

URBAN DWELLING ENVIRONMENTS IN RAPIDLY GROWING CITIES  
MECCA, SAUDI ARABIA

by

GHAZI SAHAL AL-OTAIBI

School of Engineering, University of Riyadh, Riyadh

1977

Submitted in Partial Fulfillment  
of the Requirements for the  
Degree of  
Master of Architecture in Advanced Studies  
at the  
Massachusetts Institute of Technology,  
May, 1980

© Ghzi Sahal Al-Otaibi, 1980

The Author hereby grants to M.I.T. permission to reproduce and  
to distribute publicly copies of this thesis document in whole  
or in part.

Signature of Author.....

Department of Architecture, May, 1980

Certified by.....

Horacio Caminos, Professor of Architecture

Thesis Supervisor.

Rofoh  
MASSACHUSETTS INSTITUTE  
OF TECHNOLOGY

MAY 30 1980

Accepted by..... LIBRARIES ..

Julian Beinart, Professor of Architecture



URBAN DWELLING ENVIRONMENTS IN RAPIDLY GROWING CITIES

MECCA, SAUDI ARABIA

by

GHAZI SAHAL AL-OTAIBI

Submitted to the Department of Architecture  
on May 9, 1980 in partial fulfillment of the requirements  
for the degree of Master of Architecture in Advanced Studies

ABSTRACT

This study identifies, analyzes, and evaluates the existing dwelling environments in the city of Mecca, Saudi Arabia, in terms of housing systems and socio-economic conditions.

The focus of this study is on urban dwelling types with primary emphasis on land utilization which may be applied as a guide for preliminary design and evaluation of urban environments in transition and as a reference for policy makers in urban areas.

Thesis Supervisor: Horacio Caminos

Title: Professor of Architecture



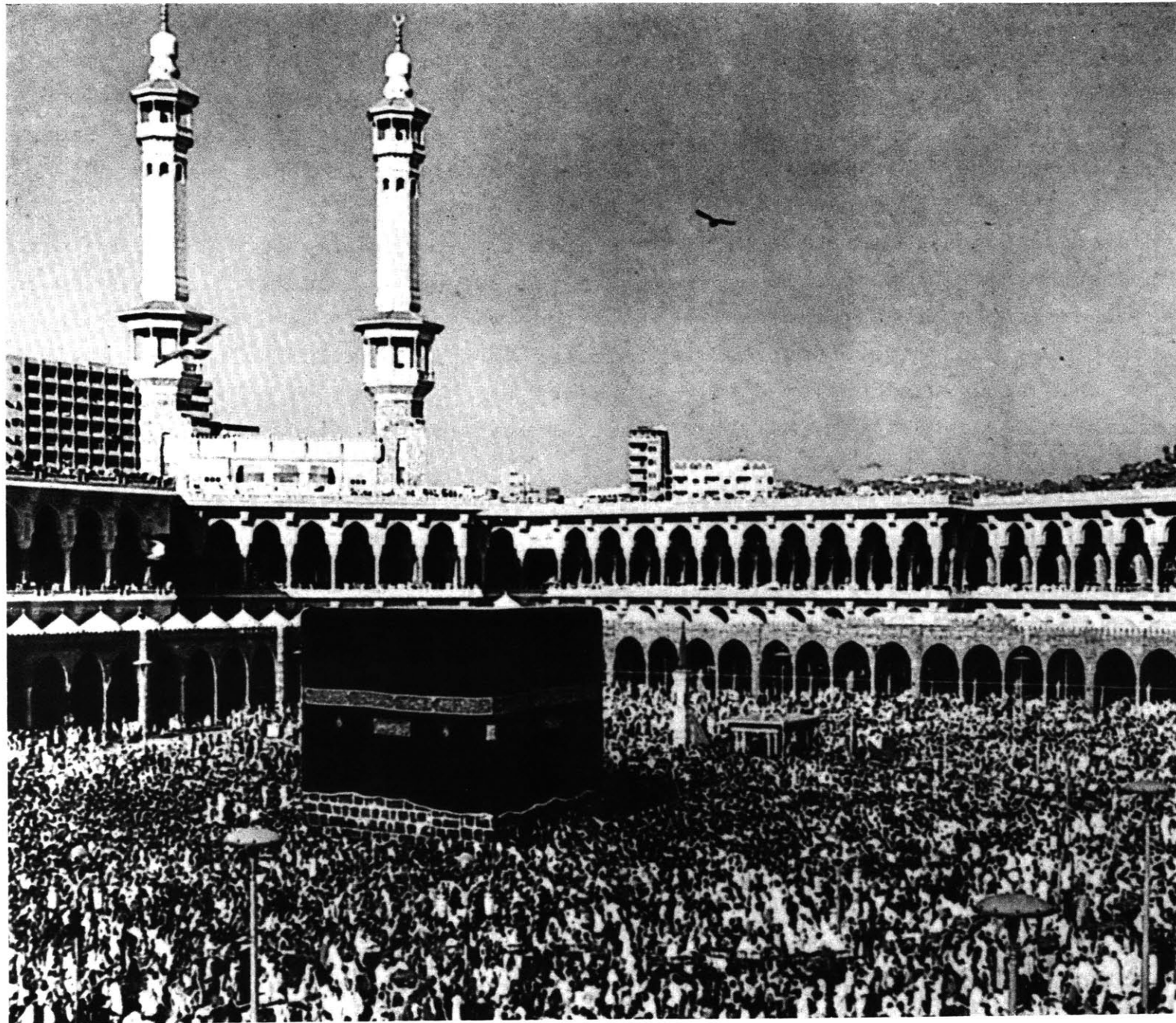
## PREFACE

This study intends to identify, analyze, and evaluate the existing housing situation in terms of systems, patterns, dwelling environments, and income of the inhabitants in Mecca City, Saudi Arabia. This report is the result of studies based on field survey carried out by the author in the summer of 1979, as well as other information provided by government authorities and private sources. The orientation of this study was developed in the Urban Settlement Design Program, MIT, under the guidance of Professor Horacio Caminos.

The support, guidance, and advice of Professor Horacio Caminos is gratefully acknowledged. I wish also to express my great appreciation for the personal advice and assistance of Mr. Reinhard Goethert and members of the class of 1977-1979 and 1978-1980 for their comments and assistance. I would like to acknowledge King Faisal University for financing this research; the Saudi Arabian Educational Mission for their kind cooperation and Ministry of Municipal and Rural Affairs, Principality of Mecca and Municipality of Mecca for their assistance. I would particularly like to acknowledge my

family and my brother Fahad for their moral support. I would express my appreciation for personal assistance to Mr. Yousef Fadan, Mr. Jamal Harriri, Mr. Fahmy Nakshabandy and Fauzia Qureshi.

Finally, to my wife, Nora Al-Daeeya for her moral support. I am further indebted to every one who directly or indirectly contributed to this work during the field survey in Mecca in the summer of 1979 and during the two years of the study while at M.I.T.



*The Holy Kaba centers the Great Mosque (AL-HARAM). People walk seven times around the Kaba for their performances during the hadji time. The minarettes are the highest landmarks in the city of Mecca.*

# CONTENTS

PREFACE.....	5
CONTENTS.....	7
INTRODUCTION.....	8
URBAN CONTEXT.....	10
CASE STUDIES.....	15
1- AL-GARARA LOCALITY (OLD SETTLEMENT) .....	16
2- AL-HINDAWIYYAH LOCALITY (SQUATTER SETTLEMENT) .....	26
3- JARWAL LOCALITY (TRANSITION SETTLEMENT).....	36
4- AL-NUZHAH LOCALITY (NEW SETTLEMENT) .....	46
EVALUATION .....	57
DWELLING TIME/PROCESS PERSPECTIVE .....	57
PYSICAL DATA MATRIX .....	60
SOCIO-ECONOMEC DATA MATRIX .....	61
LAND UTILIZATION .....	62
CONCLUSION .....	64
POLICY RECOMMENDATIONS .....	64
GLOSSARY .....	65
BIBLIOGRAPHY.....	69
EQUIVALENTS .....	69

# INTRODUCTION

Mecca has been chosen to be a holy place for the heavenly Islamic message to humanity. It is the center of the Islamic religion and canons for all Muslim nations of the world.

Mecca recently face each year more than 2 million pilgrims during the hadji time and 500,000 visitors during all days of the year. People in large numbers are migrating to the city from rural areas as well as from Islamic countries in search of better income opportunities following the recent high economic growth of the kingdom of Saudi Arabia. The city is currently experiencing a rapid rate of urbanization and through a period of painful transition in the evolution of a human settlement pattern with the introduction of modern technology. The city's urban area is developing on the same pattern as in western cities without much consideration to the local cultural and physical characteristics. This adopted pattern has had also a wide impact on the people's living conditions which is reflected in community life as well as in emerging housing standards.

The process of rapid urbanization is resulting in an acute shortage of housing, community facilities, services, public utilities, losses of social-cultural value, high public expenditure and the excessively high land speculation. These are not only due to the high immigration and the inadequacy of public services, but also due to the lack of adequate planning controls, uncoordinated administrative structure, lack of necessary data and information for providing development guidelines.

The focus of this study is on urban dwelling environments in growing cities with primary emphasis on land utilization which may be applied as a guide for preliminary design and evaluation of urban environments in transition and a point of reference for policy makers in urban dwelling environments.

The survey of existing dwelling environments identifies, analyzes and evaluates four distinct urban areas in Mecca, which are characterized by their location, origins, layouts and socio-economic charac-



teristics of their inhabitants. These cases are: Al-Garara (old settlement), Al-Hindawiyah (squatter settlement), Jarwal (transitional settlement), Al-Nuzhah (new settlement). The case studies attempt to provide a base for decisions by documenting typical existing dwelling situations/environments from all income sectors. The focus is on the low income groups who bear the greatest burden in regard to shortages, inadequate services, and limited municipal resources.

The study is intended to:

- . Provide a reference for understanding and evaluating the existing housing conditions and the urban environment.
- . Provide guidelines for the identification of dwelling systems.
- . Provide a reference to orient policies - and decision - makers in optimizing the allocation of financial resources in housing improvements and urban development.

This study has been divided in the following sections:

**URBAN CONTEXT:** Identification of Mecca's topography, circulation growth, patterns, land use patterns and income patterns.

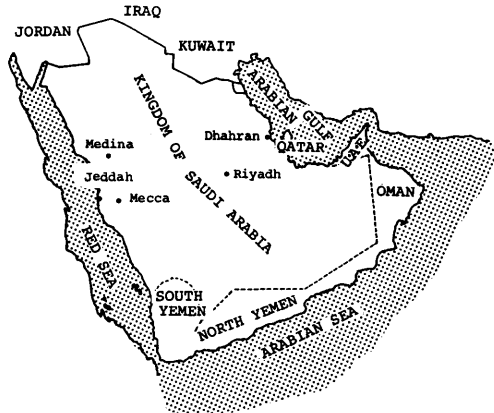
**CASE STUDIES:** Presentation of four representative case studies, analyzed at four levels being: locality, selected segment, selected block and typical dwelling unit.

**EVALUATION:** Includes the time process perspective and the land utilization comparison of the case studies.

**CONCLUSION and POLICY REDOMMENDATIONS:** which are driven from evaluating the case studies.

# URBAN CONTEXT

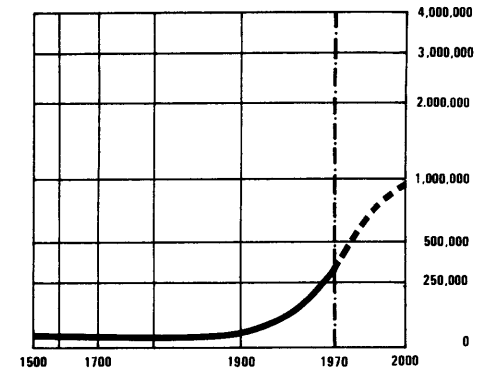
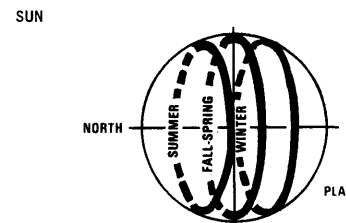
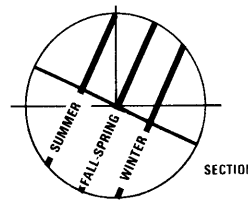
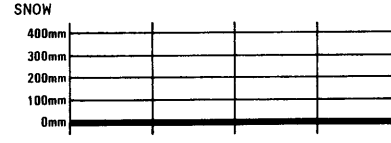
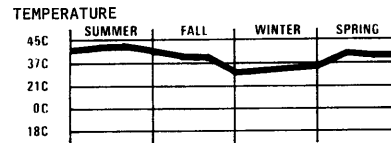
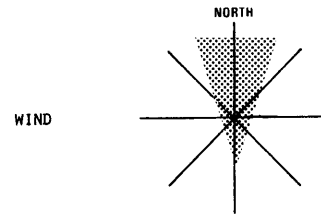
## MECCA SAUDI ARABIA



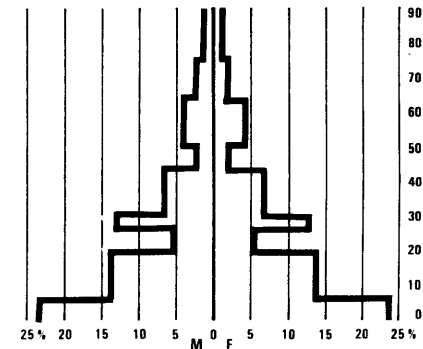
PRIMARY INFORMATION: Mecca is located at the eastern extension of the coastal plain (Tihama Plain) in the western region of the kingdom of Saudi Arabia. According to tradition, Mecca has been chosen by God to be the holy land for his heavenly Islamic message to humanity. For a short period, Mecca was the national capital for the Kingdom of Saudi Arabia. It is the headquarters of the Mecca district.

Mecca is located at an elevation of 277 meters and is closely confined by hills. There is easy access to the Red Sea. It is located at a latitude of 21°.36' north and a longitude of 39°.52' east. The climate is known for its heat and humidity, rising during the summer to 42°C and dropping to 28°C during the winter. The winds are predominantly north-westerly and north-easterly and the rainfall ranges between 70 and 120 millimeters. In 1977 the population was estimated at 301,000 and it is projected to rise to 750,000 by 1991.

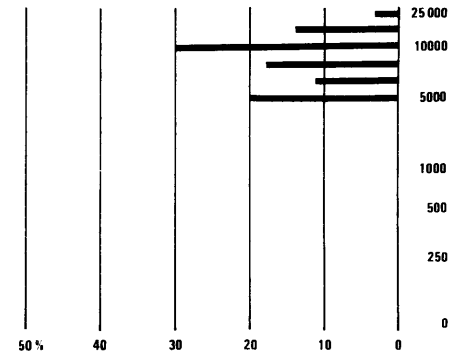
MECCA 21° 36' NORTH



URBAN POPULATION GROWTH  
horizontal: dates vertical: population  
Source: Alternative Urban Strategies

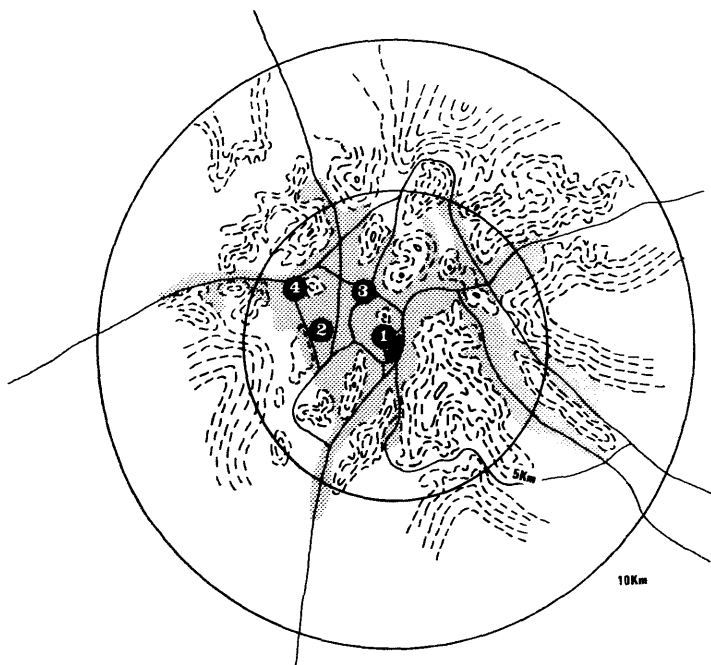


URBAN POPULATION DISTRIBUTION  
horizontal: percentages vertical: ages  
males: M females: F  
Source: Alternative urban strategies



URBAN ANNUAL INCOME DISTRIBUTION  
horizontal: percentages vertical: dollars  
Source: Alternative Urban Strategies

- 1 AL-GARARA
- 2 AL-HINDAWIYYAH
- 3 JARWAL
- 4 AL-NUZHAAH



- KEY
- A Airport
  - Primary Road
  - ++++ Railroad
  - ..... Rapid Transit
  - ..... Built-up Area



**URBAN TOPOGRAPHY AND CIRCULATION**

HISTORY: Mecca was a valley with no water or agriculture, incapable of providing any material services for human life. Yet this isolated and lonely place in the midst of the barren foothills of Arabia was selected by God, as tradition has it, to be the cradle of his heavenly Islamic message to humanity. It was to become the center of the Islamic religion and canons for all Muslim nations of the world.

The history of Mecca actually began when God instructed Prophet Ibrahim to settle part of his family in this bare location. Following these instructions, Ibrahim left his Egyptian wife Hagar and his son Ismail (still a baby) at the location of what is today the Holy Haram. Hagar's search for water was eventually rewarded when she noticed that a spring, called Zam Zam, was issuing from the ground near where she had laid Ismail to rest. The tribes of Jarham and Amalik, both from the south, learned of the presence of this spring, which provided much water, and they migrated to live nearby. Houses were built on this site as the tribes settled and the density of the buildings around the place increased little by little. Ibrahim eventually returned to see his family and also to spread the religion of God. His son Ismail was by then a grown man and the tribes believed in him and followed him.

The Kaba was built by Ibrahim and Ismail in the same location that it occupies today. The Kaba became the center of spiritual gathering and unity, and more people started migrating to Mecca (4000

The numbers of people in the tribes of Jarham and Amalik increased over the centuries, and other tribes joined the growing migration to Mecca. The family of Ismail played a preeminent role in the area, and the last Prophet Mohamed himself was a descendant from Ismail.

Since then, Mecca has continued to grow; it gained additional spiritual importance after the Prophet Mohamed. Mecca, a post on the caravan routes between North and South Arabia, became a center for religious and spiritual teaching. Islam undoubtedly established Mecca as the center of Islam and a permanently important place. It is the place to which Muslims head every year in accordance with the fifth pillar of Islam, the performance of the Hadj.

Many people turned to the new faith

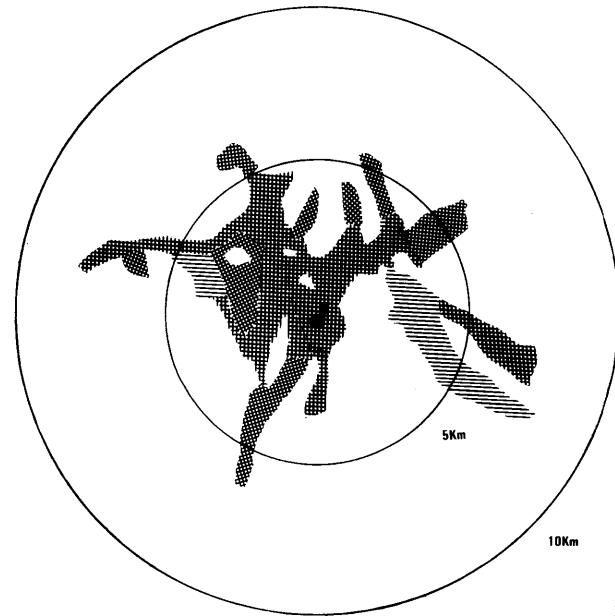
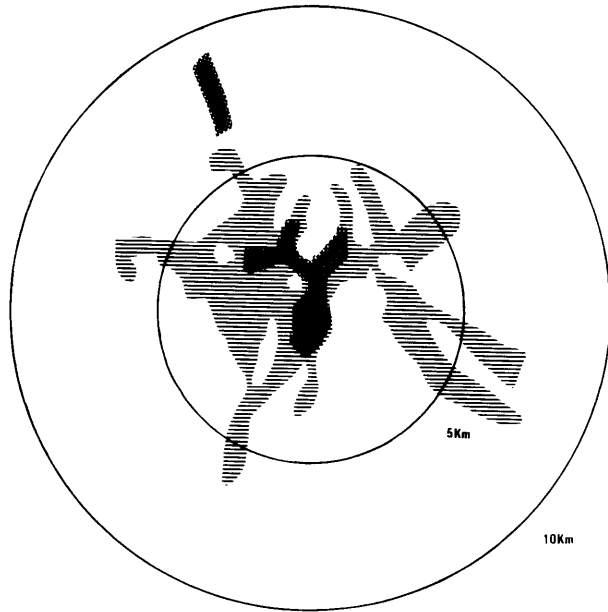
and pilgrims from foreign lands started visiting Mecca to make the Hadj. Some of them inevitably remained, settled in Mecca, and mixed with the original inhabitants.

Although Mecca was the national capital for Saudi Arabia in a short period after the rule of Ashraf, it now serves a diminished administrative function. Nevertheless, it always maintained its preeminent position as the Holy Capital of Islam and remains the headquarters of the Mecca district.

ECONOMY: Mecca is a city that has two roles to serve: one is to its population of 301,000 (1977 figure) which will increase to 750,000 by 1991 and the second is to its role as the most sacred city in Islam which must provide the Hadj services and facilities.

Economic life in Mecca is basically dependent upon the Hadj activities as they are reflected in the commercial and housing fields. The Hadjis are expected to number over 2,000,000 by 1991. The city is an extremely important market for local produce, drawing its supplies of fresh fruits and vegetables from the surrounding areas. As Mecca has grown over the last 20 years, it has attracted much of the agricultural labor away from the fields, creating a situation in which paid labor is very expensive. Thus, many of the ancient water tunnels fed by springs have been abandoned. Over the same period, the market requirements have changed from that of dates to vegetables and garden crops associated with higher incomes. Many of the farmers have moved their farms away from the spring-fed date gardens on the valley side to vegetable plots in the center of the valley. These plots draw upon wells. The output of the wells has more than offset the loss of water from the now dry springs.

GOVERNMENT: Judicial matters and the implementation of rules and regulations according to Islamic law are handled by a judge who is appointed by the King and the Ministry of Justice. The Municipality of Mecca is responsible for the administration of the city's facilities, infrastructures, and building codes.



AREAS  
RESIDENTIAL  
COMMERCIAL  
INDUSTRIAL

INCOMES  
LOW  
MEDIUM  
HIGH



URBAN LAND USE PATTERN

1:250000



URBAN INCOME PATTERN

1:250000

DEMOGRAPHY: The population of the Holy City of Mecca is estimated at 301,000 (in 1977). The guesstimate 1948 population was 100,000, which means that there has been an increase of 201,000 and an average growth rate of just over 5 1/2% compounded for the whole period compared with the estimated 9% for Jeddah. As with Jeddah, there is evidence that the bulk of this growth was concentrated in the first part of the period; that is, it occurred during the oil boom when investment in capital works was relatively unrestrained. It therefore seems likely that Mecca lost its place to Jeddah as the largest city in the western region some time in the 1950's. It is often claimed that appreciable numbers of pilgrims settle in Mecca after performing the Hadj and that the population of the city is consequently cosmopolitan. Some 59% of the heads of the households were born outside of Mecca and 15% have moved into the city within the five years preceeding 1977. Non-Saudi residents form 27% of the total population. The average household is estimated at 5.19 persons.

SOCIO-CULTURAL: Mecca's inhabitants are ethnically Arabs. Some are non-Arab adherents of Islam, most of whom immigrated as pilgrims and reside in the Hijaz area. Many Arabs from other Arab states are employed in Mecca. All of the inhabitants are Muslims and Islam places a high value on the individual's privacy. Traditional houses in Mecca, therefore, clearly take this into account. Family structure is very strong and the extended family still exists. The social hierarchy goes from pilgrim guides to the pilgrim hosts, from unskilled laborers to the industrial workers, from small salesmen to very sophisticated traders, and from very simple government employees to high-ranking professionals.

SOCIO-ECONOMIC: Before 1972 the only opportunity for income within Mecca was dependent upon the Hadj activities, reflected in the hospitality of the Hadjis, commercial services, and housing rentals. After the second development plan in 1972 which provided a wealth of jobs and opportunities in the fields of construction, distribution, education, government services, and professional services, many of the Hadjis remained in the city. In addition, there wer a large number of people who

migrated to the city from rural areas and nearby Arab nations and Islamic countries to take advantage of the improved income opportunities.

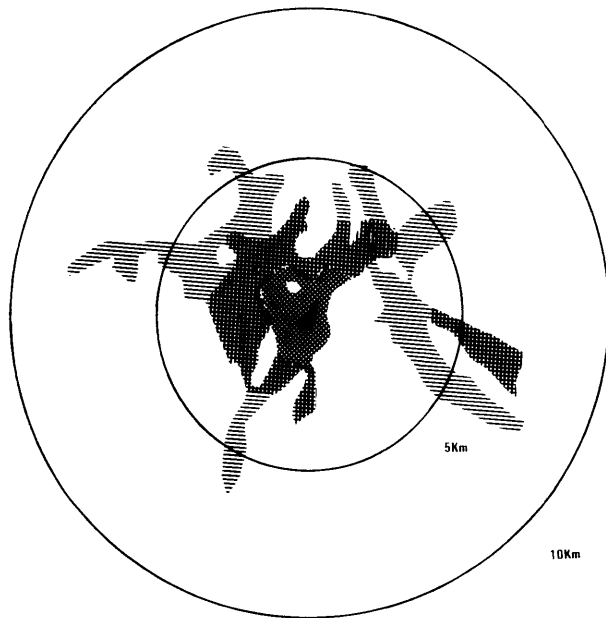
HOUSING: Presumably, because of Mecca's difficult topography, the incidence of detached houses is lower than that of other cities (1.4%) and the percentage of apartments is much higher (21.3%). The dominant dwelling type, the "non-detached" house, which accounts for 65% of Mecca's dwellings, is usually built on a very small, steeply contoured plot. Shanties represent 11.4% of the housing and .6% are other types. The areas which surround the Haram have an average "gross residential" density of 360 persons per hectare, and the figure must be several times higher than this for the parts which are immediately adjacent to the Great Mosque. Only in the outer districts does the density drop below 95 persons per hectare.



