

URBAN DWELLING ENVIRONMENTS: COLIMA, MEXICO

by

Francisco Javier Cárdenas Munguía

Architect, Instituto Tecnológico y de
Estudios Superiores de Occidente
Guadalajara, Mexico
1975

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
DEGREE OF

MASTER OF ARCHITECTURE IN ADVANCED STUDIES

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June, 1977

Signature of Author
..... Department of Architecture, May 6, 1977.

Certified by
..... Horacio Caminos, Professor of Architecture, Thesis Supervisor.

Accepted by
..... Chairman, Department Committee.

Rotch
MASS INST TECH
JUN 7 1977

URBAN DWELLING ENVIRONMENTS: COLIMA, MEXICO

by

Francisco Javier Cárdenas Munguía

Submitted to the Department of Architecture
on May, 1977 in partial fulfillment of the requirements
for the Degree of Master of Architecture in Advanced Studies

ABSTRACT

This study describes and evaluates dwelling environments in Colima, Mexico, focusing on four selected situations for the lower income groups. This includes: an "introduction" of Colima's urbanization process; a description of the city's "urban context"; four lower income housing "case studies"; and summaries of the "dwelling/land" on the time/process perspective, physical aspects, utilities and services, land utilization, and utility networks. Each case study was analyzed in its socio-economic and physical context, describing the user income groups, the availability of services, the locality layout, the land subdivision, the dwellings, and the basic networks. A case study was evaluated through a comparison of the existing project with a revised layout. This is to illustrate typical characteristics of recent gridiron layout with clearly deficient land utilization which resulted in costly utility networks.

The study attempts a) to identify and describe a representative cross-section of housing systems in the urban area of Colima, illustrating the physical and socio-economic environment; b) to organize case studies into a comparative framework to facilitate analysis/evaluation; c) to relate the housing process to issues of land utilization and basic network.

This study provides a) reference for the understanding of urban dwelling environments, particularly in Colima, Mexico; b) a reference for the formulation of housing policies.

This study was derived from field research carried out by the author in conjunction with a group of social workers from the School Vazco de Quiroga of Comala, Colima, during the summer of 1976. It is complemented by maps, aerial photographs, and mentioned reference materials. The analysis, evaluation, and design work were carried out during the academic year 1976-1977. The case study analysis is based on a methodology developed in the Urban Settlement Design in Developing Countries Program.

Thesis Supervisor: Horacio Caminos, Professor of Architecture.

URBAN DWELLING ENVIRONMENTS: COLIMA, MEXICO

FRANCISCO JAVIER CARDENAS MUNGUIA

Education/Research Program:
URBAN SETTLEMENT DESIGN IN DEVELOPING COUNTRIES
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, Massachusetts
May 1977

ACKNOWLEDGEMENTS

I gratefully acknowledge the support, guidance and advice of Professor Horacio Caminos whose direction was invaluable in the preparation of this study. I am also indebted to Reinhard Goethert for his critique and assistance, and to the members of the 1977 and 1978 classes in the Urban Settlement Design in Developing Countries Program at M.I.T., for their comments.

I also wish to acknowledge the support of the governor of Colima State, Licenciado Arturo Noriega P., to get information from: Obras Publicas Municipales, Agua y Alcantarillado, Inspeccion Municipal, Departamento de Catastro, Comité del Desarrollo Socioeconomico del Estado de Colima, Plan Lerma and Comisión Federal de Electricidad.

I am particularly indebted to Margarita Zepien de Rangel Hidalgo for her advice, and to the social workers: Pastora Ferraez, Zoila Campos, Leticia Cardenas, Rosa Govea, Blanca Lopez, Lucia Meillon, Aracely Pimentel and Claudia Portillo, who participated in the Low Income Housing Survey for Colima, in the summer of 1976. I am indebted to the Arquitectos: Elias Jaik, Maximiliano Castaneda, Joaquin Agraz; and Elias Mendez P., Juan Oseguera V., Maria Ahumada de Gomez, for the support to get information.

I especially acknowledge the continued support of my parents.

COPYRIGHT © 1977, Urban Settlement Design in Developing Countries, M.I.T.

All rights reserved; no section may be reproduced by any means without the written permission from the author.

COVER: Plan of Colima State, taken from the book "Descripcion Geografica del Partido de Colima en 1793", Pena Colorada Collection, Mexico.

CONTENTS

PREFACE	2
INTRODUCTION	3
URBAN CONTEXT	4
HOUSING SYSTEMS	8
CASE STUDIES	
1. Colima Lumber/Benito Juarez	10
2. El Moralete	18
3. Maria Auxiliadora	24
4. La Estancia	32
REVISED LAYOUT	
Background	40
Design Criteria	42
Land Subdivision	44
Land Utilization	46
Utility Networks	48
SUMMARY	
Time/Process Perspective	50
Physical Data	52
Community Facilities, Utilities/Services	53
Land Utilization	54
Utility Networks	55
GLOSSARY	56
REFERENCES	60

PREFACE

CONTENTS: This study describes and evaluates dwelling environments in Colima, Mexico, focusing on four selected situations for the lower income groups. This includes: an "introduction" of Colima's urbanization process; a description of the city's "urban context"; four lower income housing "case studies"; and summaries of the "dwelling/land" on the time/process perspective, physical aspects, utilities and services, land utilization, and utility networks. Each case study was analysed in its socio-economic and physical context, describing the user income groups, the availability of services, the locality layout, the land subdivision, the dwellings, and the basic networks. A case study was evaluated through a comparison of the existing project with a revised layout. This is to illustrate typical characteristics of recent gridiron layout with clearly deficient land utilization which resulted in costly utility networks.

PURPOSE: The study attempts a) to identify and describe a representative cross-section of housing systems in the urban area of Colima, illustrating the physical and socio-economic environment; b) to organize case studies into a comparative framework to facilitate analysis/evaluation; c) to relate the housing process to issues of land utilization and basic networks.

APPLICATION: This study provides a) reference for the understanding of urban dwelling environments, particularly in Colima, Mexico; b) a reference for the formulation of housing policies.

DATA: This study was derived from field research carried out by the author in conjunction with a group of social workers from the school Vazco de Quiroga of Comala, Colima, during the summer of 1976. It is complemented by maps, aerial photographs, and mentioned reference materials. The analysis, evaluation, and design work were carried out during the academic year 1976-1977. The case study analysis is based on a methodology developed in the Urban Settlement Design in Developing Countries Program, directed by Professor Horacio Caminos.

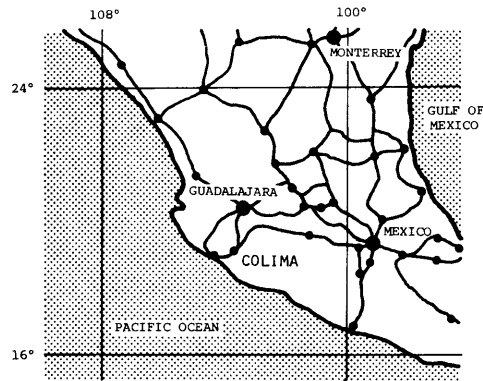
INTRODUCTION

During Colonial days, the city had been developed according to a set of planning rules that produced an urban pattern still prevailing. In the city center, the main plaza was located surrounded by administrative and religious buildings, and upper/middle class dwellers. On the city periphery, it was located lower class dwellers and light industrial activities. City size, about 1 km., was constrained by walking and horse transportation. Mobility of the population was low due to the self-sufficient extended family pattern. The layout was according to the colonial block (grid layout), that is mainly a square with lines of circulation at 100-200 meters.

By the end of XIX Century and beginning of XX Century, the traditional city structure had not substantially changed. Main issues are diversity of activities, upgrading of utility networks and new transportation systems. The service sector increased with concomitant change in building; utility networks were improved by the provision of a piped water supply, piped sewage disposal and electricity; street cars were moved by horses and electricity connecting the center to the railroad station and Villa de Alvarez village, allowing better accessibility to the periphery. The colonial block layout with only few variations in size was maintained as an established tradition.

During the posterior days to 1940's, substantial changes have been introduced into the urban structure. An accelerating urbanization growth of the city (in 1960-1970 the population grew 47%), shortage of employment-housing, prevalence of market system in urban development, ineffective government land utilization controls, among other factors, are producing a more apparent physical segregation of neighborhoods by low income groups. Upper income groups are moving out to well-located peripheric localities, and lower income groups are settling in peripheral localities where speculators provide land without complete utilities and community facilities, and dwellers build their own dwellings within the individual unit dwelling-nuclear family pattern, versus the early city traditional grouped unit dwelling-extended family pattern. Intensive usage of automotive transportation (in 1960-1970 the automobile per inhabitant grew 61%, while the population only grew 47%), may encourage city sprawl if land utilization controls do not restrict it, meaning low population densities with high infrastructure costs. The city is developing according to gridiron layouts, which are blocks generally smaller than traditional blocks (grid layout), that are determined by individual lot sizes, meaning wasted land for circulation, costly basic networks and its maintenance, and difficulty in the provision of land for community facilities.

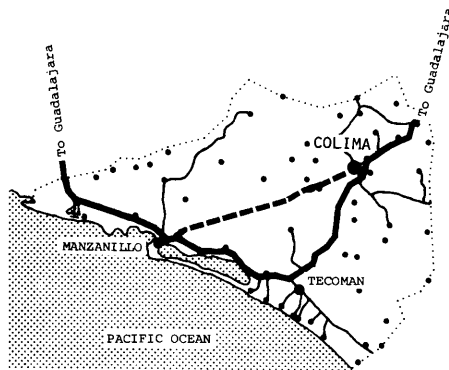
URBAN CONTEXT COLIMA, MEXICO



CENTRAL MEXICO

0 100 500 km

● Major City
— Paved Road



STATE OF COLIMA

0 10 50 km

● Town
● City
— Minor Paved Road
— Major Paved Road
- - - Future Paved Road

PRIMARY INFORMATION: The urban area of Colima is settled in the conurbation of Colima and Villa de Alvarez municipalities, this population was as 1975 of 108, 000 inhabitants. The city of Colima is the capital of the State of the same name. It is located in the Central-South part of the country, communicated by road to Guadalajara 210 km. away, and to Manzanillo-102 km. away. It is also communicated by railroad and airplane to Mexico, Guadalajara and Manzanillo. The city was settled on a big valley crossed by many streams. It has a tropical climate, with an annual average temperature of 24.8°C with little variations, the annual average humidity is 70%, the major rainfall occurs from June to October, the wind is light with changing direction according to day/night (SE-diurnal, NW-nocturnal). Latitude 19°14' N, longitude 103°14'N, and altitude 494 meters.

HISTORY: Before the Spanish Conquest the Colima region, about four times larger than the actual Colima State, was dominated by an important kingdom. Cajitlan was the seat city of this kingdom, located in the fertile valley of Tecoman, where after the Conquest was found the city of Colima in 1523. Four years later, because of the hostile weather the city was moved to its present site, where water is available, land is fertile and the Volcanos of Colima make the landscape beautiful. Colima took active part in the National Wars of Independence (1810), the Reform (1857) and the Revolution (1910). Also it played an important role in the local religious war La Cristeada (1930). Even from Colonial days, the city has suffered many earthquakes caused by one of the surrounding volcanos, which is still active and has left the city without buildings of historical testimony.

ECONOMY: During the Colonial Period, that lasted about 300 years, the local economy was hampered by rudimentary communications and economy not oriented for the benefit of the country. By the Republican Period, local economy grew, and big pieces of land were owned by few landlords, who exploited labor peasants. After the Revolution due to land reform supposedly many peasants could make the land produce for their own benefits, but because of ineffective management and lack of techniques the plan has not been achieved. In the State exist three main centers of development: Colima, Manzanillo and Tecoman. Since its foundation the main trade of Colima had been agriculture, but by 1950 it turned to commerce, the city of Tecoman became more dependent on agriculture, while the city of Manzanillo developed a service economy. The instability of Colima commerce is a manifestation of the rudimentary practice of agriculture and cattle raising and almost lack of industry. The economic benefits of the State are concentrated in Colima, that also is the commercial, political and administrative center. Manzanillo 102 km. away, functions as a commercial port and tourist center. Tecoman 48 km. away, is an agricultural center. The State economy is controlled by national influential enterprise leaders, and is under the direct influence of Guadalajara 210 km. away, a city that function as distribution center for the agriculture and fabricated products of the Center-West part of the country. Guadalajara concentrates health and educational services, which also service the Colima region. In the city of Colima, since 1940s the percentage of working population in industry has been static, constantly decreasing in agriculture, and constant increasing in services. By 1970 the population was employed as follows: 59% in services, 22% in industry and 19% in agriculture.

GOVERNMENT: Colima became a State in 1857. It has an area of 5455 km² and is the third smallest state in Mexico. State and municipal officials are supposedly elected by all literate adult persons. The State governor exercises his authority over all the State, particularly in planning. Land investors have strong influence over urban development. Due to the constituted system, the State and municipal representatives do not have political and economic autonomy, but have remained under a centralized national system, since the Porfirio Diaz Period (late XIX century). Colima urban area is settled in the conurbation of the municipalities of Colima and Villa de Alvarez, sometimes an obstacle for the holistic function of the city. Master Plans for the development of the State and the urban area of Colima are needed, as well as updated building codes and subdivision regulations. Large portion of the State budget goes into education and public construction.

DEMOGRAPHY: In the Colonial days, the slow population growth was due to a sparse indigenous population and economic dependence of Guadalajara where services have been centralized for the region. Later on, the economic weakness, rudimentary communication networks, earthquakes and a cholera epidemic, retarded a rapid population growth. In 1910-1920, during the National Revolution, the national population diminished, however, Colima State attracted many refugees, so its population increased 18%. In 1920-1930, the religious war La Cristeada caused people to migrate to other states and Colima State's diminished 33%. After the 1940s, urban population growth was accelerated, accompanied by an increase in economic development, a consolidation of the communication networks and political stability. In 1940-1950, the city's population increased 29.6%. The

greatest growth occurred in 1950-1960 and 1960-1970, with 48.6% and 47.4% respectively. The urban population of the State increased from 45% in 1940 to 69% in 1970. By 1970, the State's three main cities concentrated 46% of its population. (Colima 24%, Manzanillo 13% and Tecoman 9%). The increase of population is due to natural growth (greater number of births with diminishing mortality). Recently, however, the State and the city began to attract more migrants.

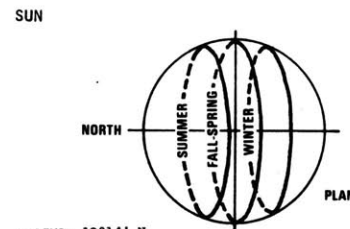
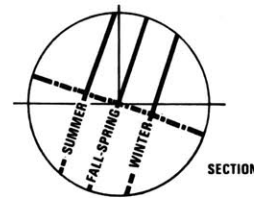
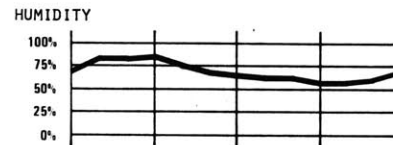
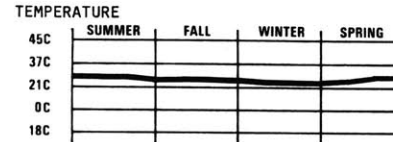
SOCIO-CULTURAL: The vast majority of the population is predominantly a mixture of Spanish and Indian. Only a few people who have lived in areas with little outside contact due to difficult access, have remained pure Indians. Imported life patterns have been adopted by upper income groups, which is reflected in their dwellings, which are imported life forms. The population has no major ethnic or cultural divisions, but is divided along lines of income groups. The family is mainly nuclear and maintains tie links. The average family size has been increasing. In 1970 it was 5.4 members. The young population has been substantially increasing since 1950. By 1970 45% of the population was under 15 years of age. The literate population has increased up to 83% by 1970. Most of the population belongs to the Catholic Church, that provides the main clue in the neighbourhood formation.

SOCIO-ECONOMIC: In 1970, the average annual income was \$913 US dollars vs \$720 US dollars for official minimum wage. 34% of the working population earned under the minimum, 60% earned 1-3 times the minimum and 4% made more than 3 times the minimum. The overall working population has diminished recently.

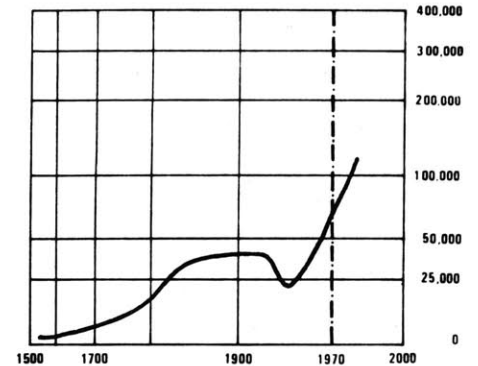
HOUSING: By 1970, there was a high percentage of overcrowded dwellings. 80% of the dwellings had 1-2 rooms. 55% of the dwellings were made of masonry-wood, 20% of masonry-concrete and 12% of shack and mud-wattle. Slight improvements have been done in dwellings tenure and in individual connection to utilities. Despite that, 34% of the dwellings lack individual connection to water borne sewage disposal, 28% lack electricity and 10% lack individual water supply connection. 62% of the dwellings are owned by users. Rural housing conditions are worse than the urban's, in terms of dwelling area per person, dwelling construction materials and provision of utilities.

URBAN CONTEXT SOURCES

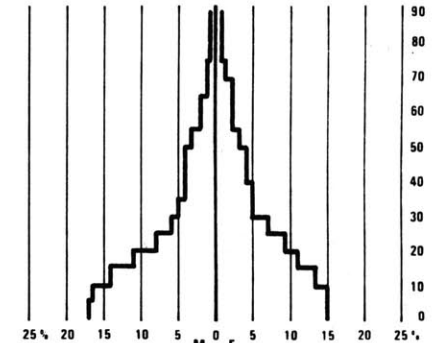
- Topography and circulation:** (accurate) Plan by Obras Publicas Municipales, 1976.
- Plano de la Ciudad de Colima, F. Mendez P., 1976.
- Aerial Photograph, 1975.
- Departamento de Catastro, Colima, 1976.
- Land Use Pattern:** (approximate) IBID
- Income Pattern:** (approximate) IBID
- Growth Pattern:** (accurate) Plano de la Ciudad de Colima, Rafael Pamplona, 1886.
- Plano Actualizado de la Ciudad de Colima, Gobierno del Estado, 1963.
- Plano de la Ciudad de Colima, F. Mendez P., 1976.
- Climate:** (accurate) Observatorio de Colima SAG.
- Photograph:** Arnoldo Medina, probably 1970.
- Housing Systems:** (approximate) Field Work by the Author, 1976.
- Low income Housing Survey by a group of Social Workers, 1976.
- Mentioned Urban Plans.
- Urban Layouts:** (approximate) IBID.
- General Information:** BACKGROUND NOTES-MEXICO, Department of State, 1975.
- CENSUS, 1900-1970.
- ESTADO DE COLIMA, G. de la Mora, 1970
- DIRECTORIO DEL ESTADO DE COLIMA, J. Oseguera V., 1964.
- PROGRAMA DE DESARROLLO DEL ESTADO DE COLIMA, Plan Lerma, probably 1974.



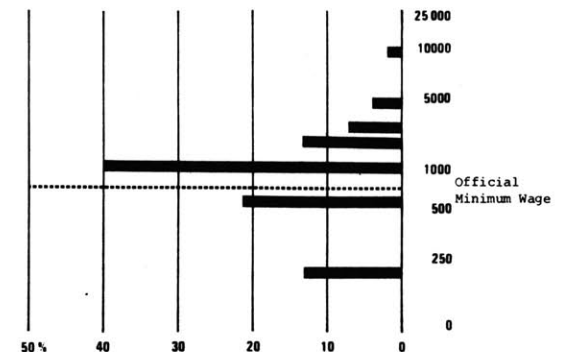
COLIMA, 19°14' N



URBAN POPULATION GROWTH
horizontal: dates vertical: population
Source: Census, 1900-1970
"Problematica del Estado de Colima", R. Romero A.
Juan I. Matute
Colegio de Mexico

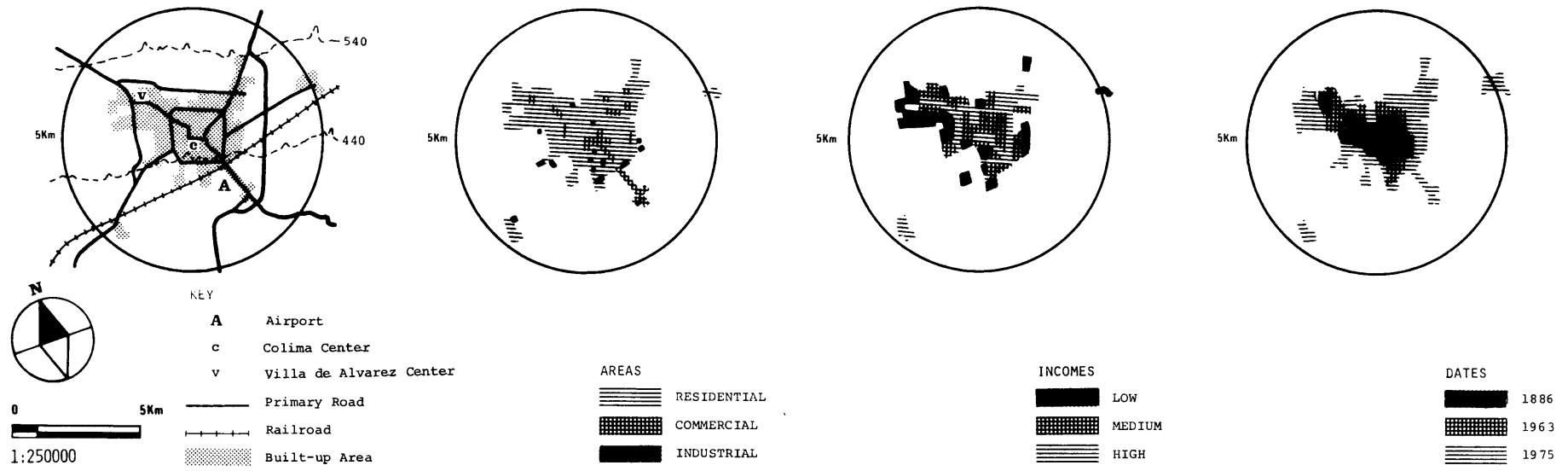


URBAN POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Census 1970; Population 72,977



URBAN ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Census 1970; Households 12,291

(6) URBAN DWELLING ENVIRONMENTS



URBAN TOPOGRAPHY AND CIRCULATION

TOPOGRAPHY AND CIRCULATION. The city is situated on a generally flat site, with a slight slope from North to South, with many small streams crossing the city. The city is in a valley surrounded by two volcanos (Volcanes de Colima) to the North and by smaller hills on the other sides. Two poles of commerce and administrative activities exist which are the result of the historical centers of Colima and Villa de Alvarez. The first pole, the most important because it concentrates community facilities, is placed in the center of a 2 km. circumferential avenue. Both poles are inside of a 5 km. circumferential avenue. The street layout is rectangular grid. All of the principal roads radiate from the historical center of Colima. A bypass road, linking Guadalajara and Manzanillo, runs along the South-East side of the city, and the railroad tracks together with the airport limit the city to the South. Around the historical center of Colima most of the streets are overcrowded by vehicles. In the municipality of Colima, from 1960 to 1970, the automobiles per inhabitant grew 61%, while population only 47%. The Public Works Office has encouraged to widen and pave central streets, or replacing stone pavement by asphalt or concrete paving.

URBAN LAND USE PATTERN

LAND USE. The main commercial area and many public community facilities are concentrated around the historical center of Colima. Commercial activities are now tending to spread along main avenues and are expanding around the commercial centers. The kind of commerce in the historical center and in the commercial centers is diversified, although along main avenues it tends to be grouped according to type. Only light industry is located in Colima and is generally scattered through the city, although a large portion is located to the South side.

LAND VALUE. The land value decreases from the historical center to the periphery with only slight irregularities indicating the location of commercial activities, the level of services provided, or the income of the dwellers. Historically the streams have discouraged development along its banks.

URBAN INCOME PATTERN

INCOME. Inside the 2 km. circumferential avenue there is a mixture of income groups, although upper income groups are attached to the historical center and to the main avenues, they are now settling more outside the interior periphery circuit where they can get more land and the feasibility to community facilities by automobile. Outside the 2 km. circumferential avenue, physical segregation according to the income group becomes more apparent. Lower income groups go farther to the periphery where land is cheaper and level of services is poor. These income groups are located primarily at the Northwest of the city, and secondarily at the North and South. Streams eventually have determined lower income groups location. Upper income groups are settling more along main avenues and well located localities where level of services and land prices are higher. These income groups are starting to concentrate at the Northeast of the city.

URBAN GROWTH PATTERN

URBAN GROWTH. The urban growth in the early days of the city followed the smoothest topography, in the axis Northwest-Southeast. Later on, urban growth followed street car lines that linked the historical center with the railroad station, to the South, and Villa de Alvarez town, to the Northwest. Recently the increased use of the automobiles encouraged growth to follow the main paved roads. A new circumferential road was built recently which caused further spreading of the city, except to the South where the railroad and the airport limit expansion. The urban growth has been at the expense of established orchards.

COLIMA: The city of Colima is nestled into the surrounding landscape, which is dominated by the Volcanos of Colima. The traditional Spanish layout still prevails: the cathedral dominates in the center, surrounded by administrative buildings, surrounded by the residential areas.



HOUSING SYSTEMS

An overview of the housing systems of Colima is presented, with emphasis on the urbanization process for the low income groups. All housing systems are initially defined; afterwards descriptions for each of the low housing systems are given. The term "housing" include all the dwellings and shelters, legal and extralegal, existing in the urban area of Colima and Villa de Alvarez conurbation. "Housing systems" are defined as the dwelling/shelter groups that constitute a defined environment, and are determined by particular socio/economic and physical/urban characteristics.

The housing systems of Colima are divided in two general income groups: lower and higher. Six systems were found, the first four systems for the lower income groups are occupying approximately 40% of the residential area (70% of the population), and the last two systems for the higher income groups are occupying approximately 60% of the residential area (30% of the population). The housing systems are mentioned from lower to higher income groups as follows:

- I SQUATTERS
- II CONSOLIDATORS A. Institutional "Site and Services"
B. Private Speculative
- III COURT TENEMENTS
- IV INSTITUTIONAL "PACKAGE"
- V TRADITIONAL
- VI UPPER INCOME

At the present, an accelerating urbanization rate of the city, approximately 4.7% in 1960-1970, has had a primary impact on the housing situation. Poor established inhabitants and new migrants from less developed areas reflect their poverty in the housing systems of the city. It is observed that generally in the low income people, the immigrants are received in TENEMENTS or CONSOLIDATORS settlements, as tenants or lodgers in friend's or relative's dwellings. Other migrants, a small portion of the population, are SQUATTERS of unoccupied land, where they build provisional shelters. When newcomers increase their income, the security of tenure is first priority, purchasing a piece of land in CONSOLIDATORS settlements, where they build progressive

houses that are generally provided with poor community facilities. A few low income households are benefited by the scarce INSTITUTIONAL "PACKAGE" housing supply, whose beneficiaries are employees within the formal contracted market, they dwell in finished houses provided with complete community facilities. Dwellers of TRADITIONAL areas hold ownership of the land/dwelling, or they rent it. They are established city dwellers, mostly middle income groups, although mixtures of income groups can be found more than in peripheral localities. UPPER INCOME dwellers are living in the traditional areas and settling more in well located peripheral areas, where they build high standard houses, as a priority of social status.

