

Figure 2 - Topographic Map of the Project Site and Vicinity

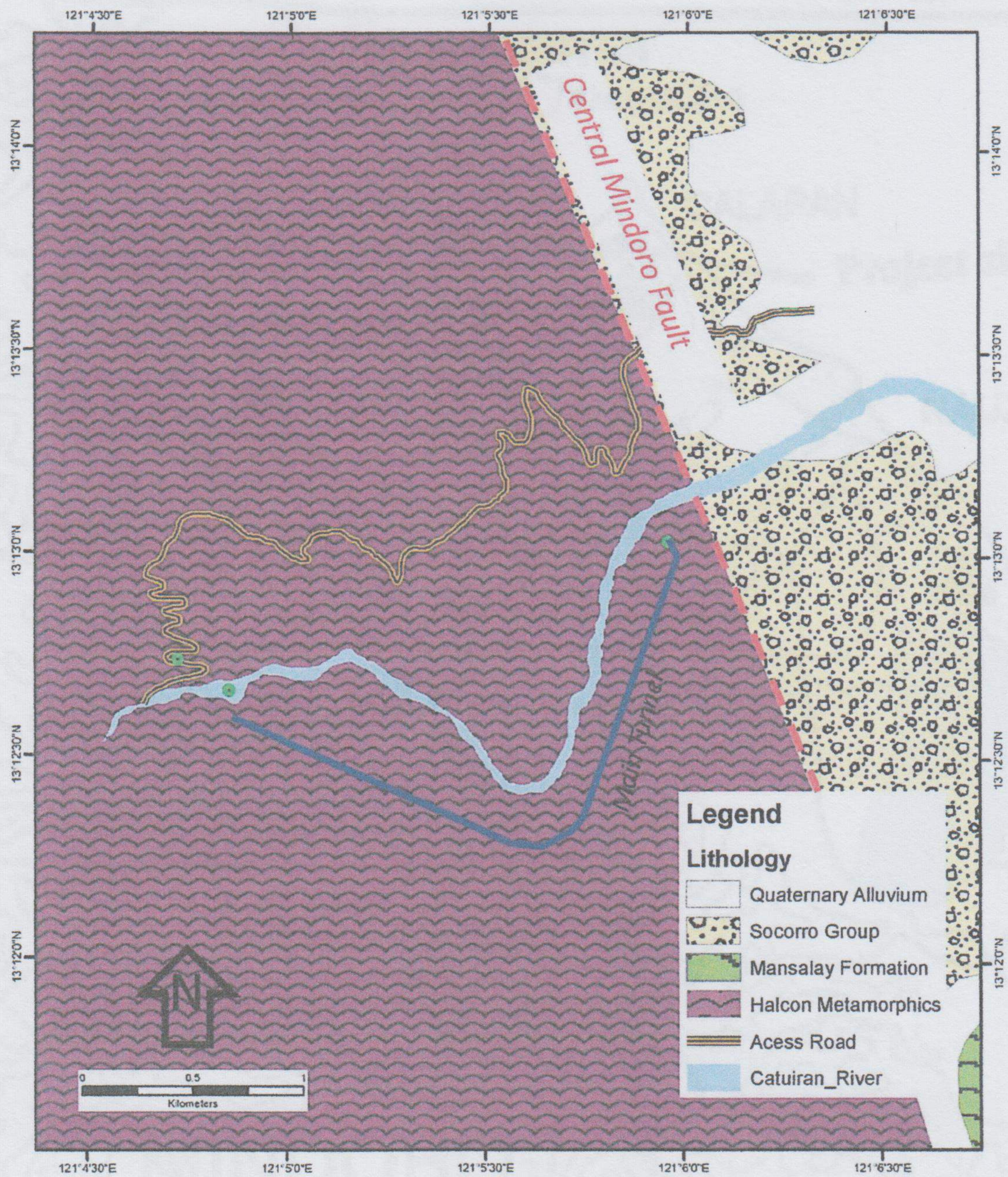


Figure 3 -Geologic Map of the Project Site and Vicinity

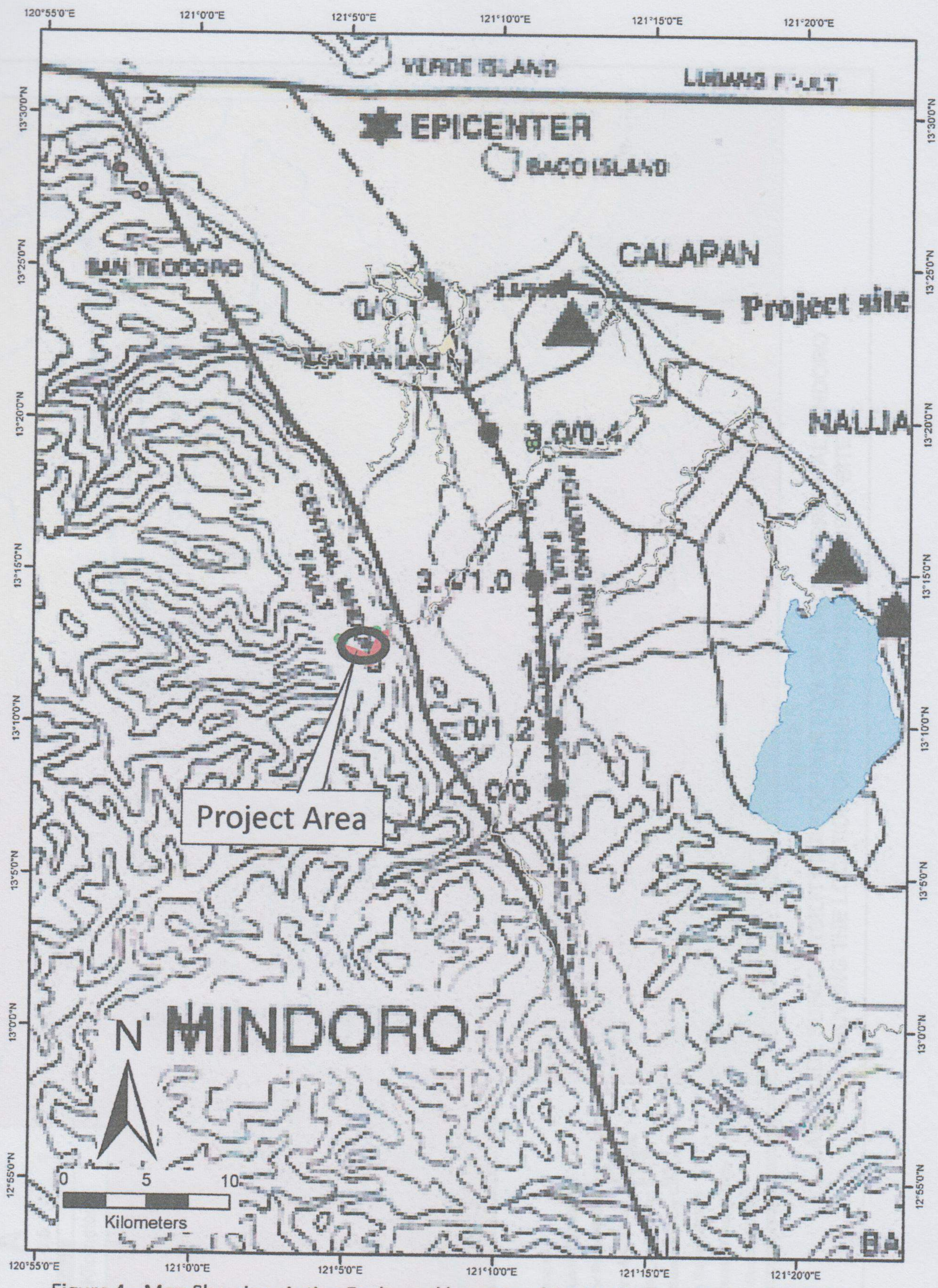


Figure 4 - Map Showing Active Faults and location of 8 MW Catuiran Hydroelectric Power Project

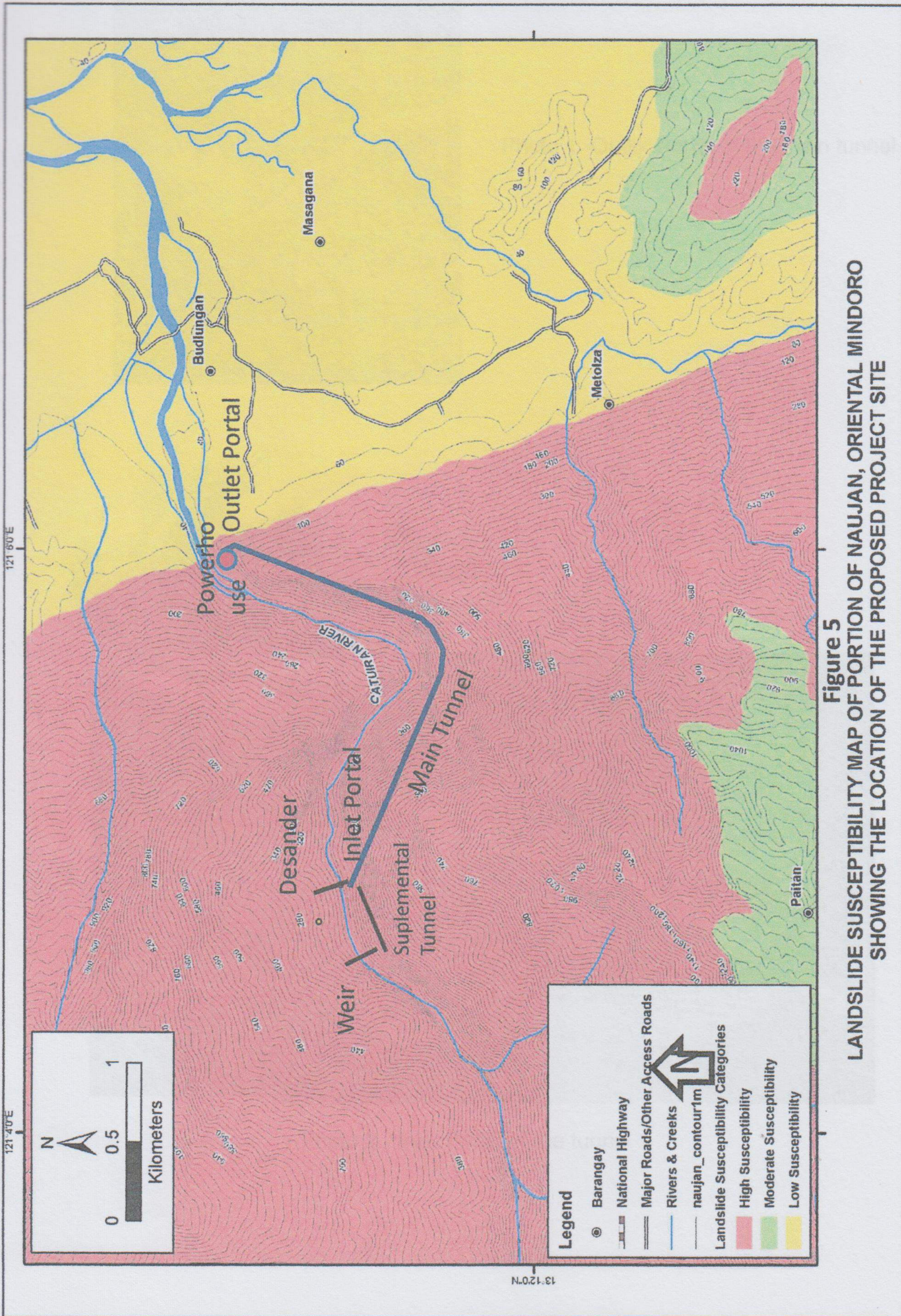


Figure 5
LANDSLIDE SUSCEPTIBILITY MAP OF PORTION OF NAUJAN, ORIENTAL MINDORO
SHOWING THE LOCATION OF THE PROPOSED PROJECT SITE



Photo 1 -Outlet Portal of the main tunnel



Photo 2 - Inlet Portal of the tunnel



Photo 3 - Catuiran River looking upstream from the inlet portal of the tunnel



Photo 4 - Halcon Metamorphics composing principally amphibolites, metagabbro, gneisses, greenschists, phyllites and slates



Photo 5 – Quartz lenses observed inside the tunnel near the inlet portal.



Photo 6- Deposit of rocks, soil, and debris overlying bedrock that prone to debris slide during incessant rains.



Photo 7 - Massive stabilization is underway at the Powerhouse area



Republic of the Philippines
Department of Environment and Natural Resources
MINES & GEOSCIENCES BUREAU
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September 4, 2015

ATTY. LEVIE U. COPAHAN

Sta. Clara Power Corporation
Highway 54 Plaza, 978 EDSA, Wack-wack,
Mandaluyong City

Dear Atty. Copahan:

This refers to your letter dated 02 September 2015 requesting for a clarification if the reports submitted by private consultants/individuals engaged by your company to conduct series of geotechnical studies/investigations for the 8 MW Caturan Hydroelectric Power Plant Project may be considered as Engineering Geological and Geohazard Assessment Report (EGGAR). Pleased be informed that a geotechnical investigation report is just a component of EGGAR and cannot be used as a substitute for a standard EGGAR being required by EMB.

