ANNEX E

ANNEX - E

CONSTRUCTION MATERIALS

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E. CONSTRUCTION MATERIALS

E.1 INTRODUCTION

Field survey, test pitting and laboratory test, as well as drilling and seismic exploration, have been carried out in El Torito area and Los Veganos area to investigate availability of construction materials, namely earth, filter, rock and concrete aggregate. The scope of investigations is briefly explained hereunder.

1) Field reconnaissance and selection of borrow areas and quarry sites:

Reconnaissance has been executed in the field to identify possible borrow areas and quarry sites for earth, sand, gravel and rock materials. The field reconnaissance has been performed on the basis of 1/5,000 scaled topographic map and 1/20,000 scaled aerial photographs, as well as by referring to the results of geologic survey.

2) Test pitting and sampling of materials:

A total of 6 test pits respectively in El Torito area and Los Veganos area have been excavated and investigated for the purpose of construction material survey. Sampling of materials has also been in possible borrow areas for earth, sand and gravel in El Torito and Los Veganos areas. (Refer to Table E-01, Fig. E-02, E-07 and E-11)

3) Drilling and geophysical exploration:

For the purpose of construction material survey, 6 seismic lines with a total length of 2,040 have been explored, in addition to the geophysical and geologic survey at the major structure sites which have also been referred to in this study. Core drillings have been performed at the possible earth borrow area and quarry sites for rock materials. A total of 5 drillings with a total depth of approximately 148 m, have been investigated. (Refer to Table E-01, Fig. E-02 and E-07)

4) Laboratory tests:

Laboratory tests to examine quality of the construction materials have been executed at the Tavera-Bao and Hatillo laboratories arranged by CDE. A total of 22 samples have been tested, as shown on Table E-02 and soil mechanic test sheets appended hereto.

5) Study on quality and quantity of available materials:

On the basis of field survey and laboratory test, studies have been executed to evaluate quality and quantity of available construction materials, in the light of major structures to be constructed for El Torito-Los Veganos hydroelectric complex.

E.2 MATERIALS IN EL TORITO AREA

E.2.1 Earth Materials

Through the field reconnaissance, the borrow areas for earth materials for impervious core and found to be obtainable, in principle, from the two alternative sites as follows:

Earth Borrow Area T-I : Located to the south of T-1 and T-2 damsites, or in the southern abutment of T-3 saddle damsite. (Refer to Fig. E-01 and E-02)

Earth Borrow Area T-II: Located at a site 2 km upstream of T-1 damsite, or called Los Pejes. It is linked with the damsite with the existing road to El Torito. (Refer to Fig. E-01 and E-02)

At the T-I earth borrow area, a seismic exploration (line T3-A) has been performed to obtain subsoil profile as an earth borrow area and as T-3 saddle damsite. (Refer to Fig. E-03) Likewise, two core drillings have been executed at the borehole No. TQ-B2 and TQ-B3. (Refer to Fig. E-02 and Log Sheets EL-02 to EL-03) 6 test pits have also been excavated and investigated. At the T-II earth borrow area, soil sampling has been conducted at two sites (Los Pejes 1 and Los Pejes 2, as shown on Fig. E-02).

On the basis of the result of investigations as explained above, available quantity of earth materials is estimated as summarized hereunder.

	Estimated Quantity
Earth borrow area T-I	700,000 m^3
Earth borrow area T-II	1,000,000 m^3

In case the combined dam construction at T-1 and T-2 damsites is planned, the excavation of earth borrow area T-I will serve simultaneously for excavation of connecting open channel of reservoirs. Available area and depth to be borrowed at T-I area are estimated to be 18 ha. and 4 m, respectively on an average. Although the borrow area T-I is located close to the T-1 and T-2 damsites, an access road of around 1 km has to be developed,

because the elevation of the borrow area is about 100 m higher than the damsites. The earth borrow area T-II has an area of about 10 ha. and the average depth of 10 m.

For construction of fill-type dams at T-1 and T-2 damsites, the available earth materials for impervious core are considered as sufficient in quantity.

Earth materials available in T-I borrow area are qualitatively examined. The materials are classified into GC-MH under the unified soil classification. A plastic index ranges from 9 to 19%. The natural moisture content varies in the range of 19-52%, which deviates by 7-16% wetter than the optimum moisture content. The result of laboratory tests of earth materials is summarized on Table E-03 and E-04.

The grain size is very fine as illustrated on Fig.E-05. The permeability coefficient is as low as a value in the order of 10^{-6} to 10^{-7} cm/sec.

To improve the soil properties such as shear strength, trafficability and gradation, earth material shall be mixed with sandy material which lain at the lower part of the clayey soil layer.

Earth materials available in T-II borrow area are classified into ML-MH. Plasticity index ranges from 16 to 24%. The natural moisture content varies in the range of 34-44%, which deviates by 6 to 16% wetter than the optimum moisture content.

The grain size is fine, as shown on Fig.E-05. The permeability coefficient is as low as a value in the order of 10^{-7} cm/sec. These materials can be utilized as core materials without mixing sandy materials.

E.2.2 Filter and Concrete Aggregates

Sand and gravel for filter and concrete aggregate are obtainable from the riverbed in the vicinity of the proposed damsites. Three borrow areas have been investigated.

Sand-gravel Borrow Area T-I : Located 600 m downstream of T-1 damsite, or immediately downstream from the confluence with Arroyo Blanco, or about 600 m upstream of T-4 weir site.

Sand-gravel Borrow Area T-II : Located on Arroyo Blanco, immediately upstream of T-2 damsite.

Sand-gravel Borrow Area T-III: Located on Arroyo Blanco, about 1.5 km upstream of T-2 damsite.

At the T-I sand and gravel borrow area, a seismic exploration (line TQ-B) has been performed, as shown on Fig. E-04. Sampling of materials at 2 sites (TQ-S1 and TQ-S2) has also been conducted to examine quality of sand and gravel. At the T-II and T-III borrow area, samplings (TQ-S3 and TQ-S4) have been conducted. (Refer to Fig.E-02)

On the basis of these investigations, the available quantity of sand and gravel in these borrow areas is estimated as summarized hereunder.

		Estimated Quantity
Sand-gravel borrow T-I	:	150,000 m^3
Sand-gravel borrow T-II	:	20,000 m^3
Sand-gravel borrow T-III	:	20,000 m^3
Total	:	190,000 m^3

The borrow area T-I is the largest in El Torito area. The borrow area T-I has an area of about 8 ha., and an average depth of about 2 m. Total quantity of sand and gravel available in El Torito area is considered as sufficient for use as filter materials for rock-fill type dams at T-1 and T-2 damsite. It will also be sufficient to use for concrete aggregates for construction of a gravity weir at T-4 site. However, to adjust a gradation curve of sand and gravel to required gradation of concrete aggregate, a crushing plant shall be installed. The available quantity of sand and gravel is not sufficient to meet the requirement for construction of a concrete gravity dam at T-1 site. In case T-1 dam is designed as a gravity dam, rocks must be crushed and sieved, which will lead to the implication

that the construction of a gravity dam at T-1 site will cost much higher.

Relatively finer sand and gravel and located at the left abutment of the Yuna river as a terrace deposit. Gradation of the sand and gravel is shown in Fig. E-05. The result of gradation analysis indicates that sand and gravel can be utilized as filter materials for T-1 and T-2 rock-fill type dams. Besides, it can also be used for concrete aggregate.

Specific gravity is 2.64 and absorption is around 1%. Fineness modulus is 3.85 and abrasion is 22% by Los Angeles abrasion test apparatus. These test results indicate that the material has a sufficient quality as a concrete aggregate.

E.2.3 Rock Materials

Rock materials are obtainable from a quarry site to be located at 1.2 km upstream of T-2 damsite. (Refer to Fig. E-01 and E-02) At this quarry site, a seismic exploration (line TQ-A) and a core drilling (hole No. TQ-B1 Refer to Log Sheet EL-01) have been conducted. The rock amphibolite of the Duarte Formation.

On the basis of drilling and seismic exploration, as well as the field reconnaissance, the available quantity of rock materials is estimated to exceed over 1 million m^3. This quantity is considered as sufficient for construction of rock-fill type dams at T-1 and T-2 damsites.

Drilled core has been examined to find that the rock of amphibolite has a sufficient durability, hardness and soundness as rock materials for a rock-fill type dam construction. Although the laboratory test has not been executed, it is inferred that the rock property is similar to that of sand and gravel tested for concrete aggregates, because amphibolite origin is the same in both cases.

E.3 MATERIALS IN LOS VEGANOS AREA

E.3.1 Earth Materials

Although the construction of a large scale rock-fill type dam at V-1 damsite has been ultimately judged as geotechnically and economically not recommendable, availability of embankment materials has been investigated in the course of this study. The result of investigations is briefly introduced for reference purposes.

Earth materials for impervious core is obtainable from two borrow areas, as follows:

Earth borrow area V-I : Located at 1.3 km upstream of V-1 damsite, or on the left bank near the village of Los Veganos. (Refer to Fig. E-06 and E-07)

Earth borrow area V-II: Located on the hill-top extending to the right abutment of V-1 damsite. (Refer to Fig. E-06 and E-07)

In the V-I borrow area, a seismic exploration (line VQ-1) has been executed as shown on Fig. E-08. Core drillings (hole No. VQ-B2 and VQ-B3) have also been conducted. (Refer to Fig. E-07 and Log Sheet EL-04 and EL-05) A total of 4 test pits have been excavated and examined. Likewise, in the V-II borrow area, a seismic exploration (line VQ-3) and 2 test pittings have been executed. (Refer to Fig. E-09)

On the basis of these investigations, available quantity of earth materials for impervious core is estimated as summarized hereunder.

