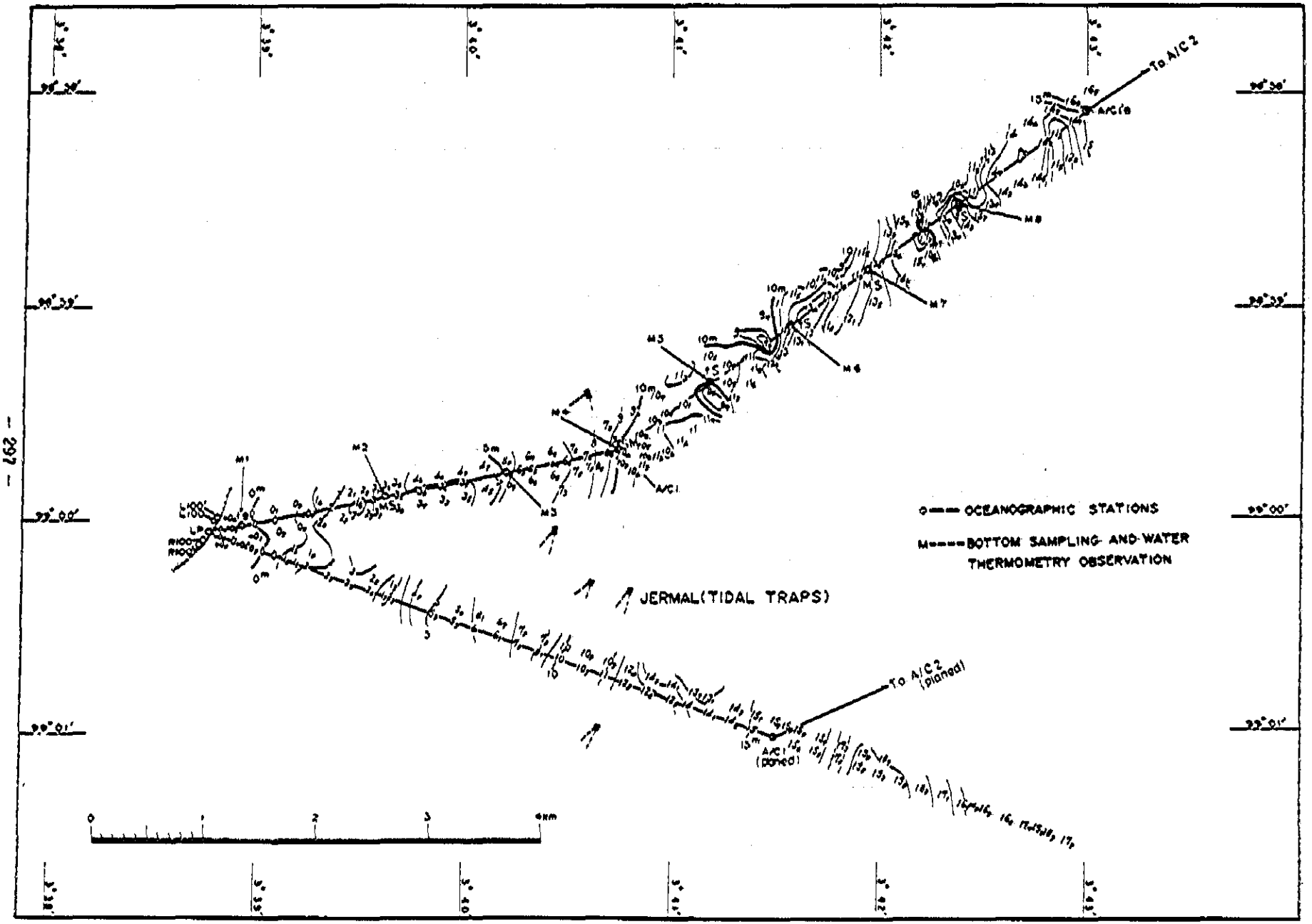
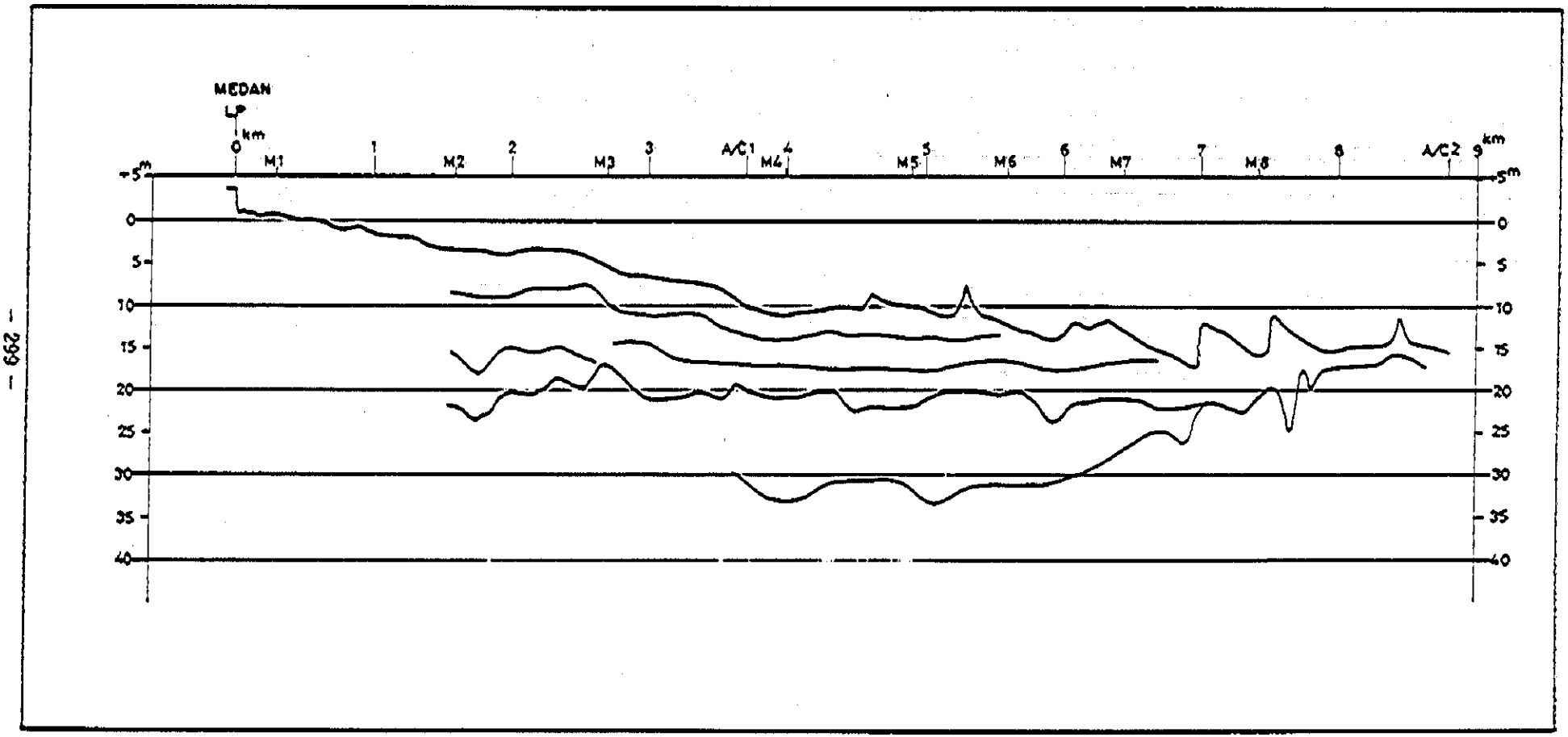


BATHYMETRIC AND CONTOUR CHART (PANTAI CERMIN APPROACH)

sounding in metres



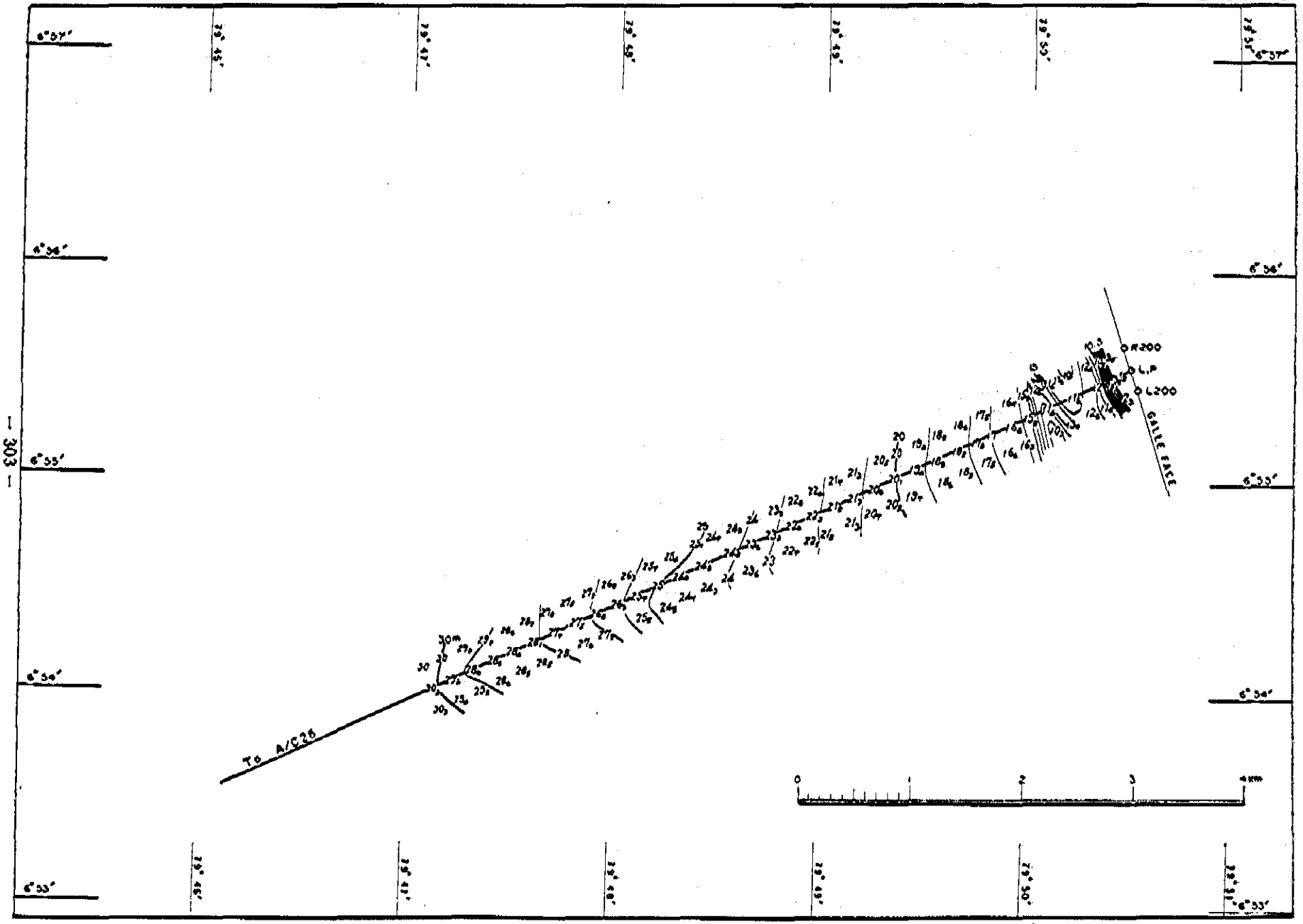
BOTTOM PROFILE AND SUB BOTTOM LAYERS
(PANTAI CERMIN APPROACH)

OCEANOGRAPHIC STATION DATA (PANTAI CERMIN APPROACH)

Observational Item \ Station		M1	M2	M3	M4	M5	M6	M7	M8	
Sampling Date		24th Sep	24th Sept	24th Sept	24th Sept	24th Sept	24th Sept	24th Sept	24th Sept	
Location	(N)	3°-38'.93	3°-39'.62	3°-40'.21	3°-40'.74	3°-41'.19	3°-41'.57	3°-42'.10	3°-42'.54	
	(E)	99°-00.02	98°-59'.89	98°-59'.77	98°-59'.67	98°-59'.33	98°-59'08	98°-58'.74	98°-58'.37	
Depth	(M)		3.5	5.5	11.0	10.0	12.0	12.7	15.8	
Temp. (°C)	Surface	-	29.6	29.7	29.4	29.4	29.4	29.5	29.5	
	Bottom	-	29.3	29.3	29.3	29.3	29.4	29.3	29.4	
Current (max.)	V (m/sec)	-	-	-	-	-	-	-	-	
	Direction	-	-	-	-	-	-	-	-	
Sampling Device		G	G	G	G	G	G	G	G	
Bottom Materials & Core Length (cm)		fine Sand	Muddy Sand	Sand	Sandy Mud	fine Sand	fine Sand	Muddy Sand	fine Sand	
Photo No.		-	-	-	-	-	-	-	-	

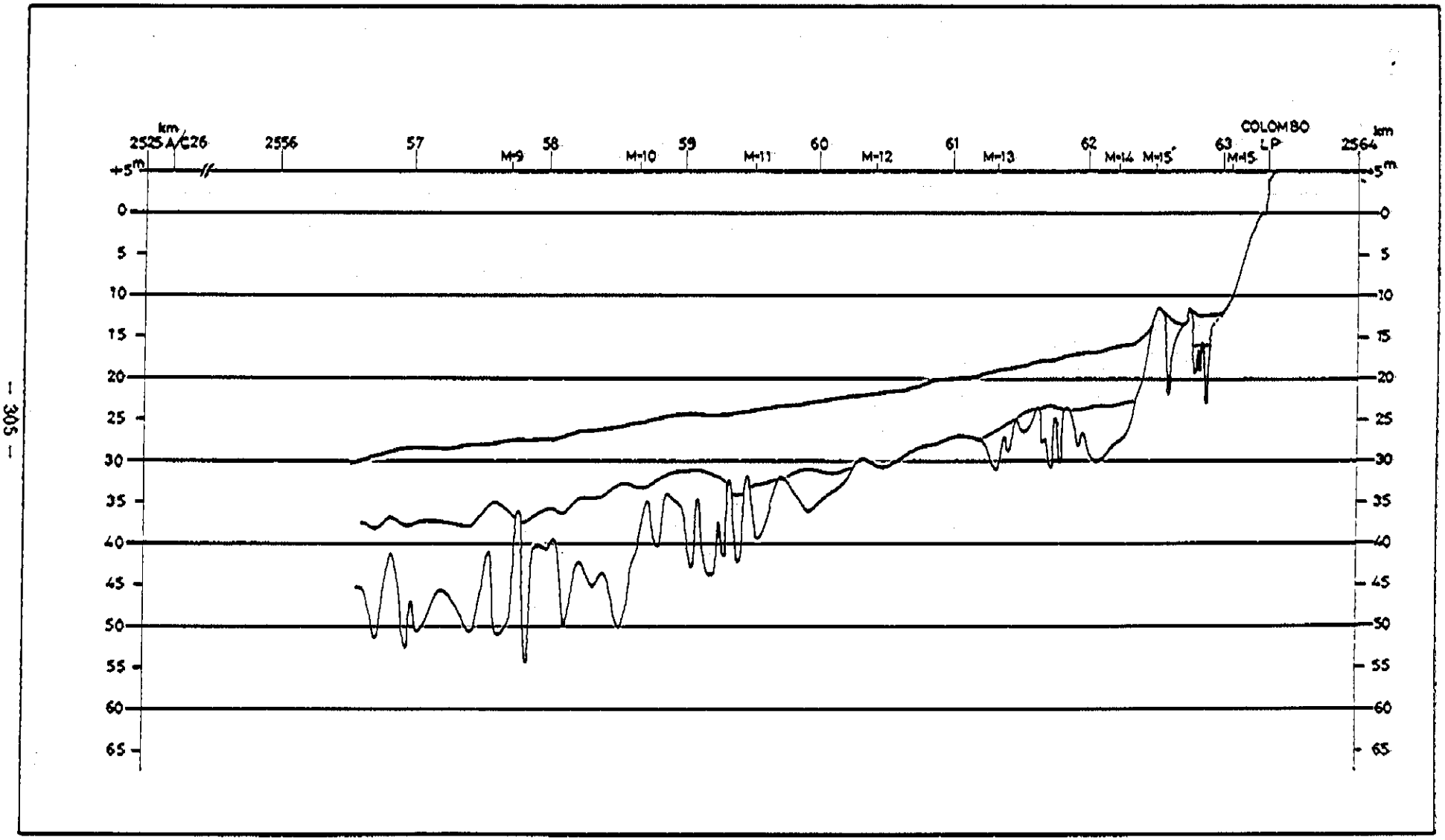
Gravel
Sand
Silt
Clay
Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

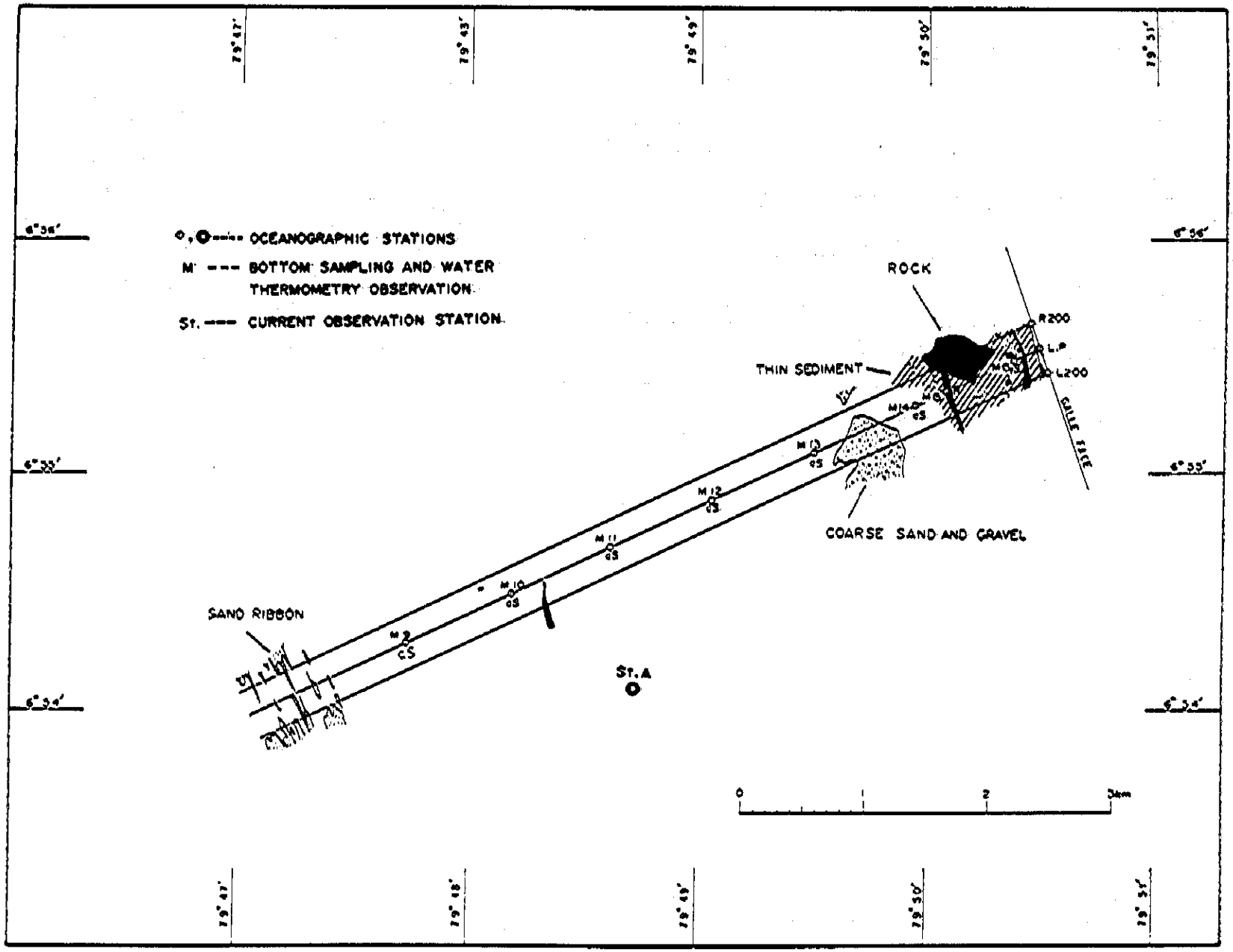


BATHYMETRIC AND CONTOUR CHART (COLOMBO APPROACH)

sounding in metres



BOTTOM PROFILE AND SUB-BOTTOM LAYERS
(COLOMBO APPROACH)



DISTRIBUTION OF BOTTOM MATERIAL (COLOMBO APPROACH)

