DOMINICAN REPUBLIC

CORPORACION DOMINICANA DE ELECTRICIDAD

DIRECCION DE DESARROLLO HIDROELECTRICO

EL TORITO - LOS VEGANOS

HYDROELECTRIC COMPLEX DEVELOPMENT PROJECT

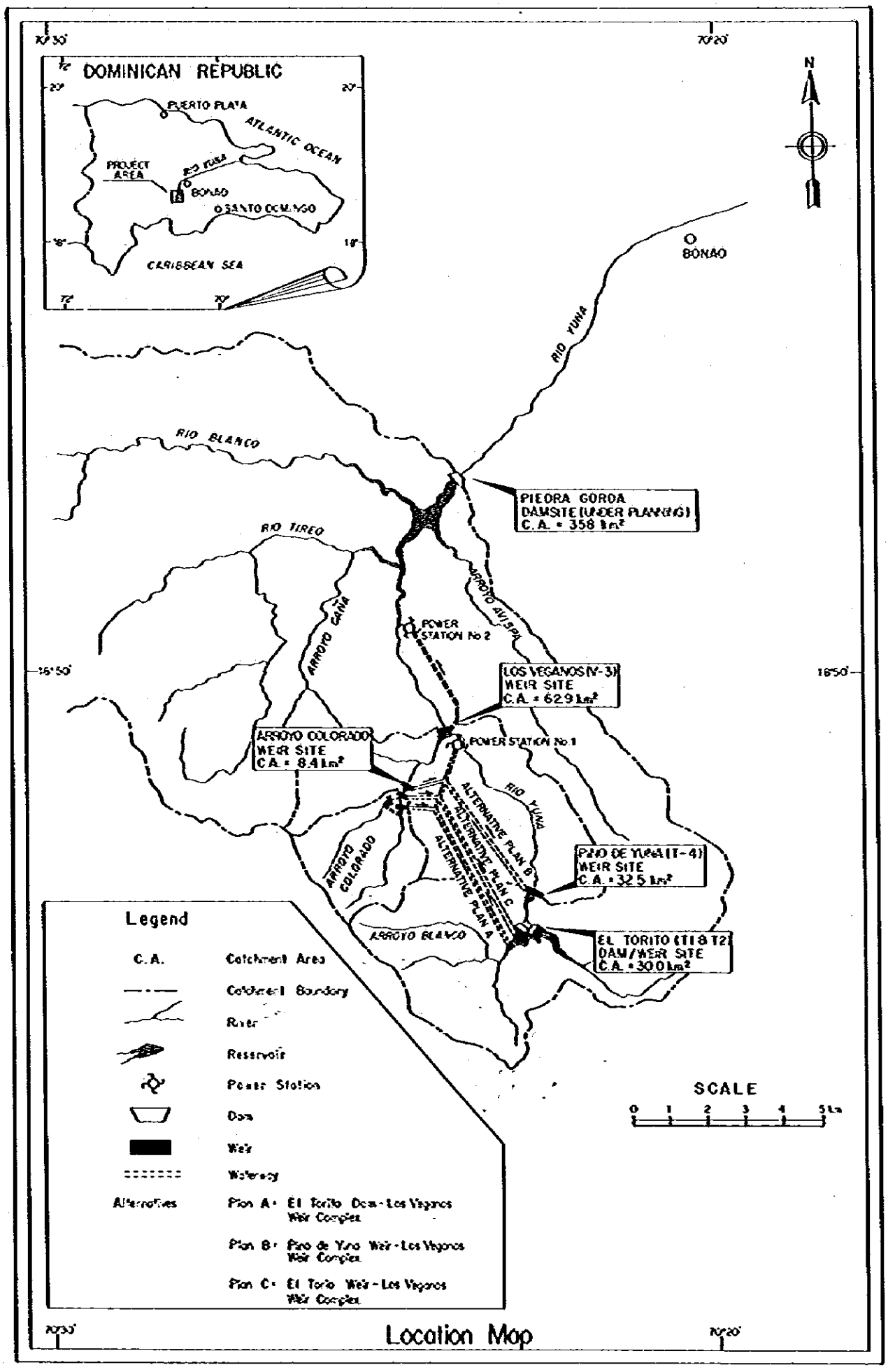
ON UPPER YUNA RIVER

FEASIBILITY REPORT

SUMMARY

JULY 1984

JAPAN INTERNATIONAL COOPERATION AGENCY



Location Map

SUMMARY

Background

01 Development of the Dominican economy has been stagnated in recent years. Although the gross domestic product increased at an average rate of 4.6% per annum in 1975-79, the growth rate decreased to 2.5% per annum in 1980-82 which was lower than the rate of population increase. One of the major burdens imposed on the national economy is the unfavorable trade balance which is appreciably caused by increasing import of petroleum and its products. The Dominican Republic depends entirely on imported petroleum, and the oil import value represented 59% of total export value of the country in 1982. Under such economic situations, development of indigenous resources for import substitution is of prime significance for the national economy in a short and long run.

02 In the power sector, dependence on the imported oil has been substantial. About 89% of the electric power was generated by thermal plants with imported fuel in 1982. CDE had to pay 67% of its total revenue in 1983 for purchase of fuel to feed the thermal plants. Despite the fact that the Republic is well endowed with the water resources, development of hydroelectric power has been lagged behind. The firm installed capacity of hydro-power is approximately 88 MW or about 15% of the total firm installed capacity of 600 MW over the country. Although CDE has recently exerted its efforts toward the development of hydroelectric power, the hydro-power development projects should be implemented in a more accelerated way.

03 Power consumption grew steadily in 1970's with an average annual growth rate of 10.8%. The sending end energy increased at a higher rate, and it reached at around 3,122 GWh with the maximum demand of 538 MW in 1983. It is forecasted that the power demand will reach at 920-970 MW in 1987 and 1,460-1,720 MW in 1992. On the other hand, power expansion plan is being executed by CDE with the principal strategy to develop coal-fired power to cover the base load, to develop hydro-power to the maximum extent and to gradually substitute them for steam, gas and diesel power. The power supply situation will, however, remain critical even after the completion of the on-going installation of two 125 MW coal-fired plants by 1987, and it is required to implement the hydro-power projects at the earliest possible time.

Project Area

04 El Torito - Los Veganos hydroelectric complex is located in the uppermost part of the Yuna river basin where rainfall is relatively abundant, with the annual mean precipitation ranging from 1,900 mm to over 3,000 mm. The river has steep gradient or about 1/40 along the mainstream of the Yuna river upstream of its confluence with the Blanco river. Major technical constraint for hydroelectric development along the Yuna mainstream is the relatively limited catchment area at the possible intake sites and the geologic faults extensively developed in the area. One of the principal faults on tectonic line in the Republic, called the Bonao fault, extends in the north-south direction through the study area.

05 Since the catchment area at the possible intake sites is limited (about 30 km^2 at the confluence of the Yuna mainstream and Arroyo Blanco and about 63 km^2 at the confluence with Arroyo Colorado), available discharge at each intake site is to be assessed with utmost care. However, a long-term hydrological record is only available at Los Quemados, and the discharge at each intake site has to be estimated by proportionally distributing Los Quemados discharge on the basis of discharge measurement executed at various spots. It is estimated that 90% dependable discharge is around 0.62 m^3/s at the confluence of the Yuna mainstream and Arroyo Blanco and 1.72 m^3/s at the confluence with Arroyo Colorado.

Alternative Plan

06 Water available in the Yuna mainstream is planned, in principle, to be developed in two steps. In the upstream reach, possible alternative dam/weir sites are found near El Torito. The dam/weir sites in the middle reach are identifiable near Los Veganos. Water is harnessed by utilizing a total gross head of 330-400 m available in the combined El Torito - Los Veganos complex. A total of 70 case studies have been made comparatively on the alternative combination of dam and weir schemes, as well as combination of water diversion from tributaries in order to increase available discharge for power generation. As a result, three alternative plans have been selected for further detailed study. They are:

a) El Torito dam - Los Veganos weir complex;

b) El Torito weir - Los Veganos weir complex, and

c) Pino de Yuna weir - Los Veganos weir complex.

Construction of a high dam near Los Veganos is not found geotechnically and economically recommendable. In any case, El Torito and Los Veganos power stations will be operated to cover the peak load for 6 hours a day at minimum.

07 For El Torito dam plan, construction of combined fill-type dams at T-1 and T-2 damsites is contemplated. Water stored in El Torito reservoir, with a high water level set at EL. 755.0 m, is led through a 5.3 km long headrace tunnel to the power station to be located on the left bank of the Yuna mainstream immediately upstream of the confluence with Arroyo Colorado. Water in the upper A. Colorado tributary basin is diverted to the headrace tunnel from El Torito reservoir. By utilizing a firm discharge estimated at 1.23 m^3/s and the maximum discharge of 4.92 m^3/s, as well as an effective head of 250.3 m, the power station (Yuna No. 1) will have an installed capacity of 10.3 MW. The annual primary energy output is estimated at 22.2 GWh and the secondary energy output at 15.8 GWh.

08 As an alternative to El Torito dam plan, two diversion weirs are planned at T-1 and T-2 sites in El Torito. Water of the Yuna mainstream is diverted by T-1 weir (17 m in height) to Arroyo Blanco where T-2 weir (22 m in height) is constructed for intake of water estimated at 0.62 m^3/s in 90% dependable discharge. A headrace tunnel of 5.2 km in length is constructed to reach Yuna No. 1 power station to be located at the same site as proposed for El Torito dam plan. Water diversion from Arroyo Colorado (0.31 m^3/s) is also contemplated. By utilizing the maximum discharge estimated at 3.72 m^3/s and the effective head of 229.2 m, El Torito weir plan will have an installed capacity of 7.2 MW, with the annual primary energy output of 15.2 GWh and the secondary energy output of 16.9 GWh.

09 As an alternative to El Torito weir plan, it is contemplated to construct an intake weir at Pino de Yuna (T-4 site) located at about 800 m downstream from the confluence with Arroyo Blanco. By constructing a 21 m high concrete weir and a 4.4 km long headrace tunnel, as well as an intake and tunnel for water diversion from Arroyo Colorado, the maximum discharge of 4.04 m^3/s is led to the power station to be located at the same place as in the case of El Torito dam weir plan. An effective head is 184.3 m. The installed capacity is planned to be 6.3 MW, and the annual primary and secondary energy output is estimated at 12.7 GWh and 13.7 GWh, respectively.

10 Los Veganos weir plan envisages to construct a 32 m high intake weir at a gorge immediately downstream from the Yuna No. 1 power station and the confluence with Arroyo Colorado. Water regulation for 6-hour peak operation is led to a 3.3 km long headrace tunnel to be aligned on the right bank of the Yuna river. The powerhouse (Yuna No. 2) is located on the terrace deposit, with a tail water level set at EL. 350.0 m. An effective head is 134.0 m. In case Los Veganos weir plan is combined with El Torito dam plan, the maximum discharge of 7.84 m^3/s is made available for Los Veganos plan and the Yuna No. 2 power station will have an installed capacity of 8.8 MW with annual energy output of 41.7 GWh. In case the plan is combined with El Torito weir or Pino de Yuna weir plan in the upstream, the maximum discharge of 6.88 m^3/s is available and the Yuna No. 2 power station is designed to have an installed capacity of 7.7 MW with annual energy output of 35.4 GWh.

