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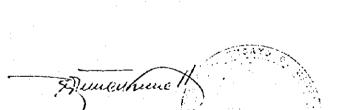
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SONDEO	SR-93-3
MUESTRA Nº	1
FROFUNDIDAD (m)	20.36-20.72
DESCRIPCION	ARENISCA GRAND FIND
PESO INICIAL SECO, A (gr)	521.0
PESO FINAL SECO DEL PRIMER CICLO, B (gr)	412.0
PESD FINAL SECO DEL SEGUNDO CICLO, C (gr)	280.6
INDICE DE DURABILIDAD SLAKE, Id2 (%)	79.1
FLUIDO EMPLEADO	AGUA POTABLE A 15 °C
AFARIENCIA DEL MATERIAL QUE PASA LA MALLA	LIMOS Y ARCILLAS CON ARENA FINA
APARIENCIA DEL MATERIAL RETENIDO EN LA MALLA	REDONDEADAS/ONDULADAS
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ENSAYO DE DURABILIDAD SLAKE

NDRMA UTILIZADA:

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FECHA: ENERO 1994 ENVIO : 3

ISRM

## PROYECTO "TRASVASES MANABI"

### FACULTAD DE INGENIERIA CIVIL Laboratorio de Mecanica de Rocas

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## PROYECTO "TRASVASES MANABI"

FECHA: ENERO 1994 ENVIO : 3 NORMA UTILIZADA: ISRM

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ENSAYO DE DURABILIDAD SLAKE

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SONDED	SR-93-5
MUESTRA Nº	i
FROFUNDIDAD (m)	8.79-9.00
DESCRIPCION	ARENISCA GRANO FIND
PESO INICIAL SECO, A (gr)	485.8
PESO FINAL SECO DEL PRIMER CICLO, B (gr)	443.7
PESO FINAL SECO DEL SEGUNDO CICLO, C (gr)	487.7
INDICE DE DURABILIDAD SLAKE, 1d2 (%)	83.9
FLUIDO EMPLEADO	AGUA POTABLE A 15 °C
AFARIENCIA DEL MATERIAL QUE PASA LA MALLA	ARENAS MEDIAS Y GRUESAS LIMOS
APARIENCIA DEL MATERIAL RETENIDO EN LA MALLA	REDONDEADOS CON FRAGMENTO PEQUENO RDONDEADO
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## PROYECTO "TRASVASES MANABI"

FECHA: ENERO 1994 ENVIO : 3 NORMA UTILIZADA: ISRM

ENSAYO DE DURABILIDAD SLAKE

SONDEO	MG-93-2
NUESTRA Nº	1
FROFUNDIDAD (m)	36.52-37.00
DESCRIPCION	ARENISCA GRANO F1NO
PESO INICIAL SECO, A (gr)	446.5
PESO FINAL SECO DEL PRIMER CICLO, 8 (gr)	293.0
PESO FINAL SECO DEL SEGUNDO CICLO, C (gr)	56.1
INDICE DE DURABILIDAD SLAKE, Id2 (%)	12.6
FLUIDO EMPLEADO	: AGUA POTABLE A 15 °C
APARIENCIA DEL MATERIAL QUE PASA LA MALLA	LIMOS Y ARENAS FINAS
APARIENCIA DEL MATERIAL RETENIDO EN LA MALLA	FRAGMENTOS REDONDEADOS

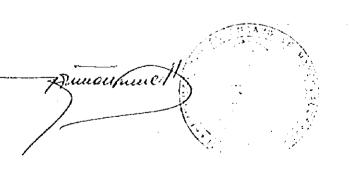
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## JAPAN INTERNATIONAL COOPERATION AGENCY J I C A

## THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS

## GEOLOGICAL - GEOTECHNICAL INVESTIGATIONS REPORT

VOLUME II

FEBRUARY 1994



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#### JAPAN INTERNATIONAL COOPERATION AGENCY J I C A

#### DETAILED DESIGN STUDY ON THE TRANSBASIN WATER PROJECT FOR THE CHONE-PORTOVIEJO RIVER BASINS

REPORT ON GEOLOGICAL - GEOTECHNICAL RESEARCH

VOLUME II

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5.2 Works Performed and Methods Used

5.2.1 Test Pits

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5.2.2 Manual Sounding

- 5.3 Results obtained
- 5.3.1 Open Channel
- 5.3.2 Transmission Line
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6. LABORATORY SOIL TESTS

6.1 Purpose and Scope of the work

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#### 7. APPENDIXES

- 7.1 Logging of test pits and manual sounding
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#### JAPAN INTERNATIONAL COOPERATION AGENCY J I C A

#### DETAILED DESIGN STUDY ON THE TRANSBASIN WATER PROJECT FOR THE CHONE-PORTOVIEJO RIVER BASINS

**REPORT ON GEOLOGICAL - GEOTECHNICAL RESEARCH** 

5. TEST PITTING AND MANUAL SOUNDING

#### 5.1 PURPOSE AND SCOPE OF THE INVESTIGATIONS

The Geotechnical Investigation Campaign using test pitting and manual sounding with standard penetration tests, "SPT," is in order to investigate the geomechanical characteristics of the highly weathered soils and rock.

For this purpose, geotechnical logging was performed both for the test pitting as well as the sounding, and samples were taken for study, depending on the focus to be given the study whether based on the foundation work or the use of the material excavated for construction material. Thus, three main activities may be defined:

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Test Pits along the Open Channel

They were excavated for the purpose of learning the characteristics of the colluvial soil or weathered rock in order to use said soils as construction materials in the earth fill of the channel. Therefore the sampling used disturbed samples on two levels.

Test Pits along the Transmission Line

Excavated for the purpose of learning the geomechanical characteristics of the soils or weathered rock for the foundations of towers or other types of structures. For this purpose, undisturbed samples were obtained of the soils wherever possible.

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#### Manual Sounding with standard penetration tests

Performed for the purpose of evaluating the soil and weathered rock resistance characteristics and on three different fronts:

Along the Open Channel, especially on the intersections of the channel line and streams.

Along the Transmission Line, basically at the sites for the foundations of the towers.

At the entrance to the Poza Honda-Mancha Grande-Estero Guajabito Tunnel and the exit of the La Esperanza-Poza Honda Tunnel at the Pata de Pajaro River for the purpose of studying the building of a Retaining Wall for these sites for the construction of the underwater portals.

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#### WORKS PERFORMED AND METHODS USED

5.2.1 <u>Test Pits</u>

Fifteen test pits were excavated, ten of which were along the section of the channel and five along the transmission line. The location of same is shown in Appendix No. 7.4

The depth and the samples taken are shown in the following table:

TEST PIT	COORD	INATE	DEPTH	TYPE O	F SAMPLE	ROCK LINE	
N₽	N	E		DISTURBED	INDISTURBED	•	
C - 10	9892630	607645	3,00	0,50-1,40 2,00-3,00	-	1,40 m	
C - 11	9892440	607000	5,00	0,55-2,00	-	N.A. 1,60 .	
C - 12	\$891880	606500	4,00	0,60-1,60 2,00-3,60	-	3,60	
C - 13	9891540	606387	4,00	0,80-2,00 2,00-3,50	-	2,60	
C - 14	9891045	606193	4,00	0,90-1,90 1,90-3,50		3,60	
C - 15	9890440	605330	3,00	0,40-1,00 1,20-1,60	· · · ·	1,60	
C - 16	9890110	605090	4,00	0,85-1,80 2,00-3,50	-	3,20	
C - 17	9889600	604670	3,00	0,40-1,60 2,00-3,00		1,60	
C - 18	9889155	604290	3,00	0,30-1,60 2,00-3,50	-	0,90	
C - 19	9888780	603850	4,00	1,00-1,70 1,20-3,60	-	3,60	

### WORK; OPEN CHANNEL

### WORK: TRANSMISSION LINE

TEST PIT	COORDINATE		DEPTH	TYPE OF SAMPLE		ROCK LINE
<b>₩</b> 2	H	E	■ .	OISTURBED	INDISTURBED	•
C - 20	9892665	607780	1,50	0,35-1,10	-	1,10
C - 21	9892400	613400	3,00	0,40-1,00 1,00-2,15	-	2,15
C - 22			3,50	1,00-2,35	0,60-0,90	2,35
C - 23	9895874	627354	3,50	2,00-2,80	1,20-1,50	2,80
C - 24 TOTAL	9897090	634780	4,00	2,50-4,00	1,50-1,80	no
15	-	-	50,00	25	3	· •

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The excavation of the test pits was performed manually, using conventional tools such as picks, shovels, buckers, etc. with dimensions of  $2.0 \times 2.0$  m and at the maximum depth possible for excavation whether due to ground water as in C-11 or bedrock within which in some cases we excavated more than 1 meter due to completely weathered and soft mudstone.

In addition to the geological-geotechnical logs, we measured the resistance of undrained cuts every 20 cm at cohesive levels, through the use of the wind vane and the hand penetrometer although at most of the test pits the soil resistance was greater than the measuring capacity of the instruments. This information is included in the description of the consistency of the materials.

The levels and types of samples obtained were selected according to JICA. At each one of the test pits at the Open Channel two disturbed samples were taken of approximately 50 kg each of the materials considered most fitting for the purposes intended. At the test pits for the Transmission Line we could take only one undisturbed sample  $(0.3 \times 0.3 \times 0.$ 

At test pits C-20 and C-21 we could not obtain undisturbed samples because of the characteristics of the materials.

We also obtained proper topographical documentation of each of the excavations as shown in Appendix No. 7.3.

For the geological-geotechnical classification of the soils, we used the criteria listed in Table No. 1 of Appendix No. 7.1 in which the character of the soils, color, consistency or compactness and organic material content were determined.

At the excavations where bedrock was found we evaluated geotechnical parameters such as weathering, fracturing, resistance, ROD as per the parameters listed in Appendix No. 7.1.

The geological and geotechnical logs for each of the test pits with the results of the laboratory tests are listed in Appendix No. 7.1.

#### 5.2.2 Manual Sounding with Standard Penetration Tests

Sixty (60) manual soundings were performed with continuation standard penetration tests (SPT) with 54 performed along the line of the Open Channel, three along the Transmission Line and three in the Poza Honda sector. ł

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The number and depth of the sounds is shown in the table herebelow:

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SITE:

### OPEN CHANNEL

KOUNDING N⊇	COORD	INATE	DEPTH	NURBER OF MADE "SPT"	ROCK LINE	N 30 MAX	KÅTER LEVEL
2	N E		TEST				
S - 1	9892430	607520	4,05	9	2,95	· 44 s	: _
S - 2	9892380	607370	3,60	8	1,95	47 🗄	
S - 3	9892330	607370	3,60	8	1,50	40	i +
S - ;4	9892240	607100	2,20	4	1,00	57/25 R	· -·
S - 5	9892210	607010	3,15	7	1,40	50	· -
S - 6	9892180	607030	7,50	6	1,50	58/25 R	-
S - 7	9892180	606840	4,95	11	3,95	21	· -
S - 8	9892110	606865	4,95	11	4,25	31	· -
S - 9	9891930	606620	3,60	8	1,60	37	2,25
S - 10	9891880	606650	3,15	7	1,30	42	-
s - 11	9891730	606440	4,50	10	3,00	47	-
s - 12	9891745	806410	4,05	9	2,80	29	· -
s - 13	9891550	606440	3,15	7	2,20	35	_
8 - 14	9891320	506485	4,05	9	3,40	55	1,50
8 - 15	9891330	605450	2,00	5	1,60	30/10 R	-
8 - 16	9891180	806320	2,40	6	1,70	30/10 R	-
8 - 17	9891210	505310	2,50	6	1,60	30/10 R	· -
S - 18	9891080	605140	4,95	11	3,80	29	· • ·
5 - 19	9890360	605130	3,50	8	3,00	30/10 R	_
8 - 20	9890370	608090	3,60	8	2,60	31	-
5 - 21	9890760	605950	3,90	9	2,60	30/15 R	-
S - 22	9890700	605900	2,90	7	1,60	30/10 R	-
8 - 23	9890540	605830	1,20	3	0,25	30/10 R	-
S - 24	9890570	605770	0,80	3	0,30	30/10 R	-
8 - 25	9890530	605730	3,10	7.	2,00	54 R	· · -
5 - 26	9890570	605830	3,15	7	1,60	49	_
5 - 27	9890520	605630	3,15	. 7	1,20	63 R	-
S - 28	3890560	605420	2,70	δ	1,20	<sup>5</sup> 51 R	-
S - 29	9890530	605435	3,60	. 8	2,50	43	-
S - 30	9890350	605280	4,30	10	2,80	30/10 R	-
8 - 31	9890380	605240	2,10	5	1,60	30/10 R	-
S - 32	9890140	605240	1,60	4	1,50	30/10 R	1,00
S - 33 ·	9890080	605090	3,00	7	2,50	30/15 R	- -
8 - 34	9889880	605000	2,80	7	1,70	30/10 R	-
9 - 35	9889910	604960	1,50	4	0,70	30/ 5 R	<b>.</b> .

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SITE:

OPEN CHANNEL

Sounding Ng	COORD	INATE	DEPTH	NUMBER OF MADE "SPT"	ROCK LINE	N30 HAX	WATER LEVEL
	N E	TEST					
5 - 36	9889840	804790	2,70	6	1,20	34	<del>.</del> .
8 - 37	9889880	604760	3,15	7	1,20	40	-
S - 38	9889700	604670	3,15	7	1,20	48	-
5 - 39	9889675	604660	1,00	3	0,90 -	30/10 8	-
S - 40	9889650	604630	2,70	6	1,40	44	-
S - 41	9889430	604520	1,10	3	1,00	30/10 R	-
\$ - 42	9889415	604540	0,95	3	0,90	30/ 5 R	. <b>-</b>
S - 43	9889400	604560	3,15	7	1,80	38	-
s - 44	9889380	604385	4,95	11	3,20	31	-
<u>8</u> - 45	9889320	604370	4,20	10	3,40	30/15 R	-
Ś - 46	9869270	604280	4,50	10	3,80	27	÷
S - 47	9889270	604240	4,95	11	3,40	35	-
8 - 48	9889160	504260	2,25	5	0,90	48	-
s - 49	9889050	604190	2,25	5	1,00	36	-
S - 50	9889030	604090	1,20	3	1,10	30/10 R	-
S - 51	9889010	604010	2,70	6	1,20	42	-
S - 52	9888930	603975	4,05	9	3,00	47	-
8 - 53	9888950	603950	3,20	7	2,90	30/10 R	
S - 54	9888810	603810	4,05	3 9	3,00	51	

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#### SITE:

TRANSMISSION LINE

SOUNDING COORDINATE			ROCK LINE	N 30 HAX	WATER LEVEL		
N≌ :		• • • • • • • • • • • • • • • • • • •			1050		
S - 55	9892320	608650	2,25	5	1,50	29	-
8 - 56	9892380	611650	2,25	5	1,30	3 42	-
8 - 57	9895885	627480	0,40	1 1	0,30	30/10 R	. <del>.</del>
S - 57		·	5,10	3	2,90	30/10 R	· -

SITE:

poza honda

SOUNDING COORDINATE			NUNBER OF	ROCK LINE	N 30	WATER	
¥6	н	E	9	HADE "SPT" TEST		MAX	LEVEL
S - 58	-	-	7,20	16	4,70	28	1,20
S - 59	-		4,00	8	3,00	17	2,20
S - 60	-	-	2,25	5	0,80	27	-

The manual sounding were performed with continuous standar penetration test, each 0,45 m.

