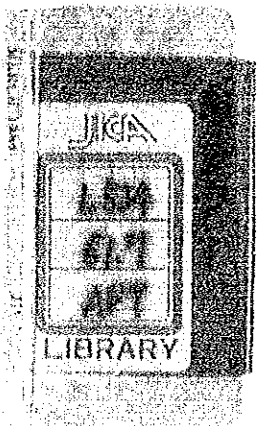


FINAL REPORT
FOR
THE FEASIBILITY STUDY ON MEDIUM SIZE DAMS
IN
MASVINGO PROVINCE IN THE REPUBLIC OF ZIMBABWE

DRAWING OF FEASIBILITY REPORT

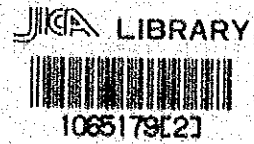
MARCH 1988

JAPAN INTERNATIONAL COOPERATION AGENCY



FINAL REPORT
FOR
THE FEASIBILITY STUDY ON MEDIUM SIZE DAMS
IN
MASVINGO PROVINCE IN THE REPUBLIC OF ZIMBABWE

DRAWING OF FEASIBILITY REPORT



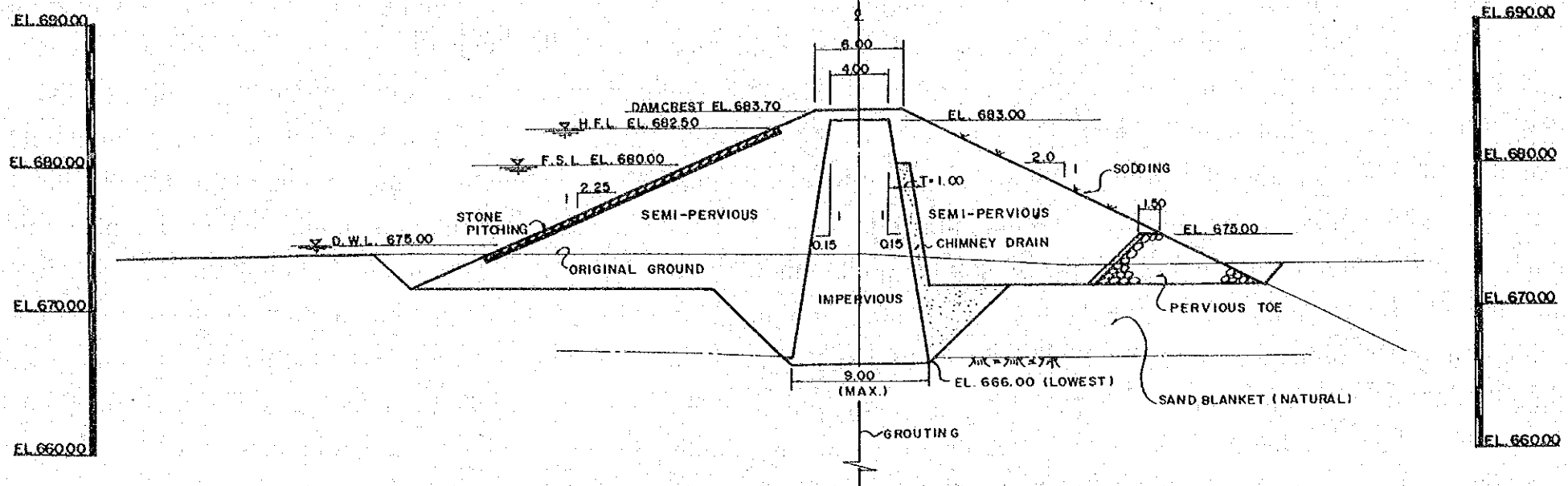
MARCH 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

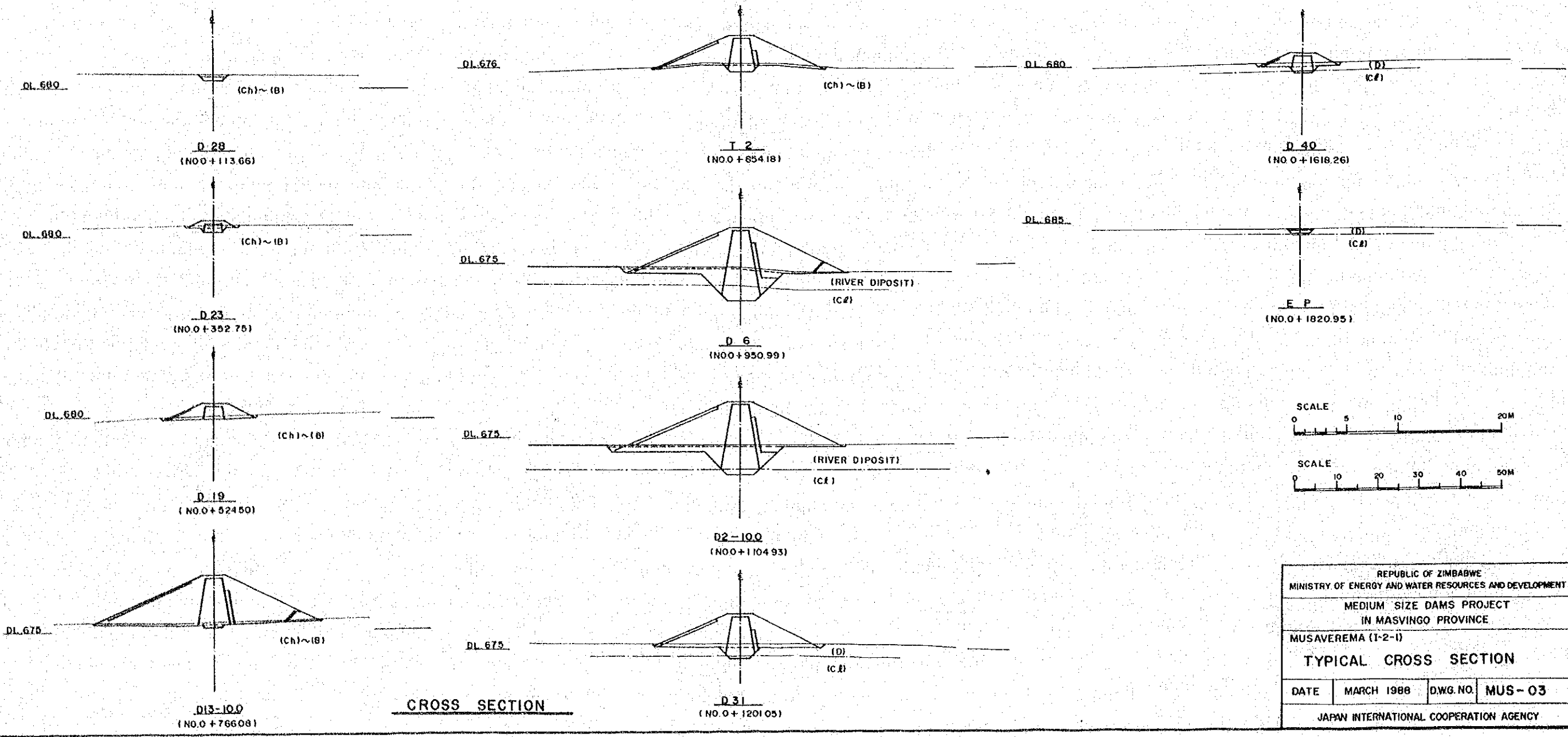
国際協力事業団	
受入 月日	'88. 5. 6
登録 No.	17526
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LIST OF DRAWINGS

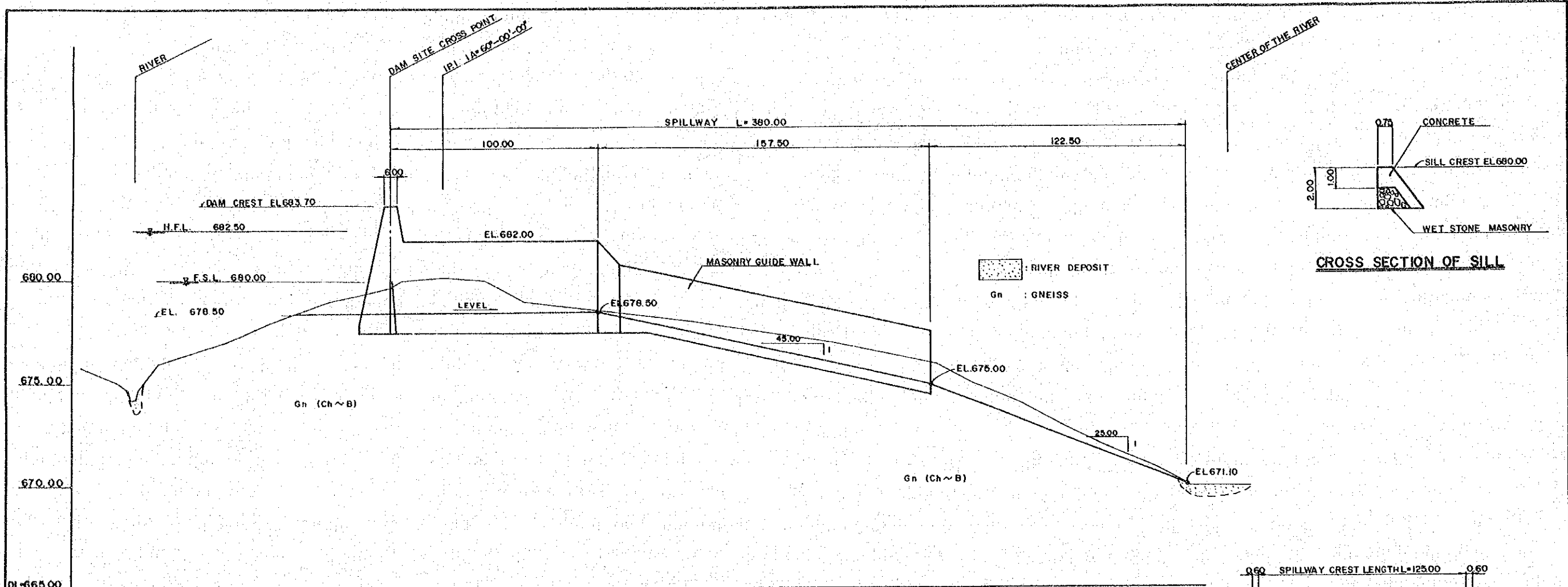
<u>NAME OF PROJECT</u>	<u>DRAWING No.</u>	<u>TITLE</u>	<u>NAME OF PROJECT</u>	<u>DRAWING NO.</u>	<u>TITLE</u>
MUSAVEREMA	MUS - 01	PLAN OF DAM	MAGUDU	MAG - 01	PLAN OF DAM
	- 02	LONGITUDINAL SECTION OF DAM		- 02	LONGITUDINAL SECTION OF DAM
	- 03	TYPICAL CROSS SECTION		- 03	TYPICAL CROSS SECTION
	- 04	SPILLWAY AND OUTLET		- 04	SPILLWAY AND OUTLET
	- 05	CONVEYANCE FACILITIES		- 05	CONVEYANCE FACILITIES
	- 06	GENERAL LAYOUT OF IN-FIELD FACILITIES		- 06	GENERAL LAYOUT OF IN-FIELD FACILITIES
CHINYAMATUMWA	CHI - 01	PLAN OF DAM	MABVUTE	MAB - 01	PLAN OF DAM
	- 02	LONGITUDINAL SECTION OF DAM		- 02	LONGITUDINAL SECTION OF DAM
	- 03	TYPICAL CROSS SECTION		- 03	TYPICAL CROSS SECTION
	- 04	SPILLWAY AND OUTLET		- 04	SPILLWAY AND OUTLET
	- 05	CONVEYANCE FACILITIES		- 05	CONVEYANCE FACILITIES
	- 06	GENERAL LAYOUT OF IN-FIELD FACILITIES		- 06	GENERAL LAYOUT OF IN-FIELD FACILITIES
MASHOKO	MAS - 01	PLAN OF DAM	GENERAL	GEN - 01	INTAKE AND OUTLET STRUCTURE
	- 02	LONGITUDINAL SECTION OF DAM		- 02	DETAILS OF OUTLET
	- 03	TYPICAL CROSS SECTION		- 03	RELATED STRUCTURES OF CONVEYAANCE FACILITIES
	- 04	SPILLWAY AND OUTLET		- 04	NIGHT STORAGE RESERVOIRS
	- 05	CONVEYANCE FACILITIES		- 05	TYPICAL IN-FIELD FACILITIES
	- 06	GENERAL LAYOUT OF IN-FIELD FACILITIES			
MUNJANGANJA	MUN - 01	PLAN OF DAM			
	- 02	LONGITUDINAL SECTION OF DAM			
	- 03	TYPICAL CROSS SECTION			
	- 04	SPILLWAY AND OUTLET			
	- 05	CONVEYANCE FACILITIES			
	- 06	GENERAL LAYOUT OF IN-FIELD FACILITIES			



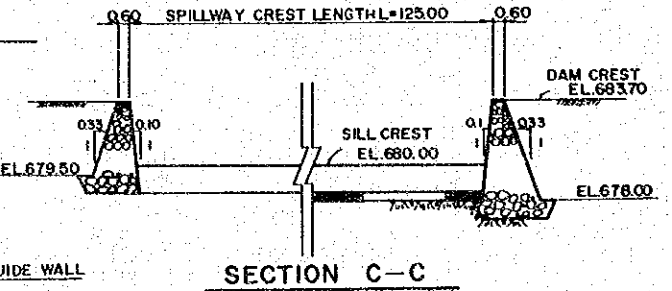
TYPICAL CROSS SECTION OF DAM



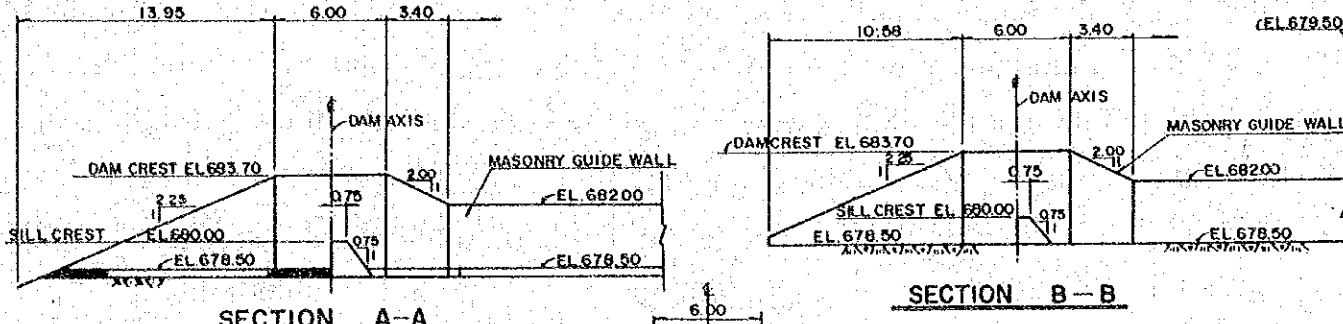
REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT IN MASVINGO PROVINCE			
MUSAVEREMA (I-2-I)			
TYPICAL CROSS SECTION			
DATE	MARCH 1988	D.W.G. NO.	MUS-03
JAPAN INTERNATIONAL COOPERATION AGENCY			



