

FIGURE NO.: B 1

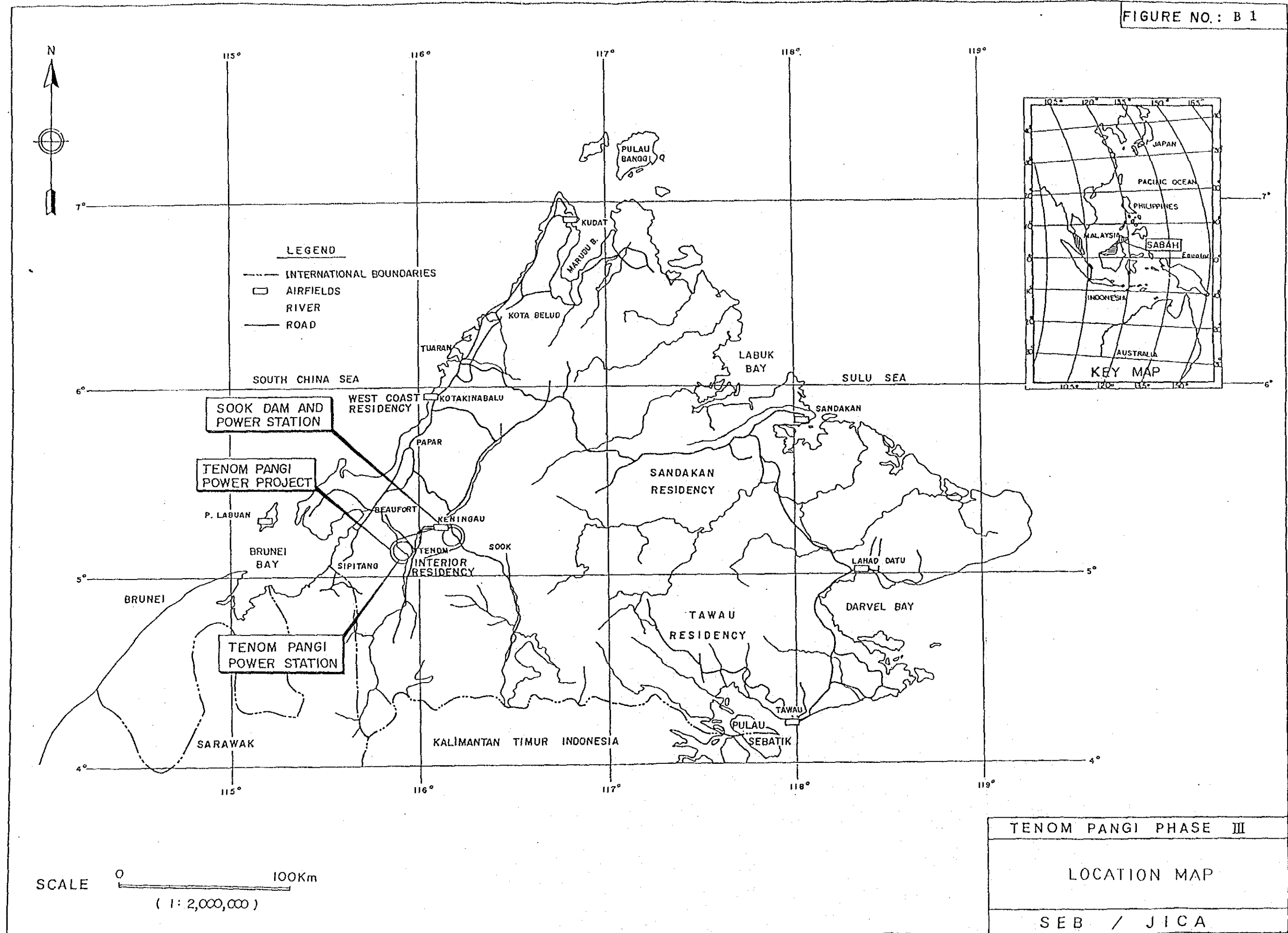
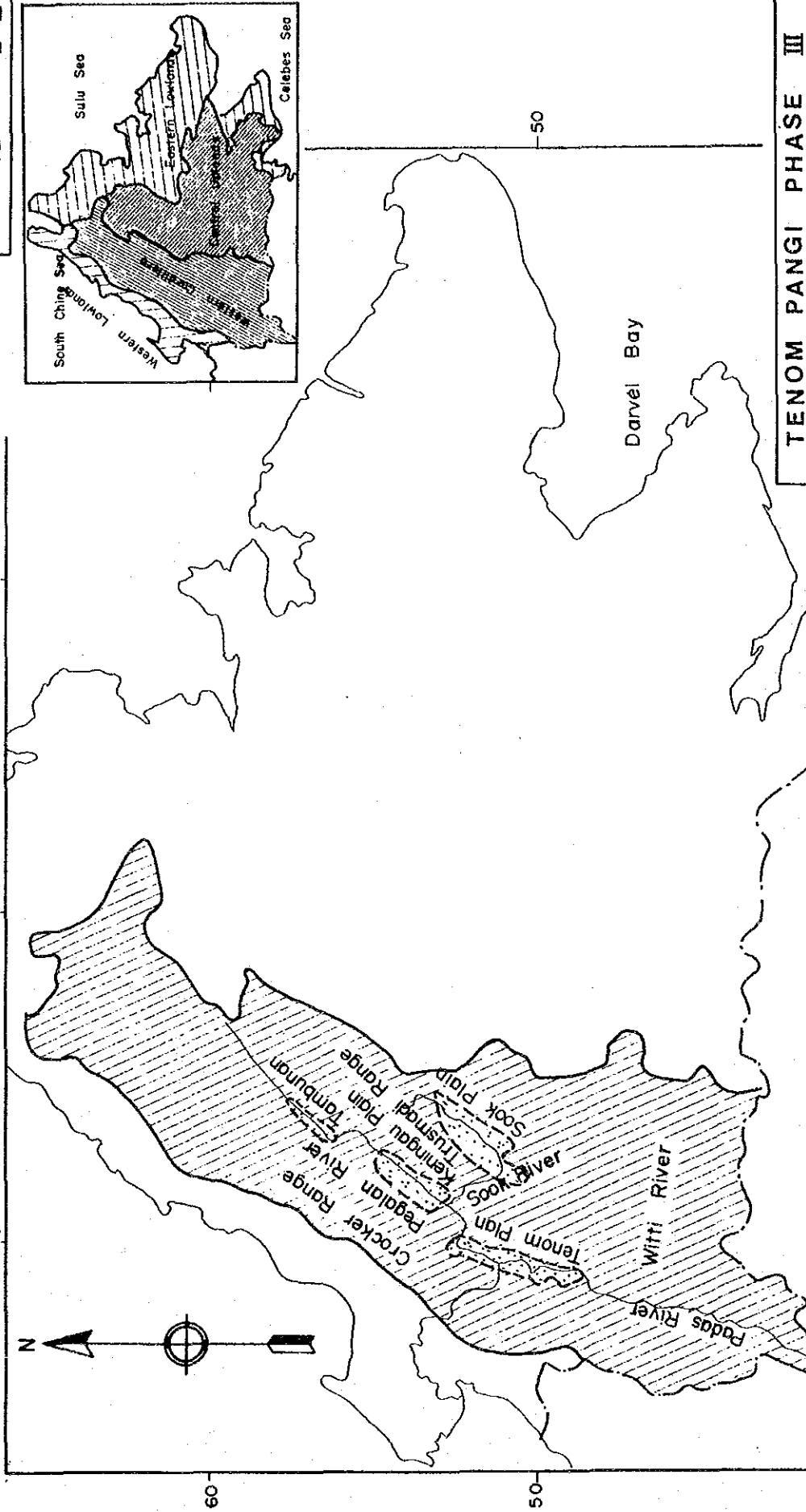


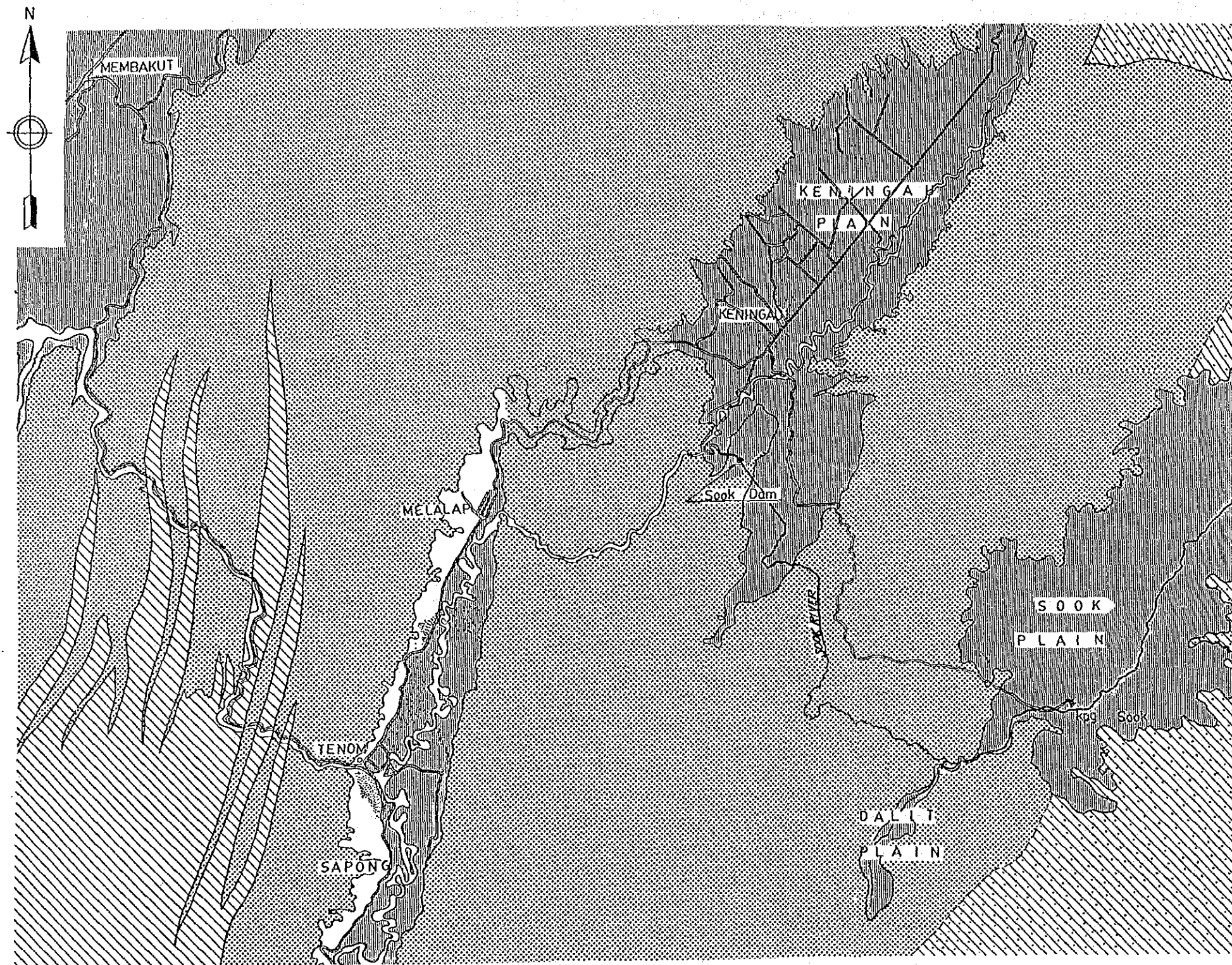
FIGURE NO. : B 2








TENOM PANGI PHASE III

GEOGRAPHY OF PADAS BASIN

SEB / JICA



LEGEND

-  RIVER & FLOOD PLAIN DEPOSIT
-  TERRACE DEPOSIT
-  CROCKER FORMATION
-  TRUSMAD FORMATION
-  TEMBURONG FORMATION

SCALE 0 10 km
(250,000)

TENOM PANGI PHASE III

GEOLOGY OF PADAS BASIN

SEB / JICA

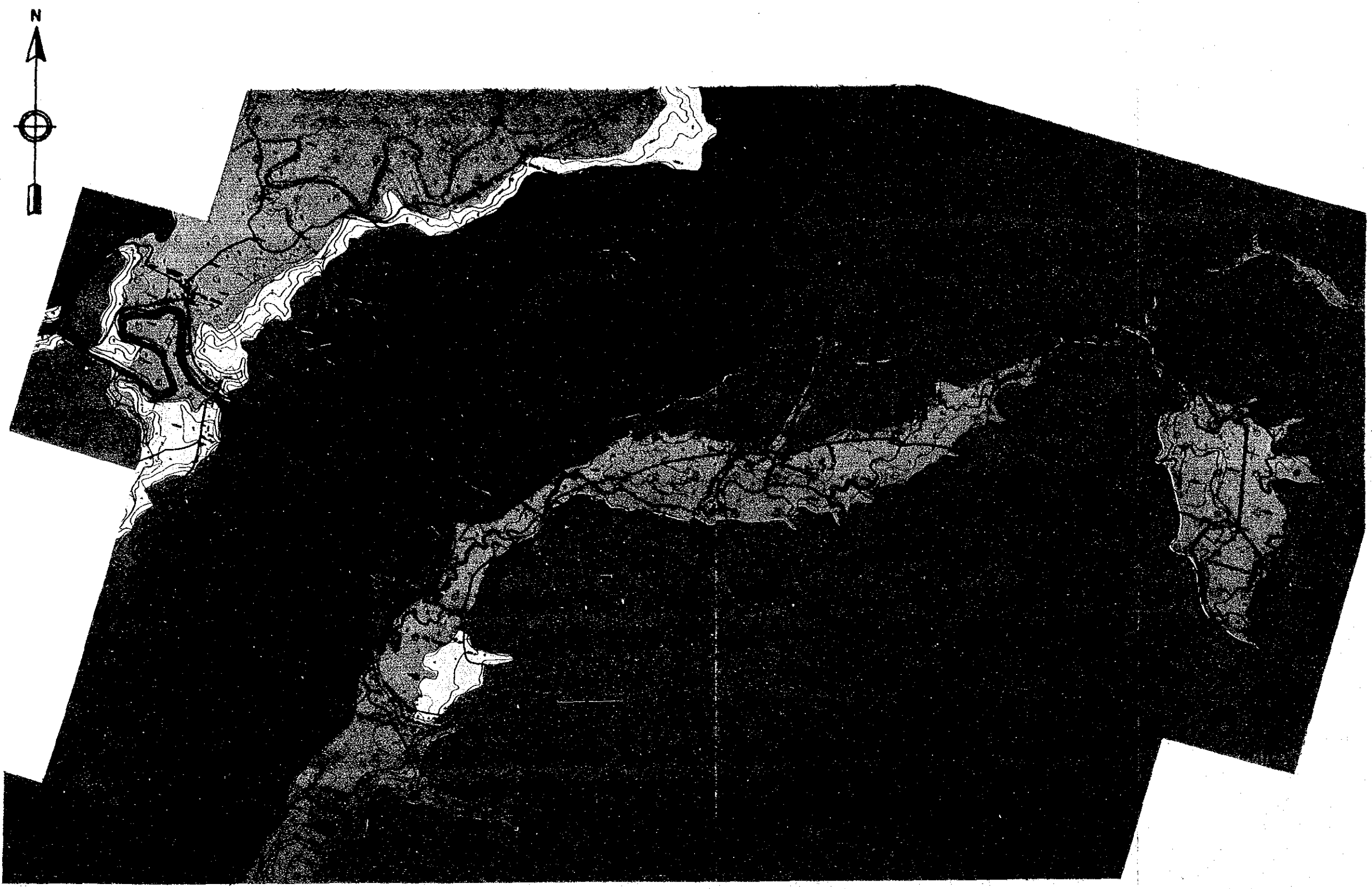
FIGURE NO. : B 4



TENOM PANGI PHASE III






VICINITY MAP

SEB / JICA

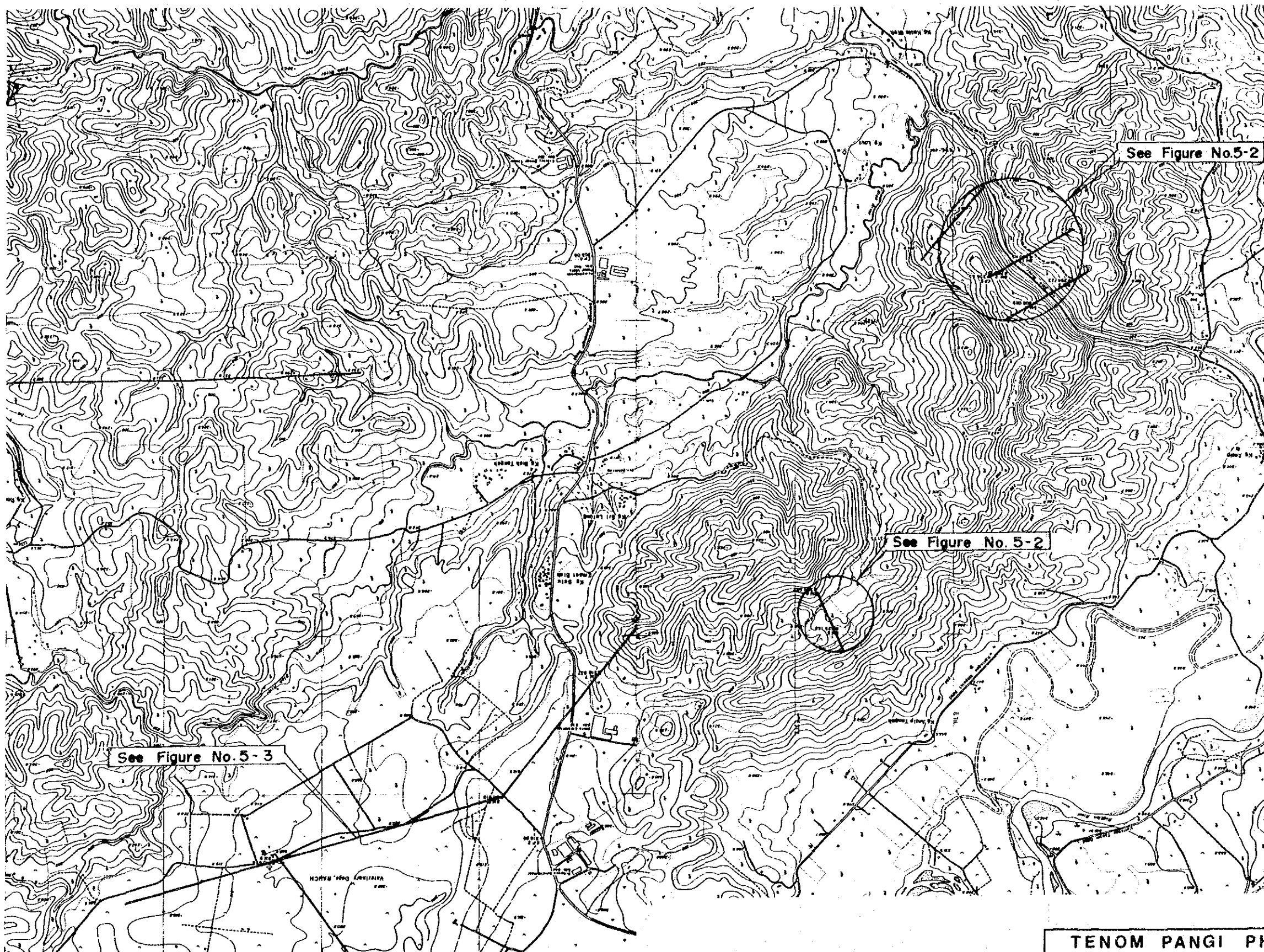


SCALE 0 1 1.5 km
(1 : 30,000)

LEGEND

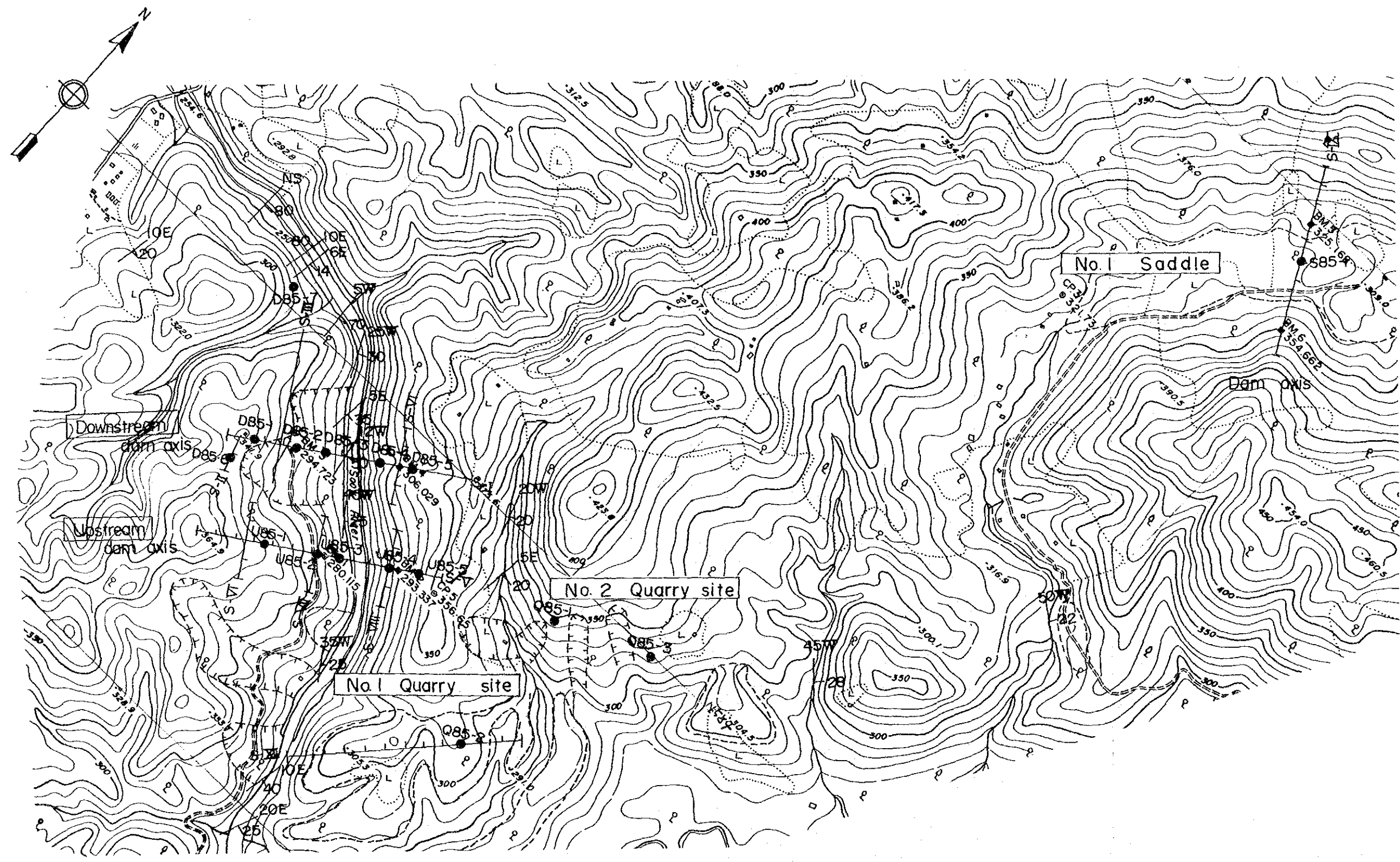
-  FLOOD PLAIN (HOLOCENE)
-  LOWER TERRACE PLAIN (PLEISTOCENE)
-  MIDDLE TERRACE PLAIN (PLEISTOCENE)
-  HIGHER TERRACE PLAIN (PLEISTOCENE)
-  BEDROCK (CROCKER FORMATION OF EOCENE TO MIOCENE)

