PEOPLE'S TELEVISION
PARA SA BAYAN
People's Television Network, Inc
Broadcast Complex, Visayas Avenue, Diliman, Quezon City 1100
Telephone No. 3453-1097 /www.ptv.ph

BID BULLETIN NO. 1
14 March 2022

Supply, Delivery, Design and Build of a Four (4) Legged Two Hundred Fifty (250) Feet TV Broadcast Tower including the Renovation of Existing Transmitter Building with Roof deck, Permanent Electricity Facilities, Grounding and Lightning Protection System with Site Development; Perimeter Fence and Guard House for PTV Legazpi of People's Television Network, Inc. (PTNI)
ITB NO. 2022-0003

This bulletin is being issued to revise/clarify certain portions of the bidding documents. This shall form an integral part of the bidding document for the above-stated project.

Reminder/ Additional Requirement	
1	Please see the Geotechnical Investigation Report in Annex "A" as basis for the detailed Preliminary Design.

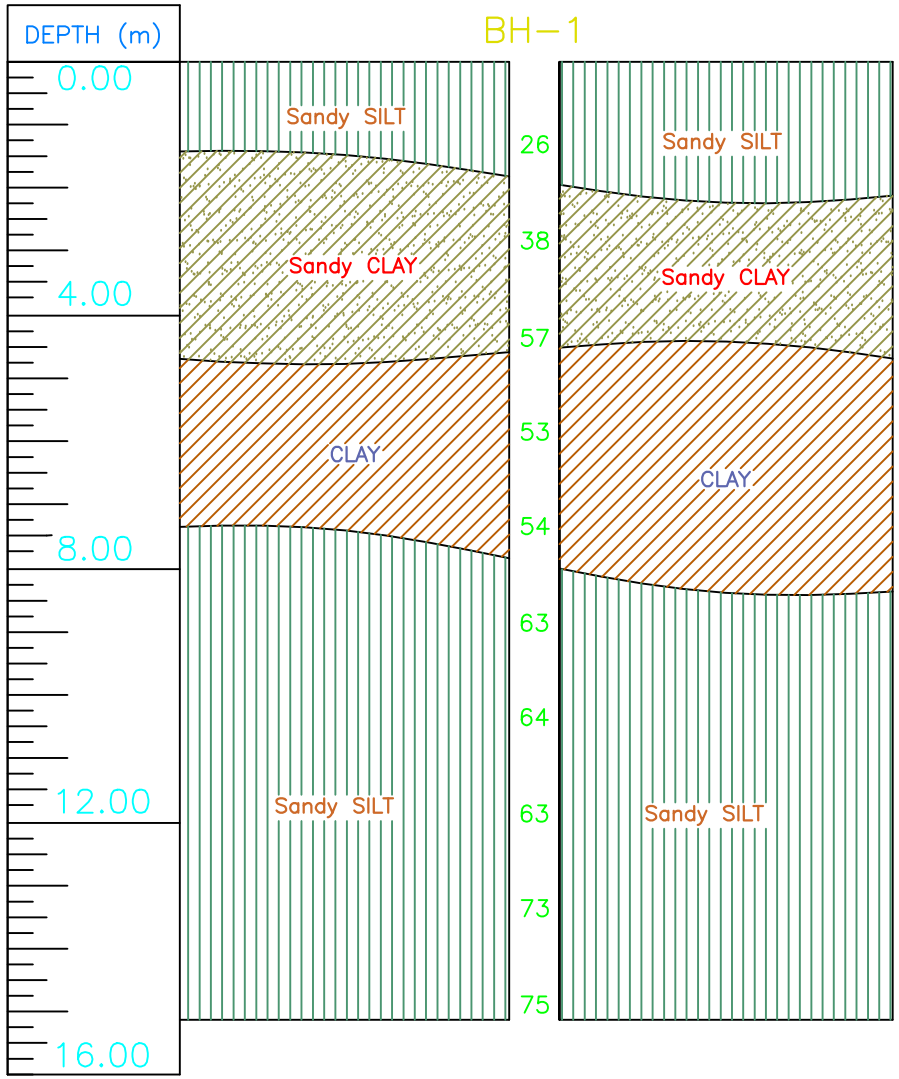
All other information in the Bidding Documents inconsistent with the above is hereby revised accordingly. All other provisions which are not affected shall remain in effect.

For further guidance and information of all concerned.

Thank you.

ATTY. JASON SHAHEER H. SALENDAB
Chairman
Bids and Awards Committee

"ANNEX A"



WATER TABLE

12 SPT N–VALUE

50/13 REFUSAL

CS CORING

FIG. 02 SOIL STRATIFICATION

LEGAZPI, ALBAY

NTS

FINAL BOREHOLE LOG AND SUMMARY OF TEST RESULTS

PROJECT NAME: PROPOSED PVT-4 TOWER

PROJECT LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

DATE DRILLED: FEBRUARY 22, 2022

DATE FINISHED: FEBRUARY 22, 2022

DRILL RIG TYPE: MANUAL DRILLING RIG

BOREHOLE NO.: 1

BOREHOLE DEPTH: 15.00 m

WATER TABLE: Not Reached

DEPTH, m	SAMPLE NO.	% RECOVERY	R.Q.D	LOG SYMBOL	CLASSIFICATION	DESCRIPTION	SPT BLOWS 15	15	15	SPT N-VALUE	MC	ATTERBERG LIMITS LL %	PI %	SIEVE ANALYSIS % PASSING SIEVE NO. 1	3/4	1/2	4	10	40	100	200
						GROUND SURFACE															
1	SS-1	100			ML	Sandy SILT, light gray; medium to fine sand; low plasticity; very stiff.	11	13	13	**26**	25.3	37	10	100	100	100	97	92	71	55	45
2																					
3	SS-2	100			CL	Sandy CLAY, brown; medium to fine sand; traces of tuff fragments; moderate plasticity; hard.	30	19	19	**38**	29.5	39	18	100	100	100	100	99	88	74	65
4	SS-3	100					30	30	27	**57**	26.7	41	20	100	100	100	98	95	79	63	54
5																					
6	SS-4	100			CH	CLAY, brown; traces of tuff fragments; high plasticity; hard.	25	25	28	**53**											
7	SS-5	100					30	27	27	**54**	42.0	60	31	100	100	100	99	96	87	73	68
8																					
9	SS-6	100			ML	Sandy SILT, brown; very fine to fine sand; traces of tuff fragments; low plasticity; hard.	30	32	31	**63**											

GRAPH: 10 20 30 40 50

*** CONTINUATION OF BH-1 AT NEXT PAGE ***

LEGEND	TYPE OF SAMPLING
LL-Liquid Limit	
PL-Plastic Limit	Split-Spoon Sample
RQD-Rock Quality Designation	Core Sample
MC-Moisture Content	
WT-Water Table	Wash Sample
NP-No Plasticity	
* -Insufficient for Test	Water Table

NDB ENGINEERING CONSULTANCY

Encoded by: G. P. Baniqo-os, Technical Manager

Approved by: Engr. Noli D. Banua, Head of Engineering Department

FINAL BOREHOLE LOG AND SUMMARY OF TEST RESULTS

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BOREHOLE DEPTH: 15.00 m

WATER TABLE: Not Reached

DEPTH, m	SAMPLE NO.	% RECOVERY	R.Q.D	LOG SYMBOL	CLASSIFICATION	DESCRIPTION	SPT BLOWS 15	15	15	SPT N-VALUE	SPT GRAPH 10	20	30	40	50	MC	ATTERBERG LIMITS LL %	PI %	SIEVE ANALYSIS % PASSING SIEVE NO. 1	3/4	1/2	4	10	40	100	200
						GROUND SURFACE																				
10	SS-7	100					32	33	31	**64**						40.3	36	7	100	100	100	96	93	85	72	51
11																										
12	SS-8	100			ML	Sandy SILT, brown; very fine to fine sand; traces of tuff fragments; low plasticity; hard.	35	30	33	**63**																
13																										
	SS-9	100					36	36	37	**73**						40.9	39	10	100	100	100	94	91	83	69	49
14																										
15	SS-10	100					35	37	38	**75**																
16																										
17																										
18																										