LONGITUDINAL SECTION OF SPILLWAY

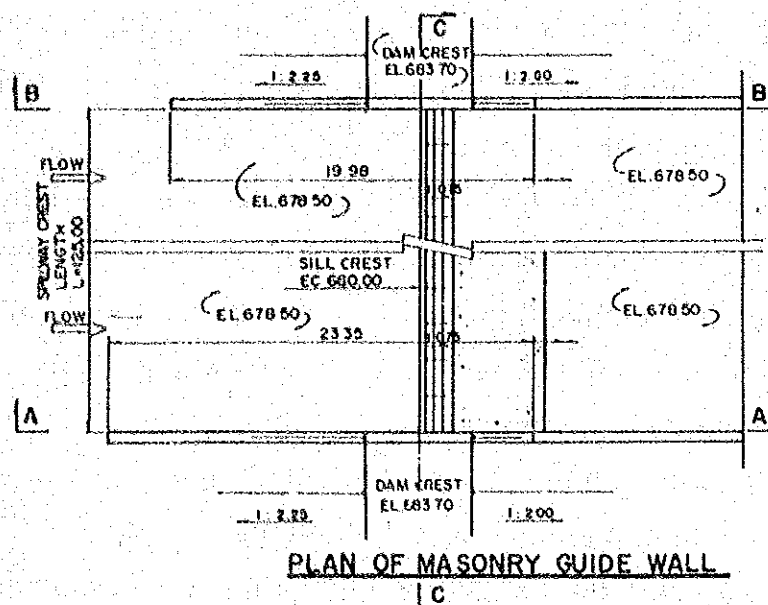


SECTION C-C

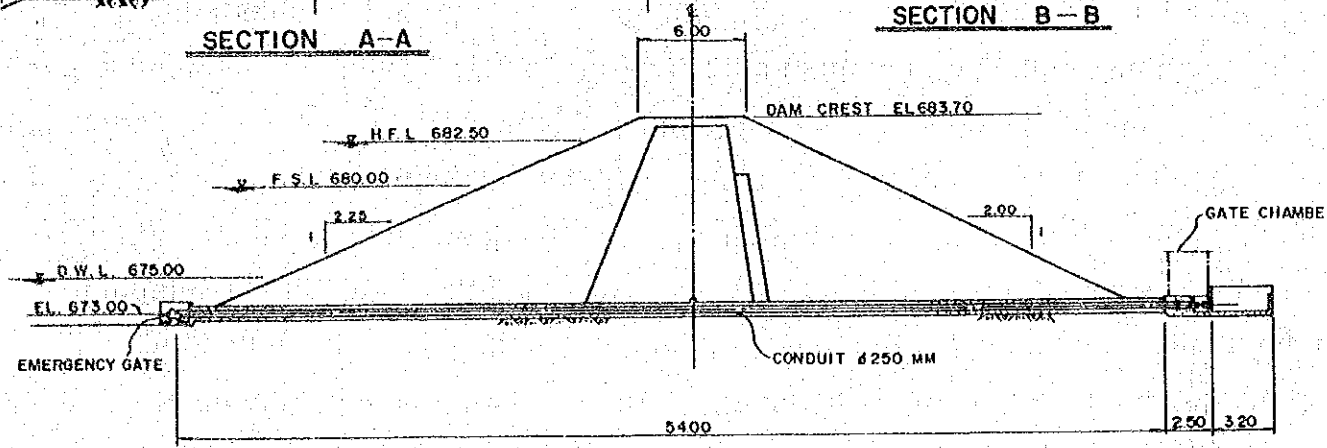


SECTION A-A

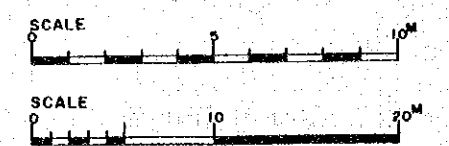
SECTION B-B



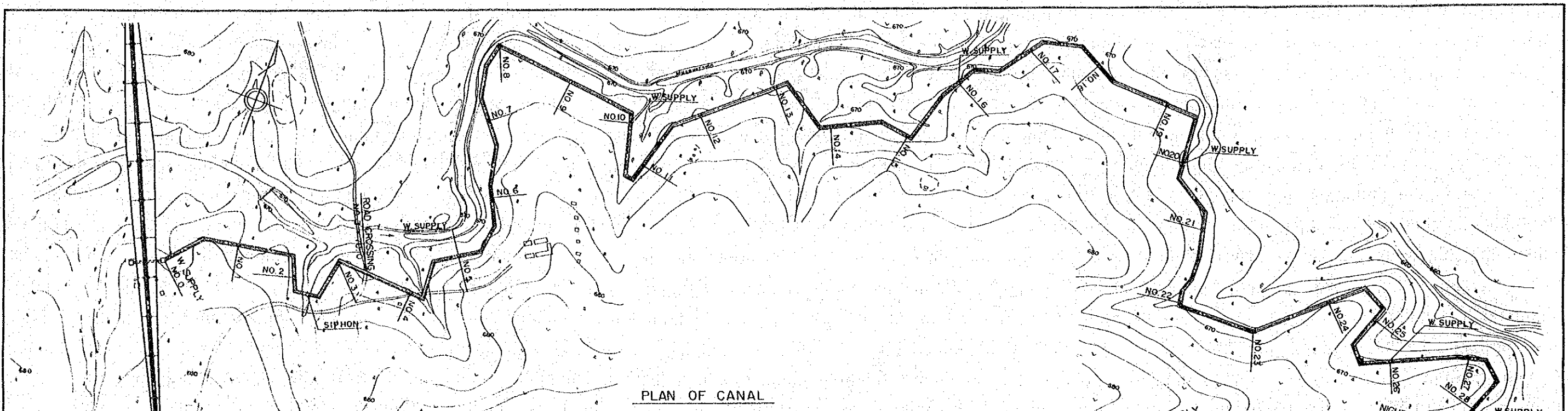
PLAN OF MASONRY GUIDE WALL



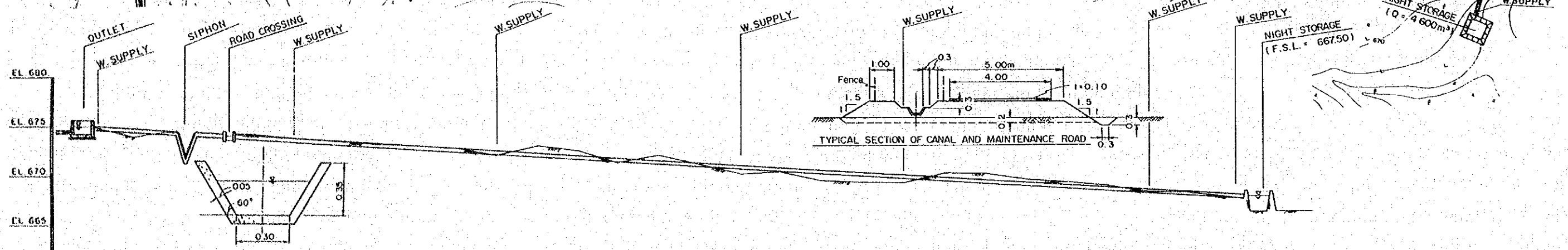
LONGITUDINAL SECTION OF OUTLET



REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MUSAVEREMA (I-2-1)			
SPILLWAY AND OUTLET			
DATE	MARCH 1988	DWG. NO.	MUS-04
JAPAN INTERNATIONAL COOPERATION AGENCY			



PLAN OF CANAL



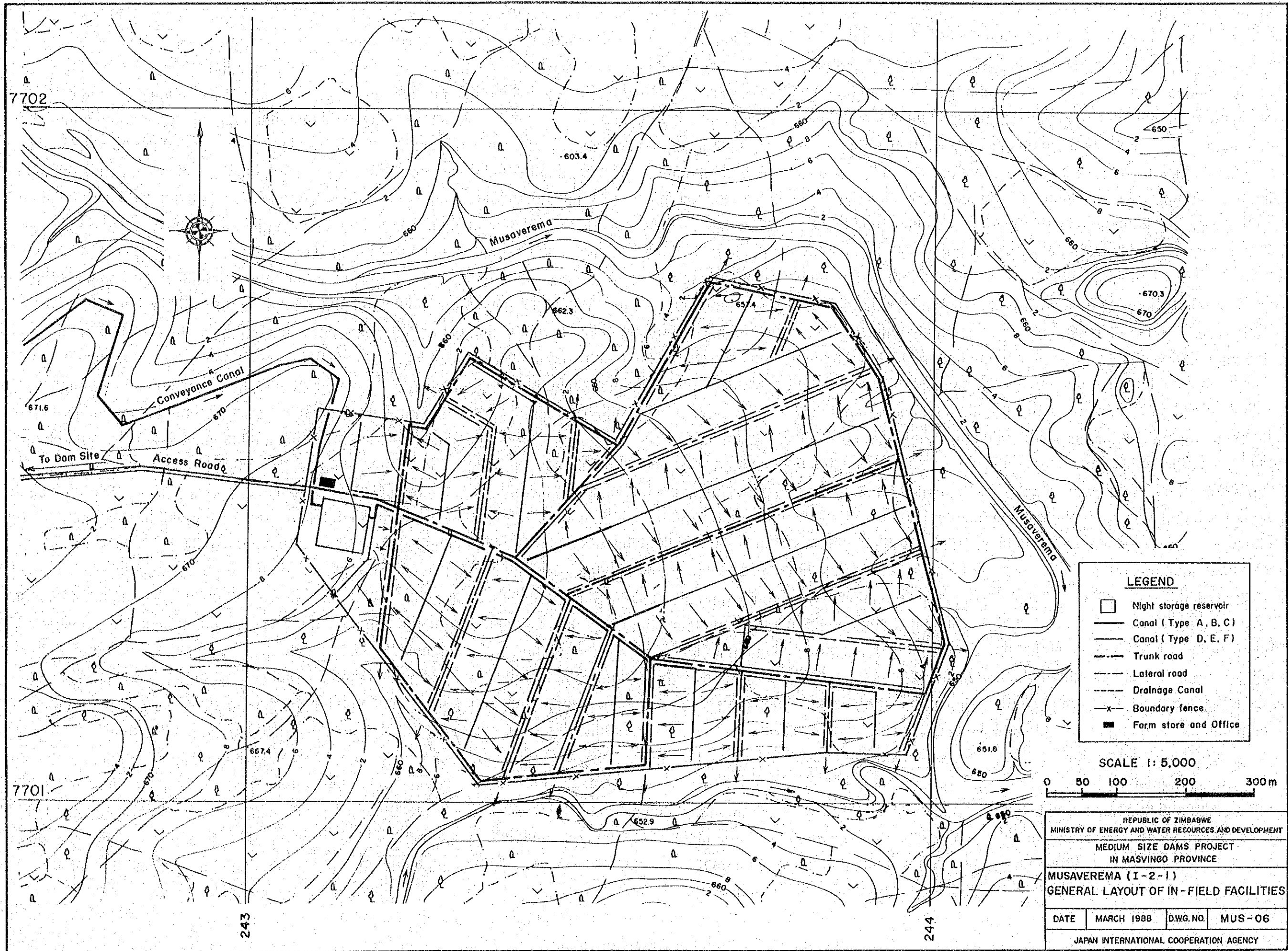
TYPICAL SECTION OF CANAL

STATION NO.	DISTANCE	MEASURED DISTANCE	GROUND ELEVATION	CANAL BOTTOM ELEVATION	WATER LEVEL	CANAL SLOPE
NO. 0	0.0	0.0	674.2	673.50	673.85	1:1000
NO. 1	200.0	200.0	673.2	673.40	673.65	1:1/1000
NO. 2	200.0	400.0	673.7	673.20	673.45	
+35.0	35.0	435.0	673.3	673.17	673.42	
+60.0	60.0	460.0	672.0	671.00	673.35	
+100.0	100.0	500.0	673.7	673.10	673.35	
+70.0	70.0	600.0	673.6	673.00	673.25	
NO. 3	100.0	670.0	674.6	672.93	673.18	
NO. 4	150.0	800.0	673.6	672.80	673.05	
NO. 5	200.0	1000.0	673.3	672.60	672.85	
NO. 6	200.0	1200.0	673.0	672.40	672.55	
NO. 7	200.0	1400.0	672.8	672.20	672.45	
NO. 8	200.0	1600.0	672.7	672.00	672.25	
NO. 9	200.0	1800.0	672.5	671.90	672.05	
NO. 10	200.0	2000.0	671.8	671.60	671.85	
NO. 11	200.0	2200.0	672.8	671.40	671.65	
NO. 12	200.0	2400.0	672.4	671.20	671.45	
NO. 13	200.0	2600.0	671.2	671.00	671.25	
NO. 14	200.0	2800.0	672.0	670.80	671.05	
NO. 15	200.0	3000.0	671.1	670.60	670.85	
NO. 16	200.0	3200.0	670.2	670.40	670.65	
NO. 17	200.0	3400.0	670.6	670.20	670.45	
NO. 18	200.0	3600.0	669.6	670.00	670.25	
NO. 19	200.0	3800.0	669.4	669.80	670.05	
NO. 20	200.0	4000.0	669.3	669.60	669.85	
NO. 21	200.0	4200.0	670.3	669.40	669.65	
NO. 22	200.0	4400.0	670.3	669.20	669.45	
NO. 23	200.0	4600.0	669.6	669.00	669.25	
NO. 24	200.0	4800.0	669.3	668.90	669.05	
NO. 25	200.0	5000.0	669.0	668.60	668.85	
NO. 26	200.0	5200.0	668.3	668.40	668.65	
NO. 27	200.0	5400.0	668.1	668.20	668.45	
NO. 28	200.0	5600.0	667.7	668.00	668.25	
+30.00	30.0	5630.0	667.5	667.97	668.22	

LONGITUDINAL SECTION OF CANAL

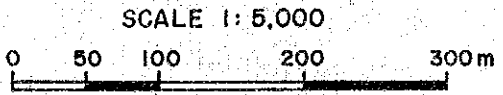
REPUBLIC OF ZIMBABWE
 MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT
 MEDIUM SIZE DAMS PROJECT
 IN MASVINGO PROVINCE
 MUSAVEREMA (1-2-1)
 CONVEYANCE FACILITIES

DATE: MARCH 1988 DWG. NO.: MUS - 05
 JAPAN INTERNATIONAL COOPERATION AGENCY

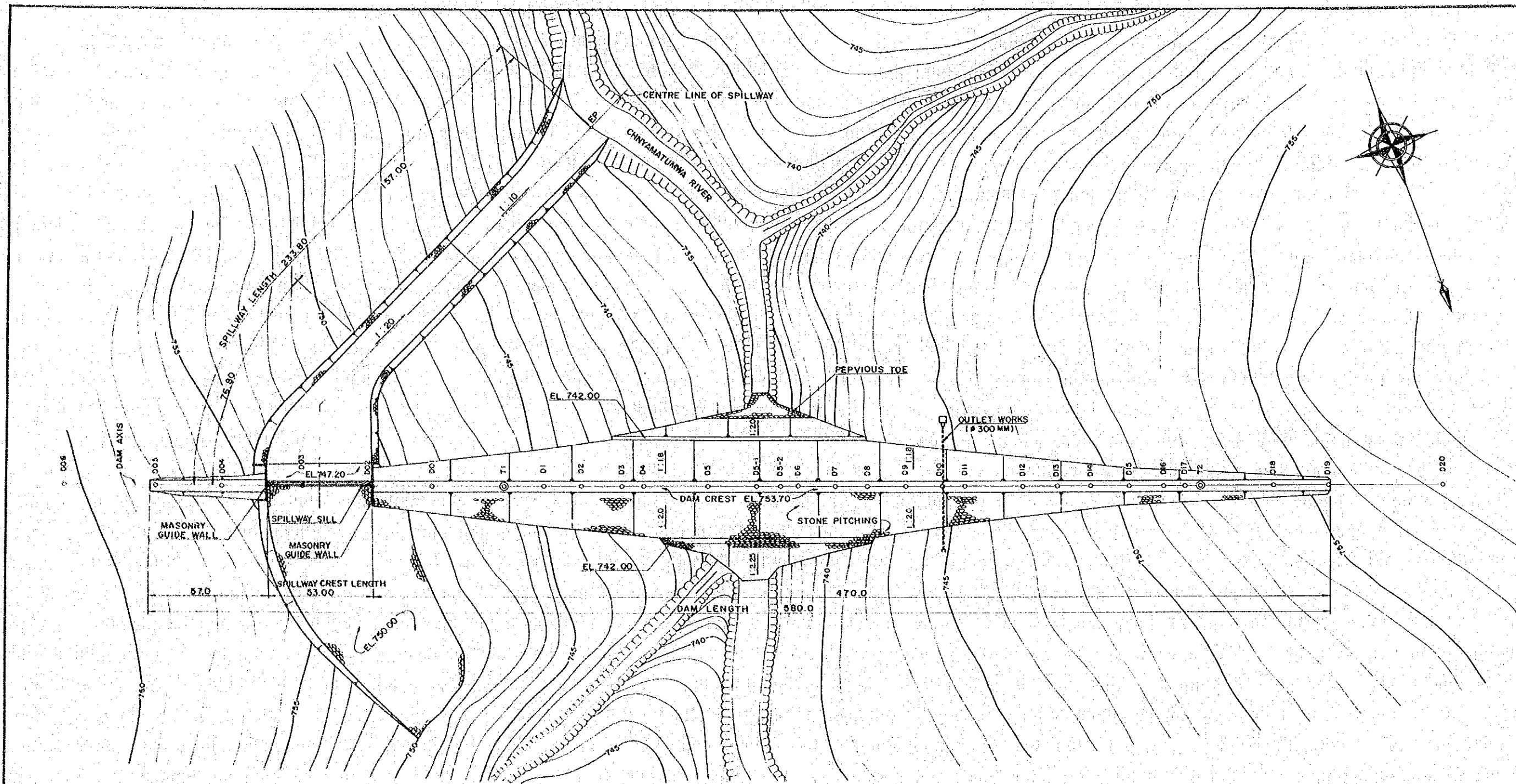


LEGEND

- Night storage reservoir
- Canal (Type A, B, C)
- Canal (Type D, E, F)
- Trunk road
- Lateral road
- Drainage Canal
- x- Boundary fence
- Farm store and Office

