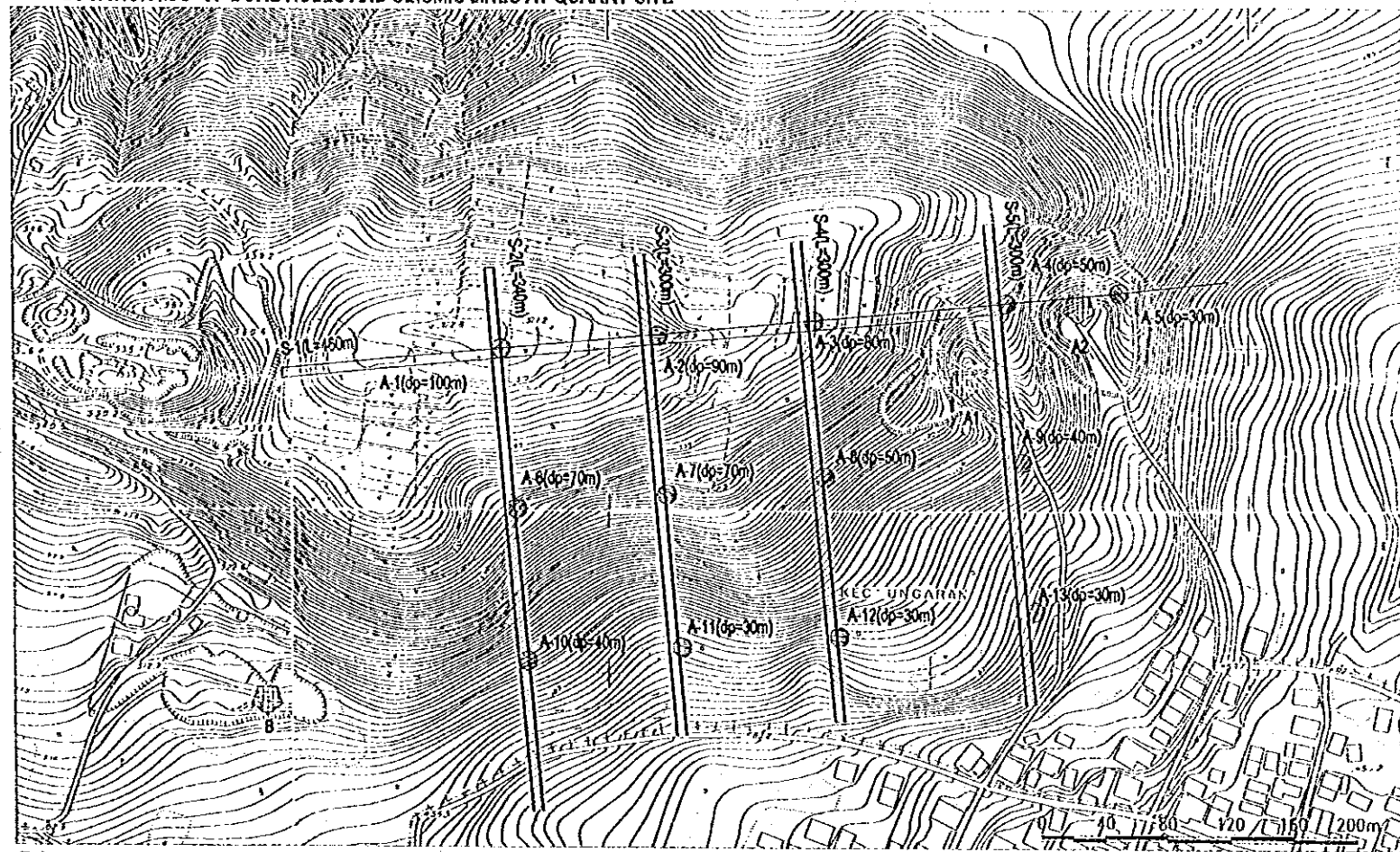


LOCATION MAP OF BORE HOLES AND SEISMIC LINES AT QUARRY SITE



LEGEND

(Geological Strata)

Age	Formation and Strata Name	Symbol	Description
Tertiary-Quaternary	Andesite	An	Andesite consists of sheet or dike, which is mainly composed Plagioclase, Pyroxene and Ore minerals, and shows dark gray. But it was changed in quality partly by the hydrothermal alteration, and secondary minerals that consists of Chlorite, Mordenite and Illite were formed, and show greenish light gray. The hardness of rock is comparatively high, and the bedrock has cracks with the interval of 10 to 200 cm.
Pliocene-Pleistocene	Pyroclastic Rock	Kp	Pyroclastic rock mainly consists of volcanic breccia and partly contains mafic tuff and andesite lava. Volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff. Rocks are weathered strongly, so hardness of rocks is very soft. this stratum is covered by andesite sheet.

(Note)

- Boundary of Geological Strata
- Boundary of Rock Class

(SYMBOLS OF ROCKS AND ROCK CLASS)

An	Andesite Sheet	D	D Class
Py	Pyroclastic Rock	CL	CL Class
La	Andesite Lava	CM	CM Class
		CH	CH Class

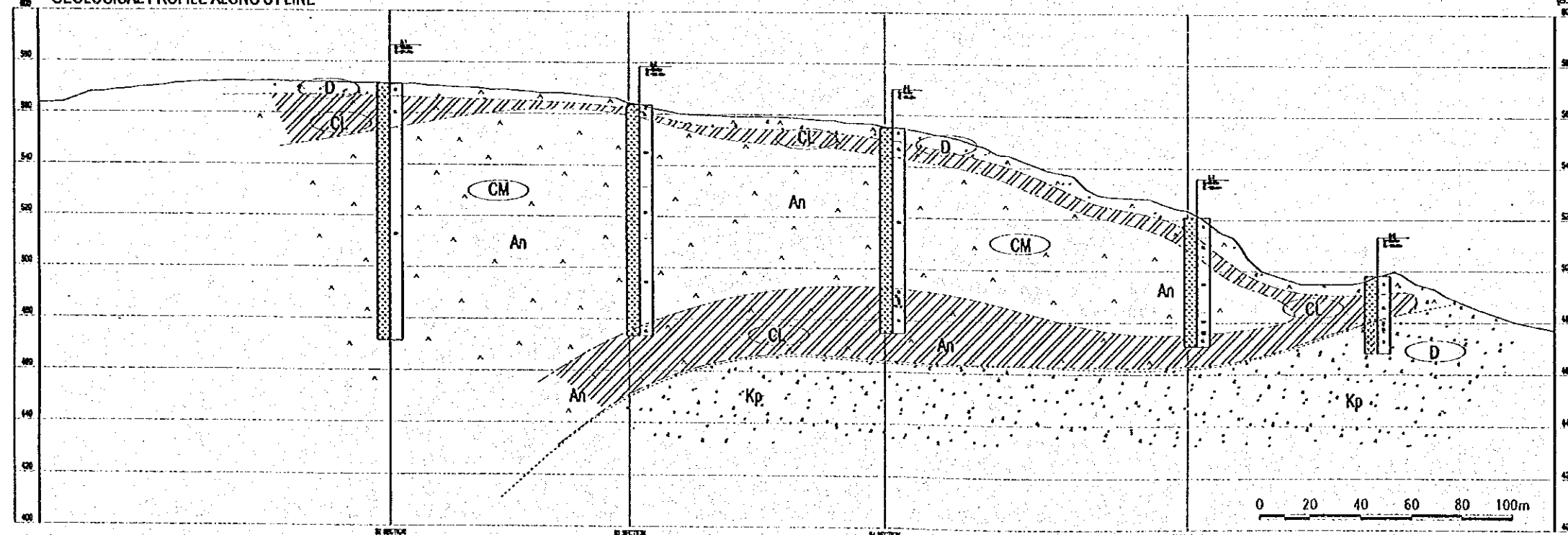
BORING POINT

LINE NAME(TOTAL LENGTH)

SAMPLE NUMBER

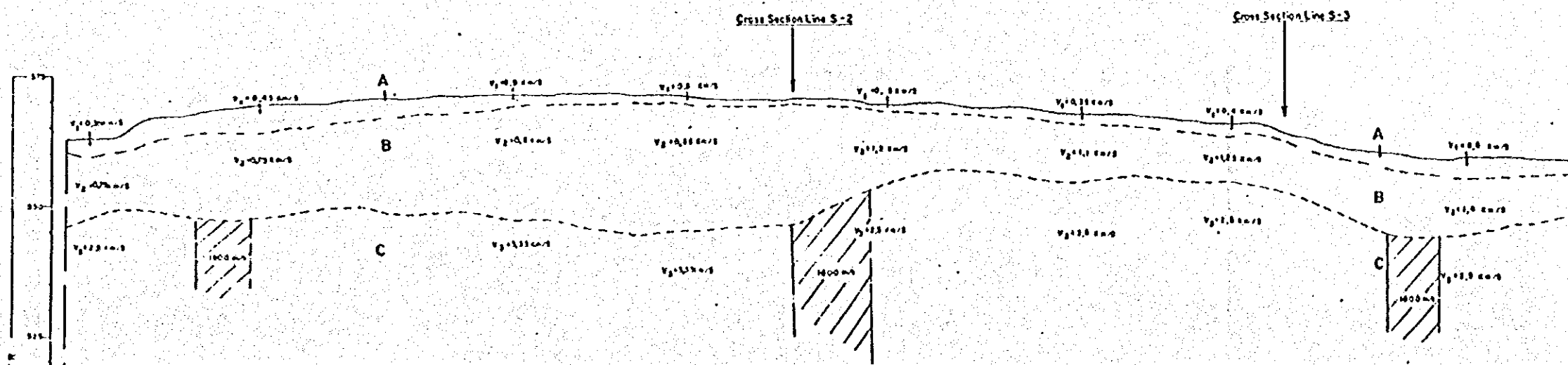
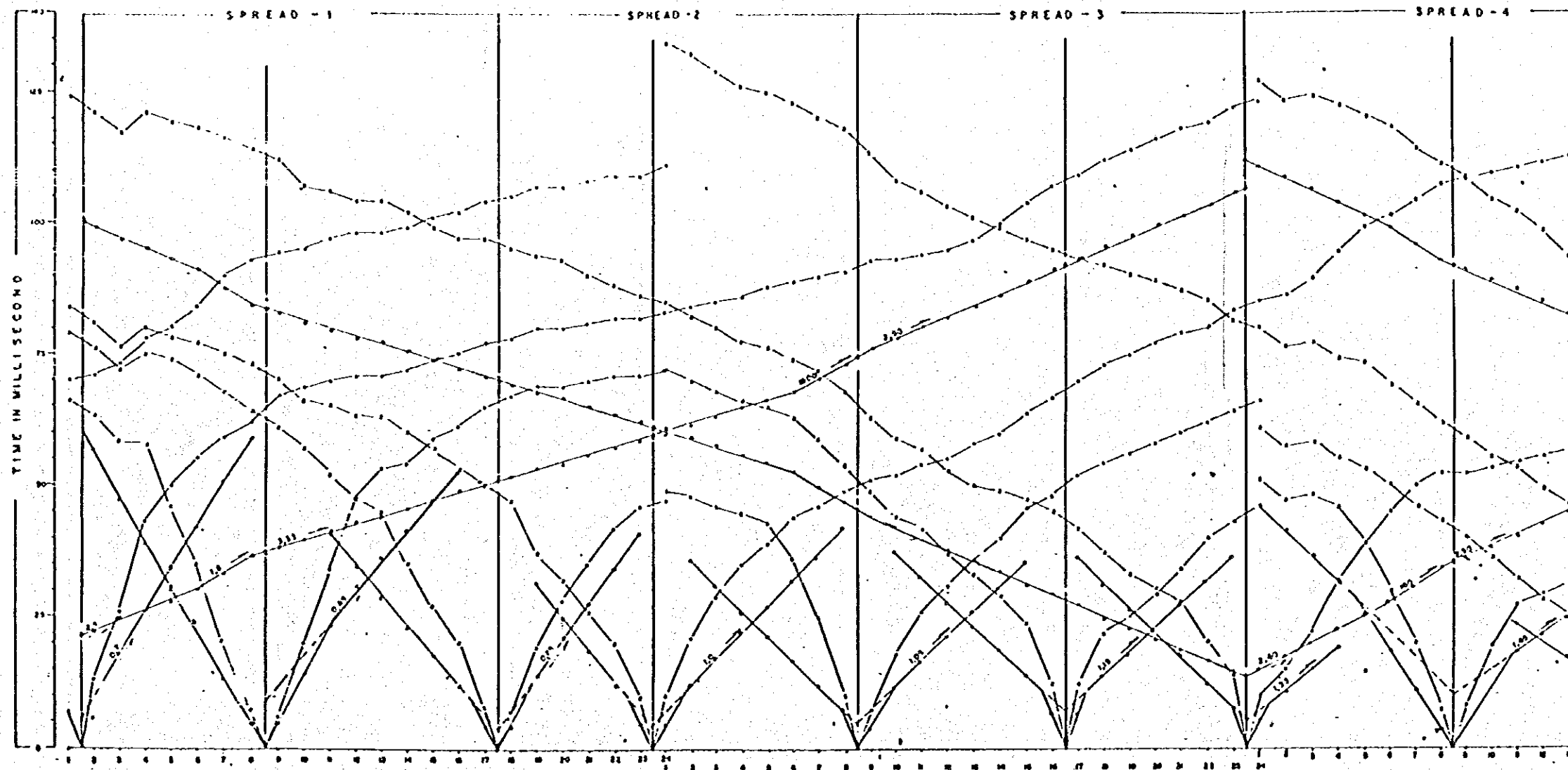
SAMPLING POINT FOR AGGREGATE TESTS

