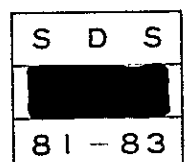REPUBLIC OF INDONESIA

TECHNICAL REPORT

LOW COST HOUSING PROJECT IN CENGKARENG

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

108
21.2
565
13923

LIST OF ABBREVIATION

PERUM PERUMNAS:
- PERUSAHAAN UMUM PEMBANGUNAN PERUMAHAN NASIONAL
- NATIONAL URBAN DEVELOPMENT CORPORATION
-

(RE)PELITA II(III):
- RENCANA PEMBANGUNAN LIMA TAHUN II(III)
- 2 IID(3 RD) 5 YEAR DEVELOPMENT PROGRAMME
-

BTN :
- BANK TABUNGAN NEGARA
- NATIONAL MORTGAGE BANK
-

DKI JAKARTA:
- DAERAH KHUSUS IBUKOTA JAKARTA
- CAPITAL CITY JAKARTA
-

JABOTABEK:
- JAKARTA-BOGOR-TANGERANG-BEKASI (JAKARTA METROPOLITAN REGION)
-

PLN:
- PERUSAHAAN LISTRIK NEGARA
- NATIONAL ELECTRICITY COMPANY
-

PAM - (JAYA):
- PERUSAHAAN DAERAH AIR MINUM (JAYA)
- (JAKARTA) WATER SUPPLY COMPANY
-

PBJR:
- PROJEK BANJIR JAKARTA RAYA
- JAKARTA FLOOD CONTROLE PROJECT
-

DPU: :
- DEPARTEMEN PEKERJAAN UMUN
- MINISTRY OF PUBLIC WORKS
-

CIPTA KARYA:
- DIRECTORAT JENDERAL CIPTA KARYA
- DIRECTORATE GENERAL OF HOUSING, BUILDING,PLANNING AND URBAN DEVELOPMENT
-

BINA MARGA:
- DIRECTORAT JENDERAL BINA MARGA
- DIRECTORATE GENERAL BINA MARGA
-

PENGAIRAN:
- DIRECTORAT JENDERAL PENGAIRAN
- DIRECTORATE GENERAL PENGAIRAN
-

NEDECO:
- NETHERLAND ENGINEERING CONSULTANT
-

EXCHANGE RATE: Rupiah = Rp.

100Rp.= 33.4 Yen = 0.163 US$

(December, 1980)

MAJOR TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

3 PLANNING AREA

6 HOUSING PLAN

7 CONSTRUCTION PROGRAMME

8 PROJECT COST ESTIMATE

9 ALTERNATIVES

10 FINANCIAL ANALYSIS

11 ECONOMIC ANALYSIS

LIST OF TABLES

6   HOUSING PLAN

XV

11 ECONOMIC ANALYSIS

STRUCTURE OF THE D.K.I. ADMINISTRATION

5 SUB-DIVISIONS (CENTRAL, NORTH, WEST, SOUTH, EAST)
   - KOTA MADYA
30 DISTRICTS - KECAMATAN*
236 SUB-DISTRICTS - KELURAHAN*(KEL.)

*In this report, KECAMATAN
and KELURAHAN are reffered
to as town and village
respectively.
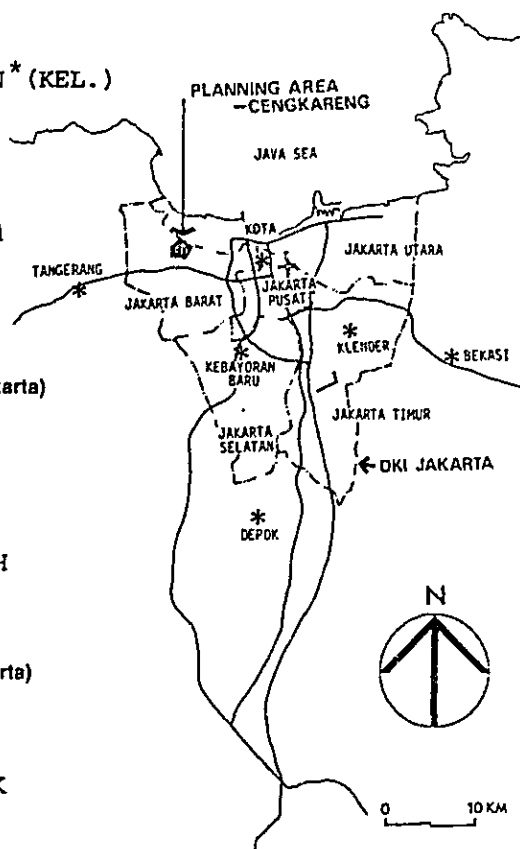
I **Kota madya JAKARTA PUSAT (Central Jakarta)**

Kecamatan (1) GAMBIR
          (2) SAWAH BESAR
          (3) KEMAYORAN
          (4) SENEN
          (5) CEMPAKA PUTIH
          (6) MENTENG
          (7) TANAH ABANG

II **Kota madya JAKARTA UTARA (North Jakarta)**

Kecamatan (1) PULAU SERIBU
          (2) PENJARINGAN
          (3) TANJUNG PRIOK
          (4) KOJA
          (5) CILINCING

III **Kota madya JAKARTA BARAT (West Jakarta)**

Kecamatan (1) CENGKARENG ————————Kel. (1) SEMANAN
          (2) GROGOL PETAMBURAN   (2) KAMAL
          (3) TAMAN SARI   (3) TEGAL ALUR
          (4) TAMBORA   (4) PEGADUNGAN
          (5) KEBON JERUK   (5) KALI DERES
                                          (6) CENGKERENG

IV. **Kota madya JAKARTA SELATAN (South Jakarta)**
                                          (7) KAPUK

Kecamatan (1) TEBET   (8) KEDAUNG KALI ANGKE
          (2) SETIA BUDI   (9) DURI KOSAMBI
          (3) MAMPANG PRAPATAN   (10) RAWA BUAYA
          (4) PASAR MINGGU
          (5) KEBAYORAN BARU
          (6) KEBAYORAN LAMA
          (7) CILANDAK

V. **Kota madya JAKARTA TIMUR (East Jakarta)**

Kecamatan (1) MATRAMAN
          (2) PULO GADUNG
          (3) JATINEGARA
          (4) KRAMAT JATI
          (5) PASAR REBO
          (6) CAKUNG

1 NATURAL CONDITIONS

TABLE OF CONTENTS

1—1 CLIMATE

DKI Jakarta, site of the Planning Area, is located on the north
coast of the western part of the island of Java and its climate
is tropical, being divided into two seasons. The dry season
lasts from April to October, and the rainy season is from
November to March.

The average annual rainfall in central DKI Jakarta over the
period 1962 - 1978 is about 1,900mm, average monthly rainfall
in the dry season being approximately 85mm, and in the rainy
season, about 265mm. The maximum monthly rainfall over the
last 16 years is about 720mm, and this is recorded in January
1965 and January 1976. Months with no rainfall are recorded
several times, in the dry season.

Rainfall in the Planning Area and its surrounding area is
relatively low, in comparison with central DKI Jakarta.
The average annual rainfall is approximately 1,600mm, and the
average monthly rainfall in the dry season is about 60mm,
and in the rainy season, about 200mm.

Table 1-1 and Fig. 1-1 show the meteorological conditions for
DKI Jakarta, and rainfall for the Planning Area and its sur-
rounding area is also shown.

When rainfall exceeded 30mm per day, over the last few years,
the peak rainfall occurred in the first hour of precipitation,
with intensity dropping off afterwards, but occasionally,
rainfall lasted for more than twelve hours.

With regard to average annual temperature, this has been
recorded as approximately 27°C, with very little fluctuation.
However, there is a tendency for peak temperatures to occur
at the change of the seasons, and for temperatures to be
slightly lower during the rainy season. The average wind
speed is low, being about 2m/sec. throughout the year, and
the wind direction is mainly easternly in the dry season and
north-westernly in the rainy season.

Table 1-1   CLIMATE DATA IN JAKARTA

	Dry season (average a month)	Rainy season (average a month)	Average annual
Temperature (°C)	27	26.5	27
Humidity (%)	78	83	80
Rainfall (mm)	80(60)	240(200)	1930(1560)
Wind direction	East	North-West	-
Wind velocity (m/sec.)	-	-	2

(   ) indicates rainfall in the Planning Area and its
surrounding area.
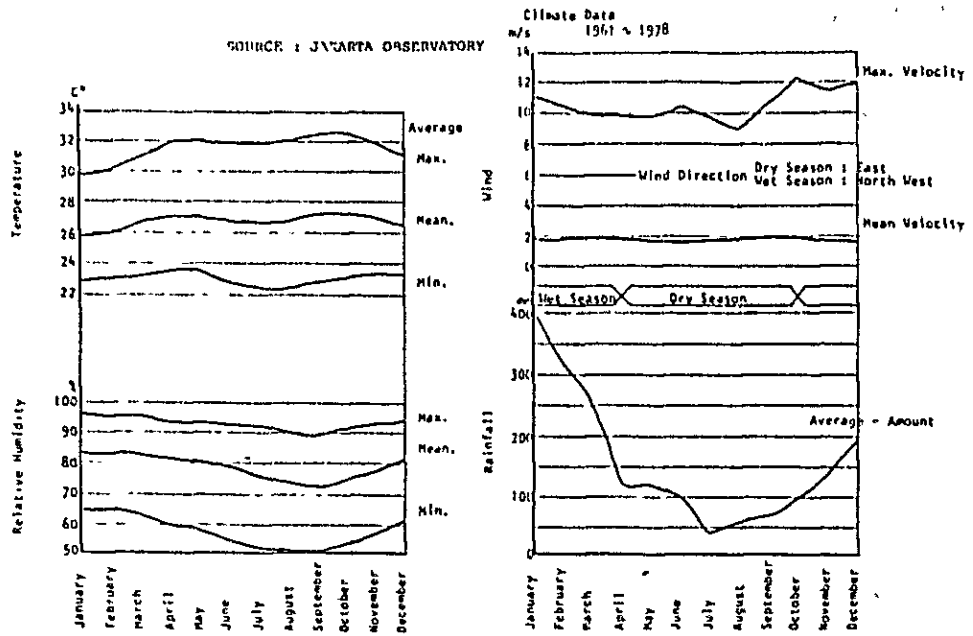
Fig. 1-1　CLIMATE DATA IN JAKARTA
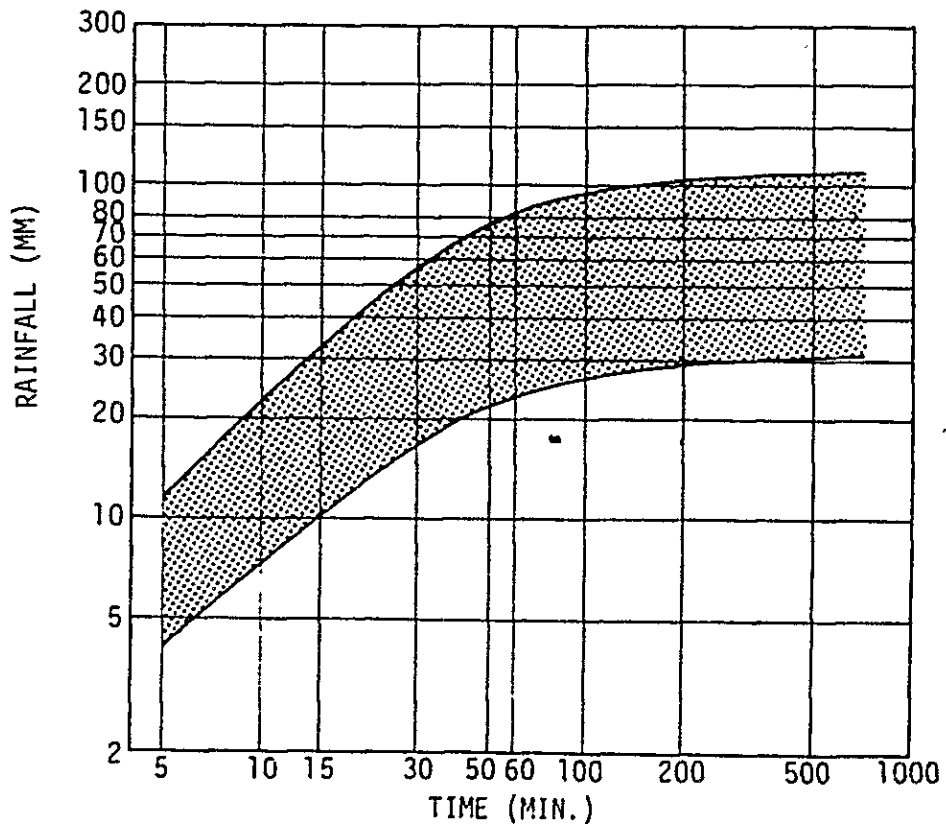
Fig. 1-2　RAINFALL IN JAKARTA

1—2 TOPOGRAPHY AND GEOLOGY

The topography of the DKI Jakarta area can be divided gener-
ally into three main areas (Fig. 1-4). The first area is a
hilly district in the upper reaches of the Ciliwung River,
more than 150m above sea-level. The second area is a terrace
area of more than 5m above sea-level. The third area consists
of a plain of less than 5m above sea-level, and includes the
Planning Area. This third area, the flat plain, lies in a
strip about 6 - 10km wide along the present coast-line. The
area consists of alluvial sand and clay deposits, exposed
as the coast-line moves north, and in the Planning Area, this
topographical district exists north of the Jakarta-Tangerang
Road.

Geologically speaking, the terrace area, 5m above sea-level
and more, mainly consists of volcanic deposits of the Tertiary
Pliocene-diluvial epoch, and generally has been well weathered,
so that the upper parts consist of weathered laterite soil.
Details of the topography of the Planning Area fall into the
following two types, as indicated in Fig. 1-5. The first is
a slightly higher area, between 5.5m and 3.5m above sea-level,
and the second is a lower area between 4m and 2m above sea-
level. Proportionally, the Planning Area is made up of the 1/3
as the higher area, and the 2/3 the lower area. the slightly
higher area is called the beach ridge, and has a flat surface
supporting palm trees and villages. The majority of the lower
area is used for paddy-fields, but some parts consist of
ordinary fields, or permanently swampy ground.

From the results of the survey carried out by PERUM PERUMNAS
in 1979, the contours of the Planning Area were determined
as shown in Fig. 1-6, and indicate a slight tilt towards the
east in both the beach ridge and the lower land. Because of
its low altitude and very slight declination, the existing
drainage of the area is extremely slow.

The northern littoral district of this area is a low swampy
area less than 2m above sea-level, used to some extent as
fish-ponds, but more generally in disuse.

The geology of the Planning Area indicates volcanic deposits
of a Tertiary to Pleistocene base, with an overlay of ac-
cumulated alluvium. According to soil surveys, carried out
by the study team in 1979 and 1980 (for details, see Appendix),
this alluvium consists of a sandy soil 4 - 5m thick on the
beach ridge, and in the lowland consists mainly of clay
deposits 9 - 15m thick. The clay deposits can be divided into
three layers according to soil quality, labelled from the top,
Layer I, Layer II and Layer III. (See Fig. 1-3).

```
BEACH RIDGE              LOW LAND
  🌴  ⛩ ⛩  🌴        (PADDY FIELD)      DEPTH (M)
┌─────────────────┐  ─────────────────────── 0
│ . .SANDY LAYER. .│    LAYER-I (ALLUVIUM)
│  (ALLUVIUM)  . . │  ─────────────────────── 2 (AVERAGE)
└─────────────────┘
                      LAYER-II (ALLUVIUM)

─────────────────────────────────────────── 6 (AVERAGE)


              LAYER-III (ALLUVIUM)


─────────────────────────────────────────── 9-15
        BASE (TERTIARY TO PLEISTOCENE)
```
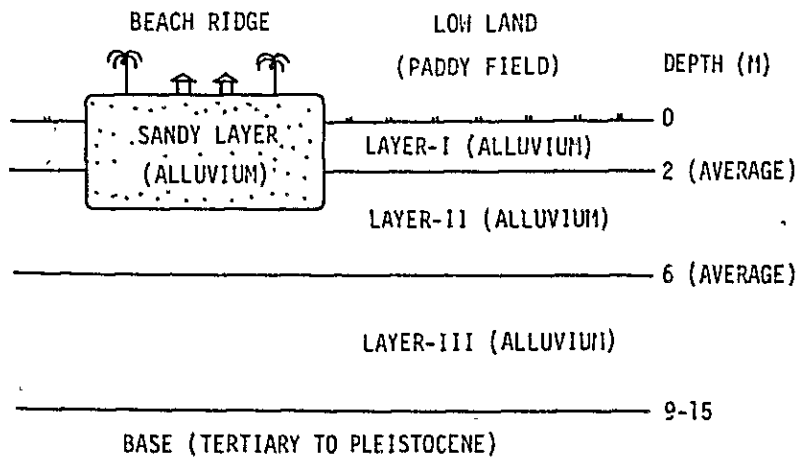
Fig. 1-3 PROFILE OF GEOLOGICAL CONDITIONS IN THE PLANNING AREA

The groundwater table in the area is at the ground's surface
in the irrigated paddy-fields of the lowland, and in the non-
irrigated areas, it lies about one metre below the surface.
With regard to the beach ridge, the groundwater table is
at the same sort of level as in the paddy-fields, being about
0.5 to 1.0 metres below the surface.
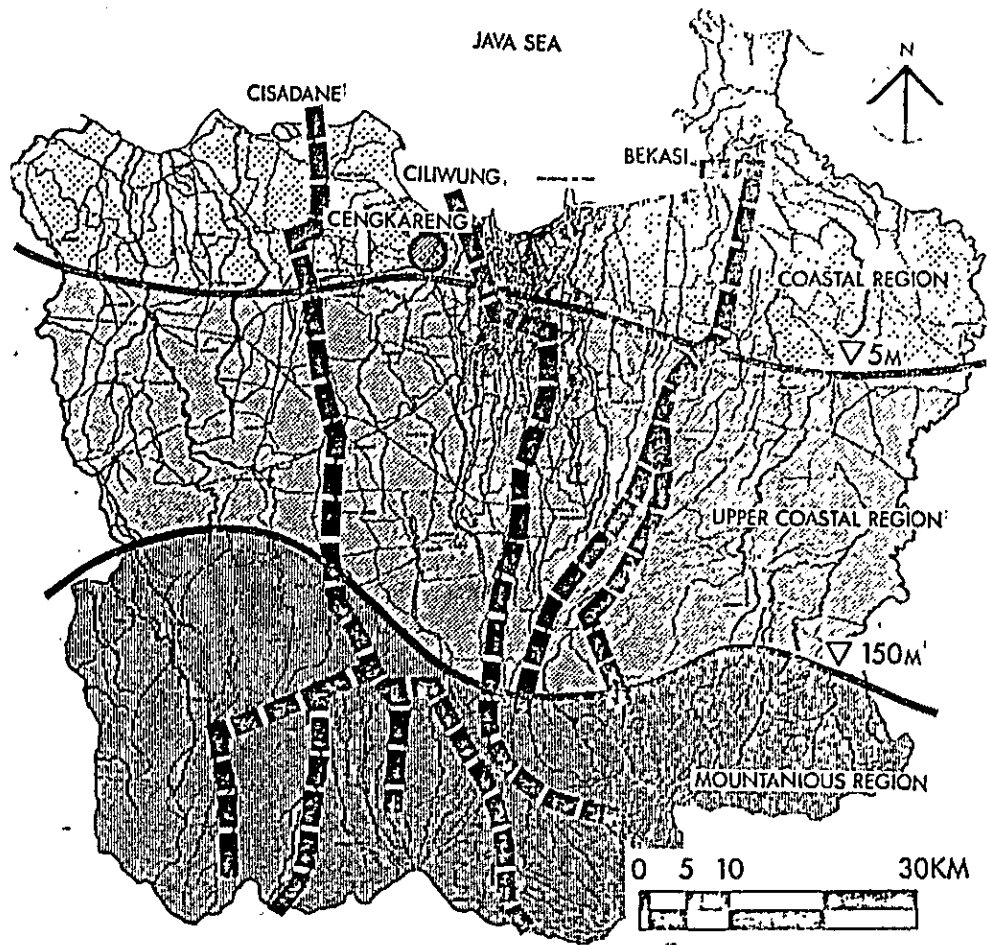
Fig. 1-4 TOPOGRAPHY IN JAKARTA
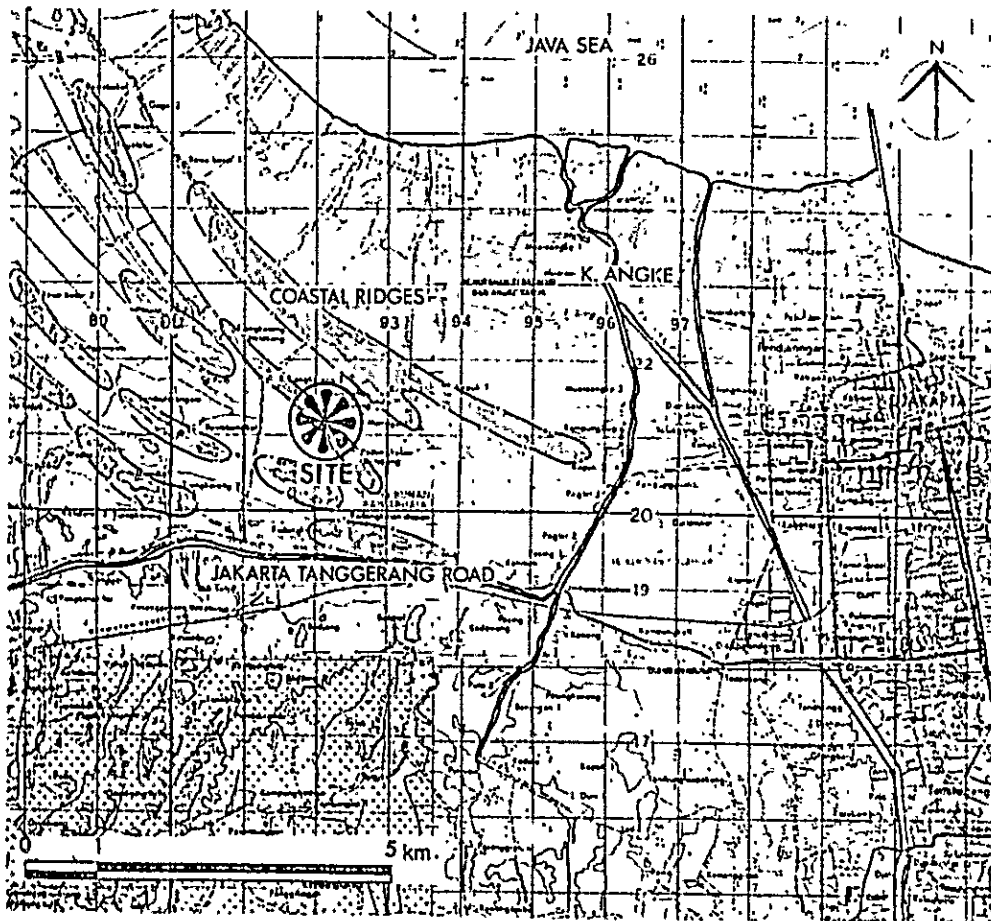
Fig. 1-5 TOPOGRAPHY IN AND AROUND THE PLANNING AREA
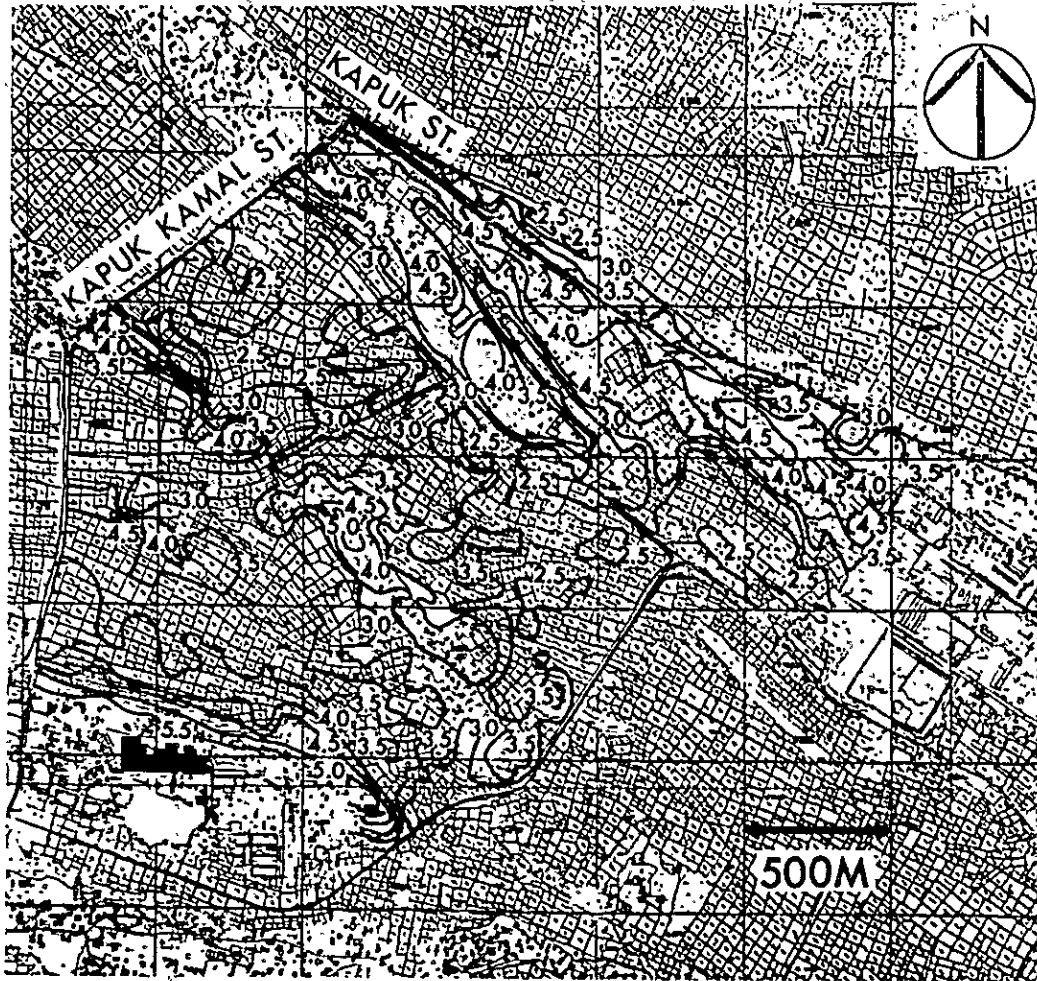
Fig. 1-6   CONTOUR MAP OF THE PLANNING AREA   (M)