Standard equipment was used for the execution of same, i.e.:

Weight of the mass:	140 lbs.
Height of the fall of the mass:	76 cm.
Diameter of sampler:	2"

At the sites where it was possible to install a headframe, when the slope was not strong, to expedite the work, a tripod or a cane tower.

Standard penetration tests were performed continuously every 45 om using the standards for said test, i.e., the line is divided into 15 cm sections and the number of strokes necessary to drive each 15 cm section is counted. When more than 30 strokes are necessary to drive a 15 cm section or when the total strokes necessary to drive the last 30 cm reaches more than 50 strokes, then it is considered a reject.

For the interpretation of the test, we take the strokes necessary to drive the last 30 cm and obtaining the amount of  $N_{30}$ . The strokes from the top 15 cm were not used because the land could have been altered.

Samples obtained from each test with the split tube 2" in diameter have been logged with the geotechnical criteria listed in Table No. 1 of Appendix 7.1 for soils and with the geotechnical classification standards for the case of rocks. The samples have been preserved in double plastic bags, duly labeled in case it is necessary to perform laboratory tests or geotechnical logging later on.

As may be observed in the geotechnical logs of the soundings, they were performed on colluvial soils and completely weathered rock down to the depth in which rejection takes place or where it is normally possible to perform such soundings. It is important to point out that all the soundings performed detected the contact of the colluvial soils with altered or healthy rock, penetrating in certain cases more than 2 cm in completely weathered rock.

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Also, we took photographic documentation of the way the soundings were performed as shown in Appendix No. 7.3.

#### 5.3 RESULTS OBTAINED

We shall make a brief analysis of the results obtained from the field investigations for each of the sectors in the study.

#### 5.3.1 <u>Open Channel</u>

Along the line of the Open Channel 10 test pits and 54 manual soundings were performed which when added to the investigations performed in the Feasibility Phase provide important documented information on the geotechnical characteristics of the soils and surface rock.

Location of the test pits and manual soundings are shown in Appendix No. 7.4.

Detailed logs of each of the test pits and each sounding are found in Appendix No. 7.1.

Excavations of the test pits were for the purpose of determining the properties of the colluvial soils for their use as building materials for the walls of the channel as well as to learn the strength of said soils for determining the exploitation volumes.

From the analysis of the bedding profiles detected we could determine the following bedding pattern:

A black soil vegetation covering made up of black silty clays with indices of organic material (roots) with a consistency that is quite hard, in its dry state when excavations took place. Strength varies from 0.2 m to 0.50 m with a predominant strength of 0.35 m.

Under the vegetable covering is a level of silty clays with gray or grayish brown coloring with approximately 20%-30% weathered 0

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debris with a consistency that is quite hard and hard, found at a depth from 0.20 m to 0.90 m with a median strength of 0.70 m.

Under the level of clays we found a stronger colluvial layer consisting completely of debris or highly weathered mudstone or siltstone, encased in a clayey-silty matrix with a brown-yellow coloration and a consistency which is quite hard. Within this layer we may observe the predominance of the clayey-silty matrix. The depth of the layer is from 0.90 m to 3.60 m with a strength varying from 1.00 m to 3.00 m.

The soils described constitute the colluvial layer which based on its characteristics are the product of on-site decay of the rock, whether mudstone or siltstone. Therefore, it is difficult to establish a clear contact of colluvial soils with the completely weathered rock since a transition occurs as a product of the degree of weathering of the rock.

Under the colluvial soils defined based on the criteria indicated, we find brown and yellow mudstone which is completely weathered and in many cases looks like weathered blocks or debris. But based on criteria for texture and bedding, we can define it as rock with a V quality index (very bad) starting from a V resistance index (no more than 20 kg/cm<sup>2</sup>), V fracturing grade, V weathering and ROD = 0.

The mudstone or siltstone detected in the excavations belong to the onzole formation.

We should indicate that the consistence of the colluvial soils or the resistance of the weathered rock changes quite a bit with water, such as the cases of test pit C-11 in which the water level is 1.60 m deep, decreasing the consistency of the debris layer to a clayey matrix which is quite hard to somewhat consistent (> 4.5 kg/cm<sup>2</sup> to 1 kg/cm<sup>2</sup>), determined with a penetrometer and hand torvane.

Manual soundings were for the purpose of determining the resistance of the soil for the purposes of foundations along the section of the Open Channel.

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All the soundings made contact with soil-rock and even some got more than 2 meters deep in the weathered rock.

Based on the analysis of same, we have determined the following: 7 soundings detected contact at a depth of less than 1 m; 27 soundings detected contact between 1.0 m and 2.0 m deep; 13 soundings determined it between 2.0 m and 5.0 m deep; 6 soundings determined it between 3.0 m and 4.0 deep' 1 sounding determined it at a depth of more than 4.0 m.

The depths reached by the soundings vary between 0.80 m and 4.95 m depending on the depth that detects the presence of rock and its characteristics since at the sites where the colluvial strength was higher, we managed to reach a greater depth since the strength of the completely weathered rock was greater. While at the sites, especially at the bottom of steams where the colluvial covering has been washed, their strength is less or does not exit. Likewise, the weathered rock has less strength or has not been washed paving the way for a rock with better geotechnical characteristics.

Regarding the bedding profiles detected, they were the same as those found in the test pits with the following sequence: One layer of vegetable soil with a strength between 0.20 m and 0.50 m, followed by a silty clay layer with debris which in some soundings is not detected and a layer of weathered debris with a clayey-silty matrix followed by completely weathered rock constituted by mudstone with a V quality index. Ę

In some cases, where soundings were at the lower sections of streams with elevations of less than 100 meters about sea level, the sequence varies passing from a small vegetable layer measuring a few centimeters to sandstone rock with a IV quality index.

The geotechnical logs for each sounding with its values of  $N_{ij}$  are shown in Appendix No. 7.1.

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#### 5.3.2 Transmission Line

Five test pits and 3 manual soundings were performed along the Transmission Line. Said investigations were for the purpose of determining the properties of the surface soils or rocks for the purposes of the foundations of the Towers.

The location of the test pits and manual soundings are shown in Appendix No. 7.4.

Because of the distance between each test pit and sounding and the considerable differences in the elevations of the sites, we have obtained different results. Therefore we will analyze each cut obtained separately.

TEST PIT C - 20

From 0,00 to 0,35 m Hard brackish vegetal soil

From 0,35 to 1,10 m Weathered debris of mudstone in dark brown clayey matrix, hard.

From 1,10 to 1,50 m Comp

Completely weathered light gray mudstone with oxidated joints, soft rock.

We could not obtain an undisturbed sample from the debris level and, therefore, took a disturbed sample in order to perform the tests on the remolded samples.

TEST PIT C - 21

From 0,00 to 0,40 m Dark brown vegetal soil very stift

matrix, very stiff.

From 0,40 to 1,10 m

Weathered debris and blocks of siltstone and fine grained sandstone in yellowish brown silty sand

From 1,10 to 2,20 m

Completely weathered yellowish brown silty fine grained sandstone with oxidated joints, very soft rock, quality index V.



From 2,20 to 3,00 m

Very weathered yellowish brown silty fine grained sandstone with a quality index IV.

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As at test pit C-20 we could not obtain an undisturbed sample from the debris level, taking a sample of a disturbed sample for the tests on the remolded sample.

TEST PIT C ~ 22

From 0,00 to 0,30 m Blackish vegetal soil, hard.

From 0,30 to 0,95 m

Grayish brown silty clay with some weathered debris, stiff.

From 0,95 to 2,35 m Weathered debris of siltstone and fine grained sandstone in brown silty matrix, stiff.

From 2,35 to 3,50 m Completely weathered brown mudstone with oxidated zone, quality index V (very soft rock).

Soundings S-55 and S-56 showed quite similar results with soilrock contact at 1.50 and 1.30 m respectively and a lithological makeup constituted by hard and sandstone colluvial soils which are finely weathered.

Toward the site of test pits C-23 and C-24 and sounding S-57 the make up of the colluvial soils varies and are similar to one another. They are constituted by a vegetable soil level 0.35 m and 0.40 m thick.

There is a debris level in a clayey-silty matrix up to 0.80 m and a strong layer of grayish brown clay which is quite hard to 2.80 m at test pit C-23 and to 2.50 m at test pit C-24. This clay level takes a reddish coloration towards the base.

At test pit C-23, under the clays, we find sandstone with a very fine grain that is highly weathered with a V quality index while at C-24 from 2.50 m we find a grayish brown mud with some fine sand that is consistent. At this test pit we did not have soil-rock contact.



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The cut detected in sounding S-57' is equal to that at test pit

C-23.

#### 5.3.3 Poza Honda

Three manual soundings were performed with different results.

Sounding S-58 which is located at Estero Guajabito, reached a depth of 7.20 m and detecting an alluvial layer made up of fine silty sand, alternating with levels of soft silt up to 4.70 m and later detecting a completely weathered level of sandstone up to 5.20 m deep (possible block) and from 5.20 m to 7.20 completely weathered brown and yellow mudstone.

At Test Pit S-59, located on a slope at the exit of Estero Guajabito, we detected a colluvial layer with a hard consistency up to 3.0 m deep and under the colluvial level a completely weathered brown and yellow mudstone with a V quality index appears.

Sounding S-60 was performed at the exit of the Pata de Pajaro River, on a slope and a colluvial layer up to 0.80 m deep was detected. Under the colluvial layer from 0.80 to 1.80 m completely weathered mudstone with a V index is detected and then a completely weathered sandstone with very fine silt with a quality V index.

#### 6. LABORATORY SOIL TESTS

#### 6.1 PURPOSE AND SCOPE OF THE WORK

The laboratory soil tests were focused on two fundamental objectives:

1. Determination of the basic geomechanical characteristics of the soils for their use as materials in the Channel earth fill.

2. Determination of the geomechanical properties of the soils for the study of the foundation along the Transmission Line.

Based on these objectives, altered samples were taken of the soils and 10 test pits were excavated along the Open Channel and unaltered and altered samples from the test pits excavated along the Transmission Line.

6.2 TESTS PERFORMED

Nineteen altered tests of approximately 50 kg each were sent to the laboratory in order to study the materials for the Open Channel, and altered samples and 3 unaltered samples in a block for the study of the soils of the Transmission Line.

The number and type of tests performed is shown in the table below:

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TIPO DE ENSAYO TYPE OF TEST	CANAL ABIERTO OPEN CHANNEL	LINEA DE TRANSHISION TRANSHISSION LINE	TOTAL
1. Contenido de Humedad Natura} Natural Noisture content	19	9	28
2. Grávedad Específica Specific Grávity	19	9	28
<ol> <li>Granulometría         <ul> <li>(tamiz e hidrómetro)</li> <li>Grain size analysis                 (sieve and hidrometer)</li> </ul> </li> </ol>	13	9	28
4. Linites de Atterberg Atterberg Linits	19	9 	28
5. Peso Unitario Unit Weight	10	5	. 15
<ol> <li>Compressión Uniaxial Uniaxial Compression</li> </ol>	10	5	15
7. Triaxial Triaxial Test	10	5	15
8. Consolidación Consolidation	10	5	15
9. Compactación Proctor Proctor Compaction	15	2	17
10. Hinchamiento Swelling	19	9	28
11. Encogimiento Shrinkage	19	9	28
12. Dispersivided Pin Hole Pin Hole Test for Dispersion	19	3	28

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From the 19 samples from the Open Channel, 10 were selected for performing all the tests provided as the most promising layer for construction materials. Five were selected for performing tests as an alternating stratum including the Proctor test. On the four remaining ones only identification, swelling, shrinking and Pin Hole tests were performed.

For the Transmission Line, we managed to obtain only three unaltered samples from three different test pits. Therefore, we took altered samples from those test pits where it was impossible to obtain unaltered blocks for performing the tests provided on the remolded samples.

Therefore, from the 9 samples taken for the study of the Transmission Line, all the tests including 2 Proctor tests were performed and on the four remaining samples only the identification, swelling, shrinking and Pin Hole tests were performed.

All the Soil Mechanics Tests were performed at the HIDROSUELOS CIA. LTDA. laboratories except for the three block samples which were performed at the National Polytechnic School laboratories, complying with the standards set forth for each test.

