7 CONSTRUCTION PROGRAMME

TABLE OF CONTENTS

7-1 METHOD OF ORDERING

7-1-1 Present ordering methods

The methods of ordering, methods of contracting, and other affiliated methods used by PERUM PERUMNAS at present, are shown in Table 7-1, and the projects of infrastructure and housing are divided into four ranks, classified by the scale and ability of the contractors. The method of separated order for infrastructure and packaged order for housing are applied. Most contracts are based on the fixed amount system, but the unit price method is used for special materials. The method of awarding contracts is made by means of tender by specified bidders, and there are many projects under special appointment contract for housing normally, but the method of open bid (tender by specified bidder at sites and services) is also used. The number of houses ordered of the contractor is not more than 500 units of the same type, and the total number should be less than 1,000 units in the case of houses of different type, Construction time will be not longer than 6 months.

TABLE 7-1 METHODS OF ORDERING, CONTRACTING AND OTHERS USED BY PERUM PERUMNAS

Items			Infrastructure and civil engineering work							Housing work	Remarks
			Roads & bridges	Drainage	Sewage	Water supply	Electricity	Solid waste	Land develop.	Walk-up-flat low rise house	
Method of ordering	Method of packaged order		×							O	•Contractors for infrastructure and housing are classified into 4 ranks based on ability.
	Separated order	by special works	O							×	
		by site	×							×	
Method of contracting	Fixed amount contract		Used for about 90% of total projects, but varies by scale and amount.								
	Unit price contract		Used for about 10% of the total project.							Used for special materials (*1)	
	Terms of cost and remuneration		×							×	•The following guarantee money shall be withheld as security after the completion of any project: Small scale housing
Method of awarding contracts	Special appointment		×							O	
	Competitive bid	Open bid	×							S&S	
		Special appointment bid	Classified by the standard of Rp.20,000,000; Less than 3 bidders in case of less than the standard, and more than 5 bidders in the case of higher than the standard.								Project 5%: Large scale project 2%. The days of guarantee vary by scale and kind, but it is usually two or three months for housing. The penalty clause payment is 1/1,000 of contract amount per day, but is not more than 5% at maximum.
Method of payment	Advanced money Intermediate payment Payment of completion		Less than Rp.20,000,000; 95% at completion, 5% reserved after for security period More than Rp.20,000,000; 10-20% in advance, every two weeks in intermediate, 5% the balace.								
Direct management system			Always general contractors.								
[illegible] system			The joint venture system is not appreciable between contractors.								

*1 [illegible] Paint, Bata a, Lumber, Asbestos, Door fitting, Zinc doors, Paint, Concrete Block, Lock, Cement, and Brick.

The maximum standard of order classified by contractors is shown in Table 7-2. (The ranking list of contractors is shown in PERUM PERUMUNAS Pre-qualification of Contractors.)

TABLE 7-2 STANDARD OF MAXIMUM CONTRACT PRICE Unit; Rupiah

Ranks of contractor	Maximum amount of order
A	More than 300,000,000
B	150,000,000 ≦ ≦ 300,000,000
C	Less than 150,000,000
D	Limited small scale work

NOTE; As of July, '80

7-1-2 Construction work

Construction work in Indonesia at present is performed under the systems shown in Table 7-1. The scale and character of the projects may be changed a little, but the method of awarding contracts is:

1. The method of separate contracts for materials and labour.

2. The method of one contract covering materials and labour for special work and plumbing.

The first method is more common.
Because the sub-contractors are of small and weak organization, there are some questions as to scale and engineering capabilities. Therefore, the general contractors or the owners have to furnish the materials. Also, the so-called Mondor system is in operation, with regard to labour, and the general work of the whole project is carried out by specialists in each field (Kepala). The Kepala has skilled and unskilled workers, made up of 20 - 40 persons, and is organized with separated work groups, but the number of persons may differ depending on the scale, and the percentage of skilled and unskilled workers differs depending on the kind of work; the number of skilled workers is 5 - 10, and the necessary number of unskilled workers is obtained for the project as a temporary employee. Regarding mechanical power for infrastructure, land development, pile driving, etc., general contractors may hire machineries from outside sources, in the case of shortage. There are three machine leasing companies in and around Jakarta. Pile driving is contracted to a local subcontractor, as in Japan. (Details are given in the Phase 1 Report: on the study of Low Cost Housing Project in CENGKARENG, MARCH 1980.)

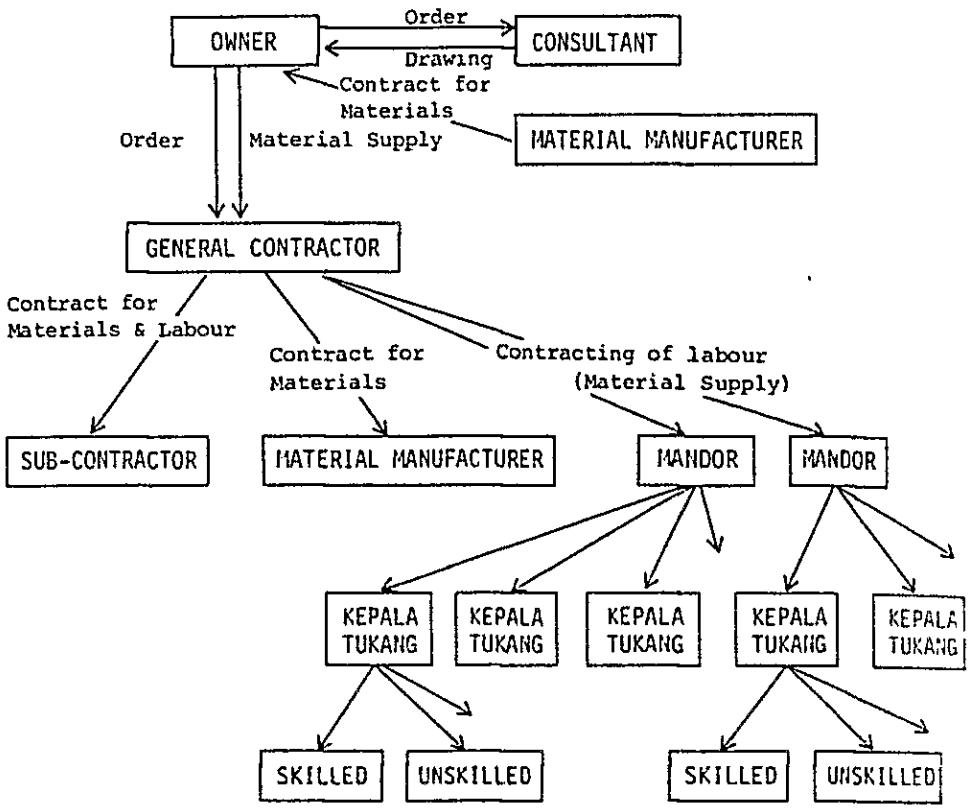


Fig. 7-1 CONSTRUCTION WORK SYSTEM

7-1-3 Proposal

The order is made under PERUM PERUMNAS regulations, in principle, but it is divided into 3 sections, as mentioned in the schedule of Fig. 7-18, that is, it is concluded that the first order should be made for urgent works and common ones, and the second and the third orders should be for the separate sites 'A' & 'B', from the point of related work (schedule for the detailed design).

Orders for the construction of walk-up flats will be given to large construction companies, because of the advanced technical capabilities required. Furthermore, the number of these companies must be limited; so, the amount of orders to be awarded them must be carefully determined. As a standard for this program, about 1,500 houses for each order would be suitable, in view of the schedule and the related works.

7-2 ESTIMATION OF MATERIALS AND LABOURS TO BE USED

7-2-1 Comprehension of materials used, by types of work, and their quantities

a. Infrastructure work

Fig. 7-2 shows, in units of three months, the estimated quantities of materials used at different stages of work -- the estimates being based on the computation of materials by types of work. Here, we assume equal allocation by dividing the materials by the period of each work. In the figures shown here, there are slight fluctuations for footpaths, depending on the ratios of housing types, but the fluctuations are so small, amounting to only about 3%, that they seem to be negligible on the whole. As quantities are listed as for units of three months, the monthly supply of materials does not necessarily agree with the averages given.

b. Housing construction

Here, calculation has been made for number of units shown below.

Conditions of computation

Housing type	Housing unit
FS'5 - 36	2,170
FS'2 - 36	1,710
M - 36	2,170
R - 36N	1,710
Empty lot	380
Total	7,760

Fig. 7-3 shows estimated quantities per unit of three months, as in the case of infrastructure work, based on the computation of materials by the above-mentioned housing types, and by types of work. As for methods of division, work for walk-up flats is divided into foundation work, housing construction, and finishing work, and the materials for each is equally allocated. For low rise housing, materials are equally allocated for the entire stages of work. Fig. 7-4 to Fig. 7-7 are the related computation graphs.

There are monthly variations in the supply of materials for both infrastructure work and housing construction, but these involve no particular problems.

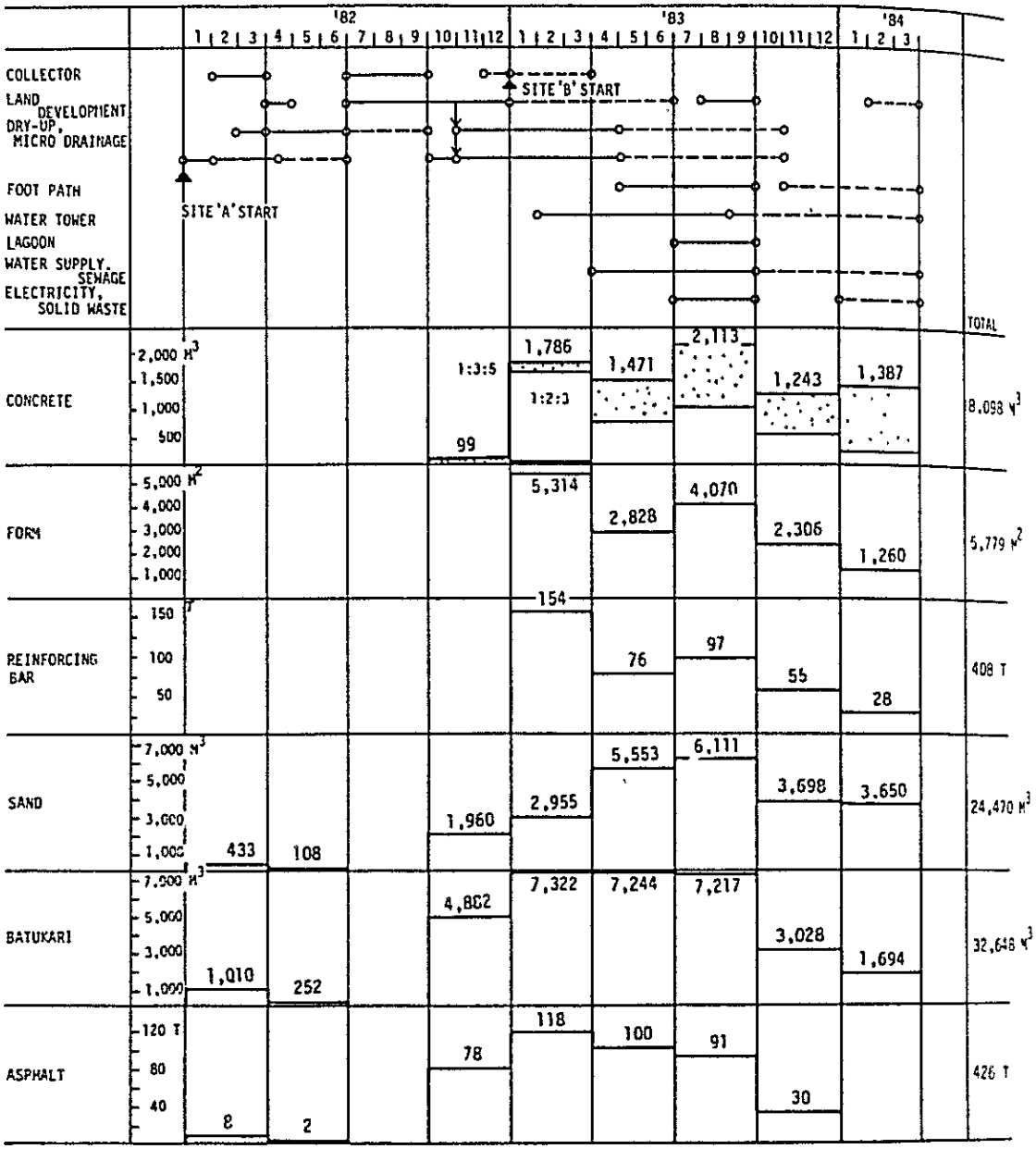


Fig. 7-2 ESTIMATION OF MATERIALS FOR INFRASTRUCTURE

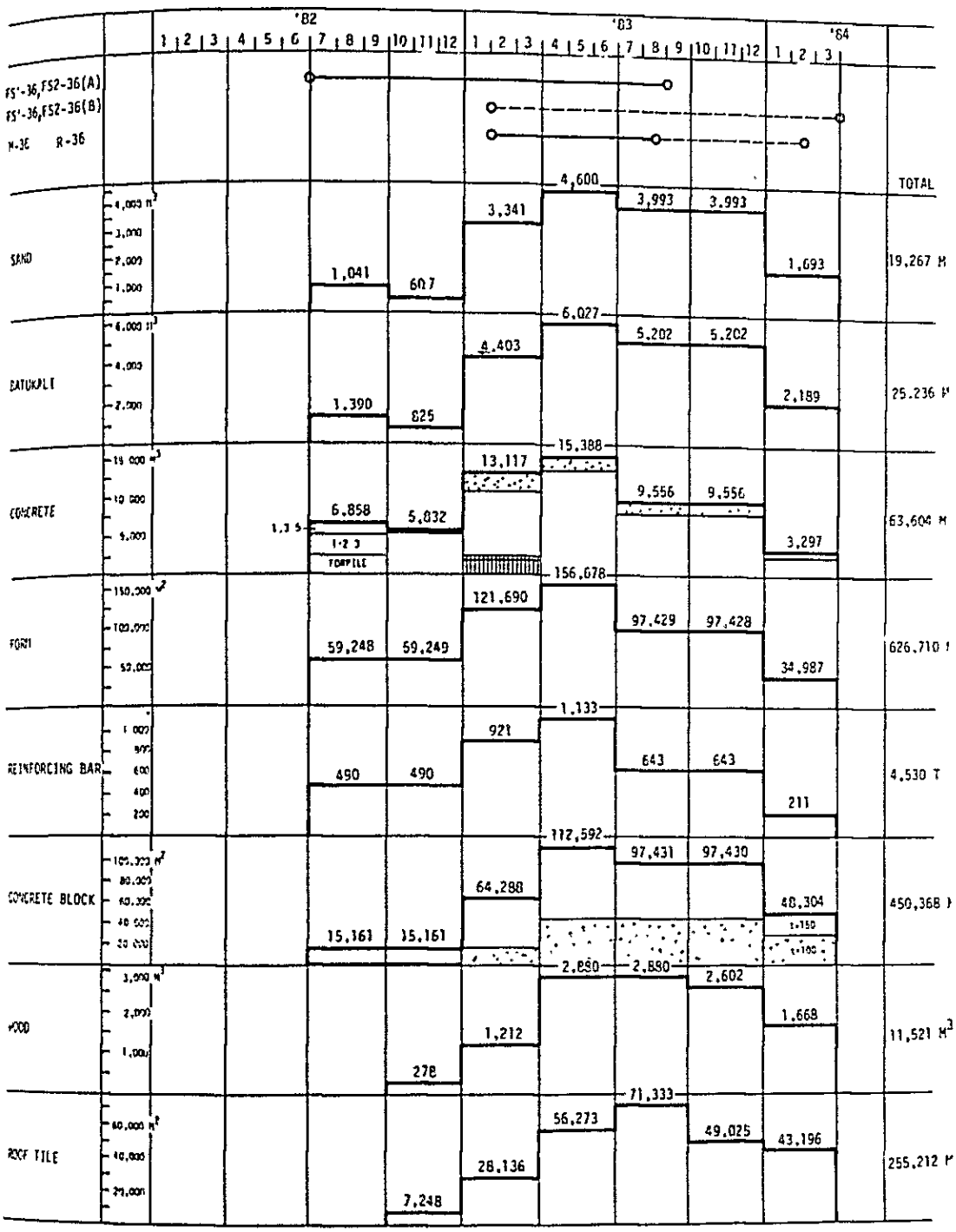


Fig. 7-3 ESTIMATION OF MATERIALS FOR HOUSING

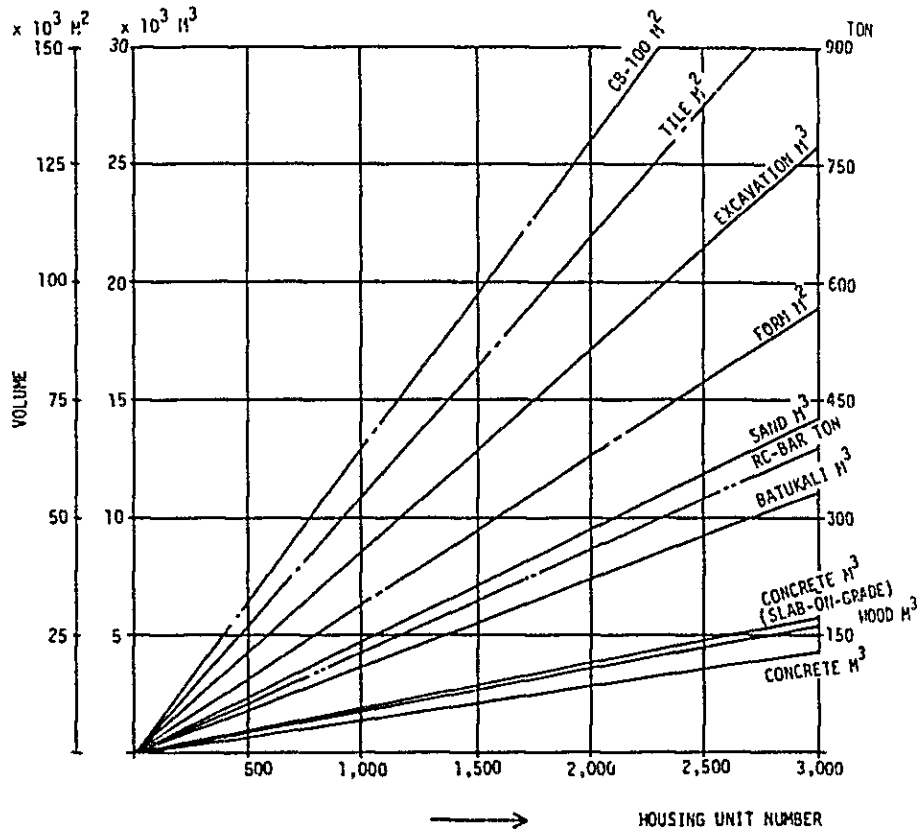


Fig. 7-4 VOLUME OF MATERIALS AND NUMBER OF HOUSING UNITS FOR R-36 TYPE

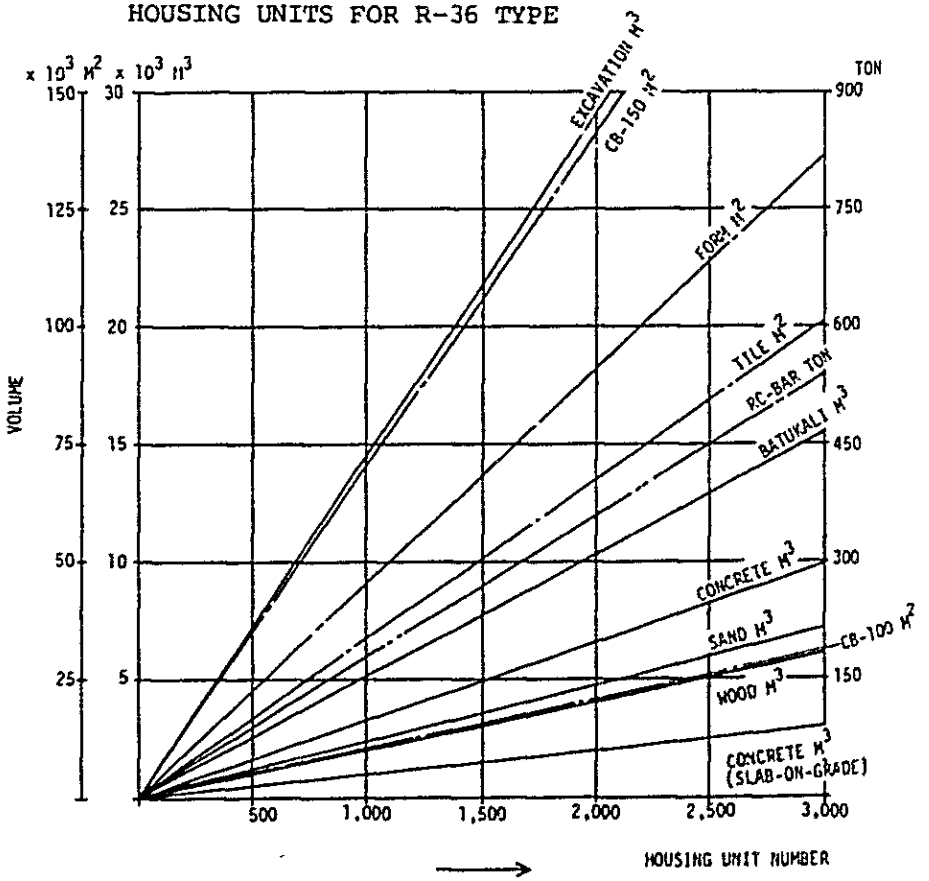


Fig. 7-5 VOLUME OF MATERIALS AND NUMBER OF HOUSING UNITS FOR M-36 TYPE

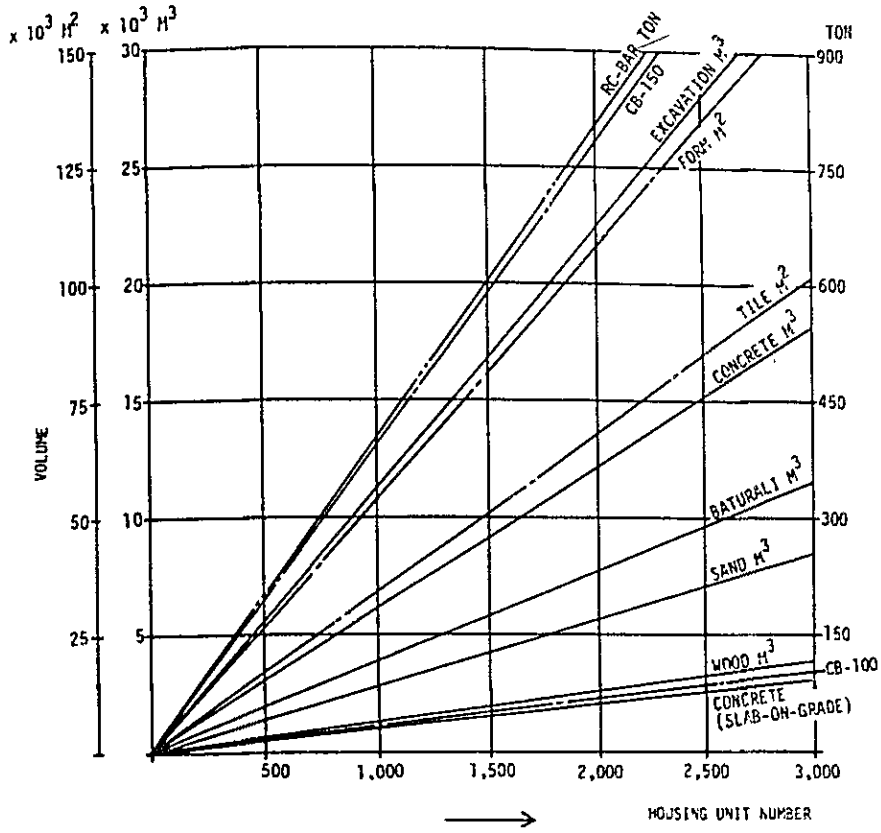


Fig. 7-6 VOLUME OF MATERIALS AND NUMBER OF HOUSING UNITS FOR FS'2-36 TYPE

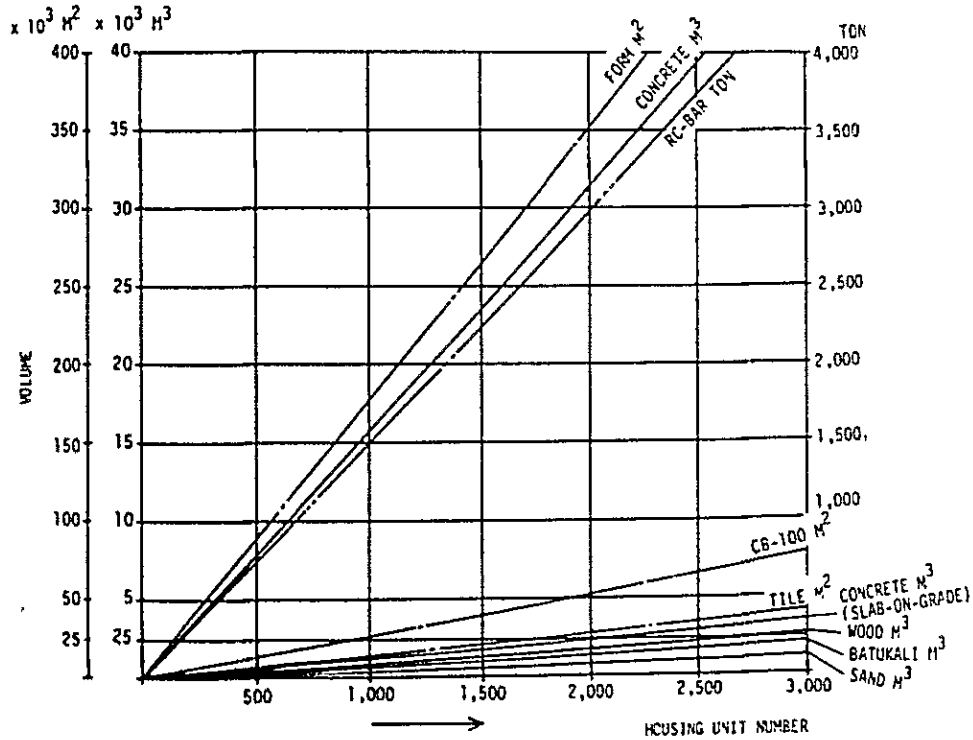


Fig. 7-7 VOLUME OF MATERIALS AND NUMBER OF HOUSING UNITS FOR FS'5-36 TYPE

7-2-2 Comprehension of labour and its volume by types of work

The basis used for computing labour volume is estimated efficiency per unit work. So, the total number of workers is computed from the per-day unit wage for workers used for each work.

For infrastructure work, the estimated labour volume was computed for a unit of three months at different stages of work, as in the case of the preceding item. Assuming, as in Fig. 7-8, that the monthly effective number of days is 25, the maximum number of available workers per day is 2,360. For housing construction, meanwhile, the results of computation made in a similar manner, are shown in Fig. 7-9. The maximum number of available workers per day is 2,780. The combined maximum number of available workers per day for infrastructure work and housing construction during the same period ('83, 07-08) is 4,670.

The relationship between labour volume and the number of housing units by type is shown in Fig. 7-10 to Fig. 7-13.

