CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA, MEXICO

by

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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
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CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

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 Mexico 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-Cuautila 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 Mexico 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.
2. GEOGRAPHY. México is the third largest country in Latin America (after Brazil 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 México ranges from low desert plains and coastal jungles to high plateaus and rugged mountains. Beginning at the Isthmus of Tehuantepec in southern México, 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 such as 800 Km wide. From the low desert plain in the north, it rises to over 2,600 meters near México 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 Méxic 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 caucasians of large, 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 practicants 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 Olmeca, the Tolteca and the Maya, had as the Olmeca, the Tolteca and the Maya, had as
However, this development and the distribution of wealth have been very uneven. Although almost half of the economically active population is 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 forth 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 enacted 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 economic activities, 35% 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 manufactured, 16% were mineral and the rest 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 30% of gross investment, foreign financing has played a crucial role. Today, Mexico's foreign debt is over 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 Justices 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 existence of an effective choice breeds political apathy and ignorance. The opposition parties which are insignificant, obsolescent and openly collaborate with PRI, include PAN (national action, rightist), PAN (authentic mexican revolutionary, rightist), PPS (popular socialist), PCMG (mexican communist) and the new PSTM (mexican workers, leftists).
URBAN CONTEXT
Cuernavaca, Mexico

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

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

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

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 22.9%, up 109.1% 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 cardboard, 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
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

Land Use Pattern: (approximate) Field Surveys by the authors, 1973-1975.
Income Pattern: (approximate) INEO
Growth Pattern: (approximate) INEO
CUESTION SOUTHEASTERN METROPOLITAN AREA

INCOMES
LOW
MEDIUM
HIGH

INCOME PATTERN
1: 125 000
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 Atlaaculco. This last community, and the Colonias of Satellite and Flores Monterey, strung along the Mexico-Acapulco highway,
can be considered as the southeastern most tip of Cuernavaca at el Polvorín, and the town of Temixco; and the Cuernavaca-Cuatlja highway, which in turn branches off to the south via Jiutepec and structures the conurbation of the southeastern periphery of the city mentioned above, and the triple sided CIVAC-Tlalhuapa, Jiutepec-Tlapate, Tejelapa-Progreso system (see Urban Topography and Circulation, page 1). 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, Tejelapa 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.
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 Jilotepec, CIVAC turned the textile/agricultural area into an industrial/residential oriented conurbation. For centuries the rich land and abundant water surrounding Jilotepec 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 Jilotepec. 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.
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, where 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 with that 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 CoReTT, for this purpose.
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/Very Low Income
   Periphery.

4. CUAUHCHILES: Squatter Settlement/Shanty/Detached
   Popular/Very Low Income
   Periphery.

5. VISTA HERMOSA: Squatter Settlement/Shanty/Grouped/Room
   Popular, Low/Very Low Income
   Periphery.
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

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total</th>
<th>Area</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
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<td>38</td>
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<tr>
<td>DWELLING UNITS</td>
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<tr>
<td>PEOPLE</td>
<td>3,720</td>
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<td>232</td>
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<table>
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<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>1.3</td>
<td>8</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>10.7</td>
<td>67</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>100</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

- \( R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 302 \text{ m/Ha} \)
- \( \text{AVERAGE LOT AREA} = 130 \text{ m}^2 \)
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
CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

LAND UTILIZATION DIAGRAMS

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

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

DENSITY
Persons/Hectare 232
- 20 persons

LOCALITY SEGMENT LAND UTILIZATION
1: 2500
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

<table>
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<tr>
<th></th>
<th>Total</th>
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<th>Density</th>
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<tr>
<td>Number Hectares</td>
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<td>0.45</td>
<td>62</td>
</tr>
<tr>
<td><strong>LOTS</strong></td>
<td>22</td>
<td>0.45</td>
<td>42</td>
</tr>
<tr>
<td><strong>PEOPLE</strong></td>
<td>132</td>
<td>0.45</td>
<td>293</td>
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<tr>
<td><strong>AREAS</strong></td>
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<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.08</td>
<td>10</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.37</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.45</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

- Network length (circulation) = 333 m/Ha
- Areas served (circulation, lots) = 333 m²/Ha
- Average Lot Area = 121 m²
CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

