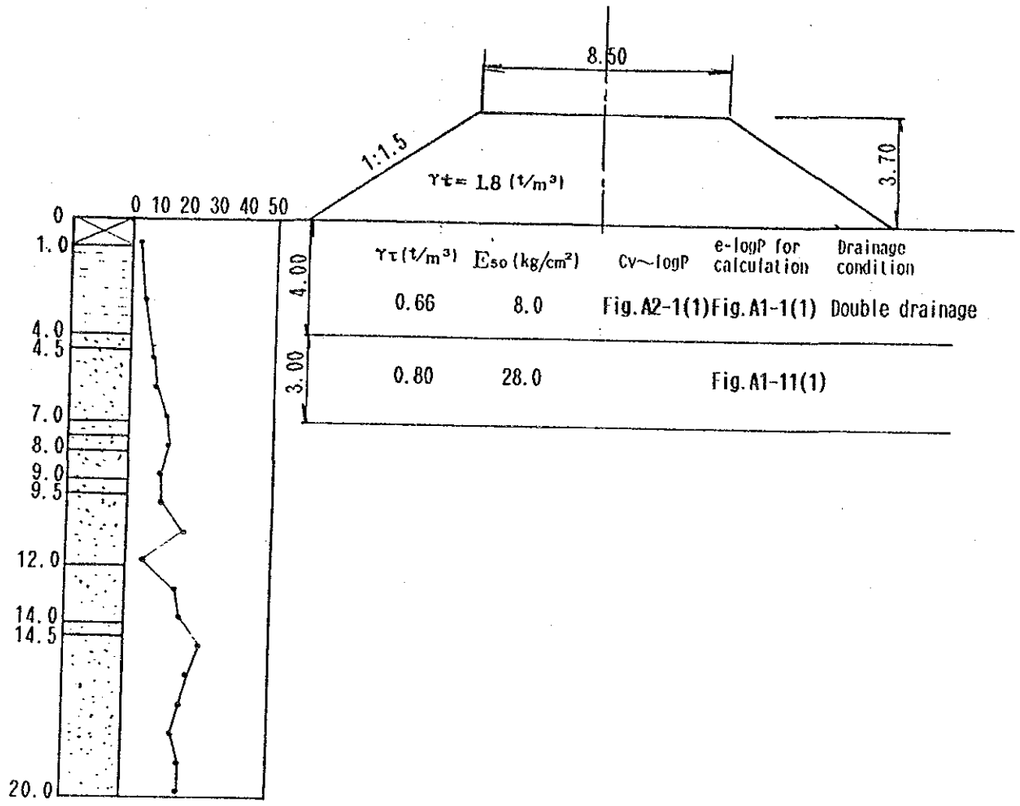
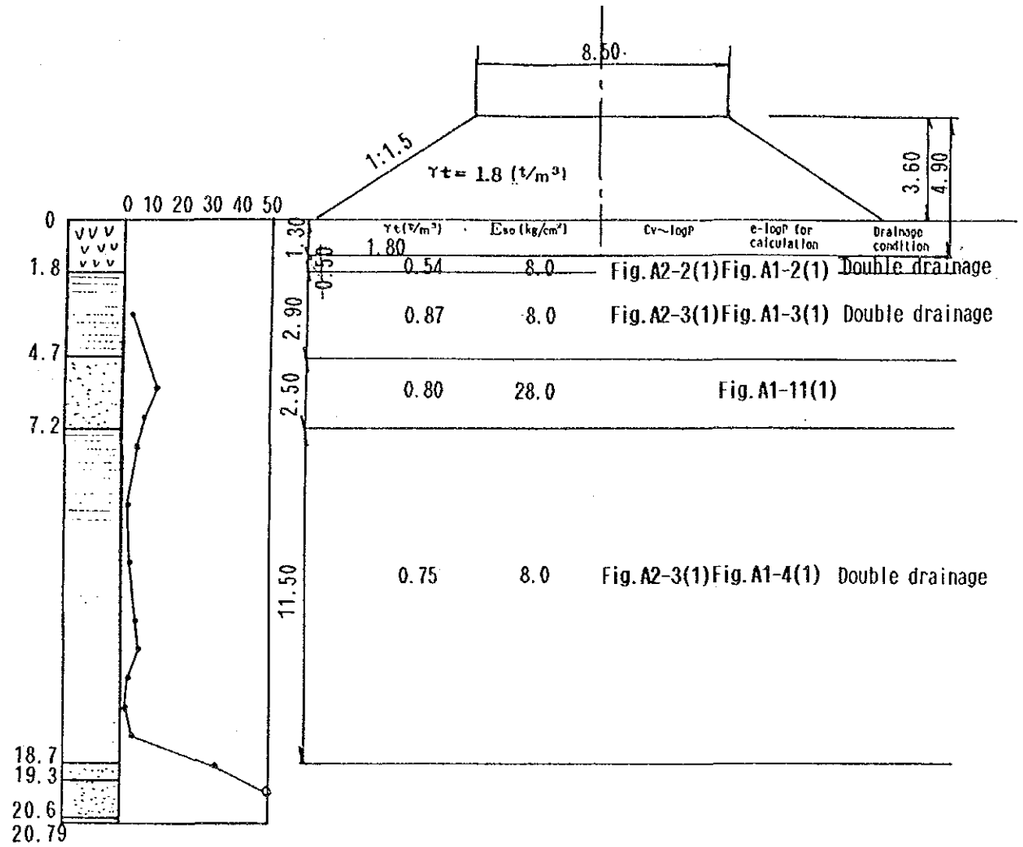
ATTACHMENT-2

Cross Section and Soil Properties
applied to calculation for settlement
and stability of embankment

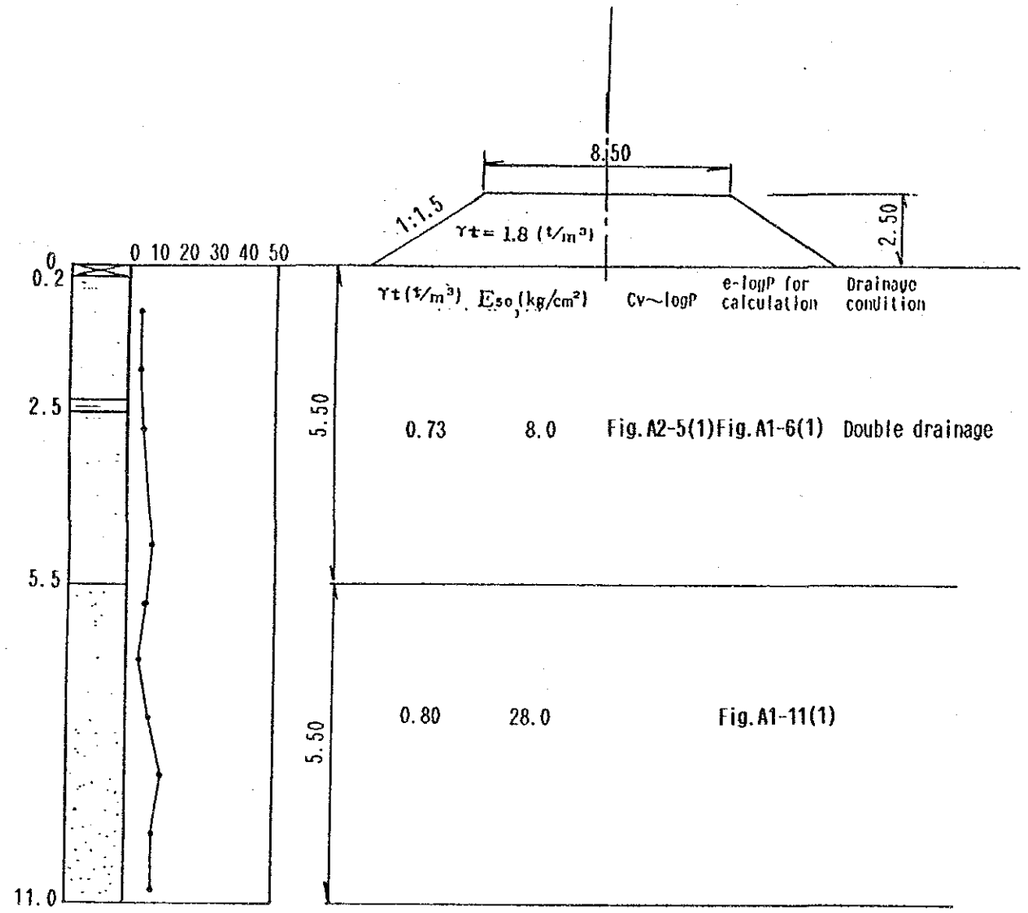
HI(a) Embankment
HIARU with more than 3 m height B-6



AL(a) Embankment
ALIKA with more than 3 m height B-8

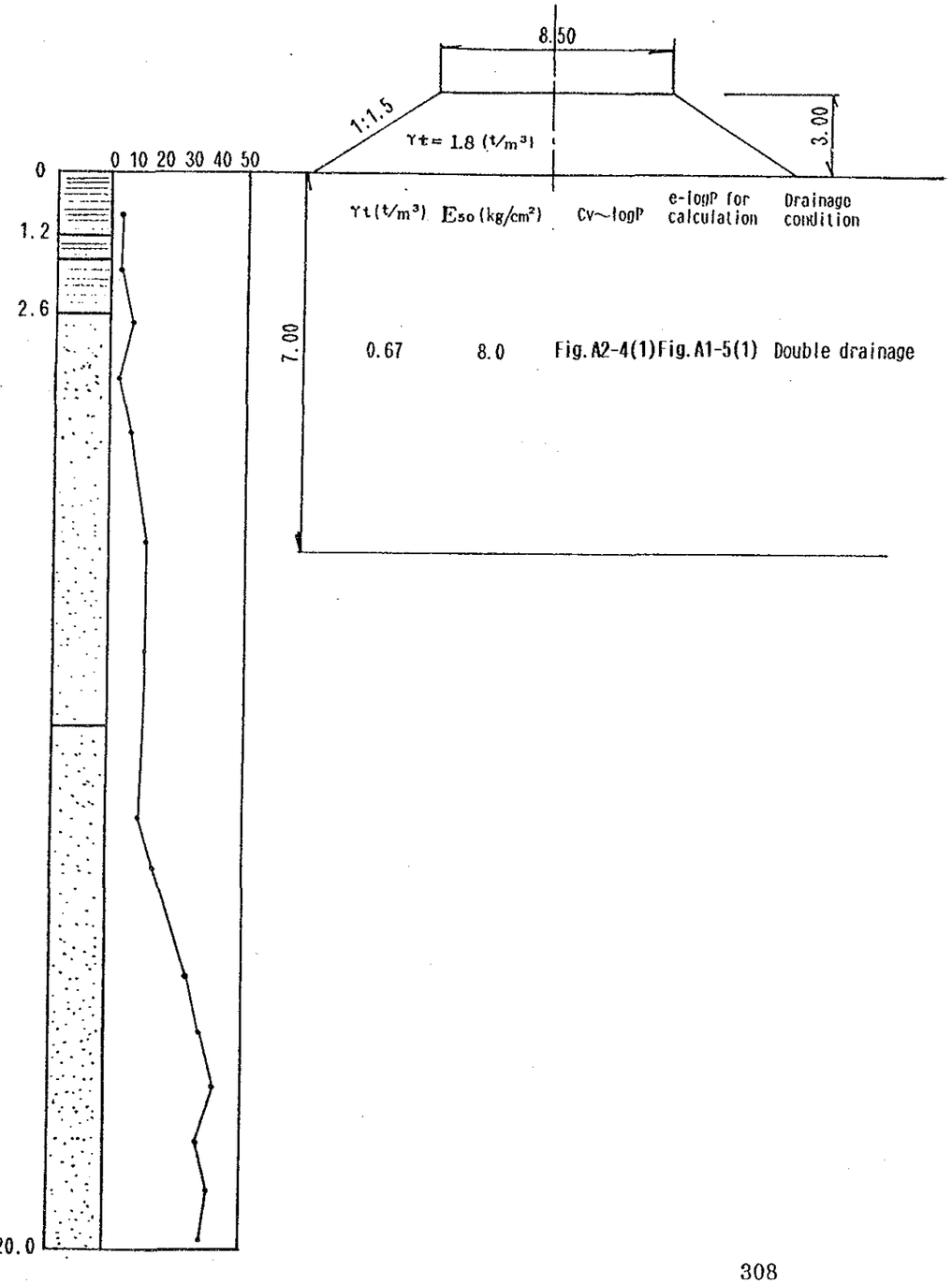


KA(a) Embankment
KAPURI with less than 3 m height S-2



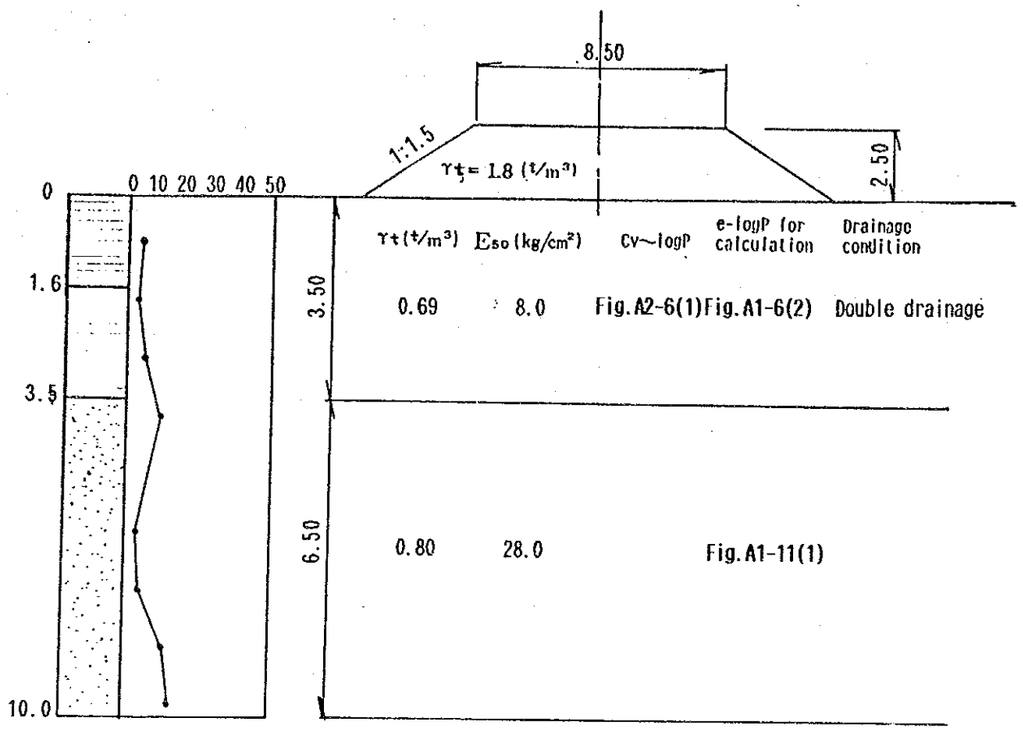
γt(t/m³)	Eso(kg/cm²)	Cv~logP	e-logP for calculation	Drainage condition
0.73	8.0	Fig.A2-5(1)	Fig.A1-6(1)	Double drainage
0.80	28.0		Fig.A1-11(1)	

KA(b) Embankment
KAPURI with more than 3 m height B-9



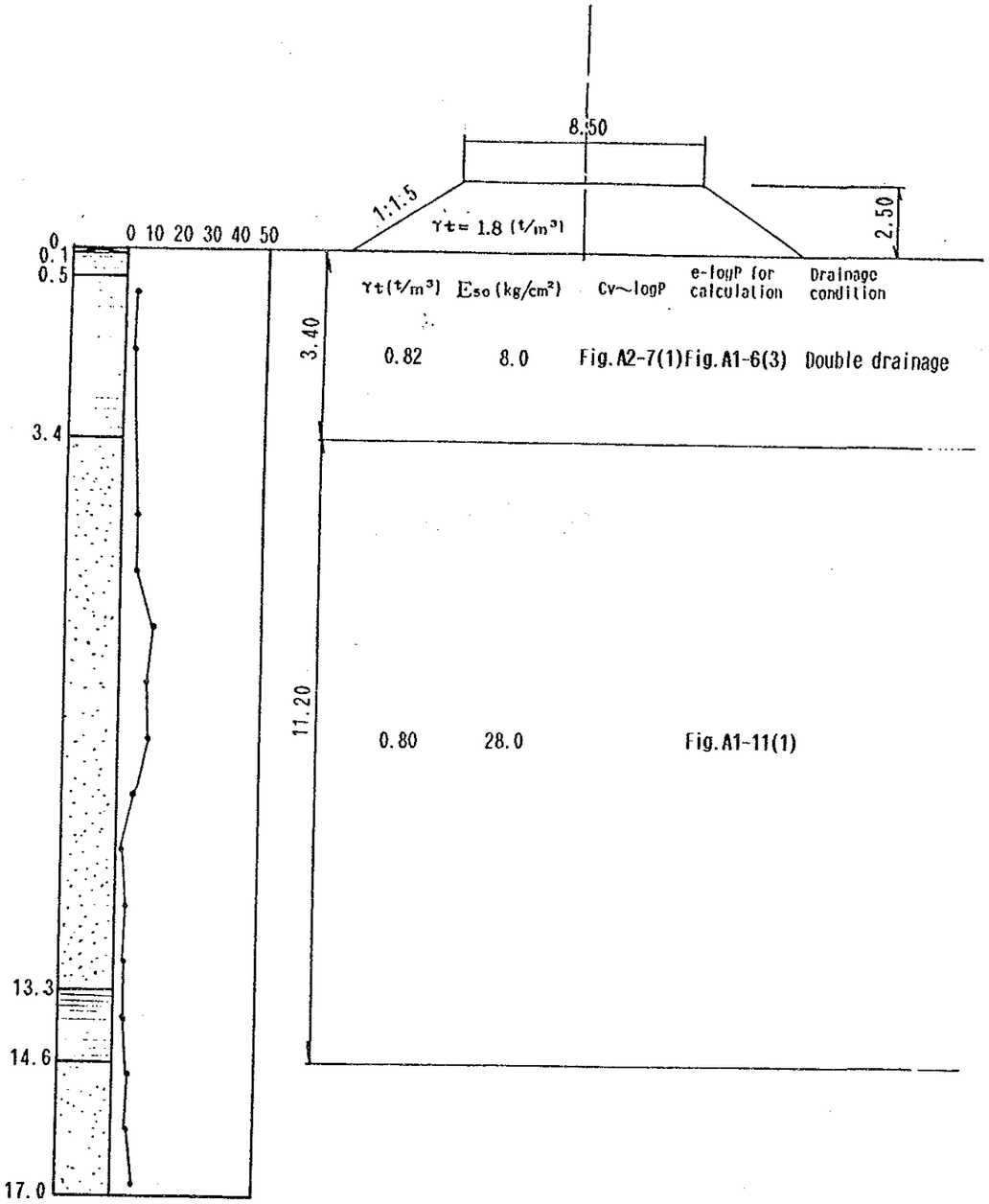
γt(t/m³)	Eso(kg/cm²)	Cv~logP	e-logP for calculation	Drainage condition
0.67	8.0	Fig.A2-4(1)	Fig.A1-5(1)	Double drainage

KA(c) Embankment
KAPURI with less than 3 m height S-3



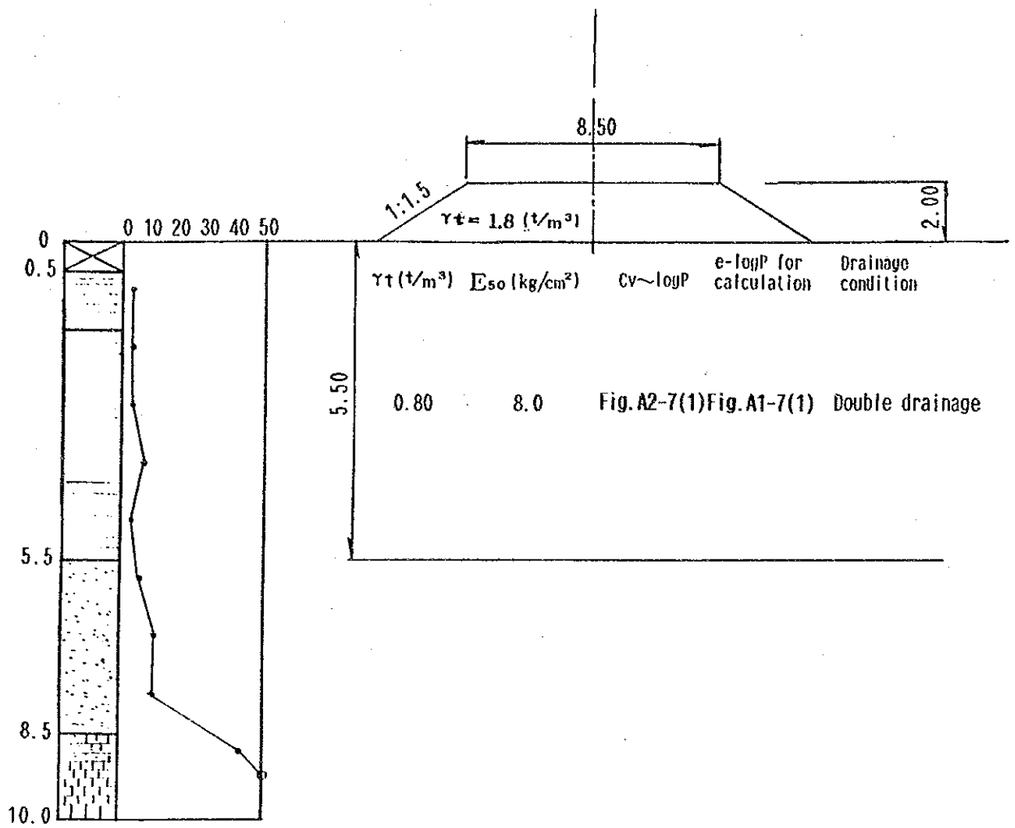
γt(t/m³)	Eso (kg/cm²)	Cv~logP	e-logP for calculation	Drainage condition
0.69	8.0	Fig.A2-6(1)Fig.A1-6(2)		Double drainage
0.80	28.0	Fig.A1-11(1)		

KA(d) Embankment
KAPURI with less than 3 m height S-4

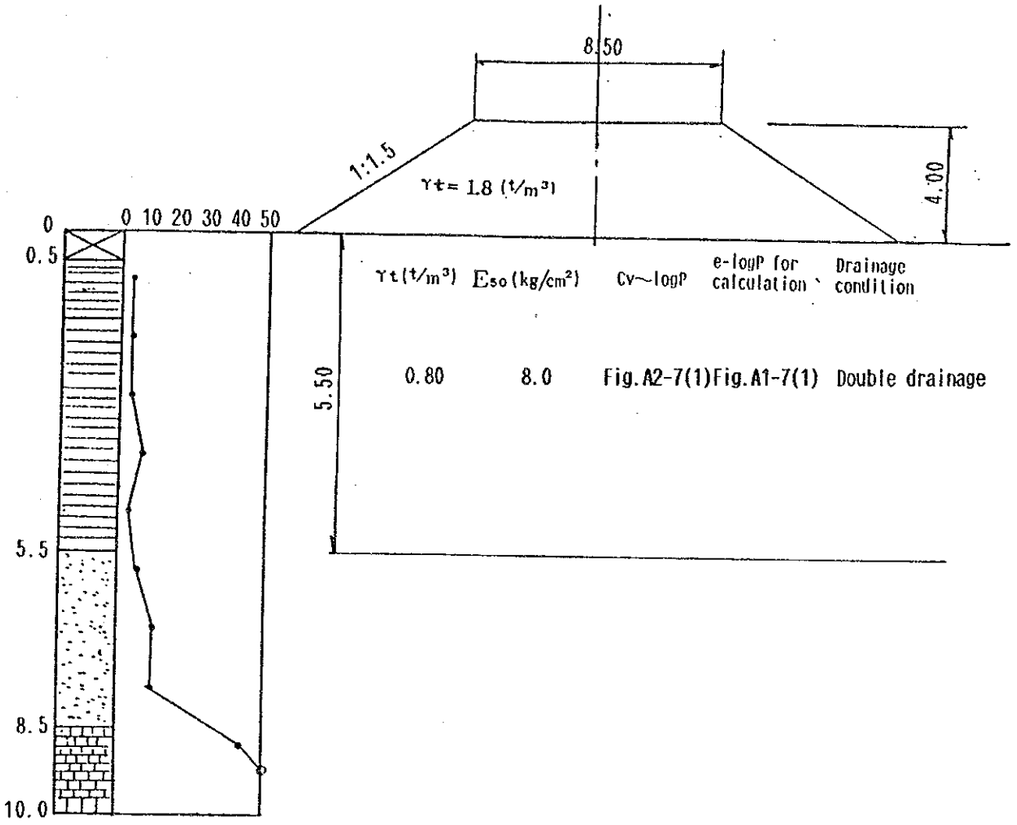


γt(t/m³)	Eso (kg/cm²)	Cv~logP	e-logP for calculation	Drainage condition
0.82	8.0	Fig.A2-7(1)Fig.A1-6(3)		Double drainage
0.80	28.0	Fig.A1-11(1)		

