TABLES

Table 1 SCHEMES IDENTIFIED FROM MAP STUDY

No.	Name of Scheme	Name of River	Type	Catchment Area (Sq. km)	Annual Rainfall (mm)
1	Salto Pilao (1)	Itajai	ROR /1	5,597	1,530
2	Salto Pilao (2)	Itajai	ROR	5,597	1,530
3	Ibirama	Itajai	ROR	9,041,	1,510
4	Subida	Itajai	ROR	9,147	1,510
5	Ascurra	Itajai	ROR	9,586	1,510
6	Indaial	Itajai	ROR	11,493	1,500
7	Dalbergia	Itajai do Norte	ROR	3,212	1,520
8	Barra da Pratinha	Itajai do Norte	RES /2	1,405	1,620
9	Barra das Pombas	Itajai do Norte	RES	979	1,670
10	Timbo	Benedito	RES	765	1,510
11	Benedito Novo	Benedito	ROR	586	1,510
12	Alto Benedito Novo	Benedito	ROR	473	1,520
13	Doutor Pedrinho	Benedito	RES	161	1,550
14	Trombudo Central (1)	Trombudo	RES	293	1,550
15	Trombudo Central (2)	Trombudo	RES	117	1,550
16	Botuvera	Itajai Mirim	RES	625	1,560

Notes:
/1: ROR means Run-of-river type.
/2: RES means Reservoir type.

Table 2 GEOLOGICAL ASSESSMENT

No.	Name of Scheme	Name of River	*1 Type	*2 Lithology	*3 Assessment				
					Dam Site	Waterway	Powerhouse	Reservoir	Material
1	Salto Pilao (1)	Itajai	1	Gr, Ss	A/B	B/C	B	A/B	B
2	Salto Pilao (2)	Itajai	1	Gr, Ss	A/B	B/C	C	A/B	B
3	Ibirama	Itajai	1	Ry, Ss	A/B	B/C	A	A/B	B
4	Subida	Itajai	1	Ry, Ss	A	A/B	A	A	B
5	Ascurra	Itajai	1	Ry, Ss	A/B	B/C	C	A/B	B
6	Indaial	Itajai	1	Gr	B	C/D	C/D	B	C
7	Dalbergia	Itajai do Norte	1	Gs, Gr	A	B	B	A	B
8	Barra da Pratinha	Itajai do Norte	2	Ss	A	-	B	A	B/C
9	Barra das Pombas	Itajai do Norte	2	Ss, Md	B	-	B	B	C/D
10	Timbo	Benedito	2	Gs	A/B	-	B	A/B	B/C
11	Benedito Novo	Benedito	1	Gr, Di	A/B	B/C	B	A/B	B
12	Alto Benedito Novo	Benedito	1	Gr, Di	A/B	B/C	C/D	A/B	B
13	Doutor Pedrinho	Benedito	2	Ss, Md	C	-	C	B/C	C/D
14	Trombudo Central (1)	Trombudo	2	Ss, Sh	C	-	C	C	C/D
15	Trombudo Central (2)	Trombudo	2	Ss, Sh	C	-	C	C	C/D
16	Botuvera	Itajai Mirim	2	Ph	C	-	C	C	C

*1 Type 1: Run-of river Type 2: Reservoir

*2 Lithology; Gr: Granite Ss: Sandstone Ry: Rhyolite
Gs: Gneiss Md: Mudstone Di: Diorite
Sh: Shale Ph: Phyllite

*3 A: Excellent B: Good C: Acceptable D: Poor

Table 3 ENVIRONMENTAL EXAMINATION

	Item of Check List	Evaluation for Identified Schemes															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Natural Environment	Sedimentation and its downstream effect	x	x	x	x	x	x	x	A	A	B	x	x	A	A	A	A
	Impact on soil erosion	C	C	C	C	B	C	C	C	B	C	C	C	C	A	A	C
	Impact on river environment	x	x	x	x	x	x	x	C	B	B	x	x	C	A	A	C
	Impact on vegetation	C	C	C	C	B	C	C	A	A	C	C	C	B	B	B	B
	Impact on wildlife	x	x	x	x	x	x	x	D	D	x	x	x	D	x	x	D
Social Environment	Effect on population	C	C	C	C	B	C	C	C	C	C	C	C	C	B	B	C
	Effect on agriculture	C	C	C	C	B	C	C	C	B	C	C	C	C	A	A	C
	Effect on inland fishery	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Effect on secondary industry	x	x	x	x	x	x	x	x	x	x	C	x	x	A	A	x
	Effect on use of water resources	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Effect on traffic	C	C	B	B	B	B	C	A	A	B	C	x	B	A	A	B
	Effect on landscape	x	x	x	x	x	x	x	x	x	x	x	x	x	C	C	x
	Effect on historical and archaecological assets	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Note:
A : Degree of impact is significant.
B : Degree of impact is moderate.
C : Degree of impact is relatively small.
D : Impact is unknown but study is needed.
x : There are no influence

Table 4 RESULT OF GEOLOGICAL INVESTIGATION

(1) Content of investigation
- (i) Core boring; 285 m in total length
- (ii) Permeability test; 15 times for damsites
- (iii) Construction material survey

(2) Breakdown of the core boring

(Unit: m)

	Schemes sites		
	Salto Pilão (1)	Dalbergia	Benedito Novo
Damsite	20	30	20
Headrace tunnel	60	75	
Powerhouse site	30	25	25
Total	110	130	45

(3) Geological features for major project facilities of 3 hydropower schemes

	River width (m)	Geological feature	Assumed quantity of water leakage	Geological problem
Salto Pilão (1)				
Damsite				
Dam axis-A	315	Hard granite	0.1 l/min/m	Faults in left side
Dam axis-B	265	Hard granite	0.1 l/min/m	No problem
Dam axis-C	220	Hard granite	0.1 l/min/m	Cracks in river bed
Headrace tunnel		Hard granite		110 m long fault zone
Surge tank site		Hard rhyolite		No problem
Penstock route		Hard rhyolite		No problem
Powerhouse site		Hard rhyolite in 12 m below ground surface		No problem
Dalbergia				
Damsite				
Dam axis-A	310	Hard gneiss	3 l/min/m	Cracks in river bed
Dam axis-B	240	Hard gneiss	3 l/min/m	Cracks in river bed
Dam axis-C	250	Hard gneiss	3 l/min/m	Cracks in river bed
Headrace tunnel		Hard gneiss		110 m long fault zone
Surge tank site		Hard gneiss		No problem
Penstock route		Hard gneiss		No problem
Powerhouse site		Hard gneiss in 11 m below ground surface		No problem
Benedito Novo				
Damsite				
Dam axis-A	130	Hard gneiss	23 l/min/m	No problem
Dam axis-B	170	Hard gneiss	23 l/min/m	No problem
Dam axis-C	130	Hard gneiss	23 l/min/m	Fault in left side
Headrace tunnel		Hard gneiss		280 m long fault zone
Surge tank site		Hard gneiss		No problem
Penstock route		Hard gneiss		No problem
Powerhouse site		Hard gneiss in 5 m below ground surface		No problem

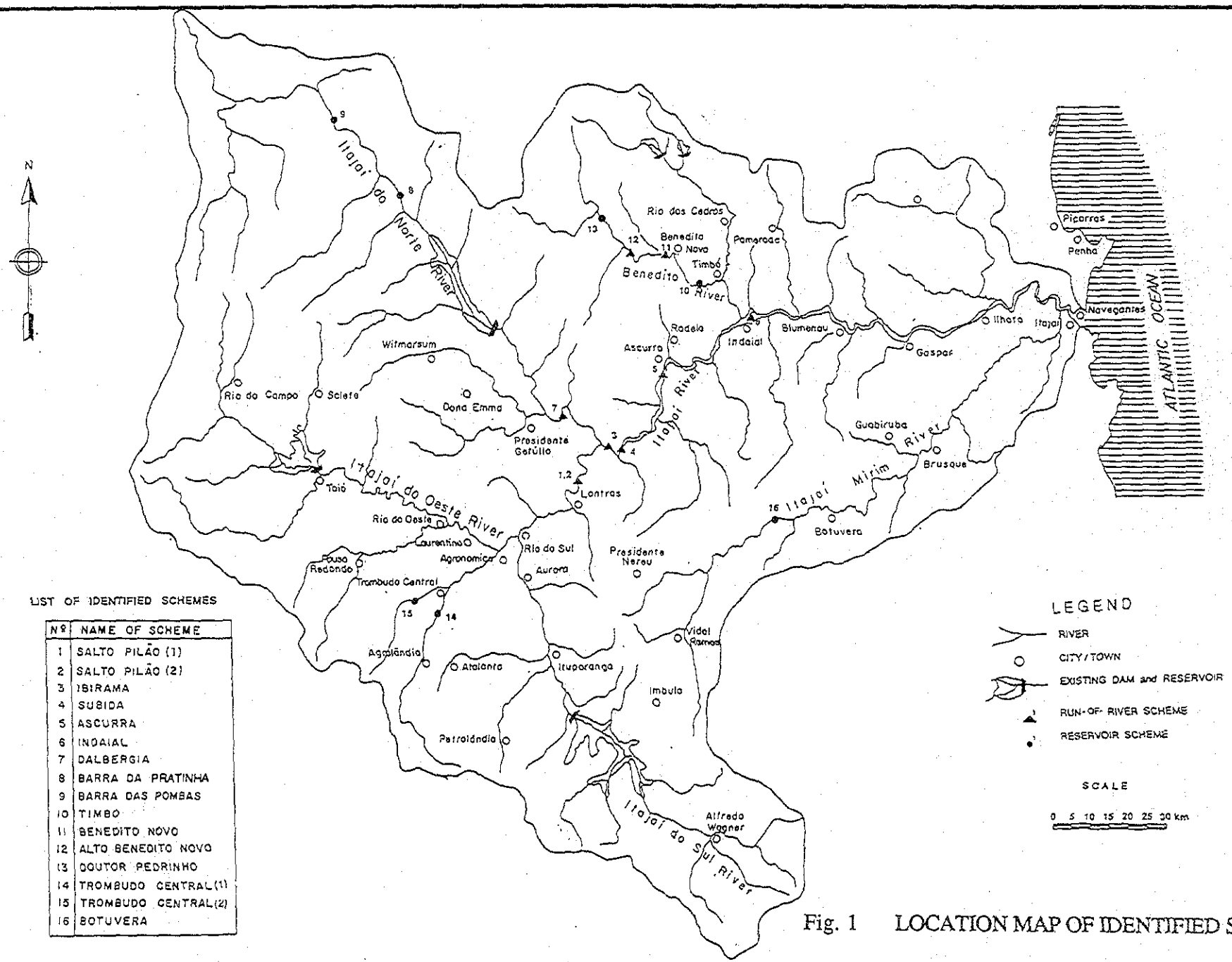
(4) Construction materials

Name of scheme	Location of quarry site for concrete aggregates	Assumed rock volume (m^3)
Salto Pilão (1)	Hilly mountain at about 1 km upstream of right bank of damsite	400,000
Dalbergia	Hilly mountain at about 0.5 km upstream of right bank of damsite	500,000
Benedito Novo	Hilly mountain at 3 km upstream of left bank of damsite	200,000

