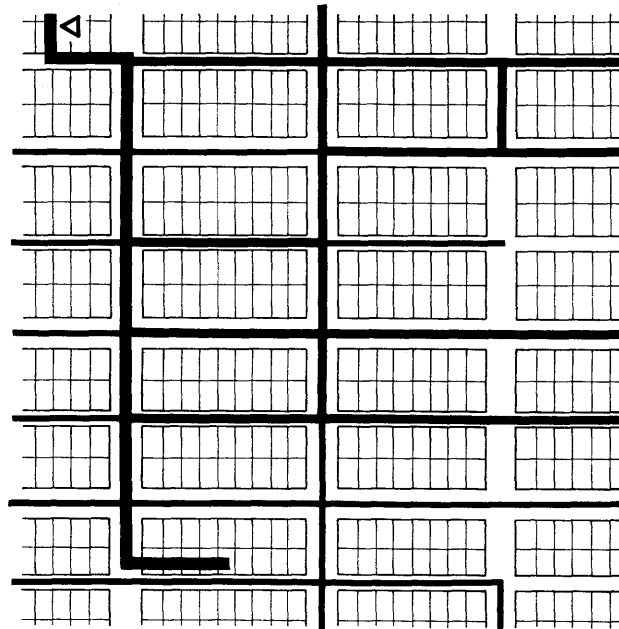
**STREET LEVELING:** Some people, lacking regular jobs, spontaneously bring their tools and work making the streets even. For this they collect money from the bus companies and private care drivers.

WATER NETWORK: A comparison between the three case studies' utility networks and street paving is shown. The design of Margarita Maza's network is good although the excessive length of circulation affects the network's cost. In the Cerro de la Cruz the main pipes belong to the city center's water provision network rather than to the neighborhood's. The Rosario and Dale have a better network design but it is affected also by the network carrying water from the Cerro de la Cruz tanks to the city center.