1—3 SOIL CHARACTERISTICS

According to the results of the soil survey carried out by
the study team , the characteristics of the laterite soil
distributed over the alluvial clay layer in the Planning Area
and in Tangerang are as follows (for details, see Appedix).

1-3-1 Alluvial clay layer

Table 1-2 shows the main characteristics of this layer's soil,
and consolidation test data are·given in Figs. 1-7 and 1-8.

Table 1-2   SOIL CHARACTERISTICS

Item \ Layer	Layer-I	Layer-II	Layer-III
N-value	2-6	3-7	8-21
Weight percent of sand (%)	90	50	15
Water content (%)	55	58	60
Liquid limit (%)	110	70	94
Unit weight (t/m^3)	1.75	1.60	1.60
Cohesion (t/m^2)	3.0	3.5	3.2
Angle of internal friction	10°	10°	10°
Preloading (t/m^2)	6.2	23	32
Compression index	0.4	0.6	0.4
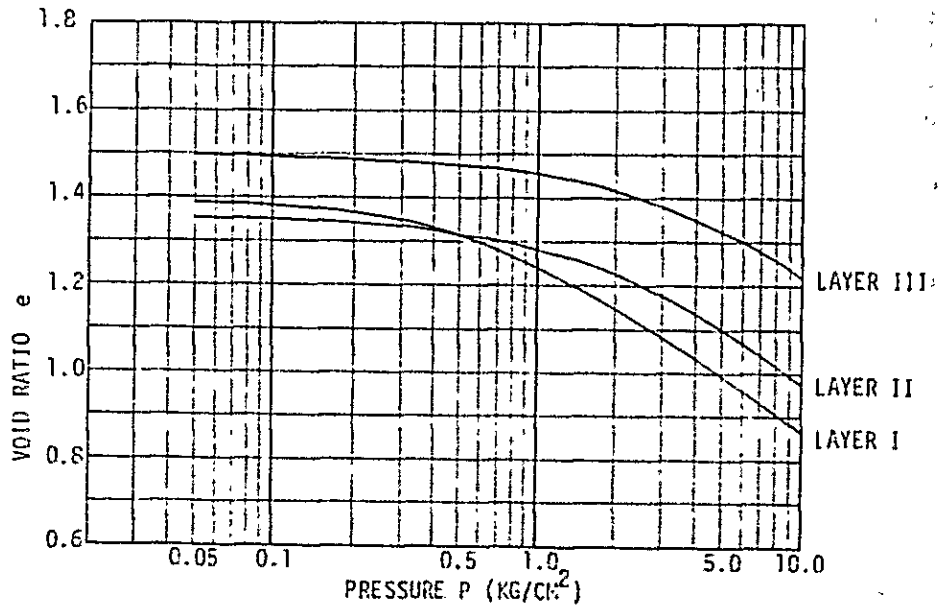
Fig. 1-7 e-log P.
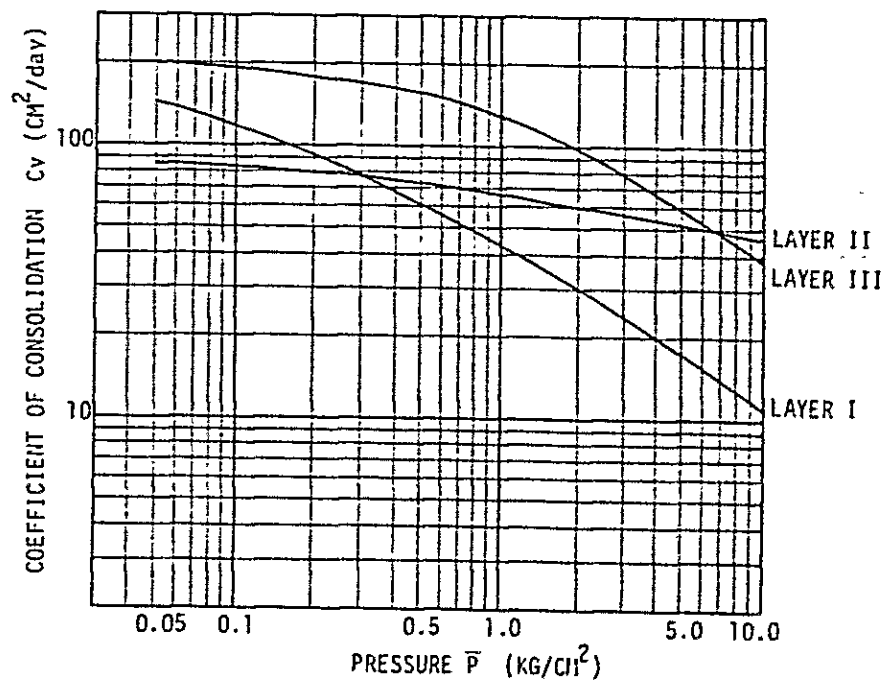
Fig. 1-8 log Cv-log P̄

When considering the bearing capacity of this clay layer, the following results are obtained.

a. Bearing capacity of soil

The bearing capacity of Layer I related to continuous footing. The formulae used in calculating the bearing capacity of soil are as follows:

Continuous footing: $Qd = CNc + QNq + \frac{1}{2}\gamma BN_\gamma$ (1)

Square footing: $Qd = 1.3CNc + QNq + 0.4\gamma BN_\gamma$ (2)

Round footing : $Qd = 1.3CNc + QNq + 0.3\gamma BN_\gamma$ (3)

Q: γDf (γ:unit weight; Df: depth of embedment) *1

C: Cohesion

N_c, N_q, N_γ: bearing capacity factor (function of ϕ), *2

B: Width of foundation

*1 (Where γ is lower than the water table, this should be weight in water)

*2

ϕ	N_c	N_q	N_γ	ϕ	N_c	N_q	N_γ
0	5.7	1.0	0	25	25.1	12.7	9.7
5	7.3	1.6	0.5	30	37.2	22.5	19.7
10	9.6	2.7	1.2	35	57.8	41.4	42.4
15	12.9	4.4	2.5	40	95.7	81.3	100.4
20	17.7	7.4	5.0	45	172.3	173.3	297.5

As shown in Tabel 1-2, the cohesion C of Layer I is $3t/m^2$, but allowing for a margin of error, C is given a value of $2.5t/m^2$. Also in these calculations, the depth of embedment of the foundation Df is ignored, and Df is given a zero value.

In formula (1) values are given as follows:

$C=2.5t/m^2$, $\gamma=0.75t/m^3$, $N_c=9.6$, $N_q=1.2$. The soil bearing capacity Q_d is calculated, and the allowable soil bearing capacity Q_a (= $Q_d/3$) found to be as follows:

$$Q_a = \frac{1}{3}(2.5 \times 9.6 + \frac{1}{2} \times 0.75B \times 1.2)$$

$$= 8.0 + 0.15B \quad t/m^2$$

FOOTING WIDTH B (M)
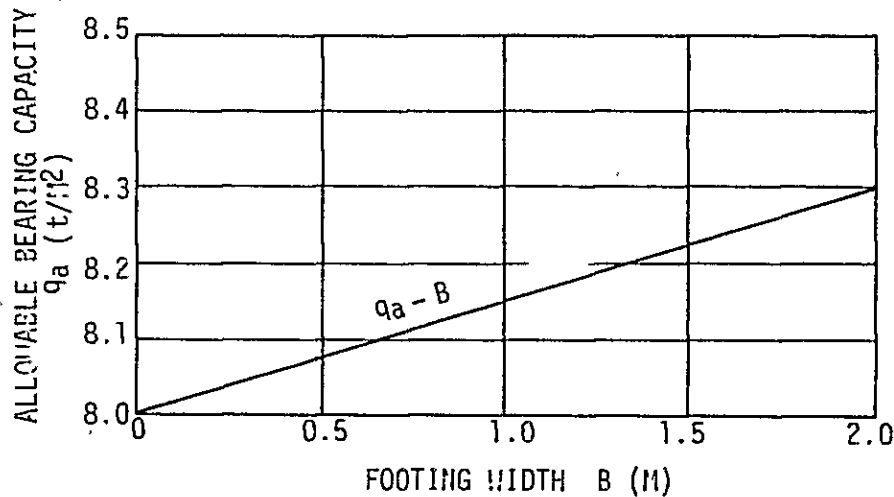
b. Consolidation settlement

When the building's foundation consists of continuous footing, the amount of pressure settling caused in the alluvial clay layer is calculated as follows: The formulae for calculating are given here.

$$S = \frac{e_o - e}{1 + e_o} \times H \tag{4}$$

$$t = \frac{T_v \cdot D^2}{C_v} \tag{5}$$

where
S : Amount of settlement (cm)
H : Thickness of clay layer (cm)
e_o: Void ratio before consolidation
e : Void ratio after consolidation
P_o: Present overburden pressure (t/m^2)
Δp: Increased pressure in the soil (t/m^2)
T_v: Time factor

50% consolidation .... T_v = 0.196
90% consolidation .... T_v = 0.848

D : Length of longest drainage distance (cm)
C_v: Consolidation coefficient (cm^2/day)

The amount of settlement and period of settlement under various loads was calculated for values of depths of embedment of the foundation D_f of 0.3m and 0.5m, and the results are given in Figs. 1-9, 1-10 and 1-11.
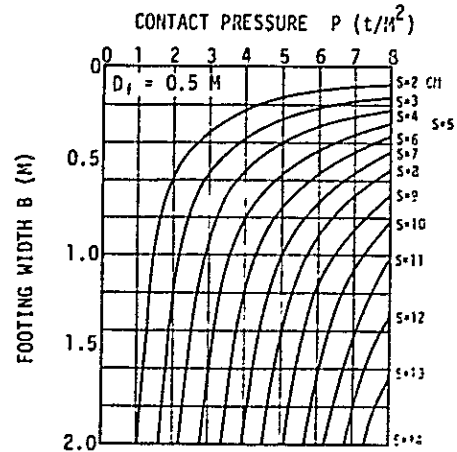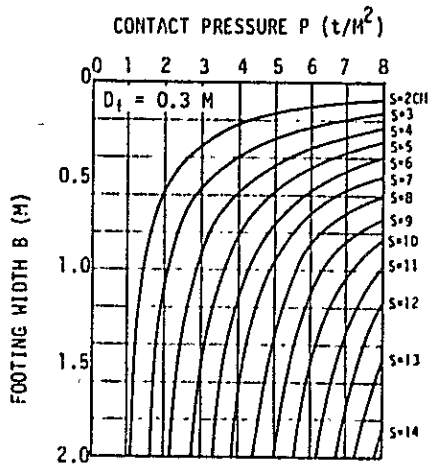
Fig. 1-9   CONSOLIDATION SETTLEMENT (1)(Df = 0.3M)

Fig. 1-10   CONSOLIDATION SETTLEMENT (2)(Df = 0.5M)
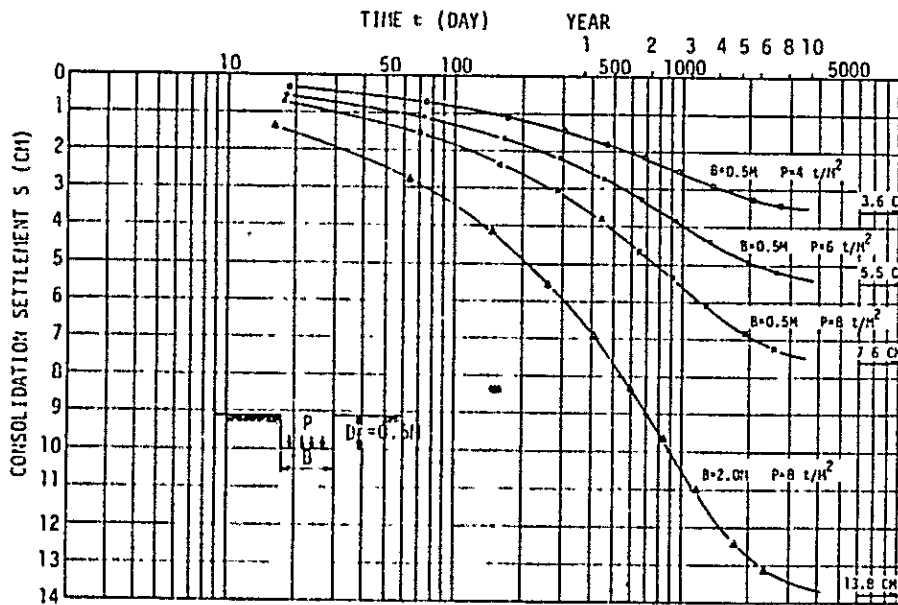
Fig. 1-11   CONSOLIDATION SETTLEMENT (3)

c. Assessment of bearing layer

The bearing capacity Q_a of the alluvial clay layer, taking away the cultivated soil of top 30 cms., is assumed to be approximately $8.0t/m^2$. Therefore, this layer can be considered as a direct foundation support for one or two-storey buildings. With regard to consolidation settlement, this will depend on the design of the foundation and upper structure, and it is assumed that unacceptable settlement can be avoided. With regard to buildings creating high loads, or requiring avoidance of settling, pile foundations into the diluvial layer would be most suitable.

d. Compaction characteristics

The optimum water content W_{opt} of Layer I is 27%, and compared with the natural water content ratio W of 59%, this is a very low value. After disturbance, if compaction is carried out regardless of the natural water content ratio, cohesion $C \approx 3t/m^2$ is obtained, and by lowering the water content by 10% of the natural water content, by compaction, cohesion of about $6t/m^2$ can be obtained. Thus, when Layer I is used as banking material, it is more efficient for it to be dried as much as possible, and by so doing, it can be used as a bearing layer in the same way as natural ground.

e. Swelling

After lowering the water content of Layer I soil by 10%, and after disturbance, if the soil is compacted, water absorption causes a maximum expansion of about 2%. Swelling pressure is approximately $1.3t/m^2$, and in natural ground the swelling percentage is zero.

Therefore, as a bearing layer for foundation, swelling percentage and pressure presents no problems.

1-3-2 Laterite

The characteristics of the laterite soil are very similar to the alluvial clay of Layer I described above. However, after compaction, the cohesion shows values seven or eight times that of Layer I. Absorption and expansion results in a maximum value of about 3%, and the expansion pressure is $4t/m^2$. This indicates inferior characteristics compared with Layer I.

1-4 TIDES

The tidal profile of the Java Sea at DKI Jakarta is indicated in Fig. 1-12, and a single high and low tide occurs per day. The tide levels are given below.

Spring tide (High High Water)   P.P. + 1.15
Average high water (H.W.)   P.P. + 0.90
Slack tide high water   P.P. + 0.80
Mean Sea Level (M.S.L.)   P.P. + 0.60
Slack tide low water   P.P. + 0.40
Average low water (L.W.)   P.P. + 0.25
Spring tide (Low Low Water)   P.P. = 0

Here, P.P. is an abbreviation for Priok Peil. Low Low Water measured in Tanjung Priok Harbour (Jakarta) is given the reference value, 0.
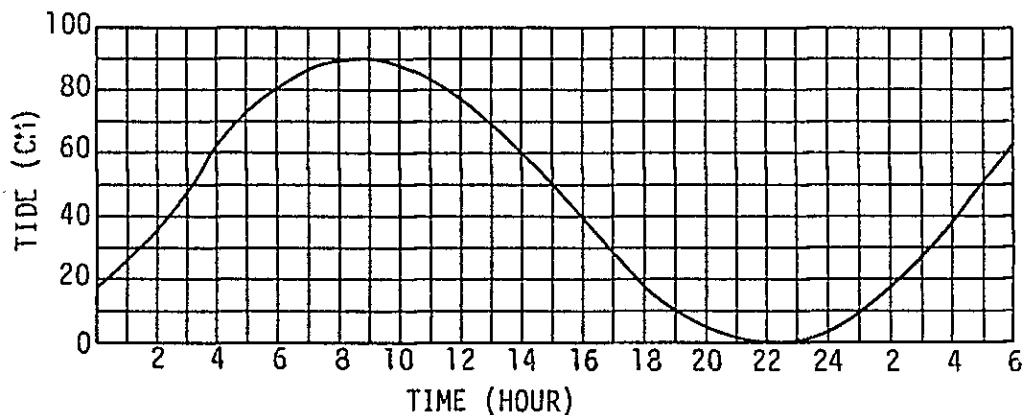
Fig. 1-12   TIDE AT TANJUNG PRIOK HARBOUR (JAKARTA)

1—5 PLANT ORGANISM

Regarding the distribution of plants in the Planning Area as shown in Fig. 1-13, trees are growing on the beach ridge to the sourth-east from the north-west, and form two lines of wooded-area. This beach ridge consists of sandy loam as mentioned in 1-2, and seems suitable for the growing of trees. The lower areas are mostly of use for paddy-field, but those areas are not fit for the growing of trees due to a viscous soil. This wooded area is dotted with small villages at present, and the people lead their life there. The shade of trees utilized for valuable chat, recreation and rest areas. The trees grown here are mostly for fruit such as coconut palms, and also a part of the areas are utilized for cultivated field, and food is supplied from there to the people in the village. The people use shallow wells in the villages, and the wooded areas are helpful for keeping the under ground water.

