社会開発協力部報告書

NO 8

REPUBLIC OF INDONESIA

APPENDICES

LOW COST HOUSING PROJECT IN CENGKARENG

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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SOCIO-ECONOMIC SURVEY DATA

I-1 HOME INTERVIEW SURVEY IN KLENDER AND DEPOK

I-1-1 Purpose

In the Socio-economical study of Cengkareng's Low Cost Housing Project (Phase II, Round I), Questionairing and Home Interview Survey is taken in Klender and Depok I, II.

The purpose of the Q & I survey is

(1) to grasp the characteristics and special features of the demand for PERUMNAS's housing projects.

(2) to get some information about socio-economical benefits of the new low cost housing development.

I-1-2 Scope of survey

The scope of survey is shown as next.

(1) Sampling Areas

Klender and Depok housing areas of PERUMNAS

(2) Period of Field Work

July 1980

(3) Samples

Klender	.....	202
Depok I	.....	40
Depok II Tengah	.....	80
Depok II Timur	.....	81
Total		403

(4) Procedure

To send interviewer for explanation how to answer the questionaire

↓

To leave the questionaire in each visited house, giving the date and time to collect back

↓

To collect the filled-in questionaire

I-1-3 Summary

(1) Comparison the Resident's Present Conditions of Dwelling with the Previous Conditions

The chief matter of concern in the survey is to compare the resident's present conditions of dwelling with the previous conditions. Generally speaking the residents are enjoying higher level of living in the new housing area in comparison with the previous level. Main findings is shown as below.

1 The residents are generally enjoying

a. higher level of monthly income (see page 28, 29 and 7).
in Klender; the average of 90,628 Rp/month
(63,468 Rp; previous, the rate of increase 15%/year)

in Depok I; the average of 87,666 Rp/month
(45,217 Rp; previous, the rate of increase 18%/year)

in Depok II Tengah; the average of 86,711 Rp/month
(63,686 Rp; previous, the rate of increase 17%/year)

in Depok II Timur; the average of 74,450 Rp/month
(58,282 Rp; previous, the rate of increase 18%/year)

b. wider floor and land space (see page 15, 21)

c. having a chance of extension (see page 16, 17, 18)

More or less half of the residents have already extended, the average of 33.4m^2 in Klender, 16.1m^2 in Depok I, 23.2m^2 in Depok II Tengah, and 19.1m^2 in Depok II Timur.

And half of the rest have a plan of extension.

d. facilities for prime use such as W.C and Mandi (see page 24, 25).

It is important to say that they are enjoying such benefits as above in the situation of decrease of numbers of family members (excluding Depok II Tengah), resident's members and income earners (see page 9, 12 and 32).

2 The residents get merits of paying smaller rate of housing expenditure among monthly income as compared with that in previous residence (excluding Depok I, see page 30, 31 and 42).

3 The residents are very satisfied with obtaining their own house and land.

a. The decisive factor for them in selecting the present residence was they were anxious to have a house of their own (see page 41).

b. Almost all of them lived in a leased independent house under private management or they were roomer in someone else's house in the previous residence (see page 25).

c. Half of them had no yard to use to their disposition. One third of them had a yard for common use, but not for private use (see page 26).

d. They have no plan to move another residence (see page 13).

(2) Problems of Present Conditions

On the other hand there also are such problems as shown below as a whole or in each site.

1 As to floor space, there are considerable numbers of residents who cannot enjoy the increase of that in comparison with the previous one (see page 15. About one fourth of the residents are living on a smaller floor space).

2 Commuting condition is very bad especially in Depok area. The residents are troubled with incovenience for commutation - longer time and higher cost (see page 29, 40 and 44).

3 In Klender and Depok II Timur, more than half of the residents criticize poor equipment of water supply, electricity and drainage system (page 40, 45).

4 In some sites especially Depok II Tengah, the residents are suffering from inconvenience for shopping and poor environment for peace and education (see page 44, 45, and 46).

(3) Floor Space to Occupants Monthly Income

As a general tendency, the bigger the floor space, the higher the occupants monthly income becomes. But, above the range of $40m^2$ of the floor space, differences of monthly income can not be found among the occupants. (See page 20)

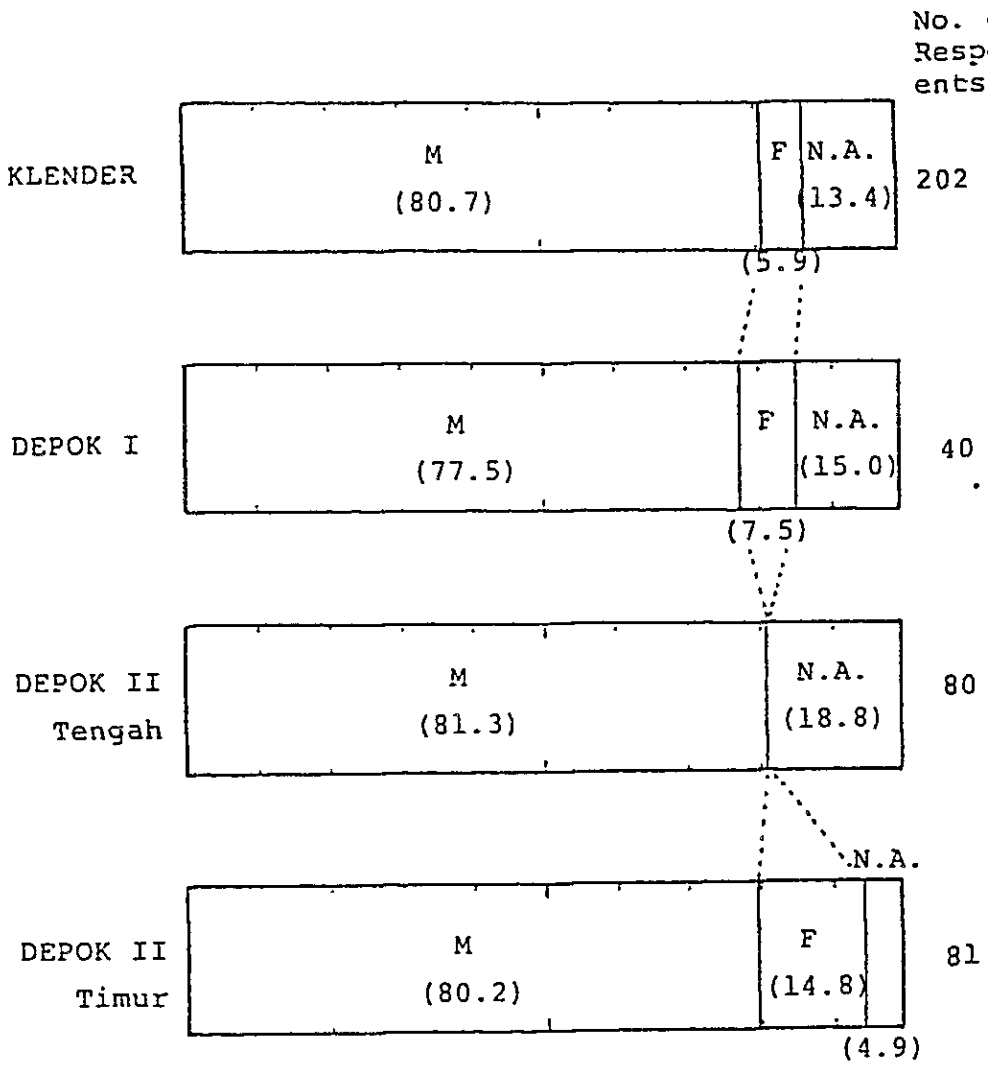
(4) Opinion about the Walk-up Flat

The resident's opinion about the medium-rise apartment (walk-up flat) is asked in the end of the survey. They are negative in general, about three fourth of the residents don't like to live in it however inexpensive the rent is as shown in page 50.

But on the other it is evaluated that vacant lots can be set aside in the periphery of the building, it commands a fine view, one can live without being familiar with neighbours, and little damage is likely to be caused by earthquakes or floods.

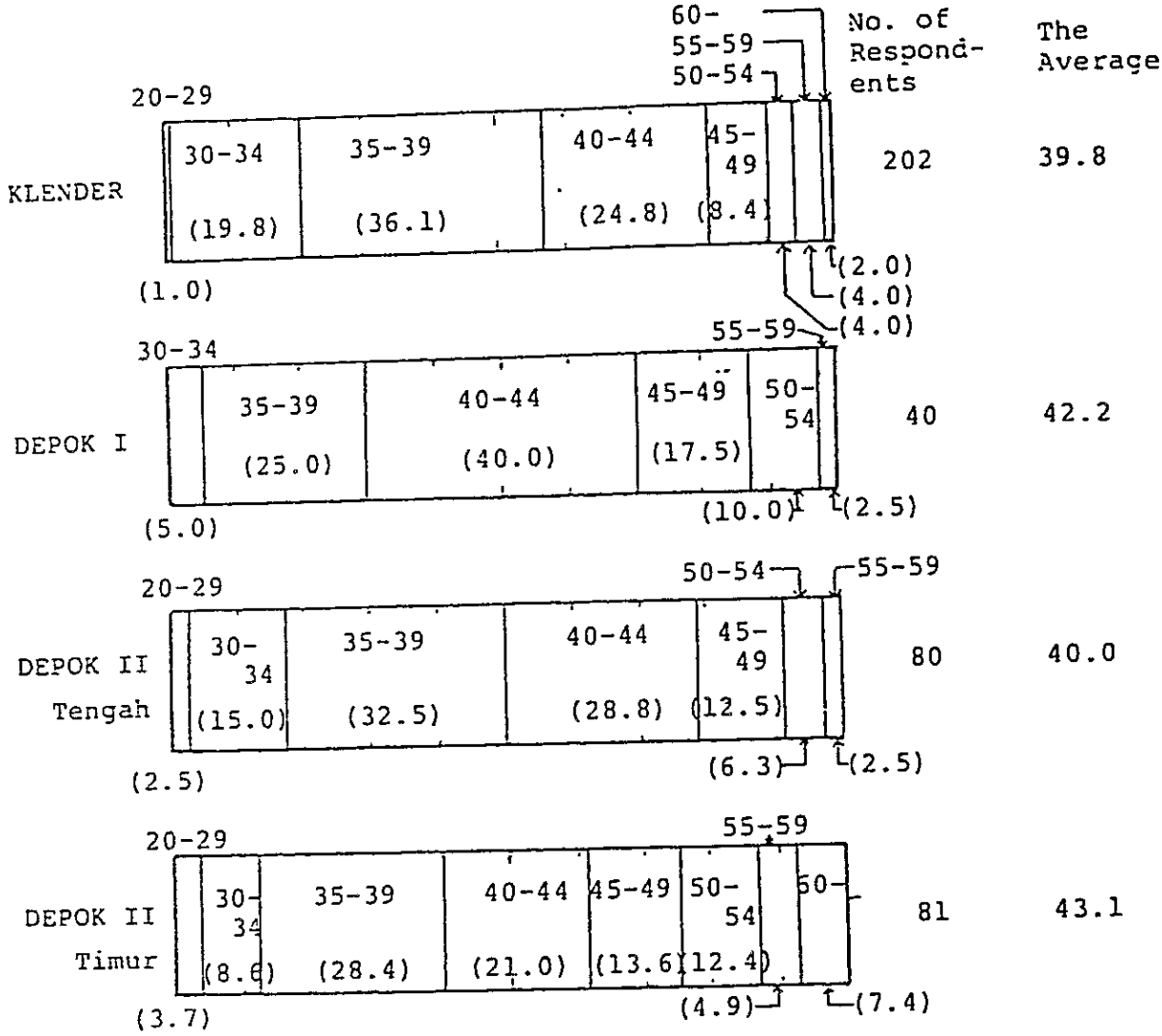
I-1-4 The characteristics of householders

(1) Sex of Householders

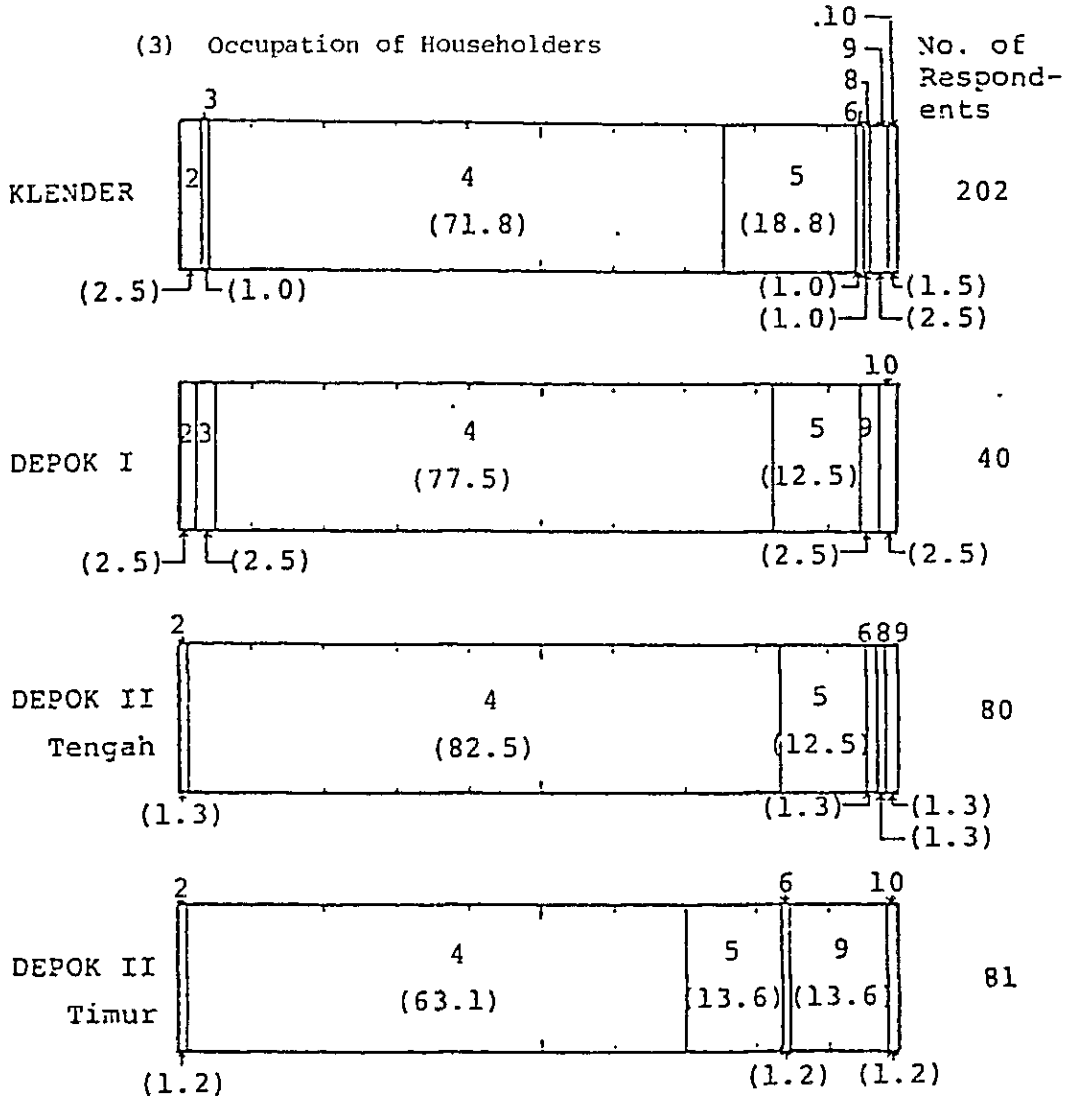


Area	Men	Female	N.A.	Total
KLENDER	163	12	27	202
DEPOK I	31	3	6	40
DEPOK II Tengah	65	0	15	80
DEPOK II Timur	65	12	4	81

(2) Age of Householders



(3) Occupation of Householders



1 Professional (college professor, doctor, professional engineer, other professionals, etc.)

2 Manager of a government office

3 Manager of a company

4 Public official, soldier, teacher

5 Clerk of a company

6 Factory worker, shop attendant craftman, driver, etc.

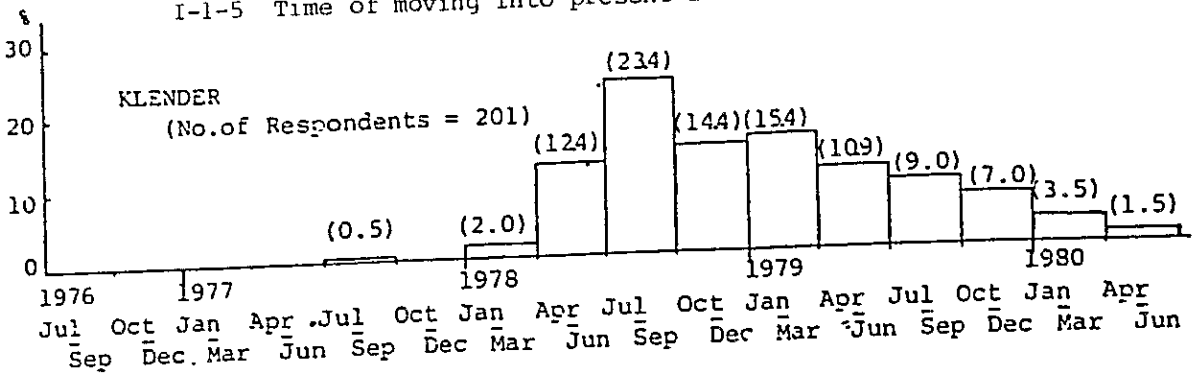
7 Farmer, fisherman, etc.

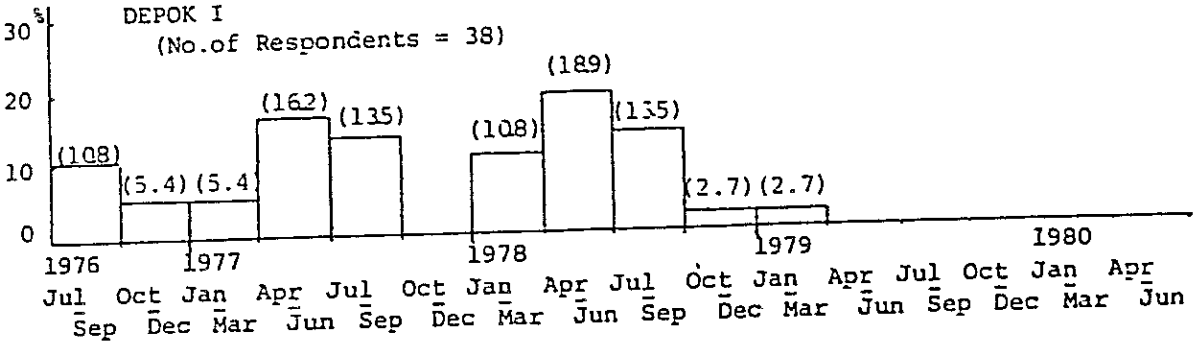
8 Independent

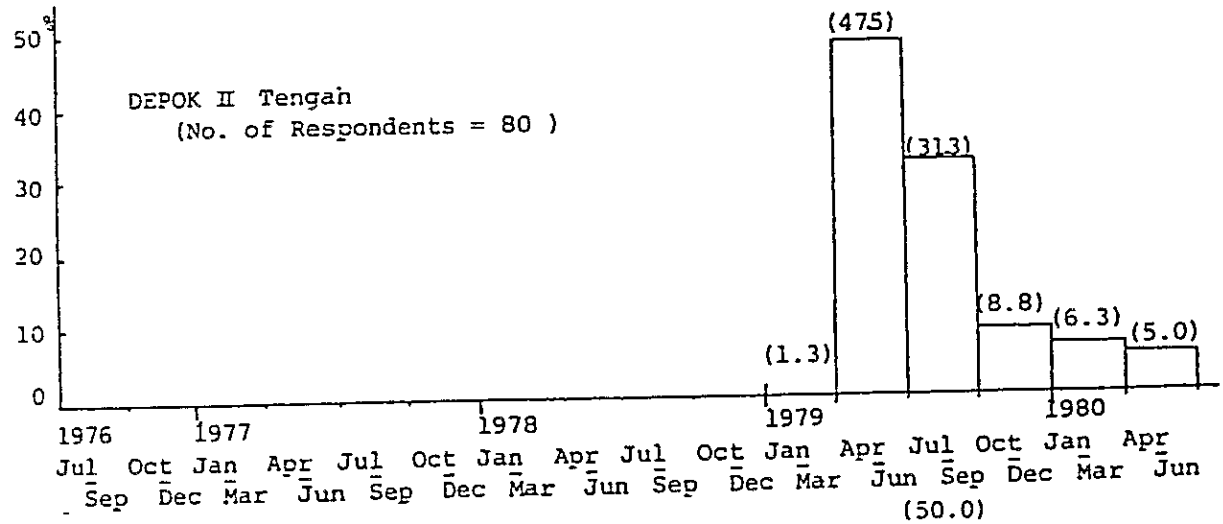
9 Others

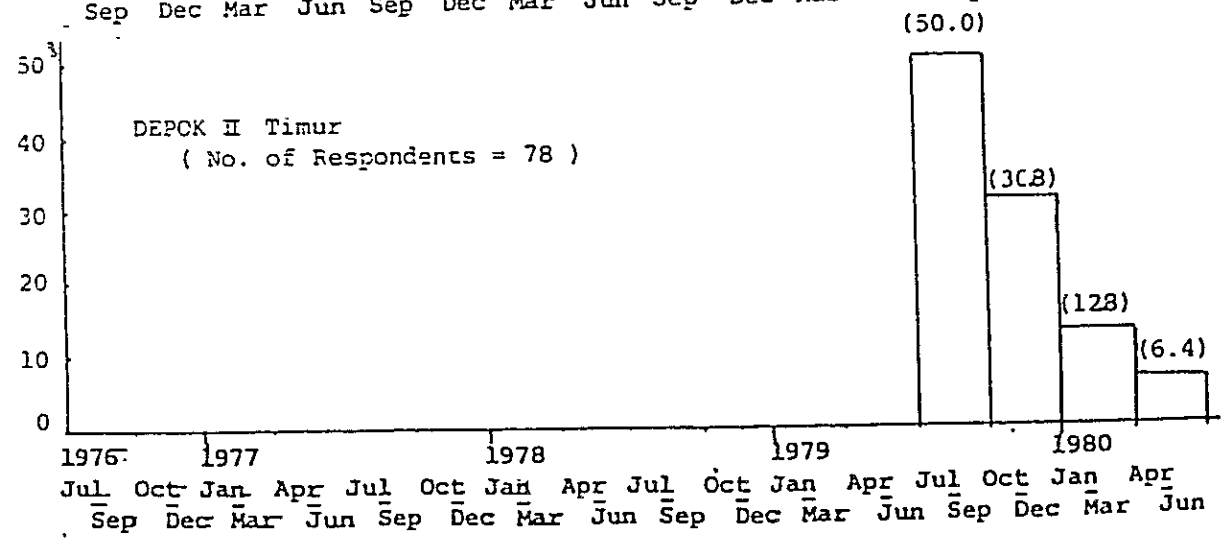
10 Unemployed

I-1-5 Time of moving into present residence

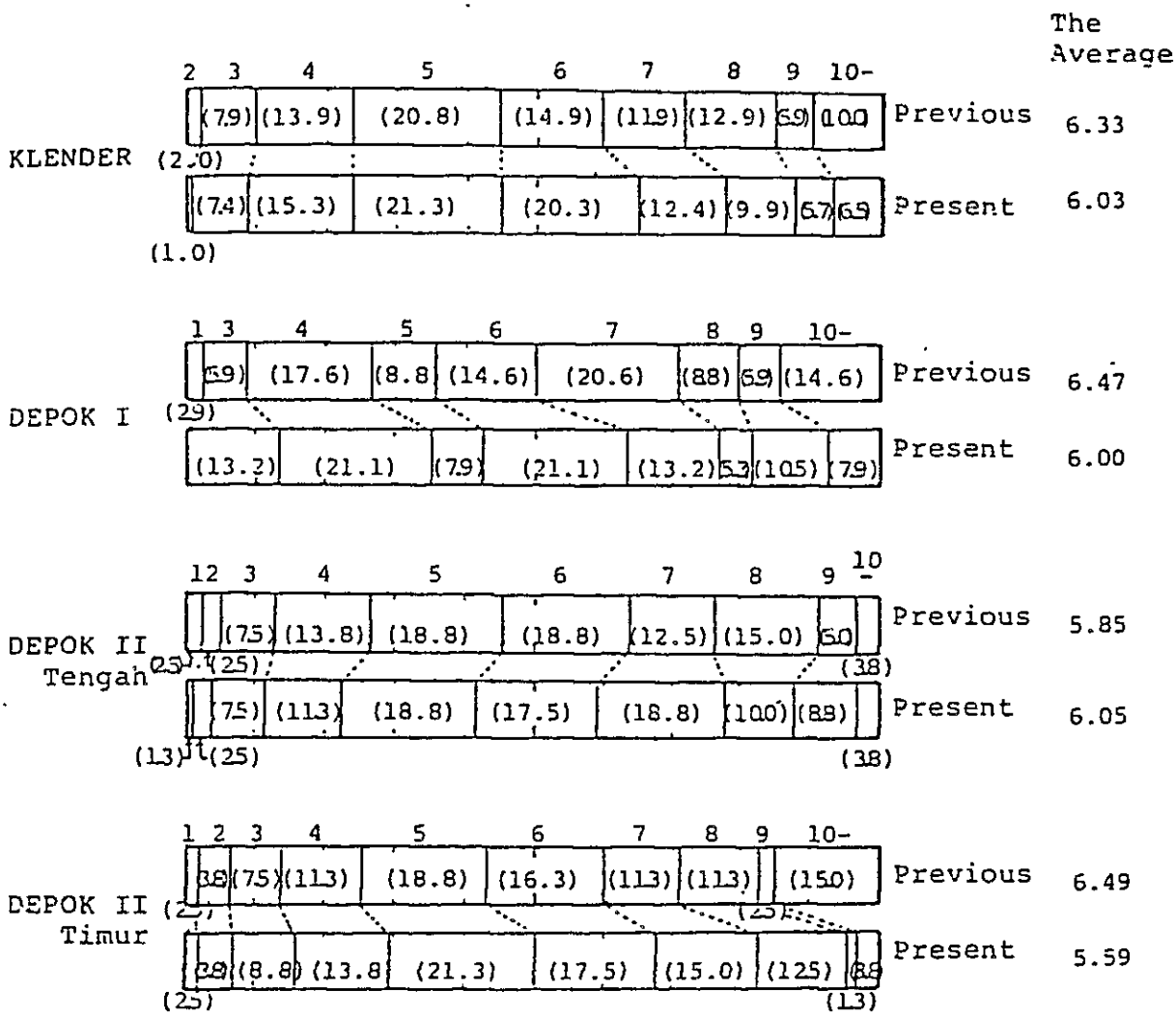








I-1-6 No. of family members



No. of Family Members

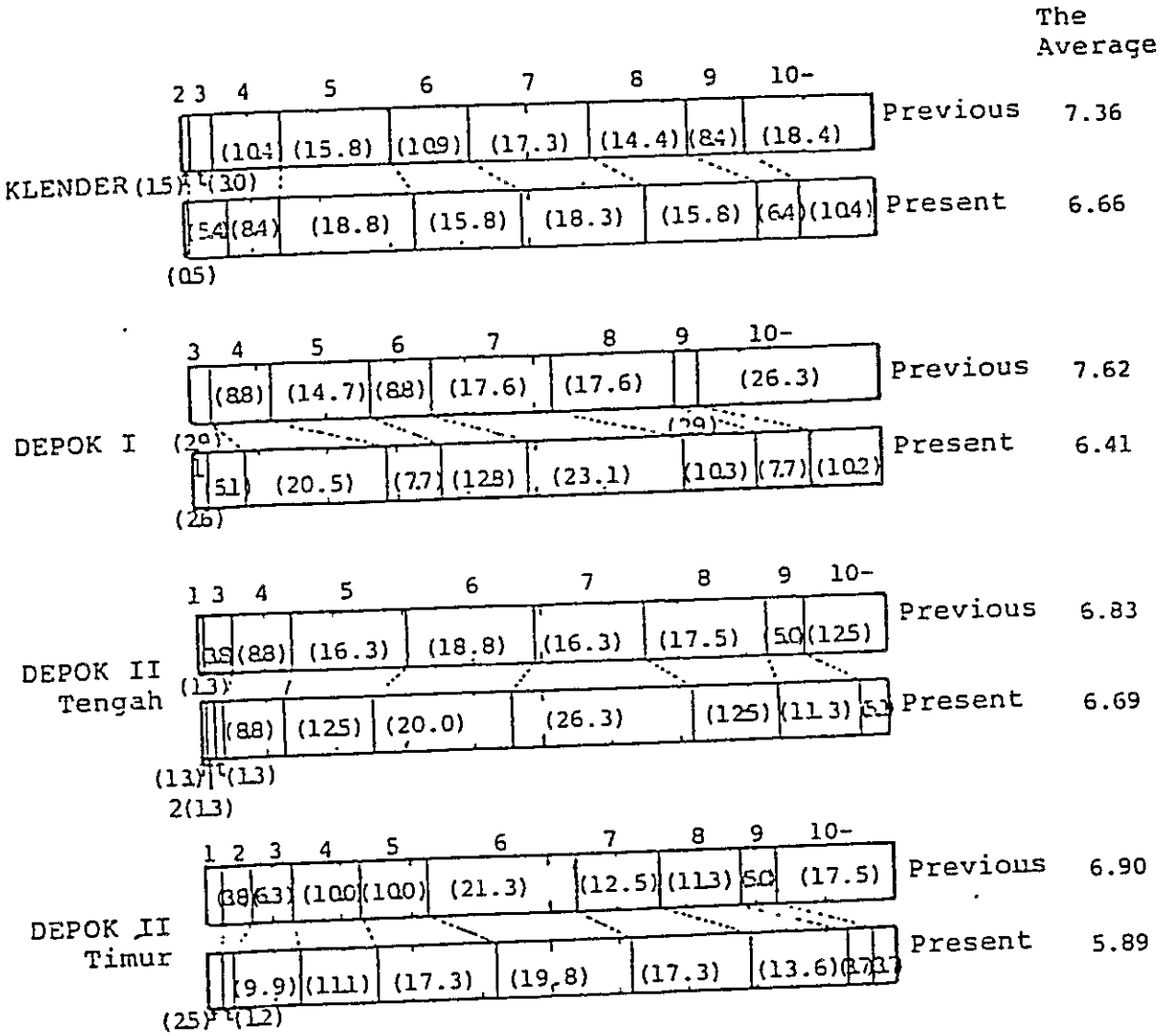
Pre. \ Pre.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	NA	Total
1	2			1															3
2	1	3			2			1											7
3	1		23	6		1					1	1							33
4	1	4	5	34	4	3	1	2	1	1	2							1	59
5		1	1	8	52	6	4	2		1			2					1	78
6			1	4	15	42	3	5	1	1	1						1	3	77
7		1				8	34	5	1	3	1	2	1		1			1	57
8				1	1	1	6	26	3			1							40
9					1	1	1	7	12				1	1					24
10							1	1	2	6						1			11
11										2	2								4
12								1			1	3	1						6
13																1			1
N.A.						1									1			1	3
Total	5	9	30	54	75	63	50	50	20	14	8	7	5	1	2	2	1	7	403

Present > Previous :	78
Present = Previous :	239
Present < Previous :	77
Unknown :	9
Total	403

The Average --- Present : 5.95

Previous : 6.28

I-1-7 No. of residents



No. of Residents

Present / Previous	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	21	NA	Total
1	1		1					1							1					4
2		2			1															3
3	1		10	6	1		2		1			1								22
4	1	4	1	22	5	2	1	1	2	1									1	41
5				8	32	7	5	4		2	3	2		2						65
6			2	1	10	34	6	8	2	1			1	1				1	2	69
7			1	1	7	12	35	7	2	5	5	2	1						3	81
8				1	1	2	10	29	7	1		1	2		2		1			57
9							3	8	10	3		1	1	1		1				28
10					1		1		2	7					1	1	1			14
11										1	2	2								5
12							1			2		4	2		1	1				11
13											1						1			2
N.A.																			1	1
Total	3	6	15	39	58	57	64	58	26	23	11	13	7	4	5	3	3	1	7	403

Present > Previous : 83

Present = Previous : 188

Present < Previous : 125

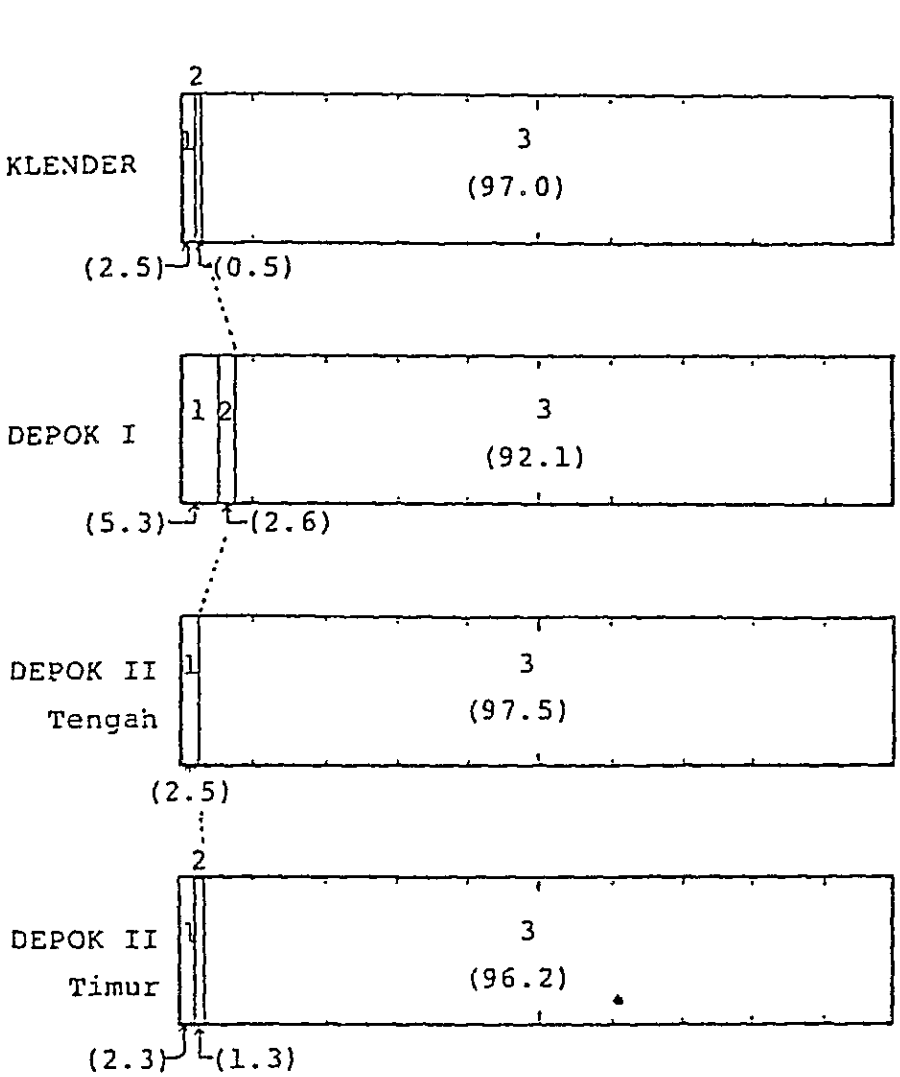
Unknown : 7

T O T A L 403

The Average --- Present : 6.49

Previous : 7.18

I-1-8 Plan to move

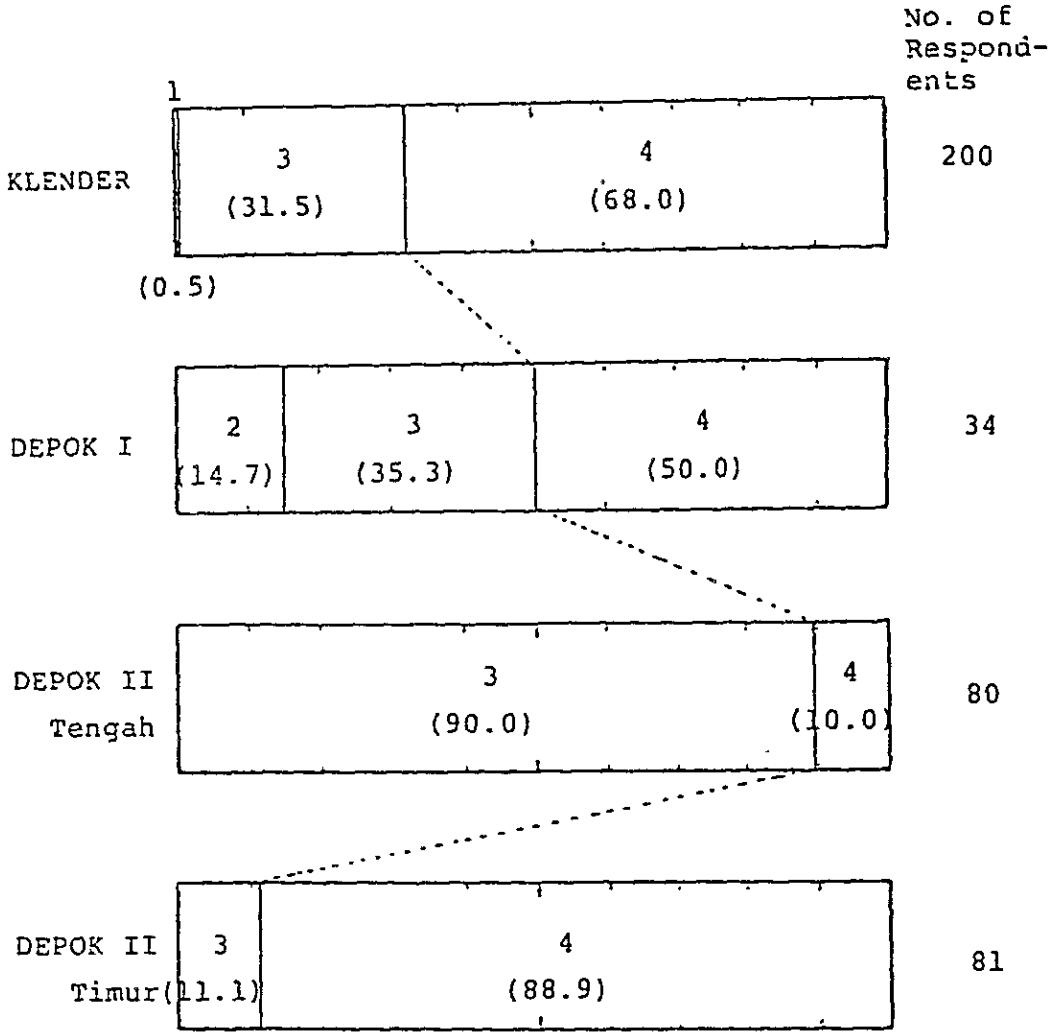


1 I plan to move to another residence within three years.

2 I would like to move to another residence in the near future.

3 I don't intend to move to another residence.

I-1-9 Ownership of present residence



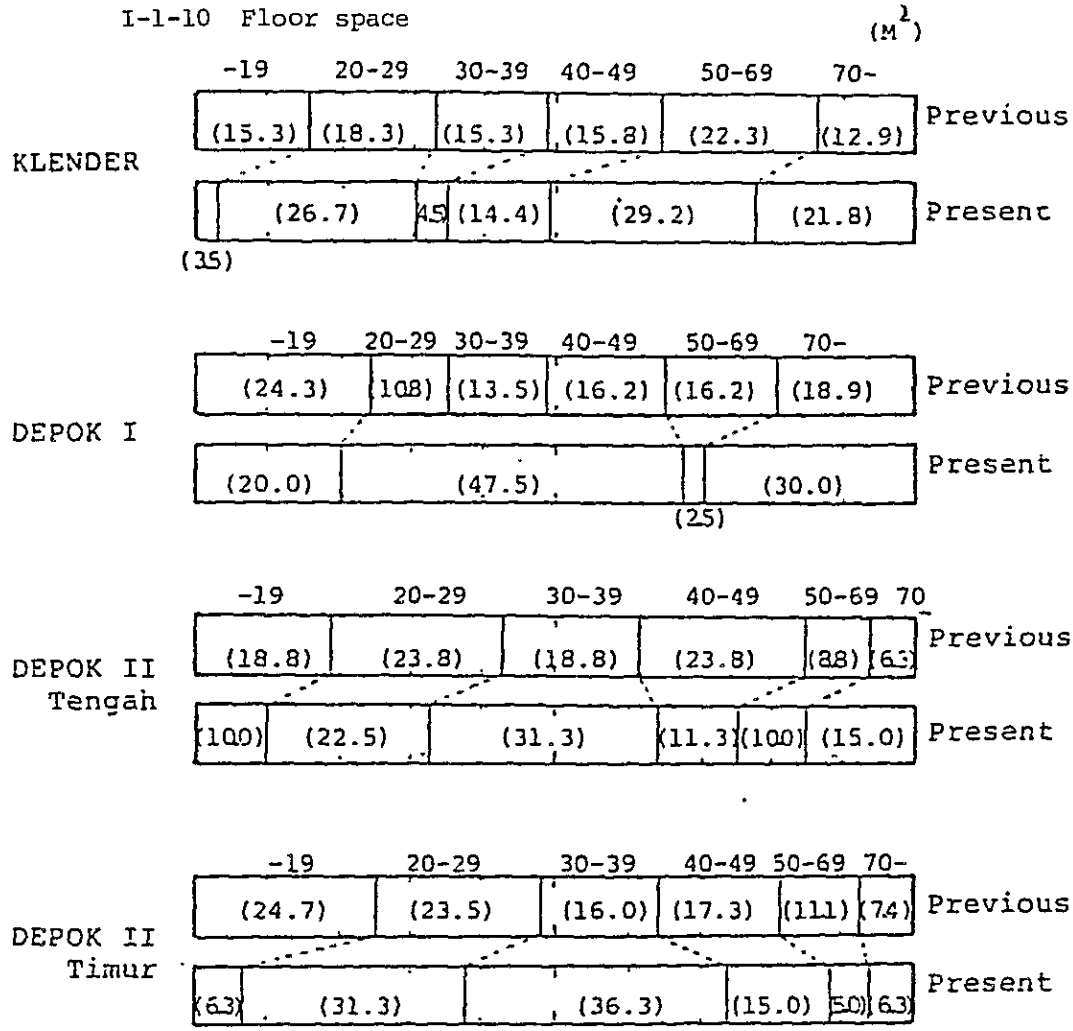
1 I built a house on the site previously purchased.

2 I purchased a house and the site simultaneously.

3 Special lease (the residence is now on lease, but will be sold to me in the future).

4 Lease

I-1-10 Floor space



Present \ Previous (m²)	-19	20-29	30-39	40-49	50-69	70-	N.A.	Total
-19	9	4	1	3	2	1	0	20
20-29	19	32	14	16	13	3	0	97
30-39	18	13	16	13	6	5	0	71
40-49	15	11	13	8	16	5	1	69
50-69	9	10	10	16	16	11	0	72
70-	5	9	10	15	14	18	2	73
N.A.	0	0	0	0	0	1	0	1
Total	75	79	64	71	67	44	3	403

Present > Previous : 187

Present = Previous : 99

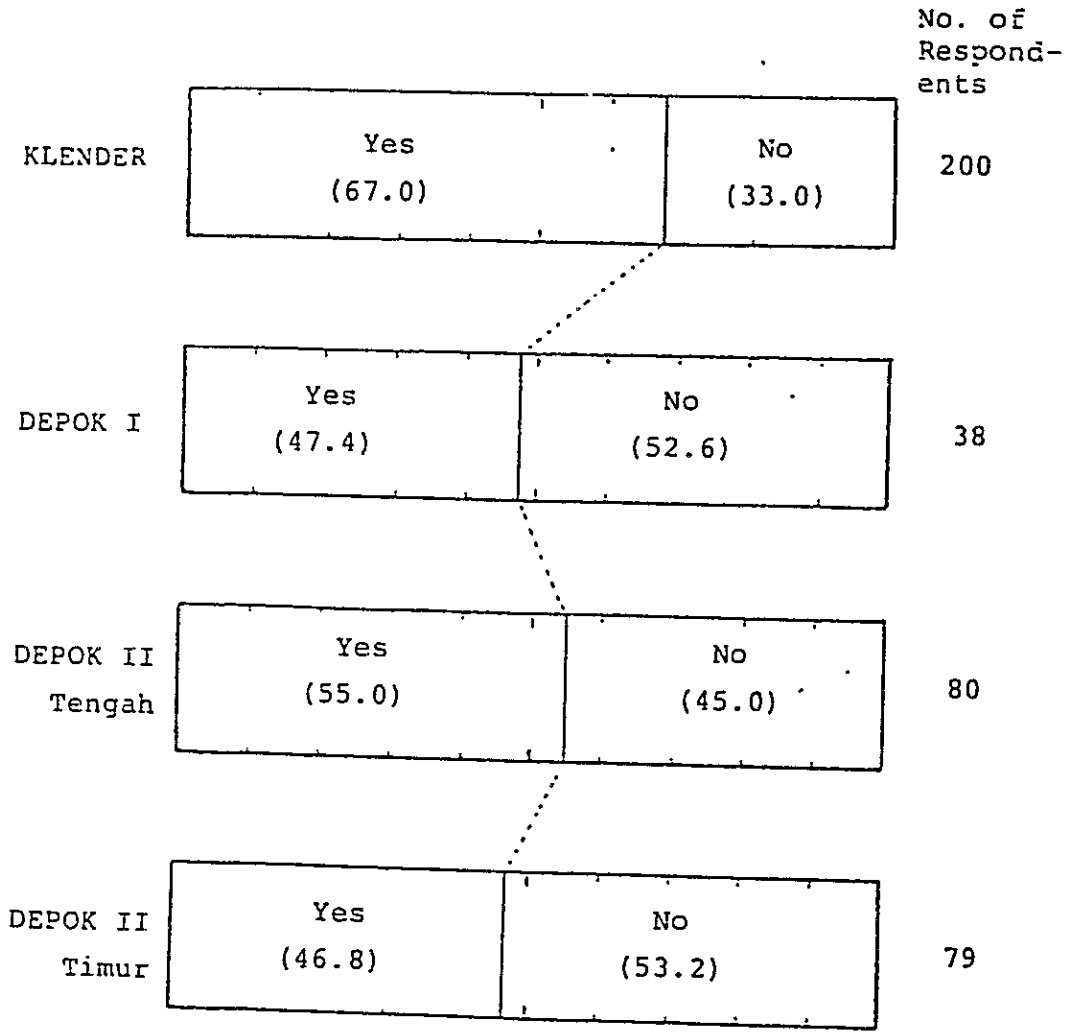
Present < Previous : 113

Unknown : 4

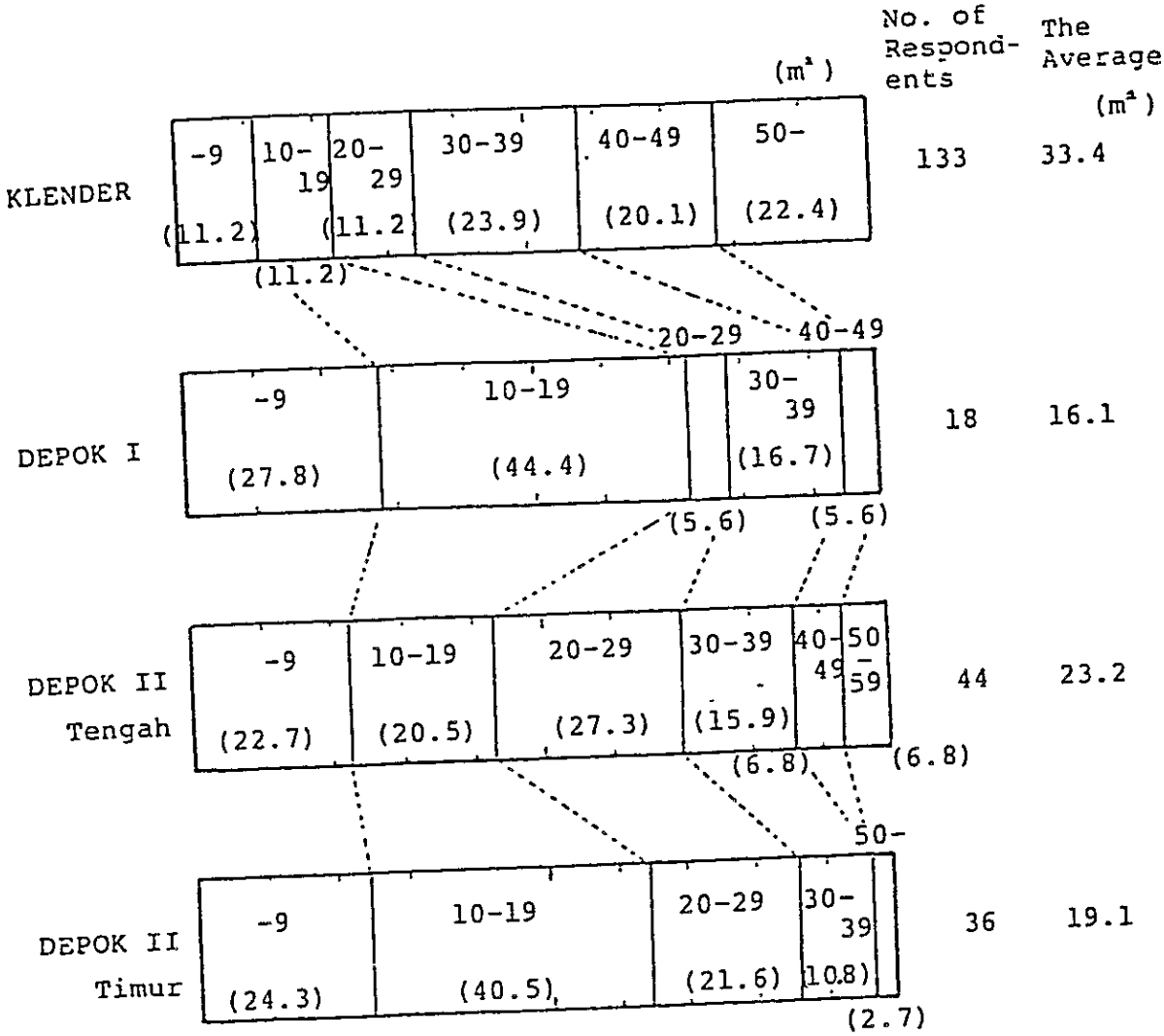
T O T A L 403

I-1-11 Extension

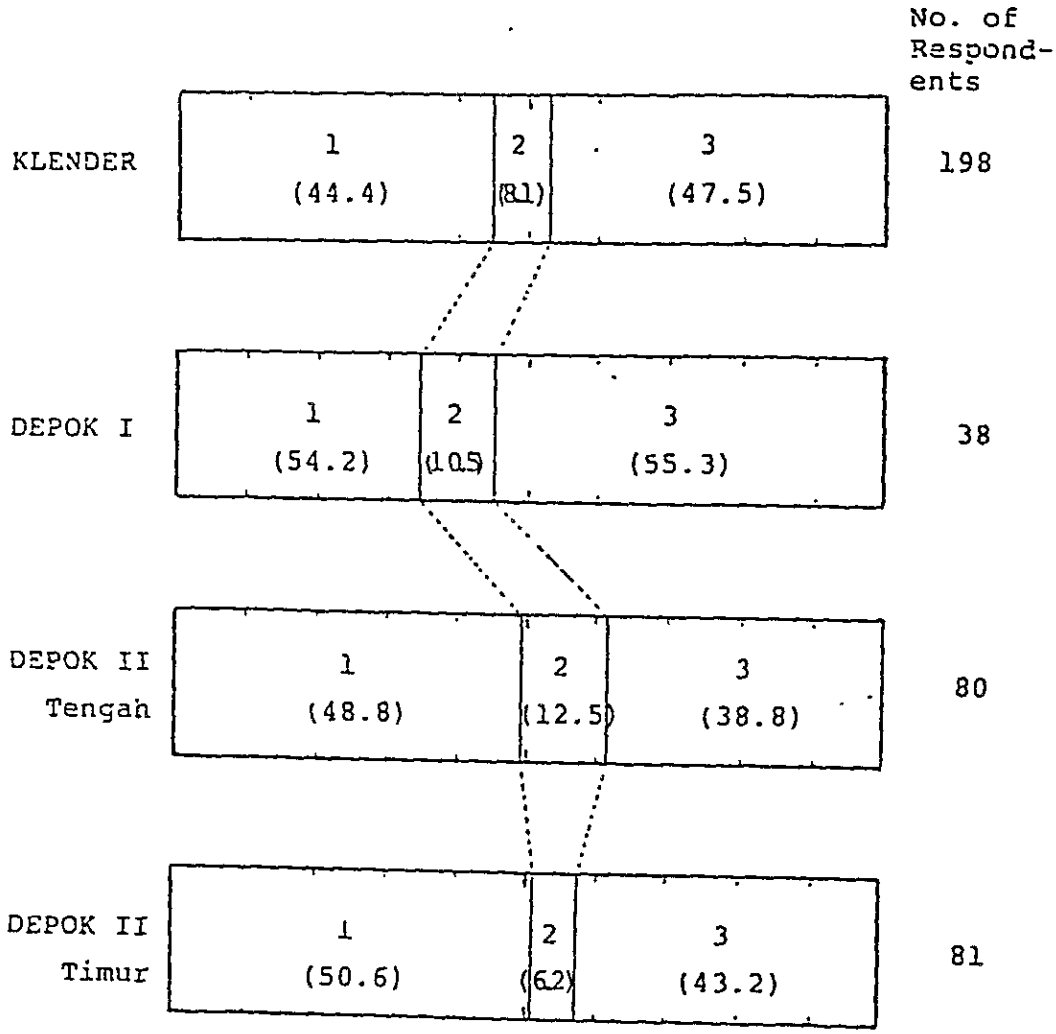
(1) Have You Extended?