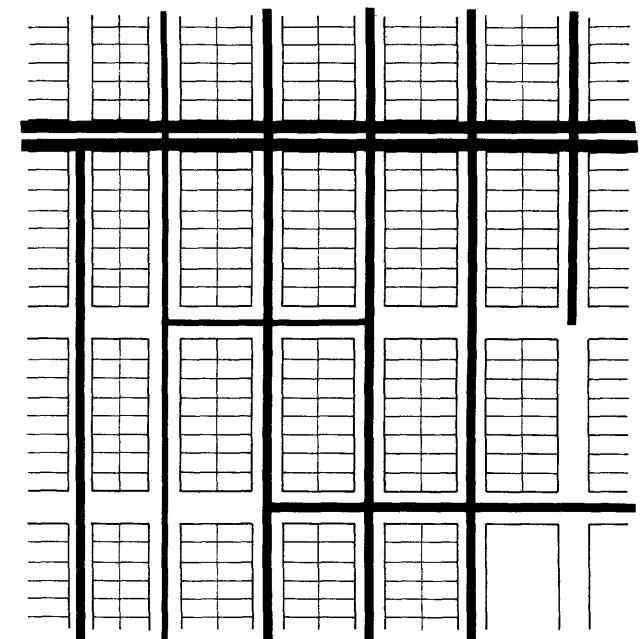
MARGARITA MAZA - BUROCRATICA



CERRO DE LA CRUZ







ROSARIO - DALE



WATER SUPPLY

KEY

-  VALVES
-  2" 4" PIPES
-  6" 12" PIPES
-  18" 24" PIPES

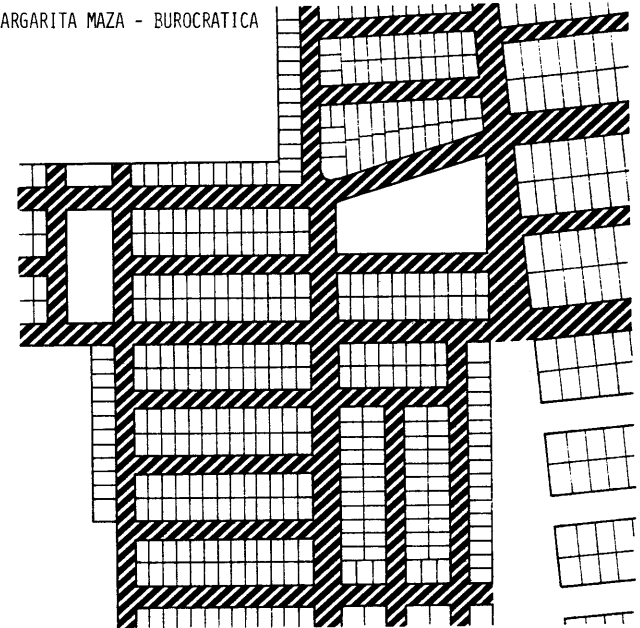


UTILITIES NETWORKS

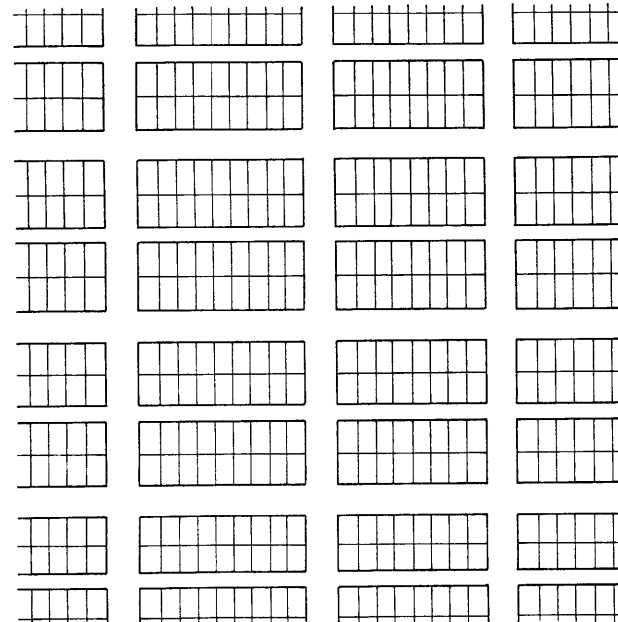


**STREET PAVING:** The Margarita Maza-Burocratica streets are paved and sidewalks are provided on either side of the street. In the Cerro de la Cruz no street paving or side walks are provided. The Rosario Settlement is partially provided with street paving. In Colonia Dale streets are paved and side walks are provided.