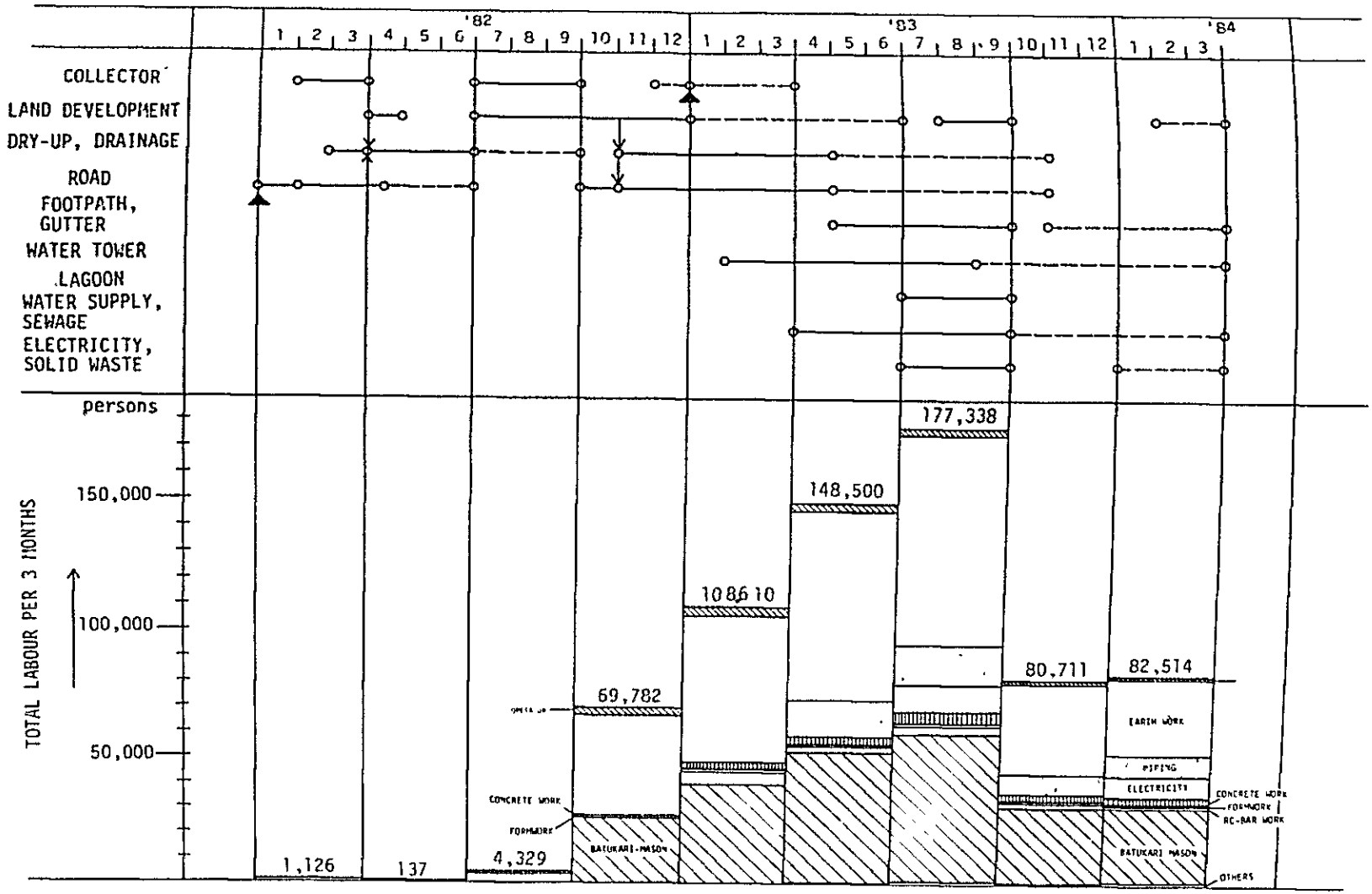


Fig. 7-8 ESTIMATION OF LABOURER FOR INFRASTRUCTURE

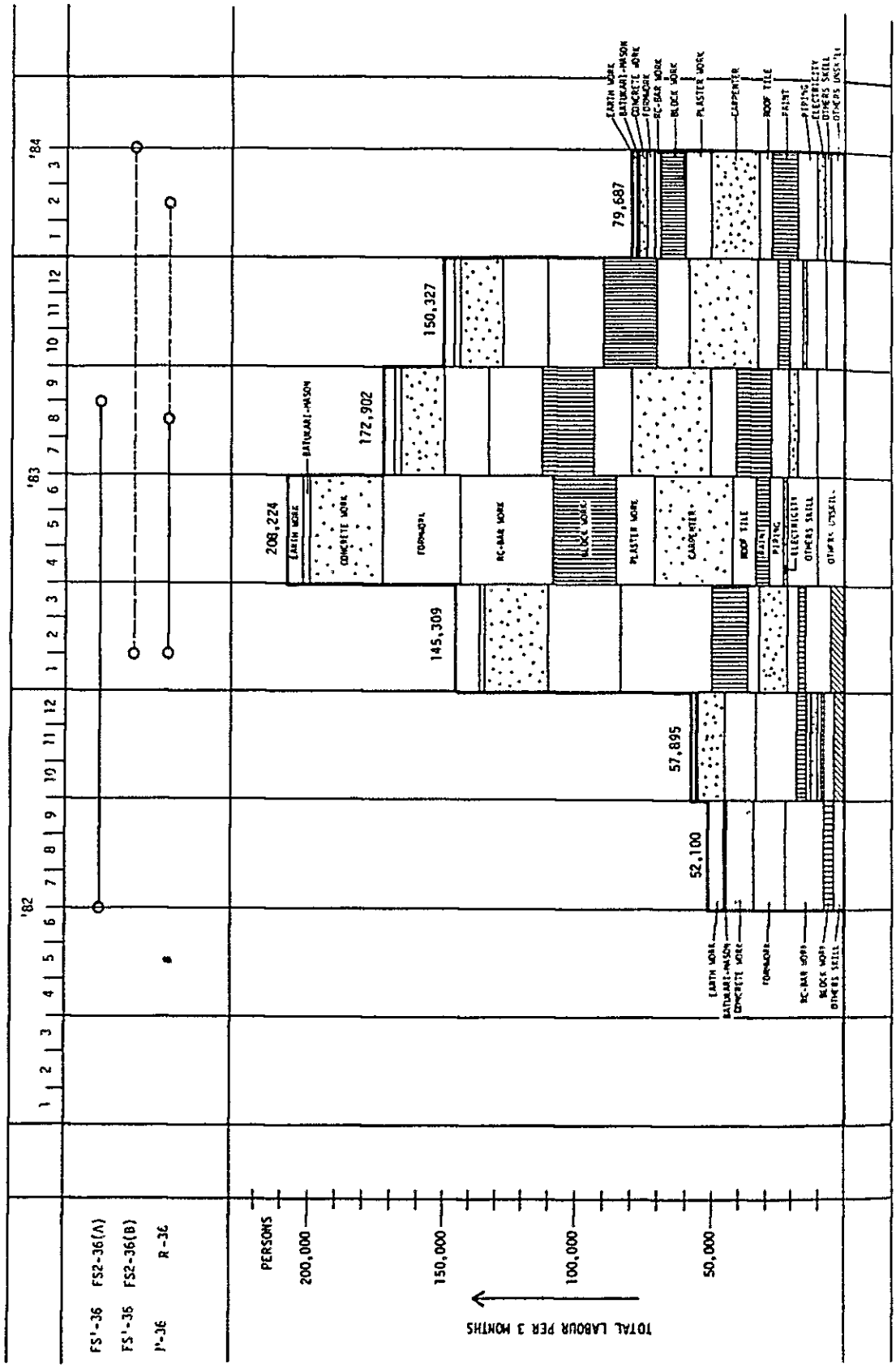


Fig. 7-9 ESTIMATION OF LABOURER FOR HOUSING

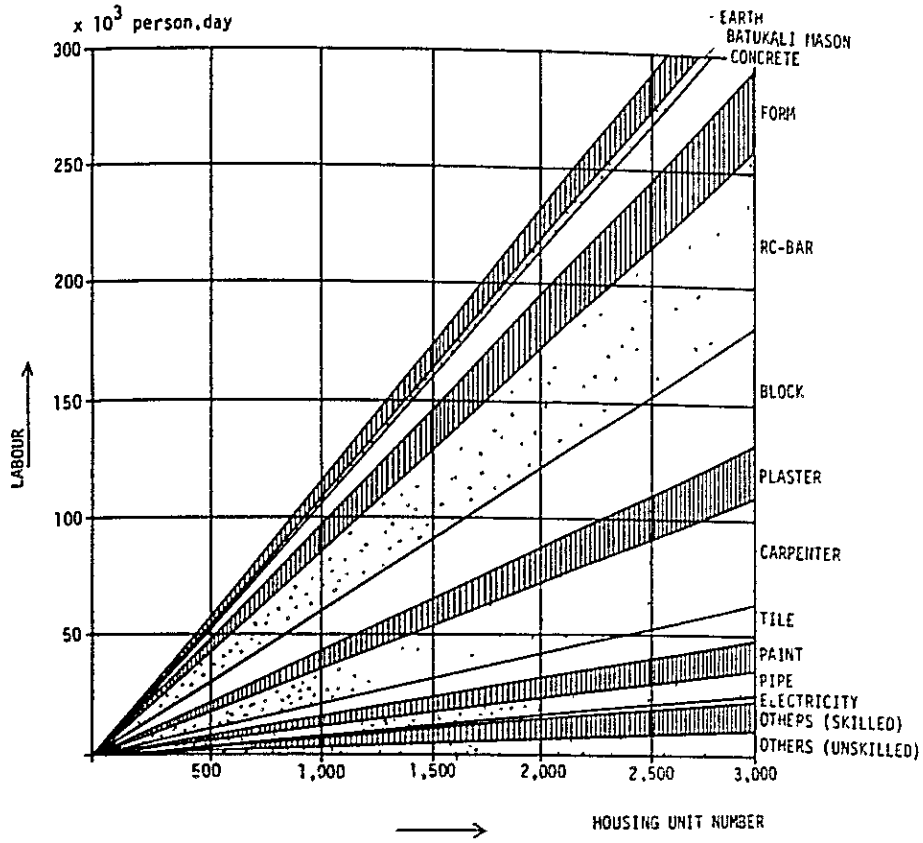


Fig. 7-10 NUMBER OF LABOURER AND HOUSING UNITS FOR FS'2-36 TYPE

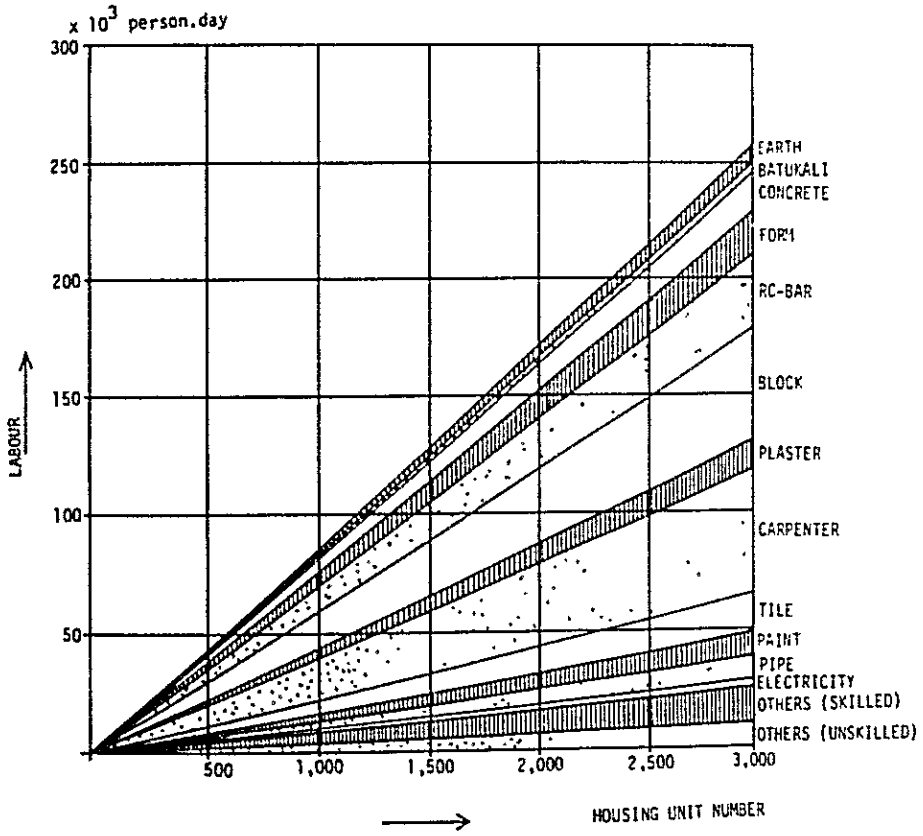


Fig. 7-11 NUMBER OF LABOURER AND HOUSING UNITS FOR M-36 TYPE

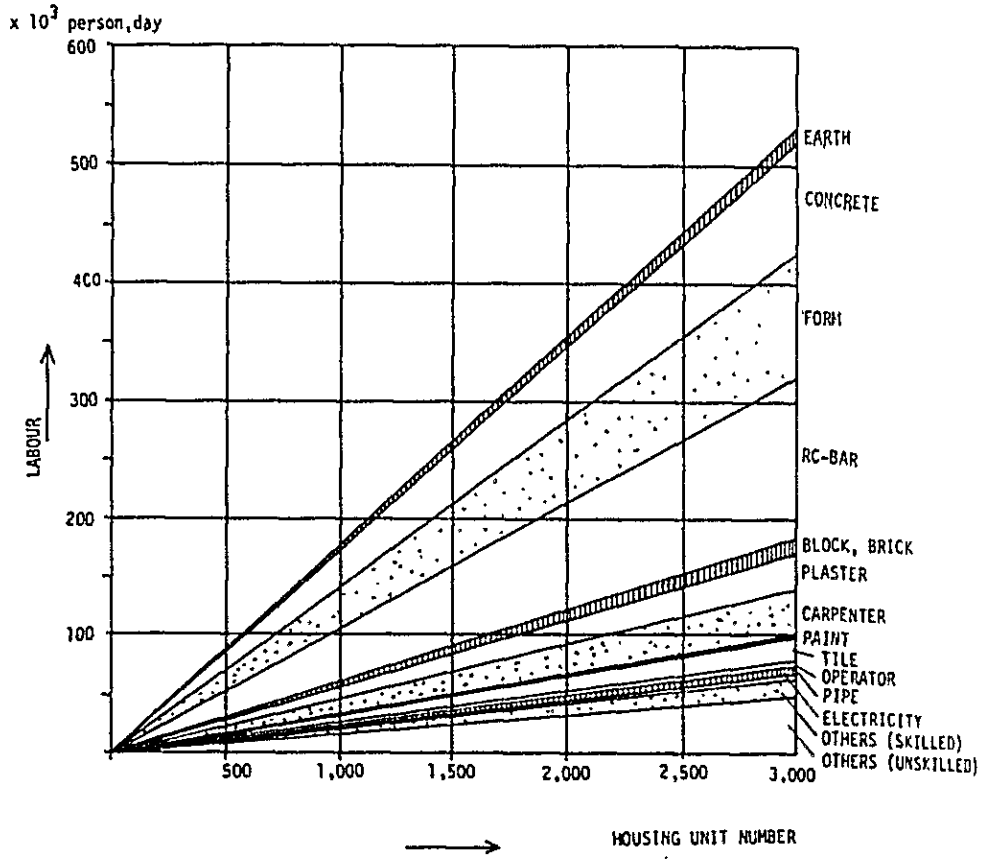


Fig. 7-12 NUMBER OF LABOURER AND HOUSING UNITS FOR 'FS'5-36 TYPE

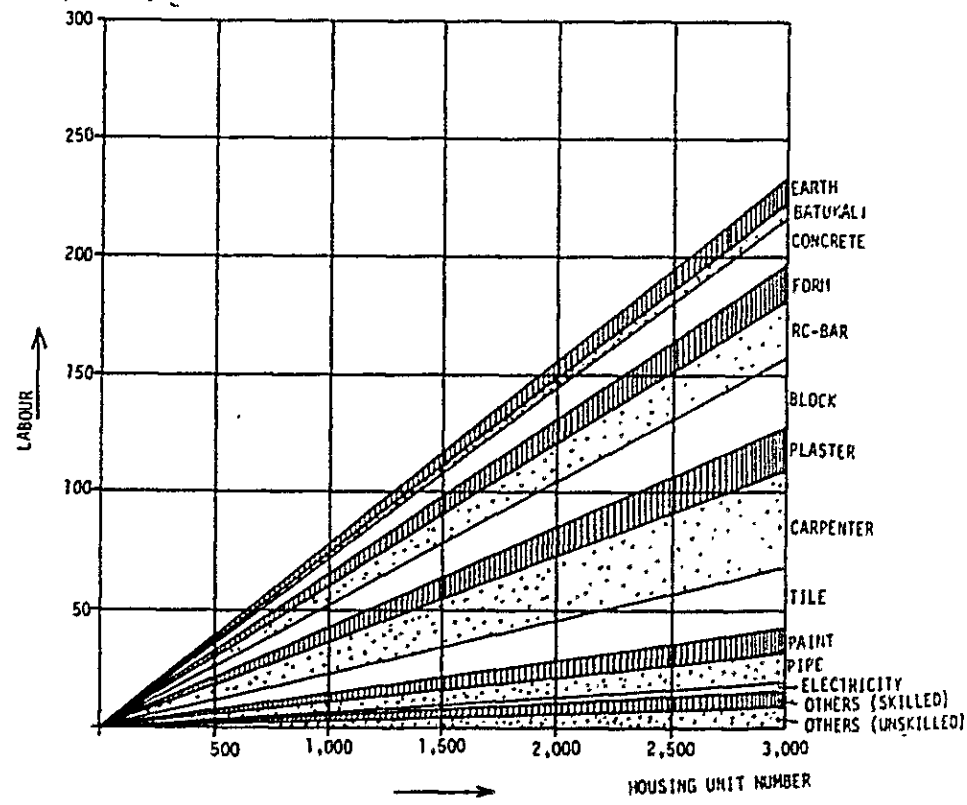


Fig. 7-13 NUMBER OF LABOURER AND HOUSING UNITS FOR R-36 TYPE

7-3 CONSTRUCTION METHOD AND PROCESS

7-3-1 Infrastructure work

a. Roads

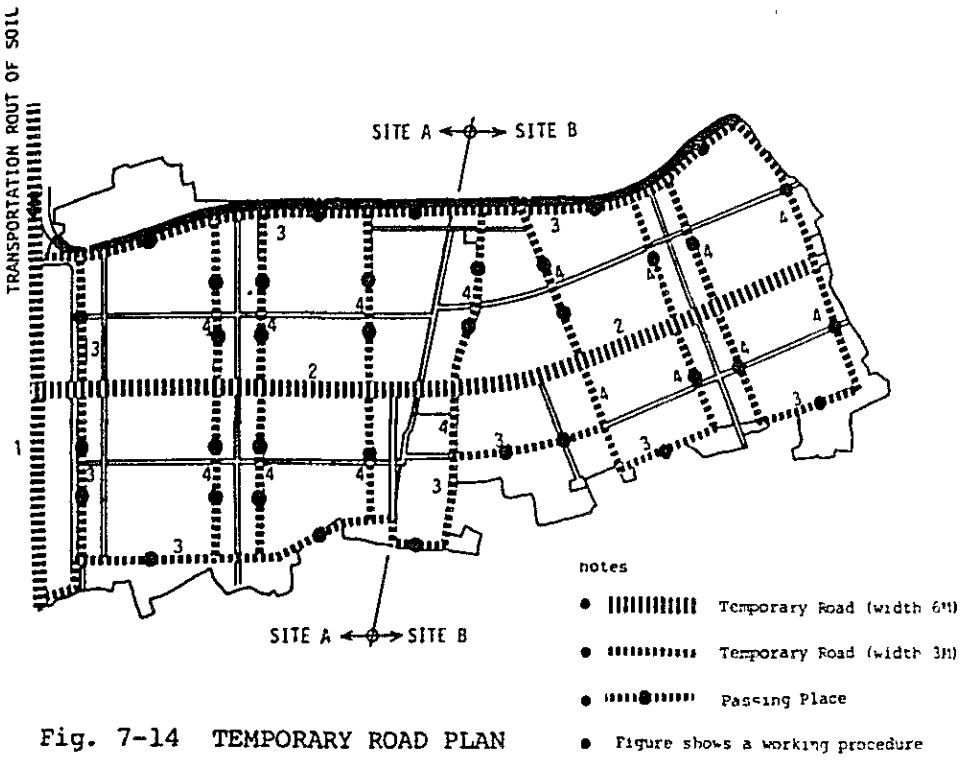


Fig. 7-14 TEMPORARY ROAD PLAN

A temporary road for the transportation of materials along the designed road as shown in Fig. 7-14 is provided, prior to construction. As this temporary road will be used for the transport of heavy loads to the site, it is vital that it be of sufficient strength to meet that need.

Filling soil for this road should be dry as much as possible and its work is necessary to use sand after the enough compaction. Filling soil with a thickness of about 30cm will be needed for the road in the right half of 'A' site. Therefore, it might be impossible to get sufficient dried-up soil, from the point of the working schedule, and latterite soil from outside may be necessary. Primary road will be liable to damage, because of the greater volume of traffic and should finish to the crushed stone layer (penetration layer) excluding the finish. Therefore, coral stone or crushed stone layer (150-200mm penetration layer) should be proceeded with promptly, and a sufficient number of labourers should be holded. The roads should be 6m wide and of two lanes. The service roads should finish to at least the crushed layer (50 - 70mm, Interior layer). This road is of 3m width and one lane traffic, but a passing place at intervals of about 100m shall be provided, for passing

or U turns, and it may be used as a detour when some troubles happened in primary roads .

b. Dry-up

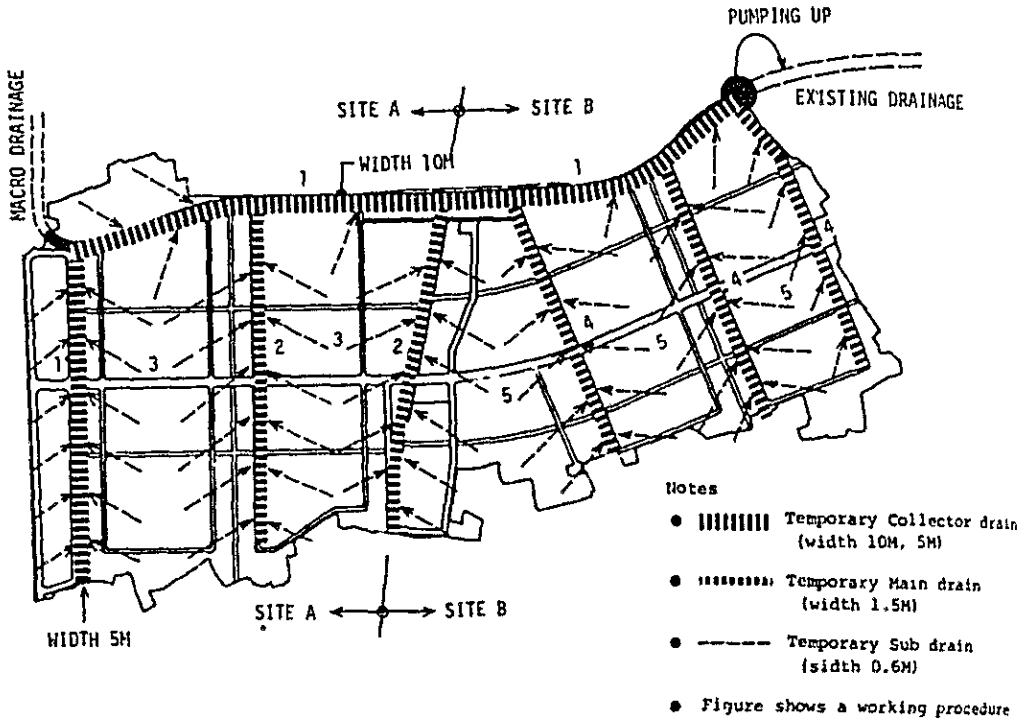


Fig. 7-15 TEMPORARY DRAIN PLAN

We are planning to proceed with the dry-up work for 6 months from April, to avoid the rainy season, and work on the temporary drains should start in February. The number of temporary drains may be increased due to the soft soil conditions, but if they are located following the micro and collector drainage proposed for the Project Area, a considerable saving in construction cost can be acheived. Therefore, we would like to put these temporary drains to the collector and micro drainages in the same location. The number of these temporary drains will decrease imparallel to the process of land development work, but temporary main drains should be remained.

The rain water flows in collector or the existing drainage, but the water flows to the existing drainage from the temporary collector by pumping. Also, the collector, of 5m, or 10m width should be completed as soon as possible, so that the main construction can start, while quick dry-up is obtained. It is necessary to succeed with the work on Site 'B' after work on Site 'A' is completed, and to make an early stockpile of soil.

c. Stockpile of soil and land development

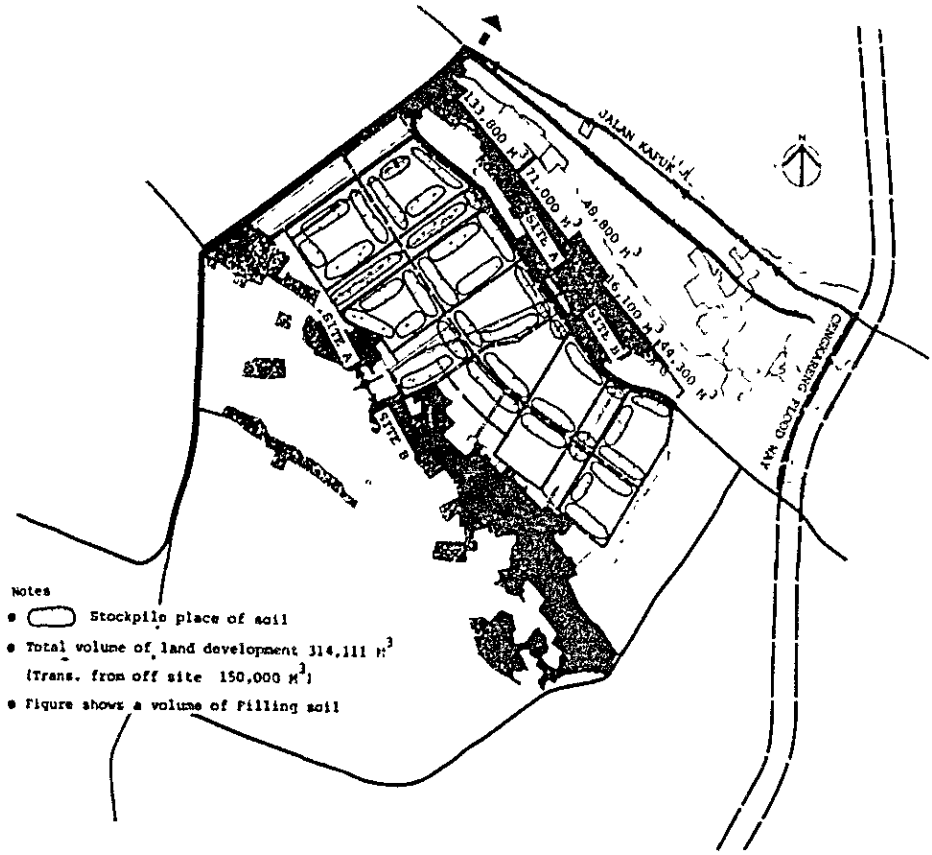


Fig. 7-16 STOCKPILE OF SOIL AND LAND DEVELOPMENT

Transportation from Cengkareug Floodway is done by means of trucks through Kapuk Street. The volume of soil is about 150,000m^3, and the soil is rich in moisture and consists of clay, so it has to be dried on the site. Therefore, it will be most effective to place the stockpiles of soil wide spread and low for drying, on both sides of the temporary road already completed, as shown in Fig. 7-16. Soil from the collector and micro drainages on site should also be stockpiled there.

It would be better for the land development to wait until the time when the inside of stockpiled soil becomes completely dry, but work must proceed under the schedule, even if it is not completely dry. Therefore, drying process and land development shall be done by turns unit by unit(neighbourhood unit).

The work will be done by mechanical power. The kind of machinery to be used is as following:

Bull dozer	(2)	Hydraulic excavator	1
Swampy dozer	4	Vibrating roller	2
Dozer shovel (30s type;	1)	Road roller	1
or (small type;	2)	Dump truck	10
Wheel Loader	1		

The amount of the above listed machinery to be used will depend on the working schedule. The capacity is controlled by the degree of drying of the stockpiled soil, but use of as much small machinery as possible will give the greatest efficiency. Swamp dozers will be mainly used for land development.

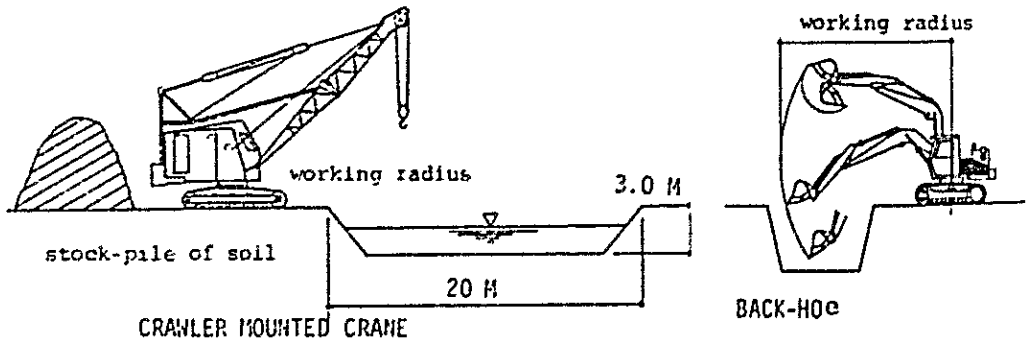
d. Collector and micro drainage

The kind of machinery to be used for collector is a crawler mounted crane, one or two of each, and cramshell may be used as an attachment. The working radius is 21m at max. and only one unit is enough to proceed with the work. The capacity of the bucket is 0.4060.8m^3, and working capacity is about 150 - 300m^3 per day. Also, it is possible to proceed with the work under the rear digging by the use of 2 each of a back-hoe or power shovel, and also it is possible to work by 7.1m in the working length and 4.3m in the working depth. The capacity of the bucket is 0.35 and 0.5m^3, and the working capacity will be about 200 - 280m^3 per day. It is also possible to dig even where the ground is a little hard.

The working ability is higher than a cramshell and it is easy to operate, the weight is about 10t. Therefore, its capacity for transportation and working is superior, but the kind and capacity of the machinery may be decided according to the working schedule.

The working process as shown in Fig. 7-15 is to start from the west side end of micro drainage, and to excavate on both sides toward east and west. The temporary drain line of 5m or 10m width for dry-up is already completed, therefore the work will be proceeded to the designed depth and width.

Micro drainage is effective to use a back-hoe or power-shovel. The work will start from the completed portion of land development at the same time as the work for collector, but it will not cause any trouble.



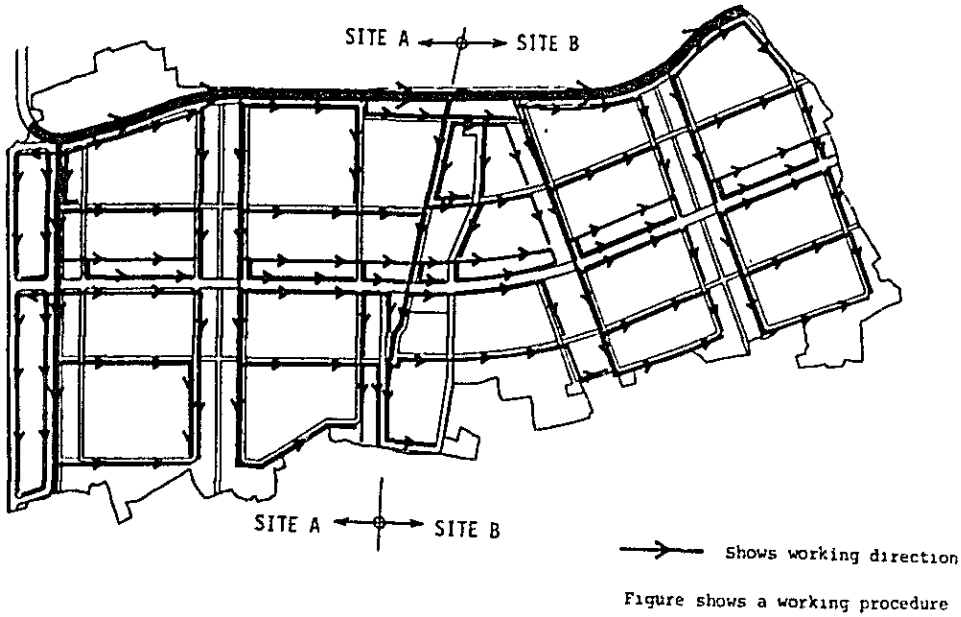


Fig. 7-17 WORKING PROCEDURE OF COLLECTOR AND MICRO DRAINAGE

7-3-2 Housing work

a. Walk-up-flats

They will be 5 stories and of reinforced concrete. We are estimating a work schedule of 14 months. Therefore, it is so pressed that the same time orders for each Site may be considered, and the start of the work must be done at the same time of the completion of temporary roads. The piling shall be used in the design, so the piles should be manufactured in the vicinity of the Site, in advance, and it is necessary to start the pile driving (by a drop hammer, diesel hammer) at the same time. The only problem related to other work is the temporary road problem. The work adjustment for such as stockyards for materials, working plants, roads for the transport etc. between each building construction will be very important, because of the considerable numbers of houses.

b. Two storied flats, low rise housing

They will be 2 storied and of concrete block. We are estimating a work schedule of 6 months, but we can save the working days even if the number of houses are too many, if the order is made not at the same time for each Site. In this case, the piles are not requested, so there is nothing to manufacture prior to the work. Even in this case, ensurement of stockyards for materials, working plants, road for the transport will be important like in walk-up-flat case.

7—4 PLANNING DATA

We would like to make note of the data regarding estimated standards for working schedule.

Table 7-3 DATA ON CALCULATIONS OF WORKING DAYS FOR INFRASTRUCTURES

Items		Estimated volume	Estimated days	Planning contents
Land development	Soil transp. of Cengkareng Floodway	150,000m³	'82/3-9 175 day	Pump truck 3.5m³/machine 150,000/175×3.5 → 245 machine/day
	Filling	230,000m³	'82/7-12 150 day	Types of Machine Bull dozer 3 Dozer shovel 1 Dump truck 5 600-700m³/day Moter grader 1 Compacting machine 2 230,000/150×600 = 2.56 → 3 parties
Collector and mirco-drainage	Excavating	27,700m³	'82/11-'83/4 150 day	Manual labour 3m³/machine·day 27,700/150×3 → 62 person/day
	Loading of Batukali	4,850m³		Manual labour 2m³/machine·day 4,850/150×2 → 17 person/day
Gutter	Excavating	10,740m³	'83/5-9 125 day	Manual labour 10,740/125×3 → 29 person/day
	Loading of Batukali	2,500m³		Manual labour 2,500/125×2 → 10 person/day
Road	Paved Area	25,380m²	'82/11-'83/4 150 day	by party Skilled labour 10 Unskilled labour 20 175m²/day Road roller 1 25,380/150×175 → 1 party
Footpatch	Excavating	4,170m³	'83/5-9 125 day	Manual labour 3m³/machine·day 4,170/125×3 → 12 person/day
	Concrete	1,720m³		Mixer 15m³/day 1,720/125×15 → 1.

7-5 WORK SCHEDULE

This project is closely related to the plan of the off-site. That is, it is the transportation of 150,000m^3 of soil for filling, from the Second Phase of Cengkareng Floodway, and the connection of collector to macro drainage . Therefore, we have to carry the necessary volume of soil by the time of completion of the Second Phase of Cengkareng Floodway under planning. The construction work in the site will be performed under these conditions.

The dry-up is to be completed by the end of September, 1982. According to the plan, the design conditions will be fully satisfied when connection is made with the macro drainage simultaneous with the completion of work, thereby promoting complete drying of the existing surface layer and the earthfill land development soil. We are expecting to provide housing during the REPELITA III, and the time of occupancy is divided into two stages due to the sales capacity. On the field work, the land will be split into two districts Site 'A' and Site 'B', and the work will proceed from west to east. It should be prior to the dry-up and the construction of temporary roads for the transportation of soil and materials. The temporary roads and drainage lines are performed in parallel, and the Site 'B' should be completed as earlier as possible after the completion of Site 'A'.

The completion of dry-up work will be the critical path of land development and micro drainages and roads will be the critical path of housing, the utilities are not critical. Each work will wholly be conducted in parallel, respectively, and the next work will be started from the completed sections. Therefore, we think the working procedure for adjustment in each work is complicated, so sufficient coordination will be necessary. There is a 6 month gap in substance, between the work on Site 'A' and 'B', and each Site has a standard 15 months working schedule. By the increase or decrease of labours and contractors, the changes in types and number of housing will be controlled.