TENOM PANGI PHASE III
GEOLOGICAL PLAN OF PROJECT SITE
SEB / JICA



SCALE 0 1 Km
(1 : 25,000)

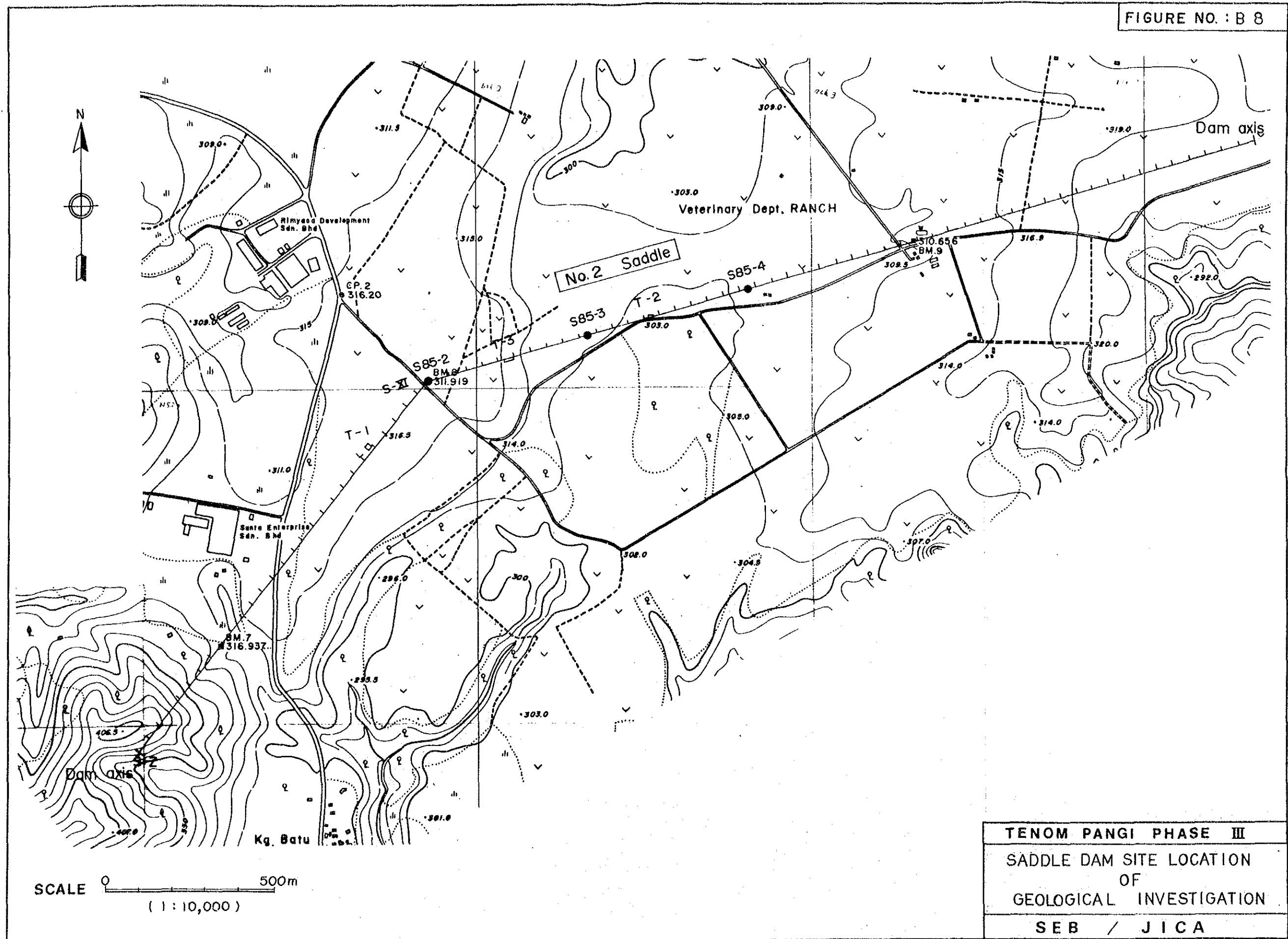
TENOM PANGI PHASE III
SOOK SITE LOCATION OF GEOLOGICAL INVESTIGATION
SEB / JICA



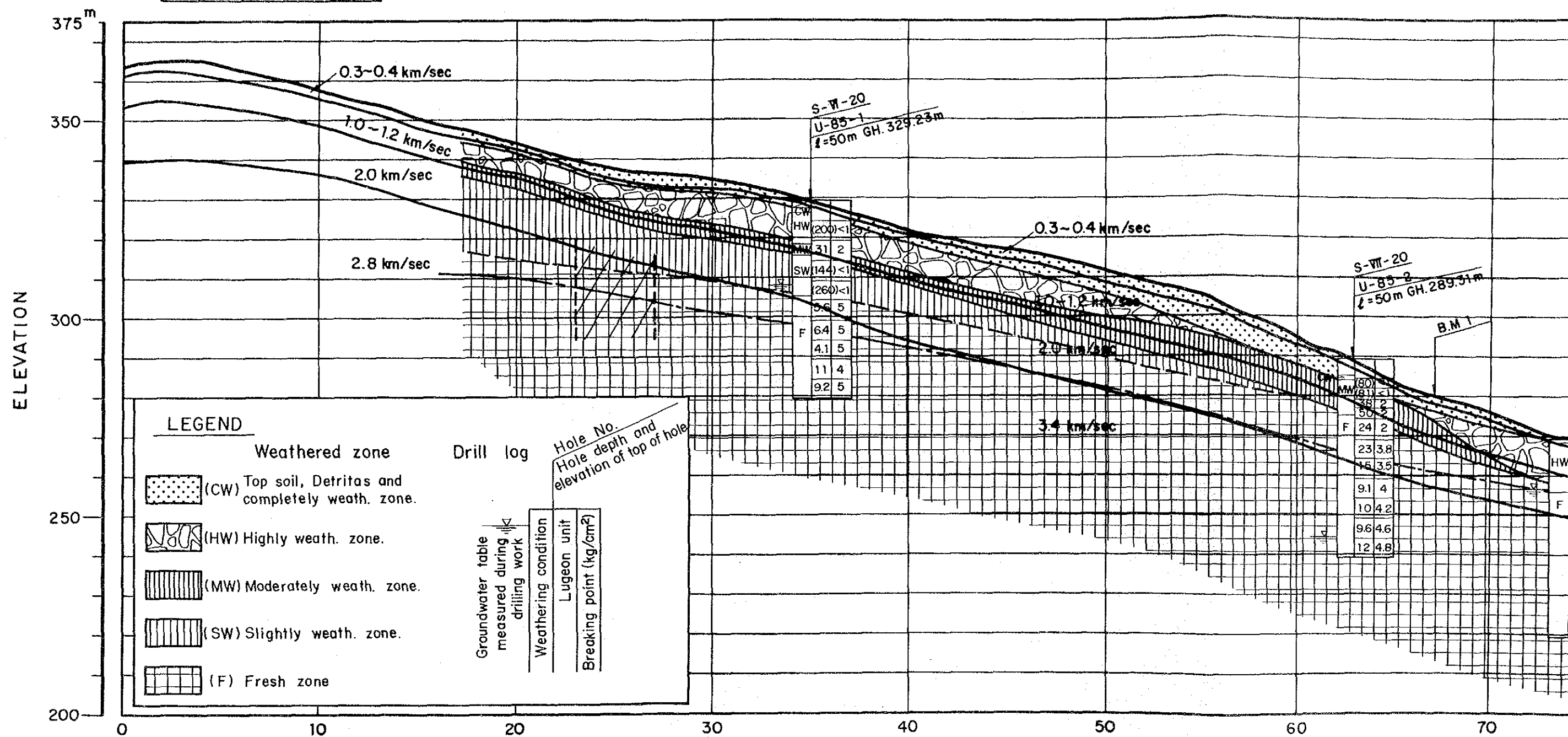
SCALE 0 500m
(1 : 10,000)

TENOM PANGI PHASE III
MAIN DAM SITE LOCATION OF GEOLOGICAL INVESTIGATION
SEB / JICA

FIGURE NO. : B 8



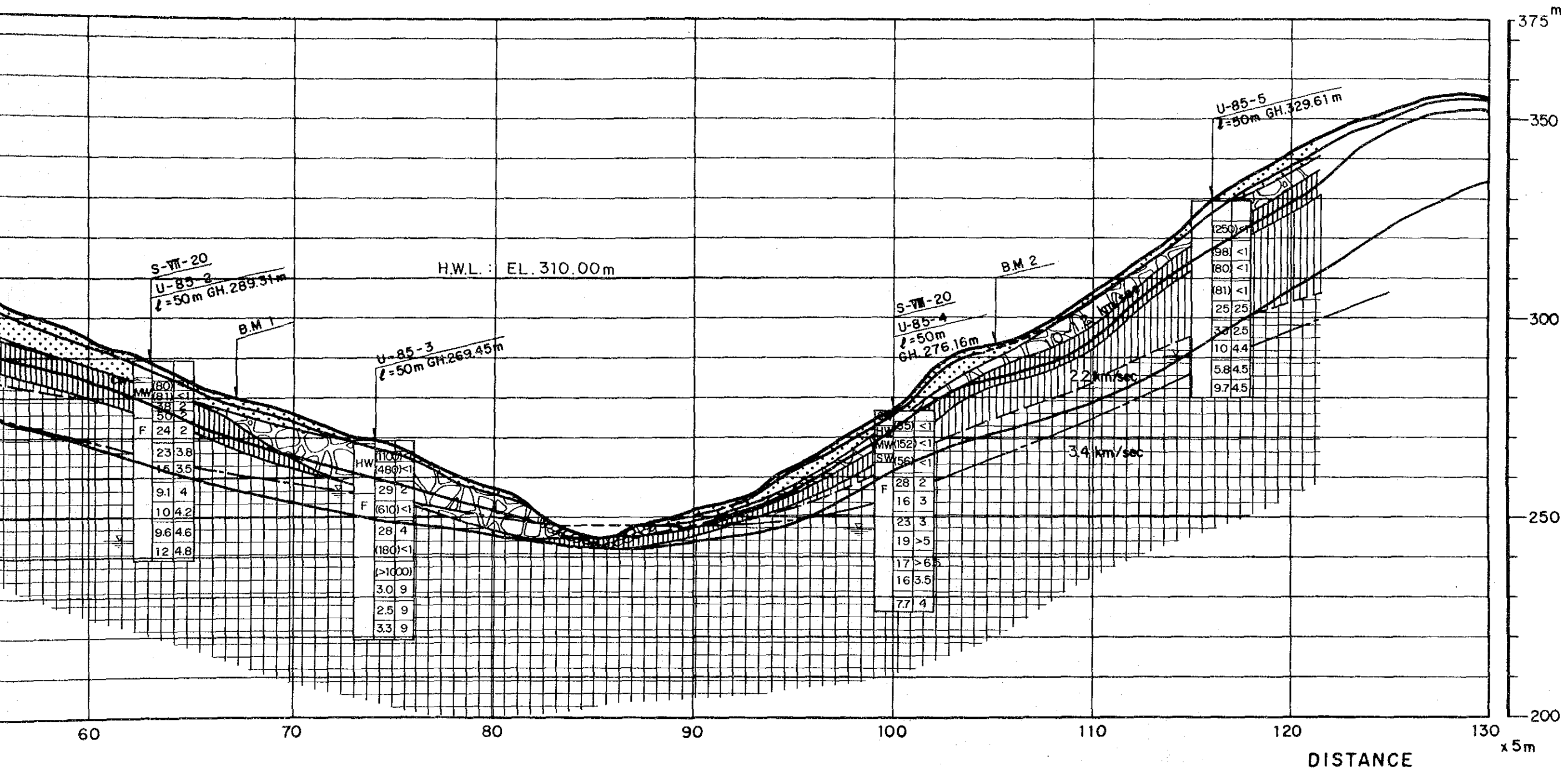
Weathered Zone



SCALE H 0 10m
(1:200)

SCALE V 0 50m
(1:1,000)

FIGURE NO. : B 9



TENOM PANGI PHASE III

WEATHERING CONDITION
OF
UPSTREAM DAM AXIS

SEB / JICA

Lugeon Map

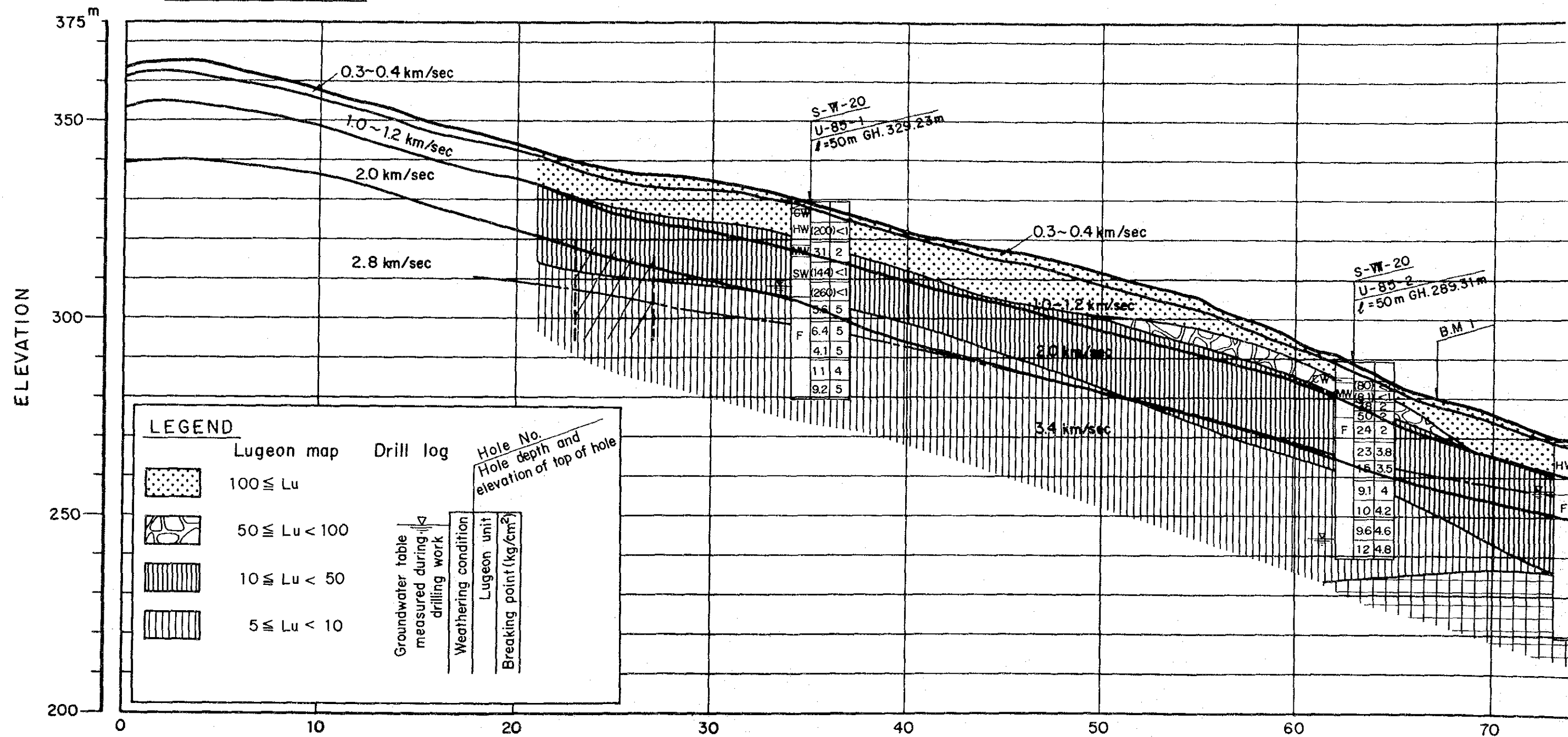
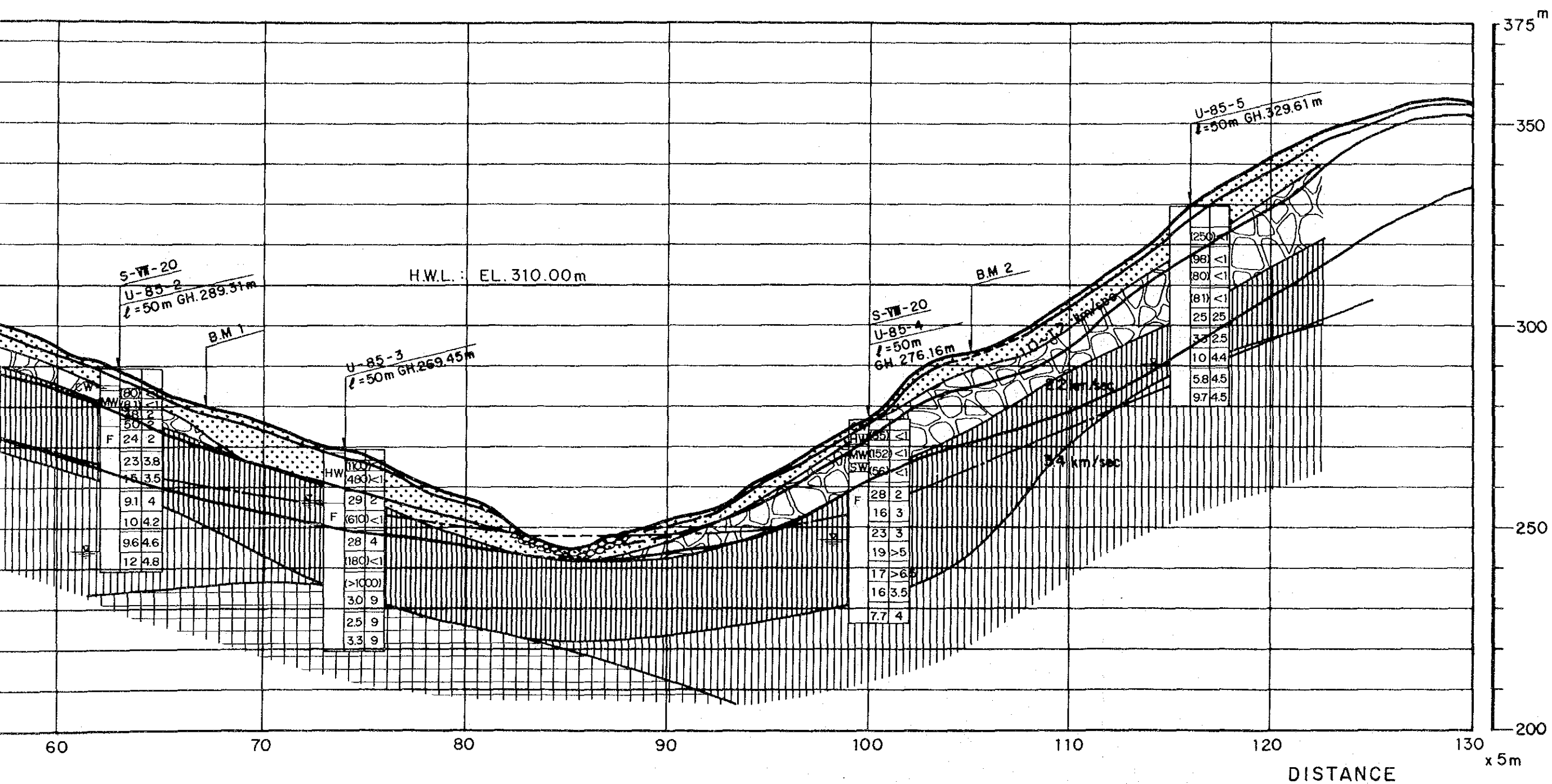