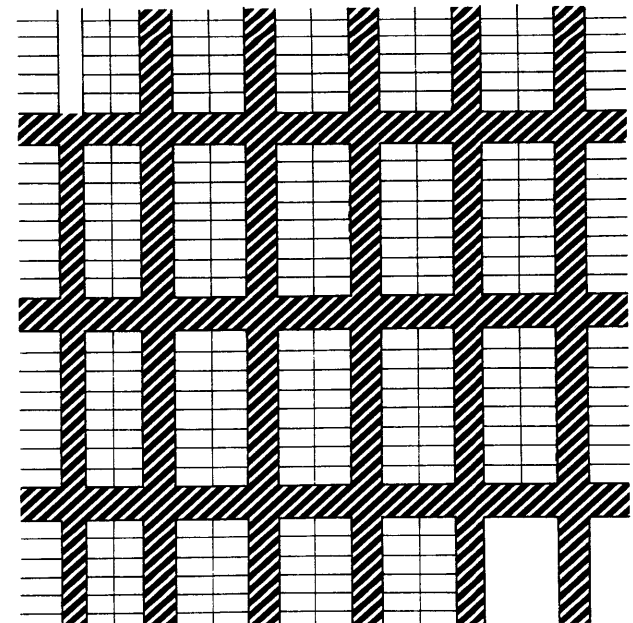
MARGARITA MAZA - BUROCRATICA



CERRO DE LA CRUZ



ROSARIO - DALE



CIRCULATION

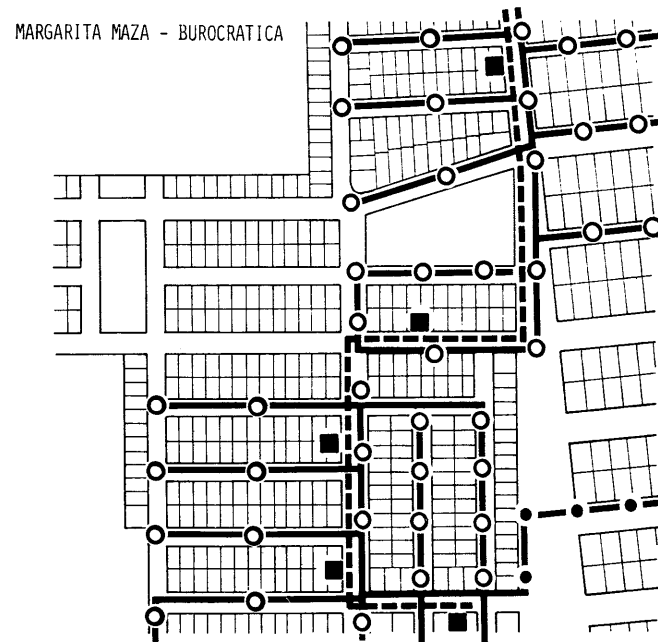
KEY

 PAVED STREET

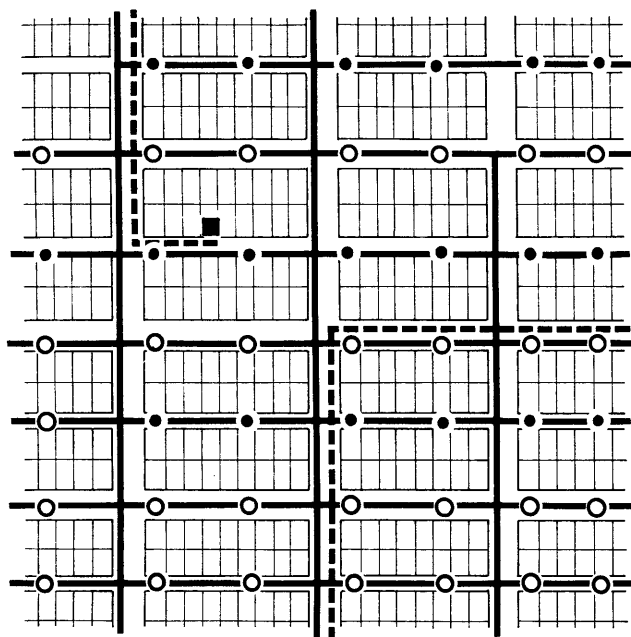


UTILITIES NETWORKS

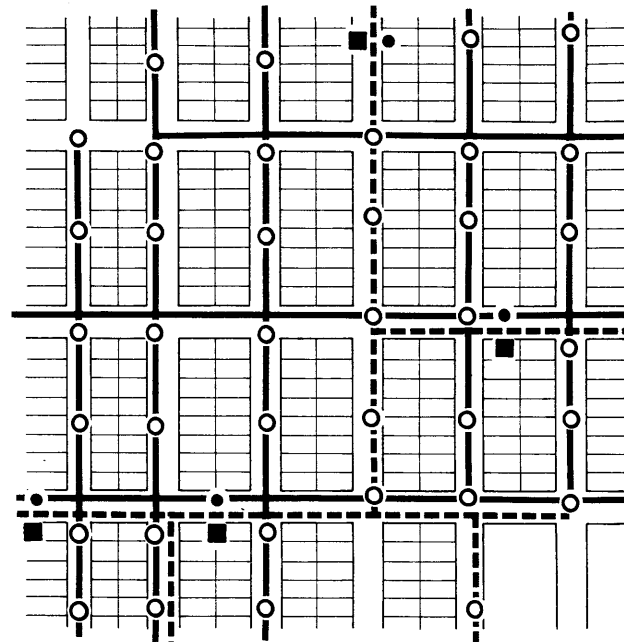
**ELECTRICITY:** The Margarita Maza-Burocratica has a basically good design because it divides the area into small circuits. However, the electricity network becomes more expensive than necessary as a result of the layout. Street lighting is provided in all the streets. In the Cerro de la Cruz settlement electricity was the first service provided. Approximately 98 percent of the inhabitants have it. The electricity network is planned for low capacities, which is reflected in the low amount of transformers. Street lighting is provided in most of the area. In the Colonia Rosario-Dale the electricity network is like that of the Cerro de la Cruz. Street lighting is provided in the Dale settlement but is not provided in the Rosario.