	Estimated Quantity
Earth borrow area V-I :	300,000 m^3
Earth borrow area V-II:	400,000 m^3

The earth borrow area V-I is limited to the toe of the mountain slope, and the treatment of the excavated borrow area requires special care due to the substantially steep slope. In the borrow area V-II, the

extension and the average depth of earth materials are estimated to be 6 ha. and 7 m, respectively.

The earth materials in the V-I borrow area are classified into GM-MH under the unified soil classification. The natural moisture content falls in the range of 12-40%, which deviates by 1-19% drier or wetter than the optimum moisture content. The plasticity index ranges from 5 to 16%. The permeability coefficient is in the order of 10^{-5} to 10^{-6} cm/sec. (Refer to Table E-03 and E-04). The grain size distribution is also illustrated on Fig. E-10.

Judging from the results of tests, the earth materials in the V-I borrow area can be utilized as core materials for the construction of a rock-fill type dam. They can be used without mixing sandy materials.

The earth materials in the V-II borrow area are classified into ML under the unified soil classification. The natural moisture content is about 13%, which is nearly the same as the optimum moisture content. The plasticity index is around 4%. These materials are non or low plastic materials, and it is inferior to the earth materials in the V-I borrow area. The results of soil mechanic tests are shown on Table E-03 and E-04, as well as on Fig. E-10.

E.3.2 Filter and Concrete Aggregates

Sand and gravel for filter and concrete aggregates are available from the riverbed in the vicinity of the alternative damsites. Four borrow areas have been investigated. (Refer to Fig. E-06)

Sand-gravel Borrow Area V-I : Located along the Yuna river, just downstream from V-3 damsite.

Sand-gravel Borrow Area V-II : Located 800 m upstream of V-3 damsite.

Sand-gravel Borrow Area V-III: Located along the Yuna river, 1.8 km upstream of V-3 damsite, or near the village of Los Veganos.

Sand-gravel Borrow Area V-IV : Located along the Yuna river, 2.2 km upstream of V-3 damsite.

The borrow area V-I has an extension of around 3 ha. with an average depth of 1 m. On the basis of field survey and 1/5,000 scaled topographic map, the available quantity of sand and gravel in each borrow area is estimated as summarized hereunder.

	Estimated Quantity
Sand-gravel borrow V-I :	30,000 m^3
Sand-gravel borrow V-II :	25,000 m^3
Sand-gravel borrow V-III:	15,000 m^3
Sand-gravel borrow V-IV :	20,000 m^3
Total :	90,000 m^3

It is considered that the available sand and gravel are quantitatively sufficient to meet the requirement for filter materials for construction of a rock-fill type dam, or for concrete aggregates of a gravity type weir construction at V-3 site. However, to adjust a gradation curve of sand and gravel to required gradation of concrete aggregate, a crushing plant shall be installed.

The results of grain size distribution analysis on filter and concrete aggregates are shown on Fig. E-10. The gradation is similar to the results obtained in filter and concrete aggregate test executed for T-I to T-III borrow area in El Torito area. The properties of specific gravity, absorption and fineness modulus are summarized as follows:

Specific gravity:	2.67
Absorption :	1.0 - 1.1%
Fineness modulus:	4.2

E.3.3 Rock Materials

Rock materials are obtainable from a quarry site to be located on the left bank of the Yuna river, immediately upstream of the confluence with Arroyo Colorado. It is about 200 m downstream from V-1 damsite, or

200 m upstream of V-3 damsite. A seismic exploration (line VQ-2) has been executed at the quarry site. (Refer to Fig. E-08) Although a drilling originally programmed in the site was cancelled, the geologic investigations including drillings along the surge tank and penstock line for the downstream alternative power station of El Torito scheme which are located immediately to the south of the quarry site, are referable.

Judging from the results of field survey and seismic exploration, available quantity of rock materials is estimated to be more than 1 million m^3 in volume, which is sufficient for embankment materials for V-1 dam. According to the seismic exploration, the overburden of soil and weathered rock is around 7-10 m in depth on an average. Quality of rock materials (limestone) underlying such an overburden is suitable for use as rock/riprap materials for a rock-fill type dam construction.

TABLES

Table E-01 QUANTITY OF TEST PITTING, DRILLING AND SEISMIC EXPLORATION

(CANTIDAD DE CARICATAS, PERFORACION Y EXPLORACION SISMICA)

Location and Material		Test Pit No. Drilling No. Seismic Expl.No.	Depth Length (m)	Remarks
[A] El Torito Area				
(1) Earth Materials				
Earth borrow area	T-I	TQ-1	2.0	Test Pit
-do-		TQ-2	2.4	"
-do-		TQ-3	4.2	"
-do-		TQ-4	4.0	"
-do-		TQ-5	4.0	"
-do-		Terrace deposit	2.0	"
-do-		T3-A	460	Seismic exploration (T-3 saddle damsite)
-do-		TQ-B2	24.5	Drilling
-do-		TQ-B3	34.6	"
Earth borrow area	T-II	Los Pejes-1	-	Sampling
		Los Pejes-2	-	"
(2) Filter/Concrete Aggregate Materials				
Sand and gravel borrow area	T-I	TS-1	0.5	Sampling
-do-	T-I	TS-2	0.5	"
-do-	T-II	TS-3	0.5	"
-do-	T-III	TS-4	0.5	"
-do-	T-I	TQ-B	245	Seismic exploration
(3) Rock Materials				
Quarry site	T	TQ-B1	40.0	Drilling
-do-		TQ-A	150	Seismic exploration

(to be continued)

Location and Material		Test Pit No. Drilling No. Seismic Expl.No.	Depth Length (m)	Remarks
[B] Los Veganos Area				
(1) Earth Materials				
Earth borrow area	V-I	VQ-1	4.0	Test pit
-do-		VQ-2	3.8	"
-do-		VQ-4	4.0	"
-do-		VQ-5	6.0	"
-do-		VQ-1	345	Seismic exploration
-do-		VQ-B2	28.8	Drilling
-do-		VQ-B3	20.0	"
Earth borrow area	V-II	VQ-3-1	4.0	Test pit
-do-		VQ-3-2	2.5	"
-do-		VQ-3	495	Seismic exploration
(2) Filter/Concrete Aggregate Materials				
Sand and gravel borrow area	V-I	VS-1	0.5	Sampling
-do-	V-II	VS-2	0.5	"
-do-	V-III	VS-3	0.5	"
-do-	V-IV	VS-4	0.5	"
(3) Rock Materials				
Quarry site	V	VQ-B1	(cancelled)	Drilling
-do-		VQ-2	345	Seismic exploration

Table E-02 ITEMS OF LABORATORY TESTS
(ENSAYOS DE LABORATORIO)

Test Item	El Torito	Los Veganos	Total
A. Earth Material Test			(14 Samples)
1) Index Properties Test			
- Natural moisture content	8	6	14
- Specific gravity	8	6	14
- Gradation analysis	8	6	14
- Soil consistency	8	6	14
- Unit weight	1	0	1
2) Engineering Properties Test			
- Compaction	8	6	14
- Triaxial compression	2	2	4
- Permeability	8	6	14
- Consolidation	3	2	5
B. Filter and Concrete Aggregate Tests			(8 Samples)
- Sieve analysis	4	4	8
- Specific gravity and absorption	1	1	2
- Abration of coarse aggregate	1	1	2
- Maximum and minimum density	1	1	2

Table E-03 SUMMARY OF LABORATORY TEST RESULTS (EARTH MATERIAL) (1)

(RESULTADO DEL ENSAYO DE LABORATORIO MATERIALES IMPERMEABLES)(1)