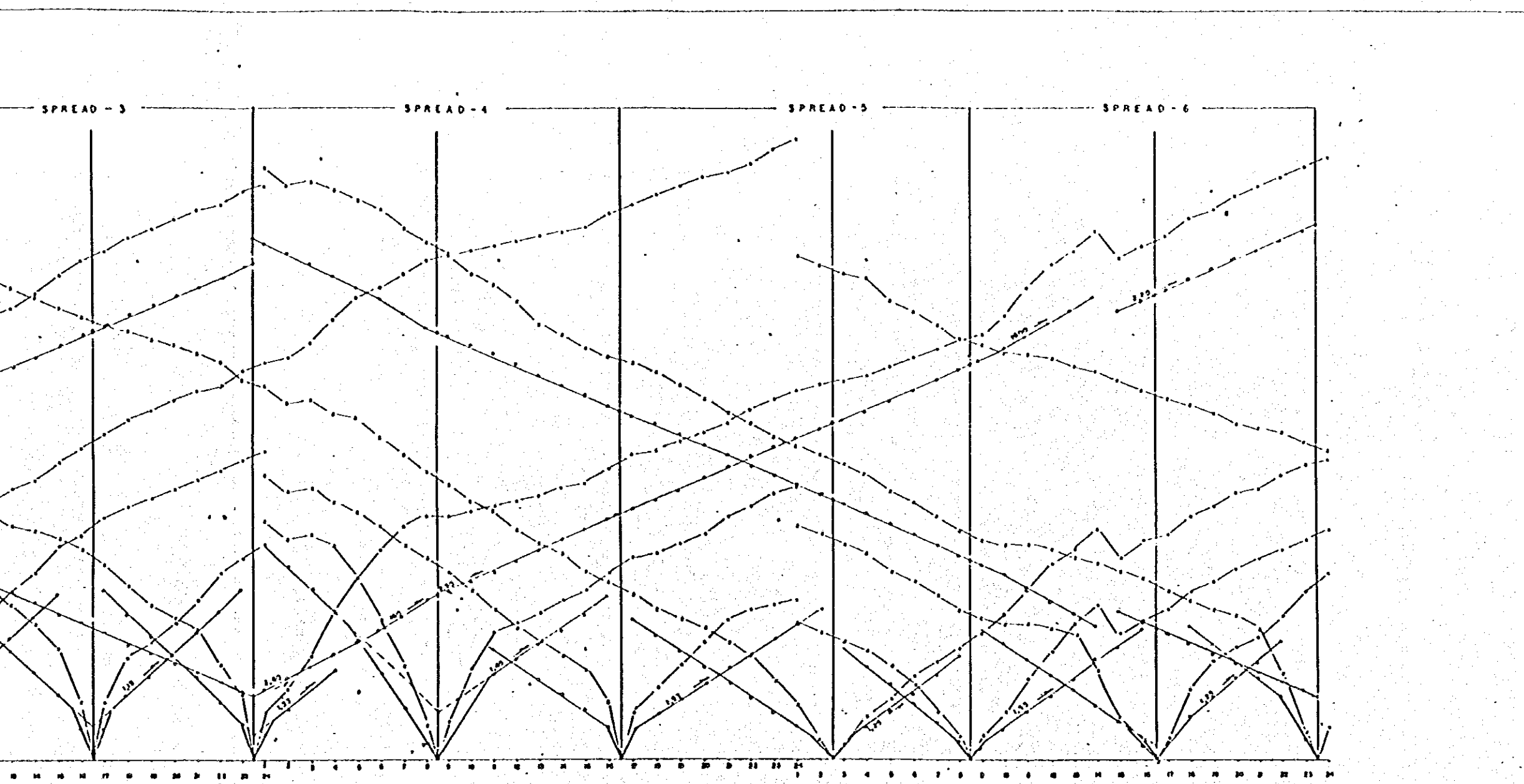
GEOLOGICAL PROFILE ALONG S1 LINE



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 2.4.1
BORRHOLE LOCATION AND LINE SEISMIC FOR QUARRY SITE





Sketch Location Map

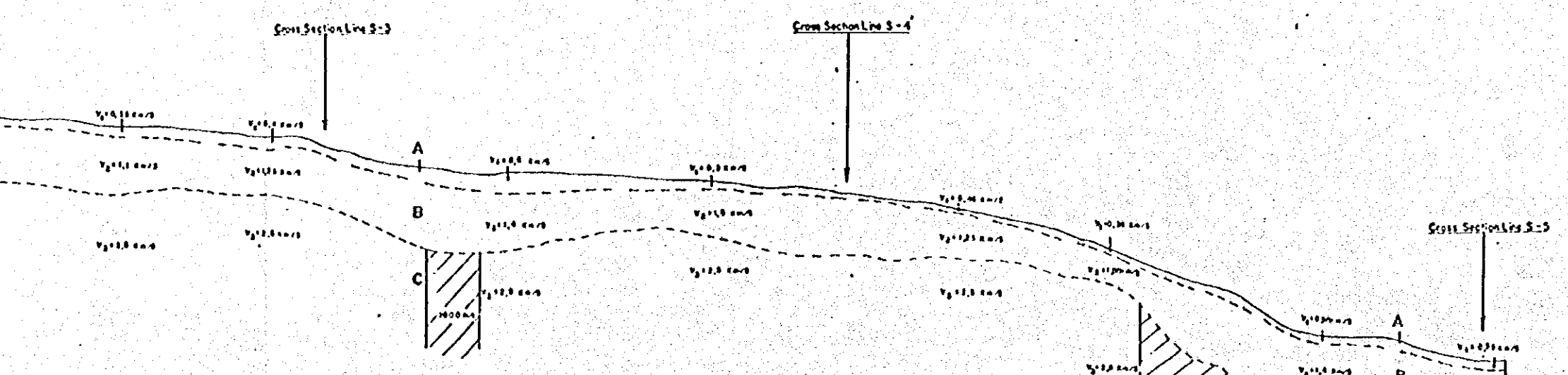
REFRACTION SEISMIC FOR
JATIBARANG DAM PROJECT AT
QUARRY
GUNUNG MERGI - SEMARANG

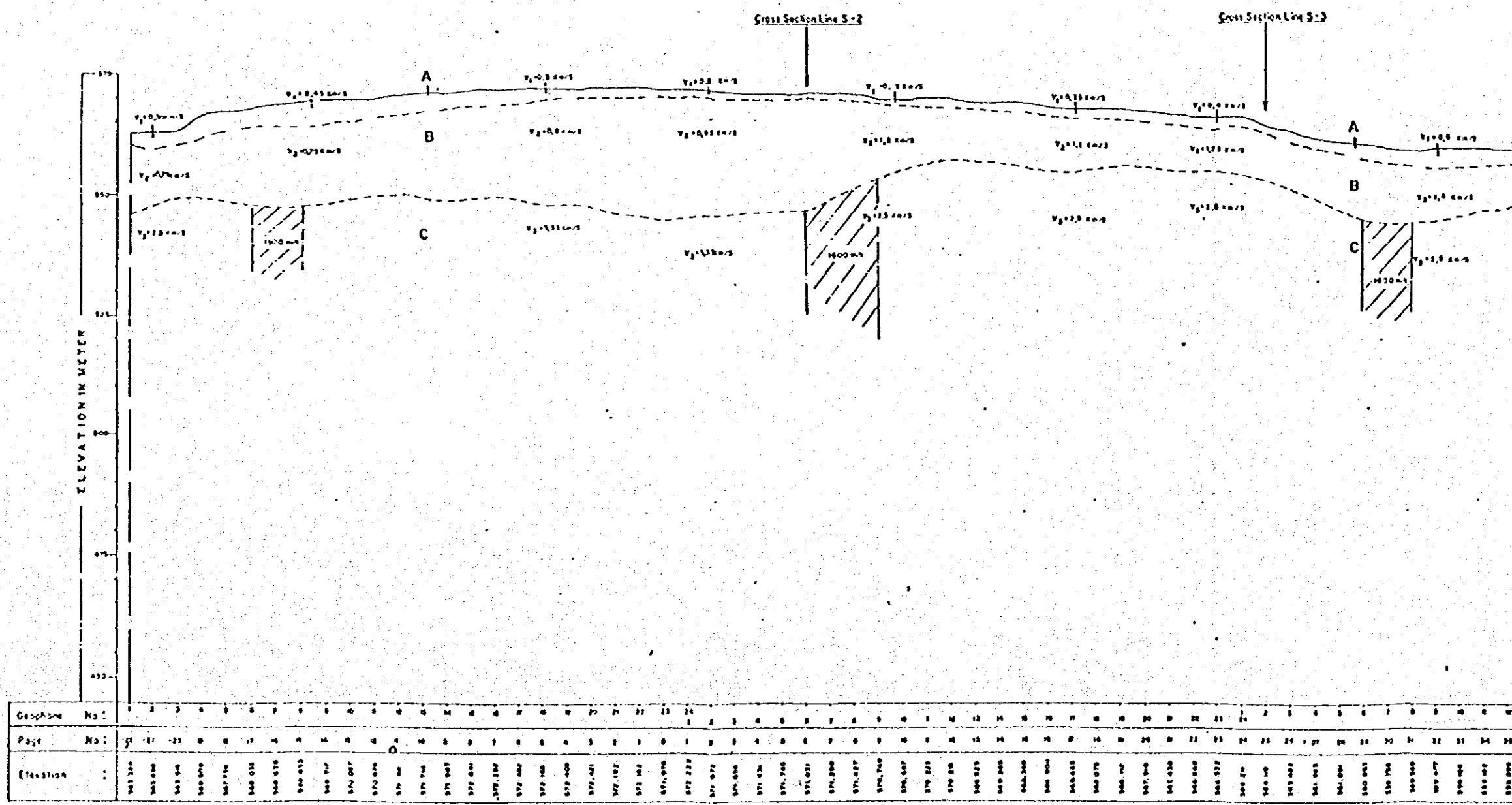
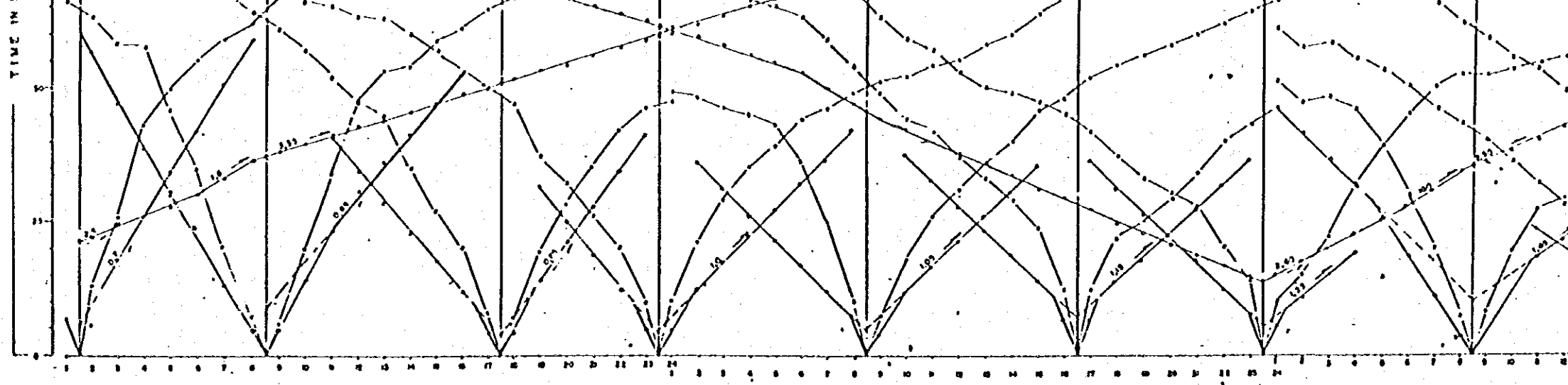
SCALE: Vertical 1:1000
Horizontal 1:1000

LEGEND:

- A Top Soil Silt, Clay, Sandy Silt, Brown (300 m/s - 600 m/s)
- B Andesite Weak to Medium Strong (750 m/s - 1500 m/s)
- C Andesite Medium strong to Strong (2200 m/s - 3000 m/s)
- Low Velocity Zone

- Geophone number.
- Layer boundary.
- Velocity
- Forward shoot.
- Reverse shoot.





Geophone No :	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35																	
Page No :	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55																	
Elevation :	361.100	361.000	360.900	360.800	360.700	360.600	360.500	360.400	360.300	360.200	360.100	360.000	359.900	359.800	359.700	359.600	359.500	359.400	359.300	359.200	359.100	359.000	358.900	358.800	358.700	358.600	358.500	358.400	358.300	358.200	358.100	358.000	357.900	357.800	357.700	357.600	357.500	357.400	357.300	357.200	357.100	357.000	356.900	356.800	356.700	356.600	356.500	356.400	356.300	356.200	356.100	356.000

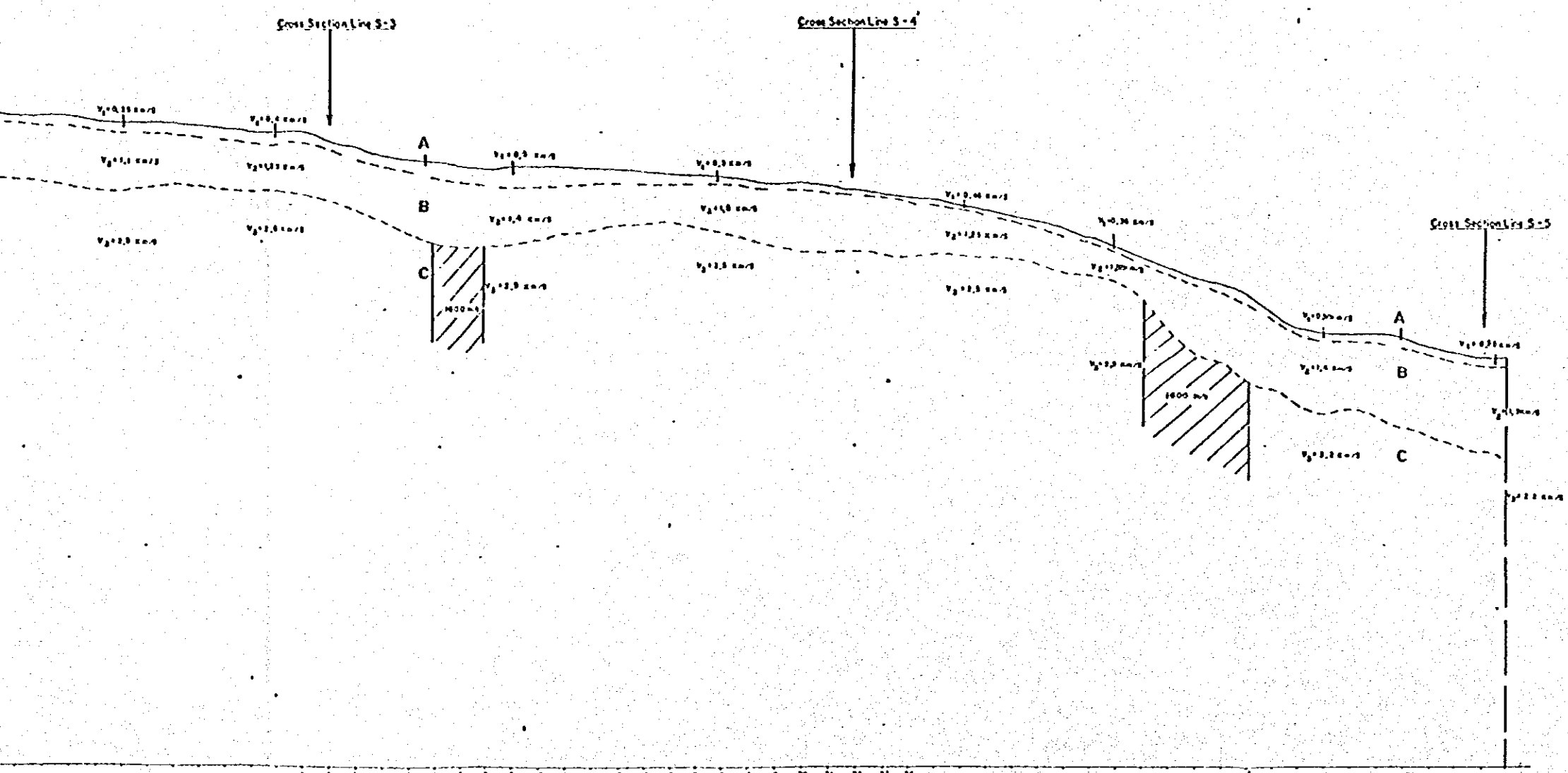
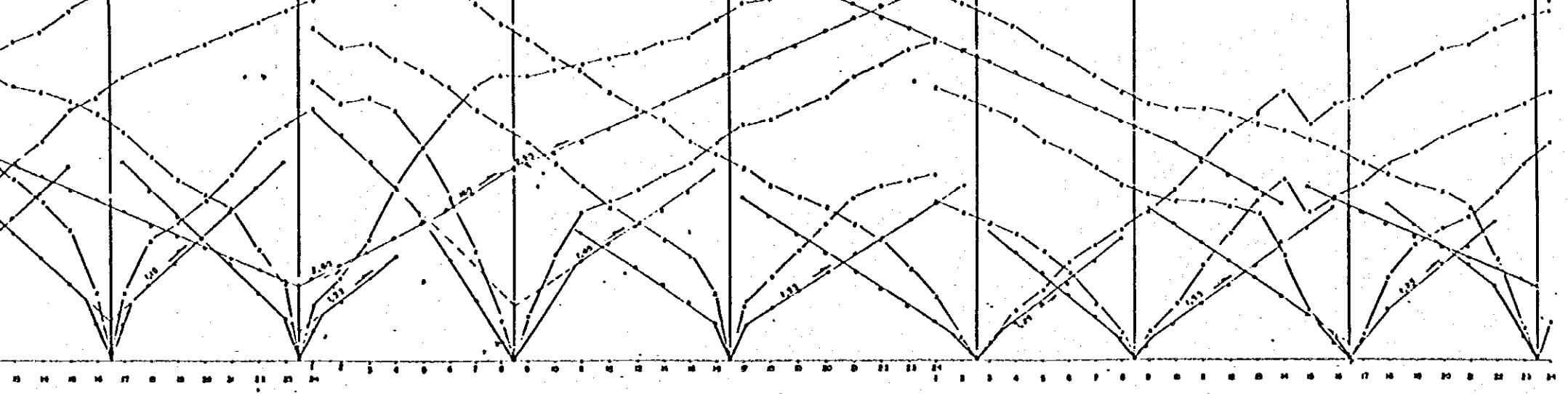
REFRACTION SEISMIC FOR
JATIBARANG DAM PROJECT AT
QUARRY
GUNUNG MERGI - SEMARANG

SCALE: Vertical 1:1000
Horizontal 1:1000

- LEGEND:
- A** Top Soil Silty Clay Sand / Silty Brown (300 m/s - 600 m/s)
 - B** Andesite Weak to Medium Strong (750 m/s - 1500 m/s)
 - C** Andesite Medium strong to Strong (2200 m/s - 3000 m/s)

Low Velocity Zone

- Geophone number.
- Layer boundary
- Velocity
- Forward shoot.
- Reverse shoot.



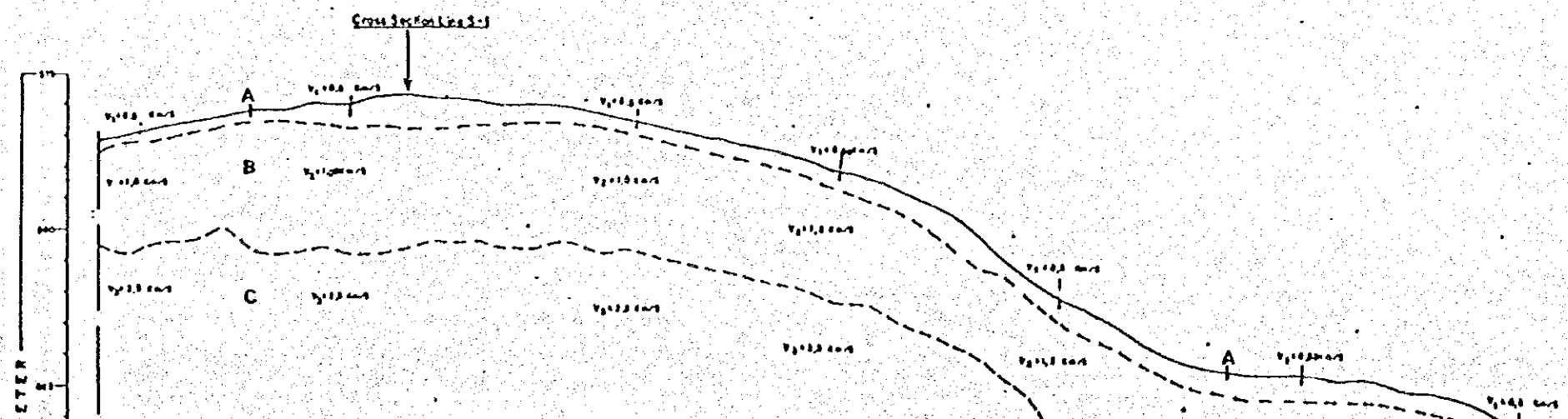
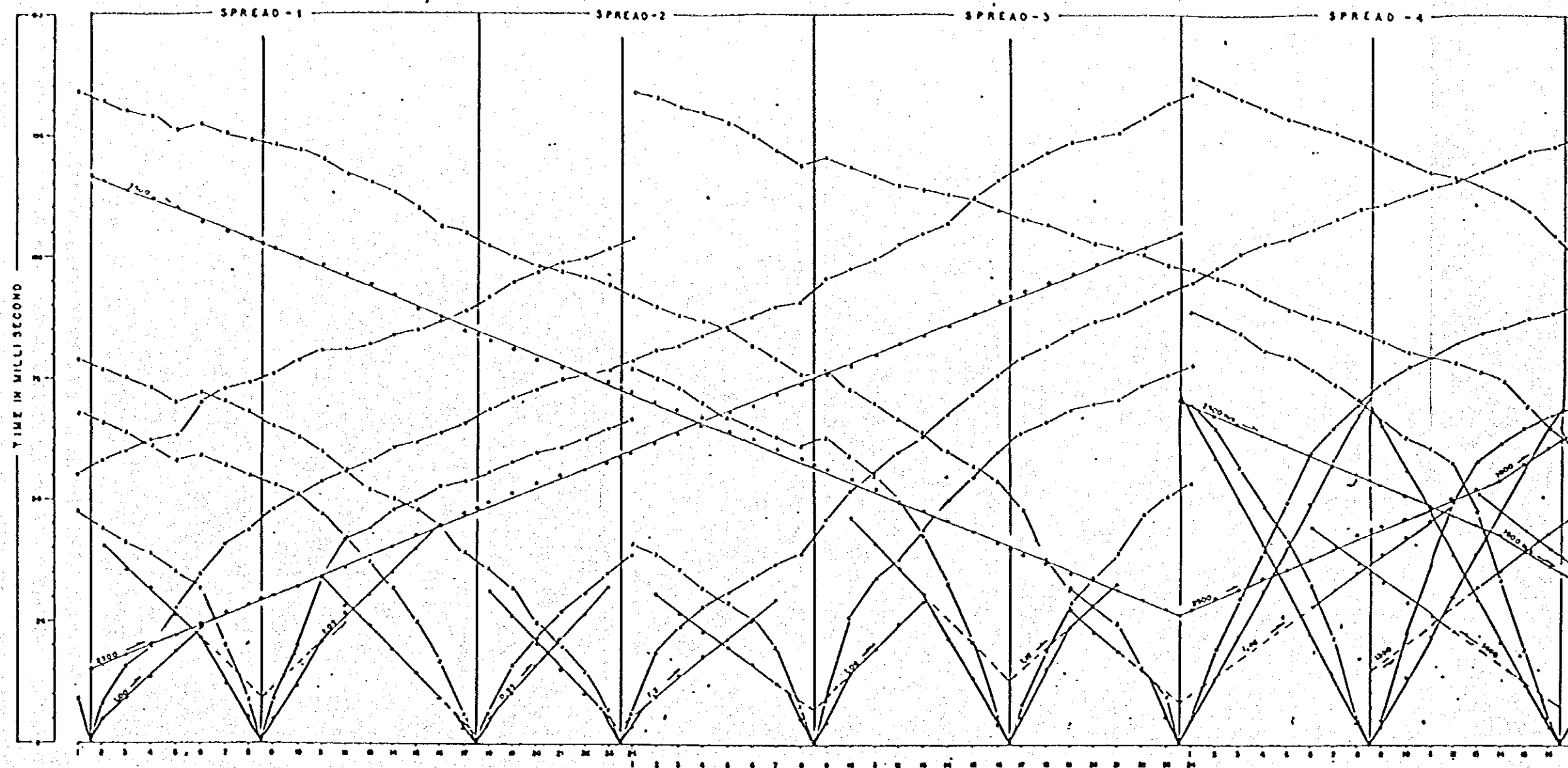
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000.075	000.150	000.225	000.300	000.375	000.450	000.525	000.600	000.675	000.750	000.825	000.900	000.975	001.050	001.075	001.150	001.225	001.300	001.375	001.450	001.525	001.600	001.675	001.750	001.825	001.900	001.975	002.050	002.125	002.200	002.275	002.350	002.425	002.500	002.575	002.650	002.725	002.800	002.875	002.950	003.025