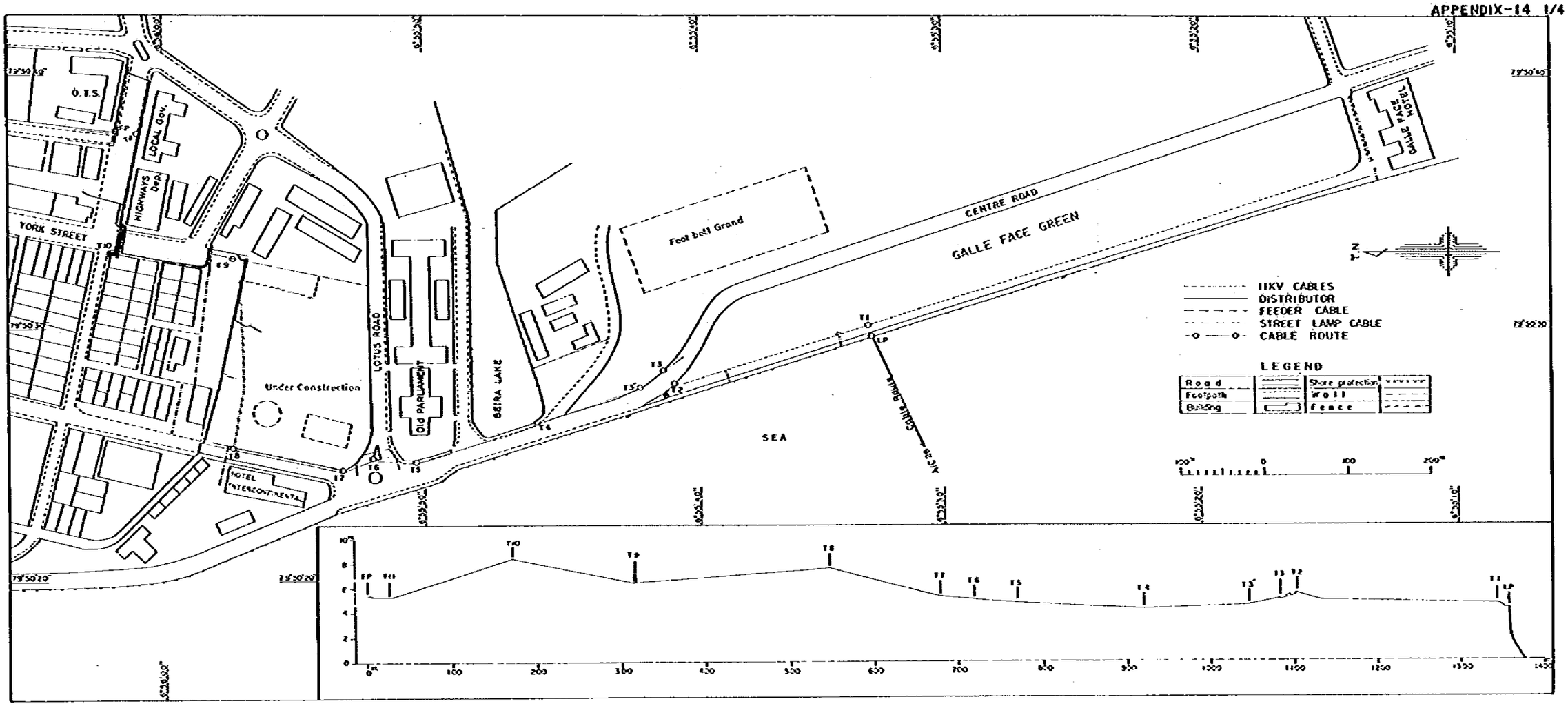
OCEANOGRAPHIC STATION DATA (COLOMBO APPROACH)

APPENDIX -13

Observational Item \ Station		M10	M11	M12	M13	M14	M15''	M15	St A	M9
Sampling Date		20th Oct	20th Oct	20th Oct	20th Oct	20th Oct	20th Oct	20th Oct	18th-19th Oct	20th Oct
Location	(N)	6°-54'.49	6°-54'.69	6°-54'.89	6°-55'.49	6°-55'.30	6°-55'.36	6°-55'.48	6°-54'.10	6°-54'.29
	(E)	79°-48'.17	79°-48'.62	79°-49'.06	79°-50'.36	79°-49'.95	79°-50'.08	79°-50'.42	79°-48'.72	79°-47'.73
Depth	(M)	25.5	24.0	22.0	18.0	16.0		10.5	23.5	27.5
Temp. (°C)	Surface	28.5	28.6	28.5	28.6	28.3	-	28.1	-	28.3
	Bottom	25.7	25.8	25.9	26.2	27.3	-	26.7	-	25.6
Current (max.)	V (m/sec)	-	-	-	-	-	-	-	25.6	
	Direction	-	-	-	-	-	-	-	S	
Sampling Device		G	G	G	G	G	Camera	G	—	G
Bottom Materials & Core Length (cm)		Coarse Sand	Coarse Sand	Coarse Sand	Coarse Sand	Coarse Sand	Rock	fine Sand	—	Coarse Sand
Photo No.		-	-	-	-	-	00	0	-	-

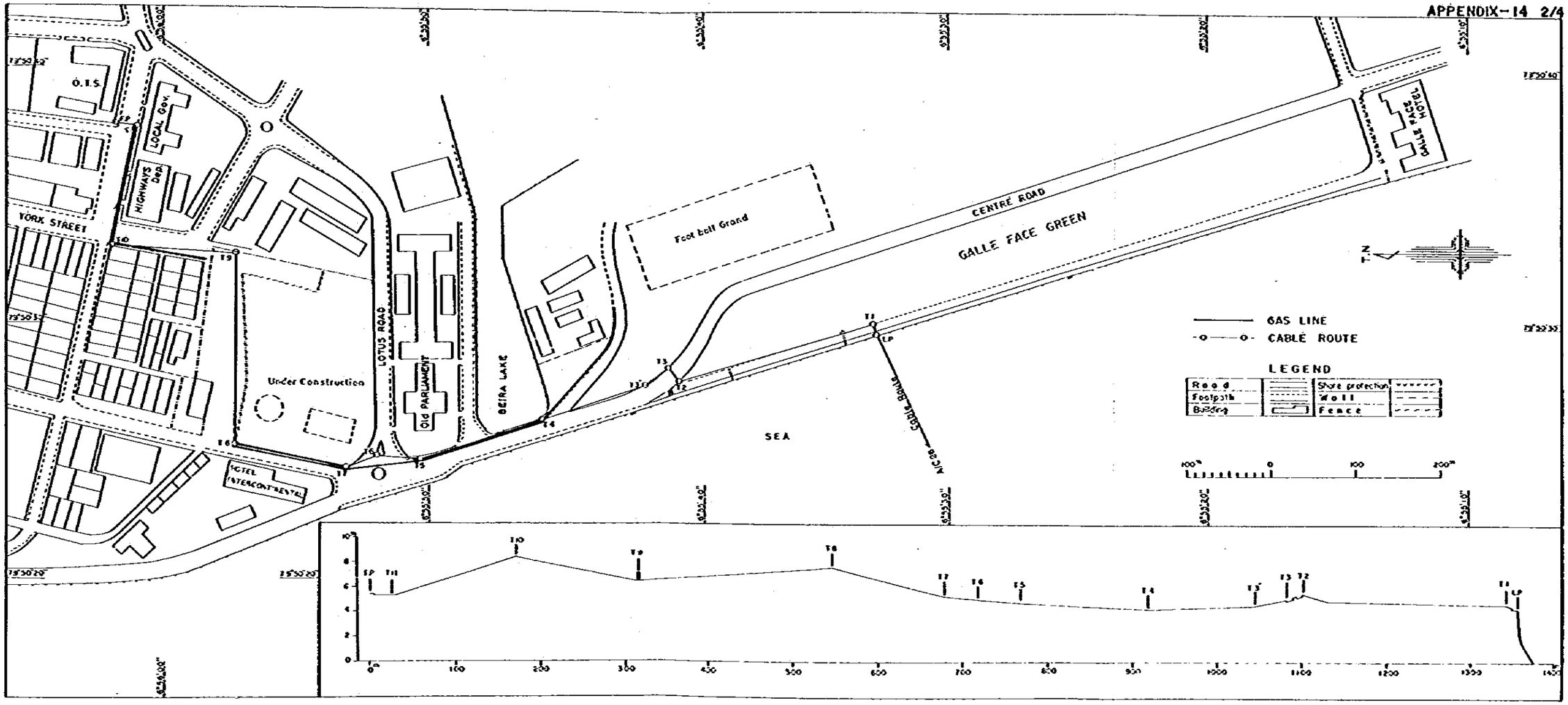
Gravel
Sand
Silt
Clay
Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger



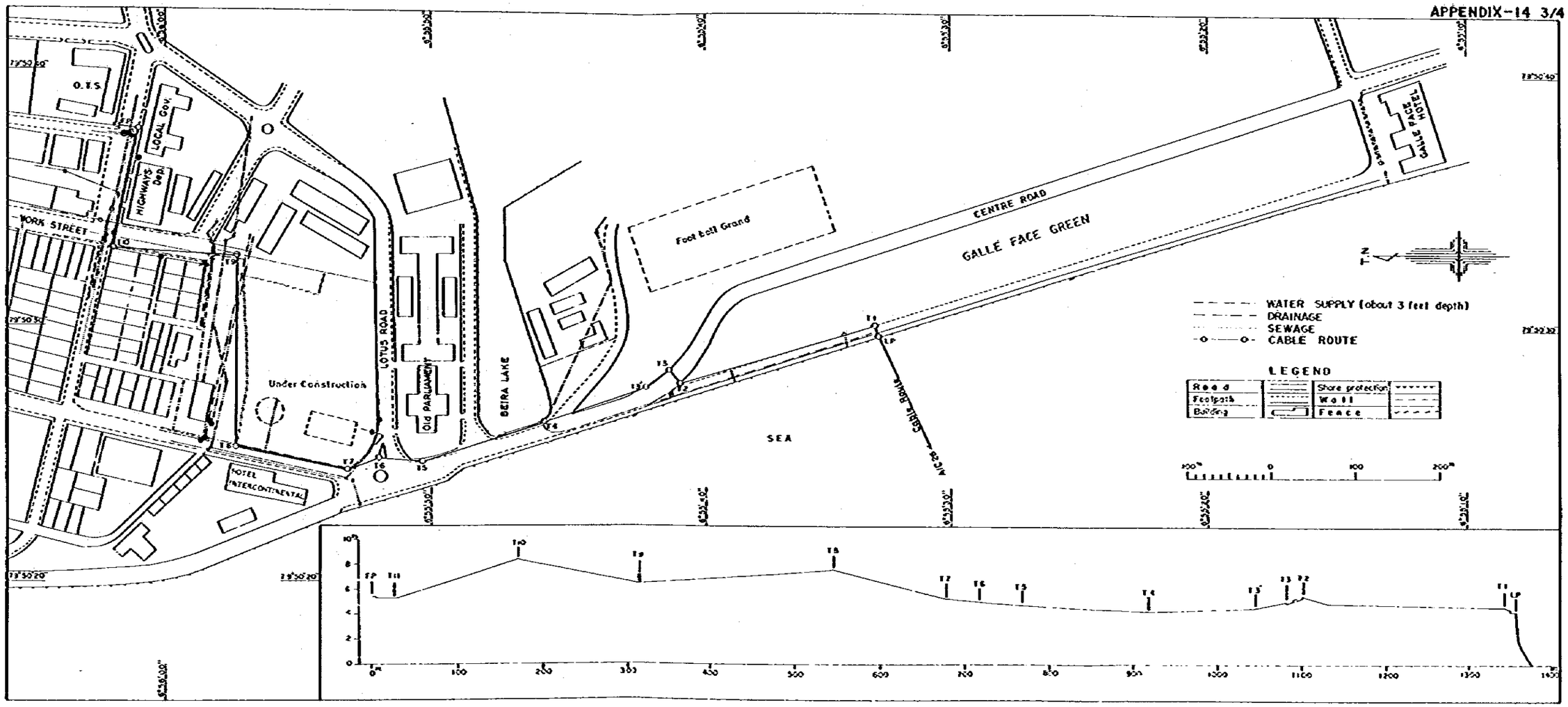
UNDERGROUND CABLES/PIPES ALONG COLOMBO LAND ROUTE

(Power Cable)

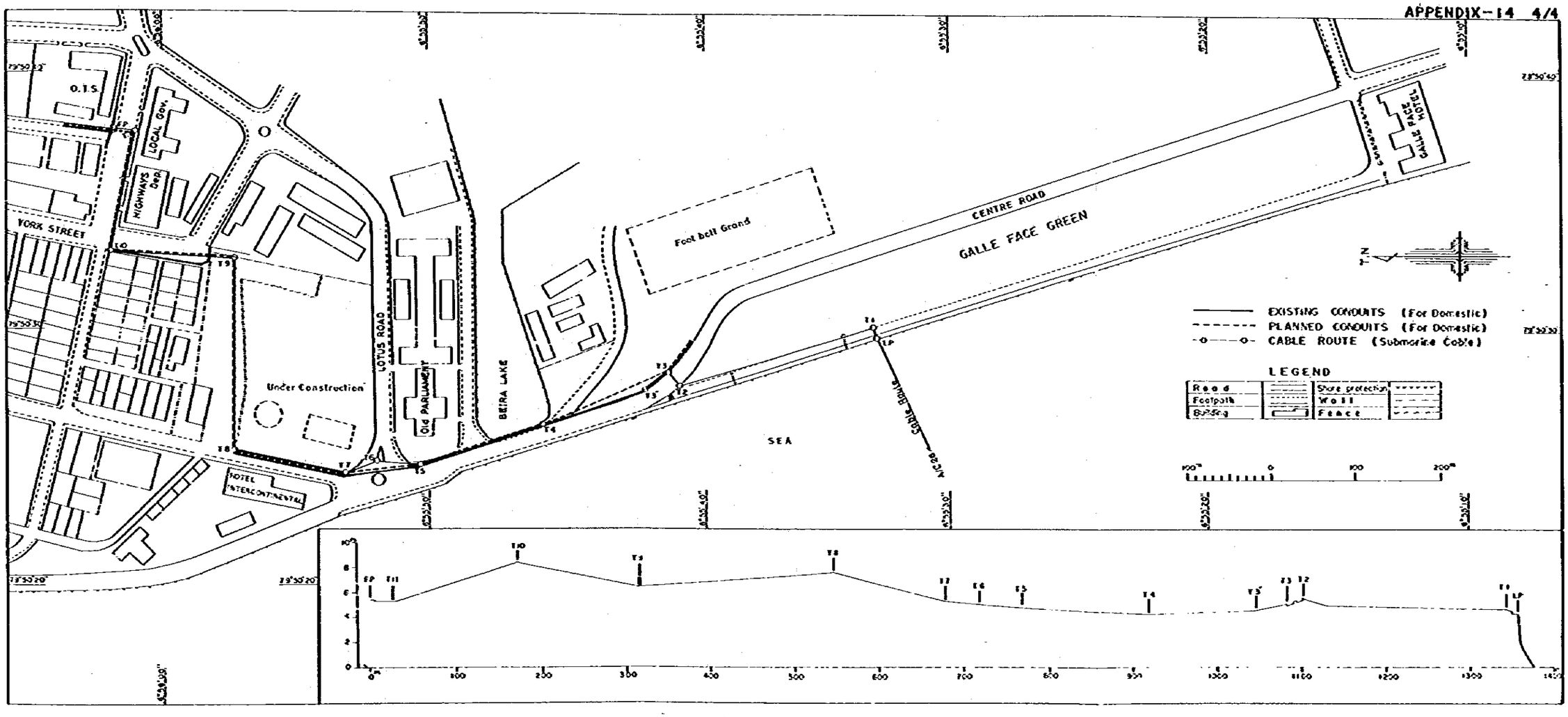


UNDERGROUND CABLES/PIPES ALONG COLOMBO LAND ROUTE

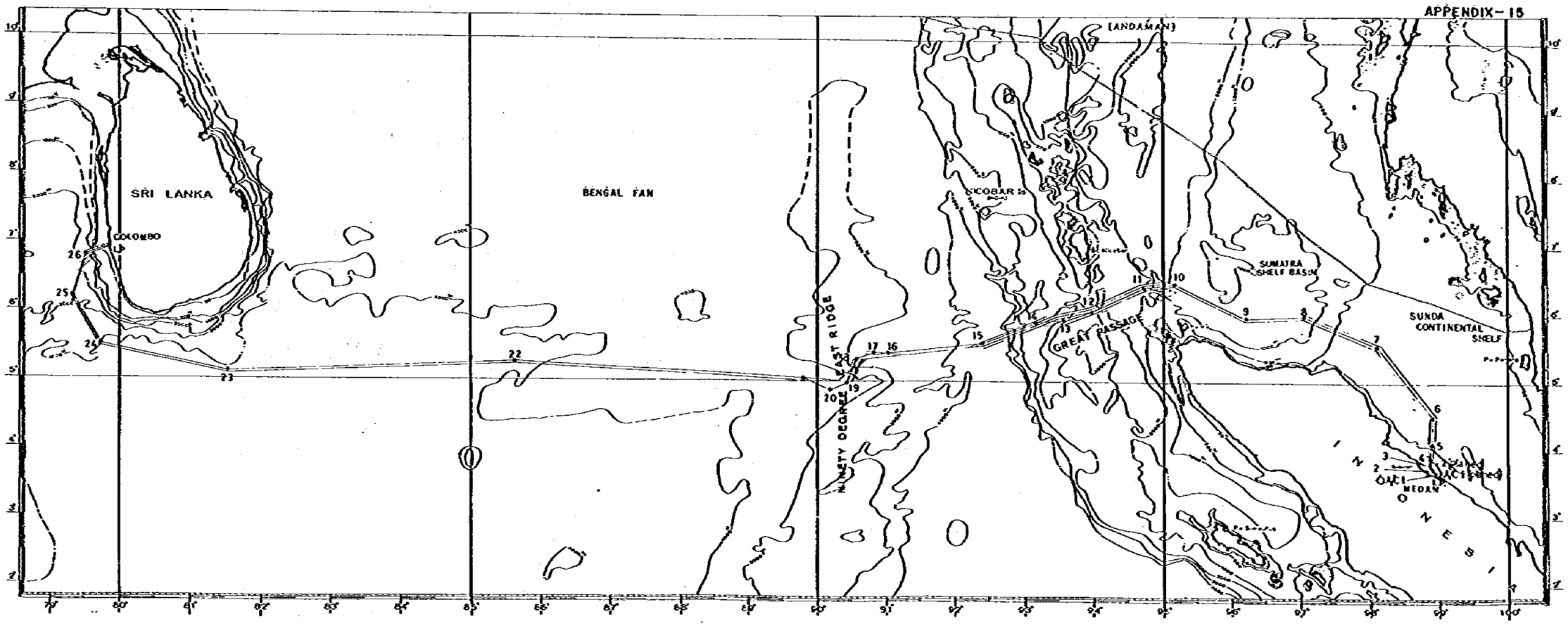
(Gas Line)



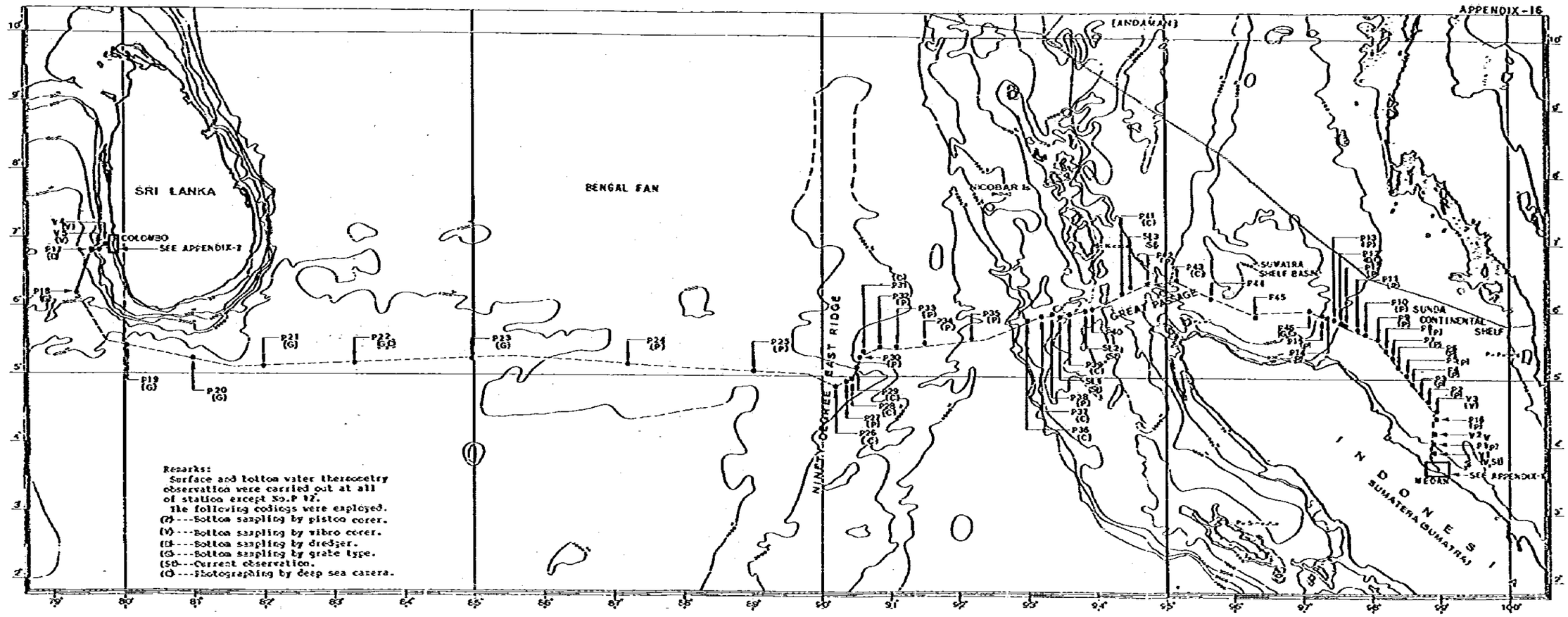
UNDERGROUND CABLES/PIPES ALONG COLOMBO LAND ROUTE
(Water Supply, Drainage, Sewage)



