EVALUATION OF TWO PUBLIC HOUSING PROJECTS
BAGHDAD AND MOSUL, IRAQ

by

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Evaluation of two public housing projects

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PREFACE

BACKGROUND: Iraq, in the past few years, has followed a policy which puts emphasis on the provision of housing. The policy includes:
1. Construction of high rise and walkup apartment buildings.
2. Reduction of the size of plots provided to families for building houses.

The policy is carried out in the following manner:
1. High rise apartment building projects are carried out in residential areas close to the center of cities.
2. Walkup apartment building projects are carried out in the urban and semiurban residential areas.
3. The projects which support single family houses are located in the suburban and rural areas. Many projects are carried out in almost every state in Iraq. Most of these projects are walkup apartment buildings. They are designed for different family sizes but for only type of (middle income) in order to overcome the social differences.

CONTENT: Two walkup apartment building projects were chosen after considering the weight given to this type of housing by the public housing policies.

The first project, "Seidiya, lot no. 6" is in the capital city of Baghdad, which is located in the middle of Iraq. The last phase of the project is under construction. The first and the second phases are already inhabited.

The second project, "Wadi Al-Aen Al-Jnubiya", is in the city of Mosul, which is in the north and is the third largest city in Iraq. The first of the three phases of the project is under construction.

I divided the thesis into three parts:
I. Iraq National Context.
II. Seidiya project.
III. Wadi Al-Aen Al-Jnubiya project.

Parts II and III are in return divided into twelve sections. The first ten sections are presented in the form of design stages which developed in the Urban Settlement Design Program (USDP). The stages represent the accumulated knowledge of the USDP led by Prof. Horacio Caminos over a twenty year period.

OBJECTIVES: Demonstration of how physical design can reflect the different levels of the social structure. Also demonstration of how the physical design can provide the community with independence, which will help to solve some of its problems without complete dependence on public agencies.
This thesis deals with the physical design of urban public housing projects. To meet the objectives stated in the preface, the following issues were addressed: The social hierarchy of the community; the administration of the settlement; the maintenance and operation of the settlements; and finally the users' control and responsibility over the land.

Stage nine of the design process of the projects deals with the design of the cluster, which is a basic social and administrative unit proposed for settlement. The cluster represents a unit of approximately 200 persons. A cluster is defined in the Urbanization Primer as a condominium.

One of the issues which were defined is the users' responsibility over the land. In the proposed cluster designs, land between the apartment building and the fences is given to the families living on the ground floor. In the existing design these areas were left as a public land. Interestingly enough, the families living on the ground floor of the inhabited buildings of the Seidiya projects fenced the areas in the front and the rear of their apartments.

Each cluster is provided with a maintenance unit. This problem is not addressed by the existing projects. The families living in a finished project in the city of Mosul complained about the poor maintenance, if it existed at all. They claimed that there was no one directly responsible to whom they could address and follow up their complaints. The families in this case owned their apartments, which makes the problem even more complex if it is left unredressed in the physical design.

Each cluster is provided with parking areas, some of which are covered. The existing projects do not provide the proper number of parking spaces.

Each cluster has its own playground which is treated as a semipriviate area, defined by the surrounding buildings and fences. The existing projects provide fewer playgrounds fenced within the public areas.

The settlement's design is composed of two types of clusters as presented in stages nine and ten. The design meets the following goals:

1. Provide a better land utilization which implies:
   A. Less public areas which reduce the responsibility of the the public agencies in terms of maintenance.
   B. More private and semiprivate areas which will increase the number of apartments.
   C. The commercial areas (semipublic) are easily reached from adjacent residential areas which generates enough demand to support them.
   D. The location of the schools (semipublic) provides a safer access for the children. The existing project has secondary and the intermediate schools on main roads which have a considerable amount of traffic.

2. Increase the responsibilities of the families which will help to keep the neighborhoods safe and clean, by providing a better environment for interaction.

3. Provide a hierarchy of levels such as the following: The family apartment, the building unit, the cluster of families, the neighborhood represented in the group of clusters, and finally the settlement. The existing designs provide: The family apartment, the building unit and the settlement.

4. Reduce the public areas in order to reduce the over-all infrastructure cost.
IRAQ, NATIONAL CONTEXT

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GEOGRAPHY

Four main areas: The mountainous highlands in the north-east; the dry, rolling uplands between the fertile, alluvial flood plains of the Tigris and Euphrates rivers, extending from just north of Baghdad southeastward to the Arabian Gulf and the vast desert south and west of the Euphrates.

CLIMATE

Combination of shortage of rain and extreme heat makes much of the country a desert. 90% of rainfall occurs in winter; summer months are intensely hot and dry.

LANGUAGES

Arabic (official)
Kurdish, Turkish, English

RELIGION

Muslim 95%

Currency

Iraqi Dinar (ID)

PER CAPITA INCOME

US$ 2,410

MAJOR CITIES

Baghdad, Basra, Mosul

PRODUCTION

Industry 73%
Services 19%
Agriculture 8%
GEOGRAPHY

The Republic of Iraq is located in southwestern Asia, and is bounded on the north by Turkey, on the east by Iran, on the south by Kuwait and the Arabian Gulf, on the southwest by Saudi Arabia and Jordan, and on the northwest by Syria. Its land area is 434,924 square kilometers. The major physical features dividing this area consist of: an alluvial plain (covering about one-fifth of the country's area); the desert plateau (nearly three-fifths); and the mountain regions, extending to the northwest and east (covering almost one-fifth of the land area).

CLIMATE

The summers are overwhelmingly hot, with shade temperatures of over 43°C. Winters are generally pleasant, but can be quite cold in the mountains. Sudden hot spells during winter are typical in the center and south of Iraq. Rainfall is scanty over all of the country, except in the northeast, where 40 to 60 cm occur.

BRIEF HISTORY

Iraq's history dates back almost 5000 years, to the time when the Sumerian civilization flourished in the fertile area between the Tigris and Euphrates rivers. In the 17th century, the Arab conquest brought Islam to the land -- the single most significant historical and cultural change in Iraq's history. Baghdad was founded as the seat of the Abasid Caliphate, and witnessed the apogee of the Islamic empire in the 9th century.

Iraq was devastated in the 13th century by Mongol invasion. In 1258, Baghdad was totally destroyed by Hulagu. The ensuing condition of political chaos allowed Ismail Shah, founder of the Persian Safavid Dynasty, to invade Iraq. In 1534, Baghdad was captured by Suleiman the Magnificent, and Iraq remained under Ottoman rule until after World War I.

Following a period of British rule, a constitutional monarchy was set up in 1921. The revolution of 1958 abolished the monarchy, and proclaimed Iraq an independent, sovereign and Islamic Republic.