FIGURE NO. : B 10



TENOM PANGI PHASE III

PERMEABILITY
OF UPSTREAM DAM AXIS

SEB / JICA

Weathered Zone

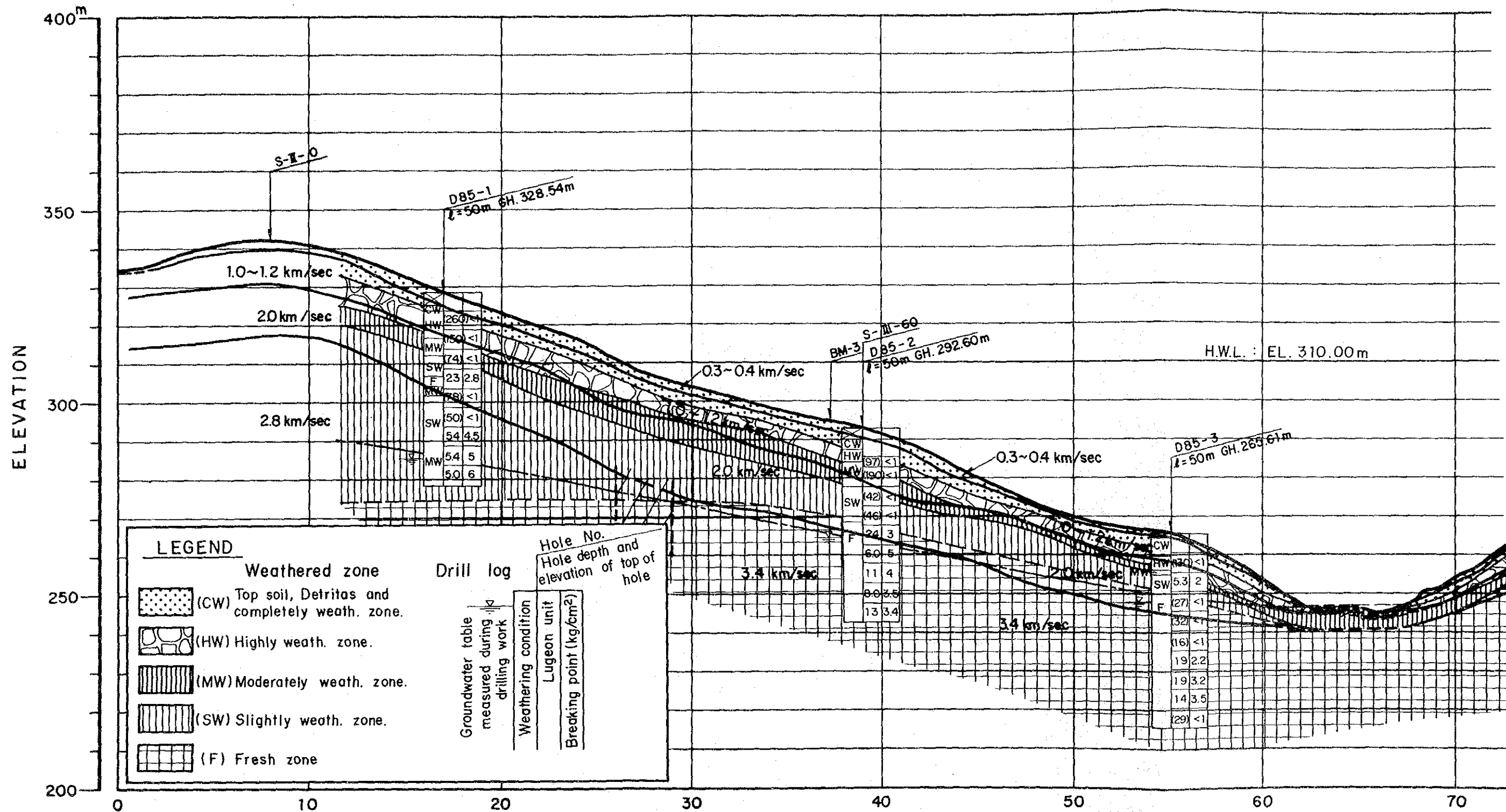
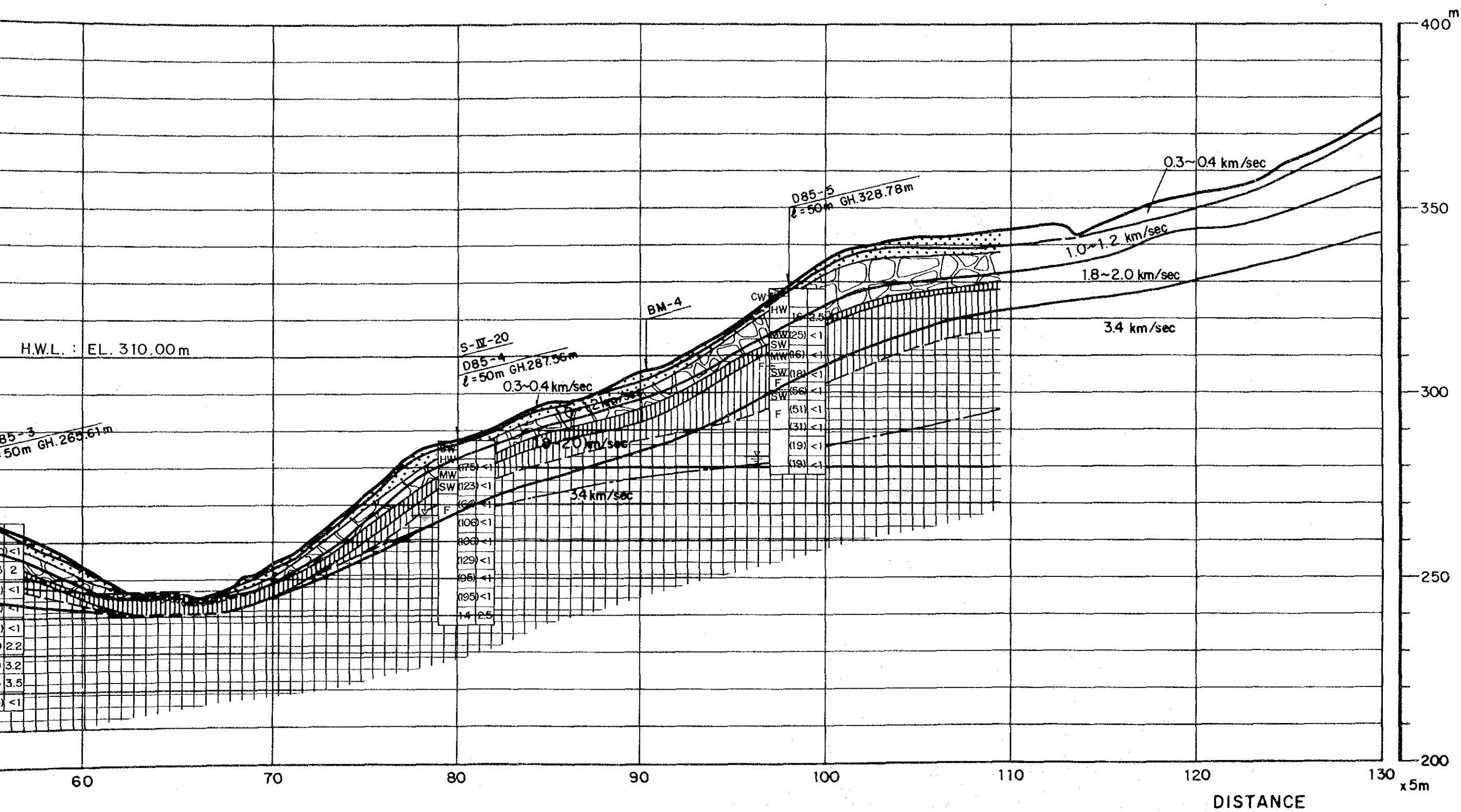


FIGURE NO. : B11

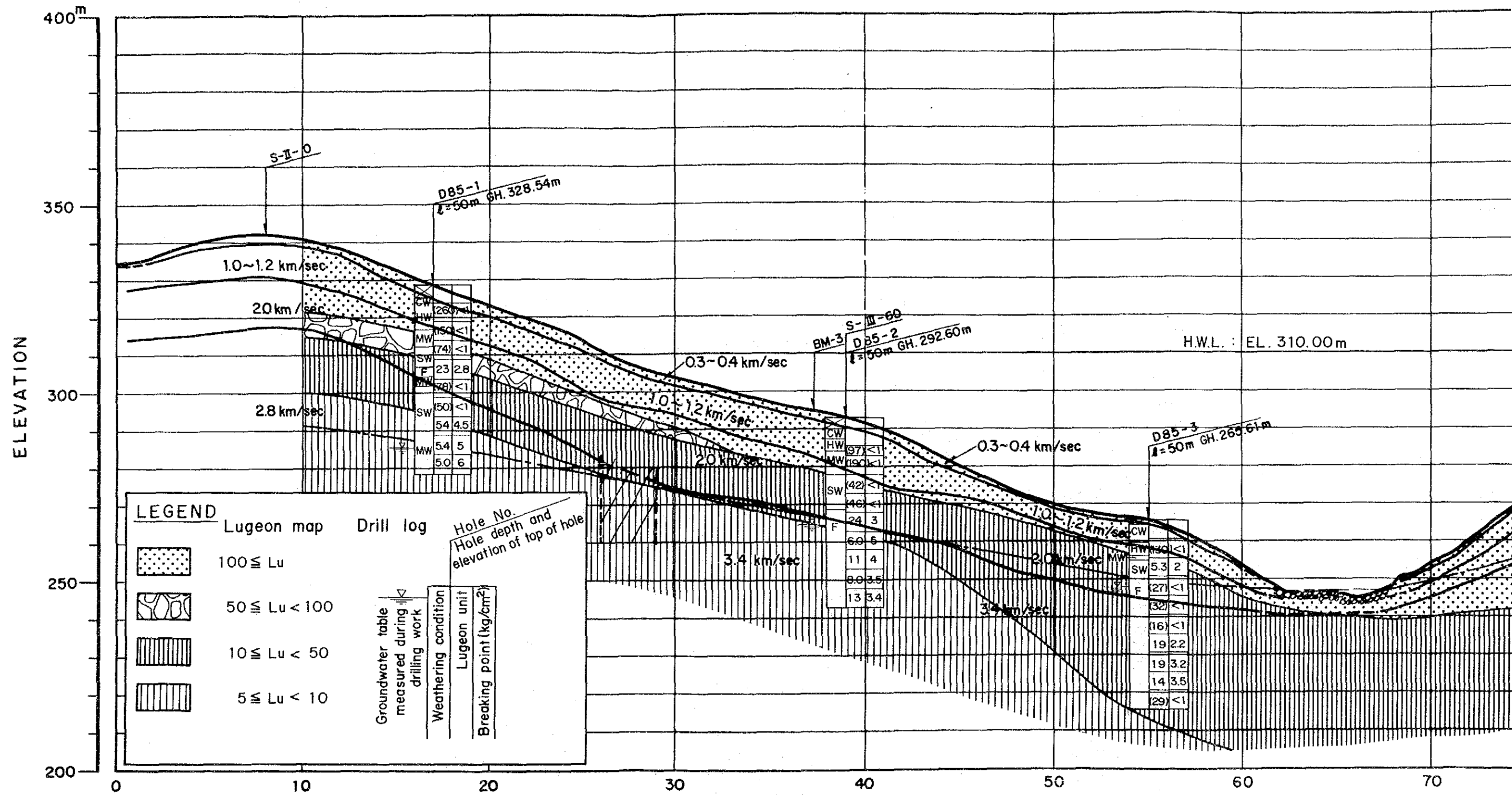


TENOM PANGI PHASE III

WEATHERING CONDITION OF DOWNSTREAM DAM AXIS

SEB / JICA

Lugeon Map



SCALE H  10m
(1 : 200)


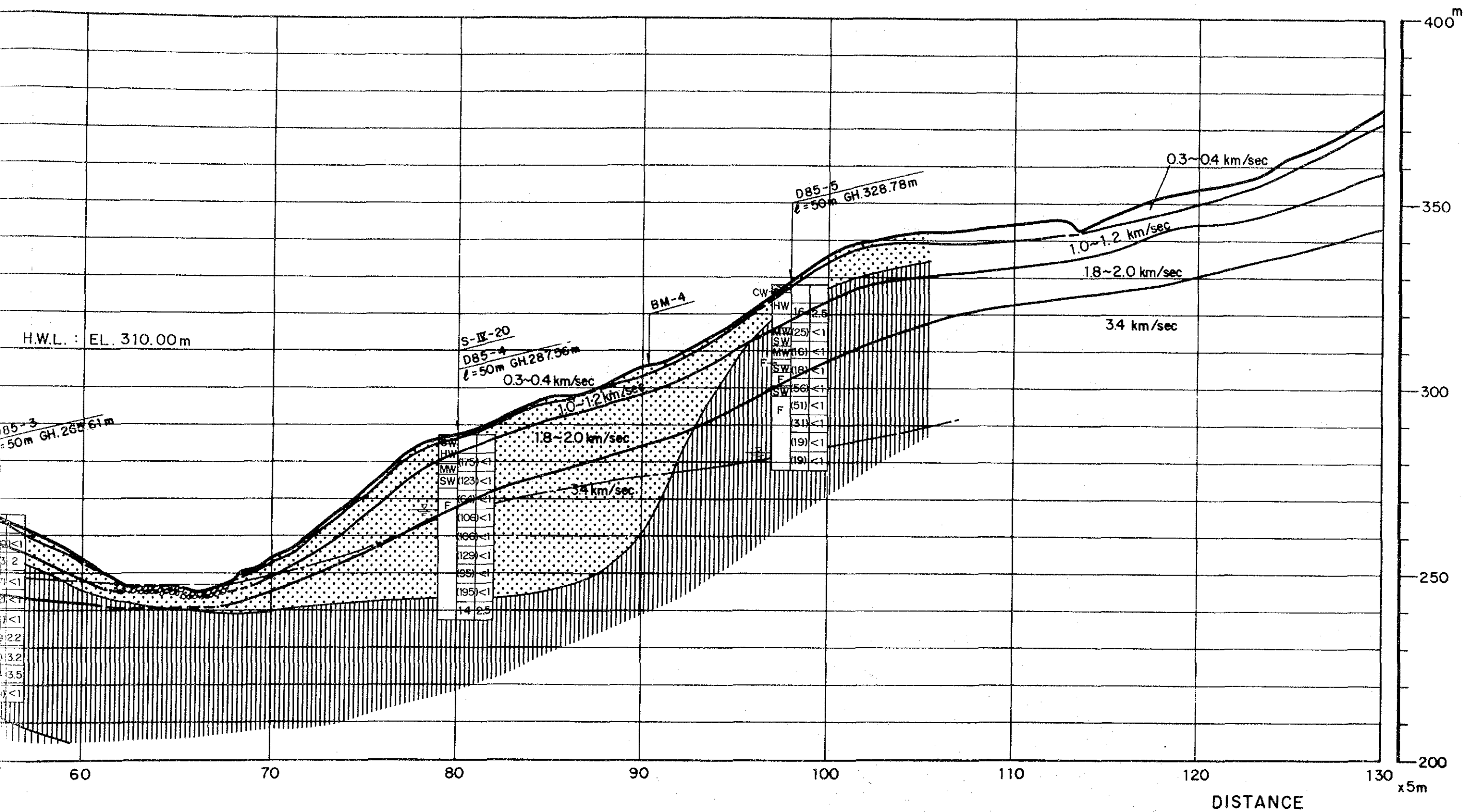
SCALE V  (1 : 1,000)

FIGURE NO. : B12



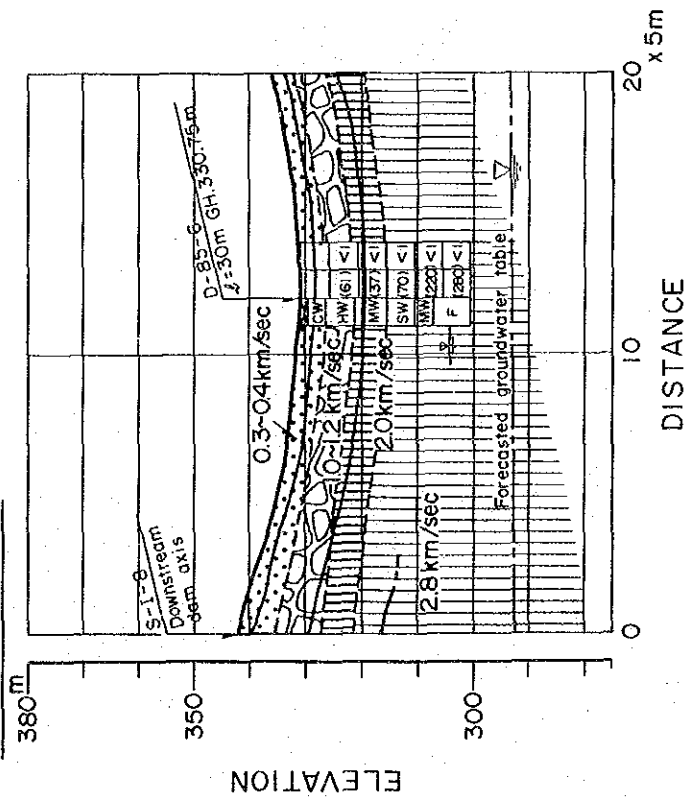
TENOM PANGI PHASE III

PERMEABILITY
OF DOWNSTREAM DAM AXIS

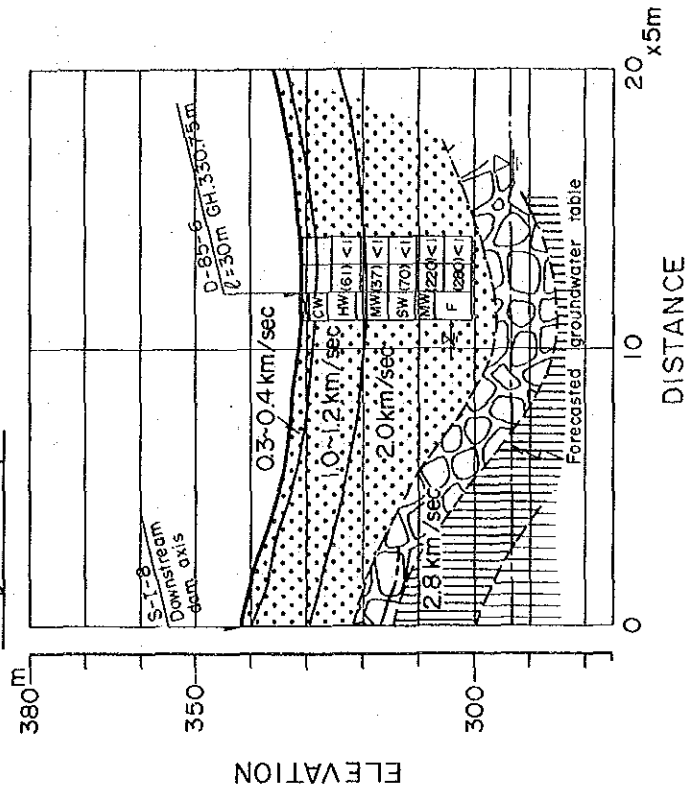
SEB / JICA

FIGURE NO. : B13

Weathered Zone



Lugeon Map



Legend

1. Drill log

No.
Hole depth and
elevation of top of hole

Breaking point (kg/cm²)
Lugeon unit
Weathering condition
Groundwater table measured during drilling work

2. Weathered zone

- Top soil, detritus and Completely weathered zone (CW)
- Highly weathered zone (HW)
- Moderately weathered zone (MW)
- Slightly weathered zone (SW)
- Fresh zone (F)

3. Lugeon map

- Over 100 Lu
- 50 to 99 Lu
- 10 to 49 Lu
- 5 to 9 Lu
- Less than 5 Lu

SCALE H 0 10 20 x5m

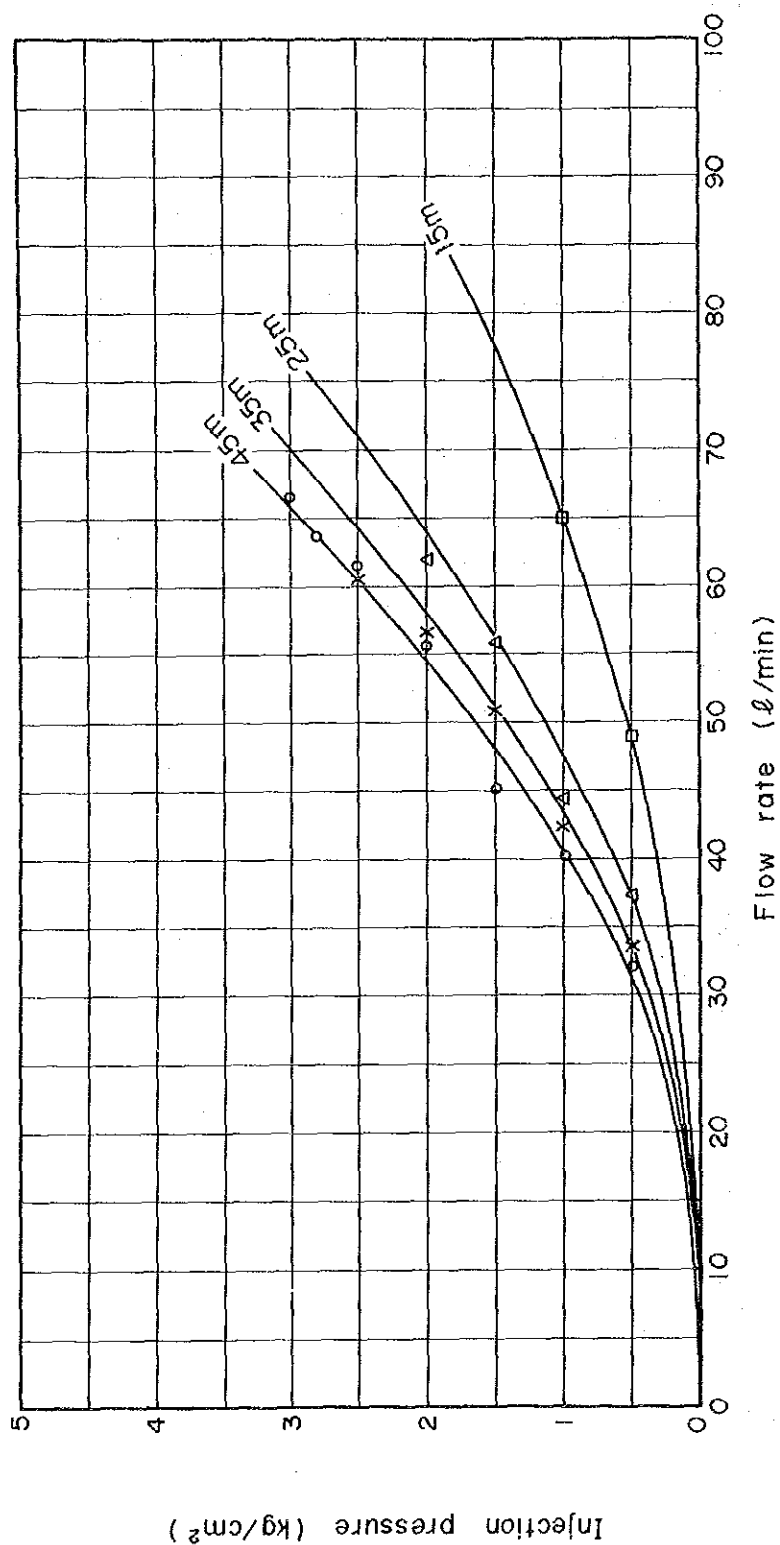
(1 : 250)

SCALE V 0 10 50m

(1 : 1,250)

TENOM PANGI PHASE III
WEATHERING CONDITION
AND
PERMEABILITY
IN LEFT BANK SADDLE
SEB / JICA

FIGURE NO. : B14



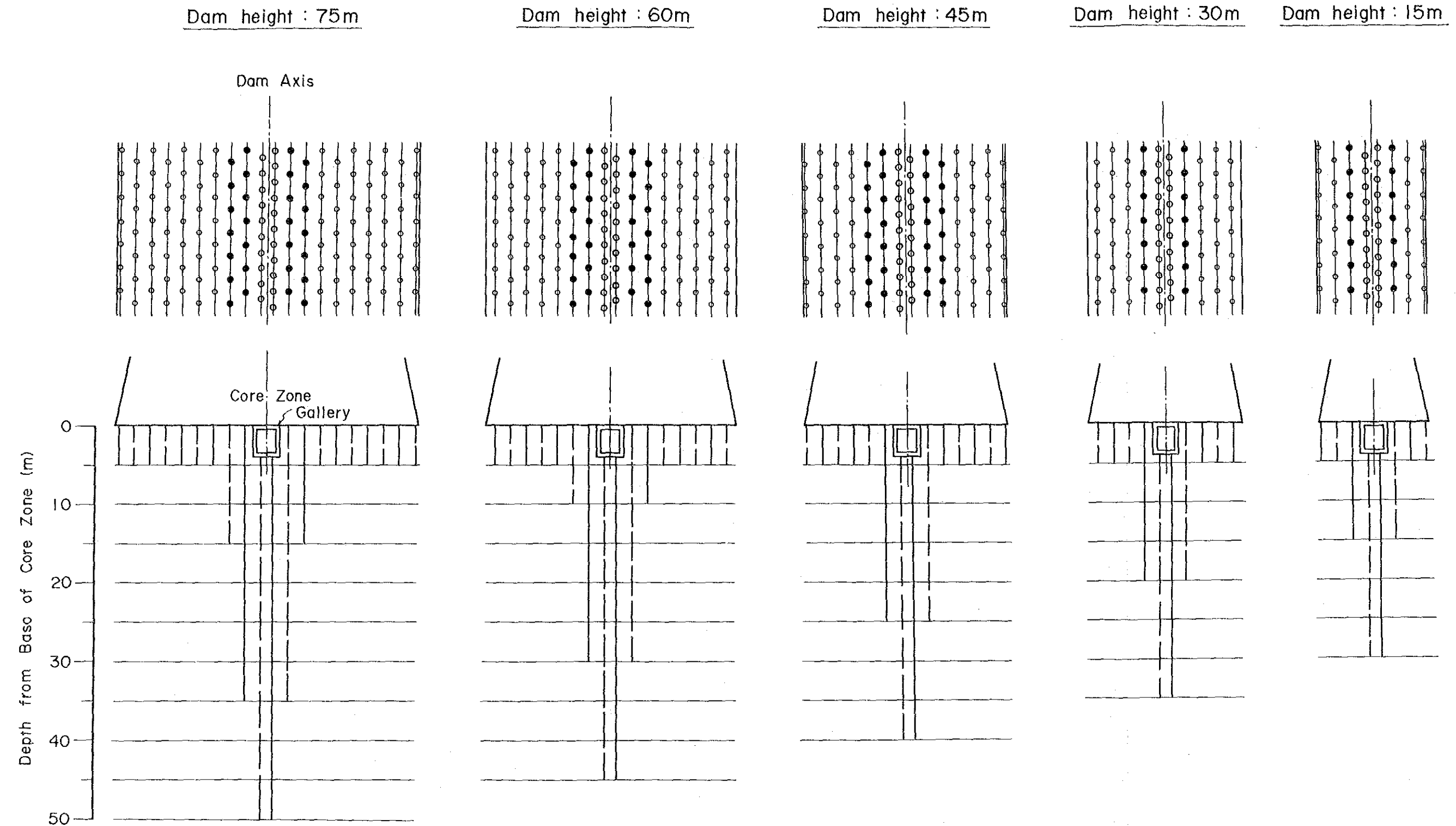
LEGEND

- : 45m long rods
- × : 35m long rods
- △ : 25m long rods
- : 15m long rods

TENOM PANGI PHASE III

FRICTION LOSS OF RODS

SEB / JICA



SCALE 0 25m
(1 : 500)