UNDERGROUND CABLES/PIPES ALONG COLOMBO LAND ROUTE
(Domestic Communication Conduit)



SURVEY TRACKS



OCEANOGRAPHIC STATION LOCATION DIAGRAM

OCEANOGRAPHIC STATION DATA

Observational Item \ Station		V1	P1	V2	P16	V3	P2	P3	P4
Sampling Date		27th Sept 23-24th Sep	27th Sept	27th Sept	30th Sept	27th Sept	28th Sept	28th Sept	28th Sept
Location	(N)	3°-55'.00	4°-04'.73	4°-13'.20	4°-24'.76	4°-32'.00	4°-39'.65	4°-47'.15	4°-55'.33
	(E)	98°-52'.00	98°-54'.73	98°-55'.07	98°-55'.16	98°-55'.00	98°-48'.52	98°-43'.21	98°-36'.52
Depth	(M)	30.0	32.7	42.0	55.0	62.0	67.0	68.5	75.0
Temp. (°C)	Surface	30.6	30.1	30.0	30.1	29.7	29.9	30.0	29.9
	Bottom	29.7	29.6	29.6	29.0	27.3	25.7	27.0	26.7
Current (max.)	V (m/sec)	57.8 / 58.9	-	-	-	-	-	-	-
	Direction	NW / SE	-	-	-	-	-	-	-
Sampling Device		V	P	V	P	V	P	P	P
Dottom Materials & Core Length (cm)		30 / 285	20 / 95	40 / 223	20 / 55	40 / 205	30 / 68	5 / 37	20 / 48
Photo No.		-	-	-	-	-	-	-	-

Gravel, Sand, Silt, Clay, Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

OCEANOGRAPHIC STATION DATA

Observational Item \ Station		P5	P6	P7	P8	P9	P10	P11	P12
Sampling Date		28th Sept	28th Sept	28th Sept	28th Sept	29th Sept	29th Sept	29th Sept	29th Sept
Location	(N)	5°-0.3'.15	5°-10'.85	5°-18'.81	5°-26'.25	5°-35'.02	5°-38'.83	5°-42'.78	5°-46'.63
	(E)	98°-29'.90	98°-24'.24	98°-17'.89	98°-11'.94	98°-04'.91	97°-55'.69	97°-46'.58	97°-37'.28
Depth	(M)	70.0	91.0	91.5	96.0	107	105	105	115
Temp. (°C)	Surface	30.9	30.9	30.0	30.0	29.6	29.4	29.2	29.3
	Bottom	25.3	25.3	25.0	25.8	20.5	19.8	19.2	19.5
Current (max.)	V (m/sec)	-	-	-	-	-	-	-	-
	Direction	-	-	-	-	-	-	-	-
Sampling Device		P	P	P	P	P	P	P	P
Bottom Materials & Core Length (cm)		65	45	35	12 / 120	5 / 43	11 / 22	27	15 / 110
Photo No.		—	—	—	—	—	—	—	—

Gravel
Sand
Silt
Clay
Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

OCEANOGRAPHIC STATION DATA

Observational Item \ Station		P12'	P13	P14	P15	P46	P45	P44	P43
Sampling Date		9th Nov	29th Sept	29th Sept	29th Sept	9th Nov	8th Nov	8th Nov	8th Nov
Location	(N)	5°-48'.69	5°-50'.43	5°-52'.92	5°-55'.25	5°-59'.76	5°-52'.95	6°-10'.36	6°-25'.88
	(E)	97°-32'.62	97°-27'.69	97°-22'.18	97°-16'.17	97°-04'.97	96°-19'.15	95°-38'.29	95°-08'.87
Depth	(M)	145	523	834	990	1,180	1,313	1,267	1,315
Temp. (°C)	Surface	-	29.6	30.2	30.7	28.6	28.8	29.0	28.0
	Bottom	-	10.1	8.1	7.3	5.5	5.0	5.0	4.9
Current (max.)	V (m/sec)	-	-	-	-	-	-	-	-
	Direction	-	-	-	-	-	-	-	-
Sampling Device		D	P	P	P	G	-	-	-
Bottom Materials & Core Length (cm)		rock	148	150	130	Mud	-	-	-
Photo No.		12	-	-	-	11	-	-	10

Gravel
Sand
Silt
Clay
Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

OCEANOGRAPHIC STATION DATA

Observational Item \ Station		P42	St 3	P41	P40	St 2	P39	St 1	P38
Sampling Date		3rd Nov	8th Oct	4th Nov	3rd Nov	9th Oct	3rd Nov	9th Oct	2nd Nov
Location	(N)	6°-23'.02	6°-20'.40	6°-12'.87	6°-01'.27	5°-58'.73	5°-54'.54	5°-57'.42	5°-53'.82
	(E)	94°-43'.53	94°-28'.27	94°- 20'.86	93°-55'.28	93°-49'.03	93°-35.06	93°- 26'.01	93°-20'.45
Depth	(M)	1,980	1,557	1,736	1,230	1,380	2,000	1,565	1,790
Temp. (°C)	Surface	28.3	29.0	28.3	28.2	29.0	28.1	29.1	28.3
	Bottom	4.9	5.0	4.6	5.4	5.4	4.8	5.1	5.1
Current (max.)	V (m/sec)	-	26.6 / 49.3	-	-	37.2 / 31.2	-	41.4 / 28.2	-
	Direction	-	NNE / WSW	-	-	NNE / SSW	-	SSW / E	-
Sampling Device		P	-	-	-	-	-	-	P
Bottom Materials & Core Length (cm)		29	-	-	-	-	-	-	139
Photo No.		-	-	9	-	-	8	-	-

Gravel / Sand / Silt / Clay / Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

OCEANOGRAPHIC STATION DATA

Observational Item \ Station	P37	P36	P35	P34	P33	P32	P31	P30
Sampling Date	2nd Nov	2nd Nov	1st Nov	31st Oct	31st Oct	31st Oct	30th Oct	30th Oct
Location (N)	5°-53'.20	5°-48'.88	5°-32'.55	5°-28'.15	5°-23'.90	5°-25'.50	5°-19'.65	5°-14'.93
Location (E)	93°-10'.29	92°-58'.53	92°-11'.65	91°-29'.30	91°-03'.72	90°-49'.45	90°-35'.15	90°-32'.78
Depth (M)	1,220	1,740	4,115	3,800	3,680	3,779	3,260	3,302
Temp. (°C) Surface	28.2	28.2	28.6	28.6	28.4	28.5	28.7	28.8
Temp. (°C) Bottom	5.4	3.2	1.1	1.2	1.2	1.2	1.4	1.5
Current (max.) V (m/sec)	-	-	-	-	-	-	-	-
Current (max.) Direction	-	-	-	-	-	-	-	-
Sampling Device	-	-	P	P	P	P	-	P
Bottom Materials & Core Length (cm)	-	-	21	40	92	20	-	65
Photo No.	7	6	-	-	-	-	5	-

Gravel / Sand / Silt / Clay / Shell Fragment

P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

Observational Item \ Station		P29	P28	P27	P26	P25	P24	P23	P22
Sampling Date		30th Oct	30th Oct	30th Oct	29th Oct	28th Oct	28th Oct	27th Oct	26th Oct
Location	(N)	5°-06'.40	4°-58'.23	4°-56'.24	4°-51'.76	5°-04'.99	5°-10'.60	5°-14'.45	5°-10'.12
	(E)	90°-28'.91	90°-25'.87	90°-21'.85	90°-10'.92	88°-59'.55	87°-10'.95	84°-59'.55	83°-17'.50
Depth	(M)	2,940	3,358	3,507	3,692	3,423	4,115	4,027	4,130
Temp. (°C)	Surface	29.0	29.0	28.8	29.2	29.1	28.5	29.3	28.5
	Bottom	1.6	1.6	1.4	1.4	1.4	1.4	1.5	1.4
Current (max.)	V (m/sec)	-	-	-	-	-	-	-	-
	Direction	-	-	-	-	-	-	-	-
Sampling Device		-	-	P	-	P	P	G	G
Bottom Materials & Core Length (cm)		-	-	105	-	35	150	-	Mud
Photo No.		4	3	-	2	-	-	-	1

Gravel
Sand
Silt
Clay
Shell Fragment

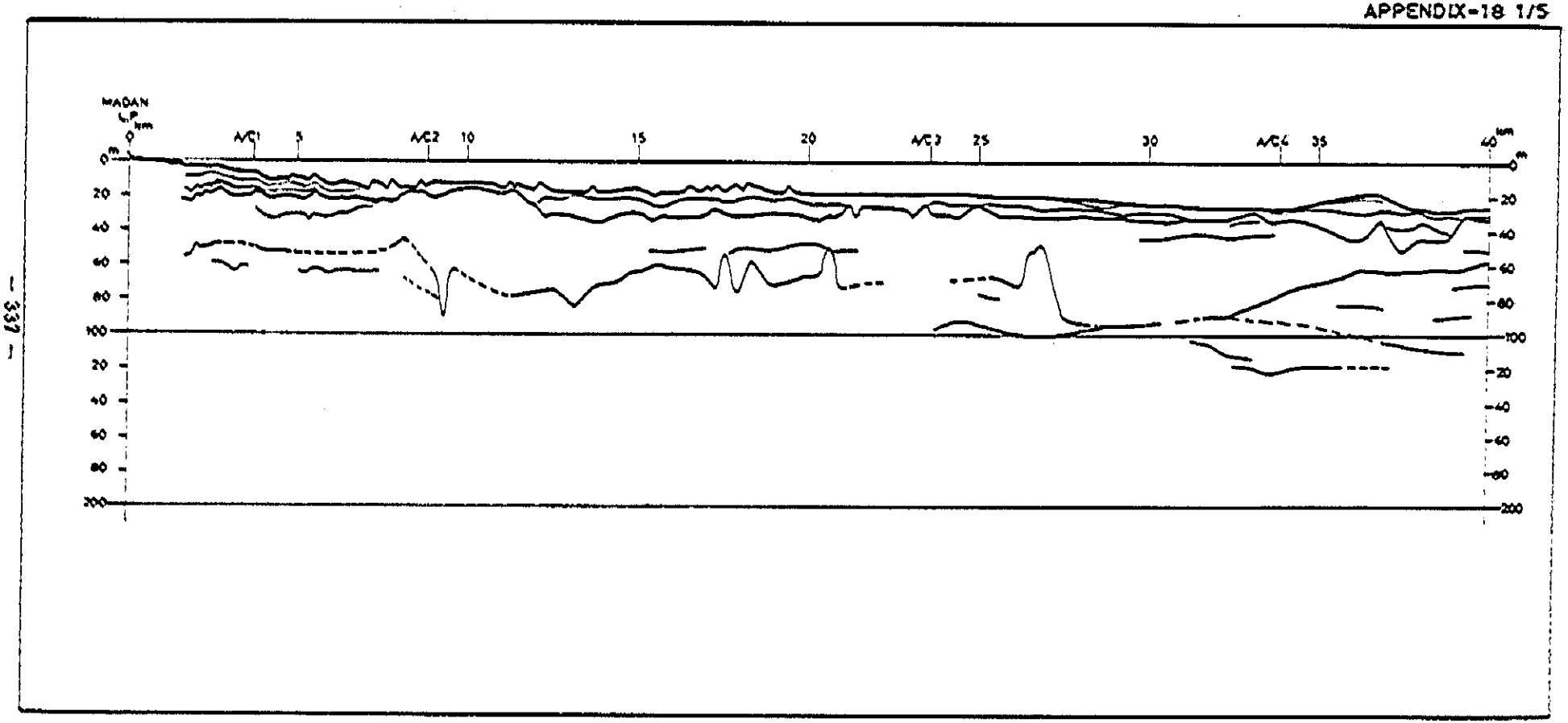
P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger

OCEANOGRAPHIC STATION DATA

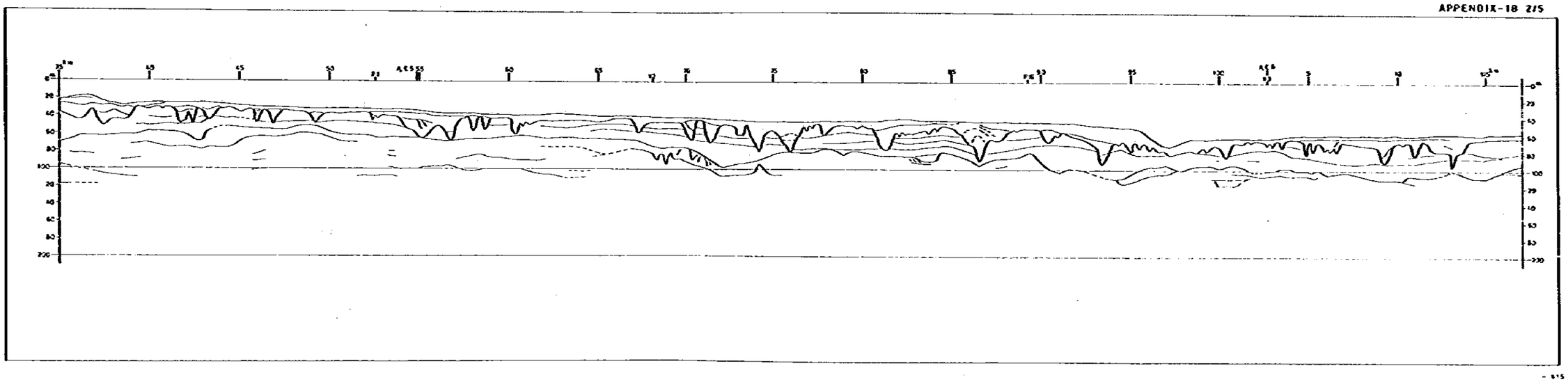
Observational Item \ Station		P 21	P20	P19	P18	P17	V5	V4	
Sampling Date		26th Oct	25th Oct	25th Oct	24th Oct	24th Oct	23rd Oct	23rd Oct	
Location	(N)	5°-06'.59	5°-12'.52	5°-24'.01	6°-12'.23	6°-48'.46	6°-50'.35	6°-53'.03	
	(E)	81°-59'.33	80°-59'.22	80°-02'.36	79°-19'.12	79°-34'.82	79°-38'.94	79°-45'.10	
Depth	(M)	4,180	4,247	4,143	2.595	944	49.5	44.5	
Temp. (°C)	Surface	28.5	28.6	28.7	28.2	27.3	27.9	27.5	
	Bottom	1.4	1.4	1.4	1.9	6.7	25.7	25.2	
Current (max.)	V (m/sec)	-	-	-	-	-	-	-	
	Direction	-	-	-	-	-	-	-	
Sampling Device		G	G	G	G	D	V	V	
Bottom Materials & Core Length (cm)		-	-	-	-	Mud	270	250 260	
Photo No.		-	-	-	-	-	-	-	

Gravel
Sand
Silt
Clay
Shell Fragment

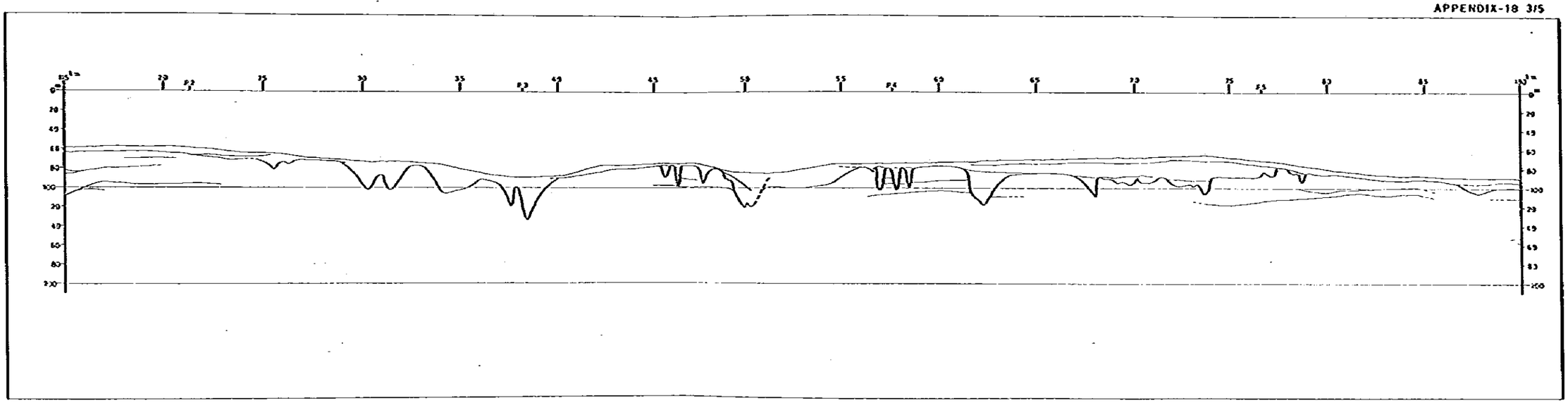
P: Piston Corer V: Vibrocorer G: Grab Type Sampler D: Dredger



