

CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA, MEXICO

by

Maria Isabel Vargas Mata

B. Arch., Universidad Autonoma del
Estado de Morelos, Mexico
1974

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
DEGREE OF

MASTER OF ARCHITECTURE IN ADVANCED STUDIES

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

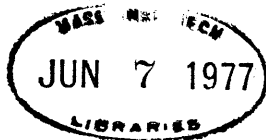
June, 1977

Signature of Author
Department of Architecture, May 6, 1977

Certified by
Horacio Caminos, Professor of Architecture, Thesis Supervisor

Accepted by
Chairman, Department Committee

Rotch



ii

iii

ABSTRACT

CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA, MEXICO
by Maria Isabel Vargas Mata

Submitted to the Department of Architecture on May 6, 1977 in partial fulfillment of the requirements for the degree of "Master of Architecture in Advanced Studies".

This study identifies and analyzes the southeastern metropolitan area of Cuernavaca, Mexico; as well as the major low income dwelling environments within it. The study is the result of research based on surveys carried out by the author in the field, and on information provided by popular and public sources. The analysis of dwelling environments is based on a method developed in the Urban Settlement Design Program, under the direction of Professor Horacio Caminos.

The study focuses on the conurbation of southeastern Cuernavaca with adjacent rural communities through a new industrial area. Based upon this an outline master plan for the area is proposed, including a specific project for the expansion of low income residential areas in the town of Jiutepec. In terms of application this study provides: a) the basis for a detailed study leading to a master plan for the Cuernavaca metropolitan area; b) a reference for low income settlement design for non optimum terrain; and c) a reference for the identification, understanding and evaluation of conurbated areas and low income dwelling systems.

Thesis Supervisor: Horacio Caminos
Title: Professor of Architecture

✓

**CONURBATION OF SOUTHEASTERN
METROPOLITAN CUERNAVACA, MEXICO**

ACKNOWLEDGMENTS

The authors gratefully acknowledge the support, critique, friendship, advice and guidance of Professor Horacio Caminos, particularly in the preparation of this work. They also are indebted to Reinhard K. Goethert for his personal assistance. To Alka, Diana, Happy, Bashir, Francisco, Vidu, William, Wo, Yousef, and the class of 1977-78 for their comments.

The authors also wish to acknowledge the Oficinas Revisora de Catastro, de Obras Publicas del Estado y Municipales, de la Secretaría de la Reforma Agraria (Delegacion Morelos), de la Comision Promotora de Desarrollo en el Estado de Morelos, all based in Cuernavaca, and the Oficina de Estadística in Mexico, D.F.

The authors are indebted to Isaias Alanís for his assistance in the case study surveys during the summer of 1976 and winter of 1977. To Bernabe Chávez and Hilario Huerta for their collaboration.

Finally, the financial support received from the Massachusetts Institute of Technology and the Consejo Nacional de Tecnologia in México are acknowledged.

Cover: drawing of Southeastern Metropolitan Cuernavaca, Isabel Vargas, 1977.

Typological Survey: Maria Isabel Vargas Mata, L. R Roberto Chávez.

Project Proposal: Maria Isabel Vargas Mata.

Education/ Research Program

URBAN SETTLEMENT DESIGN IN DEVELOPING COUNTRIES

School of Architecture and Planning, M.I.T.

CONTENTS

CONTENTS	1
PREFACE	2
INTRODUCTION	3
NATIONAL CONTEXT: Mexico	6
URBAN CONTEXT: Cuernavaca, Mexico	8
CASE STUDY: Southeastern Metropolitan Area	14
DWELLING ENVIRONMENTS	19
1. CIVAC	20
2. Satelite	26
3. Jiutepec	32
4. Cuauhchiles	38
5. Vista Hermosa	44
EVALUATIONS	50
Time Process/Perspective	51
Land Utilization: Patterns, Percentages, Densities	52
PROPOSED PROJECT	
Background	56
Master Plan Outline	57
Southeastern Metropolitan Area	58
Jiutepec	60
Basic Site Data	64
Planning Policies/Goals	65
The Site	66
GLOSSARY	70
REFERENCES	74
EXPLANATORY NOTES	74

PREFACE

CONTENTS: This study identifies and analyzes the southeastern metropolitan area of Cuernavaca, Mexico, as well as the major low income dwelling systems within it. The southeastern metropolitan area is described in terms of its topography urban infrastructure, land utilization and land tenure. The low income dwelling systems are described in terms of their layout design, land utilization, land subdivision, and specific housing types. The dwelling systems are analyzed at three levels; a locality segment, a selected block within the segment, and a typical dwelling unit. Based on this research, an outline proposal for a master plan of the southeastern metropolitan conurbation defines the land use and urban infrastructure that would allow a more rational development of the area. In addition, a proposed project addresses the problem of low income settlement design for non-optimum terrain, a solution for preserving valuable agricultural land in rapidly densifying urban areas.

APPLICATION: The outline proposal for a southeastern area master plan is intended to serve as a basis for a detailed study that could be undertaken by the Conurbation Commission for Metropolitan Cuernavaca, to be established under the new Law of Human Settlements. The proposed project provides the preliminary design for the upgrading and expansion of the Colonia Vista Hermosa in Jiutepec, Morelos.

DATA: This study is derived from field surveys carried out by the authors since 1972, and particularly by Isabel Vargas during the summer of 1976 and the winter of 1976-'77; and from her interviews with representatives of public agencies and popular organizations. Parts of the study are taken directly from the previous publication by the authors, "Urban Dwelling Environments: Cuernavaca, Mexico".

INTRODUCTION

Cuernavaca has been developed by integrating to its urban structure a series of adjacent 'ejidos' or rural communities and their agricultural lands. The process began after the turn of the century but did not gain momentum until up to 15 or 20 years ago. Cuernavaca's mild climate and proximity to México City made it a fashionable resort, resulting in the proliferation of residential subdivisions for upper class weekend homes. Vast portions of the periphery and inner ring were transformed into low density, high income residential areas. The expansion of these areas has consumed agricultural lands and in many cases forced the impoverished inhabitants of the rural communities to settle on the outskirts of their villages.

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

The physical expansion of the city has been determined largely by the topography of its surrounding environment. Due to deep gullies and steep slopes to the west and north, the development of the metropolitan area has taken place largely along the city's eastern and southern periphery. Cuernavaca's recent growth has

followed two main arteries: the México-Acapulco highway, joining the southernmost tip of the city with the town of Temixco; and the Cuernavaca-Cuautla highway with its branch via Jiutepec to the south which have structured the conurbation, first among several small communities, and then between these and the southeastern periphery of the city. Both of these systems initially developed based on their agricultural production and later due to the appearance of middle and high income residential subdivisions. However, in the case of the Cuernavaca-Jiutepec system, the introduction of an important industrial estate has made this the fastest growing and economically most important conurbation of the metropolitan area. It is with this case that we are concerned here.

For centuries, the abundant water and rich land between Jiutepec and Cuernavaca had made it one of the country's most highly productive agricultural areas. With the growth of population and economic expansion that followed World War II, the area began to change. Cuernavaca was becoming a fashionable resort and growing rapidly with low density weekend residential subdivisions. As land in the city was used up, developers converged on the area surrounding Jiutepec. In the late 1960's, as a part of a regional strategy to decentralize industry from México City, the government and private sector joined in developing an industrial city between Cuernavaca and Jiutepec. The appearance of CIVAC (Ciudad Industrial del Valle de Cuernavaca) accelerated migration into the area from the state of Guerrero and other underdeveloped states. In less than a decade this process turned the primarily agricultural area into an industrial/residential conurbation.

The conurbation of southeastern metropolitan Cuernavaca consists of three closely interacting components:

Residential, Industrial and Agricultural. The residential component has three different dwelling environments: The original rural communities often dating back to the XVI century, and including low to upper income levels of the population; the middle class weekend subdivisions and instant developments; finally the numerous, rapidly increasing, very low and low income settlements, often created by invasions. The industrial sector consists of the large international firms that make up CIVAC, such as the Datsun assembly plant and the chemical and pharmaceutical plants; of the older quarries and cement and textile factories that operated in the area before the recent boom; and of numerous service and commercial enterprises that have appeared taking advantage of the opportunities and economies afforded by the development. Ownership of productive land is held by small farmers whose properties are rapidly increasing in value and becoming highly marketable, and by native communities or 'ejidos' whose members are finding it more advantageous to sell their labor in the urban/industrial market than to usufruct their small individual plots. In terms of the conurbation's historical process, the southeastern metropolitan area first began developing with the overlapping between the old rural communities and the new weekend residential developments. Their growth was compounded by the proliferation of low income settlements and areas of stores and service shops. Soon this situation began turning the previously distinct settlements into a continuous urban sprawl. The establishment of CIVAC developed the physical link between this consolidating area and Cuernavaca.

The unplanned growth of the southeastern metropolitan area has put its dwelling environments and utility and service networks under tremendous stress. But the

most serious problem is that posed by the irreversible encroachment of the urban and industrial areas on agricultural land. Agricultural land is one of the most valuable of all natural resources. The product of many years of natural action by the elements, it is irreplaceable. Once developed it can not easily be restored to its original condition. Although the shift from an agricultural to an industrial based economy has usually been regarded as a measure of progress and development, the situation in all of central México is such that it is doubtful whether it can be sustained much longer.

In an attempt to deal with situations which arise from unplanned and uncontrolled urban development, such as the above, the government has recently passed legislation affecting the growth of human settlements. The object of this study is to explore to what extent, in view of this legislation, the process of urbanization can be controlled and rationalized for public benefit.



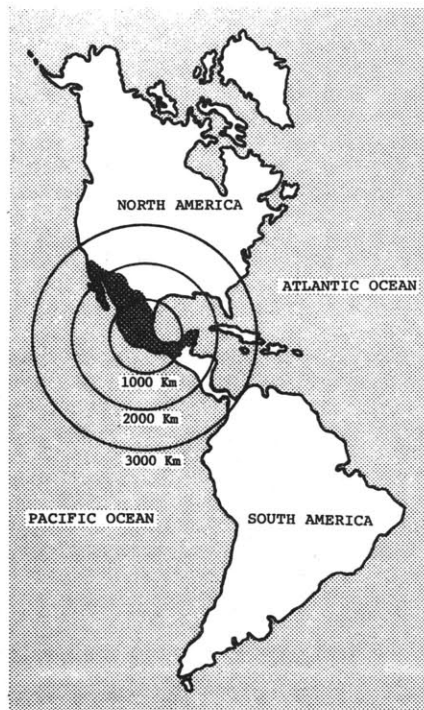
NATIONAL CONTEXT

Mexico

1. PRIMARY INFORMATION

Government	: Federal Republic
Official Name	: United Mexican States
Area	: 1 972 547 Km ²
Population	: 64 315 000 Est. 1977
Population Growth	: 3.5 % Per Annum
Population Density	: 32.6 Inhab/Km ² Est. 1977
Currency	: Mex. Peso (20 Mex\$=1US\$)
Gross Nat. Product	: US\$ 49.8 billion (1973)
GNP Per Capita	: US\$ 890 (1973)
GNP Per Cap. Growth	: 2.8 % (1965-1973)
Language	: Spanish
Religion	: Roman Catholic
Major Cities	: México City Guadalajara Monterrey

LOCATION MAP: Circles represent approximately 1 hour flying time.



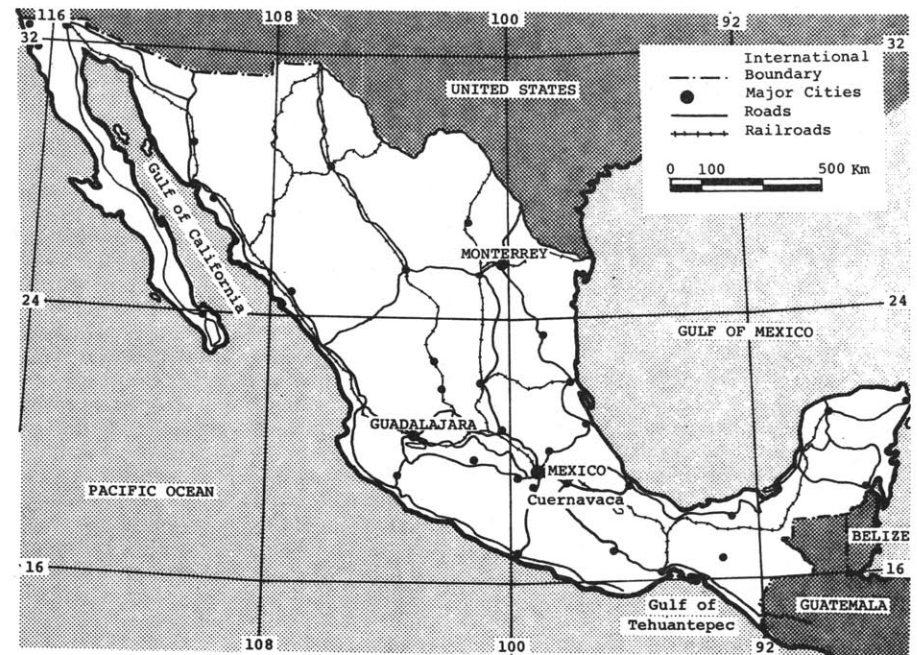
2. GEOGRAPHY: México is the third largest country in Latin America (after Brasil and Argentina), and fifth in rank of the continent. The country has considerable natural resources including petroleum, metals, minerals, timber, and almost 10 000 Km of coastline. The varied topography of Mexico ranges from low desert plains and coastal jungles to high plateaus and rugged mountains. Beginning at the Isthmus of Tehuantepec in southern Mexico, an extension of the South American Mountain range runs north almost to México City where it divides to form the coastal western and eastern ranges of the Sierra Madre. Between these ranges lies the great central plateau, a rugged tableland 2 400 Km long and as much as 800 Km wide. From the low desert plain in the north, it rises to over 2 600 meters near Mexico City. The country's dominant characteristic however, is its mountains and volcanoes. México's climate is more closely related to altitude and rainfall than to latitude. Most of the country is dry; only 12 % of the total area receives adequate rainfall in all seasons while about half is deficient in moisture all year long. Temperatures range from tropical in the coastal lowlands to cool at higher elevations.

3. POPULATION: With 64.3 million inhabitants and a sustained growth rate of 3.5 % per year, México is the most populous Spanish speaking country and has one of the world's most rapidly increasing populations. More than half of the people live in the central Mexico. With the industrial development undertaken after WW II important migrant currents developed, initially from the poor southern states to the central part of the country, and to México City, and more recently to the border areas of the northern states. Efforts by the government to reverse such unbalancing trends have come late and been largely unsuccessful. Between 1960 and 1970 the population of México City increased by 44 % from almost 5 million to 7 million. For the same period, the northwestern region had a rise of 61 % while the national average for the country was 31 %. Major urban areas, such as those of Guadalajara and Monterrey, have shown large increases as well. The most important single factor affecting México's very high growth rate, is not so much the birth rate, which in fact has decreased steadily since 1950, but rather the even greater decline of the rate of mortality for the same period.

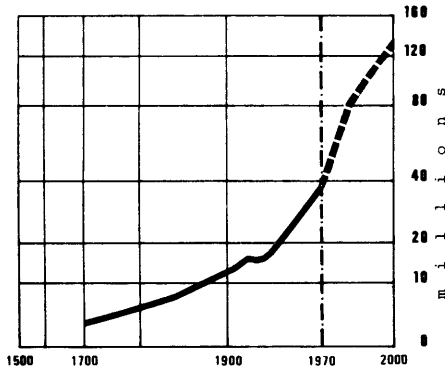
The ethnic make up of the population includes mestizos (Indian/Spanish) 60 %, American Indians 30 %, and the remaining 10% of caucasi-ans of largely European descent and other racial minorities (Asian, Black). Life expectancy averages about 61 years. The Roman Catholic religion accounts for 97 % of the population although active practicans amount to a substantially lower figure. About 65% of the school aged or older population are literate.

5. HISTORY: When Cortés arrived in México in 1519, he encountered and advanced Aztec civilization which militarily and economically dominated a large portion of meso-america. Other more sophisticated cultures, such as the Olmecca, the Tolteca and the Maya, had since disappeared. In 1521 Cortés completed the conquest and founded the Spanish Colony that was to last almost 300 years. The brutal Spanish colonial model was primarily concerned with the extraction of natural resources, mainly of precious metals, and

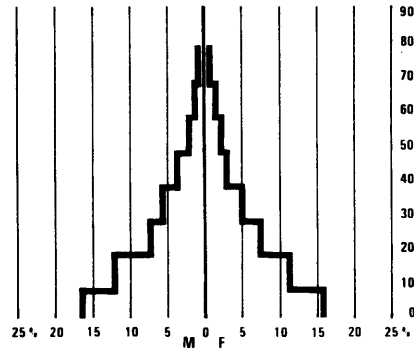
did little to develop a sound local economic base beyond the creation of the huge sugar cane producing , slave hungry haciendas. In 1810, claiming a larger part of the action and mercantile reforms such as free trade, the criollos or Mexican-born Spaniards led a mass revolt against Spain. Thus the large landholdings, and with them political and economic power, simply changed hands. The Republic was established in 1822. In 1847 México lost almost half of its territory to the United States whose rapidly expanding young capitalist economy required vital space for its growth. The government of Benito Juárez rejected a neo-colonial adventure attempted by Napoleon III of France and led by Maximilian of Austria. A brief french occupation ended with the latter's execution in 1865. Juárez' liberal government reformed the constitution, separating the state from the church and divesting the church of its properties. Porfirio Díaz instituted an iron-fisted peace for 33 years, encouraging foreign investment and allowing the expansion of



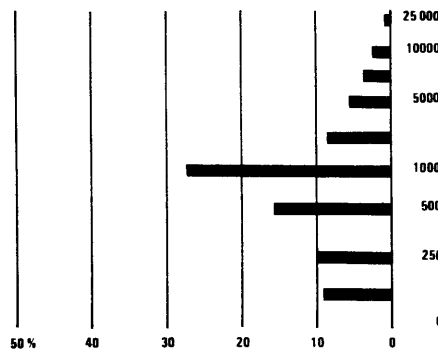
MAP OF THE REPUBLIC: indicating land communications and major cities.



URBAN POPULATION GROWTH
horizontal: dates vertical: population
Source: Atlas de Mexico 1970



URBAN POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Census, 1970; Population 48 225 238



URBAN ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Census, 1970; Households 12 955 057

the haciendas that encroached on the communal lands of native villages. The social and economic problems brought about by this period of development erupted in 1910. The electoral reforms intended by the liberal Madero soon unleashed a radical peasant war against the haciendas and the prevailing social and economic order. At the height of movement in 1914 the revolutionary forces led by Francisco Villa and Emiliano Zapata controlled most of the country including Mexico City, the seat of government. Their inability to establish a national government and their dependence on their respective regional bases was quickly capitalized upon by the moderate Carranza, who with Obregon, defeated Zapata and passed the new constitution in 1917. From the interrupted revolution emerged the ruling party which today is known as the Institutional Revolutionary Party. The period of consolidation that followed was characterized by certain social and political advances such as those carried out by Cardenas between 1934 and 1940, including the expropriation of the petroleum industry. The post WWII period was characterized by massive foreign investment and the emphasis on economic rather than social development. This policy eventually resulted in social unrest marked by a series of strikes by railroad workers, medics, and teachers, which culminated in the guerrillas of the 1960's and the massive student movement of 1968. Reforms implemented by the government have been too modest and come too late. The 1970's have seen the emergence of nationwide worker movements and peasant militancy, attempting to break loose from the bureaucratic government controlled unions and to move towards the goals of social justice and economic equality established by the Mexican Revolution.

5. **ECONOMY:** The rapid sustained growth of Mexico's mixed economy since 1950 has resulted largely from the support afforded by the government to the private sector both directly, by tax incentives, financial support, etc., and indirectly, by the construction of roads, irrigation projects, electrification, railroads, communications and in general, the basic infrastructure capable of supporting a broad range of industrial activities. Thus, the country's economy has evolved from a primary production structure based on agriculture and mining, to the more balanced structure of a semi-industrialized nation.

However, this development and the distribution of wealth have been very uneven. Although almost half of the economically active population are engaged in agriculture, agricultural production accounts for only 12% of the GNP. The underdevelopment of the agricultural sector is due largely to the failure of the agrarian reform. Some 65 million hectares of large land holdings have been subdivided and distributed to landless peasants with little or no complementary technical or financial support. Thus, only one fourth of all crop sales are made by 85% of the farmers. The highly productive remaining land is owned by medium sized independent farmers and the large U.S. corporations which control 95% of the food processing industry. Foreign investments are dominant in other areas of the manufacturing sector as well. The sector has grown at an average of 9% a year. In response to increasing control of some industries by foreigners, the government enact legislation requiring majority Mexican ownership of all new investments except those of 'national interest'. The other major sectors of the national economy are tourism and mineral resources. Of the total economically active population, 39.5% are engaged in agricultural and other primary sector activities, 16.7% works in manufacturing and 16% in services related jobs. In 1973, Mexico exported US\$ 2.63 billion of which about 25% were manufactures, 16% were minerals and the rest largely agricultural products. The US\$ 4.15 billion of imports were made up largely of capital goods although some basic foodstuffs had to be imported as well. Although internal savings have recently provided over 90% of gross investment, foreign financing has played a crucial role. Today, Mexico's foreign debt is of twenty billion dollars.

More than the western recession of 1974-75, the heavy borrowing by the government precipitated an economic crisis that led to the recent devaluation of the peso from 12.50 to around 20.00 to the dollar, the first devaluation in over 20 years. From 1940 to '56 the relative buying power of the peso decreased by 12.4%, from 1957 to '72, 3.3% and from 1975-'76, 62.5%.

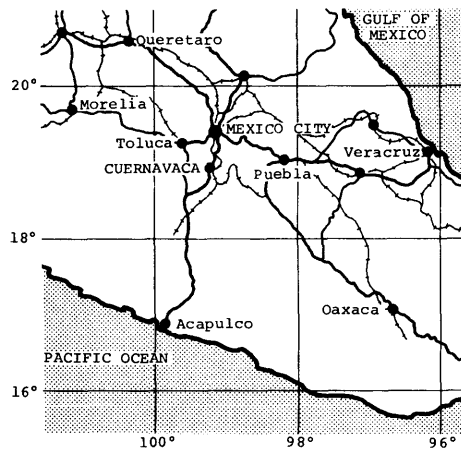
6. **GOVERNMENT:** The Constitution of 1917 established a Federal Republic with a separation of powers into executive, legislative, and judicial branches of government. The executive branch is dominant and power is

vested in the President who promulgates laws of the Congress and, by delegation of Congress, legislates by executive decree in certain economic and financial fields. The President is elected by universal adult (over 18 years of age) suffrage for a single 6 year term. Congress is composed of a Chamber of Deputies. The sixty four senators (two for each State and the federal district) are elected for 6 year terms. The Chamber of Deputies has 194 members proportionally representing electoral districts. The Mexican Congress is empowered to legislate on all matters pertaining to the National Government. The judicial system consists of local and federal courts and a Supreme Court of 21 Justices. The Supreme Court Justice are appointed by the president and approved by the Senate. México has 31 states and a Federal District. The states, composed of municipalities, are headed by an elected Governor. Powers not expressly vested in the Federal Government correspond to the states, but the states' powers are very weak as compared to those of the Federal Government.

To the Mexican, the ruling party and the government are one and the same. The PRI has been the dominant political force in the country since 1929; every president, every member of their respective cabinets and almost every senator, state governor and state officers have come from the party. The PRI's electoral victories have not always been assured legally or peacefully. The party's success until not long ago has been based on a relatively effective grass roots organization and the lack of political awareness of the Mexican people: the inexistence of an effective choice breeds political apathy and ignorance. The opposition parties which are insignificant, obsolete or openly collaborate with PRI, include PAN (national action, rightist), FARM (authentic mexican revolutionary, rightist), PPS (popular socialist), PCM (mexican communist) and the new PMT (mexican workers, leftist).

URBAN CONTEXT

Cuernavaca, Mexico



CENTRAL MEXICO

0 100 250 Km

MAJOR CITIES ●
ROADS ———
RAILROADS —+—+—

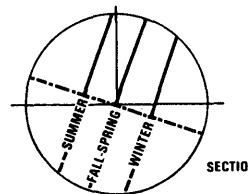
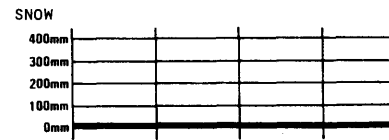
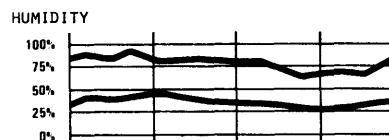
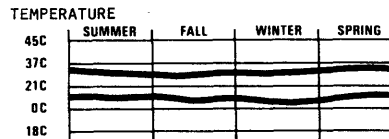
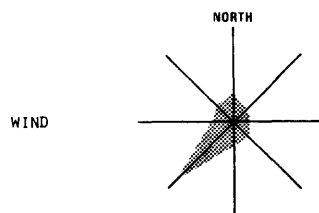
1. PRIMARY INFORMATION: The Cuernavaca metropolitan area is located over a mountain range, 70 kilometers south of the high plateau of Mexico City. It lies in a valley that slopes down from the Sierra de Ajusco in the north and which is bounded by a series of deep ravines or barrancas on the west and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

2. HISTORY: Cuauhnahuac, or place near the woods, is said to have been founded by the ancient Olmec civilization. At the time of the Spanish conquest in 1521 it was the administrative center of the Tlaluca region, under the Aztec domination. The city became capital of the Oaxaca Valley Marquisate with which Cortes was rewarded by the King, and functioned as an important link between Mexico City and the port of Acapulco on the Pacific Ocean. After the war of independence in 1810, the region saw the development of large sugar cane plantations introduced by the Spaniards. The haciendas came to dominate the area, taking over the native rural communities and turning their inhabitants into slaving day workers. These are among the main factors that made the local based movement led by Zapata one of the most important currents in the revolution of 1910.

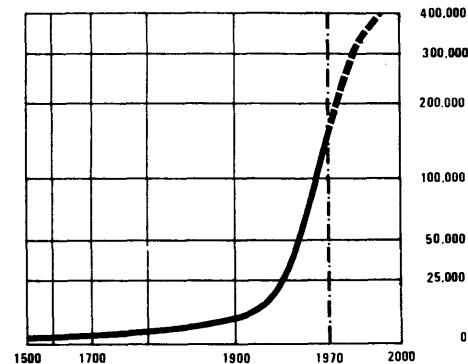
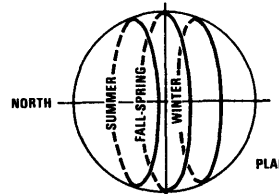
At the height of the movement in 1915 the state of Morelos was autonomously run by a democratically organized native population, which not only supported a guerrilla army, but exported sugar and fed Mexico City as well. After the revolution, Cuernavaca began to grow rapidly, becoming a fashionable resort for upper income groups from Mexico City. As in most of the country, industrialization in the area began after World War II. The trend has been reinforced in the past few years by the federal policy of decentralizing the industrial growth of Mexico to surrounding cities.