The guidelines of DENR AO 2000-28, issued as MGB Memorandum Circular No. 2000-33, stipulate that the EGGA process requires a land development project proponent to request the appropriate MGB Office for a site geological scoping survey (GSS) and related Geohazard Identification Report (GIR) document. The conduct of the GSS is aimed to determine the scope of geological study to be conducted in and around the site. The project proponent then prepares an Engineering Geological and Geohazard Assessment Report (EGGAR) focusing on potential geologic hazards that may have direct or indirect impact to the project, and their appropriate mitigating measures. The EGGA is conducted by a private practicing geologist or qualified engineer.

The scoping made by our Office identified potential geologic hazards in the project site such as Seismic/Earthquake Hazards and Mass Movement Hazards (Landslide Hazard). As per review of the geotechnical studies conducted at the area, our geologist noticed that the scope of geological studies to be addressed in the EGGA had already been discussed in the geotechnical report. Moreover, there are already slope stabilization measures being implemented by the company to address the landslide hazard in the area. In view thereof, the conduct of EGGA was not mentioned among the recommendations in the GIR.

Please be reminded also that there are other recommendations stated in the GIR that should be strictly followed. The Environmental Management Bureau, however, has a discretion to require you to submit an EGGAR to discuss further the potential geohazards identified at the site.

*Soil Investigation for the Proposed BMW Caisara
Hydro Electric Power Plant
at Oriental Mindoro*

C A B L E O F C O N T E N T S

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APPENDIX - B

*Soil Investigation for the Proposed 8MW Catuiran
Hydro Electric Power Plant
at Oriental Mindoro*

T A B L E O F C O N T E N T S

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FINAL GEOTECHNICAL REPORT

**REPORT FOR
GEOTECHNICAL INVESTIGATION FOR THE PROPOSED 8MW CATUIRAN
HYDRO ELECTRIC POWER PLANT
at BRGY. ARANGIN, NAUJAN, CALAPAN, ORIENTAL MINDORO**

1. INTRODUCTION

The project is primarily the construction of proposed Weir of the above mentioned project. The investigation conducted is implemented for the concerned and design of foundation for weirs (if recommended).

Geography (Mindoro Area)

Is located in the province of Oriental Mindoro. On north eastern side of the island of Mindoro. The site is located at Naujan in Calapan, with the coordinates of 13°13'N and 121° 8'E. The Topography of Calapan is characterized as ranging from nearly level and gradually transformed into gently sloping and undulating to steeply sloping and mountainous area. The overall land characteristic is a wide plain with rivers, interspersed with wetlands at the seacoast periphery. The highest elevation of 187 meters above sea level is Bulusan Hill, interrupts the flat terrain at the northeast towards the coast and the rise at the southwest which is part of the Halcon-Baco Mountain Range.

This report presents the results of the geotechnical investigation for the proposed weir located at Brgy. Naujan, Calapan, Mindoro. The work was carried out for *Sta. Clara International Corporation*, the client. The purpose of the investigation was to review existing data from the site and nearby sites; assess subsurface conditions at the site and provide recommendations on the following:

- Geotechnical Parameters for Foundation Design
- Depth to groundwater and anticipated dewatering requirements;

2. GEOLOGIC SETTING OF THE AREA

Geology:

From the general perspective, the core rock of Mindoro Island is dominated by a broad expanse of basement complex rocks of pre-Jurassic Age. This type of rock is overlain and unconformably underlain by a thick sequence of volcanic and sedimentary rocks that range in age from Jurassic to Quaternary. Within the municipality of Bongabong, the following geologic formation could be found: basement complex, recent, upper Miocene-pliocene and Jurassic. The quaternary recent deposit is characterized by alluvium, fluvial and bench deposits, raised coral reefs and beachrocks and appearing as unlithified deposits along streams, riverbeds and floodplains. It constitutes one of the most widespread deposits in the municipality. Basement complex is a series of rocks dominantly igneous and metamorphic, overlain unconformably by sedimentary rocks. Such formation is described as made up of undifferentiated amphibolite, quartz of fold

spathic mica schist and phyllites slates frequently associated with marble and quartzite. On the other hand, upper Miocene, Pliocene geologic formation is characterized by largely marine clastics overlain by extensive, locally transgressive, pyroclastic and tuffaceous sedimentary rocks.

3. LABORATORY TESTS

1. Grain size Analysis (ASTM D422)

This method covers the determination of the distribution of soils particle sizes by passing a representative sample into a series of Sieves of decreasing sizes. Weights are recorded and percent passing of sample is computed.

2. Atterberg limits tests (ASTM D4318)

This method covers the determination of soil Liquid limit state, plastic limit state and plasticity index. This is applied to silts and clays. Atterberg limits are defined as the water content corresponding to different behavior conditions of silts and clays.

a. Liquid limit. Is the water content corresponding to the behavior change between the liquid and plastic states of a silt or clay. The liquid limit is arbitrarily defined as the water content at which a pat of soil, cut by a groove of standard dimensions, will flow together for a distance of 12.7 mm (1/2 in.) under the impact of 25 blows in a standard liquid limit device.

b. Plastic Limit. Is the water content corresponding to the behavior change between the plastic and semisolid states of a silt or clay. The plastic limit is arbitrarily defined as the water content at which a silt or clay will just begin to crumble when rolled into a thread approximately 3.2 mm (1/8 in.) in diameter.

3. Moisture Content Determination

Also known as water content determination where the natural water content of a representative soil sample is determined. This test is probably the most common and simplest type of laboratory test. A disturbed/undisturbed natural representative sample is weigh and dried at a standard temperature where the weight of the water loss is determined and relate to the weight of dry soil to determine the percent water content.

4. Specific Gravity Test

The specific gravity of solids is a dimensionless parameter that relates the density of the soil particles to the density of water.

5. Soil Classification (USCS)

This method defines as the classification of soils delivered into the laboratory and tested for grain size and plasticity. This is classified according to engineering terms. This is when soil is classified as fine grained or coarse grained soil which depends on the soil size distribution and plasticity if soils are clay or silts. This is when soils are classified in terms of low or high plasticity.

Type and Number of Laboratory Test:

Type of test	ASTM Designations	No. of test
1. Moisture content Determination	D2216	3
2. Sieve analysis	D422	3
3. Liquid Limit Test	D423	3

RENANTE B. DELA CRUZ
671 - 0909

PRC No. 0097686
PTR No. 0444227

4. Plastic Limit test	D424	3
5. unconfined compression Test (rock)	D2938	17

4. FIELD WORK

4.1 Methods

The procedures used for field sampling and testing are in general accordance with industry standards of care and established geotechnical engineering practices for this geographic region. Our exploration consisted of performing three boreholes of 15 and 20.0 meters depth below ground surface (bgs) in the area of the weir structure. The soil borings were performed at the approximate locations as shown on Borehole Location Map. The client located the borings at the site using the provided site plan and obvious site features as reference. The soil borings were performed during the period of January to April 2015.

Type of field test:

1. Method for penetration test and split-barrel sampling of soils (ASTM D1586)
2. Practice for thin walled tube sampling of soils (ASTM D1587)
3. Practice for description and identification (visual-manual procedure) of soils (ASTM D2488)
4. Practice for diamond core drilling for site investigation (ASTM D2113)

These boreholes are advance by wash boring technique. Standard penetration test (SPT) is inaugurated at 1.05 m from the existing ground level and to the next preceding 1.5 meters intervals. After SPT, disturbed samples are recovered in the split-spoon sampler of 50 mm outside diameter, 35 mm inside diameter and about 710 mm in length, which is attached at the bottom of a string of AW drill rods. The sampler is driven into the bottom of the borehole by means of a 140 lb (63.5 kg) hammer falling along a guide from a height of 30" (760 mm) onto an anvil at the top of the drill rods. The hammer is lifted by means of the rope wrapped or turned twice around the cathead or rotating drum. The number of blows required for each 6" (150mm) of penetration is recorded. Recovered disturbed samples will be classified or identified by visual-manual procedure before placing in a sealed container for laboratory test. The results of the SPT ,description of the soil samples, and other field data are shown in the boring logs which was prepared by UTLII field supervisor Rotary core drilling will be employed if hard materials are encountered or when N-values exceeds 50 count Blows.

The water level in the borehole was measured after completing the boring.

5. SUBSURFACE CONDITIONS

Based from the results of field and laboratory tests, Borehole 2A is characterized by layers of Boulders from 0 to 9 meters depth. it is classified as gray, hard boulders and from 9 to 20 meters depth, it is classified as Gray, very poor Bedrock layer of Phyllites (classified based from geological formation). Borehole 4 is classified as bedrock layers of Phyllites from the existing ground to 15 meters depth while borehole 3 is layer of Boulders with silty sand and gravels. Bedrock layer for this borehole was not reach. Below are provided geotechnical parameters for the design of foundations:

Table 2: Geotechnical Parameters for Borehole 2A

Depth:	Classification	Unit Weight	Strength (Mean)	Phi, °	Cohesion, kPa	Remarks:
0 – 9.0	Boulders	20.0		35	0	correlated
10 – 20	Bedrock Layer (Phyllites)	22.5	25.82 MPa	15.42	471 kPa	-

For Bedrock layer of BH 2A, the tested strength range from 20.86 MPa (minimum) to 31.85 MPa (Maximum) and a standard deviation of 4.25 MPa.

Table 3: Geotechnical Parameters for Borehole 4

Depth:	Classification	Unit Weight	Strength (Mean)	Phi, °	Cohesion, kPa	Remarks:
0 – 20	Bedrock Layer (Phyllites)	22.5	25.82 MPa	14.66	415 kPa	-

For Bedrock layer of BH 4, the tested strength range from 19.11 MPa (minimum) to 32.60 MPa (Maximum) and a standard deviation of 3.89 MPa.

Table 4: Geotechnical Parameters for Borehole 3

Depth:	Classification	Unit Weight	Strength (Mean)	Phi, °	Cohesion, kPa	Remarks:
0 – 9.0	Silty Sand	18.0	-	32	0	Correlated
3 – 15.0	Boulders	20.0	-	35	0	Correlated

6. CONCLUSION/RECOMMENDATIONS

Footing Options

Like all other parts of structure, the foundation must meet certain criteria or requirements. These are based on the needs of the structure supported, because in the over-all picture the foundation (including the earth) and the superstructure form an integrated unit and act together under the influence of the applied loads.

The three basic requirements are:

1. The foundation structure must be properly located with respect to any future influence which could adversely affect its performance.
2. The foundation (including the earth beneath) must be stable or safe from failure.
3. The foundation must not settle or deflect sufficiently to damage the structure or impair its usefulness.

Shallow Foundations

For purpose of Design, bearing capacity computation are tabulated in Table 4. Below are summary of the safe bearing capacity for each respective borehole. Assumption

was made for strip footing at length of 5 meters considering 0.5 depth increase in water level on ground surface.

Table 5. Computed allowable soil bearing capacity

Borehole No.	SBC, kPa		
	2A	3	4
Depth			
2.0	307	169	1019
3.0	464	254	1245
4.0	649	353	1436
5.0	863	467	1628
6.0	1104	596	1823
7.0	1373	739	2019

7.0 Groundwater Levels

Water table was encountered at 3.8 and 1.5 meters depth in boreholes 3 and 4 respectively. This was measured at the existing ground during the time of soil drilling.

8.0 Construction Considerations

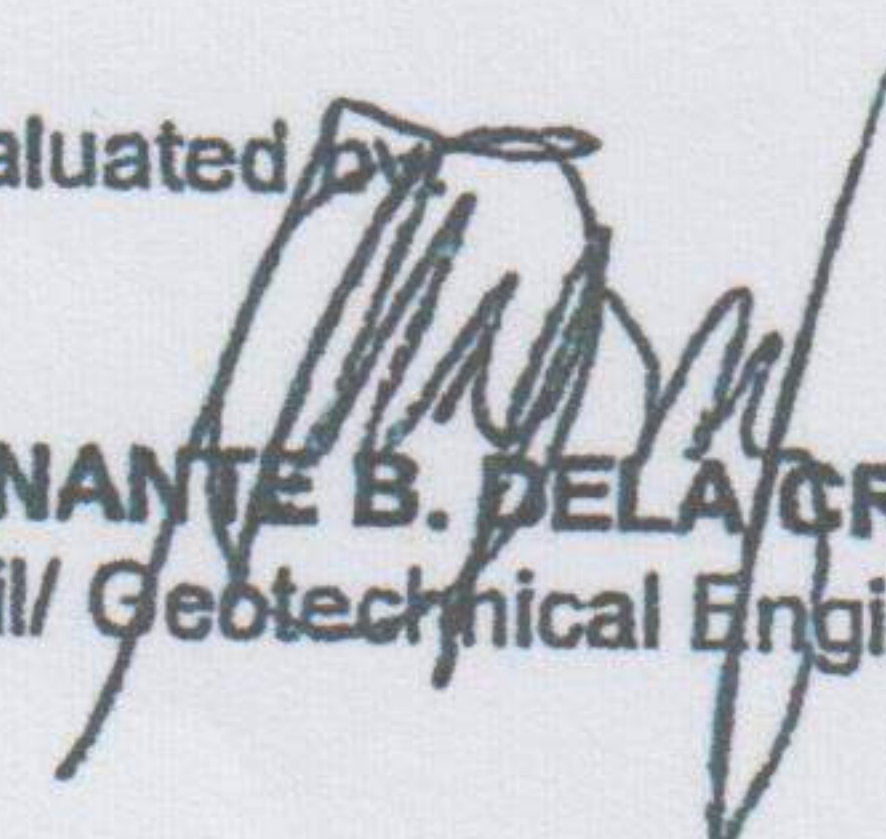
Section I: Excavation

The factors that should be considered during excavation falls to depth of excavation where in it shall be supported laterally by applying sheet piles or grouting to avoid collapse of the upper soil.