I. SQUATTERS. This housing option is not an issue in the city, although it may become serious if the increasing shortage of worker-housing is not solved. Very low income dwellers squat along scattered stream banks, where they build row or detached shanties made of scrap materials, that lack individual connection to utilities. A maximum number of shelters are allocated in a minimum space. Sometimes payments are arranged with the government for the minimum fee by which services are provided. 54% of the household are below the official minimum wage, 46% earn 1-3 times the minimum. Workers are allocated about evenly in services (35%), industry (35%), and agriculture (30%). They comprise the largest percentages in agriculture among low income groups.

II. CONSOLIDATORS. A-INSTITUTIONAL "SITE AND SERVICES". Recently, the first "Site and Services" project was developed on the city periphery, through the government housing office INDECO. A large section of land was subdivided in individual lots, which are going to be allocated for medium population densities. The layout is a gridiron type, and separates pedestrians from vehicles. Low income dwellers and previous owners of row shanties/houses will build by themselves progressive dwellings. INDECO is sponsor of urban design, land

prices, and provides assessment to the dwellers to build the utility networks and their dwellings. 53% of the households are below the official minimum wage, 47% earn 1-3 times the minimum. Workers are allocated in industry (40%), services (30%), and agriculture (30%). They comprise one of the largest percentages in agriculture, among low income groups.

II. CONSOLIDATORS. B-PRIVATE SPECULATIVE. This system is located on the city periphery and occupies about 25% of the residential area. Low and moderately low income groups own row or semi-detached rooms/houses which are built by themselves. Big pieces of land were subdivided in individual lots, and sold within the market land system. Low population densities are accomplished in gridiron layouts, where the main constraint was to get the maximum number of lots for sale, without consideration of municipal maintenance or the provision of complete services. 42% of the households are below the official minimum wage, 52% earn 1-3 times the minimum. Workers are allocated in services (45%), industry (35%) and agriculture (20%).

III. COURT TENEMENTS. About 6% of the urban population live in this system. Despite the random locations of the tenements, there is an important concentration in the Maria Auxiliadora neighborhood. Low and moderately low income groups rent row rooms/houses, which are developed by the private sector. One story dwellings, in fair physical state, share courts and communal facilities. High population densities are accomplished by overcrowding (3.1 persons per unit). Tenements are allocated on big lots, generally in the center block, with an average of 10 dwelling units per tenement. 34% of the workers are below the official minimum wage, 45% earn 1-3 times the minimum, and 21% make more than 3 times the minimum. Workers are allocated in services (60%), industry (30%), and agriculture (10%). They hold the largest percentage in services among lower income groups.

IV. INSTITUTIONAL "PACKAGE". This housing option is for the moderately low income groups, who work in the formal contracted market. The largest project within this housing system was developed by the government housing office INFONAVIT. Beneficiaries occupy finished row houses, 1-2 stories, with high population densities. The layout is a gridiron type, that separates pedestrians from vehicles. INFONAVIT headquarters dictate criteria for the urbanization design. Good physical state of dwellings and complete connection to utilities are characteristic. 17% of the households are below the official minimum wage. 78% earn 1-3 times the minimum, 25% make more than 3 times the minimum. Workers are allocated in services (50%), industry (50%), and none in agriculture. Among the lower income groups, this sector demands the largest level of welfare services.

The socio/economic and physical indicators for the lower income housing systems are the following:

INCOME/POPULATION. The annual income per family is 1.4 times the official minimum wage (\$ 1800 US dollars per year, 1976). 42% of the households earn less than the minimum, 40% earn 1-2 times the minimum, 11% make 2-3 times the minimum, and 8% make more than 3 times the minimum. They spend 11% (of their income) in housing, 55% in food. The population works in services (42%), industry (35%) and agriculture (19%). The poorest of the population is in agriculture. A great percentage of the population (50%) is under 15 years of age. The average household size is 5.8 members and 11% are extended families. 19% of the households had last resided outside of the city and 55% of the holdheads were born outside of the city. The lower income dwellers have greater residential mobility. The primary migration was inter-urban (69%), and part was rural to urban (8%), but there was no urban to rural shift. DWELLING TYPE. About one half (47%) of the households dwell in houses and the rest dwell in tenements (13%), shanties (12%) and rooms (6%).

DWELLING STATE/CONSTRUCTION/BUILDERS. About 62% of the dwellings are made of provisional (39%) and semi-provisional (23%) materials. There are more permanent materials in walls than in roofs or floors. Walls are made of brick (51%), scrap materials (14%) and adobe (11%). Roofs are made of scrap materials (38%), clay tiles (25%) and reinforced slab concrete (16%). Floors are made of compacted earth (33%), cement (31%) and paving tiles (14%). Most of the dwellings (62%) are self-help or artisan built and the remainders are small or large contractor built (10%).

DWELLING TENURE. Of the households 33% were in ownership, 27% were renters and 17% held extralegal land title (on ejidal land - land for cultivation and not salable, or on unoccupied land).

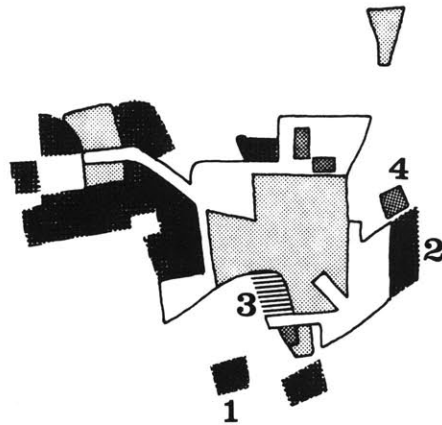
DWELLING DEVELOPERS. Most of the housing stock is supplied by the private and the popular sectors, although the public sector has recently increased its supply.

DWELLING/UTILITY NETWORKS. About one half of the total dwellings have to be rehabilitated in terms of construction materials (43% are made of semi-provisional and provisional materials). The area per dwelling is too small for the family sizes (39% have a deficit of rooms). Individual connection to network utilities are limited (35% lack connection to water supply, 35% lack connection to electricity, 22% lack sewage disposal and 65% lack paved streets). 15% of the households are in worse conditions in terms of dwelling quality, compared to their previous residence, and 19% are better off. In terms of individual connections to network utilities, 9% of the households are worse, and 44% are better off.

WORKING PLACES. The still existing human scale of the city (about 3 km. of radius) allows that within the urban area limits, a great portion of the workers (29%) have no clear defined working place, the remainder work in the periphery (18%) or in central areas (14%). Outside of the urban area limits, a few workers go to rural areas (5%) or to other urban areas (2%).

MODE OF TRANSPORTATION TO WORKING PLACES. Most workers go to work by walking (42%), by bus (20%) or bicycle (17%). Few use automobile (6%) or motorcycle.

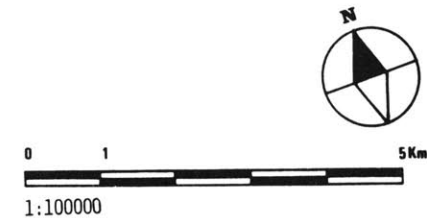
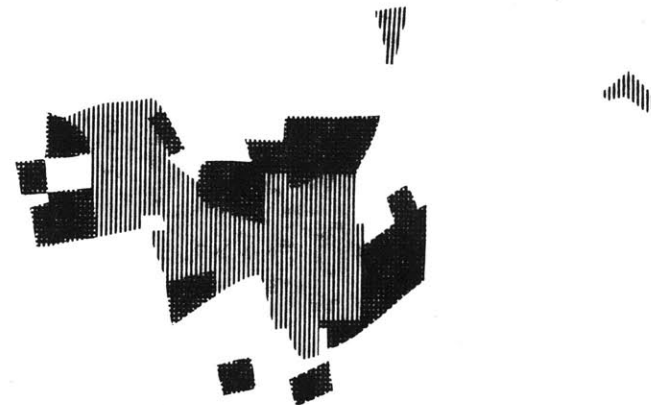
NOTE: These data is based upon a Low Income Housing Survey carried out by a group of social workers of the School Vazco de Quiroga, Colima. Data was not available for all the interviews, there fore, totals may not equal 100%.



CASE STUDIES	HOUSING SYSTEMS	POPULATION
	I SQUATTERS	2%
	II CONSOLIDATORS	
COLIMA LUMBER/ BENITO JUAREZ 1	A Institutional "Site and Services"	2%
EL MORALETE 2	B Private Speculative	35%
MARIA AUXILIADORA 3	III COURT TENEMENTS	6%
LA ESTANCIA 4	IV INSTITUTIONAL "PACKAGE"	5%
	V TRADITIONAL	40%
	VI UPPER INCOME	10%
		108,000 Inhabitants

URBAN HOUSING SYSTEMS

URBAN LAYOUTS. In the early days of the city, a set of Spanish planning rules defined the layout based upon a square block, orientated in the axis Northwest-Southeast. Later on, the established traditions were still followed in the layout but the blocks were expanded with some slight shape variations, block size change was introduced due to the bigger outside city parcels, and block shape changed due to the necessity to match with the radial roads and the topography. The average dimension of these blocks, ranging



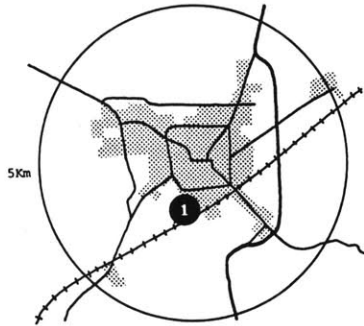
GRID LAYOUT
GRIDIRON LAYOUT

URBAN LAYOUTS

from 100 to 200 meters on each side, is 120 x 120 meters. These blocks are placed in a GRID LAYOUT, determined by dimensions of lines of circulation. At the present, the lack of government planning controls together with the maximization of salable land for speculation, produced a GRIDIRON LAYOUT characterized by blocks determined by lot dimensions, with the result of increasing circulation areas, costly networks and costly municipal maintenance.

1 COLIMA LUMBER-BENITO JUAREZ

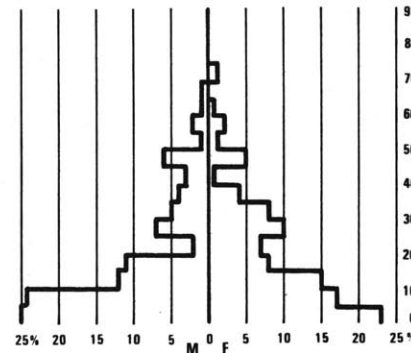
PRIVATE, LOW INCOME,
ROW SHANTIES/HOUSES



COLIMA LUMBER-BENITO JUAREZ: (panoramic view) Benito Juarez locality appears to the left of the road; Colima Lumber locality and the school appears to the right. Dwellings and utility networks are in the process of being upgraded. Scattered dwellings reflect the young age of the locality. Vegetation is abundant surrounding the localities.

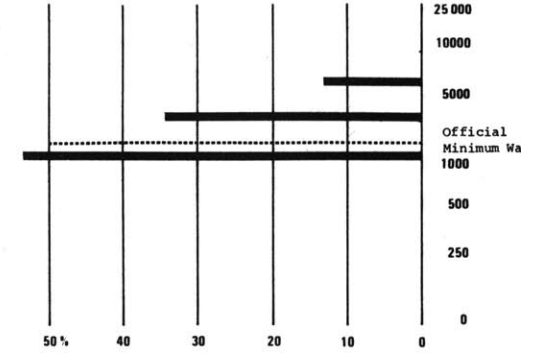
LOCATION: It is in the South city periphery, 1.8 km. away from the city center (the Cathedral), along the railroad tracks to Manzanillo, and near the interior peripheral avenue.

ORIGINS: In respond to the demand of low income groups for urbanized land, the government developed Benito Juarez and Colima Lumber projects in 1972 and 1974 respectively. The last project was developed through the National Institute for Community Development (Instituto Nacional para el Desarrollo de la Comunidad - INDECO). Big pieces of land were subdivided in individual lots, provided by limited services and utilities, as an alternative housing solution for the low income people within the informal sector. The Institute is responsible for land development, land prices, and gives technical advice to the dwellers who build the network utilities and their own individual dwellings. Dwelling types are row shanties and row houses, 1-2 floors, that are in the process of upgrading.



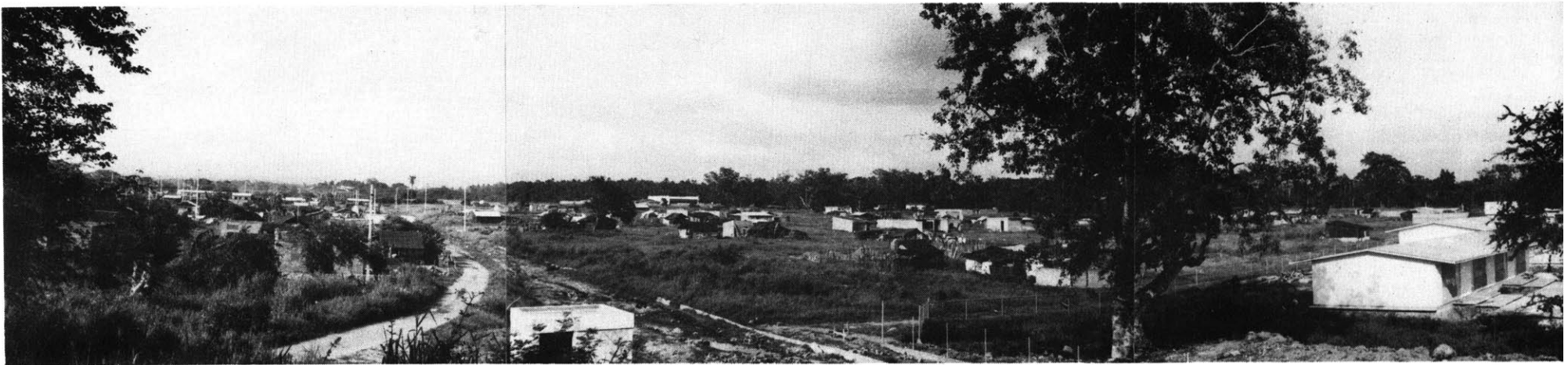
LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Low Income Housing Survey by a group of Social Workers, 1976

POPULATION: There will be about 6500 inhabitants when land is occupied. 57% are under 15 years of age. The average age is 21 years. 50% of the population is male. The average household size is 6.3 members. 19% of the families are extended. 37% of the family heads were born outside of the city. 13% of the households had the last resided outside of the city.



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Low Income Housing Survey by a group of Social Workers, 1976

INCOME: The average annual household income is \$ 2148 US dollars. 53% of the workers are under the official minimum wage. The economic productive population work in industry (47%), agriculture (29%), and services (24%). The locality holds the largest percentage of agriculture workers, among low income localities. The official minimum wage is indicated for 1976 and not for 1970 as indicated in the urban context.





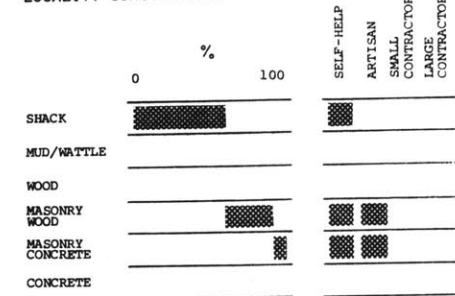
LOCALITY PLAN

KEY
 S School
 Ch Church
 R Recreation-Public Garden
 Selected Locality



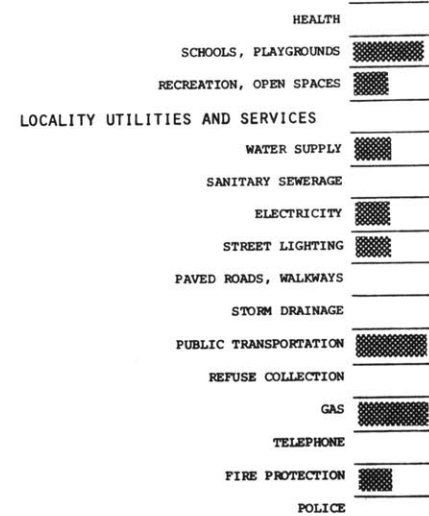
LAYOUT: The area of both developments has 19 hectares. On the South runs the railroad to Manzanillo, and are located a farm and a Lions' Club Building. All sides are bounded by land not urbanized. The East and South boundaries are defined by residential land, instead of public circulation as it is on the other sides. A North-South street connects the site to the interior peripheral avenue, where nearby is found the Social Security Center for the State of Colima. Both sites were layout within long rectangular block gridiron.

LOCALITY CONSTRUCTION TYPES



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

LOCALITY COMMUNITY FACILITIES



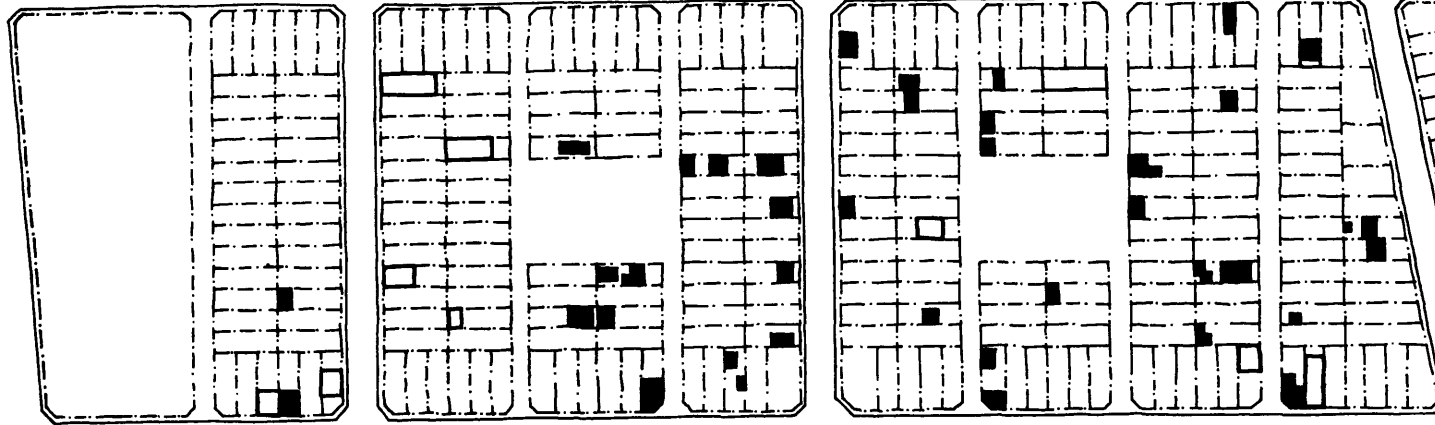
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

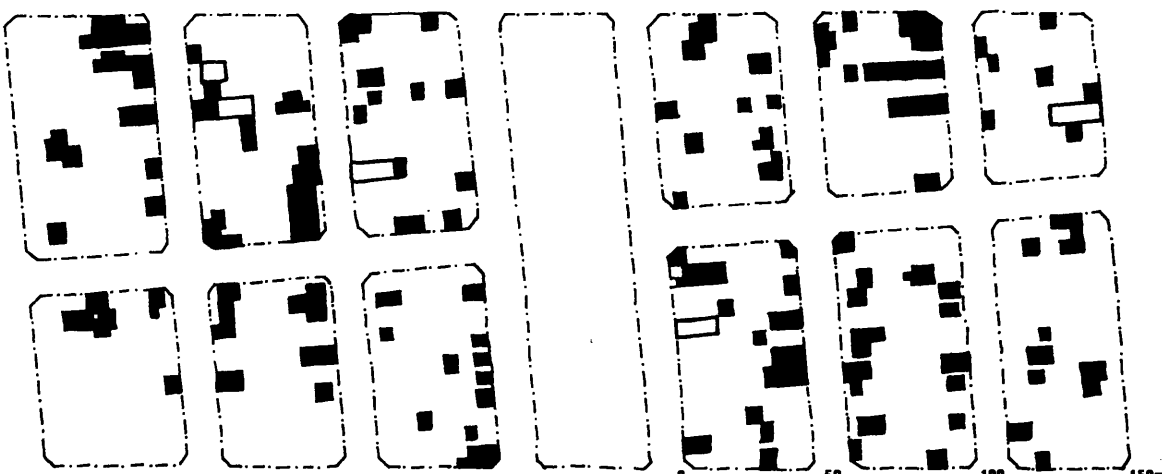
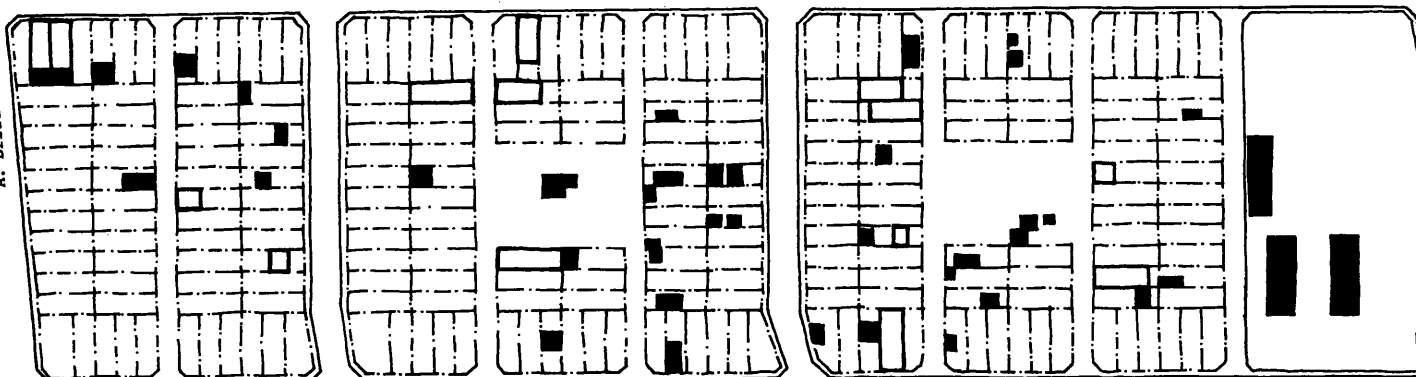
(12) URBAN DWELLING ENVIRONMENTS



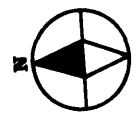
De la Huerta



A. Brizuela



LOCALITY LAND SUBDIVISION



Only Colima Lumber was evaluated in terms of land utilization and utility networks, because data was available only for this locality.

CIRCULATION: In Benito Juarez project, the streets are projected to be used by vehicles and pedestrians together, but in Colima Lumber in some of the streets vehicles are separated from pedestrians, at least on plan. Street are not paved and farm animals can be found everywhere.

LAND USE: Open spaces are located in the center of several blocks and are dispersed through the site. Individual rectangular lots form narrow rectangular blocks. Row shanties or row houses, 1-2 stories, achieved medium densities. Utilities are incomplete.

LOCALITY LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	625	12.69	49
DWELLING UNITS	625	12.69	49
PEOPLE	4375	12.69	345

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	5.69	45
SEMI-PUBLIC (open spaces, schools, community centers)	0.78	6
SEMI-PRIVATE (cluster courts)	-	-
PRIVATE (dwellings, shops, factories, lots)	6.22	49
TOTAL	12.60	100

NETWORK EFFICIENCY

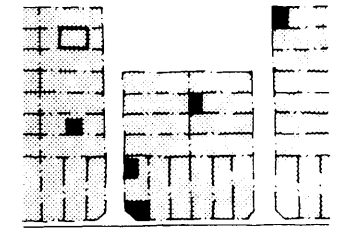
$$R = \frac{\text{network length(circulation)}}{\text{area served(circulation, lots)}} = \frac{4176}{12.69} = 329 \text{ m/h}$$

$$\text{AVERAGE LOT AREA} = \frac{\text{private area}}{\text{lots}} = \frac{62200}{625} = 100 \text{ m}^2$$

LAND UTILIZATION DIAGRAMS

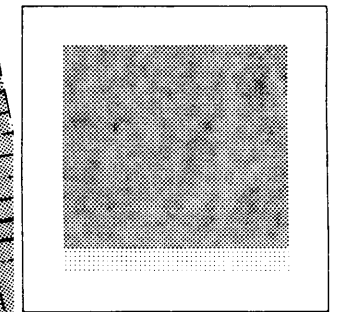


1 Hectare

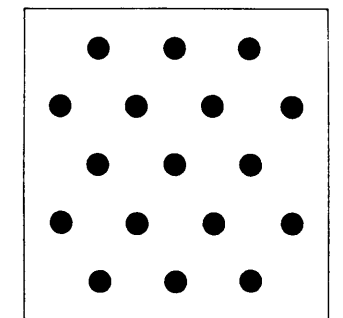


PATTERN

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

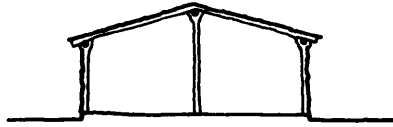


PERCENTAGES Streets/walkways 45%
 Playgrounds 6
 Cluster Courts -
 Dwellings/Lots 49

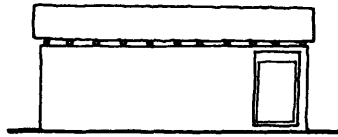


DENSITY Persons/Hectare 345

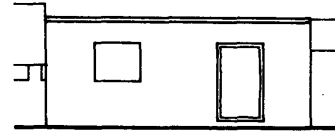
20 Persons



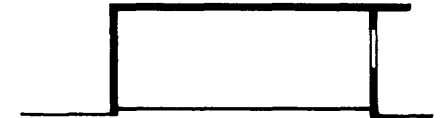
SECTION



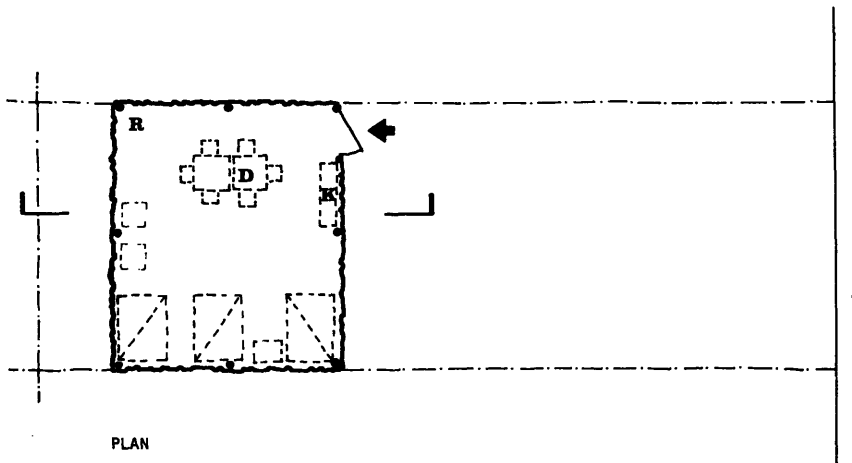
ELEVATION



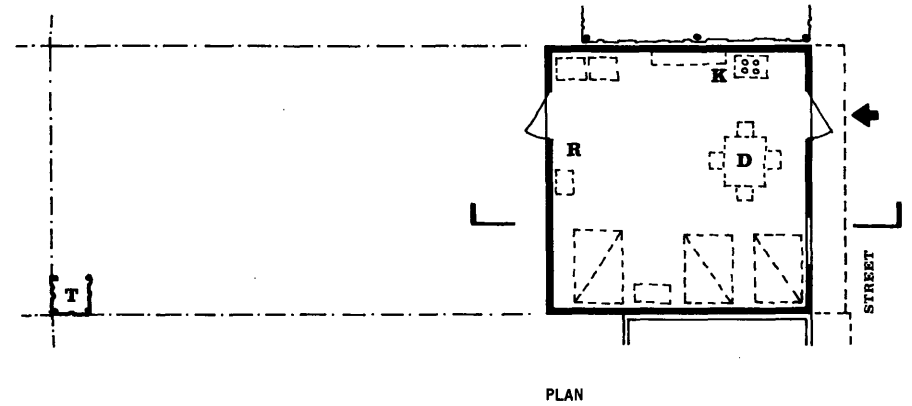
ELEVATION



SECTION



PLAN



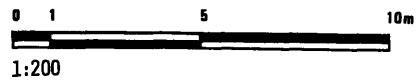
PLAN

KEY

- D Dining/Eating Area
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- R Room (multi-use)

Two stages of dwelling construction are shown: an initial stage or provisional shelter (left), and an advanced stage or permanent room/house (right).