LEGEND

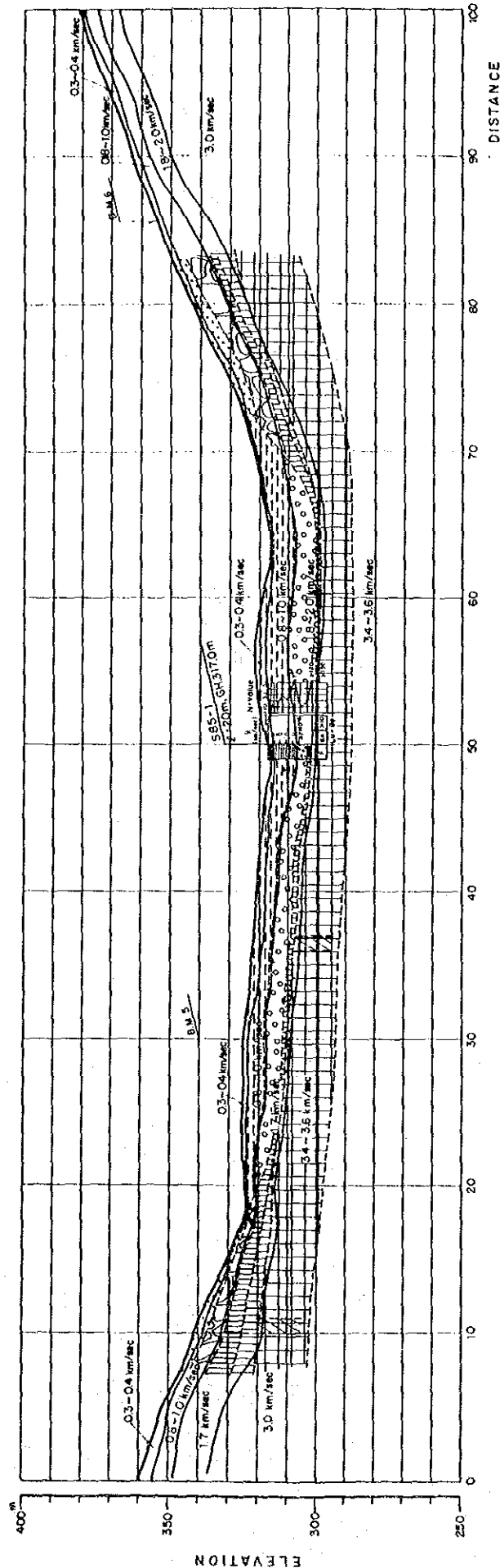
- Main curtain grouting hole
- Supporting curtain grouting hole
- Blanket grouting hole

TENOM PANGI PHASE III

GROUTING SCHEME

SEB / JICA

FIGURE NO. : B16



SCALE H 0 50 100m
(1:2,000)

SCALE V 0 10 20m
(1:400)

Weathered zone

(CM) Top soil detritus and completely weathered zone
(HW) Highly weathered zone
(MW) Moderately weathered zone
(SW) Slightly weathered zone
Fresh zone
Fracture zone

Facies of bedrock in log

Silty clay
Gravelly sand

LEGEND

Drill log

Penetration resistance (N-value) estimated from result of standard penetration test

Permeability coefficient of deposits (cm/sec)

Breaking point (kg/cm²)

Lugeon unit

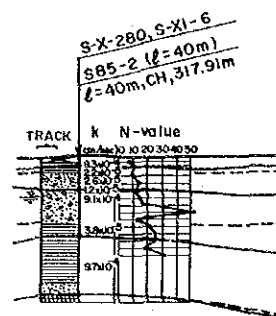
Facies of deposits and weathering condition of bedrock

Groundwater table measured during drilling

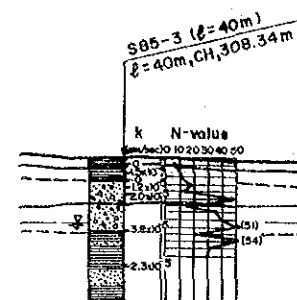
TENOM PANGI PHASE III

GEOLOGICAL PROFILE OF NO.1 SADDLE DAM AXIS

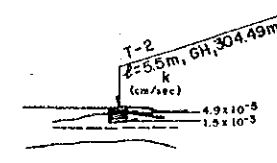
SEB / JICA



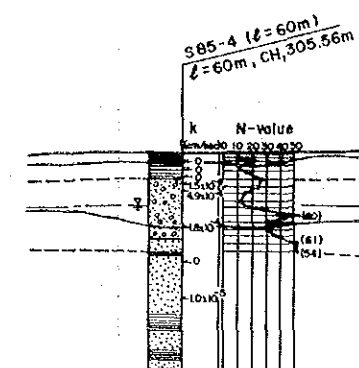
DETAIL "Z"



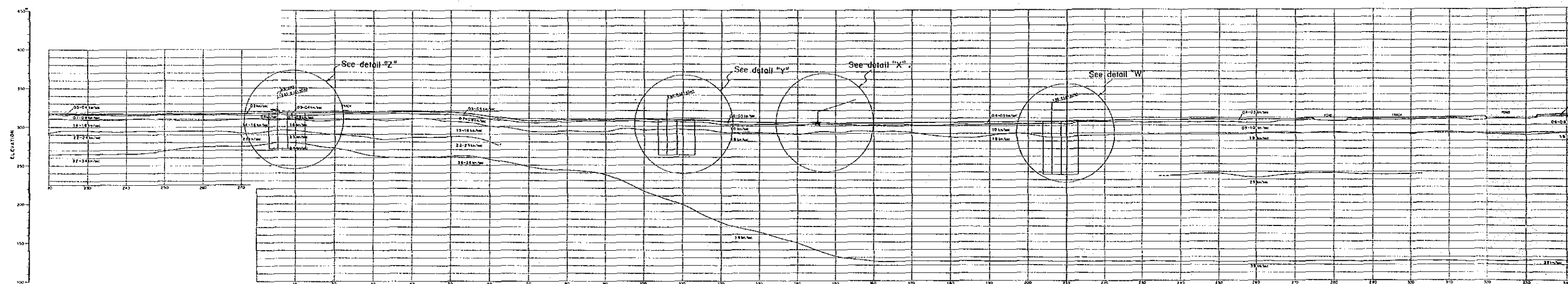
DETAIL "Y"



DETAIL "X"

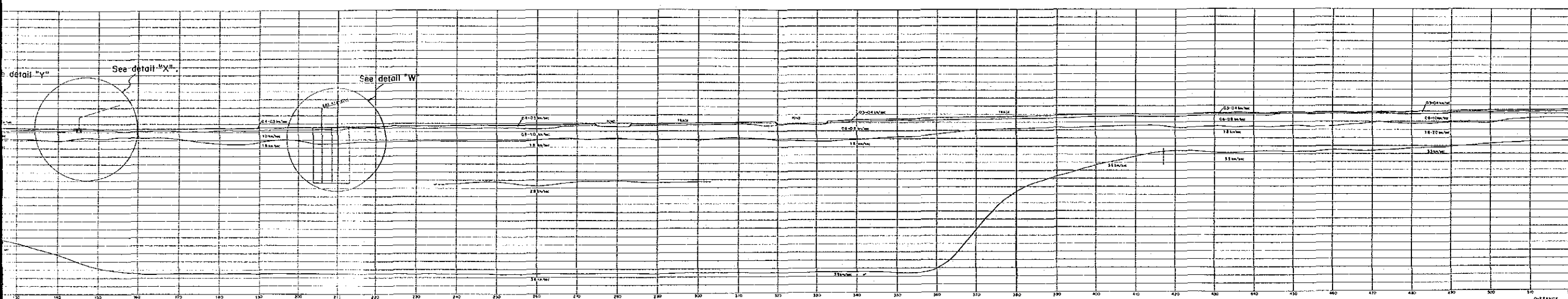
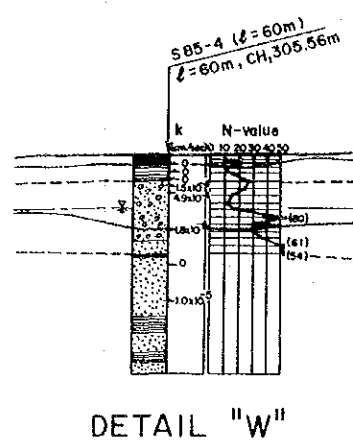
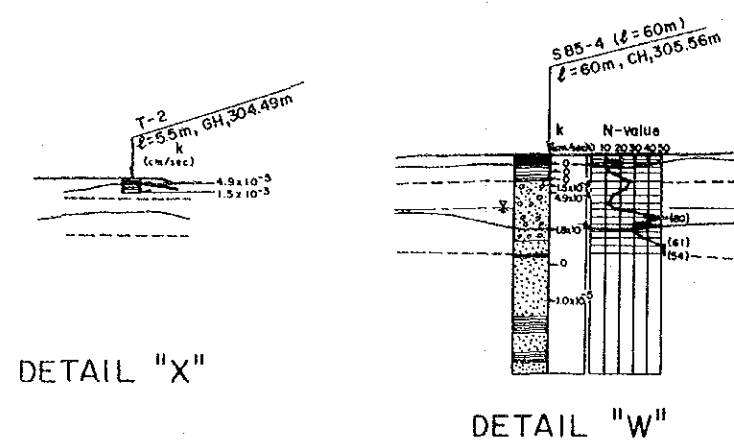


DETAIL "W"



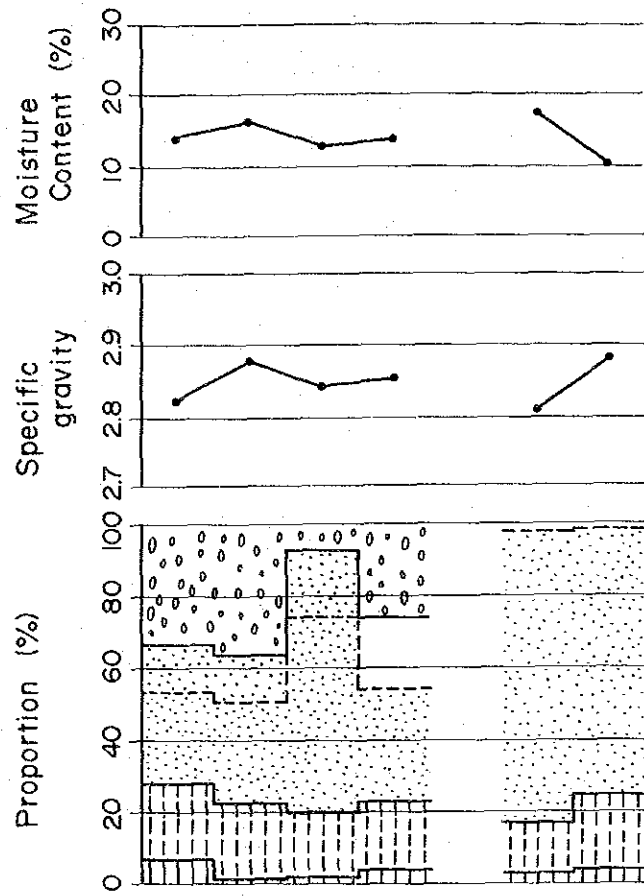
SCALE H 0 50m
(1:1,000)

SCALE V 0 100 125m
(1:5,000)

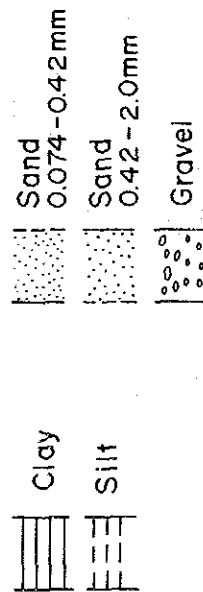


TENOM PANGI PHASE III
GEOLOGICAL PROFILE
OF
NO.2 SADDLE DAM AXIS
SEB / JICA

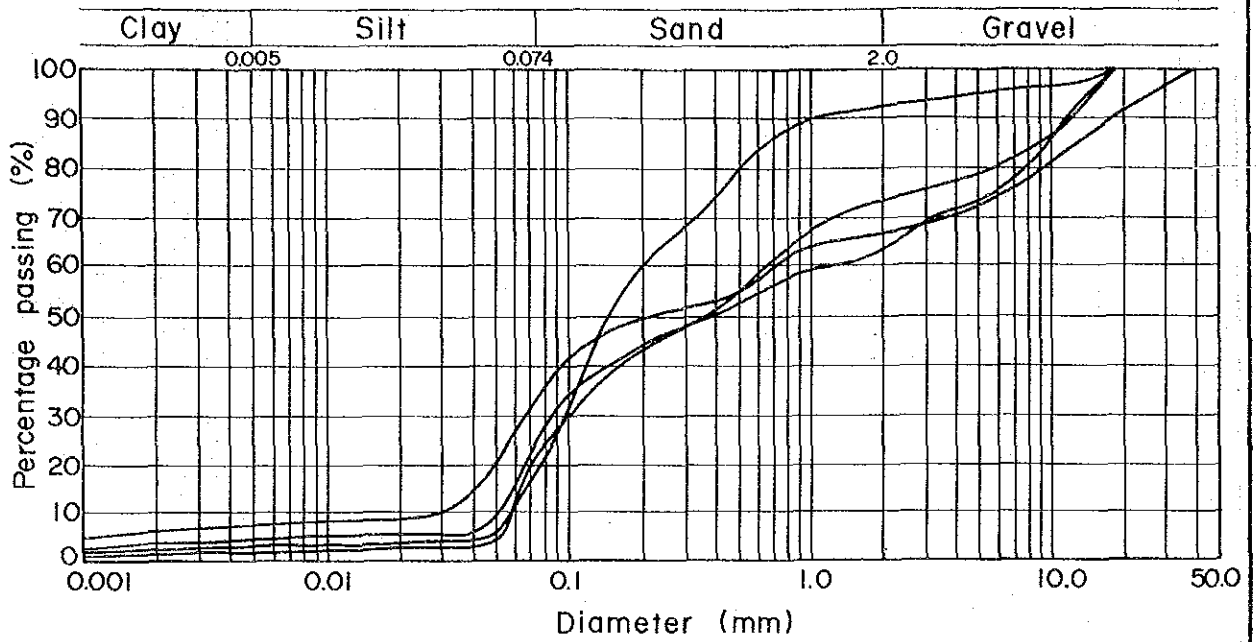
FIGURE NO. : B18



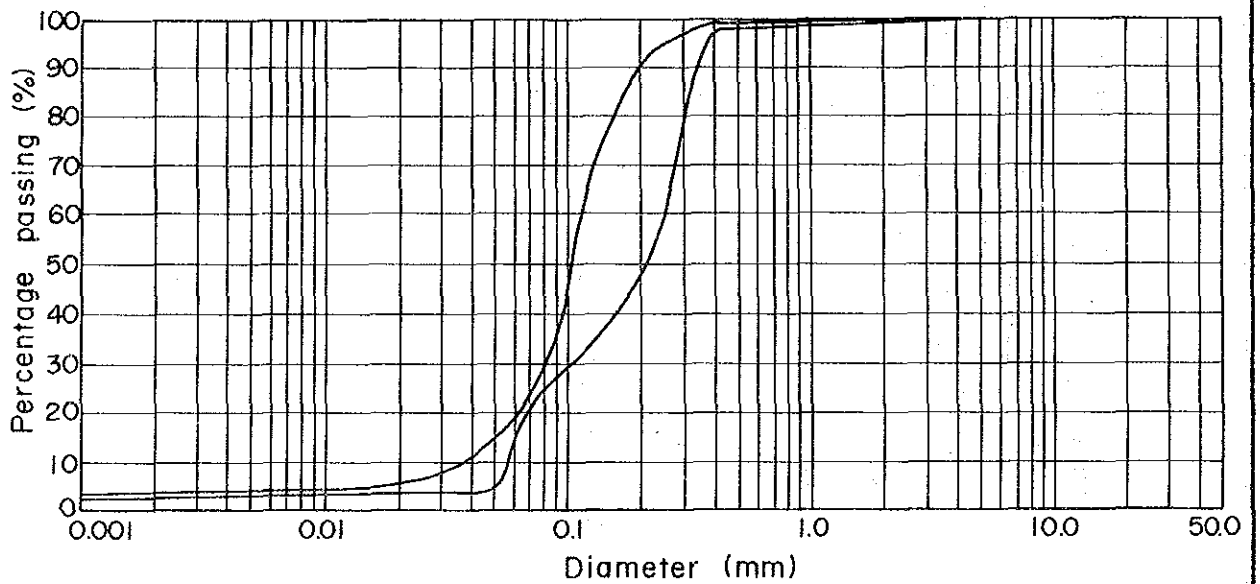
LEGEND



TENOM PANGI PHASE III
SAMPLING DEPTH
AND
RESULT OF
LABORATORY TEST
SEB / JICA



(1) Gravelly layer



(2) Fine sand layer

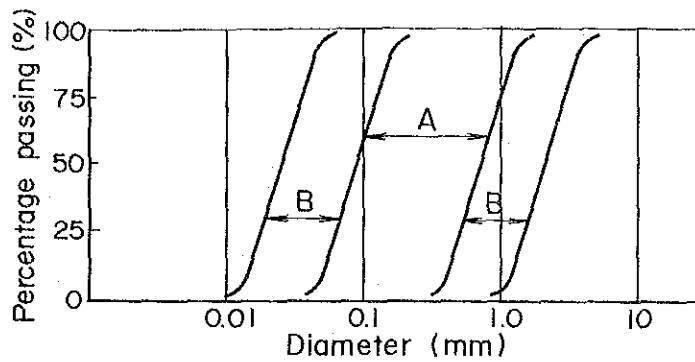
TENOM PANGI PHASE III

GRAIN SIZE DISTRIBUTION CURVE

SEB / JICA

1. Liquefaction appearing range of grain size

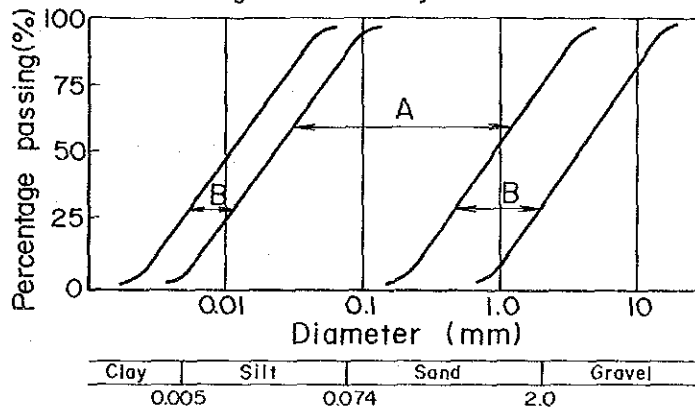
1.1 Sand with small uniformity coefficient



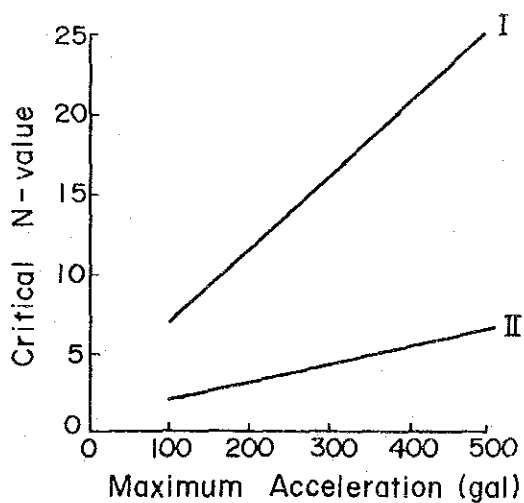
A : Material in a range of liquefaction appearing

B : Material in a range of possibly liquefaction appearing

1.2 Sand with large uniformity coefficient



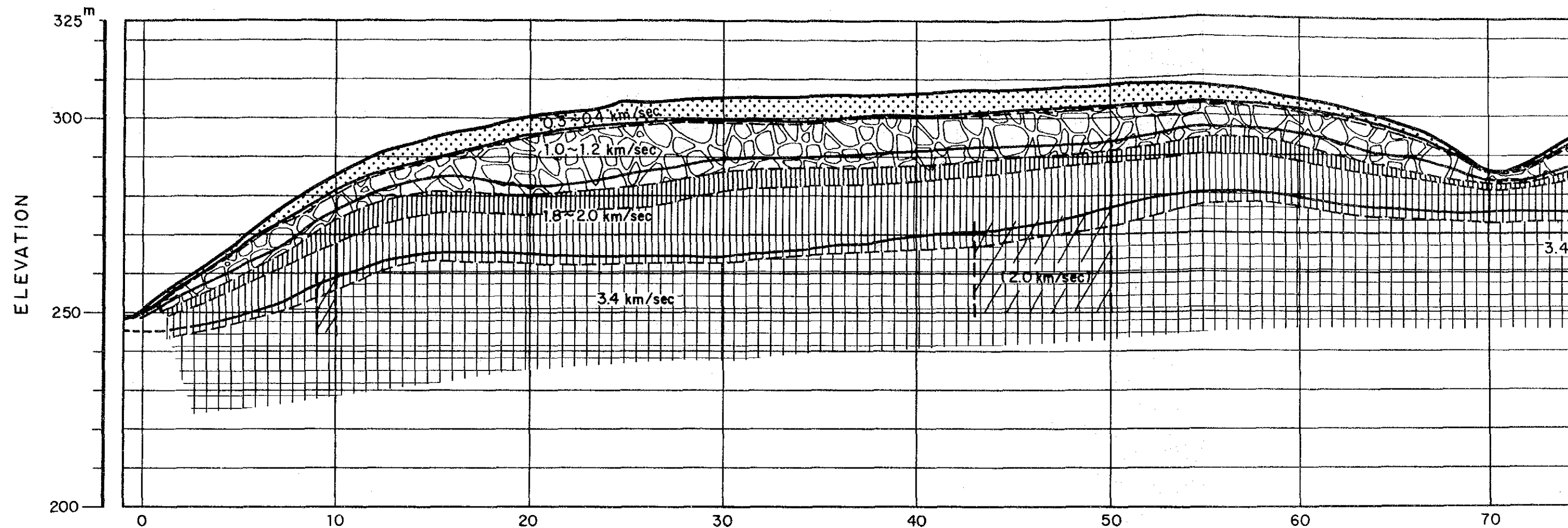
2. Liquefaction appearing range of N-value