(2) Extended Space



(3) Plan to Extend

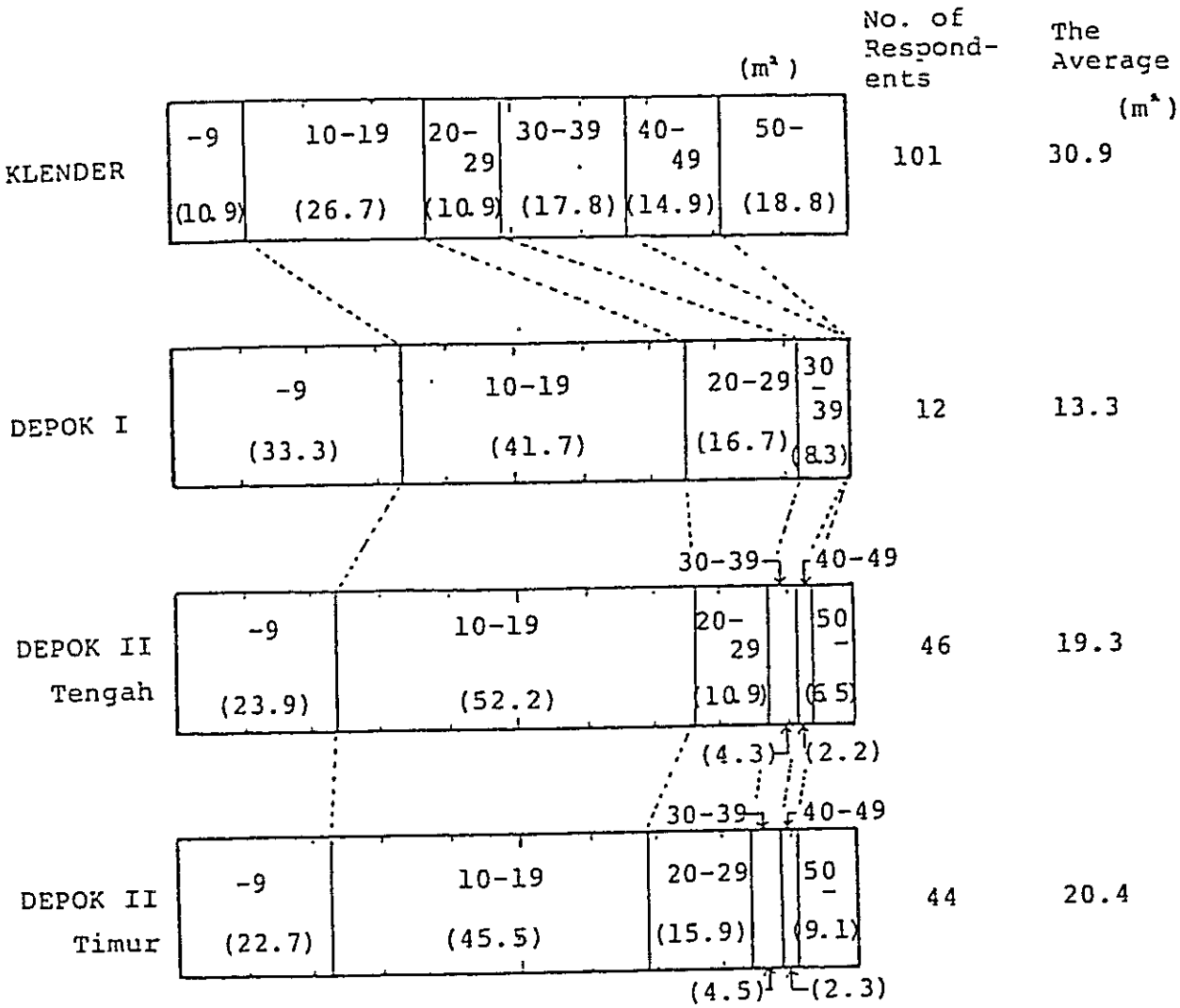


1 I intend to extend it within three years.

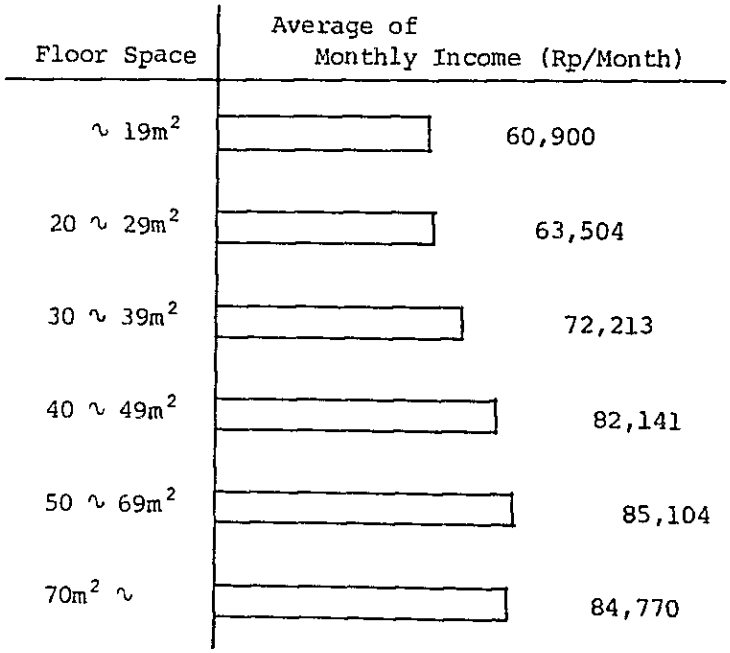
2 I would like to extend it in the near future.

3 I don't intend to extend it.

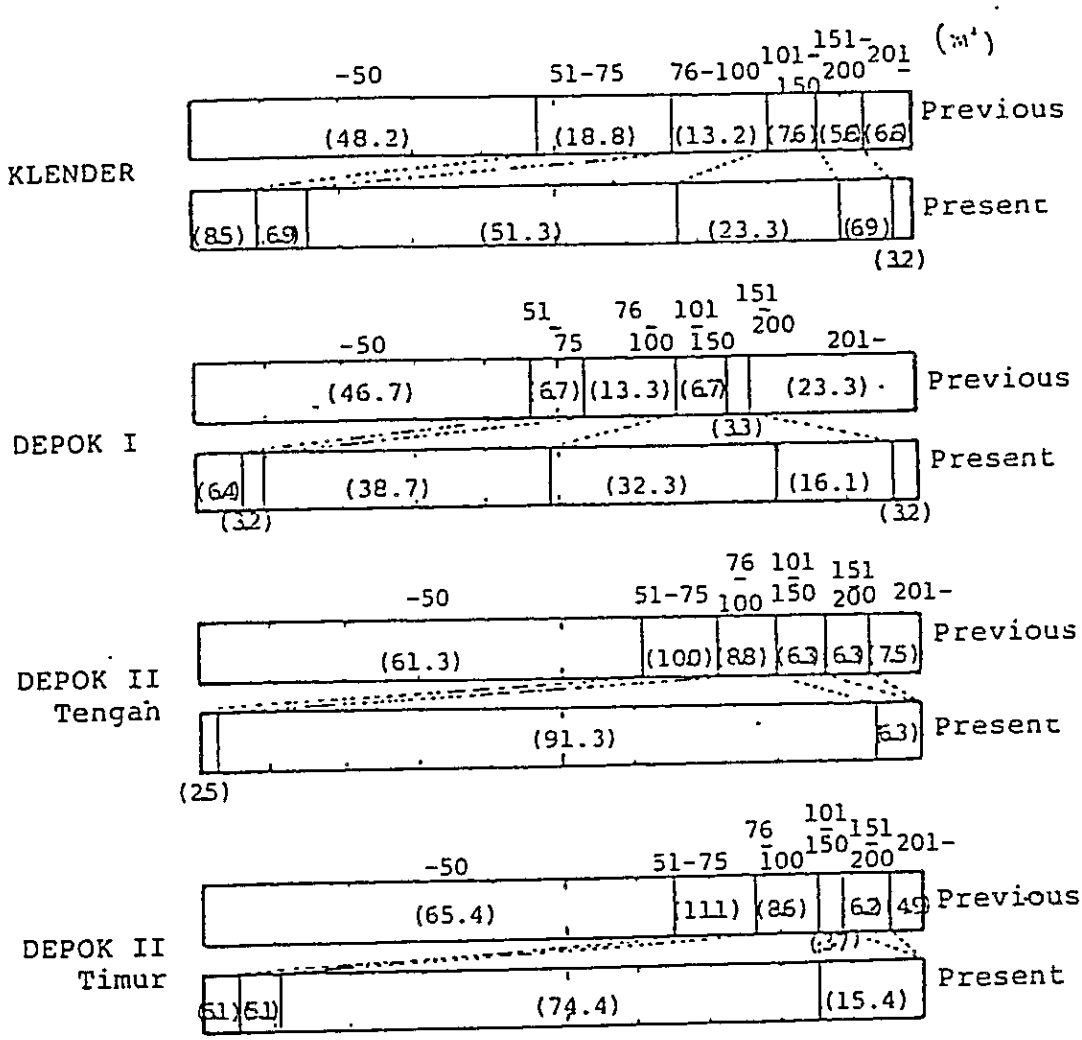
(4) Plan of Extend Space



I-1-12 Floor space to occupants' monthly income



I-1-13 Land space

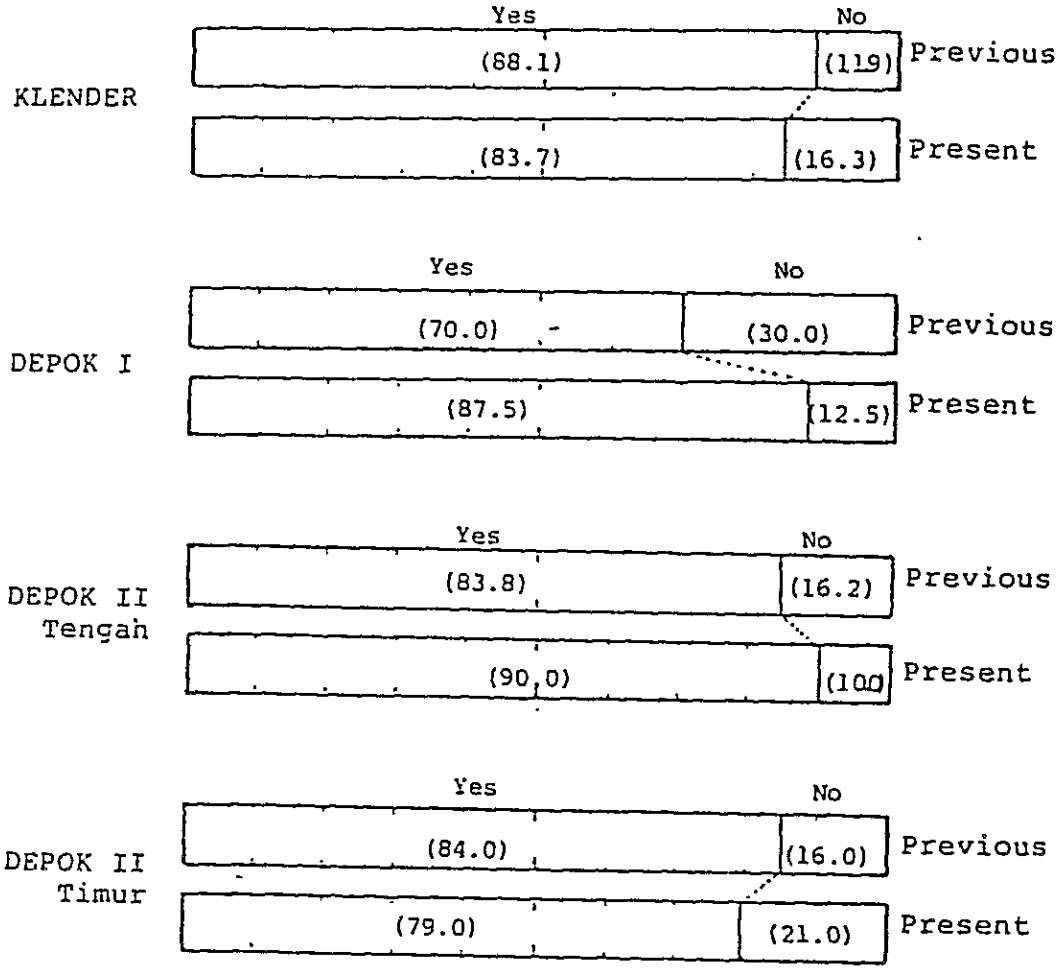


Present \ Previous	- 50	51- 75	76-100	101-150	151-200	201-	N.A.	Total
- 25	5	4	2	0	0	1	2	14
26- 50	4	0	0	1	0	0	1	6
51- 75	11	4	1	1	1	0	0	18
76-100	118	25	24	12	11	15	6	211
101-150	31	11	7	6	4	6	0	65
151-200	6	2	2	2	2	4	0	18
201-	3	2	0	0	1	1	0	7
N.A.	33	8	8	3	3	3	6	64
Total	211	56	4	25	22	30	15	403

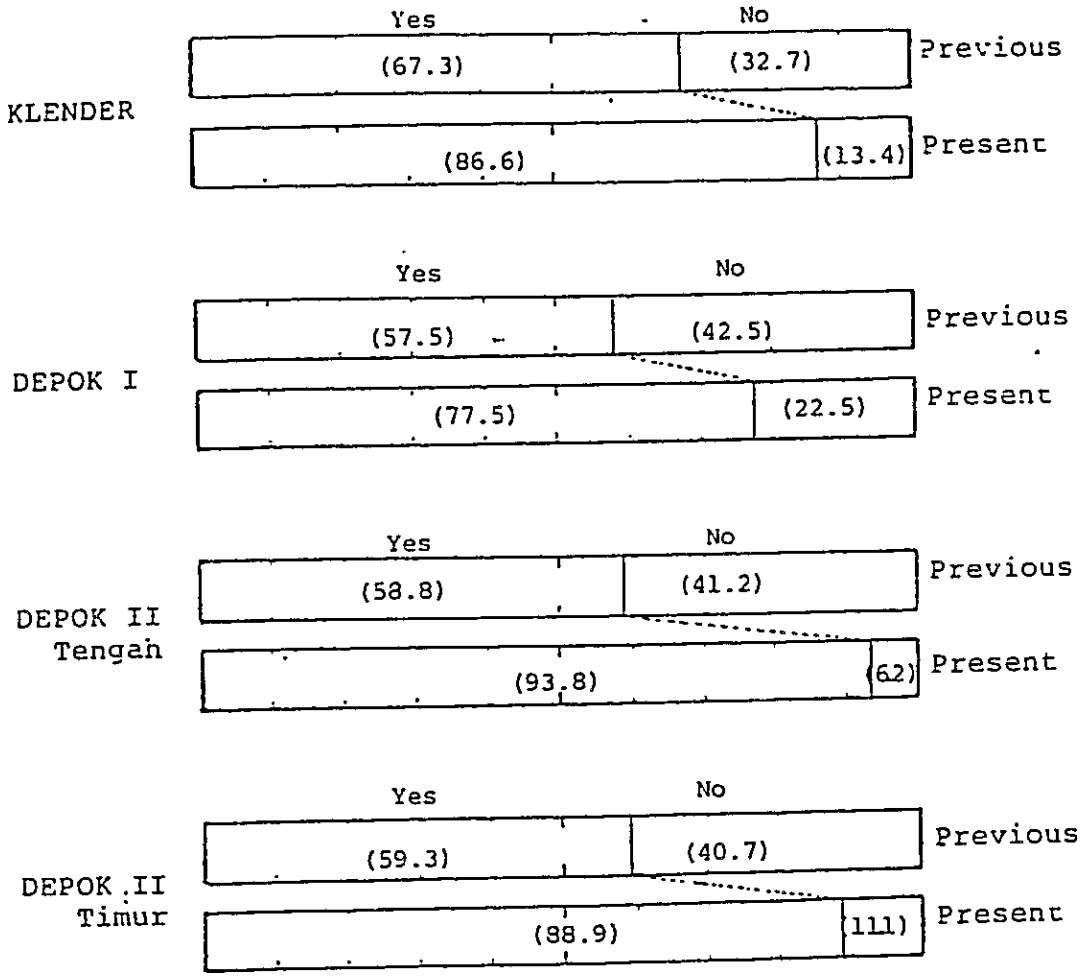
Present > Previous : 221
Present = Previous : 46
Present < Previous : 63
Unknown : 73
TOTAL 403

I-1-14 Private use facilities

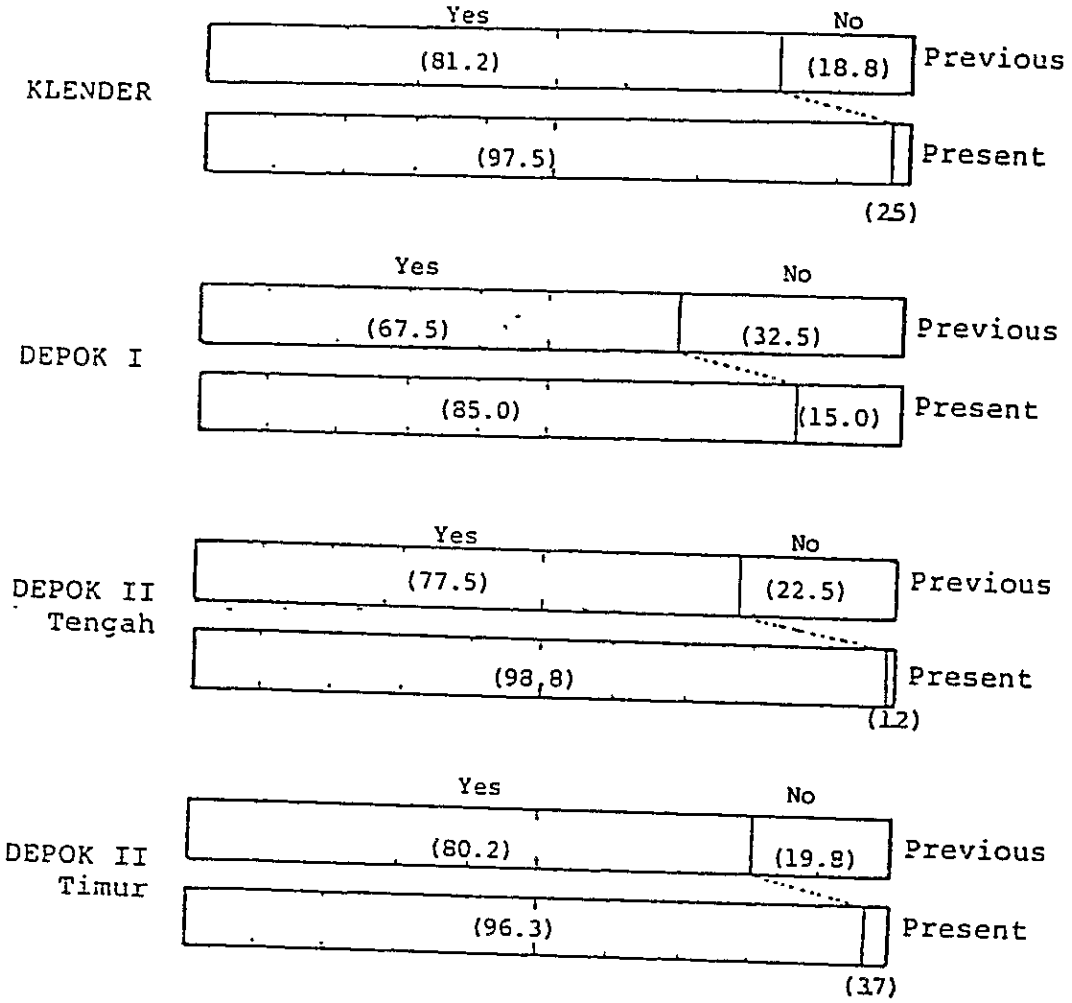
(1) Private Use Kitchen



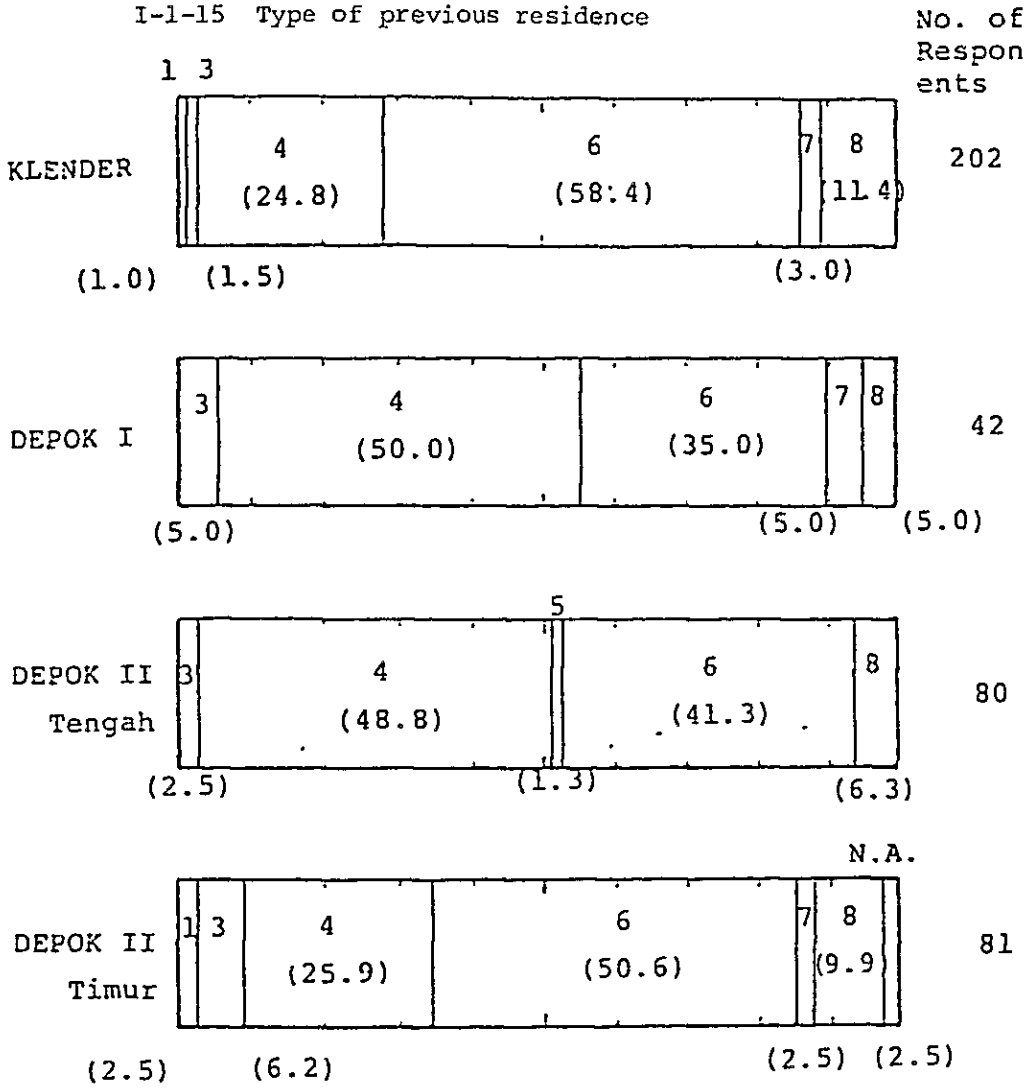
(2) Private Use W.C.



(3) Private Use Mandi



I-1-15 Type of previous residence



1 An independent house of one's own

2 An apartment house of one's own

3 A leased house under public management

4 A leased independent house under private management

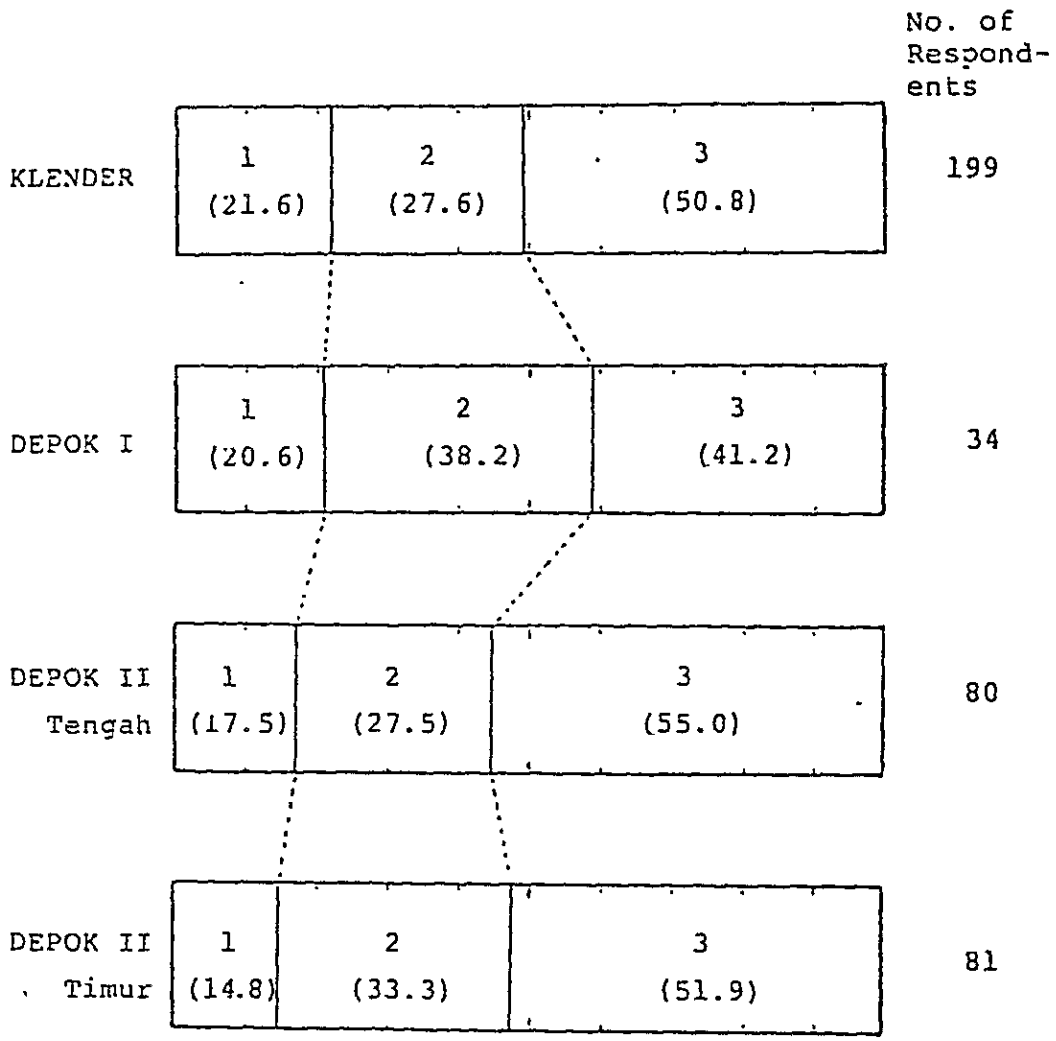
5 A leased apartment house under private management

6 A roomer in someone else's house

7 A building other than a house

8 Others

I-1-16 Ownership of previous land

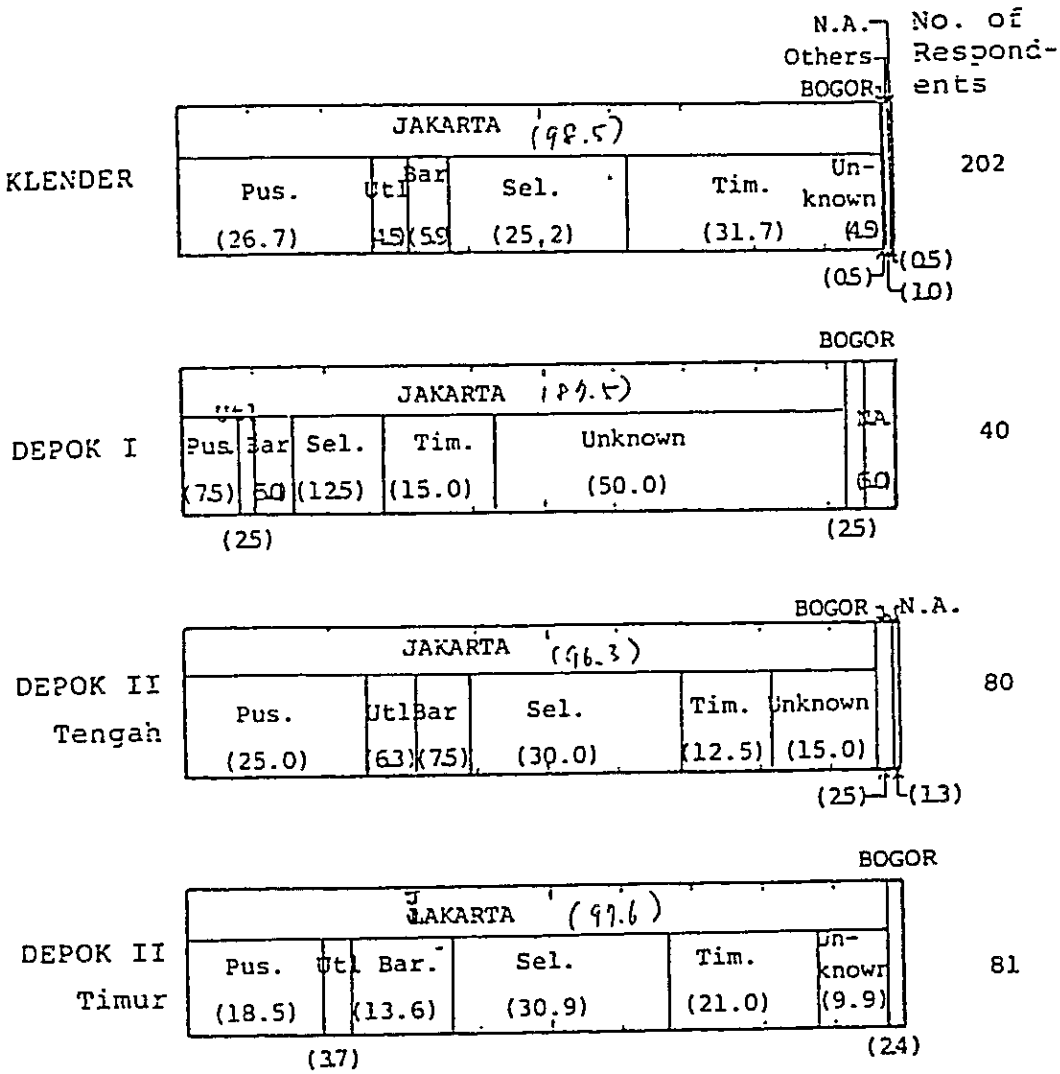


1 I had a yard for private use

2 There was a yard for common use, not for private use.

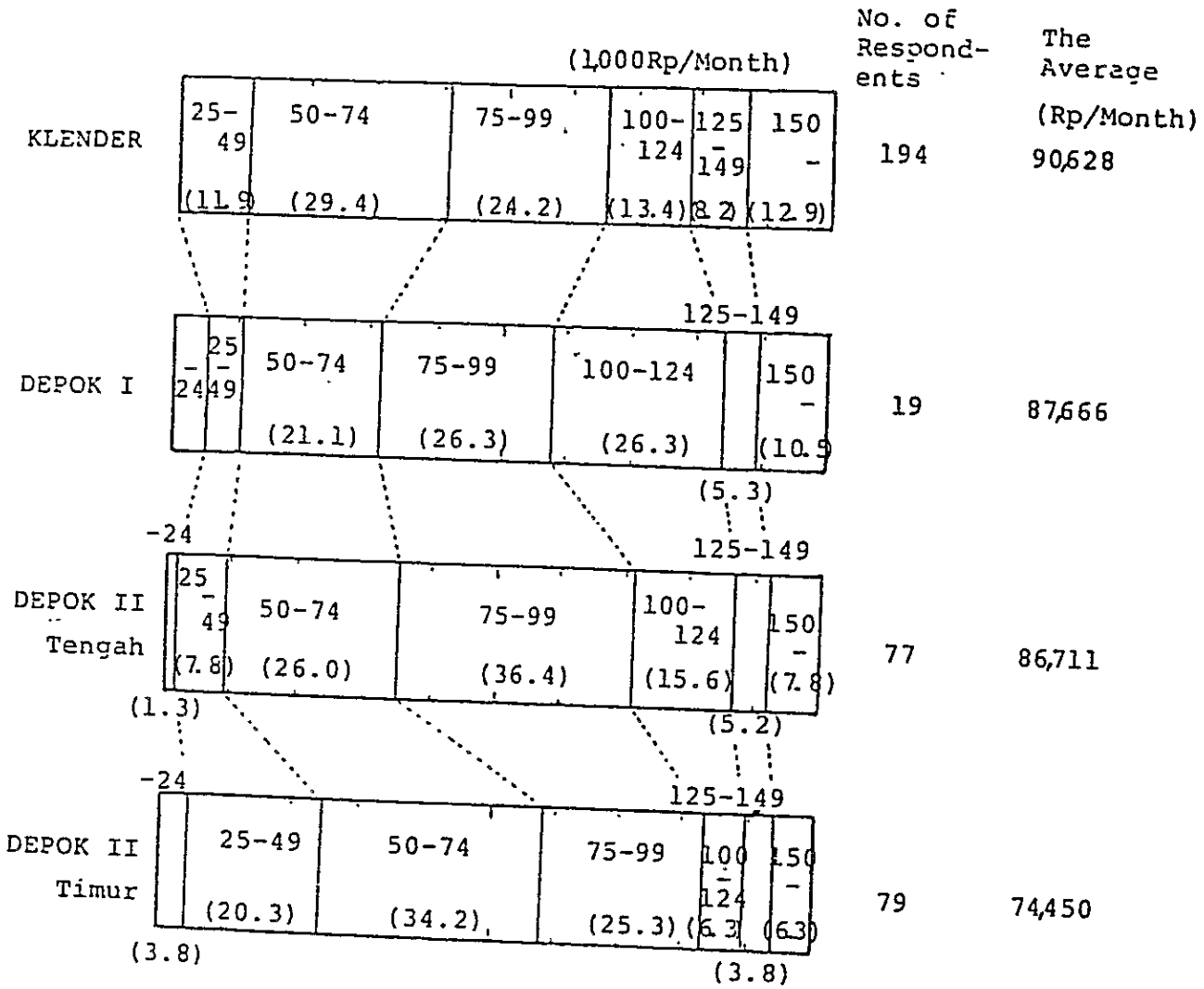
3 I had no yard to use to my disposition.

I-1-17 Previous address

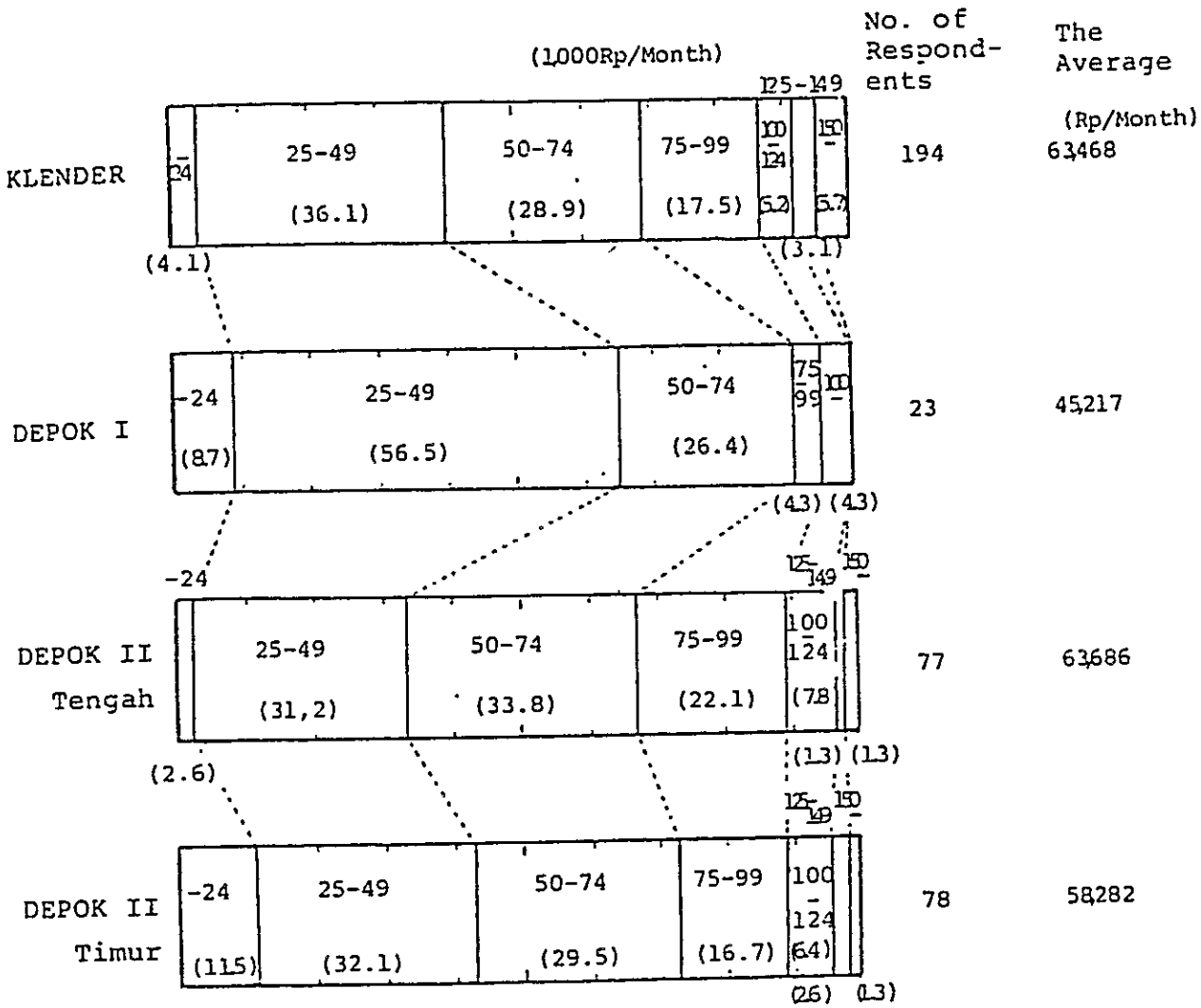


I-1-18 Monthly income

(1) Monthly Income (Present)

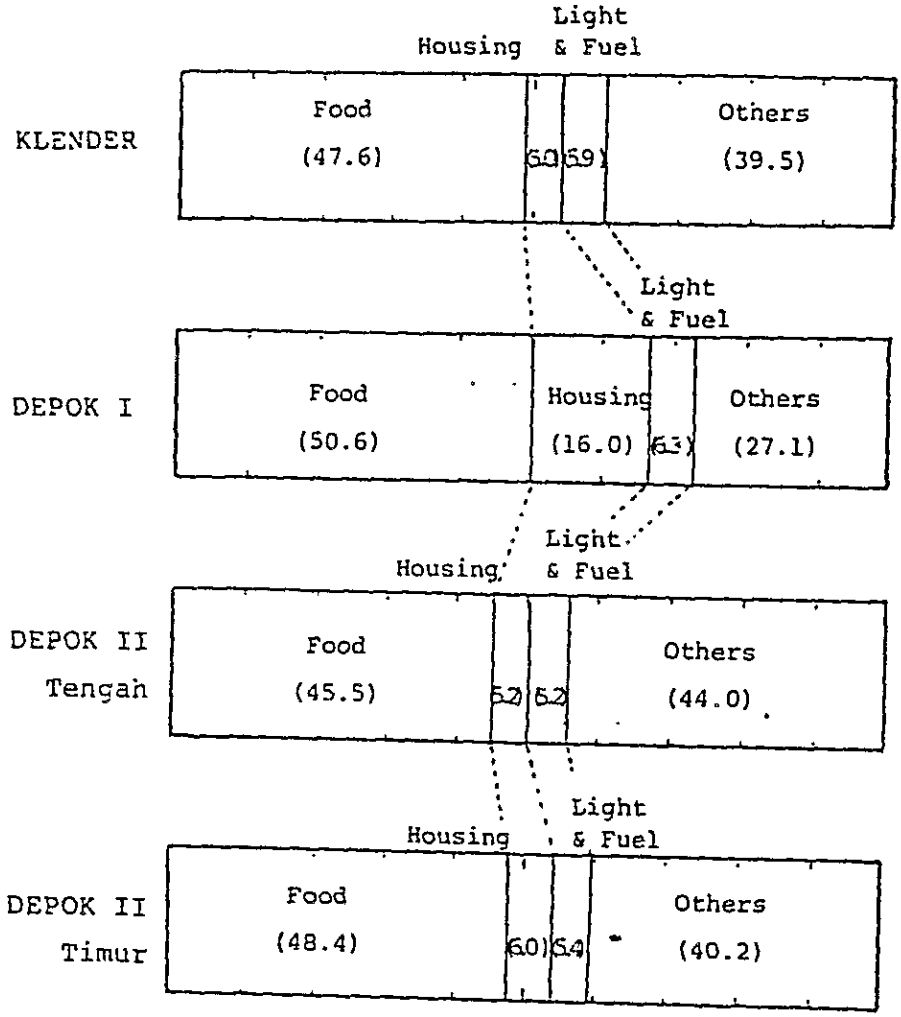


(2) Monthly Income (Previous)



I-1-19 Household expenditure

(1) Household Expenditure (Present)

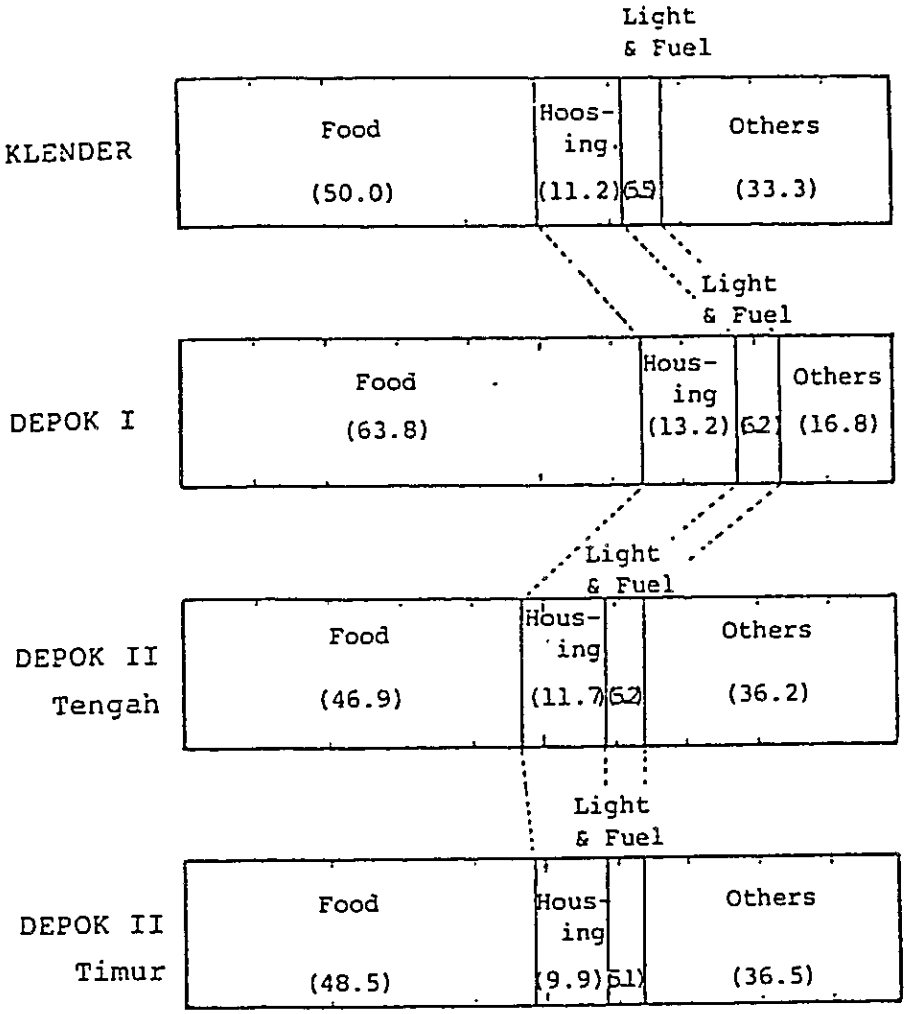


HOUSEHOLD EXPENDITURE

(Rp/Month)

ITEM		KLENDER	DEPOK I	DEPOK II Tengah	DEPOK II Timur
INCOME		90,628	87,666	86,711	74,450
EXPENDITURE	FOOD	44,990	44,341	39,419	36,019
	HOUSING	4,563	13,915	4,505	4,470
	LIGHT & FUEL	5,305	5,523	4,591	4,011