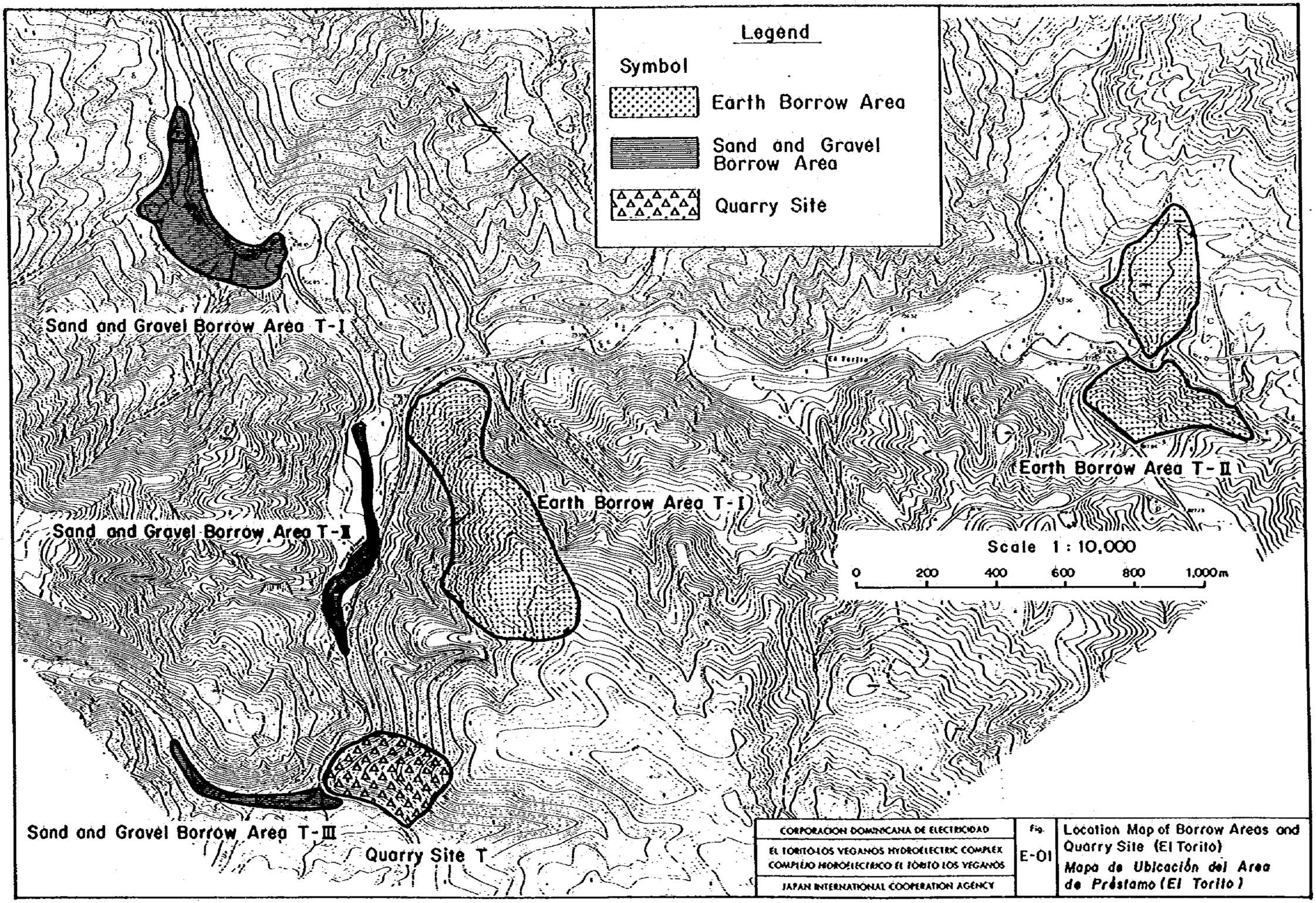
Sample No.	Sampling depth (m)	Gradation (Passing %) Max. (mm)	4.76 (mm)	0.074 (mm)	0.005 (mm)	Consistency WL (%)	WP (%)	IP (%)	Gs	Wn	Unified Soil classification
El Torito Area											
T3-1	4.0	25.4	84	50	21	36.5	30.4	6.1	2.97	42.9	ML
T3-3	4.0	2.38	100	40	28	35.5	27.4	8.1	2.81	33.0	ML
TQ-1	2.0	2.38	100	76	37	43.0	32.9	10.1	2.73	47.2	ML
TQ-4	3.5	25.4	99	96	45	50.5	32.0	18.5	2.82	45.5	MH
TQ-5	3.5	2.38	100	95	34	55.5	36.9	18.6	2.90	52.0	MH
Terrace deposit	2.0	38.1	42	31	19	29.2	20.4	8.8	2.93	18.5	GC
Los Pejes 1	0.5	4.76	100	82	39	64.5	40.5	24.0	2.76	33.5	MH
Los Pejes 2	0.5	4.76	100	77	31	48.5	32.0	16.5	2.82	44.2	ML
Los Veganos Area											
VQ-1	4.0	38.1	36	18	7	32.0	22.6	9.4	2.65	17.1	GM-GC
VQ-2	3.8	50.8	60	54	28	51.0	35.3	15.7	2.82	41.2	MH
VQ-4	4.0	25.4	37	28	18	30.0	23.6	6.4	2.60	12.2	ML
VQ-5	4.0	9.52	97	22	10	27.0	22.0	5.0	2.78	17.2	SM-SC
VQ-3-1	3.0	4.76	100	62	28	29.5	25.6	3.9	2.77	12.8	ML
VQ-3-2	2.0	50.8	20	5	2	38.0	28.7	9.3	2.79	7.6	SM-SC

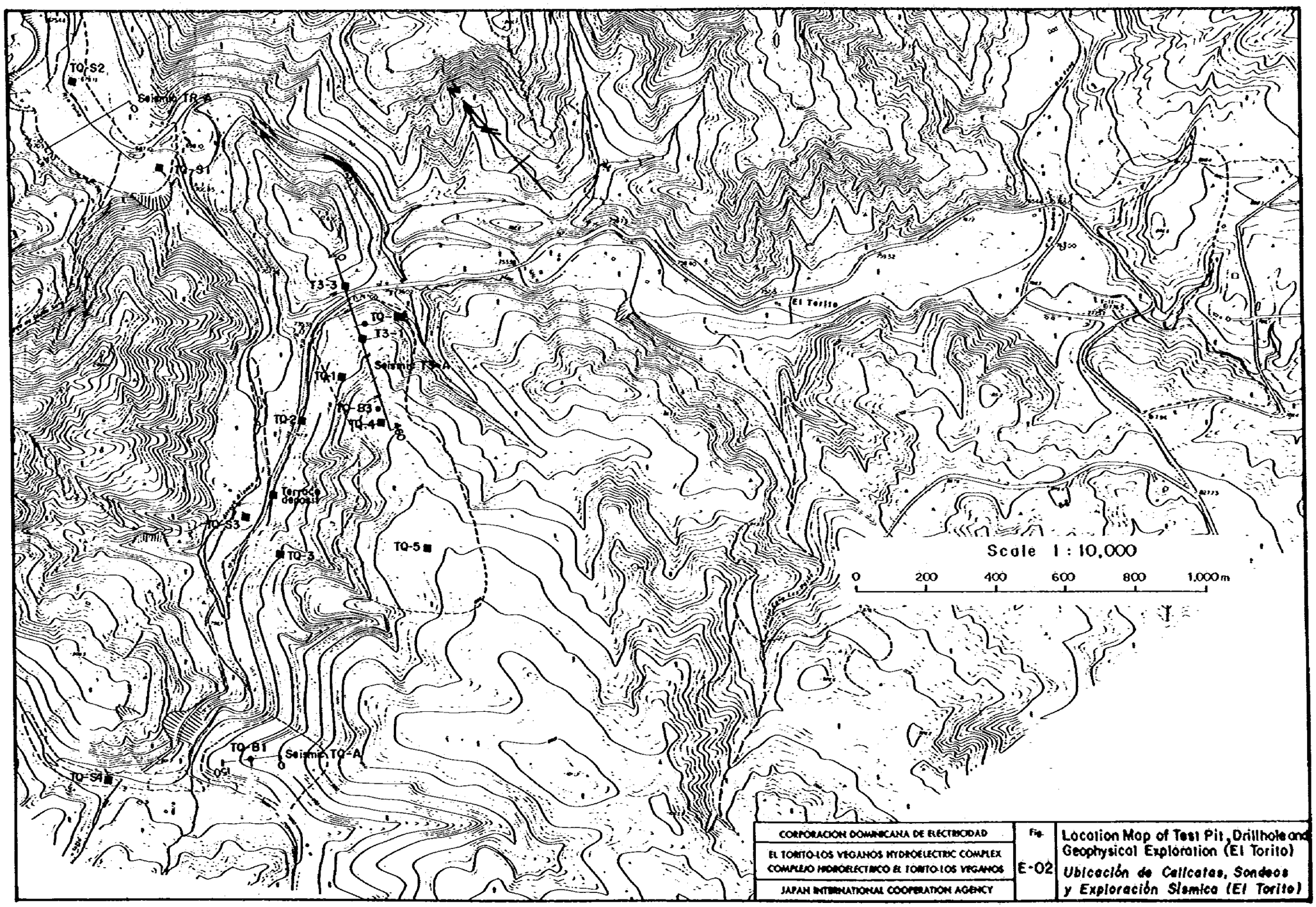
Table E-04 SUMMARY OF LABORATORY TEST RESULTS (EARTH MATERIAL) (2)

(RESULTADO DEL ENSAYO DE LABORATORIO MATERIALES IMPERMEABLES)(2)