END OF BH-1 @ 15.00 m

LEGEND	TYPE OF SAMPLING	
LL-Liquid Limit		
PL-Plastic Limit		Split-Spoon Sample
RQD-Rock Quality Designation		Core Sample
MC-Moisture Content		
WT-Water Table		Wash Sample
NP-No Plasticity		
* -Insufficient for Test		Water Table

NDB ENGINEERING CONSULTANCY

Encoded by: G. P. Banigo-os, Technical Manager

Approved by: Engr. Noli D. Banua, Head of Engineering Department

1.0 INTRODUCTION

This report pertains to the **PROPOSED PVT-4 TOWER** located at Highlands, Brgy. Estanza, Legaspi City, Albay presents the evaluation of the results of the geotechnical investigation of the said area.

The geotechnical investigation drilled one (1) borehole, in order to assess the sub-soil condition and evaluate its characteristics, and for each site the soil samples recovered were then brought to the soil laboratory center for analysis and testing. Laboratory tests on selected soil samples include:

- Soil Classification of Soils for Engineering Purposes
  Unified Soil Classification System (ASTM D2487-93)
- Grain Size Analysis of Soils (ASTM D422-63)
- Liquid Limits of Soils (ASTM D4318-95)
- Plastic Limits of Soils (ASTM D4318-95)
- Determination of Moisture Content of Soils (ASTM D2216-92)
- Unconfined Compressive Strength of Cohesive Soil (ASTM D2166-91)

This report presents the field (Standard Penetration Test – SPT) and laboratory procedures adopted in the investigation as well as the evaluation of the test results for the subsequent foundation analysis.

Subsurface conditions are presented in the form of idealized soil profiles (See: Appendices) and borehole logs that include the results of the field and laboratory tests on soil samples.

2.0 FIELD INVESTIGATION

The field investigation within the site consisted of drilling of one (1) borehole. The Borehole Location Plan is appended to this report (See Appendices).
Table 1 presents the summary of the investigation conducted.

Table 1: Summary of Field Investigation

Borehole Designation	Final Depth of Borehole	Water Level	Casing Depth	Date of Drilling
BH-1	**15.00 m**	**Not Reached**	**9.00 m**	**02-22-22 to 02-22-22**

Washboring procedures were employed in order to advance the borehole and the Standard Penetration Test was done in order to get the penetration resistance profile of the underlying soils.

The Standard Penetration Test (SPT) was done in Accordance with ASTM specifications. For each test, a 2-inch (50.8mm) outside diameter Spoon Sampler is driven into soil a distance of 18 inches (460mm) by means of a 140lb. (63.5 kg.) driving mass falling free from a height of 30 inches (760mm). The number of blows needed to drive the sampler 18 inches (460mm) is recorded and the number of blows needed to drive the last 12 inches (305mm) is taken as the N-value.

Undisturbed Sample was done accordance with ASTMD-1587 procedure using thin-walled tube sampler to obtain intact specimens of fine-grained soils for laboratory tests to determine engineering properties of soils (strength, compressibility, permeability, and density).

Soil samples were recovered using the spoon sampler and were then taken to the laboratory for analysis and testing.

Complementing the field activities is the laboratory testing of the samples obtained. The results of the field works and laboratory investigation were then used to establish the parameters for determining the type of foundation, level of foundation and bearing capacities.

3.0 LABORATORY TESTING

Representative Soil Samples obtained during drilling / samplings were subjected to the following laboratory tests:

Soil Classification Tests per ASTM D2487
This standard describes a system for classifying mineral and organo-mineral soils for engineering purposes based on laboratory determination of particle size characteristics, liquid limit and plasticity index.

Grain Size Analysis per ASTM D422
This Method covers the quantities determination of the distribution of particle sizes of soils.

Soil was passed through a series of sieve, the weight of soil retained in each sieve determined and recorded. For each sample analyzed, a gradation curve was drawn based on the percent finer weight.

Determination Moisture Content per ASTM D2216
This method covers the laboratory determination of the water / moisture content of soil by weight.

The moisture content of a material is defined as the ratio, express as a percentage, of the mass of pore water in a given mass of material to the mass of the solid material particles.

Atterberg Limit Test per ASTM D4318
This test method covers the determination of the liquid limit, plastic limit and the plasticity index of soils.

Liquid Limit of Soil
The liquid limit of a soil is the water content, express as a percentage of the mass of the oven-dried soil after attaining the condition between the liquid and plastic states.

Plastic Limit and Plasticity Index of Soils
The plastic limit of the soil is the water content, express as a percentage of the mass of the oven oven-dried soil after attaining the condition between the plastic and semi-solid states.
Plasticity Index is defined as the difference of the liquid and plastic limits of the soil.

Unconfined Compressive Strength of Cohesive Soil ASTM D2166-91

This test method covers the determination of the unconfined compressive strength of cohesive soil in the intact, remolded, or reconstituted condition, using strain-controlled application of the axial load.

4.0 RESULTS OF FIELD AND LABORATORY TESTING

The result of field and laboratory testing are presented in table 2.

Table 2: Idealized subsurface profile at BH-1

Depth, m	USCS Classification / Description	SPT N-value	Consistency / Relative Condition
1.05 – 1.50	ML – Sandy SILT – light gray	26	Very Stiff
2.55 – 3.00	CL – Sandy CLAY – brown	38	Hard
4.05 – 4.50	CL – Sandy CLAY – brown	57	Hard
5.55 – 6.00	CH – CLAY – brown	53	Hard
7.05 – 7.50	CH – CLAY – brown	54	Hard
8.55 – 9.00	ML – Sandy SILT – brown	63	Hard
10.05 – 10.50	ML – Sandy SILT – brown	64	Hard
11.55 – 12.00	ML – Sandy SILT – brown	63	Hard
13.05 – 13.50	ML – Sandy SILT – brown	73	Hard
13.50 – 15.00	ML – Sandy SILT – brown	75	Hard

5.0 REGIONAL GEOLOGY AND SEISMICITY

Albay has a total land area of 2,575.77 square kilometres (994.51 sq mi), which makes it the 53rd biggest province. The province is bordered by the provinces of Camarines Sur to the north and Sorsogon to the south. To the northeast lies the Lagonoy Gulf, which separates the province from Catanduanes. To the southwest of the province is the Burias Pass with the island of Burias of Masbate province located about 14 kilometres (8.7 mi) offshore.

In 2016, an area of 250,000 hectares (620,000 acres) was declared a UNESCO Biosphere Reserve. The Albay Biosphere Reserve is home to 182 terrestrial plant species, of which 46 are endemic to the Philippines. Its marine waters and coastal area also provide habitat to five of the world's seven marine turtle species, as well as mangrove, seagrass and seaweed ecosystems.

Topography

The province is generally mountainous with scattered fertile plains and valleys. On the eastern part of the province is a line of volcanic mountains starting with the northernmost Malinao in Tiwi, followed by Mount Masaraga and the free-standing Mayon Volcano. Separated by the Poliqui Bay is the Pocdol Mountains in the town of Manito.