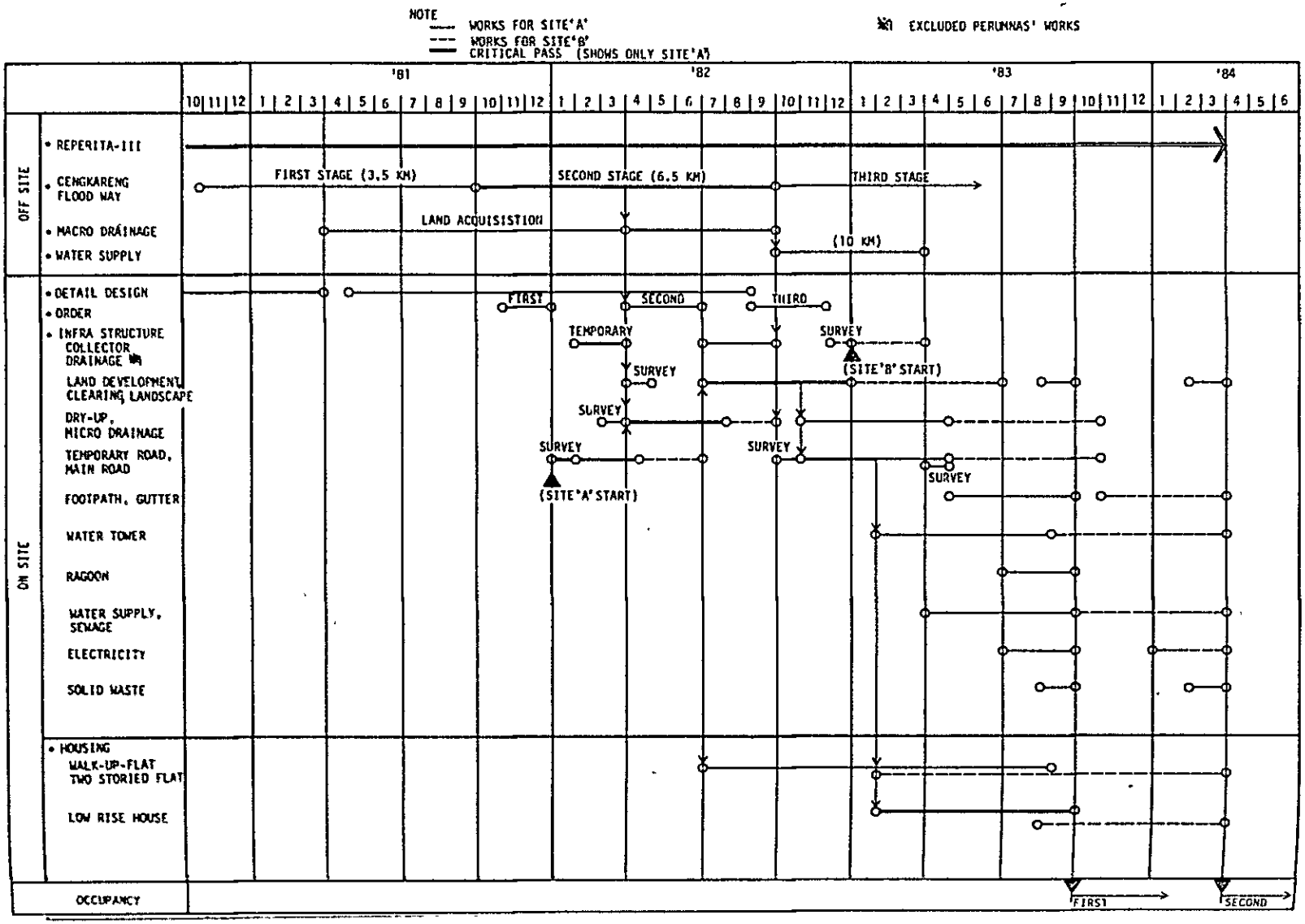
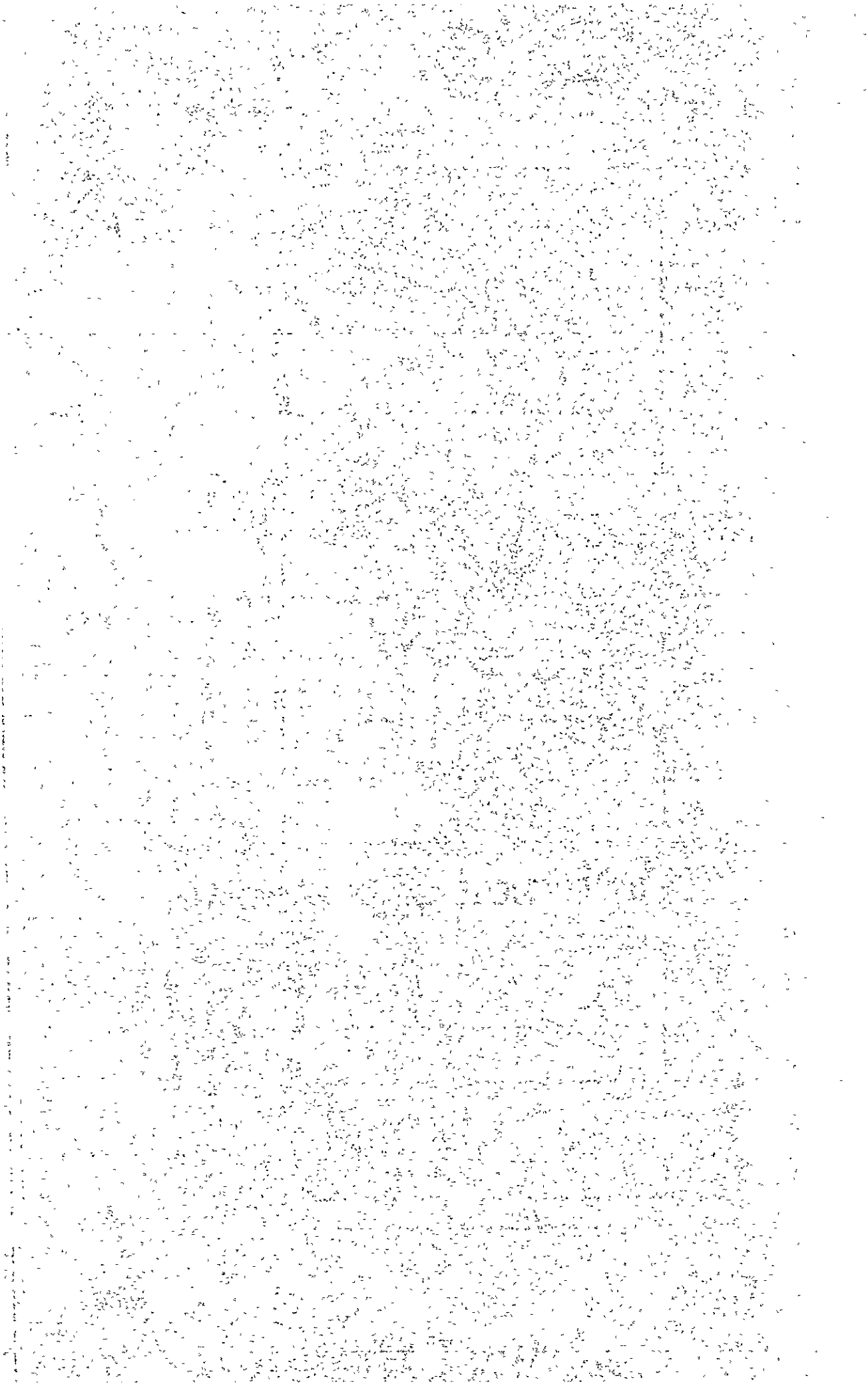


Fig. 7-18 IMPLEMENTATION SCHEDULE

8 PROJECT COST ESTIMATE



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8-1 OBJECTIVES OF THE WORK

The objectives of the work in Chapter 8 are as follows.

1. Calculation of basic house and land price by housing type at the time of affodability examination.

2. Calculation of the project cost.

The work flow of Chapter 8 is shown in Fig. 8-1.

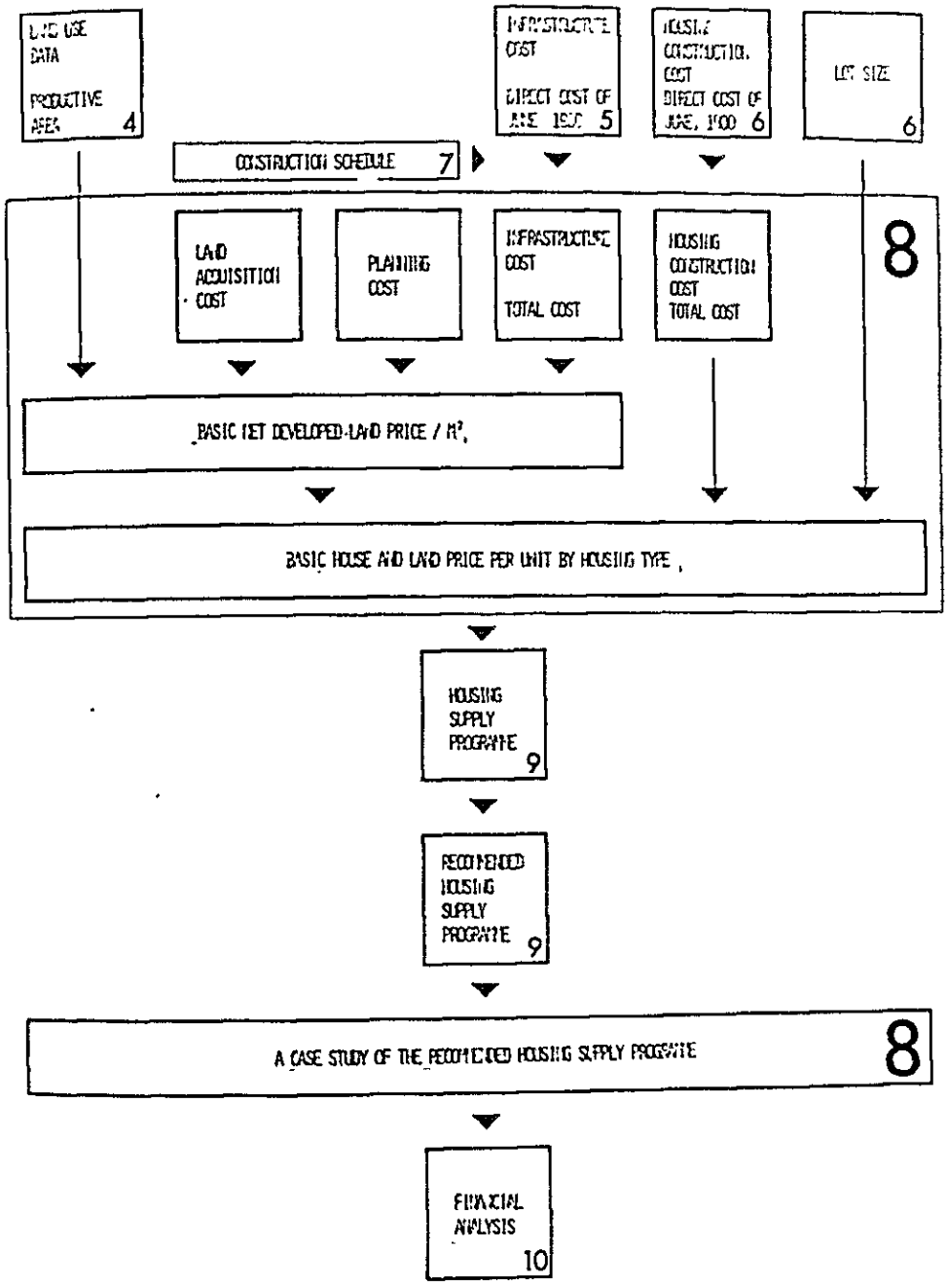


Fig. 8-1 WORK FLOW

4~10 : Chapters

8-2 METHOD FOR COST CALCULATION

8-2-1 Basis for calculation

The calculation of costs is based on PERUM PERUMNAS

"Basic Guide to Calculating House and Land Prices for Construction Credit". (June, 1980)

The basic assumptions in calculation are as follows.

1. All the project costs are covered by selling housing and empty lots.

2. Cross subsidy is intended. (See 9-4-2).

3. The capital provided by PERUM PERUMNAS covers:
   Land acquisition cost
   Planning cost
   Interest
   Overhead
   Investment for allocation
   Insurance

   Construction credit covers:
   Infrastructure cost
   Hosuing construction cost
   (including physical contingency and price contingency)

4. The capital provided by PERUM PERUMNAS does not require interest, while the construction credit requires an annual interest of 13.5%. For calculation of basic house and land prices to examine the affordability of the target income group, an annual interest rate of 11.5% is taken as the average interest rate for all the projects by PERUM PERUMNAS in Indonesia.

5. Physical contingency is 10% for both infrastructure costs and housing construction costs.

   Price contingency is 15% for both infrastructure costs and housing construction costs.

6. Overhead is 10% for planning costs, infrastructure costs and housing construction costs.

7. Investment for allocation is 1.5% for planning costs, infrastructure costs and housing construction costs.

8. Insurance is 4% for housing construction costs.

8-2-2 Data Source

Infrastructure costs and housing construction costs (Direct costs of June, 1980), estimated in Chapters 5 and 6 respectively are based on the following data.

A. Prices of labour and material

1. Price List of Building Material in Jakarta (June, 1980)
   Building Information Centre, Cipta Karya
   *DAFTAR HARGA SATUAN BAHAN BANGUNAN DI JAKARTA

2. Logistic Price List (June, 1980): PERUM PERUMNAS

B. Unit volume of labour and material by work

1. Basic Method for Calculation of Building Cost
   Ir. J. A. Mukomoko, 1978
   *DASAR PENYUSUNAN ANGGARAN BIAYA BANGUNAN

2. Unit Price List in Indonesia (Apr.-June, 1979)
   Building Information Centre, Cipta Karya
   *DAFTAR SATUAN PEKERJAAN DI INDONESIA

To make an adequate estimate for the construction by PERUM PERUMNAS, information, including experiences in other development by PERUM PERUMNAS, obtained from the following sources is also taken into account.

1. Logistic Division, PERUM PERUMNAS

2. Construction Division, PERUM PERUMNAS

3. Directorate of Sanitary Engineering, General Diretorate of Cipta Karya

4. Pam-Jaya

5. Various contractors and suppliers

See Appedix for cost data.

8-2-3 Date of estimate

Based on the study in Chapter 7, the date of the estimate is set as shown in Fig. 8-2. Costs are based on the data of June, 1980, and are uniformly multipled by the annual inflation rate of 15%.

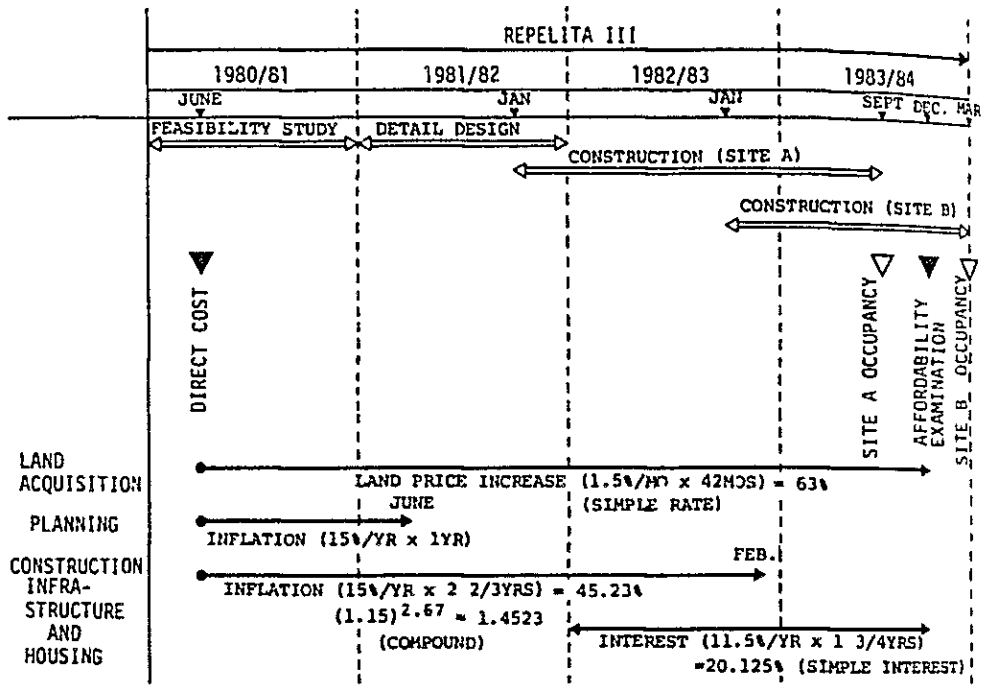
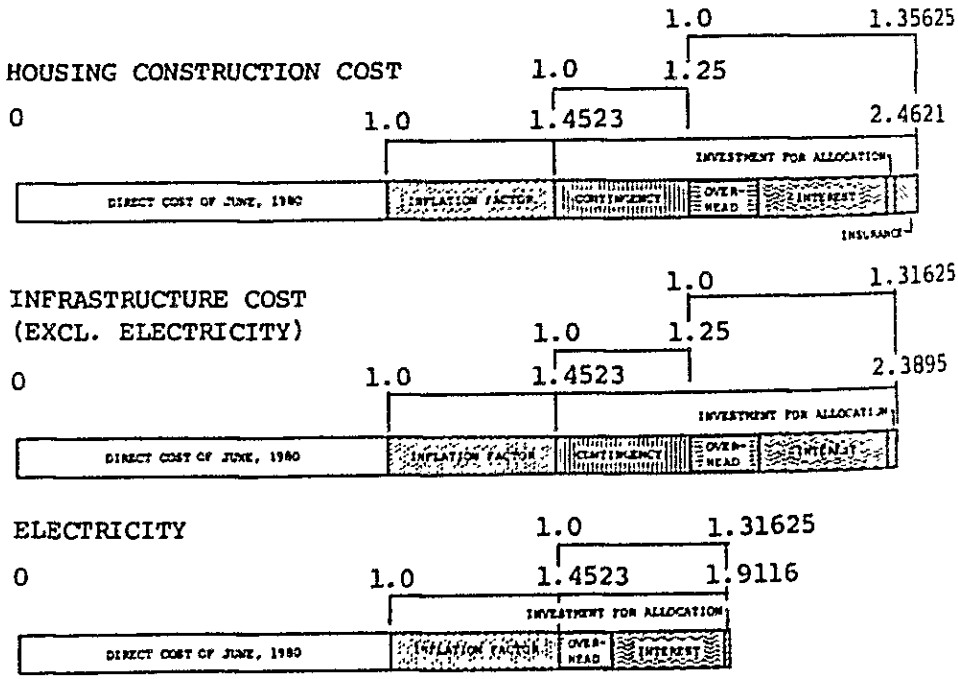


Fig. 8-2 CONSTRUCTION SCHEDULE AND DATE OF ESTIMATE

COMPOSITION OF COST



8-2-4 Off-site infrastructure costs borne by PERUM PERUMNAS

The construction cost for three culverts cross the existing irrigation canal along Kapuk Kamal Street is borne by PERUM PERUMNAS. (Fig. 8-3.)

8-2-5 On-site infrastructure costs not borne by PERUM PERUMNAS

The construction cost of the access road and the two collector drainages are not borne by PERUM PERUMNAS. (Fig. 8-3.)

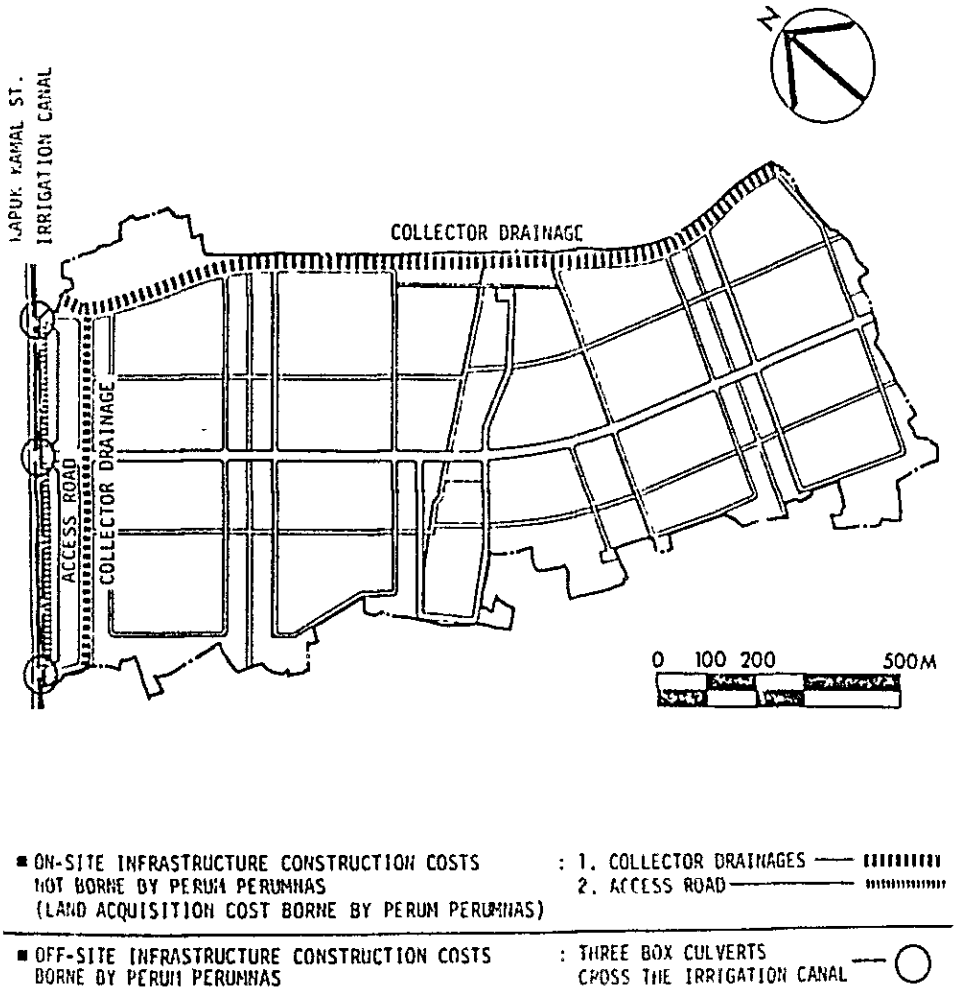


Fig. 8-3 INFRASTRUCTURE COSTS

8-2-6 Community facility costs borne by PERUM PERUMNAS

The land for the following community facilities shown in Table 8-1 is prepared by PERUM PERUMNAS, and

a. Sold at market price

b. Sold at market price with a 50% subsidy

c. Sold at *net developed land price *See 8-2-7.

d. Provided at no cost

The construction costs of community facilities are not borne by PERUM PERUMNAS, except when otherwise indicated.

Table 8-1 COMMUNITY FACILITY COSTS

	Land is:	Construction cost borne by:
Recreational facilities	d	
Educational facilities		
Kindergarten	c	
Elementary school	d	
Junior high school	c	
Senior high school	c	
Religious facilities	d	
Medical facilities		
Poly-clinic	d	
Health centre	d	
Hospital	a	
Administrative/Municipal/ Utility facilities		
Watch guard	d	
Bus stop	d	
Public telephone	d	
Post box	d	
Solid waste deposit	d	PERUM PERUMNAS
Electricity	a	PERUM PERUMNAS
Government branch	d	
Fire station	d	
Branch post office	d	
Police station	d	
Kelurahan office	d	
PERUM PERUMNAS office	d	
Three houses for PERUM PERUMNAS staffs	d	
Commercial facilities	a	

8-2-7 Formulas for the calculation of net developed land price and basic house and land price

The basic net developed land price Bj for the alternative plan j is given by the following formula.

$$B_j = \frac{(C_a \times K) + C_b + C_j}{G_j}$$

C_a: Land acquisition cost
K : Land price increase ratio during the development period 1.5% increase per month
C_b: Planning cost
C_j: Infrastructure cost for alternative plan j
G_j: Productive area for the alternative plan j

For the convenience of the feasibility study, both C_j and G_j are invariant over the alternative plans. Therefore,

$$B_j = B, \quad C_j = C, \quad G_j = G.$$

The basic house and land price D_i for housing type i is given by the following formula.

$$D_i = B \times A_i + C_i + E$$

A_i: Nominal lot size for housing type i
C_i: Housing construction cost per unit for housing type i
E : Cost for the right to build (Rp. 40,000 per unit)

The detailed process of the above calculation is shown in 8-4.

8-3 BASIC HOUSE AND LAND PRICE PER UNIT BY HOUSING TYPE

Basic house and land prices per unit for the types of housing studied in Chapter 6 are shown in Table 8-2.

Table 8-2 BASIC HOUSE AND LAND PRICES

Type	Floor area m2	Lot size m2	*1 Construction cost per unit x Rp.1,000	*2 Land price per unit x Rp.1,000	*3 Basic house & land price x Rp.1,000
FS'-2-26 (F2-26)	26	35.0	2,505	877	3,422
FS'-2-36N (F2-36)	36	50.0	3,483	1,252	4,775
M-36	36	60.0	3,295	1,503	4,838
R-36N	36	75.0	3,417	1,879	5,336
D-15	18	72.0	1,529	1,804	3,373
D-21	24	96.0	2,017	2,406	4,463
D-36	36	108.0	3,068	2,706	5,814
FS'-5-36 (F5-36)	36	35.0	7,278	877	8,195

( ): The name of a type used in Chapter 9.

*1 : Cost at the time of the affordability examination. (Dec., 1983)

*2 : Land price at the time of the affordability examination.

Basic net developed land price per m x lot size

*3 : Construction cost per unit + Land price per unit + Rp.40,000 (Cost for the right to build).

8-4 CASE STUDY

The number of units to be supplied under the recommended housing supply programme studied in Chapter 9 is shown in Table 8-3.

Table 8-3 RECOMMENDED HOUSING SUPPLY PROGRAMME

Type I	FS'-2-36N (F2-36)	2,510 units
Type II	M-36	1,890 units
Type III	FS'-5-36 (F5-36)	880 units
Type IV	R-36N	1,500 units
Average 150 m2 empty lots		770 units

Computer aided calculation of the above case for:

Basic net developed land prices
Basic house and land prices
Total project costs

is given in the following pages.

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**********************
 00.00  LAND USE DATA
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01	OFF-SITE INFRASTRUCTURE AREA		0 M2
02	SITE AREA		1,100,000 M2
03	ON-SITE ROAD AREA		250,000 M2
04	OPEN SPACE AREA		130,000 M2
05	COMMERCIAL FACILITY AREA		80,000 M2
06	SOCIAL FACILITY AREA		80,000 M2
07	HOUSING AREA		560,000 M2
08	PRODUCTIVE AREA	00.05 + 00.07	640,000 M2
09	PERCENTAGE OF ON-SITE ROAD AREA	(00.03 / 00.02) X 100 %	23 %
10	PERCENTAGE OF OPEN SPACE AREA	(00.04 / 00.02) X 100 %	12 %
11	PERCENTAGE OF COMMERCIAL FACILITY AREA	(00.05 / 00.02) X 100 %	7 %
12	PERCENTAGE OF SOCIAL FACILITY AREA	(00.06 / 00.02) X 100 %	7 %
13	PERCENTAGE OF HOUSING AREA	(00.07 / 00.02) X 100 %	51 %
14	PERCENTAGE OF PRODUCTIVE AREA	(00.08 / 00.02) X 100 %	58 %
15	FLOOR AREA / LOT SIZE TYPE I (F2-36)		36.0 / 50.0 M2/M2
16	FLOOR AREA / LOT SIZE TYPE II (M-36)		36.0 / 60.0 M2/M2
17	FLOOR AREA / LOT SIZE TYPE III (F5-36)		36.0 / 35.0 M2/M2
18	FLOOR AREA / LOT SIZE TYPE IV (R-36N)		36.0 / 75.0 M2/M2
19	FLOOR AREA / LOT SIZE TYPE V		0.0 / 0.0 M2/M2
20	NUMBER OF UNITS TYPE I (F2-36)		2516 UNITS
21	NUMBER OF UNITS TYPE II (M-36)		1904 UNITS
22	NUMBER OF UNITS TYPE III (F5-36)		884 UNITS
23	NUMBER OF UNITS TYPE IV (R-36N)		1496 UNITS
24	NUMBER OF UNITS TYPE V		0 UNITS
25	TOTAL NUMBER OF UNITS	SUM(00.20+---+00.24)	6800 UNITS
26	EMPTY LOT SIZE TYPE I		90.0 M2
27	EMPTY LOT SIZE TYPE II		120.0 M2
28	EMPTY LOT SIZE TYPE III		150.0 M2
29	EMPTY LOT SIZE TYPE IV		200.0 M2
30	EMPTY LOT SIZE TYPE V		0.0 M2
31	NUMBER OF EMPTY LOTS TYPE I		0 UNITS
32	NUMBER OF EMPTY LOTS TYPE II		0 UNITS
33	NUMBER OF EMPTY LOTS TYPE III (150 M2)		770 UNITS
34	NUMBER OF EMPTY LOTS TYPE IV		0 UNITS
35	NUMBER OF EMPTY LOTS TYPE V		0 UNITS
36	TOTAL NUMBER OF EMPTY LOTS	SUM(00.31+---+00.35)	770 UNITS
37	TOTAL NUMBER OF LOTS	00.25+00.36	7570 UNITS
38	TOTAL OF IRREGULAR LAND (DIFFERENCE BETWEEN HOUSING AREA AND TOTAL OF NOMINAL LOTS)	00.07-(00.15X00.20+00.16X00.21 +00.17X00.22+00.18X00.23+00.19X00.24 +00.26X00.31+00.27X00.32+00.28X00.33 +00.29X00.34+00.30X00.35)	61320 M2
39	IRREGULAR LOT CORRECTION FACTOR	00.38/00.07	0.1095
40	GROSS DENSITY	(00.37/00.02) X 10,000	68.8 UNIT/HA

* The area for a hospital is included to commercial facility area, here. Therefore, the land use data differ from those in Chapter 4.

01.00 LAND ACQUISITION COST

x 1,000

01	LAND COMPENSATION	ACTUAL	0	RP.
02	VEGETATION COMPENSATION	ACTUAL	0	RP.
03	BUILDING COMPENSATION	ACTUAL	0	RP.
04	SUB TOTAL	01.01+01.02+01.03	0	RP.
05	OPERATION COST OF COMMITTEE	ACTUAL	0	RP.
06	ADMINISTRATION COST	ACTUAL	0	RP.
07	HONORARIUM FOR COMMITTEE	ACTUAL	0	RP.
08	TOTAL OPERATION COST	01.05+01.06+01.07	0	RP.
09	SUB TOTAL LAND ACQUISITION COST IN JUNE,1980	01.04+01.08 (00.02 X RP.3,000/M2)	3,300,000	RP.
10	RIGHT OF DEVELOPMENT (HAK PENGALOLAAN)	01.09 X 3.5%	115,500	RP.
11	DEVELOPMENT TAX (IPEDA)	00.02 X RP.7/M2/YR. X 2YR.	15,400	RP.
12	TOTAL LAND ACQUISITION COST	01.09+01.10+01.11	3,430,900	RP.

02.00 PLANNING COST

x 1,000

01	TOPOGRAPHICAL SURVEY	00.02 X RP.8/M2	8,800	RP.
02	SOIL INVESTIGATION	ESTIMATED	11,000	RP.
03	FEASIBILITY STUDY AND DETAIL ENGINEERING	00.02 X RP.100/M2	110,000	RP.
04	INFLATION FACTOR	SUM(02.01+---+02.03) X 15%	19,470	RP.
05	LEGALIZATION	(04.06X00.20+04.17X00.21 +04.28X00.22+04.39X00.23 04.50X00.24) X 1%	195,988	RP.
06	SUB-TOTAL	SUM(02.01+---+02.05)	345,258	RP.
07	OVERHEAD	02.06 X 10%	34,526	RP.
08	INVESTMENT FOR ALLOCATION	02.06 X 1.5%	5,179	RP.
09	TOTAL	SUM(02.06+02.07+02.08)	384,962	RP.