Implementation

11 Under El Torito dam - Los Veganos weir complex, a total installed capacity will be 19.1 MW and the annual energy output is estimated at 79.7 GWh. The alternative to construct El Torito weir - Los Veganos weir complex will have an installed capacity of 14.9 MW, with the annual energy output of 67.5 GWh. While the Pino de Yuna weir - Los Veganos weir complex will have a total installed capacity of 14.0 MW with the annual energy output of 61.8 GWh. The period required for construction of El Torito dam - Los Veganos weir complex or El Torito weir - Los Veganos weir complex is scheduled to be 51 months and 36 months, respectively, from the award of contracts. In case of the Pino de Yuna weir - Los Veganos weir plan, 49 months for the Yuna No. 1 station and 36 months for the Yuna No. 2 station will be required for construction. If the construction works are started in July 1985, the Yuna No. 2 power station is planned to be committed for commercial operation in June 1988 and the Yuna No. 1 power station in July-September 1989.

12 Construction cost of El Torito dam - Los Veganos weir complex, including physical and price contingencies, is estimated at around RD$106.1 million, which comprises RD$59.9 million in foreign currency portion and RD$46.2 million in local currency portion. On the other hand, El Torito weir - Los Veganos weir complex will cost RD$57.1 million, consisting of RD$33.8 million in foreign currency and RD$23.3 million in local currency. Further, construction cost of the Pino de Yuna weir - Los Veganos weir complex is estimated at RD$51.5 million (RD$30.9 million in foreign currency and RD$20.6 million in local currency). In addition to this construction cost, fund is required for execution of the associated programs for resettlement and watershed control, which will amount to around RD$3.3 million for El Torito dam - Los Veganos weir complex and RD$2.2 million for El Torito weir/Pino de Yuna weir - Los Veganos weir complex.

Evaluation

13 Economic feasibility of each complex is evaluated in terms of economic internal rate of return (EIRR). Capacity benefit and the primary energy benefit are valued by assuming an alternative gas turbine power, while the secondary energy benefit is valued in terms of steam and coal-fired power. EIRR of El Torito dam - Los Veganos weir complex is calculated at 8.7%, while EIRR of El Torito weir - Los Veganos weir complex is estimated at 12.9%. EIRR of the Pino de Yuna weir - Los Veganos weir complex is estimated at 12.8%. (EIRR of each component of the complex is estimated at 5.2% for El Torito dam scheme, 10.4% for El Torito weir scheme, 10.0% for the Pino de Yuna weir scheme and 15.6% for Los Veganos weir scheme.) The comparative study revealed that El Torito weir - Los Veganos weir complex is economically most advantageous. El Torito weir - Los Veganos weir complex is evaluated to be economically feasible, in the light of the opportunity cost of capital estimated at around 12% in the Dominican Republic.

14 Financial viability of the complex is evaluated through analysis of a financial internal rate of return (FIRR) and repayability of loans. FIRR of El Torito dam - Los Veganos weir complex is estimated at 6.1%, while FIRR of El Torito weir - Los Veganos weir complex and the FIRR of the Pino de Yuna weir - Los Veganos weir complex are estimated at 10.1% respectively. (FIRR of each component is 2.7% for El Torito scheme, 7.9% for El Torito weir scheme, 7.5% for the Pino de Yuna weir scheme and 13.0% for Los Veganos weir scheme.) Through the repayability analysis, it is vertified that loans to be extended for the implementation of El Torito weir - Los Veganos weir complex are repayable if they are extended on concessional terms. Financial viability and repayability of El Torito dam - Los Veganos weir complex are marginal, and it will make it difficult for CDE to maintain sound financial position.

Conclusion and Recommendation

15. Through the investigation and feasibility study on the hydroelectric development along the Yuna mainstream, it has been clarified that the implementation of El Torito dam - Los Veganos weir complex is economically and financially less attractive. Further, it has also been clarified that El Torito weir - Los Veganos weir complex is more advantageous, economically and financially, than the alternative to implement Pino de Yuna weir - Los Veganos weir complex. The selected El Torito weir - Los Veganos weir complex is technically sound, economically feasible and financially viable. It is therefore recommended to take up El Torito weir (Yuna No. 1 power station) - Los Veganos weir (Yuna No. 2 power station) complex for implementation. In view of the power demand-supply situation in the late 1980's it is recommended that the Yuna No. 1 power station and No. 2 power station be implemented at the earliest possible time.

16. El Torito weir - Los Veganos weir complex, if it is realized, will contribute among others to save the foreign exchange by substituting it for the thermal power generation by imported fuels. Such savings in foreign exchange is estimated at RD$4.7 million per annum.

17. For the implementation of the Yuna No. 1 - No. 2 power stations, it is suggestible to immediately proceed to the preparation of tender documents for construction, in parallel with the arrangement of construction funds. Such preparatory works as access road construction are to be promoted at the same time.

PRINCIPAL FEATURE OF RECOMMENDED PLAN

El Torito Weir Plan (Yuna No. 1 Power Station)

Catchment Area	38.4 km^2
Direct area	30.0 km^2
Stream diversion	8.4 km^2
Firm discharge	0.93 m^3/s
Maximum discharge	3.72 m^3/s

Diversion Weir (T-1):

Type	non-gated concrete gravity
Height	17.0 m
Crest Length	50.0 m
Volume	6,400 m^3

Intake Weir (T-2):

Type	gated concrete gravity
Height	22.0 m
Crest length	86.0 m
Volume	8,700 m^3
High water level	EL. 726.0 m
Low water level	EL. 723.4 m

Waterway:

Headrace tunnel,	Diameter	2.0 m
	Length	5.2 km
Surge tank,	Type	restricted orifice type
Penstock,	Diameter	2.0 - 1.0 m
	Length	615 m

Arroyo Colorado Diversion:

Intake,	Height	7.5 m
	Crest length	67.0 m
Diversion tunnel,	Length	1.45 km

Yuna No. 1 Power Station:

Tail water level		EL. 490.8 m
Effective Head		229.2 m
Turbine,	Type	Vertical shaft Francis type
	Rated capacity	7.2 MW
Generator,	Voltage	8.0 MVA
	Power factor	0.9
Energy output,	Primary	15.2 GWh
	Secondary	16.9 GWh
	Total	32.1 GWh
Transmission line,	Voltage	69 kV
	Length	8.0 km

Los Veganos Weir Plan (Yuna No. 2 Power Station)

Catchment Area	62.9 km^2
Firm discharge	1.72 m^3/s
Maximum discharge	6.88 m^3/s

Intake Weir and Storage:

Type	gated concrete gravity
Height	32.0 m
Crest length	68.0 m
Volume	18,140 m^3
High water level	EL. 493.0 m
Low water level	EL. 488.5 m

Waterway:

Headrace tunnel,	Diameter	2.0 m
	Length	3.3 km
Surge tank,	Type	restricted orifice type
Penstock	Diameter	2.0 - 1.0 m
	Length	290 m

Yuna No. 2 Power Station:

Tail water level		EL. 350.0 m
Effective head		134.0 m
Turbine,	Type	vertical shaft Francis type
	Rated capacity	7.7 MW
Generator,	Voltage	9.0 MVA
	Power factor	0.9
Energy output,	Primary	16.4 GWh
	Secondary	19.0 GWh
	Total	35.4 GWh
Transmission line,	Voltage	69 kV
	Length	4.0 km

El Torito Weir - Los Veganos Weir Complex

Installed Capacity		14.9 MW
Energy output,	Primary	31.6 GWh
	Secondary	35.9 GWh
	Total	67.5 GWh

Construction Period:

Yuna No. 1 power station	49 months
Yuna No. 2 power station	36 months

Construction Cost (Financial):

Foreign currency	RD$33.8 million
Local currency	RD$23.3 million
Total	RD$57.1 million
Associated programs	RD$ 2.2 million

Economic Internal Rate of Return:

Yuna No. 1	10.4%
Yuna No. 2	15.6%
Total	12.9%

Table -01 GROSS DOMESTIC PRODUCT BY SECTOR

PRODUCTO INTERNO BRUTO POR SACTORES

At 1970 Prices
Unit:Million RD$

	1976	1977	1978	1979*	1980*	1981**	1982**
Agriculture	429.2	436.8	456.8	461.7	483.3	509.1	592.8
Mining	146.7	143.0	114.3	146.5	124.8	136.2	95.9
Manufacturing	457.4	483.2	482.6	504.8	530.2	546.1	574.4
Construction	153.2	168.7	174.5	183.5	196.5	198.0	188.3
Commerce	414.0	429.8	438.8	451.5	473.6	491.6	508.8
Transport/Communic.	190.8	211.8	218.9	225.4	230.5	242.7	254.0
Electricity	30.9	39.3	42.9	43.7	49.0	53.4	48.3
Finance	58.2	63.4	66.4	67.9	70.4	73.2	76.5
Housing	156.8	169.8	177.2	186.0	198.1	199.7	197.9
Goverment	189.9	191.2	200.4	236.1	277.8	274.7	287.9
Others	215.8	227.4	246.8	234.5	265.4	278.1	287.8
Total	2,442.9	2,564.5	2,619.5	2,741.6	2,899.6	3,002.8	3,048.6

(%)

Agriculture	17.6	17.1	17.4	16.8	16.6	17.0	19.4
Mining	6.0	5.6	4.4	5.3	4.3	4.5	3.2
Manufacturing	18.7	18.8	18.4	18.4	18.3	18.2	18.8
Construction	6.3	6.6	6.7	6.7	6.8	6.6	6.2
Commerce	16.9	16.8	16.8	16.5	16.3	16.4	16.7
Transport/Communic.	7.8	8.2	8.3	8.2	8.0	8.1	8.3
Electricity	1.3	1.5	1.6	1.6	1.7	1.8	1.6
Finance	2.4	2.5	2.5	2.5	2.4	2.4	2.5
Housing	6.4	6.6	6.8	6.8	6.8	6.6	6.5
Goverment	7.8	7.4	7.6	8.6	9.6	9.1	9.4
Others	8.8	8.9	9.4	8.6	9.2	9.3	9.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: * Preliminary figures

** Estimated figures

Source: Central Bank, National Account 1976-80 and Monthly Bulletin

Table -02 EXPORT AND IMPORT

EXPORTACION E IMPORTACION

Unit: Million RD$

	Export (FOB)	Import (FOB)		Balance
	Total	Total	(Petroleum)	
1977	780.5	847.8	(187.8)	-67.3
1978	675.5	859.7	(199.0)	-184.2
1979	868.6	1,080.4	(314.9)	-211.8
1980	961.9	1,498.4	(448.8)	-536.5
1981*	1,188.0	1,450.2	(497.4)	-262.2
1982*	767.7	1,248.4	(449.5)	-480.7
1983**	785.2	1,250.0	(466.4)	-464.8

