

INDIAN TRIANGULATION COORDINATES :

Station No.	Easting	Northing	Height	Remarks
1	540 525.5	3 067 729.7	568.2	Gairdohat
2	542 438.1	3 075 919.3	1184.2	Kapilas
36	529 932.7	3 065 640.6		Bherabati

NOTE : All coordinates are expressed in meters and Universal Transverse Mercator (UTM) coordinates in Grid Zone 44 S with Central meridian of 84° East reading 500,000 meters.

LEGEND :

- △ No. 1 : Indian Survey Triangulation Points
- BM 1 : New bench marks
- BM 1 : Existing bench marks
- GC 1 : Ground control points for aero-photo mapping
- T 1 : Main traverse stations

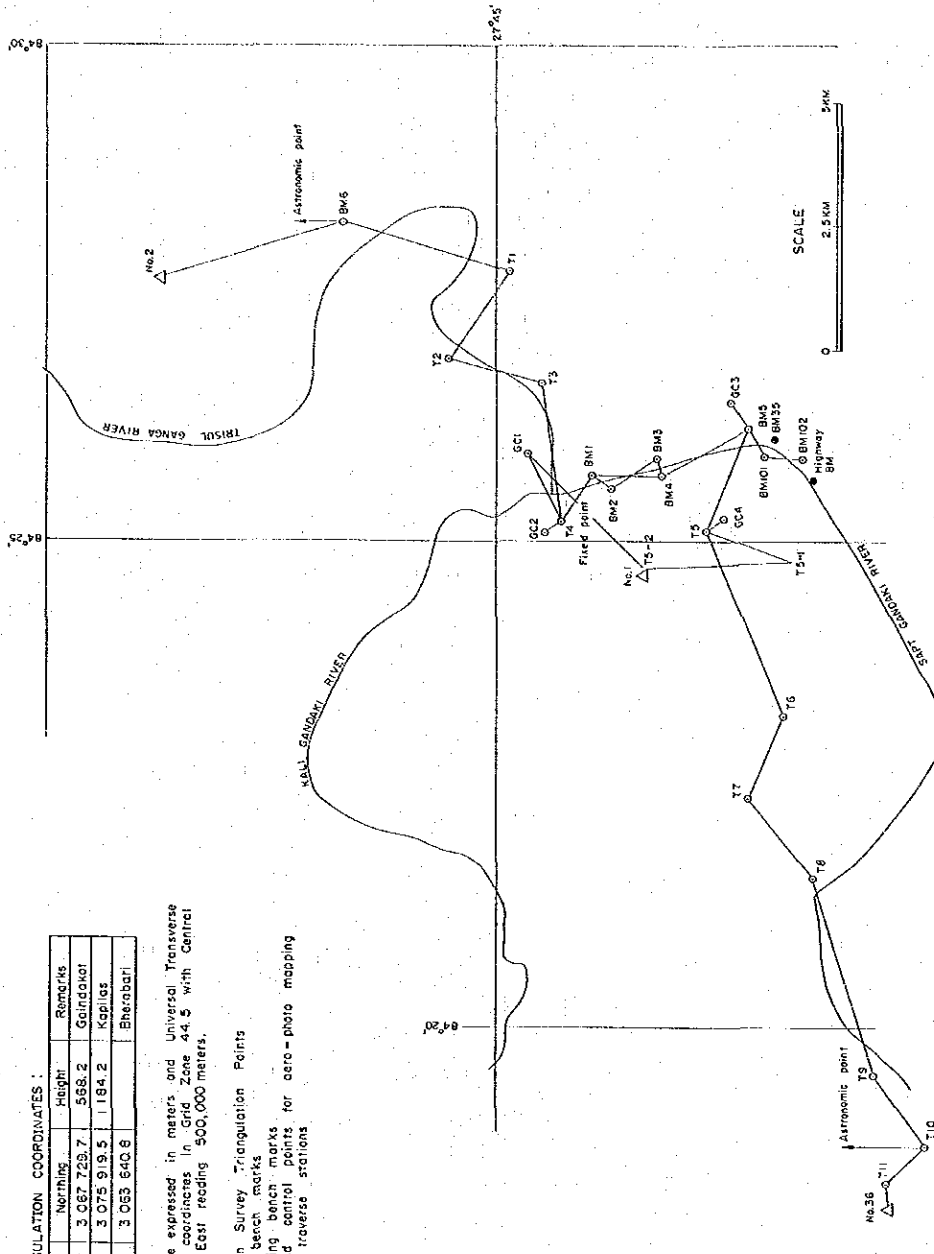


FIG- 4.2.4 : LOCATION MAP OF BENCH MARKS AND CONTROL POINTS

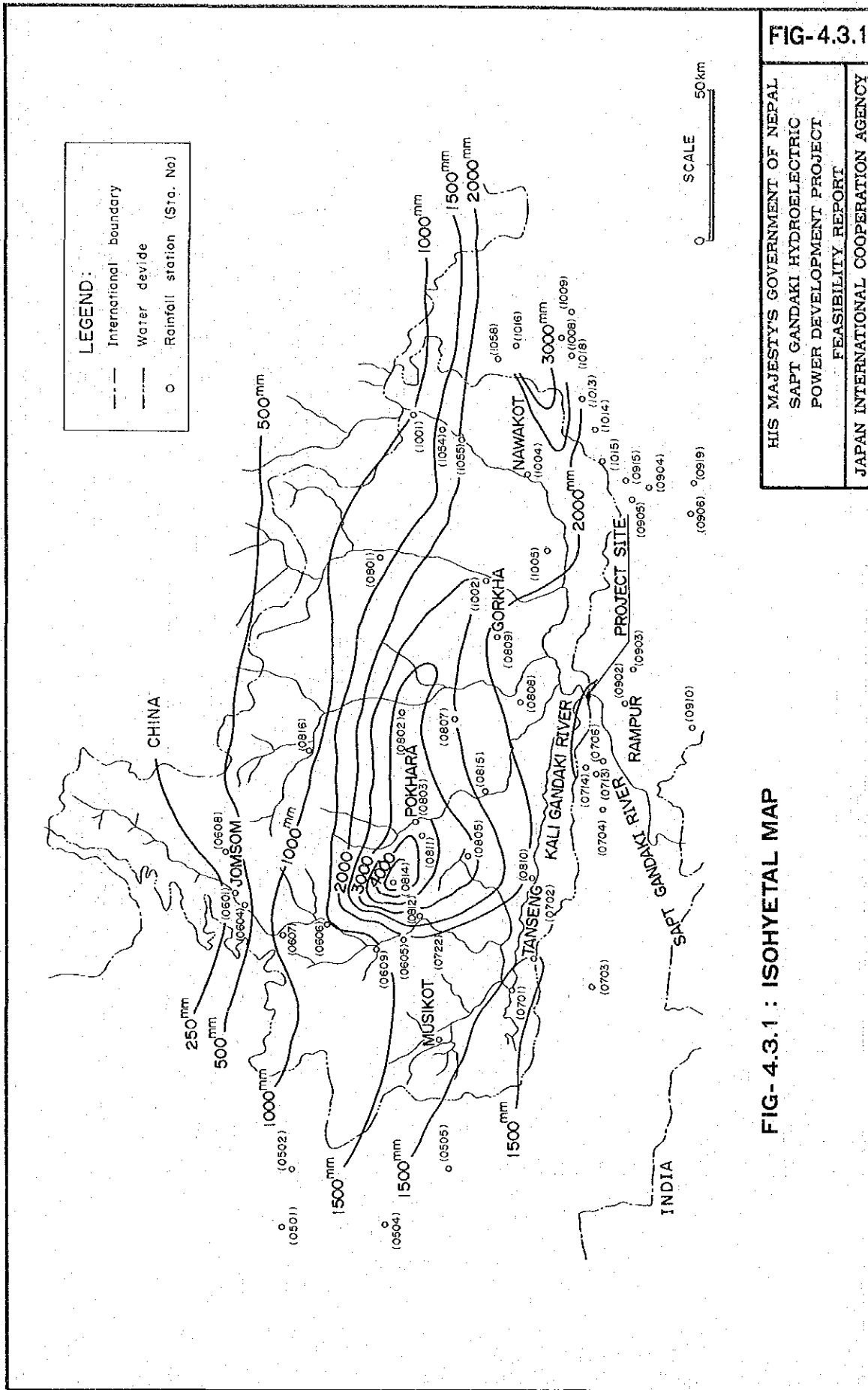
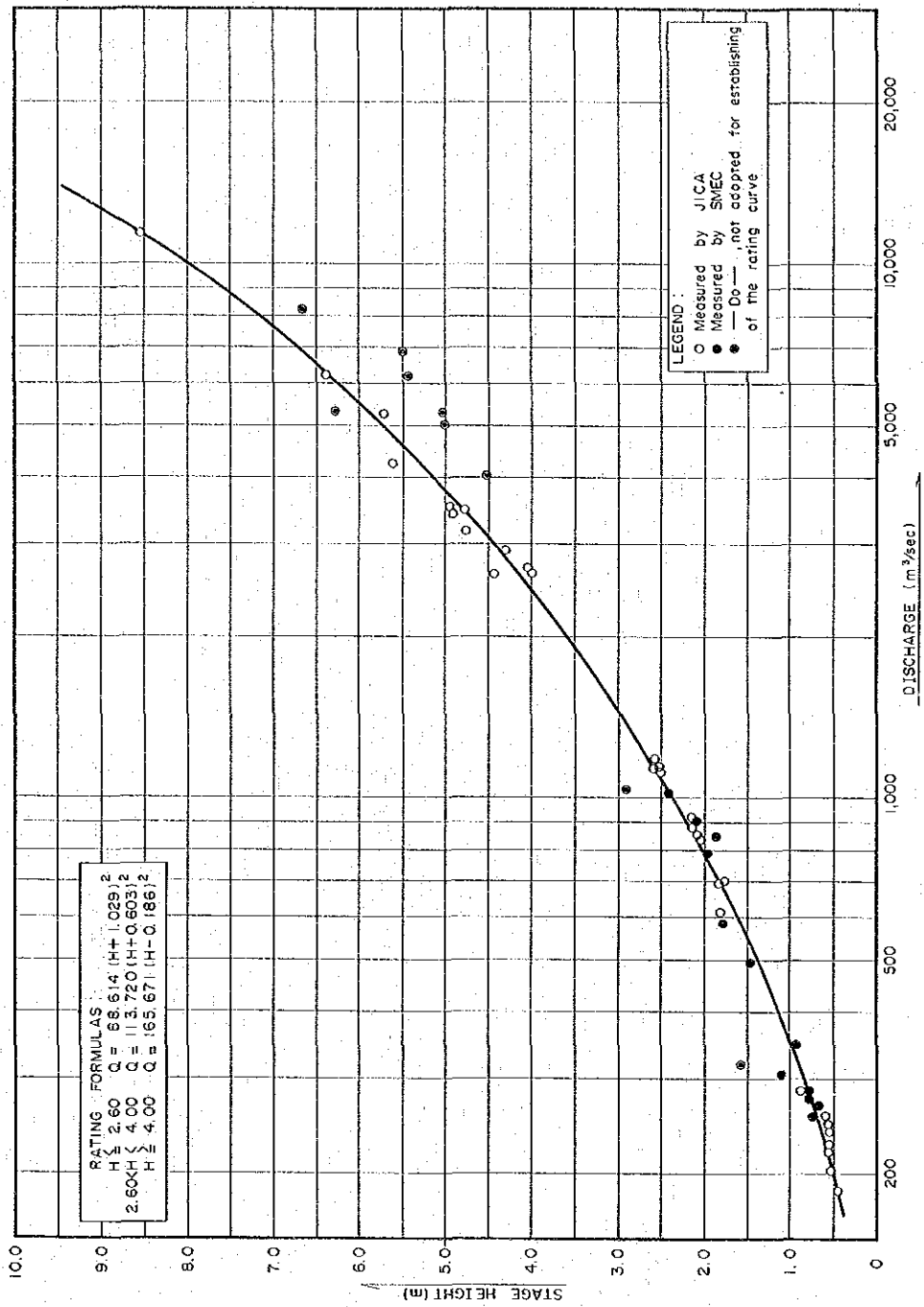


FIG-4.3.1 : ISOHYETAL MAP



**FIG-4.3.2 : DISCHARGE RATING CURVE AT GAGING STATION 450**

FIG-4.3.3

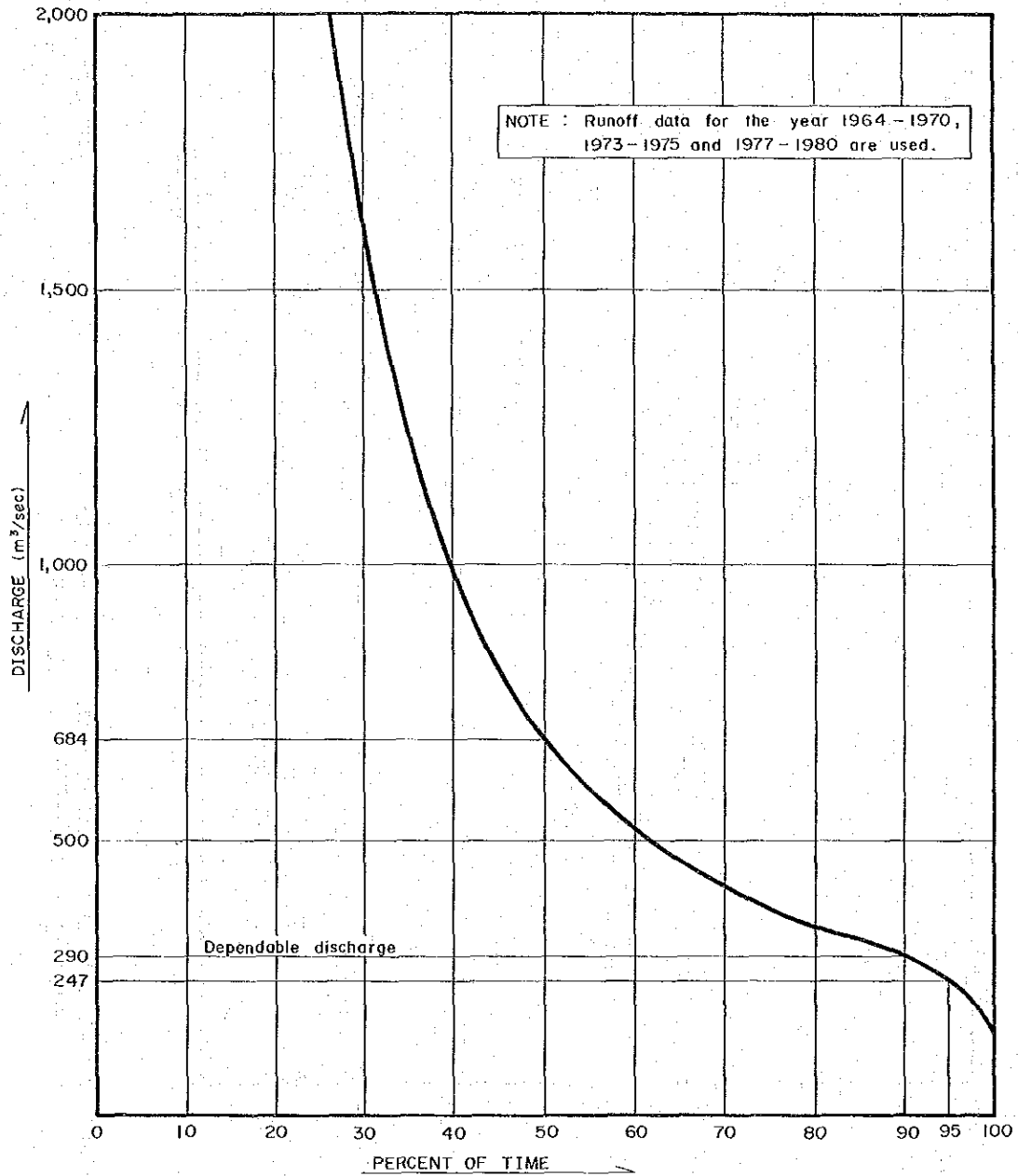
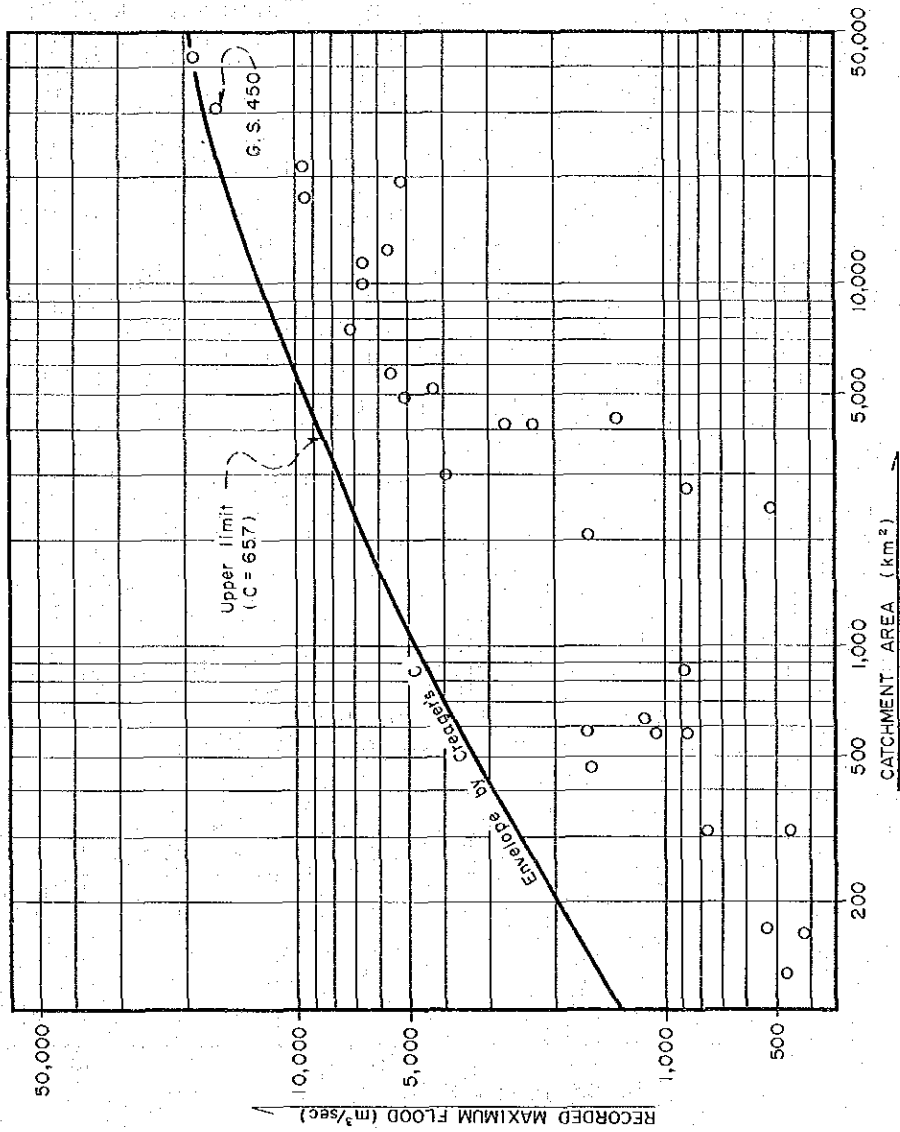