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

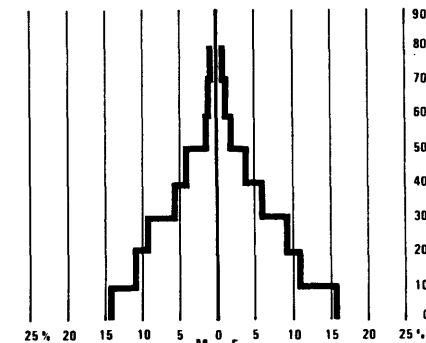
CUERNAVACA, 18° 55' N



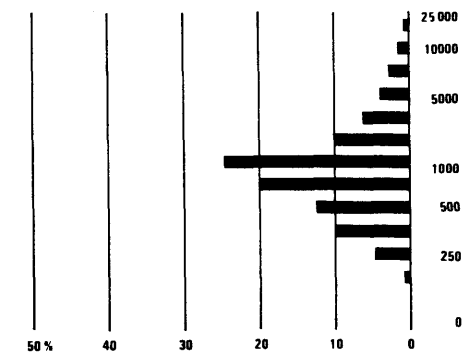
SUN



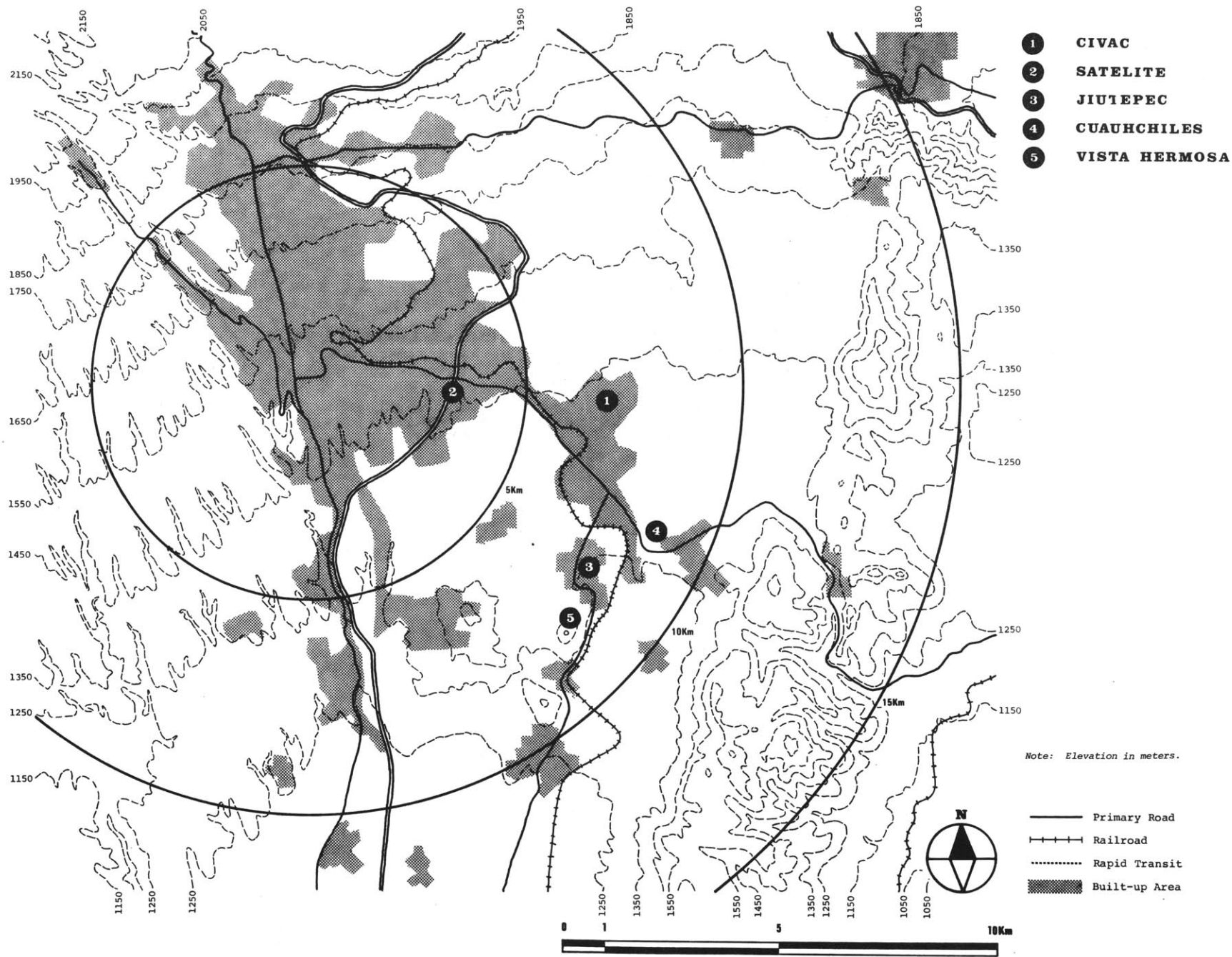
URBAN POPULATION GROWTH
horizontal: dates vertical: population
Source: Direccion de Estadisticas, S.I.C., 1973



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



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



URBAN TOPOGRAPHY AND CIRCULATION

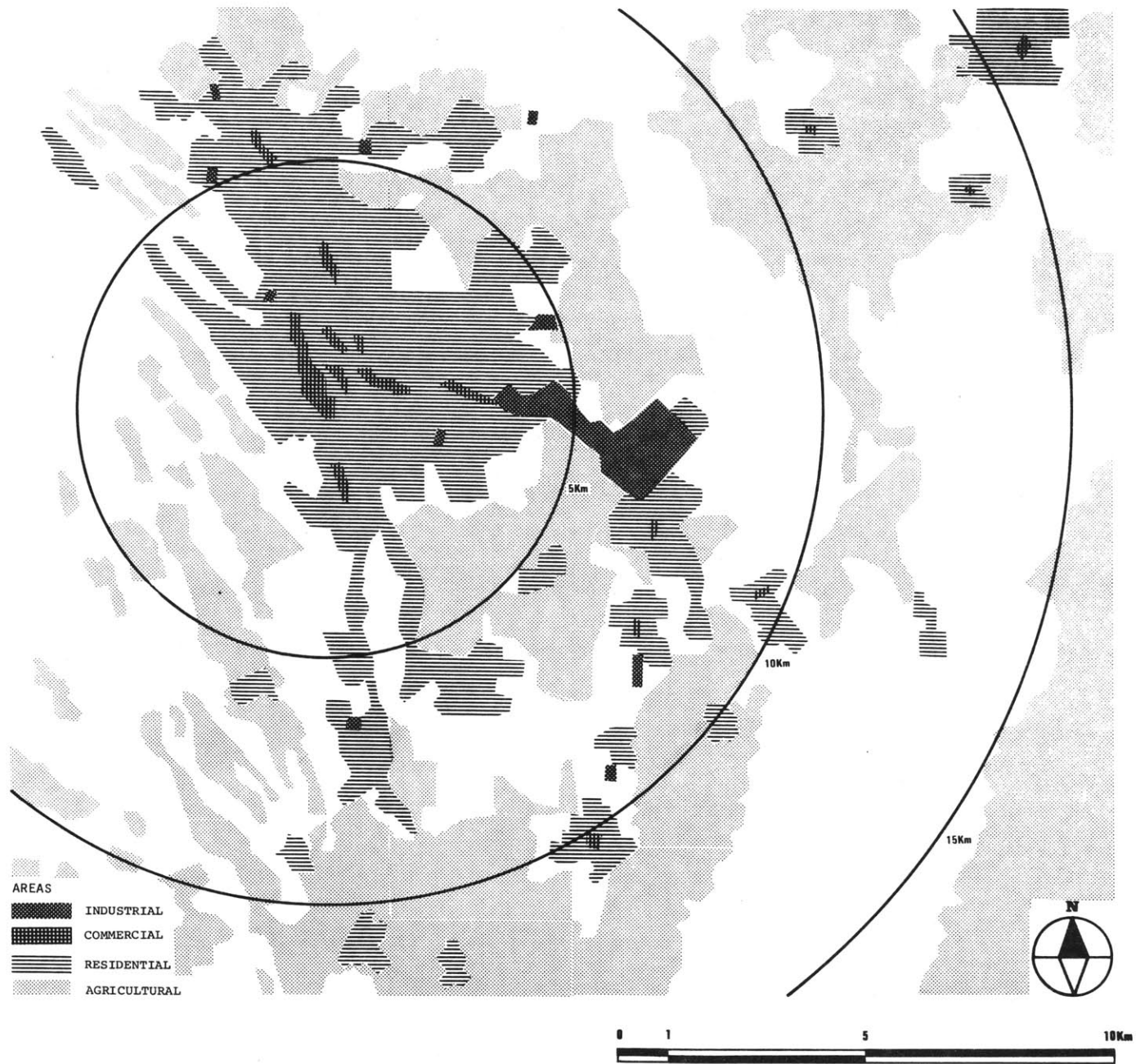
1: 125 000

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

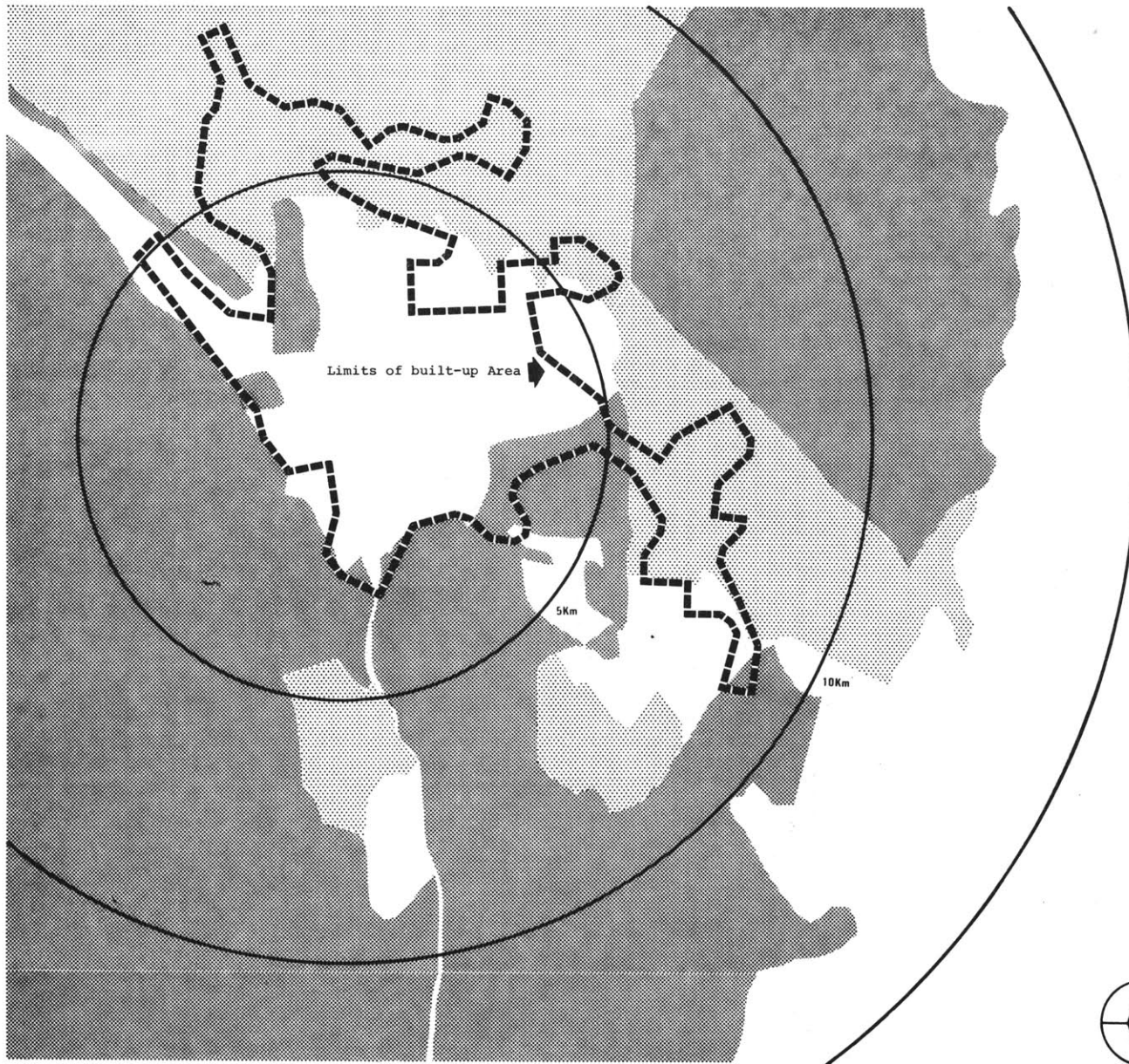
A measure of the sustained relevance of tourism for the city is shown by the "floating" population which increased from 18,000 in 1950 to 45,000 in 1970.

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

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



URBAN LAND USE PATTERN



However, if the effort to divert migrant currents from México to secondary cities succeeds, the above figures are likely to be considerably higher.




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

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

7. SOCIO-ECONOMIC: Ninety percent of the city's working population has incomes of less than US\$ 2,400 per annum. In 1970, approximately 26% had incomes of less than \$ 479 a year, while 57% made between \$ 480 and \$ 1,440. Around 20% of the economically active population was paid less than official wage minima in 1970.

The lower income groups are mainly concentrated in three areas: in and around the city center, in low income tenements, or as squatters on federal properties; in rural



AREAS	
	EJIDAL
	COMMUNAL
	PRIVATE

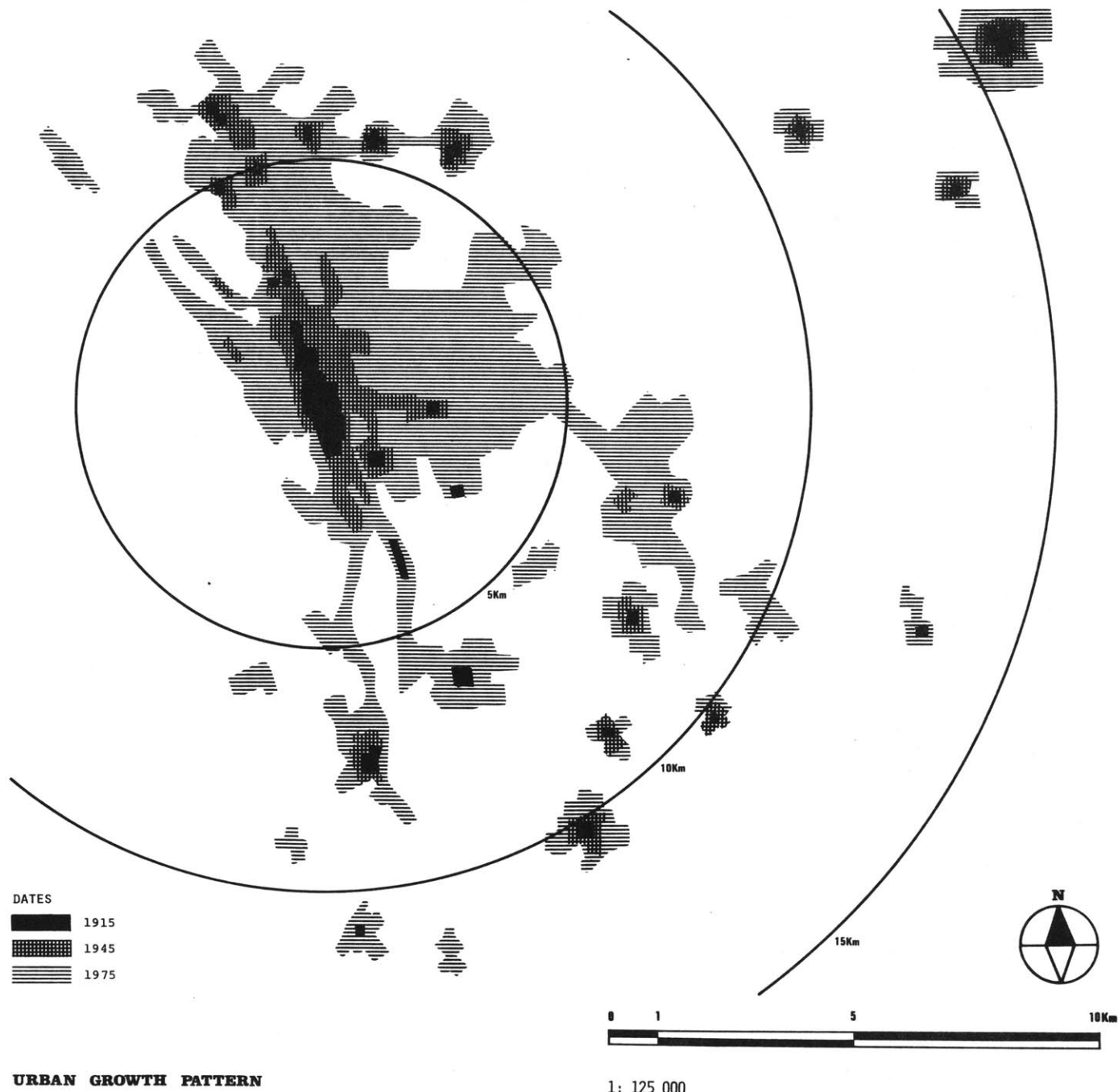
URBAN LAND TENURE PATTERN

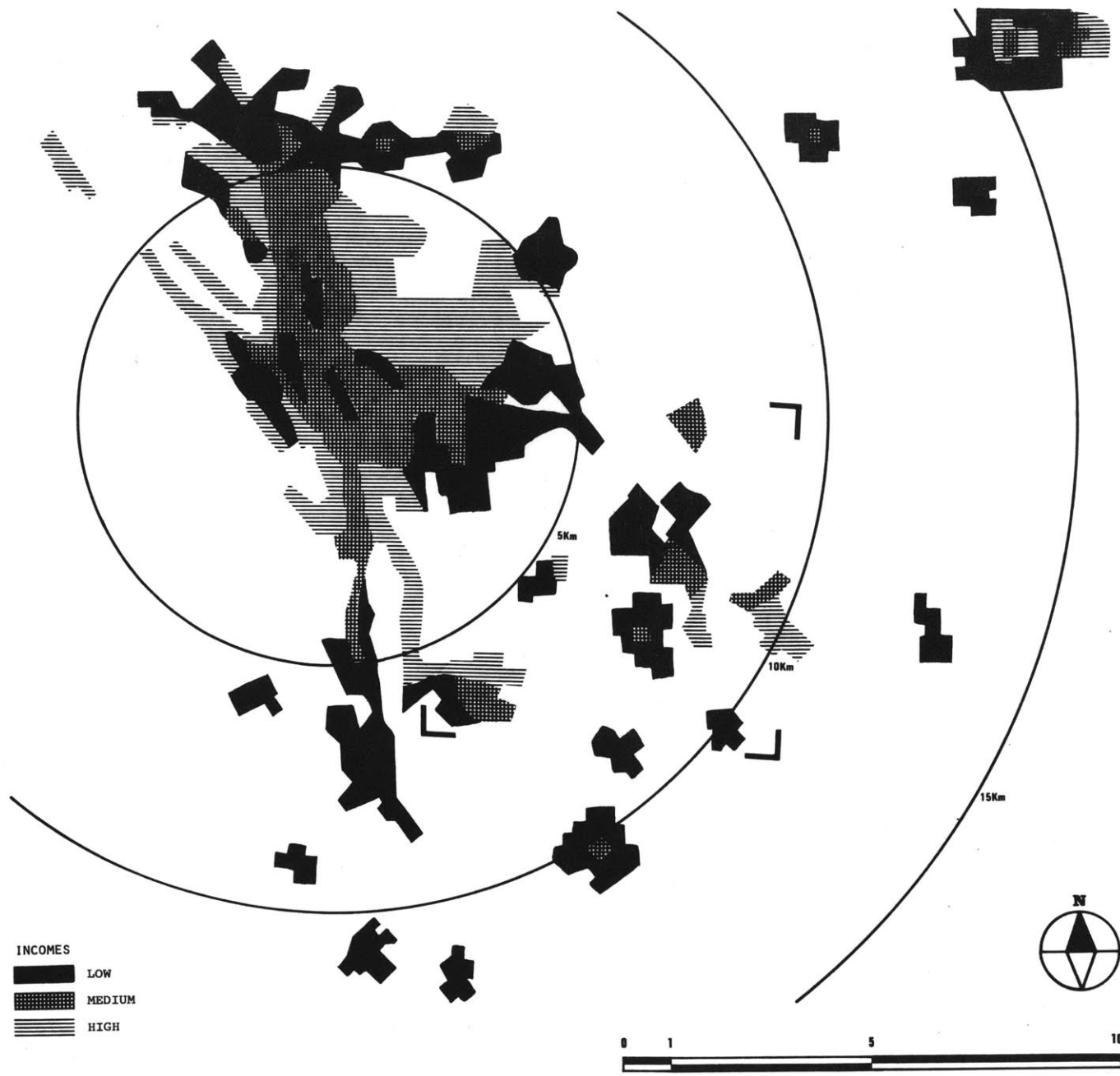
1: 125 000

communities around the city that have become part of the metropolitan area; and in the newer suburban working class neighborhoods. The upper income groups live in old high walled villas in the downtown area or in many of the more recent residential subdivisions, in and around the city.

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

9. URBAN GROWTH: The physical expansion of the city has usually been at the expense of valuable agricultural areas. This was determined in part by local topography which made development to the west very difficult due to the series of deep barrancas. Thus, urban growth has primarily taken place on the gently sloping agricultural land along the whole eastern periphery of the city. Nonetheless, large patches of land to the northwest have been destroyed by massive erosion as the exploitation of forests for fuel and construction materials pushed the timber line several kilometers up the hillside. In addition to this the rainy season pattern, and indeed the overall climate, have changed from being highly predictable to unstable and erratic in less than two decades. This, as well as the human ecological changes occurring in the Cuernavaca metropolitan area, are of course part of





INCOMES
 ■ LOW
 ▨ MEDIUM
 ▨ HIGH

URBAN INCOME PATTERN



1: 125 000



☐☐☐☐
 ☐☐☐☐ SOUTHEASTERN METROPOLITAN AREA

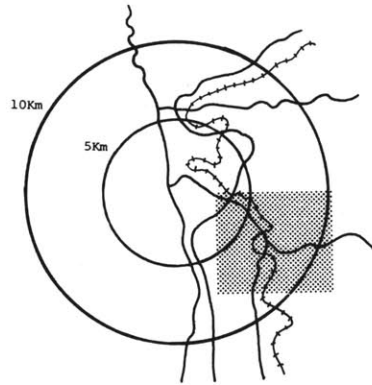
interacting, massive impact that growth of México City has had on the environment. Furthermore, there does not seem to be much change in these trends in the foreseeable future. In general terms, Cuernavaca metropolitan area does not have any major direct physical constraints on its overall development. Of course, the trade off is that the land water used up by urban growth is taken out, in direct proportion, of agricultural production. Although much of the agricultural based economy can be shifted to an industrial based one, this is a situation which cannot be sustained in central México for much longer.

URBAN CONTEXT SOURCES

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

CASE STUDY

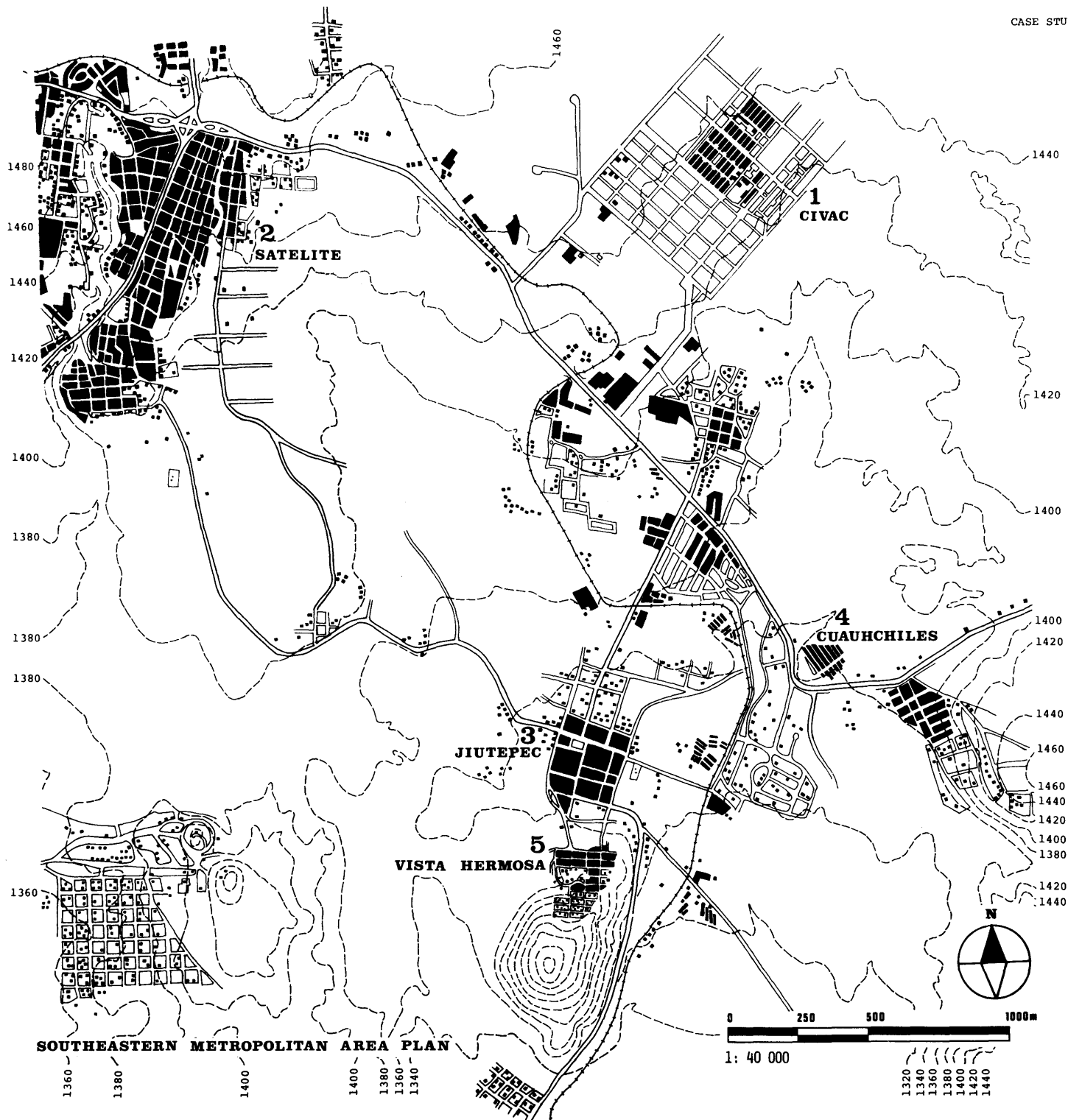
Southeastern Metropolitan Area



The photograph shows the transition between agricultural and urban lands at the southeastern metropolitan area. The irrigated agricultural lands are limited by the eastern sector of Cuernavaca City, by the Industrial City to the north and by the town of Jiutepec to the east. They extended to the south and east, past the town of Zapata. Idle land lie to the northeast and southwest of the area. The scale is 1: 40000 meters, the same as the plan in the opposite page.

ORIGIN: The southeastern metropolitan area has consolidated as a result of the conurbation occurred over the past few decades between the city of Cuernavaca and a series of neighboring, primarily rural communities. In fact, the process began with the integration of the ejidos of Acapantzingo, Chapultepec and Atlacomulco. This last community, and the Colonias of Satellite and Flores Magon, strung along the Mexico-Acapulco highway,





can be considered as the southeastern most tip of Cuernavaca at el Polvorin, and the town of Temixco; and the Cuernavaca-Cuautla highway, which in turn branches off to the south via Jiutepec and structures the conurbation of the southeastern peiphery of the city mentioned above, and the triple sided CIVAC-Tlalhuapa, Jiutepec-Zapata, Tejalpa-Progreso system. (see Urban Topography and Circulation, page). The two systems, Cuernavaca-Temixco, and what we will simply refer to as Cuernavaca-Jiutepec, were generated by differing economic forces within the overall context of the city's expansion. The Cuernavaca-Temixco system has developed based primarily on the agricultural production of the area, and more recently by the appearance of high income weekend residential subdivisions. In addition, the ex-hacienda of Temixco is an important recreational spot for moderately low to middle income, one day vacationers from Mexico City. In the case of the Cuernavaca-Jiutepec system, besides the agricultural and recreational/residential elements noted above, a relatively recent but important industrial component has made this the fastest growing conurbation within the Cuernavaca metropolitan area. It is with this system, the backbone of the southeastern metropolitan area, that we are concerned in this case. The southeastern metropolitan conurbation stretches across the boundary between the municipalities of Jiutepec and Cuernavaca. Most of the recent growth has taken place, and will continue to do so, in the municipality of Jiutepec. The XIV century town of Jiutepec is the administrative and historic heart of the area. It is also the center of gravity for the rural communities of Parres, Progreso, Tejalpa and Tlalhuapa, and the middle and upper income residential subdivisions of Las Fuentes, Villas del Descanso, La Escondida and Tamoanchan, that together make up the southeastern pole of the Cuernavaca-Jiutepec system.

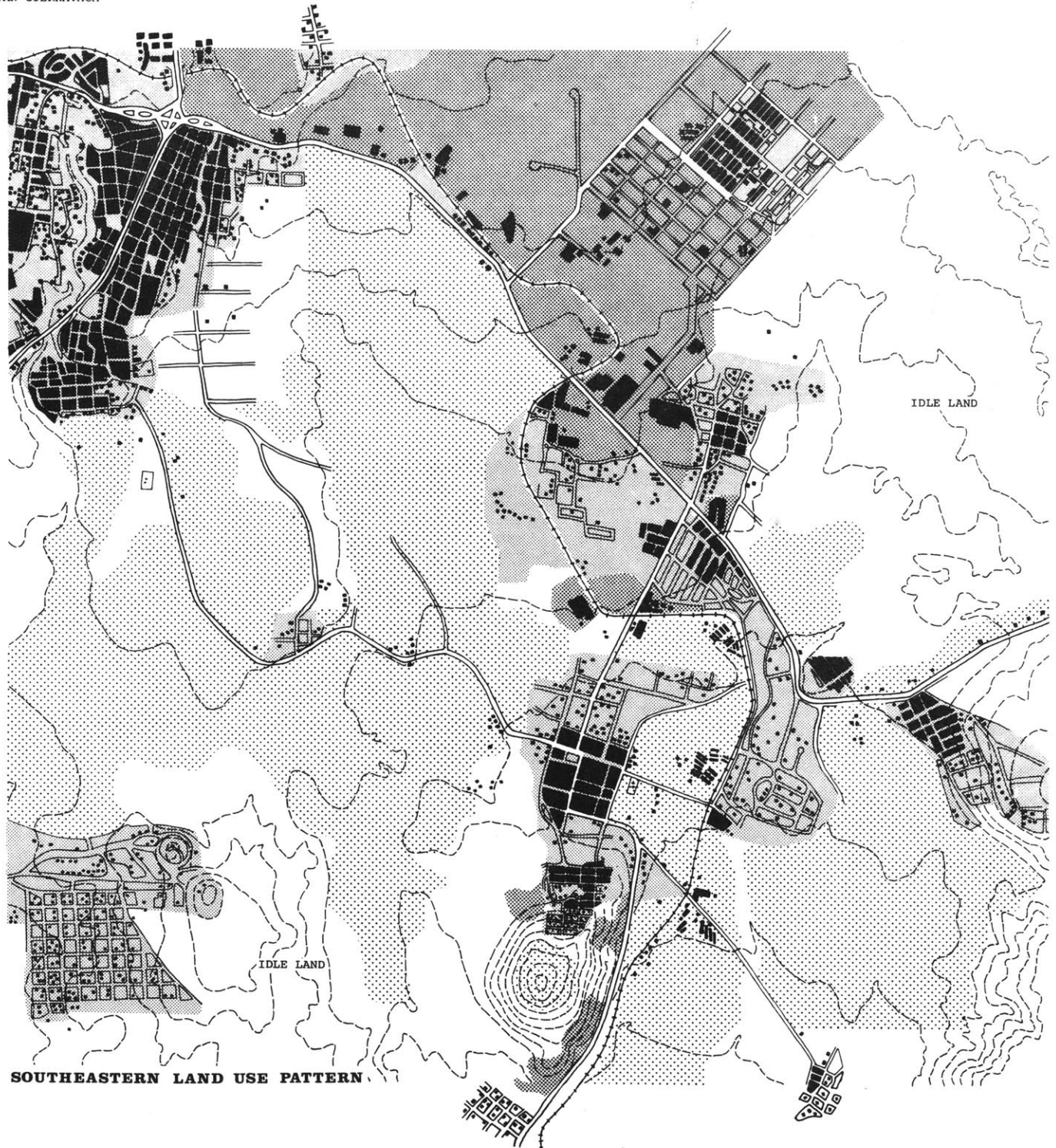
Note: elevation meters

LAND USE: The Cuernavaca Industrial City, or CIVAC, was initiated as a joint private sector-state and federal Government venture in the late 1960's. Adding to the incipient textile and raw material enterprises already existing in Jiutepec, CIVAC turned the textile/agricultural area into an industrial/residential oriented conurbation. For centuries the rich land and abundant water surrounding Jiutepec made it a high productivity, sugar cane and rice exporting area. The majority of the population was directly involved in agriculture and animal husbandry. A minor part of the economy was based on the extraction of Limestone from small quarries. With the explosive population growth and economic development that followed World War II, the area began to densify and change. Lime processing, cement and textile factories appeared, and the area absorbed part of the migrant currents converging to the center of the country from the severely underdeveloped state of Guerrero and others. At the same time, Cuernavaca had become a fashionable resort, and was growing rapidly with low density weekend residential subdivisions. As land in the inner rings and periphery of the city was taken up, developers converged upon the area surrounding Jiutepec. Thus the residential sector of the southern metropolitan area is made up of three distinct dwelling environments: the original rural communities, usually dating back to the XVI century and including low to upper income levels; the weekend middle and upper income residential subdivisions, that often accommodate permanent Cuernavaca residents, and the moderately low to very low income, and often squatter settlements. The development of CIVAC and the appearance additional services and industrial firms has in turn led to increasing population pressures. All of this unplanned growth has put tremendous stress on the utility and service networks. However, the most serious problem is that posed by the encroachment on the scarce and very valuable, highly productive, irrigated agricultural land.