TYPICAL DWELLINGS





PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT
 type: House
 area (sq m): 49
 tenure: Legal ownership

LAND/LOT
 utilization: Private
 area (sq m): 140
 tenure: Legal ownership

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

DWELLING DEVELOPMENT
 mode: Progressive
 developer: Private
 builder: Artisan
 construction type: Masonry concrete
 year of construction: 1975

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

DWELLING FACILITIES
 wc: Pit latrine
 shower: -
 kitchen: In the room
 rooms: 1
 other: -

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL
 user's ethnic origin: Southwest Mexico
 place of birth: Colima, Colima
 education level: Primary

NUMBER OF USERS
 married: 2
 single: -
 children: 7
 total: 9

MIGRATION PATTERN
 number of moves: 2
 rural - urban: -
 urban - urban: 2
 urban - rural: -
 why came to urban area: N.A.

GENERAL: ECONOMIC
 user's income group: \$ 2000
 employment: Construction employee
 distance to work: Variable
 mode of travel: Bus

COSTS
 dwelling unit: -
 land - market value: -

DWELLING UNIT PAYMENTS
 financing: Self-financed
 rent/mortgage: \$11 monthly
 % income for rent/mortgage: 8%

COLIMA LUMBER-BENITO JUAREZ: (left) Provisional shelters are built in the front or in the back of the lots in order to allow future construction of permanent houses. Note the incomplete brick dwellings in the back and the frame for a shelter on the right.




(right) In the Benito Juarez locality provisional and consolidating dwellings are located along the street that faces the public open space (supposedly a future public garden). Excessive area for circulation and undefined public use areas will make the provision of pavements and street maintenance unnecessarily costly. Note the overhang for sun and rain protection in the dwellings.

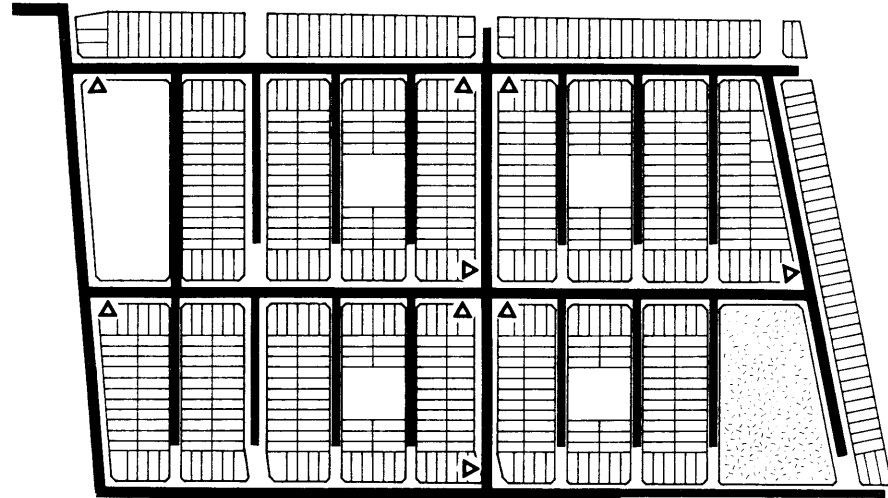
CASE STUDY SOURCES

Plan: (accurate) Aerial Photograph, 1975.
 INDECO, 1976.
 Segment Plan: IBID
 Segment Land
 Utilization: IBID
 Typical Dwelling: (approximate) Field Survey by the author, 1976.
 Physical Data: Low Income Housing Survey by a group of Social Workers, 1976.
 Photographs: The author, 1976.
 General Information: INDECO, 1976.
 Field Survey by the author, 1976.
 IBID Physical Data.
 Utility Networks: (accurate) INDECO 1976.
 The author 1977.

WATER SUPPLY





KEY

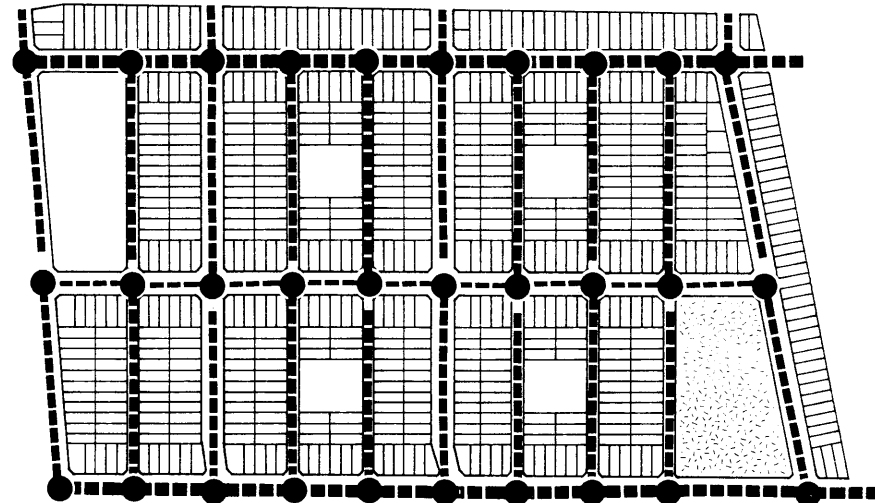
	VALVES	9 UNITS
	2.5" PIPES	1706 METERS
	3" PIPES	1963 METERS
	TOTAL PIPES	3669 METERS



SEWAGE DISPOSAL

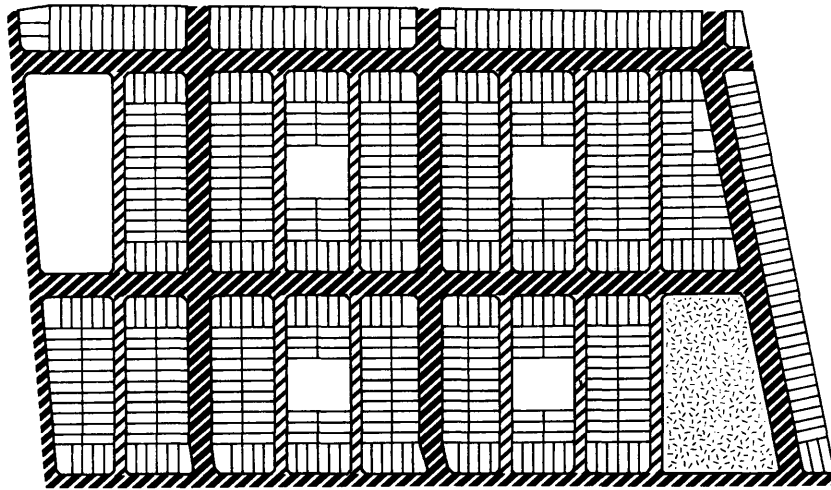
KEY

	MANHOLES	24 UNITS
	6" PIPES	473 METERS
	8" PIPES	2666 METERS
	12" PIPES	691 METERS
	TOTAL PIPES	3830 METERS





UTILITY NETWORKS

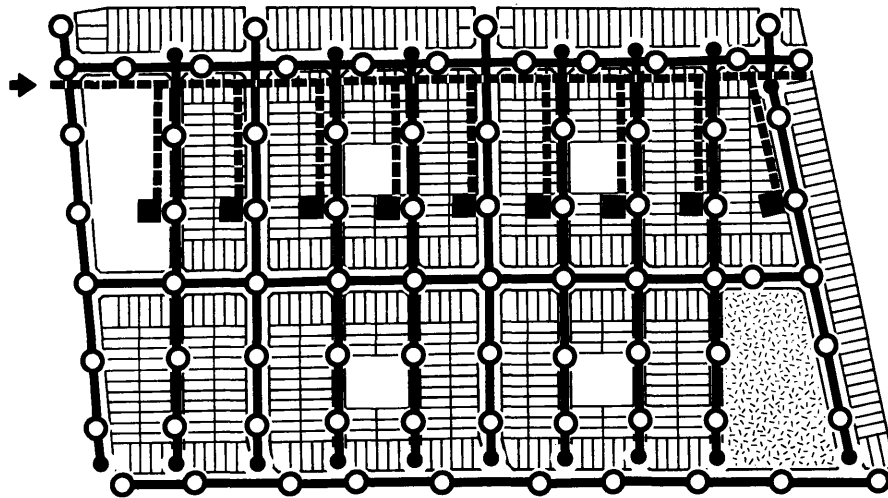




CIRCULATION







KEY

	FINISHED PAVING STREET MODE A (PEDESTRIANS)	11676 METERS ²
	MODE B (PEDESTRIANS AND VEHICLES)	32368 METERS ²
	TOTAL	44044 METERS ²



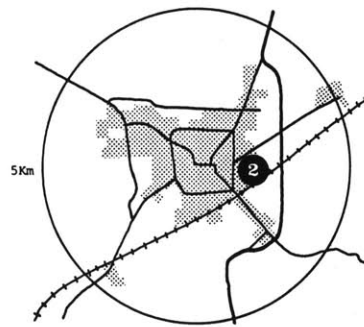
ELECTRICITY AND STREET LIGHTING

KEY

	TRANSFORMERS	9 UNITS
	POLES WITH LAMPS	69 UNITS
	POLES	17 UNITS
	LOW TENSION LINES	3807 METERS
	HIGH TENSION LINES	1287 METERS
	CITY NETWORK CONNECTION	

2 EL MORALETE

PRIVATE, LOW INCOME
ROW ROOMS/HOUSES



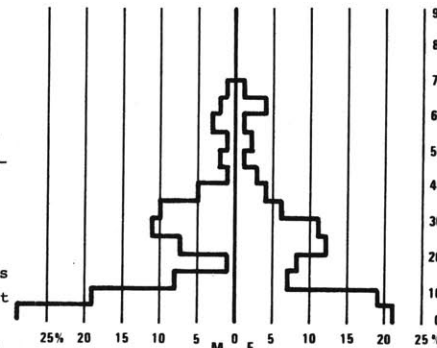
LOCATION: It is in the East city periphery, 2 km. away from the city center (the Cathedral). It fronts the railroad tracks to Guadalupe.

ORIGINS: About two decades ago, the site was developed on ejidal land (cultivable and not salable land), where individual lots were illegally sold to families, that now are in the process of legalization. The locality started with a public garden, a school and few lots, although the construction boom came one decade ago with the provision of a church and electricity. Dwelling types are row houses, 1-2 stories, and few tenements and shanties, 1 story. Self-help and artisan construction is prevalent. Low income people acquainted with the city dwell there, initially with ownership of the land, however, recently newcomers are allocated in rental dwellings (houses or tenements). Incomplete utilities were provided, now in the process of completion, together with the land legalization process. The church and the school are places of strong communal activities.

EL MORALETE: (left) The plaza is on the right, which is in the center of the locality, surrounded by the school and the church (on the left).

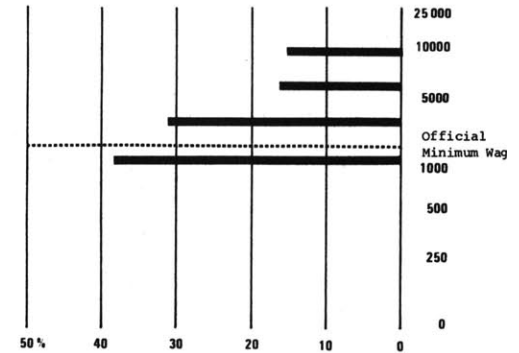
(center) In the center of the locality many dwellings are consolidated, although the streets are not yet paved. Electricity is provided to all dwellings, but sewage is not available.

(right) In the periphery of the locality dwellings and the environment are in poor condition but electricity is available (note the TV antenna). Vegetation is abundant in all of the locality.



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Low Income Housing Survey by a group of Social Workers, 1976

POPULATION: There are about 1200 inhabitants. 52% of the population is under 15 years of age. The average age is 22 years. 49% of the population is male. The average household size is 5.3 members. 10% of the families are extended. 28% of the family heads were born outside of the city. 13% of the households had last resided outside of the city.



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Low Income Housing Survey by a group of Social Workers, 1976

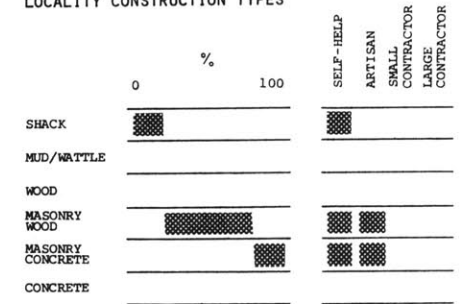
INCOME: The average annual household income is \$ 2243 dollars. 38% of the workers are under the official minimum wage. The economic productive population works in services (62%), industry (28%), and agriculture (10%). The locality holds one of the larger percentages of workers in services, among low income localities. The official minimum wage is indicated for 1976 and not for 1970 as indicated in the urban context.





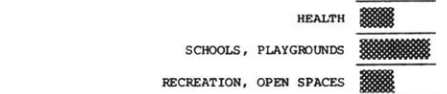
LAYOUT: The site has about 27 hectares. It is limited to the North by a road to the village La Estancia, to the West by the main street Del Campesino, to the South by the railroad tracks, and to the East by land not urbanized. The layout was developed based upon square and long rectangular blocks. Provision of maximum salable land was an important constraint. At the beginning big lots were provided, however, latter when the land value increased, subdivided initial lots were available. In the center of the site are concentrated the public garden, the church, and the schools.

LOCALITY CONSTRUCTION TYPES

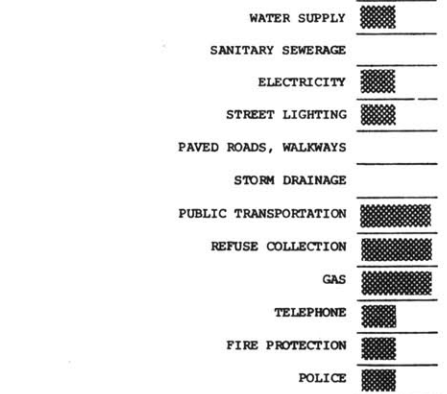


The chart shows (1) approximate percentage of each construction type within the total number of dwellings; and (2) building group that generally produces each type.

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES



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

Quality of information: Approximate

(20) URBAN DWELLING ENVIRONMENTS

CIRCULATION: Streets are projected for pedestrians and vehicles. The main street La Madero runs East-West providing access to the city center. Another important street Del Campesino, runs North-South bordering the site. The creek El Tucolote crosses the site, where some shanties can be found along the bank. Street are not paved, and farm animals can be found everywhere.

LAND USE: The site is mainly residential, with some light industries and warehouses near the railroad and the mentioned road. A few shops are concentrated along La Madero street. Little area is devoted to open space, allocated in a central public garden. Two public schools serve the site. Dwelling types are mostly, 1-2 floors, houses and few tenements and shanties. The site has incomplete utilities.



LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	208	16.00	13
DWELLING UNITS	197	16.00	12
PEOPLE	1182	16.00	74

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	4.05	25
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
SEMI-PRIVATE (cluster courts)	-	-
PRIVATE (dwellings, shops, factories, lots)	11.95	75
TOTAL	16.00	100

NETWORK EFFICIENCY

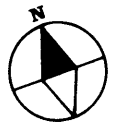
$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = \frac{3558}{16} = 222 \text{ m/ha}$$

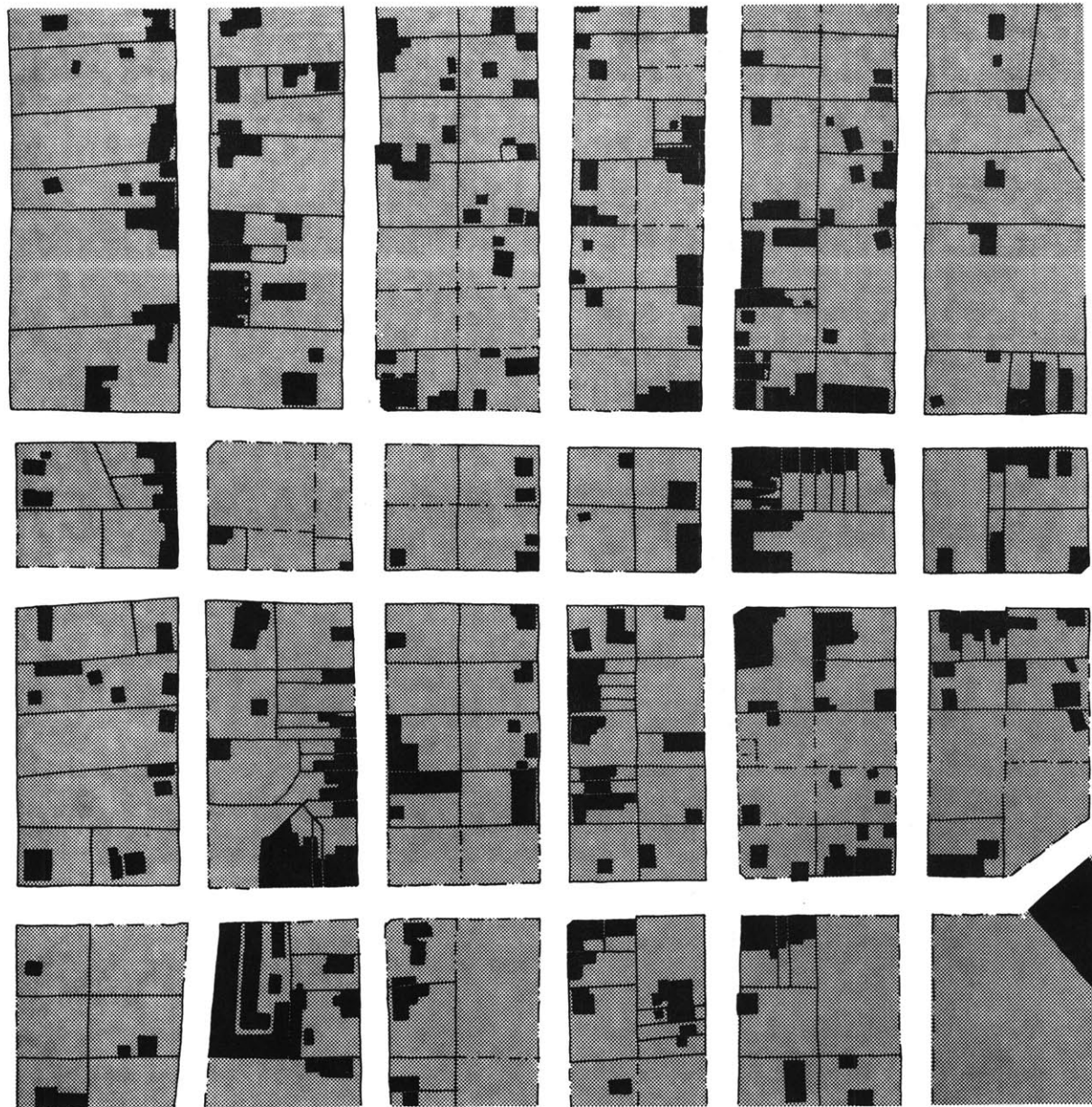
$$\text{AVERAGE LOT AREA} = \frac{\text{private area}}{\text{lots}} = \frac{119500}{208} = 575 \text{ m}^2$$

LOCALITY SEGMENT LAND SUBDIVISION



1:2500





400m

300m

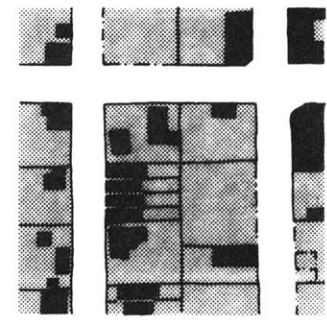
200m

100m

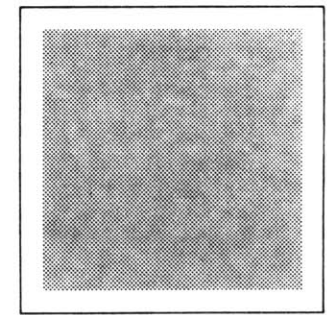
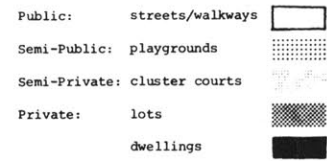
0m

LAND UTILIZATION DIAGRAMS

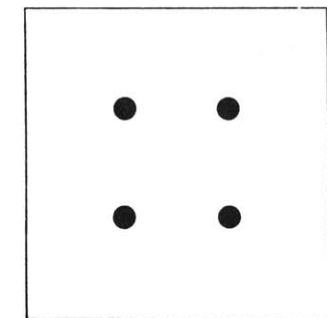
1 Hectare



PATTERN

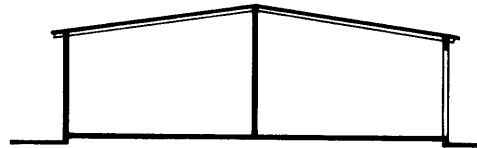


PERCENTAGES Streets/walkways 25%
Playgrounds -
Cluster Courts -
Dwellings/Lots 75

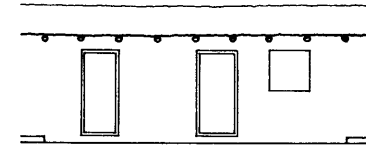


DENSITY Persons/Hectare 74

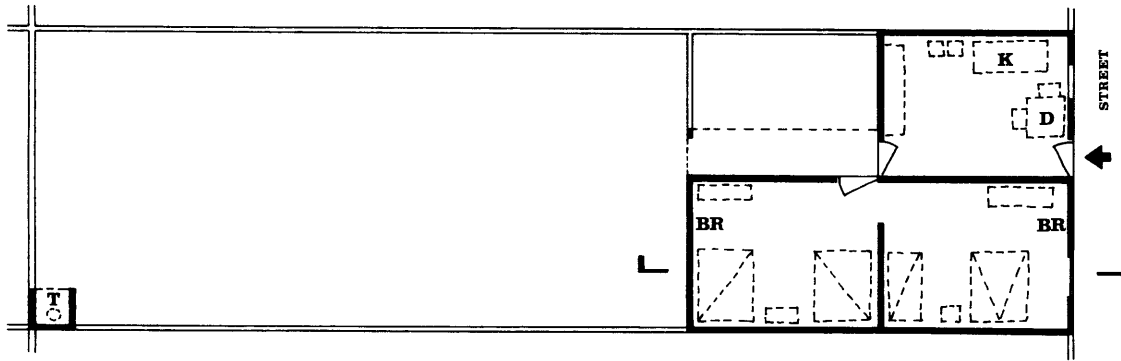
● 20 Persons



SECTION



ELEVATION

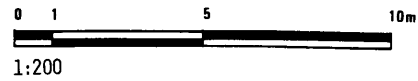


PLAN

KEY

- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom

TYPICAL DWELLING



**PHYSICAL DATA***(related to dwelling and land)***DWELLING UNIT**

type: House
 area (sq m): 67
 tenure: Legal owner

LAND/LOT

utilization: Private
 area (sq m): 220
 tenure: Illegal owner

DWELLING

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

DWELLING DEVELOPMENT

mode: Progressive
 developer: Private
 builder: Self-help
 construction type: Masonry wood
 year of construction: 1972

MATERIALS

foundation: Stone concrete
 floors: Cement
 walls: Brick
 roof: Wood, asbestos sheets

DWELLING FACILITIES

wc: Pit latrine
 shower: -
 kitchen: In the room
 rooms: 3
 other: -

SOCIO-ECONOMIC DATA*(related to user)***GENERAL: SOCIAL**

user's ethnic origin: Southwest Mexico
 place of birth: Colima, Colima
 education level: Secondary

NUMBER OF USERS

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

MIGRATION PATTERN

number of moves: 3
 rural - urban: -
 urban - urban: 3
 urban - rural: -
 why came to urban area: N.A.

GENERAL: ECONOMIC

user's income group: \$ 2300
 employment: Truck driver
 distance to work: -
 mode of travel: Walking

COSTS

dwelling unit: -
 land - market value: -

DWELLING UNIT PAYMENTS

financing: Self-financed
 rent/mortgage: \$ 370
 % income for rent/mortgage: 16 %

EL MORALETE: (left) Dwellings are in the stage of consolidation with provisional roofs made of asbestos or cardboard sheets. A large percentage of land is used for circulation which makes maintenance difficult.

(right) Two story dwellings are already found in the longer established sections, only electricity was available in 1976.

CASE STUDY SOURCES

Plan: (accurate) Aerial Photograph, 1975.
 Departamento de Catastro, Colima 1976.
 Plano de la Ciudad de Colima,
 E. Mendez P., 1976.

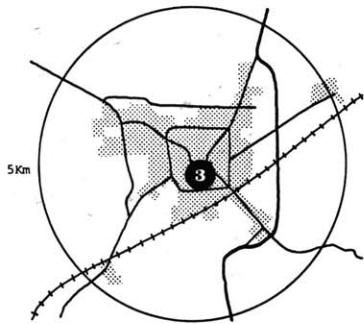
Segment Plan: IBID.
 Segment Land
 Utilization: IBID.
 Typical Dwelling: (approximate) Field Survey by
 the author, 1976.

Physical Data: Low Income Housing Survey by
 a group of Social Workers, 1976.

Photographs: The author, 1976.
 General Information: Field Survey by the author, 1976.
 IBID Physical Data.

3 MARIA AUXILIADORA

PRIVATE, MODERATELY LOW INCOME,
GROUPED ROOMS/HOUSES

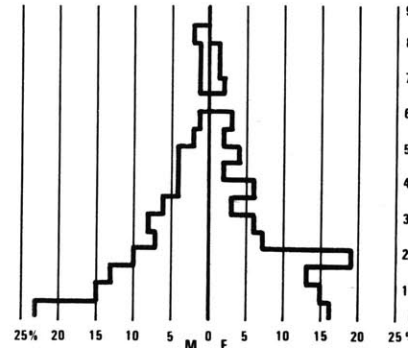


LOCATION: It is in the center of the city, on the South side of the main commercial area.

ORIGINS: It is in the old part of the city, a few blocks away from the Cathedral, where the city was found. Because of its central location there is a diversity in land use, combining residential, commercial and industrial land. The main activity focus is the bus terminal and the public market Constitucion, which are surrounded by commercial activities. The area is crossed by streams that have constrained the irregular block, and the construction of provisional shelters along the bank streams. The lower income people dwell in old row houses or in newer tenements, and the medium income people dwell in old traditional houses or in new semi-detached houses. Tenements are overcrowded and in fair physical and sanitary conditions, where bad socioeconomic conditions are most apparent.