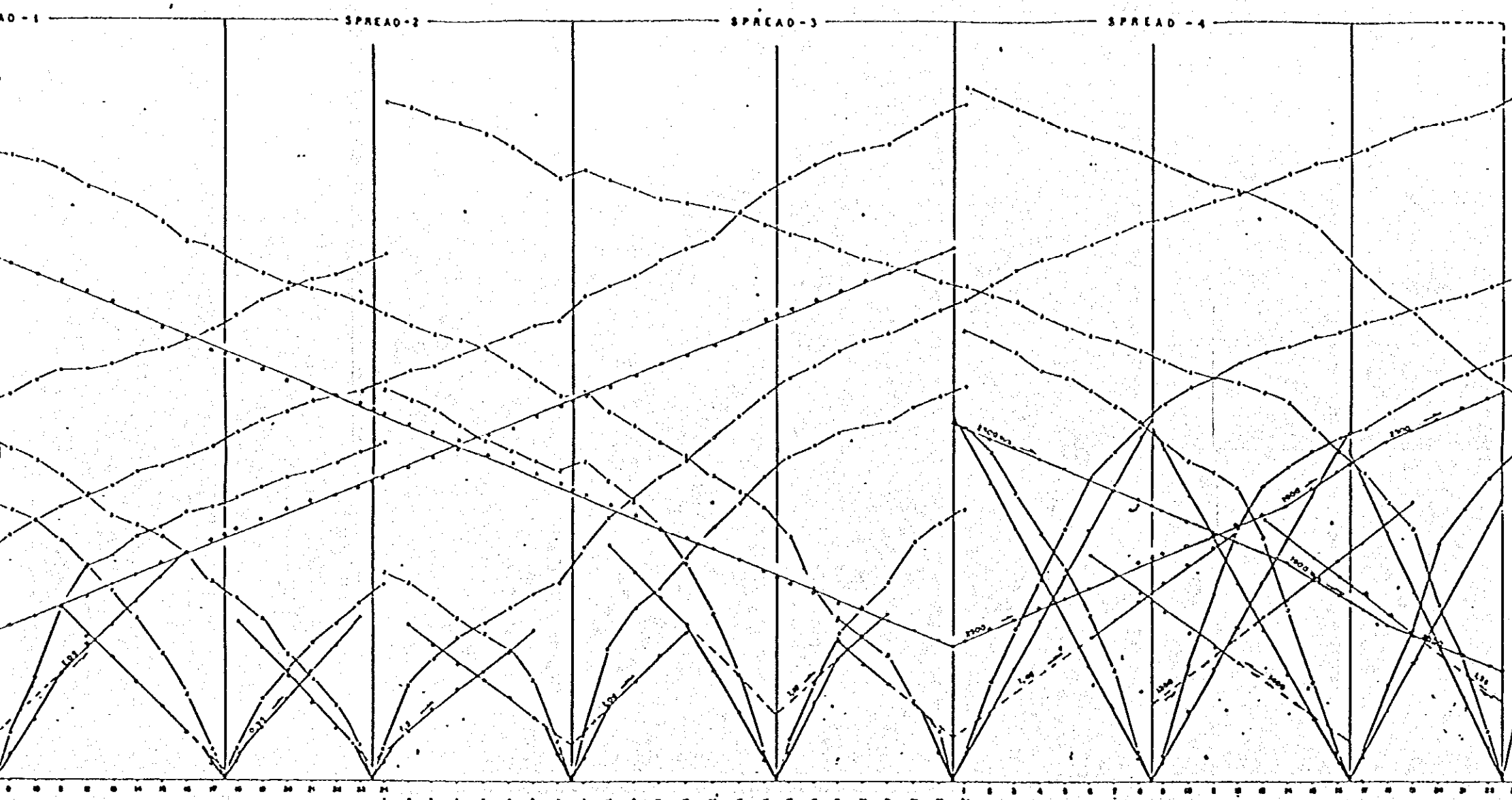
Fig. 2.4.2

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

DIRECTION GENERAL OF WATER RESOURCES DEVELOPMENT
MINISTRY OF PUBLIC WORKS

T-X GRAPH & SEISMIC SECTION
LINE S-1





Sketch Location Map

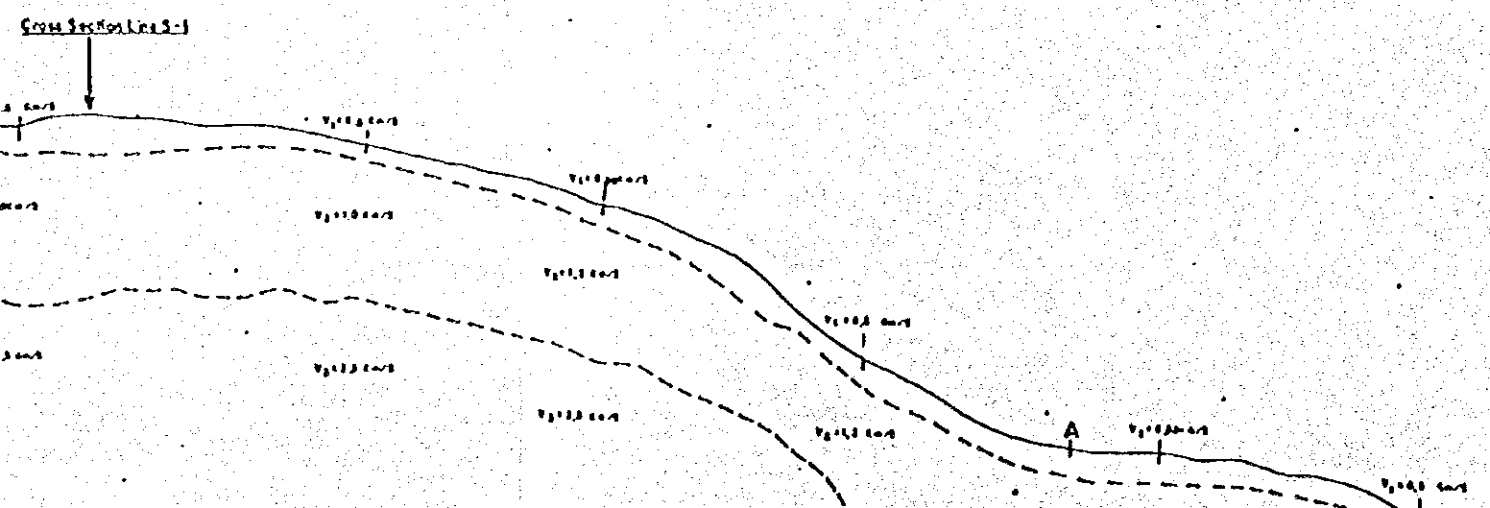
REFRACTION SEISMOLOG FOR
 JATIBARANG DAM PROJECT AT
 QUARRY
 GUNUNG MERGI - SEMARANG

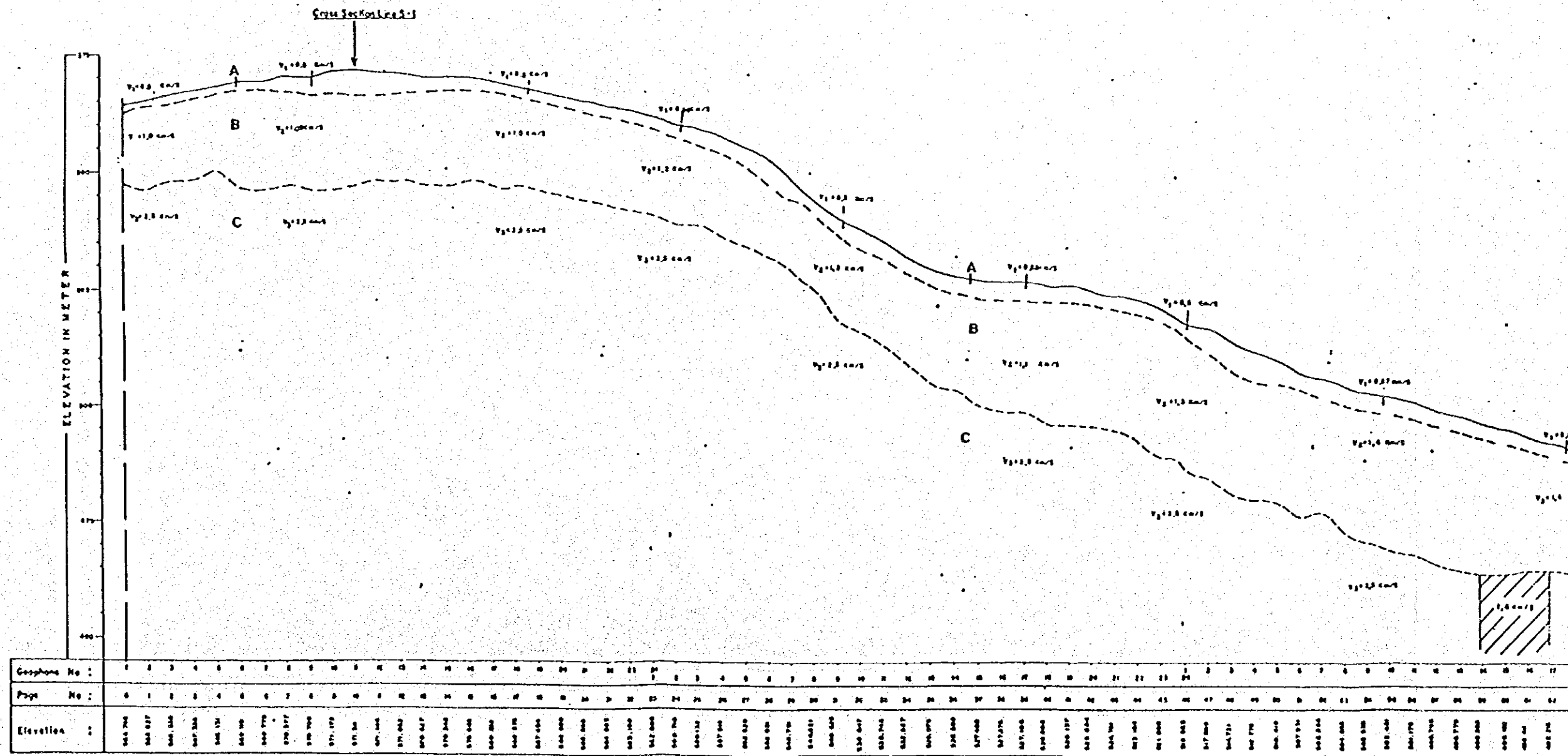
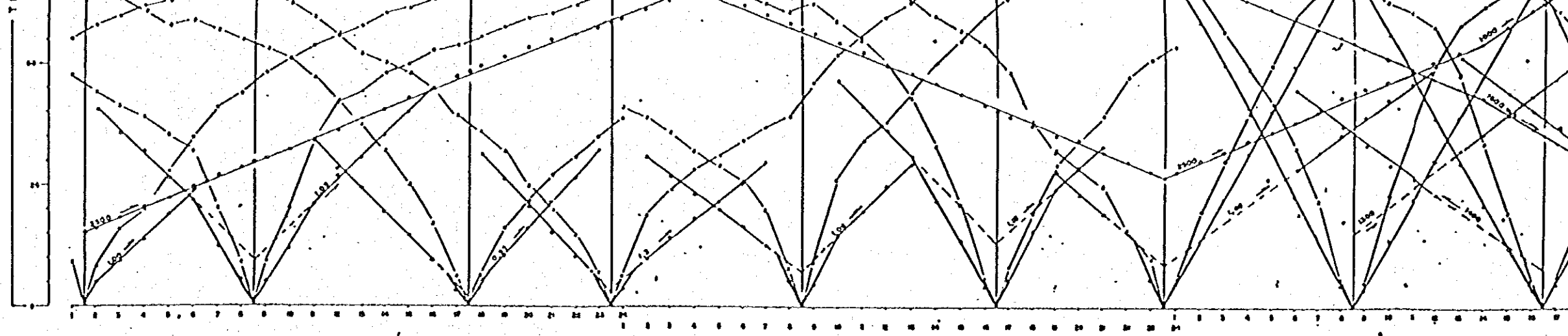
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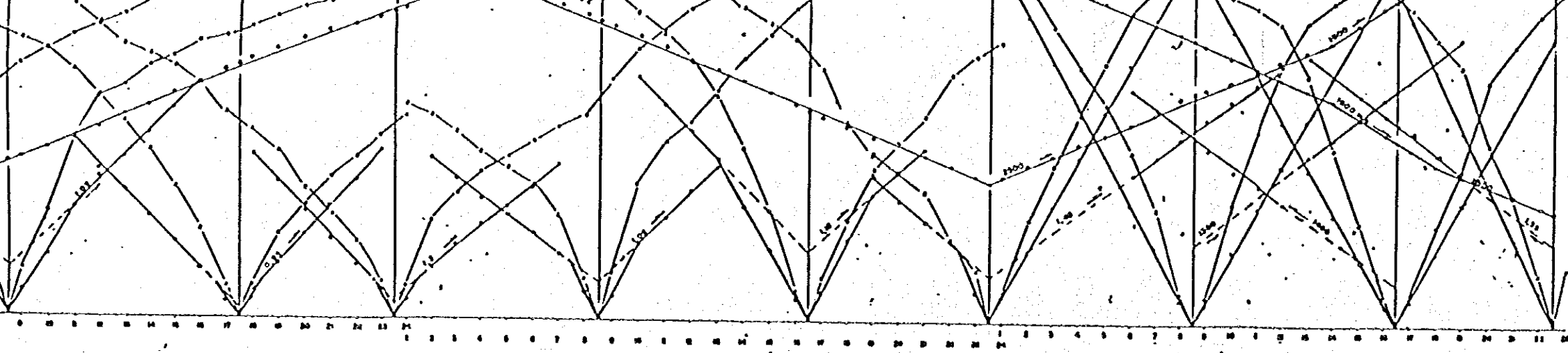
LEGEND:

- A Top Soil Silty Clay, Sandy Silt, Brown (300 m/s - 600 m/s)
- B Andesite Weak to Medium Strong (750 m/s - 1500 m/s)
- C Andesite Medium strong to Strong (2200 m/s - 3000 m/s)
- Low Velocity Zone

- Geophone number.
- Layer boundary.
- Velocity.
- Forward shot.
- Reverse shot.







WATUBARAH DAM PROJECT AT
 QUARRY
 GUMUNG MERGI - SEMARANG

SCALE: Vertical . 1:1000
 Horizontal . 1:1000

- LEGEND :
- A Top Soil (Sty Clay, Sandy Silt, Brown (300m/s - 600 m/s))
 - B Andesite Weak to Medium Strong (750 m/s - 1300 m/s)
 - C Andesite Medium strong to Strong (2200 m/s - 3000 m/s)
 - Low Velocity Zone
 - Geophone number.
 - Layer boundary.
 - Velocity.
 - Forward shock.
 - Reverse shock.

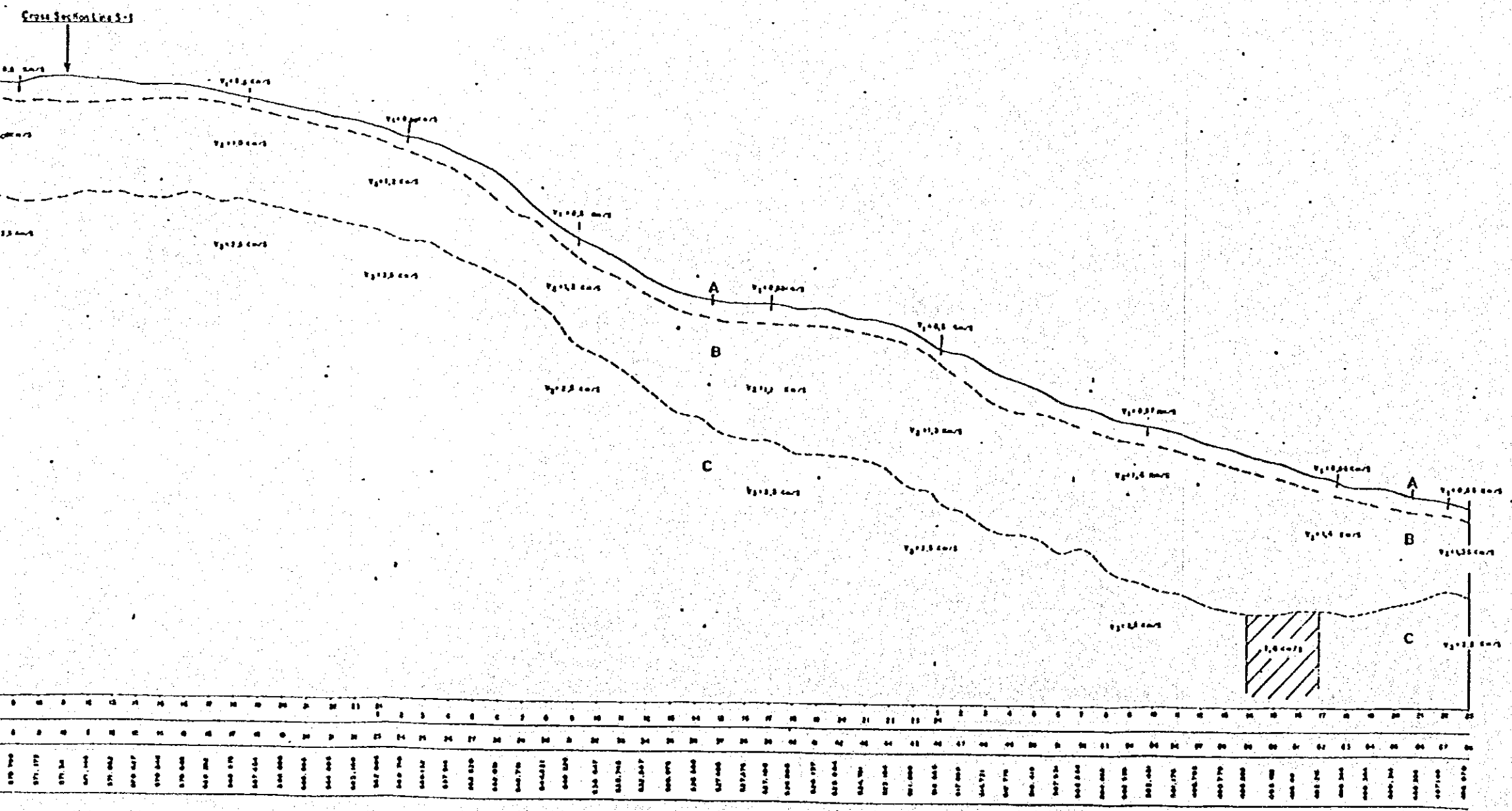


Fig. 2.4.3

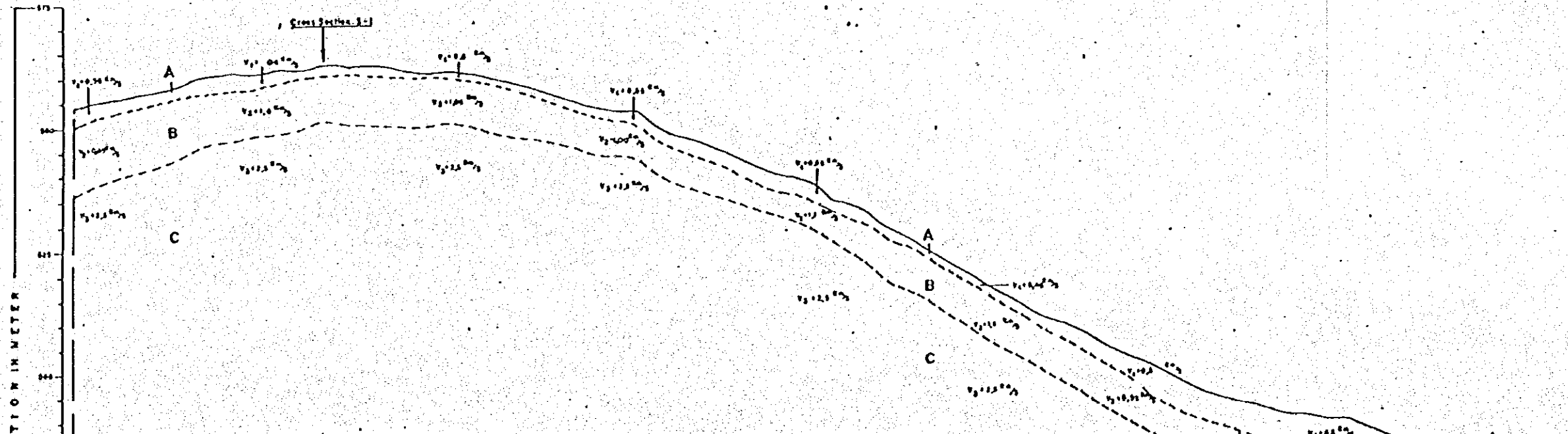
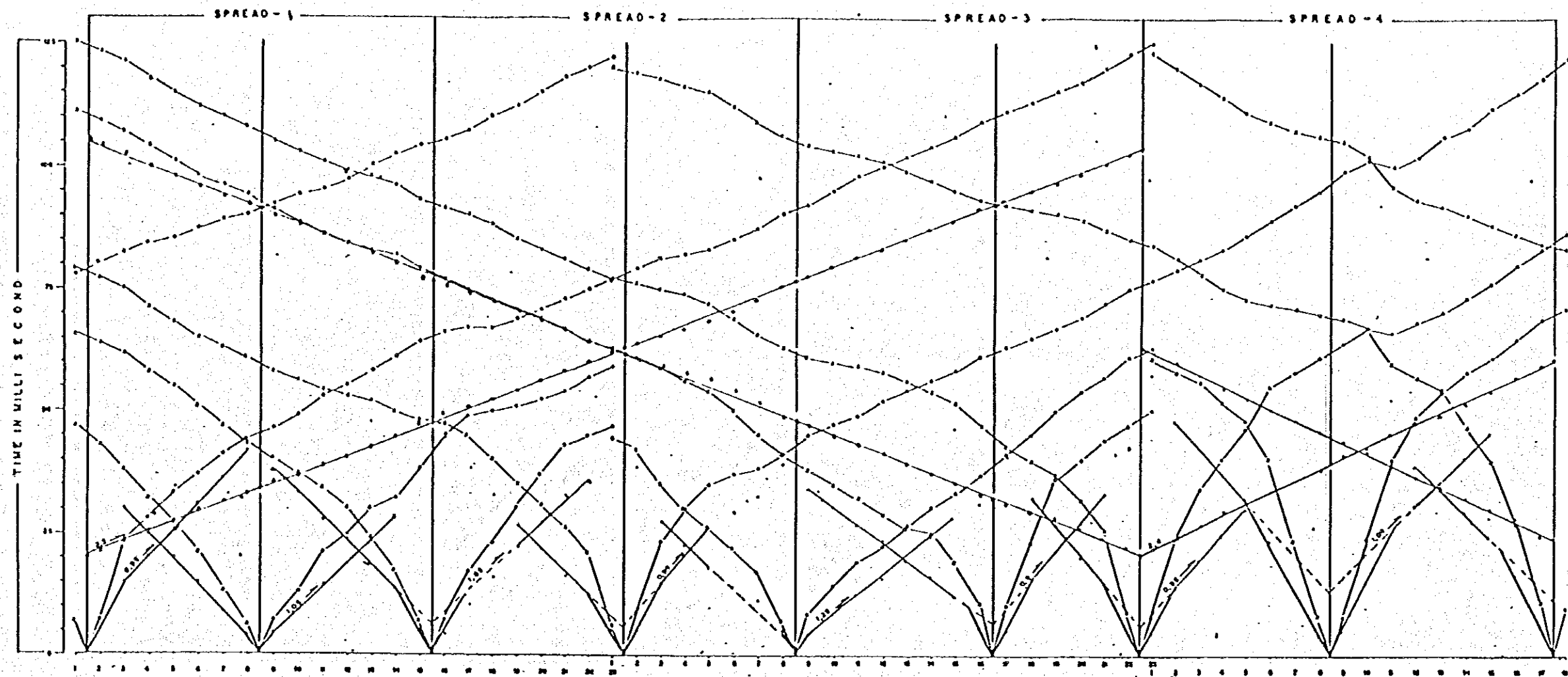
JAPAN INTERNATIONAL COOPERATION AGENCY