#### 6.3 <u>RESULTS OBTAINED</u>

A table summarizing the results obtained for each of the tests performed is shown herebelow. The complete tests are enclosed in ANNEX -VOLUME II. ()

SECTOR LOCATION	CALICATA N TEST PIT N	MUESTRA N SAMPLE N	PROFUNDIDAD DEPTH	HUMEDAD NATURAL NATURAL MOISTURE		CRANULOMETRIA	CRAIN SITE ANALYSIS	GRAIN SIZE ANALYSIS (SIEVE AND HIDROMETER)		LIMITES DE ATTERBERG ATTERBERG LIMITS		CLASIFICACION CLASIFICATION	PESO UNITARIO	UNIT WEIGHT	COMPRESION UNIAXIAL UNIAXIAL COMPRESSION	ENSAYO TRIAXIAL TRIAXIAI TEST		CONSOLIDACION CONSOLIDATION		COMPACTACION PROCTOR PROCTOR COMPACTION		HINCHAMIENTO	SWELLING		ENCOGIMIENTO SHRINKAGE		Pin - HOLE	RVA		
	- · ·			W Z	C-s	<b>∦</b> 4 7.	∦200 %	211 %	WL %	₩P %	IP %		HUM gr/m3	SATUR m3	qu' Ke/cm3	C' Kg/on2	Ø" dog	Pp Kg/on2	Сс	CV mm2/min	Ymox sr/ma	Wopt %	P Ky/cm2	V X	Ws X	Ls X	Vc X		· · · · · · · · · · · · · · · · · · ·	
	C10	M−1 M−2	0.501.40 2.003.00		2.768 2.727		96.0 98.7	21 18	59.0 55.0	37.0 37.0	22.0 18.0	МН МН	1.54 1.538	1.683	1.82	0.90	20°	0.55	0.125	4.046	1.07		0.20 0.40				42.5 47.88		DISTURBADA / D	ISTURBED "
	C-11	M 1	0.552.00	37.7	2.606	100	86.9	20	80	54	26	мн	1.558	1.6 59	1.70	0.70	16°	0.46	0.136	2.62	1.07	45.6	1.25	0.00		15.80	42.09	NDI	11	19
	C-12	M −1 M −2	0.601.60 2.003.60				90 89	14 16	61 71	43 48	18 23	MH MH	1.58 1.54	1.708 1.684	- 2.18	- 0.85	- 20°	- 1.05	- 0.126	- 4.752	1.13 1.09	41.60 42.60					35.15 41.19		41 19	11
, 님	C-13	M −1 M −2	0.802.00 2.003.50		2.743 2.622		97 99	53 8.0	92 78	47 •42	45 36	MB MH	1.566	1.750	2.53 -	1.00	26°	0.95	0.16	1.92	1.18	36.30 -	1.35 -	0.00			57.33 40.1		ii	
CHANNEL	C-14	M −1 M −2	0.90-1.90 1.90-3.50		2,598 2,565		76 94	19 18	78 78	43 144	35 34	MH MH	1.518 1.523	1.714 1.708	1.01	- 1.60	- 14°	0.72	- 0.145	- 5.494	1.16 1.16		0,60 0,10				28.24 31.17		u 11	
OPEN CH	C-15	M −1 M −2	0.40-1.00 1.20-1.60		2.658 2.698		76 98	48 18	91 90	39 44	52 46	ĊH Mh	1.399 1.400	1.661 -	1.09	0.70	22°	0.80 -	0.439 -	1.531	1.06	34.6 -	1.50 1.60	0.00 0.00	:		57.08 57.74		11	
OPEN	C-16	M -1 M -2	0.85-1.80 2.00-3.50		2.636 2.456		78 95	28 30	62 63	36 34	26 29	МН МН	1.627 1.642	1.794 1.759	1.88	-	- 12°	- 0.75	0.107	- 13.91		32.8 31.8	0.75	J		17.39	38.72 41.82	NOI		
	C17	M −1 M −2	0.401.60 2.003.00		2.623 2.680		95 99	30 43	71 73	41 44	30 29	MH MH	1.498 1.496	1.718	1.66	1,50	110		0.243			32.3		0.00 0.00	·	16.02	44.96 42.47	NO1	u H	
	C18	M1 M2	0.30-1.60	21.7	2.726	100		24 28	65 64	, 35 36	30 28	МВ			2.40	1.20	22° -	0,70	0.335	6.224	•		1.30	0.00		18.28	46.14 53.59	NDI	11	34
	C-19	M 1 M 2	1.00-1.70 1.703.60				99 58	30 20	45 40	22 21	23 19		1.423		- 2.56	1.65	100	-		2.443	1.32	29.6	0.30	0.00		13.83	39.02 31.00	NDI	13	
έų	C-20	1	0.35-1.10	·	••••••		80	39	49	31	18				3.00	,					<b></b>	· ·	· · ·				40.73		11	
SSION LINE	C21		0.40-1.00				50 9.0	16	44	28	16			1.826	0.83	0.40	200	0.74	0.134	6.18	1.32						26.61		ù	t3
oissii	······	M −2 M −1	0.60-0.90	39.64	2.832	100	88	8 50	40 106	22 58	18 48	сн		1.750	• 13.18	- 1.10	26°	0.40	0.18	2.597	1.16		2.49	1 1		18.09	25.00 47.25	NDI	" INDISTURBADA	
TRANSMISSION	C-23	M - 1	1.00-2.35 1.20-1.50	44.03	2.878	•	49		60 114	29 51	31 63	СН	1.660	- 1.757	- 8.38	- 2.60	- 140	- 0.60	0.18	- 2.575	I.16	46.00	1.36	1 1		27.26	39.94 44.25	NDI	DISTURBADA / INDISTURBADA	/UNDISTURBED
Ë	C-24		2.00-2.80 1.50-1.80 2.50-4.00	41.57	2,803		98 90	50 53 33	74 87 64	. 30 44 32	44 43 32	СН СН МН	1.67 1.655 1.66	1.843	1.97	0.80		- 0.5	• 0.15	- 2.404	- 1.31	36.00	0.51	0.00 0.00 0.00		24.87	49.19 44.00	NDI	DISTURBADA / INDISTURBADA / DISTURBADA /	UNDISTURBED

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PESO UNITARIO TOMADO EN CONDICIONES DE COMPACTACIÓN / UNIT WEIGHT TAKED IN COMPACTION CONDITIONS CV. TOMADO ENTRE 4.00 Y 5.00 Kg/cm<sup>2</sup>/ CV.TAKED BETWEN 4.00 AND 5.00 Kg/cm<sup>2</sup> CONSOLIDATION

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7. APPENDIXES

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# 7.1 LOGGING OF TEST PIT AND SOUNDING

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### RULES FOLLOWED FOR THE GEOTECHNICAL DESCRIPTION OF THE TEST PITS AND SOUNDING

The figure enclosed shown the distribution of the log of the geotechnical data obtained from test pits and sounding as per the type columns.

#### TEST PIT

1. Project name

2. Test pit number

3. Execution date

4. Site and coordenate

5. Depth

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6. Description of the type of soil or rock

The characterization of the soils was performed based on the laboratory tests as per the modified Casagrande Classification, standard ASTM-2487 and in based on the visual-manual description, as per ASTMD-2488. The main criteria are summarized in table NQ 1.

The rock characterization was corried out according to the International Society of Rock Mechanicks (Basic Geotechnical Description of Rock Masses)

7. Graphic representation of the type of land. Graph No 1

8. Result of the Laboratory Test

9. Type of sample and depth

#### SOUNDING

1. Project name

2. Sounding number

3. Coordenate

4. Execution date

5. Depth

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6. Formation name

7. Soil and Rock type

8. Graphic representation of the type of land.Graph No 1

9. Description of the type of soil or rock

10. Soil consistency or rock grade (Bieniawsky)

11. Graphic representation of "SPT"

2 DATE :	•	CONSOLIDATION COMPACTION SIMELIAC SHERMAUCE	P P C C Vma OC P V N			 								
() TEST PT NA	(4) COORDINATE :	UNIT MDICHT			>	 					· · · · · · · · · · · · · · · · · · ·		 	
PROJECT : THE DETAILED DESIGN ON TRANSBASIN CHONE-POTOVELO BASH		1						· · · · · · · · · · · · · · · · · · ·						
ROJECT : THE DETALED DESIGN ON	STE:			6	9	 0,1	<u></u>		20	•	· · · · ·		•	

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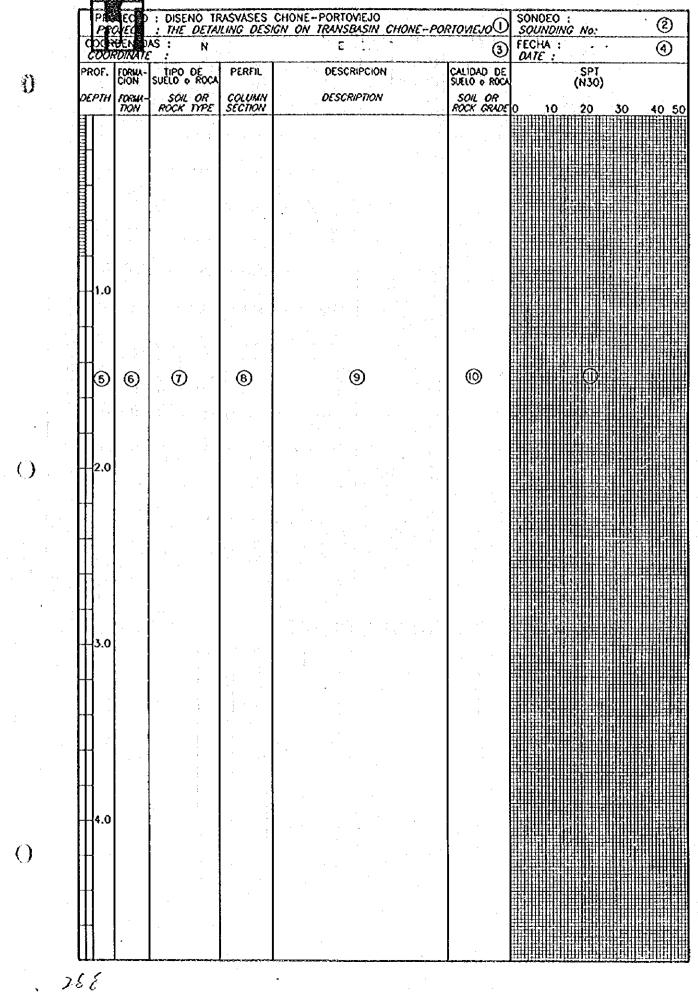


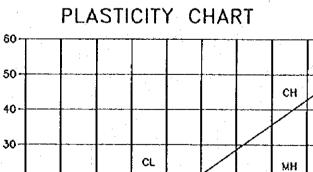
TABLE Nº I

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# CRITERION FOR SOIL DESCRIPTION

· · · · · · · · · · · · · · · · ·	1				
	GRAVELS	CLEAN GRAVELS	0.00		Well graded gravels sond mixtures little or no fines
COARSE	More than half of coarse	FINES >5%	0.00	СР	Poorly graded gravels, gravel—sond mixtures, little or no fines
GRAINED SOILS More than	traction is larger than No. 4	GRÀVELS WHIT FINES	0.00	GM	Silty gravels, poorly graded gravel-sand- silt mixtures
half of moterial is larger	sieve size	FINES	0.00		Clayey gravels, poorly graded gravel—sand— clay mixture
than No, 200 sieve size	SANDS	CLEAN SANOS		SW	Well graded snads, grovelly sands, litte or no fines
	More than half of coorse traction	FINES <5%		SP	Poorly graded sands, gravelly sands, little or no fines
	in smoller than No. 4 sieve size	SANDS WITH		SM	Silty sands, poorly groded sond silt mixtures
		FINES >12%		SC	Clayey sonds, poorly graded sond-clay-mixtures
				ML	Inorganic silts and very fine sands, rack flour, silty or clayey fine sands with slight plasticity
	SILITS AND CL Liquid limit less than 5			CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
FINE GRANED SOILS			SE I	OL	Organic silty and organic silt-clays of low plasticity
More than holf materials			SE S	мн	Inorgonic silts, micaceous or diatomaceus fine sandy or silty soils, elostic silts
is smoller than No. 200	SILITS AND C Liquid limi greater than	t i		СН	Inorganic clays or high plasticity, fat clays
sieve size		•		он	Organic clays of medium to high plasticity
	HIGHLY ORGANIC	SOILS	444	PT	Peat and other highly organic soils
			····		



ML

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50

60

40

LIQUID LIMIT

OH

80

90

70

PLASTICITY INDEX

20-

10-

0-<del>|</del> 0 CL-ML

10

20

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## DESCRIPTION FOR PARTICLE SIZE CONTENT

3/4" No.4 No.10 No.40 No.200 211 ASTM GRAVEL SAND FINES

	COARSE	FINE	COARSE	MEDIUM	FINE	SILTS	CLAYS	
10 10	D 20	0.0 4	.7 2	I .0 0	.5 0.1	74 0.0	02 Š	ieve size

RATE	DESCRIPTION TERM
5 - 10	TRACES
10 - 20	SOME
20 - 35	LARGE AMOUNT OF
35 - 50	CLAYEY, SILTY, ETC.

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DESCRIPTION OF COMPRESSIBILITY TERMS FOR A GRANULAR SOIL

	A strain of the first strain of the providence o
<u>N</u>	DESCRIPTION TERM
O TO 4	VERY LOOSE
5 TO 10	LOOSE
11 TO 30	COMPACT DENSE
31 TO 50	DENSE
>50	VERY DENSE
and the second	

### DESCRIPTION OF CONSISTENCY TERMS FOR A COHESIVE SOIL

9, (KPO)	N <sub>30</sub>	DESCRIPTION TERM	
<25	<2	VERY SOFT	
25 TO 50	2 to 4	SOFT	
50 TO 100	4 to 8	FIRM	1 kg/cm <sup>2</sup> = 100 k Pa
100 TO 200	8 to 10	STIFF	q, - UNIAXIAL COMPREHENSION
200 TO 400	15 to 30	VERY STIFF	STRENGTH
>400	>30	HARD	

#### TABLE NO 2

#### ROCK'S WEATHERING

- WI Sound Rock
- a) Without visible meteorization
- b) The joints are slightly oxidated
- W2 Slightly Weathered Rock

Weathering penetrates slightly into the rock thru main joints

#### W-3 Very Weathered Rock

- a) Weathering follows thru all the rock's body, but the rock is strong enough not to be broken by hand.
- b) Less than half of the rock's body is desintegrated and/or decomposed into soil. Some parts of the rock's body is healthy rock or slightly decolorized, as a whole, or as contiguous blocks.

#### W4 Highly Weathered Rock

- a) Weathering thru the whole rock's body. The rock can be easily desintegrated by hand.
- b) More than half of the rock's body is desintegrated and/or decomposed into soil. The rock's body could have healthy blocks or slightly decolorized blocks.

#### W5 Completely Weathered Rock

All the rock's body is desintegrated or decomposed into soil, being possible to recognize its original structure and rock type.

### TABLE NO 3

#### VISUAL RESISTANCE GRADES OF ROCK'S MATRIZ

<b>S1</b>	<u>Very</u>	Stiff Rock
	  	Hard to break (qu > 2000 kg/cm <sup>2</sup> ) Very crisp sound when hit by hammer's head qu > 2000 kg/cm <sup>2</sup>
S2	<u>Stiff</u>	Rock
· · ·	- - -	Scratchable and breakable with hammer's head Crisp sound when hit by hammer's head 600 < qu < 2000 kg/cm <sup>2</sup>
<b>S</b> 3	Mediu	m Rock
		Easy to scratch with hammer's head Uncrisp sound when hit by hammer's head 200 < qu < 600 kg/cm <sup>2</sup>
S4	<u>Soft</u>	Rock
· ·	-	Easily to scratch with hammer Impossible to break by hand in blocks greater than 10 $cm^2$ 60 < qu < 200 kg/cm <sup>2</sup>
<b>S</b> 5	<u>Very</u>	soft Rock
	-	Hammer's head corner hit leaves a mark on the rock Breakable by hand

- 20 < qu < 60 kg/cm<sup>2</sup>

Transition between rock and soil:  $4 < qu < 20 \text{ kg/cm}^2$ 

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### TABLE NO 4

### STRATA THICKNESS ACCORDING TO B.G.D.'S SPECIFICATIONS

INTERVALS CM	SYMBOL.	DESCRIPTION
> 200	F 1	Very thick
60 - 200	F 2	Thick
20 - 60	F 3	Medium
6 - 20	F. 4	Thin
< 6	F 5	Very thin

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### Table 5 : The Rock Mass Rating System (after Bieniawski, 1979).