However, these very high densities are not reflected in high occupancy rates; the dwellings are crowded together. The overcrowding of people within these dwellings does not appear to be any greater than in most of the other Western Region cities. The proportion of households who live with more than 2 persons per room is 35% and the proportion of the population who rent their dwellings is 52.4%.

Rapid rates of urbanization following the recent economic growth have caused a significant increase in housing structures. The problems of the system are increasing each year, not only due to lack of consideration to local cultural and physical characteristics, but to the lack of necessary data and information for building codes.

URBAN CONTEXT SOURCES

- Urban Topography and Circulation : (accurate) Maps. Alternative Urban Strategies of Mecca and Medina.
- Urban Land Use Pattern : (approximate)
- Urban Income Pattern : (approximate)
- Climate : (accurate) Alternative Urban Strategies of Mecca and Medina
- Photographs : Field survey, Ghazi Al-Otaibi
- General Information : Alternative Urban Strategies of Mecca and Medina  
Field Survey: Ghazi Al-Otaibi



- DATES
-  1924
  -  1955
  -  1971



1:250000

URBAN GROWTH PATTERN



*The western style buildings and the high rises which surround the Holy Mosque (AL-HARAM) have no relation to the Islamic culture. These buildings increase the population density in the area where utilities and services are limited. Also, these buildings lose the religious feeling that is in and around AL-HARAM.*

# CASE STUDIES

The following section contains case studies describing selected low/middle/high income dwelling environment situations within the Mecca urban area at the present time. The four case studies were selected on the basis of income groups, housing systems, location, and the percentage of population that each system houses. Each case study is represented at four scales.

**Locality:** A locality is defined as a relatively self-contained residential area. It is generally confined within physical boundaries.

**Locality segment:** All the localities differ in size and shape. A segment of 400x400 meters has been taken from each locality for purposes of comparison.

**Locality block:** Within each locality segment a typical residential block has been selected to allow comparison of land utilization (pattern, percentages, densities and circulation efficiency).

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

## AL-GARARA

Old settlement/middle income/private/traditional.



## AL-HINDAWIYYAH

Squatter settlement/very low and low income/private/grouped



## JARWAL

Transitional settlement/middle income/private/walk-up



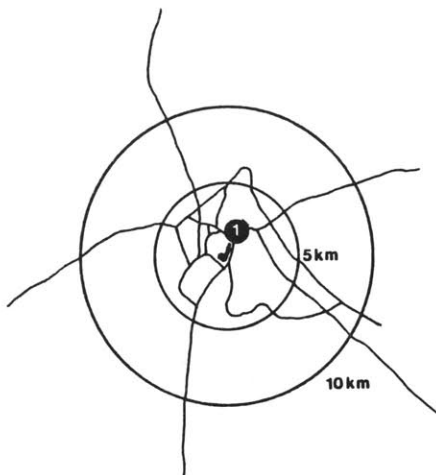
## AL-NUZHAAH

New settlement/high income/private,public/detached



## 1 AL-GARARA

Old settlement/traditional houses  
/middle income/ Private



**LOCATION:** It is located in the central part of the city, northeast of the Great Mosque (AL-HARAM).

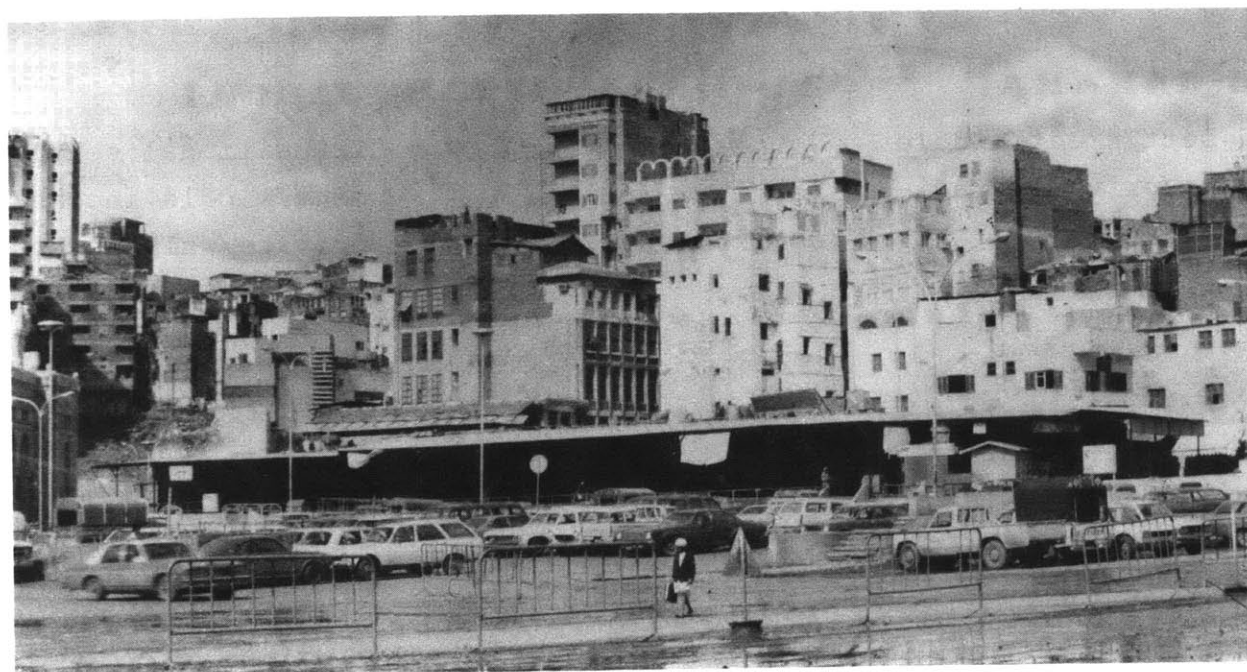
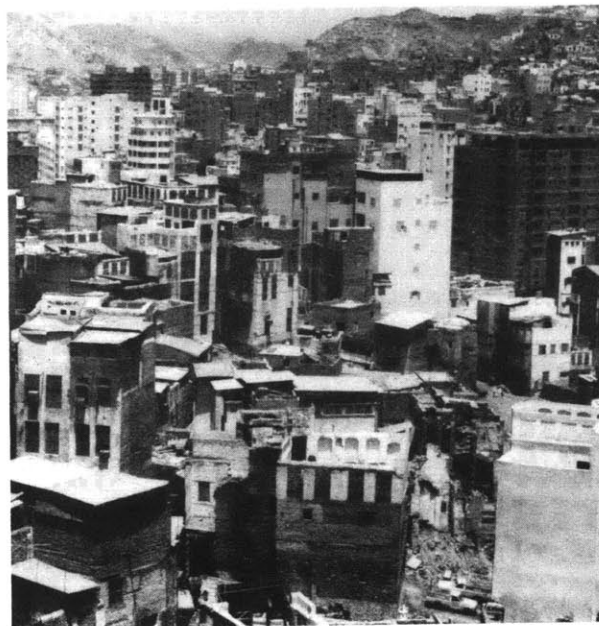
**DEVELOPMENT:** The development period of the area is related to the beginning of the Islamic period. Some of the relics still existing in the area date back to the Prophet Mohamed and his followers. Most of Al-Garara's traditional houses are being demolished for the new extension of AL-HARAM and the movement of the hadjis. Some of them are replaced with "modern" high rise buildings to provide space for the hadjis and the visitors to the area who wish to be close to AL-HARAM. Most of the locality's inhabitants offer hospitality to the hadjis and their servants who have travelled to AL-HARAM. These people are predominantly from the middle and upper income sector, but a small group of low income people live in this locality; most of them are students of the Islamic teachings or small salesmen.

### PHOTOGRAPHS

AL-GARARA, MECCA: (top right) Al-Mudaah street, the most pedestrian and commercial street in the locality, covered with steel roof (Pozan), small shops are found on both sides of the street.

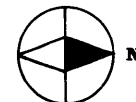
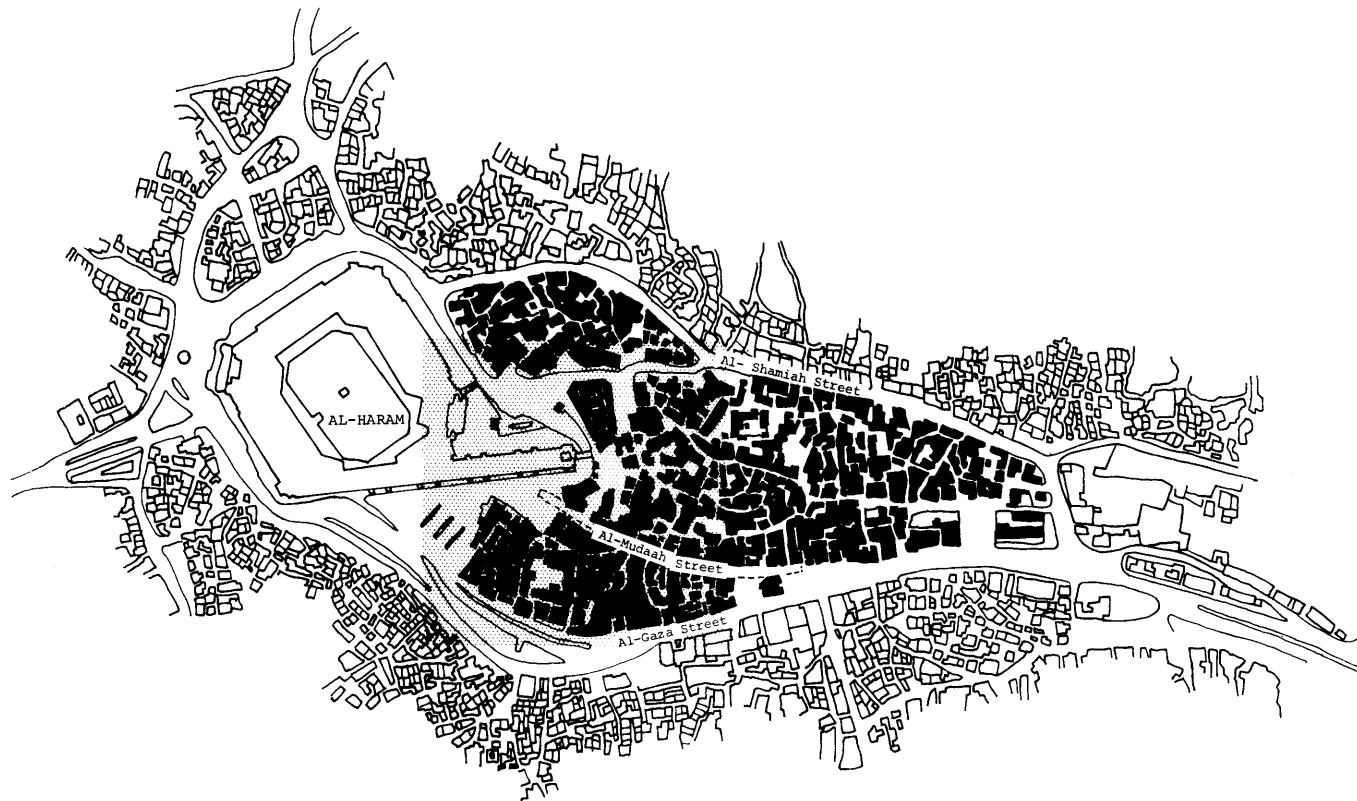
(top left) An overview of the locality, the arrangement of the traditional houses, and their physical state.

(bottom) An extension of Al-Mudaah street which is located in front of Al-Haram, recetarass, coffee shops and small shops are found in this ex-





LAYOUT: AL-GARRARA locality is one of the localities which is representative of a typical Arab Muslim city in its layout. The main mosque (AL-HARAM) is located in the center, and the winding pedestrian routes connect the mosque with the periphery of the site. Streets are narrow and of various widths. The very high land value and the maintenance of the traditional layout prevent the government from widening the streets.







 SELECTED SEGMENT


LOCALITY PLAN

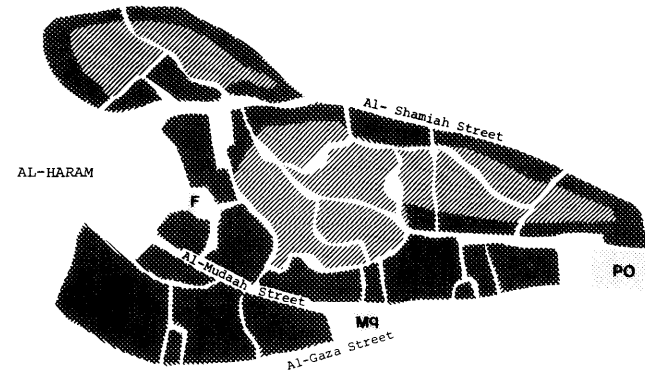
LAND USE: The locality was mainly developed for residential use. However, the dominant location in the center of the city and the proximity to AL-HARAM changed the locality so that it became the site for the main hotels and also the center of commercial distribution. The major shops, banks, offices, and restaurants are located along Al-Mudaah Street and Al-Gaza Street.

AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

KEY

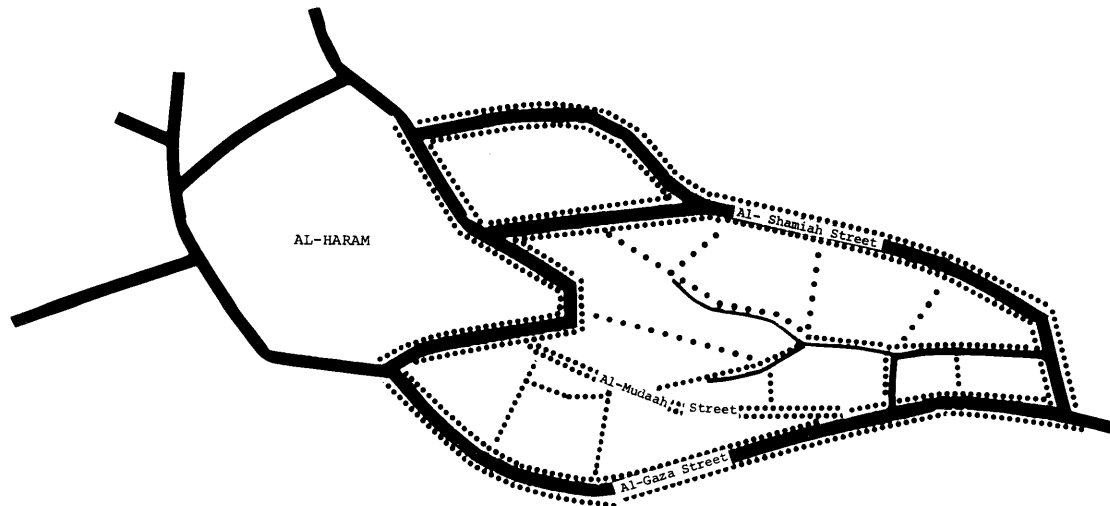
- Pk** Parking
- P** Police
- F** Fire Department
- S** School
- Mq** Mosque
- R** Recreation
- L** Library
- U** University
- H** Health
- PO** Post Office
- SS** Social Services
- M** Market
- C** Cemetery
-  Bus



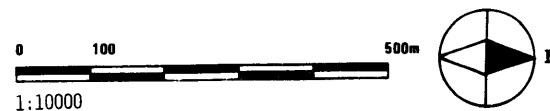
LOCALITY LAND USE PATTERN



CIRCULATION: The location of AL-GARRARA gives the locality's streets a dominant position for both pedestrians and vehicles. Al-Mudaad Street is the main pedestrian street. It is crowded five times a day during prayer times, and also is crowded during Al-Jomah prayer (Friday prayer, the most important prayer of the week). Also, most commercial activities are located in this street. The narrow interior streets are dusty with no maintenance or garbage collection control. Al Shamiah and Al-Gaza Streets are the most vehicular streets, crowded during the day when most of the cars are delivering goods, visitors, and worshippers from other parts of the city. These streets are paved streets and are lighted by electricity from the municipality.



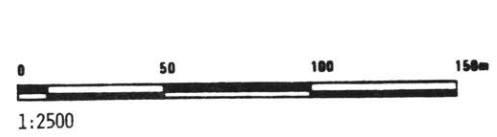
KEY  
 ————— VEHICULAR  
 ..... PEDLSTRIAN

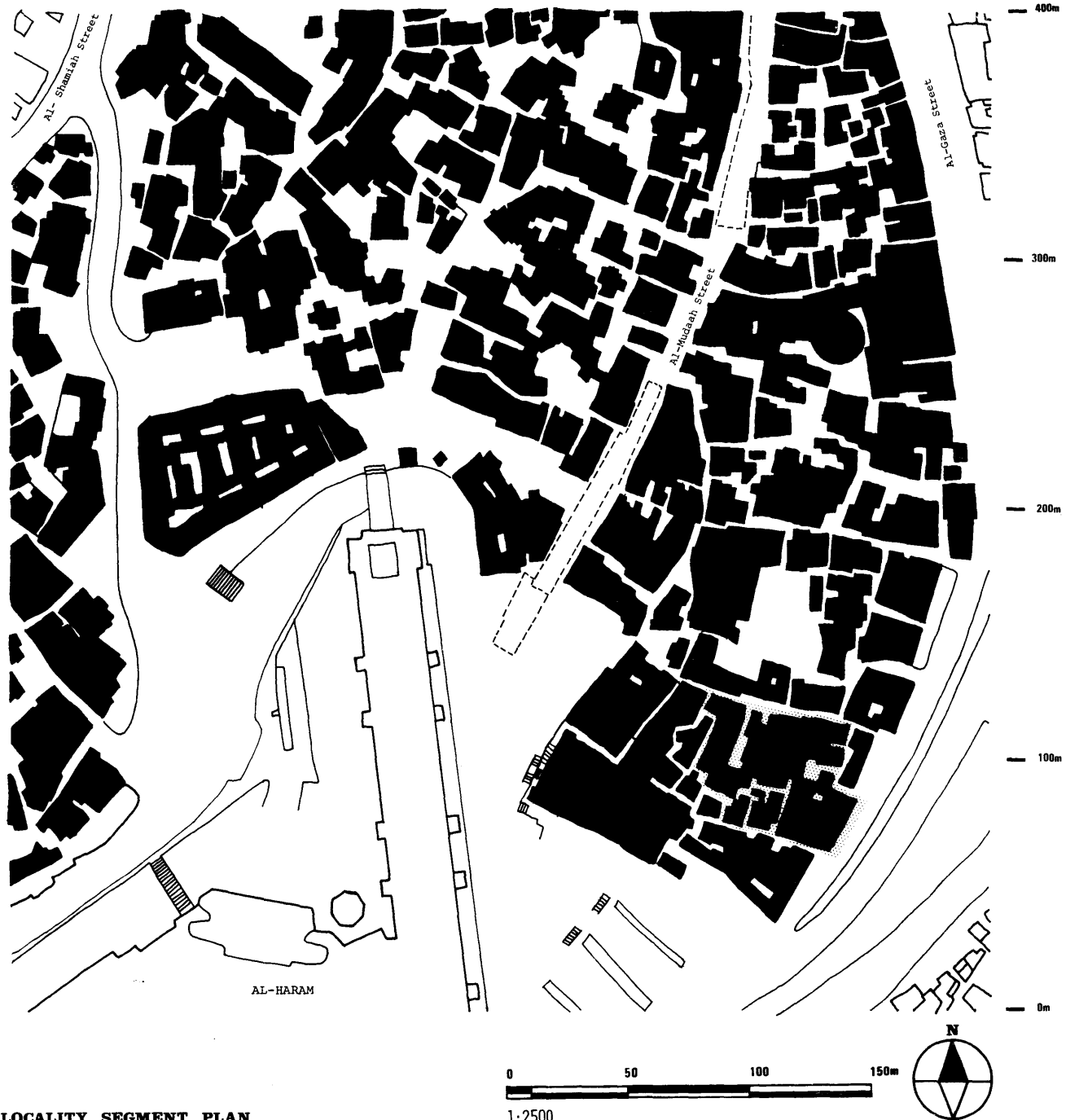


LOCALITY CIRCULATION PATTERN

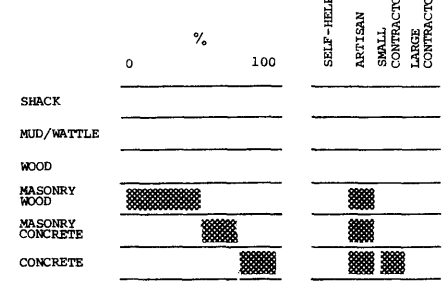


LOCALITY SEGMENT AIR PHOTOGRAPH





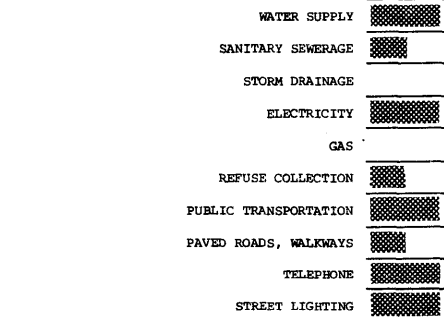
LOCALITY CONSTRUCTION TYPES



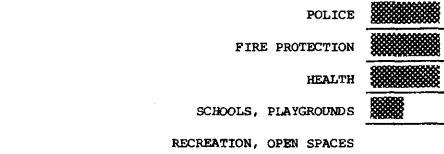
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximately

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



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

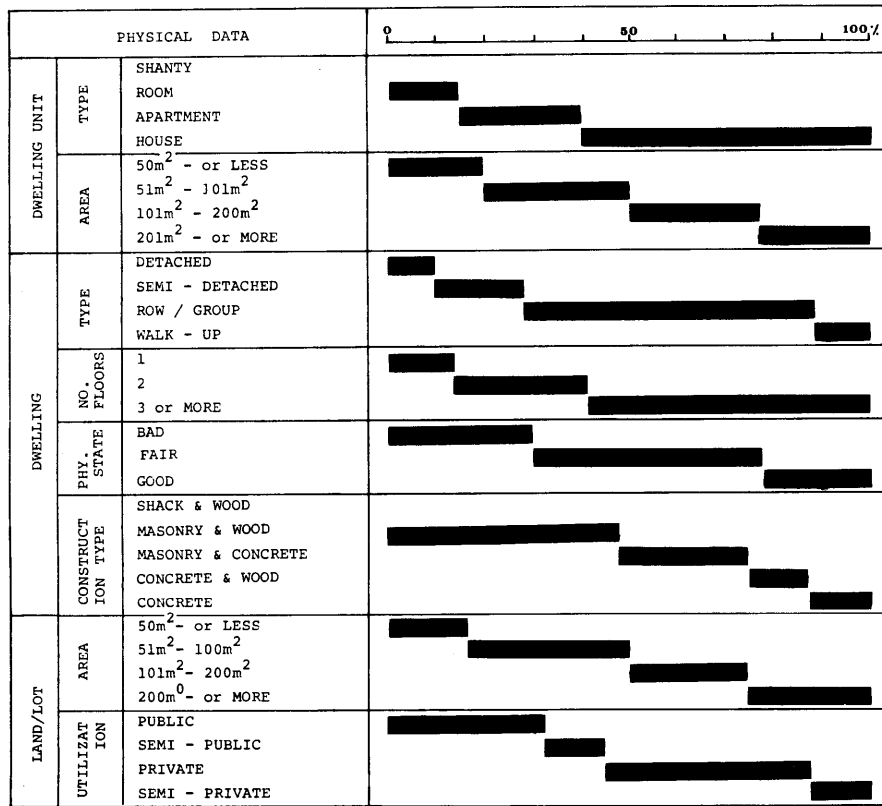
Quality of information: Approximately

LOCALITY SEGMENT PLAN

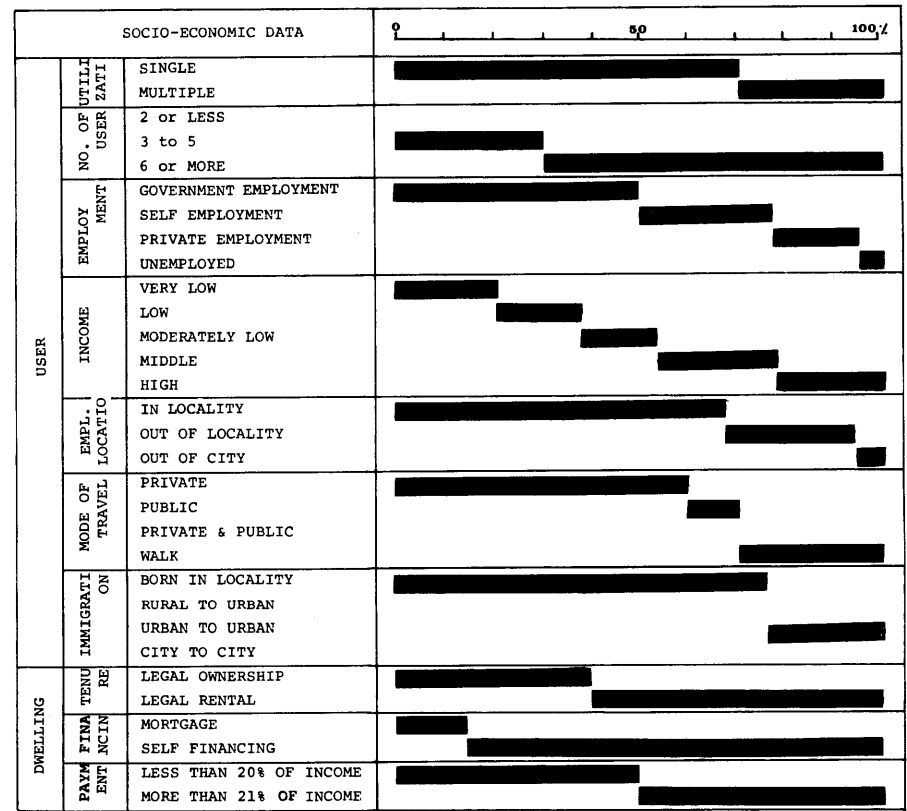
1:2500

[Hatched pattern] SELECTED BLOCK

**LOCALITY PHYSICAL DATA CHART**



**LOCALITY SOCIO-ECONOMIC DATA CHART**



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	24	0.33	72
DWELLING UNITS	60	0.33	181
PEOPLE	300	0.33	909