I : Critical line for material A

II : Critical line for material B

TENOM PANGI PHASE III
LIQUEFACTION APPEARING RANGE OF GRAIN SIZE AND N-VALUE
SEB / JICA



LEGEND

Weathered zone

- (CM) Top soil detritus and completely weathered zone
- (HW) Highly weathered zone
- (MW) Moderately weathered zone
- (SW) Slightly weathered zone
- Fresh zone
- Fracture zone

Facies of bedrock in log

- Sand stone
- Shale and mudstone

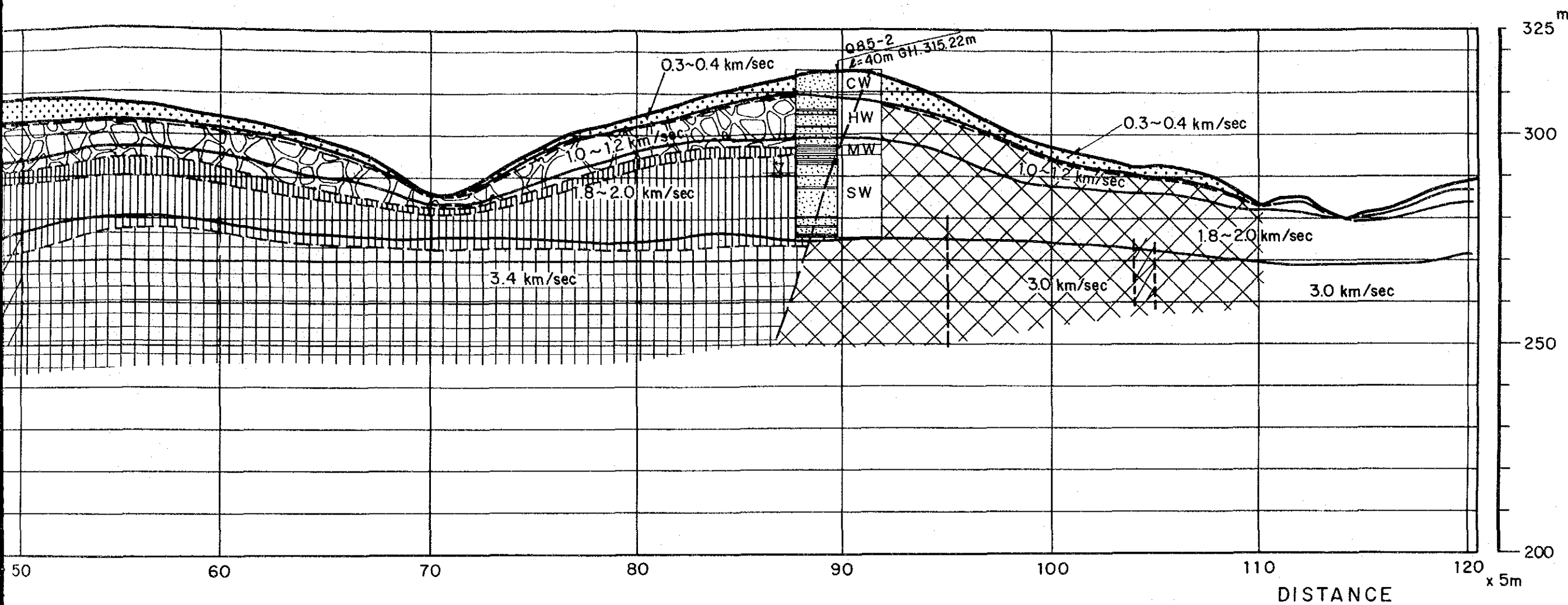
Drill log

- Hole No.
- Depth and ground height
- Weathering condition
- Facies of bedrock
- Groundwater table measured during drilling

SCALE H 0 10m
(1 : 200)

SCALE V 0 50m
(1 : 1,000)

FIGURE NO. :B2T



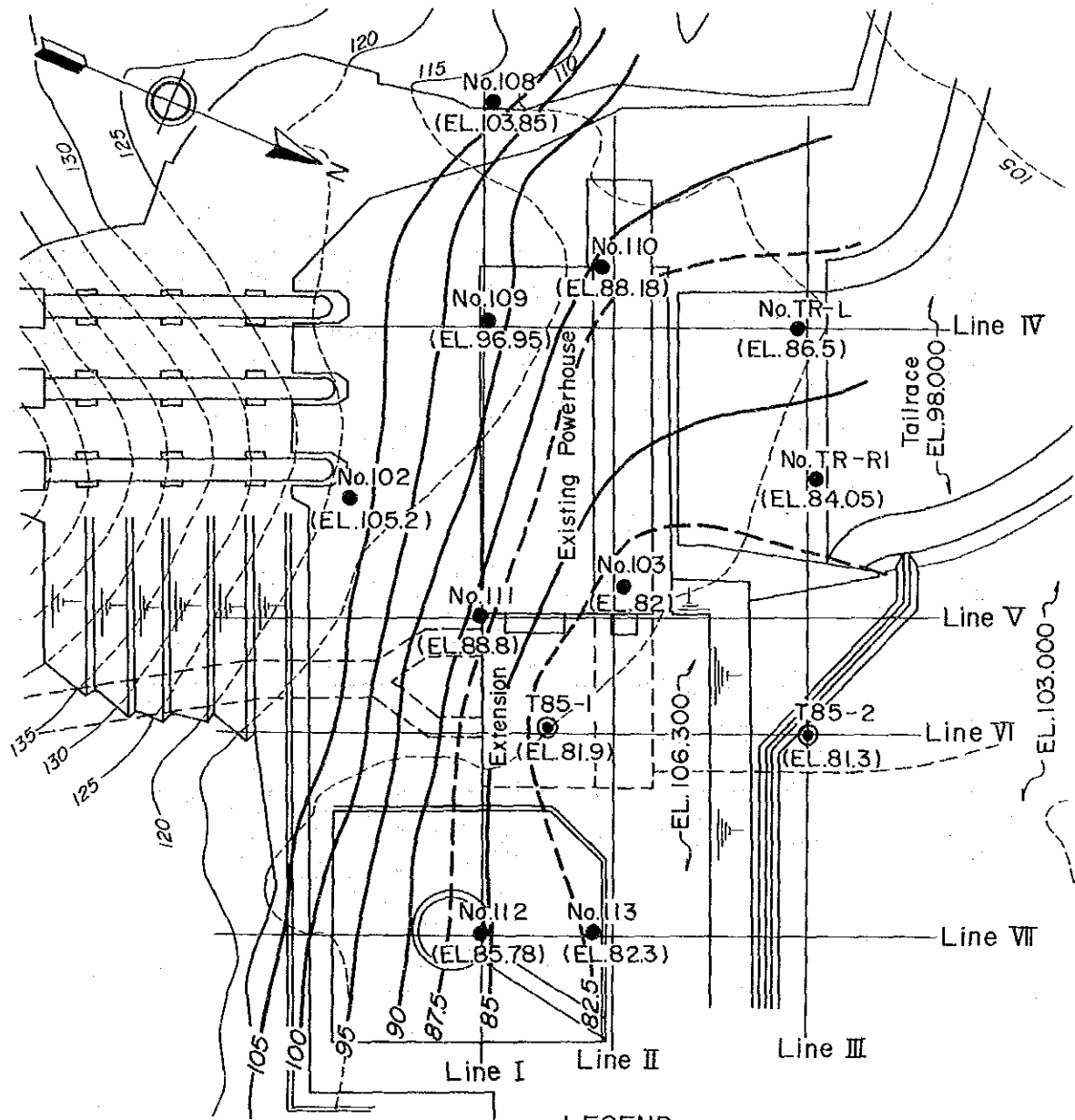
Drill log

Hole No.
Depth and ground height

Weathering condition
Facies of bedrock
Groundwater table
measured during drilling

TENOM PANGI PHASE III
GEOLOGICAL PROFILE OF
NO.1 QUARRY SITE
SEB / JICA

FIGURE NO. : B22



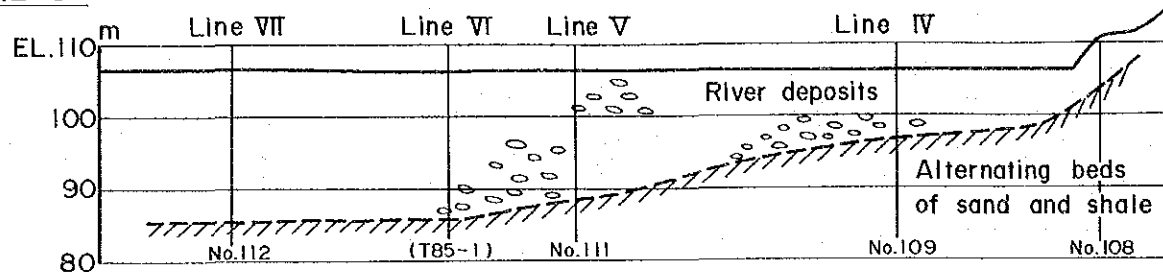
LEGEND

- ⊙ : Drilling point conducted in 1985
- : Drilling point conducted for existing powerhouse
- : Bedrock contour, 5m line
- - - : Bedrock contour, 2.5m line
- () : Elevation of bedrock in drillhole

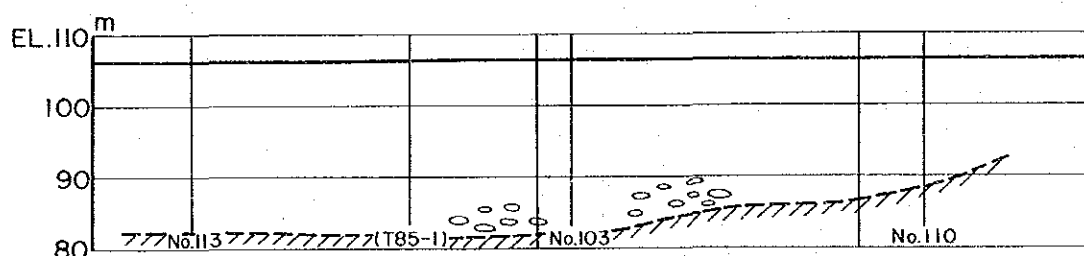
SCALE 0 50m
(1 : 1,000)

TENOM PANGI PHASE III
DRILLING LOCATION
AT
TENOM PANGI POWERHOUSE
AND BEDROCK CONTOUR
SEB / JICA

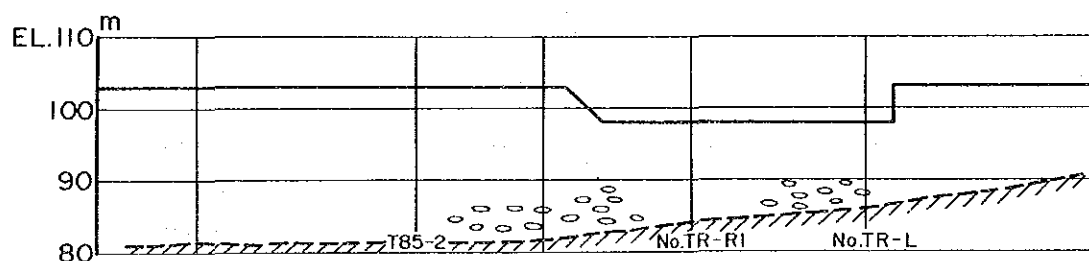
LINE I



LINE II

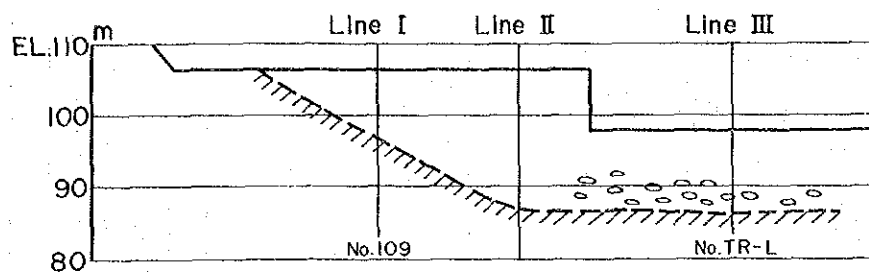


LINE III

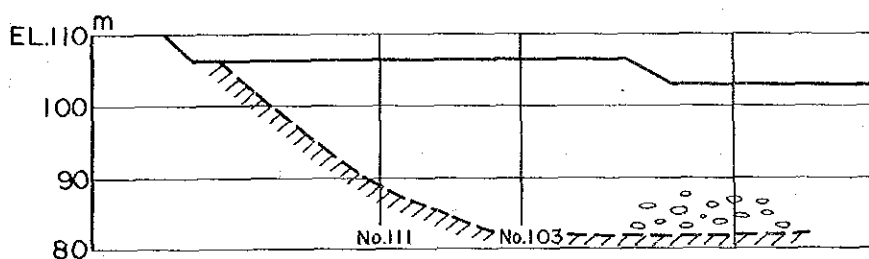


TENOM PANGI PHASE III
GEOLOGICAL PROFILE
OF
TENOM PANGI POWERHOUSE
SEB / JICA

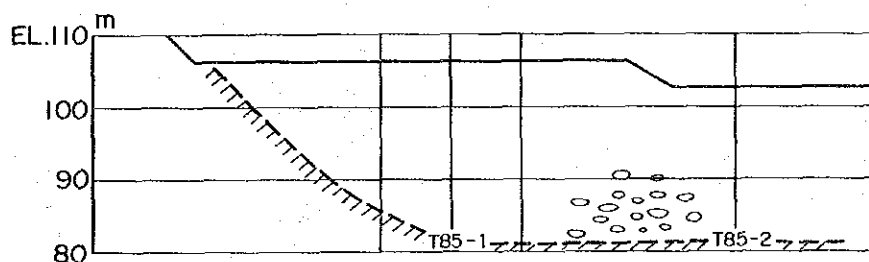
LINE IV



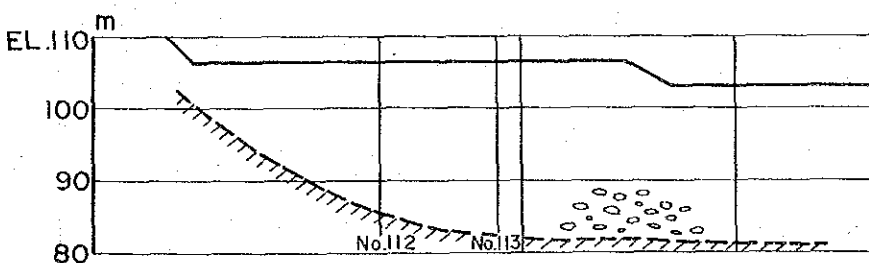
LINE V



LINE VI



LINE VII



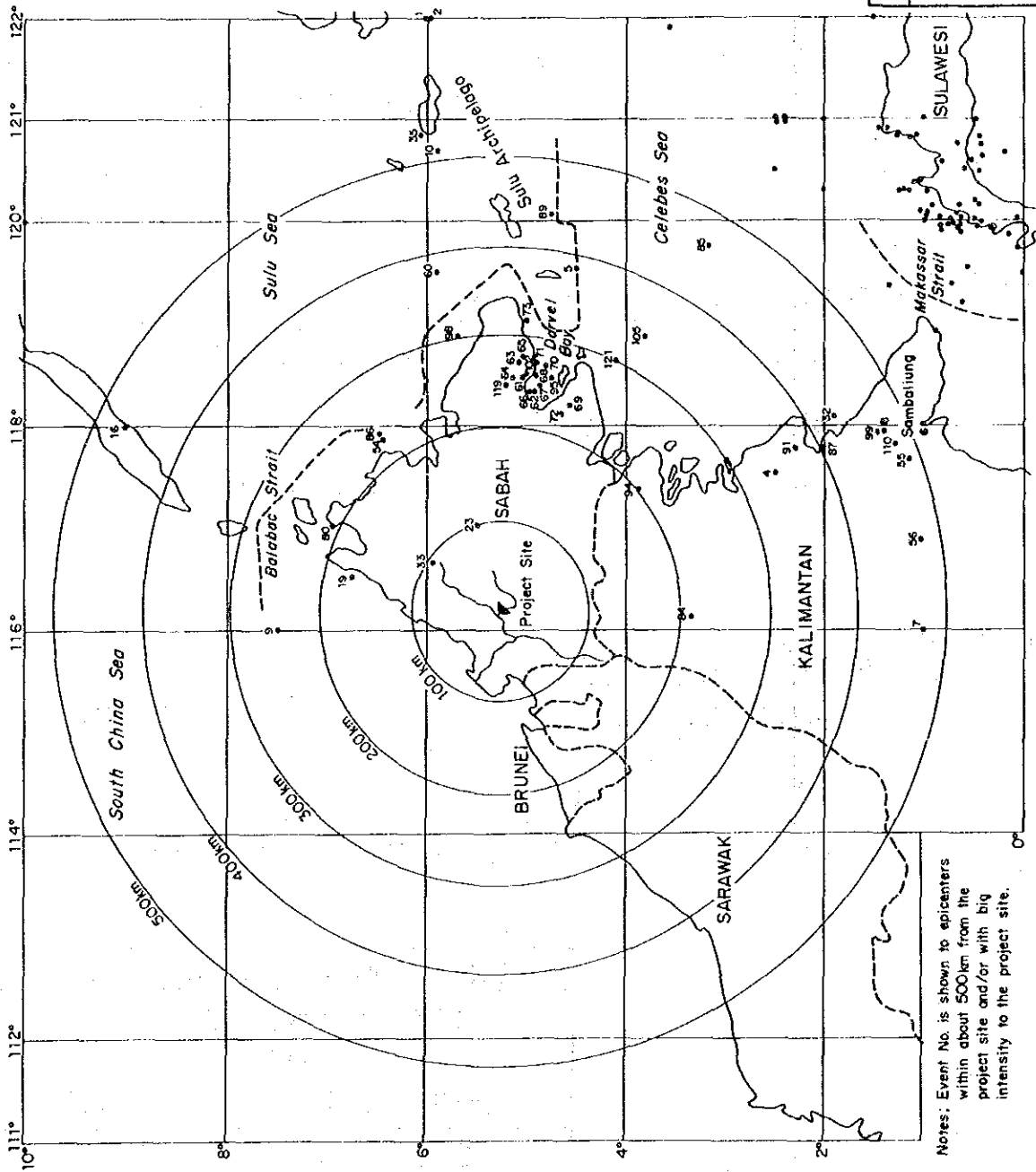
TENOM PANGI PHASE III

GEOLOGICAL PROFILE
OF

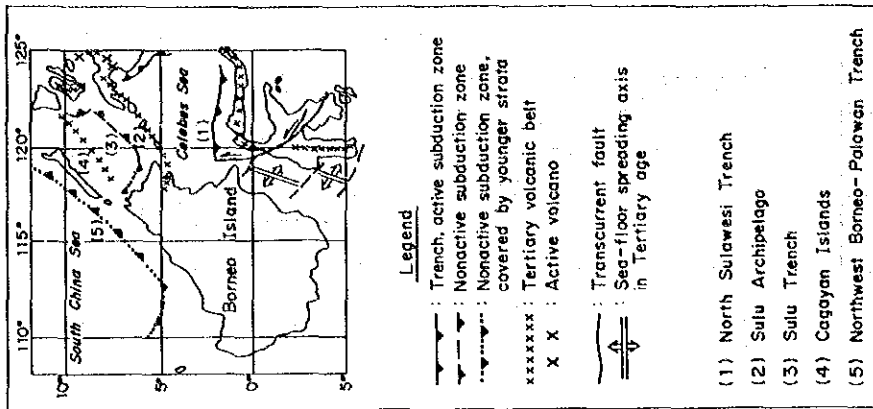
TENOM PANGI POWERHOUSE

SEB / JICA

FIGURE NO. : B24



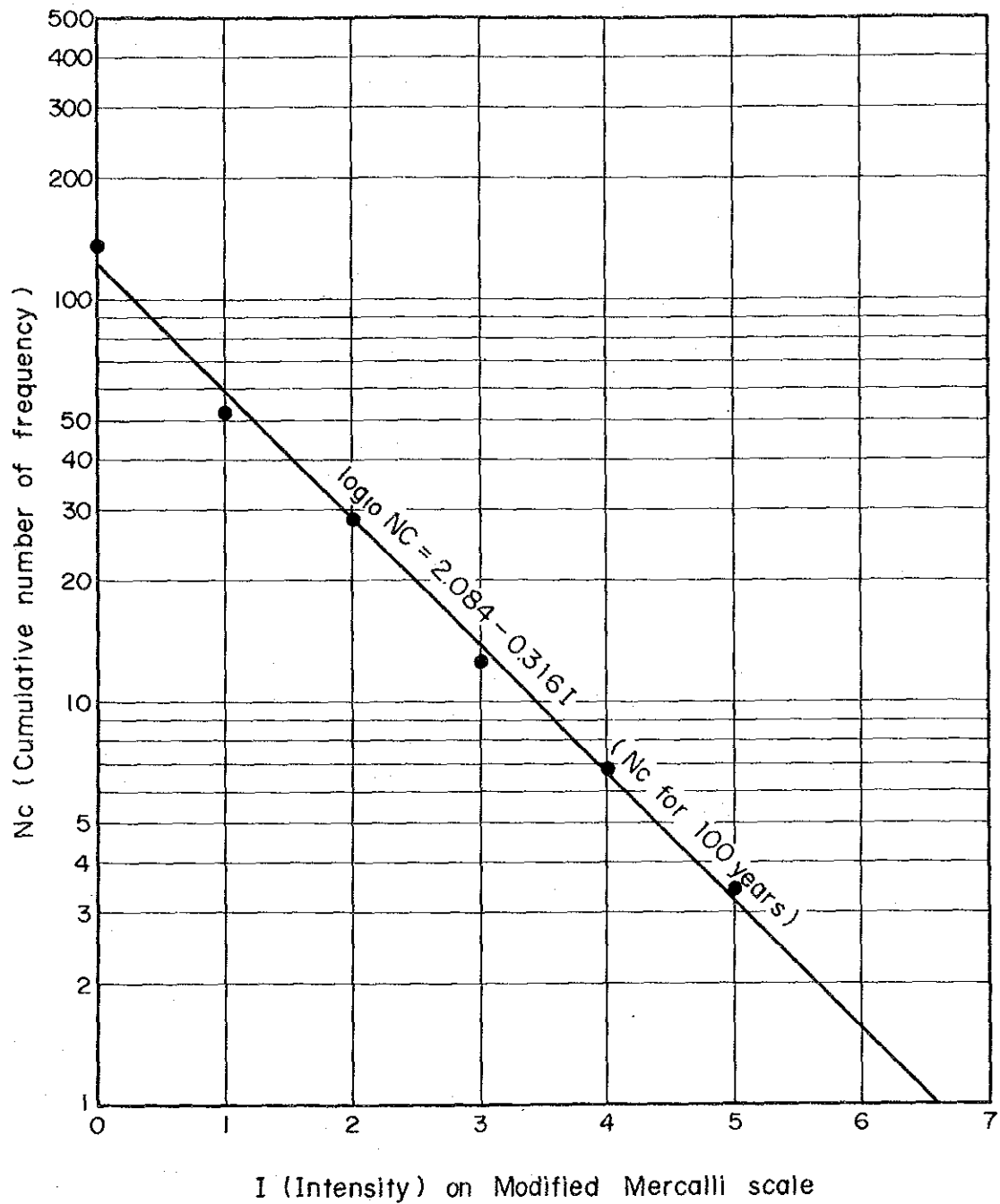
Notes: Event No. is shown to epicenters within about 500 km from the project site and/or with big intensity to the project site.