A SUPPORTION PARAMETERS AND THEIR RATINGS

	Pa	rameler			Hanges of Value	<u>۲ منابع م</u>			*****
,	Siler gill of	Point load strength index (KIPs)	10	4 - 19	2-4	1.2		range unitari NE lest is pref	
	matenat	Uniarial compressive strength (Mthay	240	100 250	51-100	25 - 53	5-25	1-5	
		Rating	15	P2	2			l	
<u>،</u>	Owl co.	equality ROD (1-c)	99 - 100	15 51	50-75	25 55		: < 25	<u> </u>
4-		Rating	20	12	13			1	
•	Spacing	of discontinuities	2 m	46-2m	232-600 mm	50 200 mm		sf0 mm	
		Rating	20	15	10			5	
•	Condition	ก of discontinuities	Very rough surfaces Not continuous No separation Universitiered wall rock	Sightly rough contacts Separation of 1 mm Sightly weathered wate	Grightly much surfaces : Sebarzikin < 1 mm Highty weathered was	Sichensided surfaces Souge < Simmunick Separation 3 - Simm Continuous	Sola ghuge : Separation : Continuous :	>.5 mm shick or > 5 mm	
1		Rating	30	25	50	.10	a an	0	•• <b></b>
		Inflow per 10 m Juninel length (Limin)	None	< 10	10 - 25	25-125		>125	
	Shoundwater	Johit water Pressure Major principal stress	0 or	-01	01-02	02-05	~~ <u>~</u>	>0 5	• •
		General conditions	Completely day	Camp	Wei	Oreprig	07	Flowing	
1_		Rating	15	10	7			0	

8. AATING ADJUSTMENT FOR DISCONTINUITY ORIENTATIONS

	De Orientations of continuities	Very Favorable	Favorable	Fad	Unizvorable	Very Unfevorable
	Turnels and mines	0	-2	-\$	-10	- 12
Balings	Foundations	0	-2	-7,	-1\$	-25
	Stopes	0	-5	- 25	-50	- 60
. POCK MASS	CLASSES DETERMINED	FROM TOTAL RATINGS				· · · · · · · · · · · · · · · · · · ·
	Rating	100 81	60 <del>-</del> - 51	50 <b>⊢</b> 41 .	40 21	<20
c	Jass no.	1	<u> </u>	4 <b>1</b>	N	v
. 0	e scription	Very good rock	Good with	Fair rock	Poor rock	Very poor rock
WEANING OF	BOCK MASS CLASSES		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		
	lass no	1	#	lat	n	v
Autrage	sland-up time	20 yr for 15 m span	14610000	* wa f⊻r \$ m soan	10 h \$x 2 5 m scan	30 min fer 1 m spart
Cohesion of	the rock mass (kPa)	>400	309 - 430	200 - 200	100 - 200	×100
Fiction angle (	of the rock mass (deg)	>45	35-45	25-35	15-25	<15

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SYMBOLIC FOR EACH TYPE OF SOIL OR ROCK

GRAPHIC Nº I SOILS VEGETAL SOIL, ORGANIC SILT OR CLAY SILT SANDY SILT OR SILTY SAND PLASTIC CLAYS FINE GRAINED SAND WITH A SMALL CONTENT OF FINES ROCKS MUDSTONE SILTSTONE FINE GRANED SANDSTONE NEDIUM TO COARSE GRAINED SANDSTONE ALTENATING LAYERS OF SILTSTONE, BUDSTONE AND SANDSTONE

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TEST PIT

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SM	E: OPEN CHANNEL	P	, 	s G P R	2480	ICLE S	IZE.	Ĺ	MITES			UN	і IЛ	RDIN	ATE : TRIAX		CONS	SOLIDAT	TION	N 91		30 Swel		E 60 Sh	7645 IRINKA				
DEPT} m	DESCRIPTION	0 F L	w X	E A C F I F T T Y	· · · ·	<b>#</b> 200	·.	۸۱ WL	ERBER		CLASIF UCCS	weig Moist	<b></b>	No to to		<b>6</b> 0	20	Cc	Cv		онс		۷	Ws X	La	Vc X	pin Hole	8	IEMARKS
 - -	BLACKISH VEGETAL SOIL, HARD DARK GRAY ORGANIC CLAY							-											· · · ·	<u></u>								0.50	
	WEATHERED DEBRIS OF SILTSTONE IN YELLOWISH BROWN SILT-CLAY MATRIX, HARD																											0.50 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2	
1.0		11141141141141141141		2.768	100	96	51	59	37	22	мн	1,59	1.683	1.82	0.90	20	0.55	0.125	4.046	1,07	44.4	0.20	0.00		16.53	42.5	NDI	03. M - 1 DISTURBED	- <u>-</u>
- - -	WEATHERED YELLOWISH BROWN MUDSTONE, VERY SOFT ROCK		1																							-	. :	1.10	
<u>2</u> .0			-		· · ·																							2.00	
-																						0.40			12.09	478	3 ND 2	TURBED N 2	
			34.3	2.72	100	98.7	18	55	37	18	мн	1.538		- - - -	-	÷ .	-	-	-	-	• •		0.00	-	12.50	11.0		00°C M -2 DISTUR	
3.0	END : 3.0 m			-																		· · · · ·						0.00	
- · ·												1 1						· ·			•						-	÷	



		P R		S G P R F A	PAR	TICLE	size	AT	UMITES TERBEI	RG		UN WEIK	1 11 2HT	ÿ	TRIA	KINL	CON	SOLIDA	TION	COMP	ACTION	SWE	LING	i Si	HRINKA	GE		
0EPTI M	DESCRIPTION		`₩`  %		<b>#</b> 4	<b>#</b> 200	2/4		Τ		UCCS	F}	SATUR	₩ ₩ ₩ ₩ ₩	C'	deg	Pp Kg/cm2	Co	() 101		ONC		γ	W3 X	i.	Vc X	Pin Thole	REMA
	BLACKISH VEGETAL SOIL, HARD				·}		-							kg/om.	Kg/cm					gr/cm		Kg/cm						
	GREVISH BROWN CLAYEY SILT WITH SOME OF WEATHERED CLASTICS, HARD		1		:																•	:						0.55
-	WEATHERED CLASTICS OF SILTSTONE IN YELLOWISH BROWN CLAYEY-SILT MATRIX, HARD		-																		· · ·	·····					-	· · · ·
<u>1.0</u>	CLAY WITH CLASTICS	4 4 4 1 4 1 4 1 1 4													0.70	10		0.170							15.00			۳ ۲
	SNFF			2.606	5 100	869	20	80	54	26	мн	1,558	1.659	1.70	0.70	10	0.45	0.136	2.62	1.07	45.6	1,25	0.00		15.80	142.05	9 NDI	DISTURBED N
_2.0				1									 															2.00
	END ; 2.0 m END OF PIT BY WATER PRESENCE								· .							· .												
									· · ·								· .											
3.0				· ·		· ·				:																		
•									н - 									÷ .										
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	OJECT : THE DETAILED DESIGN ON E: OPEN CHANNEL	11040	13043			·rvn	1011	<u>evv</u>	BA	2114			}		ATE :		12			N 9	89244	- المعن	DATE	<b>E</b> 60				<del></del>
		P R O		S R P R E V	PAR	nole s	SIZE	L	JMITES TERBEF	8		UN WEK		U N	TRIA	KIAL	CON	SOLIDA	non	COMP	VETTION	SWE	Ling	sH	IRINKA	GE	PIN	
DEPT} m	e OESCRIPTION	F I E	₩ ★	C   Y   I     T   T   Y   Y	#4	#200	214	WL	ŴP	IP	CLÁSIF UCCS	MOIST	SATUR	¢ ₩ Va Ka/cm		¢0 deg	Pp Kg/cm2	Co	Cy mol/mb	Yrnax gr/cm <sup>2</sup>	omc X	P Kg/cm	V X	Ws X	La X	Vc X	HOLE	REM
	BLACKISH VEGETAL SOIL, HARD								<u> </u>			· · ·				·				1.62								
	DARK GRAY CLAY WITH TRACES OF OXIDIZED DEBRIS AND ORGANIC MATERIAL, HARD									÷	-					-												
-	WEATHERED AND OXIDIZED DEBRIS OF SILT IN YELLOWISH BROWN SILTY-CLAY MATRIX, VERY STIFF																						- <u></u>					0.60
<u>1.0</u>			32.2	2.679	100	90	14	61	43	18	MH.	1.58	1.708	-	-		-			1.13	<b>41,60</b>	1,60	0.00		25.19	35.15	ND2	DISTURBED N
		4	· · · · · · · · · · · · · · · · · · ·			·		· · ·					· -															1.60
-	YELLOWISH BROWN CLAYEY SILT WITH NUMEROUS WEATHERED AND OXIDIZED DEBRIS, VERY STIFF					:		· · · ·																				2.00
_2.0																					· · · ·							2.00
				0.007									· · · · · · · · · · · · · · · · · · ·															2 2 2
3.0	SULL		41.6	2.683		89	16	71	48	23	MH	1.54		2.18	0.85	20	1.05	0.126	4.752	1.09	42.60	) F.60	0.00		21.53	41.19	ND5	DISTURBED
								· .									· .		· .									3.60
4.0	WEATHERED BLOCKS OF YELLOWISH BROWN SILTSTONE IN SILTY-CLAY MATRIX	D D							•	 -					· [					· · · · · · ·			•					

	JECT : THE DETAILED DESIGN ON OPEN CHANNEL													t pit Drdin		- ÷,			· · ·	N 9	89154		ATE	<b>E</b> 60			· · · · ·	<u> </u>
OEPTH	DESCRIPTION	P R O	W	SPEC	PAR	NCLE :	SIZE	L AT	JHITES TERBEF	05	CLASIF	UN WER	I SHT	ų :	TRIAX	KIAL		SOLIDA	TION		CTION			T	IRINKA	·	PIN	REMA
m	DESCRIPTION	i L E	X	U Y I I T T Y Y	#4	<b>#</b> 200	2/4	WL.	WP	IP	UCCS	MOIST	SATUR	o ₩ yma Ka/cm <sup>2</sup>		go deg	Pp Kg/orn2	00	Cy mot/mb	Ymax	омс X	P Kg/cm	V X	Ws X	Ls X	Vc X	HOLE	
 - -	BLACKISH VEGETAL SOIL, HARD													19.011.						3- <u>7-6-11.</u>			· · · · · ·					
	DARK GRAY CLAY WITH DEBRIS, HARD		1 1																									
	WEATHERED DEBRIS IN GRAYISH BROWN SILTY MATRIX, HARD																				:							0.80
_1.0	GRAYISH BROWN CLAY WITH TRACES OF OXIDIZED DEBRIS, HARD	<u>a</u>					· .						+										   					
	- WITH SOME DEBRIS		-					·																				
			35.7	2.743	100	97	53	92	47	45	МН	1.566	1.750	2.53	1.00	26	0.95	0.16	1.92	1.18	36,30	1,35	0.00		21.12	57.33	3 NDI	15
												:												н н н				DIST
2.0			-																									2.00
	Yellowish brown clay with numerous oxidized debris, hard		- · ·					۰.																				
• 											.*			-														
	WEATHERED YELLOWISH BROWN VERY SOFT MUDSTONE	<b>&gt;</b>				÷																						7 2
3.0	YERT SUFT MUDSIONE		33.3	2.622	100	99	8	78	42	36	мн	•	-	÷.	-	•	-	-	-	-	-		-	-	21.9	9 40.1	NDI	DISTURBED
			- - -	· .													:											õ
				-				 									· · .								ŕ			3.50
			-			·																						

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END : 4.0 m

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SITE	C OPEN CHANNEL					POR					<u> </u>				ATE :				<del> </del>	N 98	9104		ATE :		6183		<u>.</u>	
	DESCRIPTION	PRO		S G P R E A	PARI	ncle s	1ZE		IMITES ERBER	G	CLASIF	UN WEK		U	TRIA	(IAL	CONS	SOLIDAT	NON	сонра	стюн	SWEL	LING	SH	IRINKAA		PIN	REMARKS
DEPTH m	DESCRIPTION		W X	C V I I T T Y Y	#4	<b>#</b> 200	2/1	m	WP	IP	متعندا		SATUR	Kg/cm	C' Kg/tm <sup>2</sup>		Pp Kg/om2	Co	Cv ===2/3==	Ymax gr/tm <sup>2</sup>	онс Х	P Xg/cnf	V. X	Ws X	Ls X	Vc X	HOLE	
-	BLACKISH VEGETAL SOIL WITH OXIDIZED DEBRIS, HARD																											
	BLACKISH GRAY CLAY WITH TRACES OF OXIDIZED DEBRIS AND ORGANIC MATERIAL, HARD							-																				
- <u>1</u> .0	YELLOWISH BROWN WEATHERED AND OXIDIZED DEBRIS IN DARK GRAY SILTY-CLAY MATRIX, HARD	0 P																	· <u></u> .									0.90
- - -			31.9	2.598	100	76	19	78	43	35	мн	1.518	L714							1.16	37.8	0.60	0.00		32.95	5 28 24	NDI	DISTURBED N 1
<u>2</u> .0		p P											· · .		-			· ·										1.90
	GRAYISH BROWN CLAY WITH NUMEROUS WEATHERED DEBRIS OF MUDSTONE, HARD				· .																							
 -			39.7	2.565	100	94	18	78	44	34	мн	1.523		1.01	1.60	14	0.72	0.145	5 494	1,16	40.2	0.10	0.00		31.07	7 31.17	NOI	5C0 X 2
3.0			- 																	•		•						DISTURBED
	BLOCKS OF SILTSTONE																	· · · · · · · · · · · · · · · · · · ·					<u>.</u>					3.50
	WEATHERED YELLOWISH BROWN MUDSTONE, VERY SOFT ROCK									1		•				· . · .	·							- 				