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.053	16%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.247	74%
SEMI-PRIVATE (cluster courts)	0.030	10%
<b>TOTAL</b>	<b>0.330</b>	<b>100%</b>

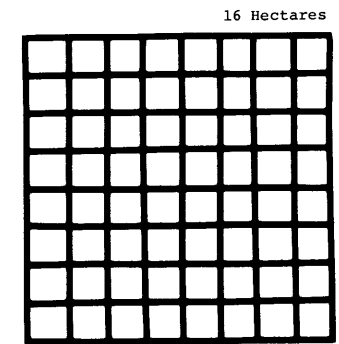
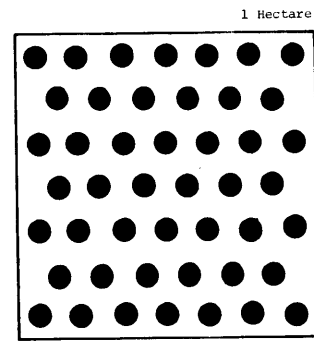
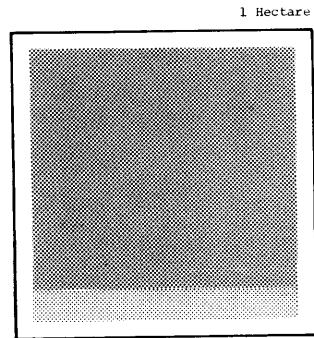
NETWORK EFFICIENCY

Network length (streets, walkways) = 386m/ha  
 Areas served (total area)

LOTS  
 Average area, dimensions = 102 m<sup>2</sup>



LAND UTILIZATION DIAGRAMS



PATTERN

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

PERCENTAGES

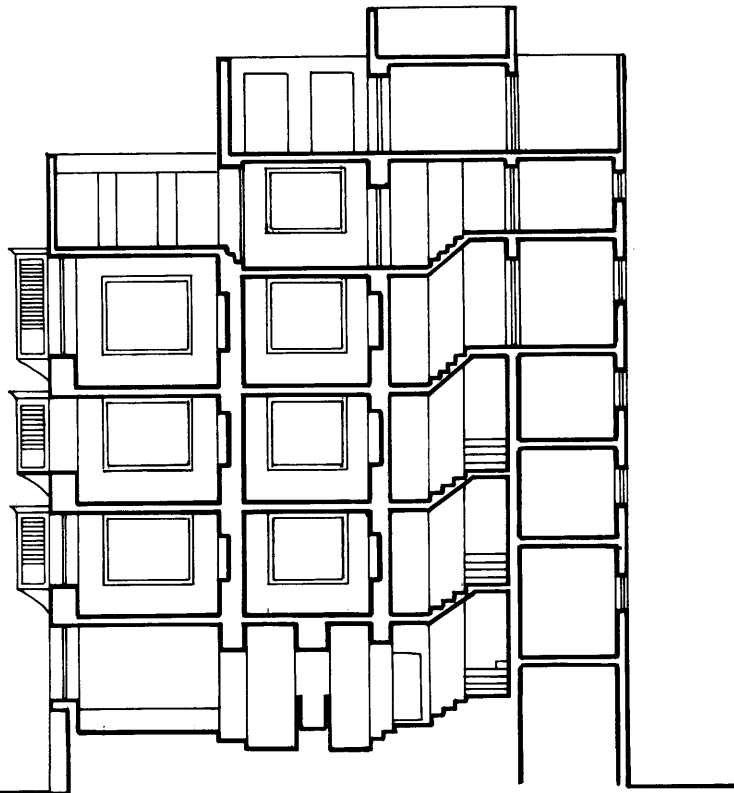
Streets/Walkways	16%
Playgrounds	10%
Cluster Courts	-
Dwellings/Lots	74%

DENSITY

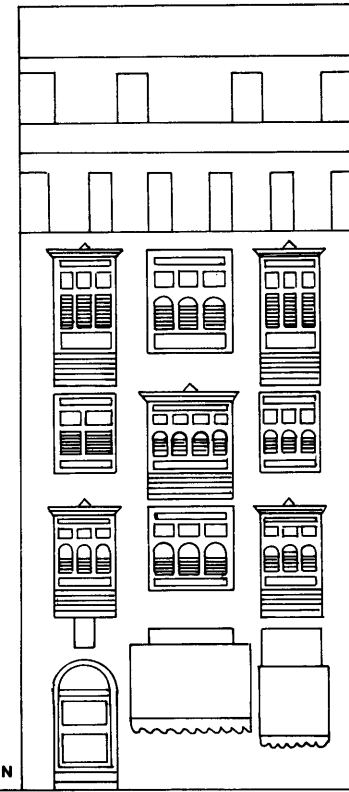
Persons/Hectare	909
	20 Persons

CIRCULATION

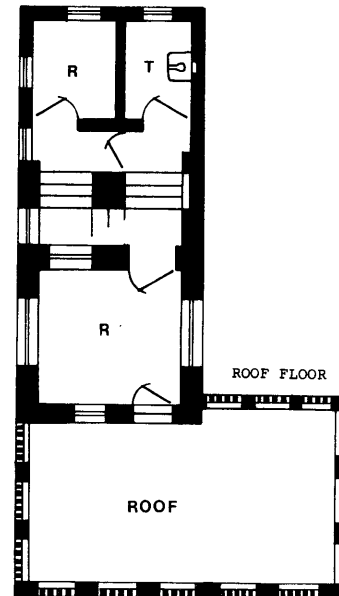
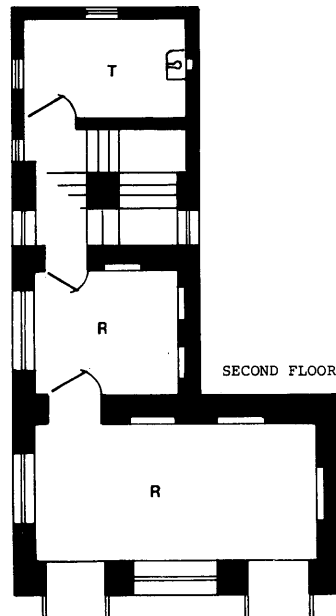
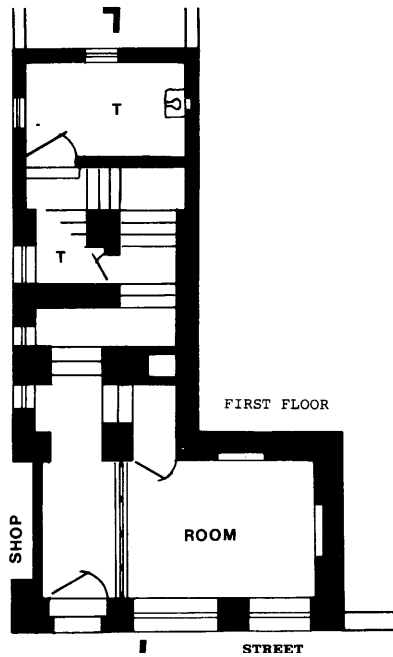
Meter/Hectare	386
---------------	-----



SECTION

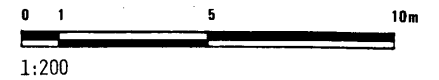


ELEVATION



KEY

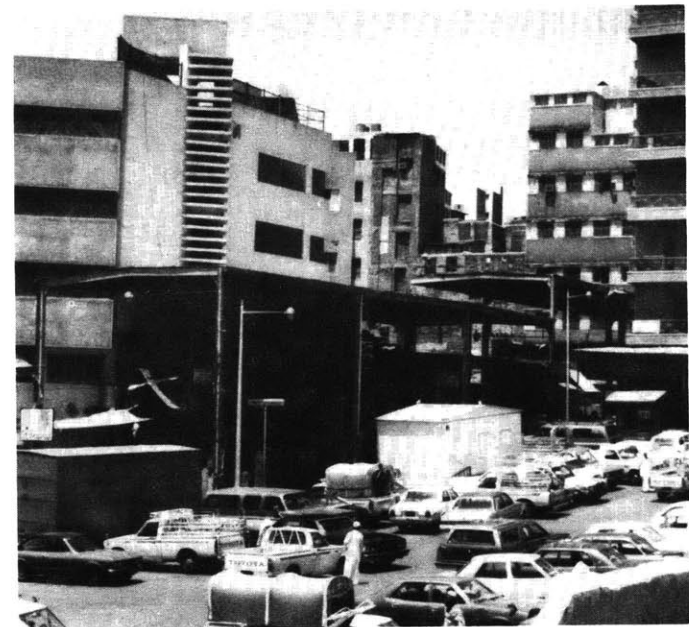
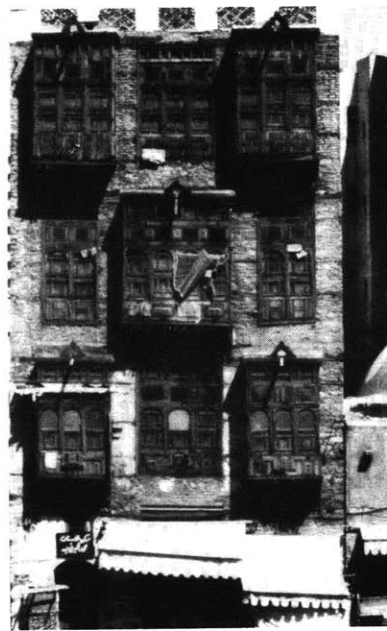
- R Room (multi-use)
- RC Reception
- D Dining/Eating Area
- B Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- S Storage
- C Court



1:200

TYPICAL DWELLING





#### PHYSICAL DATA (related to dwelling and land)

**DWELLING UNIT**  
 type: Traditional house  
 area (sq m): 98 m<sup>2</sup>  
 tenure: legal rental

**LAND/LOT**  
 utilization: Private  
 area (sq m): 98 m<sup>2</sup>  
 tenure: legal ownership

**DWELLING**  
 location: city center  
 type: row houses  
 number of floors: 6  
 utilization: single family  
 physical state: good

**DWELLING DEVELOPMENT**  
 mode: Incremental  
 developer: Private  
 builder: Artisan  
 construction type: stone/wood  
 year of construction: -

**MATERIALS**  
 foundation: stone  
 floors: wood  
 walls: stone  
 roof: wood

**DWELLING FACILITIES**  
 wc: 6  
 shower: -  
 kitchen: 4  
 rooms: 10  
 other: storage

#### SOCIO-ECONOMIC DATA (related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: Saudi  
 place of birth: Mecca  
 education level: high

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

**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: Middle  
 employment: Private  
 distance to work: -  
 mode of travel: Private

**COSTS**  
 dwelling unit: -  
 land - market value: -

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

#### PHOTOGRAPHS

(right) The entrance of Al-Mudaah street from Al-Haram side where the hotels and modern buildings are found.

(middle) The typical dwelling (traditional house) of Al-Garara locality.

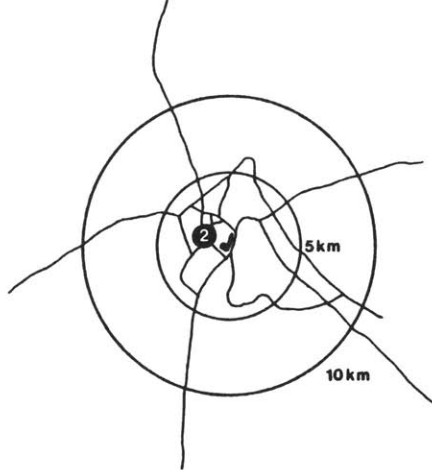
(left) Al-Gaza street is the most crowded street in the locality. High rise, modern buildings and the big shops are found on both sides of the streets.

#### CASE STUDY SOURCES

Locality Plan : (accurate) Maps, Town Planning Office, Mecca  
 Locality land use : (approximate) Maps, Town Planning Office  
 Locality circulation pattern : (accurate) Maps, Town Planning Office  
 Segment Plan : (accurate) Maps, Town Planning Office  
 Segment air photographs : Ministry of Municipal and Rural Affairs  
 Block plan : (accurate) Maps, Town Planning Office  
 Physical Data : (approximate) Field survey, Ghazi Al-Otaibi  
 Socio-economic data : (approximate) Field survey, Ghazi Al-Otaibi  
 Typical dwelling : (approximate) Field survey, Yousf Fadan  
 Photographs : field survey, Ghazi Al-Otaibi, Yousf Fadan  
 General information : field survey, Ghazi Al-Otaibi

## 2 AL-HINDAWIYYAH

Squatter settlement/very low and low income/Grouped



**LOCATION:** It is located immediately to the northwest of the city center, about 3 km from AL-HARAM, bounded by Al-Mansur Street from the east and Al-Steen Street from the north.

**DEVELOPMENT:** The development of the area occurred gradually by the people who came from Africa, south of Arabia, and nearby rural areas. They settled here because of the access to the city center (AL-HARAM) and to the small industrial areas, which are located around the area. Most of the houses were originally shanties; over time people legalized their land ownership by building on their properties. Because of this, the locality developed an irregular shape with narrow streets. The inhabitants are working in different job activities: from government employees to manual laborers, and from small salesmen to taxi drivers.

### PHOTOGRAPHS

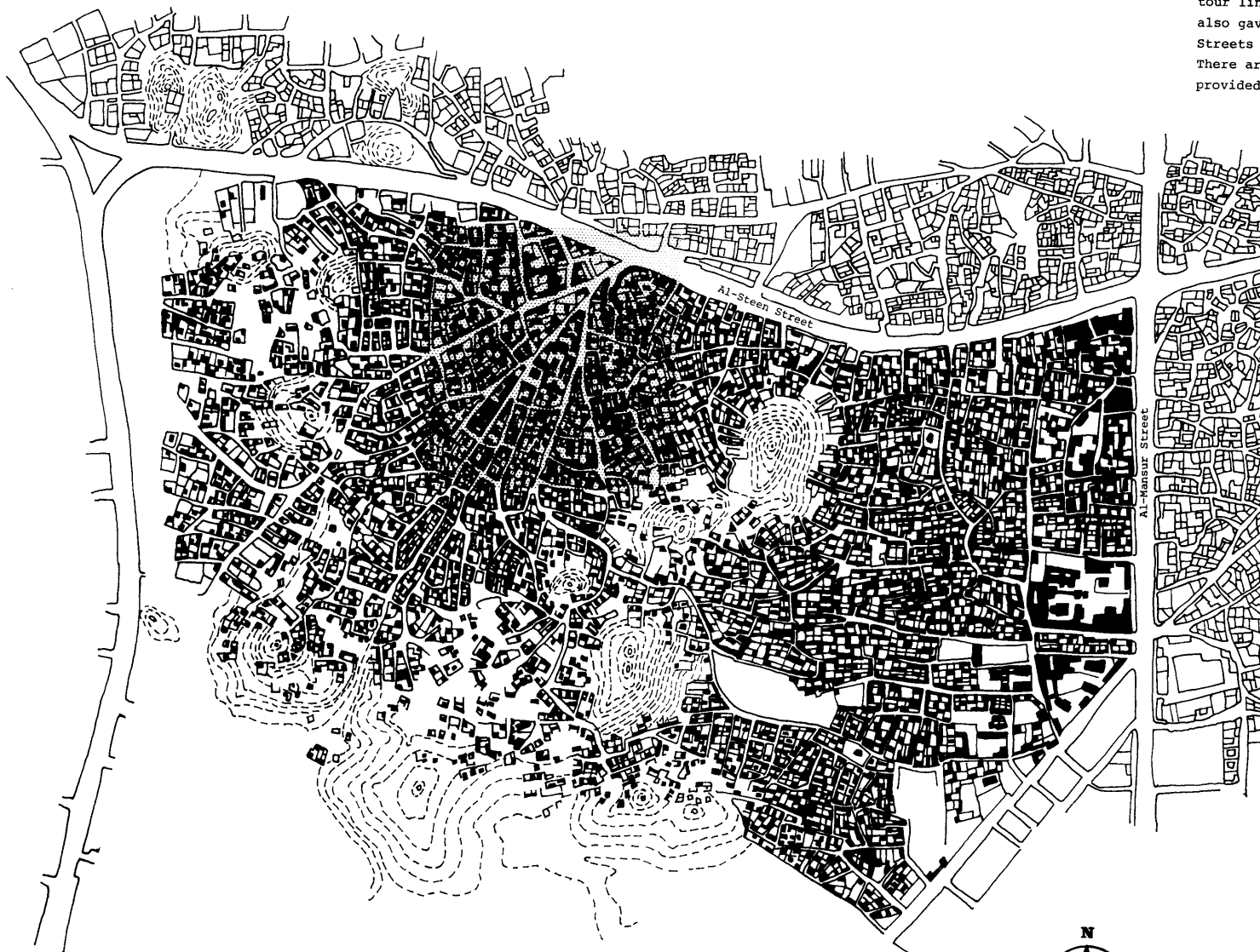
(top right) One of Al-Hindawiyah interior streets. Narrow, slopy, unpaved street.

(top left) Daily commercial street in the locality. People sell fresh fruits and vegetables where they can find the place.

(bottom) An overview of Al-Hindawiyah locality shacks, court houses, and the high density of the dwellings.



LAYOUT: The irregular topography gave the streets a winding shape following the contour lines, and the progressive development also gave the locality its irregular shape. Streets are narrow and of various widths. There are very few areas and playgrounds provided within the locality.

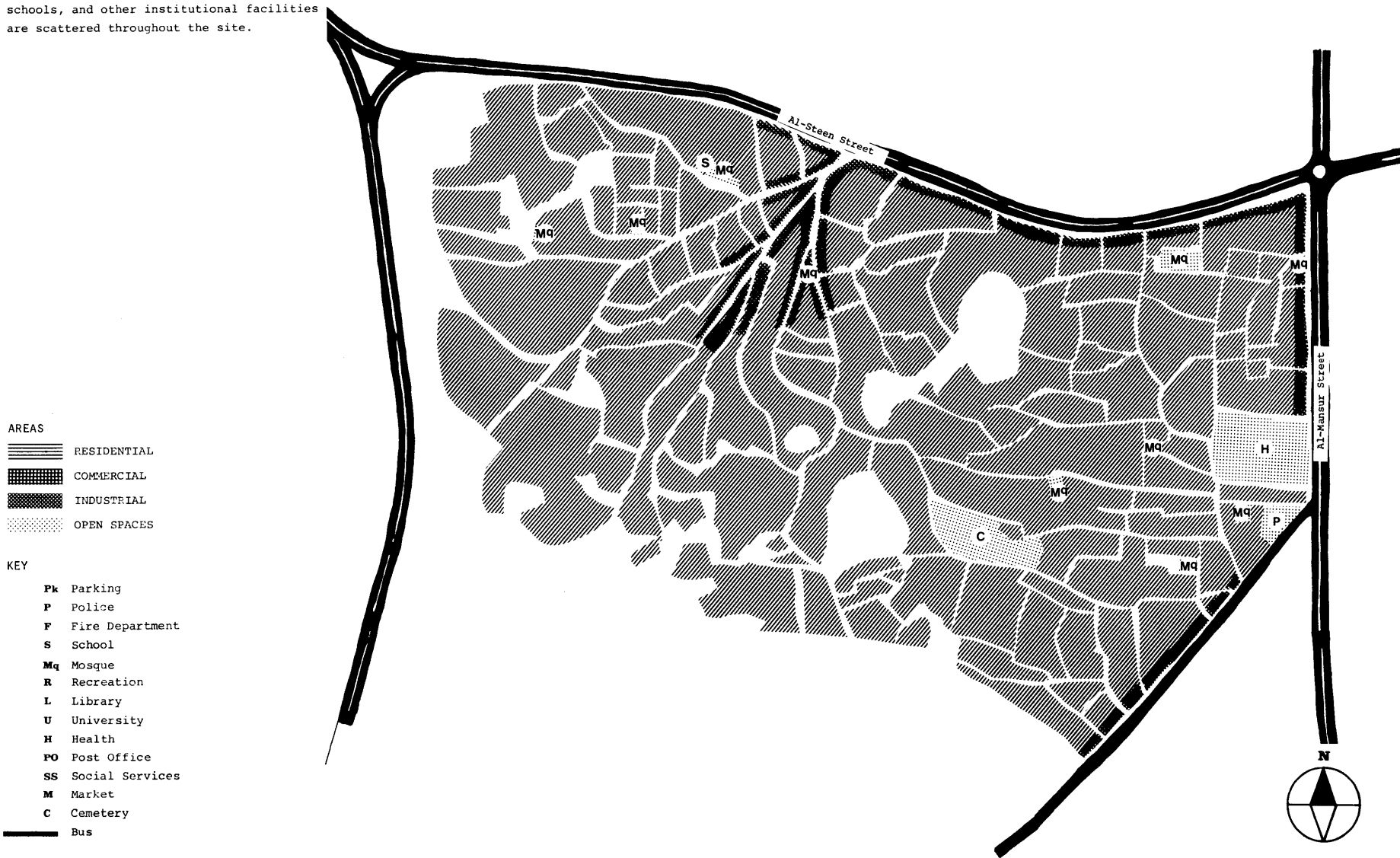






LOCALITY PLAN




SELECTED SEGMENT

LAND USE: The locality was mainly developed for residential use. Most of the commercial centers, coffee shops, restaurants, and shops are located along Al-Steen Street and Al-Mansune Street. A daily open market, small shops, and light industries are located in the inner streets. Mosques, schools, and other institutional facilities are scattered throughout the site.



- AREAS
-  RESIDENTIAL
  -  COMMERCIAL
  -  INDUSTRIAL
  -  OPEN SPACES

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

LOCALITY LAND USE PATTERN



CIRCULATION: Al-Steer street (Al-Hafyer Road), and Al-Mansur Street are the only paved streets in this locality. Topography and the development of the locality gave its inner streets a branching and winding shape. Most of the streets have both vehicular and pedestrian traffic, but some of the streets have a sloping contour, which makes it difficult for the cars to reach the houses. The natural surface storm drainage prevented the government from paving the interior streets, but all interior streets are lighted by electricity from the municipality. These narrow interior streets are dusty with no maintenance or garbage collection control; no parking lots are provided and cars park wherever they can.