FIG- 4.3.3 : FLOW DURATION CURVE AT THE DAMSITE

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**FIG- 4.3.4: ENVELOPE CURVE OF RECORDED MAXIMUM FLOODS IN NEPAL**

FIG-4.3.5

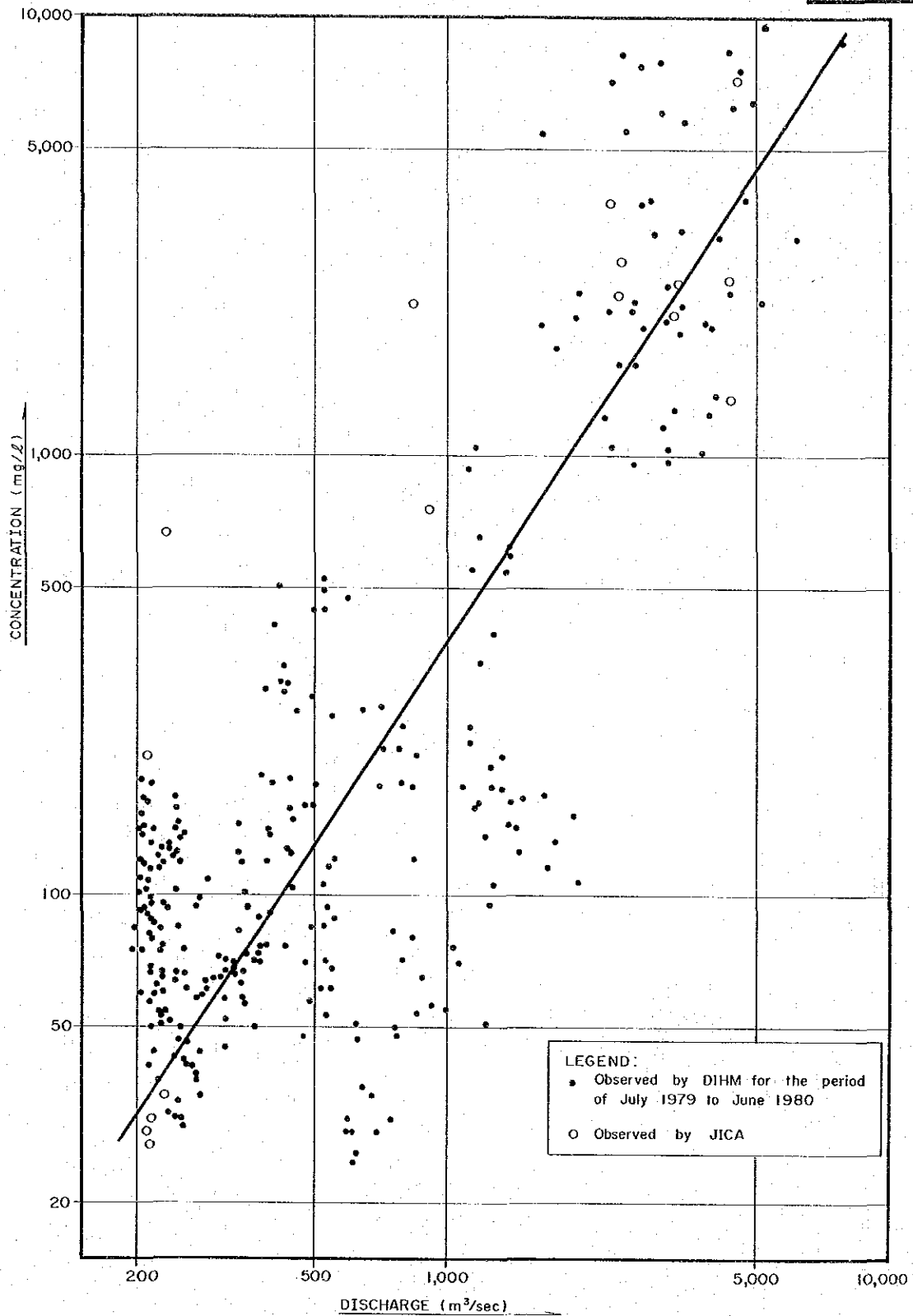


FIG- 4.3.5 : SUSPENDED LOAD VERSUS DISCHARGE

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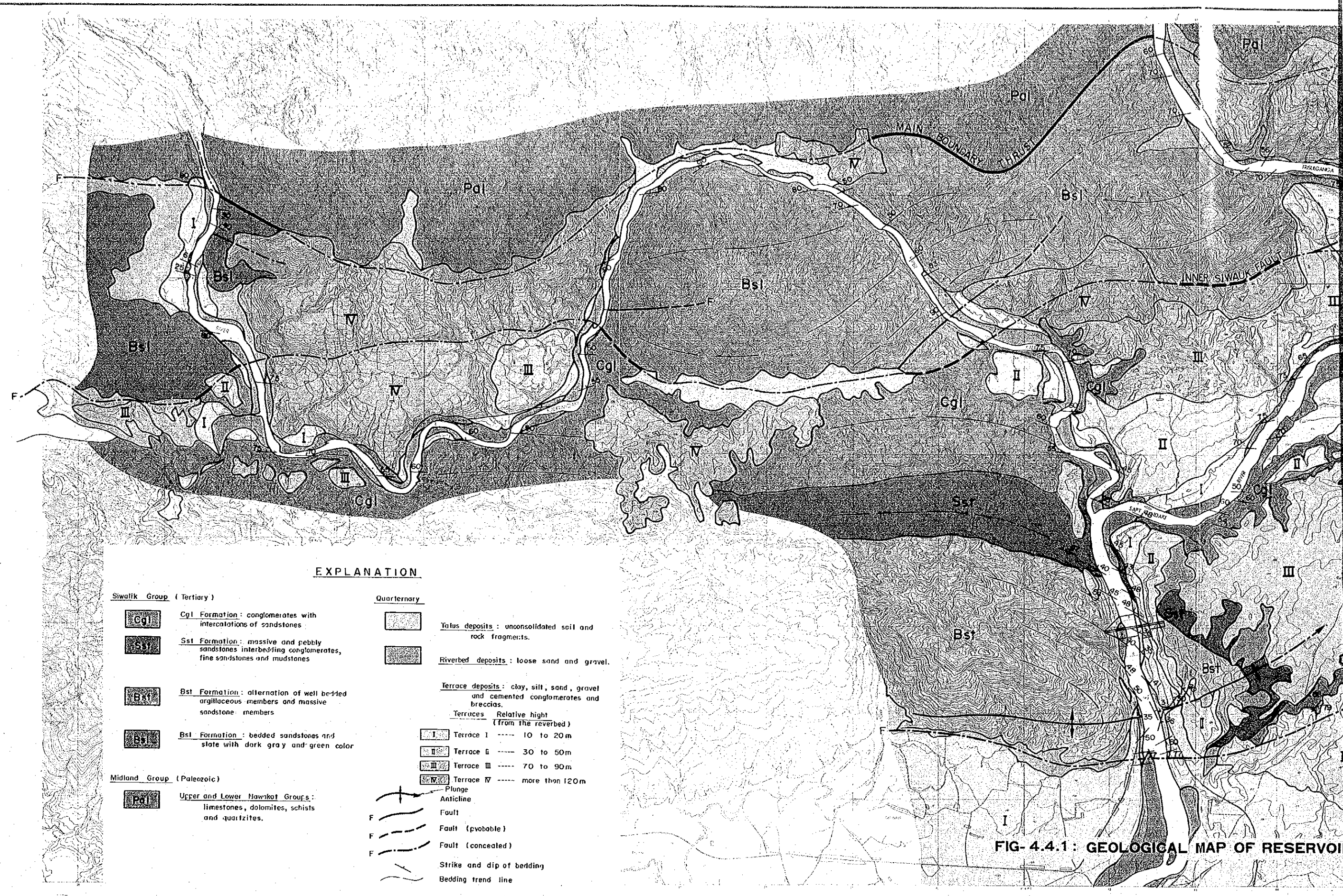
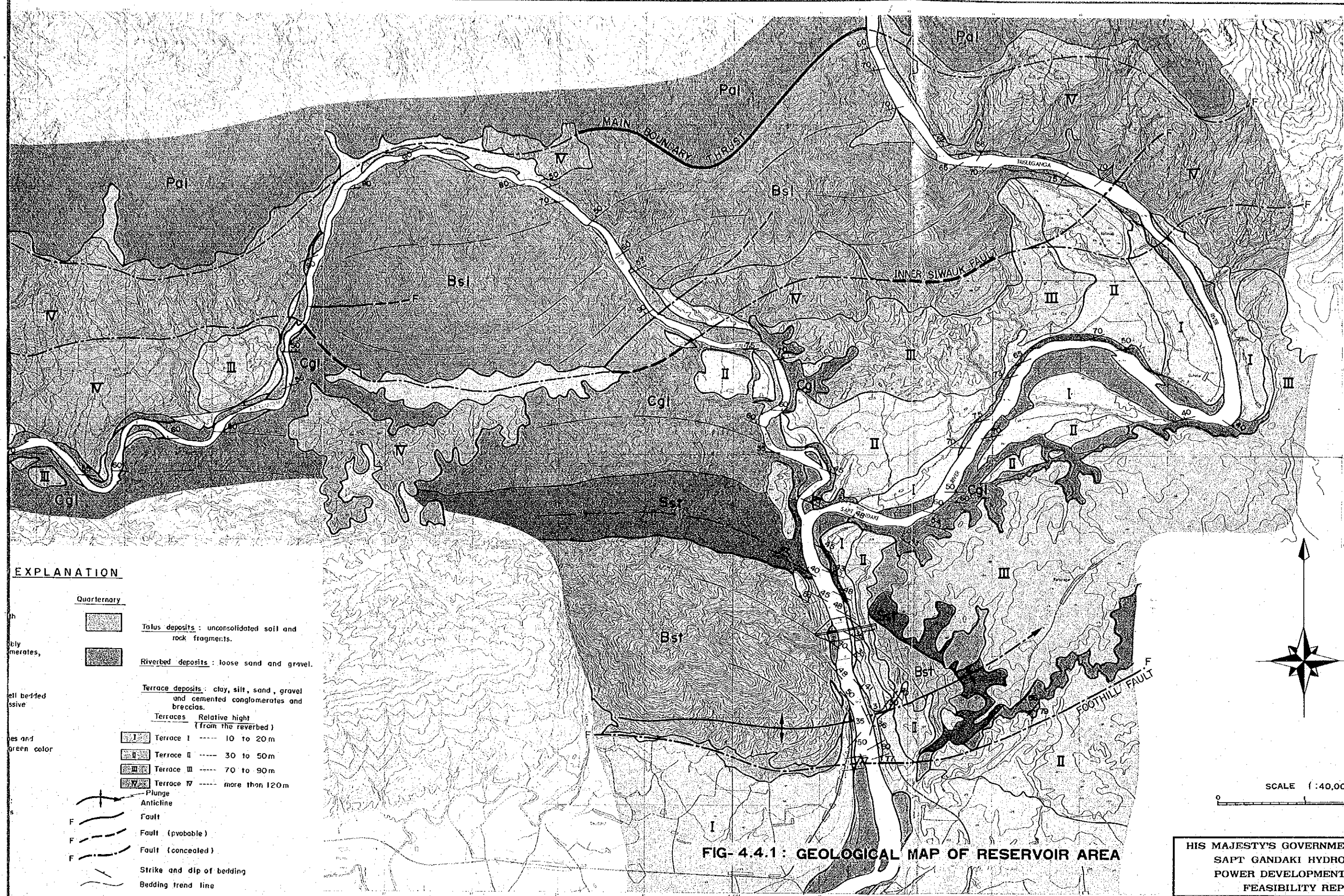


FIG- 4.4.1 : GEOLOGICAL MAP OF RESERVOIR



**EXPLANATION**

**Quaternary**

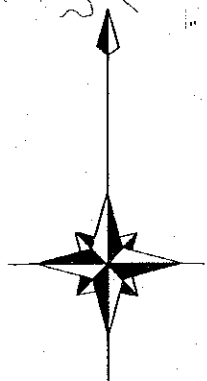
- Talus deposits : unconsolidated soil and rock fragments.
- Riverbed deposits : loose sand and gravel.
- Terrace deposits : clay, silt, sand, gravel and cemented conglomerates and breccias.

**Terraces**    Relative height (from the riverbed)

- Terrace I    ----- 10 to 20m
- Terrace II    ----- 30 to 50m
- Terrace III    ----- 70 to 90m
- Terrace IV    ----- more than 120m

**Plunge**

- Anticline
- Fault
- Fault (probable)
- Fault (concealed)
- Strike and dip of bedding
- Bedding trend line