ADMINISTRATION

Iraq is divided into 18 governorates. Its most important city is Mosul. The southern region comprises 6 governorates, and the port of Basra is its major center. The central region is experiencing a rate of urbanization higher than the national average, and it now accounts for over 60% of the total urban population.

Since 1977, the state administration has undergone major reorganization to strengthen centralized planning and expand the role of the public sector.

The Ministry of planning is the central agency responsible for the formulation of national policies. The Ministry of Housing and Construction implements the government's housing programs through numerous state organizations. With the exception of Baghdad, the capital city, governorate and municipal authorities are population. Arabs occupy most of the center, west and south, while Kurds are located mainly in the north and east. Other smaller groups include the Turkmens, the Shabaks and Mandeans. About 95% of the population is Muslim.

Iraq's population grew from 3 million in 1930 to 6 million in the mid 1950's. It reached 12 million in 1977 (a census year). If the growth rate of 3.3% registered between 1970 and 1977 continues, the population will again double by the end of the century, to reach 24 million. The 1980 population was estimated to be 13 million. It is characterized by a broad age pyramid, with 49% under 15 years of age.

Since the mid 1970's, Iraq's labor force has been insufficient to meet the demand generated by the pace of economic growth, encouraging immigration from labor-exporting countries, particularly Egypt. In 1980, total employment was estimated to be around 3.5 million. The huge construction
program launched by the state has led to an influx of expatriate workers, particularly Asians.

An estimated 66% population lives in towns today, compared to 43% in 1960. The growing contrast between declining villages and booming cities has led to a considerable rural-urban migration -- particularly to Baghdad, which is attracting an increasing share of economic activities despite government efforts to decentralize industry.

The urban distribution is characterized by primary: Baghdad's size is 6 to 7 times greater than that of the second-largest cities, Basra and Mosul; 10 times larger than that of the fourth, Kirkuk; and 20 times larger than remaining five cities of over 100,000 inhabitants.

**IRAQ'S TRANSPORTATION SYSTEM**

There are about 13,000 miles of roads in Iraq, over 30% of which are paved. Also, the desert land is sufficiently hard to allow cars, trucks, and developed parts of the road system are in central, northern, and southern Iraq. Three major railway lines connect the principal cities, and all converge on Baghdad and Basra. Two narrow-gauge lines connect Baghdad with Basra and link Baghdad with the northeast provinces east of Tigris, and a standard-gauge railway connects Baghdad with Mosul and other northern cities and then continues on to Syria, Turkey and beyond.

Iraq's connection with the outside world through the seas is limited to two ports-- one at Basra, 85 miles upstream on the Tigris from the Gulf on the Shatt al-Arab, and other at Umm Qasr, five miles from the Kuwait border. Both are accessible to oceangoing vessels of all sizes. The Tigris is navigable by steamer from Basra to Baghdad; smaller power craft can travel upstream as far as Mosul.

Only small local rivercraft use the Euphrates. Large rafts however, carry goods downstream on both rivers. Baghdad has two airports, one of which is international, and there is an international airport at Basra. In addition to the national airline, various middle-east and some major international airlines have landing privileges at Baghdad mostly responsible for implementation at the regional and local levels.

**ECONOMY**

Agriculture was the traditional mainstay of the economy until oil production on a large scale. With its ample supply of water and fertile land, Iraq's agriculture is among the most developed in the region. 20% of the total land area is cultivated, and the agricultural sector provides employment to 45% of the active labor force. Development plans of the 1950's emphasized irrigation and other agricultural programs, but agriculture today receives a limited share of national investment.

The Ministry of planning, established in 1959, produced its first 5-year plan (1961-65), focusing on industrialization. The second 5-year plan (1965-69) continued this trend seeking to reduce the country's dependence on oil revenue through industrial diversification. The period between 1970 witnessed the nationalization of the oil industry and the jump in oil prices after 1973. Baghdad expenditures almost doubled and growth targets were exceeded.

Focusing on the oil and manufacturing sectors, the fourth plan (1976-80) launched a massive development program. Impressive annual GDP growth rates of over 15% were achieved. Per capita income, which had been rising slowly and steadily increased quite sharply after 1973. It grew from ID 730 in 1980 (US$ 2,410).
SEIDIYA, LOT NO.6
BAGHDAD

STAGE 1.
the program

General data of the existing and proposed designs.

| Country: Iraq |
| City: Baghdad |
| Project Name: Seidiya/Lot No.6 |
| Latitude: 33°20' N |
| Date: 1977 - 1981 |
| Population: |
| E: 10,944 - 12,252 Persons |
| P: 13,668 - 17,142 Persons |
| Target Income Group(s): Middle Income |
| Site Gross Area: 34.90 Ha |
| Useable Area: 34.90 Ha |
| Site Condition: Regular |
| Net Density: Pop/Private Area |
| E: 2,487 - 2,785 P/ha |
| P: 661 - 829 P/ha |
| Gross Density (Pop/Area) |
| E: 314 - 351 P/ha |
| P: 392 - 491 P/ha |
| Type of Dwellings: Walk Up Apartments and Highrise Buildings |
| Total Number of Dwelling Units |
| E: 1,824 - 2,042 APT |
| P: 2,278 - 2,854 APT |
| Dwelling Unit Density |
| E: 52 - 59 APT/HA |
| P: 65 - 82 APT/HA |
| Average Dwelling Unit Area |
| E: 110 - 130 m² |
| Design and Research Department |
| Designer: Faieda Noori Salim Atto |
| Development Instant |
| Level of Services: Standard, All Services |
| Parking: 1 Parking/apt |
| Length of Public Circulation |
| E: 13,960 m |
| P: 5,105 m |
| Community Facilities |
| E: 2 Nurseries |
| P: 1 Kindergarten |
| 2 Primary Schools |
| 2 Intermediate Schools |
| 1 Secondary School |
| 2 Social and Cultural Center |
| 2 Groups of Shopes |
| 3 Private Shopes Plus |
| 6 Public Shopes |
| Maintenance Workshops and Governmental Services |
| Reserved Area |
| Playgrounds |
| Plazas |
| P: The Above Facilities Plus |
| Another Group of Public Shopes |
| Areas of Land Utilisation |
| E: Public 23.90 68 |
| Semipublic 6.60 19 |
| Semiprivate / / |
| Private 4.40 13 |
| P: Public 7.48 22 |
| Semipublic 6.73 19 |
| Semiprivate 11.60 33 |
| Private 9.09 26 |
STAGE 2.

**Urban parameters**

Data of the urban area which contain the site.

