Chapter 11.

Necessary Measures for Implementation of Andekaleka Hydro Power Project

Chapter 11 Necessary Measures for Implementation of Andekaleka Hydro Power Project

As aforementioned, the development project for hydro power generation at Andekaleka is urgently required for Madagascar, in view of the present power situation in the country. In this respect, the S. E. M is required to be responsible for proper and prompt implementation of the construction, operation, and maintenance of the installed power generating capacity which is twice as much as the presently installed capacity, the transmission line over a distance of some 160 Km, and the supply of power to the specific type of industrial furnaces. This Chapter summarizes some constructional or operational problems related to the project and suggests a guideline dealing with the measures to be taken to solve those problems.

The problems involved in implementation of the project may be divided largely into three phases: at pre-construction stage, during construction, and after completion of construction.

The project planned for the immediate future will be the 1st-term construction of Andekaleka No. 1 Power Station for 35. 2 MW generating capacity. In this conjunction, pre-arrangements must be proceeded with the necessary survey, planning, and designing for the subsequent No. 2 Power Station construction project, so that it can be performed without difficulty in a coordinated manner with the previous project.

11. 1 Measures to be taken at pre-construction stage

For the earliest possible start of the construction work, prompt and suitable steps must be taken in accordance with the following procedures by the scheduled dates:

(a)	Establishment of basic design	Apr. - July, 1975
(b)	Investigation	Aug., 1975 - Nov., 1976
(c)	Definite estimation of construction costs	Aug., 1975
(d)	Loan agreement	Aug., 1975 - Oct., 1976
(e)	Detailed design	Feb., 1976 - Mar., 1977
(f)	Tender and contract award	Nov., 1976 - Mar., 1977

In order to meet the time requirement for the above schedule, it is recommended that the S. E. M (S. I. N. E. E) should provide its preparatory organization for the development project, being composed of several engineering and administrative staff. In addition to this, a construction office should be provided for survey and construction works at the site.

In order to meet the time limit for the construction work, it is important that prompt arrangements should be made by the S. E. M to proceed with basic and detailed designing including investigations. For this purpose, the loan arrangements for financing such design and engineering services must be separately made in advance of the financing arrangements for the subsequent construction work of the project.

11. 2 Measures to be taken during construction

After commencement of the construction work the problems may arise with respect to (a) construction fund, (b) construction equipment and materials, and (c) work progress and construction supervision.

Normally, at the beginning of this stage, the work will increase tremendously all at once to deal with operation of loan fund for construction work, estimation of revenues and expenditures, local procurement of materials, and stock and supply control of the off-shore purchased equipment and materials. Such business can be dealt with by increasing the number of staff of the preparatory organization as well as by operation of the construction office. As regards the detailed designing and construction supervision, many experienced engineers will be required.

In view of the fact that the project will include construction of large generating and transmission capacities, and since almost half of the estimated power demand will be for the electric furnaces of a specific type, the following arrangements must be made at the latter half of the construction period to prepare for the start-up of the operation, so that an effective and economical system operation can be achieved after the commissioned operation.

(a) Training for operators

(b) Setting-up of load dispatching rules

(c) Studies on transmission engineering

11.3 Measures to be taken after completion of construction

Andekaleka No. 1 Power Station is expected to perform its fullest function upon entering into its commercial operation. In order to make this assurance doubly sure, such steps as aforementioned must be taken in advance during construction. The following problems may, however, arise at the stage of operation.

(a) Establishment of load dispatching system.
(b) Operation of hydro power system including existing reservoir.
(c) Saving of power cost due to decrease of diesel power load as a result of hydro power operation.
(d) Some operational problems due to sharp decrease of diesel power load.
(e) Coordinated operation with ferrochrome plant.
(f) Establishment of maintenance system.
(g) Flicker problem arising from operation of electric furnace.
(h) Thermal pollution problem.

As for load dispatching, the system must be established to issue or receive the order for load dispatching, so as to insure the effect of the Andekaleka Power Station operation. At the same time, the method of economic operation of the new power station, including the existing hydro power stations and reservoirs, must be formulated, for it is a great task to be accomplished by Andekaleka Power Station to decrease the load on the diesel power plant and save its fuel expense thus reducing the overall power generating cost within the system.

When the effective method of operation of the Andekaleka Power Station is established, the load on the diesel plant will decrease largely, say about one-tenth of full load. However, certain problems related to plant maintenance and manning of operating personnel may arise in this connection.

When the Andekaleka Project is completed, large hydro power generating sources interconnected through a long distant transmission line will be scattered over the Mandoraka - Andekaleka region. To set up fixed maintenance system for those facilities in the region, a maintenance station must be established in Moramanga.

A liaison engineer must be stationed at the ferrochrome plant full time in order to coordinate its production plan with the operation schedule of the power station, so that both plant and power station can be coordinated closely to insure an economic and systematic operation.

While the electric furnace is in operation, it may tend to cause some fluctuations in the working voltage of the system. This is only a minor problem as is seen in the actual instances in Japan. However, since the power system around Tananarive is not as yet developed to its maximum extent, technical or administrative guidance must be extended to the ferrochrome plant for the stabilization of the system voltage.

In wet and normal flow years, a hydro power station can be operated efficiently and effectively. But the drought may often occur in a cycling period. In such a case, a constant power supply must be maintained adequately by supplemental supply from a diesel power plant. This will require extra money. It is therefore necessary to maintain a reserve for drought as a part of internal reserve from each year's earning.

APPENDICES

Table-A.3.1 Demand Forecast for Most Probable Case in Public Sector

Year	(1) Growth rate of G.D.P	(2) Increase rate of Energy	(3) Sales Energy	(4) Loss rate	(5) Gene-rated Energy	(6) Load Factor	7 Peak Demand
	%	%	10^6kWh	%	10^6kWh	%	MW
1974	2	2.6	136	11.0	153	51	34.3
1975	3	3.9	141	"	158	"	35.3
1976	4	5.2	148	"	166	"	37.1
1977	5	6.5	158	"	178	"	39.8
1978	5.0	6.5	168	"	189	52	41.5
1979	"	"	179	"	201	"	44.0
1980	"	"	191	"	215	"	47.1
1981	"	"	203	"	228	"	50.0
1982	"	"	216	"	243	"	53.3
1983	5.5	7.0	231	"	260	53	55.0
1984	"	"	247	"	278	"	59.8
1985	"	"	264	"	297	"	64.0
1986	"	"	282	12.0	320	"	68.9
1987	"	"	302	"	343	"	74.0
1988	6.0	7.7	325	"	369	54	78.0
1989	"	"	350	"	398	"	84.1
1990	"	"	377	"	428	"	90.6
1991	"	"	406	13.0	467	"	98.7
1992	"	"	437	"	502	"	106.1
1993	"	"	471	"	541	55	112.4
1994	"	"	507	"	583	"	121.1
1995	"	"	546	"	628	"	130.4

Table-A.3.2 Peak Balance (1-0-B)

unit: MW

Year	Peak Demand (1) Public Sector	(2) Ferro-chrome	(3) Total	Capable Output (4) Exist Hydro	(5) Ande-kaleka	(6) Diesel	(7) Gas Turbine	(8) Total	(9) Reserve
						*1(9)			*1(9)
1974	34.3		34.3	27		12		39	4.7
1975	35.3		35.3	27		12		39	3.7
1976	37.1		37.1	27		18		45	7.9
1977	39.8		39.8	27		18		45	5.2
1978	41.5		41.5	27		18		45	3.5
1979	44.0		44.0	27		24		51	7.0
1980	47.1		47.1	27		24		51	3.9
1981	50.0	16.5	66.5	27	48	24		99	32.5
1982	53.0	16.5	69.8	27	48	24		99	29.2
1983	55.0	16.5	71.5	27	48	24		99	27.5
1984	59.8	16.5	76.3	27	48	24		99	22.7
1985	64.0	16.5	80.5	27	48	24		99	18.5
1986	68.9	32.5	101.4	27	81	24		132	30.6
1987	74.0	32.5	106.5	27	81	24		132	25.5
1988	78.0	32.5	110.5	27	97.3	24		148.3	37.8
1989	84.1	32.5	116.6	27	97.3	24		148.3	31.7
1990	90.6	32.5	123.1	27	97.3	24		148.3	25.2
1991	98.7	32.5	131.2	27	97.3	24	15	163.3	32.1
1992	106.1	32.5	138.6	27	97.3	24	15	163.3	24.7
1993	112.4	32.5	144.9	27	97.3	35	15	174.3	29.4
1994	121.1	32.5	153.6	27	97.3	46	15	185.3	31.7
1995	130.9	32.5	162.9	27	97.3	46	15	185.3	22.4

Note: *1 shows cold reserve, not included in capable out put.

Table-A.3.3 Peak Balance (2-1-A & 2-2-A)

unit: MW

Year	Peak Demand			Capable Output					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Exist Hydro	Ande-kaleka	Diesel	Gas Turbine	Total	Reserve
						*1(9)			*1(9)
1974	34.3		34.3	27		12		39	4.7
1975	35.3		35.3	27		12		39	3.7
1976	37.1		37.1	27		18		45	7.9
1977	39.8		39.8	27		18		45	5.2
1978	41.5		41.5	27		18		45	3.5
1979	44.0		44.0	27		24		51	7.0
1980	47.1		47.1	27		24		51	3.9
1981	50.0	16.5	66.5	27	31.7	24		82.7	16.2
1982	53.3	16.5	69.8	27	31.7	24		82.7	12.9
1983	55.0	16.5	71.5	27	31.7	24	15	97.7	26.2
1984	59.8	16.5	76.3	27	31.7	24	15	97.7	21.4
1985	64.0	16.5	80.5	27	31.7	24	15	97.7	17.2
1986	68.9	32.5	101.4	27	52.8	24	15	118.8	17.4
1987	74.0	32.5	106.5	27	60.4	24	15	126.4	19.9
1988	78.0	32.5	110.5	27	60.4	24	15	126.4	15.9
1989	84.1	32.5	116.6	27	78.4	24	15	144.4	27.8
1990	90.6	32.5	123.1	27	78.4	24	15	144.4	21.3
1991	98.7	32.5	131.2	27	95.7	24	15	161.7	30.5
1992	106.1	32.5	138.6	27	95.7	24	15	161.7	23.1
1993	112.4	32.5	144.9	27	95.7	35	15	172.7	27.8
1994	121.1	32.5	153.6	27	95.7	35	15	172.7	19.1
1995	130.4	32.5	162.9	27	95.7	46	15	183.7	20.8

Note: *1 shows cold reserve, not included in capable out put.

Table-A.3.4 Energy Balance (1-0-B)

unit: GWh

Year	Energy Demand			Generated Energy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Hydro			Thermal		
				Exist	Andekaleka	Total	Diesel	G.T.	Total
1974	153		153	128		128	25		25
1975	158		158	128		128	30		30
1976	166		166	128		128	38		38
1977	178		178	128		128	50		50
1978	189		189	128		128	61		61
1979	201		201	128		128	73		73
1980	215		215	128		128	87		87
1981	228	87	315	128	180	308	7		7
1982	243	104	347	128	212	340	7		7
1983	260	115	375	128	240	368	7		7
1984	278	127	405	128	269	397	8		8
1985	297	127	424	128	287	415	9		9
1986	320	232	552	128	411	539	13		13
1987	343	254	597	128	453	581	16		16
1988	369	254	623	128	476	604	19		19
1989	398	254	652	128	502	630	22		22
1990	428	254	682	128	526	654	28		28
1991	467	254	721	128	560	688	26	5	31
1992	502	254	756	128	588	716	32	8	40
1993	541	254	795	128	618	746	44	5	49
1994	583	254	837	128	645	773	59	5	64
1995	628	254	882	128	670	798	76	8	84

Table-A.3.5 Energy Balance (2-1-A & 2-2-A)

Unit: GWh

Year	Energy Demand			Generated Energy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Hydro.			Thermal		
				Exist	Andekaleka	Total	Diesel	G.T.	Total
1974	153		153	128		128	25		25
1975	158		158	128		128	30		30
1976	166		166	128		128	38		38
1977	178		178	128		128	50		50
1978	189		189	128		128	61		61
1979	201		201	128		128	73		73
1980	215		215	128		128	87		87
1981	228	87	315	128	181	309	6		6
1982	243	104	347	128	212	340	7		7
1983	260	115	375	128	238	366	9		9
1984	278	127	405	128	263	391	14		14
1985	297	127	424	128	276	404	15	5	20
1986	320	232	552	128	391	519	28	5	33
1987	343	254	597	128	427	555	35	5	40
1988	369	254	623	128	442	570	45	8	53
1989	398	254	652	128	504	632	20	-	20
1990	428	254	682	128	527	655	22	5	27
1991	467	254	721	128	559	687	34	-	34
1992	502	254	756	128	587	715	36	5	41
1993	541	254	795	128	615	743	47	5	52
1994	583	254	837	128	642	770	62	5	67
1995	628	254	882	128	666	794	83	5	88

Table-A.3.6 Demand Forecast for Maximum Case in Public Sector

Year	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Growth rate of G.D.P	Increase rate of Energy	Sales Energy	Loss rate	Gene-rated Energy	Load Factor	Peak Demand
	%	%	10^6kWh	%	10^6kWh	%	MW
1974	2	2.6	136	11.0	153	51	34.3
1975	3	3.9	141	"	158	"	35.3
1976	4	5.2	148	"	166	"	37.1
1977	5	6.5	158	"	178	"	39.8
1978	5.0	6.5	168	"	189	52	41.5
1979	"	"	179	"	201	"	44.0
1980	"	"	191	"	215	"	47.1
1981	"	"	203	"	228	"	50.0
1982	"	"	216	"	243	"	53.3
1983	6.0	7.7	233	"	262	53	56.4
1984	"	"	251	"	282	"	60.8
1985	"	"	270	"	303	"	65.3
1986	"	"	291	12.0	331	"	71.3
1987	"	"	313	"	356	"	76.6
1988	7.0	9.0	341	"	388	54	82.0
1989	"	"	372	"	423	"	89.4
1990	"	"	405	"	460	"	97.2
1991	"	"	441	13.0	507	"	107.2
1992	"	"	481	"	553	"	116.9
1993	8.0	10.0	529	"	608	55	126.2
1994	"	"	582	"	669	"	138.9
1995	"	"	640	"	736	"	152.7

3.2/ year

Table-A.3.7 Peak Balance (1-0-B)

unit: MW

Year	Peak Demand			Capable Output					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Exist Hydro	Ande-kaleka	Diesel	Gas Tarbine	Total	Reserve
						*1(9)			*1(9)
1974	34.3		34.3	27		12		39	4.7
1975	35.3		35.3	27		12		39	3.7
1976	37.1		37.1	27		18		45	7.9
1977	39.8		39.8	27		18		45	5.2
1978	41.5		41.5	27		18		45	3.5
1979	44.0		44.0	27		24		51	7.0
1980	47.1		47.1	27		24		51	3.9
1981	50.0	16.5	66.5	27	48	24		99	32.5
1982	53.3	16.5	69.8	27	48	24		99	29.2
1983	56.4	16.5	72.9	27	48	24		99	26.1
1984	60.8	16.5	77.3	27	48	24		99	21.7
1985	65.3	16.5	81.8	27	48	24		99	17.2
1986	71.3	32.5	103.8	27	81	24		132	28.2
1987	76.6	32.5	109.1	27	81	24		132	22.9
1988	82.0	32.5	114.5	27	97.3	24		148.3	33.8
1989	89.4	32.5	121.9	27	97.3	24		148.3	26.4
1990	97.2	32.5	129.7	27	97.3	24	15	163.3	33.6
1991	107.2	48.5	155.7	27	97.3	35	30	189.3	33.6
1992	116.9	48.5	165.4	27	97.3	46	30	200.3	34.9
1993	126.2	48.5	174.7	27	97.3	46	30	200.3	25.6
1994	138.9	48.5	187.4	27	97.3	57	30	211.3	23.9
1995	152.7	48.5	201.2	27	97.3	57	45	226.3	25.1

Note: *1 shows cold reserve, not included in capabl out put.

Table-A.3.8 Peak Balance (2-1-A & 2-2-A)

unit: MW

Year	Peak Demand			Capable Output					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Exist Hydro	Ande-kaleka	Diesel	Gas Turbine	Total	Reserve
						*1(9)			*1(9)
1974	34.3		34.3	27		12		39	4.7
1975	35.3		35.3	27		12		39	3.7
1976	37.1		37.1	27		18		45	7.9
1977	39.8		39.8	27		18		45	5.2
1978	41.5		41.5	27		18		45	3.5
1979	44.0		44.0	27		24		51	7.0
1980	47.1		47.1	27		24		51	3.9
1981	50.0	16.5	66.5	27	31.7	24		82.7	16.2
1982	53.3	16.5	69.8	27	31.7	24		82.7	12.9
1983	56.4	16.5	72.9	27	31.7	24	15	97.7	24.8
1984	60.8	16.5	77.3	27	31.7	24	15	97.7	20.4
1985	65.3	16.5	81.8	27	31.7	24	15	97.7	15.9
1986	71.3	32.5	103.8	27	60.4	24	15	128.4	22.6
1987	76.6	32.5	109.1	27	60.4	24	15	128.4	17.3
1988	82.0	32.5	114.5	27	60.4	35	15	137.4	22.9
1989	89.4	32.5	121.9	27	60.4	35	15	137.4	15.5
1990	97.2	32.5	129.7	27	78.4	35	15	155.4	25.7
1991	107.2	48.5	155.7	27	95.7	35	15	172.7	17.0
1992	116.9	48.5	165.4	27	95.7	35	30	187.7	22.3
1993	126.2	48.5	174.7	27	95.7	46	30	198.7	24.0
1994	138.9	48.5	187.4	27	95.7	57	30	209.7	22.3
1995	152.7	48.5	201.2	27	95.7	68	30	220.7	19.5

Note: *1 shows cold reserve, not includ in capable out put.

Table-A.3.9 Energy Balance (1-0-B)

Unit: GWh

Year	Energy Demand			Generated Energy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Hydro			Thermal		
				Exist	Andeluela	Total	Diesel	G.T.	Total
1974	153		153	128		128	25		25
1975	158		158	128		128	30		30
1976	166		166	128		128	38		38
1977	178		178	128		128	50		50
1978	189		189	128		128	61		61
1979	201		201	128		128	73		73
1980	215		215	128		128	87		87
1981	228	87	315	128	180	308	7		7
1982	243	104	347	128	212	340	7		7
1983	262	115	377	128	241	369	8		8
1984	282	127	409	128	273	401	8		8
1985	303	127	430	128	293	421	9		9
1986	331	232	563	128	421	549	14		14
1987	356	254	610	128	464	592	18		18
1988	388	254	642	128	493	621	21		21
1989	423	254	677	128	524	652	25		25
1990	460	254	714	128	555	683	26	5	31
1991	507	360	867	128	666	794	64	9	73
1992	553	383	936	128	702	830	97	9	106
1993	608	383	991	128	725	853	126	12	138
1994	669	383	1,052	128	746	874	163	15	178
1995	736	383	1,119	128	761	889	215	15	230

Table-A.3.10 Energy Balance (2-1-A & 2-2-A)

unit: GWh

Year	Energy Demand			Generated Energy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Hydro			Thermal		
				Exist	Andeluela	Total	Diesel	G.T.	Total
1974	153		153	128		128	25		25
1975	158		158	128		128	30		30
1976	166		166	128		128	38		38
1977	178		178	128		128	50		50
1978	189		189	128		128	61		61
1979	201		201	128		128	73		73
1980	215		215	128		128	87		87
1981	228	87	315	128	181	309	6		6
1982	243	104	347	128	212	340	7		7
1983	262	115	377	128	239	367	10		10
1984	282	127	409	128	266	394	15		15
1985	303	127	430	128	278	406	19	5	24
1986	331	232	563	128	398	526	37	-	37
1987	356	254	610	128	434	562	43	5	48
1988	388	254	642	128	452	580	57	5	62
1989	423	254	677	128	468	596	73	8	81
1990	460	254	714	128	553	681	33	-	33
1991	507	360	867	128	662	790	71	6	77
1992	553	383	936	128	697	825	106	5	111
1993	608	383	991	128	719	847	139	5	144
1994	669	383	1,052	128	738	866	181	5	186
1995	736	383	1,119	128	752	880	231	8	239

Table-A.3.11 Demand Forecast for Minimum Case in Public Sector

Year	(1) Growth rate of G.D.P	(2) Increase rate of Energy	(3) Sales Energy	(4) Loss rate	(5) Generated Energy	(6) Load Factor	(7) Peak Demand
	%	%	10^6kWh	%	10^6kWh	%	MW
1974	2	2.6	136	11.0	153	51	34.3
1975	3	3.9	141	"	158	"	35.3
1976	4	5.2	148	"	166	"	37.1
1977	5	6.5	158	"	178	"	39.8
1978	5.0	6.5	168	"	189	52	41.5
1979	"	"	179	"	201	"	44.0
1980	"	"	191	"	215	"	47.1
1981	"	"	203	"	228	"	50.0
1982	"	"	216	"	243	"	53.3
1983	5.5	7.0	231	"	260	53	55.0
1984	"	"	247	"	278	"	59.8
1985	"	"	264	"	297	"	64.0
1986	"	"	282	12.0	320	"	68.9
1987	"	"	302	"	343	"	74.0
1988	6.0	7.7	325	"	369	54	78.0
1989	"	"	350	"	398	"	84.1
1990	"	"	377	"	428	"	90.6
1991	"	"	406	13.0	467	"	98.7
1992	"	"	437	"	502	"	106.1
1993	"	"	471	"	541	55	112.4
1994	"	"	507	"	583	"	121.1
1995	"	"	546	"	628	"	130.4

Table-A.3.12 Peak Balance (1-0-B)

unit: MW

Year	Demand (1)	Capable Output (2)	(3)	(4)	(5)	(6)	(7)
	Public Sector	Exist Hydro	Andekaleka	Diesel	Gas Turbine	Total	Reserve
				*1(9)			*1(9)
1974	34.3	27		12		39	4.7
1975	35.3	27		12		39	3.7
1976	37.1	27		18		45	7.9
1977	39.8	27		18		45	5.2
1978	41.5	27		18		45	3.5
1979	44.0	27		24		51	7.0
1980	47.1	27		24		51	3.9
1981	50.0	27	27	24		78	28.0
1982	53.3	27	27	24		78	24.7
1983	55.0	27	27	24		78	23.0
1984	59.8	27	27	24		78	18.2
1985	64.0	27	27	24		78	14.0
1986	68.9	27	48	24		99	30.1
1987	74.0	27	48	24		99	25.0
1988	78.0	27	48	24		99	21.0
1989	84.1	27	48	24		99	14.9
1990	90.6	27	81	24		132	41.4
1991	98.7	27	81	24		132	33.3
1992	106.1	27	81	24		132	25.9
1993	112.4	27	81	24		132	19.6
1994	121.1	27	108	24		159	37.9
1995	130.4	27	108	24		159	28.6

Note: *1 shows cold reserve, not included in capable out put.

Table-A.3.13 Peak Balance (2-1-A & 2-2-A)

unit: MW

Year	Demand	Capable Output					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Public Sector	Exist Hydro	Andeka-leka	Diesel	Gas Turbine	Total	Reserve
				*1(9)			*1(9)
1974	34.3	27		12		39	4.7
1975	35.3	27		12		39	3.7
1976	37.1	27		18		45	7.9
1977	39.8	27		18		45	5.2
1978	41.5	27		18		45	3.5
1979	44.0	27		24		51	7.0
1980	47.1	27		24		51	3.9
1981	50.0	27	17.6	24		68.6	18.6
1982	53.3	27	17.6	24		68.6	15.3
1983	55.0	27	31.7	24		82.7	27.7
1984	59.8	27	31.7	24		82.7	22.9
1985	64.0	27	31.7	24		82.7	18.7
1986	68.9	27	31.7	24		82.7	13.8
1987	74.0	27	52.8	24		103.8	29.8
1988	78.0	27	52.8	24		103.8	25.8
1989	84.1	27	52.8	24		103.8	19.7
1990	90.6	27	52.8	24		103.8	13.2
1991	98.7	27	70.4	24		121.4	22.7
1992	106.1	27	70.4	24		121.4	15.3
1993	112.4	27	88.4	24		139.4	27.0
1994	121.1	27	88.4	24		139.4	18.3
1995	130.4	27	106.4	24		157.4	27.0
1996	140.4	27	106.4	24	15	172.4	32.0
1997	151.2	27	106.4	24	15	172.4	21.2
1998	162.8	27	106.4	35	15	183.4	20.6
1999	175.3	27	106.4	46	15	194.4	19.1
2000	188.8	27	106.4	46	30	209.4	20.6

Note: *1 shows cold reserve, not included in capable out put.

Table-A.3.14 Energy Balance (1-0-B)

unit: GWh

Year	Energy Demand			Generated Energy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Hydro			Thermal		
				Exist	Andekaleka	Total	Diesel	G.T.	Total
1974	153		153	128		128	25		25
1975	158		158	128		128	30		30
1976	166		166	128		128	38		38
1977	178		178	128		128	50		50
1978	189		189	128		128	61		61
1979	201		201	128		128	73		73
1980	215		215	128		128	87		87
1981	228		228	128	97	225	3		3
1982	243		243	128	111	239	4		4
1983	260		260	128	127	255	5		5
1984	278		278	128	144	272	6		6
1985	297		297	128	163	291	6		6
1986	320		320	128	186	314	6		6
1987	343		343	128	209	337	6		6
1988	369		369	128	234	362	7		7
1989	398		398	128	262	390	8		8
1990	428		428	128	291	419	9		9
1991	467		467	128	329	457	10		10
1992	502		502	128	363	491	11		11
1993	541		541	128	400	528	13		13
1994	583		583	128	440	568	20		20
1995	628		628	128	480	608	20		20

Table-A.3.15 Energy Balance (2-1-A & 2-2-A)

unit: GWh

Year	Energy Demand			Generated Energy					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Public Sector	Ferro-chrome	Total	Hydro			Thermal		
				Exist	Andekaleka	Total	Diesel	G.T.	Total
1974	153		153	128		128	25		25
1975	158		158	128		128	30		30
1976	166		166	128		128	38		38
1977	178		178	128		128	50		50
1978	189		189	128		128	61		61
1979	201		201	128		128	73		73
1980	215		215	128		128	87		87
1981	228		228	128	97	225	3		3
1982	243		243	128	111	239	4		4
1983	260		260	128	130	258	5		5
1984	278		278	128	150	278	6		6
1985	297		297	128	170	298	6		6
1986	320		320	128	196	324	6		6
1987	343		343	128	209	337	6		6
1988	369		369	128	234	362	7		7
1989	398		398	128	261	389	8		8
1990	428		428	128	290	418	10		10
1991	467		467	128	324	452	15		15
1992	502		502	128	353	481	21		21
1993	541		541	128	400	528	13		13
1994	583		583	128	439	567	16		16
1995	628		628	128	479	607	21		21
1996	676		676	128	510	638	38		38
1997	728		728	128	550	678	55	5	60
1998	784		784	128	590	718	61	5	66
1999	844		844	128	630	758	81	5	86
2000	909		909	128	670	798	103	8	111

Table-A.4.1-(1) Repayment Schedule

	Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1st Term	Loan Fund	4,000,000												
	Interest (A)		320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	288,000	256,000
	Principal (B)											400,000	400,000	400,000
	(A) + (B)		320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	732,000	688,000	656,000
	Balance	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	3,600,000	3,200,000	2,800,000
2nd Term	Loan Fund						3,000,000							
	Interest (A)							240,000	240,000	240,000	240,000	240,000	240,000	240,000
	Principal (B)													
	(A) + (B)							240,000	240,000	240,000	240,000	240,000	240,000	240,000
	Balance						3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Total	Loan Fund	4,000,000					3,000,000							
	Interest (A)		320,000	320,000	320,000	320,000	320,000	560,000	560,000	560,000	560,000	560,000	528,000	496,000
	Principal (B)											400,000	400,000	400,000
	(A) + (B)		320,000	320,000	320,000	320,000	320,000	560 000	560,000	560,000	560,000	960,000	928,000	896,000
	Balance	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000	6,600,000	6,200,000	5,800,000

	Item	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
1st Term	Loan Fund													
	Interest (A)	224,000	192,000	160,000	128,000	96,000	64,000	32,000						
	Principal (B)	400,000	400,000	400,000	400,000	400,000	400,000	400,000						
	(A) + (B)	624,000	592,000	560,000	528,000	496,000	464,000	432,000						
	Balance	2,400,000	2,000,000	1,600,000	1,200,000	800,000	400,000	0						
2nd Term	Loan Fund													
	Interest (A)	240,000	240,000	240,000	216,000	192,000	168,000	144,000	120,000	96,000	72,000	48,000	24,000	
	Principal (B)			300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	
	(A) + (B)	240,000	240,000	540,000	516,000	492,000	468,000	444,000	420,000	396,000	372,000	348,000	324,000	
	Balance	3,000,000	3,000,000	2,700,000	2,400,000	2,100,000	1,800,000	1,500,000	1,200,000	900,000	600,000	300,000	0	
Total	Loan Fund													
	Interest (A)	464,000	432,000	400,000	344,000	288,000	232,000	176,000	120,000	96,000	72,000	48,000	24,000	
	Principal (B)	400,000	400,000	700,000	700,000	700,000	700,000	700,000	300,000	300,000	300,000	300,000	300,000	
	(A) + (B)	864,000	832,000	1,100,000	1,044,000	988,000	932,000	876,000	420,000	396,000	372,000	348,000	324,000	
	Balance	5,400,000	5,000,000	4,300,000	3,600,000	2,900,000	2,200,000	1,500,000	1,200,000	900,000	600,000	300,000	0	

Table-A.4.1-(2) Repayment Schedule

(Total Construction Cost at Standard Estimation)

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Profit	498,280	293,266	103,109	80,200	153,250	350,443	659,577	678,909	678,909	678,909
Depreciation	378,000	378,000	378,000	378,000	378,000	609,500	609,500	609,500	609,500	609,500
Repayment		320,000	320,000	320,000	320,000	560,000	560,000	560,000	560,000	560,000
Net Balance	120,280	253,266	45,109	138,200	211,250	399,943	709,077	728,409	728,409	728,409
Total	120,280	373,546	418,655	280,455	69,205	330,738	1,039,815	1,768,224	2,496,633	3,285,042

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Profit	1,099,109	1,099,109	1,099,109	1,099,109	1,099,109	1,271,009	1,271,009	1,271,009	1,271,009	1,271,009
Depreciation	189,300	189,300	189,300	189,300	189,300	17,400	17,400	17,400	17,400	17,400
Repayment	960,000	928,000	896,000	864,000	832,000	1,100,000	1,044,000	988,000	932,000	876,000
Net Balance	328,409	360,409	392,409	424,409	456,409	188,409	244,409	300,409	356,409	412,409
Total	3,613,451	3,973,860	4,366,269	4,790,678	5,247,087	5,435,496	5,679,905	5,980,314	6,336,723	6,749,132

Item	2001	2002	2003	2004	2005
Profit	1,271,009	1,271,009	1,271,009	1,271,009	1,271,009
Depreciation	17,400	17,400	17,400	17,400	17,400
Repayment	420,000	396,000	372,000	348,000	324,000
Net Balance	868,409	892,409	916,409	940,409	964,409
Total	7,617,541	8,509,950	9,426,359	10,366,768	11,331,177

Table-A.4.1-(3) Repayment Schedule

(Total Construction Cost at Standard Estimation - 4,000 FMG)

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Profit	438,280	217,266	15,109	180,200	253,250	526,443	859,577	879,909	879,909	879,909
Depreciation	378,000	378,000	378,000	378,000	378,000	609,500	609,500	609,500	609,500	609,500
Repayment		320,000	320,000	320,000	320,000	560,000	560,000	560,000	560,000	560,000
Net Balance	60,280	159,266	42,891	238,200	311,250	575,943	909,077	929,409	929,409	929,409
Total	60,280	219,546	176,655	61,545	372,795	948,738	1,857,815	2,787,224	3,716,633	4,646,042

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Profit	1,300,109	1,300,109	1,300,109	1,300,109	1,300,109	1,472,009	1,472,009	1,472,009	1,472,009	1,472,009
Depreciation	189,300	189,300	189,300	189,300	189,300	17,400	17,400	17,400	17,400	17,400
Repayment	960,000	928,000	896,000	864,000	832,000	1,100,000	1,044,000	988,000	932,000	876,000
Net Balance	529,409	561,409	593,409	625,409	657,409	389,409	445,409	501,409	557,409	613,409
Total	5,175,451	5,736,860	6,330,269	6,955,678	7,613,087	8,002,496	8,447,905	8,949,314	9,506,723	1,012,132

Item	2001	2002	2003	2004	2005
Profit	1,472,009	1,472,009	1,472,009	1,472,009	1,472,009
Depreciation	17,400	17,400	17,400	17,400	17,400
Repayment	420,000	396,000	372,000	348,000	324,000
Net Balance	1,069,409	1,093,409	1,117,409	1,141,409	1,165,409
Total	11,189,541	12,282,950	13,400,359	14,541,768	15,707,177

Table-A.4.1-(4) Repayment Schedule

(Total Construction Cost at Standard Estimation + 4,000 FMG)

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Profit	558,280	369,266	191,109	19,800	53,250	174,443	429,577	478,909	478,909	478,909
Depreciation	378,000	378,000	378,000	378,000	378,000	609,500	609,500	609,500	609,500	609,500
Repayment		320,000	320,000	320,000	320,000	320,000	560,000	560,000	560,000	560,000
Net Balance	180,280	311,266	133,109	38,200	111,250	463,943	479,077	528,409	528,409	528,409
Total	180,280	491,546	624,655	586,455	475,205	11,262	467,815	996,224	1,524,633	2,053,042

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Profit	899,109	899,109	899,109	899,109	899,109	1,071,009	1,071,009	1,071,009	1,071,009	1,071,009
Depreciation	189,300	189,300	189,300	189,300	189,300	17,400	17,400	17,400	17,400	17,400
Repayment	960,000	928,000	896,000	864,000	832,000	1,100,000	1,044,000	988,000	932,000	876,000
Net Balance	128,409	160,409	192,409	224,409	256,409	11,591	44,409	100,409	156,409	212,409
Total	2,181,451	2,341,860	2,534,269	2,758,678	3,015,087	3,003,496	3,047,905	3,148,314	3,304,723	3,517,132

Item	2001	2002	2003	2004	2005
Profit	1,071,009	1,071,009	1,071,009	1,071,009	1,071,009
Depreciation	17,400	17,400	17,400	17,400	17,400
Repayment	420,000	396,000	372,000	348,000	324,000
Net Balance	668,409	692,409	716,409	740,409	764,409
Total	4,185,541	4,877,950	5,594,359	6,334,768	7,099,177

Table-A.4.1-(5) Repayment Schedule

(Total Construction Cost at Standard Estimation - 10 % Rate of Interest)

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Profit	588,462	384,787	195,443	12,830	60,305	188,102	495,346	514,678	514,678	514,678
Depreciation	378,000	378,000	378,000	378,000	378,000	609,500	609,500	609,500	609,500	609,500
Repayment		400,000	400,000	400,000	400,000	700,000	700,000	700,000	700,000	700,000
Net Balance	210,462	406,787	217,443	34,830	38,305	97,602	404,846	424,178	424,178	424,178
Total	210,462	617,249	834,692	869,522	831,217	733,615	328,769	95,409	519,587	943,765

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Profit	934,878	934,878	934,878	934,878	934,878	1,106,778	1,106,778	1,106,778	1,106,778	1,106,778
Depreciation	189,300	189,300	189,300	189,300	189,300	17,400	17,400	17,400	17,400	17,400
Repayment	1,100,000	1,060,000	1,020,000	980,000	940,000	1,200,000	1,130,000	1,060,400	990,000	920,000
Net Balance	24,178	64,178	104,178	144,178	184,178	75,822	5,822	63,778	134,178	204,178
Total	967,943	1,032,121	1,136,299	1,280,477	1,464,655	1,388,833	1,383,011	1,446,789	1,580,967	1,785,145

Item	2001	2002	2003	2004	2005
Profit	1,106,778	1,106,778	1,106,778	1,106,778	1,106,778
Depreciation	17,400	17,400	17,400	17,400	17,400
Repayment	450,000	420,000	390,000	360,000	330,000
Net Balance	674,178	704,178	734,178	764,178	794,178
Total	2,459,323	3,163,501	3,897,679	4,661,857	5,456,035

Table-A.4.2 Production Cost (Standard Condition)

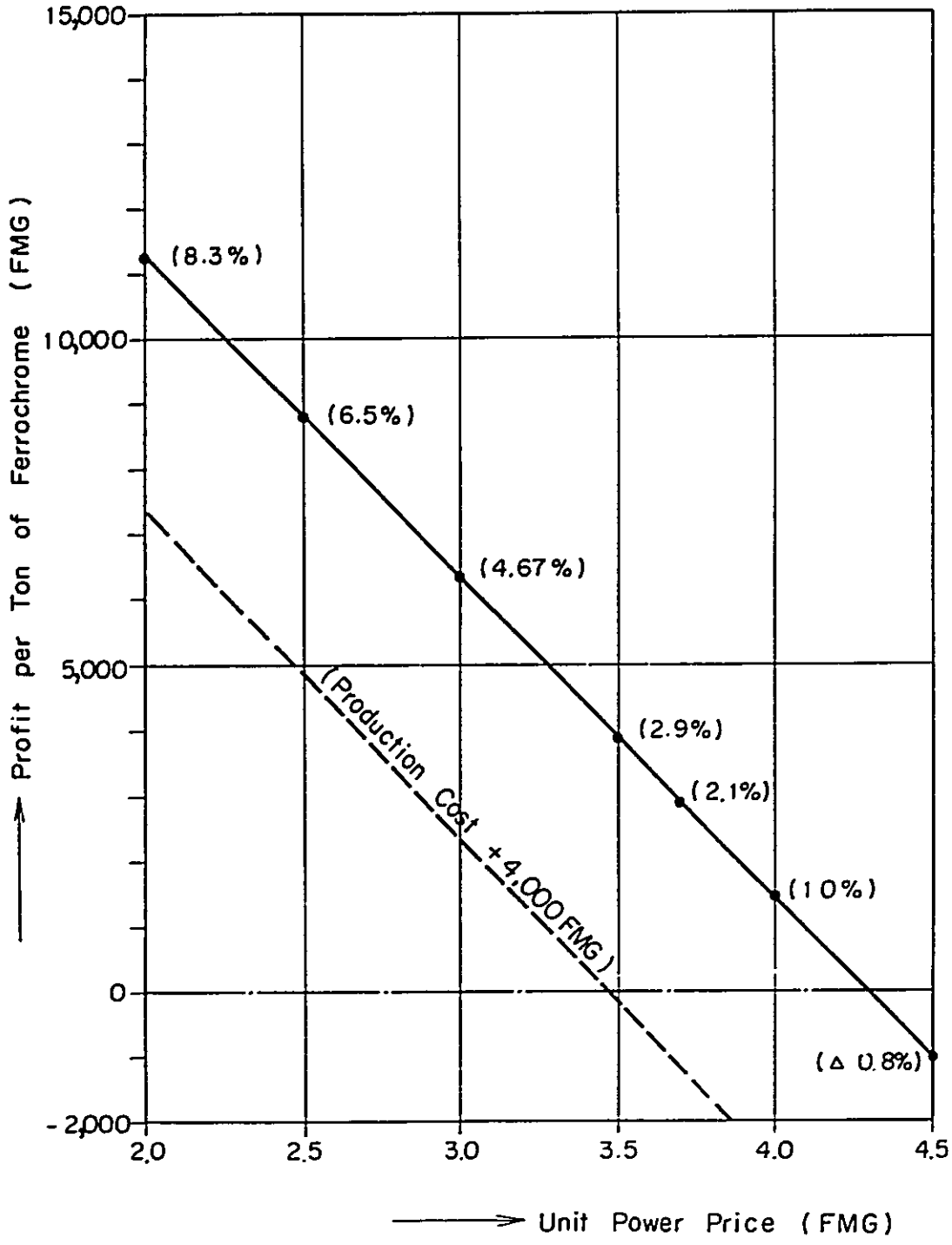
Unit: FMG

Item			Unit Consumption (t)	Unit Price	Electric Power Unit Price 3.70		Electric Power Unit Price 4.00	
					Cost Per Ton	Ratio %	Cost Per Ton	Ratio %
Direct Cost	Materials Cost	Chrome Ore	2.4	8,000	19,200	25.4	19,200	25.0
		Wood Charcoal	0.75	8,000	6,000	8.0	6,000	7.8
		Quartzite and Lime Stone	0.2	3,200	640	0.8	640	0.8
		Electrode Paste	0.04	120,000	4,800	6.4	4,800	6.2
		Electric Power	kWh 4,950	3.70	18,320	24.3	-	-
				4.00	-	-	19,800	25.8
		Industrial Water	75	2.00	150	0.2	150	0.2
		Sub-total			(49,110)	65.1	(49,110)	65.8
	Maintenance Cost and Operating Supplies Cost				4,800		4,800	
	Labor Cost				3,500		3,500	
	Total				(57,410)	76.1	(58,890)	76.6
	Depreciation				14,200		14,200	
	General Plant Overhead and Insurance Premium				3,800		3,800	
	Total				(18,000)	23.9	(18,000)	23.4
Production Cost					75,410	100	76,890	100
Standard Cost (71,940)					3,470	4.8	4,950	6.9

Table-A.4.3 List of Personnel by Job Classifications

Classifications	1 Furnace	2 Furnaces
	1981	1986
	Number	Number
Laborer of all-work	76	133
Operator	28	53
Skilled worker	34	36
Skilled electrician	13	16
Vehicle Driver and Operator	14	17
Cook	1	1
Guard	7	7
Nurse	2	2
Clerk	8	8
Engineer	4	4
Manager	3	3
Total	190	280

Fig-A.4.1 Unit Power Price and Profit per Ton of Ferrochrome



Note : Figure in parenthesis shows ratio attained as against sales price -136,000 FMG

Table-A.5.1 Rainfall Observatories and Observation Period

Rain fall Data

N°	Station	Monthly Rainfall Observation Period	Max. 24 hours Rainfall Observation Period	Remarks
1	Mouneyres	1936 - 1970	1936 - 1970	1965, 1970
8	Moramanga	1931 - 1974/6	1931 - 1970	1951, 1952, 1954 1973
3	Andekaleka	1935/7 - 1973/11	1935/6 - 1973/11	1953, 1954, 1955
7	Masse =Ampasimpotsy	1938 - 1974/6	1938 - 1974/6	1971
13	Didy	1936 - 1970	1936 - 1970	1947, 1948, 1949
6	Andasibe (=Analama)	1931 - 1974/6	1931 - 1970	
11	Ambasary	1951 - 1973	1963 - 1974/6	1968, 1969, 1970 1972, 1973, 1974
10	Ambohidray	1949 - 1974/6	1954/11 - 1974/6	1969, 1970
16	Beforona	1973 - 1974/4	1973 - 1974/4	
12	Andaingo	1961/10 - 1974/6	1961/10 - 1974/6	1970, 1971, 1973

Total 10 stations

Temperature

N°	Station	Observation Period	Remarks
8	Moramanga	1941 - 1970	Monthly Max and Min.
6	Anaramazaotra	1941 - 1970	"
16	Beforona	1974/1 - 1974/4	"

Total 3 stations

Table-A.5.2 Monthly Total Rainfall

Amboasary Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1957			374.5	26.5	0.0	31.3			4.4	0.0		361.7	798.4
1958	251.6	101.3	188.4	39.8		24.6	34.0			140.0	122.3	455.4	1357.4
1959	463.1	261.1	754.1	11.8	8.8	22.7		13.5		6.2	320.9	129.8	1992.0
1960	370.6	107.7	166.4	6.8	9.9	23.0	13.2	0.0	19.0	20.3	133.1	202.8	1072.8
1961	374.6			183.6	0.0	17.6	47.2	40.7	5.8	21.4	148.8	182.0	1021.7
1962		214.7	76.8	19.9	34.5	4.1	38.8	12.4		12.7	162.4		576.3
1963	242.0	111.7	63.4	37.0			9.8					242.2	706.1
1964	89.9	209.5	296.6	7.6		21.3	52.8	74.5		5.2	40.8	37.2	835.4
1965		36.0		8.0	0.9	0.0	18.4	16.3	0.9	0.1		201.3	281.9
1966	109.9	182.5	96.2	26.1	0.7				0.4		205.4	307.7	928.9
1967	202.8	24.6	199.6	48.0	22.5		0.6	150.8	22.2	112.4	154.7		938.2
1968	92.6	128.1	132.8	109.3								275.1	737.9
1969	163.0	112.9	173.3	117.0	7.5				0.0	104.5	147.0		825.2
1970	320.6	94.5	279.3	124.6	88.7	33.3	100.1	54.0	0.0	0.0	126.3	144.9	1366.3
1971	472.3	196.1		26.4			15.8			20.8	405.2	217.2	1353.8
1972	77.7	288.7	266.5		9.0	21.5		22.0		109.0	152.0	127.0	1073.4
1973	220.5	140.2					50.8	46.0	0.0		0.7		458.2
1974				86.0		139.7							225.7
Total	3451.2	2209.6	3067.9	878.4	182.5	339.1	381.5	430.2	52.7	552.6	2119.6	2884.3	16549.6
Average	246.5	147.3	217.9	54.9	16.6	30.8	34.7	43.0	5.9	42.5	163.0	221.9	
Max.	472.3	288.7	754.1	183.6	88.7	139.7	100.1	150.8	22.2	140.0	405.2	455.4	
Min.	13.2	31.5	31.0	6.8	0.0	0.0	0.6	0.0	0.0	0.0	0.7	12.0	

Ambohidray Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1949											94.1	27.6	121.7
1950	327.8	290.2	103.8	13.8	0.2		25.8	3.3	0.8	14.7		20.3	800.7
1951		67.3			0.5	1.0	2.6	1.0	1.1	14.1	183.4	72.2	343.2
1952	267.2	109.5	113.7	30.3	79.7	146.5	3.0	35.6	57.1	1.5	283.6	57.6	1185.3
1953	78.3	93.7	94.8	70.2			26.2	24.2	41.1				428.5
1954	111.5	40.0	83.8	15.8	10.8	57.8	3.1	26.6	12.6		191.4	77.6	631.0
1955	173.4	26.4	169.5	4.8	17.5	48.4	58.2	44.5		24.5	76.5	166.4	810.1
1956	270.9	19.2		19.9	48.5	3.6			0.0	0.0	160.0	200.5	722.6
1957	8.5	112.5	89.3	20.0		8.8	46.4		20.5	15.7	55.4	149.9	527.0
1958	217.1	51.6	158.8	11.3	21.4	0.0	26.0	34.8	66.4	115.9	145.1	310.3	1158.7
1959	296.4	263.4	650.1	2.2	4.1	12.4	38.3	10.3		38.8	201.7	91.1	1608.8
1960	347.7	108.2	97.3			26.0	14.6	8.8	9.5	22.7	101.8	219.8	956.4
1961	176.4	14.8	151.8	67.6	10.6	16.2	62.0	35.7		12.6	104.5	320.3	972.5
1962	70.6	202.2	75.1	8.9	34.0	8.1	54.5	24.9	5.2	26.9	119.7	326.4	956.5
1963	333.8	88.2	151.4	43.3	41.3	17.3	5.3	23.8	19.1	42.3	203.3	210.9	1180.0
1964	109.7	242.0	219.8	15.5	3.6	26.8	68.3	32.9	19.6	50.1	142.7	395.1	1326.1
1965	348.3	293.6	89.9	97.1	3.5		30.6	45.5	22.7	3.2	123.1	273.7	1331.2
1966	108.1	134.7	50.3	24.2	51.7	7.3	11.9	72.2	3.2	16.1	73.6	231.7	785.0
1967	289.4	147.9	235.0	35.8	8.1	25.7	27.4	118.9	22.9	44.0	368.0	454.9	1778.0
1968	338.2	147.5	276.6	92.3	36.8	18.2	42.6	6.3		6.2	191.5	236.5	1392.7
1969	132.6	135.2	57.4	126.7		7.5							459.4
1970										2.5	96.9	158.8	258.2
1971	303.4			29.1	93.4	30.0	59.8	33.2	24.6	81.5	294.0	123.5	1072.5

Ambohidray Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1972	126.0	533.0	338.9	131.0	34.3	16.0	40.3		5.3	58.3	119.5	246.9	1649.5
1973	525.0	411.9	236.1	57.5		49.8	24.6	15.8	6.4	11.5	25.3	207.3	1571.2
1974	455.0	231.7	166.1	86.1	19.7	73.2							1031.8
Total	5415.3	3764.7	3609.5	1003.4	519.7	600.6	671.5	598.3	338.1	603.1	3355.1	4574.3	25053.6
Average	235.4	163.7	171.9	45.6	27.4	28.6	32.0	31.5	18.8	28.7	152.5	198.9	
Max.	525.0	533.0	650.1	131.0	93.4	146.5	68.3	118.9	66.4	115.9	368.0	454.9	
Min.	8.5	19.2	50.3	2.2	0.2	0.0	2.6	1.0	0.0	0.0	25.3	20.3	

Andaingo Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1961										0.0	158.4	136.9	295.3
1962	96.9	182.7	195.8	56.0	23.0	4.8	5.0	15.0	7.0	43.8	124.6	204.2	958.8
1963	243.7	201.9		163.3	56.3	18.9	18.1	5.7	2.5	81.0	318.8	329.3	1439.5
1964	20.2		117.5	34.1	1.3	32.9	68.6	7.6	0.0	66.7	97.1	264.3	710.3
1965	232.5	108.0	66.1	3.1	5.9	12.8	50.4	46.6	3.9	12.4	59.5	279.0	880.2
1966	36.7	116.7		28.8	5.5	52.4	37.8	47.6	4.2	5.5	172.6	231.4	739.2
1967	279.5	144.6	157.5	36.8		15.0	9.1	16.0		44.8	369.0	375.5	1447.8
1968	151.2	194.9	121.3			17.0		1.3	4.9	4.2	220.7	486.1	1359.4
1969	157.8	106.8	154.6	79.8		2.9	5.3	13.9		74.1	151.8	331.5	1078.5
1970	432.4	200.5	187.6					2.5			129.8	150.2	1103.0
1971	308.6	125.3	78.0							23.4	344.0	243.4	1122.7
1972	158.8	474.3	231.5	75.1	4.5	2.5	26.0	24.2		19.8	152.7	247.4	1416.8
1973	253.5	308.4	200.8	94.4		2.2		4.8			8.9	153.1	1026.1
1974	332.7	152.5	94.0	45.0		39.7							663.9
Total	2704.5	2316.6	1611.9	616.4	96.5	201.1	220.3	185.2	22.5	375.7	2307.9	3432.5	14090.9
Average	208.0	193.1	146.5	61.6	16.1	18.3	27.5	16.8	3.8	34.2	177.5	264.0	
Max.	432.4	474.3	231.5	163.3	56.3	52.4	50.4	47.6	7.0	81.0	369.0	486.1	
Min.	20.2	108.0	66.1	3.1	1.3	2.2	5.0	1.3	0.0	0.0	8.9	136.9	

Beforona Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1973	854.0	907.4	412.2	143.1	43.4	206.2	197.7	168.2	66.7	55.3	10.6	306.9	3371.7
1974	689.1	507.6	449.7	377.1									2023.5
Total	1543.1	1415.0	861.9	520.2	43.4	206.2	197.7	168.2	66.7	55.3	10.6	306.9	5395.2
Average	771.6	707.5	431.0	260.1									
Max.													
Min.													