SECTION

ELEVATION

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

LOCALITY SOURCES
Plan: (accurate) CIVAC, 1975
Land Use Pattern: (accurate) IBID
Circulation Pattern: (accurate) IBID
Segment Plan: (accurate) IBID
Segment Land
Utilisation: (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. Garduno, 1976.
General Information: Oficinas de CIVAC (Ciudad Industrial del Valle de Cuernavaca), Field survey by the authors, 1975.
PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT

type: House
area (sq m): 82

LAND/LOT
utilization: Private
area (sq m): 126

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

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

NETWORK EFFICIENCY

\[ R_n = \frac{\text{network length (circulation)}}{\text{area served (circulation, lots)}} = \frac{207 \text{ m/Ha}}{1} \]

AVERAGE LOT AREA = 453 m²
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: None, Limited, Adequate.

Note: Elevation in meters
LAND UTILIZATION DIAGRAMS

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

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

**DENSITY**
- Persons/Hectare: 78
- 20 persons

**LOCALITY SEGMENT LAND UTILIZATION**

1:2500
POPULATION: The population of Satelite is made up largely of working class moderately low income population. There is, however, a small percentage of both middle and low income groups, as well. 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

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
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<tbody>
<tr>
<td>LOTS</td>
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<td>0.76</td>
<td>15.5</td>
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<tr>
<td>DWELLING UNITS</td>
<td>16</td>
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<td>20</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>96</td>
<td>0.76</td>
<td>124</td>
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<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
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</thead>
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<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
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<td>20</td>
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<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PRIVATE (dwelling, shops, factories, lots)</td>
<td>0.61</td>
<td>80</td>
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<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.76</td>
<td>100</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \text{network length (circulation)} \]
\[ \text{areas served (circulation, lots)} = 228 \text{ m/Ha} \]
\[ \text{AVERAGE LOT AREA} = 508 \text{ m}^2 \]
CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

ELEVATION

SECTION

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

CETEAL Air Photograph, 1970.
Land Use Pattern: (approximate) Field Survey by the authors, 1975.
CETEAL Air Photograph, 1970.
Circulation Pattern: (approximate) IBID
CETEAL air photograph, 1970.
Segment Land Utilization: (approximate) Field Survey by the authors, 1975.
Typical Dwelling: (approximate) Field Survey by the authors, T. Bautista and G. Engstrom, 1975.
Physical Data: (accurate) IBID
PHYSICAL DATA

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

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

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>107</td>
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<td>7</td>
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<tr>
<td>DWELLING UNITS</td>
<td>150</td>
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<tr>
<td>PEOPLE</td>
<td>1 950</td>
<td>15.22</td>
<td>68</td>
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<tr>
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<th>Hectares</th>
<th>Percentages</th>
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<tbody>
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<td>PUBLIC (streets, walkways, open spaces)</td>
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</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>1.7</td>
<td>11.5</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>11.43</td>
<td>75</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15.22</td>
<td>100</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

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

AVERAGE LOT AREA = 1400 m²
The chart shows (1) approximate percentage of each construction type within the total number of dwellings; and (2) building group that generally produces each type.

Quality of information: Approximate

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

Quality of information: Approximate

Note: elevation in meters
LAND UTILIZATION DIAGRAMS

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

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

DENSITY
Persons/Hectare 68

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**

<table>
<thead>
<tr>
<th></th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>14</td>
<td>2.53</td>
<td>5.6</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>24</td>
<td>2.53</td>
<td>9.6</td>
</tr>
<tr>
<td>People</td>
<td>168</td>
<td>2.53</td>
<td>68</td>
</tr>
</tbody>
</table>

**AREAS**

<table>
<thead>
<tr>
<th>Area Description</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.27</td>
<td>11</td>
</tr>
<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>0.15</td>
<td>5</td>
</tr>
<tr>
<td>Private (dwelling, shops, factories, lots)</td>
<td>2.11</td>
<td>84</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>2.53</td>
<td>100</td>
</tr>
</tbody>
</table>

**NETWORK EFFICIENCY**

\[ R = \frac{\text{network length (circulation)}}{\text{area served (circulation, lots)}} \]