03.0) INFRASTRUCTURE COST

X 1,000

01	OFF-SITE INFRASTRUCTURE (JUNE,1980)	ESTIMATED	38,588 RP.
02	SETTING AND STAKING OUT (JUNE,1980)	00.02 X RP.11.5/M2	12,650 RP.
03	LAND DEVELOPMENT (JUNE,1980)	ESTIMATED	338,360 RP.
04	ROAD AND BRIDGE (JUNE,1980)	ESTIMATED	618,038 RP.
05	DRAINAGE (JUNE,1980)	ESTIMATED	768,896 RP.
06	SEWERAGE (JUNE,1980)	ESTIMATED	975,000 RP.
07	LANDSCAPING (JUNE,1980)	ESTIMATED	12,650 RP.
08	SOLID WASTE DISPOSAL (JUNE,1980)	ESTIMATED	32,700 RP.
09	SOCIAL FACILITIES (JUNE,1980)	ESTIMATED	0 RP.
10	WATER SUPPLY (JUNE,1980)	ESTIMATED	823,800 RP.
11	INFLATION FACTOR	SUM(03.01+---+03.10) X 45.23%	1,637,714 RP.
12	CONSTRUCTION COST IN FEB ,1983	SUM(03.01+---+03.11)	5,258,396 RP.
13	ELECTRICITY (JUNE,1980)	ESTIMATED	735,700 RP.
14	GAS (JUNE,1980)	ESTIMATED	0 RP.
15	INFLATION FACTOR	(03.13+03.14) X 45.23%	332,773 RP.
16	CONSTRUCTION COST IN FEB ,1983	03.13+03.14+03.15	1,068,473 RP.
17	PHYSICAL CONTINGENCY	03.12 X 10%	525,840 RP.
18	PRICE CONTINGENCY	03.12 X 15%	788,759 RP.
19	SUB-TOTAL	03.12+03.16+03.17+03.18	7,641,468 RP.
20	OVERHEAD	03.19 X 10%	764,147 RP.
21	INVESTMENT FOR ALLOCATION	03.19 X 1.5%	114,622 RP.
22	INTEREST	03.19 X 11.5%/YR. X 1.75YR.	1,537,846 RP.
23	TOTAL	03.19+03.20+03.21+03.22	10,058,083 RP.

04.03 HOUSING CONSTRUCTION COST/UNIT

TYPE I (F2-36) — X 1,000

HOUSING CONSTRUCTION COST IN JUNE,1980	ESTIMATED	1414.47	RP.
INFLATION FACTOR	04.01 X 45.23%	639.80	PR.
CONSTRUCTION COST IN FEB ,1983	04.01 + 04.02	2054.27	RP.
PHYSICAL CONTINGENCY	04.03 X 10%	205.43	RP.
PRICE CONTINGENCY	04.03 X 15%	308.14	RP.
SUB-TOTAL	04.03+04.04+04.05	2567.83	RP.
OVERHEAD	04.06 X 10%	256.78	RP.
INVESTMENT FOR ALLOCATION	04.06 X 1.5%	38.52	RP.
INTEREST	04.06 X 11.5%/YR. X 1.75YR.	516.78	RP.
INSURANCE	04.06 X 4%	102.71	RP.
TOTAL	SUM(04.06+---+04.10)	3482.62	RP.

TYPE II (R-36) — X 1,000

HOUSING CONSTRUCTION COST IN JUNE,1980	ESTIMATED	1338.13	RP.
INFLATION FACTOR	04.12 X 45.23%	605.27	PR.
CONSTRUCTION COST IN FEB ,1983	04.12 + 04.13	1943.40	RP.
PHYSICAL CONTINGENCY	04.14 X 10%	194.34	RP.
PRICE CONTINGENCY	04.14 X 15%	291.51	RP.
SUB-TOTAL	04.14+04.15+04.16	2429.24	RP.
OVERHEAD	04.17 X 10%	242.92	RP.
INVESTMENT FOR ALLOCATION	04.17 X 1.5%	36.44	RP.
INTEREST	04.17 X 11.5%/YR. X 1.75YR.	488.89	RP.
INSURANCE	04.17 X 4%	97.17	RP.
TOTAL	SUM(04.17+---+04.21)	3294.66	RP.

TYPE III (F5-36) — X 1,000

HOUSING CONSTRUCTION COST IN JUNE,1980	ESTIMATED	2956.09	RP.
INFLATION FACTOR	04.23 X 45.23%	1337.10	PR.
CONSTRUCTION COST IN FEB ,1983	04.23 + 04.24	4293.19	RP.
PHYSICAL CONTINGENCY	04.25 X 10%	429.32	RP.
PRICE CONTINGENCY	04.25 X 15%	643.98	RP.
SUB-TOTAL	04.25+04.26+04.27	5366.49	RP.
OVERHEAD	04.28 X 10%	536.65	RP.
INVESTMENT FOR ALLOCATION	04.28 X 1.5%	80.50	RP.
INTEREST	04.28 X 11.5%/YR. X 1.75YR.	1080.01	RP.
INSURANCE	04.28 X 4%	214.66	RP.
TOTAL	SUM(04.28+---+04.32)	7278.31	RP.

TYPE IV (R-36N) — X 1,000

HOUSING CONSTRUCTION COST IN JUNE,1980	ESTIMATED	1387.73	RP.
INFLATION FACTOR	04.34 X 45.23%	627.70	PR.
CONSTRUCTION COST IN FEB ,1983	04.34 + 04.35	2015.43	RP.
PHYSICAL CONTINGENCY	04.36 X 10%	201.54	RP.
PRICE CONTINGENCY	04.36 X 15%	302.31	RP.
SUB-TOTAL	04.36+04.37+04.38	2519.29	RP.
OVERHEAD	04.39 X 10%	251.93	RP.
INVESTMENT FOR ALLOCATION	04.39 X 1.5%	37.79	RP.
INTEREST	04.39 X 11.5%/YR. X 1.75YR.	507.01	RP.
INSURANCE	04.39 X 4%	100.77	RP.
TOTAL	SUM(04.39+---+04.43)	3416.79	RP.

05.01 BASIC NET DEVELOPED LAND PRICE / M2 OR / UNIT

				X 1,000
01	LAND ACQUISITION COST		01.12	3,430,900 RP./
02	LAND PRICE INCREASE		05.01 X 1.5%/MO. X 42MO.	2,161,467 RP./
03	PLANNING COST		02.09	384,962 RP./
04	LAND DEVELOPMENT COST		03.23	10,058,083 RP./
05	TOTAL		SUM(05.01+---+05.04)	16,035,412 RP./
06	PRODUCTIVE AREA		00.08	640,000 M2
07	BASIC NET DEVELOPED LAND PRICE / M2		05.05 / 05.06	25.06 RP./
08	BASIC NET DEVELOPED LAND PRICE / UNIT	TYPE I (F2-36)	05.07 X 00.15	1252.77 RP./
09	BASIC NET DEVELOPED LAND PRICE / UNIT	TYPE II (M-36)	05.07 X 00.16	1503.32 RP./
10	BASIC NET DEVELOPED LAND PRICE / UNIT	TYPE III (F5-36)	05.07 X 00.17	876.94 RP./
11	BASIC NET DEVELOPED LAND PRICE / UNIT	TYPE IV (R-36N)	05.07 X 00.18	1879.15 RP./
12	BASIC NET DEVELOPED LAND PRICE / UNIT	TYPE V	05.07 X 00.19	0.00 RP./
13	BASIC NET DEVELOPED LAND PRICE/UNIT EMPTY LOT TYPE I		05.07 X 00.26	2254.98 RP./
14	BASIC NET DEVELOPED LAND PRICE/UNIT EMPTY LOT TYPE II		05.07 X 00.27	3006.64 RP./
15	BASIC NET DEVELOPED LAND PRICE/UNIT EMPTY LOT TYPE III (150 M2)		05.07 X 00.28	3758.30 RP./
16	BASIC NET DEVELOPED LAND PRICE/UNIT EMPTY LOT TYPE IV		05.07 X 00.29	5011.07 RP./
17	BASIC NET DEVELOPED LAND PRICE/UNIT EMPTY LOT TYPE V		05.07 X 00.30	0.00 RP./

06.00 BASIC HOUSE & LAND PRICE / UNIT

				X 1,000
01	BASIC HOUSE & LAND PRICE / UNIT	TYPE I (F2-36)	04.11+05.08+RP.40,000*	4775.39 RP./
02	BASIC HOUSE & LAND PRICE / UNIT	TYPE II (M-36)	04.22+05.09+RP.40,000*	4837.98 RP./
03	BASIC HOUSE & LAND PRICE / UNIT	TYPE III (F5-36)	04.33+05.10+RP.40,000*	8195.24 RP./
04	BASIC HOUSE & LAND PRICE / UNIT	TYPE IV (R-36N)	04.44+05.11+RP.40,000*	5335.93 RP./
05	BASIC HOUSE & LAND PRICE / UNIT	TYPE V	04.55+05.12+RP.40,000*	40.00 RP./

* COST FOR THE RIGHT TO BUILD : RP.40,000/UNIT
(HAK GUNA BANGUNAN COST)

****
07.00 SUBSIDY OR PROFIT / UNIT
****

X 1,000

01	SUBSIDY / UNIT TYPE I (F2-36)		745.39 RP.
02	SUBSIDY / UNIT TYPE II (M-36)		0.00 RP.
03	SUBSIDY / UNIT TYPE III (F5-36)		4725.24 RP.
04	SUBSIDY / UNIT TYPE IV (R-36N)		0.00 RP.
05	SUBSIDY / UNIT TYPE V		0.00 RP.
06	SUBSIDY FOR SOCIAL FACILITY / M2		0.00 RP.
07	PROFIT / UNIT TYPE I (F2-36)		0.00 RP.
08	PROFIT / UNIT TYPE II (M-36)		592.02 RP.
09	PROFIT / UNIT TYPE III (F5-36)		0.00 RP.
10	PROFIT / UNIT TYPE IV (R-36N)		1854.07 RP.
11	PROFIT / UNIT TYPE V		0.00 RP.
12	PROFIT / UNIT EMPTY LOT TYPE I		0.00 RP.
13	PROFIT / UNIT EMPTY LOT TYPE II		0.00 RP.
14	PROFIT / UNIT EMPTY LOT TYPE III (150 M2)		1746.00 RP.
15	PROFIT / UNIT EMPTY LOT TYPE IV		0.00 RP.
16	PROFIT / UNIT EMPTY LOT TYPE V		0.00 RP.
17	PROFIT FROM COMMERCIAL FACILITY / M2		11.64 RP.

****
08.00 PRICE / UNIT OR M2
****

X 1,000

01	LAND & HOUSE PRICE / UNIT TYPE I (F2-36)	06.01 (-07.01 OR +07.07)	4030.00 RP.
02	LAND & HOUSE PRICE / UNIT TYPE II (M-36)	06.02 (-07.02 OR +07.08)	5430.00 RP.
03	LAND & HOUSE PRICE / UNIT TYPE III(F5-36)	06.03 (-07.03 OR +07.09)	3470.00 RP.
04	LAND & HOUSE PRICE / UNIT TYPE IV (R-36N)	06.04 (-07.04 OR +07.10)	7190.00 RP.
05	LAND & HOUSE PRICE / UNIT TYPE V	06.05 (-07.05 OR +07.11)	0.00 RP.
06	LAND PRICE / UNIT EMPTY LOT TYPE I	05.13+07.12	2254.98 RP.
07	LAND PRICE / UNIT EMPTY LOT TYPE II	05.14+07.13	3006.64 RP.
08	LAND PRICE / UNIT EMPTY LOT TYPE III (150 M2)	05.15+07.14	5504.30 RP.
09	LAND PRICE / UNIT EMPTY LOT TYPE IV	05.16+07.15	5011.07 RP.
10	LAND PRICE / UNIT EMPTY LOT TYPE V	05.17+07.16	0.00 RP.
11	COMMERCIAL FACILITY LOT PRICE / M2	05.07+07.17	36.70 RP.
12	SOCIAL FACILITY LOT PRICE / M2	05.07-07.06	0.00 RP.

****
09.00 SUMMARY OF PROJECT COST
****

			X 1,000
01	LAND ACQUISITION COST	01.12	3,430,900 RP.
02	PLANNING COST	02.06	345,258 RP.
03	INFRASTRUCTURE COST	03.12+03.16	6,326,869 RP.
04	HOUSING CONSTRUCTION COST	04.03X00.20+04.14X00.21 +04.25X00.22+04.36X00.23 +04.47X00.24	15,679,027 RP.
05	PHYSICAL CONTINGENCY	03.17+04.04X00.20+04.15X00.21 +04.26X00.22+04.37X00.23 +04.48X00.24	2,093,742 RP.
06	PRICE CONTINGENCY	03.18+04.05X00.20+04.16X00.21 +04.27X00.22+04.38X00.23 +04.49X00.24	3,140,613 RP.
07	DEVELOPMENT & CONSTRUCTION COST	SUM(09.01+---+09.06)	27,240,252 RP.
08	INTEREST	03.22+04.09X00.20+04.20X00.21 +04.31X00.22+04.42X00.23 +04.53X00.24	5,482,101 RP.
09	OVERHEAD	02.07+03.20+04.07X00.20 +04.18X00.21+04.29X00.22 +04.40X00.23+04.51X00.24	2,758,551 RP.
10	INVESTMENT FOR ALLOCATION	02.08+03.21+04.08X00.20 +04.19X00.21+04.30X00.22 +04.41X00.23+04.52X00.24	413,783 RP.
11	INSURANCE	04.10X00.20+04.21X00.21 +04.32X00.22+04.43X00.23 +04.54X00.24	783,951 RP.
12	COST FOR THE RIGHT TO BUILD	00.25 X RP.40,000	272,000 RP.
13	TOTAL	SUM(09.01+---+09.12) - 09.07	40,726,796 RP.

****
10.00 SUMMARY OF INCOMINGS
****

			X 1,000
01	SALE OF HOUSE TYPE I (F2-36)	00.20 X 08.01	10,139,478 RP.
02	SALE OF HOUSE TYPE II (M-36)	00.21 X 08.02	10,338,725 RP.
03	SALE OF HOUSE TYPE III (F5-36)	00.22 X 08.03	3,067,483 RP.
04	SALE OF HOUSE TYPE IV (R-36N)	00.23 X 08.04	10,756,247 RP.
05	SALE OF HOUSE TYPE V	00.24 X 08.05	0 RP.
06	SALE OF EMPTY LOT TYPE I	00.31 X 08.06	0 RP.
07	SALE OF EMPTY LOT TYPE II	00.32 X 08.07	0 RP.
08	SALE OF EMPTY LOT TYPE III (150 M2)	00.33 X 08.08	4,238,311 RP.
09	SALE OF EMPTY LOT TYPE IV	00.34 X 08.09	0 RP.
10	SALE OF EMPTY LOT TYPE V	00.35 X 08.10	0 RP.
11	SALE OF COMMERCIAL FACILITY LOT	00.05 X 08.11	2,935,627 RP.
12	SALE OF SOCIAL FACILITY LOT	00.06 X 08.12	0 RP.
13	SALE OF IRREGULAR LAND	00.38 X 05.07	1,536,393 RP.
14	TOTAL	SUM(10.00+---+10.13)	43,012,264 RP.

Explanation:

Land use data

(00.08, 00.14)

The productive area is the land that PERUM PERUMNAS sells. It includes the housing area, commercial facility area and some parts of the other community facility area. The details of the land sold by PERUM PERUMNAS are shown in Table 8-1.

In this report, productive area is defined as the housing plus commercial facility area, taking the safer side for the financial security of PERUM PERUMNAS. The area to be included in the productive area should be re-examined at the detailed design stage.

(00.30)

The irregular lot correction factor k is given by the following formula.

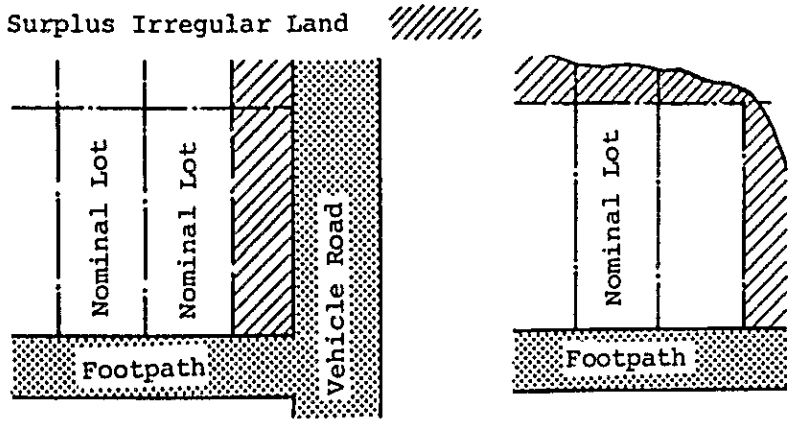
$$k = \frac{\text{Housing area}}{\sum_{i}^{n} [(\text{Nominal lot size of housing type i}) \times (\text{Number of units of housing type i})]}$$

Irregular lot correction factor for housing type i k_i is given by the following formula.

$$k_i = \frac{\text{Housing area for housing type i}}{(\text{Nominal lot size of housing type i}) \times (\text{Number of units of housing type i})}$$

* k_i in the Chapter 9 study is assumed through the study of housing area blocks in Chapter 6 and examination of irregularity in the shape of the site.

Surplus irregular land are sold, for the convenience of the feasibility study, at the basic net developed land price.



Land acquisition cost

(01.09)

Rp. 3,000/m^2 has been given by the Land Acquisition Division, PERUM PERUMNAS.

(01.11)

Rp. 7/m^2.yr x 2 yrs - Rp. 14/m^2 is tentatively taken, based on consultation with PERUM PERUMNAS.

Planning cost

(02.01)

Rp. 8/m^2 has been given by the Planning and Feasibility Division Division of PERUM PERUMNAS.

(02.02)

The cost for the boring of the site for 5-storied flats.

Depth 20m×14 points×Rp. 500,000 per point:	Rp. 7,000×1,000
Soil and other investigation:	Rp. 4,000×1,000
	Rp. 11,000×1,000

Infrastructure cost

(03.01) See 5-1-3-d.

(03.02)

Rp.10/m2 has been taken from the Bekasi II Report, and is multipled by the annual inflation rate of 15%.

(03.03) See 5-2-c-3.

(03.04) See 5-3-b.

(03.05) See 5-1-3-d.

(03.06) See 5-5-2-j.

(03.07)

200trees/ha x RP.500/tree x (00.02) x 115%
200trees/ha and Rp.500/tree have been taken from the Bekasi II Report, multipled by the annual inflation rate of 15%.

(03.08) See 5-6-2-f.

(03.10) See 5-7-2-h.

(03.13) See 5-7-2-d.

Housing construction cost

(04.01), (04.12), (04.23), (04.34) See 6-1-3-c.

9 ALTERNATIVES

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The main object of the study is mass supply of housing for low income people. The housing density in PERUM PERUMNAS housing complexes has been approximately 40 to 50 dwellings per hectare. The target density of the study is set as 60 to 80 dwellings per hectare, as the site, being close to the centre of Jakarta, has a high potential. (See 4-3).

To achive this object, new proposals such as financing methods which enables low income people to get better housing, and a development of multi-storied housing corresponding to the adoption of smaller lot sizes will be requested. This is why alternative plans of the feasibility study are established over housing supply programme here.

9—1 LOAN CONDITIONS AND TARGET INCOME GROUP

People who wish to buy housing supplied by PERUM PERUMNAS are able to get low interest loan from BTN.*

As loan conditions, a fixed repayment method and a gradual repayment method are studied, as mentioned in 2-6. Under the fixed repayment method, which has been taken by BTN up to now, the total amount to be loaned is determined by the income at the time of requesting loan. Under the gradual repaymentmethod, on the other hand, the total amount to be loaned is determined taking into account of the income increase at a certain annual rate. People can get a larger amount of loan through a gradual repayment method than through a fixed repayment method.

The target income group is set according to the income distribution percentile. Under the loan conditions with a fixed repayment method taken by PERUM PERUMNAS up to now, the target income group has been the 20th to the 70th percentile of the income distribution. In this study, the target income group, in case of the gradual repayment method, is to be extended up to the 80th percentile, expecting that this will make an easier cross-subsidy.* In case of the fixed repayment method, in addition to the target income group of the 20th to the 70th percentile, the group of the 30th to the 70th percentile is to be studied, in this case, expecting the cut-off of the lowest 10% will compensate for the high land-relating expenditure.

Thus, three types of combination of repayment methods and a suuply target are formed as shown in Fig. 9-1, for the examination of housing supply programme.

The loan conditions with the gradual and fixed repayment methods are shown in Table 9-2. The loan conditions with the gradual repayment method vary, at the boundary of the 50th percentile of the income distribution.

* National Mortgage Bank

Table 9-1 TARGET INCOME GROUP AND REPAYMENT METHOD

	Repayment method	
	Gradual repayment	Fixed repayment
Target income group of the income distribution (percentile)	1) 20^{th} - 80^{th} percentile	2) 20^{th} - 70^{th} 3) 30^{th} - 70^{th}

Table 9-2 LOAN CONDITIONS

Loan Condition	Gradual repayment		Fixed repayment
Target income group of the income distribution (percentile)	20^{th} - 50^{th}	50^{th} - 80^{th}	20^{th} - 70^{th} 30^{th} - 70^{th}
(i) Down payment (%)	5	10	5
(ii) Interest (%/year)	5	9	5
(iii) Terms of repayment (years)	20	20	20
(iv) Increase rate* (%/year)	5	7.5	0
Purchasing capacity index**	0.6084	0.5415	0.4209

* Annual increase of repayment

** Affordable unit price - Down payment
= 60.84, 54.15 and 42.09 times monthly income

* Cross-subsidy

Cross-subsidizing is a mean to acquire a revenue and expenditure balance. Since all the expenditure should be covered by a revenue from selling housing units (building + land) and empty lots for commercial, home-industrial and housing use, housing units whose basic house and land prices (see 8-2-7) are more than the affordable unit prices must be subsidized by the benefits (or profits) from selling empty lots which are sold at market prices and housing units whose basic house and land prices are lower than the selling prices (= affordable unit prices).

9—2 TYPES OF HOUSING TO BE SUPPLIED

The types of housing suitable for the Cengkareng project are studied in Chapter 6 and approximately 20 types are developed. In this Chapter, 9 types are selected for housing supply programme. These are typical types with much consideration to lot sizes, floor areas, possibility of expansion, supply targets, etc. When the supply conditions change, these types can be replaced by other types developed.

The criteria for the selection of housing types are as follows:

i) To be able to form a diversified residential area

ii) To be able to develop a high density residential area for mass supply of housing

According to the criteria, single- to two-storied housing with a a yard, two- and five storied flat type housing and empty lots for commercial, home industrial and housing use are to be supplied. The minimum floor areas for flat type housing with little possibility for expansion and for other housing with a yard with possibility of expansion are $26m^2$ and $15m^2$, respectively. The maximum floor area is $36m^2$ for both cases from the view point of supplying low cost housing. As a measure to realize a high density development, groups of housing with average lot size of $60m^2$ are considered.

The value of $60m^2$ per unit is adequate for a density of 70 dwellings per hectare when housing area is 60% of the whole site and the low cost housing area is 70% of the productive area or empty lot area is*30% of the productive area. (See P. 8-17 for the explanation of the productive area). Specifically, one lot size for every $10m^2$ to $15m^2$ stage is selected within the range from $35m^2$ to $108m^2$. Among these, lots less than $60m^2$ are collectively owned.

Fig. 9-1 shows the relation of lot sizes and floor areas of the housing types selected by the above criteria.

Table 9-3 is a list of data of the selected housing types including basic land and house prices (Di). (See Chapter 8 for the explanation of the basic land and house price).

* Herafter, the percentage of the empty lot area to the productive area is reffered to as empty lot ratio.

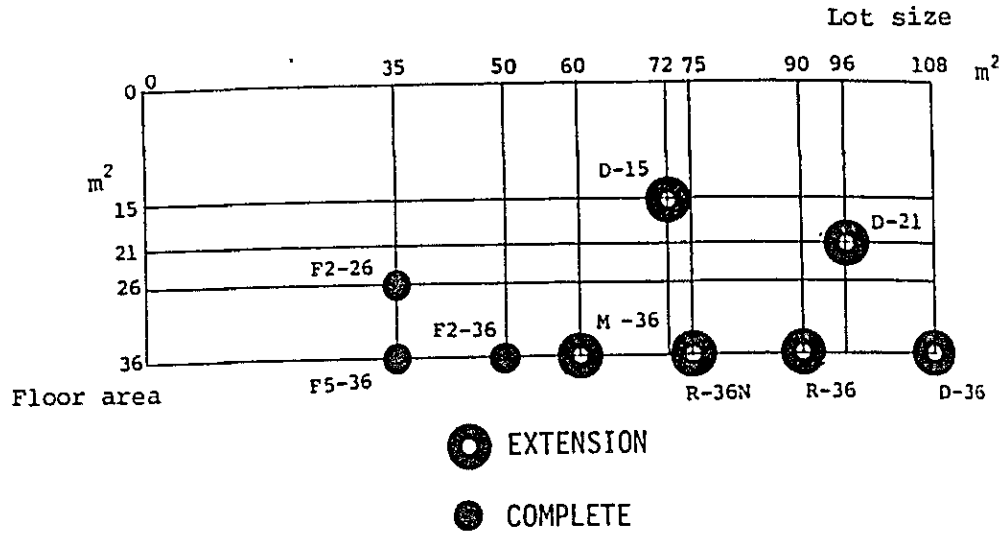


Fig. 9-1 LOT SIZE AND FLOOR AREA BY HOUSING TYPE

Table 9-3 DATA BY HOUSING TYPE

	F2-26	F5-36	F2-36	M-36	R-36N	R-36	D-15	D-21	D-36	Empty lot for sale**
Nominal lot size (m^2)	35	35	50	60	75	90	72	96	108	150
Floor area (m^2)	26	36	36	36	36	36	15	21	36	-
Basic house and land price* (Rp.x 10^6)	3.42	8.20	4.77	4.83	5.34	5.31	3.37	4.47	5.82	3.76
Possibility of extension	x	x	x	o	o	o	o	o	o	o
Ownership of the land	Collectively owned					Exclusively owned				

* See 8-2-7.
** Average value.
Lot sizes $90m^2$, $120m^2$, $150m^2$, $200m^2$ are to be supplied.
are to be supplied.

F2-26 : Two-storied flat.
F5-36 : Five-storied flat, hereafter reffered to as F5.
F2-36 : Two-storied flat.
M -36 : Maisonette-type row-house, hereafter reffered to as M.
R -36N : Single-storied row-house with narrower frontage.
R -36 : Single-storied row-house with 6m frontage.
D -15, -21, -36 : Duplex-type house.

Figures following the hyphen indicate floor areas.

9-3 ALLOCATION OF HOUSING

9-3-1 Setting of housing supply patterns

Housing area is formed of several housing types supplied according to a certain allocation ratio. Housing types suitable for composing a housing area are mentioned in the preceding section. These follows a discussion of what particular types should be adopted, what classes they should be supplied to and what kind of housing areas should be formed.

i) F5 type housing is to be allocated according to a balance of the following factors: high potentiality of the location of the site, contribution to the future techniques of housing construction, the safety of buildings and the creation of a varied townscape.

ii) Four housing types are to be adopted. The purpose is to assure a sizable number of housing of each type for construction and production, while attempting to supply a variety of housing types.

iii) Supply targets and grades of housing types must, as a rule, agree.

Table 9-4 shows the four housing supply patterns set in accordance with the above principles. As far as the average lot size is concerned, all these supply patterns permit realization of the target densities ranging from 60 dwellings per hectare to 80 dwellings per hectare. These are taken as the basis for the study of project profitability and the empty lot ratio.

* These four patterns have different charavters. Which pattern should be taken would be influenced by housing policies.

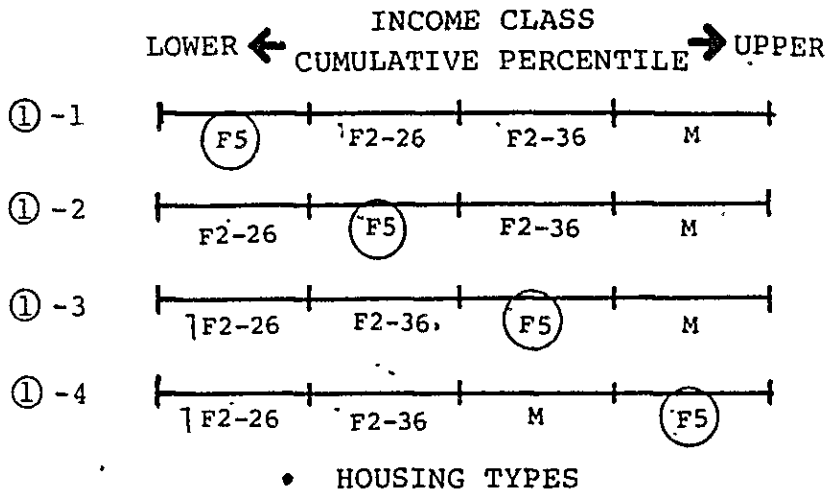
Table 9-4 HOUSING SUPPLY PATTERN

Housing supply pattern		Low ← Income → High Small ← Lot size → Large				Average lot size (m^2) *	Average floor area (m^2)
1 Higher density complete	Housing type Nominal lot size (m^2)	F2-26 35	F5 35	F2-36 50	M 60	45	33
2 High density combination	Housing type Nominal lot size (m^2)	F5 35	F2-36 50	M 60	R-36N 75	55	36
3 Moderate density extention (1)	Housing type Nominal lot size (m^2)	F5 35	M 60	R-36N 75	R-36 90	65	36
4 Moderate density extention (2)	Housing type Nominal lot size (m^2)	F5 35	D-15 72	D-21 96	D-36 108	78	27

* Assuming that the four house types are equally allocated.

9-3-2 Housing types and supply targets

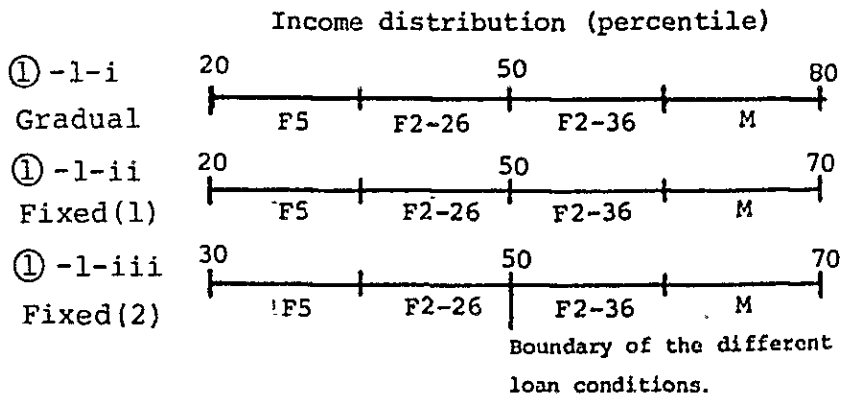
As stated in the preceding section, it is a principle to set supply targets according to grades of housing types. But F5 type is so different in structure and cost from other housing types that their grades cannot be set merely by lot size or floor area. So as an exception, the order of supply targets is ignored in the allocation of F5 type. In this case, four different F5 supply patterns can be assumed for one of the housing supply patterns mentioned in the preceding section. For a high density complete type of ①, for example, there are following four patterns.



• HOUSING TYPES

The differences in housing supply patterns caused by the relations between housing types and their supply targets do not directly affect the character of housing sites, yet they are important for the study of project profitability, which will be described later, and affect housing densities. From the same point of view, supply patterns due to the difference of the aforementioned methods of repayment are discussed below.