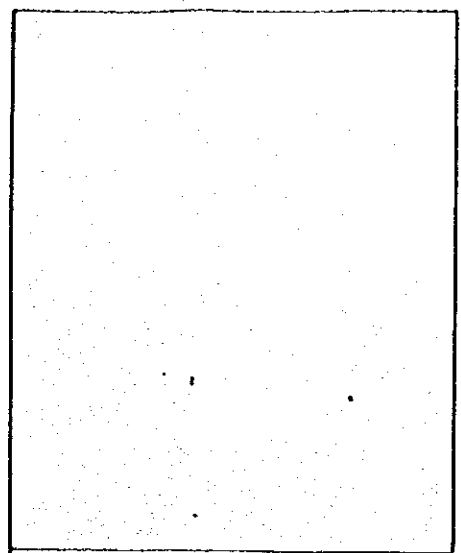
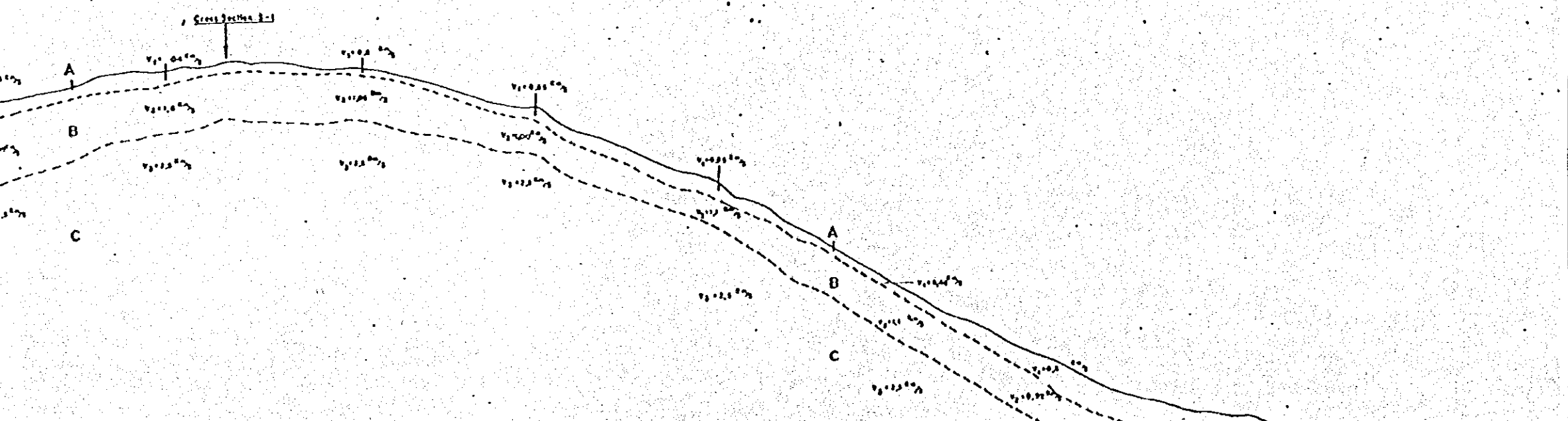
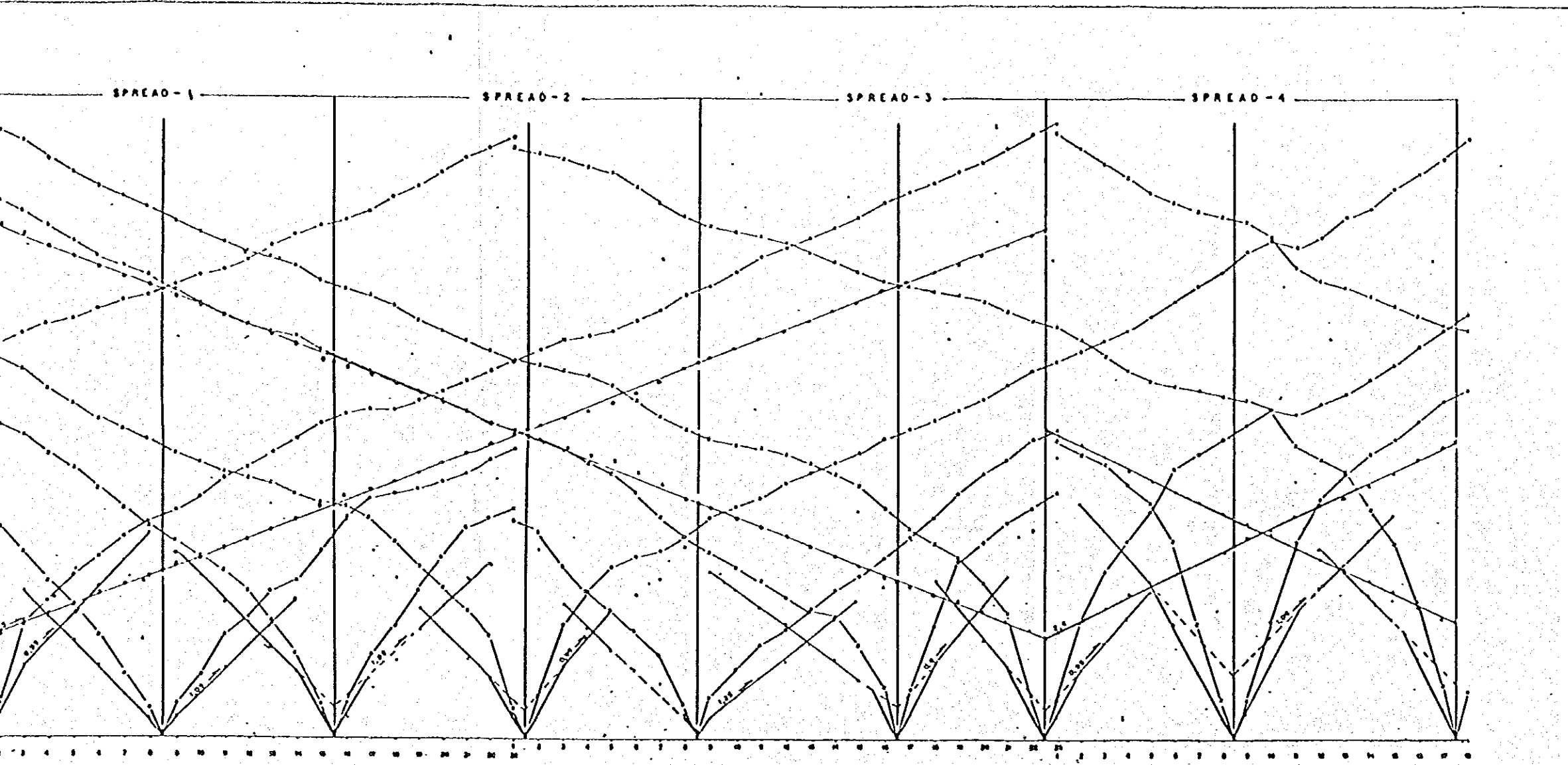
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
 MINISTRY OF PUBLIC WORKS

T-X GRAPH & SEISMIC SECTION
 LINE S-2

SCALE: 1:1000 (Vertical), 1:1000 (Horizontal)

DATE: 1974
 SHEET: 1000





Sketch Location Map

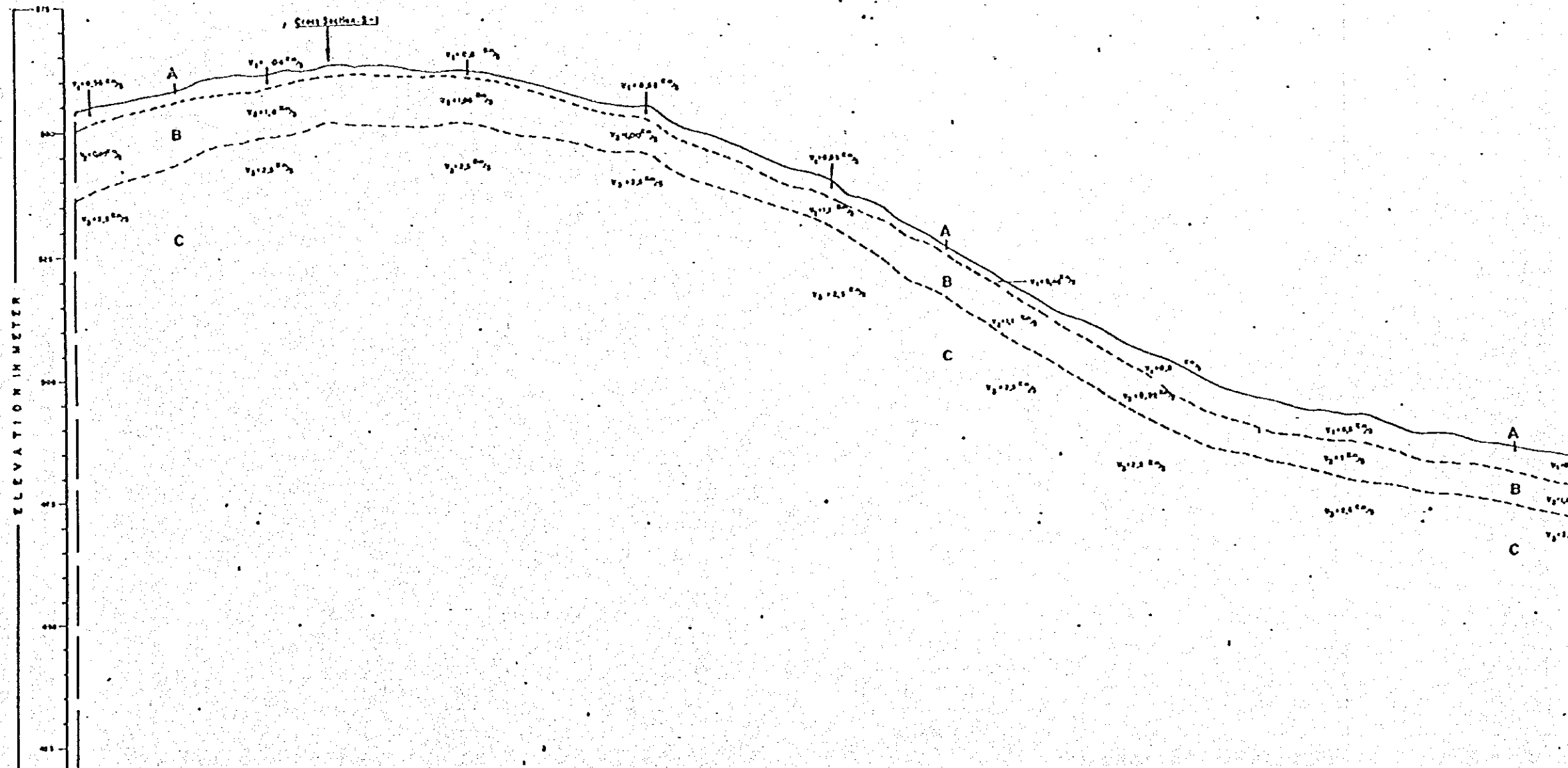
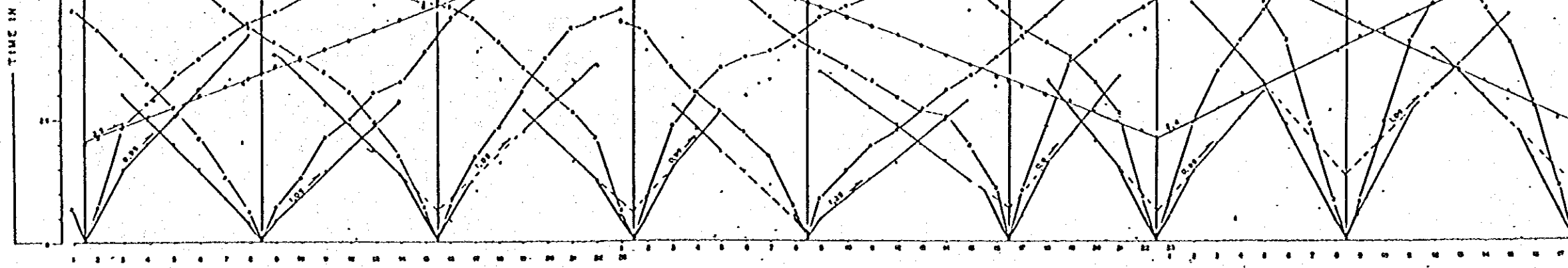
REFRACTION SEISMIC FOR
JATIBARANG DAM PROJECT AT
QUARRY
GUNUNG MERGI - SEMARANG

SCALE: Vertical 1:1000
Horizontal 1:1000

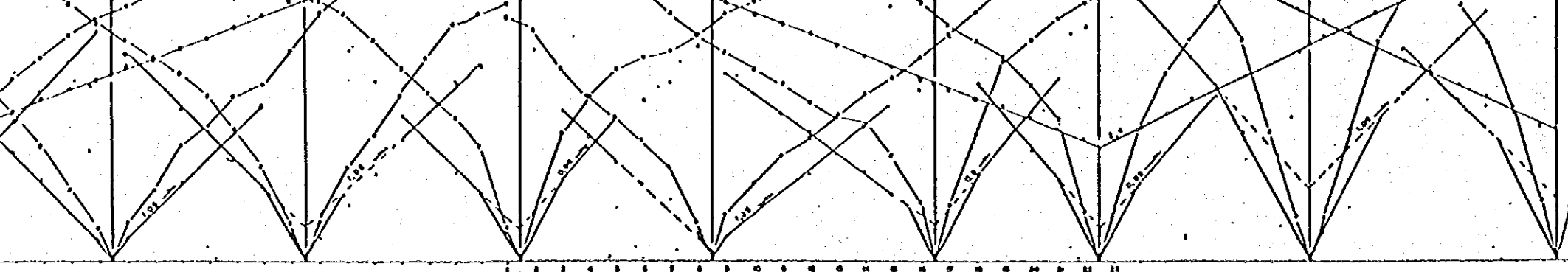
LEGEND :

- A Top Soil/Silty Clay/Sandy Silt, Brown (300 m/s - 600 m/s)
- B Andesite Weak to Medium Strong (750 m/s - 1500 m/s)
- C Andesite Medium Strong to Strong (2200 m/s - 3000 m/s)
- low Velocity Zone

- ||||| Geophone number.
- Layer boundary.
- X Velocity
- - - Forward shoot.
- - - Reverse shoot.



Geophone No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Elevation	146.07	146.50	146.70	147.00	147.20	147.50	147.80	148.00	148.20	148.50	148.70	149.00	149.20	149.50	149.70	150.00	150.20	150.50	150.70	151.00	151.20	151.50	151.70	152.00	152.20	152.50	152.70	153.00	153.20	153.50	153.70	154.00	154.20	154.50	154.70	155.00	155.20	155.50	155.70	156.00	156.20	156.50	156.70	157.00	157.20	157.50	157.70	158.00		



Vertical 1:1000
 Horizontal 1:1000

LEGEND :

- A Top Soil Silty Clay Sandy Silty Brown (300 m/s - 600 m/s)
 - B Andesite Weak to Medium Strong (750 m/s - 1500 m/s)
 - C Andesite Medium Strong to Strong (2200 m/s - 3000 m/s)
- low Velocity Zone

- Geophone Number.
- Layer boundary.
- Velocity
- Forward shoot.
- Reverse shoot.