CERRO DE LA CRUZ



ROSARIO - DALE



**ELECTRICITY AND STREET LIGHTING**

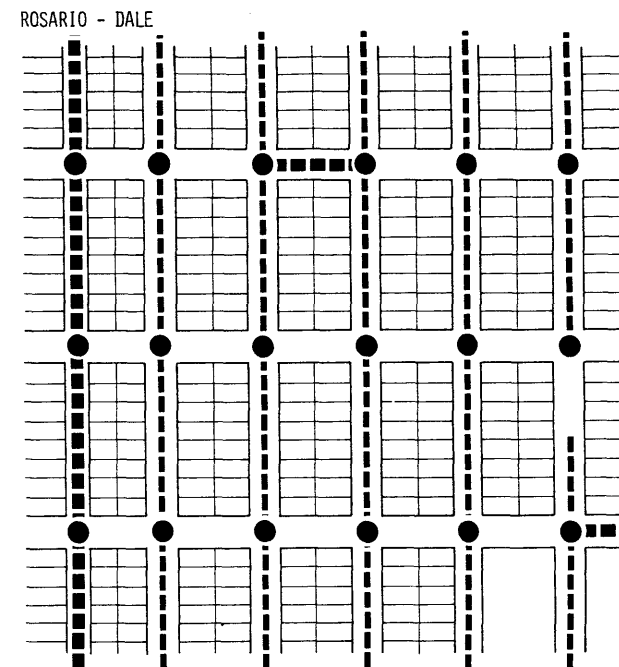
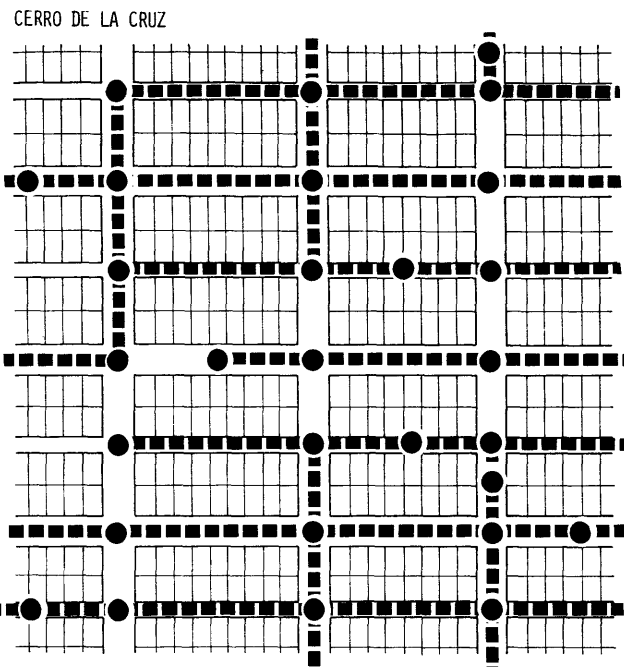
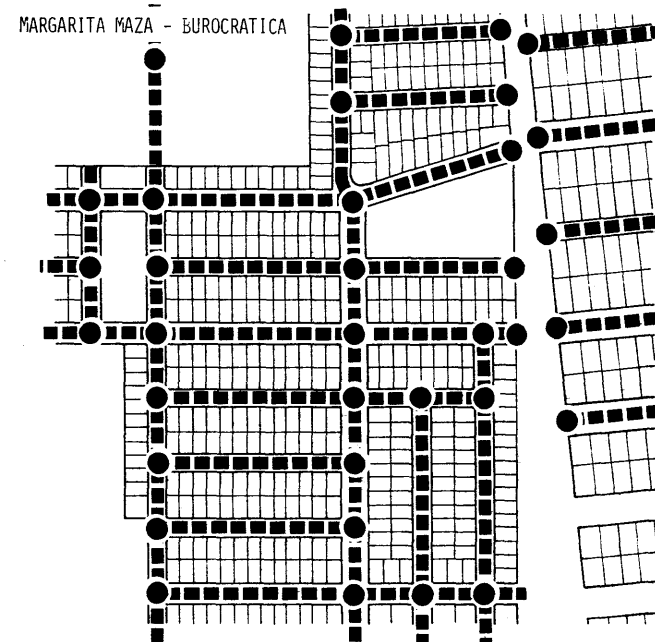
**KEY**

- POLES
- POLES WITH LAMPS
- TRANSFORMERS
- LOW TENSION LINES
- - - HIGH TENSION LINES



**UTILITIES NETWORKS**

SEWAGE NETWORK: The sewage network in the Margarita Maza-Burocratica has a long length per hectare because of the layout. In the Cerro de la Cruz and Rosario settlements the sewage network reflects the effects of the sloped land on which the settlements lie. The Dale settlement network is simple because the existing site conditions provide good drainage.