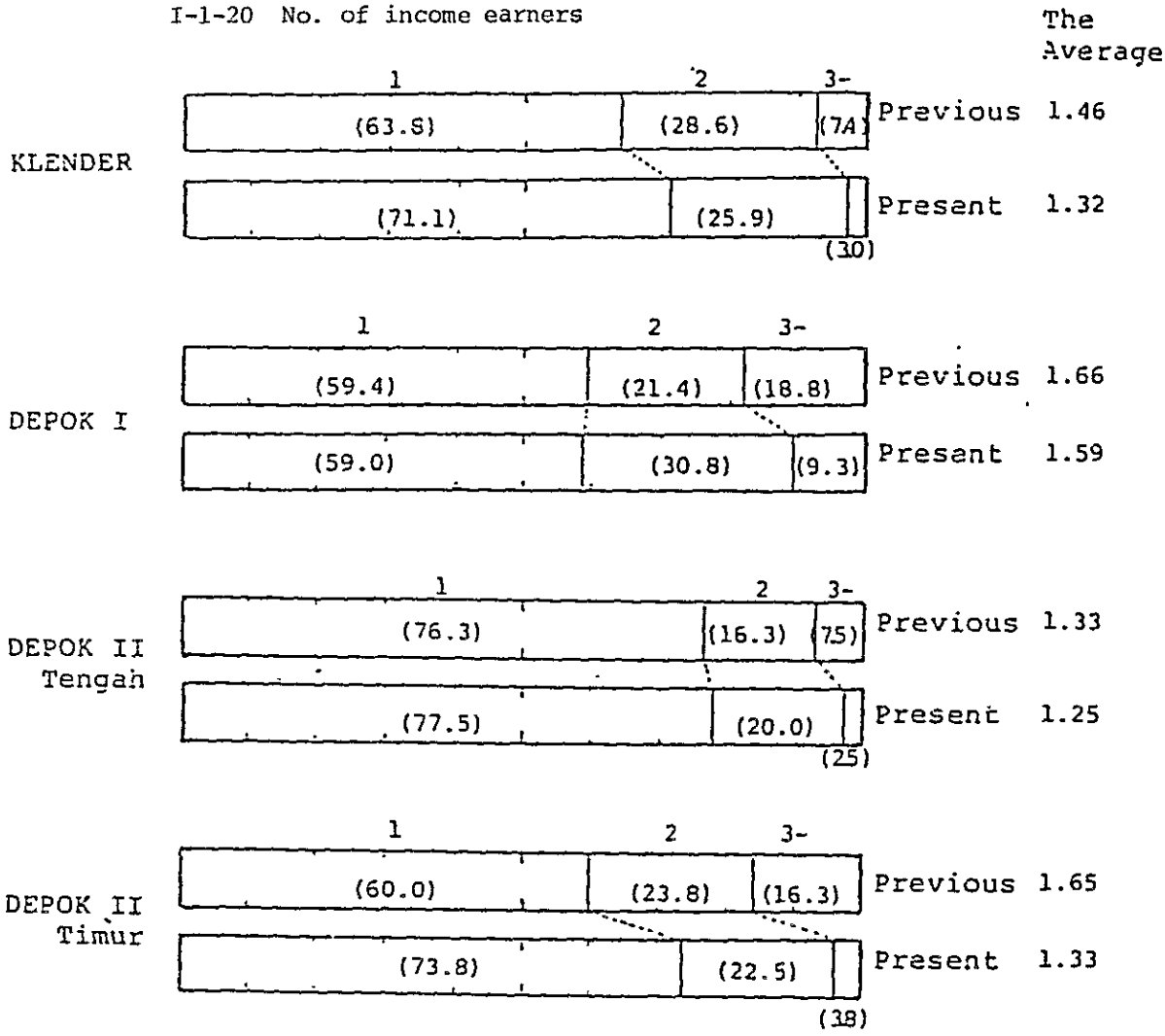
(2) Household Expenditure (Previous)



HOUSEHOLD EXPENDITURE (Rp/Month)

ITEM		KLENDER	DEPOK I	DEPOK II Tengah	DEPOK II Timur
INCOME		63,468	45,217	63,686	58,283
EXPENDITURE	FOOD	31,718	28,830	29,855	28,526
	HOUSING	7,059	5,991	7,481	5,779
	LIGHT & FUEL	3,471	2,806	3,296	2,983

I-1-20 No. of income earners



Present \ Previous	1	2	3	4	5	N.A.	Total
1	242	25	11	3	2	5	288
2	13	66	11	2	2	3	97
3	0	3	6	0	0	1	10
4	0	2	2	0	0	0	4
5	0	0	0	0	1	3	4
N.A.	0	0	0	0	0	0	0
TOTAL	255	96	30	5	4	12	403

Present > Previous : 20

Present = Previous : 315

Present < Previous : 56

Unknown : 12

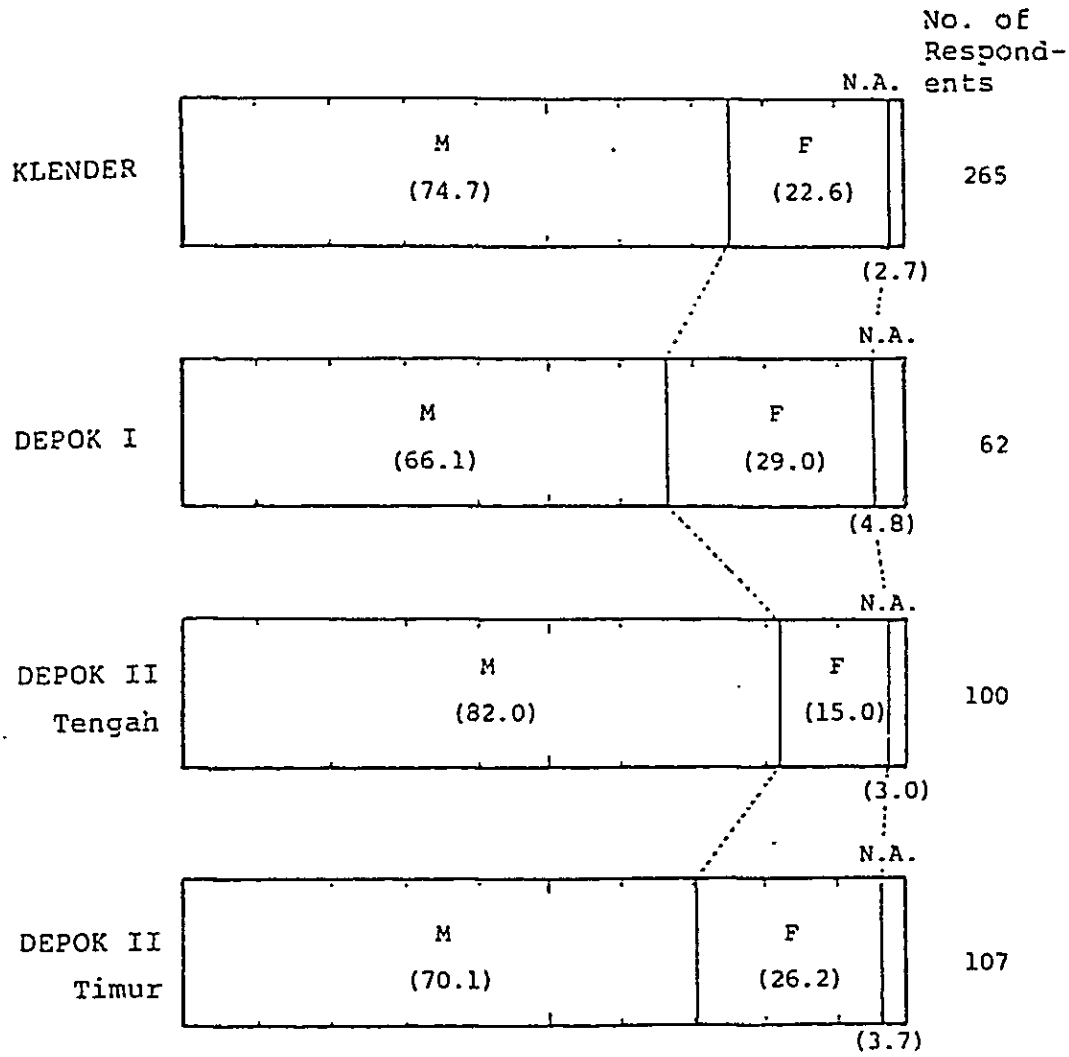
T O T A L 403

The Average --- Present : 1.36

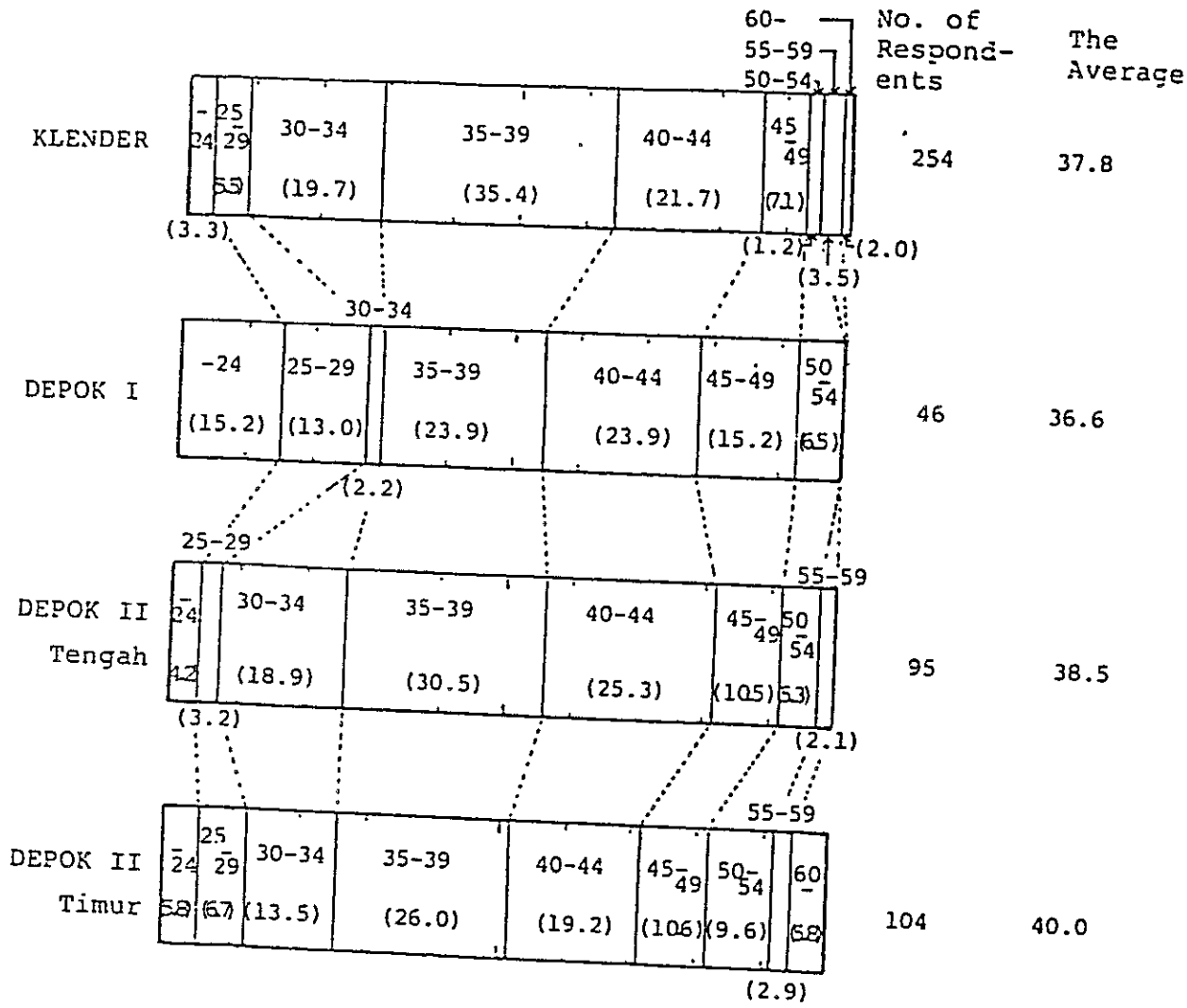
Previous : 1.48

I-1-21 The characteristics of income earners

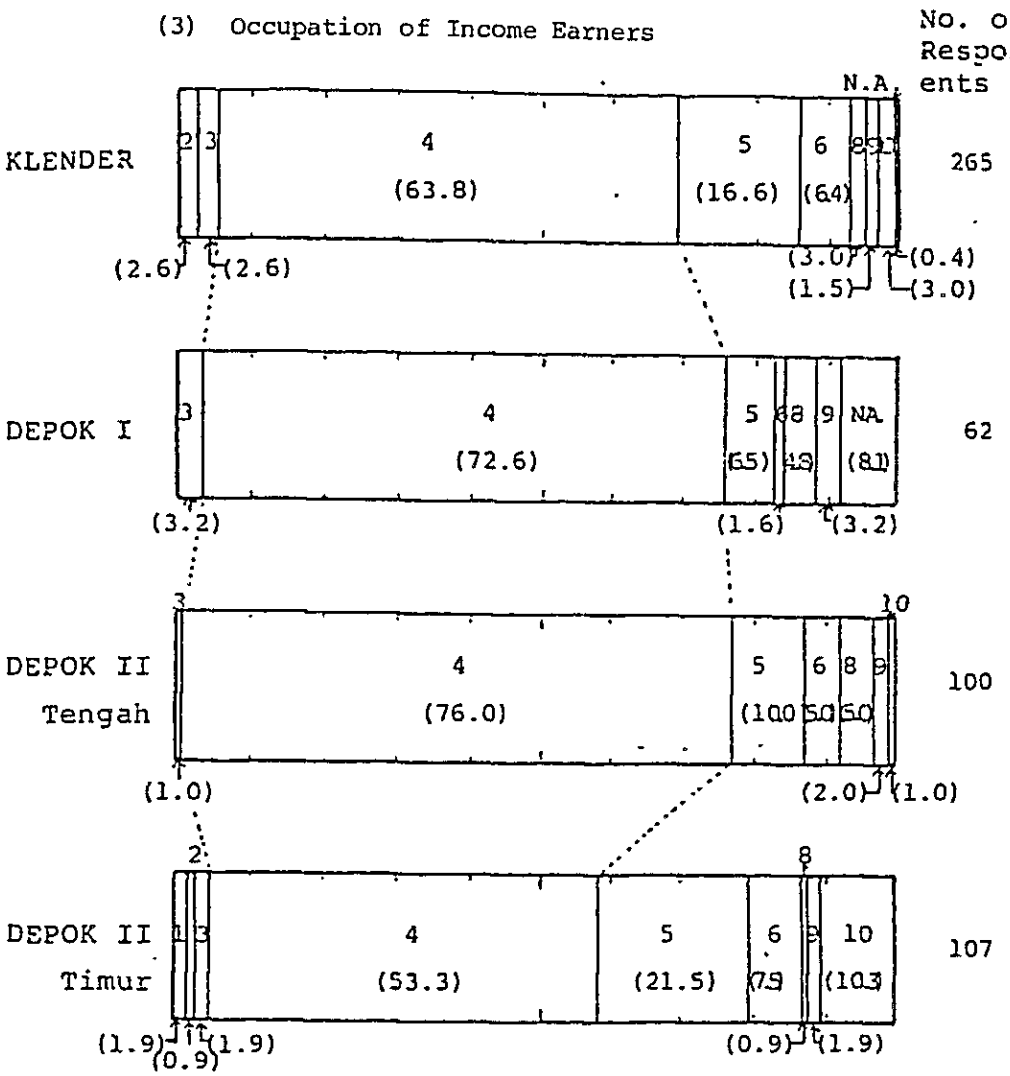
(1) Sex of Income Earners



(2) Age of Income Earners



(3) Occupation of Income Earners



1 Professional (college professor, doctor, professional engineer, other professionals, etc.)

2 Manager of a government office

3 Manager of a company

4 Public official, soldier, teacher

5 Clerk of a company

6 Factory worker, shop attendant craftman, driver, etc.

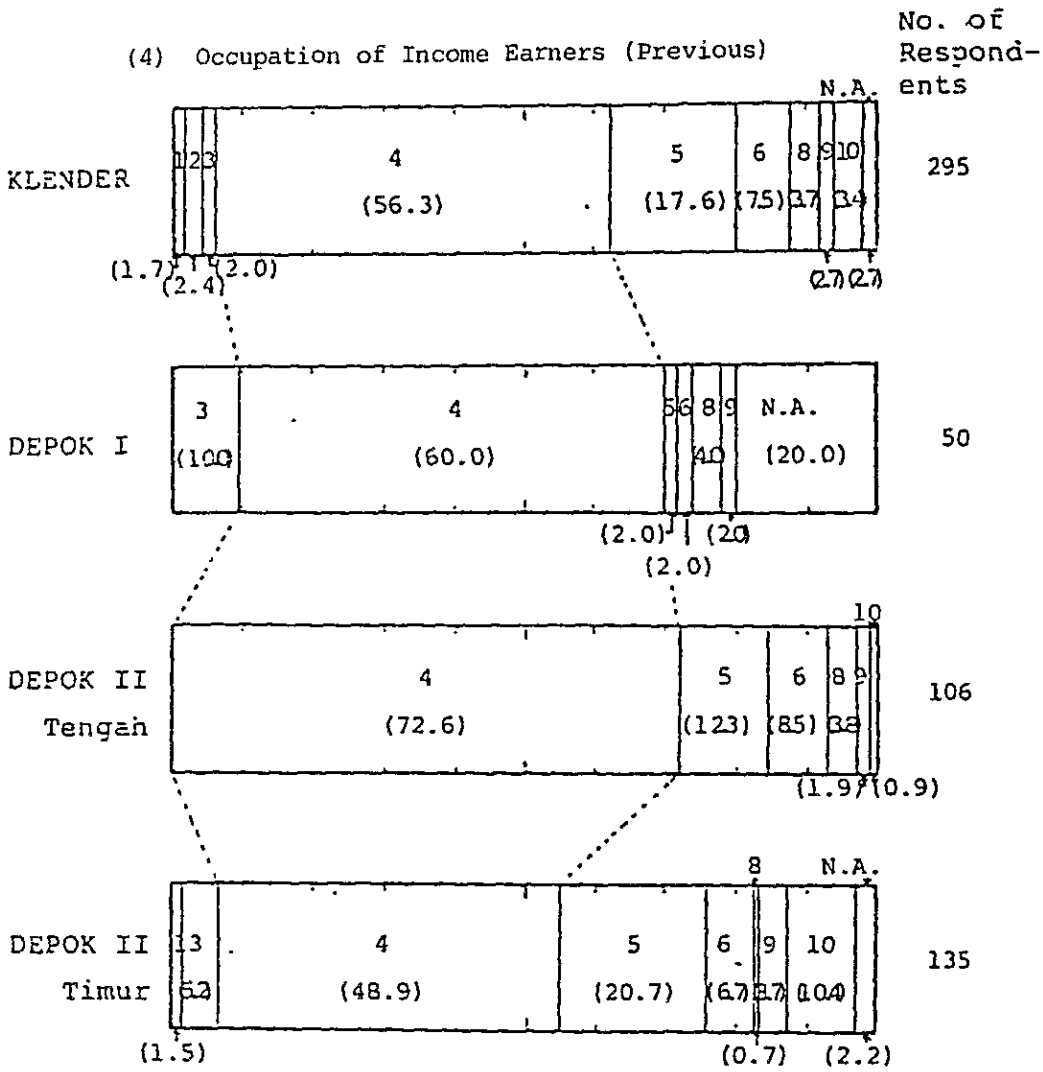
7 Farmer, fisherman, etc.

8 Independent

9 Others

10 Unemployed

(4) Occupation of Income Earners (Previous)



1 Professional (college professor, doctor, professional engineer, other professionals, etc.)

2 Manager of a government office

3 Manager of a company

4 Public official, soldier, teacher

5 Clerk of a company

6 Factory worker, shop attendant craftman, driver, etc.

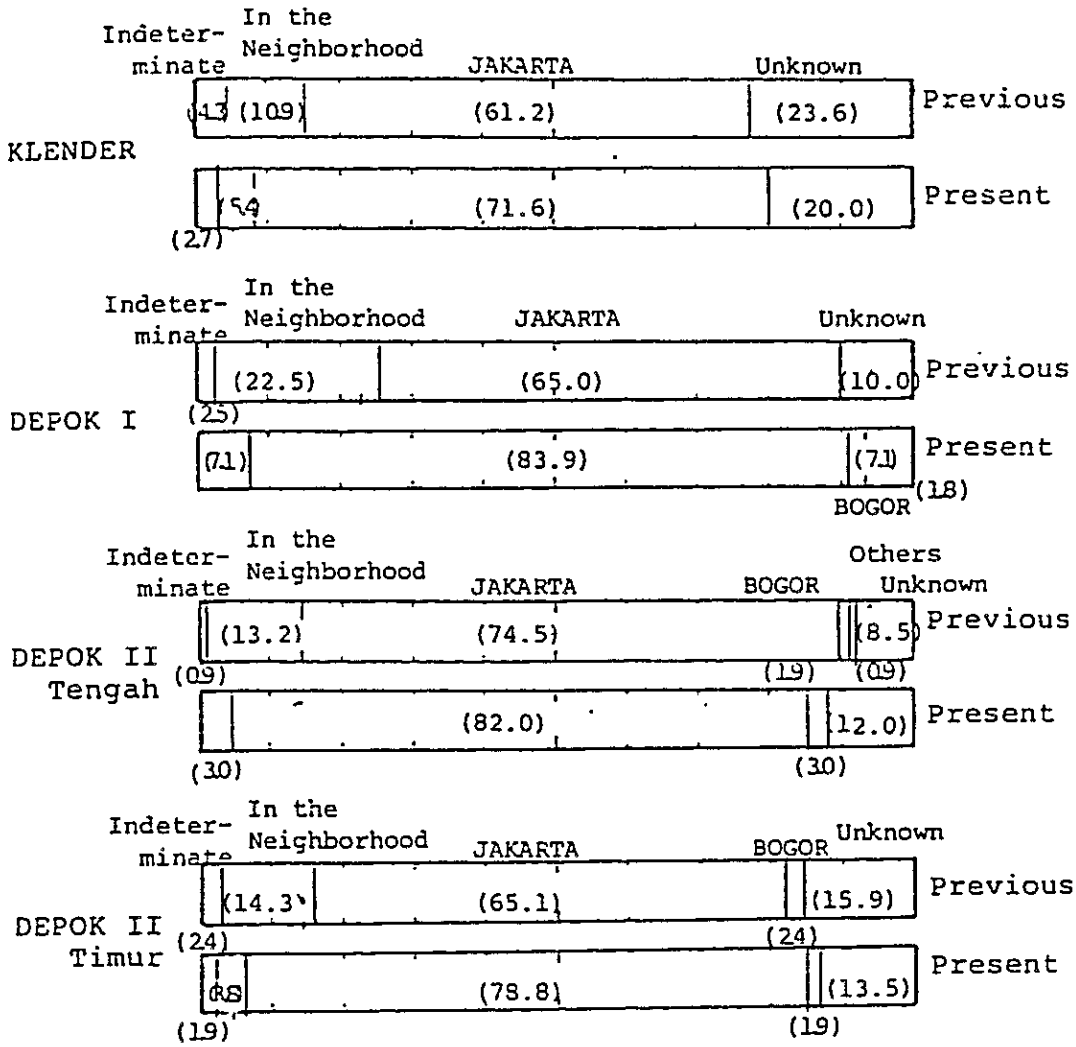
7 Farmer, fisherman, etc.

8 Independent

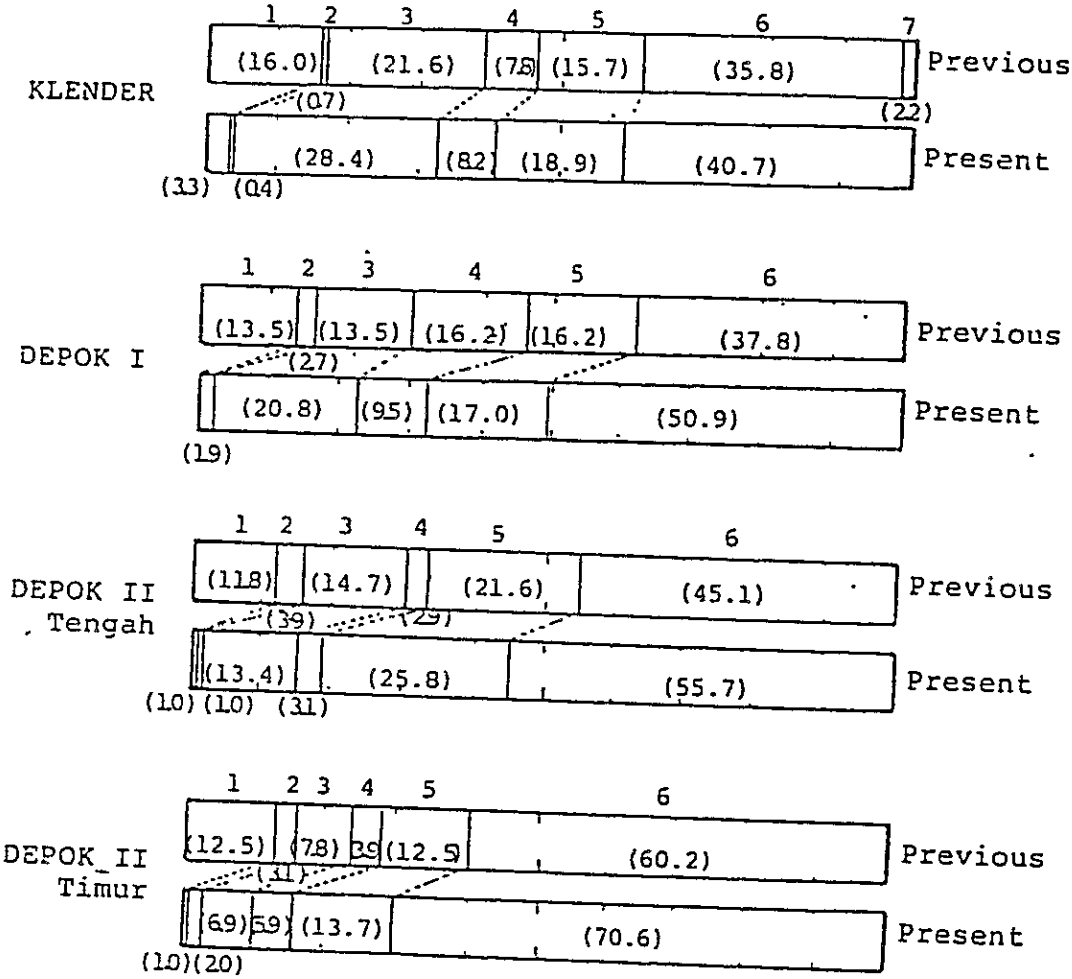
9 Others

10 Unemployed

(5) Place to Work

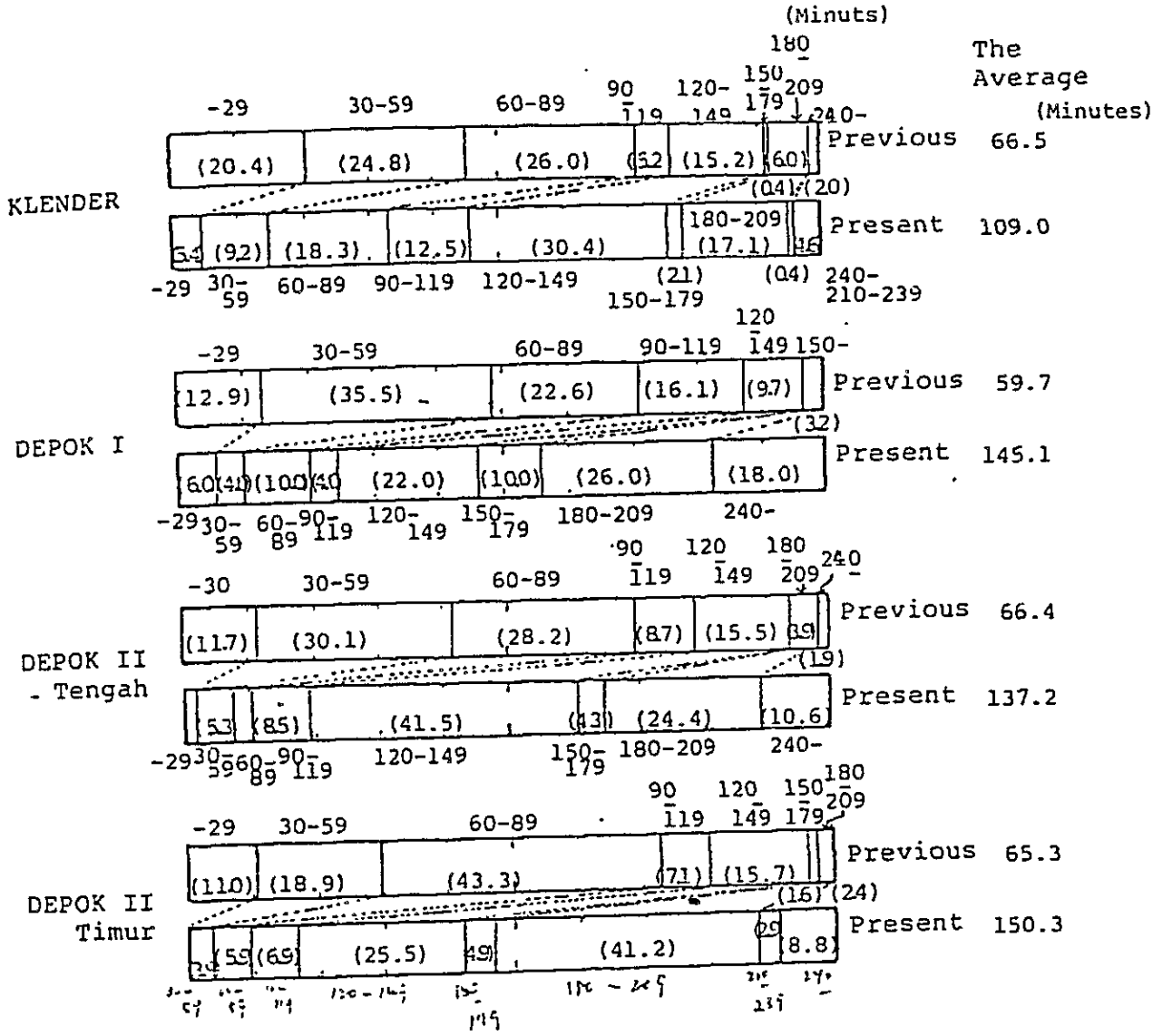


(6) Commuting Mode

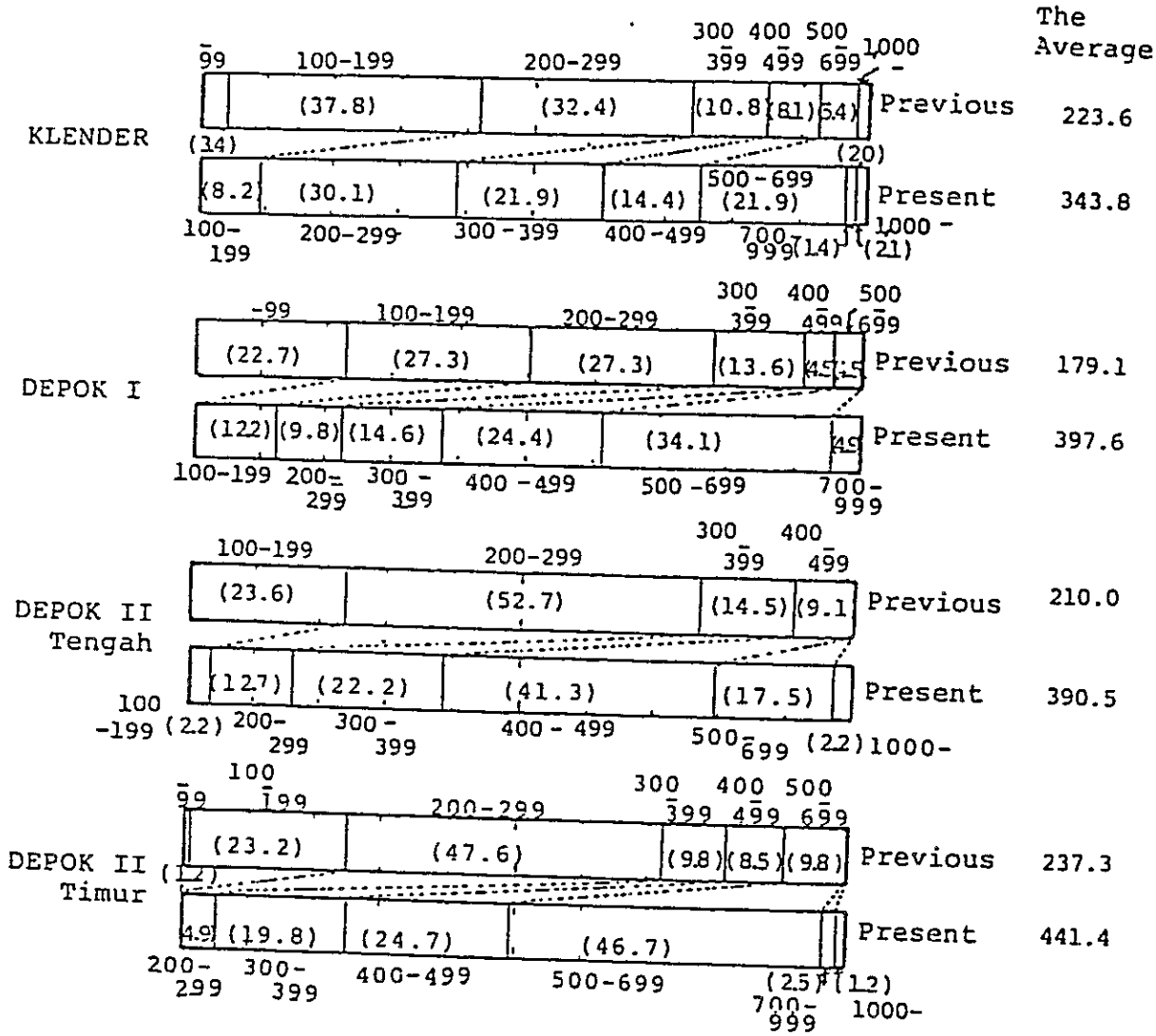


1 On foot
2 Bicycle
3 Motercycle
4 Car
5 Specially arrenged bus
6 Route bus
7 Others

(7) Commuting Time

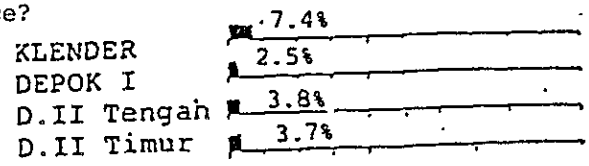


(8) Commuting Cost

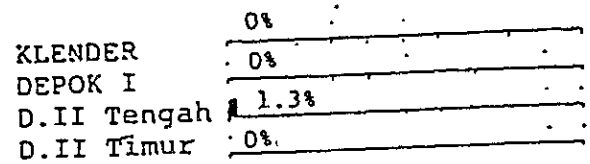


I-1-22 Q: What were the decisive factors in selecting your present residence?

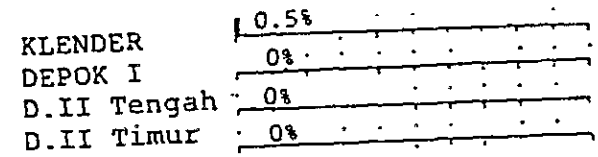
(1) Convenience for commutation.



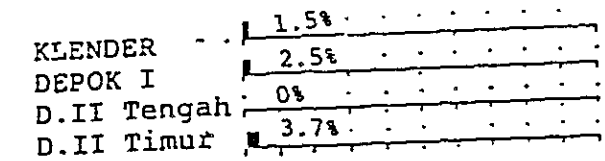
(2) There are many working places, such as factories and shops, in the neighborhood



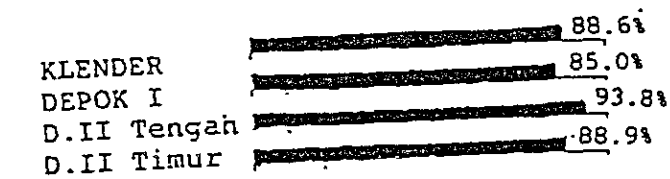
(3) Convenient for job or business



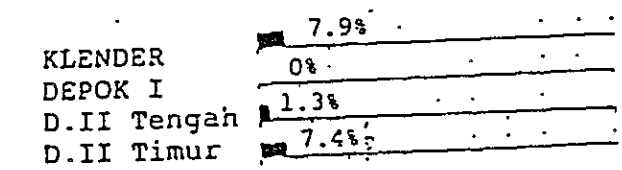
(4) Convenient for shopping



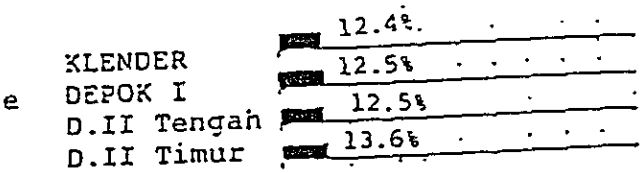
(5) I was anxious to have a house of my own.



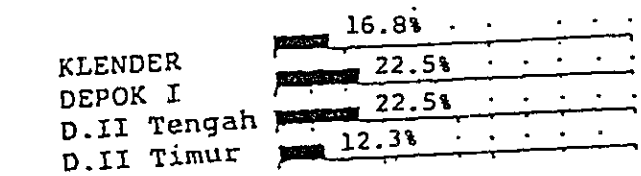
(6) I was anxious to have a house of my own (or for lease) which can be used exclusively for my family.



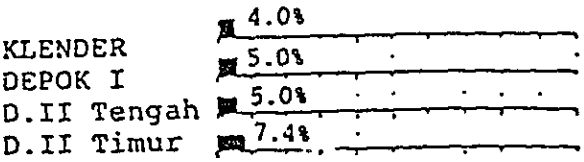
(7) Good residential space



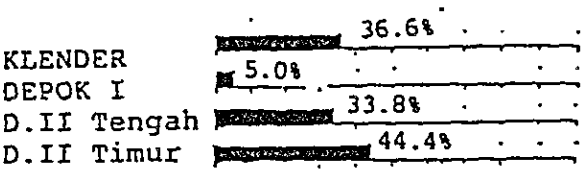
(8) Good house planning



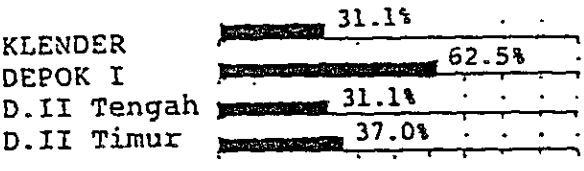
(9) Good land area



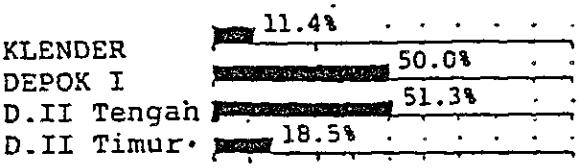
(10) Low rent



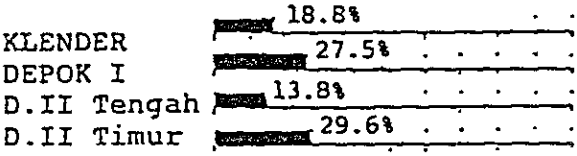
(11) Good conditions for the loan on the purchase of the residence.



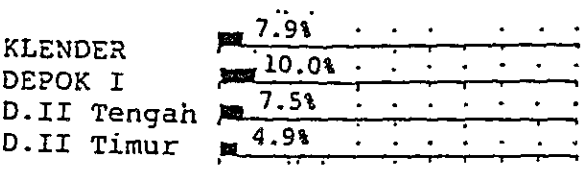
(12) Water supply, electricity and drainage systems are well equipped.



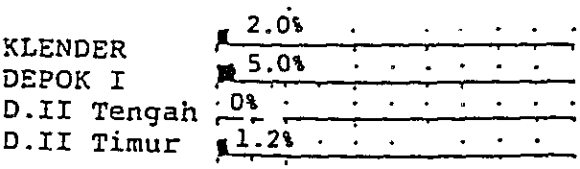
(13) Clean environment around the residence.



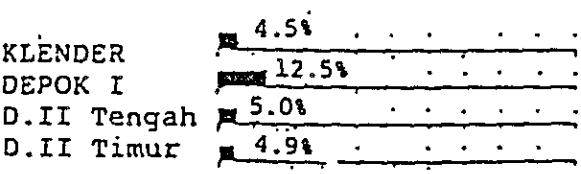
(14) Public peace and order is well maintained around the residence.



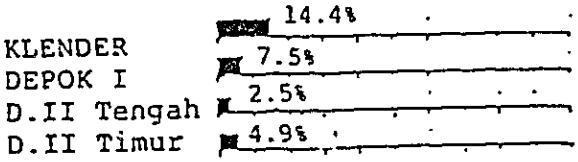
(15) There are many medical facilities, meeting places, etc. in the neighborhood.



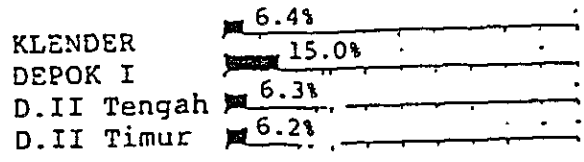
(16) There is a good environment with lots of greenery in the neighborhood



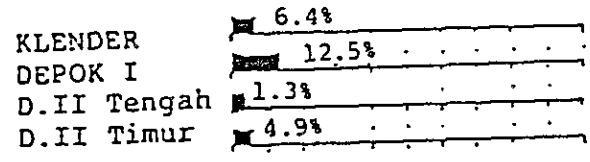
(17) There is a good environment for peace and education.



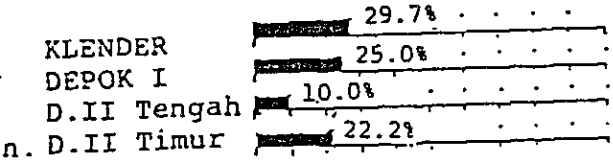
(18) No pollution such as noise, oscillation, smell, etc.



(19) There are good sanitary conditions regarding ventilation and sewage.

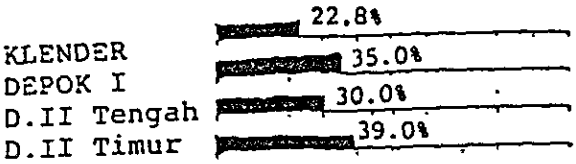


(20) The residence was developed by a reliable public organization.

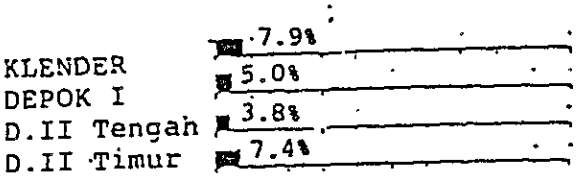


I-1-23 Q: Are you unsatisfied with your present residence?

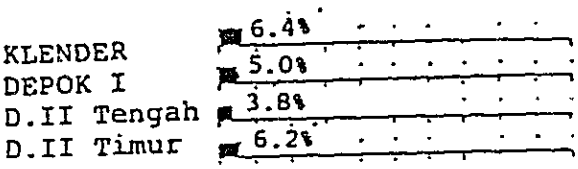
(1) Inconvenience for commutation.



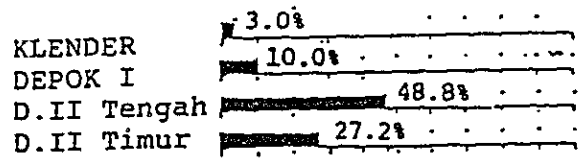
(2) There are few working places, such as factories and shops, in the neighborhood.



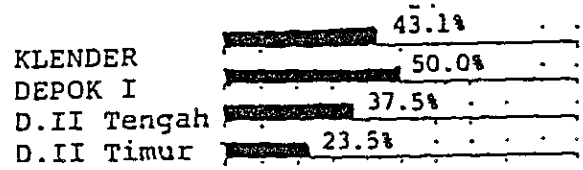
(3) Inconvenient for job or business.



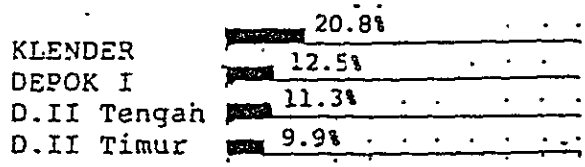
(4) Inconvenient for shopping.



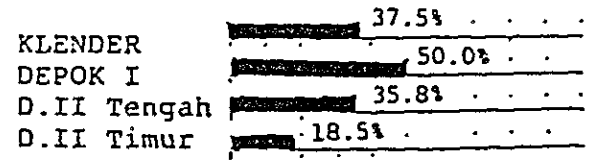
(5) Limited residential space.



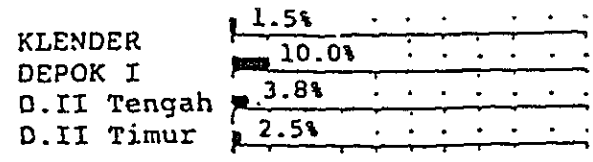
(6) Bad planning of the residence



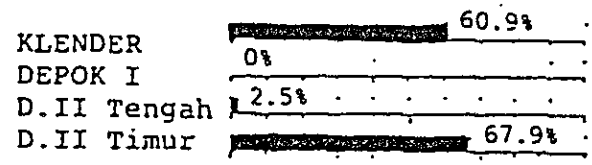
(7) Limited land area



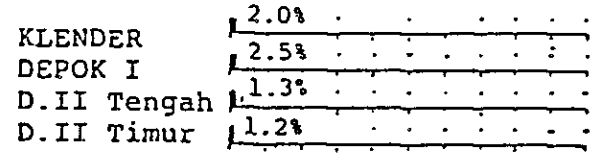
(8) High rent



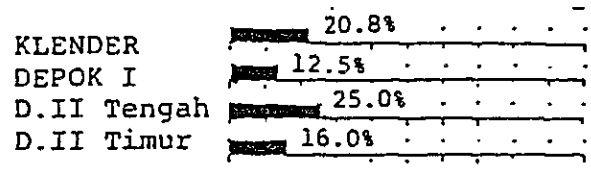
(9) Water supply, electricity, sewage, and other systems are not well equipped.



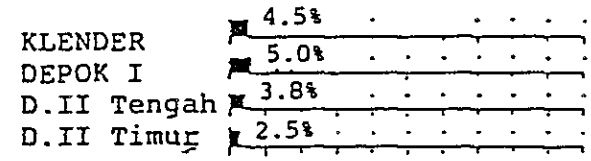
(10) Public peace and order is poorly maintained around the residence.



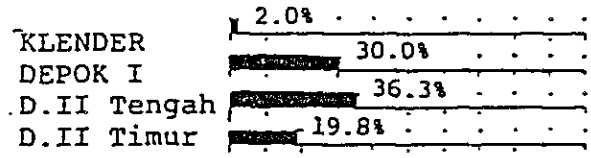
(11) There are few medical facilities, meeting places, etc. in the neighborhood.



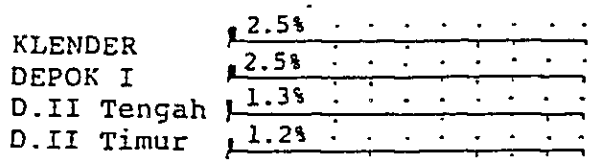
(12) A poor environment with little greenery in the neighborhood.



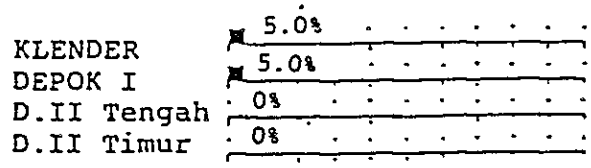
(13) A poor environment for peace and education.



(14) Afflicted by pollution such as noise, oscillation and smell.

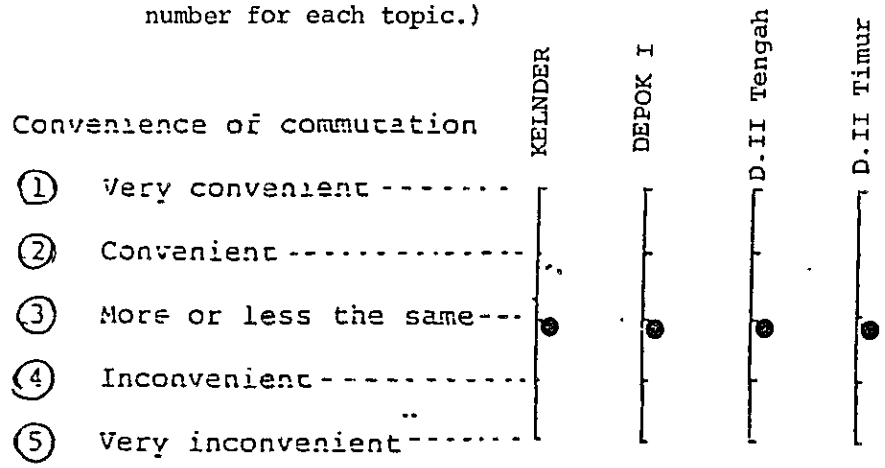


(15) Poor sanitary conditions regarding ventillation and sewage.

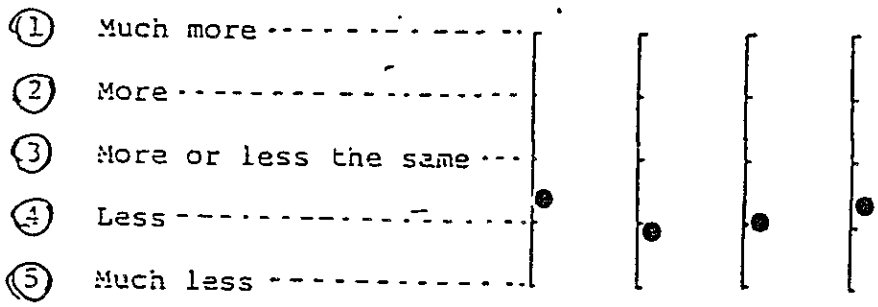


I-1-24 Q: How do you evaluate the conditions or environment of your present residence as compared with your previous one? (draw a circle around the appropriate number for each topic.)