Table 5 COMPARISON OF SUBMERGED AREAS AND COMPENSATION AREAS

Scheme	Water Level (m)	Submerged Area (km2)	Compensation Area (km2)	Relocation of Houses (Units)		Road Construction in the Reservoir Area				
				Reservoir Area	Construction Areas	Realignment (m)	New Bridge(s) (m)	New Road (m)	Culvert(s) (unit)	Submerged Road (m)
Salto Pilão(1)										
Axis A	330	4.43	2.590	87	0	590	40	1,900	2	630
Axis B	330	4.59	2.880	87	0	590	40	1,900	2	630
Axis C	319	0.40	0.334	9	0	-	-	-	-	-
Dalbergia										
Axis A	232	0.28	0.193	5	12	-	-	-	-	950
Axis B	227	0.37	0.248	5	12	-	-	-	-	1,250
Axis C	215	0.29	0.156	8	12	-	-	-	-	-
Benedito Novo										
Axis A	290	0.229	0.307	93	19	440	50	980	3	490
Axis B	287	0.092	0.166	15	13	440	50	980	3	490
Axis C	277	0.029	0.028	13	10	200	50	-	0	250

FIGURES



LIST OF IDENTIFIED SCHEMES

Nº	NAME OF SCHEME
1	SALTO PILÃO (1)
2	SALTO PILÃO (2)
3	IBIRAMA
4	SUBIDA
5	ASCURRA
6	INDAIAL
7	DALBERGIA
8	BARRA DA PRATINHA
9	BARRA DAS POMBAS
10	TIMBÓ
11	BENEDITO NOVO
12	ALTO BENEDITO NOVO
13	DOUTOR PEDRINHO
14	TROMBUDO CENTRAL(1)
15	TROMBUDO CENTRAL(2)
16	BOTUVERA