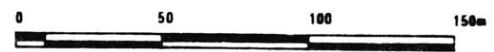
KEY  
 ————— VEHICULAR  
 ..... PEDLSTRIAN



LOCALITY CIRCULATION PATTERN



LOCALITY SEGMENT AIR PHOTOGRAPH

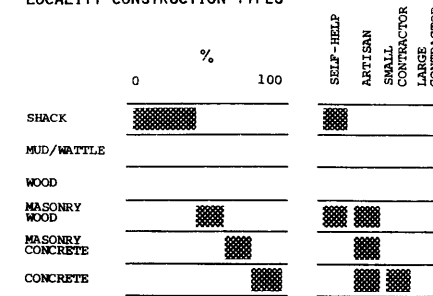


1:2500





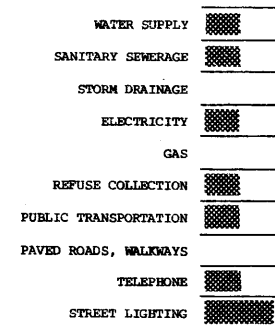
LOCALITY CONSTRUCTION TYPES



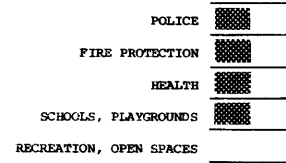
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: approximate

LOCALITY UTILITIES AND SERVICES

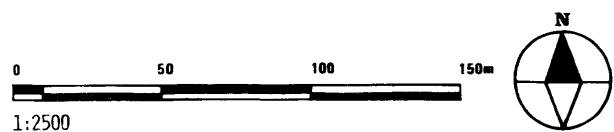


LOCALITY COMMUNITY FACILITIES



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

Quality of information: approximate

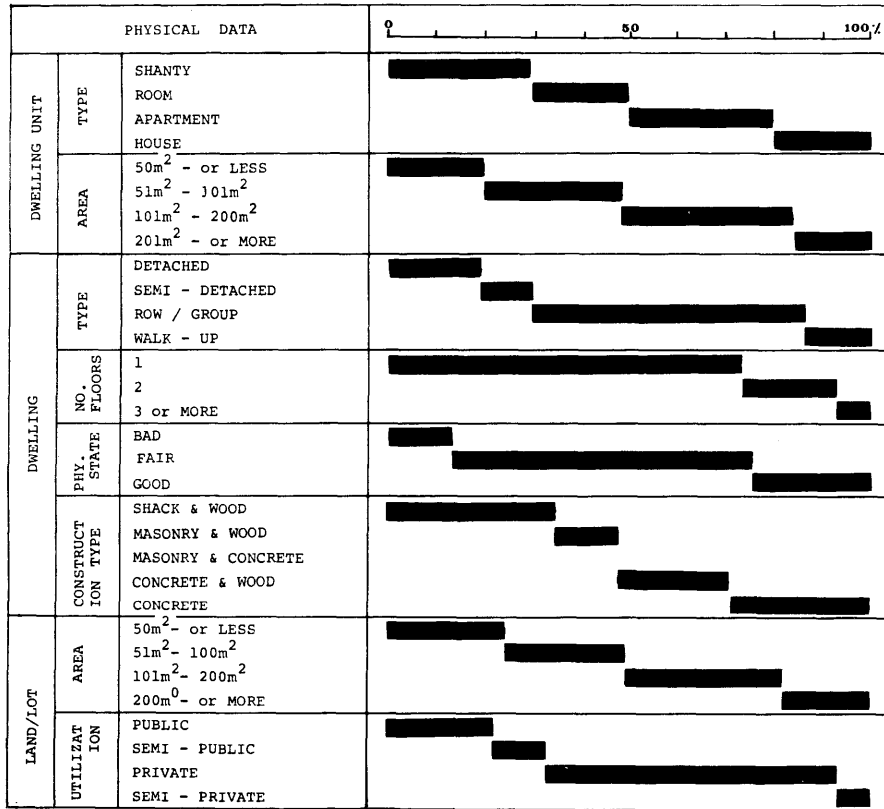


LOCALITY SEGMENT PLAN

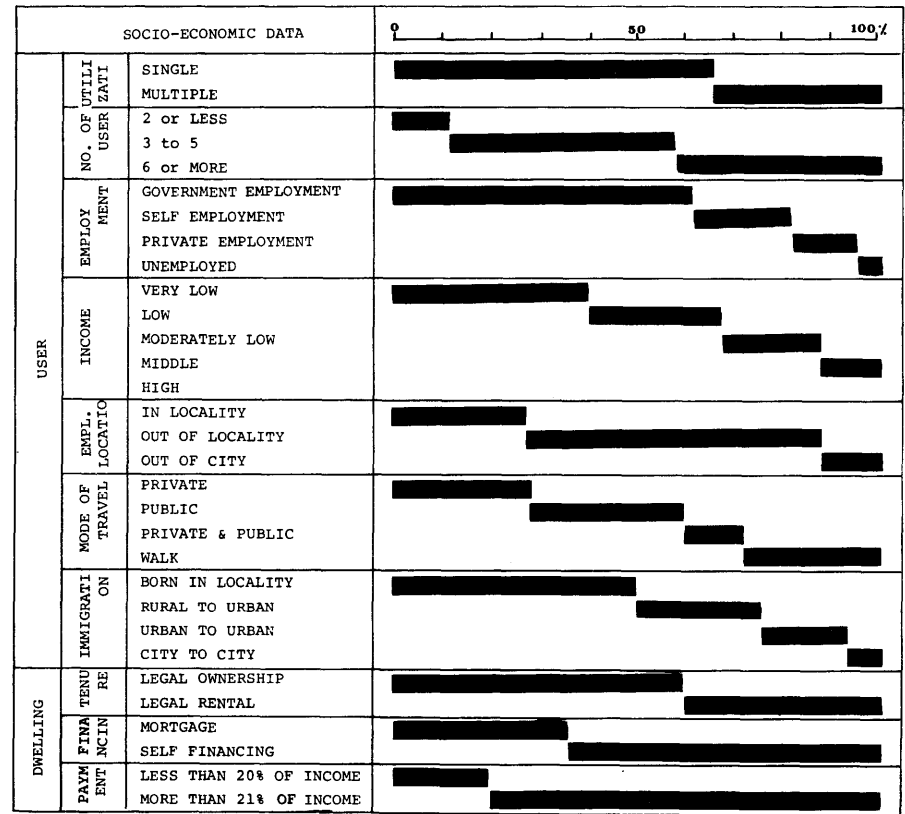
1:2500

[Patterned bar] SELECTED BLOCK

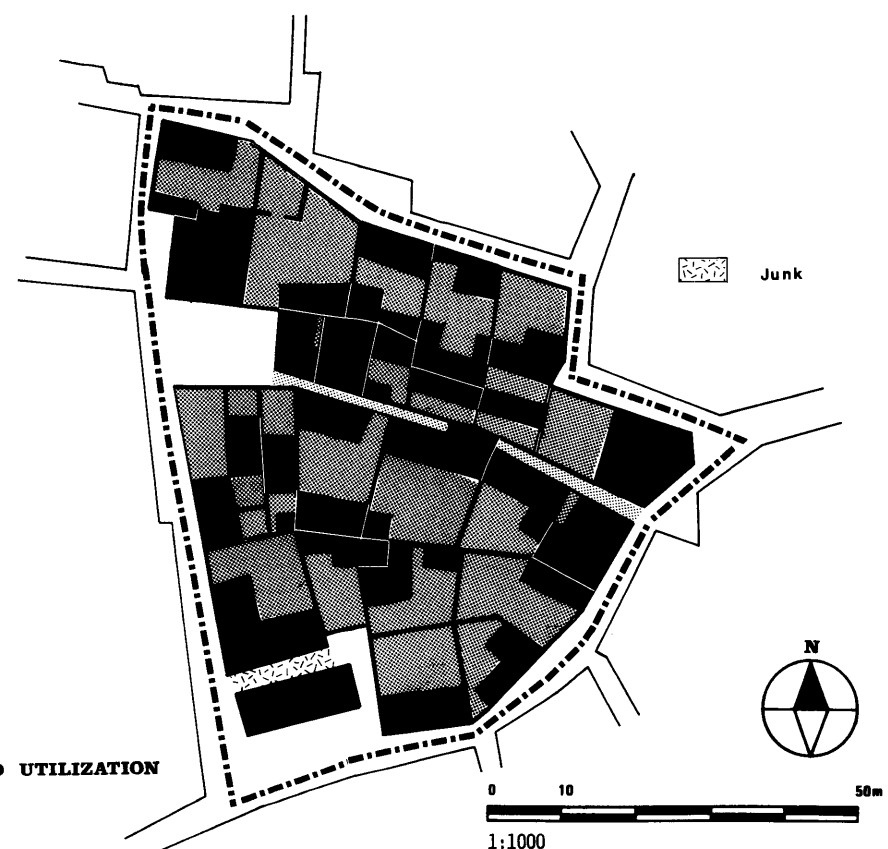
**LOCALITY PHYSICAL DATA CHART**



**LOCALITY SOCIO-ECONOMIC DATA CHART**







LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	28	0.43	65
DWELLING UNITS	34	0.43	79
PEOPLE	170	0.43	395

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.095	22%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.320	74%
SEMI-PRIVATE (cluster courts)	0.015	4%
<b>TOTAL</b>	<b>0.430</b>	<b>100%</b>

NETWORK EFFICIENCY

Network length (streets, walkways) = 434m/ha  
 Areas served (total area)

LOTS  
 Average area, dimensions = 115 m<sup>2</sup>

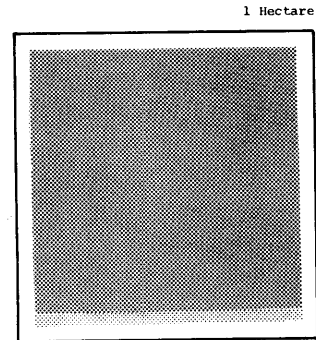
LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS



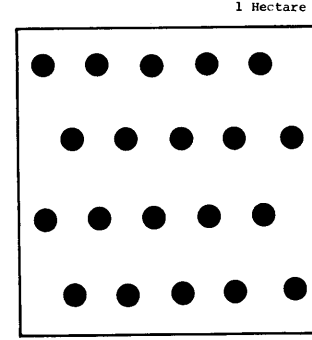
**PATTERN**

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



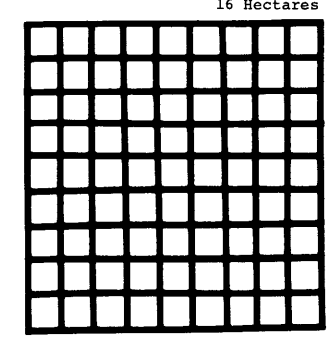
**PERCENTAGES**

Streets/Walkways	22%
Playgrounds	-
Cluster Courts	4%
Dwellings/Lots	74%



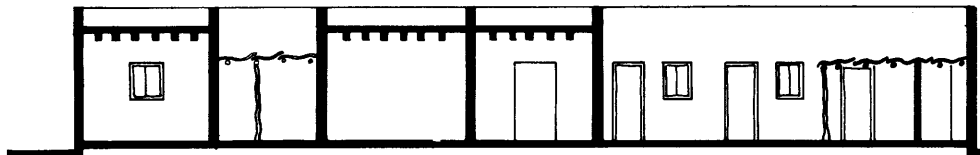
**DENSITY**

Persons/Hectare	395
●	20 Persons

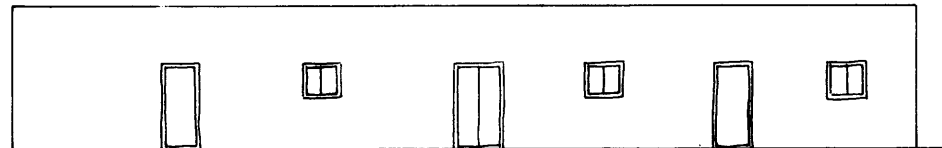


**CIRCULATION**

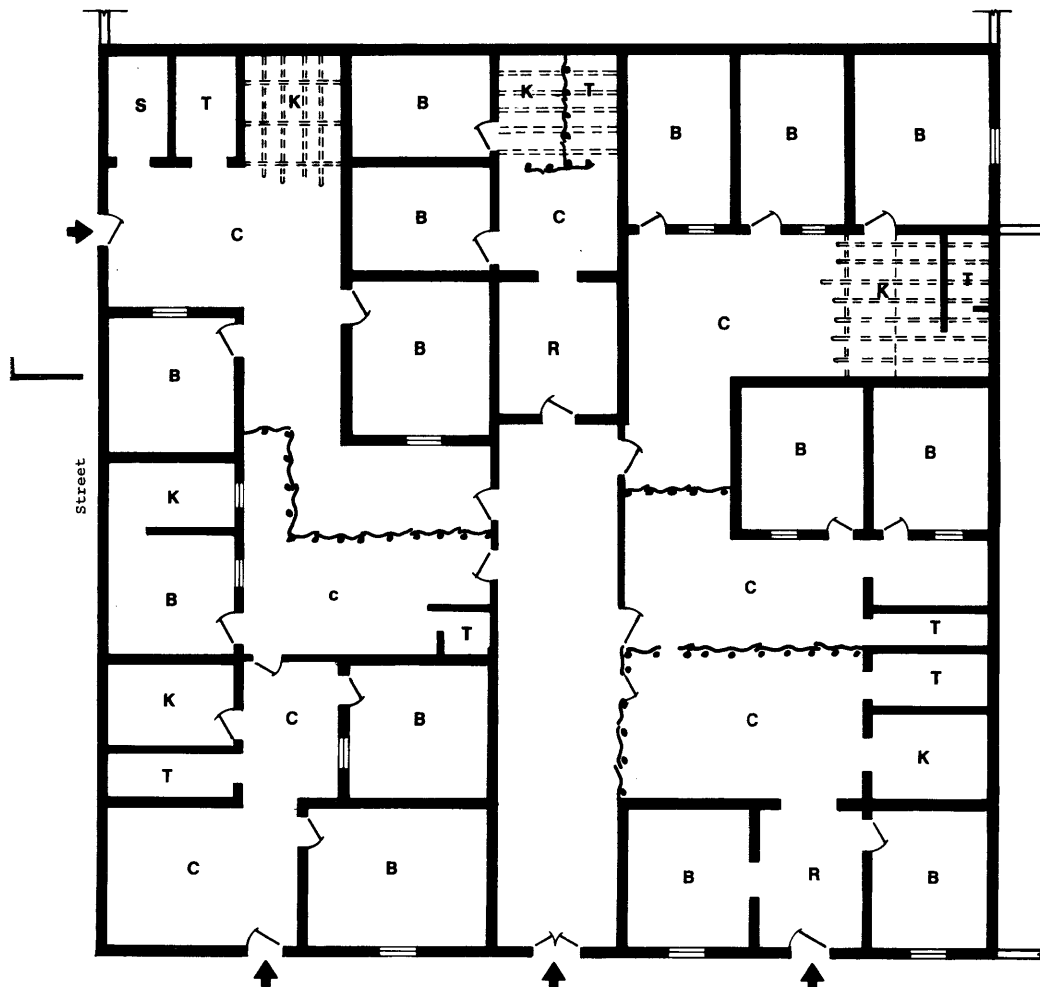
Meter/Hectare	434
---------------	-----



SECTION



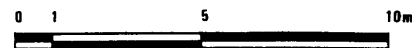
ELEVATION



PLAN

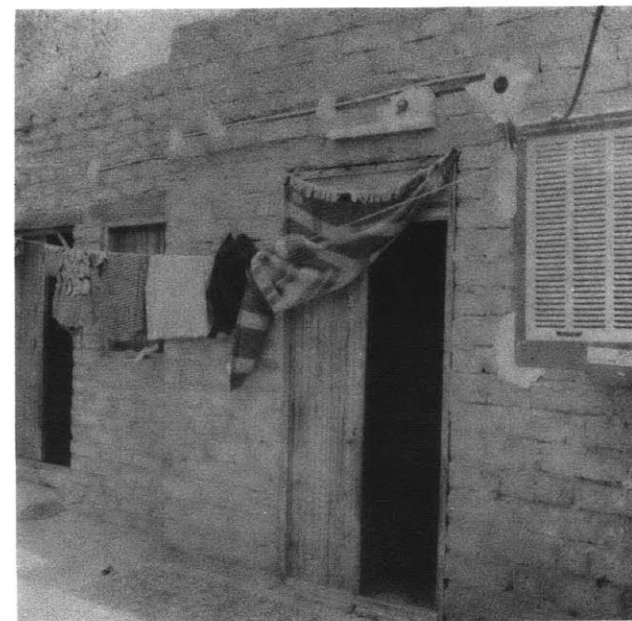
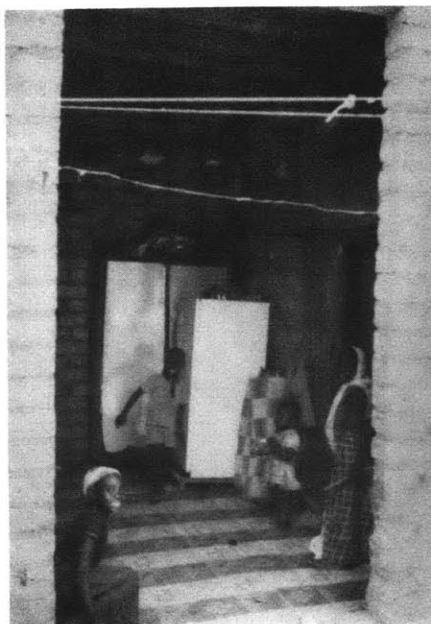
Streer

- KEY
- R Room (multi-use)
  - RC Reception
  - D Dining/Eating Area
  - B Bedroom
  - K Kitchen/Cooking Area
  - T Toilet/Bathroom
  - S Storage
  - C Court



1:200

TYPICAL DWELLING



#### PHYSICAL DATA (related to dwelling and land)

**DWELLING UNIT**  
 type: Tenement room  
 area (sq m): 576 m<sup>2</sup>  
 tenure: legal rental

**LAND/LOT**  
 utilization: Private  
 area (sq m): 567 m<sup>2</sup>  
 tenure: legal ownership

**DWELLING**  
 location: Inner ring  
 type: group  
 number of floors: 1  
 utilization: Multi-family  
 physical state: fair

**DWELLING DEVELOPMENT**  
 mode: Incremental  
 developer: Private  
 builder: Self-help  
 construction type: concrete/shack/wood  
 year of construction: 1968

**MATERIALS**  
 foundation: stone  
 floors: -  
 walls: concrete  
 roof: wood

**DWELLING FACILITIES**  
 wc: 7  
 shower: -  
 kitchen: 7  
 rooms: 16  
 other: 8 courts/storage

#### SOCIO-ECONOMIC DATA (related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: African  
 place of birth: Mecca  
 education level: low

**NUMBER OF USERS**  
 married: 8  
 single: 3  
 children: 10  
 total: 21

**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: low income  
 employment: Private  
 distance to work: 2 km.  
 mode of travel: Public transportation

**COSTS**  
 dwelling unit: -  
 land - market value: -

**DWELLING UNIT PAYMENTS**  
 financing: self financing  
 rent/mortgage: -  
 % income for rent/mortgage: 28% of income

#### PHOTOGRAPHS

(right) Typical dwelling of Al-Hindawiyah. The entrances of the rooms which is directed to the inner courtyard. The courtyard used for sleeping at night, drying clothes and other activities.

(middle) This photograph shows the inside of the room where the refrigerator and kitchen shelves are found.

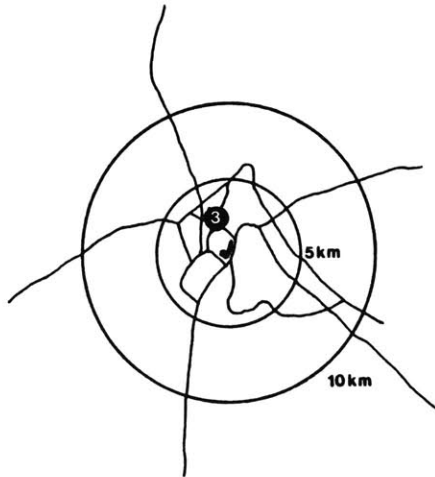
(left) This photograph shows a barber shaving a customer in front of the mosque after the prayer time in Al-Hindawiyah narrow streets.

#### CASE STUDY SOURCES

Locality Plan : (accurate) Maps, Town Planning Office, Mecca  
 Locality land use : (approximate) Maps, Town Planning Office  
 Locality circulation pattern : (accurate) Maps, Town Planning Office  
 Segment Plan : (accurate) Maps, Town Planning Office  
 Segment air photographs : Ministry of Municipal and Rural Affairs  
 Block plan : (accurate) Maps, Town Planning Office  
 Physical Data : (approximate) Field survey, Ghazi Al-Otaibi  
 Socio-economic data : (approximate) Field survey, Ghazi Al-Otaibi  
 Typical dwelling : (approximate) Field survey, Ghazi Al-Otaibi  
 Photographs : field survey, Ghazi Al-Otaibi  
 General information : field survey, Ghazi Al-Otaibi

### 3 JARWAL

Transitional settlement/Middle income/Walk-up



LOCATION: It is located in the northwest part of the city center about 3 km. from AL-HARAM.

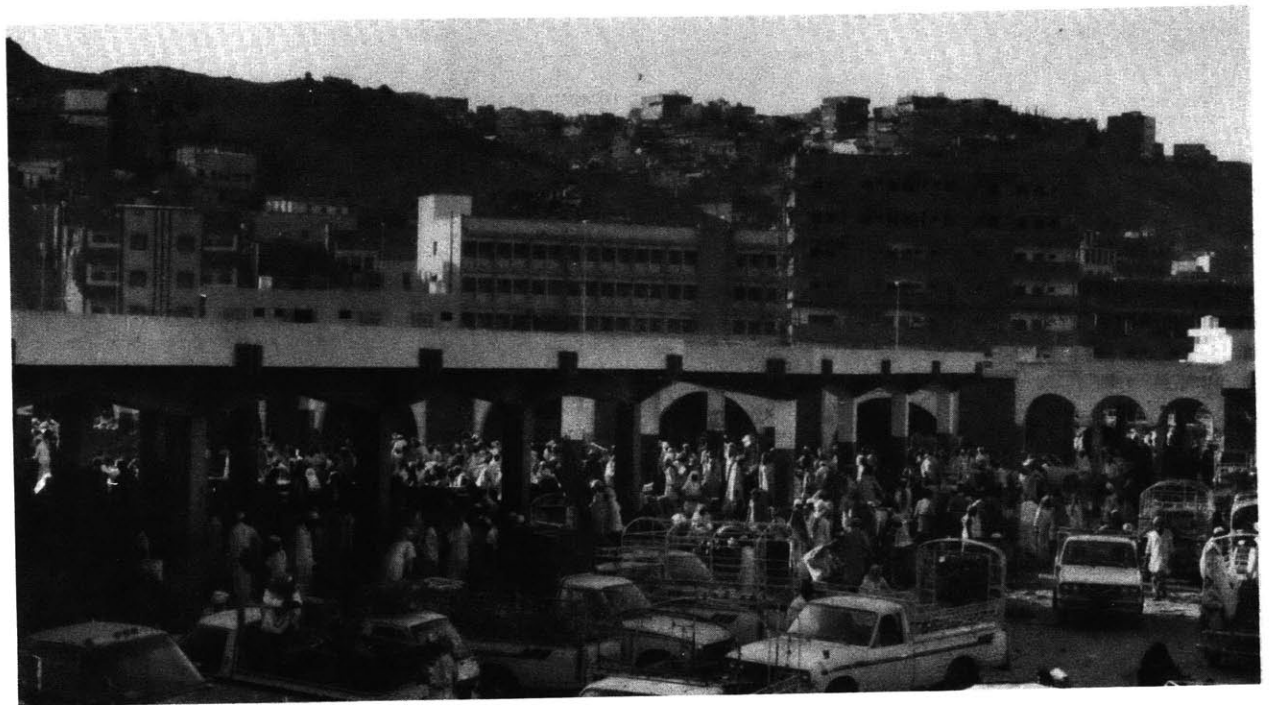
DEVELOPMENT: The development of the area occurred gradually by the people who came from the rural area in the early years of the kingdom, when they delivered fruits, hay, and vegetables to the city. The daily open market of the city is located in this area. These locality developed at the time that automobiles were beginning to be used, and the result was that the streets were made wider than the width of the traditional streets. Most of the houses were originally court houses; these have been replaced by row-house apartments. The inhabitants are working in different job activities, but the majority are working in the daily marketing of fruits, hay, and vegetables from venders to small salesmen.

**PHOTOGRAPHS**

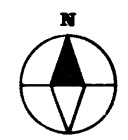
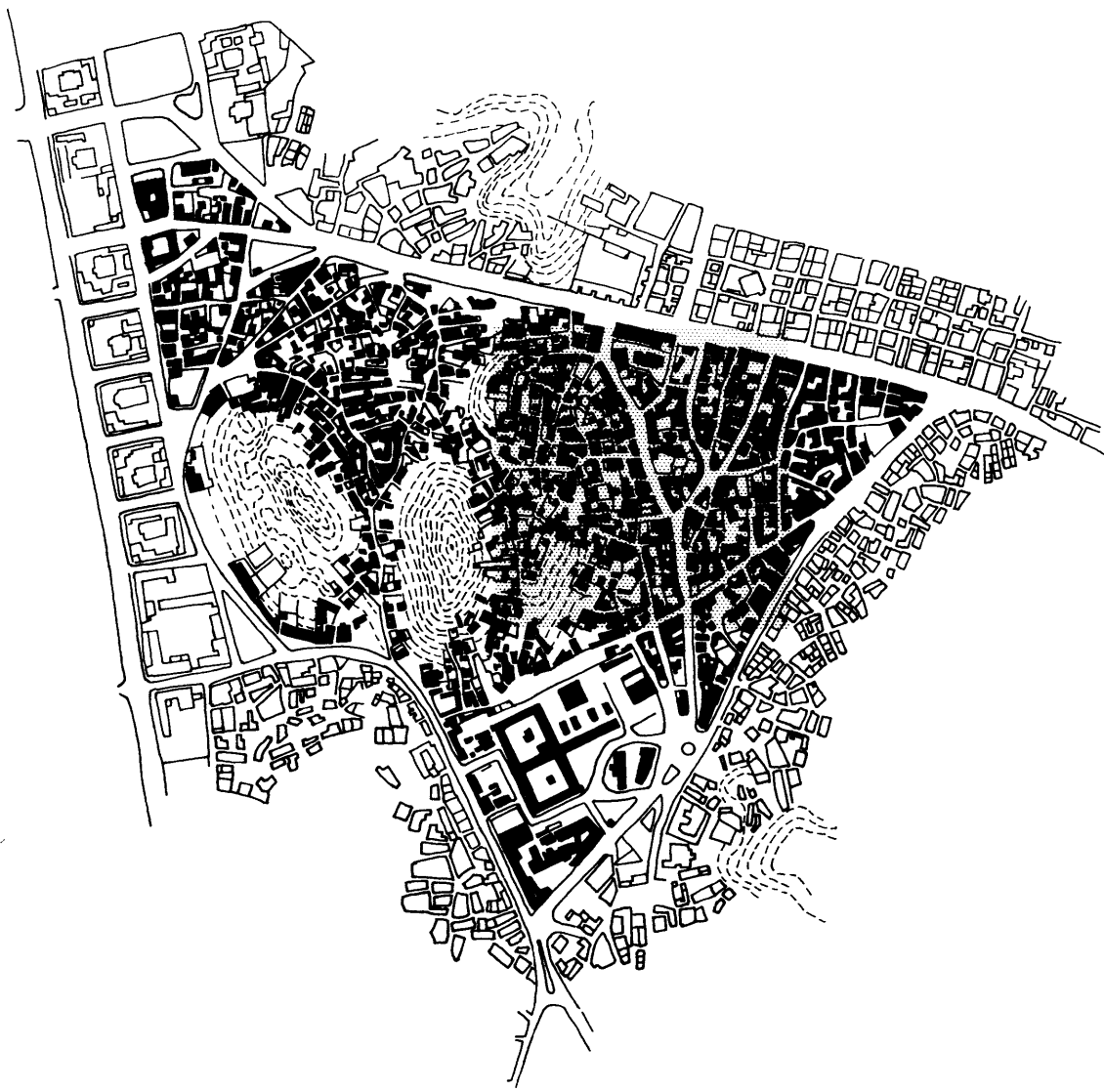
(top right) The main street of Jarwal locality where the apartment buildings are found on both sides of the street. No parking lots provided.

(top left) This photograph shows the arrangement of walk-up apartments. No parking lots provided. People park their cars immediately in front of their houses on both sides of the narrow street.