9.0 Limitations

This report and accompanying recommendations are based on the actual soil investigation conducted by UTLII. Variation in the soil profile may not become evident during and until the course of construction.

Evaluated by


RENANTE B. DELA CRUZ
Civil/ Geotechnical Engineer

REFERENCES:

Bowles, J. E., 1996. Foundation analysis and design, 5th edition, McGraw-Hill, New York, 1175 p.

Terzaghi, K., 1943. Theoretical Soil Mechanics, John Wiley and Sons, New York

ASEP, 2001. National Structural Code of The Philippines (Volume 1).

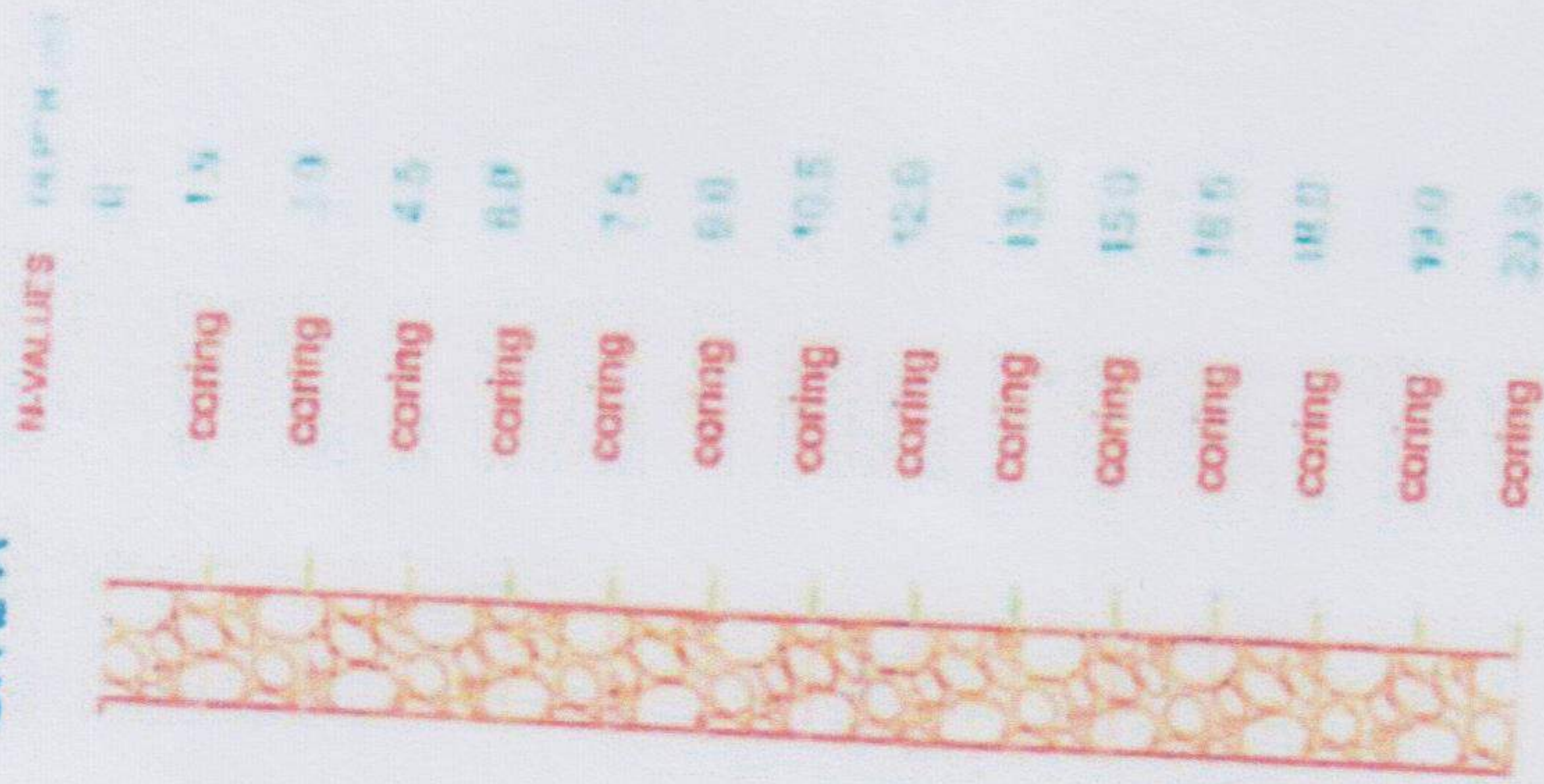
SOIL PROFILE

BH 2



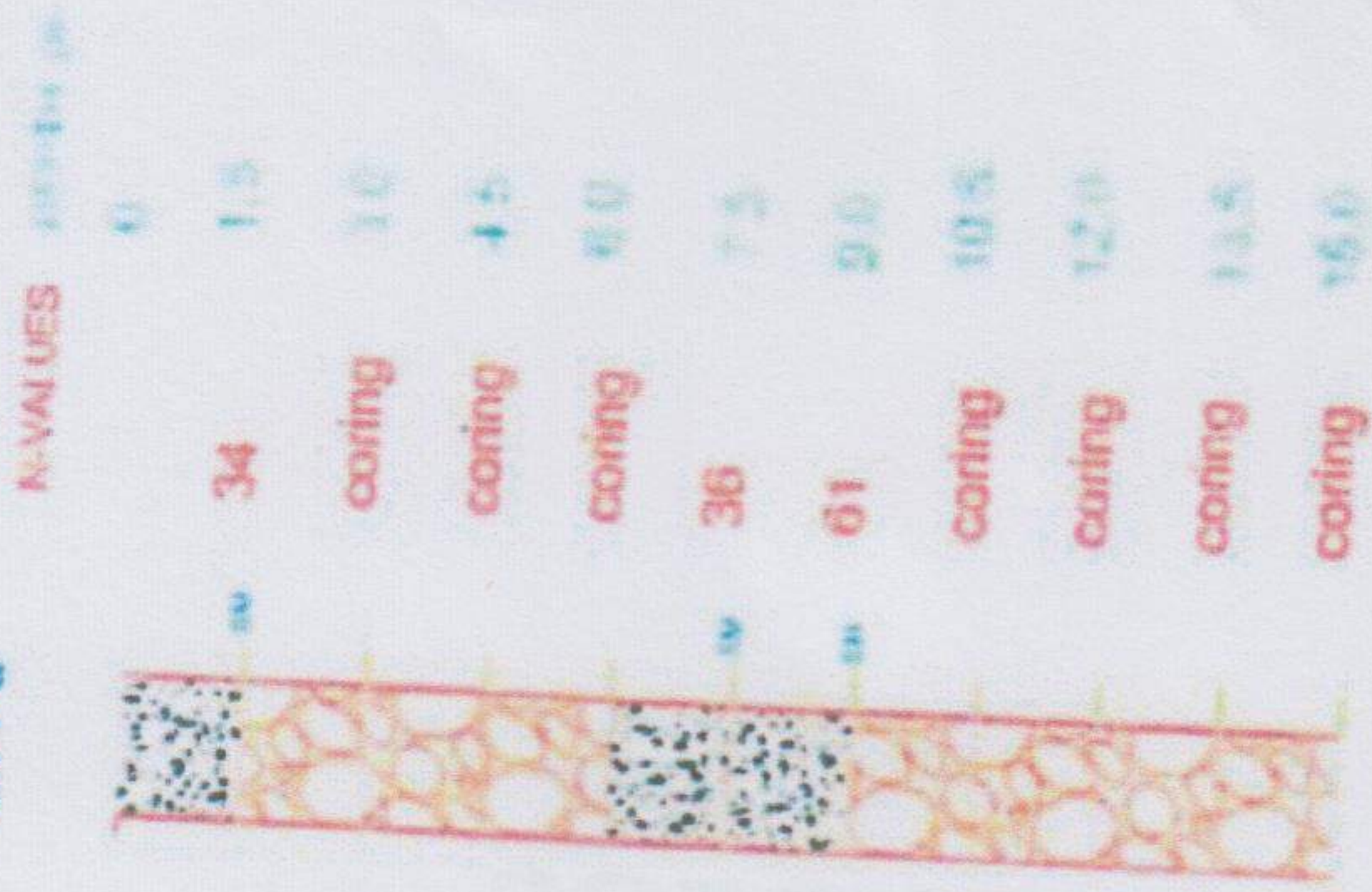
End of Borehole BH2 @ Depth of 15.0m

BH 2-A



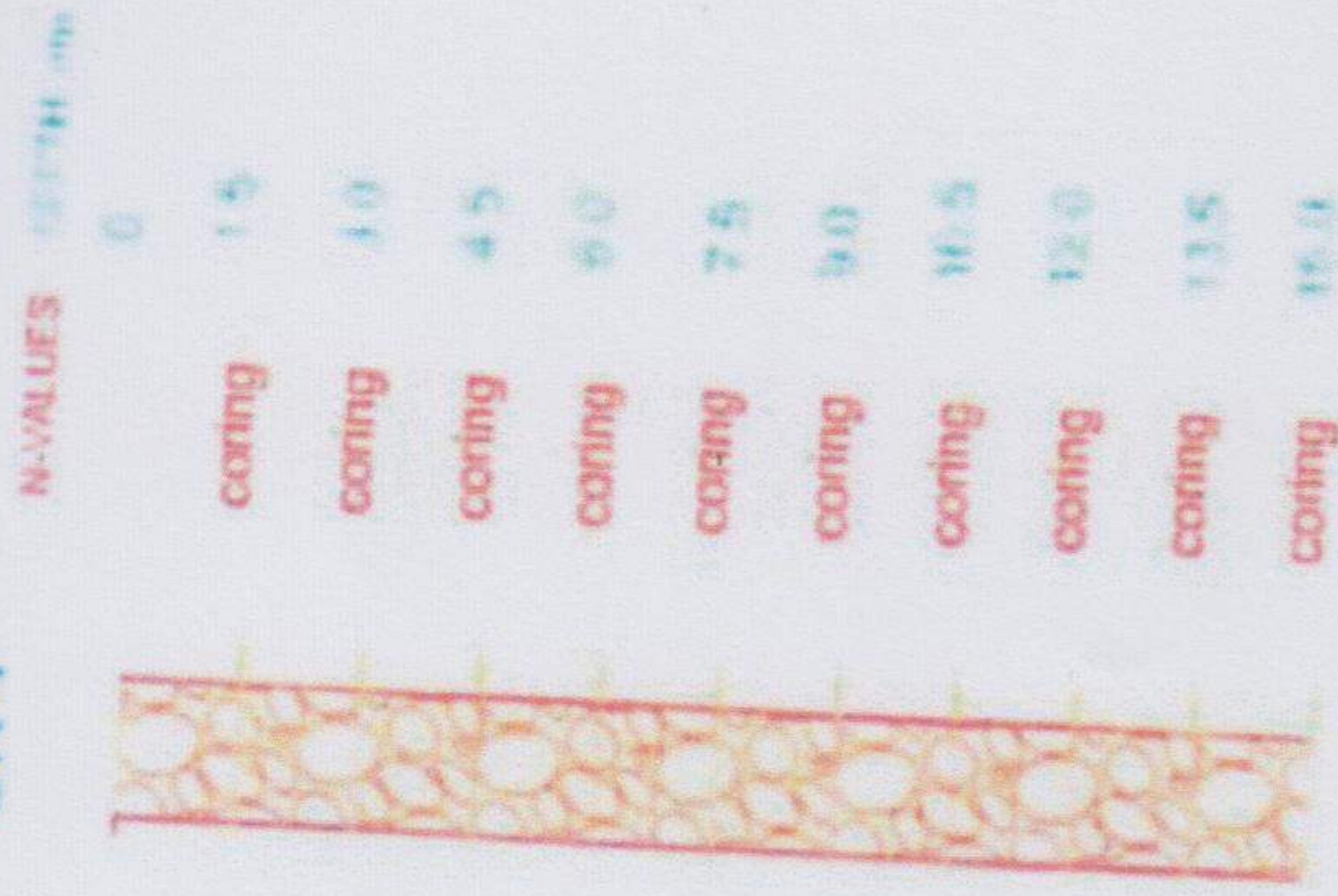
End of Borehole BH2-A @ Depth of 20.0m

BH 3



End of Borehole BH3 @ Depth of 15.0m

BH 4

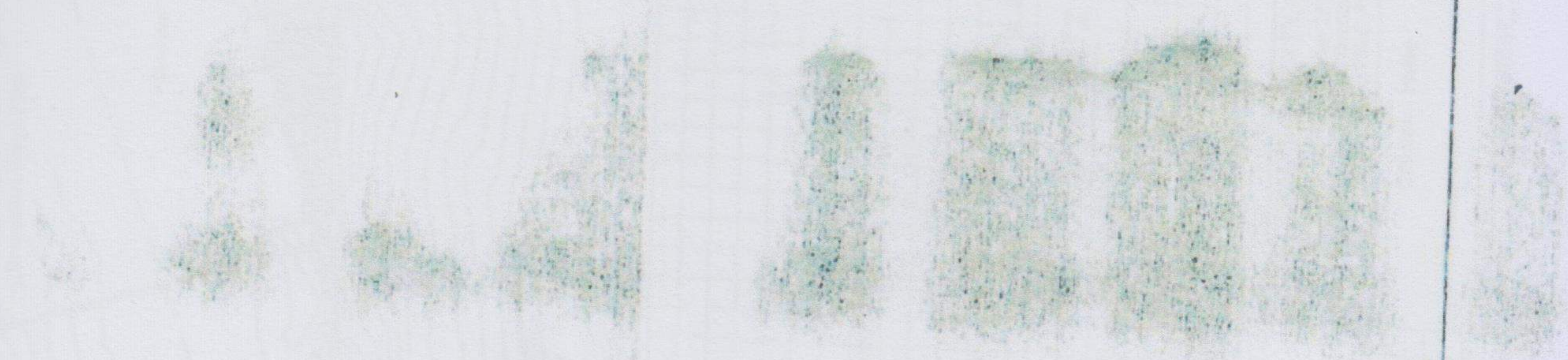


End of Borehole BH4 @ Depth of 15.0m

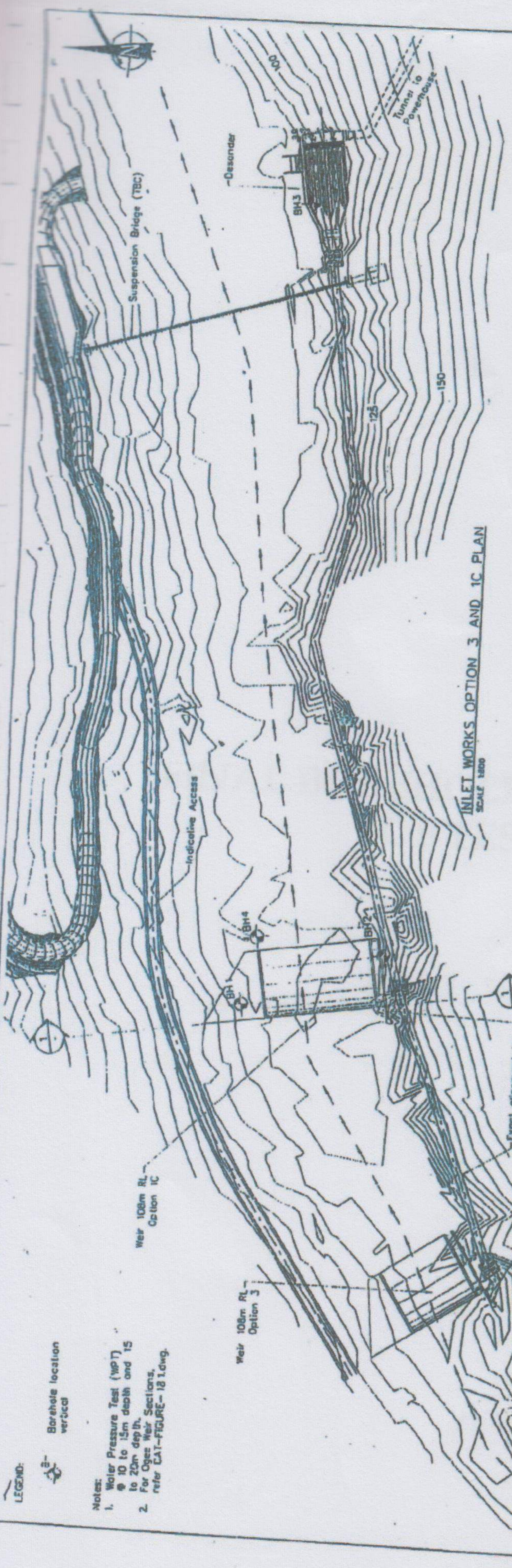
LEGEND

SP	SW	SM	SC	MH	ML	CH	CL
CP	CU	CW	WHEELS & RIGGS	WHEELS & RIGGS	WHEELS & RIGGS	WHEELS & RIGGS	WHEELS & RIGGS

Location:	Oriental Mindoro	
Sheet Content:	SOIL PROFILE	
Project:	Soil Investigation for the Proposed BMS Catmon Hydro Electric Power Plant	
Client / Consultant:	SEA CLARA INTERNATIONAL CORPORATION	
Prepared By:	DSLJ	Sheet No. 1

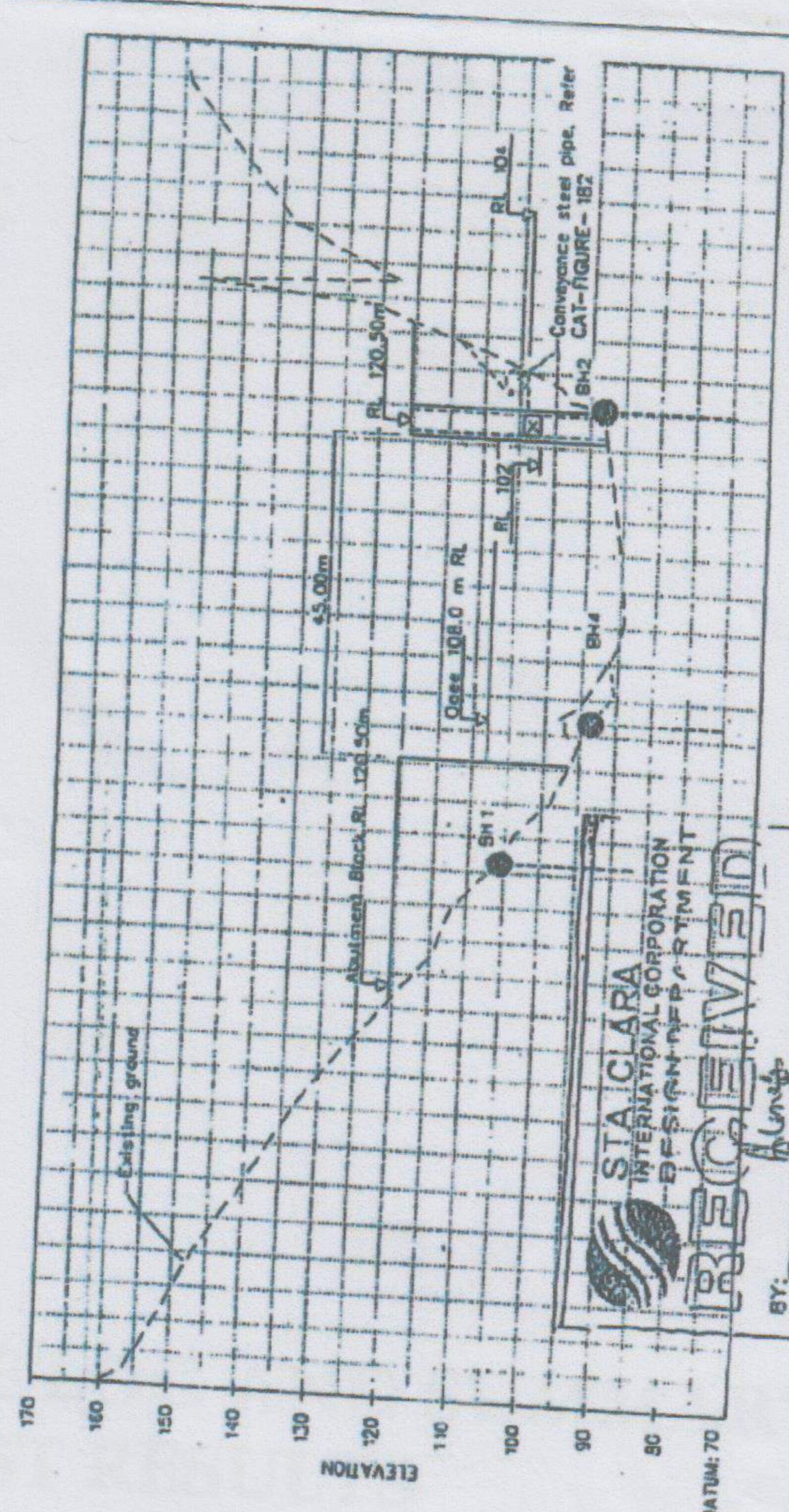


BOREHOLE LOCATION MAP



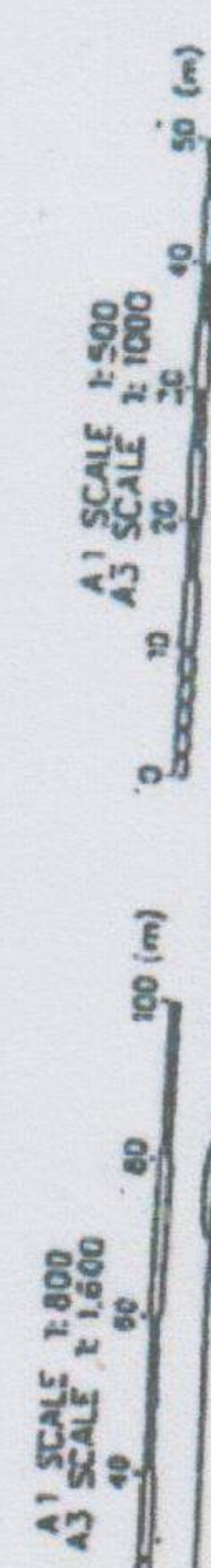
- Notes:**
- Water Pressure Test (WPT) @ 10 to 15m depth and 15 to 20m depth. For Ogee Weir Sections, refer CAT-FIGURE-181.dwg.
 -

Borehole location vertical



Borehole Coordinates

Description	Northings	Eastings	Elevation	Depth	Vertical
BH1	1,460,850.599	508,453.986	105.59m	20.0m	WPT-2 Sections
BH2	1,460,793.362	508,476.984	92.70m	20.0m	WPT-2 Sections
BH3	1,480,833.066	508,785.026	89.66m	20.0m	WPT-2 Sections
BH4	1,460,835.532	508,481.888	93.62m	20.0m	WPT-2 Sections



FOR INFORMATION ONLY
16 September 2014

CATUIRAN HYDROELECTRIC PROJECT
Catuiran - Intake

Geotechnical Investigation Plan

BY: *[Signature]*
DATE & TIME: 12 Sept. 2014 5:15 PM
SECTION: (1)
SCALE: 1:500

STA. CLAZA INTERNATIONAL CORPORATION
DESIGN DEPARTMENT
REGEMISID

STA. CLAZA INT'L. CORP.
1000 North Highway 101, Suite 200
Pasig, Rizal, Philippines