Fig. 1 LOCATION MAP OF IDENTIFIED SCHEMES

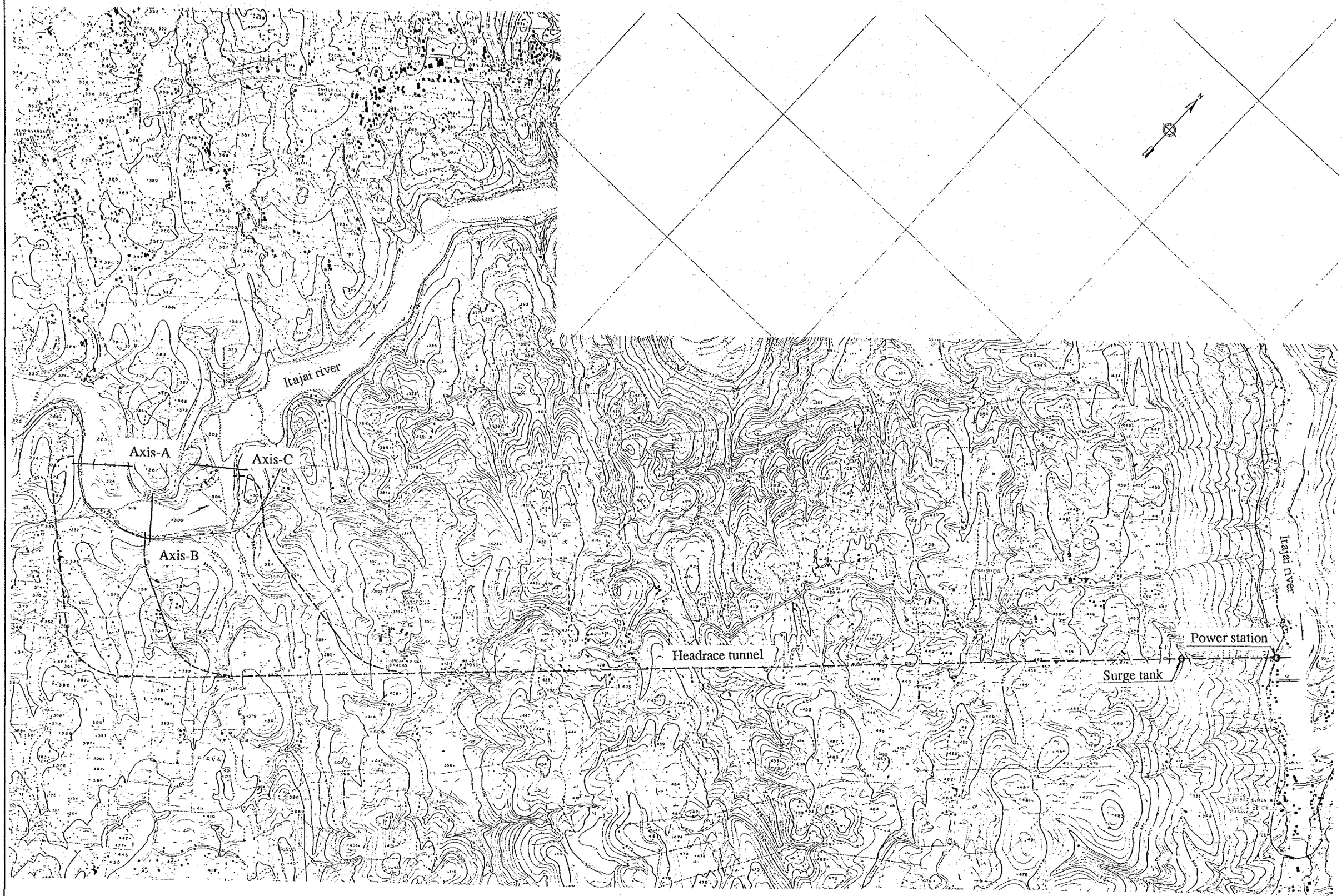


Fig. 2 GENERAL LAYOUT OF SALTO PILÃO (1) HYDROPOWER SCHEME FOR COMPARATIVE STUDY

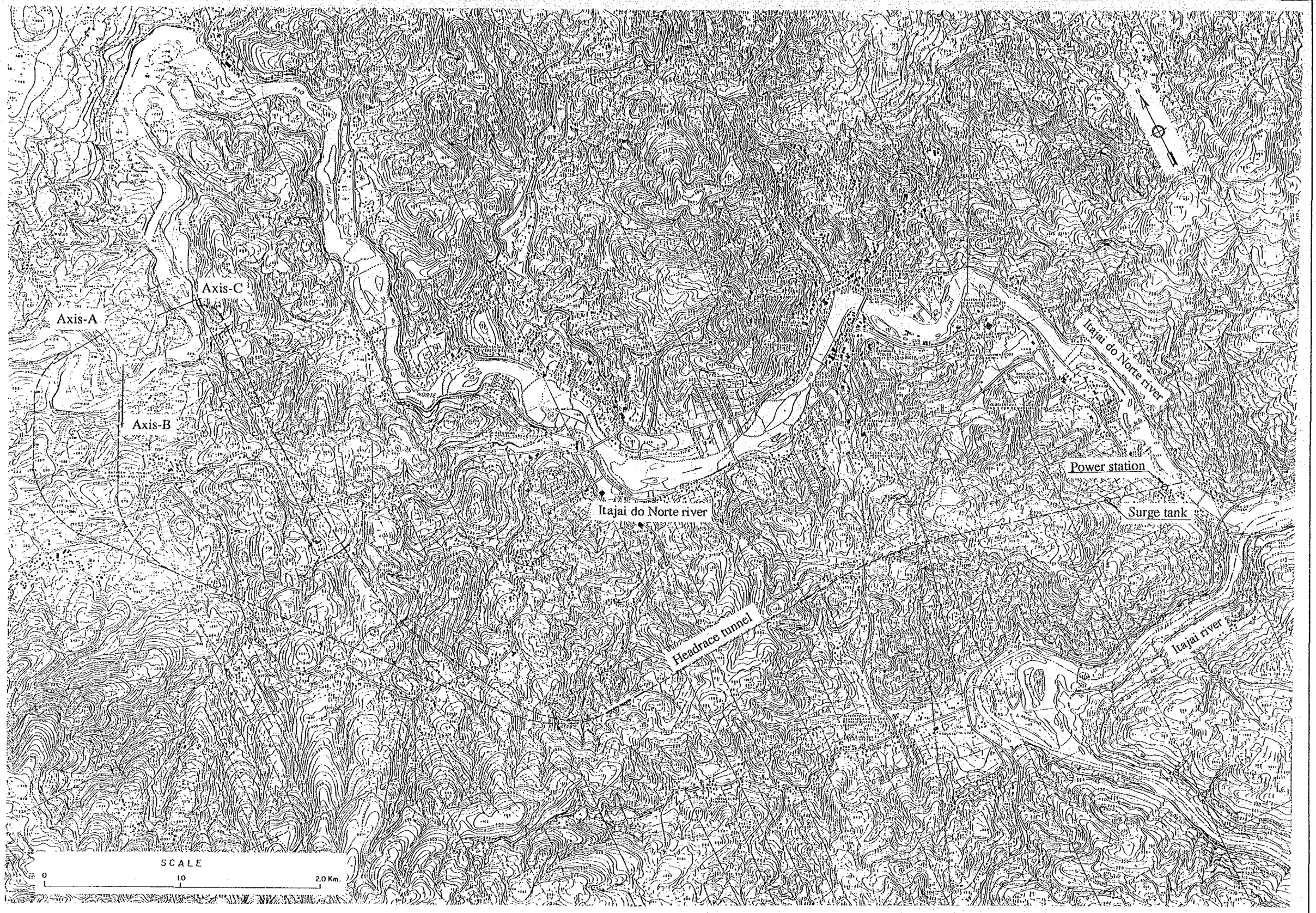


Fig. 3 GENERAL LAYOUT OF DALBERGIA HYDROPOWER SCHEME FOR COMPARATIVE STUDY