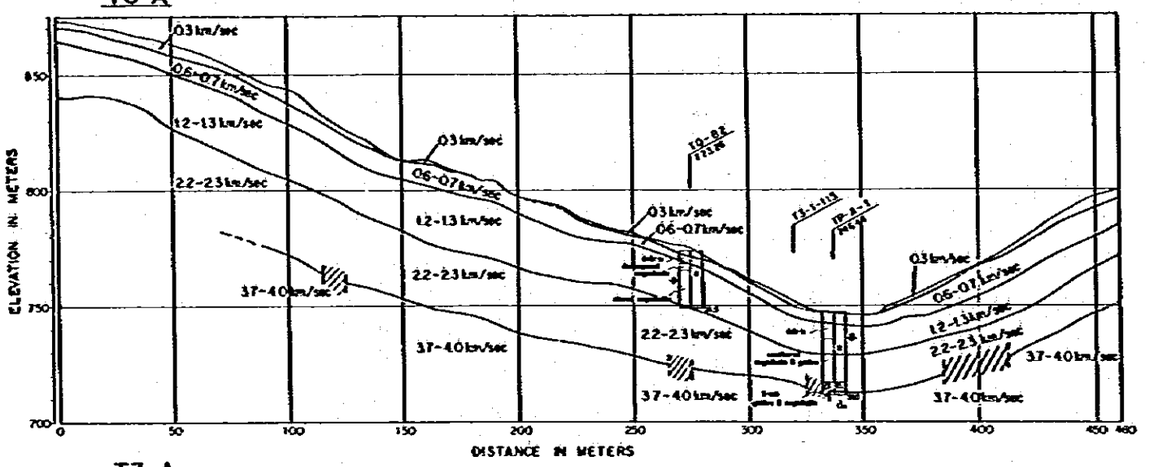
Sample No.	Compaction Wopt (%)	γ_{dmax} (t/m^3)	Shear Strength C' (t/m^2)	ø' (degree)	Coefficient of Permeability K (cm/sec)	Consolidation Cc	Py (kg/cm^2)
El Torito Area							
T-3-1	28.4	1.44	-	-	2.3×10^{-5}	0.81	2.0
T-3-3	25.0	1.53	-	-	9.7×10^{-6}	-	-
TQ-1	31.4	1.45	-	-	9.9×10^{-7}	-	-
TQ-4	33.1	1.35	0.55	29	5.6×10^{-7}	0.29	6.0
TQ-5	36.0	1.36	-	-	1.2×10^{-6}	-	-
Terrace deposit	12.0	1.97	-	-	8.6×10^{-6}	-	-
Los Pejes 1	28.0	1.48	-	-	9.5×10^{-7}		
Los Pejes 2	27.9	1.48	0.64	28.5	8.0×10^{-7}	0.11	5.2
Los Veganos Area							
VQ-1	16.4	2.07	-	-	-	-	-
VQ-2	22.5	1.61	1.60	37	2.3×10^{-5}	0.19	6.2
VQ-4	20.0	2.01	-	-	9.5×10^{-6}	-	-
VQ-5	18.2	1.74	-	-	-	-	-
VQ-3-1	12.5	1.87	0.45	36	2.5×10^{-5}	0.16	6.6
VQ-3-2	14.0	1.99	-	-	1.6×10^{-6}	-	-

FIGURES


Legend
Symbol
Earth Borrow Area
Sand and Gravel Borrow Area
Quarry Site
Sand and Gravel Borrow Area T-I
Earth Borrow Area T-II
Earth Borrow Area T-I
Sand and Gravel Borrow Area T-II
Scale 1 : 10,000
0 200 400 600 800 1,000m
Sand and Gravel Borrow Area T-III
Quarry Site T
CORPORACION DOMINICANA DE ELECTRICIDAD
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX
COMPLEJO HIDROELECTRICO EL TORITO LOS VEGANOS
JAPAN INTERNATIONAL COOPERATION AGENCY
Fig. E-01
Location Map of Borrow Areas and Quarry Site (El Torito)
Mapa de Ubicación del Area de Préstamo (El Torito)


TQ-S2
Seismic TR-B
TQ-S1
T3-3
TQ-
T3-1
Seismic TR-A
TQ-1
TQ-B3
TQ-2
TQ-4
Terrace deposit
TQ-S3
TQ-3
TQ-5
El Torito
TQ-B1
Seismic TQ-A
TQ-S4
Scale 1 : 10,000
0 200 400 600 800 1,000 m
CORPORACION DOMINICANA DE ELECTRICIDAD
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX
COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS
JAPAN INTERNATIONAL COOPERATION AGENCY
Fig. E-02
Location Map of Test Pit, Drillhole and Geophysical Exploration (El Torito)
Ubicación de Calicatas, Sondeos y Exploración Sísmica (El Torito)

T3-A



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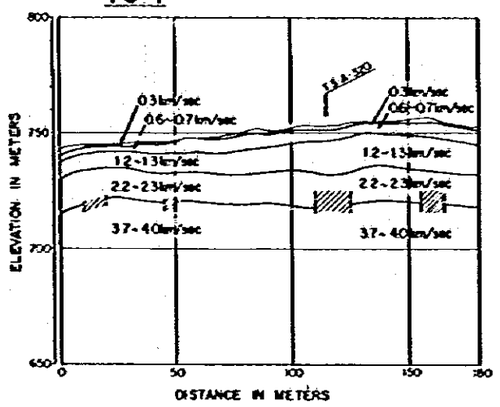

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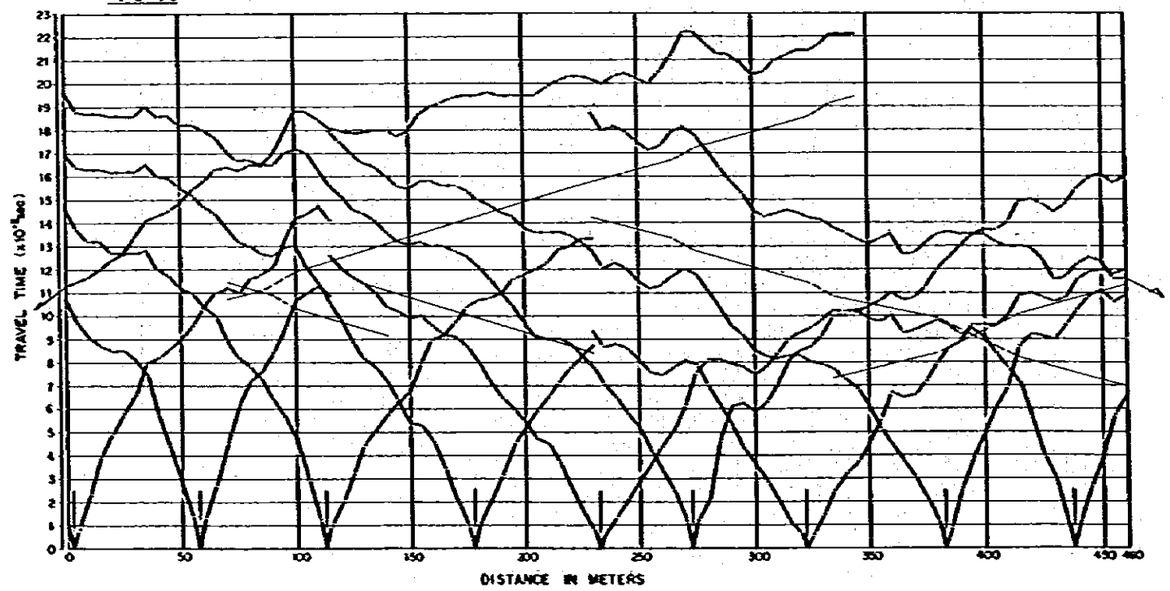

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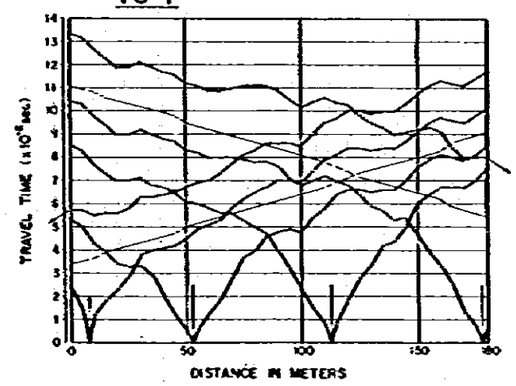
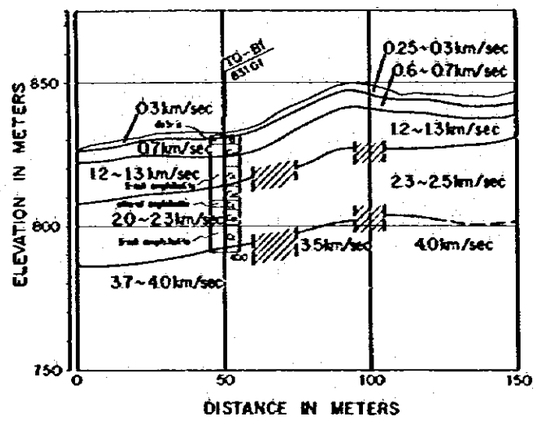
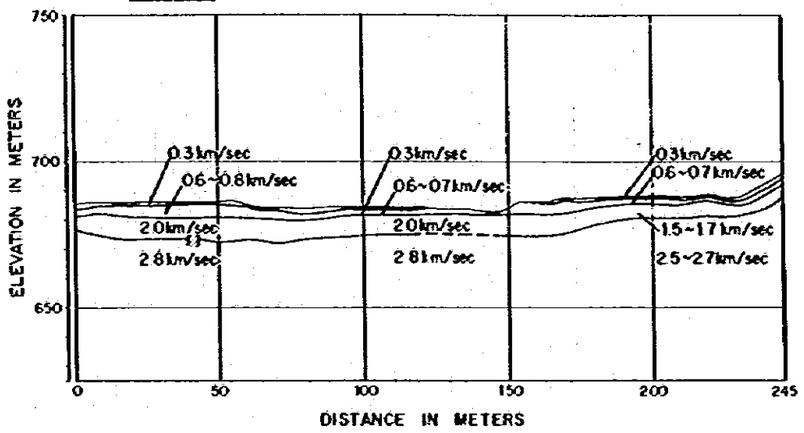


CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Interpretation Profile of Geophysical Exploration (T3)
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELÉCTRICO EL TORITO-LOS VEGANOS	E-03	*Perfil Sísmico (T3)*
JAPAN INTERNATIONAL COOPERATION AGENCY		