Tel: +632 781 1111
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JOHN L. GRIMSTON
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Project Engineer

Engineering and Development Corporation of the Philippines
Tomas T. Yambol
President/CEO

CATUIRAN HYDRO POWER CORPORATION
2nd Floor, Katatagan Building
989 Katatagan Street
Pasig, Rizal

Scale: 1:500
Date: 16 Sept 2014

**FINAL BOREHOLE LOG AND SUMMARY
OF TEST RESULTS**

UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

FINAL BOREHOLE LOG AND SUMMARY OF TEST RESULTS

PROJECT: Soil Investigation for the Proposed RMV Catuzan Hydro Electric Power Plant
 LOCATION: Oriental Mindoro
 DATE DRILLED: 3/17/2015 DATE FINISHED: 3/22/2015 WATER TABLE: _____
 HOLE NO.: 8H-2
 DEPTH: 13.50 m

DEPTH, m	SAMPLE NUMBER	% RECOVERY	% RQD	SAMPLE TYPE	LOG SYMBOL	UNIFIED CLASSIFICATION	DESCRIPTION	N-VALUES				MOISTURE CONTENT	ATTERBERG LIMITS		SIEVE ANALYSIS % PASSING SIEVE NO.											
								SPT			GRAPH		LL (%)	PI (%)	1/2"	1/4"	75µ	30µ	15µ	7.5µ	4.75µ	2.0µ				
								15 cm	15 cm	15 cm																
							Ground Surface																			
1	1	53	0	CS			Gray, very poor hard intensely fractured boulders																			
2	2	27	0	CS			Gray, very poor hard intensely fractured boulders																			
3	3	31	0	CS			Gray, very poor hard intensely fractured boulders																			
4	4	45	0	CS			Gray, very poor hard intensely fractured boulders																			
5	5	46	0	CS			Gray, very poor hard intensely fractured boulders																			
6	6	63	0	CS			Gray, very poor hard intensely fractured boulders																			
7	7	93	0	CS			Gray, very poor hard intensely fractured boulders																			
8	8	95	0	CS			Gray, very poor hard intensely fractured boulders																			
9	9	57	0	CS			Gray, very poor hard intensely fractured boulders																			

LEGEND: Split-spoon Sample Undisturbed Sample END OF BOREHOLE Wash Sample Core Sample

[Signature]
 Laboratory Technician

[Signature]
 D. Santos
 Manager

LABORATORY TEST RESULTS

UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

Client: STA. CLARA INTERNATIONAL CORP.
Project: Soil Investigation for the Proposed Caturian Hydro Electric Power Plant
Location: Oriental Mindoro
Specimen: BH - 2A