(bottom) The main daily commercial market of the city which is located in Jarwal locality.

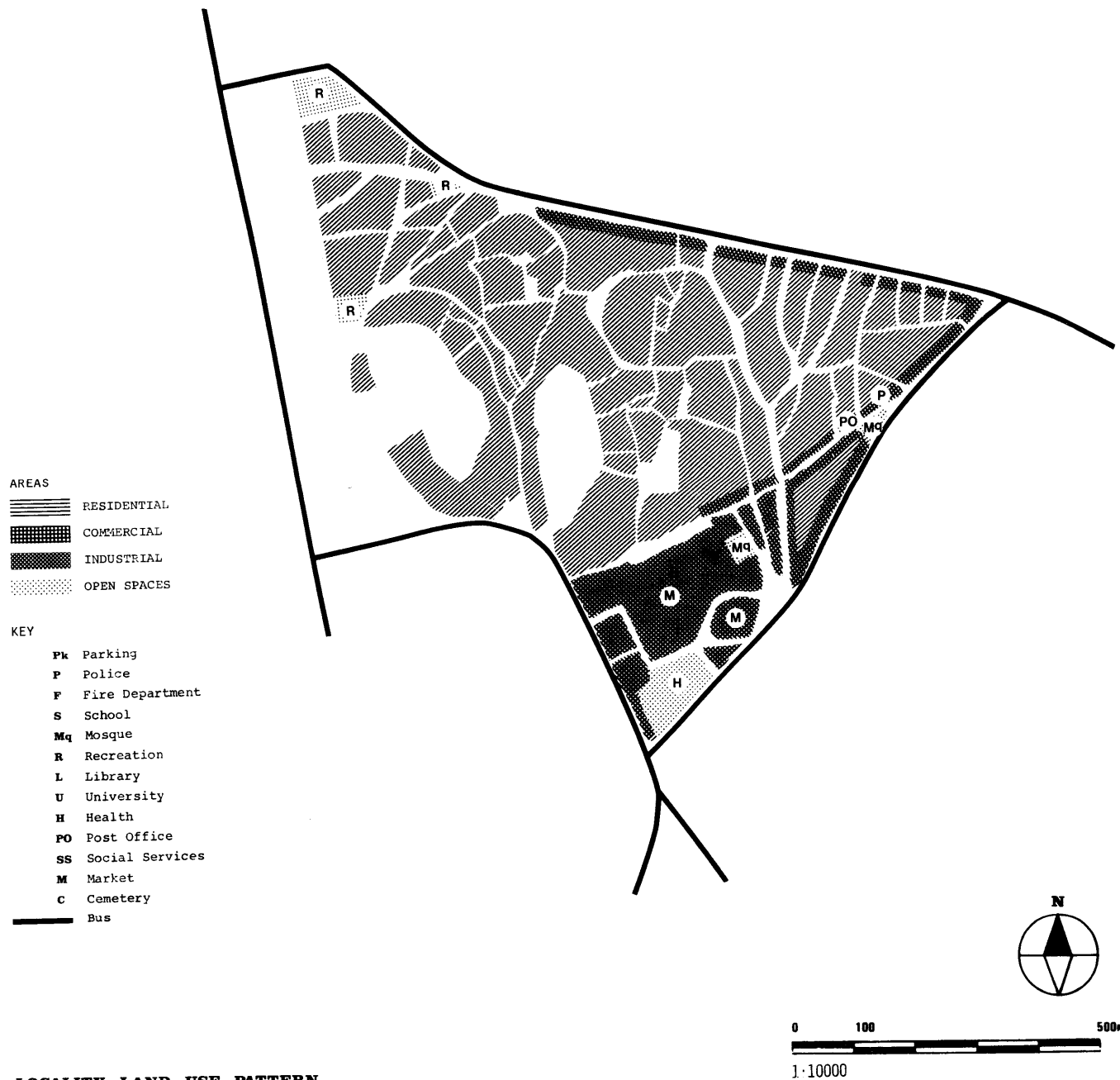


LAYOUT: Two kinds of patterns appear in this locality. The eastern pattern is located on flat land demonstrating the arrangement of the dwellings in row houses for semi-private use. The western pattern is located on contoured land which has squatter dwellings in irregular shapes.

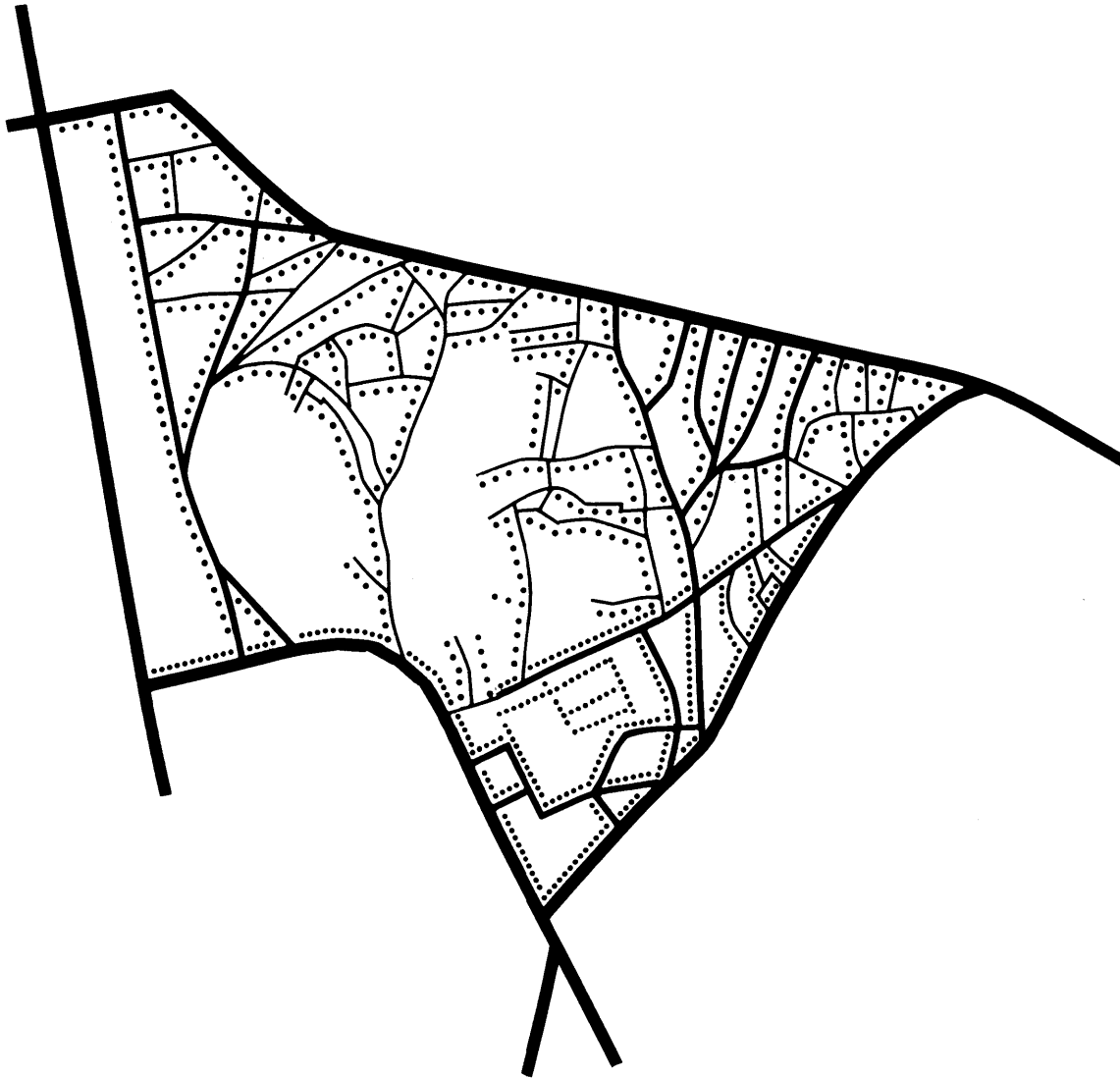


 SELECTED SEGMENT

LAND USE: The north part of this locality from the east to the west has been developed mainly for residential use. Some commercial and light industrial use is concentrated along the wider streets in this part. The south part was developed for commercial marketing; here are located the daily open market, the hay market, and the coal market of the city. Mosques, schools and other institutional facilities are scattered throughout the site.

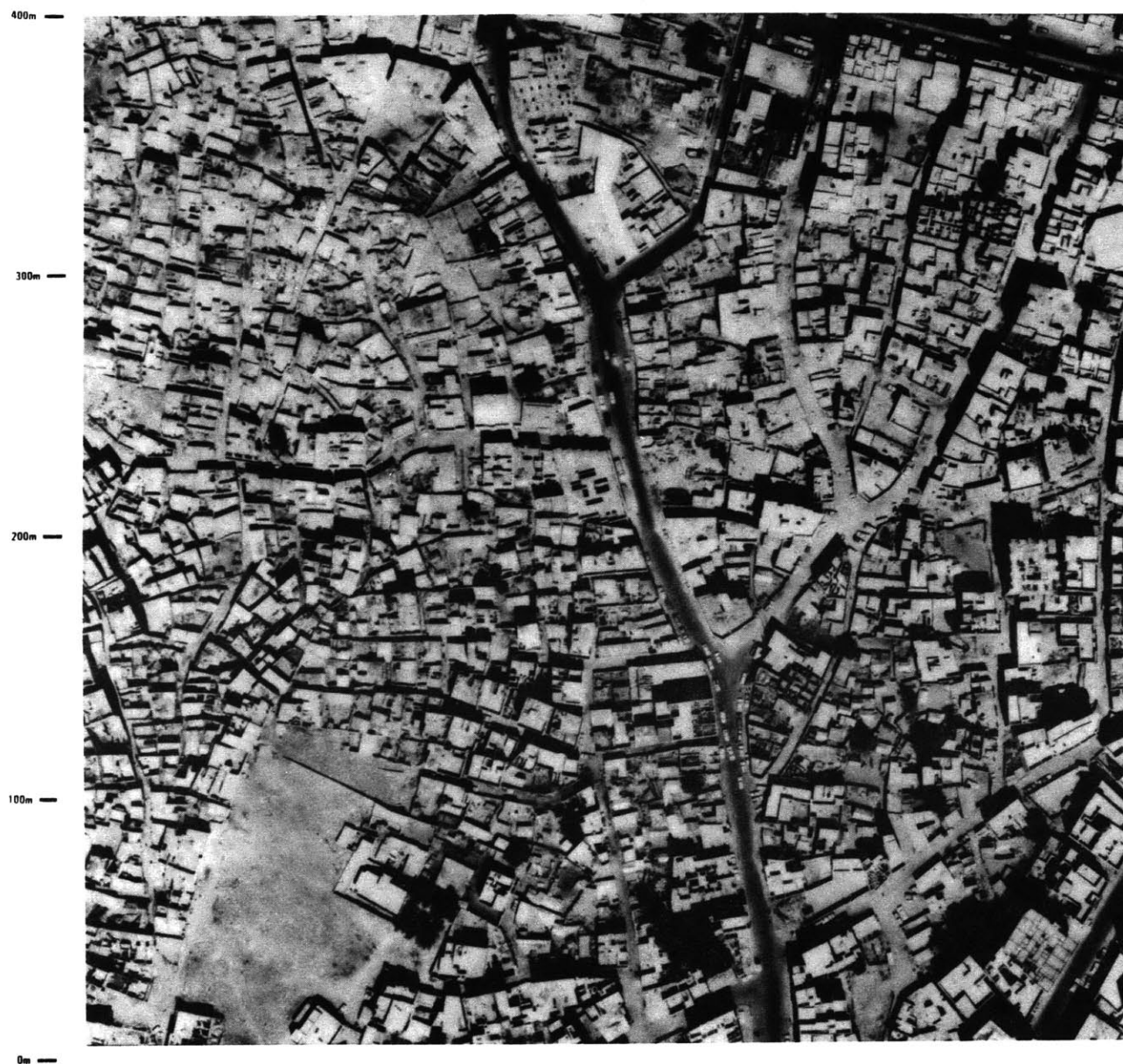


CIRCULATION: The location of this area as a linking point among the other parts of the city make this locality's streets the most important. The bounded streets are crowded by vehicles and pedestrians, particularly during shopping and lunch hours. The interior streets are important also since they provide vehicles and pedestrians access from the bounded streets to the commercial areas. The narrow interior streets are dusty and have no maintenance or garbage collection control. No parking lots are provided in the residential area, and cars park wherever they can.



— VEHICULAR  
 ..... PEDLSTRIAN

LOCALITY CIRCULATION PATTERN



LOCALITY SEGMENT AIR PHOTOGRAPH



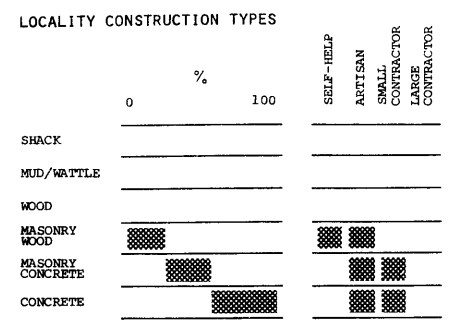
1:2500





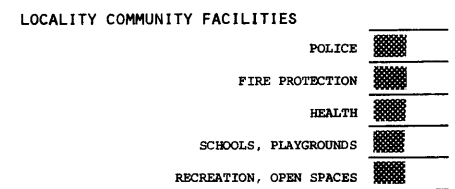
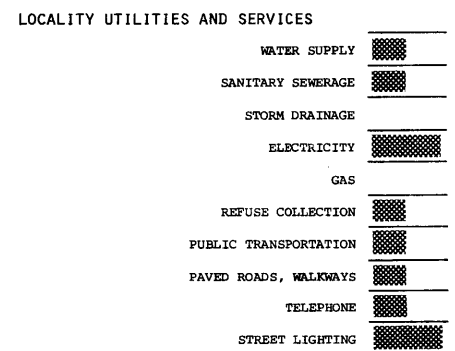


LOCALITY SEGMENT PLAN



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

Quality of information: Approximately

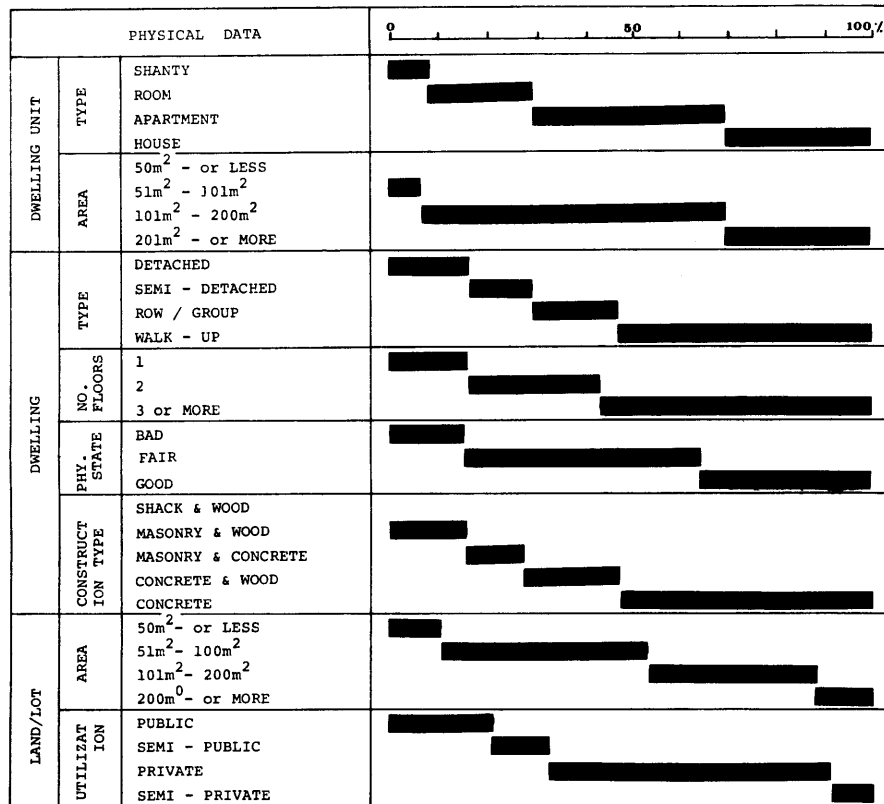


The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

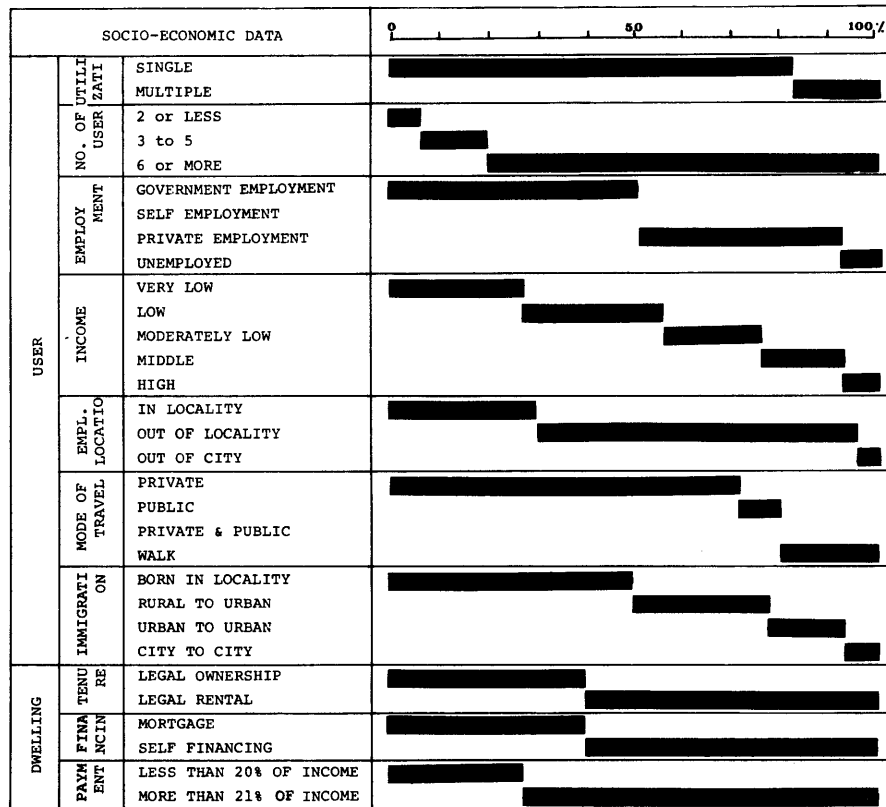
Quality of information: Approximately

SELECTED BLOCK

**LOCALITY PHYSICAL DATA CHART**



**LOCALITY SOCIO-ECONOMIC DATA CHART**



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	34	0.65	52
DWELLING UNITS	73	0.65	112
PEOPLE	365	0.65	561

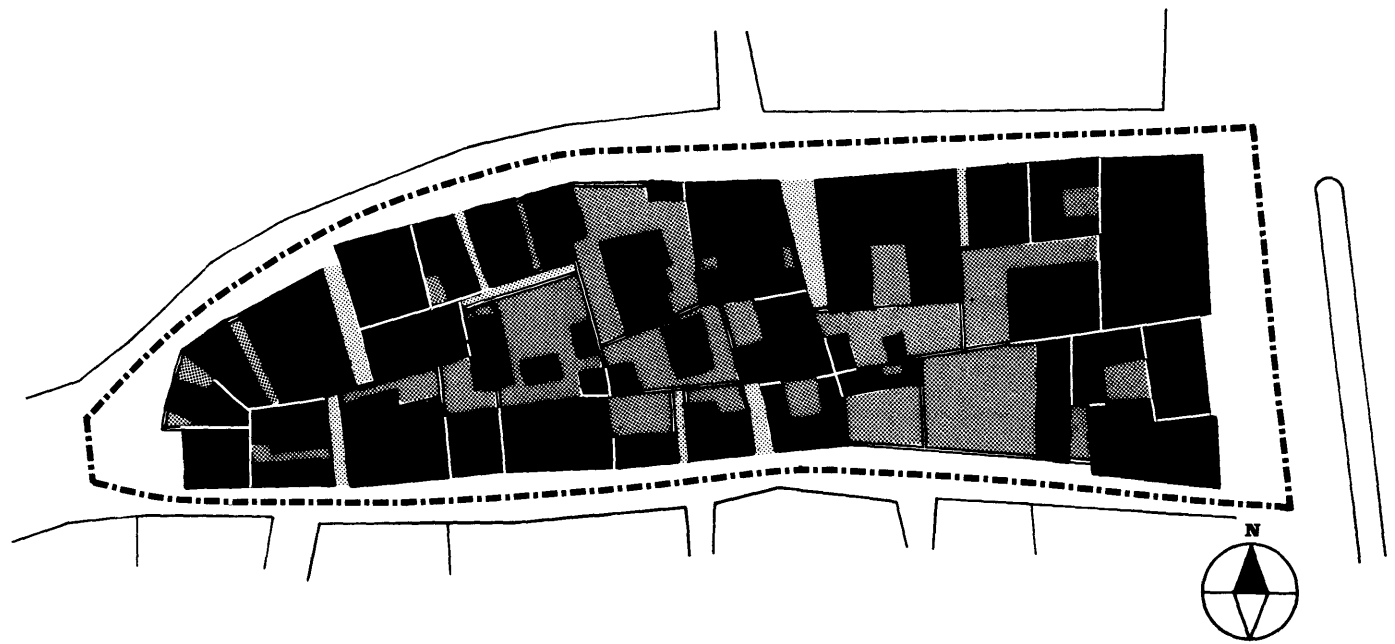
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.14	22%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.49	75%
SEMI-PRIVATE (cluster courts)	0.02	3%
<b>TOTAL</b>	<b>0.69</b>	<b>100%</b>

NETWORK EFFICIENCY

Network length (streets, walkways) = 255m/ha  
 Areas served (total area)

LOTS

Average area, dimensions = 144 m<sup>2</sup>



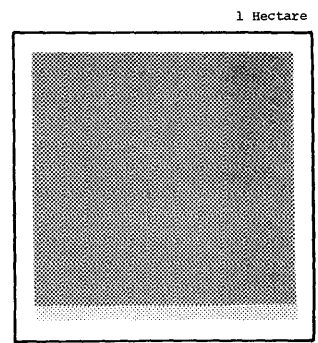
LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS



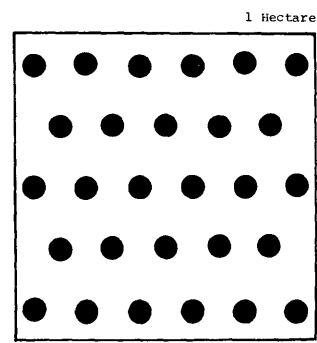
**PATTERN**

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



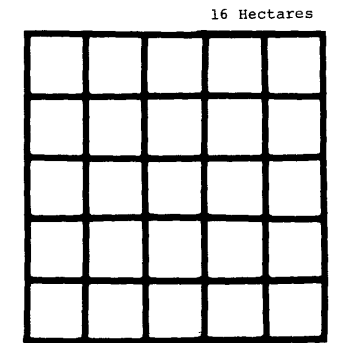
**PERCENTAGES**

Streets/Walkways	22%
Playgrounds	3%
Cluster Courts	3%
Dwellings/Lots	75%



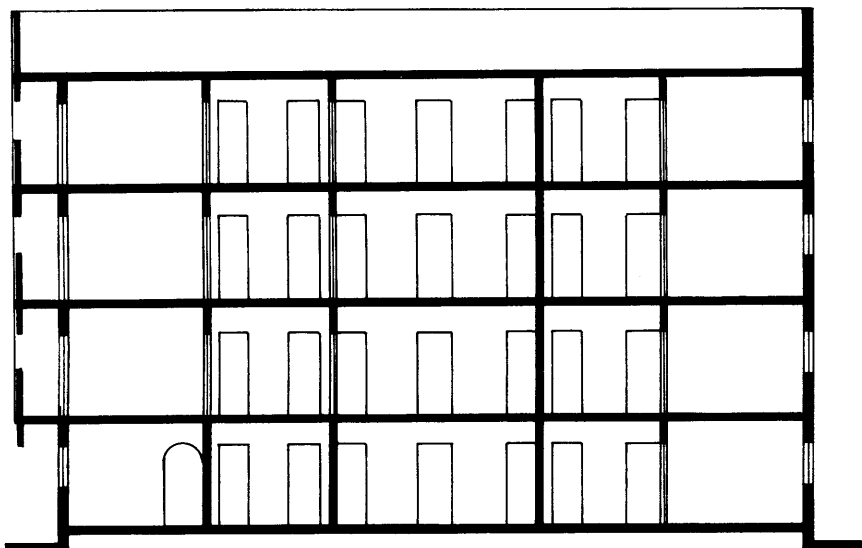
**DENSITY**

Persons/Hectare	561
●	20 Persons

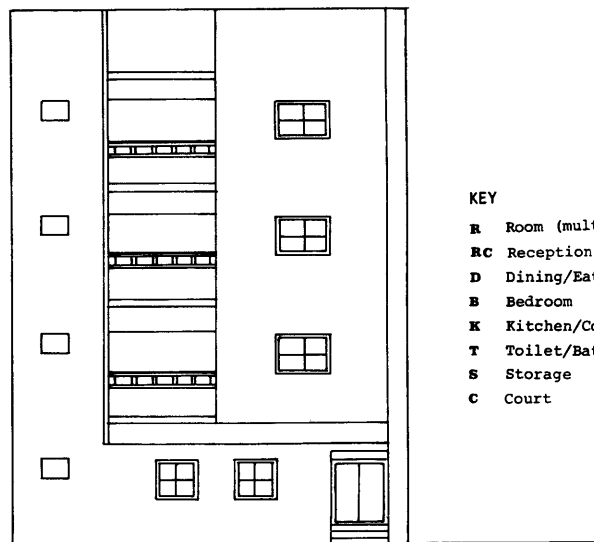


**CIRCULATION**

Meter/Hectare	255
---------------	-----

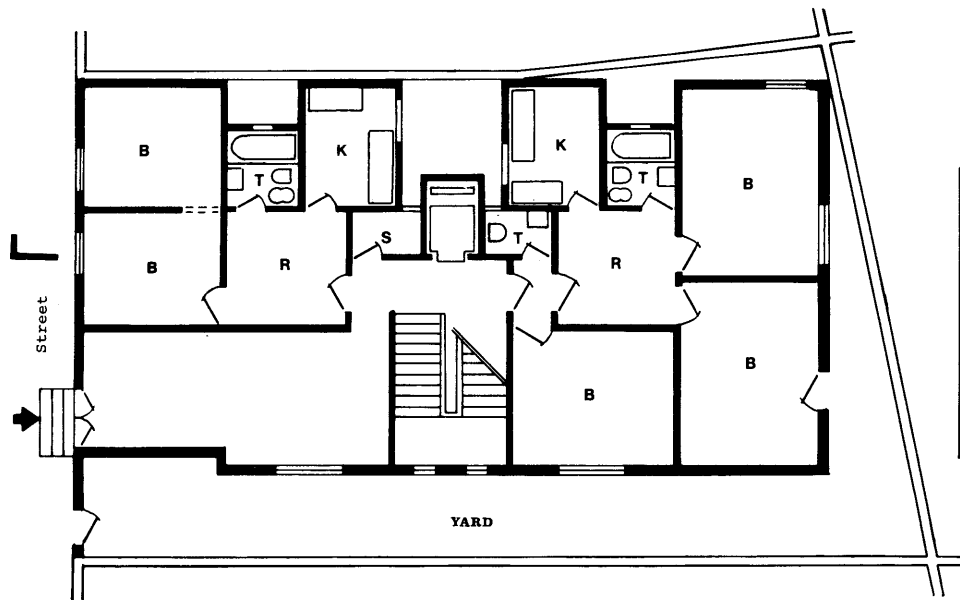


SECTION

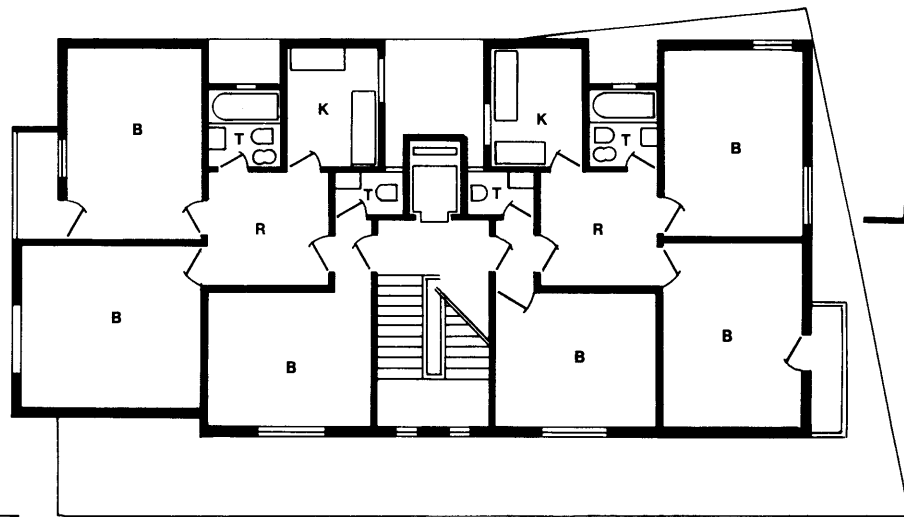


ELEVATION

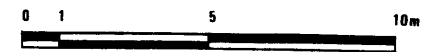
- KEY
- R Room (multi-use)
  - RC Reception
  - D Dining/Eating Area
  - B Bedroom
  - K Kitchen/Cooking Area
  - T Toilet/Bathroom
  - S Storage
  - C Court



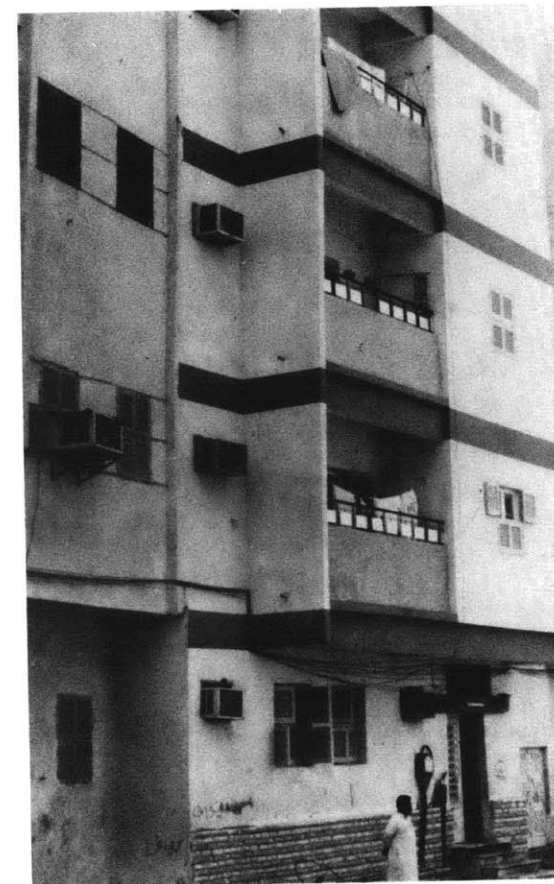
FIRST FLOOR



TYPICAL FLOOR



1:200



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

**DWELLING UNIT**  
 type: Apartment  
 area (sq m): 100 m<sup>2</sup>  
 tenure: legal rental

**LAND/LOT**  
 utilization: Private  
 area (sq m): 240 m<sup>2</sup>  
 tenure: legal ownership

**DWELLING**  
 location: Inner ring  
 type: Row houses  
 number of floors: 4  
 utilization: multi-families  
 physical state: good

**DWELLING DEVELOPMENT**  
 mode: Incremental  
 developer: Private  
 builder: small contractor  
 construction type: concrete  
 year of construction: 1974

**MATERIALS**  
 foundation: Reinforced concrete  
 floors: Reinforced concrete  
 walls: cement brick  
 roof: Mosaic tiles

**DWELLING FACILITIES**  
 wc: 2  
 shower: -  
 kitchen: 1  
 rooms: 3  
 other: Multi-room

**SOCIO-ECONOMIC DATA**  
(related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: Egyptian  
 place of birth: Egypt  
 education level: High

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

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

**GENERAL: ECONOMIC**  
 user's income group: Middle  
 employment: Government Employment  
 distance to work: 3 km.  
 mode of travel: Public transportation

**COSTS**  
 dwelling unit: -  
 land - market value: -

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

**PHOTOGRAPHS**

(right) The elevation of the typical dwellings in Jarwal locality, and the arrangement of the walk-up apartments.

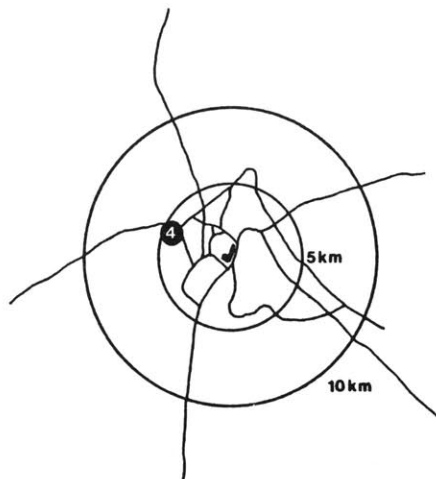
(left) The intersection of the two main streets of Jarwal locality, cars park on the two sides of the streets.

**CASE STUDY SOURCES**

Locality Plan : (accurate) Maps, Town Planning Office, Mecca  
 Locality land use : (approximate) Maps, Town Planning Office  
 Locality circulation pattern : (accurate) Maps, Town Planning Office  
 Segment Plan : (accurate) Maps, Town Planning Office  
 Segment air photographs : Ministry of Municipal and Rural Affairs  
 Block plan : (accurate) Maps, Town Planning Office  
 Physical Data : (approximate) Field survey, Ghazi Al-Otaibi  
 Socio-economic data : (approximate) Field survey, Ghazi Al-Otaibi  
 Typical dwelling : (approximate) Field survey, Ghazi Al-Otaibi  
 Photographs : field survey, Ghazi Al-Otaibi  
 General information : field survey, Ghazi Al-Otaibi

## 4 AL-NUZHAH

New settlement/high income  
Private, Public/Detached



**LOCATION:** This locality is located on the west part of the city, about 4km. from AL-HARAM (center of the city). It is largely located along the road between Jeddah and Mecca.

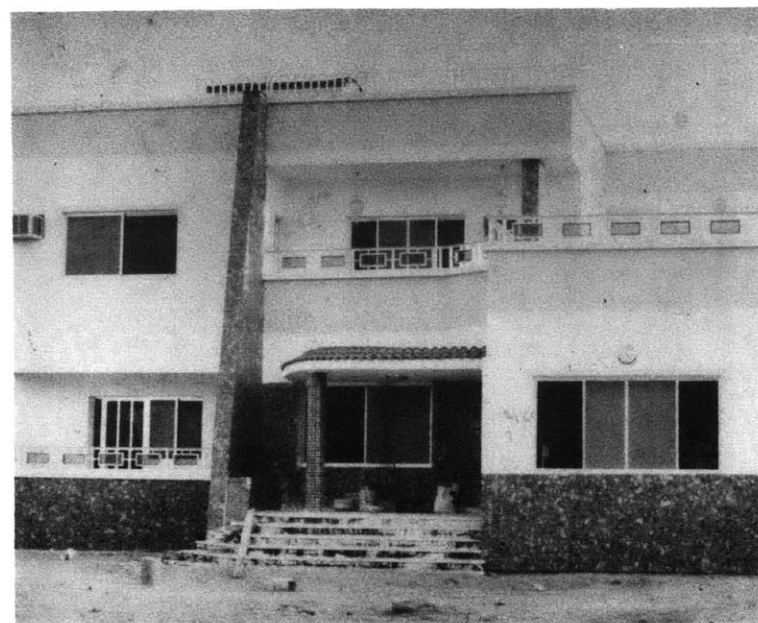
**DEVELOPMENT:** The development of this area started in the last twenty years. The town-planning office subdivided this area and the Mecca municipality sold the lots to the people. Most of the dwellings are detached and semi-detached (villas and walk-up apartments). The inhabitants are predominantly upper middle class and high income, working for the government and companies as businessmen and professionals.

### PHOTOGRAPHS

(top right) A modern villa in Al-Nuzhah locality. This villa is under construction in the process of the western culture.

(top left) This photograph shows the detached houses in Al-Nuzhah locality.

(bottom) The main street in the high income locality. Width, electricity, light, cleaning and the modern cars.



LAYOUT: The locality was developed in a grid pattern by private developers. The blocks were mainly individual lots 25m x 25m, which created detached villas. Over time, people legalized some of the streets in order to minimize the crossing of the streets, which created semi detached houses.



SELECTION  
SEGMENT

LOCALITY PLAN

LAND USE: The locality is predominantly residential, with some commercial areas scattered on the site. Some of the villas on the main road have been rented to the government authorities. Mosques, hospitals, schools, and institutional facilities are scattered throughout the site.

- AREAS
- RESIDENTIAL
  - COMMERCIAL
  - INDUSTRIAL
  - OPEN SPACES

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



LOCALITY LAND USE PATTERN



CIRCULATION: All locality streets are secondary streets connected with the main streets. Pedestrian circulation is not separated from vehicular circulation, and all intersections are without traffic lights. Public transportation is provided to this locality from the city center along the main streets.



KEY  
—— VEHICULAR  
..... PEDLSTRIAN



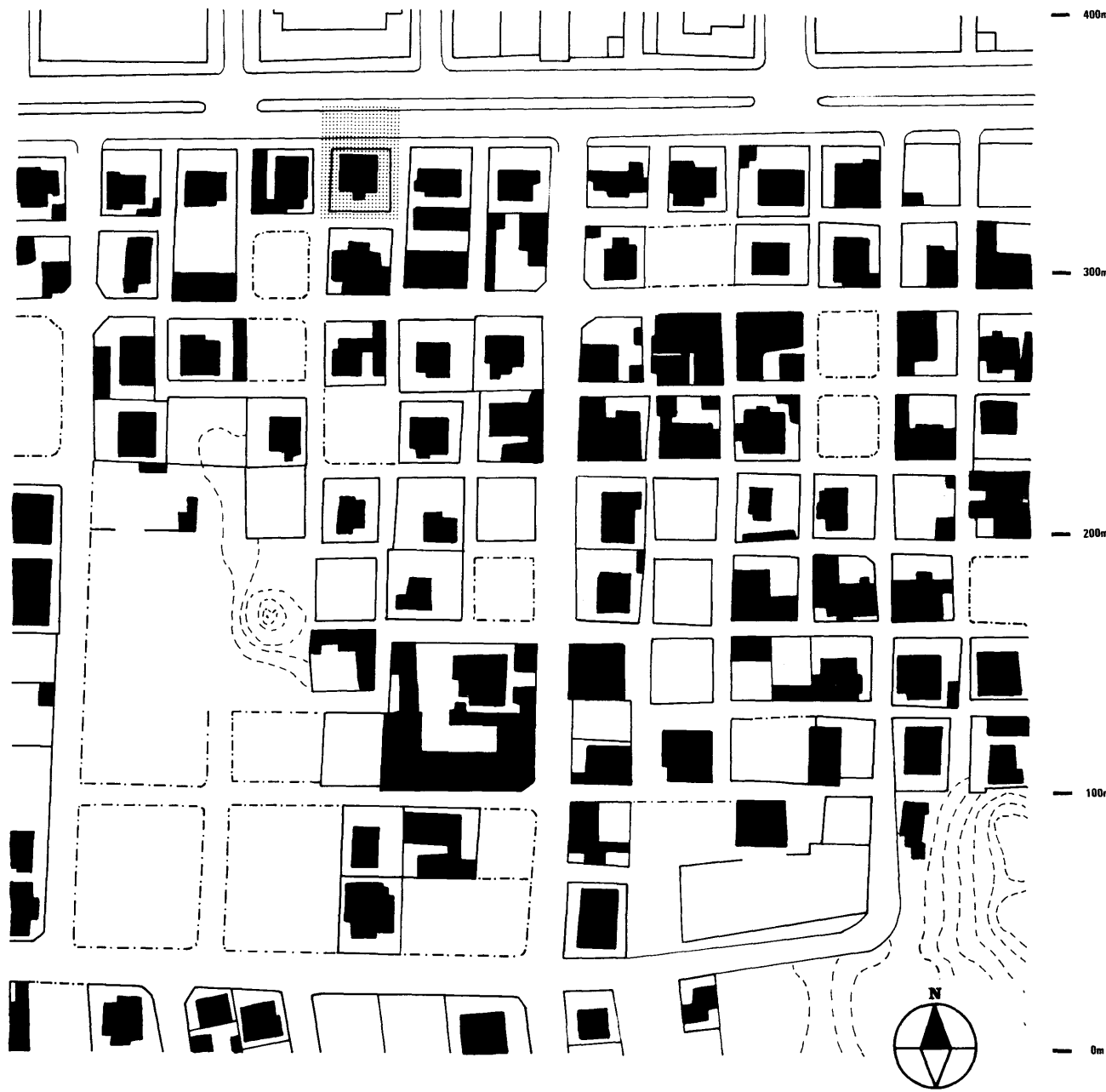
1:10000

LOCALITY CIRCULATION PATTERN



LOCALITY SEGMENT AIR PHOTOGRAPH





LOCALITY SEGMENT PLAN



LOCALITY CONSTRUCTION TYPES

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

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

Quality of information: Approximately

LOCALITY UTILITIES AND SERVICES

WATER SUPPLY	[Dotted pattern]
SANITARY SEWERAGE	[Dotted pattern]
STORM DRAINAGE	[Dotted pattern]
ELECTRICITY	[Dotted pattern]
GAS	[Dotted pattern]
REFUSE COLLECTION	[Dotted pattern]
PUBLIC TRANSPORTATION	[Dotted pattern]
PAVED ROADS, WALKWAYS	[Dotted pattern]
TELEPHONE	[Dotted pattern]
STREET LIGHTING	[Dotted pattern]

LOCALITY COMMUNITY FACILITIES

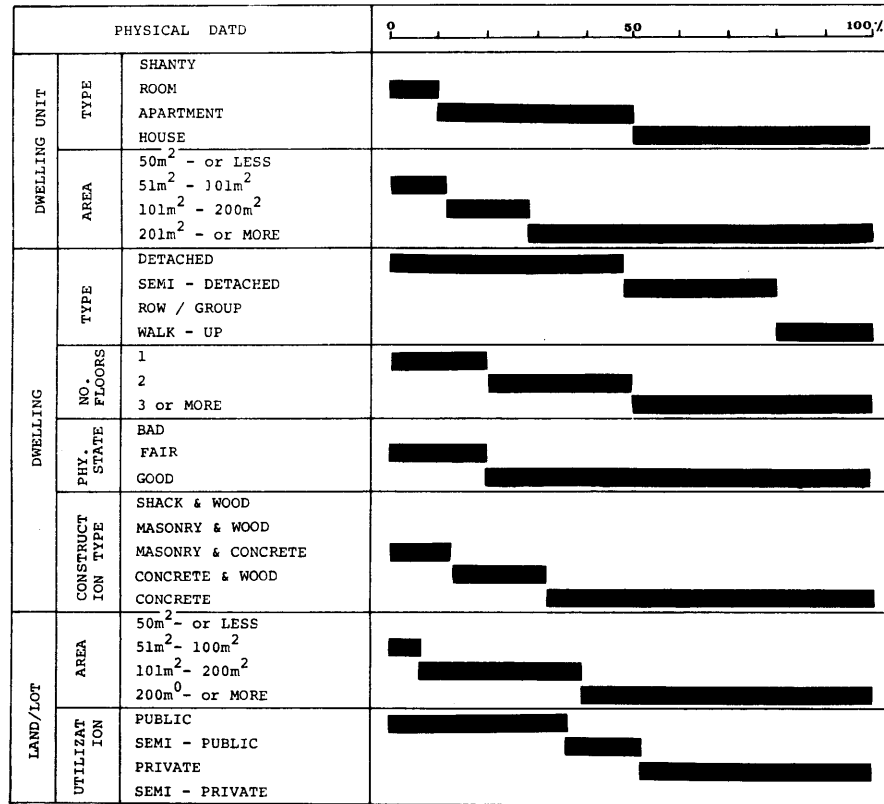
POLICE	[Dotted pattern]
FIRE PROTECTION	[Dotted pattern]
HEALTH	[Dotted pattern]
SCHOOLS, PLAYGROUNDS	[Dotted pattern]
RECREATION, OPEN SPACES	[Dotted pattern]

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

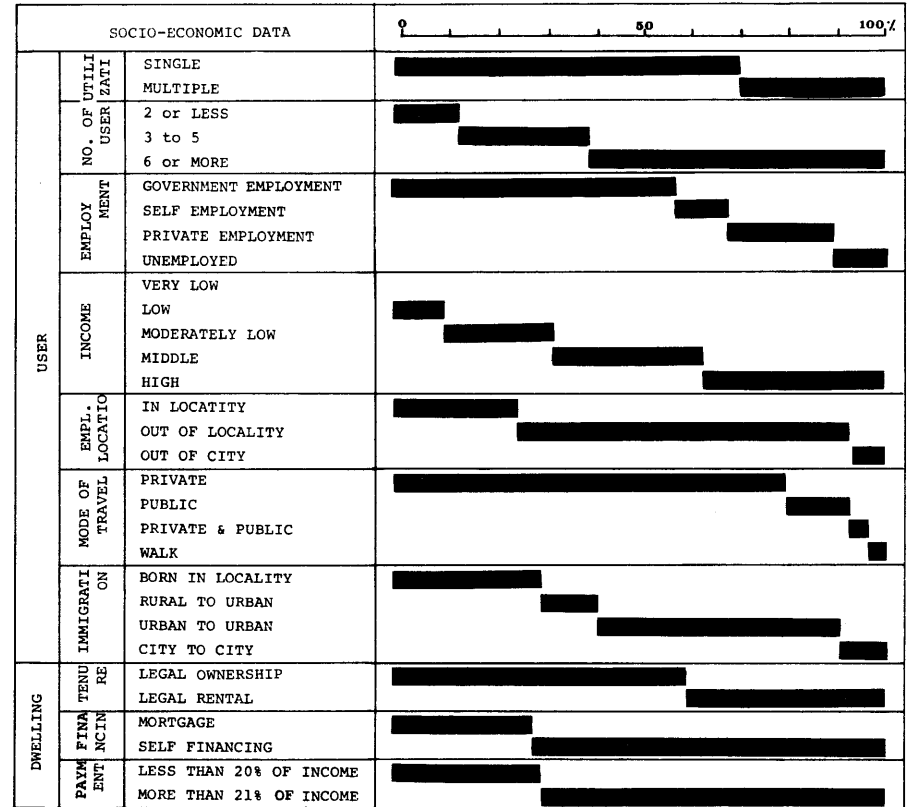
Quality of information: Approximately

[Dotted pattern] SELECTED BLOCK

**LOCALITY PHYSICAL DATA CHART**



**LOCALITY SOCIO-ECONOMIC DATA CHART**



LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	1	0.15	7
DWELLING UNITS	3	0.15	20
PEOPLE	15	0.15	100

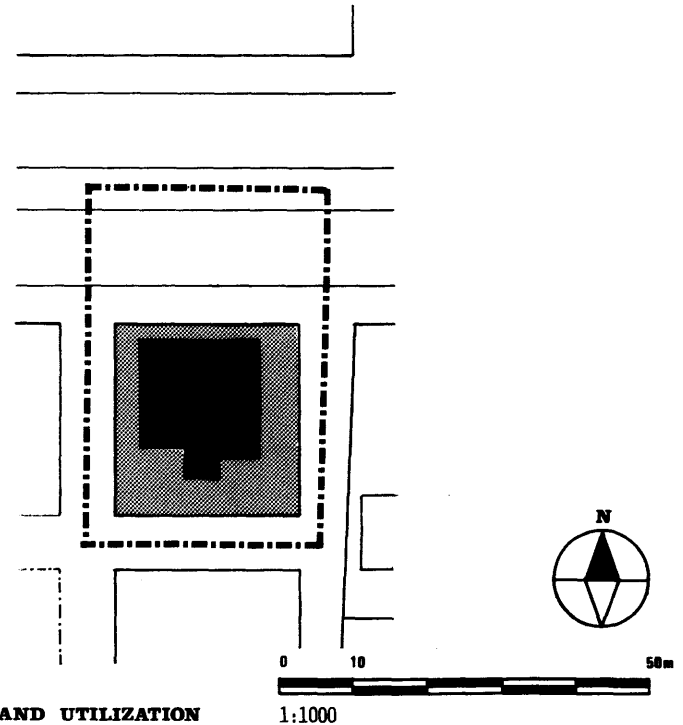
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.087	58%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.063	42%
SEMI-PRIVATE (cluster courts)	-	-
<b>TOTAL</b>	<b>0.15</b>	<b>100%</b>

NETWORK EFFICIENCY

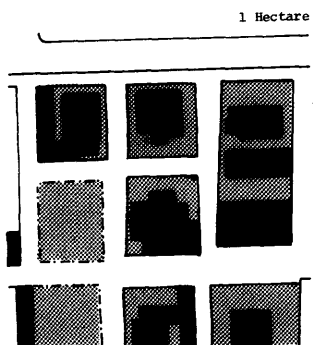
Network length (streets, walkways) = 526m/ha  
 Areas served (total area)