Three types of repayment methods are joined to the above-mentioned housing supply patterns. For ① -1, for example, there are the following 3:

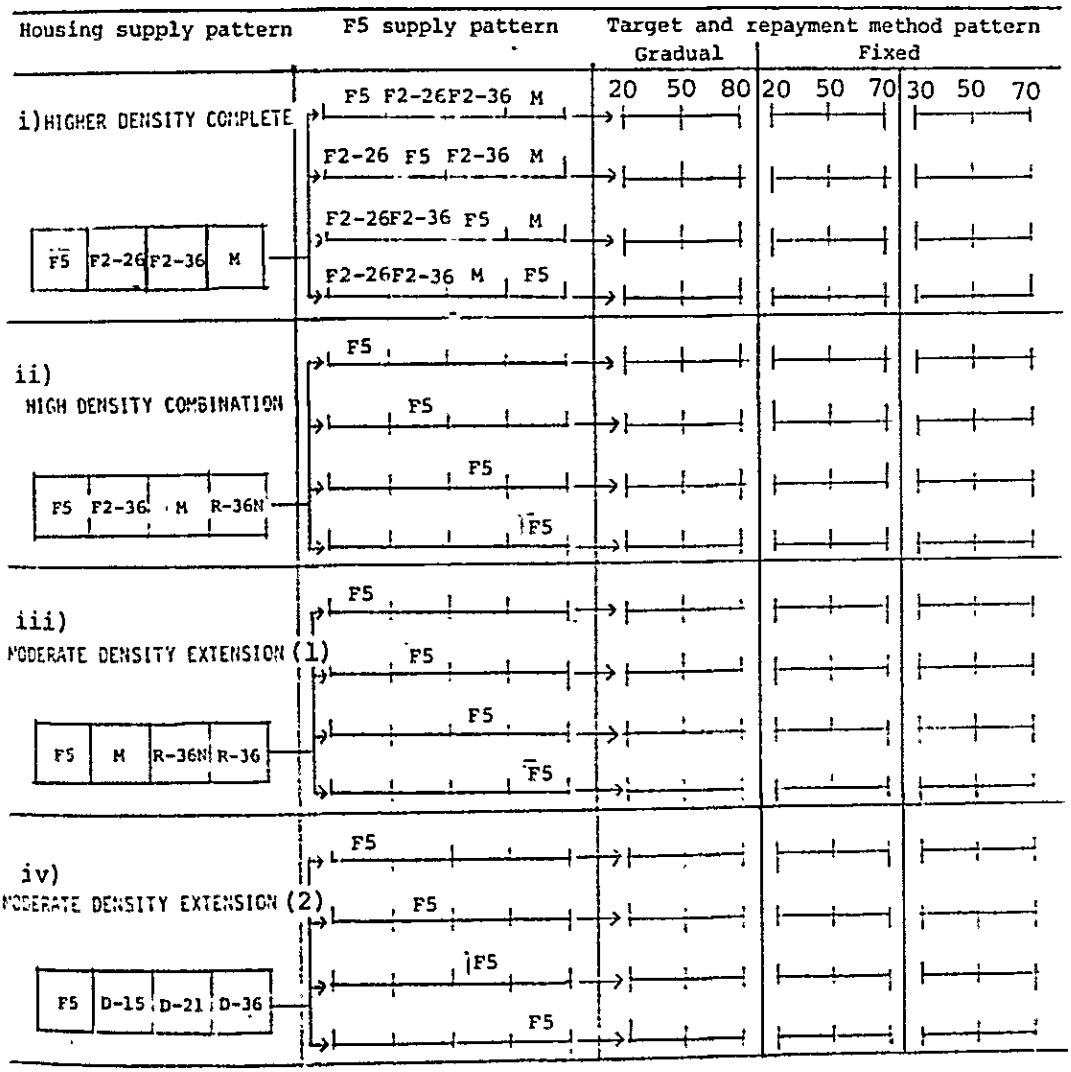


In the relations between repayment methods and housing supply patterns, to arrange two housing types, respectively above and below the boundary of the 50th percentile of the income distribution is to be introduced as a principle. This is necessary because the loan conditions differ, in case of the gradual repayment method, with above and below the 50th percentile of the income distribution and this boundary is located precisely midway between the supply target.

In summary, 48 allocation patterns to be studied have been set by variously combining the three elements of; (table 9-5).

i) Housing supply patterns
ii) F5 supply target patterns
iii) Repayment methods
→ Housing allocation patterns

Table 9-5 HOUSING TYPES ALLOCATION PATTERN



9—4 SETTING OF AFFORDABLE UNIT PRICES, PROJECT REVENUE AND EXPENDITURE BALANCE

9-4-1 Setting of affordable unit prices

Selling prices of housing units are supposed to be determined according to the incomes of supply targets rather than by market prices or construction costs. Affordable unit prices determined according to incomes are set as selling prices. This is the Indonesian practice in supplying public for-sale housing to low income people. Fig. 9-2 shows the relationship between income distribution and affordable unit prices. The axis of ordinates shows the affordable unit price while the axis of abscissas expresses income distribution in percentile. Since loan conditions differ by repayment method, affordable unit prices differ at the same percentile of the income distribution If curve "A" represents the gradual repayment method, curve "B" represents the fixed repayment method. The two curve show a co-relationship because, in the gradual repayment method, loan conditions differ with above and below the income boundary of the 50th percentile. Affordable unit prices at a typical percentile are shown in Table 9-6.

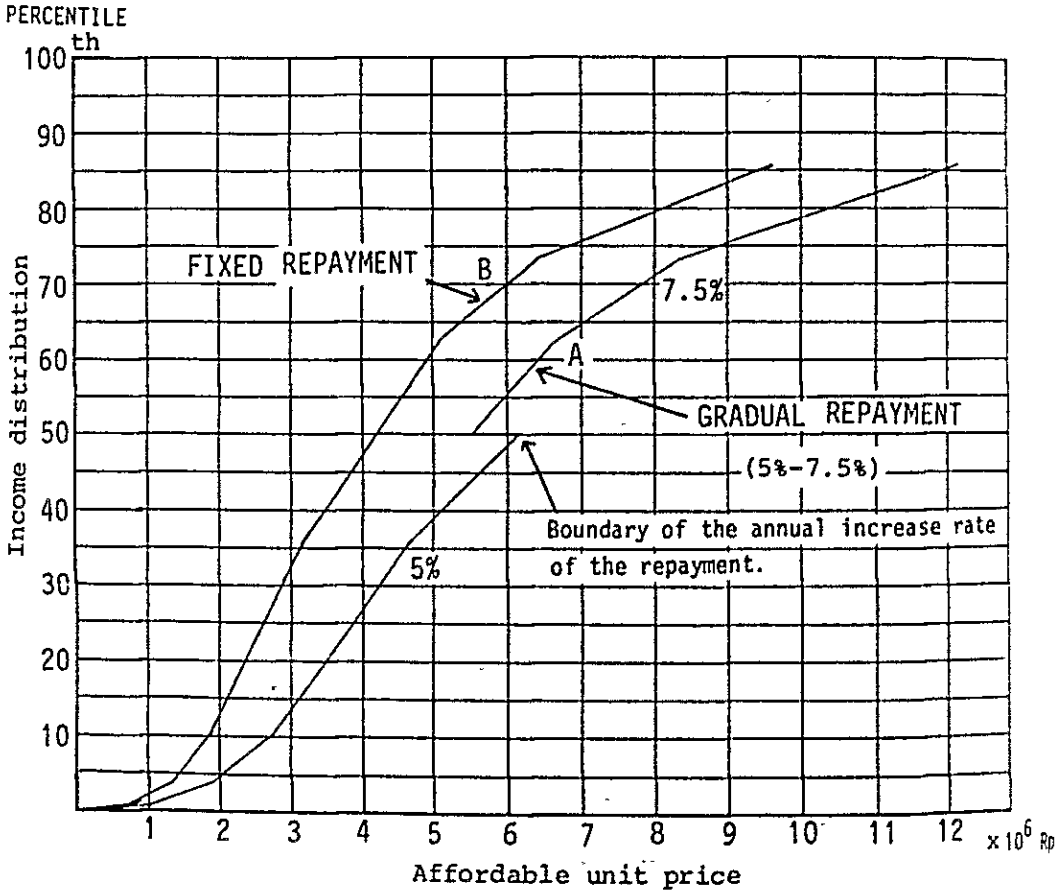
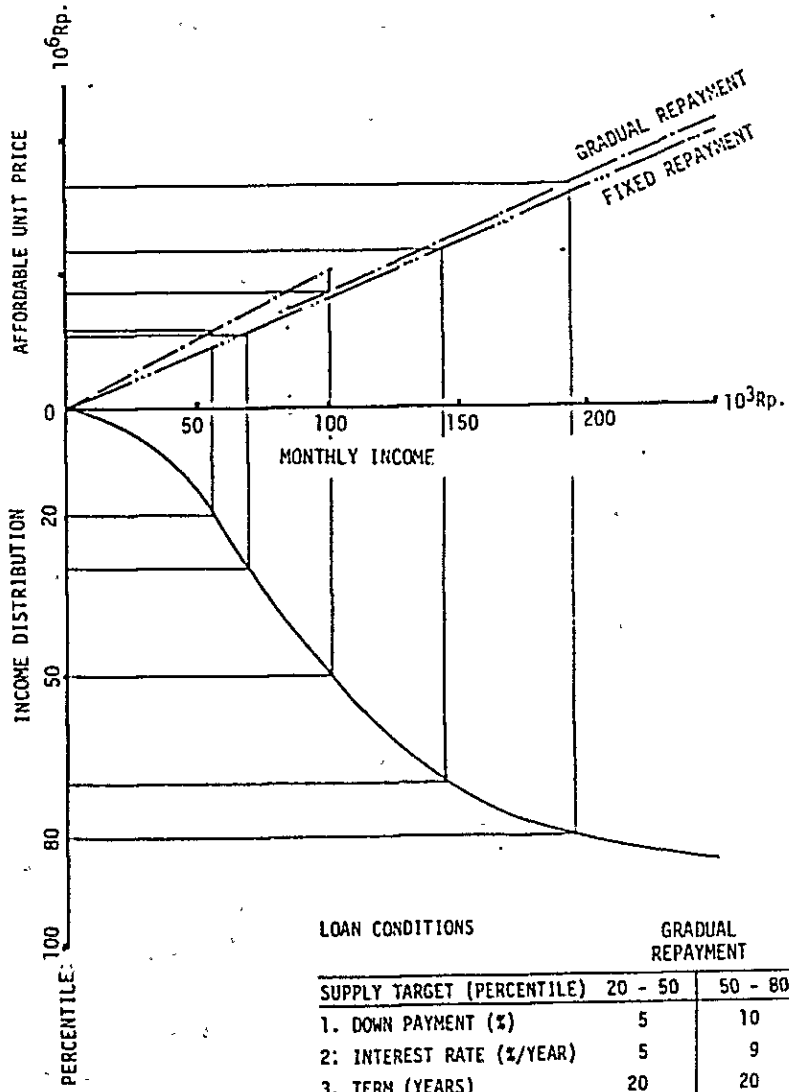


Fig. 9-2 AFFORDABLE UNIT PRICE AND INCOME DISTRIBUTION

Table 9-6 AFFORDABLE UNIT PRICES BY REPAYMENT METHOD

REPAYMENT METHODS	Gradual			Fixed			
PERCENTILE	20th	50th	80th	20th	30th	50th	70th
AFFORDABLE UNIT PRICE million	3.47	6.10	-				
	-	5.43	10.18	2.40	2.90	4.22	5.97

Fig. 9-2 has been prepared through synthesis of Fig. 9-3 which shows the relations between the loan conditions, monthly income, affordable unit price; and affordable unit price, monthly income, income distribution.



LOAN CONDITIONS	GRADUAL REPAYMENT		FIXED REPAYMENT
SUPPLY TARGET (PERCENTILE)	20 - 50	50 - 80	20 (30) - 70
1. DOWN PAYMENT (%)	5	10	5
2: INTEREST RATE (%/YEAR)	5	9	5
3. TERM (YEARS)	20	20	20
4. INCREASE RATE (%/YEAR)	5	7.5	0

Fig. 9-3 LOAN CONDITIONS-MONTHLY INCOME-AFFORDABLE UNIT PRICE

9-4-2 Project revenue and expenditure balance

In the preceding section, the setting of selling prices has been discussed. These follows a description of how the prices thus determined should be balanced for profitability from the viewpoint of the whole project.

Since the prices of housing types are determined without much relation to construction costs, the revenue and expenditure of the entire housing area, a conglomerate of several housing types are normally not balanced. Two methods are usually used to achieve this balance. They are: i) to find an allocation ratio of housing types where balancing of revenue and expenditure come closer and supply according to this ratio, and ii) to cross-subsidize by the profits from the sale, at market prices, of empty lots, and in some cases by the profits from the sale of one or two types of housing among the low cost housing. Both methods are taken in this study.

° Conditions of the project revenue and expenditure balance

In supplying low cost housing, the construction cost generally exceeds the selling price and a revenue and expenditure balance cannot be achieved as they are. Therefore, as stated already, the sale of empty lots at market prices is mainly used as a mean to cover the deficits in the supply of low cost housing. The relation between revenue and expenditure involved is shown by the following formula: (See 8-2-7 and 8-4).

$$Pa\{G-\Sigma(1+ki)AiNi\}+Pb(\Sigma kiAiNi)+\Sigma PiNi=\Sigma DiNi \quad \ldots\ldots (1)$$
$$+P_b(\Sigma kiAiNi)+D_b\{G-\Sigma(1+ki)AiNi\}$$

Pa: Selling price of empty lots ($Rp./m^2$) ... $0.0367\times Rp.10^6$
(Market price)**

Pb: Basic net developed land price ($Rp./m^2$) $0.0250\times Rp.10^6$

G : Productive area (m^2) .... $640,000m^2$

ki: Assumed irregular lot correction factor
for housing type i ..... 0, 0.1, 0.25 *

Ai: Nominal lot size of housing type i (m^2) $35m^2 \sim 108m^2$

Ni: Number of units to be supplied
for housing type i

Pi: Selling price (= affordable unit price)
of housing type i (Rp.) ..... $2.40 \sim 6.28\times Rp.10^5$

Di: Basic house and land price (RP/house;
of housing type i (Rp.)..... $3.45 \sim 8.22\times Rp.10^6$

* 0 for F5, 0.1 for F2 and 0.25 for M and R.

** Assumed market price in Dec., 1983, when market land price is $Rp.25,000/m^2$ in June, 1980 and multipled by the 1.5%/month land price increase rate for 42 months. (See 2-5-4 and 8-2-7.)

The left hand side of the formula represents revenue from the sale of empty lots, surplus irregular land (see P. 8-17) and housing units while the right hand side shows the total project costs. The selling price is the affordable unit price itself, which is described in the preceding section and can be determined when the allocation ratio of the number of units and the repayment methods are set. All other values are derived from the physical planning.

The number of units to be suppliedunder a certain housing type allocation pattern is obtained, if an allocation ratio of the housing types to be supplied is set.

Table 9-a shows the balance of project revenue and expenditure determined by setting housing types and the allocation ratios for the number of units. The method of repayment is gradual repayment. It can be seen that a total project cost of about RP.43.0 billion has to be covered by the revenue from the empty lots and housing units. (Cross-subsidy).

Table 9-7 EXAMPLE OF THE PROJECT REVENUE AND EXPENDITURE BALANCE (FOR THE PROJECT AREA - 110HA)

REVENUE

•Housing Group for Supply			• Revenue from Empty Lots			• Revenue from Housing Units			
•Housing Types	•Number of Units Ni	•Nominal Lot Size Ai	1+ki	•Empty Lot Area (1+ki)× AiNi	G-Σ(1+ki)× AiNi	• Surplus Irregular Land kiAiNi	•Affordable Unit Price Pi	PiNo	
F5	884	35	1.0	30,940	-	0	3.47	3,067.5	
F2-36	2,516	50	1.1	138,380	-	12,580	4.03	10,139.5	
H-36	1,904	60	1.25	142,800	-	28,560	5.43	10,338.7	
R-36N	1,496	75	1.25	140,250	-	28,050	7.19	10,756.2	
	6,800 units	-	-	452,370m²	187,630m²	69,190m²	-	-	-
					(Pa = 0.0367)	(Pb = 0.0250)			RP. million
Total: RP million			-	-	6886.0	1,729.8	-	34,301.9	42,917.7

* G = 640,000m²

EXPENDITURE

•Housing Types	•Number of Units Ni	•Basic House and Land price Di	NiDi	• Surplus Irregular Land ΣkiDiNi	•Empty Lot Area G-Σ(1+ki)AiNi	
F5	884	8.20	7,248.8	-	-	
F2-36	2,516	4.78	12,026.5	-	-	
H-36	1,904	4.84	9,215.4	-	-	
R-36N	1,496	5.34	7,988.6	-	-	
	6,800 units	-	-	69,190m²	187,630m²	
				(Pb = 0.0250)	(Pb = 0.0250)	RP. million 42,900.0
Total; RP. million			36,479.3	1,729.8	4,690.8	

* Allocation ratio of number of housing types: F5:F2-36:H-36:R36N = 13:37:28:22

The types of lots as seen from the view-point of the project profitability may be schematically expressed by the above examples as in Fig. 9-4.

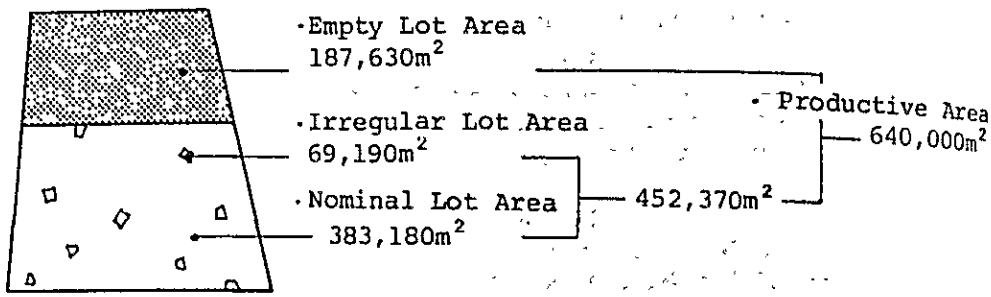


Fig. 9-4 LOT TYPES

The empty lot ratio, the* walk-up flat ratio and the housing density in this case can be determined from the above Table as 29%, 12% and 69 dwellings/ha, respectively.

Meanwhile, as can be seen from the consolidated results in Table 9-5, there are as many as 48 housing allocation patterns that must be studied. In any one of these patterns, it will be possible for the project revenue and expenditure to be balanced by changing the volume of empty lots or the allocation ratio of housing types.

As seen in the example for determining project revenue and expenditure, the housing density, the walk-up flat ratio and the empty lot ratio are automatically determined if a certain housing type allocation pattern and ~~a~~certain housing number allocation ratio are given. What must be done next is to find suitable alternative plans from this relationship.

* Percentage of the number of F5 type housing to the total number of units including empty lots, when all the empty lot area, excluding 76,000m² for exclusively commercial use, are divided into 150m² lots.

9—5 SETTING OF ALTERNATIVES

The setting of alternatives is purported to realize a housing density suitable for Cengkareng and, at the same time, find a housing allocation pattern that can produce appropriate values for walk-up flat ratio and empty lot ratio. As stated in the section concerning project revenue and expenditure balance, housing type allocation patterns are basic to the determination of the housing density and the walk-up flat ratio. Hereunder is a study of how the above-mentioned elements are affected by . housing allocation patterns.

9-5-1 Specific Characters for each housing type allocation

The changes in housing density, walk-up flat ratio and empty lot ratio under a housing number allocation ratio by type. by type for each housing type allocation pattern are shown in 4 diagrams, from Fig. 9-6 to 9-9. Fig. 9-5 is a diagramme how these Figs. are understood:

Walk-up flat ratio are shown vertically in percentage, and the housing density and empty lot ratio is shown horizontally. The six curved lines shown in the diagrammes consist of 3 sets by 2 lines, and correspond to 3 repayment methods. The two curved lines in one set show the difference between the case of supplying walk-up flat housing for above and below the 50th percentile of the income distribution under the same repayment method. By the connection with the straight line parallel to the cross axis which shows the housing density and empty lot ratio, the value of the housing density, empty lot ratio and walk-up flat ratio are found.

For example, in case of gradual repayment method, when empty lot ratio is 30%, F5 (walk-up flat) ratio is 10% (point A) and housing density is 70 dwellings/ha (point B).

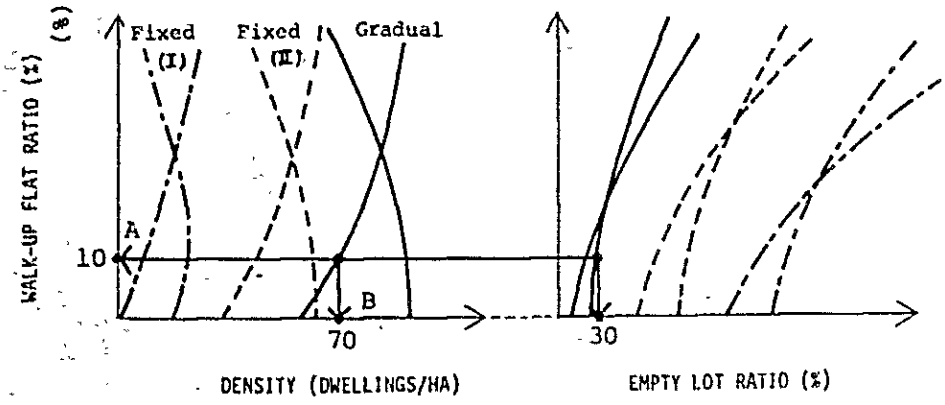


Fig. 9-5 INTERRELATION DIAGRAMME OF DENSITY — WALK-UP FLAT RATIO — EMPTY LOT RATIO

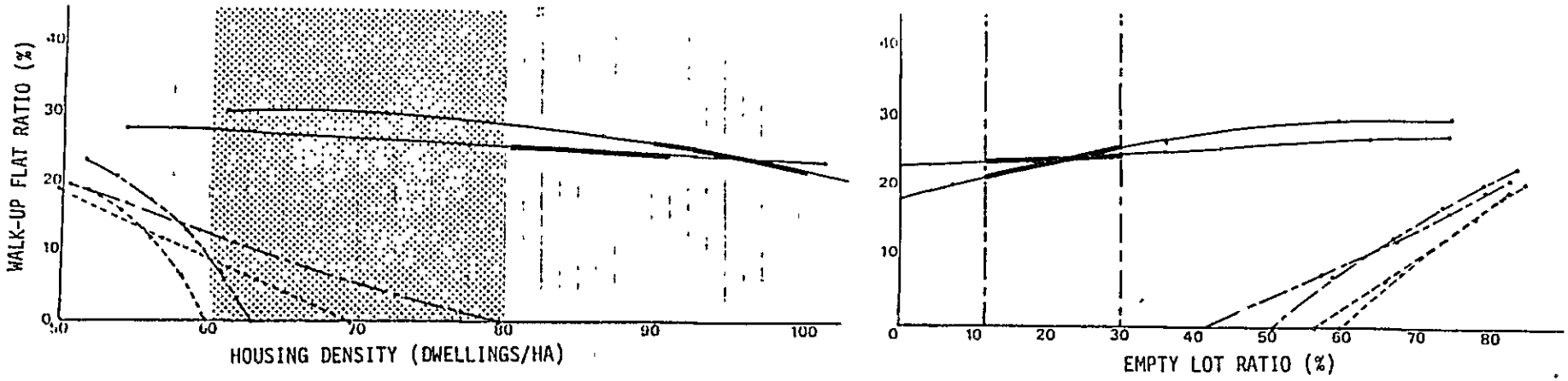


Fig. 9-6 INTERRELATION OF DENSITY — WALK-UP FLAT RATIO — EMPTY LOT RATIO IN HIGHER DENSITY COMPLETE TYPE

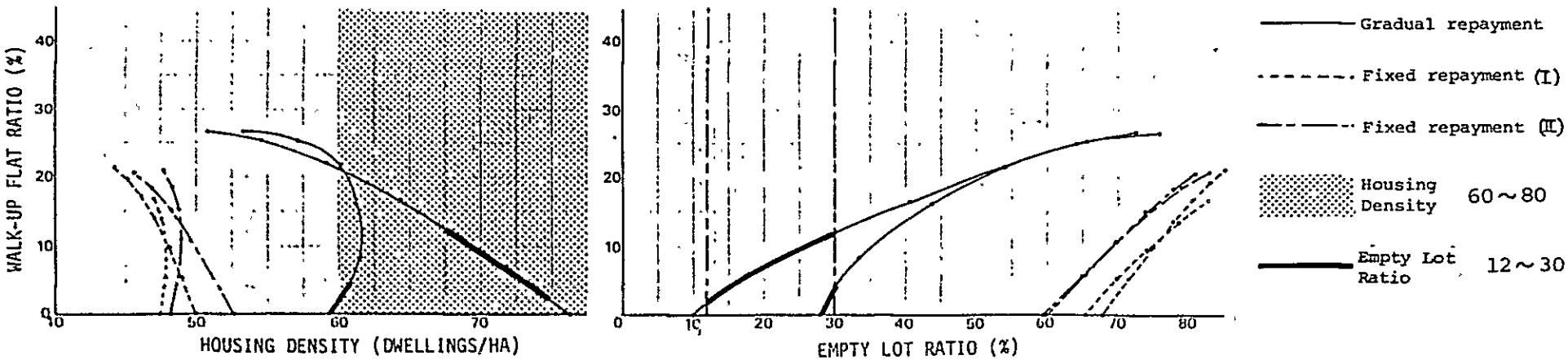


Fig. 9-7 INTERRELATION OF DENSITY — WALK-UP FLAT RATIO — EMPTY LOT RATIO IN HIGH DENSITY COMBINATION TYPE

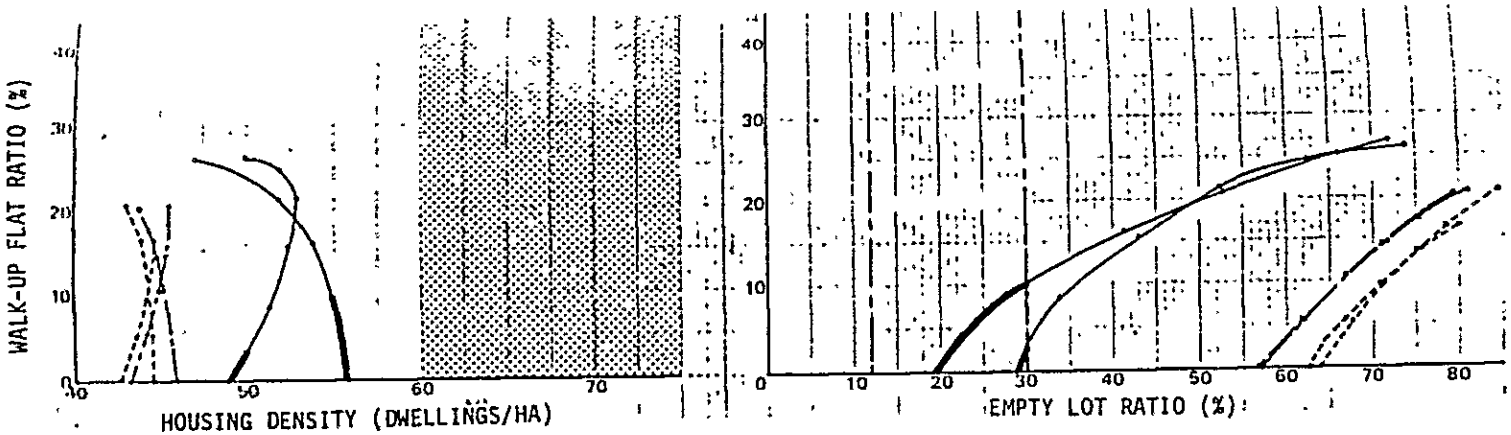


Fig. 9-8 INTERRELATION OF DENSITY — WALK-UP FLAT RATIO
— EMPTY LOT RATIO IN MODERATE DENSITY EXTENSION TYPE (I)

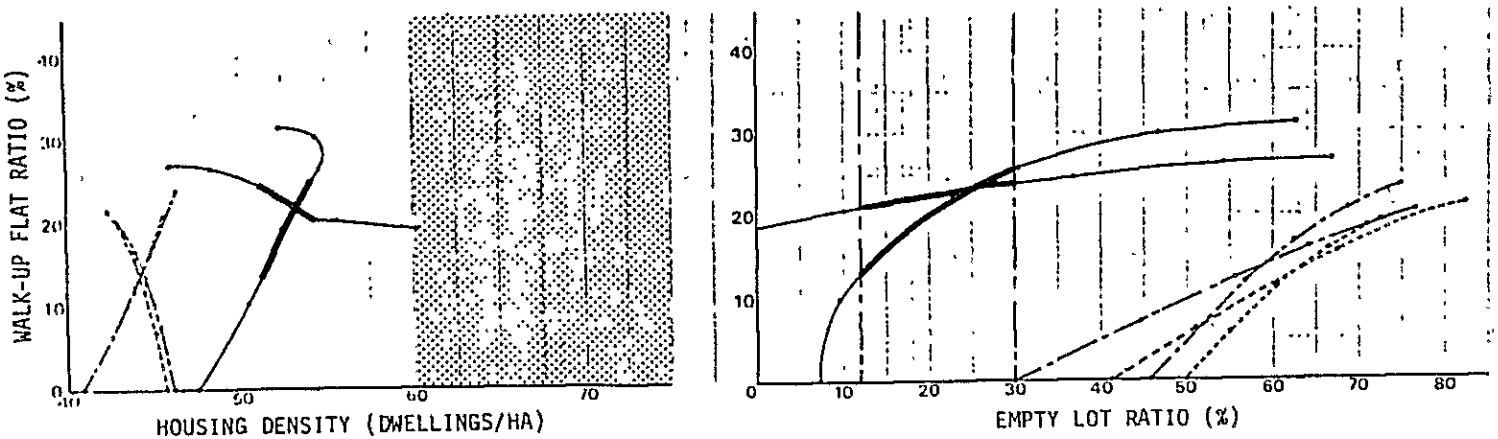


Fig. 9-9 INTERRELATION OF DENSITY — WALK-UP FLAT RATIO
— EMPTY LOT RATIO IN MODERATE DENSITY EXTENSION TYPE (II)

When four housing supply patterns are compared, in Higher Density Complete type, density can be more than 100 dwellings/ha but on the contrary in High Density Combination and Moderate Density Extension (I) types about 70 dwellings /ha is almost maximum and in Moderate Density Extension (II) type maximum is density is less than 60 dwellings/ha. This is the results directly affected by the lot size per unit in each supply pattern.

As to walk-up flat ratio, 30% and 20% in cases of gradual and fixed repayment method respectively are maximum values. This tendency does not differ so much by supply pattern and in both cases, when walk-up flat ratio is near its maximum, empty lot ratio is so high as 60%, 80% respectively, because of high construction cost of walk-up flats.

Looking at one housing group to be supplied, housing density is highest under the gradual repayment method, with the fixed repayment method (30th - 70th percentile) and the fixed repayment method (20th - 70th percentile) following. But the difference between the two cases under the fixed repayment method is not so large.

9-5-2 Setting of final alternatives

The final alternatives are selected from the following frames based on the above explained graphs:

i) To be able to realize the target housing density of 60 to 80 dwellings per hectare.

ii) The empty lot ratio should not exceed 30%. Empty lots of 76,000m^2 is always necessary as commercial facility lot area along Kapuk Kamal St. and commercial facility lots in the Town Centre and sub-centres. (See 4-7-12). This will be 12% of the productive area.

Graphic segments satisfying these conditions are shown in Figs. 9-9 and 9-10. The heavy lines show the range of 12% to 30% in the empty lot ratio.