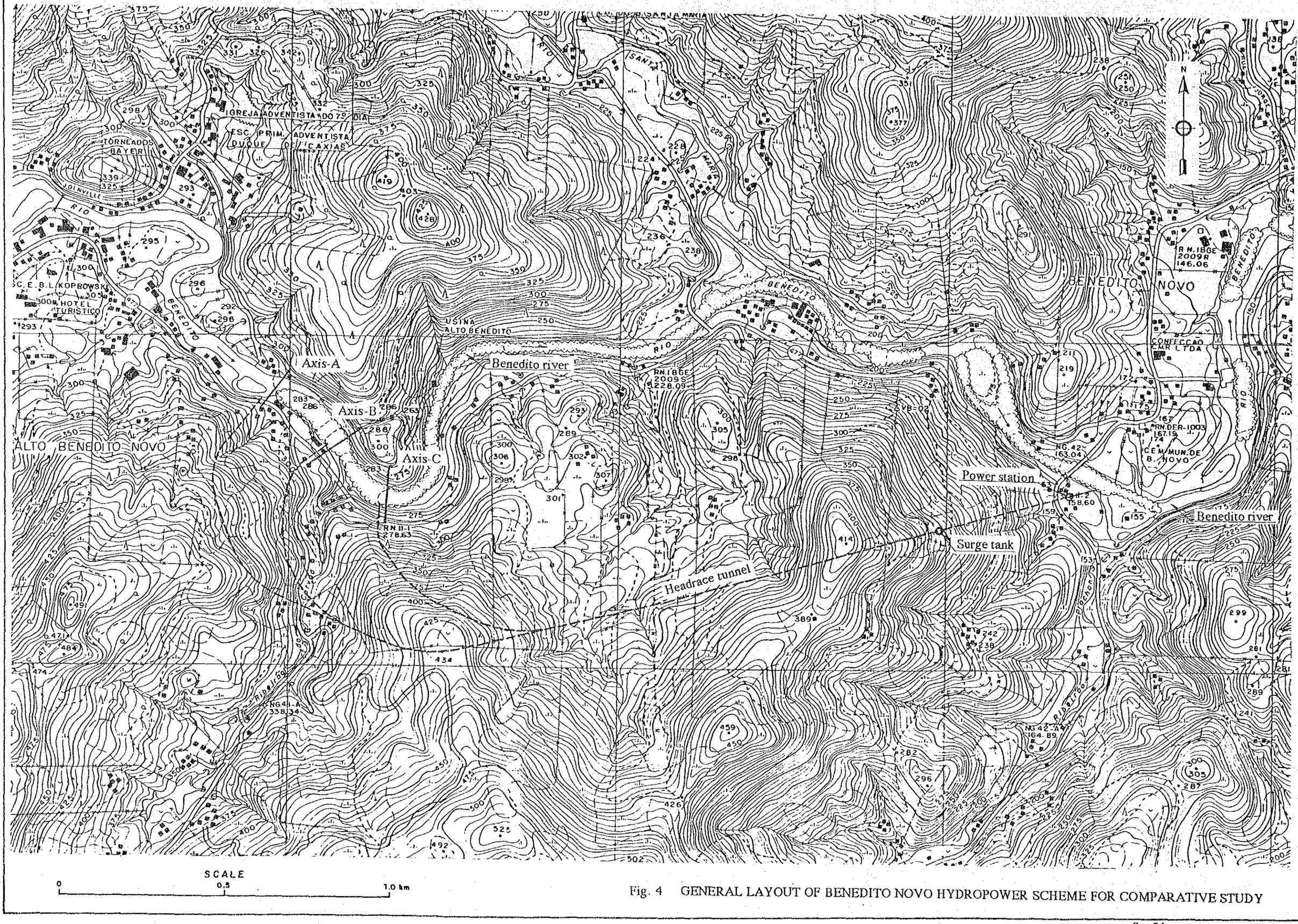


Fig. 4 GENERAL LAYOUT OF BENEDITO NOVO HYDROPOWER SCHEME FOR COMPARATIVE STUDY

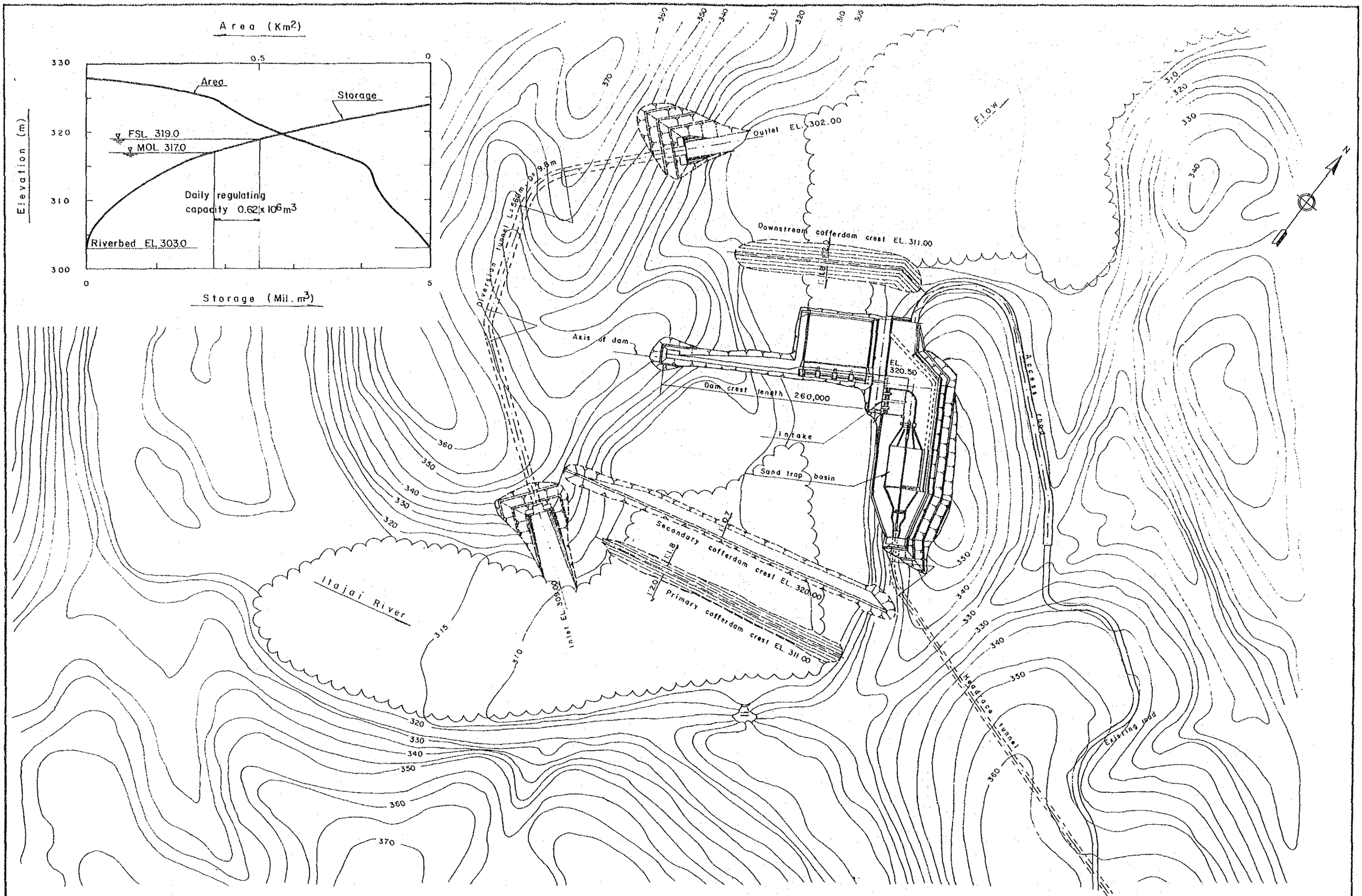
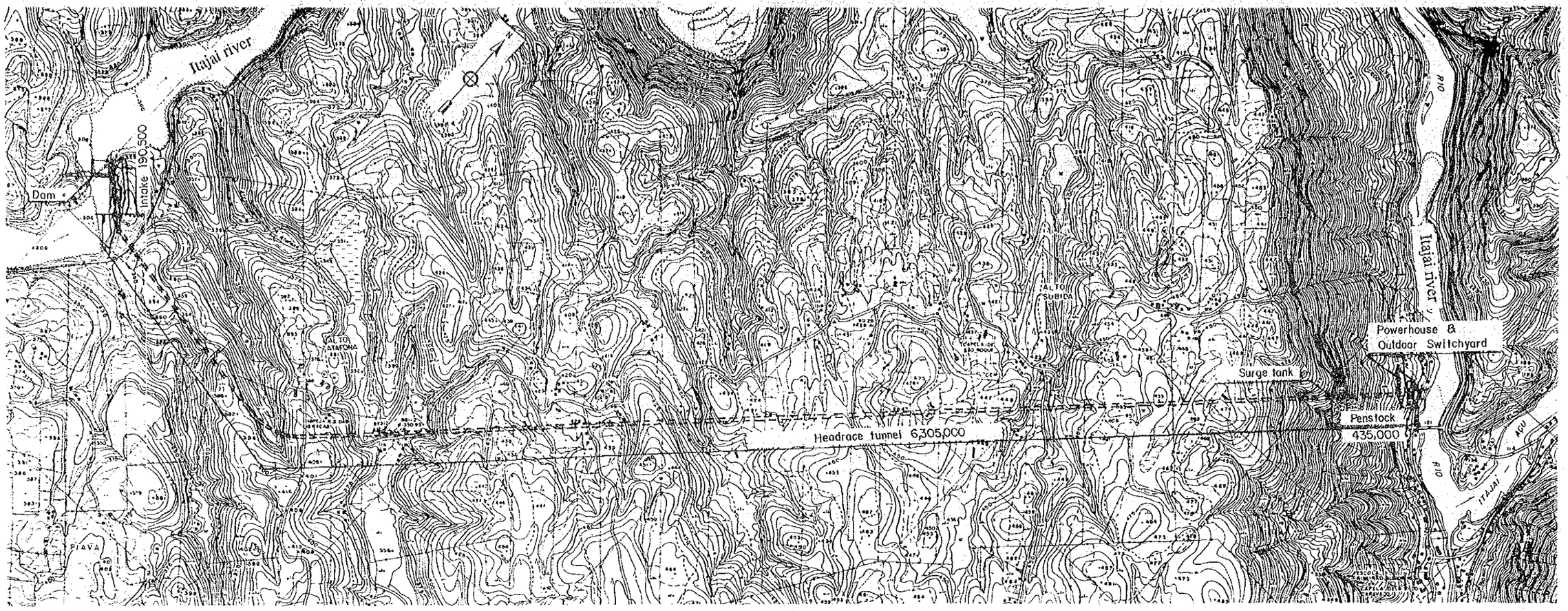
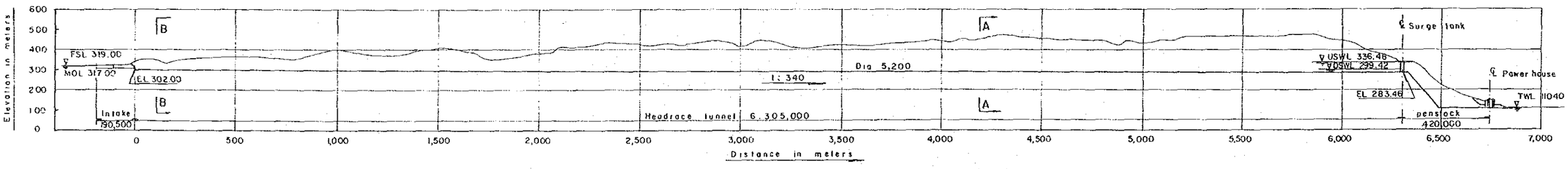
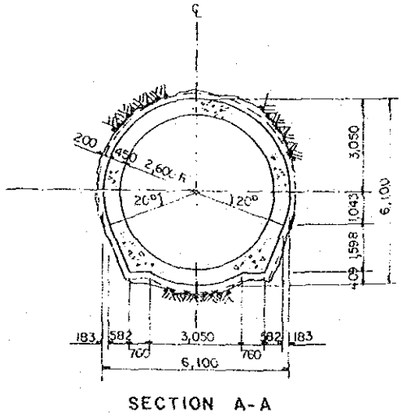
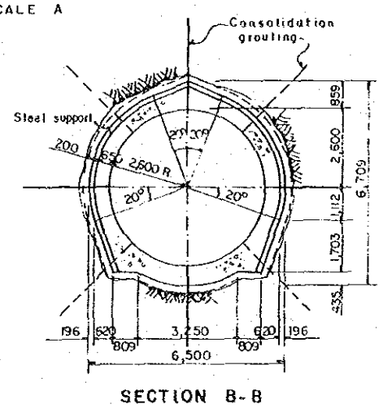