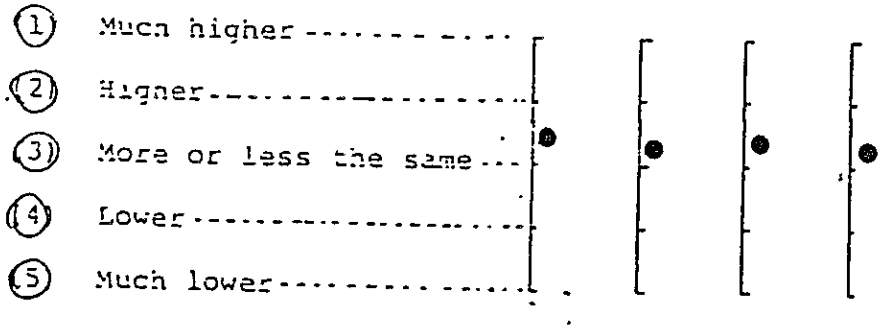
(1) Convenience of commutation



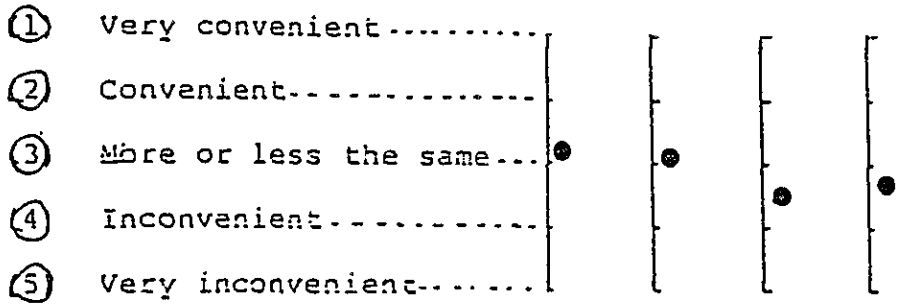
(2) Working places such as factories and shops in the neighborhood.



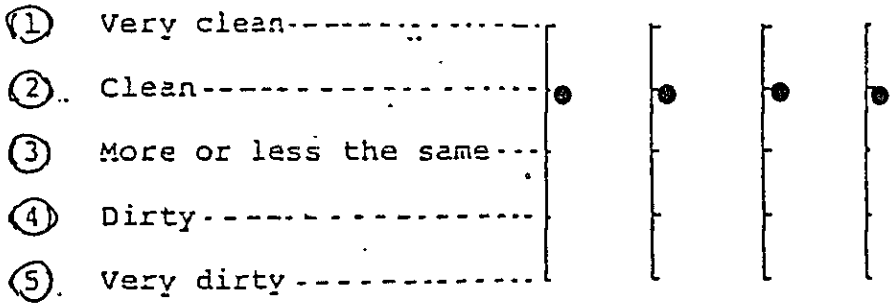
(3) Income level



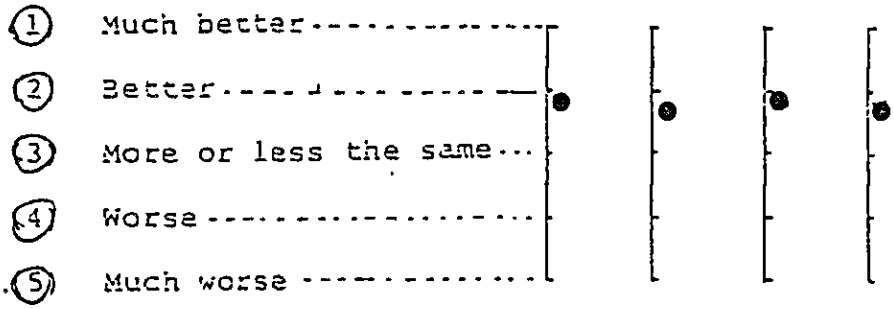
(4) Convenient for shopping



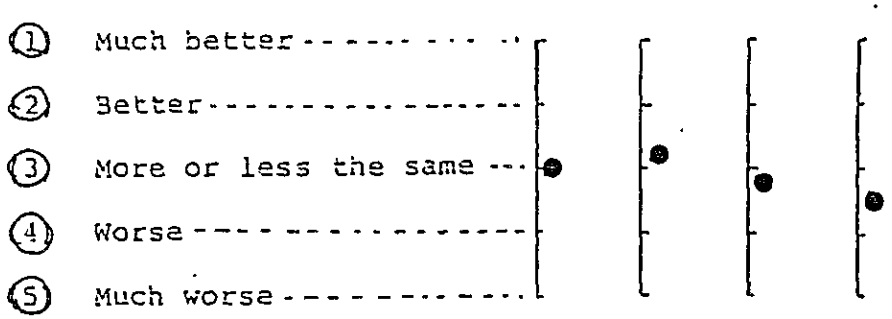
(5) A clean environment in the neighborhood of the residence.



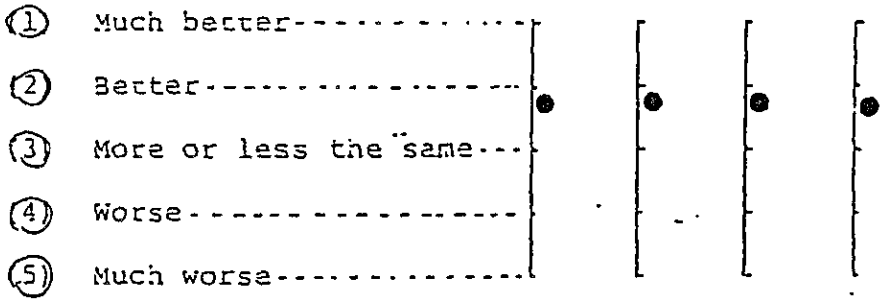
(6) Peace and order in the neighborhood of the residence.



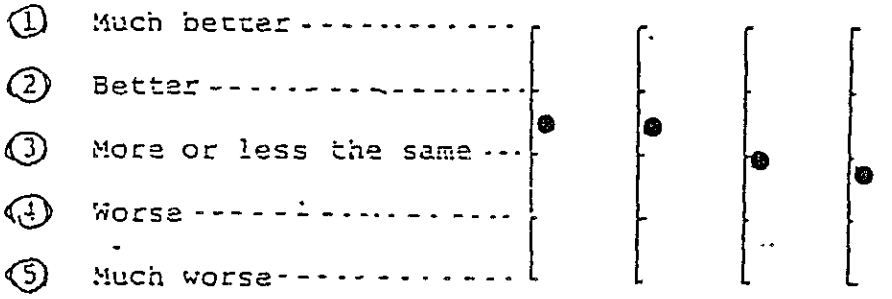
(7) Access to medical facilities



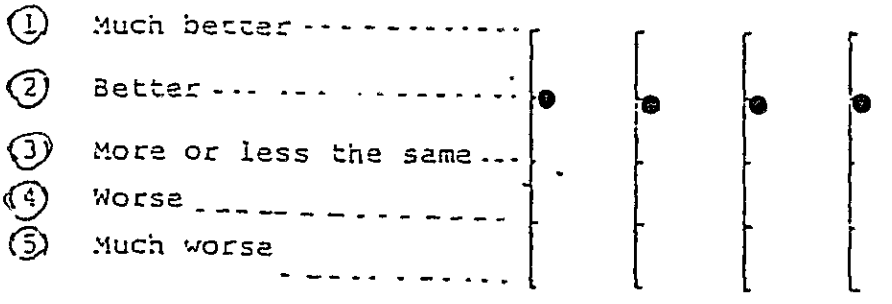
(8) Relationship with neighbors



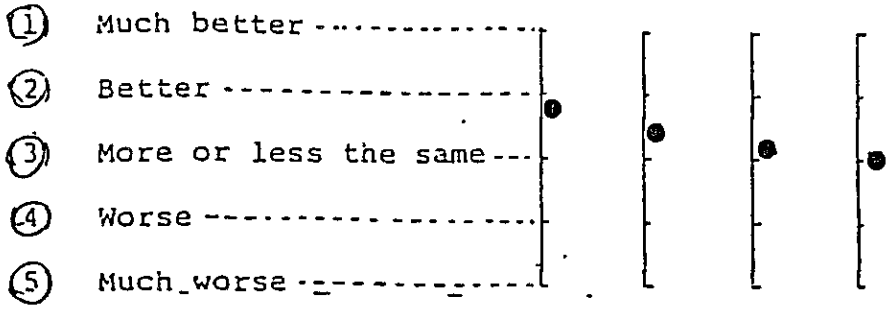
(9) Access to meeting places, mosques and other social facilities.



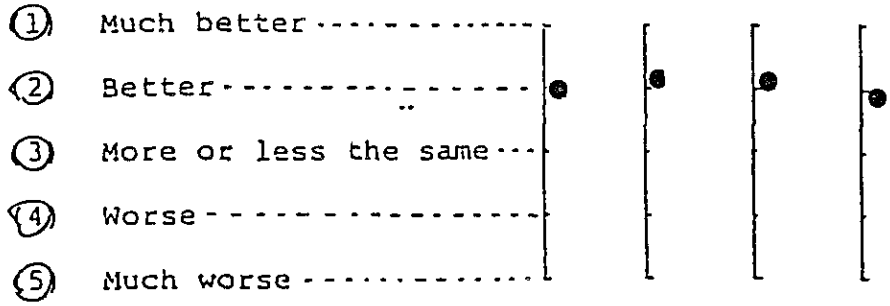
(10) Natural environment with greenery



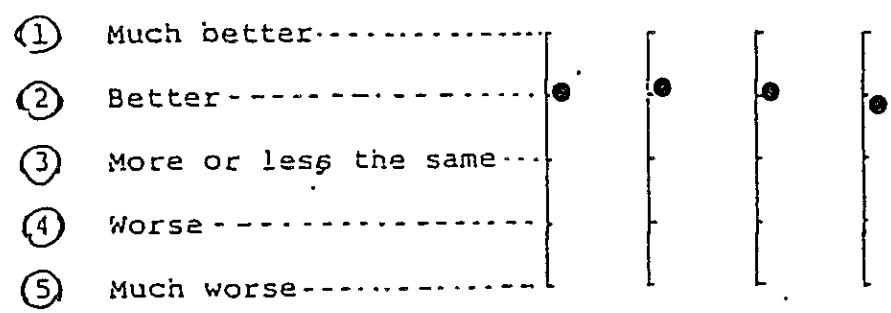
(11) Educational environment for children



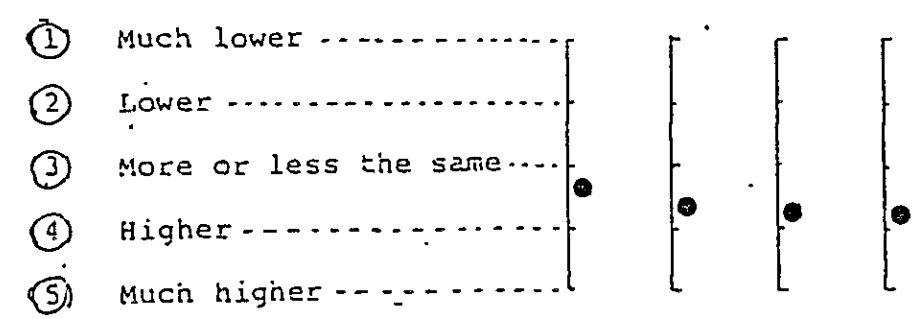
(12) Pollution such as noise, oscillation and smell



(13) Sanitary environment such as sunshine, ventilation and sewage.



(14) Commodity price



I-1-25 Q: At what level of rent do you prefer to live in the medium-rise apartment residence, provided that it has the same floor space as your present residence?

	No. of Respondents
(1) I would prefer to live in it even at the same rent as my present residence.	25 (6.2%)
(2) I would prefer to live in it if the rent were 10% less than my present residence.	14 (3.5%)
(3) I would prefer to live in it if the rent were 20% less than my present residence.	20 (5.0%)
(4) I would prefer to live in it if the rent were 30% less than my present residence.	7 (1.7%)
(5) I would prefer to live in it if the rent were 40% less than my present residence.	6 (1.5%)
(6) I would prefer to live in it if the rent were 50% less than my present residence.	23 (8.2%)
(7) I would not like to live in it, however inexpensive the rent is.	296 (73.8%)
Total	401

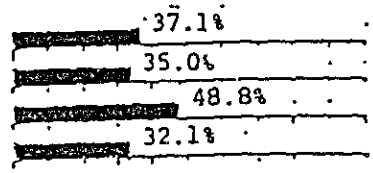
I-1-26 Will you move to medium-rise apartment like that if fulfill which location requirement?

	No. of Respondents	The Average Distance (km)
1. not more than ..... km from working place	138	6.29
2. not more than ..... km from family or friends	30	7.77
3. not more than ..... km from market	33	1.60
4. not more than ..... km from medical facility	51	1.86
5. not more than ..... km from educational facility	69	1.93
6. not more than ..... km from meeting facility	28	1.65
7. not more than ..... km from green area	34	2.12
8. not more than ..... km from existing housing area	29	2.59

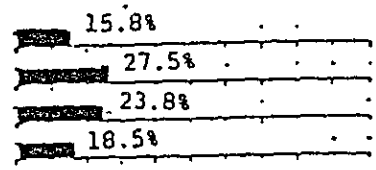
I-1-27 Q: Described below are several comments on a medium-rise apartment residence.

Do you agree these?

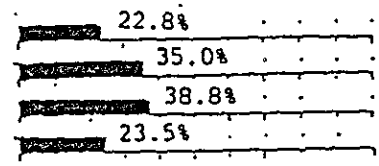
(1) Vacant lots can be set aside in the periphery of the building.



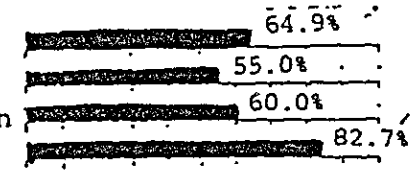
(2) Little damage is likely to be caused by earthquakes or floods.



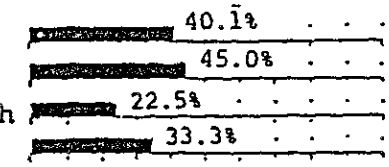
(3) It commands a fine view.



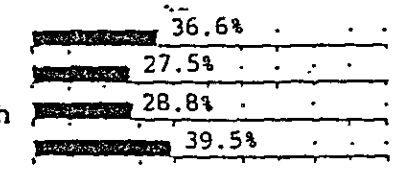
(4) It tires you to go up and down the stairway.



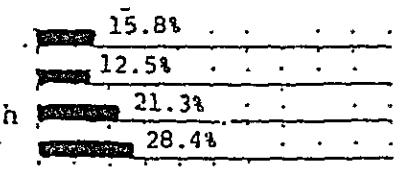
(5) Being apart from the land makes one feel uneasy psychologically.



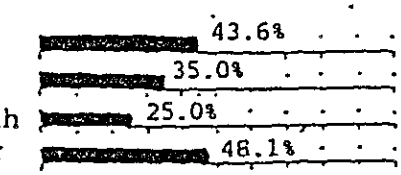
(6) One can live without being familiar with neighbors.



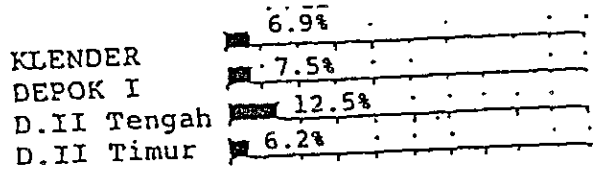
(7) One can shut out the outside world with a key.



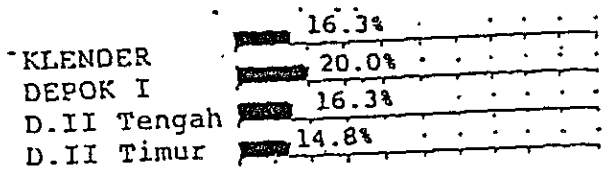
(8) Noise from the upper or the neighboring apartments makes one feel uneasy.



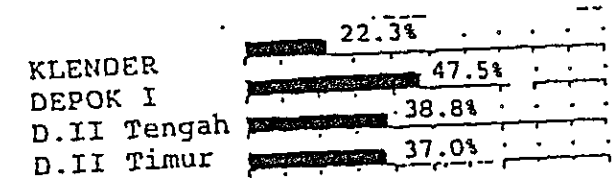
(9) It is unnecessary to take care of or clean up the garden.



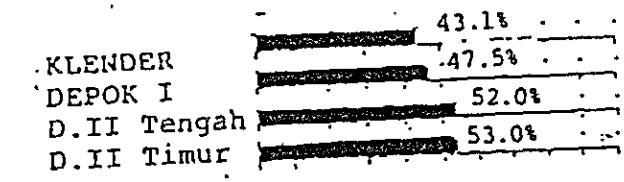
(10) One must go outside less frequently.



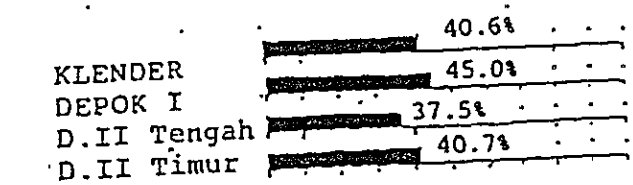
(11) One cannot enjoy gardening.



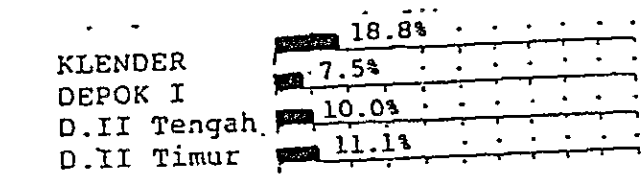
(12) One cannot raise pet animals



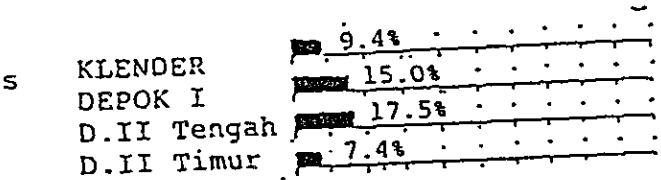
(13) One cannot extend the apartment.



(14) The storage space in the apartment is limited.

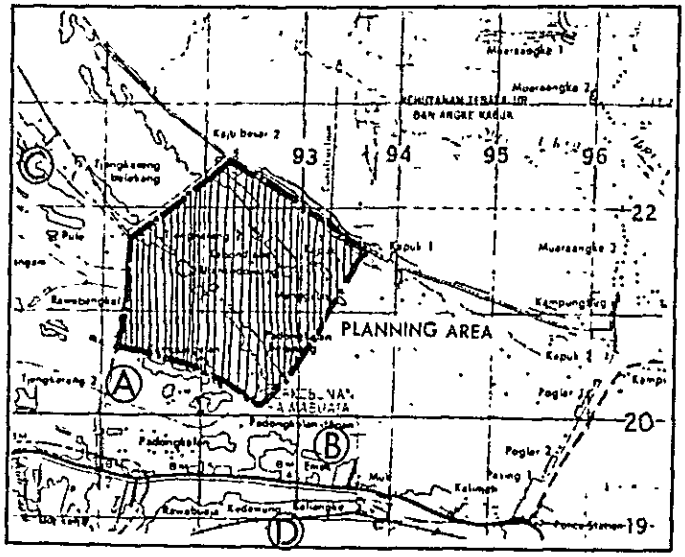


(15) The apartment has a long durable life.



I-2 HOME INTERVIEW SURVEY AROUND PROJECT AREA

I-2-1 Covered area



I-2-2 No. of respondents

A: 1 (No. 1)

B: 5 (No. 2 ∿ 6)

C: 4 (No. 7 ∿ 10)

D: 2 (No. 11 ∿ 12)

Total 12

I-2-3 Comparison with former dwelling places

Many of the present inhabitants around the project site moved in relatively recently (since 1977) indicating that this area has been exposed to an increased population in recent years. Looking at their former addresses, it can be seen that many came from DKI Jakarta, and, the in-flow, from Grogol in particular which is in the same ward as Cengkareng but closer to the city center, is remarkable.

Comparison of present house with previous one

No.	Present					Previous				
	Time of moved	Land Space (m^2)	Floor Space (m^2)	No. of residents	Ownership	Address	Land Space (m^2)	Floor Spare (m^2)	No. of residents	Ownership
1.	Mar. '70	101 ∿ 150	70 ∿	8	his own	Tommang Koppo Banjir, JKT Barat	?	70 ∿	8	his own
2.	Apr. '77	?	70 ∿	8	his own	(Same Area)	?	70 ∿	6	his own
3.	Nov. '79	101 ∿ 150	70 ∿	5	his own	Tebet, Jakarta	?	?	5	lease
4.	Feb. '79	51 ∿ 75	50 ∿ 69	3	his own	Grogol, Jakarta	101 ∿ 150	70 ∿	11	?
5.	Jun. '76	51 ∿ 75	50 ∿ 69	4	lease	Gunung Sahari, Jakarta	∿ 50	40 ∿ 49	11	lease
6.	Sep. '77	101 ∿ 150	70 ∿	8	his own	Grogol, Jakarta	51 ∿ 75	50 ∿ 70	?	lease
7.	Jun. '78	101 ∿ 150	50 ∿ 69	7	his own	Grogol, Jakarta	-	?	5	lease (roomer)
8.	Mar. '77	76 ∿ 100	50 ∿ 69	10	his own	Hutan Kayu, Jakarta	-	∿ 20	1	lease (roomer)
9.	Sep. '78	101 ∿ 150	50 ∿ 69	7	his own	Cempaka Wang, JKT Pusat	51 ∿ 75	40 ∿ 49	6	his own
10.	'78	101 ∿ 150	70 ∿	6	his own	Cengkareng	?	?	?	?
11.	Jul. '80	76 ∿ 100	70 ∿	5	his own	Grogol, Jakarta	76 ∿ 100	70 ∿	4	lease
12.	May '80	?	?	1	his company's own	Paoe mangan, JKT Utara	?	?	1	his company's own

I-2-4 The reasons why they moved the present housing

Reasons selected by more than 3 respondents each are as follows.

- o I was anxious to have a house of my own. (5 respondents)
- o No disturbance such as noise, vibration, smell, etc. (5 respondents)
- o Good residential space. (4 respondents)
- o Good house planning. (3 respondents)
- o Public peace and order is well maintained around the residence. (3 respondents)

Glancing at the above responses, it seems that many are anxious to have their own houses, and many mention reasons of size of lots and room layout.

I-2-5 Dissatisfaction with their present residence

Items selected by more than 3 respondents each are as follows.

- o Inconvenience for commutation. (4 responders)
- o Water supply, electricity, sewage, and other systems are not well supplied. (4 responders)
- o There are few working places, such as factories and shops, in the neighbourhood. (3 responders)

For the future of housing development in Cengkareng, it is necessary to consider above dissatisfaction.

I-2-6 Evaluation of the conditions or environment of their present residence as compared with their previous one

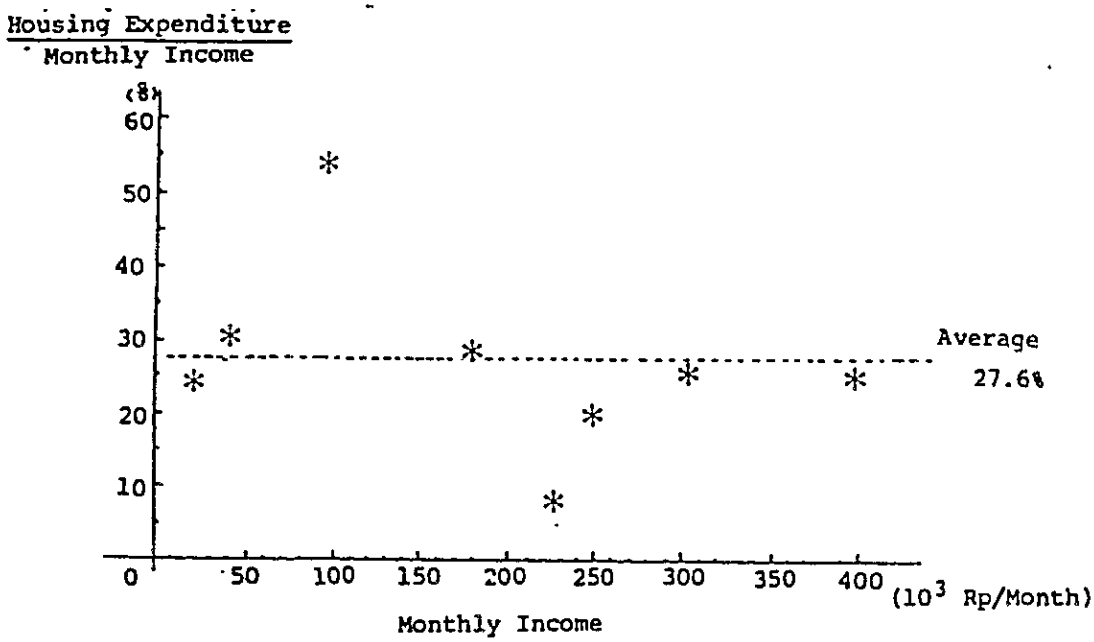
Items	Better	Same	Worse
Convenience of commutation	3	1	2
Working places such as factories and shops in the neighbourhood	0	3	4
Income level	5	1	1
Convenient for shopping	1	4	3
A clean environment in the neighbourhood of the residence	7	1	0
Peace and order in the neighbourhood of the residence	6	2	0
Access to medical facilities	1	2	5
Relationship with neighbours	4	3	1
Access to meeting places, mosques and other social facilities	3	1	4
Natural environment with greenery	6	1	1
Educational environment for children	3	3	2
Disturbance such as noise, oscillation and smell	7	1	0
Sanitary environment such as sunshine, ventilation and sewage	7	1	0
Commodity price	1	6	1

The present inhabitants around the project area appreciate that, in comparison with their previous dwelling places, Cengkareng is better on account its clean environment, position and order, rich natural environment, less pollution, and sanitation. They also say their income level is higher than before.

Access to working places and medical facilities, however, is worse than before. And this problem should be coped with in future Cengkareng.

I-2-7 Ratio of housing expenditure to income

According to Home Interview Survey around Cengkareng site, the ratio of housing expenditure to monthly income is shown in following figure.



Ratio of housing expenditure to monthly income

The present inhabitants around the project site pay average of 27.6% of their income for housing expenditure.

I-3 PRIVATELY DEVELOPED HOUSING COMPLEXES AROUND THE PROJECT SITE

According to the materials of the Indonesia Real Estate Association, the following housing development for low/medium income groups are being carried out by private enterprises in the area along the Jakarta-Tangerang road:

Private Housing Development Project along the Jakarta - Tangerang Road

Name of Project	Target Groupe
• Taman Kota	Middle Income Group
• Bojon Indah	Low Cost Housing
• Cengkareng Indar	Middle Income Group
• Pakuwon	Middle Income Group
• Batucepper	Low Cost Housing - Middle Income Group

Out of these developments, two areas of Taman Kota and Cengkareng Indah near the area covered by this survey have been surveyed as follows for their lot size, floor space and price:

Housing Development in Taman Kota

Floor Space (m^2)	Land Space (m^2)	For Sale ($\times 10^3$Rp)
150	160	20,000
140	144	18,500
70	96	8,650

Housing Development in Cengkareng Indah

Type	Floor Space (m^2)	Land Space (m^2)	For Rent (Rp 1,000/ month)	For Sale ($\times 10^3$Rp)
A	114	220	210	23,000
B	77	135	150	14,000
C	56	90	120	10,500
D	45	72	100	9,000

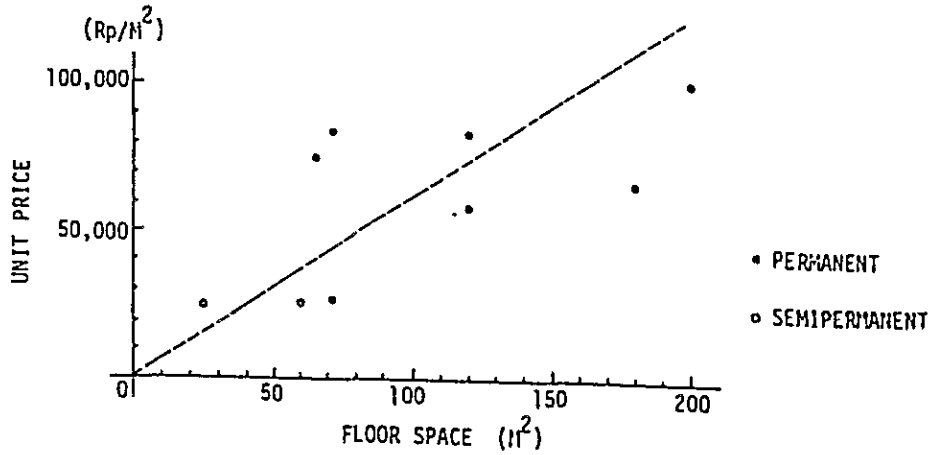
I-4 HOUSING MARKET SURVEY IN DKI JAKARTA

Through surveys on cases of housing for sale in the housing market in DKI Jakarta, the following data have been collected:

Housing Market Survey in DKI Jakarta (For Sale)

No.	Floor Space (m^2)	Price (1,000 Rp)	Type	Quality	Facility		
					MCK	Water	Electricity
1	72	2,000	Detached	Permanent	Independent	Well	?
2	72	6,000	Detached	Permanent	Independent	Well by Hand	?
3	120	7,000	Detached	Permanent	Independent	Well	450W
4	120	10,000	Detached	Permanent	Independent	Well	?
5	180	12,000	Detached	Permanent	Independent	Well	450W
6	66	5,000	Detached	Permanent	Independent	Well	-
7	200	20,000	Detached	Permanent	Independent	City Water	1,000W
8	24	600	Semidetached	Semipermanent	Communal	Well	-
9	60	1,500	Semidetached	Semipermanent	Independent	Well	-

If unit selling prices per $1m^2$ of floor space are obtained from above data and plotted, they will be as shown on the following chart indicating that housing with a smaller floor space is cheaper per unit selling prices. Also, semipermanent buildings are cheaper per unit selling price if compared with permanent ones.



UNIT SELLING PRICE OF HOUSING EMPTY LOTS

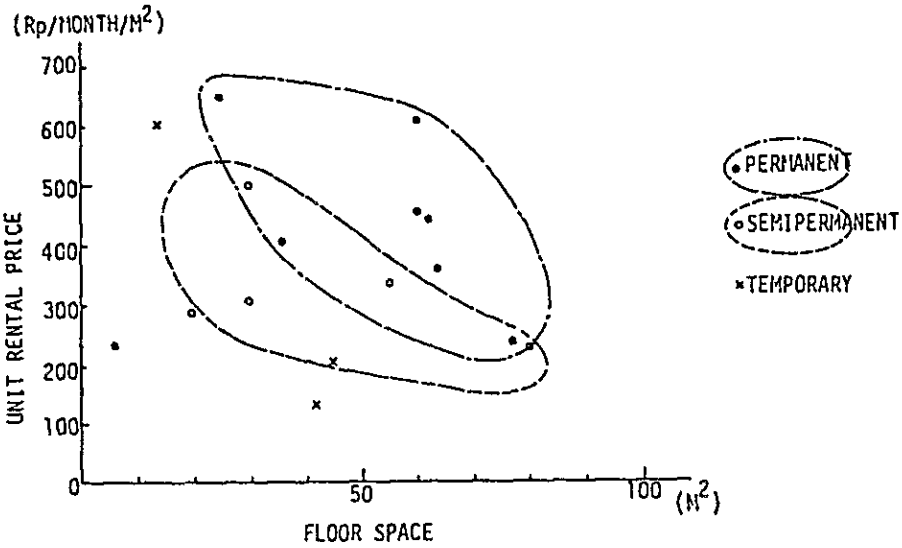
I-4-2 Housing for rent

Further, the below table shows cases of housing for rent in the housing market in DKI Jakarta.

Housing Market Survey in DKI Jakarta (For Rent)

No.	Floor-Space (m^2)	Rental	Rental/Month (Rp/M)	Type	Quality	Facility		
						MCK	Water	Electricity
1	20	260,000/5y	5,780	Row House	Semi Permanent	Independent	Well by Hand	-
2	80	200,000/y	18,180	A House	Semi Permanent	Independent	Well	450W
3	55	200,000/y	18,180	A House	Semi Permanent	Independent	Well	700W
4	108	25,000/M	25,000	Room($6m^2$)	Permanent	Communal	Well	600W
4'	60	300,000/y	27,270	A+House	Permanent	Independent	Well	450W
5	30	15,000/M	15,000	Row House	Semi Permanent	Communal	Well	450W
6	14	175,000/2y	8,500	Row House	Temporary	Communal	Well by Hand	-
7	28	200,000/y	18,180	A House	Permanent	Independent	Well	950W
8	45	100,000/y	9,090	A House	Temporary	Independent	Well by Hand	-
9	62	300,000/y	27,270	A House	Permanent	Independent	Well	950W
10	42	60,000/y	5,450	Row House	Temporary	Communal	City Water	-
11	77	200,000/y	18,180	A House	Permanent	Independent	Well	400W
12	60	400,000/y	36,363	A House	Permanent	Independent	Well	450~600W
13	30	10,000/M	10,000	Row House	Semi Permanent	Communal	Well	100W
14	64	250,000/y	22,730	A House	Permanent	Independent	Well by Hand	450W
15	36	300,000/2y	14,580	A House	Permanent	Independent	Well	150W

If monthly rental prices per $1m^2$ of floor space are obtained from the above data and plotted, they will be as shown on the following chart giving 231 ∿ 650 Rp/month·m^2 for permanent buildings, 227 ∿ 500 for semi permanent, and 130 ∿ 607 for temporary.

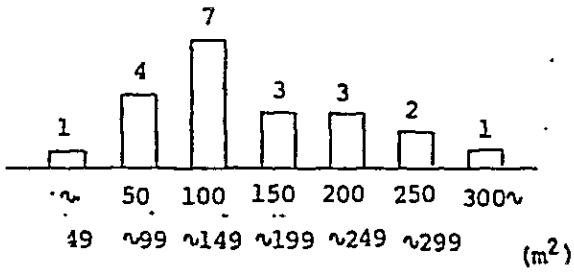


UNIT RENTAL PRICE FOR ACCOMMODATION

I-4-3 Residential lot size

We got the 22 sample data of lot size which have been sold in DKI Jakarta. As shown below, the most case is between 100 and 149m^2 and the average is 180m^2.

(Average = 180m^2)



Selling Residential Lot Size in Jakarta

APPENDIX II
SOIL INVESTIGATION DATA (PHASE I)

REPORT ON SOIL INVESTIGATION IN CENGKARENG

1. WEST JAKARTA

The project area is located at a part of vast alluvial plain faced to the JAKART BAY and nearly 5 km. west of DKI Jakarta.

The area getting between Cisadane River and Banjil Canal which include this project area and west parts of DKI Jakarta can divided into following two regions, north and south, with boundary line of Jakarta-Tanggerang Road, topographically and geologically.

a) The Coastal Plain

b) The Upper Coastal Region

"The Coastal Plain" is in general low and very flat alluvial plain and is very swampy in part, the ground elevation in this region ranges below 5 m. contourline. In this region some coastal ridges and small natural river levees occurred by shifting of coastal line and river courses scattered belt-like and nearly parallel to the coast.

"The Upper Coastal Region" is a part of vast foothill of southern mountain region. The ground elevation ranges from El. 5 to 20 m. or more but the ground slope toward north is rather gentle. This region is composed of soft volcanic rocks or it's weathered materials geologically, and valley alluvial deposits also exist here and there because they are easily erroded by surface water.

Geologically, the upper coastal region mainly consists of volcanic rocks belonging to Pliocene to Pleistcene and volcanic deposits belonging to Pleistcene, but they are very easily weathered and product lateritic soils at upper part. These formation extends continuously toward north but at the coastal plain region they are overlay by thick alluvial deposits. Alluvial deposits consist of mainly clayey layer (clay, silt) and interbedded by sandy layer or sand lenses.

GEOLOGICAL FORMATION

Quaternary	Holocene	Coastel Alluvium (mainly clay) River Alluvium (clay, sand, gravel) Valley Alluvium (tuffacious clay, sand) Beach Ridge Deposite (fine sand)
	Pleistcene	Young Volcanic Rocks (tuffacious clay, sand, lahar deposite)
Tertiary	Pliocene	Genteng Formation (tuffacious sandstone)

2. CENGKARENG DISTRICT

Cengkareng district is very flat lowland with ground elevation ranging from El. 3 to 5 m. and some coastal ridges are scattered with liniation of NW - SE which nearly parallel to the present coast. The width of coastal ridges range from 300 to 800 m., the length of them are several kilometers or more. They are forming a belt-like high zone than the surrounding alluvial plain and usually occupied by villages and roads. Alluvial plain getting between these coastal ridges are mainly cultivated as a paddy field but some part of them are used as a fish ponds or kept as non-cultivated swamp area.

Geologically the practical bed rock of this area is volcanic deposits or volcanic rocks belonging the end of Tertiary of Pleistcene and overlay by thick (10 - 30 m.) alluvial deposits. Alluvial deposits consist of very soft clay and silt containing some organic materials and interbedded sandy layer partially, but at the upper part of coastal ridges fine sand is predominant than clayey components.

Subsoil in this area is composed of mainly clay and silt and have very poor bearing capacity. The characteristics of the soil are high water contents, high saturation degree, rather high cohesion, high plasticity and low permeability.

The volcanic deposits underlying the alluvial soil mentioned above are composed of hard clay and tuffacious sand and have a high bearing capacity but depth of this layer ranges from 9 - 10 m. at Tanggerang to 16 - 20 m. at the west end of DKI Jakarta. This means that the distribution of these hard layers have same tendency with the wide topographical feature of this area as sloping toward north-east.

The groundwater level is generally very high or same level to the ground surface partially but at the coastal ridge zone it lies 0.6 - 1.5 m. below the ground surface.

3. STUDY AREA

a) Field survey

The field investigations are carried out in the study area to grasp the geological and soil mechanical conditions. The items of field investigations and laboratory tests are follows:

i.	Drillings	2 holes	total 50 m.
ii.	Standard Penetration Tests	"	" 42 times
iii.	Undisturbed Soil Sampling	"	" 12 samples
iv.	Dutch Cone Soundings	18 points	225 m.
v.	Soil Laboratory Tests		12 samples

-- Series of physical tests, consolidation test, triaxial compression test --

The field investigation works and laboratory tests are performed by the contractor, P,T. P.P. TAISEI CONSTRUCTION under supervising of the geologist belonging to the project team. The location map of field investigation and the results of this investigations and tests are attached at the end of this paper.

b) Geology and Subsoil Condition

The results of field investigations are condensed to the attached sheet "SOIL PROFILE, PANEL DIAGRAM". The soil profile of this site consists of thick very soft clay (N<3), soft clay (N=3 - 10), interbedded sand layers or sand lenses and underlying hard clay (N>30).

Very soft or soft clayey layers interbedded by sandy layers are alluvial deposits, that have high plasticity and high water contents (most of them are almost saturated) except a few parts. The characteristics of this layer is similar to the common alluvial clay such as poor permeability, low compression strength (qu), middle cohesion (C), low angle of internal friction (ϕ) and high compression index (Cc). These characteristics are showed as a summarise table of the laboratory test data.

Underlying hard clayey layer is considered as dilvial deposits and consists of sandy clay, clayey silt and sandy silt. This layer have a rather high compression strength (N>30, mainly N>50) and enough bearing capacity. The depth of this diluvium varies from 7 to 15 m. from the ground surface and generally tend to go deep toward east. Fig. - "ISOBATH MAP OF DILUVIUM" already stated in Part I. 3 shows the distribution and tendency of the depth of diluvium.

c) Bearing Capacity

The bearing capacity is considered from the results of S.P.T. and Dutch Cone Sounding. At first, the relationship between N-value of S.P.T. and qu-value of sounding are studied based on the results of the field investigation and the geological and/or subsoil investigation

data collected at the site, then the bearing capacity of each layer in the field and distribution of safety bearing layers are studied.

The relation between N-value and qu-value is showed as a figure. From the figure, 2 tendencys are get, one is a relativity of whole data and another is relativity of low qu-value and N-value, but in this report the interrelation, N=0.437 qu is adopted finally from the view of safety evaluation.

Based on the interrelation of N-value and qu-value mentioned above, the distribution of bearing capacity was got like as an attached sheet "SOIL PROFILE, PANEL DIAGRAM". As indicated in the figure, the upmost layer at the most of all project area have very poor bearing capacity less than 3 in N-value, it means the long term allowable bearing capacity is less than 3 t/m^2 for the sheet base. Furthermore this very soft clayey layer lies generally thick and a depth from the ground surface varied from 5.5 to 9.0 m., it means that the risks of wide subsidence and unbalanced subsidence are very serious as a foundation of the constructions. From these consideration mentioned above, the alluvium in this site is concluded that it's not suitable for the direct foundation except some kind of very light simple housing like as bamboo and wooden house, without any special land-treatment.

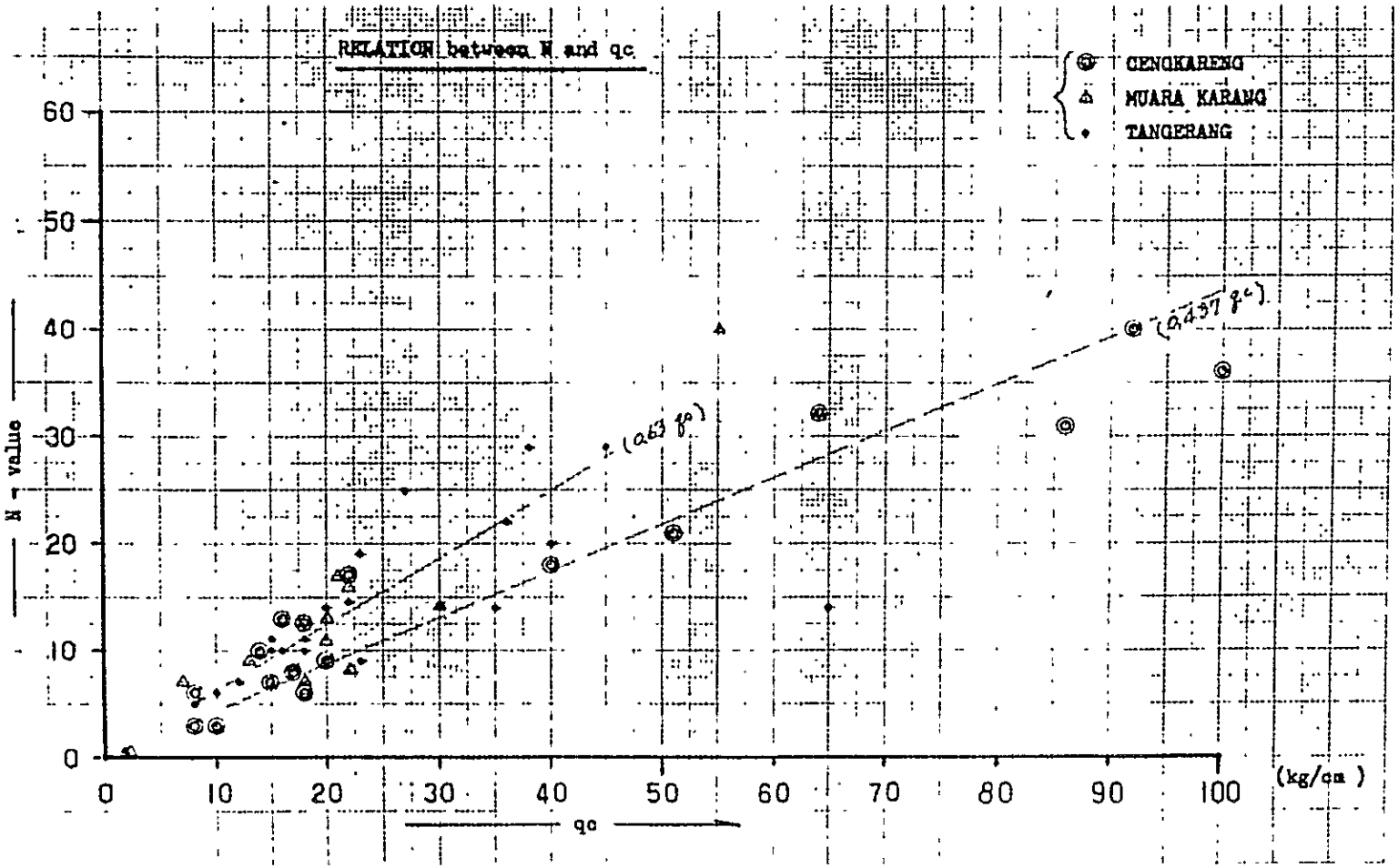
Practically, the safety bearing capacity for the construction foundation is the hardness more than 30 in N-value, and the layer which has N-value more than 30 are mainly dilvium and some parts of interbedded sandy layers. Depth of these safety bearing layers also varied from 7 to 13 m. under the ground surface, and the plane delineation of the upper surface of these layers are shown as fig.- "ISOBATH MAP OF BEARING LAYER". As shown in that figure, the distribution of the layer which has enough bearing capacity is rather confusing, but there's a tendency that rather shallow at the coastal ridge zones and deep in the middle area of these ridges. Then there is another notable feature indicated in the figure that is the existing of gaps in depth to the bearing layer like as a fault. This gaps come from the discontinuity of interbedding sandy layer which has enough bearing capacity.

From the consideration described above, the following matters are concluded:

Most of all constructions at this project site must be based on the layers which have enough bearing capacity but the depth of these layers are deeper than 7 m., therefore a piar foundation shall be adopted, and it mean the construction cost should become rather high.

d) Groundwater

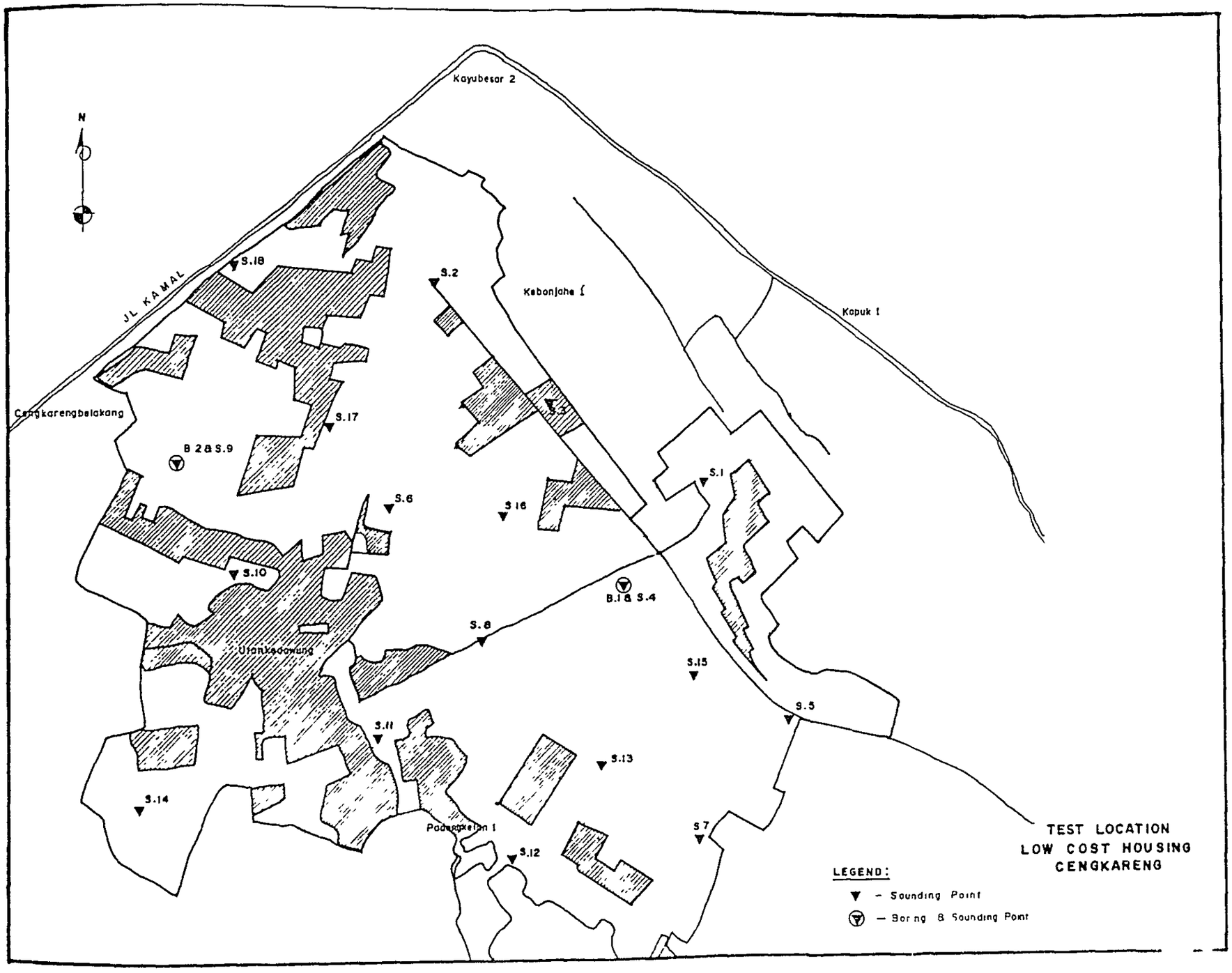
At this time field investigation, the systematic groundwater survey was not carried out, but the following matter is said from field reconnaissance. The natural groundwater level in this field is very high or nearly same level to the ground surface at an alluvial plain and 0.6 - 1.5 m. below from the ground surface at coastal ridge zones. Anyway concerning to the groundwater, further investigation should be carried out systematically to grasp the distribution of the groundwater surface, groundwater-flow system, and the groundwater hydrograph through a year. These data will be required to design the underground construction, the drainage system and development of the groundwater.


