

REVISED	REV.	APR.	DATA

OBSERVAÇÕES:

APPROVAL

PROJETO E-201
 REVISÃO E-201
 VENTURA
 DATA AUGUST, 1982
 APROVADO

DAE SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
 NÚCLEO DE PLANEJAMENTO E CONTROLE

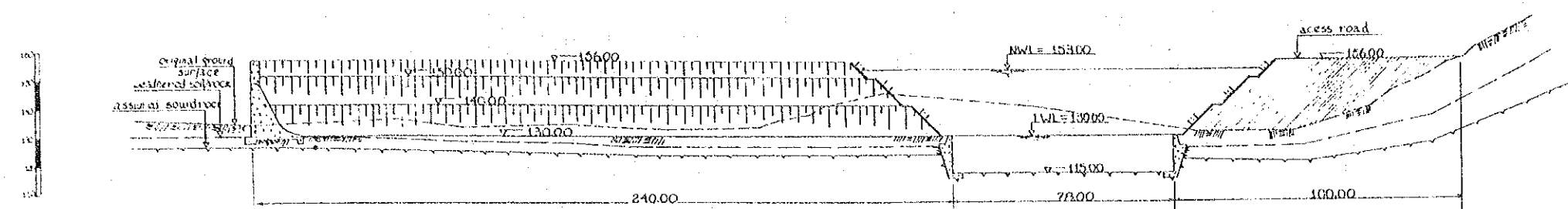
TÍTULO
 JUAQUÁ - SÃO LOURENÇO
 PROJECT

SÃO LOURENÇO REVERSIBLE
 POWER STATION OUTLET
 PLAN

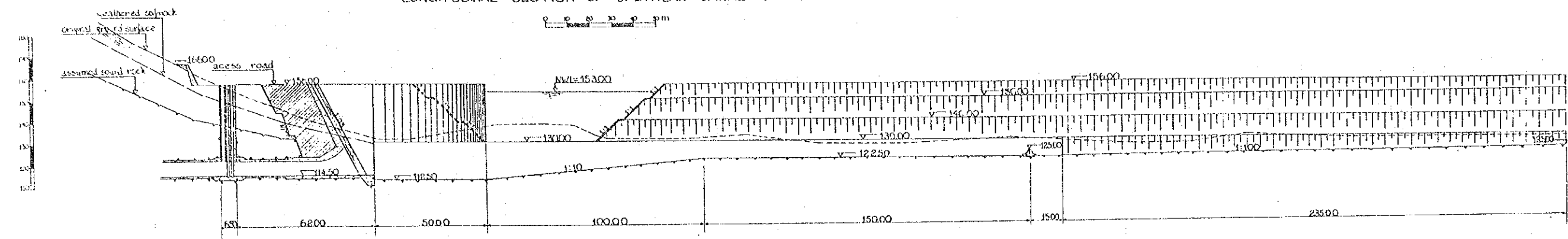
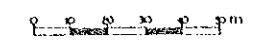
FIGURA
 NÚMERO DO
 PROJETO

REVISÃO	REV.	DATA

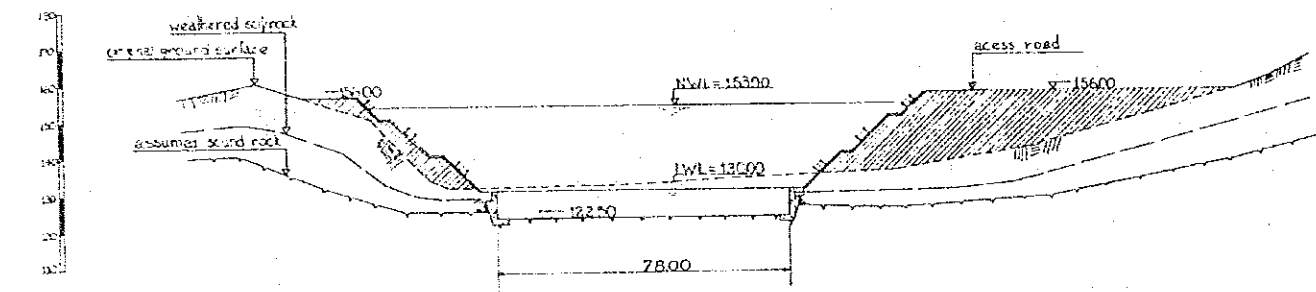
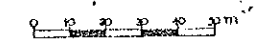
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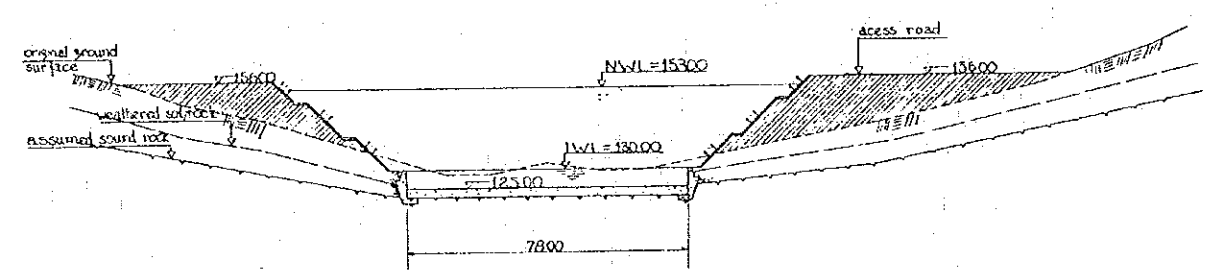
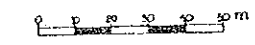
LONGITUDINAL SECTION OF UPSTREAM CANAL (A-A)



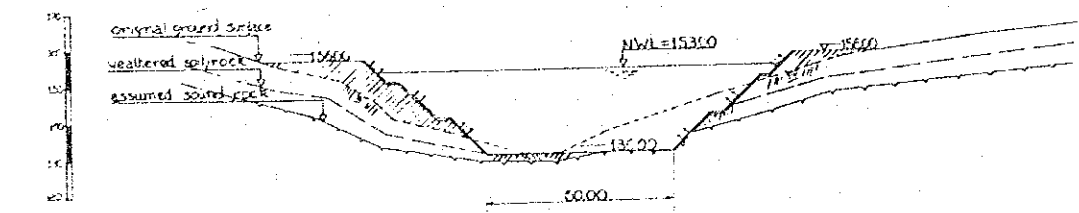
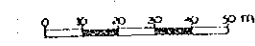
LONGITUDINAL SECTION OF DOWNSTREAM CANAL (B-B)



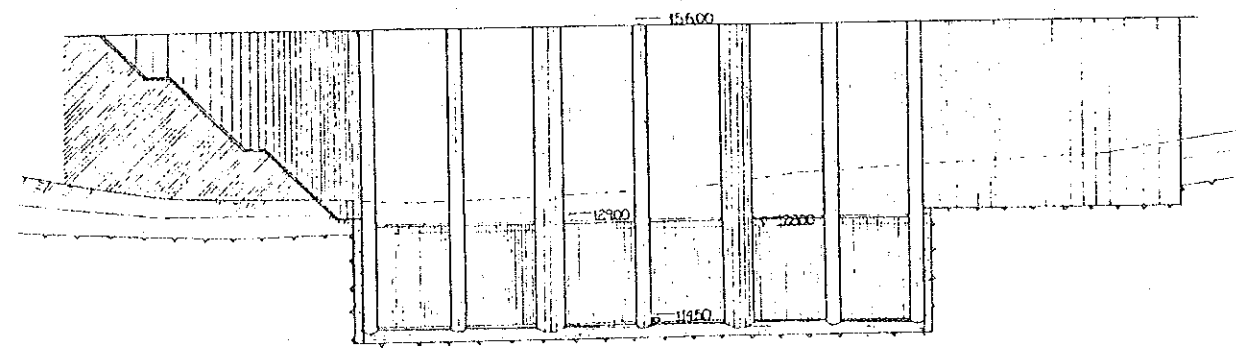
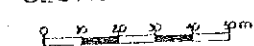
SECTION (C-C)



SECTION (D-D)



SECTION (E-E)



FRONT VIEW OF OUTLET



PROJETO	Epm
DESENHO	Epm
VERIFICADO	
DATA	August 1982
APROVADO	
APROVADO	

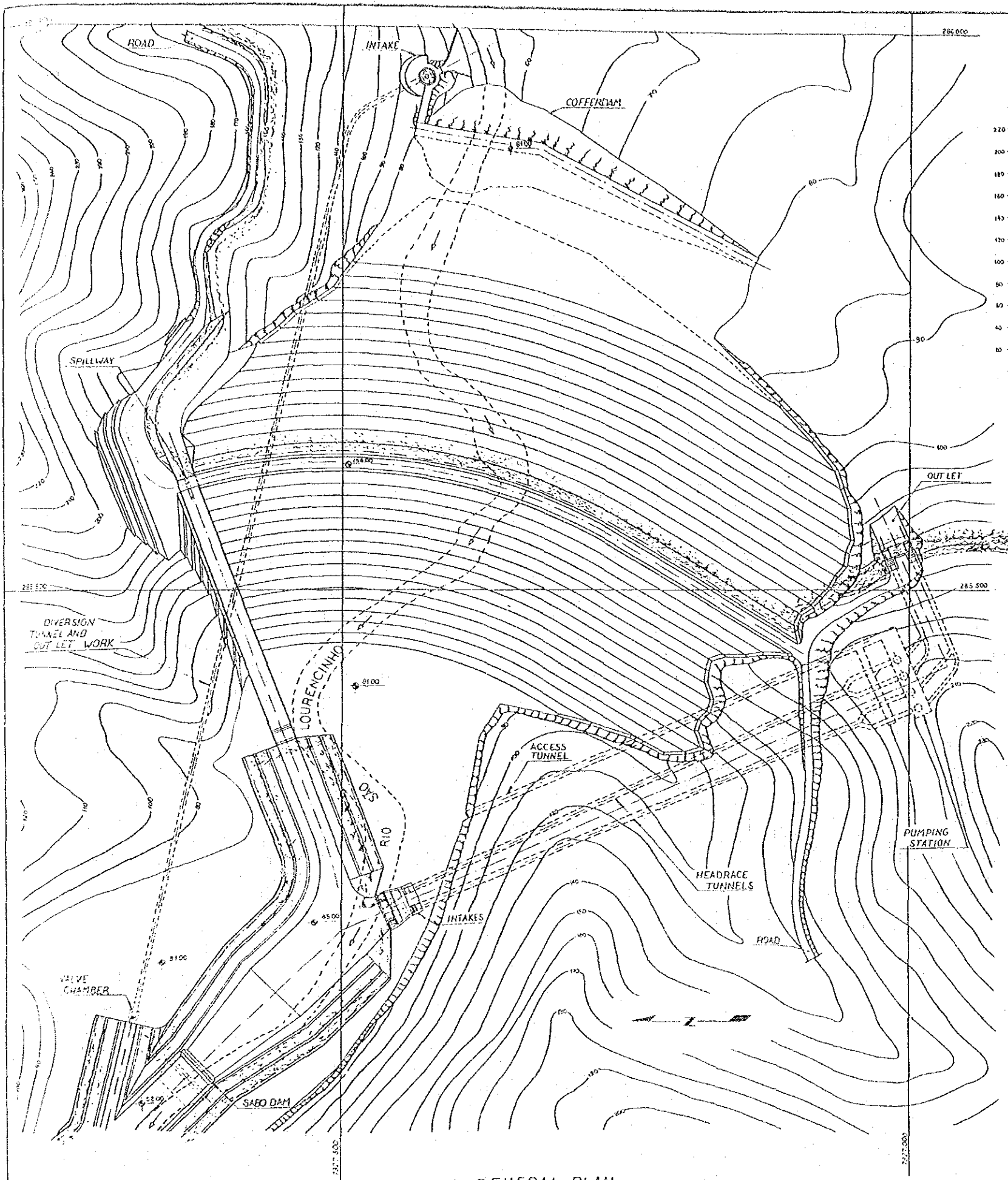
SECRETARIA DE OBRAS E DO MEIO AMBIENTE
DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
DIRETORIA DE PLANEJAMENTO E CONTROLE

TÍTULO
JUQUÍ - SÃO LOURENÇO
PROJECT

SÃO LOURENÇO REVERSIBLE
POWER STATION OUTLET

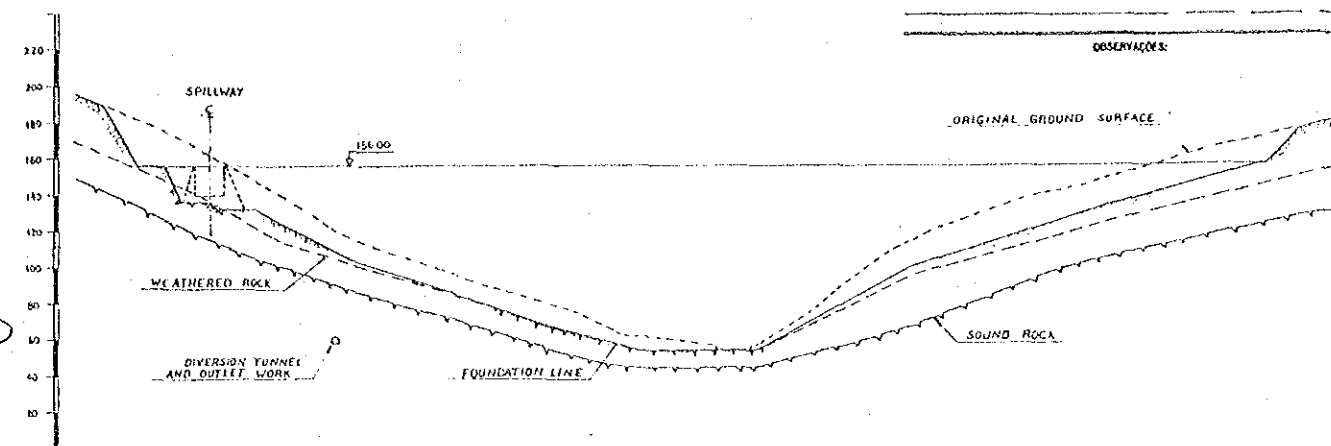
PROFILE AND SECTION

ESCALA
NÚMERO DO
DESENHO



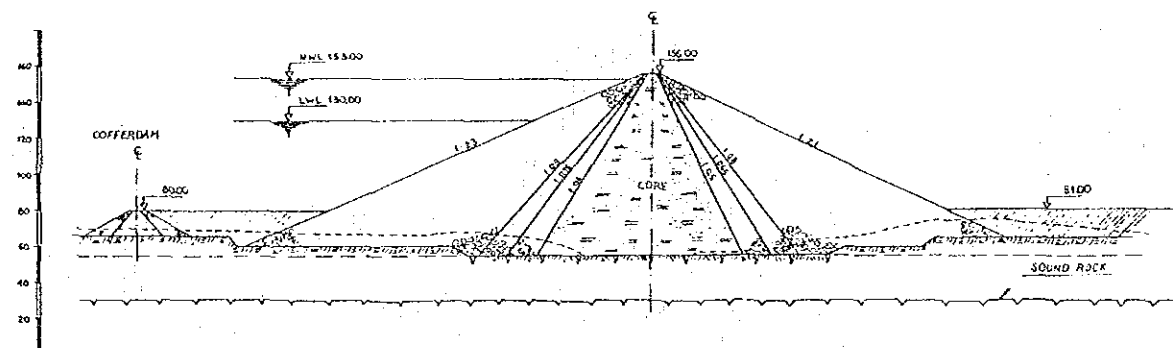
GENERAL PLAN

0 20 40 60 80 100 m



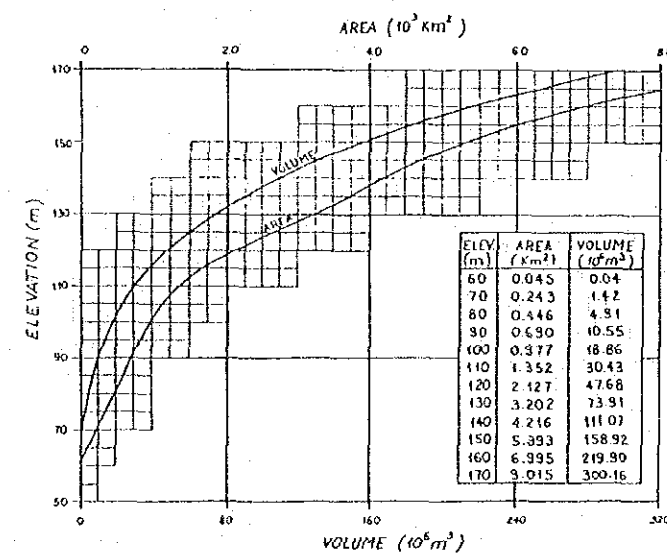
DAM LONGITUDINAL SECTION

0 20 40 60 80 100 m



DAM TRANSVERSAL SECTION

0 20 40 60 80 100 m



AREA AND VOLUME CURVES OF RESERVOIR

REVISED	REV.	APP.	DATA

OBSERVATIONS:

PROJETO: CP
 DESENHO: P. J. J. J.
 VERIFICADO: P. J. J. J.
 DATA: Agosto 1982
 APROVADO: P. J. J. J.
 APROVADO: P. J. J. J.

TÍTULO: JUIQUIA - SÃO LOURENÇO PROJECT

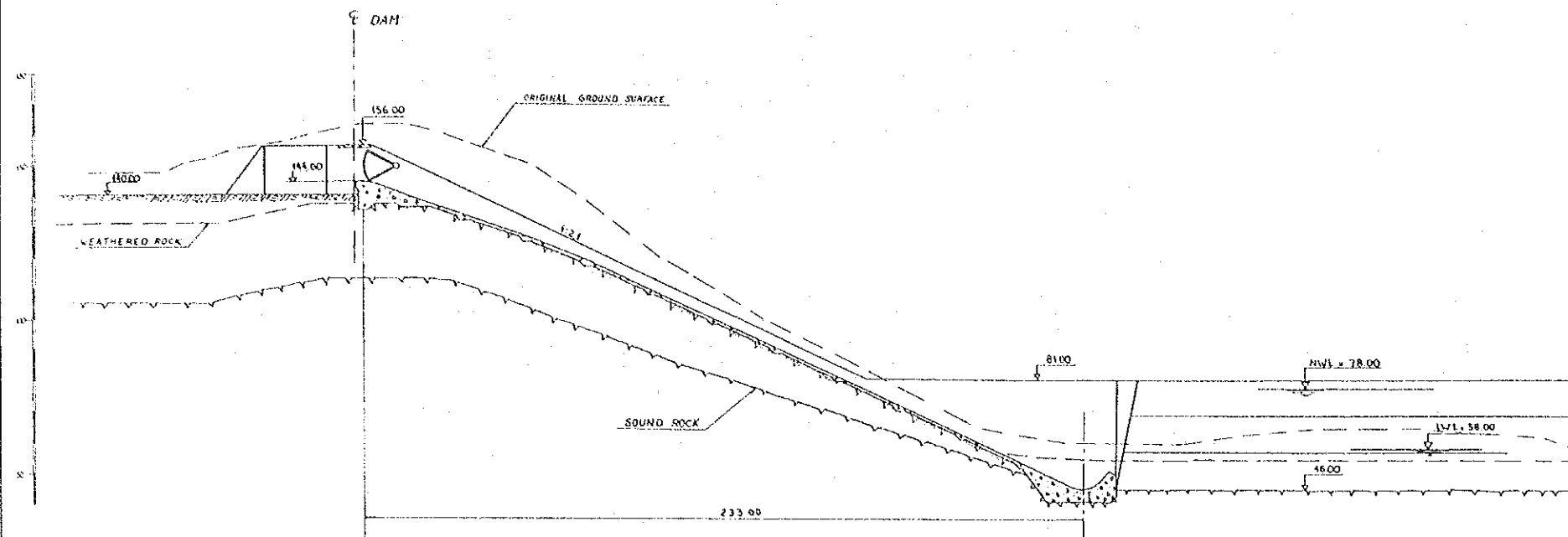
DAM OF LH-2A

PLAN, PROFILE AND SECTION

ESCALA: 1:1000
 NÚMERO DO: 100
 NÚMERO: 100

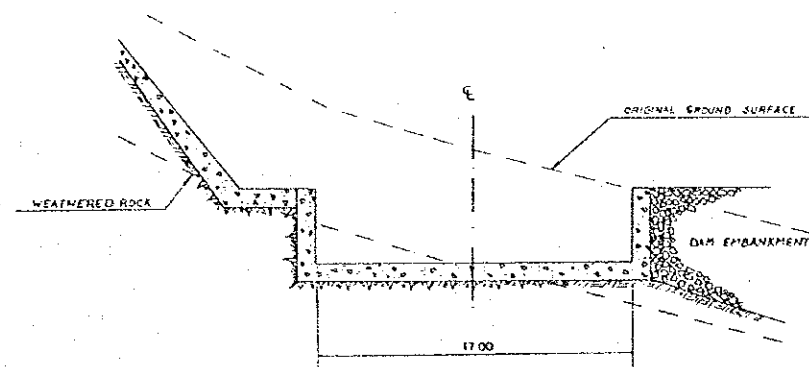
REVISED	REV.	APR.	DATA

OBSERVAÇÕES:



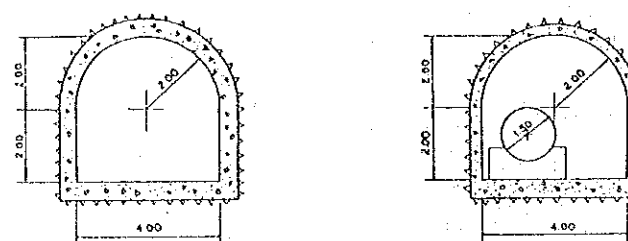
SPILLWAY LONGITUDINAL SECTION

0 10 20 30 40 50 m



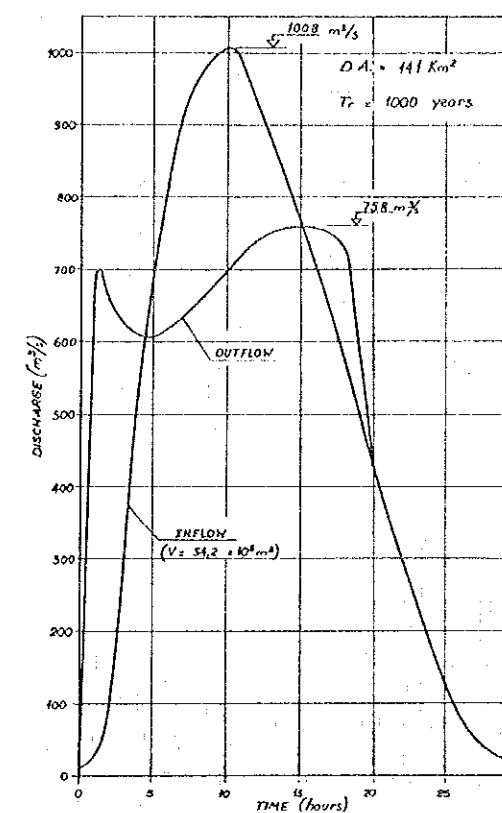
SPILLWAY TYPICAL SECTION

0 2 4 6 8 10 m



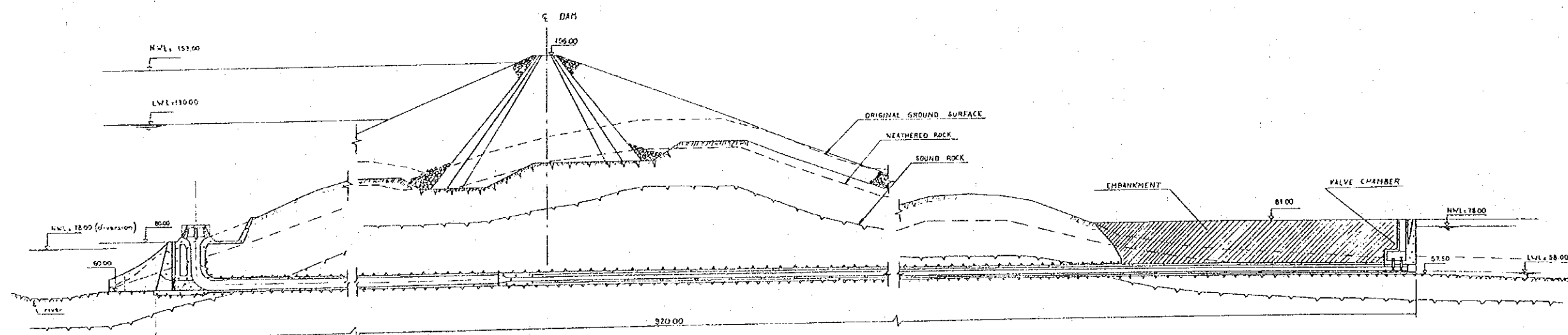
DIVERSION TUNNEL AND OUTLET WORK TRANSVERSAL SECTIONS

0 1 2 3 4 5 m



DESIGN FLOOD OF SPILLWAY

REVISIONS



DIVERSION TUNNEL AND OUTLET WORK LONGITUDINAL SECTION

0 10 20 30 40 50 m

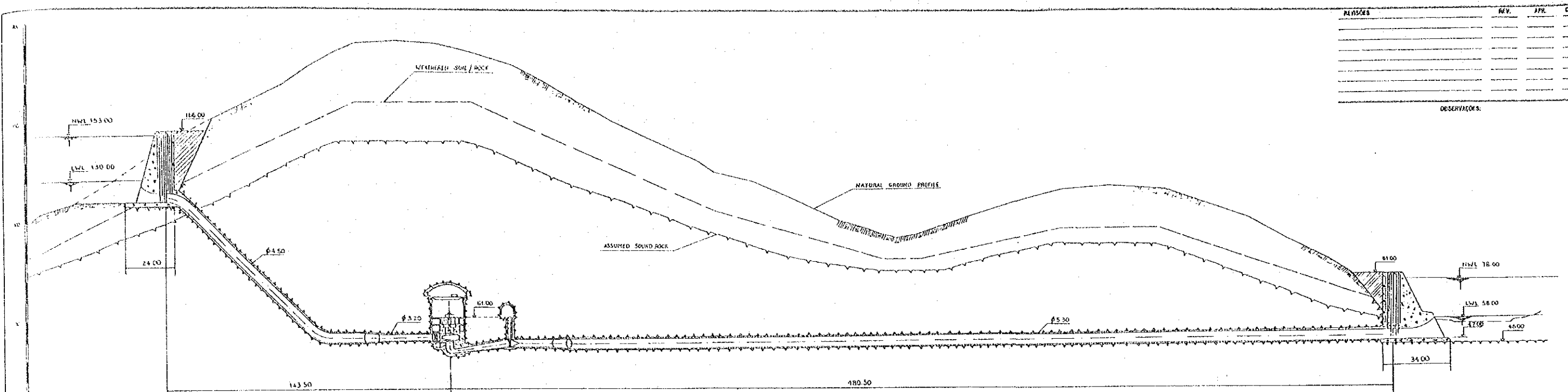
PROJETO	07
DESENVOLVIDO	Alfonso
VERIFICADO	
DATA	Agosto 1982
APROVADO	
APROVADO	