Analamazaotra Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1931	595.5	355.7	425.0	145.7	59.2	57.2	64.4	71.8	20.5	19.5	281.9	175.3	2271.7
1932	456.7	241.5	134.1	143.3	111.1	42.1	71.6	39.9	129.8	26.0	108.6	193.6	1698.3
1933	285.8	563.3	126.9	294.0	68.1	185.7	52.2	50.7	68.1	25.9	30.1	188.7	1939.5
1934	215.2	221.3	244.1	104.2	94.1	95.3	73.1	124.9	87.7	22.2	141.2	452.5	1875.8
1935	305.4	331.1	89.9	177.4	10.1	167.0	83.2	62.1	41.1	19.8	118.4	354.2	1759.7
1936	236.4	71.9	167.2	89.6	47.2	150.2	139.6	48.1	35.7	77.9	107.1	166.3	1337.2
1937	253.8	421.3	540.9	39.2	81.0	23.2	49.0	91.8	51.7	65.2	25.4	149.3	1791.8
1938	125.1	445.8	106.2	39.7	29.0	82.4	59.6	5.7	48.9	43.5	58.2	68.1	1112.2
1939	224.1	368.8	231.2	86.4	62.4	45.6	64.2	65.6	43.3	7.0	49.9	516.7	1765.2
1940	340.6	700.7	306.2	52.3	45.3	32.7	85.4	71.1	28.1	121.4	13.1	378.1	2175.0
1941	422.2	322.9	203.3	128.7	54.3	41.3	76.5	119.4	45.9	82.3	169.1	154.8	1820.7
1942	144.6	66.5	166.2	48.5	46.7	55.7	86.7	101.2	39.3	86.7	133.3	119.8	1095.2
1943	444.5	308.3	164.6	10.4	11.2	76.7	78.5	27.4	89.9	24.3	3.5	341.7	1581.0
1944	149.7	200.4	363.3	217.8	66.0	38.3	161.2	29.7	43.5	90.6	97.1	322.5	1780.1
1945	152.3	409.5	96.4	138.3	33.6	3.2	33.7	51.7	18.8	36.8	71.9	245.9	1292.1
1946	201.9	341.2	199.5	97.0	71.1	62.2	64.1	51.7	80.3	58.9	194.8	193.5	1616.2
1947	233.3	224.7	284.0	96.1	58.2	134.8	90.7	106.0	61.1	39.5	46.8	122.4	1497.6
1948	490.5	217.9	291.6	73.0	23.6	76.4	122.6	66.5	96.2	143.6	194.8	338.8	2135.5
1949	114.7	205.8	542.5	101.0	127.6	96.0	103.5	23.1	30.3	24.9	108.2	195.3	1672.9
1950	233.1	637.9	126.0	69.6	20.2	34.9	107.8	50.3	47.7	19.7	65.1	49.6	1461.9
1951	597.7	617.1	260.7	51.3	36.2	63.8	35.0	53.0	15.2	23.4	147.7	177.6	2078.7
1952	239.0	111.0		73.7	282.4	170.6	75.6	123.2	38.5	27.4	297.4	168.5	1607.3
1953	125.8	104.7	205.1	71.6	21.6	100.0	66.9	160.4	96.3	43.8	78.5	327.0	1401.7
1954	536.2	128.5	203.4	53.0	66.2	109.1	50.4	63.6	39.6	15.1	172.7	237.0	1674.8
1955	269.1	260.9	312.3	28.7	72.4	91.0	125.1	28.8	49.2	22.9	95.5	180.5	1536.4

Analamazaotra Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1956	537.2	619.5	86.3	169.6	70.4	47.0	32.4	23.2	19.1	6.5	273.3	187.7	2072.2
1957	182.0	299.6	253.3	143.6	31.9	48.3	60.3	44.5	57.5	12.8	38.5	395.8	1568.1
1958	222.1	155.0	367.0	33.5	69.9	108.4	73.7	124.3	36.3	76.4	105.3	311.2	1683.1
1959	273.0	163.9	1208.2	40.5	22.1	56.4	109.2	27.3	44.6	51.8	230.7	185.1	2412.8
1960	480.8	140.9	151.2	17.0	40.0	87.0	52.3	42.3	43.1	36.1	150.8	164.9	1406.4
1961	229.5	32.1	181.7	89.6	23.7	4.0	152.0	106.4	63.4	14.2	134.6	507.7	1368.9
1962	189.2	236.2	75.0	30.7	75.5	33.4	73.6	105.0	89.2	86.1	89.2	132.2	1215.3
1963	275.8	271.3	299.9	103.4	59.3	52.0	67.0	48.0	30.4	63.1	204.1	471.1	1945.4
1964	100.5	219.4	504.4	59.8	37.3	76.2	204.7	106.4	118.5	118.9	90.4	156.4	1792.9
1965	414.4	292.1	323.4	69.5	30.7	26.1	130.9	117.0	65.5	34.2	118.8	372.9	1995.5
1966	165.5	213.7	125.9	39.5	103.8	97.0	81.4	100.5	49.3	24.2	49.8	302.7	1353.3
1967	367.2	148.5	197.5	51.8	76.3	120.9	90.0	236.9	49.0	48.6	210.3	272.4	1739.4
1968	459.7	196.3	188.2	53.1	29.7	33.0	130.5	33.5	21.4	30.4	254.0	139.9	1569.7
1969	385.8	301.4	95.3	124.9	28.0	60.9	90.2	310.0	69.0	47.5	91.1	551.7	2155.8
1970	591.7	303.3	342.2	423.8	101.9	111.0	114.4	149.3	19.8	12.7	118.2	142.7	2431.0
1971	1071.5	371.5	87.4	63.0	61.3	46.6	118.7	79.6	43.1	69.5	161.4	181.3	2354.9
1972	228.9	572.4		96.1	43.1	16.0	125.4	25.7	30.9	165.2	115.5	323.3	1742.5
1973	650.2	537.3	210.6	90.1	13.9	100.2	101.8	89.7	15.2	28.9	2.0	176.9	2016.8
1974	438.5	203.2	309.5	201.4	32.5	132.0							1317.1
Total	14656.7	13156.3	10722.6	4331.4	2550.1	3291.8	3829.1	3457.3	2212.0	2095.4	5248.3	10793.6	76344.6
Average	333.1	299.0	255.3	98.4	58.0	74.8	89.0	80.4	51.4	48.7	122.0	251.0	
Max.	1071.5	700.7	1208.2	423.8	282.4	185.7	204.7	310.0	129.8	165.2	297.4	551.7	
Min.	100.5	32.1	75.0	17.0	13.9	3.2	32.4	5.7	15.2	6.5	2.0	49.6	

Didy Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1936	296.0	36.7	207.2	78.4	27.5	118.3	172.8	12.4	17.7	53.8	83.8	194.2	1298.8
1937	285.1	226.5	938.0	14.7	165.2	10.0	112.5	151.9		9.5	8.5	136.8	2058.7
1938	205.0	387.3	341.2	50.2	18.9	62.7	58.8	17.1	49.1	35.4	32.0	36.1	1293.8
1939	241.9	203.6	335.2	55.8	47.5	24.4	50.4	65.9	27.8	13.0	40.5	511.4	1617.4
1940	212.0	422.3	170.8	27.6	21.7	35.5	54.7	56.0	21.0	38.8	43.4	411.6	1515.4
1941	454.1	345.4	290.4	76.8	48.1	39.4	88.4	80.3	27.0	115.2	82.4	72.8	1720.3
1942	269.0	173.2	190.4	52.3	47.6	54.7	77.0	56.9	26.0	69.5	132.6	219.5	1368.7
1943	540.8	246.9	215.7	18.1	3.8	57.2	69.6	37.4	87.1	9.8	1.5	288.4	1576.3
1944	102.3	169.7	377.0	144.0	37.0	26.7	117.8	29.2	54.5	43.4	70.0	251.5	1423.1
1945	150.8	390.5	126.4	50.3	26.4	5.3	52.4	81.8	10.5	13.4	66.8	422.6	1397.2
1946	231.2	428.1	148.8	82.6	34.8	38.2	41.4	37.5	61.6	49.1	246.2	160.1	1559.6
1947	257.0	344.6	349.9	97.1									1048.6
1948													
1949									22.9	22.0	60.4	54.9	160.2
1950	217.1	426.9	85.2	35.0	4.5	28.0	65.0	20.3	7.4	0.7	44.7	38.3	973.1
1951	384.7	153.4	94.9	14.7	17.3	41.9	23.5	41.4	13.8		92.7	107.7	986.0
1952	257.3	141.2	100.5	81.0	136.5	86.9	37.5	63.7	10.2	14.1	191.2		1120.1
1953	107.5	142.0	193.0	109.8	17.2	18.5	46.7	100.5	51.6	19.9	89.1	58.5	954.3
1954	252.0	86.3	48.4	1.2	36.0	72.1	46.3	54.3	46.9	21.0	115.5	274.4	1054.4
1955	223.2	84.4	194.5	35.5	36.0	79.3	58.0	45.3	32.3	14.0	63.5	148.8	1014.8
1956	421.7	378.4	107.9	98.6	73.5	8.6	3.7	4.1	2.9	1.2	152.2	244.3	1497.1
1957	284.3	131.5	275.3	113.0	12.2	5.8	41.3	47.0	38.7	14.2	16.0	131.7	1111.0
1958	298.4	101.8	275.6	46.9	13.7	96.4	17.7	62.0	65.9	220.6	61.6	172.7	1433.3
1959	184.0	128.9	616.5	58.0	14.0	44.8	25.3	46.3	33.1	82.2	280.8	223.0	1678.9
1960	201.5	53.0	42.5	7.5	13.6	41.1	4.9	47.3	2.9	7.7	117.8	115.3	655.3

Didy Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1961	146.2	46.4	82.3	119.5	0.9	1.4	17.3				102.7	294.2	810.9
1962	113.4	232.5	61.0	12.7	27.4	20.1	27.1	47.0	30.0	90.9	140.1	110.1	912.3
1963	188.0	132.4	120.4	16.6	32.2	33.7	77.8	17.4	16.2	44.0	88.5		767.2
1964	16.5	174.5	395.1	19.2	34.9	43.3	74.3	34.8	22.7	64.0	19.0	128.1	1026.4
1965	301.3	95.6	98.4	9.0	22.2	7.0	118.9	80.1	24.5	9.3	72.5	140.2	979.0
1966	46.7	174.5	56.1	16.9	19.7	77.1	43.3	82.9	57.6	9.8	24.1	350.2	958.9
1967			216.8	28.7		102.9	58.2	181.2	17.2	60.4	57.0		722.4
1968	62.1			11.6	8.0		94.7		11.5	22.7	79.9	198.5	511.5
1969		156.0				21.8	46.3	66.5	8.6				299.2
1970						34.4		35.3	38.3	13.1		137.2	258.3
1971	297.0	159.9	80.5	24.6	56.8	24.6	103.5		36.8	78.6	262.6	162.2	1287.1
1972	110.2					30.0	76.0	44.2	26.7				287.1
Total	7506.8	6374.4	6825.9	1607.9	1055.1	1392.1	2003.1	1748.0	1001.0	1261.3	2939.6	5795.5	39510.7
Average	220.8	193.2	206.8	47.3	33.0	39.8	57.2	53.0	27.8	37.1	86.5	175.6	
Max.	540.8	426.9	938.0	144.0	165.2	118.3	172.8	181.2	87.1	220.6	280.8	511.4	
Min.	16.5	36.7	42.5	1.2	0.9	1.4	3.7	4.1	2.9	0.7	8.5	36.1	

Masse Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1938	165.1	462.0	137.3	45.1	21.5	63.0	49.8	19.1	36.5	58.9	45.6	60.3	1164.2
1939	263.6	339.9	279.6	72.3	71.6	40.2	62.9	56.8	36.4	11.6	52.8	518.8	1806.5
1940	292.0	537.7	278.3	37.6	45.7	42.5	94.9	83.9	30.9	102.4	27.4	427.5	2000.8
1941	373.9	332.8	219.0	92.1	42.6	44.1	55.7	91.4	33.9	104.0	173.9	91.3	1654.7
1942	207.3	140.5	192.3	51.6	47.6	41.7	65.8	59.6	19.1	53.5	156.4	99.0	1134.4
1943	635.8	251.6	251.4	40.4	5.4	40.9	49.1	20.5	54.4	6.8	0.6	459.9	1816.8
1944	204.1	269.7	403.5	215.5	72.5	26.1	95.2	22.1	37.2	110.8	93.0	245.6	1795.3
1945	105.1	378.2	123.0	122.0	42.7	2.3	32.9	37.5	7.5	29.2	66.2	298.8	1245.4
1946	183.5	421.5	285.9	40.5	49.9	71.2	34.0	47.4	63.8	69.7	238.3	241.5	1747.2
1947	219.4	183.3	406.1	85.7	68.9	75.6	34.3	73.8	28.2	17.6	58.7	118.3	1369.9
1948	484.7	189.4	176.0	42.6	23.8	47.1	94.0	40.9	65.8	77.0	205.8	328.7	1775.8
1949	95.9	131.6	389.6	93.3	92.0	66.7	74.0	10.4	23.4	29.2	43.3	85.8	1135.2
1950	256.0	442.8	143.1	52.5	20.1	24.5	91.4	77.5	45.5	26.0	89.1	47.9	1316.4
1951	555.0	443.6	278.9	81.9	29.8	81.1	32.0	89.9	16.7	33.9	191.6	114.3	1948.7
1952	287.5	254.5	173.3	87.8	142.7	124.0	69.3	96.2	36.9	28.6	234.4	183.7	1718.9
1953	101.7	104.6	248.9	102.2	26.6	92.2	74.7	116.4	98.2	66.3	108.4	258.4	1398.6
1954	506.2	197.2	233.2	33.8	71.4	93.3	49.9	62.4	50.1	15.2	194.8	181.0	1688.5
1955	288.7	183.8	340.0	34.7	76.6	87.1	90.3		37.5	30.6	162.3	249.8	1581.4
1956	500.7	507.8	174.2	174.6		70.6	61.4	34.6	18.7	8.3	282.3	171.8	2005.0
1957	153.9	297.4	253.9	141.2	35.6	60.7	42.9		73.7	18.2	36.7	374.8	1489.0
1958	319.5	194.7	454.3	28.1	81.1	144.6	125.6	97.7	63.3	85.2	135.5	355.8	2085.4
1959	332.7	178.1	991.4	12.8	2.5	24.6	64.1	11.3	18.9	45.9	84.1	125.6	1892.0
1960	234.0	100.8		12.7	19.3	16.8	13.2	10.6		32.9	138.3	96.2	674.8
1961	190.9	21.4	124.2	103.5	5.4	18.7	103.5	81.8	32.4	7.2	70.7	523.8	1283.5
1962	130.8	242.4	82.5	35.7	95.8	12.6	31.3	71.8	58.8	57.5	213.6	167.7	1200.5

Masse Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1963	327.7	216.5	255.5	137.0	39.4	68.9	48.1	28.1	19.6	38.1	192.4	298.3	1669.6
1964	96.1	152.5	407.2	34.8	33.5	51.3	129.4	61.2	70.7	73.1	98.4	222.7	1430.9
1965	421.7	218.9	293.0	58.8	41.6	21.5	151.2	42.5			128.0	187.3	1564.5
1966		134.7	99.5	63.9	172.9	64.2	136.5	12.8	42.4	6.9	59.2	315.9	1108.9
1967	284.7	89.2	98.4	88.5		51.1	17.8	135.3	17.6	46.0	300.9	395.2	1524.7
1968	306.2	302.7	167.2	94.2	20.7	48.4	37.8			5.2	160.1	226.4	1368.9
1969	172.8	215.6	169.4	146.8	27.8	25.6	45.8		5.9	45.1	79.3	453.1	1387.2
1970	487.4	262.4	132.3	186.3	57.2	61.2	59.4	67.4	9.2	3.3	122.3	220.0	1668.4
1971							74.5	84.2	29.7	40.4	124.5	214.5	567.8
1972	233.7	430.7	405.8	38.8	33.5	27.3	83.2	15.1	17.5	80.8	130.7	263.3	1760.4
1973	533.0	388.0	184.8	63.7	10.0	78.7	69.2	59.3	9.1	6.2	5.1	177.7	1584.8
1974	305.9	232.3	177.2	157.3	38.6	141.2							1052.5
Total	10257.2	9450.8	9030.2	2910.3	1666.3	1927.6	2445.1	1819.5	1209.5	1471.6	4504.7	8800.7	55493.5
Average	293.1	262.5	258.0	80.8	49.0	53.5	67.9	56.9	36.7	42.0	125.1	244.5	
Max.	555.0	537.7	991.4	215.5	172.9	144.6	151.2	135.3	98.2	110.8	300.9	523.8	
Min.	95.9	21.4	82.5	12.7	2.5	2.3	13.2	10.4	5.9	3.3	0.6	47.9	

Andekaleka Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1935							97.1	33.8	63.7	21.8	200.8	748.8	1166.0
1936	585.8	133.8	443.8	201.4	69.4	281.7	274.8	106.2	123.0	169.1	162.4	617.9	3169.3
1937	548.3	616.5	729.4	75.1	135.8	47.9	74.6	252.4	85.6	83.6	29.1	258.9	2937.2
1938	287.8	608.6	334.5	215.3	78.1	113.4	128.9	57.7	91.6	138.0	95.6	123.1	2272.6
1939	348.4	276.4	423.4	158.4	120.0		113.0	172.0	76.5	29.7	72.7	682.6	2473.1
1940	513.1	1227.6	478.2	66.2	97.6	75.0	133.4	167.8	116.7	126.6	77.9	407.8	3487.9
1941	636.7	568.2	403.8	140.0	76.1	81.3	126.2	213.9	100.6	147.4	157.8	211.4	2863.4
1942	261.0	226.0	353.8	169.8	94.6	143.8	134.5	187.3	126.9	155.0	223.2	224.8	2300.7
1943	763.1	437.0	417.0	36.5	345.0	91.2	93.2	47.9	115.8	24.7	21.2	399.1	2791.7
1944	280.8	211.8	600.7	441.0	79.0	93.0	264.7	51.6	124.4	113.8	220.5	545.0	3026.3
1945	184.4	573.3	348.9	231.6	93.4	19.0	51.5	89.9	69.8	96.2	193.6	449.0	2400.6
1946	370.5	574.4	446.6	243.4	141.8	91.6	113.4	181.0	139.8	91.7	293.7	534.5	3222.4
1947	337.7	410.0	949.5	298.8	158.2	229.8			130.6	57.4	82.0	128.3	2782.3
1948	623.2	431.1	464.9	112.7	72.3	172.9	257.8	134.2	174.3	159.5	168.4	570.5	3341.8
1949	257.8	337.9		267.0	188.4	173.1	164.4	48.4	53.5	53.9	154.1	162.2	1860.7
1950	452.7	795.5	318.4		51.2	68.3	45.0	37.0	49.0	53.0	108.0	38.0	2016.1
1951							99.5	207.7				384.3	691.5
1952	598.9	333.6	535.7	234.4	548.7	288.4	157.9	332.5	71.4	122.9	484.9	362.0	4071.3
1953	358.0	435.6	252.5	303.7	47.0	188.5	100.9	311.6					1997.8
1954	591.8												591.8
1955													
1956		926.0	290.1	260.6	262.4	110.3	140.4	98.6	43.8	13.4	273.0	315.8	2734.4
1957	258.5	500.0	434.8	254.7	136.8	124.5	124.9	104.8	118.5	13.4	72.4	494.7	2638.0
1958	385.3	368.4	544.1	56.8	104.6	205.0	171.3	137.0	47.9	139.8	112.7	323.6	2596.5

Andekaleka Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1959	513.1	326.4	1566.0	87.3	97.6	118.6	236.4	56.2	79.6	115.7	316.9	120.9	3634.7
1960	724.2	192.7	247.2	71.9	91.3	158.2	101.3	85.2	150.0	100.0	177.4	128.6	2228.0
1961	310.0	73.5	183.3	212.0	56.5	90.6	338.6	256.0	93.3	18.7	173.9	831.9	2638.3
1962	230.4	456.4	138.2	80.8	128.1	36.2	123.0	139.8	118.8	171.2	258.7	287.0	2168.6
1963	437.9	523.1	751.9	109.8	178.8	240.5	208.7	103.9	137.0	213.1	473.0		3377.7
1964	308.0	350.6	636.0	69.9	147.2	180.5	177.1	126.0	190.0	232.2	229.3	498.2	3145.0
1965	596.9	319.2	523.9	113.6	42.8	34.0	322.3	250.7	133.6	110.0	214.3	510.1	3171.4
1966	198.6	347.2	193.2	105.8	102.6	122.6	186.4	231.9	51.8	42.3	126.3	413.9	2122.6
1967	353.3	407.0	347.1	159.0	140.3	158.2	147.9	325.3	90.9	98.5	283.0	465.0	2975.5
1968	693.6	322.6	225.3	65.8	38.2	49.5	242.7	88.8	55.3	30.5	295.6	506.6	2614.5
1969	366.2	364.8	251.0	308.0		95.2	182.4	239.2	58.8	47.1	95.6	623.6	2631.9
1970	405.9	154.2	300.2	309.1	160.7	129.6	259.4	232.6	58.9	42.7			2053.3
1971	1041.2	326.4	149.4	158.7	94.1	70.2	273.3	152.3	75.7	79.1	277.7	256.5	2954.6
1972	351.5	701.3	557.6	197.6	81.5	31.1	162.7	78.3	49.5	304.7	358.8	524.7	3399.3
1973	888.9	808.6	487.5	103.5		174.8			55.9	30.3	13.9		2563.4
Total	16063.5	15665.7	15327.9	5920.2	4260.1	4288.5	5829.6	5339.5	3322.5	3447.0	6498.4	13149.3	99112.2
Average	459.0	447.6	450.8	174.1	129.1	126.1	166.6	152.6	94.9	98.5	191.1	398.5	
Max.	1041.2	1227.6	1566.0	441.0	548.7	288.4	338.6	332.5	190.0	304.7	484.9	831.9	
Min.	184.4	73.5	138.2	36.5	38.2	19.0	45.0	33.8	43.8	13.4	13.9	38.0	

Moramanga Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1931	360.8	140.2	298.9	68.5	28.2	30.0	35.3	29.0	12.5	6.4	192.3	306.0	1508.1
1932	321.4	239.4	171.5	75.1	62.5	32.6	41.5	14.0	42.1	4.4	91.1	109.9	1205.5
1933	176.0	438.2	53.5	147.0	28.3	88.5	19.5	18.0	28.5	0.0	12.0	279.0	1288.5
1934	191.0	141.2	95.0	58.7	79.8	65.3	36.6	66.6	35.8	15.8	132.0	601.5	1519.3
1935	613.9	297.9	138.3	147.5	8.7	33.5	41.1	24.6	14.7	24.9	154.0	340.3	1839.4
1936	393.8	76.9	122.9	80.5	38.0	80.5	87.9	30.6	21.8	45.5	162.0	256.6	1397.0
1937	419.0	401.3	249.9	40.6	180.1	0.0	75.0	71.8	26.1	86.2	7.7	384.0	1866.7
1938	108.4	645.6	153.3	57.3	7.6	140.4	25.6	5.9	25.8	36.0	43.7	78.7	1328.3
1939	125.0	128.5	217.0		35.6	20.6	32.8	29.2	12.6	6.2	82.8	667.4	1357.7
1940	239.8	396.7	184.0	21.3	14.6	15.4	42.0	40.4	16.4	46.1	31.1	410.3	1458.1
1941	447.7	407.0	217.3	57.1	42.9	24.1	34.0	81.6	18.1	89.5	131.9	106.1	1657.3
1942	193.8	176.6	138.4	46.6	25.8	26.8	63.7	35.8	20.2	33.2	288.2	144.1	1193.2
1943	509.4	246.7	238.5	22.2	4.3	34.7	29.5	7.9	29.2	5.3	0.2	445.3	1573.2
1944	144.4	272.5	405.7	171.5	65.5	29.1	40.9	13.9	23.9	69.9	98.2	250.0	1585.5
1945	128.1	283.6	117.3	147.8	18.8	2.0	16.1	25.0	10.1	26.0	93.3	274.0	1142.1
1946	117.6	387.0	151.3	49.9	55.4	55.7	49.0	24.9	33.8	67.5	246.8	233.6	1472.5
1947	268.0	153.0			51.4	52.1	27.9	54.7	17.6	9.7	89.5	128.0	851.9
1948	502.5	141.7	127.2	27.4			50.6	18.7	30.2	66.1	154.6	314.8	1433.8
1949		139.8	284.0	69.4	66.6	25.9	54.6	3.6	14.4	18.4	185.1	72.7	934.5
1950	284.2	386.5	173.6	50.0	8.6	13.7	53.4	17.8	16.8	33.2	79.0	38.1	1154.9
1951	423.4	284.5	194.2	83.5	20.9								1006.5
1952					85.4	76.7	28.1	61.4	49.3	9.6	312.4	145.8	768.7
1953	96.9	142.5	232.9	138.0	9.5	59.3	39.7	77.8	40.5	21.8	59.8	211.8	1130.5
1954		119.9	205.8	21.4	29.2	36.2	24.2						436.7
1955	291.5	98.4	320.3	16.8	46.0	46.9	78.9	48.9	35.2	37.3	112.9	263.0	1396.1

Moramanga Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1956	439.9	444.5	129.0	91.5	64.7	46.6	56.2	22.5	14.0	4.7	321.8	215.0	1850.4
1957	172.3	326.1	202.0	114.2	35.1	38.3	34.9	43.6	33.4	11.3	42.6	349.0	1402.8
1958	330.9	171.8	371.2	59.7	47.0	76.1	50.9	67.3	62.4	181.1	174.9	421.2	2014.5
1959	537.6	243.9	1101.9	34.5	20.2	49.5	98.2	24.7	18.6	132.9	325.0	143.3	2730.3
1960	434.2	178.6	182.3	19.5	48.3	79.4	49.6	32.1	27.6	27.2	170.1	281.5	1530.4
1961	254.8	48.2	164.5	117.5	26.6	21.1	149.7	98.7	38.6	33.3	132.2	607.8	1693.0
1962	95.8	251.1	172.2	29.1	133.5	28.5	77.4	91.6	66.9	57.8	246.5	257.0	1507.4
1963	442.5	227.9	431.5	142.3	36.7	109.5	64.5		32.2	81.1	330.9	393.3	2292.4
1964	182.5	419.9	147.6	42.6	37.0	69.1	140.3		69.5	137.6	233.6	311.1	1790.8
1965	403.4	187.7	192.9	56.3	20.2	12.4	76.3	87.5	26.3	10.0	201.7	435.4	1710.1
1966	213.0	121.5	72.9	15.5	135.5	43.7	54.7	71.4	52.0	69.8	94.3	279.5	1223.8
1967	295.6	95.5	218.1	35.3	42.0	56.8	35.8	94.0	16.1	33.5	412.5	453.1	1783.3
1968	299.3	193.6	146.8	59.3	12.0	35.4	91.2	25.1	8.9	6.2	214.5	293.2	1385.5
1969	199.8	271.8	178.6	95.6	19.5	42.7	51.4		5.5	44.8			909.7
1970		133.5	119.6	164.6	46.7	55.8	59.2	73.1	10.2	2.6	142.3	176.5	984.1
1971		308.5	183.7	33.0	63.2	37.5	63.4	44.3	20.9		297.1	147.3	1198.9
1972	171.0	532.5		35.6	53.6	19.8	54.9	15.6	9.1	106.9	94.2	286.2	1379.4
1973	501.9								5.0	16.4			523.3
1974	315.6	287.0	119.2	159.3	56.1	72.6							1009.8
Total	11646.7	10589.2	8624.8	2903.5	1911.6	1884.8	2236.5	1593.6	1092.8	1716.2	6194.8	11111.4	61505.9
Average	298.6	258.3	215.6	72.6	45.5	46.0	54.6	43.0	26.7	42.9	158.8	284.9	
Max.	613.9	645.6	1101.9	171.5	180.1	140.4	149.7	98.7	69.5	181.1	325.0	667.4	
Min.	95.8	48.2	53.5	16.8	4.3	0.0	16.1	3.6	5.0	0.0	0.2	38.1	

Mouneyres Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1936	338.9	81.9	398.2	199.1	68.8	299.5	243.4	108.5	131.6	117.5	75.1	483.7	2546.2
1937	466.6	523.0	891.6	62.0	164.7	78.7	80.2	260.4	76.2	103.5	26.9	160.0	2893.8
1938	289.1	439.1	343.9	401.1	71.3	263.4	122.5	290.1	102.0	89.4	54.0	42.0	2507.9
1939	394.2	299.0	278.4	245.3	116.6	202.8	293.9	143.3	149.5	31.1	28.4	356.1	2538.6
1940	464.3	1212.9	487.9	69.9	112.3	59.9	163.2	131.1	76.0	83.7	136.9	213.6	3211.7
1941	633.2	361.5	310.5	174.6	121.9	85.2	89.1	215.2	107.2	82.0	155.4	195.3	2531.1
1942	296.6	269.8	473.0	164.2	102.9	161.5	127.1	188.5	108.0	48.4	134.3	277.4	2351.7
1943	743.3	362.6	312.7	35.9	28.2	141.2	122.3	69.8	176.0	12.0	17.1	267.6	2288.7
1944	233.4	231.8	621.0	525.9	51.6	116.0	190.2	29.3	138.5	104.9	254.0	255.2	2751.8
1945	81.9	332.9	108.5	225.5	123.1	13.7	92.4	106.1	56.8	22.8	164.1	398.0	1725.8
1946	519.0	307.3	462.7	261.5	170.7	96.1	134.7	117.3	142.7	85.9	312.0	375.5	2985.4
1947	287.1	250.8	1081.3	282.3	87.7	199.2	144.3	137.4	110.9	54.5	142.*	77.3	2855.0
1948	449.8	132.6	348.9	119.2	104.1	118.3	268.1	162.3	223.2	158.1	85.1	520.8	2690.5
1949	196.9	422.3	818.4	352.0	285.5	169.7	182.8	47.2	66.8	40.0	67.8	100.5	2749.9
1950	335.9	903.5	303.4	188.7	75.8	57.1	159.5	109.5	57.2	26.7	104.6	200.0	2521.9
1951	727.7	678.3	401.0	237.3	169.9	145.8	77.1	215.4	81.0		481.4	247.0	3461.9
1952	452.5	274.6	333.1	230.4	503.1	220.0	92.6	227.6	53.2	101.0	194.9	206.7	2889.7
1953	249.7	214.3	209.0	209.1	58.2	307.6	78.7	330.8	145.7	82.2	118.5	453.9	2457.7
1954	389.2	228.0	317.3	81.4	115.6	250.0	99.9	129.9	98.4	42.5	196.4	171.0	2119.6
1955	373.8	294.5	412.4	61.4	81.4	213.3	242.7	100.5	98.1	55.0	239.5	298.0	2470.6
1956	773.8	1105.4	395.6	265.7	203.2	121.1	104.0	96.1	44.3	10.7	214.3	353.1	3687.3
1957	246.3	379.6	382.6	335.3	98.0	73.7	136.6	107.4	81.8	20.2		508.7	2370.2
1958	366.1	311.5	384.5	55.8	74.6	222.8	49.5	226.6	48.9	112.6	116.5	226.4	2195.8
1959	224.0	359.7		187.8	78.5	99.2	196.7	57.2	55.3	114.9	286.9	101.5	1761.7
1960	742.1	177.2	205.1	107.0	86.9	185.1	114.8	101.8	186.6	76.4	120.5	245.0	2348.5

Mouneyres Station

Unit: mm

Month / A.D.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1961	302.5	80.1	154.6	189.8	53.6	130.2	379.0	235.5	85.0	30.7	151.6	862.2	2654.8
1962	331.5	442.8	176.9	130.8	296.9	20.2	212.7	328.8	199.8	169.5	156.8	168.3	2635.0
1963	366.2	454.0	845.5	113.7	158.1	226.5	165.3	116.2	76.0	167.4	438.9	424.7	3552.5
1964	139.1	219.5	642.2	96.6	115.2	115.2	285.2	157.0	184.6	108.6	138.6	217.3	2419.1
1965	642.1	263.4	770.4	138.8			342.2	189.7	99.9	86.4	276.2	461.6	3270.7
1966	252.6	331.2	307.0	87.9	222.6	153.7	220.6	225.0	38.2	60.1	108.7	333.3	2340.9
1967	296.8	222.9	342.9	213.2	93.3	175.4	173.0	290.4	88.0	134.0	194.1	430.0	2654.0
1968	458.9	280.0	375.2	56.5	19.0	59.0	184.2	73.0	25.0	43.0	303.9	380.2	2257.9
1969	194.6	218.9	152.0	200.5	74.5		146.1	245.6	44.5	46.8	64.5	258.0	1646.0
1970	276.8	175.6	294.8	351.1	201.5		183.6	251.1		44.6		199.2	1978.3
1971	1116.0		243.3	112.2	193.8	176.4	450.7	143.3	62.5	49.1	299.2	219.3	3065.8
1972	499.4	559.6	616.3	146.2	162.8	58.4	271.1	45.9	50.8	27.0			2437.5
Total	15151.9	13402.1	15202.1	6910.7	4745.9	5015.9	6620.0	6010.8	3570.2	2643.2	5859.3	10688.4	95820.5
Average	409.5	372.3	422.3	186.8	131.8	147.5	178.9	162.5	99.2	73.4	172.3	296.9	
Max.	1116.0	1212.9	1081.3	525.9	503.1	307.6	450.7	330.8	223.2	169.5	481.4	862.2	
Min.	81.9	80.1	108.5	35.9	19.0	13.7	49.5	29.3	25.0	20.2	17.1	42.0	

Table-A.5.3 Maximum 24 Hours Rainfall

Unit: mm/day

Station / A.D.	Analama-zaotra	Ambohi-dray	Didy	Masse	Ande-kaleka	Mora-manga	Mouney-res	Andaingo	Amboa-sary	Beforona
1931	93.1					100.6				
1932	83.8					90.6				
1933	83.2					63.0				
1934	65.5					116.0				
1935	138.0				73.9	117.0				
1936	51.0		70.8		122.8	71.5	157.2			
1937	259.2		61.9		182.0	177.8	200.9			
1938	126.2		78.3	105.1	195.3	280.0	98.0			
1939	74.3		85.7	110.1	92.3	88.9	108.7			
1940	150.6		71.6	94.3	224.0	80.1	211.7			
1941	112.6		97.0	81.0	103.6	69.4	77.9			
1942	54.5		110.6	89.9	126.2	63.3	180.0			
1943	217.2		144.7	168.3	161.8	119.0	146.7			
1944	150.1		66.1	136.2	228.0	115.7	247.9			
1945	157.2		139.9	129.9	181.3	115.1	107.3			
1946	56.6		91.7	59.2	104.7	78.9	116.8			
1947	73.2		83.2	102.5	268.1	56.4	236.4			
1948	104.5			149.0	103.6	76.2	130.2			
1949	180.8			140.6	52.2	58.0	72.6			
1950	150.5		189.3	114.2	158.2	101.7	166.1			
1951	139.0		82.2	91.2		67.7	173.8			
1952	85.5		80.6	53.5	118.0	58.4	123.3			
1953	100.5		58.9	75.4	72.2	79.1	98.0			
1954	222.7	73.4	147.7	239.2	176.6	38.0	138.5			
1955	52.5	42.7	63.2	58.9		71.8	107.8			

Unit: mm/day

Station / A.D.	Analama-zaotra	Ambohi-dray	Didy	Masse	Ande-kaleka	Mora-manga	Mouney-res	Andaingo	Amboa-sary	Beforona
1956	180.0	86.6	146.4	130.4	214.5	105.2	207.3			
1957	64.5	40.0	40.5	69.4	77.1	87.3	118.0			
1958	83.3	72.1	85.1	83.6	78.6	99.6	99.0			
1959	208.9	93.2	147.8	158.5	373.3	163.2	124.8			
1960	74.1	72.2	52.2	78.5	110.3	61.5	100.4			
1961	82.7	53.2	70.9	66.3	166.0	102.6	107.6	53.8		
1962	112.5	95.7	52.7	85.1	107.8	87.2	115.6	76.2		
1963	117.6	84.3	60.2	83.6	189.3	105.5	222.2	65.6	63.4	
1964	243.0	71.5	78.5	198.0	208.0	73.9	163.3	97.0	85.8	
1965	125.5	88.7	40.0	126.1	123.1	107.1	142.8	49.3	25.2	
1966	109.9	65.8	45.2	123.3	96.6	102.1	117.3	49.3	34.8	
1967	74.8	106.9	40.0	70.0	91.9	94.7	60.6	71.7	30.5	
1968	150.8	110.5	37.8	46.3	113.7	71.4	93.0	87.9	27.0	
1969	77.0	50.0	50.4	58.7	148.7	78.2	34.4	106.0	67.0	
1970		60.2	40.0	115.6	117.4	111.7	102.5	135.2	70.0	
1971				95.4	153.3			54.9	43.0	
1972		134.2		116.8	175.9			104.4	86.0	
1973		79.6		82.4	132.2			78.6	31.5	149.0
1974		72.9		67.6				68.9	19.8	120.6

Table-A.5.4 Monthly Average Discharge

Unit: m^3

Month / A.D.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Total	Ave-rage
1948 - 49	47.2	141.0	69.0	95.0	243.0	117.0	102.0	93.0	94.0	68.0	53.0	40.6	1162.8	96.9
1949 - 50	(40.8)	(36.9)											(77.7)	(38.9)
1950 - 51														
1951 - 52							(100.0)	(105.0)	(77.0)	(89.0)	(61.0)	(49.8)	(481.8)	(80.3)
1952 - 53	67.0	61.0	56.0	58.0	79.0	66.0	44.8	57.0	51.0	72.0	67.0	64.0	742.8	61.9
1953 - 54	44.7	64.0	209.0	88.0	78.0	65.0	56.0	79.0	60.0	54.0	43.0	35.7	876.4	73.0
1954 - 55	34.5	61.0	73.0	74.0	117.0	71.0	56.0	63.0	68.0	53.0	43.6	33.9	748.0	62.3
1955 - 56	31.5	61.0	196.0	379.0	162.0	117.0	89.0	79.0	60.0	50.0	38.9	29.4	1292.8	107.7
1956 - 57	43.7	64.0	46.0	99.0	86.0	96.0	67.0	56.0	50.0	45.1	45.8	29.1	727.7	60.6
1957 - 58	27.6	55.8	62.0	83.0	152.0	56.0	46.3	63.0	65.0	65.0	44.0	43.2	762.9	63.6
1958 - 59	53.0	75.0	141.0	86.0	564.0	224.0	105.0	81.0	90.0	71.0	45.0	40.8	1575.8	131.3
1959 - 60	74.0	37.7	113.0	82.0	75.0	51.0	34.6	53.0	48.5	37.3	32.9	27.0	666.0	55.5
1960 - 61	23.5	53.0	47.0	32.0	34.9	32.0	25.2	23.9	52.0	79.0	48.0	27.3	477.8	39.8
1961 - 62	45.5	104.0	63.0	156.0	44.9	28.6	27.8	35.0	56.0	46.9	39.8	38.6	686.1	57.2
1962 - 63	26.5	35.2	116.0	100.0	166.0	86.0	33.1	31.3	40.9	37.6	37.9	24.7	735.2	61.3
1963 - 64	42.9	75.0	41.7	59.0	208.0	26.9	45.8	53.0	76.0	74.0	71.0	62.0	835.3	69.6
1964 - 65	61.0	75.0	126.0	130.0	136.0	54.0	24.7	19.7	39.3	78.0	53.0	40.3	837.0	69.8
1965 - 66	53.0	96.0	79.0	97.0	73.0	54.0	46.7	46.4	57.0	56.0	44.0	32.3	734.4	61.2
1966 - 67	28.2	50.0	88.0	82.0	87.0	64.0	52.0	57.0	63.0	81.0	75.0	46.1	773.3	64.4
1967 - 68	77.0	93.0	108.0	92.4	89.6	55.7	40.1	46.4	53.9	63.5	31.8	26.3	777.7	64.8
1968 - 69	34.6	81.0	80.0	87.0	54.0	60.0	38.3	39.5	48.5	85.0	56.0	37.1	701.0	58.4
1969 - 70	33.8	77.0	103.0	100.0	81.0	110.0	77.0	68.0	67.0	87.0	57.0	40.0	900.8	75.1
1970 - 71	39.9	41.6	175.0	160.0	89.3	65.3	58.4	46.3	65.0	55.9	48.4	36.2	881.3	73.4
1971 - 72	48.3	62.1	69.6	222.0	203.0	95.1	65.0	49.2	60.8	39.0	31.8	42.8	988.7	82.4
Total	978.2	1500.3	2061.3	2361.4	2822.7	1594.6	1234.8	1244.7	1342.9	1387.3	1067.9	847.2		
Average	44.5	68.2	98.2	112.4	134.4	75.9	56.1	56.6	61.0	63.1	48.5	38.5		

Table-A.5.5 Daily Average Discharge

1948 - 1949

Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.
1	54	123	103	54	100	119	88	94	92	83	58	40.2
2	51	119	105	47.7	108	141	82	94	94	79	60	40.2
3	48.4	118	90	44.6	168	170	88	88	97	80	60	40.9
4	44.6	109	76	44.6	100	144	82	88	112	79	60	46.9
5	43.8	112	72	48.4	90	128	88	88	91	82	57	50
6	42.3	155	70	108	92	130	91	88	85	79	60	44.6
7	41.5	185	67	87	142	119	111	83	82	82	60	44.6
8	40.9	146	71	66	1520	113	107	72	83	74	54	43.0
9	40.2	112	84	67	560	107	107	71	85	76	53	49.2
10	39.6	95	69	63	720	119	114	73	85	73	54	47.7
11	38.9	80	74	61	670	104	104	97	84	71	54	45.4
12	37.7	70	71	76	468	125	100	86	86	71	60	44.6
13	37.0	63	96	119	310	105	111	112	83	65	54	43.0
14	36.4	60	85	108	256	92	102	104	74	71	54	40.2
15	38.9	58	73	98	198	89	98	82	88	66	54	42.3
16	40.9	53	74	89	184	109	100	85	85	69	52	40.9
17	40.2	50	70	80	173	106	97	85	79	65	52	38.9
18	46.1	49.2	65	91	158	114	133	82	85	63	63	38.9
19	43.0	46.9	62	170	151	119	118	79	100	65	53	38.3
20	41.5	46.1	60	119	135	114	107	68	111	65	49.2	36.4
21	40.2	46.1	59	119	120	107	97	79	100	63	49.2	37.0
22	37.7	46.9	55	106	107	139	100	114	88	63	45.4	37.0
23	51	44.6	54	107	94	175	129	118	85	63	46.9	37.0
24	46.1	94	58	161	85	128	112	107	82	63	43.0	36.4
25	49.2	98	55	148	106	120	114	111	94	60	52	36.4
26	58	950	61	141	114	108	107	136	129	57	54	36.4
27	60	352	53	117	111	104	97	116	129	57	50	37.0
28	78	378	50	114	135	85	94	104	133	60	47.7	35.1
29	68	219	49.2		130	87	95	87	111	60	47.7	34.5
30	82	166	53		127	91	91	91	100	57	40.9	40.2
31		130	53		114		97		97	57		36.4
Ave.	47.2	141	69	95	243	117	102	93	94	68	53	40.6

Annual Average: 97 m^3/s

1949-1950

Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	36.4	40.2										
2	34.5	38.3										
3	34.5	36.4										
4	37.0	35.1										
5	36.4	34.5										
6	35.1	32.7										
7	34.5	33.3										
8	36.4	32.7										
9	36.4	32.7										
10	38.3	32.7										
11	49.2	32.7										
12	63	33.3										
13	63	31.0										
14	49.2	31.0										
15	44.6	31.6										
16	43.0	79										
17	42.3	42.3										
18	32.7	32.7										
19	32.2	32.7										
20	37.0	31.0										
21	38.3	31.0										
22	34.5	31.0										
23	32.7	31 0										
24	37.0	33.3										
25	36.4	34.5										
26	38.3	36.4										
27	54	44.6										
28	52	54										
29	44.6	52										
30	40.9	36.4										
31		32.7										
Ave.	40.8	36.9										

Annual Average:

1951 - 1952 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1							65	144	89	63	71	52
2							65	152	94	76	72	51
3							62	111	89	69	72	50
4							60	114	97	66	72	49.2
5							58	111	89	81	63	48.4
6							57	109	85	94	63	47.7
7							57	100	81	91	62	67
8							56	99	79	108	61	61
9							56	95	87	84	60	62
10							56	90	91	78	57	68
11							56	86	88	84	56	69
12							56	83	83	85	56	57
13							53	81	79	111	55	53
14							50	80	77	94	54	53
15							56	79	75	94	63	50
16							56	83	74	91	55	48.4
17							52	113	72	118	55	47.7
18							51	111	79	114	56	46.9
19							50	95	72	135	58	46.9
20							47.7	89	71	123	62	46.1
21							56	98	70	108	61	44.6
22							111	123	68	95	68	44.6
23							111	123	67	91	72	46.1
24							172	120	65	85	70	44.6
25							303	129	66	82	62	43.8
26							330	130	70	79	61	42.3
27							238	113	74	76	59	43.0
28							196	105	69	73	56	40.9
29							170	98	68	72	55	40.2
30							159	92	69	71	54	39.6
31							142		65	72		38.9
Ave.							100	105	77	89	61	49.8

Annual Average:

1952 - 1953 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	38.3	44.6	45.4	46.9	44.6	84	54	40.2	43.0	42.3	61	54
2	37.7	43.8	44.6	48.4	43.0	90	53	49.9	42.3	40.9	63	52
3	37.7	43.0	42.3	43.0	46.1	70	51	43.8	41.5	40.2	66	51
4	37.0	41.5	40.9	41.5	52	66	50	47.7	40.9	43.8	113	50
5	47.7	40.9	40.2	50	63	64	48.4	46.1	47.7	43.0	90	49.2
6	51	42.3	39.6	46.9	135	72	47.7	40.2	54	45.4	80	51
7	56	46.1	38.9	67	91	61	47.7	43.8	57	52	73	48.4
8	61	43.0	38.3	54	81	71	46.9	41.5	54	63	68	46.9
9	62	63	43.0	49.2	80	63	46.1	40.2	46.9	74	84	64
10	83	47.7	47.7	46.1	106	60	46.9	43.8	43.8	62	72	54
11	116	52	46.1	45.4	108	58	48.4	59	44.6	60	67	53
12	114	71	80	44.6	98	61	46.1	55	86	86	63	46.9
13	127	87	51	85	91	59	48.4	49.2	61	178	62	46.1
14	131	67	61	65	114	61	50	46.1	50	169	60	44.6
15	123	63	86	54	82	103	46.9	43.0	61	114	59	55
16	95	60	66	57	80	71	44.6	42.3	55	92	57	48.4
17	87	59	80	62	81	65	43.8	41.5	54	80	56	46.1
18	76	56	74	87	76	62	43.0	40.9	57	74	55	46.9
19	66	72	69	81	67	57	43.0	106	53	68	56	51
20	57	113	65	67	63	56	42.3	107	51	63	54	50
21	54	98	60	62	64	54	40.9	157	49.2	63	53	60
22	52	78	54	61	96	53	40.9	96	48.4	68	50	47.7
23	49.2	77	52	63	82	54	40.2	75	54	66	51	49.2
24	52	75	48.4	54	72	69	40.2	65	53	62	53	52
25	50	77	95	82	66	67	39.6	57	54	59	63	47.7
26	49.2	65	72	49.2	63	73	39.6	53	50	56	90	46.1
27	46.1	58	56	52	61	72	38.9	50	47.7	73	91	44.6
28	47.7	54	52	46.9	95	63	38.3	47.7	46.9	79	69	43.8
29	46.9	52	47.7		67	60	37.7	45.4	45.4	74	61	43.0
30	46.1	48.4	46.1		61	58	42.3	43.8	43.8	66	56	41.5
31		46.9	47.7		116		42.3		41.5	62		40.9
Ave.	67	61	56	58	79	66	44.8	57	51	72	67	64

Annual Average: 62 m^3/s

1953 - 1954 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	40.2	37.7	166	112	65	114	53	51	58	50	43.0	40.2
2	40.2	37.0	106	113	63	89	52	48.4	56	49.2	42.3	39.6
3	39.6	36.4	92	178	66	72	51	51	55	47.7	41.5	39.6
4	40.2	39.6	117	148	65	79	50	49.2	54	46.1	40.9	38.9
5	39.6	38.9	90	123	63	77	48.4	47.7	67	45.4	42.3	40.9
6	38.9	69	76	106	56	80	47.7	48.4	63	43.8	54	40.2
7	39.6	79	68	98	60	75	48.4	57	59	47.7	46.1	39.6
8	40.2	61	62	95	63	65	47.7	64	62	50	49.2	38.9
9	46.9	54	63	90	62	65	46.9	54	76	52	46.1	39.6
10	44.6	52	60	86	64	63	46.1	51	88	57	43.8	38.9
11	42.3	63	54	82	102	66	45.4	58	74	59	40.9	39.6
12	41.5	54	53	85	119	63	46.1	388	70	54	39.6	40.2
13	41.5	72	52	78	139	61	47.7	152	65	51	40.2	43.8
14	40.9	79	950	75	107	66	48.4	114	67	72	51	47.7
15	37.7	63	1240	72	123	62	62	96	65	68	43.8	46.1
16	37.0	60	805	70	102	60	58	74	62	61	41.5	37.0
17	36.4	65	570	67	88	58	56	85	60	54	39.6	35.7
18	37.7	69	326	66	93	56	53	78	58	52	40.2	33.9
19	37.7	97	162	65	84	55	49.2	71	56	56	38.9	33.3
20	43.0	70	184	68	77	56	47.7	66	57	80	40.2	32.7
21	48.4	75	150	73	71	54	48.4	64	60	64	49.2	31.6
22	56	67	127	92	68	53	66	63	57	61	47.7	31.0
23	48.4	62	109	75	65	54	77	66	55	58	46.1	30.4
24	43.8	54	100	72	66	53	89	74	53	55	43.8	29.8
25	45.1	51	99	69	68	54	73	72	52	54	41.5	29.2
26	99	46.9	108	72	70	64	62	72	51	52	39.6	28.7
27	57	45.4	98	72	66	62	72	68	50	49.2	40.2	28.2
28	48.4	44.6	92	74	69	60	62	63	48.4	46.9	38.9	28.0
29	44.6	51	84		71	56	60	60	49.2	46.1	39.6	27.8
30	43.0	113	85		69	54	56	59	51	44.6	38.9	27.6
31		175	140		66		54		49.2	43.8		27.4
Ave.	44.7	64	209	88	78	65	56	79	60	54	43.0	36.9

Annual Average: 73 m^3/s

1954 - 1955 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	27.2	67	41.5	99	69	100	57	49.2	65	88	47.7	35.1
2	27.0	82	78	93	63	94	56	47.7	69	72	45.4	34.5
3	28.2	72	80	89	90	88	58	46.9	99	64	43.0	35.7
4	28.7	63	82	81	80	86	61	46.1	80	61	42.3	38.3
5	31.6	70	67	95	147	81	65	44.6	71	59	49.2	40.2
6	37.0	61	63	68	164	79	62	52	65	56	65	40.9
7	34.5	90	61	59	98	77	60	48.4	62	54	52	37.0
8	63	74	162	54	139	74	57	45.4	59	53	46.9	35.1
9	40.9	60	90	49.2	106	72	54	43.8	56	52	51	33.3
10	35.7	63	70	46.9	108	74	53	43.0	54	54	47.7	33.3
11	32.2	53	78	44.6	88	79	56	42.3	55	63	44.6	33.9
12	31.0	45.4	108	43.0	83	84	54	43.8	84	60	46.1	32.2
13	29.2	42.3	127	42.3	92	74	52	59	70	57	42.3	32.7
14	28.7	72	80	69	95	70	50	74	65	54	40.2	32.7
15	29.2	89	70	67	100	68	48.4	69	67	53	38.9	32.2
16	28.2	112	58	54	89	65	46.9	59	63	55	38.3	31.6
17	48.4	79	51	49.2	135	68	48.4	63	57	52	37.7	30.4
18	37.7	72	54	47.7	146	69	50	86	56	50	37.0	31.0
19	33.3	90	49.2	54	153	65	81	78	70	48.4	54	31.0
20	30.4	65	47.7	60	131	63	62	67	63	47.7	51	32.2
21	29.2	55	48.4	64	123	64	56	64	59	46.9	44.6	37.0
22	28.2	47.7	81	184	133	52	53	78	56	46.1	42.3	40.9
23	28.0	45.4	62	85	111	63	54	66	54	45.4	39.6	37.0
24	27.8	42.3	56	87	107	62	50	62	52	44.6	37.7	33.9
25	27.6	40.2	59	153	119	63	51	58	90	43.8	38.3	32.2
26	28.2	44.6	64	93	201	65	53	60	71	43.0	37.0	32.2
27	32.7	41.5	67	80	134	63	63	129	63	42.3	36.4	31.0
28	52	40.2	111	75	112	61	70	99	68	43.0	38.3	31.0
29	54	38.3	71		155	58	62	83	92	41.5	37.0	29.8
30	46.9	37.0	63		148	56	55	72	69	40.9	35.7	31.0
31		35.7	53		113		52		97	51		30.4
Ave.	34.6	61	73	74	117	71	56	63	68	53	43.6	33.9

Annual Average: 62 m^3/s

1955 - 1956 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	30.4	41.5	38.3	242	237	108	105	84	65	59	43.8	33.3
2	29.8	63	35.7	189	221	129	102	81	63	61	45.4	33.9
3	29.2	51	43.0	157	193	174	94	84	62	58	48.4	34.5
4	28.2	63	60	217	177	153	99	93	68	60	46.1	33.9
5	59	69	84	625	179	128	105	88	72	57	45.4	32.7
6	37.0	48.4	272	1460	164	119	102	99	70	62	43.8	32.2
7	32.2	40.2	172	995	155	113	90	95	68	57	44.6	31.6
8	29.2	36.4	135	730	147	111	86	91	68	55	43.0	30.4
9	28.2	47.7	111	540	145	105	92	86	64	54	42.3	30.4
10	35.7	53	91	406	140	102	90	90	63	63	40.9	30.4
11	32.2	62	69	276	144	99	88	94	61	52	40.2	29.8
12	29.2	72	231	299	135	103	94	87	59	63	39.6	29.8
13	28.2	69	139	303	191	112	96	81	57	52	38.9	29.8
14	28.0	70	156	258	193	105	88	78	55	50	38.3	29.2
15	27.8	68	136	238	188	100	84	76	56	49.2	37.7	29.2
16	27.6	94	161	317	237	96	89	73	54	47.7	38.3	29.2
17	27.4	72	156	254	202	117	86	76	56	46.9	37.7	29.2
18	27.2	94	113	231	169	150	84	85	56	46.1	37.0	28.7
19	28.2	80	106	196	159	141	75	82	54	45.4	36.4	28.7
20	29.2	70	99	183	146	133	72	78	57	44.6	35.7	28.2
21	34.5	111	90	179	136	168	77	72	54	43.8	35.1	28.0
22	31.6	79	86	169	145	130	74	70	55	43.0	36.4	27.8
23	29.8	65	111	159	123	117	79	67	57	42.3	35.7	27.6
24	28.2	56	88	395	118	107	76	64	61	43.0	35.1	27.4
25	28.0	50	84	423	114	107	82	66	65	41.5	34.5	27.2
26	27.8	44.6	1090	448	120	100	78	69	57	43.0	33.9	27.0
27	27.6	41.5	715	535	124	97	85	67	60	42.3	33.3	26.8
28	35.1	43.0	550	308	123	95	105	65	57	43.8	33.9	26.6
29	37.7	38.9	343	265	130	90	100	63	55	42.3	33.3	25.1
30	41.5	51	296		125	88	92	66	54	43.0	32.7	26.2
31		41.5	201		238		90		54	42.3		26.0
Ave.	31.5	61	196	379	162	117	89	79	60	50	38.9	29.4

Annual Average: 107 m^3/s

1956 - 1957 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	25.8	79	52	109	68	129	72	54	52	51	44.6	34.6
2	25.6	74	49.2	135	63	144	79	53	49.2	48.4	47.7	33.9
3	25.4	66	47.7	142	66	122	85	51	47.7	46.1	43.0	33.3
4	25.2	76	46.1	150	69	105	105	52	45.4	43.8	41.5	32.7
5	25.0	59	42.3	147	65	96	96	53	50	42.3	40.2	32.7
6	24.8	49.2	38.9	119	68	87	81	52	54	41.5	54	32.7
7	24.7	47.7	37.7	134	64	122	76	51	51	40.2	77	32.2
8	24.5	51	36.4	147	61	97	74	52	48.4	72	70	32.2
9	24.3	54	35.1	163	87	84	73	51	46.9	64	63	32.7
10	24.1	50	34.5	138	78	89	75	53	44.6	53	51	32.2
11	23.7	56	33.9	107	75	94	72	54	43.8	45.4	45.4	31.6
12	23.7	59	32.7	98	79	111	72	56	43.0	43.8	43.8	30.4
13	23.5	49.2	34.5	91	105	134	70	54	46.1	42.3	41.5	29.2
14	23.3	56	33.3	88	100	112	68	52	44.6	40.9	40.2	28.7
15	23.1	48.4	32.7	84	81	94	66	50	43.8	40.2	43.0	28.2
16	28.2	56	31.6	74	85	91	63	58	43.0	38.9	45.4	28.0
17	29.2	67	31.0	75	80	86	62	55	42.3	39.6	42.3	27.8
18	56	63	29.8	70	94	100	63	59	45.4	38.9	40.9	27.6
19	72	88	29.2	64	89	120	62	71	44.6	38.3	43.0	27.4
20	47.7	105	31.6	60	96	94	61	57	46.1	40.2	41.5	27.2
21	49.2	89	33.9	63	90	90	60	53	54	51	40.2	27.0
22	54	77	37.0	67	79	78	59	50	56	49.2	39.6	26.8
23	52	69	54	62	87	84	55	48.4	60	45.4	60	26.6
24	47.7	58	111	69	90	89	58	47.7	79	42.3	47.7	26.4
25	61	52	72	74	84	80	56	68	64	44.6	41.5	26.2
26	71	56	54	86	96	76	55	63	57	47.7	40.2	26.0
27	105	80	56	75	102	72	54	61	54	43.8	38.9	25.8
28	107	74	52	72	108	70	54	65	52	40.9	37.0	25.6
29	84	69	47.7		112	67	52	63	49.2	38.9	35.7	25.4
30	82	62	45.4		123	70	53	58	46.9	40.2	35.1	25.2
31		56	114		114		53		44.6	42.3		25.0
Ave.	(43.7)	64	46	99	86	96	67	56	50	45.1	45.8	29.1

Annual Average: 60.3 m^3/s

1957 - 1958 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	24,8	25,6	56	105	105	69	47,7	56	70	47,7	47,7	43,8
2	24,7	25,4	47,7	131	129	65	47,7	65	117	47,7	47,7	43,8
3	24,5	25,2	40,2	133	111	64	46,9	70	105	47,7	43,8	43,8
4	24,3	40,2	47,7	130	96	63	46,9	72	94	47,7	43,8	43,8
5	24,1	47,7	37,0	116	84	62	44,6	68	89	47,7	43,8	43,8
6	33,9	94	33,9	94	298	60	44,6	72	84	47,7	43,8	56
7	28,2	94	33,9	84	170	59	44,6	84	79	47,7		47,7
8	28,0	65	33,9	94	245	58	44,6	89	79	47,7		43,8
9	27,8	56	31,0	74	237	56	43,8	71	74	47,7		43,8
10	27,6	28,2	28,2	72	705	55	43,8	65	74	52	43,8	43,8
11	27,4	28,0	28,0	68	237	55	43,8	65	70	52	43,8	40,2
12	27,2	27,8	27,8	129	228	57	43,8	56	70	52		40,2
13	27,0	27,6	47,7	94	178	56	43,0	56	65	56		37,0
14	26,8	27,4	52	74	172	55	43,0	56	65	56		33,9
15	33,9	37,0	55	71	155	54	43,8	56	61	162	43,8	33,9
16	33,9	65	58	67	152	54	43,8	65	61	190	43,8	33,9
17	33,9	74	61	59	138	54	43,8	56	65	129		33,9
18	28,2	131	57	56	123	53	43,0	56	61	94		33,9
19	28,0	135	54	52	118	53	43,0	74	56	79		33,9
20	27,8	94	47,7	52	107	53	43,0	56	56	70	43,8	33,9
21	27,6	74	46,9	56	105	54	43,8	56	52	61	43,8	33,9
22	27,4	70	52	79	104	54	53	56	47,7	56		40,2
23	27,2	57	56	74	94	55	51	56	47,7	65		52
24	27,0	46,9	63	70	89	54	51	52	47,7	61		47,7
25	26,8	40,2	67	63	85	54	51	47,7	47,7	56	43,8	47,7
26	26,6	33,9	128	57	79	54	50	56	47,7	56	43,8	47,7
27	26,4	29,8	119	81	79	52	50	61	47,7	52		52
28	26,2	56	133	(93)	75	52	50	65	47,7	47,7		52
29	26,0	84	130		77	51	50	70	47,7	47,7		52
30	25,8	47,7	128		73	50	47,7	74	47,7	47,7	43,8	52
31		43,8	131		72		47,7		47,7	47,7		52
Ave.	(27,6)	(55,8)	62	83	152	56	46,3	63	65	65	(44,1)	43,2

Annual Average: 63,6 m^3/s

1958 - 1959 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	52	40,2	105	72	148	640	133	89	80	94	53	36,4
2	56	40,2	103	70	254	565	128	88	92	93	67	35,7
3	52	40,2	108	68	185	451	123	87	84	91	67	35,1
4	52	40,2	129	66	175	347	122	85	81	89	64	33,9
5	56	40,2	141	64	157	294	119	84	79	89	62	33,3
6	61	40,2	145	61	161	265	116	83	80	86	57	32,2
7	61	40,2	163	59	163	233	113	82	91	85	55	31,0
8	74	40,2	210	56	163	217	111	81	129	83	52	31,0
9	79	56	162	54	155	212	109	80	134	78	48,4	30,4
10	65	47,7	362	57	146	207	108	79	129	76	42,3	28,7
11	64	47,7	332	56	139	202	106	78	122	75	40,3	28,7
12	56	47,7	272	72	133	201	105	77	116	72	38,9	28,2
13	56	47,7	210	83	142	201	105	77	108	71	37,7	27,8
14	52	47,7	190	76	151	194	105	76	104	67	35,1	27,3
15	52	105	159	76	157	178	104	76	95	64	33,9	27,3
16	52	117	138	73	168	175	103	75	88	66	33,3	27,3
17	56	99	129	72	630	172	102	75	84	67	32,7	67
18	52	141	117	71	1 140	168	100	98	81	67	31,6	58
19	52	119	105	68	1 795	166	99	91	78	66	31,0	49,2
20	47,7	81	96	73	1 300	162	98	89	74	64	40,9	47,7
21	47,7	74	105	99	985	158	97	83	72	64	54	45,4
22	47,7	77	94	130	735	155	96	80	71	63	48,4	49,2
23	43,8	87	91	184	585	150	96	78	70	63	46,1	60
24	43,8	102	84	138	382	148	96	77	69	63	42,3	58
25	43,8	86	84	123	343	146	96	76	68	63	40,9	57
26	40,2	103	96	129	1 770	145	95	79	65	61	39,6	54
27	40,2	86	107	120	2 020(1)	142	94	82	66	60	38,9	50
28	40,2	144	99	139	1 335	141	93	78	102	59	38,9	47,7
29	40,2	105	89		855	139	92	74	95	57	38,9	44,6
30	40,2	89	82		760	136	91	72	98	55	38,3	42,3
31		102	74		685		90		94	54		40,2
Ave.	53	75	141	86	584	224	105	81	90	71	45,0	40,8

(1) - Maximum Discharge 3 950m^3/s

Annual Average: 134 m^3/s

1959 - 1960

Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	39.6	67	26.8	119	67	85	43.0	21.9	45.4	47.7	27.3	33.9
2	38.9	63	25.2	103	66	76	42.3	21.4	42.3	45.4	27.3	32.7
3	96	60	24.8	91	65	72	44.6	26.8	40.2	42.3	26.8	31.6
4	174	58	41.5	86	63	66	46.1	29.2	38.3	40.2	26.8	29.8
5	67	54	130	82	63	61	45.4	32.2	35.7	39.6	26.8	29.8
6	62	53	70	77	63	57	43.8	38.3	33.9	38.9	26.4	29.2
7	58	49.2	59	88	62	54	43.8	41.5	33.3	38.9	26.4	28.7
8	57	48.4	88	91	61	52	43.0	40.9	29.8	38.3	32.2	28.7
9	66	47.7	122	87	60	49.2	43.0	40.2	39.6	37.7	31.0	28.2
10	76	45.4	168	85	58	48.4	42.3	39.6	46.9	35.1	29.2	28.2
11	72	42.3	109	93	63	46.9	41.5	45.4	48.4	33.9	29.2	27.8
12	68	40.9	119	90	59	46.1	40.2	44.6	58	35.1	28.7	26.8
13	65	38.9	111	86	58	45.4	38.9	48.4	56	38.3	28.7	27.8
14	60	37.7	109	83	57	45.4	37.0	51	54	40.2	27.8	27.8
15	58	33.9	109	78	57	43.8	35.1	50	49.2	38.9	28.7	27.3
16	67	32.7	276	76	58	42.3	33.9	56	52	40.2	38.3	26.8
17	64	29.8	145	79	60	41.5	33.3	58	64	45.4	39.6	26.4
18	58	28.2	119	86	60	43.8	32.2	87	59	42.3	40.2	26.4
19	57	26.8	98	81	59	51	31.0	141	57	41.5	41.5	26.0
20	63	24.8	116	76	67	50	29.2	80	55	40.9	40.9	25.6
21	64	24.7	122	75	72	49.2	28.2	76	54	38.3	40.9	25.2
22	68	24.5	120	75	71	47.7	27.8	72	54	37.7	38.3	25.2
23	76	24.3	116	74	81	46.9	26.8	67	53	37.7	37.7	24.8
24	86	24.1	109	72	102	45.4	26.0	64	52	34.5	37.0	24.7
25	119	27.8	116	72	116	45.4	25.6	61	53	33.3	35.1	24.5
26	102	26.0	130	72	125	43.8	25.2	57	52	32.2	34.5	24.3
27	94	24.8	156	71	131	43.8	24.8	55	51	29.8	35.1	24.1
28	91	24.7	138	70	107	43.0	24.7	53	51	29.2	35.1	23.9
29	82	28.7	159	68	102	41.5	24.5	49.2	49.2	28.7	34.5	23.7
30	75	29.8	155		95	41.5	24.3	46.9	48.4	27.8	34.5	23.5
31		29.2	129		90		24.1		48.4	27.3		23.3
Ave.	74	(37.7)	113	82	75	51	(34.6)	(53)	48.5	37.3	32.9	(27.0)