The stratovolcano of Mayon standing at around 2,462 metres (8,077 ft), is the highest point of the province. It is the most famous landform in Albay and in the whole Bicol Region. This active volcano falls under the jurisdiction of eight municipalities and cities of Albay: Camalig, Daraga, Guinobatan, Legazpi City, Ligao City, Malilipot, Santo Domingo, and Tabaco City.

The western coast of the province is mountainous but not as prominent as the eastern range with the highest elevation at around 490 metres (1,610 ft) Among these mountains are Mount Catburawan in Ligao and Mount Pantao in Oas.

6.0 GEOTECHNICAL DESIGN / ENGINEERING CONSIDERATION

6.1 Seismic Design Criteria

The Philippine archipelago is a part of the Pacific Ring of Fire and considered as part of seismically active region globally, and locally classified under Seismic Zone IV where Z=0.4. The most probable seismic source that may affect the project site is the Luzon West Valley Fault System, Manila Trench, Lubang Fault, Casiguran Fault and Philippine Fault Zone*.

The following seismic design parameters are:

PARAMETER	VALUE
Peak Ground Acceleration	0.40g
Soil Profile Type	S_D (lenses only at the upper strata) S_C (lower strata)
Seismic Zone	4
Seismic Source Type	A

*Table 5.1 – Seismic Design Parameters Other seismic parameters shall be determined by the Design Engineer using NSCP 2015 7th Edition.

For concentrically loaded footings the required area is determined from

$$A_{req} = \frac{D+L}{q_a}$$

The allowable bearing pressure can be increased by 33% when aside from the service loads, wind and other lateral loads (transient loads) are considered.

$$A_{req} = \frac{(D+L+W)}{1.33q_a} \quad \text{or} \quad \frac{D+L+E}{1.33q_a}$$

6.2 Geotechnical Design Criteria

Soil conditions and local geological features affecting the site response are the following: thick bedded of hard SAND SILT OVERLAIN BY 1.50-meter lenses (from natural grade line) of very stiff SANDY SILT, 3.00-meter lenses of hard SANDY CLAY, 3.00-meter lenses of hard CLAY, and finally, 1.50-meter lenses of hard SANDY SILT.

The corresponding geotechnical design parameters are:

PARAMETER	VALUE
Assumed founding depth for Shallow Footing	**1.50 meter down from natural grade line**
Adhesion between foundation base to soil materials (for lateral pressure)	**C = 165 kPa**
Poisson's Ratio, μ	**0.2 to 0.3**

6.3 Potential Site Liquefaction?

Based from the idealized subsurface profile, the site area is not potential for both cyclic liquefaction and long-consolidation due to thick bedded of hard SAND SILT OVERLAIN BY 1.50-meter lenses (from natural grade line) of very stiff SANDY SILT, 3.00-meter lenses of hard SANDY CLAY, 3.00-meter lenses of hard CLAY, and finally, 1.50-meter lenses of hard SANDY SILT.

6.4 Shallow Footing with NO SOIL REMEDIATION NEEDED

Given the character of subsurface soil immediately underlain the proposed structure, the most economical and practical type of footing is a **shallow footing with no soil remedial technique needed with robust grade beams tying all the columns,** but depends also on the following factors, re: structural configuration, gravitational & seismic loads, complexity of the soil profile, regional stratigraphy, structure and soil inter-action. See computation of allowable soil bearing pressure (asbp) and settlements at the Appendices.

6.5 Overall Stability against Overturning

The foundation / footing should be checked for overturning; only those live loads that contribute to overturning should be included, and dead loads that stabilize against overturning should be multiplied by 0.90. A safety factor of at least 1.5 should be maintained against overturning, unless otherwise specified by the local building code.

6.6 For Eccentrically loaded Footing

If the supported column is not concentric with the footing area or if the column transmits at its juncture with the footing not only a vertical load but also a bending moment. In either case, the load effects at the footing base can be represented by the vertical load P and a bending moment M. The resulting bearing pressures are again assumed to be linearly distributed. As long as the eccentricity e = M/P does not exceed the kern distance k of the footing are, the usual flexure formula

$$Q_{max}_{min} = P/A +/- Mc/I$$

permits the determination of the bearing pressures at the two extreme edges. The footing area is found by trial and error from the condition $\mathbf{q_{max} \leq q_a}$.

6.7 Load Combinations using Strength Design or Load and Resistance Factor Design

6.7.1 Basic Load Combination

Structures and all portions thereof shall resist the most critical effects from the following combinations of factored loads:

1.4(D+F)

1.2(D+F+T) +1.6(L+H) +0.5(L_r or R)

1.2D+1.6(L_r or R) + (f_1Lor0.80W)

1.2D+1.6W+f_1L+0.5(L_r or R)

1.2D+1.0E+f_1L

0.9D+1.6W+1.6H

0.9D+1.6E+1.6H

6.7.2 Symbols and Notation

D=dead load

E=earthquake load

F=fluids load with well defined pressures and maximum heights

H=lateral load from the combined soil & water pressures

L=live load

L_r=roof live load including any permitted live load reduction

P=ponding load

R=rain load on undeflected roof

T=self-straining force and effects arising from contraction and expansion resulting from temperature changes, shrinkage, moisture change, creep in component materials, movement due to differential settlement or combination thereof.

W=wind pressure load

F_1=1.0 for floors in places of public assembly, for live loads in excess of 4.8 kPa, and garage live load

=0.5 for other live loads

7.0 LIMITATION

The evaluation presented was generally based on the result of **a single borehole** drilled at the site for **PROPOSED PVT-4 TOWER** located at Highlands, Brgy. Estanza, Legaspi City, Albay.

The structural design of the sub-structure is beyond the scope of this report. The foregoing analyses, recommendations and conclusions have been based on the subsoil investigation data **AT or NEAR a single borehole**, AND NOT TO BE INTERPRETED AS A WHOLE on the entire site lot, THUS, should any difference in the subsoil conditions be observed during construction, the undersigned shall be informed so that necessary corrections and changes in the recommendations can be made.

Extreme protection during excavation MUST BE EXERCISED to prevent soil softening thus, erosion by controlled dewatering technique because of the existence of high water table.

Correlated SPT Blow count for sand shear friction (ϕ) and clay cohesion value (c) were used in this computation.

ENGR. NOLI D. BANUA
PRC No.: 0045609
TIN No.: 154851714
PTR No.: 0173143
DATE: 01-11-22
PLACE: MANILA

OPTION 01: DESIGN OF SHALLOW FOOTING (Depth, D = 1.50 meters)
(For 2-storey Building)...square, combined & strip footings
(with breadth,B)

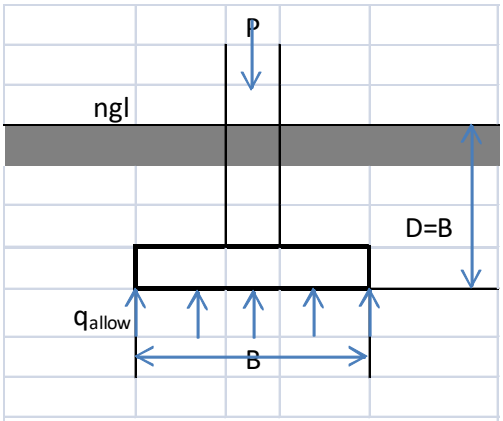


Figure 1 Dimension of Footing

Computation for the Allowable Safe Bearing Pressure: at or near BH-01

silty CLAY PROFILE

$q_u = c' \cdot N_c + p$

$q_u = c' \cdot N_c + \gamma_{moist} \cdot D$

$q_s = \frac{q_u}{FS}$

$q_s = \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$

where : q_u=ultimate bearing pressure, kN per s.m.
q_s=allowable safe bearing pressure, kN per s.m.
FS=Factor of Safety
c'=approximate eff. value of cohesion of clay
Nc=bearing capacity factordepending only on the geometry
p=initial total overburden pressure at foundation level
γ_{moist} = moist unit weight of soil @ 1.50 meter depth,kN per c.m.*
D=overburden depth, m