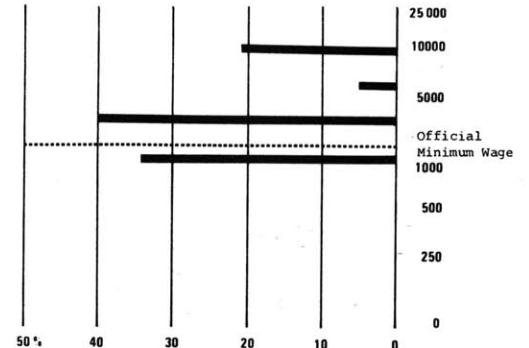
MARIA AUXILIADORA: (left) The Maria Auxiliadora church is surrounded by traditional houses, which have fewer windows than in the peripheral localities. The many parked vehicles result from the proximity to the market, "Constitucion", and its surrounding commercial activities.

(right) Activity in the streets increases in the afternoon after the heat of the sun has lessened. Already few people can be seen talking.



LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Low Income Housing Survey by a group of Social Workers, 1976

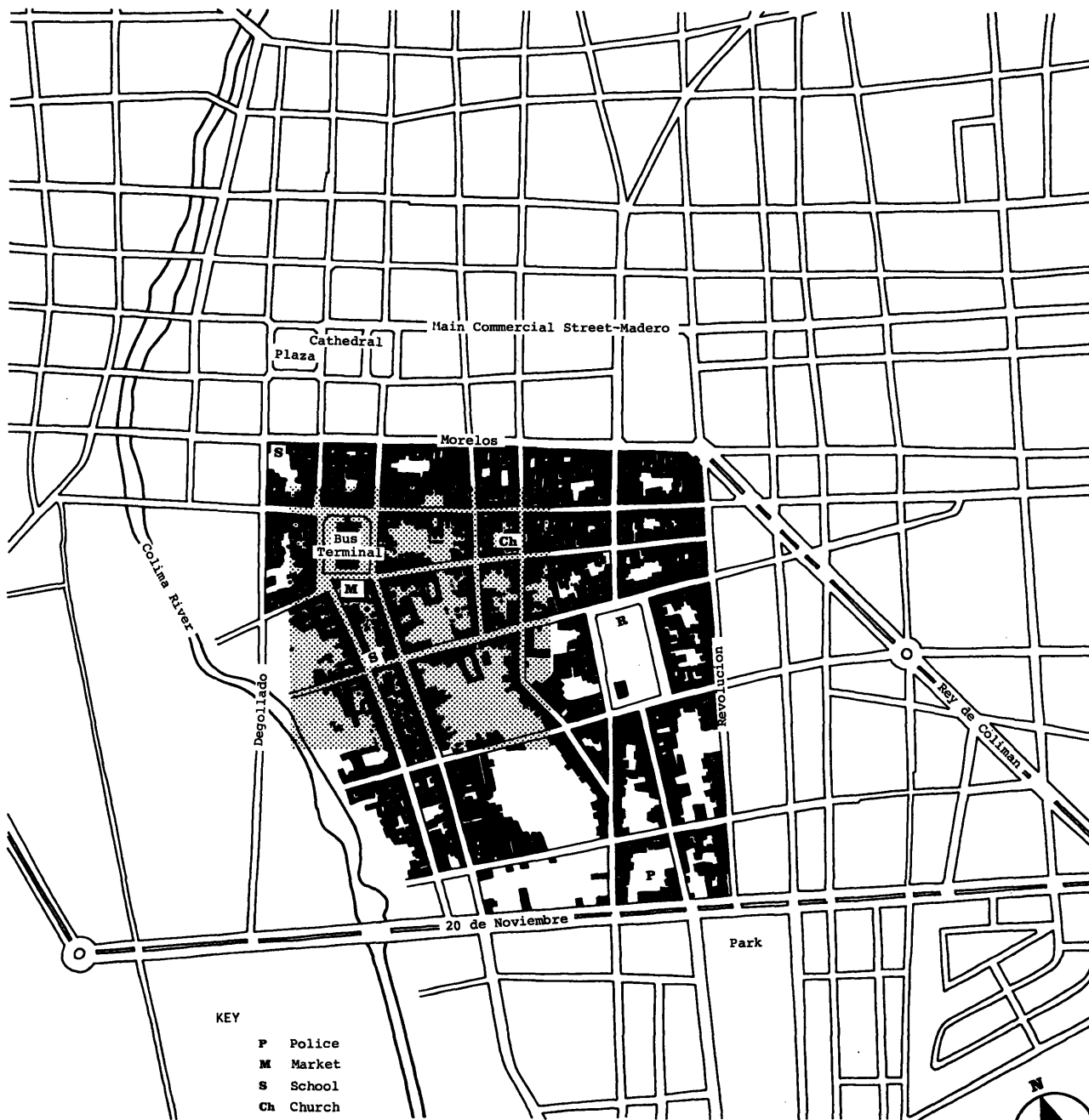
POPULATION: There are about 8300 inhabitants. 48% of the population is under 15 years of age. The average age is 24 years. 47% of the population is male. The average household size is 5.2 members. 8% of the families are extended. 80% of the family heads were born outside of the city. 33% of the households had last resided outside of the city.



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Low Income Housing Survey by a group of Social Workers, 1976

INCOME: The average annual household income is \$ 3418 US dollars. 34% of workers are under the official minimum wage. The economic productive population works in services (62%), industry (39%), and agriculture (8%). The locality holds one of the higher percentages of services workers, among low income localities. The official minimum wage is indicated for 1976 and not for 1970 as indicated in the urban context.





KEY

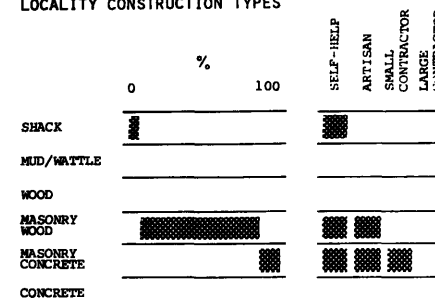
- P Police
- M Market
- S School
- Ch Church
- R Recreation-Public Garden
- SELECTED SEGMENT



LOCALITY PLAN

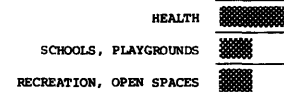
LAYOUT: The selected area has 53 hectares and is limited by streets, although the boundaries are not well defined as in some peripheral localities. To the North is Morelos Street, to the West Degollado street, to the East Revolucion street and to the South 20 de Noviembre avenue (interior peripheral avenue). The urban development was done based upon square traditional blocks, with few shape changes introduced, in order to adapt to the topography. The blocks have been internally subdivided. Building masses were generally located in the block periphery, leaving the center open.

LOCALITY CONSTRUCTION TYPES

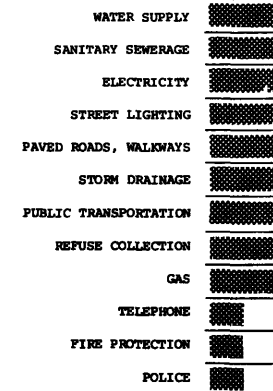


The chart shows (1) approximate percentage of each construction type within the total number of dwellings; and (2) building group that generally produces each type.

LOCALITY COMMUNITY FACILITIES



LOCALITY UTILITIES AND SERVICES



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

Quality of information: Approximate

(26) URBAN DWELLING ENVIRONMENTS

CIRCULATION: Streets are used by pedestrians and the now rapidly increasing vehicles. The overuse of the central area streets by vehicles brings as a result, conflicts between vehicles and people gathering, and width expansion of the streets. Recently the bus terminal has concentrated more noisy traffic.

LAND USE: Most of the land is residential use combined with commercial. Heavier concentration of commerce is toward the North, and the main focus of activities is the bus terminal together with the market Constitucion. A few light industries are scattered. Little land is devoted to open space, which is allocated in the public garden Juarez. Two public schools at the North served the site, the other private schools served other city areas. The main dwelling types are traditional houses, row or semi-detached houses, and tenements. Most buildings are 1-2 stories. The site is provided with complete utilities.

400m —
300m —
200m —
100m —
0m —



LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	397	14.78	27
DWELLING UNITS	387	14.78	26
PEOPLE	2322	14.78	157

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	2.94	20
SEMI-PUBLIC (open spaces, schools, community centers)	0.31	2
SEMI-PRIVATE (cluster courts)	0.24	2
PRIVATE (dwellings, shops, factories, lots)	11.31	76
TOTAL	14.78	100

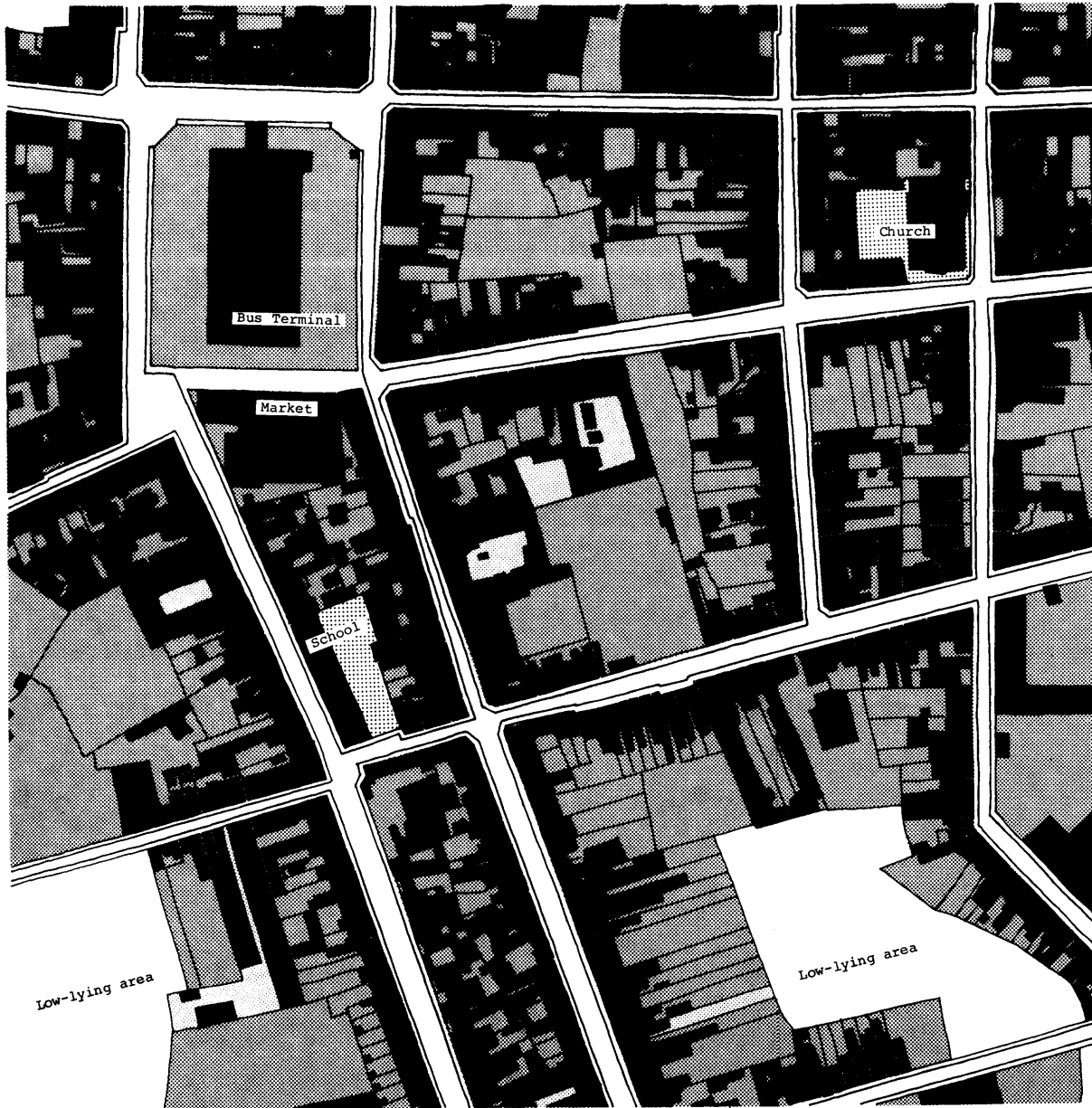
NETWORK EFFICIENCY

$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = \frac{2834}{14.78} = 192 \text{ m/ha}$$

$$\text{AVERAGE LOT AREA} = \frac{\text{private area}}{\text{lots}} = \frac{113100}{397} = 285 \text{ m}^2$$

LOCALITY SEGMENT LAND SUBDIVISION





400m

300m

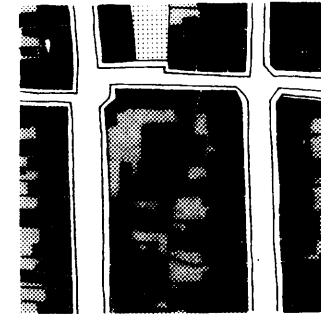
200m

100m

0m

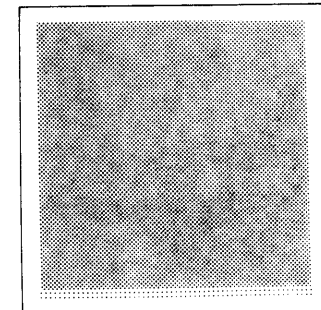
LAND UTILIZATION DIAGRAMS

1 Hectare

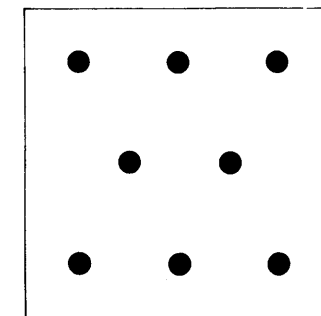


PATTERN

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



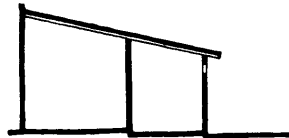
PERCENTAGES	
Streets/walkways	20%
Playgrounds	2
Cluster Courts	2
Dwellings/Lots	76



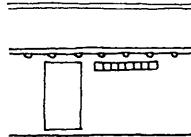
DENSITY Persons/Hectare 157

20 Persons

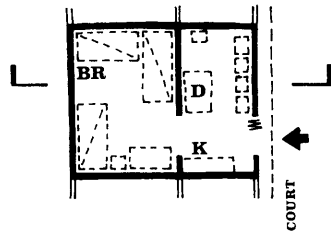
LOCALITY SEGMENT LAND UTILIZATION



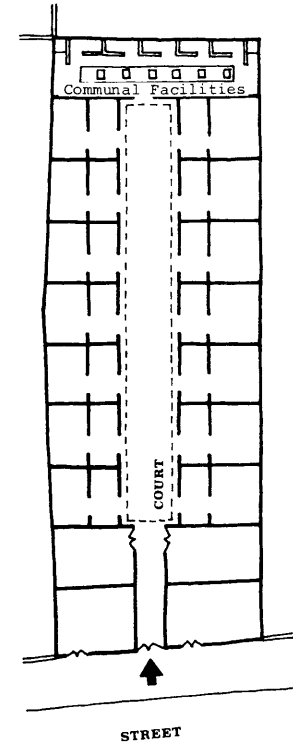
SECTION



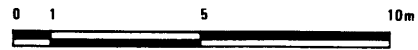
ELEVATION



PLAN



TYPICAL PLAN TENEMENT

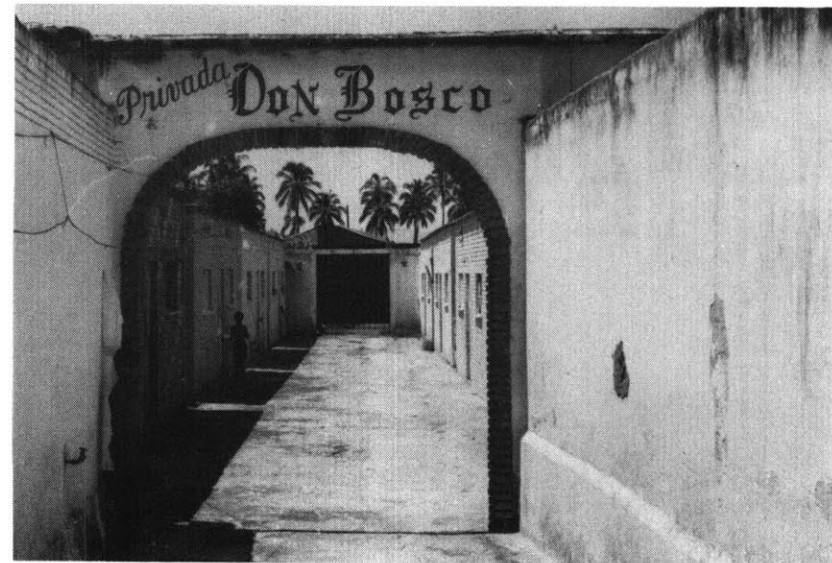


1:200

KEY

- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area

TYPICAL DWELLING

**PHYSICAL DATA***(related to dwelling and land)***DWELLING UNIT**

type: Room
 area (sq m): 22
 tenure: Legal rental

LAND/LOT

utilization: Semi-private
 area (sq m): 575
 tenure: Legal rental

DWELLING

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

DWELLING DEVELOPMENT

mode: Instant
 developer: Private
 builder: Artisan
 construction type: Masonry wood
 year of construction: 1960

MATERIALS

foundation: Stone
 floors: Tiles
 walls: Brick
 roof: Wood/Tiles

DWELLING FACILITIES

wc: Communal
 shower: Communal
 kitchen: -
 rooms: 2
 other: -

SOCIO-ECONOMIC DATA*(related to user)***GENERAL: SOCIAL**

user's ethnic origin: Southwest Mexico
 place of birth: Cuauhtemoc, Colima
 education level: Primary

NUMBER OF USERS

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

MIGRATION PATTERN

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

GENERAL: ECONOMIC

user's income group: \$ 3072
 employment: Agricultural
 distance to work: 3 km.
 mode of travel: Walking

COSTS

dwelling unit: -
 land - market value: -

DWELLING UNIT PAYMENTS

financing: Self-financed
 rent/mortgage: \$ 14 monthly
 % income for rent/mortgage: 6%

MARIA AUXILIADORA: (left) Small row houses are grouped around a court with shared communal facilities located at the back.

(right) The court is shared by small houses that are separated by narrow alleys.

CASE STUDY SOURCES

Plan: (accurate) Aerial Photograph, 1975.
 Departamento de Catastro, Colima 1976.
 Plano de la Ciudad de Colima,
 E. Mendez P., 1976.

Segment Plan: IBID
 Segment Land
 Utilization: IBID
 Typical Dwelling: (approximate) Field Survey by the author, 1976.





Physical Data: Low Income Housing Survey by a group of Social Workers, 1976.
 Photographs: The author, 1976.

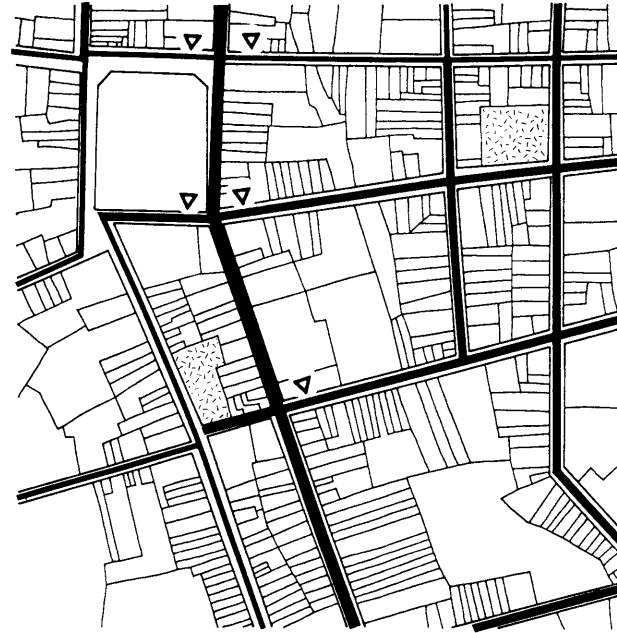
General Information: Field Survey by the author, 1976.
 IBID Physical Data.

Utility Networks: (accurate) Agua y Alcantarillado, Municipio de Colima, 1976.
 Plano de la Red de Agua Potable Colima, INIECO 1972.
 Comision Federal de Electricidad, Colima, 1970.

WATER SUPPLY





KEY

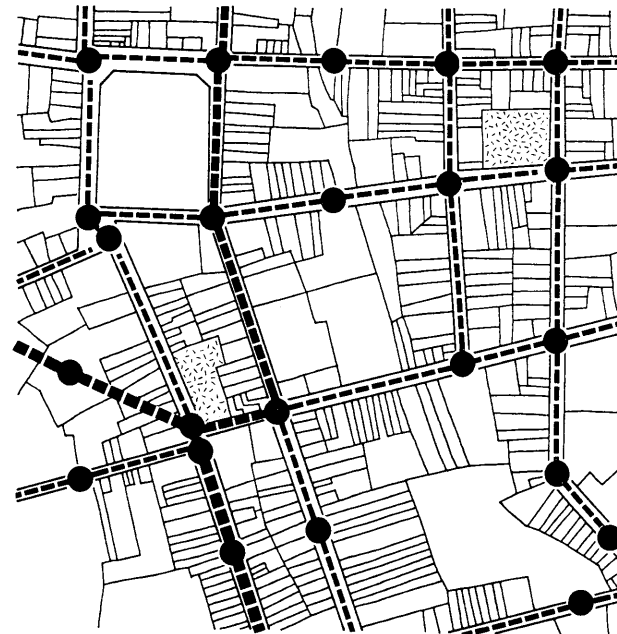
	VALVES	5 UNITS
	3" PIPES	1020 METERS
	4" PIPES	1330 METERS
	10" PIPES	415 METERS
	TOTAL PIPES	2765 METERS



SEWAGE DISPOSAL

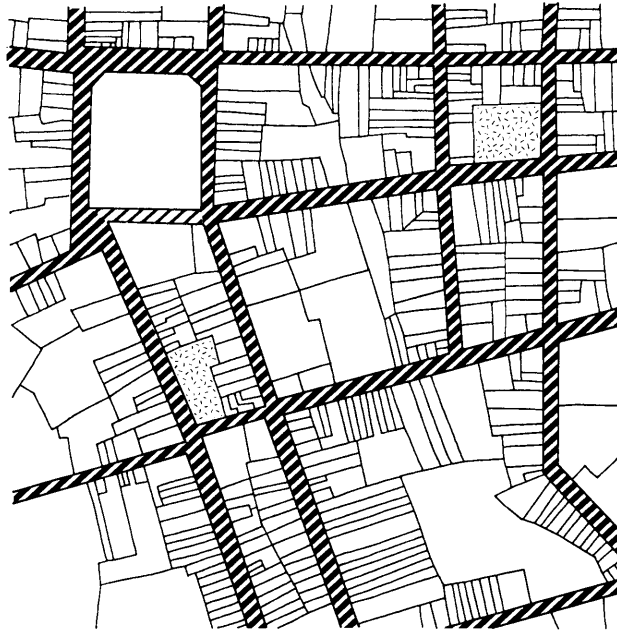
KEY

	MANHOLES	23 UNITS
	8" PIPES	2380 METERS
	12" PIPES	322 METERS
	24" PIPES	262 METERS
	TOTAL PIPES	2964 METERS





UTILITY NETWORKS

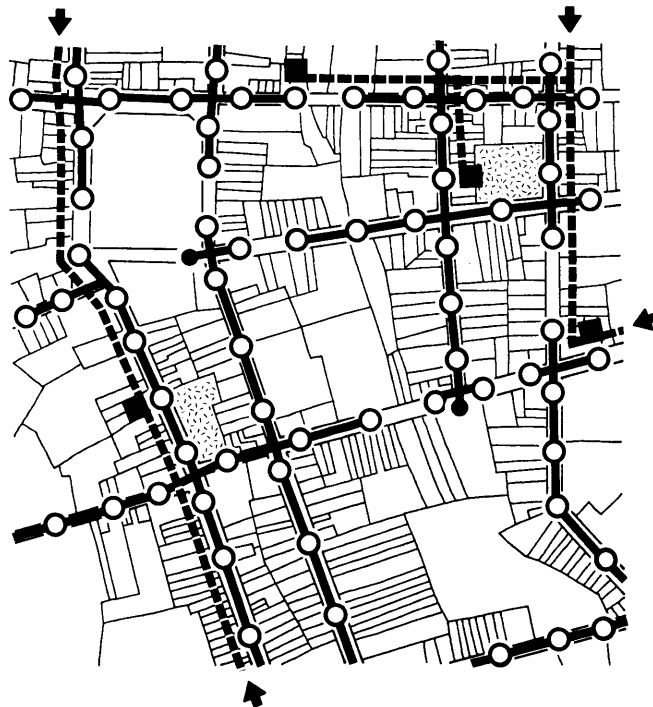
1:5000



CIRCULATION






KEY

	FINISHED PAVING STREET MODE A (PEDESTRIANS)	730 METERS ²
	MODE B (PEDESTRIANS AND VEHICLES)	28670 METERS ²
	TOTAL	29400 METERS ²



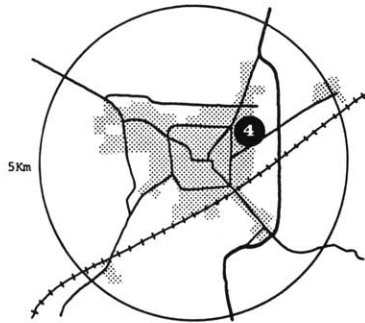
ELECTRICITY AND STREET LIGHTING

KEY

	TRANSFORMERS	4 UNITS
	POLES WITH LAMPS	69 UNITS
	LOW TENSION LINES	2253 METERS
	HIGH TENSION LINES	908 METERS
	CITY NETWORK CONNECTION	

4 LA ESTANCIA

PUBLIC, MODERATELY LOW INCOME,
ROW HOUSES

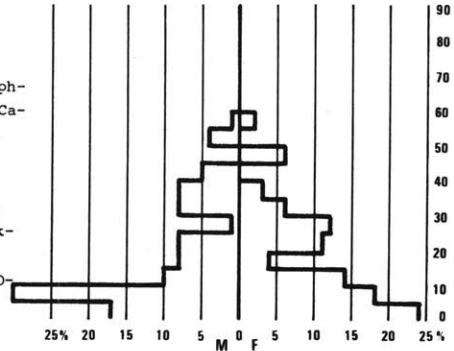


LA ESTANCIA: (left) The project is very recent and it still looks "brand new". The playground and the parking lot are not used by children or automobiles but as an area for pedestrians.

(right) The view is from the social center looking toward the dwelling complex where the front and the back of the lots can be seen. Much undefined public area is noticeable.

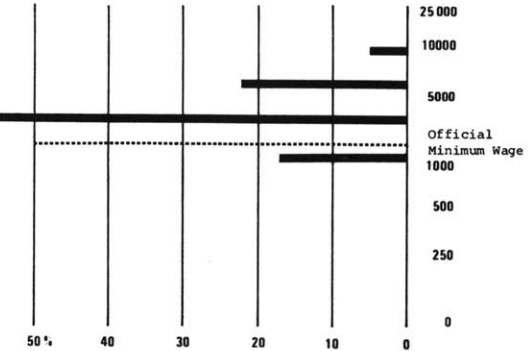
LOCATION: It is in the Northeast city periphery, 2 km. away from the city center (the Cathedral), along the road to the village La Estancia.