LOTS

Average area, dimensions = 630 m<sup>2</sup>

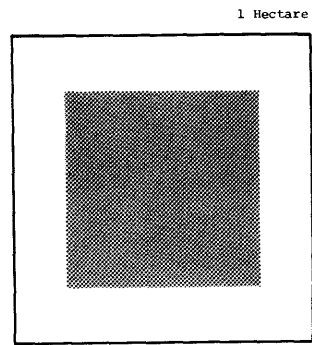


LAND UTILIZATION DIAGRAMS



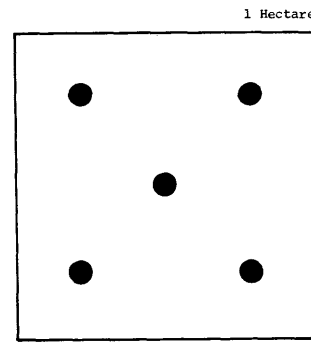
**PATTERN**

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



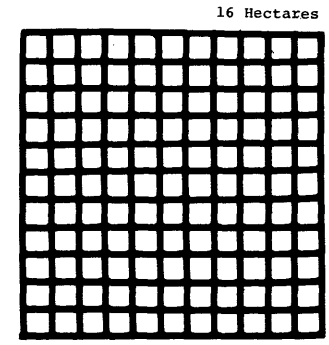
**PERCENTAGES**

Streets/Walkways	58%
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	42%



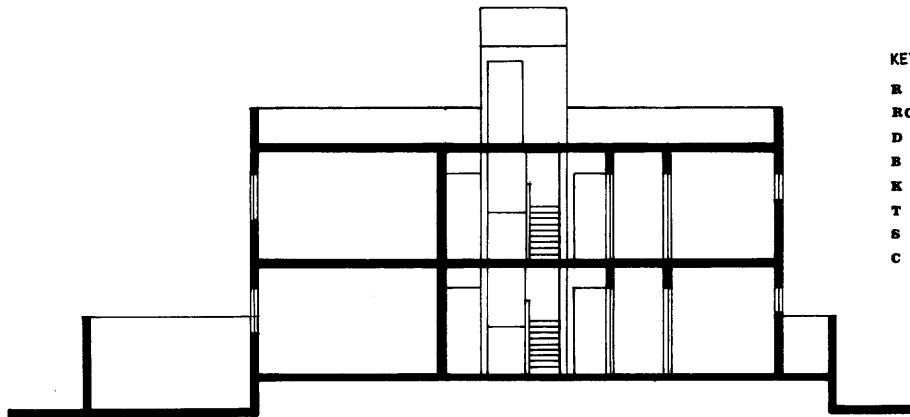
**DENSITY**

Persons/Hectare	100
●	20 Persons



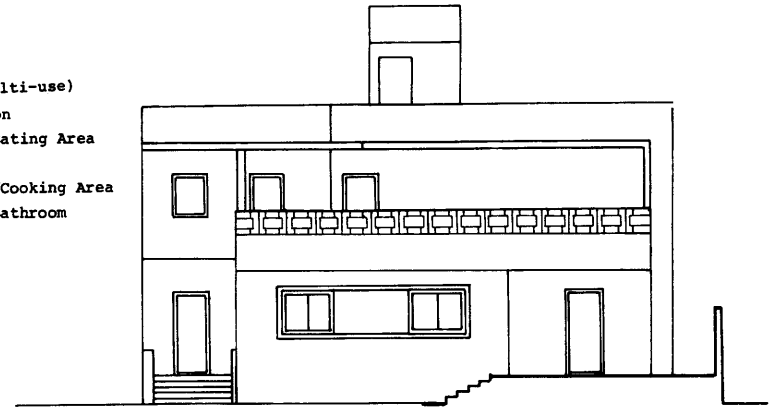
**CIRCULATION**

Meter/Hectare	526
---------------	-----

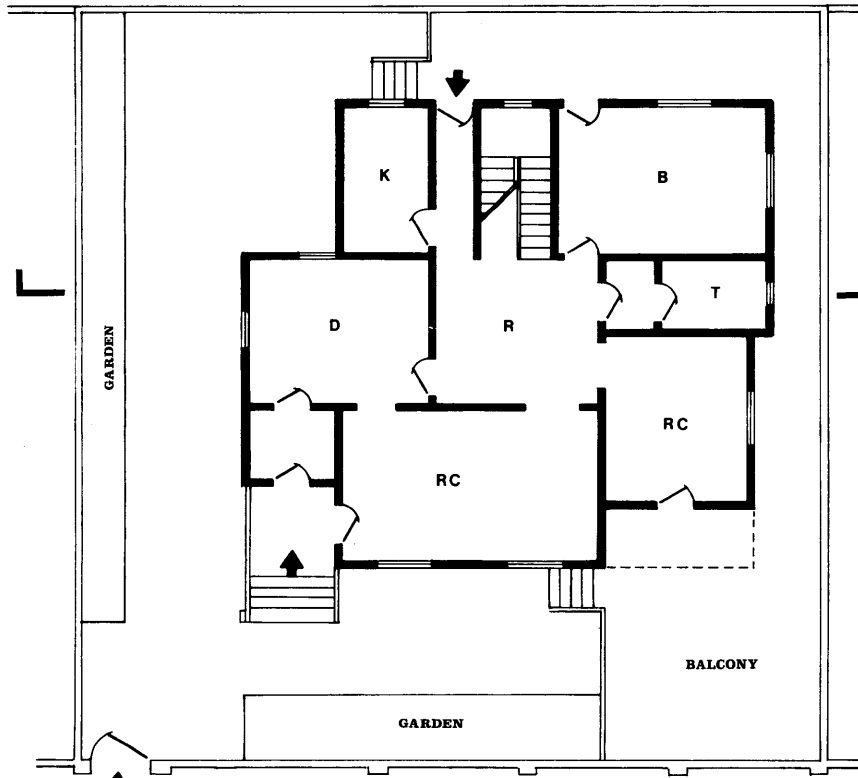


SECTION

- KEY
- R Room (multi-use)
  - RC Reception
  - D Dining/Eating Area
  - B Bedroom
  - K Kitchen/Cooking Area
  - T Toilet/Bathroom
  - S Storage
  - C Court

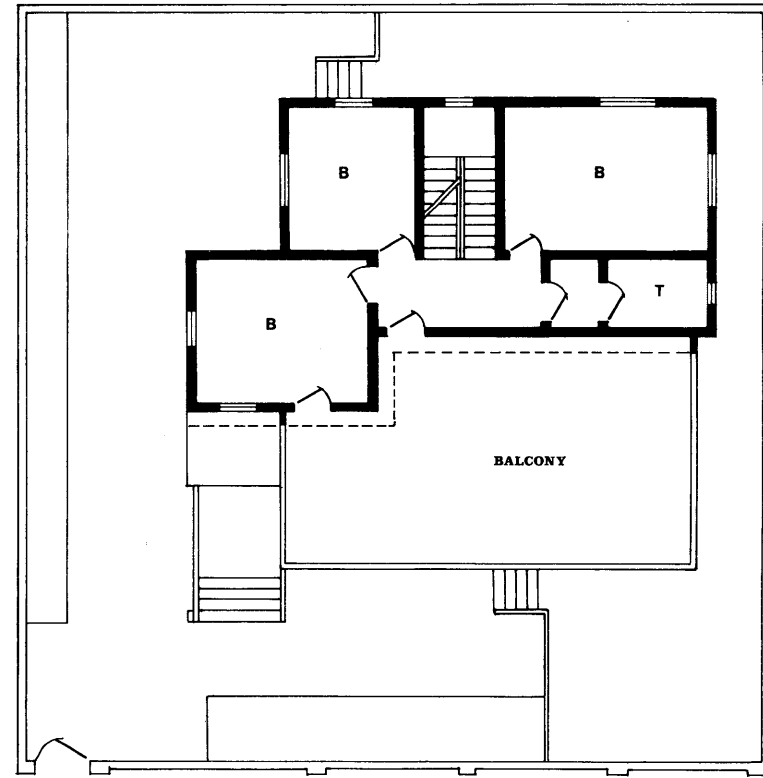


ELEVATION



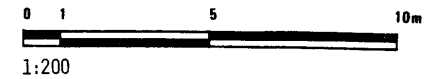
FIRST FLOOR

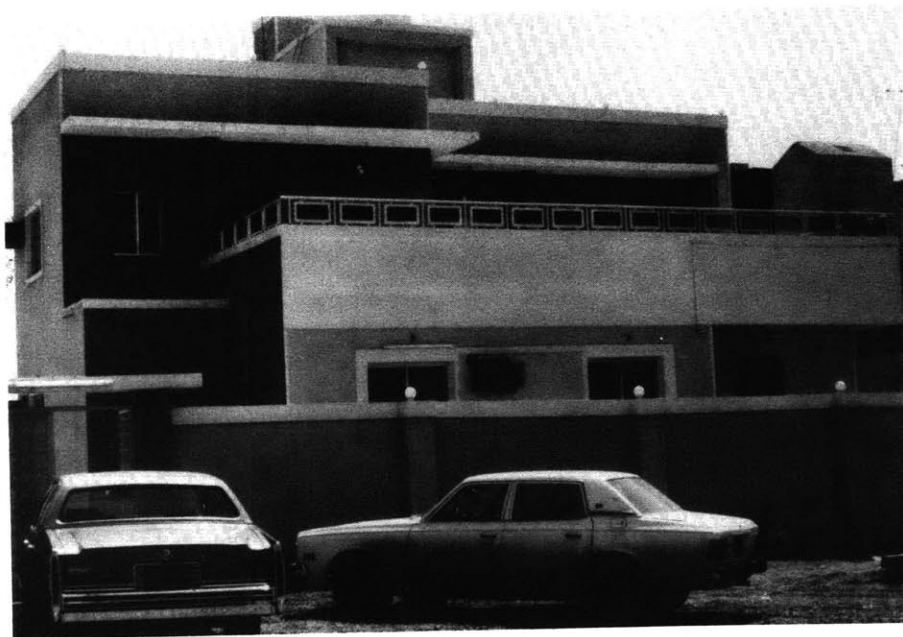
Street



SECOND FLOOR

TYPICAL DWELLING





#### PHYSICAL DATA (related to dwelling and land)

**DWELLING UNIT**  
 type: House  
 area (sq m): 175 m<sup>2</sup>  
 tenure: legal rental

**LAND/LOT**  
 utilization: Private  
 area (sq m): 400 m<sup>2</sup>  
 tenure: legal ownership

**DWELLING**  
 location: Inner ring  
 type: Detached house  
 number of floors: 2  
 utilization: single family  
 physical state: good

**DWELLING DEVELOPMENT**  
 mode: Instant  
 developer: Private  
 builder: small contractor  
 construction type: brick/concrete  
 year of construction: 1978

**MATERIALS**  
 foundation: Reinforced concrete  
 floors: concrete/tiles  
 walls: cement brick  
 roof: Reinforced concrete

**DWELLING FACILITIES**  
 wc: 2  
 shower: -  
 kitchen: 1  
 rooms: 7  
 other: Multi-rooms

#### SOCIO-ECONOMIC DATA (related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: Saudi  
 place of birth: Al-Gossim  
 education level: Intermediate

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

**MIGRATION PATTERN**  
 number of moves: 3  
 rural - urban: 1  
 urban - urban: 2  
 urban - rural: -  
 why came to urban area:

**GENERAL: ECONOMIC**  
 user's income group: High  
 employment: Private employment  
 distance to work: -  
 mode of travel: Private transportation

**COSTS**  
 dwelling unit: -  
 land - market value: -

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

#### PHOTOGRAPHS

(right) An overview of Al-Nuzhah locality walls, walk-up apartments and high rises are found in this locality. The paved streets which lighted-up by electricity in the area with no dwellings.

(left) The typical dwelling of Al-Nuzhah. The western style buildings have balconies which make them unusable, and the high wall surrounding the dwelling attempts to provide privacy for the family, modern cars are parked in front of the houses.

#### CASE STUDY SOURCES

Locality Plan : (accurate) Maps, Town Planning Office, Mecca  
 Locality land use : (approximate) Maps, Town Planning Office  
 Locality circulation pattern : (accurate) Maps, Town Planning Office  
 Segment Plan : (accurate) Maps, Town Planning Office  
 Segment air photographs : Ministry of Municipal and Rural Affairs  
 Block plan : (accurate) Maps, Town Planning Office  
 Physical Data : (approximate) Field survey, Ghazi Al-Otaibi  
 Socio-economic data : (approximate) Field survey, Ghazi Al-Otaibi  
 Typical dwelling : (approximate) Field survey, Ghazi Al-Otaibi  
 Photographs : field survey, Ghazi Al-Otaibi  
 General information : field survey, Ghazi Al-Otaibi



*An overview of Al-Garara locality, where traditional houses are being demolished and replaced with "modern" high rise buildings.*



## EVALUATIONS

The following sections are contained in the evaluation:

**DWELLING TIME/PROCESS PERSPECTIVE:** Models relating the case studies to their original models.

**PHYSICAL DATA MATRIX:** A comparison of physical data with comments.

**SOCIO-ECONOMIC DATA MATRIX:** A comparison of socio-economic data with comments.

**LAND UTILIZATION:** Patterns, percentages, densities and circulation efficiency - a graphic comparison of land utilization.

### DWELLING TIME/PROCESS PERSPECTIVE

The four case studies of Mecca city are representative of types of existing housing situations which illustrate different cases

of land utilization. Case studies do not include all of the dwelling types existing in Mecca city. Seven dwelling types represent the existing housing models presented in the following pages. The models have been distributed in the chart in an attempt to relate them to their originating models and to see them in a broader time/process perspective.

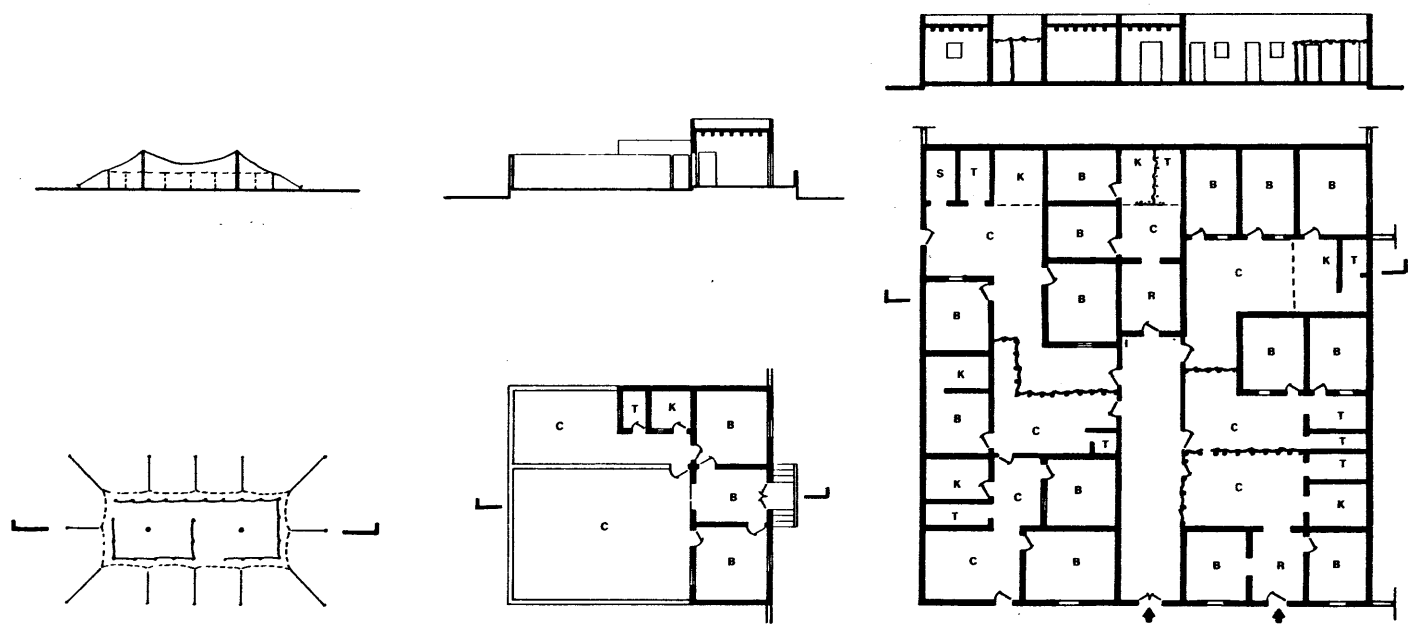
From the seven models described on the following pages, only four are Arabic models (tent, court houses, traditional houses and transitional houses). One is western oriental and two are international models. The models permit medium/high densities with the exception of court houses and detached houses which provide low density. These models are accessible to very low and low income groups, three are accessible to middle income groups and one is accessible to high income groups. Four models provide efficient land utilization. It can be seen that the new dwelling types (detached, walk-up apartments) are growing fast while the traditional houses are tending to disappear. Models have to be improved in terms of safety, and it is important to encourage efficiency in administrative procedures.

DWELLING TIME/PROCESS PERSPECTIVE

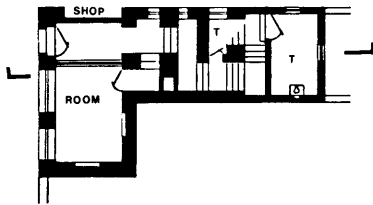
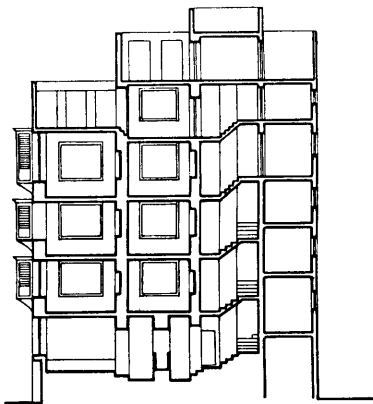
SECTION

- KEY**  
**R** Room (multi-use)  
**RC** Reception  
**D** Dining/Eating Area  
**B** Bedroom  
**K** Kitchen/Cooking Area  
**T** Toilet/Bathroom  
**S** Storage  
**C** Court

PLAN



IDENTIFICATION	Dwelling configuration	Dwelling system	<b>TENT</b>	<b>COURT HOUSE</b>	<b>TENEMENT ROOM</b>
		lot layout	lot stories layout	Irregular/small 1 Shepherds looking for pasture land	square/rectangular 1 Three rooms with their facilities ranging on side of the back yard.
	location block layout land utilization	location block layout land utilization	Round urban areas Irregular/Grouped Acceptable	Transitional settlements (Inner ring) Row/grouped Bad	Squatter settlements (Inner ring) Regular grouped Acceptable
	origin localities	origin localities	Arabic culture A random case from middle and high income	Arabic model Jarwal	International model AL-HINDAWIYYAH
PAST	User income groups	User income groups	low/middle	low/middle	very low/low
	Dwelling utilization	Dwelling utilization	single/multiple	single/multiple	multiple
PRESENT	Population density	Population density	medium/high	low	low/medium
	Trend	Trend	continuing	continuing	continuing
FUTURE	User income groups	User income groups	very low/low	very low/middle	low/middle
	Dwelling utilization	Dwelling utilization	single/multiple	single	single/multiple
RECOMMENDATIONS	Population density	Population density	medium	low	low
	Trend	Trend	continuing	continuing	continuing
	User income groups	User income groups	very low	very low/low	very low/low
	Dwelling utilization	Dwelling utilization	single/multiple	single	single
	Population density	Population density	medium	low	medium
	Trend	Trend	disappearing	proliferating	disappearing
			PROVIDE SPECIAL LOCATION IN THE CITY. PROVIDE UTILITIES AND SERVICES. MAINTAIN ITS FUNCTION AS TEMPORARY SHELTER. MAXIMIZE PRIVATE RESPONSIBILITY. PROVIDE SEMI PRIVATE LAND.	PROVIDE UTILITIES AND SERVICES. INCREASE POPULATION DENSITY. PROMOTE THIS MODEL FOR NIGHT ACTIVITIES. MINIMIZE PUBLIC LAND. DEVELOP THIS MODEL FOR VERY LOW/LOW. MIDDLE INCOME GROUPS. DEVELOP THIS MODEL FOR TRADITIONAL AND ENVIRONMENT REQUIREMENTS.	PROVIDE UTILITIES AND SERVICES. INCREASE POPULATION DENSITY. PROVIDE PROTECTION MATERIALS FROM CLIMATE AND FIRE. DEVELOP THIS MODEL FOR LOW/MIDDLE INCOME GROUPS.



**TRADITIONAL HOUSE**

irregular rectangular  
4-5  
The ground floor use for reception  
the middle floor use for families.  
Traditional settlements (center)  
Row/Grouped  
Acceptable

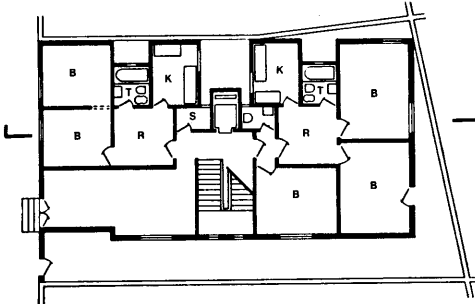
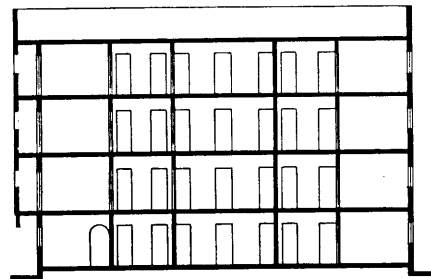
Arabic model  
Al-Garara

middle/high  
single/multiple high continuing

low/middle  
single/multiple high continuing

low/middle  
single/multiple high continuing

PROMOTE THIS MODEL FOR FURTHER DEVELOPMENT FOR LOW/MIDDLE INCOME GROUPS.  
MAINTAIN THIS MODEL FOR TRADITIONAL AND ENVIRONMENTAL REQUIREMENTS.  
MAXIMIZE PRIVATE AND SEMI PRIVATE LAND.  
MINIMIZE THE THICKNESS OF THE WALLS.



**APARTMENT**

Rectangular/square  
205  
Each floor is divided into apartments around a common staircase.  
Scattered in different areas.  
Grid iron  
Bad

International model  
JARWAL

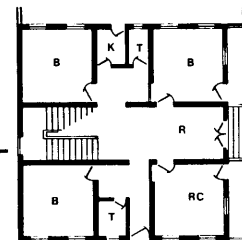
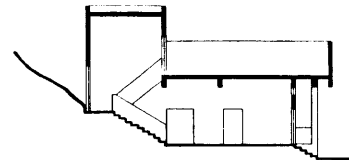
Middle/high  
single low/medium continuing

Middle/high  
single low/medium continuing

Middle/high  
single low/medium proliferating

DEVELOP THIS MODEL FOR TRADITIONAL AND ENVIRONMENT REQUIREMENTS.  
MAXIMIZE PRIVATE RESPONSIBILITY.  
MINIMIZE PUBLIC LAND.

Traditional house



**TRANSITIONAL HOUSE**

small square  
1-2  
A group of rooms around their facilities  
scattered in different areas (Inner ring)  
Accretion  
Acceptable

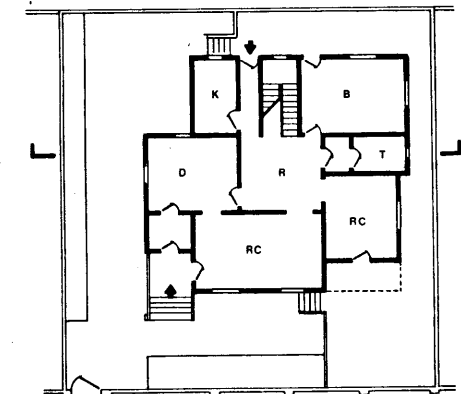
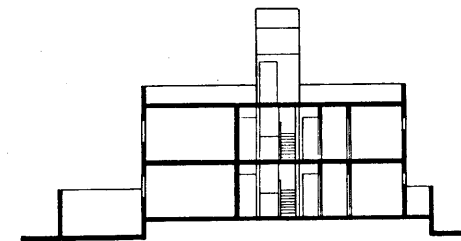
Arabic model  
AL-HINAWYYAH and Jarwal

low/middle  
single medium continuing

low/middle  
single medium continuing

low/middle  
single medium continuing

MINIMIZE PUBLIC LAND.  
DEVELOP THIS MODEL FOR TRADITIONAL AND ENVIRONMENT REQUIREMENTS.  
INCREASE POPULATION DENSITY.  
MAXIMIZE PRIVATE LAND  
MAXIMIZE PRIVATE RESPONSIBILITY



**DETACHED**

Square  
1-2  
Rooms together without focus activities.  
New settlements (periphery)  
Grid layout pattern  
Bad

Western culture  
Al-Nuzhah

high  
single low continuing

high  
single low continuing

high  
single low continuing

DEVELOP THIS MODEL FOR TRADITIONAL AND ENVIRONMENT REQUIREMENTS.  
MINIMIZE PUBLIC LAND.  
MAXIMIZE PRIVATE RESPONSIBILITY.  
REVISE BUILDING CODES TO AVOID WASTE OF LAND AROUND THE BUILDING.  
INCREASE POPULATION DENSITY.

IDENTIFICATION

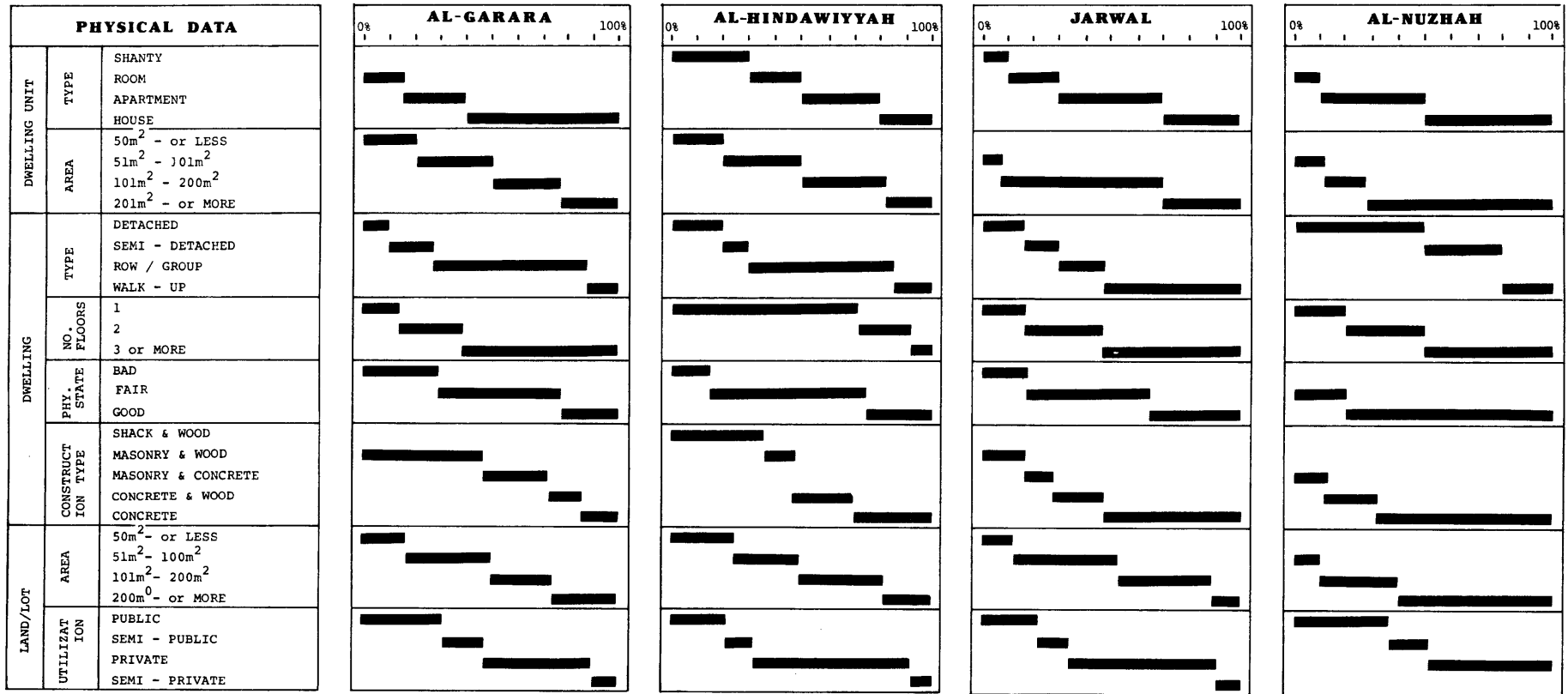
PAST

PRESENT

FUTURE

RECOMMENDATIONS

# PHYSICAL DATA MATRIX



## PHYSICAL DATA

### Dwelling Units/Type

Amongst the very low and low income sectors the percentage of shanties and rooms is high as can be seen in Al-Hindawiyah. The older settlement of Al-Garara comprises mostly of traditional houses subdivided for rental purposes. In Jarwal most of dwelling types are walk-up apartments. The upper income sector lives in individual houses.