Sample Mark	Sample Depth, m	Sample Diameter, cm	Sample Length, cm	Sample Weight, g	Sample Volume	Unit weight	Moisture content, %	Ultimate Load (kN)	Ultimate Strength	
									Mpa	Psi
CS - 1	0.00 - 1.50	4.540	10.490	443.30	16.188	27.38	12.00	46.8	2.9	419
CS - 3	3.00 - 4.50	4.510	10.482	448.60	15.975	28.08	12.00	44.7	2.8	406
CS - 7	9.00 - 10.50	4.522	10.411	436.50	16.060	27.18	10.00	36.9	2.3	333
CS - 8	10.50 - 12.00	4.535	10.530	445.20	16.153	27.56	8.00	38.4	2.4	345
CS - 9	12.00 - 13.50	4.511	10.533	430.90	15.982	26.96	10.00	39.0	2.4	354
CS - 10	13.50 - 15.00	4.528	10.472	436.10	16.103	27.08	7.00	50.6	3.1	456
CS - 11	15.00 - 16.50	4.525	10.417	455.10	16.082	28.30	2.00	48.2	3.0	435
CS - 12	16.50 - 18.00	4.530	10.585	460.50	16.117	28.57	7.00	34.3	2.1	309
CS - 13	18.00 - 19.00	4.520	10.495	451.90	16.046	28.16	7.00	51.5	3.2	465
CS - 14	19.00 - 20.00	4.515	10.528	449.70	16.011	28.09	7.00	33.4	2.1	302

Tested by:

P. K. Sienna
Lab. Technician

Checked by:

R. B. Dela Cruz
Laboratory Supervisor

Certified by:

D. Smitos
Manager

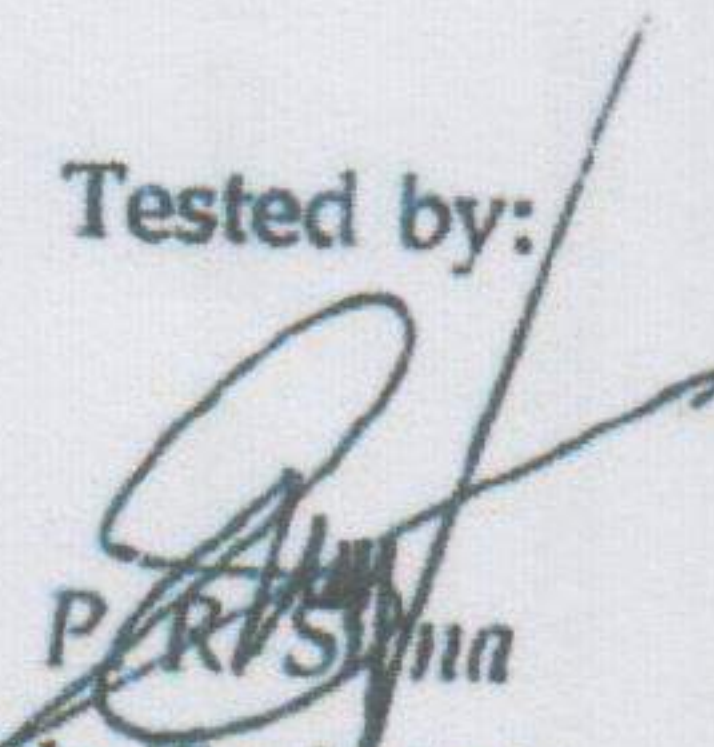
CUSTOMER/ CLIENT: STA CLARA INTERNATIONAL CORP.
 PROJECT: Soil Investigation for the Proposed 8MW Catuiran Hydro Electric Power Plant
 LOCATION: Oriental Mindoro
 SAMPLE I.D.: BH 3
 SOURCE: Site
 SAMPLED/SUBMITTED BY: UTLII Representative
 TEST REQUIRED: Moisture Content

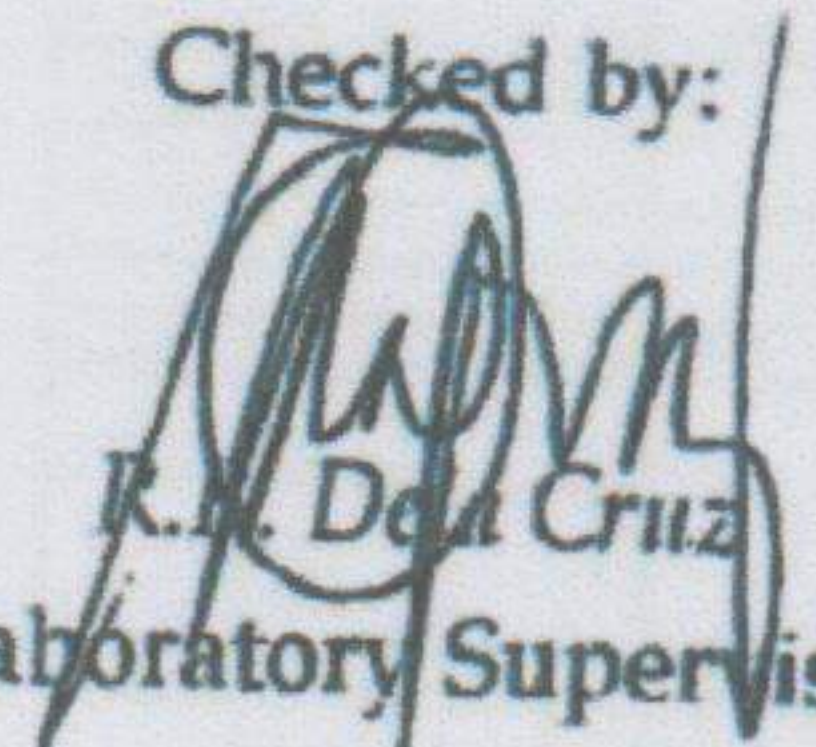
WORKSHEET ON MOISTURE CONTENT DETERMINATION

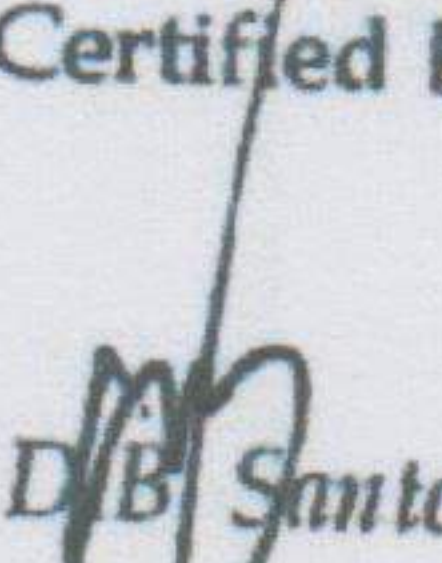
Location	SS1	SS2	SS3	-	-
Can Number	1	2	3	-	-
Weight of can & wet soil, g.	152.12	162.94	194.76	-	-
Weight of can & dry soil, g.	131.80	127.10	147.64	-	-
Weight of water, g.	20.32	35.84	47.12	-	-
Weight of can, g.	21.35	23.81	24.16	-	-
Weight of dry soil, g.	110.45	103.29	123.48	-	-
Moisture Content, %	18.40	34.70	38.16	-	-

Location	-	-	-	-	-
Can Number	-	-	-	-	-
Weight of can & wet soil, g.	-	-	-	-	-
Weight of can & dry soil, g.	-	-	-	-	-
Weight of water, g.	-	-	-	-	-
Weight of can, g.	-	-	-	-	-
Weight of dry soil, g.	-	-	-	-	-
Moisture Content, %	-	-	-	-	-

REMARKS: This report is the result of test performed on the sample submitted.

Tested by:

 P. R. Sina
 Lab. Technician

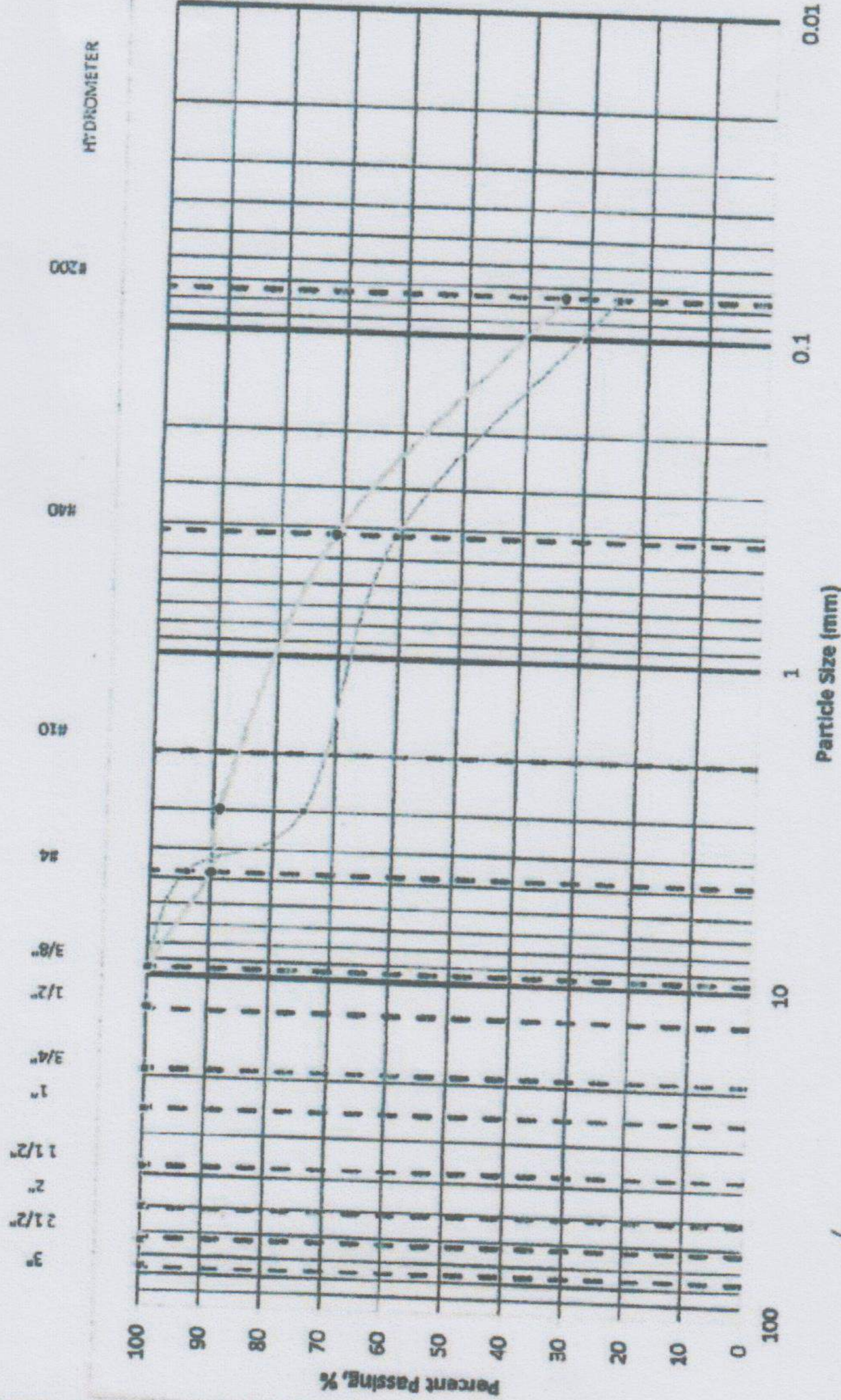
Checked by:

 R. M. Dela Cruz
 Laboratory Supervisor

Certified by:

 D. B. Santos
 Manager

UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

TEST REPORT FOR GRAIN SIZE ANALYSIS OF SOILS
(ASTM C 136)

Client: STA. CLARA INTERNATIONAL CORPORATION
 Project: Soil Investigation for the Proposed 8MW Caturian Hydro Electric Power Plant
 BH No. BH 3 - SS1/SS2
 Sampled by: UTLII Representative



REMARKS: This report is the result of test performed on the samples submitted.