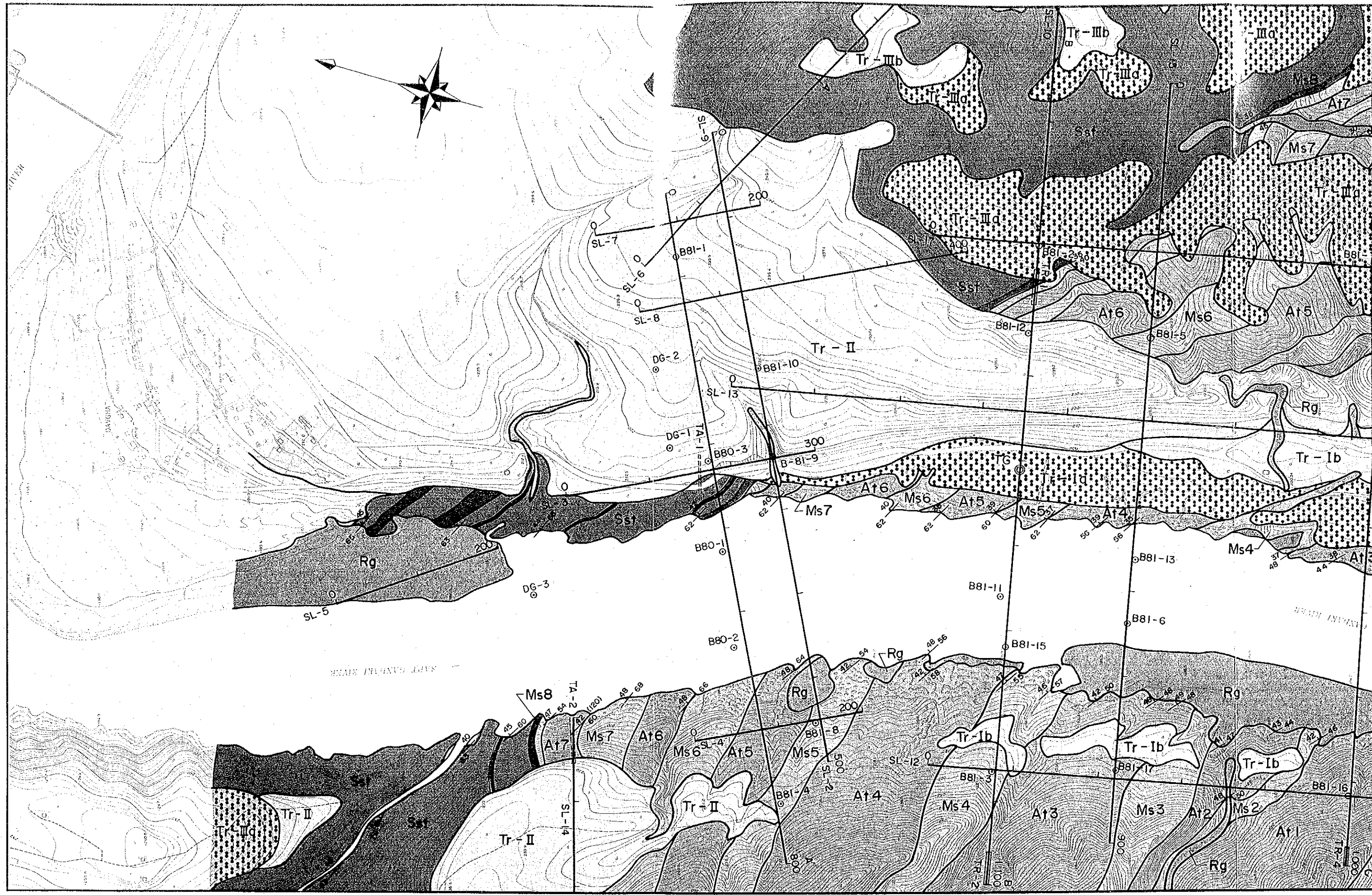


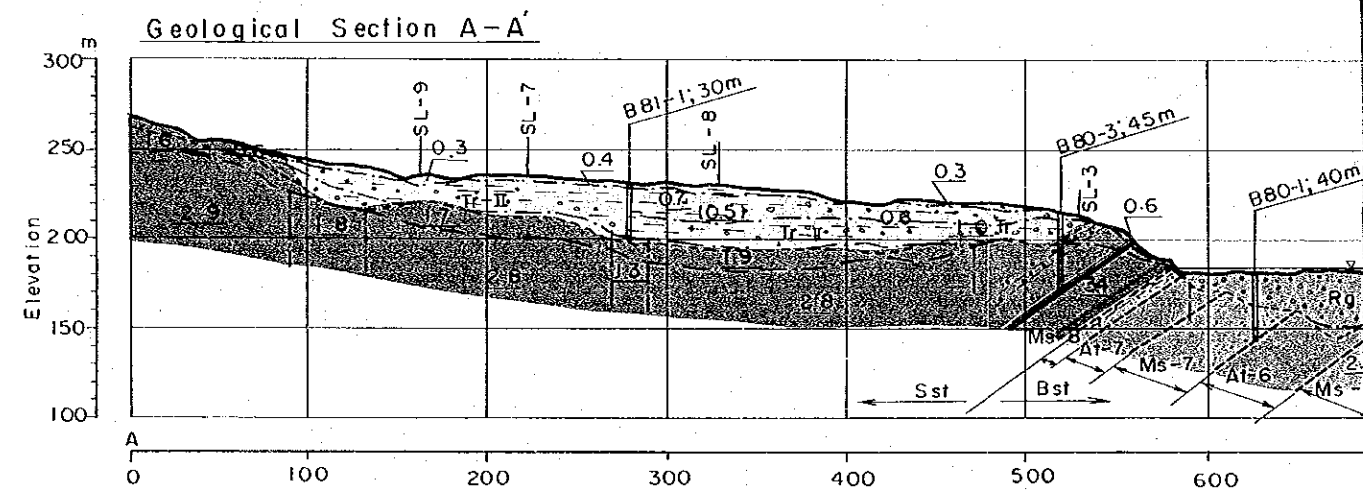
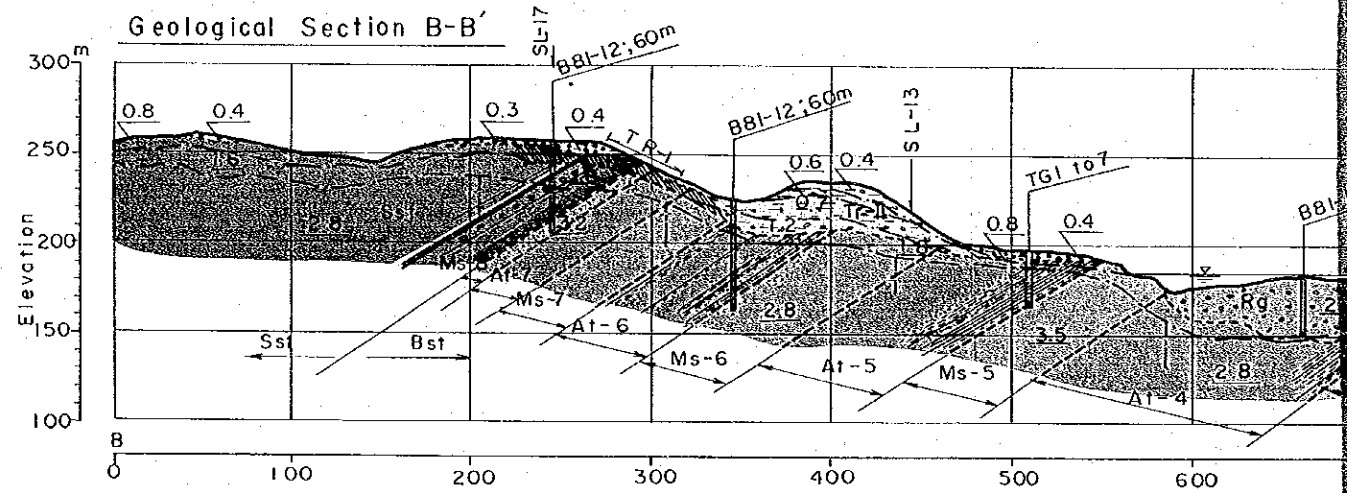
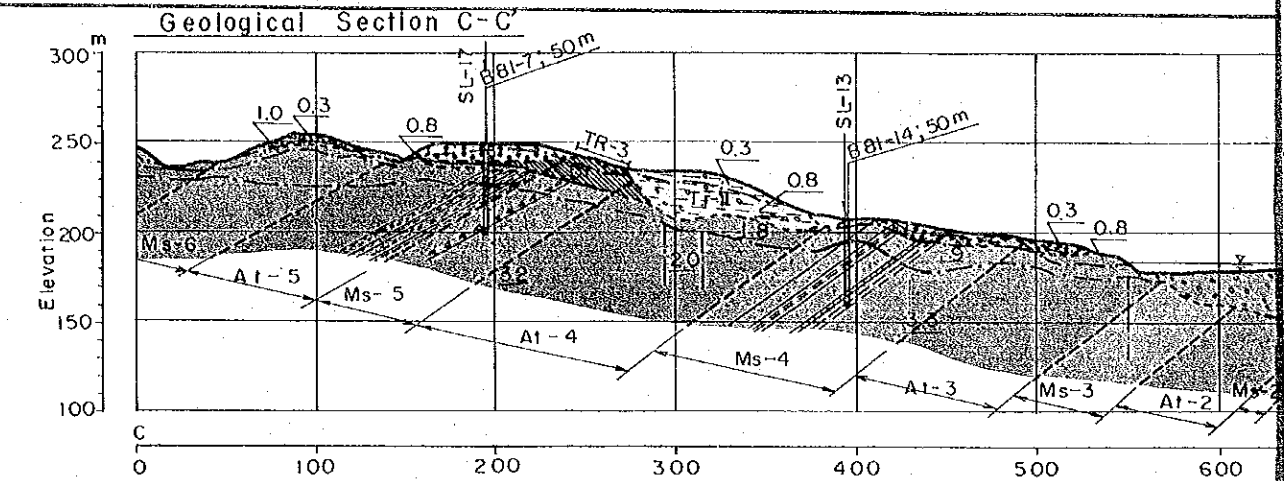
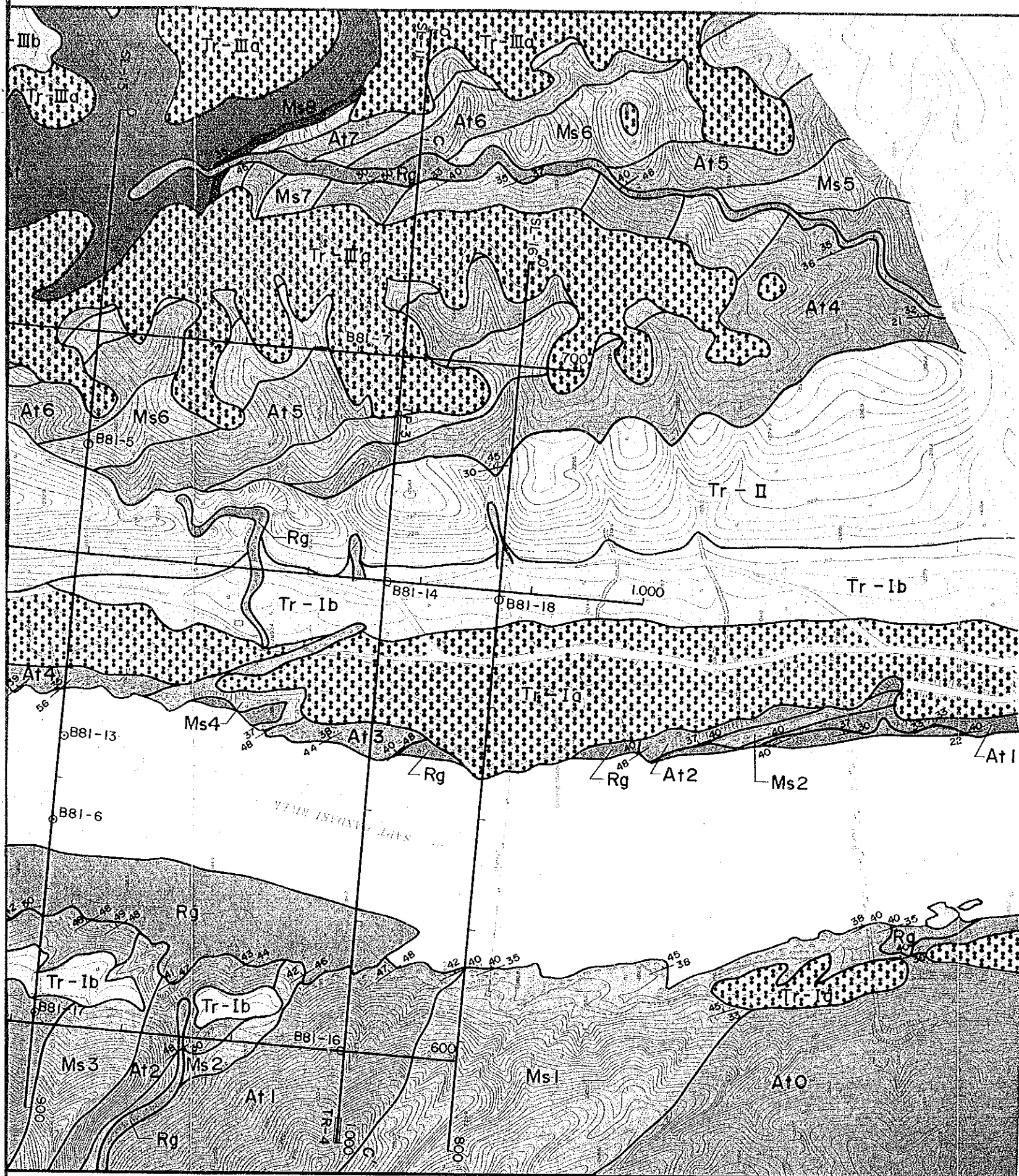
SCALE 1:40,000

FIG- 4.4.1 : GEOLOGICAL MAP OF RESERVOIR AREA

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 SAPT GANDAKI HYDROELECTRIC  
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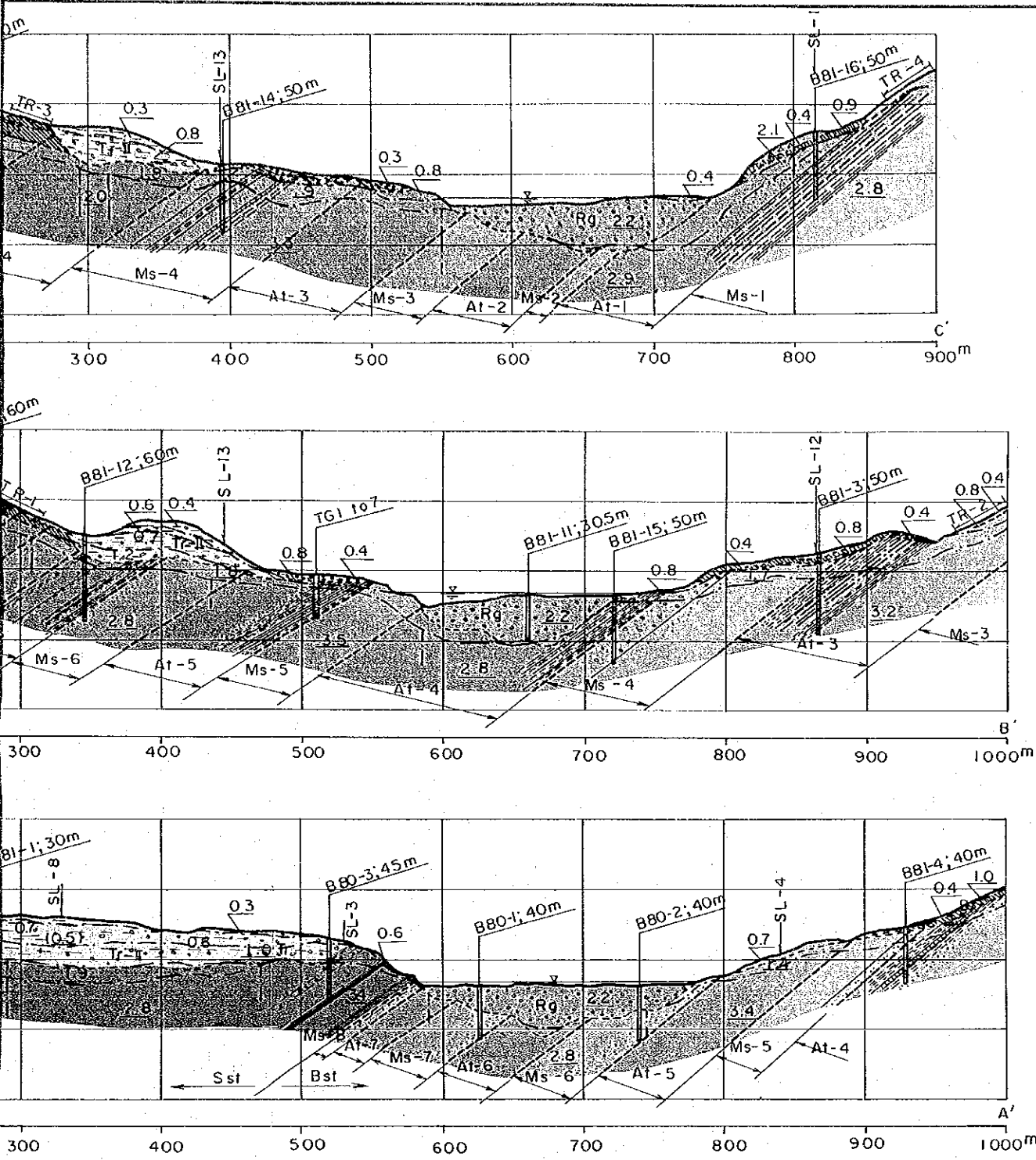
#### Marks in the Plan

- Boundary of strata.
- Strike and dip of bedding.
- Test drilling point.
- Seismic refraction survey line.
- Geological section line. (A, B and C)

#### Marks in the Sections

- Number of seismic prospecting traverse which intersects the section.
- Bore-hole No. and depth drilled. (unit in meter)
- Ground surface.
- River water level.
- Boundary of seismic wave velocity zone.
- Boundary of geological facies.
- Seismic wave velocity (unit in km/sec)

FIG- 4.4.2



Explanation

		Descriptions		Thickness	
Alluvium	Riverbed Deposits	Rg	Silt, sand and gravel.	15 to 40 m in the main channel	
	Terrace Deposits	Lower Terrace	Tr-Ia	Silt, sand, gravel and cemented conglomerates.	0 to 8 m
			Tr-Ib	Silt, sand and gravel.	3 to 10 m
		Middle Terrace	Tr-II	Thick deposits of clay, silt, sand and gravel and cemented conglomerates; including large boulders.	40 to 40 m
		Higher Terrace	Tr-IIIa	Brownish color clay, silt and sand with basal gravel.	3 to 10 m
		Tr-IIIb	Brownish color clay, silt and sand with soft pebbles and underlying residual soil.	2 to 8 m	
Siwalik Group	Sst Formation (200 m+)	Mudstone Bed	Massive and pebbly, medium to coarse sandstones; with interbeds of 3 to 7 m-thick pebble conglomerate beds and argillaceous rock beds.	200 m+	
		Conglomerate Bed			
	Bst Formation (600 m+)	Ms-8 Member	Ms-8	Massive and pebbly sandstones.	7 m
		At-7 Member	At-7	Bedded calcareous shales, muddy sandstones and fine sandstones; interbedding an intraformational breccia.	15 to 20 m
		Ms-7 Member	Ms-7	Massive medium to coarse sandstones; including laminations and concretions.	25 m
		At-6 Member	At-6	Bedded calcareous shales, greenish mudstones and sandstones; the lower half is thickly bedded fine sandstones.	30 m
		Ms-6 Member	Ms-6	Massive medium to coarse sandstones; including pebbles and concretions; fine sandstones are interbedded in the lower.	30 m
		At-5 Member	At-5	Bedded shales, mudstones, fine sandstones and breccias; argillaceous rocks and fine sandstones are alternated.	35 m
		Ms-5 Member	Ms-5	Massive medium to very coarse sandstones separated in three units by two layers of greenish thin mudstones; pebble layers are in the lower.	25 to 30 m
		At-4 Member	At-4	Bedded shales, mudstones, fine to very fine sandstones and breccias; shales are calcareous and hard with thick bedding.	65 m
		Ms-4 Member	Ms-4	Massive medium to very coarse sandstones with a few intercalations of calcareous shales, mudstones and fine sandstones.	45 to 60 m
		At-3 Member	At-3	Bedded shales, mudstones, fine to very fine sandstones and breccias; a few meter thick calcareous shales are striking in the middle part.	50 to 65 m
		Ms-3 Member	Ms-3	Massive sandstones with scattered pebbles; laminations and concretion layers are included.	30 m
		At-2 Member	At-2	Bedded shales, mudstones and fine to very fine sandstones with intraformational fragments; fine sandstones are predominant.	35 m
		Ms-2 Member	Ms-2	A thick bed of medium to coarse sandstone.	10 m
		At-1 Member	At-1	Bedded shales, mudstones, very fine to medium sandstones and breccias; generally calcareous except greenish color sandy mudstone.	45 m
		Ms-1 Member	Ms-1	Massive medium to coarse sandstones with pebbles; a few meter thick intraformational breccia interbedded in the middle.	105 m
		At-0 Member	At-0	Bedded shales, mudstones and fine sandstones.	15 m+