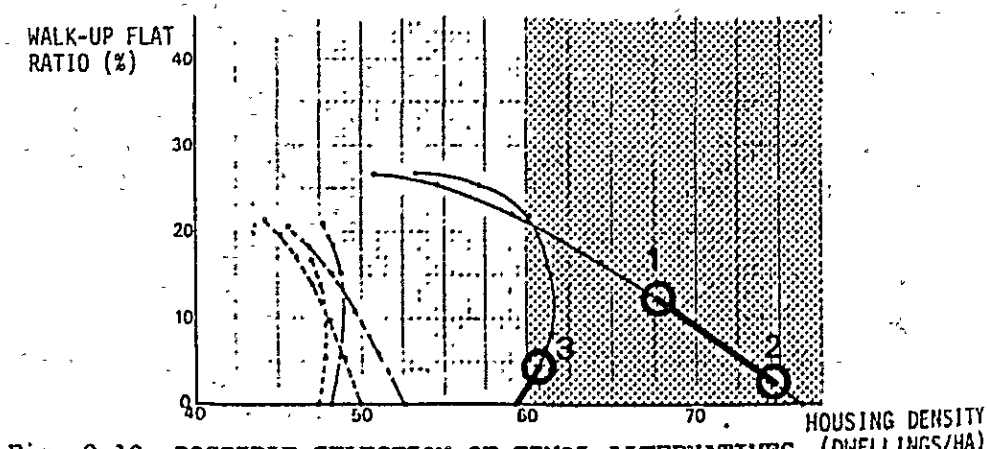


Fig. 9-10 POSSIBLE SELECTION OF FINAL ALTERNATIVES IN HIGH DENSITY COMBINATION TYPE

It can be seen from the above study that supply patterns correspond to the alternatives. Table 9-8 shows the housing allocation at the point with the highest housing density and walk-up flat ratio in each supply pattern. These are set as the final alternatives.

Table 9-8 DATA OF FINAL ALTERNATIVES

Type of Housing Group for Supply	Loan Methods	Lower ← Housing Supply Allocation → Upper					Total Housing Units	Housing Density	Walk-up Flat Ratio	Empty Lot Ratio
High Density Combination	Gradual	F5-36	F2-36	M-36	R-36N	E.L.	7550	69	12	30
		880	2510	1890	1500	770				
High Density Combination	Gradual	F5-36	F2-36	M-36	R-36N	E.L.	8340	76	2	12
		170	4000	2340	1830	0				
High Density Combination	Gradual	F2-36	M-36	F5-36	R-36-N	E.L.	6670	61	4	30
		1590	1360	240	2710	770				

9-5-3 Overall evaluation of alternatives

Three alternatives are evaluated from qualitative and quantitative view-points and the most suitable alternative under the present conditions is selected.

Walk-up flat ratios vary from the minimum of 2%(170 units) to the maximum of 13% (880 units). The meaning of the walk-up flat housing in this project is not an experimental one but "one component" of the housing area. Therefore, about 10% of walk-up flat ratio will be adequate for the total composition of housing area.

Adequate empty lot ratios are between 12% to 30%, with 12% meaning that all the empty lot area is covered by commercial facilities. (See P. 9-12). In this project empty lots for housing are indispensable because home industries and housing with shops are expected on these lots, and also the existing village inhabitants are expected to settle down within the area forming a mixed community.

Higher housing density is desirable because of the characteristics of the Cengkareng site. All the three alternatives have housing density of more than 60 dwellings/ha which is approximately 20% higher housing density compared to the existing PERUM PERUMNAS housing complexes.

To supply flat type housing for lower income people and expandable housing for higher income people is one of the effective supply methods to keep the environmental level of housing area high. In addition to this, usually higher income people desire more expandble housing types with yards. In existing housing complexes, these people have done relatively high level expansion. For these reasons alternative (3) is not a recommendable supply pattern.

The distribution of housing types to be supplied shall be well balanced without any absolute majority of housing type, to meet with the wide range of housing demand and to keep housing area with variety of housing types. From this point of view, the alternative (2) is not well balanced because more than one half of units are two-storied flats with 2% of walk-up flats and 0% of empty lots. On the other hand, the alternative (1) has well balanced distribution with each type having more than 10% allocation.

It is desirable that cross-subsidy should be arranged from higher income people to lower income people and lower income people will be more cross-subsidized from higher. In these meaning, the alternative (3) has unnatural tendency that housing types for higher income people need more cross-subsidy than those for lower income people.

Considering above mentioned items, the alternative (1) is totally evaluated as a most suitable alternative under the present conditions. Hereafter, development plans, construction shedule, financial and economic analyses are to be studied based on the alternative (1).

9-5-4 Additional study on housing density etc. supposing higher land price areas

(1) Compared to the existing PERUM PERUMNAS housing complexes, Cengkareng lies where land price is higher. But compared to the central part of Jakarta, land price in Cengkareng is still low. The ratio of land-relating cost to the total project cost is estimated about 1/3 and therfore the effort to down per-unit costs by increasing housing density is not largely expected. When land prices get higher, the effort will be enough effective. Also in future if the land price increase rate gets bigger than that of construction costs, this effort will be also effective. These cases can happen realistically in big city area where the concentration of population is progressing rapidly.

Based on the above mentioned view-points, following cases are studied on the premises that only and price increases and other conditions remain the same.

Land price: 2 times of the present land price in Cengkareng
5 -ditto-
10 -ditto-

(2) Twelve cases are studied, as 4 different housing supply patterns times 3 different land price areas. (Table 9-10). The repayment method is the gradual repayment method with target income group ranging from the 20th to the 80th percentile.

Table 9-9 STUDIED CASES

Land Price (1980) Rp/M²	Basic Net Developed Land Price* (1980) Rp/M²	Housing Supply Pattern	Repayment Method
6,000 (2 times**)	36,700(1.3 times)	F2-26 F5 F2-36 M	20 50 80 gradual repayment
15,000 (5 times)	55,900(2.4 times)	F5 F2-36 M R-36N F5 M R-36N R-36	
30,000 (10 times)	92,300(4.1 times)	F5 D-15 D-21 D-36	

* Price at the time of affordability examination, (Dec., 1983).
** Rp.3,000/m² taken as land acquisition cost for the feasibility study. (See 8-4 Explanation).

Figs. 9-11 to 9-13 show the results of the study of these cases.

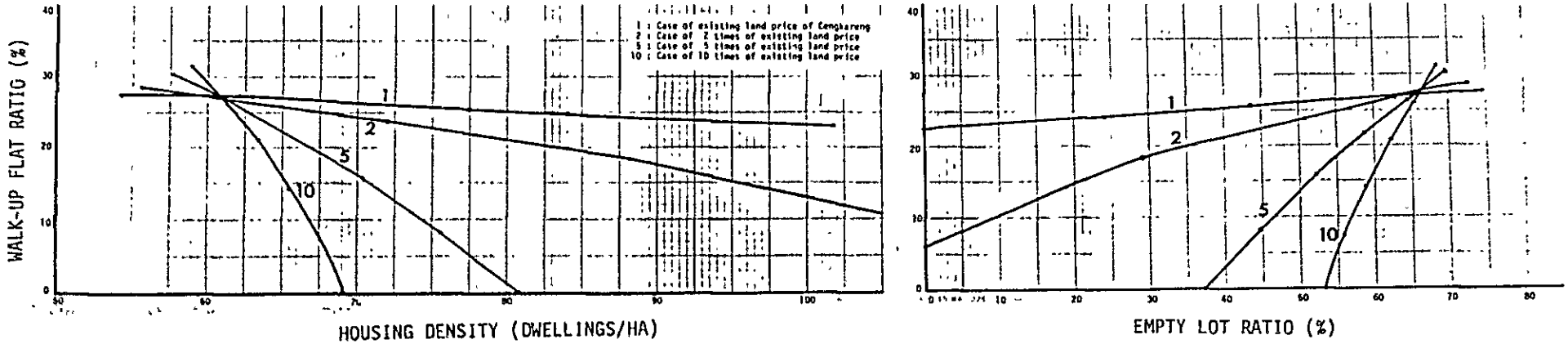


Fig.9-11 STUDY OF HOUSING DENSITY ETC. BY DIFFERENT LAND PRICE
- HIGHER DENSITY COMPLETE

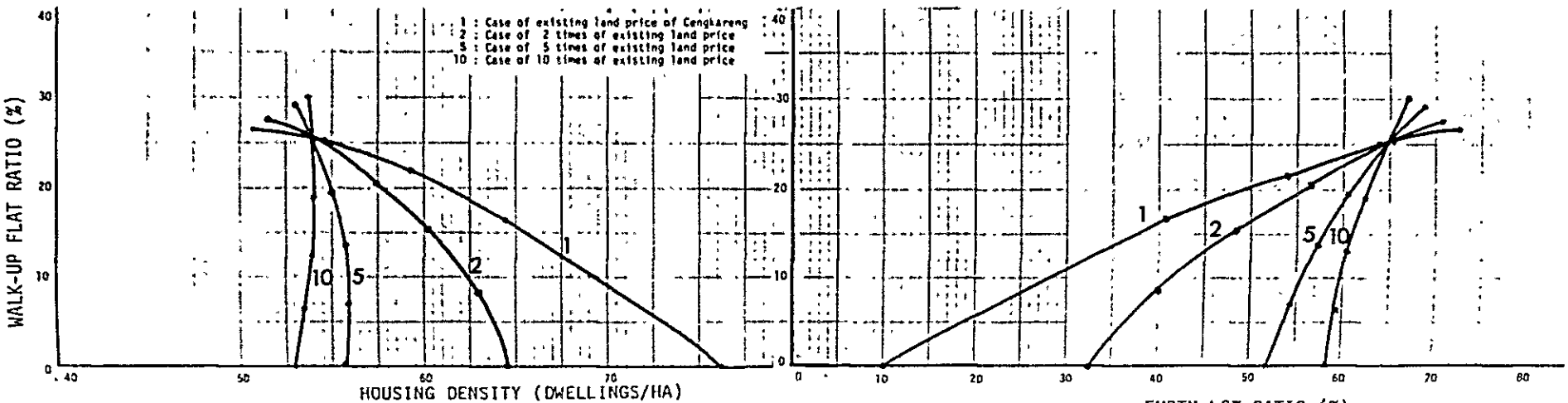


Fig.9-12 STUDY OF HOUSING DENSITY ETC. BY DIFFERNT LAND PRICE
- HIGH DENSITY COMBINATION

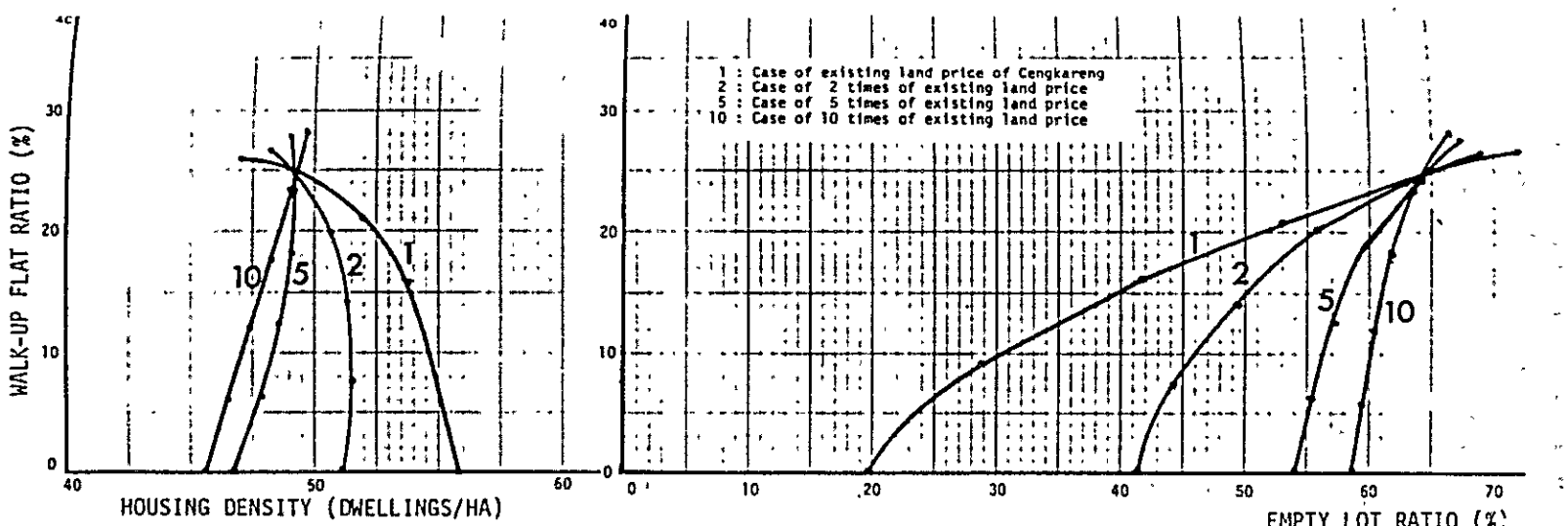


Fig.9-13 STUDY OF HOUSING DENSITY ETC. BY DIFFERENT LAND PRICE
- MODERATE DENSITY EXTENSION (I)

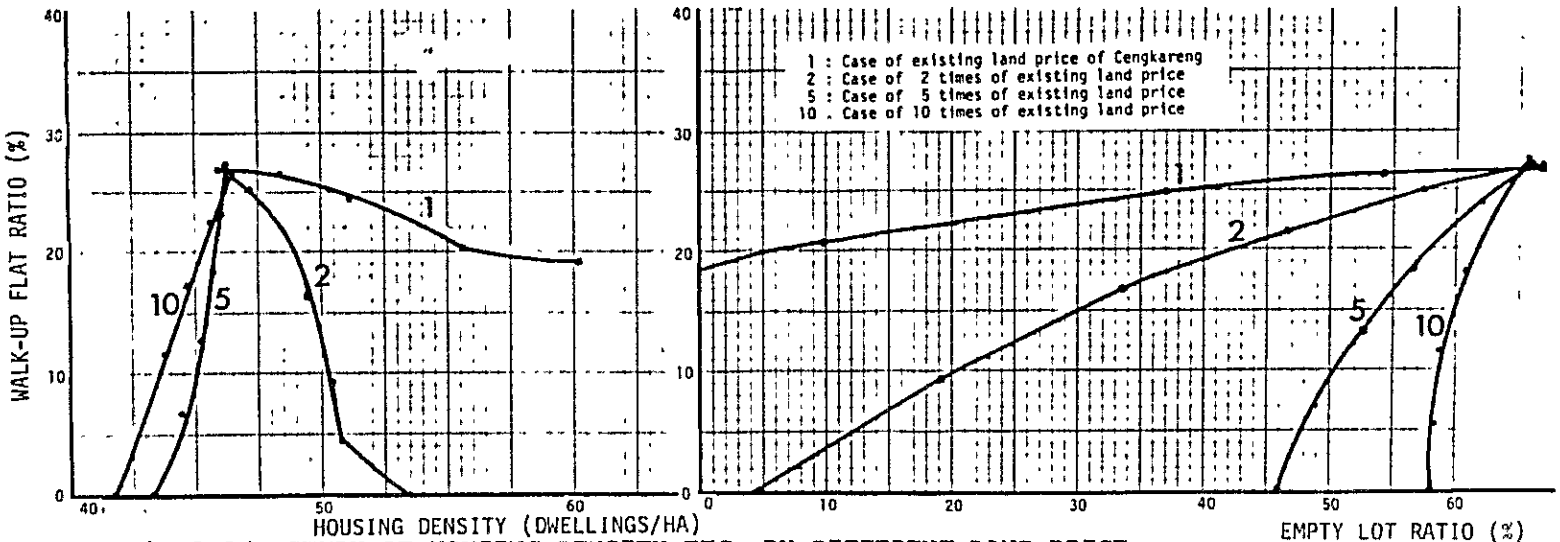


Fig.9-14 STUDY OF HOUSING DENSITY ETC. BY DIFFERENT LAND PRICE
- MODERATE DENSITY EXTENSION (II)

Results show that:

i) The more the land price increases, the more housing density decreases and empty lot ratio increases.

ii) When empty lot ratio is about 65% in all housing supply patterns, stable housing density and walk-up flat ratio can be seen independent from the effect of land prices, and in these stable points, walk-up flat ratios are between 20 to 30% and housing densities are between 45 to 60 dwellings/ha.

iii) When the land price is more than 5 times higher, housing density is in direct proportion to the walk-up flat ratio in each housing supply pattern except for the case including F2-26 type.

Above three items can be pointed out as a characteristics of the study result and especially iii) shows that if higher housing density is to be targeted by adopting more walk-up flats, Cengkareng area has to be 5 times more expensive land area, or that the land price increase rate is 5 times more than the construction cost increasing rate (= inflation rate).

Either of these conditions is necessary for walk-up flats to be effective for higher density requirement.

10 FINANCIAL ANALYSIS

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10—1 OUT LINE

PERUM PERUMNAS makes the income and expenditure balance for each project with a combination of its own capital and loans from the affiliated financing bodies of the Government at a low annual interest of 13.5% at the time of the preparation of the report, which is almost a half of the interest of loans from private banks. Therefore, after the financial analysis and appraisal of the cash flow, this project has an income of Rp.43,012 million and an investment amount (project total expenditure amount) of Rp.41,143 million finally.

On the other hand, the total operating amount will be not less than Rp.350,000 million , if 120,000 houses are built during REPELITA III by PERUM PERUMNAS. The total investment amount for this project is about Rp.40,000 million , that is, the proportion of the total operating amount for this project will approx. 11%. On the other hand, the total number of units to be supplied in this project is 7,500 units, equivalent to 6% of 120,000 units, therefore, the investment amount for this project is large compared to the number of houses. But from the viewpoint of whole of Indonesia, this higher cost is caused by its location where land price is high and the land-relating cost due to the development of the lower land. Most of other projects are located where land price is lower and the development is easier, so the investment amount per unit is relatively low. Therefore, it can be said that this project does not break the balance for total operation by PERUM PERUMNAS.

This project supplies 880 walk-up flat units equivalent to 10% of total number of units to be supplied.* At this time, the walk-up flat is a pioneer type of housing , and whether people will be interested in it or not is still to be learned.

But walk-up flats will be supplied to the lowest income group in this project, and the lowest selling price is set when the construction cost is twice that of the low-rise types. If some of the units remain unsold, this will not affect the financial frame of this project, and this will be a safe supply method in financing.

* Includes the number of empty lots.

10-2 CASH FLOW

a) This project is being carried out with a combination of PERUM PERUMNAS' capital and loans from affiliated financing bodies of the Government.

Prior to development, PERUM PERUMNAS' own capital will be used for land acquisition cost and planning cost, and also used for interest, overheads, investment for allocation and insurance.

On the other hand, loans are used for the heart of the project such as, infrastructure costs and housing construction costs (including physical and price contingency). The interst on financing for construction expenses is assumed to be 13.5% per annum.

b) The Inflation during project term will be 15%.

c) Just after completion of construction, it is supposed that all units are sold to occupants who are to be loaned by BTN (National Mortgage Bank).

d) The cash flow is shown in Table 10-1, and the flow of loan for every term and the flow of the interest and repayment is shown in Table 10-2.

TABLE 10-1 CASH FLOW

	Year / Item	∿ 1981	1982 Jan-Mar	1982 Apr-Jun	1982 Jul-Sep	1982 Oct-Dec	1983 Jan-Mar	1983 Apr-Jun	1983 Jul-Sep	1983 Oct-Dec	1984 Jan-Mar
Source of Funds	Balance									12,356,484	7,009,963
	Capital of PERUMNAS	3,815,163	5,063	10,893	193,208	277,984	649,369	1,048,081			
	Loan from Government Bank		44,027	81,797	1,248,892	1,605,538	3,698,361	5,704,813			
	Selling of Empty Lots								4,355,166		4,355,166
	Selling of Houses								17,150,967		17,150,967
	Total	3,815,863	49,090	92,690	1,442,100	1,883,522	4,347,730	6,752,894	21,506,133	12,356,484	28,516,096
Use of Funds	Land Acquisition	3,430,900									
	Planning	345,258									
	Infrastructure		35,222	65,437	92,361	345,435	489,195	1,231,375	1,983,072	952,900	1,572,323
	Housing Construction				906,753	938,996	2,469,494	3,332,474	4,013,675	2,493,836	2,582,512
	Physical Contingency		3,522	6,544	99,911	128,443	295,869	456,386	541,220	344,673	353,913
	Price Contingency		5,283	9,816	149,867	192,664	443,803	684,578	811,831	517,010	530,869
	Overhead	34,526	4,403	8,180	124,889	160,554	369,836	570,482	734,979	430,842	503,964
	Interest of the Loan			1,486	4,247	46,397	100,584	225,403	417,941	417,941	417,941
	Investment for Allocation	5,179	660	1,227	18,734	24,083	55,475	85,572	110,247	64,627	75,594
	Insurance				45,338	46,950	123,474	166,624	200,684	124,692	127,125
	Cost for the Right to Build								136,000		136,000
	Loan Repayment										12,383,428
	Total	3,815,863	49,090	92,690	1,442,100	1,883,522	4,347,730	6,752,874	9,149,649	5,346,521	18,685,659
									(12,356,484)	(7,009,963)	(9,830,437)

TABLE 10-2 LOAN AND INTEREST

Year		Loan from BTN	Loan Repayment	Balance	Interest
'82	Jan-Mar	44,027		44,027	0
	Apr-Jun	81,797		125,824	1,486
	Jul-Sep	1,248,892		1,374,716	4,247
	Oct-Dec	1,605,538		2,980,254	46,397
'83	Jan-Mar	3,698,361		6,678,615	100,584
	Apr-Jun	5,704,813		12,383,428	225,403
	Jul-Sep			12,383,428	417,941
	Oct-Dec			12,383,428	417,941
'84	Jan-Mar		12,383,428	0	417,941

10—3 FINANCIAL EVALUATION

The income and expenditure for every term is summed up based on the above shown cash flow, and the table of profit and loss is as follows:

1. Revenue (Sales)

FS'5-36	3,067,483
FS'2-36N	10,139,478
M-36	10,338,725
R-36N	10,756,247
Emply Lots	4,238,311
Commercial Lots	2,935,627
Irregular Lots	1,536,393
Total	43,012,264

2. Expenses

Land Acquisition	3,430,900
Planning	345,258
Infrastructure	6,767,320
Housing Construction	16,737,740
Physical Contingency	2,230,481
Price Contingency	3,345,721
Overhead	2,942,655
Interest	1,631,940
Investment for Allocation	441,398
Insurance	836,887
Cost for the Right to Build	272,000
Land Price Increase	2,161,466
Total	41,143,766 $\times 10^3$ Rp

3. Profit 1,868,498

11 ECONOMIC ANALYSIS

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11-1 SOCIAL AND ECONOMIC MEANINGS OF THE PRESENT DEVELOPMENT PROJECT

11-1-1 Basic character and objectives of housing development

The basic character of the present project is to put a social development plan into shape, which is able to cope with the common problem of over-population in cities, among developing countries. A large number of people flow into cities and population in cities is increasing. They live in low-grade residential houses and have repeated illegal occupancy. Many live in rented residential houses. The amount of inflow population also adds to fears of shortage and unstability of employment opportunities in the city. In order to cope with this, it is necessary to scatter the increasing population to the peripheral areas of the cities, to undertake construction of residential housing by utilizing land and effective use of limited urban areas, to encourage retention of agricultural activities in the villages and attempt to increase employment opportunities by developing commercial and industrial activities in urban areas.

As a line in the chain of this countermeasure policy, the present project is purported;

- to utilize lower land and unoccupied space near the city centre,
- to organize the community facilities and infrastructure while making an effort to safeguard the wooded areas,
- to reorganize the roads and traffic systems around Jakarta-Tangerang Road, and
- to construct urban high-density housing, including walk-up flats.

Also it will attempt

- to put a part of the current commercial and industrial activities inside the industrial lot, by providing this industrial lot, and
- to increase the opportunities for employment by forming a closer relationship with the future industrialization project.

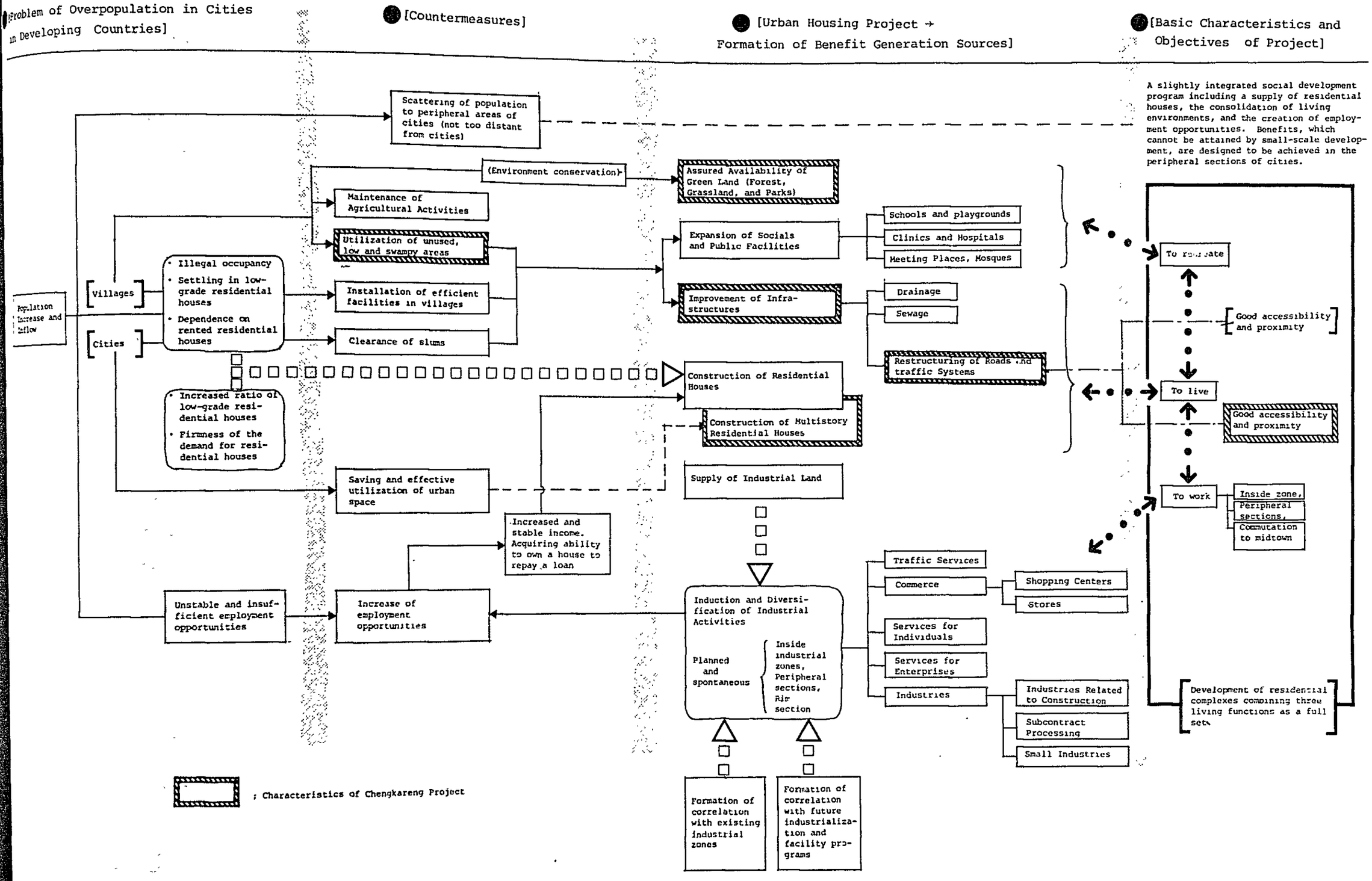
The present project is an urban housing development project towards these ends.

This enables to certain extent, autonomous working of the three living functions "to live, to recreate, and to work", that is

difficulttoachive in a small-scale project. Therefore, this project aims at developing housing complex which will bring a great deal of social and economic benefits.

The sytematic diagram of social and economic benefits described above for the present project, is summarized in Fig. 11-1.

Fig. 11-1 SYSTEM DIAGRAMME OF SOCIAL AND ECONOMIC BENEFITS



11-1-2 The present conditions of social and public environment in the peripheral area of the Planning Area

The current state of social conditions, living environment, and water and power facilities, in the peripheral area of the Planning Area is, broadly speaking, worse than that of other areas. It is located within ten kilometres of the city centre and, furthermore, the active developments of commercial and industrial principal roads, airport construction, and the like, in the Jakarta-Tangerang area, are planned for the future. In this sense, it is an area with high potential but somehow, the image of this area is low, mainly because of such poor conditions in the social and public environments. On the other hand, social facilities, such as schools, athletic fields, and recreation facilities, seem to be organized relatively well, from the viewpoint of the per capita ratio.

By taking a look at the material, "Statistik Wilayah DKI Jakarta 1979", for the study of social and public environment in the peripheral area of the Planning Area,one finds the following facts: *(Statistic Data of DKI Jakarta)

i) From the viewpoint of the indexes of natural and social safety, such as occurrence of fires, and crimes, and of floods due to this being a low and swampy area, the peripheral area of the planned zone has many problems. While flooding occured six times in 1979 as with other flood-prone areas, the number of victims was larger relative to the population number, and the damage suffered by Cengkareng was the most severe. The damage was estimated at 33,500 thousand Rp. Therefore, it forms 43% of the total damage, 78,047 thousand Rp. for the whole of DKI Jakarta.

ii) The number of fire casualties in Cengkareng is third highest out of the thirty towns surveyed and it is ranked eight in damage inflicted.

iii) The number of robberies taking place is relatively large and Cengkareng is ranked fifth among the thirty towns.

iv) In 1979, Cengkareng had one Kelurahan with piped water and nine without piped water. The use of tap water forms 2.24% and the use of well water forms 64.13%. This is second worst to Pasar Minggu (South Jakarta) where no water mains are provided for a total of ten Kelurahan.

v) In 1979, Cengkareng has five Kelurahan having no electricity, half of the total number. Electricity use is 18.39% and the use of oil lamps forms 58.12%. This is a typical example of the poor conditions prevalent, together with those of Seribu town (North Jakarta), Pasar Rebo town and Cakung town (both East Jakarta).

vi) There are many schools (kindergarten, elementary, junior high, and senior high schools) relative to the population. Also there exist many athletic facilities for football, tennis, badminton, etc., and many cinemas, as recreational facilities.

11-1-3 Benefits that the execution of the present project will bring about

As seen above, it is expected that economic benefits from development of the new residential housing lots will bring about still greater benefits in the social and public fields in the peripheral area of the present Planning Area. A variety of facilities and equipment, residential housing, administrative facilities, transportation means, and commercial and industrial activities (these could be regarded as benefits), related to these living functions, "to live, to recreate, to work," as mentioned above, would bring various benefits to households through indexes such as health, comfort, safety, convenience, high-efficiency (time-saving), and income creation.

By purchase of new land and houses, residents can finally receive gains, such as:

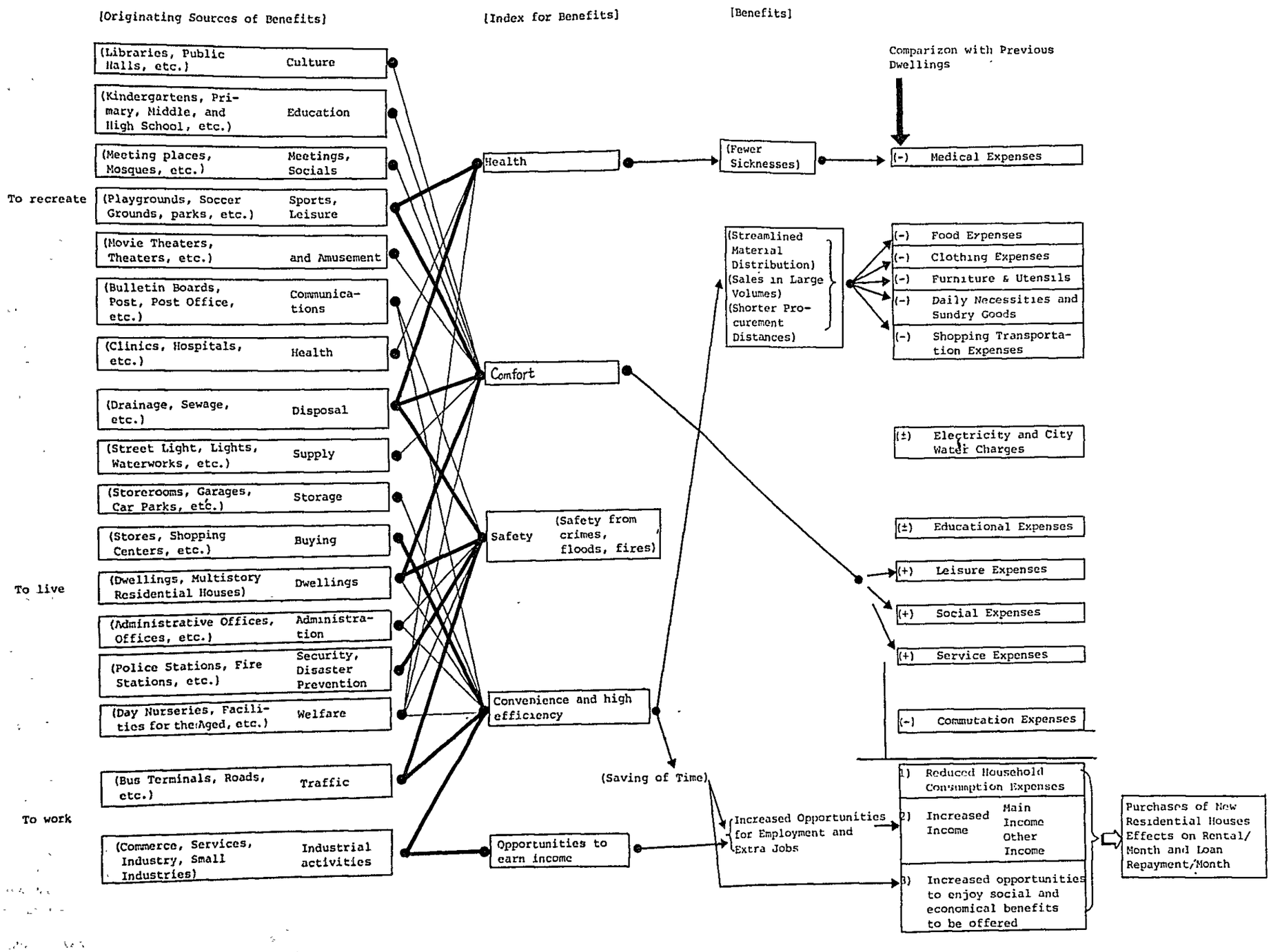
- saving the household expenditure,
- having increased income, and
- having increased opportunities to receive social and economic benefits supplied.