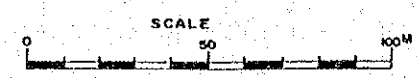


REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MUSAVEREMA (I-2-1)			
GENERAL LAYOUT OF IN-FIELD FACILITIES			
DATE	MARCH 1988	DWG. NO.	MUS-06
JAPAN INTERNATIONAL COOPERATION AGENCY			

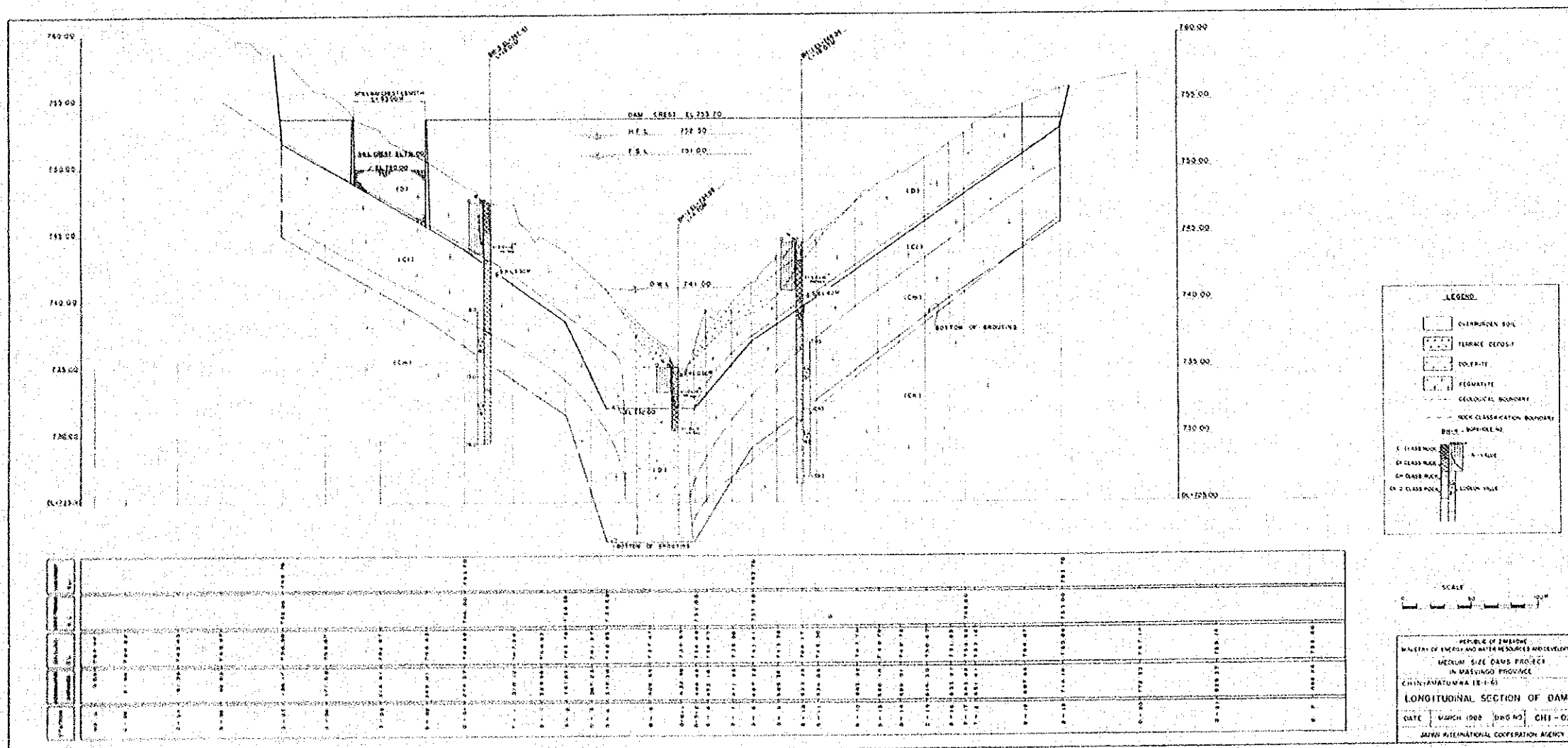


PLAN OF CHINYAMATUMWA DAM (II-1-6)

DAM DIMENSION		
CATCHMENT AREA	16.4	KM ²
GROSS STORAGE CAPACITY	2.338	MCM
FULL SUPPLY CAPACITY	2.255	MCM
TOTAL VOLUME OF SEDIMENT	0.083	MCM
HIGH FLOOD LEVEL	752.5	M
FULL SUPPLY LEVEL	751.0	M
DEAD WATER LEVEL	741.0	M
DAM TYPE	ZONE TYPE FILL DAM	
DAM HEIGHT	18.8	M
DAM LENGTH	580.0	M
DAM CREST ELEVATION	753.7	M
EMBANKMENT VOLUME	166100.0	M ³
DESIGN FLOOD DISCHARGE	163.0	M ³ /SEC
DESIGN SPILLWAY CAPACITY	163.0	M ³ /SEC
SPILLWAY TYPE	NON-GATED OVER FLOW TYPE	
OVERFLOW DEPTH	1.5	M
SPILLWAY CREST LENGTH	53.0	M
INTAKE CAPACITY	74.0	L/SEC

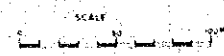


REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
CHINYAMATUMWA (II-1-6)			
PLAN OF DAM			
DATE	MARCH 1988	DWG. NO.	CHI-01
JAPAN INTERNATIONAL COOPERATION AGENCY			

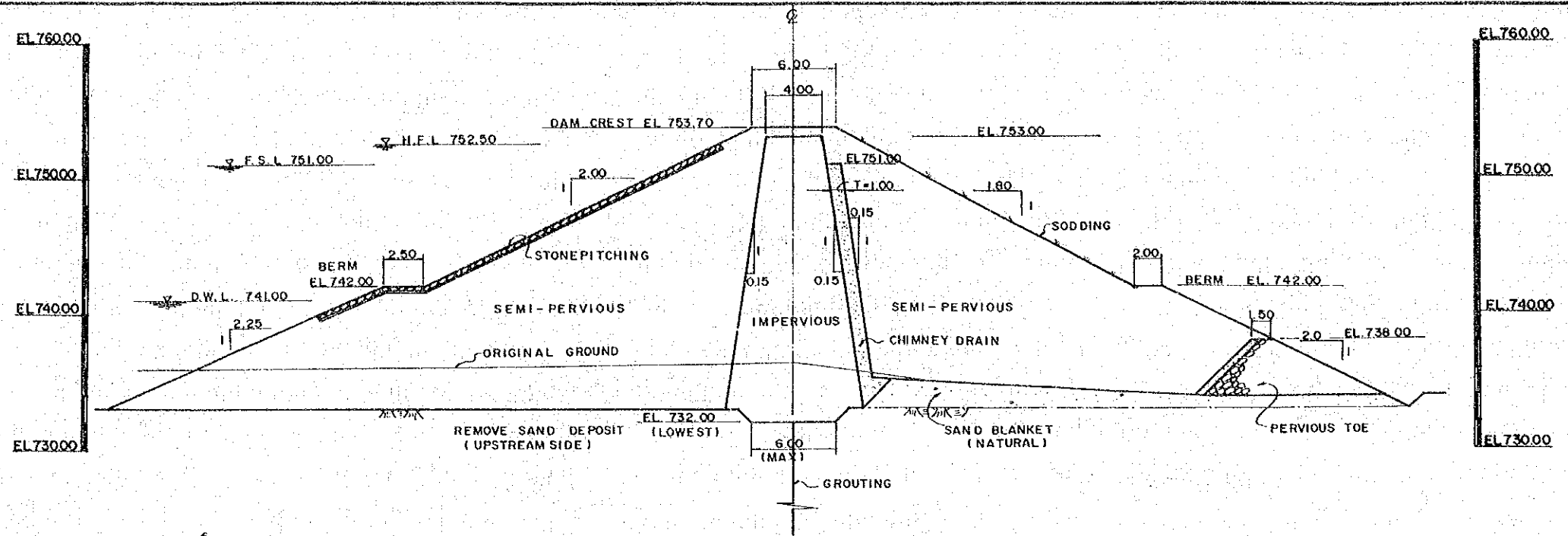


LEGEND

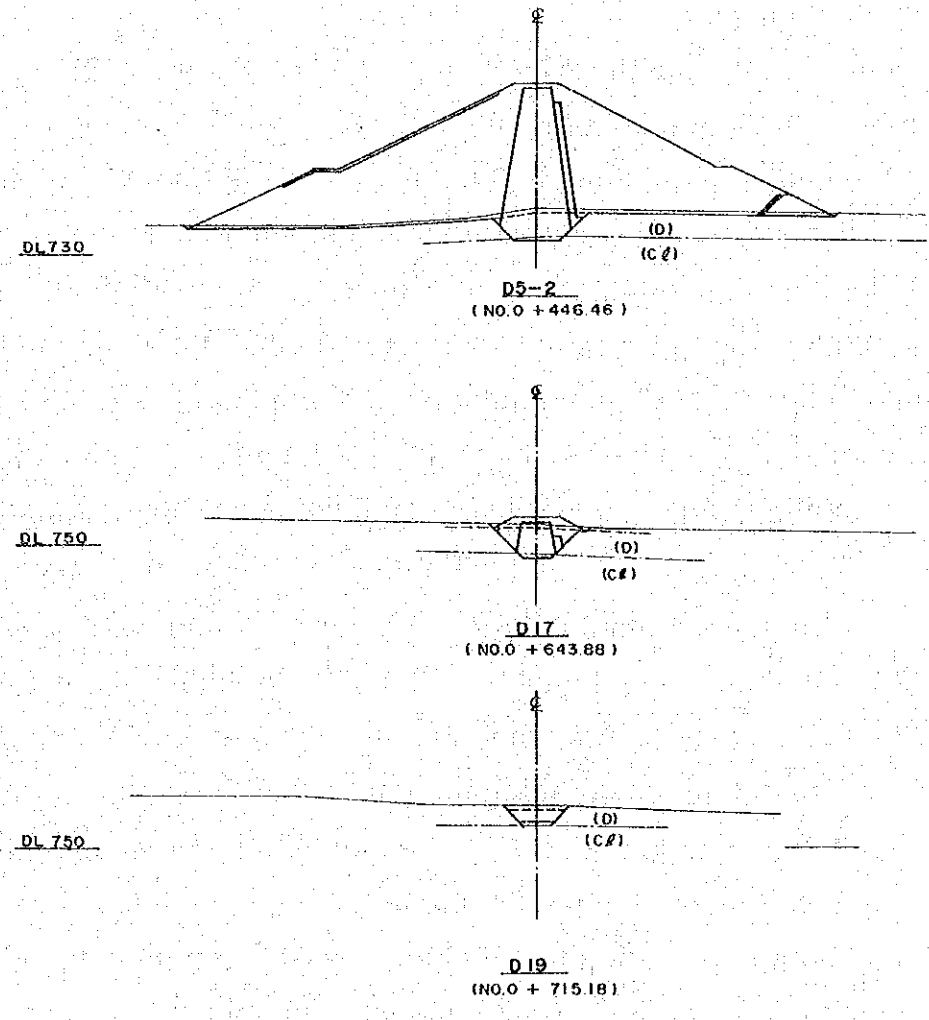
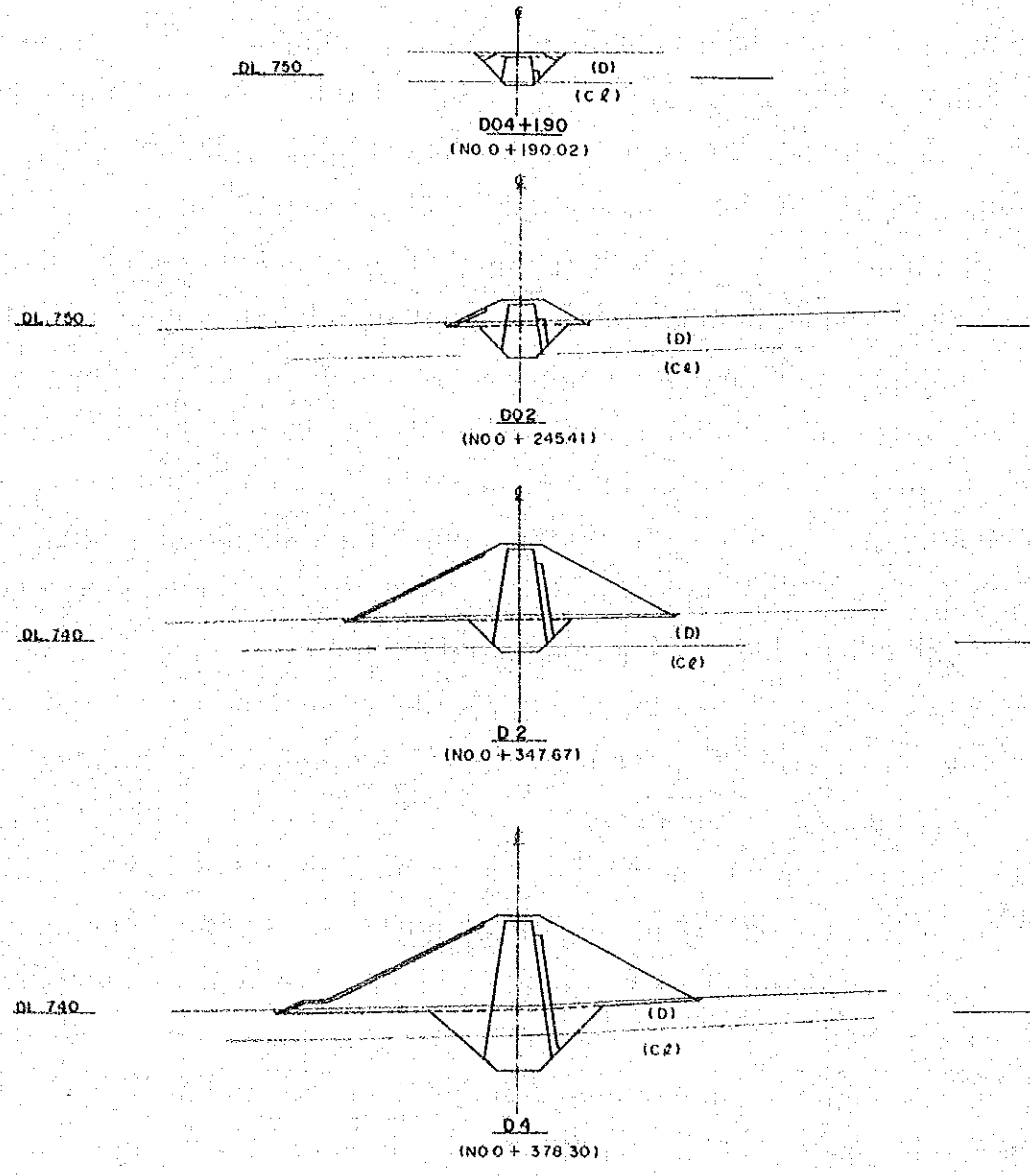
- OVERBURDEN SOIL
- TERRACE DEPOSIT
- VOLCANIC
- PEGMATITE
- GEOLOGICAL BOUNDARY
- ROCK CLASSIFICATION BOUNDARY
- SOIL - SAMPLE NO.
- CLASS NO. OF CLASS NO. OF CLASS NO. OF 2 CLASS NO.
- LITTER NO.