Marks in the Sections

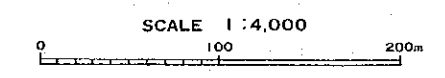
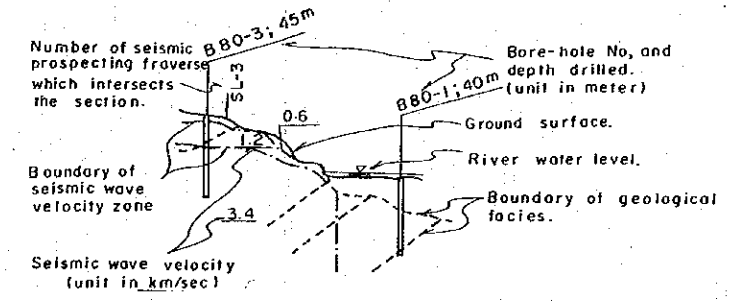
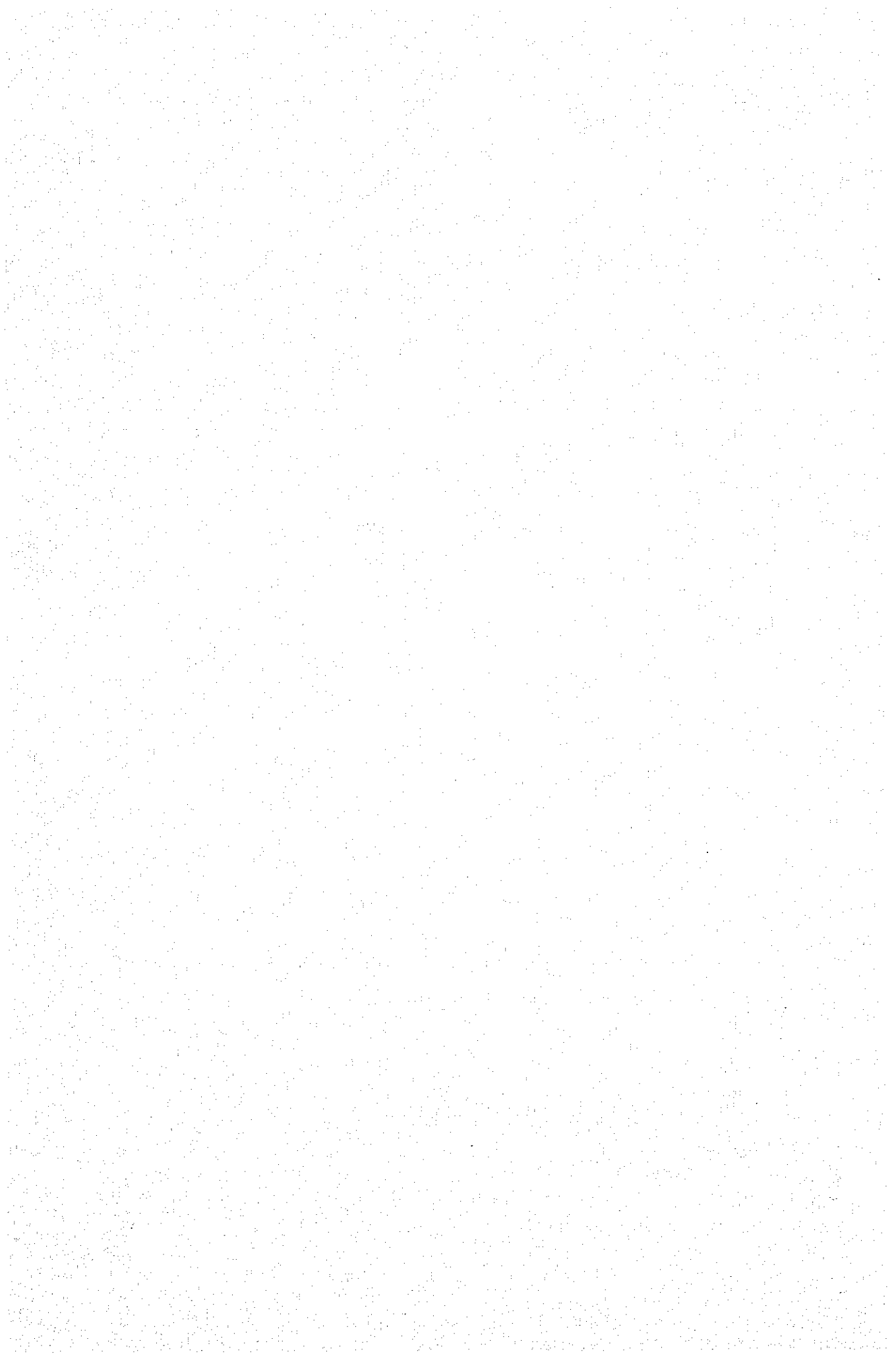


FIG-4.4.2 : GEOLOGICAL MAP AND SECTION OF DAMSITE

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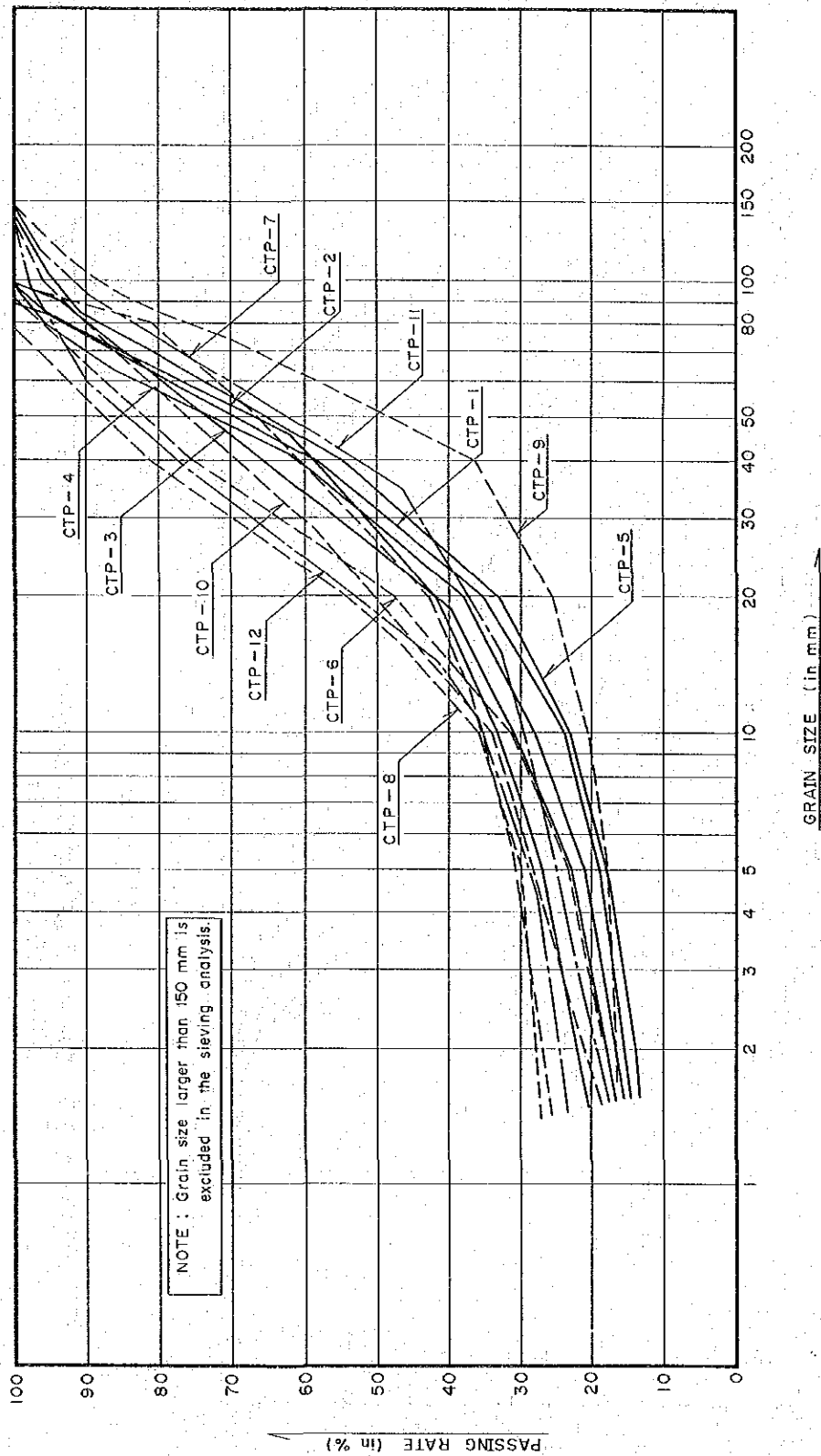
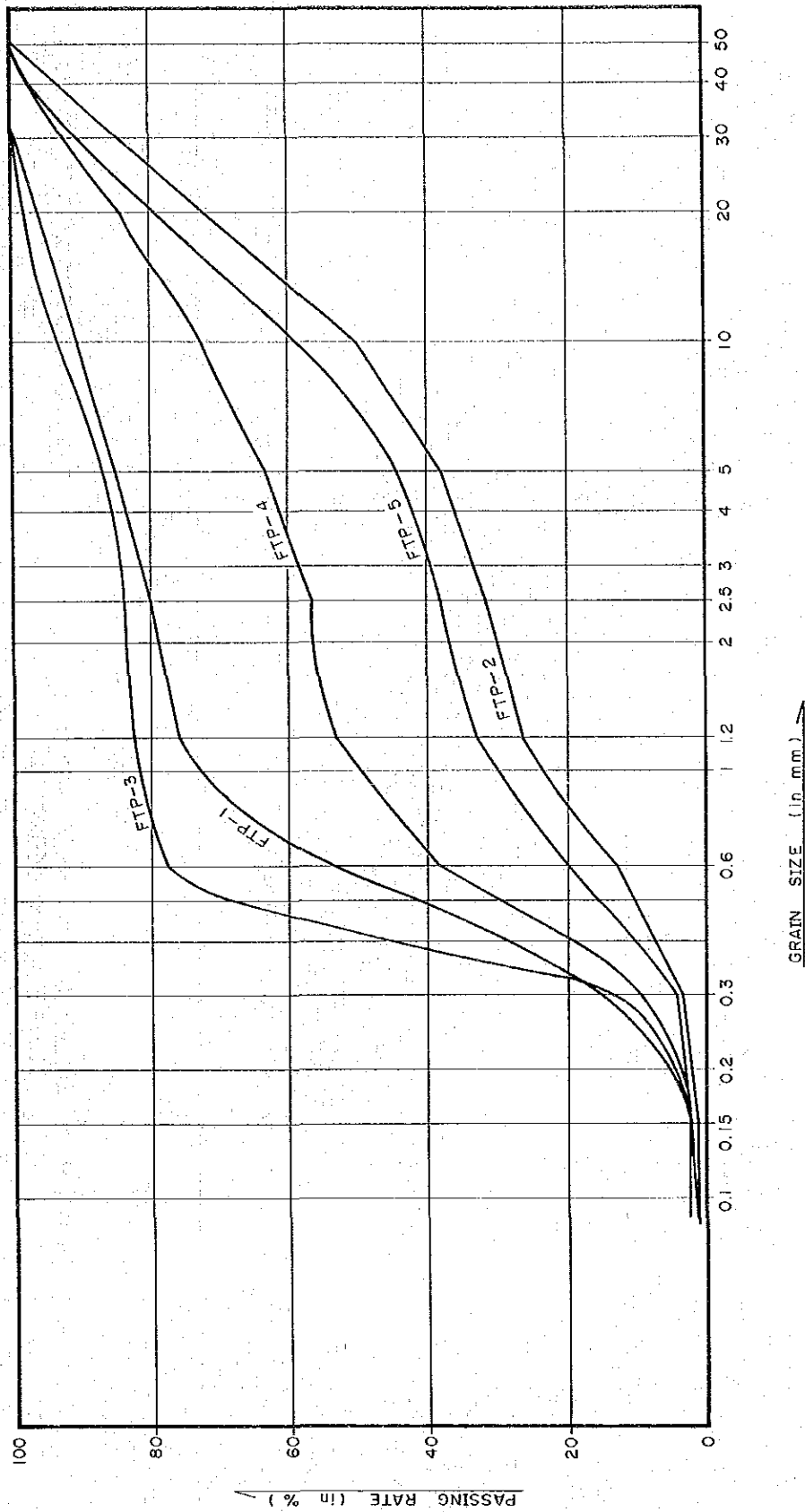
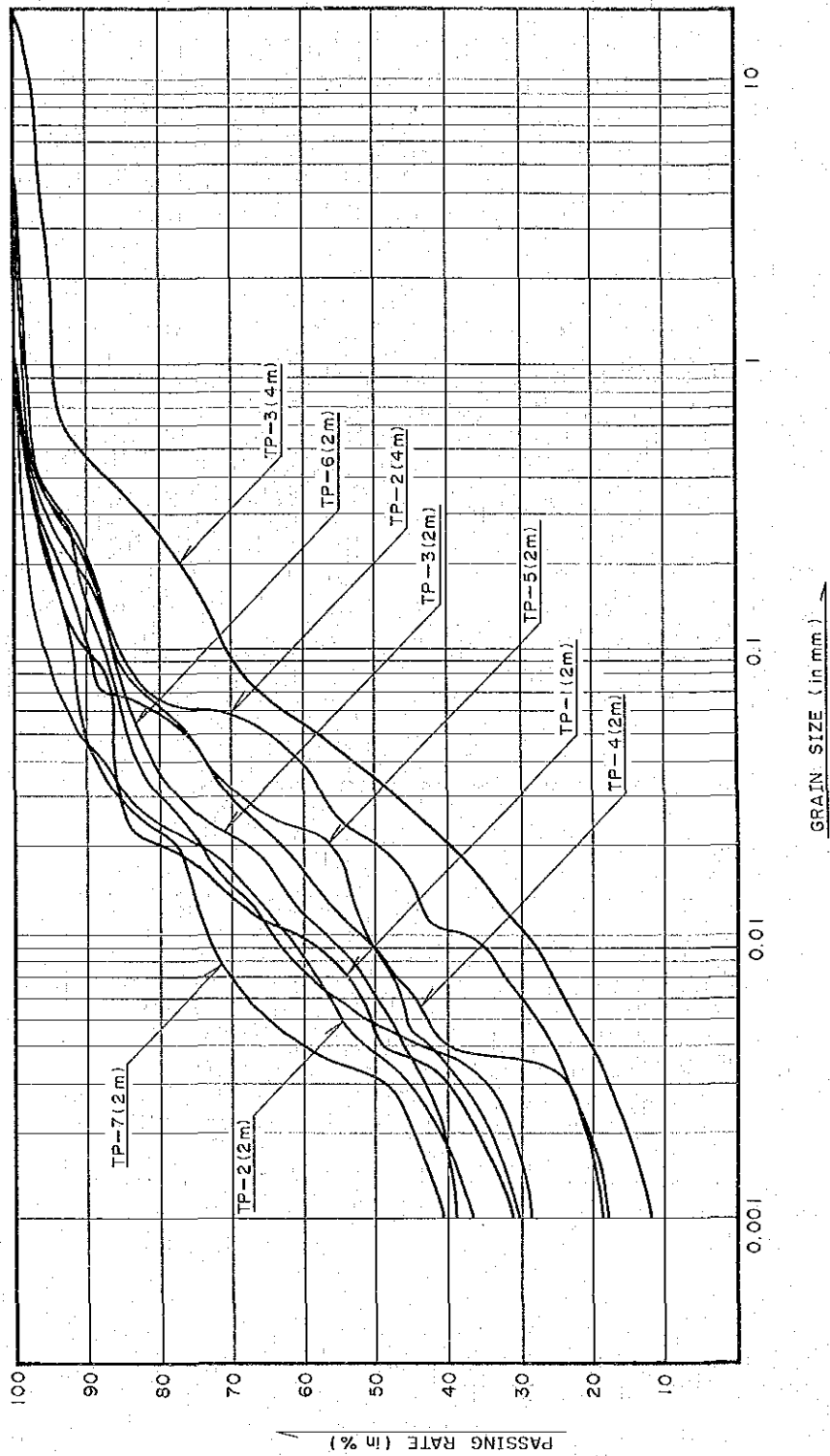


FIG- 4.5.1 : SIEVING ANALYSIS RESULT (COARSE AGGREGATE)

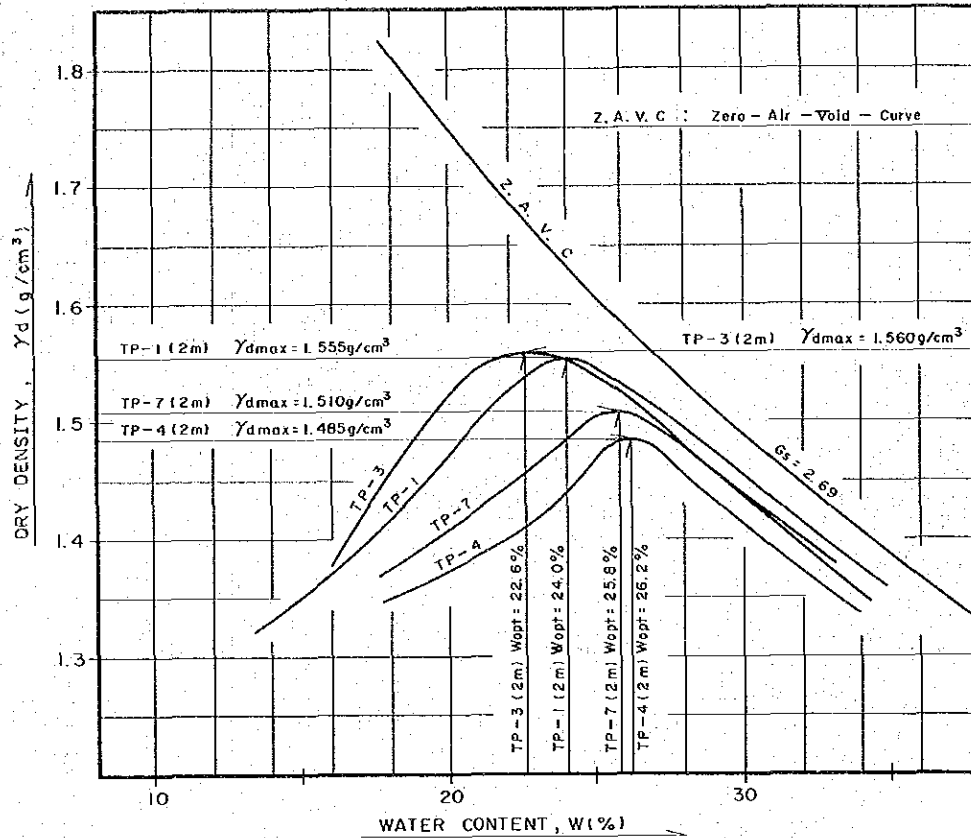


**FIG- 4.5.2 : SIEVING ANALYSIS RESULT (FINE AGGREGATE)**



**FIG- 4.5.3: SIEVING ANALYSIS RESULT  
(CORE MATERIAL)**

FIG-4.5.4



	Energy $E_c$ (%)	$\gamma_d$ max (g/cm <sup>3</sup> )	$W_{opt}$ (%)	$W_f - W_{opt}$ (%)
TP-1 (2m)	100	1.555	24.0	-6.2
TP-3 (2m)	"	1.560	22.6	-2.4
TP-4 (2m)	"	1.485	26.2	-5.7
TP-7 (2m)	"	1.510	25.8	-1.8