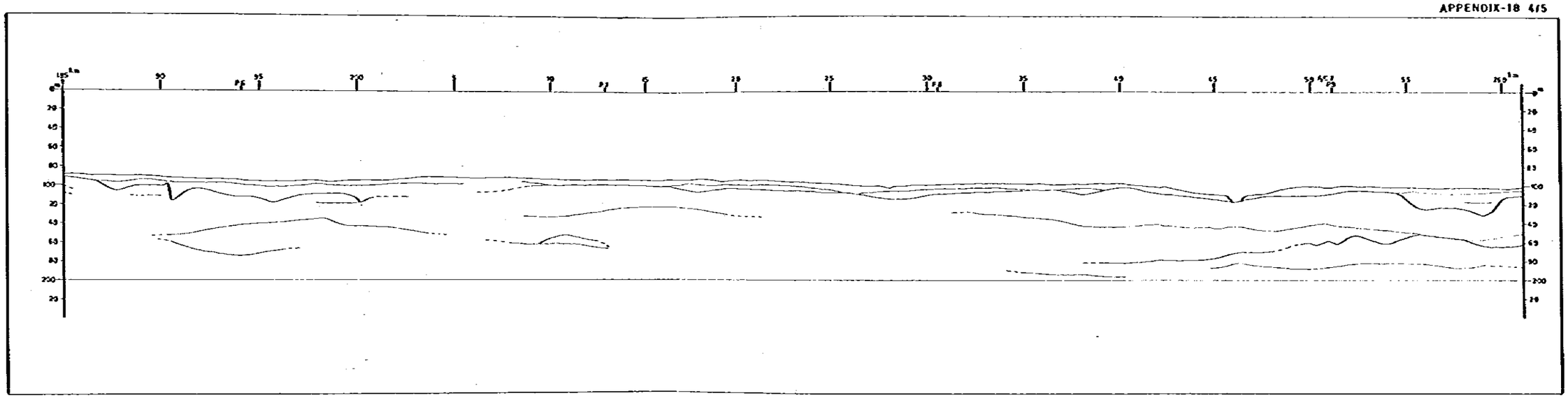
SOTTOM PROFILE AND SUS-SOTTOM LAYERS OF SUNDA SHELF AND SLOPE



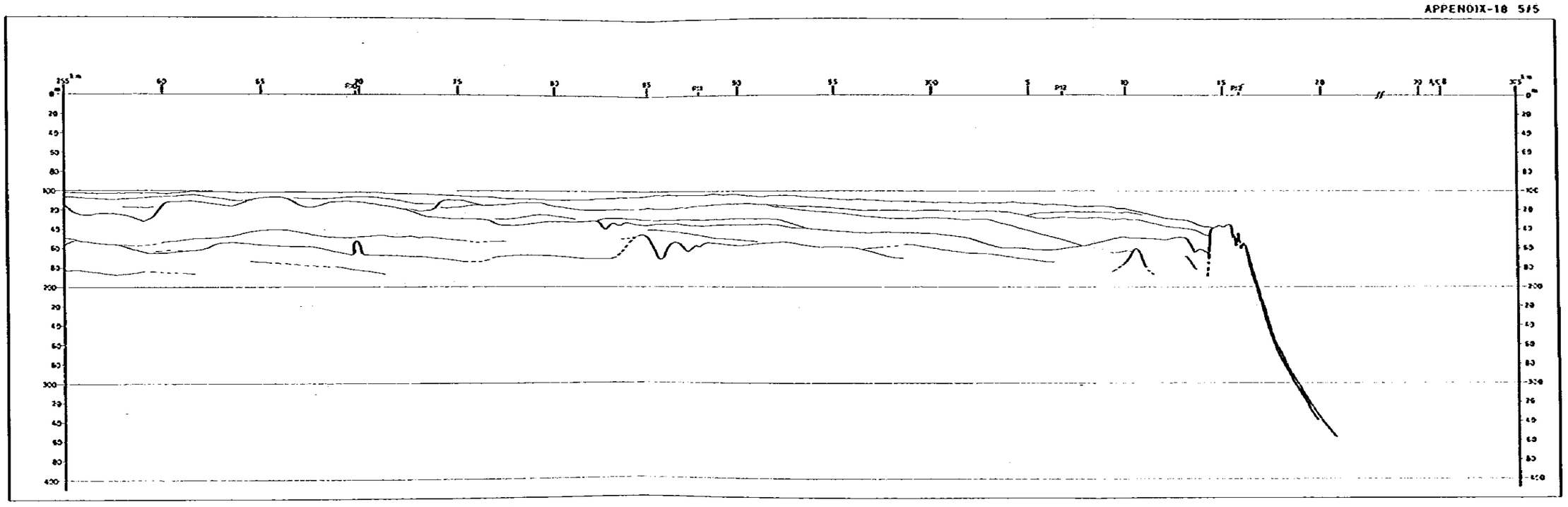
BOTTOM PROFILE AND SUB-BOTTOM LAYERS OF SUNDA SHELF AND SLOPE



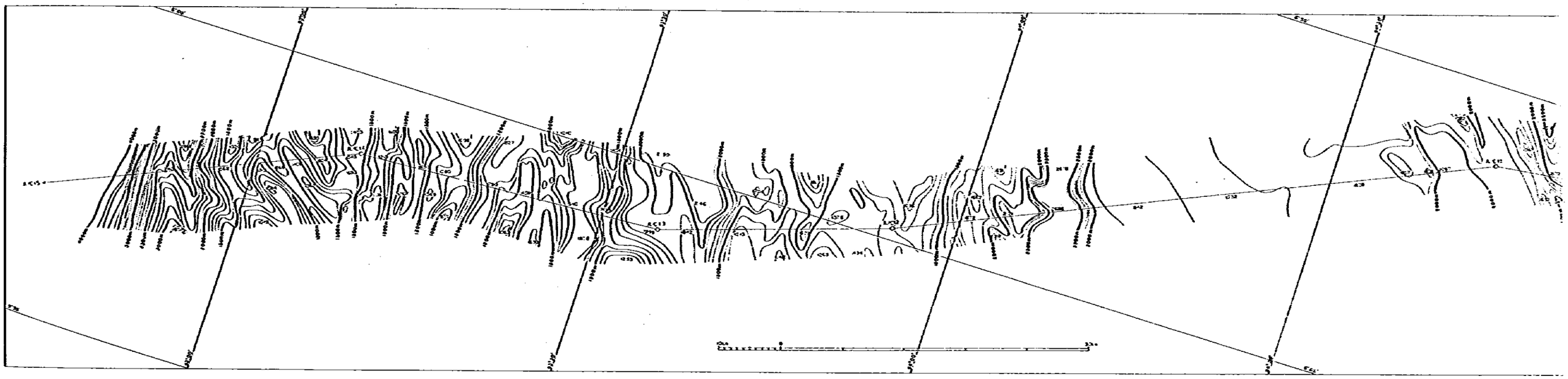
BOTTOM PROFILE AND SUB-BOTTOM LAYERS OF SUNDA SHELF AND SLOPE



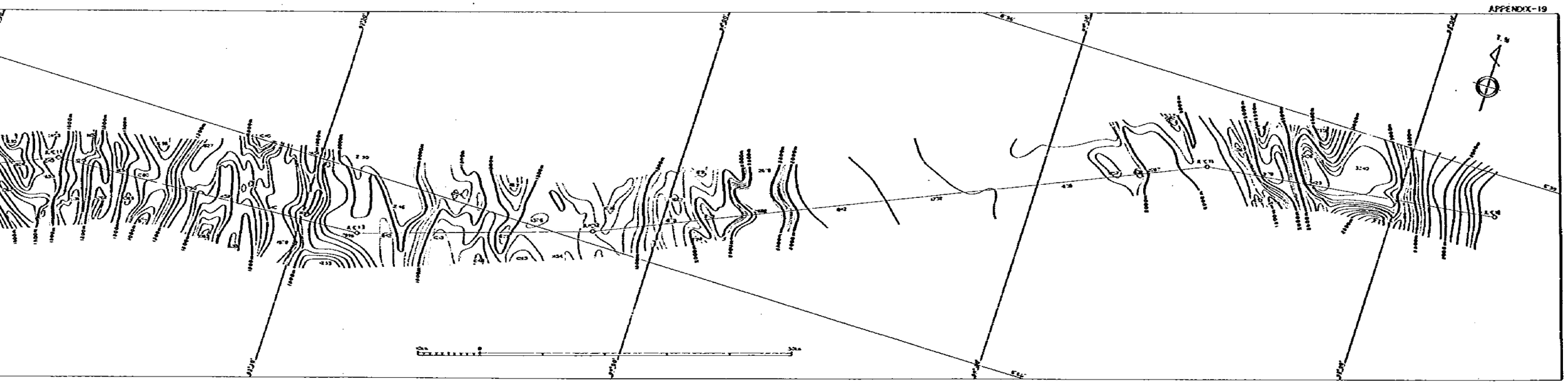
BOTTOM PROFILE AND SUB--BOTTOM LAYERS OF SUNDA SHELF AND SLOPE



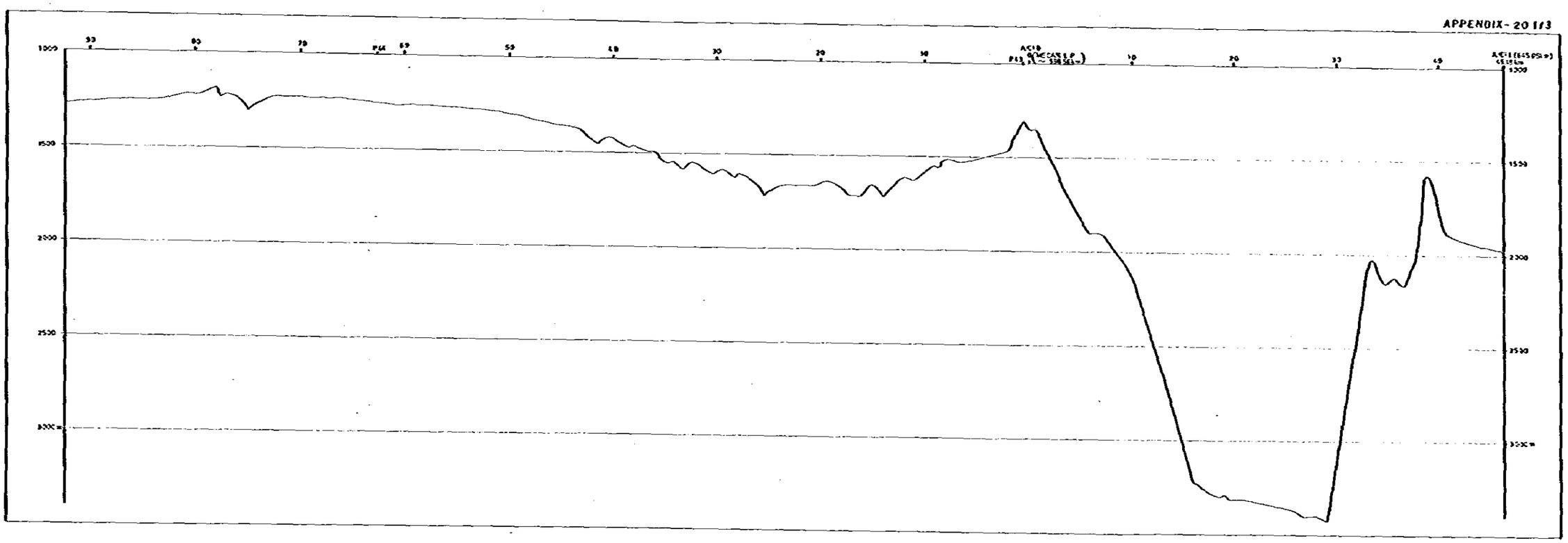
BOTTOM PROFILE AND SUB-BOTTOM LAYERS OF SUNDA SHELF AND SLOPE



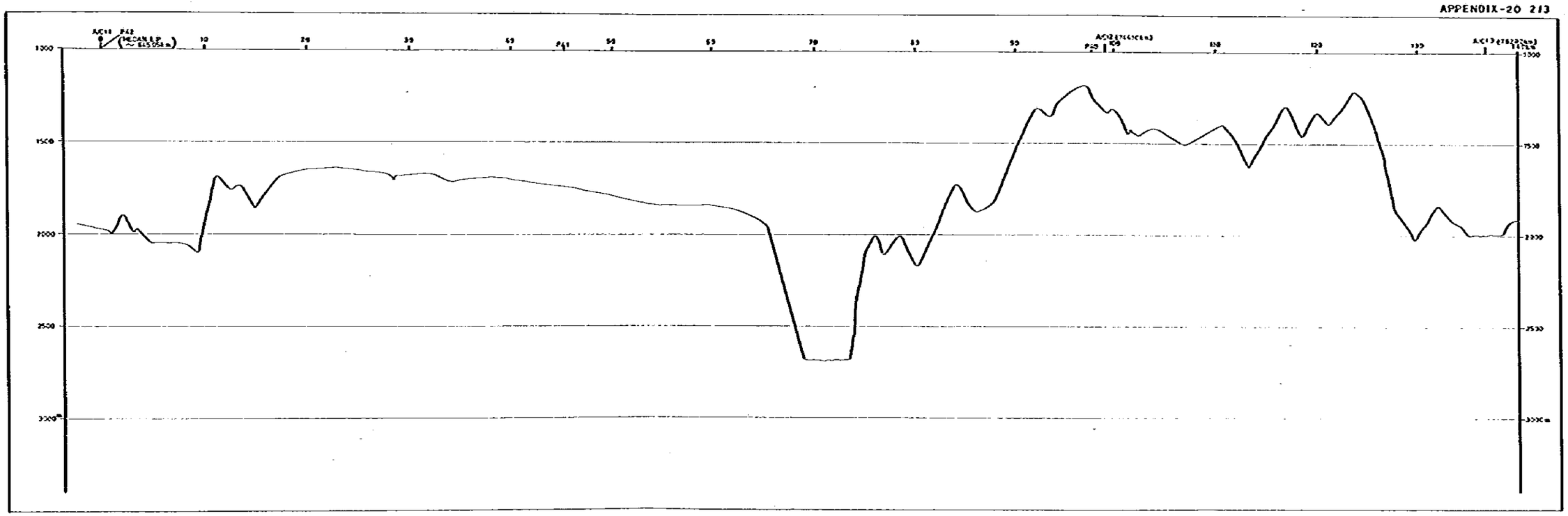
CONTOUR CHART OF GREAT PASSAGE



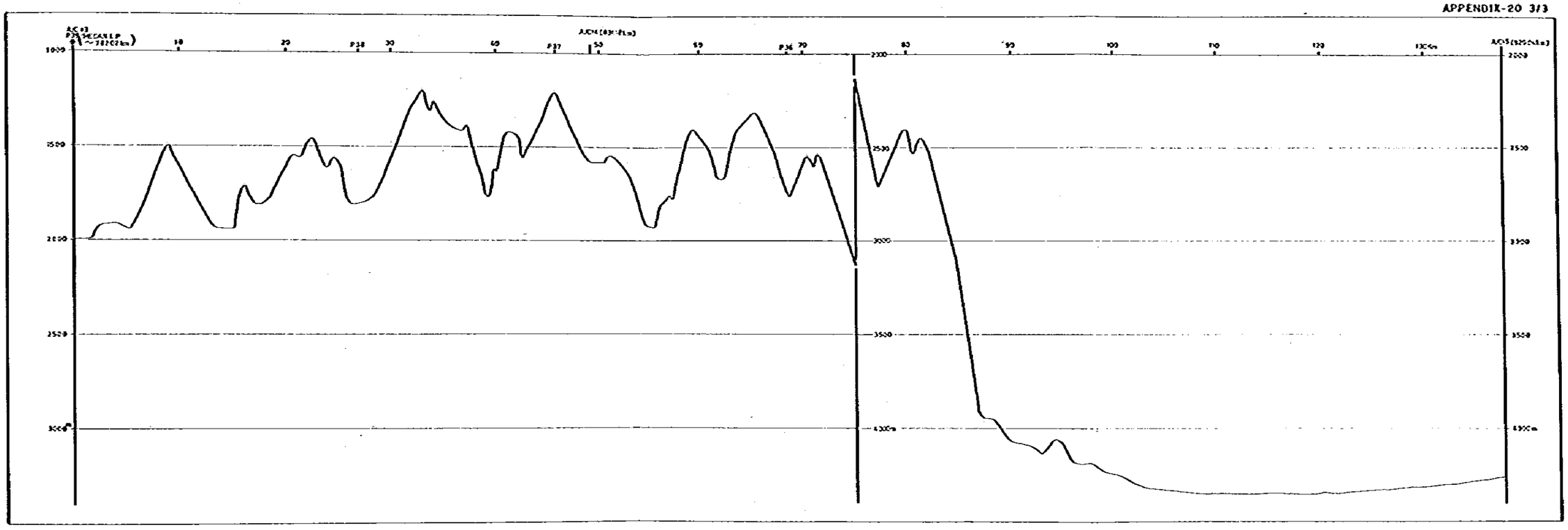
GREAT PASSAGE



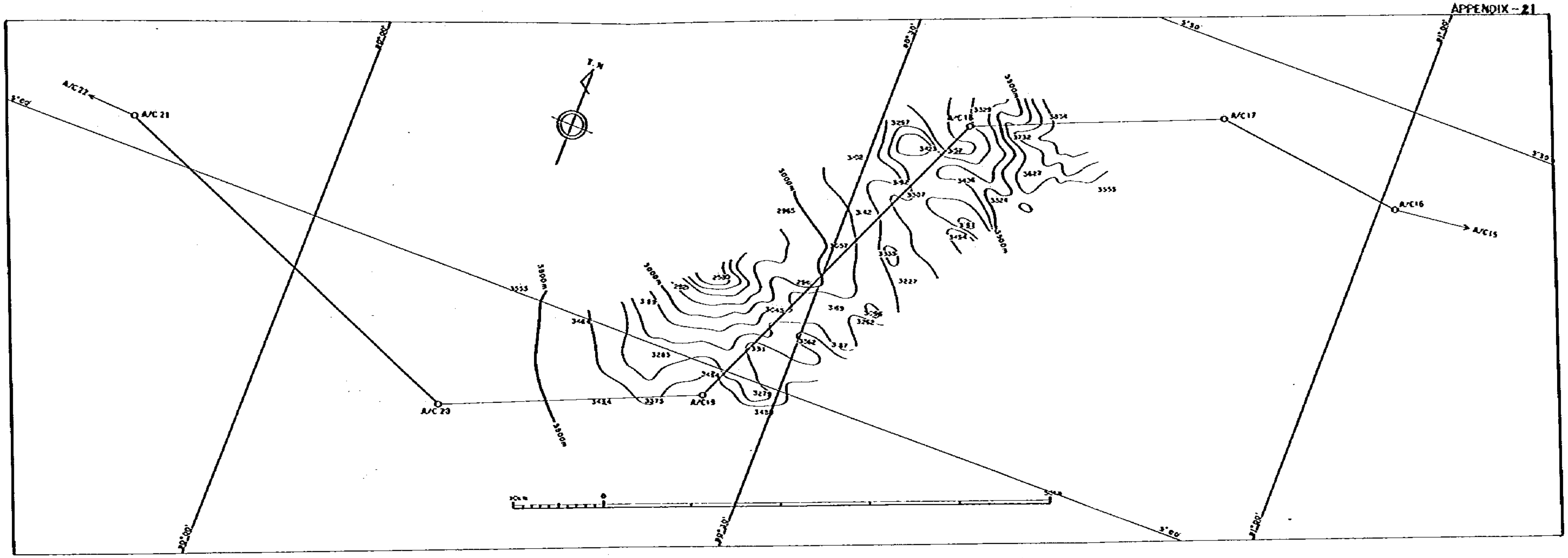
DETAILED BOTTOM PROFILE OF GREAT PASSAGE



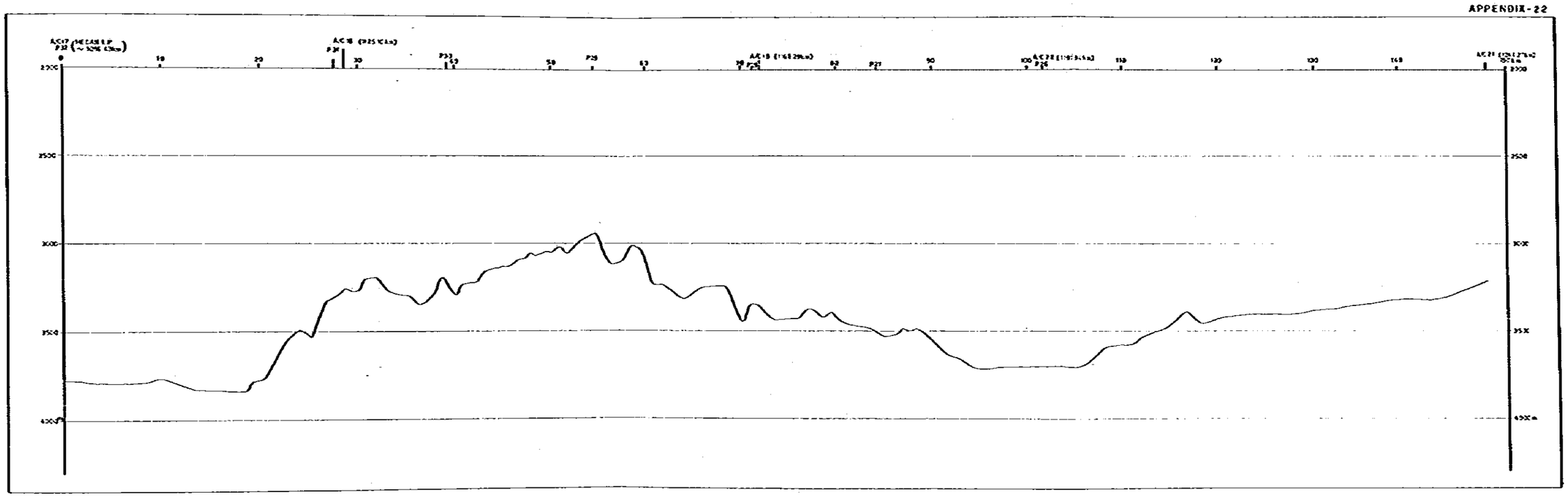
DETAILED BOTTOM PROFILE OF GREAT PASSAGE