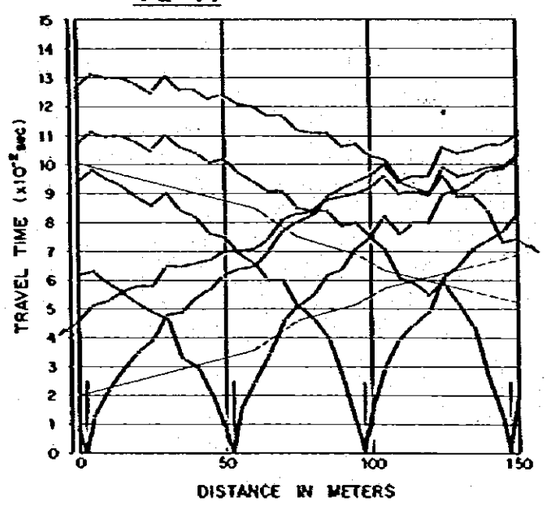
TQ-A



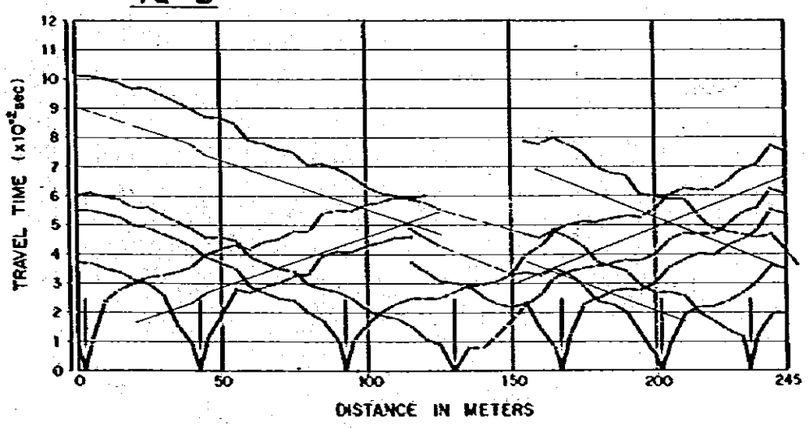
TQ-B



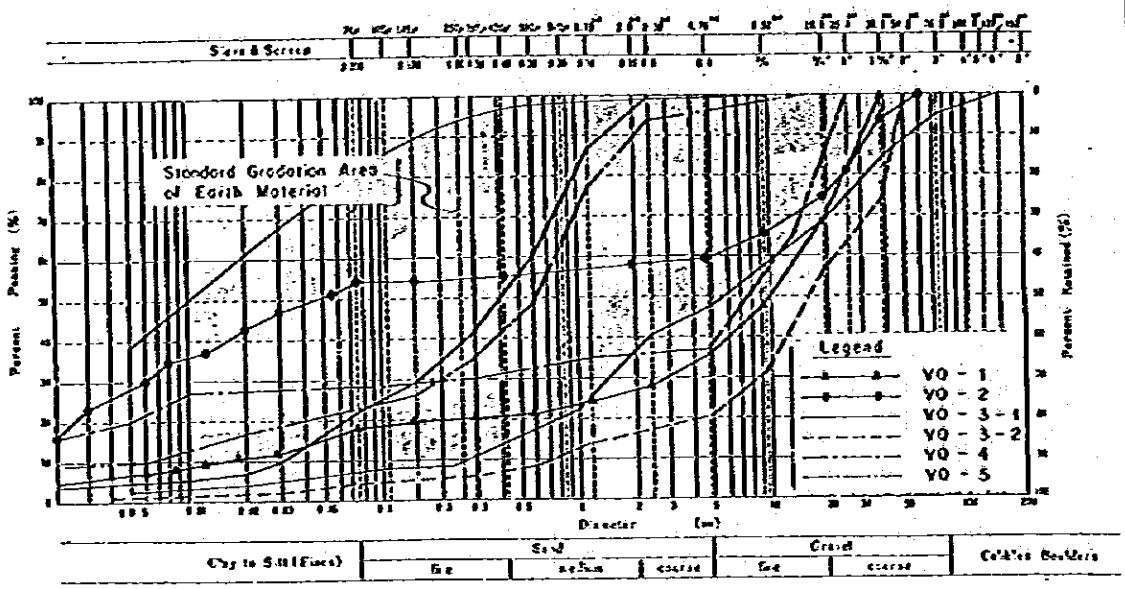
TQ-A

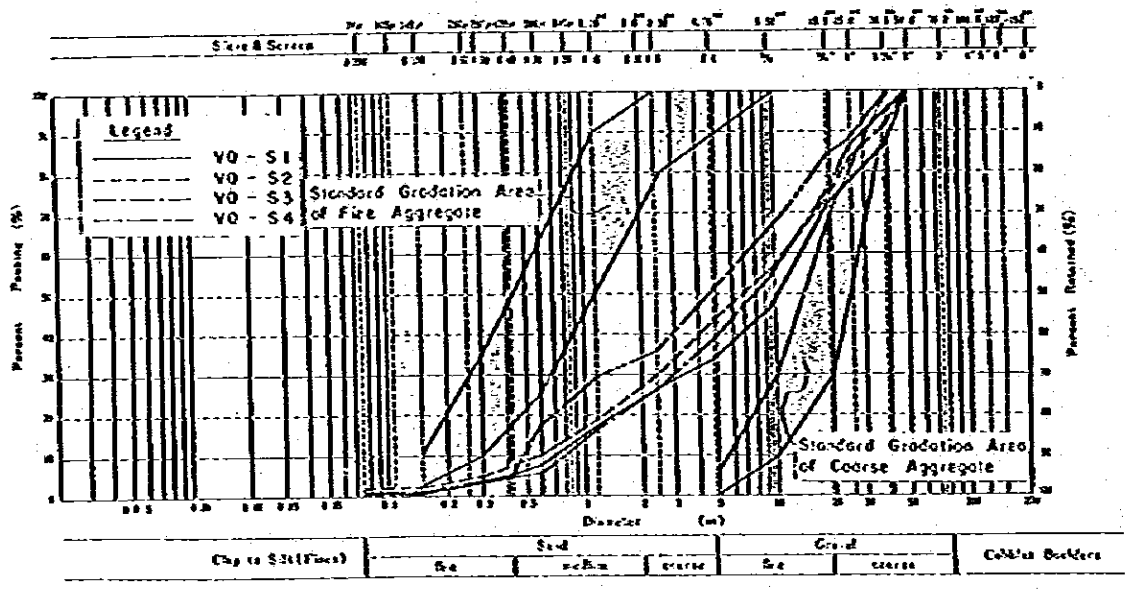


TQ-B

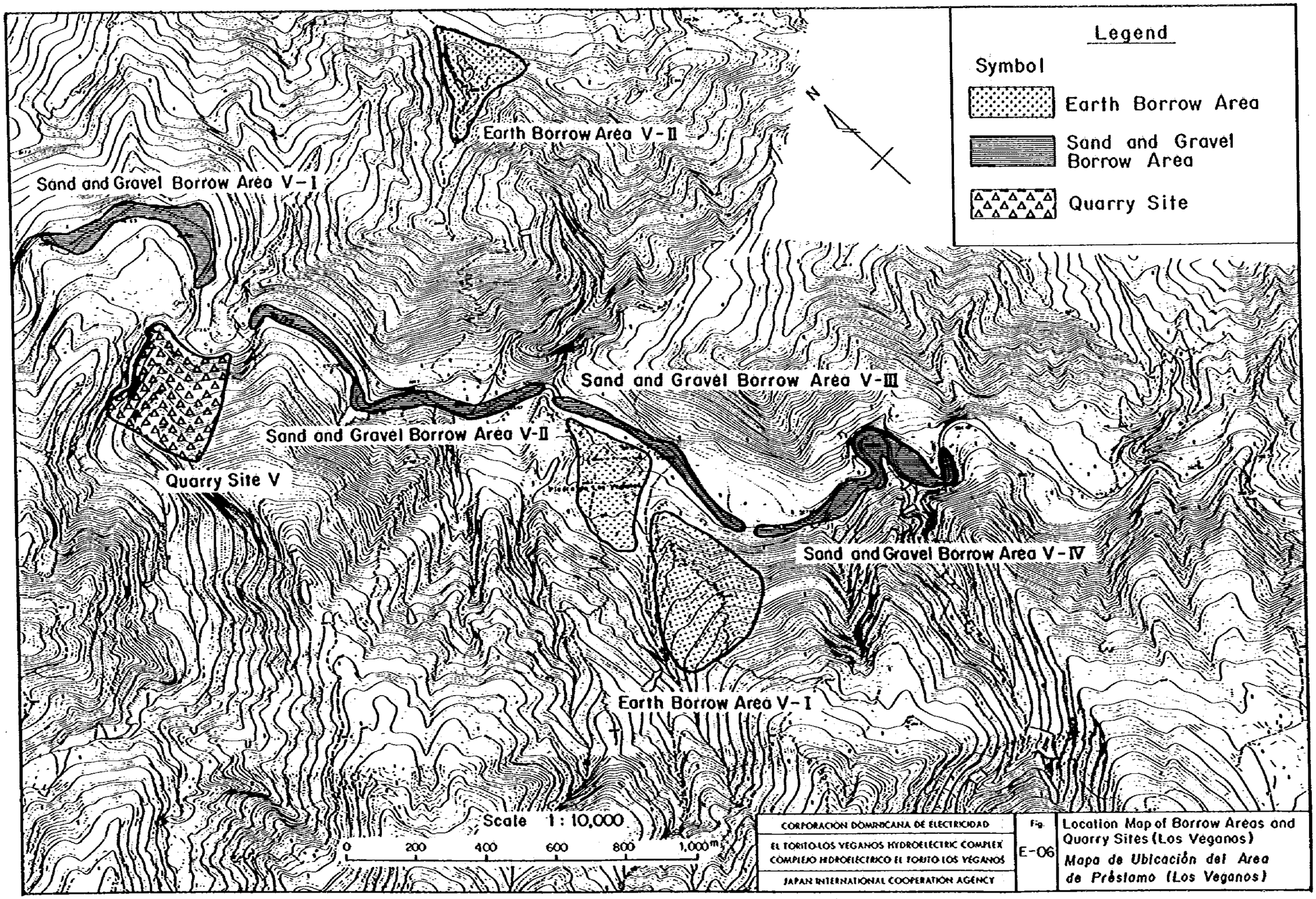


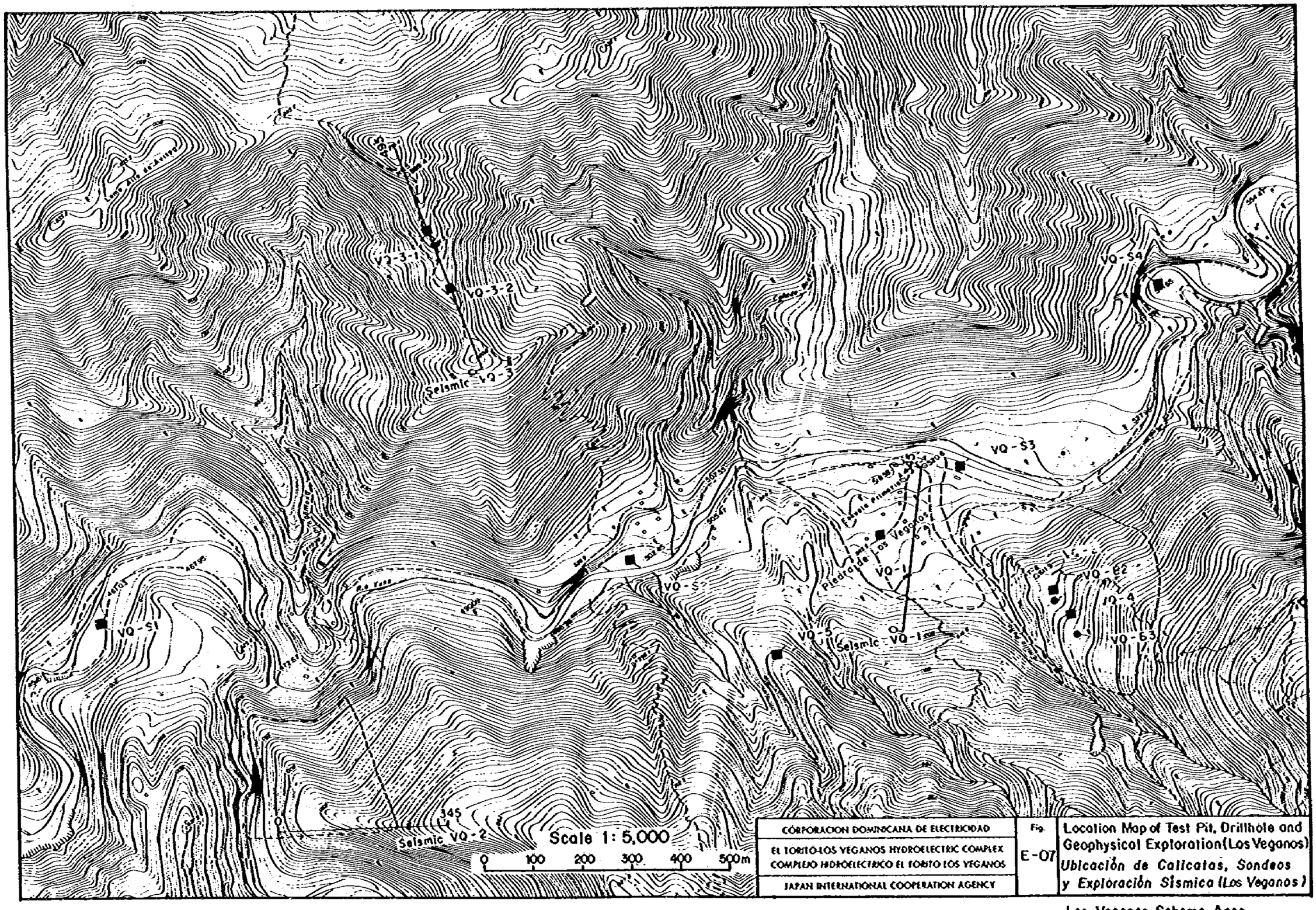
CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Interpretation Profile of Geophysical Exploration (T Q)
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS	E-04	*Perfil Sismico (TQ)*
JAPAN INTERNATIONAL COOPERATION AGENCY		





CORPORACION DOMINICANA DE ELECTRICIDAD	Fig. E-05	Grain Size Distribution of Construction Materials (El Torito) *Granulometria de Arena y Grava (El Torito)*
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS		
JAPAN INTERNATIONAL COOPERATION AGENCY		

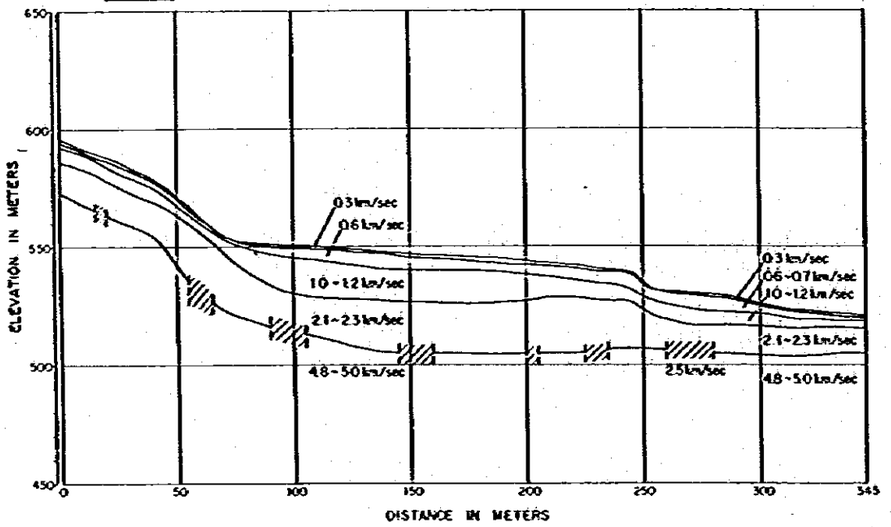

Legend
Symbol
Earth Borrow Area
Sand and Gravel Borrow Area
Quarry Site
N