JUQUIA - SÃO LOURENÇO PROJECT

DAM OF LH-2A

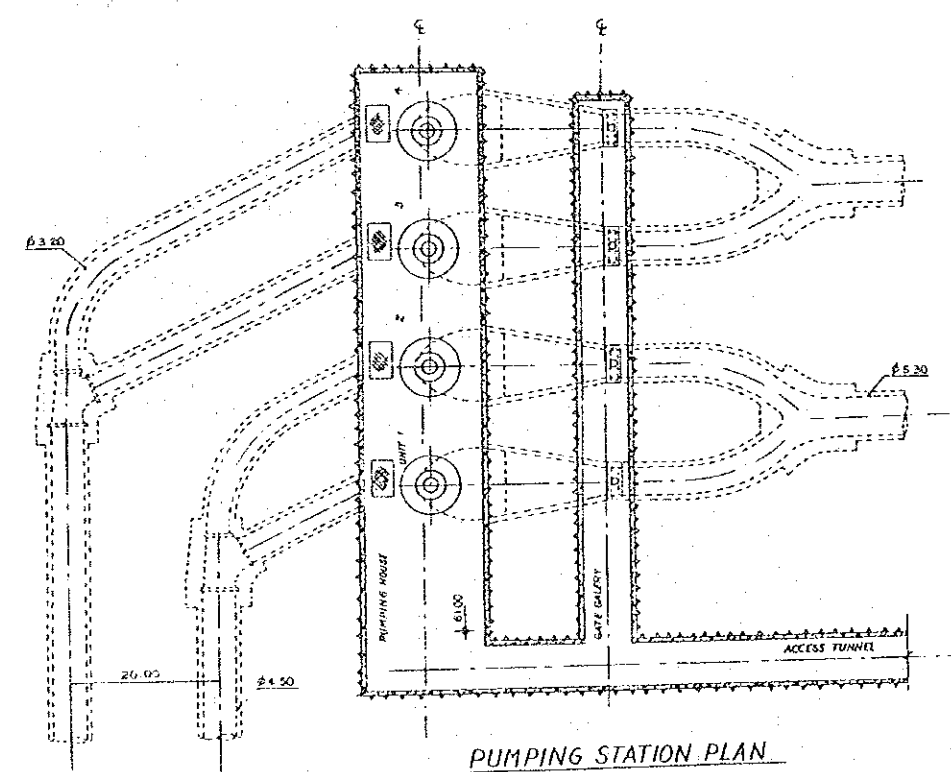
SPILLWAY AND DIVERSION - PROFILE

ESCALA
NOVO TO
DEBIO



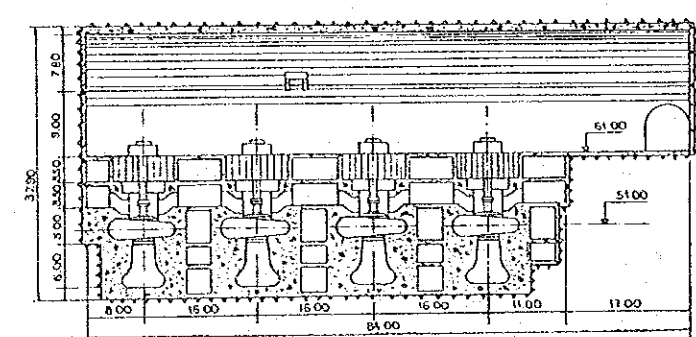
PUMPING STATION LONGITUDINAL SECTION

0 10 20 30 40 50 m



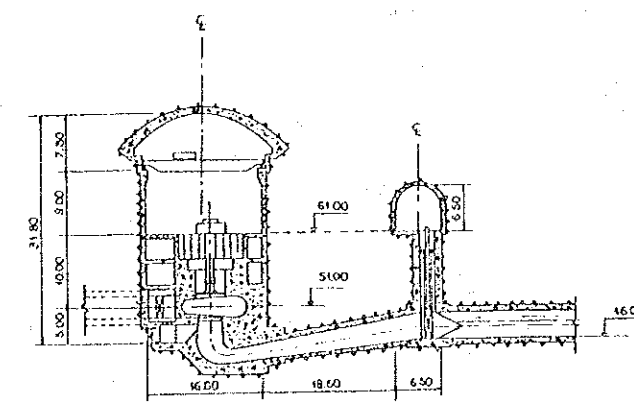
PUMPING STATION PLAN

0 5 10 15 20 25 m



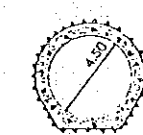
PUMPING HOUSE LONGITUDINAL SECTION

0 5 10 15 20 25 m



PUMPING HOUSE TRANSVERSAL SECTION

0 5 10 15 20 25 m



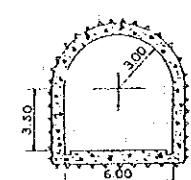
PENSTOCK SECTION

0 5 m



TAILRACE TUNNEL SECTION

0 5 m



ACCESS TUNNEL SECTION

0 5 m

REV.	APP.	DATA

OBSERVAÇÕES:

REVISÃO:

PROJETO	OP
DESENVOLVIDO	Engenharia
VERIFICADO	
DATA	Agosto 1982
APROVADO	
APROVADO	

DAEE SECRETARIA DE OBRAS E DO MEIO AMBIENTE
DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
NÚCLEO DE PLANEJAMENTO E CONTROLE

TÍTULO
JURUPÁ - SÃO LOURENÇO
PROJECT

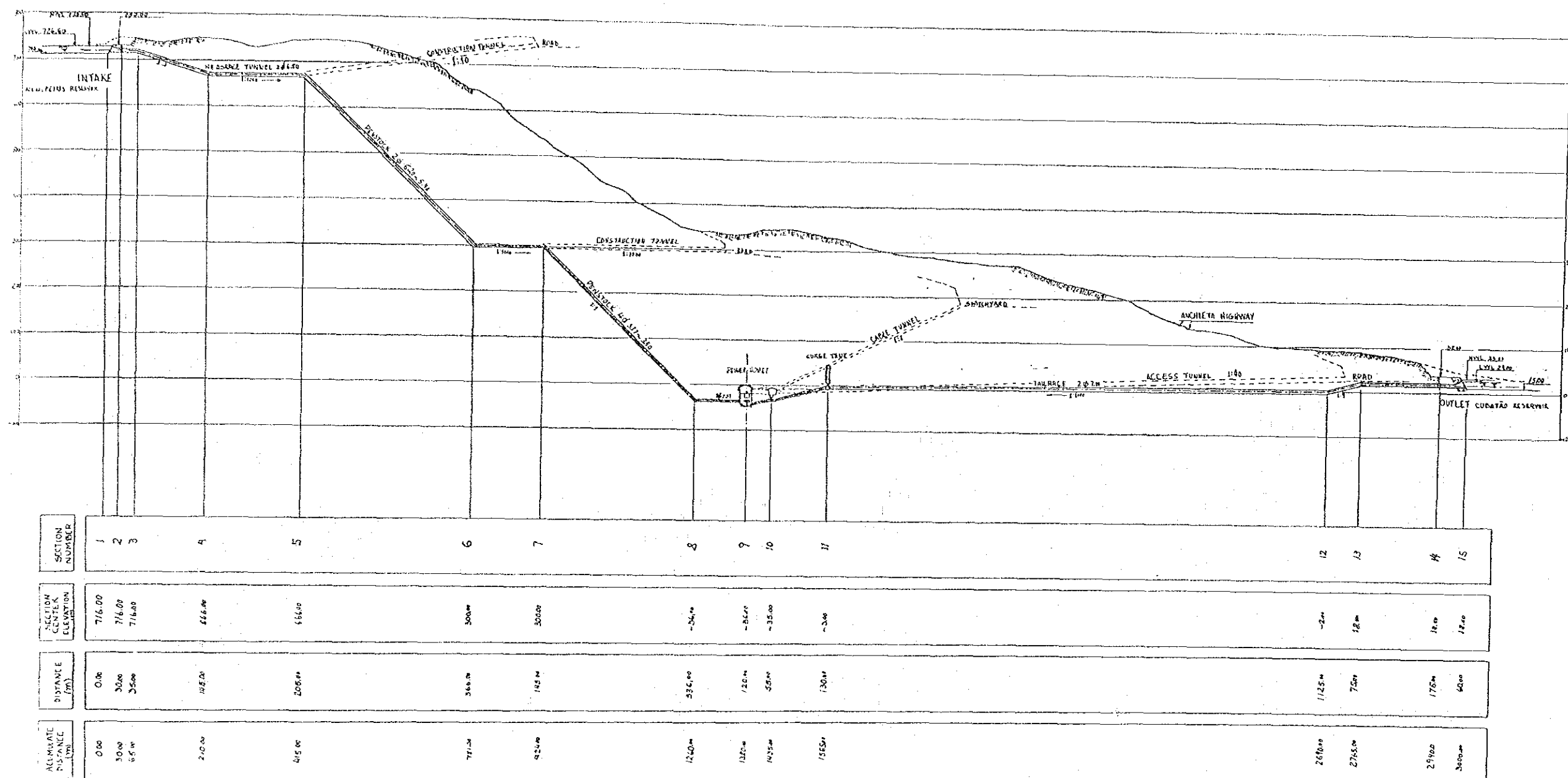
DAM OF LH-2A

PUMP STATION - PROFILE AND SECTION

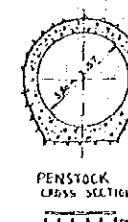
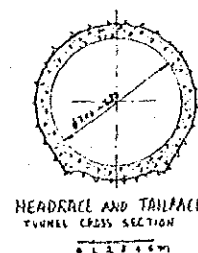
ESCALA
MÓDULO DO
DESENHO

REVISOES	REV.	APP.	DATA

OBSERVAÇÕES:



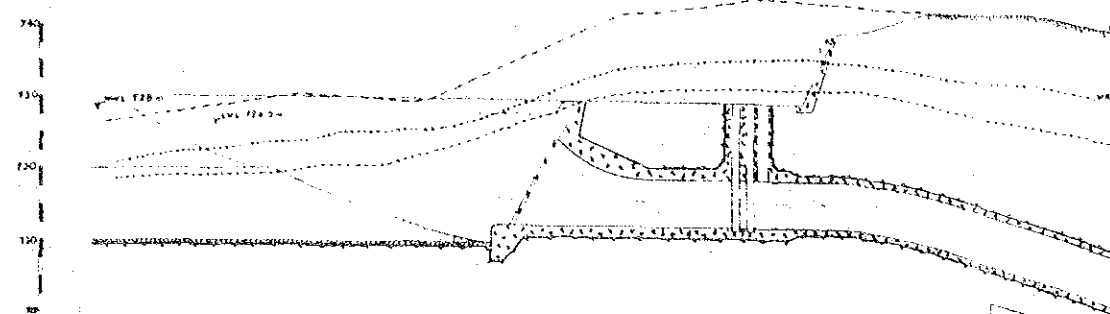
WATERWAY - LONGITUDINAL SECTION



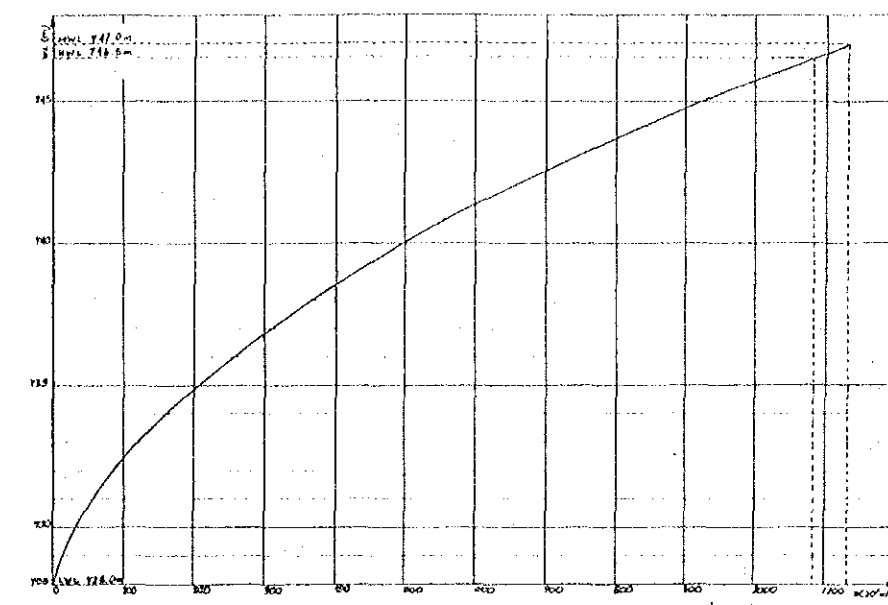
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 DESENHO: M.H.
 VERIFICADO:
 DATA: Agosto 1982
 APROVADO:
 APROVADO:
 DARE
 SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
 DIVISÃO DE PLANEJAMENTO E CONTROLE

TÍTULO: JUQUÍÁ-SÃO LOURENÇO PROJECT
 CUBATÃO COMPOUNDED REVERSIBLE POWER STATION
 PROFILE

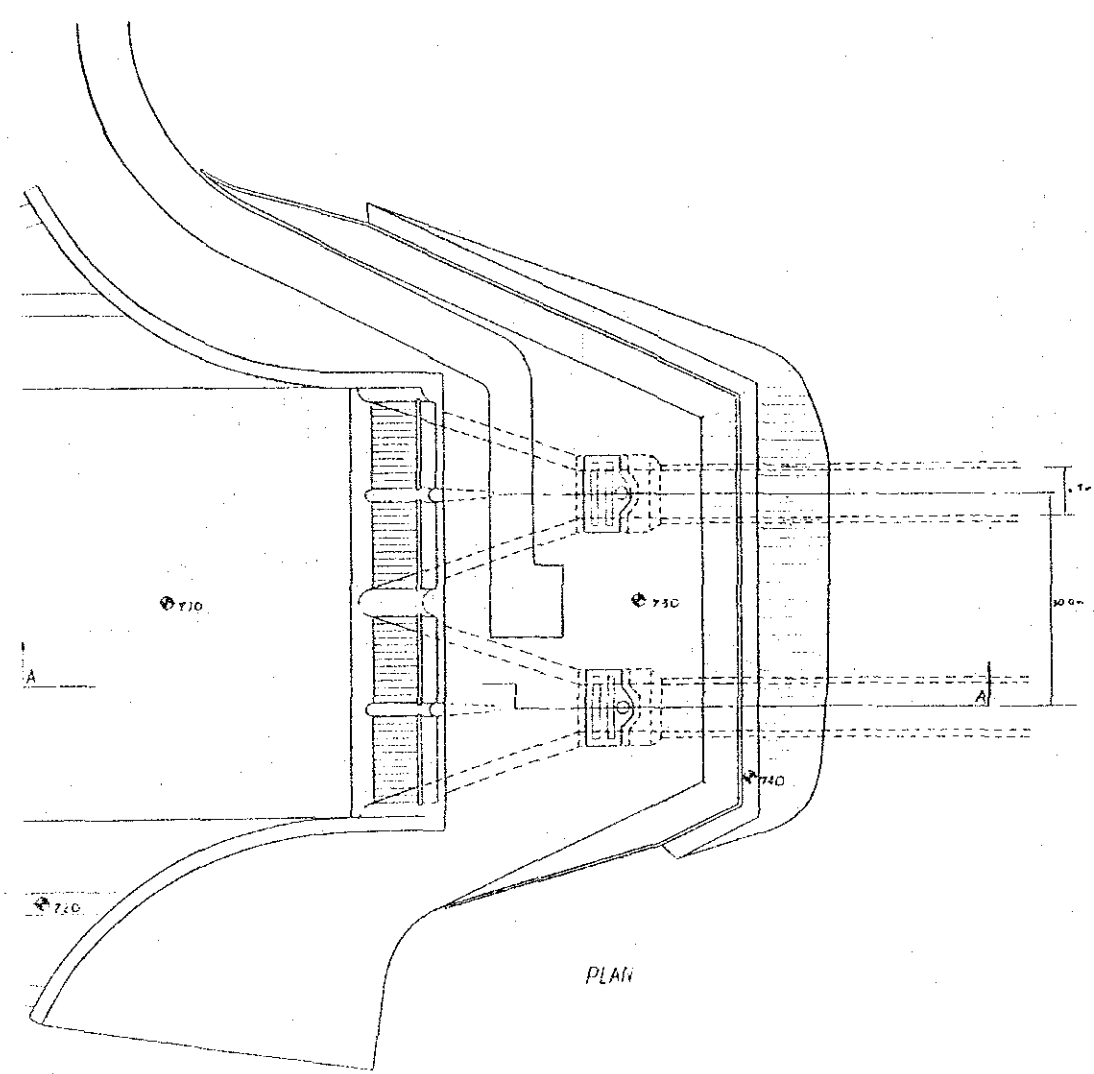
ESCALA:
 NÚMERO DO DESENHO:
 FIGURE III-7.18



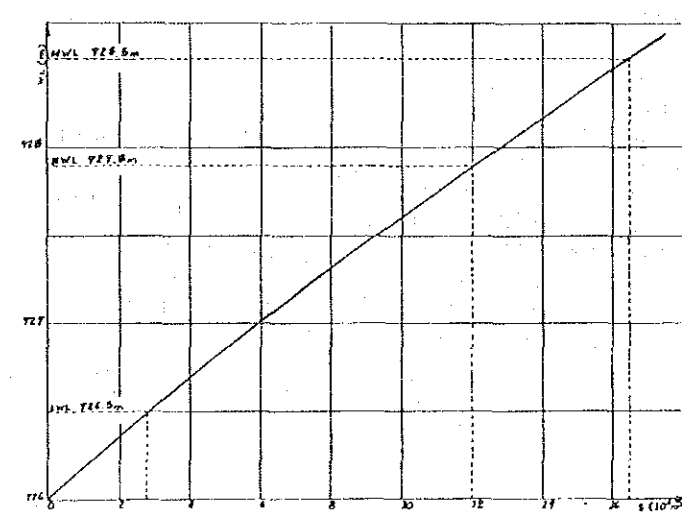
AA CROSS SECTION



BILLINGS

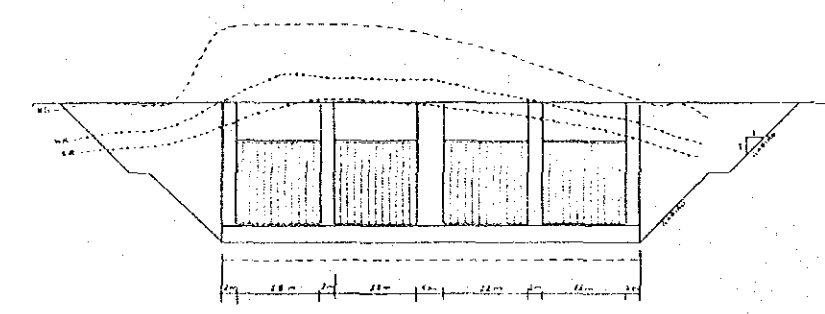


PLAN



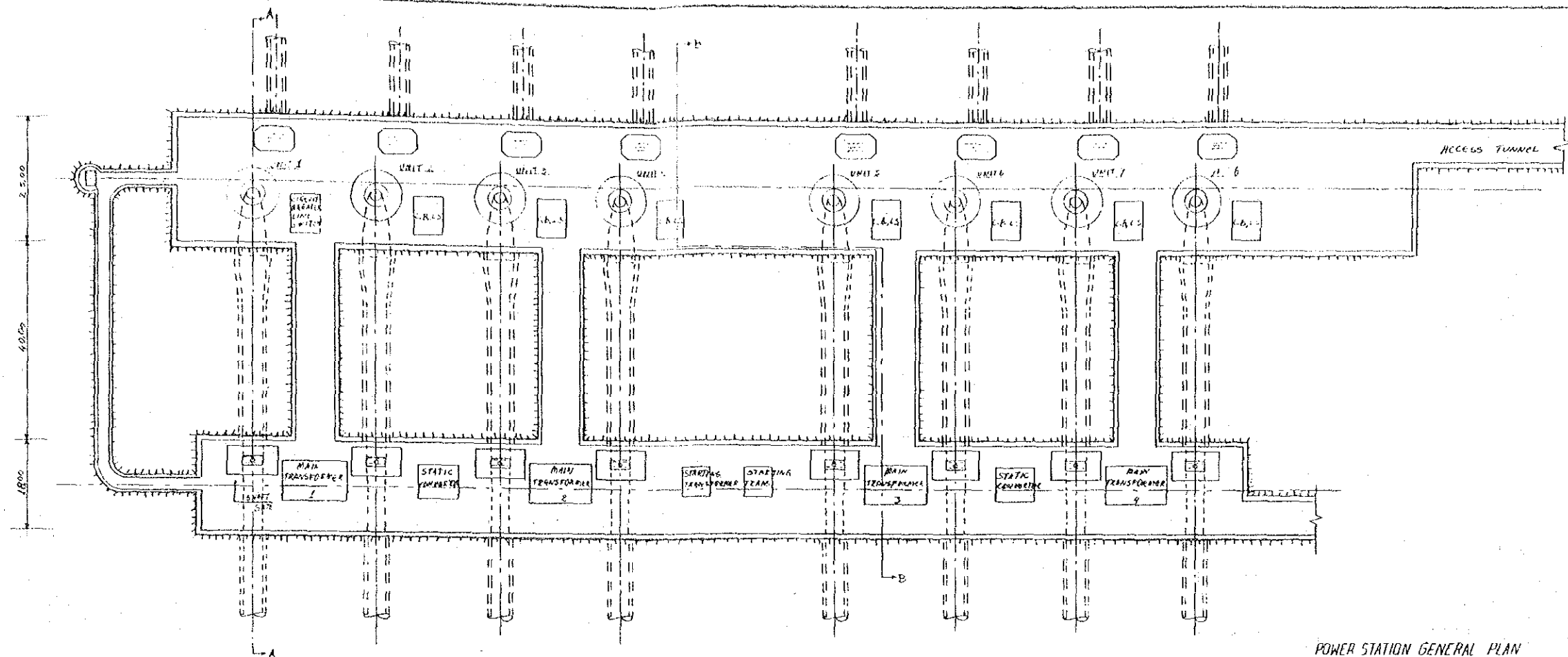
PEDRAS

STORAGE CURVES

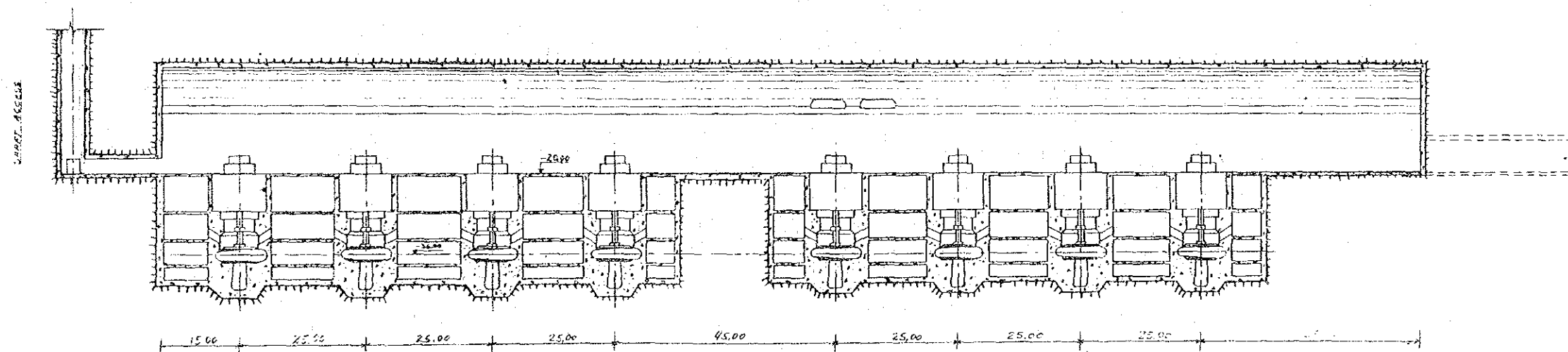


FRONTAL VIEW

<div style="display: flex; justify-content: space-between;"> <div> <p>PROJETO: J. L. G.</p> <p>REVISÃO: 25</p> <p>DATA: AUGUST, 1982</p> </div> <div> <p>PROJETO: J. L. G.</p> <p>REVISÃO: 25</p> <p>DATA: AUGUST, 1982</p> </div> </div>										<div style="display: flex; justify-content: space-between;"> <div> <p>SECRETARIA DE OBRAS E DO MEIO AMBIENTE</p> <p>DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA</p> <p>DIRETORIA DE PLANEJAMENTO E CONTROLE</p> </div> <div> <p>FIGURA - SÃO LOURENÇO PROJECT</p> <p>CUBATÃO COMPOUNDED REVERSIBLE</p> <p>POWER STATION INTAKE</p> <p>PROFILE AA SECTION - 274 -</p> </div> <div> <p>FIGURE III-7.20</p> <p>Nº DO DESENHO</p> </div> </div>									
<div style="display: flex; justify-content: space-between;"> <div> <p>PROJETO: J. L. G.</p> <p>REVISÃO: 25</p> <p>DATA: AUGUST, 1982</p> </div> <div> <p>PROJETO: J. L. G.</p> <p>REVISÃO: 25</p> <p>DATA: AUGUST, 1982</p> </div> </div>										<div style="display: flex; justify-content: space-between;"> <div> <p>SECRETARIA DE OBRAS E DO MEIO AMBIENTE</p> <p>DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA</p> <p>DIRETORIA DE PLANEJAMENTO E CONTROLE</p> </div> <div> <p>FIGURA - SÃO LOURENÇO PROJECT</p> <p>CUBATÃO COMPOUNDED REVERSIBLE</p> <p>POWER STATION INTAKE</p> <p>PROFILE AA SECTION - 274 -</p> </div> <div> <p>FIGURE III-7.20</p> <p>Nº DO DESENHO</p> </div> </div>									