PRO	NECT : THE DETAILED DESIGN ON	TRAN	SBAS	N CH	ONE-	POR	TOVI	E JO	BAS	IN			TES	T Pfr	N #1	C1	5			*****		[[	ATE :	20	1-12-	-93				
sm	OPEN CHANNEL								<b>.</b>				<b>CO</b>	RDIN	ATE :					N 9	8904	10	. {	E 60	5090	<u> </u>	·			
		PRO		SRA	PAR	icle s	SIZE					WEK		Ų	TRIA	(IAL	CON	SOLIDAT	NON	COMP	ACTION	SWE	.UNG	SH	IRINKA		PIN			
DEPTI m	DESCRIPTION	F I L	×	I I I I T T Y Y	<b>#</b> 4	<b>#</b> 200	2/4					·		Ka/cm.	C' Ka/cm <sup>2</sup>	go deg	Pp Kg/cm2	Co	Cy ====2/==3	Ymax gr/cm <sup>2</sup>	омс Х	P Ka/cm	V X	Ws X	Ls X	Vc I	HOLE	R		
	BLACKISH VEGETAL SOIL, VERY STIFF			······								- <u>+</u> -																		
		ν																										0.40		
	YELLOWISH BROWN CLAY WITH			 ·			<u> </u>			<u> </u>													i			1			•	
ŀ	VERY STIFF										с 1				-												:	_		
F	-LEVEL OF BLACKISH CLAY		27.5	ž.658	100	76	48	91	39	52	СН	1.399	1.661	1.09	0.70	22	0.80	0.439	1.531	1.06	34.6	1,50	0.00		14.75	57.08	NDI	-		
1.0	LEVEL OF BLACKISH CLAY	P								_:							· · · ·				-	·								
-	WITH NUMEROUS DEBRIS, STIFF	<u> </u>				. 						-				· · · · · · ·				-								1.20 N	1 :	
				2.698	100	98	18	90	44	46	мң	1.400	-	-	-		-	-	-	-	-	1.60	0.00		12.33	57.74	NDI	URBED		
		$\begin{array}{c c c c c c c c c c c c c c c c c c c $																												
	WEATHERED YELLOWISH BROWN		-														· · ·													
2.0				<i>11</i> 				,									:													
-			-												· .															
[																							-							
	•		-		÷.,						-					·								-		-				
OCORDINUTE : N 989040 E 055090         STEE OPEN CLIANNEL         Deprin       DESCRIPTION       Image: state																														
		-						:																						
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PRC	NECT : THE DETAILED DESIGN ON	TRAN	SBAS	IN CH	IONE	-POR	TOME	IO BA	ISIN		· .		TES	T PIT	Nat	<u>C-1</u>	6			· ·		(	ATE	1 20	)-12-	<b>93</b>		
SITE	OPEN CHANNEL									:			000	ROIN	ATE :					N 9	8901	10	_	<b>E</b> 60	5090			
оертн	DESCRIPTION	P R O F	w	SPEC	PAR	TICLE :	SIZE		umites Terbei	05	CLASIF	UN WEK	HT		TRIAX	(141,	CONS	SOUDA	אסאד	COMPI	VCTION	SWEI	LUNG	Sł	IRINKA	GE	PIN	REMAR
m		l L E	*		<b>#</b> 4	<b>#</b> 200	2/4	WL	WP	IP	UCCS	MOIST	SATUR	Ka/cm <sup>2</sup>	C' Kg/cm <sup>2</sup>	∳≎ deg	Pp Kg/cm2	Cc	CV mat/hde	Ymax gr/cm²	омс Х	P Kg/knf.		Ws X	1.s X	Vc X	HOLE	
• • •	BLACKISH VEGETAL SOIL, HARD	¥						-						- <b>8e</b> -									       					
	DARK GRAY CLAY WITH SOME WEATHERED DEBRIS AND TRACES OF ORGANIC MATERIAL, HARD							н. 1		· ·				,		-												:
•							· · · · · · · · · · · · · · · · · · ·																					0.85
1.0	WEATHERED DEBRIS OF SILTSTONE AND FINE GRAINED SANDSTONE IN YELLOWISH BROWN CLAY-SILTY MATRIX, LIGHT PLASTICITY VERY STIFF																											-
		₽ ₽. 		2,636	5 100	78	28	62	36	26	MĤ	1.627	1.794	- -	-	-	-	-	-	1.28	32.8	0.75	0.00		17.39	38.72	NDI	
																					:	:						1.80
_2.0	GRAYISH BROWN CLAY WITH SOME OF WEATHERED DEBRIS, LIGHT PLASTICITY, VERY STIFF					-																						2.00
											-																	
			4. 1.								· .		• .		· · · ·													N 2
3.0			32.7	2.456	100	95	30	63	34	29	МН	1.642	1.759	1.88	0.70	12	0.75	0. 107	13.91	1.28	31.8	1.65	0.00		15.40	41.82	NDI	DISTURBED
	WEATHERED YELLOWISH BROWN																											0
	MUDSTONE, VERY SOFT ROCK			• :		· .				:							. 									<u> </u>		3.50
																						-						
4.0					·	1	1		1:				1							1			1					

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	NECT : THE DETAILED DESIGN (				TVNG*	-1-01	IUVIE	NO RA	NIC	·· <b></b>				st pri		· · · · · ·	7		<u></u> -				MTE	1 2	0-12	-93	• <u>-</u>		
anc	G OPEN CHANNEL	<u>-</u>			<u>.</u>		<del></del>	·				<b>1</b>	00	ORDIN	ATE :	l	•			N 9	8896	00		<b>E</b> 60	4670	F.			
epth	DESCRIPTION	ROF	w.	S G P R E A C Y	PAR	ncle :	SIZE		limites Terbei		CLASIF	UN WER		V L CON	TRIA	XIAL	CON	SOLIDA	TION	COMP,	ACTION	SWE	LUNC	s	HRİNKA	GE	PIN		· · · · · · · · · · · · · · · · · · ·
m			×		<b>#</b> 4	#200	2/4	WL	WP	IΡ	UCCS	NOIST	SATUR	Kg/cmf	C,	deg .	Pp Ka/cm2	Co	CY	Ymox	омс ж	Р	V X	Ws X	Ls X	Vc X	HOLE		REMARKS
	BLACKISH VEGETAL SOIL, HARD		-	-				1		-				Kg/cm	Kg/cnt			{		gr/cnt	*	Kg/cm.	<b> </b>				<u> </u>		
			-									İ																	
		[	1			-									· · ·														
ſ	YELLOWISH BROWN CLAY WITH SOME		·					· · ·				· · · · ·					ļ								·]	· · · · ·		0.40	
	DEBRIS, HARD	· [					•																						
ł			-			:																		·					
	WEATHERED DEBRIS OF MUDSTONE IN YELLOWISH BROWN SILTY-CLAY																											<b>-</b> -	
Į.0	MATRIX, HARD	4 4	{																									z	
	· ·	[	23.3	2.623	100	95	30		41	30	мн	1.498	1.718	1.66	1.50	Ц	0.80	0.243	10,58	1,16	32.3	1.15	0.00	1	16.02	44.96	N D1	DISTURAED	•
		4																								[		n sig	•
		4																		-							1.1		
		4	7 -																						· ·				
		4	<u> </u>																										
						:			-								•				· · · · · ·		·					1.60	
.	WEATHERED YELLOWISH BROWN					-																							
.0	MUDSTONE, VERY SOFT ROCK																											• *	
		EE	•							· · .															· · · ·			2.00	
		EE														•			· .			•						•	
		EE																											•
									· ·			·										a Aliantesia					÷.,	2 2	
			28.6	2.680	100	99	43	73	44	29	мн	i 496							N.			1.10	0.00	÷	10.75	42,47			
					- -		÷.,						-							N		1.10	0.00		10.35	··· 2 ,···	NUZ	oistuka	
1															-													ö	
.0																	а. — А.												
1	END : 3.0 m							·									·											3.00	
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	WECT : THE DETAILED DESIGN ON					1 41	101/63		VIK4					ng ng	ATE :		8			N ö	8001		DATE					
OEPTH	· · · · · · · · · · · · · · · · · · ·	PROF	Ŵ	S G P R E C V	PAR	TICLE :	SIZE	TA	Limites Terbei	RG	CLASH	U) WEK	ม เก	U N	TRIA		CON	SOLIDA	•——•-	<b>[</b>	8891		ONULI	I	4290 IRINKA		PIN	
m		E	x	I I T T Y Y	14	<b>#</b> 200	214	WL	WP	۱P	UCCS	NOIST	SATUR	Ka/cm	C' Kg/cm <sup>2</sup>	go deg	Pp Kg/cm2	Co		Ymax or/cm <sup>2</sup>	омс ж	Р	V X	Ws X	ls X	Vc X	HOLE	REMAR
	DARK GRAY VEGETAL SOIL, HARD	× - +		· · · · · · · ·																	<u>-</u>	Kg/cm						0.30
	YELLOWISH BROWN SILTY CLAY WITH WEATHERED DEBRIS OF MUDSTONE, VERY STIFF																											
<u>1</u> .0	WEATHERED WITHISH BROWN MUDSTONE WITH NUMEROUS SHELLS, VERY SOFT ROCK		21.7	2.726	100	95	24	65	35	30	мн	1.528	1.753	2.40	1.20	22	0.70	0.335	6.224	1.19	34.6	I, 30	0.00		18.28	46.14	NDI	DISTURBED N 1
											-											<u>-</u> .				- -	· · ·	1.60
2.0	WEATHERED SOFT BROWN MUDSTORE BEODING - HORIZONTAL				:							-													-			2.00
																						-						พ 2
3.0			25,5	2.715	100	95	28	64	36	28	MH	1.527	1.707			•				1.12	41.6	1.50	0.00		11.55	53.59	N02	DISTURBE
-	END : 3.0 m		et.																						-			3.00
										- - -																		
4.0					5																							

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		OJECT I THE DETAILED DESIGN ON					· · · · ·									TNM				· · · · · ·				UATE	<u>t 1</u> !	5-12	93		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1887 - antonio ang. aga
)	OEPTI		R O		3 G 8 F	PA	TICLE	SIZE		UMITE: TTERBE		1		NIT .	ORON	TRIA		CON	SOLIDA	TION	N 9		1		†	)3850			1	
	m	DESCRIPTION		W X		#4	#200	2/1		T	1	CLASI	ຖ	GHT T SATUF	₩ ₩ ₩ ₩	C.	40	Po	Co	QV	Ymax	OHC		UHC V	We		Vo	PIN HOLE	REA	VARKS
		CRAY VEGETAL SOIL, HARD	- Y-+ +						-}						Kg/cr	n Katuf		Kg/cm2		Mod/set	gr/cm	*	Kg/cm	*	*	×	×	-		
	-	GRAY CLAY WITH SOME OF FINE GRAINED SANDSTONE AND NUMEROUS WEATHERED DEBRIS OF FINE GRAINED SANDSTONE, HARD																										1		
	1.0								· .																				1.00	
		gray clay, high plasticity		24.3	2.698	100	99	30	45	22	23	CL	1.423	1.831		-	-	-	-	-	l. 32	29.6	0, 30	0.00		13.83	39.02	NDI	DISTURBED N 1	
	2.0	GRAY CLAY WITH TRACES OF SAND AND LARGE AMOUNT OF WEATHERED DEBRIS OF FINE GRAINED SANDSTONE, HARD																								-			1.70	
																								-					۲ ۲	
	3.0	7STIFF AND VERY STIFF		23.5	2.607	100	58	20	40	21	19	CL	1.423	1.857	2.56	1.65	10	0.65	0982	2.443	1.39	30.2	0.30	0.00	-	18.28	31.00	N DI	DISTURBED	
																													3.60	
	4.0	WEATHERED YELLOWISH BROWN CLAY, VERY SOFT END : 4.0 m								:													•						· · ·	

510	E: TRANSMISSION LINE	P	<u> </u>	5 9				1	IMITES		<u> </u>	UN	L	ordin			<b></b>			N 9	89266	55	E	E 607	7780			[	
0EP111 m	DESCRIPTION	ROFIL	w X	P=C-=+		NCLE :	.		TERBE	RC	CLASH UCCS	WEK	GHT T		TRIA) C'	40	Da	SOLIDA Co	CV.	Ymax	ACTION OMIC		γ	۴¥۶		Vo	PIN HOLE		REMARKS
	BLACKISH VEGETAL SOIL WITH SOME OF WEATHERED DEBRIS, HARD	¥.,	1.1	• •										ξ Γ Κ <u>9/сπ</u> έ	Kg/cn <del>?</del>	499	Kg/orn2		sai/eb	gr/tm <sup>2</sup>	×	Kg/cnl	X	*	*	<b>X</b>			<u></u>
	WEATHERED DEBRIS OF MUDSTONE IN DARK BROWN CLAY MATRIX, HARD	↓ ↓ ↓										· <u></u>						<u> </u>				·					<u>`</u> _	0.35	: ·
			25.7	2.649	100	80	39	49	31	18	ML	1,54)	1.728	3.00	1.80	io	0.75	0.106	7.81	1.17	37.8	0,15	0.00		19,36	40.73	N 0 1	ISTURBED N	• •
 <u>1</u> .0	VERY WEATHERED LIGHT GRAY MUDSTONE													· · · ·				· ·					•					1.10	
	WITH OXIDIZED JOINTS, SOFT ROCK																											1.50	
-	END : 1.50 m														·				-										•
2.0					. '				•		2													-					
 - - -								÷ .															-						
- 																													
 <u>3.0</u>																:													
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RO	JECT : THE DETAILED DESIGN ON	TRAN	SBAS	N CH	ONE-	PORT	<b>COVIE</b>	O BA	SIN	· · ·			TES	r Pir	NA	C-2	1					ם   נ	ATE	2	3-12	93		·	
TE	TRANSMISSION LINE								• .				000	ADIN	ATE :			,		N 9	B924(	)0	-	E 61	3400			-	
2114	DESCRIPTION	P R O F	W	SPEC	PART	icle s	aze		lmites Terbef		CLASIF	UN WEIG		UNC	TRIN	ant.	CONS	OUDAT	NON	сонря	CTION	swei	LUNG	s	HRINKA	GE	PIN	REMARKS	
•		Ē	×	L I T T Y Y	<b>#</b> 4	<b>#</b> 200	2/4	WL.	WP	IP	ince		SATUR	¢ ₽ Kg/cm?	C <sup>e</sup> Kalom <sup>2</sup>	#0 deg	Pp Kg/cm2	Co	Cv	Ymax gr/cm²	ohc X	P Kg/tm²	Y X	₩s X	Ls X	Ye X	HOLE		
	DARK BROWN VEGETAL SOIL WITH SOME																	•••					·		-				
	SAND AND ORGANIC MATERIAL, VERY STIFF																									Î			
	·															:												0.40	
	WEATHERED DEBRIS AND BLOCKS OF	D_P											,													1.			
	SILTSTONE AND FINE GRAINED SANDSTONE IN YELLOWISH BROWN SILTY-SANDY	-0-																										z .	•
	MATRIX, VERY STIFF	L_ D_	10 7	0.077	100	50				5									· .									URBED	
		10-		2.673	100	50	16	44 .	28	16	ML	1.668	1.826	0.83	0.40	20	0.74	0,134	6.18	1.32	31.00	1.10	0.00		19.99	26.61	NDI	DISTUR	
0		2-12 1212-										· · · · ·	·									· · · · · · ·							
-		·····																	-									1.00	
	VERY WEATHERED YELLOWISH BROWN SILTY FINE GRAINED SANDSTONE WITH																							,				· · ·	
	OXIDIZED JOINTS, VERY SOFT ROCK							nin Antonio																				~	
										·							•											Ż	
			26.7	2.579	100	88	8	40	22	18	61	1.670								•		0.26	0.00		19.17	25.00	NDI	JRBED	
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ſ	VERY WEATHERED YELLOWISH BROWN																								-	-	<u> </u>		
	SILTY FINE GRAINED SANDSTONE WITH OXIDIZED JOINTS, SOFT ROCK										•										·								
	Charles Contro, Cort Rook									1			·																
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	<b>SECT : THE DETAILED DESIGN ON</b> <b>E:</b> TRANSMISSION LINE		30/13		Witt.	-POK	IOVIE	10 8/	SIN	<u> </u>			·}		ina Iate :	····	22					•	ATE	: 2	3-12	-93		
DEPTH	······································	1°P 1°R 1°C 1°F	w	S R R A V	PAR	TICLE :	SIZE		limites Terbei		CLASH	U) WEH	J	U	TRIA	<u>-</u>	CON	ISOLÍDA	TION	COMP	action	SWE	UNG	s	HRINKA	GE	PIN	DEMA
m			X	I I T T Y Y	<b>#</b> 4	#200	2/1	WL.	WP	IP			SATUR	Kg/cm	C Kg/cm	go deg	Pp Kg/onú		Cy mod/ma		OMC X	P Kg/cm	V *	Ws X	Ls X	Vc X	HOLE	REMA
	BLACKISH VEGETAL SOIL WITH SOME OF FINE GRAINED SAND AND ORGANIC MATERIAL, VERY STIFF														***						- <u></u>							
• • .	GRAYISH BROWN SILTY CLAY WITH SOME WEATHERED DEBRIS		-																							, ,		0.60
			39.64	2.832	ю		50	106	58	48	сн	1.673	1.750	13.18	1.10	26	0.40	0.18	2.597	1.16	38.00	2,49	0.00		18.09	)	NDI	RED K
1.0 	WEATHERED DEBRIS OF SILTSTONE AND FINE GRAINED SANDSTONE IN BROWN SILTY MATRIX	P																		<u> </u>								0.90 5 1.00
2.0			27.3	2.658	100	49	15	60	29	31	SC	1.660										1,25	0.00		19.89	39,94	NDI	א ג סוצדטרגופנ ג ג ג ג ג ג ג ג ג ג ג ג ג ג ג ג ג ג ג
	WEATHERED BROWN MUDSTONE WITH OXIDIZED ZONE, VERY SOFT ROCK																											
3.0													•					-										
$\mathbf{F}$	END : 3.50 m					<u>.</u>					·								<u>-</u>			<u></u>			ļ		ļ	3.50