RELATION between N and qc
CENGKARENG
MUARA KARANG
TANGERANG
N = 0.63 qc
N = 0.457 qc
N - value
qc
(kg/cm²)
0
10
20
30
40
50
60
70
80
90
100

TERMS and SYMBOLS

As recommended by the International Society of Soil Mechanics and Foundation Engineering, as adopted in Paris, July, 1961.

γ_m	=	volumetric weight, bulk density
γ_s	=	unit weight of solid particles
γ_d	=	dry density
w_{opt}	=	optimum water content
w_N	=	natural water content
e_o	=	void ratio
n	=	porosity
S_r	=	degree of saturation
w_L	=	liquid limit
w_P	=	plastic limit
I_P	=	plasticity index
w_S	=	shrinkage limit
D_S	=	degree of shrinkage
R_S	=	shrinkage ratio
L_S	=	linear shrinkage
D_{10}	=	effective size
C_u	=	uniformity coefficient
q_u	=	unconfined compressive strength
S_t	=	$\frac{\text{undisturbed } q_u}{\text{remolded } q_u}$ = sensitivity
c	=	apparent cohesion
$\varnothing$	=	apparent angle of internal friction
$\bar{c}$	=	true or intergranular cohesion
$\bar{\varnothing}$	=	true or intergranular angle of internal friction
k	=	coefficient of permeability
D_r	=	relative density
E_u	=	unsaturated modulus of elasticity
E_s	=	saturated modulus of elasticity
C_c	=	compression index
c_v	=	coefficient of consolidation


N
JL KAMAL
Kayubesar 2
Kebonjahe 1
Kapuk 1
Cengkarengbelakang
Urankadowung
Pedamaran 1
S.1
S.2
S.3
S.4
S.5
S.6
S.7
S.8
S.10
S.11
S.12
S.13
S.14
S.15
S.16
S.17
S.18
B.2 & S.9
B.1 & S.4
TEST LOCATION
LOW COST HOUSING
CENGKARENG
LEGEND:
▼ - Sounding Point
⊽ - Boring & Sounding Point

BORE HOLE NO : 1
ELEVATION : -1.830
DEPTH : 30.45 M
BEGUN : OCTOBER 30, 1979
FINISHED : NOVEMBER 4, 1979
GROUND WATER LEVEL -0.27 M IN DEPTH

BORING METHOD : CORING, SOIL DRILL
SAMPLING METHOD : THIN WALLED (SHELBY) TUBE
D : DISTURBED SAMPLE U : UNDISTURBED SAMPLE
NOTE

FOREMAN : BISMA
DRILL MASTER : A UNANG MAKBUL

LOGGED BY : WAHYU WIDODO
REVIEWED BY: DJUHANI

DRAWN BY : DEDDY S
CHECKED BY: WIRASTUSRINI

APPROVED BY : RISMANTOJO

SCALE	SAMPLE	ELEVATION in meter	DEPTH in meter	SOIL TYPE: GRAPHIC SYMBOL	SOIL TYPE: LETTER SYMBOL	SOIL TYPE: CLASSIFICATION BY FIELD IDENTIFICATION	COLOR	DESCRIPTION	DEPTH in meter	RELATIVE DENSITY & CONSISTENCY qu kg/cm²	DEPTH in meter	STANDARD PENETRATION TEST: NUMBER OF BLOWS (N-CBR)	STANDARD PENETRATION TEST: GRAPH OF N N/FOOT	RECOVERY %	PERMEABILITY: DEPTH in meter	PERMEABILITY: GRAVITY K (cm/s 10⁻ˣ)	PERMEABILITY: PRESSURE Lugeon (L/m.min)
0					CH	SILTY CLAY,	yellowish gray,	medium to high plastic fines - small amount of fine sand, stiff, moist	0.50	0.75							
1		-0.80	1.00		CH-CL	SILTY CLAY,	brownish gray,	medium plastic - mixture of fine to medium grained sand, moist	1.00	0.25							
		-1.80	1.50		ML	SANDY SILT,	dark yellowish brown,	loose - fine to coarse grained rounded to subrounded clayey - non plastic	1.50	0.50	1.27	2/25					
2									2.00	0.50							
					ML	SANDY SILT,	dark yellowish brown,	loose - fine to medium grained - small amount of clay	2.70	1.25	2.85	7/60					
3									3.15	1.00							
		-3.50							3.50	0.75							
4									4.20	1.75							
					MH-CL	CLAYEY SILT,	brownish gray,	medium to low plastic - small amount of fine sand - moist,	4.65	1.00	4.35	15/30					
5		-5.20							5.00	1.25							
		-6.70							6.70	1.50							
6					MH	CLAYEY SILT	reddish gray,	low plastic - small amount of fine sand	6.20	1.25	6.36	9/30					
		-6.70							6.65	1.50							
7					MH-CL	SILTY CLAY,	brownish gray,	medium to low plastic - trace fine sand - moist,	7.08	0.50	7.16	8/24					
									7.45	0.75							
8		-8.20							8.00	1.25							
		-8.55							8.35	>4.5	8.70	17/30					
9									9.00	>4.5							
					ML	SANDY SILT,	dark yellowish brown,	fine to medium grained sand - loose	10.00	>4.5	10.16	33/30					
10									10.45	>4.5							
		-10.45							11.00	>4.5							
11					ML-CL	CLAYEY SILT,	grayish brown,	low plastic - trace fine sand mixture	11.45	1.75	11.16	10/30					
									12.00	1.00							
12		-12.00							12.60	1.25	12.75	18/30					
		-12.70							13.05	4.00							
13					ML	SANDY SILT,	brownish gray,	fine to medium grained sand - small amount of clay - non plastic									
		-14.00							14.00	>4.5	14.15	31/30					
14					ML	SANDY SILT,	dark yellowish brown,	fine to medium grained sand - loose	14.45	>4.5							
									15.00	>4.5	15.15	36/30					
15		-15.00							15.45	>4.5							
					ML	SANDY SILT,	light brownish brown,	fine grained sand - small amount of clay - non plastic	16.00	>4.5	16.15	50/30					
16		-16.45							16.45	>4.5							
									17.00	2.75	17.16	30/30					
17									17.45	3.25							
					MH-CL	SILTY CLAY,	pale yellowish brown,	medium plastic - trace fine grained sand - moist	18.00	2.00	18.15	25/60					
18									18.45	2.75							
									19.00	2.75	19.16	19/30					
19									19.45	2.50							
		-20.00							20.00	1.75	20.15	27/30					
20									20.45	2.75							
					ML	CLAYEY SILT,	dusky yellow,	low plastic - mixture of fine grained sand	21.00	3.00	21.15	33/30					
21									21.45	3.25							
									22.00	2.75	22.15	30/30					
22		-22.95							22.45	3.00							
									23.00	2.50	23.15	30/60					
23									23.45	2.75							
									24.00	2.00	24.15	26/30					
24									24.45	2.25							
					CL	SILTY CLAY,	brownish gray,	medium to low plastic small amount of fine sand	25.00	2.25	25.15	39/30					
25									25.45	2.25							
									26.00	2.25	26.15	31/30					
26									26.45	2.25							
		-26.95							27.00	1.25	27.15	29/30					
27									27.45	2.00							
									28.00	1.50	28.15	26/30					
28					CH-CL	SILTY CLAY,	pale yellowish brown,	medium plastic - small amount of fine sand	28.45	2.00							
									29.00	2.50	29.15	84/30					
29									29.45	3.25							
									30.00	3.00	30.15	19/30					
30			30.45						30.45	-1.75							

END OF THIS BORING
CASING DOWN TO -22.00 METERS DEPTH

G 004 – 0477 S

PLATE A 1.1

BORE HOLE NO : 2
ELEVATION : -1.300
DEPTH : 20.00 M
BEGUN : OCTOBER 25, 1979
FINISHED : OCTOBER 27, 1979
GROUND WATER LEVEL : -0.20 M. IN DEPTH

BORING METHOD : CORING, SAMPLING
SAMPLING METHOD : THIN WALLED (SHELBY) TUBE
D DISTURBED SAMPLE U UNDISTURBED SAMPLE
NOTE :

FOREMAN : BISMA
DRILL MASTER : A.UNANG MAKBUL

LOGGED BY : WAHYU WIDODO
REVIEWED BY: DJUBIANI

DRAWN BY : DEDDY S.
CHECKED BY: WIRADYUSRINI

APPROVED BY : RISMANTOJO

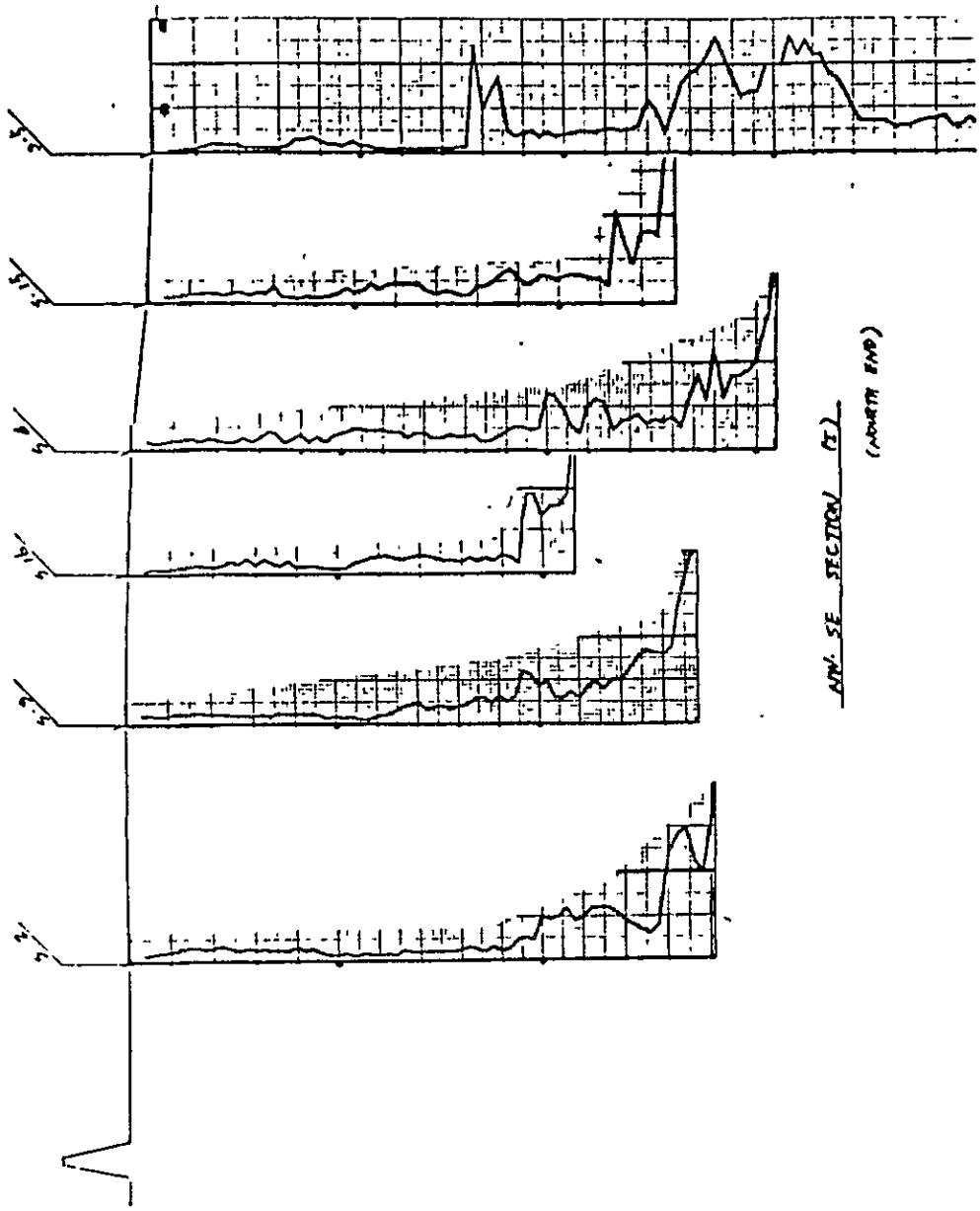
SCALE	SAMPLE	ELEVATION in meter	DEPTH in meter	SOIL TYPE: GRAPHIC SYMBOL	SOIL TYPE: LETTER SYMBOL	SOIL TYPE: CLASSIFICATION BY FIELD IDENTIFICATION	COLOR	DESCRIPTION	DEPTH in meter	RELATIVE DENSITY & CONSISTENCY qu kg/cm²	DEPTH in meter	STANDARD PENETRATION TEST: NUMBER OF BLOWS (Hammer 65 kg, 75 cm)	STANDARD PENETRATION TEST: GRAPH OF N N/FOOT	RECOVERY %	PERMEABILITY: DEPTH in meter	PERMEABILITY: GRAVITY K (cm/s 10⁻ⁿ)	PERMEABILITY: PRESSURE Lugeon (L/m.min)
0																	
1					CH	SILTY CLAY,	medium dark grey,	small amount of fine sand, medium to high plastic.	0.50	0.50							
									1.00	0.50	1.18	6/27					
									1.45	0.50							
2	2.08		2.00						2.00	0.25							
3	2.70				ML	SANDY SILT,	brownish grey,	mixture of fines and few fine to coarse grained subangular to subrounded shaped - non plastic	2.70	1.25	2.90	6/25					
	3.30								3.15	2.50							
	3.50								3.50	2.75							
4		4.20	4.20						4.20	1.50							
5	4.70				CL	SILTY CLAY,	grayish black,	few organized matter, low plastic.	4.70	0.10	4.90	3/25					
	5.50								5.15	0.25							
			5.50						5.60	0.25							
6	6.20				MH	CLAYEY SILT,	medium dark grey,	small amount of fine sand - medium to high plastic	6.20	0.50	6.25	15/30					
									6.65	2.00							
7	7.25		7.00						7.00	1.25							
8					SM	SILTY SAND,	dusky yellow,	mixture of fine to medium grained, small amount of clay - non plastic.	7.70	4.00	7.95	21/30					
									8.15	>4.5							
									8.60	>4.5							
									8.80	>4.5	8.95	40/30					
9	9.40		9.20						9.25	>4.5							
10					SM	SILTY SAND,	dark yellowish brown,	mixture of fine to coarse grained subangular to subrounded shaped	10.00	>4.5	10.15	96/17	N>100				
									10.32	>4.5							
									10.80	>4.5							
11		10.80			ML	SANDY SILT,	dark brown,	mixture of fine to coarse grained subangular to subrounded shaped - non plastic	11.00	>4.5	11.15	115/30	N>100				
									11.45	>4.5							
12		12.04			CL	SANDY CLAY,	dusky yellow,	mixture of fine to medium grained, medium to low plastic	12.00	>4.5	12.10	83/30					
									12.45	>4.5							
13			13.00						13.00	>4.5	13.15	70/30					
					ML	SANDY SILT,	pale brown,	mixture of fine to medium grained - small amount of clay - non plastic.	13.45	>4.5							
14									14.00	>4.5	14.15	73/30					
									14.45	>4.5							
15									15.00	>4.5	15.15	42/30					
									15.45	>4.5							
16									16.00	3.25	16.15	36/30					
									16.45	4.25							
17					SM	SILTY SAND,	brownish gray,	mixture of fine to medium grained - small amount of clay - non plastic.	17.00	2.50	17.15	54/30					
									17.45	3.25							
18									18.00	4.50	18.15	42/30					
									18.45	4.75							
19			19.00						19.00	2.50	19.15	72/30					
					CL	SANDY CLAY,	grayish brown,	mixture of fine to medium grained - non plastic	19.45	1.00							
20			20.00						20.00	2.50							
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	

END OF THIS BORING
CASING DOWN TO -12.00 METERS DEPTH

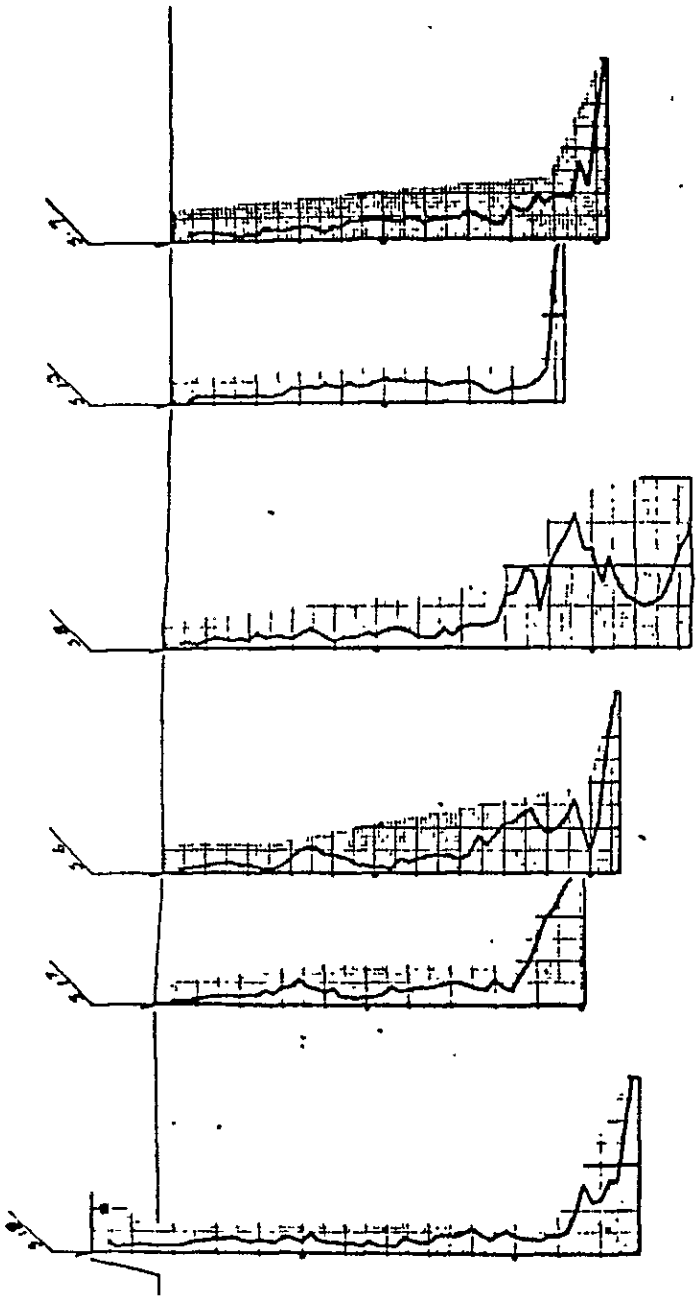
G 004 – 0477 S

PLATE. A.1.

SOUNDING GRAPH LIST (1)

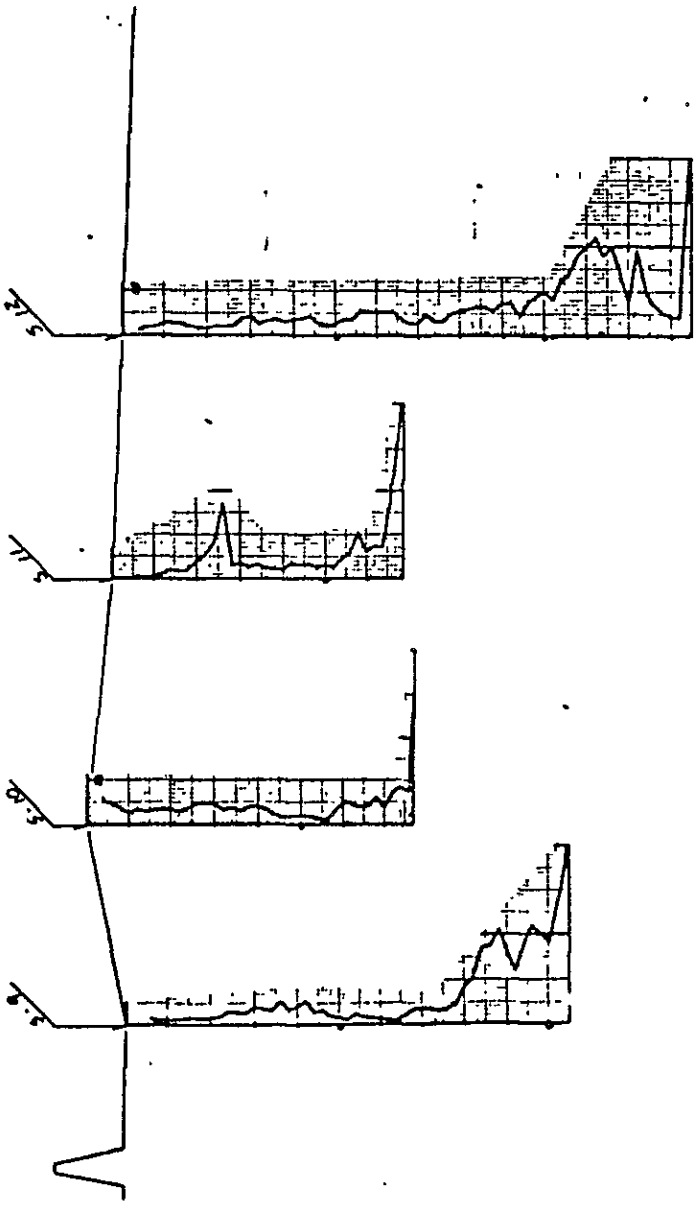


SOUNDING GRAPH LIST (2)



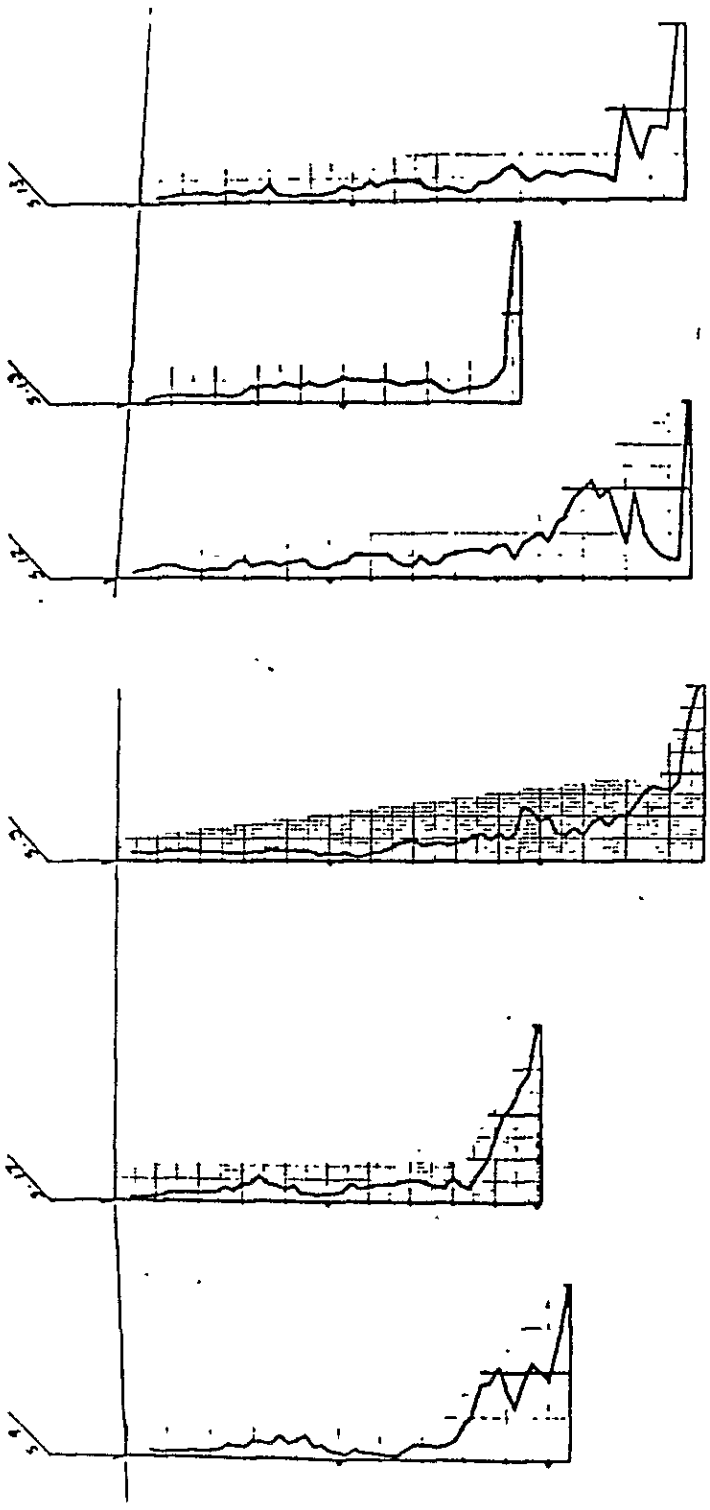
NW - SE SECTION (X) (CENTER)

SOUNDING GRAPH LIST (3)

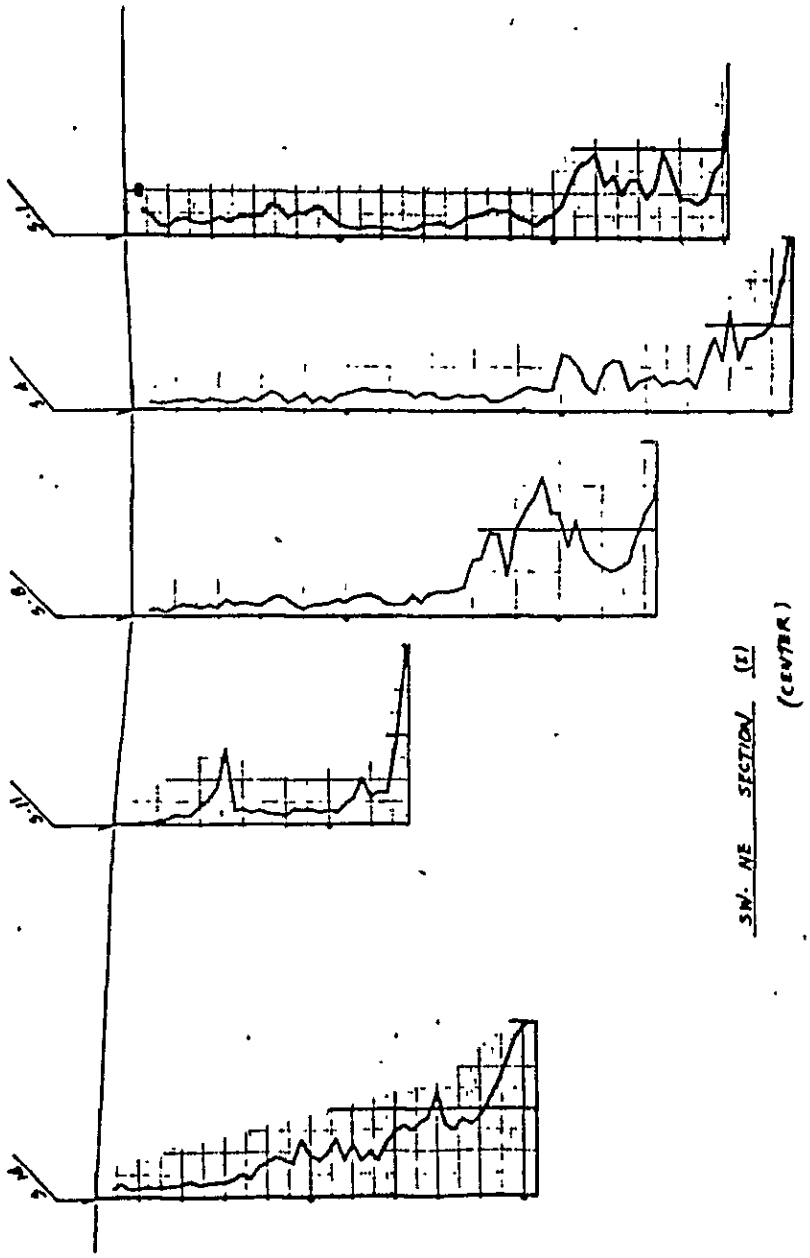


NW-SE SECTION (II)
(SOUTH END)

SOUNDING GRAPH LIST (4)



SOUNDING GRAPH LIST (5)



LABORATORY TEST DATA

PROJECT : LOW COST HOUSING

LOCATION : CENGKARENG.

	Bor/ POINT No.	Depth m	γ_s t/m³	In-Situ test γ_m t/m³	In-Situ test γ_d t/m³	In-Situ test w %	w_L %	w_P %	I_P %	I_L	w_S %	e	n %	Sr %	% finer by weight passing sieve No 200	qu kg/cm²	St %	UU ⊠ CU ⊡ Triaxial C kg/cm²	UU ⊠ CU ⊡ Triaxial ϕ °	Consolidation Cc	Consolidation P_c kg/cm²
1	B.1	2.00 - 2.70	2.65	1.75	1.21	44.5	52.3	29.1	23.2	+0.66	-	1.19	54	99	40	*	-	0.35	10.5	0.33	3.00
2		3.50 - 4.20	2.62	1.63	1.05	54.8	79.1	30.9	48.2	+0.50	-	1.49	60	96	74	0.875	2.2	0.35	11	0.43	2.00
3		5.00 - 5.70	2.60	1.67	1.07	56.2	114.8	44.2	70.6	+0.17	-	1.43	59	100	98	*	-	0.40	10.5	0.30	3.35
4		5.70 - 6.20	2.61	1.61	1.02	58.0	121.5	45.7	75.8	+0.16	-	1.56	61	97	100	*	-	0.15	17	0.39	3.80
5		8.00 - 8.55	2.54	1.37	0.69	100.2	126.5	60.3	66.2	+0.60	-	2.71	73	94	99	*	-	1.60	10	1.62	4.25
6		12.00 -12.60	2.51	1.61	1.04	54.5	108.1	42.9	65.2	+0.18	-	1.41	59	97	86	*	-	0.15	17	0.39	4.25
7	B.2	2.00 - 2.70	2.65	1.75	1.25	39.9	48.3	24.3	24.0	+0.65	-	1.12	53	94	15	*	-	0.26	9	0.33	2.10
8		3.50 - 4.20	2.63	1.57	1.01	55.5	56.7	26.5	30.2	+0.96	-	1.60	62	91	53	1.00	-	0.35	13	0.46	2.20
9		4.20 - 4.70	2.55	1.46	0.78	87.0	117.7	45.5	72.2	+0.57	-	2.27	69	98	97	0.96	1.8	0.30	8	1.18	2.05
10		5.50 - 6.20	2.57	1.73	1.26	38.2	62.4	23.0	39.4	+0.39	-	1.05	51	93	88	0.65	2.3	0.34	4.5	0.48	0.79
11		7.00 - 7.70	2.60	1.43	0.83	72.6	80.2	39.8	40.4	+0.81	-	2.14	68	88	59	0.61	-	0.30	12	0.49	3.00
12		8.50 - 8.80	2.61	1.52	0.83	82.9	108.6	50.7	51.9	+0.56	-	2.14	68	100	92	*	-	0.40	8	0.30	6.10

Note : * SAMPLE NOT ENOUGH TO BE TESTED

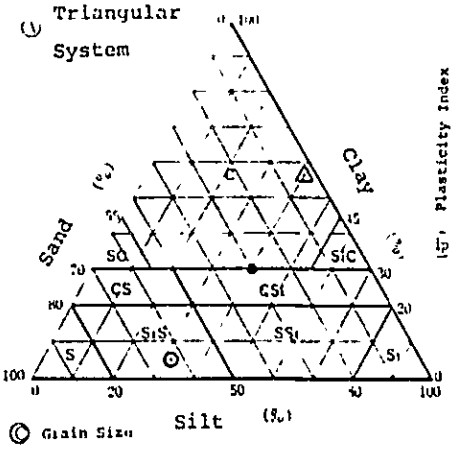
SOIL CLASSIFICATION (2)

Location CENGKARENG SITE Testing Date

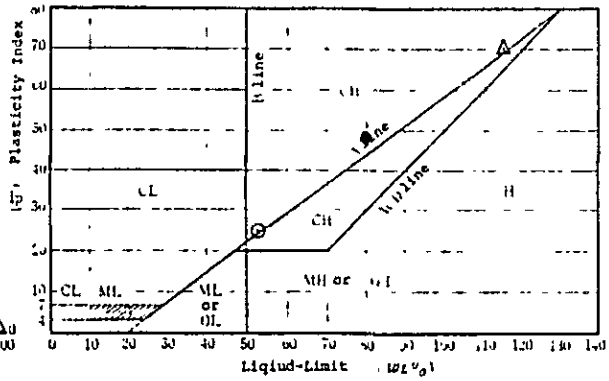
Point No B1 Tester

	Test No	Depth of Collection (m)	Specific Gravity	Field Moist Content (%)	Consistency wL %	wP %	Ip %	wn %	Gen. Classification	Classification by Triangular System
○	①	2.00~2.70	2.65	44.5	42.3	29.1	23.2		SC	Sic S
●	②	4.00~4.62	2.62	34.8	79.1	30.9	48.2		CH	Sic
△	③	5.00~5.70	2.60	56.2	110.8	44.2	70.6		CH	C

① Triangular System

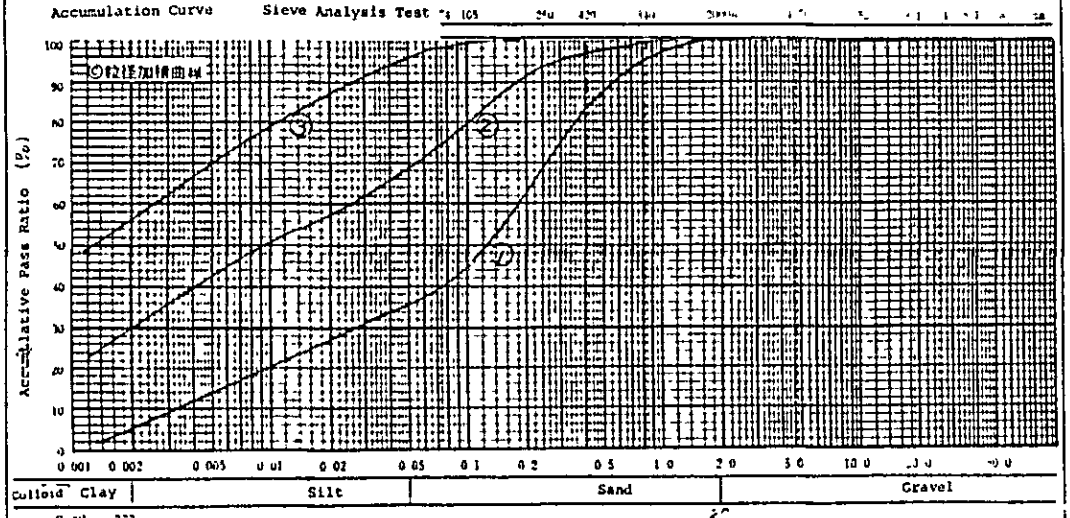


② Plasticity Chart



③ Grain Size

Accumulation Curve Sieve Analysis Test



Sample No.	Depth of Collection (m)	4.76mm Sieve Ratio (%)	74μ Sieve Ratio (%)	5μ Sieve Ratio (%)	Gravel %	Sand %	Silt %	Clay %	Max. Diameter mm	60% Dia. mm	30% Dia. mm	10% Dia mm	Uniformity Coeffi. Uc	Curvature Coeffi Uc'
①		100	32	10	0	68	32	5		0.016		0.003	5.3	
②		100	75	43	0	30	40	30		0.024				
③		100	98	70	0	3	40	57		0.005				

Note. ・Uc = D60 / D10 ・Uc' = (D30)² / D10 × D60

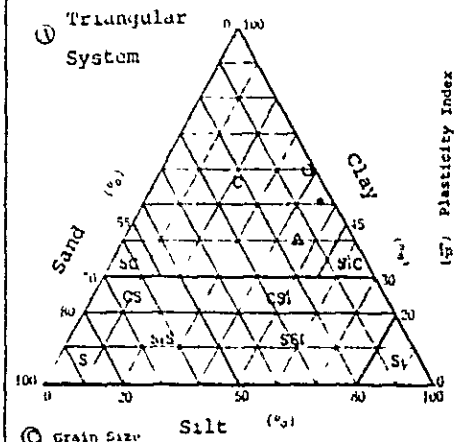
SOIL CLASSIFICATION (b)

Location: CENGKARENG SITE — Testing Date:

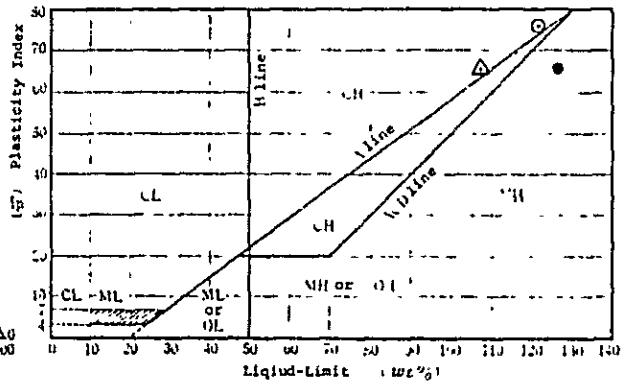
Point No: B 1 — Tester:

	Test No.	Depth of collection (m)	Specific Gravity	Field Moist content (%)	Consistency WL %	Ip %	Ic	Wp %	Cen. Classification	Classification by Triangular System
○	4	5.00 ~ 6.20	2.61	58.0	121.5	45.7	75.8		CH	C
●	5	8.00 ~ 8.51	2.39	100.2	128.5	60.3	66.2		(VH)	C
△	6	12.00 ~ 12.60	2.51	54.5	108.1	46.9	85.2		CH	C

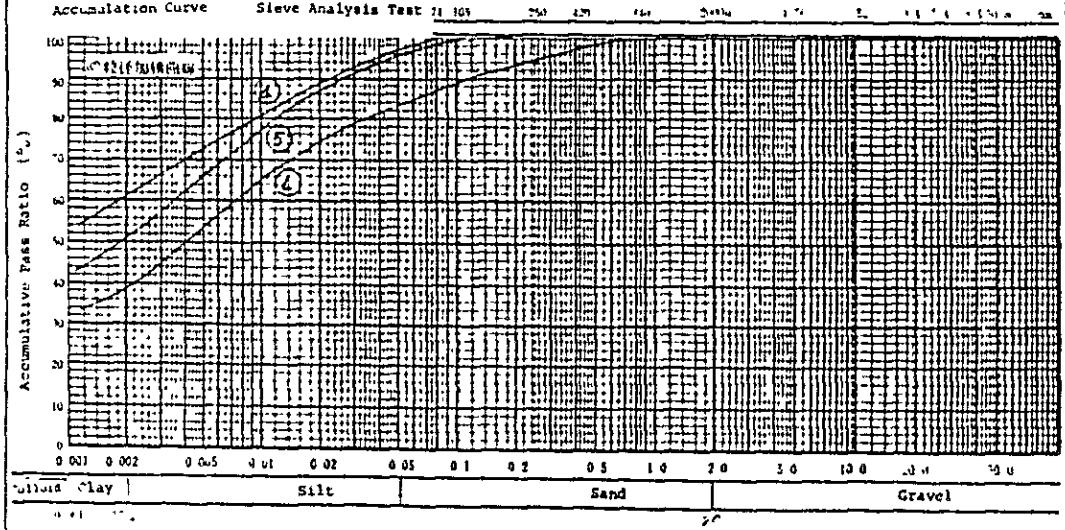
① Triangular System



② Plasticity Chart



③ Grain Size Accumulation Curve — Sieve Analysis Test



Sample No.	Depth of collection (m)	#40 Sieve Ratio (%)	#74 Sieve Ratio (%)	#200 Sieve Ratio (%)	Gravel %	Sand %	Silt %	Clay %	Max. Diameter mm	60% Dia. mm	30% Dia. mm	10% Dia. mm	Uniformity Coeff. Uc	Curvature Coeff. Uc'
4		100	99	73	0	2	38	60		0.002				
5		100	98	66	0	3	46	51		0.0035				
6		100	86	54	0	15	45	40		0.0075				

Note: $U_c = D_{60}/D_{10}$ $U'_c = (D_{30})^2/D_{60} D_{10}$

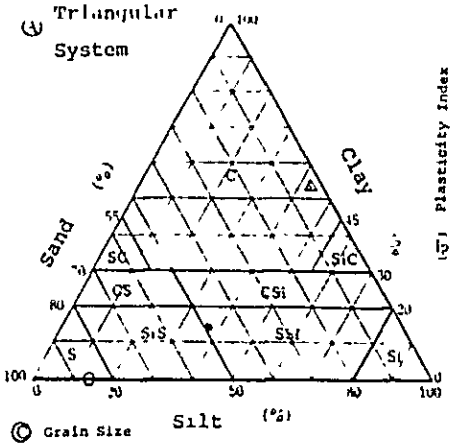
SOIL CLASSIFICATION (C)

Location CENGKARENG SITE Testing Date

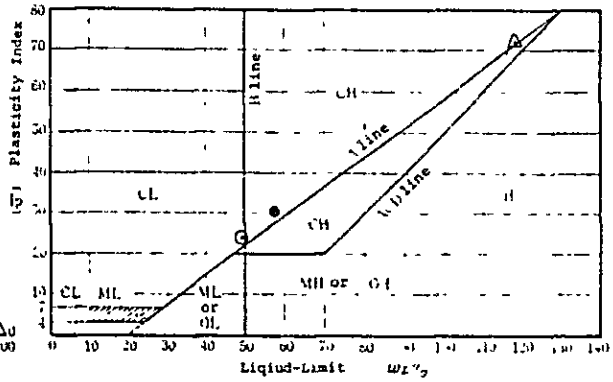
Point No B 2 Tester

	Test No	Depth of Collection (m)	Specific Gravity	Field Moist Content (%)	Consistency w_L %	w_P %	I_P %	w_s	Gen. Classification	Classification by Triangular System
○	(7)	2.00 ~ 2.70	2.65	39.9	48.3	24.3	24.0		SC	
■	(8)	3.30 ~ 4.20	2.63	35.3	36.7	28.5	30.2		CH	SSc
△	(9)	4.20 ~ 4.70	2.55	87.0	117.7	45.5	72.2		CH	C

(A) Triangular System

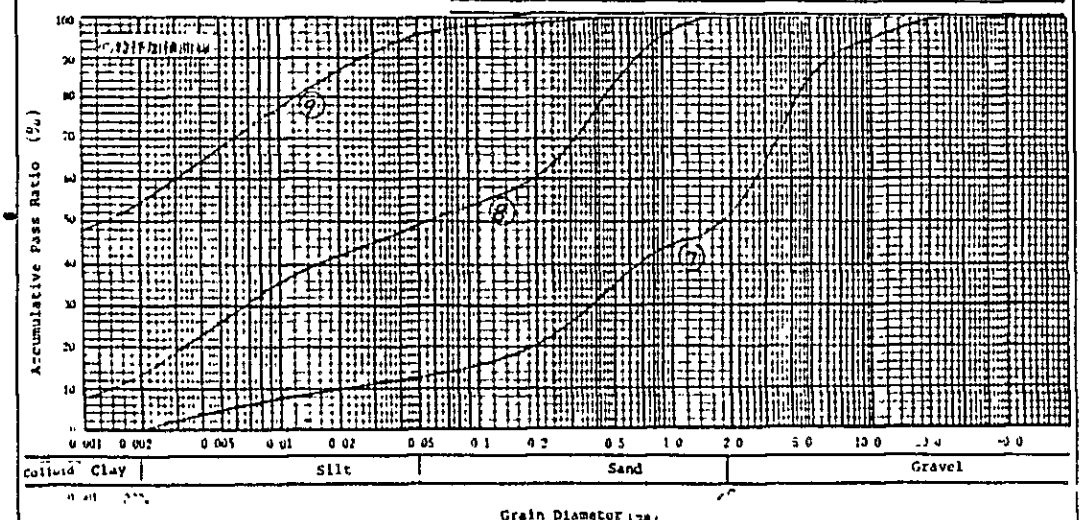


(B) Plasticity Chart



(C) Grain Size

Accumulation Curve Sieve Analysis Test



Sample No.	Depth of Collection (m)	#200 Sieve Ratio (%)	#100 Sieve Ratio (%)	#50 Sieve Ratio (%)	Gravel %	Sand %	Silt %	Clay %	Max. Dia mm	60% Dia mm	30% Dia mm	10% Dia mm	Uniformity Coeff. U_c	Curvature Coeff. U'_c
(7)		85	14	5	48	38	14	0		2.80		0.017	164.7	
(8)		100	52	26	0	49	37	14		0.20		0.004	12.9	
(9)		100	97	67	0	4	42	54		0.0031				

Note: D_{60} = 60% Dia D_{30} = 30% Dia D_{10} = 10% Dia

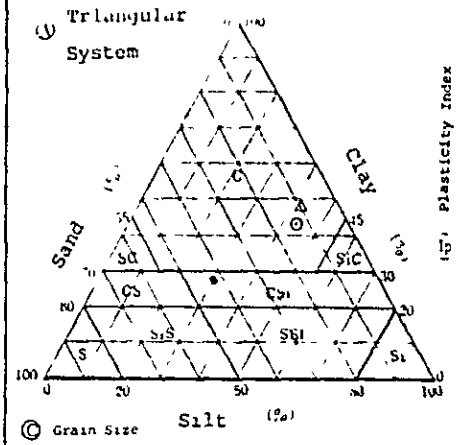
SOIL CLASSIFICATION (d)

Location: CENGKARENG SITE — Testing Date:

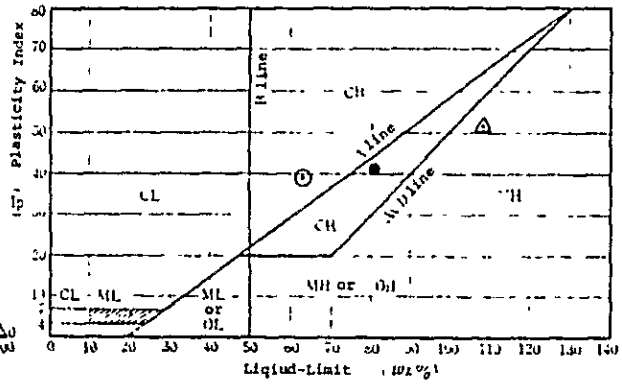
Point No: B 2 — Tester:

	Test No	Depth of Collection (m)	Specific Gravity	Field Moist Content (%)	Consistency wL (%)	wP (%)	Ip	Ic	Gen. Classification	Classification by Triangular System
○		11.1 ~ 2.31	2.57	18.2	42.4	20.0	19.4		CL	C
●		700 ~ 770	2.60	72.6	80.2	39.8	40.4		CH	CSi
△	(12)	830 ~ 880	2.61	82.9	108.6	50.7	57.9		(VH)	C

① Triangular System

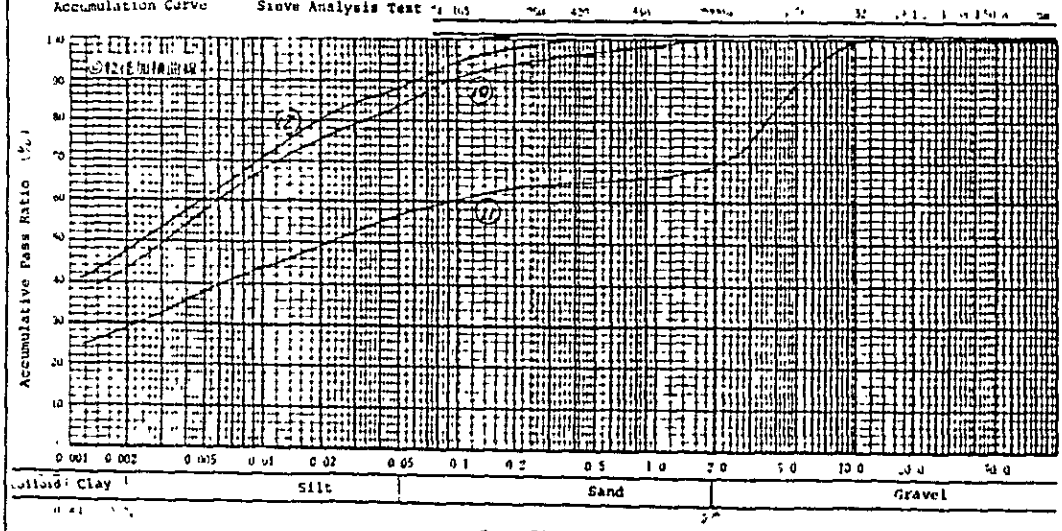


② Plasticity Chart



③ Grain Size

Accumulation Curve — Sieve Analysis Test



Sample No	Depth of Collection (m)	#200 Sieve Ratio (%)	#40 Sieve Ratio (%)	#4 Sieve Ratio (%)	Gravel %	Sand %	Silt %	Clay %	Max. Dia mm	60% Dia. mm	30% Dia. %	10% Dia %	Uniformity Coeffi. Uc	Curvature coeffi Uc
(10)		100	88	57	0	14	43	43		.0058				
(11)		89	59	38	31	11	30	28		.01				
(12)		100	92	60	0	10	42	48		.0049				