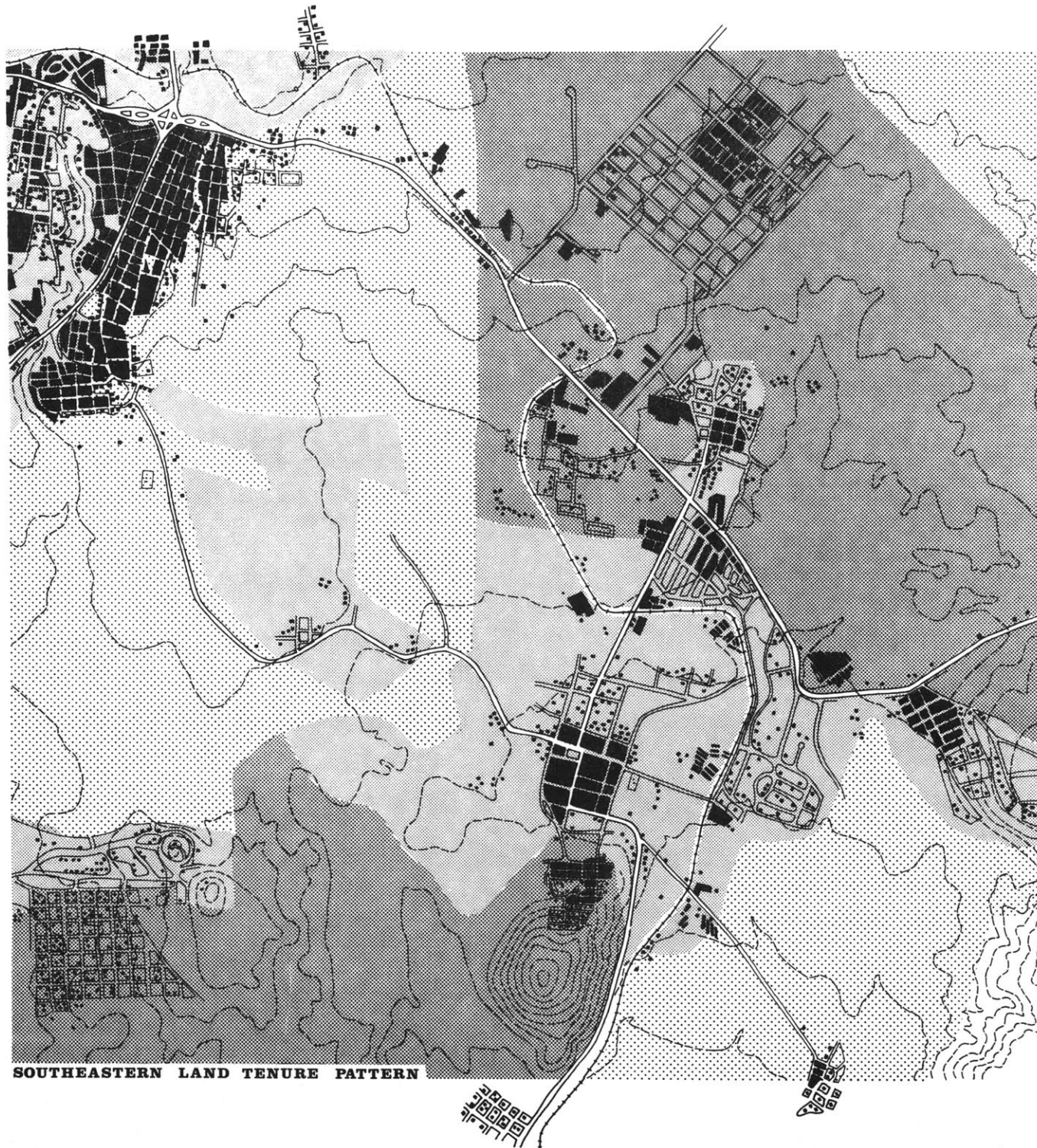
- INDUSTRIAL
- RESIDENTIAL
- AGRICULTURAL




1: 40000



SOUTHEASTERN LAND USE PATTERN



LAND TENURE: Long before, and up to the Spanish conquest, the fertile area southeast of Cuernavaca was populated by Tlahuica communities. The regional administrative center, then as today, was Cuauhnahuac or 'place near the edge of the forest'. Cortes made it the seat of his Marquisate and parcelled out the valley of Cuernavaca among his people, who introduced sugar cane production in the haciendas. The native communities were recognized by the Viceroy and the first formal land titles were awarded to each village. This situation persisted for centuries, up to the second half of the XIX century, when Juárez made all land property of the nation. Large properties including those of the church, were then put on the market. Questioning the validity of the native communities' rights to their land, the expanding haciendas encroached on communal properties. This situation was one of the main detonants of the revolution in the southern part of the country. During the Morelos Commune of 1915, while the Federal Government was intent on finishing off Villa, the campesinos installed a simple democratic socialist state where land and several haciendas were worked collectively by the respective villages. But Zapata was assassinated and the real revolution was interrupted. After that, the government gave back much of the best land to the wealthy 'hacendados' in the legal form of 'pequeña propiedad' or small property. The rest of the land belonging to the nation, was given to the existing or new native communities in the form of ejidos and communal lands. Under the ejido regime, each family of a community was given a plot to work which could not be sold or transferred other than by inheritance to direct descendants. Non agricultural areas, including forests, pastures and quarries are collectively owned by each community. Needless to say that much of the urban development in the area has been on communal and ejido lands, and later legalized. The government has recently created an agency, CoReTT, for this purpose.

 COMMUNAL
 PRIVATE
 EJIDAL



1: 40000

SOUTHEASTERN LAND TENURE PATTERN



DWELLING ENVIRONMENTS

The following section contains case studies depicting selected dwelling environments/systems in the southeastern metropolitan area, at the present time. The five cases are selected according to income groups, dwelling system, location, and the percentage of population that each system houses. Each case study is represented in three scales.

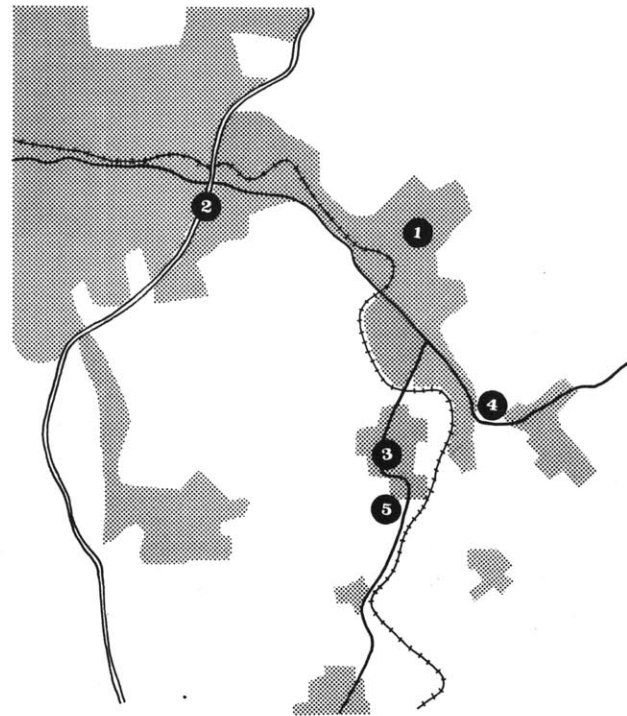
LOCALITY SEGMENT: A 400 x 400 m segment has been taken from the locality, representing the residential area to allow comparison of land utilization through patterns, percentages and densities.

LOCALITY BLOCK: Within each locality segment, a typical homogeneous residential block has been selected to illustrate subdivision of land and physical controls on it. This indicates its utilization and facilitates comparison of dwelling/land systems in terms of area, density and network efficiency.

TYPICAL DWELLING UNIT: A typical self-contained unit for an individual, a family, or a group, has been selected to describe dwelling/land systems in terms of physical and socio-economic components, and illustrate dwellings in relation to lot/land.

The case studies are arranged by locality as follows:

1. CIVAC : Institutional Row House
Private/Public, Middle Income
Periphery.
2. SATELITE Colonia Proletaria/Semi-detached
Popular/Moderately Low Income
Periphery.
3. JIUTEPEC: Rural Community/Detached House
Popular Moderately Low/Low
Income/ Periphery.
4. CUAUHCHILES: Squatter Settlement/Shanty/
Detached
Popular Low/Very Low Income
Periphery.
5. VISTA HERMOSA: Squatter Settlement/Shanty/
Grouped/Room
Popular, Low/Very Low Income
Periphery.



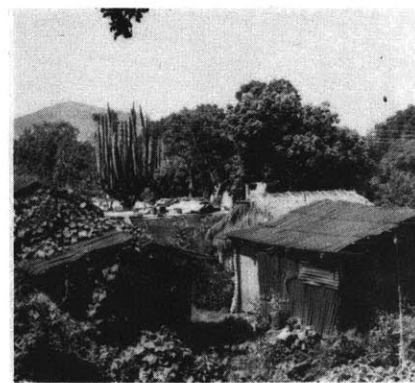
0 1 2 3 5 km

1: 125 000

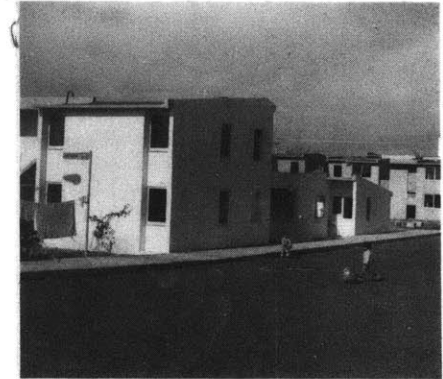
3 JIUTEPEC



4 CUAUHCHILES



1 CIVAC



2 SATELITE



5 VISTA HERMOSA



1 CIVAC

ORIGINS: CIVAC, or Ciudad Industrial del Valle de Cuernavaca, is a project developed jointly by the Federal and State governments with the participation of the private sector. It was intended to serve as a promoter of industrial development in Cuernavaca and as a model for the decentralization of industrial growth from Mexico to the surrounding secondary cities, such as Toluca, Queretaro and Puebla. The housing component of CIVAC is representative of projects being undertaken by different government agencies. The project was built in 1968 on relatively flat agricultural lands expropriated from neighboring Ejidos.

LAYOUT: CIVAC has a standard small gridiron layout which by responding to the need of providing small lots incurs in excessive network lengths per unit, thus substantially increasing costs. The community has two 16 hectare segments with a total of about 1,000 ready built dwelling units. The units consist mostly of one floor and several two story row houses, plus a handful of 3 story walk-up condominium apartments. The residential area is bounded on three sides by existing and planned light industrial areas. The southeastern side is bounded by agricultural lands of the town of Tejalpa.

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

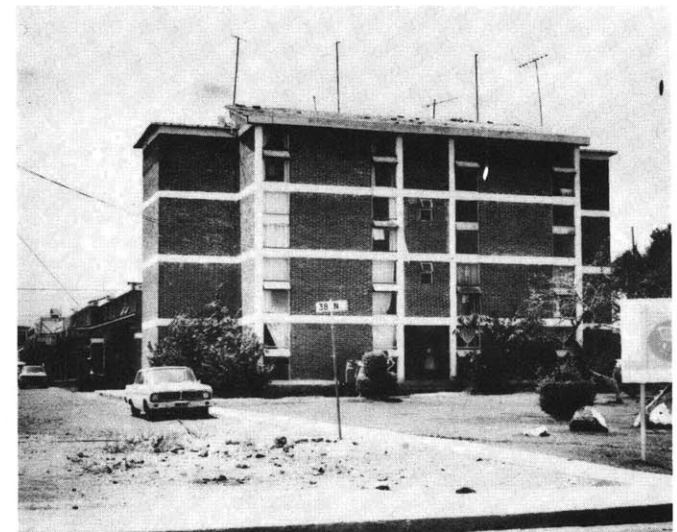
LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	615	16	38
DWELLING UNITS	620	16	39
PEOPLE	3,720	16	232
AREAS		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		4	25
SEMI-PUBLIC (open spaces, schools, community centers)		1.3	8
PRIVATE (dwellings, shops, factories, lots)		10.7	67
SEMI-PRIVATE (cluster courts)		-	-
	TOTAL	16	100

NETWORK EFFICIENCY

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

$$\text{AVERAGE LOT AREA} = 130 \text{ m}^2$$





LOCALITY CONSTRUCTION TYPES

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

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

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES

	HEALTH	SCHOOLS, PLAYGROUNDS	RECREATION, OPEN SPACES
LOCALITY UTILITIES AND SERVICES			
WATER SUPPLY			
SANITARY SEWERAGE			
ELECTRICITY			
STREET LIGHTING			
PAVED ROADS, WALKWAYS			
STORM DRAINAGE			
PUBLIC TRANSPORTATION			
REFUSE COLLECTION			
GAS			
TELEPHONE			
FIRE PROTECTION			
POLICE			

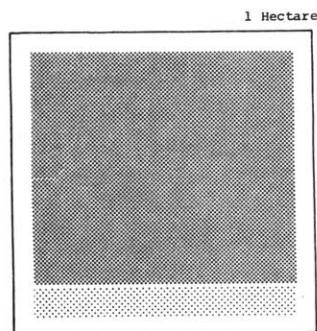
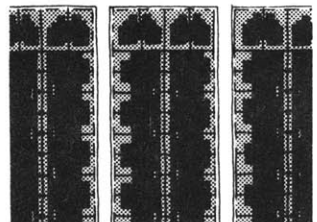
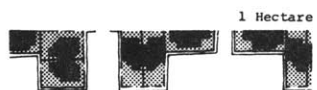
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

LOCALITY SEGMENT PLAN

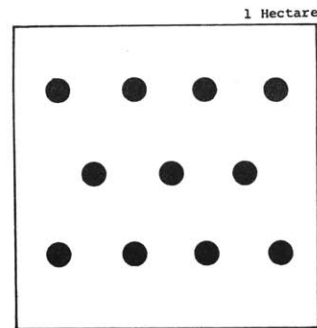


LAND UTILIZATION DIAGRAMS



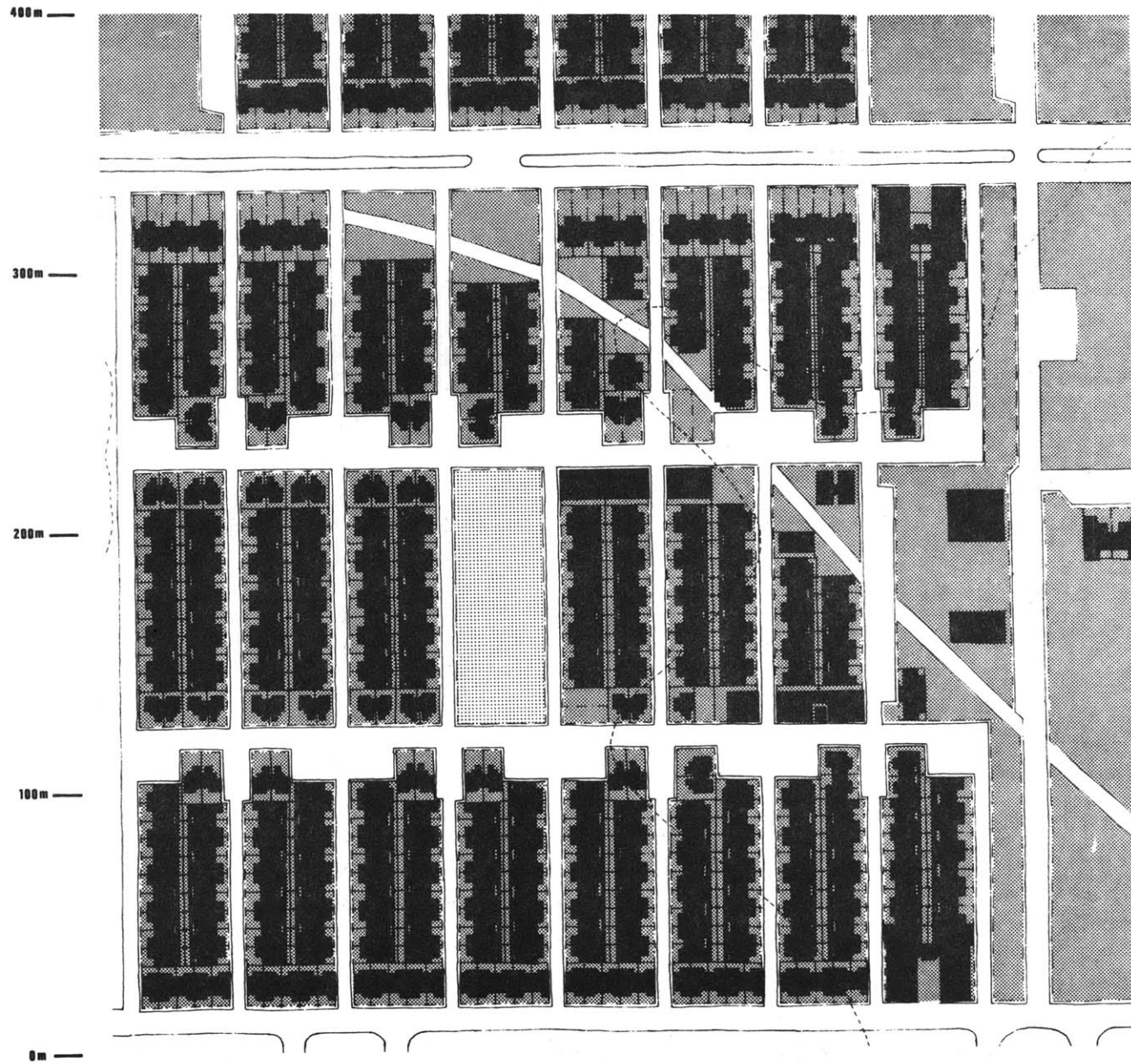
PERCENTAGES

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



DENSITY Persons/Hectare 232

● 20 persons

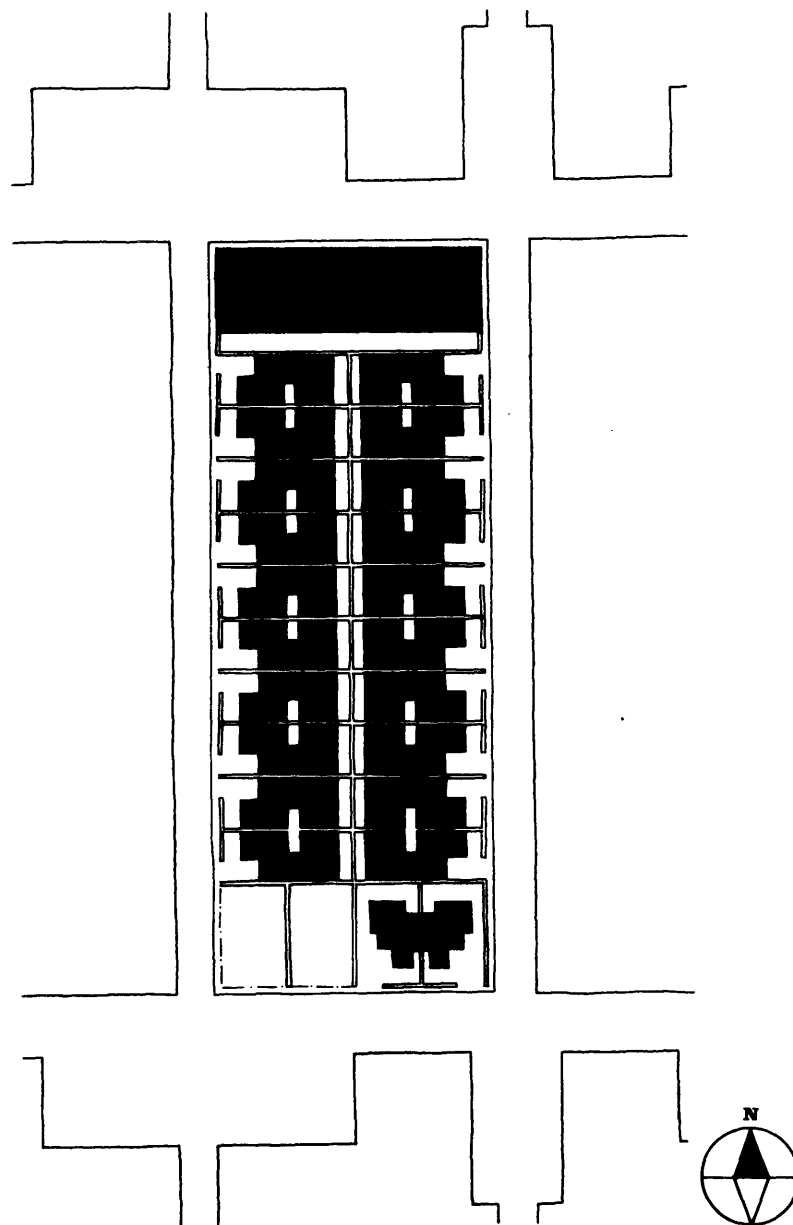


LOCALITY SEGMENT LAND UTILIZATION



1: 2500





LOCALITY BLOCK PLAN

0 10 50m
1:1000

POPULATION: Although originally intended for low income groups made up of workers and technicians of the industries at CIVAC, the high costs of the dwellings has forced them to be put up for public sale, catering to a middle income professional and semi-professional market. Clearly, CIVAC has the highest income levels among the localities surveyed as well as the most evenly upwardly mobile social group.

BLOCK: The block is typical of the standard small gridiron layout. Although the block is made up of relatively small rectangular lots, the frequency of the roads determines high circulation per unit lengths and public area percentages. This situation is complicated by areas reserved for parking, which as mentioned above, are not used for that purpose. On the other hand, the extent of construction coverage on the block allows relatively high population densities for single story dwellings. The dwellings are almost all identical and were built simultaneously by a large contractor. The units have small gardens in the front and back that are practically useless. Most of them have had a third small indoor open area converted into a useful room.

LOCALITY BLOCK LAND UTILIZATION DATA

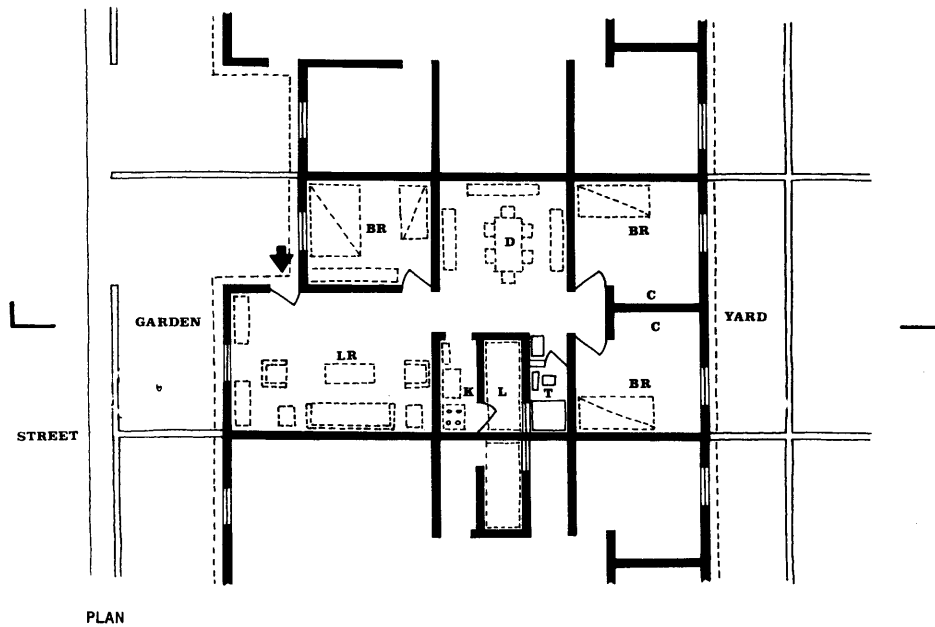
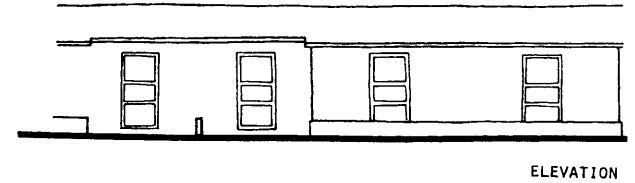
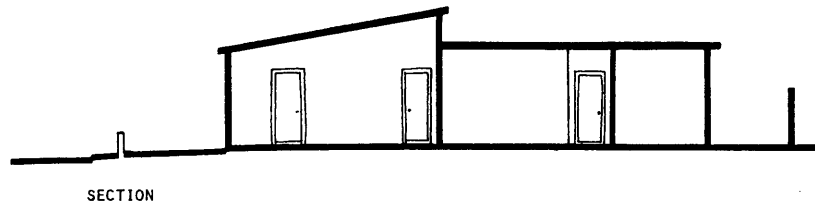
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	28	0.45	62
DWELLING UNITS	22	0.45	41
PEOPLE	132	0.45	293

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

NETWORK EFFICIENCY

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

$$\text{AVERAGE LOT AREA} = 121 \text{ m}^2$$

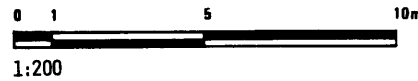
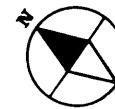


KEY

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

LOCALITY SOURCES

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



TYPICAL DWELLING

PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT

type: House
 area (sq m): 82
 tenure: Legal rental

LAND/LOT

utilization: Private
 area (sq m): 126
 tenure: Legal ownership

DWELLING

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

DWELLING DEVELOPMENT

mode: Instant
 developer: Public/Private
 builder: Private
 construction type: Brick, concrete
 year of construction: 1970

MATERIALS

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

DWELLING FACILITIES

wc: 1
 shower: 1
 kitchen: 1
 rooms: 3
 other: Indoor patio
 Converted to dining
 Room

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

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

NUMBER OF USERS

married: 2
 single: -
 children: 1
 total: 3

MIGRATION PATTERN

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

GENERAL: ECONOMIC

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

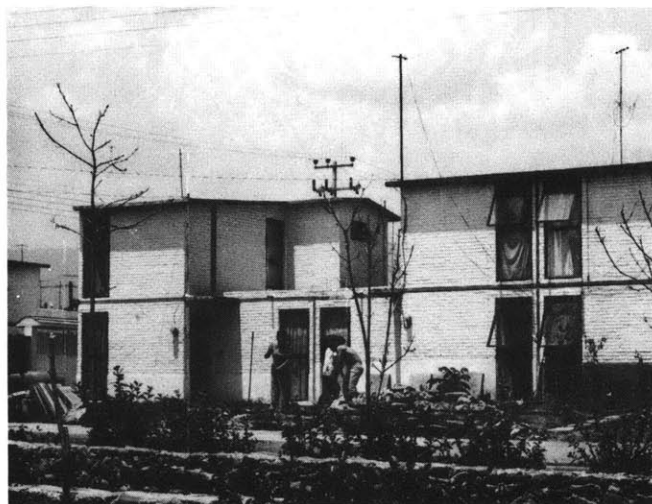
COSTS US\$

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

DWELLING UNIT PAYMENTS

financing: Private
 rent/mortgage: \$ 44 month
 % income for rent/mortgage: 6%

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



2 SATELITE

ORIGINS: The Colonia Satelite was developed in two stages on agricultural land belonging to the Ejido Chapultepec. The settlement of the older part of the Colonia began between 1960 and 1961 and that of the new part began six years later. In both cases the transactions carried out between the Ejidatarios of Chapultepec and the settlers were extralegal and it is only recently that the land tenure situation is being normalized by the new federal agency CoReTT.