FIG- 4.5.4: COMPACTION TEST RESULT FOR CORE MATERIALS



FIG-4.5.5

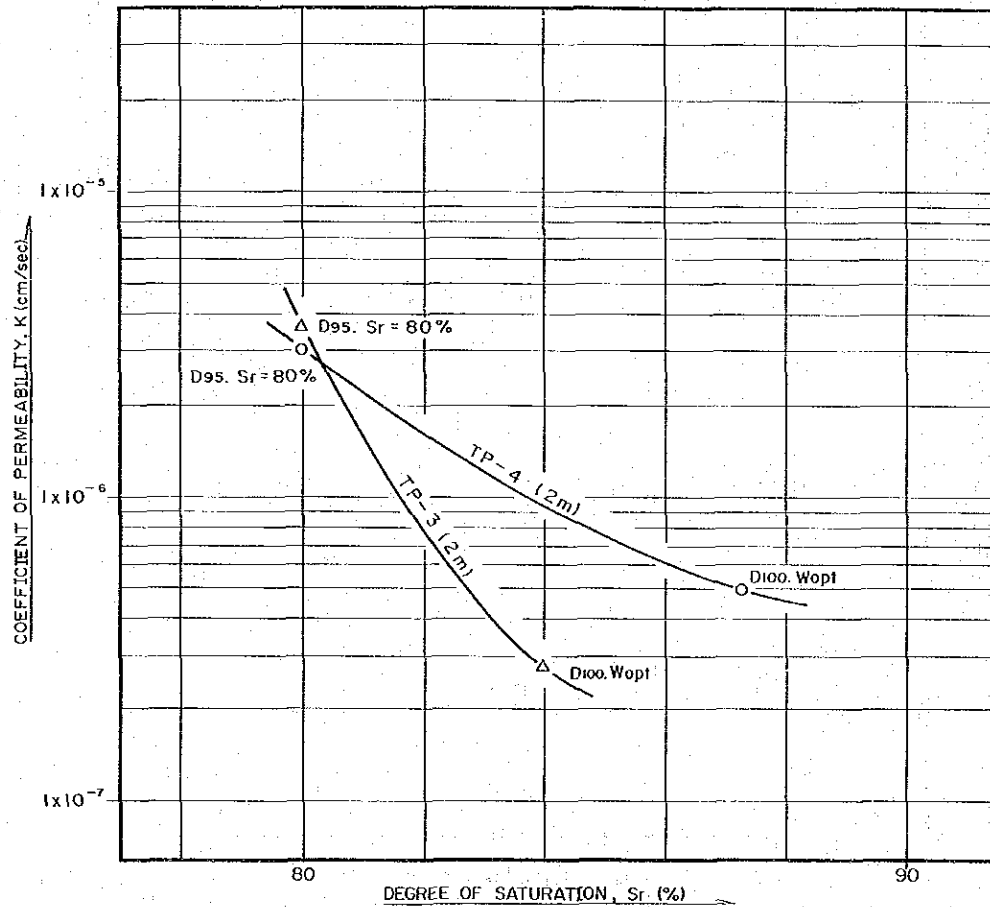
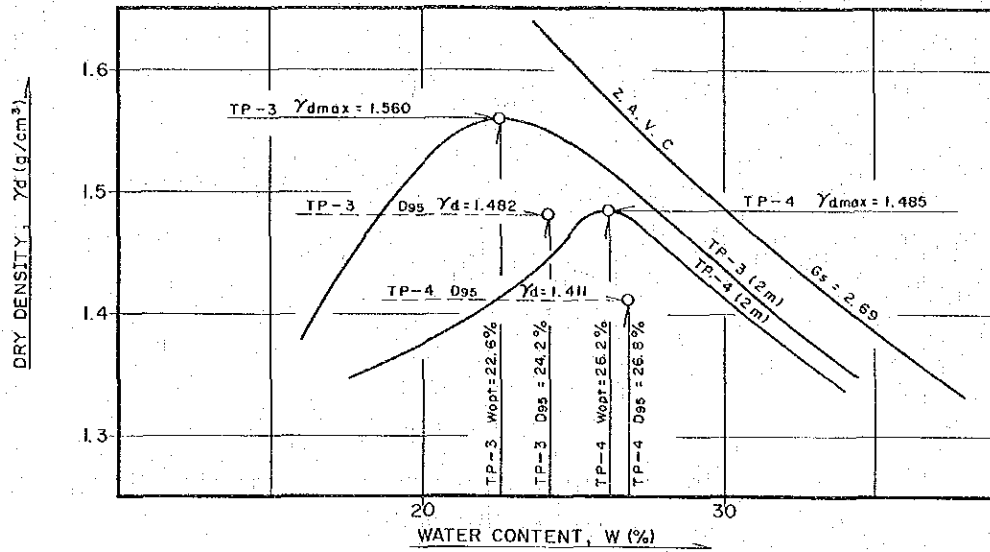


FIG-4.5.5: PERMEABILITY TEST RESULT FOR CORE MATERIALS

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FIG-4.5.6

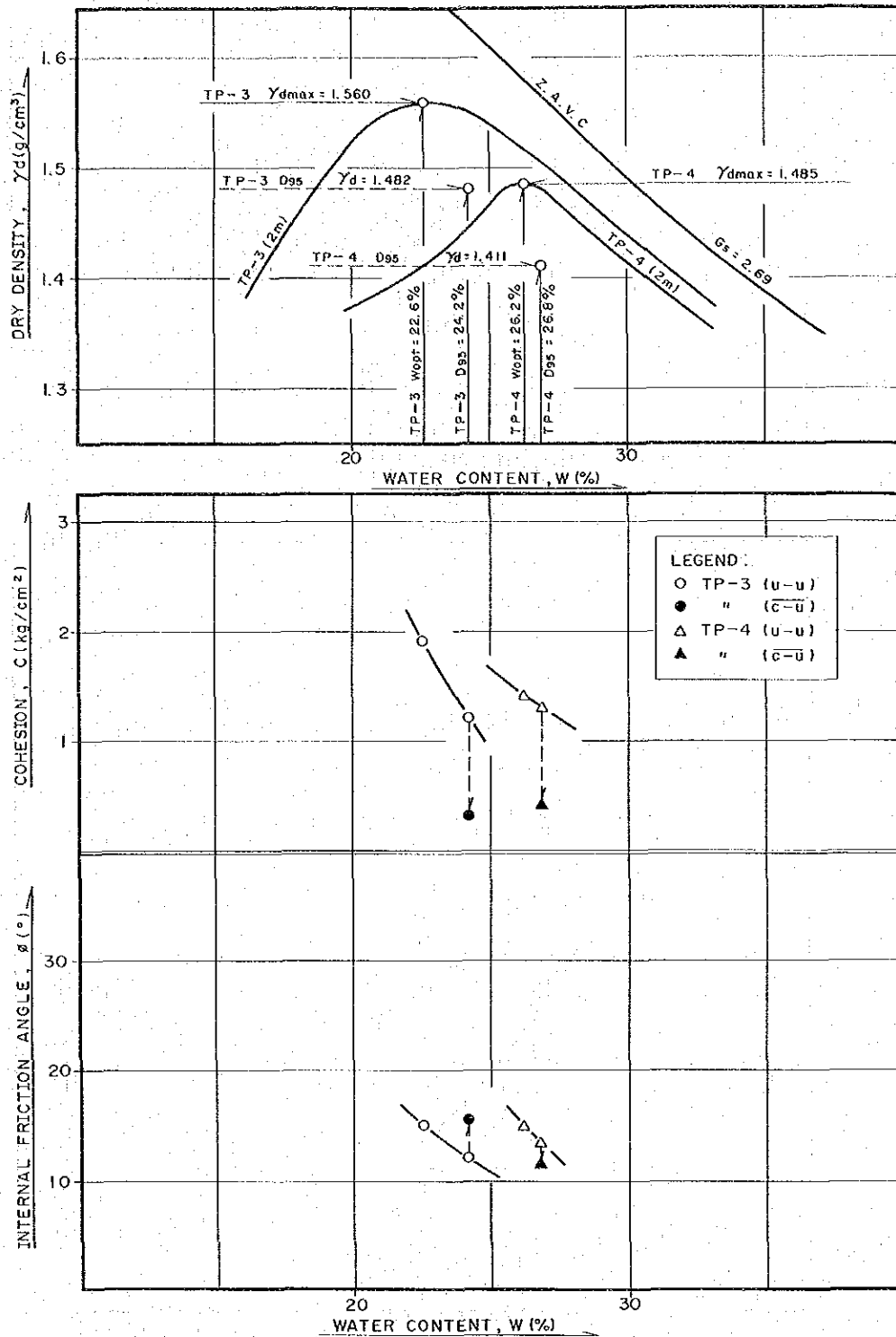
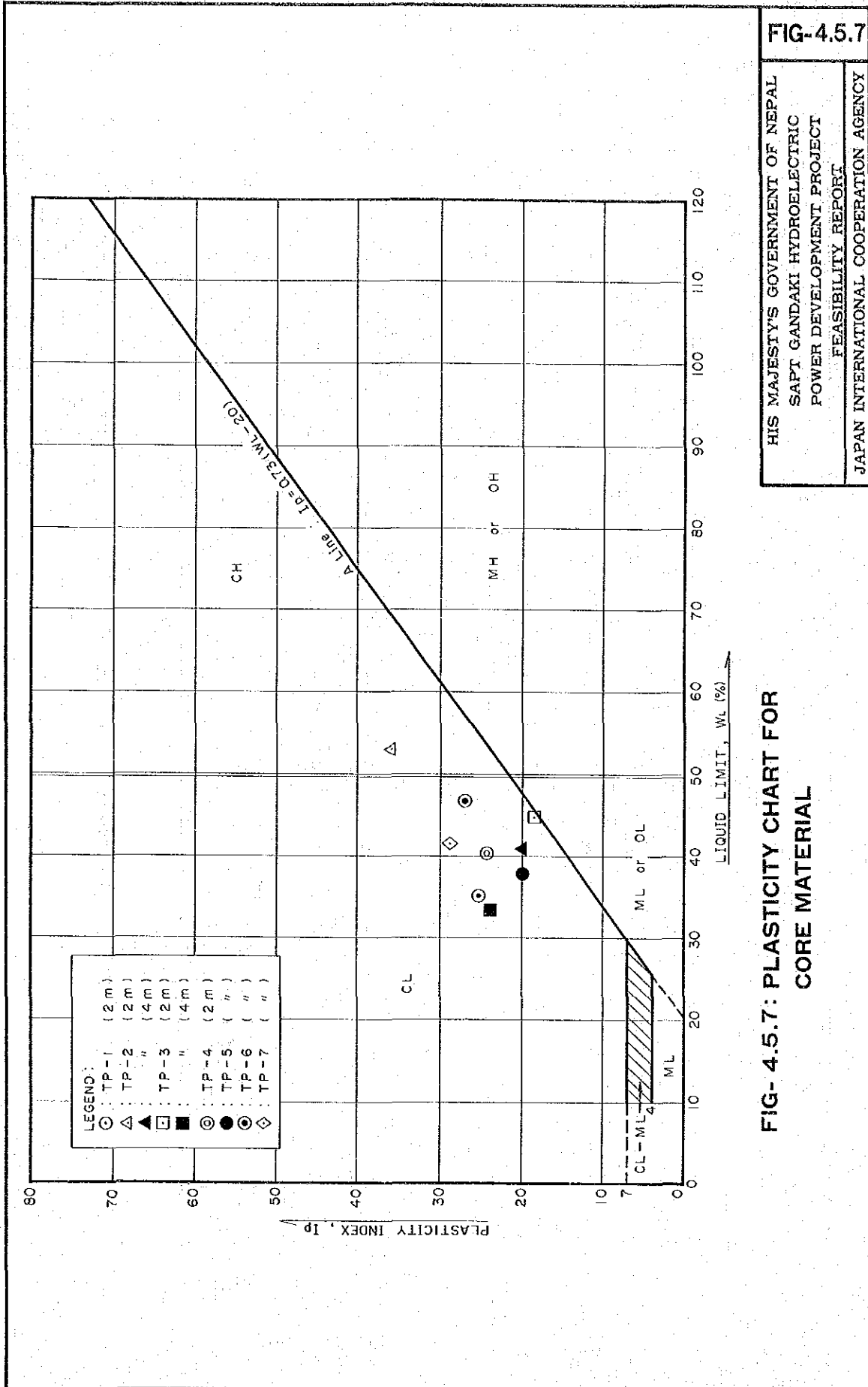


FIG- 4.5.6: TRIAXIAL COMPRESSION TEST RESULT FOR CORE MATERIALS

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**FIG- 4.5.7: PLASTICITY CHART FOR CORE MATERIAL**