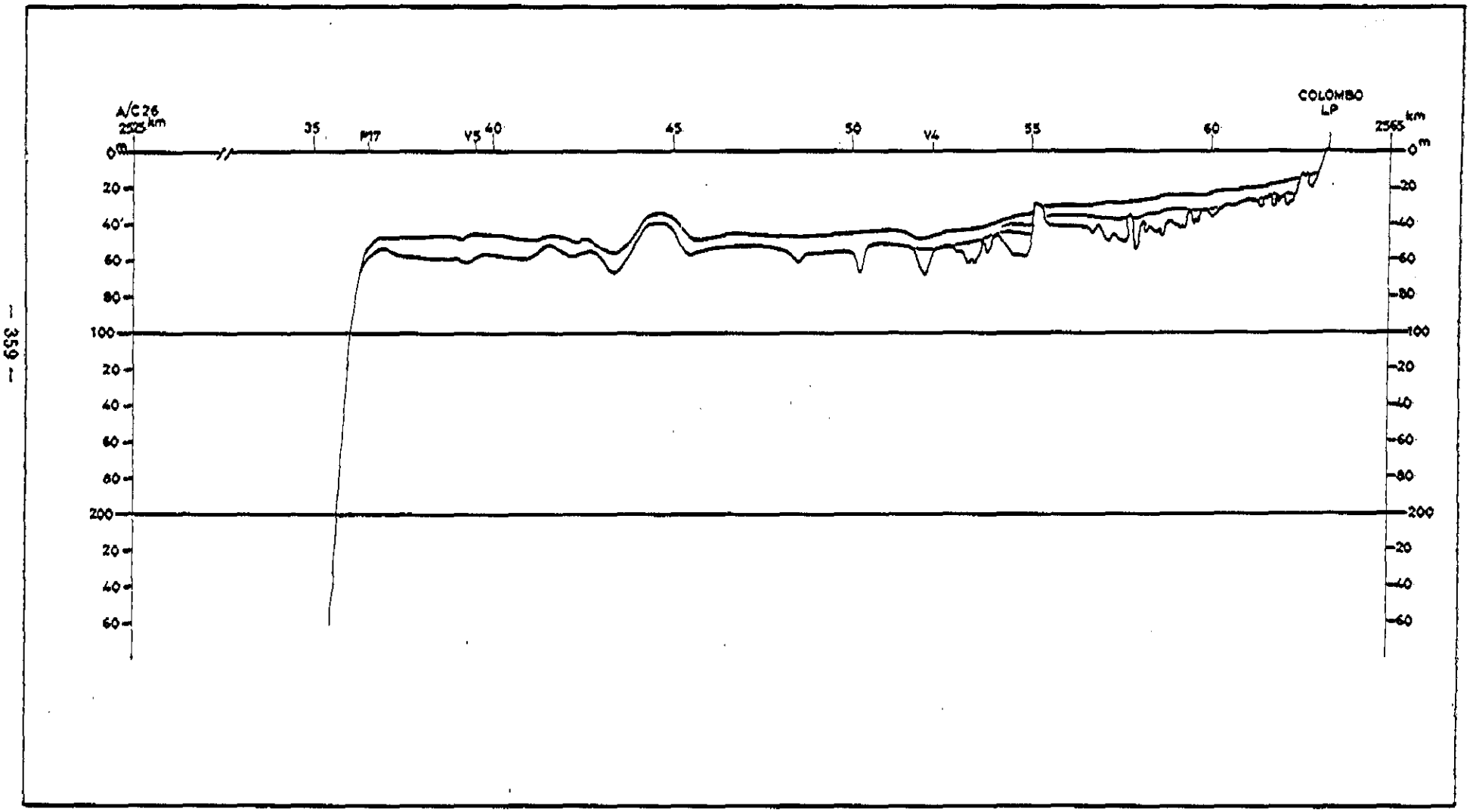
DETAILED BOTTOM PROFILE OF GREAT PASSAGE



CONTOUR CHART OF 90°E RIDGE



DETAILED BOTTOM PROFILE OF 90°E RIDGE



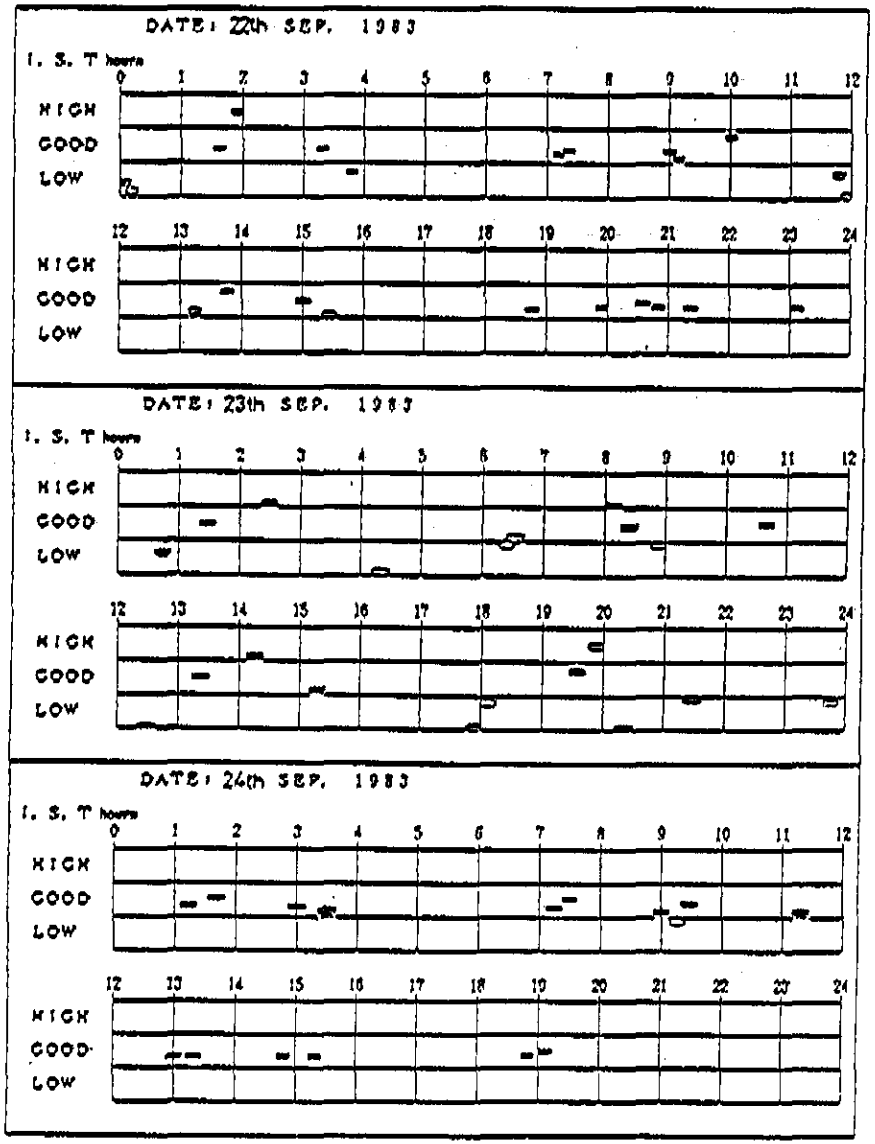
BOTTOM PROFILE AND SUB-BOTTOM LAYERS OFF COLOMBO

Appendix 24

Satellite Pass Frequency

These figures show all positioning data from NNSS system which received by the Survey ship from 22nd September to 9th November, 1983.

SATELLITE PASS FREQUENCY

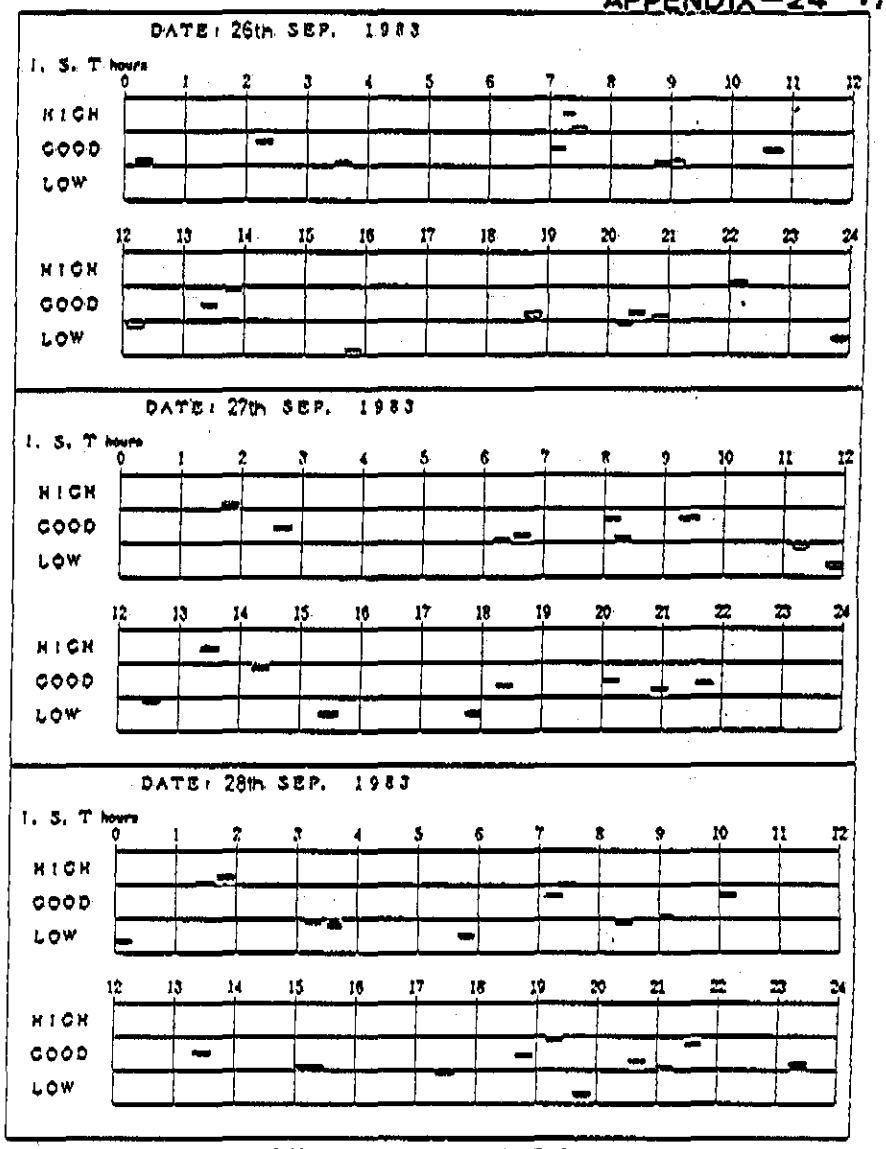


HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

O. K
N. G

I. S. T : Indonesia Standard Time
S. S. T : Sri-Lanka Standard Time

SATELLITE PASS FREQUENCY



HIGH Passes = Above 70° Alt.
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O. K
N. G

I. S. T : Indonesia Standard Time
S. S. T : Sri-Lanka Standard Time

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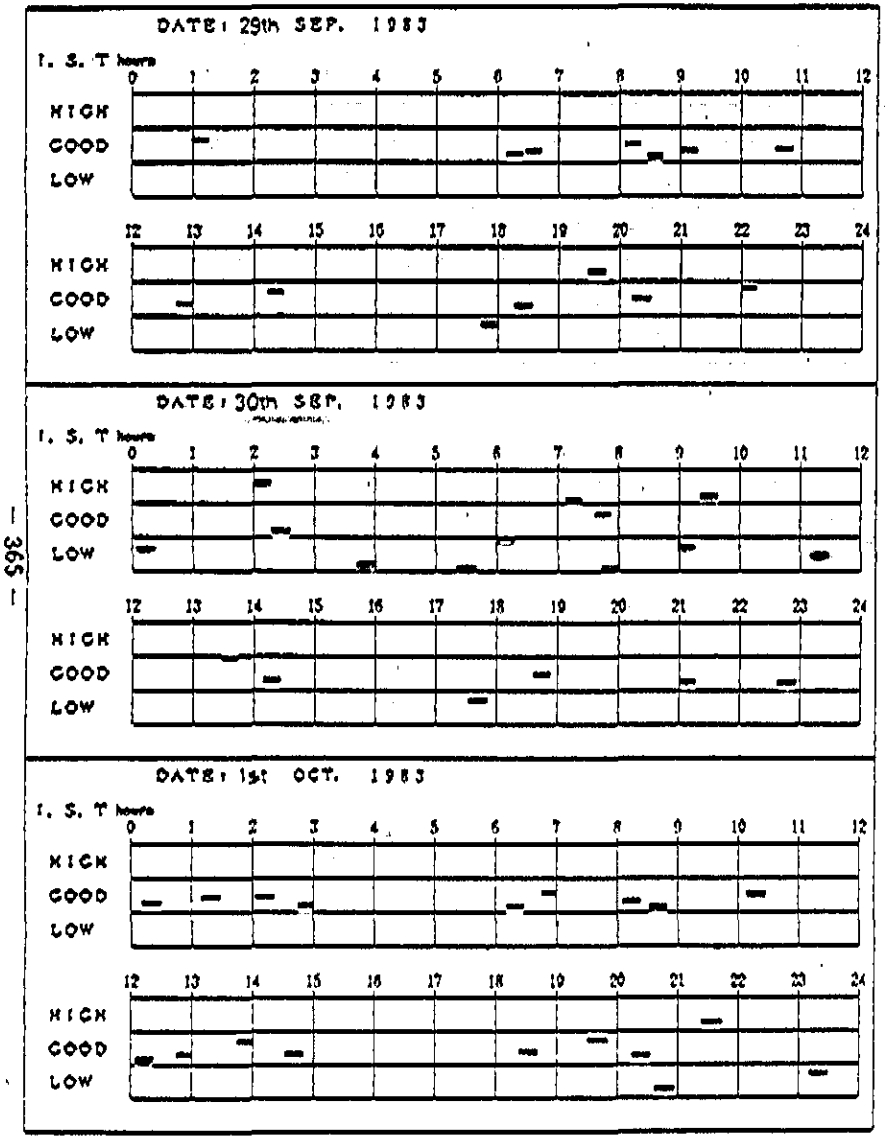

HIGH Passes = Above 70° Alt.
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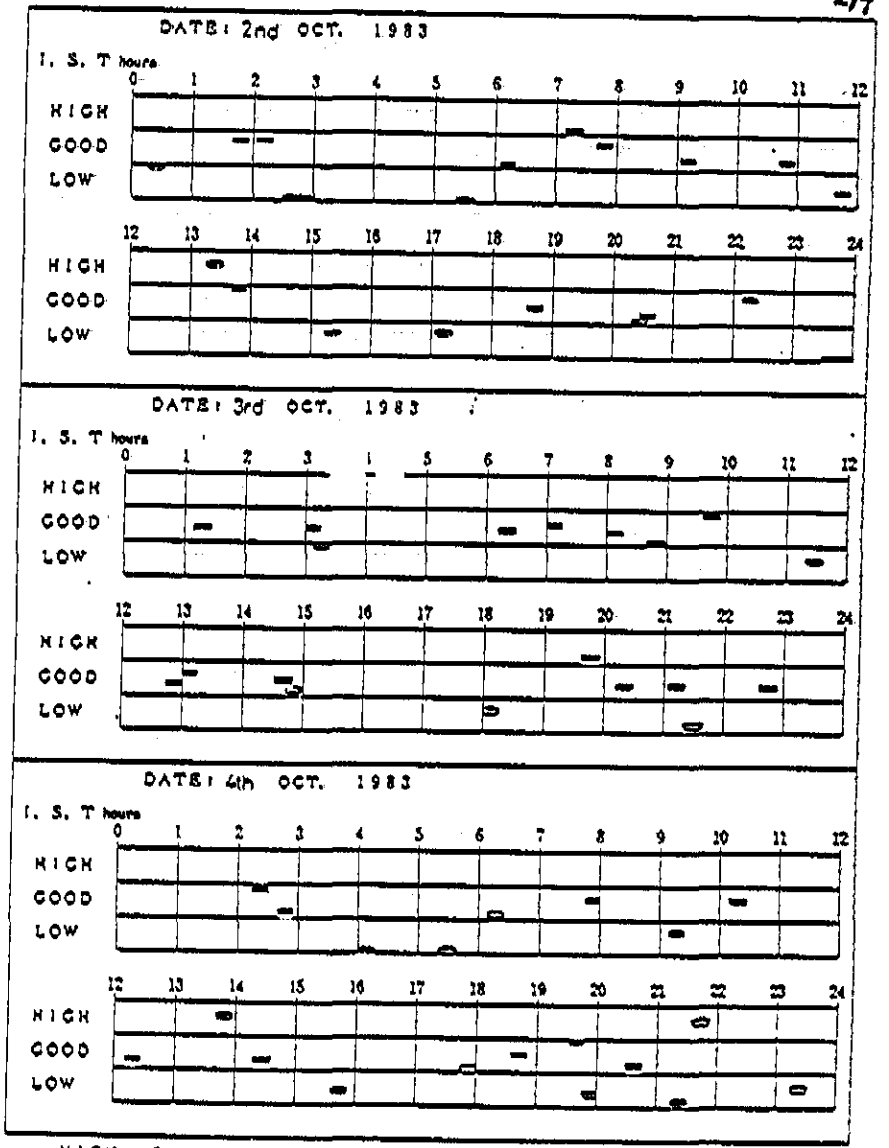
LOW Passes = Less than 10° Alt.

O. K
N. G

I. S. T : Indonesia Standard Time
S. S. T : Sri - Lanka Standard Time

SATELLITE PASS FREQUENCY.

2/7

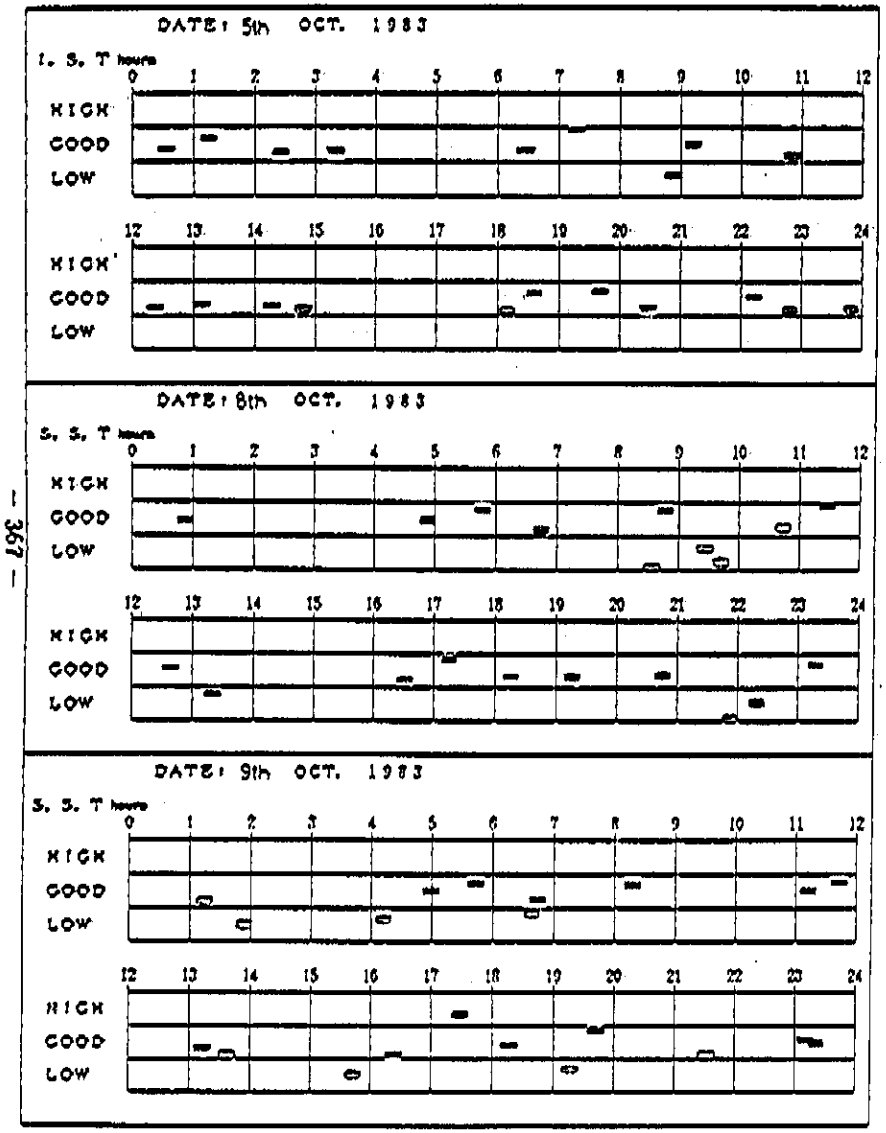


HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

O. K
N. G

I. S. T : Indonesia Standard Time
S. S. T : Sri - Lanka Standard Time

SATELLITE PASS FREQUENCY



HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

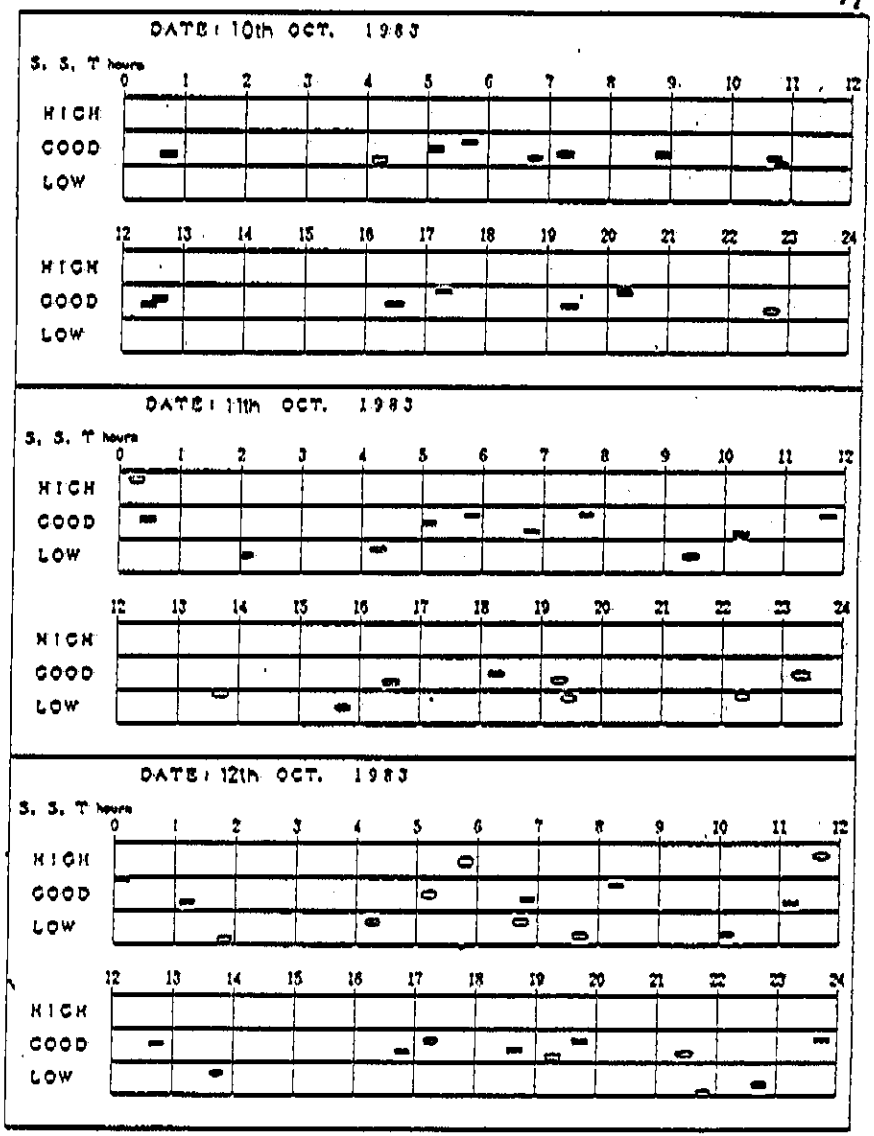
: O. K
: N. C

I. S. T : Indonesia Standard Time

S. S. T : Sri-Lanka Standard Time

SATELLITE PASS FREQUENCY

3/7



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GOOD Passes = 10° - 70° Alt.
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: O. K
: N. C