- \( R = 252 \, \text{m/Ha} \)
- \( \text{area served (circulation, lots)} = 1507 \, \text{m}^2 \)

**AVERAGE LOT AREA**

- \( = 1507 \, \text{m}^2 \)
CONJUNTO DE ORCABRAS DE SOUTHEASTERN METROPOLITAN CUERNAVACA

ELEVATION

SECTION

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 Mexico, 1972.
Segment Land Utilization: (approximate) Field survey by the authors, 1976.
Block Plan: (accurate) Oficina de Catastro Cuernavaca, Mor., 1976; Aerofoto de Mexico, 1972.
Typical Dwelling: (approximate) Field survey by the author, 1976.
Physical Data: (accurate) Field survey by the author, 1976-77.
Photographs: Aerial, Aerofoto de Mexico, 1977; Isabel Vargas, 1976-77.

GENERAL INFORMATION:

General Information: IX Censo General de Población, 1970, Cuernavaca, Mor.; Field survey by the authors; I. Vargas, S. Alanis.
**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: Artisan
- 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**
- user's ethnic origin: Southern Mexican
- place of birth: Jiutepec, More.
- 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: None
- 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 southeastern metropolitan area. It was created in 1974 by the occupation of communal lands belonging to the Ejido de Jútepec. The invasion was carried out by some 200 families, made up largely of nearby Jútepec 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 lay-out 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

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Area</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>240</td>
<td>6.17</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>129</td>
<td>6.17</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>480</td>
<td>6.17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways)</td>
<td>1.4</td>
<td>22.5</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>.17</td>
<td>3</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>4.6</td>
<td>74.5</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6.17</td>
<td>100</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \text{network length (circulation)} \]
\[ A = \text{areas served (circulation, lots)} = 252m/ha \]
\[ \text{AVERAGE LOT AREA} = 350 m^2 \]
CUAUCHILES

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>0</th>
<th>10%</th>
<th>25%</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud/Wattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
- 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

CUAUCHILES: (Top) Construction of dwellings shows mixed urban and rural background, i.e. straw, bamboo and stone in one case, corrugated tar cardboard in the other. (Bottom) A typical view of the settlement: rough, unpaved streets with no services other than electricity and street lighting.
LAND UTILIZATION DIAGRAMS

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

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

DENSITY
Persons/Hectare 78

LOCALITY SEGMENT LAND UTILIZATION
1:2500
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

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density R/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>37</td>
<td>0.72</td>
<td>51</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>28</td>
<td>0.72</td>
<td>39</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>140</td>
<td>0.72</td>
<td>194</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.19</td>
<td>26</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.014</td>
<td>2</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.52</td>
<td>72</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.72</td>
<td>100</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \text{network length (circulation)} \]
\[ A = \text{areas served (circulation, lots)} = 630 \text{ m/Ha} \]
\[ \text{AVERAGE LOT AREA} = 140 \text{ m}^2 \]
CONURABION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

ELEVATION

SECTION

KEY
LH 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)

YARD

PLAN

STREET

STREET

TYPICAL DWELLING

LOCALITY SOURCES
Segment Plan: (approximate) Plano de la Comunidad, 1975.
Segment Land Utilisation: (approximate) Field survey by the author, 1976.
Block Plan: (approximate) IBID
Typical Dwelling: (approximate) IBID
Physical Data: (accurate) IBID
Photographs: Isabel Vargas.
General Information: Field survey by the author; Interview with the leader of the settlement, I. Alamis, E. Arenas, Y. Garduna, R. Melgar, Y. Sempora, C. Vasquez, R. Villalba.
## PHYSICAL DATA

<table>
<thead>
<tr>
<th>Type of Dwelling</th>
<th>Area (sq m)</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwelling Unit</td>
<td>40 m²</td>
<td>Legal Ownership</td>
</tr>
<tr>
<td>Land/Lot</td>
<td>148 m²</td>
<td>Illegal Ownership</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Floors</th>
<th>Utilization</th>
<th>Area (sq m)</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-detached</td>
<td>1</td>
<td>Single</td>
<td>148 m²</td>
<td>Legal Ownership</td>
</tr>
</tbody>
</table>