Fig. 5 SALTO PILÃO (1) HYDROPOWER SCHEME, GENERAL PLAN OF DAM AND INTAKE







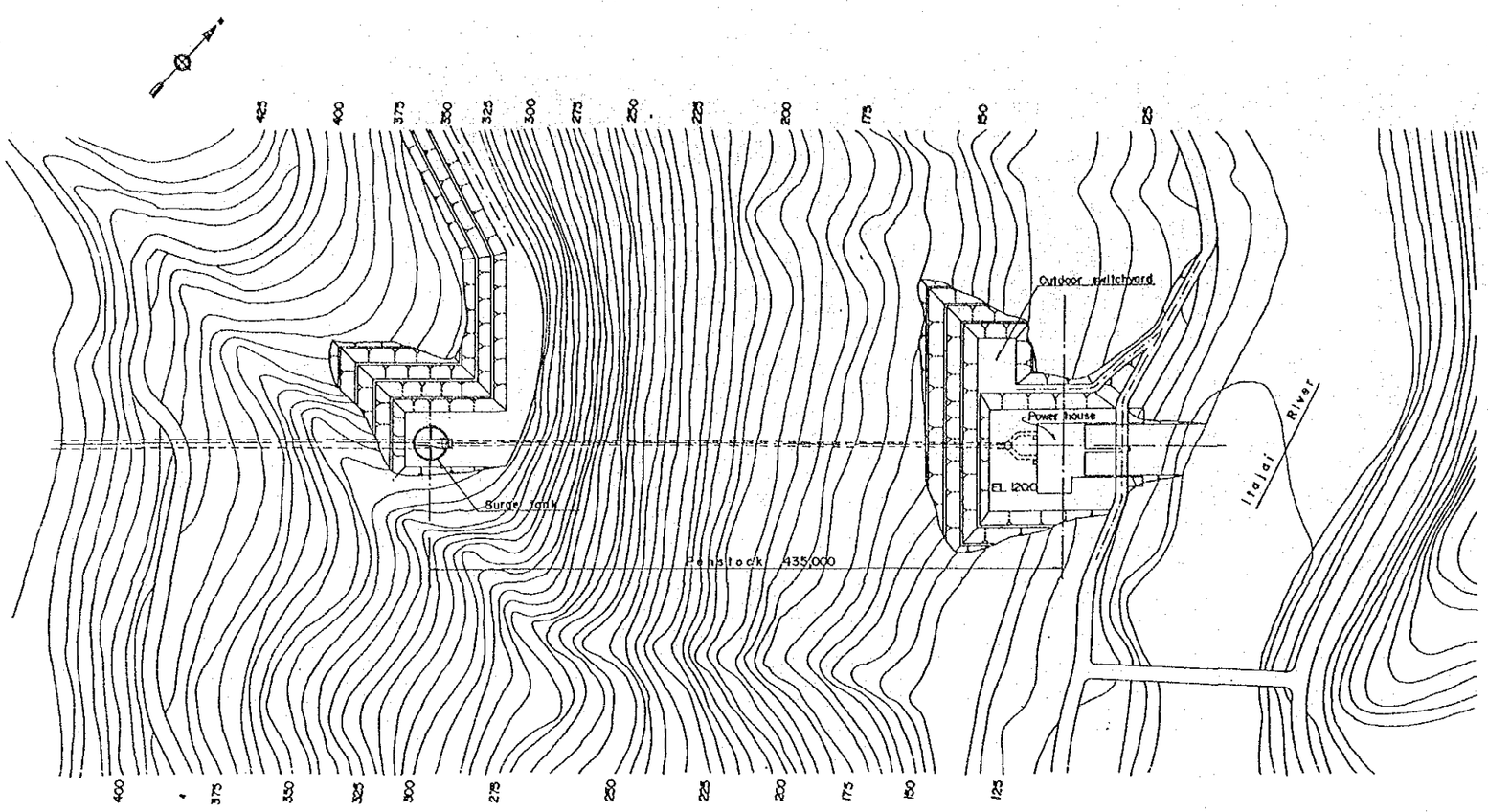


SCALE A 0 4,000m

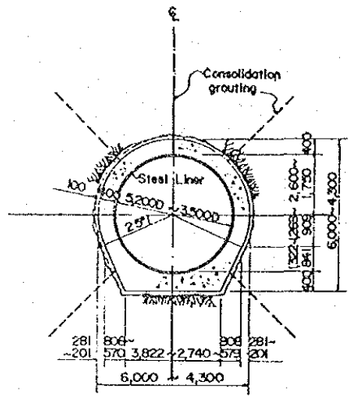
SCALE B 0 10 m

TYPICAL SECTION OF HEADRACE TUNNEL SCALE B

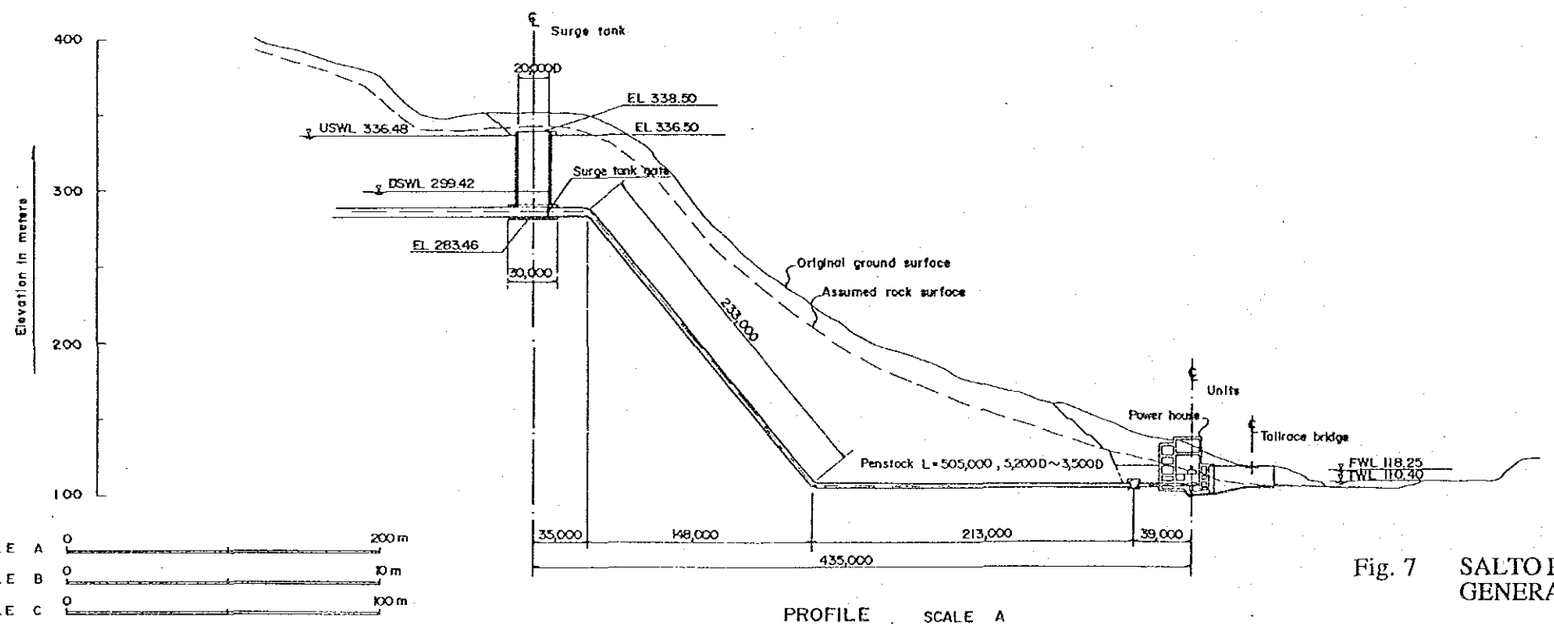
Fig. 6 SALTO PILÃO (1) HYDROPOWER SCHEME, GENERAL PLAN AND PROFILE OF WATERWAY



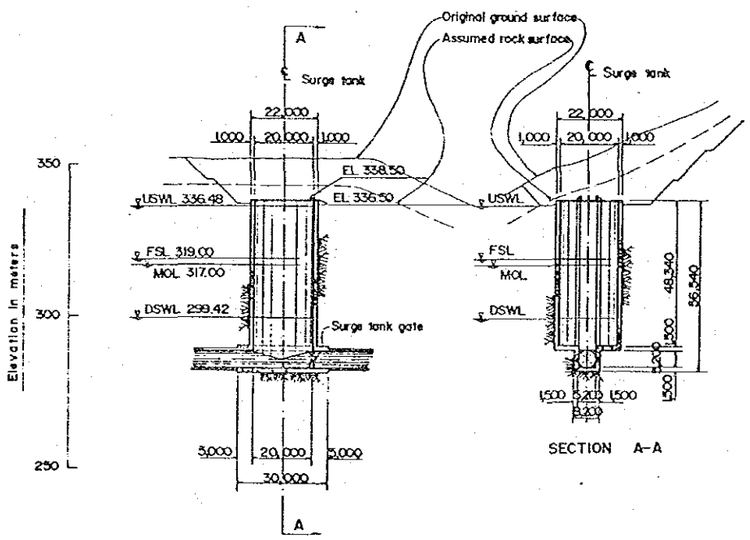
PLAN SCALE A



TYPICAL SECTION OF PENSTOCK TUNNEL SCALE B



PROFILE SCALE A



SURGE TANK SCALE C

SCALE A 0 200m
SCALE B 0 10m
SCALE C 0 100m