I. S. T : Indonesia Standard Time

S. S. T : Sri-Lanka Standard Time

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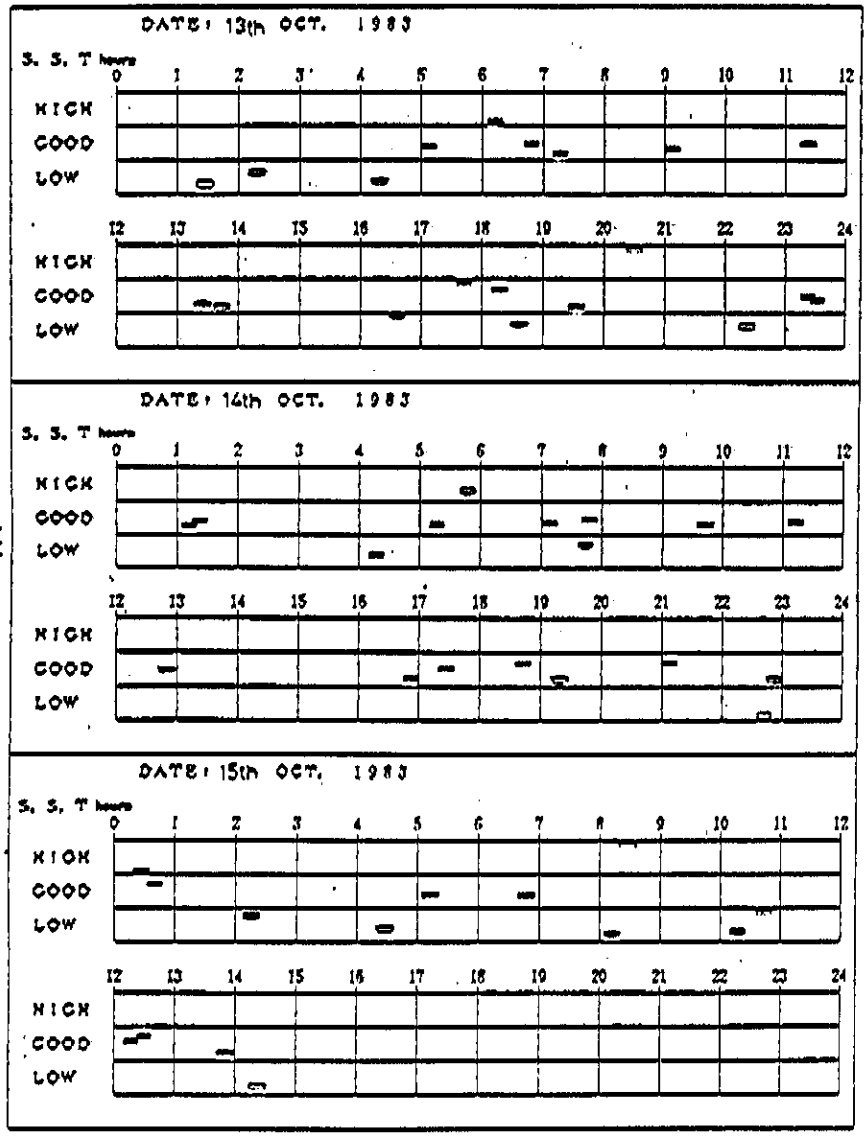

HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

O. K
N. C

I. S. T : Indonesia Standard Time
S. S. T : Sri-Lanka Standard Time

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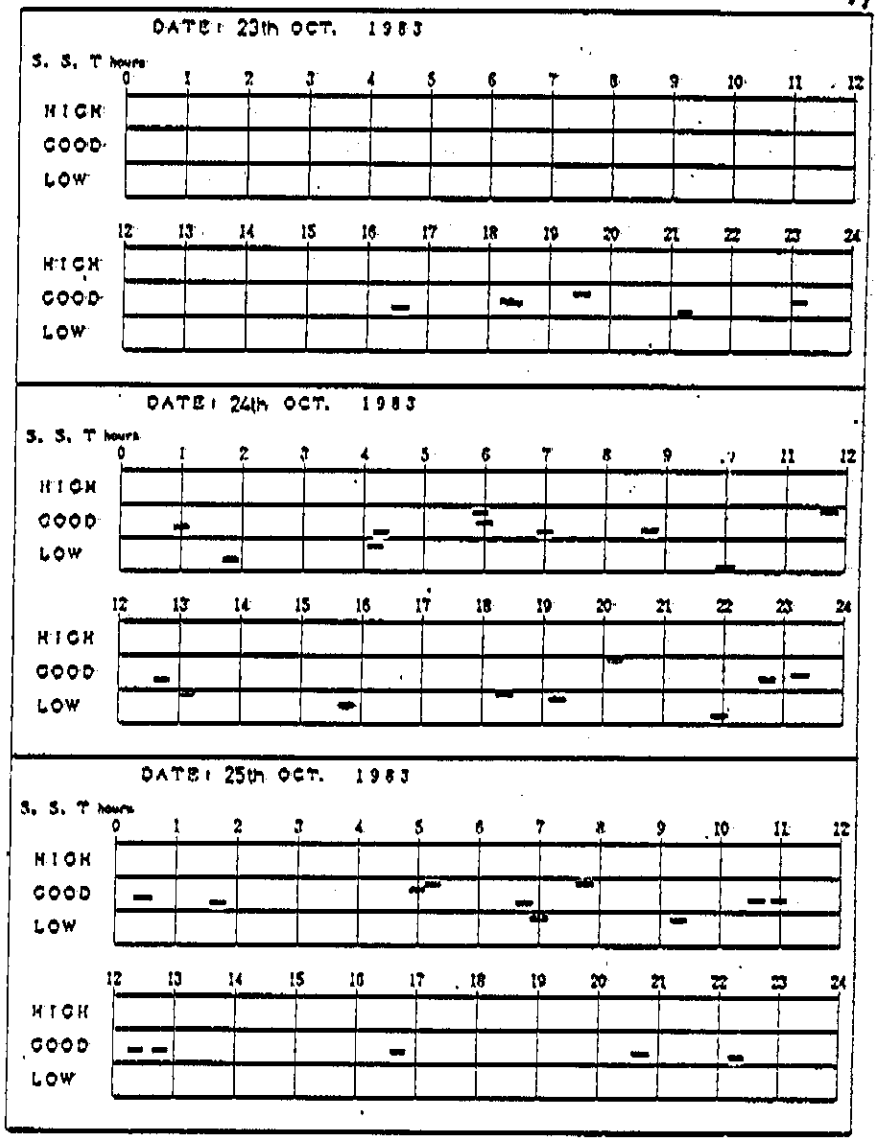

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O. K
N. C

I. S. T : Indonesia Standard Time
S. S. T : Sri-Lanka Standard Time

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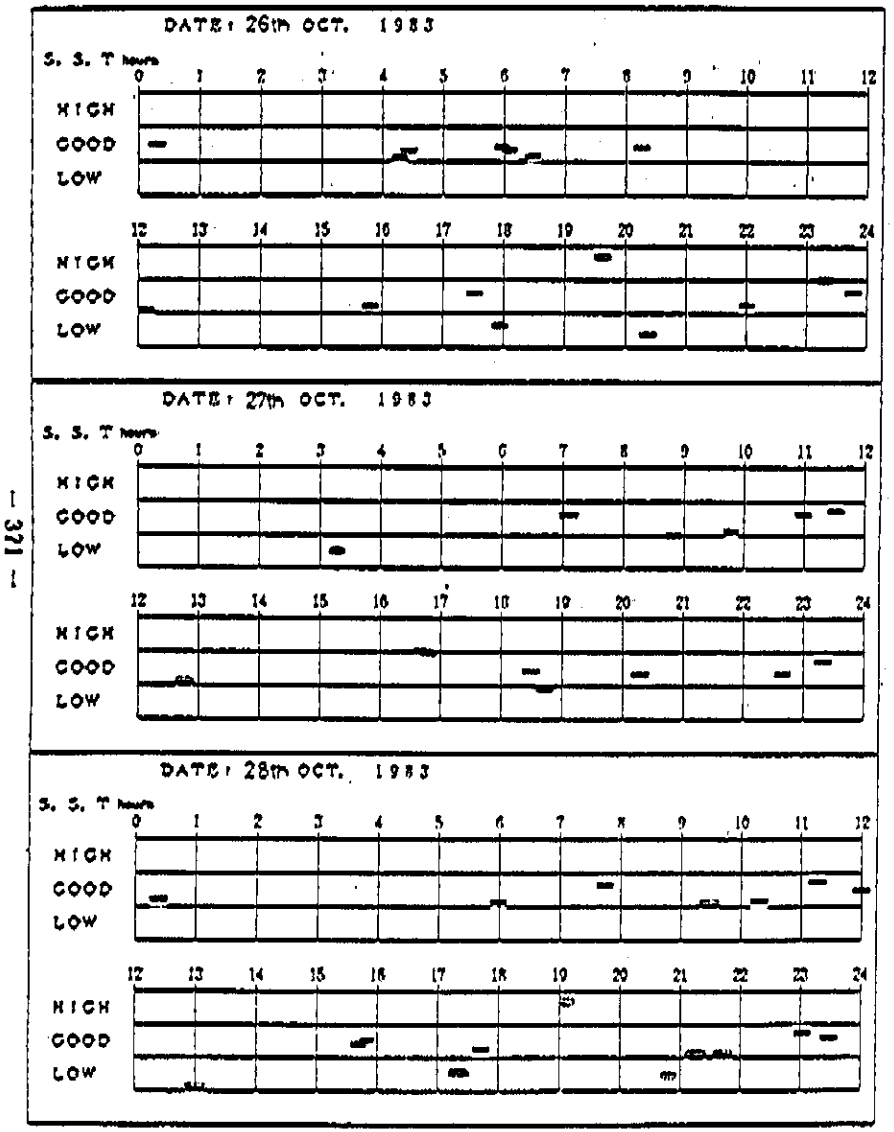

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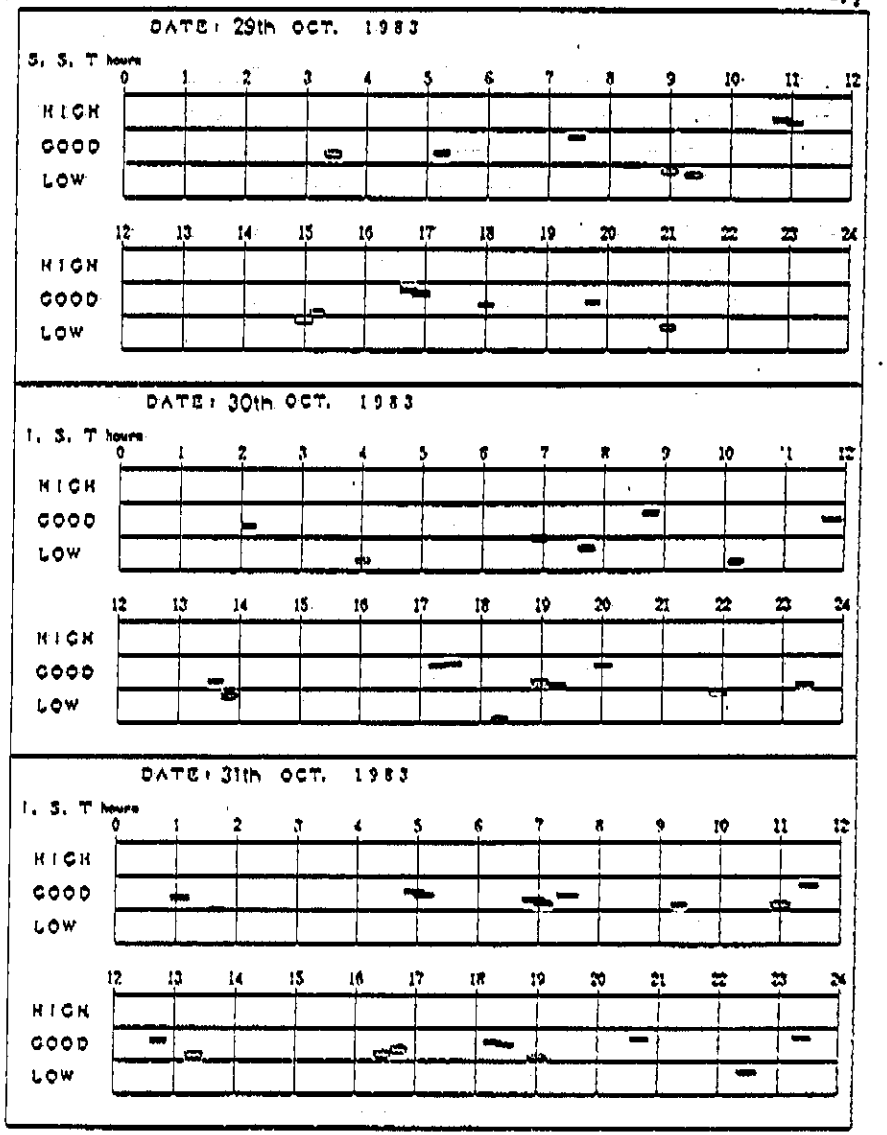
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

: O. K
: N. C

I. S. T : Indonesia Standard Time
S. S. T : Sri-Lanka Standard Time

SATELLITE PASS FREQUENCY

5/7

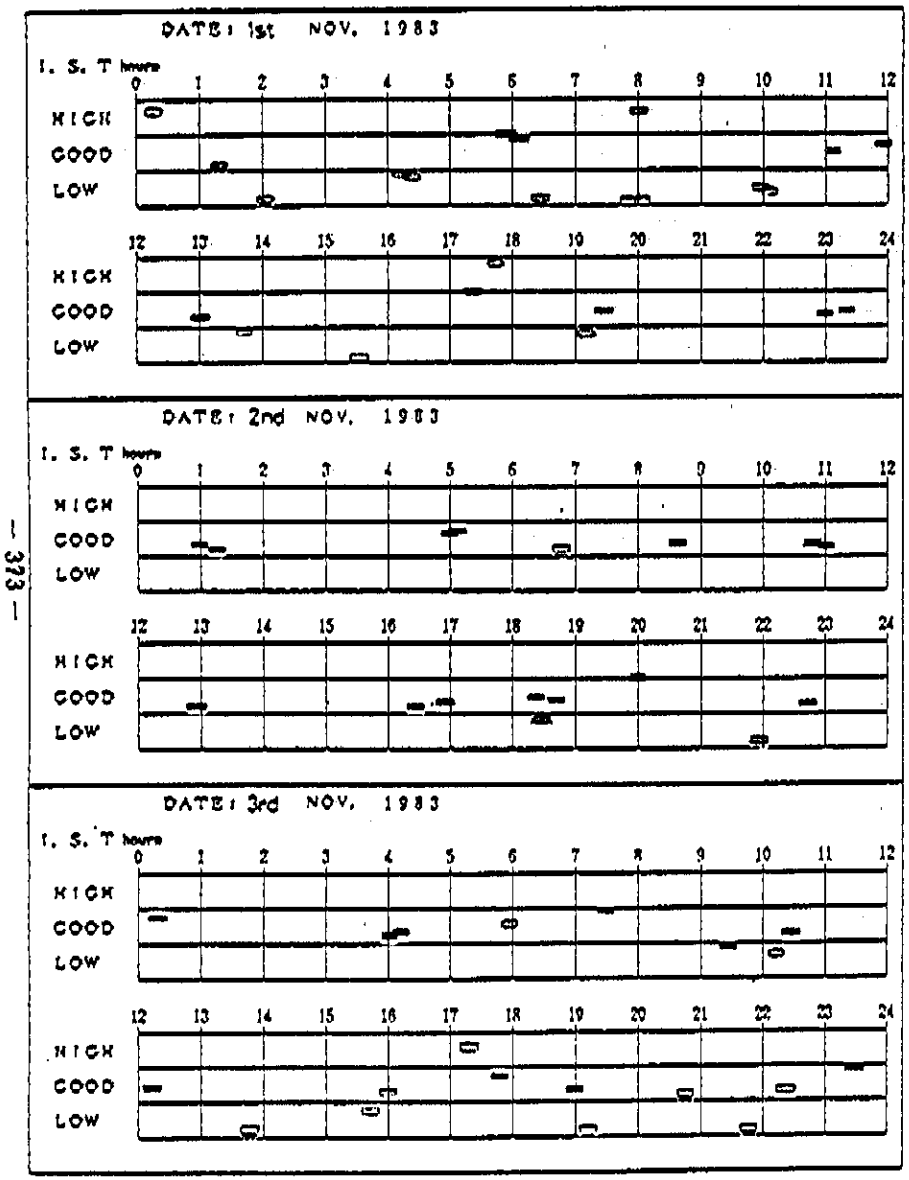


HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

: O. K
: N. C

I. S. T : Indonesia Standard Time
S. S. T : Sri-Lanka Standard Time

SATELLITE PASS FREQUENCY



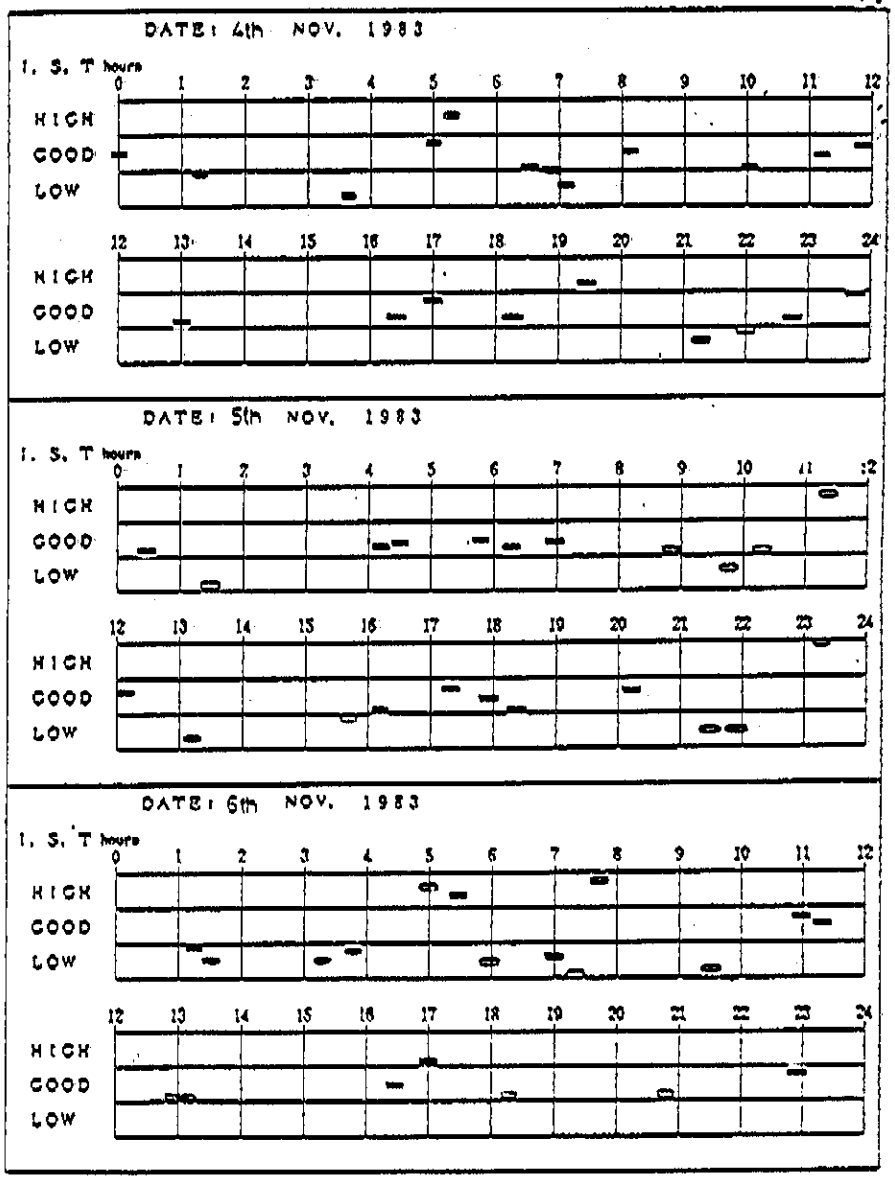
HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