Note: * Preliminary figures

** Forecasted by the Central Bank in August 1983

Source: Central Bank

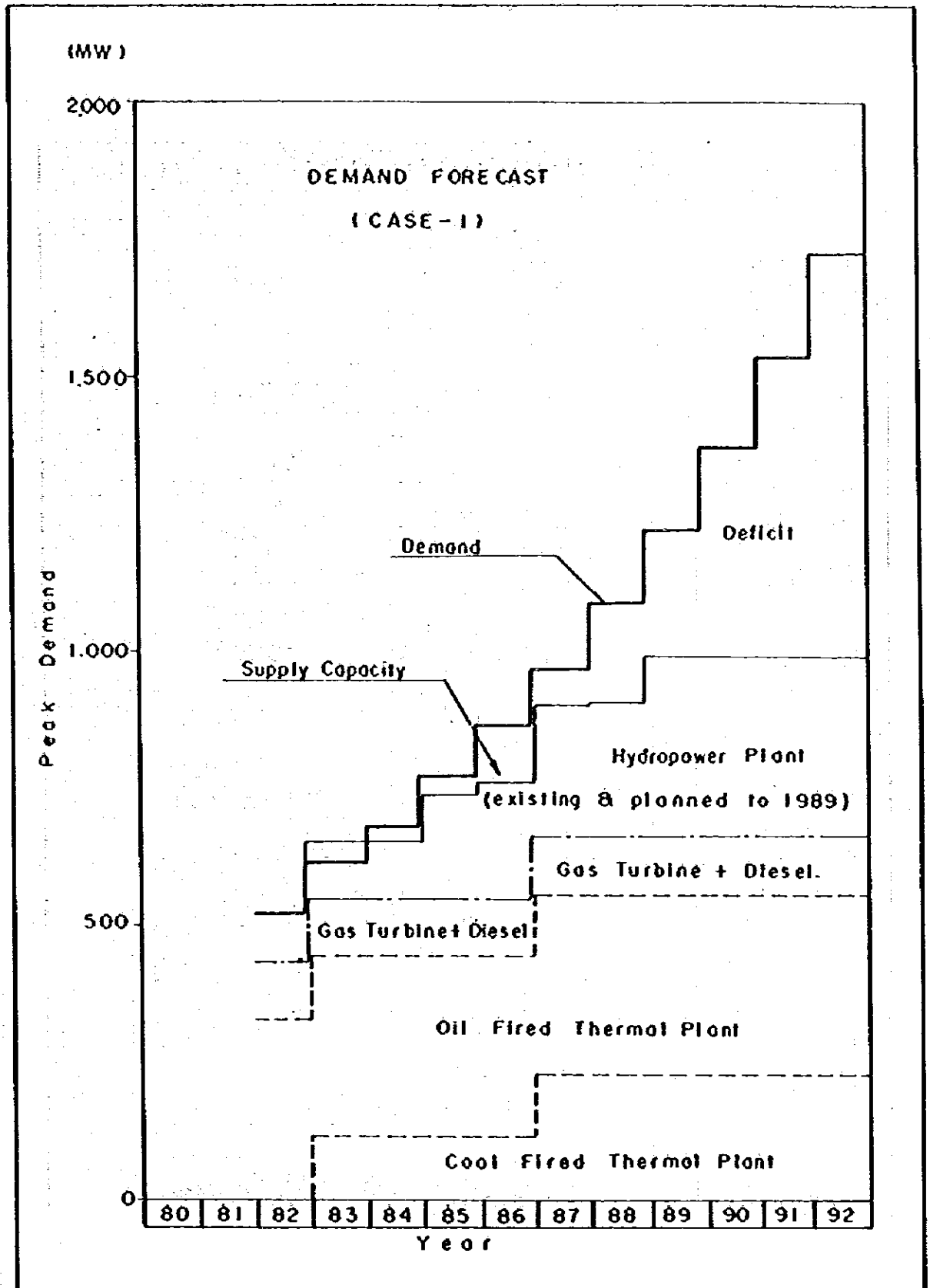
Table -03 ACTUAL POWER TREND

TENDENCIA DE ENERGIA

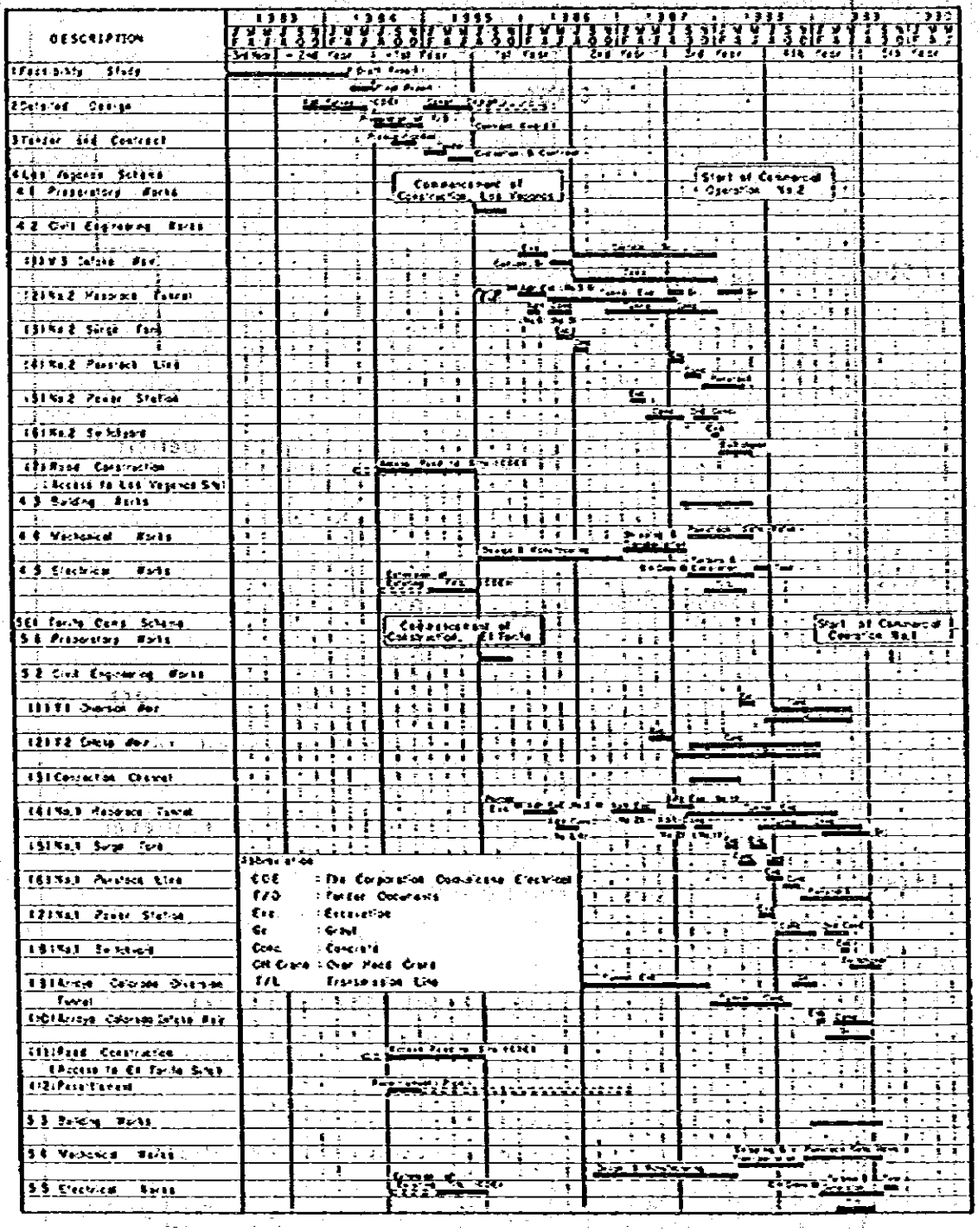
Year	Energy			Max.Demand (MW)	Energy Loss Factor (%)	Load Factor (%)
	Send'g End (GWh)	Sold (GWh)	Loss (GWh)			
1970	871.5	684.4	187.1	180.9	21.5	55.0
1971	1,000.7	772.5	228.2	201.7	22.8	56.6
1972	1,138.4	871.1	267.3	209.4	23.5	62.0
1973	1,325.9	1,023.1	302.8	268.8	22.8	56.3
1974	1,447.6	1,097.0	350.6	287.2	24.2	57.5
1975	1,545.3	1,170.7	374.6	299.0	24.2	59.0
1976	1,639.2	1,207.9	431.3	340.8	26.3	54.9
1977	2,058.7	1,535.4	523.3	396.0	25.4	59.4
1978	2,300.3	1,674.0	626.3	411.0	27.2	63.9
1979	2,252.9	1,706.8	546.2	412.0	24.2	62.4
1980	2,629.8	1,913.6	716.2	462.0	27.2	64.9
1981	2,787.7	2,084.6	703.1	475.0	25.2	67.0
1982	2,849.1	1,890.6	958.3	504.0	33.6	64.5
1983*	3,122.3	1,962.8	1,159.4	538.0	37.1	68.4

Source: CDE

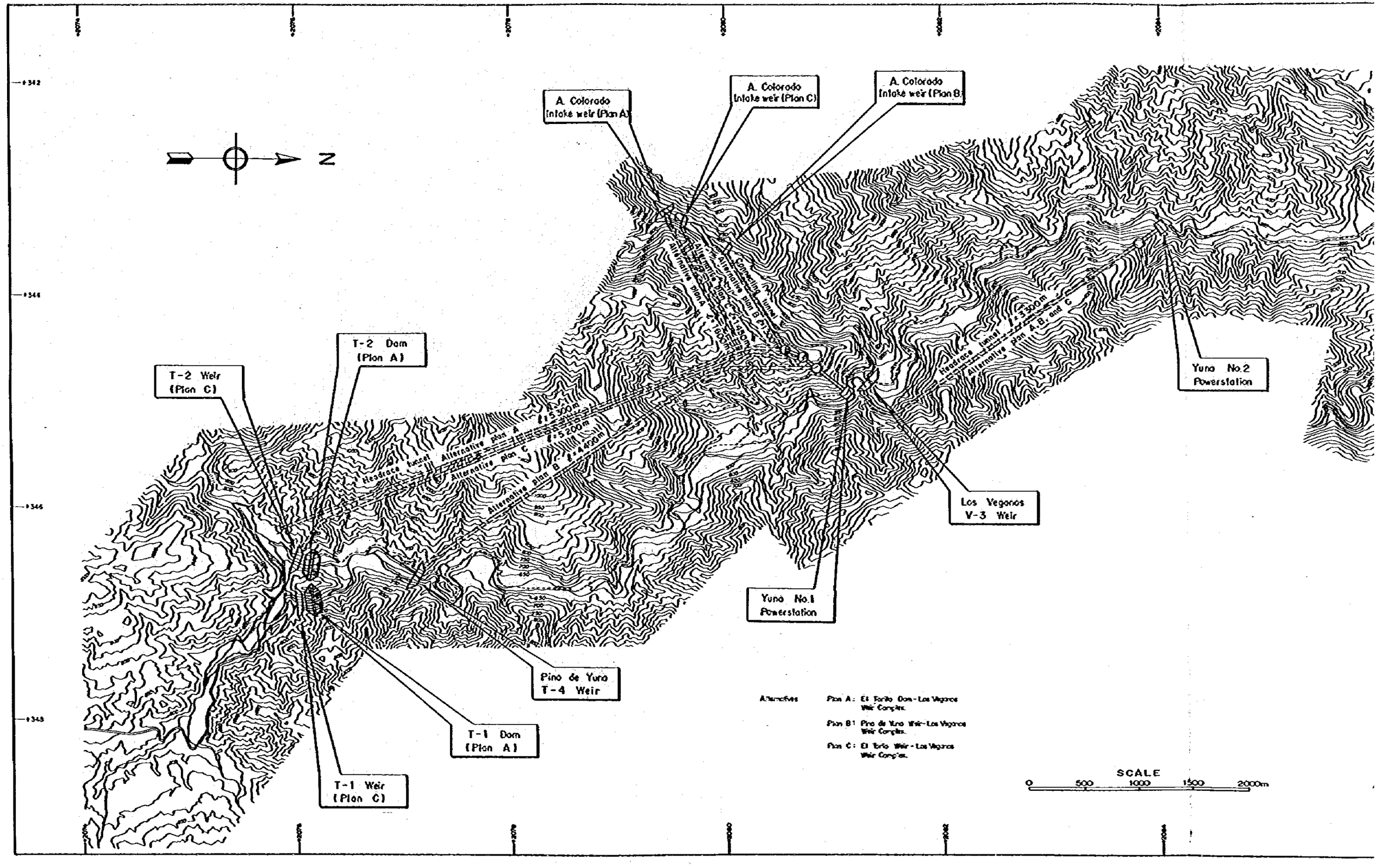
* Preliminary



CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Peak Demand and Generating Capacity (Case I)
EL TORTO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORTO LOS VEGANOS	01	*Demanda Máxima y Capacidad de Generacion (Caso I)*
JAPAN INTERNATIONAL COOPERATION AGENCY		



CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Construction Schedule For El Torito Weirs - Los Veganos Weir Complex
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX	02	*Programa de Construcción : Complejo Derivadora El Torito - Derivadora Los Veganos*
COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS		
JAPAN INTERNATIONAL COOPERATION AGENCY		


N
A. Colorado Intake weir (Plan A)
A. Colorado Intake weir (Plan C)
A. Colorado Intake weir (Plan B)
T-2 Dam (Plan A)
T-2 Weir (Plan C)
Headrace tunnel Alternative plan A
Headrace tunnel Alternative plan C
Alternative plan B
Alternative plan A
Alternative plan C
Connecting tunnel
Headrace tunnel Alternative plan A, B, and C
Yuna No.2 Powerstation
Los Vegonos V-3 Weir
Yuna No.1 Powerstation
Pino de Yuna T-4 Weir
T-1 Dam (Plan A)
T-1 Weir (Plan C)
Alternatives
Plan A: El Torito Dam - Los Vegonos Weir Complex.
Plan B: Pino de Yuna Weir - Los Vegonos Weir Complex.
Plan C: El Torito Weir - Los Vegonos Weir Complex.
SCALE
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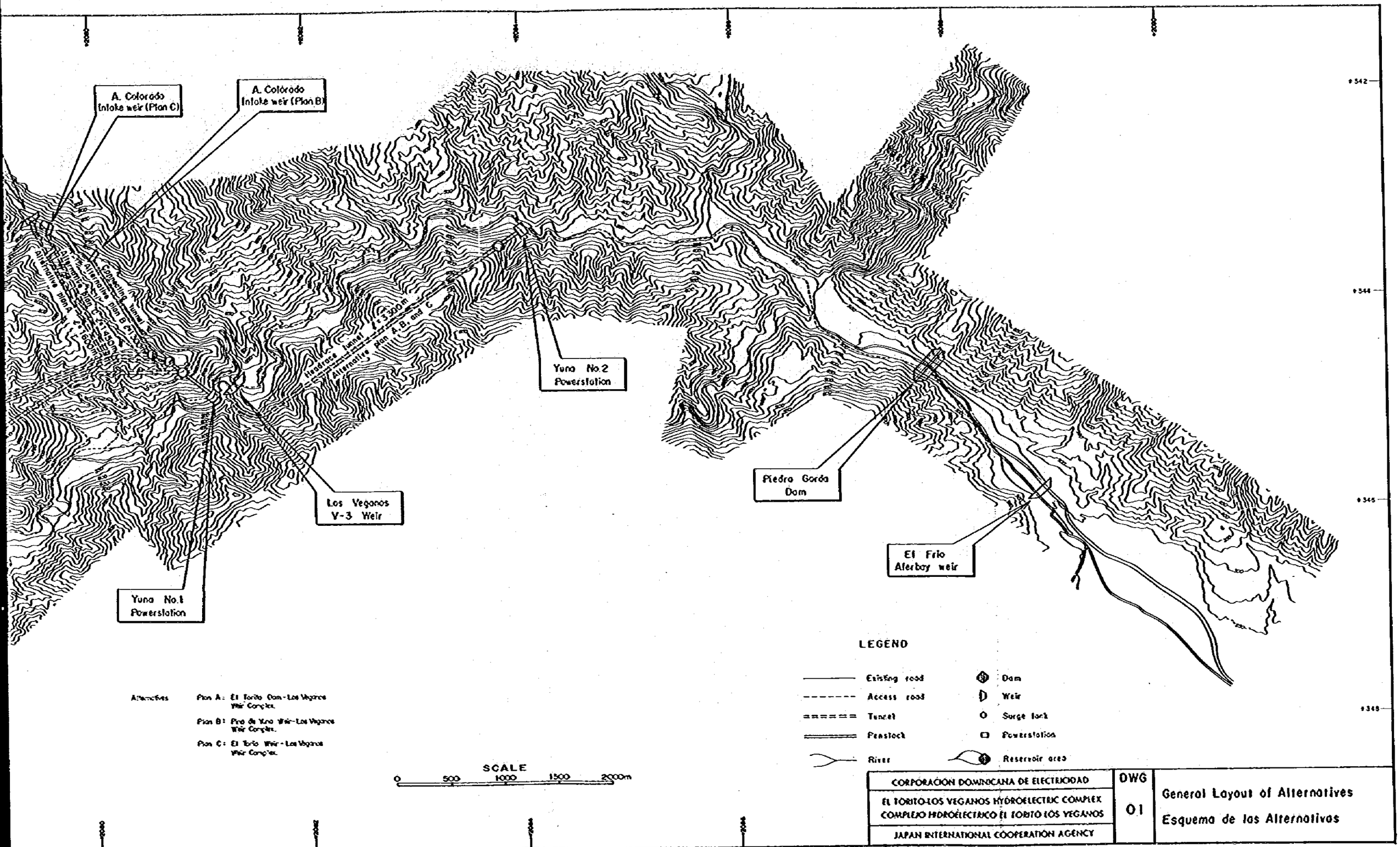
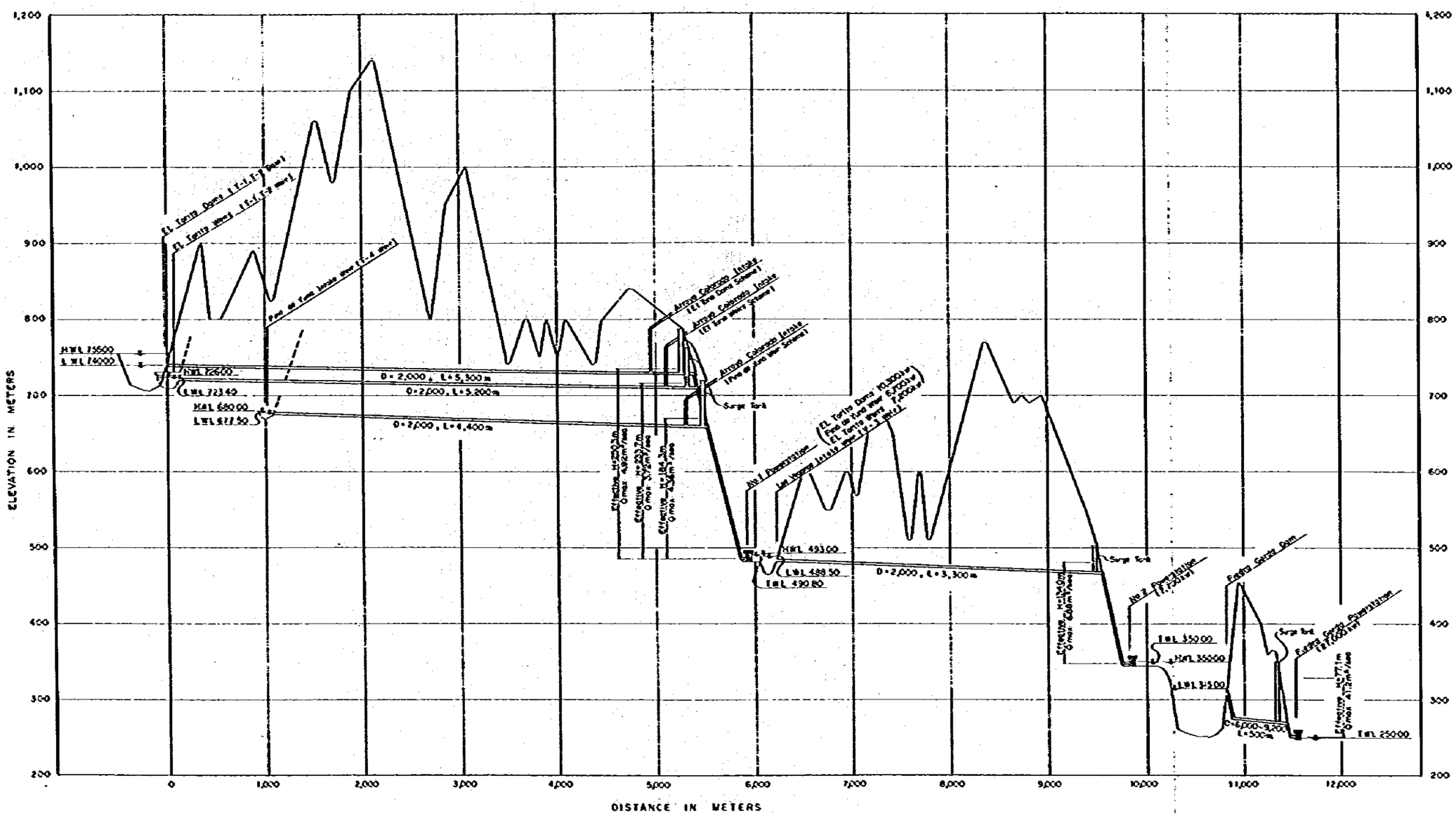
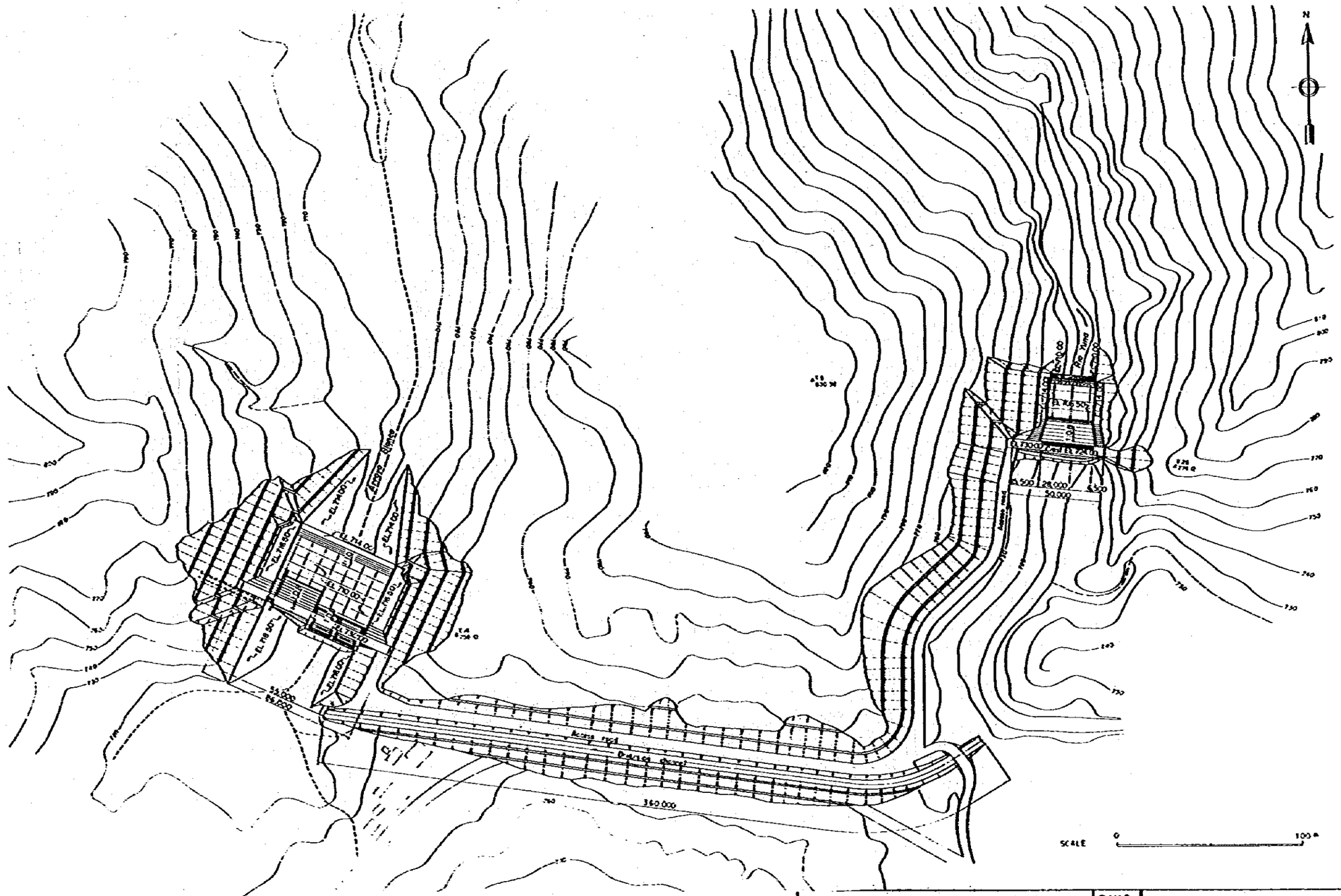