POWER STATION GENERAL PLAN



POWER HOUSE LONGITUDINAL SECTION

<p>PROJETO: VIM-MH-600</p> <p>REVISÃO: 1.00</p> <p>PROJETO: E.U.</p> <p>DATA: AUGUST 1984</p>		<p>PROJETO: VIM-MH-600</p> <p>REVISÃO: 1.00</p> <p>PROJETO: E.U.</p> <p>DATA: AUGUST 1984</p>		<p>SECRETARIA DE OBRAS E DO MEIO AMBIENTE</p> <p>DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA</p> <p>DIRETORIA DE PLANEJAMENTO E PROJETO</p>		<p>FIGURA</p> <p>III - 7.21</p> <p>Nº DO DESENHO</p>	
<p>PROJETO: VIM-MH-600</p> <p>REVISÃO: 1.00</p> <p>PROJETO: E.U.</p> <p>DATA: AUGUST 1984</p>		<p>PROJETO: VIM-MH-600</p> <p>REVISÃO: 1.00</p> <p>PROJETO: E.U.</p> <p>DATA: AUGUST 1984</p>		<p>SECRETARIA DE OBRAS E DO MEIO AMBIENTE</p> <p>DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA</p> <p>DIRETORIA DE PLANEJAMENTO E PROJETO</p>		<p>FIGURA</p> <p>III - 7.21</p> <p>Nº DO DESENHO</p>	

RESERVATIONS

A detailed longitudinal section of a transformer house. The diagram shows a long, narrow structure with a flat roof and a series of vertical supports. Eight transformer units are shown, each with a label above it: UNIT 1, MAIN TRANSFORMER 1, UNIT 2, STATIC CONVERTER, UNIT 3, MAIN TRANSFORMER 2, UNIT 4, STARTING TRANSFORMER, UNIT 5, MAIN TRANSFORMER 3, UNIT 6, STATIC CONVERTER, UNIT 7, MAIN TRANSFORMER 4, and UNIT 8. The units are arranged in a row, with the transformers and static converters alternating. Below the units, a series of dimension lines indicate the spacing between them: 10.00, 25.00, 25.00, 25.00, 43.00, 25.00, 25.00, 25.00, and 1.000. The entire structure is enclosed within a larger frame, with a sloped roof on the right side.

TRANSFORMER HOUSE LONGITUDINAL SECTION

0 5 10 15 20 25 m

A-A SECTION

42.00
12.00
9.80
16.00
5.00
25.00
40.00
12.00
19.00
5.00

BUSS TUNNEL

CROSS SECTION

ACCESS TUNNEL
CROSS SECTION

CABLE TUNNEL
CROSS SECTION

6.00

3.00

0 2 4 6 8 10 m

Technical drawing of a surge tank cross-section. The drawing shows a vertical cylindrical tank with two circular openings. The total height of the tank is 50.00. The vertical section of the tank is 12.00. The horizontal section of the tank is 24.00. The tank has a sloped inlet on the left and a horizontal outlet on the right. The outlet is at a height of 0.00 and a distance of 5.00 from the vertical section. A scale bar at the bottom indicates 0 to 30 units.

DATE: _____

PROJETADO YJM-MH-GGO

REF ID: A660

RECEIVED T 13

DATA August 1982

APPROVED _____
 AUTHORIZED _____

DOI: 10.1002/for

ENCLOSURE

DEBOW 歐(伯)爾曼(氏)研究(所)

STUD

JUQUIA - SÃO LOURENÇO

PROJECT

CHUẨN CỘNG

CD8A7AD COMPC
DEUS AC1015 DAMEO

REVERSIBLE POWER

TRANSFORMER H

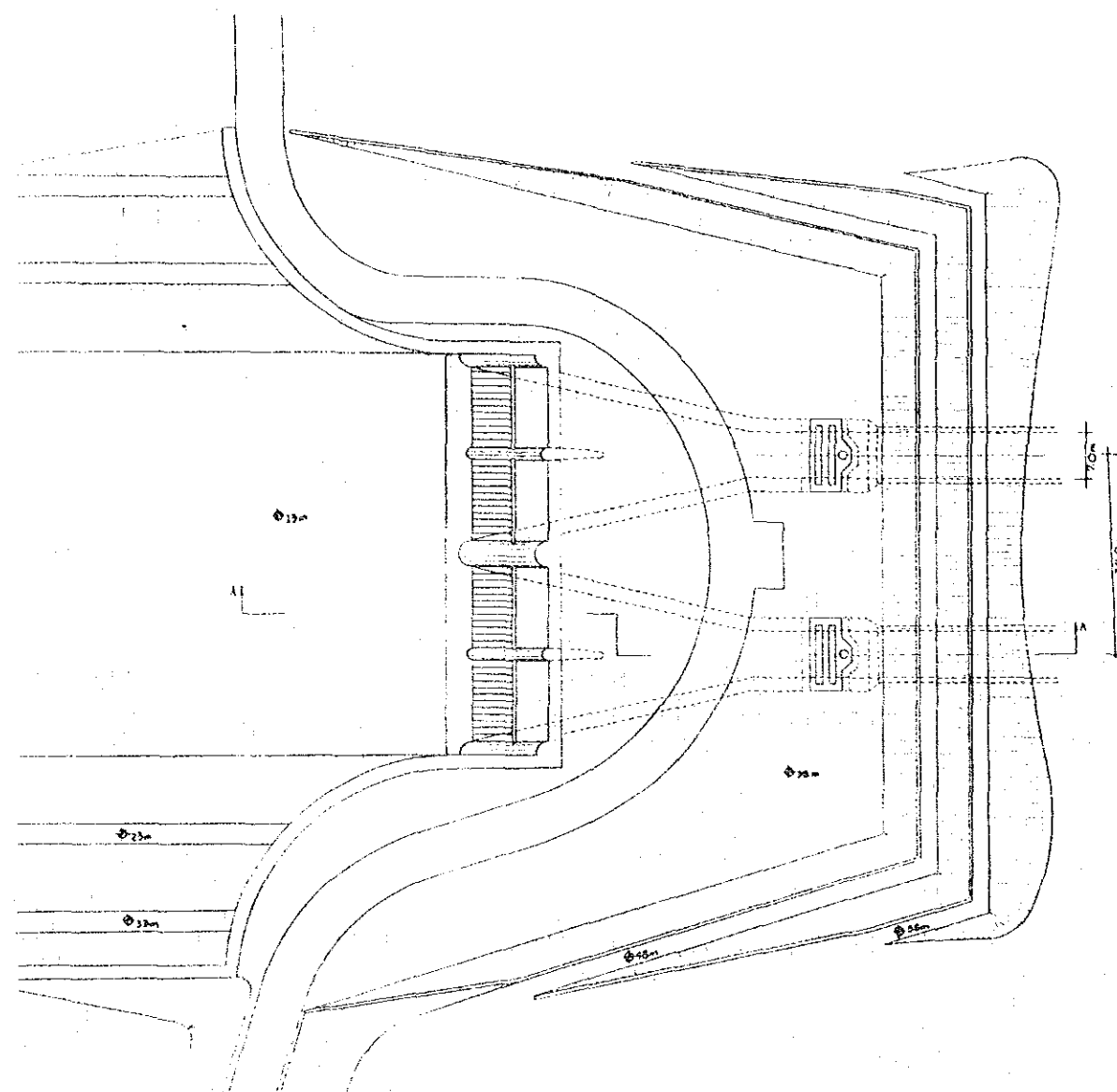
PROFILE AND SE

ESCALA

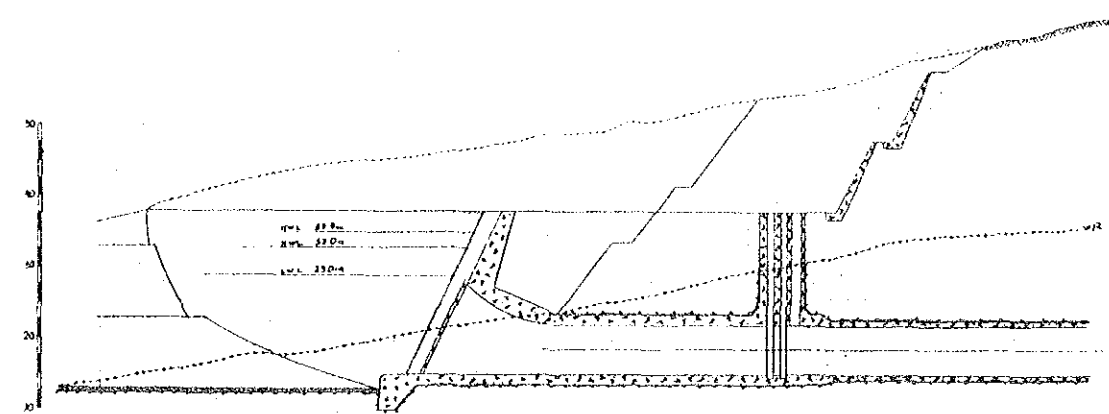
RETURN TO

FIGURE III-7.

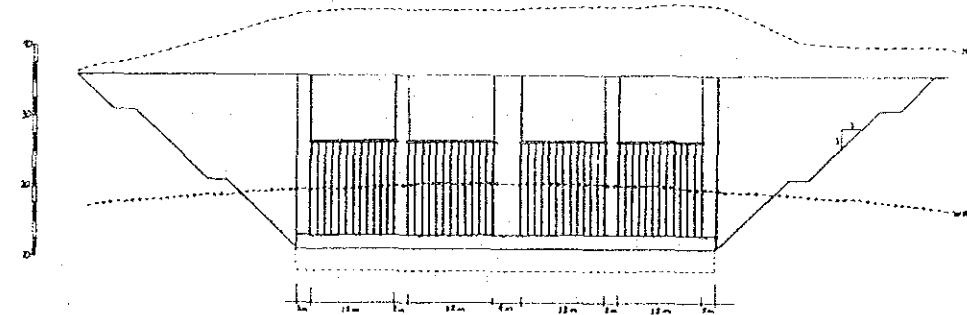
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PLAN



AA CROSS SECTION

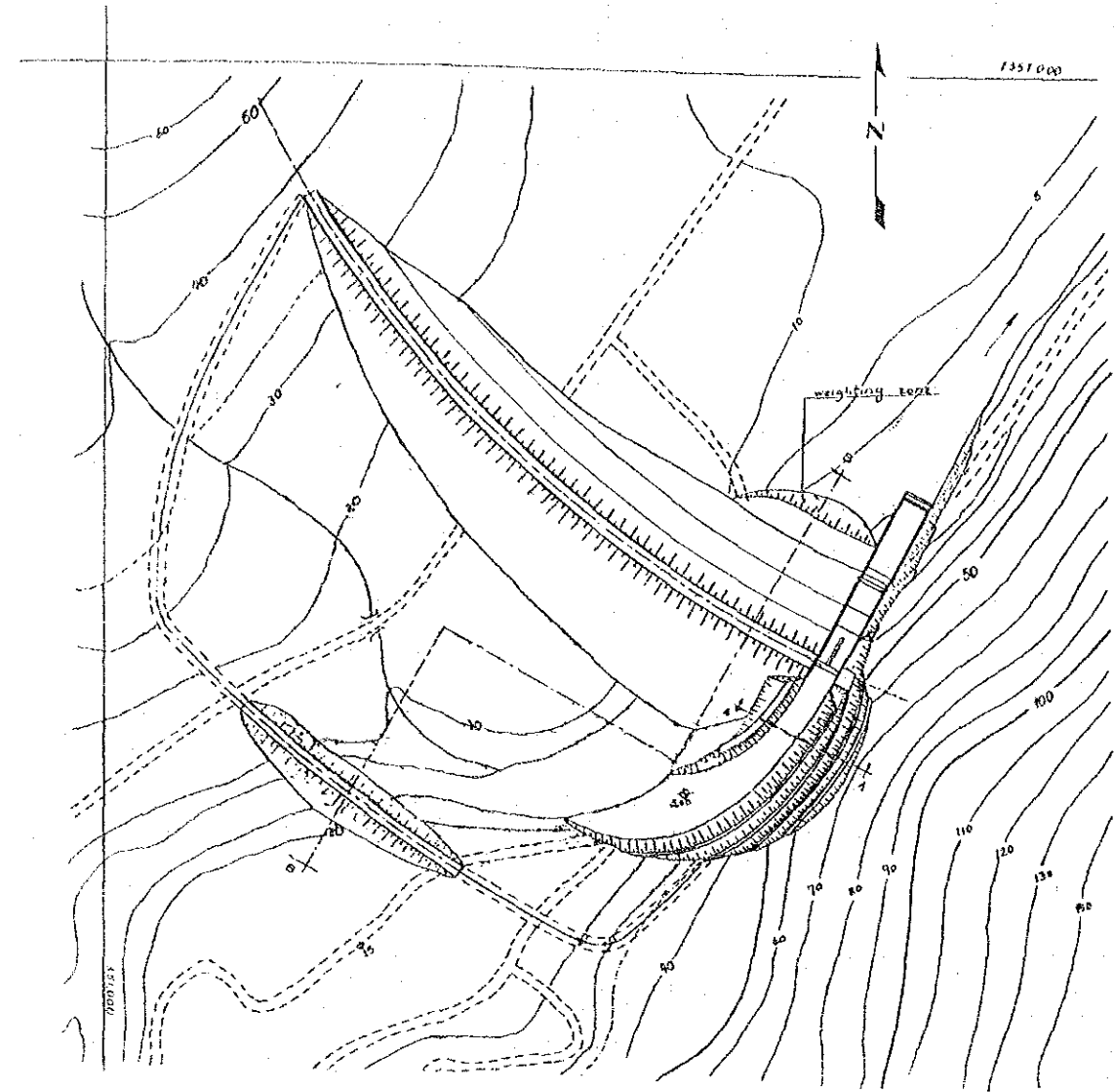


FRONTAL VIEW

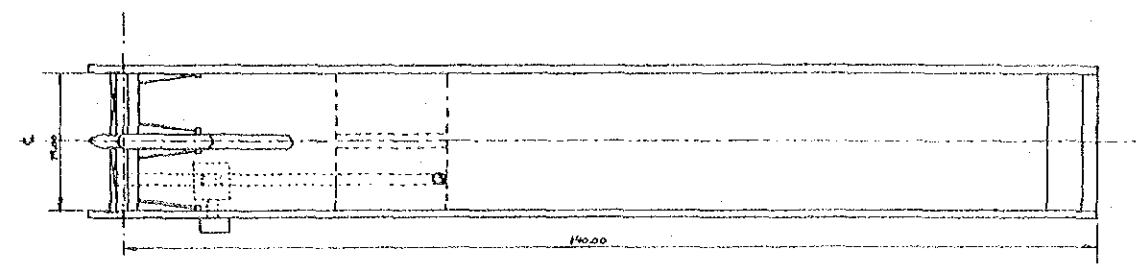
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PROJETO	VIM - JCG	REVISÃO																															
DESENHO	JCG	APPROVAÇÃO																															
DATA	AUGUST, 1982																																
<p>ESCALA</p>										<p>- 278 -</p>																							

REVISED	REV.	APP.	DATA

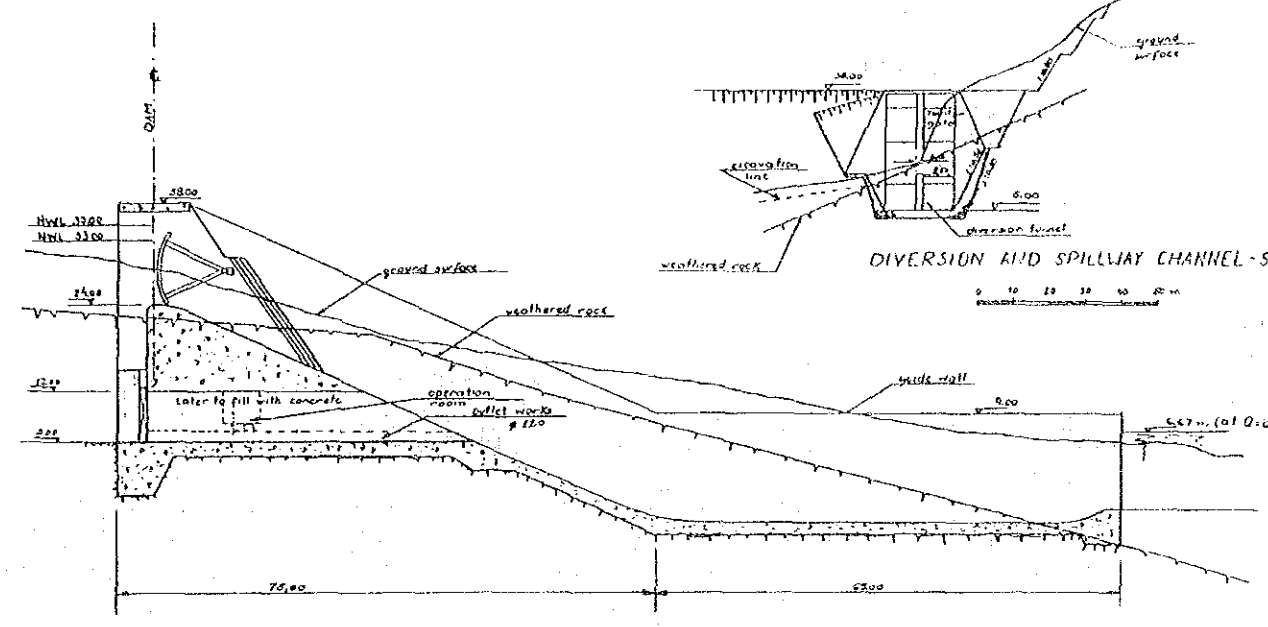
OBSERVAÇÕES:



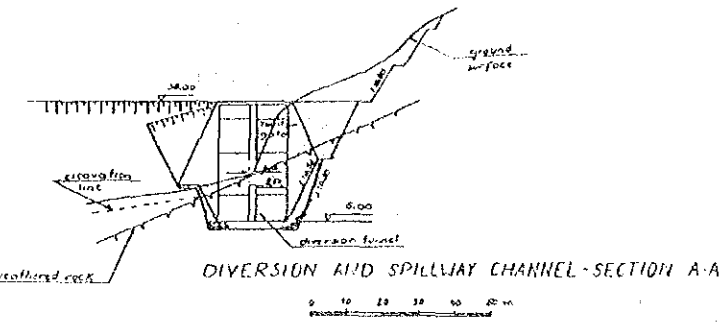
CUBATAO DAM - GENERAL PLAN



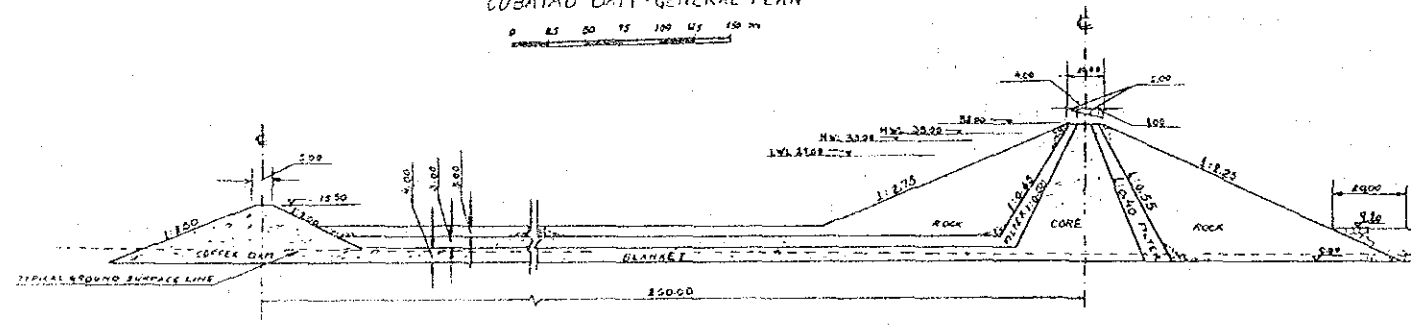
SPILLWAY PLAN



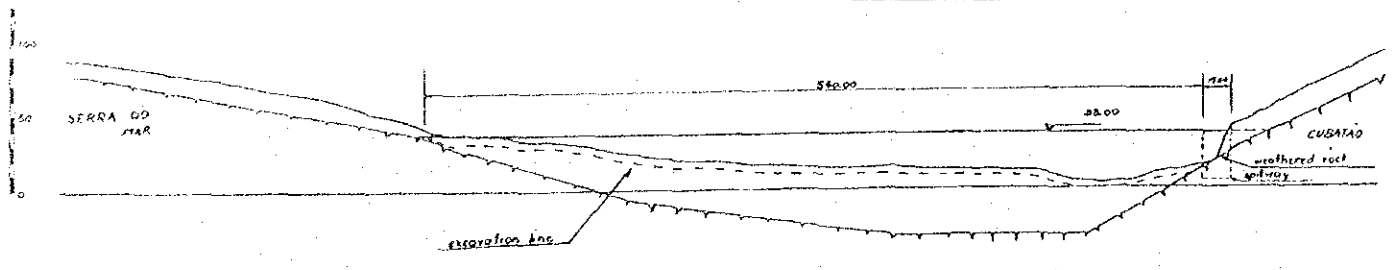
SPILLWAY - CROSS SECTION



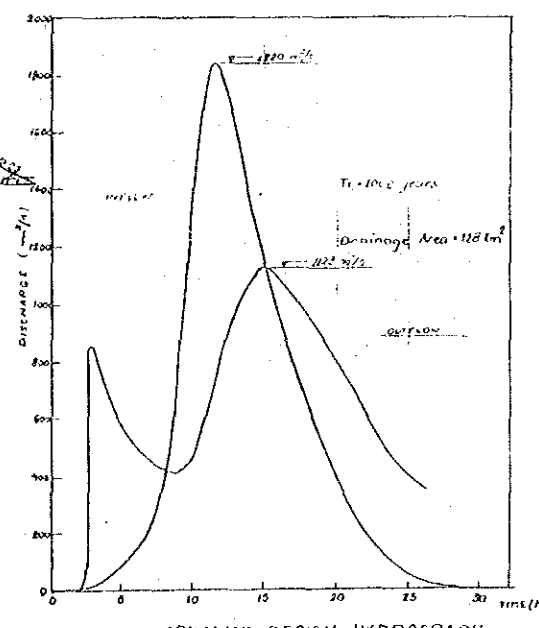
DIVERSION AND SPILLWAY CHANNEL - SECTION A-A



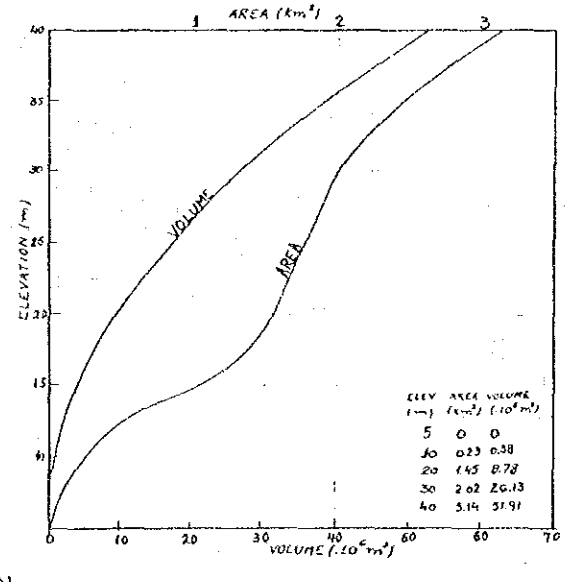
DAM AND COFFER DAM - CROSS SECTION BB



DAM - LONGITUDINAL SECTION



SPILLWAY DESIGN HYDROGRAPH



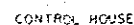
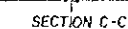
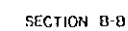
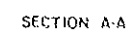
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 OBSERVADO: MHI
 VERIFICADO:
 DATA: Agosto, 1952
 APROVADO:
 APROVADO:
 DARE
 SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE AGUAS E ESGOTO
 DIRETORIA DE MANEJO DE AGUAS
 TITULO: JUAQUIM - SAO LOURENCO
 PROJECT
 CUBATAO LOWER
 RESERVOIR
 PLAN, PROFILE AND SECTION