**AREA:** There is a small percentage of very low income and low income groups living in shacks whose area is lower than 100m<sup>2</sup>. Some of low and moderately low income groups live in houses or apartments with areas ranging from 101m<sup>2</sup> to 200m<sup>2</sup>.

Apartments have areas ranging from 50-100m<sup>2</sup>. High income groups live in houses or apartments having areas over 100m<sup>2</sup>.

**DWELLING TYPES:** The majority of Al-Garara dwelling types are traditional row/group dwellings. Al-Hindawiyah, a locality of low income groups has row/group houses. Jarwal has walk up apartments. Al-Nuzhah, a locality of high income groups, comprises of detached houses built outside the city center.

**NUMBER OF FLOORS:** The majority of Al-Hindawiyah units are single storey units and all other localities range from three and above.

**PHYSICAL STATE:** Units in fair state are found in Al-Garara, Al-Hindawiyah and Jarwal. The percentage of units in good state is very high in the new settlement of Al-Nuzhah.

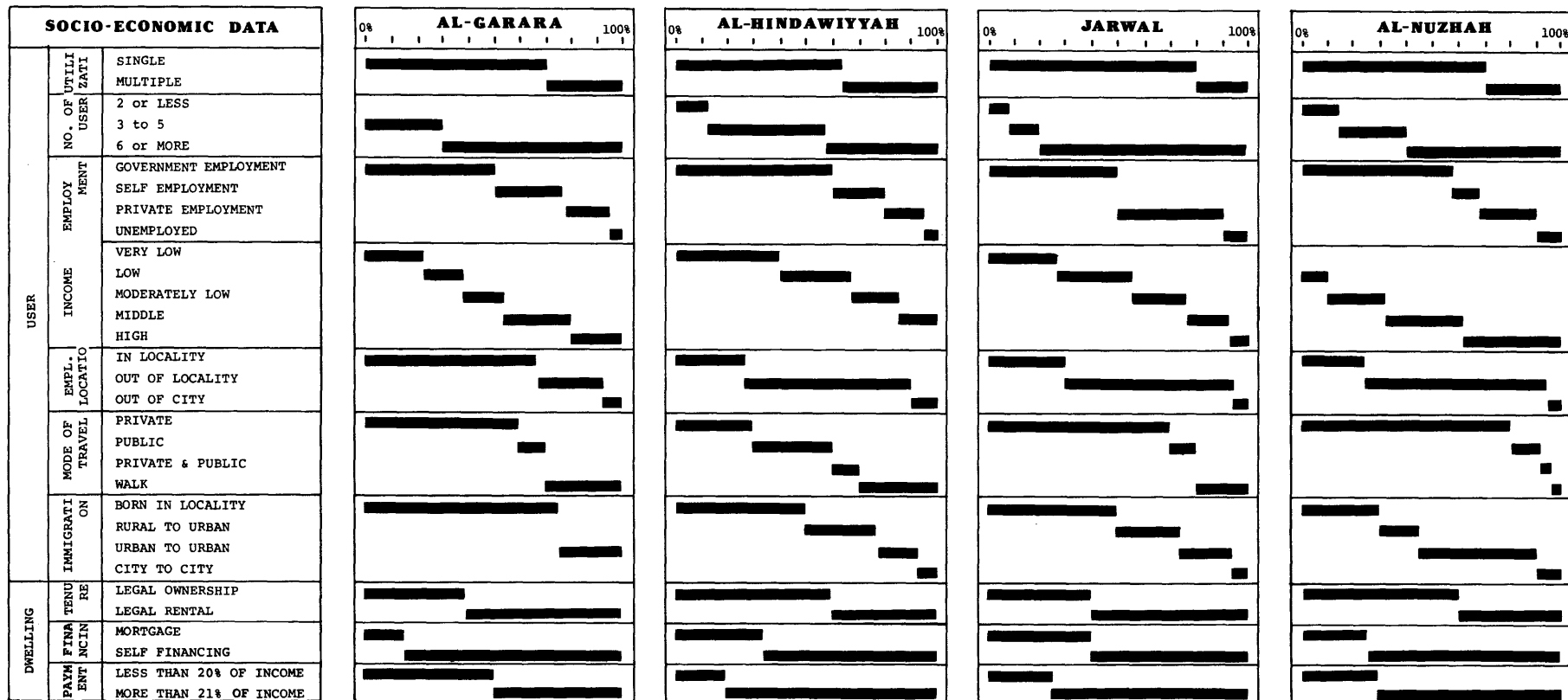
**CONSTRUCTION TYPE:** Shack and wood construction is widely used in low income settlement (Al-Hindawiyah). Masonry and wood construction used in traditional settlement, (Al-Garara). Concrete construction is the common means of construction in Jarwal and Al-Nuzhah.

**LAND/LOT AREA:** In the cases of the Al-Garara and Al-Hindawiyah localities the lots have a range of areas between 50m<sup>2</sup> to 100

m<sup>2</sup>. Whereas in Jarwal they range from 100m<sup>2</sup>-200m<sup>2</sup>. In the new settlement of Al-Nuzhah, the majority of the lots are above 200m<sup>2</sup>.

**LAND/LOT UTILIZATION:** In the Al-Garara locality, the percentage of public land is very high for the reason of hadjis movement. In Al-Hindawiyah and Jarwal, private land percentage is very high; adequate semi-public area is available in all localities. Semi private use is common in Al-Garara, Al-Hindawiyah and Jarwal, but disappears in the new settlement of Al-Nuzhah.

## SOCIO-ECONOMIC DATA MATRIX



### SOCIO-ECONOMIC DATA

**UTILIZATION:** Single occupancy is very high in all case studies.

**NUMBER OF USERS:** 6 or more per household is commonly the case in all localities. In Al-Hindawiyah locality, the extended families live in tenements or group houses in a single cluster.

**EMPLOYMENT:** In general most of the people are working in the government. In Jarwal private employment is high where the inhabitants are employed in the daily commercial center of the city.

**INCOME:** Very low and low income is found in Al-Hindawiyah, whereas Al-Nuzhah forms a high income settlement. Moderately low and middle income groups are also found

scattered in the four case studies.

**EMPLOYMENT LOCATION:** Most of the inhabitants of Al-Garara are employed within the same area, but the employments of the inhabitants in other localities are scattered in different locations of the city.

**MODE OF TRAVEL:** Within the very low and low income groups, particularly in Al-Hindawiyah walking and public transportation is the most popular means of travel. Most of high income residents in Al-Nuzhah, Al-Garara and Jarwal own private cars.

**IMMIGRATION:** In the oldest settlement of Al-Garara, most of its inhabitants were born in the same locality, but in Al-Nuzhah the new settlement, most of the inhabitants have immigrated from other urban localities.

**DWELLING TENURE:** Al-Garara mostly has legal rental due to its proximity to Al-Haram and its high rental values during the high season. Jarwal has mostly legal rental apartments. Legal ownership prevails in the high income settlement of Al-Nuzhah. The squatter settlement of Al-Hindawiyah has recently been legalized.

**FINANCING:** Self financing appears to be more in Al-Garara than in other localities.

This is related to the incremental development of the locality. In Al-Nuzhah the very high income people finance their dwellings themselves. The recently offered loan facilities from the Real Estate Development Bank are utilized by the low and middle income sectors.

**PAYMENT:** The majority of the people spend more than 21% of their income towards housing in terms of rent, loans and repairs. The low and middle income sector pay a high percentage towards housing due to their low income and high rental values and construction rates. The upper income groups can afford to pay a similar percentage on housing.

# LAND UTILIZATION PATTERNS, PERCENTAGES, DENSITIES, CIRCULATION

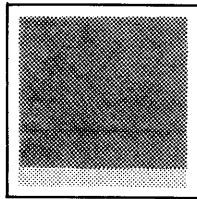
## 1 AL-GARARA

Old settlement/Traditional houses/Middle income Private/Row, Grouped/Medium percentage of land for streets, walkways/acceptable percentage of land for cluster courts and dwelling lots. Unacceptable percentage for playgrounds/high population density/high circulation efficiency.



1 Hectare

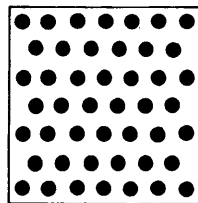
PATTERN



1 Hectare

PERCENTAGES

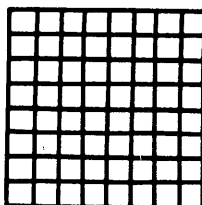
Streets/Walkways 16%  
Playgrounds -  
Cluster Courts 10%  
Dwellings/Lots 74%



1 Hectare

DENSITY

Persons/Hectare 909



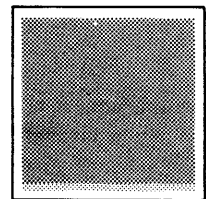
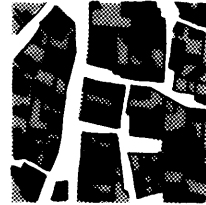
16 Hectares

CIRCULATION

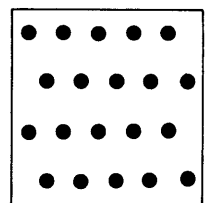
Meter/Hectare 386

## 2 AL-HINDAWIYYAH

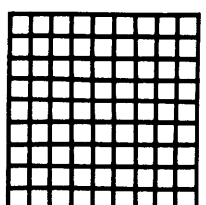
Squatter settlement/shacks/very low and low income Private/Grouped/Medium percentage of land for streets, walkways/acceptable percentage for dwelling, lots/unacceptable percentage for playgrounds and cluster courts/Medium population density/high circulation efficiency.



22%  
-  
4%  
74%



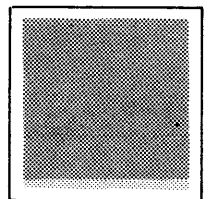
395



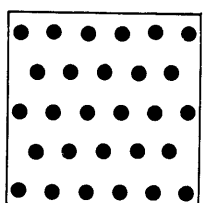
434

## 3 JARWAL

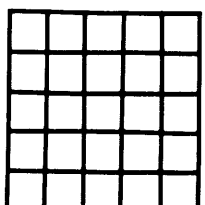
Transitional settlement/Apartment/Middle income Private/Walk up/Medium percentage of land for streets, walkways/acceptable percentage of dwelling, lots/unacceptable percentage of playgrounds and cluster courts/Medium population density/acceptable circulation efficiency.



22%  
-  
3%  
75%



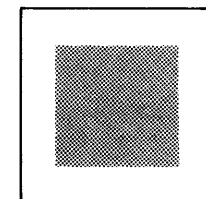
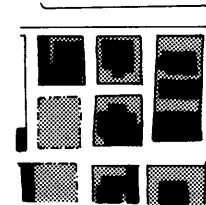
561



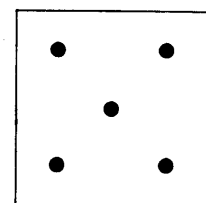
255

## 4 AL-NUZHAH

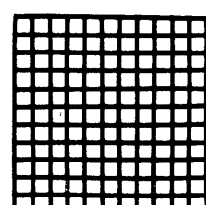
New settlement/Detached houses/high income Private, Public/Detached/very high percentage of land for streets and walkways/very low percentage of land for dwelling, lots/unacceptable percentage of land for playgrounds and cluster courts/very low population density/very high circulation efficiency.



58%  
-  
-  
42%



100



526



PHOTOGRAPHS

(top right) The children have made their own playground in a private lot, where no public playgrounds are provided in the city and the photograph also shows the destroyed dwellings where there is no maintenance provided.

(top left) The water tanks in Al-Hindawiyah locality (low income settlement, where there is no water supply provided to the dwellings).

(bottom) The crowded and the high density of the dwellings in Al-Hindawiyah localities (low income settlement).



## CONCLUSION/POLICY RECOMMENDATIONS

The previous study has demonstrated the physical and socio economic and cultural values in Mecca City and the reasons which drive these values to the urban poverty.

It is clear that the traditional layout and dwelling types reflect effective land utilization, community responsibility, private participation, social integration, family unity as well as the climate dictates of the area.

While the new layout and the western dwelling have not provided any of these aspects, its high and unacceptable public and private expenditures. An overview of the housing situation in Mecca, it is clear that an acute shortage of housing exists. This shortage is aggravated because of the following conditions:

1. High immigration to the city.
2. Insufficient production of local building material.
3. Uncoordinated administration structure.
4. Lack of adequate planning control.
5. Lack of necessary data and information.

Several policy recommendations are driven from evaluating the dwelling time/process perspective, land utilization and from physical and socio-economic matrixes.

- Maximize private participation and responsibility in development and maintenance.
- Maximize private land ownership.
- Minimize public expenditure on public utilities/services and facilities.
- Maximize social integration and interaction
- Control land/construction materials speculation.
- Control unoccupied land.
- Maximize weather/fire protection.
- Develop public transportation regulations
- Increase population densities in the new urban developments.
- Maintain physical and social-cultural values in old settlements and provide them in new settlements.
- Maintain and develop the traditional house aspects.
- Provide the necessary data and information.



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

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

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

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

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

**COMMUNITY.** The people living in a particular place or region and usually linked by common interests: the

region itself; any population cluster. (U.S.D.P.)

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

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

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

**CONDOMINIUM.** Condominium is a system of direct ownership of a single unit in a multi-unit whole. The individual owns the unit in much the same manner as if it were a single family dwelling: he holds direct legal title to the unit and a proportionate interest in the common land and areas. Two types of condominiums are recognized: *HORIZONTAL*: detached, semi-detached, row/grouped dwelling types; *VERTICAL*: walk-up, high-use dwelling types. (U.S.D.P.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**DWELLING BUILDER.** Four groups are considered: *SELF-HELP BUILT*: where the dwelling unit is directly built by the user or occupant; *ARTISAN BUILT*: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services; *SMALL CONTRACTOR BUILT*: where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer; 'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes; *LARGE CONTRACTOR BUILT*: where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex. (U.S.D.P.)

**DWELLING DENSITY.** The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots and streets). Net density is the density of selected, discrete portions of an area (ex. including only lots). (U.S.D.P.)

**DWELLING DEVELOPER.** Three sectors are considered in the supply of dwellings: *POPULAR SECTOR*: the marginal sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for 'self use' and sometimes for profit. *PUBLIC SEC-*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- gas network; telephone network, public transportation; police and fire protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)
- INSULATOR. A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)
- INTERIOR CIRCULATION NETWORK (SITE PLANNING). The pedestrian/vehicular circulation system inside the site. It should be designed based upon the exterior circulation/accesses and land development requirements. (U.S.D.P.)
- INTERVAL. A space of time (or distance) between the recurrences of similar conditions or states. (Merriam-Webster, 1971)
- KILOWATT (kw). (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (ROTC ST 45-7, 1953)
- LAMPHOLE. A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)
- LAND COST. Price: the amount of money given or set as the amount to be given as a consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)
- LAND DEVELOPMENT COSTS. The costs of making raw land ready for development through the provision of utilities, services, accesses, etc. (U.S.D.P.)
- LAND LEASE. The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)
- LAND-MARKET VALUE. Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax based value of the land; or 3) the present commercial market value of the land. (U.S.D.P.)
- LAND OWNERSHIP. The exclusive right of control and possession of a parcel of land. (U.S.D.P.)
- LAND SUBDIVISION. The division of the land in blocks, lots and laying out streets. (U.S.D.P.)
- LAND TENANCY. The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)
- LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and responsibility. *PUBLIC* (streets, walkways, open spaces): user -anyone/unlimited; physical controls -minimum; responsibility -public sector. *SEMI-PUBLIC* (open spaces, playgrounds, schools): user -limited group of people; physical controls -partial or complete; responsibility -public sector and user. *PRIVATE* (dwellings, lots): user -owner or tenant or squatter; physical controls -complete; responsibility -user. *SEMI-PRIVATE* (cluster courts): user -group of owners and/or tenants; physical controls -partial or complete; responsibility -user. (U.S.D.P.)
- LAND UTILIZATION: PHYSICAL CONTROLS. The physical/legal means or methods of directing, regulating, and coordinating the use and maintenance of land by the owners/users. (U.S.D.P.)
- LAND UTILIZATION: RESPONSIBILITY. The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)
- LATERAL SEWER. A collector pipe receiving sewage from building connection only. (U.S.D.P.)
- LATRINE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)
- LAYOUT. The plan or design or arrangement of something that is laid out. (Merriam-Webster, 1971)
- LEVELS OF SERVICES. Two levels are considered: *MINIMUM*, are admissible or possible levels below the standard; *STANDARD*, are levels set up and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight extent, value or quality. (U.S.D.P.)
- LIFT PUMP. A collection system component that forces sewage to a higher elevation to avoid deep pipe networks. (U.S.D.P.)
- LOCALITY. A relatively self-contained residential area/community/neighborhood/settlement within an urban area which may contain one or more dwelling/land systems. (U.S.D.P.)
- LOCALITY SEGMENT. A 400m x 400m area taken from and representing the residential character and layout of a locality. (U.S.D.P.)
- LOCATION. Situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster, 1971)
- LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)
- LOT CLUSTER. A group of lots (owned individually) around a semipublic common court (owned in condominium). (U.S.D.P.)
- LOT COVERAGE. The ratio of building area to the total lot area. (U.S.D.P.)
- LOT PROPORTION. The ratio of lot width to lot depth. (U.S.D.P.)
- LUMINAIRE. In highway lighting, a complete lighting device consisting of a light source, plus a globe, reflector, refractor, housing and such support as is integral with the housing. (DePina, 1972)
- MANHOLE. An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection. (U.S.D.P.)
- MATRIX (OF BASIC REFERENCE MODELS). A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)
- MASTER PLAN. A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplations on the course its transportation, housing and community facilities should take, and making proposals for industrial settlement, commerce, population distribution and other aspects of growth and development. (Abrams, 1972)
- MEDIAN BARRIER. A double-faced guard rail in the median or island dividing two adjacent roadways. (DePina, 1972)
- MESHING BOUNDARIES. Characterized by continuing, homogeneous land uses or topography, expressed as: *LINES*: property lines, political or municipal divisions, main streets, etc.; *AREAS*: similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)
- MICROCLIMATE. The local climate of a given site or habitat varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)
- MODE OF TRAVEL. Manner of moving from one place (the site) to another (other parts of the urban context). (U.S.D.P.)
- MODEL (OF URBAN LAYOUT). A representation of an urban residential area illustrating circulation, land utilization, land subdivision, and utility network of a specific layout and lot. (U.S.D.P.)
- MUTUAL OWNERSHIP. Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)
- NATURAL FEATURES. Prominent objects in or produced by nature. (U.S.D.P.)
- NATURAL UNDISTURBED SOIL. Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)
- NEIGHBORHOOD. A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)
- NETWORK EFFICIENCY (LAYOUT EFFICIENCY). The ratio of the length of the network to the area(s) contained within; or tangent to it. (U.S.D.P.)
- NEUTRAL WIRE. Wire carrying no voltage between itself and a ground. (ROTC ST 45-7, 1953)
- NOISE. Any sound (affecting the site) that is undesired (such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster, 1971)
- ODOR. A quality of something that affects the sense of smell. (Merriam-Webster, 1971)
- OHMS (electrical). The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes.  $R = E/I$ . The practical mks unit of electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)
- OPTIMIZE/OPTIMIZE. To bring to a peak of economic efficiency, specially by the use of precise analytical methods. (Merriam-Webster, 1971)
- ORGANIC SOILS. Soils composed mostly of plant material. (U.S.D.P.)
- OXIDATION POND (LAGOON). A method of sewage treatment using action of bacteria and algae to digest/decompose wastes. (U.S.D.P.)
- PERCENT RENT/MORTGAGE. The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income. (U.S.D.P.)
- PIT PRIVY/LATRINE. A simple hole in the ground, usually hand dug, covered with slab and protective superstructure; for disposal of human excreta. (U.S.D.P.)
- PLANNING. The establishment of goals, policies, and procedures for a social or economic unit, i.e. city. (U.S.D.P.)
- PLOT/LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)
- POLICE PROTECTION. Police force: a body of trained men and women entrusted by a government with the maintenance of public peace and order, enforcement of laws, prevention and detection of crime. (Merriam-Webster, 1971)
- POPULATION DENSITY. It is the ratio between the population of a given area and the area. It is expressed in people per hectare. It can be: *GROSS DENSITY*: includes any kind of land utilization, residential, circulation, public facilities, etc. *NET DENSITY*: includes only the residential land and does not include land for other uses. (U.S.D.P.)
- POSITION. The point or area in space actually occupied by a physical object (the site). (Merriam-Webster, 1971)
- PRIMER. A small introductory book on a specific subject. (U.S.D.P.)
- PRIVATE LAND OWNERSHIP. The absolute tenure of land to a person and his heirs without restriction of time. (U.S.D.P.)
- PRIVY. A small, often detached building having a bench with one or more round or oval holes through which the user may defecate or urinate (as into a pit or tub) and ordinarily lacking any means of automatic discharge of the matter deposited. (Merriam-Webster, 1971)
- PROJECT. A plan undertaken; a specific plan or design. (U.S.D.P.)
- PUBLIC CIRCULATION. The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community. (U.S.D.P.)
- PUBLIC FACILITIES. Facilities such as schools, playgrounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies. (U.S.D.P.)
- PUBLIC SERVICES AND COMMUNITY FACILITIES. Includes: public transportation, police protection, fire protection, refuse collection, health, schools, and playgrounds, recreation and open spaces, other community facilities, business, commercial, small industries, markets. (U.S.D.P.)
- PUBLIC SYSTEM (general). A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority. (HUD/AID, Minimum Standards, 1966)
- PUBLIC UTILITIES. Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks. (U.S.D.P.)
- PUMP. A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by suction or pressure or both. (Merriam-Webster, 1971)
- REFUSE COLLECTION. The service for collection and disposal of all the solid wastes from a community. (U.S.D.P.)
- RESERVOIR. Large-scale storage of water; also functions to control fluctuations in supply and pressure. (U.S.D.P.)
- RESIDENTIAL AREA. An area containing the basic needs/requirements for daily life activities: housing, education, recreation, shopping, work. (U.S.D.P.)
- RESISTANCE. The opposition to electrical flow. (Resistance increases as the length of wires is increased and decreases as the cross-sectional area of wires is increased). (ROTC ST 45-7, 1953)
- RIGHT-OF-WAY. A legal right of passage over another person's ground (land), the area or way over which a right-of-way exists such as: a path or thorough-fare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## BIBLIOGRAPHY

- . Urbanization Primer - Caminos H., Goethert R., World Bank.
- . Dwelling and Land - Caminos H., Goethert R., Chana, T.S., (USDP), Cambridge, 1973.
- . Guide for Survey-Evaluation of Urban Dwelling Engironment, Baldwin, J., MIT Thesis, Cambridge, 1974.
- . Urban Dwelling Environments - Caminos, H., Turner Steffian, MIT, Cambridge, 1969.
- . Alternative Urban Strategies of the Western Region of Saudi Arabia, Robert Mathew - The Ministry of Interior and Municipal Affairs.
- . Mecca Master Plan, Robert Mathew - The Ministry of Interior and Municipal Affairs.
- . Urban Land Utilization - Riyadh, Saudi Arabia - Al-Hathlol,S.,Al-Hussayen,M., Al-Shwaibi, A.,MIT, Cambridge, 1975
- . Urban Dwelling Environments, Jeddah, Saudi Arabia - Fadan, Y., MIT,Cambridge, 1977
- . Urban Dwelling Environments in Rapidly Growing Cities, Khamis Mushait, Saudia Arabia - Tashkandi, F., MIT, Cambridge, 1979
- ANNUAL REPORT, Research and Statistics Department, SAMA, Saudi Arabia, May, 1976 (1396)
- NATIONAL DEVELOPMENT PLAN, Ministry of Planning, Riyadh, Saudi Arabia 1970-1976
- POPULATION CENSUS of 1974, Central Department of Statistics, Ministry of Finance and National Economy, 1977
- SECOND DEVELOPMENT PLAN 1975-1980, Ministry of Planning, Riyadh, Saudi Arabia

## EQUIVALENTS

### METRIC SYSTEM EQUIVALENTS

#### Linear Measures

1 centimeter	=	0.3937 inches
1 meter	= 100 centimeters	= 39.37 inches or 3.28 feet
1 kilometer	= 1,000 meters	= 3,280.83 feet or 0.62137 miles
1 inch	=	2.54 centimeters
1 foot	=	0.3084 meters
1 mile	=	1.60935 kilometers

#### Square Measures

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

### DOLLAR EQUIVALENTS

All income, cost, and rent/mortgage data have been expressed in terms of the U.S equivalent;  
1 U.S. dollar = 3.28 Saudi Riyals

### QUALITY OF INFORMATION

The quality of information given in the drawings have been qualified in the following manner:

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

### QUALITY OF SERVICES, FACILITIES AND UTILITIES

Non: 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  
Adequate: when the existence of services, facilities and utilities are available in/to a locality