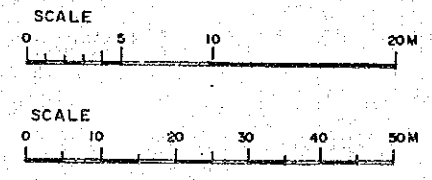
REPUBLIC OF PHILIPPINES
 DEPARTMENT OF ENERGY AND WATER RESOURCES DEVELOPMENT
 MEDIUM SIZE DAMS PROJECT
 CHINAMPATUNGA (E-1-6)
LONGITUDINAL SECTION OF DAM
 DATE: MARCH 1988 DRG NO: CHI-02
 JAPAN INTERNATIONAL COOPERATION AGENCY



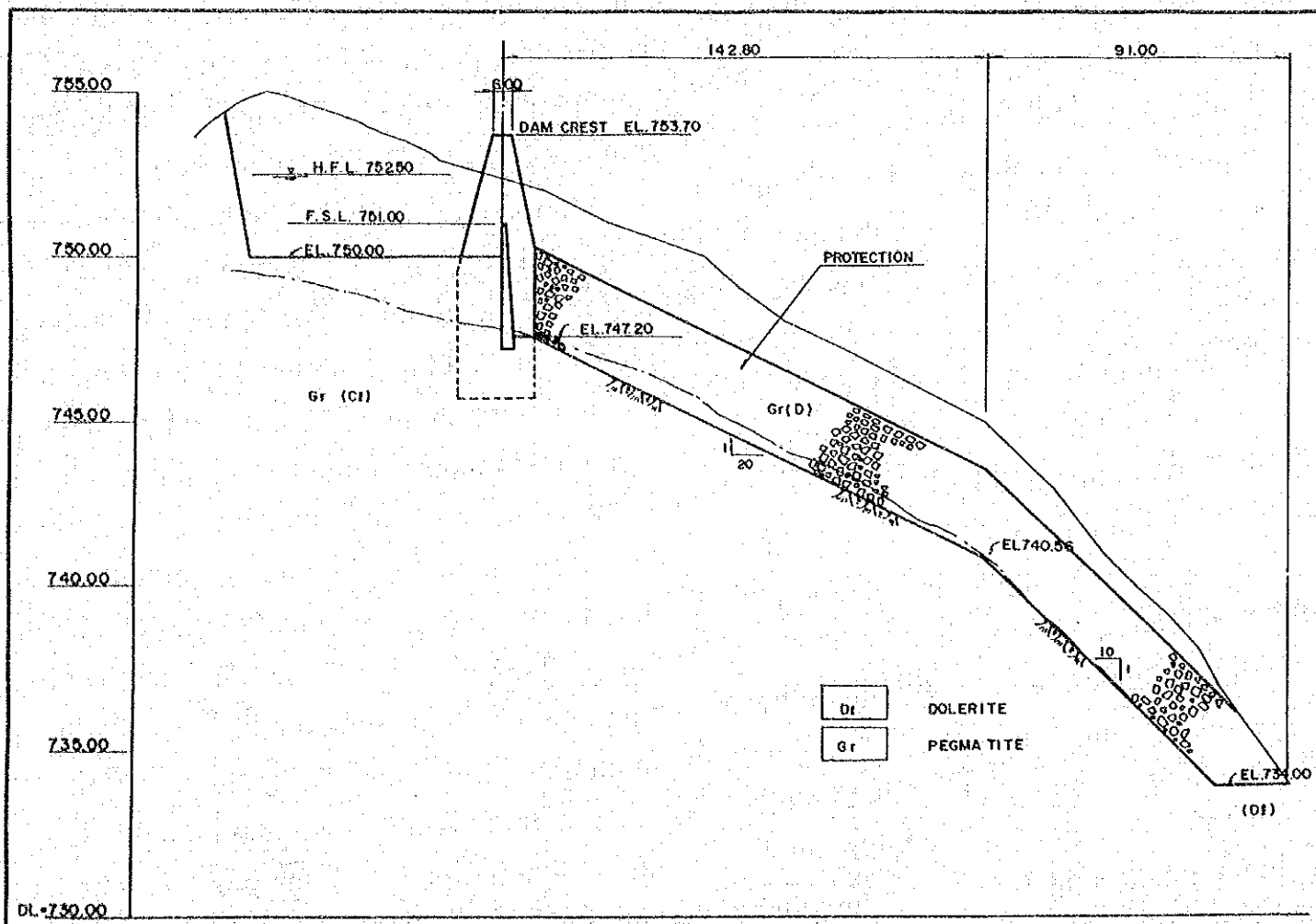
TYPICAL CROSS SECTION OF DAM



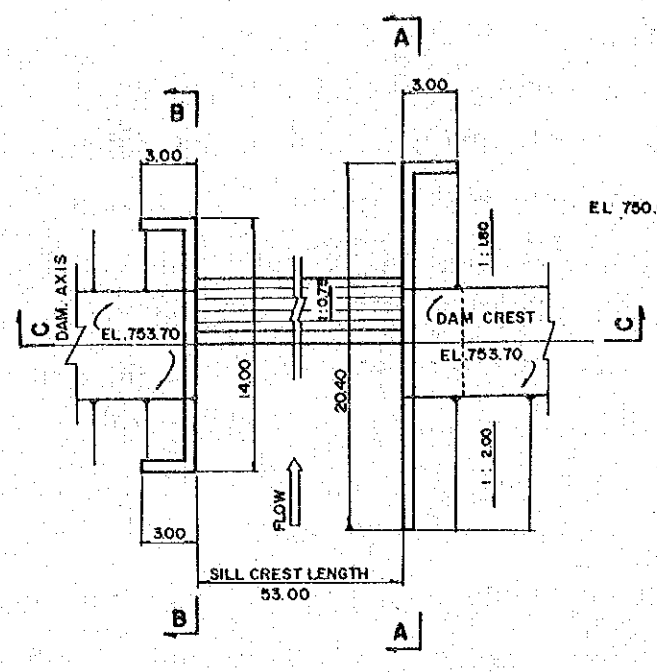
CROSS SECTION



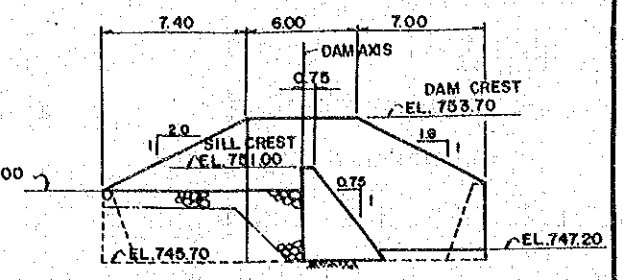
REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
CHINYAMATUMWA (II-1-6)			
TYPICAL CROSS SECTION			
DATE	MARCH 1988	D.W.G. NO.	CHI-03
JAPAN INTERNATIONAL COOPERATION AGENCY			



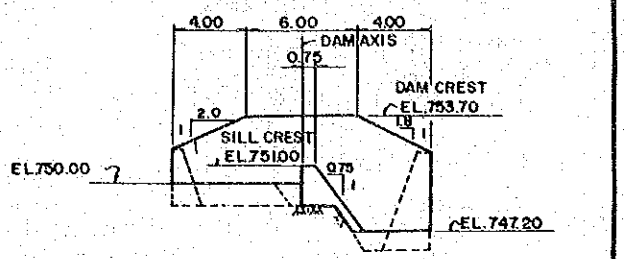
LONGITUDINAL SECTION OF SPILLWAY



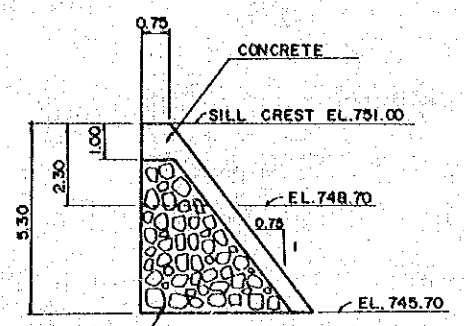
PLAN OF MASONRY GUIDE WALL



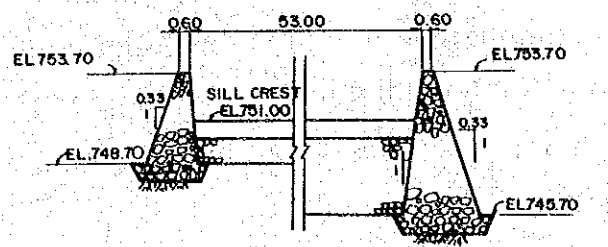
SECTION A-A



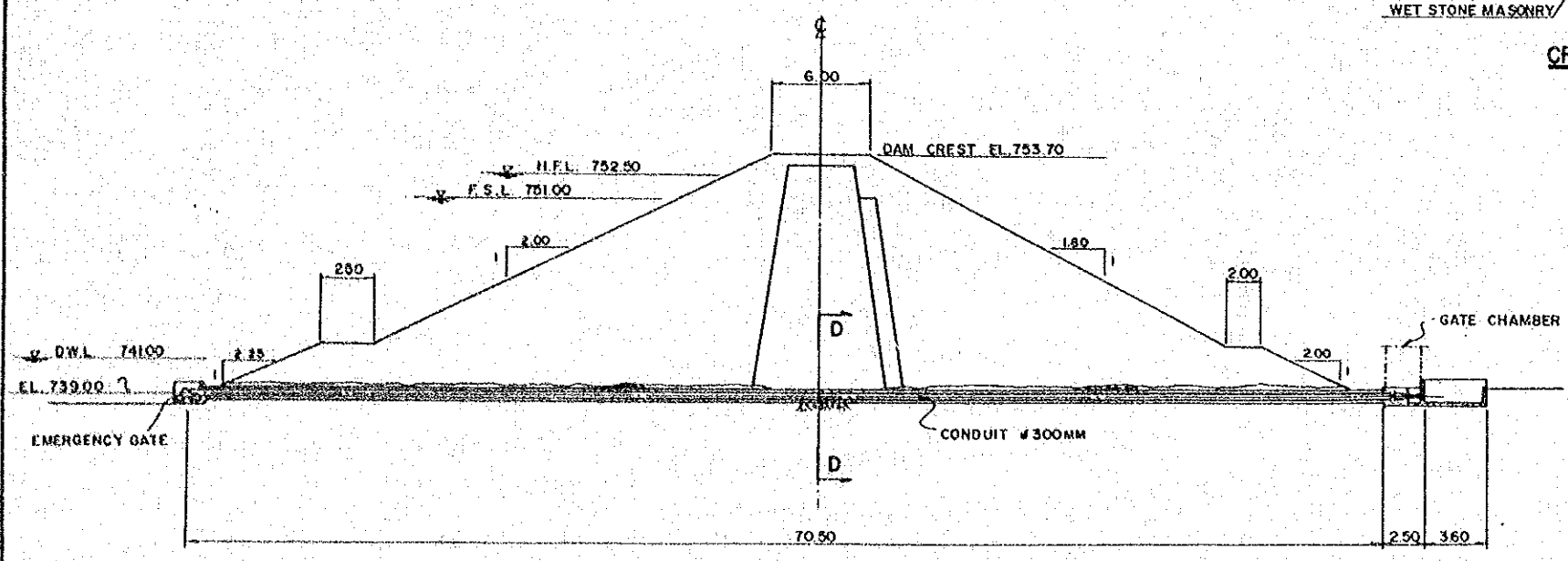
SECTION B-B



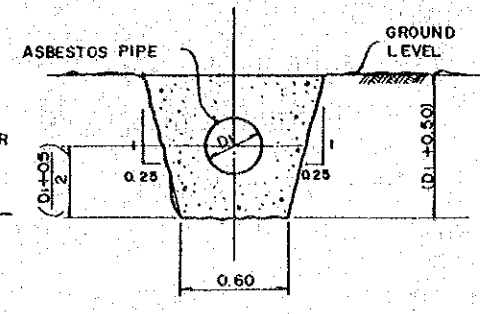
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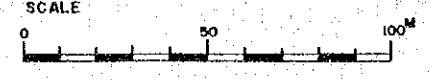
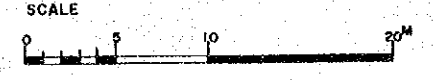
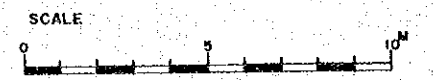
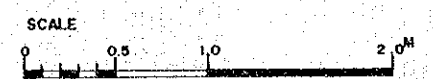
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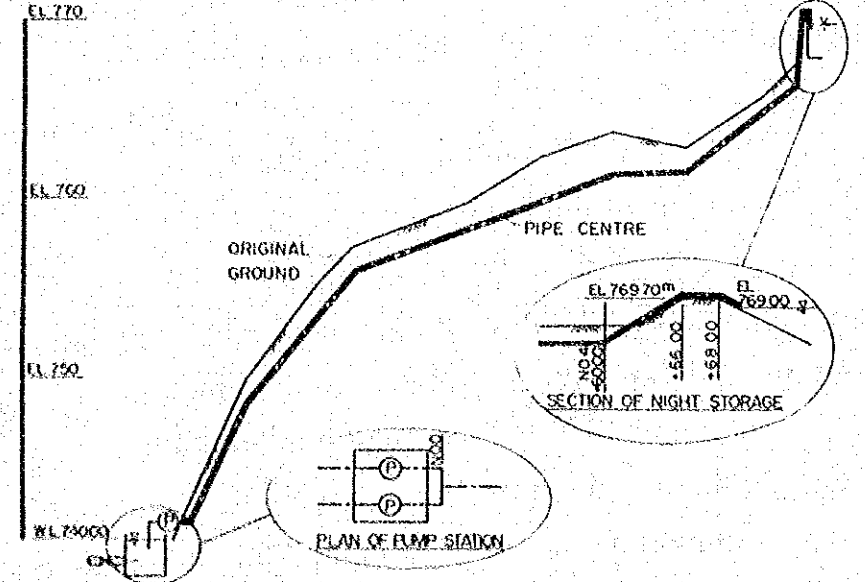
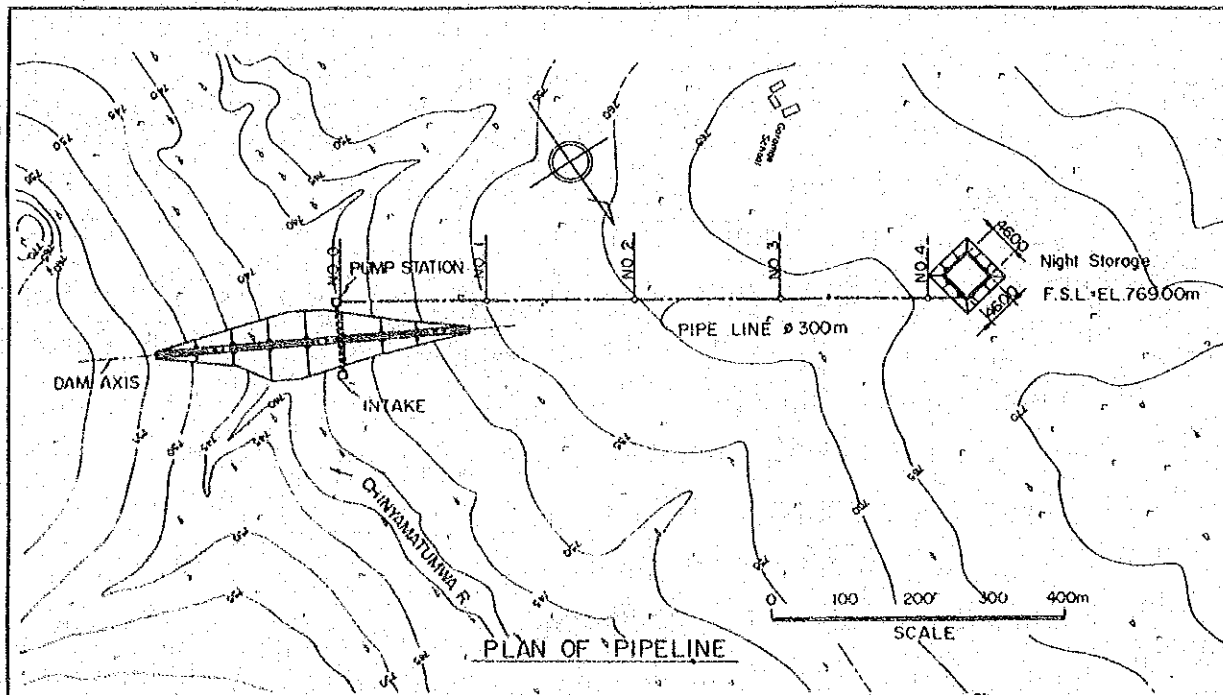
LONGITUDINAL SECTION OF OUTLET