Thus, the wooded areas have various functions for this area and they are absolutely necessary for the people.
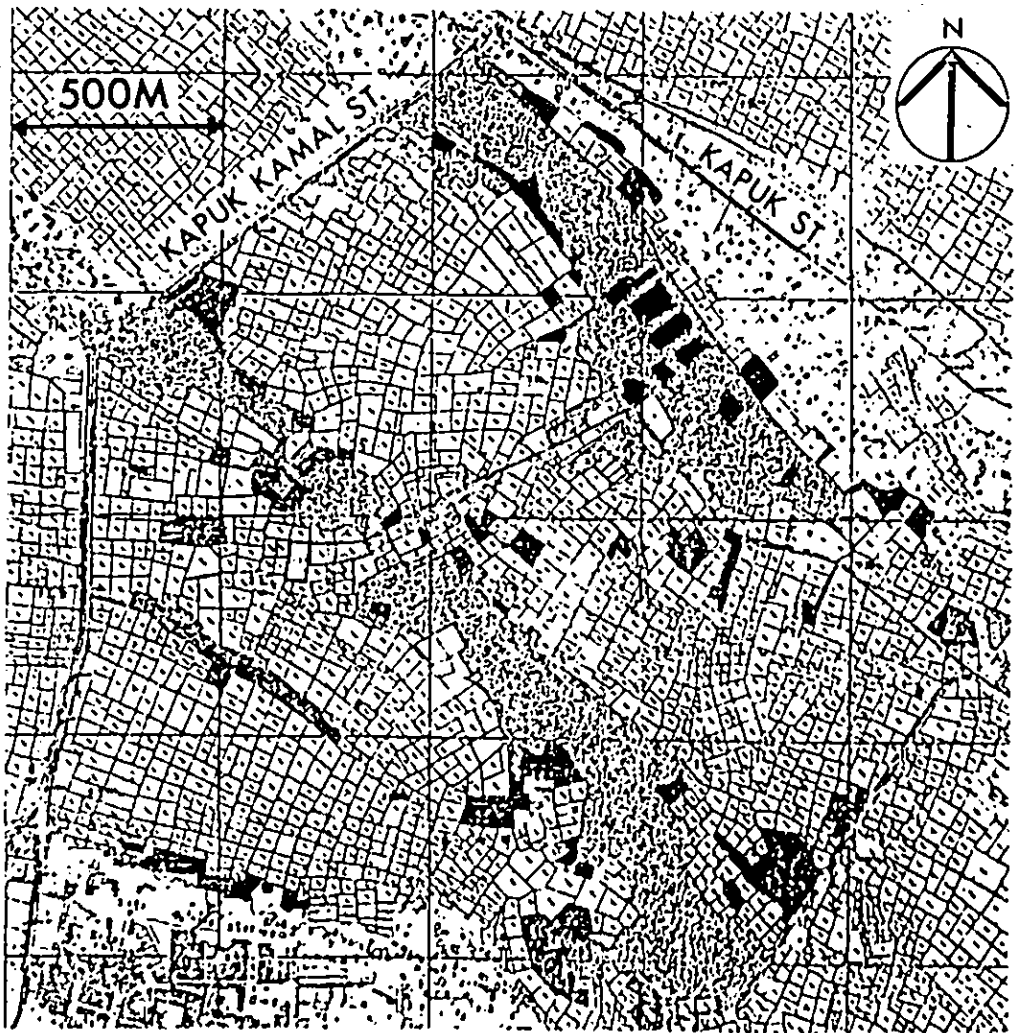
Fig. 1-13   VEGETATION MAP OF
           THE PLANNING AREA

WOODED AREA
CULTIVATED AREA

2 SOCIO-ECONOMIC CONDITIONS
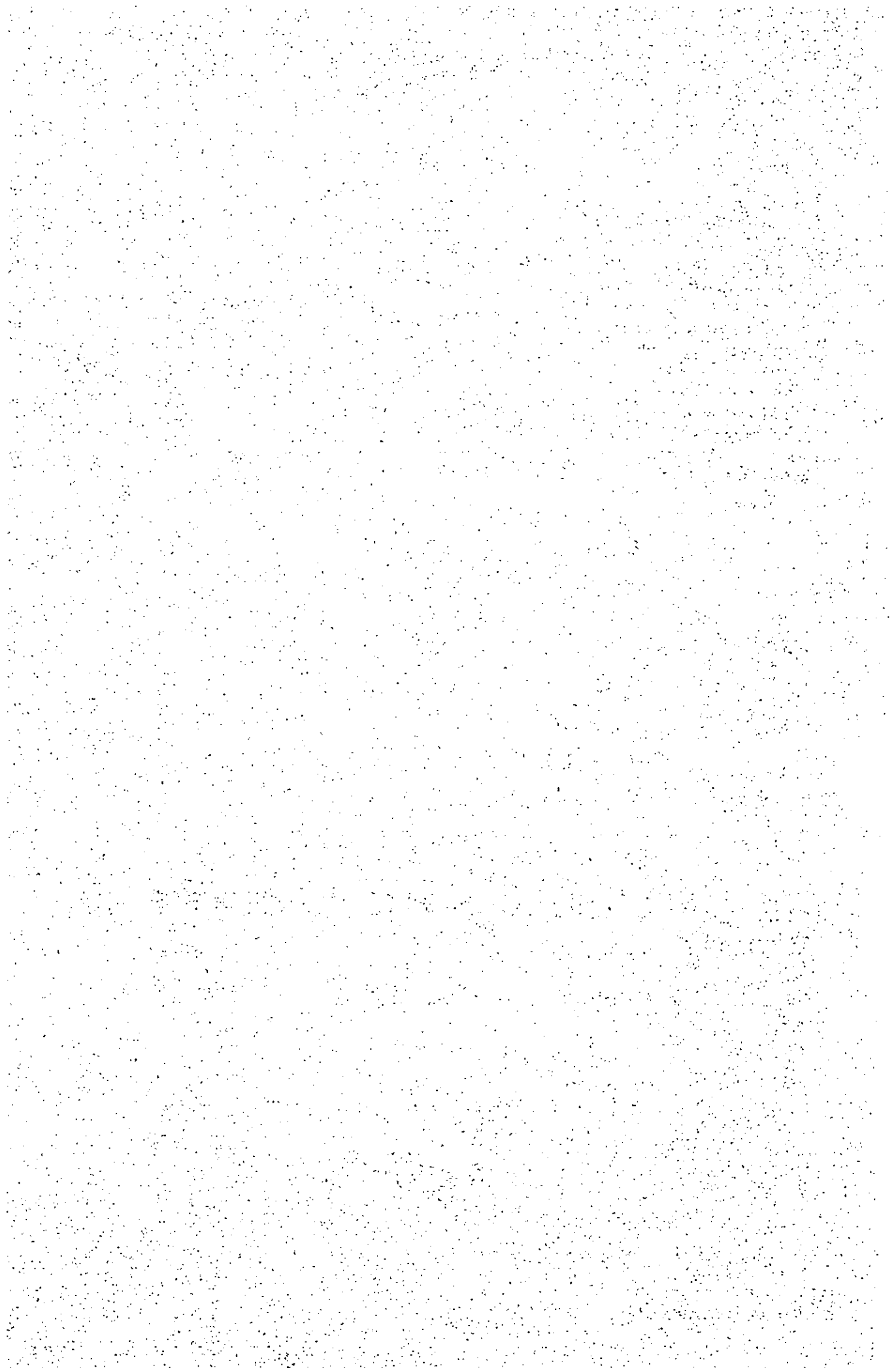
TABLE OF CONTENTS

2-1 POPULATION

2-1-1 Population and population density

The population of DKI Jakarta, shown in Table 2-1, is still increasing.

The rate of increase is more than the current rate for the whole of the Indonesian population (average annual 2.0%).

As can be seen from Table 2-1, the rate of population increase for DKI Jakarta 2.6 - 2.3%, is greater than the 2% rate for the whole of Indonesia   Table 2-1 shows that the rate of population increase for Cengkareng town (Kecamatan) is greater than that of West Jakartaand that of DKI Jakarta.   However, the population density of Cengkareng town is low, as agricultural land a greater percentage of the area.

The present population and population density (1979) of Cengkareng town (Kecamatan) is shown in Table 2-2 broken down into villages (Kelurahan).   In thePlanning Area and the nearby Kelurahan Cengkareng, Kelurahan Kapuk and Kelurahan Kedaung Kali Angke areas, the population density is relatively high.

TABLE 2-1 POPULATION, RATE OF POPULATION INCREASE, AND POPULATION DENSITY

| Year | Population (10^3 Persons) | | | | Population density (Persons/km^2) |
	1976	1977	1978	1979	1979
Republic of Indonesia 1)	131,304	133,940[3] (1.9%)	136,631 (2.0%)	139,176 (1.9%)	73
DKI Jakarta 1)	5,769	5,925 (2.7%)	6,082 (2.6%)	6,239 (2.6%)	8,131
West Jakarta 2)	949	968 (2.0%)	988 (2.0%)	990 (0.3%)	7,533
Cengkareng town 2)	142	148 (4.1%)	154 (4.1%)	162 (5.4%)	2,657

1) Statistical Yearbook of Indonesia
2) Statistik Wilayah DKI Jakarta (Statistic Data of DKI Jakarta)
3) ( ) indicates increase in population over the previous year.

TABLE 2-2 POPULATION AND POPULATION DENSITY OF CENGKARENG TOWN
(1979)

Village Town	Area km^2	Population in numbers	Population density persons/km^2
1. Semanan	5.13	12,051	2,350
2. Kamal	3.76	6,034	1,605
3. Tegal Alur	11.96	15,725	1,315
4. Kali Deres	6.26	14,130	2,258
5. Pegadungan	7.40	8,090	1,094
6. Cengkareng	10.25	46,485	4,536
7. Kapuk	6.43	30,661	4,769
8. Kedaung Kali Angke	1.71	12,719	7,438
9. Duri Kosambi	4.51	7,325	1,625
10. Rawa Buaya	3.71	9,155	2,468
Cengkareng town	61.12	162,375	2,657

Statistik Wilayah DKI Jakarta (Statistic Data of DKI Jakarta)

2-1-2 Number of households and household members

Table 2-3 shows the latest figures for the number of households (number of heads of households) and the number of members per household (number in family) in DKI Jakarta, West Jakarta and Cengkareng town.

It is noticeable that the number of households in Cengkareng town has increased rapidly.

The number of households and number of members per household in Cengkareng town is broken down into villages (Kelurahan).

As can be seen from Table 2-4, the population and the number of households is particularly high, and the number of household members is also high, in the Planning Area and the nearby Cengkareng and Kapuk villages.

TABLE 2-3 FIGURES FOR NUMBER OF HOUSEHOLDS, AND HOUSEHOLD MEMBERS

	1976		1978		1979	
	Number of households (1)	Number of members (2)	Number of households (1)	Number of members (2)	Number of households (1)	Number of members (2)
Cengkareng town	28,366	5.00	28,915	5.33	31,286	5.19
West Jakarta	187,180	5.07	176,753	5.59	179,019	5.53
DKI Jakarta	967,644	5.22	971,960	5.35	979,445	5.40

(1) Number of dwellings
(2) Persons

(Statistic Yearbook of DKI Jakarta
Statistik Wilayah DKI Jakarta   )(Statistic Data of DKI Jakarta)

TABLE 2-4 LATEST FIGURES FOR MEMBER OF HOUSEHOLDS, AND NUMBER OF MEMBERS IN CENGKARENG TOWN (1979)

Village Town	Number of households	Population	Persons/ households
Cengkareng	7,799	46,485	5.96
Kapuk	5,401	30,661	5.68
Kedaung Kali Angke	2,727	12,719	4,66
Totals for Cengkareng town	31,286	162,375	5.19

Statistik Wilayah DKI Jakarta (Statistic Data of DKI Jakarta)

From results from questionnaires answered by people in the PERUM
PERUMNAS housing developments in Klender and Depok, organized
by the study team, the number of family members and people
cohabiting as other than family members in households were
obtained, and these results are given in Fig. 2-1.

Number of people cohabiting
as other than family members

Number of family members

KLENDER	6.03	6.66
DEPOK I	6.00	6.40
DEPOK II Tengah	6.05	6.69
DEPOK II Timur	5.59	5.89

1 2 3 4 5 6 7
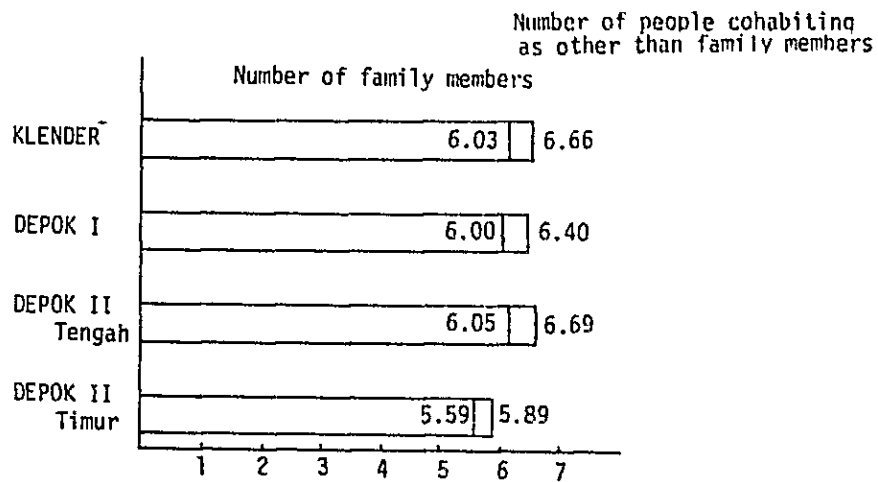
Fig. 2-1 NUMBER OF FAMILY MEMBERS AND PEOPLE COHABITING
AS OTHER THAN FAMILY MEMBERS IN HOUSEHOLDS IN
THE PERUM PERUMNAS HOUSING DEVELOPMENT

The distinction between family members and non-family members
in households is not easily made, but it has been assumed that
the number of household members per single accomodation unit
is about 5.5 - 6.5.

2-1-3 Population movements

Population movements in DKI Jakarta (movement within DKI Jakarta, and movements in and out of DKI Jakarta) are indicated in Table 2-5. Generally speaking, the central, north, and south Jakarta areas show a tendency to outward migration, and in west and east Jakarta there is a tendency towards an influx. With regard to Cengkareng town, there is a marked influx from DKI Jakarta, and furthermore, it is clear that the inward movement also includes people from outside DKI Jakarta. Therefore, it is obvious that this area is under going a large population increase.

From results from questionnaires answered by poepole in PERUM PERUMNAS housing developments in Klender and Depok, organized by the study team, the influx to these housing estates from DKI Jakarta represents the majority, being over 96%.

Therefore, in this project, the largest proportion of residents is expected to come from DKI Jakarta.

TABLE 2-5 POPULATION MOVEMENTS IN DKI JAKARTA (1979 IN PERSONS)

	Natural changes in population		Movements In		Movements Out		Changes in population due to movements		
	Birth	Deaths	(A) Movements within DKI Jakarta	(B) Movements into DKI Jakarta from outside	(C) Movements within DKI Jakarta	(D) Movements out of DKI Jakarta	(A-C)	(B-C)	Total
(District of DKI Jakarta)									
Central Jakarta	19,559	6,065	19,313	4,630	32,675	13,178	Δ13,362	Δ8,548	Δ21,910
North Jakarta	15,673	4,263	23,837	2,694	25,483	2,453	Δ1,646	+291	Δ1,355
West Jakarta	16,275	4,396	27,603	4,761	25,589	4,233	+2,014	+528	+2,542
South Jakarta	25,847	5,036	37,479	8,685	43,884	16,813	Δ6,405	Δ8,128	Δ14,533
East Jaarta	27,086	5,237	69,142	10,072	42,043	15,053	+27,099	Δ4,981	+22,118
(District of West Jakarta)									
Cengkareng town	2,992	595	7,151	615	2,848	539	+4,309	+76	+4,385
Grogol Petamburan town	4,940	1,226	8,330	1,624	11,472	1,782	Δ3,142	Δ158	Δ3,300
Taman Sari town	2,519	723	1,964	338	3,898	779	Δ1,934	Δ441	Δ2,375
Tambora town	4,145	1,494	3,318	1,176	6,075	806	Δ2,757	+370	Δ2,387
Kebon Jeruk town	1,679	358	6,834	1,008	1,296	327	+5,538	+681	+6,219

(Socio-economic survey of DKI Jakarta)
(Statistic and Sensus Office of DKI Jakarta)

2-2 INDUSTRIES

2-2-1 General Conditions around the Planning Area

First of all, we would like to study the land utilization
conditions generally around the Planning Area.
It is divided roughly into three items:
The first is urban utilization for housing, commercial,
business and industrial use. The next is land for agri-
cultural use, and it used for paddy-field in the alluvial
plain field. Comparatively higher southern areas of DKI
Jakarta are utilized for farms and planting areas. Areas
lower than 2 meter above sea-level on the ocean side are
used as fish ponds because they are not suitable for agricul-
tural or partial use. According to the land utilization of
West Jakarta , the right bank of the River Angke is mostly
urbanized, and sprawling started along the left bank, but
most of the areas are paddy-fields, and small villages are
distributed in paddy-field areas. The high density area
located on the right bank of WESTERN BANJIR CANAL in West
Jakarta is a mixed region for housing, commerce and industries.
If we divided the industries into the first industry (farming),
the second industry (mining and construction) and the third
industry (commerce, transportation, financing, and other
service and public works), the Planning Area (Cengkareng
and its vicinity) is regarded as a relatively active area
for farming, commercial and industrial activities. On the
other hand, the ratio of government employees and Jasa (public)
activity in DKI Jakarta is high, but it is lower in
West Jakarta. A.

2-2-2 Agriculture

Regarding the distribution of agricultural land, about 40% of
the land owned by people living in Cengkareng lies within the
Planning Area. This means 40% of the land lies near by,
while 60% lies some distance away. With regard to crops grown,
3/4 of the land is given over to rice production, and the re-
maining 1/4 is used for growing vegetables. Because the
farming is urban farming, the proportion of vegetable grown
is relatively high.

TABLE 2-6 HEAD OF HOUSEHOLD OCCUPATIONS IN DKI JAKARTA
(1979: FIGURES IN %)

	Manufacturing	Agriculture	Trading	Civil service, public service	Others	Total
Central Jakarta	3.07	0.17	28.06	59.99	8.71	100.00
North Jakarta	3.59	7.19	18.51	56.32	14.39	100.00
West Jakarta	1.72	9.12	28.94	47.49	12.73	100.00
South Jakarta	4.08	7.52	22.07	54.70	11.63	100.00
East Jakarta	3.32	9.97	22.09	56.12	8.50	100.00
Total for DKI Jakarta	3.21	6.70	24.23	55.38	10.48	100.00
West Jakarta						
Cengkareng town	1.06	28.90	16.54	39.48	14.02	100.00
Grogol Petamb. town	2.06	0.46	38.78	54.22	14.48	100.00
Taman Sari town	2.75	0.04	42.35	44.74	10.12	100.00
Tambera town	1.80	0.01	28.85	58.27	11.07	100.00
Kebon Jeruk town	0.54	29.02	27.76	27.36	13.32	100.00

Statistik Wilayah DKI Jakarta (Statistic Data of DKI Jakarta)

TABLE 2-7 BREAKDOWN OF HOUSEHOLD INCOMES IN DKI JAKARTA
(1976: FIGURES IN %)

	Agriculture	Mining and Manufacturing	Electricity and Water	Construction	Trading	Transport	Finance	Civil service, public service	Others	Total
Central Jakarta	0.01	6.31	0.57	3.62	24.80	6.81	3.31	43.45	11.10	100.00
North Jakarta	1.68	7.79	0.63	3.81	22.07	12.22	0.83	46.69	4.28	100.00
West Jakarta	1.23	9.12	0.76	6.55	38.24	7.22	2.48	28.62	5.78	100.00
South Jakarta	0.10	4.39	1.58	3.02	17.50	5.88	4.17	48.29	15.07	100.00
East Jakarta	0.58	12.70	0.91	5.71	20.31	7.68	2.80	39.61	9.70	100.00
Total for DKI Jakarta	0.53	7.61	0.91	4.39	24.45	7.38	1.00	41.59	10.14	100.00

Hasil Sementara Survey Sosial Ekonomi DKI Jakarta 1976, (SOCIO-ECONOMIC SURVEY OF DKI JAKARTA)
Kantor Sensus dan Statistik DKI Jakarta   CENTRAL BUREAU OF STATISTICS

Fig. 2-2 EXISTING LAND USE

Legend:
GREEN
RESIDENTIAL
COMMERCIAL
TRANSPORTATION
INDUSTRY
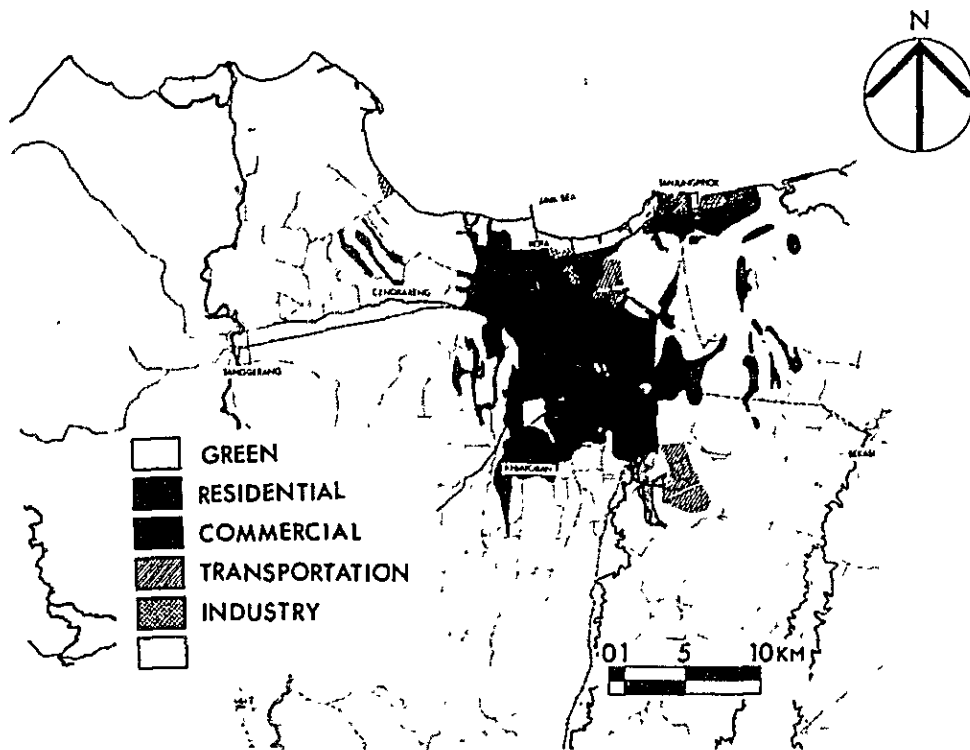
2-2-3 Commercial and manufacturing activities

A special feature of the West Jakarta is its high dependence
on commercial activities. With the emphasis on commercial
facilities, such as wholesalers, markets, and general stores,
a number of shops and markets (permanent and temporary) exist,
as indicated in Table 2-8.

As Table 2-6 indicates, in 1979,28.94% of heads of households
in the West Jakarta district were engaged in commercing, this
proportion being the highest among the five districts (Taman
Sari town is a commercial centre in West Jakarta). Also, from
Table 2-7, it can be seen that, from the 1976 survey, 38.24%
of household income is derived from commerce, and this is
the highest proportion in the five districts.

The manufacturing zone is concentrated along the Jakarta-Tangerang
Road. There are not only small and medium scale factories, but
also many large scale modern factories located here, employing
large work forces. Regarding the types of manufacturers, chemical
industries, such as pharmaceutical, rubber and plastic processing,
glassware, electronic and electrical (including cassette tapes),
food processing, textile, packaging, and construction material
industries, are in evidence. This is a typical development of
inland processing industries.

2—9

Table 2-6 shows that, in 1979, 1.72% of heads of households in West Jakarta were engaged in manufacturing (Taman Sari town is also a manufacturing centre. As Table 2-7 shows, 8.98% of household income is derived from manufacturing, this figure being the second highest after East Jakarta's 11.86% (surveyed in 1976). In 1979 there were 224 factories in Cengkareng town, placing it third after Setia Budi town (South Jakarta) with 311 factories, and Penjaringan town (North Jakarta) with 258 factories. The number of factories in DKI Jakarta is 2,568, and in West Jakarta there are 587 (Table 2-8).

With regard to the construction industry, 6.55% of household income in West Jakarta in 1976 derived from this industry, being the highest percentage in the 5 districts.

TABLE 2-8 NUMBER OF MAJOR INDUSTRIAL FACILITIES IN DKI JAKARTA (1979)

	General stores	Market (Pasar)	Factory	Bank	Hotel
Central Jakarta	3,422	75	398	71	54
North Jakarta	2,110	46	361	9	4
West Jakarta	4,234	54	587	69	12
South Jakarta	5,104	52	625	24	13
East Jakarta	4,151	49	597	19	10
Total for DKI Jakarta	19,021	276	2,568	192	93
Major town facilities					
Cengkareng town (West district)	538	13	224	–	–
Grogol Petamburan town (West district)	809	16	100	1	1
Taman Sari town (West district)	1,126	9	106	32	11
Penjaringan town (North district)	2,229	11	311	2	2
Setia Budi town (South district)	582	22	258	2	2

Statistik Wilayah DKI Jakarta (Statistic Data of DKI Jakarta)

2—3 INCOMES

2-3-1 Income per worker for the whole of Indonesia and DKI
       Jakarta.