ORIGINS: In response to a housing shortage, the Institute of the National Fund for Workers' Housing (Instituto del Fondo Nacional de la Vivienda para los Trabajadores - INFONAVIT), developed in the city by 1974, the first stage of a larger housing "package" project. The Institute, the largest public housing agency in Mexico, focuses on the construction of low income housing, with funds from a 5% payroll tax, paid by the employers. The beneficiaries are skilled workers withing the formal contracted labor market. The informal sector formed by unskilled workers is excluded. About 150 row houses, 1-2 floors, were developed instantly with complete services and utilities. Each dwelling has complete utilities fixtures, above what normally available in the low income dwellings. The provided dwellings in the project are inappropriate to the users culture, which is manifested through poor maintenance and deteriorating dwelling units.



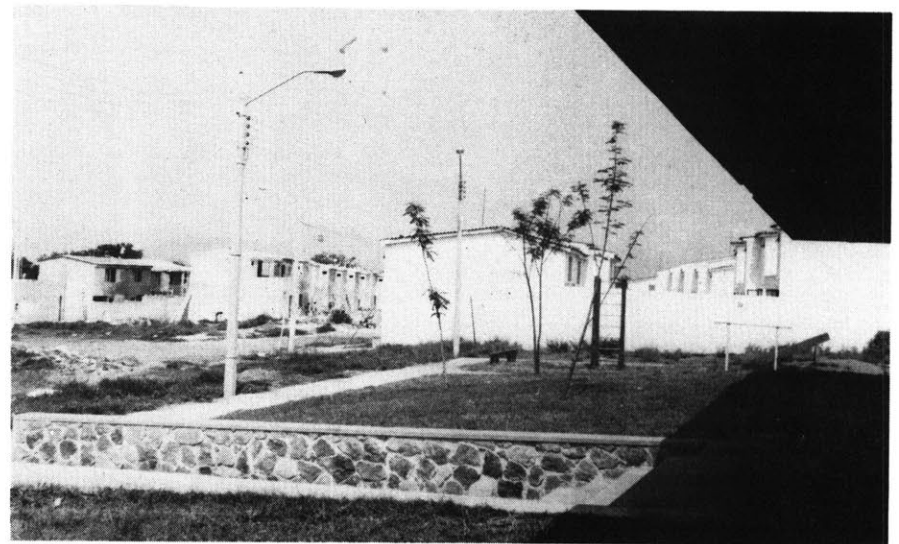
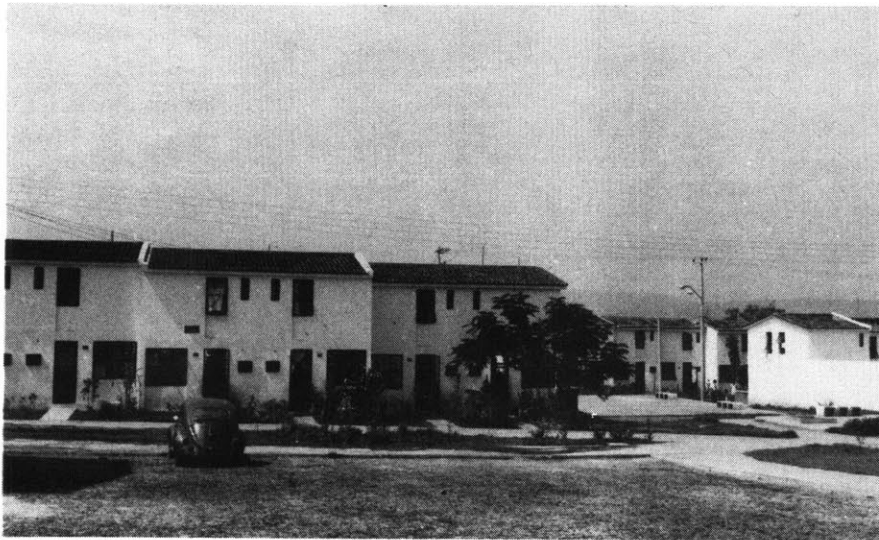
LOCALITY POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Low Income Housing Survey by
a group of Social Workers, 1976

POPULATION: There will be about 10000 inhabitants when the project is completed. 57% of the population is under 15 years of age. The average age is 20 years. 54% of the population is male. The average household size is 6.9 members, and there are no extended families. 63% of the family heads were born outside of the city. 24% of the households had last resided outside of the city.



LOCALITY ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: Low Income Housing Survey by
a group of Social Workers, 1976

INCOME: The average annual household income is \$ 2760 US dollars. The income of the families is quite homogeneous, 17% of the workers are under the official minimum wage. The economic productive population works in services (52%), and industry (48%), none of them in agriculture. This group has the most welfare facilities among low income localities. The official minimum wage is indicated for 1976 and not for 1970 as indicated in the urban context.



LAYOUT: The existing area developed is about 5 hectares, the completed project will be 20.5 hectares. It is bordered by the road to the village La Estancia at the North, the Military Field and land not urbanized limits on the other sides. The site was developed based upon irregular block gridiron. Boundaries are mostly defined by private residential land, excepting the road side that is defined by public circulation. The low income neighbourhood El Moralete fronts to the South.

LOCALITY CONSTRUCTION TYPES

	0	%	100	SELF-HELP	ARTISAN	SMALL CONTRACTOR	LARGE CONTRACTOR
SHACK	[Bar from 0 to ~15%]						
MUD/WATTLE	[Bar from 0 to ~15%]						
WOOD	[Bar from 0 to ~15%]						
MASONRY WOOD	[Bar from 0 to ~15%]						
MASONRY CONCRETE	[Bar from 0 to ~15%]						
CONCRETE	[Bar from 0 to ~15%]						

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.

LOCALITY COMMUNITY FACILITIES

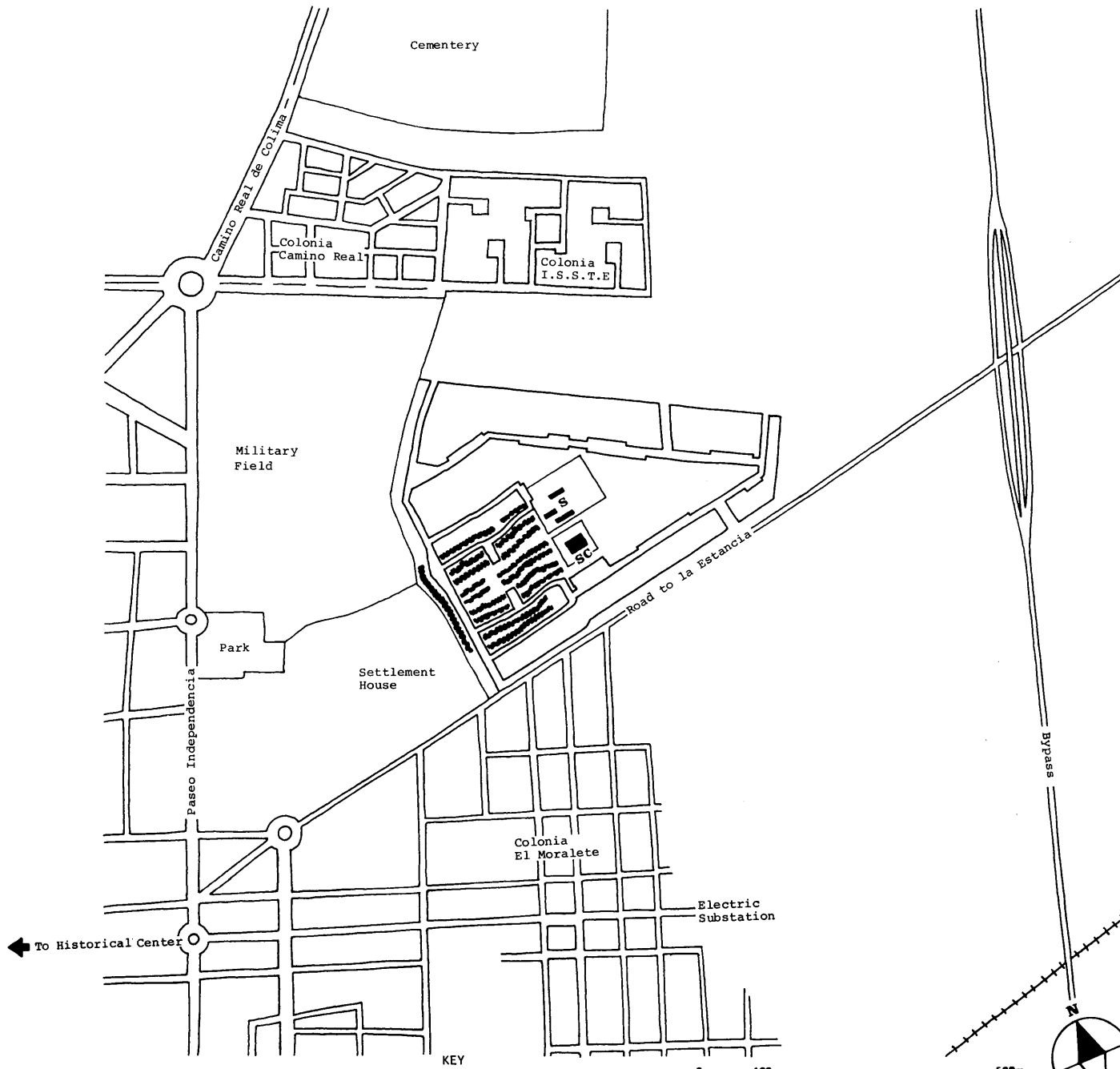
HEALTH	[Bar from 0 to ~15%]
SCHOOLS, PLAYGROUNDS	[Bar from 0 to ~15%]
RECREATION, OPEN SPACES	[Bar from 0 to ~15%]

LOCALITY UTILITIES AND SERVICES

WATER SUPPLY	[Bar from 0 to ~15%]
SANITARY SEWERAGE	[Bar from 0 to ~15%]
ELECTRICITY	[Bar from 0 to ~15%]
STREET LIGHTING	[Bar from 0 to ~15%]
PAVED ROADS, WALKWAYS	[Bar from 0 to ~15%]
STORM DRAINAGE	[Bar from 0 to ~15%]
PUBLIC TRANSPORTATION	[Bar from 0 to ~15%]
REFUSE COLLECTION	[Bar from 0 to ~15%]
GAS	[Bar from 0 to ~15%]
TELEPHONE	[Bar from 0 to ~15%]
FIRE PROTECTION	[Bar from 0 to ~15%]
POLICE	[Bar from 0 to ~15%]

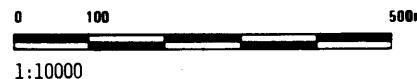
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

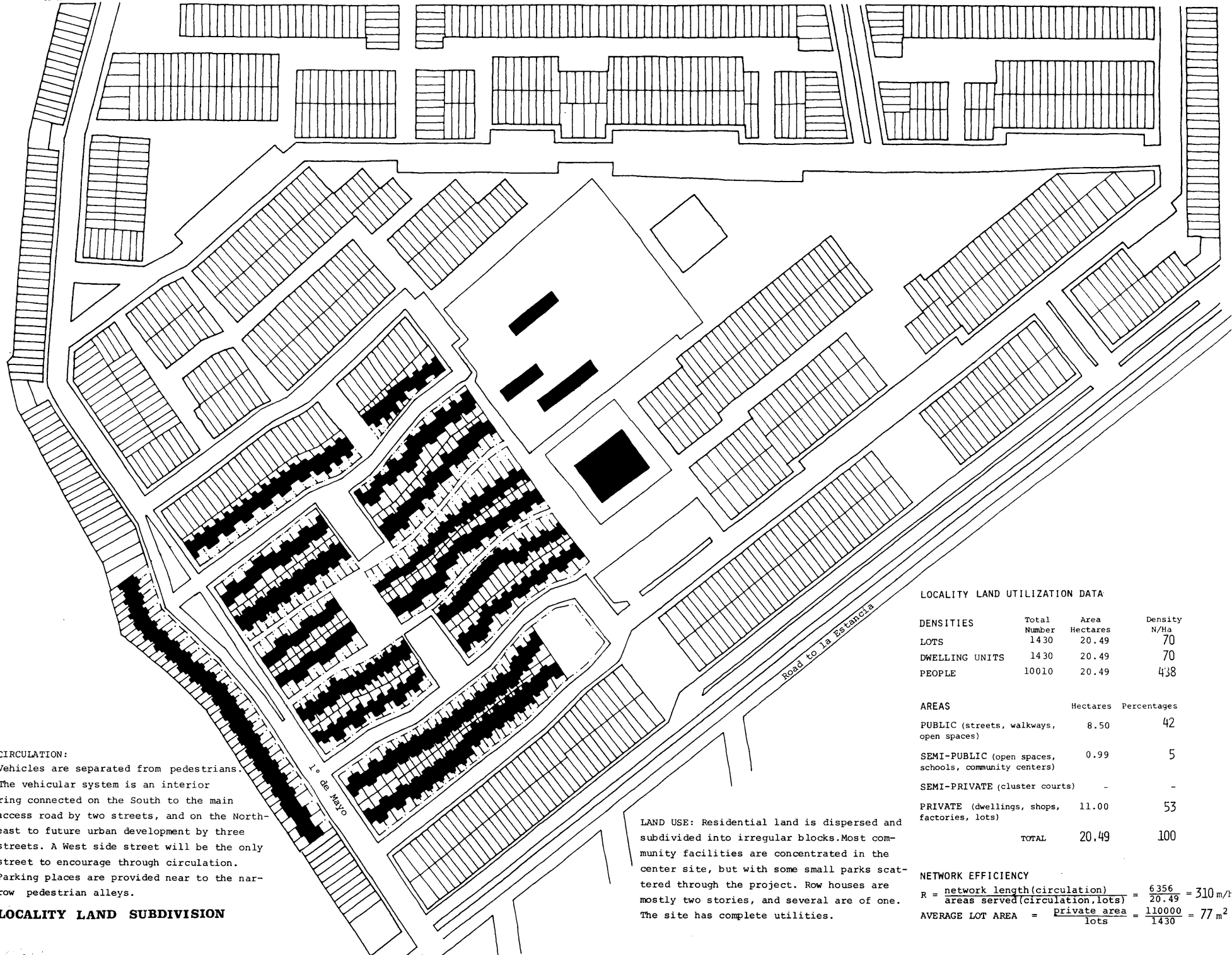
Quality of information: Approximate



LOCALITY PLAN

- S School
- SC Social Center



**CIRCULATION:**

Vehicles are separated from pedestrians. The vehicular system is an interior ring connected on the South to the main access road by two streets, and on the North-east to future urban development by three streets. A West side street will be the only street to encourage through circulation. Parking places are provided near to the narrow pedestrian alleys.

LOCALITY LAND SUBDIVISION

LAND USE: Residential land is dispersed and subdivided into irregular blocks. Most community facilities are concentrated in the center site, but with some small parks scattered through the project. Row houses are mostly two stories, and several are of one. The site has complete utilities.

LOCALITY LAND UTILIZATION DATA

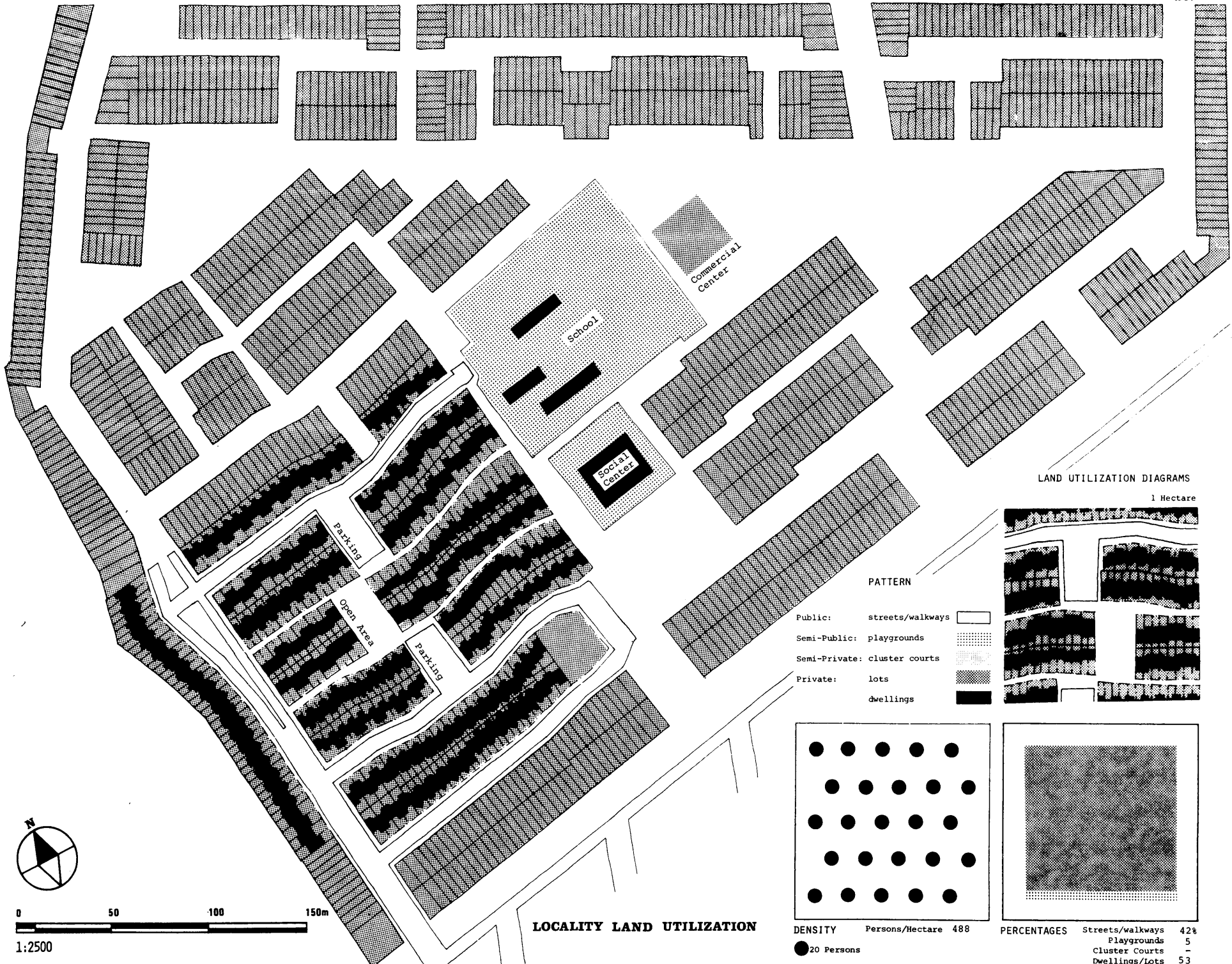
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	1430	20.49	70
DWELLING UNITS	1430	20.49	70
PEOPLE	10010	20.49	438

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	8.50	42
SEMI-PUBLIC (open spaces, schools, community centers)	0.99	5
SEMI-PRIVATE (cluster courts)	-	-
PRIVATE (dwellings, shops, factories, lots)	11.00	53
TOTAL	20.49	100

NETWORK EFFICIENCY

$$R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = \frac{6356}{20.49} = 310 \text{ m/l}$$

$$\text{AVERAGE LOT AREA} = \frac{\text{Private area}}{\text{lots}} = \frac{110000}{1430} = 77 \text{ m}^2$$



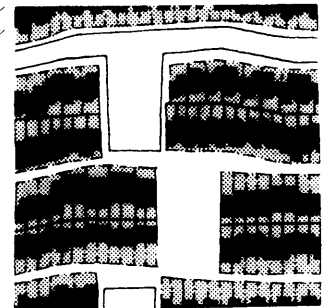
LOCALITY LAND UTILIZATION



1:2500

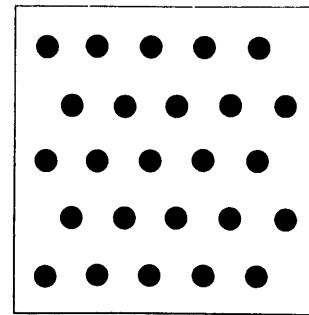
LAND UTILIZATION DIAGRAMS

1 Hectare



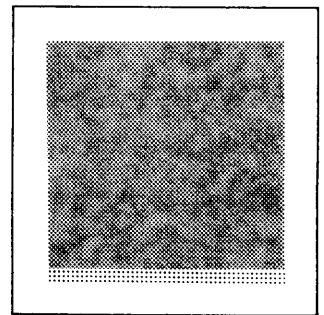
PATTERN

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

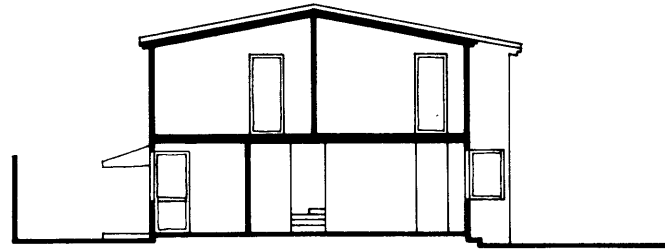


DENSITY Persons/Hectare 488

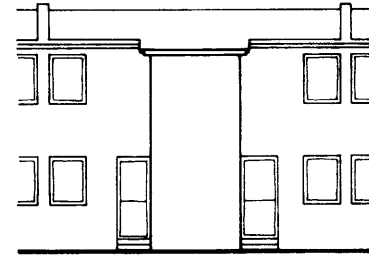
● 20 Persons



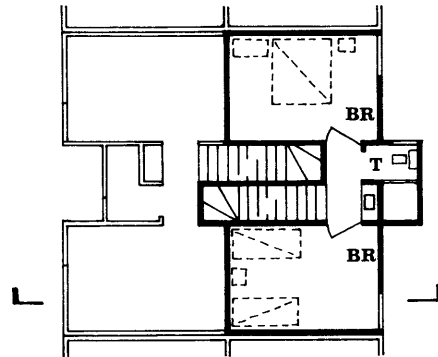
PERCENTAGES	Streets/walkways	42%
	Playgrounds	5
	Cluster Courts	-
	Dwellings/Lots	53



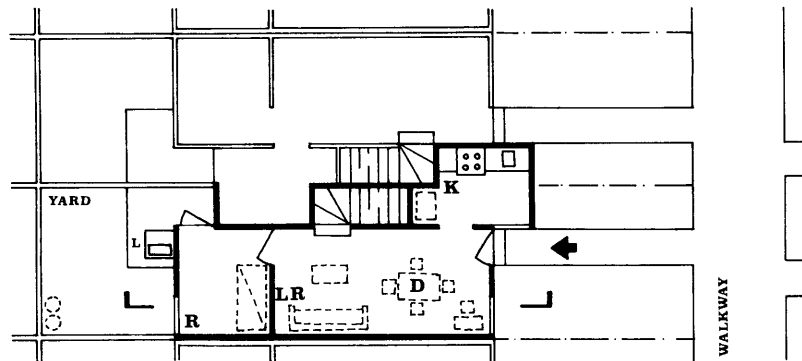
SECTION



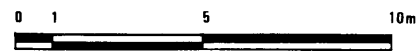
ELEVATION



SECOND FLOOR PLAN



GROUND FLOOR PLAN

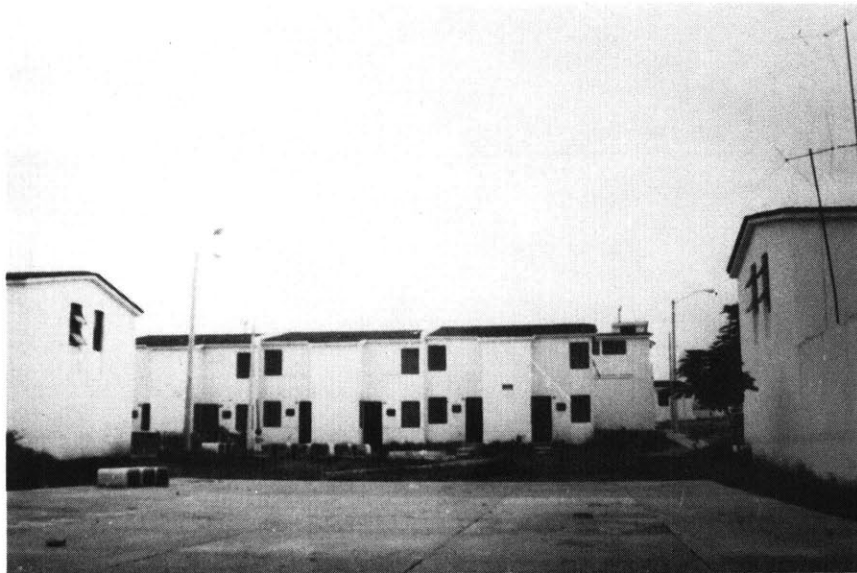


1:200

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry

TYPICAL DWELLING



PHYSICAL DATA

(related to dwelling and land)

DWELLING UNIT

type: House
 area (sq m): 67
 tenure: Legal ownership

LAND/LOT

utilization: Private
 area (sq m): 70
 tenure: Legal ownership

DWELLING

location: Periphery
 type: Row
 number of floors: 2
 utilization: Single family
 physical state: Good

DWELLING DEVELOPMENT

mode: Instant
 developer: Public
 builder: Small/large contractor
 construction type: Masonry concrete
 year of construction: 1973

MATERIALS

foundation: Stone concrete
 floors: Tiles
 walls: Brick
 roof: Concrete/Tiles

DWELLING FACILITIES

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

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

user's ethnic origin: Southwest Mexico
 place of birth: Nogueras, Colima
 education level: Primary

NUMBER OF USERS

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

MIGRATION PATTERN

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

GENERAL: ECONOMIC

user's income group: \$ 5760
 employment: Truck driver
 distance to work: 1.5 km.
 mode of travel: Bicycle

COSTS

dwelling unit: -
 land - market value: -

DWELLING UNIT PAYMENTS

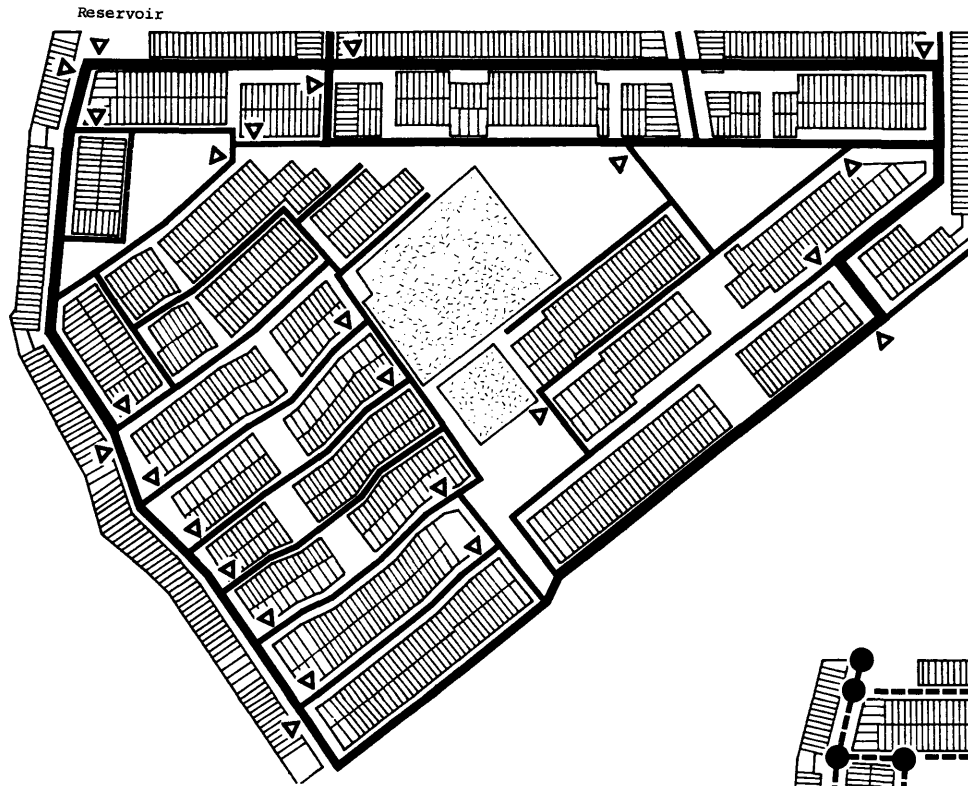
financing: Public subsidized
 rent/mortgage: \$ 51 monthly
 % income for rent/mortgage: 11%

LA ESTANCIA: (left) This group of houses faces a small playground. There are no children nor people in sight.