JUQUIA-SÃO LOURENÇO PROJECT

ENCLOSURE
ENCLOSURE (2)
ENCLOSURE (3)

CASE STUDY



ITULO

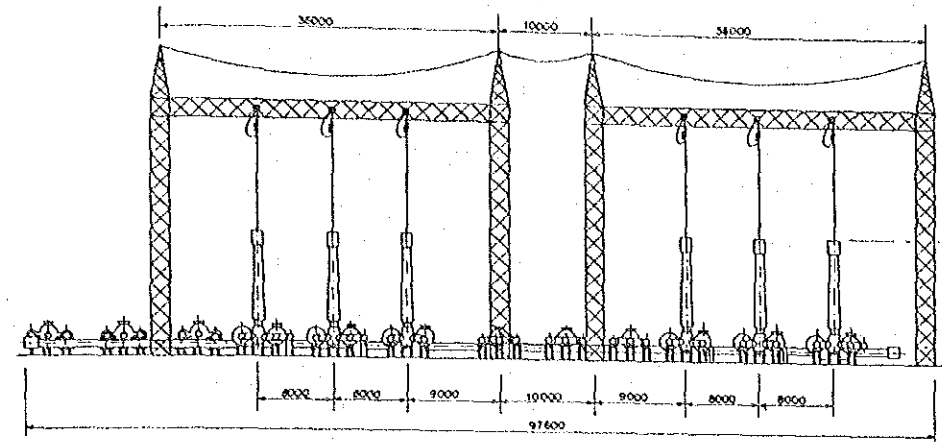
JUQUIÁ-SÃO LOURENÇO PROJECT

SF₆ SUBSTATION LAY-OUT
FOR
SÃO LOURENÇO PS
460 kV

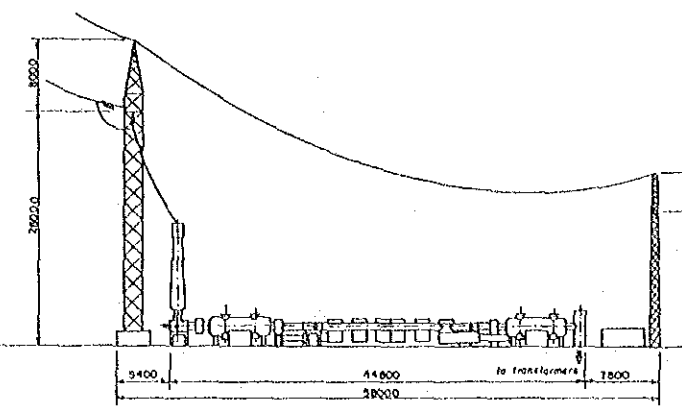
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REVISED	REV.	APR.	DATE

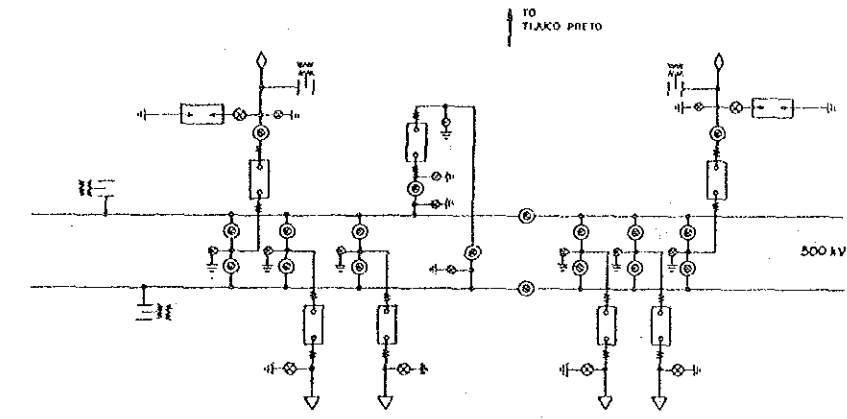
OBSERVAÇÕES:



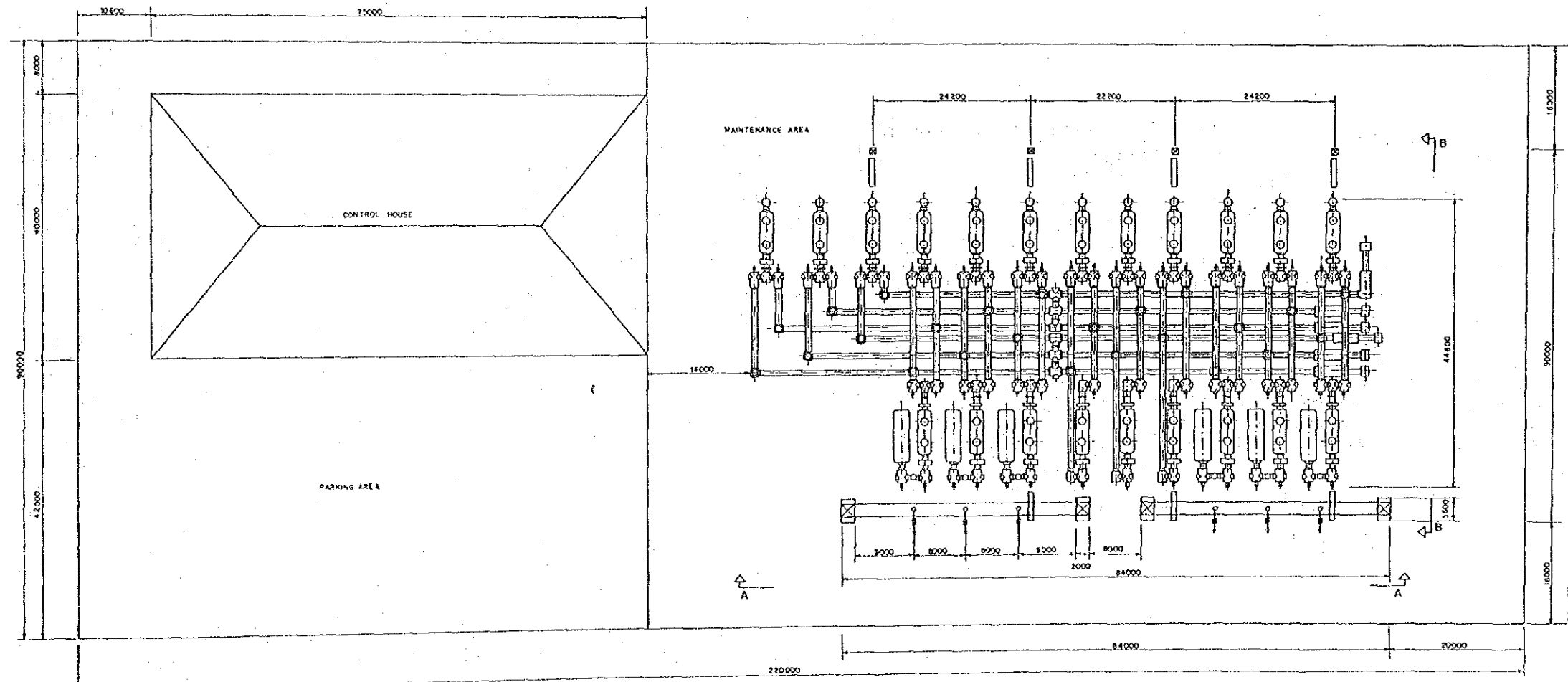
SECTION A-A



SECTION B-B



SINGLE LINE DIAGRAM



REDECAVAS

PROJETO:
 DESenhado:
 VERIFICADO:
 DATA: JUL 1 / 1982
 APROVADO:
 APROVADO:

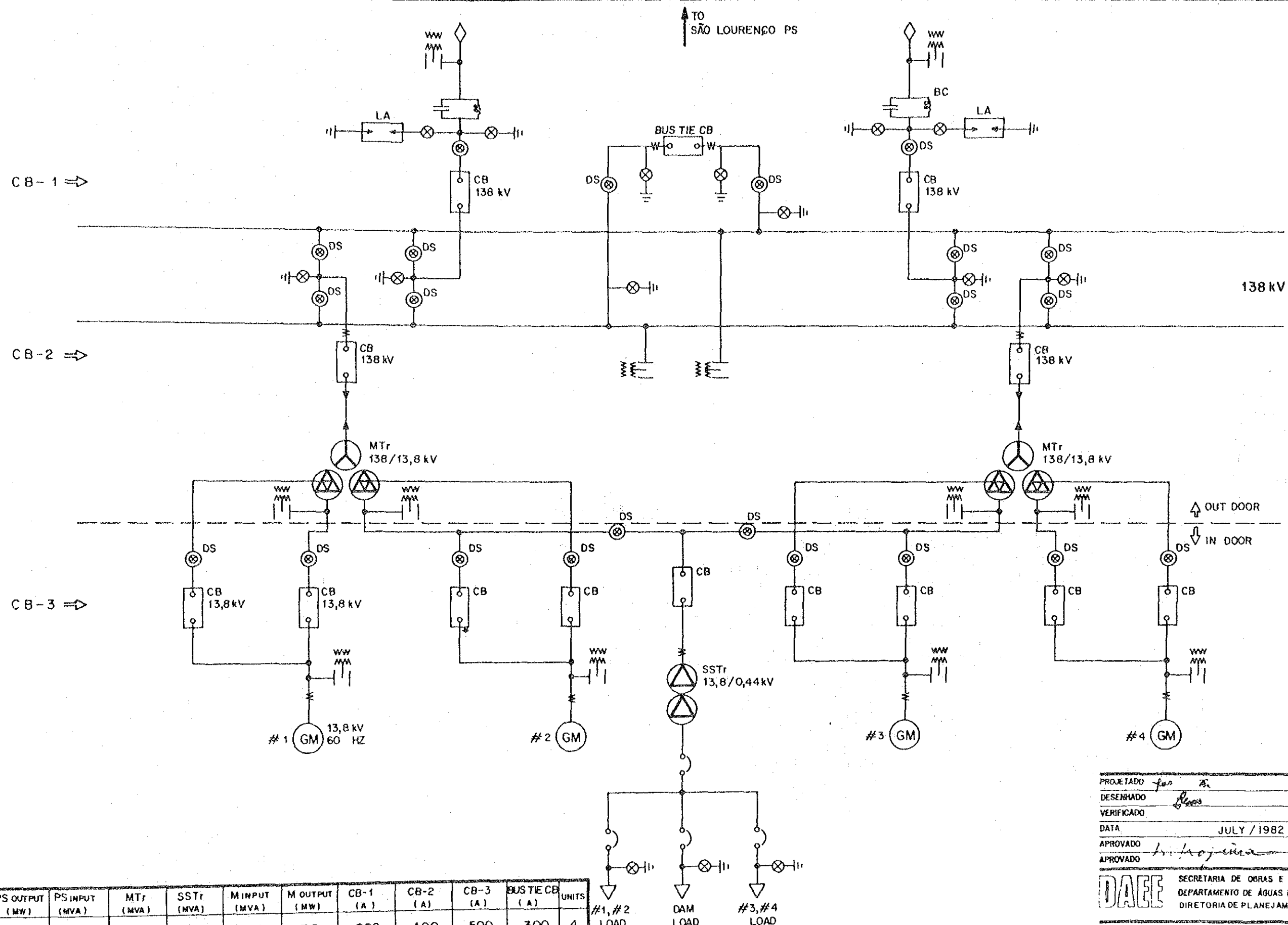
SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE OBRAS E OBRAS ELÉTRICAS
 DIRETORIA DE PLANEJAMENTO E CONTROLE

ENGENHEIRO: JUIQUIÁ - SÃO LOURENÇO PROJECT

SF6 SUBSTATION LAY-OUT
 FOR
 CUBATÃO III PS
 500 KV

ESCALA: 1:400

ROTEIRO DO PROJETO: FIGURE-III.7.29



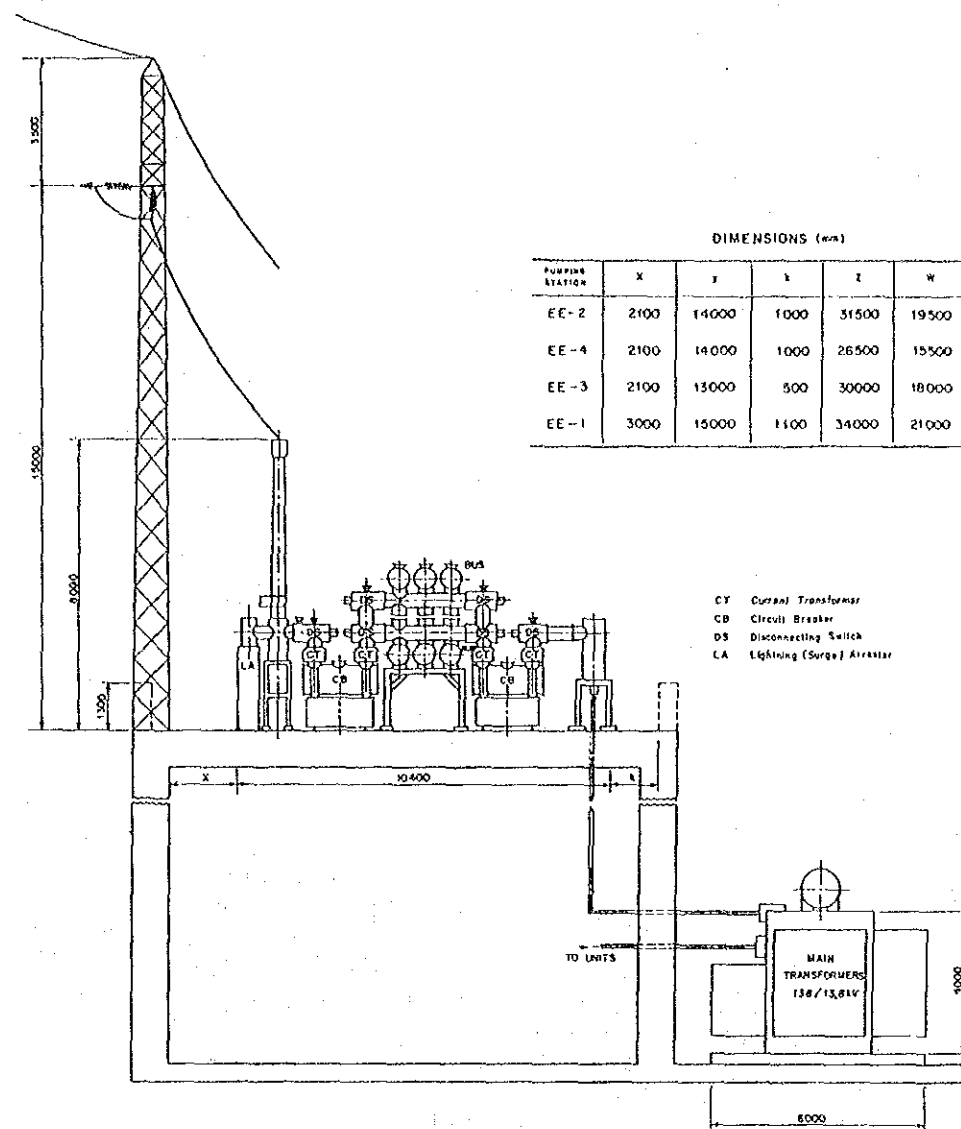
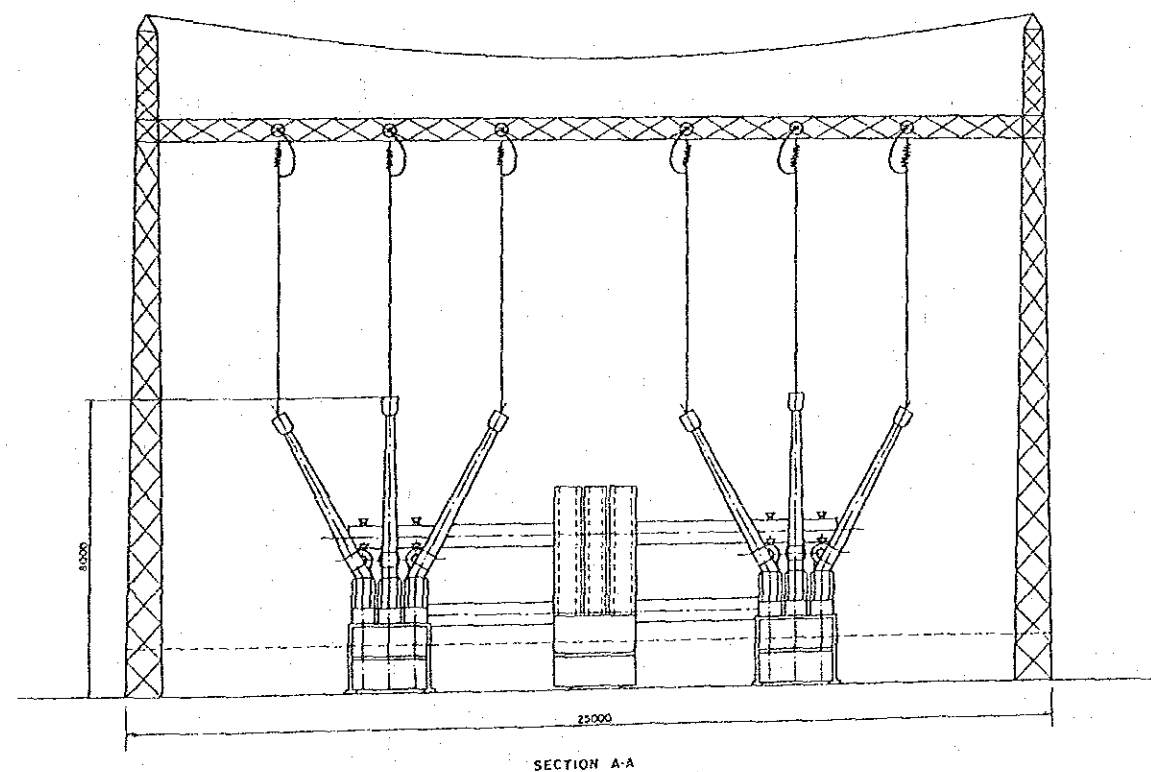
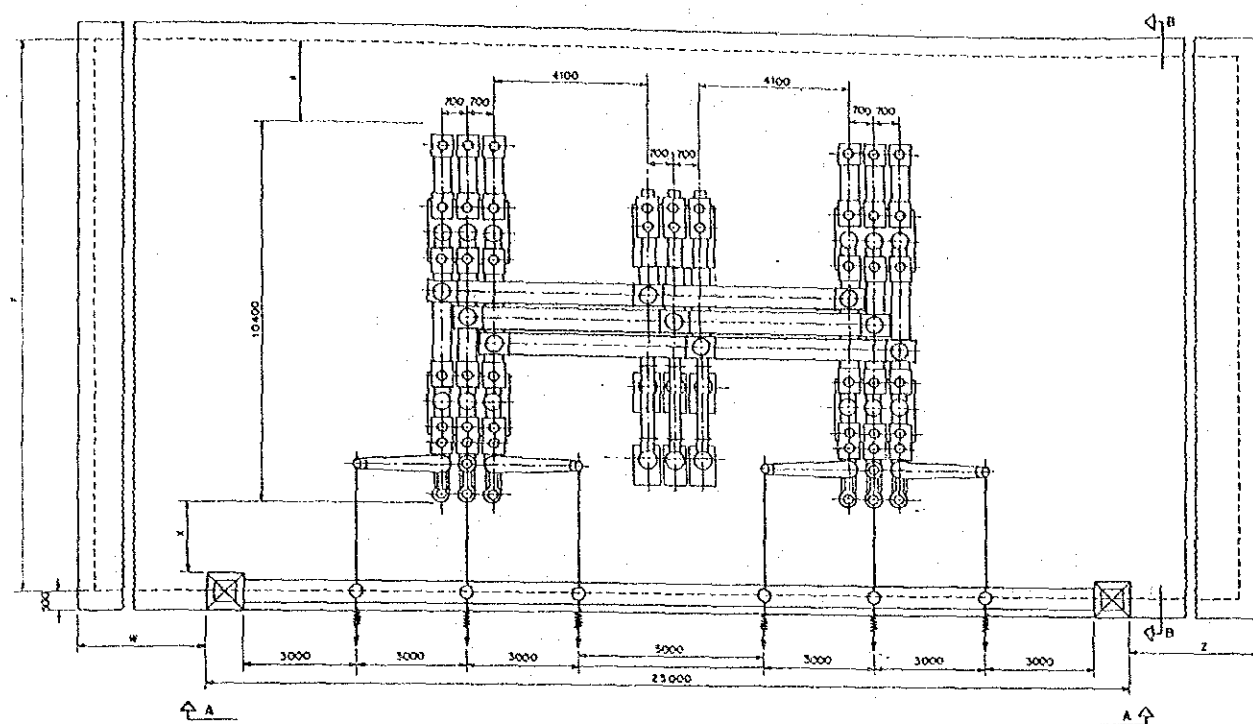
PUMPING STATION	PS OUTPUT (MW)	PS INPUT (MVA)	MTr (MVA)	SSTr (MVA)	MINPUT (MVA)	M OUTPUT (MW)	CB-1 (A)	CB-2 (A)	CB-3 (A)	BUS TIE CB (A)	UNITS
EE-2	30	32	16	1,0	8,0	7,5	200	100	500	300	4
EE-4	44	46	23	1,0	11,5	11,0	300	200	500	400	4
EE-3	80	84	42	2,0	21,0	20,0	300	200	1000	500	4
EE-1	114	120	60	2,5	30,0	28,5	500	300	2000	1000	4
EE-8A	146	154	77	3,0	38,5	36,5	1000	500	2000	1000	4