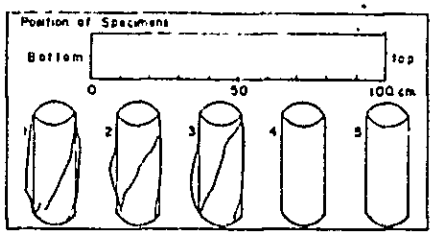
Note: 1. $C_u = D_{60}/D_{10}$ 2. $C_c = (D_{30})^2/D_{60} \times D_{10}$

TRIAXIAL COMPRESSION TEST

PROJECT: LOW COST HOUSING
LOCATION: CIKOKARENG
SAMPLE NO: B.1
DEPTH IN METER: (2.00 - 2.70
DESCRIPTION OF SOIL: CLAYEY SILT,brown coloured
REMARKS:

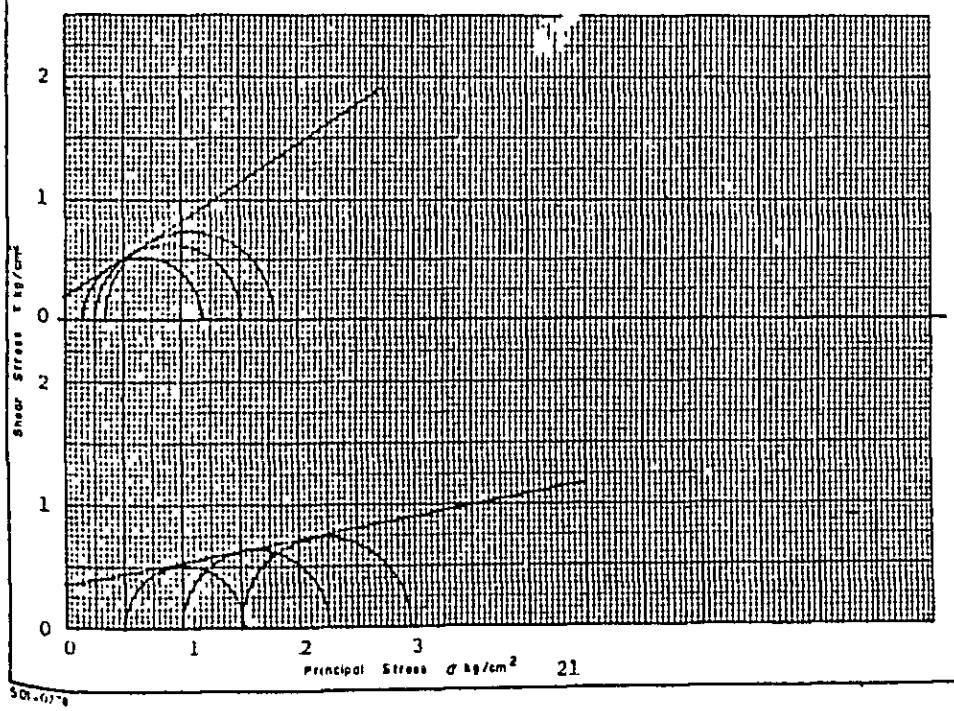
JOB NO:
DATE: Nov.9,1979
RECORDED BY:
CHECKED BY:
TESTING METHOD: (UU) (CD) (CD)

Soil Specimen No		1	2	3	4	5
Bulk Density	γ_m g/cm³	1.63	1.63	1.64		
Initial Moist Content	w_1 %	40.9	41.3	41.0		
Final Moist Content	w_2 %					
Dry Density	γ_d g/cm³	1.16	1.15	1.16		
Initial Void Ratio	e	1.29	1.30	1.28		
Degree of Saturation	Sr %	84	84	85		
Lateral Pressure	σ_3 kg/cm²	0.50	1.00	1.50		
Deviator Stress	$\sigma_1 - \sigma_3$ kg/cm²	1.036	1.252	1.460		
Volume Change Ratio	%	-	-	-		
Strain	ε %	9.0	10.5	11.0		
Pore Pressure	U kg/cm²	0.35	0.75	1.15		



Specific Gravity of Soil Gs: 2.65

Test	Results	
Cohesion C kg/cm²	$\bar{c}$ =	0.20
	c =	0.35
Angle of Internal Friction ϕ °	$\bar{\phi}$ =	32
	ϕ =	10.5



SOIL-(2)-8

TRIAXIAL COMPRESSION TEST

PROJECT LOW COST HOUSING — JOB NO

LOCATION CENGKARENG — DATE NOV. 6, 1979

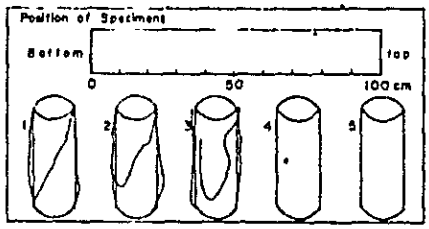
SAMPLE NO 8.2* — RECORDED BY Soe

DEPTH IN METER 2.00 - 2.70 — CHECKED BY

DESCRIPTION OF SOIL CLAYEY SAND, Greenish grey coloured — TESTING METHOD (UU) (CU) (CD)

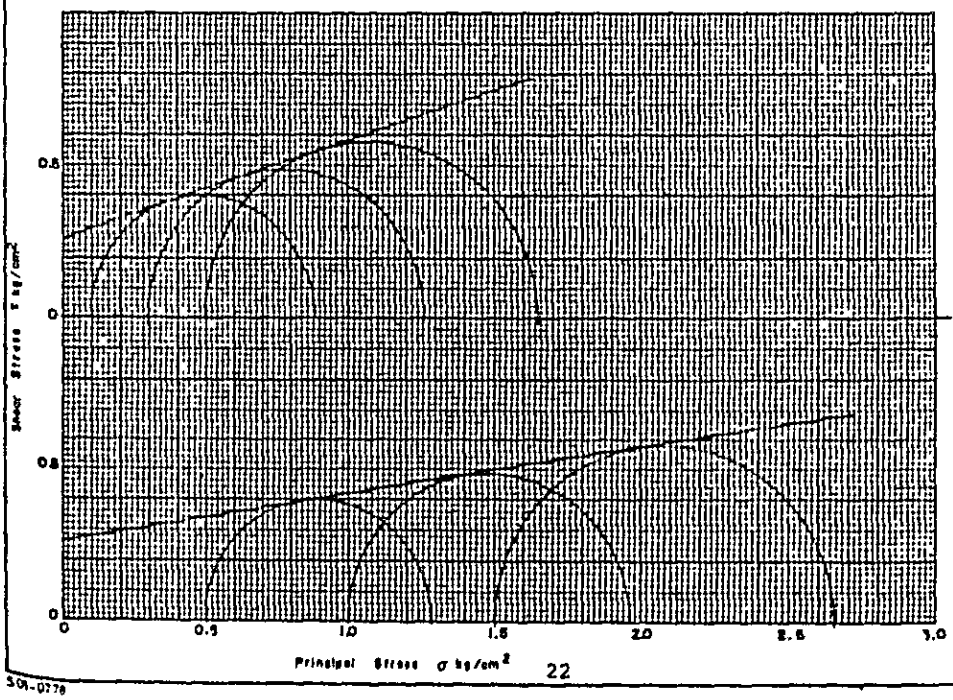
REMARKS

Soil Specimen No		1	2	3	4	5
Bulk Density	γ_m g/cm³	1.83	1.83	1.82		
Initial Moist Content	w_1 %	39.5	39.8	39.8		
Final Moist Content	w_2 %					
Dry Density	γ_d g/cm³	1.31	1.31	1.30		
Initial Void Ratio	e	1.02	1.02	1.04		
Degree of Saturation	Sr %	100	100	100		
Lateral Pressure	σ_3 kg/cm²	0.50	1.00	1.50		
Deviator Stress	$\sigma_1 - \sigma_3$ kg/cm²	0.787	0.981	1.151		
Volume Change Ratio	%	-	-	-		
Strain	ε %	14.0	13.5	12.0		
Pore Pressure	U kg/cm²	0.40	0.70	1.00		



Specific Gravity of Soil G_s = 2.65

Test Results		
Cohesion	C kg/cm²	$\bar{C}$ = 0.26
		C = 0.26
Angle of Internal Friction	ϕ °	$\bar{\phi}$ = 18
		ϕ = 9



SOIL-0278

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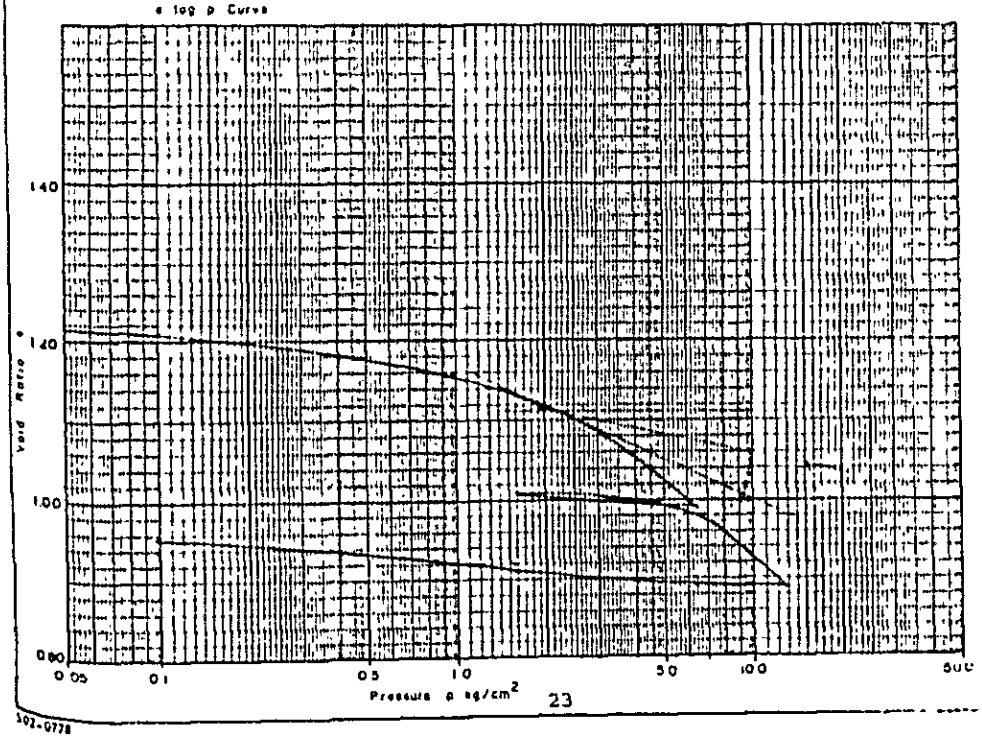
CONSOLIDATION TEST

PROJECT	LOW COST HOUSING	JOB NO	
LOCATION	CENDRARENG	DATE	
BORING / POINT NO	B 1	RECORDED BY	
DEPTH IN METER	2 00 — 2 70	CHECKED BY	
DESCRIPTION OF SOIL	FEW GRAVEL SANDY SILT, greyish brown coloured		
REMARKS			

Water Content w_1 %	Initial	45 1
	Final	40 4
Wet Density γ_m, g/cm³	Initial	1 73
	Final	1 87
Dry Density γ_d, g/cm³	Initial	1 20
	Final	1 33
Specific Gravity of Soil G_s		2 65
Degree of Saturation Sr %	Initial	98 1
	Final	100
Preloading Pc kg/cm²		1 0
Compression Index Cc		0 31

Pressure p kg/cm²	Final Change R cm	Void Ratio e	C_v cm²/sec x 10^{-4}
0 0		1 22	
0 05		1 21	15 67
0 1		1 21	20 79
0 2		1 20	10 78
0 4		1 18	8 62
0 8		1 14	10 44
1 6		1 02	5 26
3 2		1 08	6 33
6 4		0 99	3 31
3 2		1 00	
1 6		1 01	
6 4		0 98	7 94
12 8		0 89	8 39
6 4		0 89	
3 2		0 90	
1 6		0 91	
0 4		0 93	
0 1		0 95	
0 0		0 99	

e log p Curve



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302-0778

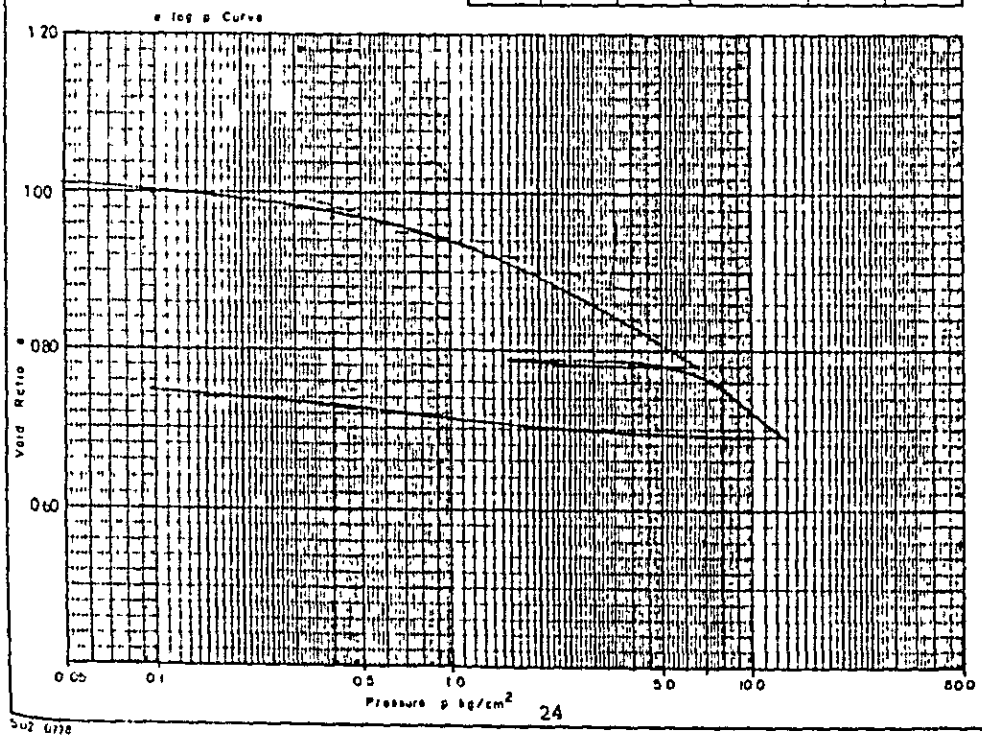
CONSOLIDATION TEST

PROJECT: LOW COST HOUSING
LOCATION: CENGKARENG
BORING / POINT NO: B 2
DEPTH IN METER: 2.00 - 2.70
DESCRIPTION OF SOIL: SANDY SILT greyish brown coloured
REMARKS

JOB NO
DATE: Nov 1 1979
RECORDED BY: Nick
CHECKED BY: AR

Water Content w_n %	Initial	37.2
	Final	32.5
Wet Density γ_m g/cm³	Initial	1.80
	Final	1.98
Dry Density γ_d g/cm³	Initial	1.31
	Final	1.50
Specific Gravity of Soil G_s		2.65
Degree of Saturation S_r %	Initial	96.8
	Final	100
Preloading P_c kg/cm²		2.10
Compression Index C_c		0.33

Pressure p kg/cm²	Final Change R cm	Void Ratio e	C_v cm²/sec x 10⁻⁴
0.00		1.02	
0.05		1.01	6.66
0.1		1.00	9.69
0.2		0.99	24.03
0.4		0.97	7.03
0.8		0.95	8.30
1.6		0.91	5.58
3.2		0.85	5.32
6.4		0.78	3.40
3.2		0.78	
1.6		0.79	
6.4		0.77	5.43
12.8		0.69	3.83
6.4		0.69	
3.2		0.70	
1.6		0.71	
0.4		0.73	
0.1		0.75	
0.0		0.77	



24

· REFERENCE

° ENGINEERING GEOLOGIC MAP OF JAKARTA-BOGOR AREA

scale 1:50,000 (THE GEOLOGICAL SURVEY OF INDONESIA '69)

° PROYEK URBAN DEVELOPMENT STUDY JAKARTA

(CIPTA KARYA '73)

° SOIL INVESTIGATION OF P.L.T.U MUARA KARANG

(P.T.P.P. TAISEI INDONECIA CONSTRUCTION '78)

° SOIL INVESTGATION AT COPPER WIRE PLANT TANGGERANG

(P.T.P.P. TAISEI INDONESIA CONSTRUCTION)

° JAKARTA MASTER PLAN 1965-1985

(JAKARTA DKI '66)

° MASTERPLAN FOR DRAINAGE AND FLOOD CONTROL OF JAKARTA

(NEDECO '73)

° PRELIMINARY STUDIES ON SEWERAGE SYSTEMS WITHIN CENGKARENG PROJECT-SITE

(J.T.B '74)

° DEEP WELL DATA BETWEEN JAKARTA AND TANGGERANG

(THE GEOLOGICAL SURVEY OF INDONESIA)

APPENDIX III
SURFACE SOIL INVESTIGATION DATA
(PHASE II)

P.T. S O I L E N S
Head office : Jalan Tasikmalaya No. 1 Bandung, Phone 71367, 73211, 73831
Liaison office : Jalan Wahid Hasyim No. 42 Jakarta, Phone 352089 323927

Messrs.
P.T. P.P. - TAISEI CONSTRUCTION
Jl. M.H. Thamrin 57
J A K A R T A.
Attn. : Mr. K. Ninomya.

Gentlemen :

We respectfully submit six (6) copies of our report entitled " Soil Investigation for the proposed Low Cost Housing Project at Cengkareng, Tangerang, West - Java ".

The scope of this Soil Investigation was done based on job order from P.T. P.P.-TAISEI CONSTRUCTION No. I/SPK/CE/PPT/80, on July 25, 1980.

This report contains data based on Hand Boring and Laboratory Test Results.

Should there be further questions concerning this report we will be pleased to consult further with your staff.

Yours very truly,

p.t. S O I L E N S

p.t. SOILENS

Ir. Rismantojo.

TABLE OF CONTENT

INDONESIA

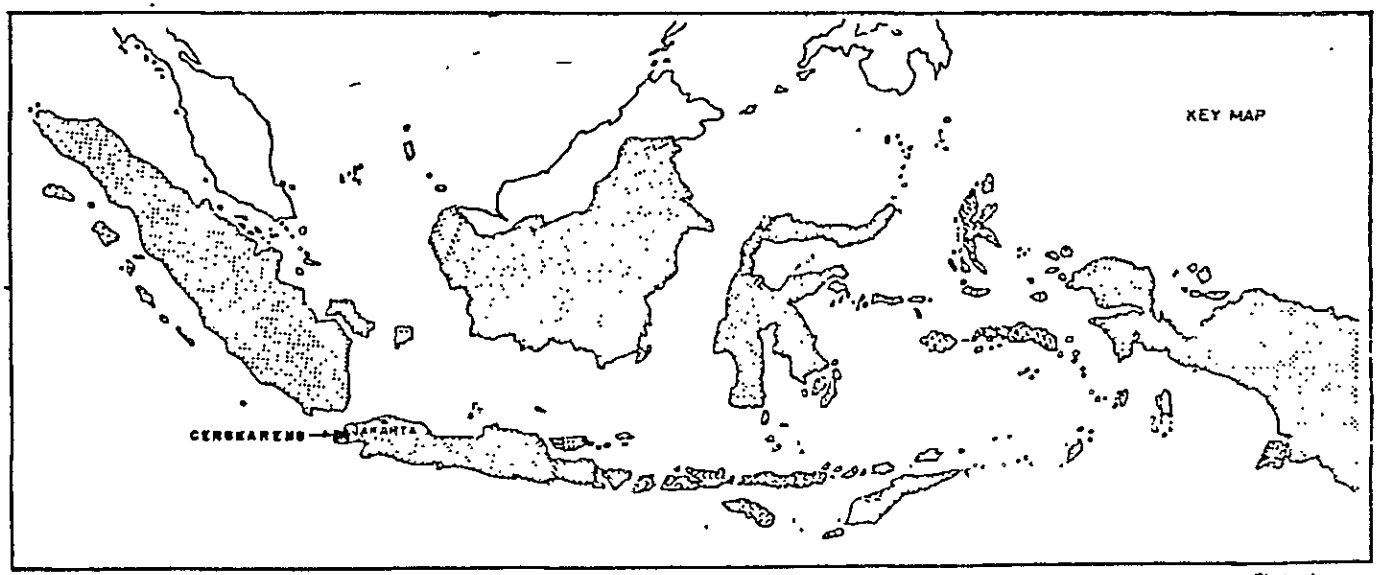


Plate 1

p.t. SOIL ENS

LABORATORY TEST DATA

PROJECT : LOW COST HOUSING

LOCATION : CENGKARENG

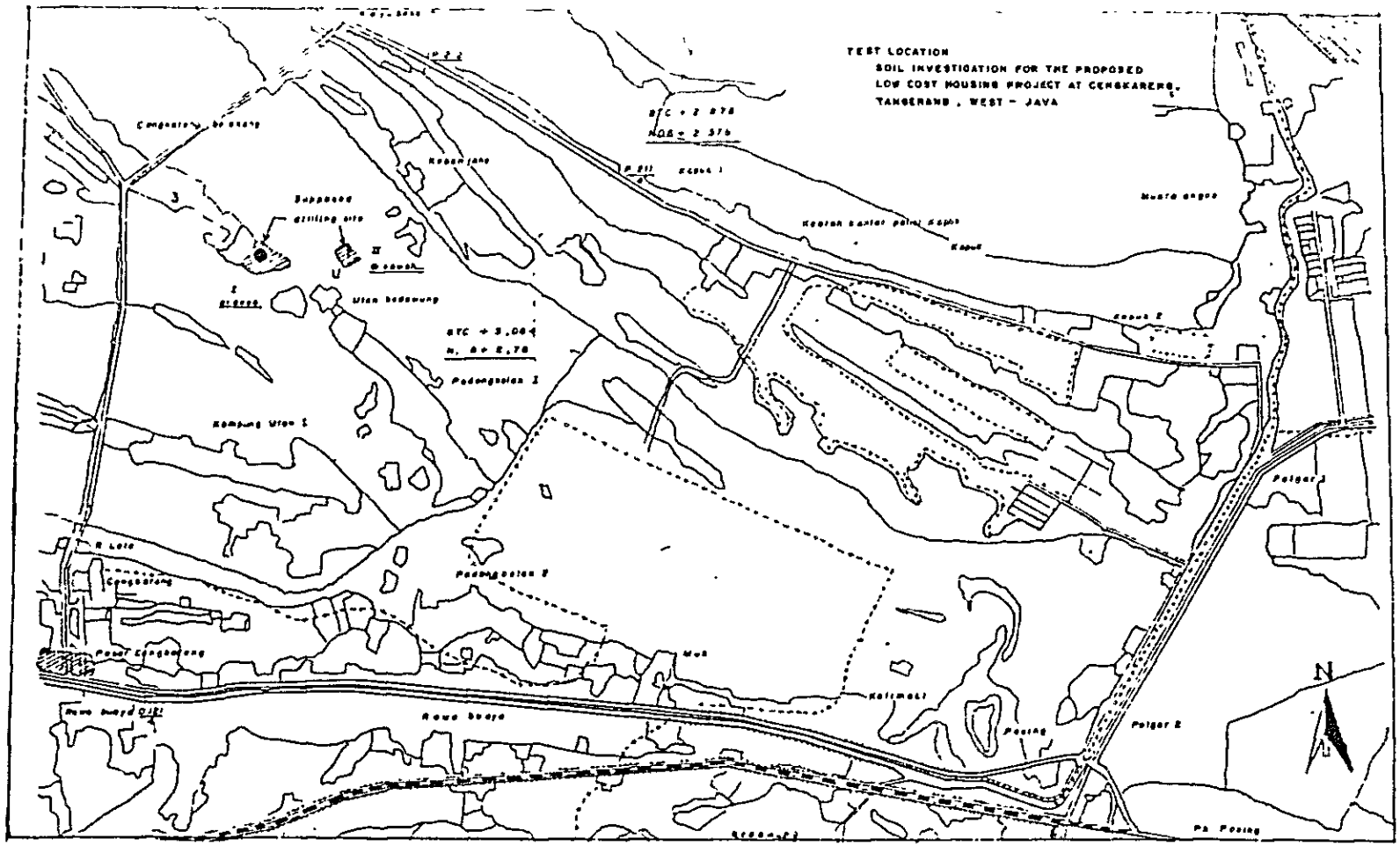
Bor/ POINT No.	Depth m	γ_s t/m³	γ_m t/m³	γ_d t/m³	w %	w_L %	w_P %	I_P %	I_L	w_S %	e	n %	Sr %	% finer by weight passing sieve No 200	qu kg/cm²	St	UU ○○ QQ Triaxial C kg/cm²	UU ○○ QQ Triaxial ϕ °	Consolidation Cc	Consolidation P_c kg/cm²
	Undisturbed																			
B.1	0.00 – 0.70	2.51	1.67	1.07	55.9	121.5	31.4	90.1	+0.27	–	1.34	57	100	95	0.85	1.1	0.10	13	0.43	0.62
	0.70 – 1.20	2.62	1.73	1.24	26.7	108.2	30.6	77.6	-0.05	–	0.92	48	76	86	0.86	1.7	0.40	10	0.37	0.82
	1.20 – 1.90	2.60	1.76	1.24	41.5	55.4	24.3	31.1	+0.55	–	1.09	52	99	69	0.51	1.4	0.25	10	0.24	1.80
	1.90 – 2.60		1.76	1.26	38.9	49.4	26.2	23.2	+0.55	–	–	–	–	31	–	–	–	–	–	–
	S.P.T.																			
B.2	1.00 – 1.45	2.66	–	–	30.2	53.3	29.1	24.2	+0.05	–	–	–	–	43	–	–	–	–	–	–
	2.00 – 2.48	2.68	–	–	37.6	41.2	25.6	15.6	+0.77	–	–	–	–	32	–	–	–	–	–	–
	3.00 – 3.45	2.69	–	–	46.4	48.0	29.5	18.5	+0.91	–	–	–	–	32	–	–	–	–	–	–
	4.00 – 4.48	2.69	–	–	56.5	68.1	31.0	37.1	+0.69	–	–	–	–	83	–	–	–	–	–	–
	5.00 – 5.45	2.53	–	–	59.3	71.2	33.0	38.2	+0.69	–	–	–	–	82	–	–	–	–	–	–
	Mold Sample																			
	(Undisturbed)																			
B.1	0.00 – 0.50	2.50	1.59	1.01	57.7	116.8	32.6	86.2	+0.29	–	1.48	60	97	95	–	–	–	–	–	–
	0.00 – 0.50	2.51	1.54	0.96	58.2	122.6	34.0	88.6	+0.27	–	1.58	61	92	97	–	–	–	–	–	–
	Bulk SAMPLE																			
	Laterite	2.68	–	–	44.5	118.0	43.11	74.89	+0.02	–	–	–	–	99	–	–	–	–	–	–
	Sawah	2.50	–	–	59.7	116.0	31.6	84.4	+0.33	–	–	–	–	96	–	–	–	–	–	–

Note :

TERMS and SYMBOLS

As recommended by the International Society of Soil Mechanics and Foundation Engineering, as adopted in Paris, July, 1961.

γ_m	=	volumetric weight, bulk density
γ_s	=	unit weight of solid particles
γ_d	=	dry density
w_{opt}	=	optimum water content
w_N	=	natural water content
e_o	=	void ratio
n	=	porosity
S_r	=	degree of saturation
w_L	=	liquid limit
w_P	=	plastic limit
I_P	=	plasticity index
w_S	=	shrinkage limit
D_S	=	degree of shrinkage
R_S	=	shrinkage ratio
L_S	=	linear shrinkage
D_{10}	=	effective size
C_u	=	uniformity coefficient
q_u	=	unconfined compressive strength
S_t	=	$\frac{\text{undisturbed } q_u}{\text{remolded } q_u}$ = sensitivity
c	=	apparent cohesion
ø	=	apparent angle of internal friction
$\bar{c}$	=	true or intergranular cohesion
$\bar{\text{ø}}$	=	true or intergranular angle of internal friction
k	=	coefficient of permeability
D_r	=	relative density
E_{tl}	=	unsaturated modulus of elasticity
E_s	=	saturated modulus of elasticity
C_c	=	compression index
c_v	=	coefficient of consolidation


TEST LOCATION
SOIL INVESTIGATION FOR THE PROPOSED
LOW COST HOUSING PROJECT AT CENGKARENG
TANGERANG , WEST - JAVA
Suppposed
drilling site
Padangpasir 1
Padangpasir 2
Kampung Utan 1
Kampung Utan 2
Kampung Cengkareng
Pasar Cengkareng
Rawa buaya
Kalimati
Polgar 1
Polgar 2
Pasing
N

BORING LOG

pt. SOILEH

PROJECT : LOW COST HOUSING

LOCATION :

BORE HOLE NO. : 1

ELEVATION : -0.80 M. BELOW ORIGINAL GROUND LEVEL

DEPTH : 3.00M

BEGUN : JULY 25, 1980

FINISHED : JULY 25, 1980

GROUND WATER LEVEL : -0.55 M. IN DEPTH

BORING METHOD : CORING

SAMPLING METHOD : CORE BARREL Ø 80 mm

FOREMAN

DRILL MASTER : A. UHANG M.

LOGGED BY : A. SOEDARTO

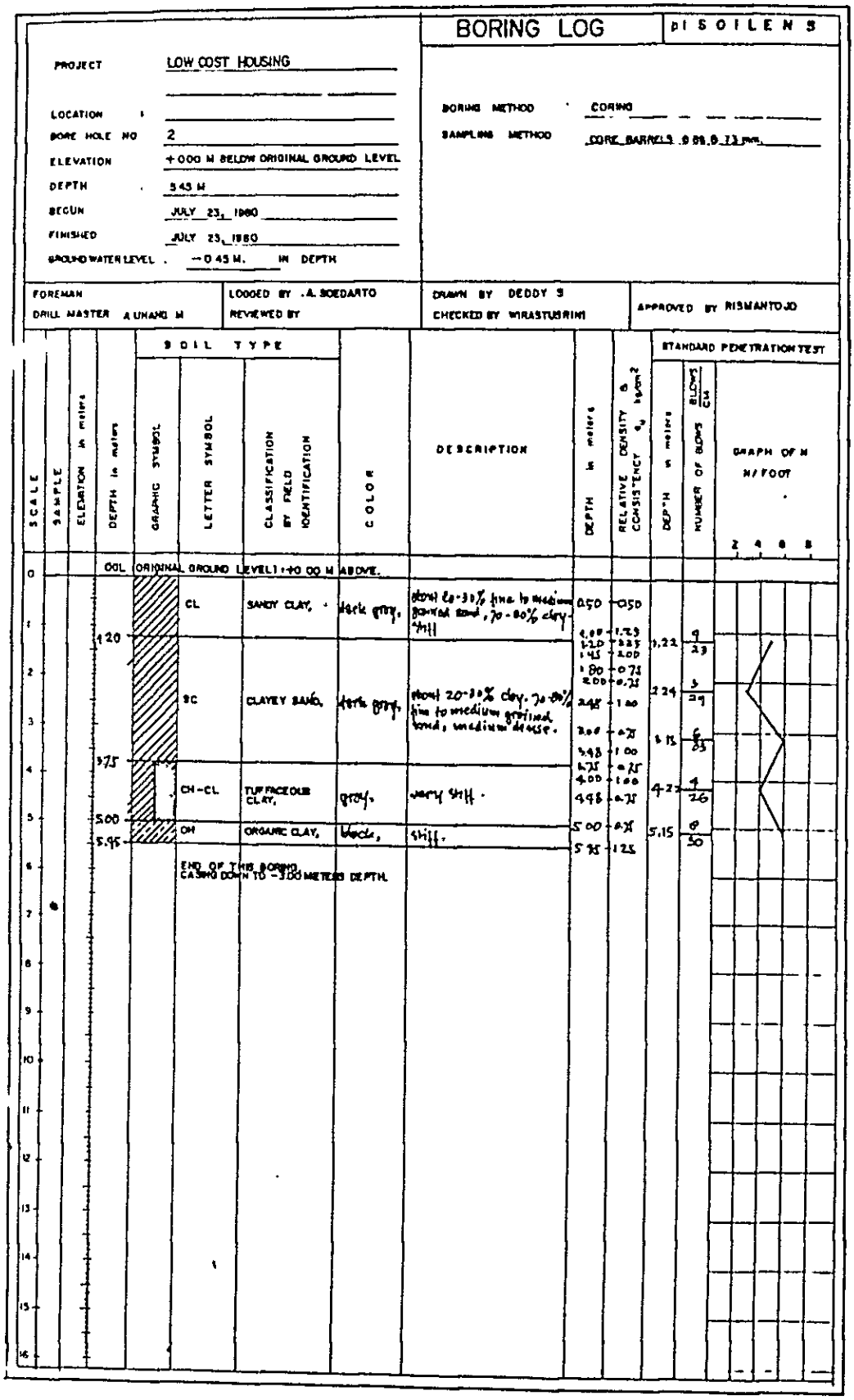
REVIEWED BY:

DRAWN BY : DEDDY S

CHECKED BY : WIRASTUSRINI

APPROVED BY : PRIHARTOJO

SCALE	SAMPLE	ELEVATION in meters	DEPTH in meters	SOIL TYPE: GRAPHIC SYMBOL	SOIL TYPE: LETTER SYMBOL	SOIL TYPE: CLASSIFICATION BY FIELD IDENTIFICATION	COLOR	DESCRIPTION	DEPTH in meters	RELATIVE DENSITY & CONSISTENCY	STANDARD PENETRATION TEST: DEPTH in meters	STANDARD PENETRATION TEST: NUMBER OF BLOWS BLOWS/CM	STANDARD PENETRATION TEST: GRAPH OF N N/FOOT
0								00L (ORIGINAL GROUND LEVEL) / -0.80 M. ABOVE -					
1			1.00		CH	CLAY,	dark grey,	stiff.					
2					CH-CL	TUFFACEOUS CLAY.	yellowish grey,	very stiff to hard - low to medium plasticity sand at the lower part - trace organic.					
3			3.00			END OF THIS BORING CASING DOWN TO -2.00 METERS DEPTH.							
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													


BORING LOG
DISOILENS
PROJECT LOW COST HOUSING
LOCATION
BORE HOLE NO 2
ELEVATION +000 M BELOW ORIGINAL GROUND LEVEL
DEPTH 5.45 M
BEGUN JULY 23, 1980
FINISHED JULY 23, 1980
GROUND WATER LEVEL -0.45 M. IN DEPTH
BORING METHOD CORING
SAMPLING METHOD CORE BARRELS Ø 86.8 73 mm.
FOREMAN
DRILL MASTER AUHANG M
LOGGED BY A. SOEDARTO
REVIEWED BY
DRAWN BY DEDDY S
CHECKED BY WIRASTUSIRIM
APPROVED BY RISMANTOJO
SOIL TYPE
SCALE
SAMPLE
ELEVATION in meters
DEPTH in meters
GRAPHIC SYMBOL
LETTER SYMBOL
CLASSIFICATION BY FIELD IDENTIFICATION
COLOR
DESCRIPTION
DEPTH in meters
RELATIVE DENSITY & CONSISTENCY
STANDARD PENETRATION TEST
DEPTH in meters
NUMBER OF BLOWS / CM
GRAPH OF N N / FOOT
0.00 ORIGINAL GROUND LEVEL 1.00 M ABOVE.
1.20
3.75
5.00
5.95
CL SANDY CLAY, dark grey, stiff
SC CLAYEY SAND, dark grey, stiff
CH-CL TUFFACEOUS CLAY, grey, very stiff
OH ORGANIC CLAY, black, stiff
END OF THIS BORING
CASING DOWN TO -3.00 METERS DEPTH.

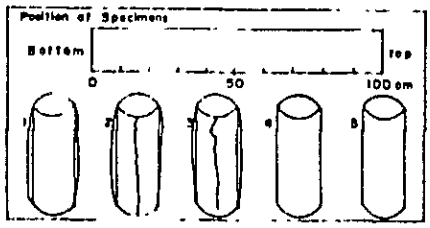
P T S O I L E N S

TRIAXIAL COMPRESSION TEST

PROJECT	LOW COST HOUSING CENGKARENG	JOB NO	
LOCATION		DATE	July.29,1980
SAMPLE NO	B 1	RECORDED BY	III.
DEPTH IN METER	0.00 - 0.70	CHECKED BY	DAS.
DESCRIPTION OF SOIL	SILTY CLAY, grey coloured	TESTING METHOD	(UU)

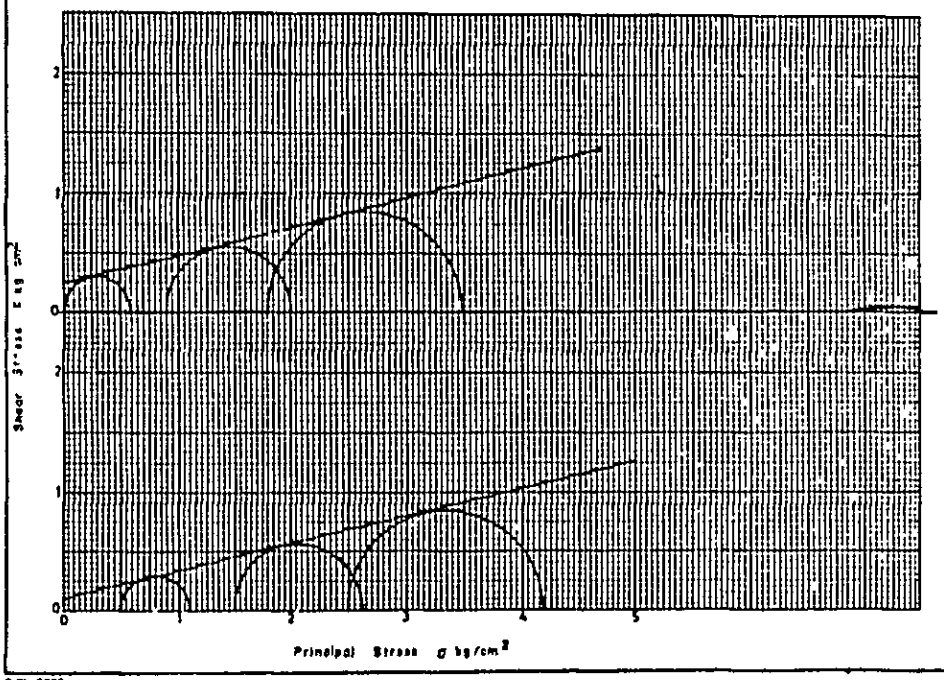
REMARKS

Soil Specimen No		1	2	3	4	5
Bulk Density	γ_m g/cm³	1.71	1.69	1.72		
Initial Moist Content	w_1 %	53.2	50.3	52.4		
Final Moist Content	w_2 %					
Dry Density	γ_d g/cm³	1.11	1.13	1.13		
Initial Void Ratio	e	1.25	1.23	1.22		
Degree of Saturation	Sr %	100	100	100		
Lateral Pressure	σ_3 kg/cm²	0.50	1.50	2.50		
Deviator Stress	$\sigma_1 - \sigma_3$ kg/cm²	0.592	1.117	1.677		
Volume Change Ratio	%	-	-	-		
Strain	ε %	13.0	13.5	13.5		
Pore Pressure	u kg/cm²	0.50	0.60	0.70		



Specific Gravity of Soil Gs: 2.51

Test		Results	
Cohesion	C kg/cm²	c	0.10
Angle of Internal Friction	ϕ°	ϕ	13.5
		ϕ	13



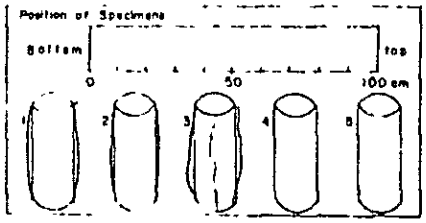
P T S O I L E N S

TRIAXIAL COMPRESSION TEST

PROJECT	LOW COST HOUSING CILINGKARING	JOB NO	
LOCATION		DATE	July.27,1980
SAMPLE NO	B.1	RECORDED BY	Iff.
DEPTH IN METER	0.70 - 1.20	CHECKED BY	BAS.
DESCRIPTION OF SOIL	SILTY CLAY, grey coloured .	TESTING METHOD	(UU)

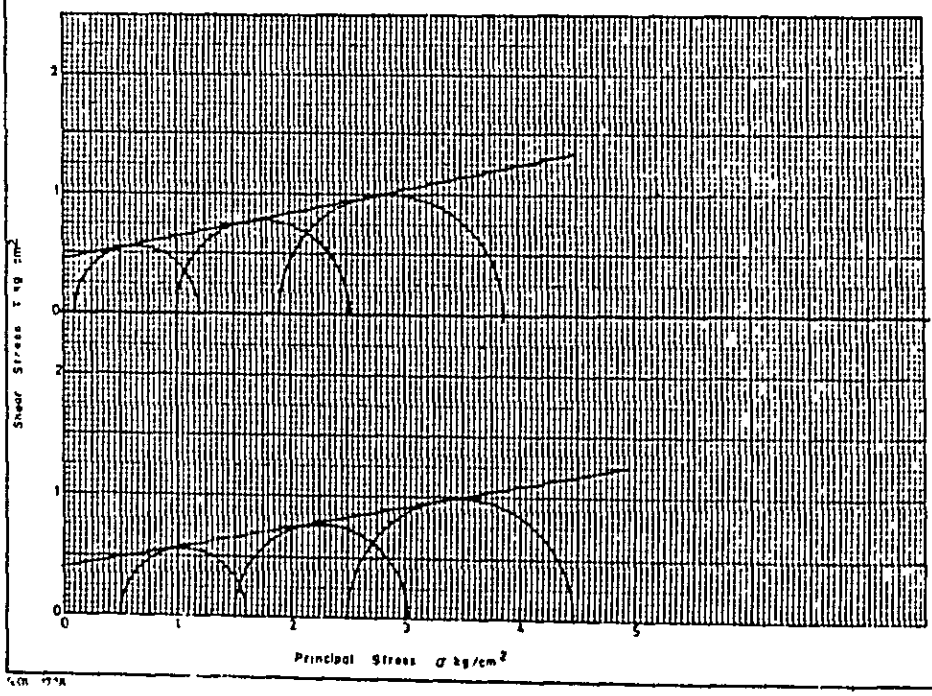
REMARKS

Soil Specimen No		1	2	3	4	5
Bulk Density	γ_m g/cm³	1.69	1.71	1.70		
Initial Moist Content	w_1 %	47.1	45.0	45.9		
Final Moist Content	w_2 %					
Dry Density	γ_d g/cm³	1.15	1.18	1.16		
Initial Void Ratio	e	1.28	1.22	1.25		
Degree of Saturation	Sr %	96	97	96		
Lateral Pressure	σ_3 kg/cm²	0.50	1.50	2.50		
Deviator Stress	$\sigma_1 - \sigma_3$ kg/cm²	1.098	1.524	1.958		
Volume Change Ratio	%	-	-	-		
Strain	ε %	14.5	14.0	14.5		
Pore Pressure	U kg/cm²	0.40	0.50	0.60		



Specific Gravity of Soil G_s

Test		Results
Cohesion	C kg/cm²	C = 0.45
		τ = 0.40
Angle of Internal Friction	ϕ °	ϕ_1 = 11
		ϕ = 10



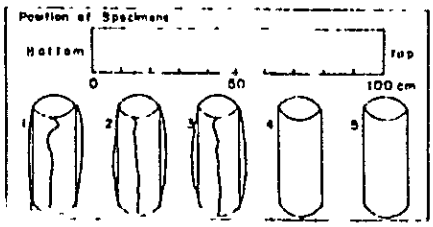
P T S O I L E N S

TRIAXIAL COMPRESSION TEST

PROJECT: LOW COST HOUSING CENGKARENG
LOCATION:
SAMPLE NO: B.1
DEPTH IN METER: 1.20 - 1.90
DESCRIPTION OF SOIL: LINE SAND CLAY, dark grey coloured
REMARKS:

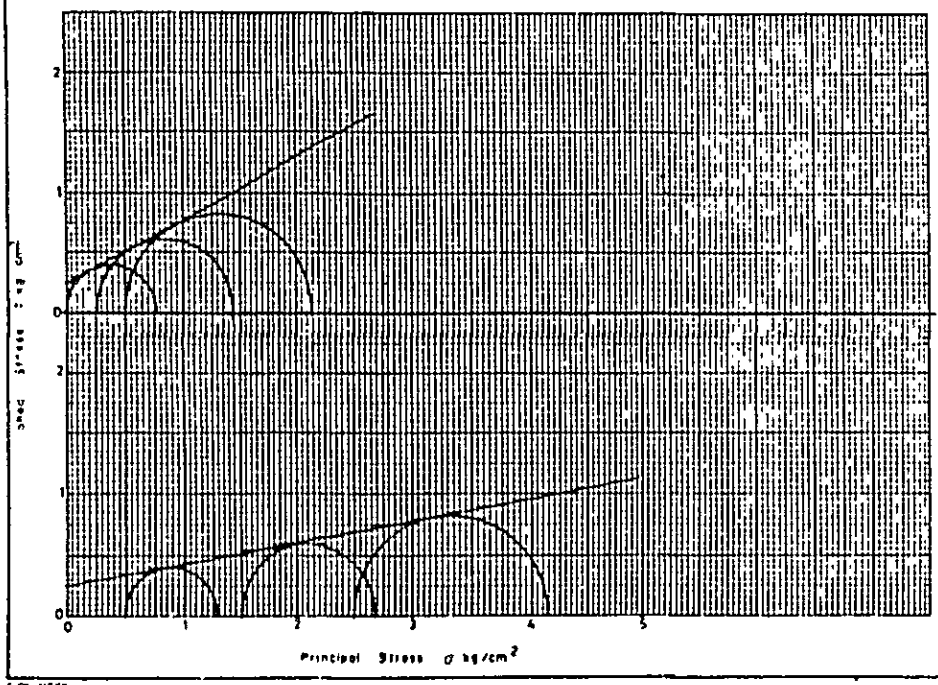
JOB NO:
DATE: July.29,1980
RECORDED BY: Iff
CHECKED BY: DAS.
TESTING METHOD: (uu)

Soil Specimen No			1	2	3	4	5
Bulk Density	γ_m	g/cm³	1.75	1.77	1.78		
Initial Moist Content	w_1	%	20.8	24.2	22.4		
Final Moist Content	w_2	%					
Dry Density	γ_d	g/cm³	1.45	1.42	1.46		
Initial Void Ratio	e		0.79	0.82	0.79		
Degree of Saturation	Sr	%	68	77	74		
Lateral Pressure	σ_3	kg/cm²	0.50	1.50	2.50		
Deviator Stress	$\sigma_1 - \sigma_3$	kg/cm²	0.781	1.196	1.632		
Volume Change Ratio		%	-	-	-		
Strain	ε	%	14.5	14.0	13.5		
Pore Pressure	U	kg/cm²	0.50	1.25	2.00		



Specific Gravity of Soil G_s : 2.60

Test		Results	
Cohesion	c kg/cm²	$\bar{c}$	0.25
		c	0.25
Angle of Internal Friction	ϕ	$\bar{\phi}$	28
		ϕ	10



UNCONFINED COMPRESSION TEST

PROJECT LOW COST HOUSING CEMBARENG

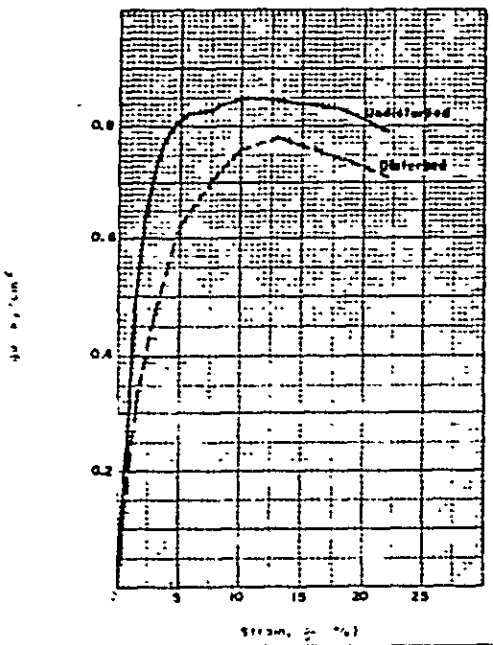
LOCATION

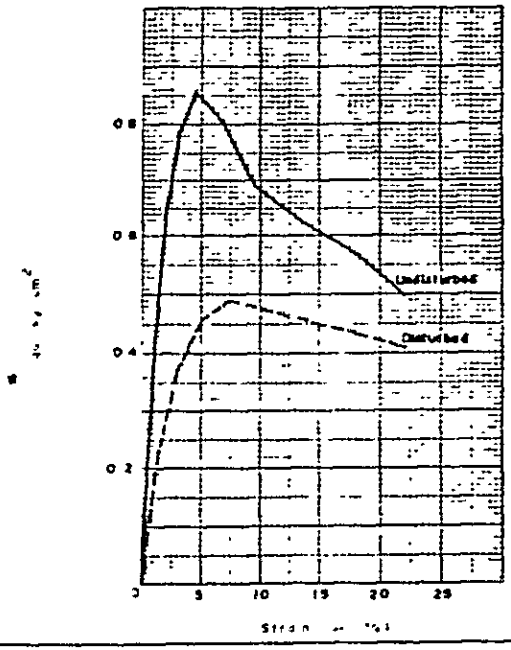
POINT NO	B.1	B.1	B.1
SAMPLE NO			
DEPTH IN M	0.00 - 0.70	0.70 - 1.20	1.20 - 1.80
DESCRIPTION	SILTY CLAY, yellowish light grey coloured	SILTY CLAY, brownish light grey coloured	FINE SAND CLAY, brown coloured