LAYOUT: The old and new sections of the Colonia are separated by the Mexico- Acapulco highway. The urban layout used in the old section was basically that of the spanish colonial block grid, adapted to the shape of the site. In the new section however, except for a strip of large blocks along the highway a standard gridiron layout was adopted in order to provide smaller lots. The Colonia Satelite is primarily a low income residential area with medium to low density. The area is surrounded by low middle income neighborhoods on one side and by agricultural lands on the east. The agricultural lands are rapidly being developed into urban areas as the corridor between the nearby industrial area of CIVAC and the southeastern portion of the city expands.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	172	16	10.7
DWELLING UNITS	210	16	13.1
PEOPLE	1,260	16	78
AREAS		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		5.6	35
SEMI-PUBLIC (open spaces, schools, community centers)		2.6	16
PRIVATE (dwellings, shops, factories, lots)		7.8	49
SEMI-PRIVATE (cluster courts)		-	-
TOTAL		16	100

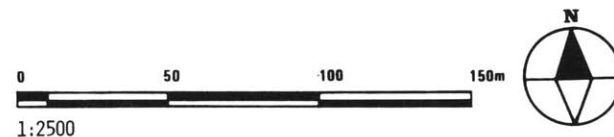
NETWORK EFFICIENCY

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

$$\text{AVERAGE LOT AREA} = 453 \text{ m}^2$$

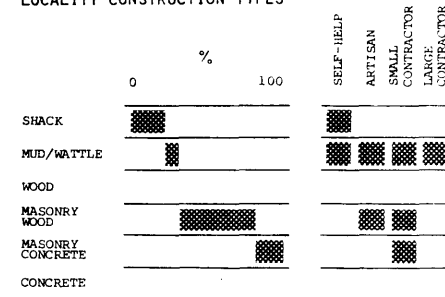


LOCALITY SEGMENT AIR PHOTOGRAPH





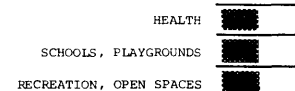
LOCALITY CONSTRUCTION TYPES



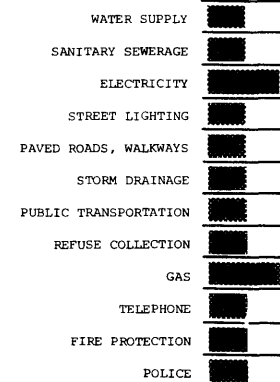
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES



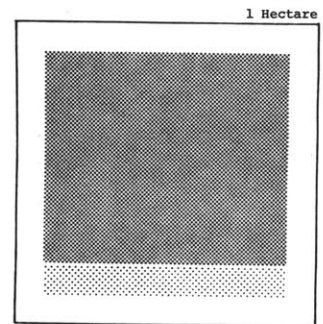
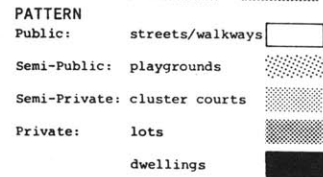
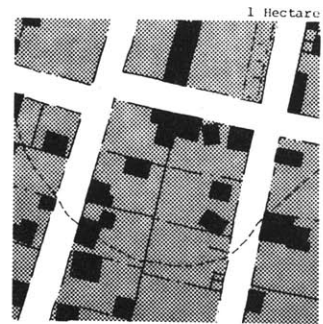
The chart illustrates the approximate availability of utilities, services, and community facilities at three level: NONE, LIMITED, ADEQUATE.

Note: elevation in meters

LOCALITY SEGMENT PLAN

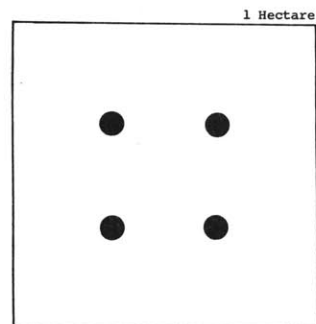


LAND UTILIZATION DIAGRAMS



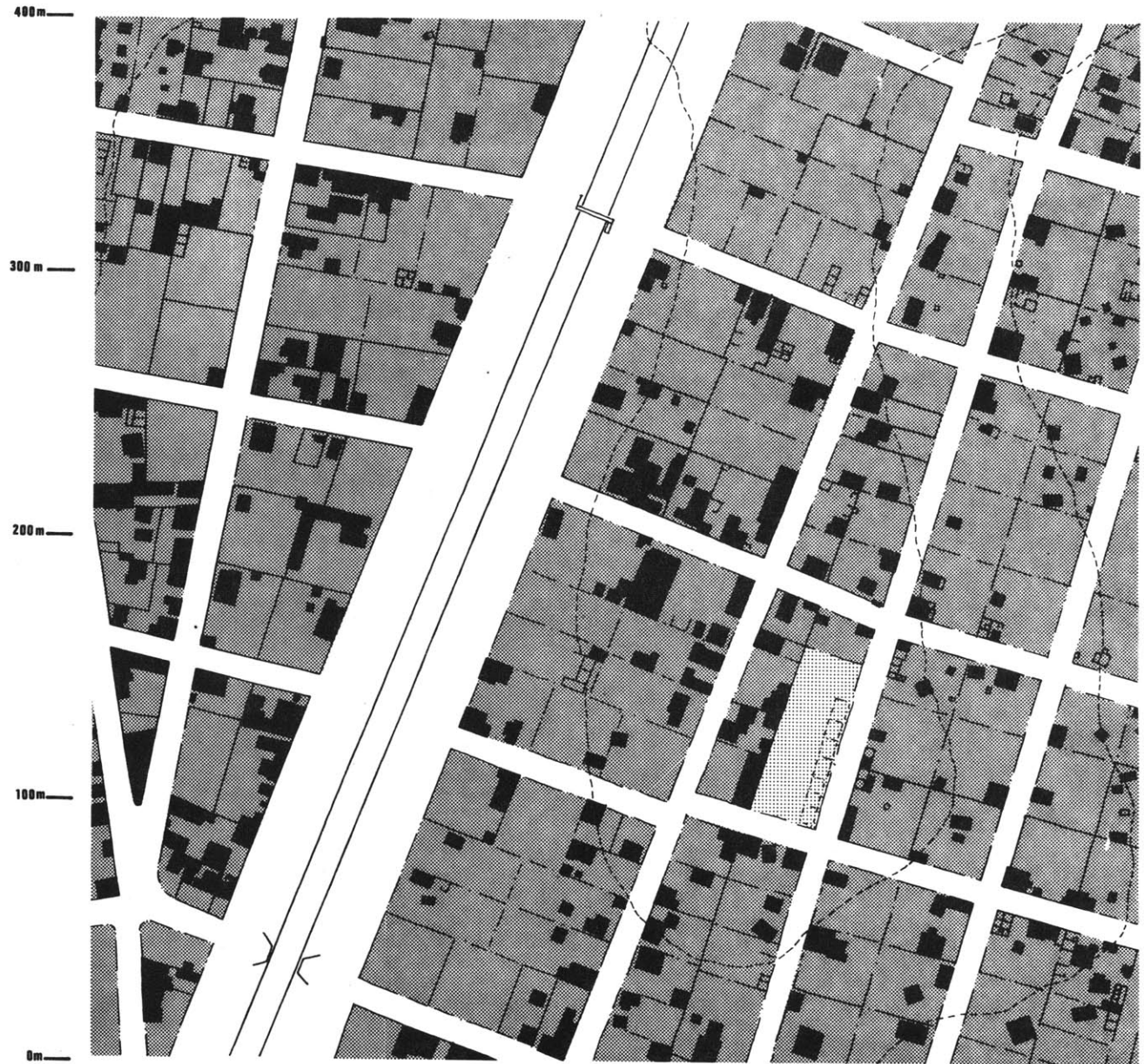
PERCENTAGES

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

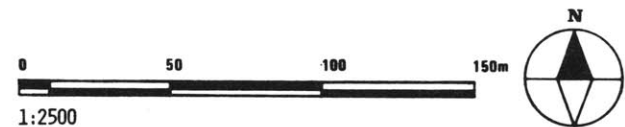


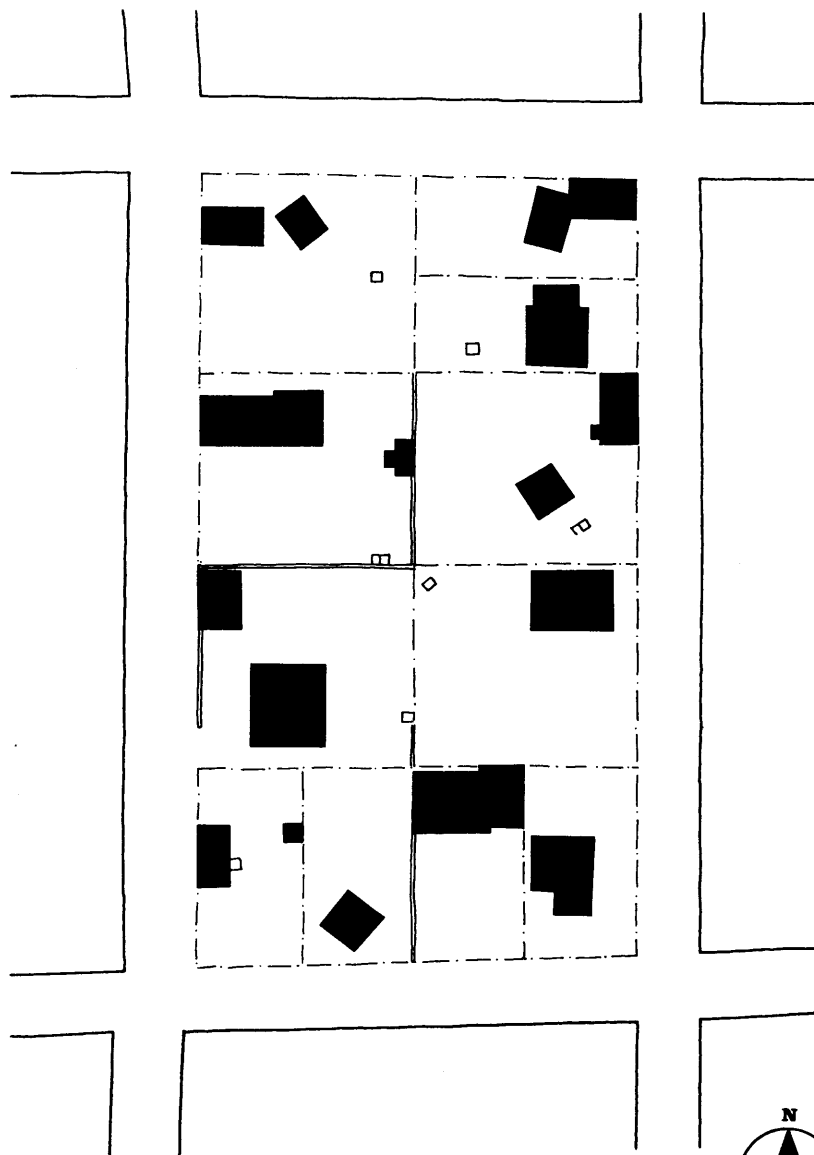
DENSITY Persons/Hectare 78

20 persons



LOCALITY SEGMENT LAND UTILIZATION





LOCALITY BLOCK PLAN

POPULATION: The population of Satellite is made up largely of working class moderately low income population. There is, however, a small percentage of both middle and low income groups, as well. The predominant employment types in the Colonia include qualified construction foremen and carpenters. It also includes industrial workers, many of whom work in the CIVAC industrial complex nearby.

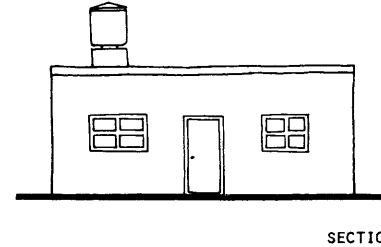
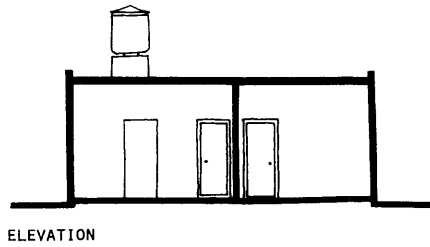
BLOCK: The block is representative of those found in most of the peripheral Colonias Proletarias, regardless of their origin, whether developed privately or by a squatter invasion. In this case; however, the block was divided into relatively large square lots, resulting in high circulation per unit ratios.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

LOCALITY BLOCK LAND UTILIZATION DATA

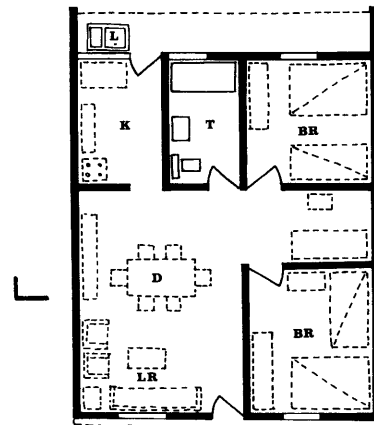
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	12	0.76	15.5
DWELLING UNITS	16	0.76	20
PEOPLE	96	0.76	124

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

NETWORK EFFICIENCY
 $R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 228 \text{ m/Ha}$
 AVERAGE LOT AREA = 508 m²



YARD



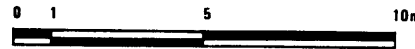
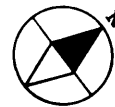
PLAN

KEY

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

LOCALITY SOURCES

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



1:200

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

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

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

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

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

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

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

SOCIO-ECONOMIC DATA
(related to user)

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

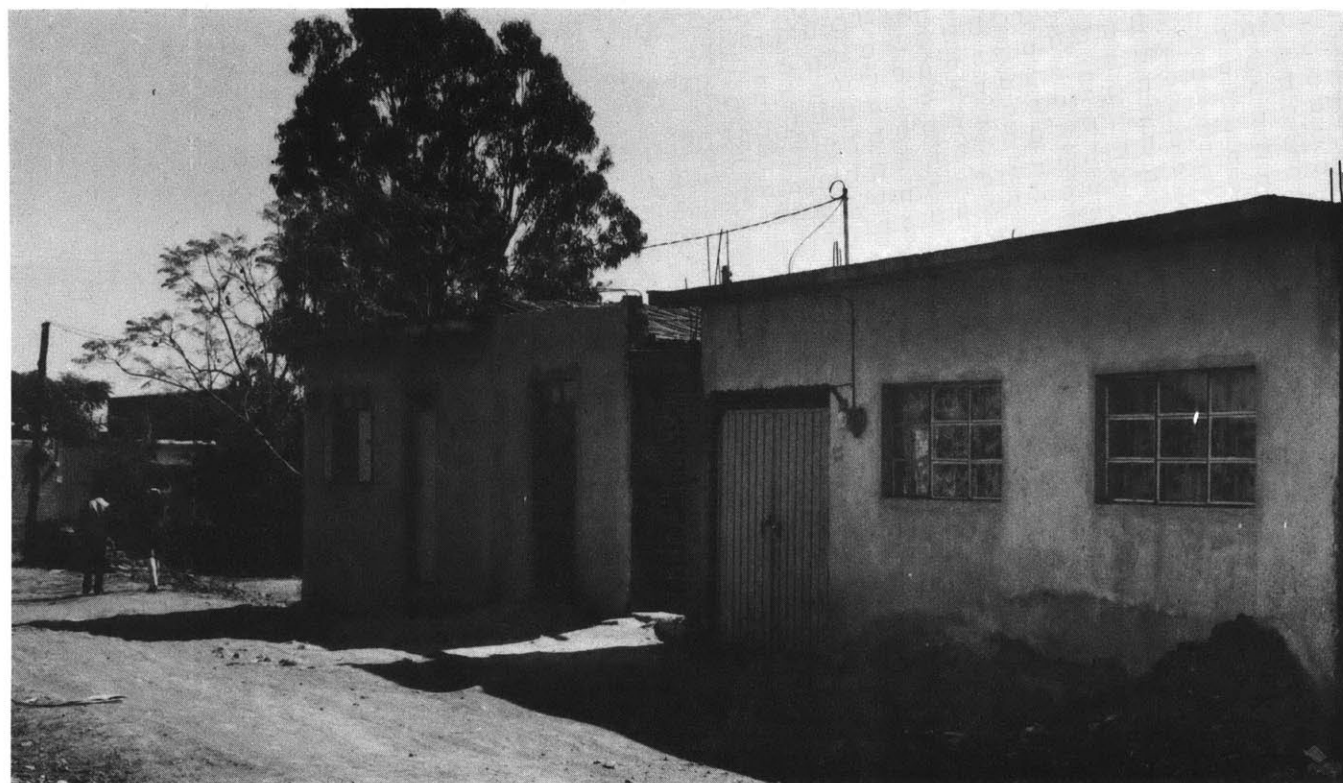
NUMBER OF USERS
married: 2
single: -
children: 3
total: 5

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

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

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

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



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

3 JIUTEPEC

ORIGINS: Jiutepec is the head of a Municipality of the same name. It was established in the second half of the XVI century by the spanish conquerors in the place of a native Tlahuica indian community. Although it is the largest among them, Jiutepec is representative of a series of towns and villages that today make up the Cuernavaca metropolitan area. For centuries the town was the administrative center of an important agricultural region. Over the past few decades it has seen the appearance of mining and industries. More than other parts of metropolitan Cuernavaca, Jiutepec has grown rapidly, during this period. Its urban area has encroached on agricultural lands and squatter settlements have appeared on the town's communal lands.

LAYOUT: The layout design of the town is a slightly elongated version of the classical spanish colonial grid. This layout is usually very efficient. The disorderly recent growth of the area, however, has resulted in the overlapping of contradictory land uses. Thus, the lime and cement factories pollute the town while residential areas compete with agricultural uses of land. The situation is complicated by heavy through traffic, travelling from the southern part of the state to Cuernavaca.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	107	15.22	7
DWELLING UNITS	150	15.22	9.8
PEOPLE	1 050	15.22	68

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	2.09	13.5
SEMI-PUBLIC (open spaces, schools, community centers)	1.7	11.5
PRIVATE (dwellings, shops, factories, lots)	11.43	75
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	15.22	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 119\text{m}/\text{Ha}$$

AVERAGE LOT AREA = 1400 m²

400m

300m

200m

100m

0m



LOCALITY SEGMENT AIR PHOTOGRAPH





400m

300m

200m

100m

0m

LOCALITY CONSTRUCTION TYPES

	%					
	0	100	SELF-HELP	ARTISAN	SMALL CONTRACTOR	LARGE CONTRACTOR
SHACK	[Horizontal line]					
MUD/WATTLE	[Horizontal line]					
WOOD	[Horizontal line]					
MASONRY WOOD	[Horizontal line with diagonal hatching]					
MASONRY CONCRETE	[Horizontal line with cross-hatching]					
CONCRETE	[Horizontal line]					

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

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES

HEALTH	[Horizontal line with diagonal hatching]
SCHOOLS, PLAYGROUNDS	[Horizontal line with diagonal hatching]
RECREATION, OPEN SPACES	[Horizontal line with diagonal hatching]

LOCALITY UTILITIES AND SERVICES

WATER SUPPLY	[Horizontal line with diagonal hatching]
SANITARY SEWERAGE	[Horizontal line with diagonal hatching]
ELECTRICITY	[Horizontal line with diagonal hatching]
STREET LIGHTING	[Horizontal line with diagonal hatching]
PAVED ROADS, WALKWAYS	[Horizontal line with diagonal hatching]
STORM DRAINAGE	[Horizontal line with diagonal hatching]
PUBLIC TRANSPORTATION	[Horizontal line with diagonal hatching]
REFUSE COLLECTION	[Horizontal line with diagonal hatching]
GAS	[Horizontal line with diagonal hatching]
TELEPHONE	[Horizontal line with diagonal hatching]
FIRE PROTECTION	[Horizontal line with diagonal hatching]
POLICE	[Horizontal line with diagonal hatching]

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

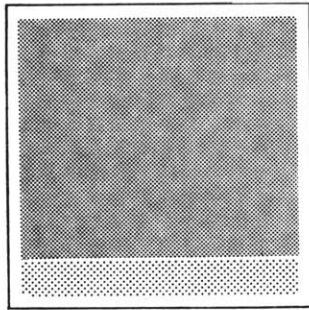
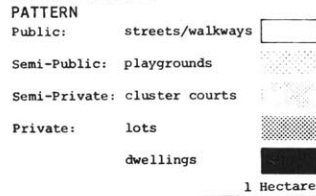
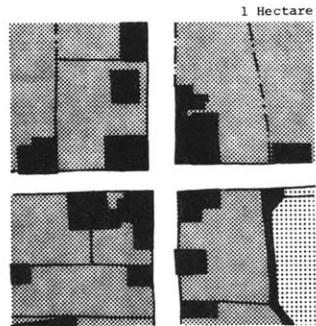
Quality of information: Approximate

Note: elevation in meters

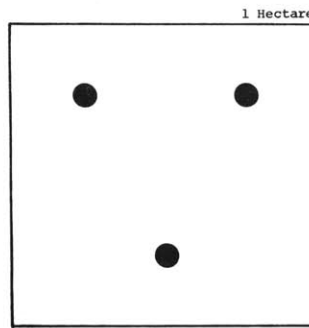
LOCALITY SEGMENT PLAN



LAND UTILIZATION DIAGRAMS



PERCENTAGES Streets/walkways 13.5
 Playgrounds 11.5
 Cluster Courts -
 Dwellings/Lots 75



DENSITY Persons/Hectare 68
 20 Persons



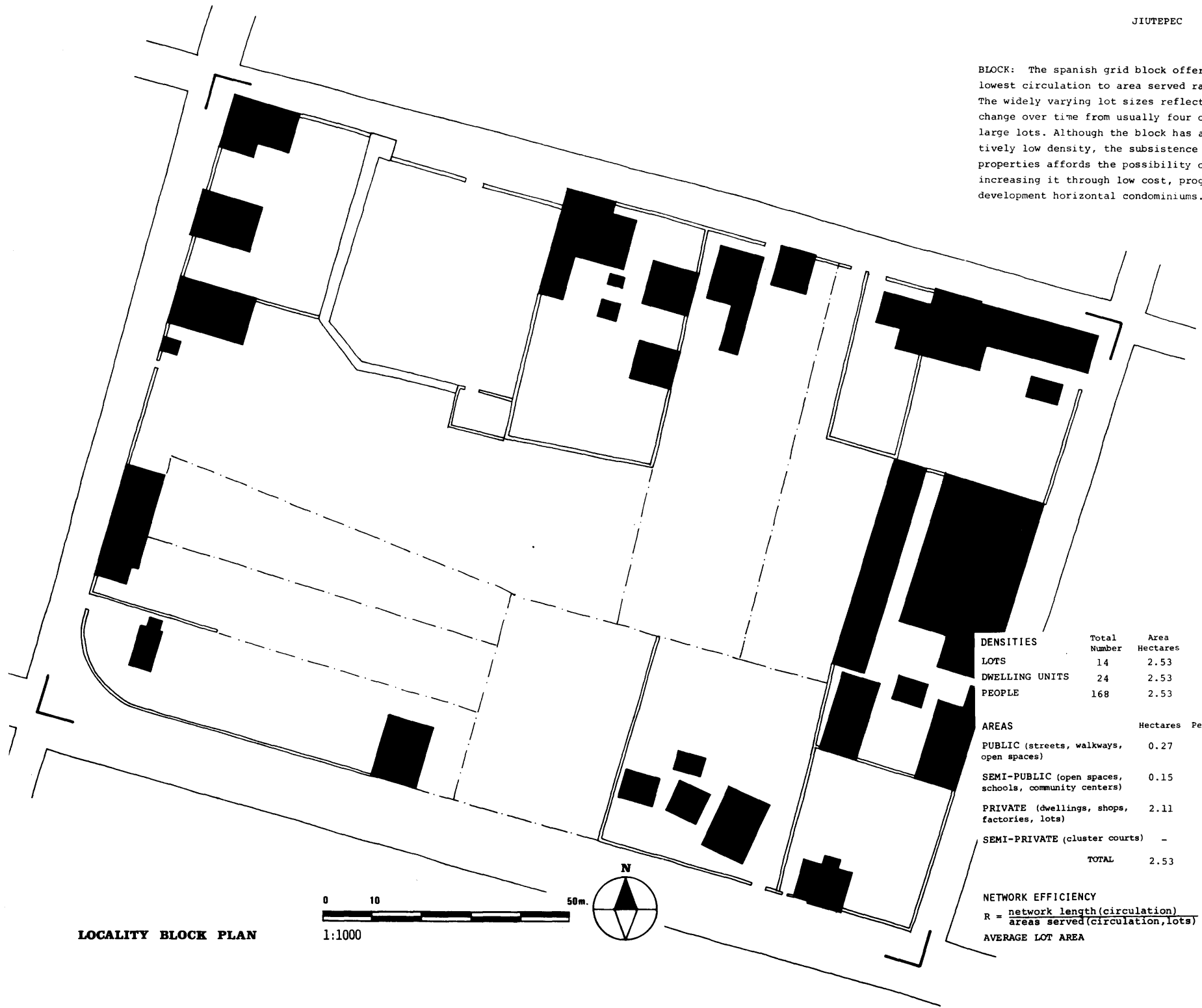
LOCALITY SEGMENT LAND UTILIZATION



1:2500



BLOCK: The spanish grid block offers the lowest circulation to area served ratios. The widely varying lot sizes reflect the change over time from usually four or six large lots. Although the block has a relatively low density, the subsistence of large properties affords the possibility of increasing it through low cost, progressive development horizontal condominiums.



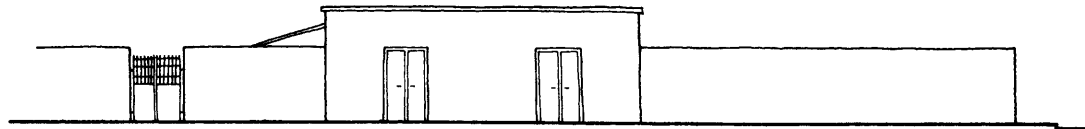
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	14	2.53	5.6
DWELLING UNITS	24	2.53	9.6
PEOPLE	168	2.53	68

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.27	11
SEMI-PUBLIC (open spaces, schools, community centers)	0.15	5
PRIVATE (dwellings, shops, factories, lots)	2.11	84
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	2.53	100

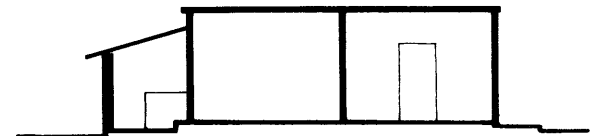
NETWORK EFFICIENCY
 $R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 252 \text{ m/Ha}$
 AVERAGE LOT AREA = 1507 m²

LOCALITY BLOCK PLAN

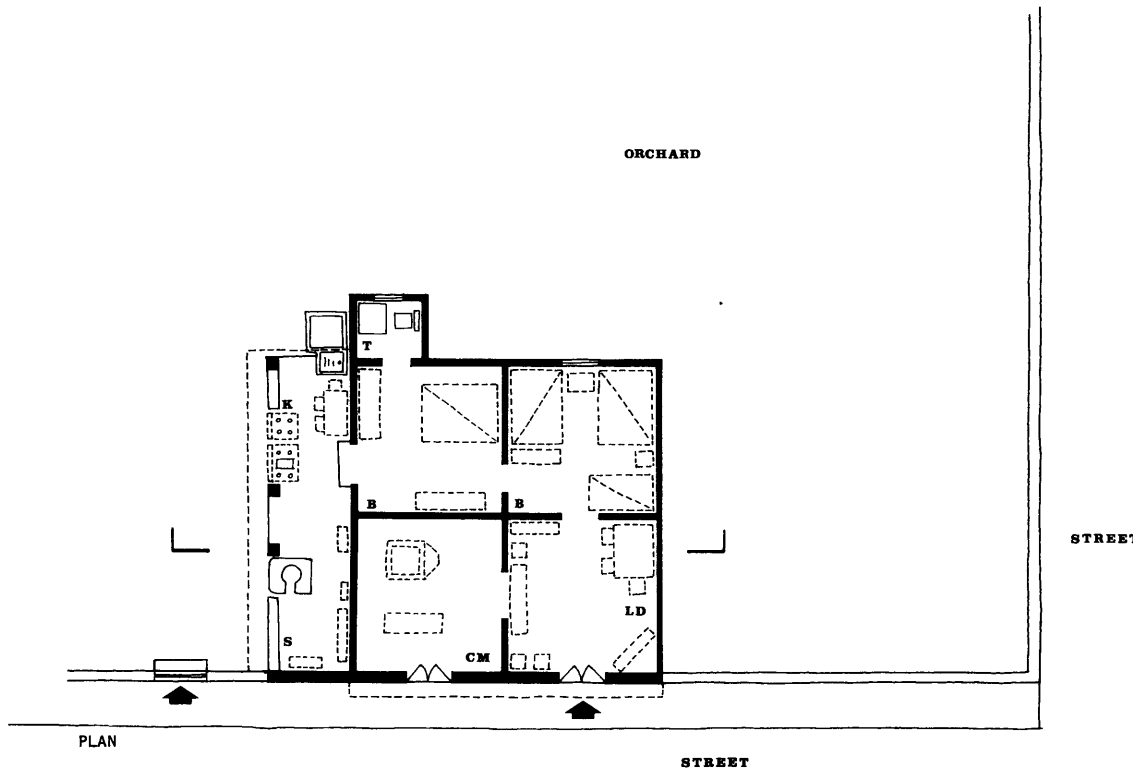




ELEVATION



SECTION



PLAN

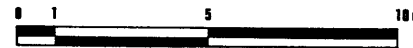
STREET

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)
- CM Corn Mill

LOCALITY SOURCES

- Segment Plan: (accurate) Oficina de Catastro Cuernavaca, Mor. 1970; Aerofoto de México, 1972.
- Segment Land Utilization: (approximate) Field survey by the authoress, 1976.
- Block Plan: (accurate) Oficina de Catastro Cuernavaca, Mor. 1970; Aerofoto de México, 1972.
- Typical Dwelling: (approximate) Field survey by the authoress, 1976.
- Physical Data: (accurate) Field survey by the authoress, 1976-77.
- Photographs: Aerial, Aerofoto de México, 1972; Isabel Vargas, 1976-77.
- General Information: IX Censo General de Población, 1970, Cuernavaca, Mor.; Field survey by the authoress; I. Vargas, I. Alanis.