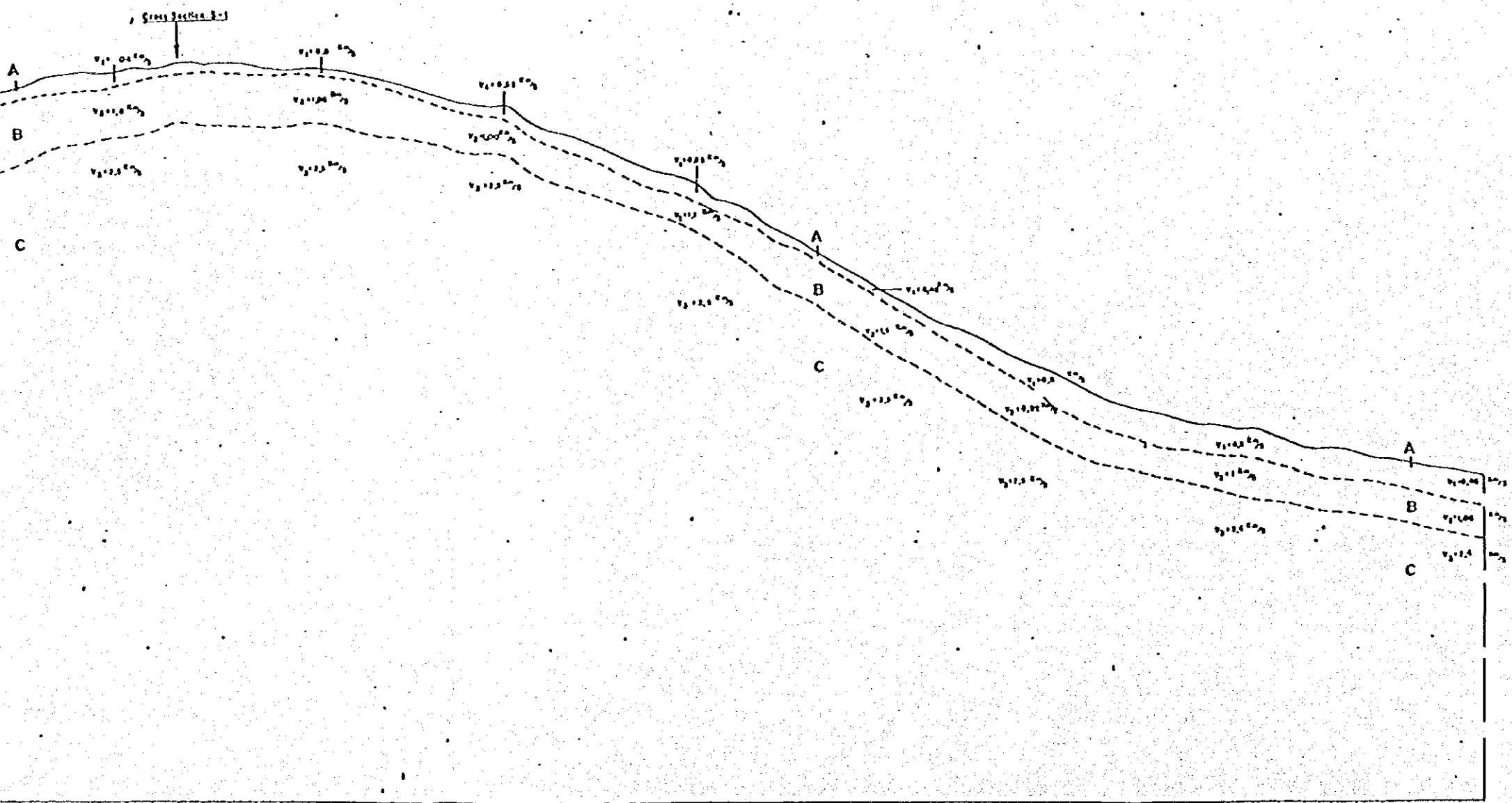
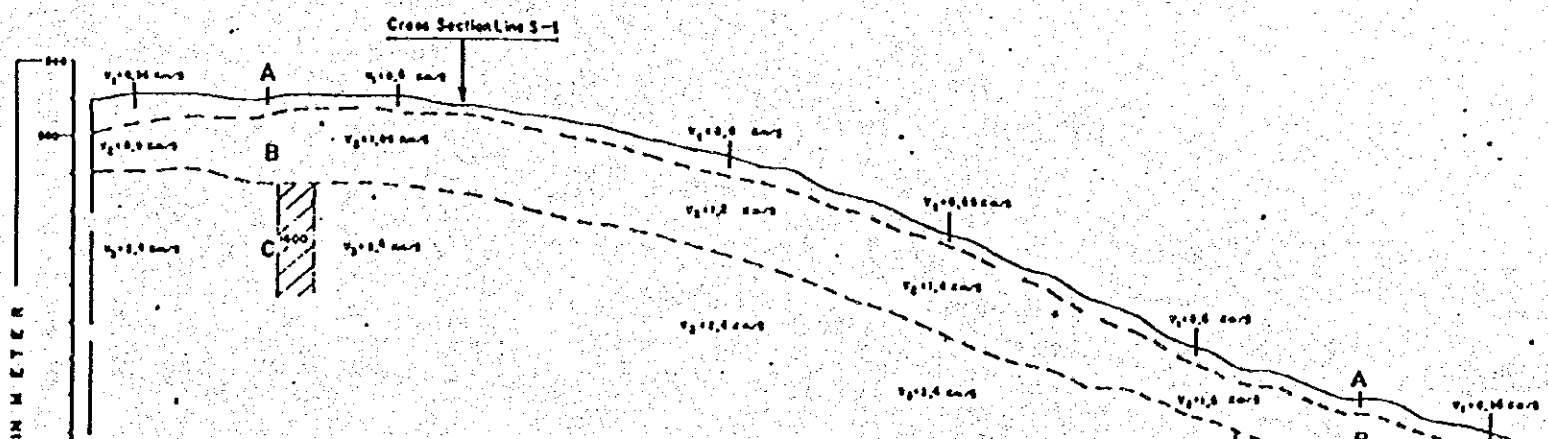
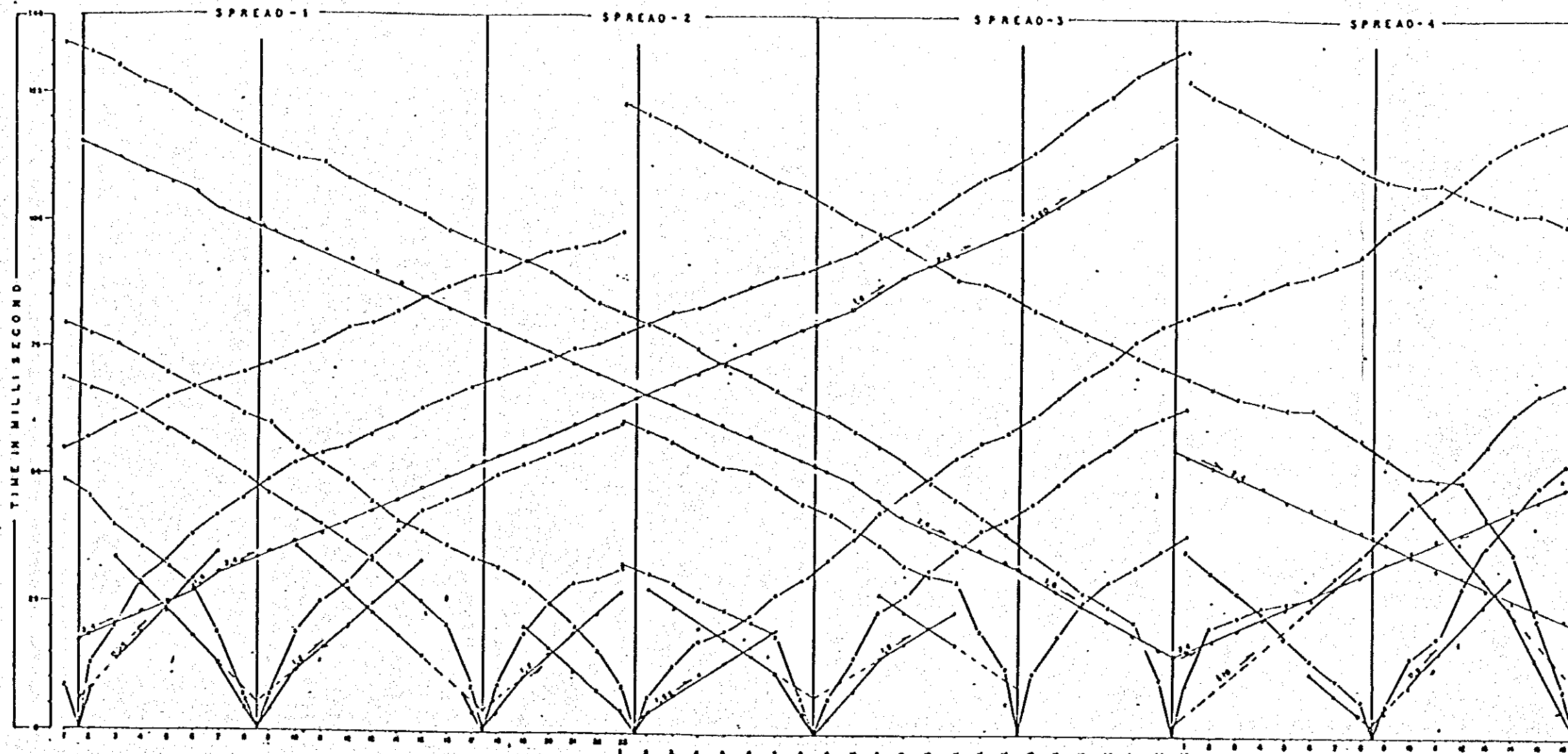
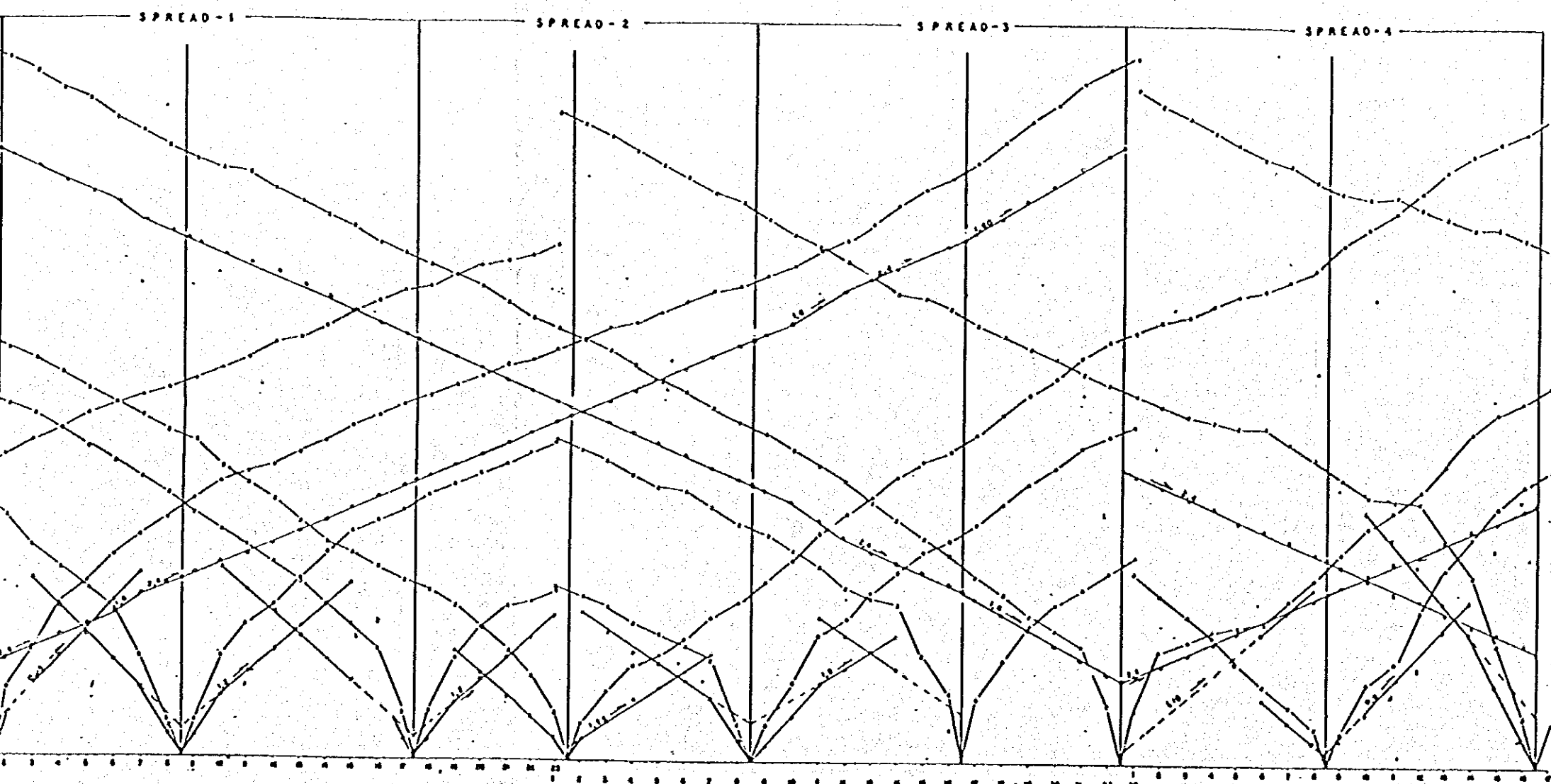


Fig. 2.4.4

JICA, JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT MINISTRY OF PUBLIC WORKS		1:1000
T-X GRAPH & SEISMIC SECTION LINE. S - 3		
DATE	PROJECT	APPENDIX

APP. 2.3





Sketch Location Map

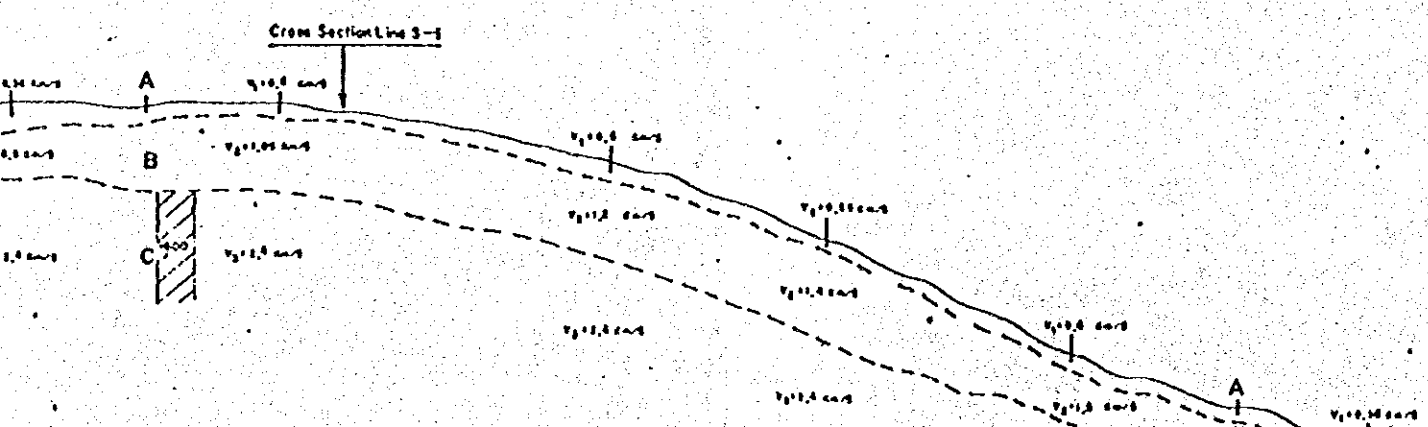
REFRACTION SEISMIC FOR
JATIBARANG DAM PROJECT AT
QUARRY
GUNUNG MERGI - SEMARANG

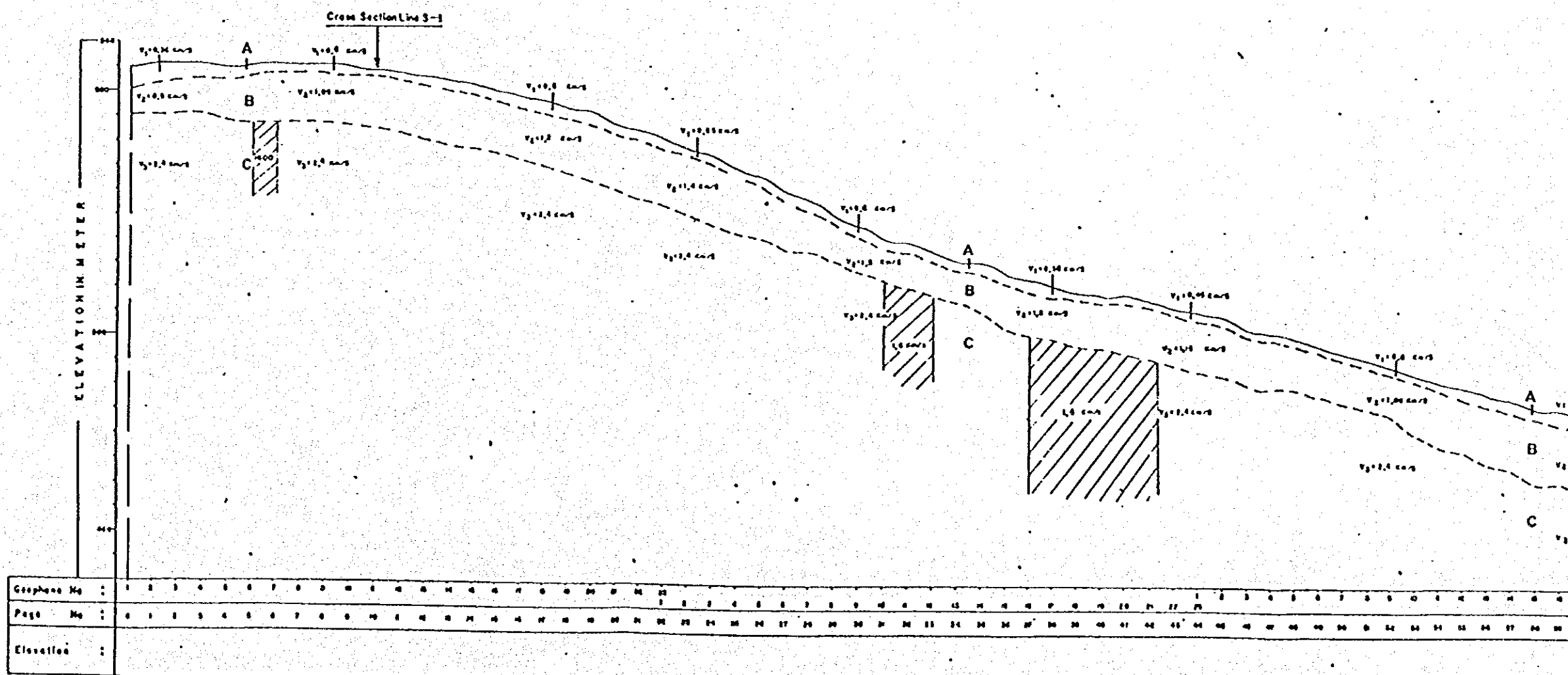
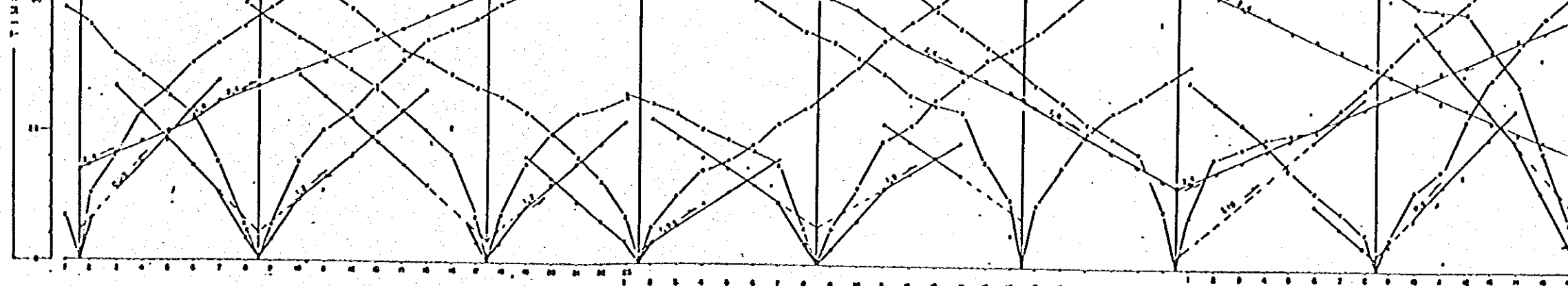
SCALE: Vertical 1:1000
Horizontal 1:1000

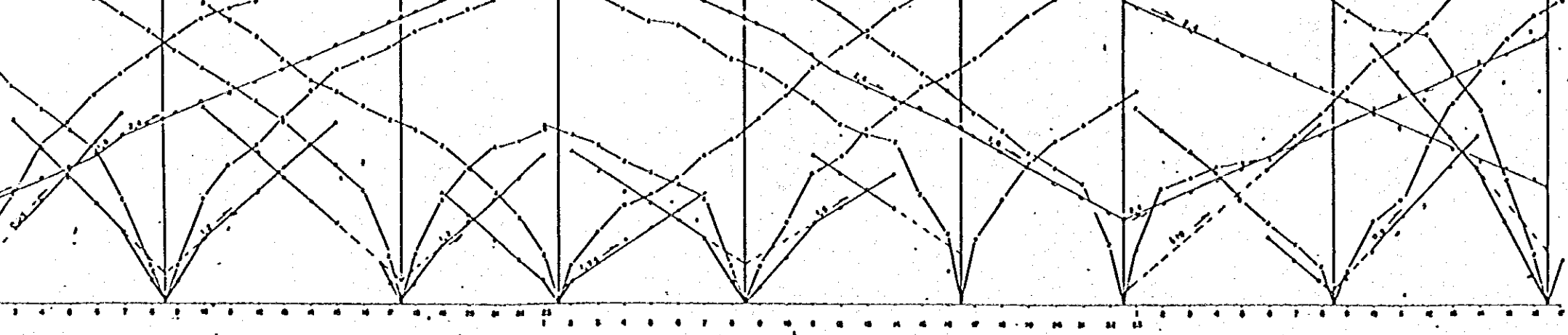
LEGEND :

- A Top Soil, Silty Clay, Sandy Silt, Brown (300m/s - 600m/s)
- B Andesite Weak to Medium Strong (750m/s - 1500m/s)
- C Andesite Medium strong to Strong (2200m/s - 3000m/s)
- Low Velocity Zone

- ||||| Geophone number.
- Layer boundary
- × Velocity
- - - Forward shoot.
- - - Reverse shoot.







Vertical : 1:1000
 SCALE: Horizontal : 1:1000

- LEGEND :
- A Top Soft Clay, Sandy Silt, Brown (300m/s - 600m/s)
 - B Andesite Weak to Medium Strong (750m/s - 1500m/s)
 - C Andesite Medium strong to Strong (2200m/s - 3000 m/s)
 - low Velocity Zone

- Geophone number.
- Layer boundary
- Velocity.
- Forward shoot.
- Reverse shoot.