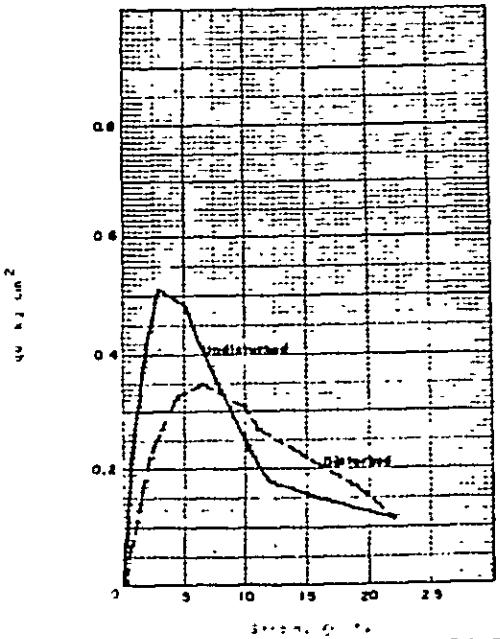
w %	γ_m g/cm³	γ_d g/cm³	q_u kg/cm²	ε %	Sr
51.3	1.71	1.13	0.855	10.5	1.095

w %	γ_m g/cm³	γ_d g/cm³	q_u kg/cm²	ε %	Sr
45.2	1.69	1.16	0.806	4.5	1.747

w %	γ_m g/cm³	γ_d g/cm³	q_u kg/cm²	ε %	Sr
23.7	1.79	1.45	0.511	3.5	1.444







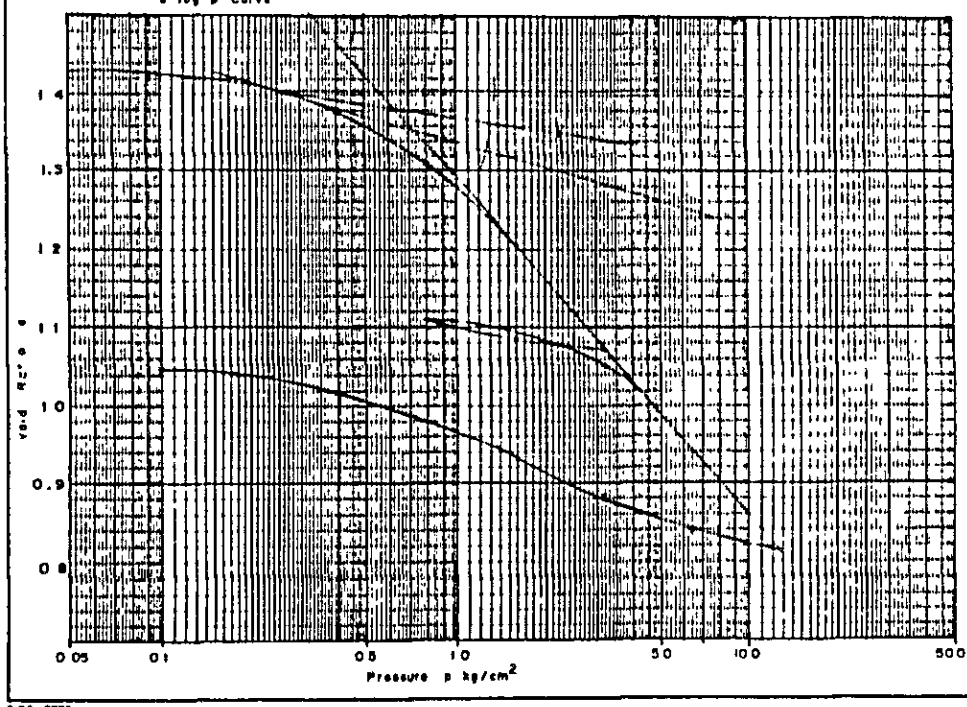
CONSOLIDATION TEST

PROJECT	LOW COST HOUSING	JOB NO	
LOCATION	GENGKARENG	DATE	JULY 31,1980
BORING / POINT NO	B 1	RECORDED BY	SHR
DEPTH IN METER	0.00 – 0.70	CHECKED BY	
DESCRIPTION OF SOIL	silty clay, grey colowed		
REMARKS			

Water Content w, %	Initial	67.6
	Final	47.7
Wet Density γ_m, g/cm^3	Initial	1.62
	Final	1.91
Dry Density γ_d, g/cm^3	Initial	1.03
	Final	1.81
Specific Gravity of Soil G_s		2.51
Degree of Saturation S_r %	Initial	100
	Final	100
Preloading Pc kg/cm^2		0.62
Compression Index Cc		0.45

Pressure p kg/cm^2	Final Change R cm	Void Ratio e	C_v cm^2/sec x 10^{-4}
0.00		1.436	
0.05		1.431	9.81
0.1		1.428	15.60
0.2		1.412	8.05
0.4		1.377	4.35
0.8		1.307	3.88
1.6		1.202	2.10
3.2		1.072	1.01
1.6		1.086	
0.8		1.117	
3.2		1.051	2.69
6.4		0.940	0.53
12.8		0.815	0.56
6.4		0.836	
3.2		0.884	
1.6		0.929	
0.4		1.015	
0.1		1.047	
0.00		1.075	

e log p Curve



502-0778

CONSOLIDATION TEST

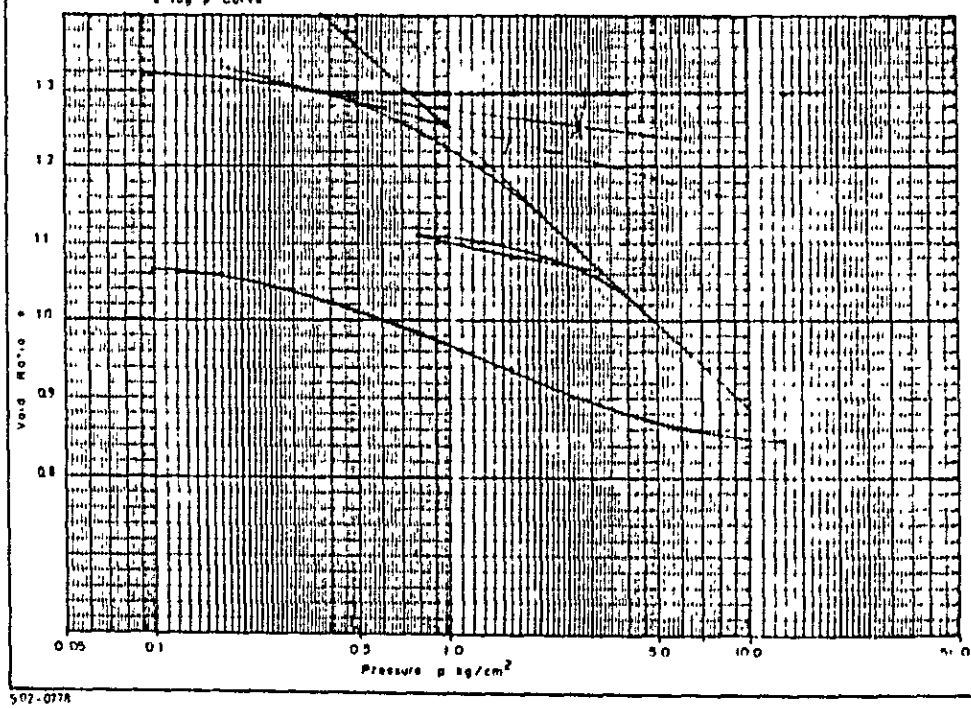
PROJECT : LOW COST HOUSING CENGKARENG
LOCATION :
BORING / POINT NO : B 1
DEPTH IN METER : 0.70 - 1.20
DESCRIPTION OF SOIL : SILTY CLAY, grey coloured
REMARKS :

JOB NO :
DATE : JULY 31, 80
RECORDED BY : SHR/SOT
CHECKED BY : DAS

Water Content w_c %	Initial	31 6
	Final	48 2
Wet Density γ_m, g/cm³	Initial	1,70
	Final	1 90
Dry Density γ_d g/cm³	Initial	1 12
	Final	1 25
Specific Gravity of Soil Gs		2 62
Degree of Saturation Sr %	Initial	100
	Final	100
Preloading Pc, kg/cm²		0 82
Compression Index Cc		0 37

Pressure p kg/cm²	Final Change R cm	Void Ratio e	C_v cm²/sec x 10^{-4}
0 00		1 331	
0 05		1 326	17 99
0 1		1 322	15 61
0 2		1.314	15 53
0 4		1 296	23,99
0 8		1 247	4 60
1 6		1 170	3 53
3.2		1 067	0 81
1.6		1 081	
0 8		1 109	
3 2		1 057	3, 98
6 4		0 956	0 97
12.8		0 843	0 80
6 4		0 859	
3 2		0 895	
1.6		0 936	
0,4		1 021	
0 1		1.067	
0 00		1 089	

e log p Curve



502-0778

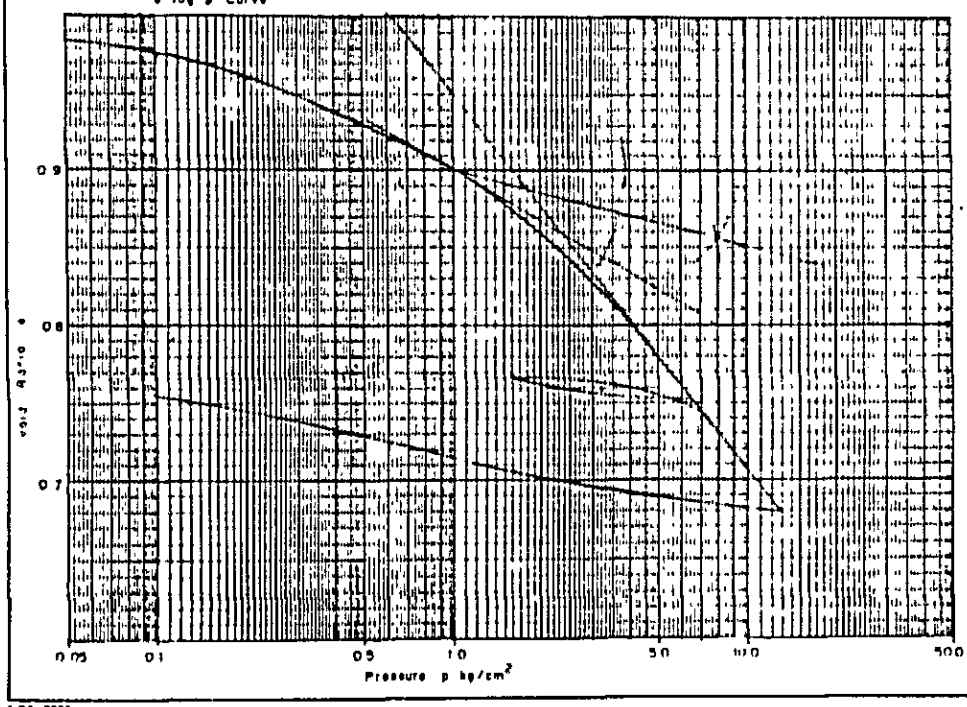
CONSOLIDATION TEST

PROJECT	LOW COST HOUSING	JOB NO	
LOCATION	CENGKARENG	DATE	JULY 31,1980
BORING / POINT NO	B1	RECORDED BY	SHR
DEPTH IN METER	1 20 — 1 90	CHECKED BY	DAS
DESCRIPTION OF SOIL	Fine sand clay, dark grey colowred		
REMARKS			

Water Content w_n %	Initial	38 8
	Final	38.0
Wet Density γ_m g/cm³	Initial	1 80
	Final	2 01
Dry Density γ_d g/cm³	Initial	1. 30
	Final	1 45
Specific Gravity of Soil Gs		2.80
Degree of Saturation Sr %	Initial	100
	Final	100
Preloading Pc kg/cm²		1 8
Compression Index, Cc		0 24

Pressure p kg/cm²	Final Change R cm	Void Ratio e	C_v cm²/sec × 10⁻⁴
0 00		0 994	15 64
0 05		0 985	12 07
0 1		0 976	34 43
0 2		0 960	23 45
0 4		0. 939	19 48
0 8		0 910	24 05
1 6		0 873	21 08
3.2		0 822	19.73
6 4		0. 753	
3 2		0 759	
1 6		0. 767	
6 4		0. 747	12 19
12 8		0 680	15 44
6 4		0 686	
3.2		0 695	
1 6		0 708	
0 4		0 731	
0 1		0 755	
0 00		0. 788	

e log p Curve



SPT 0778

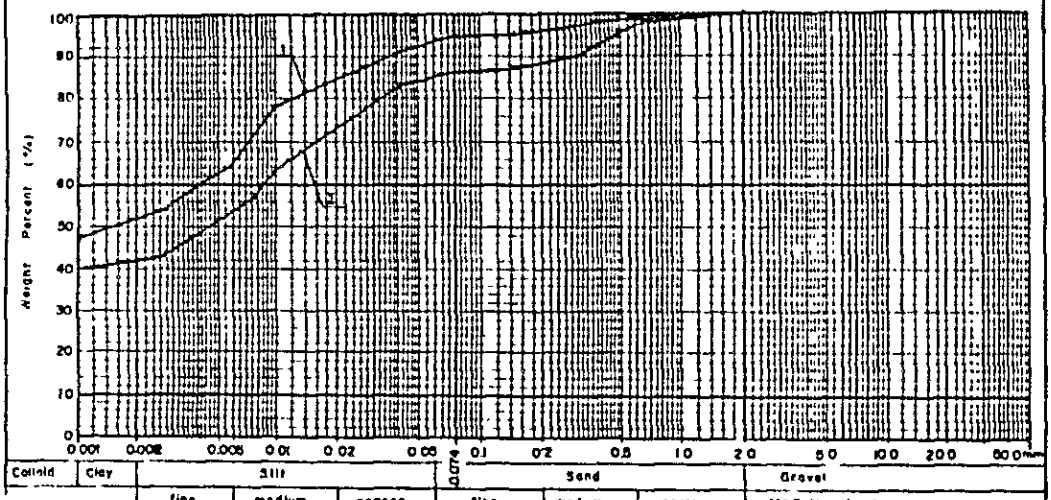
P T SOILENS

GRAIN SIZE ANALYSIS

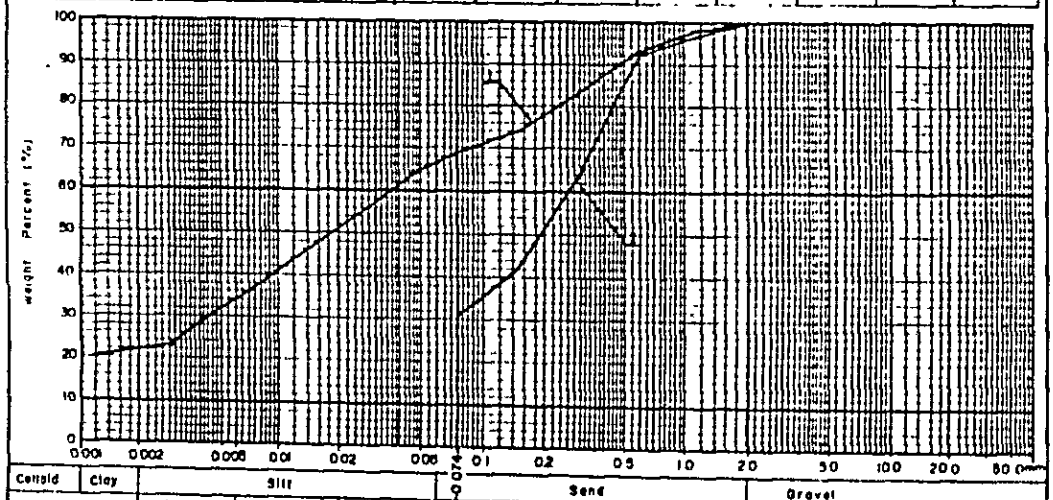
PROJECT LOW COST HOUSING
LOCATION CENGKARENG
BORING/POINT NO B1
REMARKS
Undisturbed sample (T W S)

JOB NO
DATE JULY 28, 1980
RECORDED BY DJI
CHECKED BY DAS

Sample No	Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1	0 00 – 0 70		0	7	41	52	0 0041	–	–	93
2	0 70 – 1 20		0	15	43	42	0 0085	–	–	88
3	–									



Sample No	Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1	1 20 – 1 90		0	34	44	22	0 03 6	–	–	66
2	1 90 – 2 60		0	69	31	31	0 26	–	–	31
3	–									



503-0779

P T S O I L E N S

GRAIN SIZE ANALYSIS

PROJECT LOW COST HOUSING — JOB NO

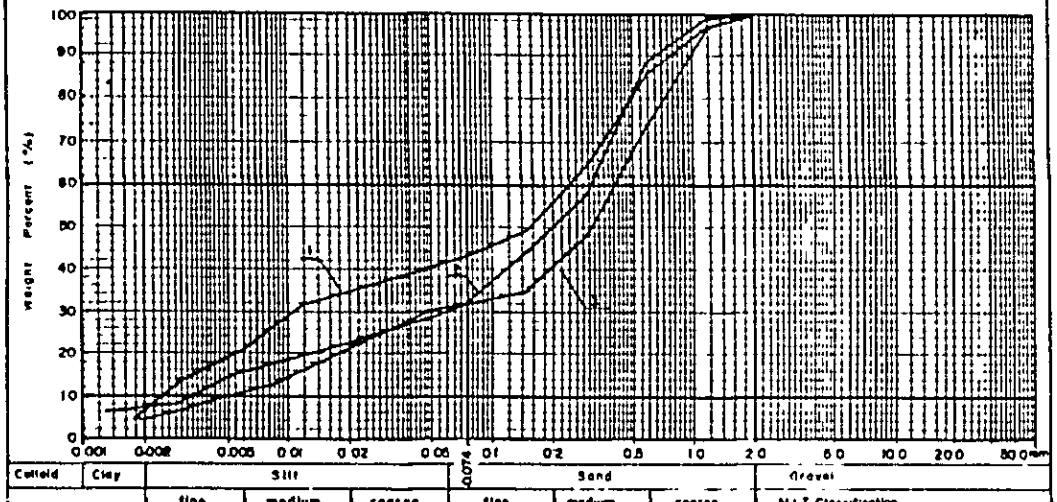
LOCATION CENGKARENG — DATE JULY 28, 1990

BORING/POINT NO B 2 — RECORDED BY DJI

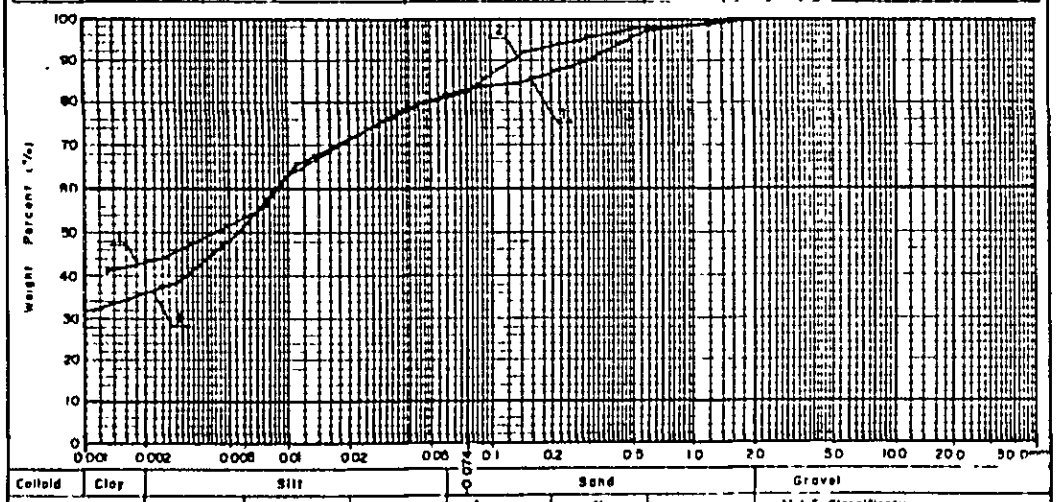
REMARKS — CHECKED BY DAS

Sample From S P T

Sample No	Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1	1 00 – 1 45		0	58	36	6	0 24	0 0024	100	43
2	2 00 – 2 48		0	69	27	4	0 31	0 005	62	32
3	3 00 – 3 45		0	69	24	7	0 40	0 0033	121 2	32



Sample No	Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficien Uc	% finer by weight passing sieve No 200
1	4 00 – 4 48		0	18	39	43	0 0087	–	–	83
2	5 00 – 5 45		0	19	45	56	0 0087	–	–	82
3	–									



503-0778

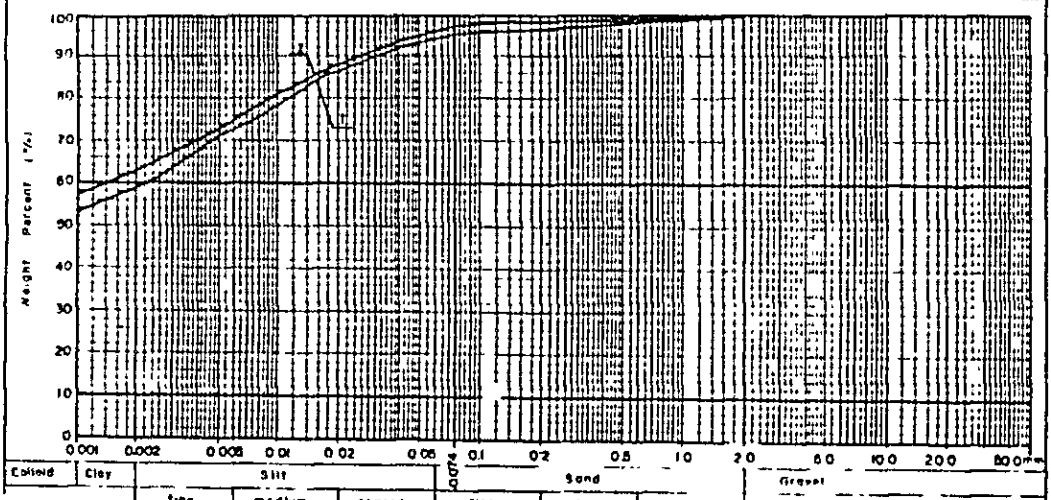
P T SOILENS

GRAIN SIZE ANALYSIS

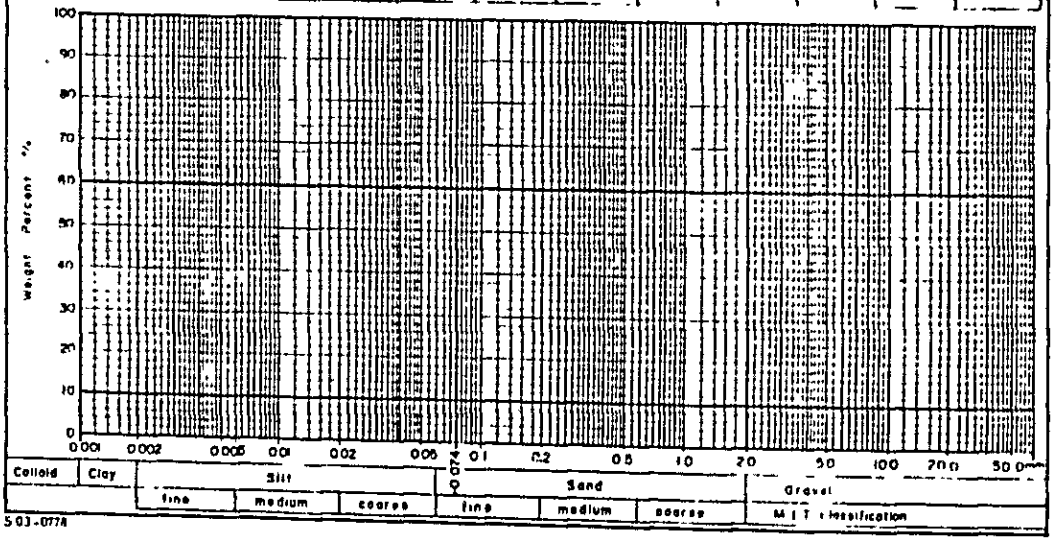
PROJECT : LOW COST HOUSING
LOCATION : CENGKARENG
BORING / POINT NO : B1
REMARKS :
Undisturbed Sample (mold)

JOB NO :
DATE : AUGUST 21,1980
RECORDED BY : DJI
CHECKED BY : DAS

Sample No		Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1	1	0.00 - 0.50		0	6	35	59	0.0022	-	-	95
2	2	0.00 - 0.80		0	4	33	63	0.0014	-	-	97
3		-									



Sample No		Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1		-									
2		-									
3		-									



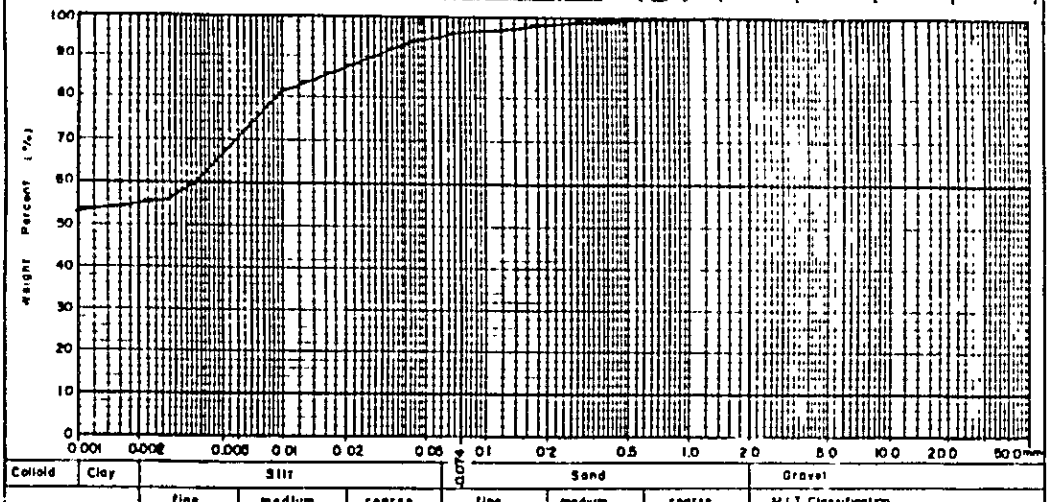
503-077A

GRAIN SIZE ANALYSIS

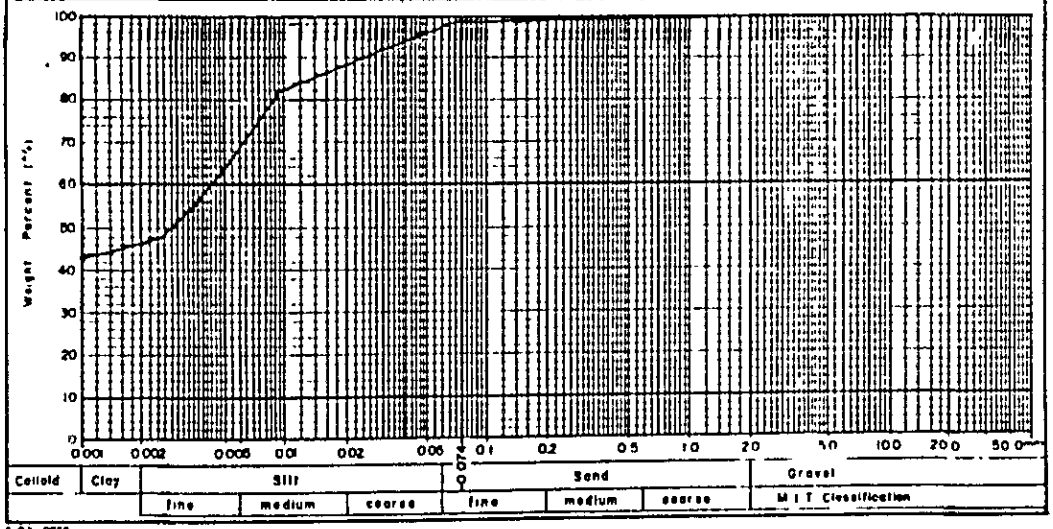
PROJECT: LOW COST HOUSING
LOCATION: CENGKARENG
BORING/POINT NO:
REMARKS: COMPACTION SAMPLE

JOB NO:
DATE: JULY 28, 1980
RECORDED BY: DJI
CHECKED BY: DAS

	Sample No	Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1	TP 1	SAWAH		0	5	40	55	0.0044		-	98
2											
3											



	Sample No	Depth m	Textural Classification	Gravel %	Sand %	Silt %	Clay %	60% Grain Size D60 mm	Effective Grain Size D10 mm	Uniformity Coefficient Uc	% finer by weight passing sieve No 200
1	TP 2	LATERITE		0	3	51	46	0.0044	-	-	99
2											
3											



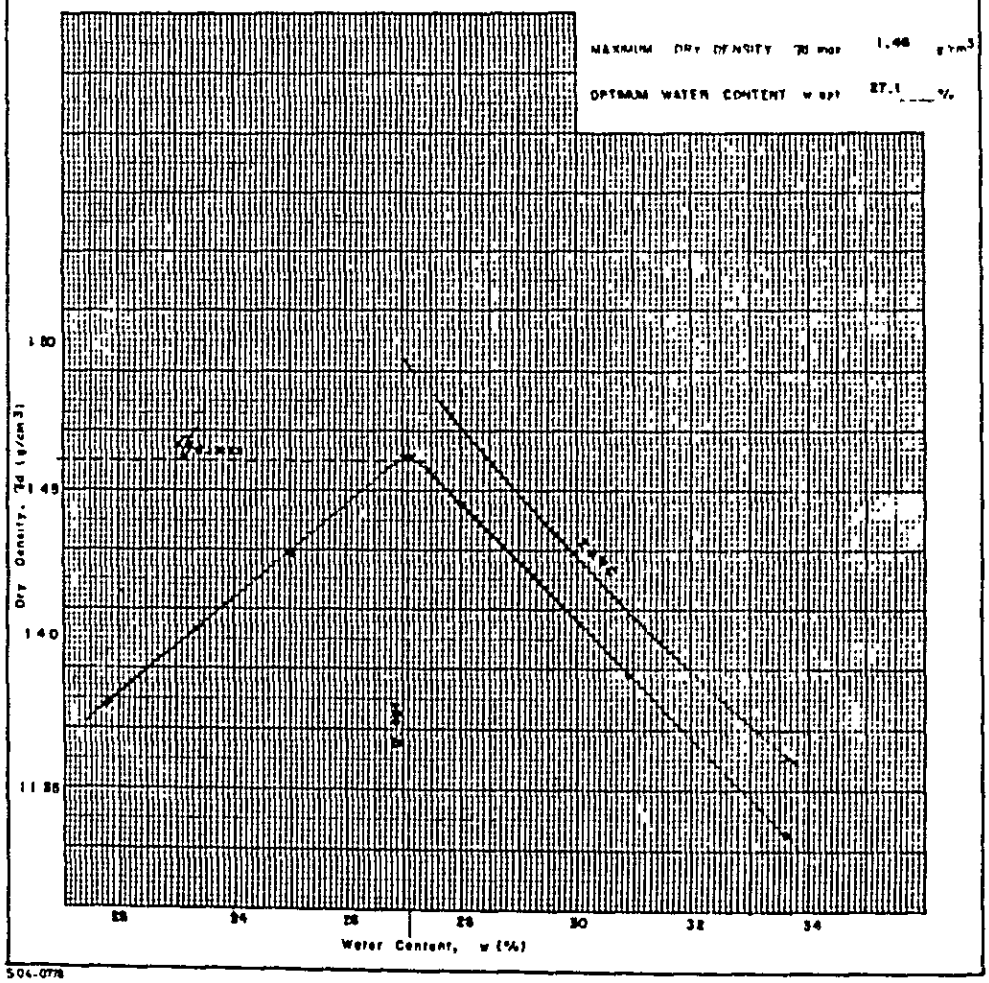
503-0778

pt SOIL ENG

COMPACTION TEST

PROJECT	LOW COST HOUSING	JOB NO	
LOCATION	CENGKARENG / BAWAH	DATE	AUGUST 23, 1980
SAMPLE NO		RECORDED BY	AJI
DEPTH IN METER		CHECKED BY	DAB
DESCRIPTION OF SOIL	Clay grey		
REMARKS	MODIFIED PROCTOR		

Volume of cylinder	944.1	Cuom	Natural water content	59	%
Weight of rammer	10	lb	Amount retained on 3/4" sieve	-	%
Height of drop	18	in	Specific gravity of soil	2.50	
Blows per layer	25		Liquid limit w_L	118.0	%
Number of layer	5		Plastic limit w_p	31.8	%
			Plasticity index I_p	86.6	%



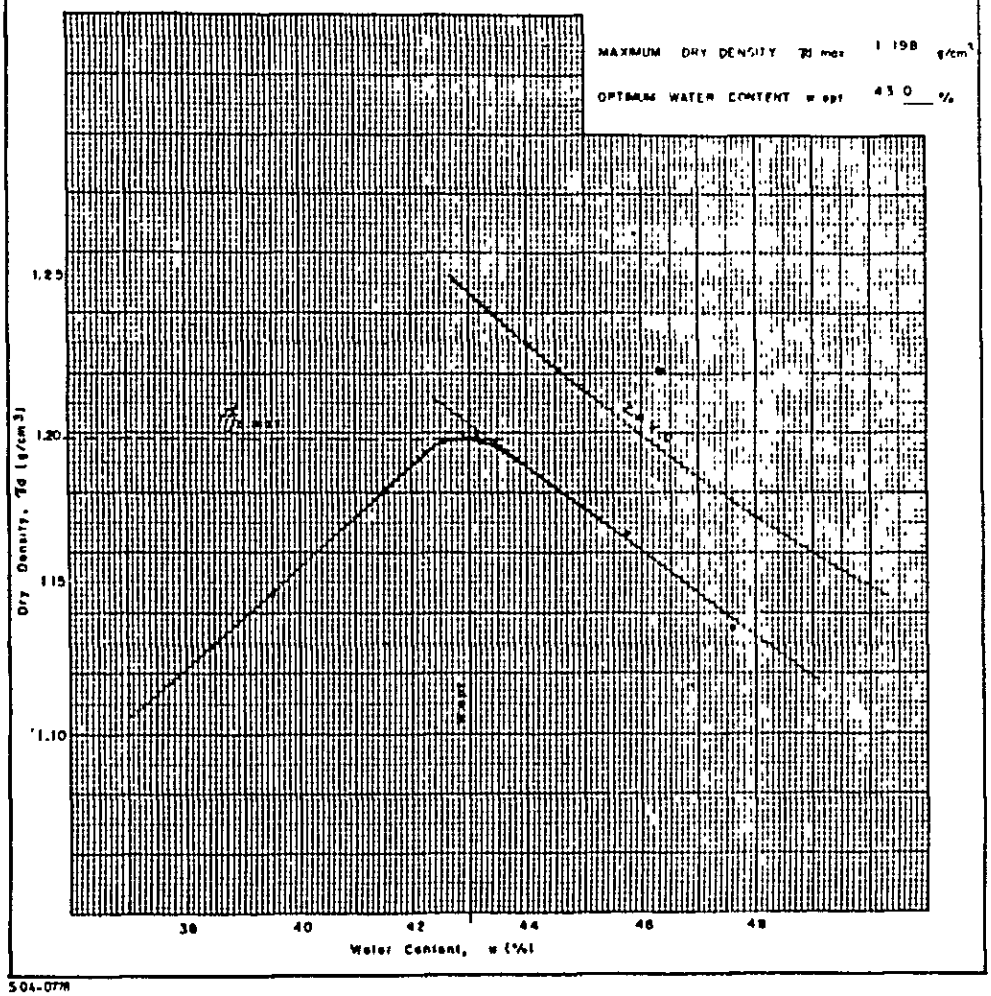
504-0778

p t S O I L E N S

COMPACTION TEST

PROJECT	LOW COST HOUSING CENGKARENG	JOB NO	
LOCATION	TANGERANG	DATE	AUGUST 6,1980
SAMPLE NO		RECORDED BY	S K M
DEPTH IN METER		CHECKED BY	D A S
DESCRIPTION OF SOIL	Laterite/clay reddish brown		
REMARKS	Modified Proctor		

Volume of cylinder	944	Ccm	Natural water content	44 5	%
Weight of rammer	10	lb	Amount retained on 3/4" sieve		%
Height of drop	18	in	Specific gravity of soil	2 68	
Blows per layer	25		Liquid limit w_L	118 0	%
Number of layer	5		Plastic limit w_p	43 1	%
			Plasticity index I_p	74 9	%



504-07R

pt SOILENS

CONE PENETRATION TEST
LOW COST HOUSING CENGKARENG

SAMPLE FROM SAWAH (DISTURBED SAMPLE)

Depth in inch	1	2	3	4
Dial Reading	42	58	75	86
Load kg	6.044	8.346	10.793	12.375
Pressure kg/cm^2	2.121	2.928	3.787	4.342
Conus Area cm^2	2.850			

Number of layer		5
Blows per layer		25
W	%	59.71
γ_m	g/cm^3	1.697
γ_d	g/cm^3	1.063

Depth in inch	1	2	3	4
Dial Reading	63	74	92	108
Load kg	9.066	10.649	13.239	15.541
Pressure kg/cm^2	3.181	3.736	4.645	5.453
Conus Area cm^2	2.850			

Number of layer		5
Blows per layer		25
W	%	54.71
γ_m	g/cm^3	1.633
γ_d	g/cm^3	1.035

Depth in inch	1	2	3	4
Dial Reading	87	104	145	159
Load kg	12.519	14.966	20.866	22.880
Pressure kg/cm^2	4.393	5.251	7.321	8.028
Conus Area cm^2	2.850			

Number of layer		5
Blows per layer		25
W	%	49.71
γ_m	g/cm^3	1.689
γ_d	g/cm^3	1.058

Note

Weight of Rammer = 10 lb
height of drop = 18 inch
Ø of mold = 6 inch
height of mold = 7 inch

BY SOILENS

CONE PENETRATION TEST
LOW COST HOUSING CENGKARENG

SAMPLE FROM LATERITE TANGERANG

Depth in inch	1	2	3	4
Dial Reading	200	248	274	391
Load kg	28.780	35.687	39.429	56.265
Pressure kg/cm^2	22.715	28.166	31.120	44.408
Conus Area cm^2	1.267			

Number of layer		5
Blows per layer		25
W	%	44.5
γ_m	g/cm^3	1.75
γ_d	g/cm^3	1.21

Depth in inch	1	2	3	4
Dial Reading	216	368	398	421
Load kg	31.082	52.955	57.272	60.582
Pressure kg/cm^2	24.532	41.796	45.203	47.815
Conus Area cm^2	1.267			

Number of layer		5
Blows per layer		25
W	%	39.5
γ_m	g/cm^3	1.75
γ_d	g/cm^3	1.21

Depth in inch	1	2	3	4
Dial Reading	245	378	416	439
Load kg	35.256	54.394	59.862	63.172
Pressure kg/cm^2	27.826	42.931	47.247	49.860
Conus Area cm^2	1.267			

Number of layer		5
Blows per layer		25
W	%	34.5
γ_m	g/cm^3	1.71
γ_d	g/cm^3	1.18

Note :

Weight of Rammer = 10 lb
height of drop = 18 inch
Ø of mold = 6 inch
height of mold = 7 inch

CONE PENETRATION TEST
LOW COST HOUSING CENGKARENG

SAMPLE FROM LATERITE TANGERANG (DISTURBED SAMPLE)

Depth in inch	1	2	3	4
Dial Reading	162	222	235	241
Load kg	23.024	31.946	33.817	34.680
Pressure kg/cm^2	18.172	25.213	26.690	27.372
Conus Area cm^2	1.267			

Number of layer		5
Blows per layer		5
W	%	44.5
γ_m	g/cm^3	1.55
γ_d	g/cm^3	1.07

Depth in inch	1	2	3	4
Dial Reading	198	236	274	386
Load kg	28.492	33.960	39.429	55.545
Pressure kg/cm^2	22.488	26.803	31.120	43.840
Conus Area cm^2	1.267			

Number of layer		5
Blows per layer		25
W	%	44.5
γ_m	g/cm^3	1.75
γ_d	g/cm^3	1.21

Depth in inch	1	2	3	4
Dial Reading	300	341	361	368
Load kg	43.170	49.070	51.948	52.955
Pressure kg/cm^2	34.073	38.729	41.000	41.796
Conus Area cm^2	1.267			

Number of layer		5
Blows per layer		45
W	%	44.5
γ_m	g/cm^3	1.75
γ_d	g/cm^3	1.21

Note

Weight of Rammer = 10 lb
height of drop = 18 inch
Ø of mold = 6 inch
height of mold = 7 inch

PT. SOILENS

SWELLING PERCENTAGE
LOW COST HOUSING CENGKARENG
Location : Sawah
Disturbed sample

				Before	After
Number of layer	5	w	%	59 71	62 67
Blows per layer	25	γ_m	g/cm³	1 64	1 67
Swelling %	0.333	γ_d	g/cm³	1 03	

				Before	After
Number of layer	5	w	%	54 71	55.94
Blows per layer	25	γ_m	g/cm³	1.63	1.64
Swelling %	0.89	γ_d	g/cm³	1 06	

				Before	After
Number of layer	5	w	%	49.71	52.63
Blows per layer	25	γ_m	g/cm³	1.69	1.73
Swelling %	2.13	γ_d	g/cm³	1.13	

				Before	After
Number of layer		w	%		
Blows per layer		γ_m	g/cm³		
Swelling %		γ_d	g/cm³		

Undisturbed sample FROM SAWAH (MOLD) – 0.50 m

				Before	After
Number of layer	–	w	%	58 2	61.3
Blows per layer	–	γ_m	g/cm³	1.54	1.55
Swelling %	0	γ_d	g/cm³	0 96	

				Before	After
Number of layer		w	%		
Blows per layer		γ_m	g/cm³		
Swelling %		γ_d	g/cm³		

NOTE :
Weight of Rammer . 10 lb
height of drop 18 inch
Ø of mold . 6 inch
height of mold = 7 inch

SWELLING PERCENTAGE
LOW COST HOUSING CENGKARENG
Disturbed sample from Tangerang
LATERITE

				Before	After
Number of layer	5	w	%	44.5	48.3
Blows per layer	25	γ_m	g/cm³	1.75	1.78
Swelling %	0.00	γ_d	g/cm³	1.21	

				Before	After
Number of layer	5	w	%	39.5	46.0
Blows per layer	25	γ_m	g/cm³	1.75	1.79
Swelling %	0.96	γ_d	g/cm³	1.21	

				Before	After
Number of layer	5	w	%	34.5	50.4
Blows per layer	25	γ_m	g/cm³	1.71	1.78
Swelling %	2.70	γ_d	g/cm³	1.18	

				Before	After
Number of layer	5	w	%	44.5	50.0
Blows per layer	5	γ_m	g/cm³	1.55	1.63
Swelling %	1.73	γ_d	g/cm³	1.07	

				Before	After
Number of layer	5	w	%	44.5	47.9
Blows per layer	25	γ_m	g/cm³	1.75	1.77
Swelling %	0.00	γ_d	g/cm³	1.21	

				Before	After
Number of layer	5	w	%	44.5	44.8
Blows per layer	45	γ_m	g/cm³	1.76	1.78
Swelling %	0.02	γ_d	g/cm³	1.22	

NOTE
Weight of Hammer : 10 lb
height of drop : 18 inch
ø of mold : 8 inch
height of mold = 7 inch

PT SOILENS.

SWELLING PRESSURE
LOW COST HOUSING CENGKARENG

Sample from Sawah (undisturbed sample from mold) – 0.50 m

DATE	Dial reading in 0.01 mm	Shear force in kg	Pressure kg/cm²
Aug. 5.80	0	0	0
6.80	0.5	0.2632	0.0014
7.80	1.5	0.7895	0.0043
8.80	2	1.0526	0.0058
9.80	3	1.5789	0.0087
18.80	5	2.6316	0.0014
19.80	5	2.6316	0.0014
20.80	5	2.6316	0.0014

Number of layer		–
Blows per layer		–
Weight of rammer		–
Height of drop		–
∅ of mold		6 inch
Height of mold		7 inch
w %	initial	57.73
	final	58.02
γ_m g/cm³	initial	1.59
	final	1.61
γ_d g/cm³	initial	1.01
	final	

DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²

Number of layer		
Blows per layer		
Weight of rammer		
Height of drop		
∅ of mold		
Height of mold		
w %	initial	
	final	
γ_m g/cm²	initial	
	final	
γ_d g/cm²	initial	
	final	

DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²

Number of layer		
Blows per layer		
Weight of rammer		
Height of drop		
∅ of mold		
Height of mold		
w %	initial	
	final	
γ_m g/cm²	initial	
	final	
γ_d g/cm²	initial	
	final	

Description : silty clay, grey coloured

SWELLING PRESSURE
LOW COST HOUSING CENGKARENG
DISTURBED SAMPLE FROM SAWAH

DATE	Dial reading in 0.01 mm	Shear force in kg	Pressure kg/cm²
Aug. 25.80	0	0	0
26.80	11.0	5.78	0.032
27.80	17.0	8.947	0.049
28.80	23.5	12.368	0.068
29.80	27.5	14.474	0.079
30.80	28.0	14.737	0.081
31.80	28.5	15.000	0.082
Sept. 1.80	29.0	15.263	0.084

Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
Ø of mold		6 inch
Height of mold		7 inch
w %	initial	53.71
	final	
γ_m g/cm³	initial	1.69
	final	
γ_d g/cm³	initial	1.03
	final	

DATE	Dial reading in 0.01 mm	Shear force in kg	Pressure kg/cm²
Aug. 29.80	0	0	0
30.80	136	4.474	0.025
31.80	229	7.534	0.041
Sept. 1.80	255	8.390	0.046
2.80	267.5	8.801	0.048
3.80	276.5	9.097	0.050
4.80	285	9.377	0.051
5.80	292	9.607	0.053

Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
Ø of mold		6 inch
Height of mold		7 inch
w %	initial	54.71
	final	
γ_m g/cm²	initial	1.63
	final	
γ_d g/cm²	initial	1.06
	final	

DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²
Sept. 3.80	0	0	0
Sept. 4.80	98.5	14.459	0.079
5.80	120	17.615	0.097
6.80	138	20.257	0.111
7.80	146	21.431	0.117
8.80	150	22.019	0.121
9.80	153.5	22.533	0.124
10.80	156	22.899	0.126

Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
Ø of mold		6 inch
Height of mold		7 inch
w %	initial	49.71
	final	
γ_m g/cm²	initial	1.69
	final	
γ_d g/cm²	initial	1.13
	final	

PT BOILENG

SWELLING PRESSURE
LOW COST HOUSING CENGKARENG
Disturbed sample From Tangerang
Laterite

at W_n

DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²
	0	0	0
	21.0	3.083	0.017
	22.5	3.303	0.0181
	22.5	3.303	0.0181
	23.0	3.376	0.0185
	23.0	3.376	0.0185
	23.0	3.376	0.0185
	23.0	3.376	0.0185

Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
ϕ of mold		6 inch
Height of mold		7 inch
W %	initial	44.5
	final	45.8
γ_m g/cm³	initial	1.75
	final	1.77
γ_d g/cm³	initial	1.21
	final	

at $W_n - 5\%$

DATE	Dial reading in 0.01 mm	Shear force in kg	Pressure kg/cm²
Sept.2.80	0	0	0
Sept. 3.80	97	51.872	0.284
4.80	99	52.941	0.290
5.80	100	53.476	0.293
6.80	101	54.013	0.296
7.80	102	54.546	0.299
8.80	102.5	54.813	0.300
9.80	103	55.080	0.302

Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
ϕ of mold		6 inch
Height of mold		7 inch
W %	initial	38.5
	final	45.3
γ_m g/cm²	initial	1.75
	final	1.85
γ_d g/cm²	initial	1.21
	final	

at $W_n - 10\%$

DATE	Dial reading in 0.001 inch	Shear force in kg	Pressure kg/cm²
Sept.3.80	0	0	0
4.80	453	66.496	0.365
5.80	457	67.083	0.368
6.80	458.5	67.230	0.369
7.80	459.5	67.450	0.370
8.80	460	67.523	0.370
9.80	461	67.670	0.371
10.80	461.5	67.744	0.371

Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
ϕ of mold		6 inch
Height of mold		7 inch
W %	initial	34.5
	final	44.7
γ_m g/cm³	initial	1.71
	final	1.84
γ_d g/cm³	initial	1.18
	final	

Description : Clay, reddish brown coloured

PT BOILENG.