1:200

TYPICAL DWELLING

PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT

type: House
 area (sq m): 120 m²
 tenure: Legal ownership

LAND/LOT

utilization: Private
 area (sq m): 800 m²
 tenure: Legal ownership

DWELLING

location: Town Center
 type: Detached
 number of floors: 1
 utilization: Single family
 physical state: Fair

DWELLING DEVELOPMENT

mode: Incremental
 developer: Popular
 builder: Artesan
 construction type: Brick, concrete
 year of construction: 1956 - 1958

MATERIALS

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

DWELLING FACILITIES

wc: 1
 shower: 1
 kitchen: 1
 rooms: 4
 other: 1 Corn mill

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

user's ethnic origin: Southern Mexican
 place of birth: Jiutepec, Mor.
 education level: Primary

NUMBER OF USERS

married: 2
 single: 6
 children: -
 total: 8

MIGRATION PATTERN

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

GENERAL: ECONOMIC

user's income group: Low
 employment: Agricultural
 distance to work: 2-5 Km
 mode of travel: Walks

COSTS US\$

dwelling unit: 2400
 land - market value: 64000/Ha

DWELLING UNIT PAYMENTS

financing: Popular
 rent/mortgage: None
 % income for rent/mortgage: None

JIUTEPEC: (left) The center of town is the traditional plaza where various activities take place. (right) Traditional dwellings line a wide unpaved street; at noon everything is closed up, in the evening people sit outside. (bottom) The main street around the square is the only paved one. It is busy with local and through traffic and is lined with shops.



4 CUAUHCHILES

ORIGINS: Cuauhchiles is one of the most recent squatter settlements in the south-eastern metropolitan area. It was created in 1974 by the occupation of communal lands belonging to the Ejido de Jiutepec. The invasion was carried out by some 200 families, made up largely of nearby Jiutepec residents and to a lesser degree by recent migrants from the impoverished neighboring state of Guerrero. In fact, less than half of the settlers had no other residence and stayed on to build a dwelling. Others continued living nearby while building permanent homes. Although only three years old, the community is pressing for, and negotiating, the recognition of the settlement.

LAYOUT: The layout design of Cuauhchiles is not typical of the low income settlements in the conurbated area. It was developed by the community with the assistance of possibly well intentioned, but incompetent, semi professionals. The result was this highly inefficient gridiron layout. The site is well located on the Cuernavaca-Cuautla highway, across the road from a middle and upper income subdivision, and surrounded by agricultural lands. The settlement is part of the urban corridor that is rapidly consolidating along the highway.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	240	6.17	39
DWELLING UNITS	129	6.17	21
PEOPLE	480	6.17	78

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.4	22.5
SEMI-PUBLIC (open spaces, schools, community centers)	.17	3
PRIVATE (dwellings, shops, factories, lots)	4.6	74.5
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	6.17	100

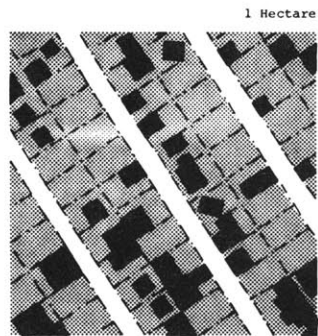
NETWORK EFFICIENCY

$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 252\text{m/Ha}$$

$$\text{AVERAGE LOT AREA} = 250 \text{ m}^2$$



LAND UTILIZATION DIAGRAMS



PATTERN

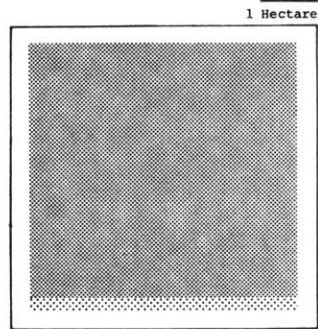
Public: streets/walkways

Semi-Public: playgrounds

Semi-Private: cluster courts

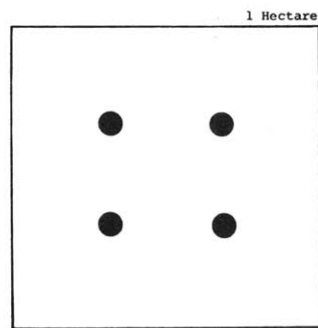
Private: lots

 dwellings



PERCENTAGES

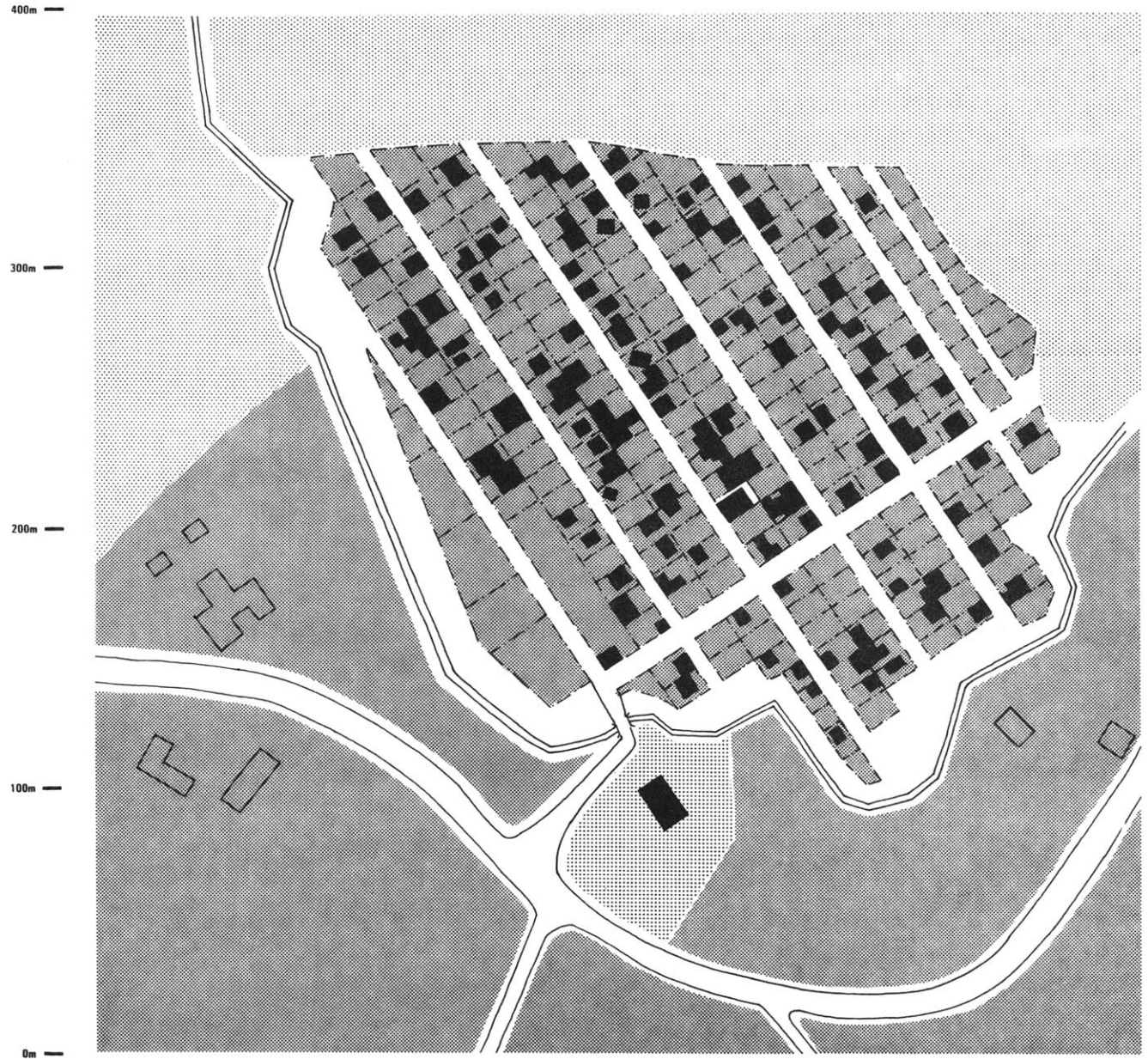
Streets/walkways	22.5
Playgrounds	3
Cluster Courts	-
Dwellings/Lots	74.5



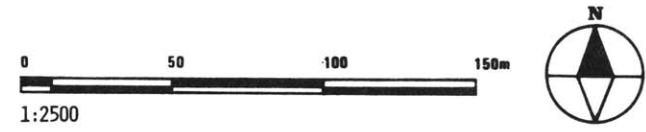
DENSITY

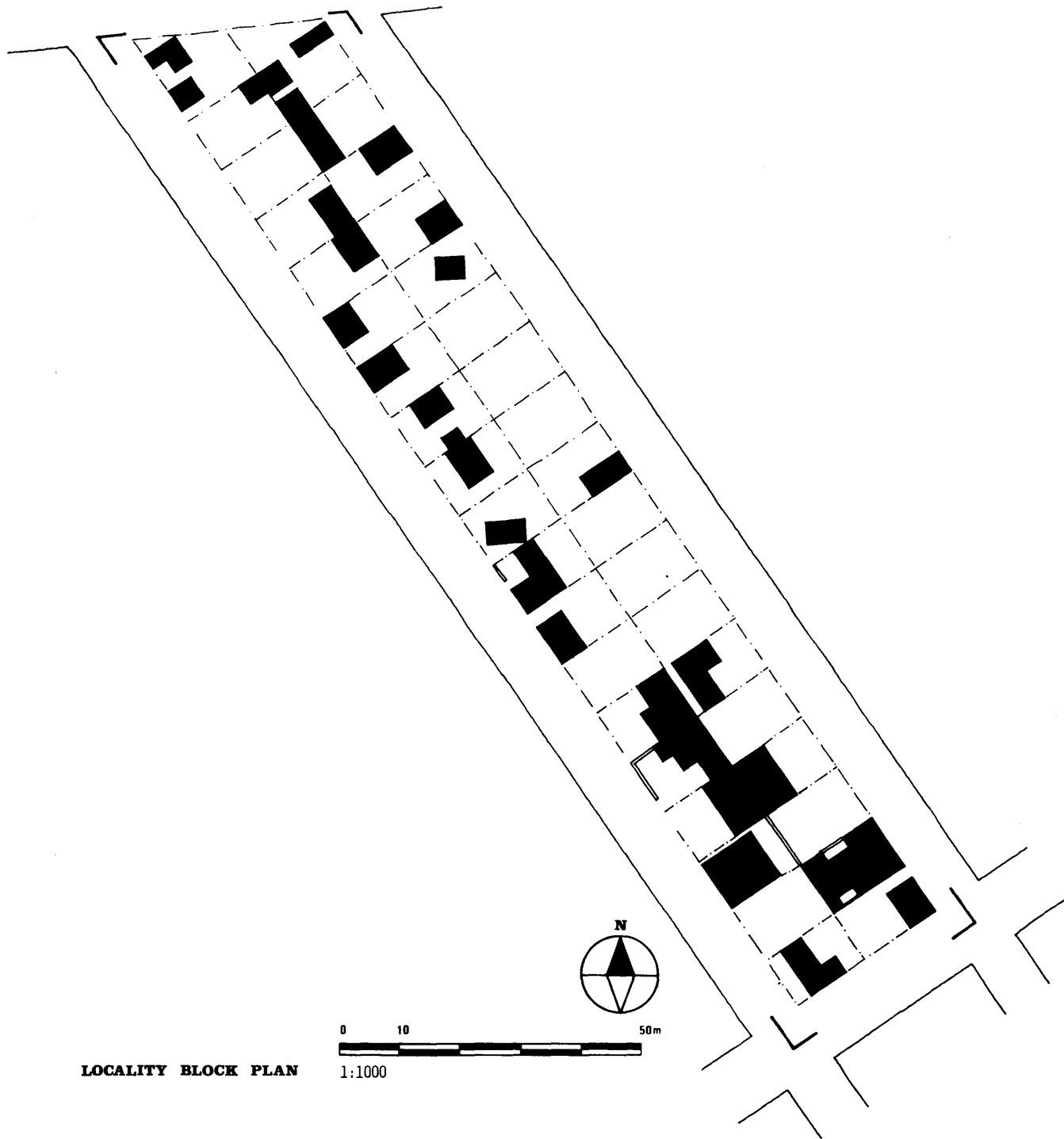
Persons/Hectare	78
-----------------	----

20 Persons



LOCALITY SEGMENT LAND UTILIZATION





LOCALITY BLOCK PLAN



POPULATION: Most of the ninety or so families living in the community at present are in the low and very low income range. Although some are part of Jiutepec's own expanding population, most are relatively recent migrants to the area. Those that are employed work in mostly unskilled jobs in construction, services, and to a lesser extent, industry and agriculture. Work sources are generally located in CIVAC, Jiutepec and Cuernavaca.

BLOCK: Due to the relatively low width to depth ratio of the lots 10x15m, the layout results in long narrow blocks 30x150m. This layout is inefficient due to the excessive network lengths per lot which will mean higher infrastructure costs. In addition to this, the long block ends directly against the adjoining property in such a way that it forces pedestrians to cross individual lots in getting from one street to another. The block has two types of dwellings generated by the shanty: the corrugated tar, one or two room shanty proper, and a permanent brick and concrete version of the same unit that becomes the core of a future complete dwelling. This settlement is undergoing a considerably shorter consolidation period than other similar but older localities.

LOCALITY BLOCK LAND UTILIZATION DATA

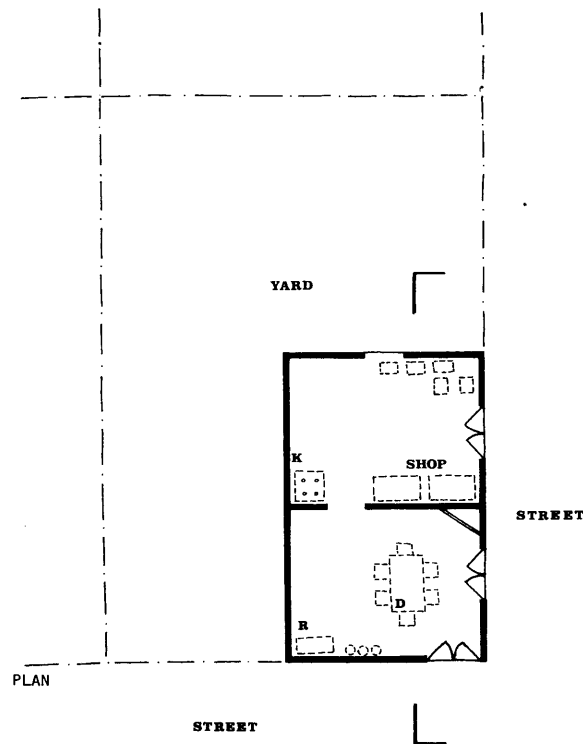
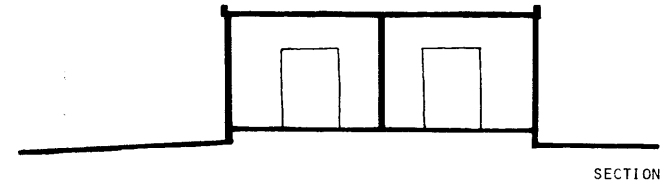
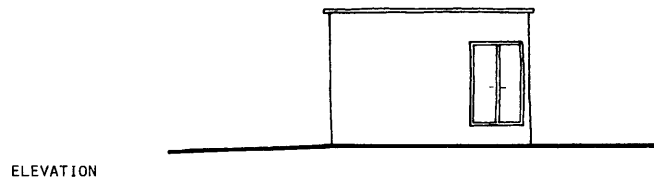
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	37	0.72	51
DWELLING UNITS	28	0.72	39
PEOPLE	140	0.72	194

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.19	26
SEMI-PUBLIC (open spaces, schools, community centers)	0.014	2
PRIVATE (dwellings, shops, factories, lots)	0.52	72
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.72	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 630 \text{ m/Ha}$$

$$\text{AVERAGE LOT AREA} = 140 \text{ m}^2$$



KEY

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

LOCALITY SOURCES

- Segment Plan: (approximate) Plano de la Comunidad, 1975.
- Segment Land Utilization: (approximate) Field survey by the authoress, 1976.
- Block Plan: (approximate) IBID
- Typical Dwelling: (approximate) IBID
- Physical Data: (accurate) IBID
- Photographs: Isabel Vargaz.
- General Information: Field survey by the authoress; Interview with the leader of the settlement, I. Alanis, E. Arrollo, Y. Garduno, M. Melgar, Y. Segura, C. Vazquez, E. Villalba.

TYPICAL DWELLING

1: 200

PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT

type: House
 area (sq m): 40 m²
 tenure: Legal ownership

LAND/LOT

utilization: Private, commercial
 area (sq m): 148 m²
 tenure: Illegal ownership

DWELLING

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

DWELLING DEVELOPMENT

mode: Incremental
 developer: Popular
 builder: Artesan, self help
 construction type: Brick, concrete
 year of construction: 1976

MATERIALS

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

DWELLING FACILITIES

wc: -
 shower: -
 kitchen: 1
 rooms: 2
 other: Corner shop

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

user's ethnic origin: Southern Mexican
 place of birth: Jiutepec, Mor.
 education level: Primary

NUMBER OF USERS

married: 1
 single: 3
 children: -
 total: 4

MIGRATION PATTERN

number of moves: 2
 rural - urban: -
 urban - urban: -
 urban - rural: 1975-1976
 why came to urban area: -

GENERAL: ECONOMIC

user's income group: Low
 employment: Shopkeeper
 distance to work: None
 mode of travel: -

COSTS US\$

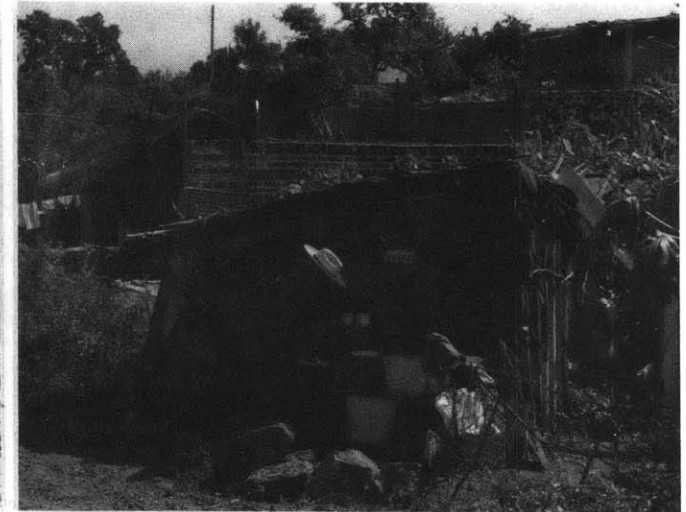
dwelling unit: 2080
 land - market value: 76000/Ha

DWELLING UNIT PAYMENTS

financing: Popular
 rent/mortgage: None
 % income for rent/mortgage: None

CUAUHCHILES: (top) Shanties in their initial stages of development contrast sharply with permanent brick dwellings in the background; cooking and washing take place outside.

(bottom) A spring, channeled for irrigation, is now also used by the community as a source for drinking and cooking water, as well as for washing and bathing.



5 VISTA HERMOSA

ORIGINS: The Colonia Vista Hermosa was created in 1959 when the Municipality of Jiutepec allowed a small group of local residents to settle on communally owned lands. For several years the settlement grew by accretion up the side of the hill located on the outskirts of town. In 1972 a squatter invasion established an 'extension' to the neighborhood. Jiutepec is surrounded by fertile agricultural lands and has little room to expand. This is generating competition for the hill among low income residents, the limestone quarries that have also been granted exploitation rights, and private developers. At present, the land tenure situation is in the process of being legalized.

LAYOUT: The layout is a modified extension of the XVI century grid format of Jiutepec. The hard ground and the rather steep slope of the hill 15% to 45%, will make the construction of utility networks relatively costly. At present only one street zig-zags cars halfway up the hill. However, an intelligent design could optimize the overall use of the site, balancing the residential and industrial areas, and rationalizing the layout of urban infrastructure.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	250	13.6	18.3
DWELLING UNITS	72	13.6	5.2
PEOPLE	576	13.6	42.3

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	2.1	15
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	11.5	85
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	13.6	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 215\text{m/Ha}$$

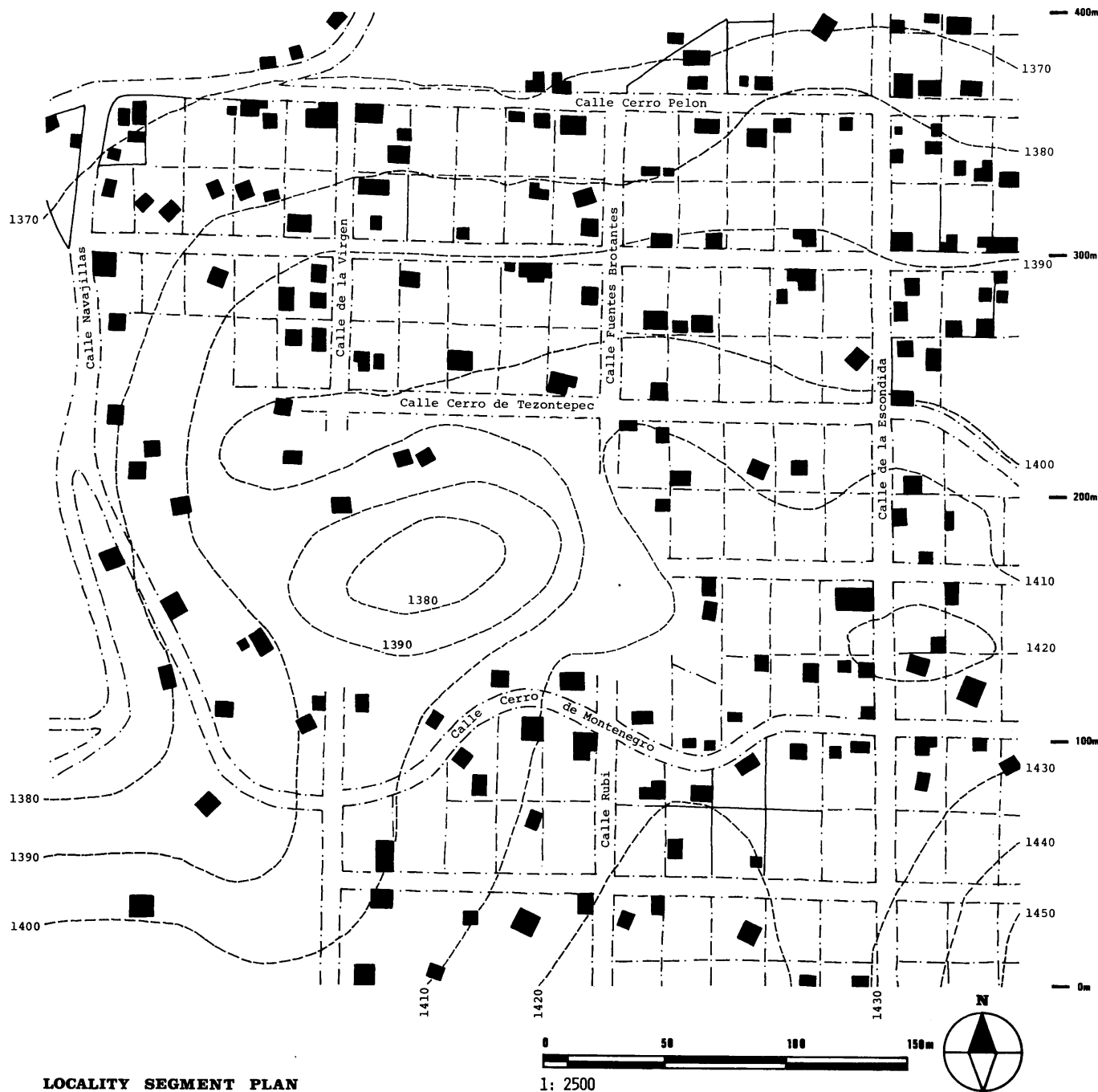
$$\text{AVERAGE LOT AREA} = 500 \text{ m}^2$$

400m —
300m —
200m —
100m —
0m —



LOCALITY SEGMENT AIR PHOTOGRAPH

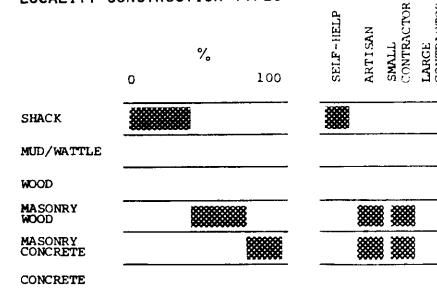




LOCALITY SEGMENT PLAN

1: 2500

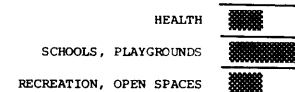
LOCALITY CONSTRUCTION TYPES



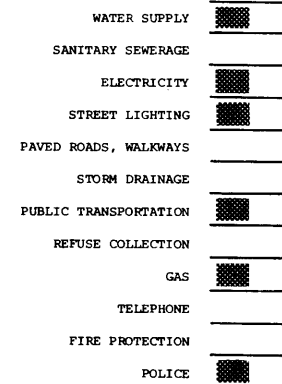
The chart shows (1) approximate percentage of each construction type within the total number of dwellings; and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES

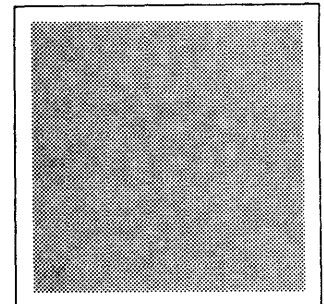
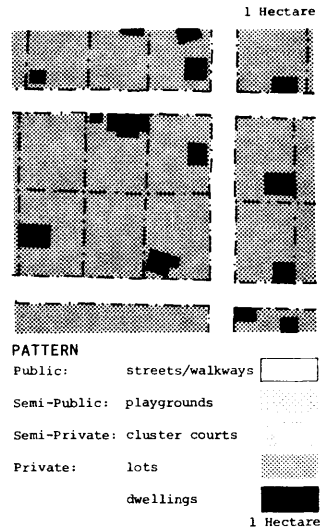