Earth Borrow Area V-II
Sand and Gravel Borrow Area V-I
Sand and Gravel Borrow Area V-III
Sand and Gravel Borrow Area V-II
Quarry Site V
Sand and Gravel Borrow Area V-IV
Earth Borrow Area V-I
Scale 1 : 10,000
0 200 400 600 800 1,000m
CORPORACION DOMINICANA DE ELECTRICIDAD
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX
COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS
JAPAN INTERNATIONAL COOPERATION AGENCY
Fig. E-06
Location Map of Borrow Areas and Quarry Sites (Los Veganos)
Mapa de Ubicación del Area de Préstamo (Los Veganos)



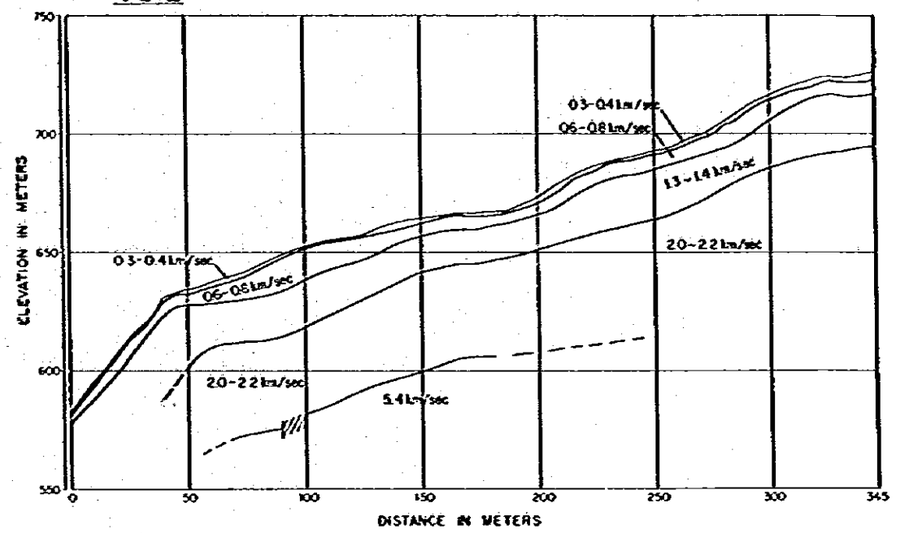
CORPORACION DOMINICANA DE ELECTRICIDAD	Fig. E-07	Location Map of Test Pit, Drillhole and Geophysical Exploration (Los Veganos)
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO LOS VEGANOS		*Ubicación de Calicatas, Sondeos y Exploración Sísmica (Los Veganos)*
JAPAN INTERNATIONAL COOPERATION AGENCY		