### 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:** No
- **Shower:** No
- **Kitchen:** 1
- **Rooms:** 2
- **Other:** Corner shop

## SOCIO-ECONOMIC DATA

### GENERAL

- **User's ethnic origin:** Southern Mexican
- **Place of birth:** Jiutepec, More.
- **Education level:** Primary

### NUMBER OF USERS

- **Married:** 1
- **Single:** 3
- **Children:**
- **Total:** 4

### MIGRATION PATTERN

- **Number of Moves:** 2
- **Rural - Urban:**
- **Urban - Rural:**
- **Urban - Urban:**
- **Why came to urban area:**

### GENERAL: ECONOMIC

- **User's income group:** Low
- **Employment:** Shopkeeper
- **Distance to work:** None
- **Mode of travel:** None

### COSTS

<table>
<thead>
<tr>
<th>Dwelling Unit</th>
<th>Land - Market Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2080</td>
<td>76000/ha</td>
</tr>
</tbody>
</table>

### DWELLING UNIT PAYMENTS

- **Financing:** Popular
- **Rent/Mortgage:** None
- **% Income for Rent/Mortgage:** None

---

_CUAUCHILES: (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

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density H/Na</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>250</td>
<td>13.6</td>
<td>18.3</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>72</td>
<td>13.6</td>
<td>5.2</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>576</td>
<td>13.6</td>
<td>42.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>2.1</td>
<td>15</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PRIVATE (dwelling, shops, factories, lots)</td>
<td>11.5</td>
<td>85</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>13.6</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NETWORK EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R = \frac{\text{Network Length (circulation)}}{\text{Areas served (circulation, lots)}} = 215\text{m/Ha}$</td>
</tr>
<tr>
<td>AVERAGE LOT AREA $= 500 \text{ m}^2$</td>
</tr>
</tbody>
</table>
VISTA HERMOSA

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>TYPE</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHACK</td>
<td></td>
</tr>
<tr>
<td>MUD/WATTLE</td>
<td></td>
</tr>
<tr>
<td>MOSS</td>
<td></td>
</tr>
<tr>
<td>MASONRY MOSS</td>
<td></td>
</tr>
<tr>
<td>MASONRY CONCRETE</td>
<td></td>
</tr>
<tr>
<td>CONCRETE</td>
<td></td>
</tr>
</tbody>
</table>

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

Note: elevation in meters
CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
Streets/Walkways 15
Playgrounds -
Cluster Courts -
Dwellings/Lots 85

DENSITY
Persons/Hectare 42.3

LOCALITY SEGMENT LAND UTILIZATION

1:2500
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.

<table>
<thead>
<tr>
<th>LOCALITY BLOCK LAND UTILIZATION DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DENSITIES</strong></td>
</tr>
<tr>
<td><strong>LOTs</strong></td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td><strong>DWELLING UNITS</strong></td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td><strong>PEOPLE</strong></td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>42</td>
</tr>
<tr>
<td><strong>AREAS</strong></td>
</tr>
<tr>
<td><strong>PUBLIC (streets, walkways, open spaces)</strong></td>
</tr>
<tr>
<td>Hectares</td>
</tr>
<tr>
<td>0.13</td>
</tr>
<tr>
<td><strong>SEMI-PUBLIC (open spaces, schools, community centers)</strong></td>
</tr>
<tr>
<td>-</td>
</tr>
<tr>
<td><strong>PRIVATE (dwelling, shops, factories, lots)</strong></td>
</tr>
<tr>
<td>Hectares</td>
</tr>
<tr>
<td>0.46</td>
</tr>
<tr>
<td><strong>SEMI-PRIVATE (cluster courts)</strong></td>
</tr>
<tr>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
<tr>
<td>Hectares</td>
</tr>
<tr>
<td>0.59</td>
</tr>
</tbody>
</table>

**NETWORK EFFICIENCY**

R = network length (circulation) = 517 m/Ha
areas served (circulation, lots) = 517 m²

**AVERAGE LOT AREA**

= 515 m²
CONURBATION OF SOUTHEASTERN METROPOLITAN CUERNAVACA

ELEVATION

SECTION

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)