Annual Average: (55.4) m^3/s

1960 - 1961

Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	23.1	147	40.2	42.3	28.2	27.3	26.8	25.2	29.8	62	63	38.3
2	23.0	131	47.7	40.9	25.2	28.7	26.8	25.2	29.8	57	57	37.7
3	22.9	107	54	48.4	24.8	28.2	26.4	24.8	29.2	49.2	55	35.7
4	22.7	86	84	47.7	24.7	29.2	26.8	24.7	28.7	42.3	52	33.9
5	22.5	67	87	41.5	24.5	32.2	26.8	24.5	28.2	40.9	53	33.9
6	22.3	63	60	39.6	24.3	29.2	26.4	24.3	26.8	37.7	49.2	33.3
7	22.1	57	45.4	38.9	24.1	28.7	26.0	24.1	26.4	32.2	49.2	32.7
8	22.0	50	38.9	38.9	23.9	27.3	26.0	23.9	25.2	29.8	56	31.6
9	21.8	46.1	36.4	38.3	23.7	33.9	26.0	23.7	24.8	28.2	57	31.0
10	21.6	42.3	53	37.7	27.8	49.2	25.6	23.5	24.6	32.2	53	28.7
11	21.4	39.6	45.4	37.7	28.2	45.4	25.6	23.3	24.5	81	53	28.2
12	21.3	37.7	42.3	35.7	33.3	40.9	25.6	23.1	24.4	102	54	28.2
13	21.2	35.7	43.0	30.4	35.7	37.0	25.2	23.0	26.8	120	50	27.3
14	21.0	35.1	40.9	28.2	34.5	34.5	25.2	22.9	26.8	130	49.2	26.8
15	20.8	34.5	43.0	26.8	37.0	38.3	25.2	22.7	27.8	144	48.4	26.8
16	20.7	46.9	46.1	25.2	32.2	34.5	24.8	22.5	29.8	141	46.1	26.4
17	20.5	57	46.9	24.8	28.7	32.2	24.7	22.3	30.4	130	45.4	26.0
18	20.3	49.2	38.9	24.7	37.7	31.0	24.5	22.1	32.2	131	45.4	25.2
19	20.2	46.9	37.0	24.5	45.4	32.2	24.3	22.0	63	120	44.6	24.8
20	20.0	45.4	37.0	24.3	58	33.3	24.1	21.8	85	106	44.6	24.7
21	19.8	42.3	37.0	24.1	82	31.6	23.9	21.6	131	96	43.8	24.5
22	19.7	39.6	36.4	23.9	52	29.2	23.7	21.4	76	89	44.6	24.3
23	19.5	35.7	35.7	23.7	42.3	29.8	23.5	21.3	78	81	43.0	24.1
24	19.4	33.9	47.7	23.5	40.9	29.2	23.3	21.2	81	68	42.3	23.9
25	19.3	32.4	52	23.3	40.2	28.4	23.1	21.0	86	95	42.3	23.7
26	19.1	31.0	57	28.2	40.9	28.2	23.0	20.8	108	87	42.3	23.5
27	29.2	29.2	51	25.6	37.7	27.8	22.9	20.7	122	65	40.9	23.3
28	49.4	34.5	45.4	26.4	34.5	27.3	22.7	20.5	94	56	40.9	23.1
29	40.2	41.5	46.1		32.2	27.3	22.5	25.6	75	52	39.6	23.0
30	64	43.0	41.5		29.8	26.8	25.6	26.0	64	76	39.6	22.9
31		41.5	42.3		28.7		25.6		58	66		22.7
Ave.	23.5	53	47	31.9	34.9	32.0	(25.2)	(23.9)	52	79	48	27.3

Annual Average: 40.0 m^3/s

1961 - 1962 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	22.5	40.9	85	73	77	33.3	26.0	27.3	38.3	48.4	39.6	54
2	22.3	51	78	76	75	32.2	25.6	28.7	86	52	39.6	54
3	22.1	64	78	69	72	31.6	25.6	32.2	89	49.2	40.9	52
4	22.0	99	68	81	64	31.0	26.8	34.5	100	45.4	41.5	49.2
5	21.8	96	68	70	59	29 8	25.2	38.3	96	44.6	45.4	49.2
6	21.6	113	63	59	58	29.2	25.2	38.9	87	43.8	42.3	46.9
7	21.4	89	60	79	55	28.7	24.8	45.4	79	41.5	41.5	45.4
8	21.3	79	57	71	54	28.7	25.2	41.5	81	40.2	40.9	44.6
9	21.2	73	55	97	49.2	28.2	27.8	35.7	70	49.2	40.9	43.8
10	21.0	70	54	494	46.1	28.2	26.8	35.1	67	54	40.9	40.9
11	20.8	205	50	276	42.3	27.8	26.8	35.7	65	52	39.6	39.6
12	20.7	158	48.4	209	40.2	27.3	26.0	41.5	63	51	39.6	38.3
13	26.0	99	53	178	38.3	27.3	26.8	43.8	58	49.2	38.9	38.3
14	27.8	76	51	530	51	26.8	28.7	40.2	54	48.4	38.9	37.7
15	32.2	66	72	316	46.1	27.3	28.2	38.3	55	47.7	37.7	37.0
16	41.5	92	77	228	43.8	28.7	27.3	34.5	53	46.9	37.0	36.4
17	38.3	166	84	195	40.2	27.8	28.2	34.5	52	46.9	37.0	35.1
18	48.4	162	77	183	37.7	27.3	31.0	33.3	49.2	46.1	36.4	34.5
19	54	164	72	169	35.7	26.8	29.8	33.9	48.4	45.4	36.4	33.9
20	50	148	67	152	35.1	26.0	33.9	32.2	45.4	48.4	35.7	33.9
21	96	108	69	138	34.5	26.4	32.7	33.9	42.3	50	35.7	33.3
22	108	99	63	111	33.3	28.2	31.0	33.3	40.9	51	35.1	32.7
23	99	86	55	96	32.2	31.0	28.7	32.2	38.3	52	34.5	32.7
24	97	83	52	92	31.0	32.7	27.8	32.2	37.7	48.4	34.5	32.7
25	87	91	50	87	30.4	29.8	27.3	33.9	35.7	47.7	37.0	32.2
26	75	135	48.4	84	33.9	28.7	27.8	32.7	37.0	46.9	39.6	32.2
27	63	139	47.7	81	40.2	27.8	26.8	32.7	35.1	44.6	38.9	31.6
28	59	105	46.9	79	34.5	26.8	28.7	31.0	33.9	43.0	37.7	31.6
29	57	96	67		34.5	26.8	28.7	31.0	33.3	40.9	52	31.0
30	47.7	98	72		32.2	26.0	27.8	30.4	35.1	40.2	57	31.0
31		89	66		35.7		27.8		46.1	40.2		31.0
Ave.	(45.5)	104	63	156	44.9	28.6	27.8	35.0	56	46.9	39.8	38.6

Annual Average: 56.6 m^3/s

1962 - 1963 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	30.4	23.1	156	82	79	157	44.6	27.8	29.2	37.7	38.3	29.2
2	30.4	23.0	147	72	86	150	41.5	27.8	31.0	39.6	48.4	28.7
3	30.4	22.9	122	60	88	136	40.9	27.3	34.5	37.0	50	28.2
4	29.8	22.7	172	55	79	124	40.9	33.3	58	35.7	47.7	27.3
5	29.8	22.5	111	53	73	113	39.6	32.2	52	35.1	46.1	26.4
6	29.2	22.3	105	49.2	68	105	38.3	31.0	55	34.5	45.4	25.2
7	28.2	22.1	175	48.4	64	103	37.7	29.2	50	50	44.6	24.8
8	28.2	22.0	153	46.9	83	100	35.1	32.2	47.7	47.7	43.8	24.7
9	28.2	21.8	153	43.0	102	98	35.1	38.9	46.9	46.9	43.0	24.5
10	27.8	21.6	146	46.9	90	96	34.5	35.1	49.2	42.3	42.3	24.3
11	27.3	21.4	196	43.0	97	95	34.5	33.3	54	40.2	40.9	24.1
12	26.8	21.3	89	52	164	94	33.3	31.0	49.2	40.2	40.9	23.9
13	26.8	21.2	63	43.8	316	92	32.2	29.2	48.4	38.3	39.6	23.7
14	26.4	21.0	52	51	254	91	32.2	29.8	46.1	37.0	37.0	23.5
15	26.0	20.8	76	166	217	88	31.0	32.7	42.3	36.4	35.7	23.3
16	26.0	20.7	129	485	185	85	30.4	31.6	40.9	39.6	35.1	25.6
17	26.0	20.5	163	230	173	81	30.4	29.8	38.3	37.0	34.5	25.6
18	25.6	20.3	128	210	164	76	29.8	38.3	35.1	35.7	34.5	25.2
19	25.6	20.2	91	181	144	72	29.2	34.5	37.0	35.7	33.9	24.8
20	25.2	20.0	125	136	133	67	28.7	31.6	35.7	35.1	33.3	24.7
21	25.2	19.8	98	107	125	67	28.7	29.8	34.5	35.1	33.3	24.5
22	24.8	19.7	91	97	139	64	28.2	28.7	33.9	33.9	33.3	24.3
23	24.7	19.5	122	83	129	60	34.5	28.7	33.9	33.9	32.7	24.1
24	24.5	19.4	147	74	123	58	31.0	28.2	33.3	33.3	32.2	23.9
25	24.3	19.3	108	69	156	56	30.4	28.2	32.7	32.7	32.2	23.7
26	24.1	31.0	88	72	420	55	29.2	27.8	34.5	38.3	32.2	23.5
27	23.9	64	81	69	400	54	29.2	33.9	37.7	37.0	31.6	23.3
28	23.7	89	67	79	371	51	28.7	33.3	39.6	36.4	31.6	23.1
29	23.5	107	67		237	49.2	28.7	33.3	35.1	35.7	31.0	23.0
30	23.3	112	88		209	46.9	28.2	31.0	35.1	35.1	31.0	22.9
31		163	97		181		28.2		35.7	33.9		22.7
Ave.	26.5	35.2	116	100	166	86	33.1	31.3	40.9	37.6	37.9	(24.7)

Annual Average: 61.1 m^3/s

1963 - 1964 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	30.4	32.7	71	32.2	42.3	26.0	58	44.6	43.0	119	62	50
2	54	29.8	58	31.0	46.9	27.3	49.2	43.8	44.6	184	64	48.4
3	42.3	33.9	50	30.4	49.2	26.0	67	42.3	47.7	145	58	46.9
4	34.5	29.8	54	29.8	46.1	26.8	49.2	41.5	51	99	56	44.6
5	34.5	48.4	47.7	41.5	42.3	28.2	58	51	48.4	92	54	45.4
6	31.0	43.0	41.5	61	43.0	28.2	49.2	58	53	86	53	46.9
7	28.2	36.4	53	60	180	27.8	41.5	68	54	78	61	65
8	39.6	36.4	47.7	88	1 080	26.8	49.2	81	56	81	63	89
9	79	35.1	40.9	116	1 060	26.0	41.5	66	59	76	62	98
10	51	32.7	40.2	96	710	26.8	41.5	63	69	73	65	109
11	37.7	33.9	39.6	118	550	27.8	58	60	81	72	58	118
12	37.0	33.3	37.7	88	414	27.8	41.5	58	86	68	54	120
13	32.7	32.2	36.4	79	317	27.8	49.2	52	102	65	88	103
14	29.8	43.8	35.7	72	265	26.0	41.5	51	134	64	156	86
15	62	78	51	72	233	26.4	35.1	51	159	63	138	67
16	54	89	44.6	62	194	26.4	35.1	50	139	62	119	63
17	50	95	40.2	53	163	26.4	41.5	52	125	61	106	59
18	46.1	373	38.3	78	147	26.4	41.5	54	106	61	91	55
19	43.0	177	36.4	74	133	26.4	41.5	55	102	60	84	52
20	50	145	35.1	66	122	27.3	35.1	57	65	61	76	52
21	43.8	112	34.5	53	109	26.4	35.1	58	58	60	70	50
22	40.2	76	37.7	44.6	98	26.4	41.5	56	56	60	63	47.7
23	55	80	34.5	43.0	84	26.8	35.1	54	54	59	61	44.6
24	49.2	78	33.9	39.6	72	27.3	35.1	52	47.7	57	58	44.6
25	41.5	84	45.4	46.9	60	26.8	35.1	49.2	57	55	57	42.3
26	39.6	73	39.6	40.9	50	26.4	58	49.2	60	55	55	40.2
27	37.0	87	35.7	37.7	40.2	27.3	64	47.7	67	54	54	44.6
28	42.3	75	33.9	37.0	31.6	26.4	51	46.1	70	53	53	46.9
29	37.7	66	33.3	35.1	26.8	26.4	49.2	44.6	72	51	52	44.6
30	34.5	61	32.2		25.6	26.8	46.1	41.5	86	56	50	45.4
31		70	32.7		25.6		45.4		94	58		47.7
Ave.	42.9	75	41.7	59	208	26.9	45.8	53	76	74	71	62

Annual Average: 70 m^3/s

1964 - 1965 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	55	58	60	130	117	109	26.8	22.0	17.5	48.4	54	44.6
2	47.7	51	57	178	107	100	26.8	21.8	17.4	54	52	41.5
3	63	48.4	54	194	97	91	26.8	21.6	17.3	68	50	39.6
4	75	100	50	336	88	83	26.4	21.4	17.2	66	48.4	38.3
5	95	75	46.9	265	70	75	26.4	21.3	17.0	64	46.1	37.0
6	94	79	43.0	219	62	69	26.4	21.2	16.8	62	43.8	37.7
7	99	79	41.5	198	55	65	26.0	21.0	16.7	58	43.0	41.5
8	96	102	40.2	181	51	63	26.0	20.8	16.6	56	42.3	43.0
9	75	98	37.7	166	47.7	62	26.0	20.7	16.5	50	41.5	45.4
10	63	85	34.5	153	44.6	59	25.6	20.5	16.3	47.7	84	56
11	56	77	40.2	141	43.0	58	25.6	20.3	16.2	59	77	50
12	53	67	37.0	129	40.9	56	25.6	20.2	16.1	62	73	45.4
13	50	63	34.5	116	38.9	56	25.6	20.0	16.0	63	72	40.9
14	49.2	59	49.2	104	92	54	25.2	19.8	15.9	64	71	39.6
15	48.4	57	46.1	94	140	50	25.2	19.7	15.7	66	58	38.3
16	47.7	60	80	82	178	47.7	24.8	19.5	25.6	67	54	38.3
17	45.4	113	104	67	162	45.4	24.7	19.4	26.8	63	52	37.7
18	42.3	72	90	55	155	44.6	24.5	19.3	27.3	95	51	40.2
19	41.5	63	86	50	148	42.3	24.3	19.1	27.8	127	50	40.2
20	41.5	57	80	46.9	144	40.9	24.1	19.0	105	156	49.2	38.3
21	38.9	54	570	43.8	169	39.6	23.9	18.9	111	131	45.4	37.0
22	35.7	81	466	41.5	343	38.3	23.7	18.7	112	124	43.8	38.3
23	35.1	92	328	84	307	37.0	23.5	18.6	77	117	49.2	38.9
24	34.5	82	312	78	289	35.7	23.3	18.5	63	112	55	39.6
25	50	80	231	104	271	34.5	23.1	18.3	63	92	54	41.5
26	138	95	198	119	249	33.3	23.0	18.1	61	86	47.7	41.5
27	64	92	168	133	179	32.2	22.9	18.0	58	86	44.6	38.3
28	72	86	141	127	152	30.4	22.7	17.9	56	84	43.0	35.7
29	60	79	135		138	29.2	22.5	17.8	54	69	47.7	34.5
30	63	72	125		130	27.8	22.3	17.6	53	66	46.9	35.7
31		63	125		123		22.1		49.2	56		34.5
Ave.	61	75	126	130	136	54	(24.7)	(19.7)	(39.3)	78	53	40.3

Annual Average: 69.5 m^3/s

1965 - 1966 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	35.3	44.3	124	60	63	61	51	34.5	69	43.0	64	37.0
2	39.3	79	114	57	64	60	55	38.3	62	42.3	62	35.1
3	43.6	79	103	65	63	58	52	37.0	53	41.5	58	35.9
4	113	73	96	95	66	58	49.2	35.7	49.2	42.3	54	37.0
5	99	56	92	91	68	57	48.4	35.1	53	43.8	57	35.1
6	68	114	86	94	87	56	84	36.4	57	46.9	52	33.7
7	54	112	80	75	75	62	77	37.7	62	50	49.2	33.1
8	49.8	92	77	69	69	60	70	44.6	66	54	47.7	33.9
9	64	82	79	65	65	56	57	51	69	52	45.4	33.9
10	69	77	87	57	64	53	51	42.3	65	54	44.6	32.5
11	61	85	92	55	69	51	47.7	38.9	55	51	44.6	31.4
12	55	113	138	70	108	49.7	45.4	37.7	47.7	53	43.8	30.6
13	47.9	102	100	60	89	50	43.0	36.4	53	54	42.3	30.8
14	44.3	102	89	111	106	57	43.0	34.5	57	56	41.5	29.6
15	41.3	94	84	189	86	65	40.2	33.3	55	54	41.5	29.2
16	40.4	85	78	170	84	65	38.3	32.7	53	52	40.9	28.9
17	39.1	77	74	153	89	67	37.7	34.5	57	48.4	40.2	29.0
18	41.1	69	72	188	88	61	40.9	36.4	62	45.4	39.6	29.2
19	39.6	61	68	160	78	54	39.6	38.3	66	43.8	38.3	43.0
20	39.8	64	64	144	74	50	38.9	46.9	72	41.5	37.7	33.7
21	44.3	64	64	119	71	48.2	37.7	44.6	68	40.2	38.3	33.3
22	51	80	65	98	67	47.7	37.0	40.9	62	38.9	40.2	31.8
23	57	148	60	85	65	46.6	40.2	47.7	59	40.9	43.0	33.3
24	54	100	58	78	64	45.9	45.4	54	55	71	38.3	32.4
25	50	86	65	83	63	44.9	43.8	64	51	80	39.6	33.5
26	57	101	65	81	60	43.5	42.3	72	48.4	108	37.7	32.9
27	57	182	58	72	60	42.5	40.9	75	46.9	85	36.4	30.4
28	51	146	55	67	61	44.9	39.6	79	45.4	82	35.1	28.9
29	46.1	171	54		59	46.6	38.3	77	50	74	33.9	28.2
30	45.1	127	52		58	45.6	37.0	75	46.9	77	33.3	27.8
31		105	53		54		35.1		43.8	73		27.1
Ave.	53	96	79	97	73	54	46.7	46.4	57	56	44.0	32.3

Annual Average: 61 m^3/s

1966 - 1967 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	26.5	23.6	74	89	58	61	47.7	46.1	73	55	156	52
2	25.9	23.3	74	84	56	63	48.4	44.6	78	54	117	49.7
3	26.1	23.1	80	83	57	67	47.7	43.0	62	72	110	49.5
4	25.9	22.3	86	83	57	62	48.4	42.3	57	61	101	48.2
5	26.0	21.5	117	74	56	58	46.9	42.3	54	54	93	47.2
6	25.9	21.2	153	67	69	57	45.4	44.6	50	52	89	47.4
7	26.9	20.8	100	66	91	58	46.9	43.0	53	57	84	45.9
8	24.8	23.8	80	63	120	80	46.1	42.3	50	54	79	44.3
9	24.5	25.1	71	61	123	101	58	41.5	47.7	50	74	42.8
10	25.9	25.7	60	59	124	79	47.7	43.0	46.9	67	72	43.0
11	29.2	25.6	52	56	119	88	45.4	40.9	47.7	58	71	43.0
12	25.2	24.9	45.9	55	114	91	54	43.8	46.9	56	70	45.4
13	27.3	25.1	40.9	138	113	87	51	40.9	188	61	72	57
14	32.7	27.8	38.1	94	96	77	49.2	47.7	106	54	73	52
15	30.5	30.0	37.0	81	95	73	52	49.2	93	72	69	47.7
16	27.4	74	36.0	80	100	71	49.2	56	77	66	67	45.6
17	27.3	112	203	80	97	65	46.9	46.1	67	61	63	43.0
18	28.1	71	90	103	93	62	49.2	51	62	51	61	44.1
19	33.9	51	78	87	88	58	48.4	92	58	49.2	59	45.4
20	34.7	49.0	78	114	84	57	57	84	57	47.7	58	43.0
21	32.2	86	89	103	80	56	62	78	54	49.2	62	44.6
22	30.4	80	102	108	75	56	66	72	54	57	70	48.7
23	28.6	80	108	91	72	54	64	65	53	82	73	47.4
24	28.9	111	102	91	69	55	58	71	51	78	64	43.0
25	32.7	123	94	82	67	52	52	67	54	73	57	41.6
26	32.5	86	165	74	113	50	59	65	51	152	56	40.4
27	28.2	70	105	69	108	48.9	62	63	53	186	54	39.8
28	26.0	55	101	60	84	47.9	58	75	54	135	54	38.7
29	24.9	51	101		78	47.2	51	81	59	150	60	40.9
30	25.6	43.0	91		71	46.9	49.2	77	56	190	58	46.4
31		47.0	88		65		47.7		52	213		61
Ave.	28.2	50	88	82	87	64	52	57	63	81	75	46.1

Annual Average: 64.4 m^3/s

1967 - 1968

Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	72	62									(34.5)	27.8
2	78	66									(33.9)	27.3
3	54	84									33.3	26 8
4	58	77									32.7	26.4
5	68	89									32.2	26.3
6	76	80									34.5	25.6
7	91	90									33.9	28.1
8	80	75									32.7	29.8
9	69	70									31.0	27.8
10	62	103									33.9	26.1
11	56	124									35.1	25.5
12	48.7	193									34.5	25.2
13	45.9	106									32.7	24.4
14	42.5	102									31.6	24.5
15	64	90									30.4	24.8
16	94	77									32.7	28.9
17	107	66									31.6	28.2
18	125	64								39.6	30.4	27.1
19	81	63								39.6	29.2	(26.0)
20	89	90								40.2	28.7	(25.2)
21	82	84								40.2	28.2	24.4
22	85	73								40.2	32.7	23.9
23	112	66								40.2	37.0	23.9
24	102	64								39.6	31.6	32.7
25	97	66								(38.9)	29.8	32.5
26	90	66								(38.3)	29.2	(29.2)
27	83	107								(37.7)	29.8	(26.0)
28	74	145								(37.0)	29.8	23.9
29	66	125								(36.4)	29.2	22.6
30	57	160								(35.7)	28.2	22.0
31		148								(35.1)		22.0
Ave.	77	93									(31.8)	26.3

1968 - 1969

Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	23.0	70	57	63	51	44.3	44.6	42.3	43.8	63	83	40.9
2	26.4	57	66	60	48.7	43.5	43.8	46.9	41.5	63	78	41.3
3	24.7	54	101	57	46.9	41.8	43.0	43.0	37.0	52	73	39.8
4	23.9	41.6	166	52	46.1	40.0	42.3	52	35.7	48.4	70	39.6
5	22.5	36.0	102	54	44.9	52.9	41.5	49.2	35.1	44.6	66	39.1
6	22.2	34.9	82	125	43.5	47.9	40.9	47.7	35.1	42.3	63	40.2
7	22.3	33.3	80	196	42.8	47.4	40.2	38.9	36.4	40.9	61	40.2
8	21.7	31.4	71	203	79	50	39.6	35.1	34.5	44.6	61	38.7
9	21.3	31.6	63	170	97	44.6	39.6	35.1	32.7	101	58	38.1
10	21.0	47.0	60	168	63	42.8	38.9	37.7	75	79	56	37.2
11	23.0	79	74	130	54	44.6	38.9	36.4	75	64	56	36.2
12	22.4	77	76	103	51	46.6	38.3	35.1	66	56	57	35.7
13	24.1	72	70	99	45.4	66	38.3	33.9	58	58	55	35.3
14	24.6	76	84	93	46.1	53	37.7	33.9	54	142	54	34.3
15	22.6	110	97	86	45.1	52	37.0	33.3	48.4	128	52	33.9
16	26.1	85	96	67	44.1	193	37.0	33.3	46.9	112	49.2	33.7
17	33.4	94	88	54	42.7	111	36.4	31.6	45.5	110	48.4	33.1
18	30.4	136	69	44.1	41.5	77	36.4	31.0	43.8	118	47.7	32.5
19	34.1	125	68	63	42.8	72	35.7	30.4	63	126	46.9	32.2
20	30.2	140	56	63	44.8	66	35.7	30.4	47.7	113	46.1	31.4
21	29.1	99	52	62	70	62	35.1	31.0	42.3	94	72	31.0
22	38.1	120	49	61	62	61	37.7	30.4	40.9	89	67	31.0
23	58	121	52	62	60	61	37.0	30.4	39.6	106	52	30.4
24	39.4	117	60	62	65	60	36.4	31.0	51	76	49.2	30.4
25	33.5	86	80	61	71	58	35.1	52	43.0	78	49.2	30.4
26	34.9	71	112	58	57	55	34.5	54	43.8	97	47.7	33.4
27	53	58	101	56	57	53	33.9	53	40.2	88	45.4	46.6
28	115	84	118	53	62	47.9	35.7	52	40.9	100	44.6	45.4
29	72	145	95		55	47.9	37.0	46.9	74	114	43.0	45.1
30	65	99	79		51	46.1	38.3	47.7	63	97	41.5	46.4
31		64	63		46.4		39.6		71	93		45.6
Ave.	34.6	81	80	87	54	60	38.3	39.5	48.5	85	56	37.1

Annual Average: $58.3 m^3/s$

1969 - 1970 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	39.3	25.5	109	123 *	68 *	70	72	64	60	135 *	76	46.9
2	38.3	32.2	106	203	70 *	69	70	61	57	126	72	45.3
3	34.5	30.6	127	162	65 *	70	66	60	56	99	70	44.6
4	33.1	45.1	115	145	68 *	69	72	64	54	86	68	44.2
5	31.8	86	134	116	60	72	120	61	55	79	65	43.2
6	30.8	58	101	104	73	65	86	60	54	77	64	42.1
7	37.4	51	90	103	77	142 *	77	59	53	74	62	41.2
8	34.9	42.7	152	171	76	567 *	74	61	51	72	60	40.6
9	33.9	39.1	143	127	68	283 *	72	63	50	71	62	40.2
10	33.7	36.8	137	100	67	146	70	66	50	69	61	40.2
11	32.5	57	76	115	66	112	67	72	49.2	65	68	39.9
12	40.9	90	69	124	62	130	65	81	48.4	63	62	39.3
13	39.1	83	69	92	65	117	66	103	47.6	66	57	38.8
14	38.1	76	70 *	84	73	108	64	85	46.9	69	55	38.6
15	41.6	61	105 *	98	63	96	62	69	46.5	67	54	38.3
16	37.5	63	92 *	91	58	93	80	72	48.6	76	53	38.3
17	35.1	82	78 *	85	58	89	76	67	67	68	52	37.7
18	34.5	97	72	76	55	84	66	64	70	64	52	37.2
19	38.7	87	65	73	80	82	79	65	74	64	52	38.0
20	39.6	102	57	72	176	82	111	67	85	71	50	47.0
21	37.0	110	54	70	137	82	118	63	65	81	49.0	47.6
22	34.5	107	53	68	104	78	110	59	68	104	48.4	40.1
23	29.6	122	52	69	103	73	95	61	83	108	48.0	37.8
24	29.0	138	48.7	68	100	72	87	76	70	115	47.3	36.2
25	27.8	96	53 *	63	90	78	75	76	82	137	48.6	35.6
26	26.8	89	78 *	61	94	76	63	73	81	138	51	35.4
27	26.8	79	100 *	59	94	72	65	68	72	103	57	38.5
28	26.0	82	98 *	75 *	98	70	60	66	94	89	57	40.2
29	25.6	88	92 *		88	68	61	64	77	87	51	37.0
30	25.2	116	193 *		81	73	61	61	70 *	83	48.3	35.0
31		104	410 *		75		69		178 *	80		34.1
Ave.	33.8	77	103	100	81	110	77	68	67	87	57	40.0

* Surveyed Discharge

Annual Average: 74.9 m^3/s

1970 - 1971 Unit: m^3/s

Day	Nov.	Dec.	Jan.	Feb.	May	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	33.3	29.9	72.4	228	112	70.6	52.9	45.9	52.8	80.9	64.3	35.1
2	33.1	29.5	62.0	188	126	74.1	54.8	44.8	59.6	65.0	85.6	34.7
3	32.2	31.0	62.8	162	121	75.0	54.0	44.0	53.9	60.1	85.4	34.1
4	32.7	37.9	77.9	167	115	77.4	58.2	43.2	49 8	55.9	71.8	33.3
5	33.9	49.0	87.5	153	115	83.5	64.3	42.5	46.9	54.0	61.2	33.3
6	44.7	42.9	90.4	150	113	77.0	57.5	42.5	49.6	51.0	56.6	33.3
7	70.2	37.7	102	144	105	76.9	53.5	44.6	88.5	49.1	53.0	32,7
8	79.7	34.7	114	140	97.4	83.0	52.0	45.4	105	51.4	50.8	32.2
9	53.2	31.9	102	118	111	73.2	50.4	44.8	96.0	56.7	48.5	30.6
10	46.9	30.1	89.2	117	96.3	67.8	56.3	44.1	75.0	59.2	47.6	32.9
11	43.8	29.2	80.0	180	90.2	64.4	70.0	45.7	63.0	53.7	47.7	37.5
12	40.2	29.1	79.7	189	91.7	64.2	108	52.1	56.0	50.6	46.9	38.0
13	37.5	29.1	91.1	399	88.7	67.8	86.2	61.1	51.0	48.0	46.0	44.3
14	36.1	28.9	73.0	276	83.8	68.3	75.2	49 5	48.4	46.3	45.0	38.0
15	35.8	28.5	57.4	220	80.8	64.1	65.6	45.4	46.9	46.1	44.4	38.8
16	37.7	33.4	52.7	194	79.6	61.6	60.9	43.2	46.9	46.1	43.1	37.2
17	46.1	64.8	58.0	157	76.8	59.7	57.3	42.7	46.9	45.4	42.1	34.2
18	39.7	42.7	61.5	134	81.1	58.0	54.8	48.2	44.6	44.6	41.1	32,9
19	38.2	41.1	88.6	139	102	56.2	53.0	56.1	50.8	45.3	42.4	34.7
20	36.4	38.7	99.8	119	83.8	56.8	52.8	47.9	83.1	49.8	42.8	38.5
21	35.0	36.3	245	120	79.0	55.2	54.0	45.7	74.6	52.8	41.6	53.2
22	38.0	33.2	535	107	76.3	55.8	52.4	45.1	143	49.8	40.4	57.3
23	41.0	30.4	432	120	74.4	63.3	51.5	44.9	83.9	59.4	38.8	42.3
24	37.5	28.3	314	102	72.2	70.2	49.5	43.6	68.6	56.3	38.4	37.7
25	34.8	28.6	367	101	69.9	63.3	48.9	43.0	61.0	92.3	41.6	34.9
26	33.2	30.9	292	103	68.2	58.0	52.9	45.9	55.8	66.4	40.1	33.4
27	32.3	30.1	283	96.7	70.6	55.0	53.8	44.4	55.5	54.7	37.9	32.7
28	31.6	73.0	400	144	72.3	54.0	58.1	44.6	60.8	49.8	36.7	32.2
29	31.4	84.0	272		69.3	53.0	52.5	50.0	56.7	49.9	35.7	31.3
30	30.9	100	388		72.1	51.3	50.7	49.4	63.2	74.3	35.6	30.7
31		94.5	308		73.1		47.6		76.8	58.6		30.4
Ave.	39.9	41.6	175	160	89.3	65.3	58.4	46.3	65.0	55.9	48.4	36.2

Annual Average: 73.0 m^3/s

Table-A.5.6 Maximum-Minimum Temperature

Unit: °C

Station		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Remarks
Moramanga	Max.	27.7	27.8	26.7	25.8	23.5	21.4	20.2	20.9	23.0	25.6	27.4	27.7	1941 - 1970
	Min.	17.2	17.2	17.0	15.5	13.2	11.3	10.6	10.5	11.3	12.8	15.1	16.5	
Analamazaotra	Max.	26.8	27.1	26.0	25.3	23.1	21.3	20.0	20.2	21.9	23.9	25.9	26.6	1941 - 1970
	Min.	16.7	16.7	16.6	15.4	13.0	11.2	10.5	10.3	11.0	12.4	14.7	16.2	
Beforona	Max.	27.5	27.4	27.6	24.6	25.2	22.2	22.0	21.6	24.1	26.0	28.5	a	1973
	Min.	19.5	20.1	a	a	15.9	15.1	13.0	12.6	14.7	16.5	16.7	a	
Beforona	Max.	a	a	a	26.4									1974
	Min.	17.2	17.8	18.2	18.2									

Table-A.6.1-(1) Economic Comparison Table

MOST PROBABLE, 2 FURNACES 1 STEP

UNIT : MFMG

		HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N	I	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06
1	76	1454	1425	1398	1372	582	571	560	549	0	0	0	0	223	219	214	210	24	24	23	23	2283	2239	2195	2154
2	77	2791	2683	2580	2484	0	0	0	0	121	116	112	108	294	283	272	262	31	30	29	28	3237	3112	2993	2882
3	78	2371	2234	2108	1991	0	0	0	0	1184	1120	1057	998	359	338	319	301	37	35	33	31	3956	3727	3517	3321
4	79	3123	2885	2670	2474	582	538	497	461	939	867	803	744	429	396	367	340	44	41	38	35	5117	4727	4375	4054
5	80	2649	2399	2177	1979	0	0	0	0	472	428	388	353	512	464	421	383	52	47	43	39	3685	3338	3029	2754
6	81	0	0	0	0	0	0	0	0	0	0	0	0	41	36	32	29	131	116	104	92	172	152	136	121
7	82	672	585	511	447	0	0	0	0	0	0	0	0	41	36	31	27	131	114	100	87	844	735	642	561
8	83	1111	948	812	697	0	0	0	0	0	0	0	0	41	35	30	26	131	112	96	82	1283	1095	938	805
9	84	1031	863	724	610	468	701	590	497	140	151	126	107	47	39	33	28	132	110	93	78	2230	1866	1566	1320
10	85	1132	929	765	632	0	0	0	0	38	25	20	17	53	43	36	30	132	108	89	74	1347	1105	910	753
11	86	0	0	0	0	0	0	0	0	0	0	0	0	76	61	49	40	170	137	110	90	246	198	159	130
12	87	0	0	0	0	0	0	0	0	140	142	112	89	94	74	59	47	171	135	107	85	445	351	278	221
13	88	0	0	0	0	0	0	0	0	38	23	14	14	112	87	67	53	173	134	104	81	315	244	189	148
14	89	0	0	0	0	0	0	0	0	0	0	0	0	124	98	74	57	178	135	103	79	307	233	177	136
15	90	0	0	0	0	542	432	323	243	0	0	0	0	165	123	92	69	181	134	101	76	928	689	516	388
16	91	0	0	0	0	0	0	0	0	0	0	0	0	217	158	116	85	182	133	97	72	399	291	213	157
17	92	0	0	0	0	0	0	0	0	0	0	0	0	290	207	149	108	186	133	95	69	476	340	244	177
18	93	0	0	0	0	1374	956	674	481	0	0	0	0	323	226	159	113	195	137	96	68	1892	1325	933	662
19	94	0	0	0	0	742	544	376	262	0	0	0	0	411	282	195	136	203	139	96	67	1406	965	667	465
20	95	0	0	0	0	0	0	0	0	0	0	0	0	549	369	251	171	213	143	97	66	762	512	348	237
TOTAL		16334	14951	13745	12686	4752	3750	3024	2493	3141	2872	2636	2430	4406	3574	2966	2515	2697	2097	1654	1322	31330	27244	24025	21446

		HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N	I	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14
1	76	1346	1322	1298	1275	534	524	514	505	0	0	0	0	206	203	199	196	22	22	21	21	2113	2076	2038	2003
2	77	2393	2307	2225	2148	0	0	0	0	104	100	96	93	252	243	234	226	27	26	25	24	2776	2676	2580	2491
3	78	1882	1781	1688	1600	0	0	0	0	944	893	846	803	285	270	256	242	29	28	26	25	3140	2972	2816	2670
4	79	2296	2133	1985	1844	428	398	370	345	690	641	597	556	315	293	273	254	32	30	28	26	3761	3495	3253	3030
5	80	1803	1645	1503	1376	0	0	0	0	321	293	268	245	348	318	291	266	35	32	30	27	2507	2288	2092	1914
6	81	0	0	0	0	0	0	0	0	0	0	0	0	26	23	21	19	83	74	66	60	109	97	87	79
7	82	392	345	304	269	0	0	0	0	0	0	0	0	24	21	19	16	76	67	59	52	492	433	382	337
8	83	600	518	449	389	0	0	0	0	0	0	0	0	22	19	17	14	71	61	53	46	693	598	519	449
9	84	516	437	372	317	428	356	303	258	90	76	65	55	24	20	17	14	66	56	48	41	1116	945	805	685
10	85	524	436	364	305	0	0	0	0	14	12	10	8	25	20	17	14	61	51	43	36	624	519	434	363
11	86	0	0	0	0	0	0	0	0	0	0	0	0	33	27	22	18	73	60	49	40	106	87	71	58
12	87	0	0	0	0	0	0	0	0	71	57	46	37	37	30	24	20	68	54	44	35	176	141	114	92
13	88	0	0	0	0	0	0	0	0	11	9	7	5	41	32	26	20	64	50	40	31	116	91	73	56
14	89	0	0	0	0	0	0	0	0	0	0	0	0	44	34	26	21	61	47	36	28	105	81	62	49
15	90	0	0	0	0	143	134	106	82	0	0	0	0	52	40	30	23	57	43	33	25	292	222	169	130
16	91	0	0	0	0	0	0	0	0	0	0	0	0	63	47	35	27	53	40	30	22	116	87	65	49
17	92	0	0	0	0	0	0	0	0	0	0	0	0	78	57	42	31	50	37	27	20	128	94	69	51
18	93	0	0	0	0	344	247	179	130	0	0	0	0	81	58	42	31	49	35	25	18	474	340	246	179
19	94	0	0	0	0	144	130	92	66	0	0	0	0	95	67	48	34	47	33	24	17	326	230	164	117
20	95	0	0	0	0	0	0	0	0	0	0	0	0	118	82	57	40	46	32	22	15	164	114	79	55
TOTAL		11752	10924	10188	9528	2098	1799	1570	1392	2245	2081	1935	1802	2169	1904	1696	1526	1070	878	729	609	19334	17586	16118	14857

Table-A.6.1-(2) Internal Rate of Return

MOST PROBABLE: 2 FURNACES 1 STEP

UNIT : MFMG

		ROGEZ PROJECT			BENEFIT			NET BENE.	PRESENT VALUE		COEFFICIENT
NO	YEAR	(1) INVESTMENT	(2) O & M	(3) FUEL EX	(4) FIXED EX	(5) O & M	(6) FUEL EX	(7) NET	(8) INVESTMENT	(9) NET BENE.	(10) 13.44 %
1	1976	1454	0	0	0	0	0	0	1282	0	0.8815
2	1977	2912	0	0	0	0	0	0	2263	0	0.7771
3	1978	3560	0	0	0	0	0	0	2439	0	0.6850
4	1979	4062	0	0	0	0	0	0	2453	0	0.6039
5	1980	3121	0	0	0	0	0	0	1661	0	0.5324
6	1981	0	79	-471	269	65	625	1351	0	634	0.4693
7	1982	672	79	-471	269	84	781	1526	278	631	0.4137
8	1983	1111	79	-471	269	101	957	1719	405	627	0.3647
9	1984	2051	80	-465	269	117	1148	1919	659	617	0.3215
10	1985	1162	80	-459	384	131	1240	2114	329	599	0.2834
11	1986	0	118	-436	459	202	2015	2994	0	748	0.2498
12	1987	180	119	-418	554	241	2239	3333	40	734	0.2202
13	1988	30	121	-400	554	254	2407	3494	6	678	0.1941
14	1989	0	126	-383	744	275	2551	3827	0	655	0.1711
15	1990	0	129	-347	744	291	2748	4001	0	604	0.1509
16	1991	0	130	-295	839	313	2915	4232	0	563	0.1330
17	1992	0	134	-222	934	334	3121	4477	0	525	0.1172
18	1993	792	143	-189	934	363	3359	4702	82	486	0.1034
19	1994	792	151	-101	1029	390	3574	4943	72	450	0.0911
20	1995	0	161	37	1217	418	3833	5270	0	423	0.0803
SUB TOTAL 1		21899	1729	-5091	9448	3579	33513	49902	11969	8974	
SUB TOTAL 2		7989	4830	1110	36510	12540	114990	158100	83	3078	
TOTAL (1+2)		29888	6559	-3981	45958	16119	148503	208002	12052	12052	

Table-A.6.1-(3) Present Value at Each Discount Rate

RATE OF RETURN (%)	(4)	(6)	(8)	(10)	(12)	(14)	(16)
INVESTMENT (MFMG)	19544	17050	15256	13874	12748	11799	10981
NET BENEFIT (MFMG)	70039	44468	29696	20693	14948	11123	8484

Table-A.6.1-(4) Expenses for Diesel Plant

MOST PROBABLE, 2 FURNACES 1 STEP

UNIT : MEMS

NO	YEAR	DIESEL (1) INVEST.	(2) AMOUNT	(3) FIXED EX	GAS TURBIN (4) INVEST.	(5) AMOUNT	(6) FIXED EX	T/L & S/S (7) INVEST.	(8) AMOUNT	(9) FIXED EX	TOTAL FIXED (10) EX	INCRE-MENTAL (11) O & M EX	FUEL EX (12) DIESEL	(13) G.T.	INCRE-MENTAL (14) FUEL EX
5	1980	0	0	0	0	0	0	0	0	0	0	50	512	0	512
6	1981	1584	1584	174	440	440	74	206	206	16	264	65	1035	102	625
7	1982	0	1584	174	0	440	74	0	206	16	264	84	1229	64	781
8	1983	0	1584	174	0	440	74	0	206	16	264	101	1405	64	957
9	1984	0	1584	174	0	440	74	0	206	16	264	117	1558	102	1148
10	1985	792	2376	261	0	440	74	103	309	24	364	131	1688	64	1240
11	1986	792	3168	348	0	440	74	103	412	32	454	202	2387	140	2015
12	1987	792	3960	435	0	440	74	103	515	40	554	241	2687	64	2239
13	1988	0	3960	435	0	440	74	0	515	40	554	254	2817	102	2407
14	1989	1584	5544	609	0	440	74	206	721	56	744	275	2999	64	2551
15	1990	0	5544	609	0	440	74	0	721	56	744	291	3158	102	2748
16	1991	792	6336	696	0	440	74	103	824	64	834	313	3363	64	2915
17	1992	792	7128	783	0	440	74	103	927	72	934	334	3569	64	3121
18	1993	0	7128	783	0	440	74	0	927	72	934	363	3769	102	3359
19	1994	792	7920	870	0	440	74	103	1030	80	1024	390	4022	64	3574
20	1995	1584	9504	1043	0	440	74	206	1236	95	1217	418	4281	64	3833

Table-A.6.1-(5) Repayment Schedule

MOST PROBABLE, 2.FURNACES , 1.STEP.

UNIT : MFMG

NO	YEAR	1ST STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	2ND STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	3RD STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	TOTAL (1) PAY. OF INTEREST	(2) REPAYMENT DEBT
6	1981	17611	1233	0	0	17611	0	0	0	0	0						1233	0
7	1982	0	1233	0	0	17611	0	0	0	0	0						1233	0
8	1983	0	1233	330	1562	17281	0	0	0	0	0						1233	330
9	1984	0	1210	353	1562	16929	0	0	0	0	0						1210	353
10	1985	0	1185	377	1562	16551	0	0	0	0	0						1185	377
11	1986	0	1159	404	1562	16148	4713	330	0	0	4713						1489	404
12	1987	0	1130	432	1562	15716	0	330	0	0	4713						1460	432
13	1988	0	1100	462	1562	15253	0	330	0	0	4713						1430	462
14	1989	0	1068	495	1562	14759	0	330	88	418	4625						1398	583
15	1990	0	1033	529	1562	14230	0	324	94	418	4530						1357	624
16	1991	0	996	566	1562	13663	0	317	101	418	4429						1313	667
17	1992	0	956	606	1562	13057	0	310	108	418	4321						1266	714
18	1993	0	914	648	1562	12409	0	302	116	418	4206						1217	764
19	1994	0	869	694	1562	11715	0	294	124	418	4082						1163	817
20	1995	0	820	742	1562	10973	0	286	132	418	3950						1106	875
21	1996	0	768	794	1562	10179	0	276	142	418	3808						1045	936
22	1997	0	713	850	1562	9329	0	267	152	418	3657						979	1001
23	1998	0	653	909	1562	8420	0	256	162	418	3494						909	1071
24	1999	0	589	973	1562	7447	0	245	174	418	3321						834	1146
25	2000	0	521	1041	1562	6406	0	232	186	418	3135						754	1227
26	2001	0	448	1114	1562	5292	0	219	199	418	2937						668	1313
27	2002	0	370	1192	1562	4100	0	206	213	418	2724						576	1404
28	2003	0	287	1275	1562	2824	0	191	227	418	2497						478	1503
29	2004	0	198	1365	1562	1460	0	175	243	418	2253						372	1608
30	2005	0	102	1460	1562	0	0	158	260	418	1993						260	1721
31	2006	0	0	0	0	0	0	139	279	418	1714						139	279
32	2007	0	0	0	0	0	0	120	298	418	1416						120	298
33	2008	0	0	0	0	0	0	99	319	418	1097						99	319
34	2009	0	0	0	0	0	0	77	341	418	756						77	341
35	2010	0	0	0	0	0	0	53	365	418	391						53	365
36	2011	0	0	0	0	0	0	27	391	418	0						27	391

Table-A.6.1-(6) Income Statement

MOST PROBABLE, 2 FURNACES 1 STEP

UNIT : MFMG

NO	YEAR	REVENUES (1) INCREASE PUBLIC ENERGY	(2) UNIT PX.OF PUBLIC	(3) INCOME FROM PUBLIC	(4) ENERGY OF FERRO	(5) UNIT PX.OF FERRO	(6) INCOME FROM FERRO	(7) TOTAL INCOME	EXPENCES (8) OPE. AND MAIN.	(9) OTHER EX.	(10) DEPRECIATION	(11) SUB TOTAL	(12) OPERAT. INCOME	(13) SAVING FUEL EX.	(14) INTEREST	(15) NET INCOME
		GWH	FMG/KWH	MFMG	GWH	FMG/KWH	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG
6	1981	13	7.20	94	87	3.90	339	433	79	3	341	423	10	471	1233	-752
7	1982	28	7.20	202	104	3.90	406	608	79	3	341	423	185	471	1233	-577
8	1983	45	7.20	324	115	3.90	449	773	79	3	341	423	350	471	1233	-412
9	1984	63	7.20	454	127	3.90	495	949	80	82	341	503	446	465	1210	-299
10	1985	82	7.20	590	127	3.90	495	1085	80	82	341	503	582	459	1185	-144
11	1986	105	6.50	683	232	3.50	812	1495	118	82	428	628	867	436	1489	-186
12	1987	128	6.50	832	254	3.50	889	1721	119	82	428	629	1092	418	1460	50
13	1988	154	6.50	1001	254	3.50	889	1890	121	82	428	631	1259	400	1430	229
14	1989	183	6.50	1190	254	3.50	889	2079	126	102	428	656	1423	383	1398	408
15	1990	213	6.50	1385	254	3.50	889	2274	129	102	428	659	1615	347	1357	605
16	1991	252	6.20	1562	254	3.20	813	2375	130	102	428	660	1715	295	1313	697
17	1992	287	6.20	1779	254	3.20	813	2592	134	102	428	664	1928	222	1266	884
18	1993	326	6.20	2021	254	3.20	813	2834	143	189	428	760	2074	189	1217	1046
19	1994	368	6.20	2282	254	3.20	813	3095	151	276	428	855	2240	101	1163	1178
20	1995	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	1106	1366
21	1996	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	1045	1427
22	1997	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	979	1493
23	1998	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	909	1563
24	1999	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	834	1638
25	2000	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	754	1718
26	2001	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	668	1804
27	2002	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	576	1896
28	2003	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	478	1994
29	2004	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	372	2100
30	2005	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	260	2212
31	2006	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	139	2333
32	2007	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	120	2352
33	2008	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	99	2373
34	2009	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	77	2395
35	2010	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	53	2419
36	2011	413	6.20	2561	254	3.20	813	3374	161	276	428	865	2509	-37	27	2445

Table-A.6.1-(7) Cash Flow

MOST PROBABLE, 2 FURNACES, 1 STEP — UNIT : MFMG

NO	YEAR	(1) CASH FROM INCOME	(2) NET INCOME	(3) DEPRECIATION	(4) REPAYMENT OF DEBT	(5) NET CASH PROVIDED
6	1981	-411	-752	341	0	-411
7	1982	-236	-577	341	0	-236
8	1983	-71	-412	341	330	-401
9	1984	42	-299	341	353	-311
10	1985	197	-144	341	377	-180
11	1986	242	-186	428	404	-162
12	1987	478	50	428	432	46
13	1988	657	229	428	462	195
14	1989	836	408	428	583	253
15	1990	1033	605	428	624	409
16	1991	1125	697	428	667	458
17	1992	1312	884	428	714	598
18	1993	1474	1046	428	764	710
19	1994	1606	1178	428	817	789
20	1995	1794	1366	428	875	919
21	1996	1855	1427	428	936	919
22	1997	1921	1493	428	1001	920
23	1998	1991	1563	428	1071	920
24	1999	2066	1638	428	1146	920
25	2000	2146	1718	428	1227	919
26	2001	2232	1804	428	1313	919
27	2002	2324	1896	428	1404	920
28	2003	2422	1994	428	1503	919
29	2004	2528	2100	428	1608	920
30	2005	2640	2212	428	1721	919
31	2006	2761	2333	428	279	2482
32	2007	2780	2352	428	298	2482
33	2008	2801	2373	428	319	2482
34	2009	2823	2395	428	341	2482
35	2010	2847	2419	428	365	2482
36	2011	2873	2445	428	391	2482

Table-A.6.2-(1) Economic Comparison Table

MOST PROBABLE, 2 FURNACES 2 STEP

UNIT : MFMG

		HYDRO				O & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N	I	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06
1	76	1454	1425	1398	1372	542	571	560	549	0	0	0	0	223	219	214	210	24	24	23	23	2283	2239	2195	2154
2	77	2173	2089	2009	1934	0	0	0	0	121	116	112	108	294	283	272	262	31	30	29	28	2619	2518	2422	2332
3	78	1684	1587	1497	1414	0	0	0	0	1189	1120	1057	998	359	338	319	301	37	35	33	31	3269	3080	2906	2744
4	79	2033	1878	1738	1610	542	538	497	461	939	867	803	744	429	396	367	340	44	41	38	35	4027	3720	3443	3190
5	80	1695	1535	1393	1267	0	0	0	0	510	462	419	381	512	464	421	383	52	47	43	39	2769	2508	2276	2070
6	81	0	0	0	0	0	0	0	0	0	0	0	0	35	31	28	25	110	98	87	78	145	129	115	103
7	82	524	456	398	348	0	0	0	0	0	0	0	0	41	36	31	27	111	97	84	74	676	589	513	449
8	83	988	843	722	620	840	717	614	527	0	0	0	0	53	45	39	33	113	96	83	71	1994	1701	1458	1251
9	84	908	760	638	537	0	0	0	0	180	151	126	107	82	69	58	49	116	97	82	69	1286	1077	904	762
10	85	2876	2359	1943	1606	0	0	0	0	30	25	20	17	152	125	103	85	118	97	80	66	3176	2606	2146	1774
11	86	1955	1572	1270	1030	0	0	0	0	0	0	0	0	229	184	149	121	156	125	101	82	2340	1881	1520	1233
12	87	2337	1843	1460	1161	0	0	0	0	140	142	112	89	270	213	169	134	160	126	100	80	2947	2324	1841	1464
13	88	1945	1504	1168	912	0	0	0	0	30	23	18	14	367	284	220	172	166	128	100	78	2508	1939	1506	1176
14	89	0	0	0	0	0	0	0	0	0	0	0	0	118	89	68	52	222	168	128	98	340	257	196	150
15	90	0	0	0	0	542	432	323	243	0	0	0	0	193	143	107	81	224	166	124	93	999	741	554	417
16	91	0	0	0	0	0	0	0	0	0	0	0	0	200	146	107	79	230	168	123	91	430	314	230	170
17	92	0	0	0	0	0	0	0	0	0	0	0	0	276	197	142	102	232	166	119	86	508	363	261	188
18	93	0	0	0	0	1374	962	674	481	0	0	0	0	340	238	168	119	240	168	118	84	1954	1368	964	684
19	94	0	0	0	0	0	0	0	0	0	0	0	0	429	294	204	142	249	171	118	82	678	465	322	224
20	95	0	0	0	0	742	533	361	247	0	0	0	0	552	371	252	172	261	176	119	81	1605	1080	732	500
TOTAL		20572	17851	15634	13811	4752	3753	3033	2508	3179	2906	2667	2459	5154	4165	3438	2889	2896	2224	1732	1369	36553	30899	26504	23035

		HYDRO				O & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N	I	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14
1	76	1346	1322	1298	1275	539	529	520	511	0	0	0	0	206	203	199	196	22	22	21	21	2113	2076	2038	2003
2	77	1863	1796	1732	1672	0	0	0	0	104	100	96	93	252	243	234	226	27	26	25	24	2246	2165	2087	2015
3	78	1337	1265	1199	1137	0	0	0	0	944	893	846	803	285	270	256	242	29	28	26	25	2595	2456	2327	2207
4	79	1494	1389	1292	1204	428	398	370	345	690	641	597	556	315	293	273	254	32	30	28	26	2959	2751	2560	2385
5	80	1154	1052	962	880	0	0	0	0	347	317	289	265	348	318	291	266	35	32	30	27	1884	1719	1572	1438
6	81	0	0	0	0	0	0	0	0	0	0	0	0	22	20	18	16	69	62	56	50	91	82	74	66
7	82	306	269	237	209	0	0	0	0	0	0	0	0	26	21	19	16	65	57	50	44	395	347	306	269
8	83	534	461	399	346	454	392	339	294	0	0	0	0	29	25	21	19	61	53	46	40	1078	931	805	699
9	84	454	385	327	279	0	0	0	0	90	76	65	55	41	35	30	25	58	49	42	36	643	545	464	395
10	85	1332	1109	926	776	0	0	0	0	14	12	10	8	70	59	49	41	55	45	38	32	1471	1225	1023	857
11	86	838	685	562	463	0	0	0	0	0	0	0	0	98	80	66	54	67	55	45	37	1003	820	673	554
12	87	928	745	600	485	0	0	0	0	71	57	46	37	107	86	69	56	64	51	41	33	1170	939	756	611
13	88	715	563	446	354	0	0	0	0	11	9	7	5	135	106	84	67	61	48	38	30	922	726	575	456
14	89	0	0	0	0	0	0	0	0	0	0	0	0	40	31	24	19	76	58	45	35	116	89	69	54
15	90	0	0	0	0	183	139	106	82	0	0	0	0	61	46	35	27	71	54	41	31	315	239	182	140
16	91	0	0	0	0	0	0	0	0	0	0	0	0	58	44	33	25	67	50	38	28	125	94	71	53
17	92	0	0	0	0	0	0	0	0	0	0	0	0	75	55	40	30	63	46	34	25	138	101	74	55
18	93	0	0	0	0	344	247	179	130	0	0	0	0	85	61	44	32	60	43	31	23	489	351	254	185
19	94	0	0	0	0	0	0	0	0	0	0	0	0	99	70	50	36	58	41	29	21	157	111	79	57
20	95	0	0	0	0	170	118	82	58	0	0	0	0	118	82	57	40	56	39	27	19	344	239	166	117
TOTAL		12301	11041	9980	9080	2118	1823	1596	1420	2271	2105	1956	1822	2468	2148	1892	1687	1096	889	731	607	20254	18006	16155	14616