**Land Use Pattern**
- Residential, open spaces
- And public services

**Population Density Pattern**
- 75 p/ha

**Income Group Pattern**
- Middle and high middle income

**Land Value Pattern**
- Compatible with the project

**Utilities, Services**
- Water supply, sewage disposal, storm drainage, electricity/street lighting,
- Refuse collection, telephone services, public schools,
- Private sector

**Community Facilities**
- Schools, markets and shops, public parks, public buses
- Distance from site: 2000m - 3500m

**Sources of Employment**
- Distance from city center
- Governmental offices, public
- 3500m
STAGE 3.

site parameters

Data of the site of the project.

LOCATION
RESIDENTIAL AREA
APPROACHES
SECONDARY ROUT AND ADJACENT TO SECONDARY CITY CENTER
ACCESSES
STREETS ON PERIMETER
ACCESSSES
STREETS ON PARAMETERS
TRANSPORTATION
PUBLIC BUSES, PRIVATE CARS AND TAXIS
SIZE
LAND GROSS AREA 34.90 HA
LAND USABLE AREA 34.90 HA
SHAPE ELONGATED
TOPOGRAPHY AND NATURAL FEATURES
SLOPE: 0% - 2%

SOIL

RELATIVE DESIRABILITY:

DESIRABLE

CLIMATE

AIR TEMPERATURE: HOT/LONG SUMMER

AIR RELATIVE HUMIDITY: DRY

BOUNDARIES

MAJOR AND SECONDARY STREETS
LEGAL BOUNDARIES

VIEWS

EFFECT: NEUTRAL

FLOODING

ZONE OF SITE: OUTSIDE OF FLOODWAY

DUST, DIRT, SMOKE, FUMES, ODORS, NOISES

RELATIVELY DUSTY

FIRE EXPLOSION HAZARDS NONE

AIRPORT DISTURBANCE, ZONING

RESTRICTIONS NONE

EXISTING STRUCTURES, EASEMENTS

RIGHT OF WAY NONE

LAND TENURE PUBLIC

LAND COSTS COMPATIBLE WITH THE PROJECT

GOVERNMENT REGULATION

THE SITE IS ALLOCATED FOR RESIDENTIAL USE IN THE MASTERPLAN
STAGE 4.

main urban circulation network and accesses affecting the site

The projections of possible uses and accesses to the site are defined. The projections are based on the data given in stages 1, 2 and 3.

DATA

1. OUTPUT FROM PREVIOUS STAGE POLICIES

SIZE AND SHAPE: MAXIMUM

  WIDTH 425 M
  MAXIMUM LENGTH 1000 M
  THE SITE IS L-SHAPE

2. ADDITIONAL DATA FROM STAGES 1 AND 2

A. THE SITE IS LOCATED AT THE END OF CIRCUMFERENTIAL ROUT, CONNECTING THE RESIDENTIAL AREA WITH THE INDUSTRIAL AREA LOCATED TO THE EAST OF THE SITE
B. THE SITE IS ADJACENT TO A SECONDARY CITY CENTER

ASSUMPTIONS

A. THERE WILL BE A NEED FOR ANOTHER ROAD TO THE SOUTH OF THE SITE (THE LENGTH OF THE N-S DIMENSION OF THE SITE IS 1000 M)
B. THE SUGGESTED ROAD WILL PROVIDE ADDITIONAL ACCESSES POSSIBILITIES
C. THE AREA TO THE WEST OF THE SITE IS A RESIDENTIAL

POTENTIAL AREA

FREQUENCY OF MAIN URBAN CIRCULATION NETWORK: 1000 M TO 2000 M APPROXIMATELY

THE AREA IS RESIDENTIAL (MASTER PLAN)

THERE IS A NEED FOR MORE HOUSING PROJECTS

RESULTS

A. THE SITE WILL BE BOUNDED BY THREE STREETS AND WILL BE PART OF A LARGER NEIGHBOURHOOD
B. THE SITE HAVE TWO SIDES FOR POTENTIAL ACCESSES

Occupied public housing in Za'una/Baghdad. 2+ years of occupation. Aug.1983.
STAGE 5.

**primary site circulation**

The primary site circulation is defined based on the data given in stages 1, 2, 3 and the projections made in stage 4.

**DATA**

1. OUTPUT FROM PREVIOUS STAGE
   A. THE SITE IS BOUNDED BY THREE ROADS
   B. THE SITE IS PART OF LARGER RESIDENTIAL AREA
   C. ACCESS AVAILABLE FROM THREE SIDES

2. ADDITIONAL DATA FROM STAGES 1, 2 AND 3
   A. THE SITE IS FLAT (0%-2% SLOPE)
   B. THE BOUNDARY LINES
   C. THE ADJACENT RESIDENTIAL AREA IS ALSO WALKUP APARTMENT BUILDINGS OF THE SAME INCOME GROUP

**ASSUMPTIONS**

A. THE PROJECT WITH THE EXISTING RESIDENTIAL AREA TO THE NORTH AND THE SUGGESTED AREA TO THE SOUTH WEST WILL FORM ONE RESIDENTIAL AREA
B. THE SEMIPUBLIC SERVICES PROVIDED FOR THIS PROJECT WILL BE USED BY THOSE TWO RESIDENTIAL AREAS
C. THE PROJECT IS PART OF A LARGER DEVELOPMENT
D. THE SITE MAXIMUM WIDTH IS 400 M

**RESULTS**

A. THE PRIMARY SITE CIRCULATION IS LOCATED ON THE EAST EDGE OF THE SITE
B. THE ACCESS ARE: 1. FROM THE EAST FACING THE CIRCUM-
C. A BY-PASS IS NEEDED ON THE INNER BOUNDARY OF THE SITE (WEST SIDE)
D. THE SITE MAXIMUM WIDTH IS 400 M
STAGE 6.

areas of major commercial potential land values

The possible major commercial potential areas are defined based on the location of the primary site circulation and the projections of stage 4.

DATA
1. OUTPUT FROM PREVIOUS STAGE
   A. THE ACCESSES
   B. THE PRIMARY SITE CIRCULATION
   C. THE BY-PASS
2. ADDITIONAL DATA FROM STAGE 4
   A. PUBLIC TRANSPORTATION IS PROVIDED ON THE ROAD BOUNDING THE SITE FROM THE NORTH AND THE EAST (PARALLEL TO THE PRIMARY SITE CIRCULATION)
   B. THE AREA FACING THE ROAD

GOING TO THE INDUSTRIAL AREA WILL HAVE MORE COMMERCIAL POTENTIAL POLICIES

HIGH COMMERCIAL POTENTIAL/LAND VALUES ADJACENT TO THE PRIMARY CIRCULATION/PUBLIC TRANSPORTATION
LOWER COMMERCIAL POTENTIAL/LAND VALUES FARTHER FROM PRIMARY CIRCULATION/PUBLIC TRANSPORTATION

RESULTS
THE HIGH COMMERCIAL POTENTIAL/LAND VALUE WILL BE ADJACENT TO THE PRIMARY SITE CIRCULATION FACING THE EXISTING RESIDENTIAL AREA

ASSUMPTIONS
THE AREA FACING THE ROAD

Scale 1/10000

- HIGH LAND VALUE
- MEDIUM LAND VALUE
- LOW LAND VALUE
- RESIDENTIAL AREA
- PUBLIC PARK
- BOUNDARY LINE
STAGE 7.

areas for schools, playgrounds, plazas, markets (semipublic land) major commercial areas (private)

The semipublic areas and commercial areas are defined based on the conclusions of stages 4, 5, and some data from stage 3.