(right) These houses face a narrow curved pedestrian alley. This layout forces a costly infrastructure.

CASE STUDY SOURCES

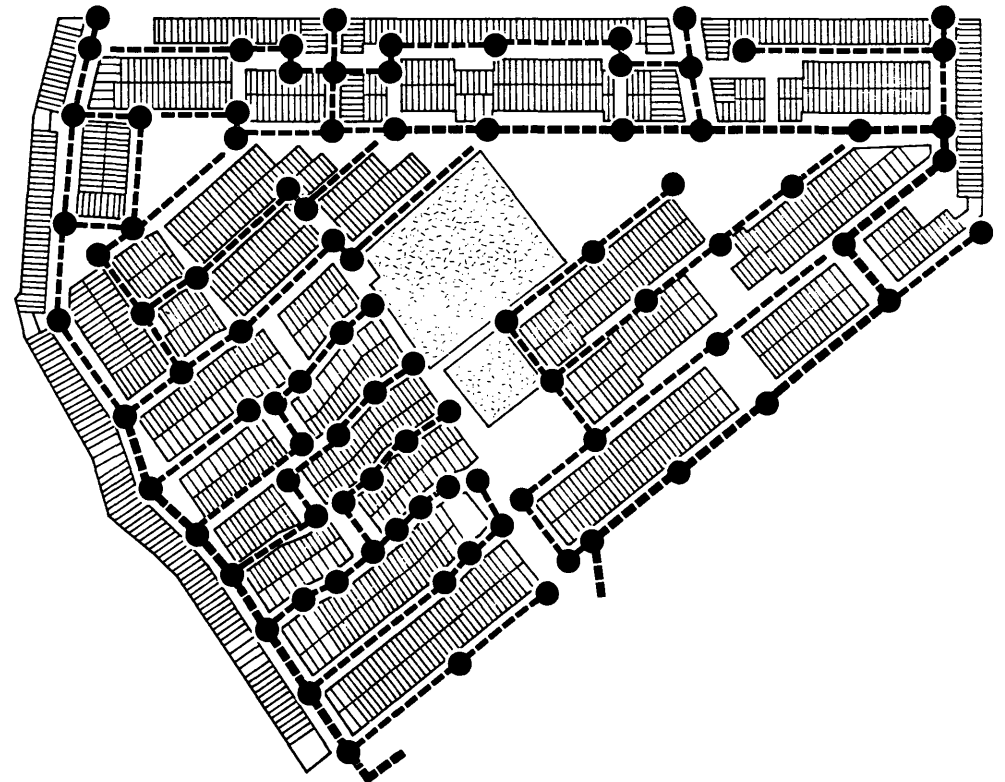
Plan: (accurate) Aerial Photograph, 1975.
 Plano de la Ciudad de Colima,
 E. Mendez P., 1976.
 INFONAVIT, 1976.
 Segment Plan: IBID
 Segment land
 Utilization: IBID
 Typical Dwelling: (accurate) INFONAVIT, 1976.
 Field Survey by the author, 1976.
 Physical Data: Low income Housing Survey by
 a group of Social Workers, 1976.
 Photographs: The author.
 General Information: Field Survey by the author, 1976.
 IBID Physical Data.
 INFONAVIT, 1976.
 Utility Networks: INFONAVIT, 1976.
 Comision Federal de Electricidad
 Colima, 1970.



WATER SUPPLY

KEY

△	VALVES	25 UNITS
—	3" PIPES	3254 METERS
—	4" PIPES	875 METERS
—	6" PIPES	1360 METERS
	TOTAL PIPES	5489 METERS



UTILITY NETWORKS

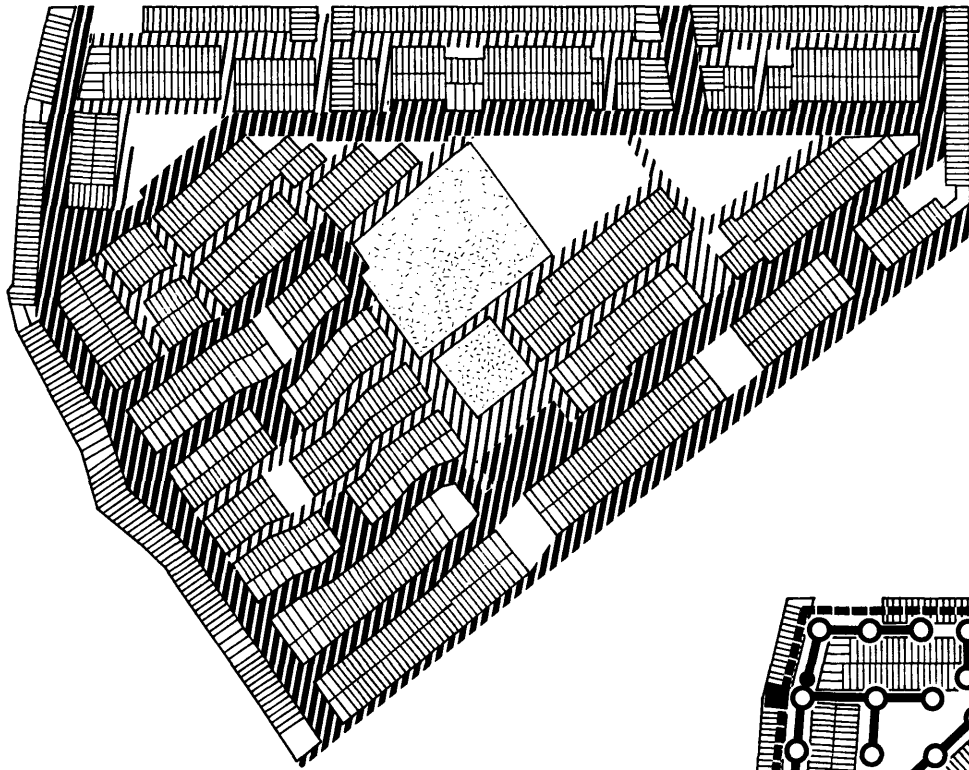


1:5000

SEWAGE DISPOSAL

KEY

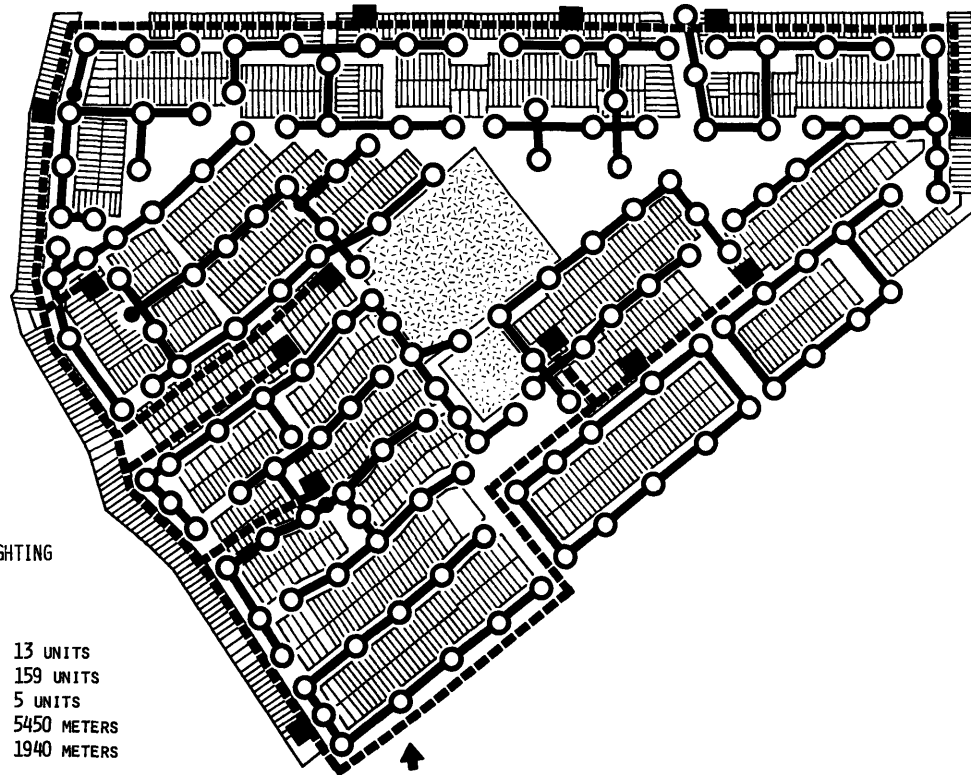
●	MANHOLES	94 UNITS
---	8" PIPES	4106 METERS
----	10" PIPES	1028 METERS
	TOTAL PIPES	5134 PIPES



CIRCULATION

KEY

	FINISHED PAVING STREET MODE A (PEDESTRIANS)	21332 METERS ²
	MODE B (PEDESTRIANS AND VEHICLES)	53808 METERS ²
	TOTAL	75140 METERS ²



ELECTRICITY AND STREET LIGHTING

KEY

■	TRANSFORMERS	13 UNITS
○	POLES WITH LAMPS	159 UNITS
●	POLES	5 UNITS
—	LOW TENSION LINES	5450 METERS
- - -	HIGH TENSION LINES	1940 METERS
→	CITY NETWORK CONNECTION	

REVISED LAYOUT

Background

INTRODUCTION:

Among the 4 case studies, the project La Estancia was evaluated to illustrate typical characteristics of recent gridiron layouts with clearly deficient land utilization and resultant costly utility networks. A physical evaluation was made through a comparison of the existing project with a revised layout where public land was minimized. The evaluation was focused on layout (land utilization and circulation) and utilities layout (water supply, sewage disposal, circulation, and electricity/street lighting). The revised layout is only a model of reference for a comparative evaluation, when basic land utilization changes are introduced. The model is not a detailed layout; further information would be required for an actual design.

BASIC DATA:

The site is located on the outskirts of the city toward the Northeast. The project to be developed is the first one made in Colima by the Institute of the National Fund for Workers' Housing (Instituto del Fondo Nacional de la Vivienda para los Trabajadores-INFONAVIT), whose beneficiaries are workers within the formal contracted labor market. When the project is completed it will have an area of 20.5 ha. and will provide about 1400 row houses, 1 - 2 stories. All utilities are available. The main access is on the South side. Barrier boundaries are to the West and South sides determined by a change in land use and a main road; meshing boundaries are to the North and East sides where land is assumed for future residential use. A high voltage line crosses the site in a Northeast-Southwest direction. The site has a 4% slope.



SITE AERIAL PHOTOGRAPH



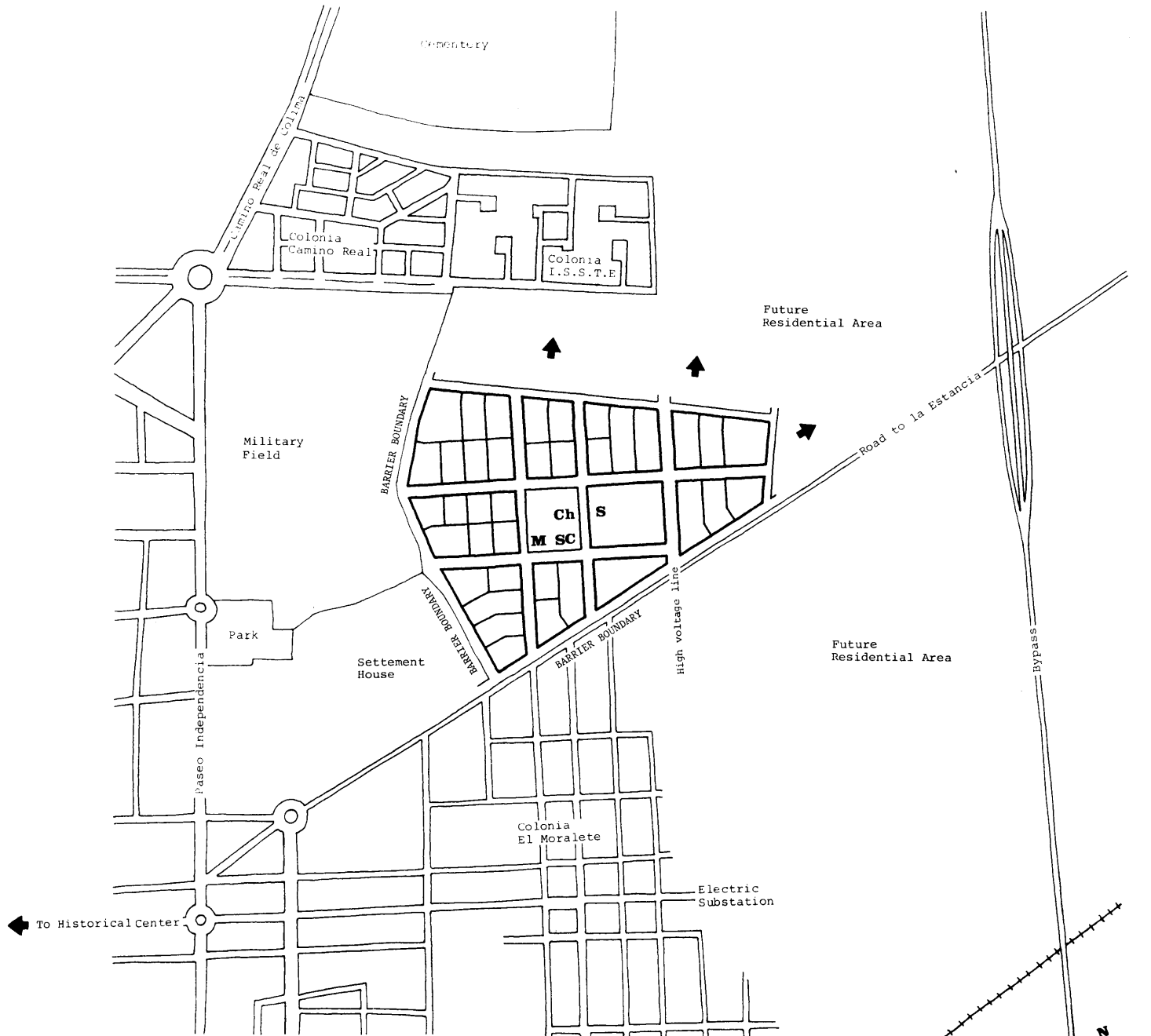
Design Criteria

The revised layout is based upon the following policy:

- Minimization of:
- public ownership of land
 - length of utility networks per area served
 - government burdens, responsibilities and services.
- Maximization of:
- private ownership of land
 - private responsibility/control.

The revised circulation layout intends to follow the traditional pattern of the city, which is a regular grid with circulation intervals of 100-200 meters, oriented orthogonally to the Northeast-Southwest axis. Semi-public facilities are located in the center of the site to create a focus activity, to facilitate walking access for the neighborhood dwellers and to encourage use. The site is defined by public circulation.

The main access to the site is on the South side, along the road to La Estancia (Mode IV). Through circulation is allowed only in two main streets (Mode III), running in the North-South direction; other streets are encouraged to be used mainly by pedestrians, by reducing to a minimum the traffic way (Mode II), or by replacing the permanent traffic way (Mode I) by eventually (emergency, services) traffic way. Public parking areas in the existing project have been replaced by parking in public streets, semi-private clusters or private lots. Parking places are also located around semi-public facilities.



REVISED LOCALITY PLAN

- KEY
- Ch Church
 - M Market
 - S School
 - SC Social Center



Land Subdivision

DEFINITIONS:

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

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

LOT CLUSTER is a group of lots (owned individually) around a semi-private common court (owned in condominium).

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

BLOCKS:

The average size/shape of blocks is within the traditional regular grid of 100-200 meter spacing, orthogonally oriented in the Northeast-Southwest axis, that parallels the direction of the high voltage line which crosses the site. Blocks vary in size/shape according to the site conditions and limitations.

LOTS:

Allocation of different lot sizes responds, among other factors, to circulation forces, which determine land values, concentration of commercial/light industrial activities and population densities. Optional bigger lots are allocated on main streets, corners of blocks, and the periphery of the blocks. Optional smaller lots are allocated on minor streets and interior of the blocks. Lot sizes are in the range of the existing project.

CLUSTER/LOTS:

The allocation of all lots in condominium clusters is based upon the following policy:

Maximization of: - user responsibility over semi-private land

- social interaction

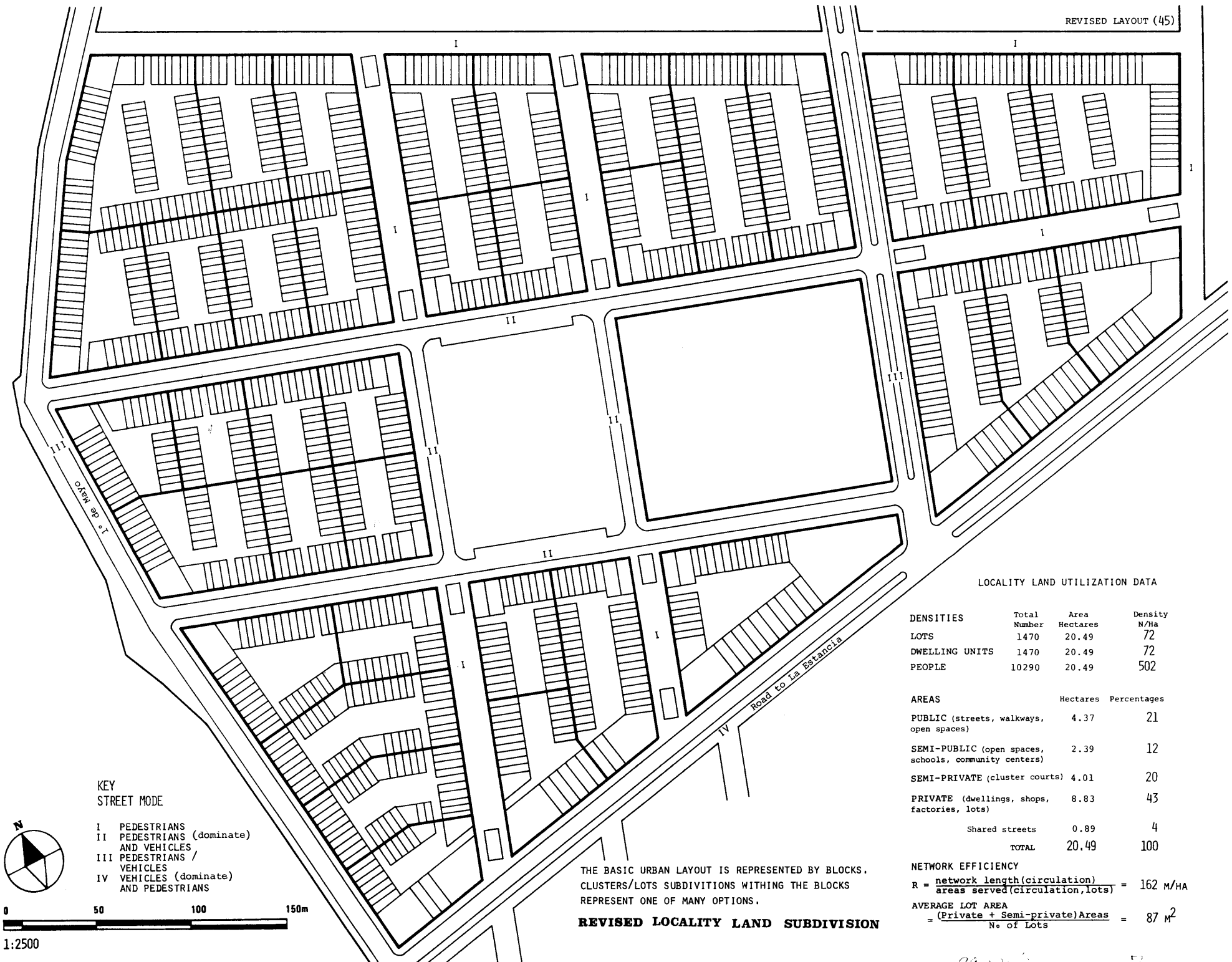
- mixture of income groups.

Minimization of: - individual connection to main network utilities on public streets, to reduce its costs

- individual legal titles, which the larger the number, the larger the burden in government administration.

Provision of: optional complete coverage area in peripheral block lots, which face open areas in the front/back sides.

Number of lots sharing condominium clusters was limited to the number of 50, in order to allow better dweller identity. Entrances to clusters were placed as near as possible to the community facilities and if possible away from main vehicular streets.



- KEY**
STREET MODE
- I PEDESTRIANS (dominate)
 - II PEDESTRIANS AND VEHICLES
 - III PEDESTRIANS / VEHICLES
 - IV VEHICLES (dominate) AND PEDESTRIANS



LOCALITY LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	1470	20.49	72
DWELLING UNITS	1470	20.49	72
PEOPLE	10290	20.49	502

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	4.37	21
SEMI-PUBLIC (open spaces, schools, community centers)	2.39	12
SEMI-PRIVATE (cluster courts)	4.01	20
PRIVATE (dwellings, shops, factories, lots)	8.83	43
Shared streets	0.89	4
TOTAL	20.49	100

NETWORK EFFICIENCY
 $R = \frac{\text{network length(circulation)}}{\text{areas served(circulation, lots)}} = 162 \text{ M/HA}$
 AVERAGE LOT AREA
 $= \frac{(\text{Private} + \text{Semi-private})\text{Areas}}{\text{No. of Lots}} = 87 \text{ M}^2$

THE BASIC URBAN LAYOUT IS REPRESENTED BY BLOCKS. CLUSTERS/LOTS SUBDIVISIONS WITHIN THE BLOCKS REPRESENT ONE OF MANY OPTIONS.
REVISED LOCALITY LAND SUBDIVISION

Land Utilization

The existing project devotes almost two times more land for public use than the revised one, and consequently offers less dwelling/lot land and semi-public land. The revised layout reduces public land by replacing the gridiron layout for the grid layout, while providing cluster lots, which are owned in condominium with semi-private use courts. Also semi-public facilities are located where they can be used effectively.

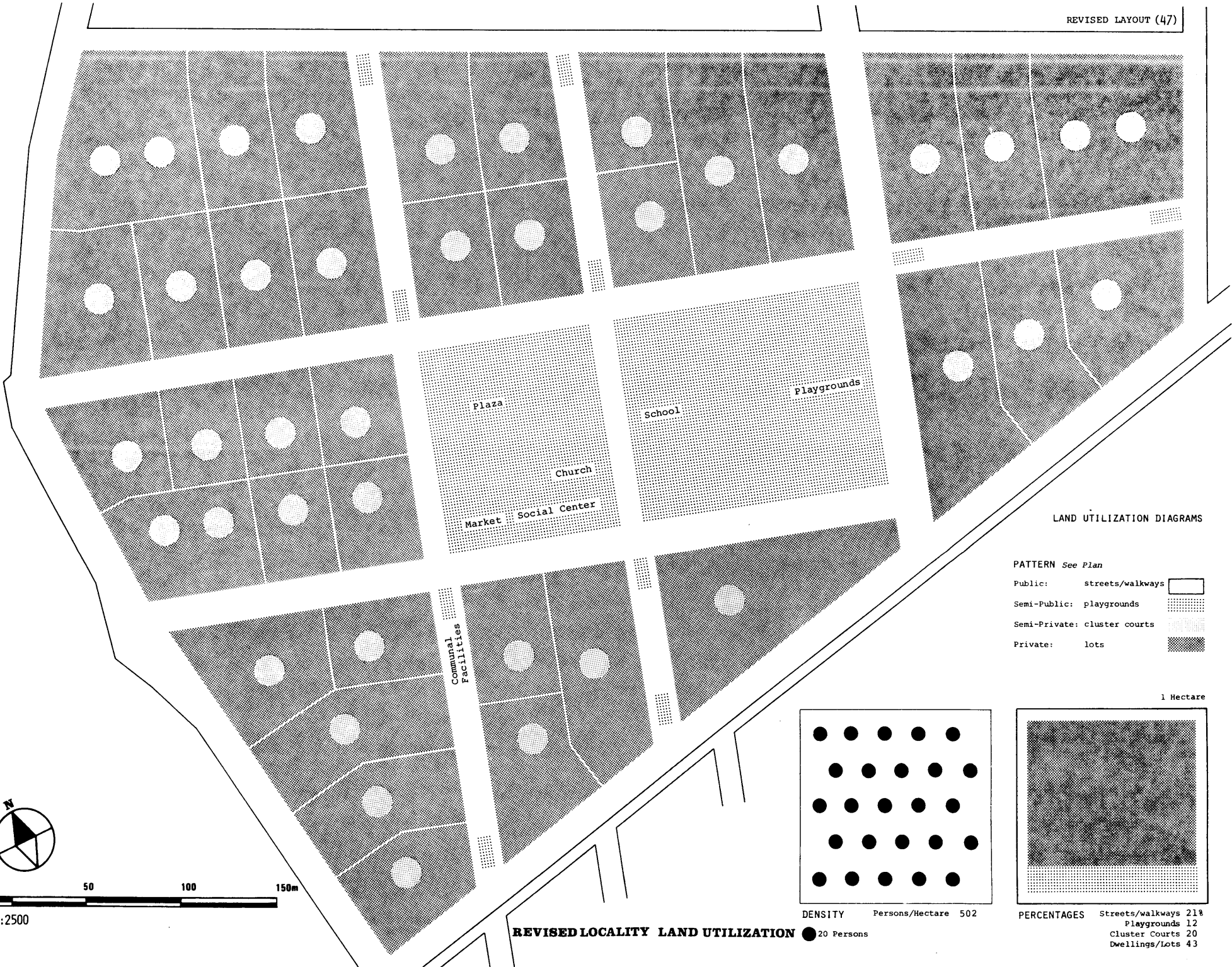
Community facilities are composed of: a plaza, a church, a market, a social center, a school, and playgrounds. These facilities may be the clue to the neighborhood's conformable identity. Communal facilities are located in some street entrances to encourage primarily pedestrian use of these streets.

The revised layout permits:

Flexibility in: - land use. Blocks permit the accommodation of different land uses (residential, commercial, light industries)
- residential densities and housing options.

Different types of land tenures.

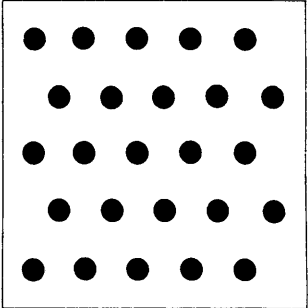
Expansion and transformation of housing systems.