STREET

PLAN

YARD

EXPANSION

TYPICAL DWELLING

LOCALITY SOURCES
Segment Plan: (accurate) Aerofoto de México, 1972.
Segment Land Utilisation: (approximate) Field survey by the authors, 1976.
Block Plan: (accurate) Aerofoto de México, 1972.
Typical Dwelling: (approximate) Field survey by the authors, 1976.
General Information: IX Censo General de Población 1970, Cuernavaca, Morelos.
Field Survey by the authors, 1976.
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: 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.
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. A comparative overview of the dwelling systems is presented in the evaluations, analyzing each case from a different angle. The following sections are included in the 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.
EVALUATION: TIME/PROCESS PERSPECTIVE

TYPE/SYSTEM

SHANTY/ROOM/GROUPED SQUATTER SETTLEMENT

ACCRETION; growing organically, gridiron, other solutions.

ORIGIN; appeared with the growth of urban areas.

PROLIFERATING; increasingly present in the periphery.

LOCALITIES; Cuauhtemoc, Nevada, others.

PAST

USER; VERY LOW; housed lowest income levels, recent migrants.

DENSITY; MEDIUM; open urban spaces were more easily available, less crowded.

CONFIGURATION; 1-2 rooms, semi-temporary construction, scrap materials; no services or utilities.

DEVELOPMENT; POPULAR/INSTANT; built by self-help, incrementally if land tenure secured.

TRADITIONAL/DETACHED HOUSE RURAL COMMUNITY

COLONIAL BLOCK; in 16th Century villages; and irregular topographic solution.

LOCAL/UNIVERSAL; appears in 20th Century in modern version.

USER; MODERATELY LOW INCOME; employees, established workers.

DENSITY; LOW; large lots, small dwelling units determined low densities.

CONFIGURATION; HOUSE; 2-3 rooms, 1-2 floors; with some utilities, yard or garden; often with store or shop.

DEVELOPMENT; POPULAR/INCREMENTAL; popula
dy developed; built over 5-10 years by arti
tis, self-help.

PRESENT

USER; MODERATELY LOW/MEDIUM INCOME; farmers, small merchants.

DENSITY; MODERATELY LOW/MEDIUM INCOME; increased densities due to subdivision of large lots.

CONFIGURATION; SATELITE; Ejido, etc. Oxtotlan.

DEVELOPMENT; POPULAR/INSTANT; developed popularly; incrementally.

TREND; PROLIFERATING; one of the fastest growing systems; privately or by squatter invasion.

LOCALITIES; Cuauhtemoc, Tejupis, Teula, Sta. Maria, Coatepec, Chamula, others.

LNG; LOW/MODERATELY LOW INCOME; will tend to accept slightly lower income levels.

MIDDLE/MODERATELY LOW INCOME; increasing in more established peripheral settlements.

DENSITY; HIGH/MEDIUM; in general densities increasing.

PAST

USER; MODERATELY LOW/MODERATELY LOW INCOME; occasionally others

DENSITY; VARYING; densities increasing with sub-
division of lots, increasing construction.

TRADITIONAL/DETACHED HOUSE INSTITUTIONAL

GIRDIRON; standard gridiron layout; sometimes colonial block or others.

EUROPEAN; 19th Century; imported in 1920's and first used in Cuernavaca in 1950's.

MIDDLE INCOME; professional types; sometimes used as vacation homes.

MEDIUM/LOW; medium, single family units on medium sized lots.

USER; PRIVATE, PUBLIC/INSTANT; first privately, then publicly developed; instantaneous, by large contractor.

DEVELOPMENT; MIDDLE/MODERATELY LOW INCOME; government projects allow lower income groups, often through subsidy.

LOCALITIES; Las Fuentes, Bego
dill, Chapultepec, Tepotzotlan.

TREND; PROLIFERATING; increasing private and municipally subsidized investments.

FUTURE

USER; MODERATELY LOW/MEDIUM INCOME; increasing public housing projects will continue to broaden market.

DENSITY; MEDIUM/LOW; smaller units likely, with greater coverage, allowing increased densities.

PAST

USER; MODERATELY LOW/MODERATELY LOW INCOME; increasingly dominant in urban development.

DENSITY; VARYING; densities increasing with subdivision of lots, increasing construction.

PREFABRICATING; traditional cultural patterns succumb to urban development.
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, a 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).
**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.