DATA

1. OUTPUT FROM PREVIOUS STAGE

POTENTIAL AREAS FOR COMMERCIAL DEVELOPMENT AND LAND VALUES

2. ADDITIONAL DATA FROM STAGES 3, 4 AND 5

A. THE SITE DIMENSIONS (MAXIMUM DEPTH IS 1000M AND MAXIMUM WIDTH IS 400M)

B. THE SITE IS FLAT

C. THE SITE IS PART OF A LARGER RESIDENTIAL AREA

ASSUMPTIONS

A. SMALL PLAYGROUNDS WILL BE PART OF A SEMIPRIVATE AREAS (FOR SOCIAL AND SECURITY REASONS)

B. SEMIPRIVATE AREAS WILL BE ENCLOSED BY PRIVATE AREAS

POLICIES

PLAZAS, MARKETS, MAJOR COMMERCIAL AREAS SHOULD BE LOCATED ON HIGHER LAND VALUE

SCHOOLS, PLAYGROUNDS, ETC. SHOULD BE LOCATED ON A LOWER VALUE LAND OR ON A STEEP LAND

RESULTS

A. THERE WILL BE TWO GROUPS COMMERCIAL, SOCIAL/CULTURAL CENTERS (DUE TO THE LENGTH OF THE SITE), LOCATED ALONG THE PRIMARY SITE CIRCULATION

B. SCHOOLS WILL BE LOCATED ON THE SOUTH WEST SIDE

(CAUSE IT UPSETS HIGHER LAND VALUES)

THE INNER BOUNDARY OF THE SITE - BY-PASS) ALLOWING THE ACCESS TO THE RESIDENTIAL POTENTIAL AREA ADJACENT TO THE SITE

C. RESERVED AREA FOR FUTURE PRIVATE COMMERCIAL DEVELOPMENT IS PROVIDED ALONG THE PRIMARY SITE CIRCULATION AND THE ROAD TO THE WEST
the direction of secondary site circulation (vehicles and pedestrians)

The directions of the secondary site circulation are defined based on the conclusions of stages 4, 5, 7 and some data from stage 3.

DATA
1. OUTPUT FROM PREVIOUS STAGE
   A. LOCATION OF THE SEMI-PUBLIC AREAS
   B. LOCATION OF THE RESERVED LAND FOR FUTURE PRIVATE COMMERCIAL DEVELOPMENT
2. ADDITIONAL DATA FROM STAGES 3, 4 AND 5
   A. LOCATION OF THE PRIMARY SITE CIRCULATION
   B. SUGGESTED ROAD
   C. BY-PASS
   D. BOUNDARIES

ASSUMPTIONS
A. MINIMIZE STREETS AND THROUGH TRAFFIC
B. DISTANCE BETWEEN TWO SECONDARY STREETS IS EQUAL TO THE DEPTH OF TWO CLUSTERS
C. THE CENTERS SUGGESTED FOR THE PROJECT (SHOPES AND OTHER SEMIPUBLIC FACILITIES) SHOULD BE SURROUNDED BY SECONDARY STREETS, TO PROVIDE MAXIMUM CONVENIENCE FOR ACCESSES

POLICIES
SECONDARY CIRCULATION SHOULD BE LINKING RESIDENTIAL AREAS WITH PRIMARY CIRCULATION

RESULTS
A. SECONDARY STREETS WILL BE PERPENDICULAR TO THE SITE CIRCULATION LINKING THE SCHOOLS TO THE COMMERCIAL, SOCIAL/CULTURAL CENTER
B. THE APPROXIMATE DISTANCE BETWEEN TWO SECONDARY STREETS IS 130M (USING THE INFORMATION FROM PROJECT’S STAGE NINE)
STAGE 9.

clusters layout

The cluster is the basic social and administrative unit proposed for the settlement. The design is based on data from stages 1 and 2. Also the approximate dimensions was anticipated from stage 8's conclusion.

DATA
1. OUTPUT FROM PREVIOUS STAGE
2. APPROXIMATE CLUSTER DEPTH
3. ADDITIONAL DATA FROM STAGES 1 AND 3
4. CLIMATE: HOT AND DRY WEATHER
5. TYPE OF DWELLING UNIT: 1, 2 AND 3 BEDROOM APARTMENTS
6. AVERAGE SIZE OF DWELLING UNITS: 100 - 150 m²
7. TYPES OF DWELLINGS: 4 4 FLOORS BUILDINGS OF TWO TYPES: 2 APARTMENTS/FLOOR AND 4 APARTMENTS/FLOOR
8. 1 PARKING LOT/APARTMENT
9. SMALL PLAYGROUNDS SHOULD BE PART OF THE CLUSTER

ASSUMPTIONS

A. THE NUMBER OF PEOPLE LIVING WITHIN A CLUSTER SHOULD BE WITHIN THE RANGE 200 PEOPLE (200 PEOPLE WILL STILL KNOW EACH OTHER)
B. THE MAXIMUM DISTANCE BETWEEN ANY POINT (ON HORIZONTAL OR VERTICAL CIRCULATION) AND THE ACCESS TO THE CLUSTER SHOULD NOT EXCEED 100m
C. THE LIVING AREA OF ANY DWELLING UNIT SHOULD FACE THE SOUTH/SOUTH EAST OR THE EAST AS A SECOND CHOICE
D. THE CLUSTERS ARE FENCED
E. TWO ALTERNATIVES FOR CLUSTER'S LAYOUT

RESULTS

A. ALTERNATIVE A
- 2 DWELLINGS OF 4 APARTMENTS/FLOOR
- THE ENTRANCE TO THE CLUSTER IS 4M OPENING IN THE GROUND FLOOR OF THE BUILDING FACING THE SECONDARY STREETS
- THE AREAS OF 3m WIDTH ON BOTH SIDE OF THE ENTRANCE BUILDING IS PROVIDED FOR THE GENERAL SERVICES NEEDED FOR THE CLUSTER
- THE AREAS ON THE GROUND FLOOR BETWEEN THE FENCE AND THE BUILDINGS ARE OWNED BY THE RESIDENTS OF THE GROUND FLOOR APARTMENTS
- FOR 4 FLOOR DWELLINGS THE CLUSTER WILL HAVE POPULATION OF APPROXIMATELY 155 PERSONS (ASSUMING THE AVERAGE NUMBER OF RESIDENTS IN EACH APARTMENT IS 5 PERSONS)
- POSSIBLE FUTURE EXTENTION TO 5 FLOORS
- THE TOTAL POPULATION FOR EACH CLUSTER WILL BE 195 PERSONS