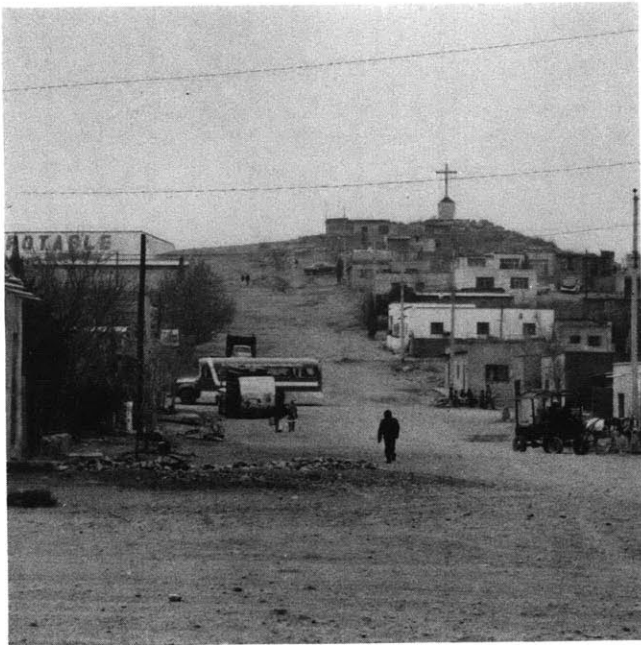
SEWAGE DISPOSAL

KEY

- MANHOLES
- - - 6" PIPES
- ▬▬▬ 8" PIPES



UTILITIES NETWORKS



- (top) The Rosario Settlement has more streets than needed. There are still many empty lots. The schools have the only playgrounds.
- (left) The Cerro de la Cruz streets extend to unsuitable sloped land. The streets are used only by commercial vehicles and pedestrian traffic.
- (right) In the Colonia Dale streets are used in many cases mainly for pedestrian traffic.

## PROPOSAL

### INTRODUCTION

The description and evaluation of the three case studies show that those settlements have longer circulation length per hectare than desired. Their public area is excessive and their semi-public area is very low. This is reflected in the use of existing streets for solving the necessities caused by the lack of playgrounds, schools and back yards. This problem not only affects the inhabitants of the neighborhoods, but also the municipality which is not able to take care of that much public land and providing utilities and services becomes a very expensive and slow process.

The case studies also demonstrate that people living in low income settlements have the time and the ability to work in the development of their communities. Houses are constructed by the inhabitants. Water networks and sewage networks are installed by neighbors who provide organization and labor and government which provides materials and technical assistance.

### PROPOSAL

The area covered by the Cerro de la Cruz and part of the Rosario settlements is now in the process of development. Water and sewage networks are partially installed and street paving is partially provided in the northern area of the Rosario settlement. The speculators' plans call for the extension of the existing grid to areas with slope of 20 or more percent; areas which are not suitable for housing development.

A proposed revised layout is presented based on the principle of minimizing public land by creating semi-private land in benefit of the neighbors and providing a defined circulation network for vehicles.

## OBJECTIVES

The up-grading of Cerro de La Cruz and Rosario Settlements covers an area of 280 hectares.

The present population is 19,500. And the settlements are expected to house approximately 32,400 people at the saturated stage.

The proposal contemplates the following main considerations:

The excessive public land should be given in condominium to the inhabitants, either by blocking complete streets or by giving a portion of the fronting streets to the lot owner.

The amount of necessary public land will be defined by the required circulation composed of by-pass roads and local traffic streets.

The commercial and light industrial activities will be along the main streets.

The excessive public area should be transformed in part to provide schools, playgrounds for the people.

To carry out the objectives the following specific tasks are required:

Encourage by taxes and regulations the saturation of empty areas within a reasonable period of time.

Improve water network for satisfactory service at saturation stage.

Improve the main collectors of the sewage network.

Improve the electricity network considering future loads.

Design and construct the main circulation network according to realistic expected vehicular loads.