A. Colorado Intake weir (Plan C)
A. Colorado Intake weir (Plan B)
Alternative plan B
Alternative plan C
Alternative plan A
Connecting tunnel
Headrace tunnel
Alternative plan A, B, and C
Yuna No.2 Powerstation
Piedra Gorda Dam
Los Veganos V-3 Weir
Yuna No.1 Powerstation
El Frio Afterbay weir
LEGEND
Existing road
Access road
Tunnel
Penstock
River
Dam
Weir
Surge tank
Powerstation
Reservoir area
Alternatives
Plan A: El Torito Dam - Los Veganos Weir Complex.
Plan B: Pico de Yuna Weir - Los Veganos Weir Complex.
Plan C: El Torito Weir - Los Veganos Weir Complex.
SCALE
0 500 1000 1500 2000m
CORPORACION DOMINICANA DE ELECTRICIDAD
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX
COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS
JAPAN INTERNATIONAL COOPERATION AGENCY
DWG
01
General Layout of Alternatives
Esquema de las Alternativas

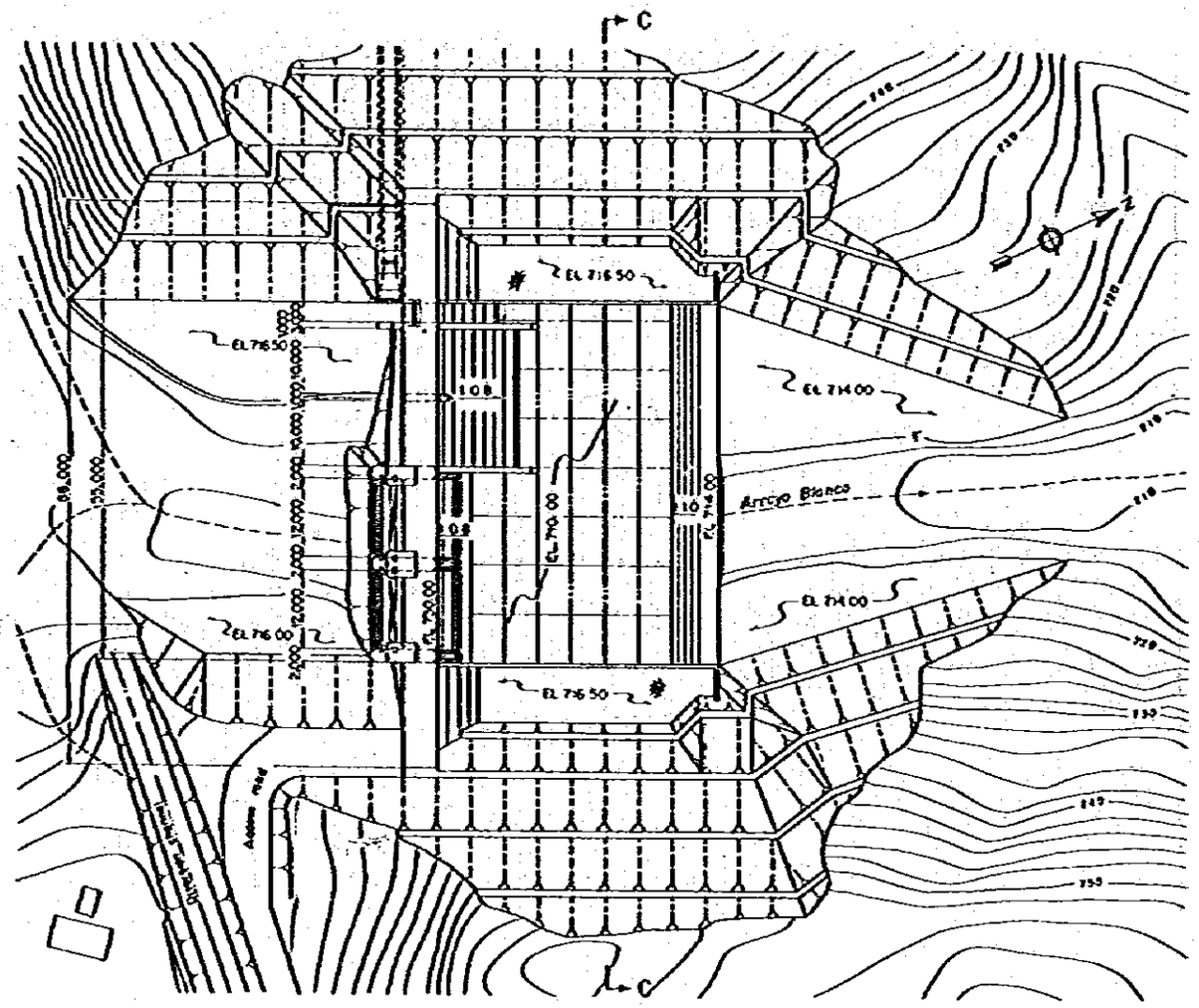


SCHEMATIC PROFILE OF EL TORITO – LOS VEGANOS COMPLEX

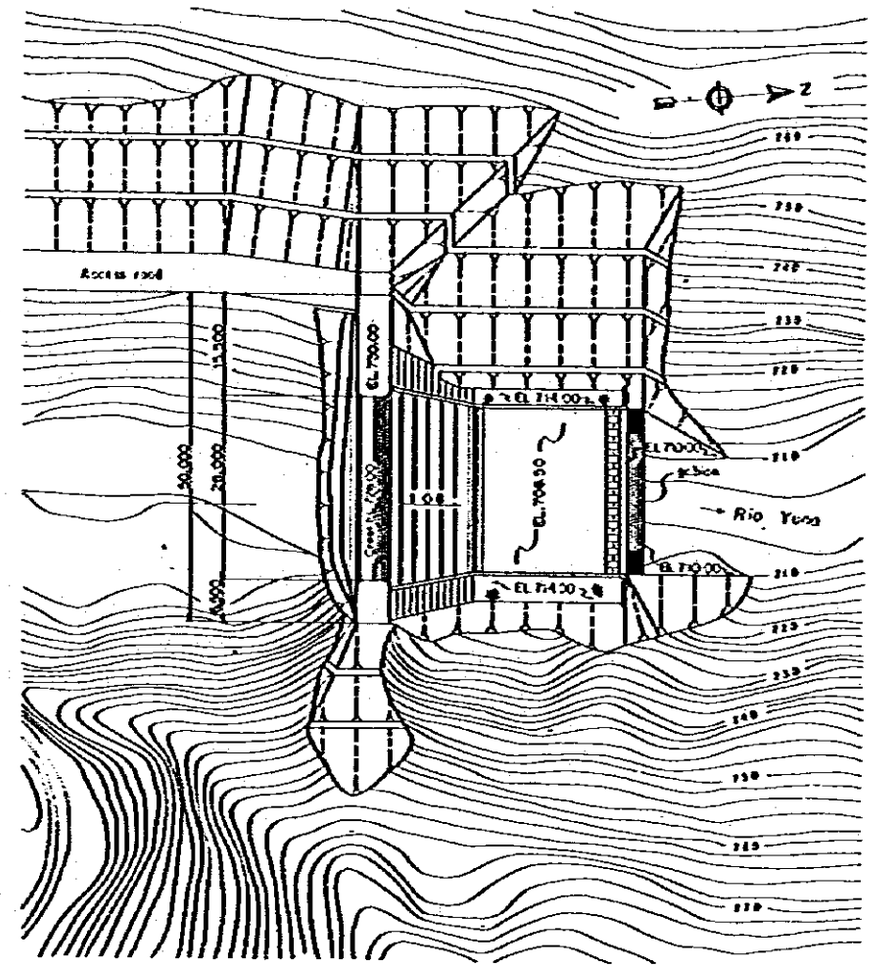
CORPORACIÓN DOMINICANA DE ELECTRICIDAD	DWG	General Profile of El Torito – Los Veganos Complex
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO LOS VEGANOS	02	Perfil de las Alternativas
JAPAN INTERNATIONAL COOPERATION AGENCY		



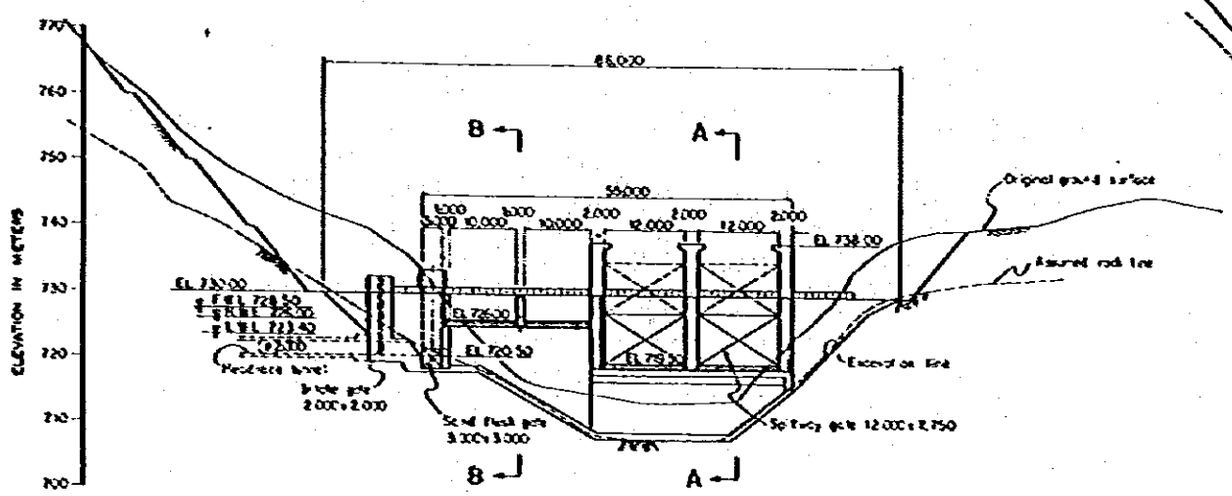
CORPORACION DOMINICANA DE ELECTRICIDAD EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS JAPAN INTERNATIONAL COOPERATION AGENCY	DWG 03	T-1 & T-2 Weir General Layout Plan General de las Derivadoras El Torito