Table-A.6.2-(2). Internal Rate of Return

MOST PROBABLE, 2 FURNACES 2 STEP — UNIT : MFMG

NO	YEAR	ROGEZ PROJECT (1) INVESTMENT	(2) O & M	(3) FUEL EX	BENEFIT (4) FIXED EX	(5) O & M	(6) FUEL EX	NET BENE. (7) NET	PRESENT VALUE (8) INVESTMENT	(9) NET BENE.	COEFFICIENT (10) 13.56 %
1	1976	1454	0	0	0	0	0	0	1280	0	0.8806
2	1977	2294	0	0	0	0	0	0	1779	0	0.7754
3	1978	2873	0	0	0	0	0	0	1962	0	0.6828
4	1979	2972	0	0	0	0	0	0	1787	0	0.6012
5	1980	2205	0	0	0	0	0	0	1167	0	0.5294
6	1981	0	58	-477	269	65	625	1378	0	642	0.4662
7	1982	524	59	-471	269	84	781	1546	215	635	0.4105
8	1983	1828	61	-459	269	101	957	1725	661	624	0.3615
9	1984	1088	64	-430	269	117	1148	1900	346	605	0.3183
10	1985	2906	66	-360	364	131	1240	2029	815	569	0.2803
11	1986	1955	104	-283	459	202	2015	2855	483	705	0.2468
12	1987	2517	108	-242	554	241	2239	3168	547	689	0.2173
13	1988	1975	114	-145	554	254	2407	3246	378	621	0.1914
14	1989	0	170	-394	744	275	2551	3794	0	639	0.1685
15	1990	0	172	-319	744	291	2748	3930	0	583	0.1484
16	1991	0	178	-312	839	313	2915	4201	0	549	0.1307
17	1992	0	180	-236	934	334	3121	4445	0	511	0.1151
18	1993	792	186	-172	934	363	3359	4640	80	470	0.1013
19	1994	0	197	-83	1029	390	3574	4879	0	435	0.0892
20	1995	792	209	40	1217	418	3833	5219	62	410	0.0786
SUB. TOTAL 1		26175	1926	-4343	9448	3579	33513	48955	11562	8687	
SUB. TOTAL 2		8027	6270	1200	36510	12540	114990	156570	82	2957	
TOTAL (1+2)		34202	8198	-3143	45958	16119	148503	205525	11644	11644	

Table-A.6.2-(3) Present Value at Each Discount Rate

RATE OF RETURN (%)	(4)	(6)	(8)	(10)	(12)	(14)	(16)
INVESTMENT (MFMG)	21484	18227	15860	14041	12591	11401	10408
NET BENEFIT (MFMG)	69088	43826	29244	20370	14705	10942	8349

Table-A.6.2-(4)' Expenses for Diesel Plant

MOST PROBABLE, 2 FURNACES 2 STEP

UNIT : MFMG

NO	YEAR	DIESEL (1) INVEST.	DIESEL (2) AMOUNT	DIESEL (3) FIXED EX	GAS TURBIN (4) INVEST.	GAS TURBIN (5) AMOUNT	GAS TURBIN (6) FIXED EX	T/L & S/S (7) INVEST.	T/L & S/S (8) AMOUNT	T/L & S/S (9) FIXED EX	TOTAL FIXED (10) EX	INCREMENTAL (11) O & M EX	FUEL EX (12) DIESEL	FUEL EX (13) G.T.	INCREMENTAL (14) FUEL EX
5	1980	0	0	0	0	0	0	0	0	0	0	50	512	0	512
6	1981	1584	1584	174	440	440	79	206	206	16	269	65	1035	102	625
7	1982	0	1584	174	0	440	79	0	206	16	269	84	1229	64	781
8	1983	0	1584	174	0	440	79	0	206	16	269	101	1405	64	957
9	1984	0	1584	174	0	440	79	0	206	16	269	117	1558	102	1148
10	1985	792	2376	261	0	440	79	103	309	24	364	131	1688	64	1240
11	1986	792	3168	348	0	440	79	103	412	32	459	202	2387	140	2015
12	1987	792	3960	435	0	440	79	103	515	40	554	241	2687	64	2239
13	1988	0	3960	435	0	440	79	0	515	40	554	254	2817	102	2407
14	1989	1584	5544	609	0	440	79	206	721	56	744	275	2999	64	2551
15	1990	0	5544	609	0	440	79	0	721	56	744	291	3158	102	2748
16	1991	792	6336	696	0	440	79	103	824	64	839	313	3363	64	2915
17	1992	792	7128	783	0	440	79	103	927	72	934	334	3569	64	3121
18	1993	0	7128	783	0	440	79	0	927	72	934	363	3769	102	3359
19	1994	792	7920	870	0	440	79	103	1030	80	1029	390	4022	64	3574
20	1995	1584	9504	1043	0	440	79	206	1236	95	1217	418	4281	64	3833

Table-A.6.2-(5) Repayment Schedule

MOST PROBABLE, 2 FURNACES, 2 STEP

UNIT : MFNG

NO	YEAR	1ST STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	2ND STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	3RD STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	TOTAL (1) PAY. OF INTEREST	(2) REPAYMENT DEBT
6	1981	13859	970	0	0	13859	0	0	0	0	0	0	0	0	0	0	970	0
7	1982	0	970	0	0	13859	0	0	0	0	0	0	0	0	0	0	970	0
8	1983	0	970	259	1229	13600	0	0	0	0	0	0	0	0	0	0	970	259
9	1984	0	952	278	1229	13322	0	0	0	0	0	0	0	0	0	0	952	278
10	1985	0	933	297	1229	13025	0	0	0	0	0	0	0	0	0	0	933	297
11	1986	0	912	318	1229	12707	4142	290	0	0	4142	0	0	0	0	0	1202	318
12	1987	0	890	340	1229	12367	0	290	0	0	4142	0	0	0	0	0	1179	340
13	1988	0	866	364	1229	12004	0	290	0	0	4142	0	0	0	0	0	1156	364
14	1989	0	840	389	1229	11614	0	290	78	367	4064	9482	664	0	0	9482	1794	467
15	1990	0	813	416	1229	11198	0	285	83	367	3982	0	664	0	0	9482	1761	499
16	1991	0	784	446	1229	10752	0	279	89	367	3893	0	664	0	0	9482	1726	534
17	1992	0	753	477	1229	10276	0	272	95	367	3798	0	664	177	841	9305	1689	749
18	1993	0	719	510	1229	9765	0	266	102	367	3696	0	651	190	841	9115	1636	802
19	1994	0	684	546	1229	9219	0	259	109	367	3588	0	638	203	841	8912	1580	858
20	1995	0	645	584	1229	8635	0	251	116	367	3471	0	624	217	841	8694	1520	918
21	1996	0	604	625	1229	8010	0	243	124	367	3347	0	609	233	841	8462	1456	982
22	1997	0	561	669	1229	7341	0	234	133	367	3214	0	592	249	841	8213	1387	1051
23	1998	0	514	716	1229	6626	0	225	143	367	3071	0	575	266	841	7946	1314	1124
24	1999	0	464	766	1229	5860	0	215	152	367	2919	0	556	285	841	7661	1235	1203
25	2000	0	410	819	1229	5041	0	204	163	367	2755	0	536	305	841	7357	1151	1287
26	2001	0	353	877	1229	4164	0	193	175	367	2581	0	515	326	841	7030	1061	1377
27	2002	0	291	938	1229	3226	0	181	187	367	2394	0	492	349	841	6681	964	1474
28	2003	0	226	1004	1229	2223	0	168	200	367	2194	0	468	374	841	6308	861	1577
29	2004	0	156	1074	1229	1149	0	154	214	367	1980	0	442	400	841	5908	751	1687
30	2005	0	80	1149	1229	0	0	139	229	367	1751	0	414	428	841	5480	633	1806
31	2006	0	0	0	0	0	0	123	245	367	1507	0	384	458	841	5023	506	702
32	2007	0	0	0	0	0	0	105	262	367	1245	0	352	490	841	4533	457	752
33	2008	0	0	0	0	0	0	87	280	367	964	0	317	524	841	4009	404	804
34	2009	0	0	0	0	0	0	67	300	367	664	0	281	561	841	3449	348	860
35	2010	0	0	0	0	0	0	47	321	367	343	0	241	600	841	2849	288	921
36	2011	0	0	0	0	0	0	24	343	367	0	0	199	642	841	2207	223	985
37	2012	0	0	0	0	0	0	0	0	0	0	0	155	687	841	1521	155	687
38	2013	0	0	0	0	0	0	0	0	0	0	0	106	735	841	786	106	735
39	2014	0	0	0	0	0	0	0	0	0	0	0	55	786	841	0	55	786

Table-A.6.2-(6) Income Statement

MOST PROBABLE, 2 FURNACES, 2 STEP

UNIT : MFMG

NO	YEAR	REVENUES (1) INCRE. PUBLIC ENERGY	(2) UNIT PX.OF PUBLIC	(3) INCOME FROM PUBLIC	(4) ENERGY OF FERRO	(5) UNIT PX.OF FERRO	(6) INCOME FROM FERRO	(7) TOTAL INCOME	EXPENCES (8) OPE. AND MAIN.	(9) OTHER EX.	(10) DEPRE-CIATIO N	(11) SUB TOTAL	(12) OPERAT. INCOME	(13) SAVING FUEL EX.	(14) INTER-EST	(15) NET INCOME
		GWH	FMG/KWH	MFMG	GWH	FMG/KWH	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG	MFMG
6	1981	13	7.20	94	87	3.90	339	433	58	3	274	335	98	477	970	-395
7	1982	28	7.20	202	104	3.90	406	608	59	3	274	336	272	471	970	-227
8	1983	45	7.20	324	115	3.90	449	773	61	82	274	417	356	459	970	-155
9	1984	63	7.20	454	127	3.90	495	949	64	82	274	420	529	430	952	7
10	1985	82	7.20	590	127	3.90	495	1085	66	82	274	422	663	360	933	90
11	1986	105	6.50	683	232	3.50	812	1495	104	82	350	536	959	283	1202	40
12	1987	128	6.50	832	254	3.50	889	1721	108	82	350	540	1181	242	1179	244
13	1988	154	6.50	1001	254	3.50	889	1890	114	82	350	546	1344	145	1156	333
14	1989	183	6.50	1190	254	3.50	889	2079	170	85	522	777	1302	394	1794	-98
15	1990	213	6.50	1385	254	3.50	889	2274	172	85	522	779	1495	319	1761	53
16	1991	252	6.20	1562	254	3.20	813	2375	178	85	522	785	1590	312	1726	176
17	1992	287	6.20	1779	254	3.20	813	2592	180	85	522	787	1805	236	1689	352
18	1993	326	6.20	2021	254	3.20	813	2834	188	172	522	882	1952	172	1636	488
19	1994	368	6.20	2282	254	3.20	813	3095	197	172	522	891	2204	83	1580	707
20	1995	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1520	824
21	1996	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1456	888
22	1997	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1387	957
23	1998	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1314	1030
24	1999	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1235	1109
25	2000	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1151	1193
26	2001	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	1061	1283
27	2002	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	964	1380
28	2003	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	861	1483
29	2004	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	751	1593
30	2005	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	633	1711
31	2006	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	506	1838
32	2007	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	457	1887
33	2008	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	404	1940
34	2009	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	348	1996
35	2010	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	288	2056
36	2011	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	223	2121
37	2012	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	155	2189
38	2013	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	106	2238
39	2014	413	6.20	2561	254	3.20	813	3374	209	259	522	990	2384	-40	55	2289

Table-A.6.2-(7). Cash Flow

MOST PROBABLE, 2 FURNACES 2 STEP UNIT : MFMG

NO	YEAR	(1) CASH FROM INCOME	(2) NET INCOME	(3) DEPRECIATION	(4) REPAYMENT OF DEBT	(5) NET CASH PROVIDED
6	1981	-121	-395	274	0	-121
7	1982	47	-227	274	0	47
8	1983	119	-155	274	259	-140
9	1984	281	7	274	278	3
10	1985	364	90	274	297	67
11	1986	390	40	350	318	72
12	1987	594	244	350	340	254
13	1988	683	333	350	364	319
14	1989	424	-98	522	467	-43
15	1990	575	53	522	499	76
16	1991	698	176	522	534	164
17	1992	874	352	522	749	125
18	1993	1010	488	522	802	208
19	1994	1229	707	522	858	371
20	1995	1346	824	522	918	428
21	1996	1410	888	522	982	428
22	1997	1479	957	522	1051	428
23	1998	1552	1030	522	1124	428
24	1999	1631	1109	522	1203	428
25	2000	1715	1193	522	1287	428
26	2001	1805	1283	522	1377	428
27	2002	1902	1380	522	1474	428
28	2003	2005	1483	522	1577	428
29	2004	2115	1593	522	1687	428
30	2005	2233	1711	522	1806	427
31	2006	2360	1838	522	702	1658
32	2007	2409	1887	522	752	1657
33	2008	2462	1940	522	804	1658
34	2009	2518	1996	522	860	1658
35	2010	2578	2056	522	921	1657
36	2011	2643	2121	522	985	1658
37	2012	2711	2189	522	687	2024
38	2013	2760	2238	522	735	2025
39	2014	2811	2289	522	786	2025

Table-A.6.3-(1) Economic Comparison Table

MAXIMUM= 3 FURNACES 1 STEP UNIT : MFMG

	HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N I	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06
1 76	1454	1425	1398	1372	582	571	560	549	0	0	0	0	223	219	214	210	24	24	23	23	2283	2239	2195	2154
2 77	2791	2683	2580	2484	0	0	0	0	121	116	112	108	294	283	272	262	31	30	29	28	3237	3112	2993	2882
3 78	2371	2234	2108	1991	0	0	0	0	1189	1120	1057	998	359	338	319	301	37	35	33	31	3956	3727	3517	3321
4 79	3123	2885	2670	2474	582	538	497	461	939	867	803	744	429	396	367	340	44	41	38	35	5117	4727	4375	4054
5 80	2649	2399	2177	1979	0	0	0	0	472	428	388	353	512	464	421	383	52	47	43	39	3685	3338	3029	2754
6 81	0	0	0	0	0	0	0	0	0	0	0	0	41	36	32	29	131	116	104	92	172	152	136	121
7 82	672	585	511	447	0	0	0	0	0	0	0	0	41	36	31	27	131	114	100	87	844	735	642	561
8 83	1111	948	812	697	0	0	0	0	0	0	0	0	47	40	34	29	132	113	96	83	1290	1101	942	809
9 84	1031	863	724	610	840	703	590	497	140	151	126	107	47	39	33	28	132	110	93	78	2230	1866	1566	1320
10 85	1132	929	765	632	0	0	0	0	30	25	20	17	53	43	36	30	132	108	89	74	1347	1105	910	753
11 86	0	0	0	0	0	0	0	0	0	0	0	0	82	66	53	43	170	137	110	90	252	203	163	133
12 87	0	0	0	0	0	0	0	0	0	0	0	0	106	84	66	53	172	136	107	85	278	220	173	138
13 88	0	0	0	0	0	0	0	0	140	139	108	84	123	95	74	58	174	135	105	82	477	369	287	224
14 89	0	0	0	0	0	0	0	0	30	23	17	13	147	111	85	65	177	134	102	78	354	268	204	156
15 90	0	0	0	0	582	432	323	243	0	0	0	0	217	161	120	91	182	135	101	76	981	728	544	410
16 91	0	0	0	0	1632	1189	871	642	0	0	0	0	490	357	262	193	206	150	110	81	2328	1696	1243	916
17 92	0	0	0	0	742	566	407	294	0	0	0	0	684	488	351	254	225	161	116	84	1701	1215	874	632
18 93	0	0	0	0	582	407	287	204	0	0	0	0	894	626	441	313	242	169	119	85	1718	1202	847	602
19 94	0	0	0	0	742	544	376	262	0	0	0	0	1149	789	545	380	265	182	126	88	2206	1515	1047	730
20 95	0	0	0	0	840	565	383	262	0	0	0	0	1455	979	664	454	295	199	135	92	2590	1743	1182	808
TOTAL	16334	14951	13745	12686	7224	5515	4294	3414	3141	2869	2631	2424	7393	5650	4420	3543	2954	2276	1779	1411	37046	31261	26869	23478

	HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N I	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14
1 76	1346	1322	1298	1275	599	529	520	511	0	0	0	0	206	203	199	196	22	22	21	21	2113	2076	2038	2003
2 77	2393	2307	2225	2148	0	0	0	0	104	100	96	93	252	243	234	226	27	26	25	24	2776	2676	2580	2491
3 78	1882	1781	1688	1600	0	0	0	0	944	893	846	803	285	270	256	242	29	28	26	25	3140	2972	2816	2670
4 79	2296	2133	1985	1849	428	398	370	345	690	641	597	556	315	293	273	254	32	30	28	26	3761	3495	3253	3030
5 80	1803	1645	1503	1376	0	0	0	0	321	293	268	245	346	318	291	266	35	32	30	27	2507	2288	2092	1914
6 81	0	0	0	0	0	0	0	0	0	0	0	0	26	23	21	19	83	74	66	60	109	97	87	79
7 82	392	345	304	269	0	0	0	0	0	0	0	0	24	21	19	16	76	67	59	52	492	433	382	337
8 83	600	518	449	389	0	0	0	0	0	0	0	0	25	22	19	16	71	62	53	46	696	602	521	451
9 84	516	437	372	317	420	356	303	258	98	76	65	55	24	20	17	14	66	56	48	41	1116	945	805	685
10 85	524	436	364	305	0	0	0	0	14	12	10	8	25	20	17	14	61	51	43	36	624	519	434	363
11 86	0	0	0	0	0	0	0	0	0	0	0	0	35	29	24	19	73	60	49	40	108	89	73	59
12 87	0	0	0	0	0	0	0	0	0	0	0	0	42	34	27	22	68	55	44	36	110	89	71	58
13 88	0	0	0	0	0	0	0	0	66	52	41	33	45	36	28	22	64	50	40	32	175	138	109	87
14 89	0	0	0	0	0	0	0	0	10	8	6	5	50	39	30	23	60	47	36	28	120	94	72	56
15 90	0	0	0	0	183	139	104	82	0	0	0	0	68	52	40	30	57	44	33	25	308	235	179	137
16 91	0	0	0	0	476	355	266	201	0	0	0	0	143	107	80	60	60	45	34	25	679	507	380	286
17 92	0	0	0	0	214	157	115	85	0	0	0	0	185	135	100	74	61	45	33	24	460	337	248	183
18 93	0	0	0	0	146	105	76	55	0	0	0	0	224	161	116	85	61	44	31	23	431	310	223	163
19 94	0	0	0	0	184	130	92	66	0	0	0	0	266	188	133	95	61	43	31	22	511	361	256	183
20 95	0	0	0	0	180	125	87	61	0	0	0	0	312	216	151	106	63	44	31	21	555	385	269	188
TOTAL	11752	10924	10188	9528	2770	2294	1935	1664	2239	2075	1929	1798	2900	2430	2075	1799	1130	925	761	634	20791	18648	16888	15423

Table-A.6.3-(2) Internal Rate of Return

MAXIMUM= 3 FURNACES 1 STEP UNIT : MFMG

NO	YEAR	ROGEZ PROJECT (1) INVESTMENT	(2) O & M	(3) FUEL EX	BENEFIT (4) FIXED EX	(5) O & M	(6) FUEL EX	NET BENE. (7) NET	PRESENT VALUE (8) INVESTMENT	(9) NET BENE.	COEFFICIENT (10) 14.45 %
1	1976	1454	0	0	0	0	0	0	1270	0	0.8738
2	1977	2912	0	0	0	0	0	0	2223	0	0.7634
3	1978	3560	0	0	0	0	0	0	2375	0	0.6671
4	1979	4062	0	0	0	0	0	0	2368	0	0.5828
5	1980	3121	0	0	0	0	0	0	1589	0	0.5093
6	1981	0	79	-471	269	66	631	1358	0	604	0.4450
7	1982	672	79	-471	364	87	793	1636	261	636	0.3888
8	1983	1111	80	-465	364	104	969	1822	377	619	0.3397
9	1984	2051	80	-465	364	121	1178	2048	609	608	0.2968
10	1985	1162	80	-459	459	136	1281	2255	301	585	0.2593
11	1986	0	118	-430	649	223	2033	3217	0	729	0.2266
12	1987	180	120	-406	744	250	2330	3610	36	715	0.1980
13	1988	30	122	-349	839	271	2492	3869	5	669	0.1730
14	1989	0	125	-365	839	289	2712	4080	0	617	0.1512
15	1990	0	130	-295	934	323	2909	4331	0	572	0.1321
16	1991	1632	154	-22	1109	397	3938	5312	188	613	0.1154
17	1992	792	173	172	1297	439	4332	5723	80	577	0.1008
18	1993	0	190	382	1392	476	4588	5884	0	518	0.0881
19	1994	792	213	637	1487	520	5023	6180	61	476	0.0770
20	1995	840	243	943	1566	537	5475	6392	56	430	0.0673
SUB TOTAL 1		24371	1986	-2104	12676	4239	40684	57717	11799	8968	
SUB TOTAL 2		11253	7290	28290	46980	16110	164250	191760	92	2923	
TOTAL (1+2)		35624	9276	26186	59656	20349	204934	249477	11891	11891	

Table-A.6.3-(3) Present Value at Each Discount Rate

RATE OF RETURN (%)	(6)	(8)	(10)	(12)	(14)	(16)	(18)
INVESTMENT (MFMG)	18375	16141	14481	13175	12106	11204	10431
NET BENEFIT (MFMG)	52322	34666	23966	17181	12685	9602	7430

Table-A.6.3-(4). Expenses for Diesel Plant

MAXIMUM, 3 FURNACES 1 STEP UNIT : MFMG

NO	YEAR	DIESEL (1) INVEST.	DIESEL (2) AMOUNT	DIESEL (3) FIXED EX	GAS TURBIN (4) INVEST.	GAS TURBIN (5) AMOUNT	GAS TURBIN (6) FIXED EX	T/L & S/S (7) INVEST.	T/L & S/S (8) AMOUNT	T/L & S/S (9) FIXED EX	TOTAL FIXED (10) EX	INCREMENTAL (11) O & M EX	FUEL EX (12) DIESEL	FUEL EX (13) G.T.	INCREMENTAL (14) FUEL EX
5	1980	0	0	0	0	0	0	0	0	0	0	50	512	0	512
6	1981	1584	1584	174	840	840	74	206	206	16	264	66	1041	102	631
7	1982	792	2376	261	0	840	74	103	309	24	364	87	1241	64	793
8	1983	0	2376	261	0	840	74	0	309	24	364	104	1417	64	969
9	1984	0	2376	261	0	840	74	0	309	24	364	121	1588	102	1178
10	1985	792	3168	348	0	840	74	103	412	32	454	136	1729	64	1281
11	1986	1584	4752	522	0	840	74	206	618	48	644	223	2481	64	2033
12	1987	792	5544	609	0	840	74	103	721	56	744	250	2740	102	2330
13	1988	792	6336	696	0	840	74	103	824	64	834	271	2940	64	2492
14	1989	0	6336	696	0	840	74	0	824	64	834	289	3122	102	2712
15	1990	792	7128	783	0	840	74	103	927	72	934	323	3357	64	2909
16	1991	792	7920	870	840	1680	159	103	1030	80	1109	397	4069	381	3938
17	1992	1584	9504	1044	0	1680	159	206	1236	95	1297	439	4463	381	4332
18	1993	792	10296	1130	0	1680	159	103	1339	103	1392	476	4833	267	4588
19	1994	792	11088	1217	0	1680	159	103	1442	111	1487	520	5268	267	5023
20	1995	0	11088	1217	840	2520	238	0	1442	111	1566	537	5415	572	5475

Table-A.6.3-(5) Repayment Schedule

MAXIMUM: 3 FURNACES 1 STEP

UNIT : MFMG

NO	YEAR	1ST STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	2ND STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	3RD STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	TOTAL (1) PAY. OF INTEREST	(2) REPAYMENT DEBT
6	1981	17611	1233	0	0	17611	0	0	0	0	0						1233	0
7	1982	0	1233	0	0	17611	0	0	0	0	0						1233	0
8	1983	0	1233	330	1562	17281	0	0	0	0	0						1233	330
9	1984	0	1210	353	1562	16929	0	0	0	0	0						1210	353
10	1985	0	1185	377	1562	16551	0	0	0	0	0						1185	377
11	1986	0	1159	404	1562	16148	4713	330	0	0	4713						1489	404
12	1987	0	1130	432	1562	15716	0	330	0	0	4713						1460	432
13	1988	0	1100	462	1562	15253	0	330	0	0	4713						1430	462
14	1989	0	1068	495	1562	14759	0	330	88	418	4625						1398	583
15	1990	0	1033	529	1562	14230	0	324	94	418	4530						1357	624
16	1991	0	996	566	1562	13663	0	317	101	418	4429						1313	667
17	1992	0	956	606	1562	13057	0	310	108	418	4321						1266	714
18	1993	0	914	648	1562	12409	0	302	116	418	4206						1217	764
19	1994	0	869	694	1562	11715	0	294	124	418	4082						1163	817
20	1995	0	820	742	1562	10973	0	286	132	418	3950						1106	875
21	1996	0	768	794	1562	10179	0	276	142	418	3808						1045	936
22	1997	0	713	850	1562	9329	0	267	152	418	3657						979	1001
23	1998	0	653	909	1562	8420	0	256	162	418	3494						909	1071
24	1999	0	589	973	1562	7447	0	245	174	418	3321						834	1146
25	2000	0	521	1041	1562	6406	0	232	186	418	3135						754	1227
26	2001	0	448	1114	1562	5292	0	219	199	418	2937						668	1313
27	2002	0	370	1192	1562	4100	0	206	213	418	2724						576	1404
28	2003	0	287	1275	1562	2824	0	191	227	418	2497						478	1503
29	2004	0	198	1365	1562	1460	0	175	243	418	2253						372	1608
30	2005	0	102	1460	1562	0	0	158	260	418	1993						260	1721
31	2006	0	0	0	0	0	0	139	279	418	1714						139	279
32	2007	0	0	0	0	0	0	120	298	418	1416						120	298
33	2008	0	0	0	0	0	0	99	319	418	1097						99	319
34	2009	0	0	0	0	0	0	77	341	418	756						77	341
35	2010	0	0	0	0	0	0	53	365	418	391						53	365
36	2011	0	0	0	0	0	0	27	391	418	0						27	391

Table-A.6.3-(6) Income Statement

MAXIMUM, 3 FURNACES 1 STEP UNIT : MFMG

NO	YEAR	REVENUES (1) INCRE. PUBLIC ENERGY GWH	(2) UNIT PX.OF PUBLIC FMG/KWH	(3) INCOME FROM PUBLIC MFMG	(4) ENERGY OF FERRO GWH	(5) UNIT PX.OF FERRO FMG/KWH	(6) INCOME FROM FERRO MFMG	(7) TOTAL INCOME MFMG	EXPENCES (8) OPE. AND MAIN. MFMG	(9) OTHER EX. MFMG	(10) DEPRE-CIATIO N MFMG	(11) SUB TOTAL MFMG	(12) OPERAT. INCOME MFMG	(13) SAVING FUEL EX. MFMG	(14) INTER-EST MFMG	(15) NET INCOME MFMG
6	1981	13	7.20	94	87	3.90	339	433	79	3	341	423	10	471	1233	-752
7	1982	28	7.20	202	104	3.90	406	608	79	3	341	423	185	471	1233	-577
8	1983	47	7.20	338	115	3.90	449	787	80	3	341	424	363	465	1233	-405
9	1984	67	7.20	482	127	3.90	495	977	80	87	341	503	474	465	1210	-271
10	1985	88	7.20	634	127	3.90	495	1129	80	82	341	503	626	459	1185	-100
11	1986	116	6.50	754	232	3.50	812	1566	118	82	428	628	938	430	1489	-121
12	1987	141	6.50	917	254	3.50	889	1806	120	82	428	630	1176	406	1460	122
13	1988	173	6.50	1125	254	3.50	889	2014	122	82	428	632	1382	389	1430	341
14	1989	208	6.50	1352	254	3.50	889	2241	125	82	428	635	1606	365	1398	573
15	1990	245	6.50	1593	254	3.50	889	2482	130	102	428	660	1822	295	1357	760
16	1991	292	6.20	1810	360	3.20	1152	2962	154	189	428	771	2191	22	1313	900
17	1992	338	6.20	2096	383	3.20	1226	3322	173	276	428	877	2445	-172	1266	1007
18	1993	393	6.20	2437	383	3.20	1226	3663	190	276	428	894	2769	-382	1217	1170
19	1994	454	6.20	2815	383	3.20	1226	4041	213	363	428	1004	3037	-637	1163	1237
20	1995	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	1106	1373
21	1996	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	1045	1434
22	1997	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	979	1500
23	1998	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	909	1570
24	1999	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	834	1645
25	2000	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	754	1725
26	2001	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	668	1811
27	2002	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	576	1903
28	2003	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	478	2001
29	2004	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	372	2107
30	2005	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	260	2219
31	2006	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	139	2340
32	2007	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	120	2359
33	2008	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	99	2380
34	2009	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	77	2402
35	2010	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	53	2426
36	2011	521	6.20	3230	383	3.20	1226	4456	243	363	428	1034	3422	-943	27	2452

Table-A.6.3-(7) Cash Flow

MAXIMUM= 3 FURNACES 1 STEP UNIT : MFMG

NO	YEAR	(1) CASH FROM INCOME	(2) NET INCOME	(3) DEPRECIATION	(4) REPAYMENT OF DEBT	(5) NET CASH PROVIDED
6	1981	-411	-752	341	0	-411
7	1982	-236	-577	341	0	-236
8	1983	-64	-405	341	330	-394
9	1984	70	-271	341	353	-283
10	1985	241	-100	341	377	-136
11	1986	307	-121	428	404	-97
12	1987	550	122	428	432	119
13	1988	769	341	428	462	307
14	1989	1001	573	428	583	418
15	1990	1188	760	428	624	564
16	1991	1328	900	428	667	661
17	1992	1435	1007	428	714	721
18	1993	1598	1170	428	764	834
19	1994	1665	1237	428	817	848
20	1995	1801	1373	428	875	926
21	1996	1862	1434	428	936	926
22	1997	1928	1500	428	1001	927
23	1998	1998	1570	428	1071	927
24	1999	2073	1645	428	1146	927
25	2000	2153	1725	428	1227	926
26	2001	2239	1811	428	1313	926
27	2002	2331	1903	428	1404	927
28	2003	2429	2001	428	1503	926
29	2004	2535	2107	428	1608	927
30	2005	2647	2219	428	1721	926
31	2006	2768	2340	428	279	2489
32	2007	2787	2359	428	298	2489
33	2008	2808	2380	428	319	2489
34	2009	2830	2402	428	341	2489
35	2010	2854	2426	428	365	2489
36	2011	2880	2452	428	391	2489

Table-A.6.4-(1) Economic Comparison Table

MAXIMUM, 3 FURNACES — UNIT : MFMG

		HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N	I	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06
1	76	1454	1425	1398	1372	542	571	560	549	0	0	0	0	223	219	214	210	24	24	23	23	2283	2239	2195	2154
2	77	2173	2089	2009	1934	0	0	0	0	121	116	112	108	294	283	272	262	31	30	29	28	2619	2518	2422	2332
3	78	1684	1587	1497	1414	0	0	0	0	1184	1120	1057	998	359	338	319	301	37	35	33	31	3269	3080	2906	2744
4	79	2033	1878	1738	1610	542	538	497	461	939	867	803	744	429	396	367	340	44	41	38	35	4027	3720	3443	3190
5	80	1645	1535	1393	1267	0	0	0	0	510	462	419	381	512	464	421	383	52	47	43	39	2769	2508	2276	2070
6	81	0	0	0	0	0	0	0	0	0	0	0	0	35	31	28	25	110	98	87	78	145	129	115	103
7	82	524	456	398	348	0	0	0	0	0	0	0	0	41	36	31	27	111	97	84	74	676	589	513	449
8	83	988	843	722	620	840	717	614	527	0	0	0	0	59	50	43	37	114	97	83	72	2001	1707	1462	1256
9	84	908	760	638	537	0	0	0	0	180	151	126	107	88	74	62	52	117	98	82	69	1293	1083	908	765
10	85	2876	2359	1943	1606	0	0	0	0	30	25	20	17	176	144	119	98	120	98	81	67	3202	2626	2163	1788
11	86	1955	1572	1270	1030	0	0	0	0	0	0	0	0	218	175	142	115	160	129	104	84	2333	1876	1516	1229
12	87	2337	1843	1460	1161	0	0	0	0	180	142	112	89	317	250	198	158	165	130	103	82	2999	2365	1873	1490
13	88	1945	1504	1168	912	792	612	476	371	30	23	18	14	399	308	240	187	175	135	105	82	3341	2582	2007	1566
14	89	0	0	0	0	0	0	0	0	0	0	0	0	159	121	92	70	228	173	132	101	387	294	224	171
15	90	0	0	0	0	552	432	323	243	0	0	0	0	194	144	108	81	231	172	128	96	1007	748	559	420
16	91	0	0	0	0	0	0	0	0	0	0	0	0	493	359	263	194	254	185	136	100	747	544	399	294
17	92	0	0	0	0	840	600	431	312	0	0	0	0	687	491	353	255	274	196	141	102	1801	1287	925	669
18	93	0	0	0	0	1374	966	678	481	0	0	0	0	881	617	435	309	294	206	145	103	2549	1785	1258	893
19	94	0	0	0	0	792	544	376	262	0	0	0	0	1128	774	535	373	318	218	151	105	2238	1536	1062	740
20	95	0	0	0	0	792	533	361	247	0	0	0	0	1460	983	666	455	347	234	158	108	2599	1750	1185	810
TOTAL		20572	17851	15634	13811	7176	5509	4316	3453	3179	2906	2667	2458	8152	6257	4908	3932	3206	2443	1886	1479	42285	34966	29411	25133

		HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N	I	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14
1	76	1346	1322	1298	1275	539	529	529	511	0	0	0	0	206	203	199	196	22	22	21	21	2113	2076	2038	2003
2	77	1863	1796	1732	1672	0	0	0	0	104	100	96	93	252	243	234	226	27	26	25	24	2246	2165	2087	2015
3	78	1337	1265	1199	1137	0	0	0	0	944	893	846	803	285	270	256	242	29	28	26	25	2595	2456	2327	2207
4	79	1494	1389	1292	1204	428	398	370	345	690	641	597	556	315	293	273	254	32	30	28	26	2959	2751	2560	2385
5	80	1154	1052	962	880	0	0	0	0	347	317	289	265	348	318	291	266	35	32	30	27	1884	1719	1572	1438
6	81	0	0	0	0	0	0	0	0	0	0	0	0	22	20	18	16	69	62	56	50	91	82	74	66
7	82	306	269	237	209	0	0	0	0	0	0	0	0	24	21	19	16	65	57	50	44	395	347	306	269
8	83	534	461	399	346	454	392	339	294	0	0	0	0	32	28	24	21	62	53	46	40	1082	934	808	701
9	84	454	385	327	279	0	0	0	0	90	76	65	55	44	37	32	27	59	50	42	36	647	548	466	397
10	85	1332	1109	926	776	0	0	0	0	14	12	10	8	82	68	57	47	56	46	39	32	1484	1235	1032	863
11	86	838	685	562	463	0	0	0	0	0	0	0	0	93	76	63	52	69	56	46	38	1000	817	671	553
12	87	928	745	600	485	0	0	0	0	71	57	46	37	126	101	81	66	66	53	42	34	1191	956	769	622
13	88	715	563	446	354	241	229	182	144	11	9	7	5	147	116	91	73	64	51	40	32	1228	968	766	608
14	89	0	0	0	0	0	0	0	0	0	0	0	0	54	42	33	25	78	60	47	36	132	102	80	61
15	90	0	0	0	0	183	139	106	82	0	0	0	0	61	46	35	27	73	55	42	32	317	240	183	141
16	91	0	0	0	0	0	0	0	0	0	0	0	0	144	107	80	61	74	55	41	31	218	162	121	92
17	92	0	0	0	0	227	166	122	91	0	0	0	0	186	136	100	74	74	54	40	30	487	356	262	195
18	93	0	0	0	0	344	247	179	130	0	0	0	0	220	158	115	83	74	53	38	28	638	458	332	241
19	94	0	0	0	0	184	130	92	66	0	0	0	0	261	184	131	94	74	52	37	26	519	366	260	186
20	95	0	0	0	0	170	118	82	58	0	0	0	0	313	217	151	106	74	52	36	25	557	387	269	189
TOTAL		12301	11041	9980	9080	2820	2348	1992	1721	2271	2105	1956	1827	3215	2684	2283	1972	1176	947	772	637	21783	19125	16983	15232

Table-A.6.4-(2) Internal Rate of Return

MAXIMUM: 3 FURNACES 2 STEP UNIT : MFMG

		POGEZ PROJECT			BENEFIT			NET BENE.	PRESENT VALUE		COEFFICIENT
NO	YEAR	(1) INVESTMENT	(2) O & M	(3) FUEL EX	(4) FIXED EX	(5) O & M	(6) FUEL EX	(7) NET	(8) INVESTMENT	(9) NET BENE.	(10) 14.65 %
1	1976	1454	0	0	0	0	0	0	1268	0	0.8722
2	1977	2294	0	0	0	0	0	0	1745	0	0.7608
3	1978	2873	0	0	0	0	0	0	1907	0	0.6636
4	1979	2972	0	0	0	0	0	0	1720	0	0.5788
5	1980	2209	0	0	0	0	0	0	1113	0	0.5049
6	1981	0	58	-477	269	66	631	1385	0	610	0.4404
7	1982	524	59	-471	364	87	793	1656	201	636	0.3841
8	1983	1828	62	-453	364	104	969	1828	612	612	0.3350
9	1984	1088	65	-424	364	121	1178	2022	318	591	0.2922
10	1985	2906	68	-336	459	136	1281	2144	741	546	0.2549
11	1986	1955	108	-294	649	223	2033	3091	435	687	0.2223
12	1987	2517	113	-195	744	250	2330	3406	488	661	0.1939
13	1988	2767	123	-113	839	271	2492	3592	468	608	0.1691
14	1989	0	176	-353	839	289	2712	4017	0	593	0.1475
15	1990	0	179	-318	934	323	2909	4305	0	554	0.1287
16	1991	0	202	-19	1109	397	3938	5261	0	591	0.1122
17	1992	840	222	175	1297	439	4332	5671	82	555	0.0979
18	1993	792	242	369	1392	476	4588	5845	68	499	0.0854
19	1994	792	266	616	1487	520	5023	6148	59	458	0.0745
20	1995	792	295	948	1566	537	5475	6335	51	412	0.0650
SUB TOTAL 1		28599	2238	-1345	12676	4239	40684	56706	11276	8613	
SUB TOTAL 2		12035	8850	28440	46980	16110	164250	190050	100	2763	
TOTAL (1+2)		40634	11088	27095	59656	20349	204934	246756	11376	11376	

Table-A.6.4-(3) Present Value at Each Discount Rate

RATE OF RETURN (%)	(6)	(8)	(10)	(12)	(14)	(16)	(18)
INVESTMENT (MFMG)	19679	16830	14713	13069	11749	10665	9752
NET BENEFIT (MFMG)	51621	34174	23607	16907	12482	9450	7307

Table-6.4-(4) Expenses for Diesel Plant

MAXIMUM 3 FURNACES 2 STEP

UNIT : MFMG

NO	YEAR	DIESEL (1) INVEST.	DIESEL (2) AMOUNT	DIESEL (3) FIXED EX	GAS TURBIN (4) INVEST.	GAS TURBIN (5) AMOUNT	GAS TURBIN (6) FIXED EX	T/L & S/S (7) INVEST.	T/L & S/S (8) AMOUNT	T/L & S/S (9) FIXED EX	TOTAL FIXED (10) EX	INCRE-MENTAL (11) O & M EX	FUEL EX (12) DIESEL	FUEL EX (13) G.T.	INCRE-MENTAL (14) FUEL EX
5	1980	0	0	0	0	0	0	0	0	0	0	50	512	0	512
6	1981	1584	1584	174	840	840	79	206	206	16	269	66	1041	102	631
7	1982	792	2376	261	0	840	79	103	309	24	364	87	1241	64	793
8	1983	0	2376	261	0	840	79	0	309	24	364	104	1417	64	969
9	1984	0	2376	261	0	840	79	0	309	24	364	121	1588	102	1178
10	1985	792	3168	348	0	840	79	103	412	32	459	136	1729	64	1281
11	1986	1584	4752	522	0	840	79	206	618	48	649	223	2481	64	2033
12	1987	792	5544	609	0	840	79	103	721	56	744	250	2740	102	2330
13	1988	792	6336	696	0	840	79	103	824	64	839	271	2940	64	2492
14	1989	0	6336	696	0	840	79	0	824	64	839	289	3122	102	2712
15	1990	792	7128	783	0	840	79	103	927	72	934	323	3357	64	2909
16	1991	792	7920	870	840	1680	159	103	1030	80	1109	397	4069	381	3938
17	1992	1584	9504	1043	0	1680	159	206	1236	95	1297	439	4463	381	4332
18	1993	792	10296	1130	0	1680	159	103	1339	103	1392	476	4833	267	4588
19	1994	792	11088	1217	0	1680	159	103	1442	111	1487	520	5268	267	5023
20	1995	0	11088	1217	840	2520	238	0	1442	111	1566	537	5415	572	5475

Table-A.6.4-(5) Repayment Schedule

MAXIMUM: 3 FURNACES, 2 STEP — UNIT : MFNG

NO	YEAR	1ST STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	2ND STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	3RD STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	TOTAL (1) PAY. OF INTEREST	(2) REPAYMENT DEBT
6	1981	13859	970	0	0	13859	0	0	0	0	0	0	0	0	0	0	970	0
7	1982	0	970	0	0	13859	0	0	0	0	0	0	0	0	0	0	970	0
8	1983	0	970	259	1229	13600	0	0	0	0	0	0	0	0	0	0	970	259
9	1984	0	952	278	1229	13322	0	0	0	0	0	0	0	0	0	0	952	278
10	1985	0	933	297	1229	13025	0	0	0	0	0	0	0	0	0	0	933	297
11	1986	0	912	318	1229	12707	4142	290	0	0	4142	0	0	0	0	0	1202	318
12	1987	0	890	340	1229	12367	0	290	0	0	4142	0	0	0	0	0	1179	340
13	1988	0	866	364	1229	12004	0	290	0	0	4142	0	0	0	0	0	1156	364
14	1989	0	840	389	1229	11614	0	290	78	367	4064	9482	664	0	0	9482	1794	467
15	1990	0	813	416	1229	11198	0	285	83	367	3982	0	664	0	0	9482	1761	499
16	1991	0	784	446	1229	10752	0	279	89	367	3893	0	664	0	0	9482	1726	534
17	1992	0	753	477	1229	10276	0	272	95	367	3798	0	664	177	841	9305	1689	749
18	1993	0	719	510	1229	9765	0	266	102	367	3696	0	651	190	841	9115	1636	802
19	1994	0	684	546	1229	9219	0	259	109	367	3588	0	638	203	841	8912	1580	858
20	1995	0	645	584	1229	8635	0	251	116	367	3471	0	624	217	841	8694	1520	918
21	1996	0	604	625	1229	8010	0	243	124	367	3347	0	609	233	841	8462	1456	982
22	1997	0	561	669	1229	7341	0	234	133	367	3214	0	592	249	841	8213	1387	1051
23	1998	0	514	716	1229	6626	0	225	143	367	3071	0	575	266	841	7946	1314	1124
24	1999	0	464	766	1229	5860	0	215	152	367	2919	0	556	285	841	7661	1235	1203
25	2000	0	410	819	1229	5041	0	204	163	367	2755	0	536	305	841	7357	1151	1287
26	2001	0	353	877	1229	4164	0	193	175	367	2581	0	515	326	841	7030	1061	1377
27	2002	0	291	938	1229	3226	0	181	187	367	2394	0	492	349	841	6681	964	1474
28	2003	0	226	1004	1229	2223	0	168	200	367	2194	0	468	374	841	6308	861	1577
29	2004	0	156	1074	1229	1149	0	154	214	367	1980	0	442	400	841	5908	751	1687
30	2005	0	80	1149	1229	0	0	139	229	367	1751	0	414	428	841	5480	633	1806
31	2006	0	0	0	0	0	0	123	245	367	1507	0	384	458	841	5023	506	702
32	2007	0	0	0	0	0	0	105	262	367	1245	0	352	490	841	4533	457	752
33	2008	0	0	0	0	0	0	87	280	367	964	0	317	524	841	4009	404	804
34	2009	0	0	0	0	0	0	67	300	367	664	0	281	561	841	3449	348	860
35	2010	0	0	0	0	0	0	47	321	367	343	0	241	600	841	2849	288	921
36	2011	0	0	0	0	0	0	24	343	367	0	0	199	642	841	2207	223	985
37	2012	0	0	0	0	0	0	0	0	0	0	0	155	687	841	1521	155	687
38	2013	0	0	0	0	0	0	0	0	0	0	0	106	735	841	786	106	735
39	2014	0	0	0	0	0	0	0	0	0	0	0	55	786	841	0	55	786

Table-A.6.4-(6) Income Statement

MAXIMUM, 3 FURNACES ... 2 STEP

UNIT : MFMG

NO	YEAR	REVENUES (1) INCRE. PUBLIC ENERGY GWH	(2) UNIT PX.OF PUBLIC FMG/KWH	(3) INCOME FROM PUBLIC MFMG	(4) ENERGY OF FERRO GWH	(5) UNIT PX.OF FERRO FMG/KWH	(6) INCOME FROM FERRO MFMG	(7) TOTAL INCOME MFMG	EXPENCES (8) OPE. AND MAIN. MFMG	(9) OTHER EX. MFMG	(10) DEPRE-CIATIO N MFMG	(11) SUB TOTAL MFMG	(12) UPERAT. INCOME MFMG	(13) SAVING FUEL EX. MFMG	(14) INTER-EST MFMG	(15) NET INCOME MFMG
6	1981	13	7.20	94	87	3.90	339	433	58	3	274	335	98	477	970	-395
7	1982	28	7.20	202	104	3.90	406	608	59	3	274	336	272	471	970	-227
8	1983	47	7.20	338	115	3.90	449	787	62	82	274	418	369	453	970	-148
9	1984	67	7.20	482	127	3.90	495	977	65	82	274	421	556	424	952	28
10	1985	88	7.20	634	127	3.90	495	1129	68	82	274	424	705	336	933	108
11	1986	116	6.50	754	232	3.50	812	1566	108	82	350	540	1026	294	1202	118
12	1987	141	6.50	917	254	3.50	889	1806	113	82	350	545	1261	195	1179	277
13	1988	173	6.50	1125	254	3.50	889	2014	123	169	350	642	1372	113	1156	329
14	1989	208	6.50	1352	254	3.50	889	2241	176	172	522	870	1371	353	1794	-70
15	1990	245	6.50	1593	254	3.50	889	2482	179	172	522	873	1609	318	1761	166
16	1991	292	6.20	1810	360	3.20	1152	2962	202	172	522	896	2066	19	1726	359
17	1992	338	6.20	2098	383	3.20	1226	3322	222	251	522	995	2327	-175	1689	463
18	1993	393	6.20	2437	383	3.20	1226	3663	242	338	522	1102	2561	-369	1636	556
19	1994	454	6.20	2815	383	3.20	1226	4041	266	425	522	1213	2828	-616	1580	632
20	1995	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1520	659
21	1996	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1456	723
22	1997	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1387	792
23	1998	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1314	865
24	1999	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1235	944
25	2000	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1151	1028
26	2001	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	1061	1118
27	2002	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	964	1215
28	2003	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	861	1318
29	2004	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	751	1428
30	2005	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	633	1546
31	2006	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	506	1673
32	2007	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	457	1722
33	2008	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	404	1775
34	2009	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	348	1831
35	2010	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	288	1891
36	2011	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	223	1956
37	2012	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	155	2024
38	2013	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	106	2073
39	2014	521	6.20	3230	383	3.20	1226	4456	295	512	522	1329	3127	-948	55	2124

Table-A.6.4-(7) Cash Flow

MAXIMUM 3 FURNACES 2 STEP UNIT : MFMG

NO	YEAR	(1) CASH FROM INCOME	(2) NET INCOME	(3) DEPRECI-ATION	(4) REPAYMENT OF DEBT	(5) NET CASH PROVIDED
6	1981	-121	-395	274	0	-121
7	1982	47	-227	274	0	47
8	1983	126	-148	274	259	-133
9	1984	302	28	274	278	24
10	1985	382	108	274	297	85
11	1986	468	114	360	318	150
12	1987	627	277	350	340	287
13	1988	679	329	350	364	315
14	1989	452	-70	522	467	-15
15	1990	688	166	522	499	189
16	1991	881	359	522	534	347
17	1992	985	463	522	749	236
18	1993	1078	556	522	802	276
19	1994	1154	632	522	858	296
20	1995	1181	659	522	918	263
21	1996	1245	723	522	982	263
22	1997	1314	792	522	1051	263
23	1998	1387	865	522	1124	263
24	1999	1466	944	522	1203	263
25	2000	1550	1028	522	1287	263
26	2001	1640	1118	522	1377	263
27	2002	1737	1215	522	1474	263
28	2003	1840	1318	522	1577	263
29	2004	1950	1428	522	1687	263
30	2005	2068	1546	522	1806	262
31	2006	2195	1673	522	707	1493
32	2007	2244	1722	522	752	1492
33	2008	2297	1775	522	804	1493
34	2009	2353	1831	522	860	1493
35	2010	2413	1891	522	921	1492
36	2011	2478	1956	522	985	1493
37	2012	2546	2024	522	687	1859
38	2013	2595	2073	522	735	1860
39	2014	2646	2124	522	786	1860

Table-A.6.5-(1) Economic Comparison Table

MINIMUM, NO FURNACE 1 STEP UNIT : MFMG

	HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N I	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06	0.0	0.02	0.04	0.06
1 76	1454	1425	1398	1372	582	571	560	549	0	0	0	0	223	219	214	210	24	24	23	23	2283	2239	2195	2154
2 77	2791	2683	2580	2484	0	0	0	0	121	116	112	108	294	283	272	262	31	30	29	28	3237	3112	2993	2882
3 78	2371	2234	2108	1991	0	0	0	0	1149	1120	1057	998	359	338	319	301	37	35	33	31	3956	3727	3517	3321
4 79	3123	2885	2670	2474	582	538	497	461	934	867	803	744	429	396	367	340	44	41	38	35	5117	4727	4375	4054
5 80	2649	2399	2177	1979	0	0	0	0	472	428	388	353	512	464	421	383	52	47	43	39	3685	3338	3029	2754
6 81	0	0	0	0	0	0	0	0	0	0	0	0	18	16	14	13	129	115	102	91	147	131	116	104
7 82	0	0	0	0	0	0	0	0	0	0	0	0	24	21	18	16	129	112	98	86	153	133	116	102
8 83	0	0	0	0	0	0	0	0	0	0	0	0	29	25	21	18	130	111	95	82	159	136	116	100
9 84	0	0	0	0	0	0	0	0	0	0	0	0	35	29	25	21	130	109	91	77	165	138	116	98
10 85	0	0	0	0	0	0	0	0	0	0	0	0	35	29	24	20	130	107	88	73	165	136	112	93
11 86	672	540	437	354	0	0	0	0	0	0	0	0	35	28	23	18	130	105	84	68	837	673	544	440
12 87	1111	876	694	552	0	0	0	0	0	0	0	0	35	28	22	17	130	103	81	65	1276	1007	797	634
13 88	1031	797	619	483	0	0	0	0	148	119	108	84	41	32	25	19	131	101	79	61	1383	1069	831	647
14 89	1132	858	654	501	0	0	0	0	30	23	17	13	47	36	27	21	132	100	76	58	1341	1017	774	593
15 90	0	0	0	0	542	432	323	243	0	0	0	0	53	39	29	22	167	124	93	70	802	595	445	335
16 91	0	0	0	0	0	0	0	0	148	131	96	71	59	43	32	23	168	122	90	66	407	296	218	160
17 92	0	0	0	0	0	0	0	0	30	21	15	11	65	46	33	24	168	120	86	62	263	187	134	97
18 93	0	0	0	0	0	0	0	0	0	0	0	0	76	53	38	27	173	121	85	61	249	174	123	88
19 94	0	0	0	0	0	0	0	0	0	0	0	0	118	81	56	39	177	122	84	59	295	203	140	98
20 95	0	0	0	0	0	0	0	0	0	0	0	0	118	79	54	37	177	119	81	55	295	198	135	92
TOTAL	16334	14697	13337	12190	1746	1541	1380	1253	3141	2845	2596	2382	2605	2285	2034	1831	2389	1868	1479	1190	26215	23236	20826	18846

	HYDRO				D & GT				T & S				FUEL EXPENS				O & M				TOTAL			
N I	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14	0.08	0.10	0.12	0.14
1 76	1346	1322	1298	1275	539	529	519	511	0	0	0	0	206	203	199	196	22	22	21	21	2113	2076	2038	2003
2 77	2393	2307	2225	2148	0	0	0	0	104	100	96	93	252	243	234	226	27	26	25	24	2776	2676	2580	2491
3 78	1882	1781	1688	1600	0	0	0	0	944	893	846	803	285	270	256	242	29	28	26	25	3140	2972	2816	2670
4 79	2296	2133	1985	1849	428	398	370	345	690	641	597	556	315	293	273	254	32	30	28	26	3761	3495	3253	3030
5 80	1803	1645	1503	1376	0	0	0	0	321	293	268	245	348	318	291	266	35	32	30	27	2507	2288	2092	1914
6 81	0	0	0	0	0	0	0	0	0	0	0	0	11	10	9	8	81	73	65	59	92	83	74	67
7 82	0	0	0	0	0	0	0	0	0	0	0	0	14	12	11	10	75	66	58	52	89	78	69	62
8 83	0	0	0	0	0	0	0	0	0	0	0	0	16	14	12	10	70	61	53	46	86	75	65	56
9 84	0	0	0	0	0	0	0	0	0	0	0	0	18	15	13	11	65	55	47	40	83	70	60	51
10 85	0	0	0	0	0	0	0	0	0	0	0	0	16	13	11	9	60	50	42	35	76	63	53	44
11 86	288	236	193	159	0	0	0	0	0	0	0	0	15	12	10	8	56	46	37	31	359	294	240	198
12 87	441	354	285	231	0	0	0	0	0	0	0	0	14	11	9	7	52	41	33	27	507	406	327	265
13 88	379	299	236	184	0	0	0	0	66	52	41	33	15	12	9	7	48	38	30	24	508	401	316	252
14 89	385	298	232	181	0	0	0	0	10	8	6	5	16	12	10	8	45	35	27	21	456	353	275	215
15 90	0	0	0	0	143	139	105	82	0	0	0	0	17	13	10	7	53	40	31	23	253	192	147	112
16 91	0	0	0	0	0	0	0	0	53	39	29	22	17	13	10	7	49	37	27	21	119	89	66	50
17 92	0	0	0	0	0	0	0	0	8	6	4	3	18	13	9	7	45	33	24	18	71	52	37	28
18 93	0	0	0	0	0	0	0	0	0	0	0	0	19	14	10	7	43	31	22	16	62	45	32	23
19 94	0	0	0	0	0	0	0	0	0	0	0	0	27	19	14	10	41	29	21	15	68	48	35	25
20 95	0	0	0	0	0	0	0	0	0	0	0	0	25	18	12	9	38	26	18	13	63	44	30	22
TOTAL	11213	10375	9645	9007	1150	1066	996	938	2196	2032	1887	1760	1664	1528	1412	1309	966	799	665	564	17189	15800	14605	13578

Table-A.6.5-(2) Internal Rate of Return

MINIMUM: NO FURNACE 1 STEP — UNIT : MFMG

NO	YEAR	ROGEZ PROJECT (1) INVESTMENT	(2) O & M	(3) FUEL EX	BENEFIT (4) FIXED EX	(5) O & M	(6) FUEL EX	NET BENE. (7) NET	PRESENT VALUE (8) INVESTMENT	(9) NET BENE.	COEEFICIENT (10) 10.92 %
1	1976	1454	0	0	0	0	0	0	1311	0	0.9016
2	1977	2912	0	0	0	0	0	0	2367	0	0.8128
3	1978	3560	0	0	0	0	0	0	2609	0	0.7328
4	1979	4062	0	0	0	0	0	0	2684	0	0.6607
5	1980	3121	0	0	0	0	0	0	1859	0	0.5957
6	1981	0	77	-494	190	11	58	676	0	363	0.5370
7	1982	0	77	-488	190	20	147	768	0	372	0.4842
8	1983	0	76	-483	269	29	281	984	0	430	0.4365
9	1984	0	78	-477	269	38	381	1087	0	428	0.3935
10	1985	0	78	-477	269	48	513	1229	0	436	0.3548
11	1986	672	78	-477	364	63	610	1436	215	459	0.3199
12	1987	1111	78	-477	364	76	746	1585	320	457	0.2884
13	1988	1211	79	-471	364	37	933	1776	315	462	0.2600
14	1989	1162	80	-465	459	110	1057	2011	272	471	0.2344
15	1990	0	115	-459	554	124	1234	2261	0	478	0.2113
16	1991	180	116	-453	554	148	1422	2461	34	469	0.1905
17	1992	30	116	-447	744	173	1628	2876	5	494	0.1718
18	1993	0	121	-436	744	193	1866	3118	0	483	0.1549
19	1994	0	125	-394	839	219	2080	3407	0	476	0.1396
20	1995	0	125	-394	934	248	2339	3790	0	477	0.1259
21	1996	840	127	-313	1029	277	2615	4107	95	466	0.1135
22	1997	792	141	-183	1217	311	2909	4479	81	458	0.1023
23	1998	792	147	-148	1312	344	3227	4884	73	451	0.0922
24	1999	840	155	-10	1407	381	3568	5210	70	433	0.0832
25	2000	792	171	137	1502	419	3938	5551	59	416	0.0750
SUB TOTAL 1		23531	2163	-7409	13574	3324	31552	53696	12369	8979	
SUB TOTAL 2		7941	4275	3425	37550	10475	98450	138775	136	3526	
TOTAL (1+2)		31472	6438	-3984	51124	13799	130002	192471	12505	12505	

Table-A.6.5-(3) Present Value at Each Discount Rate

RATE OF RETURN (%)	(2)	(4)	(6)	(8)	(10)	(12)	(14)
INVESTMENT (MFMG)	23717	19250	16428	14487	13051	11927	11015
NET BENEFIT (MFMG)	103316	58833	35423	22451	14890	10281	7353