Tested by: *[Signature]*
 Checked by: *[Signature]*

[Signature]
 Laboratory Supervisor

Certified by: *[Signature]*
 Manager

T E S T D A T A

SS - 1

OVEN-DRY Wt., gm	110.45	Wash OVEN-Dry Wt., gm	73.12
SIEVE SIZE	mm	Wt. Retained	Wt. Passing
INCH	mm	gms	% Passing
			% Retained
			CUMMULATIVE
3"	75		
2 1/2"	63		
2"	50		
1 1/2"	37.5		
1"	25		
3/4"	19		
1/2"	12.5		
3/8"	9.5	0.00	110.45
No. 4	4.75	11.05	99.41
No. 10	2.99	1.10	98.30
No. 40	0.425	19.88	78.42
No. 200	0.075	40.87	37.55
PAN		0.22	
Wash Loss Passing No. 200		37.33	
TOTAL		110.45	

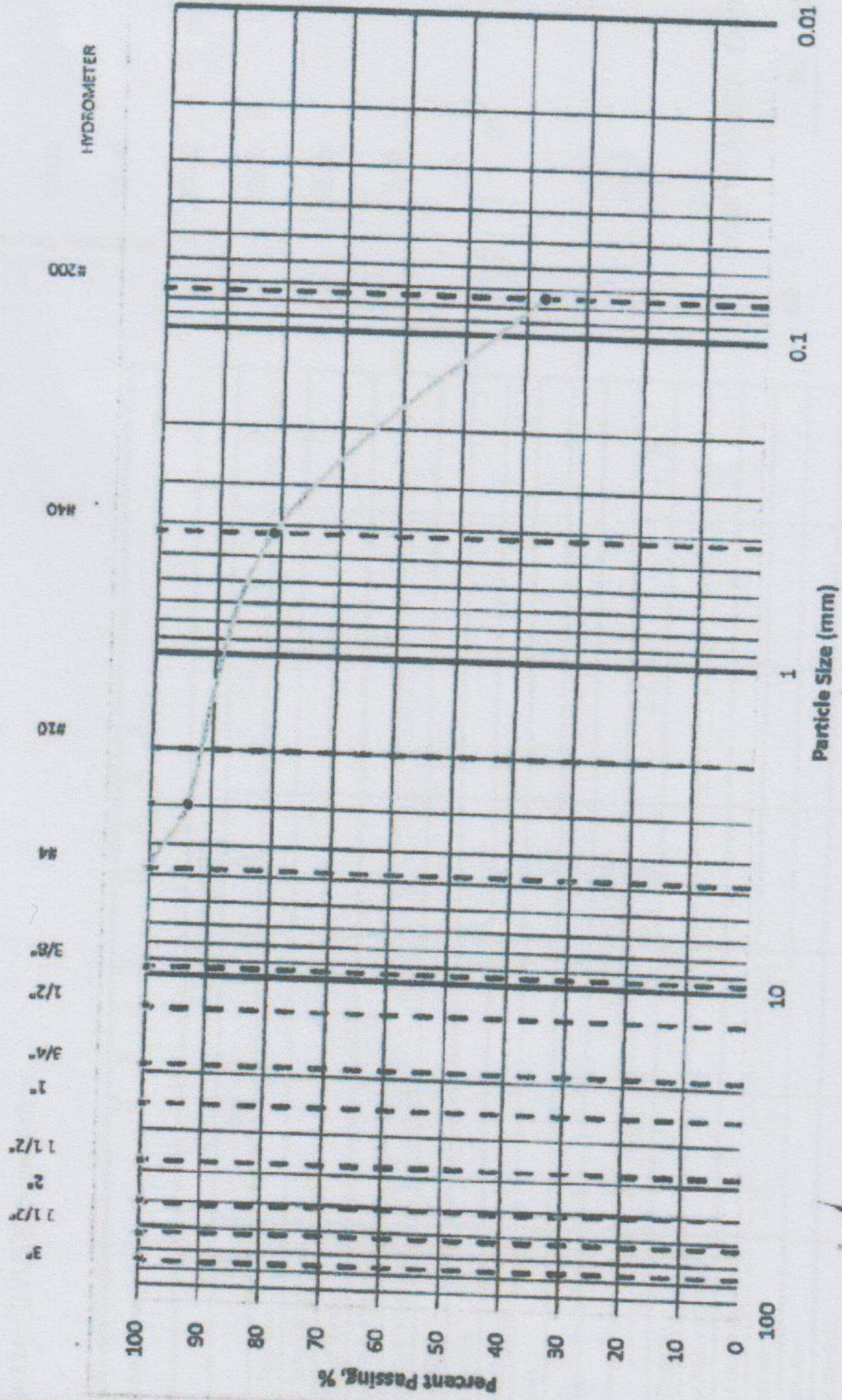
SS - 2

OVEN-DRY Wt., gm	103.29	Wash OVEN-Dry Wt., gm	77.47
SIEVE SIZE	mm	Wt. Retained	Wt. Passing
INCH	mm	gms	% Passing
			% Retained
			CUMMULATIVE
			gms
3"	75		
2 1/2"	63		
2"	50		
1 1/2"	37.5		
1"	25		
3/4"	19		
1/2"	12.5		
3/8"	9.5	0.00	103.29
No. 4	4.75	6.20	97.09
No. 10	2.99	19.63	77.47
No. 40	0.425	14.46	63.01
No. 200	0.075	37.18	25.82
PAN		0.00	
Wash Loss Passing No. 200		25.82	
TOTAL		103.29	

UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

TEST REPORT FOR GRAIN SIZE ANALYSIS OF SOILS
(ASTM C 136)

Client: STA. CLARA INTERNATIONAL CORPORATION
 Project: Soil Investigation for the Proposed 8MW Caturran Hydro Electric Power Plant
 BH No. BH 3 - SS3
 Sampled by: UTLII Representative



REMARKS: This report is the result of test performed on the samples submitted.

Tested by: *[Signature]*
 Checked by: *[Signature]*
 Laboratory Supervisor

Certified by: *[Signature]*
 Manager

TEST DATA

SS - 3

OVEN-DRY WL, gm	123.48	Wash OVEN-Dry WL, gm	78.01
SIEVE SIZE	Wt. Retained	Wt. Passing	% Retained
INCH	gms	gms	% Retained
3"			
2 1/2"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
No.4	0.00	123.48	100
No.10	7.41	116.07	94
No.40	16.05	100.02	81
No.200	54.33	45.69	37
PAN	0.22		
Wash Loss Passing No.200	45.47		
TOTAL	123.48		

SS - -

OVEN-DRY WL, gm	0.00	Wash OVEN-Dry WL, gm	0.00
SIEVE SIZE	Wt. Retained	Wt. Passing	% Retained
INCH	gms	gms	% Retained
3"			
2 1/2"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
No.4			
No.10			
No.40			
No.200			
PAN			
Wash Loss Passing No.200			
TOTAL			



UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

TEST REPORT FOR LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS
(ASTM D 4318)

Client: STA CLARA INTERNATIONAL CORPORATION
 Project: Soil Investigation for the Proposed 8MW Caturian Hydro Electric Power Plant
 BH No. BH3-SS3
 Sampled by: UTILI Representative

T E S T I D A T A

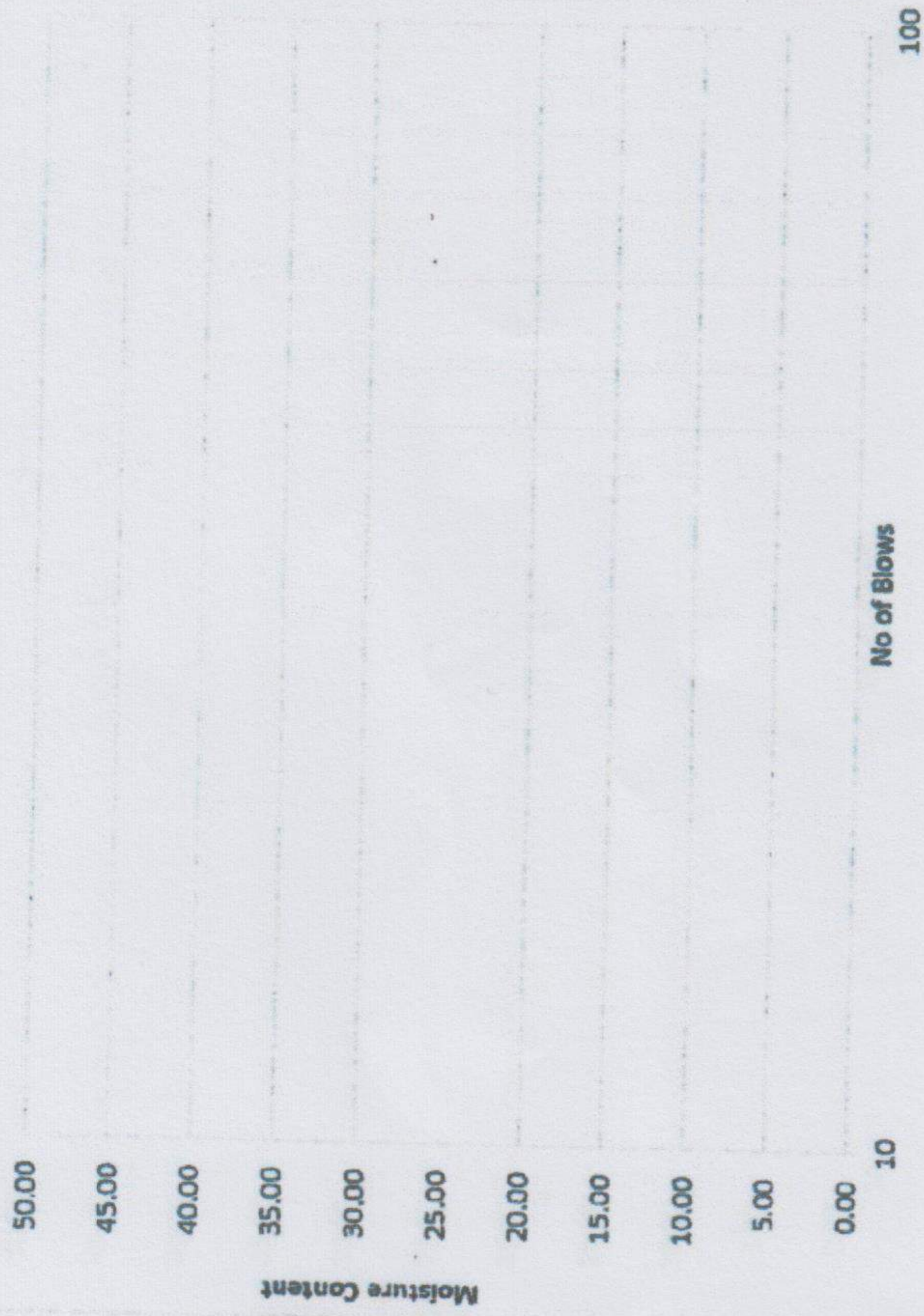
		LIQUID LIMIT			PLASTIC LIMIT		
		SS - 3	0	SS - -	SS - 3	0	SS - -
Trial No.							
No. of Blows Required							
No. of Blows							
1. Weight of Dish + Wet Soil							
2. Weight of Dish + Dry Soil							
3. Weight of Dish							
4. Weight of water							
5. Weight of Dry Soil							
6. % Moisture							
7. Average Plastic Limits							

REMARKS: This report is the result of test performed on the samples submitted.

Tested by:
 P. M. Medina
 Lab. Technician

Checked by:
 R. B. De la Cruz
 Laboratory Supervisor

Certified by:
 V. B. Santos
 Manager



SOIL CLASSIFICATION

SS - 3 SM Light gray, very dense silty sand of no plasticity
 SS - -



UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

TEST REPORT FOR LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS
(ASTM D 4318)

Client: STA CLARA INTERNATIONAL CORPORATION
Project: Soil Investigation for the Proposed 8MW Catiuran Hydro Electric Power Plant
BH No. BH3-SS1/SS2
Sampled by: UTLII Representative

T E S T D A T A

		LIQUID LIMIT		PLASTIC LIMIT	
		SS - 1	SS - 2	SS - 1	SS - 2
Trial No.		0	0	0	0
No. of Blows Required					
No. of Blows					
1. Weight of Dish + Wet Soil					
2. Weight of Dish + Dry Soil					
3. Weight of Dish					
4. Weight of water					
5. Weight of Dry Soil					
6. % Moisture					
Dish No.					
1. Weight of Dish + Wet Soil					
2. Weight of Dish + Dry Soil					
3. Weight of Dish					
4. Weight of water					
5. Weight of Dry Soil					
6. % Moisture					
7. Average Plastic Limit					

REMARKS: This report is the result of test performed on the samples submitted.

Tested by:
Lab. Technician

Certified by:
Lab. Supervisor



SOIL CLASSIFICATION

SS - 1	SM	Light gray, dense silty of no plasticity
SS - 2	SM	Dark gray, dense silty sand of no plasticity

Certified by:
D.Y. Santos
Manager



UNIVERSAL TESTING LABORATORY AND INSPECTION, INC.

Client: STA. CLARA INTERNATIONAL CORP.
Project: Soil Investigation for the Proposed Caturian Hydro Electric Power Plant
Location: Oriental Mindoro
Specimen: BH - 4

COMPRESSIVE STRENGTH OF ROCK										
Sample Mark	Sample Depth, m	Sample Diameter, cm	Sample Length, cm	Sample Weight, g	Sample Volume	Unit weight	Moisture content, %	Ultimate Load (kN)	Ultimate Strength	
									Mpa	Psi
CS - 2	1.50 - 3.00	4.517	10.564	458.30	16.025	28.60	5.00	47.5	3.0	430
CS - 3	3.00 - 4.50	4.522	10.406	441.30	16.060	27.48	7.00	45.1	2.8	407
CS - 4	4.50 - 6.00	4.527	10.422	458.80	16.096	28.50	9.00	50.4	3.1	454
CS - 5	6.00 - 7.50	4.513	10.431	438.60	15.996	27.42	7.00	47.3	3.0	429
CS - 6	7.50 - 9.00	4.512	10.436	428.70	15.989	26.81	14.00	41.7	2.6	378
CS - 8	10.50 - 12.00	4.530	10.448	454.90	16.117	28.22	7.00	30.8	1.9	277
CS - 9	12.00 - 13.50	4.515	10.425	450.80	16.011	28.16	9.00	52.2	3.3	473
CS - 10	13.50 - 15.00	4.538	10.550	451.30	16.174	27.90	5.00	46.9	2.9	420

Tested by:
P.R. Soria
Lab. Technician

Checked by:
R.V. Dila Cruz
Laboratory Supervisor

Certified by:
D.B. Santos
Manager

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: April 18, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH-2 Test No. 1

Depth, m: Top of Packer: 10 Meters
Bottom of Packer: 15 Meters
Water Table: 0.6 Meters

Height of Extended Pipe above ground, m: 1.15 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 15 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: -