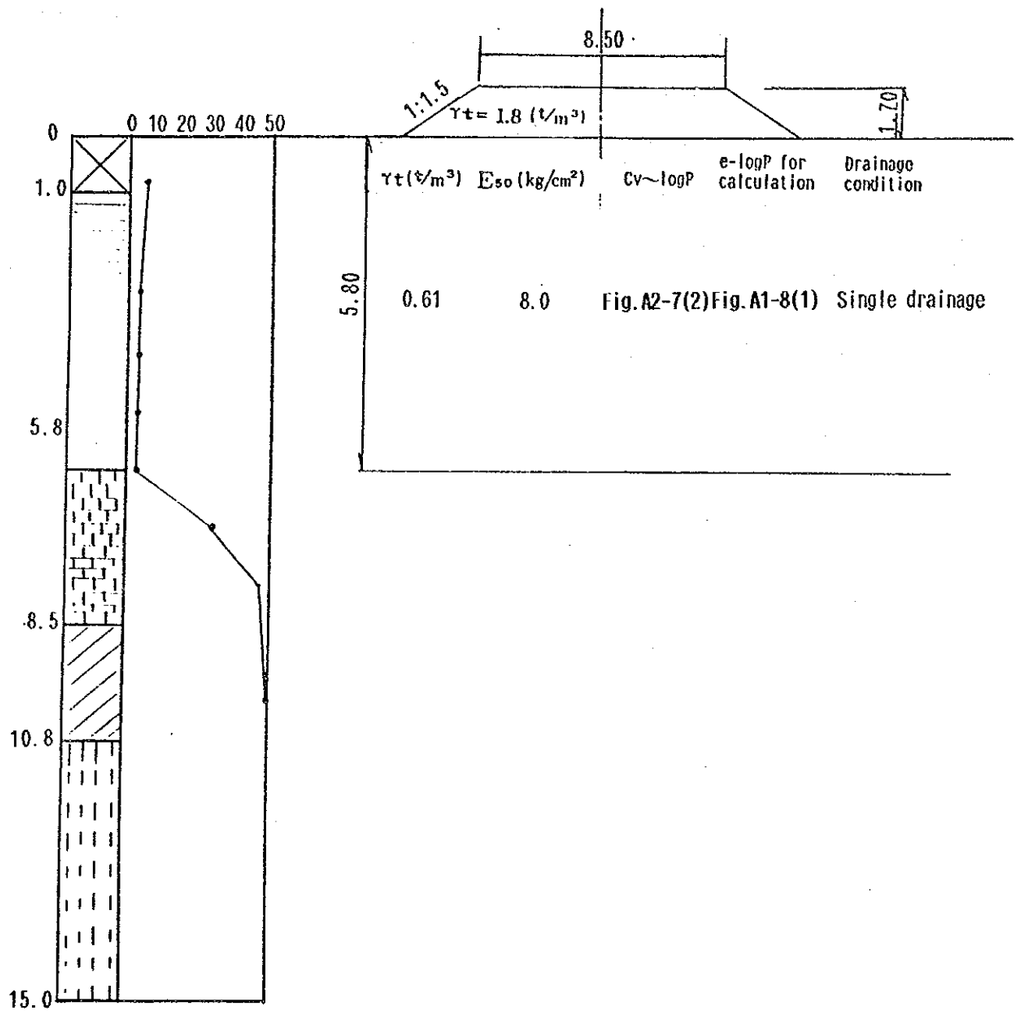
LA(a) Embankment
LAKEKAHU with less than 3 m height B-11



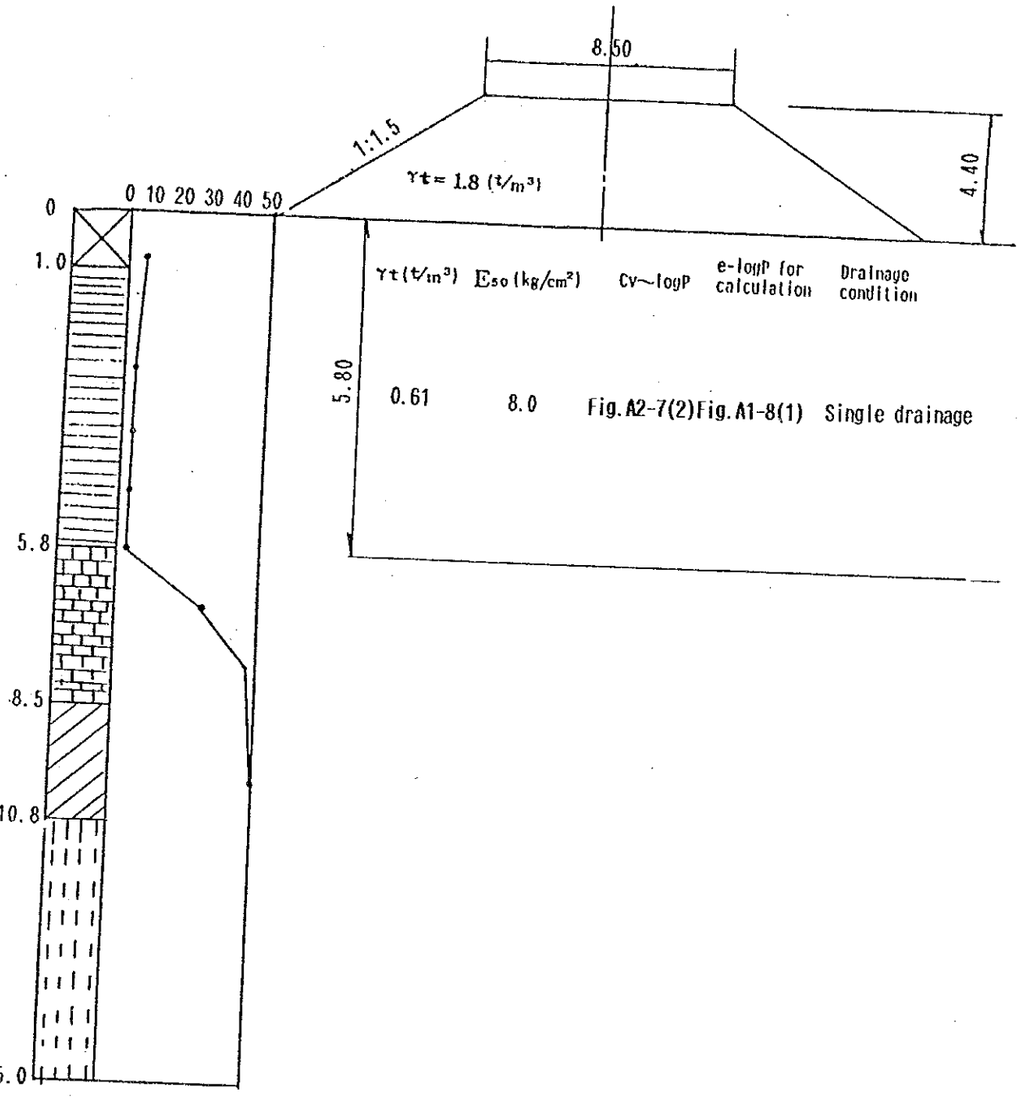
LA(b) Embankment
LAKEKAHU with more than 3 m height B-11



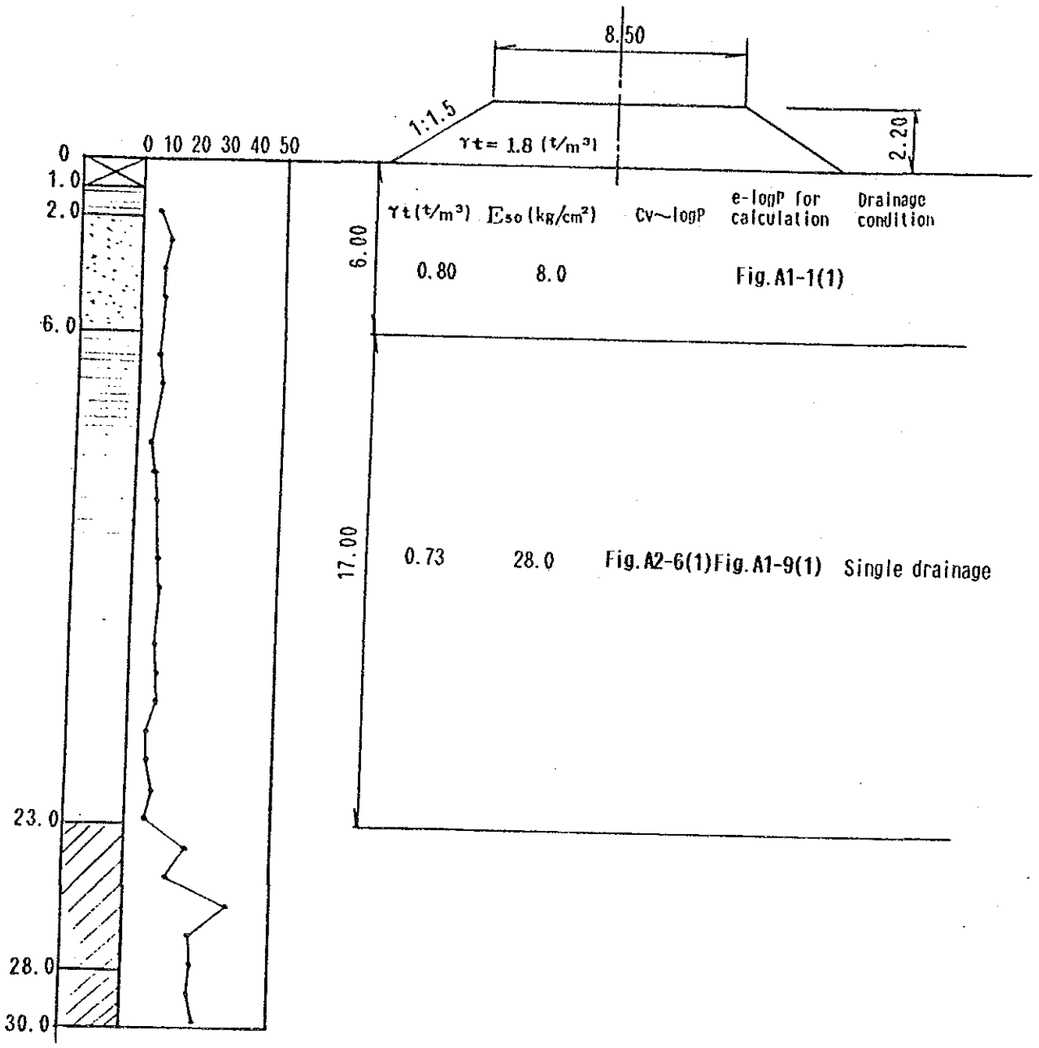
TA(a) & (c) Embankment
TAURI with less than 3 m height B-14



TA(b) Embankment
TAURI with more than 3 m height B-14

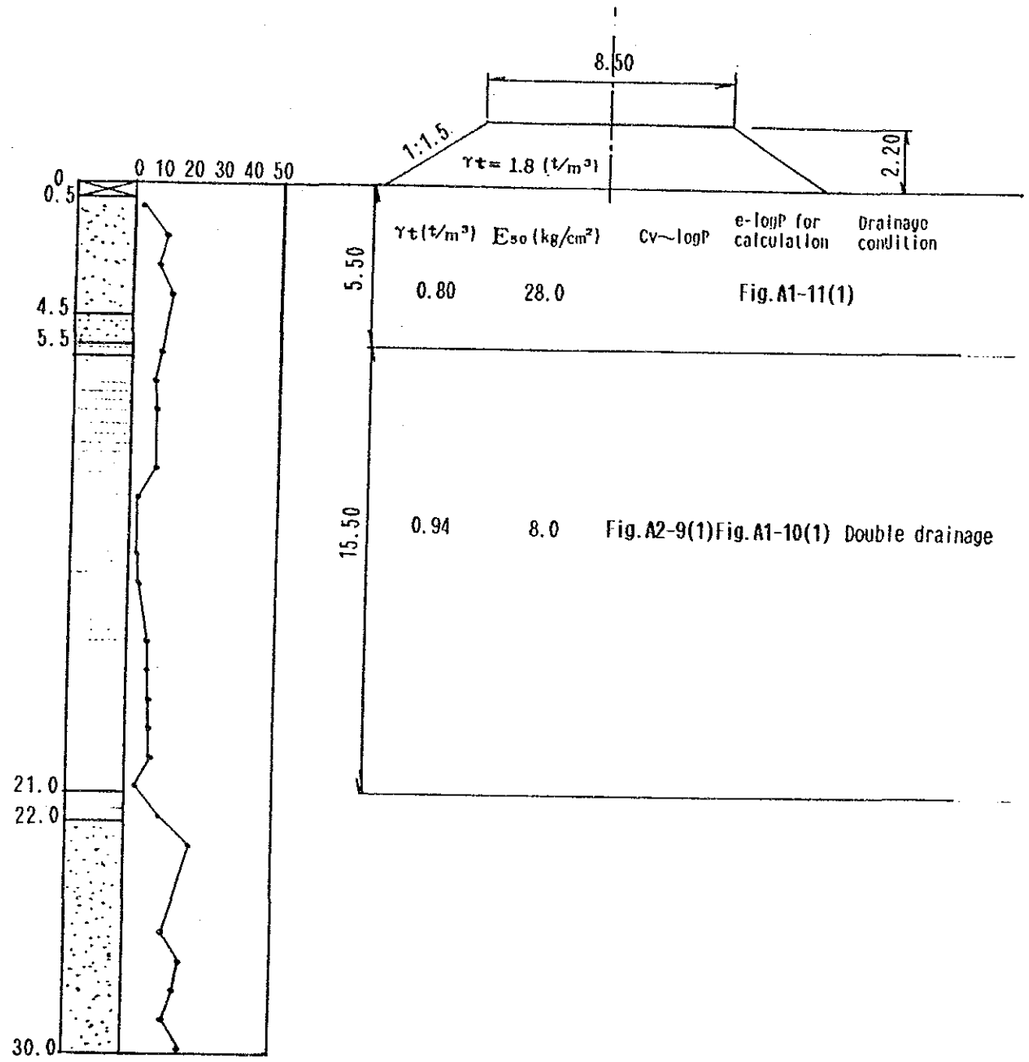


HA(a) Embankment
HAKARA with less than 3 m height B-16



γt(t/m³)	Eso (kg/cm²)	Cv~logP	e-logP for calculation	Drainage condition
0.80	8.0		Fig.A1-1(1)	
0.73	28.0		Fig.A2-6(1)Fig.A1-9(1)	Single drainage

SA(a) Embankment
SAPPAHARO with less than 3 m height B-17



γt(t/m³)	Eso (kg/cm²)	Cv~logP	e-logP for calculation	Drainage condition
0.80	28.0		Fig.A1-11(1)	
0.94	8.0		Fig.A2-9(1)Fig.A1-10(1)	Double drainage

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

(e – log P CURVE / f – log P (COURBE))

FOR REPORTING (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L'ENQUÊTE ET LOCALITÉ)	MIARU RIVER	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	B6 (m ~ m)	TESTED BY (ESSAI PAR)	

※UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

※INITIAL WATER CONTENT w_0 (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO I_0 (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_0 (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION Sr (%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSION)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)

e – log p CURVE
~~f – log p~~ (COURBE)

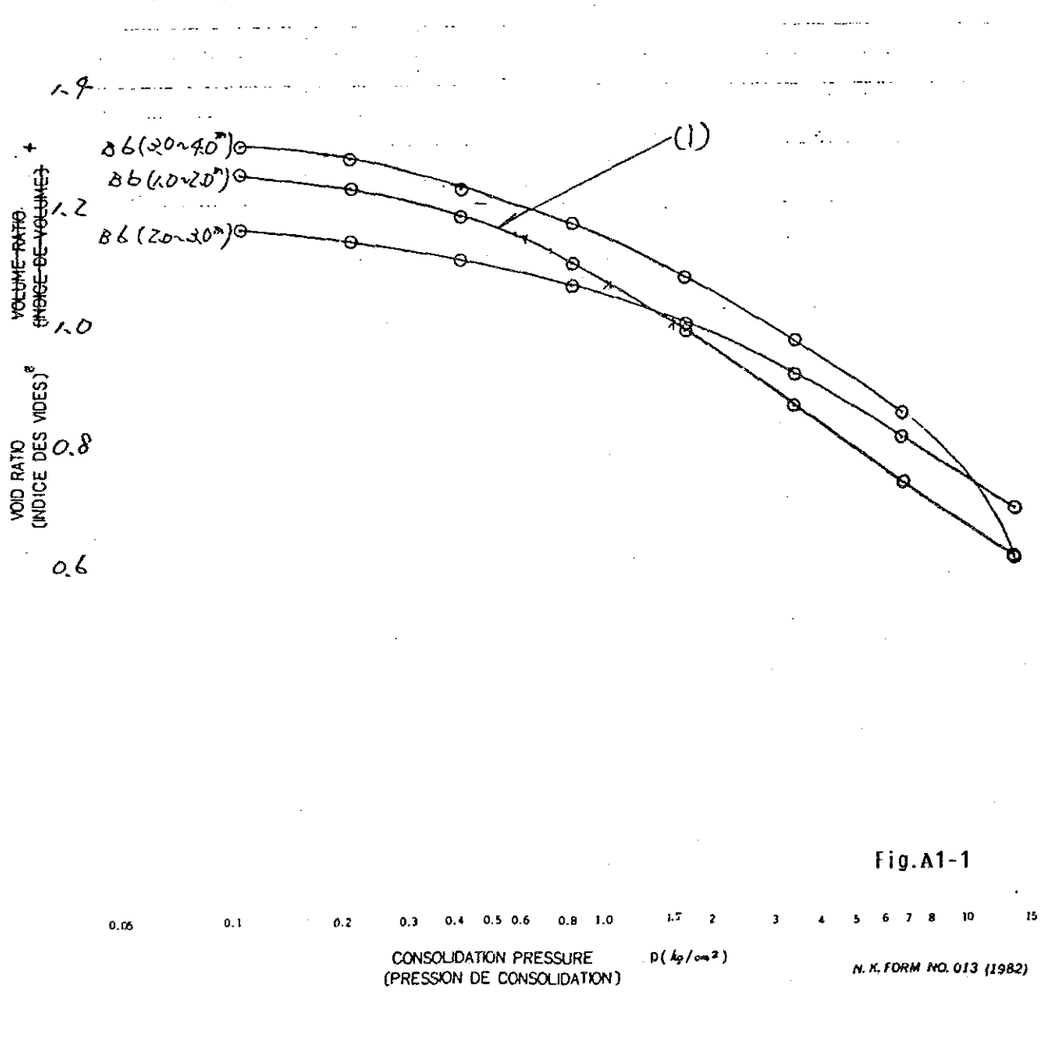


Fig.A1-1

N. K. FORM NO. 013 (1982)

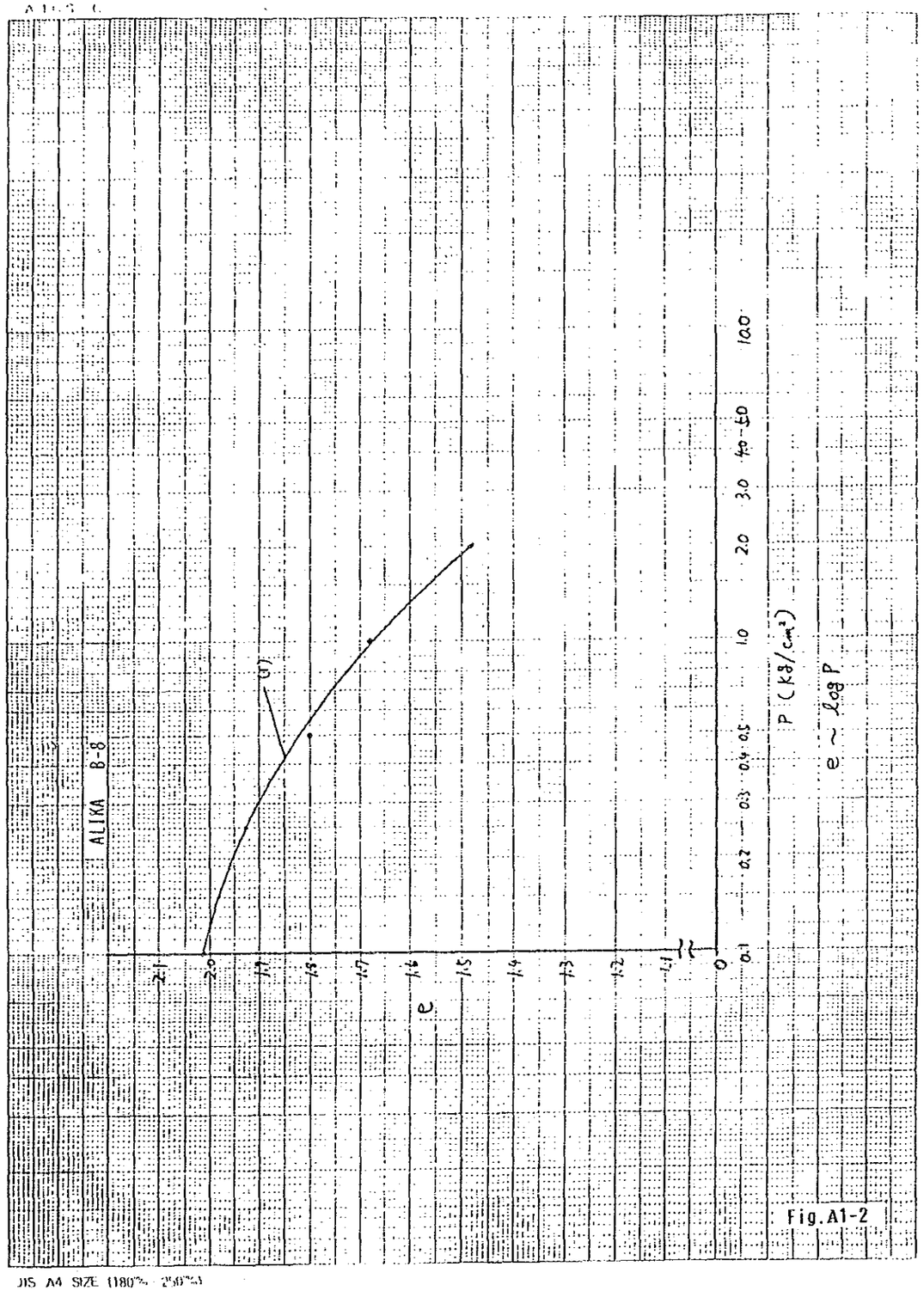


Fig.A1-2

JIS A4 SIZE (180mm × 260mm)

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

(e – log P CURVE / f – log P (COURBE))