TENOM PANGI PHASE III

LOCATION OF EPICENTER
AND MAJOR GEOTECTONIC
AROUND SABAH

SEB / JICA

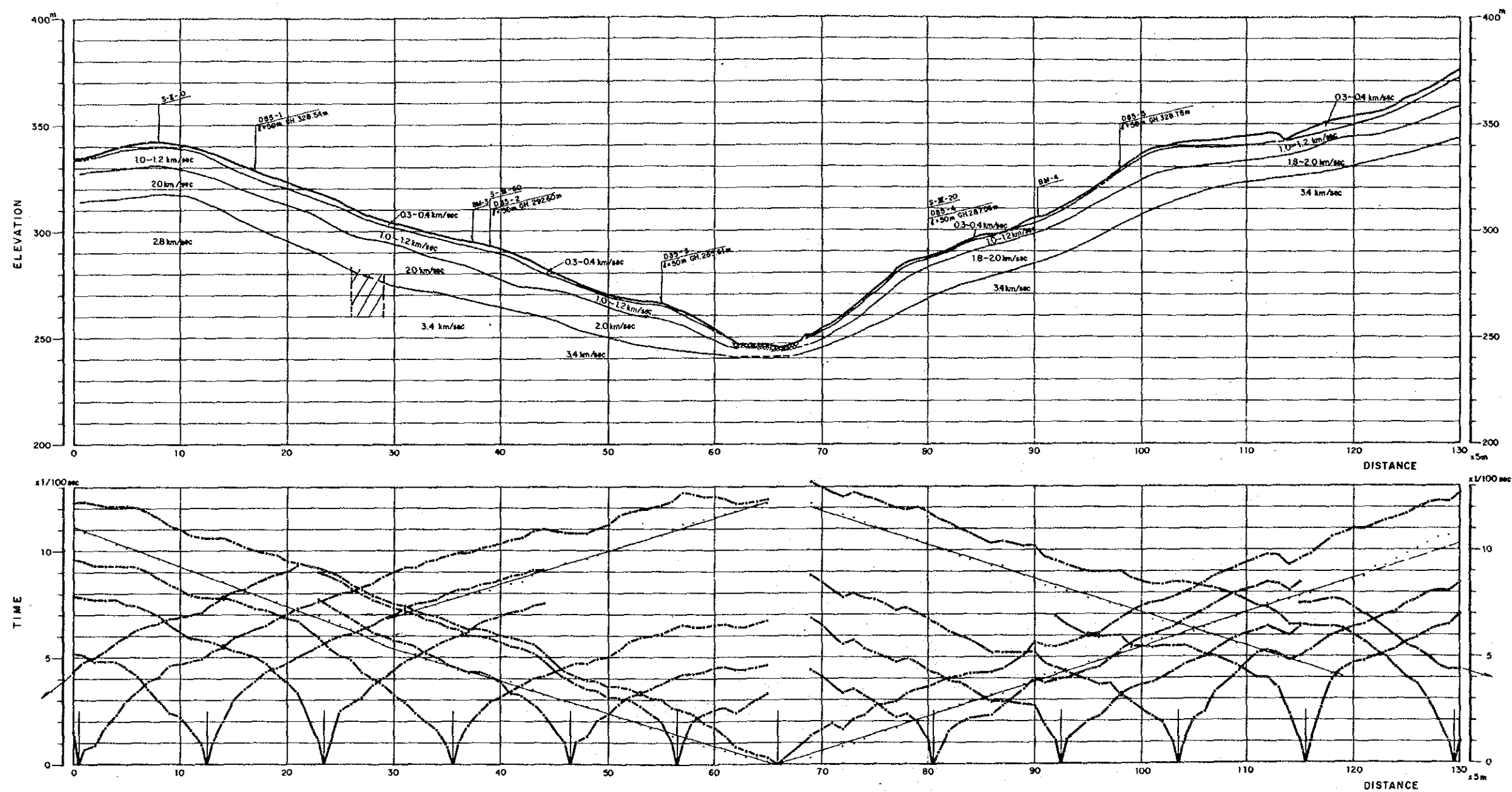


TENOM PANGI PHASE III

RELATION BETWEEN INTENSITY
AND CUMULATIVE NUMBER
OF FREQUENCY

SEB / JICA

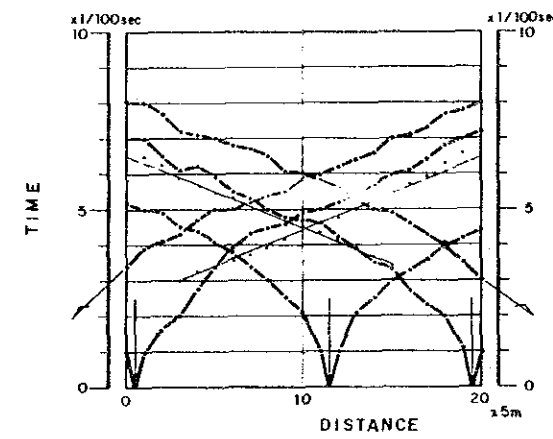
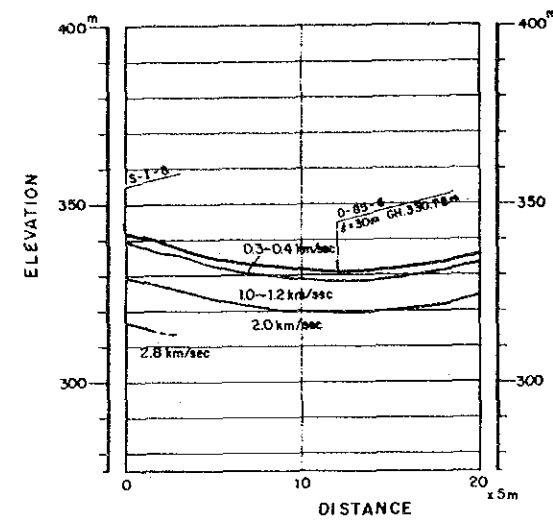
FIGURE NO. : B 26



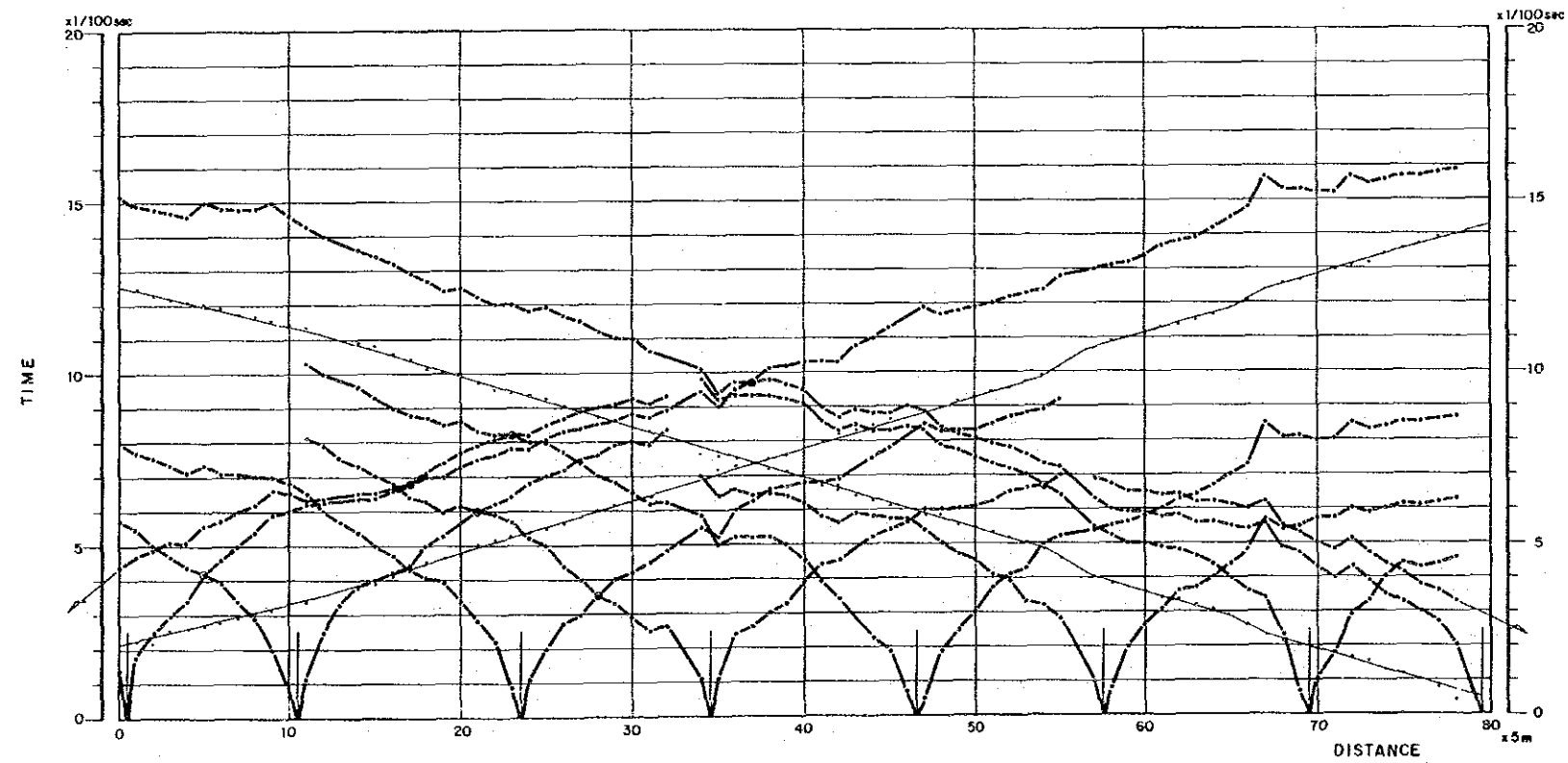
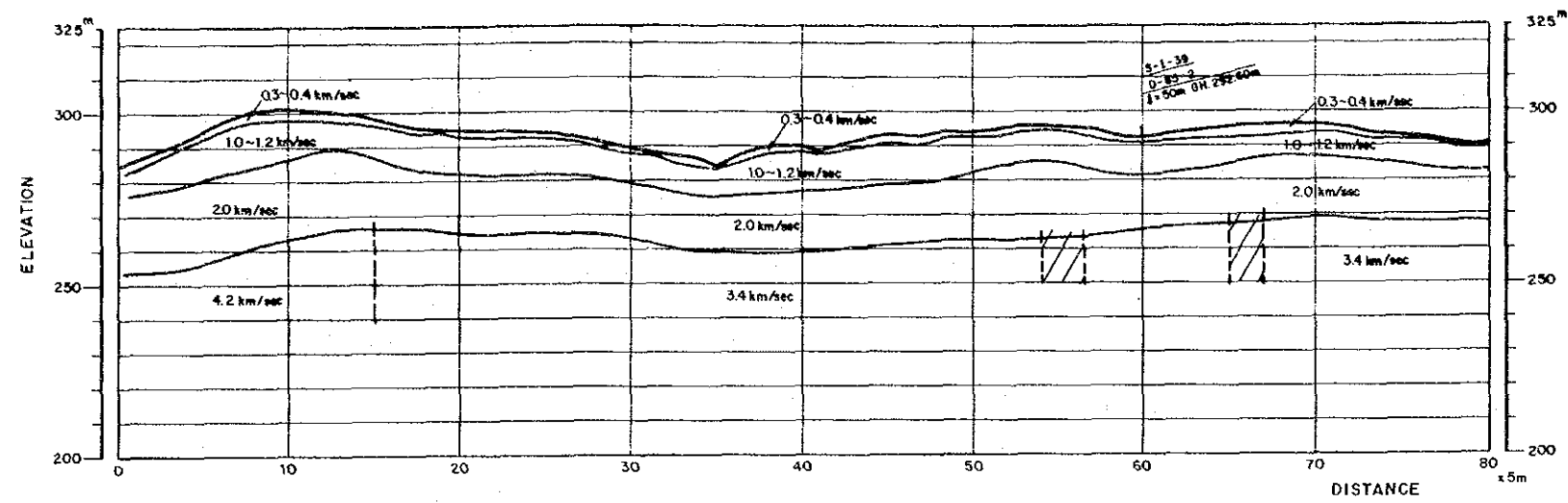
SCALE H 0 10 20m
(1 : 400)

TENOM PANGI PHASE III
RESULT OF SEISMIC EXPLORATION (LINE I, DOWNSTREAM DAM AXIS)
SEB / JICA

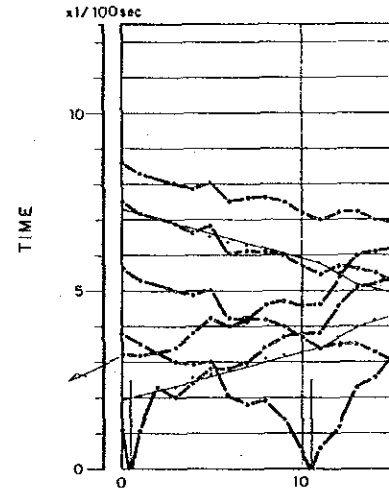
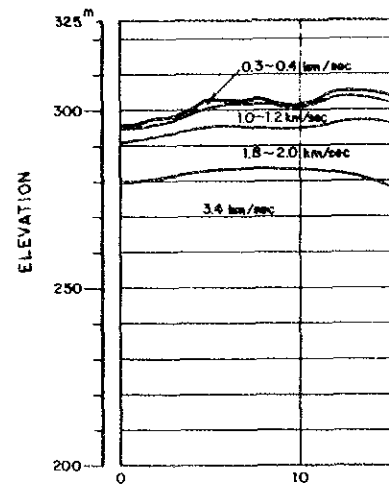
(Line II, Left Bank saddle)



(Line III, Left Abutment of Downstream Dam Axis)



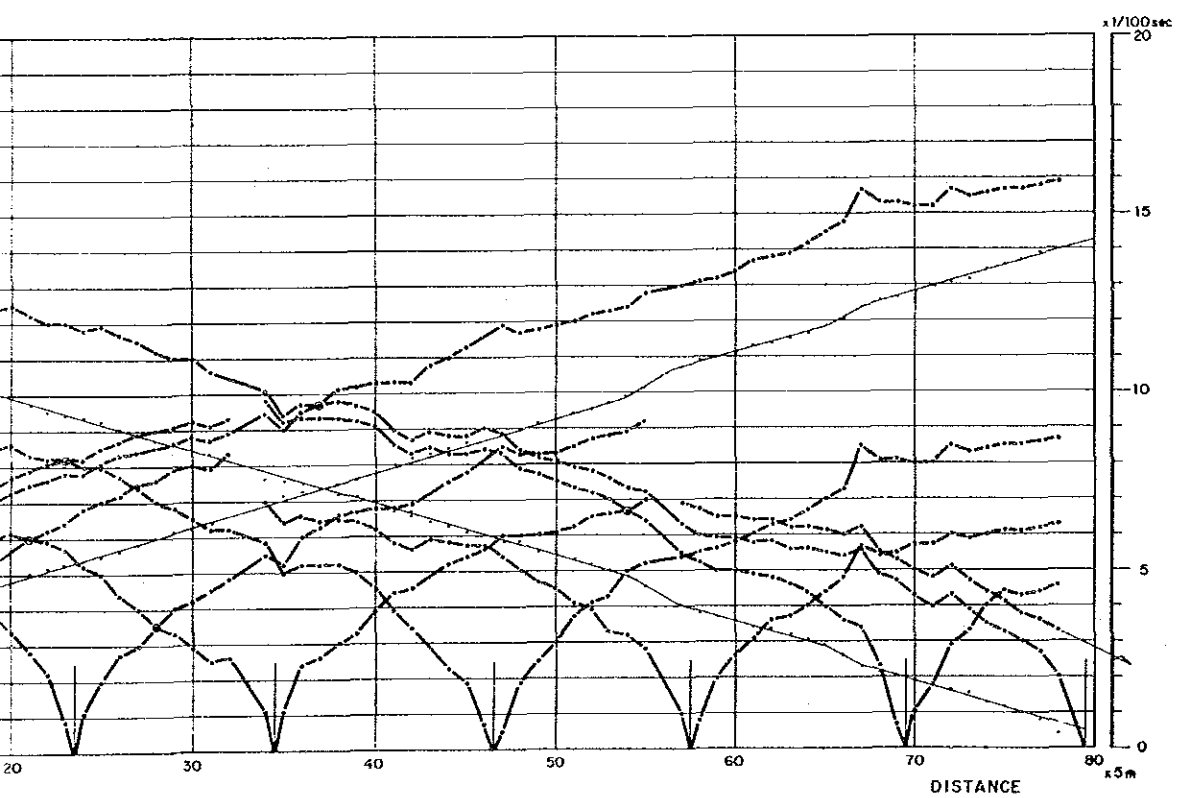
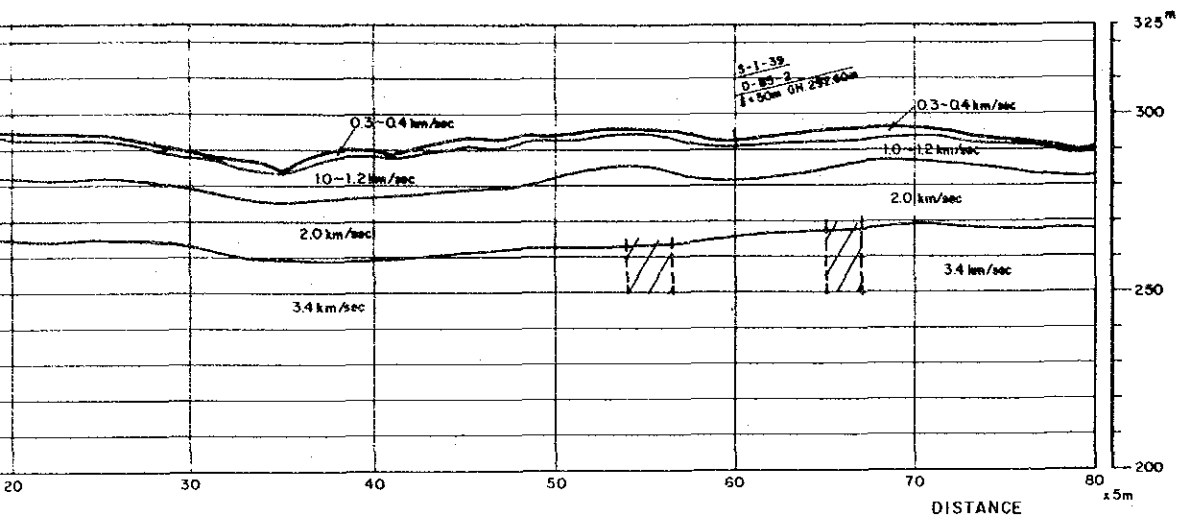
(Line IV Right Abutment)



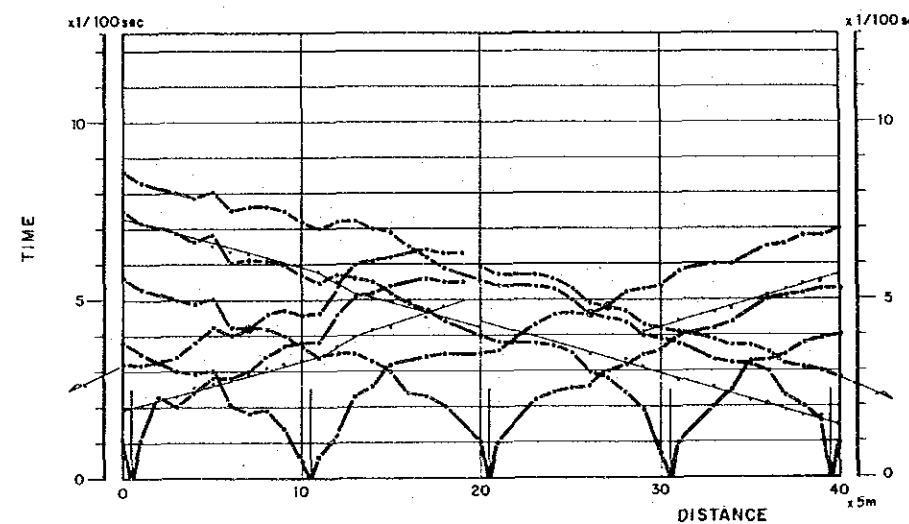
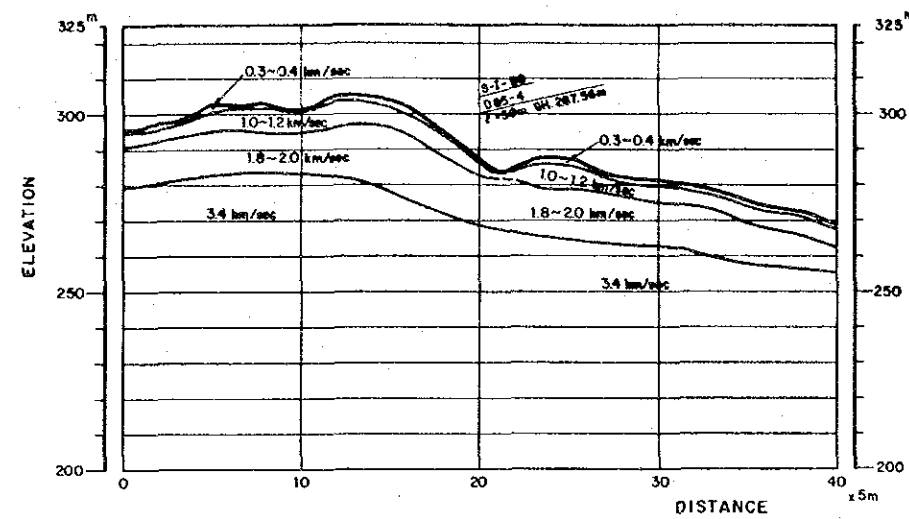
SCALE H 0 10 20m
(1 : 400)