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi Packer Inflation Pressure	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
15	1:20:00 PM	0.0	13.2674	
	1:20:30 PM	0.5	13.3992	0.1318
	1:21:00 PM	1.0	13.4279	0.1605
	1:21:30 PM	1.5	13.4538	0.1864
	1:22:00 PM	2.0	13.4778	0.2104
	1:22:30 PM	2.5	13.4939	0.2265
	1:23:00 PM	3.0	13.4977	0.2303
	1:24:00 PM	4.0	13.5003	0.2329
	1:25:00 PM	5.0	13.5444	0.2770
	Q _{AVE} : (Liter/minute)			
30	1:25:00 PM	0.0	13.5444	
	1:25:30 PM	0.5	13.6181	0.0737
	1:26:00 PM	1.0	13.6409	0.0965
	1:26:30 PM	1.5	13.6723	0.1279
	1:27:00 PM	2.0	13.6818	0.1374
	1:27:30 PM	2.5	13.7495	0.2051
	1:28:00 PM	3.0	13.7676	0.2232
	1:29:00 PM	4.0	13.7989	0.2545
	1:30:00 PM	5.0	13.8411	0.2967
	Q _{AVE} : (Liter/minute)			

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: April 18, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH -2 Test No. 1

Depth, m: Top of Packer: 10 Meter
Bottom of Packer: 15 Meter
Water Table: 0.6 Meters

Height of Extended Pipe above ground, m: 1.15 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 15 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: -

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
---------------------	--------------	---------------------------	--	-------------------------------

35	1:30:00 PM	0.0	13.8411	
	1:30:30 PM	0.5	13.8935	0.0524
	1:31:00 PM	1.0	13.9100	0.0689
	1:31:30 PM	1.5	13.9402	0.0991
	1:32:00 PM	2.0	13.9745	0.1334
	1:32:30 PM	2.5	13.9929	0.1518
	1:33:00 PM	3.0	14.0298	0.1887
	1:34:00 PM	4.0	14.0735	0.2324
	1:35:00 PM	5.0	14.1386	0.2975
Q _{AVE} :	(Liter/minute)			0.05950
20	1:35:00 PM	0.0	14.1386	
	1:35:30 PM	0.5	14.1705	0.0319
	1:36:00 PM	1.0	14.1938	0.0552
	1:36:29 PM	1.5	14.2168	0.0782
	1:37:00 PM	2.0	14.2483	0.1097
	1:37:30 PM	2.5	14.2690	0.1304
	1:37:59 PM	3.0	14.2824	0.1438
	1:39:00 PM	4.0	14.3395	0.2009
	1:39:59 PM	5.0	14.3754	0.2368
Q _{AVE} :	(Liter/minute)			0.04736

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: April 18, 2015

Project **Soil Investigation for the Proposed 8MW Catuiran Hydro**
Electric Power Plant

Borehole No. BH -2 Test No. 1

Depth, m: Top of Packer: 10 Meter
Bottom of Packer: 15 Meter
Water Table: 0.6 Meters

Height of Extended Pipe above ground, m: 1.15 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 15 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: -

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
20	1:39:59 PM	0.0	14.3754	
	1:40:30 PM	0.5	14.4111	0.0357
	1:41:00 PM	1.0	14.4394	0.0640
	1:41:29 PM	1.5	14.4501	0.0747
	1:42:00 PM	2.0	14.4707	0.0953
	1:42:30 PM	2.5	14.4928	0.1174
	1:42:59 PM	3.0	14.5114	0.1360
	1:44:00 PM	4.0	14.5539	0.1785
	1:44:59 PM	5.0	14.5943	0.2189
Q _{AVE} :	(Liter/minute)			0.04378

PACKER - TYPE PRESSURE TEST (TEST DATA)

Date: April 21, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH -2 Test No. 2

Depth, m: Top of Packer: 15 Meters
Bottom of Packer: 20 Meters
Water Table: 0.6 Meters

Height of Extended Pipe above ground, m: 1.08 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 20 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: 92.091

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi Packer Inflation Pressure	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
20	3:58:00 PM	0.0	15.7100	
	3:58:30 PM	0.5	15.8339	0.1239
	3:59:00 PM	1.0	15.8504	0.1404
	3:59:30 PM	1.5	15.8772	0.1672
	4:00:00 PM	2.0	15.8834	0.1734
	4:00:30 PM	2.5	15.8906	0.1806
	4:01:00 PM	3.0	15.9170	0.2070
	4:02:00 PM	4.0	15.9501	0.2401
	4:03:00 PM	5.0	15.9825	0.2725
	Q_{AVE}: (Liter/minute)			
35	4:04:00 PM	0.0	16.0148	
	4:04:30 PM	0.5	16.1440	0.1292
	4:05:00 PM	1.0	16.1637	0.1489
	4:05:30 PM	1.5	16.1857	0.1709
	4:06:00 PM	2.0	16.2158	0.2010
	4:06:30 PM	2.5	16.2369	0.2221
	4:07:00 PM	3.0	16.2573	0.2425
	4:08:00 PM	4.0	16.2894	0.2746
	4:09:00 PM	5.0	16.3305	0.3157
	Q_{AVE}: (Liter/minute)			

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: April 21, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH -2 Test No. 2

Depth, m: Top of Packer: 15 Meter
Bottom of Packer: 20 Meter
Water Table: 0.6 Meters

Height of Extended Pipe above ground, m: 1.08 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 20 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: 92.091

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
55	4:11:00 PM	0.0	16.3975	
	4:12:00 PM	1.0	13.4478	-2.9497
	4:13:00 PM	2.0	16.4615	0.0640
	4:14:00 PM	3.0	16.5207	0.1232
	4:15:00 PM	4.0	16.5865	0.1890
	4:16:00 PM	5.0	16.6128	0.2153
	4:17:00 PM	6.0	16.6756	0.2781
	4:18:00 PM	7.0	16.7495	0.3520
	4:19:00 PM	8.0	16.8084	0.4109
	4:20:00 PM	9.0	16.8763	0.4788
	4:21:00 PM	10.0	16.9427	0.5452
Q AVE: (Liter/minute)				0.05452
37	4:21:00 PM	0.0	16.9626	
	4:21:30 PM	0.5	16.9936	0.0310
	4:22:00 PM	1.0	17.0148	0.0522
	4:22:30 PM	1.5	17.0462	0.0836
	4:23:00 PM	2.0	17.0671	0.1045
	4:23:30 PM	2.5	17.0875	0.1249
	4:24:00 PM	3.0	17.0920	0.1294
	4:25:00 PM	4.0	17.1455	0.1829
	4:26:00 PM	5.0	17.1992	0.2366
Q AVE: (Liter/minute)				0.04732

**PACKER - TYPE PRESSURE TEST
(TEST DATA)**

Date: April 21, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH -2 Test No. 2

Depth, m: Top of Packer: 15 Meter
Bottom of Packer: 20 Meter
Water Table: 0.6 Meters

Height of Extended Pipe above ground, m: 1.08 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 20 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: 92.091

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
30	4:27:00 PM	0.0	17.2174	
	4:27:30 PM	0.5	17.2324	0.0150
	4:28:00 PM	1.0	17.2726	0.0552
	4:28:30 PM	1.5	17.2919	0.0745
	4:29:00 PM			
	4:29:30 PM			
	4:30:00 PM			
	4:31:00 PM			
	4:32:00 PM			
	Q_{AVE}: (Liter/minute)			
30	8:34:00 AM	0.0	17.3160	
	8:34:30 AM	0.5	17.3466	0.0306
	8:35:00 AM	1.0	17.3689	0.0529
	8:35:30 AM	1.5	17.3894	0.0734
	8:36:00 AM	2.0	17.4006	0.0846
	8:36:30 AM	2.5	17.4219	0.1059
	8:37:00 AM	3.0	17.4436	0.1276
	8:38:00 AM	4.0	17.4855	0.1695
	8:39:00 AM	5.0	17.5383	0.2223
	Q_{AVE}: (Liter/minute)			

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: March 9, 2015

Project **Soil Investigation for the Proposed 8MW Catuiran Hydro**
Electric Power Plant

Borehole No. BH -4 Test No. 1

Depth, m: Top of Packer: 5 Meters
Bottom of Packer: 10 Meters
Water Table: 1.5 Meters

Height of Extended Pipe above ground, m: 0.7 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 10 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: -

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi Packer Inflation Pressure	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
10	2:45:00 PM	0.0	9.0902	
	2:45:30 PM	0.5	9.1124	0.0222
	2:46:00 PM	1.0	9.1615	0.0713
	2:46:30 PM	1.5	9.2793	0.1891
	2:47:00 PM	2.0	9.3084	0.2182
	2:47:30 PM	2.5	9.3367	0.2465
	2:48:00 PM	3.0	9.3508	0.2606
	2:49:00 PM	4.0	9.4049	0.3147
	2:50:00 PM	5.0	9.4684	0.3782
	Q_{AVE}	(Liter/minute)		
20	2:50:00 PM	0.0	9.4684	
	2:50:30 PM	0.5	9.5756	0.1072
	2:51:00 PM	1.0	9.5999	0.1315
	2:51:30 PM	1.5	9.6012	0.1328
	2:52:00 PM	2.0	9.6405	0.1721
	2:52:30 PM	2.5	9.6508	0.1824
	2:53:00 PM	3.0	9.6596	0.1912
	2:54:00 PM	4.0	9.6681	0.1997
	2:55:00 PM	5.0	9.6786	0.2102
	Q_{AVE}	(Liter/minute)		

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: March 9, 2015

Project **Soil Investigation for the Proposed 8MW Catuiran Hydro**
Electric Power Plant

Borehole No. BH -4 Test No. 1

Depth, m: Top of Packer: 5 Meter
Bottom of Packer: 10 Meter
Water Table: 1.5 Meters

Height of Extended Pipe above ground, m: 0.7 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 10 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: -

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
30	2:55:00 PM	0.0	9.6839	
	2:55:30 PM	0.5	9.7638	0.0799
	2:56:00 PM	1.0	9.7929	0.1090
	2:56:30 PM	1.5	9.8036	0.1197
	2:57:00 PM	2.0	9.8696	0.1857
	2:57:30 PM	2.5	9.9078	0.2239
	2:58:00 PM	3.0	9.9458	0.2619
	2:59:00 PM	4.0	9.9575	0.2736
	3:00:00 PM	5.0	9.9685	0.2846
	Q_{AVE}: (Liter/minute)			
20	3:00:00 PM	0.0	9.9685	
	3:00:30 PM	0.5	10.1681	0.1996
	3:01:00 PM	1.0	10.1729	0.2044
	3:01:30 PM	1.5	10.2111	0.2426
	3:02:00 PM	2.0	10.2631	0.2946
	3:02:30 PM	2.5	10.2844	0.3159
	3:03:00 PM	3.0	10.3928	0.4243
	3:04:00 PM	4.0	10.4995	0.5310
	3:05:00 PM	5.0	10.5669	0.5984
	Q_{AVE}: (Liter/minute)			

**PACKER - TYPE PRESSURE TEST
(TEST DATA)**

Date: March 9, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH-4 Test No. 1

Depth, m: Top of Packer: 5 Meter
 Bottom of Packer: 10 Meter
 Water Table: 1.5 Meters

Height of Extended Pipe above ground, m: 0.7 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 10 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: -

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
15	3:05:00 PM	0.0	10.5669	
	3:05:30 PM	0.5	10.5960	0.0291
	3:06:00 PM	1.0	10.6364	0.0695
	3:06:30 PM	1.5	10.6678	0.1009
	3:07:00 PM	2.0	10.6981	0.1312
	3:07:30 PM	2.5	10.6991	0.1322
	3:08:00 PM	3.0	10.7461	0.1792
	3:09:00 PM	4.0	10.8121	0.2452
	3:10:00 PM	5.0	10.8798	0.3129
Q_{AVE}	(Liter/minute)			0.06258

PACKER - TYPE PRESSURE TEST
(TEST DATA)

Date: March 11, 2015

Project **Soil Investigation for the Proposed 8MW Catuiran Hydro**
Electric Power Plant

Borehole No. BH -4 Test No. 2

Depth, m: Top of Packer: 10 Meters
Bottom of Packer: 15 Meters
Water Table: 1.5 Meters

Height of Extended Pipe above ground, m: 0.7 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 15 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: 91.9

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi Packer Inflation Pressure	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
15	1:42:00 PM	0.0	11.2964	
	1:42:30 PM	0.5	11.3325	0.0361
	1:43:00 PM	1.0	11.3667	0.0703
	1:43:30 PM	1.5	11.4081	0.1117
	1:44:00 PM	2.0	11.4237	0.1273
	1:44:30 PM	2.5	11.4527	0.1563
	1:45:00 PM	3.0	11.4609	0.1645
	1:46:00 PM	4.0	11.5478	0.2514
	1:47:00 PM	5.0	11.6270	0.3306
	Q_{AVE}:	(Liter/minute)		
30	1:47:00 PM	0.0	11.6270	
	1:47:30 PM	0.5	11.7921	0.1651
	1:48:00 PM	1.0	11.8291	0.2021
	1:48:30 PM	1.5	11.8524	0.2254
	1:49:00 PM	2.0	11.9060	0.2790
	1:49:30 PM	2.5	11.9493	0.3223
	1:50:00 PM	3.0	11.9831	0.3561
	1:51:00 PM	4.0	11.9883	0.3613
	1:52:00 PM	5.0	11.9992	0.3722
	Q_{AVE}:	(Liter/minute)		

**PACKER - TYPE PRESSURE TEST
(TEST DATA)**

Date: March 11, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH -4 Test No. 2

Depth, m: Top of Packer: 10 Meter
Bottom of Packer: 15 Meter
Water Table: 1.5 Meters