TABLE 10-3. ***APPROXIMATE RELATION BETWEEN N* AND COHESION OF CLAYS***			
*Value of N**	Relative Condition of Soil	Approximate value of Cohesion, c	
		psf	kN/m2
2 to 4	soft	250-500	`12-24
4 to 8	medium	500-1000	24-48
8 to 15	stiff	1000-2000	48-96
15 to 30	very stiff	2000-4000	96-190
above 30	hard	above 4000	above 190

Moist Unit Weight (γ_{moist})

Assumption: Specific_Gravity $G_s := 2.65$ Unit_Weight_of_Water $\gamma_w := 9.81 \frac{kN}{m^3}$

Moisture_Content $w := 0.253$ Degree of Saturation,S= 30% $S := 0.30$

Analysis: $\gamma_{moist} := \frac{(1+w)\cdot G_s\cdot\gamma_w}{1+\frac{w\cdot G_s}{S}}$ $\gamma_{moist} = 10.070\cdot\frac{kN}{m^3}$

Moisture Content (w) = 25.30% at Depth,D = 1.50 m, from the Appendix; Moist Unit Weight,γ_{moist} = 10.070 kN per c.m. (computed)

COMPUTATION OF BEARING CAPACITY FACTOR, N_c, FOR *UNDRAINED ANALYSIS*, after Skempton (1951)

At depth, D=1.50 meters

Type of Footing	Breadth (B),m	Length (L),m	D/B	B/L	N_c
Square Ftg	1.50	1.50	1.000	1.000	7.700
	2.00	2.00	0.750	1.000	7.500
	2.50	2.50	0.600	1.000	7.200
	3.00	3.00	0.500	1.000	7.100
	3.50	3.50	0.429	1.000	7.000
	4.00	4.00	0.375	1.000	6.950
Combined Ftg.	1.50	3.00	1.000	0.500	7.050
	2.00	4.00	0.750	0.500	6.800
	2.50	5.00	0.600	0.500	6.700
	3.00	6.00	0.500	0.500	6.500
	3.50	7.00	0.429	0.500	6.400
	4.00	8.00	0.375	0.500	6.350

FOR SQUARE FOOTING:

Thus , Average value of N to depth 2.0*B: B=1.50 m $N_{ave} := mean(26, 38, 57)$ $N_{ave} = 40.333$

$c' := 253kPa$ $N_c := 7.7$ $\gamma_{moist} := 10.070\frac{kN}{m^3}$ $D := 1.50m$ $FS := 3$

$q_{c1} := \frac{c'\cdot N_c + \gamma_{moist}\cdot D}{FS}$

$q_{c1} = 654401.667\ Pa$ $q_{c1} = 654.402\cdot kPa$

Average value of N
to depth 2.0*B: B=2.00 m

$N_{ave} := mean(26, 38, 57, 53)$ $N_{ave} = 43.500$

$c' := 278kPa$ $N_c := 7.50$ $\gamma_{moist} := 10.070\frac{kN}{m^3}$ $D := 1.50m$ $FS := 3$

$$q_{c2} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c2} = 700035.000\,Pa$ $q_{c2} = 700.035 \cdot kPa$

Average value of N
to depth 2.0*B: B=2.50 m

$N_{ave} := mean(26, 38, 57, 53, 54)$ $N_{ave} = 45.600$

$c' := 290kPa$ $N_c := 7.20$ $\gamma_{moist} := 10.070\frac{kN}{m^3}$ $D := 1.50m$ $FS := 3$

$$q_{c3} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c3} = 701035.000\,Pa$ $q_{c3} = 701.035 \cdot kPa$

Average value of N
to depth 2.0*B: B=3.00 m

$N_{ave} := mean(26, 38, 57, 53, 54, 63)$ $N_{ave} = 48.500$

$c' := 309kPa$ $N_c := 7.10$ $\gamma_{moist} := 10.070\frac{kN}{m^3}$ $D := 1.50m$ $FS := 3$

$$q_{c4} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c4} = 736335.000\,Pa$ $q_{c4} = 736.335 \cdot kPa$

Average value of N
to depth 2.0*B: B=3.50 m

$N_{ave} := mean(26, 38, 57, 53, 54, 63, 64)$ $N_{ave} = 50.714$

$c' := 352kPa$ $N_c := 7.10$ $\gamma_{moist} := 10.070\frac{kN}{m^3}$ $D := 1.50m$ $FS := 3$

$$q_{c5} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c5} = 838101.667\ \text{Pa}$ $q_{c5} = 838.102 \cdot \text{kPa}$

Average value of N
to depth 2.0*B: B=4.00 m

$N_{ave} := \text{mean}(26, 38, 57, 53, 54, 63, 64, 63)$ $N_{ave} = 52.250$

$c' := 328\text{kPa}$ $N_c := 6.95$ $\gamma_{moist} := 10.070 \frac{\text{kN}}{\text{m}^3}$ $D := 1.50\text{m}$ $FS := 3$

$$q_{c6} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c6} = 764901.667\ \text{Pa}$ $q_{c6} = 764.902 \cdot \text{kPa}$

Allowable Soil Bearing Pressure, SBP:

$$q_{cA} := \begin{pmatrix} q_{c1} \\ q_{c2} \\ q_{c3} \\ q_{c4} \\ q_{c5} \\ q_{c6} \end{pmatrix} \qquad q_{cA} = \begin{pmatrix} 654.402 \\ 700.035 \\ 701.035 \\ 736.335 \\ 838.102 \\ 764.902 \end{pmatrix} \cdot \text{kPa}$$

FOR COMBINED FOOTING:

Average value of N
to depth 2.0*B: B=1.50 m

$N_{ave} := \text{mean}(26, 38, 57)$ $N_{ave} = 40.333$

$c' := 253\text{kPa}$ $N_c := 7.05$ $\gamma_{moist} := 10.070 \frac{\text{kN}}{\text{m}^3}$ $D := 1.50\text{m}$ $FS := 3$

$$q_{c7} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c7} = 599585.000\ \text{Pa}$ $q_{c7} = 599.585 \cdot \text{kPa}$

Average value of N
to depth 2.0*B: B=2.00 m

$N_{ave} := \text{mean}(26, 38, 57, 53)$ $N_{ave} = 43.500$

$c' := 278\,kPa$ $N_c := 6.80$ $\gamma_{moist} := 10.070\,\frac{kN}{m^3}$ $D := 1.50\,m$ $FS := 3$

$$q_{c8} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c8} = 635168.333\ Pa$ $q_{c8} = 635.168 \cdot kPa$

Average value of N
to depth 2.0*B: B=2.50 m

$N_{ave} := mean(26, 38, 57, 53, 54)$ $N_{ave} = 45.600$

$c' := 290\,kPa$ $N_c := 6.70$ $\gamma_{moist} := 10.070\,\frac{kN}{m^3}$ $D := 1.50\,m$ $FS := 3$

$$q_{c9} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c9} = 652701.667\ Pa$ $q_{c9} = 652.702 \cdot kPa$