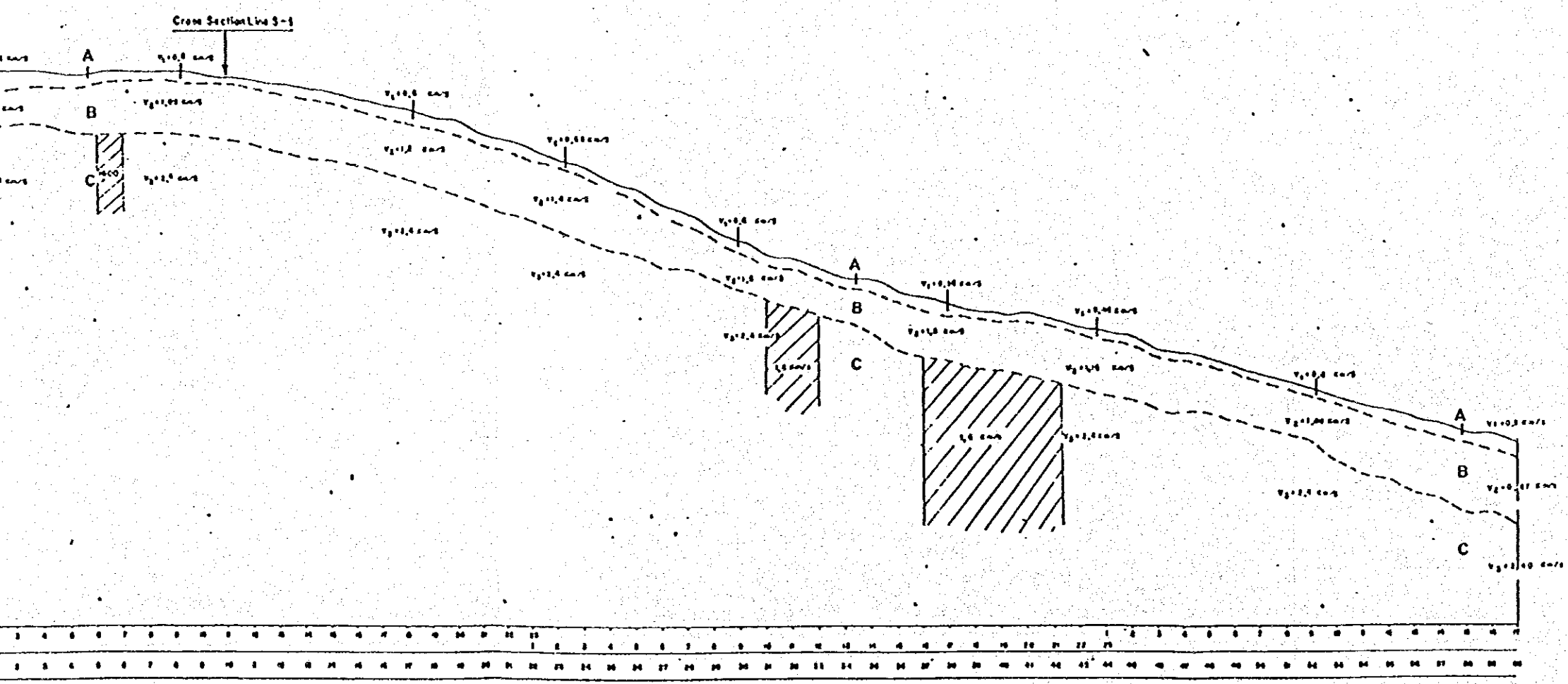
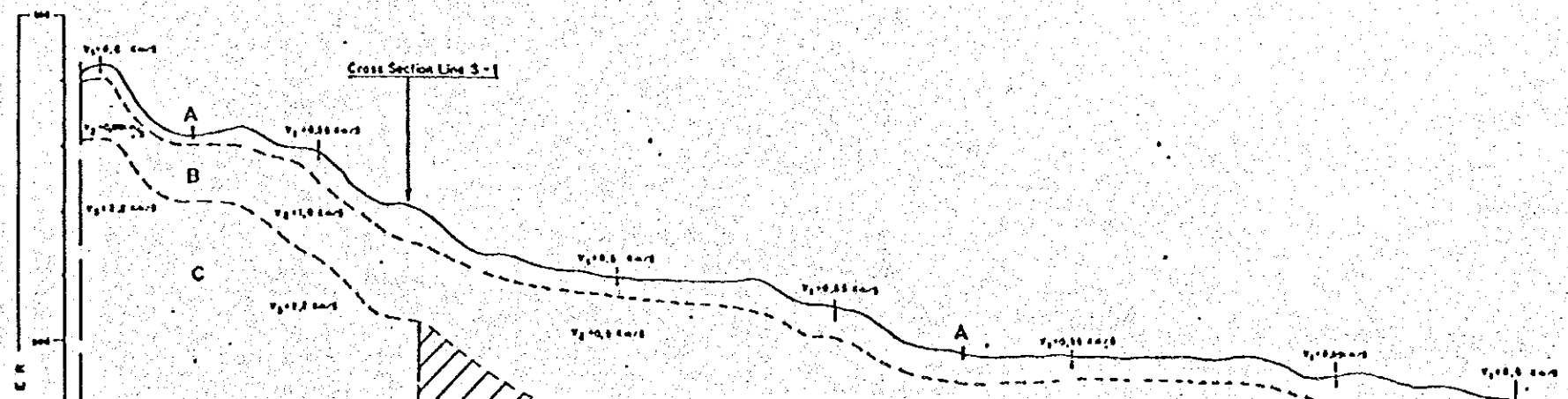
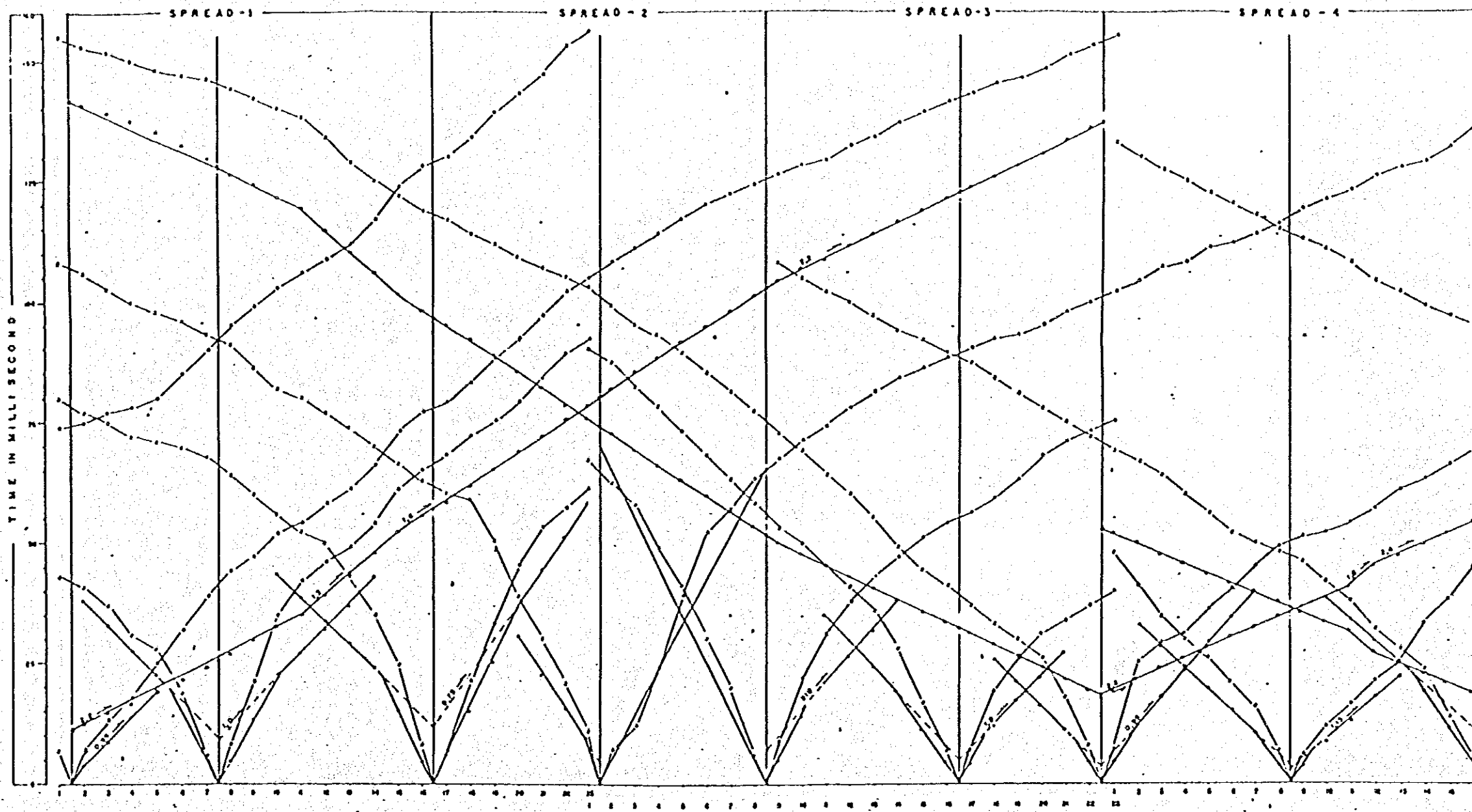
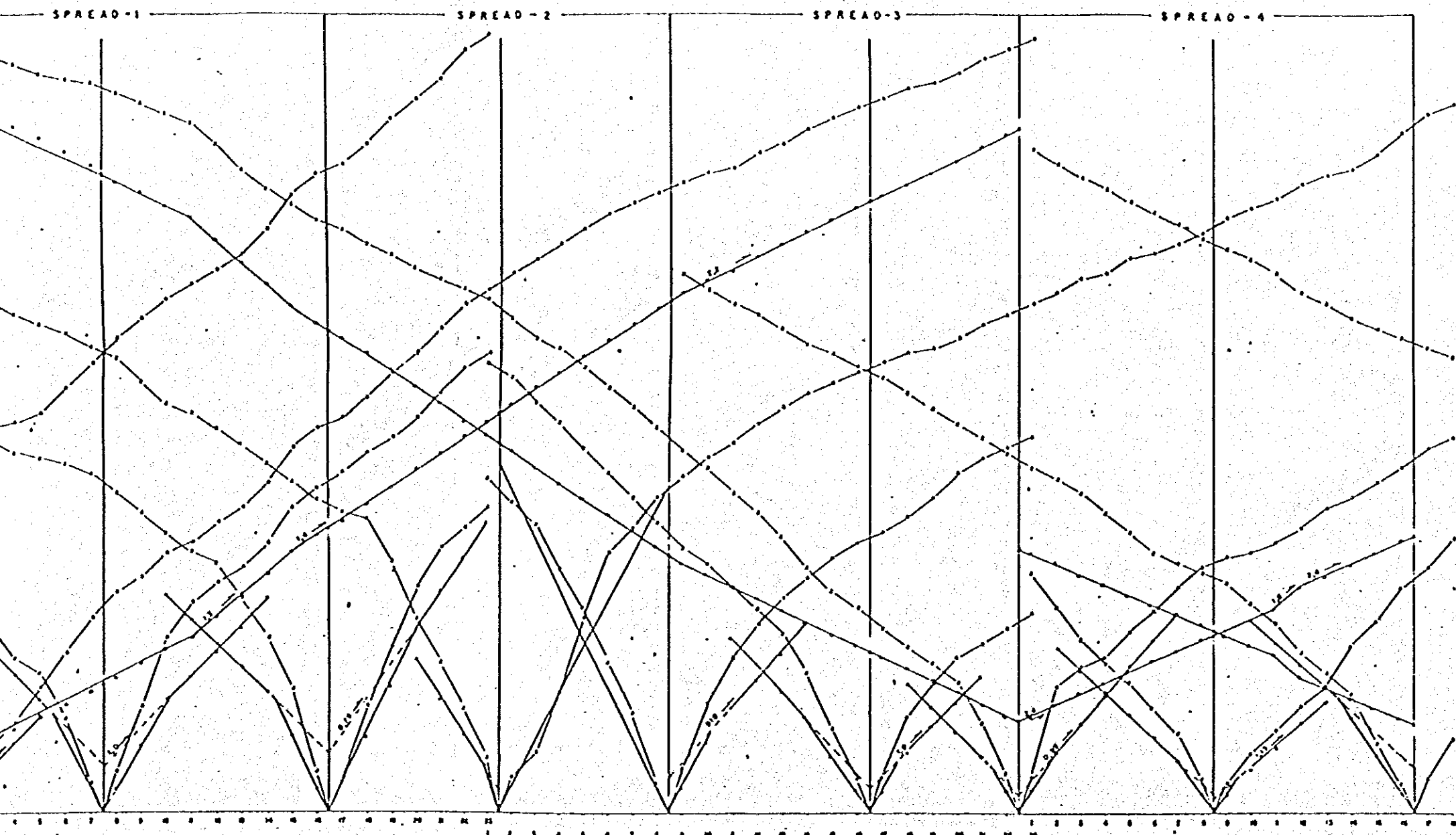


Fig. 2.4.5

	JAPAN INTERNATIONAL COOPERATION AGENCY	SCALE
	DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT MINISTRY OF PUBLIC WORKS	1:1000
T-X GRAPH & SEISMIC SECTION		DATE
LINE S-4		1966
DRAWN BY	CHECKED BY	APPROVED BY

App. 2.6





Sketch Location Map

REFRACTION SEISMIC FOR
JATBARANG DAM PROJECT AT
QUARRY
GUNUNG MERGI - SEMARANG

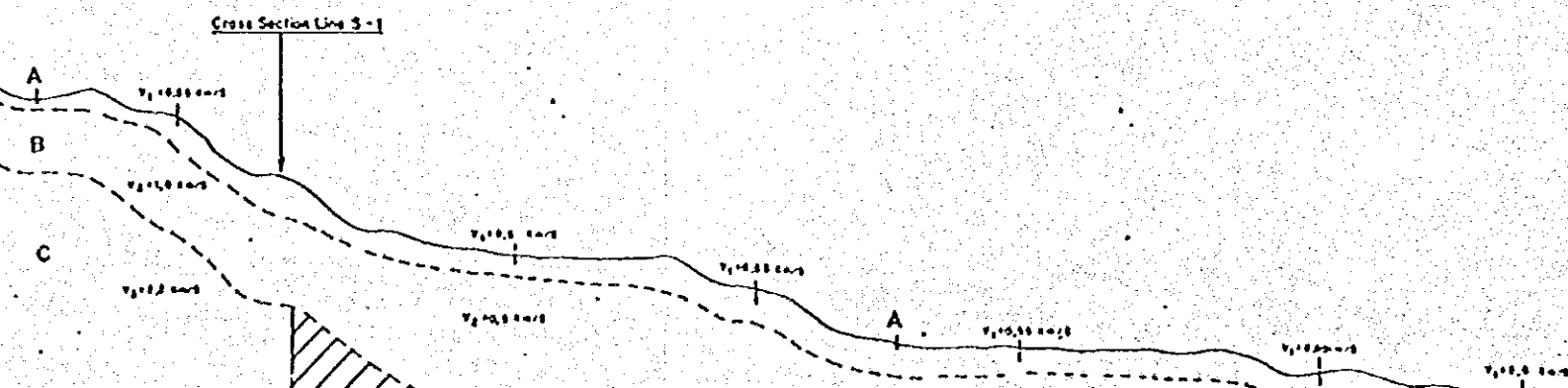
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Horizontal 1:1000

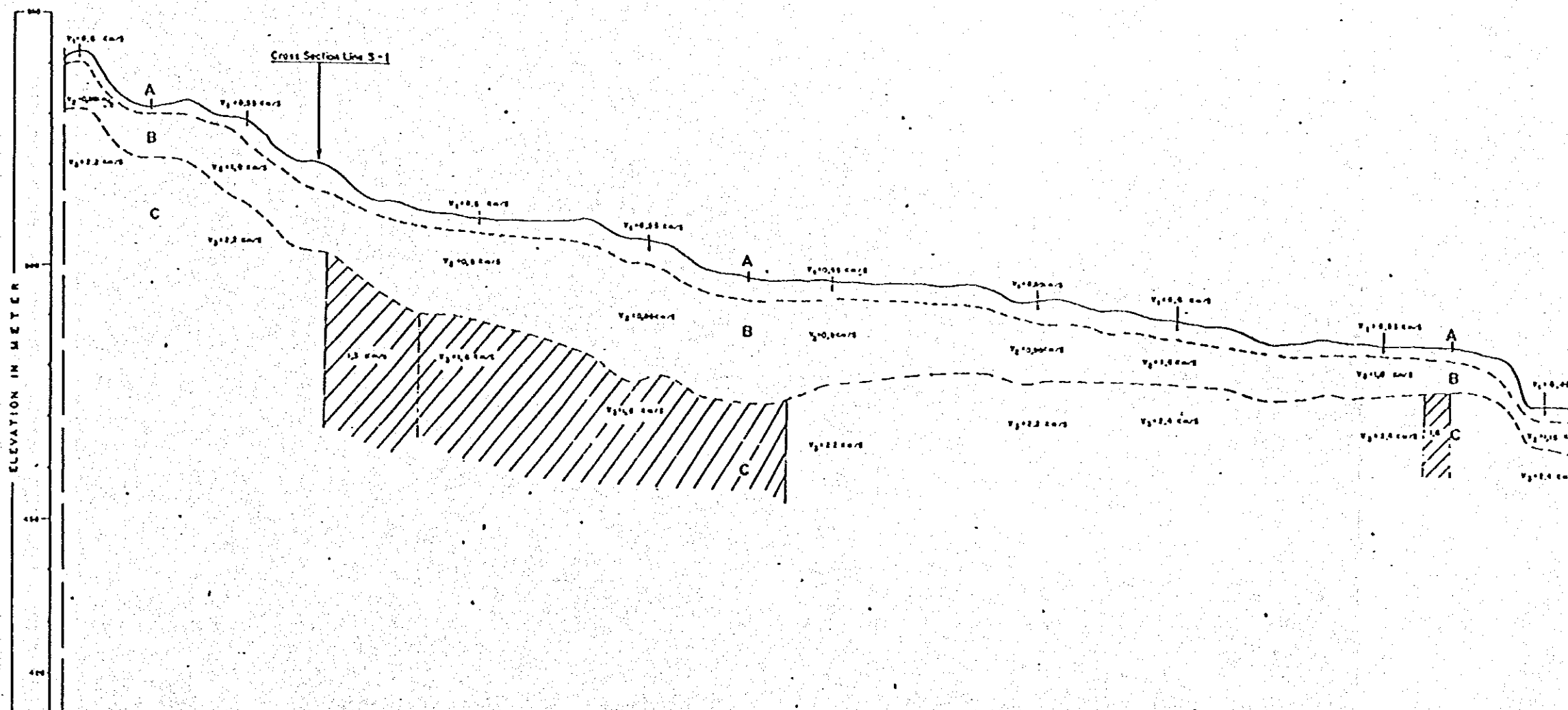
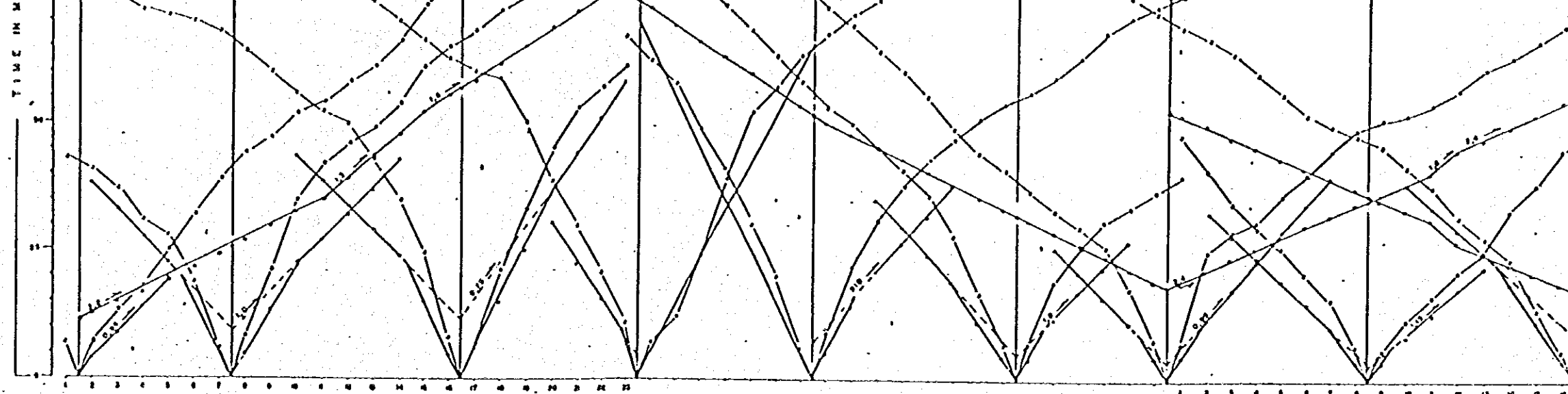
LEGEND :

- A** Top Soil Silty Clay Sandy Silt, Brown (300 m/s - 600 m/s)
- B** Andesite Weak to Medium Strong (1750 m/s - 1900 m/s)
- C** Andesite Medium strong to Strong (2200 m/s - 3000 m/s)

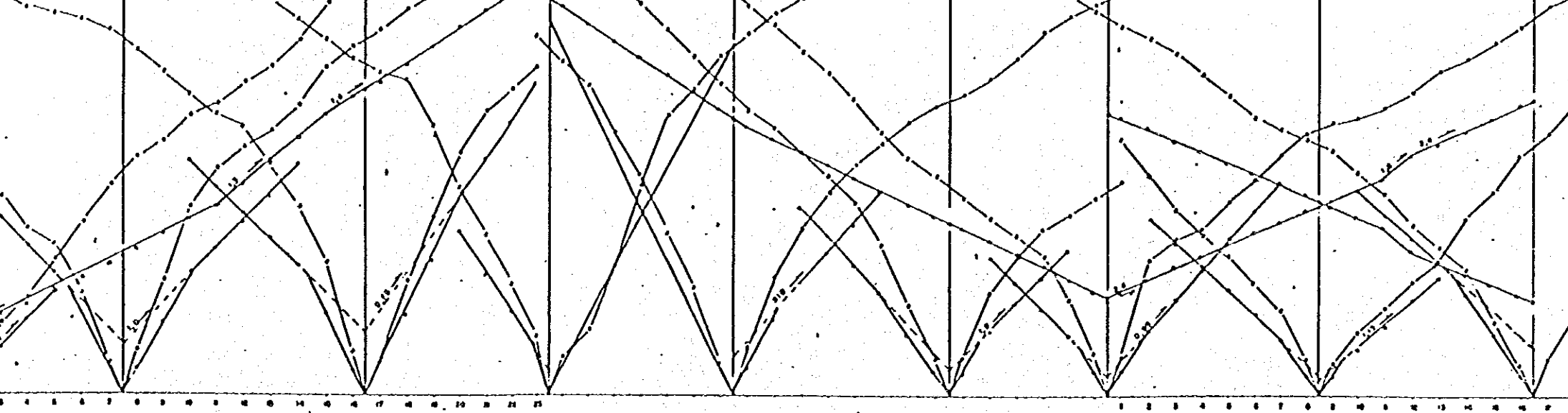
low Velocity Zone

- Geophone number.
- Layer boundary
- Velocity.
- Forward shoot.
- Reverse shoot.