FIGURE NO. : B27

III, Left Abutment of Downstream Dam Axis)



(Line IV Right Abutment of Downstream Dam Axis)

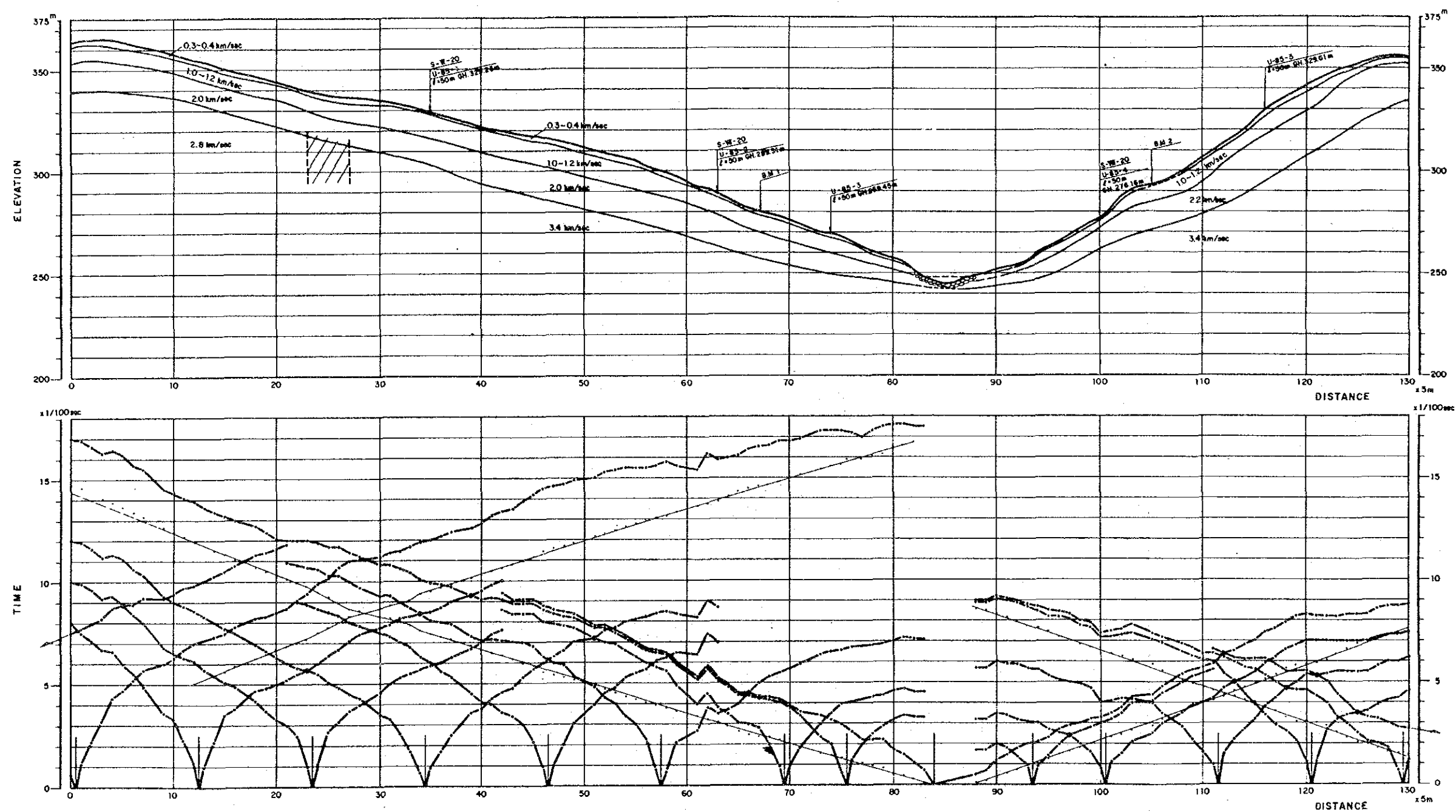


TENOM PANGI PHASE III

RESULT OF SEISMIC EXPLORATION
(LINES II, III AND IV, BOTH ABUTMENTS
OF DOWNSTREAM DAM AXIS)

SEB / JICA

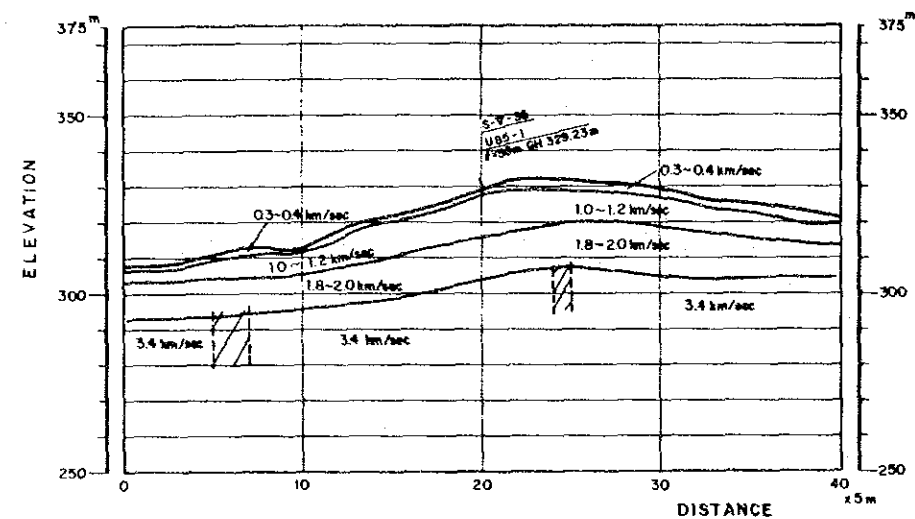
FIGURE NO. :B28



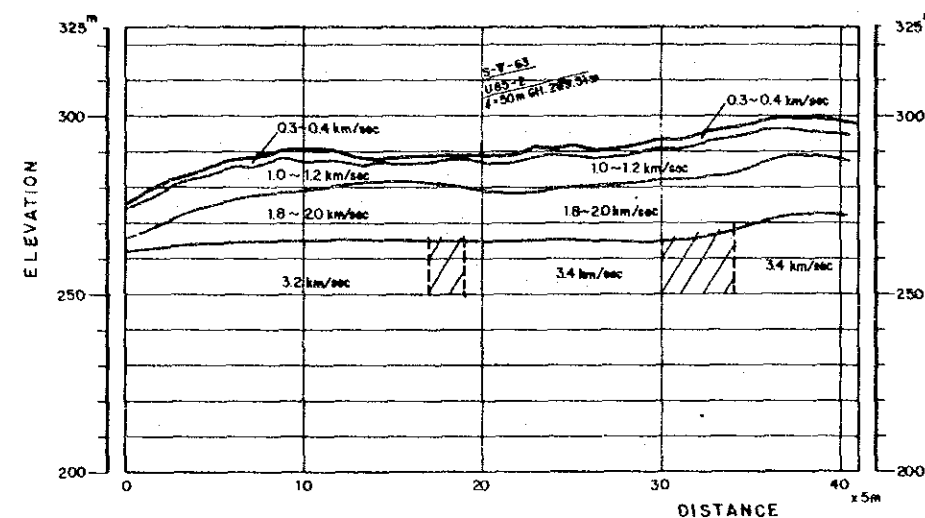
SCALE H 0 10 20m
(1 : 400)

TENOM PANGI PHASE III
RESULT OF SEISMIC EXPLORATION
(LINES V, UPSTREAM DAM AXIS)
SEB / JICA

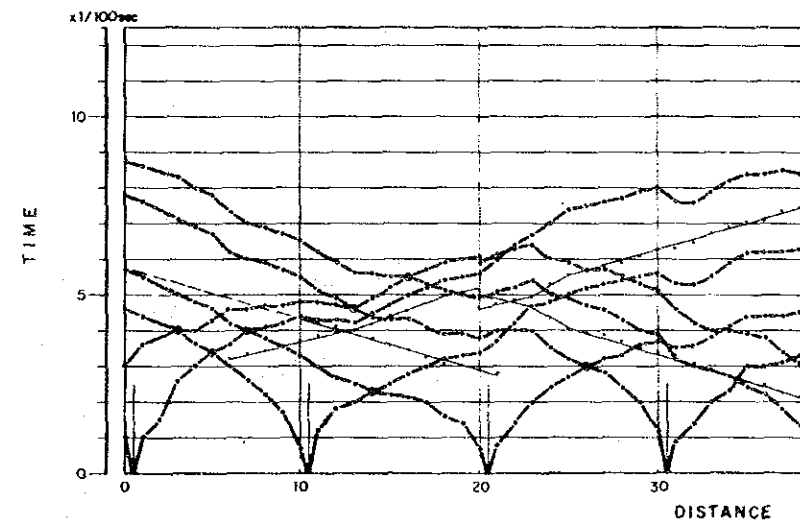
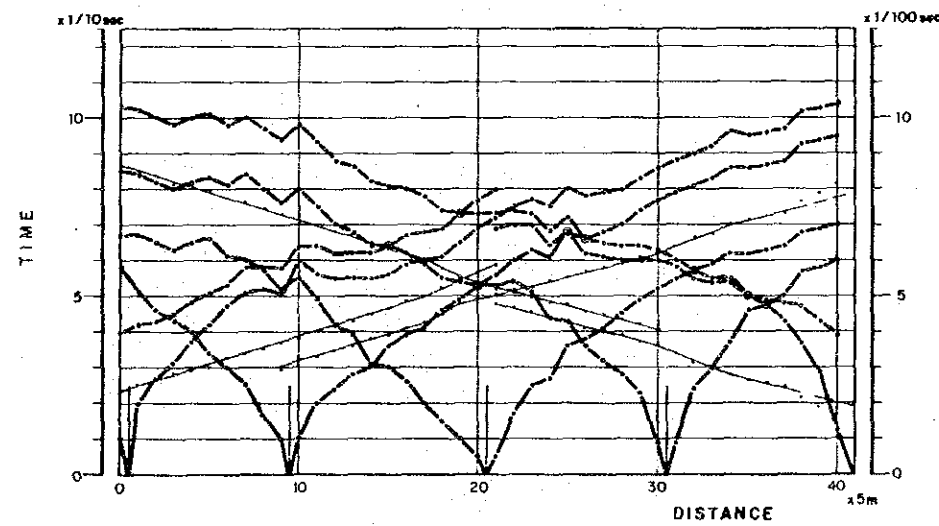
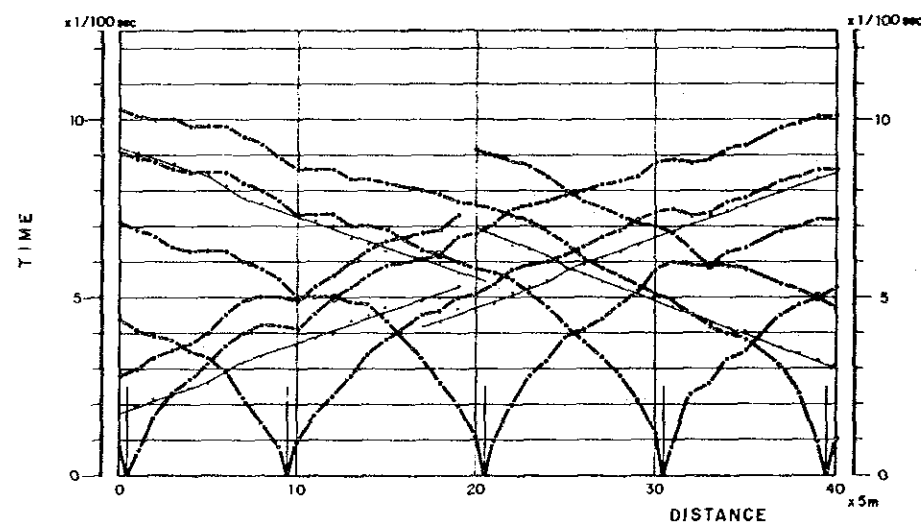
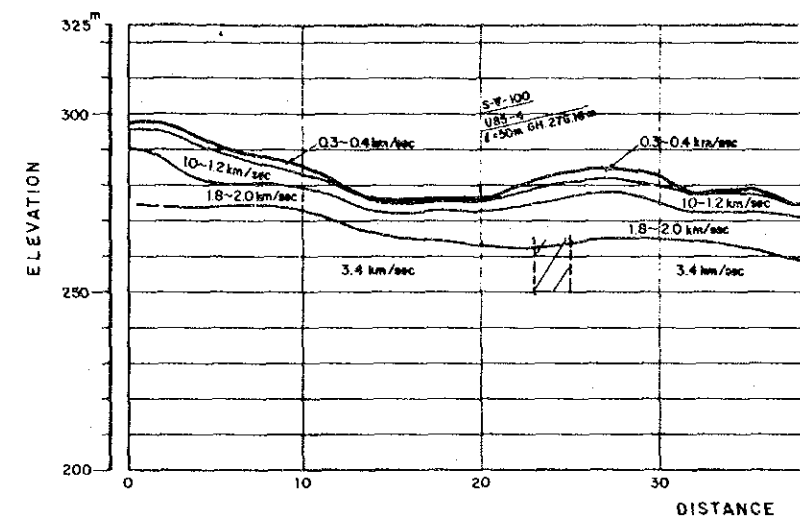
(Line VI, Left Abutment of Upstream Dam Axis)



(Line VII, Left Abutment of Upstream Dam Axis)



(Line VIII, Right Abutment of Upstream Dam Axis)



SCALE H 0 10 120m
(1 : 400)

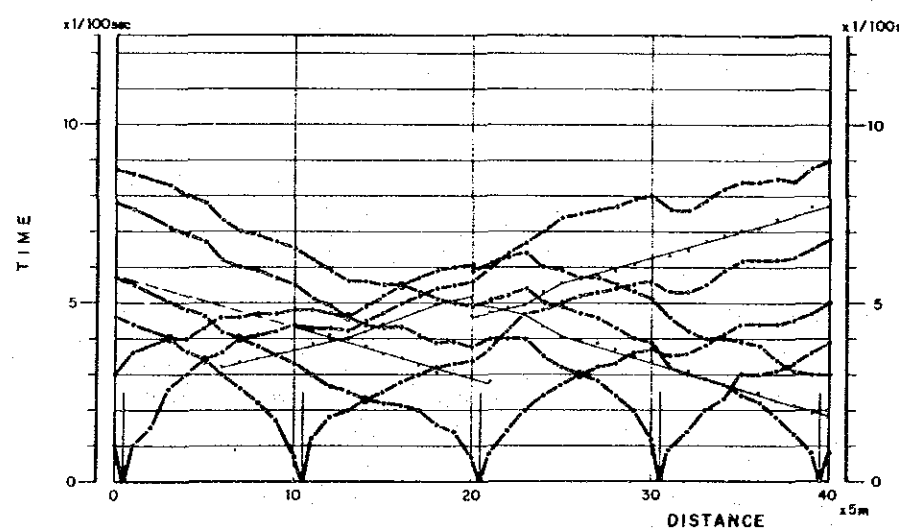
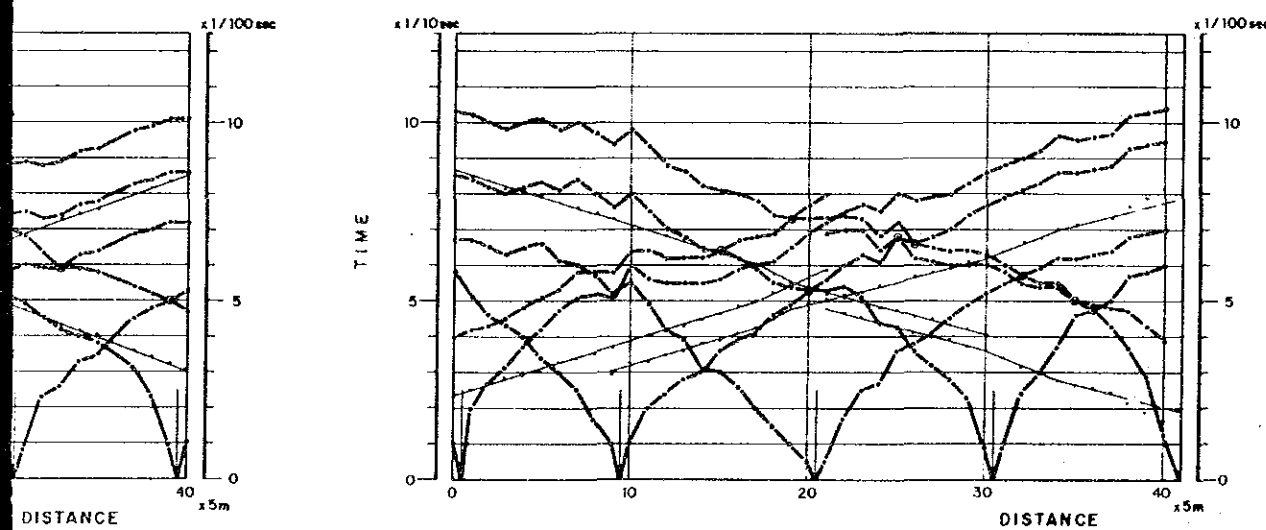
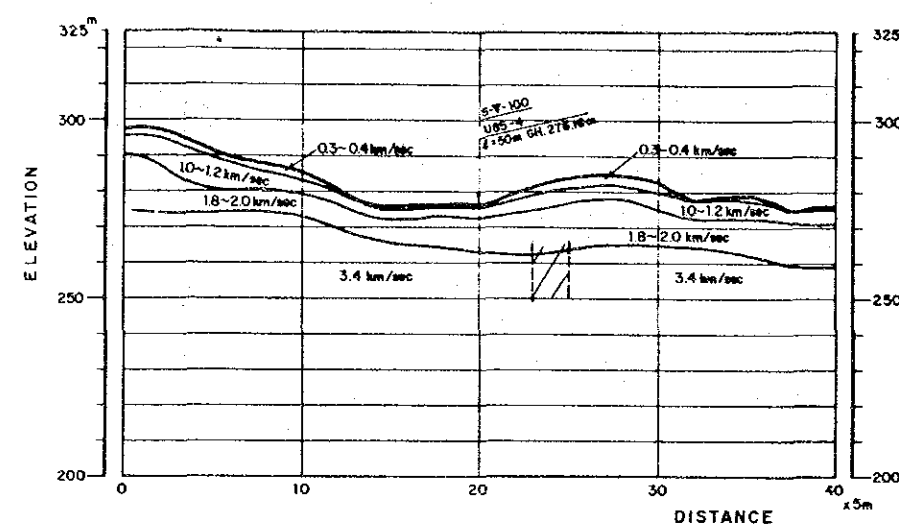
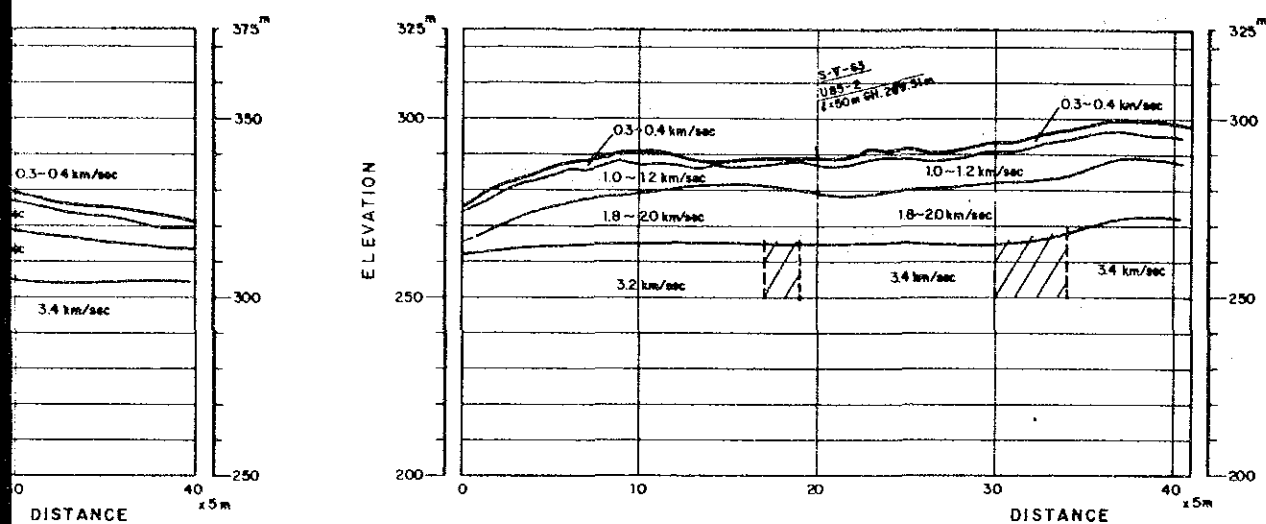
TENOM PANGI PH
RESULT OF SEISMIC I
(LINES VI, VII AND VIII BO
OF UPSTREAM DAM AXI
SEB / JI