SECTION D-D

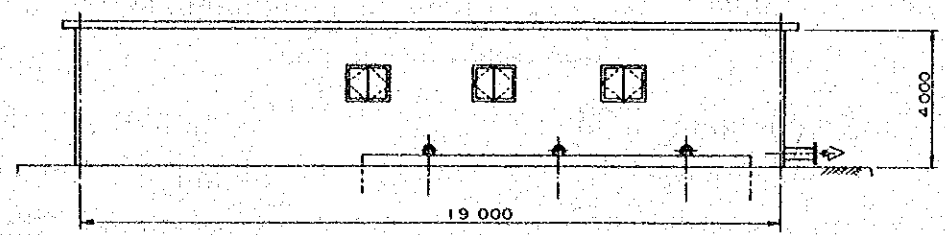
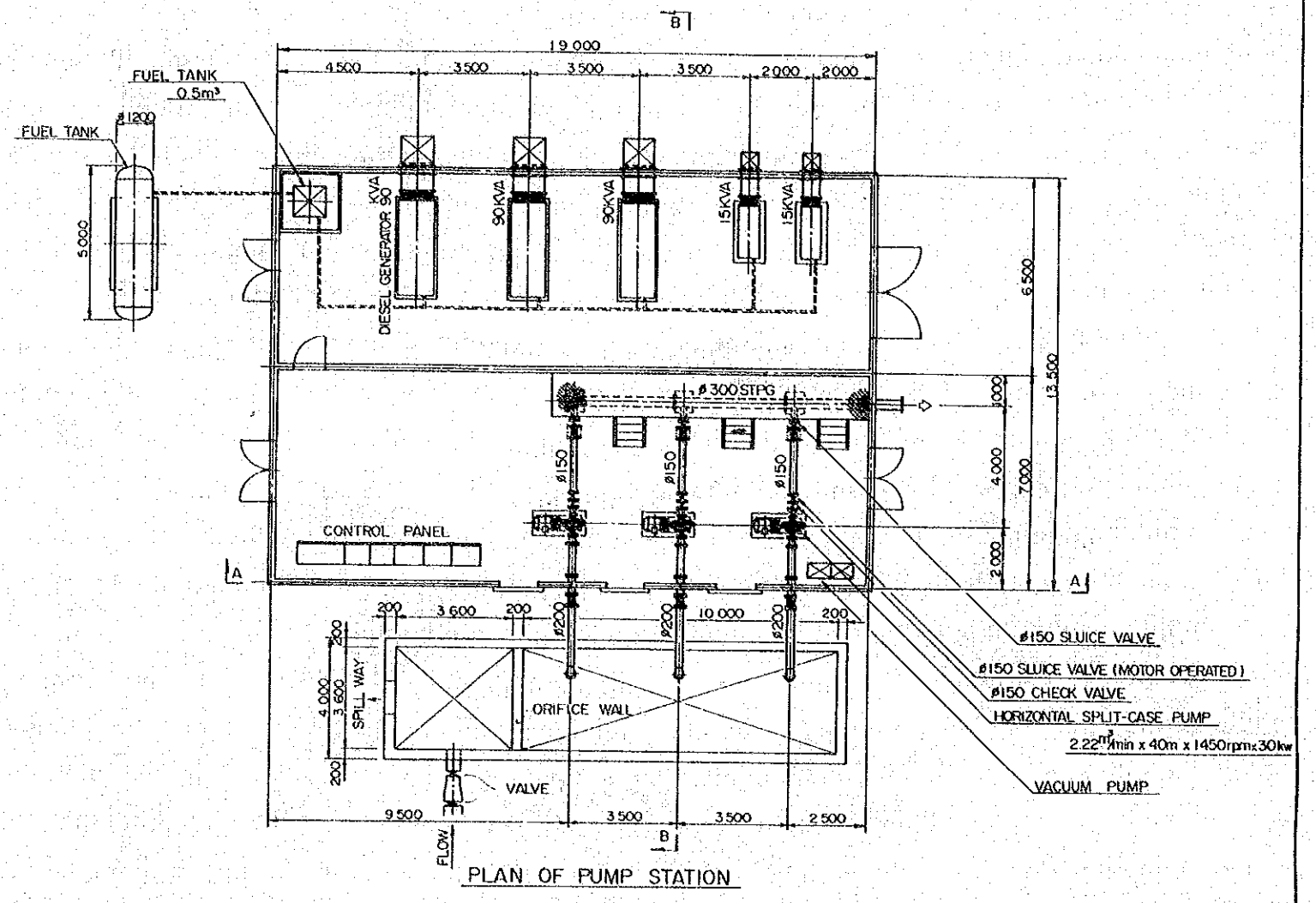


REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
CHINYAMATUMWA (II-1-6)			
SPILLWAY AND OUTLET			
DATE	MARCH 1988	DWG. NO.	CHI-04
JAPAN INTERNATIONAL COOPERATION AGENCY			

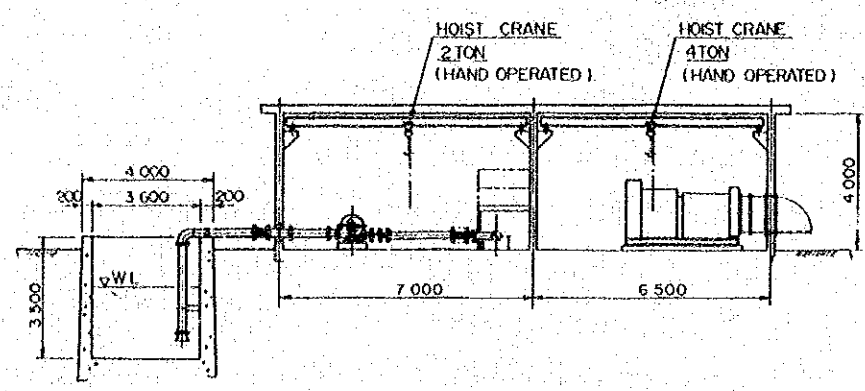


STATION	DISTANCE (m)	ACCUMULATED DISTANCE (m)	GROUND ELEVATION (m)	ELEVATION OF PIPE CENTRE	ENERGY HEAD (m)
NO. 0	0.00	0.00	741.00	742.00	742.00
+25	25.00	25.00	743.20	742.00	742.00
+50	75.00	100.00	750.00	748.50	748.50
NO. 1	100.00	200.00	753.40	753.33	753.33
+50	50.00	250.00	757.40	756.00	756.00
NO. 2	150.00	400.00	759.80	758.31	758.31
+100	100.00	500.00	762.40	759.86	759.86
NO. 3	100.00	600.00	763.80	761.40	761.40
+100	100.00	700.00	763.00	761.60	761.60
NO. 4	100.00	800.00	765.80	764.73	764.73
+50	50.00	850.00	768.00	766.00	766.00
+58	58.00	908.00	768.30	766.90	766.90
+88	88.00	996.00	769.00	769.00	769.00

LONGITUDINAL SECTION OF PIPELINE

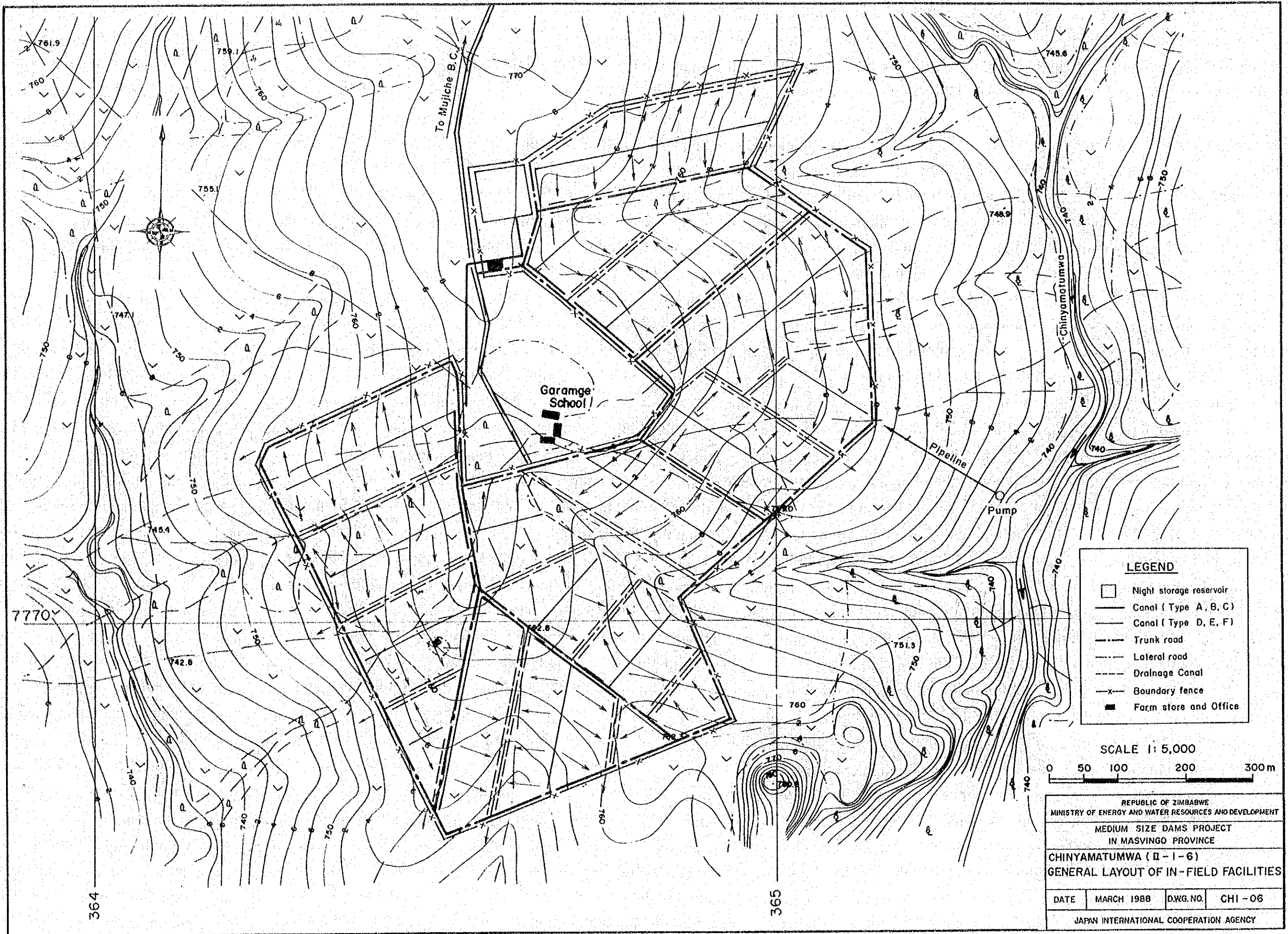


SECTION A-A



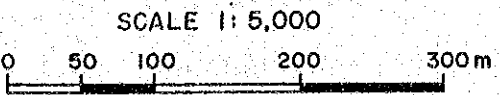
SECTION B-B

REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
CHINYAMATUMWA (II-1-6)			
CONVEYANCE FACILITIES			
DATE	MARCH 1988	D.W.G. NO.	CHI - 05
JAPAN INTERNATIONAL COOPERATION AGENCY			



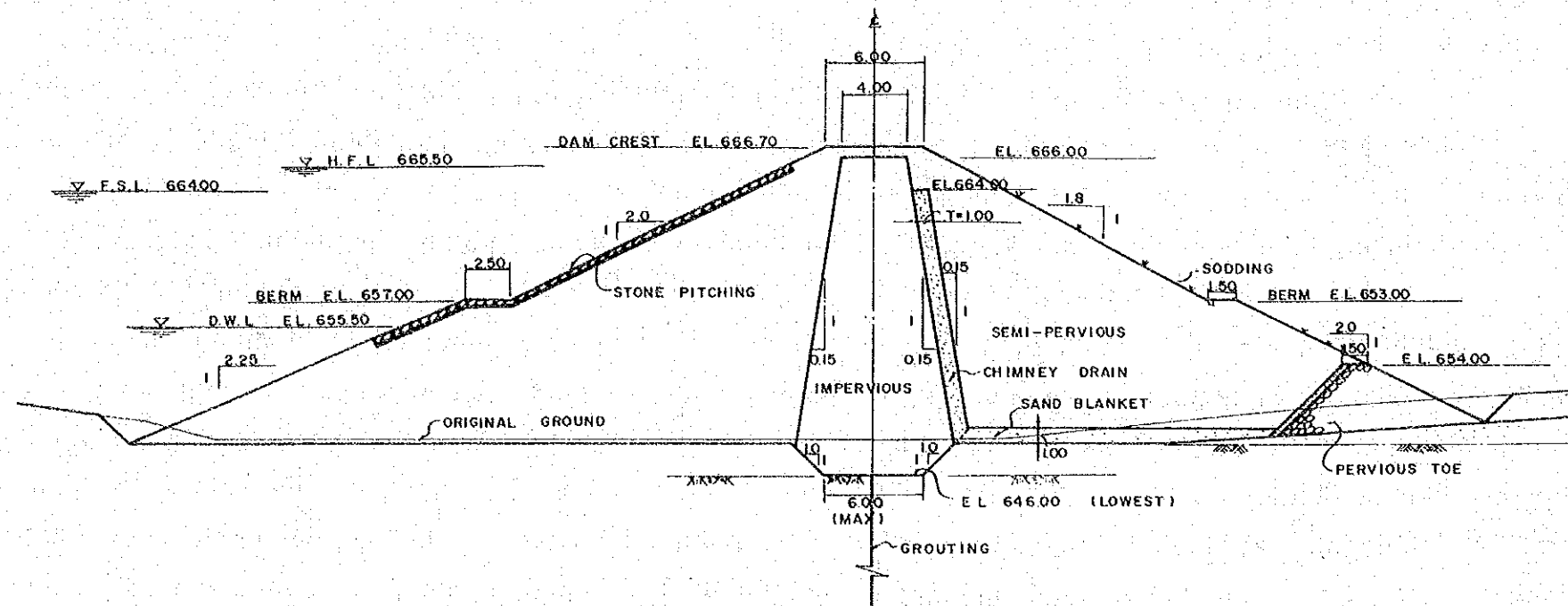
LEGEND

- Night storage reservoir
- Canal (Type A, B, C)
- Canal (Type D, E, F)
- Trunk road
- Lateral road
- Drainage Canal
- x- Boundary fence
- Farm store and Office