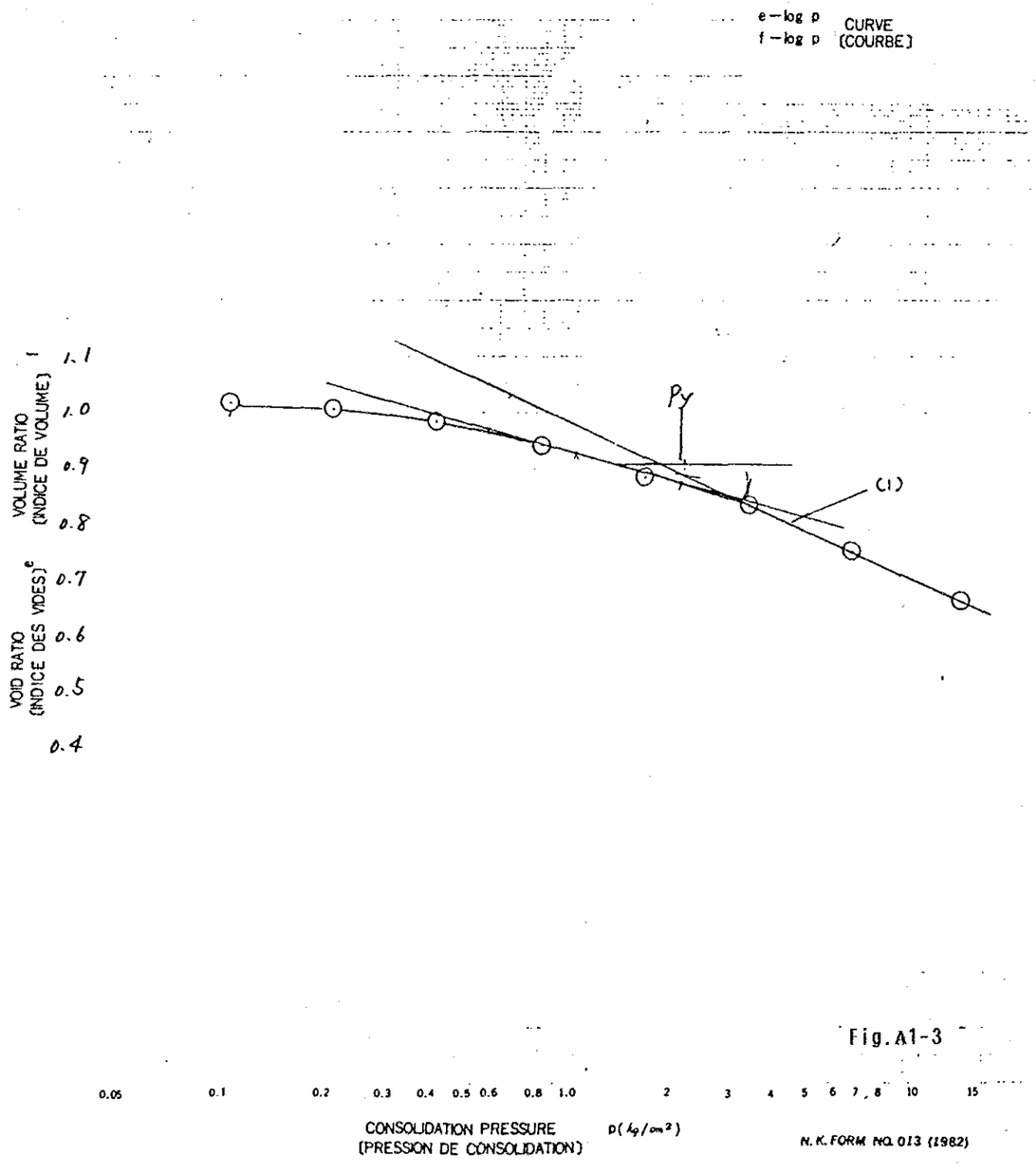
FOR REPORTING (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	Alika Swamp	DATE (DATE)	29. 10. 88
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	88/331 B8 (4.0 m ~ 5.0 m)	TESTED BY (ESSAI PAR)	WK

※UNDISTURBED OR DISTURBED (ONTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)*	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)
		2.599	41.8	2.00	6.00

※INITIAL WATER CONTENT w_o (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO I (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION Sr (%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSON)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)
41.8	2.026	1.026	100	0.287	2.03

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)



N. K. FORM NO. 013 (1982)

Fig. A1-3

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

(e – log / f – log P (COURBE) /)

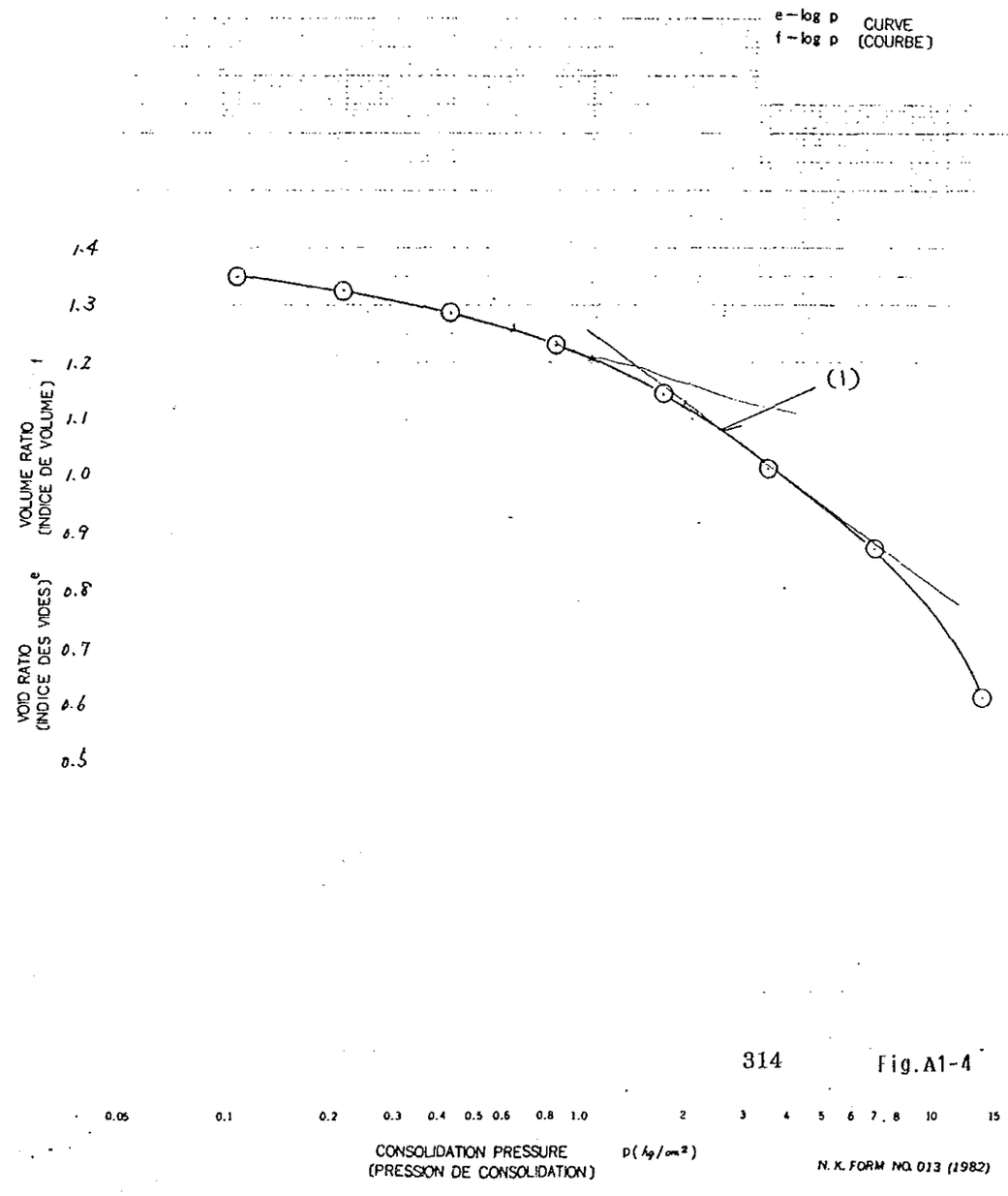
(POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	ALIKA SWAMP	DATE (DATE)	1. 11. 88
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	88/334 B 8 (12.0 m ~ 13.0 m)	TESTED BY (ESSAI PAR)	WK

※UNDISTURBED OR DISTURBED (ONTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)*	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)
		2.642		2.00	6.00

※INITIAL WATER CONTENT w_o (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO I (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION Sr (%) (DEGRÉ DE SATURATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSON)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)
	2.370	1.370		0.95	—

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)



N. K. FORM NO. 013 (1982)

Fig. A1-4

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

(e−log P CURVE / f−log P (COURBE)) — FOR REPORTING (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	KAPURI RIVER	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	B9 (m ~ m)	TESTED BY (ESSAI PAR)	

*UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	*CLASSIFICATION (CLASSIFICATION)*	*SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	*LIQUID LIMIT w_L(%) (LIMIT DE LIQUIDITÉ)	*INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

*INITIAL WATER CONTENT w_o(%) (TENEUR EN EAU INITIALE)	*INITIAL VOLUME RATIO f (INDICE DE VOLUME INITIAL)	*INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	*DEGREE OF INITIAL SATURATION S_r(%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSON)	YIELD STRESS OF CONSOLIDATION P_y(kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

*THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)

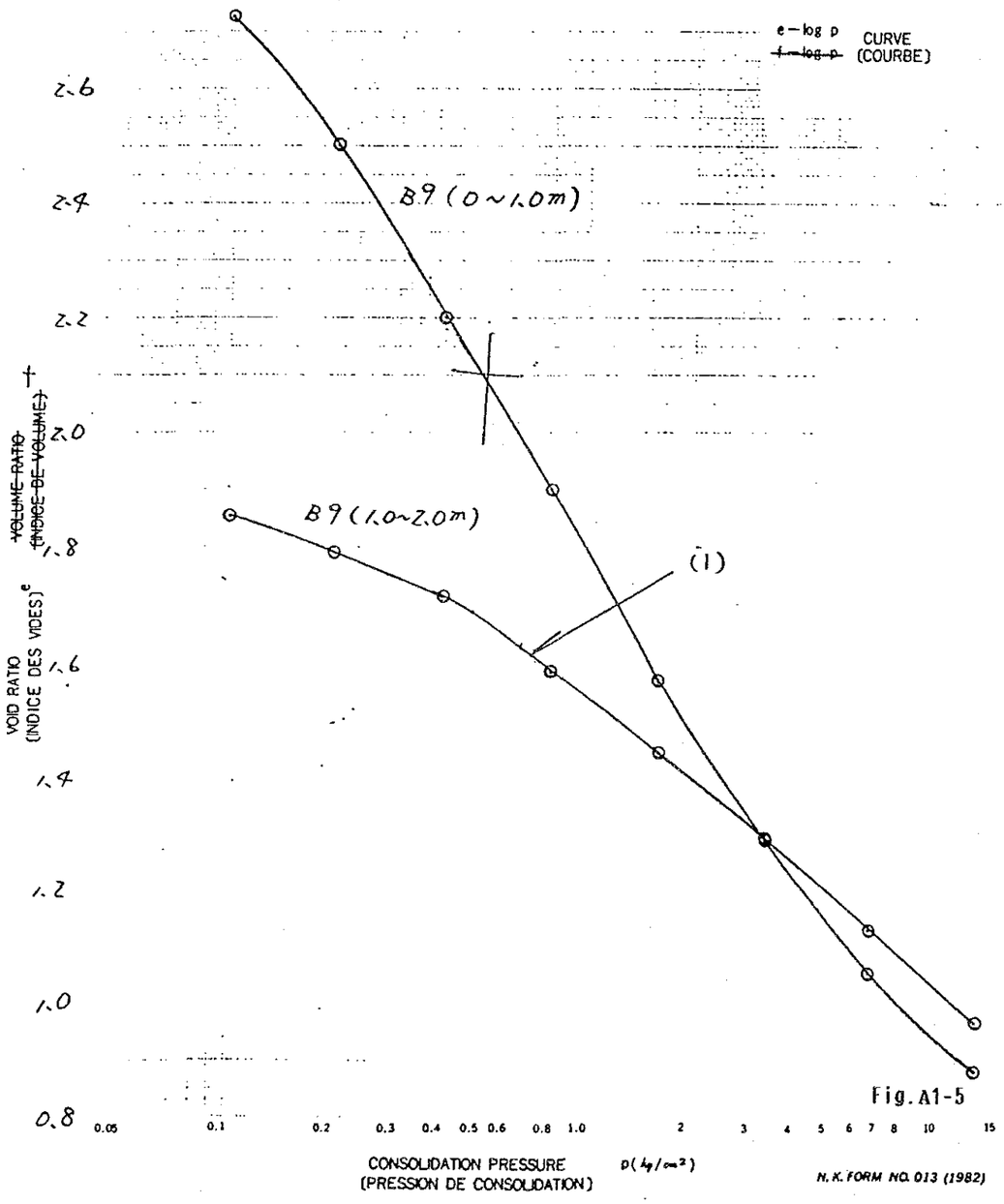


Fig. A1-5

N. K. FORM NO. 013 (1982)

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

(e−log P / f−log P (COURBE)) — (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	SWAMP	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	S2, S3, S4 (m ~ m)	TESTED BY (ESSAI PAR)	

*UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	*CLASSIFICATION (CLASSIFICATION)*	*SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	*LIQUID LIMIT w_L(%) (LIMIT DE LIQUIDITÉ)	*INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

*INITIAL WATER CONTENT w_o(%) (TENEUR EN EAU INITIALE)	*INITIAL VOLUME RATIO f (INDICE DE VOLUME INITIAL)	*INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	*DEGREE OF INITIAL SATURATION S_r(%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSON)	YIELD STRESS OF CONSOLIDATION P_y(kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

*THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)

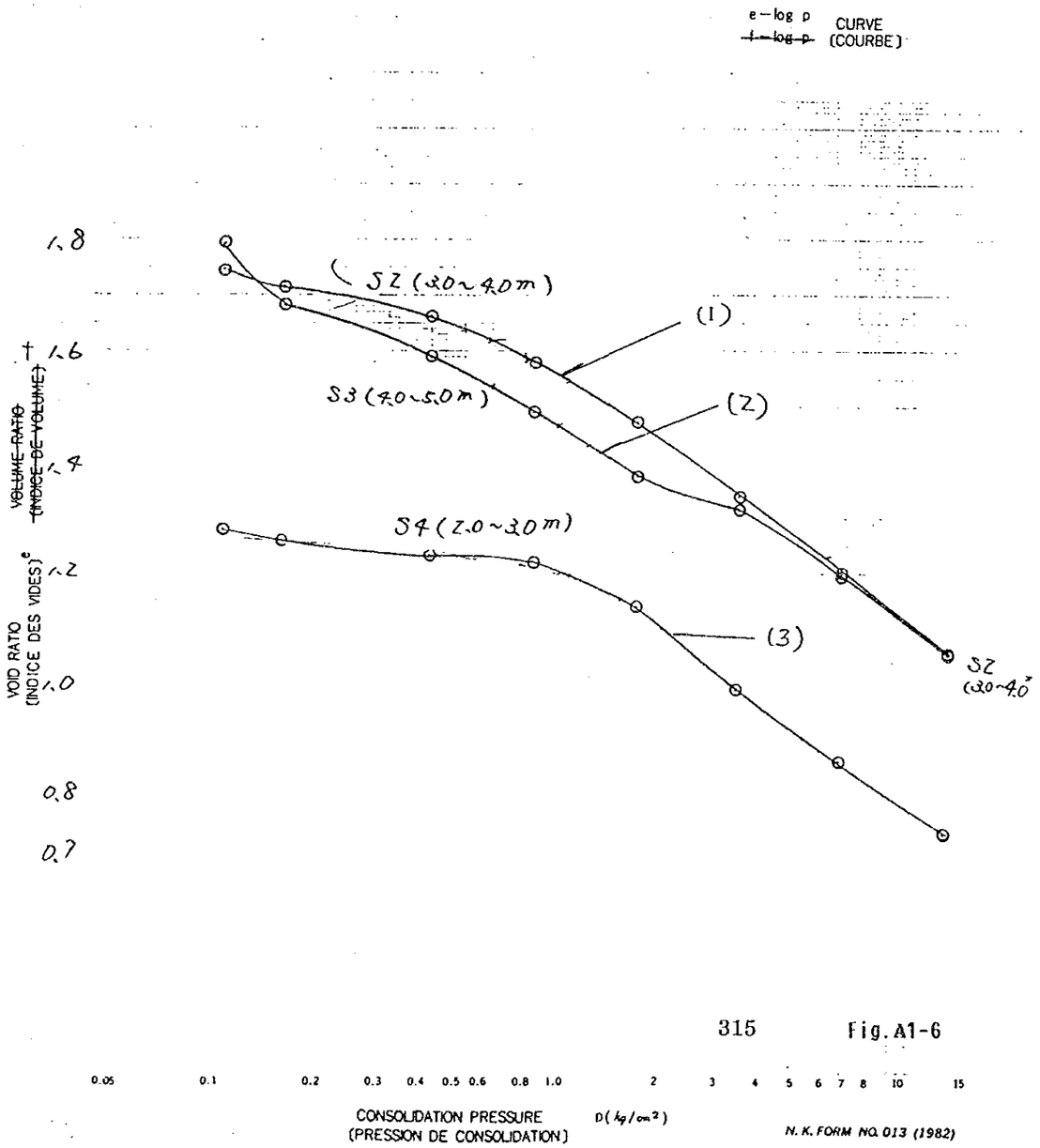


Fig. A1-6

N. K. FORM NO. 013 (1982)

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

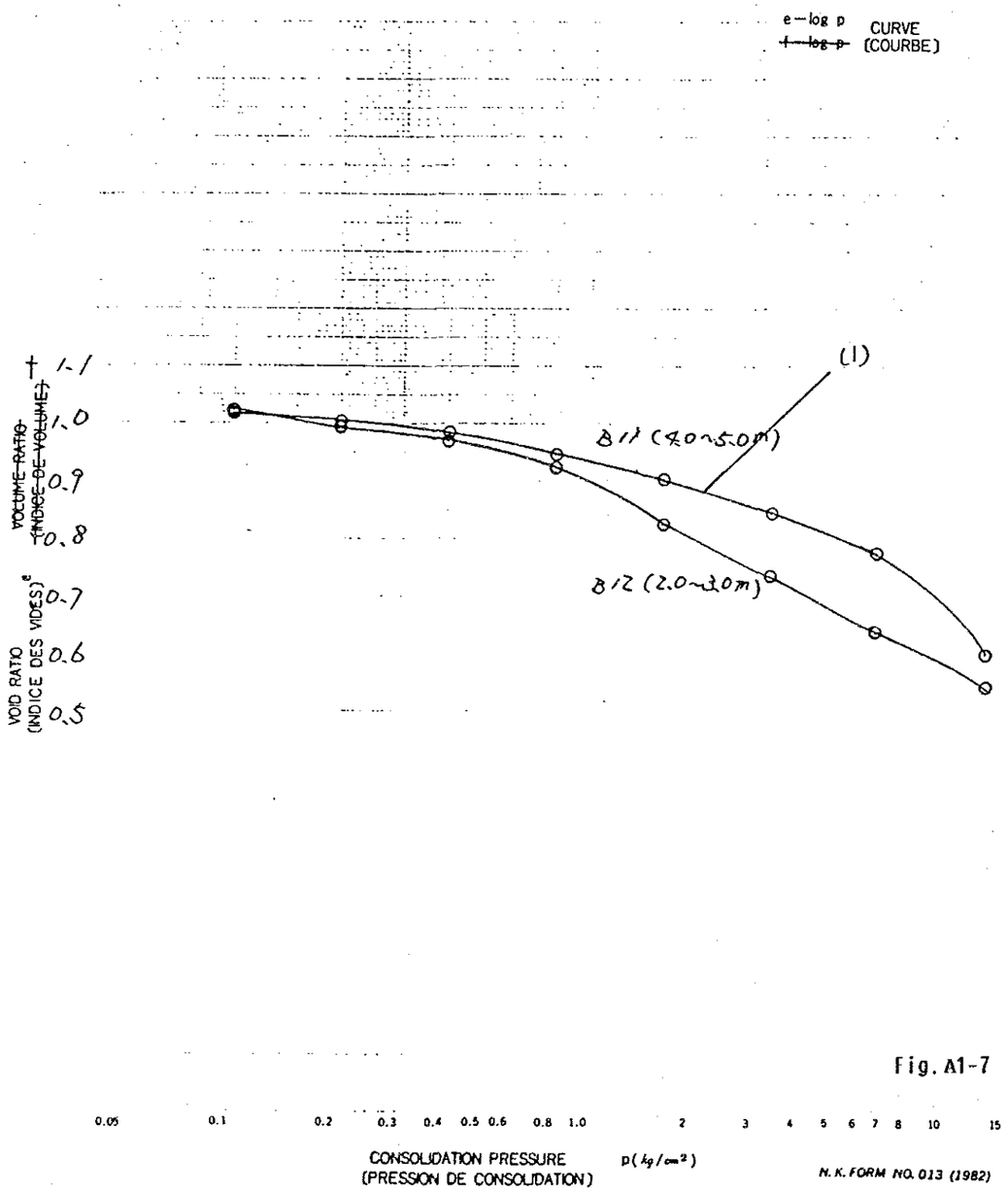
(e–log P CURVE / f–log P (COURBE)) | FOR REPORTING (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	LAKEKAMU RIVER	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	B11, B12 (m ~ m)	TESTED BY (ESSAI PAR)	

※UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)*	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

※INITIAL WATER CONTENT w_o (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO v_o (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION S_r (%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSION)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)



N. K. FORM NO. 013 (1982)

Fig. A1-7

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

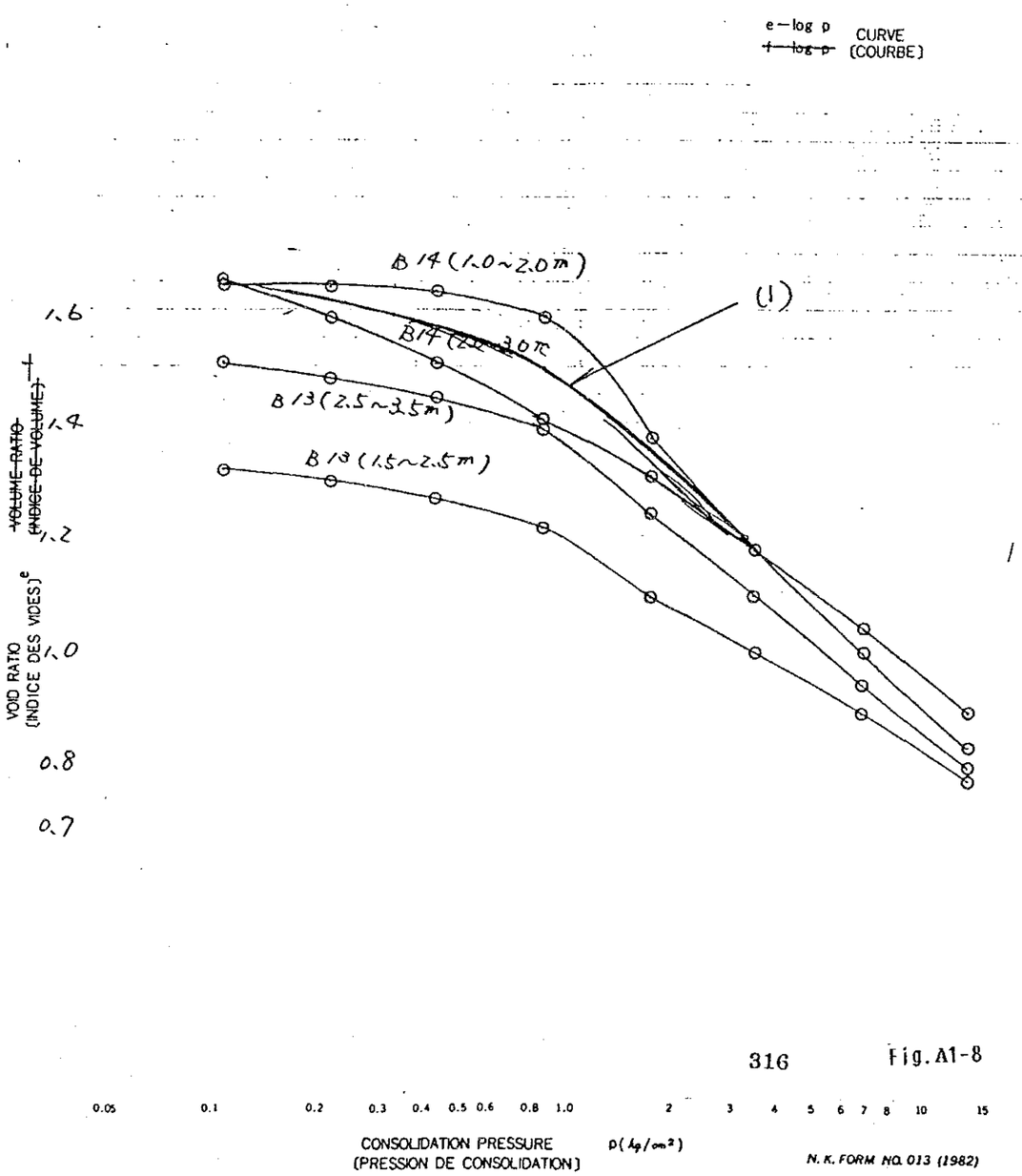
(e–log P / f–log P (COURBE)) | (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	TAURI RIVER	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	B13, B19 (m ~ m)	TESTED BY (ESSAI PAR)	

※UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)*	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

※INITIAL WATER CONTENT w_o (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO v_o (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION S_r (%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSION)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)



N. K. FORM NO. 013 (1982)

Fig. A1-8

CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

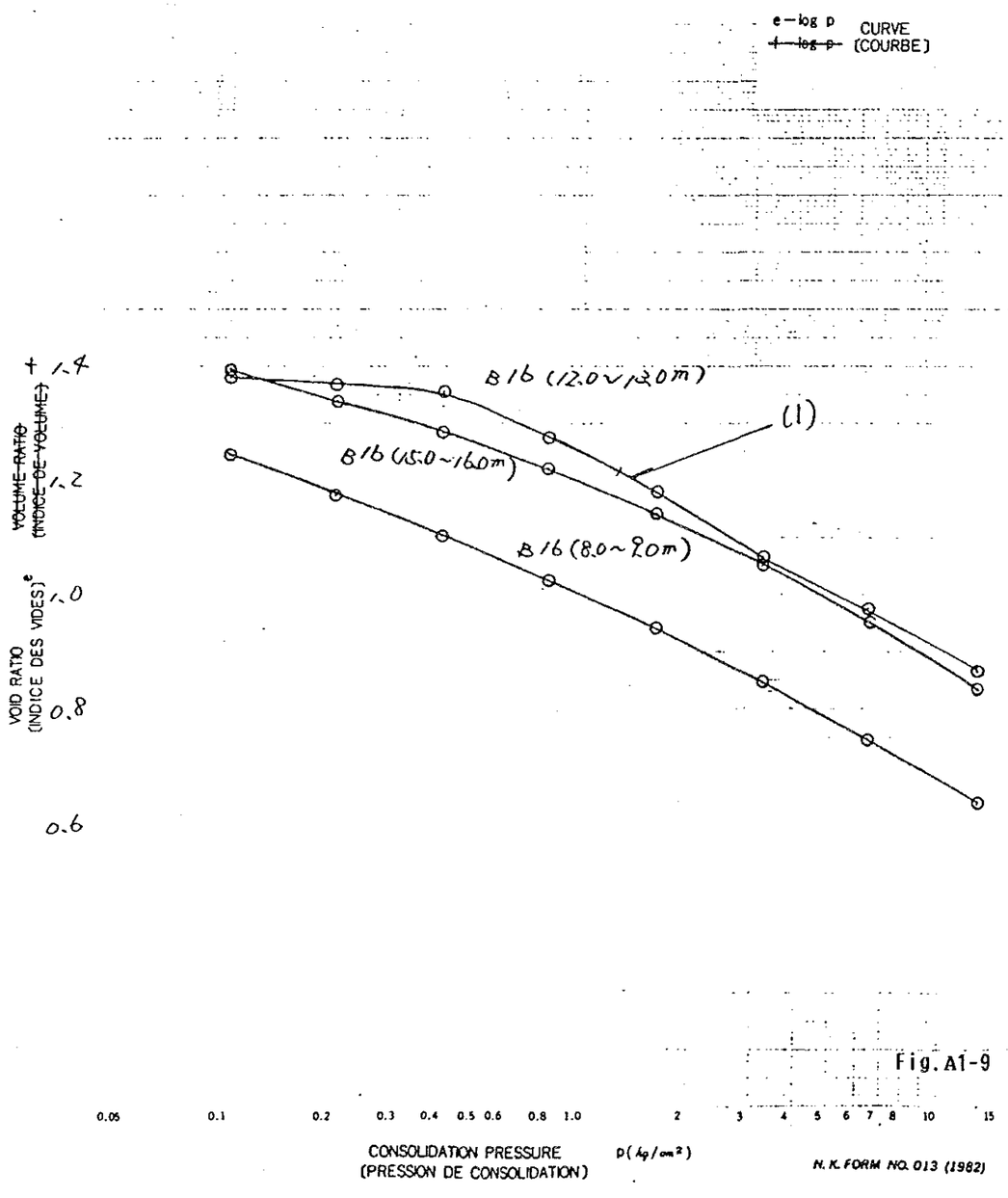
(e−log P CURVE / (f−log P (COURBE)) — FOR REPORTING (POUR LE RAPPORT)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	MAKARA RIVER	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	B 16 (m ~ m)	TESTED BY (ESSAI PAR)	

※UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)*	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

※INITIAL WATER CONTENT w_o (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO f (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION Sr (%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSION)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)



N. K. FORM NO. 013 (1982)

Fig. A1-9

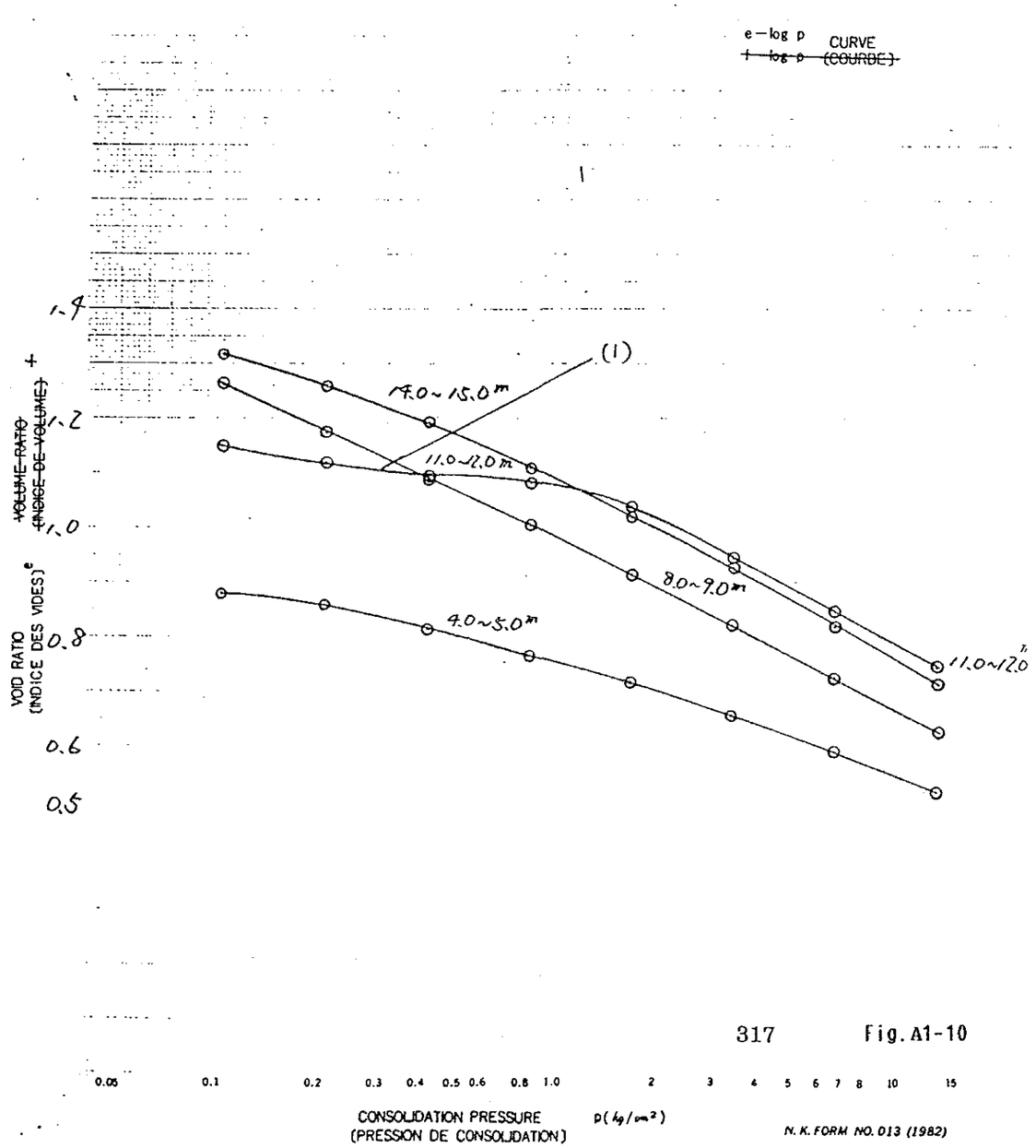
CONSOLIDATION TEST (ESSAI DE CONSOLIDATION)

NAME OF SURVEY & LOCALITY (DÉNOMINATION DE L' ENQUÊTE ET LOCALITÉ)	DIVOLA SWAMP	DATE (DATE)	
SAMPLE NO. & DEPTH (N° DE L'ÉCHANTILLON ET PROFONDEUR)	B 17 (m ~ m)	TESTED BY (ESSAI PAR)	

※UNDISTURBED OR DISTURBED (INTACT OU REMANIÉ)	※CLASSIFICATION (CLASSIFICATION)*	※SPECIFIC GRAVITY Gs (POIDS SPÉCIFIQUE)	※LIQUID LIMIT w_L (%) (LIMIT DE LIQUIDITÉ)	※INITIAL DIMENSION OF SPECIMEN (DIMENSION INITIALE DU SPÉCIMEN) HEIGHT (HAUTEUR) (cm)	DIAMETER (DIAMÈTRE) (cm)

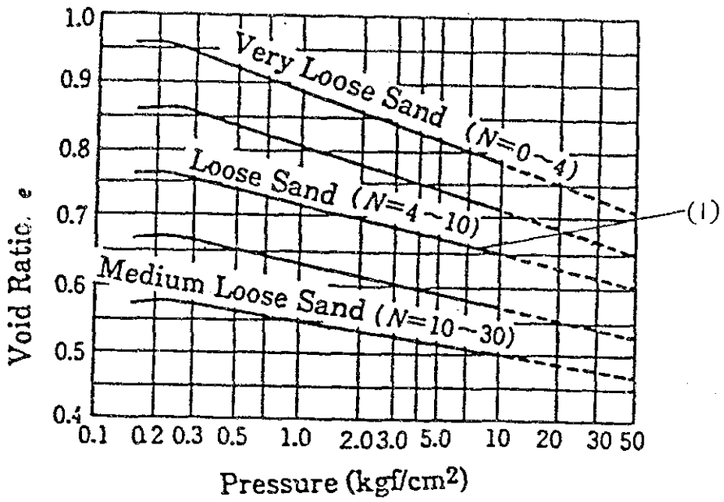
※INITIAL WATER CONTENT w_o (%) (TENEUR EN EAU INITIALE)	※INITIAL VOLUME RATIO f (INDICE DE VOLUME INITIAL)	※INITIAL VOID RATIO e_o (INDICE DES VIDES INITIAL)	※DEGREE OF INITIAL SATURATION Sr (%) (DEGRÉ DE SATURATION INITIALE)	COMPRESSION INDEX C_c (INDICE DE COMPRESSION)	YIELD STRESS OF CONSOLIDATION P_y (kg/cm²) (LIMITE D'ÉLASTICITÉ DE CONSOLIDATION)

※THE RECORDING IS NOT NECESSARY IN THE CASE THAT CALCULATION DATA SHEET IS APPENDED.
(LES CHIFFRES NE FIGURENT PAS ICIQUAND LA FEUILLE DES CALCULS DÉTAILLÉS EST ANNEXÉE)



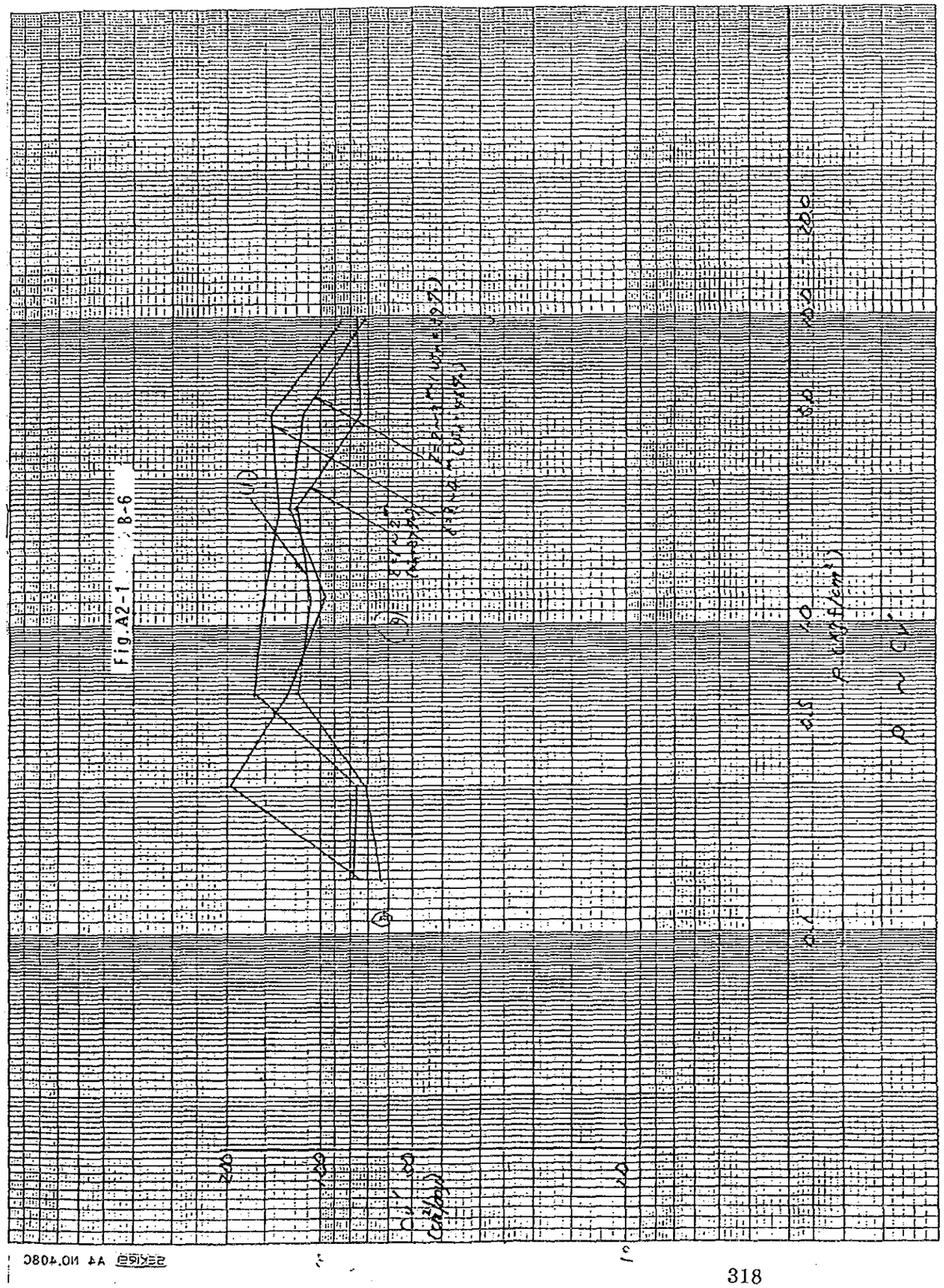
N. K. FORM NO. 013 (1982)

Fig. A1-10



(B) Pressure versus void ratio curve of sand (B.K.Hough)

Fig. A1-11



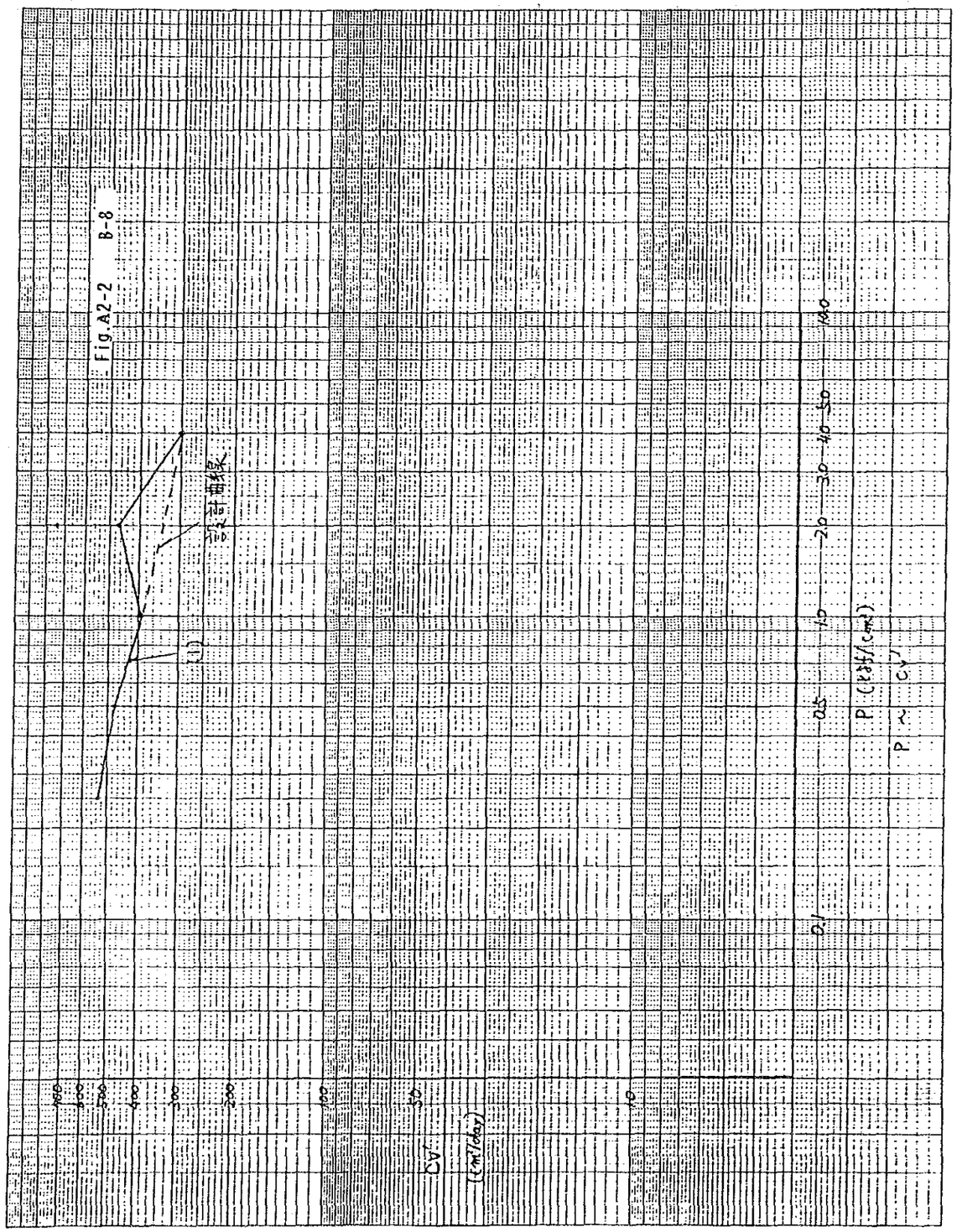


Fig.A2-2 B-8
設計曲線
(1)
(2)
P (kgf/cm²)
0.1
0.25
0.5
1.0
2.0
3.0
4.0
5.0
10.0
20
30
40
50
100
200
300
400
500
600
700
800
900
1000
(cm/day)
CV

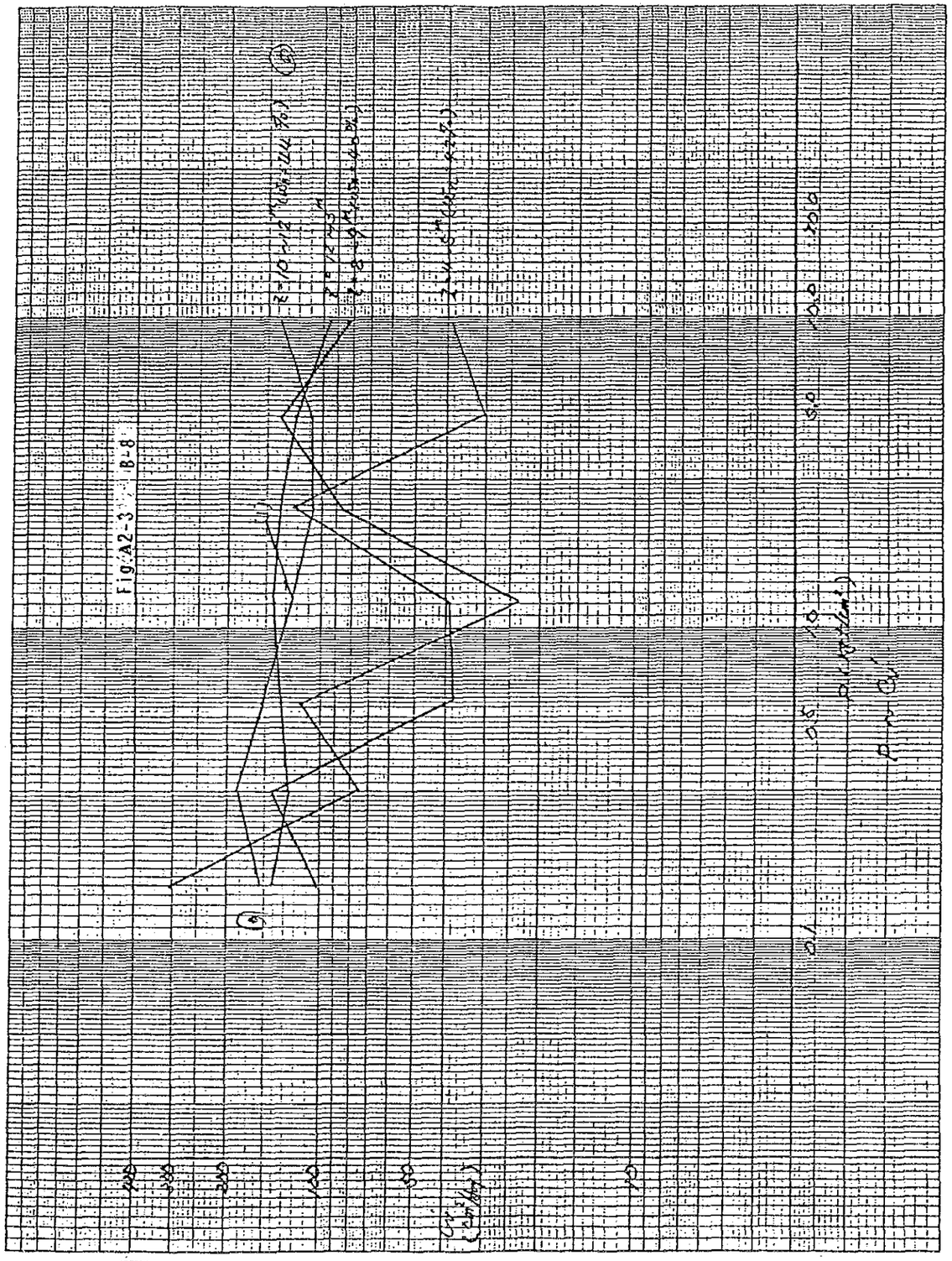


Fig.A2-3 B-8
(a)
(b)
P (kgf/cm²)
0.1
0.25
0.5
1.0
2.0
3.0
4.0
5.0
10.0
100
200
300
400
500
600
700
800
900
1000
(cm²/day)
CV