In 1976 and 1977, the distribution of income per worker
is as shown in Fig. 2-3, according to the survey carried out
as the National Labour Force Survey (Biro Pusat Statistic)*

* Central Bureau of Statistics
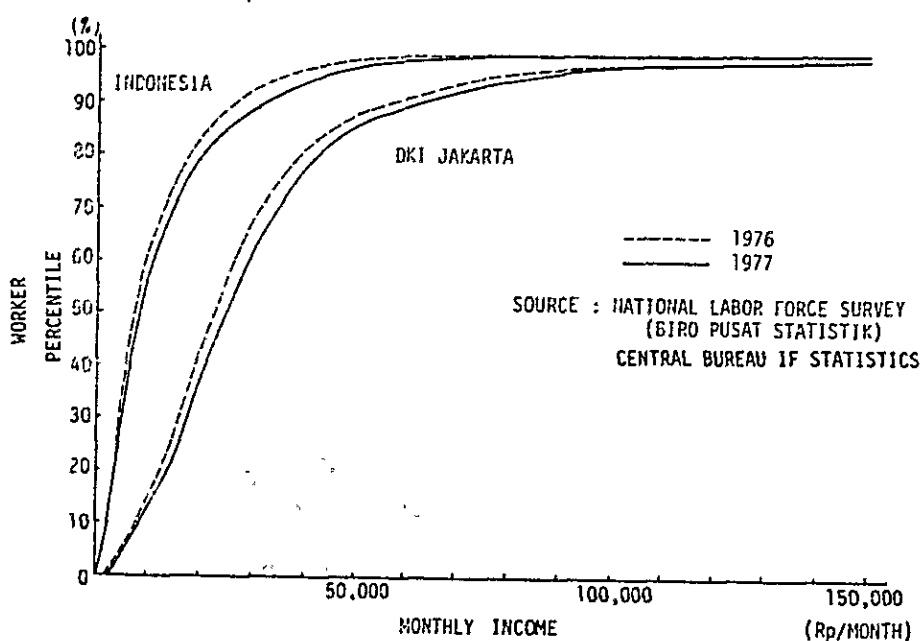
Fig. 2-3 INCOME PERCENTILE PER WORKER

From the above income distribution data the average income
per worker is obtained and shown in Table 2-9. Workers in
DKI Jakarta are seen to have over twice the income of workers
in other areas.

Table 2-9   ' AVERAGE INCOME PER WORKER

Year	Indonesia	DKI Jakarta
1976	1,2351	30,382
1977	1,4501	32,817

(Unit: Rp/month)
Nominal income

The income distribution per worker by industrial sector, is
shown as average income per worker in Fig. 2-4. The average
income covering all industries is Rp.14,501 per month, and
the agricultural, forestry, and fishing industries, which are
the major industries of the agricultural villages, show the
lowest income, at Rp 7,431 per month. Generally speaking,
the urban industries have higher wage levels, with only the
manufacturing industry falling below the average with a wage-
level of Rp 12,878 per month.
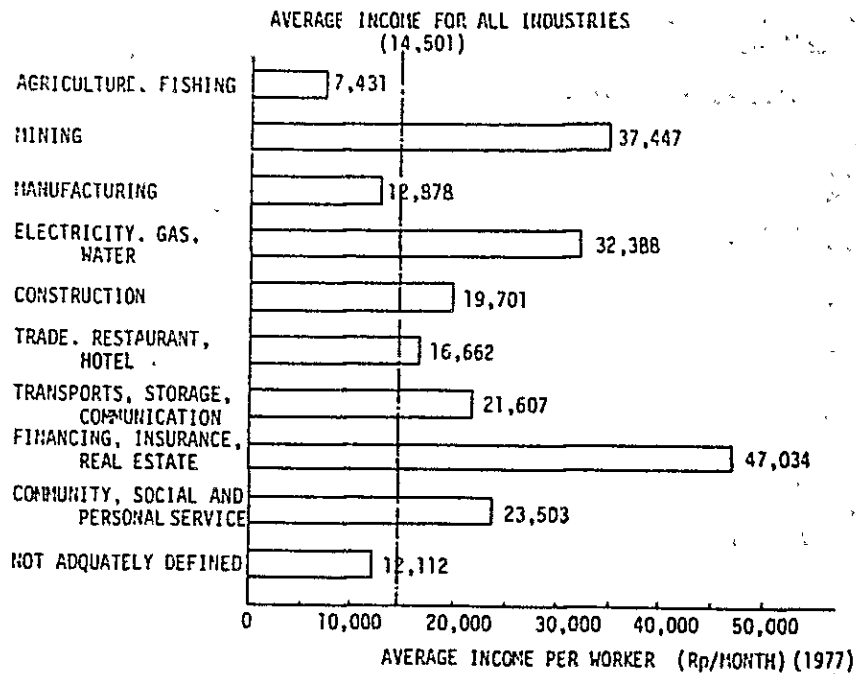
Fig. 2-4 AVERAGE INCOME PER WORKER BY INDUSTRIAL SECTION

2-3-2 Distribution of household income in DKI Jakarta

In 2-3-1 income per worker was considered, but the following
difficulties arise in considering household income.

*. Income as allowances, including housing, transportation
  allowances.

* Income from side jobs.

* Income of household members other than head of the house-
  hold.

However, in order to determine household income, DKI Jakarta
data are used, and the household incomes for DKI Jakarta and
West Jakarta figures are shown in Fig. 2-5.
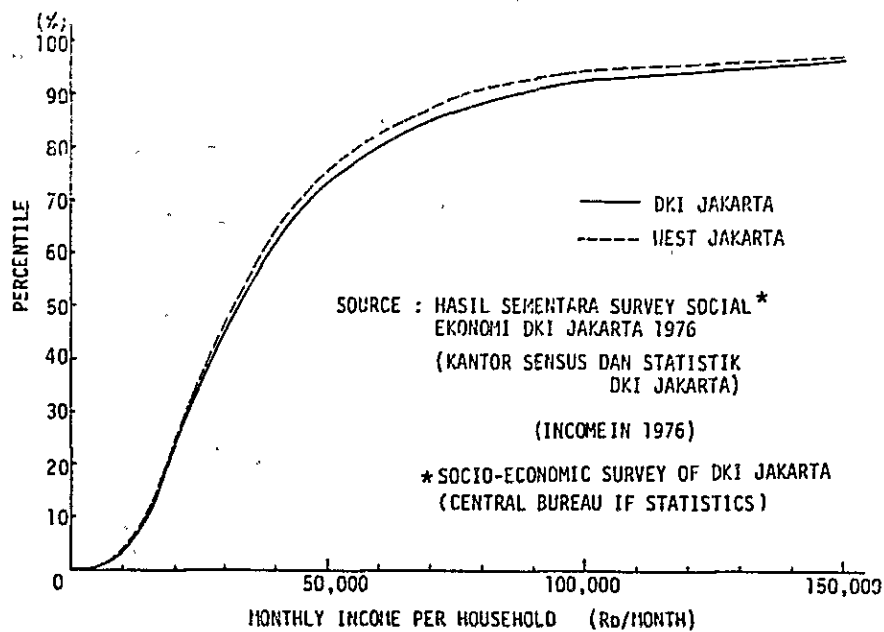
Fig. 2-5 INCOME PERCENTILE PER HOUSEHOLD IN 1976

From the same source, the average income per household, by
section in DKI Jakarta, is shown in Fig. 2-6, and West
Jakarta shows a slightly lower level than the overall average
level of DKI Jakarta.
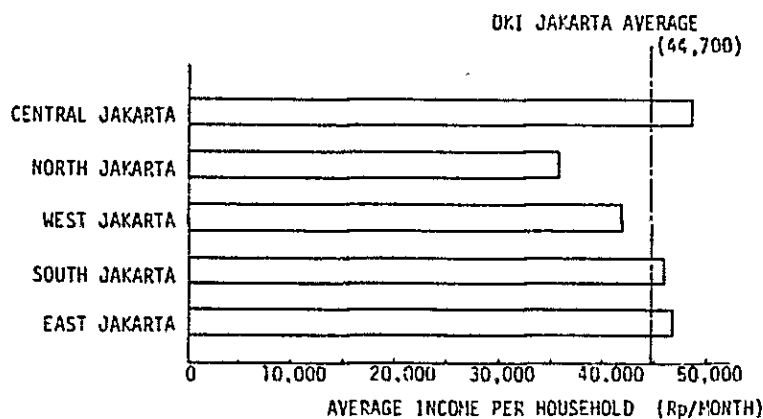
Fig. 2-6 AVERAGE INCOME PER HOUSEHOLD BY SECTION IN DKI JAKARTA

(1976)

The target group for this housing development project will be
from all areas of DKI Jakarta. Therefore it is necessary to
match development to the income distribution for the whole of
DKI Jakarta. Wage increases in DKI Jakarta are assumed to
amount to an annual 15% and the income distribution per house-
hold in 1980 and 1984 is estimated and shown in Fig. 2-7.
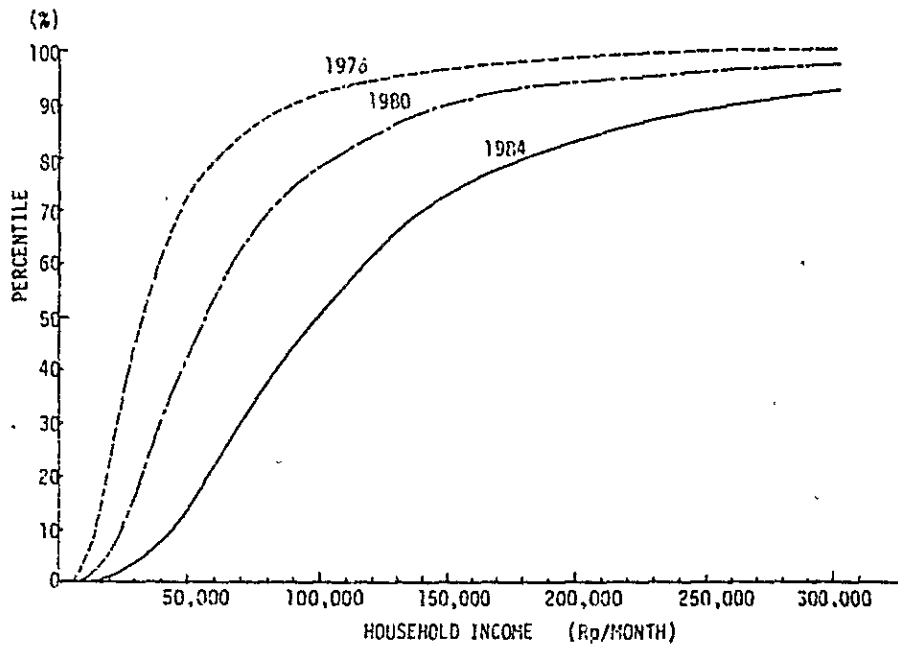
Fig. 2-7   PROJECTION OF INCOME PERCENTILE PER HOUSEHOLD
           IN 1980 AND 1984

NOTE: The annual increase ratio of consumer's price index
        in Indonesia is 15.8% (1975 = 100, 1979 = 180)

2-3-3   Household incomes of the occupants in the PERUM PERUMNAS
        housing complexes (Klender, Depok)

From the results of home interview survey for PERUM PERUMNAS
housing complexes' occupants in Klender and Depok, as organized
by the study team (June, 1980), the household incomes are shown
in Fig. 2-8.

The average monthly household income for the whole of DKI
Jakarta in 1980 is estimated to be Rp 18,181 per month
(44,700 (1976 value) $\times$ 1.15^4). Only in DEPOK II Tengah the
figure is lower than the average (For detail, see Appendix)

Fig. 2-8   HOUSEHOLD INCOME OF OCCUPANTS

IN PERUM PERUMNAS HOUSING COMPLEXES

2—4 RELATED PROGRAMME

2-4-1 Housing policy

a. PELITA II and Housing Projects by PERUM PERUMNAS

Housing supply programme in PELITA II (1974-1979) is shown
in Fig. 2-9, below. As to the policy, 315,000 dwelling units
were supplied in the whole Indonesia and PERUM PERUMNAS
supplied 73,000, as Sites and Services Projects and Low
Cost HOusing Projects.
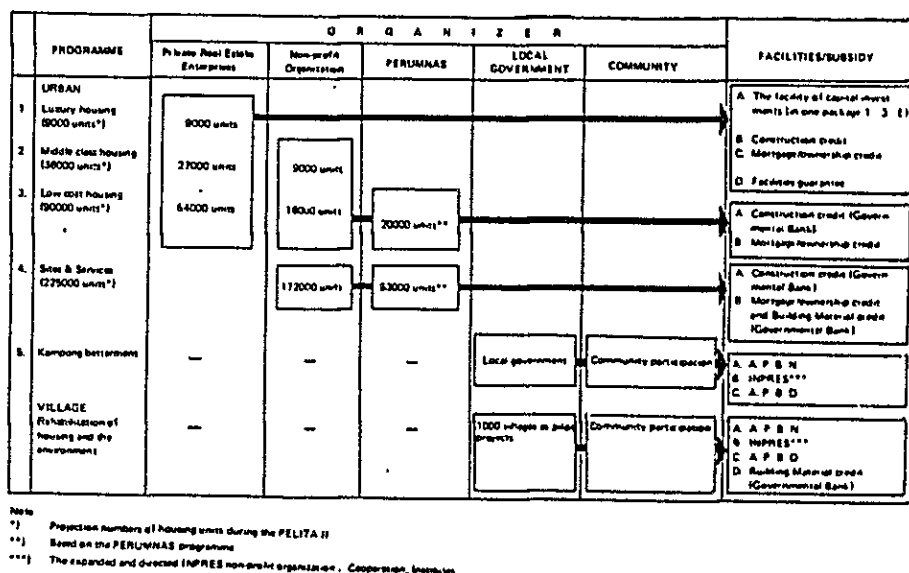
Fig. 2-9 GENERAL GUIDELINE ON HOUSING DEVELOPMENT POLICY

PERUM PERUMNAS's construction ratio by area is as next.

JABOTABEK	48%
Outside JABOTABEK	52%

And construction activities by year is as next number.

1975/76	2,268	housing units
1976/77	8,205	
1977/78	21,665	
1978/79	40,881	

To promote this plan, BTN provided low interest loan to the
people of low income group.

In Indinesia, housing policy are considered for income groups
of the poorest, poor, low-income and medium-high income. The
target groups for PERUM PERUMNAS are poor and low-income cover-
ing the 20th to the 80th percentile of the population. Sites
and services and low cost housing are supplied respectively for
these groups.

b. Housing supply programme in REPELITA III (Third National
    Five Year Project)

The housing of supply for the lower income groups is one of
the main concerns of REPELITA III, with the aim of improvement
of national welfare. With regard to housing construction in
REPELITA III, the following provides a brief outline.

   i. In PELITA II, 73,000 dwellings were constructed by PERUM
       PERUMNAS, with the additional provision of water, electri-
       city, and sewage services, garbage disposal facilities,
       roads, kindergartens, elementary schools, markets,
       medical clinics, playgrounds, and other recreational
       facilities.

       For low income groups, the National Mortgage Bank (BTN)
       provided low interest loans.

  ii. During REPELITA III, a population increase of 15,000,000
       is expected, and requiring 3,000,000 more dwellings.

 iii. In REPELITA III, 600,000 dwellings are to be constructed,
       with related facilities, in the urban areas. Also in
       urban areas, walk-up flats for common people are required.

  iv. PERUM PERUMNAS will make an effort to provide low cost
       housing developments, especially in the urban area.
       PERUM PERUMNAS is to construct 120,000 low cost housing
       units in the REPELITA III period.

   v. With loans from the National Mortagage Bank (BTN), about
       30,000 dwellings are to be constructed.

Table 2-10 shows the PERUM PERUMNAS programme based on the
Jakarta Metropolitan (JABOTABEK) plan.

Table 2-10   PERUM PERUMNAS'S CONSTRUCTION PROGRAMME FOR REPELITA III

	'79/'80	'80/'81	'81/'82	'82/'83	'83/'84	Total number of dwellings
Jakarta						
Sites and services		342		600	900	1,842
Low cost housing		360				360
Flats	800	1,336	7,000	7,000	5,000	21,136
Bogor						800
Sites and services	400			·		400
Low cost housing		· 400				400
Bekasi						3,300
Sites and services	1,600	1,200				2,800
Low cost housing	500					500
Tangerang						3,658
Sites and services	1,754	208				1,962
Low cost housing	1,696					1,696
Total number of dwellings	6,750	3,840	7,000	7,600	5,900	31,096

Source: JABOTABEK METROPOLITAN DEVELOPMENT PLANNING
(JUNE, 1980)

2—17

2-4-2 Jakarta Metropolitan (JABOTABEK) plan

The Jakarta Metropolitan plan (JABOTABEK Metropolitan Develop-
ment Plan) supports the later-mentioned DKI Jakarta Master Plan.
This aims to improve the functions of Bogor, Tangerang and
Bekasi, which lie within a 30km around DKI Jakarta, to ease
the extreme congestion in Central Jakarta, and to establish
a stable metropolitan area as the national capital. For this
purpose as Tables 2-11 and 2-12 show, the decentralization of
manufacturing industries and population shifts to these areas,
and housing developments in these areas are being promoted.

TABLE 2-11 INTENDED DISTRIBUTION OF INDUSTRIES IN JABOTABEK (PERCENTAGE OF
         INDUSTRY GROWTH ACCORDING TO AREA, BETWEEN 1973 AND 2003)

(%)

Industry / Area	Agri-culture	Large and medium scale manu-facturing	Small scale manu-facturing and con-struction	civil service	Distribu-tion service, others	Total
BOTABEK	2.4	7.5	3.9	6.2	5.2	3.9
DKI Jakarta	-0.8	2.3	3.9	3.6	4.0	3.7
JABOTABEK	2.3	4.5	3.9	4.3	4.2	3.8

Source; JABOTABEK PLAN 1979

TABLE 2-12 ESTIMATED DISTRIBUTION OF POPULATION IN JABOTABEK (PERCENTAGE OF
         POPULATION INCREASE BETWEEN 1978 AND 2003)

(%)

Bogor	2.67
Tangerang	3.28
Bekasi	3.53
BOTABEK	3.04
DKI Jakarta	2.57
JABOTABEK	2.77

Source; JABOTABEC PLAN 1979

2-4-3 DKI Jakarta Master Plan

The DKI Jakarta Master Plan was formulated in 1965 and, despite
partial amendments, city planning works have followed along
this original conception. The DKI Jakarta Master Plan was
developed on the framework of trunk roads connecting each of
the above mentioned locations and Jakarta, i.e. the radial
roads and ring roads. In these frame work administrative
and business offices are mainly planned along the trunk
roads in the central area. Industry, on the other hand, is
planned to be concentrated on a large scale in the eastern
outskirts, connecting Tanjung Priok Port and the Jakarta-
Bekasi Road. In the west and southwest of DKI Jakarta, the
plan provides for medium scale inland processing industries
along the radial roads.

With regard to residential areas, new developments are planned
for the west and south-west parts of DKI Jakarta, forming islands
of residentail districts in the existing agricultural area.

The urban area as described above, is largely contained within
a 15km radius of the centre of the city, and outside that, the
land is to be kept as agricultural and recreational land.

The planning area falls within the above-mentioned scheme, as
a residential area flanked by radial roads and the outer ring
road.

Additionally, along the above-mentioned trunk roads, industrial
and office districts are planned, with recreational facilities
on the beach side. A new international airport is proposed on
the administrative border of DKI Jakarta and Tangerang (Fig. 2-10).
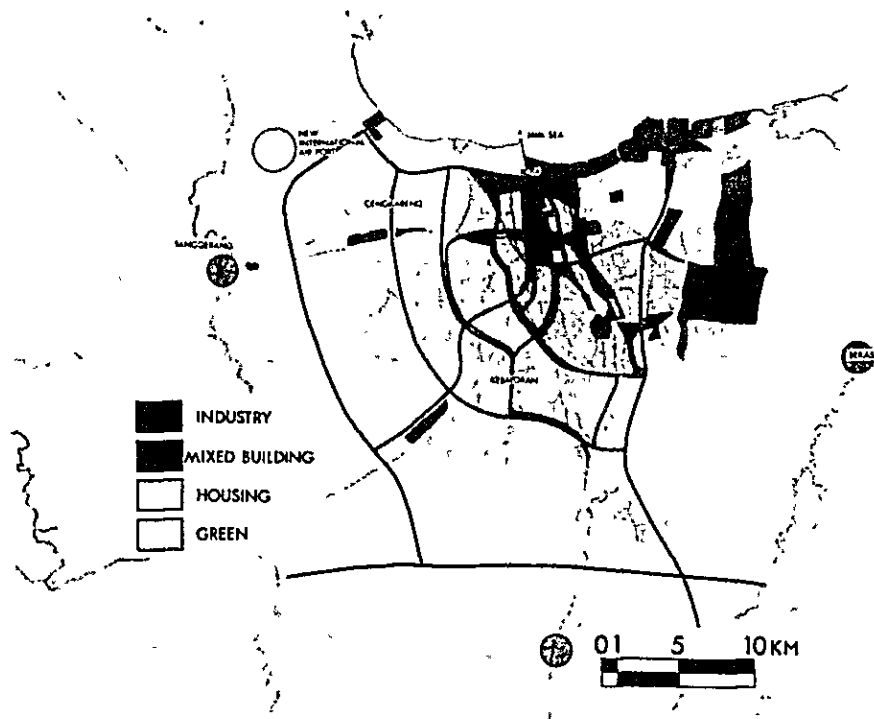
Fig. 2-10 DKI JAKARTA MASTER PLAN

2-19

2—5 HOUSING DEMAND

2-5-1 Present housing conditions

a. Percentage of housing types by structure.

The percentages of different housing structures in DKI Jakarta are given in Table 2-13 and Fig. 2-11. In West Jakarta the percentage of high quality housing (permanent) is relatively high, being 40.40%. However, the percentage of low quality housing (temporary) is about the same as that of the whole city, being 33.28%.

Table 2-13   PERCENTAGE OF HOUSING TYPES BY STRUCTURE
IN DKI JAKARTA

(%)

Section	Permanent	Semi-Permanent	Temporary	Total
1. Central Jakarta	36.04	33.96	30.00	100
2. North Jakarta	23.38	31.12	45.50	100
3. West Jakarta	40.40	36.32	33.28	100
4. South Jakarta	41.19	43.01	15.80	100
5. East Jakarta	32.74	31.95	35.31	100
6. DKI Jakarta	34.75	33.27	31.98	100

Source: (Statistic Data of DKI Jakarta)
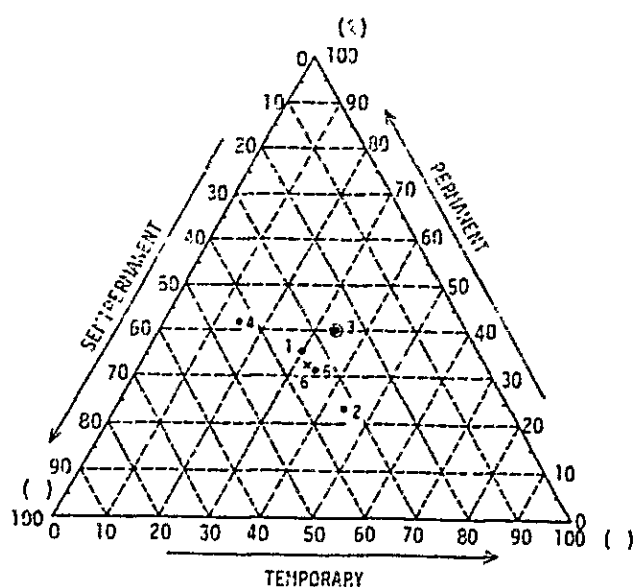
Fig. 2-11   PERCENTAGE OF HOUSING TYPES BY STRUCTURE
(DKI JAKARTA)

When West Jakarta is divided up into towns (Kecamatan), the
results are as shown in Table 2-14 and Fig. 2-12. In Cengkareng
town (Kecamatan Cengkareng) the percentage of high quality
(permanent) housing is 20.44%, which is the lowest among the
towns. Low quality (temporary) housing accounts for 49.64%
which is the highest for the towns, indicating that this area
fares the worst in respect to housing.