B. ALTERNATIVE B
- 3 DWELLINGS: 2 OF 4 APARTMENTS/FLOOR, 1 OF 2 APARTMENTS/FLOOR
- THE ENTRANCE TO THE CLUSTER AND THE PARKING AREA ARE SEGREGATED FROM THE PLAYGROUND AREA
- ADDITIONAL UNIT IS PROVIDED FOR THE GENERAL SERVICES (APP. 5Mx20M)
- THE AREAS ON THE GROUND FLOOR BETWEEN THE FENCE AND THE BUILDINGS ARE OWNED BY THE RESIDENTS OF THE GROUND FLOOR APARTMENTS
- FOR 4 FLOOR DWELLINGS, THE CLUSTER WILL HAVE POPULATION OF APPROXIMATELY 200 PERSONS
- FOR FUTURE EXTENTION
TO 5 FLOORS, THE POPULATION WILL BE 250 PERSONS APPROXIMATELY.

FOR BOTH ALTERNATIVES, SOME COVERED PARKING AREAS ARE PROVIDED.

(A) ALTERNATIVE A
(B) ALTERNATIVE B
apt-2 TWO APARTMENTS PER FLOOR
apt-4 FOUR APARTMENTS PER FLOOR
ad ADMINISTRATION AND WORKSHOPS
pl PLAYGROUND
pk PARKING

Occupied public housing in Seidiya/Baghdad (lots no. 5 and 4). 1-2 years of occupation. Aug 1983.


STAGE 10.

Complete project


DATA
1. OUTPUT FROM PREVIOUS STAGE
   CLUSTERS ARRANGMENTS AND ITS ORIENTATION
2. ADDITIONAL DATA FROM STAGES 1, 3, 5, 7 AND 8
   A. POPULATION: 13670 - 17140 PERSONS’
   B. NUMBER OF DWELLING UNITS
      2280 - 2850 APARTMENTS
   C. LAND UTILIZATION AREAS
   D. SIZE 34.90 HA
   E. SHAPE AND DIMENSIONS
   F. SLOPE 0%-2% (FLAT)
   G. CLIMATE: HOT/DRY WEATHER
   H. LOCATION OF PRIMARY SITE CIRCULATION
   I. LOCATION OF SEMIPUBLIC AREAS AND RESERVED AREAS
   J. LOCATION OF SECONDARY SITE CIRCULATION

RESULTS
COMPLETE PROJECT

ASSUMPTIONS
A. THE SECONDARY STREETS SHOULD BE LINKED FROM ENDS TO AVOID THE CREATION OF A DEAD END STREET (FIRE REGULATION)
B. THE ORIENTATION OF THE LIVING AREAS SHOULD FACE THE SOUTH OR THE SOUTH EAST
C. THE WIDTH OF THE SECONDARY STREETS SHOULD EQUAL TO TWO WAYS CIRCULATION FOR CARS AND A WIDTH OF A CAR PARKING AREA (6M+2.5M) PLUS PEDESTRIAN WALKWAYS (1-2M)
proposed design

Evaluation of two public housing projects

20 Person/Ha
Gross density = \[ \frac{\text{population}}{\text{Gross area}} = \frac{13670}{392} = 34.90 \]

4 dwelling/Ha
Dwelling density = \[ \frac{\text{Number of dwellings}}{\text{Gross area}} = \frac{65}{392} = 0.165 \]

Scale 1/5000

IS INTERMEDIATE SCHOOL
K KINDERGARTEN
N NURSERY
M MARKET
R RESERVED AREA
PS PRIMARY SCHOOL
SH SHOPES
SS SECONDARY SCHOOL
SC SOCIAL CULTURAL CENTER

PG PLAYGROUNDS
WG WORKSHOPS AND SERVICES
P PLAZA

Boundary lines

1 Hectare

2 Hectare
existing design

Gross density = Population
               Gross area
               = 10950
               34.90 = 314

Number of dwellings = 52
                     Gross area

20 Person/Ha
Dwelling density
land utilization
proposed design

PRIVATE AREAS

SEMIPRIVATE AREA

SEMIPUBLIC AREAS

PUBLIC AREAS

CIRCULATION

Scale 1/5000

Land utilization

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<td>Semipublic</td>
<td>19%</td>
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<td>Private/Semiprivate</td>
<td>59%</td>
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CIRCULATION 146 m/Ha
existing design

Land utilization

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<td>19%</td>
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<td>Private/Semiprivate</td>
<td>13%</td>
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CIRCULATION 400 m/ha
STAGE .5.

Proposed
Primary site circulation

STAGE .6.

Proposed
Land Values

Existing
Primary Site Circulation

Existing
Land Values

School of Al-Yermuk residential area/Mosul. Aug.1983.


Occupied public housing/Mosul. 3+ years of occupation. Aug. 1983.
WADI AL-AEN AL-JNUBIYA
MOSUL

STAGE 1.
The program

General data of the existing and proposed designs.

COUNTRY IRAQ
CITY MOSUL
PROJECT NAME WADI AL A'AN AL-JNUBIYA
LATITUDE 32° N
DATE 1979 - 1981
POPULATION
E/ 5080 - 6350 PERSONS
P/ 9080 - 11350 PERSONS
TARGET INCOME GROUP(S) MIDDLE INCOME
SITE GROSS AREA 27.32 HA
USABLE AREA 27.32 HA
SITE CONDITION REGULAR
NET DENSITY
E/ 1570 - 1970 P/HA
P/ 547 - 683 P/HA
GROSS DENSITY
E/ 186 - 232 P/HA
P/ 332 - 425 P/HA
TYPE OF DWELLINGS
WALKUP APARTMENTS
TOTAL NUMBER OF DWELLING UNITS
E/ 1016 - 1270 APT
P/ 1816 - 2270 APT
Dwelling unit density
E/ 37 - 46 APT/HA
P/ 66 - 83 APT/HA
AVERAGE DWELLING UNIT AREA
100 - 130 M²
TYPE OF DWELLING UNITS
1,2 AND 3 BEDROOM APT
PERSON/DWELLING UNIT
MAX 5 PERSONS
DEVELOPMENT INSTANT
LEVEL OF SERVICES
STANDARD, ALL SERVICES
PARKING 1 PARKING/APARTMENT
PROJECT COST /
DESIGNER
E/ POLSERVICE WITH DAR AL-IMARAH / IRAQ
P/ FAIEEDA NOORI SALIM ATTO
AREAS OF LAND UTILIZATION
E/ HA %
PUBLIC 20.20 74
SEMPUBLIC 3.90 14
SEMPRIVATE / /
PRIVATE 3.22 12
P/
PUBLIC 6.60 24
SEMPUBLIC 4.11 15
SEMPRIVATE 9.37 34
PRIVATE 7.24 27
LENGTH OF PUBLIC CIRCULATION
E/ 12900 M, 472 M/HA
P/ 3150 M , 115 M/HA
COMMUNITY FACILITIES
E/ 1 NURSERY
1 KINDERGARTEN
1 PRIMARY SCHOOL
1 INTERMEDIATE SCHOOL
2 SOCIAL CULTURAL CENTER
RESERVED AREA
PLAYGROUNDS
PLAZA
P/ THE ABOVE FACILITIES PLUS
A GROUP OF SHOPES
(6 SHOPES)
Evaluation of two public housing projects

STAGE 2.

urban parameters

Data of the urban area which contain the site.