PROJETADO *for*
 DESENHADO *Blas*
 VERIFICADO
 DATA JULY / 1982
 APROVADO *in*
 APROVADO

DAEF SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
 DIRETORIA DE PLANEJAMENTO E CONTROLE

TÍTULO
 PUMPING STATIONS
 SINGLE LINE DIAGRAM

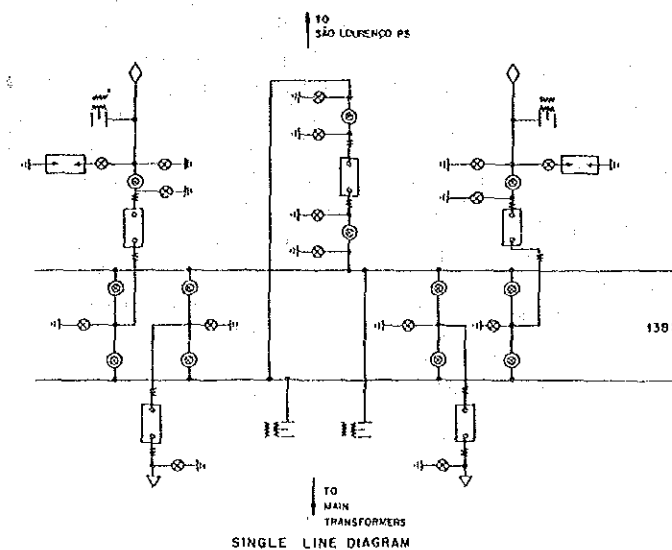
ESCALA - 284 -
 N.º DESENHO
 FIGURE - III. 7.30



DIMENSIONS (mm)

PUMPING STATION	X	Y	L	Z	W
EE-2	2100	14000	1000	31500	19500
EE-4	2100	14000	1000	28500	15500
EE-3	2100	13000	500	30000	18000
EE-1	3000	15000	1100	34000	21000

CT Current Transformer
 CB Circuit Breaker
 DS Disconnecting Switch
 LA Lightning (Surge) Arrester



REVISÃO	REV.	APR.	DATA

OBSERVAÇÕES:

REFERÊNCIAS

PROJETADO *for*
 DESenhADO *for*
 VERIFICADO
 DATA JULY / 1982
 APROVADO *K. Regina*
 APROVADO

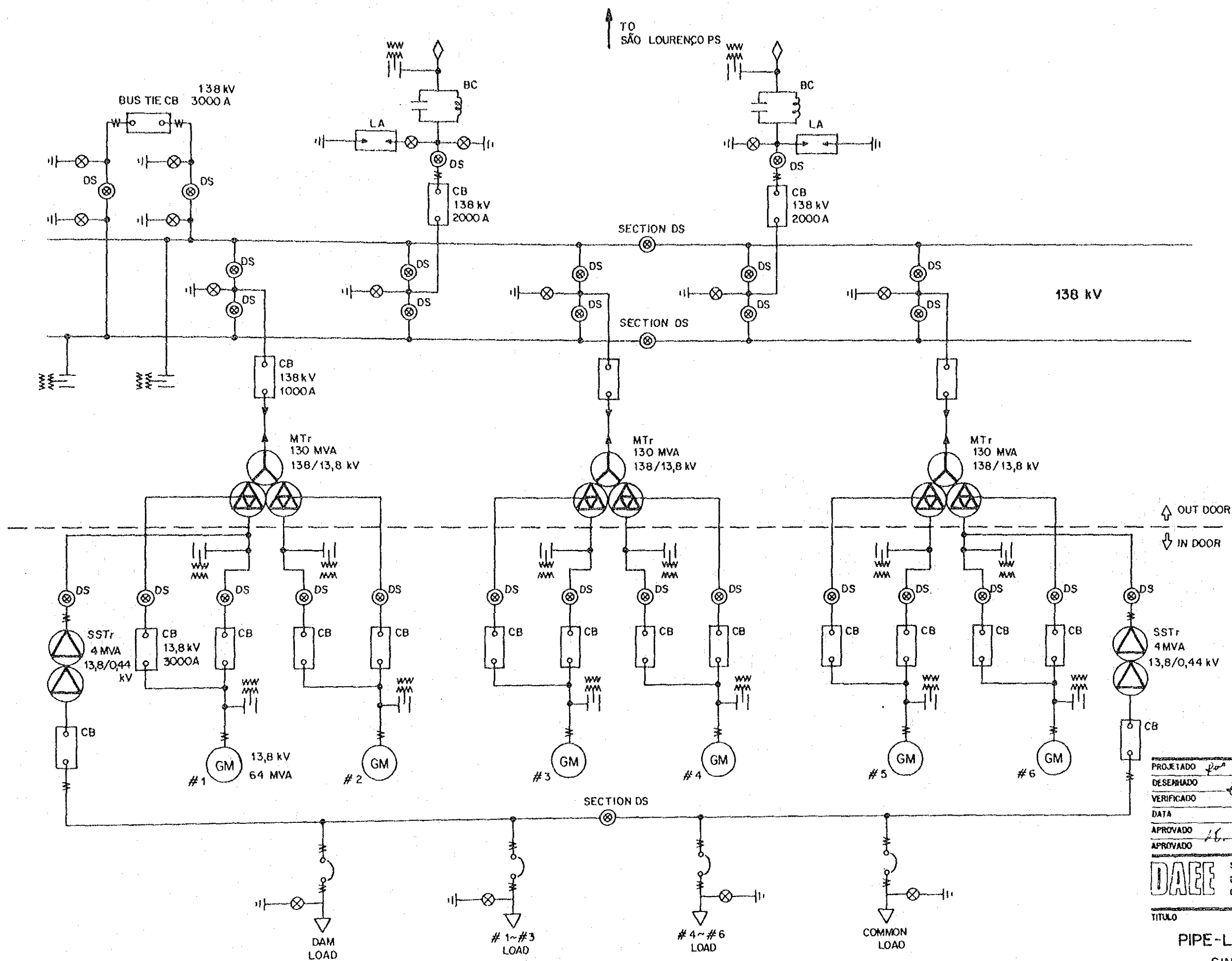
SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
 DIVISÃO DE PLANEJAMENTO E CONTROLE

TÍTULO
 JUQUIA - SÃO LOURENÇO PROJECT

SF₆ SUBSTATION LAY-OUT
 FOR
 PUMPING STATIONS
 138 kV

ESCALA 1: 100

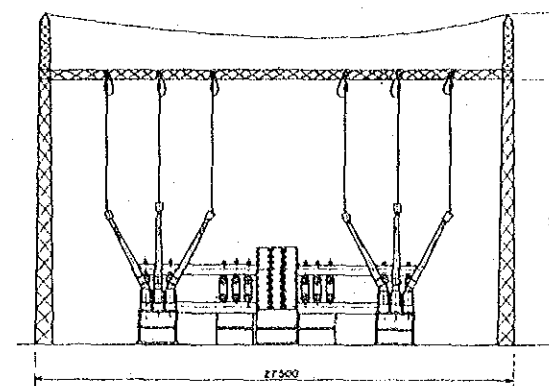
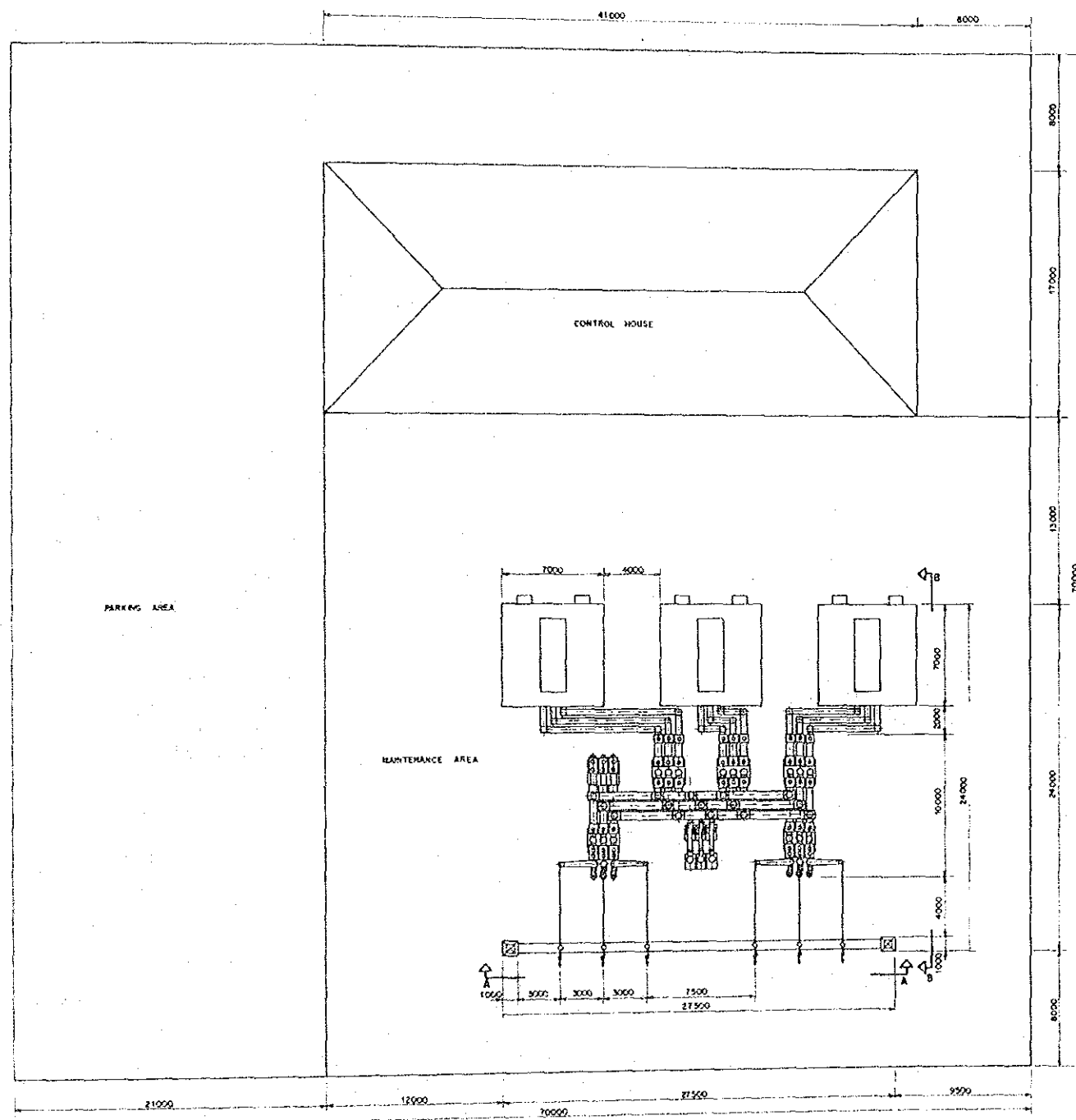
NÚMERO DO
 DESENHO
 FIGURE - [II.7.31]



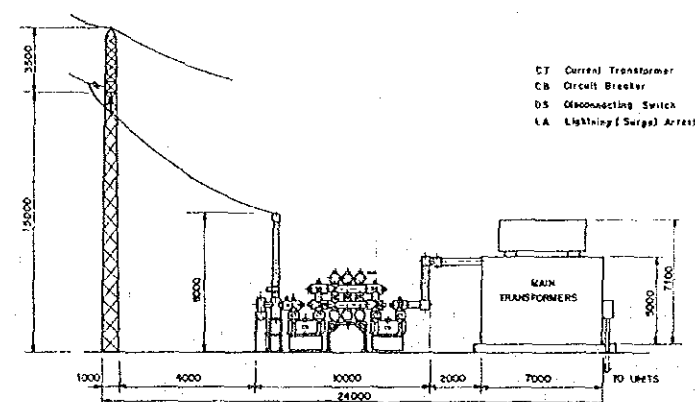
PROJETADO	João
DESENHADO	João
VERIFICADO	
DATA	JULY / 1982
APROVADO	16. Kojima
APROVADO	
DAEE	SECRETARIA DE OBRAS E DO MEIO AMBIENTE DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA DIRETORIA DE PLANEJAMENTO E CONTROLE
TÍTULO	

PIPE-LINE PUMPING STATION
SINGLE LINE DIAGRAM

ESCALA - 287 - N.º DESENHO
FIGURE - III. 7.33

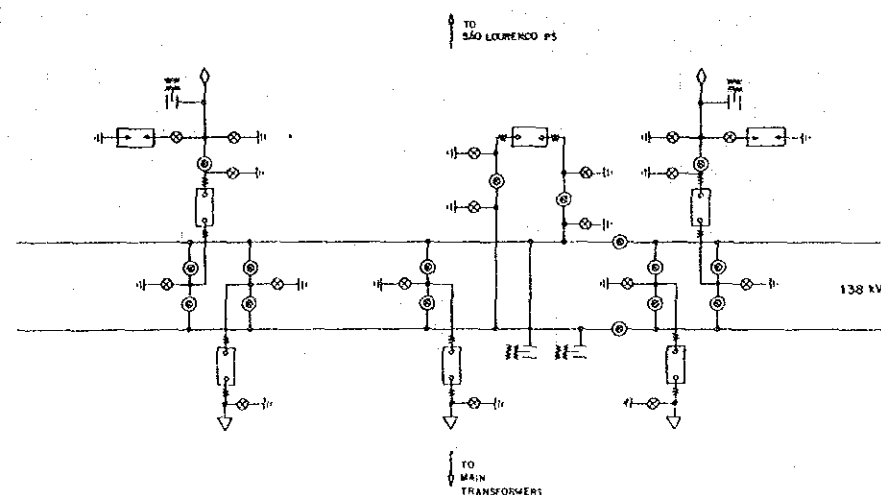


SECTION A-A



SECTION B-B

CT Current Transformer
CB Circuit Breaker
DS Disconnecting Switch
LA Lightning (Surge) Arrestor



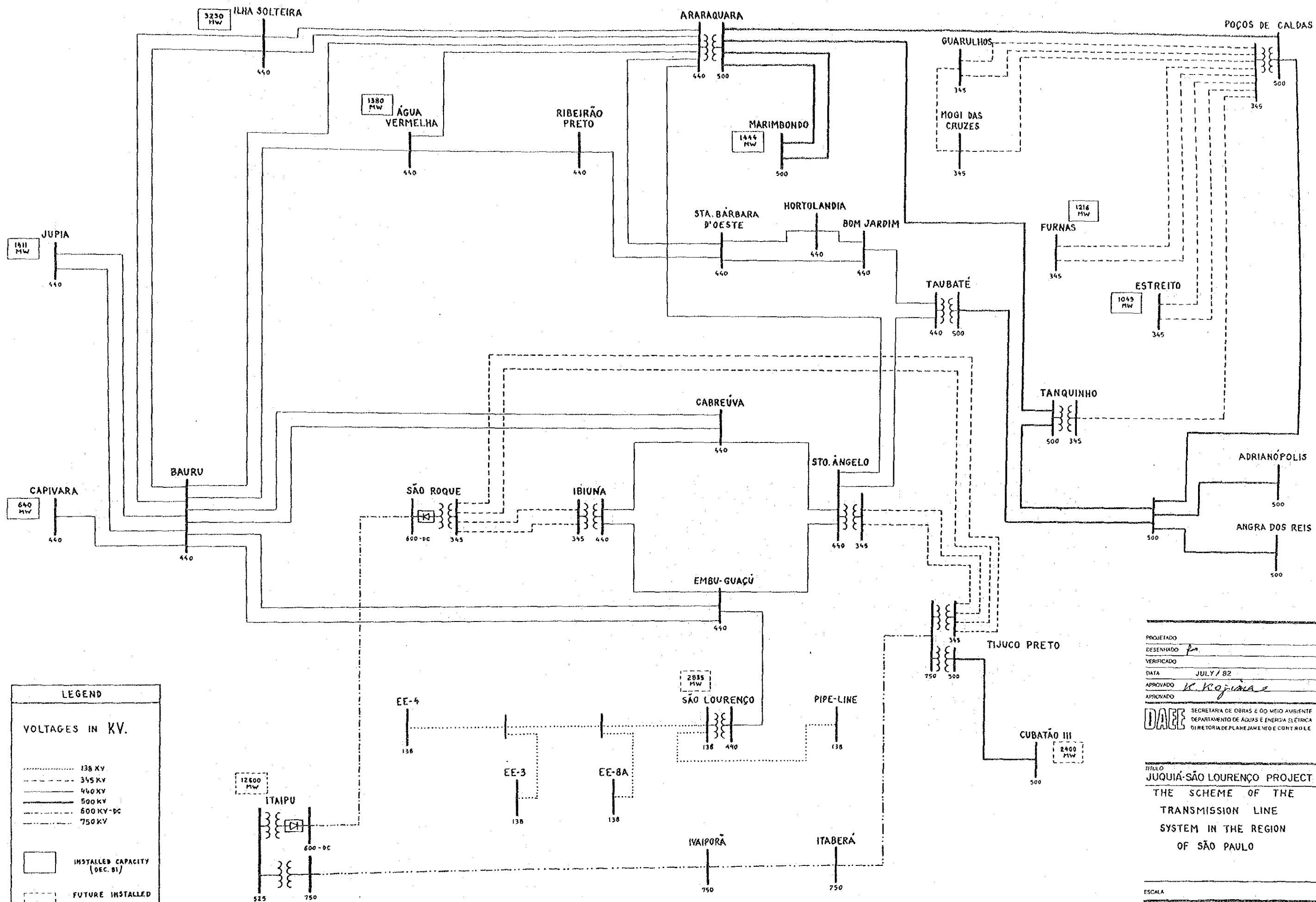
SINGLE LINE DIAGRAM

PROJETO: *[Signature]*
DESENO: *[Signature]*
VERIFICADO: *[Signature]*
DATA: JULY / 1982
APPROVADO: *[Signature]*
APPROVADO: *[Signature]*
DEPARTAMENTO DE OBRAS E DO RIO AMARELO
DEPARTAMENTO DE OBRAS E DO RIO AMARELO
DEPARTAMENTO DE OBRAS E DO RIO AMARELO

TIPO: JUQUIA-SÃO LOURENÇO PROJEC

SF₆ SUBSTATION LAY-OUT
FOR
PIPE-LINE PS
138 kV

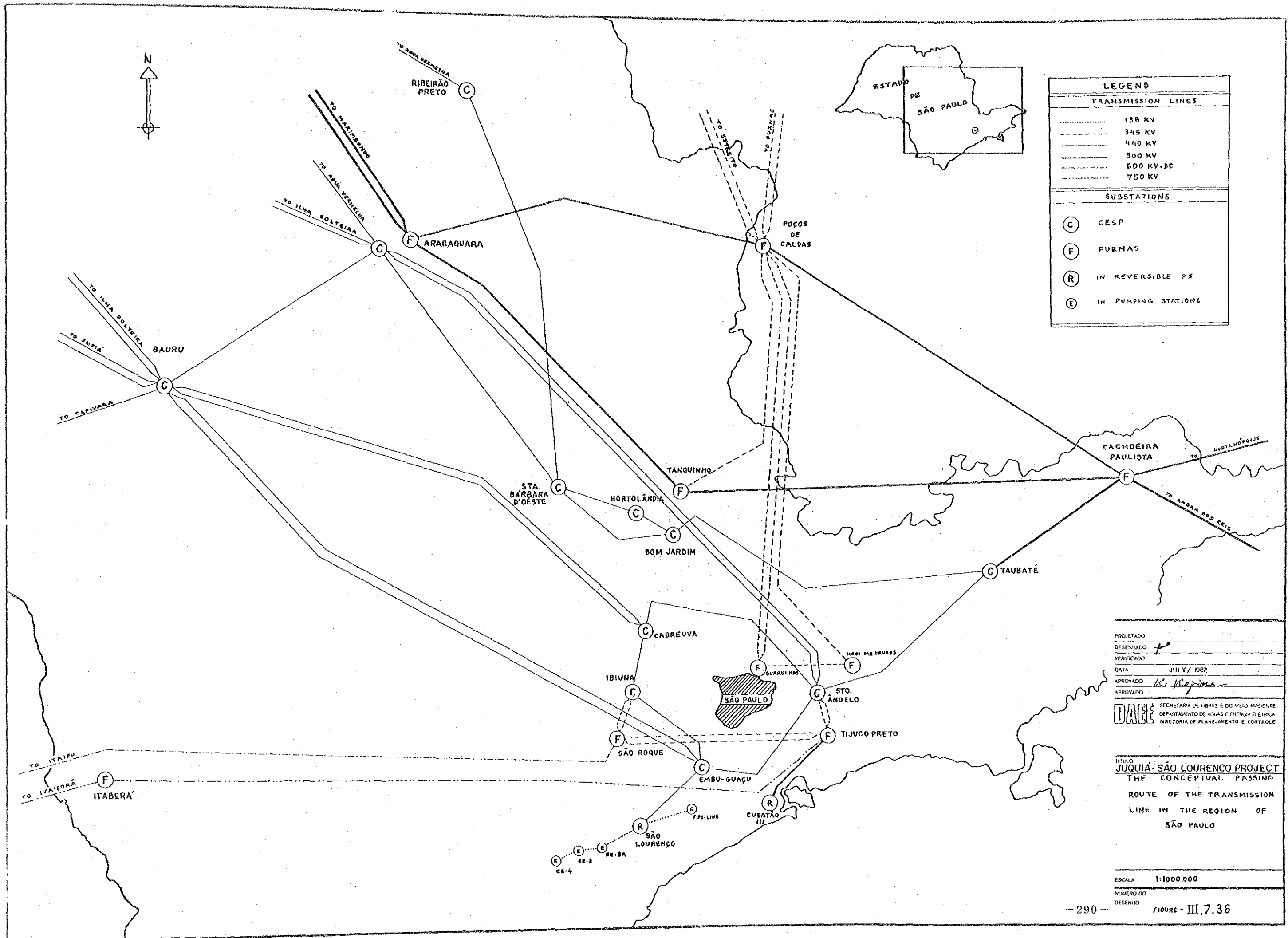
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PROJETADO
 DESENHADO *pa*
 VERIFICADO
 DATA JULY / 82
 APROVADO *K. Rojima*
 APROVADO
DAEE SECRETARIA DE OBRAS E DO MEIO AMBIENTE
 DEPARTAMENTO DE ÁGUAS E ENERGIA ELÉTRICA
 DIRETORIA DE PLANEJAMENTO E CONTROLE

TÍTULO
JUQUIÁ-SÃO LOURENÇO PROJECT
 THE SCHEME OF THE
 TRANSMISSION LINE
 SYSTEM IN THE REGION
 OF SÃO PAULO

ESCALA
 NÚMERO DO
 DESENHO



Manuscript NO3

APPENDIX

Appendix

Appendix-A Monthly Run-off at gauging Stations

Appendix-B Route Selection Study of

São Lourenço Reversible Power Station

Appendix-C Field Investigations

Appendix - A

Monthly Run-off at Gauging Stations

Table A-1 Monthly Run-off for Juquiá River
at Juquiá

Table A-2 Monthly Run-off for São Lourenço
River at Pedro Barros

Table A-3 Monthly Run-off for São Lourenço
River at Pedra do Largo

Table A-4 Monthly Run-off for Juquiá River at Silvas

Table A-5 Monthly Run-off for Juquiá River at Rosas

Table A-6 Monthly Run-off for Embu-Guaçu at Olaria

Table A-7 Monthly Run-off for Santa Rita River
at Embu-Guaçu

Table A-8 Monthly Run-off for Cubatão
River at Barragen Fixo I

TABLE A-1 - Monthly run-off for Juquiá River at Juquiá
 STATION PREFIX: 81.680.000 DRAINAGE AREA: 4,369 km²