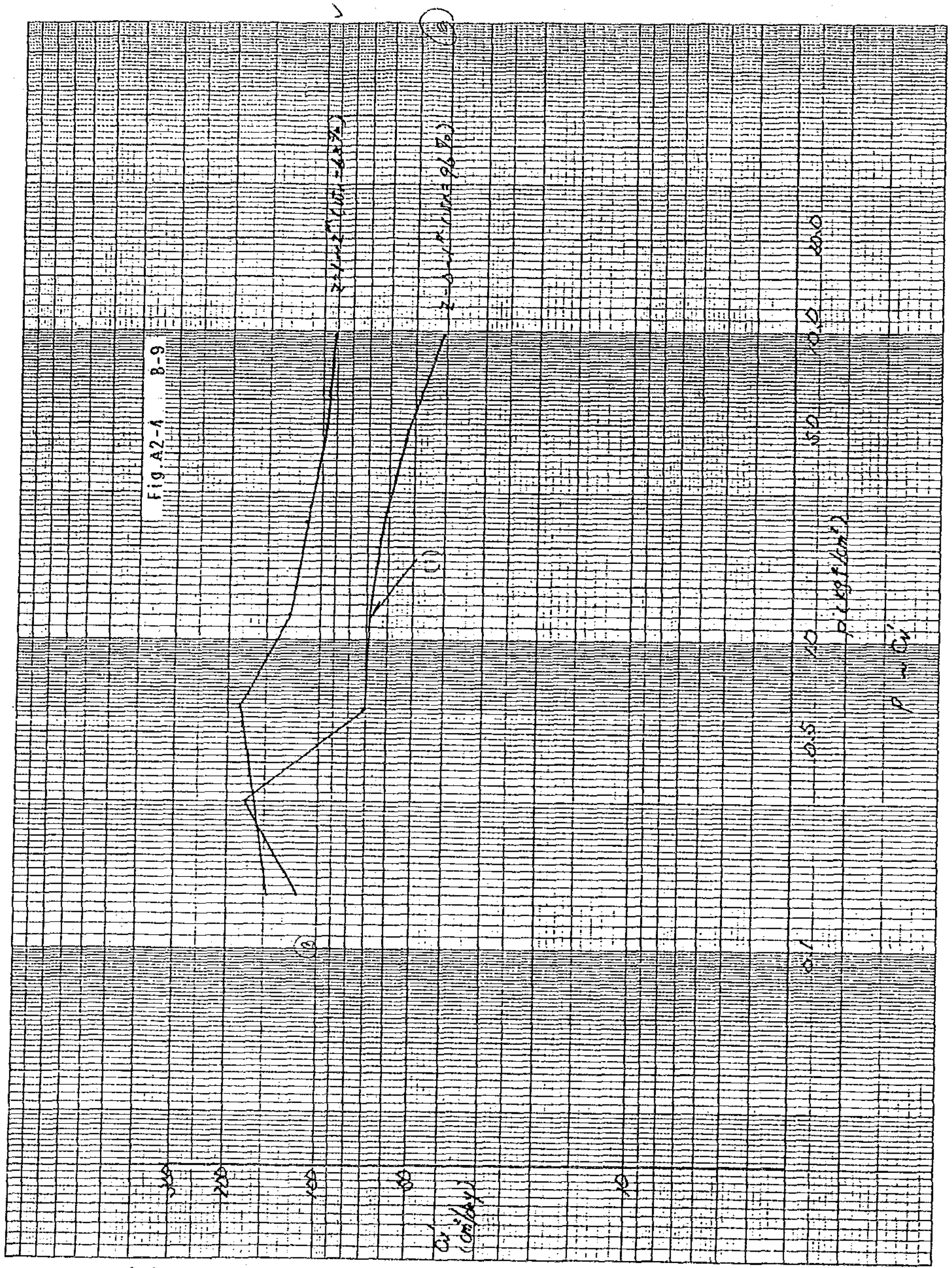


Fig.A2-4 B-9

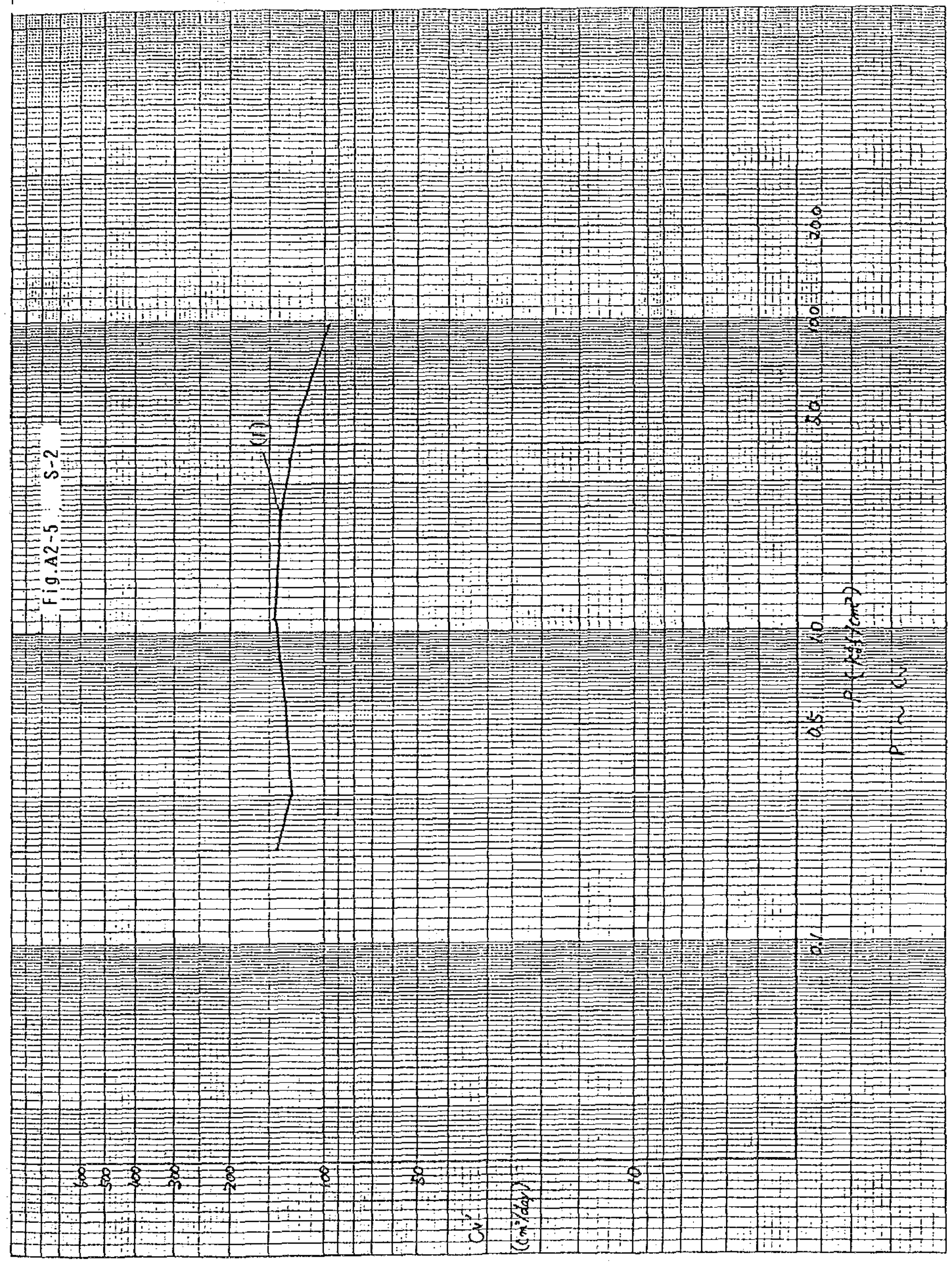


Fig.A2-5 S-2

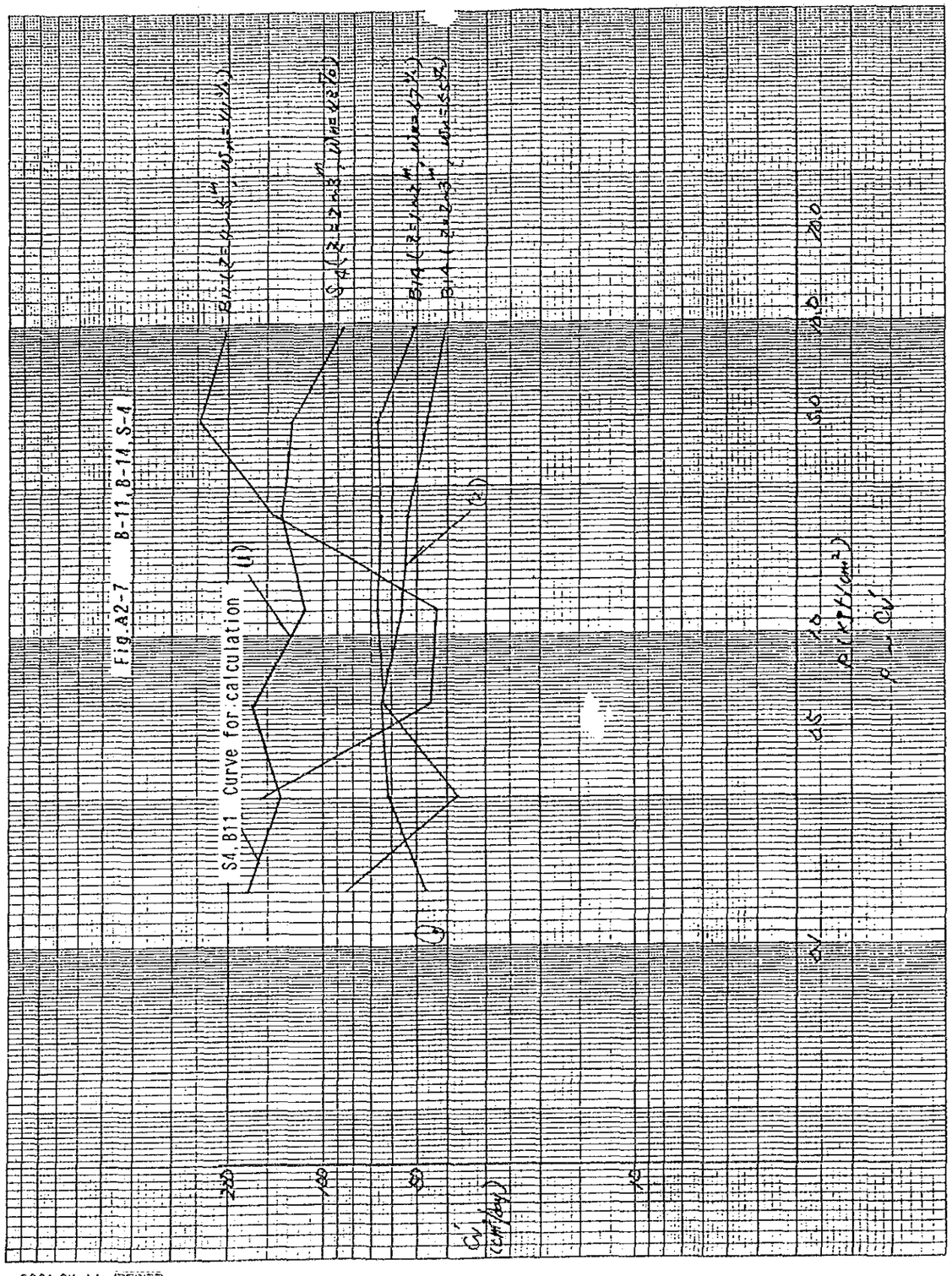


Fig.A2-7 B-11, B-14, S-4
S4, B11 Curve for calculation (1)

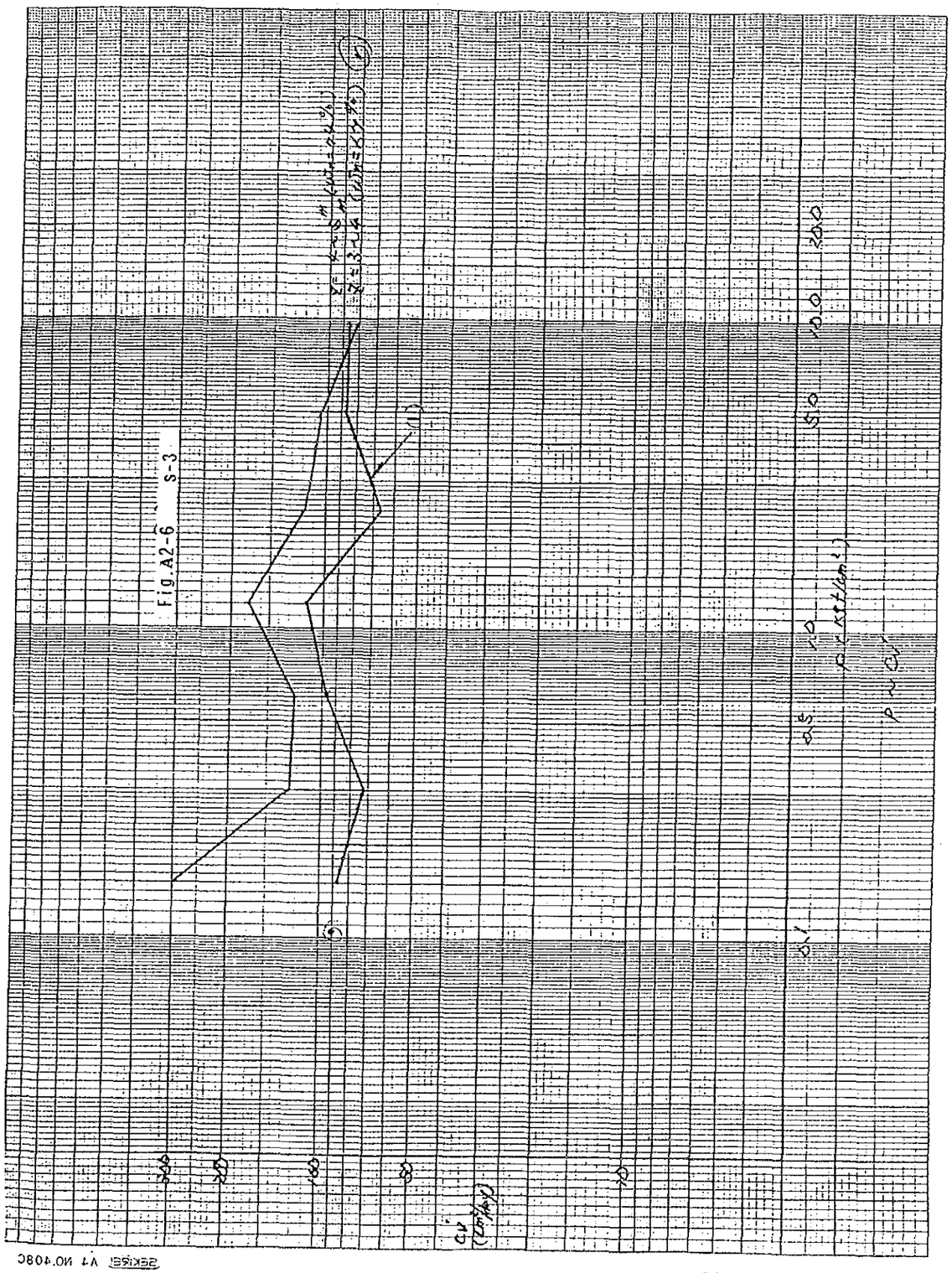


Fig.A2-6 S-3

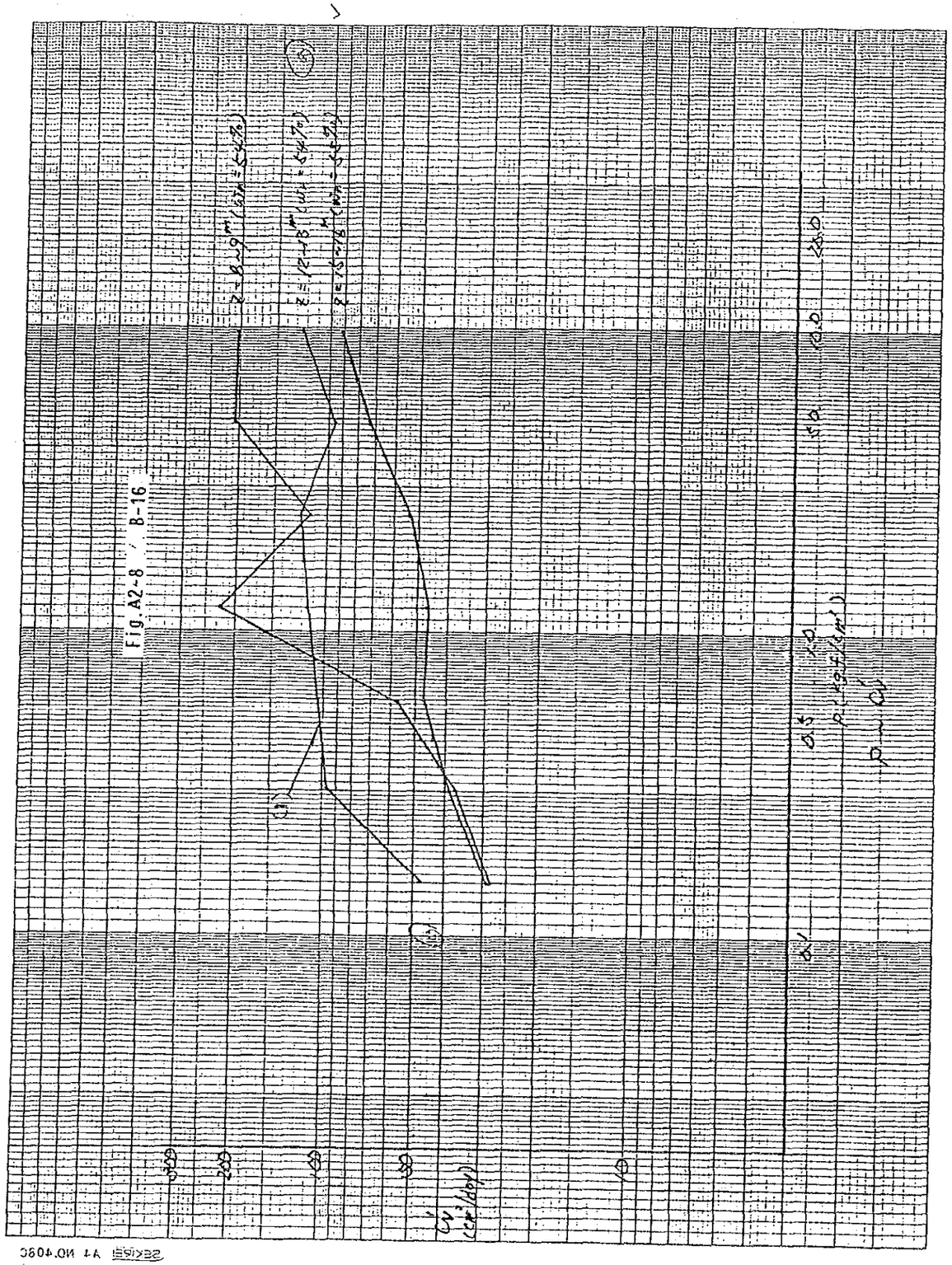


Fig. A2-8 B-16

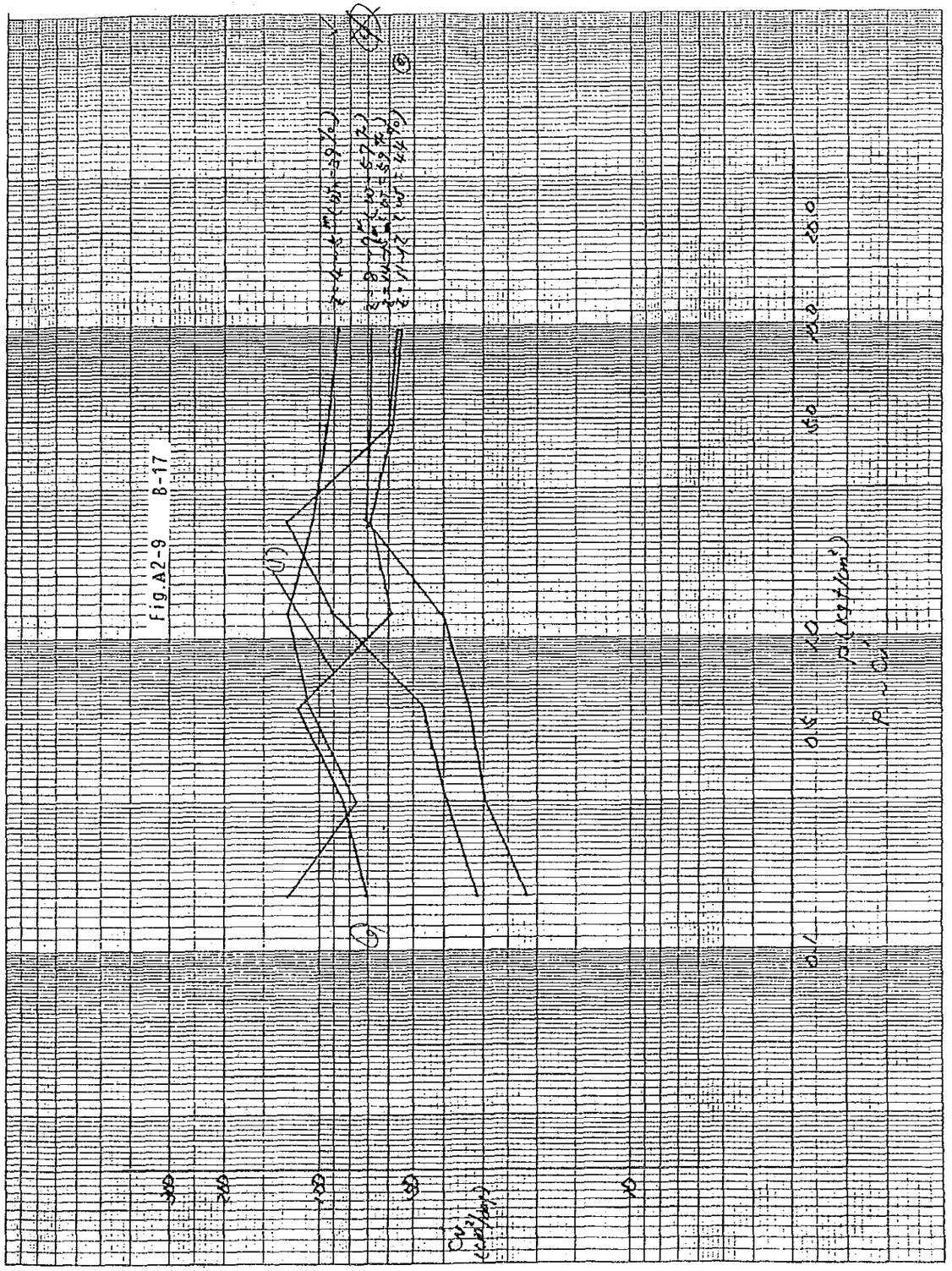
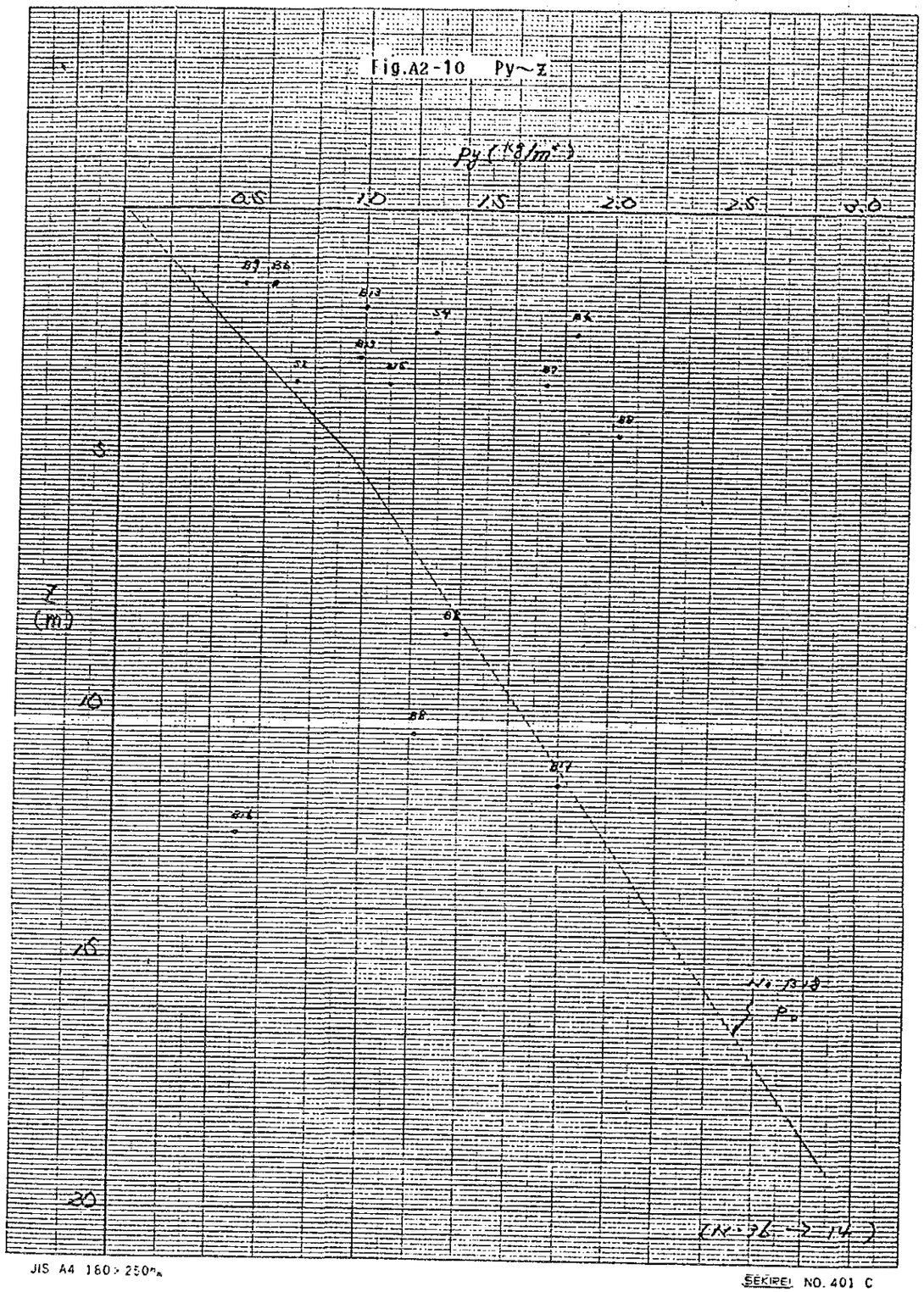