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RO	JECT : THE DETAILED DESIGN ON	TRAN	SBASI	IN CH	ONE-	PORI	OVIEJ	O BA	SIN				TES	r pir	NA	C-2-	3					· 0	ATE :	: 27	/-12-	-93			<u> </u>
STE:	: TRANSMISSION LINE				· · ·	·	· .	•			• • • • • • • •		COC	RON	NTE :					98	39587	74		62	7354				
የጡ	DESCRIPTION	P R O F	W	SPEC	PART	icle s	ŧZE		INITES ERBER	G	CLASIF	UN WEX		520	TRW	KIAL	CONS	SOLIDA	NON	сощра	CTION	SWEL	1340	sł	IRINKAC		PIN	REMARI	ĸs
n		l L E	*	I I T T Y Y	<b>#</b> 4	<b>#</b> 200	2/4	WL.	WP	IP	UCCS	NOIST	SATUR	Kg/caf	C' Kg/cm <sup>2</sup>	go deg	Pp Kg/cm2	Co	CV 8073/343	Ymax gr/cin²	ONC X	P Kg.km <sup>2</sup>	۷ <b>X</b>	Ws X	13 X	Yo X	HOLE		
	BLACKISH CLAY SILT WITH SOME FINE GRAINED SAND, HARD											-																-	
	grayish brown silty clay, with	.pp								. e								-	· ·										
	NUMEROUS WEATHERED DEBRIS OF SILTSTONE, HIGH PLASTICITY, HARD	PPP PP																				- 3					-		
.0		- ¥.							÷.,		÷.		· · ·												:			<b>,</b>	
	GRAYISH BROWN SILTY CLAY, High plasticity, hard	· · · · · · · · · · · · · · · · · · ·																										1.20	
		  	44.03	2.873	100		65	<b>U</b> 4	ક્ર	63	сн	1.719	1.757	8.38	2.60	14	0.60	0.18	2.575	1.16	46.00	1.36	0.00		27.26	- -	NDI	URBED N	
	REDISH BROWN SILTY CLAY, VERY STIFF																												
										•				:										~	·				
0			 	. •		<sup>-</sup>					<b></b>	·										. 1					   	2.00	
			37.7	2 733	100	98	50	74	30	44	СН	1.67		-	_						_	0.75	0.00		20.27	49 19	NDI	א 198	
		· · · · · ·																										DISTUR	
.0			]															÷.										2.80	
	GRAYISH BROWN VERY WEATHERED SILTY FINE GRAINED SANDSTONE, SOFT ROCK																												
																	н 1. т. н.											1.00	
	END : 3.50 m		 									· .			<u>.</u>													3.50	
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PRO	PROJECT : THE DETAILED DESIGN ON TRANSBASIN CHONEPORTOMEJO BASIN										TEST PIT N* C-24								NTE :	2				
SITE	: TRANSMISSION LINE		· · · · · · · · · · · ·	<u>.</u>									COC	ORDIN	ATE :					9	89709	30	Ŧ	63
DEPTH	DESCRIPTION	P R O F	₩	5 R A V	PARTICLE SIZE		UMITES ATTERBERG		CLASIF	WEIG	UNIT WEIGHT		TRIAXIAL C		CON	ONSOLIDATION		COMPACTION		SWELLING		s		
m	•	Ē	×		<b>#</b> 4	#200	2/4	WL.	WP	IP	UCCS	Moist	SATUR	Kg/cn7.	C' Ka/cm <sup>2</sup>	go deg	Pp Kg/cm2	Co	CV meta/man	Ymax gr.tn?	OMC X	P Kg/on?	V X	Ws X
	BLACKISH VEGETAL SOIL WITH SOME OF SAND, HARD									-														
	WEATHERED DEBRIS OF SANOSTONE AND SILTSTONE IN GRAY SILTY-CLAY MATRIX, HARD	0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-			•													-						
_1.0																								
	CRAYISH BROWN CLAY WITH REDISH ZONE (OXIDIZED)HIGH PLASTICITY, VERY STIFF										•													•
			4157	2,803	100		53	87	44	43	сн	1.655	1.843	1,97	0.80	14	0.50	0.15	2,404	1.31	36.00	0.51	0.00	
2.0		· · · · · ·	· · · · ·							·					·····				<u>.</u>					· ·
			-																					
		[											· · .											
	GRAYISH BROWN SILT WITH SOME OF FINE GRAINED SAND, MEDIUM PLASTICITY, STIFF					· · ·							•											
3.0			57.7	2.681	100	90	33	64	32	32	мн	1.66	_	-	-			_			-	0.76	0.00	
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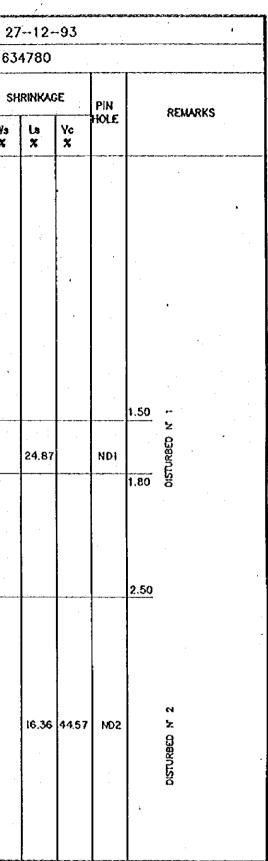
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C008 C001	IDENAD R <i>DINATI</i>	AS: NO	9892430	E 607520		SOUNDING No: FECHA : 11-01-94 DATE : 11-01-94
PROF.		TIPO DE SUELO O ROCA		DESCRIPCION	CALIDAD DE SUELO o ROCA	
DEPTH	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
	VECETAL	HUMUS VEGETAL SOIL		SUELO VEGETAL VEGETAL SOIL	85	
				ARCILLA LIMOSA MARRON AMARILLENTO CON ALGO DE CLASTOS METEORIZADOS	BLANDO SOFT	
≡ -~1.0				YELLOWISH BROWN SILTY CLAY WITH WEATHERED DEBRIS		
			<u></u> 2	CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ		
		S.	Δ	LIMO-ARCILLOSO MARRON AMARILLENTA		
	COLLUMIAL	arcillas y clastos clay and debris	Δ4 Δ-Δ Δ-Δ_	WEATHERED SILSIONE DEBRIS IN YELLOMSH BROWN CLAYEY SILTY MATRIX	CONSISTENTE STIFF	нин (1997) 1997 - 12 страница 1997 - 12 страница (1997)
2.0	୪ଟ୍ର	ARCILLA			8	
				ARCILLA MARRON GRISACEA CON CLASTOS DE LIMOLITA MARRON OSCURA, MUY PLASTICA		
		· · · ·		GRAYISH BROWN CLAY WITH DARK BROWN SILTSTONE DEBRIS, HIGH PLASTICITY		
		ZADAS DNE		LIMOLITA MARRON AMARILLENTA, COMPLETAMENTE METEORIZADA		
	ONZOLE ONZOLE	limonitas meteorizadas <i>meathered siltstone</i>		YELLOWISH BROWN SILTSTONE VERY WEATHERED	<b>⊻</b>	
4.0		LIMONIT				
	<u> </u>			FIN : 4.05 m END : 4.05 m		
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PR	NECT	: THE DETA	LING DESK	HONE-PORTOVIEJO	RTOMEJO	SONDEO : S - 2 <i>SOUNDING No:</i> FECHA : 12-01-04	
COOK	DENAD		892380	E 607370	CAUDAD DE	DATE :	
1 A A	FORMA- CION			DESCRIPTION	CALIDAD DE SUELO O ROCA		
	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	COVERTURA VEGETAL	SOIL OR ROCK GRADE	0 10 20 30 40 50	
				VEGETAL SOIL			
-	. 1		- <u>o</u>	LIMO ARCILLOSO GRIS BLANQUESINO CON CLASTOS			
-			0	DE LIMOLITA			:
				LICHTCRAY CLAYEY SILT WITH DEBRIS OF	BLANDO		
1			0	SILTSTONE	ត		
-1.0	N.C.	COLUMAL		•			
	COLUMAL	COLLUMUM	-0				·
		· .	<u></u> 2	CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ			-
				LIMO-ÁRCILLOSO MARRON AMARILLENTA	STENTI		
				WEATHERED DEBRIS OF	CONSISTENTE		
				SILTSTONE IN YELLOWISH BROWN CLAYEY SILTSTONE			
2.0				MATRIX			
				LUTITA MARRON AMARILLENTA COMPLETAMENTE METEORIZADA	÷.,		
Π		Le R		METEUNIZAUA		1×20	
$\mathbf{H}$		LUTITÀ COMPLETAMENTE METEORIZADAS VERY MEATHERED MUDSTONE	<u> </u>	VERY WEATHERED YELLOWISH BROWN MUDSTONE			
		METEC D MUL			Ϋ́	N <sub>x</sub> ,	
		CNTE					
	ONZOLE	ETAMI			-		
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	PRC	NECT	: THE DETA	ILING DESK	CHONE-PORTOVIEJO GN ON TRANSBASIN CHONE-PO	RTOMEJO	SONDEO : S - 3 SOUNDING No:
<u>(</u>	005	DENAD DINATE		892330	E 607370	·····	FECHA : 12-01-94 DATE :
PRC	)F.	FORMA- CION	TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO O ROCA	SPT (N30)
0EF	ТН	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
B			VEGETAL VEGETAL		SUELO VEGETAL VEGETAL SOIL	4 (L)	
Ħ	ж <sup>1</sup>		VEGE IAL		YEUEIAL SUIL		
					ARCILLA GRIS AMARILLENTA CON ALGO DE CLASTOS	BLANDO	
					METEORIZADOS	S. BL	<b>Ģ</b>
		2			YELLOWISH GRAY CLAY WITH WEATHERED DEBRIS		
	н . н			224	CLASTOS METEORIZADOS		
					DE LIMOLITA EN MATRIZ		19
1	.0	5		<u> </u>	LIMO-ARCILLOSO MARRON AMARILLENTA		
		COLUMAL	COLUMAL	[⊿ 4	WEATHERED DEBRIS OF		
		ÖÖ	OULLOTION		SILTSTONE IN YELLOWISH	N 31EN	
				<u>− − </u> Δ	BROWN CLAYEY SILT MATRIX	CONSISTENTE STIFF	0
				∆4	· ·	Ŭ	
				2-2			
++2	.0				<u></u>		
					LIMOLITA MARRON AMARILLENTA, COMPLETAMENTE	-	
			SAG		METEORIZADA CON PLANOS OXIDADOS		
	·		e meteorizadas siltistone				
			ISTO,		VERY WEATHERED YELLOWISH BROWN SILTSTONE	Σ	
					WITH OXIDIZED JOINTS		1
_		ដ្ឋម្ភ	AMEN				
	·	<i>ONZOLE</i>	FLET				
+3	.0	ັັ	LIMONITA COMPLETAMENT VERY WEATHERED				
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			CINO				
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PF	ROF.	PDINATE FORMA- CION		PERFIL	DESCRIPCION	CALIDAD DE SUELO o ROCA	047E · 12-01-94 SPT (N30)
DE T	PTH		SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
			VEGETAL VEGETAL		SUELO VEGETAL VEGETAL SOIL	BLANDO	
	1.0	COLUMNIA COLUMAL	COLUMAL		CLASTOS METEORIZADOS DE ARENISCA FINA EN MATRIZ LIMO ARCILLOSA MARRON AMARILLA WEATHERED DEBRIS OF FINE GRAINED SANDSTONE IN CLAYEY SILT MATRIX IN YELLOWISH BROWN COLOR	CONSISTENTE STIFF	
			METEORIZADA UNEO SANDSTONE		ARENISCA FINA LIMOSA AMARILLA, COMPLETAMENTE METEORIZADA		22 22
		<i>SNZOLE</i> ONZOLE	METE( UNEO		VERY WEATHERED YELLOWISH SILTY FINE GRAINED SANDSTONE	Ŷ	
	2.0		ARENISCA FINA WEATHERED FINE GR				
			· · · · · · · · · · · · · · · · · · ·		FIN : 2.20 m END : 2.20 m		
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	4.0						
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	Pl	ROVECT	THE DETA	ILING DES	CHONE-PORTOVIEJO IGN ON TRANSBASIN CHONE-P	ORTOVIEJO	SONDEO SOUNDIN	: S - 5 G No:
· ·	000	RDENAC RDINAT	<u>E :</u>	892210	E 607010		FECHA : DATE :	12-01-94
	PROF.	CION		· .	DESCRIPCION	CALIDAD DE SUELO o ROCA		SPT (N30)
i.	DEPTH	TION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	0 10	20 30 40 5
			VEGETAL VEGETAL		SUELO VEGETAL VEGETAL SOIL	BLANDO SOFT		
		COLLUNIAL COLUNIAL	COLUMAL		ARCILLA MARRON OSCURA CON ALGO DE CLASTOS DE LIMOLITA DARKBROWN CLAY WITH SILTSTONE DEBRIS	ŧ		
	≓  1.0		COLLUMUM		CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ LIMO-	CONSISTENTE STIFF	8	
·				Δ Δ	ARCILLOSA MARRON ARCILLOSA WEATHERED DEBRIS OF SILTSTONE IN CLAYEY-SILT MATRIX YELLOWISH BROWN COLO	R		
			EORIZADAS IL TSTONE		LIMOLITA MARRON COMPLETAMENTE METEORIZADA WEATHERED			
-	2.0	<i>ONZOLE</i> ONZOLE	LIMOLITAS METEORIZADAS WEATHERED SULTSTONE		BROWN SILTSTONE	⊻ .		
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	3.0							
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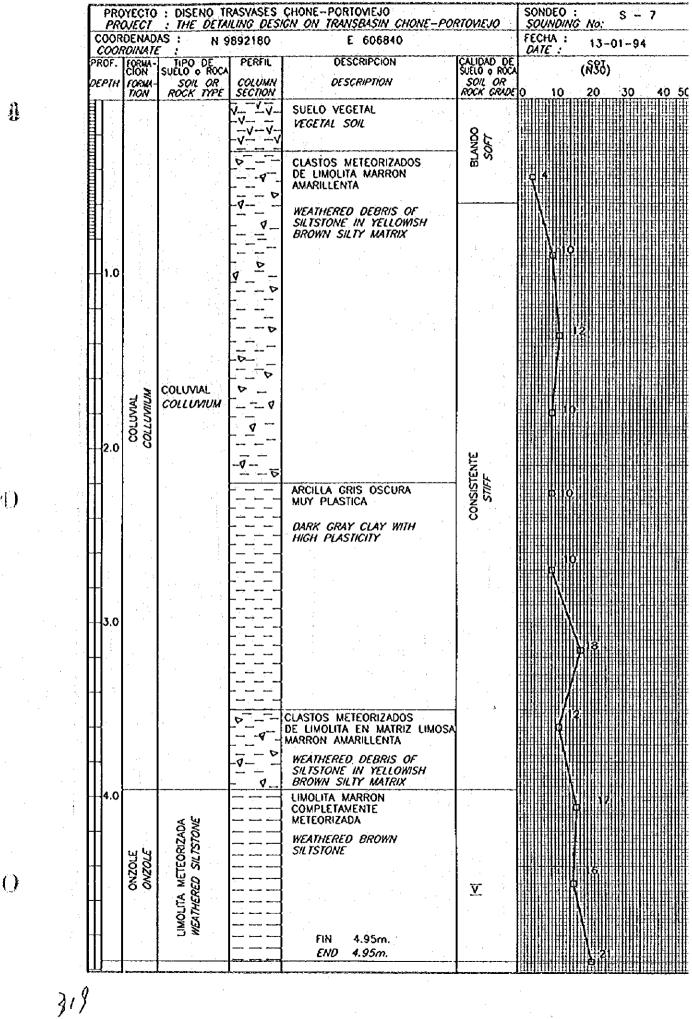
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PR(	DYECTO OVECT	: DISENO THE	VASVASES LING DESK	CHONE-PORTOVIEJO GN ON TRANSBASIN CHONE-PO	RTOMEJQ	SONDEO : S - 6 SOUNDING No:
COOR	RDENAD. RDINATE	ASI Ng	892180	E 607030		FECHA : 12-01-94 DATE :
	FORMA- CION	TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO o ROCA	SPT (N30)
	TORMA-	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
		VEGETAL VEGETAL		SUELO VEGETAL VEGETAL SOIL		
	COLUMAL	COLUVIAL COLLUNUM		ARCILLA MARRON OSCURA CON ALGO DE CLASTOS METEORIZADOS DARKBROWN CLAY WITH WEATHERED DEBRIS	CONSISTENTE STIFF	
1.0				CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ LIMOSA MARRON AMARILLENTA WEATHERED DEBRIS OF		
$H^{-}$		· · · ·	227	SILTSTONE IN YELLOWISH BROWN SILTY MATRIX		
	<i>STOZNO</i> SNZOIE	LIMOUTAS METEORIZADAS WEATHERED SILTSTONE		LIMOLITÀ MARRON AMARILLA COMPLETAMENTE WETEORIZADA VERY WEATHERED YELLOWISH BROWN SILTSTONE MUY METEORIZADA VERY WEATHERED	Ŷ	
				FIN : 2.50 m END : 2.50 m	₩	