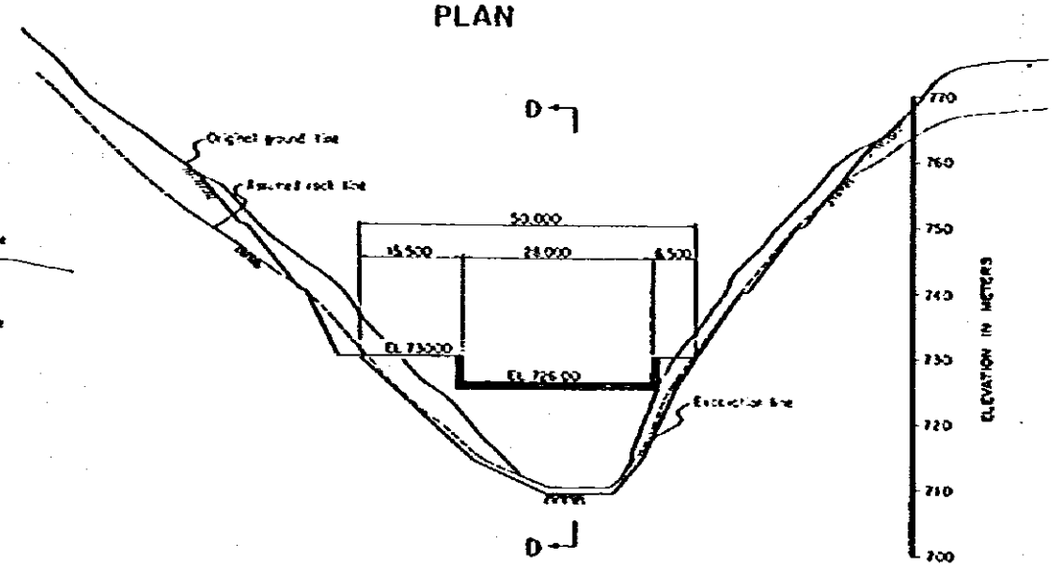
PLAN



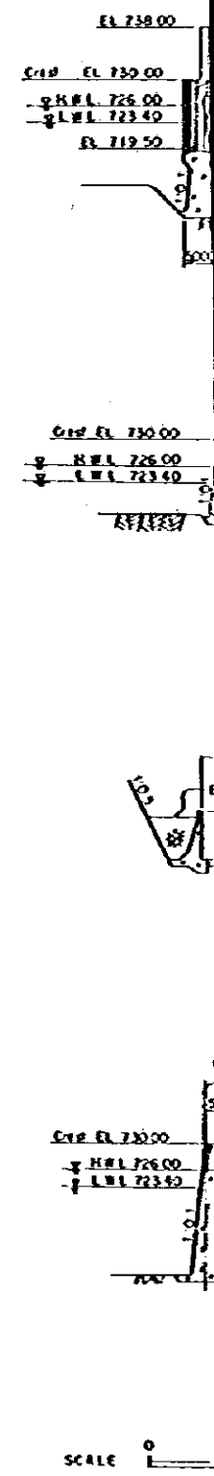
PLAN



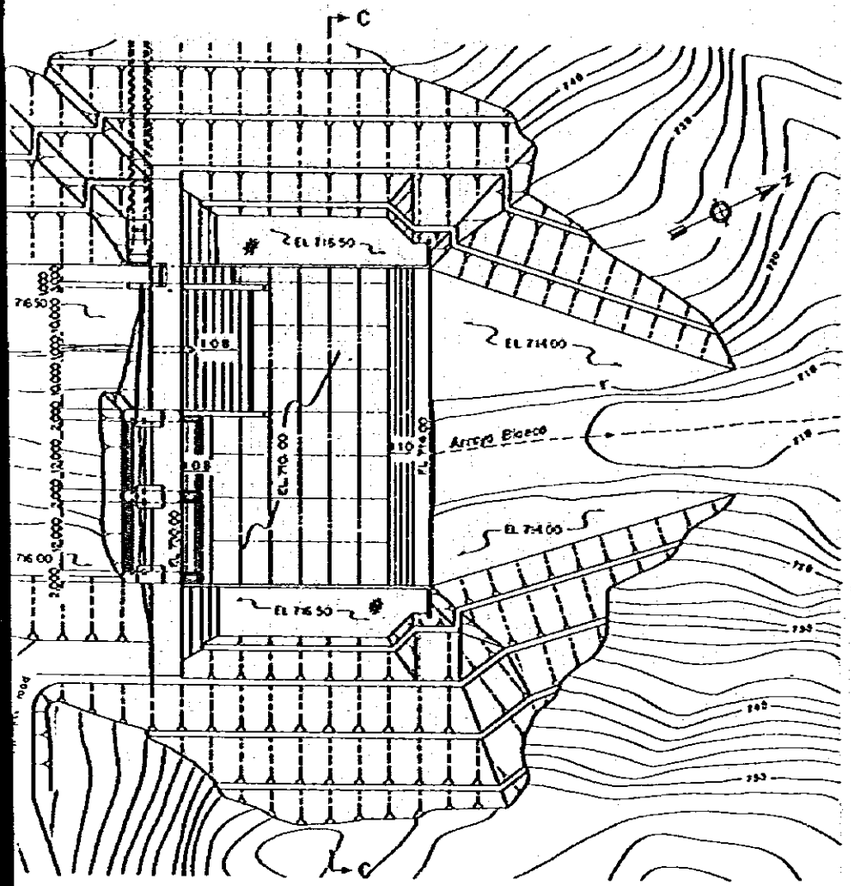
UPSTREAM ELEVATION



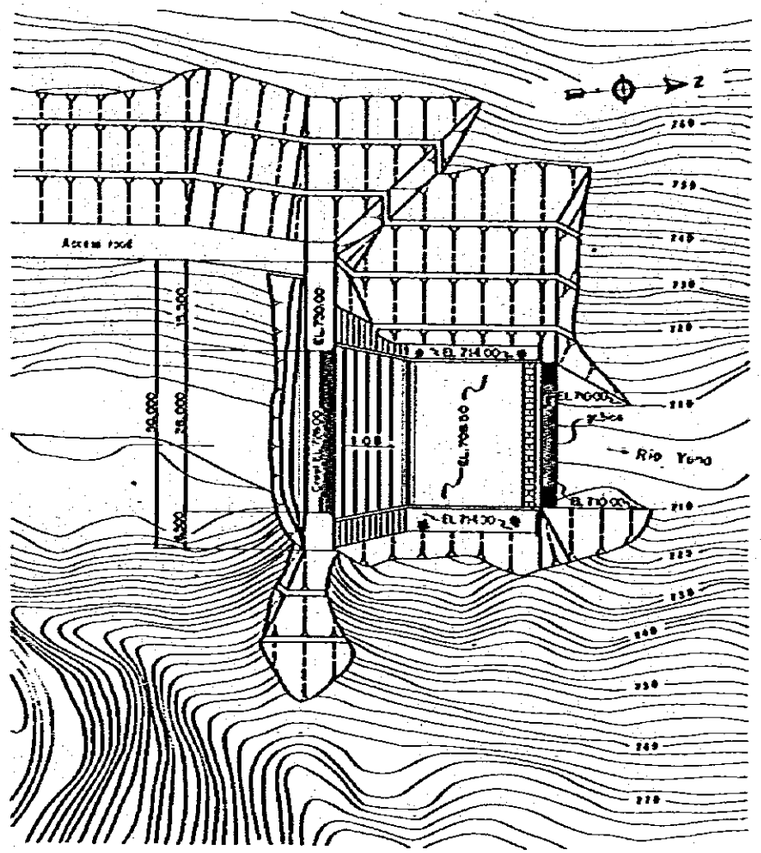
UPSTREAM ELEVATION



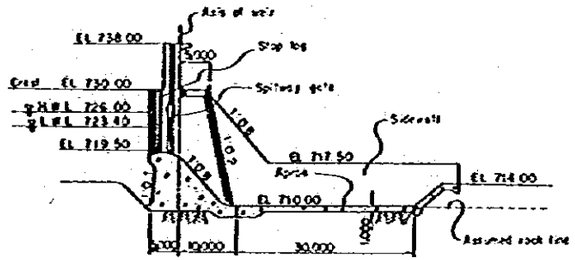
CORPORACIÓN DOMINICANA DE ELECTRICIDAD
EL TORTO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORTO-LOS VEGANOS
JAPAN INTERNATIONAL COOPERATION AGENCY