FIGURE NO. : B29

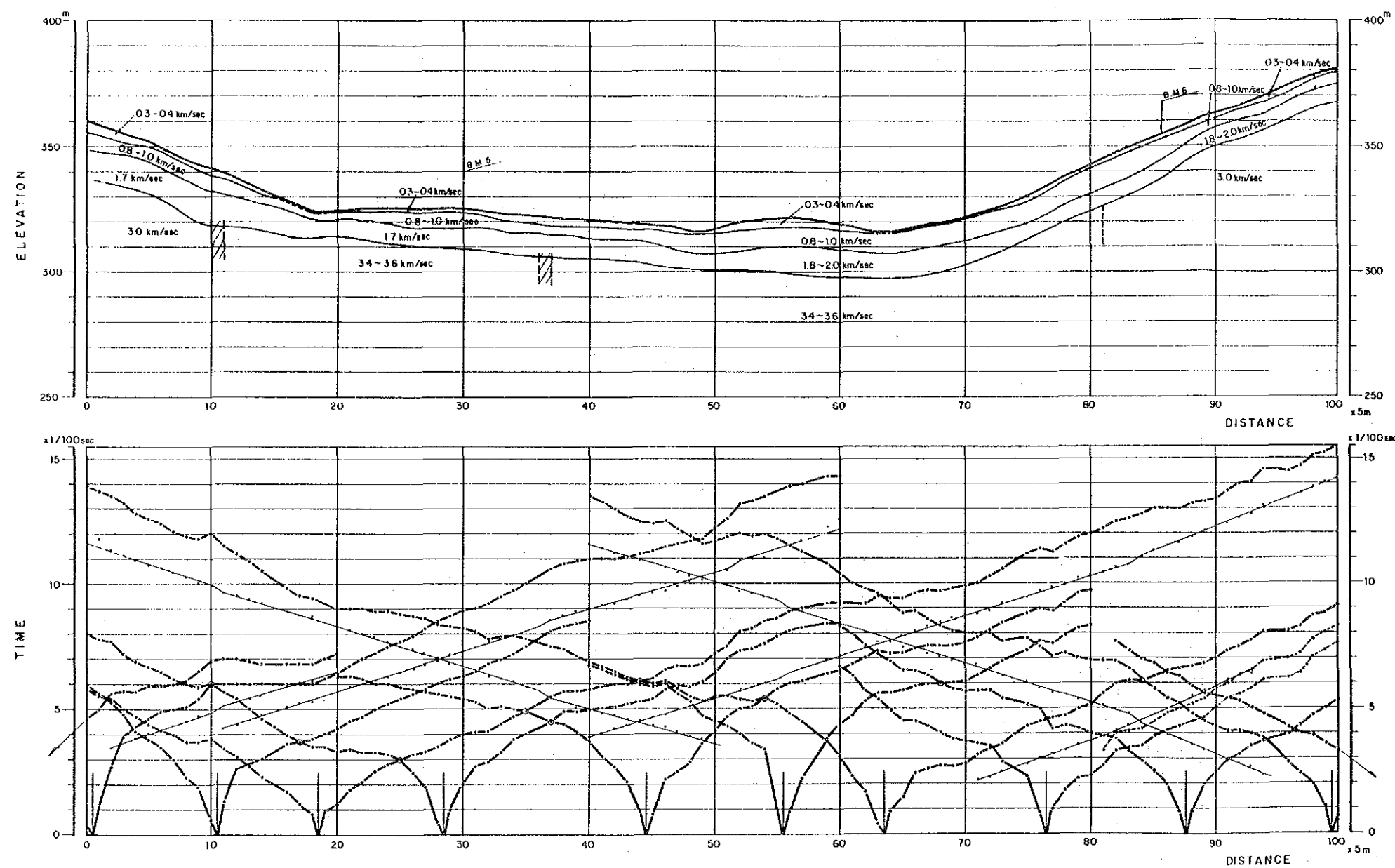
m Dam Axis)

(Line VII, Left Abutment of Upstream Dam Axis)

(Line VIII, Right Abutment of Upstream Dam Axis)

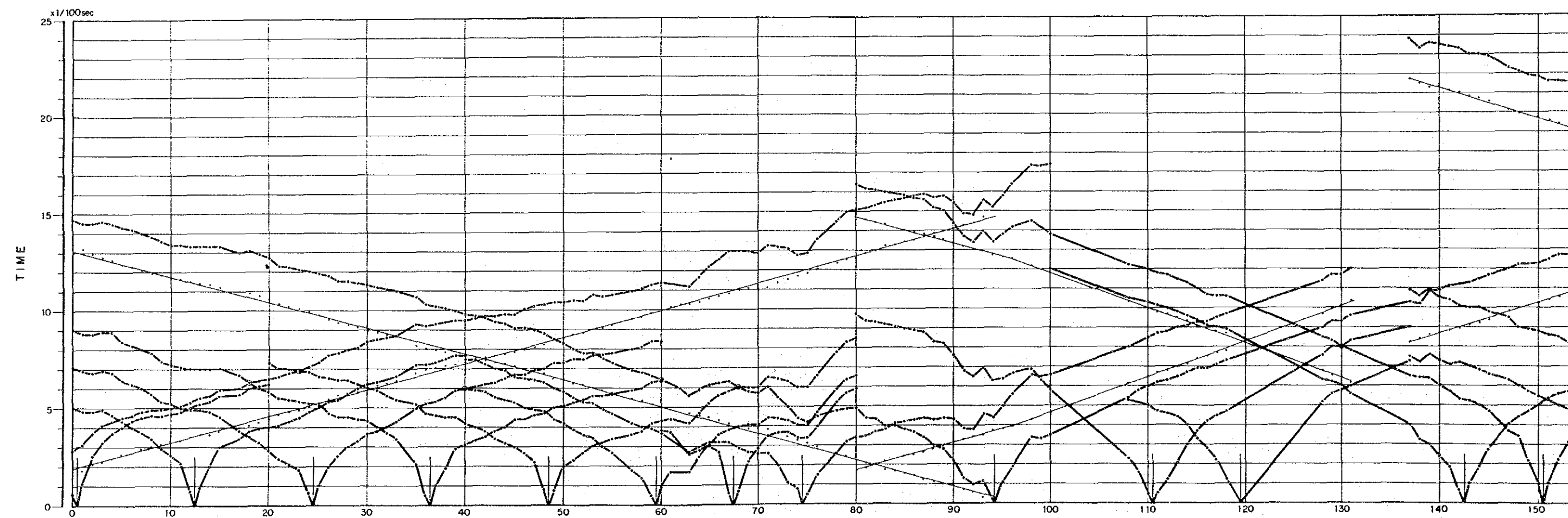
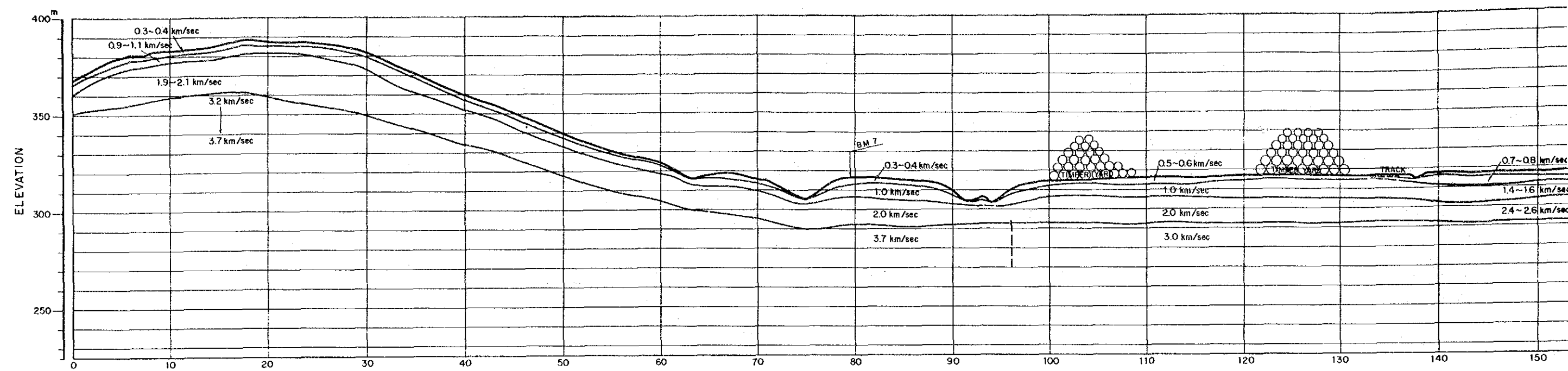


TENOM PANGI PHASE III
 RESULT OF SEISMIC EXPLORATION
 (LINES VI, VII AND VIII BOTH ABUTMENTS
 OF UPSTREAM DAM AXIS)
 SEB / JICA



SCALE H 0 10 20m
(1 : 400)

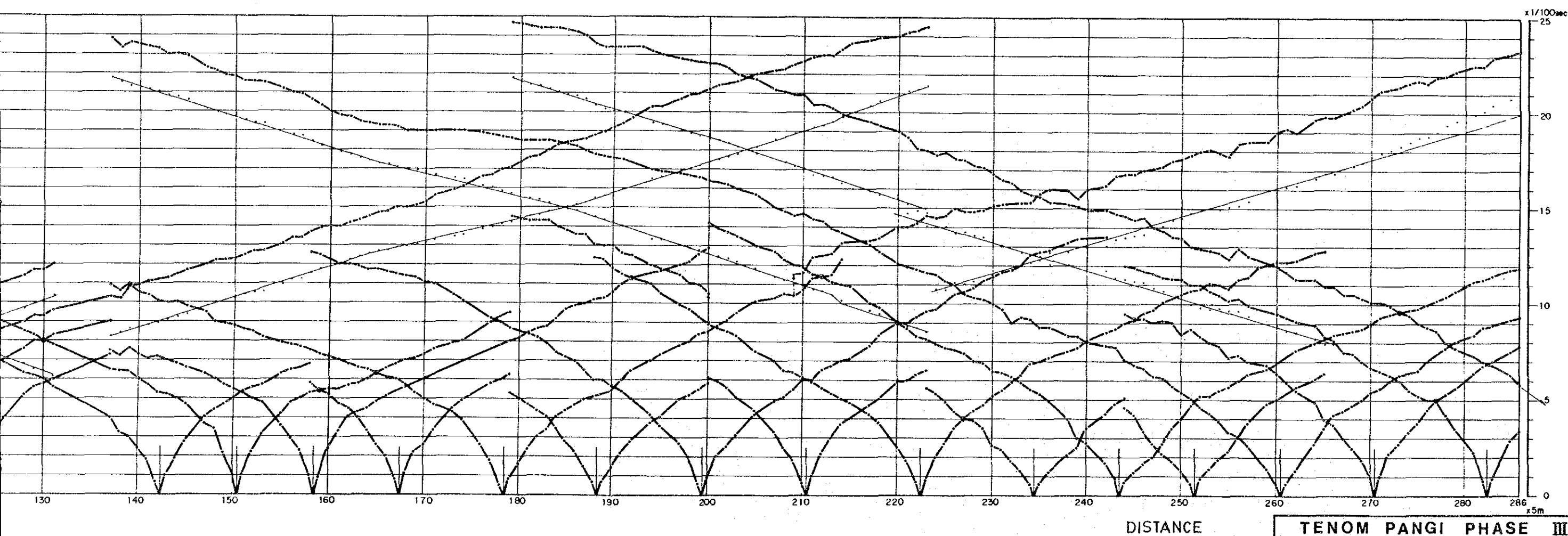
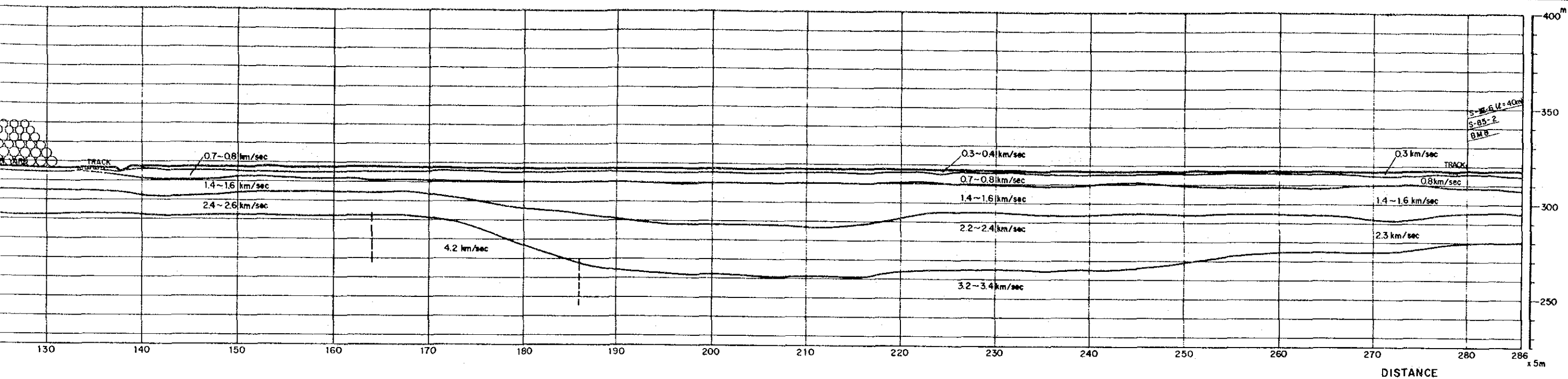
TENOM PANGI PHASE III
RESULT OF SEISMIC EXPLORATION (LINE IX, NO.1 SADDLE DAM AXIS)
SEB / JICA



SCALE F

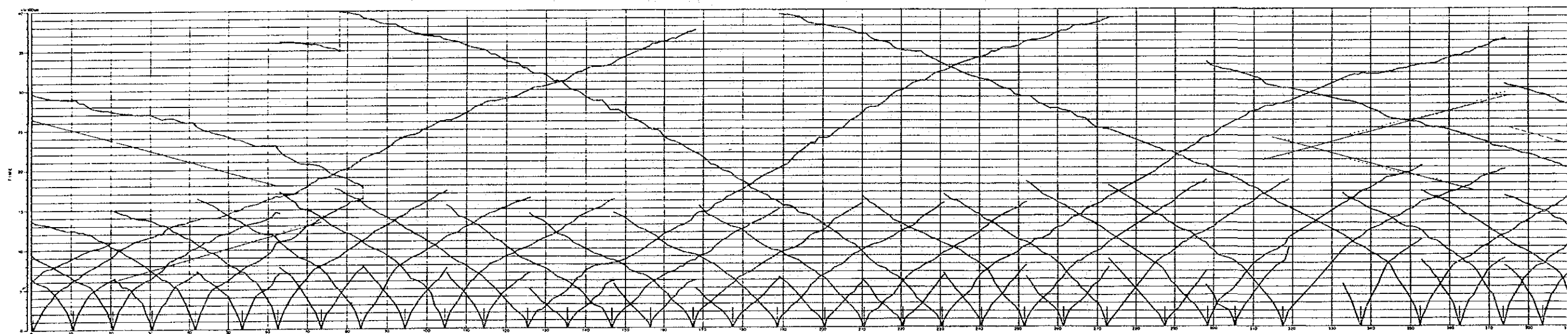
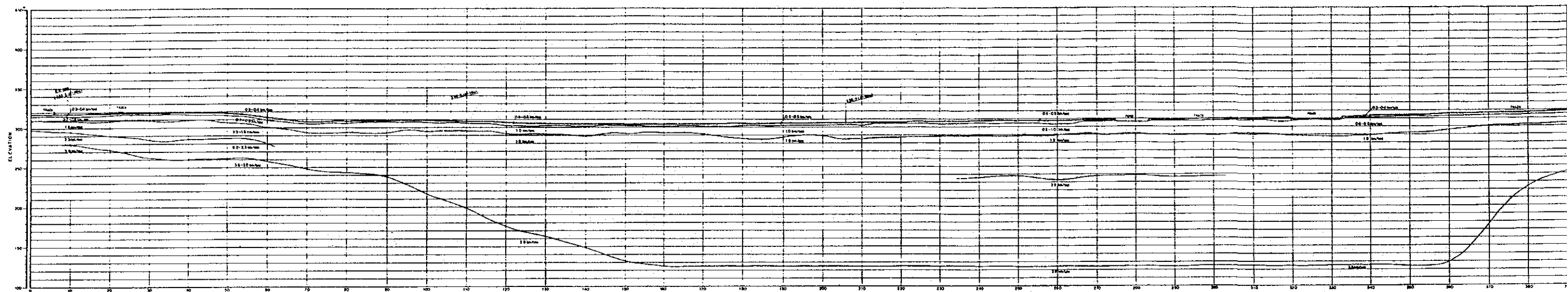
SCALE H 0 10 20m
(1 : 400)

TABLE NO. B 31



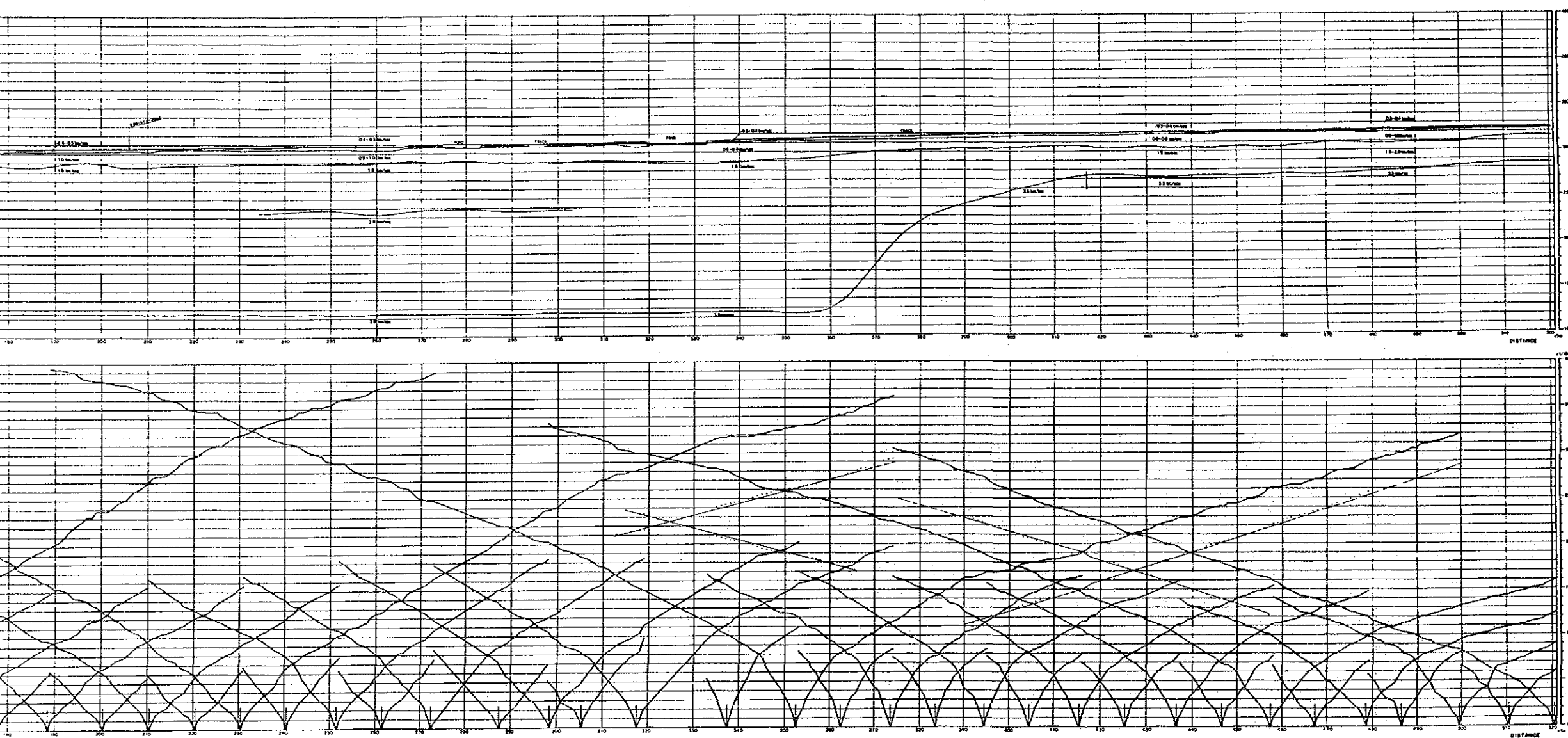
TENOM PANGI PHASE III
 RESULT OF SEISMIC EXPLORATION
 (LINE X, NO.2 SADDLE DAM AXIS)

SEB / JICA



SCALE H 0 50m
(1:1,000)

SCALE V 0 100 125m
(1:5,000)

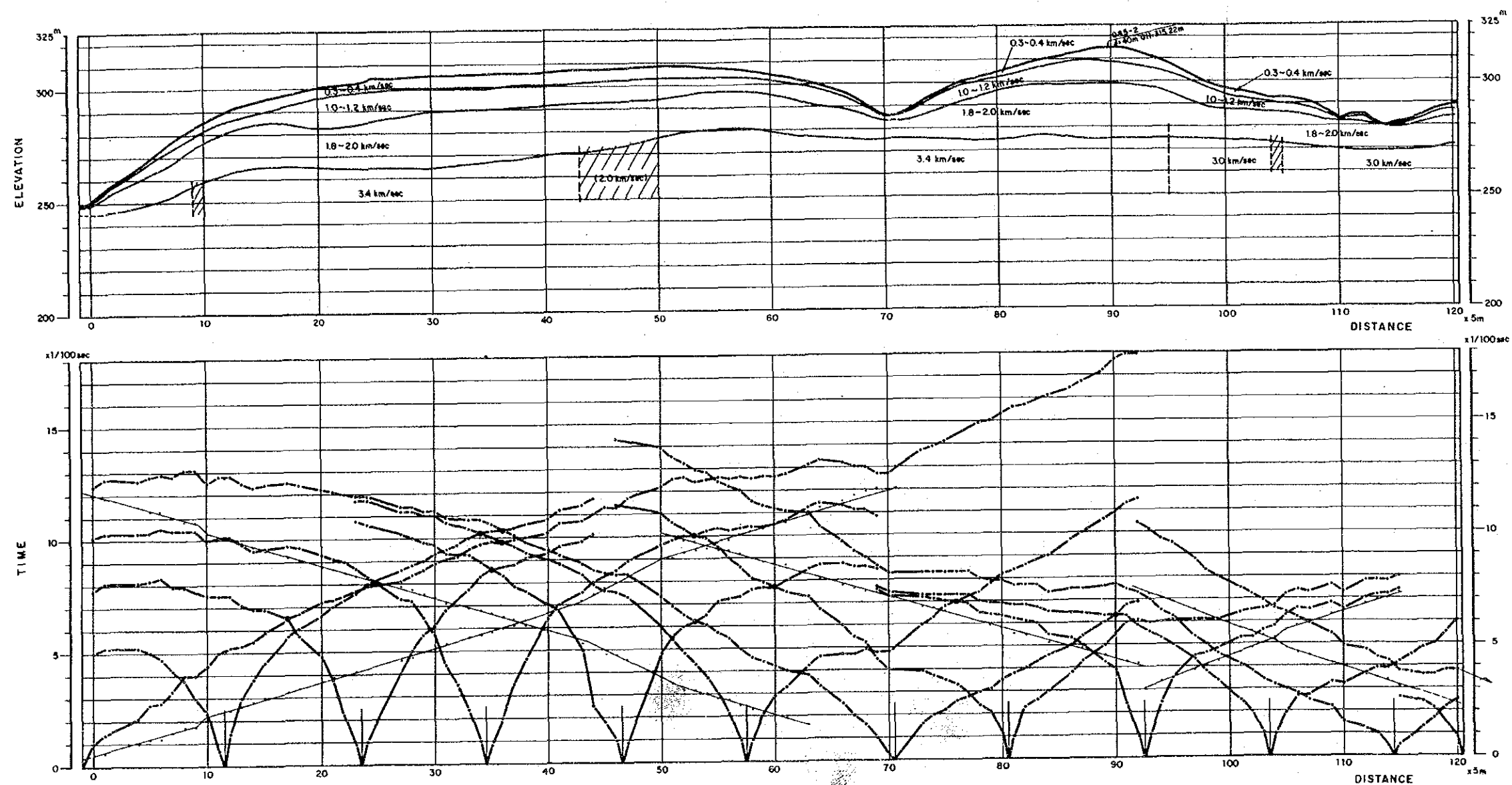


TENOM PANGI PHASE III

RESULT OF SEISMIC EXPLORATION
(LINE XI, NO.2 SADDLE DAM AXIS)

SEB / JICA

FIGURE NO. : B 33



SCALE H 0 10 20m
(1 : 400)

TENOM PANGI PHASE III
RESULT OF SEISMIC EXPLORATION
(LINE XII, NO.1 QUARRY SITE)
SEB / JICA