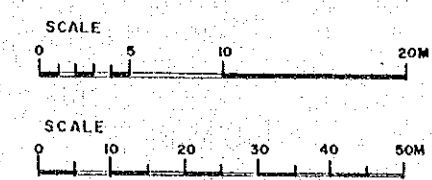
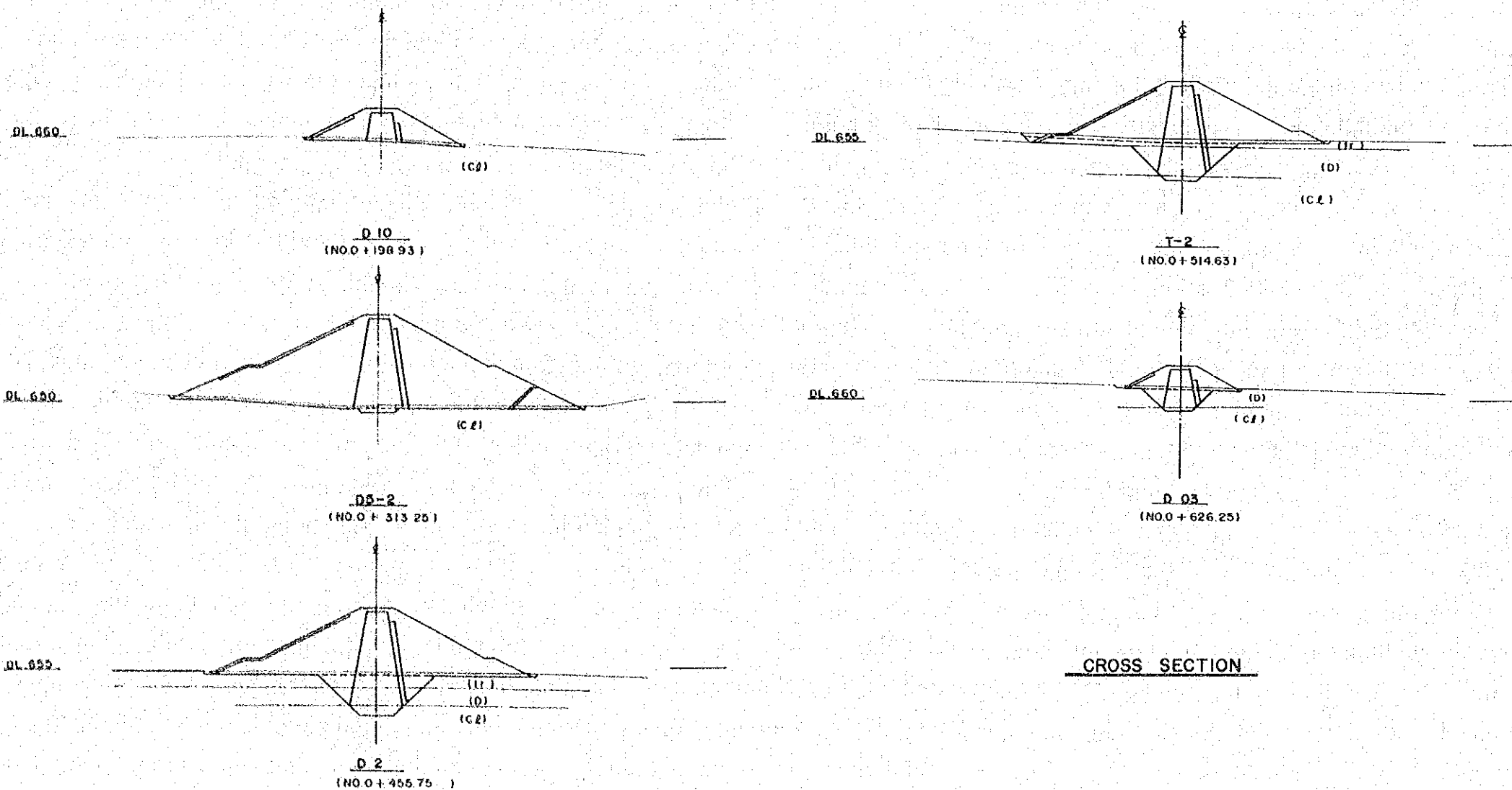
REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
CHINYAMATUMWA (II-1-6)			
GENERAL LAYOUT OF IN-FIELD FACILITIES			
DATE	MARCH 1988	D.W.G. NO.	CHI-06
JAPAN INTERNATIONAL COOPERATION AGENCY			

EL 670.00
EL 660.00
EL 650.00
EL 640.00



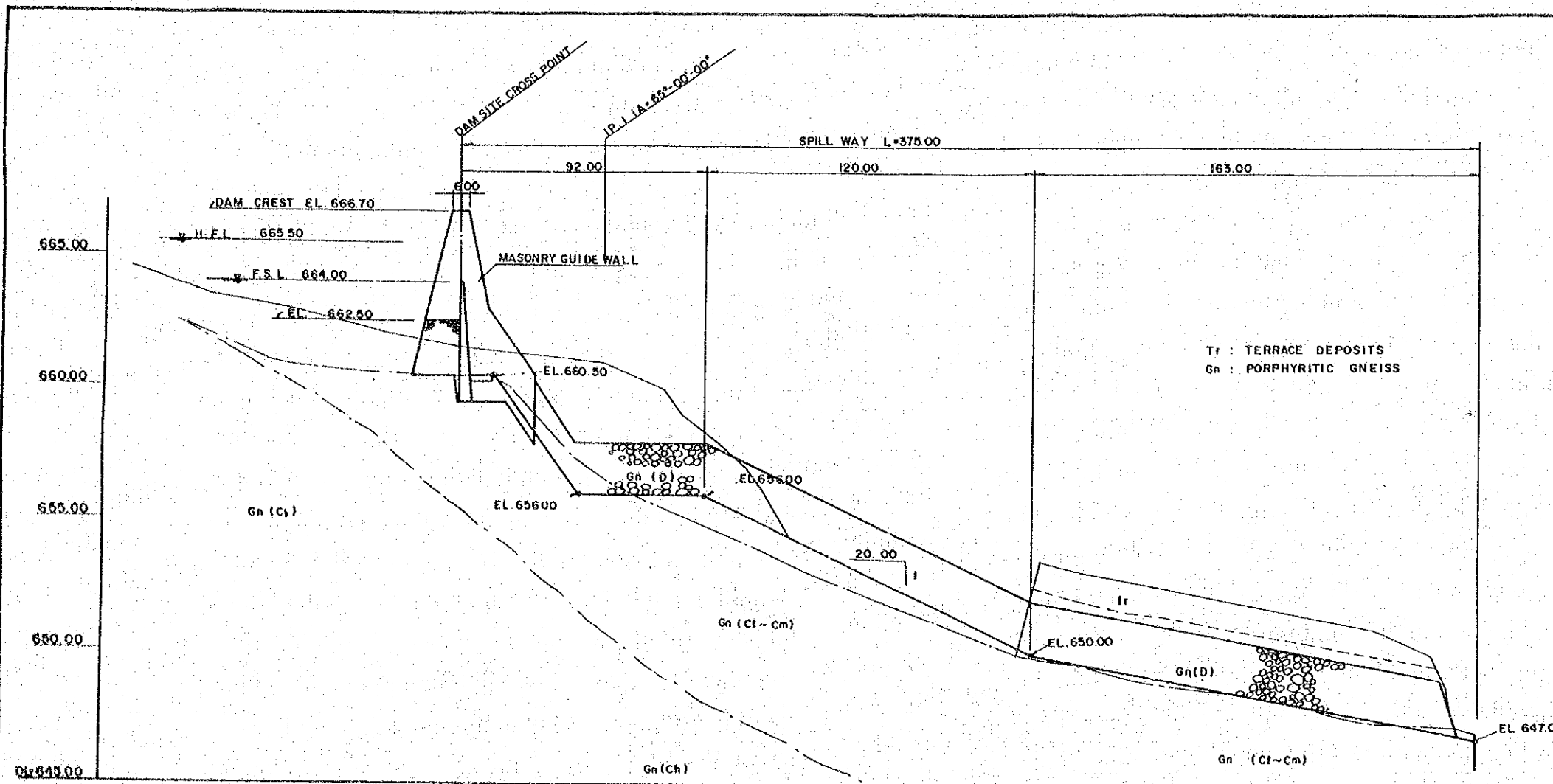
EL 670.00
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TYPICAL CROSS SECTION OF DAM

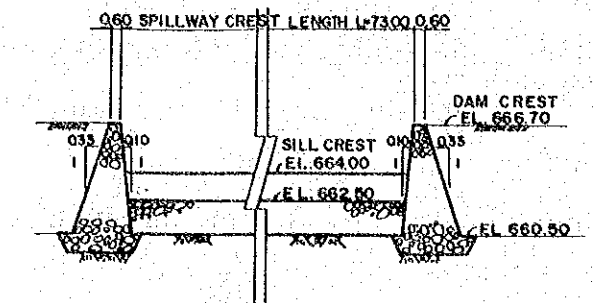


CROSS SECTION

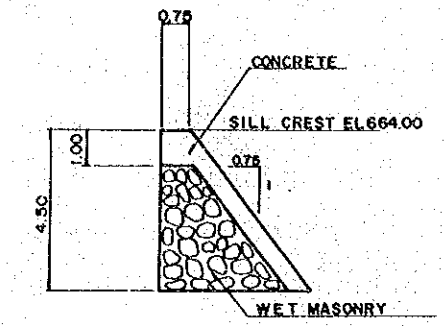
REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MASHOKO (II-2-1)			
TYPICAL CROSS SECTION			
DATE	MARCH 1988	DWG. NO.	MAS-03
JAPAN INTERNATIONAL COOPERATION AGENCY			