The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

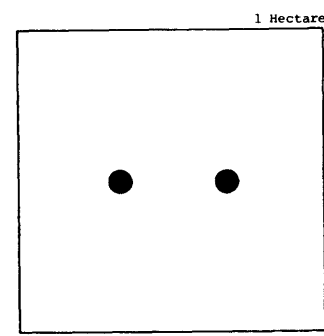
Note: elevation in meters

LAND UTILIZATION DIAGRAMS



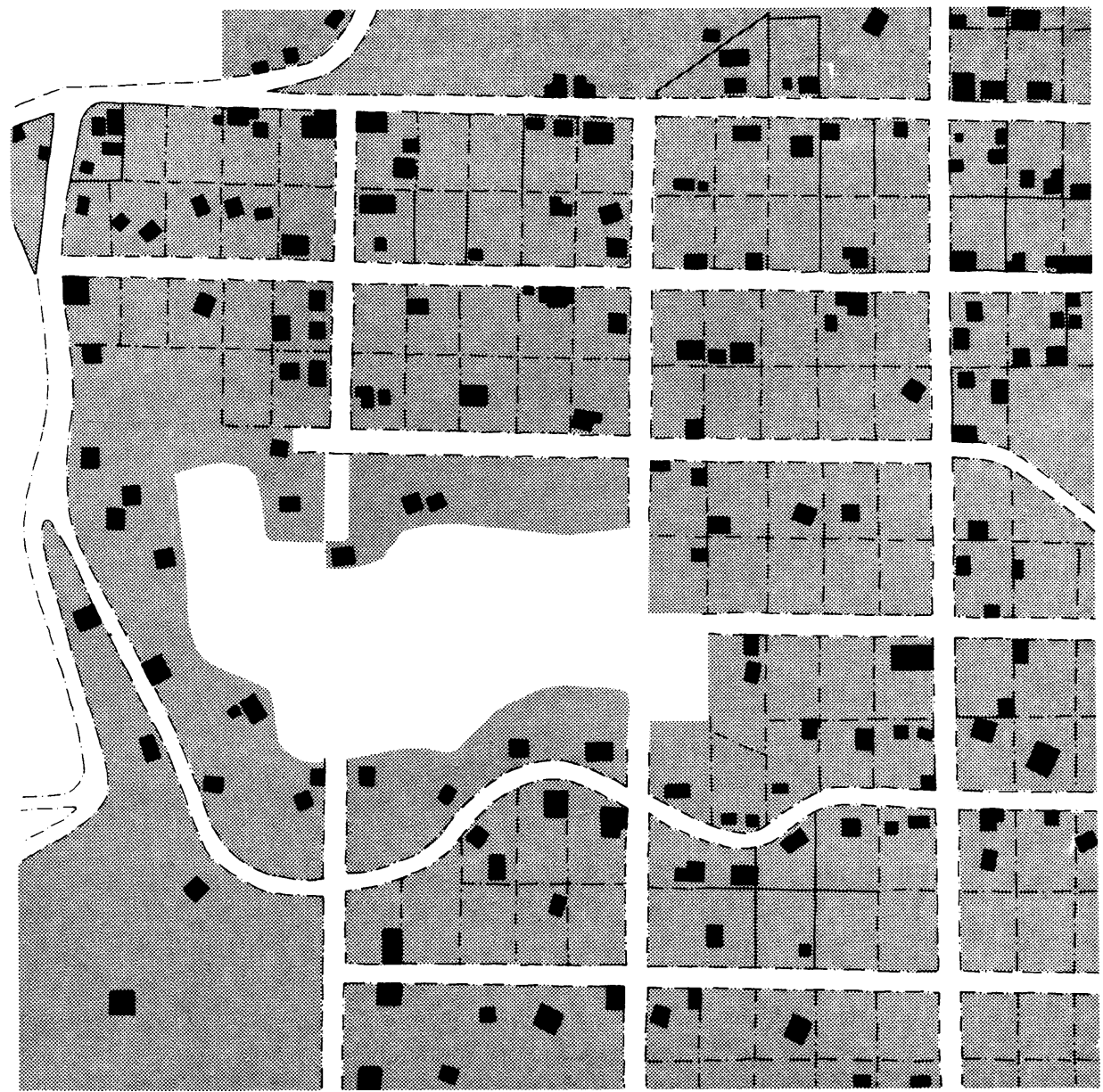
PERCENTAGES

Streets/walkways	15
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	85

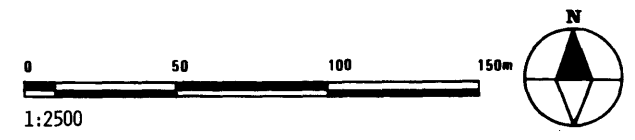


DENSITY Persons/Hectare 42.3

400m —
300m —
200m —
100m —
0m —

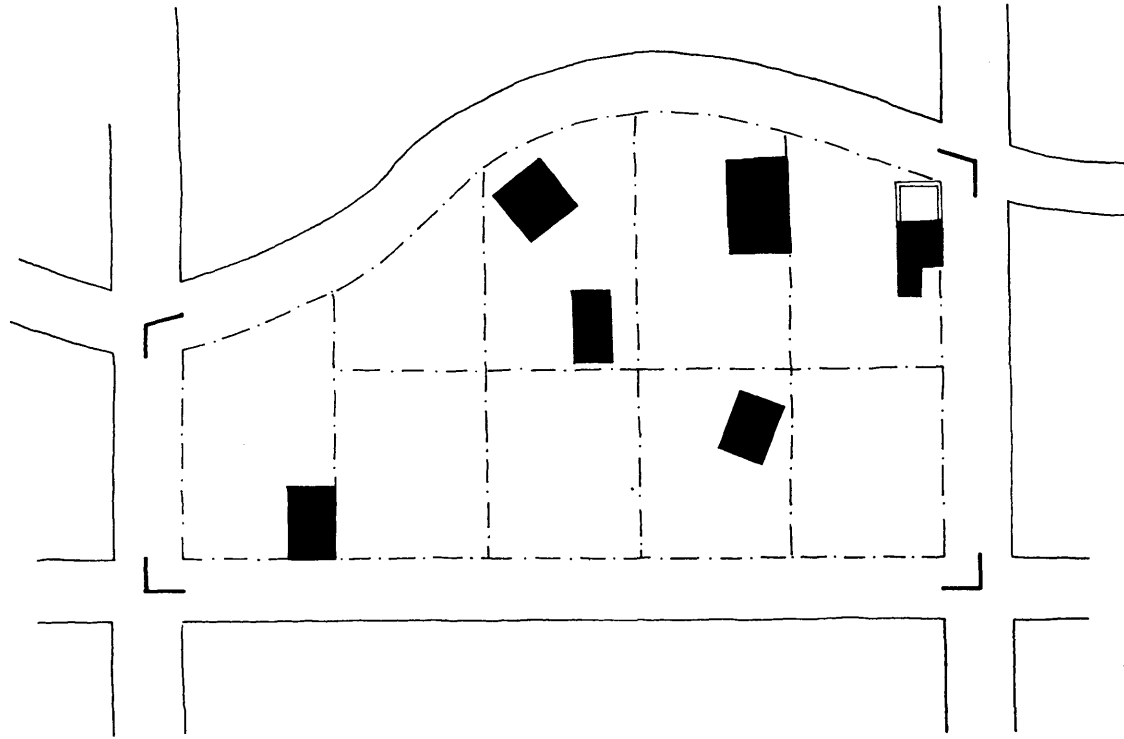


LOCALITY SEGMENT LAND UTILIZATION



POPULATION: The approximately 1500 inhabitants of the Colonia Vista Hermosa are mostly of low and very low income levels. Although they show the varied composition of employment that is typical of low income areas, there is a greater proportion of landless agricultural day workers and share croppers, particularly among the earlier settlers of the Colonia. Others work in the limestone quarries below or travel to CIVAC and Cuernavaca daily.

BLOCK: The block, which is typical of many low income settlements in the metropolitan area, was arrived at with rather large 20x25m almost square lots. The very low width to depth ratio of the lots 1/1.25, results in expensive high network lengths per unit. However, population pressures are leading to the subdivision of lots into more reasonably shaped 10x25m units. Dwelling units range from permanent two and three room units to temporary tar cardboard shacks, depending on mainly, the length of the dwelling's consolidation period.



LOCALITY BLOCK LAND UTILIZATION DATA

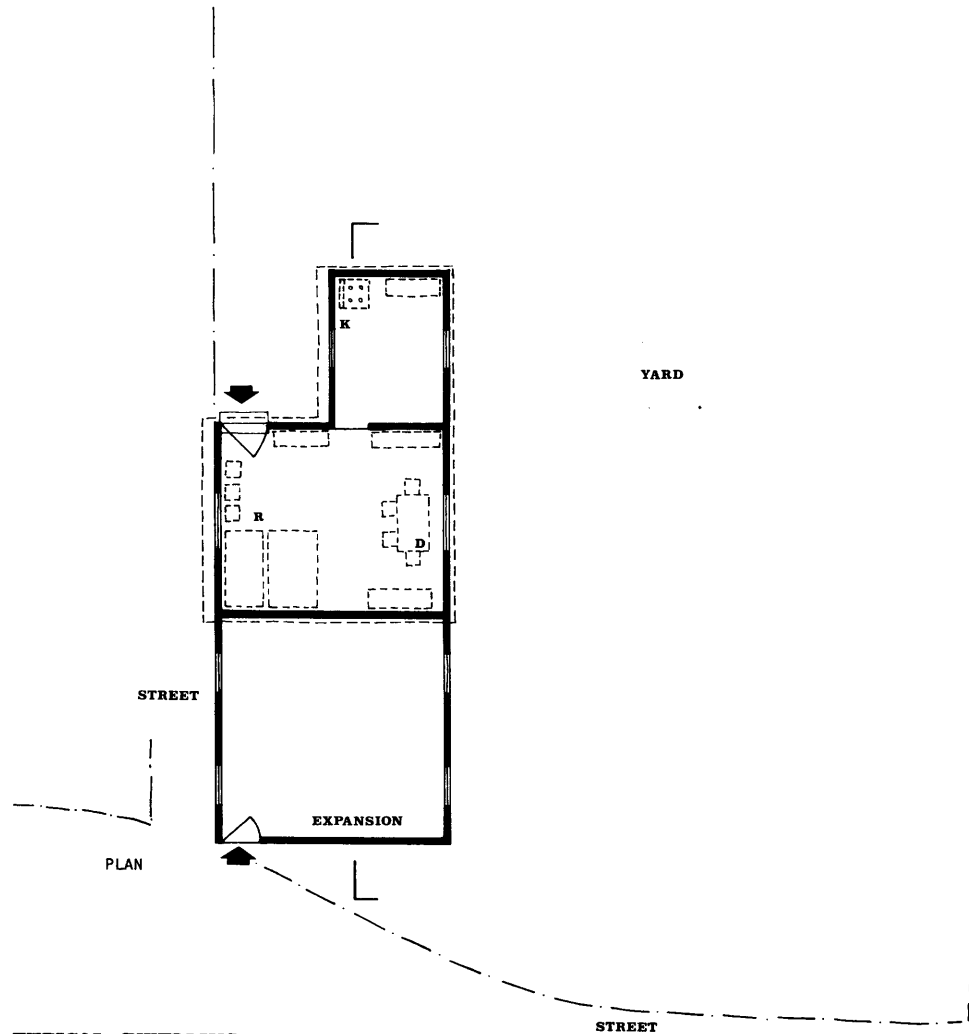
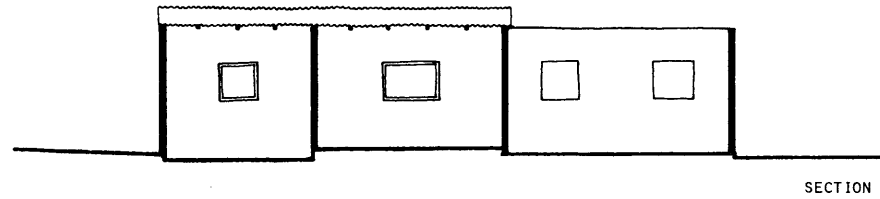
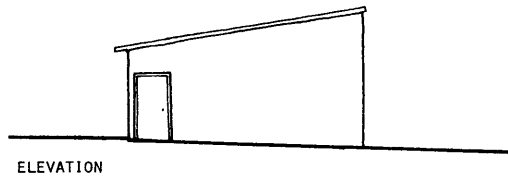
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	9	0.59	15
DWELLING UNITS	6	0.59	10
PEOPLE	42	0.59	71

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.13	22
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.46	78
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.59	100



LOCALITY BLOCK PLAN

NETWORK EFFICIENCY
 $R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 517 \text{ m/Ha}$
 AVERAGE LOT AREA = 515 m²



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

LOCALITY SOURCES

- Segment Plan: (accurate) Aerofoto de México, 1972.
- Segment Land Utilization: (approximate) Field survey by the authoress, 1976.
- Block Plan: (accurate) Aerofoto de México, 1972.
- Typical Dwelling: (approximate) Field survey by the authoress, 1976
- Physical Data: (accurate) IBID
- Photographs: Aerial, Aerofoto de México, 1972; Isabel Vargas, 1976, 1977.
- General Information: IX Censo General de Población 1970, Cuernavaca, morelos. Field Survey by the authoress, 1976.



1:200

TYPICAL DWELLING

PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT

type: House
 area (sq m): 90 m²
 tenure: Legal ownership

LAND/LOT

utilization: Private
 area (sq m): 430 m²
 tenure: Illegal ownership

DWELLING

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

DWELLING DEVELOPMENT

mode: Incremental
 developer: Popular
 builder: Self-help
 construction type: Brick
 year of construction: Corrugated cardboard
 1973

MATERIALS

foundation: Stone
 floors: Dirt
 walls: Brick
 roof: Corrugated cardboard

DWELLING FACILITIES

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

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

user's ethnic origin: Southern Mexican
 place of birth: Cuernavaca, Mor
 education level: Primary

NUMBER OF USERS

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

MIGRATION PATTERN

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

GENERAL: ECONOMIC

user's income group: Low
 employment: Worker
 distance to work: 2 Km.
 mode of travel: Bus

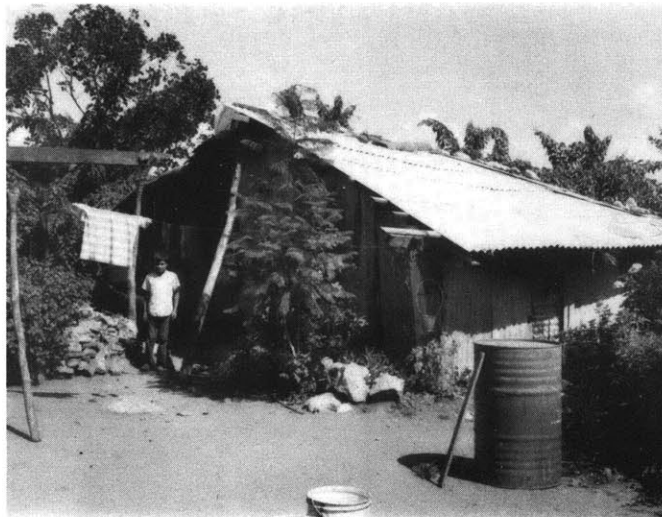
COSTS US\$

dwelling unit: 360
 land - market value: 24000/Ha

DWELLING UNIT PAYMENTS

financing: Popular
 rent/mortgage: None

VISTA HERMOSA: (left) A typical single family, one room dwelling built with semi permanent materials; water is stored in oil drum outside.
 (right) Dwellings showing three degrees of consolidation, from temporary to permanent, left to right.
 (bottom) General view of the Colonia: unpaved streets, electricity and street lighting, and slopes of up to 45%. Consolidation of dwellings shows varying degrees of family income and time of settlement.



EVALUATION

Time Process Perspective

The existing housing types are the most valuable source of information and reference in formulating urban land policies and housing programs. The types provide a guide to general, yet basic questions of land use, land distribution/tenure, and land subdivision. The types also provide a guide to more specific questions: How do they relate to different cultures and values? What range of population densities do they permit? To what income groups are they accessible? How efficient is the land utilization which they permit?

Each of the five case studies described above represent a basic dwelling type of the low income urban environments of the southeastern metropolitan area. comparative overview of the dwelling systems is presented in the evaluations, analyzing each case from a different angle. The following sections are included in the evaluation.

TIME/PROCESS PERSPECTIVE: Chart relating each case study to their originating models.

LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES
A graphic comparison of land utilization.

The five case studies of the southeastern metropolitan area are the representative models of existing housing situations which illustrate different cases of land utilization. The case studies cover the range of income levels from very low to middle income. They are representative of dwelling types which originated, have developed, and are evolving in different ways. In this evaluation, the dwelling types are arranged horizontally according to their income levels, and related vertically to their past, present and future conditions, in order to see them in a broader time/process perspective. The chart permits the observation of users, densities and trends as they change over time.

In general terms, of the dwelling types on the periphery, the semi-detached, detached and small rural houses are growing fastest, while the traditional rural house tends to disappear or be modified. This coincides with our hypothesis by which as Cuernavaca becomes a low density upper income resort area, the city expands at the expense of the rural communities, spawning squatter settlements and impoverished semi-rural slums.



	TYPE/ SYSTEM	SHANTY/ROOM/GROUPED SQUATTER SETTLEMENT	SEMI-DETACHED HOUSE (COLONIA PROLETARIA	TRADITIONAL/DETACHED HOUSE RURAL COMMUNITY	ROW HOUSE INSTITUTIONAL	TYPE/ SYSTEM
PAST	<i>Urban Layout</i>	ACCRETION ; growing organically, gridiron, other solutions.	GRIDIRON; standard gridiron layout; sometimes colonial block or others.	COLONIAL BLOCK; in 16th Century vil- lages; and irregular topographic so- lution.	GRIDIRON; standard small gridiron layout; occasionally others	<i>Urban Layout</i>
	<i>Origin</i>	UNIVERSAL; appeared with the growth of urban areas.	LOCAL/UNIVERSAL; appears in 20th Century in modern version.	HYBRID; or spanish and native dwelling types; appeared in 16th Century	EUROPEAN; 19th Century; imported in 1920's and first used in Cuernavaca in 1960's.	<i>Origin</i>
	<i>Users</i>	VERY LOW; housed lowest income levels, recent migrants.	MODERATELY LOW INCOME; employees, ex- farmers, established workers.	MODERATELY LOW/MIDDLE INCOME; farmers, small merchants.	MIDDLE INCOME; professional types; sometimes used as vacation homes.	<i>Users</i>
	<i>Density</i>	MEDIUM; open urban spaces were more easily available, less crowded	LOW; large lots, small dwelling units determined low densities.	LOW; usually had very low densities due to large lots.	MEDIUM/LOW; medium, single family units on medium sized lots.	<i>Density</i>
PRESENT	<i>Config- uration</i>	ROOM; 1-2 rooms, semi-temporary con- struction, scrap materials; no ser- vices or utilities.	HOUSE; 2-3 rooms, 1-2 floors; with some utilities, yard or garden ; often with store or shop.	HOUSE; detached 2-3 rooms, verandah, outside kitchen, orchard yard; some utilities.	HOUSE; 3-4 rooms, 1-2 floors; small yard; full utilities.	<i>Config- uration</i>
	<i>Develop- ment</i>	POPULAR/INSTANT; built by self-help, developed incrementally if land tenure secured.	POPULAR/INCREMENTAL; popularly deve- loped; built over 5-10 years by ar- tisan, self-help.	POPULAR/INSTANT; developed popularly; instantly, although often enlarged incrementally.	PRIVATE, PUBLIC/INSTANT; first private- ly, then publicly developed; instan- tly, by large contractor.	<i>Develop- ment</i>
	<i>Users</i>	VERY LOW/LOW; lowest income groups in city center; low income in peripheral settlements.	MODERATELY LOW/LOW INCOME; predomi- nantly upwardly mobile, established work- ing class.	LOW/MODERATELY LOW; income level de- creases due to impoverishment of rural classes.	MIDDLE/MODERATELY LOW INCOME; govern- ment projects allow lower income groups, often through subsidy.	<i>Users</i>
	<i>Density</i>	MEDIUM/HIGH; growth of settlements, decreasing urban land, increase densi- ties.	MEDIUM/LOW; smaller lots, established working class.	LOW; continued low densities, in spite of subdivision of large lots.	MEDIUM/HIGH; smaller lots and units, higher buildings and coverage allow greater densities.	<i>Density</i>
FUTURE	<i>Trend</i>	PROLIFERATING; proliferating in the periphery	PROLIFERATING; one of the fastest growing systems; privately or by squatter invasion..	DIMINISHING; urbanization and new eco- nomic structure in villages wiping out type.	PROLIFERATING; increasing private and specially public investments.	<i>Trend</i>
	<i>Locali- ties</i>	PERIPHERY; Cuauhchiles Vista Hermosa, others.	SATELITE; Revoluci3n , Flores Mag3n, Barona, others.	JIUTEPEC; Tejalpa, Tetela, Sta. Maria, Ocoatepec, Chamilpa, others.	CIVAC; Las Piletas, Bugambillas, Cuauh- nahuac, Teopanzolco, others.	<i>Locali- ties</i>
	<i>Users</i>	VERY LOW/LOW INCOME; same groups, in- come increasing in more established peripheral settlements.	LOW/MODERATELY LOW INCOME; will tend to accept slightly lower income levels	LOW INCOME; continued impoverishment of urbanized rural population.	MODERATELY LOW/MIDDLE INCOME; increas- ing public housing projects will con- tinue to broaden market.	<i>Users</i>
	<i>Density</i>	HIGH/MEDIUM; in general densities increasing.	MEDIUM/HIGH; smaller lots, consolida- ting settlements will increase densi- ties.	MEDIUM; densities increasing with sub- division of lots, increasing construc- tion.	MEDIUM/HIGH; smaller units likely, with greater coverage, allowing increased densities.	<i>Density</i>
	<i>Trend</i>	PROLIFERATING; new areas appearing on periphery of existing settlements.	PROLIFERATING; will continue to proli- ferate on periphery, encroaching on agricultural land.	DISAPPEARING; traditional cultural patterns succumb to urban development.	PROLIFERATING; promoted by government programs and demanded by increasing middle class.	<i>Trend</i>

Land Utilization: Patterns, Percentages, Densities

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

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

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

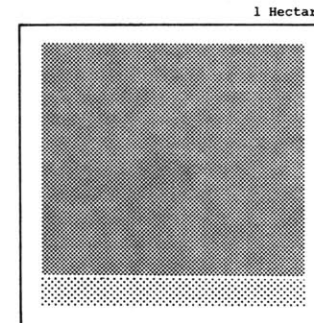
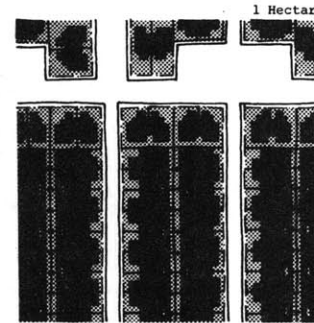
POPULATION DENSITY: Number of person per hectare; related to the number and type of dwellings per hectare. This determines the intensity of land use; e.g. low densities mean higher cost of development per person.

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

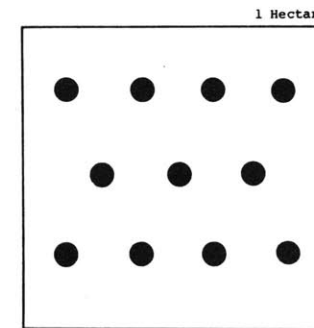
Besides the five case studies, an proposed project is included in order to facilitate comparison and evaluation. The project is proposed as an optimized expansion to the existing Colonia Vista Hermosa (pp 64 to 69).

1 CIVAC PRIV/PUBLIC MIDDLE INCOME ROW HOUSE

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



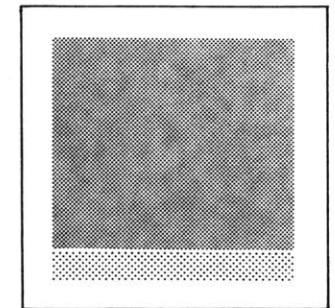
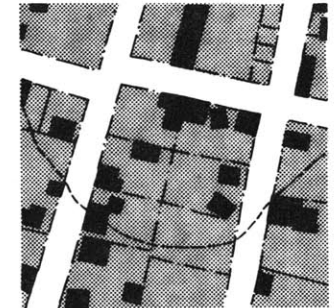
PERCENTAGES	
Streets/walkways	25%
Playgrounds	8
Cluster Courts	-
Dwellings/Lots	67



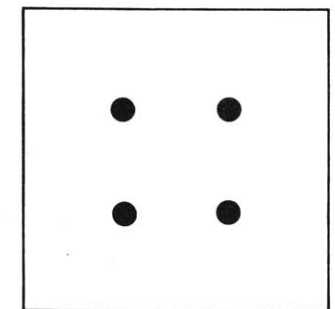
DENSITY	
Persons/Hectare	232
●	20 Persons

2 SATELITE POPULAR MODERATELY LOW/LOW HOUSE.

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



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

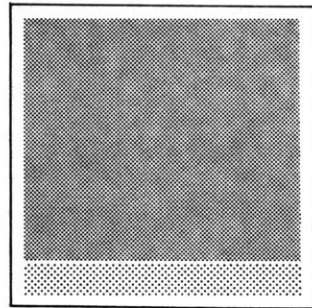
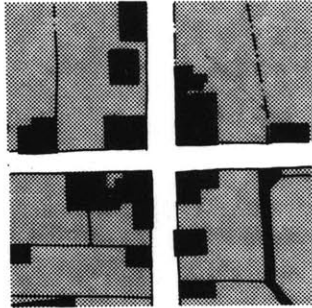


Persons/Hectare	78
-----------------	----

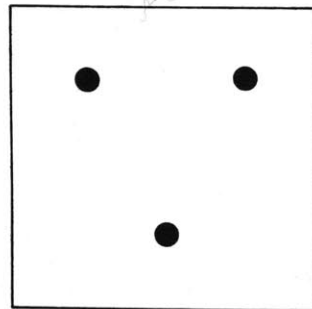
3 JIUTEPEC

POPULAR MODERATELY LOW/LOW HOUSE

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



13.5%
11.5
-
75

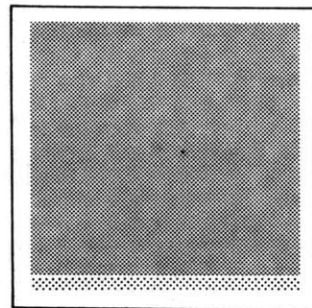
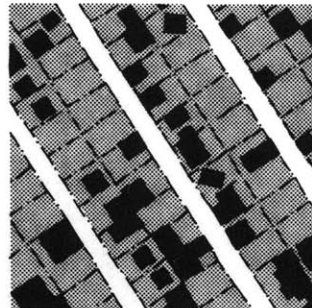


68

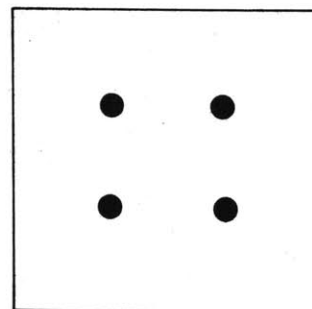
4 CUAUHCHILES

POPULAR LOW/VERY LOW HOUSE

Medium high percentages for circulation; very low percentage of open spaces; medium high percentage for private land; low population densities; excessive circulation length and hardness of soil make network costly. A better solution would have provided adequate open spaces.



22.5%
3
-
74.5

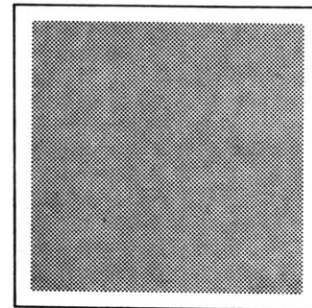
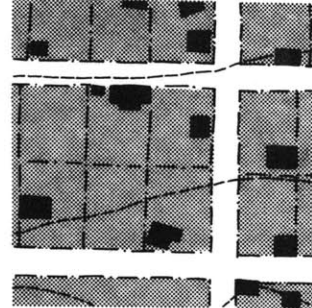


78

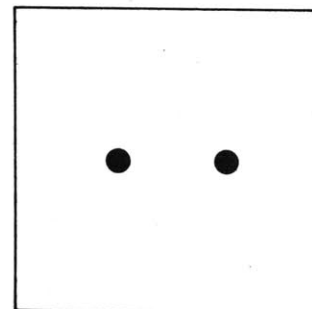
5 VISTA HERMOSA

POPULAR LOW/VERY LOW HOUSE

Low percentages for circulation and open spaces; very high private area; very low population densities; topography and excessive circulation length make utility network costly to install.



15%
-
-
85

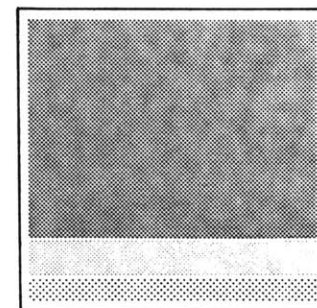
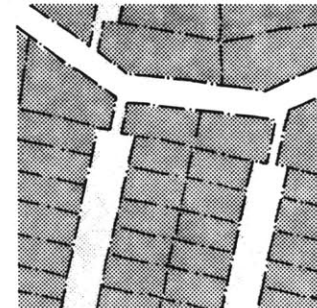


42

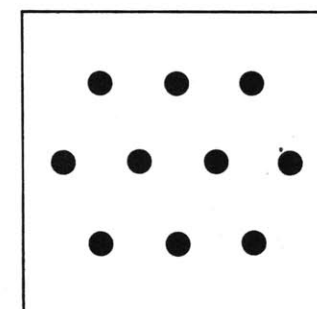
6 PROPOSED PROJECT

POPULAR LOW/VERY LOW HOUSE

The proposed expansion to Vista Hermosa responds more closely to the specific topography of the site. It offers higher densities, less public areas and lower network lengths per unit. The above all lower costs of utilities and services.