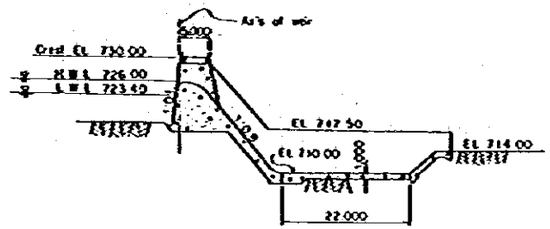
PLAN



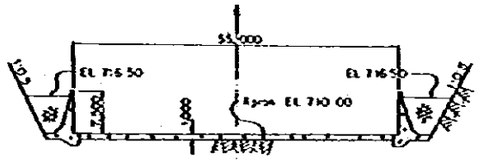
PLAN



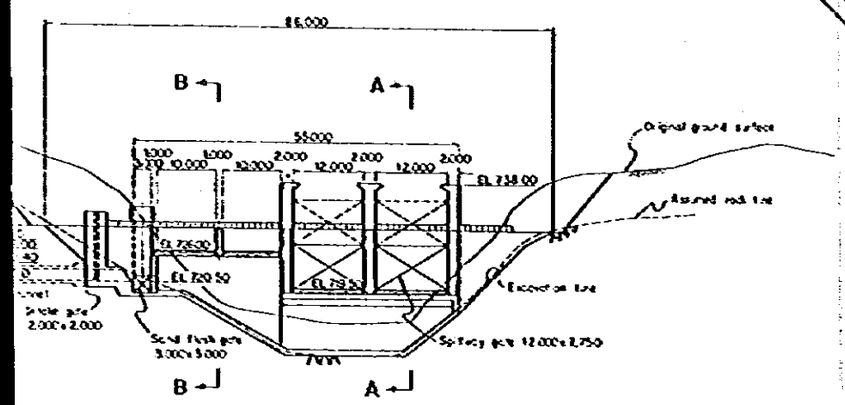
SECTION A-A



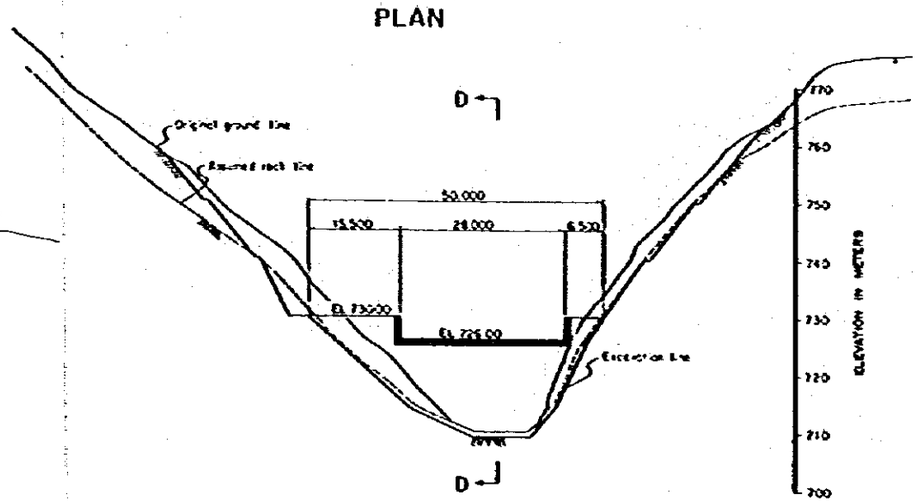
SECTION B-B



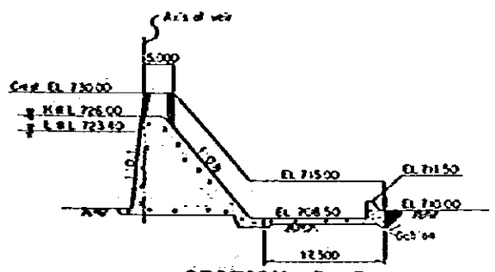
SECTION C-C



UPSTREAM ELEVATION



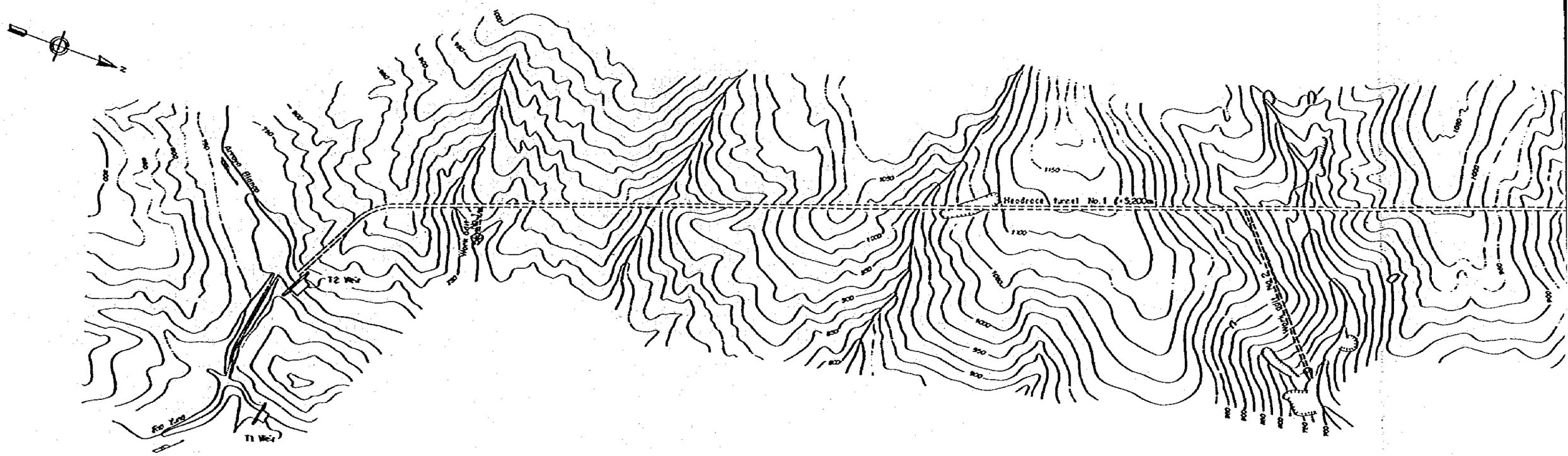
UPSTREAM ELEVATION



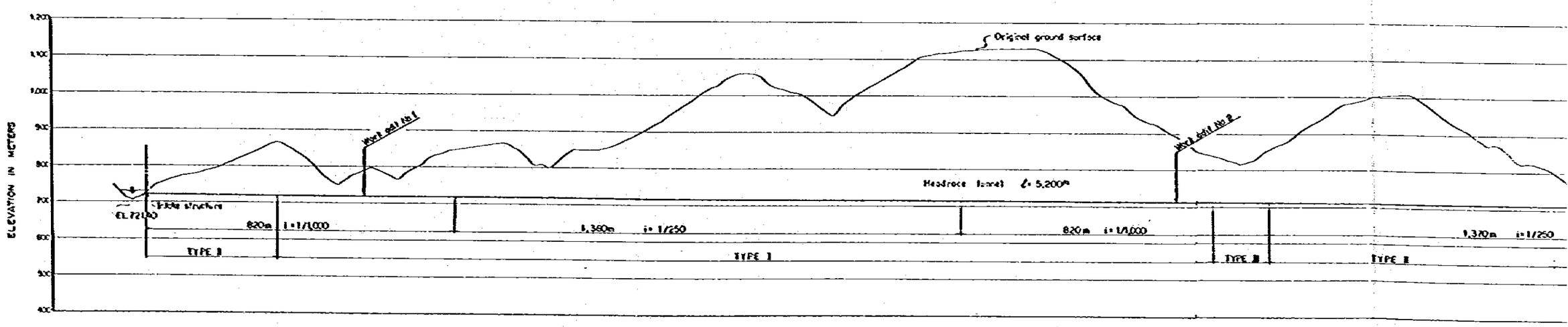
SECTION D-D

SCALE 0 50m

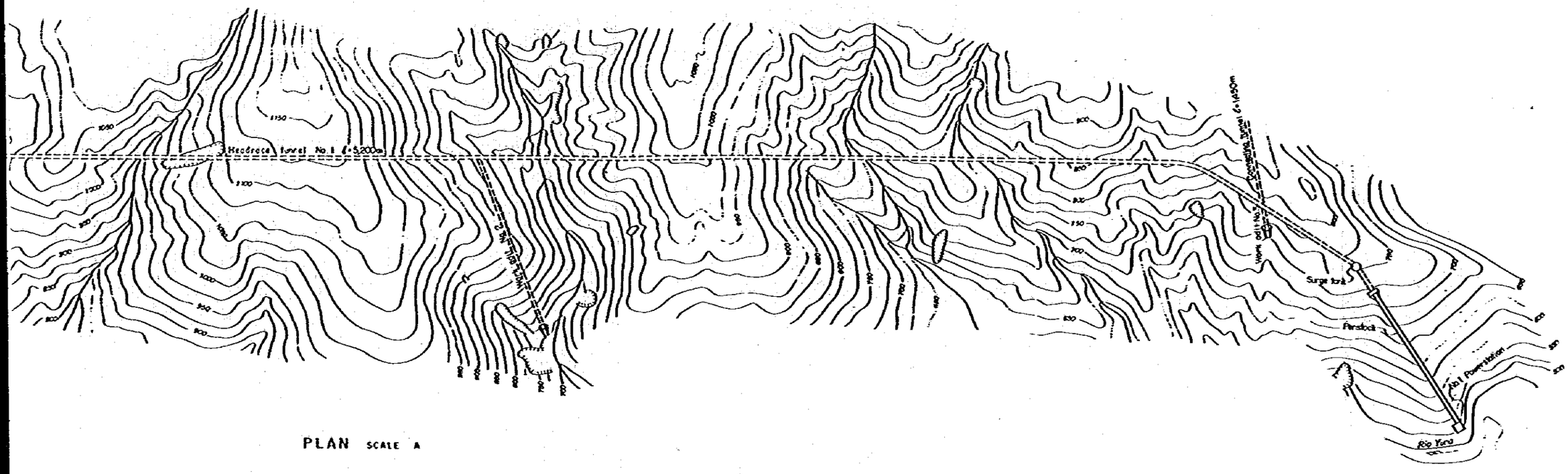
CORPORACIÓN DOMINICANA DE ELECTRICIDAD	DWG	T-1 & T-2 Weir Plan and Profile of Weir
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELÉCTRICO EL TORITO-LOS VEGANOS	04	Plan y Sección de los Derivadoras T-1 y T-2
JAPAN INTERNATIONAL COOPERATION AGENCY		