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	OOR	DENAD	AS :		1892110	<u>GN ON TRANSBASIN CHONE-POR</u> E 606865		SOUNDING No: FECHA : 13-01-94 DATE :
	:00/	DINATE	TIPO SUELO O	DE	PERFIL	DESCRIPCION	CALIDAD DE SUELO O ROCA	SPT
		FORMA- CION FORMA-	SOL	OR	COLUMN	DESCRIPTION	SOIL OR ROCK ORADE	
Ì	·	TION	ROCK	TYPE	SECTION	SUELO VEGETAL	much white	
					V	VEGETAL SOIL		
	•	· ·	n de la dela Nel de la dela		-vv		BLANDO	
	ч. 1			÷		ARCILLA GRIS OSCURA	ъ К К	
						MUY PLASTICA		<b>a</b> 1
	ľ	· ·				DARK GRAY CLAY		
						HIGHT PLASTICITY		
Ξ.						CLASTOS METEORIZADOS		4
						DE LIMOLITA EN MATRIZ		
	1.0				7	LIMOSA MARRON AMARILLENTA		
					F	WEATHERED DEBRIS OF		
Ĩ						SILTSTONE IN YELLOWISH		
ļļ					<u>`</u>	BROWN SILTY MATRIX		
					-0			
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H	-3.0		· · · .			ARCILLA GRIS OSCURA	- ·	
		•				CON ALGO DE CLASTOS OXIDADOS, MUY PLASTICA		
Ħ	- ·			1	[	DARK GRAY CLAY WITH		
		ŀ				OXIDIZED DEBRIS,	ł	
Π	1		1 .	• .		HIGHT PLASTICITY		
H					-V	CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ		
	Ì					LIMO ARCILLOSA MARRON		
H	-	1		•				
		1	1			WEATHERED DEBRIS OF SILTSTONE IN YELLOWISH		
Ħ	-4.0	1	1 × 1 ×			BROWN CLAYEY-SILTY MATRIX	1	9
μ	1			•		· · ·		
		<b> </b>		•		LIMOLITA MARRON GRISACEA	·	
H			1 3	WCATHERED SULTSTONE		COMPLETAMENTE		118
		1.1.	EOR	1217		METEORIZADA	· :	
H	H	ONZOLE ONZOLE	E La	я 8		WEATHERED GRANISH BROWN SILTSTONE	X	
		No	Į ₹	HERE				
f	П	~	∣ ĝ	8		FIN 4.95m. END 4.95m.	1 **	

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	PR	YECTO <i>WECT</i> DENAD	: THE DETA	LING DESI	CHONE-PORTOVIEJO GN ON TRANSBASIN CHONE-POL	RTOMEJO	SONDEO : S - 9 SOUNDING NO: S - 9 FECHA : 13-01-94
	000	PDINATI		891930	E 606620	CALIDAD OF	DATE : 15-01-34
	PROF.		1		DESCRIPCION	CALIDAD DE SUELO 6 ROCA	(พี่30)
	ОСРТН	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRIDE	0 10 20 30 40
			· · ·		SUELO VECETAL VECETAL SOIL		
·				Δ	CLASTOS METEORIZADOS DE	ъ. <sup>с</sup>	
				<u>5</u> 77	LIMOLITA EN MATRIZ LIMO- ARCILLOSA MARRON AMARILLENTA		
				<u>-</u>			82
		32		Δ	WEATHERED DEBRIS OF SILTSTONE IN YELLOWISH	8	
		COLUMIAL COLUMAL	COLUMAL	337	BROWN CLAYEY SILT MATRIX	BLANDO	
		ပဗ္မ			:		<b>o</b> y - the second s
	++1.0			227		· .	
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				227		а. 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 — 1917 —	
				<u> </u>			
					LIMOLITA COMPLETAMENTE METEORIZADA, COLOR		
					MARRON AMARILLENTO		
	2.0						
					VERY WEATHERED YELLOWISH BROWN SILTSTONE		
		, ·	۶u S				<b>A</b> 12
			RZAD				
		<i>SUZOLE</i>	ETEO! SVL7				
		ŠŠ	1 N K			<b>v</b>	1. 
			UMOLITA			· · ·	
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	3,0		· . ·				N25
	H.				FIN : 3.60 m	· · · · ·	
					END : 3.60 m		
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OOR	DENAD	NS: N9	891880	<u>GN ON TRANSBASIN CHONE-POP</u> E 606650	·. ·	FECHA : 13-01-94 DATE :
	POINATE FORMA- CION	TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO O ROCA	
	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
Γ	1.010			SUELO VEGETAL VEGETAL SOIL		
				CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ LIMO- ARCILLOSA MARRON AMARILLENTA		
	COLLUNAL	COLUMAL COLLUMUM		WEATHERED DEBRIS OF SILTSTONE IN YELLOWISH BROWN CLAYEY SILT MATRIX	CONSISTENTE STIFF	
		· . · ·			Ö	
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		· · ·		LIMOLITA COMPLETAMENTE METEORIZADA, COLOR MARRON AMARILLENTO		
				VERY WEATHERED YELLOWISH BROWN SILISIONE		
2.0		RIZADAS STONE				
	ONZOLE	umoutas meteorizadas Meathered Siltistone			<b>⊻</b>	
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				FIN : 3.15 m END : 3.15 m		
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PR COOF	OVECT DENAD RDINATE	<u>: THE DETAU</u> AS : N 9	<u>ung desi</u> 891730	CHONE-PORTOYIEJO GN ON TRANSBASIN CHONE-PO E 606440	RTOMEJO	SONDEO : S - 11 SOUNDING No: FECHA : 11-01-94 DATE : 11-01-94
PROF.		TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO O ROCA	SPT
	FORMA- TION		COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
				SUELO VEGETAL VEGETAL SOIL ARCILLA GRIS OSCURA PLASTICA DARKCRAY CLAY HIGH PLASTICITY	BLANDO SOFT	
1.0	COLUMIAL			CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ LIMO ARCILLOSA GRIS WEATHERED DEBRIS OF SILTSTONE IN GRAY CLAYEY SILT MATRIX	CONSISTENTE	
		COLUMUM		CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ LIMOSA MARRON AMARILLO WEATHERED DEBRIS OF SILTSTONE IN YELLOWISH BROWN SILTY MATRIX	CONSISTENTE STIFF	
	<i>STOZNO</i> SNZOLE	LIMOLITAS METEORIZADAS WEATHERED SILTSTONE		LINOLITA MARRON AMARILLA COMPLETAMENTE METEORIZADA VERY WEATHERED YELLOWISH BROWN SILTSTONE	ž	
				FIN : 4.50 m END : 4.50 m		

	PDINATE FORMA- CION	TIPO DE SUELO O ROCA	PERFIL	DESCRIPCIÓN	CALIDAD DE SUELO & ROCA	<u>0416 : 11-01-94</u> SPT (N30)
DEPTH	FORMA-	SOIL OR	COLUMN	DESCRIPTION	SOIL OR ROCK GRADE	
1	TION	ROCK TYPE	SECTION	SUELO VEGETAL	nun unc	
			- <u></u> v	VEGETAL SOIL	8.	
				ARCILLA GRIS PLASTICA	BLANDO	
				GRAY CLAY HIGHT PLASTICITY		
			$\Delta^{-}$	CLASTOS METEORIZADOS DE LIMOLITA EN MATRIZ LIMOSA GRIS		
		· · ·	444	WEATHERED DEBRIS OF SILTSTONE IN CRAY		
  1.0			<u>}/</u>	SILTY MATRIX	1 - 1 - 1 <sup>3</sup> -	
		and the second	<u>777</u>			
	13	· · ·	∧/	MATRIŻ COLOR MARRON		
	COLLUMUM COLUMAL	COLUMAL		AMARILLENTO	NTE	
<del> </del>	88	COLLUNUM	447	YELLOWISH BROWN MATRIX		
		· · ·	Δ		L Signal	
Π				$\{ (x_i,y_i) \in \{i,j\} \}$	ALCO CONSISTENTE SOME STIFF	
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1	i   ·			LIMOLITA WARRON AMARILLA	-	
3.0	· .	· · · .	= = =	COMPLETAMENTE	1.54	
		SA S		METEORIZADA	-	
	l	DAT NOT		IFON WEITIEDED UP ( ANO)	∑ 2 <b>⊻</b> :	
		umoutas meteorizadas meathered slitstone		VERY WEATHERED YELLOWISH BROWN SILTSTONE		
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	PR	YECTO	: DISENO TI	ASVASES	CHONE-PORTOVIEJO GN ON TRANSBASIN CHONE-PO		SONDEO : S - 13 SOUNDING No:
	COOR	DENAD RDINATI	AS: NO	891550	E 606440	<i>anviav</i>	FECHA : 14-01-94 DATE :
A	PROF.	FORMA- CION	TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO O ROCA	SPT (N30)
0	ОЕРТН	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	0 10 20 30 40 5(
		-			SUELO VEGETAL VEGETAL SOIL		
				Δ	CLASTOS METEORIZADOS DE		
				∆ ∠	LIMOLITA EN MATRIZ LIMOSA MARRON AMARILLENTA		
				777	WEATHERED DEBRIS OF SILTSTONE IN YELLOWISH BROWN SILTY MATRIX	8	
						BLANDO SOFT	
				<u>-</u> _			
				<u>5</u> 57			
		NUN	COLUVIAL	Δ4			
		COLLUNIAN COLUNIAL	COLLUMUM	<u> </u>		L.	
			· · · ·	$\overline{\Delta} = \overline{\Delta}$	CLASTOS OXIDADOS	CONSISTENTE STIFF	
				777	OXIDIZED DEBRIS	STR	
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()	2.0			- <u>-</u> Δ			
	H	 		Δ			
			DAS NE		LIMOLITA MARRON AMARILLA COMPLETAMENTE METEORIZADA	n an	
			ORIZA L 7570		METEURIZAUA	<b>⊻</b>	
		<i>ONZOLE</i>	UMOLITAS METEORIZADAS WEATHERED SILTSTONE		VERY WEATHERED YELLOWISH BROWN SILTSTONE		
		δg	OLITAS				
	3.0						
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PR COOR	<i>DENAD</i>	<u>: THE DETAI</u> AS: N9	ASVASES <u>LING DES/</u> 891320	CHONE-PORTOVIEJO <u>GN ON TRANSBASIN CHONE-PO</u> E 606485	RTONEJO	SONDEO : S - 14 SOUNDING No: FECHA : 11-01-94	
	FORMA-	TIPO DE SUELO O ROCA		DESCRIPCION	CALIDAD DE SUELO O ROCA	DATE : SPT (N30)	
	FORM-	SULLO & ROCA SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE		
	TION			LIMO GRIS CLARO CON CLASTOS DE LUTITA METEORIZADOS LICHT GRAY SILT WITH WEATHERED MUDSTONE DEBRIS CLASTOS METEORIZADOS DE LUTITA GRIS CLARO EN MATRIZ LIMO ARCILLOSA WEATHERED DEBRIS OF GRAY MUDSTONE IN CLAYEY SILT	SOFT DO		
2.0				MATRIX ARCILLA GRIS OSCURA	ALGO CONSISTENTE SOME STIFF		-
3.0				CON ALGO DE CLASIOS DARK GRAY CLAY WITH SOME DEBRIS			
    4.(	ONZOLE	CRAY MUDSTONE		LUTITA GRIS VERDOSA CON INDICIOS DE CONCHAS GREENISH GRAY SHALE WITH TRACE OF SHELLS	۲ <u>۲</u>		•
				FiN : 4.05 m END : 4.05 m			