PERIOD: 1938 - 1979

ANO	JAN	FEV	MAR	ARP	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
38	113.00	174.00	179.00	263.00	158.00	130.00	107.00	167.00	105.00	106.00	116.00	141.00	146.58	106.00	263.00
39	173.00	168.00	128.00	147.00	111.00	89.40	79.30	63.60	81.70	54.50	102.00	141.00	111.71	54.50	173.00
40	135.00	173.00	146.00	112.00	87.10	70.00	60.70	55.30	61.70	89.00	96.40	105.00	99.27	33.30	173.00
41	122.00	166.00	236.00	108.00	112.00	76.00	104.00	93.00	107.00	109.00	142.00	179.00	129.50	76.00	236.00
42	123.00	339.00	215.00	208.00	146.00	122.00	147.00	96.30	84.20	89.20	104.00	177.00	164.23	84.20	339.00
43	180.00	183.00	157.00	104.00	85.50	101.00	71.00	87.10	78.20	167.00	133.00	97.60	120.37	71.00	183.00
44	118.00	365.00*	279.00	265.00*	149.00	111.00	98.80	76.90	74.90	66.30	106.00	105.00	151.24	66.30	365.00
45	111.00	264.00	240.00	151.00	110.00	156.00	133.00	46.70	48.90	87.60	80.50	96.80	134.54	80.50	264.00
46	224.00	189.00	251.00	162.00	117.00	115.00	95.40	77.10	66.60	108.00	120.00	91.40	134.71	66.60	251.00
47	259.00	257.00	211.00	147.00	148.00	130.00	115.00	120.00	147.00	150.00	166.00	220.00	172.50	115.00	259.00
48	175.00	294.00*	272.00	191.00	178.00	141.00	121.00	162.00	120.00	98.00	131.00	107.00	165.83	98.00	294.00
49	141.00	169.00	148.00	148.00	92.20	86.80	86.30	75.90	85.20	99.00	98.60	169.00	116.58	75.90	169.00
50	204.00	232.00	238.00	263.00	178.00	131.00	107.00	89.10	90.50	114.00	107.00	109.00	156.05	89.10	263.00
51	219.00	242.00	311.00	176.00	117.00	97.30	85.10	77.50	64.50	95.90	103.00	99.20	140.63	64.50	311.00
52	130.00	162.00	174.00	93.90	88.00	109.00	71.10	64.00	85.70	92.00	98.90	71.20	103.32	64.00	174.00
53	109.00	142.00	93.40	113.00	91.90	84.00	68.80	80.00	71.50	90.70	103.00	141.00	99.03	68.80	142.00
54	105.00	120.00	124.00	136.00	122.00	110.00	77.60	68.40	66.70	127.00	66.78	72.80	99.68	66.70	136.00
55	132.00	77.40	89.30	82.40	64.60	65.00	63.90	63.80	59.00	61.70	81.40	102.00	78.60	59.00	132.00
56	106.00	114.00	181.00	145.00	161.00	145.00	99.70	104.00	82.80	111.00	91.28	107.00	120.64	82.80	181.00
57	175.00	136.00	141.00	195.00	101.00	89.50	174.00	102.00	213.00	157.00	155.00	149.00	145.63	89.50	213.00
58	169.00	145.00	328.00	228.00	216.00	170.00	123.00	95.40	114.00	144.00	207.00	212.00	179.28	95.40	328.00
59	258.00	183.00	188.00	165.00	127.00	102.00	85.70	84.60	98.80	90.50	103.00	117.00	132.88	84.60	254.00
60	134.00	214.00*	168.00	136.00	115.00	95.70	78.80	75.70	79.20	80.80	94.80	112.00	116.25	75.70	214.00
61	165.00	272.00*	342.00*	171.00	140.00	116.00	96.80	77.50	77.10	78.40	90.70	122.00	145.71	77.10	342.00
62	137.00	166.00	276.00	151.00	113.00	92.90	97.00	89.70	89.40	175.00	134.00	177.00	140.08	82.70	276.00
63	281.00	231.00	151.00	122.00	107.00	88.20	73.80	68.70	68.50	105.00	104.00	96.00	124.68	68.50	281.00
64	80.10	118.00	75.70	81.90	77.80	70.90	62.50	63.00	68.40	85.50	96.10	120.00	83.32	62.50	120.00
65	161.00	166.00*	125.00	122.00	215.00	119.00	120.00	89.30	95.10	116.00	97.90	169.00*	132.03	89.30	215.00
66	310.00*	230.00	202.00*	271.00	179.00	114.00	114.00	110.00	120.00	167.00	186.00	166.00	179.92	110.00	310.00
67	165.00	352.00*	434.00*	207.00	145.00	173.00	128.00	102.00	106.00	109.00	148.00	159.00	185.67	102.00	434.00
68	207.00	134.00	196.00	164.00	114.00	101.00	91.30	81.30	74.90	105.00	76.80	105.00	120.86	74.90	207.00
69	78.04	86.28	100.34	92.93	65.52	68.90	97.15	57.55	53.73	96.31	212.43	154.52	93.76	53.73	212.93
70	177.72	195.51	209.56	139.07	119.03	98.65	94.10	91.22	107.06	101.18	100.14	107.49	128.39	91.22	209.56

TABLE A-2 - Monthly run-off for Juquía River at Juquía (continuation)

STATION PREFIX: 81.680.000 DRAINAGE AREA: 4,369 km²

PERIOD: 1932 - 1979

ANO	JAN	FEV	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	165.19	120.96	148.53	108.15	107.06	107.11	90.66	81.35	83.47	83.34	74.71	93.35	105.32	74.71	165.14
72	124.13	151.42	138.46	114.94	81.44	71.82	76.75	84.17	106.03	185.29	132.82	107.15	114.54	71.82	185.29
73	157.97	233.19	186.66	296.52	160.18	124.82	123.84	108.04	144.68	143.85	142.62	127.57	160.76	108.04	296.52
74	167.58	111.73	198.65	144.40	99.03	114.01	91.50	80.18	79.58	89.09	79.41	152.61	117.81	79.41	198.65
75	196.70*	204.31	198.97	128.71	105.19	80.84	89.17	83.26	77.08	94.90	118.02	174.33	129.92	77.08	204.31
76	208.27	354.36	325.39	210.49*	157.67*	164.48	182.59	132.45	128.82*	126.52*	115.07	135.51	186.74	115.07	356.36
77	195.68	140.96	113.33	172.05	119.51	110.20	92.82	45.42	95.92	109.77	103.04	130.04	122.40	85.42	195.68
78	121.40	124.08	143.65	140.11	91.62	85.80	73.10	66.24	71.74	53.24	106.57	80.41	93.08	53.24	143.65
79	84.98	85.42	118.30	98.46	86.81	67.21	70.82	75.60	96.32	91.77	130.68	161.02	97.27	67.21	161.02
n	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
MED	161.90	189.87	194.32	157.00	122.84	107.24	96.86	87.71	92.17	107.01	115.59	130.26	130.23	79.34	234.12
DP	53.55	74.65	77.94	55.46	36.78	28.00	28.19	23.82	28.93	31.10	33.10	36.08	28.04	16.68	73.21
MIN	78.94	77.40	75.70	81.90	64.60	65.00	57.15	55.38	53.73	53.24	66.70	76.20	78.50	53.24	99.00
MAX	310.00	365.00	434.00	296.52	216.00	173.00	182.59	167.00	213.00	185.24	212.93	220.00	186.74	115.07	434.00

* DADO CORREGIDO + DADO GERADO

TABLE A-2 - Monthly Run-off for São Lourenço River at Pedro Barros

STATION: 81.600.000 DRAINAGE AREA: 1,223 km² PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
38	35.40	71.20	79.60	103.00	55.20	42.80	34.40	56.70	38.70	32.90	39.00	41.99	52.57	32.98	103.00
39	63.50	62.40	43.60	59.90	39.40	29.00	26.30	21.00	24.00	17.90	31.30	47.20	38.78	17.90	63.50
40	43.90	47.10	50.20	36.20	28.90	22.10	19.70	18.30	20.80	36.30	29.20	35.60	32.36	18.30	50.20
41	45.80	55.40	71.00	38.40	36.10	24.10	28.40	24.50	32.00	27.20	39.30	54.30	39.78	24.10	71.00
42	34.10	94.50	55.20	66.90	37.30	33.90	39.90	25.80	25.50	27.10	36.40	53.40	43.67	25.50	94.50
43	60.90	53.70	48.50	29.10	24.70	40.30	22.80	28.20	24.50	56.00	42.80	31.70	38.60	22.80	60.90
44	41.00	131.00	83.80	93.00	53.10	36.90	32.30	25.60	25.40	22.00	35.80	41.00	51.74	22.00	131.00
45	34.80	86.40	81.80	51.80	34.30	44.80	38.00	26.00	34.30	28.90	25.80	30.30	43.10	25.80	86.40
46	67.80	58.20	92.50	41.00	32.00	32.40	27.10	23.90	23.40	32.70	38.50	29.80	41.61	23.40	92.50
47	95.90	93.20	68.40	51.60	57.80	48.90	39.70	38.90	48.00	46.70	62.70	70.70	60.21	38.90	45.90
48	59.00	104.00	93.40	58.00	56.80	46.90	39.20	54.50	38.60	38.50	37.90	40.40	55.16	30.50	104.00
49	52.20	44.90	54.90	45.00	24.60	26.40	23.60	20.20	27.90	34.90	33.30	50.40	36.53	20.20	54.90
50	55.70	65.60	85.30	81.00	50.50	42.20	26.70	23.30	27.30	33.10	34.60	40.20	47.96	23.30	85.30
51	80.80	90.00	109.00	59.00	36.30	29.50	25.30	22.60	20.20	31.30	29.40	29.50	46.41	20.20	104.00
52	43.80	52.30	63.90	30.10	28.50	35.50	21.90	19.90	25.20	26.90	30.30	22.00	33.36	19.90	63.90
53	36.30	444.20	30.20	37.30	31.10	27.40	20.50	25.70	21.70	24.30	34.60	52.60	32.58	20.50	52.60
54	33.40	36.60	36.80	46.80	44.40	34.70	23.40	19.90	20.70	44.70	21.30	23.70	32.20	19.90	46.80
55	42.20	23.40	25.00	26.10	18.80	19.10	14.90	18.40	18.60	18.70	26.30	35.60	24.26	18.40	42.20
56	36.60	38.90	69.20	52.80	45.90	41.30	27.40	26.80	22.90	35.50	29.00	28.20	37.86	22.90	69.20
57	54.00	37.80	40.20	44.50	30.00	24.70	45.60	26.70	57.20	45.50	41.70	40.50	40.70	24.70	57.20
58	48.80	38.40	108.00	71.50	58.00	41.50	30.20	25.90	34.70	56.30	68.10	77.10	54.87	25.98	108.00
59	81.80	64.50	64.70	56.90	43.80	30.60	24.30	25.40	26.30	27.70	31.20	36.50	42.73	24.30	81.80
60	43.80	73.60	53.90	41.70	36.10	24.60	22.10	21.60	22.80	24.10	34.10	42.00	36.70	21.60	73.00
61	67.70	95.70	122.00	62.30	47.90	36.20	28.80	22.60	24.40	23.10	26.60	49.20	50.52	22.50	122.00
62	49.60	64.20	92.40	47.60	34.80	27.00	24.00	22.80	28.60	57.10	46.50	73.70	47.36	22.80	92.40
63	99.80	72.50	47.00	34.70	29.10	24.40	22.20	17.70	14.90	34.00	32.80	29.60	38.23	14.00	99.80
64	17.24	30.70	24.10	28.50	22.40	21.70	17.70	17.60	16.90	32.00	35.50	46.60	25.89	16.90	46.60
65	56.50	51.20	46.90	44.60	72.80	37.20	39.10	23.60	25.60	33.10	30.30	60.20	43.43	23.60	72.80
66	110.00	79.80	64.20	95.10	66.00	37.00	34.50	29.80	35.60	54.80	67.10	57.90	60.98	29.80	110.00
67	59.80	126.00	157.00	83.30	53.30	59.30	40.20	28.00	33.70	35.20	49.40	59.90	65.42	28.00	157.00
68	69.40	42.00	72.40	58.80	34.80	25.80	21.40	21.50	18.50	28.50	17.70	31.90	36.89	17.70	72.40
69	23.64	39.08	37.41	43.69	25.68	23.71	17.92	16.00	15.34	37.86	79.18	58.01	34.79	15.34	79.18
70	59.58	64.73	64.84	43.23	36.07	28.03	25.36	22.74	25.32	27.85	31.52	29.00	38.19	22.74	64.84

TABLE A-2 - Monthly Run-off for São Lourenço River at Pedro Barros

STATION: 81.600.000 DRAINAGE AREA: 1,223 km² PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	63.14	45.69	62.13	43.55	34.81	33.35	25.54	23.97	22.92	23.41	19.97	28.20	35.56	19.97	63.14
72	41.68	56.91	49.76	45.42	26.00	19.16	17.48	21.70	33.55	60.23	43.07	31.55	37.21	17.48	60.23
73	58.89	87.80	56.24	104.85*	52.79	36.09	34.40	28.88	40.29	45.23	42.17	36.10	51.98	28.88	104.85
74	51.74	32.33	55.99	35.05	25.34	28.02	19.84	16.64	16.89	21.39	16.93	49.28	30.79	16.64	55.99
75	67.00	82.43	68.84	46.68	35.47	27.61	27.64	25.21	21.93	32.07	38.67	61.03*	44.55	21.93	82.43
76	81.03	103.13	97.41	72.23	52.20	41.32	47.83	36.12	40.96	40.39	35.01	40.15	57.31	35.01	103.13
77	54.22	36.86	29.12	44.51	31.48	28.14	20.71	20.65	27.36	37.73	28.81	40.50	33.34	20.65	54.22
78	34.33	44.20	56.72	28.98	23.63	23.13	19.01	15.66	15.25	11.31	39.46	25.14	28.07	11.31	56.72
79	22.68	24.17	51.31	31.31	25.05	18.70	21.35	22.07	30.14	26.17	44.38	49.93	30.61	18.70	51.31
N	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
NED	54.51	63.02	65.88	52.64	38.89	32.27	27.68	25.05	27.37	33.99	37.08	43.15	41.79	22.59	79.68
DP	20.45	26.60	27.44	20.45	13.05	9.09	8.06	8.37	9.05	11.35	12.98	13.84	9.90	5.46	25.90
MIN	17.20	23.40	24.10	26.10	18.80	18.70	17.48	15.66	14.90	11.31	16.93	22.00	24.26	11.31	42.20
MAX	110.00	131.00	157.00	104.85	72.80	59.30	47.83	56.70	57.20	60.23	79.18	77.10	65.42	38.90	157.00

* DADO CORRIGIDO + DADO GERADO

TABLE A-3 - Monthly Run-off for São Lourenço River at Pedra do Largo

STATION PREFIX: 4F-0017

DRAINAGE AREA: 560 km²

PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
38	19.21+	36.37+	40.40+	61.52+	28.70+	22.76+	18.73+	29.42+	20.79+	18.01+	20.94+	22.33+	27.44+	18.01	51.62
39	32.68+	32.15+	33.09+	30.95+	21.13+	16.14+	14.85+	12.31+	13.75+	10.82+	17.24+	24.87+	20.83+	10.82	32.68
40	23.28+	24.82+	26.30+	19.59+	16.06+	12.83+	11.68+	11.01+	12.21+	19.84+	16.22+	19.31+	17.75+	11.01	26.30
41	24.20+	28.80+	36.28+	20.65+	19.55+	13.79+	15.85+	13.98+	17.96+	15.28+	21.08+	28.27+	21.31+	13.79	36.28
42	18.59+	47.54+	28.70+	31.43+	20.12+	18.49+	21.37+	14.61+	14.46+	15.23+	19.69+	27.84+	23.17+	14.46	47.54
43	31.43+	27.98+	25.49+	16.19+	14.08+	21.56+	13.17+	15.76+	13.98+	29.09+	22.76+	17.44+	20.74+	13.17	31.43
44	21.89+	65.04+	42.41+	46.82+	27.70+	19.93+	17.72+	14.51+	14.42+	12.79+	19.40+	21.88+	27.04+	12.79	65.04
45	18.92+	43.06+	41.45+	27.07+	18.68+	23.72+	20.46+	14.70+	18.68+	16.00+	14.61+	16.77+	22.90+	14.61	43.66
46	34.72+	30.14+	46.58+	21.89+	17.58+	17.77+	15.23+	13.70+	13.46+	17.92+	20.70+	16.63+	22.19+	11.46	46.58
47	48.21+	46.92+	35.03+	26.98+	29.95+	25.68+	21.27+	20.89+	25.25+	24.63+	32.30+	36.13+	31.10+	20.89	48.21
48	30.52+	52.10+	47.97+	30.43+	29.47+	24.72+	21.03+	28.32+	20.74+	16.86+	20.41+	21.61+	28.68+	16.86	52.10
49	27.26+	23.76+	28.56+	23.81+	14.03+	14.90+	13.56+	11.92+	15.61+	18.97+	18.20+	24.40+	19.68+	11.92	28.56
50	33.74+	33.69+	43.13+	41.07+	26.45+	22.47+	15.04+	13.41+	15.33+	18.11+	18.83+	21.51+	25.23+	13.41	43.13
51	40.97+	45.38+	54.49+	30.52+	19.64+	16.38+	14.37+	13.07+	11.92+	17.24+	16.33+	16.38+	24.72+	11.92	54.49
52	23.24+	27.31+	32.87+	16.67+	15.90+	19.26+	12.74+	11.78+	14.32+	15.14+	16.77+	12.79+	18.23+	11.78	32.87
53	19.64+	23.43+	16.72+	20.12+	17.15+	15.38+	12.07+	14.56+	12.64+	16.29+	18.83+	27.46+	17.86+	12.07	27.46
54	18.25+	19.79+	19.88+	24.68+	23.52+	18.87+	13.46+	11.78+	12.16+	23.67+	12.46+	13.60+	17.68+	11.78	24.68
55	22.47+	13.46+	14.22+	14.75+	11.25+	11.40+	11.30+	11.06+	11.16+	11.20+	14.85+	19.31+	13.87+	11.06	22.47
56	19.79+	20.89+	35.41+	27.55+	24.24+	22.04+	15.38+	15.09+	13.22+	19.16+	16.14+	15.76+	20.39+	13.22	35.41
57	28.13+	20.36+	21.51+	23.57+	16.62+	14.08+	24.18+	16.04+	29.66+	24.03+	22.23+	21.65+	21.75+	14.08	29.66
58	25.63+	20.65+	54.01+	36.52+	30.04+	22.13+	16.72+	14.66+	18.87+	29.23+	34.90+	39.50+	28.55+	14.46	54.01
59	41.45+	33.16+	33.26+	29.52+	23.24+	16.91+	13.80+	13.98+	14.85+	15.52+	17.20+	14.74+	22.73+	13.89	41.45
60	23.24+	37.52+	28.08+	22.23+	19.55+	14.03+	12.83+	12.59+	13.17+	13.79+	18.59+	22.37+	19.83+	12.59	37.52
61	34.69+	48.12+	60.72+	32.11+	25.20+	19.59+	16.05+	13.03+	13.94+	13.31+	14.99+	25.83+	26.47+	13.03	60.72
62	26.02+	33.02+	46.53+	25.06+	18.92+	15.18+	13.75+	13.17+	15.95+	29.61+	24.53+	37.57+	24.94+	13.17	46.53
63	50.08+	36.99+	24.77+	18.87+	16.19+	13.94+	12.88+	8.63+	7.16+	16.70+	16.50+	14.90+	19.80+	7.16	50.08
64	9.60	15.50	13.70	15.30	11.50	10.40	8.86	8.91	9.11	16.30	17.30	25.30	13.48	8.86	25.30
65	26.20	25.00	24.90	25.70	34.10	21.40	21.50	14.80	17.20	18.30	18.00	32.40	23.29	14.80	34.10
66	54.97+	35.30	31.70	45.00	34.50	22.50	20.80	19.20	24.30	30.90	38.00	33.30	32.54	14.20	54.97
67	35.30	62.00	79.20	45.90	30.60	28.20	20.26	14.80	16.10	17.70	29.10	29.80	34.08	14.80	79.20
68	33.50	22.80	31.80	29.90	18.70	15.40	15.10	13.80	12.40	17.40	11.80	20.60	20.10	11.80	33.50
69	14.30	19.60	18.60	20.30	14.40	13.00	10.60	9.93	9.70	21.50	43.30	31.50	18.89	9.70	43.30
70	36.10	34.90	37.70	26.10	20.70	18.20	16.00	16.80	17.10	19.00	21.00	18.40	23.50	16.00	37.70

TABLE A-3 - Monthly Run-off for São Lourenço River at Pedra do Largo

STATION PREFIX: 4F-0017

DRAINAGE AREA: 560 km²

PERIOD: 1938 - 1979

ANO	JAN	FEV	MAR	APR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	29.65	21.30	25.95	18.29	17.24	16.68	13.67	13.68	13.20	14.11	12.79	16.35	17.75	12.79	29.65
72	19.86	29.52*	21.73	18.92	12.29	9.74	9.01	10.42	19.02	27.44	22.06	15.18	17.43	9.01	29.52
73	25.75	44.33*	26.08	52.50*	25.46	18.46	17.63	16.21	21.55	25.54	23.68	21.62	26.57	16.21	52.50
74	25.36	18.30	29.87	19.59	15.29	16.74	12.82	11.11	11.37	13.35	11.40	27.96	17.61	11.11	29.07
75	36.73	40.06	33.02	22.52	16.45	13.92	13.27	12.41	11.39	16.21	23.66	29.93	22.46	11.39	40.06
76	46.02	51.66*	47.16	38.54	29.90	23.45	27.14	20.71	22.33	23.54	20.87	21.64	31.08	20.71	51.68
77	29.13	20.32	16.56	23.96	16.89	15.19	12.52	12.77	16.27	21.48	19.59	24.45	19.09	12.52	29.13
78	22.44	26.17	32.64	17.06	13.62	12.50	10.99	9.45	9.14	7.88	18.00	13.12	16.08	7.88	32.64
79	11.90	14.08	22.38	15.44	12.68	9.99	11.32	10.54	15.17	13.62	25.28	27.84	15.85	9.99	27.84
N	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
MED	28.45	32.24	33.33	27.28	20.70	17.59	15.45	14.25	15.50	18.63	20.54	23.21	22.26	13.15	40.49
DP	10.14	12.71	13.50	10.07	6.44	4.54	4.15	4.28	4.63	5.46	6.70	6.79	4.97	3.03	12.53
MIN	9.60	13.46	13.70	14.75	11.25	9.74	8.86	8.63	7.16	7.88	11.40	12.79	13.48	7.16	22.47
MAX	54.97	65.04	79.20	52.50	34.50	28.20	27.14	29.42	29.66	30.90	43.30	39.20	34.08	20.89	79.20