Table 2-14   PERCENTAGE OF HOUSING TYPES BY STRUCTURE
              IN WEST JAKARTA

(%)

Town (Kecamatan)	Permanent	Semi-permanent	Temporary	Total
1. Cengkareng	20.44	29.92	49.64	100
2. Grogol Petamburan	43.03	26.88	30.09	100
3. Taman Sari	52.94	29.00	18.06	100
4. Tambora	52.75	23.03	24.22	100
5. Kebon Jeruk	34.03	21.79	44.18	100
6. West Jakarta	40.40	26.32	33.28	100

Source: (Statistic Data of DKI Jakarta)
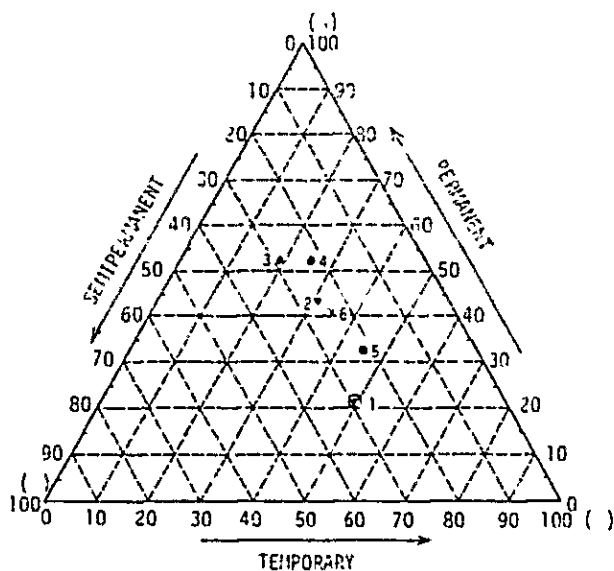
Fig. 2-12   PERCENTAGE OF HOUSING TYPES BY STRUCTURE
            (WEST JAKARTA)

b. Scale of houses, and housing lots

The current housing floor area provided by PERUM PERUMNAS for the Depok I (1976 ∿), Depok II (1979 ∿) and Bekasi II housing developments are shown in Fig. 2-13, and housing supply is considered based on the income level.
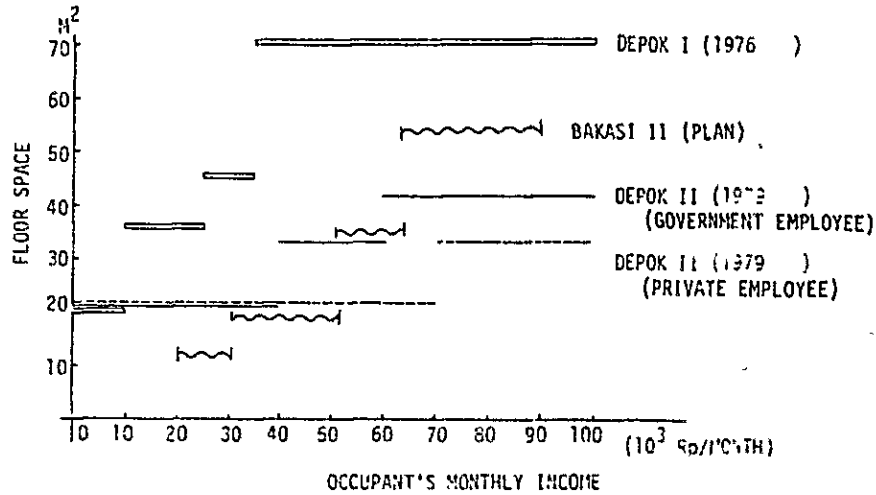
Fig. 2-13 RELATION OF FLOOR AREA — OCCUPANT'S MONTHLY INCOME

With regard to the empty lot size, previously PERUM PERUMNAS set one lot as 200 - 400m².

However, housing market research in DKI Jakarta carried out by the survey team, indicated that the most popular housing lot size, out of 22 examples, was 100 - 149m², and the average was 180m² (Fig. 2-14).
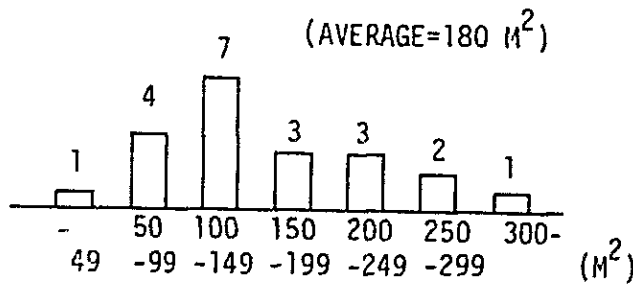
Fig. 2-14 EMPTY LOT SIZE IN DKI JAKARTA (JUNE, 1980)

According to a case study by the study team of housing complexes built by private developers around the Planning Area, housing lot sizes for middle income occupants measured 70 - 200m².

As the housing lot sizes shown in these examples were targeted
to occupants with higher income levels that the adequate empty
lot size for this project will be about 150m^2 per lot.

c. Price of private houses in DKI Jakarta

According to the study team's market research into prices of
private houses in DKI Jakarta, the unit selling price, for 1m^2
of floor area, is shown in Fig. 2-15. Housing with a bigger
floor space has a bigger unit selling price. Also, the selling
unit price is higher for permanent housing, compared to semi-
permanent housing.
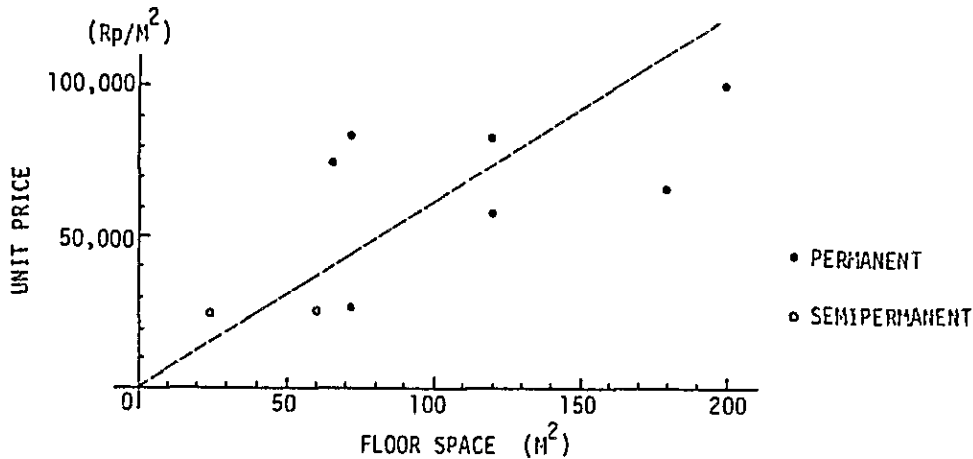
Fig. 2-15 UNIT SELLING PRICE OF PRIVATE HOUSING

(JUNE, 1980)

Fig. 2-16 shows the results of market research on the monthly
rental price of 1m^2 floor space in DKI Jakarta. For permanent
housing, the price is Rp 231 - 650/month/m^2; for semi-permanent
housing it is Rp 227-500/month/m^2; for temporary housing it is
Rp 130 - 607/month/m^2. As a general tendency, the bigger the
floor space, the lower the unit rental price becomes.
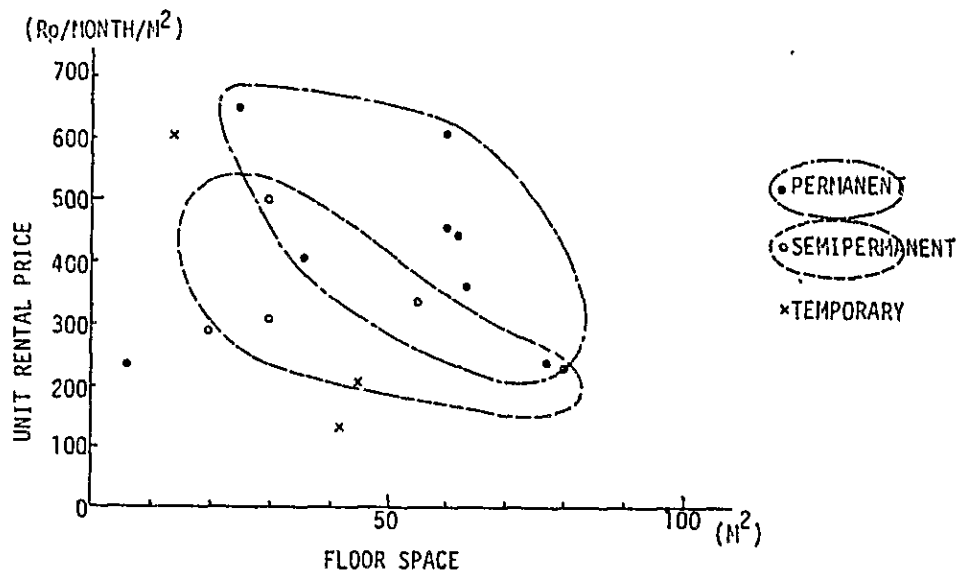
Fig. 2-16   UNIT RENTAL PRICE OF PRIVATE HOUSING (JUNE, 1980)

2-5-2   Trends in housing construction

There are no reliable statistics regarding housing construction
in DKI Jakarta, but according to data supplied by the Indonesian
Real Estate Association the number of privately developed houses
over the five years between 1975 and 1980 is as given in
Table 2-15, and Table 2-16 shows the number of privately
developed houses planned for the two years between 1980 and
1982.

Housing construction by private developers carried out over
the last five years provided an annual average of approximately
3,500 dwellings, and, according to the projected construction
for the next two years, an annual average of about 6,500
dwellings will be built.

Table 2-15   NUMBER OF HOUSES BY PRIVATELY DEVELOPED HOUSING
PROJECTS IN DKI JAKARTA

Type	Units
Low cost houses	4,442
Mediocre houses	5,343
Medium size	4,574
Semi luxurious houses	2,321
Luxurious houses	653
Total	17,333

Source: Hearing by the study team from Indonesian Real Estate Association, 1980

Table 2-16   NUMBER OF PLANNED HOUSES BY PRIVATELY DEVELOPED
·HOUSING PROJECTS IN DKI JAKARTA

Type	Units
Low cost houses	6,924
Mediocre houses	5,624
Luxurious houses	587
Total	13,173

Source: Hearing by the study team from Indonesian Real Estate Association, 1980

In addition to the above, the number of dwellings constructed
by individuals, or under the auspices of public developments
will reach to the same amount of those constructed by private
developers.

According to data from the Indonesian Real Estate Association,
at five places in the area along the Jakarta-Tangerang Road,
private developers are constructing housing aimed at the low
to middle income strata. Under pressure from the population
increase, housing construction has been promoted in the
Planning Area and near by areas in recent years.

2-5-3 Estimated housing demand

Table 2-17 shows the number of households sharing dwellings
in DKI Jakarta in 1977, taken from DKI Jakarta Statistical
Bureau data.

Table 2-17   NUMBER OF HOUSEHOLDS SHARING DWELLINGS

(Year: 1977)

Number of households sharing	1	2	3	4	Total
Number of households	697,680	89,532	53,892	92,448	933,552
Number of dwellings	697,680	44,766	17,964	23,112	783,552

Source: Kantor Statistik Pemerintah DKI Jakarta, 1977.

The housing shortage in 1977 can be calculated by deducting the number of dwellings from the number of households, and the figure obtained is 150,030 (= 933,552 - 783,522). The annual population increase ratio of DKI Jakarta since 1978 is estimated to be 2.5% (according to the Statistical Yearbook, and applying the same percentage to find the annual increase in households, gives a figure of approximately 25,000 households increase per year.

In contrast, the future number of dwellings to be constructed yearly is estimated at 20,000 (about three times more than the 6,500 dwellings to be developed annually by private developers). Thus the revised annual housing shortage is expected to be about 5,000 dwellings, and estimates of the housing shortage for each year are shown in Table 2-18.

Table 2-18   ESTIMATED HOUSING SHORTAGE

Year	Housing shortage
1977	150,000
1978	155,000
1979	160,000
1980	165,000
1981	170,000
1982	175,000
1983	180,000
1984	185,000

As about 30% of DKI Jakarta housing is low quality (temporary), there is expected to be a demand for reconstruction.

2-5-4 Distribution of land prices

Fig. 2-17 indicates the distribution of land prices in metro-
politan Jakarta (JABOTABEK) for 1979, and this survey's target
area, lying north of the Jakarta-Tangerang Road, commands
prices of Rp 10,000 - Rp 25,000/m^2.

From Indonesian Real Estate Association data, the 1976 land
prices in the Planning area and nearby areas, consisted of
a purchase price of Rp 10,000/m^2, and handling charges of
Rp 2,643/m^2, making a total land price of Rp 12,643/m^2.
From the same data, at the end of 1979, land prices in the
Planning Area and nearby areas were estimated to be Rp 20,000 -
Rp 25,000/m^2 (for high class housing lots: Rp 30,000 - 35,000/m^2).

And based on the hearing from "Real Estate of Indonesia", the
annual land price increase ratio is 15 to 20% in recent 5 years.
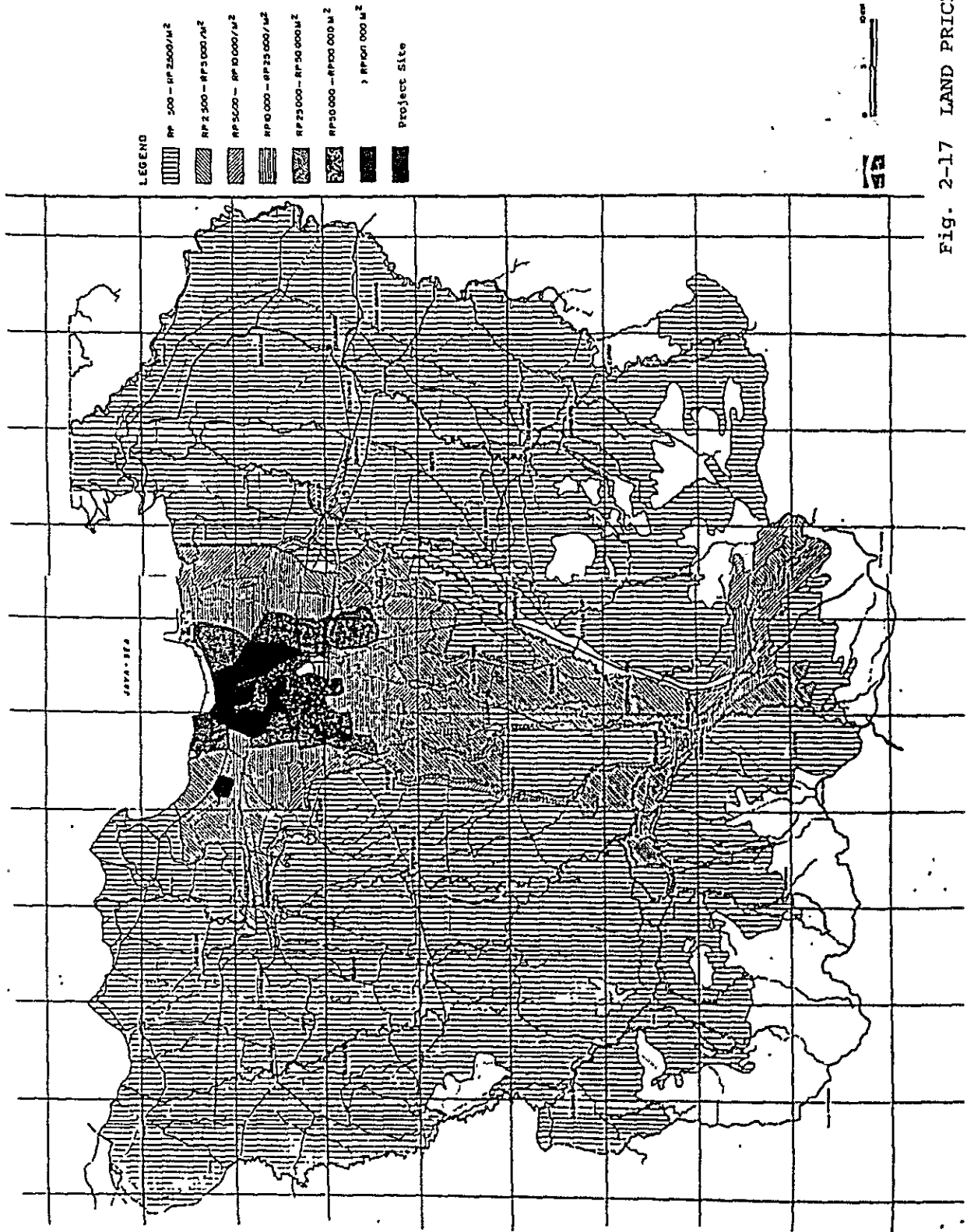
Fig. 2-17 LAND PRICE MAP IN 1979

LEGEND

RP 500 — RP 2,500/m²
RP 2,500 — RP 5,000/m²
RP 5,000 — RP 10,000/m²
RP 10,000 — RP 25,000/m²
RP 25,000 — RP 50,000 m²
RP 50,000 — RP 100,000 m²
> RP 100,000 m²

Project Site

2-5-5 Household expenditure for houses

According to the various surveys and data, the percentages of expenditure paid for house are as given in Fig. 2-18.

Judging from Fig. 2-18, occupants will be able to expend for houses up to 25% of their income.

In the case of fixed repayments system in which the fixed amount of repayment is done annualy and if the first year's repayment is 25% of income, after the second year, as wages increase, the percentage to income for repayment decreases annually. The current rate of annual wage increase is estimated to be 15%, and even if 10% is the figure used, the first year's proportion of income 25%, reduces to about 10% after ten years, and to about 4% after twenty years, which is well within the occupant's affordable range.

SOURCE
1. NATIONAL SOCIO-ECONOMIC SURVEY ROUND V, JAN.-APR. 1976

2-6. HOME INTERVIEW SURVEY BY STUDY TEAM IN 1980

*OCCUPATION IN KLENDER AND DEPOK II, AT THE TIME OF SURVEY, WERE PAYING DEPOSIT INSTALLEMENTS, THUS FORMING A LOWER PERCENTAGE COMPARED WITH DEPOK I IN WHICH THE OCCUPANTS WERE PAYING OFF LOANS.
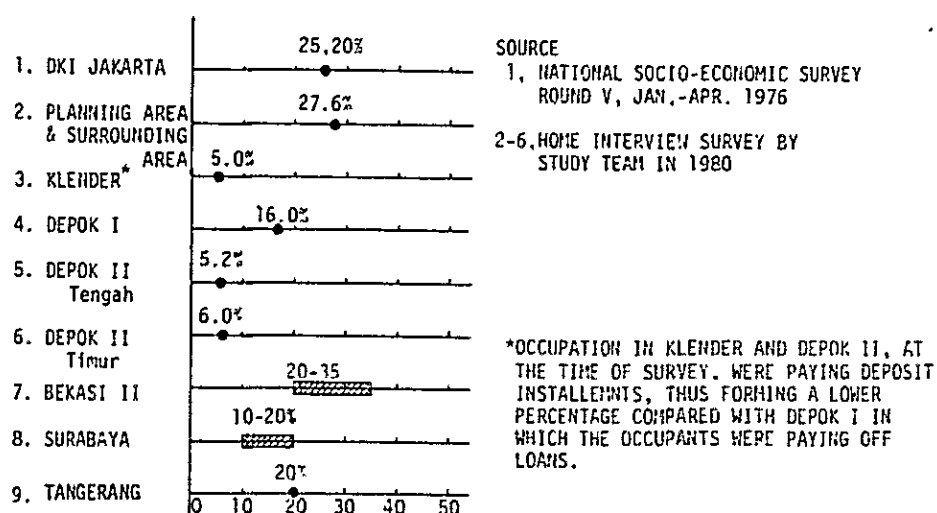
Fig. 2-18 PERCENTAGE OF EXPENDITURE FOR HOUSE

In cases 2 to 9, expenditure paid for house means loan repayment or rental fee.

Another repayment method is gradual payment system in which the amount of repayment increases yearly. By this method, even if the annual increase in repayments is 5% and even if the annual wage increases by 10%, repayment rate of first year of 25% will reduce to 16% after ten years, and to about 10% after twenty years.

2—6 LOAN CONDITIONS

At present, housing purchase loan condition from BTN to occupants of PERUM PERUMNAS housing developments is as shown in Table 2-19.

Table 2-19   PRESENT LOAN CONDITIONS FOR GOLONGAN I AND II*

Price of dwelling	Under Rp 2,500,000	Rp 2,500,000 and Over
Down payment	5%	10%
Interest	5%	5%
Repayment period	20 years	20 years
Repayment method	Principal and interest costant	Principal and interest constant

Target group: Income percentile of 20 - 70%.

Following these conditions, where 25% of the monthly income is paid for the first 12 months, as Fig. 2-18 shows, an occupant can afford a dwelling of price equal, for (A) to 39.9 times his monthly income, and for (B), to 42.1 times his monthly income. This method has fixed annual repayment amounts covering both principal and interest, and taking wage increases into account, the proportion of income representing repayment decreases year by year, which creates less of a burden on the applicant. On the other hand, the size of the loan is restricted, so only low price dwellings can be purchased.

An alternative method allows for the repayments to icnrease annually, covering principal and interest. By this method, although the repayments increase annually, compared with the fixed principal and interest repayment method, it is possible to raise a much higher loan, making higher priced dwellings available to the purchaser, therefore offering a more efficient arrangement for purchasers with stable incomes. As the annual increase of household income in DKI Jakarta is estimated to be 15%, the loan conditions shown in Table 2-20, in which the repayments increase by 5% and 7.5% annually (monthly repayments remain constant over 12 months).