Fig. A2-9 B-17

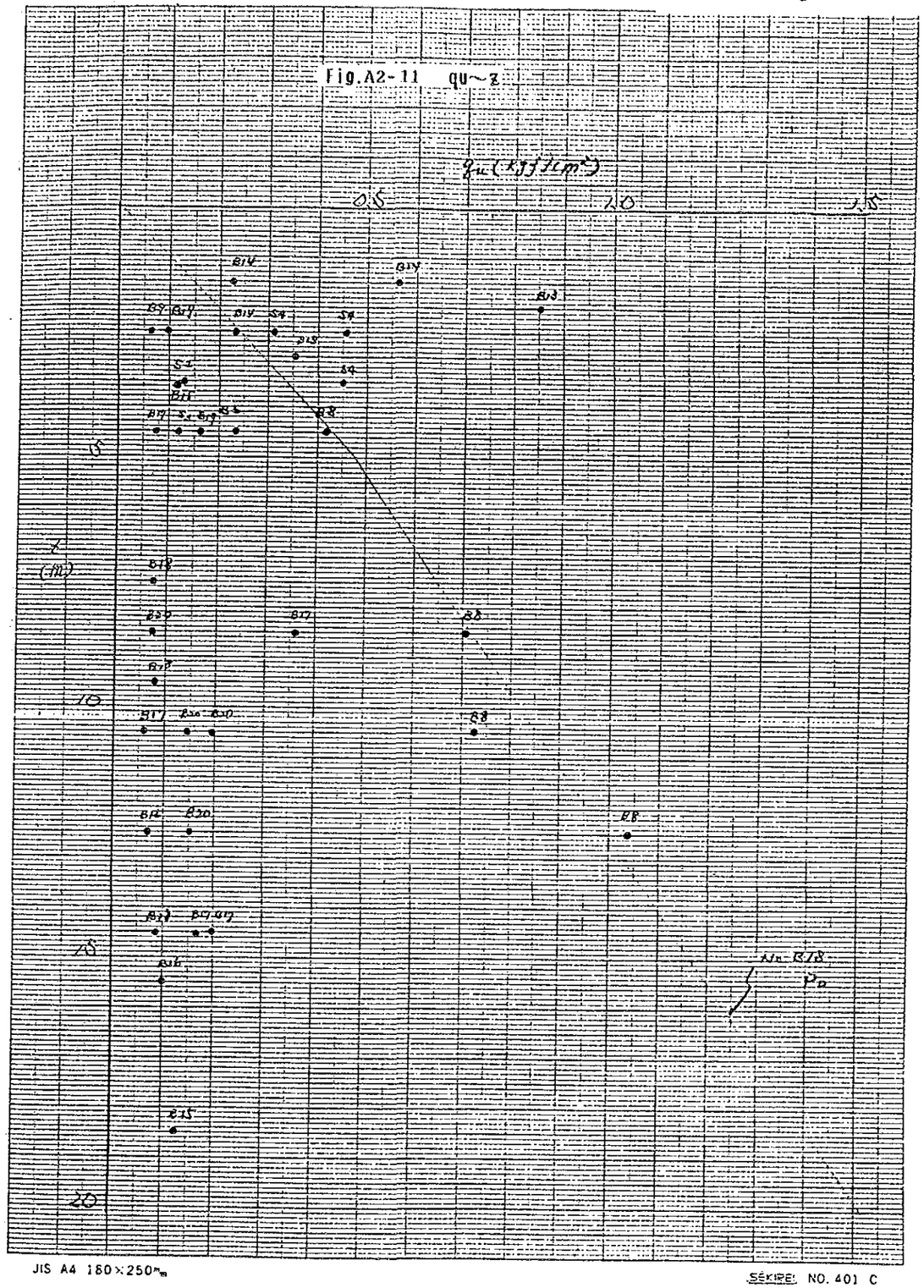
Fig.A2-10 Py～z



JIS A4 180×250mm

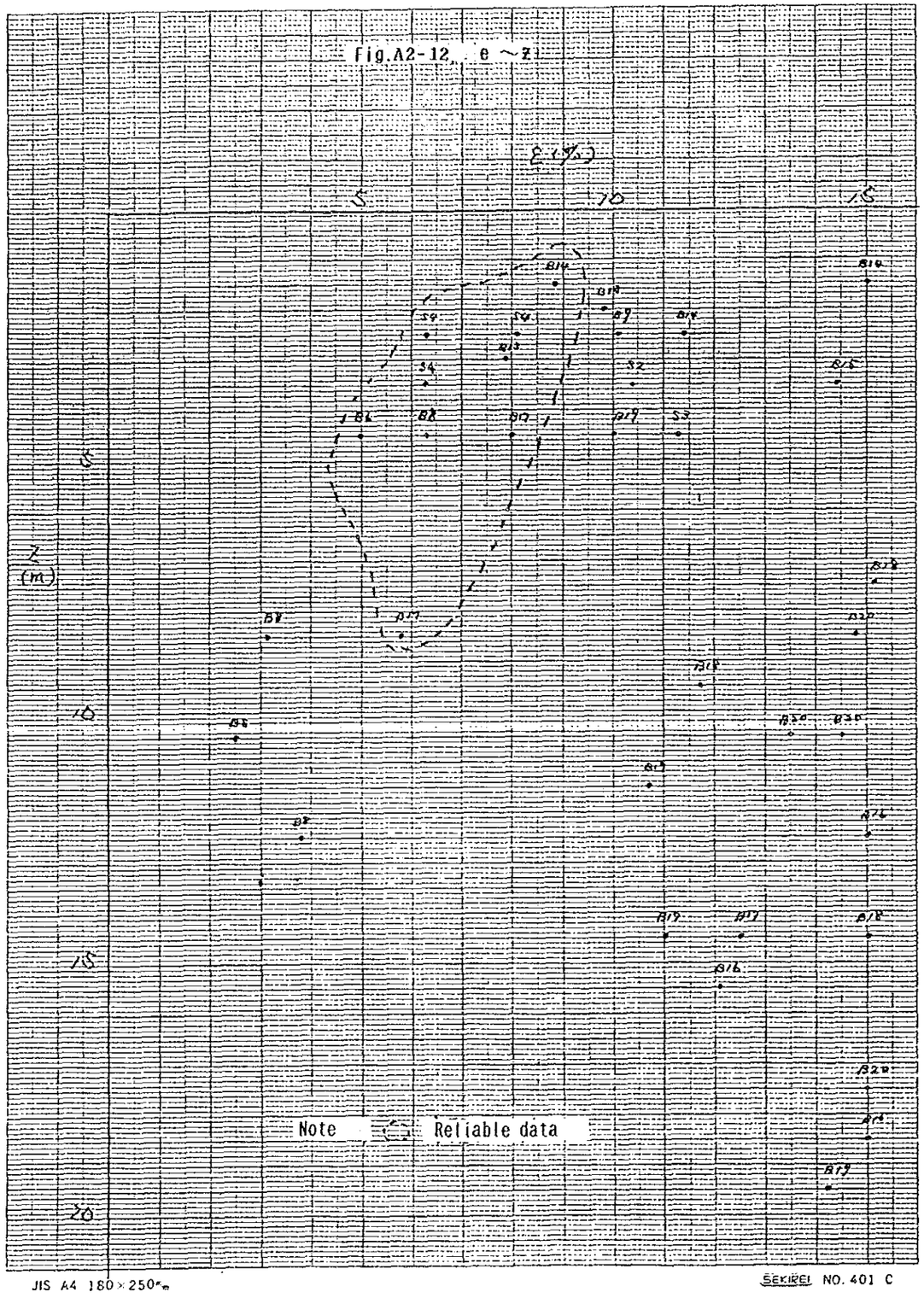
SEKIREI NO. 401 C

Fig.A2-11 qu～z

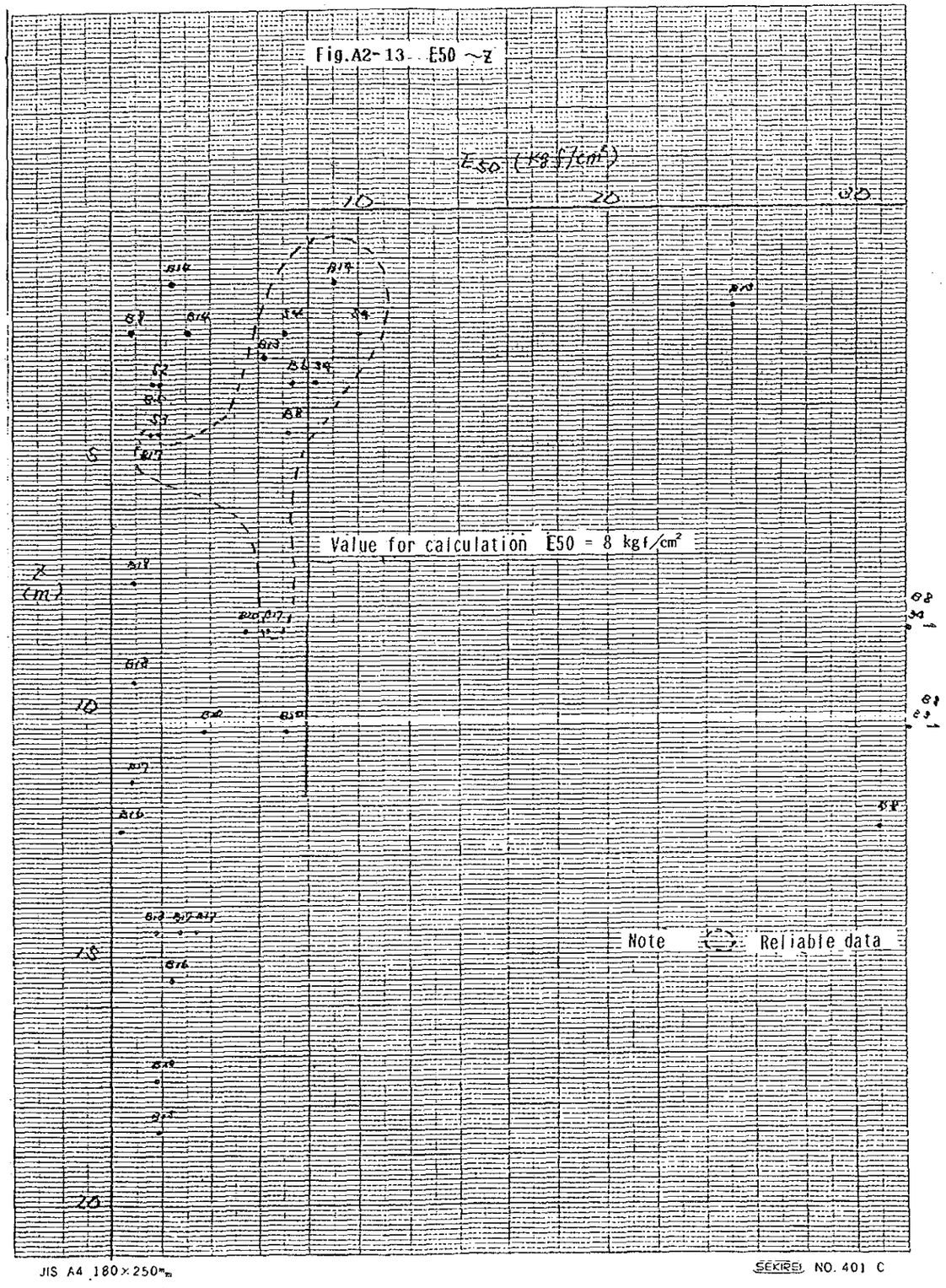


JIS A4 180×250mm

SEKIREI NO. 401 C



JIS A4 180×250㎜ SEKIREI NO. 401 C



JIS A4 180×250㎜ SEKIREI NO. 401 C

ATTACHMENT-3

METHOD OF QUANTITY CALCULATIONS

(ROAD WORKS)

METHOD OF QUANTITY CALCULATION

The whole Project area was divided into two lots for contracting.
The total quantities were summarized as for Lot-I and Lot-II.

LOT-I	Bereina CH. 0+000	TO	Miaru River CH.33+500	Length 33.500 km
LOT-II	Miaru River CH.33+500	TO	Malalaua CH.80+596	47.096 km

The calculation area was divided into road work and bridge work for both lots.

For the purpose of calculating quantities on items of 1(Group-3) Clearing and Grubbing, 2(Group-4) Earthworks and 4(Group-7) Drainage, the bridge work includes the earth work within ten (10) metres from both abutments. And Lot-II was subdivided by the type of embankment structures such as borrow embankment and embankment with settlement, sand mat and sand bag.

Lot-I and Lot-II were divided into 34 sections in total.

Sectioning LOT-I : 7 sections
LOT-II : 27 sections

Other items of 3-1(Group-5) Base and Subbase, 3-2(Group-6) Bituminous surfacing and 5(Group-7) Road Furniture and Marking were divided into road work and bridge work except ten (10) metres of earthwork behind the abutments.

Sections in LOT-I

NO. OF SECTION	CHAINAGE	TERRAIN TYPE	ROAD WORK	BRIDGE WORK
1	0+000 TO 11+986	ROLLING/HILLY	○	-
2	11+986 TO 12+025	TAIENA Br. 11+996 TO 12+015	-	○
3	12+025 TO 14+712	ROLLING/HILLY	○	-
4	14+712 TO 14+755	AGOBINO Br. 14+722 TO 14+744	-	○
5	14+755 TO 16+098	ROLLING/HILLY	○	-
6	16+098 TO 16+141	UNGOUNGO Br. 16+109 TO 16+130	-	○
7	16+141 TO 33+500	ROLLING/HILLY	○	-

Sections in LOT-II

NO.OF SECTION	CHAINAGE	TERRAIN TYPE	ROAD WORK	BRIDGE WORK	FORESEEN SETTLE-MENT	SAND MAT (THICKNESS)	SAND BAG
1	33+500 TO 33+800	FLAT	○	—	○	○(0.5m)	—
2	33+800 TO 33+914	MIARU Br. 33+810 - 33+904	—	○	○	○(0.5m)	—
3	33+914 TO 34+150	FLAT	○	—	○	○(0.5m)	—
4	34+150 TO 37+750	ROLLING/HILLY	○	—	—	—	—
5	37+750 TO 38+200	ALIKA SWAMP/W	○	—	○	○	○
6	38+200 TO 47+500	ROLLING/HILLY	○	—	—	—	—
7	47+500 TO 51+200	ROLLING	○	—	—	—	—
8	51+200 TO 54+000	FLAT/ROLLING	○	—	—	—	—
9	54+000 TO 57+100	FLAT	○	—	—	—	—
10	57+100 TO 58+600	KAPURI SWAMP/W	○	—	○	○(0.5m)	—
11	58+600 TO 59+909	KAPURI SWAMP/W	○	—	○	○(1.0m)	○
12	59+909 TO 59+998	KAPURI Br. 59+919 - 59+988	—	○	○	○(1.0m)	—
13	59+998 TO 63+500	KAPURI SWAMP/W	○	—	○	○(1.0m)	○
14	63+500 TO 64+000	KAPURI SWAMP/W	○	—	○	○(0.5m)	—
15	64+000 TO 67+100	FLAT/ILAVALA H.	○	—	—	—	—
16	67+100 TO 67+166	FLAT	○	—	○	—	—
17	67+166 TO 67+308	LAKEKAMU Br. 67+176 - 67+298	—	○	○	—	—
18	67+308 TO 68+667	FLAT	○	—	○	—	—
19	68+667 TO 68+809	TAURI Br. 68+677 - 68+799	—	○	○	—	—
20	68+809 TO 69+000	FLAT	○	—	○	—	—
21	69+000 TO 73+000	FLAT	○	—	—	—	—
22	73+000 TO 75+901	FLAT	○	—	○	○(1.0m)	—
23	75+901 TO 75+965	MAKARA Br. 75+911 - 75+955	—	○	○	○(1.0m)	—
24	75+965 TO 77+204	FLAT	○	—	○	○(1.0m)	—
25	77+204 TO 77+265	SAPPAHARO Br. 77+214 - 77+257	—	○	○	○(1.0m)	—
26	77+265 TO 77+700	FLAT	○	—	○	○(0.5m)	—
27	77+700 TO 80+596	FLAT/EXISTING R.	○	—	—	—	—

1 CLEARING AND GRUBBING (GROUP-3)

-1 Clearing

The area calculated covers an area within 20 metres of the centre line on both sides, and extends to 5 metres outside the top of cutting slope when it exceeds 20 metres. The subject area was classified by vegetations; light, dense and grass, and also by land with and without water. The swamp area is herewith defined as land with water.

-2 Grubbing

An area 2 metres beyond the toe of embankment or the top of cutting slope by is covered. For sections where geotextile fabrications are applied, a further 2 metres is included on both sides.

The limit of the clearing and grubbing area, and the classification with map symbols are shown in figures A3-2, A3-3 and A3-4.

2 EARTHWORKS (GROUP-4)

-1 Excavation

- 4 types of soil defined in the DOW Design Standard were adopted for cutting based on the geological data.

TYPE	Depth from ground level
A (Solid Rock)	Deeper than 13m
B (Ripping Soils)	1m -- 13m
C (Concrete pier in Sappaharo river M. side)	
D (Common Soil)	0m -- 1m

- Summed as solid cut volume calculated by the average end area method.

- Typical cross sections are shown in Figure A3-5.

-2 Embankment

i. Embankment

- Summed as compacted volume calculated by the average end area method.
- The compacted fill volume is qualified from cutting earth volume by multiplying by the following conversion factors.

Type D (Common Soil) ... 0.85
Type B (Ripping Soil) ... 0.95
Type A (Solid Rock) ... 1.05

2 EARTHWORKS (GROUP-4)

ii. Settlement for LOT-II only

The settlement was analysed on the soft ground sections listed in Table A3-1. The settlement area of each embankment cross section was calculated employing the cross sectional settlement diagram shown in Figure A3-1. The settlement earth volume of each section was obtained by multiplying the ratio of the settlement area by embankment area of the cross section.

iii. Extra Fill for LOT-II only

In Lakekamu and Turi sections, due to residual settlement of the soft ground during 20 years after opening for traffic, the grade level would settle below the specified level which is 30 cm higher than flood water level Q50. Extra fill with height of 10 cm is planned as a countermeasure.
Extra fill volume is calculated below.

a) Lakekamu section 67+500 - 68+200 (L=700m)
9.67m * 700.0m * 0.1m = 676.9 m^3

b) Tauri section 68+200 - 68+500 (L=300m)
9.67m * 300.0m * 0.1m = 290.1 m^3

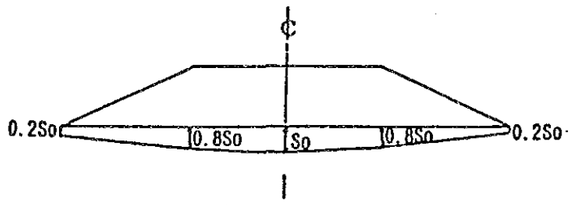


Figure A3-1 SECTIONAL SETTLEMENT DIAGRAM

TABLE A3-1 SOFT GROUND SECTIONS

LOCATION	CHAINAGE	LENGTH (m)	EMBANKMENT HEIGHT (m)	BORING NO.
MIARU	33+550 - 34+150	506	3.70	B- 6
ALIKA	37+750 - 38+200	450	3.60	B- 8
	57+100 - 59+800	2700	2.50	S- 2
KAPURI	59+800 - 60+100	231	3.00	B- 9
	60+100 - 62+400	2300	2.50	S- 3
	62+400 - 64+000	1600	2.50	S- 4
LAKEKAMU	67+100 - 67+500	278	4.00	B-11
	67+500 - 68+200	700	2.00	B-11
	68+200 - 68+550	350	1.70	B-14
TAURI	68+550 - 68+850	178	4.40	B-14
	68+850 - 69+000	150	1.70	B-14
MAKARA	73+000 - 76+300	3256	2.20	B-16
SAPPAHARO	76+300 - 77+700	1357	2.20	B-17
TOTAL		14056		

-3 Surplus material for Lot-II only

- Roadway

Soil volume 10,000 m^3 was planned to be reserved for Lot-II Miaru River Bereina side in the stock pile No.1 16,000 m^3 actually resulted in.

- Intersections

11,000 m^3 was Surplus-Soils at Intersection CH.1+450 and spoiled to spoil bank No.1. It was not used for the roadway.

2 EARTHWORKS (GROUP-4)

-4 Cut in borrow for Lot-II only

Calculated quantity of borrow to meet fill requirement is based on volume Type-D & B excavation.
Borrow Pits 1--5 were provided accordingly as analyzed mass curve.

LOCATION OF BORROW PITS

Borrow Pits	Chainage	Side	Location
ST-1	33+300	RHS	Apanaipi Bereina side
B -1	34+200	RHS	Apanaipi Malalaua side
B -2	49+200	RHS	Palipala Hill
B -3	54+000	RHS	Palipala Hill
B -4	64+750	RHS	Ilavala Hill
B -5	Over the Project area		Malalaua Existing B.P.

-5 Unsuitable Material

i. Land (Roadway)

Estimates only. Estimated area is as same as grubbing area.

ii. Land (Borrow Pit) LOT-II only

Estimates only.
Calculated volume is the area of borrow pit times each assessed thickness as below.

Borrow pit	No.1	t=0.05m	
Borrow pit	No.2--4	t=0.10m	
Borrow pit	No.5	t=1.00m	...*Analysed from test pit
Sand borrow pit	No.2	t=0.10m	

iii. Swamp (Alika swamp) LOT-II only

The embankment structure for the soft ground in Alika swamp is shown in the typical cross section in Figure A3-6 (b).
A layer of peat from the surface to 1.3m below the ground, which continues up to 1.8 m and comprises roots and decayed vegetation, was displaced.
Calculated volume f unsuitable material is the product of the area which was computed (including additional 2m width where sand mat and sand bag are applied) and the depth of 1.3m.

2 EARTHWORKS (GROUP-4)

iv. Land (Base Borrow Pit No. 1 & Subbase Borrow Pit No. 3) LOT-II only

Suitable material for base and subbase is located below 7m from the ground surface, which was analysed by test pit data.
The assessed thickness of the layer is only 2 to 3m. After removing fill material, there is still approx. 350,000 m^3 which is located below the fill materials collected and must be spoiled.

-6 Excavation for Structural Foundation

i. Road work

Volume was calculated by taking account of the areas for the gabions installed at the inlet and outlet of the pipe culverts and of the depth. Calculated at 60% of gabion cubic contents.

ii. Bridge work

The calculated volume is based on foundation levels and dimensions as shown on the drawings.
The volume includes river training.