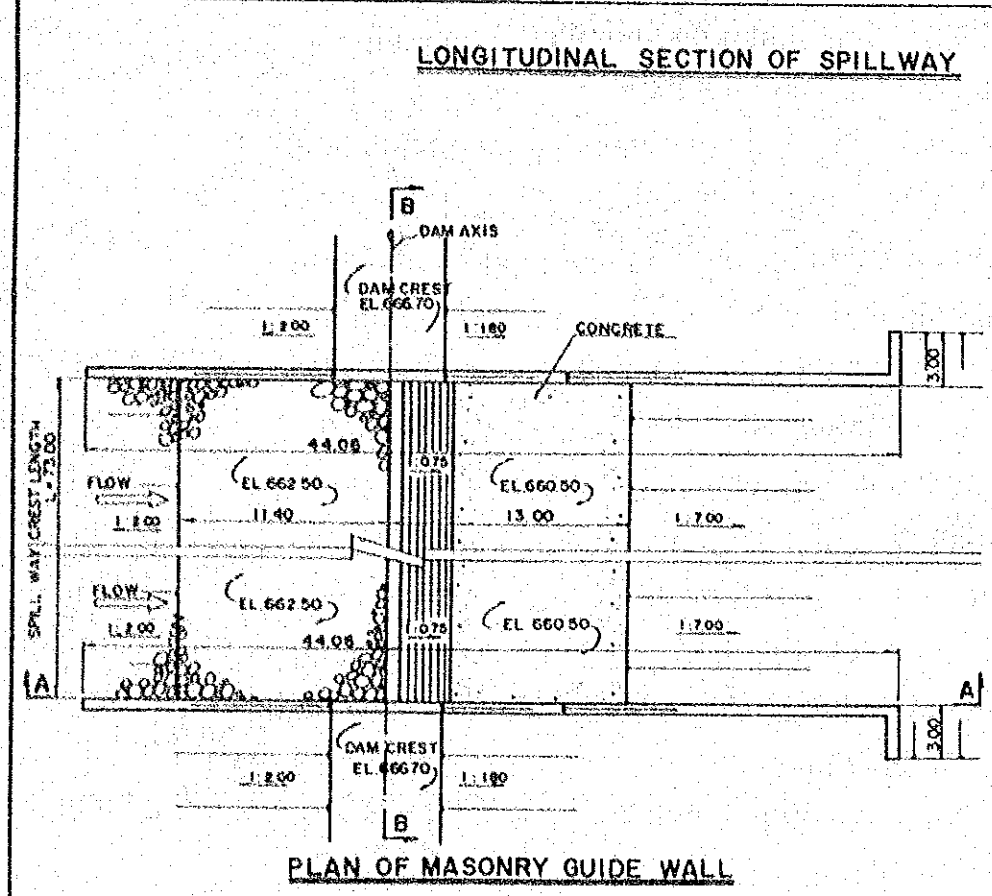
LONGITUDINAL SECTION OF SPILLWAY



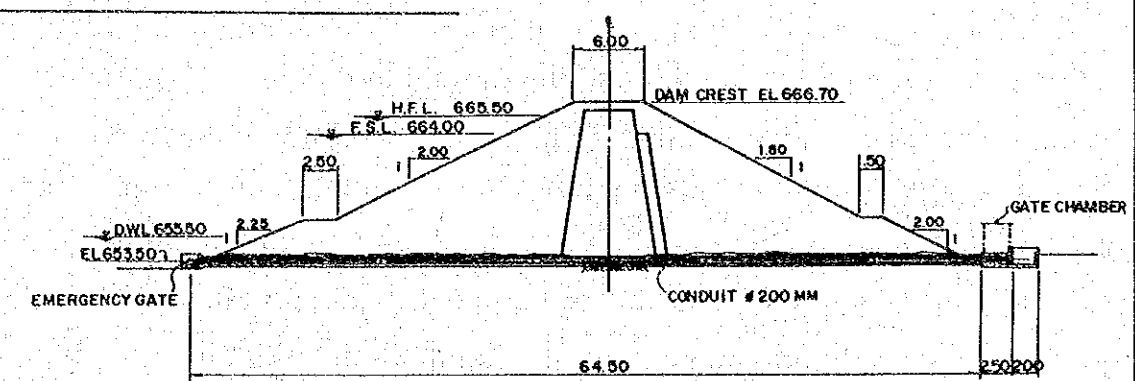
SECTION B-B



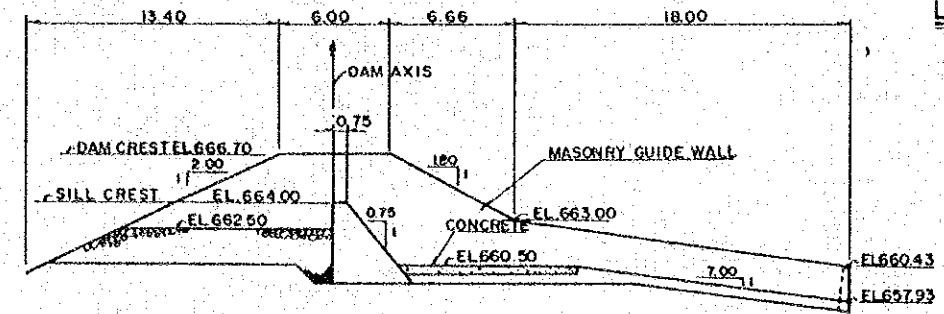
CROSS SECTION OF SILL



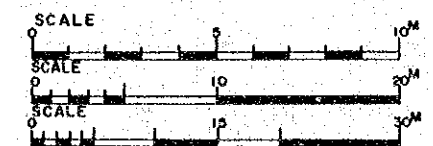
PLAN OF MASONRY GUIDE WALL



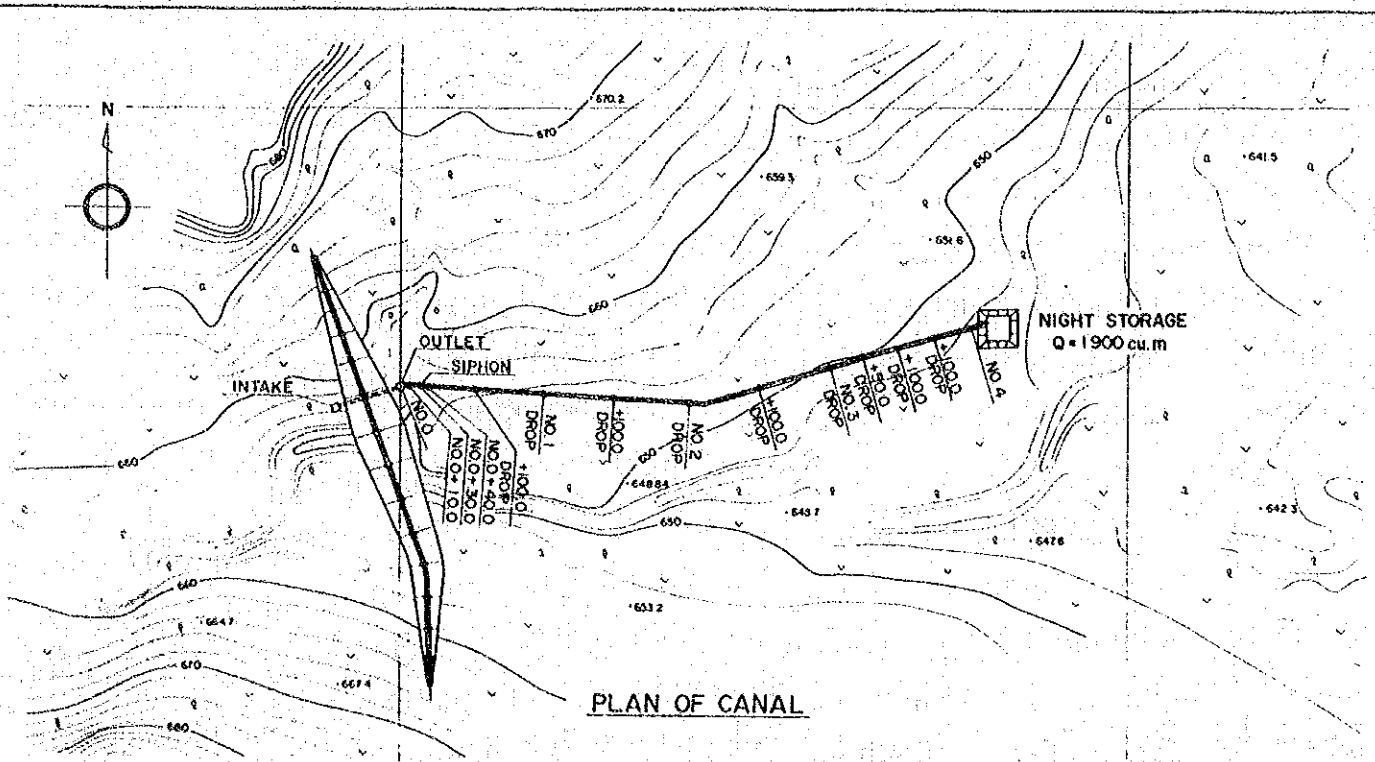
LONGITUDINAL SECTION OF OUTLET



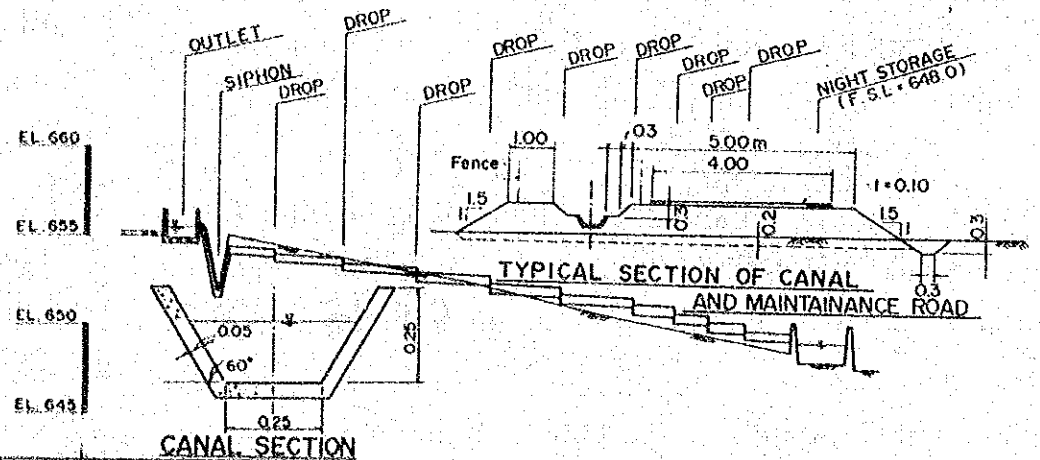
SECTION A-A



REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MASHOKO (II-2-I)			
SPILLWAY AND OUTLET			
DATE	MARCH 1988	DWG. NO.	MAS-04
JAPAN INTERNATIONAL COOPERATION AGENCY			



PLAN OF CANAL

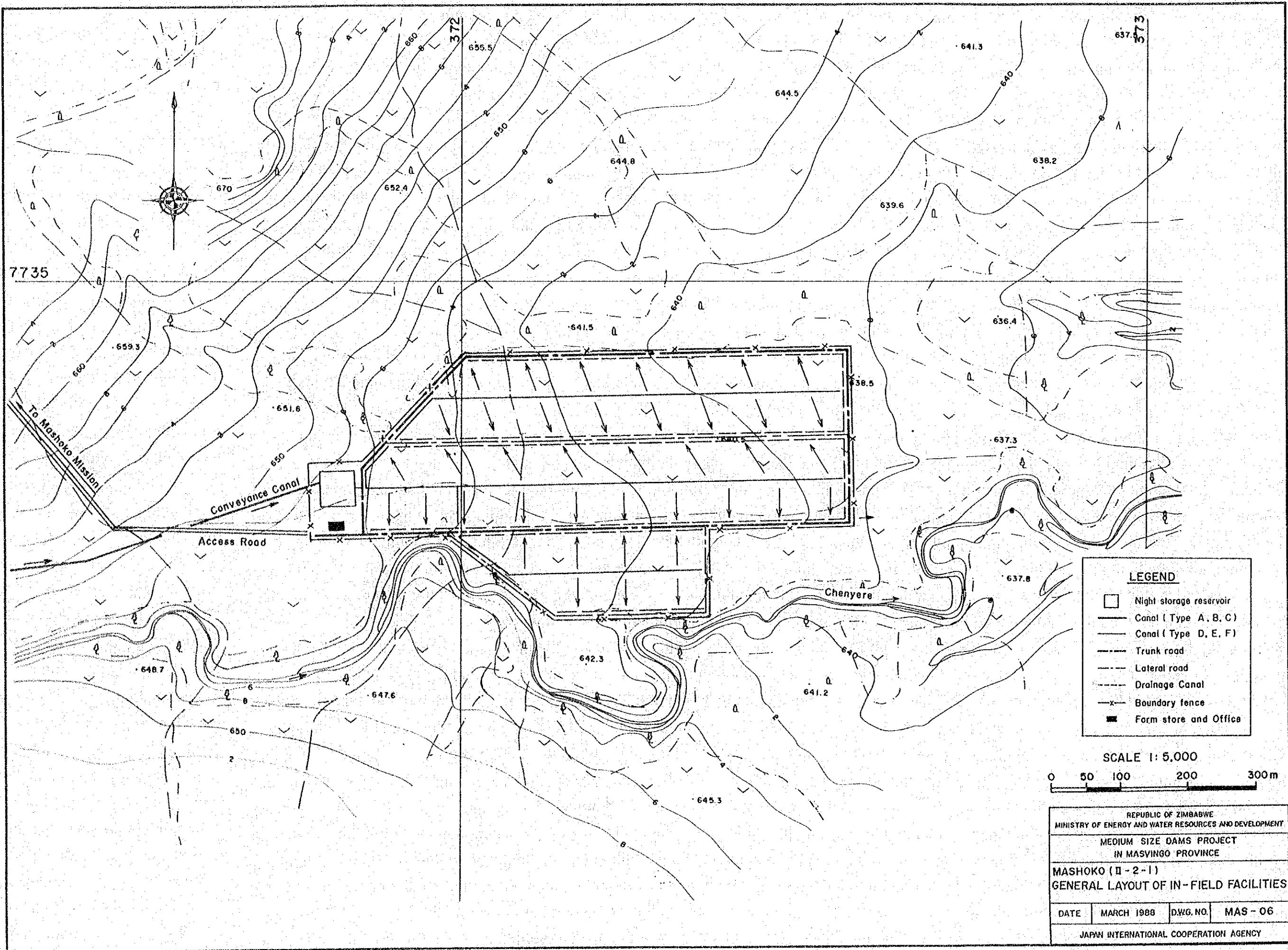


CANAL SECTION

STATION NO.	DISTANCE	ACCUMULATIVE DISTANCE	GROUND ELEVATION	CANAL BOTTOM ELEVATION	WATER LEVEL	CANAL SLOPE
NO 0	00	00	654.6	654.1	654.21	1:1/300
+100	100	100	654.0	653.5	654.26	
+200	200	200	654.0	653.0	654.31	
+300	300	300	654.0	652.5	654.36	
+400	400	400	654.0	652.0	654.41	
+500	500	500	654.0	651.5	654.46	
+600	600	600	654.0	651.0	654.51	
+700	700	700	654.0	650.5	654.56	
+800	800	800	654.0	650.0	654.61	
+900	900	900	654.0	649.5	654.66	
+1000	1000	1000	654.0	649.0	654.71	
NO 1	1000	2000	653.5	652.5	653.28	
+1000	1000	3000	652.9	652.2	652.55	
NO 2	1000	4000	652.6	651.9	652.01	
+1000	1000	5000	651.4	651.7	651.38	
NO 3	1000	6000	650.0	650.4	650.75	
+500	500	6500	649.5	650.3	650.45	
+1000	500	7000	649.0	649.7	650.28	
+1500	500	7500	648.5	649.8	650.11	
NO 4	500	8000	648.1	649.3	649.94	
+100	100	8100	647.9	648.7	649.77	
					648.81	

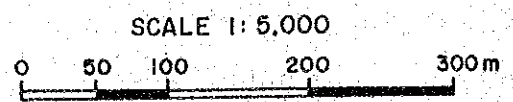
LONGITUDINAL SECTION OF CANAL

REPUBLIC OF ZIMBABWE
 MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT
 MEDIUM SIZE DAMS PROJECT
 IN MASVINGO PROVINCE
 MASHOKO (II-2-1)
 CONVEYANCE FACILITIES
 DATE: MARCH 1988 | DWG. NO. MAS-05
 JAPAN INTERNATIONAL COOPERATION AGENCY

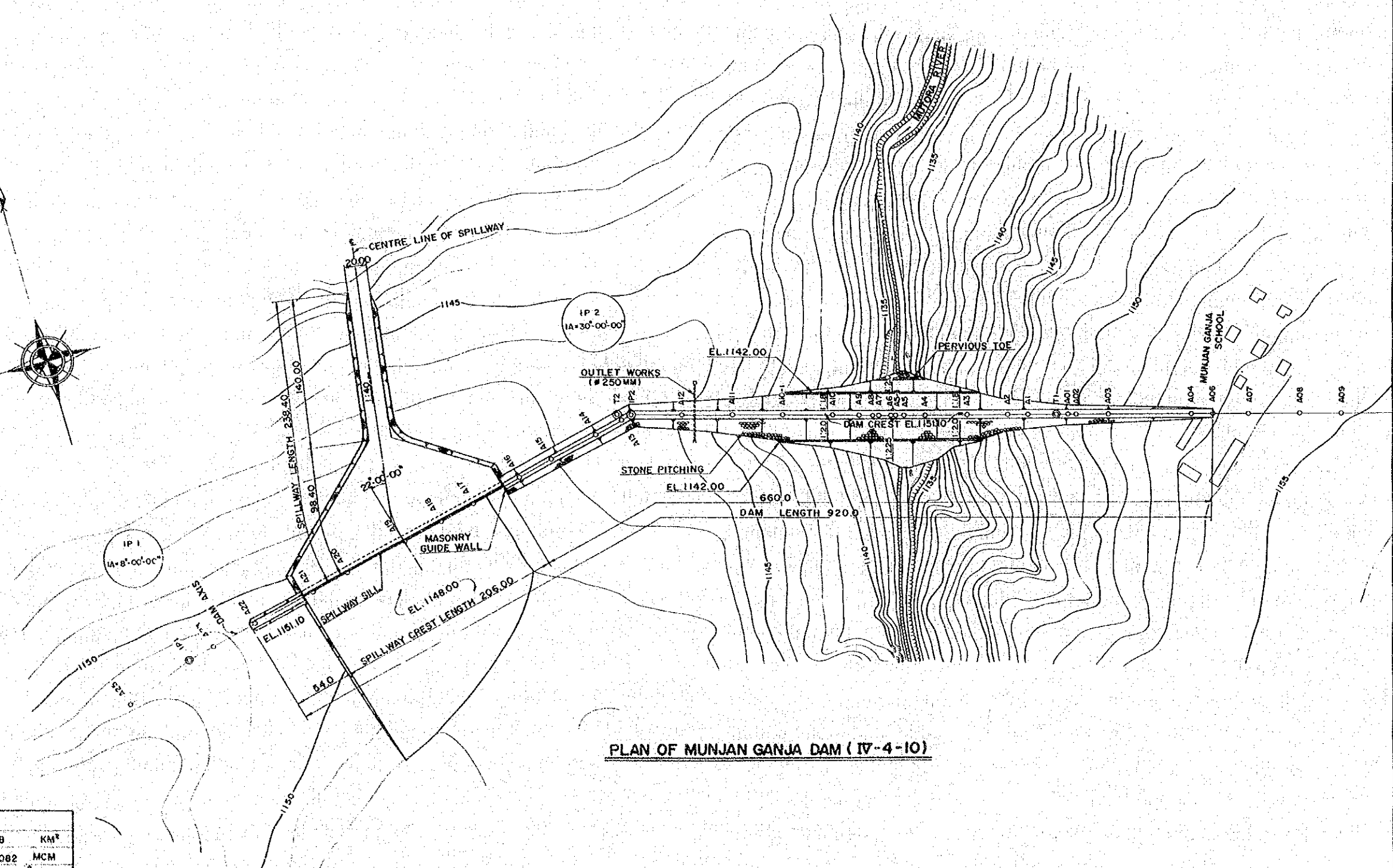
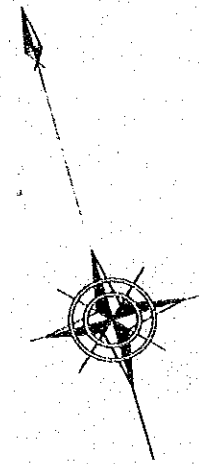


LEGEND

- Night storage reservoir
- Canal (Type A, B, C)
- Canal (Type D, E, F)
- Trunk road
- Lateral road
- Drainage Canal
- x- Boundary fence
- Farm store and Office

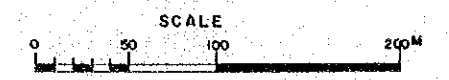


REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MASHOKO (II - 2 - 1)			
GENERAL LAYOUT OF IN-FIELD FACILITIES			
DATE	MARCH 1988	DWG. NO.	MAS - 06
JAPAN INTERNATIONAL COOPERATION AGENCY			

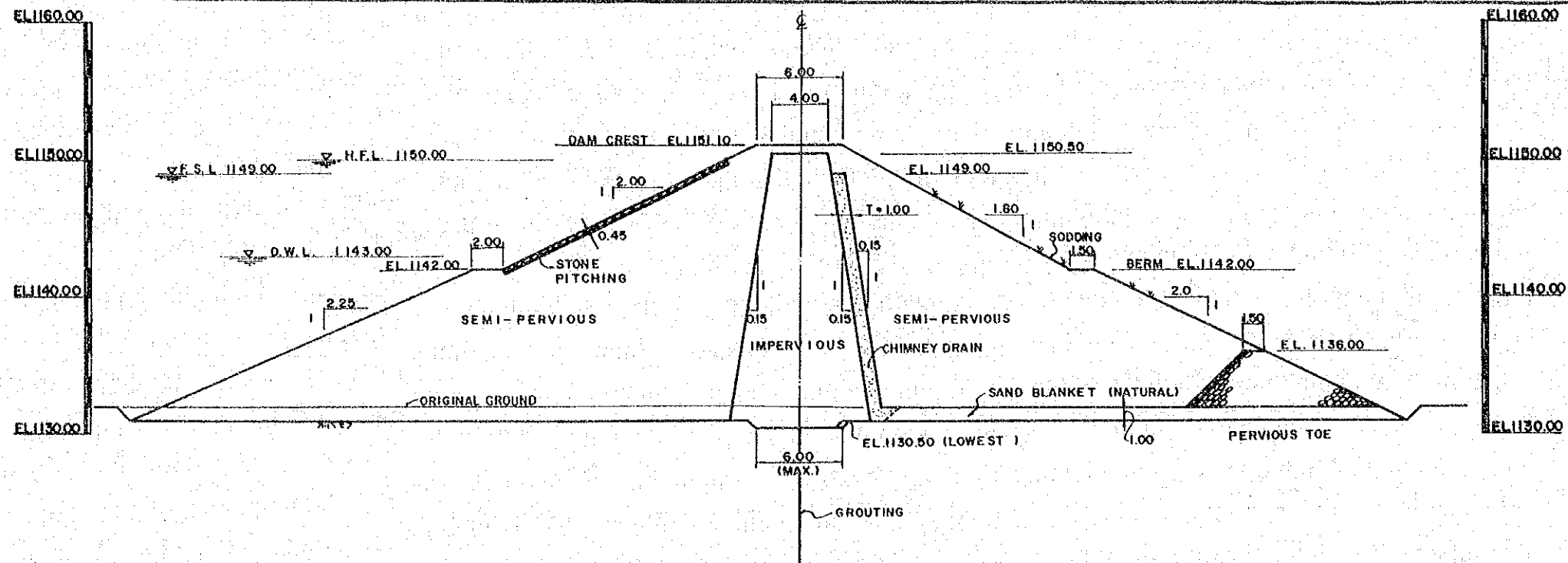


PLAN OF MUNJAN GANJA DAM (IV-4-10)