: O. K
: N. C

I. S. T : Indonesia Standard Time
S. S. T : Sri - Lanka Standard Time

SATELLITE PASS FREQUENCY

617



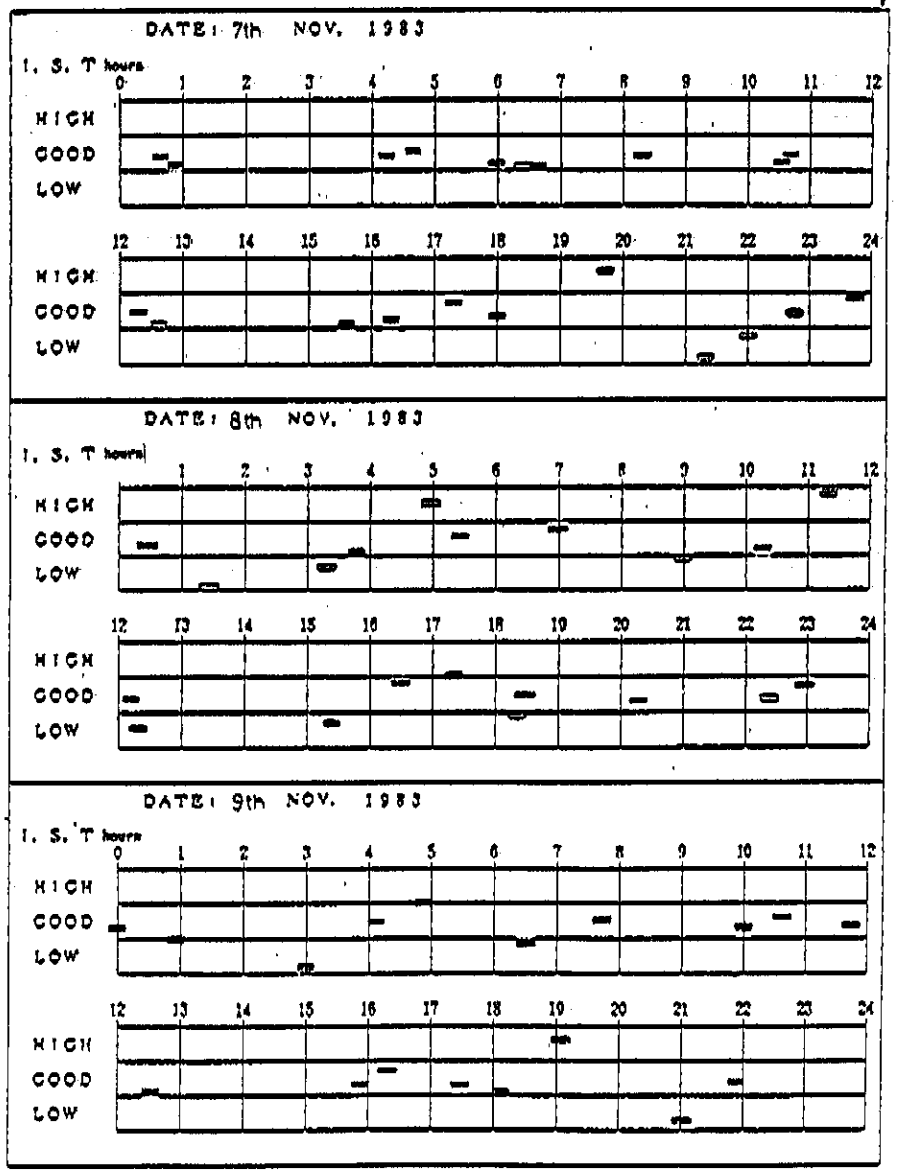
HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

: O. K
: N. C

I. S. T : Indonesia Standard Time
S. S. T : Sri - Lanka Standard Time

SATELLITE PASS FREQUENCY.

7/7



HIGH Passes = Above 70° Alt.
GOOD Passes = 10° - 70° Alt.
LOW Passes = Less than 10° Alt.

O. K
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I. S. T : Indonesia Standard Time

S. S. T : Sri-Lanka Standard Time

Appendix 25

Photograph of Seabed

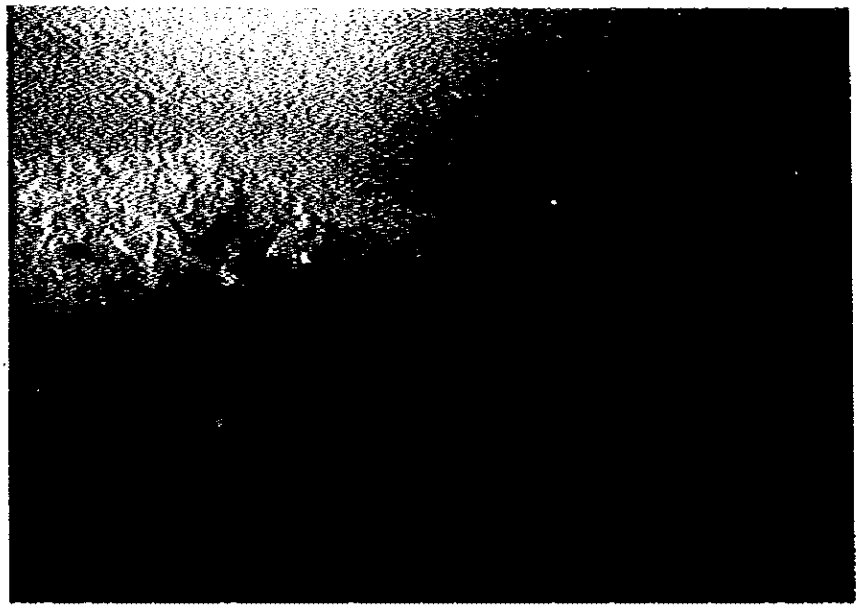
When conducting the cable route survey, photographs were taken by divers and deep sea camera respectively in shallow and deep sea areas so as to grasp conditions of the seabeds of the cable route in more detail. Contents, etc. of the photographs are given in the table below, and main photographs are shown in Plate 1 ~ 4.

Photo No.	St. No.	Area	Bottom Material	Seabed Conditions
00	H-15'	C.C.S.*	Rock	Prominent rock (1 ~ 1.5 m) from seabed. Coral grows on the rocks.
0	H-13	C.C.S.*	Coarse Sand	Yellowish-brown sand. Sand ripples have developed, and height and length of these ripples are 10 ~ 40 cm and about 50 cm, respectively.
1	P-22	Bengal Fan	Mud	Yellowish-brown-grey soft mud. Seabed surface is flat.
2	P-26	90°E Ridge	Globige-rina Ooze	Many globigerina are contained in the ooze.
3	P-28	"	"	"
4	P-29	"	"	"
5	P-31	"	"	"
6	P-36	Great Passage	Muddy Sand	Muddy fine sand. Sand ripples have developed, and they indicate presence of current.

Photo No.	St. No.	Area	Bottom Material	Seabed Conditions
7	P-37	Great Passage	Rock Sand and Mud	Outcrops of rock. Rock is seemed as lava, and muddy sand is deposited between rocks.
8	P-39	"	Mud	Soft mud. One pebble of about 50 cm is seen. Surface sediments is conjectured to be thin.
9	P-41	"	Mud	Soft mud. Its surface is flat.
10	P-43	"	Rock	Outcrops of rock. Seabed surface is interspersed with pebbles of 5 ~ 30 cm, and sediments are scarcely seen.
11	P-46	Sumatra Basin	Mud	Soft mud.
12	P-12	Sunda Shelf	Rock	Outcrops of rocks. Kinds of rocks are sandstone and mudstone, and holes made by boring shell are seen on their surface.

* C.C.S. ... Colombo Continental Shelf.

Phot No.OO

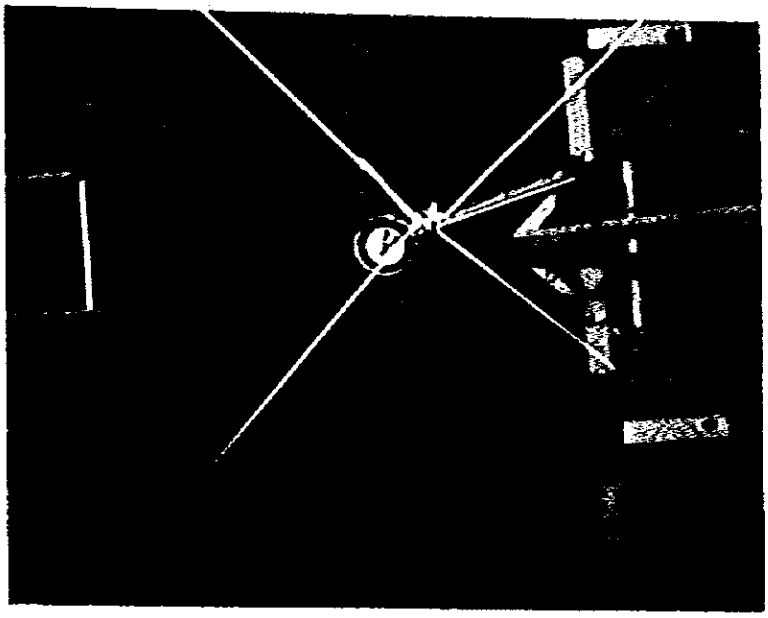


Hard metamorphic rock. Coral have adhered to the surface of the rock.

Phot No.O

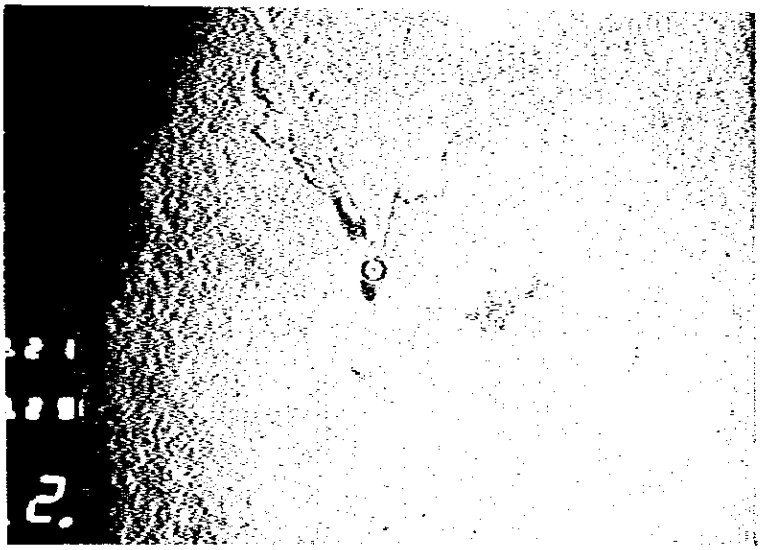
The seabed is covered with coarse sand. Ripple marks have developed. The width and height of ripple marks are about 50cm and 30cm , respectively.

Phot No. 1



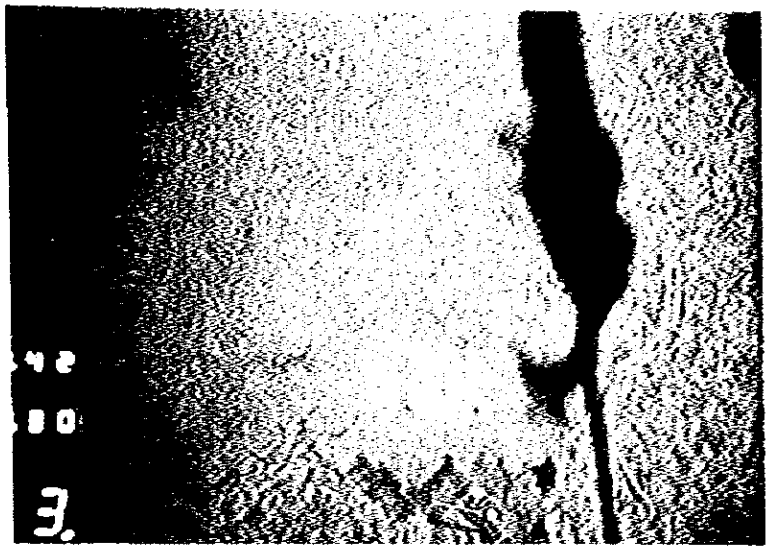
Yellowish-brownish grey soft mud.

Phot No.2



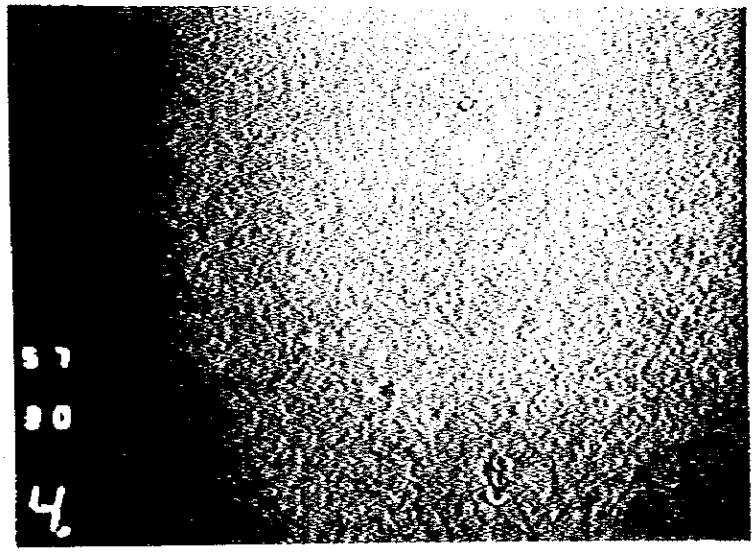
Mud flied up when the weight landed the seabed. The seabed is very soft and contains many globigerinas.

Phot No. 3



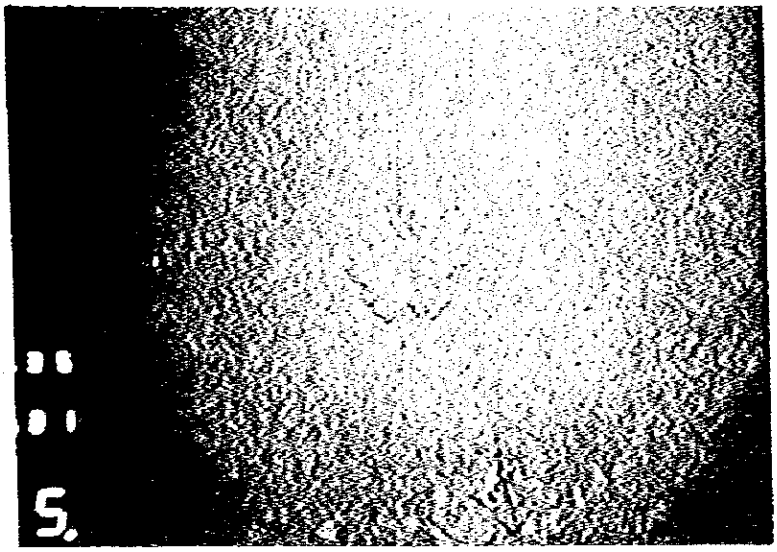
Mud flied up. Strange pattern on the seabed is seezed trace of benthos.

Phot No. 4



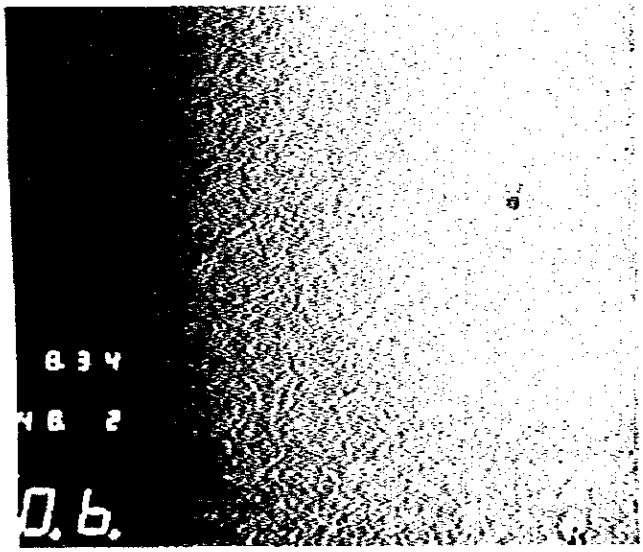
Mud flied up. The seabed is soft and contains many globigerinas.

Phot No.5



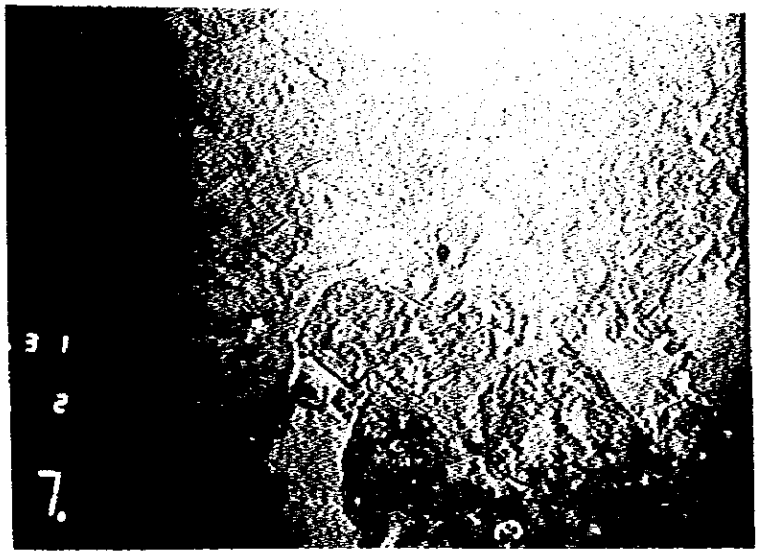
Mud flied up. The seabed is soft and contains many globigerinas.

Phot No.6



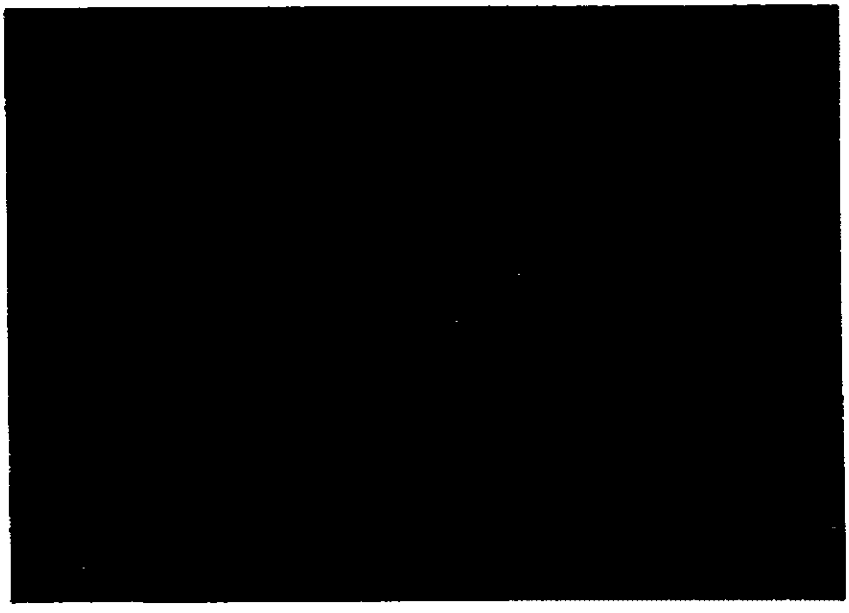
Sand ripples have developed.