-7 Filling to Structural Foundations

Bridge section only.
The calculated volume is based on the requirement to the existing surface level from the top of the relieving slabs.
The volume includes back fill materials.

-8 Sand Mat Material for LOT-II only

i. Sand Mat

Calculated by the average end area method.
Sand mat with 1.00m or 0.50m thickness with varying width depending on the embankment height is measured from the cross sections concerned. Volume in Alika swamp is based on the requirement to fill to the elevation 3.20m, which is the usual water level in the dry season.

ii. Sand Bag in Alika Swamp

The calculated volume is based on the required elevation of 3.20m. The width of the top is 1.0m with an outer slope of 1 in 1.5 and an inner slope of 1 in 1; the bags are placed on both sides as shown in Figure A3-6 (b).

iii. Sand Bag in K apuri Swamp

The calculated volume is based on the required elevation of 0.30m, which is the usual water level in the dry season and is measured from the existing ground level with installation on a slope of 1 in 1.5 shown in Figure A3-6 (b).

iv. Replacement in Alika Swamp

Calculated the same as -5.iii above.

v. Settlement

The calculated volume is based on settlement calculations.

2 EARTHWORKS (GROUP-4)

-9 Geotextile for Lot-II only

i. Type A

a) Alika swamp
The calculated volume is based on the slope up to the required elevation of 4.2m, which is flood water level Q100. This goes 1m into thembankment and extends 2m beyond the toe of the slope.

b) Kapuri swamp
The calculated volume is based on the assumption that geotextile is placed on the surface of 1.00m thick sand mat layer and extended 2m from the toe of slope.

ii. Type B

The calculated volume is based on the assumption that geotextile is placed under a 1.00m thick sand mat layer and extended 2m from the toe of the slope.
The layout of geotextile is shown in Figure A3-8.

-10 Subsoil Drain

Subsoil drains with UPVC pipe were provided in the sand mat or the embankment whose material is from Ilavala hills due to increased permeability.
The calculated volume is based on each cross sectional length times an area of 0.5m x 0.5m at 20m intervals.

-11 Reno Mattress

i. Type A for pipe

The calculated volume ibased on the required slope area depending on the culvert barrels times 0.15m thick at the inlet and outlet of the pipe.

ii. Type A for Alika for Lot-II only

The calculated volume is based on the slope up to the required elevation of 4.10m, which is flood water level Q100 and is from the toe of the sand mat. The area of the pipe mouth is deducted.
The thickness of the Reno Mattress is 0.15m.

iii. Type B

The calculated volume is based on the required level from the top of the gabions at TAENA, AGOBINO and UNGONGO Bridges and at MIARU River Malalaua side for river protection.
The thickness of the Reno Mattress is 0.23m.

The Reno Mattress in Alika swamp is shown in Figure A3-9.

-12 Gabion

The calculated volume of Gabions is the required area at the inlet and outlet depending on the culvert barrels times 0.50m thickness (excluding Alika swamp), and also at TAIENA, AGOBINO and UNGONGO Bridges for abutment protection.

2 EARTHWORKS (GROUP-4)

-13 Settlement plate for Lot-II only

The calculated volume of settlement plate is based on the installation at 250m intervals at the centre and both edges of the road in the settlement area.

-14 Displacement Peg for Lot-II only

The calculated volume of displacement peg is based on the installation at 250m intervals on both sides at the same location as the settlement plate installed.
The layout of settlement plate and displacement peg are shown in Figure A3-11.

-15 Excavation for Intersections for Lot-I only

The sum of 3 major intersections as solid cut volume calculated by average end area method. Type D only was assessed.

2 EARTHWORKS (GROUP-4)

-16 Embankment for Intersections

Nominal volume of 125.6 m^3 at each minor intersection.
Calculated intersections are as follows;

	MAJOR	MINOR
LOT-I	CH. 0+200 (R) ,0+260 (L) CH. 1+450 (L) CH.33+425 (L)	CH.14+200 (R)
LOT-II	-	CH.33+530 (L/R) CH.34+160 (R) CH.49+400 (L) CH.54+100 (R) CH.67+625 (L) CH.67+665 (R) CH.68+500 (L) CH.78+186 (L) CH.79+433 (L) CH.79+780 (L) CH.80+318 (L) CH.80+368 (R) CH.80+446 (R) CH.80+532 (L) CH.80+545 (R) CH.80+586 (L)

3-1 BASE AND SUBBASE (GROUP-5)

ROADWAY

-1 BASE COURSE

The calculated volume of base course layer is based on the length of the construction line minus the length of bridging. Sections of bridge approach winding for two lanes in Lot-I and reducing into single in Lot-II were adjusted. The volume of base course is calculated by the average end area method using 0.15m thickness.

-2 SUBBASE

(a) Upper subbase
The calculated volume is the same area as 3-1-1 above. Summed as base course calculated by the average end area method using 0.10m thickness.

(b) Lower subbase
The calculated volume is the same area as 3-1-1 above. Summed as base course calculated by the average end area method using 0.14m thickness.

3-1 BASE AND SUBBASE (GROUP-5)

INTERSECTIONS

-3 BASE COURSE

The calculated volume of base course layer is based on the length of construction line up to the top of the embankment slope of the main road from approaching existing road, and the road width required with 0.15m thickness at 3 major intersections.
Summed as base course calculated by the average end area method.

-4 SUBBASE COURSE

(a) Upper subbase
The calculated volume of upper subbase is based on the length of construction line minus cutting areas.
Summed as upper subbase calculated by the average end area method using 0.10m thickness.

(b) Lower subbase
The calculated volume of lower subbase is based on the length of construction line minus cutting areas.
Summed as lower subbase calculated by the average end are method using 0.14m thickness.

3-2 BITUMINOUS SURFACING (GROUP-6)

i. Prime Coat

The calculated volume of prime coat is the total area of base course surface and upper subbase surface and includes the 3 major intersections at an application rate of 0.6 litre/m^2.

ii. Blotter Material

The calculated area is the total surface areas of base and upper subbase courses.

iii. Residual Bitumen class 170

The calculated volume of residual bitumen is the length of the construction line excluding the bridge length which is multiplied by 7.10m standard width on the main road first seal at an application rate of 1.45 litre/m^2, and is multiplied by 6.50m width on the carriage way second seal at an application rate of 0.80 litre/m^2.
Calculation includes 3 major intersections.

The width is adjusted in the widened bridge approaches when double lanes are reduced to single lane, and also intersections. The list of tapered points is shown in figure A3-12 for LOT-I and figure A3-13 for LOT-II.

iv. Adhesive Agent

Calculated as 1% of iii. above.

v. 19.0mm cover aggregate

The volume is based on the area of bitumen as calculated under iii. first seal above at a spread rate of 75 m^2/m^3.

vi. 9.5mm cover aggregate

The volume is based on the area of bitumen as calculated under iii. second seal above at a spread rate of 117.5 m^2/m^3.

vii. Precoating material

The calculated volume of precoating material for sealing aggregate is the volume as calculated in v,vi. above at a rate of 9 litre/m^3.

viii. Area calculations

The areas for items i--vi above were calculated.

3-2 BITUMINOUS SURFACING (GROUP-6)

AREAS CALCULATED

No.	Area	Unit	Lot-I	Lot-II
	ROADWAY			
A-1	FIRST SEAL	m^2	226,799	330,247
A-2	SECOND SEAL	m^2	210,935	302,297
A-3	PRIME COAT ON BASE COURSE	m^2	284,361	395,611
A-4	PRIME COAT ON SUBBASE	m^2	299,401	416,574
	INTERSECTIONS			
B-1	FIRST SEAL	m^2	1,171	-
B-2	SECOND SEAL	m^2	1,131	-
B-3	PRIME COAT ON BASE COURSE	m^2	3,970	-
B-4	PRIME COAT ON SUBBASE	m^2	1,162	-

4 DRAINAGE (GROUP-7)

-1 Corrugated steel pipe culvert

The quantity was determined from the information on the schedule of culverts and culvert detail drawings.

-2 Reno Mattress

Type A

The calculated volume is based on the slope areas required depending on the culvert barrels and a 0.15m thickness at the inlet and outlet pipe.

-3 Gabion

The calculated volume of gabions is the required area at the inlet and outlet taking account of the area required for barrels of 0.50m thickness.

-4 Excavation and backfill of drainage structure foundation

Calculated at 60% of 4-3 above.

Sectional length of pipe for calculation is shown in Figure A3-14.

5 ROAD FURNITURE AND MARKING (GROUP-7)

-1 Road signs

Calculated from the number of road signs shown on the schedule.
Types of road signs are shown in Figure A3-15.

-2 Road edge guide posts

Calculated as the number of road edge guide posts as shown on the schedule.
Layout for road edge guide posts is shown in Figure A3-16.

-3 Guardrails

Quantified on the assumptions that a two lane bridge approach is at 12m and a single lane bridge approach is at 28m on both sides.

Quantity composed of (1) 4m length of guardrail
(2) End section
(3) Post
(4) Fender post for single lane bridge in Lot-II only

Quantities of guardrails per bridge are shown in Table A3-2.

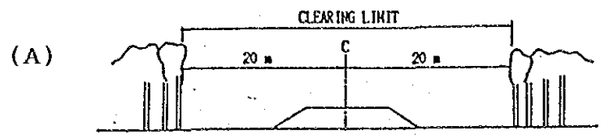
-4 Marking

Calculated as the linear metre of marking as shown on the schedule.

CLEARING AND GRUBBING

CLEARING

STANDARD LIMIT 20 m. BOTH SIDES OF THE CENTERLINE AS (A).



INCASE MORE THAN 20 m. FROM THE CENTERLINE TO TOP OF CUTTING SLOPE. A FURTHER 5 m. OUT FROM THE TOP OF CUTTING SLOPE AS (B).

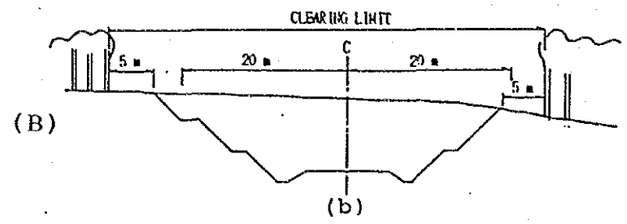
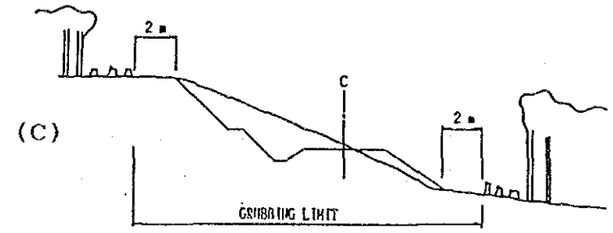


Figure A3-2 Limit of Clearing

GRUBBING

STANDARD LIMIT 2 m. OUT FROM THE TOE OR TOP OF SLOPE AS (C).



INCASE SETTING GEOTEXTILE SECTION; 2 m. OUT FROM THE EDGE OF SETTING GEOTEXTILE AS (D).

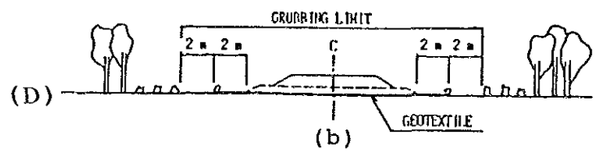
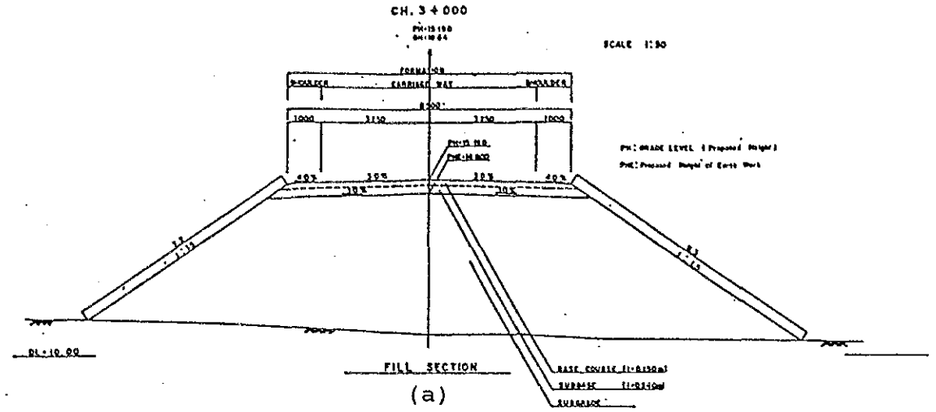


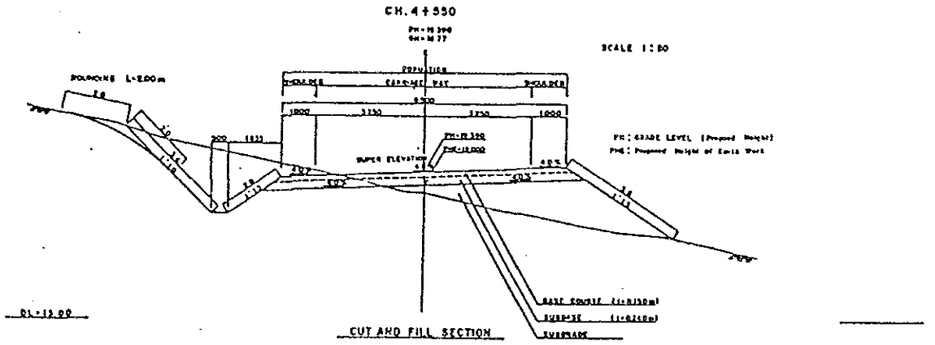
Figure A3-3 Limit of Grubbing

1/1000 TOPOGRAPHIC MAP SYMBOL	CLACIFICATION
SCATTERED TREES	LIGHT
FOREST	DENSE
GRASSLAND	GRASS

Figure A3-4 Classification of Vegetation

TYPICAL CROSS SECTIONS





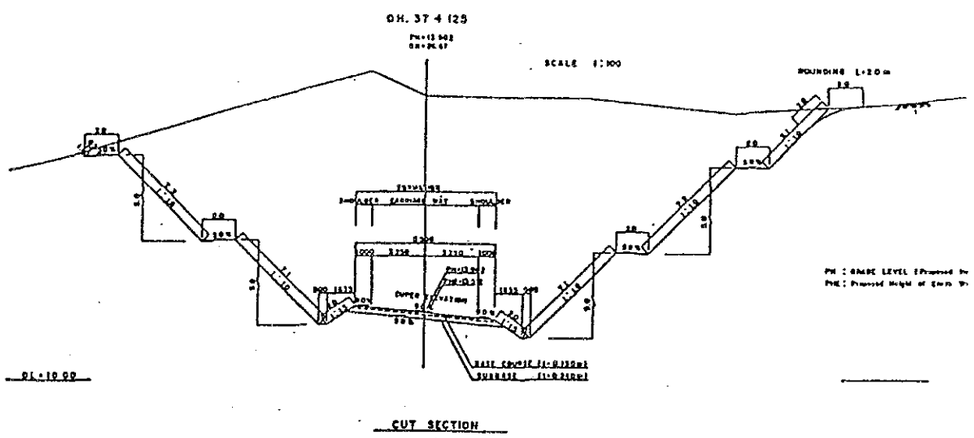
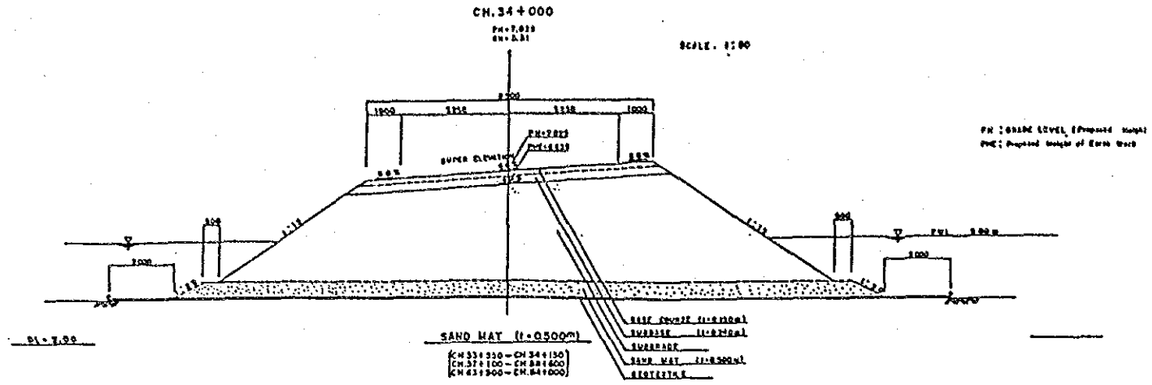
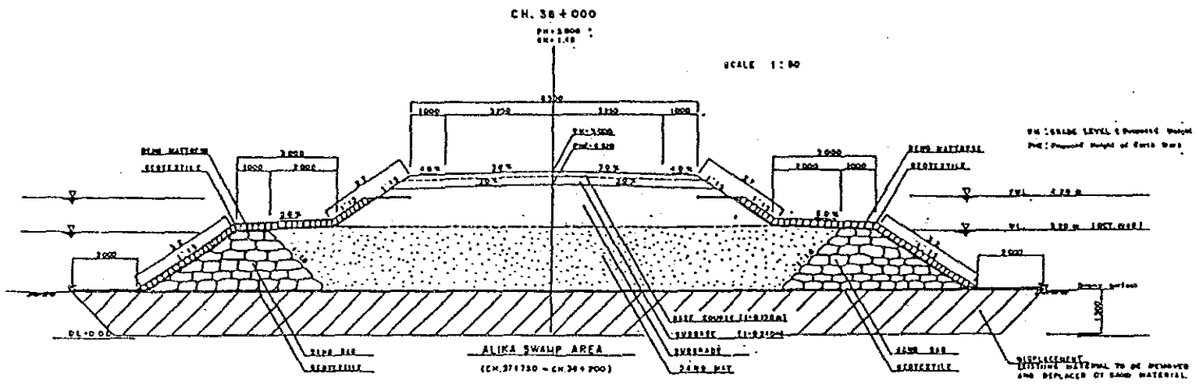


Figure A3-5 Typical Cross Sections in (a)Fill (b)Cut and fill (c)Cut

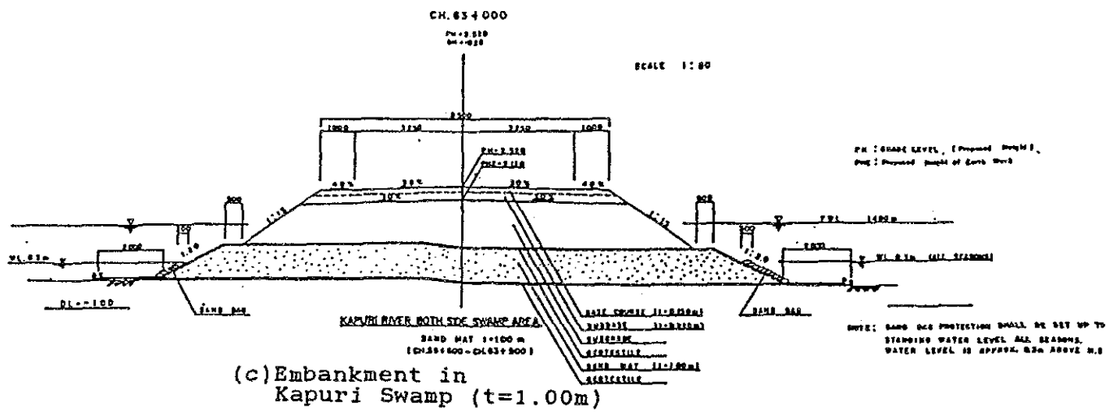
TYPICAL CROSS SECTIONS EMBANKMENT STRUCTURE



(a)Enbamkment with Sand Mat (t=0.50m)



(b)Enbankment in Alika Swamp



(c)Embankment in
Kapuri Swamp (t=1.00m)

Figure A3-6 Typical Cross Sections Embankment Structures

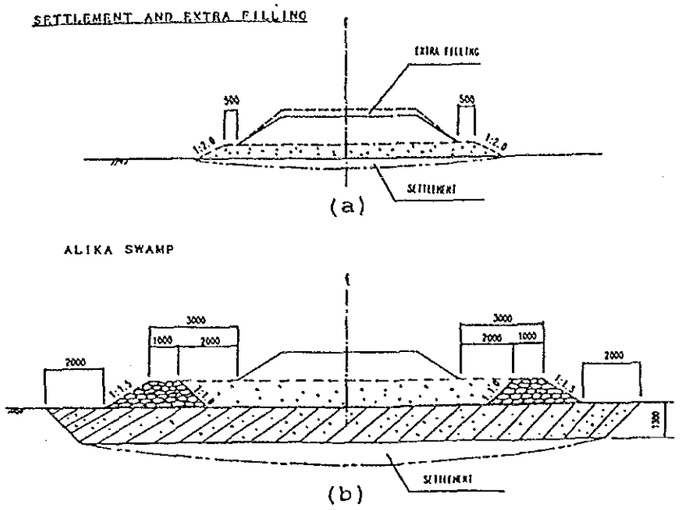


Figure A3-7 Settlement and Extra Filling

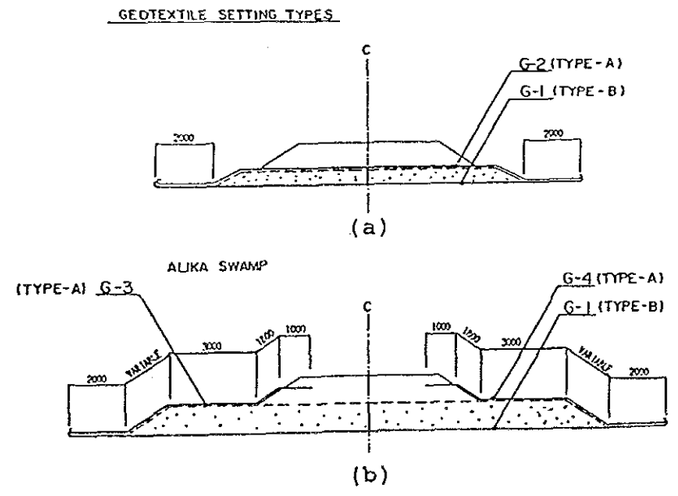
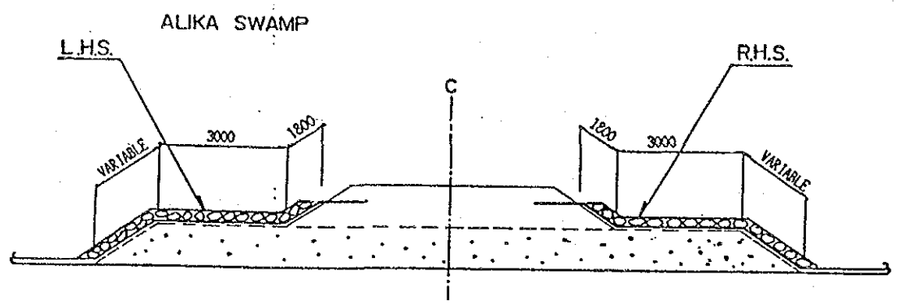