Average value of N
to depth 2.0*B: B=3.00 m

$N_{ave} := mean(26, 38, 57, 53, 54, 63)$ $N_{ave} = 48.500$

$c' := 309\,kPa$ $N_c := 6.50$ $\gamma_{moist} := 10.070\,\frac{kN}{m^3}$ $D := 1.50\,m$ $FS := 3$

$$q_{c10} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c10} = 674535.000\ Pa$ $q_{c10} = 674.535 \cdot kPa$

Average value of N
to depth 2.0*B: B=3.50 m

$N_{ave} := mean(26, 38, 57, 53, 54, 63, 64)$ $N_{ave} = 50.714$

$c' := 352\,kPa$ $N_c := 6.40$ $\gamma_{moist} := 10.070\,\frac{kN}{m^3}$ $D := 1.50\,m$ $FS := 3$

$$q_{c11} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c11} = 755968.333\ Pa$ $q_{c11} = 755.968 \cdot kPa$

Average value of N
to depth 2.0*B: B=4.00 m

$N_{ave} := \text{mean}(26, 38, 57, 53, 54, 63, 64, 63)$ $N_{ave} = 52.250$

$c' := 328\text{kPa}$ $N_c := 6.35$ $\gamma_{moist} := 10.070\frac{\text{kN}}{\text{m}^3}$ $D := 1.50\text{m}$ $FS := 3$

$$q_{c12} := \frac{c' \cdot N_c + \gamma_{moist} \cdot D}{FS}$$

$q_{c12} = 699301.667\ \text{Pa}$ $q_{c12} = 699.302 \cdot \text{kPa}$

Allowable Soil Bearing Pressure, SBP:

$$q_{cB} := \begin{pmatrix} q_{c7} \\ q_{c8} \\ q_{c9} \\ q_{c10} \\ q_{c11} \\ q_{c12} \end{pmatrix} \qquad q_{cB} = \begin{pmatrix} 599.585 \\ 635.168 \\ 652.702 \\ 674.535 \\ 755.968 \\ 699.302 \end{pmatrix} \cdot \text{kPa}$$

determine the predicted **Allowable Soil Bearing Pressure** to depth influence of 2xB,

$q := \frac{2.84}{N} \cdot q_c \cdot \left(\frac{B}{B + 0.33}\right)^2$ for B > 1.25m. *Meyerhof (1965)*. All units of δ are in millimeter

$$B := \begin{pmatrix} 1.50 \\ 2.00 \\ 2.50 \\ 3.00 \\ 3.50 \\ 4.00 \end{pmatrix} \qquad N'_A := \begin{pmatrix} 40 \\ 44 \\ 46 \\ 49 \\ 51 \\ 52 \end{pmatrix}$$

compute the value of q_c to limit settlement of 25 mm: $q'_{cA} := \frac{q_c \cdot N'_A}{\left(\frac{B}{B + 0.33}\right)^2 \cdot 2.84}$

$$q'_{c1} := \frac{25\frac{mm}{mm}\cdot 40}{2.84\cdot\left(\frac{1.50m}{1.50m+0.33m}\right)^2}\cdot kPa \qquad q'_{c1} = 524.085\cdot kPa$$

$$q'_{c2} := \frac{25\frac{mm}{mm}\cdot 44}{2.84\cdot\left(\frac{2.00m}{2.00m+0.33m}\right)^2}\cdot kPa \qquad q'_{c2} = 525.686\cdot kPa$$

$$q'_{c3} := \frac{25\frac{mm}{mm}\cdot 46}{2.84\cdot\left(\frac{2.50m}{2.50m+0.33m}\right)^2}\cdot kPa \qquad q'_{c3} = 518.886\cdot kPa$$

$$q'_{c4} := \frac{25\frac{mm}{mm}\cdot 49}{2.84\cdot\left(\frac{3.00m}{3.00m+0.33m}\right)^2}\cdot kPa \qquad q'_{c4} = 531.452\cdot kPa$$

$$q'_{c5} := \frac{25\frac{mm}{mm}\cdot 51}{2.84\cdot\left(\frac{3.50m}{3.50m+0.33m}\right)^2}\cdot kPa \qquad q'_{c5} = 537.593\cdot kPa$$

$$q'_{c6} := \frac{25\frac{mm}{mm}\cdot 52}{2.84\cdot\left(\frac{4.00m}{4.00m+0.33m}\right)^2}\cdot kPa \qquad q'_{c6} = 536.390\cdot kPa$$

$$q'_{cA} := \begin{pmatrix} 524.085 \\ 525.686 \\ 518.886 \\ 531.452 \\ 537.593 \\ 536.390 \end{pmatrix} kPa$$

$$q'_{cA} := \begin{pmatrix} 524.085 \\ 525.686 \\ 518.886 \\ 531.452 \\ 537.593 \\ 536.390 \end{pmatrix} kPa \qquad q'_{cA} < (q_{cA}) \qquad q_{cA} = \begin{pmatrix} 654.402 \\ 700.035 \\ 701.035 \\ 736.335 \\ 838.102 \\ 764.902 \end{pmatrix}\cdot kPa \qquad q'_{cA} < (q_{cB}) \qquad q_{cB} = \begin{pmatrix} 599.585 \\ 635.168 \\ 652.702 \\ 674.535 \\ 755.968 \\ 699.302 \end{pmatrix}\cdot kPa$$

S U M M A R Y for B H No. 01

ALLOWABLE SOIL BEARING PRESSURE (ASBP) AT or NEAR BH 01				
At depth, D=1.50 meters				
Type of Footing	Breadth (B),m	Length (L),m	ASBP (kPa)	Settlement, mm
Square Ftg.	1.50	1.50	524.085	25.000
	2.00	2.00	525.686	25.000
	2.50	2.50	518.886	25.000
	3.00	3.00	531.452	25.000
	3.50	3.50	537.593	25.000
	4.00	4.00	536.390	25.000
Combined Ftg.	1.50	3.00	524.085	25.000
	2.00	4.00	525.686	25.000
	2.50	5.00	518.886	25.000
	3.00	6.00	531.452	25.000
	3.50	6.00	537.593	25.000
	4.00	6.00	536.390	25.000

CONCLUSION : Based from the above matrix, **ALL the computed ALLOWABLE SOIL BEARING PRESSURE (ASBP) EXCEEDED the 96 kPa (based from the DPWH & Dep-ED 3-to 4-sty school bldg. for shallow footing) for the EXISTING SSS NAGA BRANCH BUILDING**

RECOMMENDATION:
NO REMEDIAL MEASURE IS NECESSARY.

REFERENCES :

a : A Short Course in Foundation Engineering by N.E. Simons and B.K. Menzies, c. Butterworth & Co. Ltd., 1977

** : Principles of Geotechnical Engineering. 4th Ed. by Braja M. Das*

***: Foundation Design Principles and Practices, 2nd Ed. by Donald P. Coduto*

$2 \cdot 1.5 + 1.5 = 4.500$

NDB ENGINEERING CONSULTANCY

CIVIL - STRUCTURAL - GEOTECHNICAL - PLUMBING - SANITARY

242 Pahati Street,Balut, Tondo, Manila

DPWH/BRS Accredited

PROJECT: PROPOSED PVT-4 TOWER

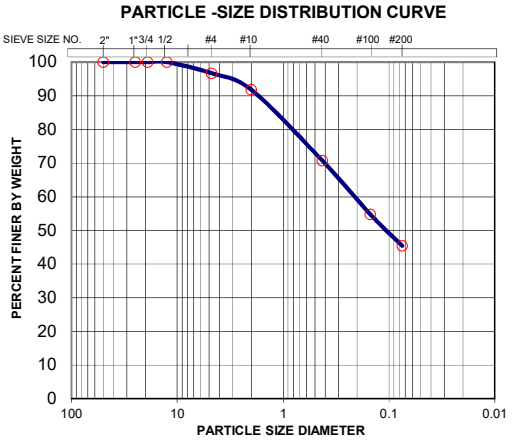
LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