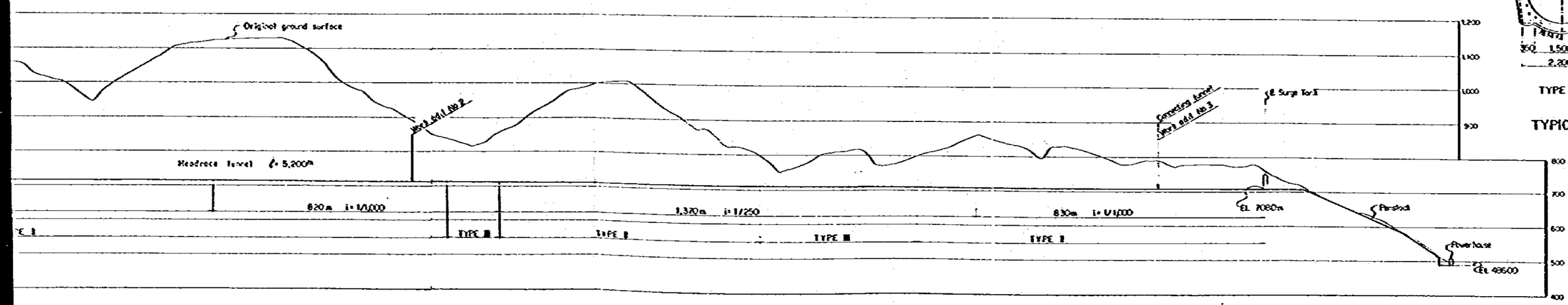
PLAN SCALE A



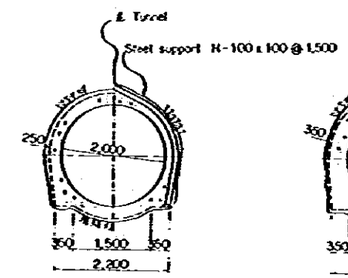
PROFILE SCALE A



PLAN SCALE A

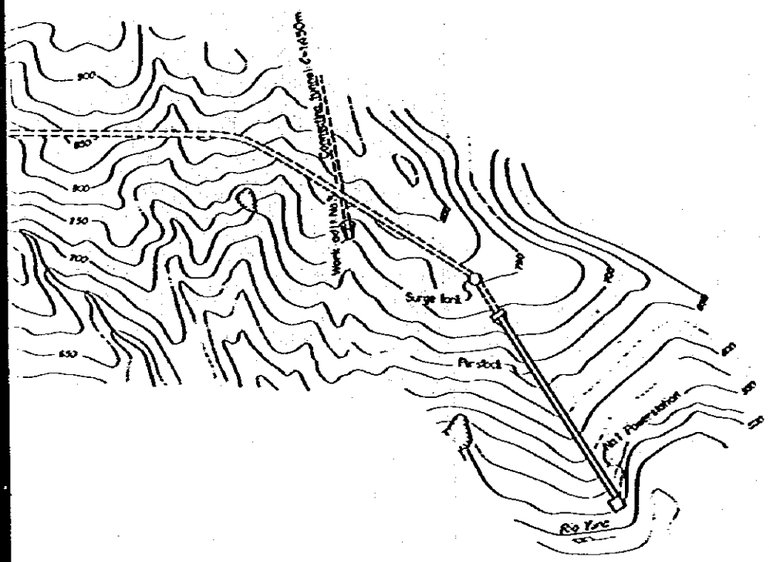


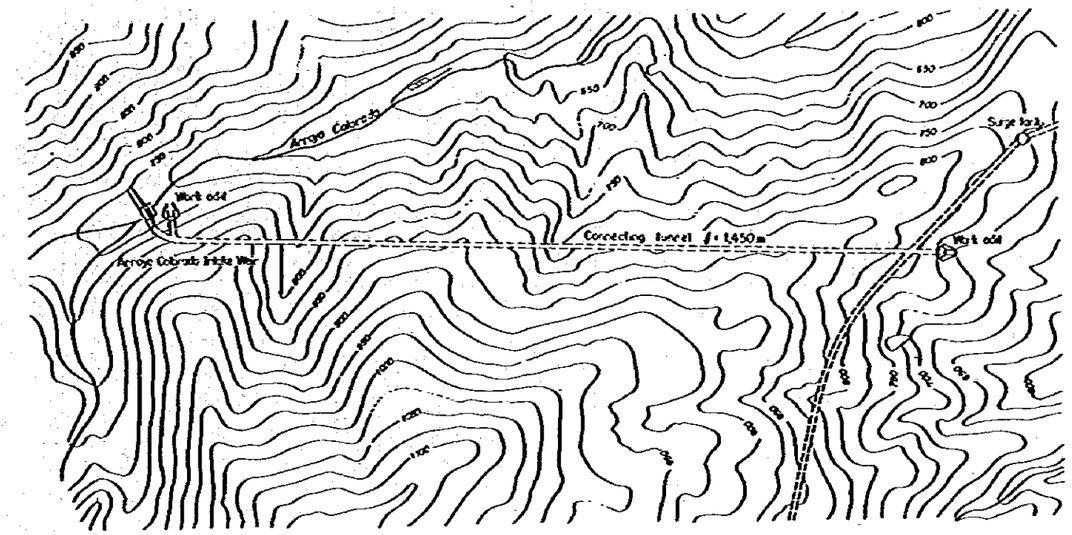
PROFILE SCALE A



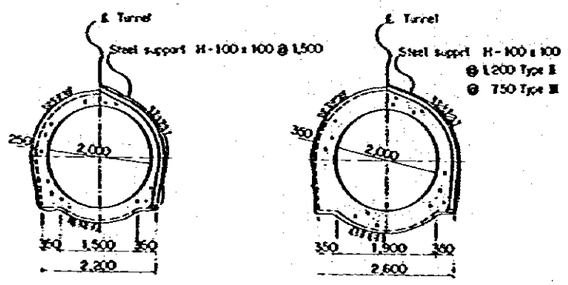
TYPE I

TYPICAL CROSS SECTIONS OF TI

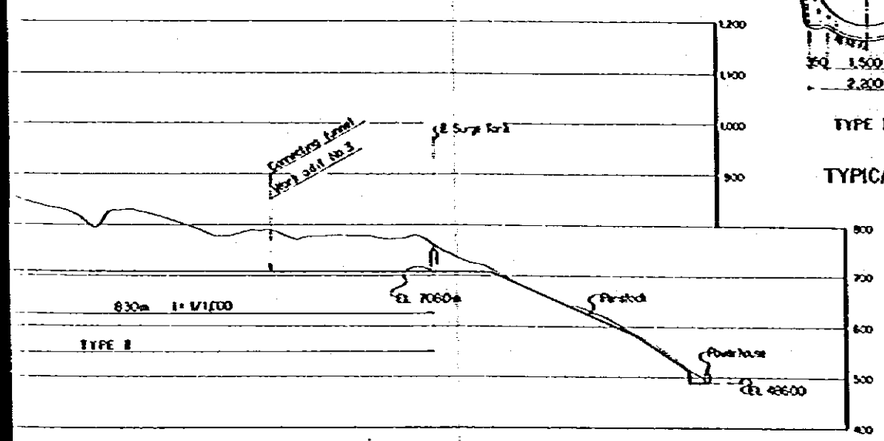


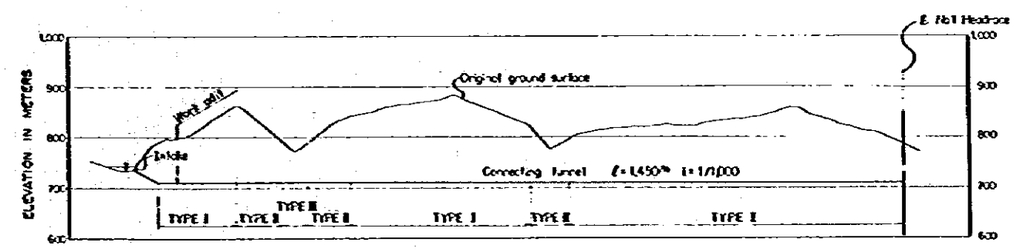


PLAN SCALE A



TYPICAL CROSS SECTIONS OF TUNNEL SCALE B

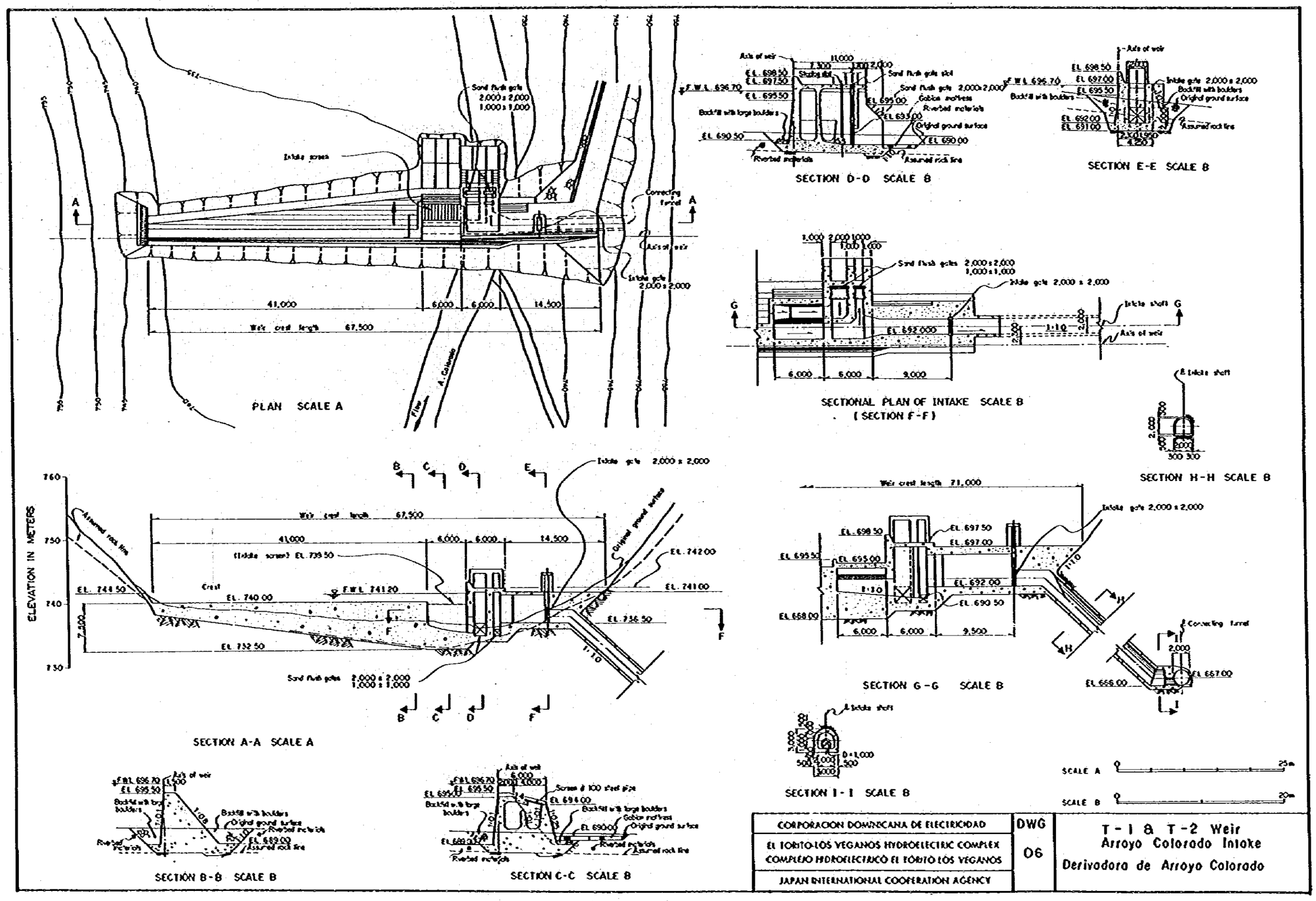




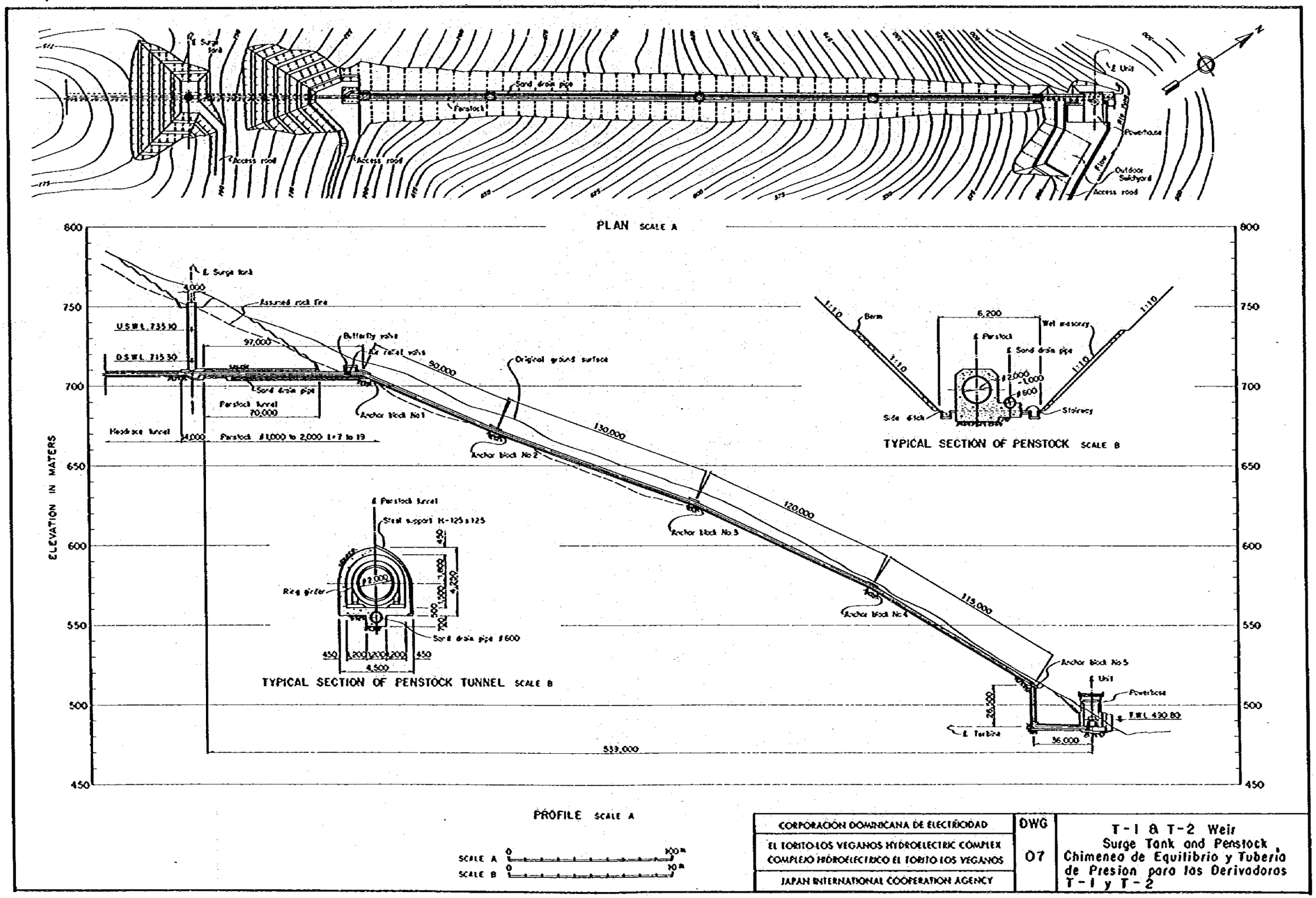
PROFILE OF CONNECTING TUNNEL SCALE A

SCALE A 0 — 500m
SCALE B 0 — 50m

CORPORACION DOMINICANA DE ELECTRICIDAD	DWG	T-1 & T-2 Weir Waterway
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO LOS VEGANOS	05	Conduccion de Agua Derivadora T-1 y T-2
JAPAN INTERNATIONAL COOPERATION AGENCY		



CORPORACION DOMINICANA DE ELECTRICIDAD	DWG	T-1 & T-2 Weir Arroyo Colorado Intake Derivadora de Arroyo Colorado
EL TORTO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORTO LOS VEGANOS	06	
JAPAN INTERNATIONAL COOPERATION AGENCY		



CORPORACION DOMINICANA DE ELECTRICIDAD	DWG	T-1 & T-2 Weir Surge Tank and Penstock, Chimenea de Equilibrio y Tuberia de Presion para las Derivadoras T-1 y T-2
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS	07	
JAPAN INTERNATIONAL COOPERATION AGENCY		

END