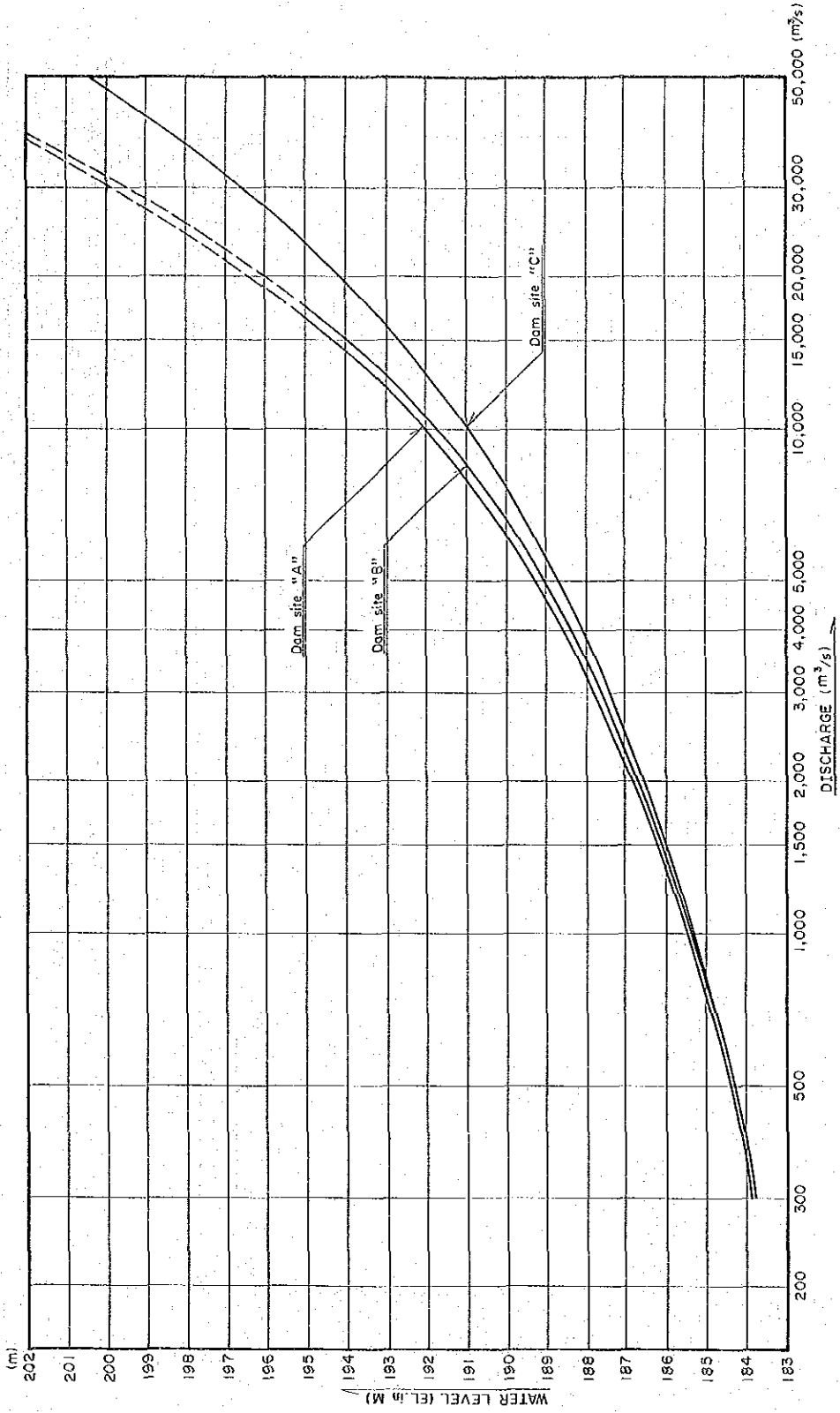


FIG-5.1.1 : TAILWATER RATING CURVE

FIG-5.1.1

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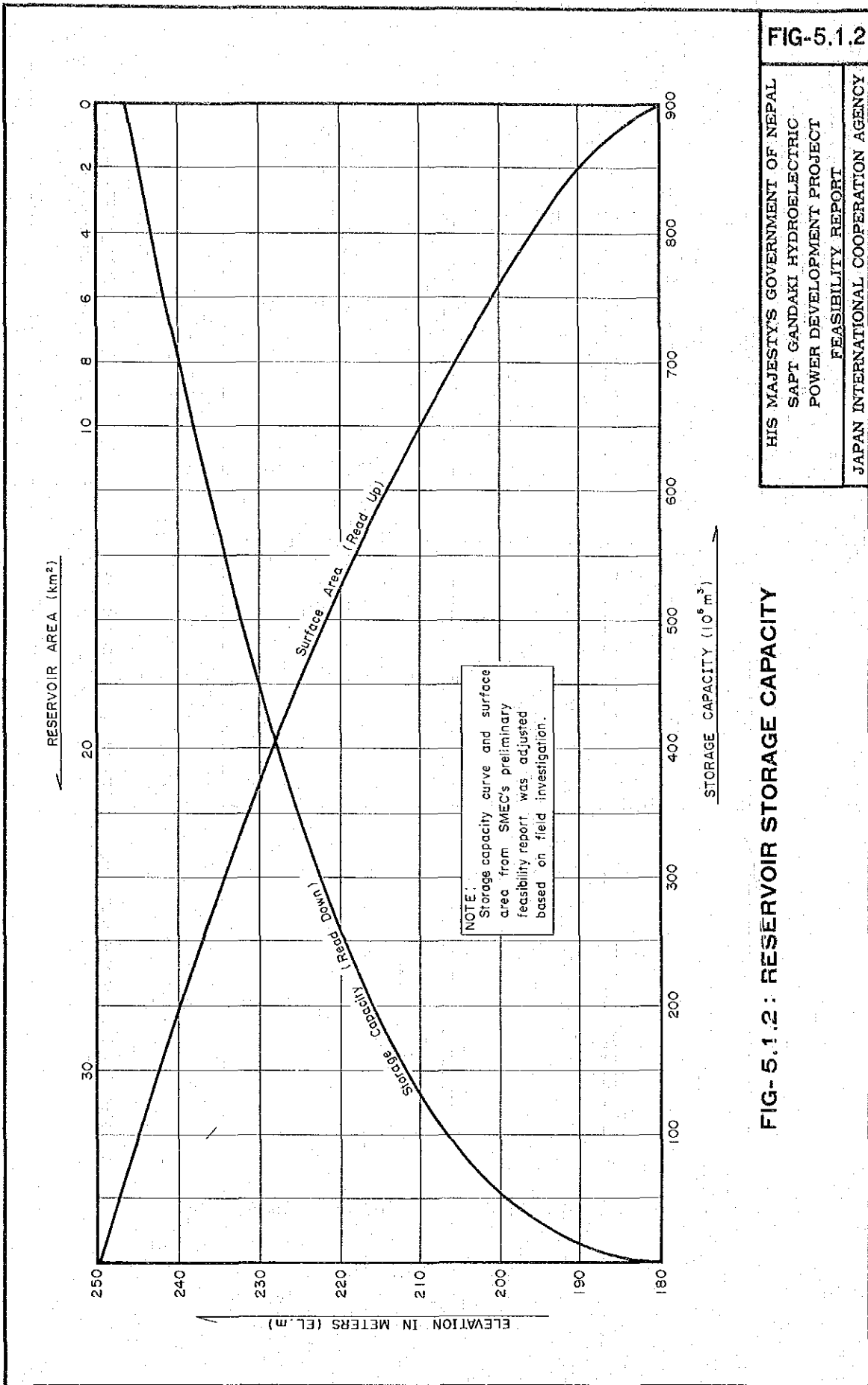


FIG-5.1.2: RESERVOIR STORAGE CAPACITY

FIG-5.1.2

HIS MAJESTY'S GOVERNMENT OF NEPAL  
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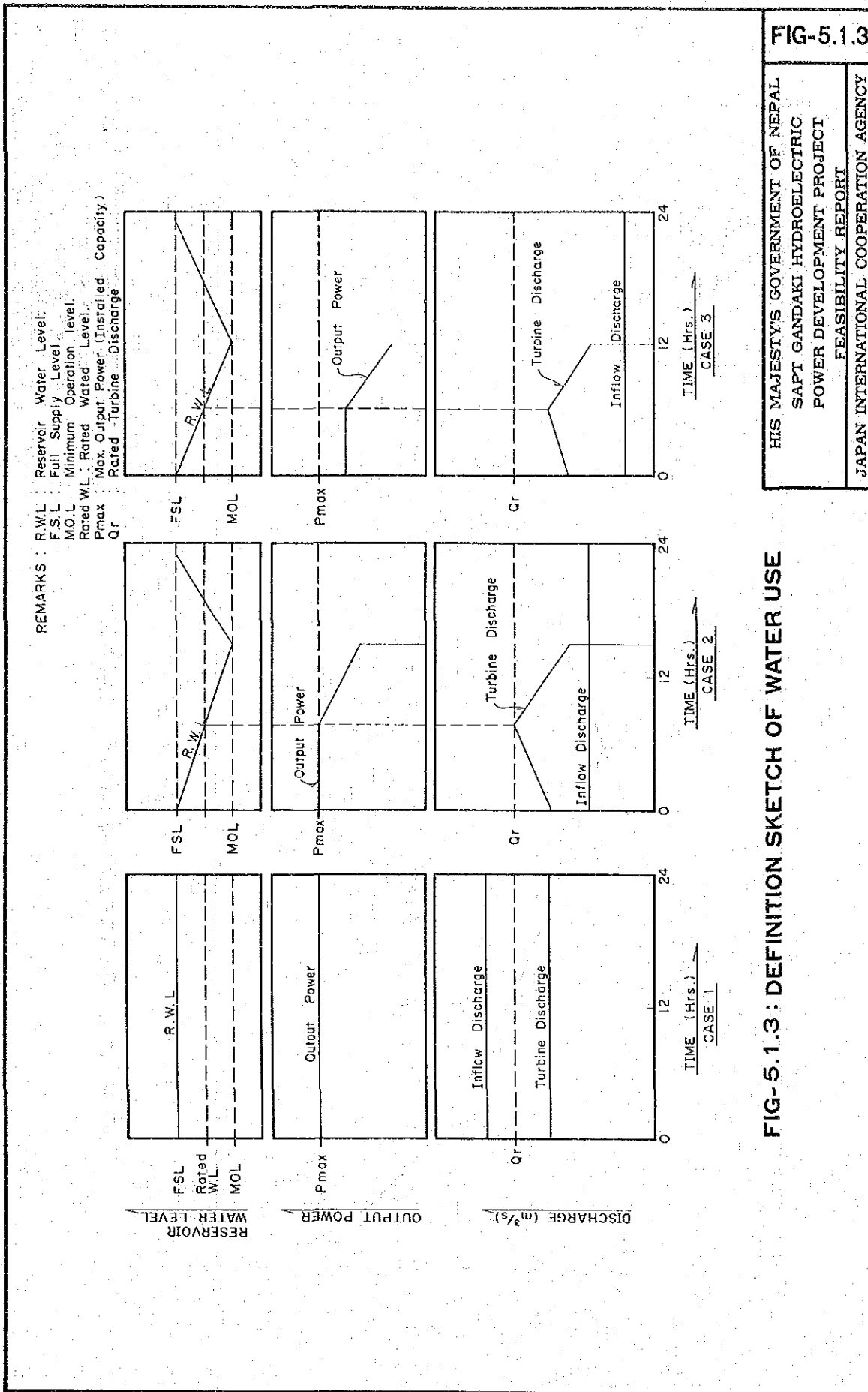


FIG-5.1.3 : DEFINITION SKETCH OF WATER USE

FIG-5.1.4

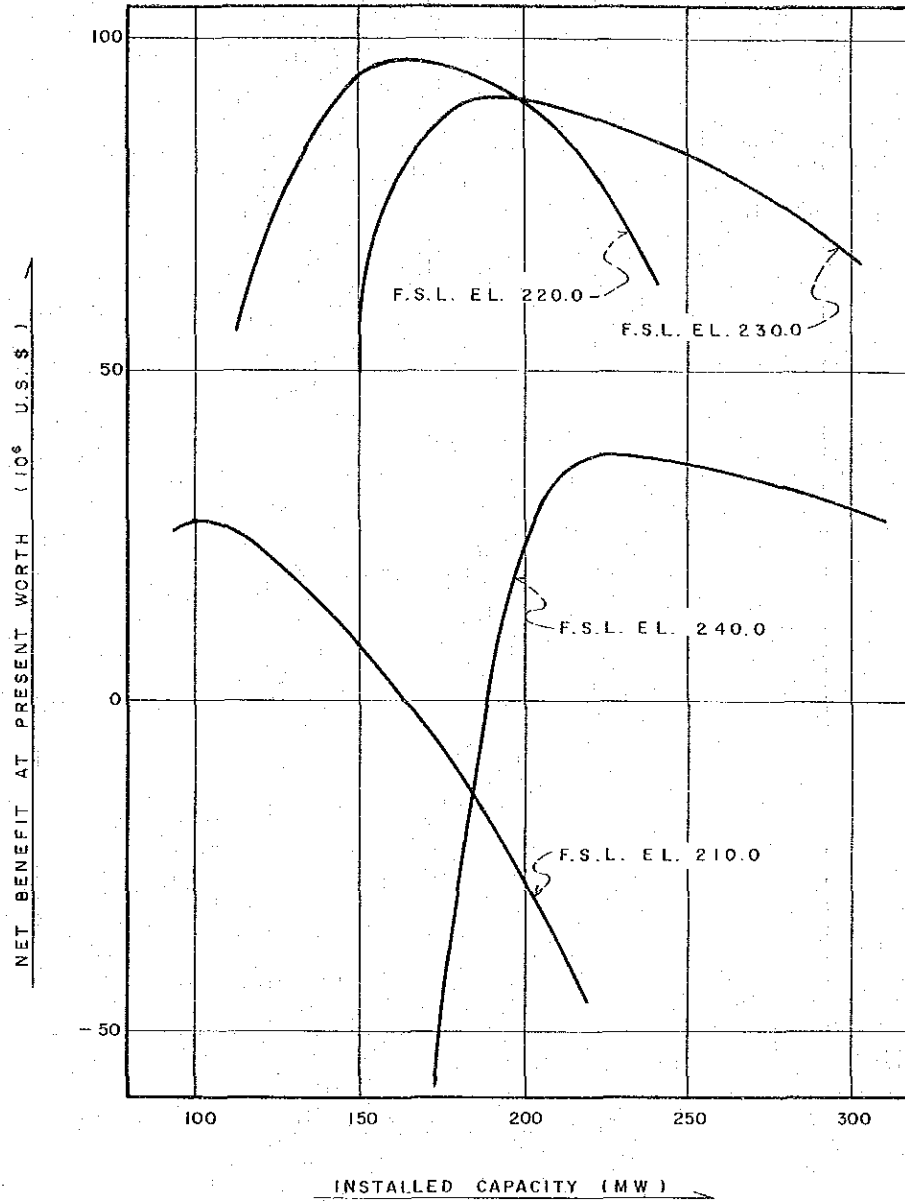


FIG-5.1.4: RESULT OF OPTIMIZATION STUDY (1)  
(ROCKFILL DAM SCHEME IN DAMSITE-A)

HIS MAJESTY'S GOVERNMENT OF NEPAL  
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FIG-5.1.5

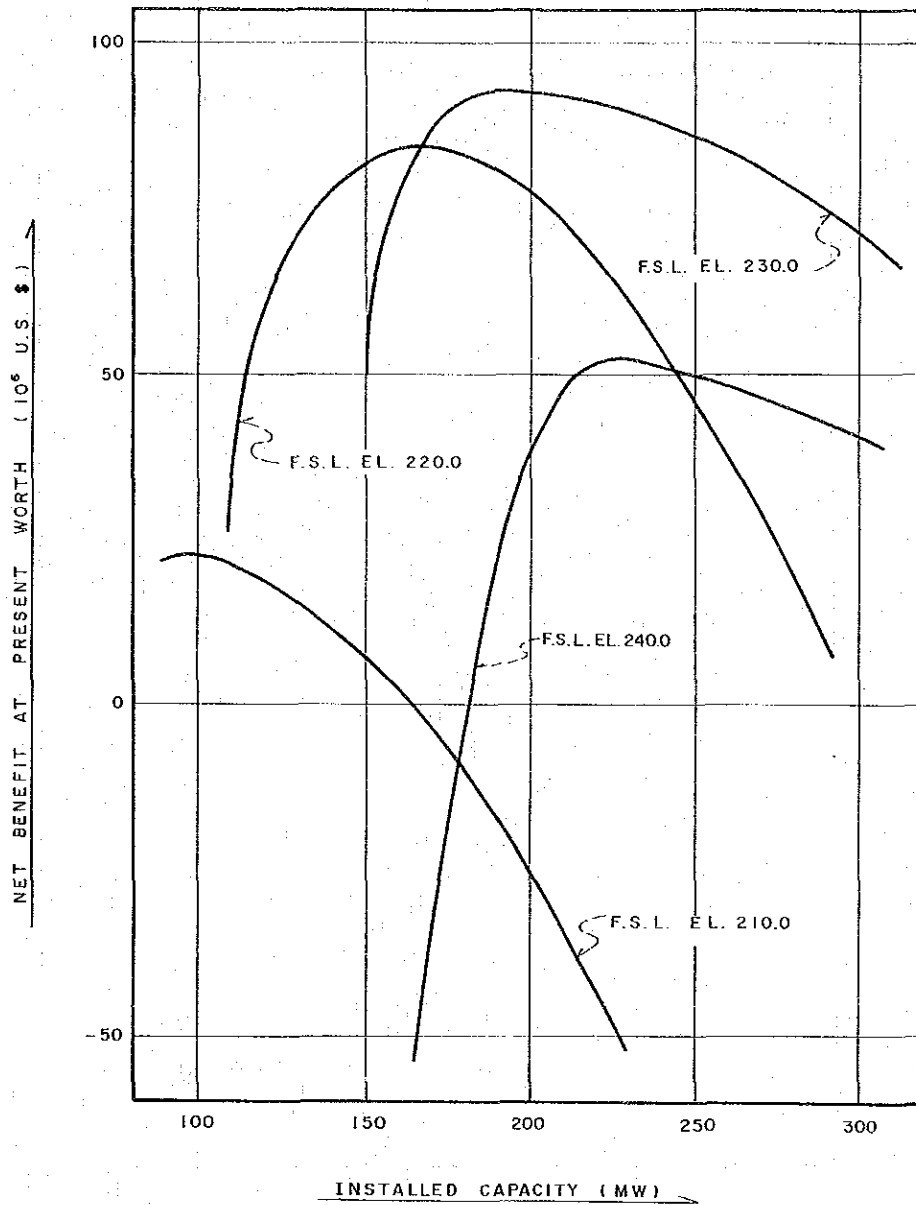


FIG-5.1.5: RESULT OF OPTIMIZATION STUDY (2)  
(GRAVITY DAM SCHEME IN DAMSITE-A)

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FIG-5.1.6

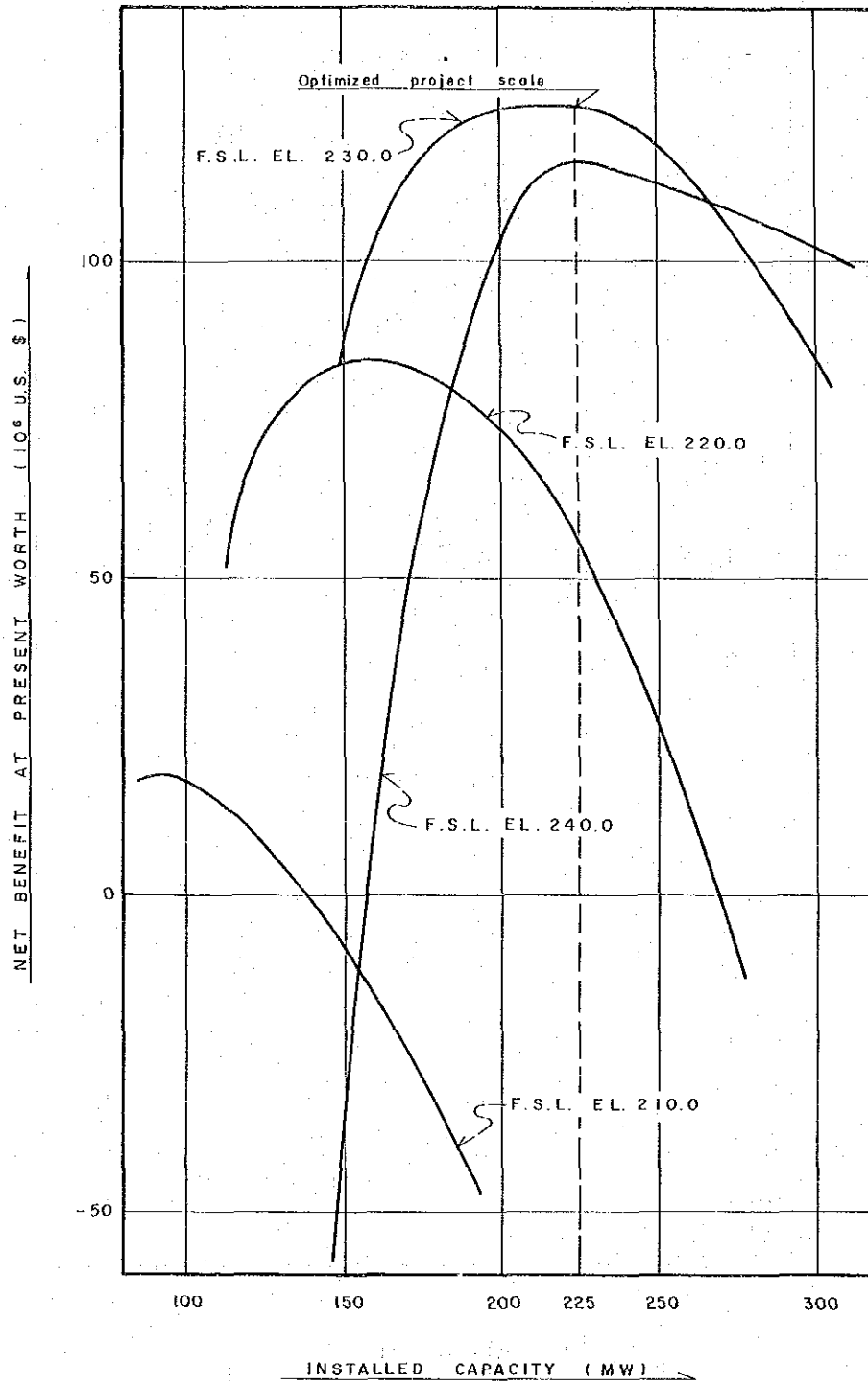


FIG-5.1.6: RESULT OF OPTIMIZATION STUDY (3)  
(ROCKFILL DAM SCHEME IN DAMSITE-B)