**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.

**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.

**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.
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.
The main objective of the master plan is, to rationalize and control the urban development of the southeastern 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 proceed 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 networks 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 'plus-valia' 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.

(pictures 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.
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.
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.

On the opposite page:

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

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

INDUSTRIAL
RESIDENTIAL
AGRICULTURAL

EXISTING LAND USE CIRCULATION PLAN
The basic data for the optimized layout is the following:

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>3.9</td>
<td>11</td>
</tr>
<tr>
<td>Semi-Public</td>
<td>3.3</td>
<td>9</td>
</tr>
<tr>
<td>Private, Semi-Private</td>
<td>29</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>36.2</td>
<td>100</td>
</tr>
</tbody>
</table>

**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 south-east 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 Jutecpec 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.
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.
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 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.
PROPOSED PROJECT

LAND UTILIZATION DIAGRAMS

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

BELT
LIME QUARRY

PROPOSED LAND SUBDIVISION PLAN

1:5000

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

DENSITY
Persons/Hectare 200

20 persons
GLOSSARY

The criteria for the preparation of the definitions were based on the following:

GLOSSARY

FLOW METER. A device to measure flow of water.

FLOW PUMP: Toilet with storage tank of water which supplies water directly from pipe. It requires adequate pressure for proper functioning.

FOOT VAULT: Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning.

FOOT CANDLES. A unit of illumination on a surface that results from one (1) foot candle and equals one (1) lumen per square foot. It is measured in foot candles (fc).

FUMES. Gaseous emissions that are usually odorous and sometimes noxious.

GAS. A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and adjacent users.

GRADE. Profile of the center of a roadway, or the slope of the earth or surface of any building.

GRID BLOCKS. The blocks determined by a conventional public circulation and not by dimensions of lots. In grid block lots some lots in public circulation and not by dimensions of lots.

GRID LAYOUT. The urban layouts with grid blocks.

GROUPS. A segment of persons or families included in a legal entity.

GIVEAWAY. A transfer of property without consideration.

GIVEAWAY DEVELOPMENT. A transfer of property without consideration.

GIVEAWAY RIGHTS. A right in respect of an object owned by another person as a consequence of law. (Merriam-Webster, 1971)

GIVEAWAY RECEIPTS. A right in respect of an object owned by another person as a consequence of law. (Merriam-Webster, 1971)

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gas network; telephone network; public transportation; police and fire protection; refuse collection, health, schools, 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 physical means of transport and communication systems inside a site. It should be designed based upon the exterior circulation/macrocosmic and land development requirements. (U.S.D.P.)

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

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

LAWFROE. 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, streets, sewers, schools, highways, 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-MARK 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 capacity of the land to produce crops. (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 conditions and responsibility. PUBLIC (streets, walkways, open spaces): user - anyone/limited; physical conditions - minimal; responsibility - public sector. COMMERCIAL (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 occupant; physical controls - complete; responsibility -user. (U.S.D.P.)

LAND UTILIZATION: PHYSICAL. 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)

LAWS. A group of laws (owned individually) or cluster of laws (owned in condominium). (U.S.D.P.)

LAW OF LARGE NUMBERS. The ratio of the expected value of a sampling distribution to the actual value of a sampling distribution. (Merriam-Webster, 1971)

LAW OF INCREASE. A measure of land having fixed boundaries and access to public circulation. (U.S.D.P.)

LAW OF NEIGHBORHOOD. A legal right of passage over another person's ground (land), the area or way over which a right of passage is exercised, or a path that is thorough-fair 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. Right-of-way may be shared (as streets; parking, or exclusively (as rapid transit routes; subways, railroads, etc.) (Merriam-Webster, 1971) U.S.D.P.)

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

ROW/GROUNDED 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. (DeFina, 1972)

RUN-RAINFALL RATIO. The percentage (ratio) of storm runoff that is not reduced by evaporation, depression storage, surface wetting, and percolation; whereby increased rainfall duration, runoff-rainfall ratios increase storm runoff flow. (U.S.D.P.)