Table-A.6.5-(4) Expenses for Diesel Plant

MINIMUM NO FURNACE 1 STEP

UNIT : MFMG

NO	YEAR	DIESEL (1) INVEST.	DIESEL (2) AMOUNT	DIESEL (3) FIXED EX	GAS TURBIN (4) INVEST.	GAS TURBIN (5) AMOUNT	GAS TURBIN (6) FIXED EX	T/L & S/S (7) INVEST.	T/L & S/S (8) AMOUNT	T/L & S/S (9) FIXED EX	TOTAL FIXED (10) EX	INCRE-MENTAL (11) O & M EX	FUEL EX (12) DIESEL	FUEL EX (13) G.T.	INCRE-MENTAL (14) FUEL EX
5	1980	0	0	0	0	0	0	0	0	0	0	50	512	0	512
6	1981	1584	1584	174	0	0	0	206	206	16	190	11	570	0	58
7	1982	0	1584	174	0	0	0	0	206	16	190	20	659	0	147
8	1983	0	1584	174	440	440	79	0	206	16	269	29	729	64	281
9	1984	0	1584	174	0	440	79	0	206	16	269	38	829	64	381
10	1985	0	1584	174	0	440	79	0	206	16	269	48	923	102	513
11	1986	792	2376	261	0	440	79	103	309	24	364	63	1058	64	610
12	1987	0	2376	261	0	440	79	0	309	24	364	76	1194	64	746
13	1988	0	2376	261	0	440	79	0	309	24	364	87	1305	140	933
14	1989	792	3168	348	0	440	79	103	412	32	459	110	1505	64	1057
15	1990	792	3960	435	0	440	79	103	515	40	554	129	1682	64	1234
16	1991	0	3960	435	0	440	79	0	515	40	554	148	1870	64	1422
17	1992	1584	5544	609	0	440	79	206	721	56	744	173	2076	64	1628
18	1993	0	5544	609	0	440	79	0	721	56	744	193	2276	102	1866
19	1994	792	6336	696	0	440	79	103	824	64	839	219	2528	64	2080
20	1995	792	7128	783	0	440	79	103	927	72	934	248	2787	64	2339
21	1996	792	7920	870	0	440	79	103	1030	80	1029	277	3063	64	2615
22	1997	1584	9504	1043	0	440	79	206	1236	95	1217	311	3357	64	2909
23	1998	792	10296	1130	0	440	79	103	1339	103	1312	344	3675	64	3227
24	1999	792	11088	1217	0	440	79	103	1442	111	1407	381	4016	64	3568
25	2000	792	11880	1304	0	440	79	103	1545	119	1502	419	4386	64	3938

Table-A.6.5-(5) Repayment Schedule

MINIMUM, NO FURNACE . . . 1.STEP

UNIT : MFMG

NO	YEAR	1ST STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	2ND STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	3RD STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	TOTAL (1) PAY. OF INTEREST	(2) REPAYMENT DEBT
6	1981	17611	1233	0	0	17611	0	0	0	0	0						1233	0
7	1982	0	1233	0	0	17611	0	0	0	0	0						1233	0
8	1983	0	1233	330	1562	17281	0	0	0	0	0						1233	330
9	1984	0	1210	353	1562	16929	0	0	0	0	0						1210	353
10	1985	0	1185	377	1562	16551	0	0	0	0	0						1185	377
11	1986	0	1159	404	1562	16146	0	0	0	0	0						1159	404
12	1987	0	1130	432	1562	15716	0	0	0	0	0						1130	432
13	1988	0	1100	462	1562	15253	0	0	0	0	0						1100	462
14	1989	0	1068	495	1562	14759	0	0	0	0	0						1068	495
15	1990	0	1033	529	1562	14230	4713	330	0	0	4713						1363	529
16	1991	0	996	566	1562	13663	0	330	0	0	4713						1326	566
17	1992	0	956	606	1562	13057	0	330	0	0	4713						1286	606
18	1993	0	914	648	1562	12409	0	330	88	418	4625						1244	737
19	1994	0	869	694	1562	11715	0	324	94	418	4530						1192	788
20	1995	0	820	742	1562	10973	0	317	101	418	4429						1137	843
21	1996	0	768	794	1562	10179	0	310	108	418	4321						1078	902
22	1997	0	713	850	1562	9329	0	302	116	418	4206						1015	965
23	1998	0	653	909	1562	8420	0	294	124	418	4082						947	1033
24	1999	0	589	973	1562	7447	0	286	132	418	3950						875	1105
25	2000	0	521	1041	1562	6406	0	276	142	418	3808						798	1183
26	2001	0	448	1114	1562	5292	0	267	152	418	3657						715	1266
27	2002	0	370	1192	1562	4100	0	256	162	418	3494						626	1354
28	2003	0	287	1275	1562	2824	0	245	174	418	3321						532	1449
29	2004	0	198	1365	1562	1460	0	232	186	418	3135						430	1550
30	2005	0	102	1460	1562	0	0	219	199	418	2937						322	1659
31	2006	0	0	0	0	0	0	206	213	418	2724						206	213
32	2007	0	0	0	0	0	0	191	227	418	2497						191	227
33	2008	0	0	0	0	0	0	175	243	418	2253						175	243
34	2009	0	0	0	0	0	0	158	260	418	1993						158	260
35	2010	0	0	0	0	0	0	139	279	418	1714						139	279
36	2011	0	0	0	0	0	0	120	298	418	1416						120	298
37	2012	0	0	0	0	0	0	99	319	418	1097						99	319
38	2013	0	0	0	0	0	0	77	341	418	756						77	341
39	2014	0	0	0	0	0	0	53	365	418	391						53	365
40	2015	0	0	0	0	0	0	27	391	418	0						27	391

Table-A.6.5-(6) Income Statement

MINIMUM NO.FURNACE . .) SIED

UNIT : MFMG

NO	YEAR	REVENUES (1) INCRE. PUBLIC ENERGY GWH	(2) UNIT PX.OF PUBLIC FMG/KWH	(3) INCOME FROM PUBLIC MFMG	(4) ENERGY OF FERRO GWH	(5) UNIT PX.OF FERRO FMG/KWH	(6) INCOME FROM FERRO MFMG	(7) TOTAL INCOME MFMG	EXPENCES (8) OPE. AND MAIN. MFMG	(9) OTHER EX. MFMG	(10) DEPRE-CIATIO N MFMG	(11) SUB TOTAL MFMG	(12) OPERAT. INCOME MFMG	(13) SAVING FUEL EX. MFMG	(14) INTER-EST MFMG	(15) NET INCOME MFMG
6	1981	13	7.20	94	0	0.0	0	94	77	3	341	421	-327	494	1233	-1066
7	1982	28	7.20	202	0	0.0	0	202	77	3	341	421	-219	488	1233	-964
8	1983	45	7.20	324	0	0.0	0	324	78	3	341	422	-98	483	1233	-848
9	1984	63	7.20	454	0	0.0	0	454	78	3	341	422	32	477	1210	-701
10	1985	82	7.20	590	0	0.0	0	590	78	3	341	422	168	477	1185	-540
11	1986	105	6.50	683	0	0.0	0	683	78	3	341	422	261	477	1159	-421
12	1987	128	6.50	832	0	0.0	0	832	78	3	341	422	410	477	1130	-243
13	1988	154	6.50	1001	0	0.0	0	1001	79	3	341	423	578	471	1100	-51
14	1989	183	6.50	1190	0	0.0	0	1190	80	3	341	424	766	465	1068	163
15	1990	213	6.50	1385	0	0.0	0	1385	115	3	428	546	839	459	1363	-65
16	1991	252	6.20	1562	0	0.0	0	1562	116	3	428	547	1015	453	1326	142
17	1992	287	6.20	1779	0	0.0	0	1779	116	3	428	547	1232	447	1286	393
18	1993	326	6.20	2021	0	0.0	0	2021	121	23	428	572	1449	436	1244	641
19	1994	368	6.20	2282	0	0.0	0	2282	125	23	428	576	1706	394	1192	908
20	1995	413	6.20	2561	0	0.0	0	2561	125	23	428	576	1985	394	1137	1242
21	1996	461	6.20	2858	0	0.0	0	2858	127	102	428	657	2201	313	1078	1436
22	1997	513	6.20	3181	0	0.0	0	3181	141	102	428	671	2510	183	1015	1678
23	1998	569	6.20	3528	0	0.0	0	3528	147	189	428	764	2764	148	947	1965
24	1999	629	6.20	3900	0	0.0	0	3900	156	276	428	860	3040	10	875	2175
25	2000	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	798	2493
26	2001	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	715	2576
27	2002	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	626	2665
28	2003	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	532	2759
29	2004	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	430	2861
30	2005	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	322	2969
31	2006	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	206	3085
32	2007	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	191	3100
33	2008	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	175	3116
34	2009	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	158	3133
35	2010	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	139	3152
36	2011	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	120	3171
37	2012	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	99	3192
38	2013	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	77	3214
39	2014	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	53	3238
40	2015	694	6.20	4303	0	0.0	0	4303	171	276	428	875	3428	-137	27	3264

Table-A.6.5-(7) Cash Flow

MINIMUM NO.FURNACE . . . . 1 STEP UNIT : MFMG

NO	YEAR	(1) CASH FROM INCOME	(2) NET INCOME	(3) DEPRECI-ATION	(4) REPAYMENT OF DEBT	(5) NET CASH PROVIDED
6	1981	-725	-1066	341	0	-725
7	1982	-623	-964	341	0	-623
8	1983	-507	-848	341	330	-837
9	1984	-360	-701	341	353	-713
10	1985	-199	-540	341	377	-576
11	1986	-80	-421	341	404	-484
12	1987	98	-243	341	432	-334
13	1988	290	-51	341	462	-172
14	1989	504	163	341	495	9
15	1990	363	-65	428	529	-166
16	1991	570	142	428	566	4
17	1992	821	393	428	606	215
18	1993	1069	641	428	737	332
19	1994	1336	908	428	784	544
20	1995	1670	1242	428	843	827
21	1996	1864	1436	428	902	962
22	1997	2106	1678	428	965	1141
23	1998	2393	1965	428	1033	1360
24	1999	2603	2175	428	1105	1498
25	2000	2921	2493	428	1183	1738
26	2001	3004	2576	428	1266	1738
27	2002	3093	2665	428	1354	1739
28	2003	3187	2759	428	1449	1738
29	2004	3289	2861	428	1550	1739
30	2005	3397	2969	428	1659	1738
31	2006	3513	3085	428	213	3300
32	2007	3528	3100	428	227	3301
33	2008	3544	3116	428	243	3301
34	2009	3561	3133	428	260	3301
35	2010	3580	3152	428	279	3301
36	2011	3599	3171	428	298	3301
37	2012	3620	3192	428	319	3301
38	2013	3642	3214	428	341	3301
39	2014	3666	3238	428	365	3301
40	2015	3692	3264	428	391	3301

Table-A.6.6-(1) Economic Comparitive Table

MINIMUM, NO FURNACE 2 STEP UNIT : MFMG

N	I	HYDRO 0.0	0.02	0.04	0.06	O & GT 0.0	0.02	0.04	0.06	T & S 0.0	0.02	0.04	0.06	FUEL EXPENS 0.0	0.02	0.04	0.06	O & M 0.0	0.02	0.04	0.06	TOTAL 0.0	0.02	0.04	0.06
1	76	1454	1425	1398	1372	582	571	560	549	0	0	0	0	223	219	214	210	24	24	23	23	2283	2239	2195	2154
2	77	2173	2089	2009	1934	0	0	0	0	121	116	112	108	294	283	272	262	31	30	29	28	2619	2518	2422	2332
3	78	1684	1587	1497	1414	0	0	0	0	1189	1120	1057	998	359	338	319	301	37	35	33	31	3269	3080	2906	2744
4	79	2033	1878	1738	1610	582	538	497	461	939	867	803	744	429	396	367	340	44	41	38	35	4027	3720	3443	3190
5	80	1695	1535	1393	1267	0	0	0	0	510	462	419	381	512	464	421	383	52	47	43	39	2769	2508	2276	2070
6	81	0	0	0	0	0	0	0	0	0	0	0	0	18	16	14	13	109	97	86	77	127	113	100	90
7	82	0	0	0	0	0	0	0	0	0	0	0	0	24	21	18	16	109	95	83	72	133	116	101	88
8	83	524	447	383	329	0	0	0	0	0	0	0	0	29	25	21	18	110	94	80	69	663	566	484	416
9	84	988	827	694	585	0	0	0	0	0	0	0	0	35	29	25	21	110	92	77	65	1133	948	796	671
10	85	908	745	613	507	0	0	0	0	180	148	122	101	35	29	24	20	110	90	74	61	1233	1012	833	689
11	86	1035	832	672	545	0	0	0	0	30	24	19	16	35	28	23	18	110	88	71	58	1210	972	785	637
12	87	0	0	0	0	0	0	0	0	0	0	0	0	35	28	22	17	141	111	88	70	176	139	110	87
13	88	0	0	0	0	0	0	0	0	0	0	0	0	41	32	25	19	142	110	85	67	183	142	110	86
14	89	1841	1395	1063	814	0	0	0	0	0	0	0	0	47	36	27	21	143	108	83	63	2031	1539	1173	898
15	90	1955	1453	1086	816	582	432	323	243	0	0	0	0	59	44	33	25	144	107	80	60	2740	2036	1522	1144
16	91	2337	1702	1248	920	0	0	0	0	180	131	96	71	88	64	47	35	147	107	78	58	2752	2004	1469	1084
17	92	1945	1389	999	722	0	0	0	0	30	21	15	11	123	88	63	46	150	107	77	56	2248	1605	1154	835
18	93	0	0	0	0	582	407	287	204	0	0	0	0	76	53	38	27	217	152	107	76	875	612	432	307
19	94	0	0	0	0	0	0	0	0	0	0	0	0	94	65	45	31	218	150	103	72	312	215	148	103
20	95	0	0	0	0	0	0	0	0	0	0	0	0	123	83	56	38	221	149	101	69	344	232	157	107
TOTAL		20572	17304	14793	12835	2328	1946	1667	1457	3179	2689	2293	2430	2679	2341	2074	1861	2369	1834	1439	1149	31127	26316	22619	19732

N	I	HYDRO 0.08	0.10	0.12	0.14	O & GT 0.08	0.10	0.12	0.14	T & S 0.08	0.10	0.12	0.14	FUEL EXPENS 0.08	0.10	0.12	0.14	O & M 0.08	0.10	0.12	0.14	TOTAL 0.08	0.10	0.12	0.14
1	76	1346	1322	1298	1275	539	529	520	511	0	0	0	0	206	203	199	196	22	22	21	21	2113	2076	2038	2003
2	77	1863	1796	1732	1672	0	0	0	0	104	100	96	93	252	243	234	226	27	26	25	24	2246	2165	2087	2015
3	78	1337	1265	1199	1137	0	0	0	0	944	893	846	803	285	270	256	242	29	28	26	25	2595	2456	2327	2207
4	79	1494	1389	1292	1204	428	398	370	345	690	641	597	556	315	293	273	254	32	30	28	26	2959	2751	2560	2385
5	80	1154	1052	962	880	0	0	0	0	347	317	289	265	348	318	291	266	35	32	30	27	1884	1719	1572	1438
6	81	0	0	0	0	0	0	0	0	0	0	0	0	11	10	9	8	69	62	55	50	80	72	64	58
7	82	0	0	0	0	0	0	0	0	0	0	0	0	14	12	11	10	64	56	49	44	78	68	60	54
8	83	283	244	212	184	0	0	0	0	0	0	0	0	16	14	12	10	59	51	44	39	358	309	268	233
9	84	494	419	356	304	0	0	0	0	0	0	0	0	18	15	13	11	55	47	40	34	567	481	409	349
10	85	421	350	292	245	0	0	0	0	83	69	58	49	16	13	11	9	51	42	35	30	571	474	396	333
11	86	444	363	298	245	0	0	0	0	13	11	9	7	15	12	10	8	47	39	32	26	519	425	349	286
12	87	0	0	0	0	0	0	0	0	0	0	0	0	14	11	9	7	56	45	36	29	70	56	45	36
13	88	0	0	0	0	0	0	0	0	0	0	0	0	15	12	9	7	52	41	33	26	67	53	42	33
14	89	627	485	377	294	0	0	0	0	0	0	0	0	16	12	10	8	49	38	29	23	692	535	416	325
15	90	616	468	357	274	183	139	106	82	0	0	0	0	19	14	11	8	45	34	26	20	863	655	500	384
16	91	682	509	381	287	0	0	0	0	53	39	29	22	26	19	14	11	43	32	24	18	804	599	448	338
17	92	526	385	283	210	0	0	0	0	8	6	4	3	33	24	18	13	41	30	22	16	608	445	327	242
18	93	0	0	0	0	146	105	76	55	0	0	0	0	19	14	10	7	54	39	28	21	219	158	114	83
19	94	0	0	0	0	0	0	0	0	0	0	0	0	22	15	11	8	51	36	25	18	73	51	36	26
20	95	0	0	0	0	0	0	0	0	0	0	0	0	26	18	13	9	47	33	23	16	73	51	36	25
TOTAL		11287	10047	9039	8211	1296	1171	1072	993	2242	2076	1928	1798	1686	1542	1424	1318	928	763	631	533	17439	15599	14094	12853

Table-A.6.6-(2) Internal Rate of Return

MINIMUM NO FURNACE 2 STEP — UNIT : MFMG

NO	YEAR	ROGEZ PROJECT (1) INVESTMENT	(2) O & M	(3) FUEL EX	BENEFIT (4) FIXED EX	(5) O & M	(6) FUEL EX	NET BENE. (7) NET	PRESENT VALUE (8) INVESTMENT	(9) NET BENE.	COEFFICIENT (10) 11.23 %
1	1976	1454	0	0	0	0	0	0	1307	0	0.8991
2	1977	2294	0	0	0	0	0	0	1854	0	0.8083
3	1978	2873	0	0	0	0	0	0	2088	0	0.7267
4	1979	2972	0	0	0	0	0	0	1942	0	0.6534
5	1980	2205	0	0	0	0	0	0	1295	0	0.5874
6	1981	0	57	-494	190	11	58	696	0	368	0.5281
7	1982	0	57	-488	190	20	147	788	0	374	0.4748
8	1983	524	58	-483	269	29	281	1004	224	429	0.4269
9	1984	988	58	-477	269	38	381	1107	379	425	0.3838
10	1985	1088	58	-477	269	48	513	1249	375	431	0.3451
11	1986	1065	58	-477	364	63	610	1456	330	452	0.3103
12	1987	0	89	-477	364	76	746	1574	0	439	0.2789
13	1988	0	90	-471	364	87	933	1765	0	443	0.2508
14	1989	1841	91	-465	459	110	1057	2000	415	451	0.2255
15	1990	1955	92	-453	554	129	1234	2278	396	462	0.2027
16	1991	2517	95	-424	554	148	1422	2453	459	447	0.1823
17	1992	1975	98	-389	744	173	1628	2836	324	465	0.1639
18	1993	0	165	-436	744	193	1866	3074	0	453	0.1473
19	1994	0	166	-418	839	219	2080	3390	0	449	0.1325
20	1995	0	169	-389	934	248	2339	3741	0	445	0.1191
21	1996	840	179	-284	1029	277	2615	4031	90	432	0.1071
22	1997	0	191	-125	1217	311	2909	4371	0	421	0.0963
23	1998	792	196	-89	1312	344	3227	4776	69	413	0.0865
24	1999	792	208	28	1407	381	3568	5120	62	398	0.0778
25	2000	840	221	158	1502	419	3938	5480	59	383	0.0700
SUB TOTAL 1		27015	2396	-7135	13574	3324	31552	53189	11668	8580	
SUB TOTAL 2		5573	5525	3950	37550	10475	98450	137000	87	3175	
TOTAL (1+2)		32588	7921	-3185	51124	13799	130002	190189	11755	11755	

Table-A.6.6-(3) Present Value at Each Discount Rate

RATE OF RETURN (%)	(2)	(4)	(6)	(8)	(10)	(12)	(14)
INVESTMENT (MFMG)	24785	19924	16668	14350	12615	11272	10200
NET BENEFIT (MFMG)	102162	58231	35106	22276	14801	10237	7333

Table-A.6.6-(4) Expenses for Diesel Plant

MINIMUM, NO FURNACE.... 6 STEP

UNIT : MFMG

NO	YEAR	DIESEL (1) INVEST.	DIESEL (2) AMOUNT	DIESEL (3) FIXED EX	GAS TURBIN (4) INVEST.	GAS TURBIN (5) AMOUNT	GAS TURBIN (6) FIXED EX	T/L & S/S (7) INVEST.	T/L & S/S (8) AMOUNT	T/L & S/S (9) FIXED EX	TOTAL FIXED (10) EX	INCRE-MENTAL (11) O & M EX	FUEL EX (12) DIESEL	FUEL EX (13) G.T.	INCRE-MENTAL (14) FUEL EX
5	1980	0	0	0	0	0	0	0	0	0	0	50	512	0	512
6	1981	1584	1584	174	0	0	0	206	206	16	190	11	570	0	58
7	1982	0	1584	174	0	0	0	0	206	16	190	20	659	0	147
8	1983	0	1584	174	840	840	79	0	206	16	269	29	729	64	281
9	1984	0	1584	174	0	840	79	0	206	16	269	38	829	64	381
10	1985	0	1584	174	0	840	79	0	206	16	269	48	923	102	513
11	1986	792	2376	261	0	840	79	103	309	24	364	63	1058	64	610
12	1987	0	2376	261	0	840	79	0	309	24	364	76	1194	64	746
13	1988	0	2376	261	0	840	79	0	309	24	364	87	1305	140	933
14	1989	792	3168	348	0	840	79	103	412	32	459	110	1505	64	1057
15	1990	792	3960	435	0	840	79	103	515	40	554	129	1682	64	1234
16	1991	0	3960	435	0	840	79	0	515	40	554	148	1870	64	1422
17	1992	1584	5544	609	0	840	79	206	721	56	744	173	2076	64	1628
18	1993	0	5544	609	0	840	79	0	721	56	744	193	2276	102	1866
19	1994	792	6336	696	0	840	79	103	824	64	839	219	2528	64	2080
20	1995	792	7128	783	0	840	79	103	927	72	934	248	2787	64	2339
21	1996	792	7920	870	0	840	79	103	1030	80	1029	277	3063	64	2615
22	1997	1584	9504	1043	0	840	79	206	1236	95	1217	311	3357	64	2909
23	1998	792	10296	1130	0	840	79	103	1339	103	1312	344	3675	64	3227
24	1999	792	11088	1217	0	840	79	103	1442	111	1407	381	4016	64	3568
25	2000	792	11880	1304	0	840	79	103	1545	119	1502	419	4386	64	3938

Table-A.6.6-(5) Repayment Schedule

MINIMUM, NO FURNACE, 2 STEP — UNIT : MFMG

NO	YEAR	1ST STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	2ND STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	3RD STAGE (1) AMOUNT OF LOAN	(2) INTEREST	(3) REPAYMENT DEBT	(4) AMOUNT	(5) BALANCE	TOTAL (1) PAY. OF INTEREST	(2) REPAYMENT DEBT
6	1981	13859	970	0	0	13859	0	0	0	0	0	0	0	0	0	0	970	0
7	1982	0	970	0	0	13859	0	0	0	0	0	0	0	0	0	0	970	0
8	1983	0	970	259	1229	13600	0	0	0	0	0	0	0	0	0	0	970	259
9	1984	0	952	278	1229	13322	0	0	0	0	0	0	0	0	0	0	952	278
10	1985	0	933	297	1229	13025	0	0	0	0	0	0	0	0	0	0	933	297
11	1986	0	912	318	1229	12707	0	0	0	0	0	0	0	0	0	0	912	318
12	1987	0	890	340	1229	12367	4142	290	0	0	4142	0	0	0	0	0	1179	340
13	1988	0	866	364	1229	12004	0	290	0	0	4142	0	0	0	0	0	1156	364
14	1989	0	840	389	1229	11614	0	290	0	0	4142	0	0	0	0	0	1130	389
15	1990	0	813	416	1229	11198	0	290	78	367	4064	0	0	0	0	0	1103	494
16	1991	0	784	446	1229	10752	0	285	83	367	3982	0	0	0	0	0	1068	529
17	1992	0	753	477	1229	10276	0	279	89	367	3893	0	0	0	0	0	1031	566
18	1993	0	719	510	1229	9765	0	272	95	367	3798	9482	664	0	0	9482	1656	605
19	1994	0	684	546	1229	9219	0	266	102	367	3696	0	664	0	0	9482	1613	648
20	1995	0	645	584	1229	8635	0	259	109	367	3588	0	664	0	0	9482	1568	693
21	1996	0	604	625	1229	8010	0	251	116	367	3471	0	664	177	841	9305	1519	919
22	1997	0	561	669	1229	7341	0	243	124	367	3347	0	651	190	841	9115	1455	983
23	1998	0	514	716	1229	6626	0	234	133	367	3214	0	638	203	841	8912	1386	1052
24	1999	0	464	766	1229	5860	0	225	143	367	3071	0	624	217	841	8694	1313	1126
25	2000	0	410	819	1229	5041	0	215	152	367	2919	0	609	233	841	8462	1234	1204
26	2001	0	353	877	1229	4164	0	204	163	367	2755	0	592	249	841	8213	1149	1289
27	2002	0	291	938	1229	3226	0	193	175	367	2581	0	575	266	841	7946	1059	1379
28	2003	0	226	1004	1229	2223	0	181	187	367	2394	0	556	285	841	7661	963	1475
29	2004	0	156	1074	1229	1149	0	168	200	367	2194	0	536	305	841	7357	859	1579
30	2005	0	80	1149	1229	0	0	154	214	367	1980	0	515	326	841	7030	749	1689
31	2006	0	0	0	0	0	0	139	229	367	1751	0	492	349	841	6681	631	578
32	2007	0	0	0	0	0	0	123	245	367	1507	0	468	374	841	6308	590	618
33	2008	0	0	0	0	0	0	105	262	367	1245	0	442	400	841	5908	547	662
34	2009	0	0	0	0	0	0	87	280	367	964	0	414	428	841	5480	501	708
35	2010	0	0	0	0	0	0	67	300	367	664	0	384	458	841	5023	451	758
36	2011	0	0	0	0	0	0	47	321	367	343	0	352	490	841	4533	398	811
37	2012	0	0	0	0	0	0	24	343	367	0	0	317	524	841	4009	341	867
38	2013	0	0	0	0	0	0	0	0	0	0	0	281	561	841	3449	281	561
39	2014	0	0	0	0	0	0	0	0	0	0	0	241	600	841	2849	241	600
40	2015	0	0	0	0	0	0	0	0	0	0	0	199	642	841	2207	199	642
41	2016	0	0	0	0	0	0	0	0	0	0	0	155	687	841	1521	155	687
42	2017	0	0	0	0	0	0	0	0	0	0	0	106	735	841	786	106	735
43	2018	0	0	0	0	0	0	0	0	0	0	0	55	786	841	0	55	786

Table-A.6.6-(6) Income Statement

MINIMUM NO FURNACE — 2 STEP — UNIT : MFMG

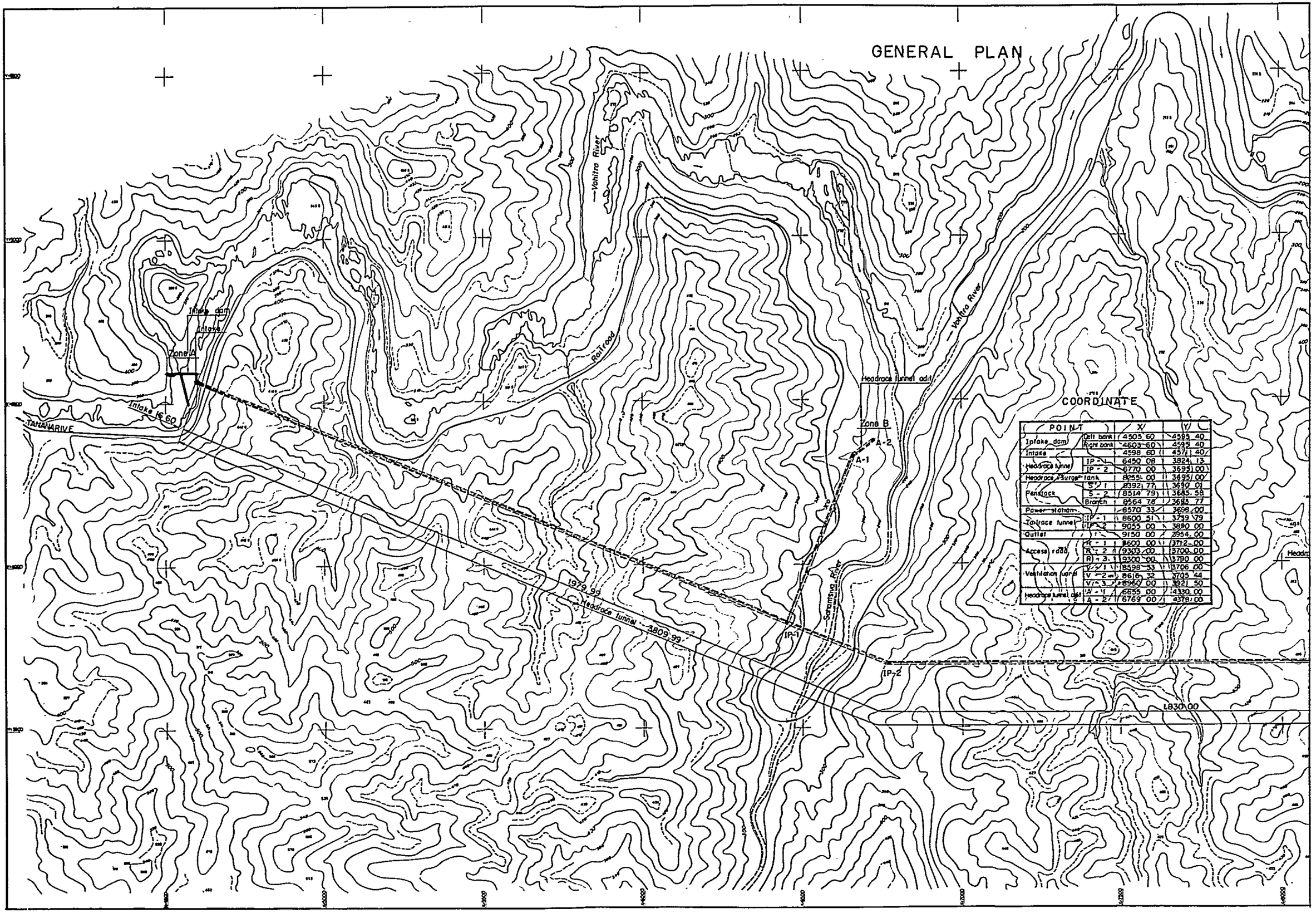
NO	YEAR	REVENUES (1) INCRE. PUBLIC ENERGY GWH	(2) UNIT PX.OF PUBLIC FMG/KWH	(3) INCOME FROM PUBLIC MFMG.	(4) ENERGY OF FERRO GWH	(5) UNIT PX.OF FERRO FMG/KWH	(6) INCOME FROM FERRO MFMG	(7) TOTAL INCOME MFMG	EXPENCES (8) OPE. AND MAIN. MFMG	(9) OTHER EX. MFMG	(10) DEPRE-CIATIO N MFMG	(11) SUB TOTAL MFMG	(12) OPERAT. INCOME MFMG	(13) SAVING FUEL EX. MFMG	(14) INTER-EST MFMG	(15) NET INCOME MFMG
6	1981	13	7.20	94	0	0.0	0	94	57	3	274	334	-240	494	970	-716
7	1982	28	7.20	202	0	0.0	0	202	57	3	274	334	-132	488	970	-614
8	1983	45	7.20	324	0	0.0	0	324	58	3	274	335	-11	483	970	-498
9	1984	63	7.20	454	0	0.0	0	454	58	3	274	335	119	477	952	-356
10	1985	82	7.20	590	0	0.0	0	590	58	3	274	335	255	477	933	-201
11	1986	105	6.50	683	0	0.0	0	683	58	3	274	335	348	477	912	-87
12	1987	128	6.50	832	0	0.0	0	832	89	3	356	448	384	477	1179	-318
13	1988	154	6.50	1001	0	0.0	0	1001	90	3	356	449	552	471	1156	-133
14	1989	143	6.50	1190	0	0.0	0	1190	91	3	356	450	740	465	1130	75
15	1990	213	6.50	1385	0	0.0	0	1385	92	3	356	451	934	453	1103	284
16	1991	252	6.20	1562	0	0.0	0	1562	95	3	356	454	1108	424	1068	464
17	1992	287	6.20	1779	0	0.0	0	1779	98	3	522	623	1156	389	1031	514
18	1993	326	6.20	2021	0	0.0	0	2021	165	6	522	693	1328	436	1656	108
19	1994	368	6.20	2282	0	0.0	0	2282	166	6	522	694	1588	418	1613	393
20	1995	413	6.20	2561	0	0.0	0	2561	169	6	522	697	1864	389	1568	685
21	1996	461	6.20	2858	0	0.0	0	2858	179	85	522	786	2072	289	1519	842
22	1997	513	6.20	3181	0	0.0	0	3181	191	85	522	798	2383	125	1455	1053
23	1998	569	6.20	3528	0	0.0	0	3528	196	172	522	890	2638	89	1386	1341
24	1999	629	6.20	3900	0	0.0	0	3900	208	259	522	989	2911	-28	1313	1570
25	2000	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	1234	1909
26	2001	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	1149	1994
27	2002	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	1059	2084
28	2003	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	963	2180
29	2004	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	859	2284
30	2005	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	749	2394
31	2006	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	631	2512
32	2007	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	590	2553
33	2008	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	547	2596
34	2009	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	501	2642
35	2010	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	451	2692
36	2011	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	398	2745
37	2012	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	341	2802
38	2013	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	281	2862
39	2014	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	241	2902
40	2015	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	199	2944
41	2016	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	155	2988
42	2017	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	106	3037
43	2018	694	6.20	4303	0	0.0	0	4303	221	259	522	1002	3301	-158	55	3088

Table-A.6.6-(7). Cash Flow

.MINIMUM. .NO .FURNACE . 2 STEP UNIT : MEMO

NO	YEAR	(1) CASH FROM INCOME	(2) NET INCOME	(3) DEPRECI- ATION	(4) REPAYMENT OF DEBT	(5) NET CASH PROVIDED
6	1981	-442	-716	274	0	-442
7	1982	-340	-614	274	0	-340
8	1983	-224	-498	274	259	-483
9	1984	-82	-356	274	278	-360
10	1985	73	-201	274	297	-224
11	1986	187	-87	274	318	-131
12	1987	38	-318	356	340	-302
13	1988	223	-133	356	364	-141
14	1989	431	75	356	389	42
15	1990	640	284	356	494	146
16	1991	820	464	356	529	291
17	1992	1036	514	522	566	470
18	1993	630	108	522	605	25
19	1994	915	393	522	648	267
20	1995	1207	685	522	693	514
21	1996	1364	842	522	919	445
22	1997	1575	1053	522	983	592
23	1998	1863	1341	522	1052	811
24	1999	2092	1570	522	1126	966
25	2000	2431	1909	522	1204	1227
26	2001	2516	1994	522	1289	1227
27	2002	2606	2084	522	1379	1227
28	2003	2702	2180	522	1475	1227
29	2004	2806	2284	522	1579	1227
30	2005	2916	2394	522	1689	1227
31	2006	3034	2512	522	578	2456
32	2007	3075	2553	522	618	2457
33	2008	3118	2596	522	662	2456
34	2009	3164	2642	522	708	2456
35	2010	3214	2692	522	758	2456
36	2011	3267	2745	522	811	2456
37	2012	3324	2802	522	867	2457
38	2013	3384	2862	522	561	2823
39	2014	3424	2902	522	600	2824
40	2015	3466	2944	522	642	2824
41	2016	3510	2988	522	687	2823
42	2017	3559	3037	522	735	2824
43	2018	3610	3088	522	786	2824

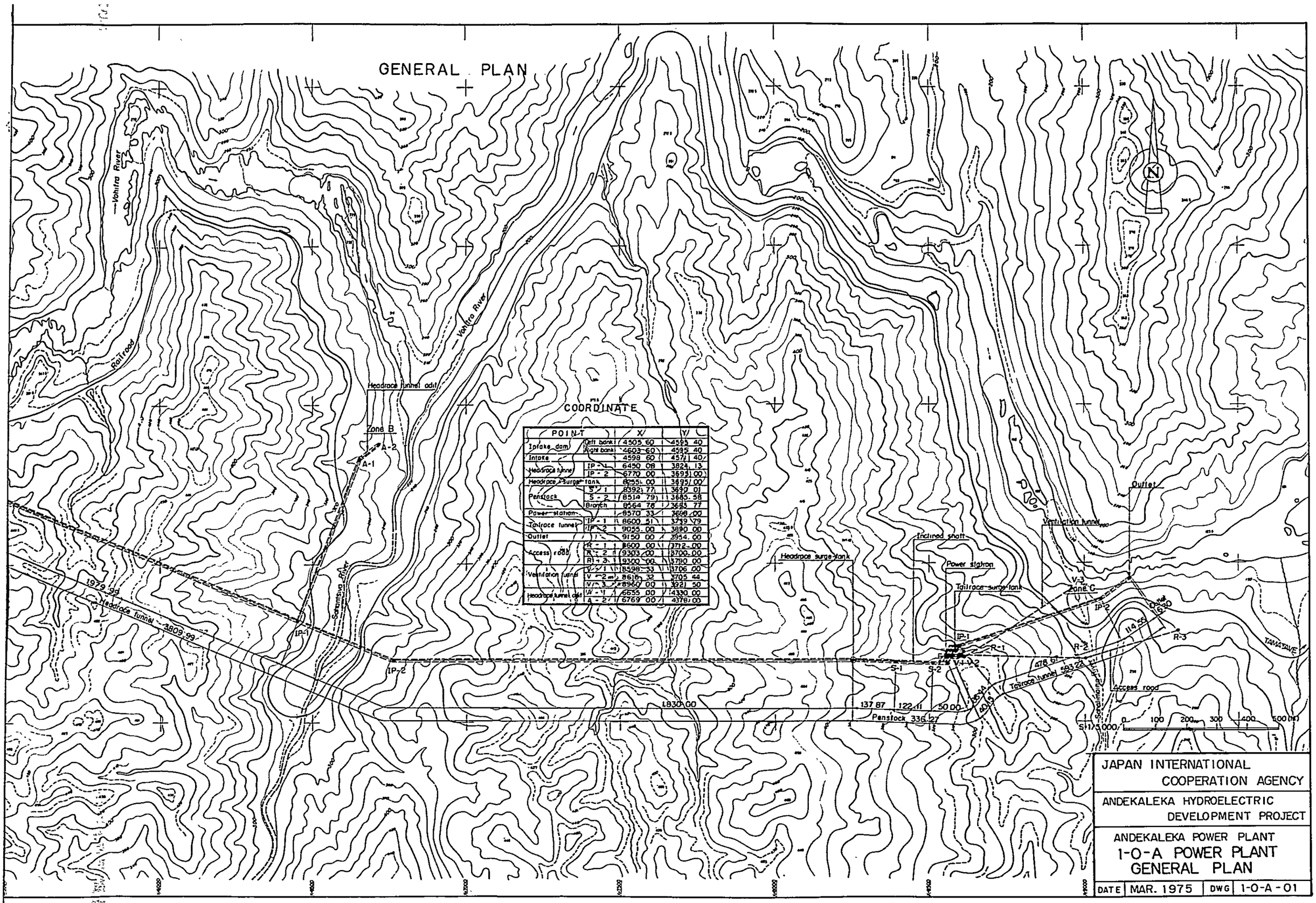
GENERAL PLAN



COORDINATE

POINT		X	Y
Intake dam	Left bank	4505 60	4595 40
	Right bank	4603 60	4595 40
Intake		4598 60	4571 40
Headrace tunnel	IP - 1	6450 08	3824. 13
	IP - 2	6770 00	3693 00
Headrace surge tank		8255. 00	3695 00
Penstock	S - 1	8392 77	3690 01
	S - 2	8514 79	3685. 58
	Branch	8564 78	3685 77
Power station		8570 33	3698 00
Tailrace tunnel	IP - 1	8600 51	3739 79
	IP - 2	9055 00	3890 00
Outlet		9150 00	3954. 00
Access road	R - 1	8600 00	3712 00
	R - 2	9303 00	3700 00
	R - 3	9300 00	3790 00
Ventilation tunnel	V - 1	8598 33	3706 60
	V - 2	8616 32	3705 44
	V - 3	8960 00	3921 50
Headrace tunnel adit	A - 1	6655 00	4330 00
	A - 2	6769 00	4378 00

GENERAL PLAN



COORDINATE

POINT		X	Y
Intake dam	Left bank	4505.60	4595.40
	Right bank	4603.60	4595.40
Intake		4598.60	4571.40
Headrace tunnel	IP-1	6450.08	3824.13
	IP-2	6770.00	3693.00
Headrace surge tank		8255.00	3695.00
Penstock	S-1	8392.77	3690.01
	S-2	8514.79	3685.58
	Branch	8564.78	3683.77
Power station		8570.33	3668.00
Tailrace tunnel	IP-1	8600.51	3739.79
	IP-2	9055.00	3890.00
Outlet		9150.00	3954.00
Access road	R-1	8600.00	3772.00
	R-2	9303.00	3700.00
	R-3	9300.00	3780.00
Ventilation tunnel	V-1	8598.33	3706.00
	V-2	8818.32	3705.44
	V-3	8960.00	3821.50
Headrace tunnel adit	W-1	6655.00	4330.00
	A-2	6769.00	4378.00

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

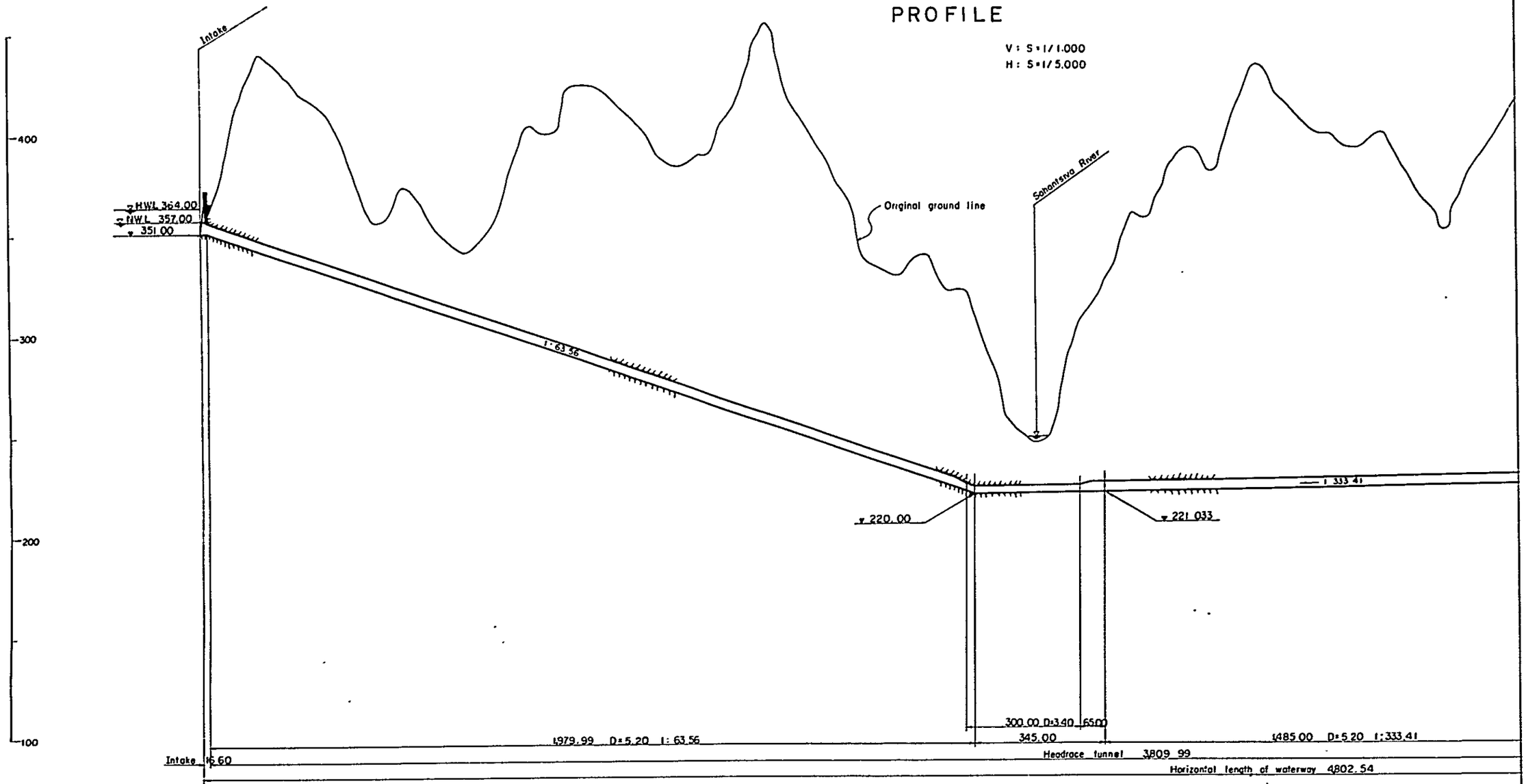
ANDEKALEKA POWER PLANT

1-O-A POWER PLANT GENERAL PLAN

DATE	MAR. 1975	DWG	1-O-A-01

PROFILE

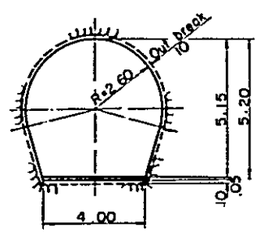
V : S = 1/1.000
H : S = 1/5.000

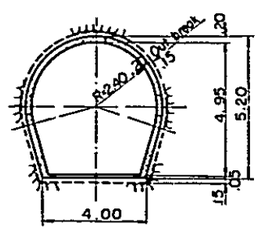


TYPICAL SECTION

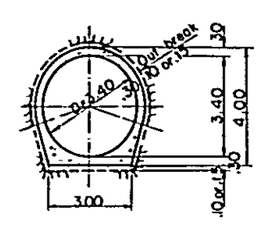
S = 1/100

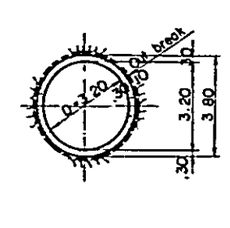
HEADRACE TUNNEL AND TAILRACE TUNNEL





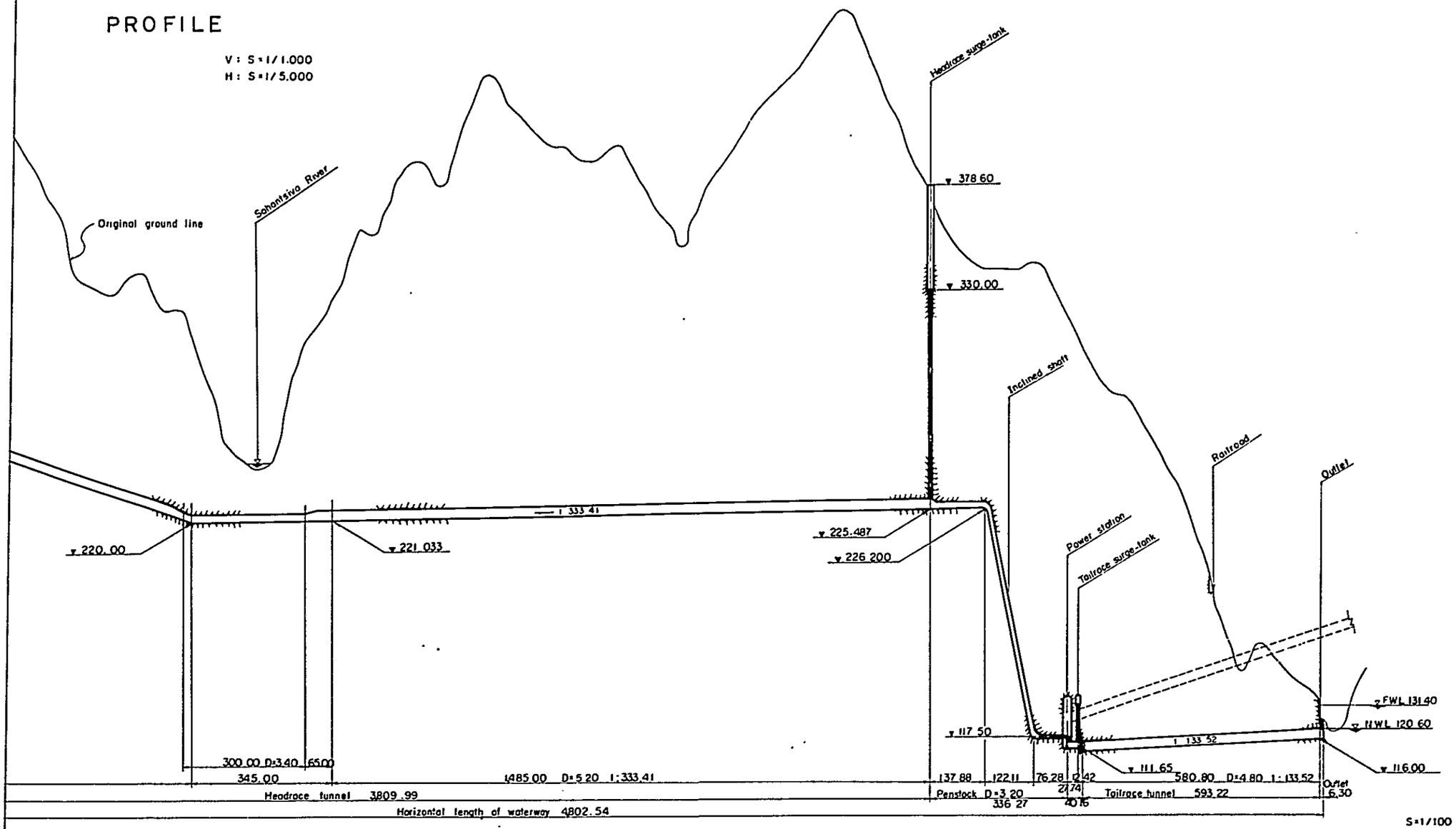
PENSTOCK





PROFILE

V : S=1/1.000
H : S=1/5.000



S=1/100 0 5 10(M)

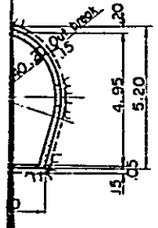
S=1/1000 0 50 100(M)

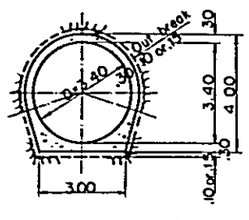
S=1/5000 0 100 200 300 400 500(M)

TYPICAL SECTION

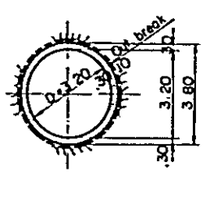
S=1/100

AND TAILRACE TUNNEL



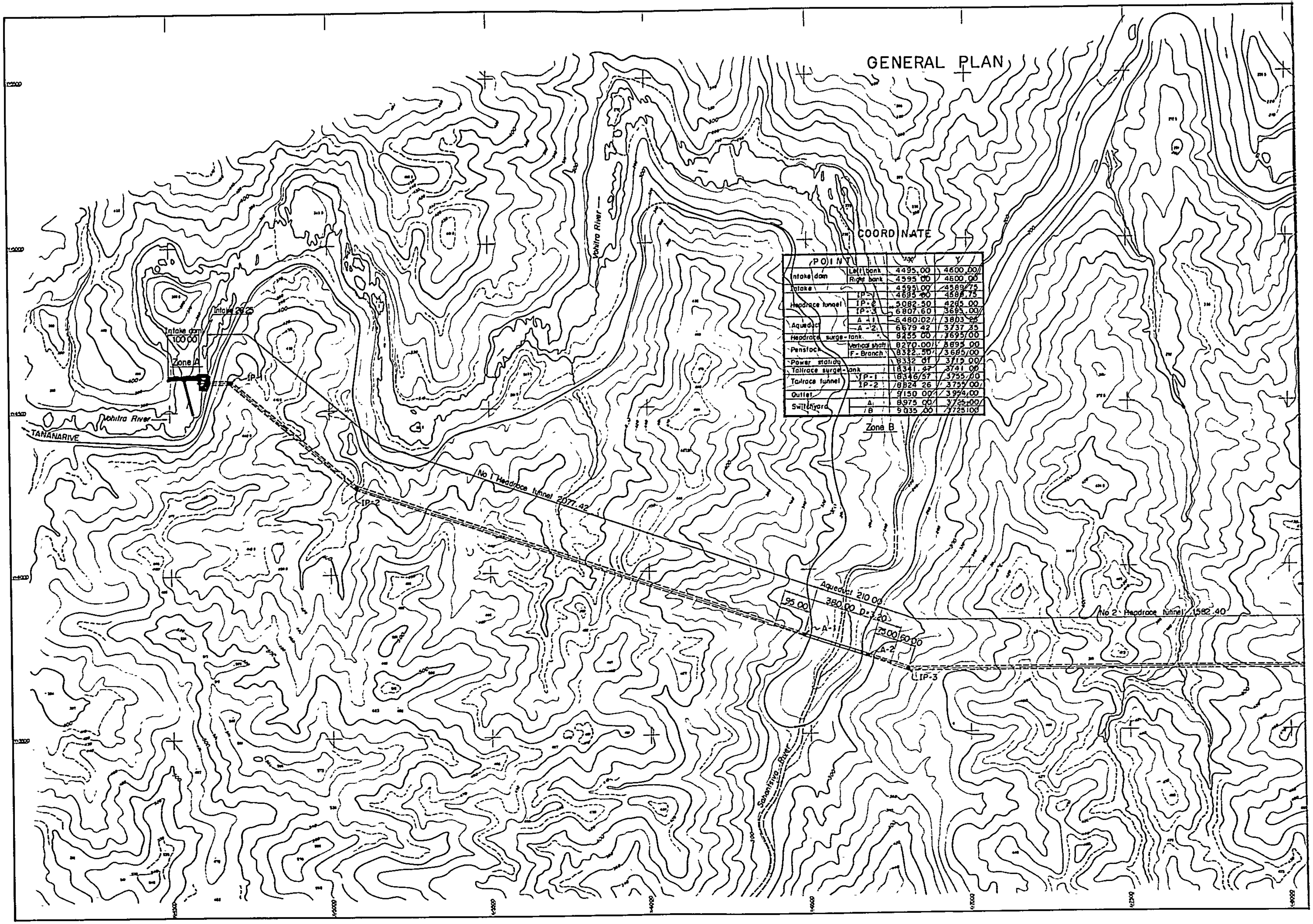


PENSTOCK



JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA POWER PLANT	
1-0-A POWER PLANT PROFILE & TYPICAL SECTION	
DATE	MAR. 1975 / DWG 1-0-A-02

GENERAL PLAN



COORDINATE

POINT		X	Y
Intake dam	Left bank	4495.00	4600.00
	Right bank	4595.00	4600.00
Intake		4595.00	4589.75
Headrace tunnel	IP-1	4695.00	4588.75
	IP-2	5082.50	4265.00
	IP-3	6807.60	3695.00
Aqueduct	A-1	6480.02	3803.25
	A-2	6679.42	3737.35
Headrace surge-tank		8255.00	3695.00
Penstock	Vertical shaft	8270.00	3695.00
	F-Branch	8322.50	3685.00
Power station		8332.01	3715.00
Tailrace surge-tank		8341.47	3741.00
Tailrace tunnel	IP-1	8346.57	3755.00
	IP-2	8824.26	3755.00
Outlet		9150.00	3954.00
Switchyard	A	8975.00	3725.00
	B	9035.00	3725.00

GENERAL PLAN

POINT		X	Y
Intake dam	Left bank	4495.00	4600.00
	Right bank	4595.00	4600.00
Intake		4595.00	4589.73
Headrace tunnel	IP-1	4633.80	4584.75
	IP-2	5082.50	4265.00
	IP-3	6807.60	3693.00
Aqueduct	A-1	6480.02	3803.55
	A-2	6679.42	3737.35
Headrace surge-tank		8455.00	3695.00
Penstock	Vertical shaft	8270.00	3695.00
	F-Branch	8322.50	3695.00
Power station		8332.61	3719.00
Tailrace surge-tank		8341.47	3741.00
Tailrace tunnel	IP-1	8346.57	3755.00
	IP-2	8824.26	3759.00
Outlet		9150.00	3994.00
Switchyard	A	8975.00	3725.00
	B	9035.00	3725.00