LAND USE PATTERN
SEMIURBAN AREA, RESIDENTIAL
OPEN SPACES AND PUBLIC SERVICES

POPULATION DENSITY PATTERN
250 - 300 p/ha

INCOME GROUP PATTERN
MIDDLE AND LOW MIDDLE INCOME

LAND VALUE PATTERN
COMPATIBLE WITH THE PROJECT UTILITIES, SERVICES

WATER SUPPLY, SEWAGE DISPOSAL, STORM DRAINAGE, ELECTRICITY/STREET LIGHTING,
REFUSE COLLECTION, TELEPHONE

COMMUNITY FACILITIES
SCHOOLS, MARKETS AND SHOPS,
PLAYGROUNDS, PARKS, PUBLIC BUSES

SOURCES OF EMPLOYMENT
INDUSTRY, GOVERNMENTAL OFFICES, PRIVATE SECTOR
1000 - 3000 M

URBAN CIRCULATION NETWORK
THE SITE IS ADJACENT TO SECONDARY CITY CENTER AND CONNECTED WITH THE PRIMARY CITY CENTER BY RADIAL ROUTE
DISTANCE FROM CITY CENTER 3000 M

Scale 1/20000
STAGE 3.

site parameters

Data of the site of the project.

LOCATION
RESIDENTIAL AREA AND OPEN SPACES
APPROACHES
PRIMARY RADIAL ROUT
ACCESSSES
STREET ON PARAMETER
TRANSPORTATION
PUBLIC BUSES, PRIVATE CARS, TAXIS

SIZE
LAND GROSS AREA 27.32 HA
LAND USABLE AREA 27.32 HA
SHAPE L-SHAPE

TOPOGRAPHY, NATURAL FEATURES
SLOPE 0%-5%
SOIL
RELATIVE DESIRABILITY: DESIRABLE

CLIMATE
AIR TEMPERATURE: HOT TO TEMPERATE, AIR RELATIVE HUMIDITY: MODERATE

BOUNDARIES
MAJOR STREET, LEGAL BOUNDARIES

VIEWS
NEUTRAL TO POSITIVE

FLOODING
ZONE OF SITE: OUTSIDE OF FLOODWAY

DUST, DIRT, SMOKE, HAZARDS
NONE

AIRPORT DISTURBANCE, ZONING RESTRICTION NONE
EXISTING STRUCTURES, EASEMENTS
RIGHT OF WAYS NONE

LAND TENURE PUBLIC

LAND COSTS
COMPATIBLE WITH THE PROJECT

GOVERNMENT REGULATIONS NONE
STAGE 4.

main urban circulation network and accesses affecting the site

The projections of possible uses and accesses to the site are defined. The projections are based on the data given in stages 1, 2 and 3.

DATA

1. OUTPUT FROM PREVIOUS STAGE
   A. SIZE AND SHAPE: MAXIMUM WIDTH 800M, MAXIMUM DEPTH 700M, THE SITE IS L-SHAPED
   2. ADDITIONAL DATA FROM STAGES 1 AND 2
   A. THE SITE IS LOCATED ON A MAIN RADIAL ROUT CONNECTING THE CITY OF MOSUL WITH THE CITY OF SINJAR (MAIN CITY ON THE IRAQI BOUNDARY WITH SYRIA)
   B. THE CLOSEST CIRCUMFERENTIAL ROUT IS 350M FROM THE CLOSEST POINT OF THE SITE, TO THE EAST.
   C. THE SITE IS LOCATED ADJACENT TO A RESIDENTIAL AREA (AL-YERMUK NEIGHBOURHOOD)
   D. ANOTHER RADIAL ROUT, TO THE SOUTH OF THE SITE, STOPS AT THE CLOSEST CIRCUMFERENTIAL ROUT

ASSUMPTIONS

A. THERE WILL BE A NEED FOR ANOTHER ROAD TO THE WEST SIDE OF THE SITE (350m+800m=1150m)
B. THE NEW ROAD WILL PROVIDE OTHER POINTS OF ACCESS
C. THE AREA TO THE SOUTH OF THE SITE IS A RESIDENTIAL POTENTIAL AREA
D. THE RADIAL ROAD TO THE SOUTH OF THE SITE WILL BE CONTINUED

POLICIES

FREQUENCY OF MAIN URBAN CIRCULATION NETWORK: 1000M TO 2000M APPROXIMATELY
THE AREA IS RESIDENTIAL (MASTER PLAN)
THERE IS A NEED FOR MORE RESIDENTIAL PROJECTS

RESULTS

THE SITE WILL BE BOUNDED BY TWO ROADS AND WILL BE PART OF A LARGER NEIGHBOURHOOD. THE SITE WILL HAVE TWO SIDES FOR POTENTIAL ACCESSES

View of the residential area to the east of the site of Wadi Al-Aen Al-Jnubiya/Mosul project. Aug.1983.
COMMERCIAL POTENTIAL AREAS

EXISTING RESIDENTIAL AREA

THE SITE

PUBLIC PARKS AND SERVICES

PROPOSED ROAD

ACCESS

BUS LINES

Scale 1/20000
STAGE 5.

primary site circulation

The primary site circulation is defined based on the data given in stages 1, 2, 3 and the projections made in stage 4.