Fig. 7 SALTO PILÃO (1) HYDROPOWER SCHEME, GENERAL PLAN AND PROFILE OF SURGE TANK AND PENSTOCK LINE

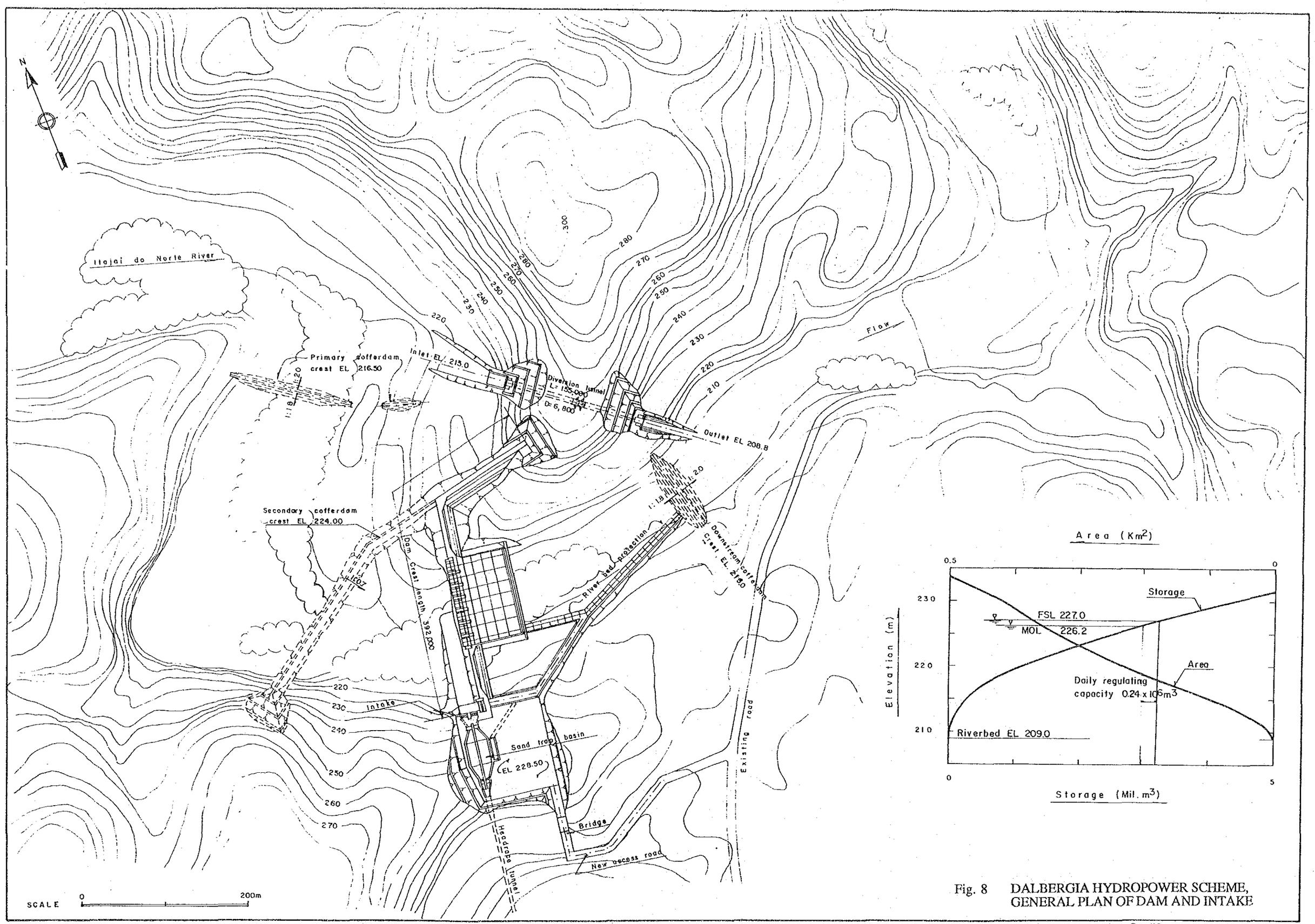
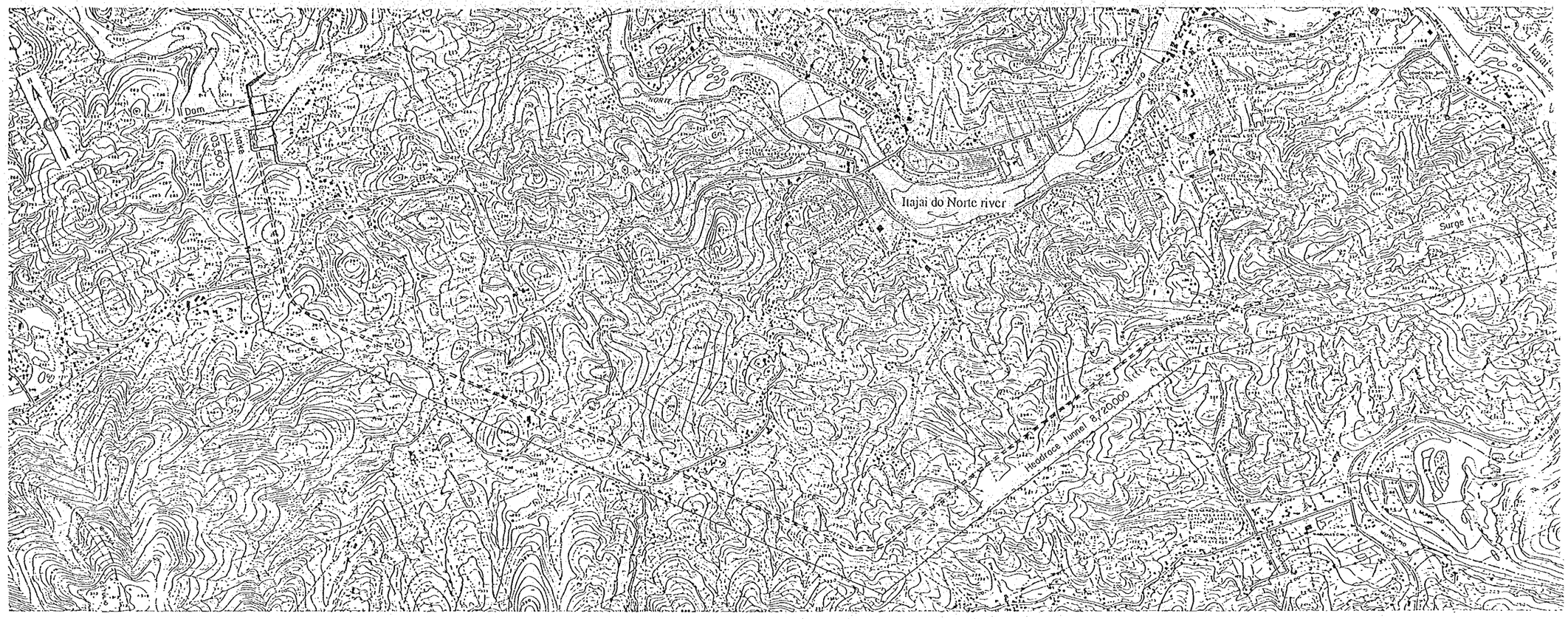
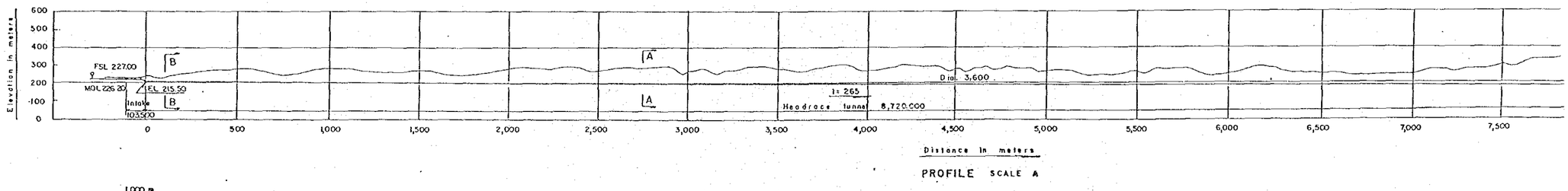


Fig. 8 DALBERGIA HYDROPOWER SCHEME, GENERAL PLAN OF DAM AND INTAKE



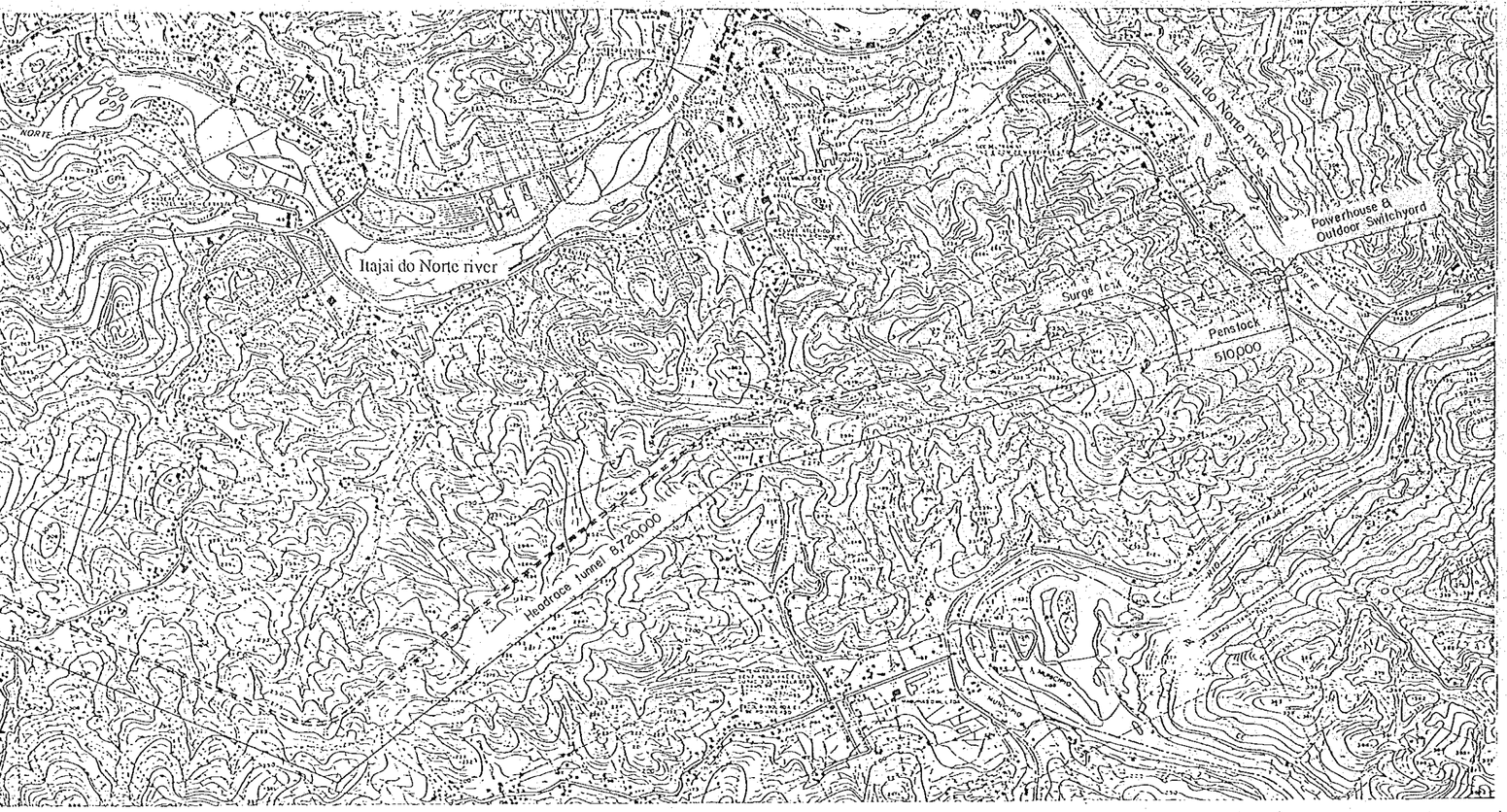
PLAN SCALE A



PROFILE SCALE A

SCALE A 0 1,000 m

SCALE B 0 10 m



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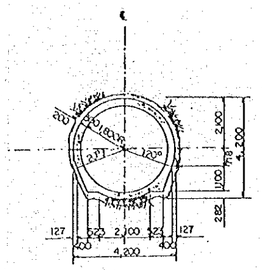
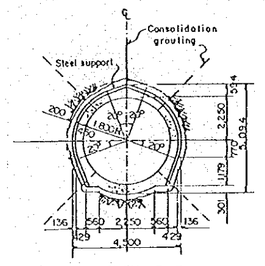
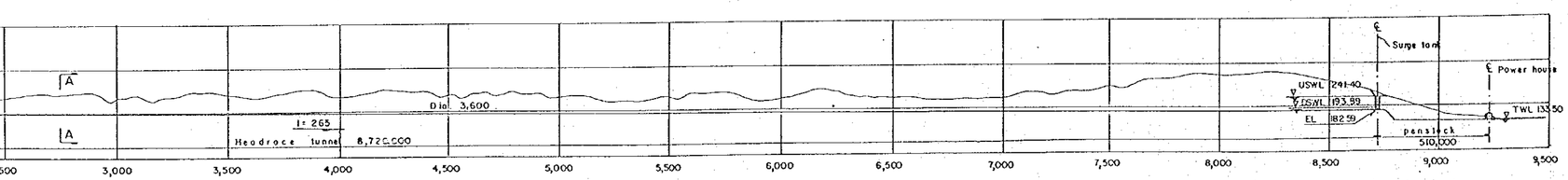