Vohitra River

Zone B

No 1 Headrace tunnel 2077.42

Aqueduct 210.00

95.00

380.00 D=3.20

75.00 60.00

A-1

A-2

IP-3

No 2 Headrace tunnel 1582.40

1500

Tailrace tunnel 859.41

Headrace surge-tank

Vertical shaft

Power station

Tailrace surge-tank

IP-1

IP-2

Penstock

67.50

40.00

Outlet 15.00

Vohitra River

Zone C

Switchyard

A 50.00 B

TAMATAVE

Sahanisiva River

S=1/5,000

100 200 300 400 500 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

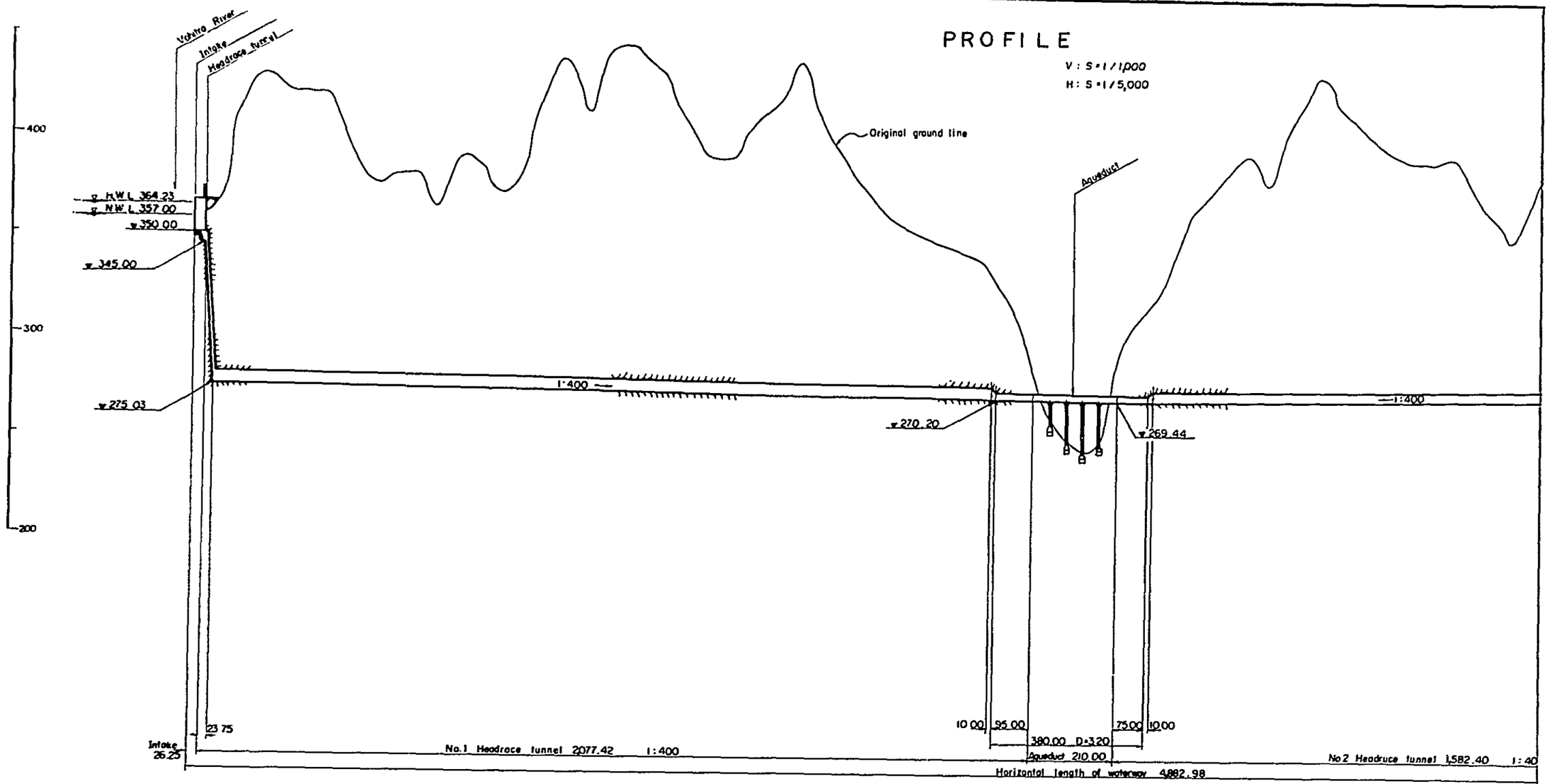
ANDEKALEKA POWER PLANT

1-0-B POWER PLANT GENERAL PLAN

DATE MAR. 1975 | DWG. 1-0-B-01

PROFILE

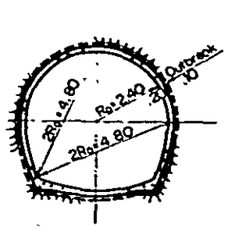
V : S = 1 / 1,000
H : S = 1 / 5,000

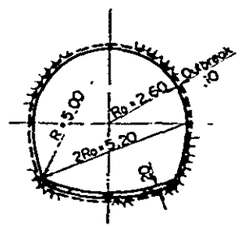


TYPICAL SECTION

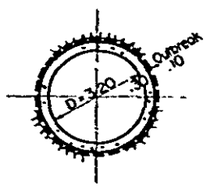
S = 1/100

HEADRACE TUNNEL AND TAILRACE



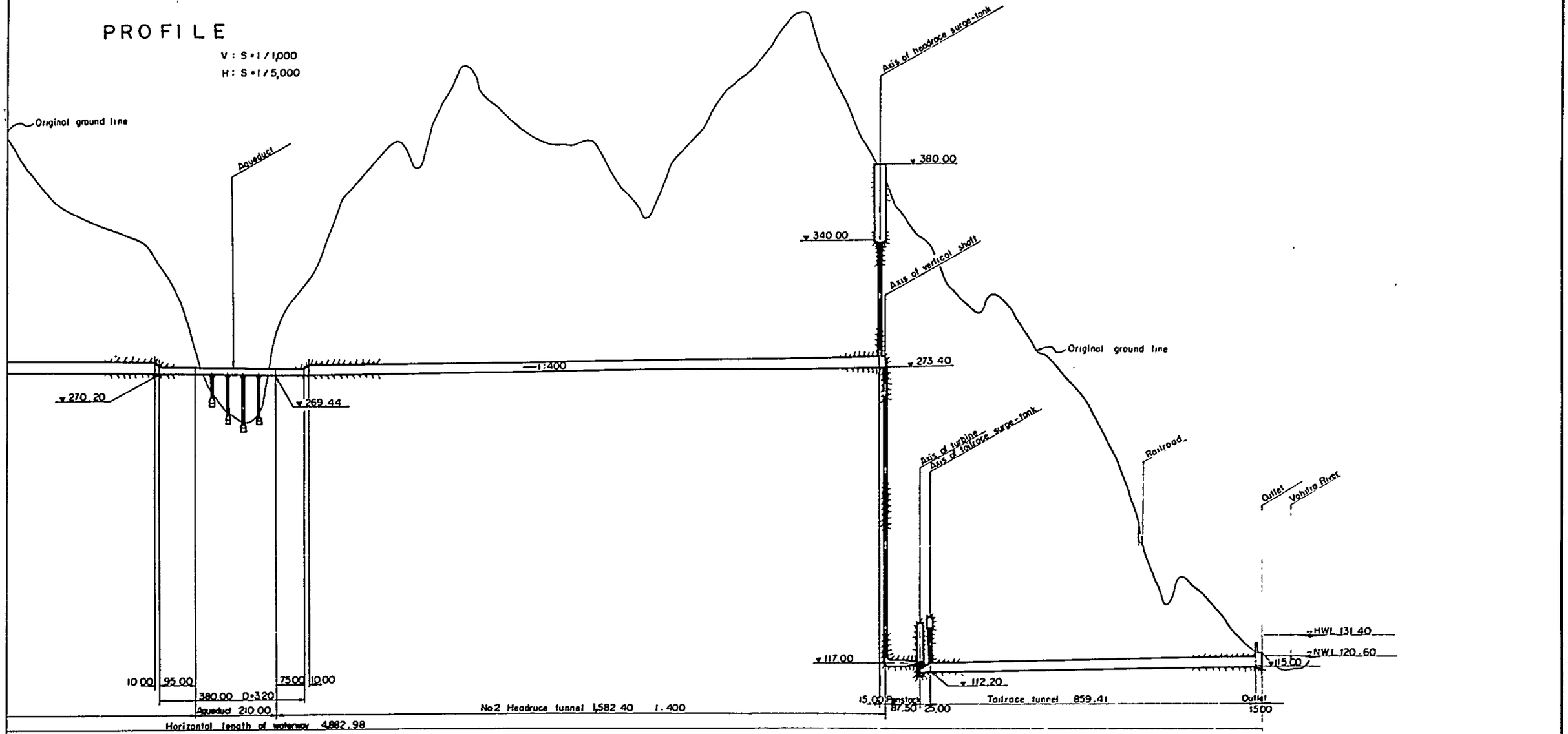


VERTICAL SHAFT



PROFILE

V : S=1/1,000
H : S=1/5,000



S=1/100 0 5 10 (M)

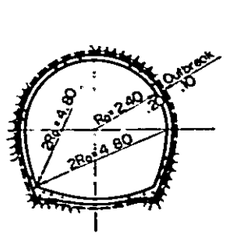
V: S=1/1,000 0 50 100 (M)

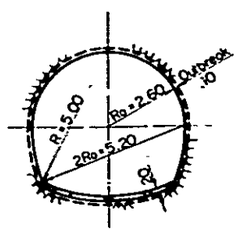
H: S=1/5,000 0 100 200 300 400 500 (M)

TYPICAL SECTION

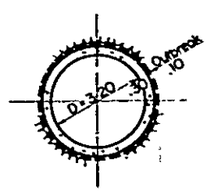
S=1/100

HEADRACE TUNNEL AND TAILRACE



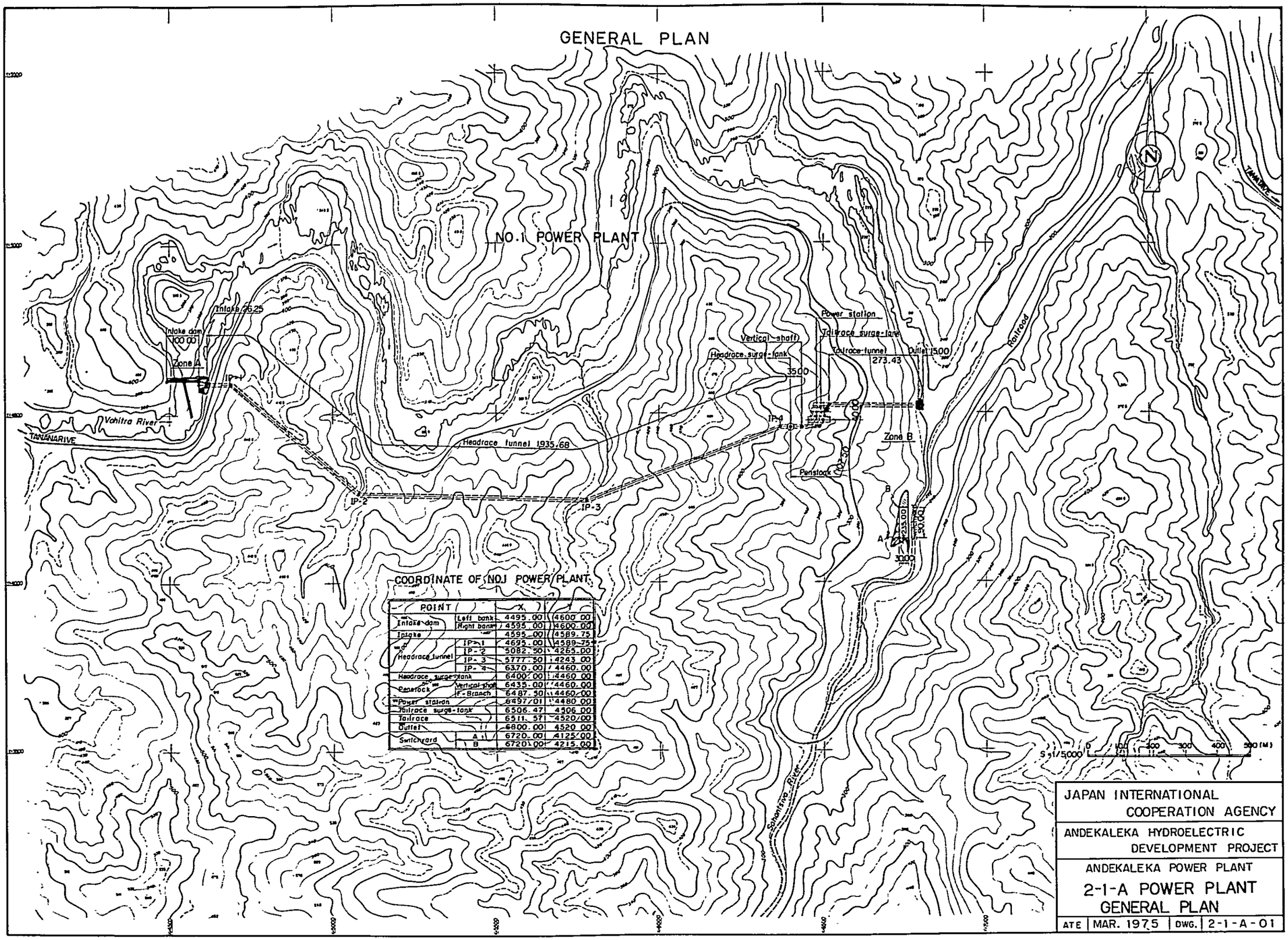


VERTICAL SHAFT



JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA POWER PLANT	
1-0-B POWER PLANT PROFILE & TYPICAL SECTION	
DATE MAR. 1975	DWG. 1-0-B-02

GENERAL PLAN



COORDINATE OF NOJ POWER PLANT

POINT		X	Y
Intake dam	Left bank	4495.00	4600.00
	Right bank	4595.00	4600.00
Intake		4595.00	4589.75
Headrace tunnel	IP-1	4695.00	4589.75
	IP-2	5082.50	4265.00
	IP-3	5777.50	4243.00
	IP-4	6370.00	4460.00
Headrace surge-tank		6400.00	4460.00
Penstock	Vertical shaft	6435.00	4460.00
	F-Branch	6487.50	4460.00
Power station		6497.01	4480.00
Tailrace surge-tank		6506.47	4506.00
Tailrace		6511.57	4520.00
Outlet	"	6800.00	4520.00
Switchyard	A	6720.00	4125.00
	B	6720.00	4215.00

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

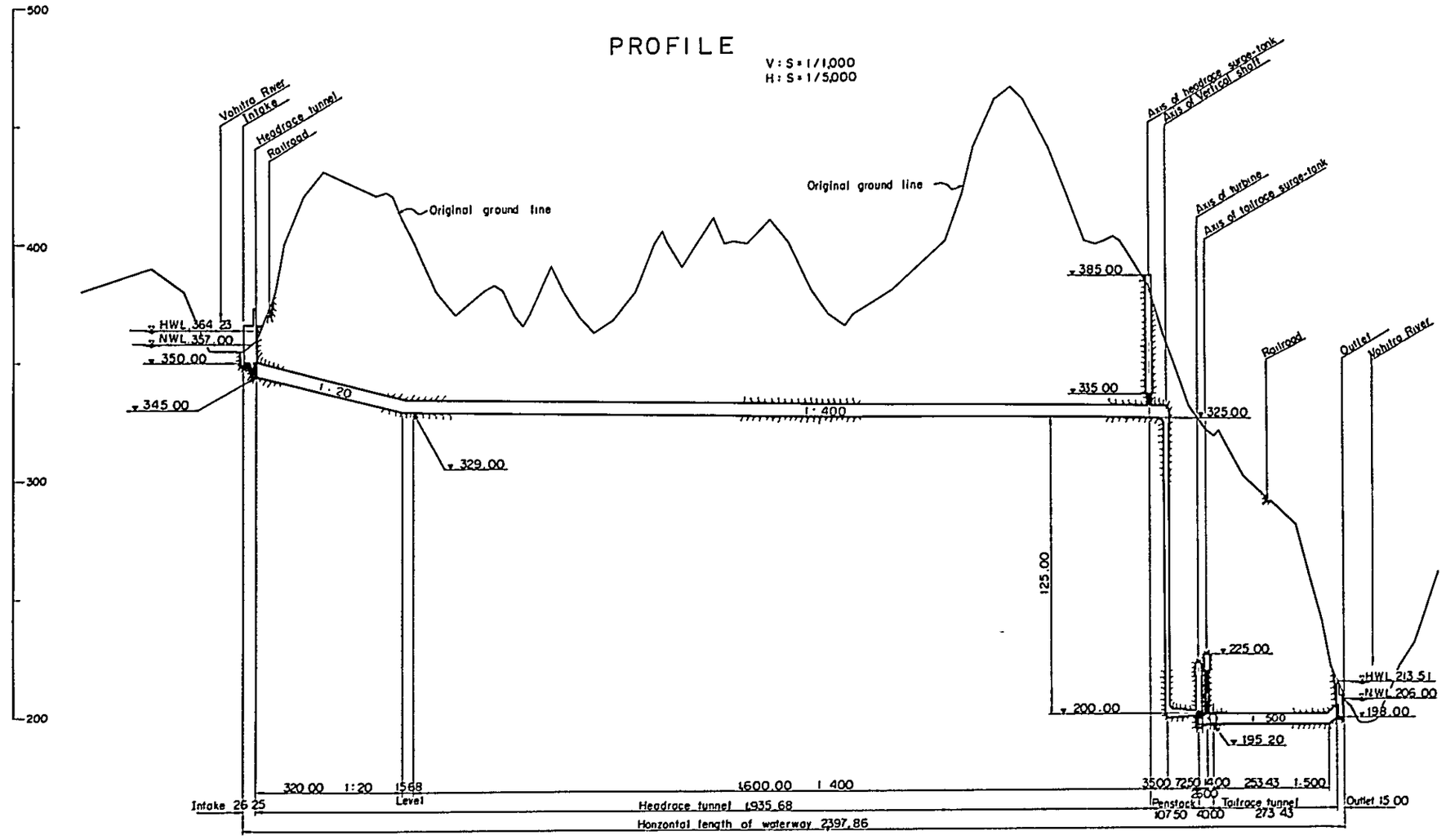
ANDEKALEKA POWER PLANT

2-1-A POWER PLANT GENERAL PLAN

DATE MAR. 1975 | DWG. 2-1-A-01

PROFILE

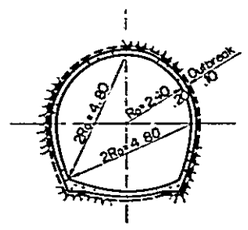
V : S = 1/1,000
H : S = 1/5,000

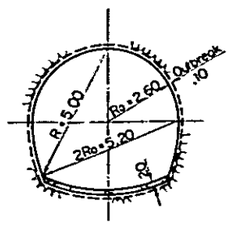


TYPICAL SECTION

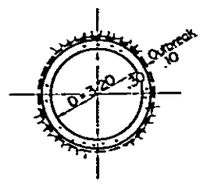
S = 1/100

HEADRACE TUNNEL AND TAILRACE





VERTICAL SAFT



S = 1/100 0 5 10(M)

S = 1/1,000 0 50 100(M)

S = 1/5,000 0 100 200 300 400 500(M)

JAPAN INTERNATIONAL COOPERATION AGENCY

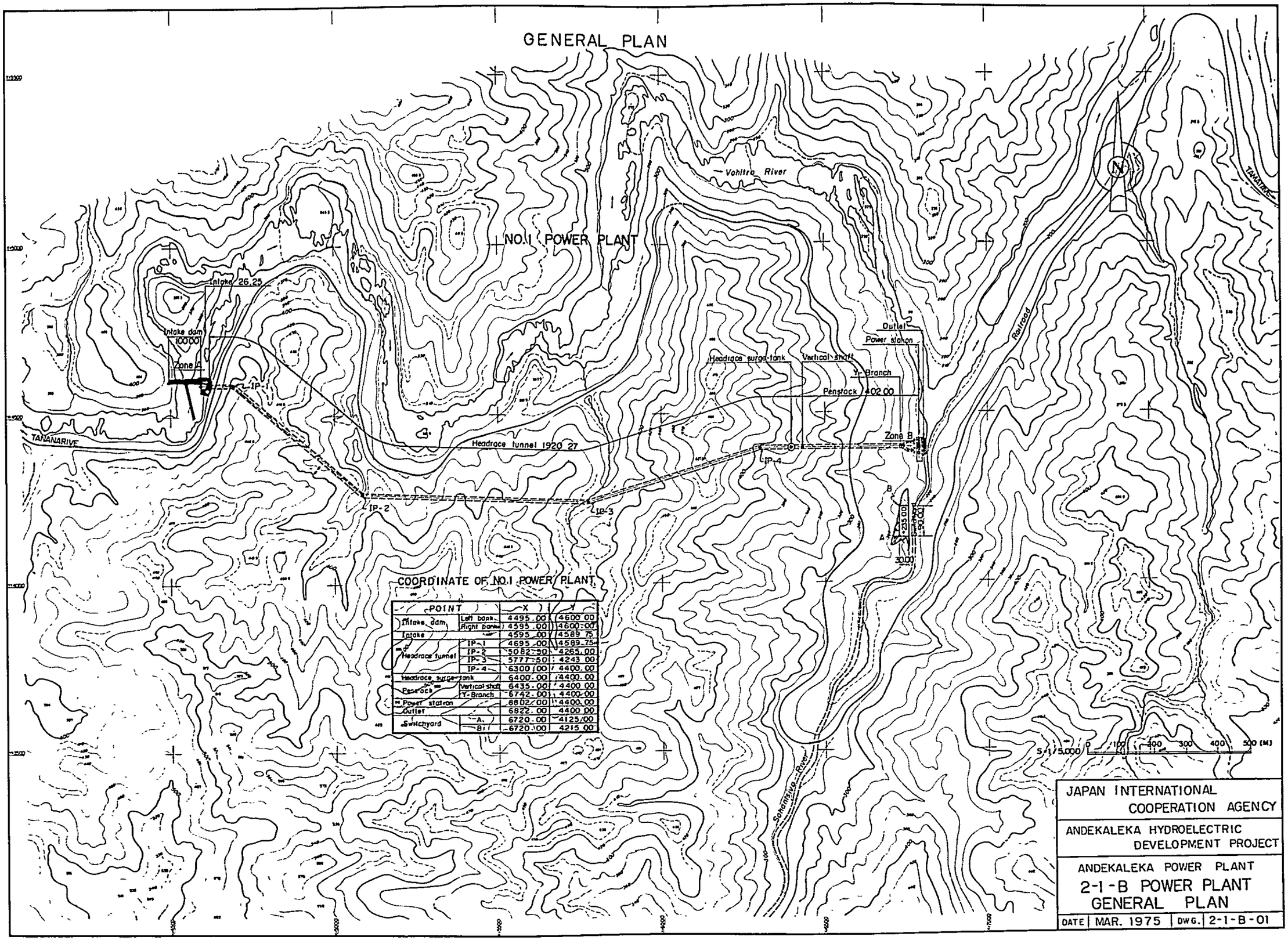
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA POWER PLANT

2-1-A POWER PLANT PROFILE & TYPICAL SECTION

DATE MAR. 1975 | DWG. 2-1-A-02

GENERAL PLAN



COORDINATE OF NO.1 POWER PLANT

POINT		X	Y
Intake dam	Left bank	4495.00	4600.00
	Right bank	4595.00	4600.00
Intake		4595.00	4589.75
Headrace tunnel	IP-1	4695.00	4589.75
	IP-2	5082.50	4265.00
	IP-3	5777.50	4243.00
	IP-4	6300.00	4400.00
Headrace surge-tank		6400.00	4400.00
Penstock	Vertical shaft	6435.00	4400.00
	Y-Branch	6742.00	4400.00
Power station		6802.00	4400.00
Outlet		6822.00	4400.00
Switchyard	A	6720.00	4125.00
	B	6720.00	4215.00

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

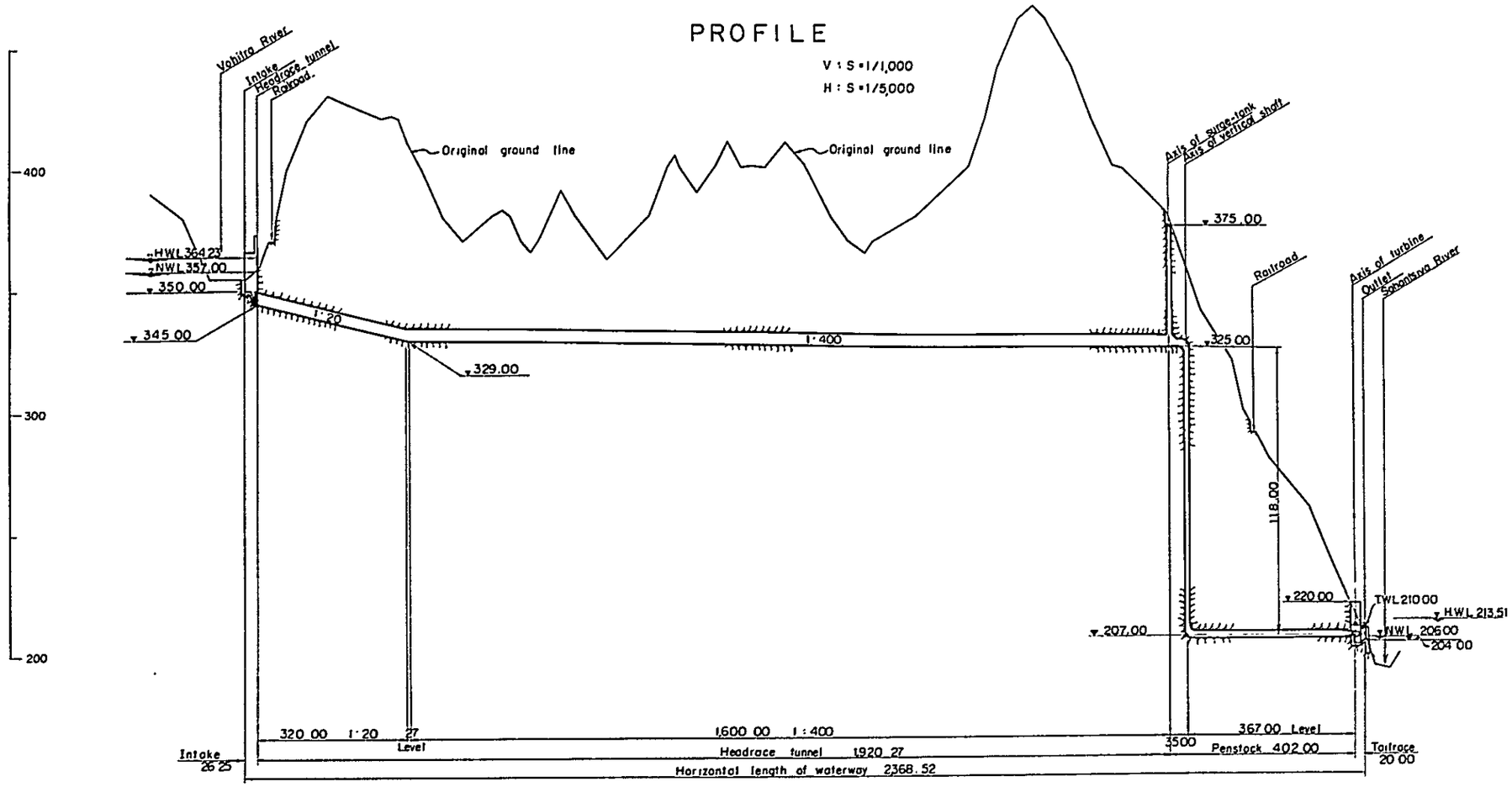
ANDEKALEKA POWER PLANT

2-1-B POWER PLANT GENERAL PLAN

DATE: MAR. 1975 | DWG.: 2-1-B-01

PROFILE

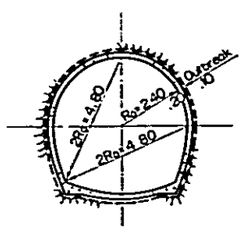
V : S = 1/1,000
H : S = 1/5,000

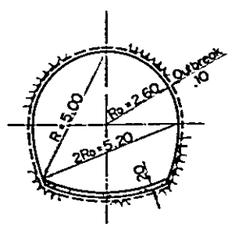


TYPICAL SECTION

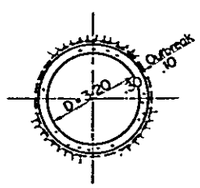
S = 1/100

HEADRACE TUNNEL





VERTICAL SHAFT



S = 1/100 0 5 10 (M)

S = 1/1,000 0 50 100 (M)

S = 1/5,000 0 100 200 300 400 500 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA POWER PLANT

2-1-B POWER PLANT

PROFILE & TYPICAL SECTON

DATE | MAR. 1975 | DWG | 2-1-B-02

GENERAL PLAN

No. 2 POWER PLANT

COORDINATE OF NO.2 POWER PLANT

POINT		X	Y
Intake dam	Left bank	6895.47	4681.88
	Right bank	6975.00	4640.00
Intake		6967.71	4626.32
Headrace tunnel	IP-1	7156.59	4927.35
	IP-2	7244.83	4880.00
	IP-3	8750.00	3780.00
Headrace surge-tank		8825.00	3780.00
Penstock	Vertical shaft	8860.00	3780.00
	Y-Branch	8874.00	3788.69
Power station		8895.85	3798.55
Tailrace surge-tank		8975.60	3810.80
Outlet		9130.00	3954.00
Switchyard	A	9330.00	3788.00
	B	9415.00	3788.00

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

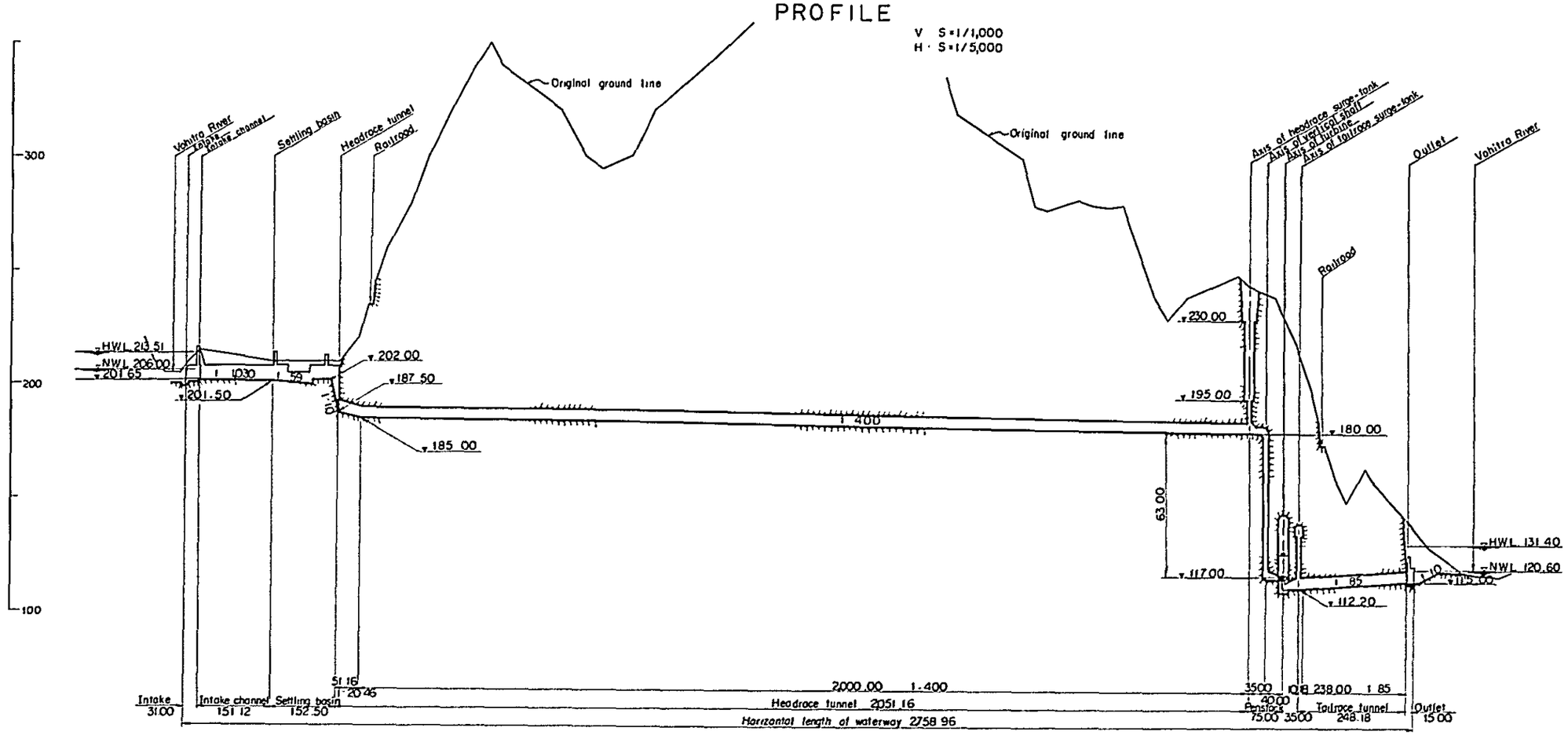
ANDEKALEKA POWER PLANT

2-2-A POWER PLANT GENERAL PLAN

DATE MAR. 1975 | DWG. 2-2-A-01

PROFILE

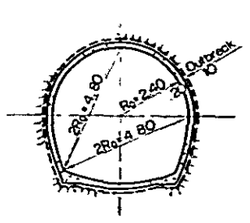
V S=1/1,000
H · S=1/5,000

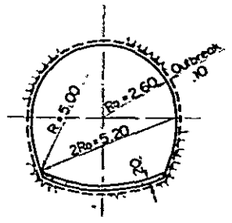


TYPICAL SECTION

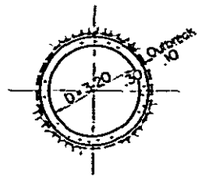
S = 1/100

HEADRACE TUNNEL AND TAILRACE





VERTICAL SHAFT



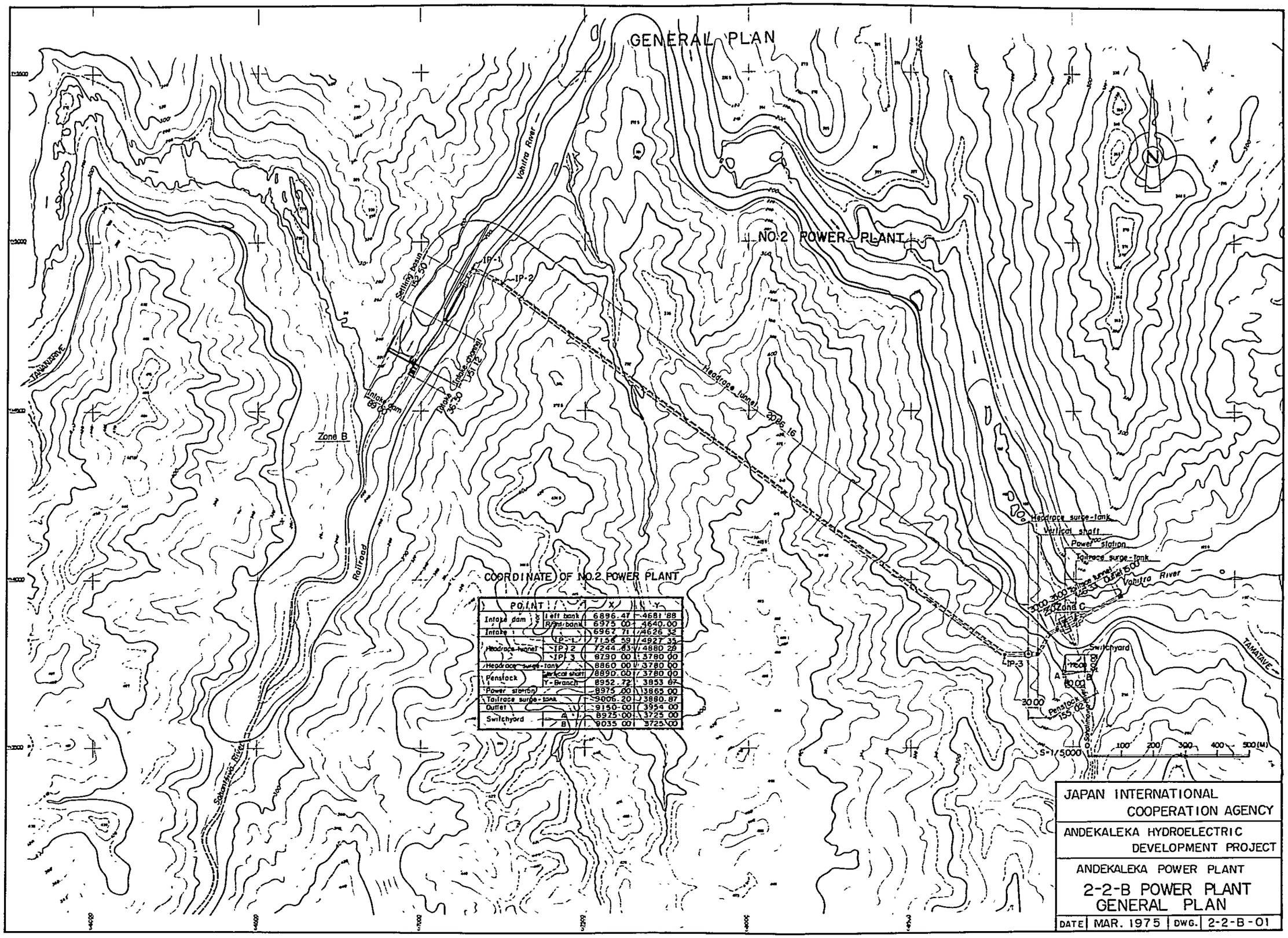
S=1/100 0 5 10 (M)

S=1/1,000 0 50 100(M)

S=1/5,000 0 100 200 300 400 500(M)

JAPAN INTERNATIONAL COOPERATION AGENCY
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT
ANDEKALEKA POWER PLANT 2-2-A POWER PLANT PROFILE & TYPICAL SECTION
DATE MAR. 1975 | DWG. 2-2-A-02

GENERAL PLAN



COORDINATE OF NO.2 POWER PLANT

POINT		X	Y
Intake dam	Left bank	6896.47	4681.88
	Rigth bank	6975.00	4640.00
Intake		6967.71	4626.32
Headrace tunnel	IP-1	7156.59	4927.35
	IP-2	7244.63	4880.29
	IP-3	8790.00	3780.00
Headrace surge-tank		8860.00	3780.00
Penstock	Vertical shaft	8890.00	3780.00
	Y-Branch	8952.72	3853.67
Power station		8975.00	3865.00
Tailrace surge-tank		9006.20	3880.87
Outlet		9150.00	3954.00
Switchyard	A	8925.00	3725.00
	B	9035.00	3725.00

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

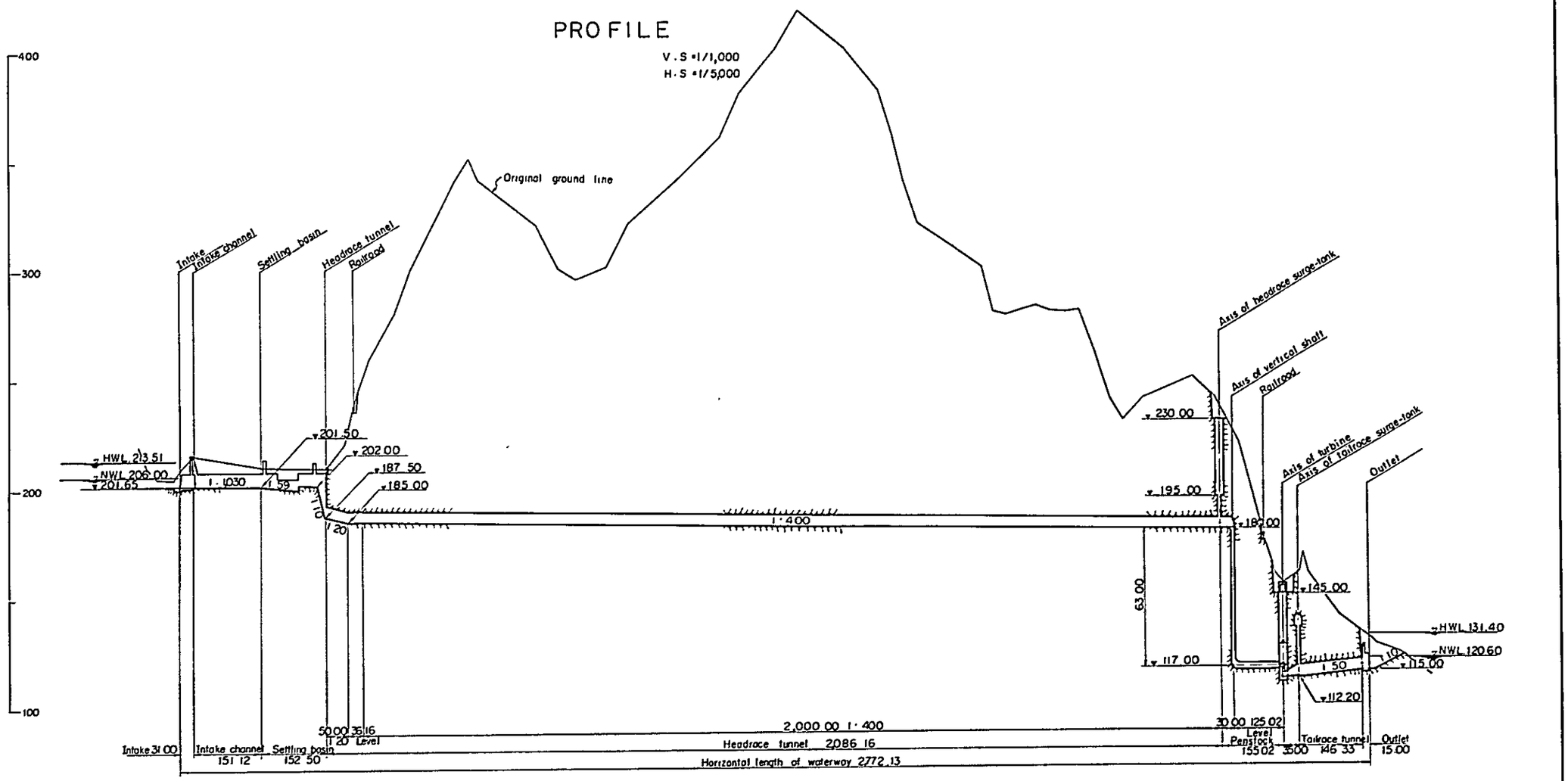
ANDEKALEKA POWER PLANT

2-2-B POWER PLANT GENERAL PLAN

DATE	MAR. 1975	DWG.	2-2-B-01

PROFILE

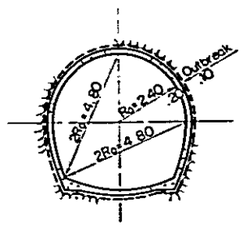
V.S =1/1,000
H.S =1/5,000

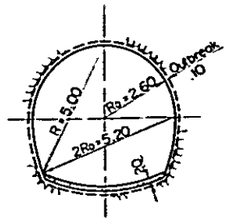


TYPICAL SECTION

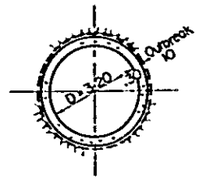
S=1/100

HEADRACE TUNNEL AND TAILRACE





VERTICAL SHAFT



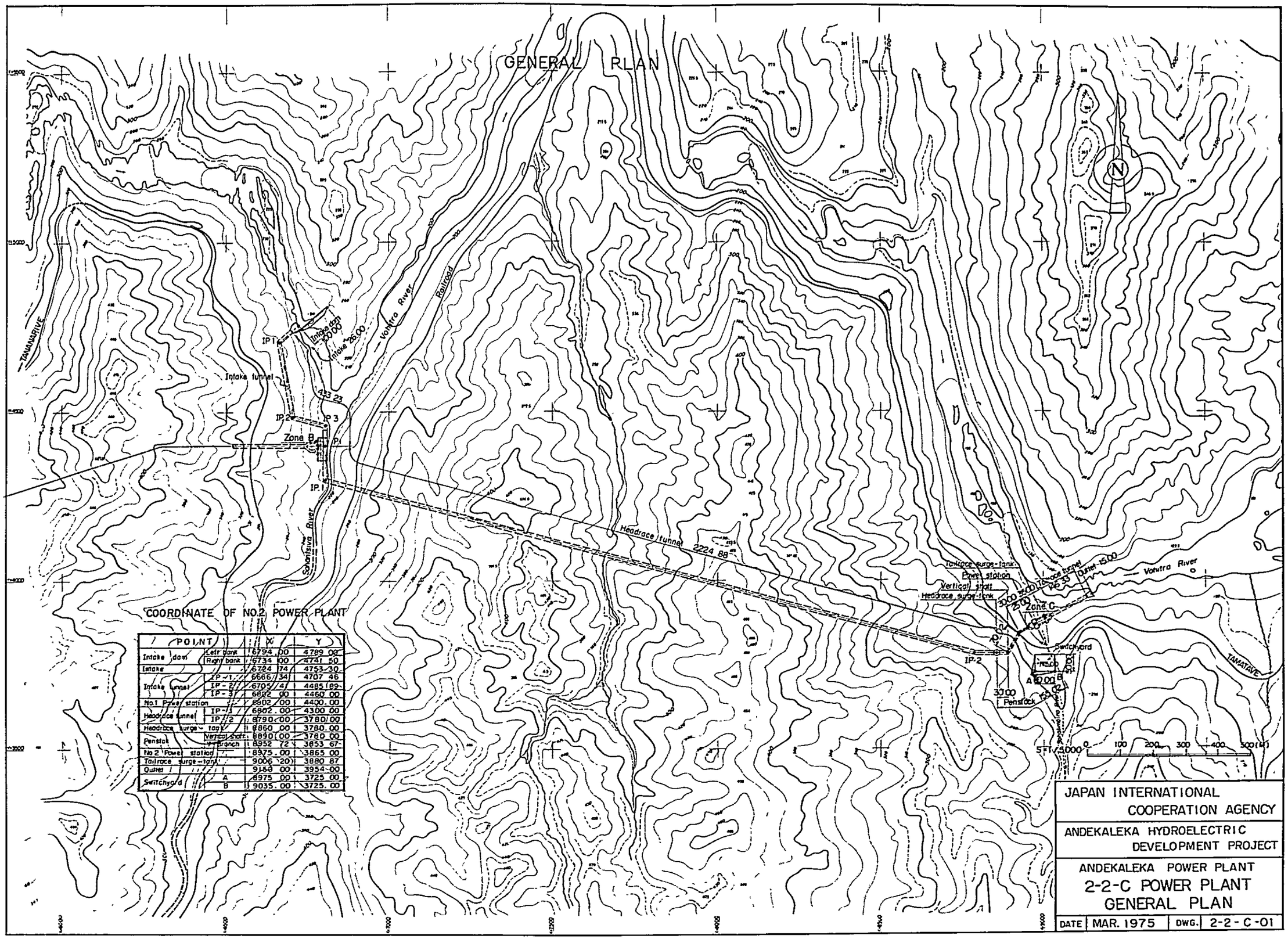
S=1/100 0 5 10 (M)

S=1/1000 0 50 100 (M)

S=1/5000 0 100 200 300 400 500 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT
ANDEKALEKA POWER PLANT 2-2-B POWER PLANT PROFILE & TYPICAL SECTION
DATE MAR. 1975 | DWG. 2-2-B-02

GENERAL PLAN



COORDINATE OF NO.2 POWER PLANT

POINT		X	Y
Intake dam	Left bank	6794.00	4789.00
	Right bank	6734.00	4741.50
Intake		6724.74	4753.30
Intake tunnel	IP-1	6666.34	4707.46
	IP-2	6705.41	4485.89
	IP-3	6822.00	4460.00
No.1 Power station		6902.00	4400.00
Headrace tunnel	IP-1	6802.00	4300.00
	IP-2	6790.00	3780.00
Headrace surge-tank		6860.00	3780.00
	Vertical shaft	6890.00	3780.00
Penstock	Branch	6952.72	3653.67
No.2 Power station		8975.00	3865.00
Tailrace surge-tank		9006.20	3880.87
Outlet		9160.00	3954.00
Switchyard	A	8975.00	3725.00
	B	9035.00	3725.00

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

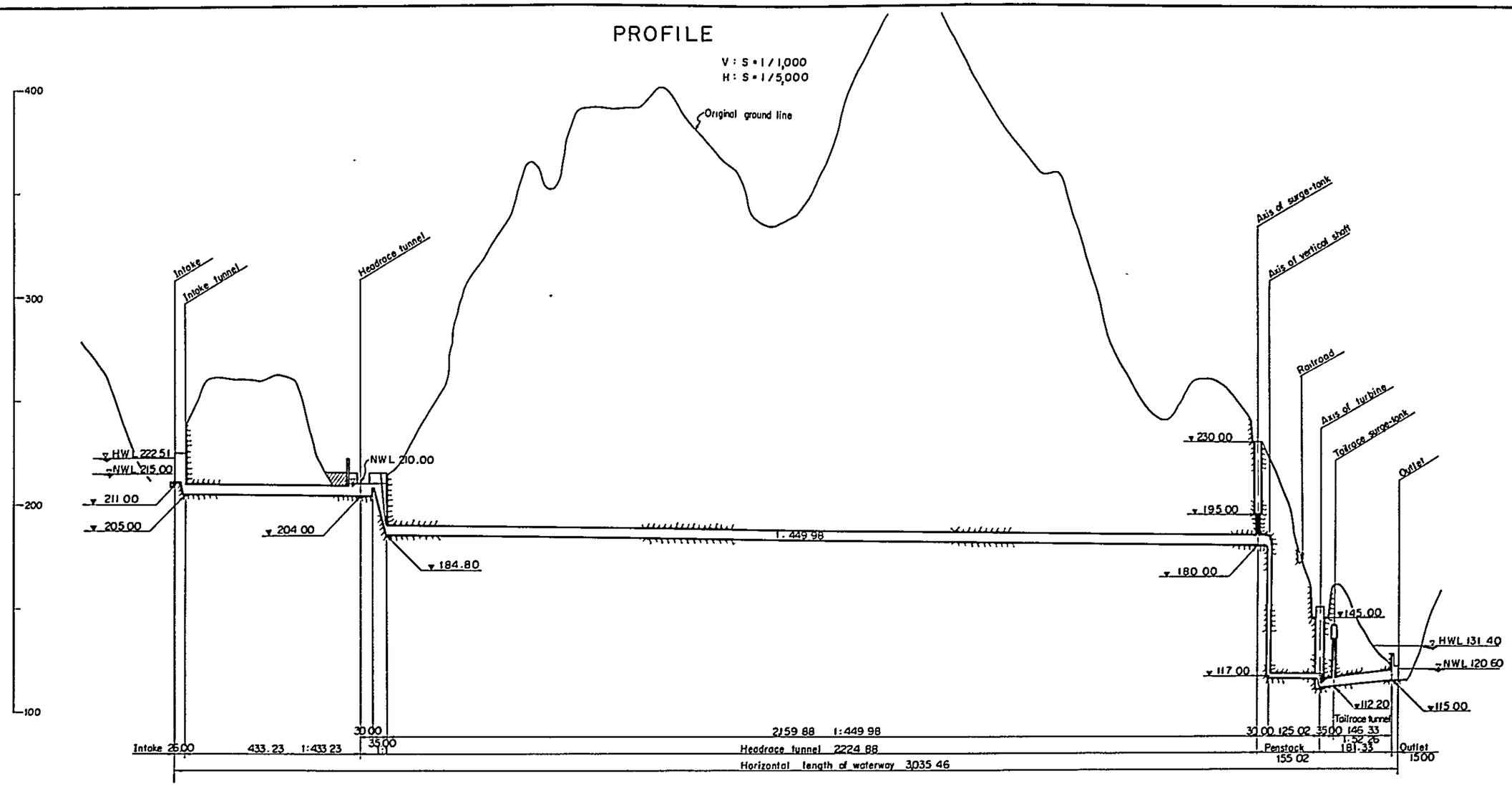
ANDEKALEKA POWER PLANT

2-2-C POWER PLANT GENERAL PLAN

DATE	MAR. 1975	DWG.	2-2-C-01

PROFILE

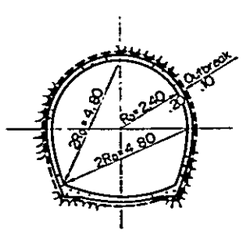
V : S = 1 / 1,000
H : S = 1 / 5,000

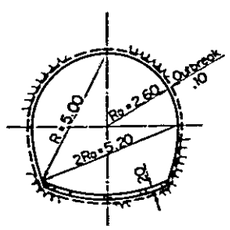


TYPICAL SECTION

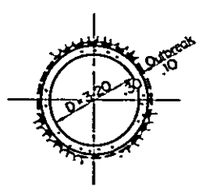
S = 1 / 100

HEADRACE TUNNEL AND TAILRACE





VERTICAL SHAFT



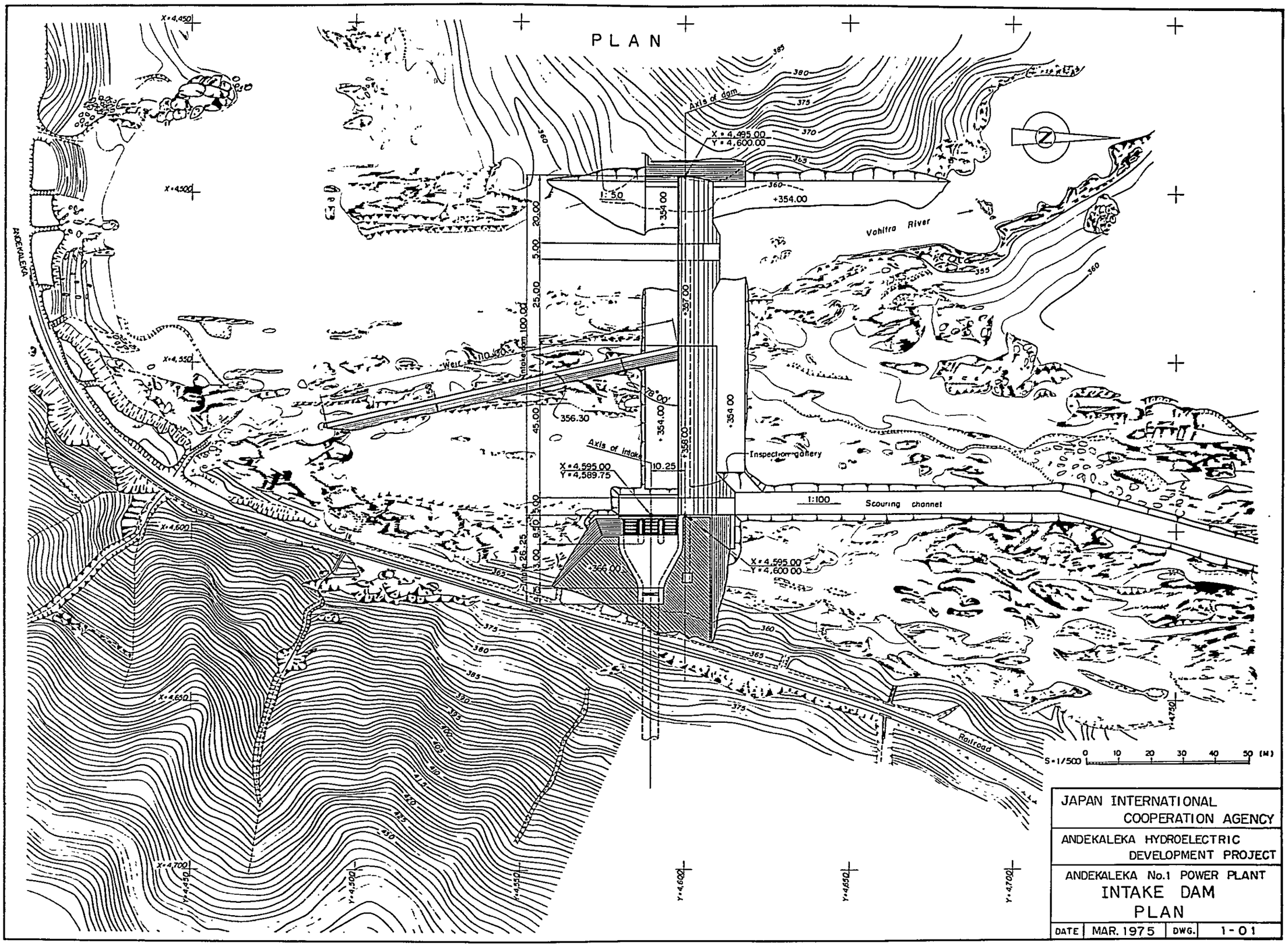
S = 1/100 0 5 10 (M)

S = 1/1000 0 50 100 (M)

S = 1/5000 0 100 200 300 400 500 (M)

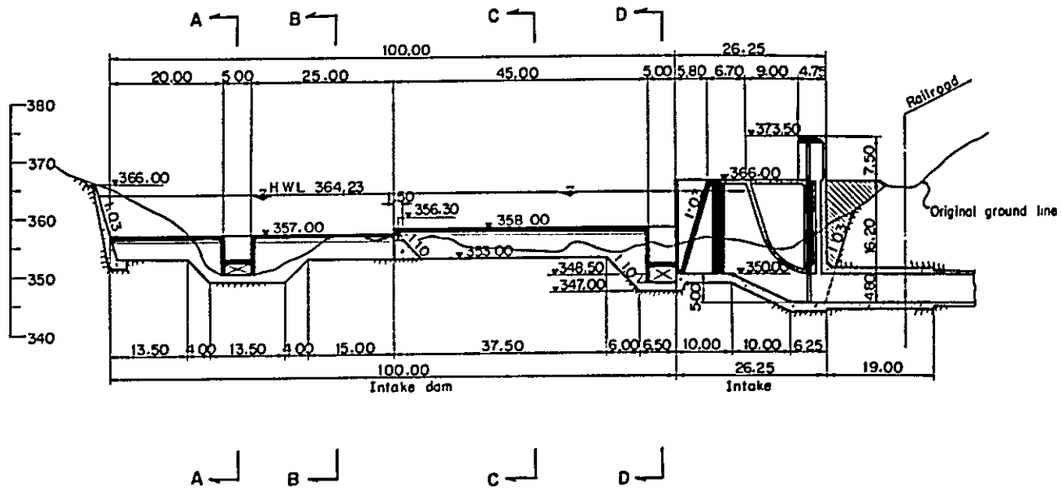
JAPAN INTERNATIONAL COOPERATION AGENCY
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT
ANDEKALEKA POWER PLANT 2-2-C POWER PLANT PROFILE & TYPICAL SECTION
DATE MAR. 1975 | DWG. 2-2-C-02

PLAN

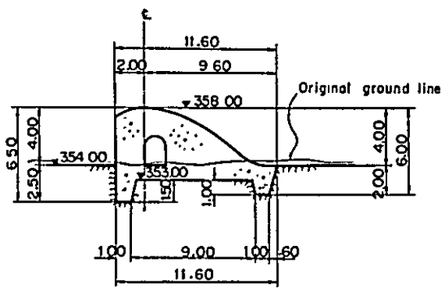


JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.1 POWER PLANT INTAKE DAM PLAN	
DATE	MAR. 1975
DWG.	1-01

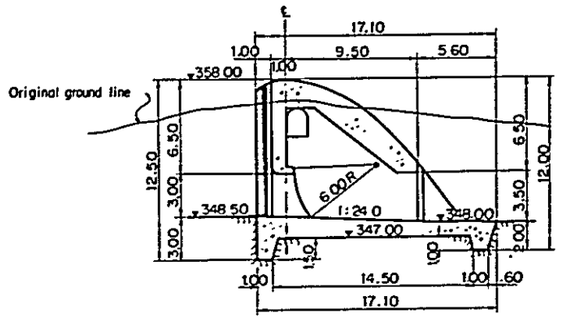
PROFILE S=1/500



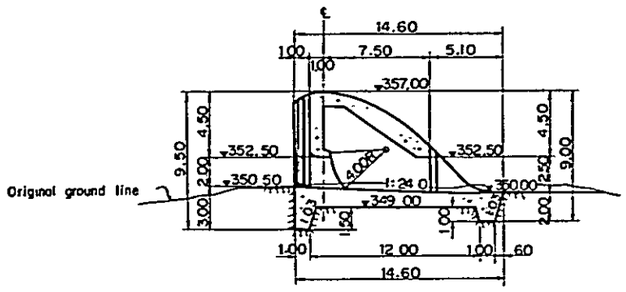
C - C S=1/200



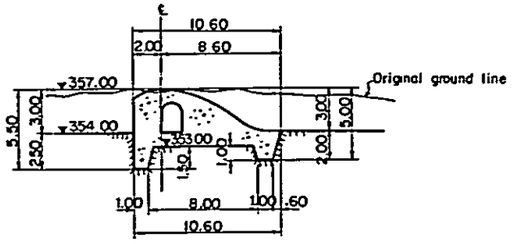
D - D S=1/200



A - A S=1/200



B - B S=1/200



S = 1/200 0 10 20 (M)