SAMPLE NO.: BH-1 SS-1 **DEPTH:** 1.05 - 1.50 m **DATE:** March 01, 2022

SIEVE ANALYSIS (ASTM D 422)

Wet Soil + Wt. Of Tare	122.83	Original Wt		106.70
Dry Soil + Wt. Of Tare	101.27	Oven-Dry Wt.		85.14
Wt. Of Tare	16.13	Dry Washed Weight		46.46
		Moisture Content		25.32

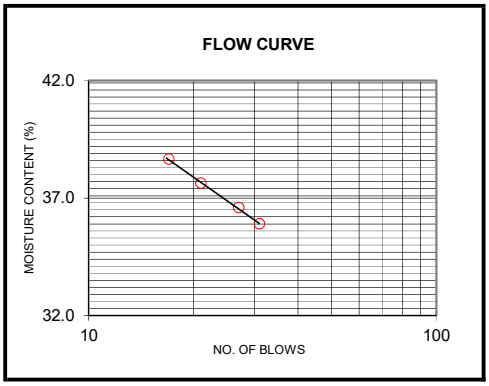
SIEVE SIZE		WT. RETAINED (gm)	PERCENT RETAINED	PERCENT PASSING 10TH	PERCENT PASSING (%)
INCH / NO.	DIAMETER (mm)				
2"	50.0	0.00	0.00	100.00	100
1"	25.0	0.00	0.00	100.00	100
3/4	19.0	0.00	0.00	100.00	100
1/2"	12.50	0.00	0.00	100.00	100
#4	4.75	2.80	3.29	96.71	97
#10	2.0	4.16	4.89	91.83	92
#40	0.425	17.99	21.13	70.70	71
#100	0.15	13.55	15.91	54.78	55
#200	0.075	7.96	9.35	45.43	45
PAN					
WASH LOSS		38.68	45.43		
TOTAL		85.14			



LIQUID LIMIT & PLASTIC LIMIT (ASTM D 4318-05)

	LIQUID LIMIT				PLASTIC LIMIT	
TRIAL NO.	1	2	3	4	1	2
WT. OF WET SOIL + TARE	20.13	21.01	20.72	23.20	18.20	18.42
WT. OF DRY SOIL + TARE	16.50	17.16	16.76	18.60	15.70	15.90
WATER CONTENT	3.63	3.85	3.96	4.60	2.50	2.52
TARE NO.	E8	S3	F10	M6	P8	M10
TARE WT.	6.39	6.64	6.24	6.70	6.45	6.72
WT. OF DRY SOIL	10.11	10.52	10.52	11.90	9.25	9.18
MOISTURE CONTENT, %	35.9	36.6	37.6	38.7	27.0	27.5
NO. OF BLOWS	31	27	21	17	AVERAGE	27.2
LIQUID LIMIT	36.9					

LIQUID LIMIT:	36.9
PLASTIC LIMIT:	27.2
PLASTICITY INDEX:	9.7
SOIL DESCRIPTION:	Sandy SILT
GROUP SYMBOL	ML
COLOR	light gray
TESTED BY:	A. Pradeep
CERTIFIED BY:	G. P. Banigo-os



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DPWH/BRS Accredited

PROJECT: PROPOSED PVT-4 TOWER

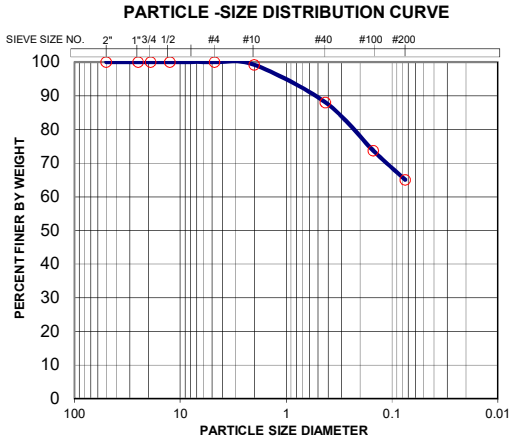
LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

SAMPLE NO.: BH-1 SS-2 **DEPTH:** 2.55 - 3.00 m **DATE:** March 01, 2022

SIEVE ANALYSIS (ASTM D 422)

Wet Soil + Wt. Of Tare	134.45	Original Wt		117.21
Dry Soil + Wt. Of Tare	107.72	Oven-Dry Wt.		90.48
Wt. Of Tare	17.24	Dry Washed Weight		31.62
		Moisture Content		29.54

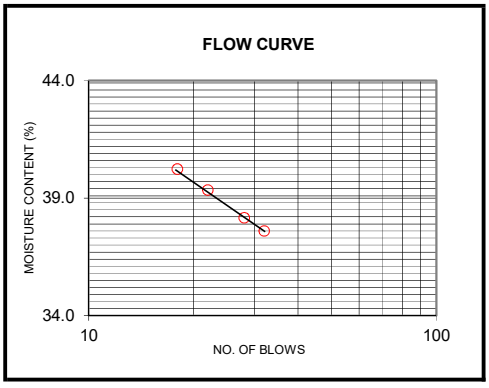
SIEVE SIZE		WT. RETAINED	PERCENT RETAINED	PERCENT PASSING 10TH	PERCENT PASSING
INCH / NO.	DIAMETER (mm)	(gm)			(%)
2"	50.0	0.00	0.00	100.00	100
1"	25.0	0.00	0.00	100.00	100
3/4	19.0	0.00	0.00	100.00	100
1/2"	12.50	0.00	0.00	100.00	100
#4	4.75	0.00	0.00	100.00	100
#10	2.0	0.73	0.81	99.19	99
#40	0.425	10.10	11.16	88.03	88
#100	0.15	12.97	14.33	73.70	74
#200	0.075	7.82	8.64	65.05	65
PAN					
WASH LOSS		58.86	65.05		
TOTAL		90.48			



LIQUID LIMIT & PLASTIC LIMIT (ASTM D 4318-05)

	LIQUID LIMIT				PLASTIC LIMIT	
TRIAL NO.	1	2	3	4	1	2
WT. OF WET SOIL + TARE	19.05	19.48	21.75	21.11	21.51	21.17
WT. OF DRY SOIL + TARE	15.58	15.92	17.43	16.91	18.95	18.68
WATER CONTENT	3.47	3.56	4.32	4.20	2.56	2.49
TARE NO.	J9	K3	D9	S5	W11	H10
TARE WT.	6.35	6.59	6.45	6.47	6.75	6.51
WT. OF DRY SOIL	9.23	9.33	10.98	10.44	12.20	12.17
MOISTURE CONTENT, %	37.6	38.2	39.3	40.2	21.0	20.5
NO. OF BLOWS	32	28	22	18	AVERAGE	20.7
LIQUID LIMIT	38.7					

LIQUID LIMIT:	38.7
PLASTIC LIMIT:	20.7
PLASTICITY INDEX:	18.0
SOIL DESCRIPTION:	Sandy CLAY
GROUP SYMBOL	CL
COLOR	brown
TESTED BY:	A. Pradeep
CERTIFIED BY:	G. P. Banigo-os



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PROJECT: PROPOSED PVT-4 TOWER