Geophone No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Page No:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Classifica :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25



SCALE: Vertical 1:1000
Horizontal 1:1000

LEGEND :

- A Top Soil Silty Clay Sandy Silt, Brown (300 m/s - 600 m/s)
 - B Andesite Weak to Medium Strong (750 m/s - 1500 m/s)
 - C Andesite Medium strong to Strong (2200 m/s - 3000 m/s)
- Low Velocity Zone

- Geophone number.
- Layer boundary
- X Velocity.
- Forward shot.
- Reverse shot.

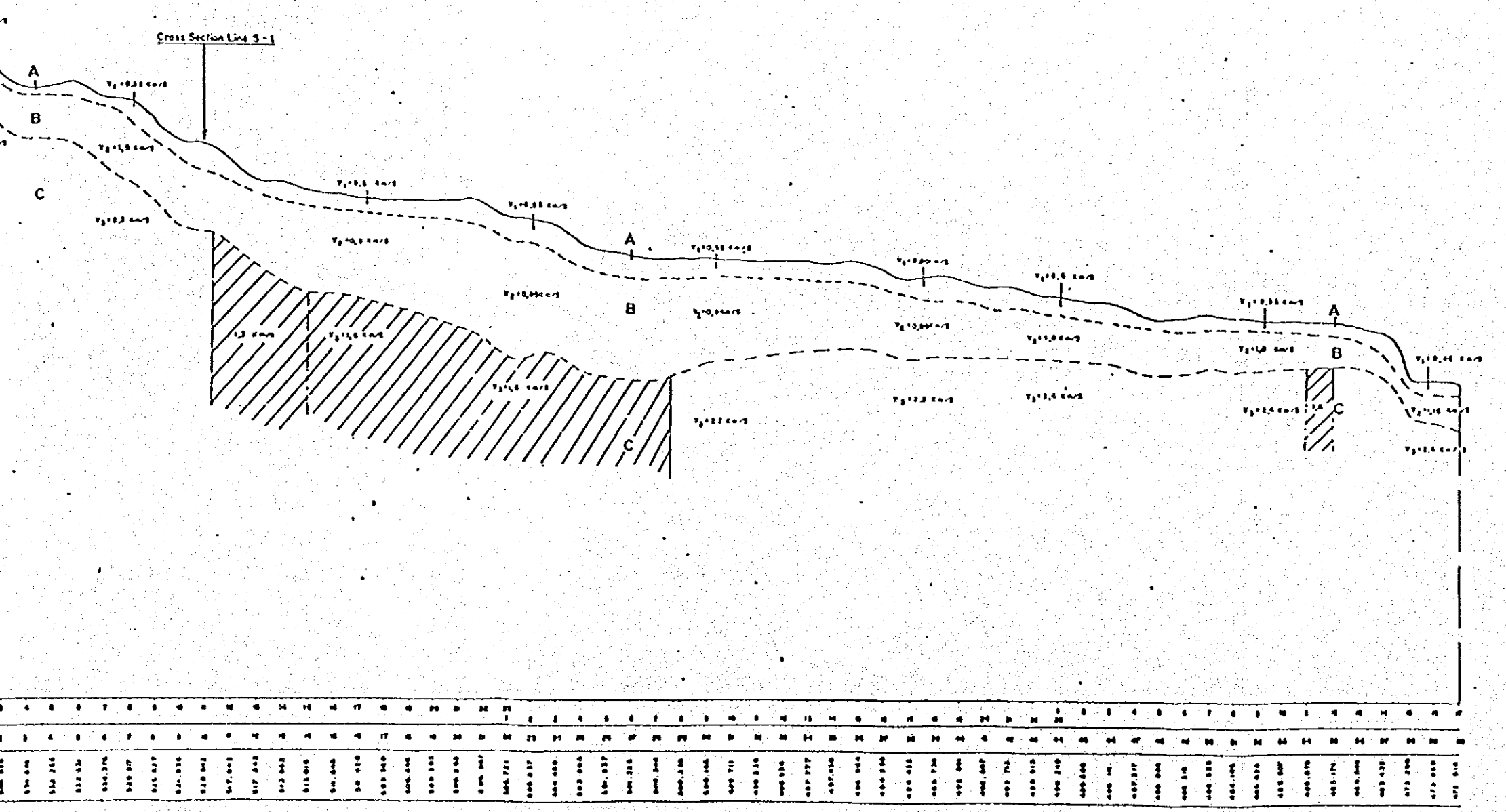
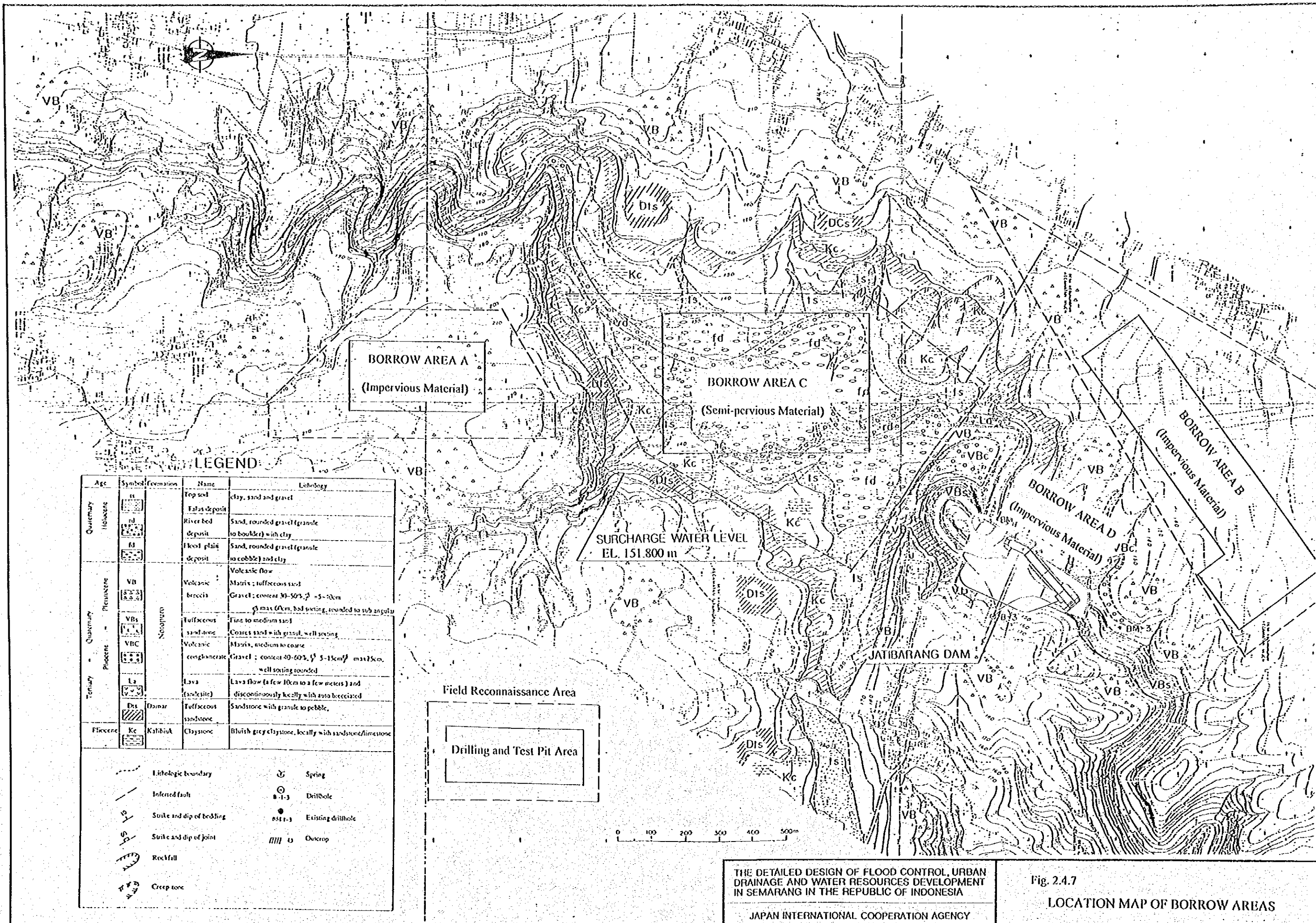


Fig. 2.4.6

JAPAN INTERNATIONAL COOPERATION AGENCY	SCALE: 1:1000
DIRECTOR GENERAL OF WATER RESOURCES DEVELOPMENT MINISTRY OF PUBLIC WORKS	DATE: 1968
T-X GRAPH & SEISMIC SECTION LINE, S-1	
DRAWN BY:	CHECKED BY:



LEGEND

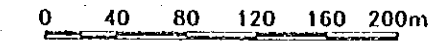
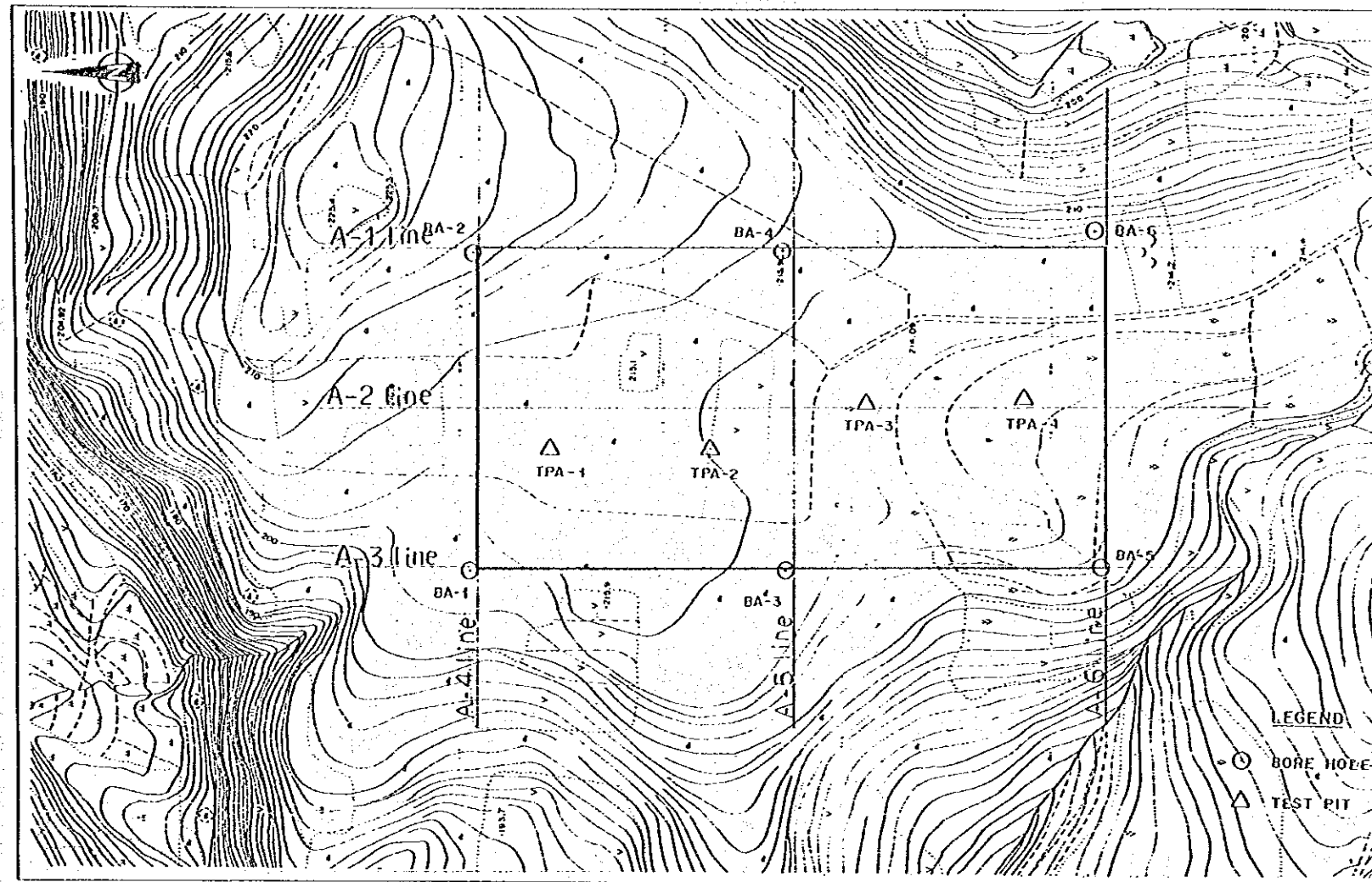
Age	Symbol	Formation	Name	Lithology
Quaternary	Holocene		Top soil	clay, sand and gravel
			Talus deposit	
			River bed deposit	Sand, rounded gravel (granite to boulder) with clay
Quaternary	Pleistocene	Nepoturo	Volcanic flow	Matrix: tuffaceous sand Gravel: content 30-50%, ϕ 5-20cm ϕ max 60cm, bad sorting, rounded to sub angular
			Tuffaceous sandstone	Fine to medium sand Coarse sand with gravel, well sorting
			Volcanic conglomerate	Matrix, medium to coarse Gravel: content 40-60%, ϕ 5-15cm, max 25cm, well sorting rounded
Tertiary	Pliocene		Lava	Lava flow (a few 10cm to a few meters) and discontinuously locally with auto brecciated
			Damar	Tuffaceous sandstone Sandstone with granite to pebble,
Flieocene		Kalibuk	Claystone	Bluish grey claystone, locally with sandstone/limestone

	Lithologic boundary		Spring
	Inferred fault		Drillhole
	Strike and dip of bedding		Existing drillhole
	Strike and dip of joint		Outcrop
	Rockfall		
	Creep zone		

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 2.4.7
 LOCATION MAP OF BORROW AREAS

LOCATION MAP OF BORE HOLES AND TEST PITS



LEGEND

- HOLE NUMBER(DEPTH)
 - : BORE HOLE
- PIT NUMBER
 - △ : TEST PIT POINT

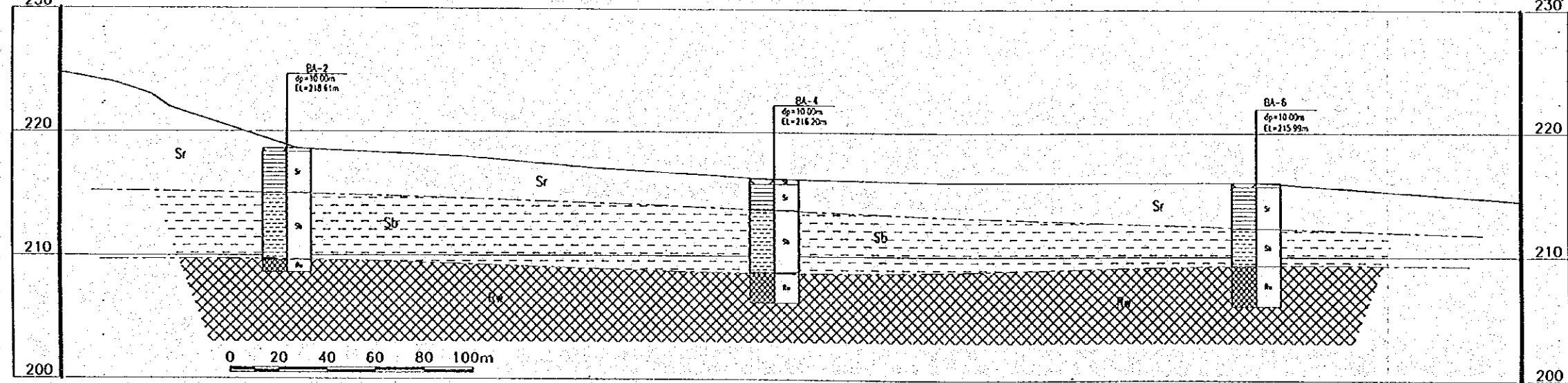
(Soil Division)

Division	Symbol	Description
Weathered Soil Zone	Topsoil	Ts Topsoil mainly consists of clay and silt, and there is no original structure of another rock. The soil has loose condition, and contains roots of plants and organic material.
	Reddish Soil	Sr Reddish soil mainly consists of clay and silt, and there is no original structure of another rock, no fragment which compose rock. Therefore it consists of clay and silt mainly. The soil has high plasticity, but moisture content is not so high.
	Brownish Soil	Sb Brownish soil mainly consists of clay and silt, and there is no original structure of another rock. But the fragments are recognized partly or generally as the mass of clay mineral and the quality of fragments is very soft. The soil has high plasticity like Reddish Soil, but moisture content is slightly high.
High Weathered Rock Zone	Rw	About half of the rock material has been weathered to clay minerals, and is converted to soil partly. But it is possible to classify the original rock.