DATA
1. OUTPUT FROM PREVIOUS STAGE
   A. THE SITE IS BOUNDED BY TWO MAIN ROADS
   B. THE SITE IS PART OF A LARGER RESIDENTIAL AREA
   C. ACCESSSES AVAILABLE FROM TWO SIDES
2. ADDITIONAL DATA FROM STAGES 1, 2 AND 3
   A. THE SITE IS BASICALLY FLAT (0%-5% SLOPE)
   B. RIGHT OF WAYS NONE
   C. EXISTING STRUCTURES NONE
   D. BOUNDARY LINES
   E. THE SITE IS ADJACENT FROM THE NORTH, TO A LARGE NEIGHBOURHOOD (AL-YERMUK). THE EXISTING RADIAL ROUT IS THE DIVIDING LINE

RESULTS
A. THE POTENTIAL ACCESS TO THE SITE IS ONE FROM THE NORTH, ADJACENT TO THE EXISTING NEIGHBOURHOOD
B. THE PROJECTED LARGER NEIGHBOURHOOD (APP. 1200M X 1200M) NEEDS ONE PRIMARY CIRCULATION
C. THE PRIMARY SITE CIRCULATION IS LOCATED ON THE BOUNDARY LINE

ASSUMPTIONS
THE PROJECT AND THE POTENTIAL RESIDENTIAL AREA TO THE SOUTH WILL FORM ONE LARGER NEIGHBOURHOOD

View of Wadi Al- Aen Al-Jnubiya project/Mosul from the west. Aug.1983.
STAGE 6.

areas of major commercial potential land values

The possible major commercial potential areas are defined based on the location of the primary site circulation and the projections of stage 4.

DATA

1. OUTPUT FROM PREVIOUS STAGE
   A. THE ACCESS IS TO THE NO NORTH OF THE SITE ON THE EXISTING RADIAL ROUT TO SINJAR
   B. THE PRIMARY SITE CIRCULATION

2. ADDITIONAL DATA FROM STAGE 4
   A. PUBLIC TRANSPORTATION IS PROVIDED ON THE ROUT TO SINJAR
   B. THE SITE IS PART OF A LARGER RESIDENTIAL AREA (A BLOCK OF 1200M X 1200M)

ASSUMPTIONS

A. THE PROJECT WILL GENERATE THE FIRST COMMERCIAL CENTER FOR THE AREA ALONG ITS PRIMARY SITE CIRCULATION. THE SECOND WILL BE GENERATED ALONG THE EXTENTION OF THE PRIMARY CIRCULATION WITHIN THE AREA WILL BE DEVELOPED FOR RESIDENTIAL USE

POLICIES

HIGH COMMERCIAL POTENTIAL/ LAND VALUES ADJACENT TO THE PRIMARY CIRCULATION/PUBLIC TRANSPORTATION
LOWER COMMERCIAL POTENTIAL/ LAND VALUES FARThER FROM PRIMARY CIRCULATION/PUBLIC TRANSPORTATION

RESULTS

A. THE AREA SURROUNDING THE PRIMARY SITE CIRCULATION WILL HAVE MAJOR COMMERCIAL POTENTIAL/HIGH LAND VALUE
   B. THE AREA ADJACENT TO THE ROAD TO SINJAR WILL HAVE MAJOR COMMERCIAL POTENTIAL/HIGH LAND VALUE
   C. THE AREAS DOWN TO THE SOUTH WEST AND TO THE EAST WILL HAVE LESS LAND VALUE

View of the residential area to the east of the site of Wadi Al-Aen Al-Jnubiya/Mosul project. Aug.1983.
STAGE 7.

Areas for schools, playgrounds, plazas, markets (semipublic land) major commercial areas (private)

The semipublic areas and commercial areas are defined based on the conclusions of stages 4, 5 and some data from stage 3.

DATA

1. Output from previous stage
   A. Potential areas for commercial development
   B. Land values

2. Additional data from stages 3, 4 and 5
   A. Location of the primary site circulation
   B. Slope of the site 0%-5%
   C. The site will be of larger neighbourhood

ASSUMPTIONS

Small playgrounds will be part of a semiprivate areas adjacent to the dwelling units, for social and security reasons.

POLICIES

Plazas, markets, major commercial areas should be located on higher land value
Schools, playgrounds, etc. should be located on a lower value land or on a steep land

(Because it upsets higher land values)

RESULTS

A. The proposed market, social cultural centers, plaza and the reserved area for future commercial and/or religious purposes is located along the primary site circulation
B. Schools will be located on the south west edge of the site plus a nursery and playground on the east side of the site
C. Reserved area for future private commercial development is provided along the primary site circulation and the radial route
STAGE 8.

the direction of secondary site circulation (vehicles and pedestrians)

The directions of the secondary site circulation are defined based on the conclusions of stages 4, 5, 7 and some data from stage 3.

DATA
1. OUTPUT FROM PREVIOUS STAGE
   A. LOCATION OF THE SEMIPUBLIC AREAS
   B. LOCATION OF THE RESERVED LAND FOR FUTURE PRIVATE COMMERCIAL DEVELOPMENT
2. ADDITIONAL DATA FROM 3, 4 AND 5
   A. LOCATION OF THE PRIMARY SITE CIRCULATION
   B. SUGGESTED ROAD
   C. BOUNDARIES

ASSUMPTIONS
A. MINIMIZE STREETS AND THROUGH TRAFFIC
B. DISTANCE BETWEEN TWO SECONDARY STREETS IS EQUAL TO TWO CLUSTERS DEPTH
C. THE AREA FOR MARKET AND OTHER SEMIPUBLIC FACILITIES WHICH ARE LOCATED ALONG THE PRIMARY SITE CIRCULATION SHOULD BE SURROUNDED BY SECONDARY STREETS, TO PROVIDE MAXIMUM CONVENIENCE FOR ACCESSSES

POLICIES
SECONDARY CIRCULATION SHOULD BE LINKING RESIDENTIAL AREAS WITH THE PRIMARY CIRCULATION RESULTS
A. SECONDARY STREETS WILL BE PERPENDICULAR TO THE SITE CIRCULATION STREETS (CONSIDERING THE DEPTH OF THE SITE) IS 130M
STAGE 9.

clusters layout

The cluster is the basic social and administrative unit proposed for the settlement. The design is based on data from stages 1 and 2. Also the approximate dimensions was anticipated from stage 8's conclusion.