Los Veganos Scheme Area

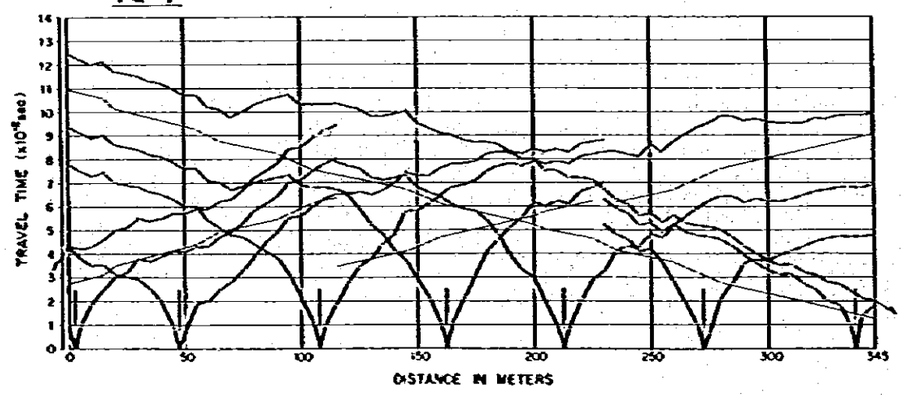
VQ-1



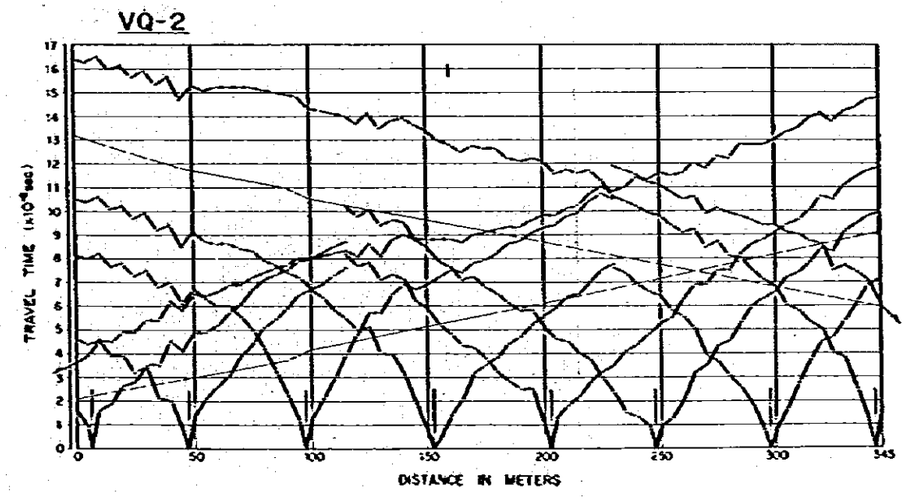
VQ-2



VQ-1

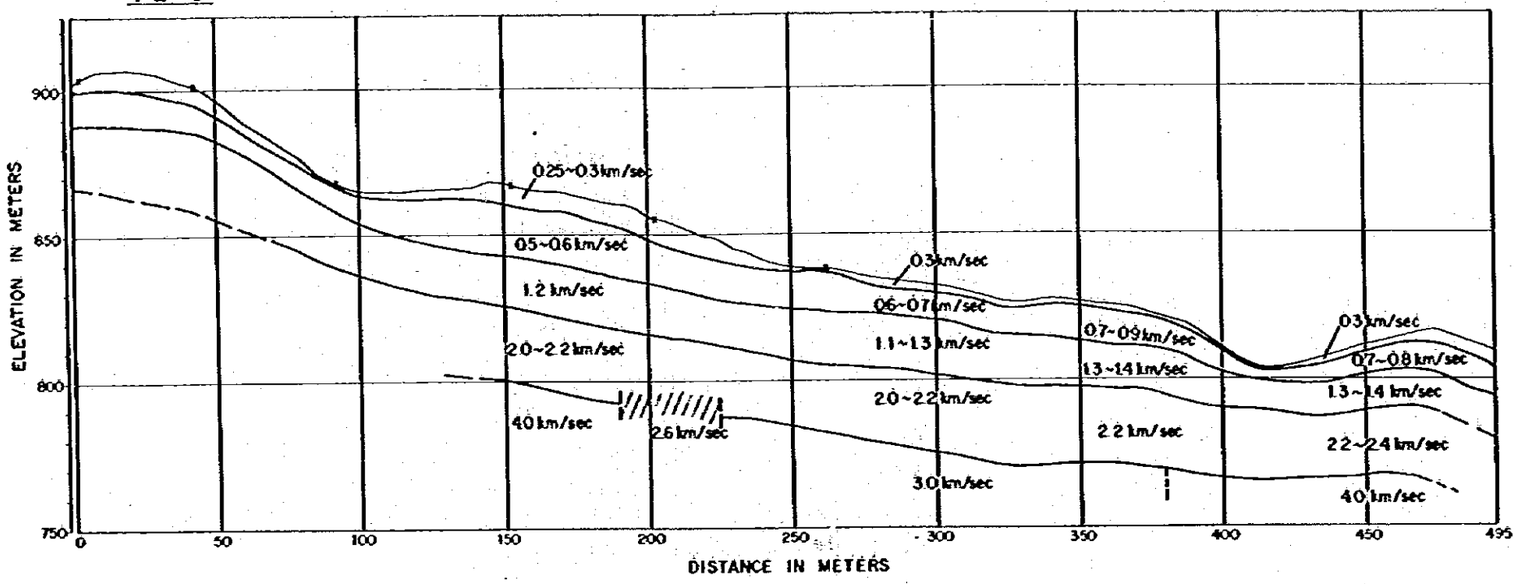


VQ-2

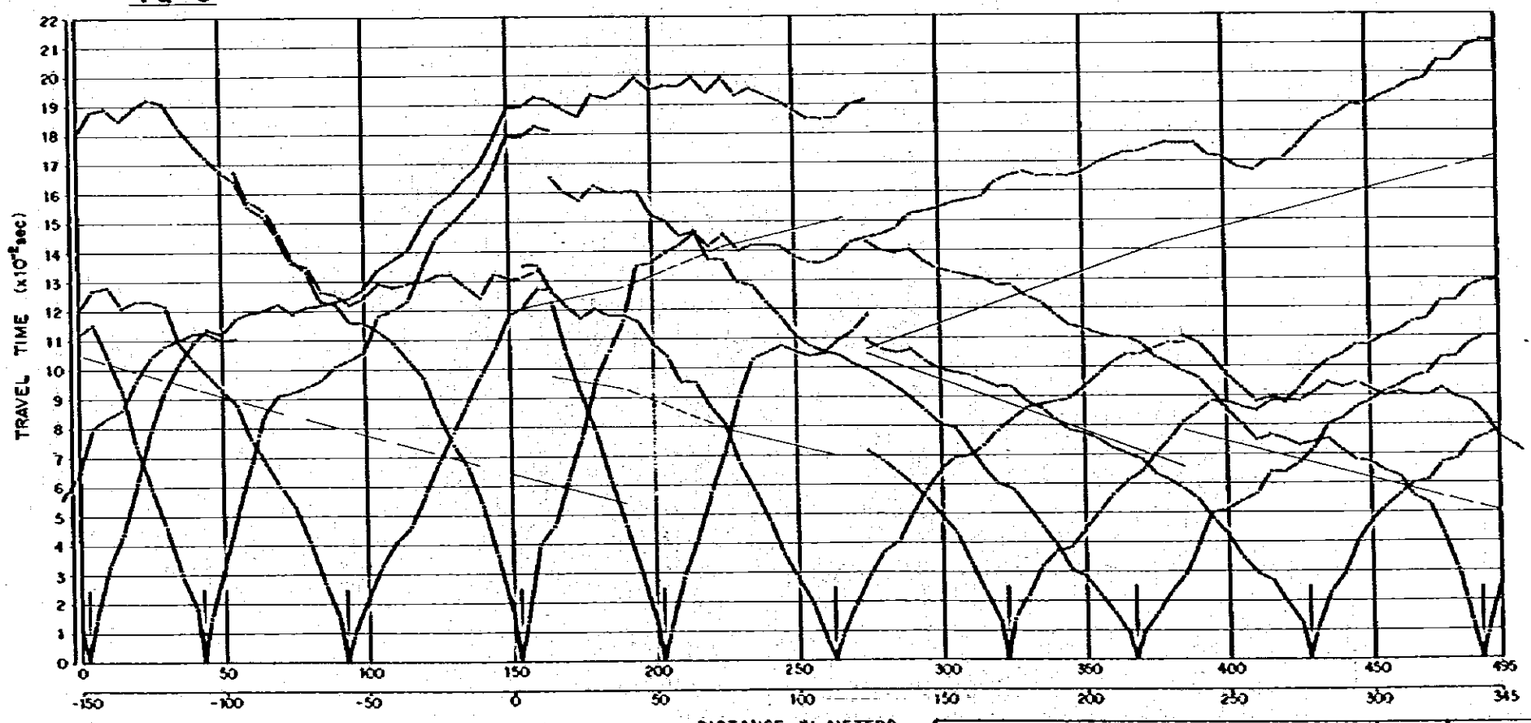


CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Interpretation Profile of Geophysical Exploration (VQ-1,2)
EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS	E-08	*Perfil Sismico (VQ-1,2)*
JAPAN INTERNATIONAL COOPERATION AGENCY		