(Note)

--- Boundary of Soils and Weathered Rock

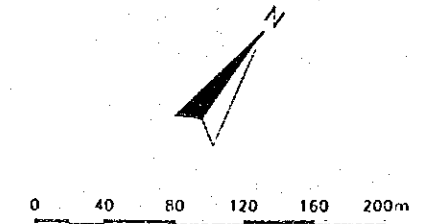
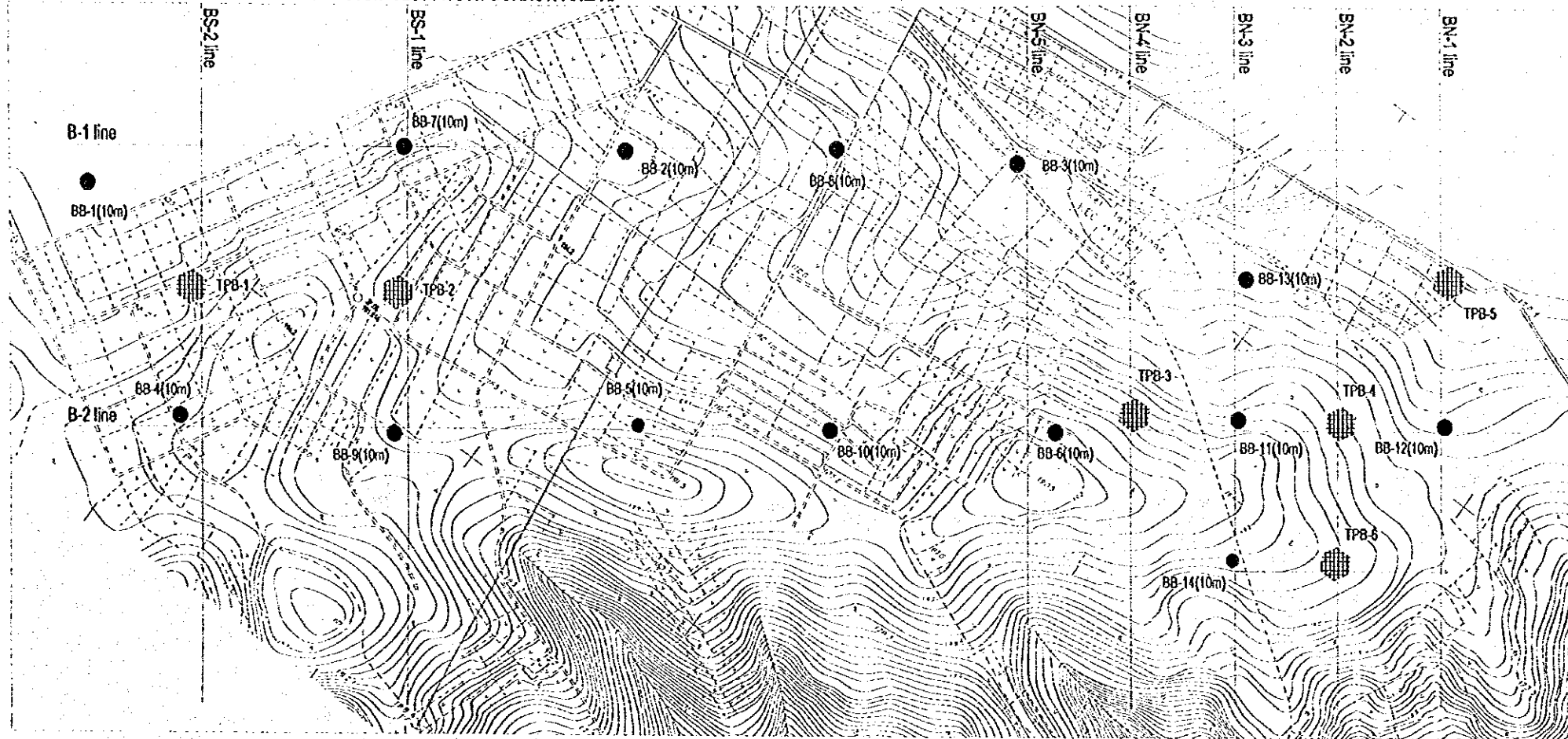
EL(m) GEOLOGICAL PROFILE ALONG A-1 LINE



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Fig. 2.4.8
LOCATION MAP AND GEOLOGICAL PROFILE AT BORROW AREA A

LOCATION MAP OF BORE HOLES AND TEST PITS AT BORROW AREA B



LEGEND

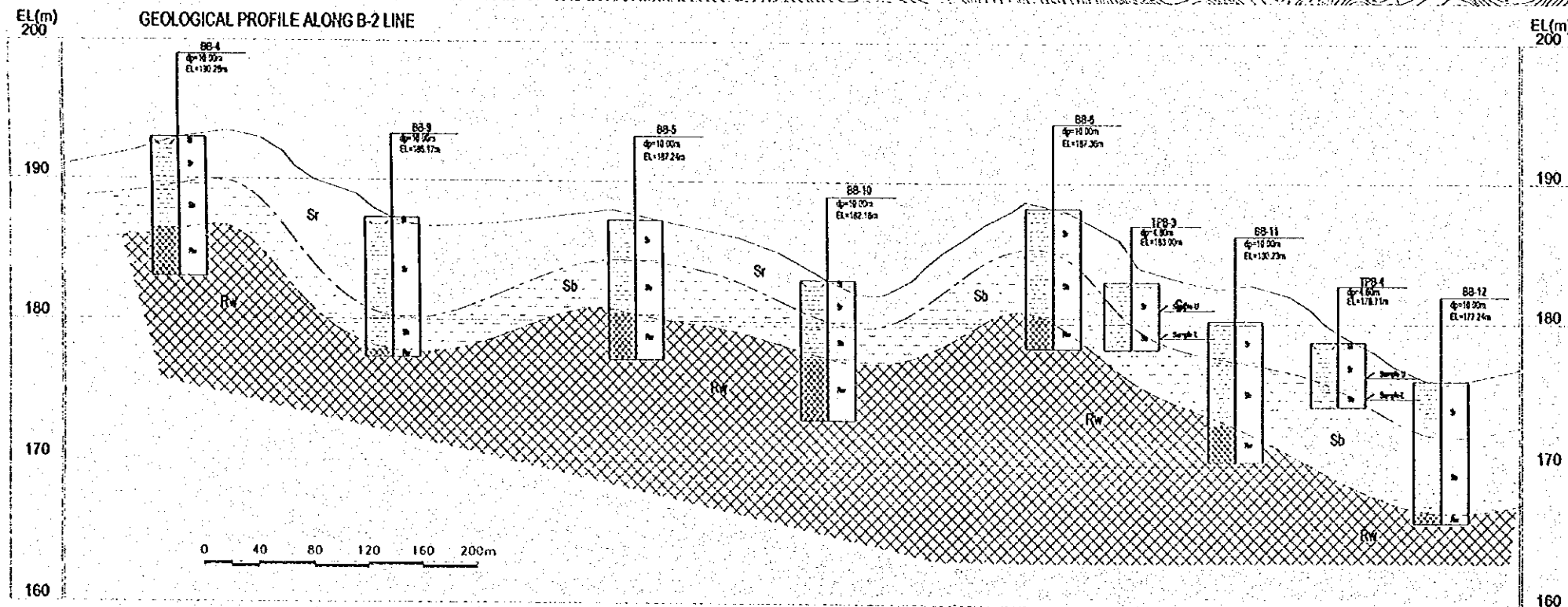
- HOLE NUMBER/DEPTH
- : BORE HOLE
- PIT NUMBER
- : TEST PIT POINT

(Soil Division)

Division	Symbol	Description
Weathered Soil Zone	Ts	Topsoil mainly consists of clay and silt, and there is no original structure of mother rock. The soil has loose condition, and contains roots of plants and organic material.
	Sr	Reddish soil mainly consists of clay and silt, and there is no original structure of mother rock, no fragment which composes rock. Therefore it consists of clay and silt mainly. The soil has high plasticity, but moisture content is not so high.
	Sb	Brownish soil mainly consists of clay and silt, and there is no original structure of mother rock. But the fragments are recognized partly or generally as the mass of clay mineral and the quality of fragments is very soft. The soil has high plasticity like Reddish Soil, but moisture content is slightly high.
High Weathered Rock Zone	Rw	About half of the rock material has been weathered to clay minerals, and is converted to soil partly. But it is possible to classify the original rock.

(Note)

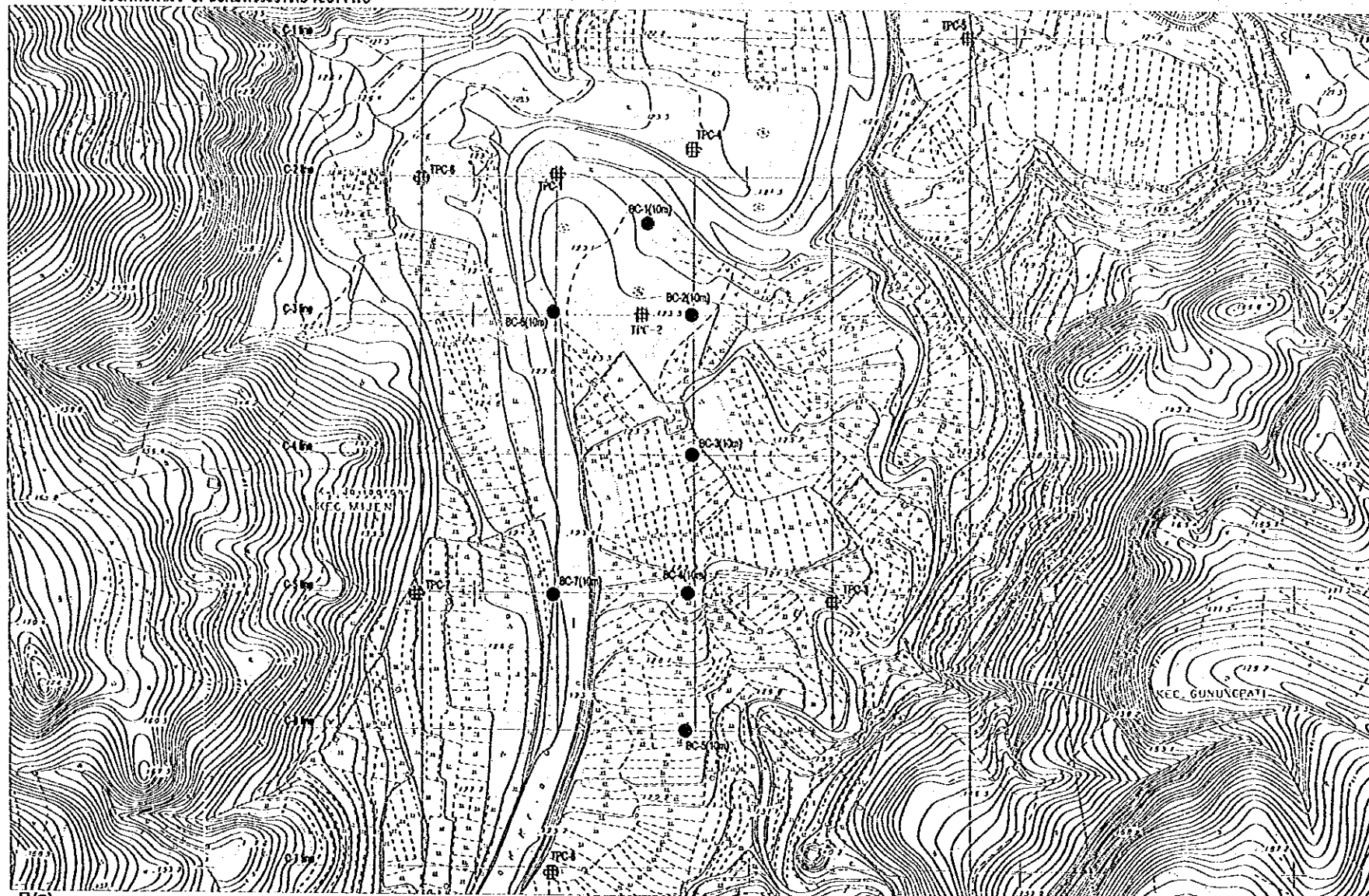
Boundary of Soils and Weathered Rock



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Fig. 2.4.9 LOCATION MAP AND GEOLOGICAL PROFILE AT BORROW AREA B

LOCATION MAP OF BORE HOLES AND TEST PITS



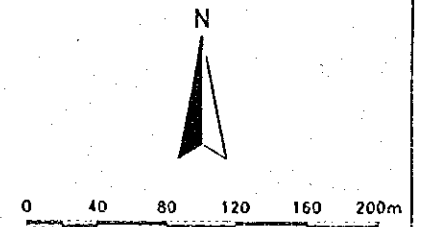
LEGEND

HOLE NUMBER(DEPTH)

● : BORE HOLE

PIT NUMBER

: TEST PIT POINT



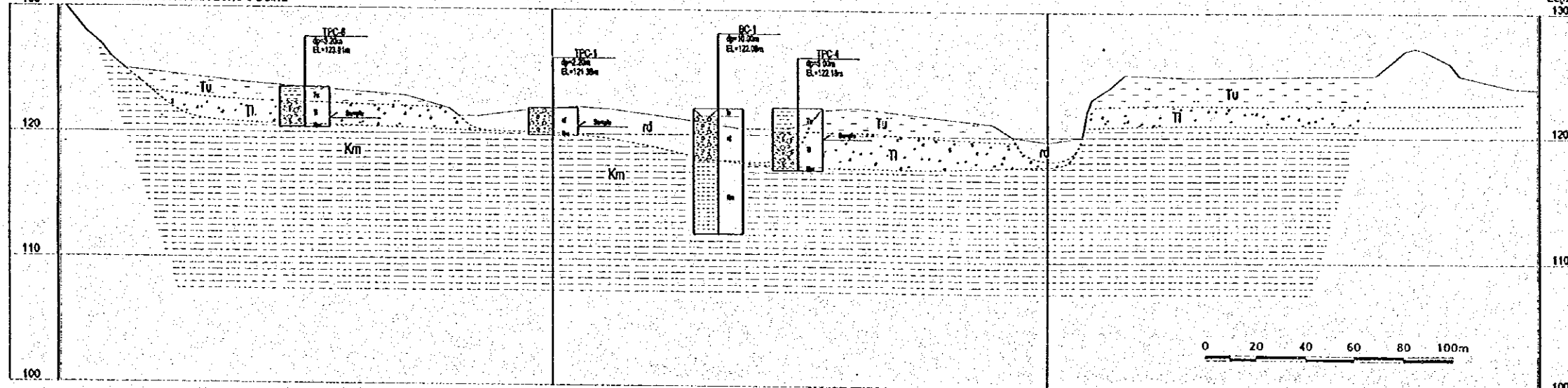
(Geological Strata)

Age	Formation and Strata Name	Symbol	Description	
Quaternary	Holocene	Topsoil	Ts	The topsoil is distributed at the surface of terrace deposit. It consists of loose soil, and contains organic material and many roots of plants.
		Riverbed deposit	Rd	The deposit is distributed at the present riverbed and the flood plain. It mainly consists of boulder, cobble, pebble and sand, and it contains silt and clay with small quantity. But the deposit contains the gravel of siltstone, which has soft quality and is crushed easily, the total rate of fine material may be more than 10 % of the deposit.
		Talus deposit	Td	The deposit is distributed at the side of the mountainside slope. It consists of failure soil and sand, detritus and fallen rocks, and the total rate of fine material is more than 50 % of the deposit.
	Terrace deposit	Upper Layer	Tu	The deposit forms the terrace plain along the riverbed, and the relative height of the plain is less than 3 m from the riverbed. The upper layer of terrace deposit mainly consists of silt, and contains sand and gravel with small quantity.
		Lower Layer	Tl	The lower layer of terrace deposit mainly consists of boulder, cobble, pebble and sand, and it contains more quantities of silt and clay than riverbed deposit. The deposit contains the gravel of siltstone, which has soft quality and is crushed easily, the total rate of fine material may be more than 20 % of the deposit.
Tertiary Miocene-Pliocene	Kerak	Siltstone	Kn	Kerak formation is distributed under the secondary deposits which include all layers in Quaternary, and it forms the bedrock of this area. It consists of siltstone whose color is greenish dark gray, and partly contains coral limestone. The hardness of siltstone is comparatively low.

(Note)

Boundary of Geological Strata

GEOLOGICAL PROFILE ALONG C-2 LINE



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Fig. 2.4.10
LOCATION MAP AND GEOLOGICAL PROFILE AT BORROW ARBA C

Figure 2.4.11 The Result of Grain Size Analysis for Test (Distribution Curve)

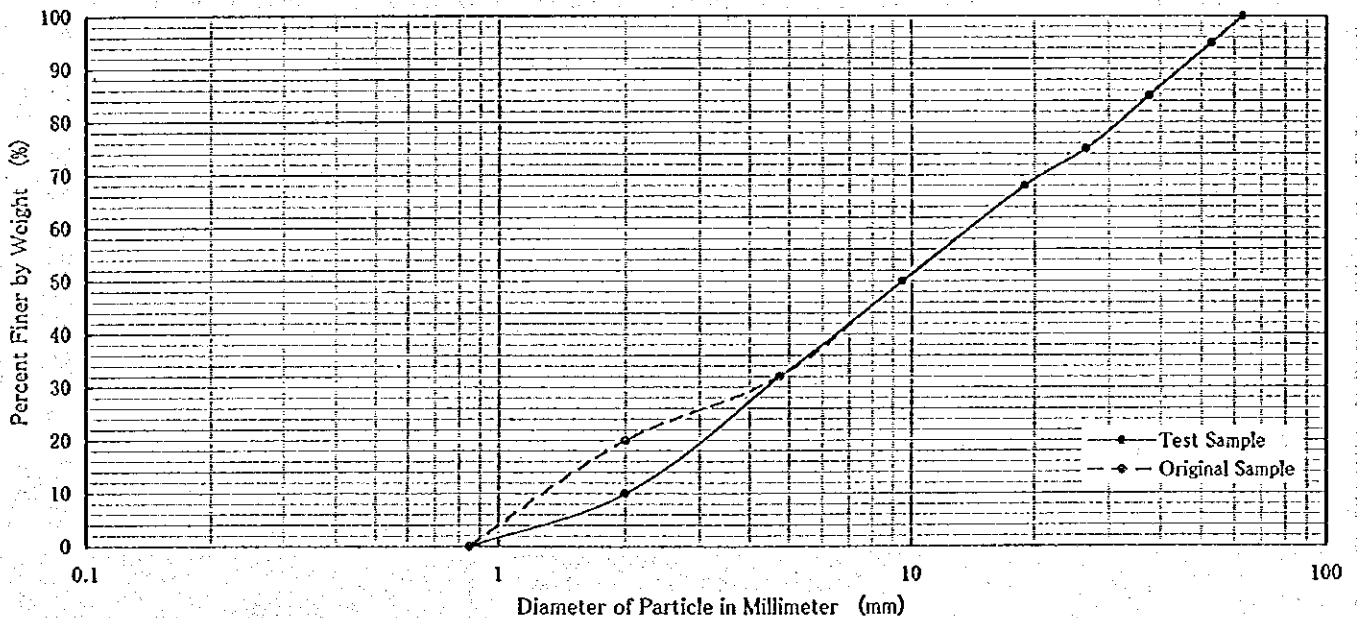
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IN SEMARANG IN THE REPUBLIC OF INDONESIA

Date; _____

Sieve Opening

Test Sample	Dia. (mm)	63.0	53.0	37.5	26.5	19.0	9.50	4.75	2.00	0.850	0.425	0.250	0.106	0.075
	P.F.W (%)	100.0	95.0	85.0	75.0	68.0	50.0	32.0	10.0	0				
Original Sample	Dia. (mm)	63.0	53.0	37.5	26.5	19.0	9.50	4.75	2.00	0.850	0.425	0.250	0.106	0.075
	P.F.W (%)	100.0	95.0	85.0	75.0	68.0	50.0	32.0	20.0	0				
	Dia. (mm)	63.0	53.0	37.5	26.5	19.0	9.50	4.75	2.00	0.850	0.425	0.250	0.106	0.075
	P.F.W (%)													
	Dia. (mm)	63.0	53.0	37.5	26.5	19.0	9.50	4.75	2.00	0.850	0.425	0.250	0.106	0.075
	P.F.W (%)													

Grain Size Distribution Curve



	Test Sample	Original Sample		Test Sample	Original Sample
Coarse Gravel (%) 75.0~19.0 mm	32	32	Dmax (mm)	63.0	63.0
Medium Gravel (%) 19.0~4.75 mm	36	36	D60% (mm)	15.0	15.0
Fine Gravel (%) 4.75~2.00 mm	22	12	D30% (mm)	4.42	4.26
Coarse Sand (%) 2.00~0.425 mm	10	20	D10% (mm)	2.00	1.28
Fine Sand (%) 0.425~75 μ mm	-	-	Uc	7.50	11.7
Silt (%) 75 μ ~ 5 μ mm	-	-	Uc'	0.651	0.945
Clay (%) 5 μ mm ~	-	-			

Notation

- Uc : Coefficient of Uniformity $Uc = (D60)/(D10)$
- Uc' : Coefficient of Curvature $Uc' = (D30)^2 / (D10 * D60)$
- D60 : 60% Diameter
- D30 : 30% Diameter
- D10 : 10% Diameter