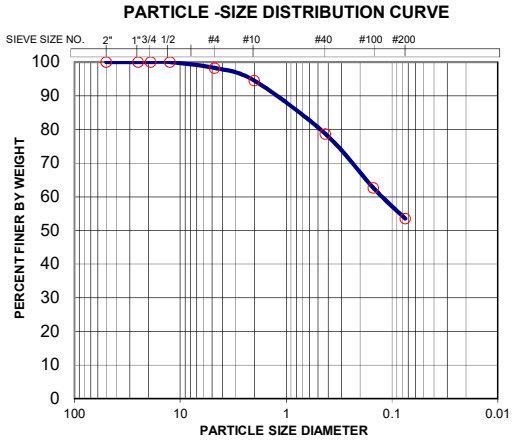
LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

SAMPLE NO.: BH-1 SS-3 **DEPTH:** 4.05 - 4.50 m **DATE:** March 01, 2022

SIEVE ANALYSIS (ASTM D 422)

Wet Soil + Wt. Of Tare	113.19	Original Wt		96.58
Dry Soil + Wt. Of Tare	92.84	Oven-Dry Wt.		76.23
Wt. Of Tare	16.61	Dry Washed Weight		35.43
		Moisture Content		26.70

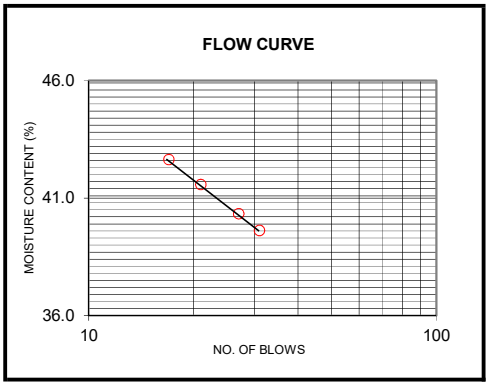
SIEVE SIZE		WT. RETAINED	PERCENT RETAINED	PERCENT PASSING	PERCENT PASSING
INCH / NO.	DIAMETER (mm)	(gm)		10TH	(%)
2"	50.0	0.00	0.00	100.00	100
1"	25.0	0.00	0.00	100.00	100
3/4	19.0	0.00	0.00	100.00	100
1/2"	12.50	0.00	0.00	100.00	100
#4	4.75	1.32	1.73	98.27	98
#10	2.0	2.87	3.76	94.50	95
#40	0.425	12.08	15.85	78.66	79
#100	0.15	12.20	16.00	62.65	63
#200	0.075	6.96	9.13	53.52	54
PAN					
WASH LOSS		40.80	53.52		
TOTAL		76.23			



LIQUID LIMIT & PLASTIC LIMIT (ASTM D 4318-05)

	LIQUID LIMIT				PLASTIC LIMIT	
TRIAL NO.	1	2	3	4	1	2
WT. OF WET SOIL + TARE	18.95	24.77	23.39	20.43	19.01	20.42
WT. OF DRY SOIL + TARE	15.57	19.70	18.43	16.29	16.86	18.08
WATER CONTENT	3.38	5.07	4.96	4.14	2.15	2.34
TARE NO.	F4	H12	Q3	A9	R3	V9
TARE WT.	7.04	7.13	6.50	6.58	6.70	6.81
WT. OF DRY SOIL	8.53	12.57	11.93	9.71	10.16	11.27
MOISTURE CONTENT, %	39.6	40.3	41.6	42.6	21.2	20.8
NO. OF BLOWS	31	27	21	17	AVERAGE	21.0
LIQUID LIMIT	40.7					

LIQUID LIMIT:	40.7
PLASTIC LIMIT:	21.0
PLASTICITY INDEX:	19.7
SOIL DESCRIPTION:	Sandy CLAY
GROUP SYMBOL	CL
COLOR	brown
TESTED BY:	A. Pradeep
CERTIFIED BY:	G. P. Banigo-os



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PROJECT: PROPOSED PVT-4 TOWER

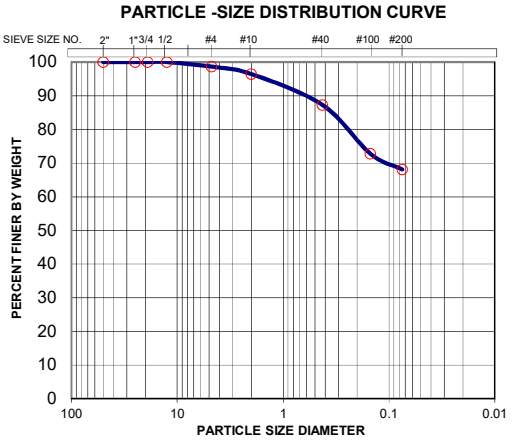
LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

SAMPLE NO.: BH-1 SS-5 **DEPTH:** 7.05 - 7.50 m **DATE:** March 01, 2022

SIEVE ANALYSIS (ASTM D 422)

Wet Soil + Wt. Of Tare	101.93	Original Wt		85.51
Dry Soil + Wt. Of Tare	76.65	Oven-Dry Wt.		60.23
Wt. Of Tare	16.42	Dry Washed Weight		19.20
		Moisture Content		41.97

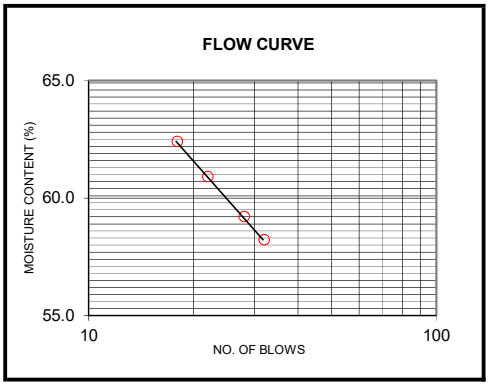
SIEVE SIZE		WT. RETAINED	PERCENT RETAINED	PERCENT PASSING 10TH	PERCENT PASSING
INCH / NO.	DIAMETER (mm)	(gm)			(%)
2"	50.0	0.00	0.00	100.00	100
1"	25.0	0.00	0.00	100.00	100
3/4	19.0	0.00	0.00	100.00	100
1/2"	12.50	0.00	0.00	100.00	100
#4	4.75	0.80	1.33	98.67	99
#10	2.0	1.33	2.21	96.46	96
#40	0.425	5.53	9.18	87.28	87
#100	0.15	8.72	14.48	72.80	73
#200	0.075	2.82	4.68	68.12	68
PAN					
WASH LOSS		41.03	68.12		
TOTAL		60.23			



LIQUID LIMIT & PLASTIC LIMIT (ASTM D 4318-05)

	LIQUID LIMIT				PLASTIC LIMIT	
TRIAL NO.	1	2	3	4	1	2
WT. OF WET SOIL + TARE	23.44	20.32	21.68	22.09	20.55	21.90
WT. OF DRY SOIL + TARE	17.21	15.34	15.96	16.23	17.40	18.55
WATER CONTENT	6.23	4.98	5.72	5.86	3.15	3.35
TARE NO.	M4	W3	B1	F11	N10	K2
TARE WT.	6.51	6.93	6.57	6.84	6.84	6.58
WT. OF DRY SOIL	10.70	8.41	9.39	9.39	10.56	11.97
MOISTURE CONTENT, %	58.2	59.2	60.9	62.4	29.8	28.0
NO. OF BLOWS	32	28	22	18	AVERAGE	28.9
LIQUID LIMIT	60.0					

LIQUID LIMIT:	60.0
PLASTIC LIMIT:	28.9
PLASTICITY INDEX:	31.1
SOIL DESCRIPTION:	CLAY
GROUP SYMBOL	CH
COLOR	brown
TESTED BY:	A. Pradeep
CERTIFIED BY:	G. P. Banigo-os