Table 2-20 LOAN CONDITIONS WITH GRADUAL REPAYMENT METHOD

Borrower	Income cumulative percentage	
	(C) 20% - Less than 50%	(D) 50% - Less than 80%
Deposit	5%	10%
Interest	5%	9%
Repayment period	20 years	20 years
Repayment method	Principal and interest increase	Principal and interest increase
Repayment increase ratio	5%	5%

According to the gradual repayment method, as shown in Fig. 2-19, an occupant can afford a dwellings of price equal, for (C), to 60.8 times his monthly income, and for (D), to 44.3 times his monthly income. Compared with the fixed repayment method, this method makes available dwellings 1.1 - 1.5 times more expensive.
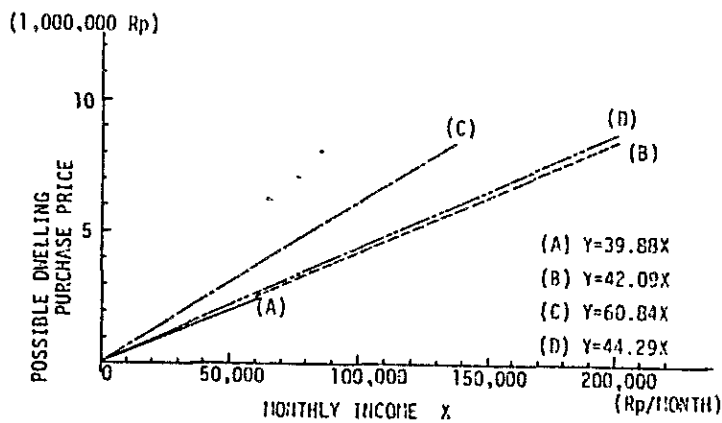
Fig. 2-19 AFFORDABLE UNIT PRICE TO MONTHLY INCOME

* Golongan is a grade in the Indonesian civil service which is broadly divided into sub-grades I (low) to IV (high), which are then further sub-divided.
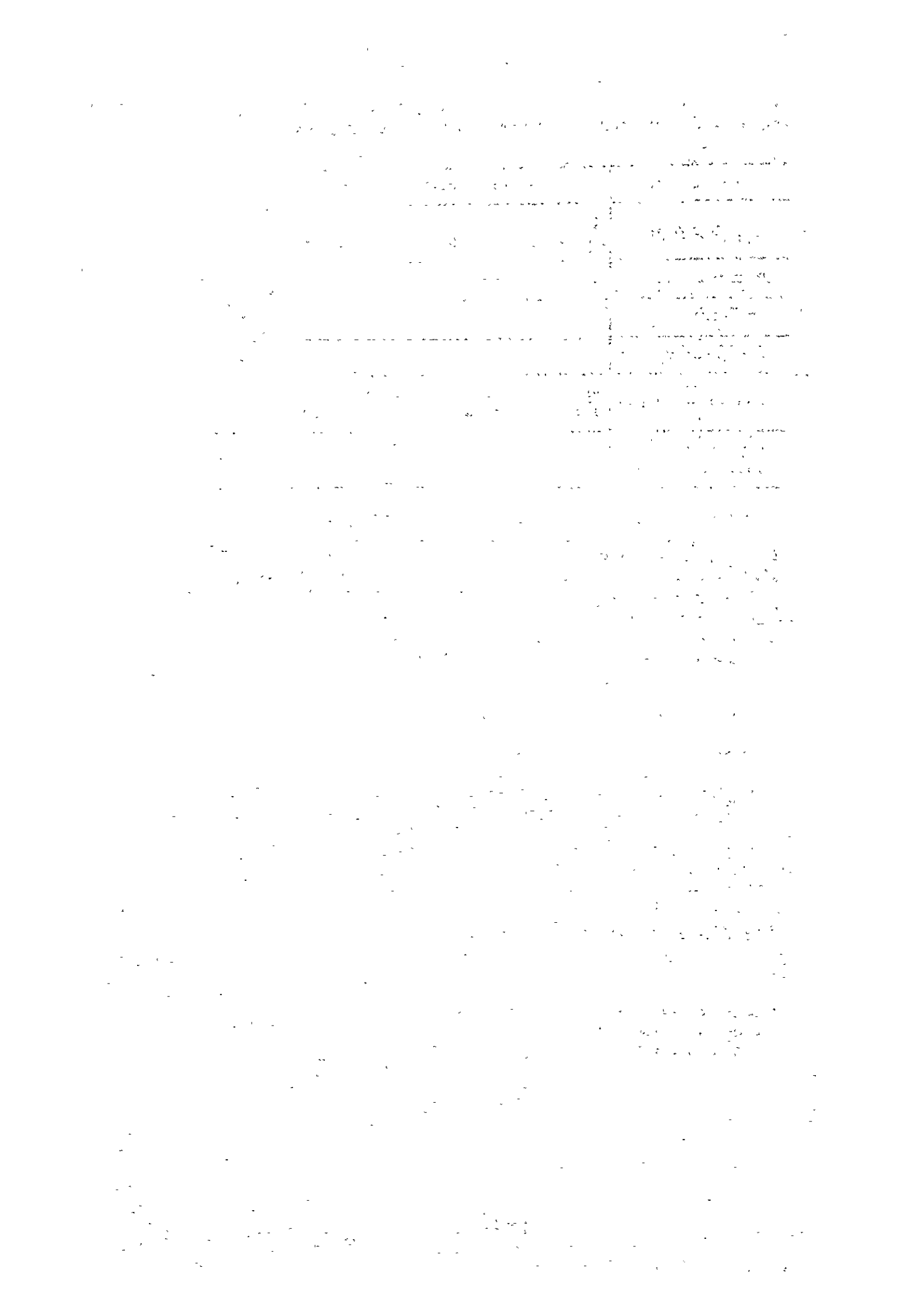
3 PLANNING AREA

TABLE OF CONTENTS

The aim of this study is to identify the suitable planning
methods applicable to a site of 370ha known in the Feasi-
bility Study Report as the Planning Area.

o LOCATION OF THE PLANNING AREA
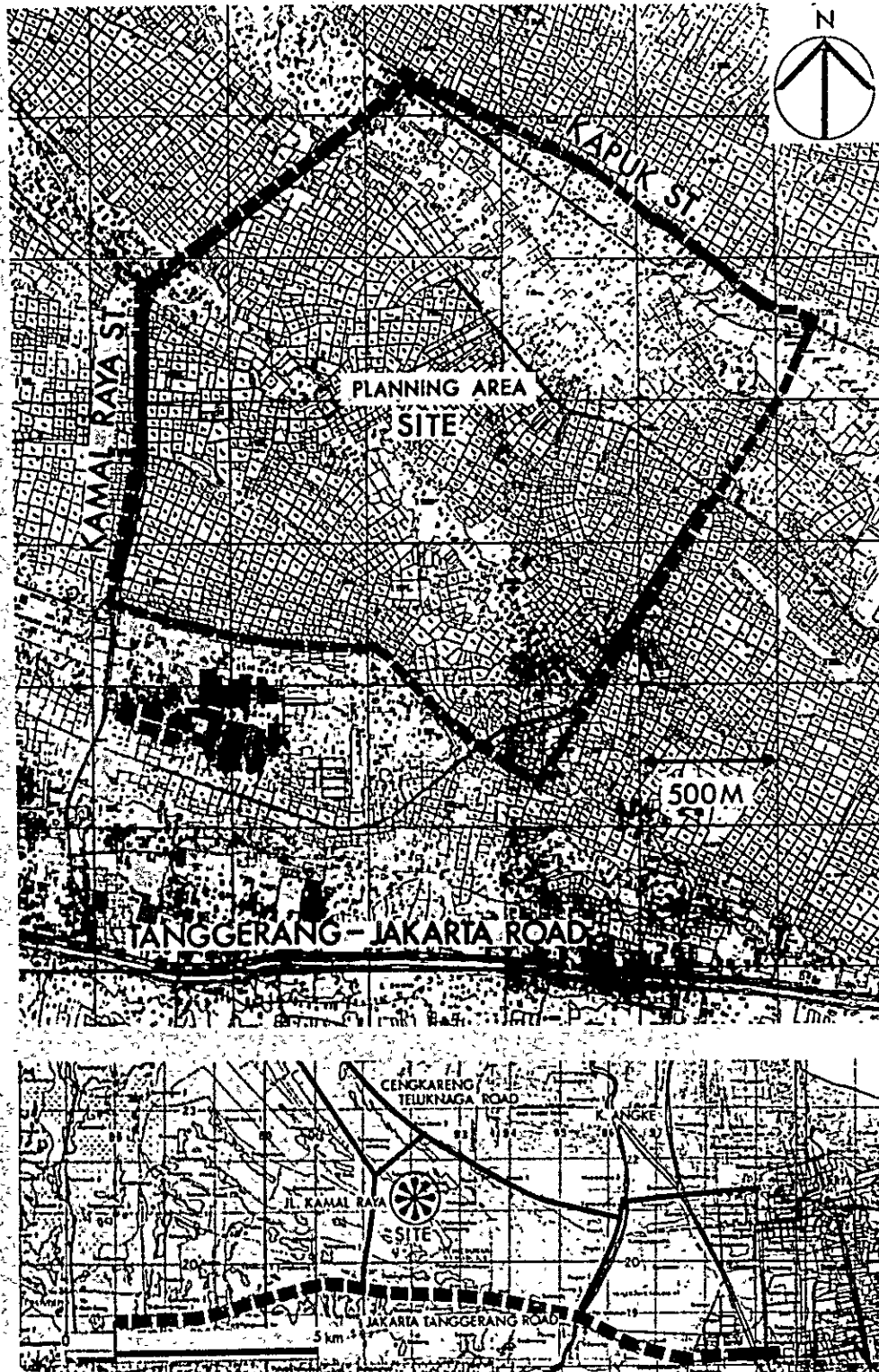
Fig. 3-1 LOCATION OF THE PLANNING AREA
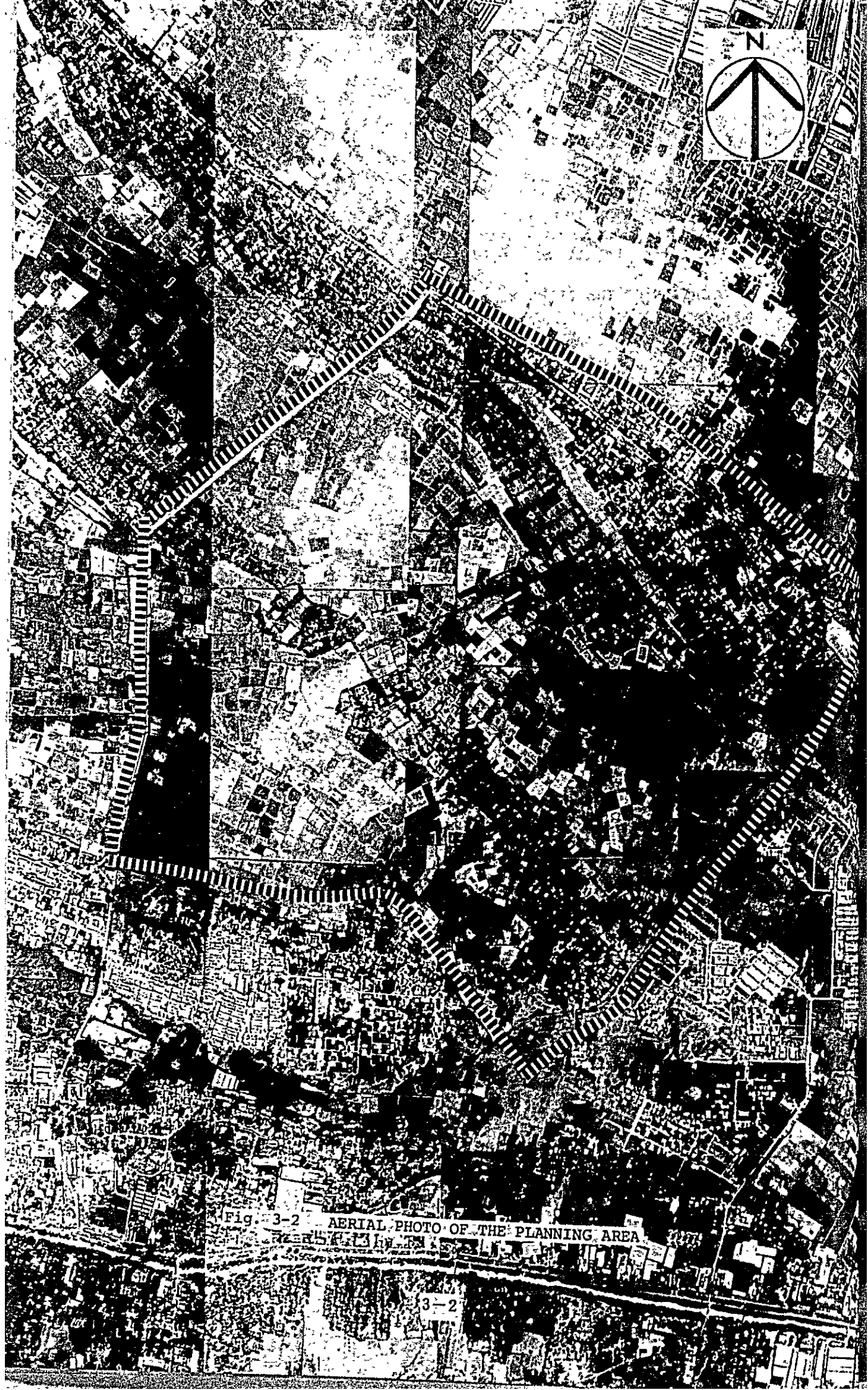
Fig. 3-2   AERIAL PHOTO OF THE PLANNING AREA

3-2

3-1 STRUCTURE OF THE PLANNING AREA

The basic conditions in planning the area will be directed by the locational and geographical characteristics of Cengkareng, or, in other words, the former is the socio-economic, the latter, natural and historical aspects, influencing the planning of Cengkareng. Taking these conditions into account, the Feasibility Study Report proposes to develop Cengkareng into a high density town through a new mass housing system. The following proposals clarify the planning methods by which a high density housing area may be created.

3-1-1 Community structure

Up to now PERUM PERUMNAS has been developing housing areas with population densities of around 40 dwellings per ha., which is a suburban type housing development. In contrast, this project intends to construct high density housing of around 70 dwelling per ha.. With this objective in mind, the following precondi-tions on community structure will be set.

  i) In order to accommodate the increase in population, multi-storied dwellings will be widely adopted, in ad-dition to the low-rise type housing already in existence.

  ii) More communal and public open space will be provided, to compensate for the relative decrease in area per house-hold.

iii) With the locational advantage of being close to Jakarta, land and building for commerce and domestic indus-tries will be provided within the residential areas.

  iv) Private automobiles as a main media of transport is un-suitable for compact high density towns, and so, efficient bus and pedestrian facilities will be installed.

In Indonesia, there are two types of community organization R.T. and R.W.. Each is a self governing body with about 250, and 3,500 members. Taking this and the high population density into account, this project has planned for a community consisting of neighbourhood units with 4,000 inhabitants. In increasing the population density from 201 persons/ha, as proposed by DKI Jakarta's Masterplan, to 500 persons/ha, the

land area available for each neighbourhood unit is between 8 to 20ha.. Taking the average to be 14ha., the Planning Area will consist of about 26 neighbourhood units. It is thought that areas of mainly multi-storied dwellings will have 8ha. and those with domestic industry and empty lots will have 20ha.

Neighbourhood units interconnected by a network of buses and footpaths will form the structure of the urban type high density housing area. Each neighbourhood unit will be designed to connect with bus routes and pedestrian footpaths.

* In Kel. Cengkareng and Kapuk, in which the Planning Area lies, there are 308 RT and 25RW. With 250 members/RT, about 40 households constitute one RT.. Whereas RW has 3,000 member and 12 RT forms one unit of RW..

3-1-2 The green axis

It has already been mentioned that the wooded area crossing through the Planning Area is ecological characteristic of the area. It is also apparent that this quality of the land has been the basic factor governing the inhabitants' method of land use: the distinct separation of paddy-fields from re-sidential zones. The study team has considered these natural and historical assets and deeply concerned that the characteristic of the area would be preserved, even if it's land use changes from an agricultural to an urban one.

In this respect, the wooded area are named the "Green Axis" and will be used as the physical and functional basis of the Planning Area. The Green Axis will not only be where vegeta-tion grows in the area, but will also function as a recreational zone for the residents. It is hoped that this will add a symbolic feature to housing areas which can easily become monotonous to the residents.

More specifically, the locality of the Planning Area will include parks, green area, schools, mosques, major footpaths, and a town centre with the design to facilitate continuous expansion. There are two wooded area running through the Planning Area dividing it into three large sections. Two of these are at the moment used as paddy-fields but are planned for housing. The other section already has housing, commercial and domestic industry developments, along Kapuk Street, so this project will encourage the mergence of the three districts.

3-1-3 The Town Centre

The Town Centre will be located towards the middle of the
Planning Area where the secondary roads meet connecting with
the major footpaths and will give it high accessibility to
the public from anywhere within the Planning Area. It will
accommodate the facilities catering for the entire region,
such as commercial, medical, and administrative centres,
parks, mosques   and bus terminals. It will be the focus of
an area of 100,000 inhabitants. At the moment, shops, factories,
schools, and administrative offices, are gathered around the
Tangerang Road and Kapuk St., so the completion of the centre
will also be useful to those residents outside the area. For
these reasons the Town Centre is an important factor in the
area's development. Addition to this Town Centre, sub-centres
will be allocated for each 1∿2 neighbourhood unit and will
function as the community centre with the facilities necessary
for daily life like shops, small mosques and kindergarten.
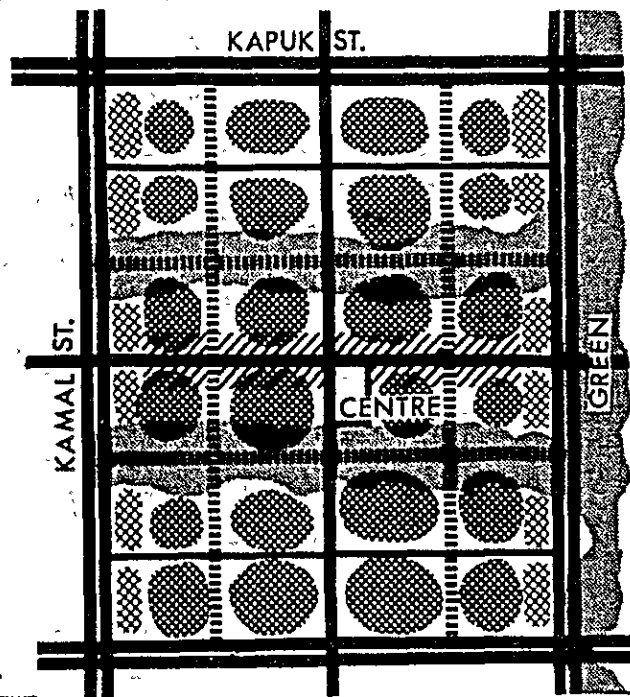
Fig. 3-3 COMMUNITY STRUCTURE
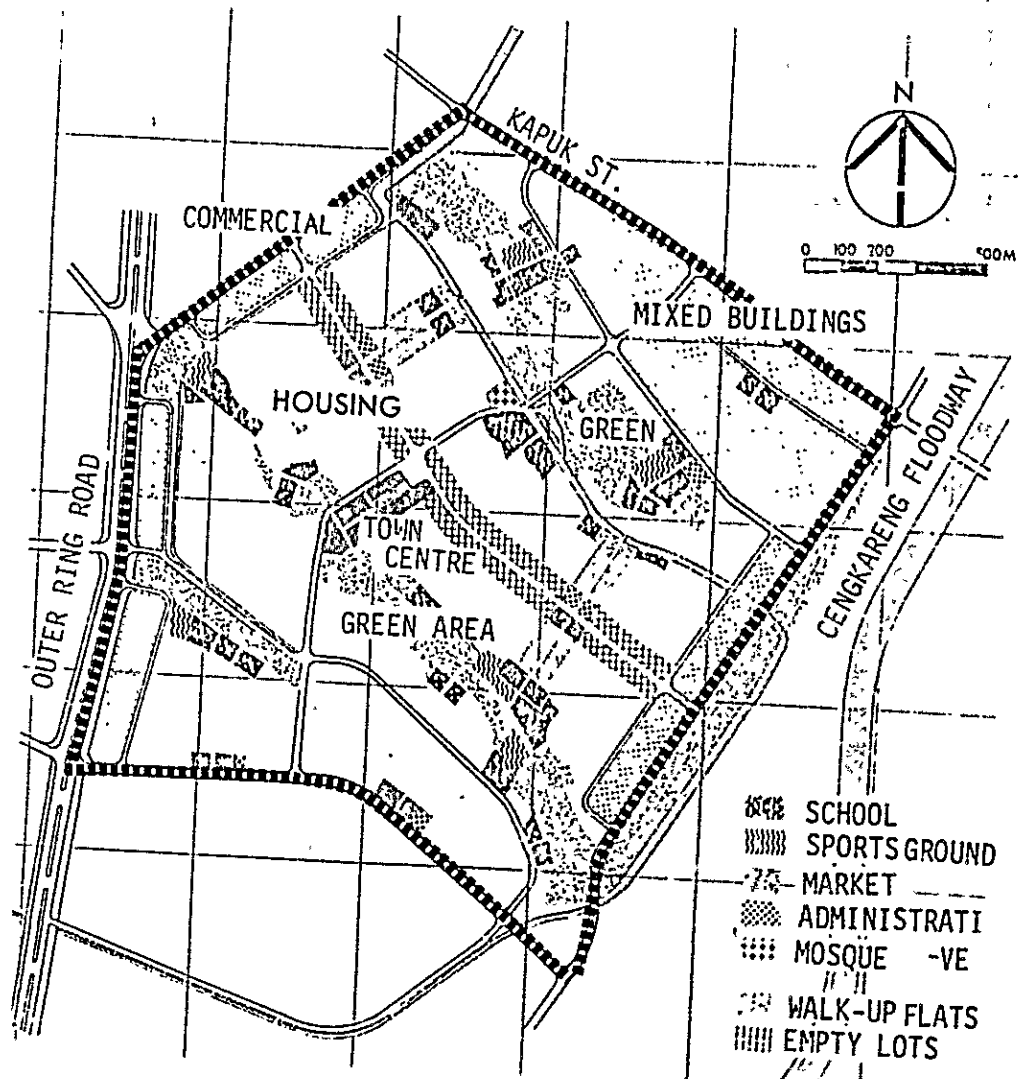
Fig. 3-4 GENERAL PLAN

The population by village surrounding the Planning Area can be determined from the 1979 census**. (See Chapter 2). The area includes parts of Cengkareng and Kapuk villages, and population for both these villages in 1979 were 77,000. Taking into account the population increase since then, it can be estimated as about 90,000. Since the Planning Area covers 370ha, which is about 1/4 of the area of the two villages, the population within the Planning Area will be about 20,000. DKI Jakarta's Masterplan gives a guideline for population density of 201 - 500 persons/ha.. The project, aiming for high density housing, will adopt the given upper limit of 500 persons/ha and plan for 400 persons/ha in residential areas***, 300 persons/ha for the composite areas, and 30 persons/ha for commercial areas.

The number of household has been set at 5.5 persons/household in DKI Jakarta's Masterplan, and 5 · persons/household by PERUM PERUMNAS. The population census** showed that the figure was 6.0 persons/household in 1979 for Cengkareng, and another study submitted for Jakarta showed a figure of 6 persons/household for 1977, but increasing yearly (see Chapter 2). From these figures, household size for this project is set as 6 persons.

     *   Kelurahan..... (See Structure of the DKI Administration).
     **   Statistik Wilyah DKI Jakarta (Statistic Data of DKI Jakarta)
     ***   The Planning Area is divided into 4 functional divisions; Housing, composite, commercialand open space.

The table below shows the target population distribution plan based on the above conditions.
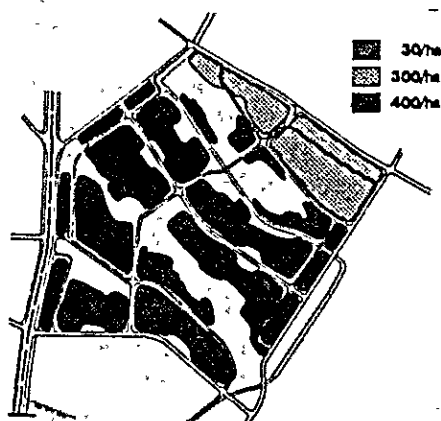
Table 3-1   FUTURE POPULATION

Zone	Areas (ha)	Population	Households	Density (persons/ha)
Residential	260	104,000	17,300	400
Planning sprawled	50	15,000	2,500	300
Commercial	20	600	100	30
Green	40	0	0	0
Totals (Planning area)	370	117,600	19,900	320

Fig. 3-5   DISTRIBUTION PLAN OF POPULATION

The Masterplan for DKI Jakarta intends to use most of this Planning Area for residential purposes, and other areas along Primary roads for industrial purposes. The Green Belt has been proposed along a high voltage line being installed in the eastern sector running from north to south. The Green Belt is to stretch from the inland terraced hillsides through the Cengkareng area to the recreational zone on the coastline. Land use in the Planning Area will therefore be modified into urban type land use preserving Cengkareng's features in accordance with the Masterplan.