S = 1/500 0 10 20 30 40 50 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY

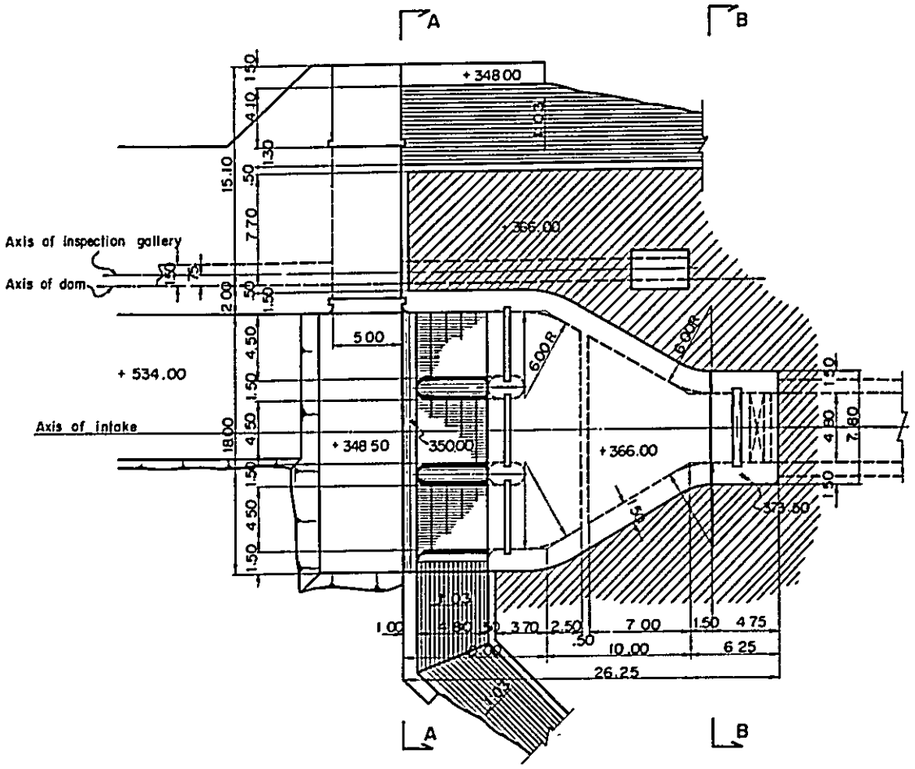
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA No.1 POWER PLANT

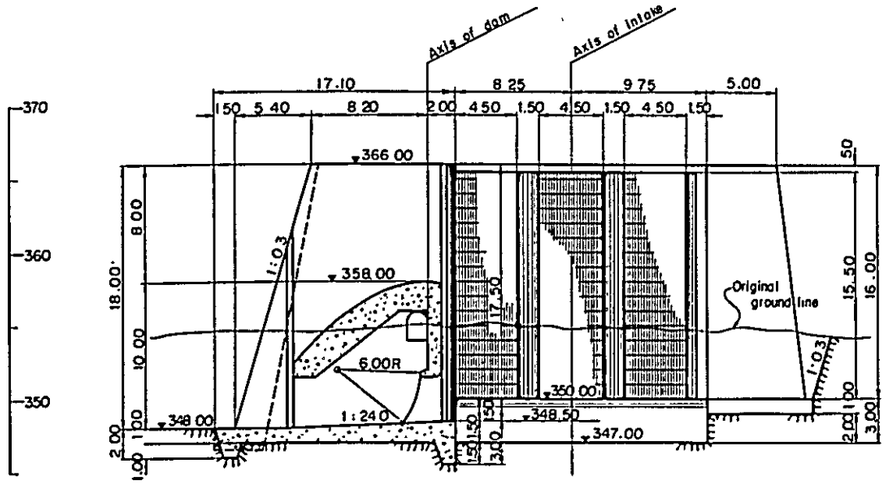
INTAKE DAM PROFILE & SECTION

DATE MAR. 1975 DWG. 1-02

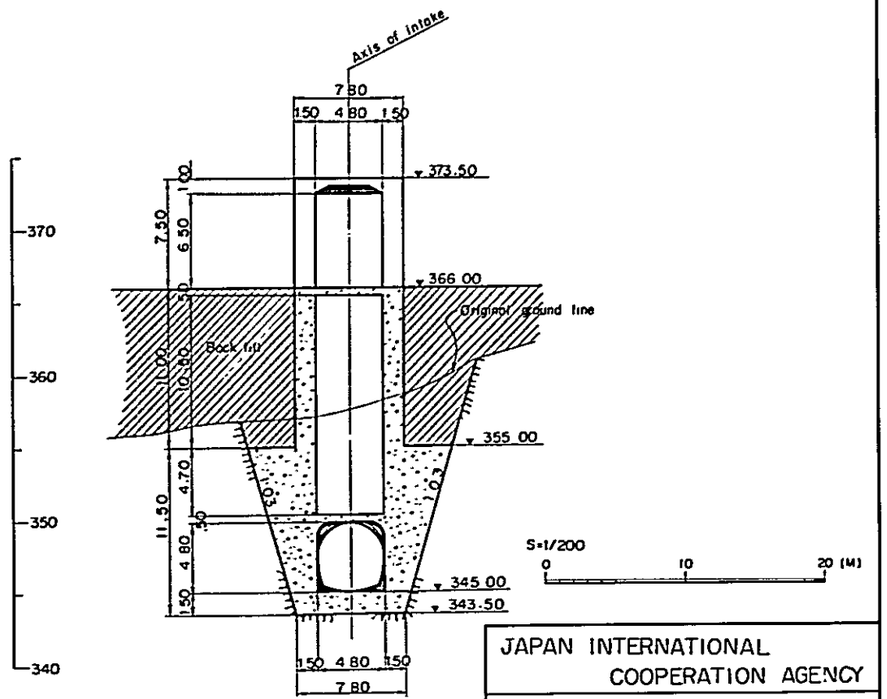
PLAN



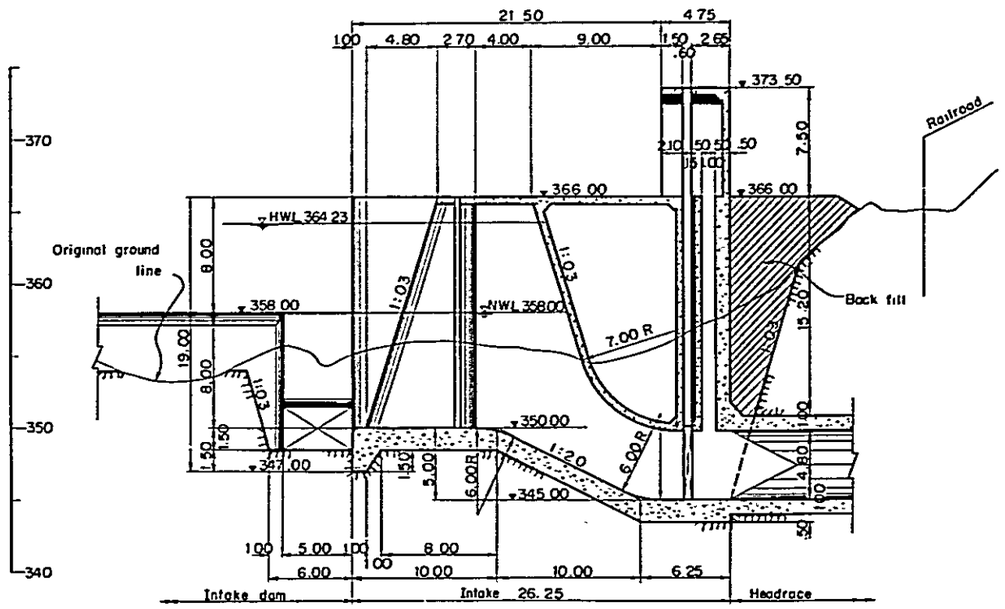
A - A



B - B



PROFILE



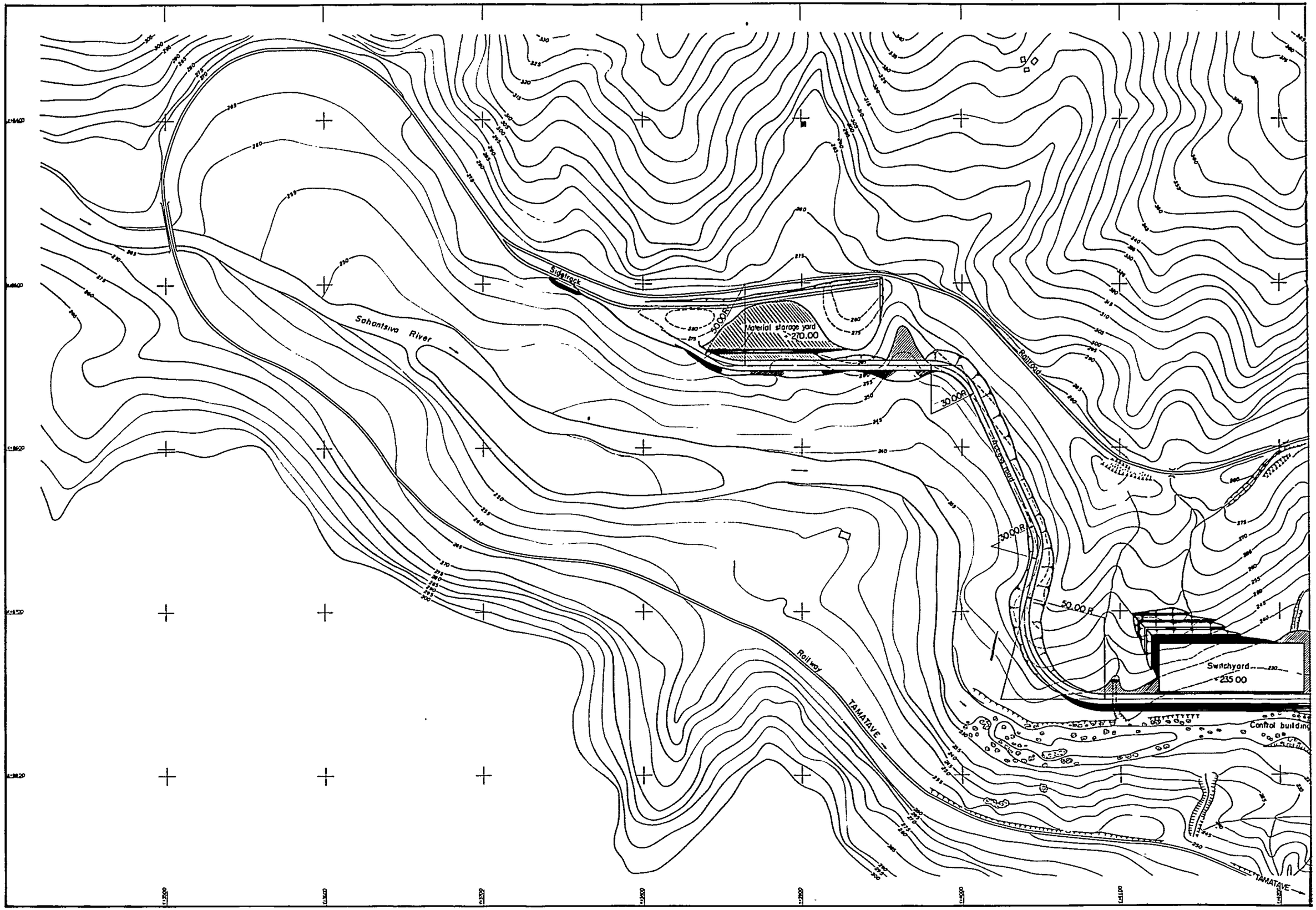
JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA No.1 POWER PLANT

INTAKE
PLAN & SECTION

DATE	MAR. 1975	DWG.	1 - 03


Sidetrack
Sahantsiva River
Material storage yard
+270.00
50.00R
30.00R
Railroad
Access road
30.00R
50.00R
Switchyard
+235.00
Control building
Railway
TAMATAVE
TAMATAVE

Headrace surge-tank

Vertical shaft

Headrace surge-tank adit

Tailrace surge-tank

Power station

Access road (tunnel)

Railroad

Access road

Switchyard

Control building

Ventilation tunnel

Tailrace tunnel

Outlet

Vohitra River

TANAMARIVE

TAMATAVE

385.00

30.00R

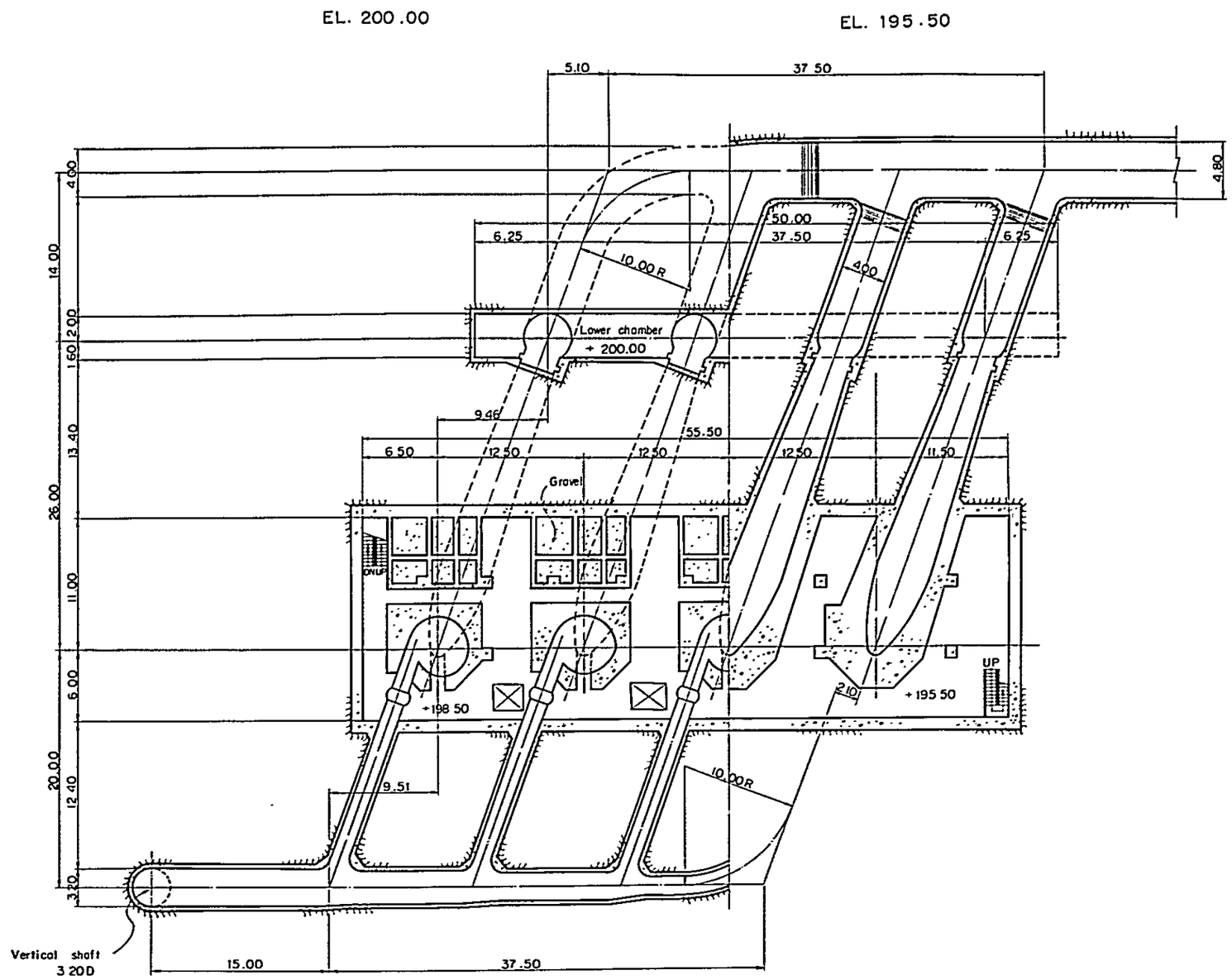
50.00R

20.00R

S=1/1,000 0 50 100 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY			
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT			
ANDEKALEK No.1 POWER PLANT POWER STATION AREA PLAN			
DATE	MAR. 1975	DWG.	1 - 04

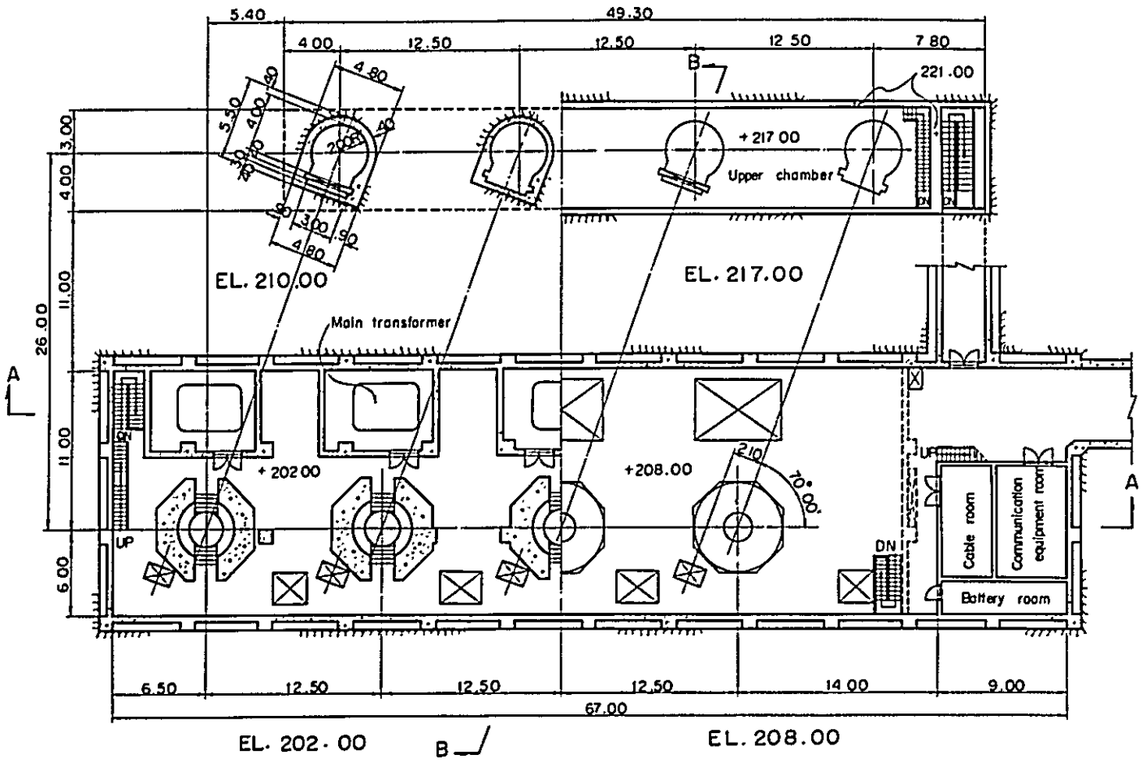
PLAN - 1



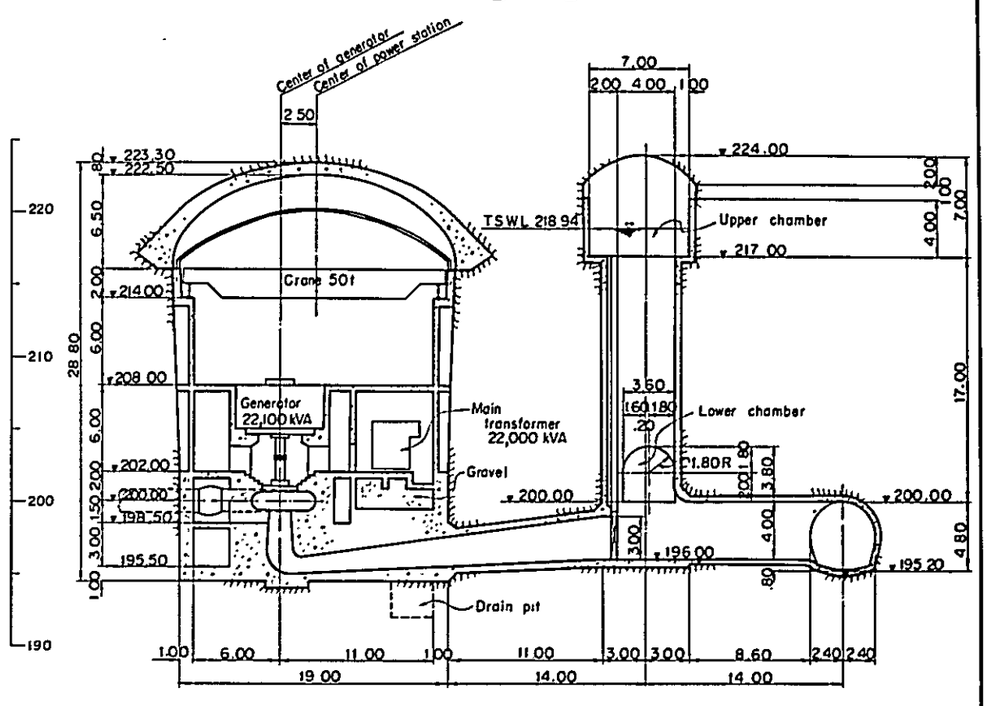
S = 1/200 0 10 20 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No1 POWER PLANT	
POWER STATION PLAN - 1	
DATE	MAR. 1975
DWG.	1 - 05

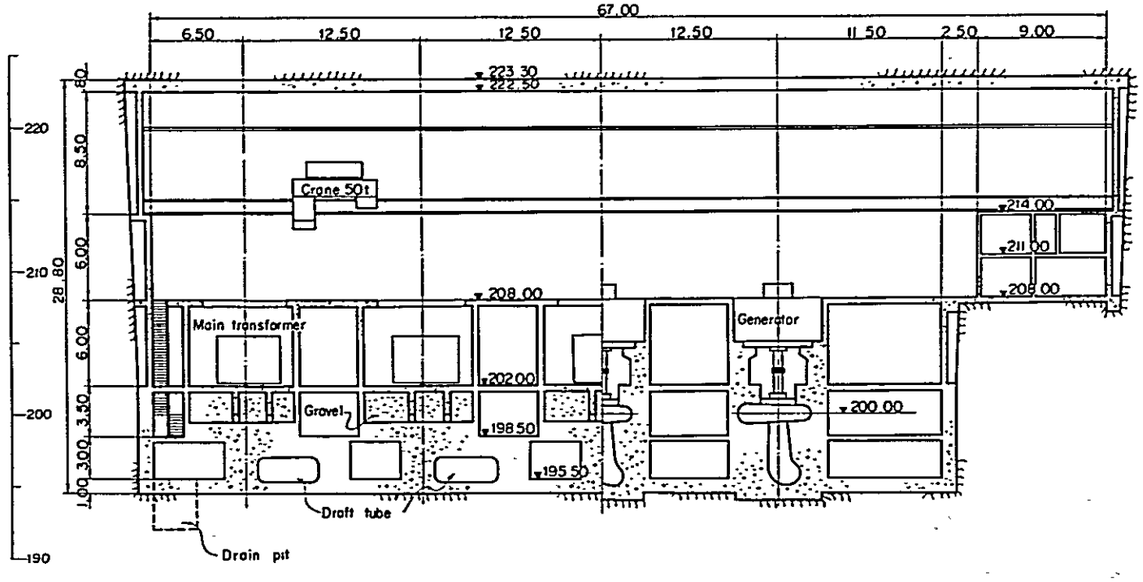
PLAN - 2



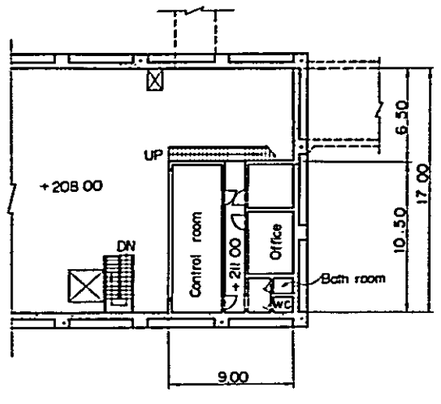
B - B



A - A



PLAN - 3



EL. 211.00

S=1/200 0 10 20 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

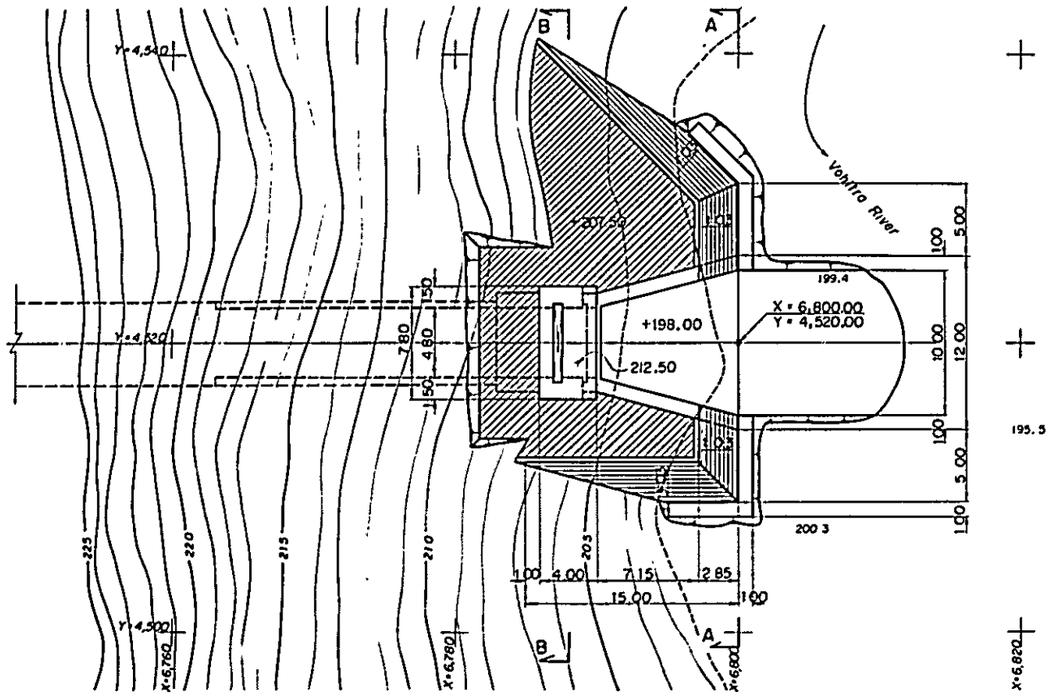
ANDEKALEKA No.1 POWER PLANT

POWER STATION

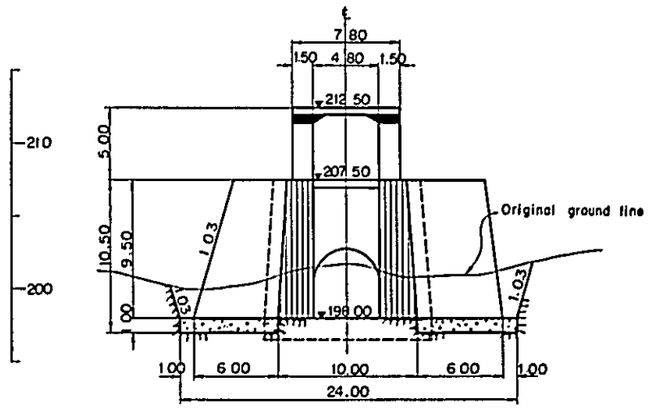
PLAN-2, PLAN-3 & SECTION

DATE	MAR. 1975	DWG	1 - 06

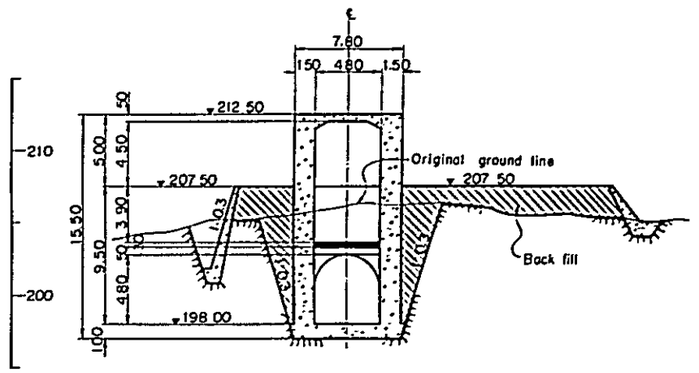
PLAN



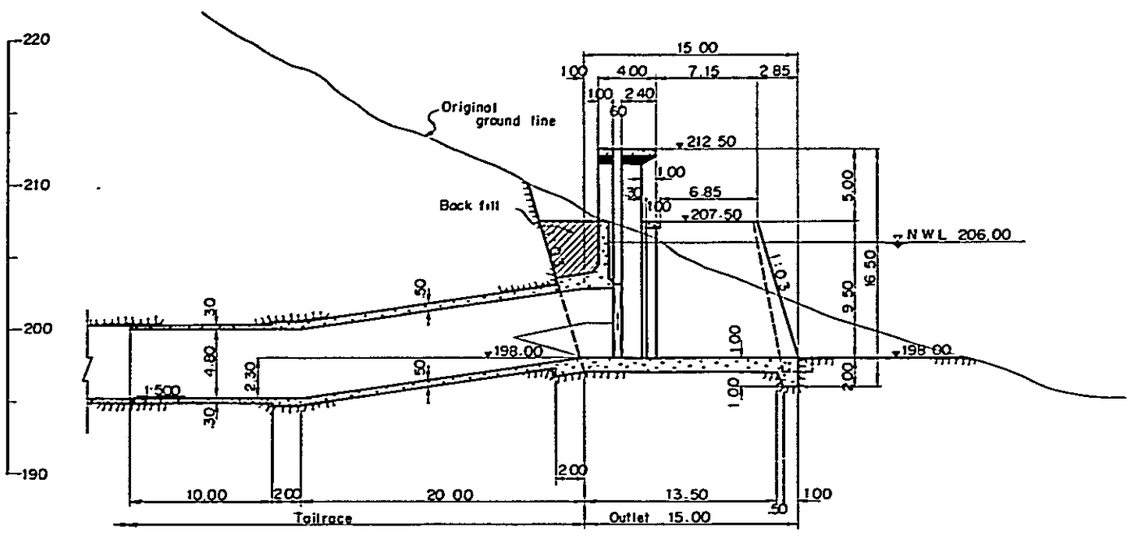
A - A



B - B



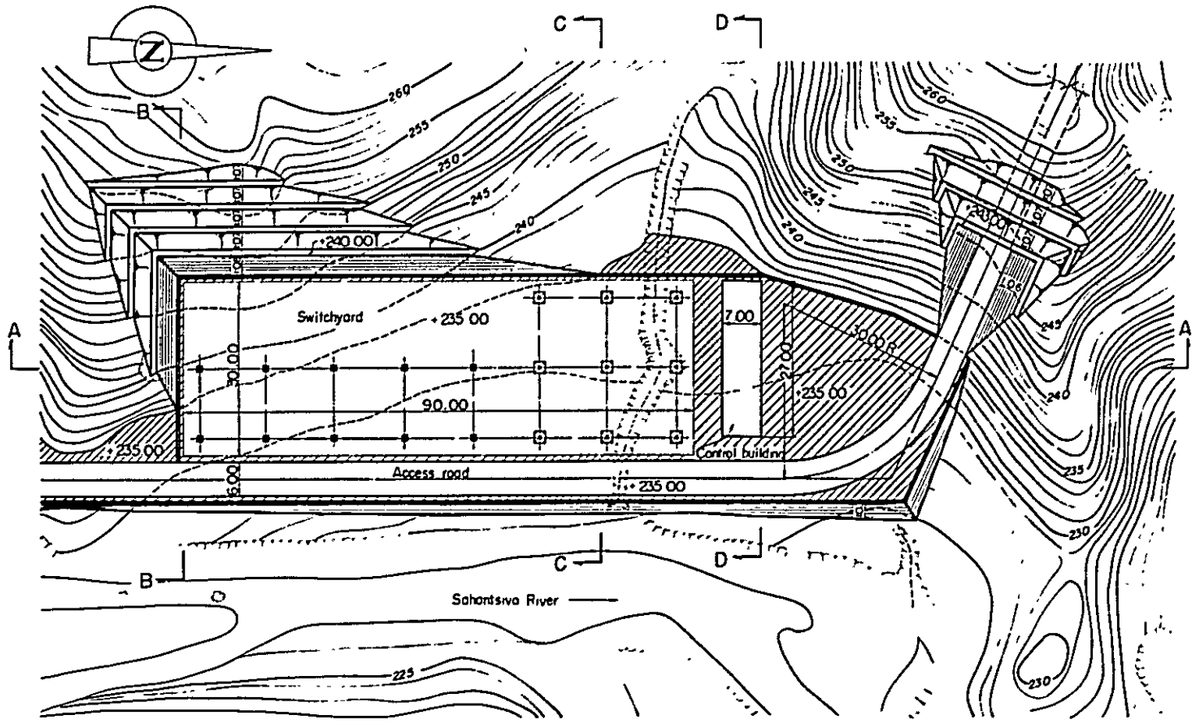
PROFILE



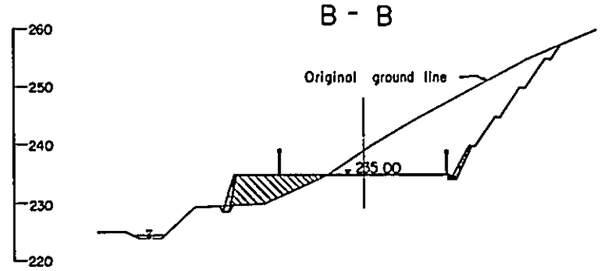
S=1/200 0 10 20 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY			
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT			
ANDEKALEKA No.1 POWER PLANT OUTLET PLAN & SECTION			
DATE	MAR. 1975	DWG.	1 - 07

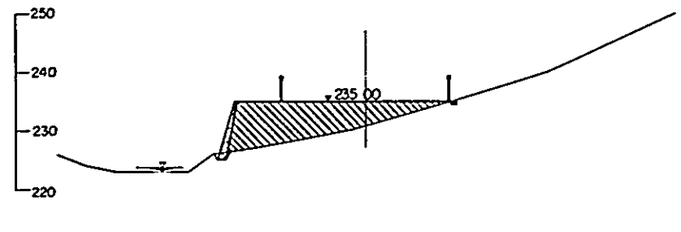
PLAN



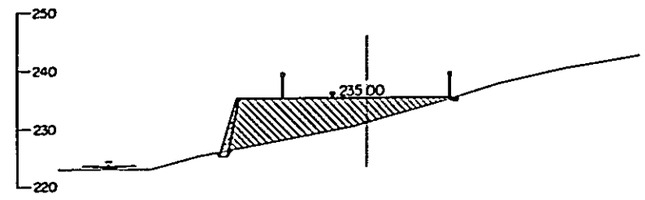
B - B



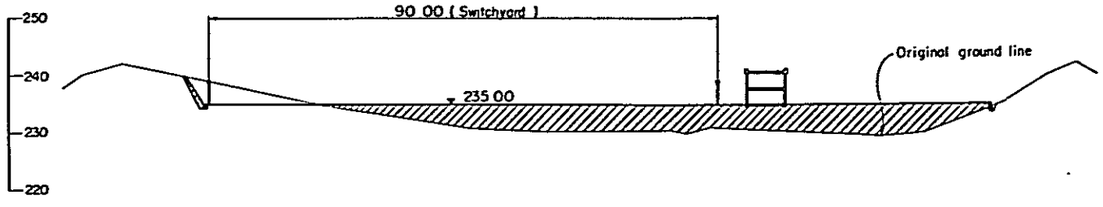
C - C



D - D



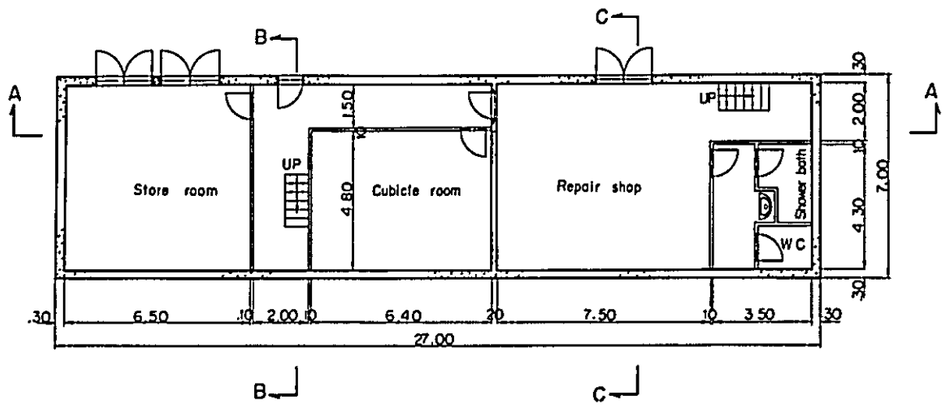
A - A



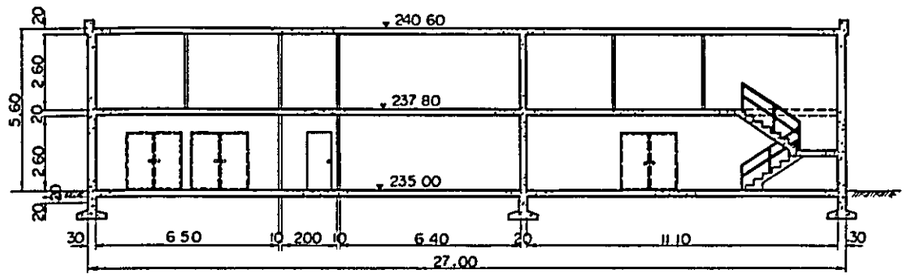
S=1/500 0 10 20 30 40 50 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.1 POWER PLANT SWITCHYARD PLAN & SECTION	
DATE	MAR. 1975
DWG.	1-08

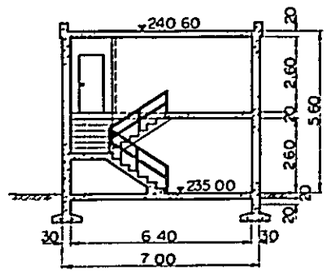
1F PLAN



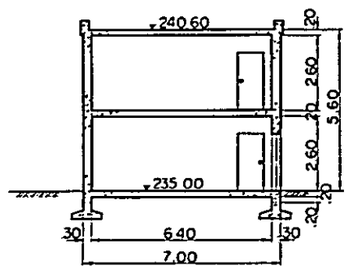
A - A



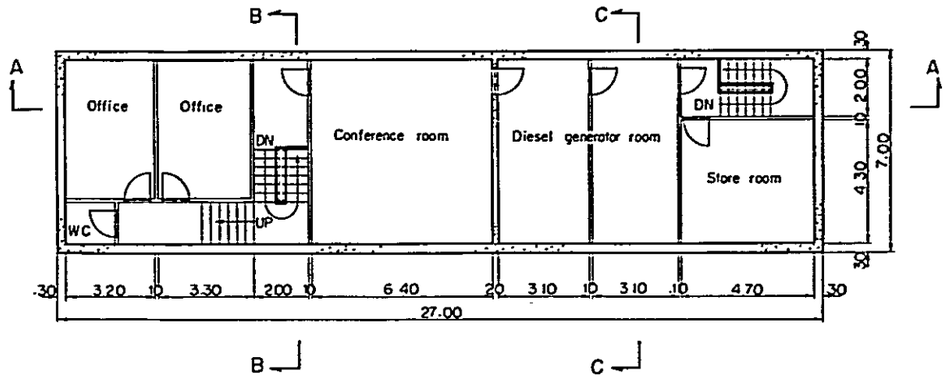
B - B



C - C



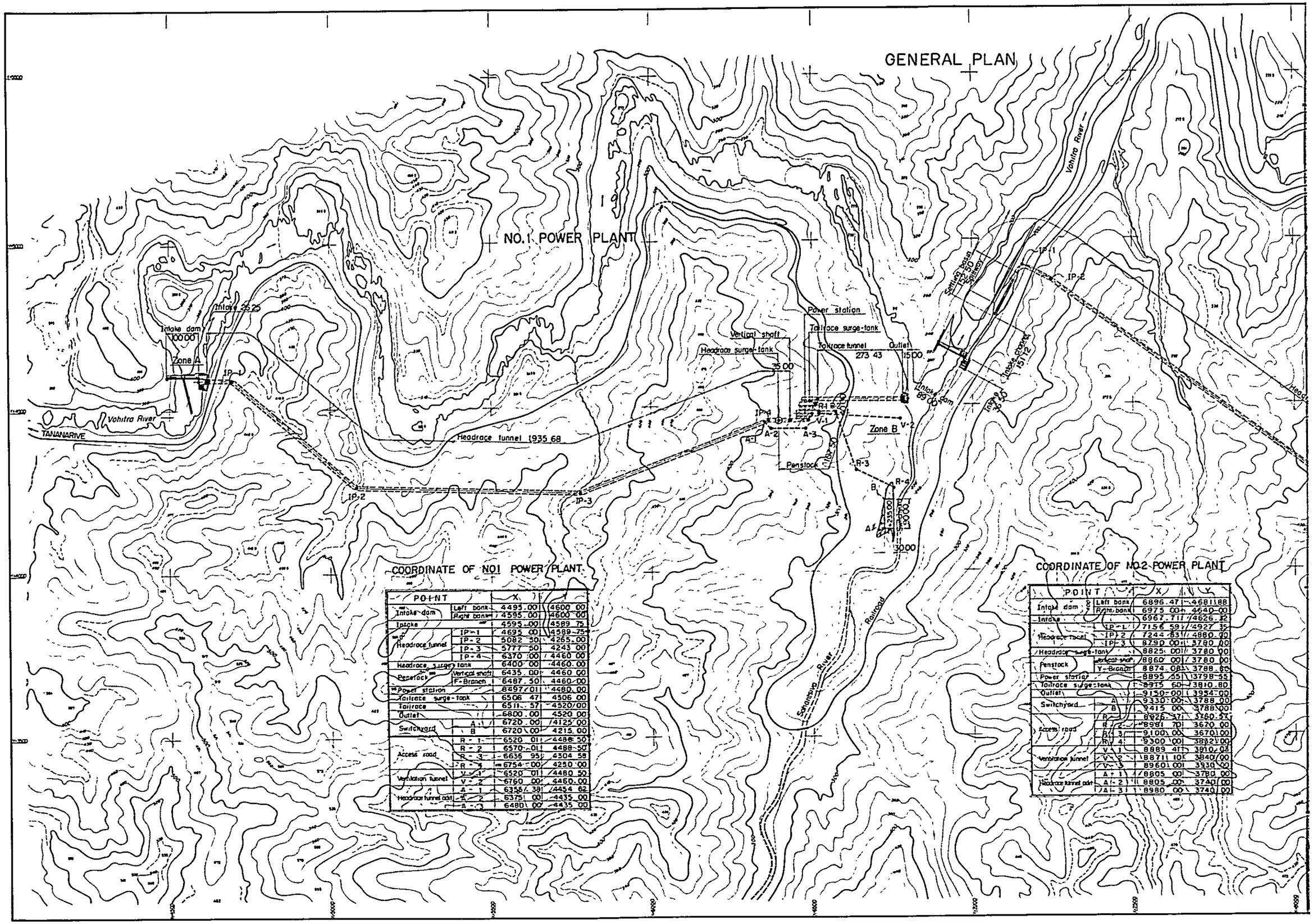
2F PLAN



S = 1/100 0 5 10 (M)

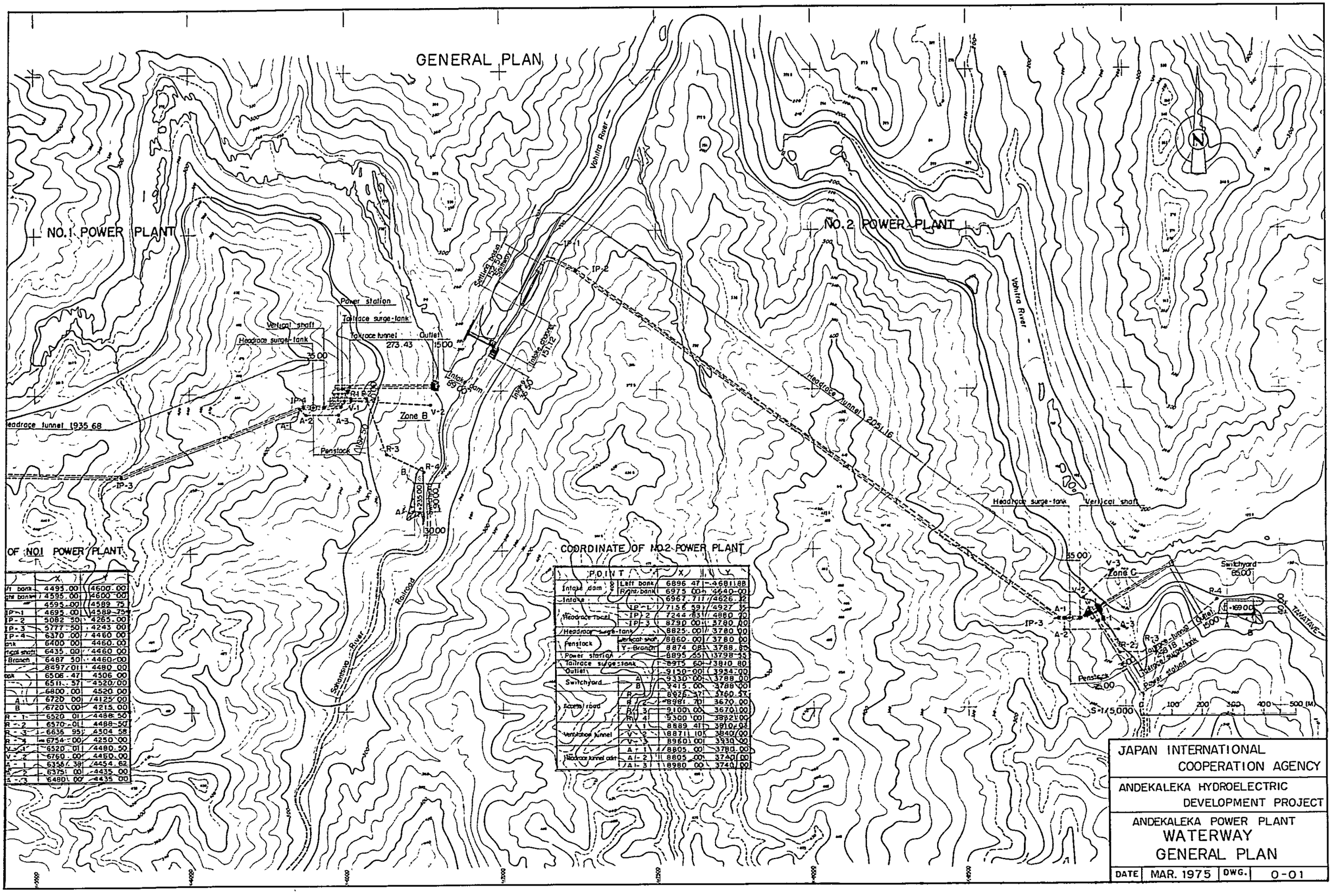
JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.1 POWER PLANT	
CONTROL BUILDING PLAN & SECTION	
DATE MAR. 1975	DWG. 1-09

GENERAL PLAN



POINT		X	Y
Intake dam	Left bank	4495.00	4600.00
	Right bank	4595.00	4600.00
Intake		4595.00	4589.75
Headrace tunnel	IP-1	4695.00	4589.75
	IP-2	5082.50	4265.00
	IP-3	5777.50	4243.00
	IP-4	6370.00	4460.00
Headrace surge-tank		6400.00	4460.00
Penstock	Vertical shaft	6435.00	4460.00
	F-Branch	6487.50	4460.00
Power station		6497.01	4480.00
Tailrace surge-tank		6506.47	4506.00
Tailrace		6511.57	4520.00
Outlet		6800.00	4520.00
Switchyard	A	6720.00	4125.00
	B	6720.00	4215.00
Access road	R-1	6520.01	4486.50
	R-2	6570.01	4488.50
	R-3	6636.95	4504.58
	R-4	6754.00	4250.00
Ventilation tunnel	V-1	6520.01	4480.50
	V-2	6760.00	4460.00
Headrace tunnel adit	A-1	6358.38	4454.62
	A-2	6375.00	4435.00
	A-3	6480.00	4435.00

POINT		X	Y
Intake dam	Left bank	6896.47	4681.88
	Right bank	6975.00	4640.00
Intake		6967.71	4626.82
Headrace tunnel	IP-1	7156.59	4927.35
	IP-2	7244.83	4880.00
	IP-3	8790.00	3780.00
Headrace surge-tank		8825.00	3780.00
Penstock	Vertical shaft	8860.00	3780.00
	Y-Branch	8874.08	3788.80
Power station		8895.65	3798.55
Tailrace surge-tank		8915.60	3810.80
Outlet		9150.00	3954.00
Switchyard	A	9330.00	3788.00
	B	9415.00	3788.00
Access road	R-1	8826.37	3760.52
	R-2	8981.70	3670.00
	R-3	9100.00	3670.00
	R-4	9300.00	3822.00
Ventilation tunnel	V-1	8889.41	3910.02
	V-2	8871.10	3840.00
	V-3	8960.00	3930.00
Headrace tunnel adit	A-1	8805.00	3780.00
	A-2	8805.00	3740.00
	A-3	8980.00	3740.00



OF NO.1 POWER PLANT

	X	Y
ft bank	4495.00	4600.00
ght bank	4595.00	4600.00
	4595.00	4589.75
IP-1	4695.00	4589.75
IP-2	5082.50	4265.00
IP-3	5777.50	4243.00
IP-4	6370.00	4460.00
ank	6400.00	4460.00
rtical shaft	6435.00	4460.00
Branch	6487.50	4460.00
	6497.01	4480.00
ank	6506.47	4506.00
	6511.57	4520.00
	6800.00	4520.00
A	6720.00	4125.00
B	6720.00	4215.00
R-1	6520.01	4488.50
R-2	6570.01	4488.50
R-3	6636.95	4304.58
R-4	6754.00	4250.00
V-1	6520.01	4480.50
V-2	6760.00	4460.00
A-1	6358.38	4454.62
A-2	6375.00	4435.00
A-3	6480.00	4435.00

COORDINATE OF NO.2 POWER PLANT

POINT		X	Y
Intake dam	Left bank	6896.47	4681.88
	Right bank	6975.00	4640.00
Intake		6967.71	4626.32
Headrace tunnel	IP-1	7156.59	4927.35
	IP-2	7244.83	4880.70
	IP-3	8790.00	3780.00
Headrace surge-tank		8825.00	3780.00
Penstock	Vertical shaft	8860.00	3780.00
	Y-Branch	8874.08	3788.60
Power station		8895.55	3798.55
Tailrace surge-tank		8915.60	3810.80
Outlet		9150.00	3954.00
Switchyard	A	9330.00	3788.00
	B	9415.00	3788.00
Access road	R	8926.37	3760.57
	R-2	8981.70	3670.00
	R-3	9100.00	3670.00
	R-4	9300.00	3832.00
Ventilation tunnel	V-1	8889.41	3810.03
	V-2	8871.10	3840.00
	V-3	8960.00	3930.00
Headrace tunnel adit	A-1	8805.00	3780.00
	A-2	8805.00	3740.00
	A-3	8980.00	3740.00

JAPAN INTERNATIONAL
COOPERATION AGENCY

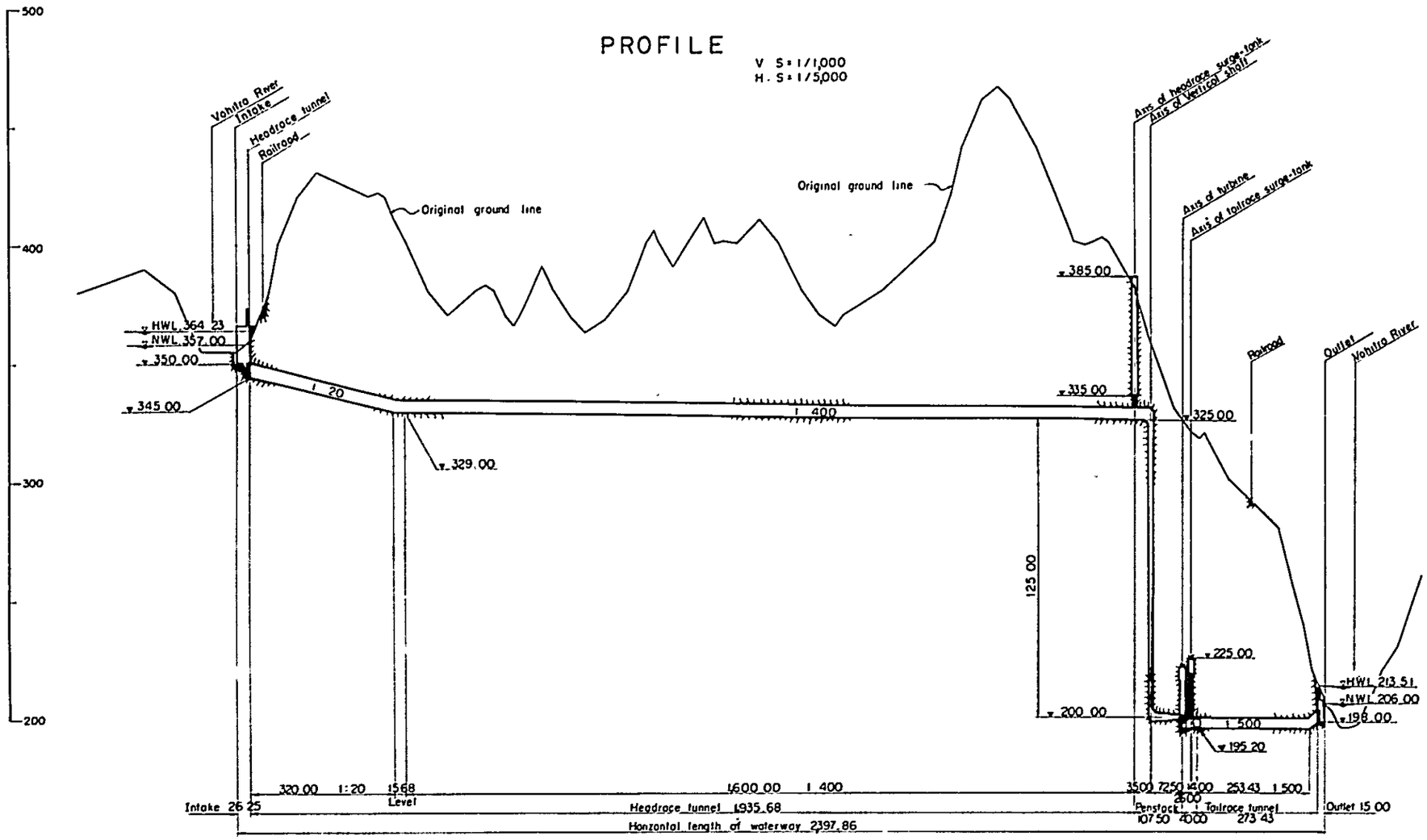
ANDEKALEKA HYDROELECTRIC
DEVELOPMENT PROJECT

ANDEKALEKA POWER PLANT
WATERWAY
GENERAL PLAN

DATE	MAR. 1975	DWG.	0-01

PROFILE

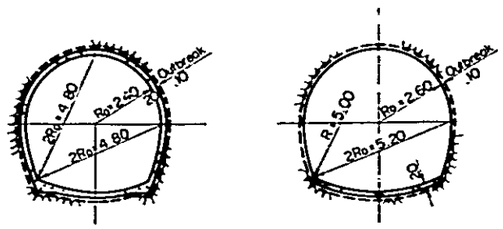
V. S = 1/1,000
H. S = 1/5,000



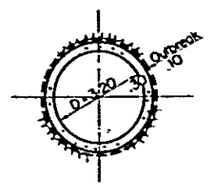
TYPICAL SECTION

S = 1/100

HEADRACE TUNNEL AND TAILRACE



VERTICAL SAFT



S = 1/100 0 5 10(M)

S = 1/1,000 0 50 100(M)

S = 1/5000 0 100 200 300 400 500(M)

JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA POWER PLANT

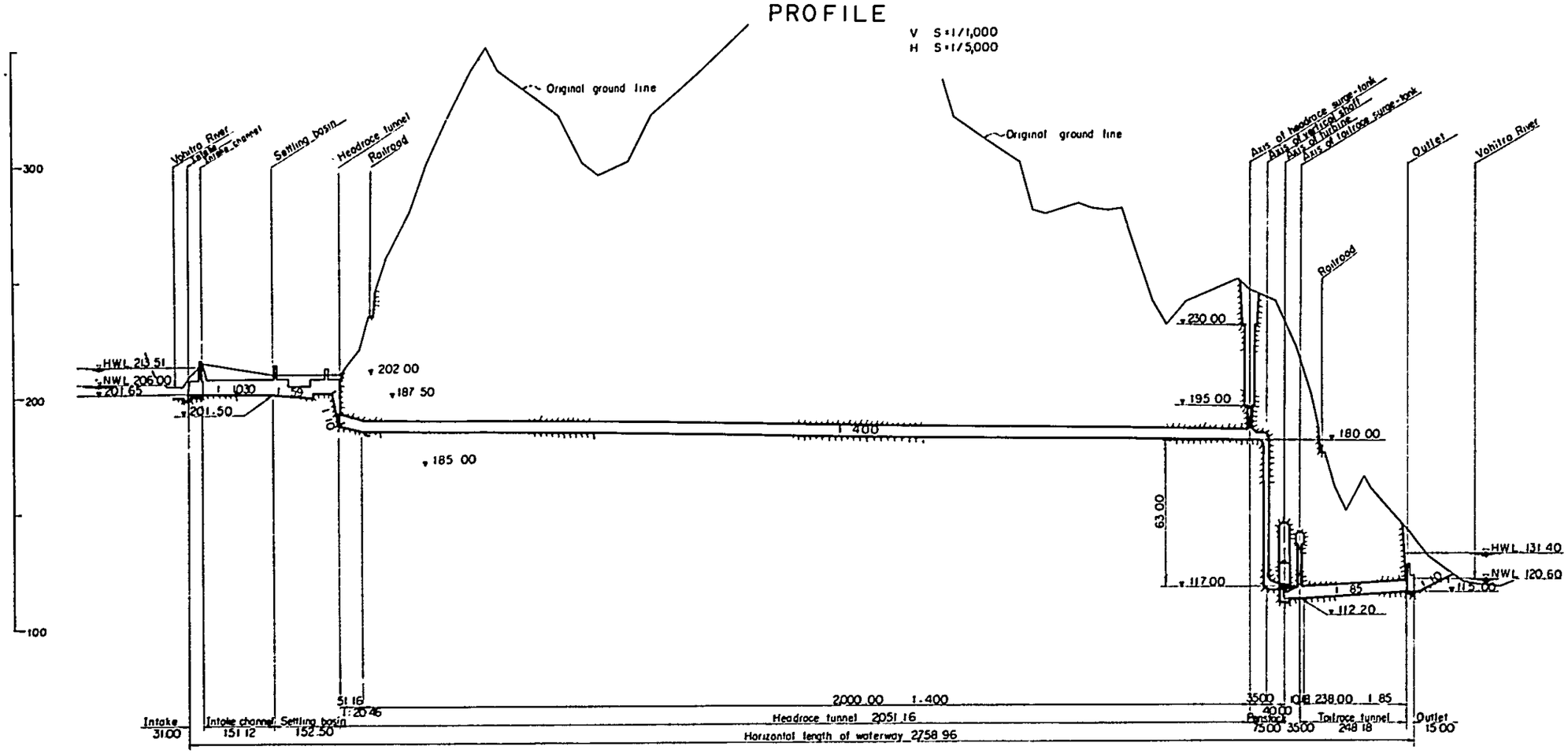
WATERWAY

PROFILE OF No.1 POWER PLANT

DATE	MAR. 1975	DWG.	O-02

PROFILE

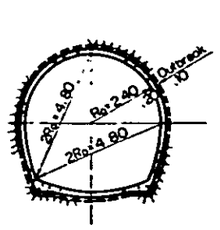
V S=1/1,000
H S=1/5,000

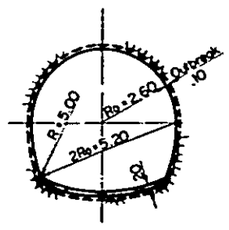


TYPICAL SECTION

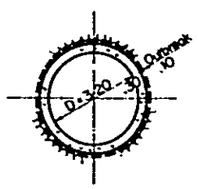
S = 1/100

HEADRACE TUNNEL AND TAILRACE





VERTICAL SHAFT



S=1/100 0 5 10 (M)