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242 Pahati Street,Balut, Tondo, Manila

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PROJECT: PROPOSED PVT-4 TOWER

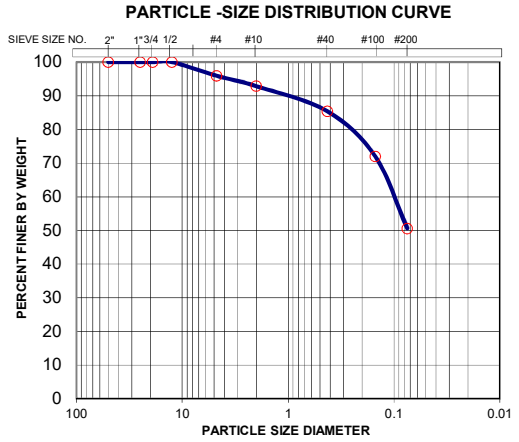
LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

SAMPLE NO.: BH-1 SS-7 **DEPTH:** 10.05 - 10.50 m **DATE:** March 01, 2022

SIEVE ANALYSIS (ASTM D 422)

Wet Soil + Wt. Of Tare	99.73	Original Wt		82.32
Dry Soil + Wt. Of Tare	76.08	Oven-Dry Wt.		58.67
Wt. Of Tare	17.41	Dry Washed Weight		28.99
		Moisture Content		40.31

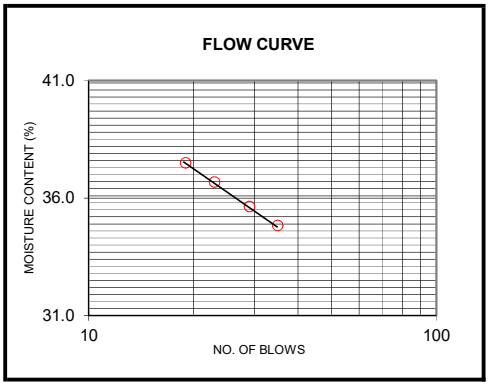
SIEVE SIZE		WT. RETAINED	PERCENT RETAINED	PERCENT PASSING 10TH	PERCENT PASSING
INCH / NO.	DIAMETER (mm)	(gm)			(%)
2"	50.0	0.00	0.00	100.00	100
1"	25.0	0.00	0.00	100.00	100
3/4	19.0	0.00	0.00	100.00	100
1/2"	12.50	0.00	0.00	100.00	100
#4	4.75	2.37	4.04	95.96	96
#10	2.0	1.82	3.10	92.86	93
#40	0.425	4.38	7.47	85.39	85
#100	0.15	7.88	13.43	71.96	72
#200	0.075	12.54	21.37	50.59	51
PAN					
WASH LOSS		29.68	50.59		
TOTAL		58.67			



LIQUID LIMIT & PLASTIC LIMIT (ASTM D 4318-05)

	LIQUID LIMIT				PLASTIC LIMIT	
TRIAL NO.	1	2	3	4	1	2
WT. OF WET SOIL + TARE	18.22	19.97	20.88	24.10	20.12	19.62
WT. OF DRY SOIL + TARE	15.18	16.52	17.04	19.42	17.00	16.68
WATER CONTENT	3.04	3.45	3.84	4.68	3.12	2.94
TARE NO.	R11	L10	F2	N1	R7	W6
TARE WT.	6.45	6.84	6.57	6.94	6.61	6.56
WT. OF DRY SOIL	8.73	9.68	10.47	12.48	10.39	10.12
MOISTURE CONTENT, %	34.8	35.6	36.7	37.5	30.0	29.1
NO. OF BLOWS	35	29	23	19	AVERAGE	29.5
LIQUID LIMIT	36.3					

LIQUID LIMIT:	36.3
PLASTIC LIMIT:	29.5
PLASTICITY INDEX:	6.8
SOIL DESCRIPTION:	Sandy SILT
GROUP SYMBOL	ML
COLOR	brown
TESTED BY:	A. Pradeep
CERTIFIED BY:	G. P. Banigo-os



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242 Pahati Street,Balut, Tondo, Manila

DPWH/BRS Accredited

PROJECT: PROPOSED PVT-4 TOWER

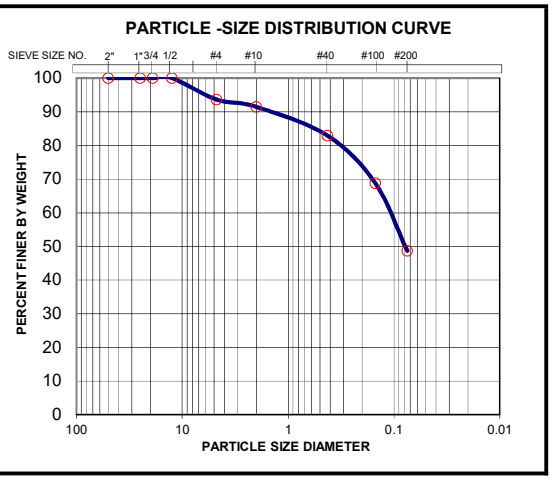
LOCATION: Highlands, Brgy. Estanza, Legaspi City, Albay

SAMPLE NO.: BH-1 SS-9 **DEPTH:** 13.05 - 13.50 m **DATE:** March 01, 2022

SIEVE ANALYSIS (ASTM D 422)

Wet Soil + Wt. Of Tare	112.43	Original Wt		95.50
Dry Soil + Wt. Of Tare	84.73	Oven-Dry Wt.		67.80
Wt. Of Tare	16.93	Dry Washed Weight		34.77
		Moisture Content		40.86

SIEVE SIZE		WT. RETAINED	PERCENT RETAINED	PERCENT PASSING 10TH	PERCENT PASSING
INCH / NO.	DIAMETER (mm)	(gm)			(%)
2"	50.0	0.00	0.00	100.00	100
1"	25.0	0.00	0.00	100.00	100
3/4	19.0	0.00	0.00	100.00	100
1/2"	12.50	0.00	0.00	100.00	100
#4	4.75	4.31	6.36	93.64	94
#10	2.0	1.47	2.17	91.47	91
#40	0.425	5.79	8.54	82.94	83
#100	0.15	9.59	14.14	68.79	69
#200	0.075	13.61	20.07	48.72	49
PAN					
WASH LOSS		33.03	48.72		
TOTAL		67.80			



LIQUID LIMIT & PLASTIC LIMIT (ASTM D 4318-05)

	LIQUID LIMIT				PLASTIC LIMIT	
TRIAL NO.	1	2	3	4	1	2
WT. OF WET SOIL + TARE	21.88	19.63	24.09	21.97	20.89	21.09
WT. OF DRY SOIL + TARE	17.79	15.94	19.18	17.48	17.69	17.73
WATER CONTENT	4.09	3.69	4.91	4.49	3.20	3.36
TARE NO.	R1	X12	H11	J6	C5	M3
TARE WT.	7.01	6.41	6.96	6.60	6.64	6.45
WT. OF DRY SOIL	10.78	9.53	12.22	10.88	11.05	11.28
MOISTURE CONTENT, %	37.9	38.7	40.2	41.3	29.0	29.8
NO. OF BLOWS	32	27	20	16	AVERAGE	29.4
LIQUID LIMIT	39.1					

LIQUID LIMIT:	39.1
PLASTIC LIMIT:	29.4
PLASTICITY INDEX:	9.7
SOIL DESCRIPTION:	Sandy SILT
GROUP SYMBOL	ML
COLOR	brown
TESTED BY:	A. Pradeep
CERTIFIED BY:	G. P. Banigo-os