HIS MAJESTY'S GOVERNMENT OF NEPAL  
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FIG-5.1.7

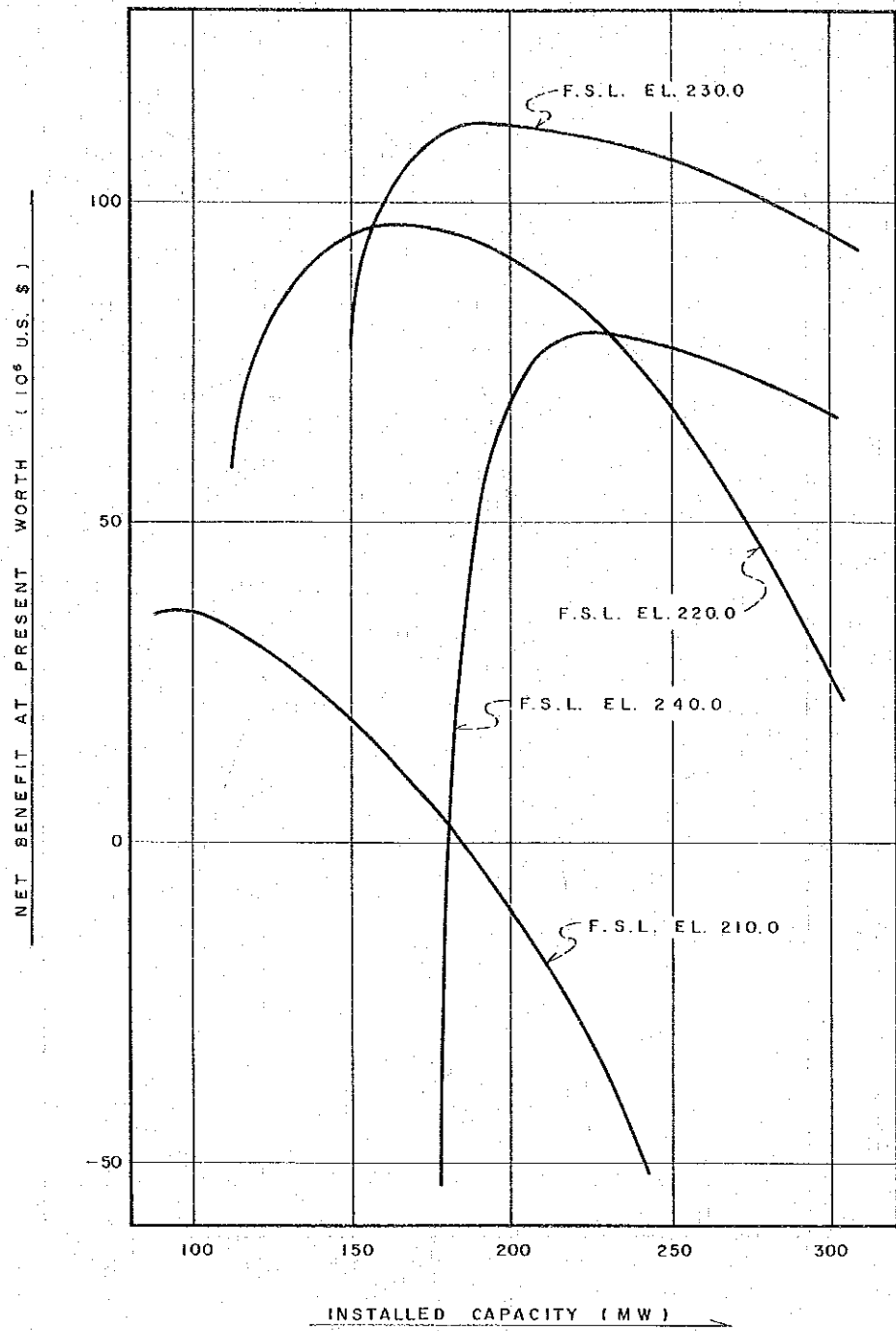
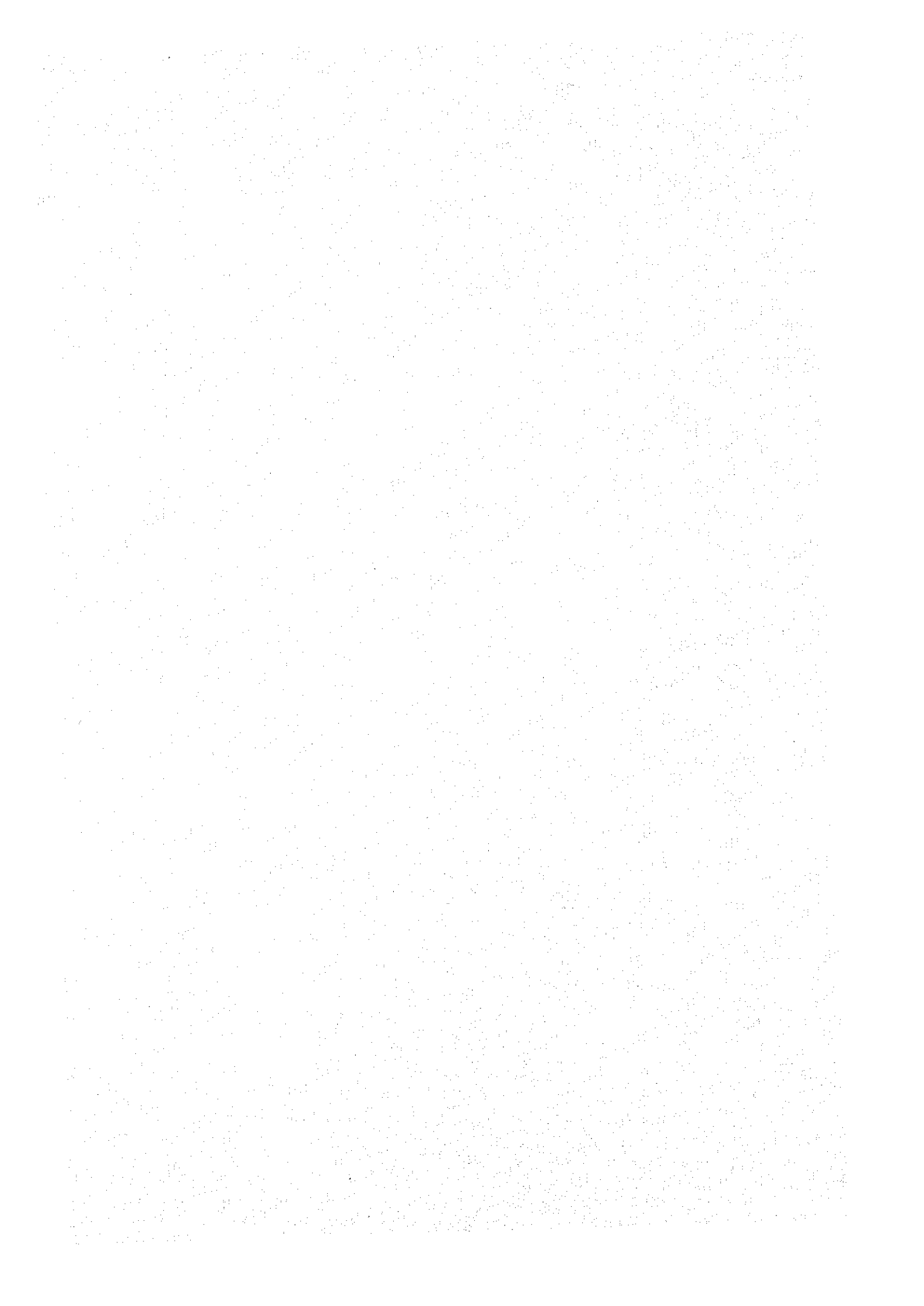
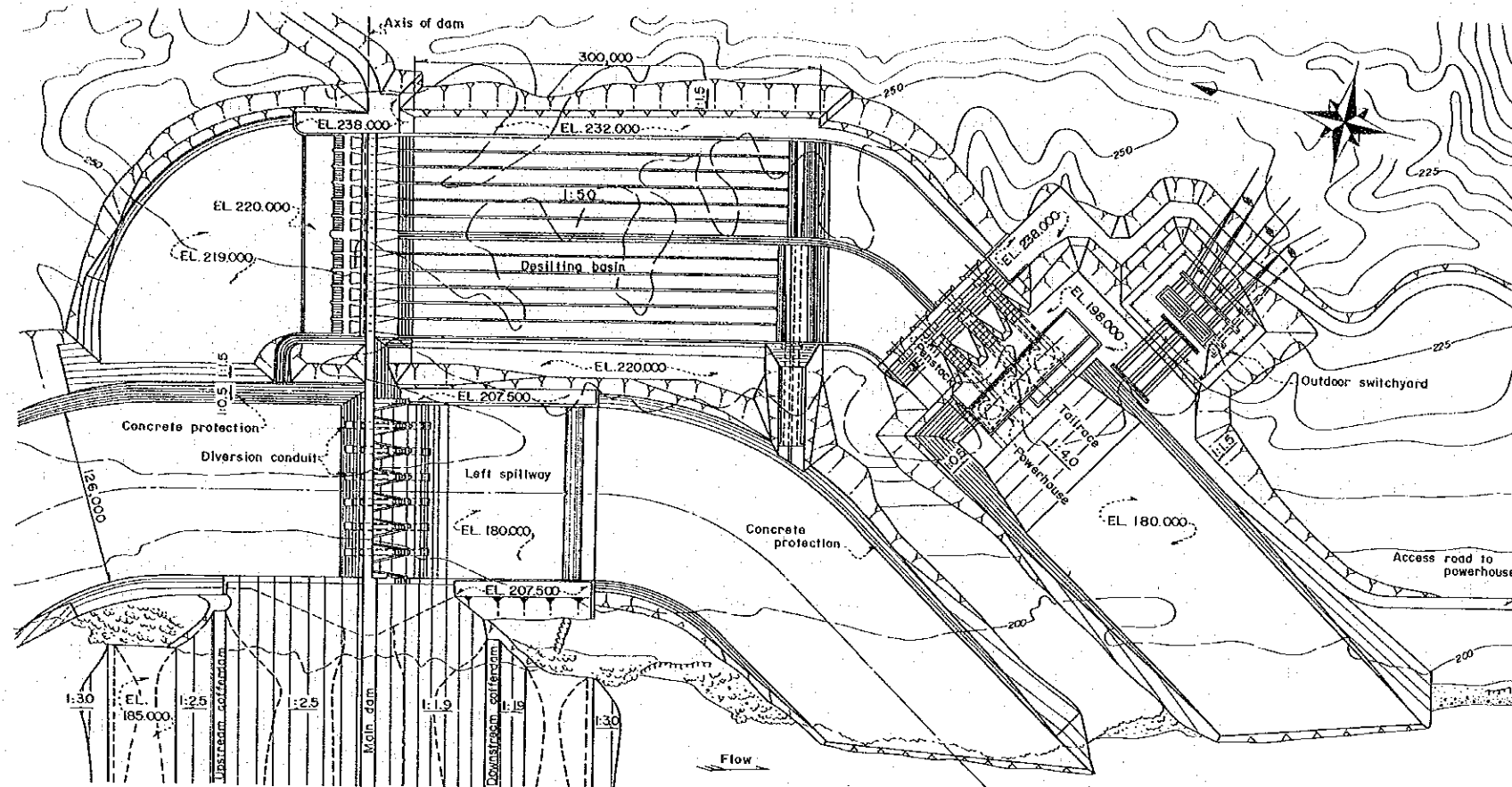


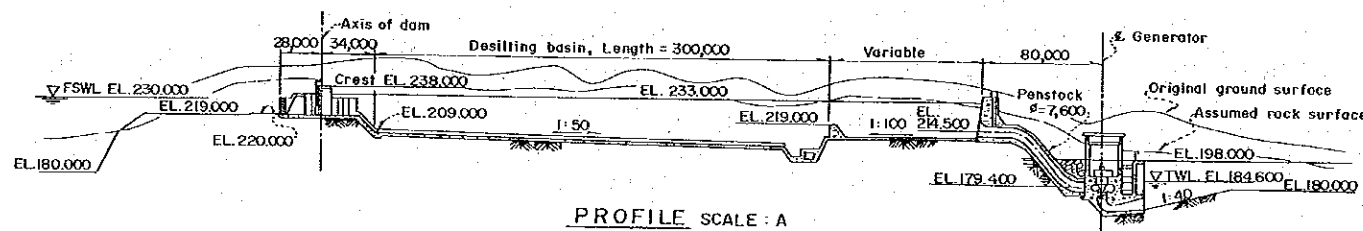
FIG- 5.1.7: RESULT OF OPTIMIZATION STUDY (4)  
(GRAVITY DAM SCHEME IN DAMSITE-B)

HIS MAJESTY'S GOVERNMENT OF NEPAL  
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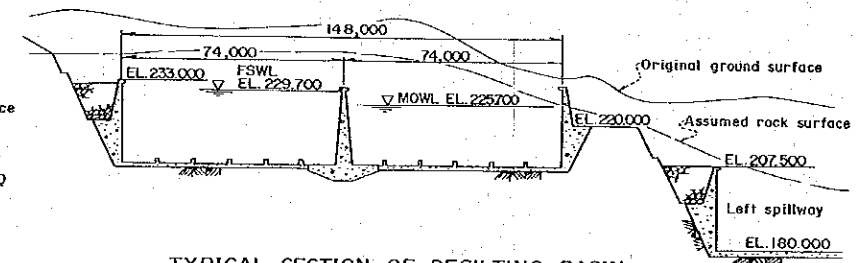




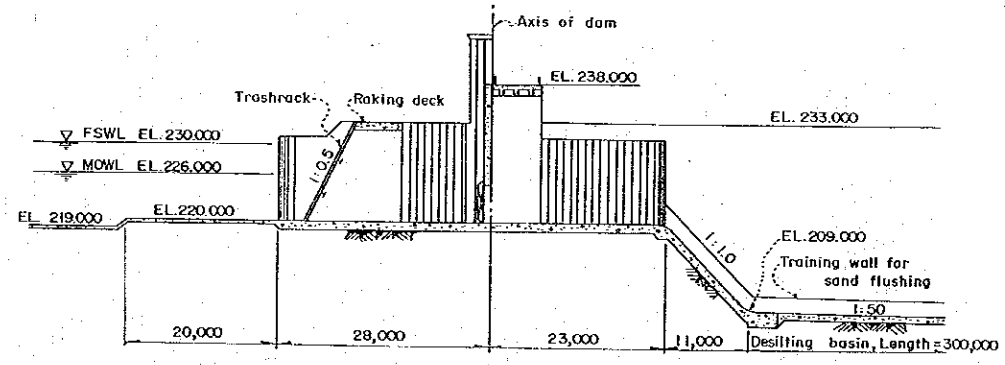
PLAN SCALE : A



PROFILE SCALE : A



TYPICAL SECTION OF DESILTING BASIN SCALE : B



ENTRANCE PORTION OF DESILTING BASIN SCALE : C

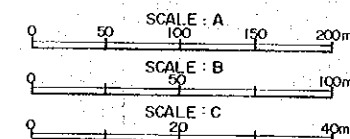


FIG-5.1.8: DESILTING BASIN SCHEME(FILL DAM, DAMSITE-B, F.S.L 230, 225MW INSTALLED CAPACITY)