3-3-1   Mixed land use

In contrast to the suburban housing developments, such as Depok constructed outside Jakarta by PERUM PERUMNAS, this project is dealing with an area closer to Jakarta where the transformation of land uses from the agricultural to the urban is rapidly in progress. Therefore, this project is different from the previous housing developments, in that both population distribution and functions of the area will be urbanized. For these reasons, in addition to allocate commercial areas along primary roads, the lots along the primary roads within the residential areas will be sold as empty lot where shops and domestic industry can be established. In addition, the areas along Kapuk St., where commerce and industry are developed, will be encouraged to develop into an area catering for a variety of functions including trade, industrial and residential. This kind of mergence of functions in one area, will be known here as mixed land use.

The proposals for the commercial areas also takes into account the potential westward expansion of DKI Jakarta, with the scheduled opening of the new international airport and construction of its access toll roads. This does not only solve the problem of the empty space between the residential areas and the primary roads, but is a means of supplying cross-subsidy and of decreasing commuting distances. The details of the commercial and industrial areas will largely depend on the study on demand to be carried out later on, but they will likely be in the nature of trade, production of high retail value commodities, and other forms of work connected with the airport.

The open area will be another characteristic of the project along with mergining of shops, factories, dwellings, and offices. The open areas will consist of the Green Axis and the green belts making up a recreational zone. The Green Axis is, as has already been mentioned, planned to utilize the topographic and functional characteristics of the existing land. Furthermore, since it is also topographically connected

to the areas surrounding the Kamal St., Road, it plays a large
part in joining the areas outside to those within the concerned
region. This also applies to the Green Belt on the eastern
side of the Planning Area. In accordance with the Masterplan,
the Green Belt will link the coastal recreational zone to the
inland areas, and so the open space in this plan will be a
'U' shaped zone.
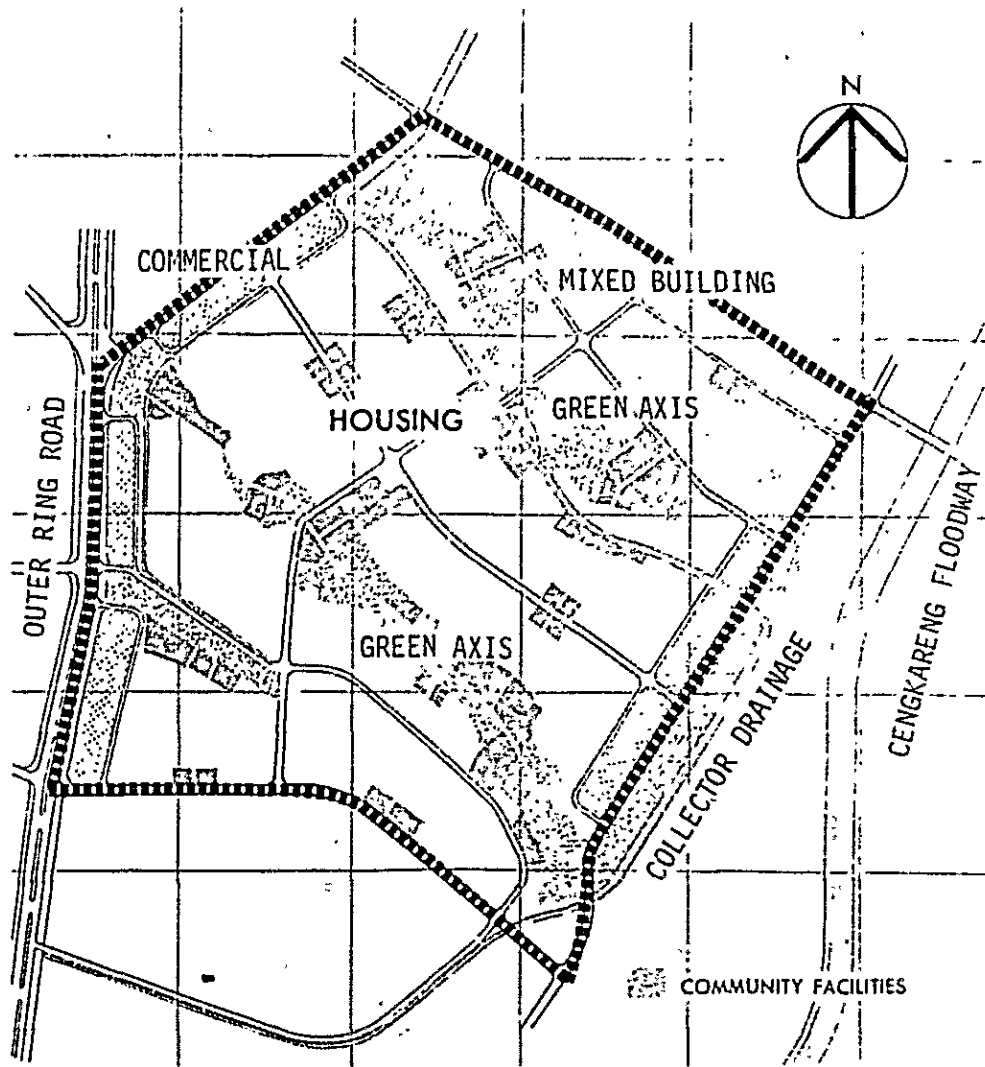
Fig. 3-6 LAND USE PLAN

3-3-2 Land use profile

Table 3-3 gives a comprehensive table of the land use based on
the scheme given in the previous section. The present land
use is given in Table 3-2.

In the present land use, 66% is cultivated land consisting
mainly of paddy fields and fields and 34% is the hamlet in
the wooded area. Houses in this hamlet are often sporadic
and the area of actual residence is small. Land use in the
hamlet consists of residences, mostly farmhouses, except
for the part facing Kapuk Street, where sales stores, facto-
ries and warehouses are distributed.

Table 3-2   EXISTING LAND USE

	Area (ha)	Profile (%)	Remarks
Paddy-field	246	66	
Village	124	34	Including fields
Totals	370	100	
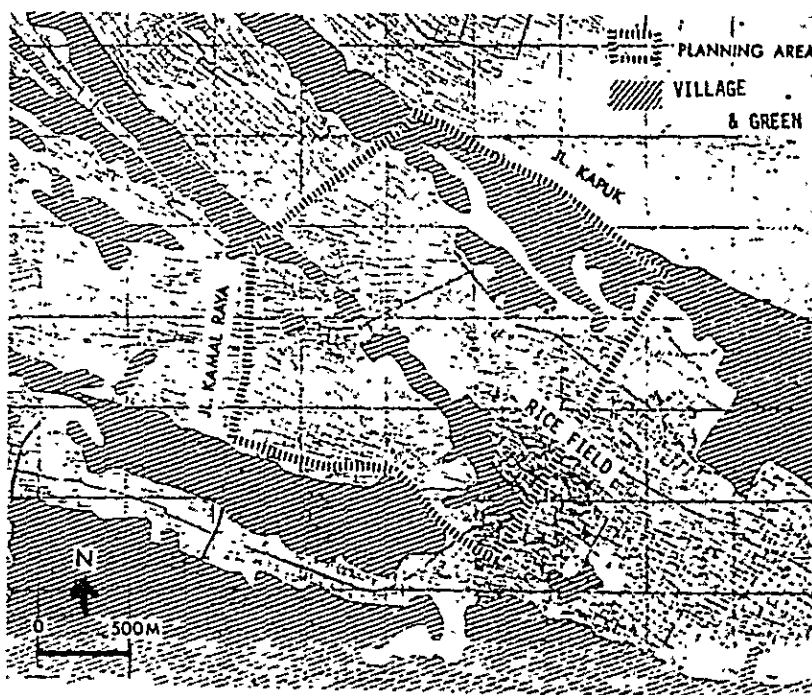
Fig. 3-6'   EXISTING LAND USE

Table 3-3   SCHEDULE OF LAND USE IN THE PLANNING AREA

Land use	Area (ha)	Profile (%)	Remarks
Residential	182	48	
Commercial	21	6	
Community facilities	28	8	• Shops, Schools, Mosque etc.
Green	40	11	
Road	89	24	
Drainage	10	3	• Collector drainage
Totals	370	100	

3—1 0

3—4 TRANSPORTATION

3-4-1 Transportation in the surrounding areas

• Air & water transportaion

The new Cengkareng International Airport to be opened in 1984,
is located 7km to the west of the Planning Area. Therefore,
in addition to the possible construction of an access road
to the airport, if domestic flights are to be allowed, it
would provide a means of transport to the other islands,
apart from Java, for the inhabitants in the Planning Area.

The existing rivers are presently being used as a trans-
portation route for fish. The proposed drainage waterway
within the Planning Area, also has a width of 18m and is
capable of being used as such.

• Railroad

2km to the south of the Planning Area is the railroad which
connects Jakarta to Tangerang. However, the distance to the
station and the scarcity of trains, makes the bus service
more preferable for the residents. It is predicted that
the development of roads will not be able to keep up with
the future increase in traffic. Rail will then become a
more popular form of transport, in which case the provision
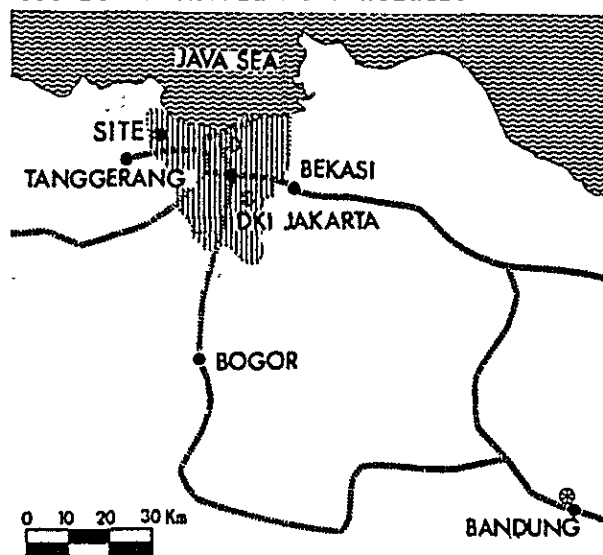of access roads should be considered.

Fig. 3-7 AIRPORT AND RAILWAY

Regional roads

DKI Jakarta and its periphery rely on the use of roads as the
main form of transport. Consequently, it has been presumed
that trunk roads will be the main connection between the

Planning Area and the heart of city, or the surrounding areas. The primary roads in relation to DKI Jakarta and the Planning Area, are shown in Fig. 3-8. The diagram indicates that the project is to be surrounded by two ring roads running east and west side of Planning Area, the Harbour Road on the north, and the Jakarta Tangerang Road to the south.
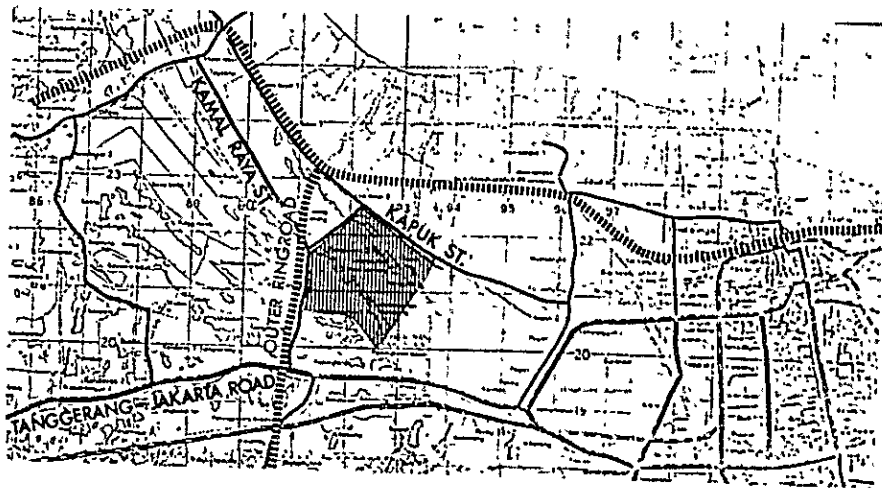
Fig. 3-8 REGIONAL ROAD NETWORK · BUS SERVICE NETWORK

3-4-2 Road network plan

Present conditions

Kapuk Street and Kapuk Kamal Street are the two roads accessible by cars to the Planning Area. Kapuk Street is a secondary regional road joining Jakarta to Teluknaga, running along the north of the Planning Area. It is 12m wide and currently bears two traffic lanes. There are plans to make this road into an access road to the airport, which will make it an important route to the city from the Planning Area. Kamal Raya Street, which is a continuation of Kapuk Kamal Street, is a connecting road which joins Kamal Street to the Jakarta-Tangerant Road. It is two lanes wide, but near the Jakarta-Tangerang Road it becomes built up with village houses and has not much capacity to expand. In the future, the Outer Ring Road is planned to be built over this road, and it will become an important route to the Planning Area, but since there is no definite development plan, it will remain as an axuiliary road for the moment.

Fig. 3-9   EXISTING ROADS IN THE PLANNING AREA AND
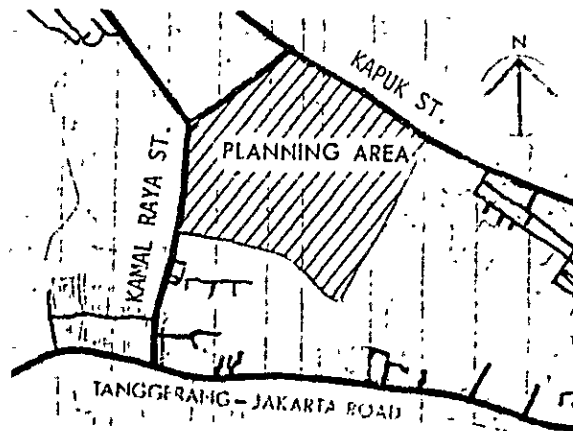   SURROUNDINGS

City planning roads

The roads around the Planning Area, according to the city
planning of DKI Jakarta, are shown in Fig. 3-10. Apart from
Kapuk Street, they are all provisional, and details of their
preparation have yet to be decided.   However they form the
radial and ring roads for DKI Jakarta and since plans for land
use are based up on their existence, they will also be treated
as basis for road planning of this project.
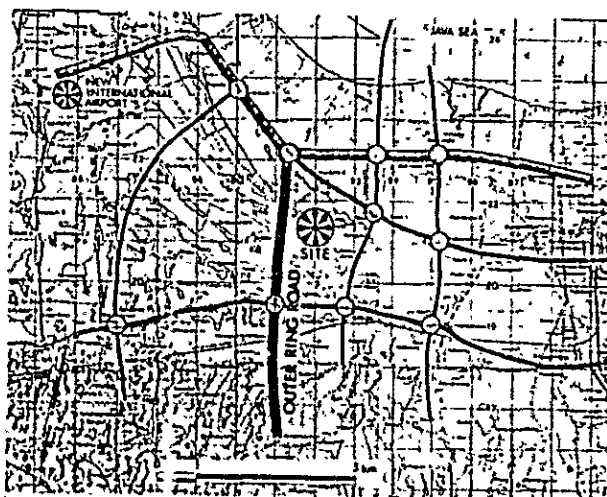
Fig. 3-10   FUTURE ROAD PLAN IN THE VICINITY OF CENGKARENG

Road network in the Planning Area

The following are prerequisites to the construction of a road
network.

i.   Since it will be based on the roads in the city planning,
     it must be able to readjust to any of their structural
     changes, or variation in time schedules.

ii. Each road must be wide enough for buses, and must be
     able to adjust to any stages of development.

3—13

iii. The walking distance from houses to the bus stops must be within 400m.

iv. A pedestrian road network must be well organized with a vehicle road network.

Model networks satisfying the above conditions and based on the 2km square shape of the Planning Area are represented in "Model A" and "Model B".

Model A uses 4 orthogonal primary roads and pedestrian roads within them to serve the Planning Area. Model B uses only two primary roads. In each case, the areas enclosed by primary roads will receive an adequate bus service. In the first model, the secitons enclosed are each about 40ha and, for the second model 90ha.

The direct distance to the nearest vehicle road is about 300m for the former, and about 500m for the latter model. Considering that the minimum walking distance is to be less than 400m, model A is favoured, but taking into account the Green Axis and the position of the Town Centre, model B is more appropriate. This is because the Town Centre should be located where there is maximum traffic, and the open areas should preferably have no traffic passing through them. The subsecondary roads in Model B are placed along the green axis to decrease the walking distance. Model B applied to the Planning Area is represented in Fig. 3-12.
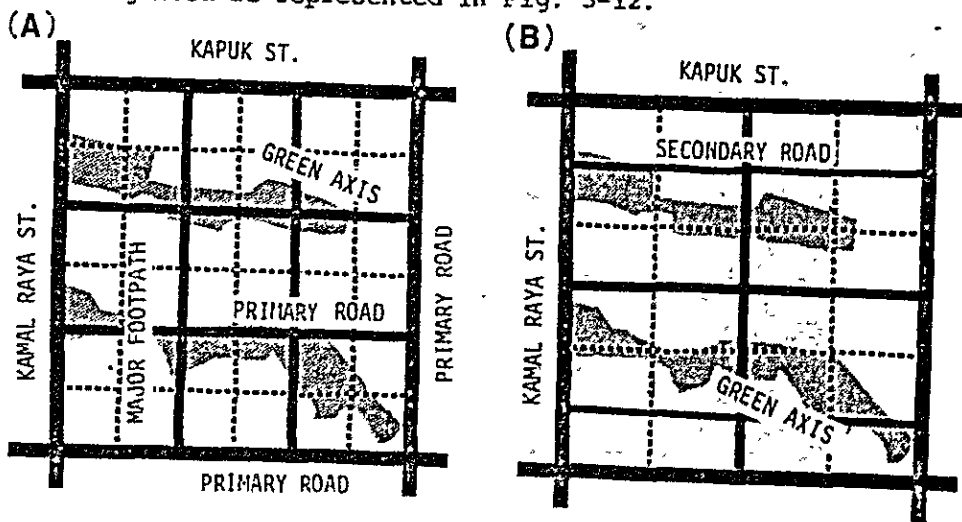

Fig. 3-11   ROAD NETWORK MODELS

Traffic system

The traffic system in this area can be an encircling bus route.

In the west and Japan the increase in preference for private cars as opposed to mass transit systems, is coming to a stop, and people are starting to use railways again. However, in Jakarta the mass transit rail system has not fully developed,

and the project must aim for a mass transport system using
buses and bemos on the roads. For these reasons the width
of the roads have been designed as the minimum required width
without affecting the efficiency of the bus systems. If the
pattern; better standard of living → increase in car owner-
ship → increase in number of car trips → increase in traffic
load, -is assumed, the width of the roads will have to be
greater. However, considering that this project is to be a
low budget development, this is not realistic, even taking
into account the future increase in Jakarta's traffic.
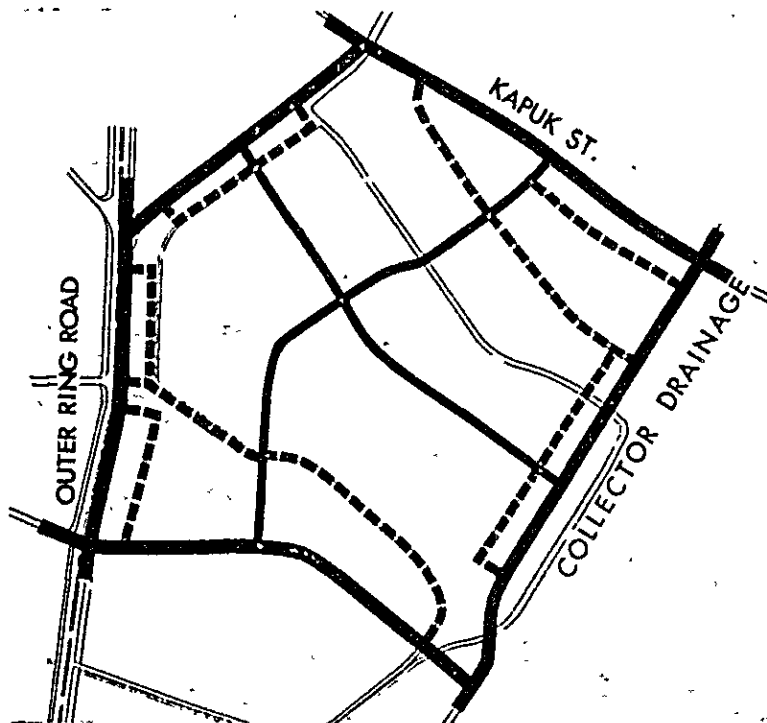The bus network system will be dealt with in detail later.

Fig. 3-12 ROAD NETWORKS PLAN

Pedestrian traffic system

The pedestrian road network to be installed, will combine the
major footpaths (1), which connect Green Axis and have re-
creational character, with the major footpaths (2) which are
for every day use. With commuting to work and shopping the
main purpose, these major paths will probably be used by both
pedestrians and cyclists. Also, becaks** used by the aged
and the handicapped will also use these paths. The residents
will be able to use the footpaths outside their houses to get
onto the major footpath, which will take them to the nearest
bus stop or shops. In going the other way, those using taxis
and bemos* will be able to ride to the service roads, from
where the major footpaths and footpath will take them home.
(*Bemo-vans converted into 6 passenger taxis **Becak-rickshaw)
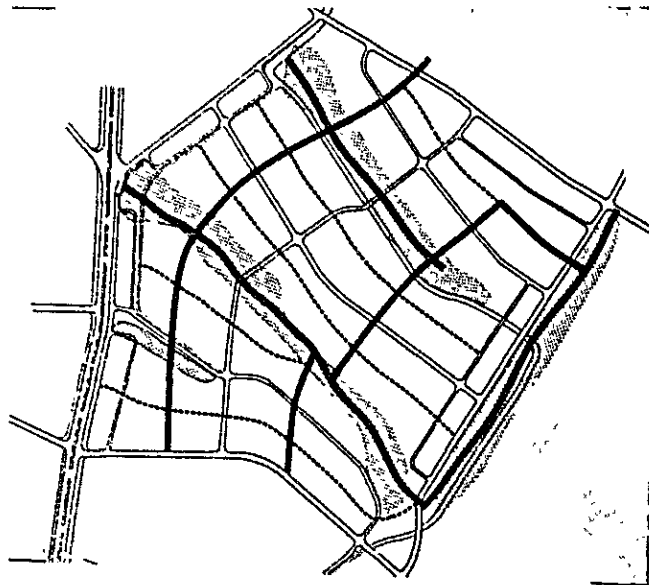
3—1 5

Fig. 3-13 PEDESTRIAN WAYS PLAN

Road network and facility distribution

Community facilities will be located with access to vehicle road or major footpath, depending on the function and their scale. Markets, hospitals, government offices, etc. requiring access by traffic, will be established beside vehicle roads. Others, such as schools, mosques, and clinics, which are required in each neighbourhood unit, will be placed along major footpaths.
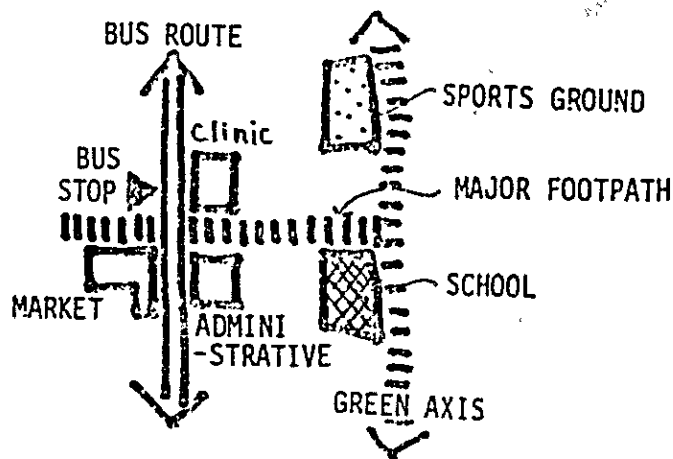

Fig. 3-14 COMMUNITY FACILITIES DISTRIBUTION MODEL

3-4-3 Transportation system

The methods of transportation currently in use are, inter-city buses, metro-buses, metro-minis, bemos, bajays, taxi and becaks. They are all vehicles which run on roads, the first four of which need network licenses, and becaks and bajays must meet road-worthy requirements. The functions of each of the vehicles are shown in Table 3-4, and the existing bus routes are shown in Fig. 3-15.