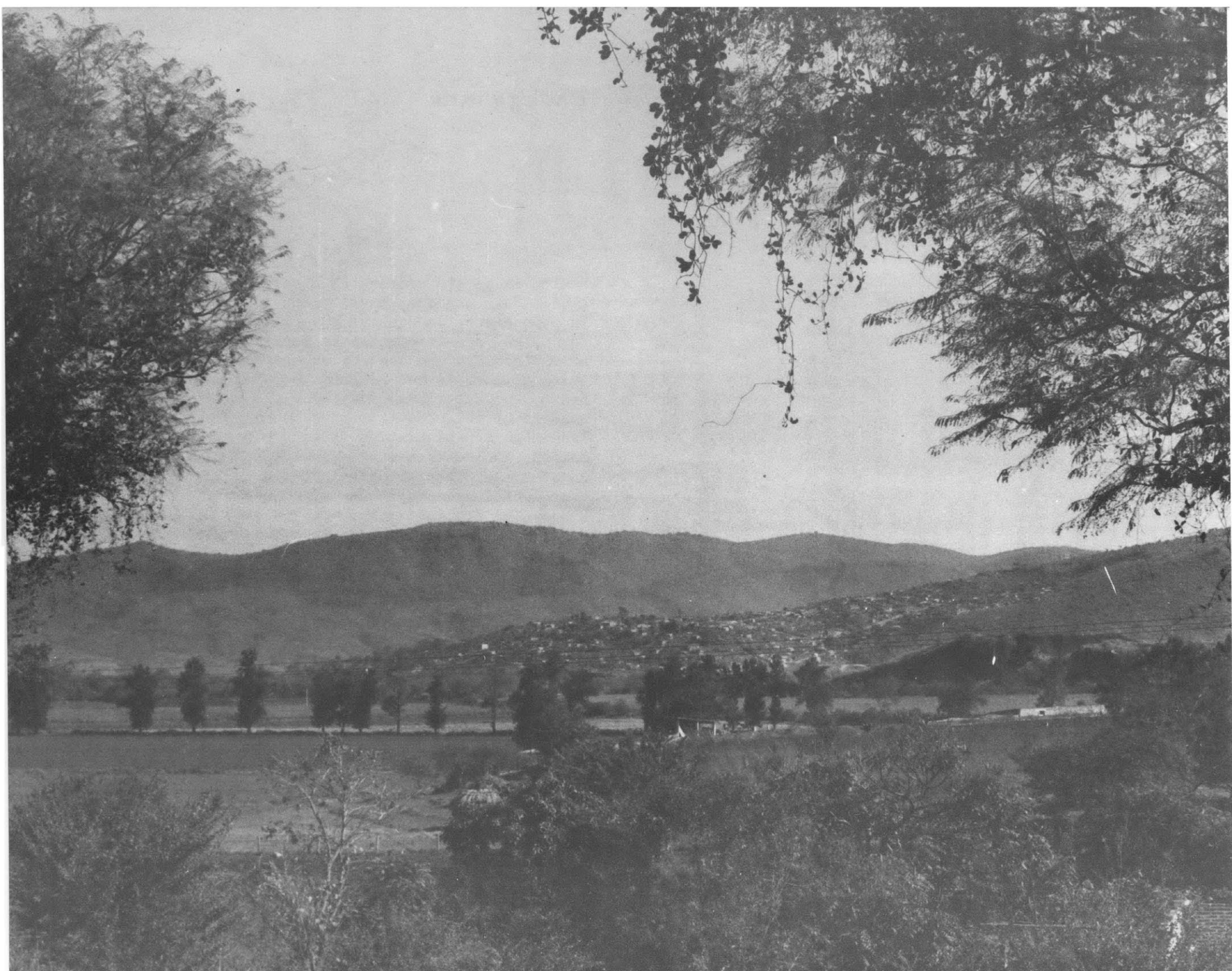


69%
11
9
11



200





PROPOSED PROJECT

Background

Mexico is in the process of developing a comprehensive spatial and regional development policy. A major step in this direction was the enactment of the General Law of Human Settlements, in May 1976. The law intends to rationalize and control urban growth in order to "harmonize the inter-relation between city and rural areas, and distribute equitably the benefits and burdens of the urbanization process". The law establishes an administrative structure for its implementation, including new agencies called Conurbation Commissions. These commissions are intended to provide coordinated management for urban areas whose legal boundaries are juxtaposed. In the case we are concerned with, for instance, the metropolitan area which has overgrown the limits of the Municipality of Cuernavaca and now partially covers the Municipalities of Jiutepec, Temixco and Tepoztlan. According to the law, the Cuernavaca Conurbation Commission will be made up of the mayors of the four municipalities, and presided over by the state governor. Although it will not have direct implementing powers other than through the coordinated effort of its individual members, the commission will be responsible for the overall planning and control of the metropolitan area's growth. To guide this growth, the law requires the establishment of an 'ordering' or master plan for both each of the municipalities and the conurbated area overall. The following project offers the general outline of master plan for the southeastern metropolitan area. Within this framework, the ordering plan of Jiutepec includes a proposal for the expansion of low income residential areas in the town.

Master Plan Outline

The main objective of the master plan is, to rationalize and control the urban development of the south-eastern metropolitan conurbation which will continue to grow and densify at an accelerated pace. The master plan outline provides two basic elements through which to attain the plan's objectives: land use and circulation.

LAND USE: The basic premise of this component is the preservation of agricultural areas. The instrument of a policy based on such a premise is the control or property of land by the public sector. This can be achieved by preserving the present structure of ejido and communal properties or transferring tenure to other public agencies. Depending on the intended utilization of the land, such agencies could range from a trust fund appointed by the conurbation commission, to a collectivized ejido for improved agricultural production. In the case of private properties, article 42 of the Law of Human Settlements provides a tool for public control of land without having to resort to lengthy and expensive expropriation procedures. The Conurbation Commission is empowered to declare certain un-built up areas as territorial reserves, requiring their owners to keep them in agricultural or other 'open' uses. Although the law provides stiff enforcement measures for such steps, it remains of course to be seen whether they will in fact be used. The detailed study that would necessarily precede the decision to declare territorial reserves would include an exhaustive classification of all properties into categories, depending on the quality of land for farming, shape of the

site, and location in regard to water, access, and other infrastructure. Beyond the immediate objective of preserving agricultural land, the control of its use by the land market, and curtail speculation.

CIRCULATION: The circulation network is the basic physical and structuring element of the use of land in a given area. In this context, its main functions are: a) to provide a means for movement from one place to another and b) establishing a physical boundary between areas of different uses. Building upon the existing system, the network will have the following hierarchies: Mode I, predominantly pedestrian street; Mode II, pedestrian and vehicular; Mode III, predominantly vehicular; and Mode IV, almost exclusively vehicular and high speed. The network will be developed and upgraded progressively responding flexibly to the increase of traffic. The circulation network is the single most important infrastructural element in developing the area. It is also directly tied to increasing land values. Based on this, techniques for recovering development costs through taxes on 'plusvalia' or unearned increment, have been successfully employed elsewhere in Mexico, and could be adapted to this area.

The proposed plan of the following pages shows the physical scheme, based on the above considerations, of the master plan outline.




Southeastern Metropolitan Area

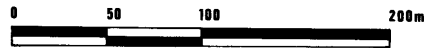
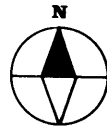
EXISTING LAND USE/CIRCULATION: The present situation reflects the gradual development and consolidation of the area over time. The land use pattern shows the encroachment of urban residential and industrial areas on agricultural lands. Large tracts of both public and private land are unused, in one case for speculative reasons, in the other due to lack of resources to integrate them into production. The circulation network was greatly improved with the introduction of the Cuernavaca-Cuautla highway, but remains very inefficient in and around Jiutepec. Jiutepec is the hub of all traffic travelling through the southeastern metropolitan area.

(photographs on previous pages)

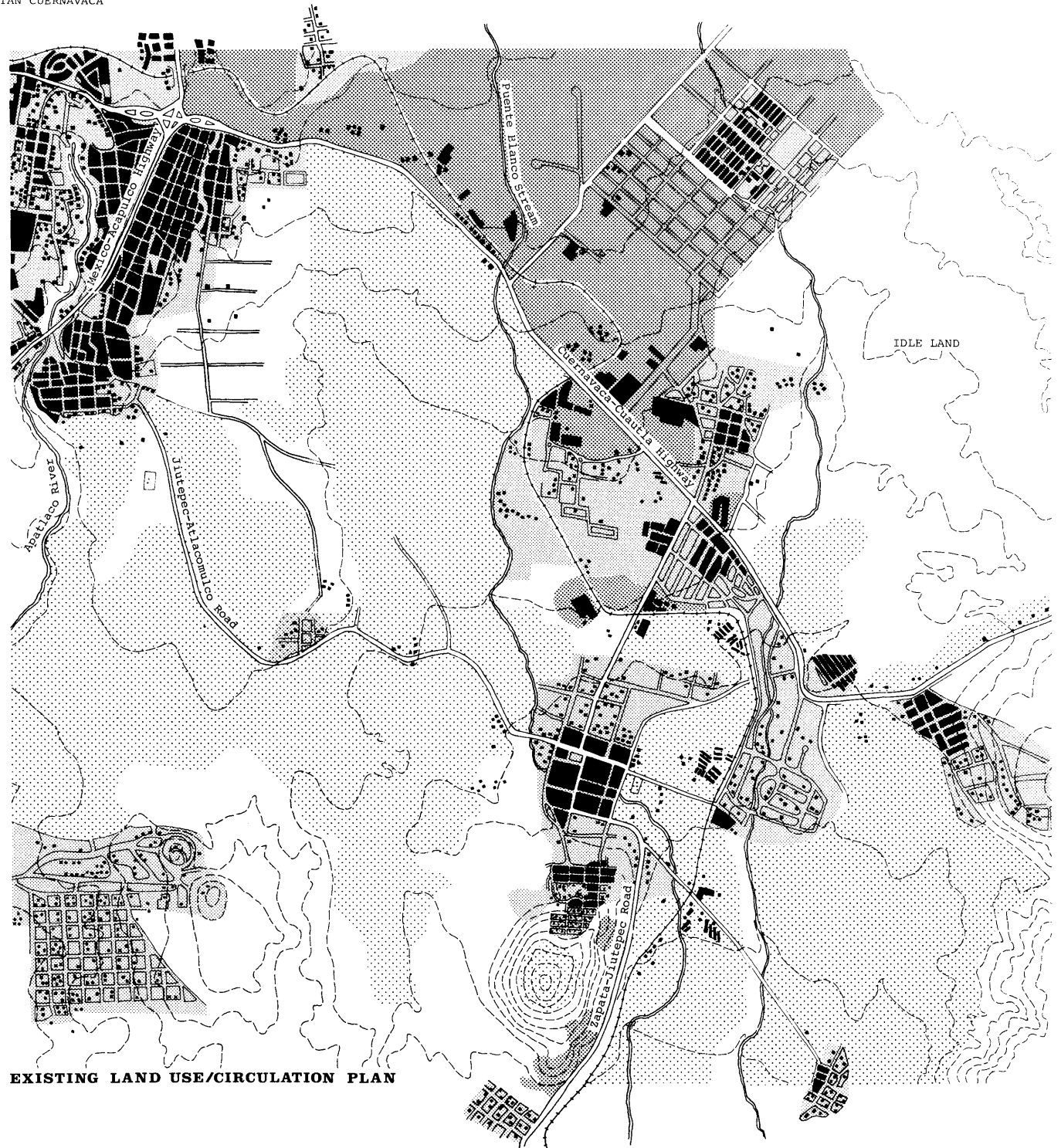
A view of the Cuernavaca-Cuautla Highway under construction, with Cuernavaca in the background. The highway is lined with service shops and stores. Access to CIVAC is on the right.

The rich irrigated agricultural plots between Cuernavaca and Jiutepec are shown in the foreground. In the background, the Colonia Vista Hermosa gradually climbs up the hillside.

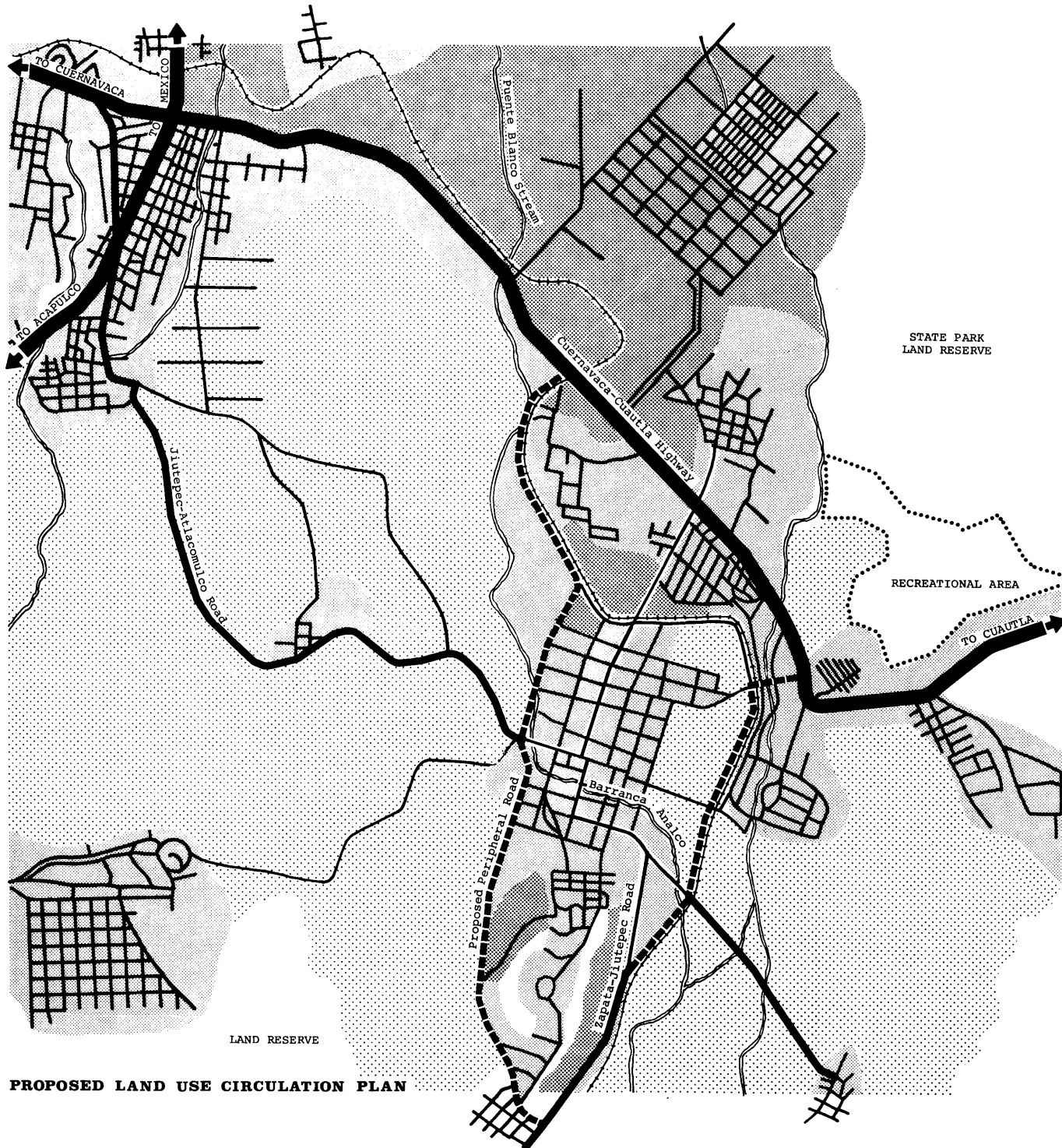
-  INDUSTRIAL
-  RESIDENTIAL
-  AGRICULTURAL



1: 40000

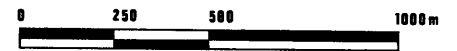


EXISTING LAND USE/CIRCULATION PLAN



PROPOSED LAND USE/CIRCULATION: The proposed situation improves and builds upon the existing urban structure of the area. All agricultural lands and open spaces are declared territorial reserves and committed to residential, industrial or agricultural use. In addition, the dense chaparral to the east of CIVAC and Tejalpa is converted into a state run natural reserve, with a metropolitan recreational area at its southern tip. The proposed land use scheme is calculated for about a 15 year period. Certain pockets of agricultural lands, such as that between the recreational area and the highway or the one within the ring road in Jiutepec, could be urbanized at a later date. The circulation network has been structured hierarchically and expanded progressively to meet the area's increasing demands. A ring road diverts traffic going from the south to Cuautla or Cuernavaca, bypassing to downtown area of Jiutepec

- | | | |
|--|-------------------------|----------|
| | HIGHWAY | MODE IV |
| | PRIMARY ROAD (proposed) | MODE III |
| | PRIMARY ROAD | MODE III |
| | STREETS | MODE II |
| | INDUSTRIAL | |
| | RESIDENTIAL | |
| | AGRICULTURAL | |



1: 40 000

PROPOSED LAND USE CIRCULATION PLAN

Jiutepec

EXISTING LAND USE/CIRCULATION: Jiutepec's unplanned growth has resulted in overlapping and conflicting uses of land. Residential areas have grown around, and are polluted by the quarries and hydrated lime and cement factories. Large portions of irrigable communal lands are idle due to lack of resources while other privately owned irrigated plots have been turned into upper income subdivisions. Contrarily, low income groups have settled on non agriculturally productive communal properties. The downtown area is often congested by the combination of local and through traffic.

(opposite page)

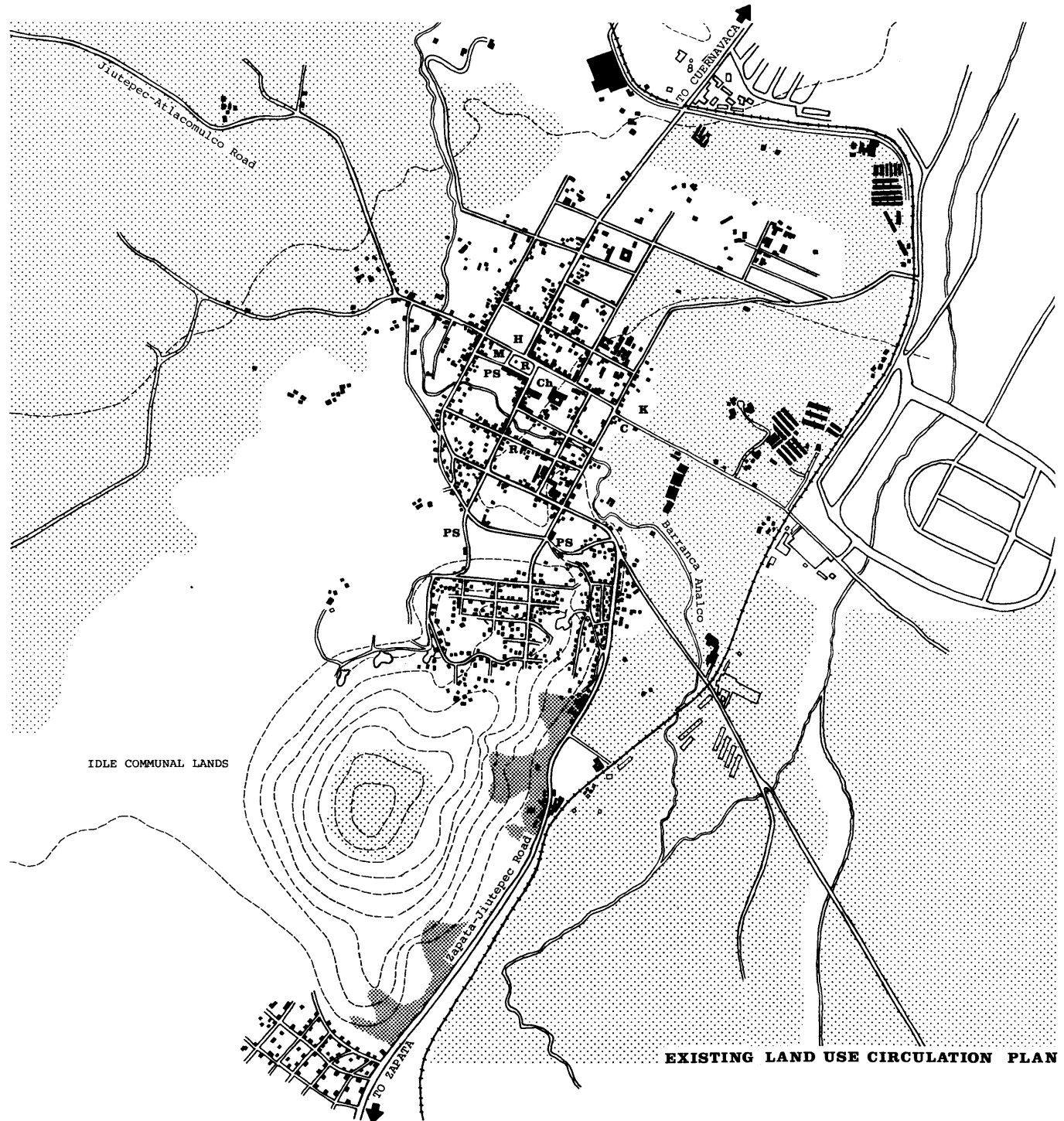
A side street in Jiutepec with shops in traditional and modern dwellings on either side. The main square and its adjacent XVI church are in the background.

- PS** Primary School
- K** Kindergarden
- H** Hospital
- Ch** Church
- R** Recreation
- PO** Post Office
- M** Market
- C** Cemetery

-  INDUSTRIAL
-  RESIDENTIAL
-  AGRICULTURAL



1: 20000



EXISTING LAND USE CIRCULATION PLAN

AMOXCALLI
PAPELERIA

DE
TORTILLAS
CONICAS



The basic data for the optimized layout is the following:

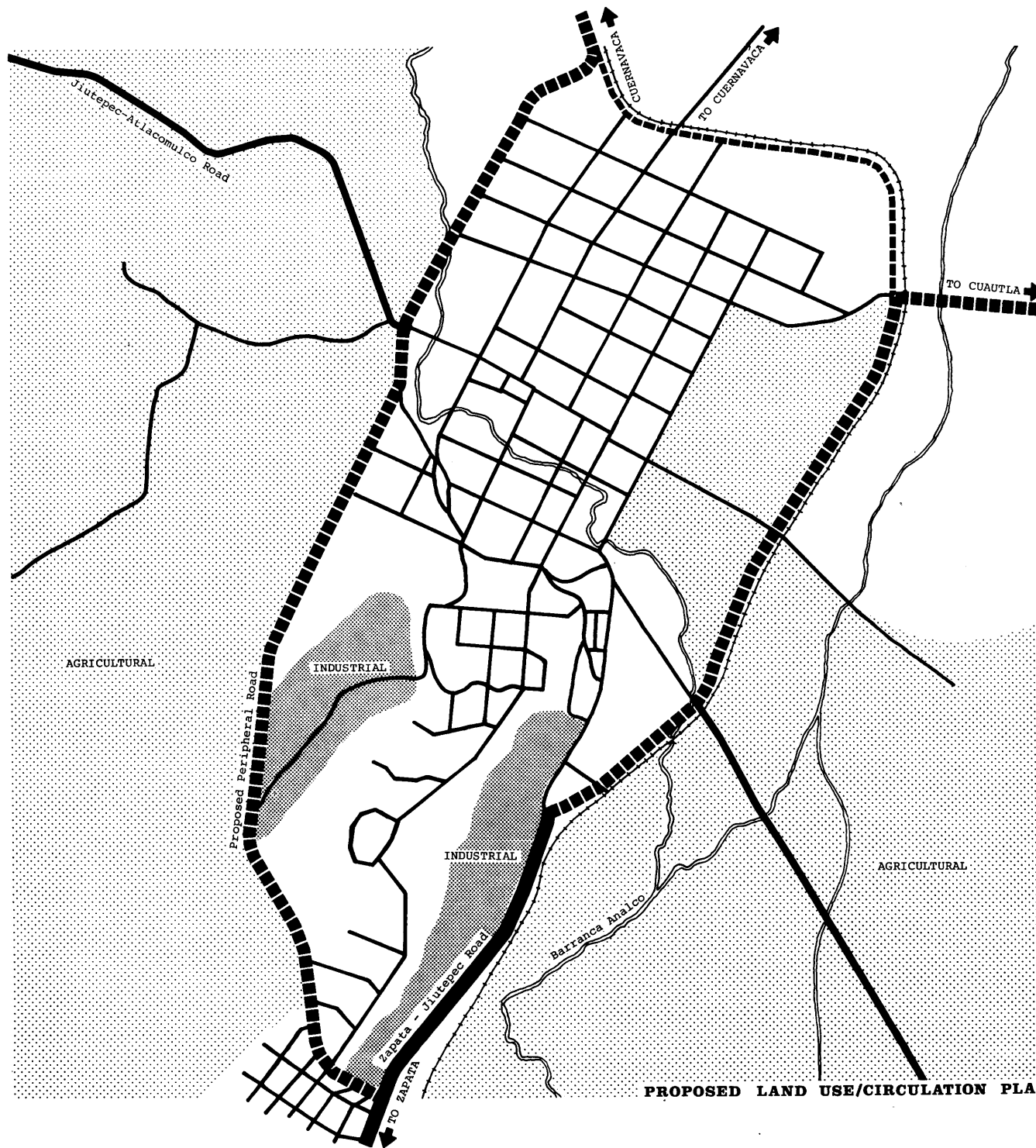
AREAS	Hectares	Percentages
Public	3.9	11
Semi-Public	3.3	9
Private, Semi-Private	29	80
	36.2	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length (circulation)}}{\text{areas served (circ., lots)}} = 143 \text{ m/ha}$$

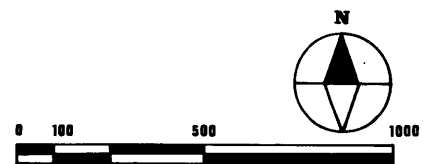


The aerial photograph shows the layout of the town of Jiutepec and the surroundings. Its limits to the north is a textile factory and a cement factory; to the south: idle lands, the site that is proposed, and lime stone quarries; to the east high income developments for weekend houses. To the northwest and southeast are irrigated agricultural lands. The scale is 1: 20000, the same as the plan in the opposite page.



PROPOSED LAND USE/CIRCULATION: The proposed use scheme for Jiutepec is based on the restructuring of the circulation network. The development of two arteries leading to the Cuernavaca-Cuautla highway would be carried out progressively. This peripheral or ring road is intended to decongest traffic in the town by allowing through traffic to bypass the downtown area. As an important physical boundary, the road would also be a major organizing element in the town. The agricultural land is preserved and expanded outside the road. Residential and industrial areas occupy most of the inside. The exception is a pocket of agricultural land that would be a transition area, serving to negotiate unexpected demands for industrial and residential areas. The circulation network inside the road is expanded following the traditional grid on the flat land to the north. The area to the south requires a more elaborate design, responding to the topographical conditions.

- | | | |
|--|-------------------------|----------|
| | PRIMARY ROAD | MODE III |
| | PRIMARY ROAD (proposed) | MODE III |
| | SECONDARY ROAD | MODE II |
| | STREETS | MODE II |



PROPOSED LAND USE/CIRCULATION PLAN

1: 20000

Basic Site Data

The Colonia Vista Hermosa is located in the municipality of Jiutepec, approximately 1.5Km from the center of the town, and 2-8Km from the major centers of employment. The sloping topography and irregular shape of the site are characteristic of many other settlements in the city of Cuernavaca.

BOUNDARIES:

The site is bounded by limestone quarries on the east; by non irrigated agricultural lands on the west; by a residential area on the south; and, by the Colonia Vista Hermosa of Jiutepec on the north. It is as an expansion to this Colonia that the project is proposed.

AREA:

The site covers an area of 117 hectares, of which only 36 hectares are adequate for residential development. The Colonia Vista Hermosa which links the site to the town, accounts for 16 hectares. The remaining 65 hectares which have excessively steep slopes will be used by the existing limestone quarries with a protective green area.

ACCESS:

The site has access to the Zapata-Jiutepec Road by the dirt streets of the Colonia Vista Hermosa. A bus line, which also serves other neighboring towns, already connects the Colonia Vista Hermosa with the town of Jiutepec and Cuernavaca as well.

UTILITIES:

The site has full electrical service and partial water supply through communal taps that provide a limited service. There are no sewerage or paved circulation networks. Adequate storm drainage is afforded by the site's natural topographic system, which however floods the immediate streets directly below the Colonia in the town.

OTHER FACTORS:

The site is a logical expansion area for both the quarries of the adjacent hydrated lime plants and the low income settlers from the existing residential sections.

EXISTING STRUCTURES:

The adjacent Colonia Vista Hermosa has a population of about 2000 inhabitants. They live in some 350 dwellings of which about 200 are temporary unconsolidated shelters. A primary school is located on the periphery of the settlement.

TOPOGRAPHY:

The site is on a oval shaped hill with slopes that range from 15% to up to 80%. The land proposed for development ranges from 15% to 45% slopes. Slopes of over 45% are costly to develop and thus are proposed for other than residential uses.

Planning Policies Goals

The project addresses the problem of low income settlement design for non optimum terrain. This is an increasingly crucial issue in the rapidly densifying areas where urban growth is encroaching on agricultural land. Low cost design relies importantly on community participation, progressive development and responding intelligently to topographical and environmental conditions.

PRIMARY USE: RESIDENTIAL

- The project will be primarily intended for residential use. It is expected to absorb an important part of the municipality's expansion of population over the next 10 to 15 years.
- The required supporting semi-public areas for community facilities are located on the flat area at the top of the hill.

TARGET INCOME GROUPS: PREDOMINANTLY LOW INCOME

- The project is directed towards the lower income groups that would otherwise not have access to the urban housing markets, except by squatting. Parts of the settlement could be offered to moderately low or middle income groups in order to cross-subsidize the development of infrastructure.

INTENSITIES OF LAND USE: MEDIUM DENSITIES

- The range of gross densities planned for is of 100 persons/Ha initially, to 200 persons/Ha at saturation stage.
- The population of the Colonia Vista Hermosa is 2000 inhabitants. The expansion is proposed for 2500 inhabitants at the initial stage and 5000 at saturation.

LAND TENURE: PUBLIC AND PRIVATE

- The communally owned site would be transferred to and developed by the municipality. The incremental value of the land would be recovered through a permanent ground rent. This usufruct arrangement would allow low income groups to pay less than for private ownership of a plot.
- Higher income groups could be offered sites in ownership after completing payments in the form of rent. Both schemes are intended to keep these groups from being expelled or bought out by upper income levels.

FINANCING: PUBLIC AND POPULAR

- The site will be developed with financing by the public sector and collective labor equity provided by the beneficiaries, through mutual aid programs.

NETWORKS: INTERNAL/EXTERNAL COORDINATION

- The internal circulation network will be connected to the town system at two points. Pedestrian circulation will be predominant within the site.
- Utility networks will be provided at two levels: minimum, at which they are self sufficient, and, standard, at which they become integrated to the larger local or regional systems.

DEVELOPMENT MODE: INCREMENTAL, PARTICIPATORY

- The site will be developed progressively and in stages. The development of the stages will rely primarily on self management, mutual aid and self help.

The Site

EXISTING LAND USE/CIRCULATION: The site reproduces in an accentuated way the characteristics common to Jiutepec. This is particularly true for the northern part of the site, in the Colonia Vista Hermosa: conflict and confusion between the different land uses, pollution of residential areas by the hydrated lime factories, congested flow of traffic. The settlements at either end of the site were laid out with variations of the traditional grid pattern. Again, the layout on the north is less adequate due to the relatively steep slopes to which the grid pattern was applied. Predictably, it has vehicular access only through the single street that follows the contours, rather than through those of the rigid layout.