Phot No.7



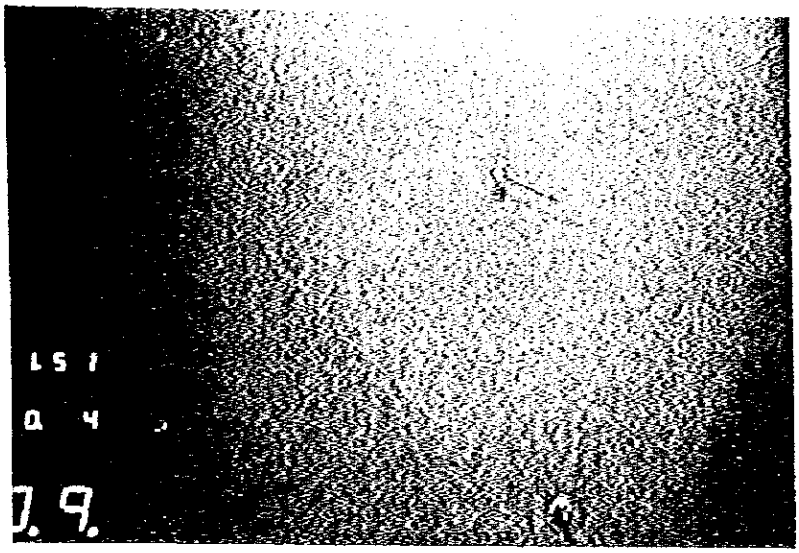
Outcrops of rock. Bottom sidiments consisting of sand and mud are deposited between rocks.

Phot No.8



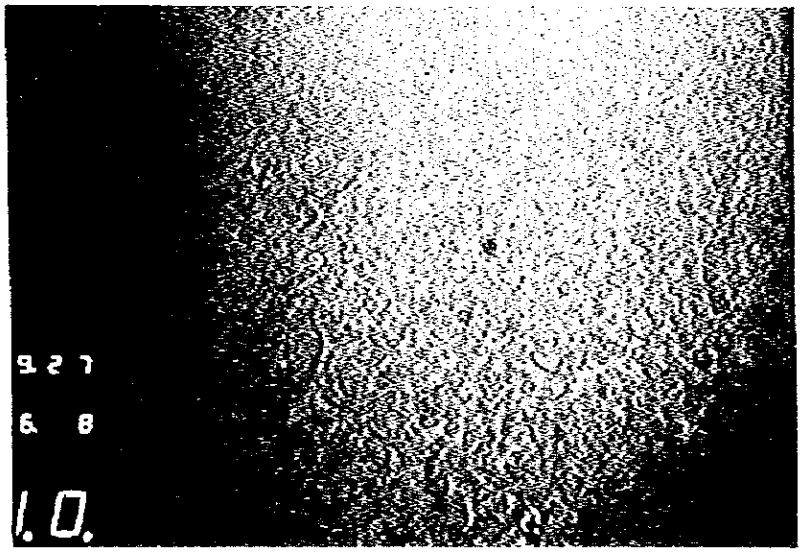
Mud flied up by a shock of landing of the mount of the deep-sea camera onto the seabed. Mud on the seabed surface is seemed to be extremely soft.

Phot No. 9



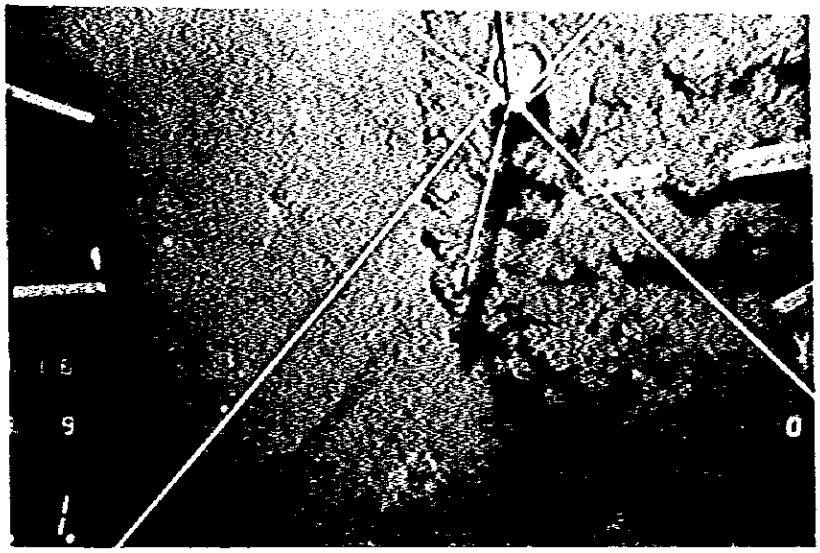
Seabed surface is flat.

Phot No.10



Exposed rock area. Pebble of 5-30cm, interspersed on the seabed surface.

Phot No. 11



Mud flied up by a shock of landing of the mount of the deep-sea camera onto the seabed. Mud on the seabed surface is seemed to be extremely soft.

Phot No.12

Alternation of strata consisting of sandstone and mudstone. There are a lot of small holes which were made by the boring shells.

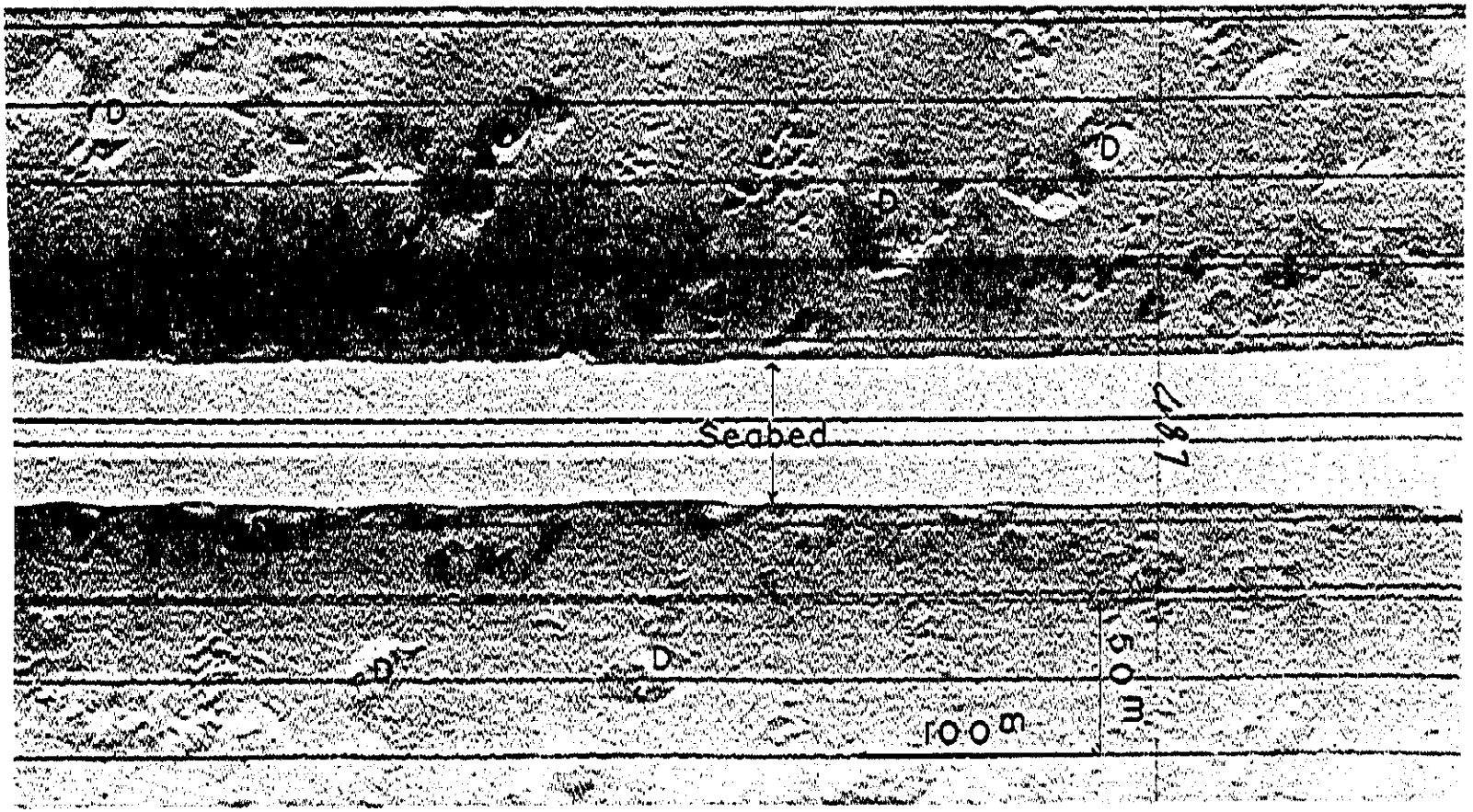
Appendix 26

Typical Records of Side Scan Sonar

Investigation of the submarine topography, the seabed conditions and the obstacles on the seabed, were carried out for laying a cable on the sunda Continental Shelf and the Colombo Continental Shelf by using the Side Scan Sonar.

As a result of the investigation, there are not to be found any obstacle for laying the submarine cable. Both of these continental shelf are almost covered with the soft sediments, and are generally plain. On the Sunda Continental Shelf, we recognized the sand ripples and the dimples which are considered to be the traces of gass sprouting, and some outcrops of the rock, and also, on the Colombo Continental Shelf, some outcrops of the rock were found near inshore. These are shown in Fig. 26.1 - Fig. 26.4.

(Fig. No.)	(Location)		(Remarks)
Fig. 26.1	Sunda Continental Shelf	about 70 km from A/C 5	dimples
Fig. 26.2	Sunda Continental Shelf	about 60 km from A/C 6	sand ripples
Fig. 26.3	Sunda Continental Shelf	about 65 km from A/C 6	rock & sand ripples
Fig. 26.4	Colombo Continental Shelf	600 - 800 m off L.P	rock



Fif. 26.1 Side Scan Sonar Record

Dimples on the Seabed of the Sunda Continental Shelf. D: Dimples

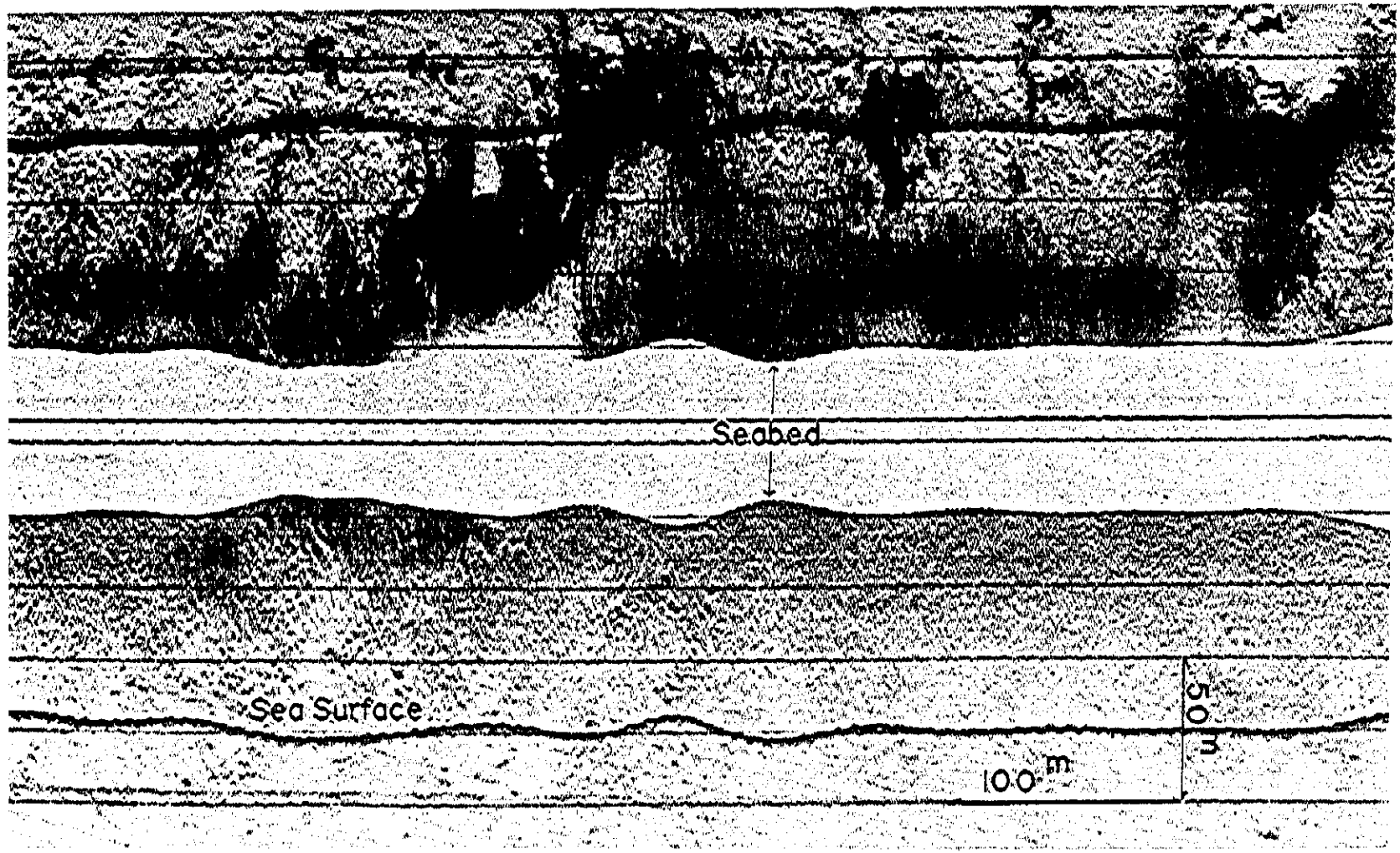


Fig. 26.2 Side Scan Sonar Record

Sand Ripple Marks on the Sunda Continental Shelf

Striped Patterns show the Sand Ripple Marks

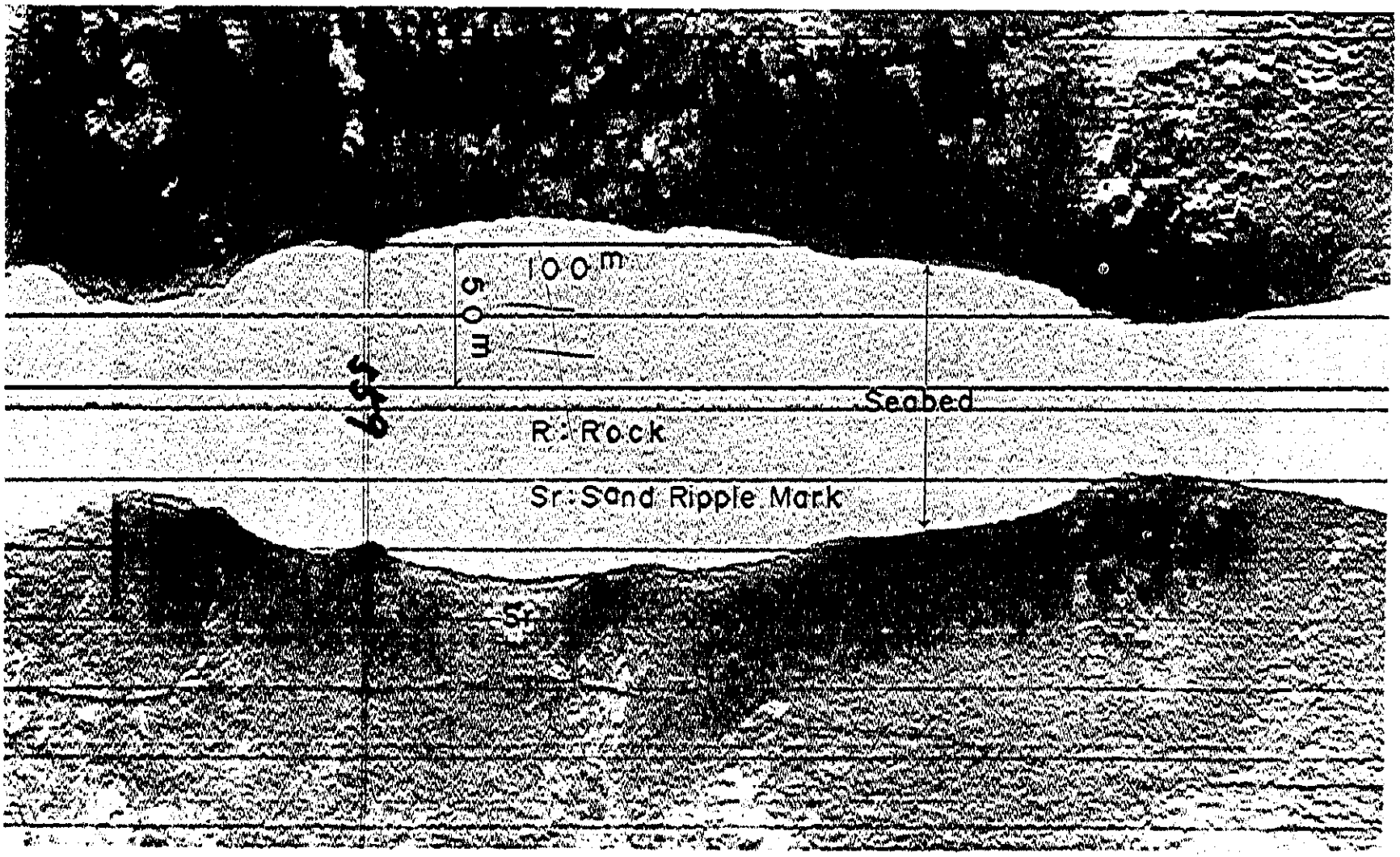


Fig. 26.3 Side Scan Sonar Record

Outcrops of Rock and Sand Ripple Marks on the Sunda Shelf edge, Rocks consist of Sandstone and/or Mudstone.

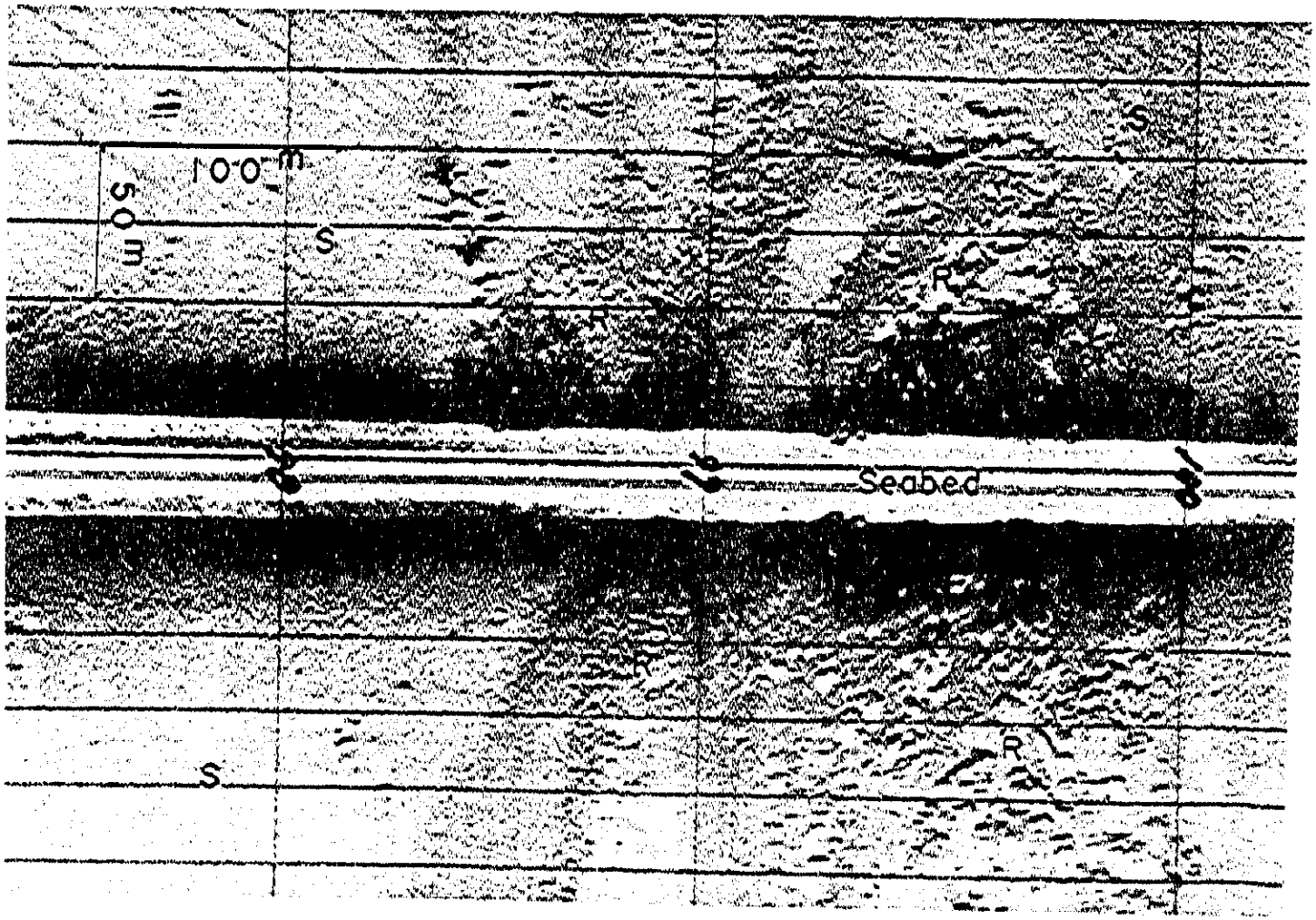


Fig.26.4 Side Scan Sonar Record