Height of Extended Pipe above ground, m: 0.7 Meter

Length of Packer, m: 0.6 Meter

Description of Material: -

Total Depth, m: 15 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: 91.9

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
35	1:52:00 PM	0.0	11.9992	
	1:52:30 PM	0.5	12.0507	0.0515
	1:53:00 PM	1.0	12.1970	0.1978
	1:53:30 PM	1.5	12.2706	0.2714
	1:54:00 PM	2.0	12.2722	0.2730
	1:54:30 PM	2.5	12.2773	0.2781
	1:55:00 PM	3.0	12.3195	0.3203
	1:56:00 PM	4.0	12.3668	0.3676
	1:57:00 PM	5.0	12.3737	0.3745
	Q_{AVE}: (Liter/minute)			
30	1:57:00 PM	0.0	12.3737	
	1:57:30 PM	0.5	12.4127	0.0390
	1:58:00 PM	1.0	12.4437	0.0700
	1:58:30 PM	1.5	12.6570	0.2833
	1:59:00 PM	2.0	12.6746	0.3009
	1:59:30 PM	2.5	12.6990	0.3253
	2:00:00 PM	3.0	12.7275	0.3538
	2:01:00 PM	4.0	12.7834	0.4097
	2:02:00 PM	5.0	12.7940	0.4203
	Q_{AVE}: (Liter/minute)			

PACKER - TYPE PRESSURE TEST (TEST DATA)

Date: March 11, 2015

Project Soil Investigation for the Proposed 8MW Catuiran Hydro
Electric Power Plant

Borehole No. BH -4 Test No. 2

Depth, m: Top of Packer: 10 Meter
Bottom of Packer: 15 Meter
Water Table: 1.5 Meters

Height of Extended Pipe above ground, m: - Meter

Length of Packer, m: 0.6 Meter

Description of Material: _____

Total Depth, m: 15 Meter

Test Section Length, m: 5 Meter

Hole Radius, cm: 3.81

Ground Elev.: 91.9

Weather: Sunny

Tested By: M. Relingado

Water pressure, Psi	Time Hrs.	Time Interval, minutes	Water Meter Reading, m ³	Quantity of Flow Q, Liters
20	2:02:00 PM	0.0	12.7940	
	2:02:30 PM	0.5	12.8733	0.0793
	2:03:00 PM	1.0	12.8841	0.0901
	2:03:30 PM	1.5	12.9546	0.1606
	2:04:00 PM	2.0	12.9769	0.1829
	2:04:30 PM	2.5	12.9803	0.1863
	2:05:00 PM	3.0	13.0612	0.2672
	2:06:00 PM	4.0	13.1543	0.3603
	2:07:00 PM	5.0	13.2371	0.4431
Q _{AVE} :	(Liter/minute)			0.08862

PHOTOS

WATER PRESSURE PICTURES



WATER PRESSURE PICTURES



WATER PRESSURE PICTURES





HAS Form 013 Rev 01

HAS-01-15-1515

DATE: 23 October 2015
 FOR: STALCURIA INTERNATIONAL CORPORATION
 REPRESENTED BY: JERMANI L. BATAAN
 PURPOSE: MGB requirement

EARTHQUAKE HAZARD ASSESSMENT

PROJECT NAME LOCATION	RELATED HAZARD
Chuañon River Hydroelectric Project Plant Project Strg. Motor, Res. and Oriental Workshop Powerhouse	<p>APPENDIX - C</p> <p>Approximately 200 meters south of the Central Machine House</p> <p>Approximately 2.5 kilometer east of the Central Machine House</p>

EXPLANATORY RECOMMENDATION

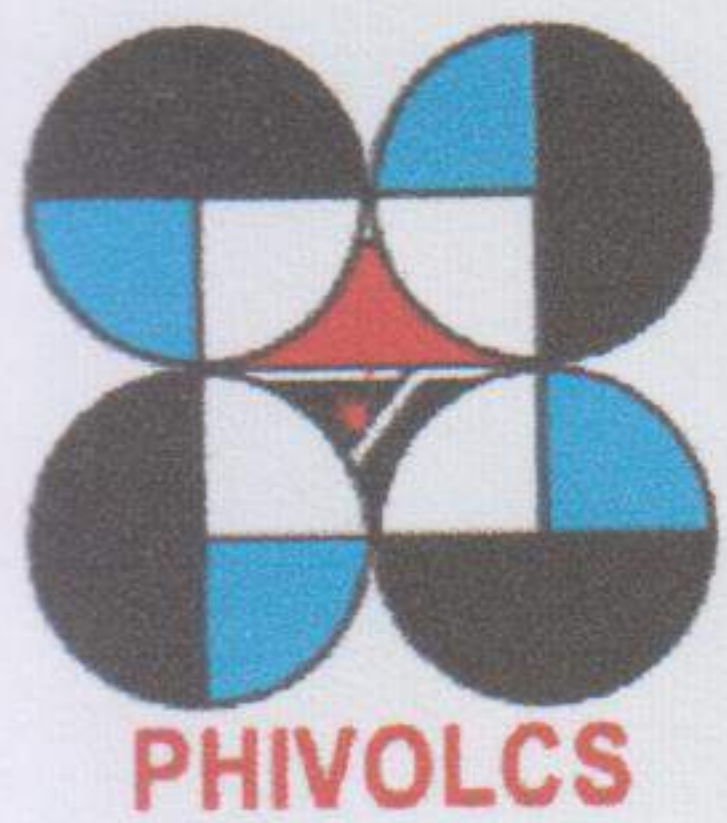
- ✓ All hazard assessments were based on the latest available hazard maps and on the locations indicated in the project data provided.
- ✓ Ground shaking hazard assessment is the distance to the nearest known active fault. The assessment is based on the distance of structures against ground rupture hazard is at least 5 meters on both sides of the active fault or from its zone of deformation.
- ✓ All sites may be affected by seismic ground shaking.
- ✓ Ground shaking hazard can be mitigated by following the provisions of the National Building Code and the Structural Code of the Philippines.
- ✓ This hazard assessment is based on previous assessment made by this office regarding the site.

Accessed by: Bryan J. Maricao
 Verified by: Mabelina T. Calumpang
 Maria Lynn F. Macatangay

Officer-in-Charge
 Senior Service Research Specialist
 Hazard Assessment Services Officer

Approved by: *[Signature]*
 JERMANI L. BATAAN, ES.
 Director

Director



HAS.Form.01.1.v01

HAS-Oct-15-1563

DATE 28 October 2015
 FOR STA. CLARA INTERNATIONAL CORPORATION
 REPRESENTED BY HERNANI I. BAYANI
 PURPOSE MGB requirement

EARTHQUAKE HAZARD ASSESSMENT

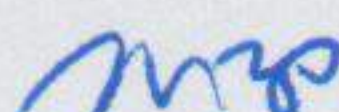
PROJECT NAME, LOCATION	GROUND RUPTURE			
Catuiran Mini-Hydroelectric Power Plant Project; Brgy. Malvar, Naujan, Oriental Mindoro				
Powerhouse	Approximately 252 meters west of the Central Mindoro Fault			
WEIR	Approximately 2.7 kilometers west of the Central Mindoro Fault			

EXPLANATION AND RECOMMENDATION

- ✓ All hazard assessments are based on the latest available hazard maps and on the location indicated in the vicinity map provided.
- ✓ Ground rupture hazard assessment is the distance to the nearest known active fault. The recommended buffer zone, or Zone of Avoidance, against ground rupture hazard is at least 5 meters on both sides of the active fault or from its zone of deformation.
- ✓ All sites may be affected by strong ground shaking.
- ✓ Ground shaking hazard can be mitigated by following the provisions of the National Building Code and the Structural Code of the Philippines.
- ✓ This hazard assessment supersedes previous assessment made by this office regarding the site.

Assessed by Bryan J. Marfito
 Verified by Mabelline T. Cahulogan
 Maria Lynn P. Melosantos

Officer-of-the-Day
 Senior Science Research Specialist
 Hazard Assessment Services Officer

Approved by 
RENATO U. SOLIDUM, JR.


Director

ACCOUNTABILITY STATEMENT

This is to certify that all geologic data or information contained in the enclosed documents are true and correct to the best of my knowledge and belief, and that I am a duly licensed Professional Engineer, Geologist and Geotechnical Engineer (REGAR) for the province of Cebu, Philippines, under the supervision of the Regional Office of the Department of Environment and Natural Resources (DENR) - Cebu, Philippines. I am also a member of the Philippine Institute of Geologists (PIG) and the Philippine Institute of Geotechnical Engineers (PIGE).

In witness whereof, I have hereunto set my hand and seal this 11th day of NOVEMBER 2013 at Manila, Philippines.

APPENDIX - D

NOTICE AND SWORN to the before me this 11th day of NOVEMBER 2013.
Attest: Notary Public for the Province of Cebu, Philippines. No. 222812 national
Patricio T. ... January 7, 2013.

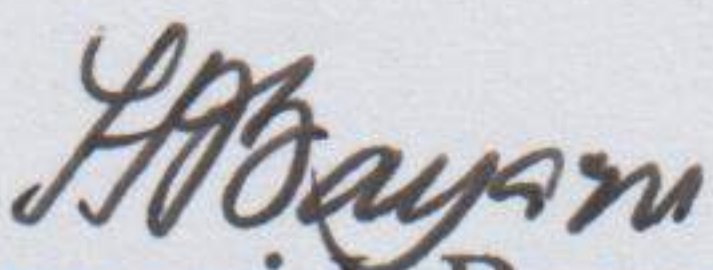
NOTARY PUBLIC



ACCOUNTABILITY STATEMENT

This is to certify that all geologic data or information contained in the enclosed Engineering, Geological and Geohazard Assessment Report (EGGAR) for the proposed "Catuiran Mini-hydroelectric Power Plant" project to be located at Barangay Malvar, Naujan, Oriental Mindoro is true, and complete to best of my knowledge, and that an objective and thorough assessment of the project was undertaken in accordance with the dictates of reasonable and sound judgement. Should we learn of any information, which would make the enclosed EGGAR inaccurate, we shall bring said information to the attention of Environmental Management Bureau (EMB – R-4B) and the Mines and Geosciences Bureau (MGB) Region 4B., of the Department of Environment and Natural Resources.

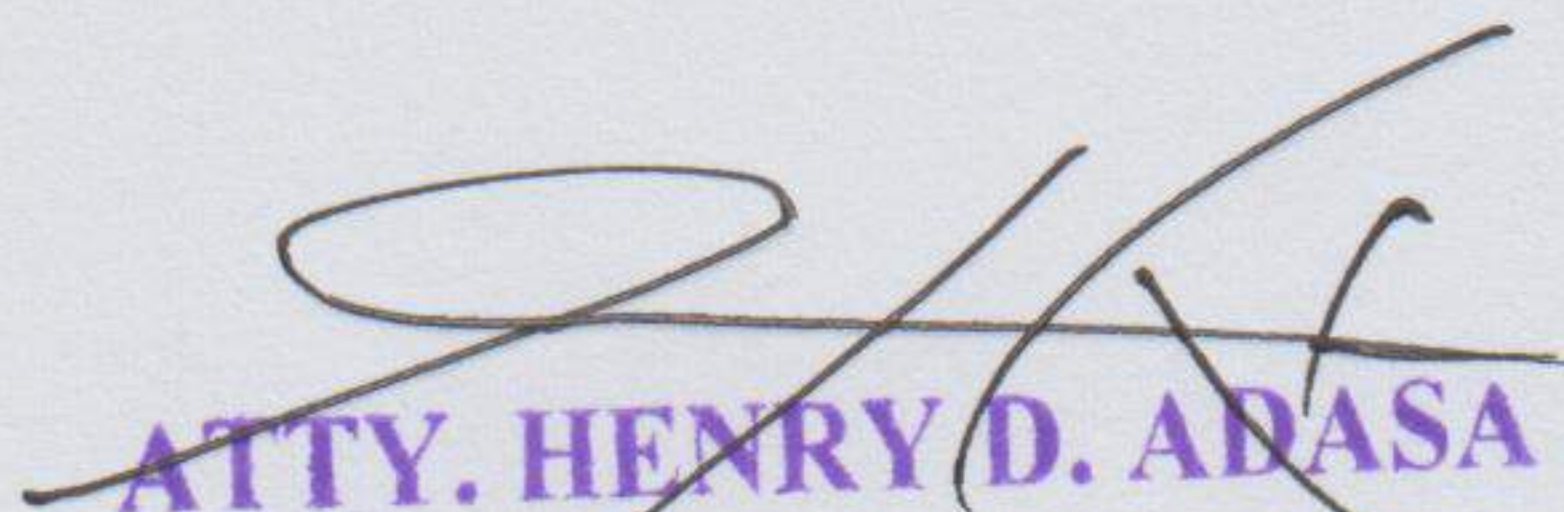
In witness, whereof, we hereby set our hands this _____ day of NOV 04 2015, 2015 at Manila, Philippines.


Hernani I. Bayani
Preparer

SUBSCRIBED AND SWORN to me before this _____ day of NOV 04 2015
Affiants exhibiting to me his Community Tax Certificates No. 23290817 issued at Paombong, Bulacan last January 7, 2015.

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Book No. VIII
Series 2015

NOTARY PUBLIC


ATTY. HENRY D. ADASA
Notary Public City of Manila
Commission No. 2014-162 Until Dec. 31, 2015
PTR NO. 3824852 - 1 -5-15 / Manila
Roll No. 29679 TIN-172-528-620
IBP No. 939450 - 1-5-15 ZN
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