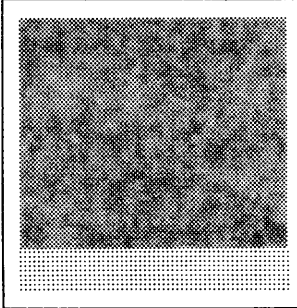
LAND UTILIZATION DIAGRAMS

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

1 Hectare



DENSITY Persons/Hectare 502



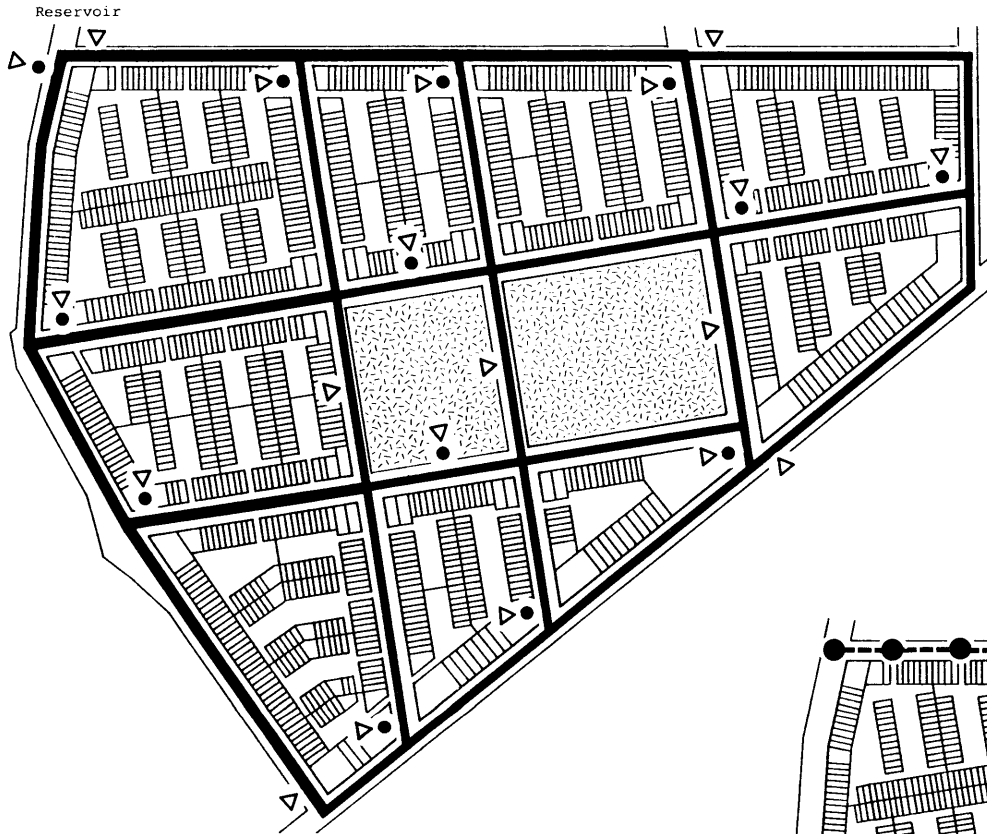
PERCENTAGES Streets/walkways 21%
Playgrounds 12%
Cluster Courts 20%
Dwellings/Lots 43%



1:2500

REVISED LOCALITY LAND UTILIZATION

● 20 Persons



WATER SUPPLY

KEY

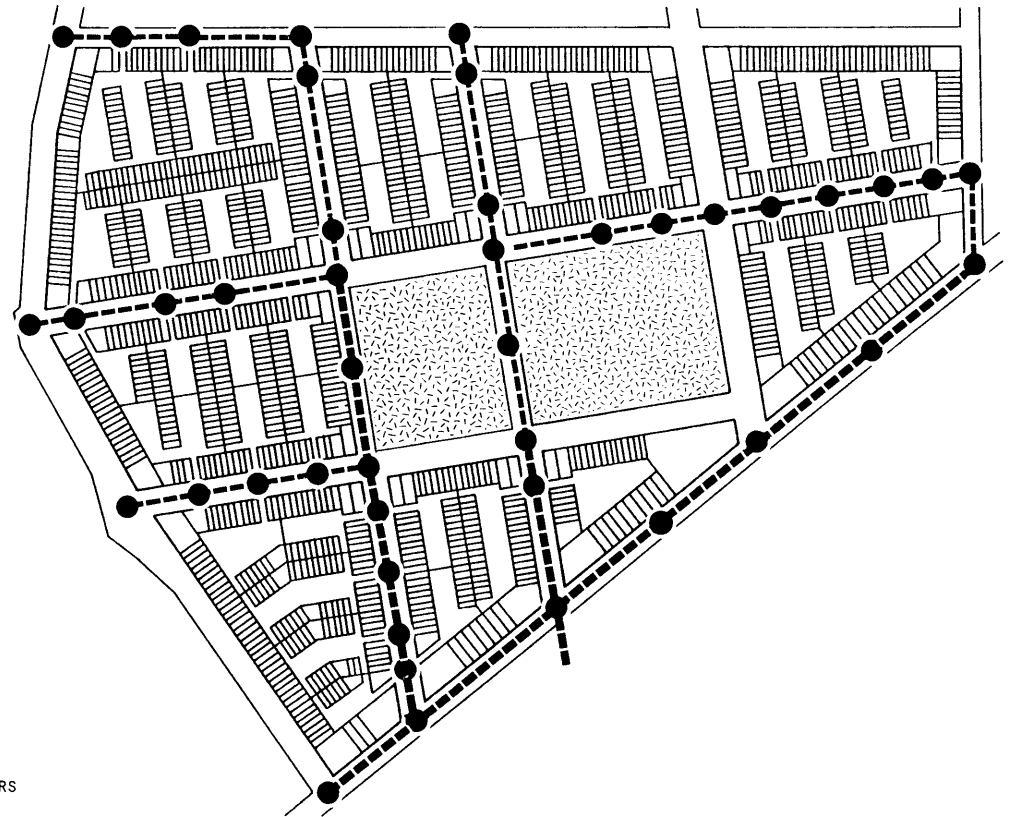
- FIRE HYDRANTS 11
- ▽ VALVES 17
- 4" PIPES
- 6" PIPES
- TOTAL PIPES 3960 METERS

ONLY PUBLIC LINES OF BASIC NETWORKS ARE SHOWN. SERVICE CONNECTIONS WILL BE PROGRESSIVELY DEVELOPED.

REVISED UTILITY NETWORKS



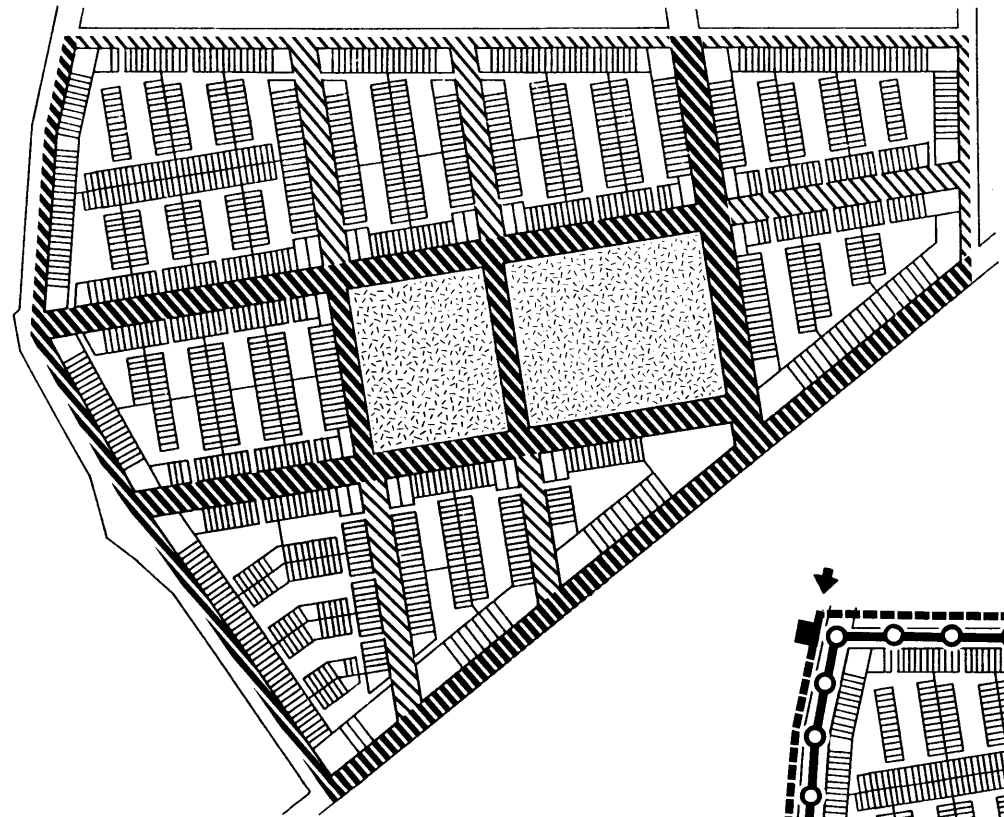
1:5000



SEWAGE DISPOSAL



KEY

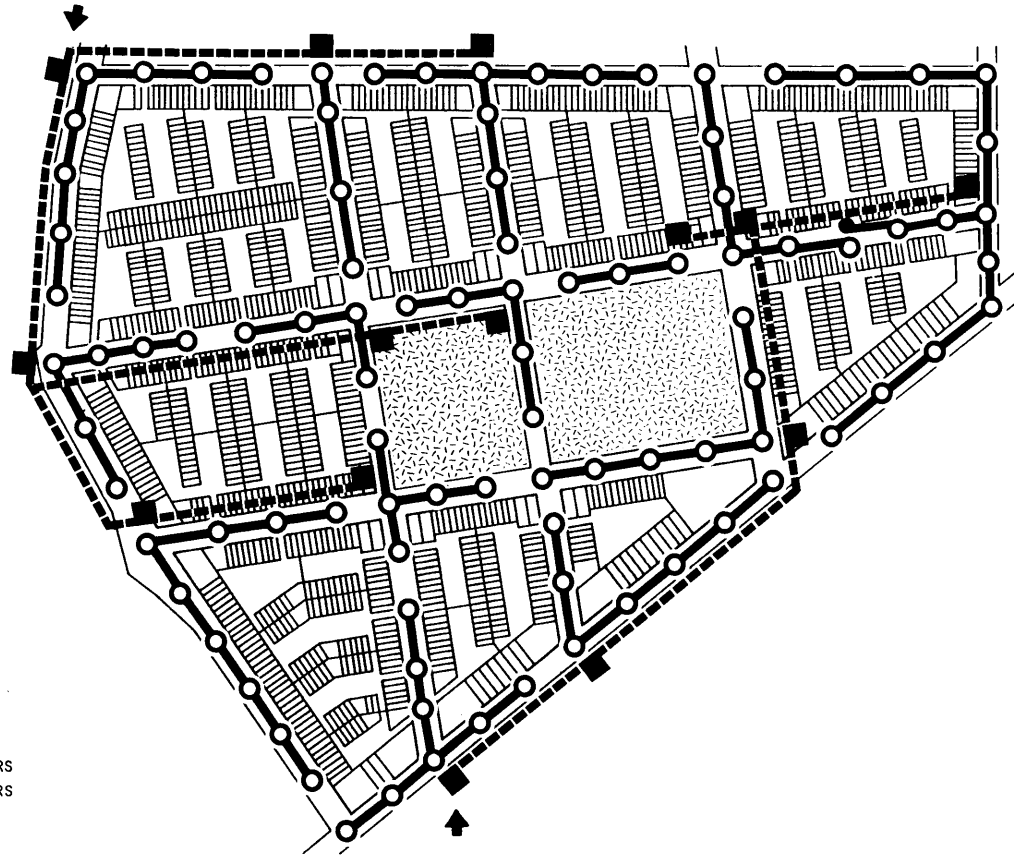
- MANHOLES 42 UNITS
- - - 8" PIPES
- - - 10" PIPES
- TOTAL PIPES 2259 METERS



CIRCULATION






KEY

-  FINISHED PAVING STREET MODE A (PEDESTRIANS)
-  MODE B (PEDESTRIANS AND VEHICLES)
- TOTAL 51502 METERS²



ELECTRICITY AND STREET LIGHTING

KEY

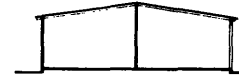
-  TRANSFORMERS 14 UNITS
-  POLES WITH LAMPS 80 UNITS
-  LOW TENSION LINES 2685 METERS
-  HIGH TENSION LINES 1735 METERS
-  CITY NETWORK CONNECTION

SUMMARY

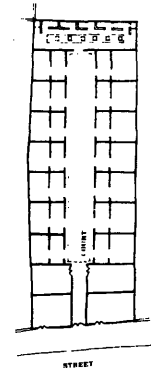
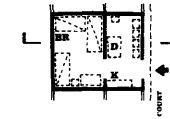
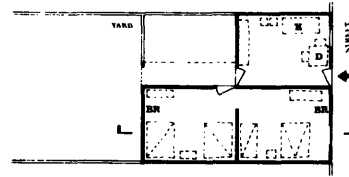
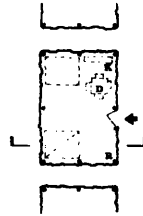
TIME/PROCESS PERSPECTIVE

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

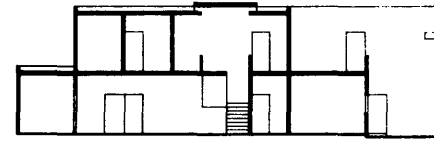
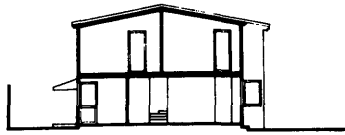
SECTION



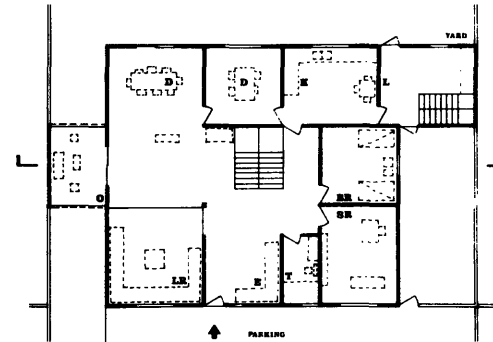
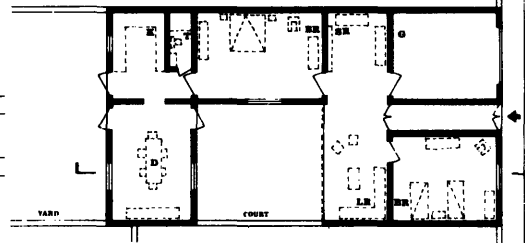
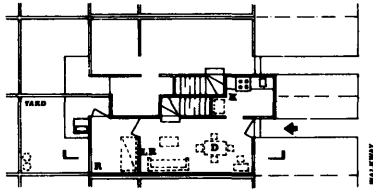
PLAN



IDENTIFICATION	Dwelling system		ROW / DETACHED SHANTIES CHOZAS	ROW / SEMIDETACHED HOUSES CASAS 'POPULARES'	COURT ROW ROOM / HOUSES VECINDADES / PRIVADAS
	Dwelling Configuration	Lot Stories Layout	Irregular remain land or medium narrow lots. 1 Compact multi-use room(s), sometimes shelters share semi-private space.	Small/medium narrow. 1-2 Rooms and small patios aside each other or central corridor, also backyard. (Rural remniscenses)	Big narrow. 1 Rooms or houses around semiprivate courtyard, and common or individual facilities.
Location	Block layout	Center/periphery (unclaimed land or private land). Accretion/Colonial. Acceptable.	Periphery/center (cheaper land, deteriorated areas). Gridiron and Colonial. Bad and acceptable.	Center Colonial (economic constraints). Acceptable.	
Origin	Localities	Universal. Morelos.	Universal. Imported in XVI century by Spanish conquerors. El Moraleta, Maria Auxiliadora.	Universal. Imported in XVI century by Spanish conquerors. Maria Auxiliadora.	
Urban population served		12 %	37 %	6 %	
PAST	User income groups	Very low	Low	Low	
	Dwelling utilization	Single/multiple	Single/multiple	Single/multiple	
	Population density	Medium/high	Low/medium	High	
	Trend	Continuing	Continuing	Proliferating	
PRESENT	User income groups	Very low	Low/very low/moderate	Low/very low	
	Dwelling utilization	Single/multiple	Single/multiple	Single/multiple	
	Population density	High	Low/medium	High	
	Trend	Continuing	Proliferating	Continuing	
FUTURE	User income groups	Very low	Low/moderate	Low/very low	
	Dwelling utilization	Single/multiple	Single/multiple	Single/multiple	
	Population density	High	Medium	High	
	Trend	Doubtfull	Proliferating	Continuing	
COMMENTS	Cultural acceptance	Yes	Yes	Doubtful (due to propinquity).	
	Income group feasibility	Unskilled newcomers, without capacity to pay for better dwelling.	Poor inhabitants, having as main priority land security tenure.	Unskilled newcomers, having as main priority accesibility to a job.	
	Model	In order to avoid shanties over uncontrolled land, should be developed: employment facilities, land/housing supply, control over unoccupied land.	Layout would be efficient if public circulation areas minimized and semipublic spaces provided. Construction materials and land speculation should be avoided. Construction code should be adapted to low dwelling standards.	Model provide maximization of private responsibility, minimization of lines of utilities, and services. Model as built can be upgraded in terms of physical state, sanitary and safety conditions. Revised model should allow more privacy.	



SECTION



PLAN

INSTITUTIONAL ROW HOUSES
CONJUNTOS HABITACIONALES

Small narrow.
1-2
Rooms aside each other.

Periphery.
Rectangular or irregular gridiron.
Acceptable.

Universal. Imported from Europe in XIX century.
La Estancia
5 %

Low/moderate
Single Medium Continuing

Low/moderate
Single Medium/high Continuing

Low/moderate
Single High/medium Proliferate

Yes
Salaried/Bureaucrats employees.

Revised layout should respond to the local user needs. Possibility of expansion and flexibility of spaces is recommended. Avoid land dispersion, and encourage user responsibility.

SEMI-DETACHED TRADITIONAL HOUSES
CASAS SEMICOLONIALES

Big rectangular.
1-2
Rooms and galleries around side/central patio, also backyard.

Center (oldest development).
Colonial (big lots were subdivided).
Acceptable.

Universal/hybrid. Imported in XVI century by Spanish conquerors.
Sangre de Cristo
30 %

High Multiple Low Proliferating

Moderate/High Single/multiple Low Stationary

Moderate Single Low Disappearing

Doubtful (preferences for imported models).

Upper classes.

The model provide a good land utilization and fitting to local environment. Where the model is big, spaces can be modified to arrange several functions.

SEMI-DETACHED / DETACHED HOUSES
CASAS RESIDENCIALES

Big rectangular.
1-2
Rooms together without focus activity, also big backyard.

Periphery (the best environments).
Gridiron.
Bad.

England. Imported through France/U.S.A. in XX century.
Calzada Galvan.
10 %

High Single/multiple Low Continuing

Moderate/high Single/multiple Low Proliferating

Moderate/high Single Low Proliferating

Yes (imported pattern, necessary the automobile).

Upper classes, moving out to the periphery.

A Revised model should avoid present tendency to encourage urban sprawl, and include traditional values in dwelling design.

Dwelling system

Lot Stories Dwelling Coconfiguration Land utilization Layout

Location Block layout Land utilization

Origin Localities Urban population served

User income groups Dwelling utilization Population density Trend

User income groups Dwelling utilization Population density Trend

User income groups Dwelling utilization Population density Trend

Cultural acceptance

Income group feasibility

Model

IDENTIFICATION

PAST

PRESENT

FUTURE

COMMENTS

PHYSICAL DATA SUMMARY

HOUSING SYSTEM	# of Urban Population Served	Localities	USER		DWELLING						LAND/LOT						DWELLING DEVELOPMENT					
			5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
			Income Group	Unit	Area	Utilizat'n	Tenure	Rent/Mort.	Loca-tion	Type	Area	No. Floors	Utili-zation	Tenure	Deve-loper	Mode	Builder	Construction Type	Phy State	Age	Pop. Densi.	
			Very Low	Shanty Room	50 m ² or more	Single	Legal Ownership	20% or less of income	Periphery	Row/Group	100 m ² or less	1	Public	Extralegal Ownership	Popular	Instant	Shack	Bad	5 years or less	Low		
			Low	Room	51 - 100 m ²	Multiple	Legal Rental	21% or more of income	City Center	Semi-detached	101 - 250 m ²	2	Semi-Public	Extralegal Rental	Public	Instant	Adobe	Fair	6 - 15 years	Medium		
			Middle	House	101 m ² or more					Detached	251 m ² or more	3 or more	Private	Legal Rental	Private	Progressive	Wood	Good	16 years or more	High		
			High	Apartment						Walk-up			Semi-Private	Legal Rental	Progressive	Masonry/Concrete	Concrete					
I Squatters	2	(*) Morelos																				
II Consolidators																						
A Institutional "Site and Services"	2	1 Colima Lumber/Benito Juarez																				
B Private Speculative	35	2 El Moralet																				
III Tenements	6	3 Maria Auxiliadora																				
IV Institutional "Package"	5	4 La Estancia																				
V Traditional	40	(*) Area Central																				
VI Upper Income	10	(*) Lomas de Circunvalacion																				
Total Population	108,000																					

(*) Cases not included in study

The physical data of the six housing systems existing in the urban area of Colima is summarized in the physical data table. The table permits: a) a comprehensive view of the spectrum of dwelling types; b) a comparison and determination of patterns.

HOUSING SYSTEMS:

(1-4) The six housing systems found in Colima are plotted in the table identifying the different users by income, physical characteristics of their dwellings and land/lot, and dwelling development. Four cases were studied in detail in selected dwelling environments where most of the lower income groups live, and represent a great portion of the urban population.

USER INCOME GROUP:

(5) The income level is the basic indicator with the expected pattern: the higher the income the higher the level of indicated characteristics.

DWELLING:

(6) The dwelling unit pattern in terms of increasing income level is: shanty, room, and house/apartment. Some shanty dwellers are squatters, who have the least financial resources for housing. Other shanty or room dwellers are builders of "progressive" houses, owners of a piece of land on In-

stitutional "Site and Services" or Private settlements, that sometimes lodge relatives or friends who cannot afford housing since they are newcomers. Tenants of rooms or houses, can save by living in tenements court rooms/houses in central areas, or in peripheral Private settlements. Subsidized house dwellers have the highest income among the lower income groups. House dwellers with a high standards own the dwellings and are in the upper income groups. Eventually this last income group rent apartments or houses of high standards.

(7) The lower the income the less capacity to afford dwelling area, however in the case of Tenement court rooms/houses dwellers, the priority for saving is prevalent over dwelling area; also houses with high standards are given to beneficiaries of Institutional "Package" Settlements, without looking to the user's area needs, and are often crowded.

(8) Most of the city dwellings are "multiple" utilized, with the exception of tenements and Institutional "Package" cases due to the small dwelling area provided.

(9) Renters are found primarily in Tenements and secondarily in Private speculative settlements.

(10) The percentage of housing expenditure for rent/mortgage is less than 20% in all the cases, probably due in the low income groups to the low housing standards and the small size of the city; although this percentage is somewhat higher in progressive house builders in Private or Institutional "Site and Services" settlements.

LAND/LOT:

(11-12) Proximity of residential to working areas is still not an issue in the city because of its small size (about 6 km. in diameter). The city center is occupied by a mixture of income users, with income decreasing from the center to the outside, and where most dwellings are row or semi-detached. The city periphery is more segregated by incomes, where lower income occupants live in row or semi-detached dwellings, and higher income occupants live in semi-detached or detached dwellings.

COMMUNITY FACILITIES, UTILITIES/SERVICES SUMMARY

Localities	COMMUNITY FACILITIES			UTILITIES AND SERVICES										Localities	# of Urban Population Served	HOUSING SYSTEM			
	Health	School, Playgrounds	Recreation	Water	Sewerage	Electricity	Street Lighting	Paved Roads, Walkway	Storm Drainage	Public Transportation	Refuse Collection	Gas (Tank)	Telephone				Fire Protection	Police	
(*)		■	■			■				■	■						(*) Morelos	2	I Squatters
1		■	■	■		■				■	■						1 Colima Lumber/ Benito Juarez	2	II Consolidators A Institutional "Site and Services"
2	■	■	■	■		■	■			■	■	■	■	■	■	■	2 El Moraletе	35	B Private Speculative
3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	3 Maria Auxiliadora	6	III Tenements
4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	4 La Estancia	5	IV Institutional "Package"
(*)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	(*) Area Central	40	V Traditional
(*)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	(*) Lomas de Circunvalacion	10	VI Upper Income
																		108,000	Total Population

(*) Cases not included in study

(13) Bigger lots correspond to semi-detached or detached dwellings, located in the city periphery where land is more available and cheaper.

(14) Almost all of the city dwellings are 1-2 floors.

(15) In the Squatter areas users have control of land around their shelters because it becomes essential as a living area. In Tenement courts users are encouraged to assume responsibility over the shared areas. All other lot with ownership tenure has private use of it.

(16) The two extralegal cases are the Squatters and the Private speculative settlements. The last case is typical of development on "ejidal land" (cultivable but not salable land).

DWELLING DEVELOPMENT:

(17) The popular sector developer is found in the lowest income group or Squatters. The private sector deals with land subdivision and dwellings for low, moderately low, middle, and high income groups. The public

sector, with only a small housing contribution, is concerned with the provision of "Site and Services" projects and "Package" projects for the low and moderately low income groups.

(18-19) The lower income groups build their dwellings progressively through self-help or artisan methods. Upper income groups construct their dwellings instantly with small or large contractors.

(20-21) The lower income groups make their dwellings of shack, masonry and wood. The Upper income groups use masonry, wood and concrete. "Bad" and "fair" physical state is found in lower income dwellings, "fair" and "good" in the upper income dwellings.

(22) The oldest localities are found in the city center.

(23) Population density is in function of income of the users, dwelling unit and type, and dwellig location. Higher population densities are found in the lower income users; and/or row houses or tenements rooms/houses; and/or central city location.

COMMUNITY FACILITIES, UTILITIES AND SERVICES:

The data plotted in the table indicate that the level of services available is related to the income sector, dwelling location, and age of the settlement. Squatters have the lowest level of services. Progressively built dwellings have few services, in which the case of Institutional "Site and Services" is provided with fewer services than the older Private speculative case. Tenements are provided with more services than the previous cases, because of its central location and consequent accessibility to services. Institutional "Package" areas with higher incomes among the lower income groups, are provided with almost complete services. The services that are most lacking are sewage, paved streets, and storm drainage. The services that are commonly available are schools, public transportation, refuse collection, electricity and water supply.

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

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

LAND UTILIZATION SUMMARY

1 COLIMA LUMBER

Private Low Income Row Shanties/Houses

Public area is excessive because of the small blocks which increase the circulation lengths, and the open spaces which are without control. Layout may be improved by minimizing public land. Good population density and good percentage of semi-public land are achieved.

2 EL MORALETE

Private Low Income Row Rooms/Houses

Semi-public land is scarce, because too much emphasis on land for speculation. Future layout should provide larger circulation intervals, higher population densities and additional semi-public land.

3 MARIA AUXILIADORA

Private Moderately Low Income Grouped Rooms/Houses

Semi-public land is scarce, good percentage of public areas is achieved. The layout may be improved by providing additional semi-public areas (perhaps in the empty center of the blocks).