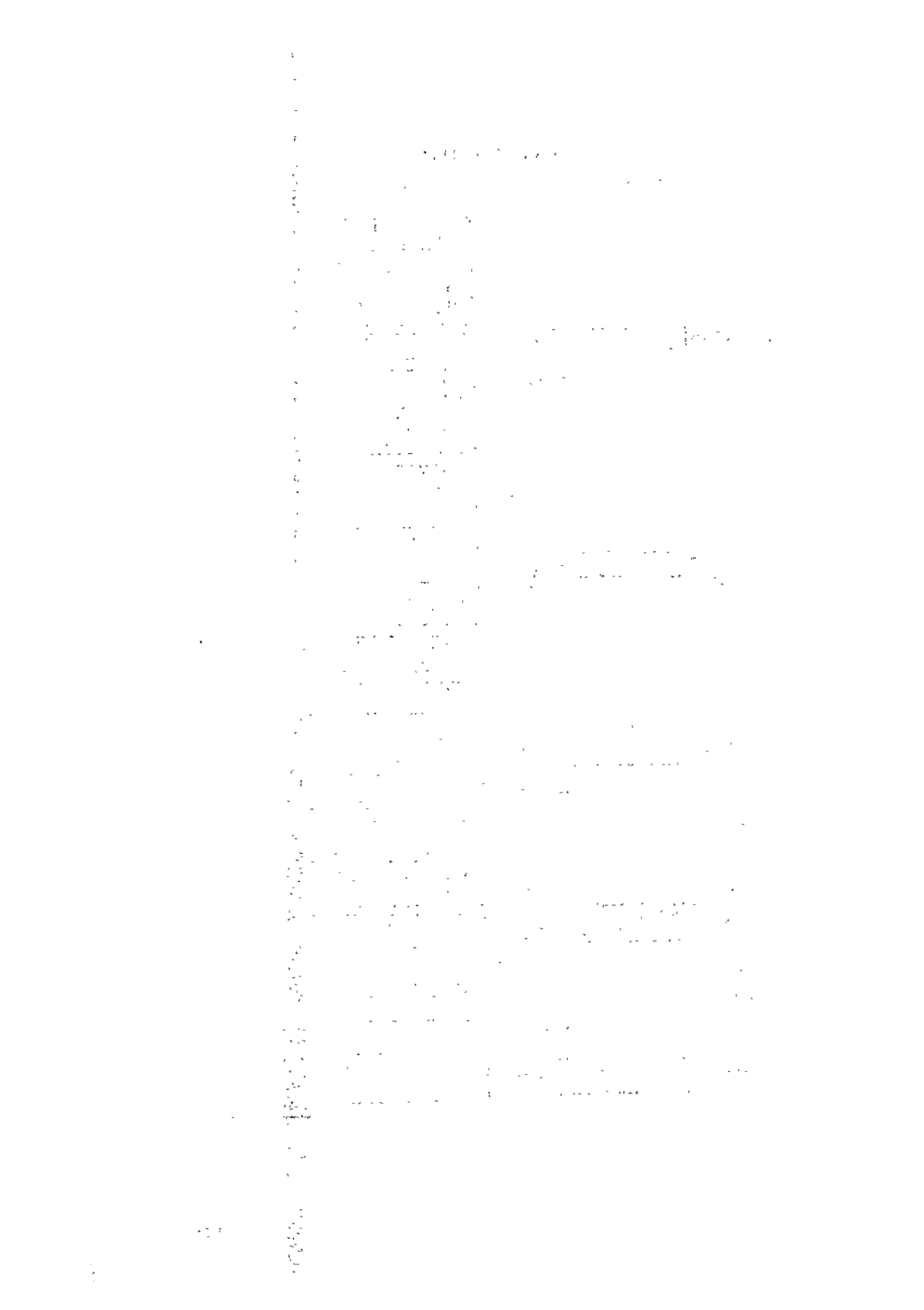
The social and economic effects of the present project can be summarized on the basis of direct benefits and indirect benefits corresponding to the contents of the project as listed in Table 11-1. As to direct benefits, Fig. 11-2 shows the corresponding relationships between benefits and sources origin.

Table 11-1 SOCIAL AND ECONOMIC BENEFITS OF THE PRESENT PROJECT

Contents of the Project			[DIRECT BENEFITS] Benefits related to Household expenditure (Saving in expenditure)	[Income increase]	Benefits in social and public activities (Saving in expenditure)	Employment expansion Project (Construction period	(After construction)	Others Negative effects	[Indirect Benefits] <Benefits brought indirectly from the present project> Effects into economic and industrial activities	Welfare improvements for regional residents	The orderly growth of "Cities"	"Effects brought by projects of higher level>
Land Preparation infrastructure	Drainage					◎				Decline of flood		
	Sewage Treatment		(Decease control →) Saving in medical expenses							Decline of flood occurrence, diseases, improvd health		
	Roads							▲ Negative Traffic Aspects				Combination of new airport related roads and outer ring roads
	Water		Water Saving							Increase of the piped water ratio		
	Electricity		Electricity							Improvement in level of power supply		
	Others											
Housing					Supply of low cost housing compared with the private sector	◎	○	▲ Disturbance to the kampung residents				
Expansion				Increase of Employment opportunities								
Social Facilities (Community Service)	School			Increase of Employment opportunities	Merit as to lower cost in building rather than existing urban redeveloping projects	○	○			Increase of educational opportunities		
	Medical Facilities									Improvements in medical care		
	Recreation & Sports Facilities									Increasing opportunities to promote recreational and sporting events		
	Others											
Relating Industries	Industries					○			Increase of production + and its inter-industrial effects			Combination of industrial expansion accompanied by opening of new airport
	Small Scale Industries			Increase of Employment opportunities								
	Markets		Saving in transportation expense for shopping				◎		Street peddling + Booth + Store			
	Small Shops											
	Others											
Project (Well-designed Site Planning) TOTAL		EIP → Land Price increase; S&S → LCH → Rental/Purchase	Improvement of living environment for a specific proportion of the whole population, whole households.			Employment expansion in the construction materials industry and related industries, during construction periods.		▲ Cost of relating People	Effects of public investments		Opportunity to initiate long term direction for the growth of cities.	Labour supply for new airport related business
			Meeting the Demand for housing: Formation of new households; Latent demands (including renewing)					▲ Compensating them for their lost of property	Improvement of managerial foundations for construction related industries and firms		Form a great center for urban activities in Jakarta Barat	
			Improvement of Access to working places, city centers.						Construction related; Contiguous industry			
			Improvements in supply capability of relatively highly skilled workers.						General improvements in labor productivity			

Fig. 11-2 DETAILS OF BENEFITS (DIRECT BENEFITS)





11-2 ECONOMIC EVALUATION

The question of this section is to establish how much social and economic welfare will be produced by the basic production elements, such as land, capitals and labor, which will be invested in the housing development project in Cengkareng. To obtain an answer to this question, it is necessary to express the social and economic effects (11-1), of this project in quantitative terms as far as possible and to evaluate them in comparison with the necessary investments for the project.

At the same time, it is also necessary to consider and evaluate the social and economic benefits that cannot be expressed in quantitative term.

In other words, the following two analyses are made here,

1) An estimate of the direct benefits of the land and houses provided by this project to residents, an evaluation of them in relation to total construction costs, and a calculation of the real return.

2) An evaluation of the following benefits among various direct and indirect benefits of this project (10-1)

   a) The benefit of expanding employment during and after the construction period.

   b) The benefit of improving productivity in construction materials and related industries.

   c) The benefit of a stable supply of labor to the nearby industrial zone

11-2-1 Evaluation of the direct benefits and internal rate of return (IRR)

a) The direct benefits which the houses of this project bring to residents can be studied by the following procedure.

   i. On the principle that the value of the properties and assets which are formed by production or development activities is determined on the basis of the demand and supply relation, the supply side will be taken up first.

      Here "supply' means to prepare the land and infrastructure and to construct houses by assigning a fixed part of the basic production elements (resources) consisting of the land, capital and labour of this country.

      The social stock and assets (property) which are formed as the result of investment activities create adequate values for their cost.

These values are the land price and the fixed asset values (equipment and structures). When these fixed assets are used yearly, they create a type of rental value, such as the land rent, the rent for equipment and machines, house rent and household expenditure.

The land and houses of well developed infrastructure which are supplied by the development of Cengkareng have a fixed value as assets and become a source of yearly rental value.

ii. Secondly, the demand side of the land and houses are considered.

The direct benefits which residents receive are shown in Fig. 11-2.

As the figure shows, residents will receive the following benefits more fully than in their former houses.

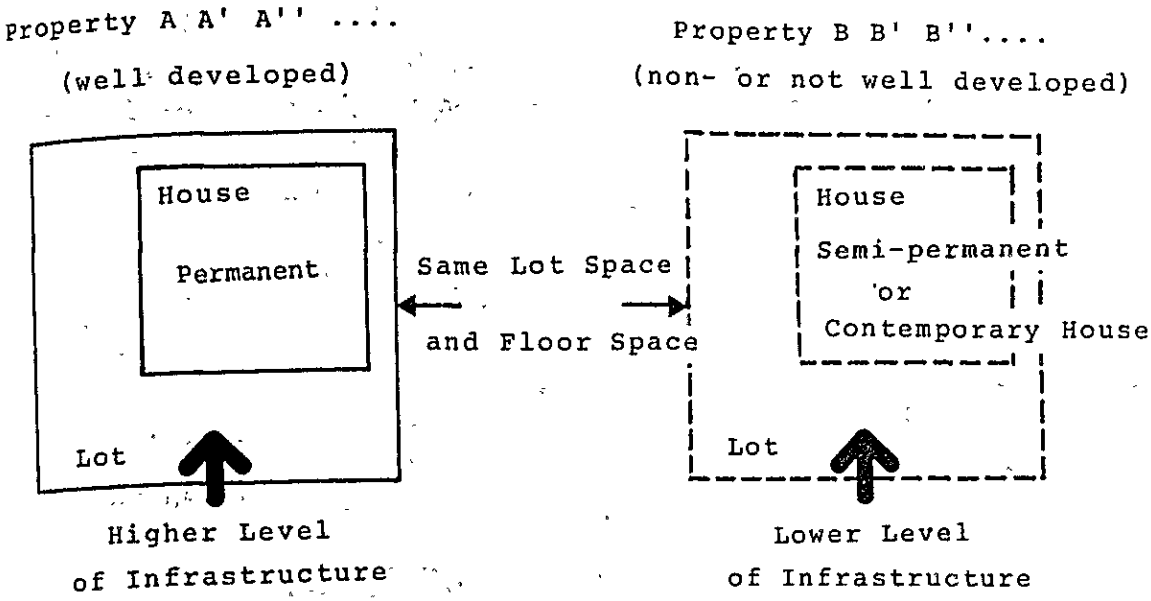
- o The benefit of saving various household expenditure (food expense, medical expense, daily necessities expenses, transportation expenses etc.)
- o The benefit of saving time
- o Employment chances and chances for secondary income
- o Chances to use social facilities (hospital, educational facilities, mosques, recreational facilities etc.)

Generally, they are able to expect a better living environment. Therefore, they demand the land and houses in Cengkarng and agree to make a fixed payment from their household income. Generally, their payment is a house rent of each term or a regular repayment of a housing loan. When a resident pays for a house in lump sum, the reduction of its future value to yearly value is calculated. The Cengkareng Project assumes loan purchase and regular repayment for housing and lumpsum purchase for empty lots and commercial lots.

iii. In principle, these supply factors and demand factors work in the market mechanism and determine prices.

The following demand and supply relation in different land and house markets determines the price (a type of rental value) which becomes the foundation for measuring benefits.

In other words, prices are determined by mutual relation between consumers' selections of lands and houses belonging to A, A', A" ... and B, B', B" ... and supply activities at various economic costs.



In reality, however, an effective market mechanism related to land and houses is not working or only working to an extremely limited extent in Jakarta.

Therefore, the price (rental value) which is the basis for measuring benefits must be estimated by an indirect method.

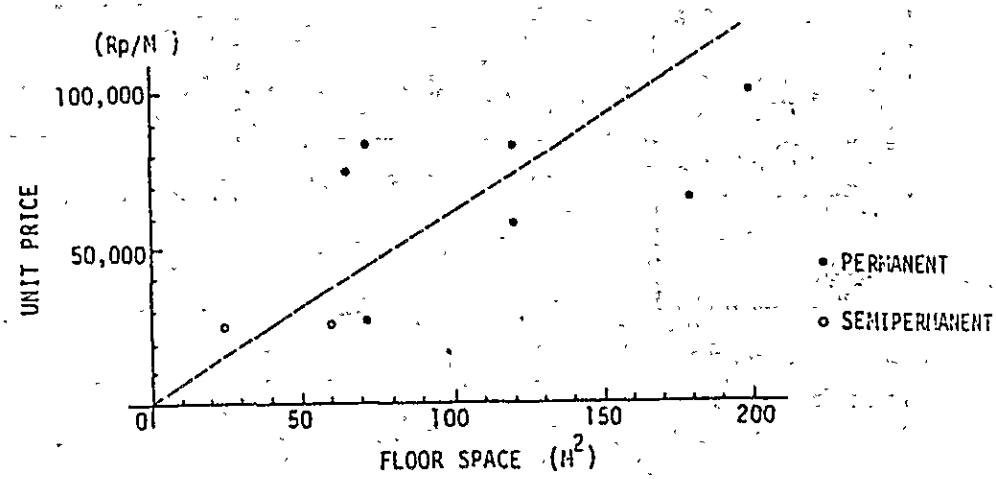
Here, the basis for the estimate is that part of a resident's household expense which he is able to pay each term as loan repayment, namely, the amout of repayment per term of the unit price. This is equivalent to 25% of the average household income (60,000 Rp/month in 1980) of the target income group for this project. (See 2-5-5).

It is assumed that the economic cost factors viewed from the supply side and the social and economic benefits viewed from the demand side are included in this price.

On the other hand, the land price in the market in 1980 is used as the basis. The internal rate of return (IRR) of Case 1 is calculated on the basis of this assumption. It is also possible to study the benefits of houses on the basis of the market price.

The following graph shows the price of a house (coverted into housing expense per month) per floor area in 1980 in DKI Jakarta, although the number of samples is extremely limited. Naturally, they are more expensive than the low cost housing which are supplied by PERUM PERUMNAS. The average price may be assumed to be approximately 22,500 Rp/month, which is 50% higher than Case 1. The

IRR calculation of Case 2 is based on this assumption. The price of Case 2 is higher than the price of Case 1.



b) The economic costs of the housing development project in Cengkareng consists of the following factors. The price in 1980 are used as the basis. (See Chapter 8).

i) Land acquisition cost after subtraction of the right of development and tax costs.

ii) Planning costs

iii) Infrastructure cost after subtraction of price contigency and interest

iv) Housing construction costs after subtraction of price contingency, interest and insurance

v) Reduction of unskilled labour from labour expense

vi) Scale merit is applicable to the construction materials to be used for this project, as explained in 11-2-2 b). Especially, improvements are expected in the material productivity in medium to small scale traditional production process. Technological innovations in modern sectors are also possible. Therefore, economic costs can be applied to construction material expenses.

For the IRR calculations in Case 2, the economic costs of construction materials are estimated as 10% below the financial costs.

c) The project life is 20 years after occupancy.

d) Internal rate of return (IRR)

Case 1	4.85%	(Table 11-2)
Case 2	11.46%	(Table 11-3)

TABLE 11-2 IRR (Case 1)

I = 4.85 %

YEAR	COST	COST PRESENT VALUE	BENEFIT	BENEFIT PRESENT VALUE
1981	3300000.	3147356.	0.	0.
1982	363253.	330425.	0.	0.
1983	1928016.	1672655.	0.	0.
1984	12271726.	10153910.	3042225.	2517207.
1985	2727598.	2152484.	3960225.	3125211.
1986	0.	0.	1224000.	921241.
1987	0.	0.	1224000.	878628.
1988	0.	0.	1224000.	837986.
1989	0.	0.	1224000.	799224.
1990	0.	0.	1224000.	762256.
1991	0.	0.	1224000.	726997.
1992	0.	0.	1224000.	693369.
1993	0.	0.	1224000.	661297.
1994	0.	0.	1224000.	630708.
1995	0.	0.	1224000.	601534.
1996	0.	0.	1224000.	573710.
1997	0.	0.	1224000.	547173.
1998	0.	0.	1224000.	521863.
1999	0.	0.	1224000.	497724.
2000	0.	0.	1224000.	474701.
2001	0.	0.	1224000.	452743.
2002	0.	0.	1224000.	431802.
2003	0.	0.	1224000.	411828.
2004	0.	0.	1224000.	392779.
TOTAL		17456816.		17459952.

B/C = 1.0002

TABLE 11-3 IRR (Case 2)

I = 11.46 %

YEAR	COST	COST PRESENT VALUE	BENEFIT	BENEFIT PRESENT VALUE
1981	2970000.	2664634.	0.	0.
1982	326928.	263157.	0.	0.
1983	1735214.	1253131.	0.	0.
1984	11044553.	7156047.	3118725.	2020701.
1985	2454838.	1427017.	4495725.	2613401.
1986	0.	0.	1836000.	957547.
1987	0.	0.	1836000.	859096.
1988	0.	0.	1836000.	770767.
1989	0.	0.	1836000.	691519.
1990	0.	0.	1836000.	620420.
1991	0.	0.	1836000.	556630.
1992	0.	0.	1836000.	499400.
1993	0.	0.	1836000.	448053.
1994	0.	0.	1836000.	401986.
1995	0.	0.	1836000.	360655.
1996	0.	0.	1836000.	323574.
1997	0.	0.	1836000.	290305.
1998	0.	0.	1836000.	260457.
1999	0.	0.	1836000.	233678.
2000	0.	0.	1836000.	209652.
2001	0.	0.	1836000.	188096.
2002	0.	0.	1836000.	168757.
2003	0.	0.	1836000.	151406.
2004	0.	0.	1836000.	135839.
TOTAL		12763985.		12761926.

B/C = 0.9998

11-2-2 Other social and economic benefits

a) Benefits of expanding employments during and after construction period

The expansion of employments is among the social and economic benefits of this project. Fig. 11-3 shows the total labour (labourers x days) to be employed for infrastructure during the construction period. Fig. 11-4 shows the total labour (labourers X days) to be employed for housing construction. They indicate the employment of 1,540 thousand labours x days. (This means that about 2,100 labourers are employed per day on average.)

This project provides various community facilities after the construction period. This will expand employment further. Table 11-4 shows the number of community facilities and the number of employees at these facilities. The project will bring about the permanent employment of about 650 people.

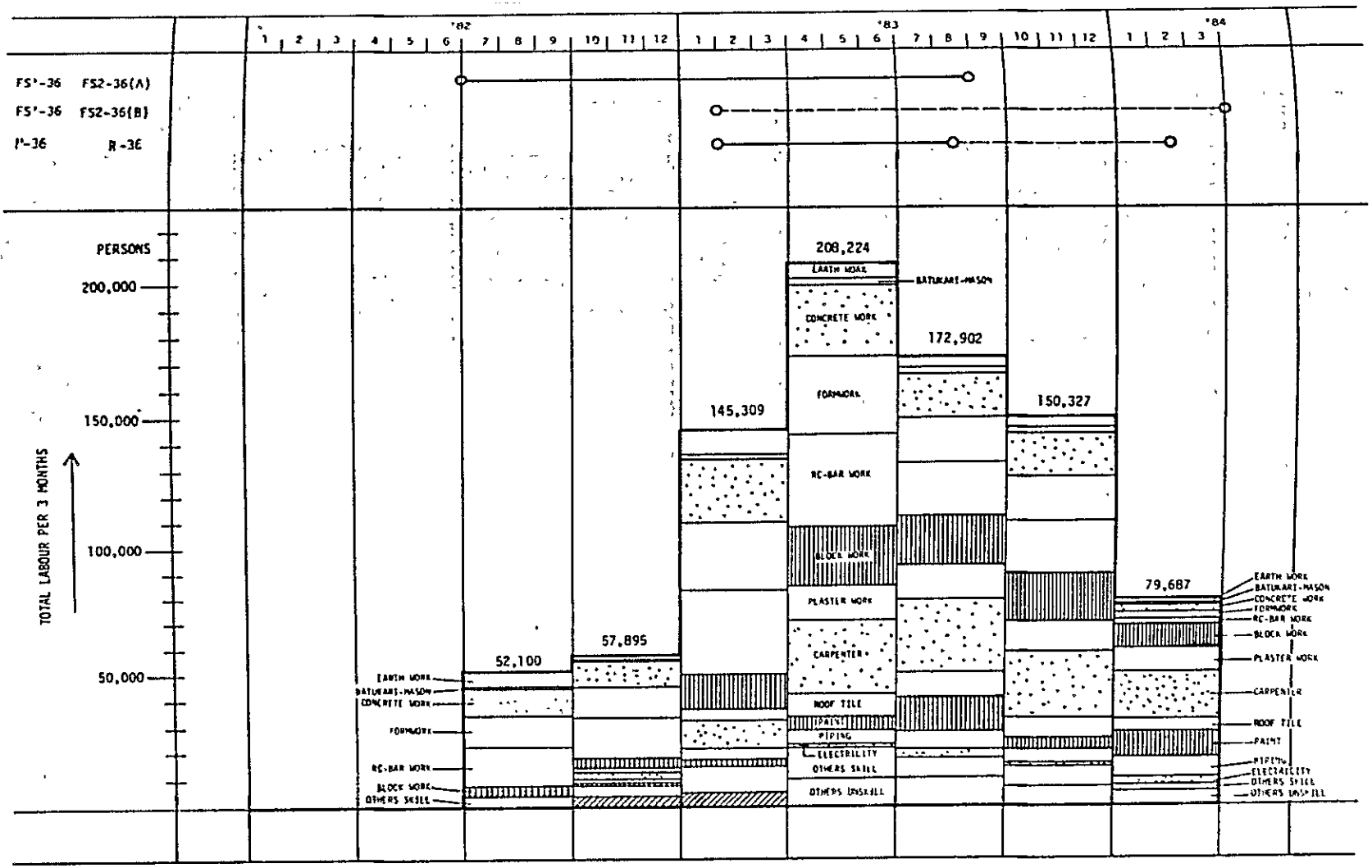


Fig. 11-3 ESTIMATION OF LABOURER FOR INFRASTRUCTURE

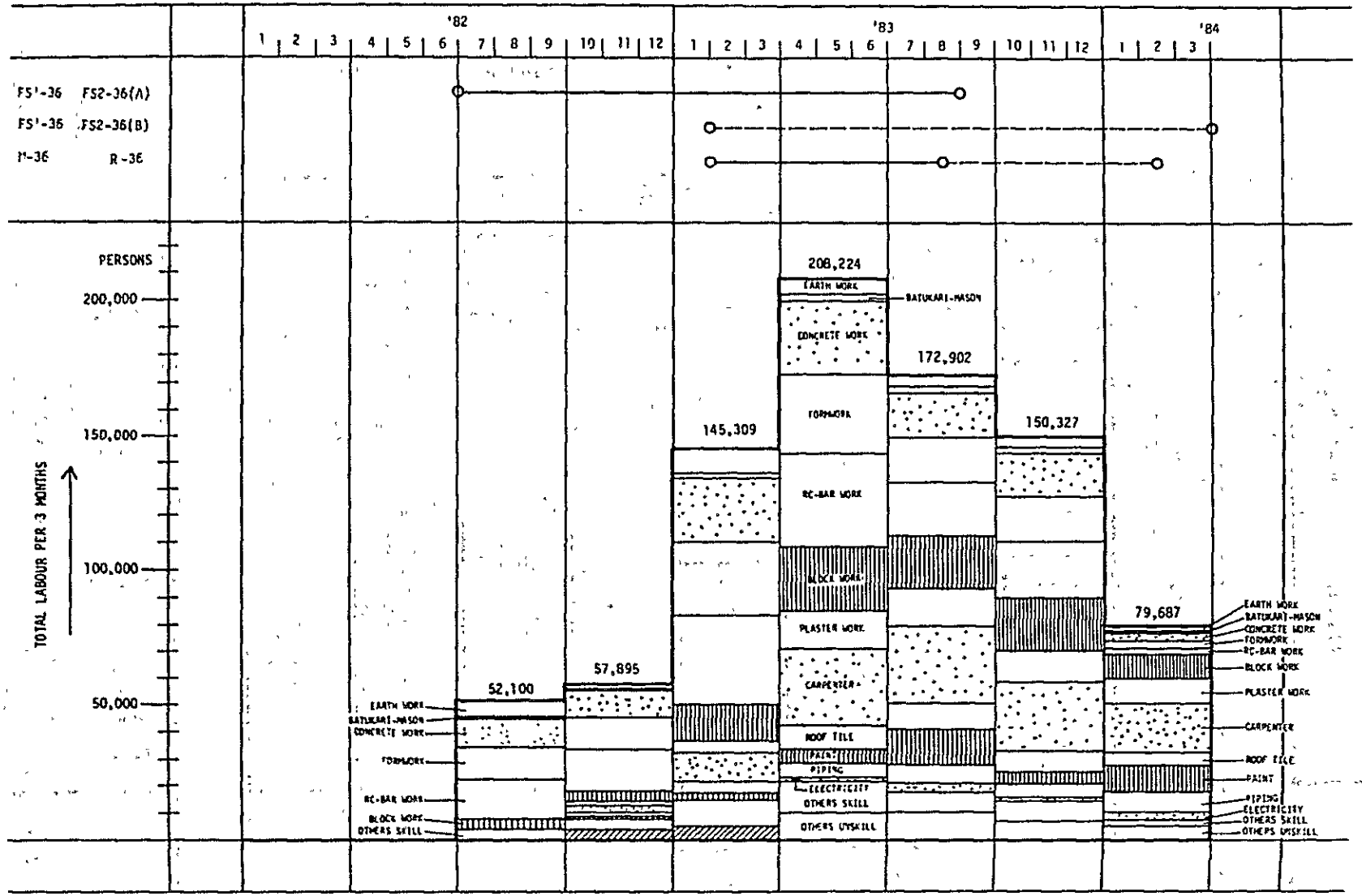


Fig. 11-4 ESTIMATION OF LABOURER FOR HOUSING

TABLE 11-4 BENEFITS OF EMPLOYMENT AT SOCIAL FACILITIES

Classification of community facilities	Number of facilities	Number of Employees	
Educational			
Kindergarten	(15)	15×5≈75 80	365
Elementary school	(28)	8×28≈224 → 250	
Junior high school	(2)	20	
Senior high school	(1)	15	
Religious			20
Mosque (Small)	(10)	10	
Mosque	(2)	10	
Medical			35
Hospital	(1)	30	
Health centre	(1)	5	
Administrative/Municipal Utility	(5)	30	30
Commercial			200
Sub-centre	(10)	100	
Centre Shops Market Cinema Parking	(1)	100	
		Total	650

b) Benefits of productivity improvements in the construction material industry

The housing development project in Cengkareng is of extremely large scale. Therefore, the industries which supply construction materials to this project are able to receive scale merit.

Furthermore, the process of mass production brings about numerous revolutionary factors to the traditional production process. It can grow into a modern production process if the necessary conditions are satisfied.

The skills of labourers will make a definite improvement in this process. Therefore, labour productivity is expected to improve.

Table 11-5 is a summary of the information on the production and circulation of the construction materials to be used in this project. The information was obtained by the study team as a result of investigations.

Productivity improvements can be expected for those materials which depend on medium or small-scale traditional production methods, those produced by scattered systems, those with much room for technological innovation and those which do not have good circulation routes.

This factor is taken into consideration for the economic costs in Case 2 of the IRR calculation.

Table 11-5 PRODUCTION AND CIRCULATION OF CONSTRUCTION MATERIALS USED FOR THE HOUSING DEVELOPMENT PROJECT IN CENGKARENG

	Domestic Products or Imported?		Produced in			Production Scale			Manufacturing System		Room to improvement(increase) of productivity in 5 years				Distributing route system is			
	Domestic	Imported	Modern Sector	Semi-modern Sector	Traditional Sector	Large	Medium	Small	Contravized and Systematic	Scattered	Lower posibilities	Higher posibilities	Technically	By another measures	In good order (systematic)	Not systematic	Possibilities of improvement: High	Possibilities of improvement: Low
(Housing)																		
Batu-Kali	○				○		○				○					○		○
Sand	○				○		○		○		○					○		○
Portland Cement	○		○			○						○	○		○		○	
Brick	○		○					○		○	○					○	○	
Bataco	○			○			○			○	○					○	○	
Concrete Block	○			○			○			○		○	○			○	○	
Roofing: Tile	○			○				○		○	○					○		○
Roofing: Asbesto (colgated)	○		○			○			○			○	○		○			○
Wood (finished)	○		○			○			○			○	○		○			
Ply wood	○		○			○			○			○	○		○			
Particle Board	○		○				○		○			○		○		○	○	
Steel Bar	○		○			○			○			○	○		○			
Steel Pipe (for Handrail)	○			○			○		○			○	○		○			
Wire	○		○			○			○			○	○		○			
Glass	○		○			○			○			○	○		○			
Paint	○		○			○			○			○	○		○			
Leim	○			○			○			○						○		○
(Instructure)																		
Crashed Stone	○			○			○			○					○		○	
Bamboo (for Swampy)	○				○			○		○					○			○
Asphalt	○		○			○			○			○	○		○			
Concrete Pipe	○			○			○			○					○			○
PVC Pipe	○		○			○			○			○	○		○			

c) Stable supply of labour to the area around Cengkareng district

One of the characteristics of the area around this project is that an industrial zone is developed along Jakarta-Tangerang Road. (See Fig. 11-5 and Fig. 11-6.)

Not only medium and small factories, but also large modern plants are located along this road. They manufacture chemicals, rubber, plastics and other chemical products, glass products, electronic and electric products (including cassette tapes), food processing, textile, packing materials, cement and other construction materials. They are typical inland type processing industries characterized by extremely high labour concentration (large labour absorbing power). Therefore, labous must be supplied stably to this industrial zone.

Residents of the Cengkareng Project have their own houses, have a habit of paying housing expenses regularly and make efforts to make some savings. Most of the house owners are expected to be employees and labourers of a relatively high quality who have a stable will to work.

Many of the workers who work in this industrial zone have lived in nearby rented houses. They will be able to enjoy a more refined life by moving into the developed houses in Cengkareng. A refined and orderly life promotes a stable will to work. The existence of these people will contribute to the productivity development of the industries as a whole.