PROYECTO : DISENO TRASVASES CHONE-PORTOMEJO PROJECT : THE DETAILING DESIGN ON TRANSBASIN CHONE-PORTOMEJO SONDEO : SOUNDING No: S ~ 15 FECHA : COORDENADAS : N 9891330 E 606460 11-01-94 DATE COORDINATE SPT (N30) CALIDAD DE SUELO o ROCA TIPO DE SUELO & ROCA PERFIL DESCRIPCIÓN FORMA-CION PROF. SOIL OR ROCK GRIDE O FORMA-TION SOIL OR ROCK TYPE COLUMN SECTION DESCRIPTION DEPTH 20 40 50 10 30 LIMO ARCILLOSO NEGRUZCO ~v-v BLACKISH CLAYEY SILT ¥ -7 6-A CLASTOS METEORIZADOS DE LIMOLITA GRIS CLARO CON ALGO DE ARCILLA GRIS OSCURA Δ COLLUMAL CONSISTENTE STIFF COLUMAL WEATHERED DEBRIS OF SILTSTONE WITH SOME DARK GRAY CLAY . 20 COLLUMUM  $\Delta$ -- ∆ Δ 7 7 1.0 Δ DD. Δ LUTITA CRIS CRAY MUDSTONE LUTITA CRIS VERDOSA CON INDICIOS DE CONCHAS <u>\_\_\_</u> ONZOLE -Ň GREENISH GRAY MUDSTONE WITH TRACE OF SHELLS \_ 2.0 FIN : 2.00 m END : 2.00 m 3.0 .0

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Ĺ	F	PRO	YECTO	: DISENO TR : THE DETAI	ASVASES LING DESK	CHONE-PORTOVIEJO GN ON TRANSBASIN CHONE-POI	RTOMEJO	SONDEO : S - 16 SOUNDING No:
	00	)QR(	DENAD	AS : 💠 N 9		E 606320		FECHA : 11-01-94 DATE :
	·	DF.		TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO o ROCA	SPT (N30)
þ	EP		FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	0 10 20 30 40 50
						SUELO VEGETAL NEGRUZCO BLACKISH VEGETAL SOIL	8.	
		-	COLUMNAL COLUMAL	COLUVIAL COLLUVIUM		ARCILLA GRIS OSCURA CON ALGO DE CLASTOS DE LIMOLITA GRIS CLARA DARK GRAY CLAY MITH SOME DEBRIS OF LIGHT	BLANDO	
F	Π	-				GRAY SILTSTONE	ITE	
		1.0			Δ Δ Δ	MATRIZ LIMO ARCILLOSA	CONSISTENTE STIFF	
						LICHT GRAY DEBRIS AND BLOCKS OF SILTSTONE IN CLAYEY SILT MATRIX		
		2.0	ONZOLE	HEATHERED SILTSTONE		LIMOLITA MARRON AMARILLENTA, MUY METEORIZADA VERY WEATHERED YELLOWISH BROWN SILTSTONE	Ň	
		3.0 -4.C				FIN : 2.40 m END : 2.40 m		

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ſ	PF PI	OYECTO	: DISENO TI : THE DETA	ASVASES	CHONE-PORTOWEJO GN ON TRANSBASIN CHONE-POL	RTONEJO	SONDEO : S - 17 SOUNDING No:
	<u>coo</u>	RDENAD DRDINATI	AS : NS	891210	E 606310		FECHA : 11-01-94
f	ROF	FORMA-	TIPO DE SUELO o ROCA	1	DESCRIPCION	CALIDAD DE SUELO o ROCA	SPT (N30)
C	EPTI	I FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	0 10 20 30 40 5
	44				SUELO VEGETAL NEGRUZCO BLACKISH VEGETAL SOIL		
		COLUMINAL	COLUMAL COLUMUM	    	ARCILLA LIMOSA GRIS OSCURA CON INDICIOS DE MATERIAL ORGANICO Y CLASTOS METEORIZADOS	BLANDO	
11111111		58		  	DARK GRAY SILTY CLAY WITH TRACES OF WEATHERED DEBRIS AND ORGANIC MATERIAL		
	-1.0	<b>)</b>			· · · · · · · · · · · · · · · · · · ·	ENTE	
		2 <sup>1</sup>		Δ Δ Δ	CLASTOS Y BLOQUES METEO- RIZADOS DE LIMOLITA EN MATRIZ LIMO ARCILLOSA MARRON AMARILLA	CONSISTENTE STIFF	
				∆/ \/	WEATHERED SILTSTONE DEBRIS AND BLOCKS IN YELLOWISH BROWN CLAYEY SILT MATRIX		
	2.1	ONZOLE	LIMOLITAS METEORIZADAS WEATHERED SILTSTONE		LIMOLITA MARRON AMARILLENTA COMPLETAMENTE METEORIZADA Y OXIOADA	Ŵ	
-		60	LIMOLITAS N WEATHEREL		VERY WEATHERED AND OXIDIZED YELLOWISH BROWN SILTSTONE		
-		1			FIN : 2.50 m END : 2.50 m	· · · ·	
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PRO	YECTO	: DISENO TR	ASVASES (	CHONE-PORTOVIEJO IN ON TRANSBASIN CHONE-POR	TOMEJO	SONDED : S - 18 SOUNDING No:
COOR	VECT DENADI DINATE	VS : N 98	<u>391080</u>	E 606140		FECHA : 11-01-94 DATE : 11-01-94
PROF.	FORMA-	TIPO DE SUELO O ROCA	PERFIL		CALIDAD DE SUELO O ROCA	102
DEPTH	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	
				SUELO VEGETAL VEGETAL SOIL ARCILLA NEGRUZCA CON INDICIOS DE CLASTOS OXIDADOS BLACKISH CLAY WITH	BLANDO SOFT	
			D D	TRACES OF OXIDIZED DEBRIS CLASTOS OXIDADOS DE LIMOLITA EN MATRIZ ARCILLOSA MARRON AMARILLENTA		
	COLLUNIUM COLUVIAL	COLUVIAL COLLUVIUM		OXIDIZED DEBRIS OF SILTSTONE IN YELLOWISH BROWN CLAYEY MATRIX		
	500			ARCILLA MARRON GRISACEA CON BASTANTE CLASTOS METEORIZADOS GRAYISH BROWN CLAY WITH NUMEROUS WEATHERED DEBRIS	CONSISTENTE STIFF	
				CLASTOS METEORIZADOS		
			0 - 0 - 0 - 0 - 0 - 0	Y OXIDADOS DE LIMOLITA EN MATRIZ LIMOSA MARRON AMARILLA WEATHERED AND OXIDIZED DEBRIS OF SILTSTONE IN YELLOWISH BROWN SILTY MATRIX		
<b>4.0</b>	ONZOLE	LUTITA METEORIZADA WEATHERED MUDSTONE		LUTITA MARRON AMARILLENTA COMPLETAMENTE METEORIZADA <i>WEATHERED YELLOWISH</i> BROWN MUDSTONE FIN 4.95m. END 4.95m.	×	

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PROYECTO : DISENO TRASVASES CHONE-PORTOVIEJO PROJECT : THE DETAILING DESIGN ON TRANSBASIN CHONE-PORTOVIEJO SONDEO : SOUNDING No: \$ - 19 FECHA : DATE : COORDENADAS : N 9890360 E 606130 11-01-94 COORDINATE SPT (N30) CALIDAD DE SUELO o ROCI TIPO DE SUELO O ROCA PROF. FORMA-PERFIL DESCRIPCION SOIL OR ROCK GRADE SOIL OR ROCK TYPE COLUMN SECTION FORMA TION DESCRIPTION ŊΕΡΤΗ 10 20 30 40.50 In SUELO VEGETAL NEGRUZCO BLACKISH VEGETAL SOIL 7 د ر ـ BLANDO SOFT ARCILLA MARRON GRISACEA CON ALGO DE CLASTOS METEORIZADOS Y OXIDADOS GRAYISH BROWN CLAY WITH SOME WEATHERED AND OXIDIZED DEBRIS 1.0 COLUNIAL COLUMAL CLASTOS METEORIZADOS Y OXIDADOS DE LIMOLITA EN MATRIZ LIMOSA COLLINUM Δ Δ. 7 . Δ MARRON AMARILLENTA ۵ WEATHERED AND OXIDIZED DEBRIS OF SILTSTONE IN YELLOWISH BROWN Δ 2.0 CONSISTENTE STIFF SILTY MATRIX Δ 3.0 WEATHERED FINE GRAINED SILTY SANDSTONE ARENISCA LIMOSA MUY FINA MARRON AMARILLENTA ARENISCA MUY FINA METEORIZADA *ONZOLE* พิ YELLOWISH BROWN FINE CRAINED SILTY SANDSTONE FiN : 3.50 m END : 3.50 m 4.0

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PRC PRC	OYECTO WECT	: DIS : TH	ENO TE	RASVASES ILING DES	CHONE-PORTOVIEJO	RTOMEJO	SONDEO : S - 20 SOUNDING No:
COOR	DENAD	AS :		890370	E 606090		FECHA : 12-01-94 DATE :
PR <b>QF</b> ,	FORMA-	SUELO	O DE ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO o ROCA	SPT (N30)
DEPTH	FORMA- TION	SC ROCI	WL OR K TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	0 10 20 30 40 50
					SUELO VEGETAL NEGRUZCO BLACKISH VEGETAL SOIL		
					ARCILLA MARRON GRISACEA CON ALGO DE CLASTOS METEORIZADOS	BLANDO	
		:		· · · · · · · · · · · · · · · · · · ·	GRAYISH BROWN CLAY WITH SOME OF WEATHERED DEBRIS		
1.0		-					
	COLLUMUM	COL COLL	UVIAL <i>UVIUM</i>		CLASTOS METEORIZADOS Y OXIDADOS DE LIMOLITA EN MATRIZ LIMOSA MARRON AMARILLENTA		<b>P 8</b>
			· · ·	$\Delta = -\Delta$ $\Delta = -\Delta$	WEATHERED AND OXIDIZED DEBRIS OF SILISTONE IN YELLOWISH BROWN SILTY MATRIX		
2.0	1	:		Δ Δ		CONSISTENTE STIFF	
			· · · ·	$\begin{array}{c} - & -\Delta \\ \Delta & - & -\Delta \\ \Delta & - & - & - \\ \Delta & - & - & - & - \\ \end{array}$		O V V V	
		<			ARENISCA GRANO FINO		
	ONZOLE	ARENISCA MUY FINA METEORIZADA	WEATHERED FINE CRAINED SILTY SANDSTONE		LIMOSA MARRON AMARILLENTA YELLOWISH BROWN FINE GRAINED SILTY SANDSTONE	Ŷ	
		ACCNI ACCNI	WEA CRAL				
					FiN : 360 m END : 3.60 m		
4.0							
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	COOR	DENAD	AS: N9	890760	E 605950		FECHA : 12-01-94 DATE :
()		FORMA- CION	TIPO DE SUELO O ROCA	PERFIL	DESCRIPCION	CALIDAD DE SUELO o ROCA	SPT (N30)
<b>{</b> }	ОЕРТН	FORMA- TION	SOIL OR ROCK TYPE	COLUMN SECTION	DESCRIPTION	SOIL OR ROCK GRADE	0 10 20 30 40 51
					ARCILLA LINOSA GRIS OSCURA DARK GRAY SILTY CLAY		
				-17 -		•	
		· · ·			ARCILLA MARRON GRISACEA CON		
					ALGO DE CLÁSTOS METEORIZADOS	BLANDO SOFT	
	Ħ				GRAYISH BROWN CLAY WITH SOME OF WEATHERED DEBRIS	Ξ.	
: :	-1.0						
* *		NL N					
		COLUNIAL	COLUMAL COLUMUM	<u>-</u> ∆ ∆4	CLASTOS METEORIZADOS DE LUTITA EN MATRIZ ARCILLOSA	•	
		ŭĝ	UDLCONO.		MARRON AMARILLENTA		
				∆	WEATHERED DEBRIS OF MUDSTONE IN YELLOWISH BROWN CLAYEY MATRIX	ដា	
	-4-4			Δ <u>-</u> Δ		CONSISTENTE STIFF	
						ISNOC	
$\mathbf{O}$	2.0			∆ ∧		•	
				Δ4			
	+			<u></u> 4			
					LUTITA MARRON		
					AMARILLENTA COMPLETAMENTE METEORIZADA		
· · ·			لن	<u> </u>		· · · · · · · · · · · · · · · · · · ·	
		цų	ZADA		WEATHERED YELLOWISH BROWN MUDSTONE	-	
		<i>STOZNO</i>	LUTITA METEORIZADA WEATHERED MUDSTONE				
			ta me Herez		MUY METEORIZADA	· · · · · · · · · · · · · · · · · · ·	
			NEAT NEAT		VERY WEATHERED	Ñ	
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OF. FORMA- CICION TIPO DE PERFIL DESCRIPCION CALIDAD DE SPT SUELO O ROCA (N30) PERFIL DESCRIPCION SOLLO ROCA (N30)	<i>PR0</i> 00R(	VECT. DENADI	<u>: THE DETAU</u> IS : N 9	ASVASES LING DESI 890700	CHONE-PORTOVIEJO GN ON TRANSBASIN CHONE-POR E 605900	RTOVIEJO	SONDED : S-22 <i>SOUNDING No:</i> FECHA : 12-01-94 <i>DATE :</i>
PDM         SOIL OR ROCK TIPE         COLUMN SCCION         DESCRIPTION         SOIL OR ROCK GRUE         O         20         30	DF.			PERFIL	DESCRIPCION	CALIDAD DE	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		FORMA-	SOIL OR	COLUMN	DESCRIPTION	SOIL OR	
1.0     Image: Second sec		HUN	RUCK IIPE				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $					VEGETAL SOIL		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	 				LIMO ARCILLOSO MARRON		
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