SECTION A-A



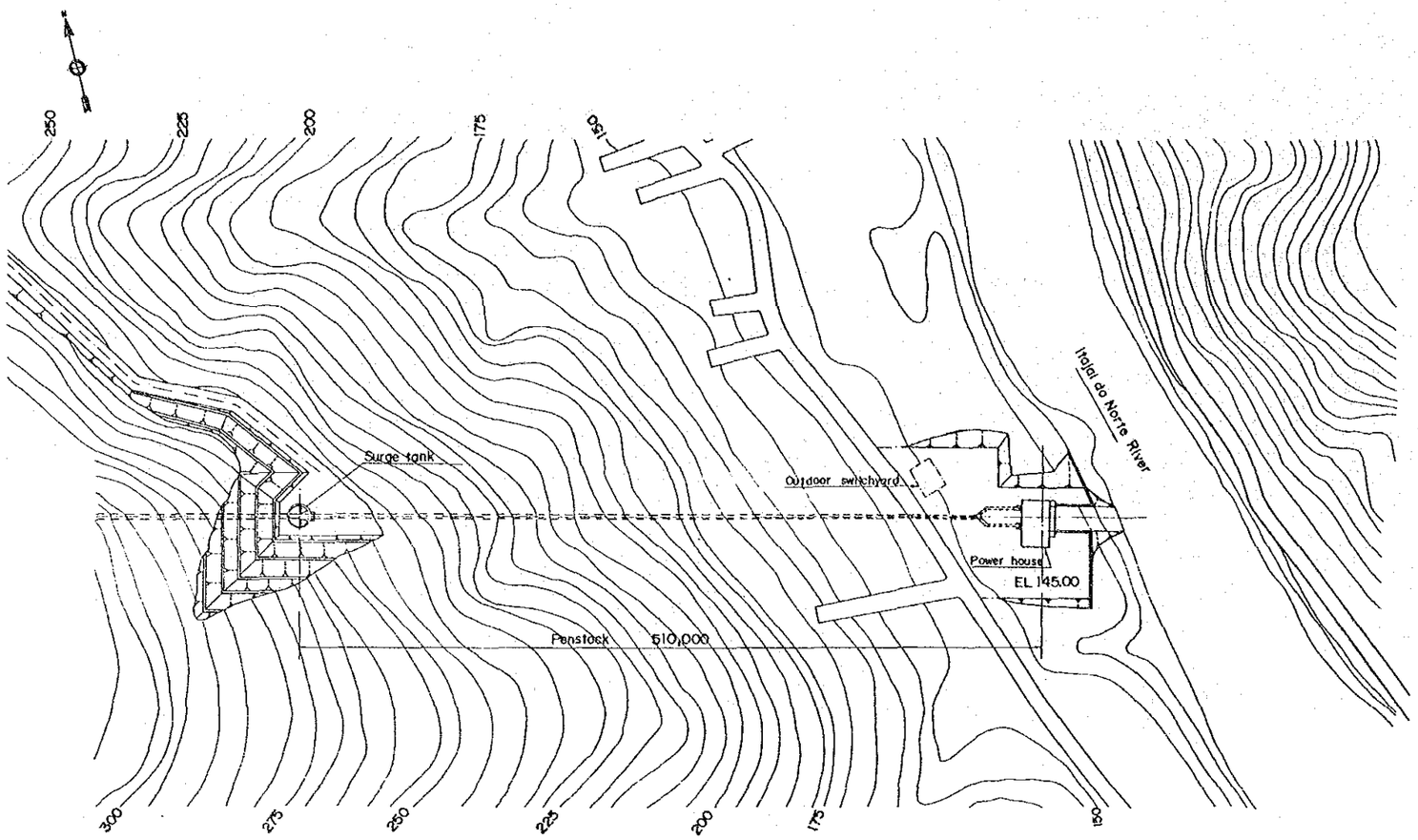
SECTION B-B

TYPICAL SECTION OF HEADRACE TUNNEL SCALE B

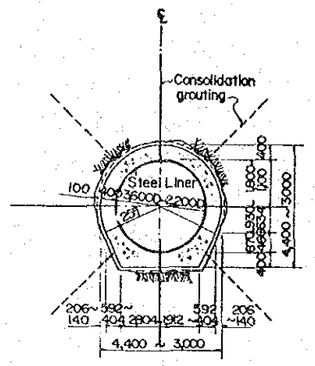


PROFILE SCALE A

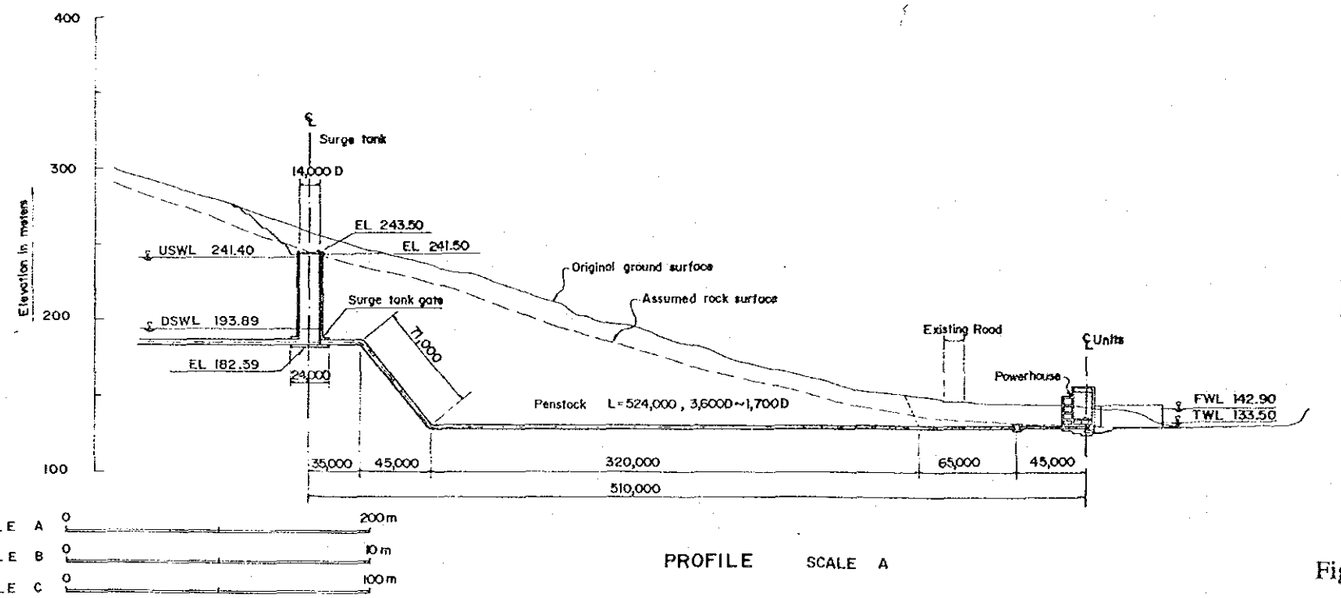
Fig. 9 DALBERGIA HYDROPOWER SCHEME, GENERAL PLAN AND PROFILE OF WATERWAY



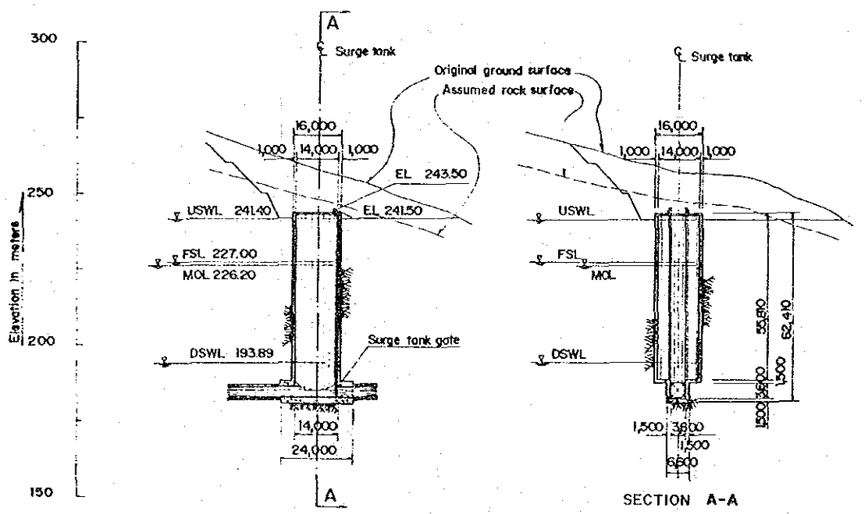
PLAN SCALE A



TYPICAL SECTION OF PENSTOCK TUNNEL SCALE B



PROFILE SCALE A



SURGE TANK SCALE C

Fig. 10 DALBERGIA HYDROPOWER SCHEME,
GENERAL PLAN AND PROFILE OF SURGE TANK AND PENSTOCK LINE

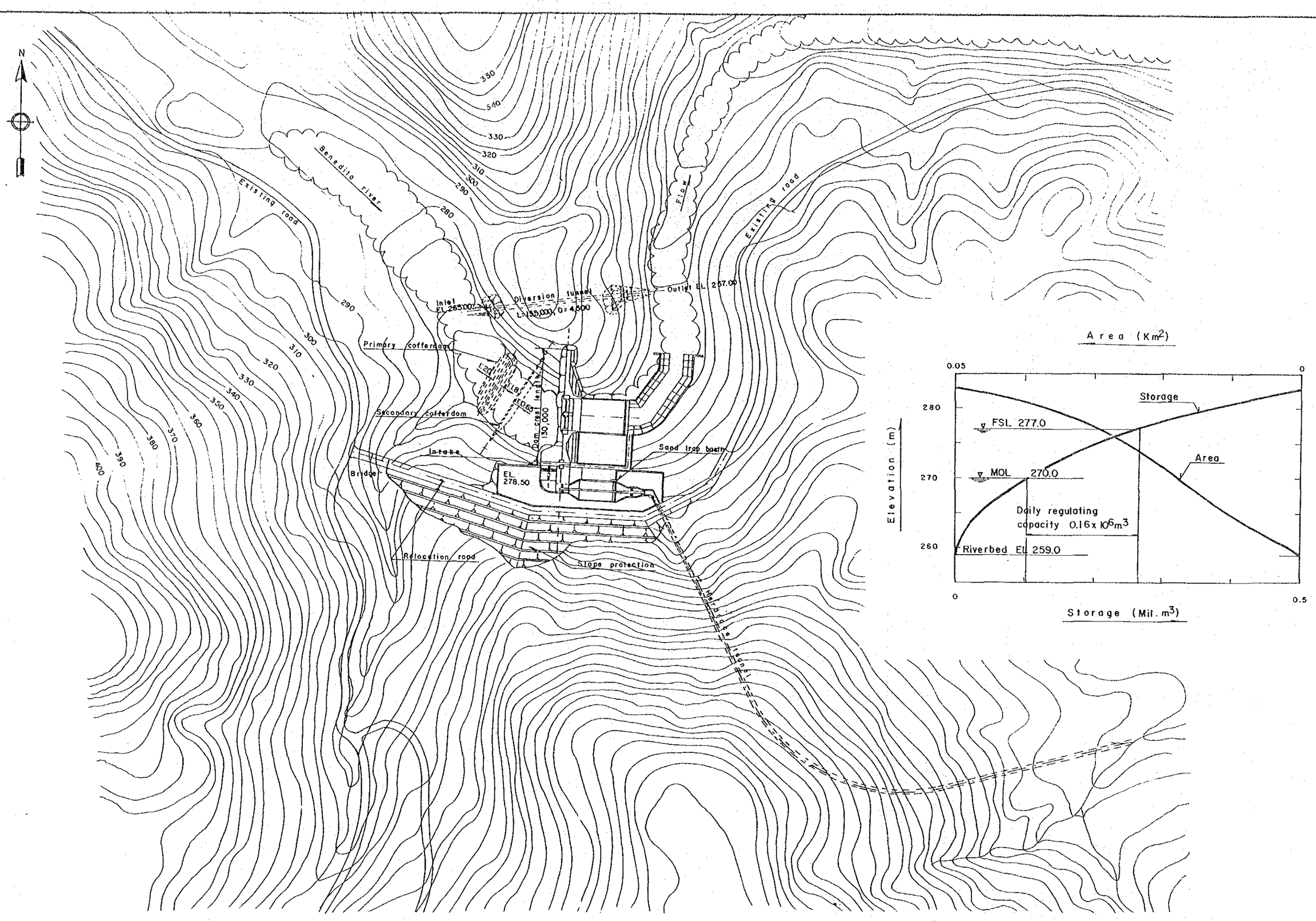
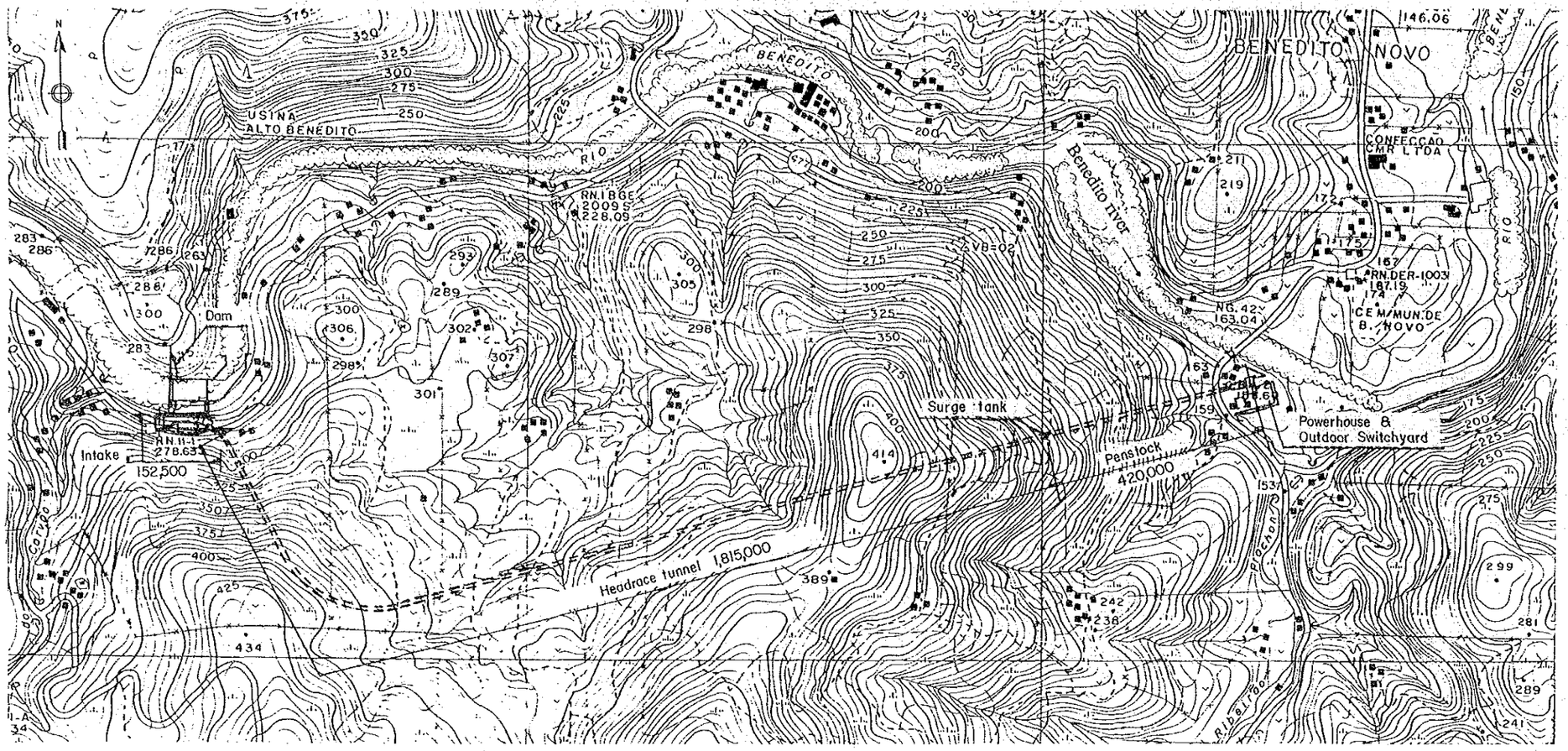
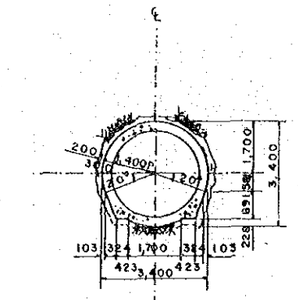
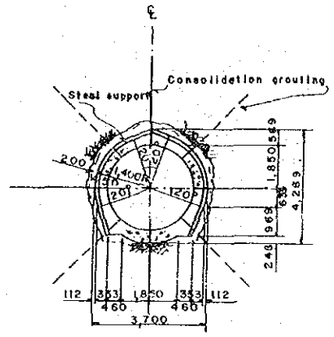