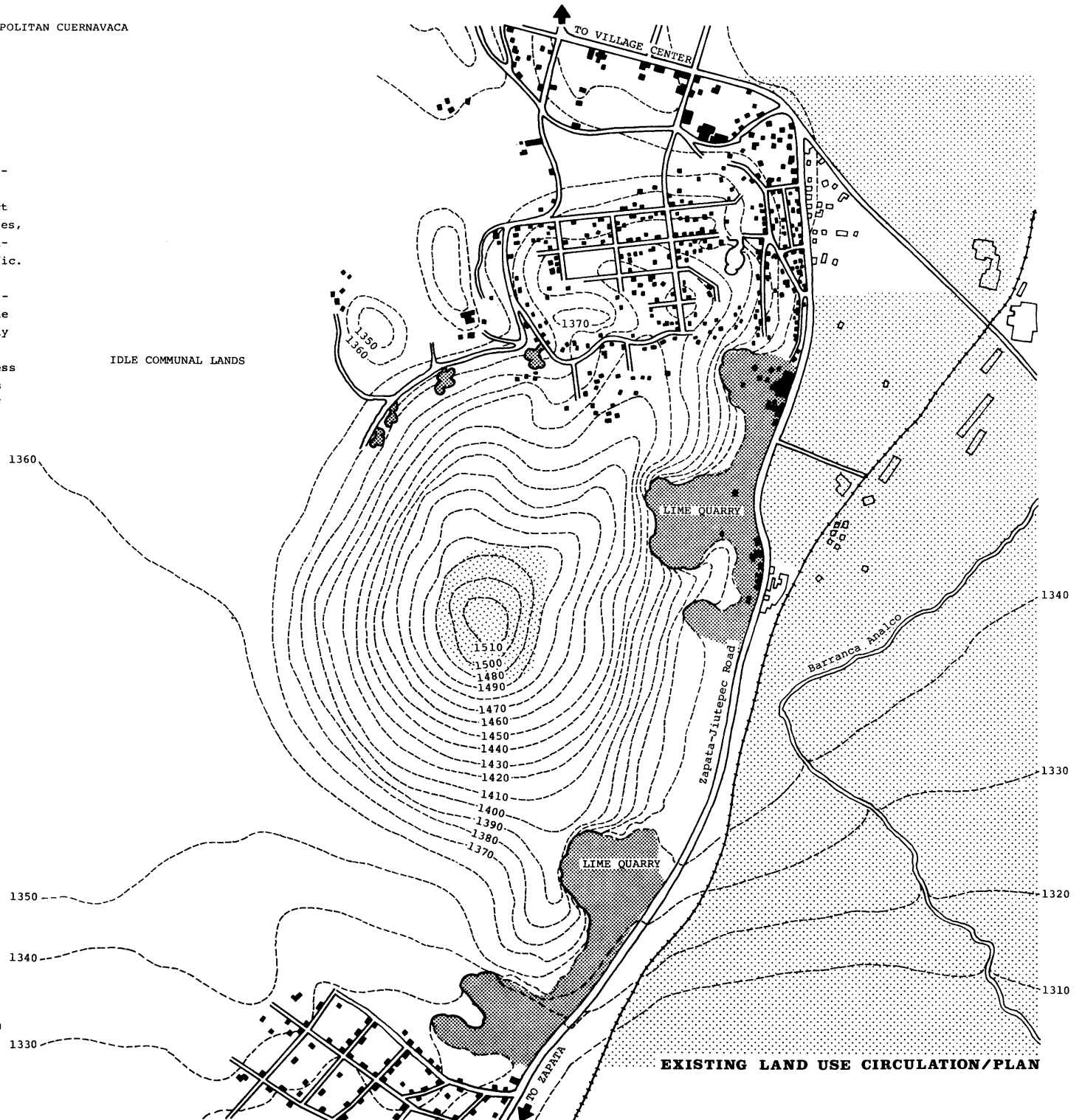
IDLE COMMUNAL LANDS

Note: elevation in meters

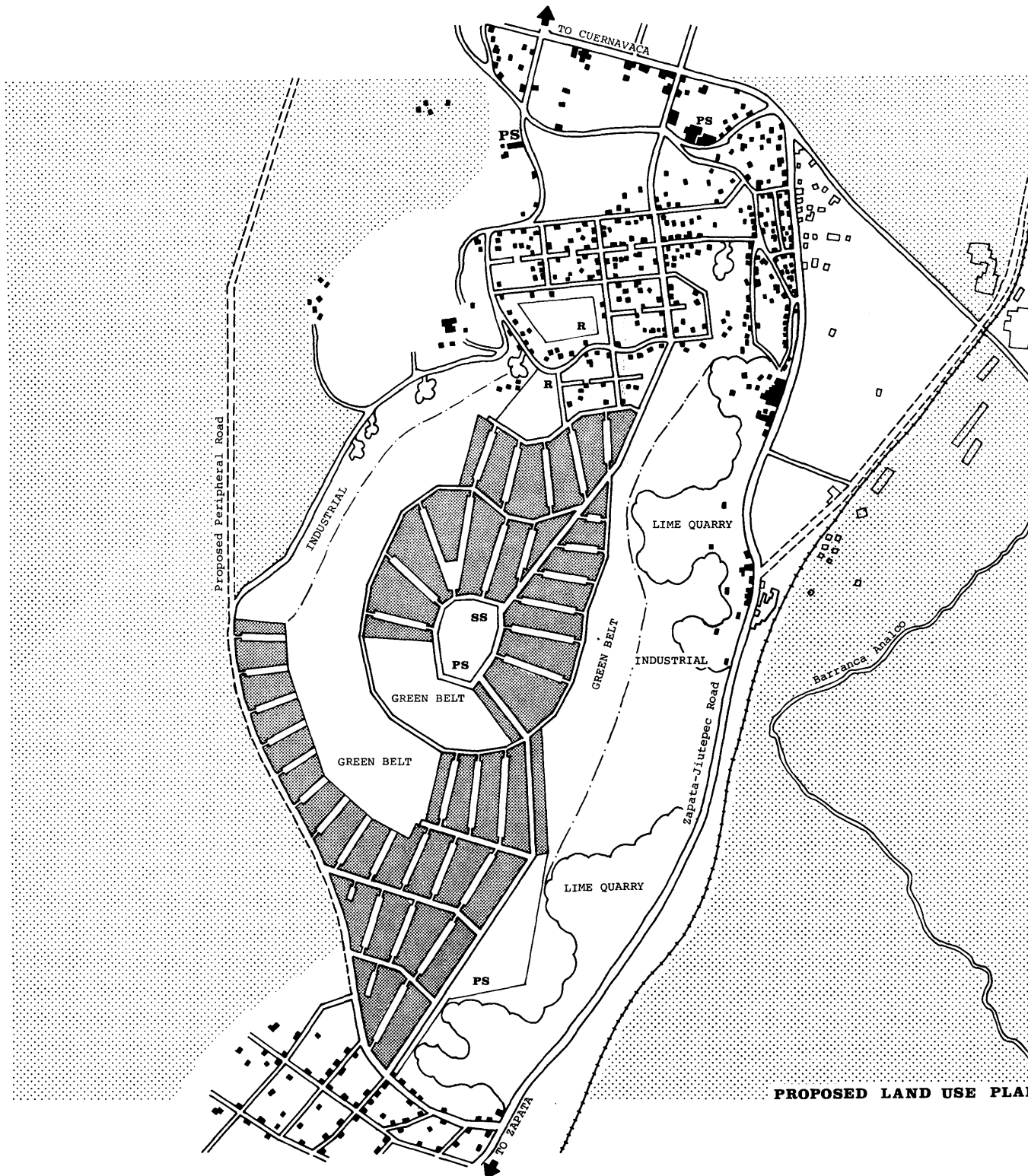
-  INDUSTRIAL
-  AGRICULTURAL
-  RESIDENTIAL



1:10000






EXISTING LAND USE CIRCULATION/PLAN



PROPOSED LAND USE: Following the overall master plan, the land use of the site is grouped in three categories: residential, industrial and agricultural. In addition, a dividing green belt (of gradual forestation) separates industrial and residential areas to reduce pollution. The green belt takes advantage of the areas with slopes of over 45% that would otherwise be largely unusable. In the same manner, the overall design of the site takes advantage of the topography to minimize the amount of costly earthworks. It is foreseen that the quarries will eventually reduce the eastern flank of the hill to the level of road. This will provide an adequate site for other industries. Communal facilities are evenly distributed and are located on flat parts of the site. A large depression in the Colonia Vista Hermosa is converted into a recreational spot, as is a steep area directly above it.





- PS** Primary School
- SS** Social Services
- R** Recreation

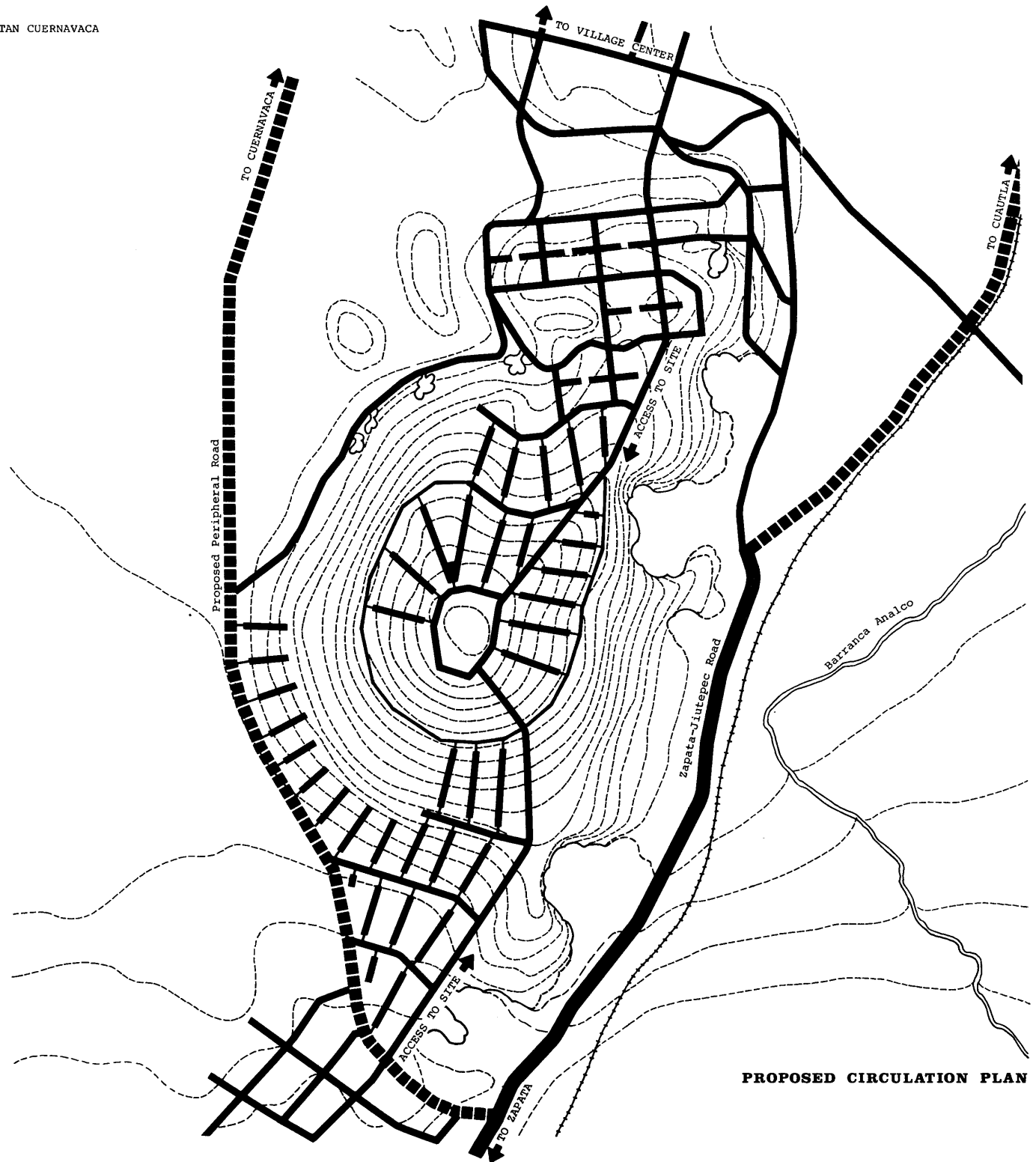
-  PROPOSED RESIDENTIAL
-  EXISTING RESIDENTIAL
-  AGRICULTURAL



PROPOSED LAND USE PLAN 1:10000

PROPOSED CIRCULATION PLAN: The boundaries of the project are well defined: the industrial area and old Zapata-Jiutepec road on the east, the existing settlements to the north and south, and the proposed peripheral or ring road to the west. The basic problem confronting the layout design is the topography of the site. The solution is to resort to pedestrian streets at right angles to the contour lines. Individual lots parallel to contours are easily serviced and drained, and require less cut and fill as well. Vehicular traffic is confined to one road providing access from both existing settlements, and following a slope ranging approximately from about 20% to 35%. A series of branches parallel to the contours provide the connection between the access road and the pedestrian streets. Thus, the site has three of the four basic circulation modes: Mode I, or predominantly pedestrian streets, Mode II of combined pedestrian-vehicular traffic such as the access road, and Mode III of predominantly vehicular traffic as in the case of the ring road. The project can be divided into two stages: The first stage, on the north, as a low income residential area expansion to the Colonia Vista Hermosa; and the second stage, on the sunnier southern and western side of the hill, which on account of a better view and slightly steeper slopes could be made available to moderately low and middle income groups at somewhat higher prices. The project also includes the upgrading of the layout of Colonia Vista Hermosa before utility networks are introduced. This is achieved by interrupting certain streets to provide larger blocks in the form of clusters.

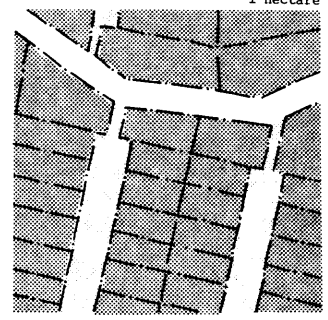
- | | | |
|---|-------------------------|----------|
|  | PRIMARY ROAD | MODE III |
|  | PRIMARY ROAD (proposed) | MODE III |
|  | STREETS | MODE II |
|  | PEDESTRIAN STREETS | MODE I |



PROPOSED CIRCULATION PLAN

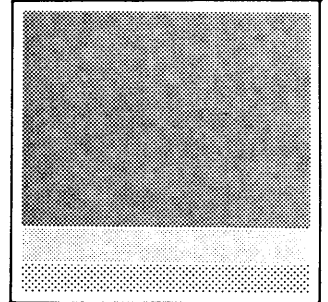
LAND UTILIZATION DIAGRAMS

1 Hectare



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

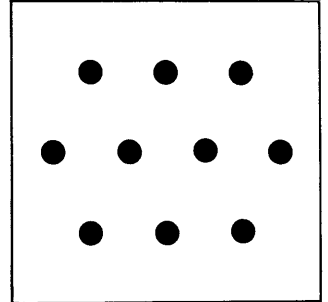
1 Hectare



PERCENTAGES

Streets/Walkways	69
Playgrounds	11
Cluster Courts	9
Dwellings/Lots	11

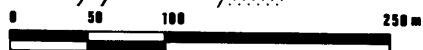
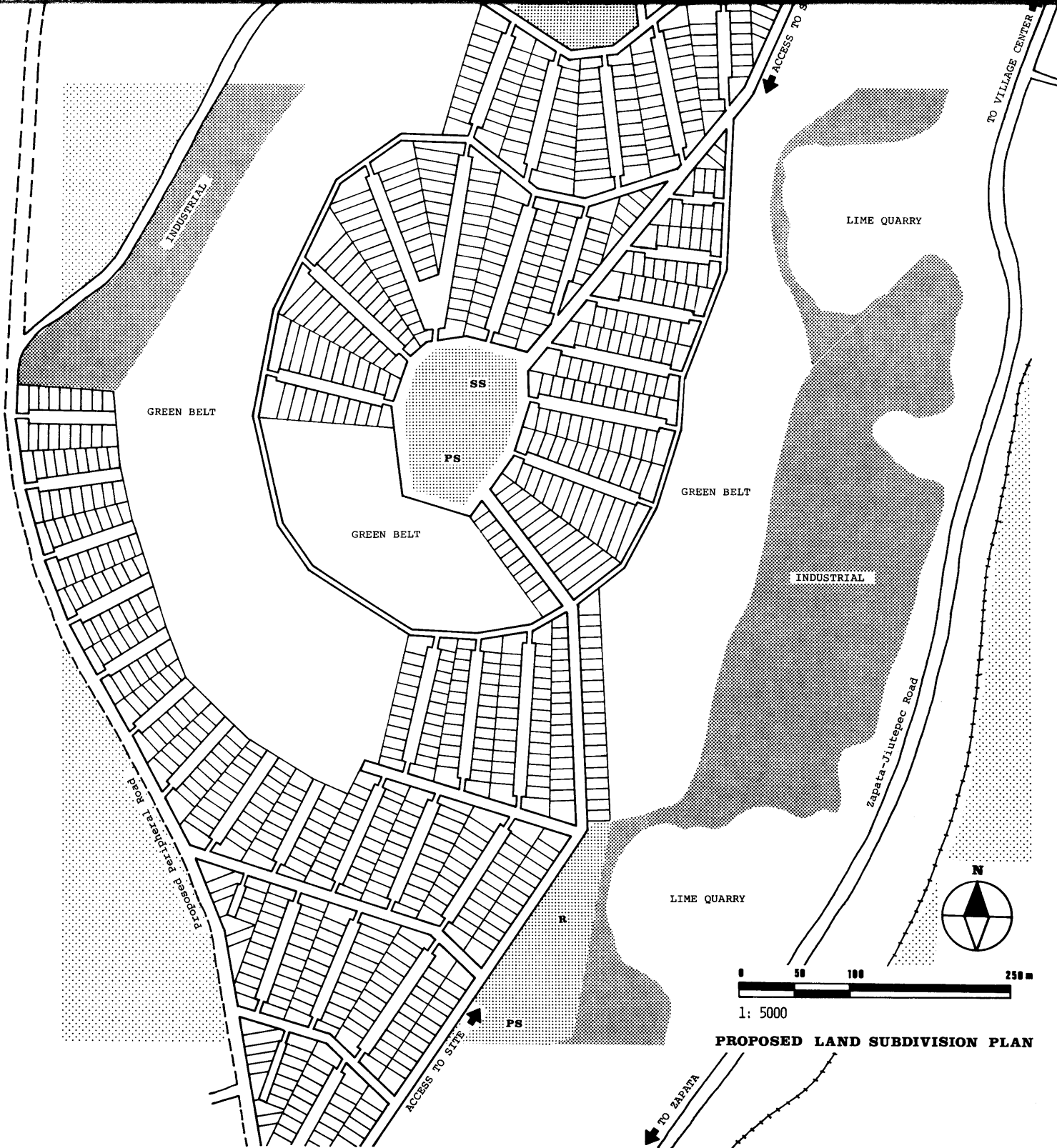
1 Hectare



DENSITY

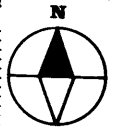
Persons/Hectare	200
-----------------	-----

20 persons



1: 5000

PROPOSED LAND SUBDIVISION PLAN



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 (m²) is the built-up, covered area of a dwelling unit. (U.S.D.P.)

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

DWELLING UNIT TYPE. Four types of dwelling units are considered: **ROOM:** A SINGLE SPACE usually bounded by

partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room. **SEVERAL ROOM UNITS** are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation, toilets, kitchens). **APARTMENT:** A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.) **SEVERAL APARTMENT UNITS** are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation). **HOUSE:** A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.) **ONE HOUSE UNIT** is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available. **SHANTY:** A SINGLE OR MULTIPLE SPACE (small, crudely built). **ONE SHANTY UNIT** is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces). (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

ELECTRIC PHASE. May be either a single-phase circuit (for small electrical devices) or a three-phase circuit (for heavy equipment, large electrical devices). In single-phase only one current is flowing through

the circuit with the voltage dropping to zero twice in each cycle. In three-phase currents flow through the circuit with the power never dropping to zero. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

FINANCING. The process of raising or providing funds. **SELF FINANCED:** provided by own funds; **PRIVATE/PUBLIC FINANCED:** provided by loan; **PUBLIC SUBSIDIZED:** provided by grant or aid. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

INFRASTRUCTURE. The underlying foundation or basic framework for utilities and services: streets; sewage, water network; storm drainage; electrical network;

- gas network; telephone network, public transportation; police and fire protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)
- INSULATOR.** A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)
- INTERIOR CIRCULATION NETWORK (SITE PLANNING).** The pedestrian/vehicular circulation system inside the site. It should be designed based upon the exterior circulation/accesses and land development requirements. (U.S.D.P.)
- INTERVAL.** A space of time (or distance) between the recurrences of similar conditions or states. (Merriam-Webster, 1971)
- KILOWATT (kw).** (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (ROTC ST 45-7, 1953)
- LAMPHOLE.** A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)
- LAND COST.** Price: the amount of money given or set as the amount to be given as a consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)
- LAND DEVELOPMENT COSTS.** The costs of making raw land ready for development through the provision of utilities, services, accesses, etc. (U.S.D.P.)
- LAND LEASE.** The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)
- LAND-MARKET VALUE.** Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax based value of the land; or 3) the present commercial market value of the land. (U.S.D.P.)
- LAND OWNERSHIP.** The exclusive right of control and possession of a parcel of land. (U.S.D.P.)
- LAND SUBDIVISION.** The division of the land in blocks, lots and laying out streets. (U.S.D.P.)
- LAND TENANCY.** The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)
- LAND UTILIZATION.** A qualification of the land around a dwelling in relation to user, physical controls and responsibility: 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: **LINES:** property lines, political or municipal divisions, main streets, etc.; **AREAS:** similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)
- MICROCLIMATE.** The local climate of a given site or habitat varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)
- MODE OF TRAVEL.** Manner of moving from one place (the site) to another (other parts of the urban context). (U.S.D.P.)
- MODEL (OF URBAN LAYOUT).** A representation of an urban residential area illustrating circulation, land utilization, land subdivision, and utility network of a specific layout and lot. (U.S.D.P.)
- MUTUAL OWNERSHIP.** Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)
- NATURAL FEATURES.** Prominent objects in or produced by nature. (U.S.D.P.)
- NATURAL UNDISTURBED SOIL.** Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)
- NEIGHBORHOOD.** A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)
- NETWORK EFFICIENCY (LAYOUT EFFICIENCY).** The ratio of the length of the network to the area(s) contained within; or tangent to it. (U.S.D.P.)
- NEUTRAL WIRE.** Wire carrying no voltage between itself and a ground. (ROTC ST 45-7, 1953)
- NOISE.** Any sound (affecting the site) that is undesired (such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster, 1971)
- ODOR.** A quality of something that affects the sense of smell. (Merriam-Webster, 1971)
- OHMS (electrical).** The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes. $R = E/I$. The practical mks unit of electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)
- OPTIMIZE/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 thorough-fare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STACK. The vertical pipe in a dwelling of the soil-, 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.)

REFERENCES

- "A Method for the Evaluation of Urban Layouts" Caminos, H. INDUSTRIAL FORUM, Volume 3, Number 2, Montreal, December 1971.
- "ANALISIS, DIAGNOSTICO Y EVALUACION DEL SISTEMA GENERAL DE VIVIENDA DE LOS SECTORES DE ESCAZOS RECURSOS Y SUS SUBSISTEMAS ESPECIFICOS EN EL AREA METROPOLITANA DE LA CIUDAD DE MEXICO" VOL. I, II, III. J. Cortes, R. Davila, E. Espinosa, T. Sudra, J.F.C. Turner, Mexico City-Cambridge, 1973.
- "IX CENSO GENERAL DE LA POBLACION 1970 MORELOS", Direccion General de Estadistica, Secretaria de Industria y Comercio, Mexico, D.F. 1971.
- "IX CENSO GENERAL DE POBLACION-1970 RESUMEN GENERAL", Direccion General de Estadistica, Secretaria de Industria y Comercio, Mexico, D.F. 1971.
- "CONTRIBUCION AL PROBLEMA DE LA VIVIENDA", Engels, F. Editorial de Lenguas Extranjeras, Moscu, 1972.
- "CULTURAL ACTION: A DIALECTICAL ANALYSIS", Freire, P. CIDOS, Cuernavaca, 1970.
- "DIALECTICA DE LA ECONOMIA MEXICANA", Aguilar, A., Editorial Nuestro Tiempo, 1971.
- "DOCUMENTO DE PLANIFICACION No. 1", Comite de Planificacion, CUAVES, Lima, Peru, 1974.
- "DWELLINGS AND LAND", Caminos, H., Goethert, R., Chana T.S., Urban Settlement Design in Developing Countries Program, MIT, Cambridge, 1973.
- "EL PROBLEMA DE LA VIVIENDA EN MEXICO", Trejo, L. M. Fondo de Cultura, Mexico D.F., 1974.
- "ENSAYOS SOBRE EL DESARROLLO URBANO DE MEXICO", Calnek E., Borah, W., Moreno, A., Davies, K., Unikel, L., Sep Setentas, Mexico, D.F., 1974.
- "FREEDOM TO BUILD", Fietcher, R., Turner, J.F.C., Macmillan, New York, 1972.
- "GUIDE FOR SURVEY - EVALUATION OF URBAN DWELLING ENVIRONMENTS", Bolwin, J., MIT Thesis, Cambridge 1974.
- "HACIA UNA SOCIEDAD CONVIVENCIAL", Illich, I., CIDOC, Cuernavaca, 1972.
- "HISTORIA SOCIAL Y ECONOMICA DE MEXICO", Cue, A., Editorial F. Trillas, S.A. Mexico, 1970.
- "HOUSING BY PEOPLE", John F.C. Turner, Whitstable Litho Ltd, Kent, London, 1976.
- "HOUSING PROBLEMS (11.20 Course notes)", Keys, L., MIT, Cambridge, 1971.
- "INTEGRACION URBANA DEL PUEBLO DE TETELA DEL MONTE", Chavez, R., Vargas, I., EAUM Thesis, Cuernavaca, Mex. 1974.
- "INTERIM URBANIZATION PROJECT DANDORA", Urban Settlement Design in Developing Countries, MIT, Cambridge, 1973.
- "LIMITS TO GROWTH", Meadows, Randers, Behrens, Fondo de Cultura Economica, Mexico, 1972.
- "MAN'S STRUGGLE FOR SHELTER IN AN URBANIZING WORLD" Abrams, C., MIT Press, Cambridge, 1970.
- "MEXICO: RIQUEZA Y MISERIA", Aguilar y Carmona, Editorial Nuestro Tiempo, Mexico 1970.
- "MOVIMIENTOS SOCIALES URBANOS", Castells, M., Siglo XXI Editores, Mexico, 1974.
- "NEOLATIFUNDISMO Y EXPLOTACION" Stevenhogen, Paz, Sanchez, Cardenas y Bonilla, Editorial Nuestro Tiempo, Mexico, 1971.
- "NOTES FOR A HOUSING POLICY WITH SPECIAL REFERENCE TO LOW INCOME HOUSING SYSTEMS IN METROPOLITAN MEXICO" Turner, J.F.C., Mexico City - Cambridge, 1971.
- "NUEVO ATLAS PORRUA DE LA REPUBLICA MEXICANA", Garcia E., Falcon, Z., Editorial Porrúa, S. A., Mexico, 1974.
- "PERSONAL SPACE", THE BEHAVIORAL BASIS OF DESIGN, Somer, R., Prentice-Hall, New Jersey, 1969.
- "PROPIEDAD SOCIAL: PREGUNTAS Y RESPUESTAS", Centro SINAMOS, Lima, 1976.
- "TEORIA DE LA CUESTION AGRARIA", V.I. Lenin, Ediciones de Cultura Popular, Mexico, 1976.
- "URBAN DWELLING ENVIRONMENTS", Caminos, H., Turner, J.F.C., Steffian, J., MIT Press, Cambridge, 1969.
- "URBAN DWELLING ENVIRONMENTS: CUERNAVACA, MEXICO", Chavez, R., Vargas, I., Thesis, MIT, Cambridge, 1976.
- "URBAN DWELLING ENVIRONMENTS: ISTANBUL TURKEY", Butler, M., Butler, N., Thesis, MIT, Cambridge, 1976.
- "URBANIZATION PRIMER", Caminos, H., Goethert, R., World Bank, Urban Projects Department, Washington, 1976.
- "ZONING FOR SMALL TOWNS AND RURAL COUNTIES", US. Department of Commerce, Economic Development Administration, Washington D.C. 1966.

EXPLANATORY NOTE

QUALITY OF INFORMATION

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

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

QUALITY OF SERVICES, FACILITIES AND UTILITIES

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

METRIC SYSTEM EQUIVALENTS

Linear Measures

1 centimeter	=	0.3937 inches
1 meter	=	100 centimeters or 39.37 inches or 3.28 feet
1 kilometer	=	1,000 meters = 3,280.83 feet or 0.62137 miles
1 inch	=	2.54 centimeters
1 foot	=	0.3048 meters
1 mile	=	1.60935 kilometers

Square Measures

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

DOLLAR EQUIVALENTS

All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent:
 1 U.S. dollar = 12.50 Mexican pesos (May 1976)
 GNP per capita = U.S.\$ 744 (1972)