* DADO CORRIGIDO

+ DADO GERADO

TABLE A-4 - Monthly Run-off for Juquiá River at Silvas

STATION PREFIX: V-8-351 DRAINAGE AREA: 46.0 km² PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEX	ANUAL	MINIMA	MAXIMA
38	1.66	2.26	2.62	3.36	1.92	1.63	1.48	2.26	1.67	1.71	1.69	1.92	2.02	1.48	3.36
39	1.85	1.92	1.71	1.76	1.37	1.20	1.25	.90	1.23	.47	1.74	2.30	1.52	.90	2.30
40	1.94	2.64*	2.14*	1.51	1.58	1.10	.99	1.00	1.58	2.06	1.49	2.20	1.69	.99	2.64
41	1.94	2.17	3.64	1.68	1.69	1.14	1.46	1.21	1.73	1.72	2.55	2.91	1.99	1.14	3.64
42	1.97	5.05	2.76	2.73	1.55	1.65	1.91	1.40	1.44	1.85	1.77	3.26	2.28	1.40	5.05
43	2.85	2.61	1.59	1.43	1.20	2.00	1.04	1.76	1.33	2.90	1.77	1.67	1.85	1.04	2.90
44	2.43	5.84	3.85*	3.16	1.95	1.61	1.56	1.13	1.05	.94	2.10	1.83	2.29	.94	5.84
45	2.53	3.60	3.53	1.99	1.79	2.31	1.93	1.49	1.22	1.37	1.02	1.73	2.04	1.02	3.60
46	3.23	2.13*	2.33	1.43	1.07	1.07	.75	.64	.61	1.92	2.15	1.24	1.55	.61	3.23
47	2.95	3.36	3.00	2.08	1.83	2.20	1.43	1.84	1.79	1.72	2.19	2.99*	2.28	1.43	3.36
48	2.33	3.65*	3.42	1.94	2.07	1.54	1.28	1.59	1.62	1.08	2.34	.93	1.98	.93	3.65
49	2.64	2.31	2.23	2.10	1.48	1.69	.97	.78	1.53	1.57	1.50*	2.47*	1.77	.78	2.64
50	2.98*	3.36*	2.86*	3.60*	2.65*	1.92*	1.83*	1.39*	1.39*	1.79*	1.66*	1.81*	2.27	1.39	3.60
51	2.72*	2.88*	3.86*	2.40*	1.45*	1.37*	1.29*	1.26*	1.17*	1.55*	1.63*	1.70*	1.94	1.17	3.86
52	1.95*	2.79*	2.96*	1.54*	1.71*	1.67*	1.27*	1.28*	1.66*	1.69*	1.77*	1.39*	1.81	1.27	3.46
53	1.70*	2.30*	1.49*	1.86*	1.46*	1.38*	1.22*	1.63*	1.27*	1.52*	1.71*	2.24*	1.65	1.22	2.39
54	1.76*	1.74*	1.66*	1.90*	1.66*	1.40*	1.22*	1.13*	1.24*	2.01*	1.14*	1.33*	1.52	1.13	2.01
55	2.33*	1.36*	1.40*	1.31*	1.09*	1.16*	1.15*	1.22*	1.18*	1.17*	1.58*	1.91*	1.41	1.09	2.33
56	1.55*	2.30*	2.38*	2.36*	2.15*	2.06*	1.54*	1.75*	1.38*	1.88*	1.78*	1.72*	1.90	1.38	2.38
57	2.49*	1.72*	2.60*	2.40*	1.70*	1.52*	2.30*	1.56*	2.90*	2.35*	2.25*	2.24*	2.17	1.52	2.90
58	2.23*	1.86*	4.47*	2.91*	3.03*	2.30*	1.78*	1.58*	1.89*	2.13*	2.45*	3.23*	2.49	1.58	4.47
59	3.48*	2.97*	3.10*	2.22*	1.91*	1.47*	1.36*	1.45*	1.45*	1.34*	1.61*	2.08*	2.04	1.34	3.48
60	1.95*	3.23*	2.18*	1.88*	1.68*	1.39*	1.35*	1.27*	1.25*	1.42*	1.31*	2.08*	1.73	1.25	3.23
61	2.99*	2.87*	3.95*	2.01*	1.75*	1.38*	1.23*	1.05*	1.17*	1.26*	1.47*	2.11*	1.94	1.05	3.95
62	2.16*	2.50*	3.41*	1.77*	1.40*	1.28*	1.18*	1.20*	1.42*	2.32*	1.88*	3.00*	1.96	1.18	3.41
63	3.44*	2.89*	1.83*	1.46*	1.31*	1.19*	1.13*	1.04*	.95*	1.52*	1.40*	1.36*	1.63	.95	3.44
64	1.04*	1.83*	1.39*	1.35*	1.28*	1.15*	1.10*	1.03*	1.21*	1.28*	1.59*	1.98*	1.35	1.03	1.98
65	2.84*	2.10*	1.86*	1.03*	2.23*	1.40*	1.75*	1.20*	1.31*	1.84*	1.60*	2.87*	1.91	1.20	2.87
66	3.74*	2.37*	2.63*	3.79*	2.29*	1.53*	1.47*	1.62*	1.96*	2.33*	2.10*	2.65*	2.37	1.47	3.74
67	2.40*	4.25*	5.13*	2.77*	1.86*	2.20*	1.63*	1.36*	1.66*	1.75*	2.15*	2.42*	2.47	1.36	5.13
68	2.58*	2.01*	3.11*	2.24*	1.75*	1.49*	1.31*	1.58*	1.28*	1.54*	1.14*	1.61*	.80	1.14	3.11
69	1.15*	1.67*	1.72*	1.26*	1.03*	1.07*	.84*	.87*	.83*	1.94*	2.53*	1.76*	.39	.83	2.53
70	2.50*	2.92*	2.56*	1.58*	1.34*	1.22*	1.10*	1.18*	1.45*	1.68*	1.27*	1.11*	1.66*	1.10*	2.92

TABLE A-4 - Monthly Run-off for Juquiá River at Silval

STATION PREFIX: V-8-351 DRAINAGE AREA: 46.0 km²

PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	1.95+	1.78+	2.06+	1.57+	1.30+	1.65+	1.20+	1.09+	.93+	1.39+	1.15+	1.66+	1.48	.93	2.06
72	2.11+	1.91+	1.63+	1.71+	1.07+	.92+	1.96+	1.22+	1.68+	2.60+	1.64+	1.23+	1.56	.92	2.60
73	2.08+	2.59+	1.86+	3.30+	1.84+	1.32+	1.42+	1.18+	1.81+	1.75+	2.00+	2.21+	1.95	1.18	3.30
74	3.01+	1.73+	2.94+	1.97+	1.33+	1.65+	1.17+	.91+	.95+	1.25+	1.22+	2.60+	1.73	.91	3.01
75	2.54+	2.91+	2.77+	1.63+	1.25+	1.08+	1.16+	1.02+	1.02+	1.35+	1.91+	3.04+	1.81	1.02	3.04
76	2.49+	4.16+	4.09+	2.76+	2.20+	2.38+	2.82+	2.16+	2.36+	2.19+	1.85+	2.28+	2.65	1.85	4.16
77	2.97+	1.97+	1.61+	2.35+	1.69+	1.48+	1.17+	1.16+	1.54+	1.75+	1.63+	2.18+	1.79	1.16	2.97
78	2.13+	1.88+	2.55+	1.27+	1.39+	1.18+	1.14+	.96+	1.05+	.92+	1.54+	1.25+	1.44	.92	2.55
79	1.59+	1.47+	1.79+	1.56+	1.35+	1.10+	1.26+	1.40+	1.82+	1.70+	2.32+	2.20+	1.63+	1.10	2.32
N	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
MED	2.36	2.62	2.63	2.09	1.66	1.51	1.37	1.30	1.43	1.69	1.75	2.06	1.87	1.15	3.21
DP	.61	.95	.91	.66	.43	.38	.39	.34	.41	.44	.40	.60	.32	.24	.85
MIN	1.04	1.36	1.39	1.26	1.03	.92	.75	.64	.61	.92	1.02	.93	1.35	.61	1.88
MAX	3.74	5.84	5.13	3.79	3.03	2.38	2.82	2.26	2.90	2.90	2.55	3.26	2.65	1.85	5.84

* DADO CORRIGIDO

+ DADO GERADO

TABLE A-5 - Monthly Run-off for Juquila River at Rosas

STATION PREFIX: V-8-353 DRAINAGE AREA: 133 km²

PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
38	4.70+	5.74+	5.24+	8.05+	5.53+	5.09+	4.22+	5.53+	4.06+	4.46+	4.34+	5.50+	5.21	4.06	8.05
39	5.29+	5.88+	5.15+	4.98+	4.27+	3.68+	3.83+	3.23+	3.35+	3.06+	4.39+	5.31+	4.37	3.06	5.88
40	5.93+	7.02+	6.07+	4.59+	4.06+	3.49+	3.23+	3.18+	3.39+	4.22+	3.84+	4.26+	4.44	3.18	7.02
41	4.86+	6.13+	8.72+	4.15+	3.96+	3.37+	4.68+	4.36+	4.06+	4.41+	5.50+	6.33+	5.04	3.37	8.72
42	4.93+	12.10+	8.66+	8.19+	6.26+	5.27+	5.46+	4.34+	3.84+	4.00+	4.16+	7.16+	6.20	3.84	12.10
43	6.90+	7.69+	5.95+	4.22+	3.72+	3.76+	3.39+	3.94+	3.89+	6.14+	5.12+	4.10+	4.90	3.39	7.09
44	5.03+	12.55+	10.11+	8.81+	5.12+	4.22+	4.03+	3.49+	3.41+	3.23+	4.74+	3.91+	5.72	3.23	12.55
45	4.62+	9.17+	8.23+	5.60+	4.46+	6.29+	4.98+	3.68+	4.01+	3.79+	3.76+	4.18+	5.23	3.68	9.17
46	8.14+	5.72+	8.11+	6.85+	5.11+	4.48+	3.75+	3.41+	3.32+	5.41+	5.65+	4.20+	5.35	3.32	8.14
47	9.06+	8.73+	7.60+	5.79+	5.29+	4.69+	4.93+	4.91+	6.24+	5.86+	5.81+	7.92+	6.10	4.63	9.06
48	6.70+	9.60+	9.02+	6.55+	6.65+	5.27+	4.78+	5.00+	4.65+	4.03+	5.76+	4.06+	6.09	4.03	9.60
49	5.04+	6.96+	5.23+	5.97+	4.65+	4.27+	4.13+	3.75+	4.20+	4.18+	4.18+	6.60+	4.91	3.75	6.96
50	7.90+	8.87+	7.59+	9.47+	7.06+	5.18+	4.94+	3.82+	3.82+	4.86+	4.51+	4.91+	6.08	3.82	9.47
51	7.22+	7.64+	10.13+	6.41+	3.98+	3.77+	3.58+	3.49+	3.27+	4.24+	4.46+	4.63+	5.23	3.27	10.13
52	5.25+	7.41+	7.83+	4.21+	4.65+	4.54+	3.53+	3.55+	4.51+	4.60+	4.80+	3.82+	4.89	3.53	7.83
53	4.63+	6.15+	4.09+	5.04+	4.00+	3.79+	3.39+	4.45+	3.52+	4.15+	4.65+	6.00+	4.49	3.39	6.15
54	4.77+	4.71+	4.51+	5.13+	4.51+	3.85+	3.38+	3.17+	3.44+	5.40+	3.19+	3.68+	4.15	3.17	5.40
55	6.24+	3.76+	3.85+	3.61+	3.06+	3.25+	3.22+	3.38+	3.29+	3.26+	4.30+	5.16+	3.87	3.06	6.24
56	4.24+	6.15+	6.35+	6.30+	5.76+	5.55+	4.21+	4.74+	3.79+	5.07+	4.83+	4.68+	5.14	3.79	6.35
57	6.83+	4.68+	6.93+	6.42+	4.63+	4.15+	6.15+	4.27+	7.68+	6.27+	6.03+	6.00+	5.82	4.15	7.68
58	5.97+	5.04+	11.70+	7.71+	8.01+	6.15+	4.83+	4.30+	5.10+	5.73+	6.54+	8.52+	6.63	4.30	11.70
59	9.18+	7.86+	8.19+	5.94+	5.16+	4.03+	3.76+	3.97+	3.97+	3.70+	4.39+	5.58+	5.48	3.70	9.18
60	5.25+	8.52+	5.85+	4.57+	4.57+	3.82+	3.73+	3.63+	3.46+	3.91+	3.63+	5.65+	4.70	3.46	8.52
61	7.92+	7.62+	10.38+	5.40+	4.74+	3.79+	3.42+	2.95+	3.26+	3.49+	4.03+	5.67+	5.22	2.95	10.38
62	5.79+	6.66+	9.00+	4.80+	3.85+	3.43+	3.30+	3.34+	3.91+	6.21+	5.07+	7.95+	5.18	3.30	4.00
63	9.06+	7.65+	4.95+	4.00+	3.61+	3.31+	3.15+	2.92+	2.71+	4.15+	3.85+	3.73+	4.42	2.71	9.06
64	2.94+	4.95+	3.82+	3.73+	3.55+	3.22+	3.09+	2.90+	3.36+	3.55+	4.33+	5.34+	3.73	2.90	5.34
65	7.53+	5.64+	5.04+	5.22+	5.97+	3.85+	4.74+	3.34+	3.62+	4.98+	4.36+	7.62+	5.16	3.34	7.62
66	9.84+	6.33+	6.99+	9.96+	6.12+	4.18+	4.03+	4.42+	5.28+	6.24+	5.64+	7.05+	6.34	4.03	9.96
67	6.42+	11.13+	13.39+	7.35+	5.04+	5.91+	4.45+	3.76+	4.51+	4.74+	5.77+	6.45+	6.58	3.76	13.39
68	6.87+	5.40+	8.22+	6.00+	4.74+	4.09+	3.62+	4.30+	3.54+	4.21+	3.19+	4.39+	4.88	3.19	8.22
69	3.21+	4.55+	4.68+	3.49+	2.90+	3.02+	2.42+	2.51+	2.39+	5.23+	6.74+	4.78+	3.83	2.39	6.74
70	6.76+	7.75+	6.81+	4.32+	3.59+	3.39+	3.09+	3.30+	3.98+	4.57+	3.53+	3.10+	4.52	3.09	7.75

TABLE A-5 - Monthly Run-off for Juquiá River at Rosas

PERIOD: 1938 - 1979

STATION PREFIX: V-8-353 DRAINAGE AREA: 133 km²

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OCT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	5.27+	4.83+	5.54+	4.28+	3.60+	4.49+	3.35+	3.06+	2.66+	3.82+	3.22+	4.51+	4.05	2.66	5.54
72	5.60+	5.15+	4.45+	4.65+	3.01+	2.62+	2.74+	3.39+	4.57+	6.92+	4.47+	3.42+	4.25	2.62	6.92
73	5.59+	6.89+	5.03+	8.71+	4.98+	3.65+	3.90+	3.29+	4.90+	4.75+	5.38+	5.93+	5.25	3.29	8.71
74	7.97+	4.68+	7.78+	5.31+	3.68+	4.40+	3.26+	2.61+	2.71+	3.48+	3.40+	6.93+	4.69	2.61	7.97
75	6.77+	7.71+	7.35+	4.44+	3.48+	3.03+	3.25+	2.89+	2.89+	3.73+	5.16+	8.05+	4.90	2.89	8.05
76	6.65+	10.91+	10.73+	7.33+	5.91+	6.35+	7.47+	5.79+	6.30+	5.86+	5.01+	6.11+	7.03	5.01	10.91
77	7.87+	5.31+	4.39+	6.28+	4.60+	4.05+	3.26+	3.23+	4.22+	4.74+	4.43+	5.86+	4.85	3.23	7.87
78	5.73+	5.08+	6.78+	3.53+	3.82+	3.30+	3.18+	2.74+	2.97+	2.62+	4.22+	3.48+	3.95	2.62	6.78
79	4.34+	4.04+	4.85+	4.25+	3.73+	3.08+	3.49+	3.86+	4.92+	4.63+	6.21+	5.90+	4.44	3.08	6.21
N	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
MED	6.21	6.91	7.03	5.75	4.65	4.17	3.94	3.74	3.98	4.67	4.68	5.44	5.09	3.40	8.33
DP	1.61	2.14	2.29	1.69	1.13	.94	.95	.81	1.04	1.00	.91	1.42	.83	.57	1.94
MIN	2.92	3.76	3.82	3.49	2.90	2.62	2.42	2.51	2.39	2.62	3.19	3.10	3.73	2.39	5.34
MAX	9.84	12.55	13.39	9.96	8.01	6.35	7.47	5.99	7.68	6.92	6.74	8.52	7.03	5.01	13.39

* DADO CORRIGIDO + DADO GERADO

TABLE A-6 - Monthly Run-off for Embu-Guaçu at Olaria

STATION PREFIX: G-6 DRAINAGE AREA: 57.3 km²

PERIOD: 1938 - 1979

ANO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
38	1.99+	1.99+	2.18+	3.98	1.68+	1.40+	1.35+	1.83+	1.97+	1.84+	2.14+	2.67+	2.09	1.35	3.98
39	2.69+	1.83+	1.50+	1.44	1.28+	1.03+	.97+	.82+	.98+	.87+	2.06+	2.33+	1.48	.82	2.69
40	3.84+	4.84+	2.33+	1.37	1.25+	.88+	.74+	.84+	1.15+	1.61+	1.35+	1.80+	1.83	.74	4.84
41	1.69+	1.34+	1.94+	1.34	1.03+	.81+	1.05+	1.13+	1.78+	1.71+	2.29+	2.11+	1.54	.81	2.29
42	2.11+	5.86+	2.58+	2.72	1.20+	1.84+	1.96+	1.07+	1.21+	1.04+	1.36+	2.46+	2.12	1.04	5.86
43	2.15+	2.11+	1.83+	1.06+	.88+	1.23	.78+	1.13+	1.05+	3.10+	1.93+	1.68+	1.58	.78	3.10
44	1.80+	4.17+	3.43+	1.83	1.15+	1.00+	1.07+	.81+	.81+	.86+	2.14+	1.65+	1.73	.81	4.17
45	2.20+	4.17+	3.09+	1.44	1.19+	2.40+	1.77+	1.16+	1.17+	1.25+	1.17+	1.68+	1.90	1.16	4.27
46	3.29+	1.80+	3.81+	1.58	1.27+	1.60+	1.13+	.90+	.76+	1.77+	1.71+	1.27+	1.74	.76	3.81
47	3.29+	3.16+	3.10+	1.84	1.74+	1.74+	1.64+	1.62+	2.15+	1.71+	2.15+	3.83+	2.33	1.62	3.83
48	2.57+	3.01+	3.64+	1.97	2.12+	1.65+	1.69+	1.81+	1.35+	1.34+	1.68+	1.56+	2.03	1.34	3.64
49	2.80+	3.69+	2.21+	2.18	1.43+	1.48+	1.38+	.99+	1.26+	1.10+	1.44+	3.28+	1.94	.99	3.69
50	3.22	3.90+	3.03+	4.10	2.15+	2.00+	1.78+	1.14+	1.05+	2.32+	1.77+	1.81+	2.36	1.05	4.10
51	3.41+	2.30+	2.09+	1.65	1.31+	1.13+	1.21+	1.08+	1.00+	1.44+	1.50+	1.65+	1.65	1.00	3.41
52	1.84+	3.78+	2.39+	1.13	1.59+	2.23+	1.59+	1.34+	1.60+	1.50+	1.91+	1.08+	1.83	1.08	3.78
53	1.41+	2.45+	1.28+	1.94	1.36+	1.25+	1.25+	1.31+	1.19+	1.44+	1.60+	1.90+	1.53	1.19	2.45
54	2.14+	2.48+	1.93+	1.78	1.69+	1.31+	.95+	.86+	.79+	1.89+	.83+	.90+	1.46	.79	2.48
55	2.32+	1.10+	1.19+	.86	.74+	.85+	.97+	1.22+	.84+	.98+	1.45+	1.54+	1.17	.74	2.32
56	1.16+	2.51+	3.64+	2.06	2.24+	2.51+	1.78+	1.90+	1.51+	2.06+	1.34+	1.54+	2.02	1.16	3.64
57	2.80+	1.94+	2.85+	2.08	1.23+	1.20+	2.17+	1.71+	4.08+	2.94+	3.53+	2.17+	2.39	1.20	4.08
58	2.06+	2.03+	3.99+	2.78	3.46+	2.48+	1.84+	1.59+	2.18+	2.30+	2.80+	3.46+	2.58	1.59	3.99
59	3.50+	2.61+	2.80+	2.12+	1.68+	1.07+	1.01+	1.32+	1.23	1.10	1.50	2.67	1.88	1.01	3.50
60	2.27+	4.73+	2.36+	1.97+	2.00+	1.35+	1.17+	1.23+	1.26	1.47	1.51	2.94	2.02	1.17	4.73
61	2.66+	3.56+	3.21+	1.90+	1.69+	1.23+	.98+	.87+	.96	1.30	1.68	2.15	1.85	.87	3.56
62	1.89+	2.80+	4.02+	1.50+	1.20+	1.12+	1.05+	1.41+	1.63	2.48	1.52	2.72	1.95	1.05	4.02
63	3.64+	2.57+	1.14+	.81+	.68+	.72+	.61+	.77+	.55	1.11	1.42	.95	1.25	.55	3.64
64	.68+	1.80+	.89+	1.11+	1.13+	1.02+	.99+	.73+	1.11	1.14	1.32	2.11	1.17	.68	2.11
65	3.78+	2.55+	2.12+	1.84+	2.21+	1.24+	1.59+	1.08+	1.16	2.00	1.96	2.79	2.03	1.08	3.78
66	3.21+	2.95+	3.07+	2.88+	2.14+	1.08+	1.02+	1.28+	1.65	2.29	1.99	2.73	2.19	1.02	3.21
67	2.35+	4.56+	3.16+	1.96+	1.17+	2.03+	1.28+	1.02+	1.59	1.54	2.75	2.12	2.13	1.02	4.56
68	2.72+	1.59+	2.64+	1.86+	1.52+	1.23+	.96+	1.14+	.92	1.29	.83	1.52	1.52	.83	2.72
69	1.17+	1.46+	1.65+	1.08+	.80+	1.07+	.65+	.69+	.69	2.37	3.96	1.71	1.44	.65	3.96
70	3.67+	5.71+	3.59+	1.15	1.12	.98	.94	1.27	1.56	1.59	1.14	.75	1.95	.75	5.71

TABLE A-6 - Monthly Run-off for Embu-Guaçu at Olaria

STATION PREFIX: G-6

DRAINAGE AREA: 57.3 km²

PERIOD: 1938 - 1979

ANO	JAN	FEV	MAR	APR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	2.09	1.71	2.51	2.12	1.39	1.85	.90	1.07	.72	1.90	1.34	2.03	1.64	.72	2.51
72	3.11	2.19	1.56	2.34	.85	.39	.55	1.22	1.80	4.17	2.20	2.03	1.87	.39	4.17
73	4.11	2.21	1.78	3.04	2.00	1.06	1.31	1.01	2.18	2.22	2.79	1.17	2.07	1.01	4.11
74	3.47	1.32	3.00	1.62	.94	1.50	.94	.64	.93	1.56	1.26	3.41	1.72	.64	3.47
75	3.19	3.96	3.38	1.56	1.05	.82	1.07	.82	.98	1.44	2.90	3.65	2.06	.82	3.96
76	6.99*	6.10*	3.59	3.99	2.49	1.61	2.82	2.01	2.40	2.30	1.57	1.92	3.16	1.57	6.99
77	3.28	1.42	.84	2.97	1.64	.95	.57	.74	1.62	1.95	1.34	2.46	1.65	.57	3.28
78	2.84	2.67	4.29*	1.22	1.18	.88	.77	.58	.80	.42	2.89	2.62	1.76	.42	4.29
79	1.99	1.54	2.02	2.04	1.23	.84	1.14	1.48	2.66	1.74	3.14	2.73	1.88	.84	3.14
N	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
MED	2.70	2.88	2.56	1.96	1.48	1.33	1.23	1.16	1.39	1.72	1.88	2.13	1.87	.94	3.76
DP	1.05	1.31	.91	.80	.55	.50	.48	.36	.66	.68	.71	.76	.38	.29	.97
MIN	.68	1.10	.84	.81	.68	.39	.55	.58	.55	.42	.83	.75	1.17	.39	2.11
MAX	6.99	6.10	4.29	4.10	3.46	2.51	2.92	2.01	4.08	4.17	3.96	3.83	3.16	1.62	6.99

* DADO CORRIGIDO

+ DADO GERADO

TABLE A-7 - Monthly Run-off for Santa Rita River at Embu-Guaçu

PERIOD: 1938 - 1979

DRAINAGE AREA: 71.5 km²

STATION PREFIX: G-8

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
38	1.67	1.67	1.83	3.27	1.42	1.20	1.16	1.54	1.66	1.55	1.79	2.22	1.75	1.16	3.27
39	2.23	1.54	1.28	1.23	1.10	.90	.85	.73	.86	.77	1.73	1.95	1.26	.73	2.23
40	3.16	3.96	1.95	1.18	1.08	.78	.67	.75	1.00	1.37	1.16	1.52	1.55	.67	3.96
41	1.43	1.31	1.64	1.15	.90	.73	.92	.99	1.51	1.45	1.91	1.77	1.31	.73	1.91
42	1.77	4.78	2.15	2.26	1.04	1.55	1.65	.94	1.05	.91	1.17	2.04	1.78	.91	4.78
43	1.80	1.77	1.54	.93	.79	1.07	.71	.98	.92	2.56	1.63	1.42	1.34	.71	2.56
44	1.52	3.42	2.83	1.54	1.00	.88	.93	.73	.73	.77	1.79	1.40	1.46	.73	3.42
45	1.84	3.50	2.55	1.23	1.03	2.01	1.49	1.01	1.02	1.08	1.01	1.42	1.60	1.01	3.50
46	2.72	1.52	3.14	1.35	1.10	1.36	.98	.80	.69	1.49	1.45	1.10	1.48	.69	3.14
47	2.72	2.61	2.56	1.55	1.47	1.47	1.39	1.38	1.80	1.45	1.80	3.15	1.95	1.38	3.15
48	2.14	2.49	2.99	1.66	1.78	1.40	1.43	1.53	1.16	1.15	1.42	1.33	1.71	1.15	2.99
49	2.33	3.04	1.85	1.83	1.22	1.27	1.19	.87	1.09	.96	1.23	2.71	1.63	.87	3.04
50	2.66	3.21	2.51	3.36	1.80	1.68	1.51	.99	.92	1.93	1.49	1.53	1.97	.92	3.36
51	2.81	1.91	1.76	1.40	1.13	.98	1.05	.95	.88	1.23	1.28	1.40	1.40	.88	2.81
52	1.55	3.11	1.99	.98	1.35	1.86	1.35	1.15	1.36	1.28	1.61	.95	1.59	.95	3.11
53	1.21	2.04	1.10	1.64	1.17	1.08	1.08	1.13	1.03	1.23	1.36	1.60	1.31	1.03	2.04
54	1.79	2.07	1.63	1.51	1.43	1.13	.84	.77	.71	1.59	.74	.80	1.25	.71	2.07
55	1.93	.96	1.03	.77	.67	.76	.85	1.06	.75	.87	1.24	1.31	1.02	.67	1.93
56	1.01	2.09	2.99	1.73	1.87	2.09	1.51	1.60	1.29	1.73	1.15	1.22	1.70	1.01	2.99
57	2.33	1.64	2.36	1.74	1.06	1.04	1.82	1.45	3.35	2.43	2.91	1.82	2.00	1.04	3.35
58	1.73	1.71	3.28	2.30	2.85	2.07	1.55	1.35	1.83	1.92	2.33	2.85	2.15	1.35	3.28
59	2.89	2.17	2.33	1.78	1.42	.94	.89	1.14	1.07	.96	1.28	2.22	1.59	.89	2.89
60	1.90	3.87	1.97	1.66	1.68	1.16	1.02	1.06	1.09	1.26	1.29	2.43	1.70	1.02	3.87
61	2.21	2.93	2.65	1.60	1.43	1.07	.86	.78	.85	1.12	1.42	1.80	1.56	.78	2.93
62	1.59	2.33	3.30	1.28	1.04	.98	.92	1.21	1.39	2.07	1.30	2.26	1.64	.92	3.30
63	2.99	2.14	.99	.73	.63	.66	.56	.70	.52	.97	1.22	.84	1.08	.52	2.99
64	.63	1.52	.79	.97	.98	.90	.87	.66	.97	.99	1.14	1.77	1.02	.63	1.77
65	3.11	2.12	1.85	1.55	1.85	1.08	1.35	.95	1.01	1.68	1.65	2.31	1.71	.95	3.11
66	2.65	2.45	2.54	2.89	1.79	.95	.90	1.10	1.40	1.91	1.67	2.27	1.84	.90	2.65
67	1.96	3.73	2.61	1.65	1.02	1.71	1.10	.90	1.35	1.31	2.28	1.78	1.78	.90	3.73
68	2.26	1.35	2.20	1.57	1.30	1.07	.85	.99	.81	1.11	.74	1.30	1.30	.74	2.26
69	1.02	1.24	1.40	.95	.72	.93	.60	.63	.63	1.98	3.25	1.45	1.23	.60	3.25
70	3.02	4.66	2.96	1.74	1.24	1.18	1.01	1.04	1.20	1.24	.99	1.12	1.78	.99	4.66