4 LA ESTANCIA EXISTING

Public Moderately Low Income Row Houses

Excessive land is devoted to public use because of too much circulation areas, wasted land for unused parking places. Location of open spaces is poor. Layout may be improved by simplifying the block layout, and minimizing public land.

LA ESTANCIA REVISED

Public Moderately Low Income Row Houses

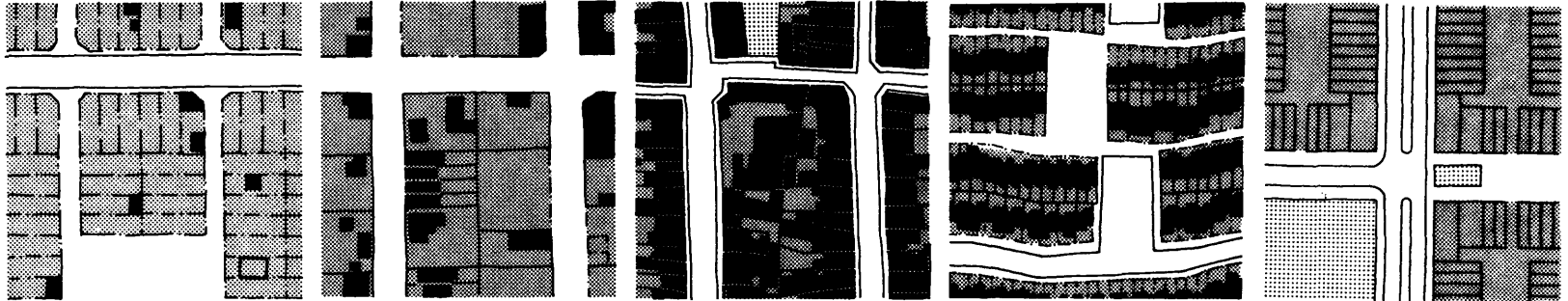
Public streets are minimized by providing condominium clusters with semi-public land and limiting circulation to only necessary access. Desired population density and optimum land utilization are achieved.

The criteria used in land utilization are the following:

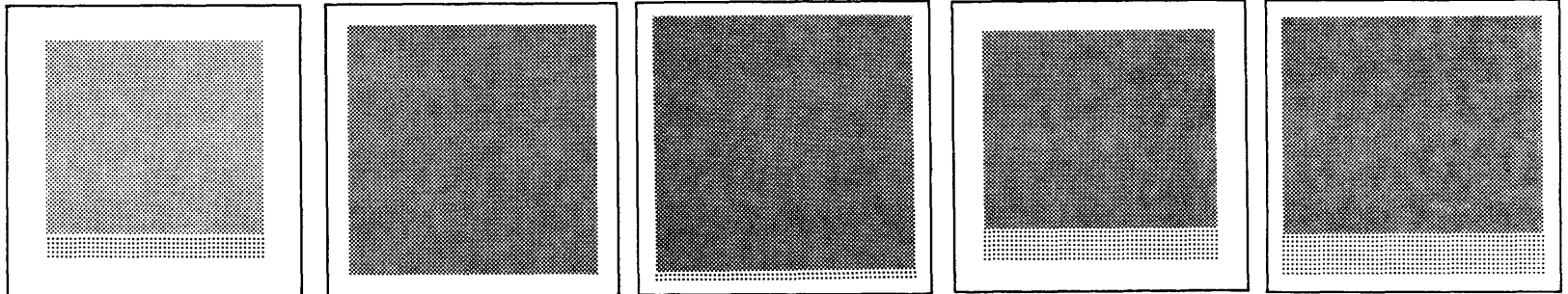
LAYOUT PATTERN: Lot configuration, blocks and circulation determine infrastructure network lengths; e.g. certain layouts have excessive lengths, resulting in higher cost per hectare.

LAND UTILIZATION PERCENTAGES: Proportion of land use areas determines 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 installation and extensive maintenance for the public sector.

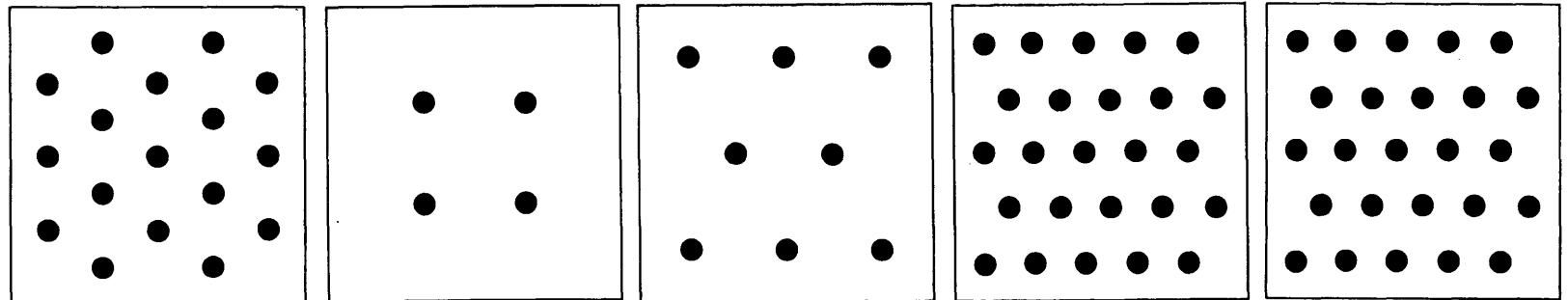
POPULATION DENSITY: Number of persons per hectare is related to the number of dwellings per hectare. This determines the intensity of land use; e.g. low densities mean higher cost of development per hectare.



PATTERN



PERCENTAGES	Streets/Walkways	45%	25%	20%	42%	21%
	Playgrounds	6	-	2	5	12
	Cluster Courts	-	-	2	-	20
	Dwellings/Lots	49	75	76	52	43



DENSITY	Persons/Hectare	345	74	157	488	502
---------	-----------------	-----	----	-----	-----	-----

● 20 Persons

UTILITY NETWORKS SUMMARY

1 COLIMA LUMBER

2 EL MORALETE

3 MARIA AUXILIADORA

4 LA ESTANCIA EXISTING

LA ESTANCIA REVISED

Private Low Income Row Shanties/Houses

Private Low Income Row Rooms/Houses

Private Moderately Low Income Grouped Rooms/Houses

Public Moderately Low Income Row Houses

Public Moderately Low Income Row Houses

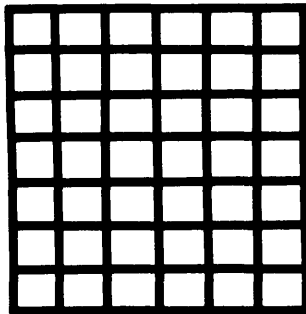
The bad network efficiency is reflected in the high index for utilities. The area of streets is not as high as expected because of the narrow width.

Utilities were not evaluated because data was not available and utilities are incomplete.

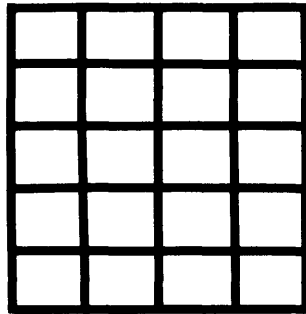
The good network efficiency results in a good index for utilities, although low population density makes the layout costly. Low indexes for street areas and number of manholes are the result of narrow width and long spacing for manholes.

The bad network efficiency is reflected in the high index for utilities.

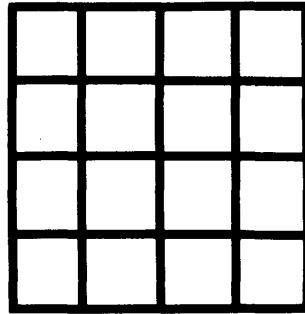
Good network efficiency gives the lowest index for utilities, meaning the cheapest layout.



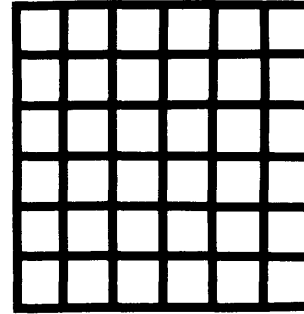
329 m/ha



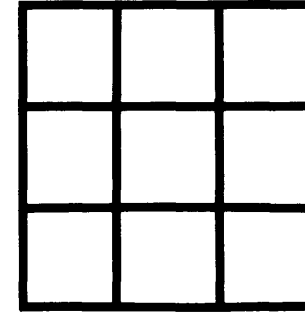
222 m/ha



192 m/ha



310 m/ha



162 m/ha

Comparative graphs represent figures in terms of utilities per hectare. The value of 1 is assigned to the Revised layout in order to get comparable values for the other layouts. Since utility networks tend to follow the public streets the circulation network efficiency determines the utility efficiency. Storm drainage was not evaluated in all the cases because data was not available.

$$\text{Network efficiency} = \frac{\text{network length}}{\text{area served}} = \text{m/ha}$$

1.5	██████████	NO DATA
0.7	INADEQUATE	NO DATA
	NOT PROVIDED	NO DATA
2.7	██████████	NO DATA
1.0	██████████	NO DATA
1.4	██████████	NO DATA
	NO DATA	NO DATA
	NO DATA	NO DATA
	NO DATA	NO DATA
	NOT APPLICABLE	NO DATA
2.3	██████████	NO DATA
	NOT APPLICABLE	NO DATA
1.7	██████████	NO DATA

1.0	██████████
0.3	INADEQUATE
	NOT PROVIDED
1.8	██████████
0.8	██████████
0.8	██████████
	NO DATA
	NO DATA
	NO DATA
	NO DATA
	NO DATA
1.2	██████████
	NOT APPLICABLE
1.2	██████████

1.4	██████████
1.5	██████████
	NOT PROVIDED
2.3	██████████
2.3	██████████
1.5	██████████
	NO DATA
	NO DATA
	NO DATA
1.1	██████████
2.0	██████████
1.0	██████████
2.1	██████████

1.0	██████████
1.0	██████████
1.0	██████████
1.0	██████████
1.0	██████████
	NO DATA
	NO DATA
	NO DATA
1.0	██████████
1.0	██████████
1.0	██████████

Network Efficiency	
Pipes	WATER SUPPLY
Valves	
Hydrants	
Pipes	SEWAGE DISPOSAL
Manholes	
Streets	
Pipes	CIRCULATION/STORM DRAINAGE
Inlets	
Manholes	
High Tension	ELECTRICITY/STREET LIGHTING
Low Tension	
Transformers	
Poles/Lamps	

GLOSSARY

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

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

-SECOND PREFERENCE: definitions from technical dictionaries, text books, or reference manuals.

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

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

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

- ACCESSES. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems such as: waterways, airlines, etc.) (U.S.D.P.)
- ACTUAL LAND COST. "(The cost of land is)...set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the users themselves in competition." (Turner, 1971)
- AD VALOREM (TAX). A tax based on a property's value; the value taxed by local governments is not always or even usually the market value, but only a valuation for tax purposes. (U.S.D.P.)
- AIRPORT DISTURBANCE. The act or process of destroying the rest, tranquility, or settled state of (the site by the annoyance of airport noise, vibration, hazards, etc.) (Merriam-Webster, 1971)
- AIRPORT ZONING RESTRICTIONS. The regulation of the height or type of structures in the path of moving aircraft. (Abrams, 1971)
- ALTERNATING CURRENT (A.C.) (an electric current that reverses its direction of flow at regular intervals. (ROTC ST 45-7, 1953)
- AMENITY. Something that conduces to physical or material comfort or convenience, or which contributes satisfaction rather than money income to its owner. (Merriam-Webster, 1971)
- AMPERES. Amperes (amp) are a measure of the rate of flow of electricity. It is somewhat comparable to the rate of flow of water (quantity/time). A steady current produced by one volt applied across a resistance of one ohm. (ROTC ST 45-7, 1953)
- APPRAISAL. An estimate and opinion of value, especially by one fitted to judge. (Merriam-Webster, 1971)
- APPROACHES. The main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context. (U.S.D.P.)
- ASSESSED VALUE. A valuation placed upon property by a public officer or board as a basis for taxation. (Keyes, 1971)
- ASSESSMENT. The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Keyes, 1971)
- BACKFILL. Earth or other material used to replace material removed during construction, such as in culvert, sewer, and pipeline trenches and behind bridge abutments and retaining walls or between an old structure and a new lining. (DePina, 1972)
- BARRIER. (A boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster, 1971)
- BETTERMENT (TAX). A tax on the increment in value accruing to an owner because of development and improvement work carried out by local authorities. (U.S.D.P.)
- BINDER COURSE. A transitional layer of bituminous paving between the crushed stone base and the surface course (to increase bond between base and surface course). (DePina, 1972)
- BITUMINOUS. A coating of or containing bitumin; as asphalt or tar. (DePina, 1972)
- BLOCK. A block is a portion of land bounded and served by lines of public streets. (U.S.D.P.)
- BOUNDARY. Something (a line or area) that fixes or indicates a limit or extent (of the site). (Merriam-Webster, 1971)
- BUILDING CODE. "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)
- BUILDING DRAIN. Lowest horizontal piping of the building drainage system receiving discharge from soil, waste, and other drainage pipes. It is connected to the building sewer. (ROTC ST 45-7, 1953)
- BUILDING MAIN. Water-supply pipe and fittings from the water main or other source of supply to the first branch of the water-distribution system of a building. (ROTC ST 45-7, 1953)
- CESS POOL. An underground catch basin that is used where there is no sewer and into which household sewage or other liquid waste is drained to permit leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)
- CIRCULATION. System(s) of movement/passage of people, goods from place to place; streets, walkways, parking areas. (U.S.D.P.)
- CLAY. A lusterless colloidal substance, plastic when moist (crystalline grains less than 0.002mm in diameter). (U.S.D.P.)
- CLEANOUT. A plug or similar fitting to permit access to traps or sewer lines. Cleanouts are usually used at turns and other points of collection. (ROTC ST 45-7, 1953)
- CLIMATE. The average condition of the weather at a particular place over a period of years as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)
- COLLECTION SYSTEM. The system of pipes in a sewage network, comprised of house service, collection lines, manholes, laterals, mains. (U.S.D.P.)
- COMBINED SEWER. A sewer that carries both storm water and sanitary or industrial wastes. (DePina, 1972)
- COMMUNITY. The people living in a particular place or region and usually linked by common interests: the region itself; any population cluster. (U.S.D.P.)
- COMMUNITY FACILITIES/SERVICES. Facilities/services used in common by a number of people. It may include: schools, health, recreation, police, fire, public transportation, community center, etc. (U.S.D.P.)
- COMMUNITY RECREATION FACILITIES. Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, exercise, self-expression, or release from boredom, worry, or tension. (U.S.D.P.)
- COMPONENT. A constituent part of the utility network. (U.S.D.P.)
- CONDOMINIUM. Condominium is a system of direct ownership of a single unit in a multi-unit whole. The individual owns the unit in much the same manner as if it were a single family dwelling; he holds direct legal title to the unit and a proportionate interest in the common land and areas. Two types of condominiums are recognized: *HORIZONTAL*: detached, semi-detached, row/grouped dwelling types; *VERTICAL*: walk-up, high-use dwelling types. (U.S.D.P.)
- CONDUCTORS. Materials which allow current to flow such as aluminum, copper, iron. (ROTC ST 45-7, 1953)
- CONDUIT. A pipe or other opening, buried or above ground, for conveying hydraulic traffic, pipelines, cables, or other utilities. (DePina, 1972)
- CONSERVATION EASEMENT. An easement acquired by the public and designed to open privately owned lands for recreational purposes or to restrict the use of private land in order to preserve open space and protect certain natural resources. (U.S.D.P.)
- CUNURBATION. Area of large urban communities where towns, etc. have spread and became joined beyond their administrative boundaries. (A.S. Hornby, A.P. Cowie, J. Windsor Lewis, 1975)
- CUNURBATION. An aggregation or continuous network of urban communities. (Merriam-Webster, 1963)
- CORPORATION COCK/CORPORATION STOP. A water or gas cock by means of which utility-company employees connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)
- COSTS OF URBANIZATION. Include the following: *CAPITAL*: cost of land and infrastructure; *OPERATING*: cost of administration, maintenance, etc.; *DIRECT*: include capital and operating costs; *INDIRECT*: include environmental and personal effects. (U.S.D.P.)
- CURRENT (See: ALTERNATING CURRENT, DIRECT CURRENT). An electric current is a movement of positive or negative electric particles (as electrons) accompanied by such observable effects as the production of heat, of a magnetic field, or of chemical transformation. (Merriam-Webster, 1971)
- CYCLE. One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)
- DAM. A barrier preventing the flow of water; a barrier built across a water course to confine and keep back flowing water. (Merriam-Webster, 1971)
- DEPRECIATION ACCELERATION (TAX). A tax incentive designed to encourage new construction by allowing a faster write-off during the early life of a building. (U.S.D.P.)
- DESIGN. 1) The arrangement of elements that make up a work of art, a machine or other man-made object. 2) The process of selecting the means and contriving the elements, steps, and procedures for producing what will adequately satisfy some need. (Merriam-Webster, 1971)
- DETACHED DWELLING. Individual dwelling unit, separated from others. (U.S.D.P.)
- DEVELOPMENT. Gradual advance or growth through progressive changes; a developed tract of land (U.S.D.P.)
- DEVELOPMENT SIZE. There are two general ranges of size: *LARGE*: may be independent communities requiring their own utilities, services, and community facilities; *SMALL*: generally are part of an adjacent urbanization and can use its supporting utilities, services, and community facilities. (U.S.D.P.)
- DIRECT CURRENT (D.C.) (An electric current that) flows continuously in one direction. (ROTC ST 45-7, 1953)
- DISCHARGE (Q). Flow from a culvert, sewer, channel, etc. (DePina, 1972)
- DISTANCE. The degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest path adjoining them (paths of travel). (Merriam-Webster, 1971)
- DISTRIBUTION (STATION). The part of an electric supply system between bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)
- DISTURBED SOIL. Soils that have been disturbed by artificial process, such as excavation, transportation, and compaction in fill. (U.S.D.P.)
- DRAINAGE. Interception and removal of ground water or surface water, by artificial or natural means. (De Pina, 1972)
- DUST/DIRT. Fine dry pulverized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster, 1971)
- DWELLING. The general, global designation of a building/shelter in which people live. A dwelling contains one or more 'dwelling units'. (U.S.D.P.)
- DWELLING BUILDER. Four groups are considered: *SELF-HELP BUILT*: where the dwelling unit is directly built by the user or occupant; *ARTISAN BUILT*: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services; *SMALL CONTRACTOR BUILT*: where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer; 'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes; *LARGE CONTRACTOR BUILT*: where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex. (U.S.D.P.)
- DWELLING DENSITY. The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). Net density is the density of selected, discrete portions of an area (ex. including only lots). (U.S.D.P.)
- DWELLING DEVELOPER. Three sectors are considered in the supply of dwellings: *POPULAR SECTOR*: the marginal sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for 'self use' and sometimes for profit. *PUBLIC SEC-*

TOR: the government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Public Sector for service (non-profit or subsidized housing). **PRIVATE SECTOR:** the individuals, groups or societies, who have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private Sector for profit. (U.S.D.P.)

DWELLING DEVELOPMENT MODE. Two modes are considered: **PROGRESSIVE:** the construction of the dwelling and the development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site. **INSTANT:** the formal development procedure in which all structures and services are completed before occupation. (U.S.D.P.)

DWELLING FLOORS. The following numbers are considered: **ONE:** single story; generally associated with detached, semi-detached and row/group dwelling types. **TWO:** double story; generally associated with detached, semi-detached and row/group dwelling types. **THREE OR MORE:** generally associated with walk-up and high-rise dwelling types. (U.S.D.P.)

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

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

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

DWELLING PHYSICAL STATE. A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; the shanty unit is not evaluated. **BAD:** generally poor state of structural stability, weather protection, and maintenance. **FAIR:** generally acceptable state of structural stability, weather protection, and maintenance with some deviation. **GOOD:** generally acceptable state of structural stability, weather protection, and maintenance without deviation. (U.S.D.P.)

DWELLING TYPE. The physical arrangement of the dwelling unit: **DETACHED:** individual dwelling unit, separated from others. **SEMI-DETACHED:** two dwelling units sharing a common wall (duplex). **ROW/GROUPED:** dwelling units grouped together linearly or in clusters. **WALK-UP:** dwelling units grouped in two to five stories with stairs for vertical circulation. **HIGH-RISE:** dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(58) URBAN DWELLING ENVIRONMENTS

gas network; telephone network, public transportation; police and fire protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

LATRINE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or

a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MODE OF TRAVEL. Manner of moving from one place (the

site) to another (other parts of the urban context). (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Webster, 1971)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TENURE. Two situations of tenure of the dwelling units and/or the lot/land are considered: *LEGAL*: having formal status derived from law; *EXTRALEGAL*: not regulated or sanctioned by law. Four types of tenure are considered: *RENTAL*: where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land; *LEASE*: where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization); *OWNERSHIP*: where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies; *EMPLOYER-PROVIDED*: where the users are provided a dwelling unit by an employer in exchange for services, i.e. domestic live-in servant. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

USER INCOME GROUPS. Based upon the subsistence (minimum wage) income per year, five income groups are distinguished: *VERY LOW* (below subsistence level): the income group with no household income available for housing, services, or transportation; *LOW* (1 x subsistence level): the income group that can afford no or very limited subsidized housing; *MODERATE* (3 x subsistence level): the income group that can afford limited housing and rent only with government assistance; *HIGH* (5 x subsistence level): the income

group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; *VERY HIGH* (10 x subsistence level): the income group that represents the most economically mobile sector of the population. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

REFERENCES

BOOKS

AREA HANDBOOK FOR MEXICO, American University, Washington, D.C., U.S. Government Office, 1970.

BACKGROUND NOTES-MEXICO, Department of State, Printing Office Public Documents, Washington, D.C., U.S. 1975.

CENSUS GENERAL DE POBLACION-COLIMA, Mexico, 1900-1970.

DIRECTORIO DEL ESTADO DE COLIMA, J. Oseguera V., Colima, Mexico, 1954, 1964.

EL COLIMA DE AYER, F. Hernandez E., Colima, Mexico, 1968.

ELEMENTARY EVALUATION OF FIVE PROJECT LAYOUTS, Urban Settlement Design in Developing Countries Program, M.I.T., Cambridge, 1976.

EL ESTADO DE COLIMA-SITUACION Y NECESIDADES ACTUALES DE VIVIENDA, Colima, Mexico, 1967.

ESTADO DE COLIMA, G. de la Mora, Mexico, 1970.

ESTADO DE COLIMA, PRI-IEPES, Colima, Mexico, 1975.

GUADALAJARA Y SU REGION, Helene Riviere D'Arc, Mexico, 1973.

GUIDE FOR SURVEY-EVALUATION OF URBAN DWELLING ENVIRONMENTS, John M. Baldwin, M.I.T., Cambridge, U.S., 1974.

HOGAR PARA NINOS ABANDONADOS, F.J. Cardenas M., ITESO Thesis, Guadalajara, Mexico, 1975.

INVESTIGACION SOBRE LA VIVIENDA EN EL SECTOR DE INGRESOS BAJOS, Z. Campos, F. Cardenas, L. Cardenas, P. Ferraez, R. Govea, B. Lopez, L. Meillon, A. Pimentel, C. Portillo, Colima, Mexico, 1976.

INVESTIGACION SOBRE LA VIVIENDA EN EL SECTOR DE INGRESOS BAJOS, ITESO, Tomas Sudra, Guadalajara, Mexico, 1974.

LA DESCRIPCION GEOGRAFICA DEL PARTIDO DE COLIMA EN 1793-EL ENSAYO ESTADISTICO SOBRE EL TERRITORIO DE COLIMA EN 1846, Coleccion Pena Colorada, Mexico, 1974

LA ESTRUCTURA INTERNA DE LA CIUDAD, EL CASO LATINO-AMERICANO, O. Yvnousky, Buenos Aires, Argentina, 1968

OXFORD ADVANCED LEARNER'S DICTIONARY OF CURRENT ENGLISH, A.S. Hornby, London, 1974.

PROGRAMA DE DESARROLLO DEL ESTADO DE COLIMA, Plan Lerma, Mexico, 1974.

PROBLEMATICA DEL ESTADO DE COLIMA, R. Romero A., Tijuana, Mexico, 1972.

URBAN DWELLING ENVIRONMENTS: CUERNAVACA, MEXICO, L.R. Chavez, M.I. Vargas, M.I.T. Thesis, Cambridge, U.S., 1976.

URBAN DWELLING ENVIRONMENTS: BOGOTA, COLOMBIA, J.E. Robledo, M.I.T. Thesis, Cambridge, U.S., 1976.

URBAN DWELLING ENVIRONMENTS: MEXICO CITY, J. Bazan, J.L. Cortez, R. Davila, E. Espinasa, M.I.T. Thesis, Cambridge, U.S., 1974.

URBANIZATION MODEL, Urban Settlement Design in Developing Countries Program, M.I.T., Cambridge, U.S., 1975.

URBANIZATION PRIMER-FOR DESIGN OF SITE AND SERVICES PROJECTS, H. Caminos, R. Goethert, World Bank, Urban Projects Department, U.S., 1976.

URBAN SERVICES-SURVEY, Urban Settlement Design in Developing Countries Program, M.I.T., Cambridge, U.S., 1975.

INSTITUTIONS IN COLIMA

AGUA Y ALCANTARILLADO-MUNICIPIO

CAPFCE (Comite Administrador del Programa Federal de Construccion de Escuelas)

COMISION FEDERAL DE ELECTRICIDAD

COMITE PROMOTOR DEL DESARROLLO SOCIO-ECONOMICO DEL ESTADO DE COLIMA

DEPARTAMENTO DE CATASTRO DEL ESTADO

DEPARTAMENTO DE TRANSITO DEL ESTADO

INDECO (Instituto Nacional para el Desarrollo de la Comunidad)

INFONAVIT (Instituto del Fondo Nacional de la Vivienda para los trabajadores)

INGENIERIA SANITARIA. SECRETARIA DE SALUBRIDAD Y ASISTENCIA

INSPECCION MUNICIPAL

OBRAS PUBLICAS-ESTADO

OBRAS PUBLICAS-MUNICIPIO

OBSERVATORIO DE COLIMA. SECRETARIA DE AGRICULTURA Y GANADERIA

PLAN LERMA. ASISTENCIA TECNICA.

EXPLANATORY NOTES

QUALITY OF INFORMATION

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

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

QUALITY OF SERVICES, FACILITIES AND UTILITIES

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

METRIC SYSTEM EQUIVALENTS

Linear Measures

1 centimeter	= 0.3937 inches
1 meter (100 centimeters)	= 39.37 inches or 3.28 feet
1 kilometer (1,000 meters)	= 3,280.83 feet or 0.62137 miles
1 inch	= 2.54 centimeters
1 foot (12 inches)	= 0.3048 meters
1 mile (5,280 feet)	= 1.60935 kilometers

Square Measures

1 square meter	= 1,550 square inches or 10.7639 square feet
1 hectare (10,000 sq. mts.)	= 2.4711 acres
1 square foot	= 0.0929 square meters
1 acre (43,560 sq. feet)	= 0.4087 hectares

DOLLAR EQUIVALENTS

All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent;
1 U.S. dollar = 12.5 Pesos (August 1976).