Table 3-4　　　TRANSIT VEHICLES

Type of vehicle	Function	Passenger capacity
Inter city bus	Busing; Between cities	40 - 80 persons
Metro bus	Busing; within city	40 - 80
Metro mini*	Busing; within city	10 - 20
Bemo**	Busing; within city	6 - 8
Bajay***	Road license	1 - 2
Taxi	Free	1 - 5
Becak****	Rickshaw	1 - 2

　　　* Micro-bus
　　** Converted van
　*** Three-wheeler
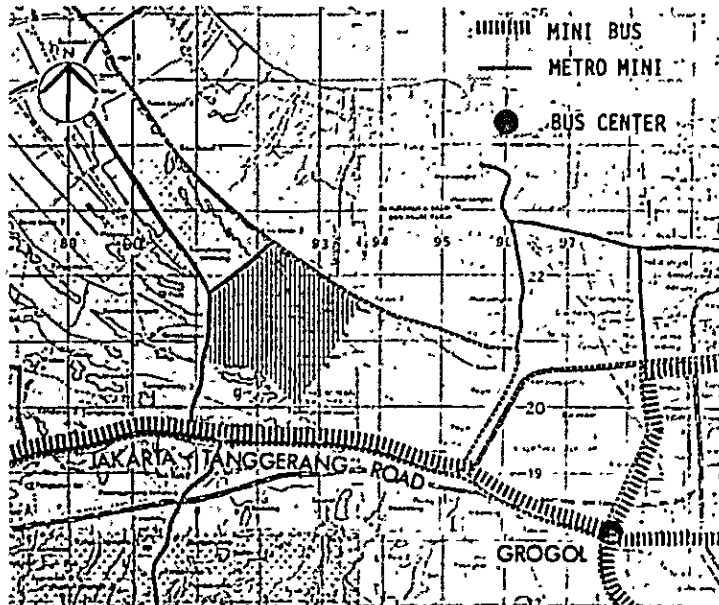**** Cannot travel on primary roads

Fig. 3-15　EXISTING BUS SERVICE

For the project, apart from the intercity buses which will be have a stop in the Town Centre, access to Jakarta will probably be done by metro-bus and metro-mini.

Transportation within Planning Area

Metro-minis will be the chief means of transportation within the Planning Area, with bemos playing an auxiliary role. Fig. 3-16 shows a model bus network for the area showing that walking distance to bus stop from each house is about 400m. In reality, the shape of the network will appear as shown in Fig. 3-17. In either case, the primary road running east to west will be the main route.

For service roads where metro minis do not pass, bajays, taxis, and becaks, can be used; especially becaks, which are the only form of transportation able to run on major footpaths.
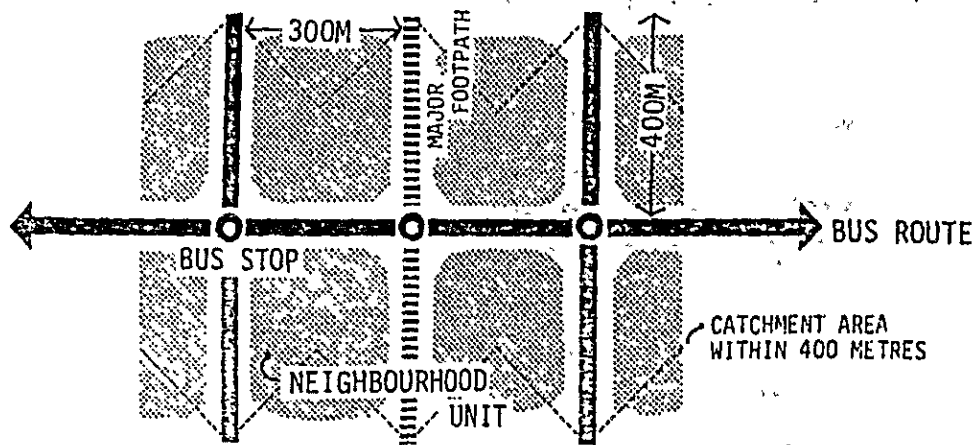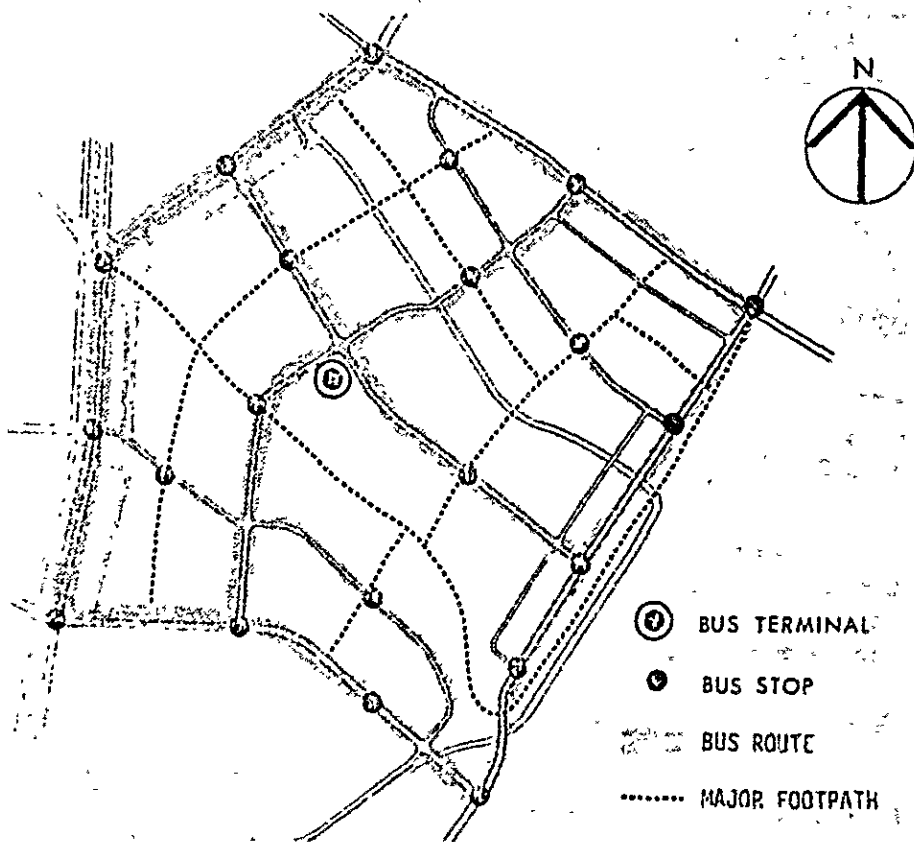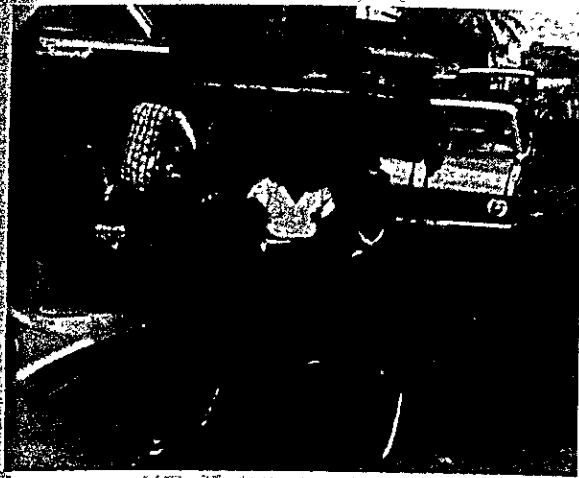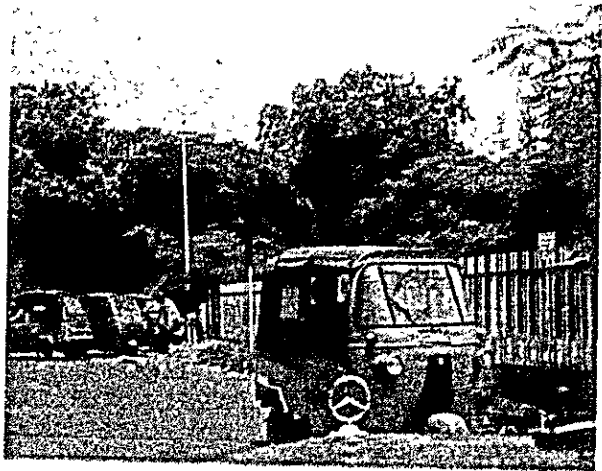
Fig. 3-16 BUS SERVICE NETWORK MODEL

Fig. 3-17 BUS SERVICE NETWORK PLAN

〈VARIOUS MEDIA OF TRANSPORTATION 〉

Becak

Bajay

Bemo

Metro Mini

Crowded Kamal Raya Street

3-5 COMMUNITY FACILITIES

Present main facilities

Looking at the distribution of educational facilities within
the Planning Area, there is one kindergarten in Cengkareng
village and, although there are 7 elementary schools in the
locality, there are none within the Kampong which is to be the
centre of the concerned area. As to other institutes, there
is one junior and 2 senior high schools. There is a mosque
each in Kapuk and Cengkareng village but smaller ones are
scattered within the Kampong. (Source: PERUM PERUMNAS)

One medical facility exists in each of Kapuk and Cengkareng
village.

There is a relatively large mosque in both Kapuk village and
Cengkareng village which serve as centres for social activities
in the respective village. In addition to these, smaller
mosques scattered in the villages are the core of RW and RT.
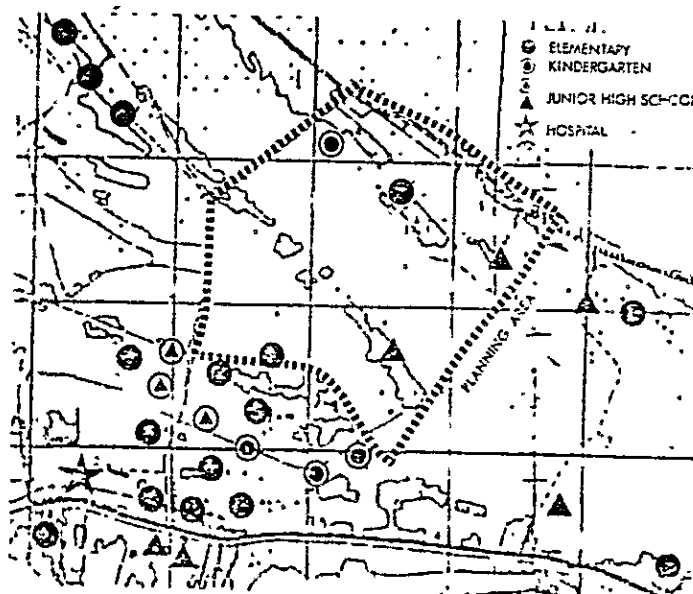
(Source: PERUM PERUMNAS)

Fig. 3-18 EXISTING COMMUNITY FACILITIES

3-5-1 Basis for distribution of facilities

The distribution of community facilities will be based on the
following:

   i) Schools, parks and open spaces where the green will be
possibly preserved, will be installed in the Green Axis.

ii) Administrative and medical facilities to where the vehicle access is important will be mainly allocated along the primary road.

iii) Shopping facilities will be allocated based on the neighbourhood unit.

Above three items are basis of community facility distribution. In general, it would be better to have these facilities in the middle of catchment area where all the residents will have good access, but in this case priority will be given to allocate the social facilities in the Green Axis, in order to conserve the wooded area.

3-5-2 Educational facilities

Kindergarten and elementary school

A neighbourhood unit will consist of 4,000 people in 700 households and it is planned to install one elementary school and two kindergarten in each. In this case, the average walking distance will be 300-400m for the elementary school children.

Junior and senior high schools

When the school attending ratio increased in the future, one junior high school will probably be required for 3 elementary schools, but at the current level, one for every 5 to 6 elementary school is probably adequate.

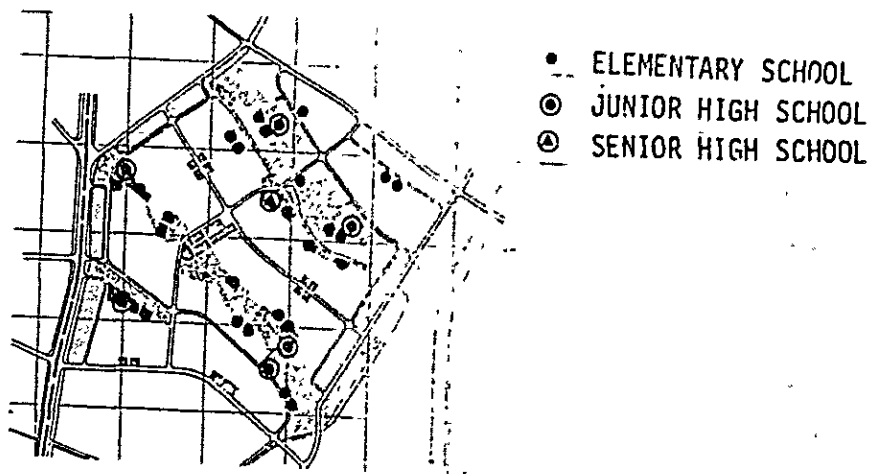As to senior high schools, 2 for the entire Planning Area is suggested.

•_ ELEMENTARY SCHOOL
◎ JUNIOR HIGH SCHOOL
Ⓐ SENIOR HIGH SCHOOL

Fig. 3-19 EDUCATIONAL FACILITIES DISTRIBUTION PLAN

3-5-3 Shopping facilities

Shopping centre will be allocated in the Town Centre for the whole Planning Area. Shops selling the everyday's necessities like

meat and vegetables will be allocated in sub-centres. Sub-centre will be a community core with small mosque and play-ground and will be distributed for every several neighbourhood units.

Addition to these planned facilities, shops along main roads, petty traders and existing market in surrounding area will be also utilized by residents.
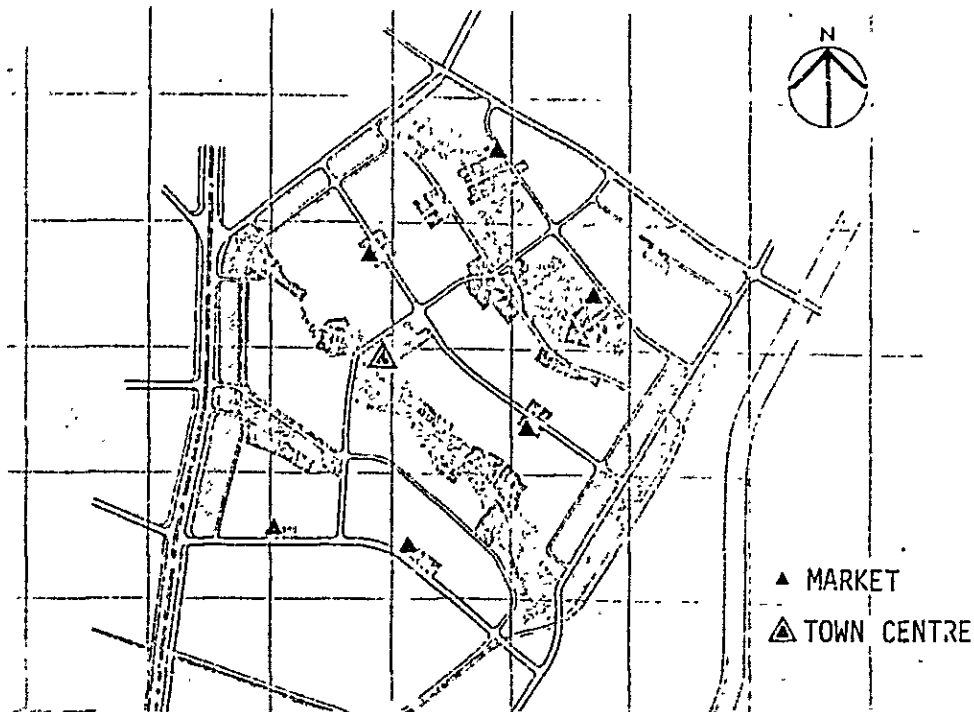

Fig. 3-20 SHOPPING FACILITIES DISTRIBUTION PLAN

3-5-4 Medical, administrative, and religious facilities

Clinics and administrative branches will be allocated based on the neighbourhood unit complex and these facilities are preferably located along secondary road which is accessible by bus network.

As medical and health facilities, hospital health centre will be allocated in the Town Centre for entire area and it is possibly expected that the specialized private clinics will be set up in empty lot zone along primary roads.

Other facilities like police and fire stations will be placed within the area assigned for govermental purpose.

Existing cemetry will be preserved and area around will be reserved for the same purpose, but will probably be used as open space for the time being.
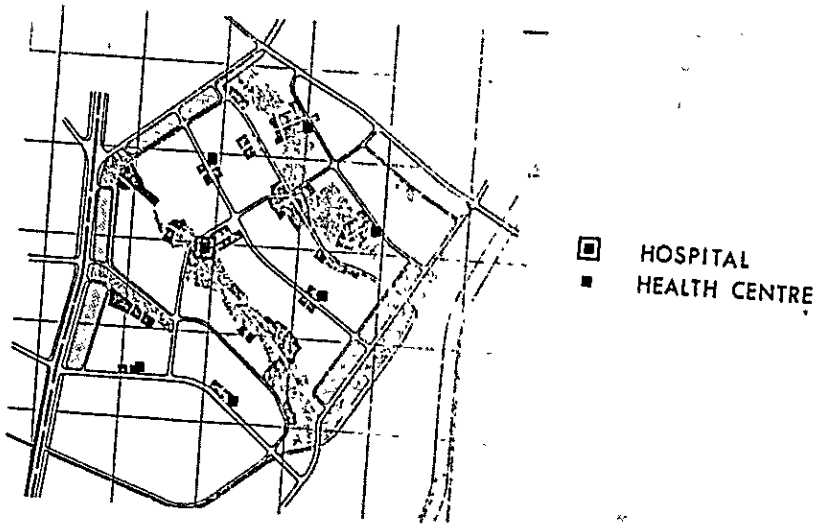
Legend:
- ▣ HOSPITAL
- ▪ HEALTH CENTRE

Fig. 3-21 DISTRIBUTION PLAN OF HEALTH SERVICE FACILITIES ETC.

SCHOOL
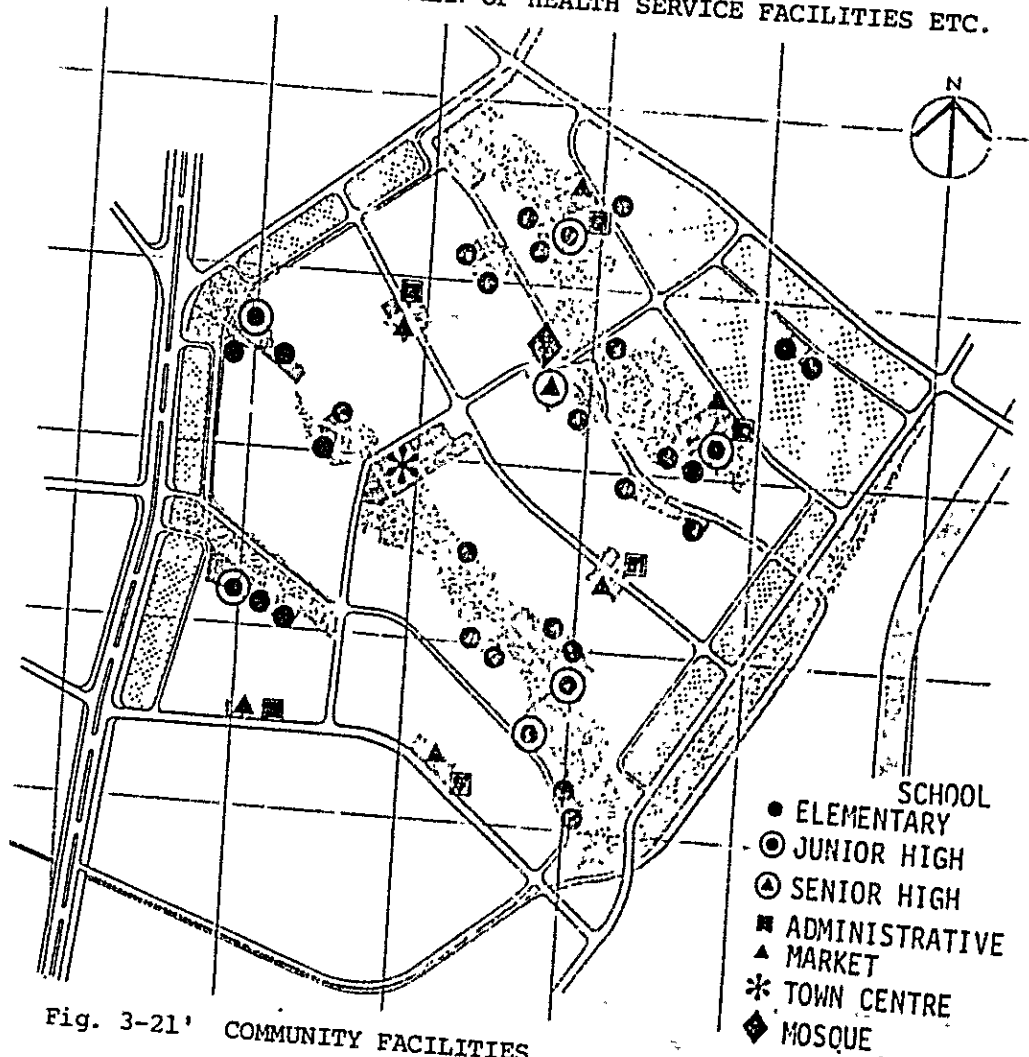- ● ELEMENTARY
- ◉ JUNIOR HIGH
- ⊛ SENIOR HIGH
- ▦ ADMINISTRATIVE
- ▲ MARKET
- ✳ TOWN CENTRE
- ◆ MOSQUE

Fig. 3-21' COMMUNITY FACILITIES