Fig. 11 BENEDITO NOVO HYDROPOWER SCHEME, GENERAL PLAN OF DAM AND INTAKE

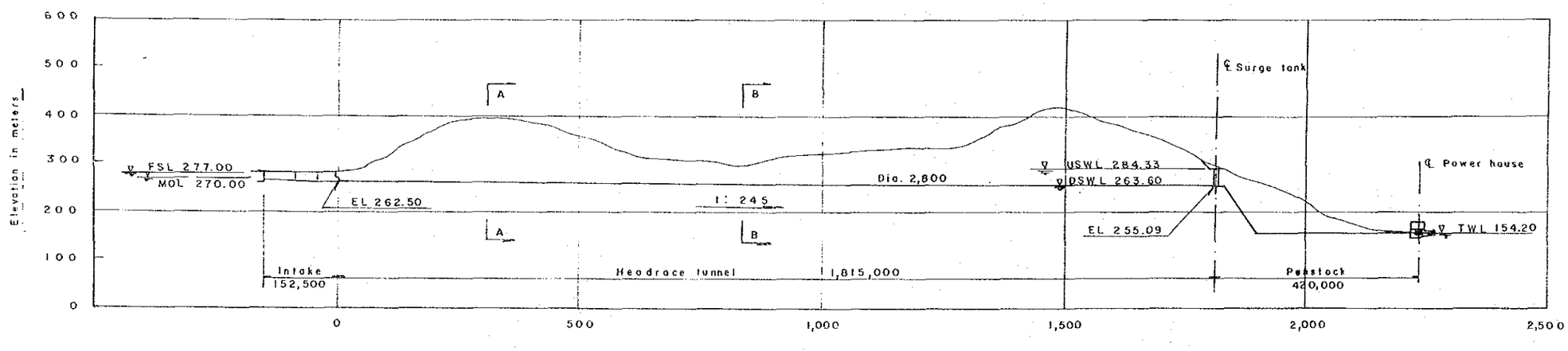


PLAN SCALE A





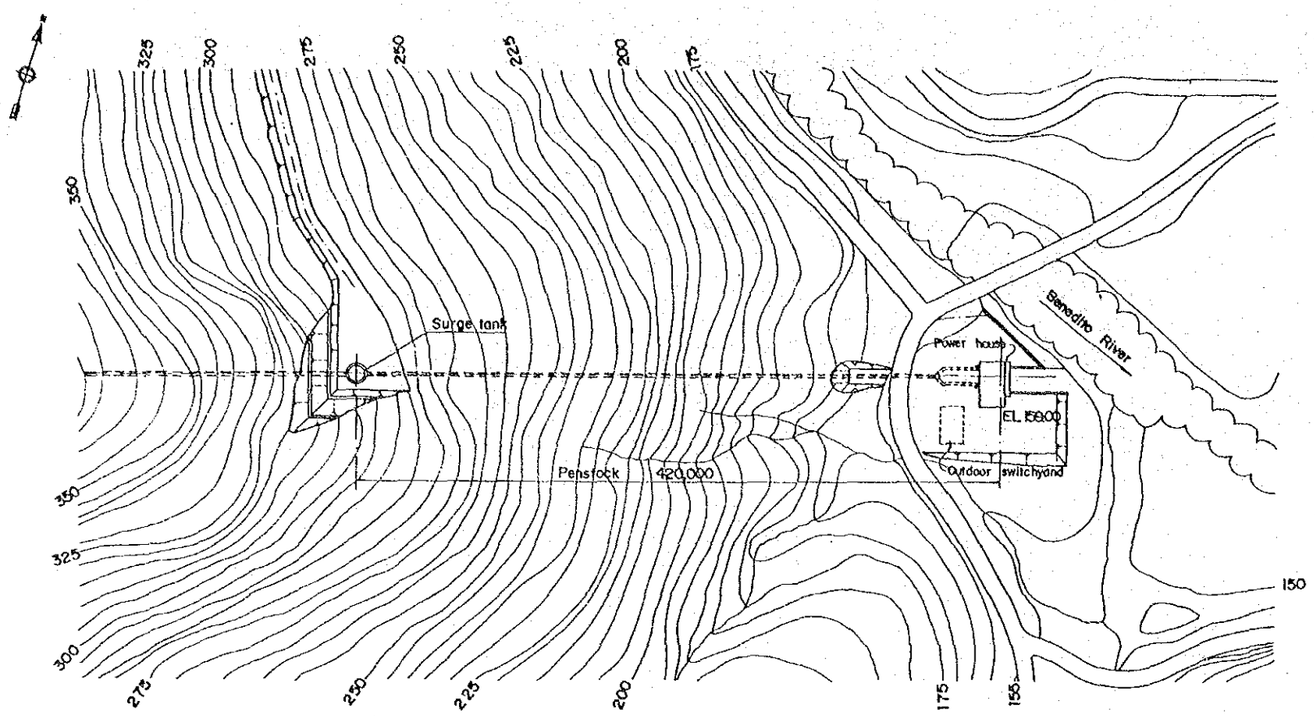
TYPICAL SECTION OF HEADRACE TUNNEL
SCALE B



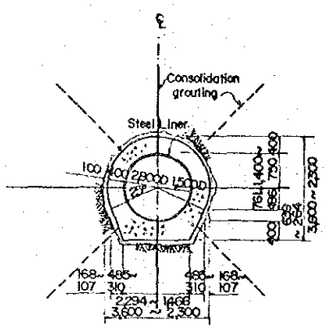
SCALE A 0 500 m
SCALE B 0 10 m

PROFILE SCALE A

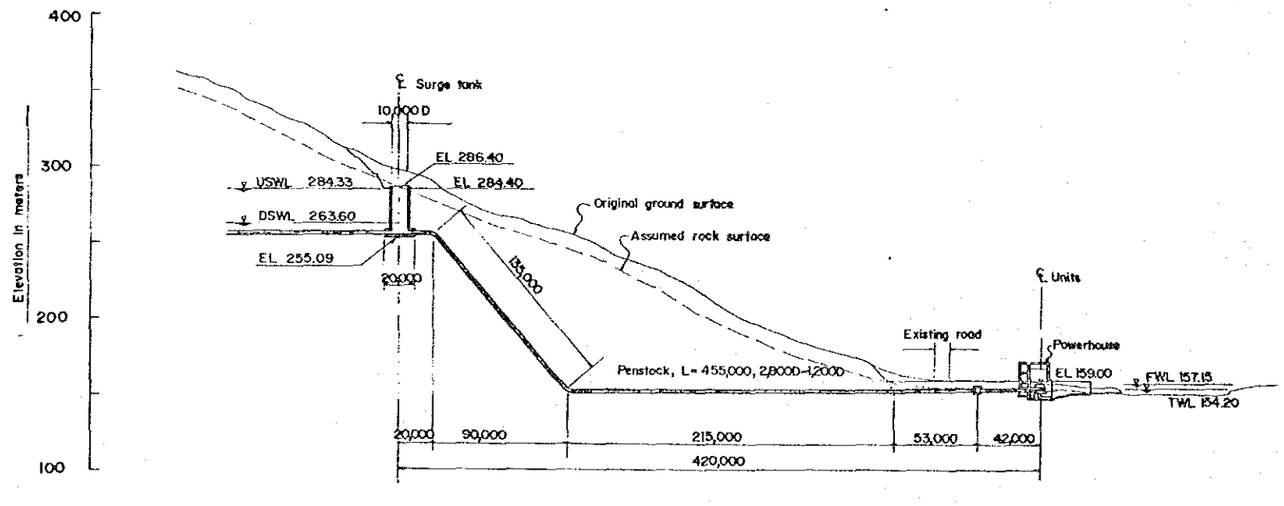
Fig. 12 BENEDITO NOVO HYDROPOWER SCHEME, GENERAL PLAN AND PROFILE OF WATERWAY



PLAN SCALE A

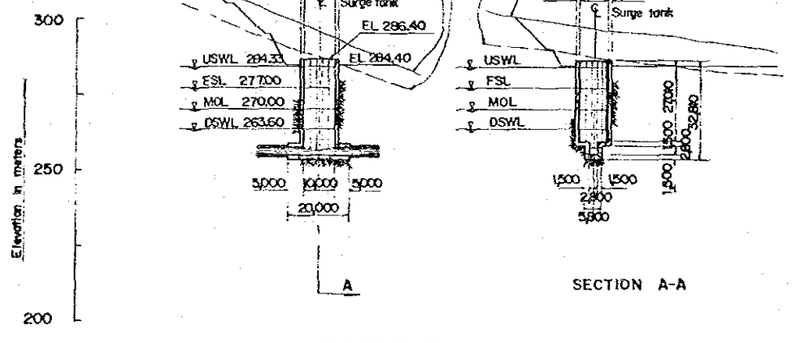


TYPICAL SECTION OF PENSTOCK TUNNEL SCALE B



PROFILE SCALE A

SCALE A 0 200m
SCALE B 0 10m
SCALE C 0 100m



SECTION A-A

SURGE TANK SCALE C

Fig. 13 BENEDITO NOVO HYDROPOWER SCHEME,
GENERAL PLAN AND PROFILE OF SURGE TANK AND PENSTOCK LINE

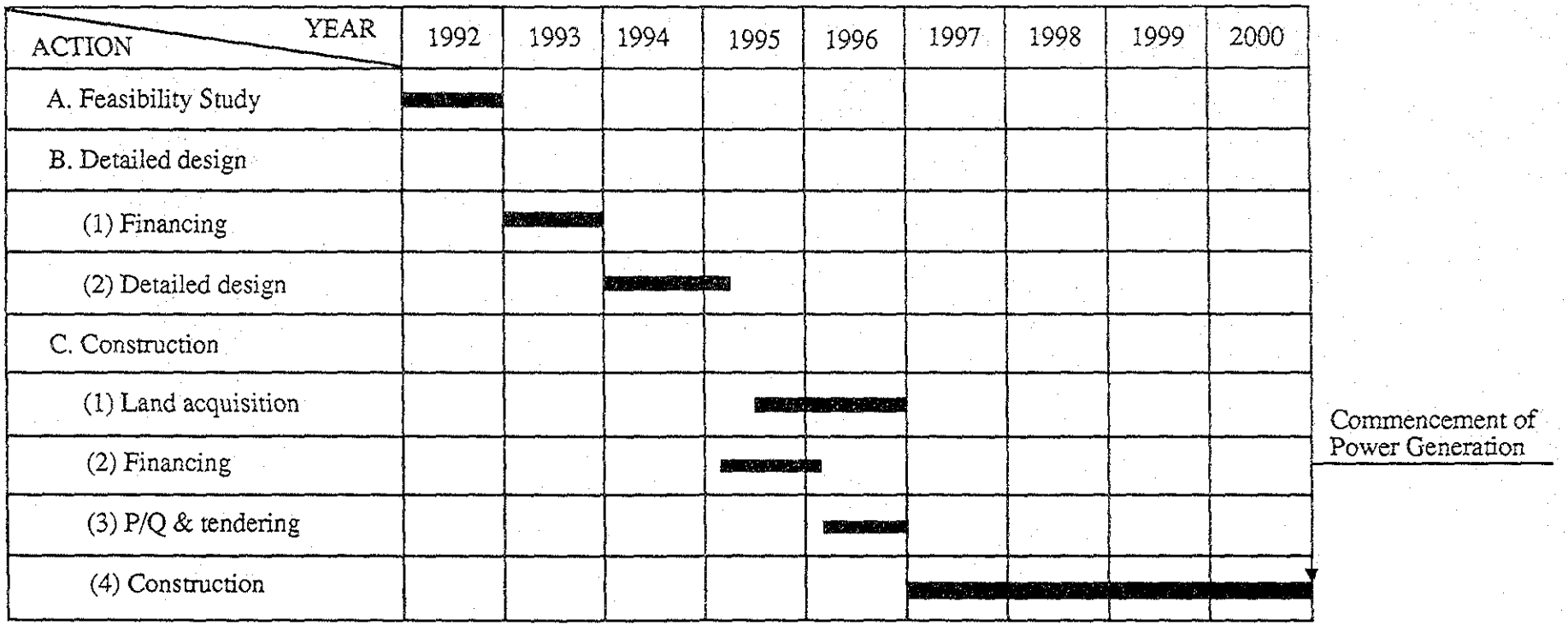


Fig. 14 IMPLEMENTATION SCHEDULE FOR SALTO PILÃO (1) HYDROPOWER SCHEME

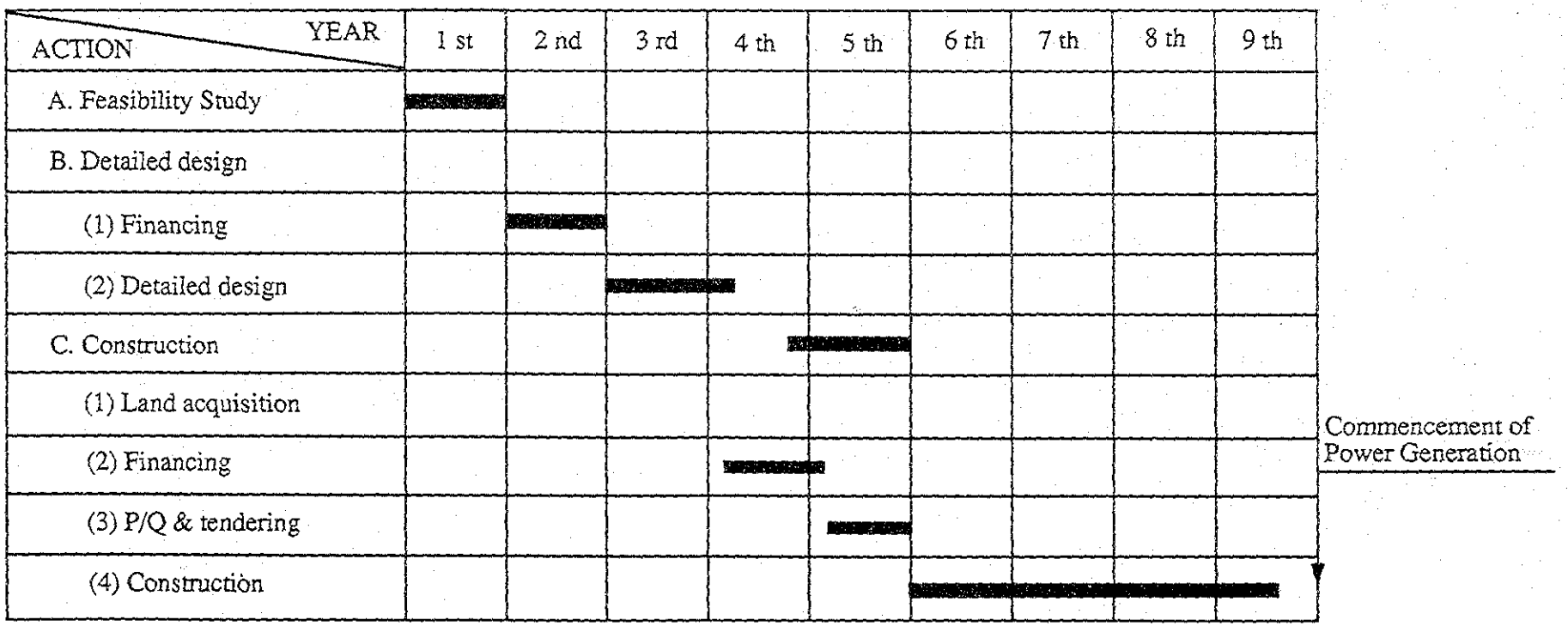


Fig. 15 IMPLEMENTATION SCHEDULE FOR DALBERGIA HYDROPOWER SCHEME

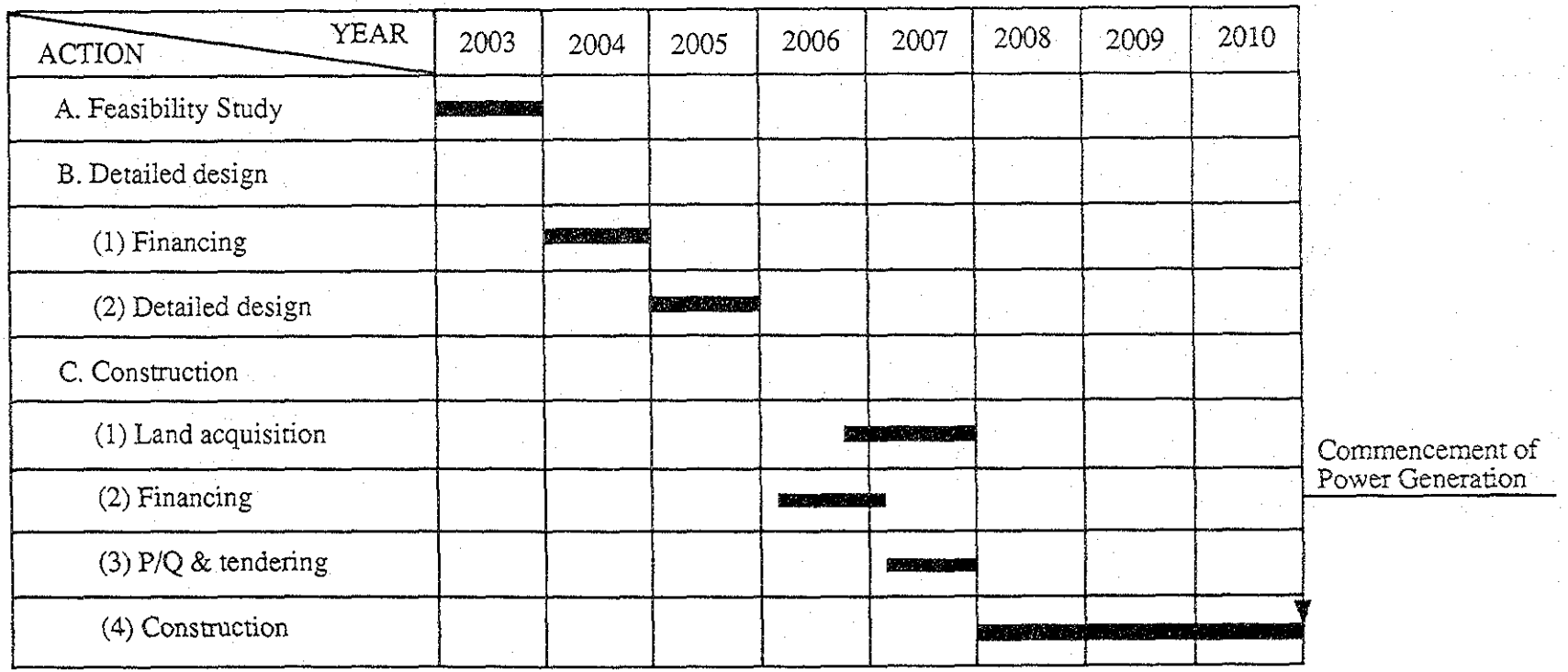


Fig. 16 IMPLEMENTATION SCHEDULE FOR BENEDITO NOVO HYDROPOWER SCHEME