TABLE A-7 - Monthly Run-off for Santa Rita River at Embu-Guaçu

STATION PREFIX: G-8

DRAINAGE AREA: 71.5 km²

PERIOD: 1938 - 1979

ANO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SET	OUT	NOV	DEZ	ANUAL	MINIMA	MAXIMA
71	1.72	1.52	2.10	1.49	1.27	1.60	1.08	.83	.81	1.40	.96	1.33	1.34	.81	2.10
72	2.52	2.09	1.25	1.11	.73	.61	.77	.93	.98	2.60	1.42	1.05	1.33	.61	2.52
73	3.31	2.41	1.43	2.14	1.38	1.09	1.24	1.03	1.34	1.45	1.76	2.06	1.72	1.03	3.31
74	3.31	1.59	2.61	1.75	1.12	1.55	1.06	.89	.87	1.13	1.03	2.65	1.63	.87	3.31
75	2.34	2.78	2.18	1.18	1.04	.91	1.08	.85	.84	1.03	1.32	2.68	1.52	.84	2.78
76	5.68	4.52	3.68	3.77	2.82	2.43	2.86	2.18	2.46	1.81	1.73	1.91	2.99	1.73	5.68
77	3.19	1.92	1.44	1.91	1.35	1.20	.99	.92	1.21	1.12	1.18	2.17	1.55	.92	3.19
78	1.74	1.39	3.52	1.00	1.14	1.02	1.00	.74	.84	.64	1.90	1.94	1.41	.64	3.52
79	1.35	1.26	1.14	1.39	1.19	.85	.88	1.04	1.68	1.70	1.81	1.64	1.33	.85	1.81
N	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
MED	2.23	2.39	2.14	1.62	1.30	1.22	1.11	1.03	1.17	1.41	1.51	1.78	1.58	.89	3.06
DP	.87	1.00	.75	.65	.47	.42	.40	.30	.51	.47	.51	.57	.34	.23	.80
MIN	.63	.96	.79	.73	.63	.61	.56	.63	.52	.64	.74	.80	1.02	.52	1.77
MAX	5.68	4.78	3.68	3.77	2.85	2.43	2.86	2.18	3.35	2.56	3.25	3.15	2.99	1.73	5.68

* DADO CORRIGIDO + DADO GERADO

TABLE A-8 Monthly Run-off For Cubatão River at Barragem₂ Fixo I
STATION PREFIX: V-374
DRAINAGE AREA: 126 km

PERIOD 1912 - 1965

Year	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total	Average	Minim.	Maxim.
1912	21,5	20,8	17,6	11,6	9,4	8,7	7,6	5,5	4,4	7,4	8,0	7,6	130,1	10,8	4,4	21,5
1913	8,5	5,8	5,4	4,4	3,5	4,8	3,3	3,3	2,9	2,3	2,7	2,7	49,6	4,1	2,3	8,5
1914	4,8	11,6	8,9	3,9	2,9	3,9	2,1	1,4	2,2	2,2	8,0	9,4	61,3	5,1	1,4	11,6
1915	13,3	2,3	1,6	2,2	1,6	1,8	3,3	2,2	2,4	4,1	8,7	4,4	47,9	4,0	1,6	13,3
1916	6,8	6,2	29,8	8,7	8,3	4,1	2,7	2,5	1,8	4,6	4,1	8,0	87,6	7,3	1,8	29,8
1917	15,2	8,0	7,1	6,6	5,2	3,9	5,5	2,7	3,3	6,0	6,0	4,8	74,3	6,2	2,7	15,2
1918	6,0	3,6	8,9	4,8	8,9	3,5	5,1	3,9	3,7	7,6	13,5	8,7	78,2	6,5	3,5	13,5
1919	9,8	33,5	12,3	5,3	3,5	4,1	2,1	4,6	2,7	4,8	7,4	10,3	100,4	8,4	2,1	33,5
1920	8,0	9,1	19,1	8,9	4,6	3,7	3,7	4,8	6,0	6,4	6,0	6,0	86,3	7,2	3,7	19,1
1921	7,8	11,6	7,3	8,7	4,1	4,4	2,7	1,8	3,9	2,7	4,4	5,3	64,7	5,4	1,8	11,6
1922	12,8	8,3	36,2	11,2	5,5	4,8	2,9	2,1	2,3	3,3	8,0	5,5	103,3	8,6	2,1	36,2
1923	6,0	7,6	18,0	7,1	6,6	6,8	2,7	2,5	4,6	5,1	5,5	4,6	77,1	6,4	2,5	18,0
1924	13,3	24,0	10,3	7,8	4,8	3,7	2,9	1,8	2,1	3,3	4,8	9,8	88,6	7,4	1,8	24,0
1925	11,0	6,0	5,5	11,0	4,6	3,7	2,5	1,4	3,9	4,1	11,2	11,2	76,1	6,3	1,4	11,2
1926	12,8	11,6	8,3	6,6	4,6	3,0	2,5	11,4	5,8	4,4	8,0	10,6	89,6	7,5	2,5	12,8
1927	9,1	10,0	11,8	6,0	3,7	4,4	2,4	5,3	9,1	8,7	8,0	8,7	87,2	7,3	2,4	11,8
1928	12,4	12,8	11,6	10,1	5,5	2,9	6,4	2,7	4,1	7,4	5,5	6,4	87,8	7,3	2,7	12,8
1929	14,5	33,5	13,7	6,4	10,6	4,6	3,9	3,5	5,8	4,4	9,4	23,8	134,1	11,2	3,5	33,5
1930	10,3	9,1	8,9	19,6	8,5	4,8	4,4	5,3	6,4	9,1	9,1	16,5	112,0	9,3	4,4	19,6
1931	10,1	12,3	14,9	8,0	6,6	5,1	3,7	3,7	7,6	9,4	10,6	8,9	100,9	8,4	3,7	14,9
1932	11,8	6,2	11,2	8,7	10,1	5,8	3,7	4,6	2,9	5,3	3,9	10,1	84,3	7,0	2,9	11,8
1933	10,3	5,8	8,0	7,6	6,6	5,8	4,6	2,9	6,8	8,0	7,1	10,3	83,8	7,0	2,9	10,3

TABLE A-8 (cont.)

Year	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total	Average	Minim.	Maxim.
1934	16,2	17,2	14,9	8,7	7,4	5,3	6,0	5,3	6,6	5,5	5,5	20,1	118,7	9,9	5,3	20,1
1935	10,1	24,7	11,2	9,1	5,3	5,1	4,1	4,4	9,4	10,3	6,8	6,0	106,5	8,9	4,1	24,7
1936	8,0	7,1	16,4	7,1	5,3	3,9	2,7	3,5	6,2	5,8	6,0	8,7	80,7	6,7	2,7	16,4
1937	15,1	9,6	6,2	9,1	12,1	6,6	3,9	3,9	2,7	6,8	11,6	10,8	98,4	8,2	2,7	15,1
1938	9,1	22,7	10,1	9,8	6,8	13,7	5,8	8,7	7,6	10,3	9,1	9,1	122,8	10,2	5,8	22,7
1939	12,1	6,4	6,8	9,6	5,8	3,9	3,9	2,7	4,8	3,5	5,8	6,8	72,1	6,0	2,7	12,1
1940	12,0	14,1	12,0	10,4	8,6	4,1	3,3	2,8	3,7	7,3	6,0	9,6	93,9	7,8	2,8	14,1
1941	8,4	6,2	10,2	4,1	4,0	2,5	4,8	3,5	7,4	7,5	12,2	12,6	83,4	6,9	2,5	12,6
1942	7,9	32,5	10,4	13,2	4,9	5,6	7,3	4,2	3,8	5,4	5,6	11,5	112,3	9,4	3,8	32,5
1943	8,3	9,4	4,4	4,1	3,5	5,5	2,7	6,0	4,9	9,9	7,4	9,5	75,6	6,3	2,7	9,9
1944	9,2	30,5	16,9	15,0	9,4	7,1	7,9	5,1	5,1	5,0	13,5	11,1	135,8	11,3	5,0	30,5
1945	17,0	18,0	11,8	9,0	6,7	10,7	8,4	4,2	6,3	4,9	4,1	6,5	107,6	9,0	4,1	18,0
1946	12,0	7,3	17,8	5,0	3,9	3,3	2,0	2,8	4,1	12,8	11,5	5,6	88,1	7,3	2,0	17,8
1947	11,1	11,8	7,4	5,4	5,1	6,1	3,6	4,4	5,8	5,5	5,6	11,6	83,7	7,0	3,6	11,8
1948	5,6	6,3	10,3	8,0	5,5	3,4	3,5	4,6	5,9	4,9	10,8	7,0	75,8	6,3	3,4	10,8
1949	13,4	14,9	10,0	10,8	6,0	5,6	7,4	6,5	9,0	9,0	8,9	14,9	116,4	9,7	5,6	14,9
1950	11,3	14,7	15,0	18,5	8,9	5,6	4,2	3,8	4,6	7,9	8,9	9,7	113,1	9,4	3,8	18,5
1951	14,4	11,8	10,3	10,0	4,6	3,8	3,5	3,0	3,2	7,2	7,3	15,8	94,9	7,9	3,0	15,8
1952	8,3	12,5	11,8	5,0	9,1	8,5	8,3	3,8	6,3	6,5	8,6	4,6	93,3	7,8	3,8	12,5
1953	4,5	8,2	5,6	7,3	7,4	4,9	3,3	5,0	4,7	3,8	6,6	5,6	66,9	5,6	3,3	8,2
1954	4,7	6,1	8,5	9,0	8,4	3,6	2,9	3,3	3,6	8,2	2,7	2,8	63,8	5,3	2,7	9,0
1955	8,0	4,8	4,6	3,8	2,8	3,7	3,0	3,6	2,8	3,6	7,9	8,0	56,6	4,7	2,8	8,0
1956	5,0	7,7	32,5	5,5	6,4	7,2	3,9	8,9	3,4	7,2	7,6	7,8	103,1	8,6	3,4	32,5

TABLE A-8 (cont.)

Year	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total	Average	Minim.	Maxim.
1957	8,6	6,8	11,8	10,9	5,1	3,5	5,6	5,8	11,2	8,7	9,0	7,8	94,8	7,9	3,5	11,8
1958	6,0	3,7	16,1	9,9	10,6	5,8	3,3	2,8	4,6	8,3	9,0	14,1	94,2	7,9	2,8	16,1
1959	9,5	13,0	7,4	4,6	4,6	2,6	2,2	3,2	3,6	2,6	4,7	8,0	66,0	5,5	2,2	13,0
1960	7,6	10,8	5,5	4,7	5,5	2,7	2,7	3,7	4,0	8,4	4,4	9,8	69,8	5,8	2,7	10,8
1961	13,8	19,0	19,8	7,9	5,5	3,9	3,4	2,1	3,2	3,2	4,5	10,1	96,4	8,0	2,1	19,8
1962	17,0	9,1	19,6	5,0	4,1	4,7	2,7	2,9	6,1	10,9	6,7	10,4	99,2	8,3	2,7	19,6
1963	9,4	10,7	4,8	3,5	3,4	2,7	2,1	2,0	0,6	3,3	4,0	4,2	50,7	4,2	0,6	10,7
1964	2,9	4,6	4,7	3,7	3,9	2,8	2,3	2,1	3,6	3,0	6,1	6,6	46,2	3,9	2,1	6,6
1965	9,2	7,5	6,7	12,2	7,4	2,8	4,8	2,4	3,5	7,5	6,0	9,4	79,4	6,6	2,4	12,2
Average	10,2	12,0	11,8	8,1	6,1	4,8	4,0	3,9	4,8	6,2	7,3	9,1		7,4		
Mínim.	2,9	2,3	1,6	2,2	1,6	1,8	2,0	1,4	0,6	2,2	2,7	2,7				
Máxim.	21,5	33,5	36,2	19,6	12,1	13,7	8,4	11,4	11,2	12,8	13,5	23,8				

Appendix - B

Route Selection Study of São Lourenço Reversible Power Station

B-1 Introduction

B-2 General Assumptions

B-3 Selections of the Site

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- Figure B-4 São Lourenço Power Station (Alt.2) Longitudinal section and cross sections.
- Figure B-5 São Lourenço Power Station (Alt.2) Power house and transformer room plant.
- Figure B-6 São Lourenço Power Station (Alt.2) Power house and transformer room cross section

B-1. INTRODUCTION

This report was prepared during march 06th to 30th by the engineers of DAEE, with the technical cooperation of the specialized civil engineer Mr. Terumi Ushijima, dispatched from Electric Power Development Co., through, the JICA - Japan International Cooperation Agency, in order to introduce DAEE the best site for the São Lourenço Reversible Power Station, after considering alternative analysis, and a general view of several aspects mentioned on the report named "Plano Director de Obras - Aproveitamento dos recursos hídricos da bacias dos rios Juquiã-São Lourenço - Consórcio hídricos da bacias dos rios Juquiã-São Lourenço - Consórcio Hidroconsult - Engenharia etc-Relatório JUQ/RE - 012-12/81", submitted to DAEE on march 1982.

B-2. GENERAL ASSUMPTIONS

For the purpose of this report the bellow assumptions, which are adopted by the "Consórcio", are followed to study alternatives;

. Upper Reservoir

Normal water level	711.00 m
Low water level	709.00 m
Effective volume	$20 \times 10^6 \text{ m}^3$

. Lower Reservoir

Normal water level	147.00 m
Low water level	141.40 m
Effective volume	$20 \times 10^6 \text{ m}^3$

. Generation Plan

. Gross head	565.20 m
Number of Units	12
Number of main tunnels	3
Power house	Underground
Total Output	3,840 MW

B-3. SELECTION OF THE SITE

After analysis of the topographical and geological informations, the locations of upper and lower reservoirs and existing path, four alternatives are selected as shown in figures 01 and 02.

These figures also shows the site selected by the "Consórcio" and the site analysed by DAEE in first report "Plano Preliminar de Obras" on 1980.

Cost evaluations for the comparison of each alternative are provided and the results show that the alternative 1 is the most economical with the total cost about $\text{US\$}116.22 \times 10^6$. However, the alternative 2 with $\text{US\$} 116.63 \times 10^6$ is selected for the lay-out and more detailed studies, considering the following points:

- . Topographical and geological conditions along the power structures and access conditions are judged to be better than the alternative 1.
- . Alternative 1 will probably have operation and maintenance troubles, because the location of outlet is close too much to the backwater of lower reservoir so that it is feared that sedimented material will be deposited around the outlet structure.
- . Cost differences between alternatives 1 and 2 are negligible such as 0.4×10^6 US\$ or 0.4%.

Main characteristics and the costs of these 4 alternatives are given in the following tables 1 and 2, assuming only one tunnel for 4 units and the following structures and costs such as intake, outlet, powerhouse, transformer room and switchyard are neglected because they are considered to be nearly same among these alternatives.

B-4. GENERAL DESCRIPTION OF LAY-OUT

As mentioned above, the lay-out of the alternative 2 considering topographical and geological conditions is prepared for the purpose of comparison with the lay-out of "Plano Director de Obras" report submitted to DAEE, and the main characteristics such as installed capacity, number of tunnels and units, and reservoir water levels, are adopted similarly.

However, several computations and considerations are performed in order to determine the dimensions of main structures:

- Relations and stabilities of each structure;
- Hydraulic phenomena such as water hammer and surging oscillations, inflow and outflow velocities and so on;

- Total loss head and effective head;
- Economical diameter of the tunnel and the penstock;
- Steel lining thickness of penstock considering transferring rate to rock of internal pressure;
- Branch point dimensions and steel weight estimations;
- Dimensions and type selections of gates and screens and their weight estimations;
- Mortar injection, grouting and rock bolt estimations;
- Excavation and concrete volumes and reinforcement weight evaluations of each structure.

Figures 3,4,5 and 6, show the developed lay-out of São Lourenço Reversible Power Station, and the following tables B-3 and B-4 summarize the main dimensions and characteristics.

TABLE B-1 MAIN CHARACTERISTICS OF ALTERNATIVES STUDIED

Item	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1. HEADRACE TUNNEL				
Length (m)	157	757	1239	1100
Diameter (m)	7.7	7.8	7.8	7.8
Excavation (m ³)	10,400	51,000	83,700	74,400
Concrete (m ³)	3,100	15,000	24,500	21,800
2. PENSTOCK				
Length (m)	1,271	1,306	1,450	1,403
Diameter (m)	2.7 - 7.7	2.7 - 7.8	2.7 - 7.8	2.7 - 7.8
Excavation (m ³)	57,800	60,200	64,500	64,500
Concrete (m ³)	23,400	24,000	25,700	25,700
3. TAILRACE TUNNEL				
Length (m)	2,229	2,180	2,354	2,354
Diameter (m)	7.7	7.8	7.8	7.8
Excavation (m ³)	147,400	151,000	159,000	159,000
Concrete (m ³)	43,600	43,000	46,600	46,600
4. HEADRACE SURGE TANK				
Height (m)	-	147	134	134
Diameter (m)	-	15	20	18
Excavation (m ³)	-	35,000	46,500	34,900
Concrete (m ³)	-	14,000	14,650	13,700
5. TAILRACE SURGE TANK				
Height (m)	64	64	71	71
Diameter (m)	15	15	15	15
Excavation (m ³)	53,700	49,000	57,500	57,500
Concrete (m ³)	13,000	14,000	13,800	13,800
6. CHANNEL				
Length (m)	1,500	115	90	110
Common excavation (m ³)	233,800	12,000	29,700	8,000
Rock excavation (m ³)	701,400	-	-	-
7. STEEL LINING (Penstock)				
normal steel thickness (mm)	18 - 31	18 - 30	18 - 27	18 - 27

Item	Alt. 1	Alt. 2	Alt. 3	Alt. 4
special steel thickness (mm)	22 - 28	24 - 34	25 - 34	25 - 34
total weight of steel (ton)	6,500	6,600	6,900	7,000
8. ACCESS				
Main roads pavement (m)	4,830	4,330	4,230	4,230
Main road bridge (mm)	330	200	200	200
Sub road pavement (m)	2,600	2,600	2,500	2,500
Sub road unpaviment (m)	1,100	2,600	2,650	2,650
Access tunnel (m)	790	680	1,030	1,030

Note: a) The structures of intake, outlet, switchyard, powerhouse and transformer room are not included for comparison effects.

b) Main physical characteristics of alternatives are one tunnel for four units.

TABLE B-2 COST ESTIMATION OF ALTERNATIVES STUDIED

Item	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1. HEADRACE TUNNEL	2.21	10.71	17.50	16.64
2. PENSTOCK	10.00	10.15	10.80	10.80
3. TAILRACE TUNNEL	30.55	31.47	32.69	32.69
4. HEADRACE SURGE TANK	-	7.50	8.56	6.93
5. TAILRACE SURGE TANK	6.44	6.77	6.94	6.94
6. CHANNEL	12.84	0.04	0.10	0.03
7. STEEL LINING	24.17	24.70	25.90	26.24
8. ACCESS	30.01	25.29	32.08	32.08
TOTAL (10 ⁶ US\$)	116.22	116.63	134.57	132.35

Note: a) Costs are estimated to one tunnel for four units.

b) Costs of intake, outlet, switchyard, powerhouse and transformer room are not included for comparison effects.

TABLE B-3 MAIN DIMENSIONS AND CHARACTERISTICS OF SAO LOURENCO
REVERSIBLE POWER STATION

Description	Unit	Dimensions
1. RESERVOIRS		
. Upper Reservoir (LH3)		
- Normal water level	m	711.0
- Low water level	m	709.0
- Effective volume	10^6 m^3	20
. Lower Reservoir (LH2)		
- Normal water level	m	147.0
- Low water level	m	141.4
- Effective volume	10^6 m^3	20
2. GENERATION PLAN		
. Gross head	m	565.2
. Effective head	m	525.0
. Number of units	-	12
. Output capacity per unit	MW	320
. Maximum output	MW	3,840
. Unit discharge	m^3/s	75.5
. Maximum discharge	m^3/s	906
3. STRUCTURES		
. Intake		
- Type	-	Horizontal type
- Screen quantity	-	6
- Screen (HXB)	m	20 x 9
- Gate type	-	Roller type with stop-log
- Gate quantity	-	3
- Gate (HXB)	m	8 x 8
. Outlet		
- Type	-	Horizontal type
- Screen quantity	-	6
- Screen (HXB)	m	20 x 9
- Gate type	-	Roller type with stop-log
- Gate quantity	-	3
- Gate (HXB)	m	8 x 8

Description	Unit	Dimensions
. Headrace tunnel		
- Type	-	pressure type
- Length	m	742
- Diameter	m	3 x 8.0
. Penstock		
- Type	-	embedded type
- Length	m	1,228
- Diameter	m	3 x 7.70 - 6 x 2.80
. Draft tunnel		
- Type	-	steel lining type
- Length	m	-170
- Diameter	m	12 x 4.0 - 6 x 5.7
. Tailrace tunnel		
- Type	-	pressure type
- Length	m	2,020
- Diameter	m	3 x 8.0
. Headrace Surge Tank		
- Type	-	port type with chamber
- Shaft (HXD)	m	85 x 7.5
- Chamber (HXD)	m	37.5 x 10
. Tailrace Surge Tank		
- Type	-	port type with chamber
- Shaft (HXD)	m	17 x 8
- Chamber (HXD)	m	47 x 15
. Power house		
- Type	-	underground
- H X B X L	m	45 x 25 x 370
. Transformer room		
- Type	-	underground
- H X B X L	m	15 x 15 x 315
. Switchyard		
- Type	-	normal open type
- Area	m ²	18,000

TABLE B-4 - SUMMARY OF MAIN QUANTITIES

Description	Excavation (m ³)			concrete (m ³)	shotcrete (m ²)	steel lining(t)
	common	rock	underground			
INTAKE STRUCTURE	255,000	38,000	30,400	40,000	-	-
OUTLET STRUCTURE	570,000	558,000	23,400	85,800	-	-
HEAD RACE TUNNEL	-	-	161,000	46,000	-	-
PENSTOCK	-	-	239,000	112,000	-	24,000
DRAFT TUNNEL AND TAILRACE TUNNEL	-	-	517,000	167,500	-	6,100
POWER HOUSE AND TRANSFORMER ROOM	-	-	494,000	141,600	-	-
HEAD RACE SURGE TANK	92,000	31,000	29,300	25,700	-	900
TAILRACE SURGE TANK	-	-	62,200	29,600	-	1,500
CABLE AND VENTILATION TUNNEL	-	-	51,000	13,600	-	-
SWITCHYARD	219,000	235,000	-	45,500	-	-
ACCESS TUNNEL TO (WATERWAYS INCLUDED)	2,350	1,750	120,300	10,080	11,300	-
TOTAL	1,138,350	863,750	1,727,800	717,380	11,300	32,500