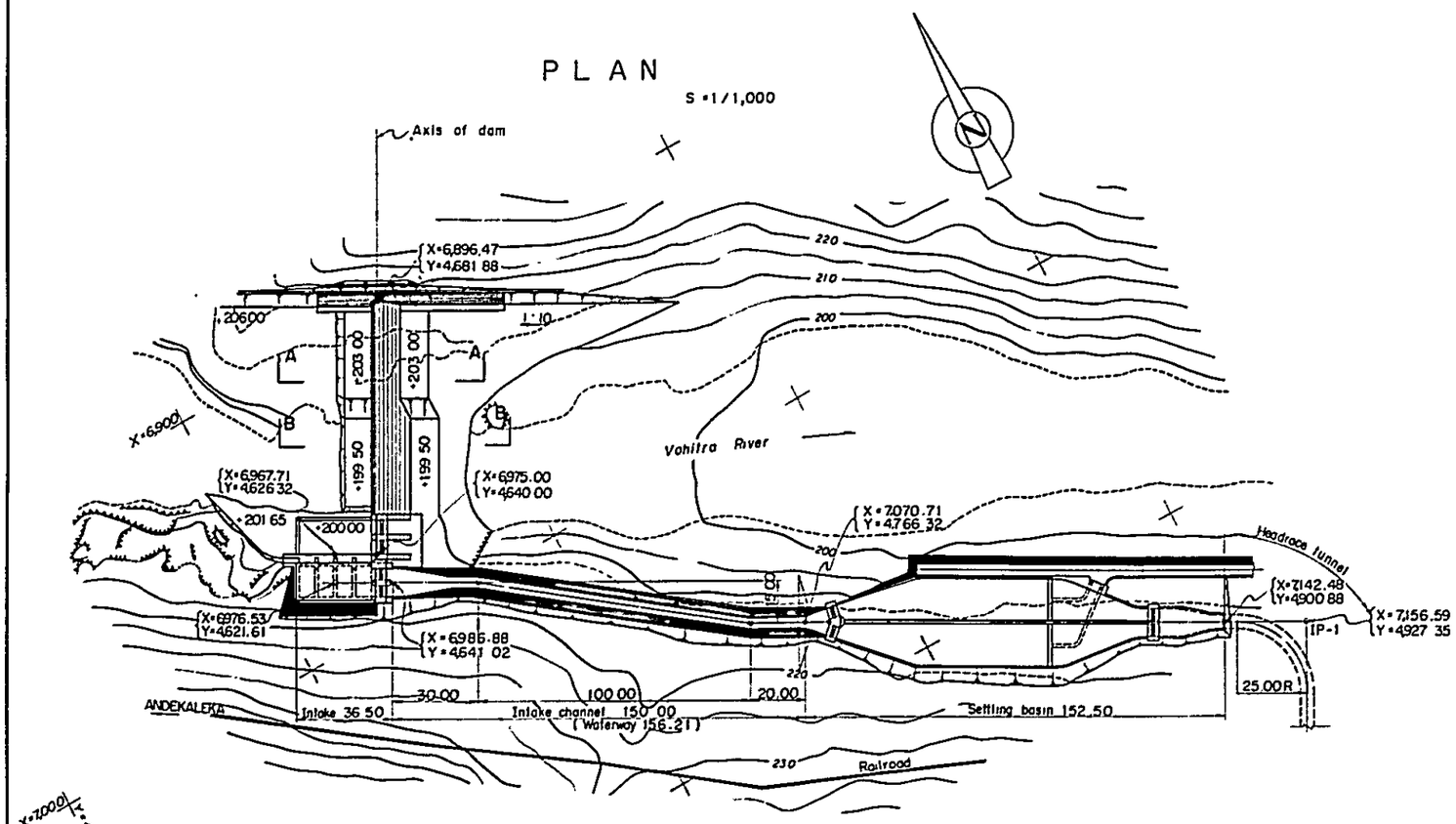
S=1/1,000 0 50 100 (M)

S=1/5,000 0 100 200 300 400 500 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA POWER PLANT WATERWAY PROFILE OF No. 2 POWER PLANT	
DATE	MAR. 1975
DWG.	O-03

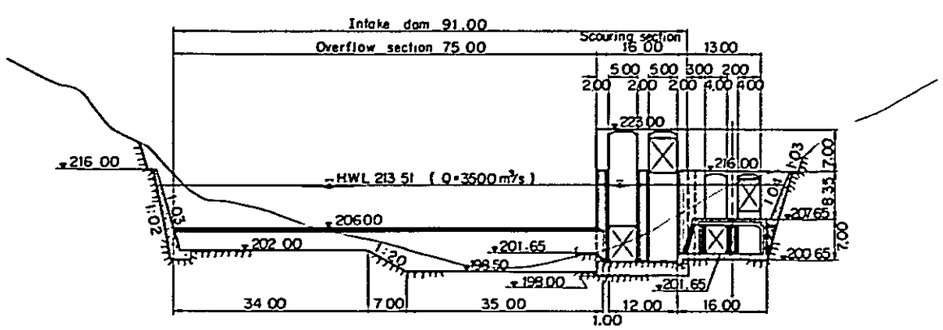
PLAN

S = 1 / 1,000



FRONT VIEW

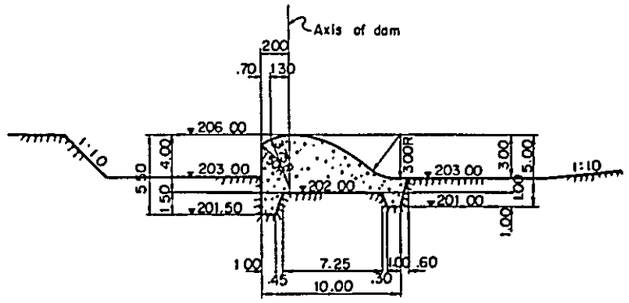
S = 1 / 500



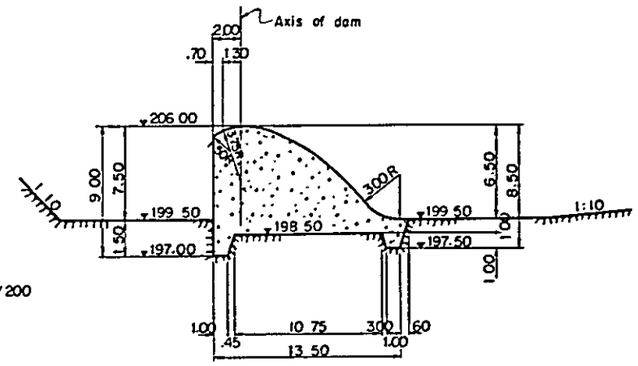
TYPICAL SECTION OF INTAKE DAM

S = 1 / 200

A - A

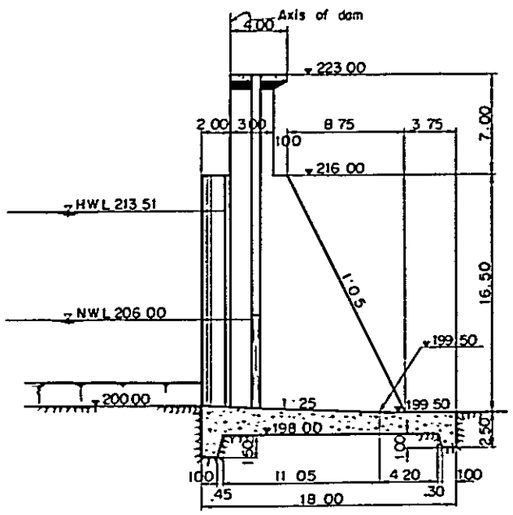


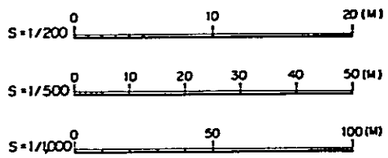
B - B



SCOURING GATE

S = 1/200





JAPAN INTERNATIONAL COOPERATION AGENCY

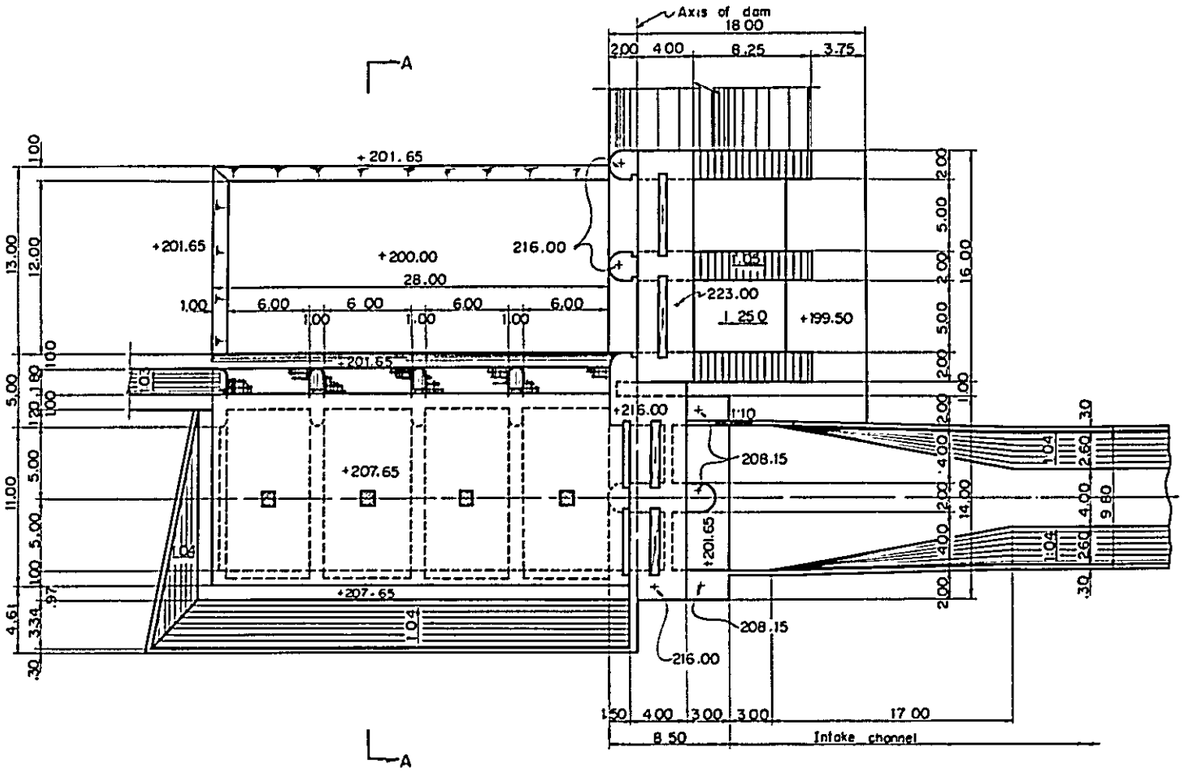
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA No.2 POWER PLANT

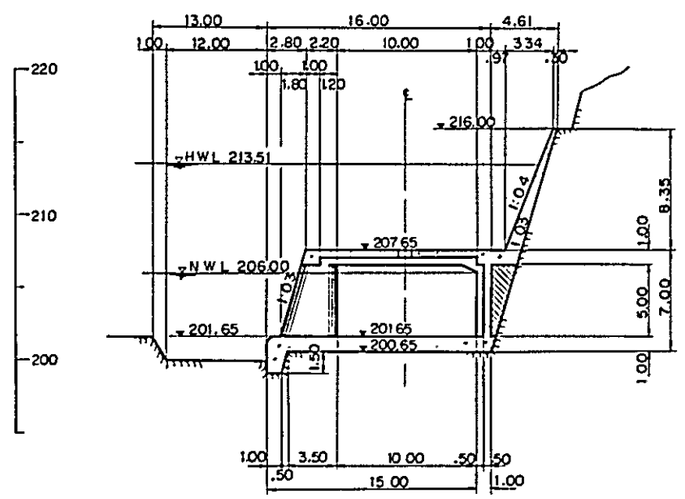
INTAKE DAM
PLAN, PROFILE & SECTION

DATE	MAR. 1975	DWG.	2-01

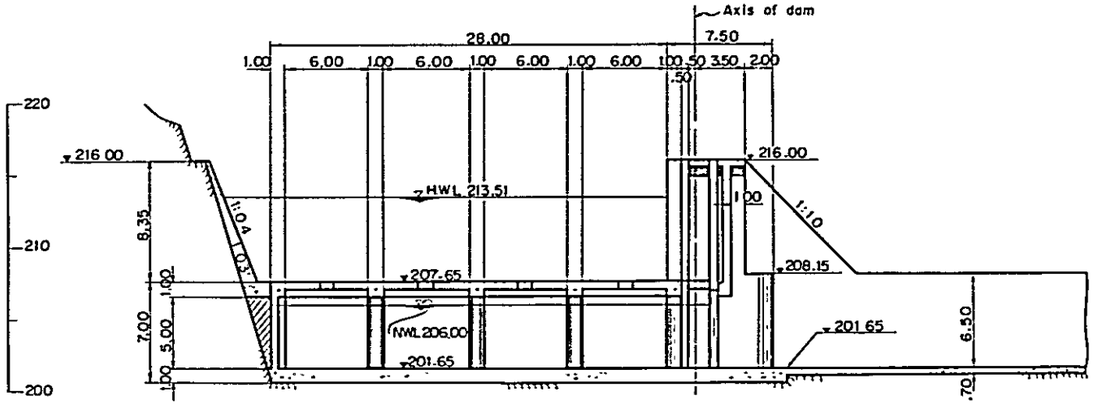
PLAN



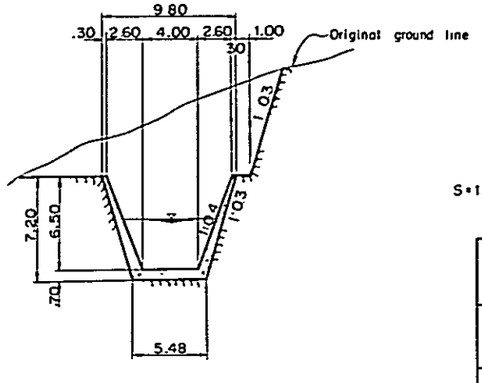
A - A



PROFILE



TYPICAL SECTION

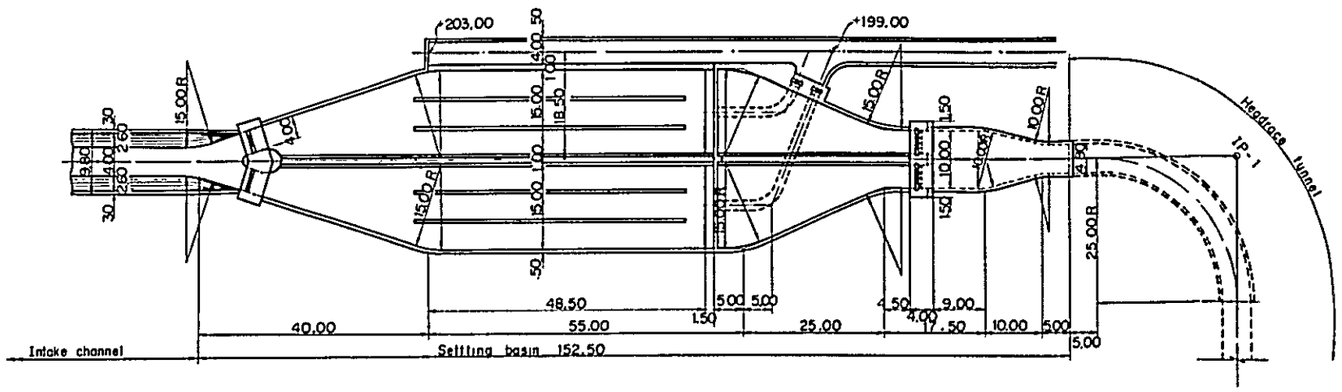


S=1/200 0 10 20(M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.2 POWER PLANT INTAKE PLAN & SECTION	
DATE	MAR. 1975
DWG.	2-02

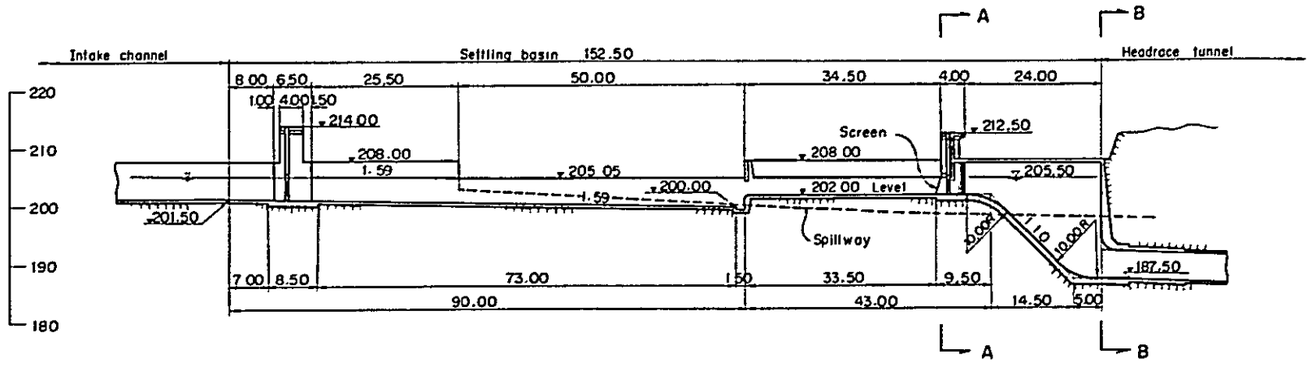
PLAN

S = 1 / 500



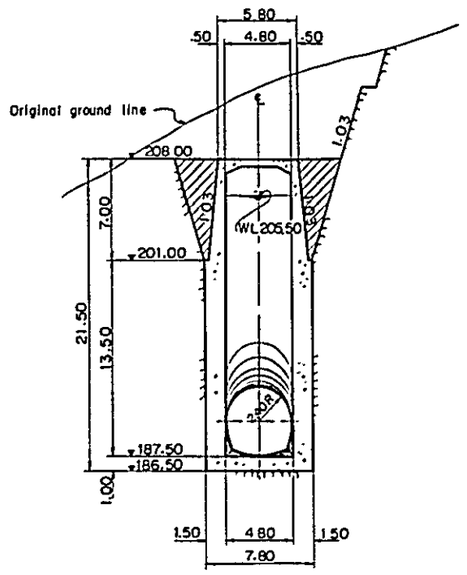
PROFILE

S = 1 / 500



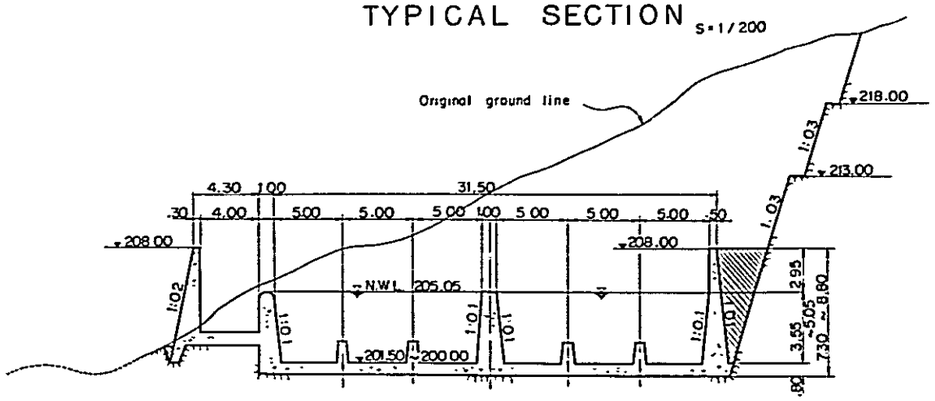
B - B

S = 1 / 200



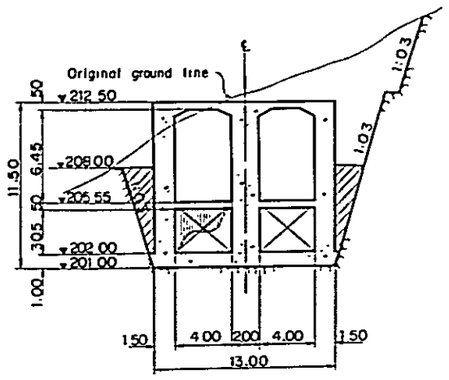
TYPICAL SECTION

S = 1 / 200



A - A

S = 1 / 200



S = 1/200 0 10 20 (M)

S = 1/500 0 10 20 30 40 50 (M)

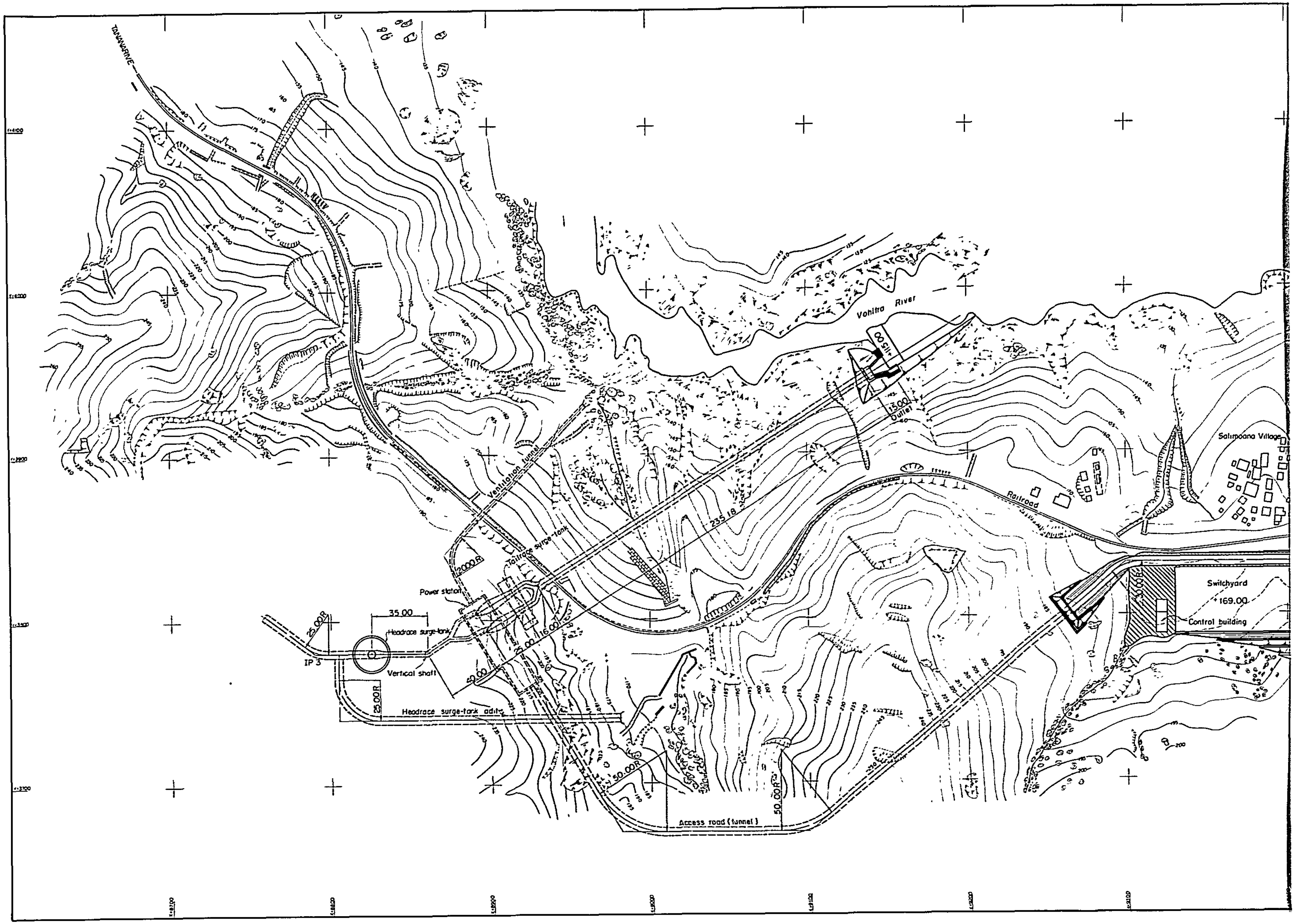
JAPAN INTERNATIONAL COOPERATION AGENCY

ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT

ANDEKALEKA No2 POWER PLANT

SETTLING BASIN PLAN, PROFILE & SECTION

DATE | MAR. 1975 : DWG. 2-03



TANANARIVE
Vohitra River
Outlet
Salimoana Village
Railroad
Ventilation tunnel
Tailrace surge-tank
235.18
Power station
35.00
25.00R
Headrace surge-tank
IP 3
Vertical shaft
25.00R
Headrace surge-tank adit
20.00R
16.00
50.00R
50.00R
Access road (tunnel)
Switchyard
169.00
Control building

Vohitra River

Ventilation tunnel

Tailrace surge-tank

Power station

Headrace surge-tank

Vertical shaft

Headrace surge-tank adit

IP 3

Access road (tunnel)

Railroad

Salimoana Village

Switchyard

169.00

Control building

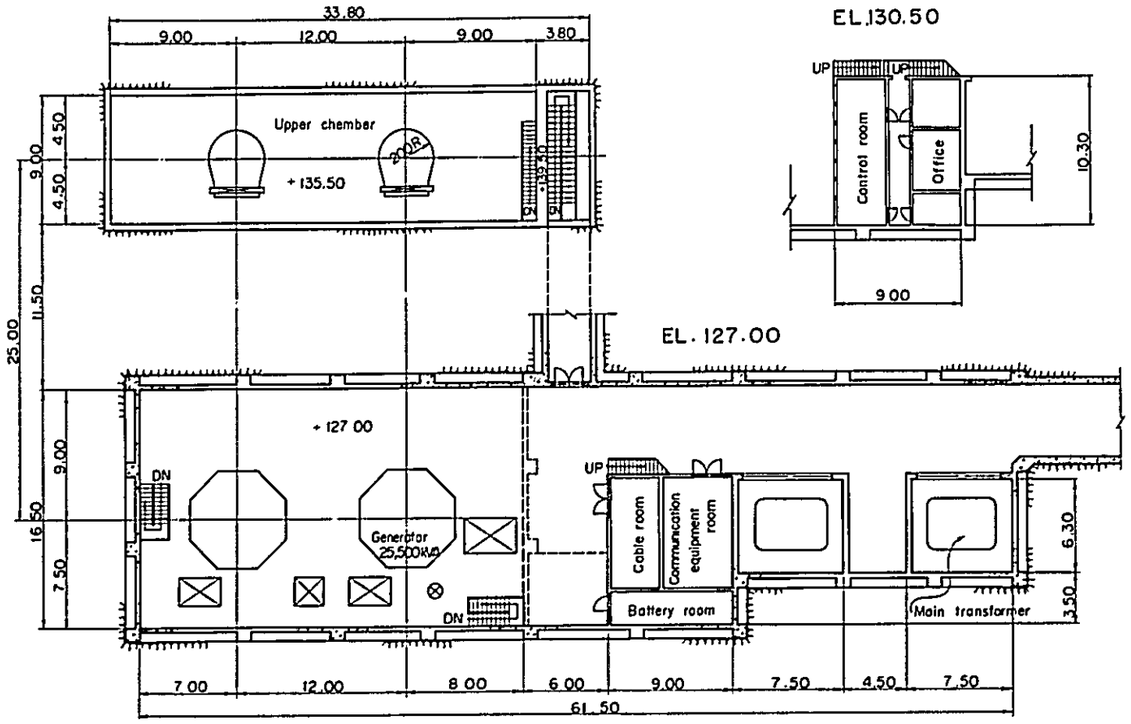
TAMATAVE

S=1/1,000 0 50 100(M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.2 POWER PLANT	
POWER STAITION AREA PLAN	
DATE	MAR. 1975
DWG.	2-04

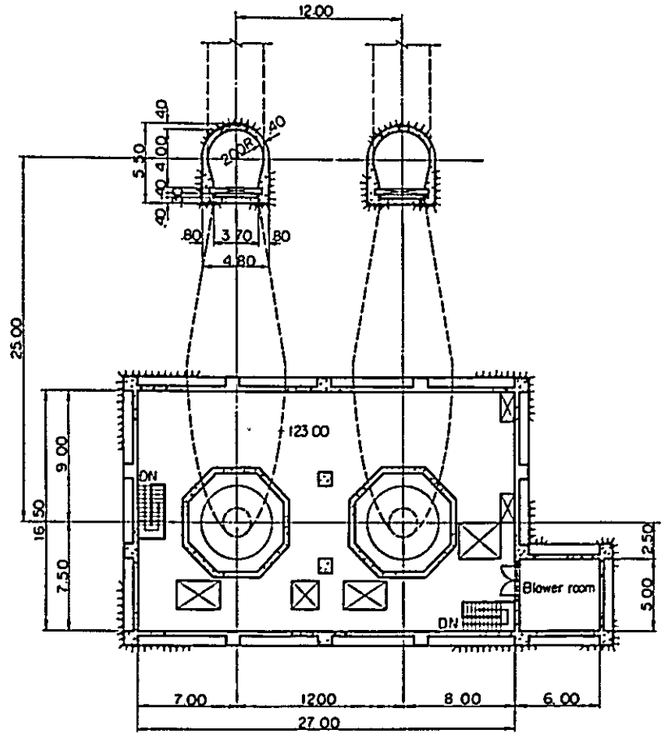
PLAN - 1

EL 139.50

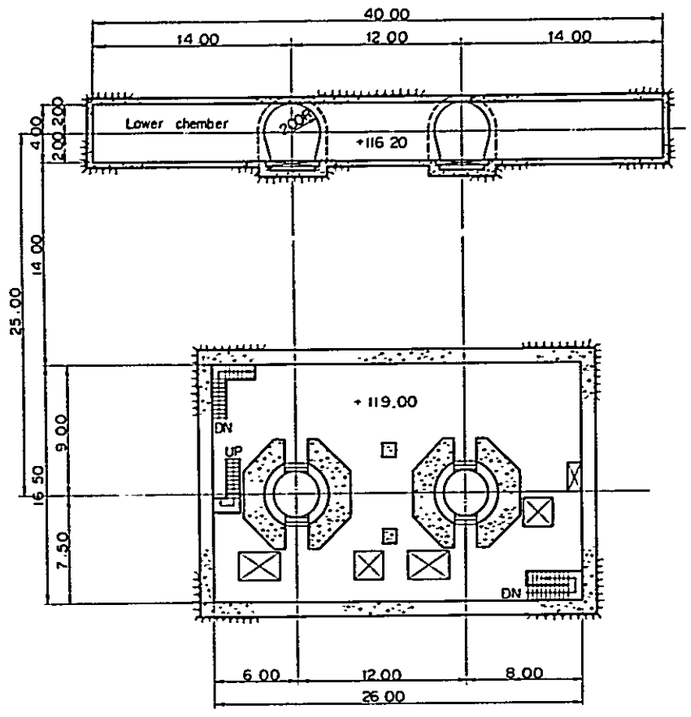


EL.130.50

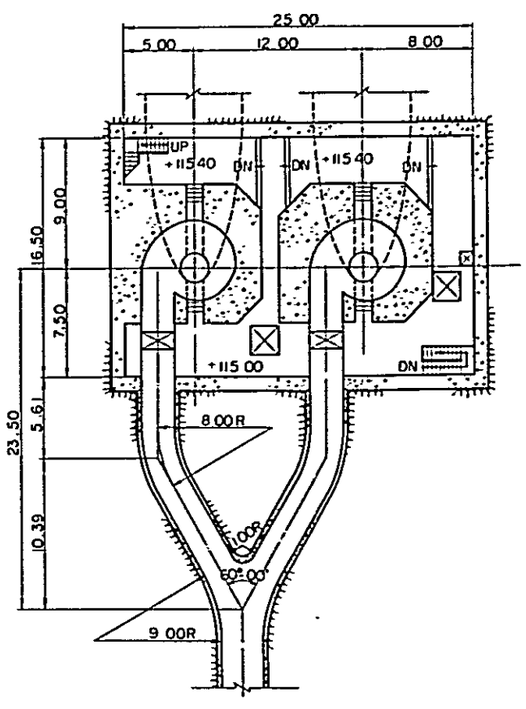
EL. 123.00



EL. 119.00



EL. 117.00

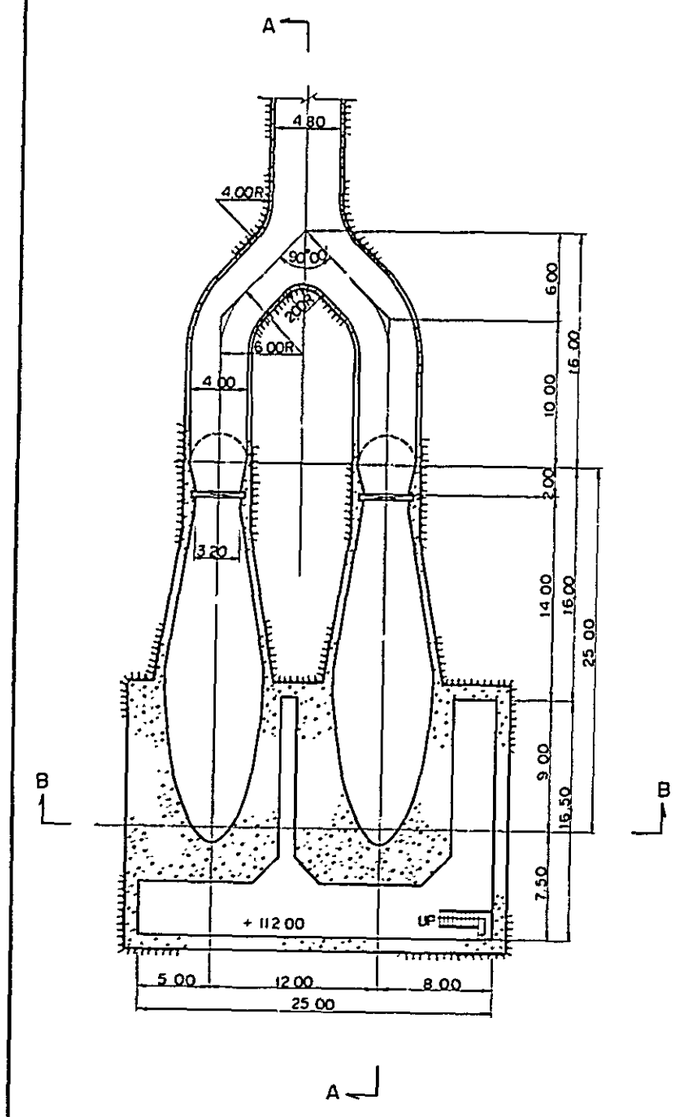


S=1/200 0 10 20 (M)

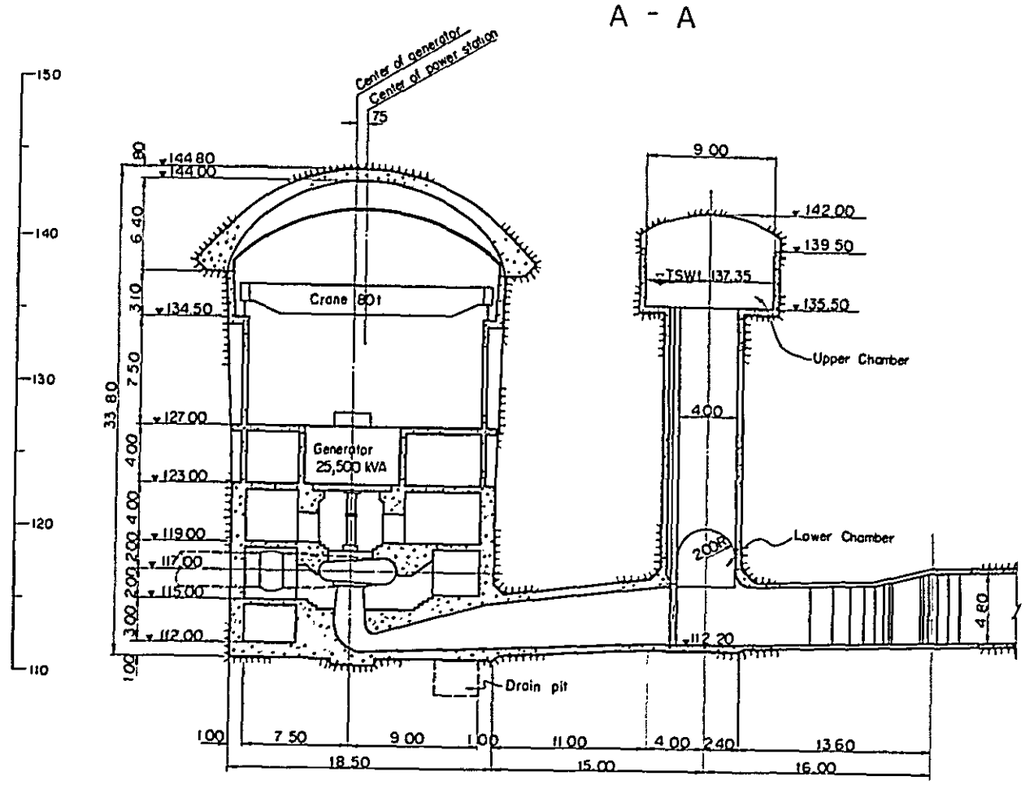
JAPAN INTERNATIONAL COOPERATION AGENCY			
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT			
ANDEKALEKA No.2 POWER PLANT POWER STATION PLAN - 1			
DATE	MAR. 1975	DWG.	2-05

PLAN - 2

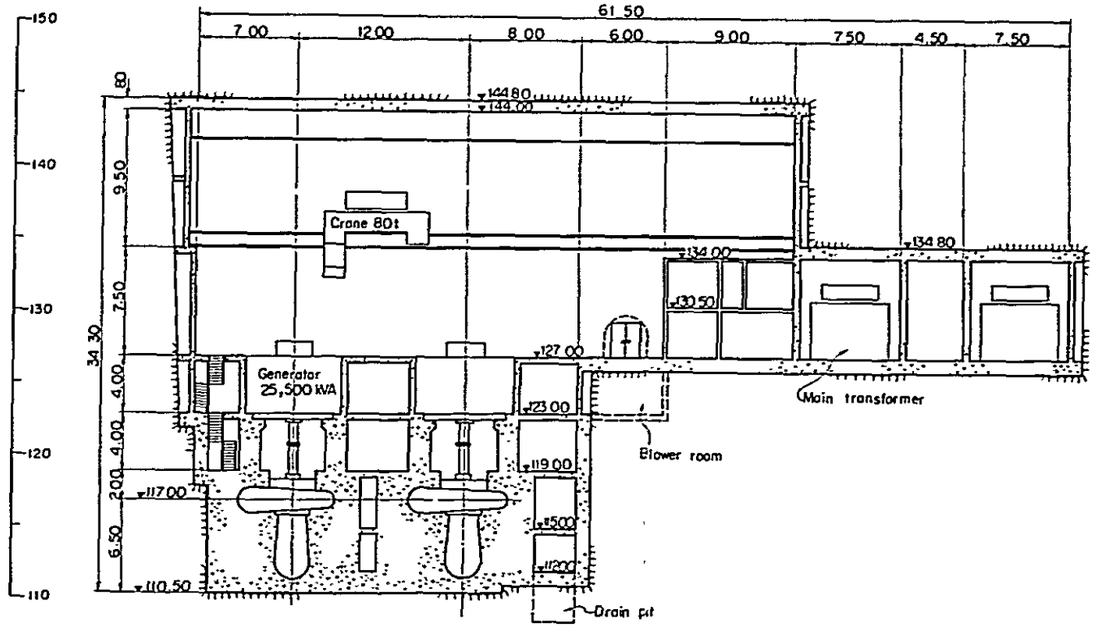
EL.112.00



A - A



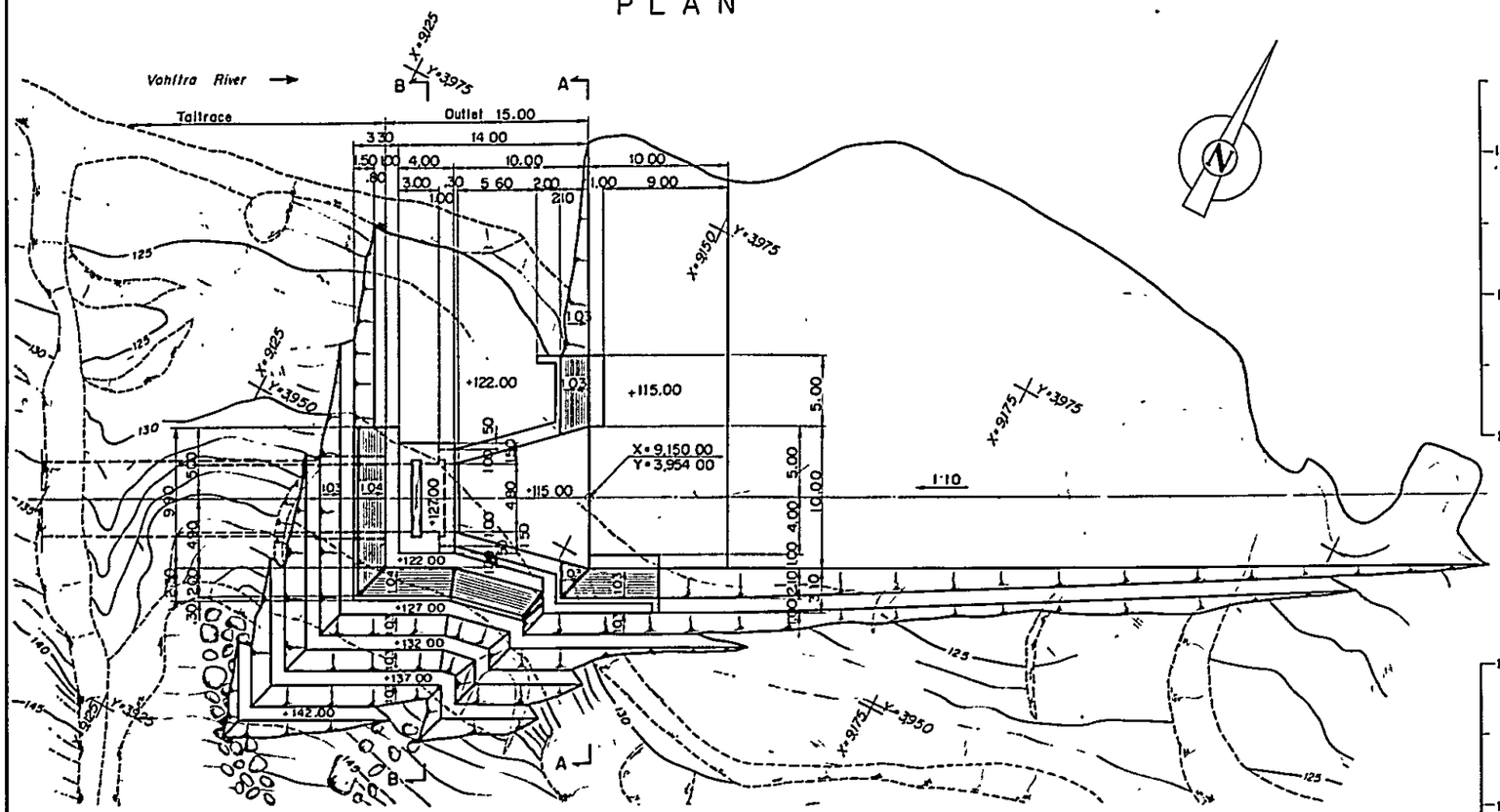
B - B



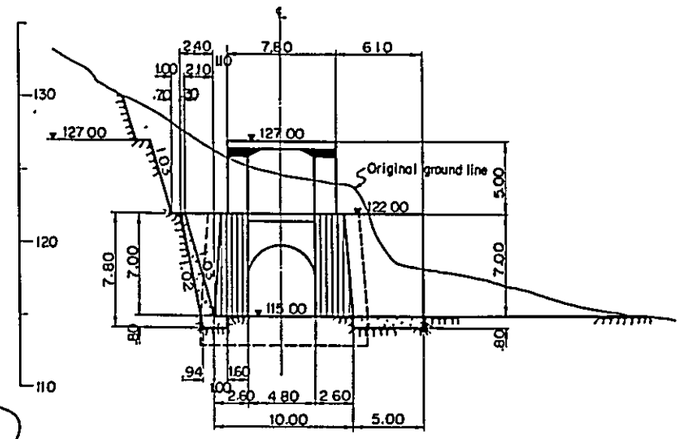
S=1/200 0 10 20 (M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.2 POWER PLANT	
POWER STATION PLAN-2 & SECTION	
DATE	MAR. 1975
DWG.	2 - 06

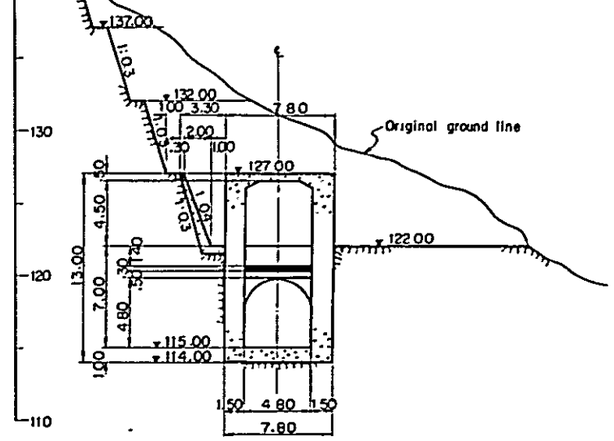
PLAN



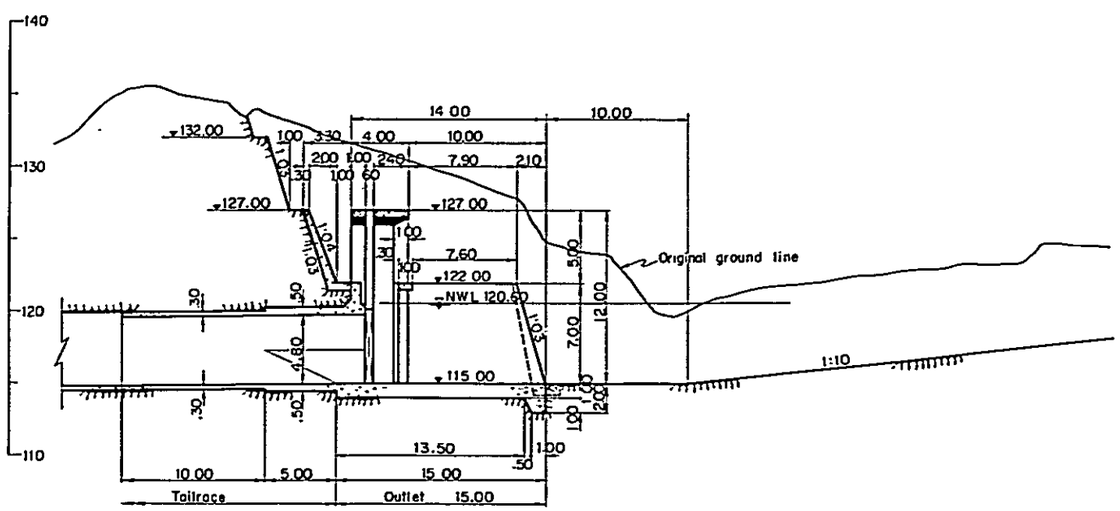
A - A



B - B



PROFILE



S=1/200 0 10 20(M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No 2 POWER PLANT OUTLET PLAN & SECTION	
DATE	MAR. 1975
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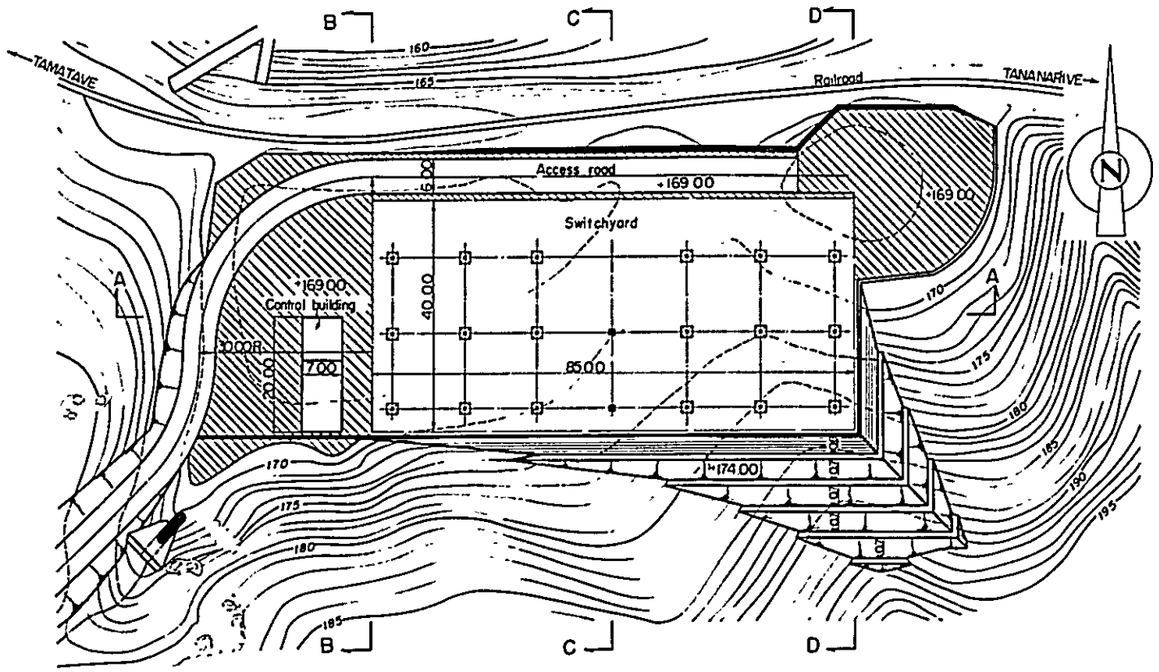
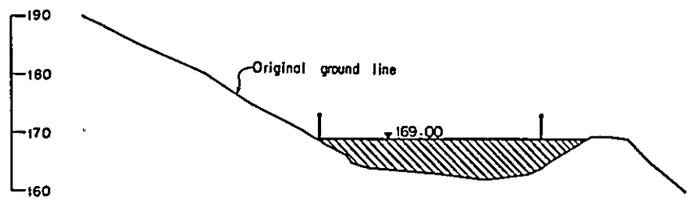
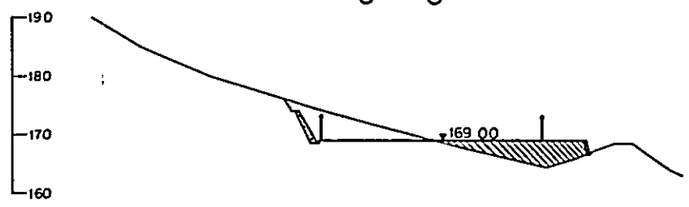
PLAN



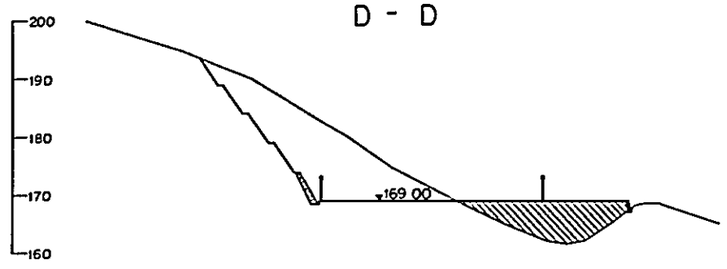
B - B



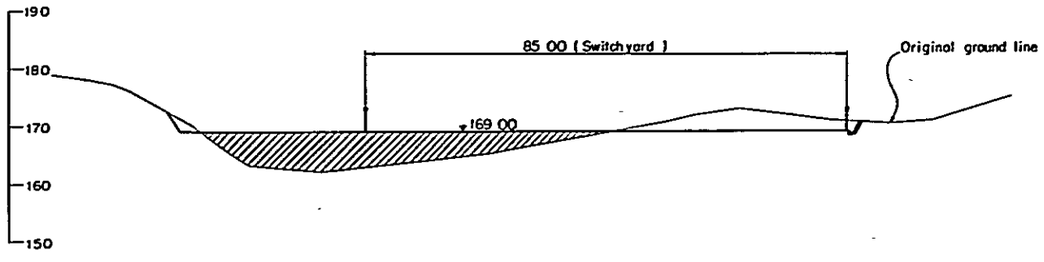
C - C



D - D



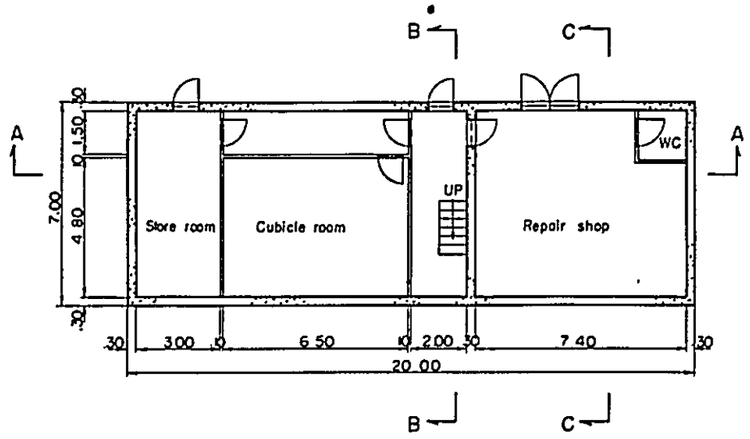
A - A



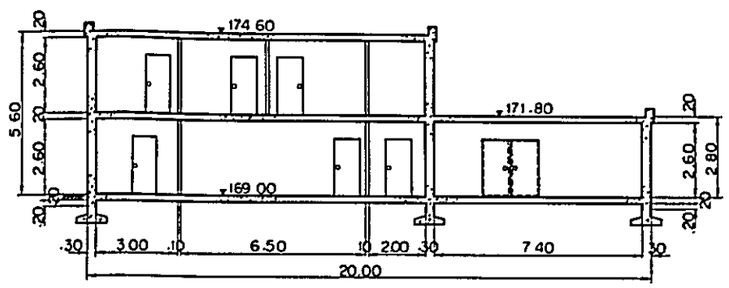
S=1/500 0 10 20 30 40 50(M)

JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No.2 POWER PLANT SWITCHYARD PLAN & SECTION	
DATE	MAR. 1975
DWG.	2-08

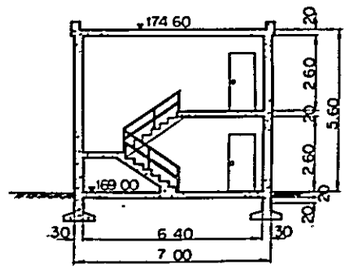
1F PLAN



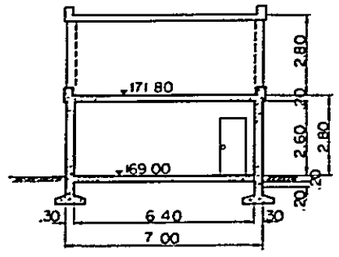
A - A



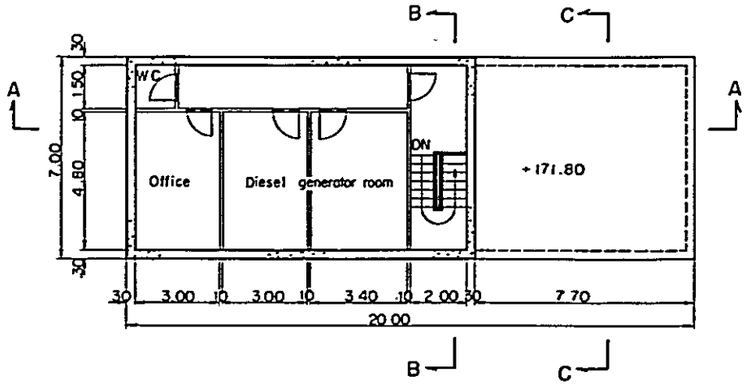
B - B



C - C



2F PLAN



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JAPAN INTERNATIONAL COOPERATION AGENCY	
ANDEKALEKA HYDROELECTRIC DEVELOPMENT PROJECT	
ANDEKALEKA No 2 POWER PLANT	
CONTOROL BUILDING PLAN & SECTION	
DATE MAR. 1975	DWG. 2-09