#### ADVANTAGES

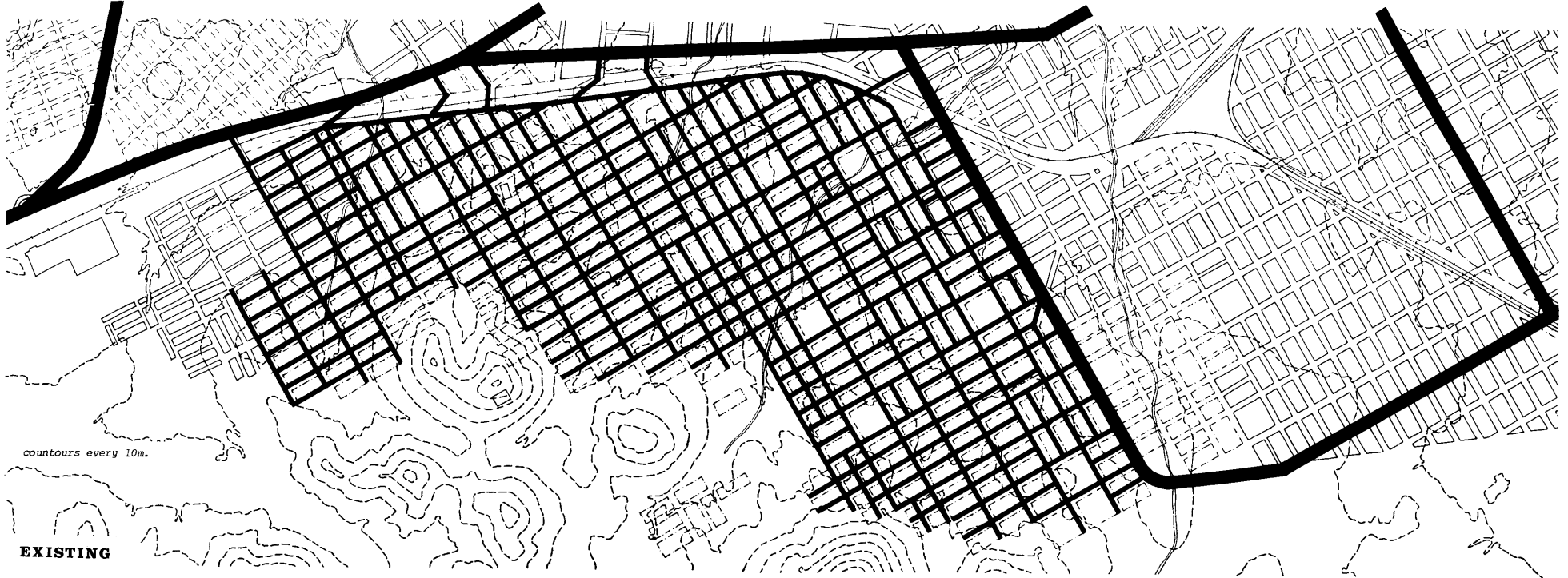
The up-grading of the site is expected to give basic desired characteristics to the neighborhood because:

A lower percentage of public area is achieved and the maintenance costs are lower.

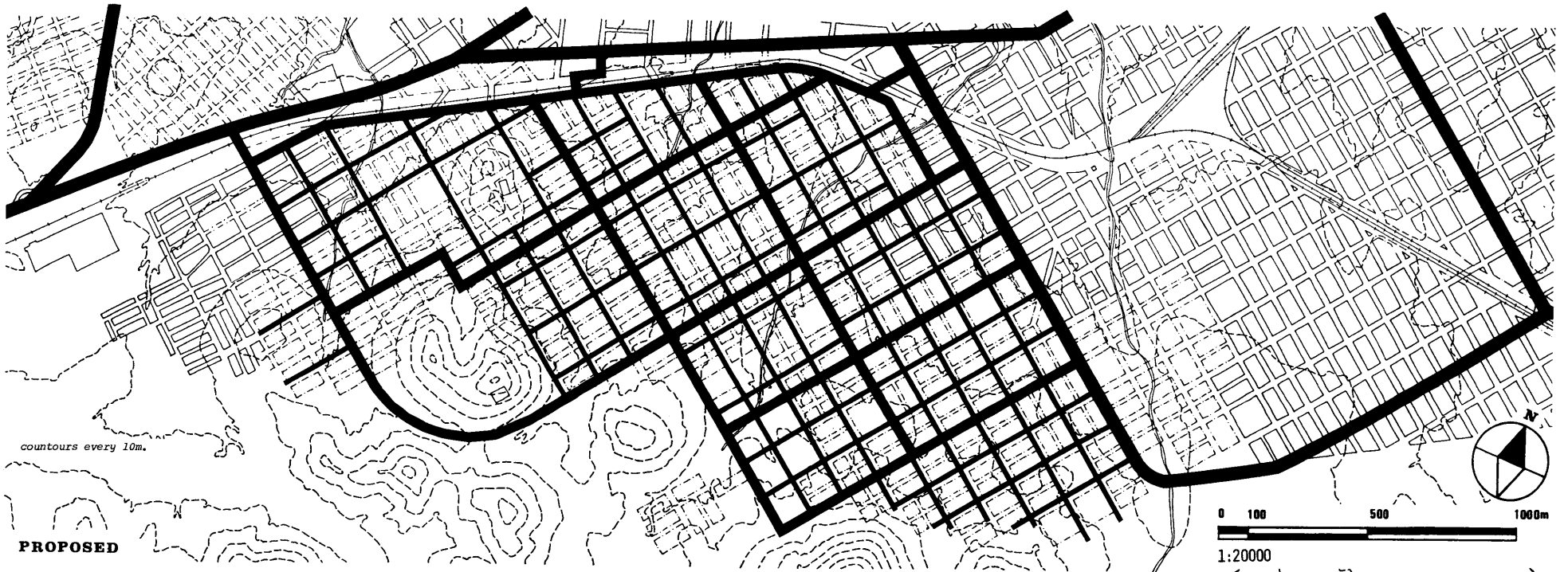
Pedestrian circulation will be safer when an improved vehicular circulation network is established.