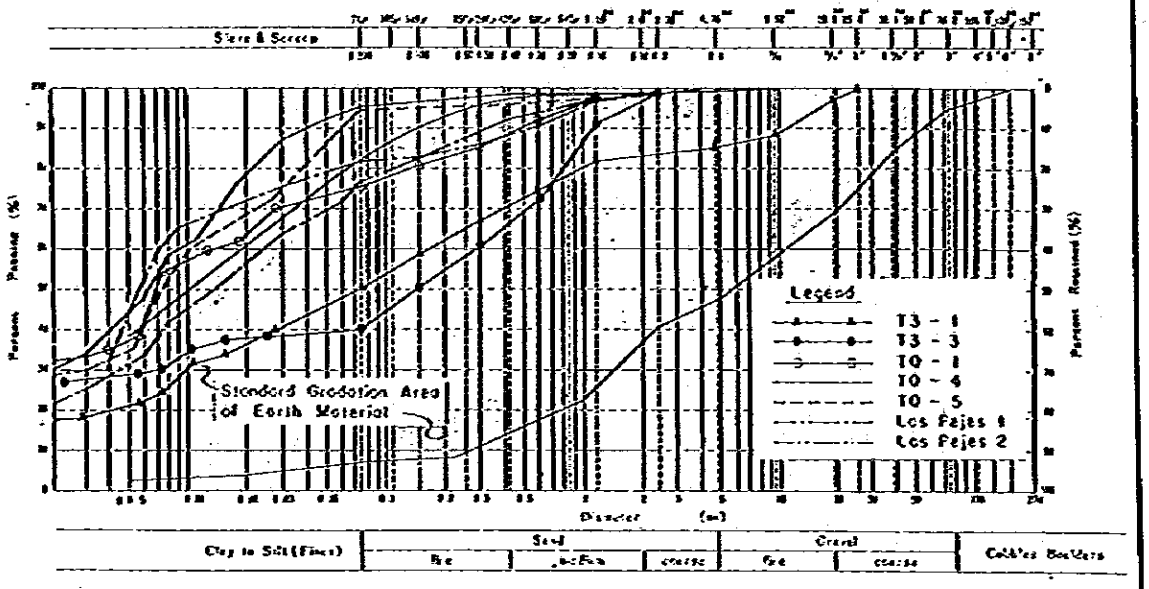
VQ-3

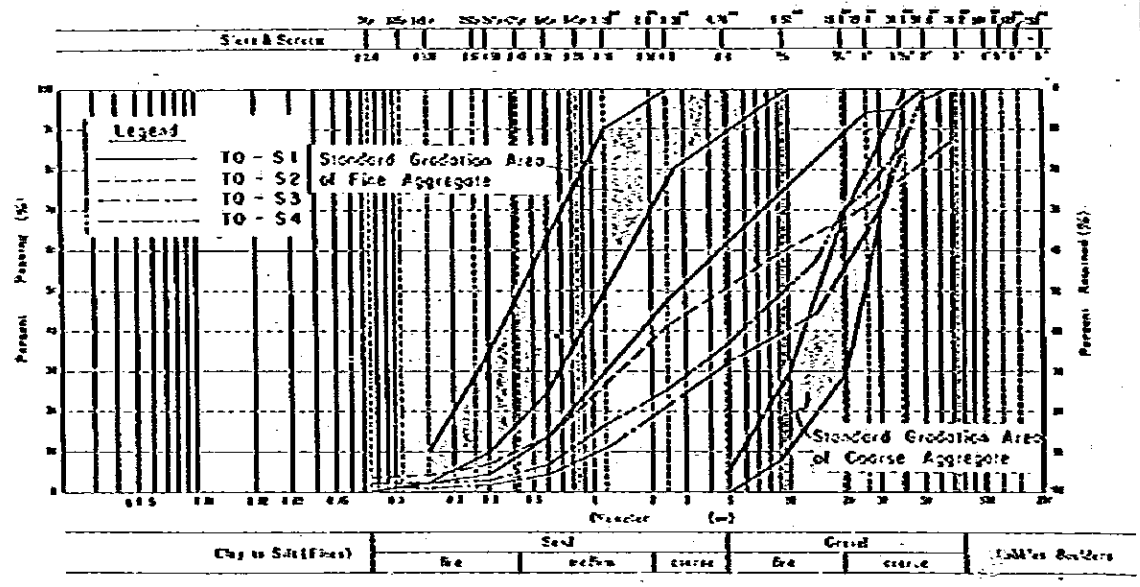


VQ-3

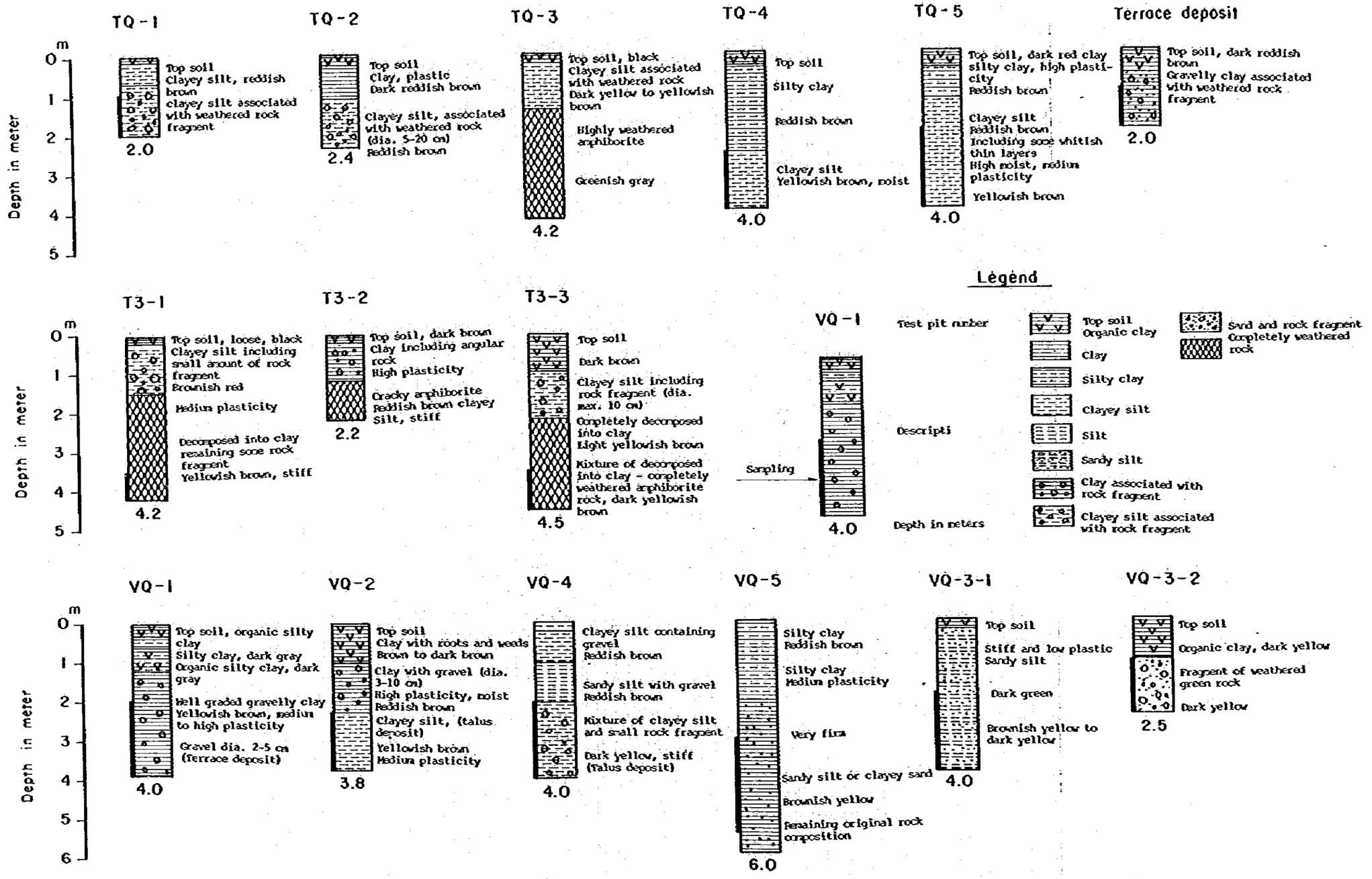


CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Interpretation Profile of Geophysical Exploration (VQ-3)
EL TORTO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORTO-LOS VEGANOS	E-09	*Perfil Sismico (VQ-3)*
JAPAN INTERNATIONAL COOPERATION AGENCY		





CORPORACION DOMINICANA DE ELECTRICIDAD EL TORITO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEJO HIDROELECTRICO EL TORITO-LOS VEGANOS JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. E-10	Grain Size Distribution of Construction Materials (Los Veganos) *Granulometria de Arena y Grava (Los Veganos)*



CORPORACION DOMINICANA DE ELECTRICIDAD	Fig.	Log of Test Pits for Construction Materials
EL TORTO-LOS VEGANOS HYDROELECTRIC COMPLEX COMPLEXO HIDROELECTRICO EL TORTO LOS VEGANOS	E-11	*Registro de Calicatas*
JAPAN INTERNATIONAL COOPERATION AGENCY		