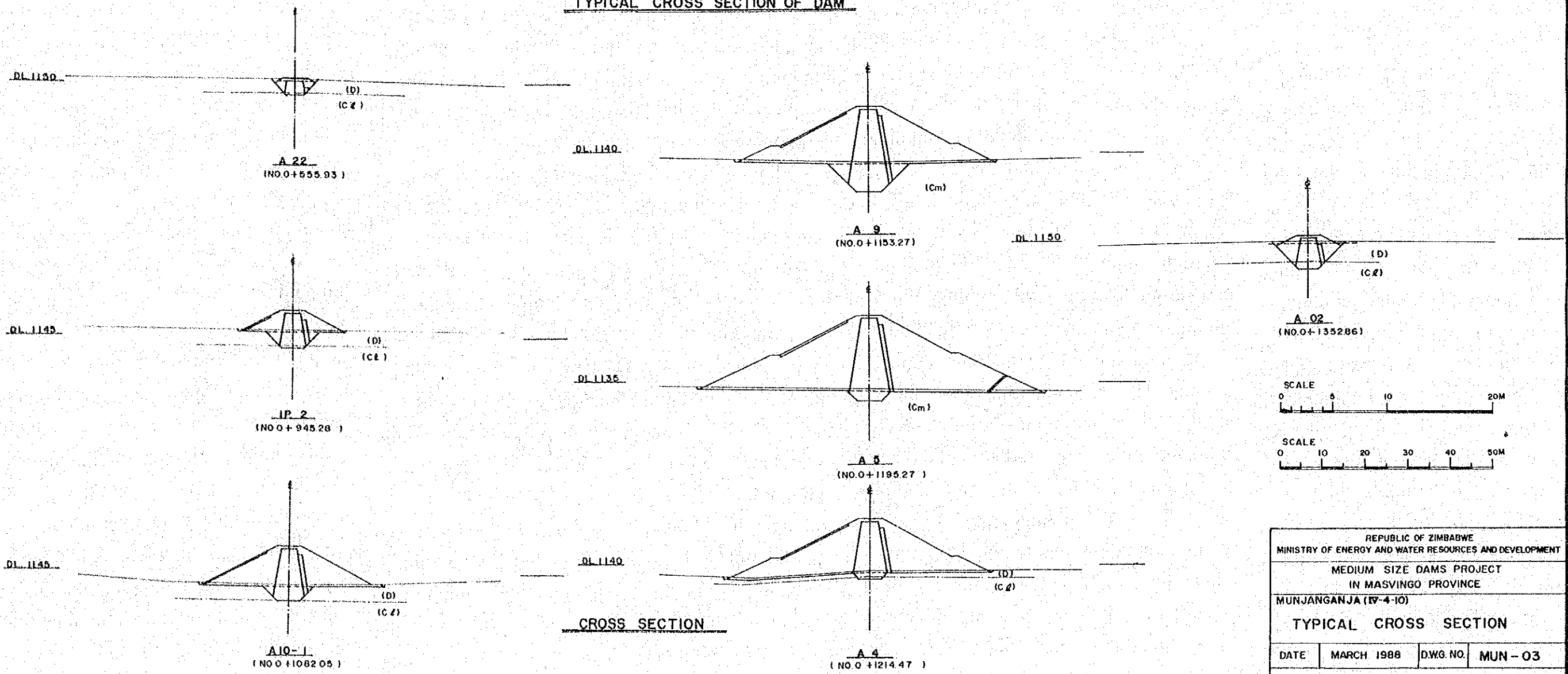
DAM DIMENSION		
CATCHMENT AREA	52.8	KM ²
GROSS STORAGE CAPACITY	2,082	MCM
FULL SUPPLY CAPACITY	1,831	MCM
TOTAL VOLUME OF SEDIMENT	0.251	MCM
HIGH FLOOD LEVEL	1150.0	M
FULL SUPPLY LEVEL	1149.0	M
DEAD WATER LEVEL	1143.0	M
DAM TYPE	ZONE TYPE FILL DAM	
DAM HEIGHT	10.7	M
DAM LENGTH	920.0	M
DAM CREST ELEVATION	1151.1	M
EMBANKMENT VOLUME	153000.0	M ³
DESIGN FLOOD DISCHARGE	349.0	M ³ /SEC
DESIGN SPILLWAY CAPACITY	349.0	M ³ /SEC
SPILLWAY TYPE	NON-GATED OVER FLOW TYPE	
OVERFLOW DEPTH	1.0	M
SPILLWAY CREST LENGTH	206.0	M
INTAKE CAPACITY	49.0	L/SEC



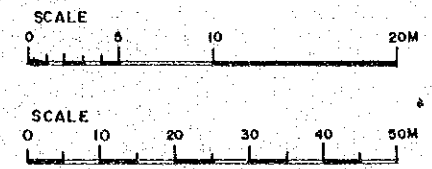
REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MUNJANGANJA (IV-4-10)			
PLAN OF DAM			
DATE	MARCH 1988	DWG. NO.	MUN-01
JAPAN INTERNATIONAL COOPERATION AGENCY			



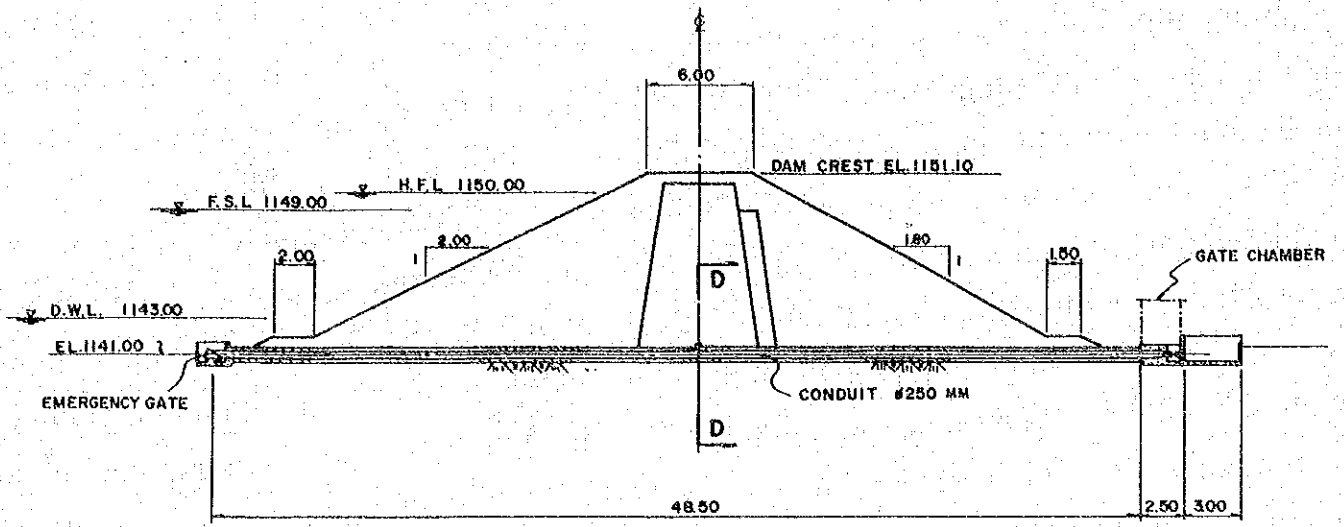
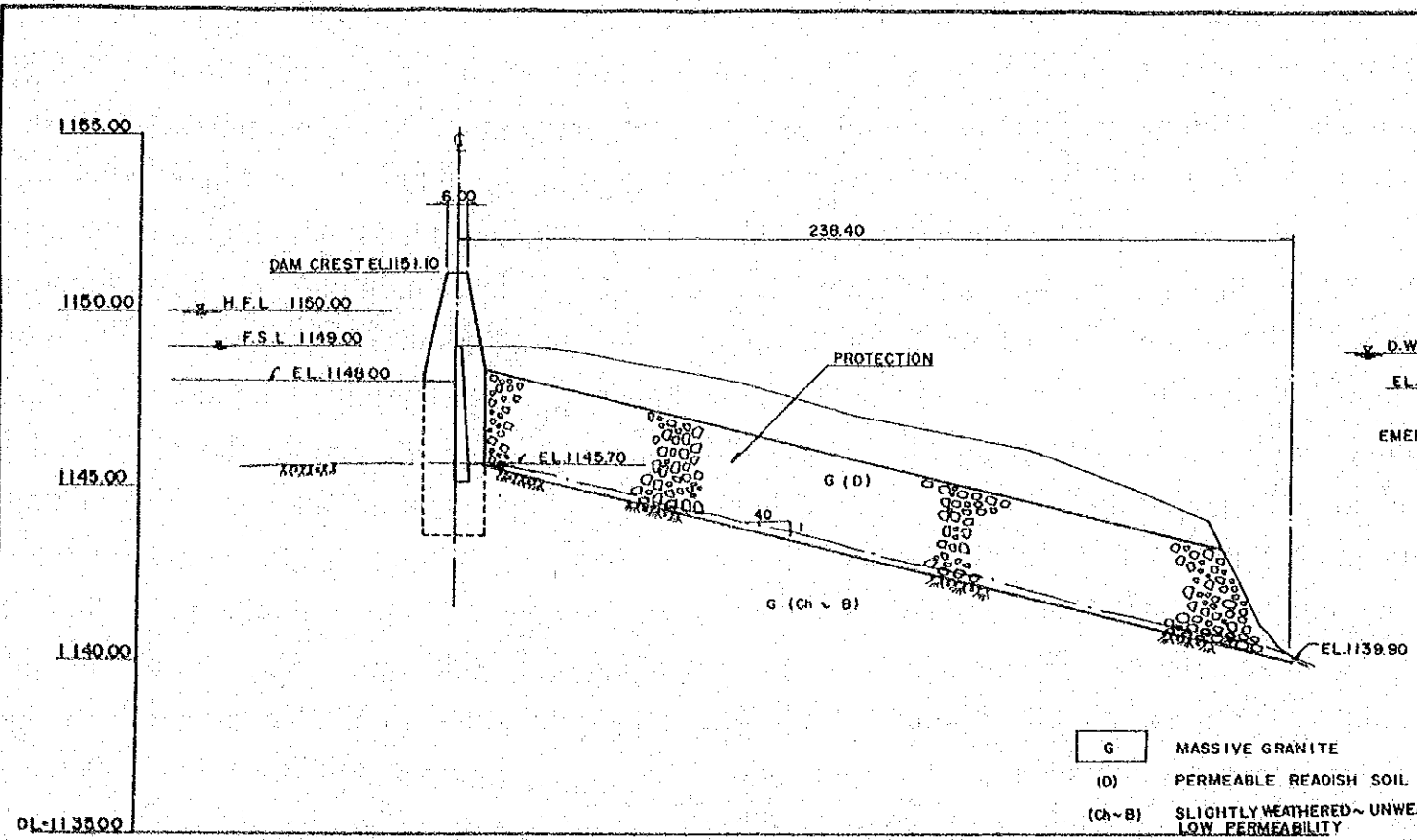
TYPICAL CROSS SECTION OF DAM



CROSS SECTION



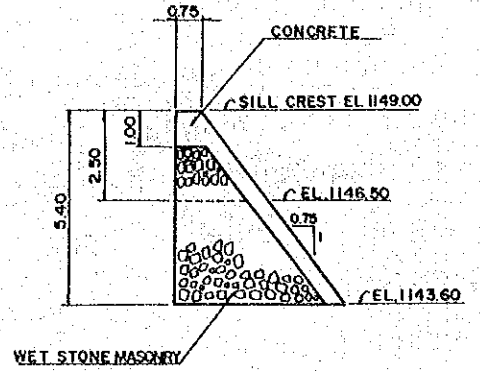
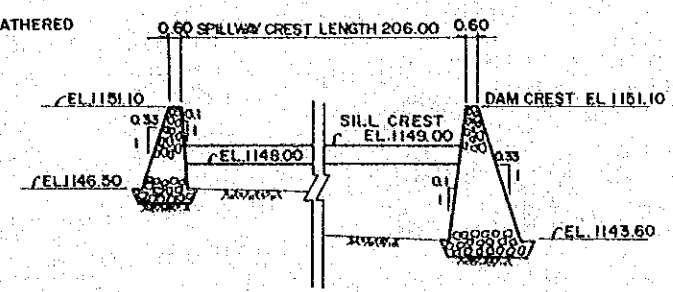
REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MUNJANGANJA (IV-4-10)			
TYPICAL CROSS SECTION			
DATE	MARCH 1988	DWG. NO.	MUN-03
JAPAN INTERNATIONAL COOPERATION AGENCY			



- G MASSIVE GRANITE
- (D) PERMEABLE REDDISH SOIL
- (Ch-B) SLIGHTLY WEATHERED ~ UNWEATHERED LOW PERMEABILITY

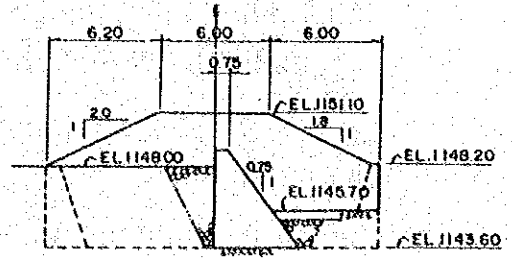
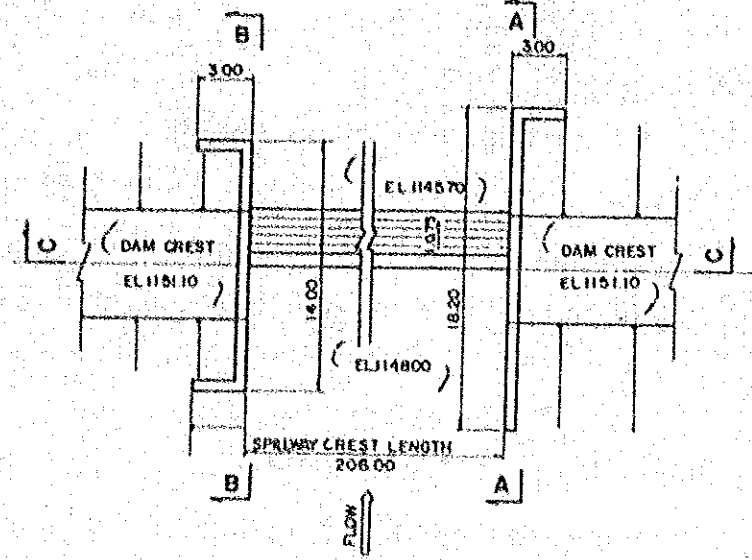
LONGITUDINAL SECTION OF SPILLWAY

LONGITUDINAL SECTION OF OUTLET

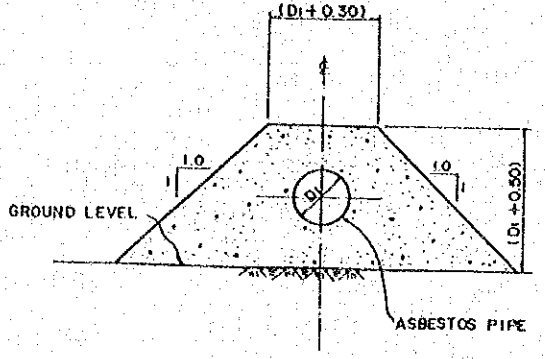


SECTION C-C

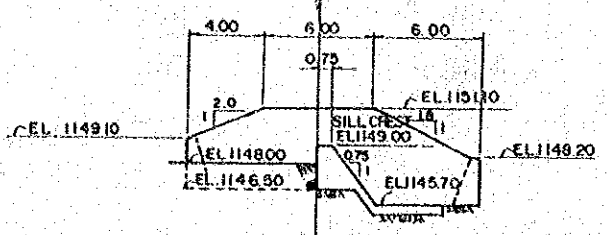
CROSS SECTION OF SILL



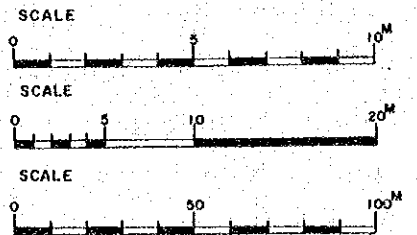
SECTION A-A



SECTION D-D



SECTION B-B



REPUBLIC OF ZIMBABWE			
MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT			
MEDIUM SIZE DAMS PROJECT			
IN MASVINGO PROVINCE			
MUNJANGANJA (IV-4-10)			
SPILLWAY AND OUTLET			
DATE	MARCH 1988	D.W.G. NO.	MUN-04
JAPM INTERNATIONAL COOPERATION AGENCY			

PLAN OF MASONRY GUIDE WALL