Better definition of land use will result in a quieter residential neighborhood.

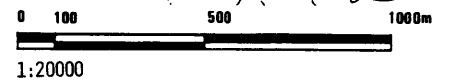
The improved circulation network will give a reference for improving other settlements in the city, which have similar problems.



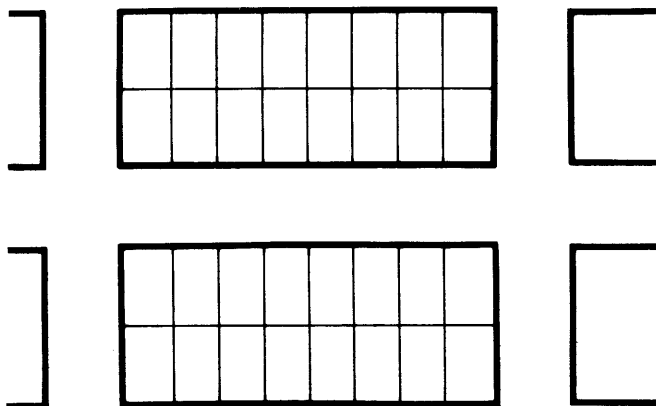
**EXISTING**



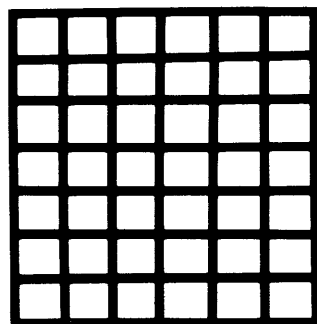
**PROPOSED**



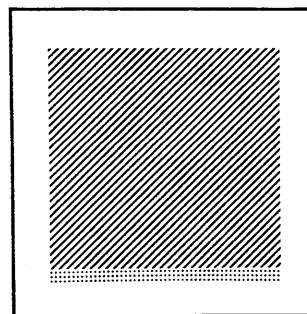




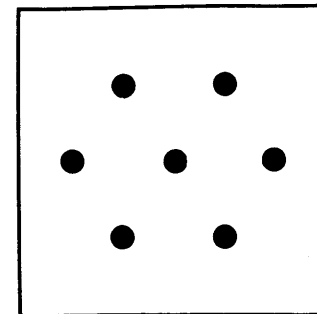
**EXISTING**



CIRCULATION 320 m/ha.