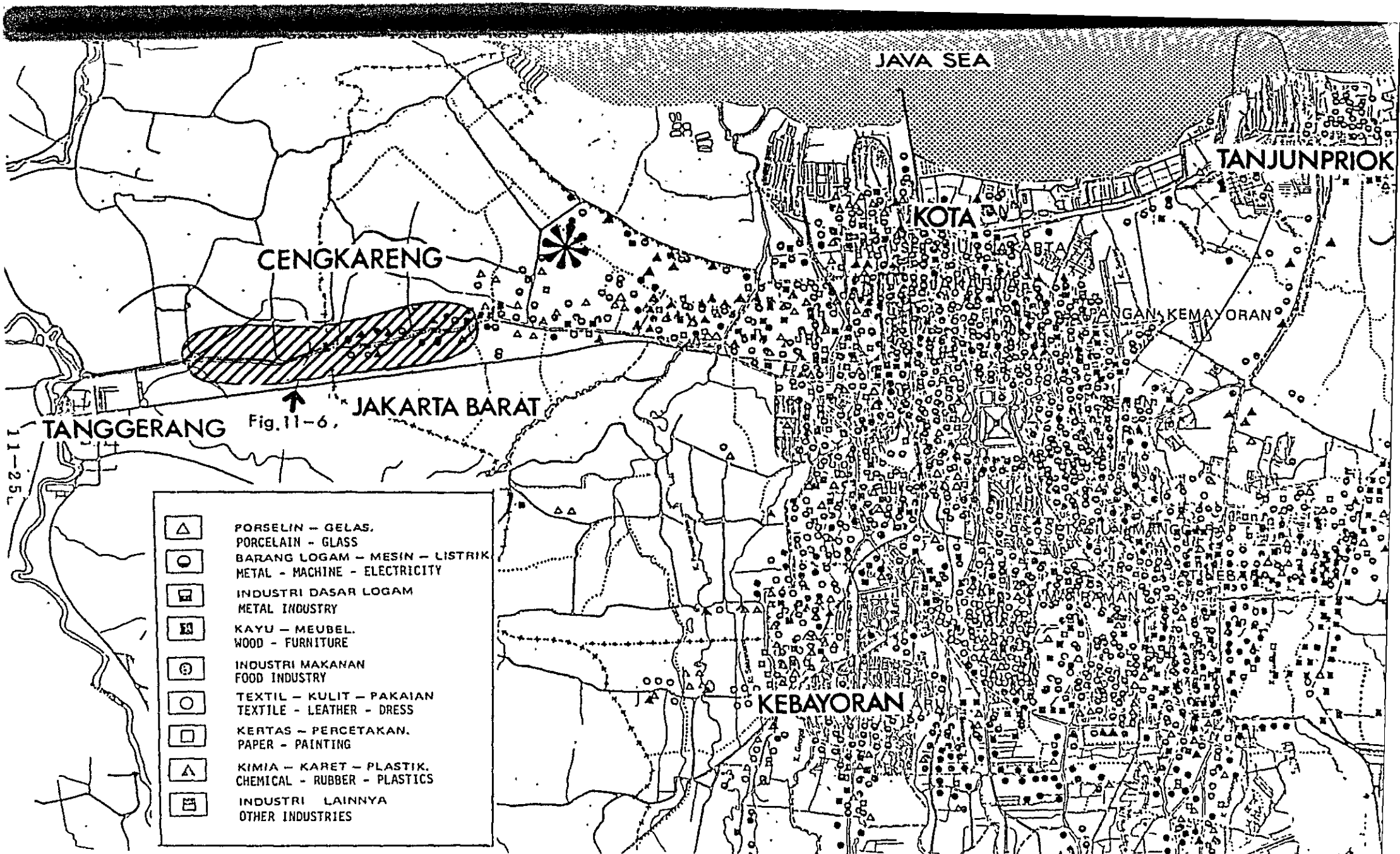
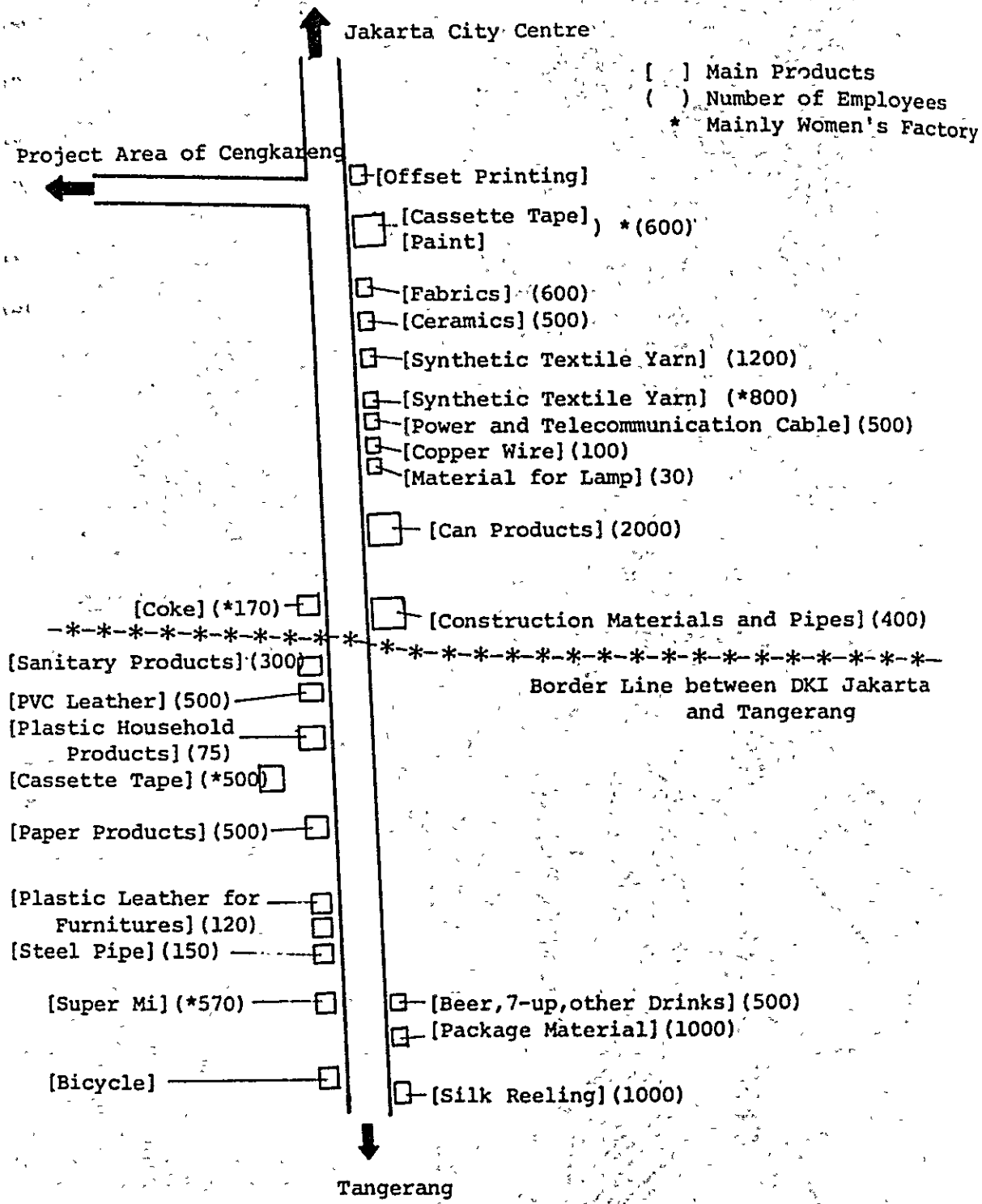
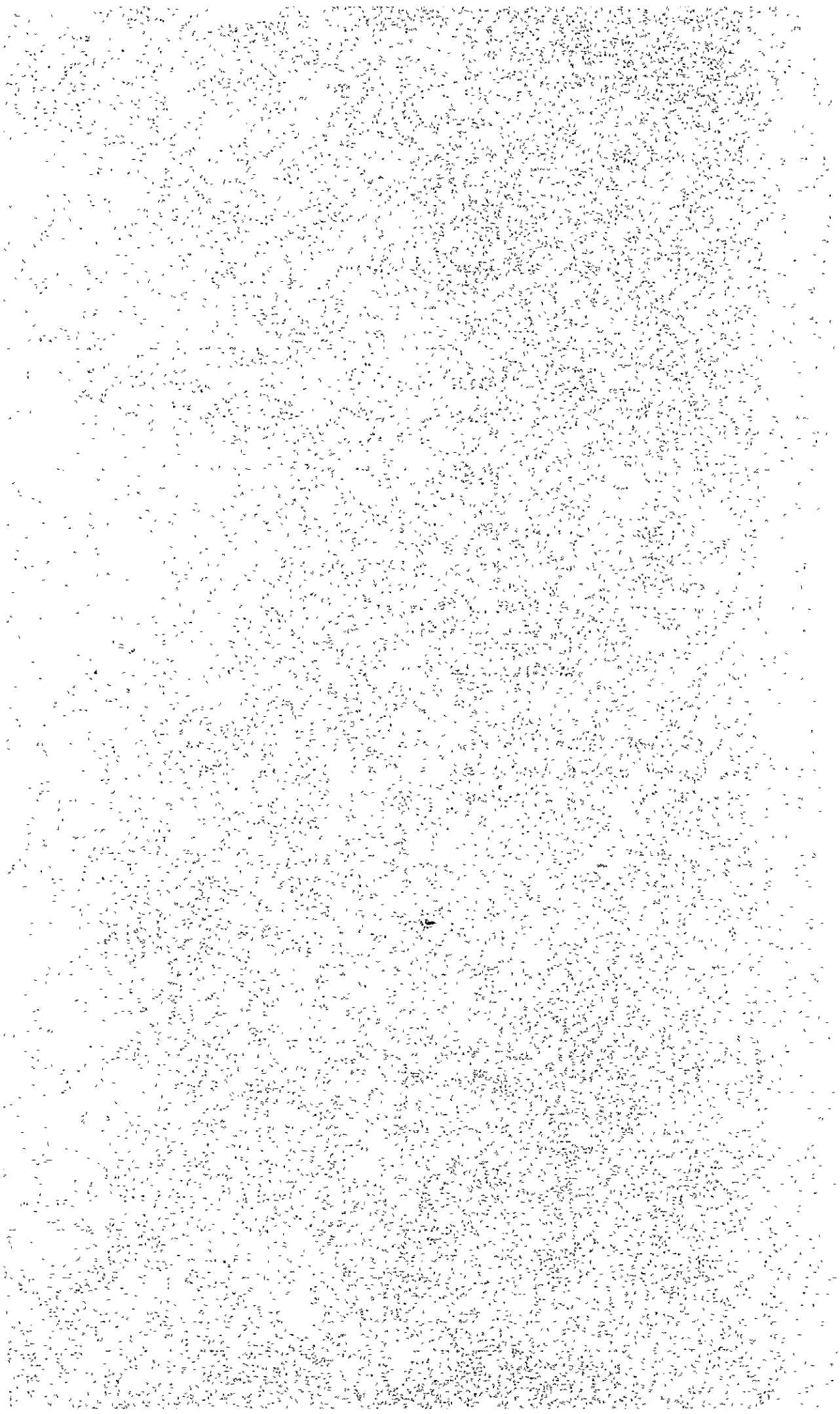

JAVA SEA
TANJUNPRIOK
KOTA
CENGKARENG
JAKARTA BARAT
TANGGERANG
Fig. 11-6
KEBAYORAN
PORSELIN – GELAS.
PORCELAIN - GLASS
BARANG LOGAM – MESIN – LISTRIK
METAL - MACHINE - ELECTRICITY
INDUSTRI DASAR LOGAM
METAL INDUSTRY
KAYU – MEUBEL.
WOOD - FURNITURE
INDUSTRI MAKANAN
FOOD INDUSTRY
TEXTIL – KULIT – PAKAIAN
TEXTILE - LEATHER - DRESS
KERTAS – PERCETAKAN.
PAPER - PAINTING
KIMIA – KARET – PLASTIK.
CHEMICAL - RUBBER - PLASTICS
INDUSTRI LAINNYA
OTHER INDUSTRIES

Fig. 11-6 MANUFACTURING INDUSTRIES ALONG JAKARTA – TANGERANG ROAD (2)



APPENDIX



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1-1 LABOR

Item	Unit	Cost (Rp)	Remarks
Mandor	day	1,500	
Foreman		2,400	
Unskilled Labor		1,250	
Carpenter		2,100	
Paitner,Mason,Tinsmith		1,750	
Plumber		1,700	
Operater			see machine cost
Earth wark man		750	

1-2 MATERIALS

Item	Unit	Cost (Rp)	Remarks
River Stone			
Crushed Stone	m^3	6,500	
Round Stone	m^3	6,500	
Koval			
Sand			
Bedding Sand	m^3	4,500	
Mortar Sand	m^3	4,500	
Concrete Sand	m^3	5,000	
Lime	m^3	7,750	
Red Brick Powder	m^3	6,500	
Portland Cement	bag	1,950	40kg/bag
Brick	pc.	19	Tangerang
Brick		82.3	Cetak
Bataco	pc.	85	t=100
Concrete Block	pc.	125	t=100
Concrete Block	pc.	165	t=150
Roofing Tile	pc.	65	Kodok

Item	Unit	Cost (Rp)	Remarks
Wood			
Kamper	m^3	200,000	Class II
Borneo	m^3	102,000	Class II III
Meranti	m^3	100,000	Class IV
Preservated Meranti	m^3	168,570	
Terentang	m^3	45,000	Class IV
Firewood		3,000	
Steel Bar	kg	280	
Steel Pipe	kg	350	for a handrail
Wire	kg	500	
Glass	m^2	7,500	t=5
Glass	m^2	4,400	t=3
Naco Window	step	400	
Bamboo	pc.	200	ϕ6cm/4cm
Asphalt	kg	150	60/70
Rumput	m^2	75	
Plywood	m^2	810	t=4
Plywood	m^2	1,090	t=6
Particle Board	m^2	1,746	t=12
Particle Board	m^2	2,150	t=16
Corrugated Asbestos	pc.	4,330	4t×2,100×1,050
Nok Patent	pc.	1,860	L=1,050
Asbestos Sheet	m^2	1,550	t=4

1-3 UNIT COST

Item	Unit		Cost (Rp)	Remarks
(1) Earth Work (Housing & Small Scale Land Development)				
Excavation	Rp/m^3	Material		
		Labor		
		Total	420	

	Item	Unit		Cost (Rp)	Remarks
	Compaction	Rp/m^2	Material		
			Labor		
			Total	100	
	Back Filling	Rp/m^3	Material		
			Labor		
			Total	100	
	Sand Filling	Rp/m^3	Material	5,400	
			Labor	200	
			Total	5,600	
	Rumpet	Rp/m^2	Material	75	
			Labor	90	
			Total	165	
(2)	Concrete Work				
	Concrete	Rp/m^3	Material	24,600	
	175kg/cm^2		Labor	3,000	1:2:3
			Total	27,600	
	Concrete	Rp/m^3	Material		
	500kg/cm^2		Labor		
			Total	32,500	
	Concrete	Rp/m^3	Material	19,350	1:3:5
			Labor	3,000	
			Total	22,350	
	Concrete	Material			
	225kg/cm^2		Labor		
			Total		
	Steel Bar	Rp/kg	Material	400	
			Labor	120	
			Total	520	

Item	Unit		Cost (Rp)	Remarks
(3) Form Work				
Foundation	Rp/m^2	Material	1,806	
		Labor	294	
		Total	2,100	
Wall	Rp/m^2	Material	2,580	
		Labor	420	
		Total	3,000	
Column	Rp/m^2	Material	2,838	
		Labor	462	
		Total	3,300	
Beam	Rp/m^2	Material	2,580	
		Labor	420	
		Total	3,000	
Floor	Rp/m^2	Material	3,612	
		Labor	588	
		Total	4,200	
Pile	Rp/m^2	Material	2,580	
		Labor	420	
		Total	3,000	
(4) Masonry Work				
Batu-kari	Rp/m^2	Material	18,050	
		Labor	2,200	1:4
		Total	20,250	
Batu-kali	Rp/m^2	Material	410	
Plaster,Finish		Labor	450	
		Total	860	
Weep Hole	Rp/pc.	Material	36	
		Labor	9	
		Total	45	

Item	Unit		Cost (Rp)	Remarks
Bataco	Rp/m^2	Material	1,570	t=100
		Labor	200	W/Vertical
		Total	1,770(2,520)	Reinforce-ment
				ϕ8 @400
Concrete Block	Rp/m^2	Material	2,070	t=100
		Labor	200	W/Vertical
		Total	2,270(3,020)	Reinforce-ment
				ϕ8 @400
Concrete Block	Rp/m^2	Material	2,730	t=150
		Labor	260	
		Total	2,990	
Brick Exposure (full brick)	Rp/m^2	Material	4,000	
		Labor	600	Tangerang Class II
		Total	4,600	
Brick Exposure (half brick)	Rp/m^2	Material	5,050	
		Labor	400	Cetak
		Total	5,450	
Brick Exposure (half blick)	Rp/m^2	Material	2,000	
		Labor	400	Tangerang Class II
		Total	2,400	

(5) Plaster/Painting Work

Floor Mortar (1:5)	Rp/m^2	Material		t=30
		Labor		
		Total	840	
Exterior Mortar (1:5)	Rp/m^2	Material		t=25
		Labor		
		Total	960	
Water Proof Mortar (1:3)	Rp/m^2	Material	810	t=30
		Labor	420	
		Total	1,230	

Item	Unit		Cost (Rp)	Remarks
Coking	Rp/m	Material		
		Labor		
		Total	700	
Mortar (1:4)		Material		
		Labor		t=15
		Total		
Painting ↓ Concrete	Rp/m^2	Material		
		Labor		
		Total	400	
Painting ↓ wood	Rp/m^2	Material		
		Labor		
		Total	500	
(6) Other Works				
Concrete Pile Driving	Rp/m	Material		
		Labor		
		Total	2,800	
Wooden Work General	Rp/m^3	Material	182,000	Preservated
		Labor	11,790	Meranti
		Total	193,790	
Wooden Work Roof Truss	Rp/m^3	Material	184,500	Preservated
		Labor	15,140	Meranti
		Total	199,640	
Wooden Work Door & Window Frame	Rp/m^3	Material	185,500	Preservated
		Labor	32,800	Meranti
		Total	218,300	
Ground Scaffolding	Rp/m^2	Material		
		Labor		
		Total	600	

Item	Unit		Cost (Rp)	Remarks
Exterior Scaffolding (Bamboo)	Rp/m^2	Material		
		Labor		
		Total	800	
Roof Tile Kodok	Rp/m^2	Material	1,500	
		Labor	200	
		Total	1,700	
Ridge Tile	Rp/m	Material		
		Labor		
		Total	1,800	
Metal Work	Rp/kg	Material		
		Labor		
		Total	750	

1-4 MACHINE COST WITH OPERATOR

Name of Machine	Type	Capacity	Cost (Rp/hr)
Bulldozer		(Operating Weight)	
	D60E.6	15.92 ton	19,530
	D65E.6	16.12 ton	20,400
	D85A.18	18.95 ton	27,780
	D155A.1	32.85 ton	31,250
Swamp Bulldozer	D65P	18.88 ton	21,700
Dozer Shovel		(Bucket Capacity)	
	D57S	$1.6m^3$	16,930
	D75S.2	$2.1m^3$	21,700
Motor Scraper	WS-16	Struck $11.0m^3$	47,310
		Heapen $15.8m^3$	
Wheel loader		(Bucket Capacity)	
	W-90	$2.3m^3$	20,830
	W-170	$3.5m^3$	23,870
Hydraulic	LS2500BJ	Heavy duty $0.35m^3$	15,840
		Loading work $0.5m^3$	

Name of Machine	Type	Capacity	Cost (Rp/hr)
	LS2800AJ	Heavy duty 0.7m^3	
		Loading work 1.0m^3	20,830
Vibrating Roller	BW212B	8.6 ton	16,930
	BW212SB	9.6 ton	17,790
Road roller		10∿12 ton	4,500
Motor Grader		Blade Width	
	GD37-6H	3.71m	16,930
Clawler Mounted Crane	LS78LS	25 ton	15,840
Dump Truck	TOYOTA	5 ton	4,320

1-5 UNIT COST FOR LARGE SCALE EARTH WORK (Land Development)

Item	Unit	Cost (Rp)	Remarks
Stripping	Rp/m^3	25	Bulldozer D60E 750m^2/hr
Clearing & Grubbing (manual)	Rp/m^2	10	
Clearing & Grubbing & Grading	Rp/m^2	60	Bulldozer D60E Dump Truck (500m) Shovel Loader
Cut	Rp/m^3	130	Bulldozer D60E 150m^3/hr
Fill (dozing)	Rp/m^3	260	Bulldozer D60E (dozing 150m)
Fill (spreading)	Rp/m^3	100	Bulldozer D60E 200m^3/hr
Compaction	Rp/m^3	120	Compactor BW212SP 150m^3/hr
Site Transportation	Rp/m^3	400	Shovel Loader Dump Truck (300∿600m)

Item	Unit	Cost (Rp)	Remarks
Excavation (manual)	Rp/m^3	420	
Excavation & Site Transportation	Rp/m^3	630	Swamp Dozer Back Hoe Dump Truck (1~1.5km)

1-6 COST DATA FOR PLUMBING

(1) PVC-CLASS VP (10 kg/cm^2)

Size	① Pipe material Rp/M	② Accessories Rp/M	③ Sub-total ① + ② Rp/M	④ Excavation & backfilling Rp/M		⑤ Sand bedding Rp/M	⑥ Installation Rp/M	⑦ Sub-total ④ ~ ⑥ Rp/M	⑧ Total ③ + ⑦ Rp/M
				d					
1/2"	305	90	395	0.4	55	270	145	470	865
3/4	365	110	475	"	55	290	145	490	965
1	530	160	690	"	60	295	215	570	1,260
1 1/4	635	190	825	"	60	325	215	600	1,425
1 1/2	930	280	1,210	"	65	335	215	615	1,825
2	1,315	395	1,710	"	70	360	275	705	2,415
2 1/2	1,695	510	2,205	0.6	100	410	275	785	2,990
3	2,585	775	3,360	"	105	440	320	865	4,225
4	4,000	1,200	5,200	"	165	915	470	1,550	6,750
5	5,240	1,570	6,810	0.8	225	1,035	470	1,730	8,540
6	7,880	2,365	10,245	"	240	1,185	635	2,060	12,305
8	11,920	3,575	15,495	1.0	405	2,085	800	3,290	18,785
10	18,160	5,450	23,610	"	460	2,440	965	3,865	27,475

d: Depth (M)

(2) PVC-CLASS VU (5 kg/cm^2, for Sewage)

Size	① Pipe material Rp/M	② Accessories Rp/M	③ Sub-total ① + ② Rp/M	④ Excavation & backfilling Rp/M		⑤ Sand bedding Rp/M	⑥ Installation Rp/M	⑦ Sub-total ④ ∿ ⑥ Rp/M	⑧ Total ③ + ⑦ Rp/M
				d					
2"	615	155	770	0.4	65	365	275	705	1,475
3	1,360	340	1,700	0.6	110	435	320	865	2,565
4	2,040	510	2,550	0.6	160	920	470	1,550	4,100
6	4,625	1,155	5,780	0.8	240	1,185	635	2,060	7,840
8	7,720	1,930	9,650	1.0	405	2,085	800	3,290	12,940
10	11,640	2,910	14,550	1.0	460	2,440	965	3,865	18,415
12	16,080	4,020	20,100	1.0	510	2,820	1,130	4,460	24,560

d: Depth (M)

(3) GALVANIZED IRON PIPE (GIP)

Size	① Pipe material Rp/M	② Accessories Rp/M	③ Sub-total ① + ② Rp/M	④ Excavation & backfilling Rp/M		⑤ Sand bedding Rp/M	⑥ Installation Rp/M	⑦ Sub-total ④ ∿ ⑥ Rp/M	⑧ Total ③ + ⑦ Rp/M
				d					
1/2"	690	210	900	0.4	55	270	580	905	1,805
3/4	890	265	1,155	"	60	285	580	925	2,080
1	1,380	415	1,795	"	60	295	860	1,215	3,010
1 1/4	1,775	535	2,310	"	60	325	860	1,245	3,555
1 1/2	2,050	615	2,665	"	65	335	860	1,260	3,925
2	2,890	865	3,755	"	65	365	1,100	1,530	5,285
2 1/2	3,720	1,115	4,835	0.6	100	410	1,100	1,610	6,445
3	4,835	1,450	6,285	"	110	435	1,280	1,825	8,110
4	6,945	2,085	9,030	"	160	920	1,880	2,960	11,990
5	9,350	2,805	12,155	0.8	225	1,035	1,880	3,140	15,295
6	11,090	3,327	14,417	"	240	1,185	2,540	3,965	18,382

d: Depth (M)

(4) ASBESTOS CEMENT PIPE (ACP) (20 kg/cm^2, for Drinking Water)

Size	① Pipe material Rp/M	② Accessories Rp/M	③ Sub-total ① + ② Rp/M	④ Excavation & backfilling Rp/M		⑤ Sand bedding Rp/M	⑥ Installation Rp/M	⑦ Sub-total ④ ∿ ⑥ Rp/M	⑧ Total ③ + ⑦ Rp/M
				d					
	-	-	-						
4"	2,535	760	3,295	0.6	160	920	940	2,020	5,315
6	4,120	1,235	5,355	0.8	240	1,185	1,270	2,695	8,050
8	7,415	2,225	9,640	1.0	405	2,085	1,600	4,090	13,730
10	10,465	3,140	13,605	1.0	460	2,440	1,930	4,830	18,435
12	15,270	4,580	19,850	1.0	510	2,820	2,260	5,590	25,440
14	20,360	6,110	26,470	1.0	560	3,235	2,590	6,385	32,855

d: Depth (M)

(5) DUCTILE CAST IRON PIPE (DCIP)

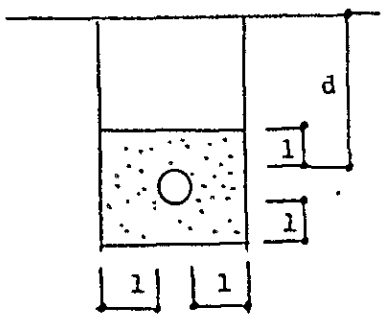
Size	① Pipe material Rp/M	② Accessories Rp/M	③ Sub-total ① + ② Rp/M	④ Excavation & backfilling Rp/M		⑤ Sand bedding Rp/M	⑥ Installation Rp/M	⑦ Sub-total ④ ∿ ⑥ Rp/M	⑧ Total ③ + ⑦ Rp/M
				d					
4"	11,200	3,360	14,560	0.6	160	920	1,410	2,490	17,050
6	16,275	4,885	21,160	0.8	240	1,185	1,905	3,330	24,490
8	19,750	5,925	25,675	1.0	405	2,085	2,400	4,890	30,565
10	26,250	7,875	34,125	"	460	2,440	2,895	5,795	39,920
12	42,420	12,725	55,145	"	510	2,820	3,390	6,720	61,865
14	47,450	14,235	61,685	"	560	3,235	3,885	7,680	69,365

d: Depth (M)

1-7 COST DATA FOR WATER SUPPLY AND SEWERAGE

(1) COST OF EXCAVATION, BACKFILLING & SAND BEDDING - WATER SUPPLY

Size	d mm	ℓ mm	Excavation		Back filling		Sand bedding		Total Rp/M	
			M^3	Rp/M	M^3	Rp/M	M^3	Rp/M		
1/2"	400	100	0.114	48	0.066	7	0.048	269	324 →	325
3/4	"	"	0.118	50	0.067	7	0.051	286	343	345
1	"	"	0.122	51	0.069	7	0.053	297	355	355
1 1/4	"	"	0.130	55	0.072	7	0.058	325	387	385
1 1/2	"	"	0.134	56	0.074	7	0.060	336	399	400
2	"	"	0.142	60	0.077	8	0.065	364	432	430
2 1/2	600	"	0.208	87	0.135	14	0.073	409	510	510
3	"	"	0.218	92	0.140	14	0.078	437	543	545
4	"	150	0.346	145	0.182	18	0.164	918	1,081	1,080
5	800	"	0.464	195	0.279	28	0.185	1,036	1,259	1,260
6	"	"	0.503	211	0.291	29	0.212	1,187	1,427	1,425
8	1,000	200	0.850	357	0.478	48	0.372	2,083	2,488	2,490
10	"	"	0.964	405	0.528	53	0.436	2,442	2,900	2,900
12	"	"	1,072	450	0.568	57	0.504	2,822	3,329	3,330
14	"	"	1,186	498	0.608	61	0.578	3,237	3,796	3,795
			420Rp/M^3		100Rp/M^3		5,600Rp/M^3			



(2) WATER METER AND HOUSE CONNECTION

• Meter 1/2"	17,500
• Meter Box	7,500
• Accessories	3,000
• PVC 3/4"×3M	2,895
• GIP 1/2"×1M	1,805
	32,700Rp/unit

(3) PROTECTION FOR ROAD CROSSING PIPE

• Pipe material cost (DCIP) + Installation cost (DCIP) × 0.8

(4) ELEVATED RESERVOIR (400M^3, 25M HEIGHT)

• Structure *	R.S.		62,193.97×10^3Rp
• Excavation	500.35M^3 × 420Rp/M^3	=	210.15
• Slab-on-grade	6.27M^3 × 22,500Rp/M^3	=	141.08
• Sand filling	15.05M^3 × 5,600Rp/M^3	=	84.28
• Back filling	292.55M^3 × 100Rp/M^3	=	29.26
• Pain work	1,752.61M^2 × 400Rp/M^2	=	701.04
• Water proof mortar	297M^2 × 1,230Rp/M^2	=	365.31
• Stairs (Concrete)	R.S.		2,652.07
• Pile driving (concrete)	572M × 2,800Rp/M^2	=	1,601.60
• Pipes and Accessories	R.S.		1,746.50
• Scaffolding and others	R.S.		18,274.74
			88,000×10^3Rp

* Structure

	Concrete			Form work			Steel Bar		
	Volume m^3	Unit price $10 \times Rp/M^3$	Price $10^3 Rp$	Volume m^2	Unit price $10^3 Rp/M^3$	Price $10^3 Rp$	Volume tons	Unit price $10^3 Rp/M^3$	Price $10^3 Rp$
Column	56.94			383.68	3.3	1,266.14	13.30		
Beam	155.75			1,059.97	3.0	3,179.91	30.89		
Slab	29.55	27.50	13,701.33	187.36	4.2	786.91	4.66	520	31,153.2
Wall	18.24			243.20	3.0	729.60	3.87		
Foundation	237.75			184.16	2.1	386.74	2.96		
Pile	35.75	32.50	1,161.88	572.00	3.0	1,716.00	4.23		
Sub-total	533.98		14,863.21	2,630.37		8,065.30	59.91		31,153.2
Total	54,081.71 × 1.15 = 62,193.79 × $10^3 Rp$								

(5) SEWAGE HOUSE CONNECTION

- PVC 4" × 2M 8,620 (-1.4M Depth)
- Junction box 52,500 = 4 (1 unit/4 households, 70 × 70CM -1.4M Depth)

21,745 → 21,700Rp/unit

(6) SEWAGE COMMERCIAL BLDG. CONNECTION

- PVC 6" × 2M 15,680 (-0.8M Depth)
- Manhole 20,300 (50 × 50CM, -0.6M Depth)
- Junction box 36,300 (50 × 50CM, -1.5M Depth)

72,280 → 72,300Rp/unit

(7) PIPE FOUNDATION

- Bamboo 2.5M × 100Rp/M = 250
- Labor and others = 100

350Rp/M

(8) LAGOON (FOR 60ℓ/d.c, Combined System, 70unit/ha)

• Embankment	$7,300M^3 \times 330Rp/M^3$	$= 2,409 \times 10^3Rp$
• Excavation	$7,300M^3 \times 420Rp/M^3$	$= 3,066$
• Chlorination pit	$40M^3$ (RC)	1,032
• Equipment and installation		75,000
• Electric house		560
• Generator set	46KW	4,400

86,467 → 86.5Mil.Rp