DATA
1. OUTPUT FROM PREVIOUS STAGE
2. APPROXIMATE CLUSTER DEPTH FROM STAGES 1 AND 2
3. CLIMATE: HOT AND DRY WEATHER
4. TYPE OF DWELLING UNIT: 1, 2 AND 3 BEDROOM APARTMENTS
5. AVERAGE SIZE OF DWELLING UNITS: 100 - 130 m²
6. TYPES OF DWELLINGS: 4
7. 4 FLOORS BUILDINGS OF TWO TYPES: 2 APARTMENTS/FLOOR AND 4 APARTMENTS/FLOOR
8. 1 PARKING LOT/APARTMENT
9. SMALL PLAYGROUNDS SHOULD BE PART OF THE CLUSTER

ASSUMPTIONS
A. THE NUMBER OF PEOPLE LIVING WITHIN A CLUSTER SHOULD BE WITHIN THE RANGE 200 PEOPLE (200 PEOPLE WILL STILL KNOW EACH OTHER)
B. THE MAXIMUM DISTANCE BETWEEN ANY POINT (ON HORIZONTAL OR VERTICAL CIRCULATION) AND THE ACCESS TO THE CLUSTER SHOULD NOT EXCEED 100M
C. THE LIVING AREA OF ANY DWELLING UNIT SHOULD FACE THE SOUTH/SOUTH EAST OR THE EAST AS A SECOND CHOICE
D. THE CLUSTERS ARE FENCED
E. TWO ALTERNATIVES FOR CLUSTER'S LAYOUT
F. THE CLUSTERS ARE FENCED

RESULTS
A. TWO ALTERNATIVES FOR CLUSTER'S LAYOUT
B. ALTERNATIVE A
- 2 DWELLINGS OF 4 APARTMENTS/FLOOR
- THE ENTRANCE TO THE CLUSTER IS 4M OPENING IN THE GROUND FLOOR OF THE BUILDING FACING THE SECONDARY STREETS
- THE AREAS OF 3M WIDTH ON BOTH SIDE OF THE ENTRANCE BUILDING IS PROVIDED FOR THE GENERAL SERVICES NEEDED FOR THE CLUSTER
- THE AREAS ON THE GROUND FLOOR BETWEEN THE FENCE AND THE BUILDINGS ARE OWNED BY THE RESIDENTES OF THE GROUND FLOOR APARTMENTS
- FOR 4 FLOOR DWELLINGS THE CLUSTER WILL HAVE POPULATION OF APPROXIMATELY 155 PERSONS (ASSUMING THE AVERAGE NUMBER OF RESIDENTS IN EACH APARTMENT IS 5 PERSONS)
- POSSIBLE FUTURE EXTENSION TO 5 FLOORS
- THE TOTAL POPULATION FOR EACH CLUSTER WILL BE 195 PERSONS
C. ALTERNATIVE B
- 3 DWELLINGS: 2 OF 4 APARTMENTS/FLOOR, 1 OF 2 APARTMENTS/FLOOR
- THE ENTRANCE TO THE CLUSTER AND THE PARKING AREA ARE SEGREGATED FROM THE PLAYGROUND AREA
- ADDITIONAL UNIT IS PROVIDED FOR THE GENERAL SERVICES (APP. 5Mx20M)
- THE AREAS ON THE GROUND FLOOR BETWEEN THE FENCE AND THE BUILDINGS ARE OWNED BY THE RESIDENTES OF THE GROUND FLOOR APARTMENTS
- FOR 4 FLOOR DWELLINGS, THE CLUSTER WILL HAVE POPULATION OF APPROXIMATELY 200 PERSONS
- FOR FUTURE EXTENTION
TO 5 FLOORS, THE POPULATION WILL BE 250 PERSONS APPROXIMATELY.

FOR BOTH ALTERNATIVES, SOME COVERED PARKING AREAS ARE PROVIDED.

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<tbody>
<tr>
<td>(B) ALTERNATIVE B</td>
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apt-2 TWO APARTMENTS PER FLOOR
apt-4 FOUR APARTMENTS PER FLOOR
ad ADMINISTRATION AND WORKSHOPS
pl PLAYGROUND
pk PARKING

PRIVATE AREAS
SEMIPRIVATE AREAS
CIRCULATION
COVERED PARKING
ACCESS
Evaluation of two public housing projects


STAGE 10.

complete project

DATA

1. OUTPUT FROM PREVIOUS STAGE
   CLUSTERS ARRANGEMENTS AND ITS ORIENTATION
2. ADDITIONAL DATA FROM STAGES 1, 3, 5, 7, AND 8
   A. POPULATION: 9080 - 11350 PERSONS
   B. NUMBER OF DWELLING UNITS: 1820 - 2270 APARTMENTS
   C. LAND UTILIZATION AREAS AS PROPOSED IN STAGE 1
   D. SIZE: 27.32 HA
   E. SHAPE AND DIMENSIONS
   F. SLOPE: 0% - 5%
   G. CLIMATE: HOT TO TEMPERATE DRY WEATHER
   H. LOCATION OF PRIMARY SITE CIRCULATION
   I. LOCATION OF SEMIPUBLIC AREAS AND RESERVED AREAS
   J. LOCATION OF SECONDARY SITE CIRCULATION

ASSUMPTIONS

A. THE SECONDARY STREETS SHOULD BE LINKED FROM BOTH ENDS TO AVOID THE CREATION OF A DEAD END STREET (FIRE REGULATION)
B. THE ORIENTATION OF THE LIVING AREAS SHOULD FACE THE SOUTH OR SOUTH EAST
C. THE WIDTH OF THE SECONDARY STREETS SHOULD EQUAL TO TWO WAYS (6M) AND PARKING AREA (2.5M) PLUS PEDESTRIAN WALK WAYS (1-2M)

RESULTS

COMPLETE PROJECT
Evaluation of two public housing projects

proposed design

1 Hectare

- 20 Person/Ha

Gross density = Population / Gross area

\[ \frac{3080}{27.32} = 332 \]

1 Hectare

- 4 dwelling/Ha

Dwelling density

Number of dwellings / Gross area = 66

IS INTERMEDIATE SCHOOL
K KINDERGARTEN
N NURSERY
M MARKET
R RESERVED AREA
PS PRIMARY SCHOOL
SH SHOPES
SS SECONDARY SCHOOL

SC SOCIAL CULTURAL CENTER
PG PLAYGROUNDS
WG WORKSHOES AND SERVICES
P PLAZA

--- BOUNDARY LINES

Scale 1/5000
existing design

1 Hectare

- 20 Person/Ha

Gross density = \frac{Population}{Gross area}

= \frac{5080}{27.32} = 186

1 Hectare

- 4 dwelling/Ha

Dwelling density

Number of dwellings = \frac{37}{5080}
land utilization
proposed design

1 Hectare

Land utilization

Public 24%
Semipublic 15%
Private/Semiprivate 61%

16 Hectares

Circulation 115 m/Ha

PRIVATE AREAS

SEMIPRIVATE AREA

SEMIPUBLIC AREAS

PUBLIC AREAS

CIRCULATION

Scale 1/5000
existing design

1 Hectare

Land utilization

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<td>Semi-public</td>
<td>14%</td>
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<tr>
<td>Private/Semi-private</td>
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16 Hectares

Circulation 472 m/Ha

Scale 1/5000
STAGE 5.

Proposed
Primary Site
Circulation

STAGE 6.

Proposed
Land Values

Existing
Primary Site
Circulation

Existing
Land Values
STAGE 7.

Proposed
Semipublic Areas
Location

STAGE 8.

Proposed
Secondary
Circulation

Existing
Semipublic Areas
Location

Secondary
Circulation