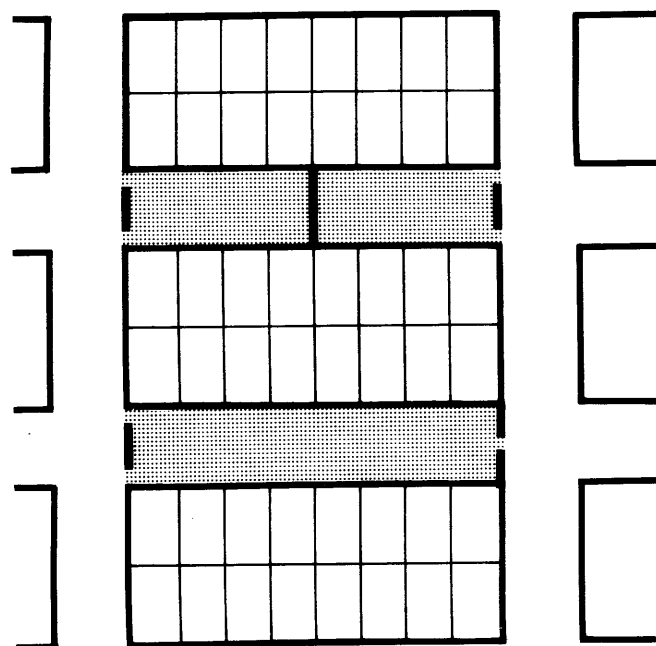


PERCENTAGES	
Streets/Walkways	42%
Playgrounds	3
Cluster Courts	-
Dwellings/Lots	55

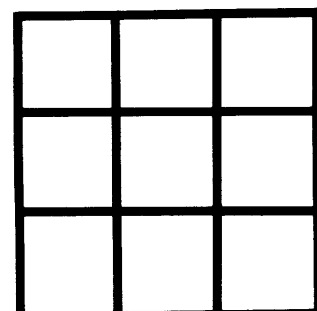


DENSITY	
Persons/Hectare	146
●	20 Persons

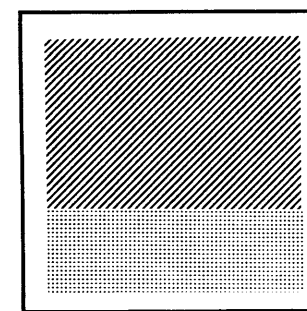
EXISTING LAYOUT: The existing layout plans propose that all existing street should be paved by private companies without considering slope, points they link, inhabitants' needs and income. Public area in this layout accounts for 42 percent of the total area.



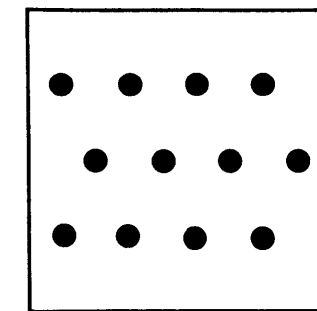
**PROPOSED**



CIRCULATION 160m/ha



PERCENTAGES	
Streets/Walkways	28%
Playgrounds	10
Cluster Courts	14
Dwellings/Lots	48



DENSITY	
Persons/Hectare	240
●	20 Persons

PROPOSED LAYOUT: The proposed layout contemplates the creation of a new circulation network for vehicles designed by tacking into account area, site approaches and topography. This plan makes possible a wider variety of choices: high quality street paving on vehicular streets and either conventional street paving or locally constructed

paving stone for semi-private streets. It results also in better use and control of the land and cheaper layout. Public land in this layout accounts for 28 percent of total area.

# 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)

**ALTERNATING 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.)

**CONURBATION.** Area of large urban communities where towns, etc. have spread and became joined beyond their administrative boundaries. (A.S. Hornby, A.P. Cowie, J. Windsor Lewis, 1975)

**CONURBATION.** An aggregation or continuous network of urban communities. (Merriam-Webster, 1963)

**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<sup>2</sup>) 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 flood ways 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 responsibility. *PUBLIC* (streets, walkways, open spaces): user -anyone/unlimited; physical controls -minimum; responsibility -public sector. *SEMI-PUBLIC* (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: *LINE*s: property lines, political or municipal divisions, main streets, etc.; *AREA*s: 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/OPTIMIZE. 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 FACILITIES. 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 thoroughfare 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-, water-, 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 horsepower 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 NOTES
- QUALITY OF INFORMATION  
The quality of information given in the drawings, charts, and descriptions have 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 (12 inches)         | =0.3048 centimeters             |
| 1 mile (5,280 feet)        | =1.60935 kilometers             |
- Square measures
- |                             |   |
|-----------------------------|---|
| 1 square meter              | =1,550 square inches or 10.7639 square feet |
| 1 hectare (10,000 sq. mts.) | =2.4711 acres                               |
| 1 square foot               | =0.0929 square meters                       |
| 1 acre (43,560 sq. feet)    | =0.4087 hectares                            |
- DOLLAR EQUIVALENTS  
All income, cost and rent/mortgage data have been expressed in terms of the US equivalent;  
1 US Dollar = 22.60 Mexican Pesos.