SWELLING PRESSURE
LOW COST HOUSING CENGKARENG
Disturbed Sample From Tangerang
Laterite

at Wn

DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²
August 23.80	0.00	0	0
Aug. 24.80	31.5	4.626	0.025
Aug. 25.80	33.5	4.918	0.027
Aug. 26.80	33.5	4.918	0.027
Aug. 27.80	33.5	4.918	0.027
Aug. 28.80	33.5	4.918	0.027
Aug. 29.80	33.5	4.918	0.027
Aug. 30.80	33.5	4.918	0.027

Number of layer		5
Blows per layer		5
Weight of rammer		10 lbs
Height of drop		18 inch
ϕ of mold		6 inch
Height of mold		7 inch
w %	initial	44.5
	final	52.6
γ_m g/cm³	initial	1.81
	final	1.64
γ_d g/cm³	initial	1.07
	final	

at Wn

DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²
Aug. 25.80	0	0	0
26.80	21.00	3.083	0.017
27.80	22.50	3.303	0.0181
28.80	22.50	3.303	0.0181
29.80	23.00	3.376	0.0185
30.80	23.00	3.376	0.0185
31.80	23.00	3.376	0.0185
Sept. 1.80	23.00	3.376	0.0185

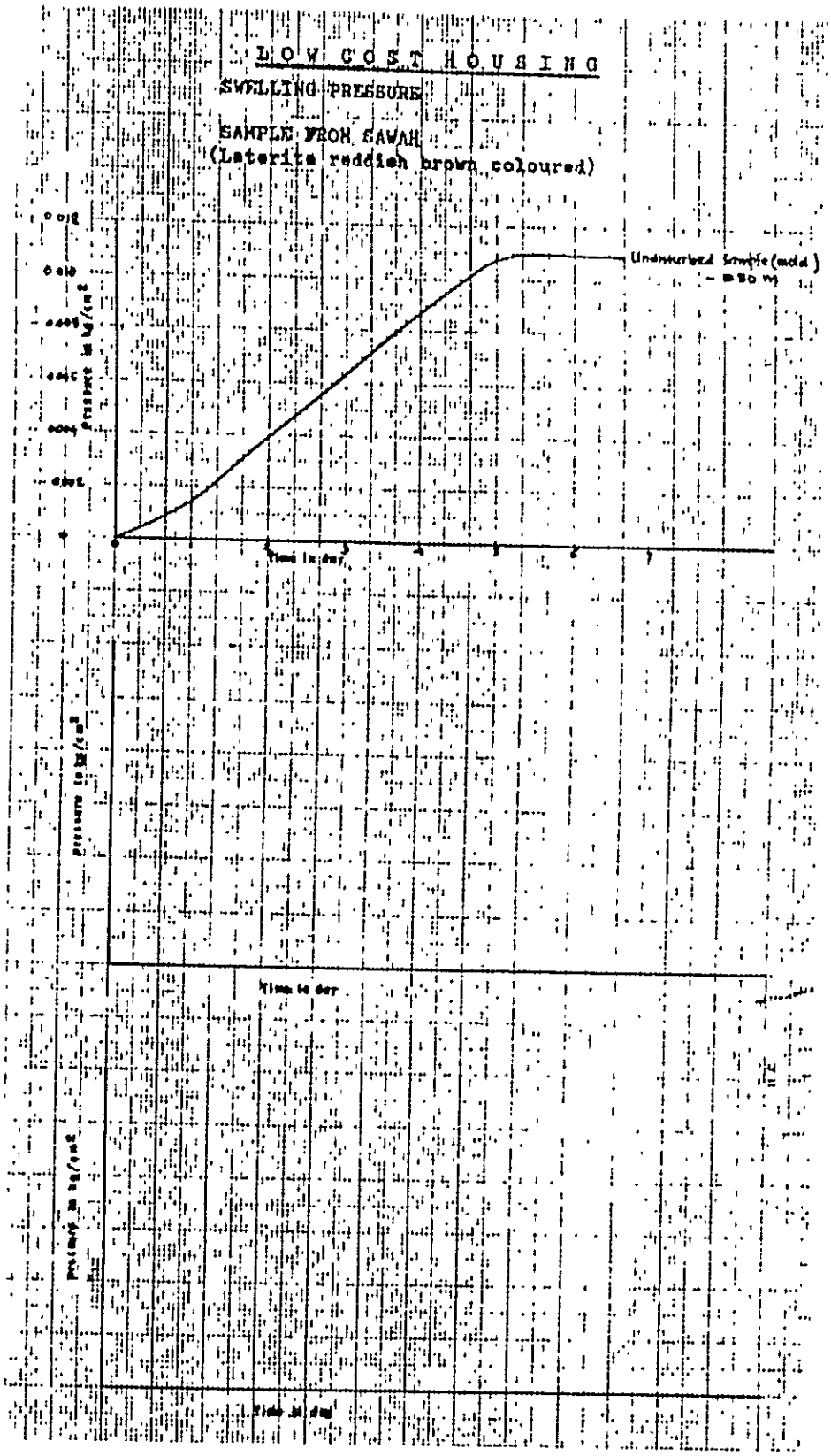
Number of layer		5
Blows per layer		25
Weight of rammer		10 lbs
Height of drop		18 inch
ϕ of mold		6 inch
Height of mold		7 inch
w %	initial	44.5
	final	45.8
γ_m g/cm²	initial	1.75
	final	1.77
γ_d g/cm²	initial	1.21
	final	

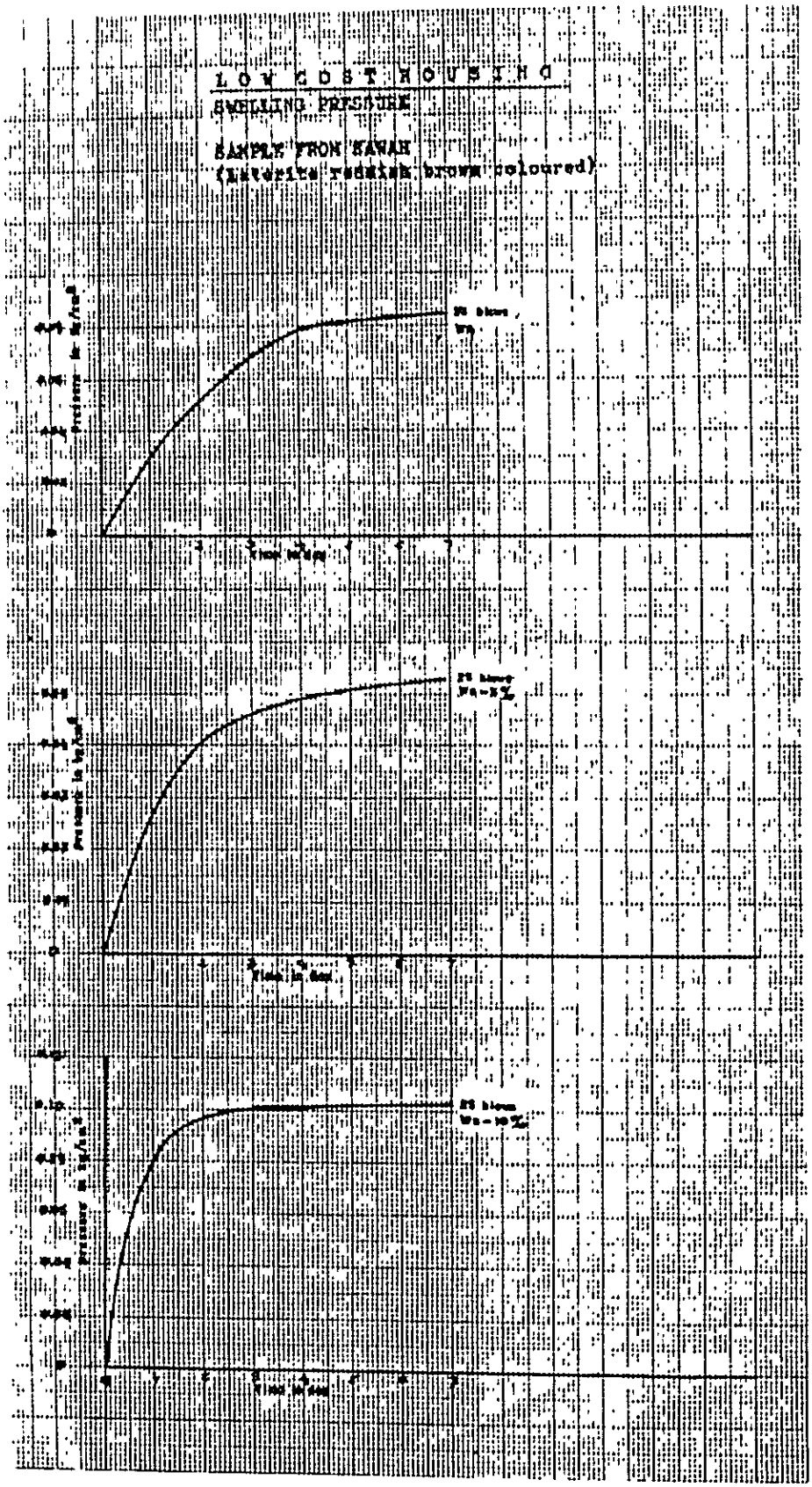
at Wn

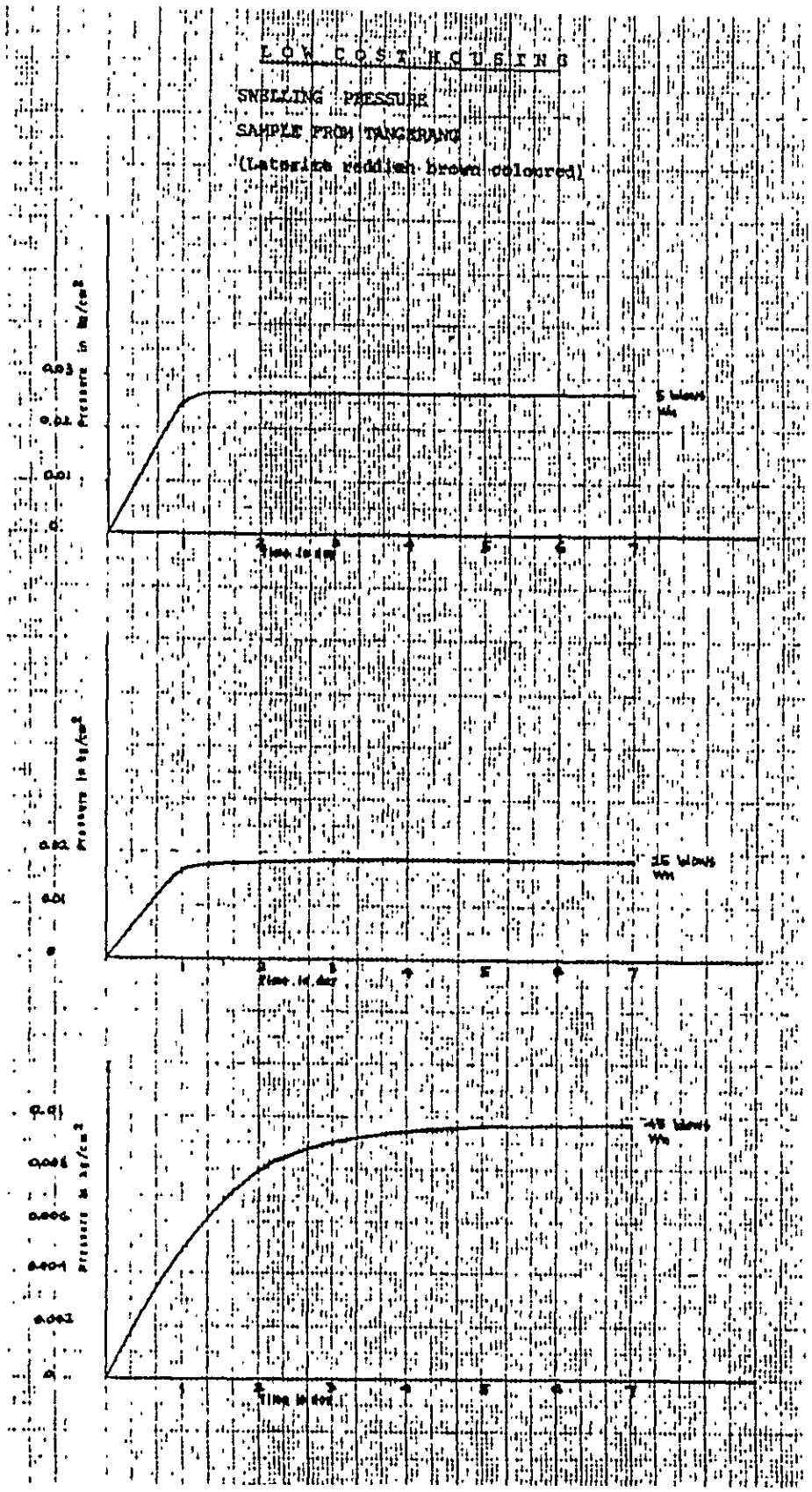
DATE	Dial reading in 0.0001 inch	Shear force in kg	Pressure kg/cm²
Aug. 26.80	0	0	0
27.80	6	0.881	0.005
28.80	10	1.468	0.008
29.80	11	1.615	0.009
30.80	11.5	1.688	0.009
31.80	12	1.762	0.010
Sept. 1.80	12	1.762	0.010
2.80	12	1.762	0.010

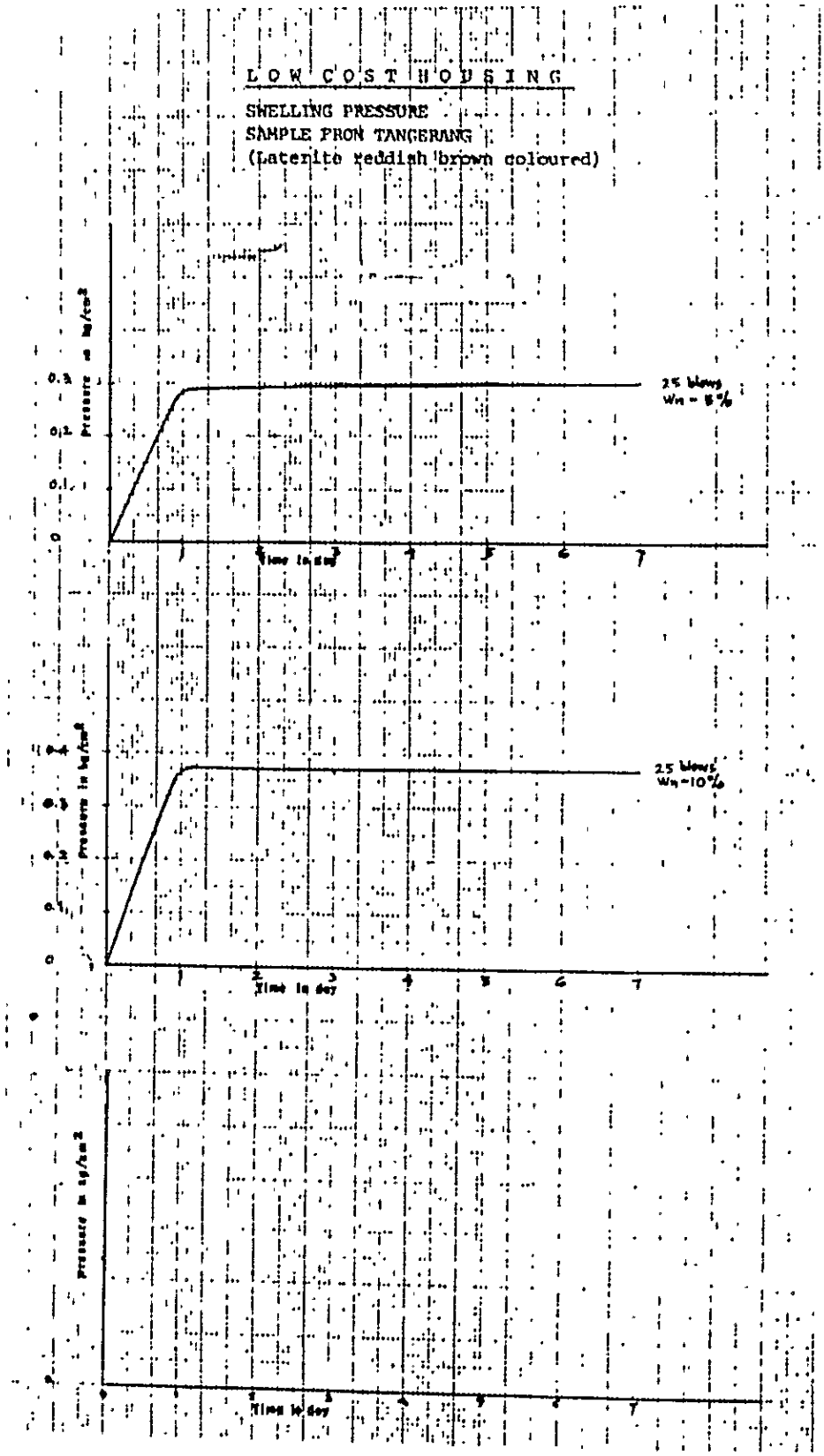
Number of layer		5
Blows per layer		45
Weight of rammer		10 lbs
Height of drop		18 inch
ϕ of mold		6 inch
Height of mold		7 inch
w %	initial	44.5
	final	45.8
γ_m g/cm²	initial	1.76
	final	1.77
γ_d g/cm²	initial	1.22
	final	

Description : clay, reddish brown coloured


LOW COST HOUSING
SWELLING PRESSURE
SAMPLE FROM SAVAH
(Laterite reddish brown coloured)
Undisturbed Sample (mold)
Time in day
Time in day


LOW COST HOUSING
SWELLING PRESSURE
SAMPLE FROM KANAH
(laterite reddish brown coloured)


L O W C O S T H O U S I N G
SWELLING PRESSURE
SAMPLE FROM TANGERANG
(Latosirca reddish brown coloured)
5 blows
15 blows
45 blows
Pressure in kg/cm²
Time in day


LOW COST HOUSING
SHELLING PRESSURE
SAMPLE FROM TANGERANG
(Laterite reddish brown coloured)
25 blows
Wn = 8%
25 blows
Wn = 10%
Time in day

EQUIPMENT and PROCEDURES

1. Sounding, Static Penetrometer.

   Equipment : — 2 ton (medium weight) capacity Dutch type sounding machine.
   — standard cone with cone base area 10 cm^2.
   — be-cone or jacket cone with cone base area 10 cm^2
   Procedure : — standard procedure of sounding test.

2. Standard Penetration Test.

   Equipment : — standard penetration test apparatus.
   2" O.D. x 1 3/8" I.D. split spoon sampler.
   140 lb. hammer, 30 inch falling height.
   Procedure : — ASTM D1586-67
   — AASHO T206-70
   — BS 1377 : 1967
   — JIS A1219-1968.

3. Hand Boring.

   Equipment : — "Acker" lightweight motorized hoist.
   — Iwan type auger or flight auger or single tube core barrel with tungsten carbide bits or other bits.
   — pumping unit for water flushing.
   Procedure : — ASTM D420-69, D1452-72
   — AASHO T86-70, T203-64.

4. Machine Boring.

   Equipment : — Long Year "24" Standard Drill.
   — Mindrill Diamond Drill type "8" model F30R.
   — Long Year 535-RQ 5 speed pumping unit, 35 gpm (132 liters per minute).
   — flight auger.
   — diamond bits or tungsten carbide bits.
   — double tube or single tube core barrels.
   — retractable triple-tube core barrels.
   Procedure : — ASTM D2113-70
   — AASHO T225-68
   — BS 4019.

5. Undisturbed Sampling.

   Equipment : — thin wall Shelby tube sampler, or solid tube sampler with liner; brass or stainless steel tubes.
   — split tube sampler from retractable triple-tube core barrels.
   — Piston sampler.
   — 70 mm I.D. or other sizes.
   Procedure : — ASTM D1587-67.
   — AASHO T207-70.

6. Speed Moisture Content Determination.

Equipment : — automatic moisture determination balance, a combination drying unit (250 watt infrared lamp) and magnetically damped precision balance, with a full range direct reading optical scale.
— speedy moisture tester, a calcium carbide gas pressure moisture tester.

Procedure : — Special procedure of the automatic moisture determination balance.
— AASHO T217-67.

7. Soil Classification and Identification.

Equipment : — torvane shear device, with sensitive and high capacity vane adapters.
— pocket penetrometer.
— soil color charts.

Procedure : — Unified soil classification system.
— Casagrande soil classification for airfield projects
— ASTM D2487-69, D2488-69.
— AASHO M145 66.

8. Atterberg Limits.

Equipment : — hand operated standard liquid limit device with counter.
— motorized liquid limit device.
— Casagrande grooving tool.
— ASTM grooving tool.

Procedure : — T.W. Lambe, Soil Testing for Engineers.
— Joseph E Bowles, Engineering Properties of Soils and Their Measurement.
— ASTM D421-72, D423-72, D424-71.
— AASHO T87-72, T89-68, T90-70
— BS 1377 : 1967.
— U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

9. Shrinkage Limit and Linear Shrinkage.

Equipment : — monel shrinkage dish.
— crystallizing dish.
— prong plate

Procedure : — T.W. Lambe, Soil Testing for Engineers.
— Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
— ASTM D421-72, D427-67.
— AASHO T87-72, T92-68, T93-68.
— BS 1377 : 1967.
— U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

10. Grain-Size Analysis.

a. Sieve Analysis.

Equipment : — series of seven French Standard Sieves, AFNOR X-11-501.
— series of seven U.S. Standard Sieves, ASTM Specification E11-70, or AASHO Specification M92-70.

- "Cenco" motorized sieve shaker

Procedure :
- T.W. Lambe, Soil Testing for Engineers
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement
- ASTM D422-72.
- AASHO T27-72.
- BS 1377-1967.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

b. Hydrometer Analysis.

Equipment :
- improved soil hydrometer, ASTM – AASHO scale 151-H and 152-H.
- mechanical analysis stirrer.
- air jet dispersion cup type-B.

Procedure :
- T.W. Lambe, Soil Testing for Engineers
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
- ASTM D422-72.
- AASHO T88-72.
- BS 1377 : 1967.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

11. Unconfined Compression.

Equipment :
- "Maruto" unconfined compression apparatus motorized with multi speed drive unit, 0.2 to 2.0 mm/min
- "Griffin & Tatlock" hand operated unconfined compression apparatus, spring loading.

Procedure :
- specimen size 1.5 inch diameter x 3 inch height.
- test speed 0.5 % of the initial sample height per minute
- T.W. Lambe, Soil Testing for Engineers
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
- ASTM D2166-72.
- AASHO T208-70.
- BS 1377 : 1967.
- JIS A1216-1968.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

12. Triaxial Compression.

Equipment :
- 5 ton capacity Wykeham-Farrance triaxial compression machine Model 57, motorized with multi-speed drive unit, 30 rates of feed ranging from 0.300 to 0.000024 ins /min.
- Wykeham-Farrance Bishop type manual pore-pressure measurement device, complete with volume change indicator twin burette type and single unit constant pressure apparatus

Procedure :
- unconsolidated undrained (UU) shear test, with pore-pressure measurement during the test.
- consolidated undrained (CU) shear test, with or without back pressure.
- consolidated drained (CD) shear test.

- specimen size 1.5 inch diameter x 3 inch height.
- T.W. Lambe, Soil Testing for Engineers.
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
- A.W. Bishop and D.J. Henkel, The Measurement of Soil Properties in the Triaxial Test.
- ASTM D2850-70.
- AASHO T234-72.
- BS 1377 : 1967.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

13 Direct Shear.

Equipment : - Wykeham-Farrance strain controlled direct shear machine, motorized with multi-speed drive unit, 0.048 to 0.000019 ms./min.

Procedure :
- unconsolidated undrained (UU) shear test.
- consolidated undrained (CU) shear test.
- specimen size 60 mm diameter.
- T.W. Lambe, Soil Testing for Engineers.
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
- ASTM D3080-72.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

14. Consolidation.

Equipment : - "Maruto" floating and fixed ring consolidation apparatus.

Procedure :
- specimen size 60 mm diameter x 20 mm height
- 6 or more times load increment and once or more times load decrement back to initial load, load increases and decreases every 24 hours or after the settlement is less than 0.000254 mm per minute.
- T.W. Lambe, Soil Testing for Engineers.
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
- ASTM D2435-70.
- AASHO T216-66.
- BS 1377 : 1967.
- JIS A1217-1967.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

15. Coefficient of Permeability.

Equipment :
- Wykeham-Farrance or Maruto constant and falling head permeameter.
- T.W. Lambe, Soil Testing for Engineers.
- Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
- ASTM D2434-68.
- AASHO T215-70.

- JIS A1218-1968.
- U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906

16. Field Permeability Test.

Equipment : — packer test equipment.
— pumping unit.
Procedure : — U.S. Bureau of Reclamation.

17. Modulus of Elasticity.

Equipment : — fixed ring consolidometer.
Procedure : — saturated and unsaturated.
— repeated loading

18. Compaction.

Equipment : — Standard Proctor compaction equipment
— Modified AASHO or Modified Proctor compaction equipment.
Procedure : — T.W. Lambe, Soil Testing for Engineers
— Joseph E. Bowles, Engineering Properties of Soils and Their Measurement
— ASTM D698-70, D1557-70, D1558-71.
— AASHO T99-70, T180-70.
— BS 1377 : 1967.
— U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

19. Laboratory C.B.R.

Equipment : - mechanical laboratory C.B.R. set
— hydraulic laboratory C.B.R. set.
— 5 ton capacity Wykeham-Farrance compression machine, motorized with multi-speed drive unit, 30 speed 0.300 to 0.000024 ins./min., complete with C.B.R. test attachment, plunger guide bracket with anti-friction bearings.
Procedure : — U.S. Corps of Engineers TM5-852-6
— Joseph E. Bowles, Engineering Properties of Soils and Their Measurement.
— ASTM D1883-67.
— AASHO T193-72.
— BS 1377 : 1967.

20. Field C.B.R.

Equipment : — mechanical field C.B.R. set.
— portable field oven and field stove.
— "Murayama Seisakusho" table platform scale
Procedure : — U.S. Corps of Engineers.
— ASTM suggested method.

21. In-Place Density.

Equipment : — Corps of Engineers surface soil sampler.

— tube density samplers.
— Volumeasure using rubber ballon method.
— sand density cone.
— portable field oven and field stove
— "Murayama Seisakusho" table platform scale

Procedure : — drive sampling.
— ASTM D1556-68, D1558-71, D2167-72, D2937-71.
— AASHO T191-61, T204-64, T205-64, T217-67
— BS 1377 : 1967.

22. Compaction Control.

Equipment : — Corps of Engineers surface soil sampler.
— tube density samplers.
— Volumeasure using rubber ballon method.
— sand density cone.
— Proctor penetrometer assembly.
— proving ring penetrometer.
— portable field oven and field stove.
— "Murayama Seisakusho" table platform scale
— Speedy moisture tester.

Procedure : — ASTM D1556-68, D1558-71, D2167-72, D2937-71.
— AASHO T191-61, T204-64, T205-64, T217-67
— BS 1377 : 1967

23. Plate Bearing.

Equipment : — "Soiltest" plate bearing set, with plates of various sizes
— 100 000 lb. capacity field loading jack
— 130 ton capacity field loading jack.
— 200 ton capacity field loading jack

Procedure : — ASTM D1194-72, D1195-71, D-1197-71.
— AASHO T221-66, T222-66.
— AIJ (Architectural Institute of Japan), Structural Standards.
— ICAO Aerodrome Manual.

24. Pile Bearing.

Equipment : — load settlement set for piles.
— 130 ton capacity loading ram.
— 200 ton capacity loading ram.

Procedure : — ASTM D1143-69.
— AIJ (Architectural Institute of Japan), Structural Standards.

25. Field Vane Shear

Equipment : — "Acker" vane shear apparatus, with vane blades of various diameters and lengths
— Precision torque head.
— torque wrenches

Procedure : — "Acker" vane shear test procedure bulletin
— ASTM D2573-72
— AASHO T223-67.
— BS 1377 1967

26. Relative Density of Cohesionless Soils.

Equipment . — complete relative density set.
— vibratory table.
— 0.1 and 0.5 cu. ft. molds.
Procedure : — ASTM D2049-69.
— U.S. Army Engineer Waterways Experiment Station (WES), Engineer Manual EM 1110-2-1906.

27. Bituminous Mixtures and Asphalt Stability

Equipment . — Marshall stability compression machine.
— water bath.
— stability compaction equipment.
— stability mold.
— asphalt flow indicator
Procedure : — ASTM D979-68, D1559-72.
— AASHO T168-55.

28. Abrasion of Aggregate.

Equipment : — Los Angeles abrasion machine.
— U.S. Standard sieves.
Procedure : — ASTM C131-69, C535-69.
— AASHO T96-70.
— JIS A1121-1967.

29. Quantitative Extraction of Bitumen.

Equipment : — centrifuge extractor.
Procedure : — ASTM D2172-72.
— AASHO T164-70.

APPENDIX Ⅳ
DRAINAGE SURVEY DATA

DRAINAGE SURVEY

1. Objective

River Kapuk Muara is only existing drainage route in and around the Planning Area of this project,therefore to graspe the real capacity of this drainage in advance is indispensable for the planning of drainage system.

And drainage survey(cross-sectional survey and longitudinal levelling) is conducted along river Kapuk Muara from the starting point to the end point of this river(about 2,730 M).

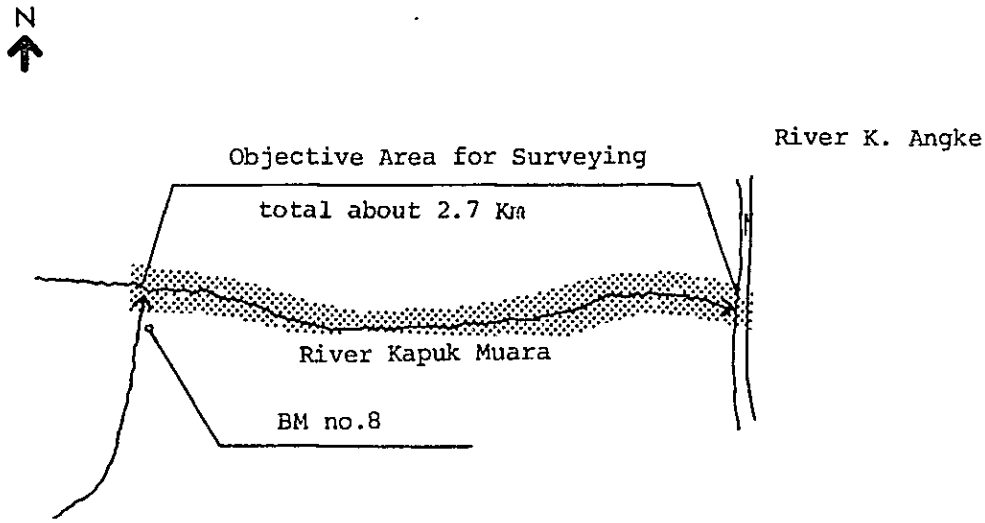
2. Date of Surveying

21,July 1980 - 24,July 1980

3. Report Making

25,July 1980 - 17,August 1980

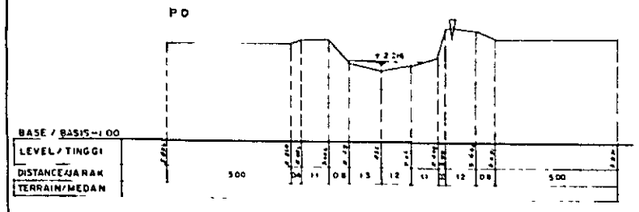
4. Survey Area



5. Local Contractor

P.T. P.P-TAISEI INDONESIA CONSTRUCTION

P0



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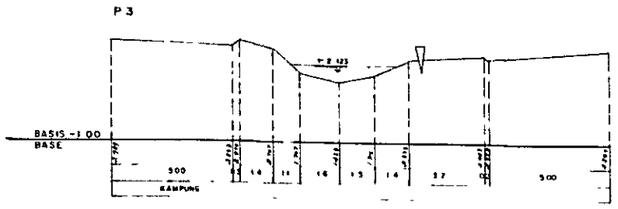

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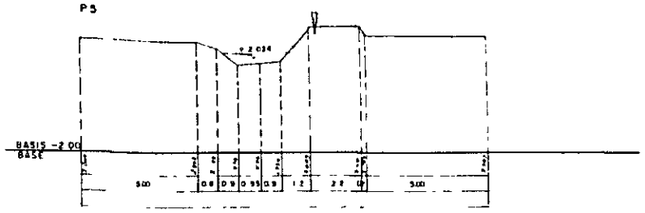

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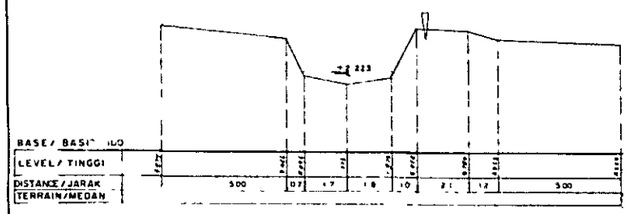

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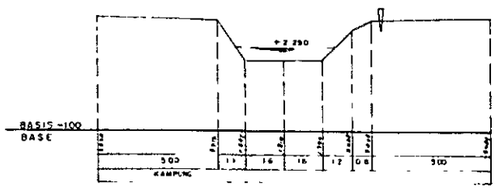

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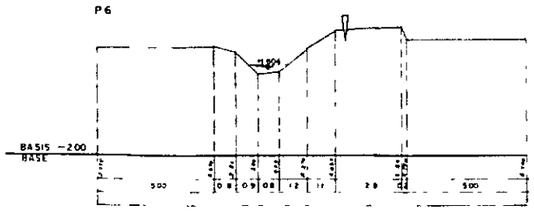

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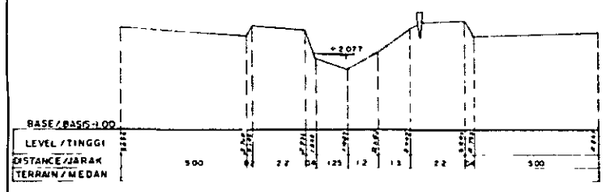

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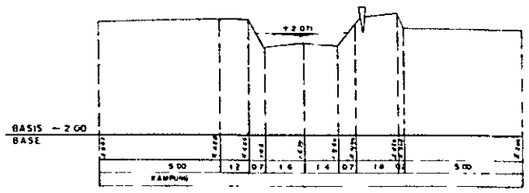

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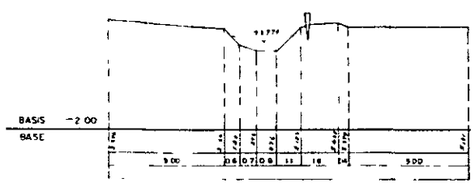

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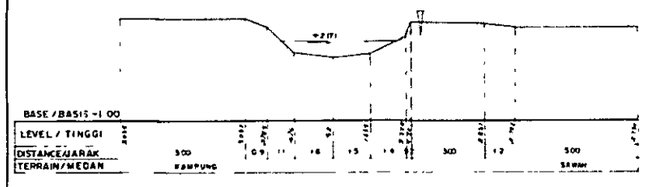

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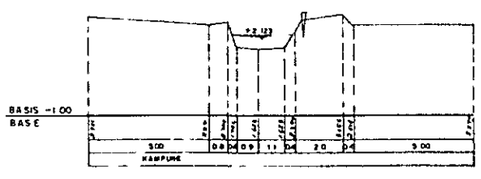

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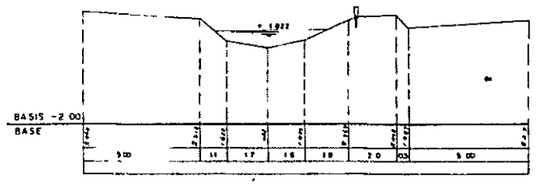

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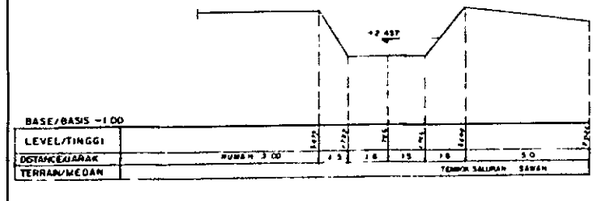

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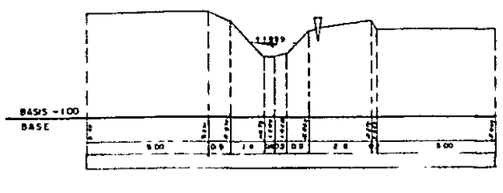
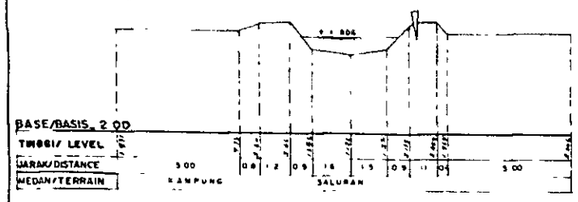


LOW COST HOUSING PROJECT
CENGKARENG - JAWA BARAT

PEKERJAAN: PENGUKURAN SALURAN	KAB TANGERANG	TANGGAL	4-8-1980
		DIGAMBAR	RR
		DIPERIKSA	
		DISETUJUI	
POTONGAN MELINTANG / CROSS SECTION	p1.SOILENS	NO. LEMBAR	JUMLAH LEMBAR 1 / 2
SKALA 1:100			

REVISI	TANGGAL REVISI	OLEH	DIPER	DISET	TGL

P8



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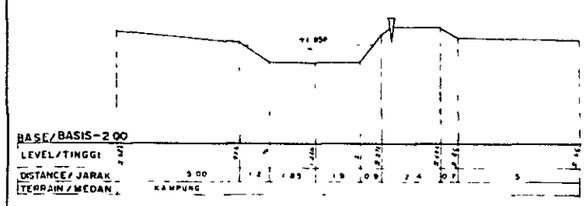

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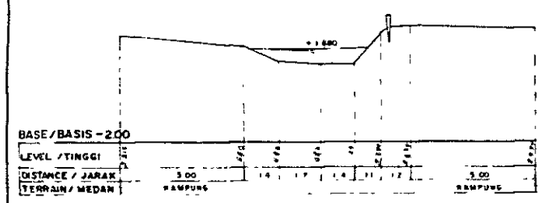

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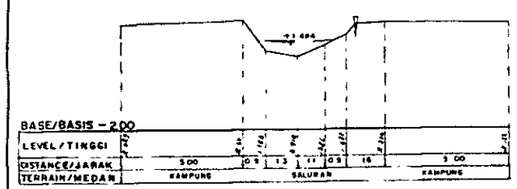

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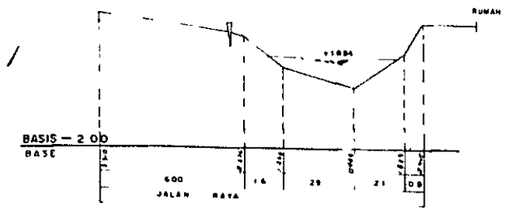

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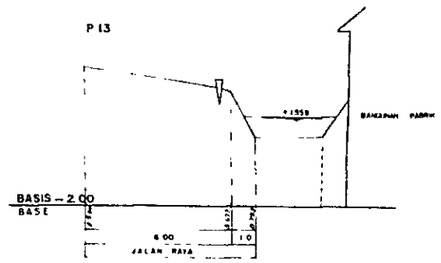

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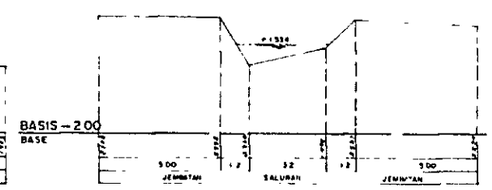

LOW COST HOUSING PROJECT
CENGKARENG - JAWA BARAT

PEKERJAAN: PENGUKURAN SALURAN	KAB TANGERANG	TANGGAL	4-8-1980
		DIGAMBAR	
		DIPERIKSA	
		DISETUJUI	
POTONGAN MELINTANG (CROSS SECTION)	p.t. SOILENS	NO LEMBAR: JUMLAH LEMBAR	2/2
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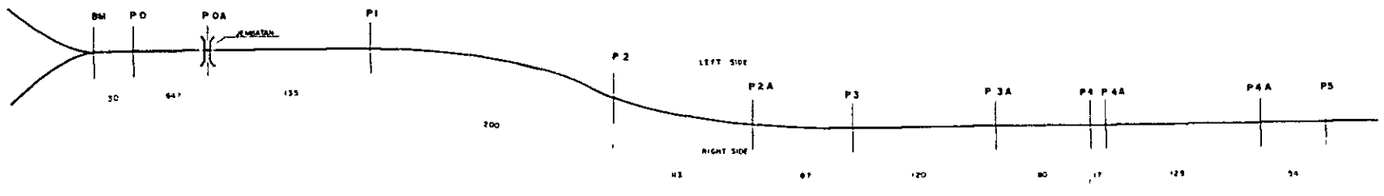

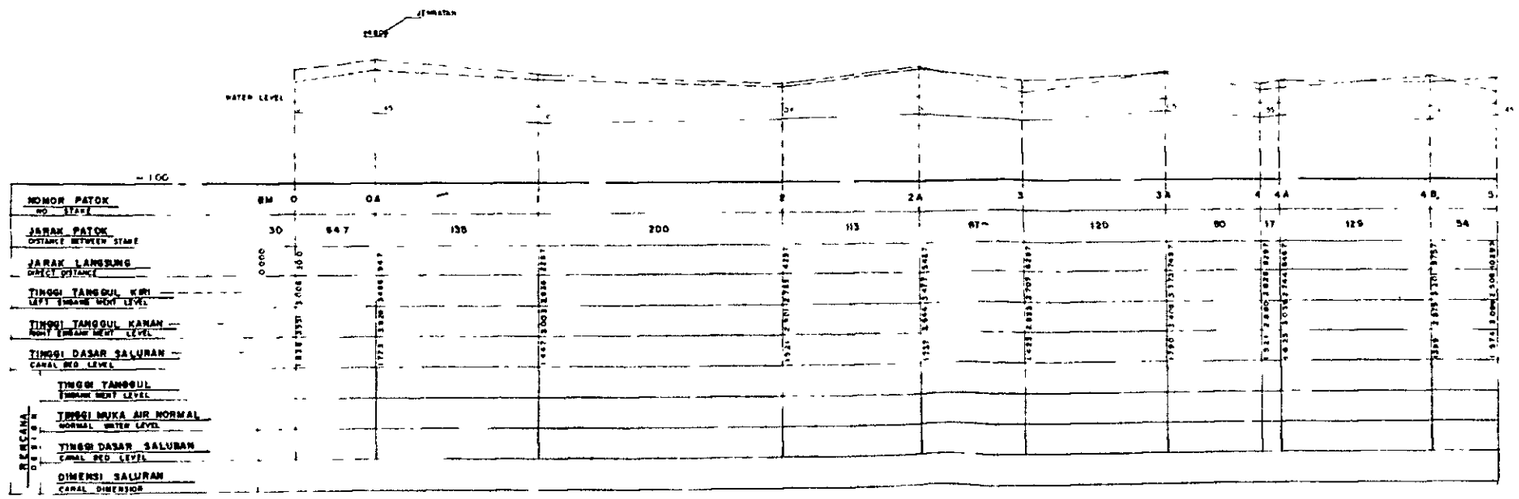

REV NO	YANG DIREVISI	OLEH	DIPER	DISET	TGL	SKALA T 1:100 P 1:200	

LOW COST HOUSING PROJECT
CENGKARENG – JAWA BARAT

PEKERJAAN: PENGUKURAN SALURAN		TANGGAL	4 – 8 – 1980
		DIGAMBAR	K.R.
	KAB TANGERANG	DIPERIKSA	
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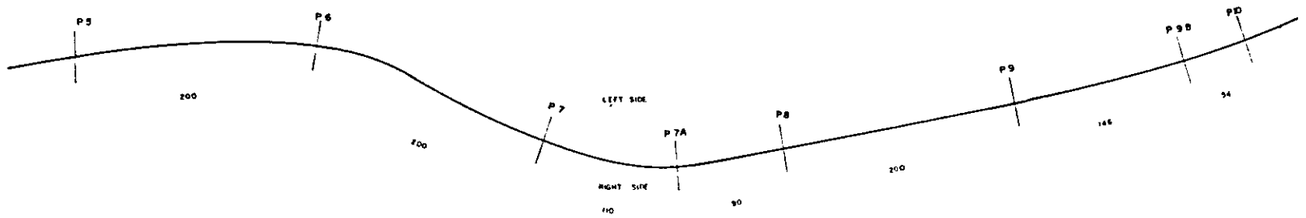

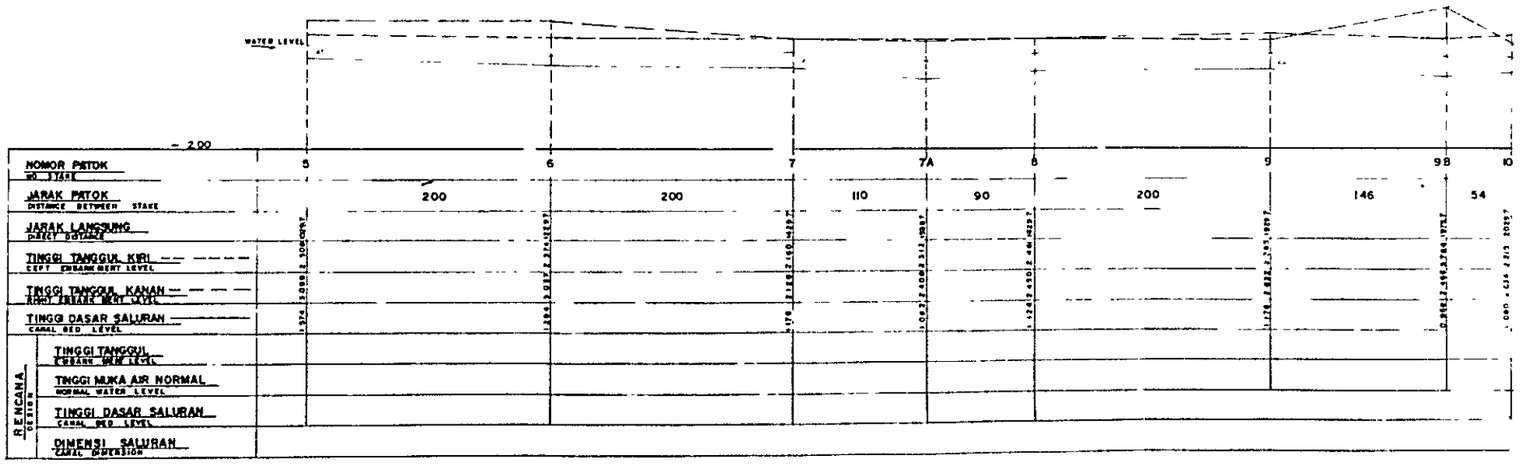

LOW COST HOUSING PROJECT
CENGKARENG - JAWA BARAT

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	KAB TANGERANG	DIPERIKSA	
		DISETUJUI	
POTONGAN MEMANJANG / LONGITUDINAL SECTION	p.t. SOILENS	NO LEMBAR / JUMLAH LEMBAR	2 / 3

REV NO	YANG DIREVISI	OLEH	DIPER	DISET	TGL

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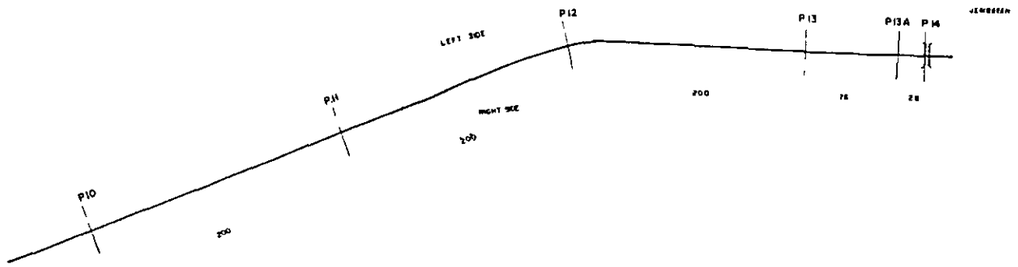

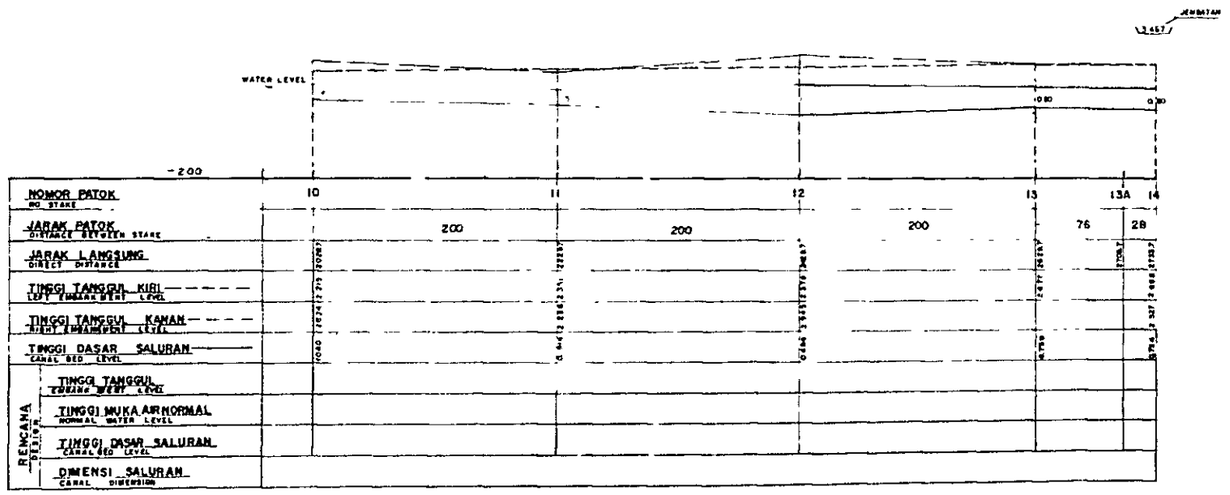

LOW COST HOUSING PROJECT
CENGKARENG - JAWA BARAT

PEKERJAAN: PENGUKURAN SALURAN

KAB. TANGERANG

TANGGAL: 4-8-1980
DIGAMBAR:
DIPERIKSA:
DISETUJUI:

POTONGAN MEMANJANG
LONGITUDINAL SECTION

SKALA T: 100 P: 200

PT SOILENS

NO. LEMBAR / JUMLAH LEMBAR: 3/3

REVISI	YANG DIREVISI	OLEH	DIPER	DISET	TGL