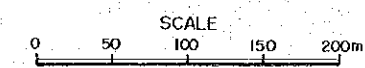
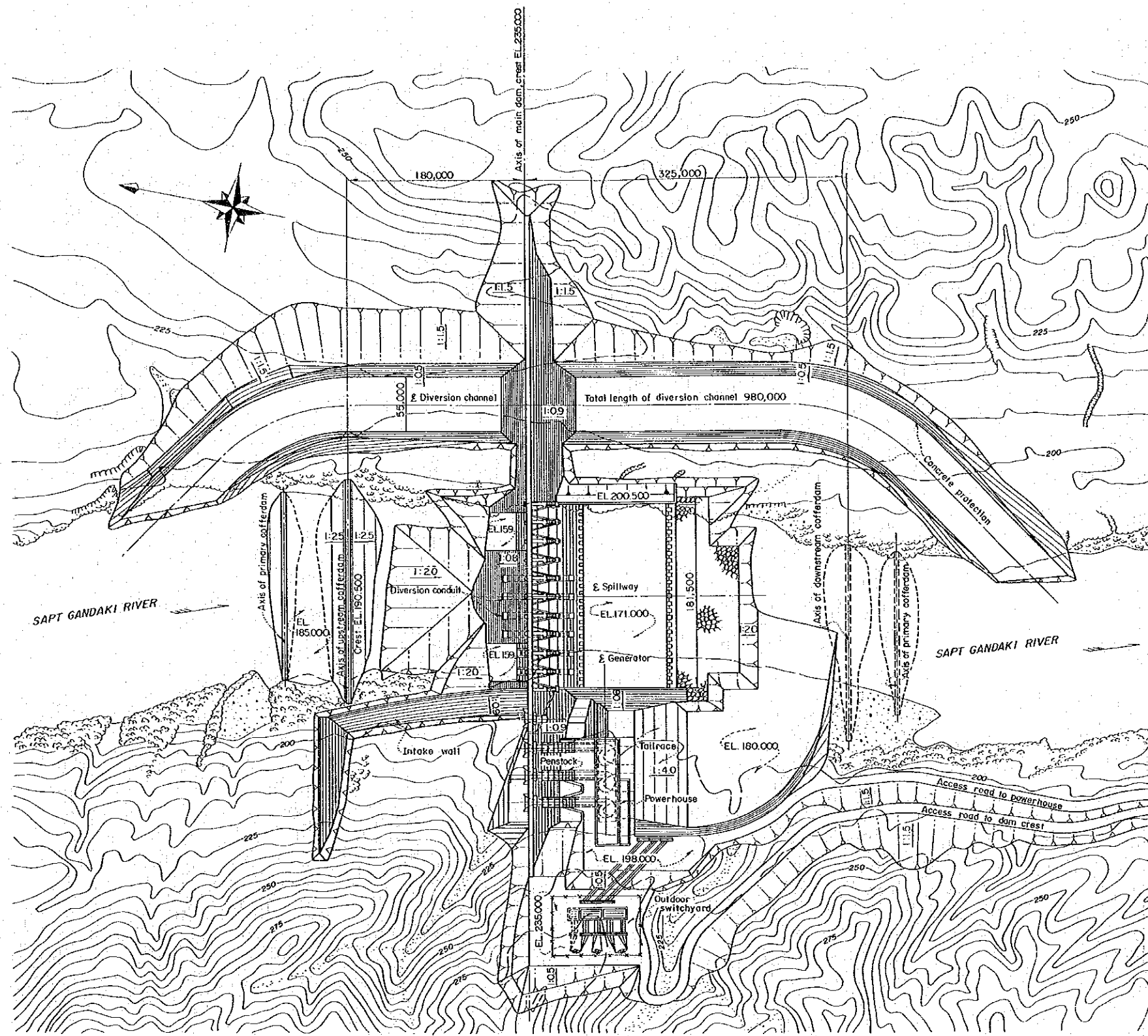


FIG-5.1.9 : GENEPAL PLAN(SCHEME : GRAVITY DAM, DAMSITE-B, F.S.L 230, 225MW INSTALLED CAPACITY)

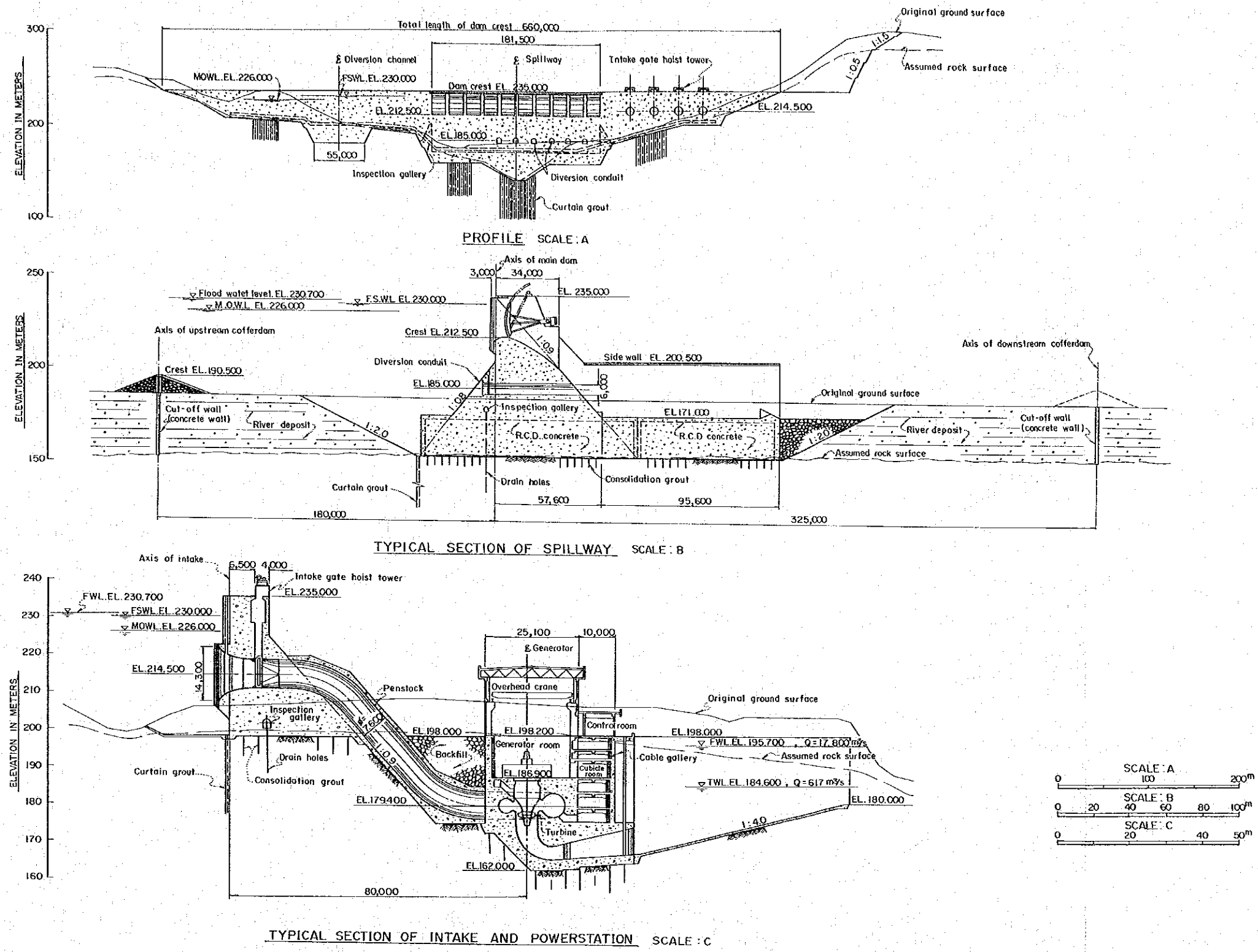
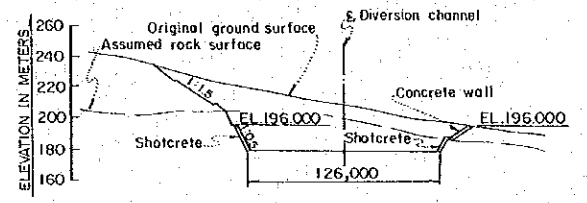
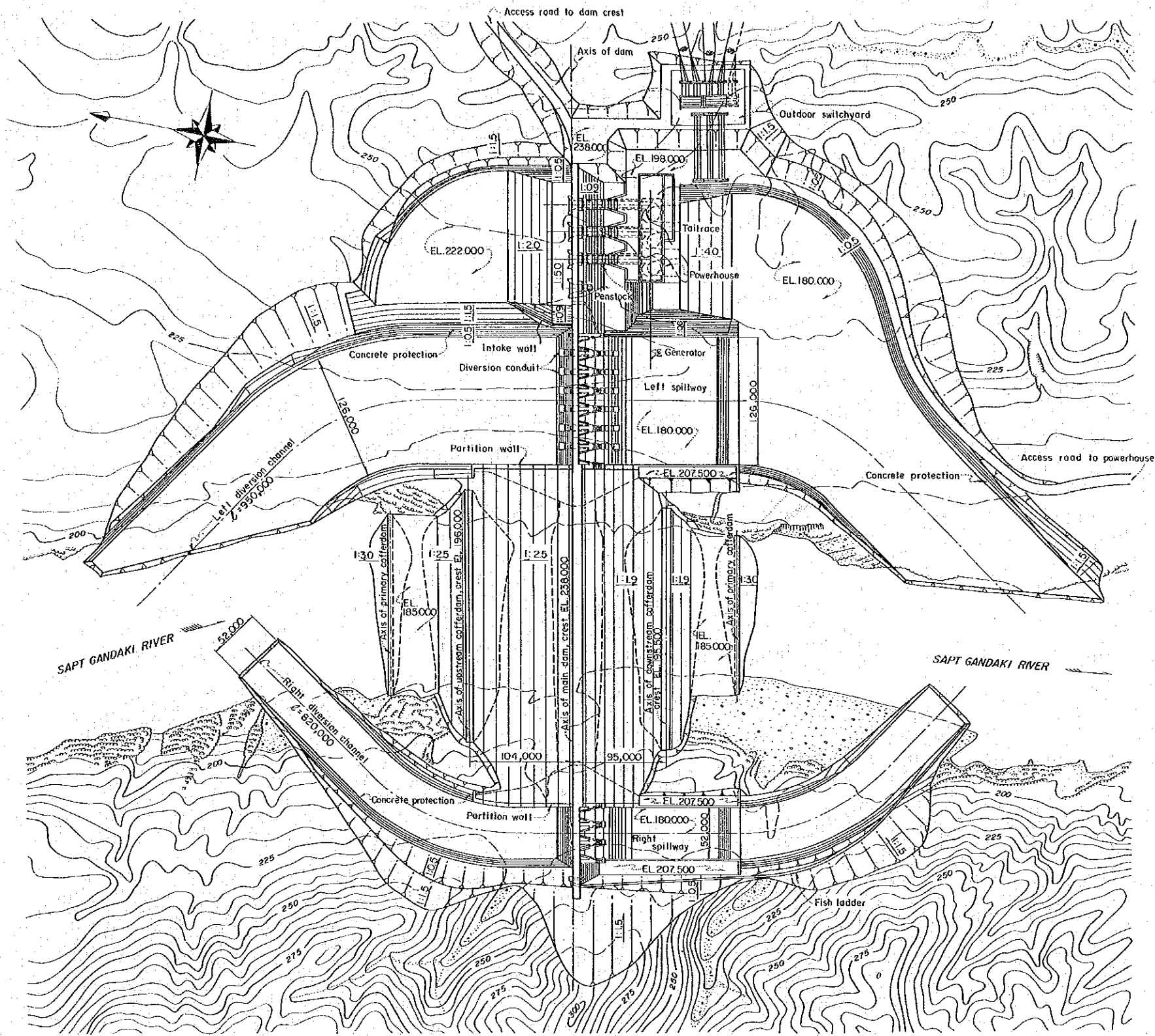


FIG- 5.1.10: SECTION AND PROFILE(SCHEME : GRAVITY DAM, DAMSITE-B, F.S.L 230, 225MW INSTALLED CAPACITY)

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TYPICAL SECTION OF DIVERSION CHANNEL

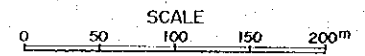
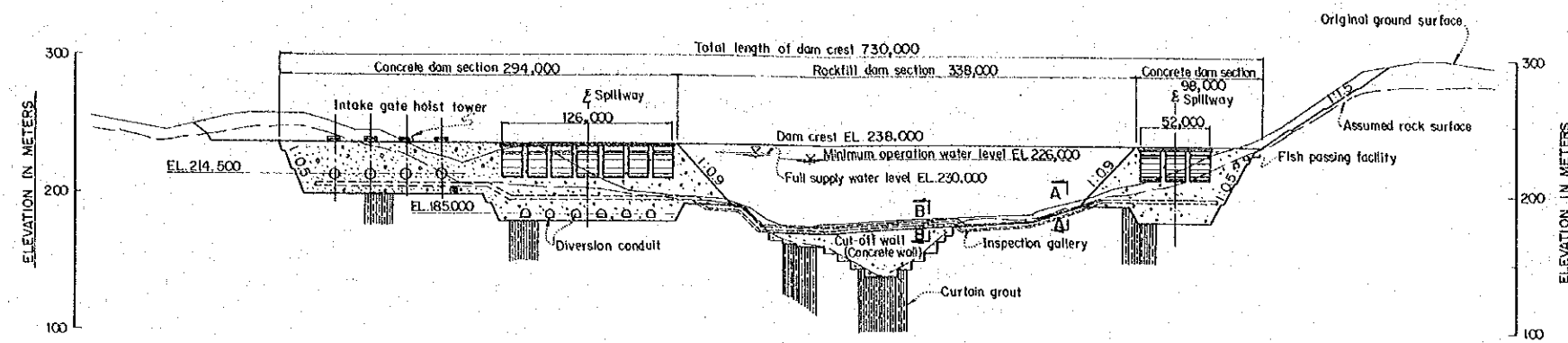


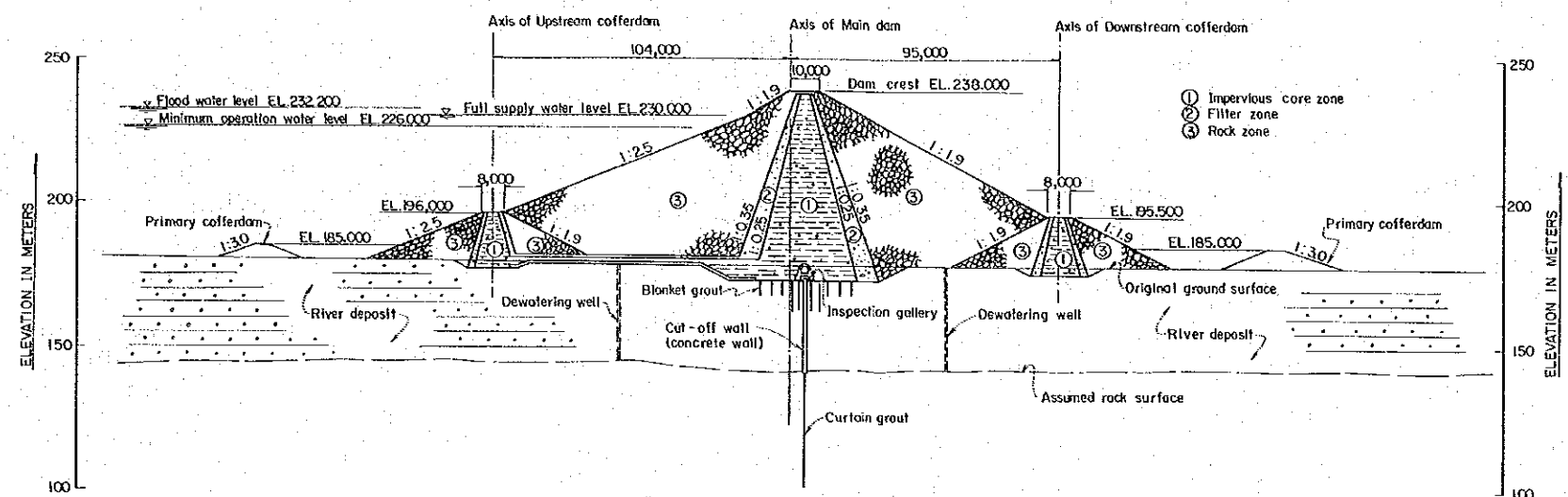
FIG- 6.1 : GENERAL PLAN(SCHEME : FILL DAM, DAMSITE-B, F.S.L 230, 225MW INSTALLED CAPACITY)

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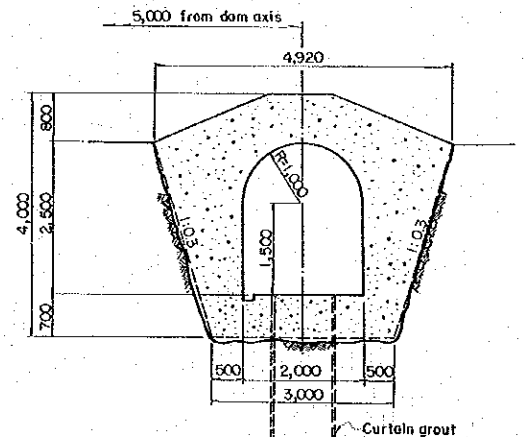
FIG- 6.2



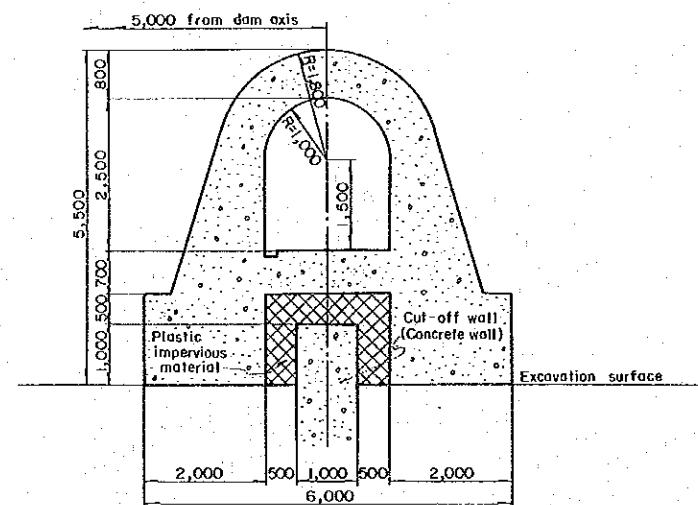
PROFILE SCALE: A



TYPICAL SECTION OF DAM SCALE: B



INSPECTION GALLERY, SECTION A-A SCALE: C



CUT-OFF WALL AND INSPECTION GALLERY, SECTION B-B SCALE: C

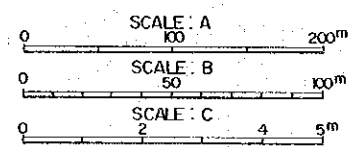


FIG- 6.2 : PROFILE AND SECTIONS OF DAM(SCHEME : FILL DAM, DAMSITE-B, F.S.L 230, 225MW INSTALLED CAPACITY)

HIS MAJESTY'S GOVERNMENT OF NEPAL  
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