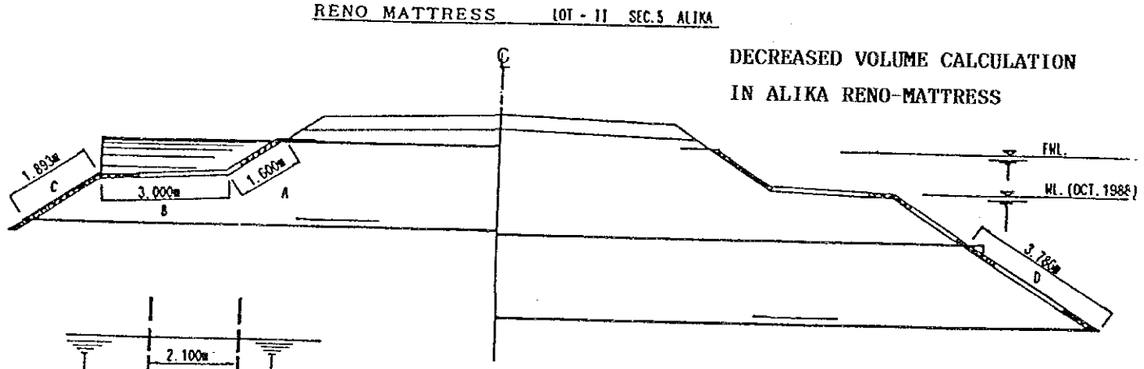
Figure A3-8 Geotextile Setting Type

RENO MATTRESS IN ALIKA SWAMP



RENO MATTRESS LOT - 11 SEC.5 ALIKA

DECREASED VOLUME CALCULATION
IN ALIKA RENO-MATTRESS



A=3.141×1.050×1.600/2
=2.638

B=3.000×2.100
=6.300

C=3.141×1.050×1.893/2
=3.122

A+B+C=2.638+6.300+3.122
=12.060
≒12 m2

D=3.141×1.050×1.893
=6.243
≒6 m2

DECREASE IN PLACE OF PIPE INLET AND OUTLET

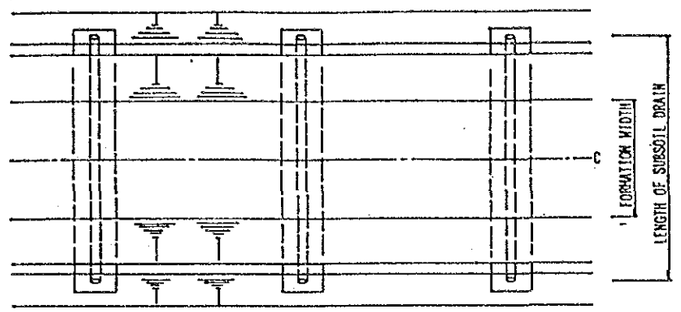
CH.37+855	m2	12×2=24
CH.37+905	m2	12×2=24
CH.37+955	m2	12×2=24
CH.37+980	m2	6×6=36
CH.38+005	m2	12×2=24
CH.38+055	m2	12×2=24
CH.38+105	m2	12×2=24
		180 m2

180 m2 × 0.15 m = 27 m3

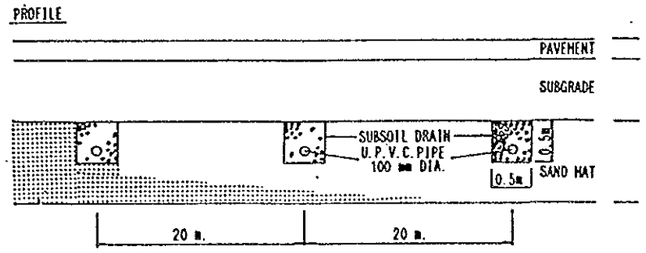
Figure A3-9 Reno Mattress in Alika Swamp

SUBSOIL DRAIN

PLAN



PROFILE



CROSS-SECTION

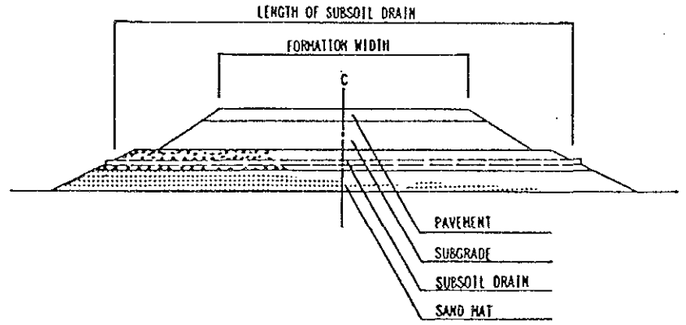


Figure A3-10 Subsoil Drain

SETTLEMENT PLATE AND DISPLACEMENT PEG

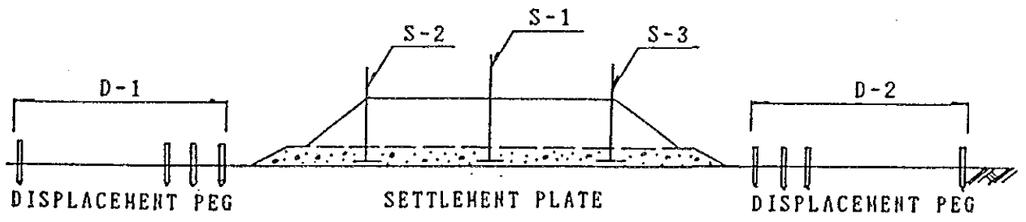
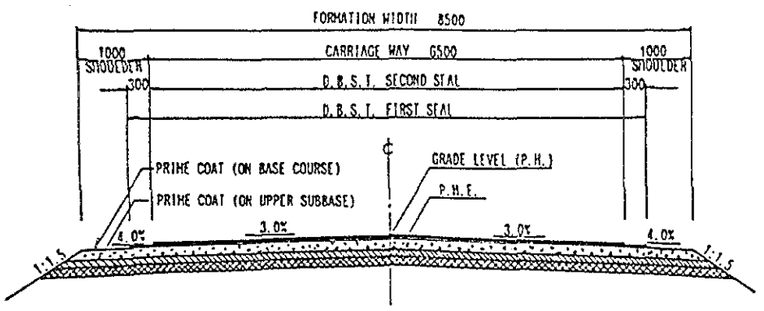


Figure A3-11 Settlement Plate and Dispalacement Peg



TYPICAL SECTION

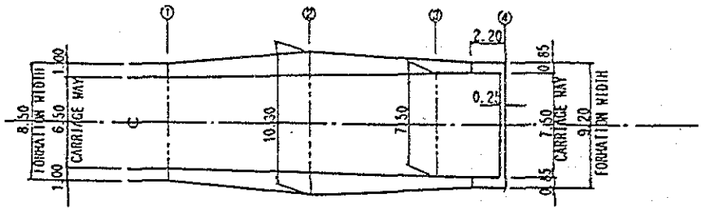
Scale 1:60

PAVEMENT COMPONENTS

- DOUBLE BITUMINOUS SURFACE TREATMENT
  - SECOND SEAL AT — Cover aggregate: 9.5mm 100-135 m2/m3; Bitumen 170 0.6-1.0 ℓ/m2
  - FIRST SEAL AT — Cover aggregate: 19mm 65-85 m2/m3; Bitumen 170 1.25-1.65 ℓ/m2
- PRIME COAT AT — Cutback bitumen: 0.4-0.8 ℓ/m2
- 150 mm COMPACTED BASE COURSE (CRUSHED STONE)
- PRIME COAT AT — Cutback bitumen: 0.4-0.8 ℓ/m2
- 100 mm COMPACTED SUBBASE (UPPER SUBBASE) (CEMENT TREATED SANDY GRAVEL)
- 140 mm COMPACTED SUBBASE (LOWER SUBBASE) (SANDY GRAVEL)

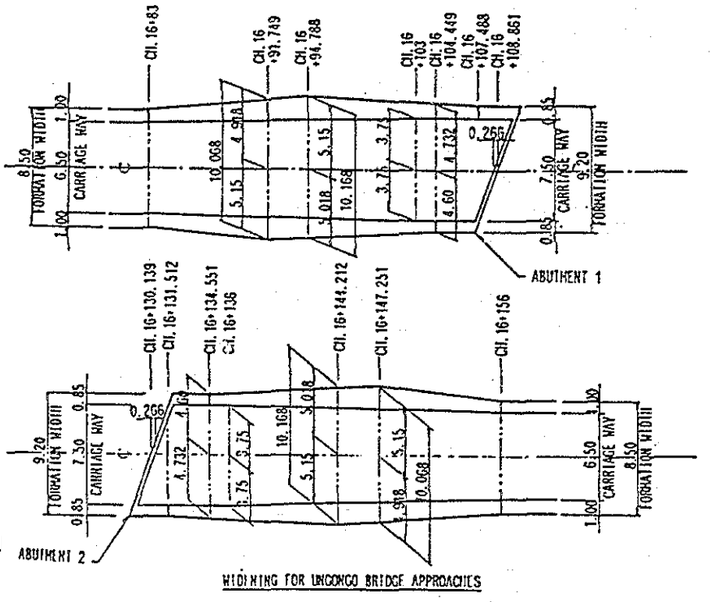
PAVEMENT SECTION FOR LOT-I

ROAD WIDTH DEFORMATION (LOT-I)



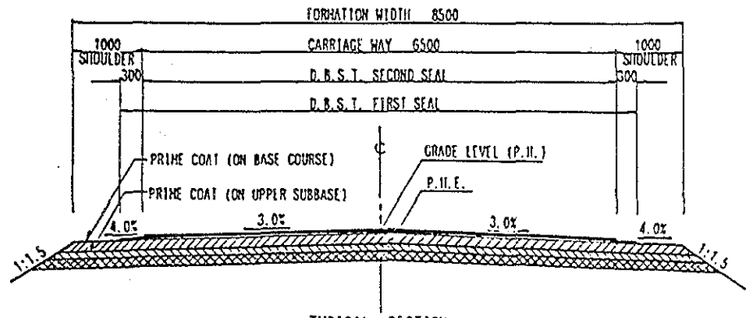
WIDENING FOR BRIDGE APPROACHES

BRIDGE \ CHAINAGE	ABUTMENT 1				ABUTMENT 2			
	①	②	③	④	④'	③'	②'	①'
TAIENA BR.	Ch. 11 +971	Ch. 11 +981.5	Ch. 11 +991	Ch. 11 +996.4	Ch. 12 +14.6	Ch. 12 +20	Ch. 12 +29.5	Ch. 12 +40
ACOBINO BR.	Ch. 14 +697	Ch. 14 +708	Ch. 14 +717	Ch. 14 +722.9	Ch. 14 +744.1	Ch. 14 +750	Ch. 14 +759	Ch. 14 +770



WIDENING FOR UNCONCO BRIDGE APPROACHES

Figure A3-12 LOT-I Pavement Section and Chainage of Width taper



TYPICAL SECTION

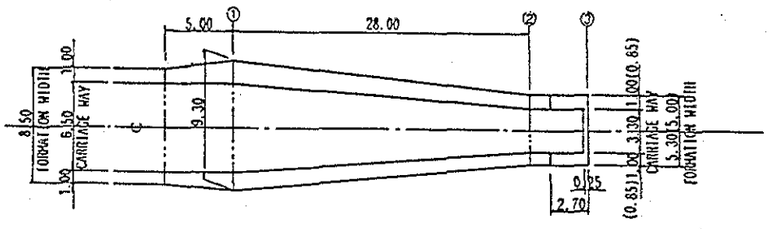
Scale 1:60

PAVEMENT COMPONENTS

- DOUBLE BITUMINOUS SURFACE TREATMENT
  - SECOND SEAL AT — Cover aggregate: 9.5mm 100-135 m2/m3; Bitumen 170 0.6-1.0 ℓ/m2
  - FIRST SEAL AT — Cover aggregate: 19mm 65-85 m2/m3; Bitumen 170 1.25-1.65 ℓ/m2
- PRIME COAT AT — Cutback bitumen: 0.4-0.8 ℓ/m2
- 150 mm COMPACTED BASE COURSE (CEMENT TREATED SANDY GRAVEL)
- PRIME COAT AT — Cutback bitumen: 0.4-0.8 ℓ/m2
- 100 mm COMPACTED SUBBASE (UPPER SUBBASE) (CEMENT TREATED SANDY GRAVEL)
- 140 mm COMPACTED SUBBASE (LOWER SUBBASE) (SANDY GRAVEL)

PAVEMENT SECTION FOR LOT-II

ROAD WIDTH DEFORMATION (LOT-II)



Note: Figures in ( ) are for KAPURI BRIDGE.

APPROACHES FOR BRIDGES

BRIDGE \ CHAINAGE	ABUTMENT 1			ABUTMENT 2		
	①	②	③	③'	②'	①'
HIARU BR.	Ch. 33 +778	Ch. 33 +805	Ch. 33 +810.25	Ch. 33 +903.75	Ch. 33 +908	Ch. 33 +936
KAPURI BR.	Ch. 59 +887	Ch. 59 +915	Ch. 59 +919.4	Ch. 59 +987.4	Ch. 59 +992	Ch. 60 +20
LAKEKAHU BR.	Ch. 67 +144	Ch. 67 +172	Ch. 67 +176.2	Ch. 67 +297.8	Ch. 67 +302	Ch. 67 +330
TAURI BR.	Ch. 68 +645	Ch. 68 +673	Ch. 68 +677.2	Ch. 68 +798.8	Ch. 68 +803	Ch. 68 +831
MAKARA BR.	Ch. 75 +879	Ch. 75 +907	Ch. 75 +911.8	Ch. 75 +954.15	Ch. 75 +959	Ch. 75 +987
SAPPANARO BR.	Ch. 77 +182	Ch. 77 +210	Ch. 77 +214.1	Ch. 77 +256.45	Ch. 77 +261	Ch. 77 +289

Figure A3-13 LOT-II Pavement Section and Point of Road Width Change

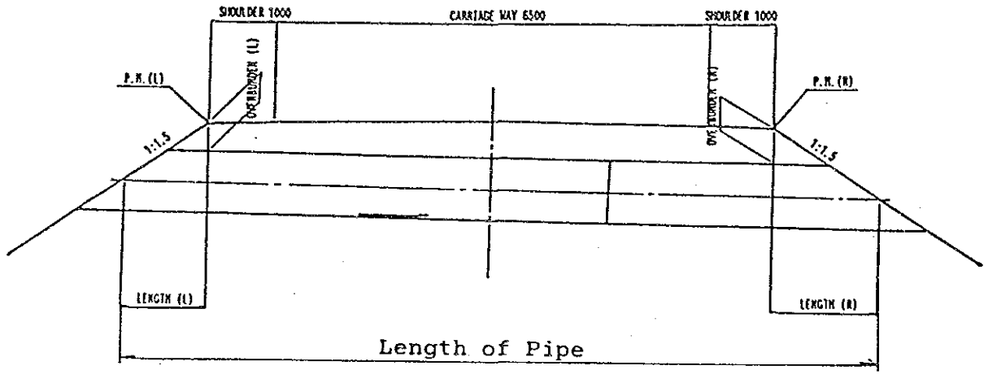
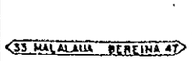


Figure A3-14 Sectional Length of Pipe

	INTERSECTION DIRECTION BOARD	FINGER BOARD	FINGER BOARD	GIVE WAY
				
TYPE	G 2	G3 - 1	G3 - 2	R1 - 2A
SIZE	1920 x 470	1260 x 200	2600 x 200	750

	NO OVERTAKING OR PASSING	GIVE WAY AHEAD	ONE LANE BRIDGE	SCHOOL
				
TYPE	R6 - 1A	W3 - 2A	W4 - 1A W8 - 16A	W6 - 4A
SIZE	750 x 900	750 x 750	600 x 600 (W4-1A) 600 x 400 (W8-16A)	600 x 600

Figure A3-15 Road Signs

ROAD EDGE GUIDE POST

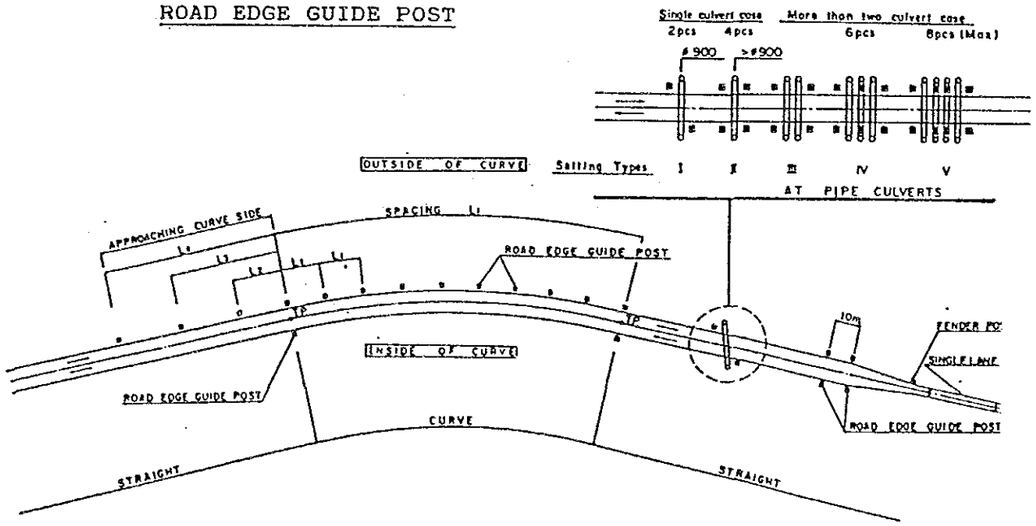


Figure A3-16 Layout for Road Edge Guide Posts

GUARDRAIL

Table A3-2 Quantities of Guardrail

TOTAL QUANTITIES PER BRIDGE

LOT-I
Single Lane Br.

BRIDGE	GUARDRAIL			
	ONE SECTION LENGTH (m)	TOTAL		
		POSTS (NO) *	4m LENGTHS OF GUARDRAIL (NO)	GUARDRAIL END SECTIONS (NO)
TWO WAY BRIDGE	12	36	12	8

LOT-II
Double Lane Br.

BRIDGE	GUARDRAIL				FENDER POST
	ONE SECTION LENGTH (m)	TOTAL			
		POSTS (NO) *	4m LENGTHS OF GUARDRAIL (NO)	GUARDRAIL END SECTIONS (NO)	
SINGLE LANE BRIDGE	28	52	28	8	4

* INCLUDES BLOCKS & MIG. BOLTS

ATTACHMENT- 4

Proposal on Alternative Construction Schedule

Proposal on Alternative Construction Schedule

Based on the comments expressed by the letter (13-5-2) dated 27 December, 1989 from the OIDA of PNG Government, the JICA study team prepared an alternative construction schedule only from the view point to minimize the annual local currency for the Project.

1. Pre-construction period

   No modification is considered for the pre-construction period of the Project.

2. Lot I construction period

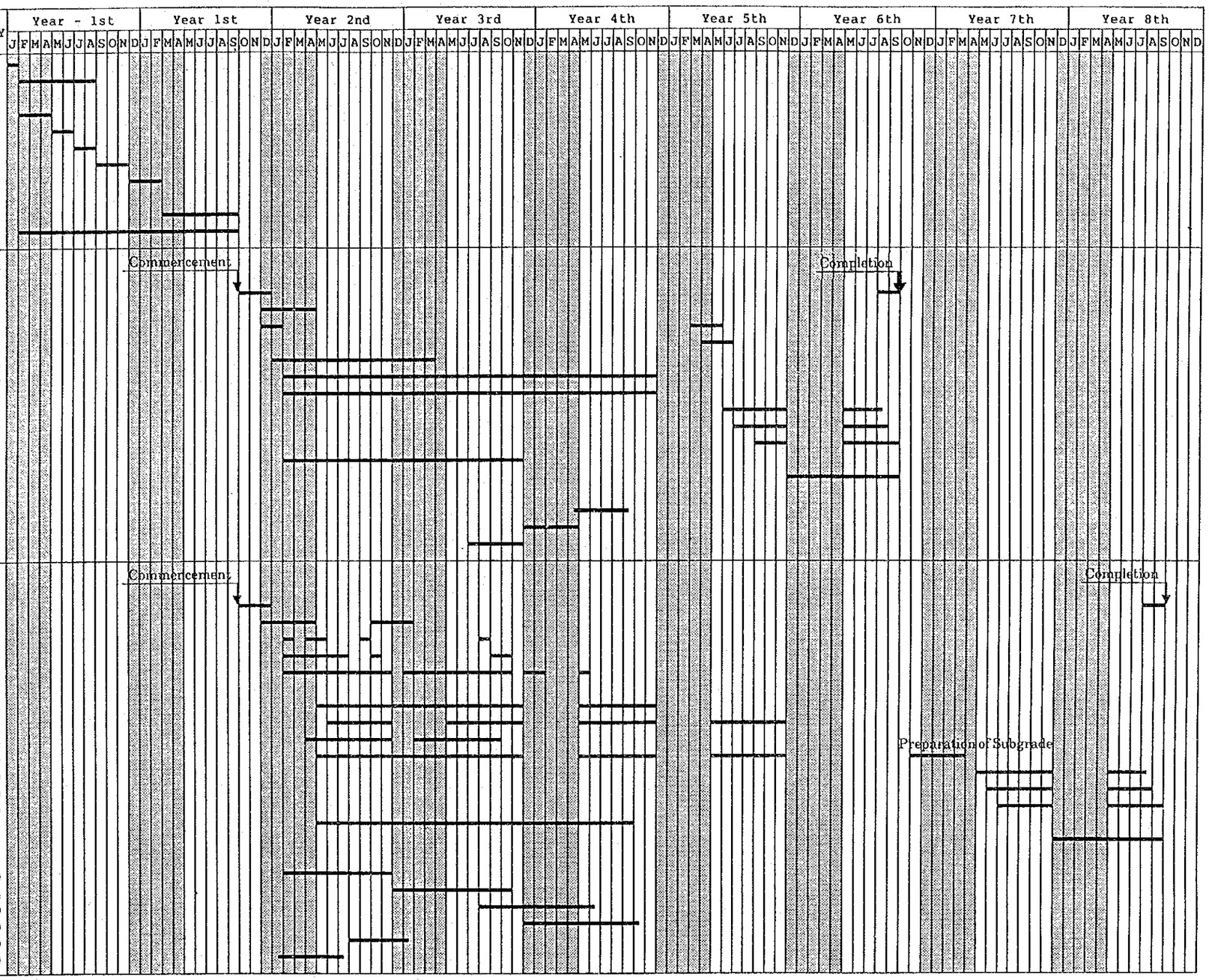
   The commencement of the Project is October of the year 1st as same as the basic schedule, however, the year of completion is to be extended two years (from the total 36 months to the 60 months). The works of Excavation and Embankment are to be extended one year, and the commencement of Pavement works are to be delayed two years.

3. Lot II construction period

   The commencement of the Project is October of the year 1st as same as the basic schedule, however, the year of completion is to be extended three years (from the total 48 months to the total 84 months).
   The works of Excavation including cut in borrow and Embankment is to be extended one year, and the commencement of Pavement works are to be delayed three years. The year 6th will have no works in the site accordingly.

The above alternative schedule is outlined in the Fig. 11-6. The disbursement for the alternative schedule is discussed in the Cost Estimate Report.

DESCRIPTION	UNIT	QUANTITY
Completion of Detailed Design		
Financial Arrangement		
Selection of Consultant		
Proposal		
Evaluation		
Approval of Consultant		
Prequalification		
Tender		
Evaluation		
Award of Contact		
Land Acquisition		
LOT I Bereina to Miaru River Sec.		
1. Preparatory Works		
Mobilization & Demobilization		LS
Temporary Building		LS
Access Road		LS
Borrow pit & Quarry site		LS
2. Clearing and Grubbing	ha	142
3. Excavation	m^3	829,000
4. Embankment	m^3	742,000
5. Subbase Course	m^3	75,500
6. Base Course	m^3	44,900
7. Bituminous Surfacing, DBST	m^2	288,300
8. Drainage Work		LS
9. Road Furniture		LS
10. Bridge Work		
(1) Bridge No.1 (Taiena)	m	17
(2) Bridge No.2 (Agobino)	m	20
(3) Bridge No.3 (Ungongo)	m	20
LOT II Miaru River to Malalaua Sec.		
1. Preparatory Works		
Mobilization & Demobilization		LS
Temporary Building		LS
Access Road		LS
Borrow Pit		LS
2. Clearing and Grubbing	ha	202
3. Excavation		
Excavation	m^3	261,000
Cut in Borrow	m^3	392,000
4. Sand Mat	m^3	172,000
5. Embankment	m^3	591,000
6. Sub base Course	m^3	104,000
7. Base Course	m^3	60,900
8. Bituminous Surfacing, DBST	m^2	395,000
9. Drainage Work		LS
10. Road Furniture		LS
11. Bridge Work		
(1) Bridge No.4 (Miaru)	m	90
(2) Bridge No.5 (Kapuri)	m	64
(3) Bridge No.6 (Lakekamu)	m	120
(4) Bridge No.7 (Tauri)	m	120
(5) Bridge No.8 (Makara)	m	40
(6) Bridge No.9 (Sappaharo)	m	40



Note : The year - 1st is 1990 in the earlist.

Fig. 11-6 ALTERNATIVE CONSTRUCTION SCHEDULE FOR THE PROJECT