SAND. Loose, distinguishable grains of quartz/feldspar, size ranging from 0.062 to 0.0020mm in diameter. (DeFina, 1972)

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

SENSITIVE DWELLING. 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 simple wire. A circuit in which all the fixtures have the same voltage and there are no branch circuits with different amperages cannot be used efficiently in the same circuit. (U.S.D.P. 45-T, 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 sewer 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). (DeFina, 1972)

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. USEABLE 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 commerce. Site and services projects are aimed to improve the housing conditions for the low income group (by providing services). a) SITE: the access to a piece of land where people can build their own dwellings; b) SERVICES: the opportunity for people to get employment, utilities, services and community facilities, financing and communication. (Merriam-Webster, 1971)

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)

SOMKE. The passive gasses 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 DETERMINATION. 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 using mode of sampling and soil MAP. It is used to reveal obvious limitations/restrictions/hazards for early planning consideration. (U.S.D.P.)

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

STANDARD. 1) Something that is established by authority, custom or convention and takes the place of rules to be followed. 2) Something that is set up and established by authority as a rule for the measurement of extent, amount, value or quality. (Merriam-Webster, 1971)

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (ROTC/AID, Minimum Standard, 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 is constructed. (Merriam-Webster, 1971)

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

SUBSIDENCE INCOME. The minimum amount of money required for the purchase of food and fuel for an average family, the cost for a community. (Merriam-Webster, 1971)

SULFATE. 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; in ten-year tax exemption on new housing (1959) (U.S.D.P.); 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 recipient 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 between interconnected individual and/or transmitting over wires. (U.S.D.P.)

TENURE. Two situations of tenure of the dwelling unit and/or the lot/lower (land) having formal status derived from law: ESTATURAL; unregulated or sanctioned by law. Four types of tenure are considered: ESTATURAL: where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/lower; LEASE: where the users pay for a long-term usage (generally for a year) for a dwelling unit and/or the lot/lower 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/lower 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 legal right, interest or ownership (of land, dwellings, or both). (Merriam-Webster, 1971)

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

TOPOGRAPHY. A configuration of (a land) surface indicating its relief and the characteristics of the natural and man-made features. (Merriam-Webster, 1971)

TRANSPORTATION. Means of conveyance or travel from one place to another. (Merriam-Webster, 1971)

VAT. A fitting that provides a water seal to prevent sewer gases and odors being discharged through water closets. (ROTC 45-T, 1953)

TREATMENT WORKS. Filtration plant, reservoirs, and all other construction required for the treatment of a water supply. (Merriam-Webster, 1971)

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.)

UTILIZATION. The quality or state of being or becoming urbanized; to cease 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 on the subsistence (monthly) income per person, five income groups are distinguished: VERY LOW (below subsistence level); LOW (below subsistence level); MODERATE (7 subsistence level); MEDIUM (5 subsistence level); the income group that can afford limited housing and rent only with government assistance; HIGH (5 subsistence level); the income group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; that can own the house (or maintenance level); income group that represents the most economically mobile sector of the population. (U.S.D.P.)

WATER SUPPLY. Source, means, or process of supplying water; water system, distribution of water, supplies, 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 drained. (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. Watts is the product of volts times amperes. Both watts and horsepower denote the rate of work being done. 746w = 1hp. (ROTC 45-T, 1953)

ZEUGNIS 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, shape, size, use, population density, and coverage of structures within each zone. (U.S.D.P.)
REFERENCES


"DOCUMENTO DE PLANIFICACION No. 1", Comite de Planificacion, Cuernavaca, Mexico, 1974.


"TENTATIVE: when based upon rough estimations of limited sources.

"NONE: when the existence of services, facilities and utilities are unavailable to a locality.

"ACUTE: when taken from reliable or actual sources.

METRIC SYSTEM EQUIVALENTS

1 centimeter = 0.03937 inches
1 meter = 100 centimeters = 39.37 inches or 3.28 feet
1 kilometer = 1,000 meters = 3,280.83 feet or 0.62137 miles
1 inch = 2.54 centimeters
1 foot = 0.3048 meters
1 mile = 1.60934 kilometers

1 square meter = 10.76 square feet
1 square inch = 6.4516 square centimeters
1 square foot = 0.0929 square meters
1 acre = 0.4047 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)
GDP per capita = U.S.$ 744 (1972)