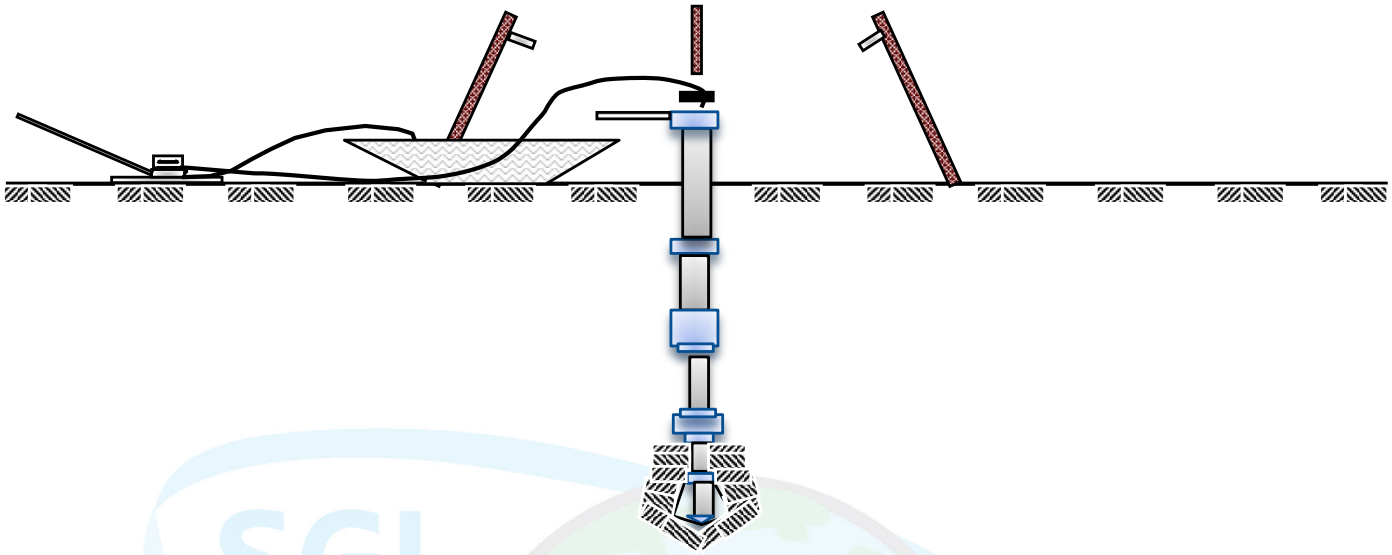
GEOTECHNICAL INVESTIGATION REPORT

(IS : 1892 - 2021)



CLIENT

Ramdoot Restores Foundation

Architech

Jiteshbhai

Location

Panchkhobla, Panchmahal

NAME OF WORK

Geotechnical Investigation for construction of Hunuman Temple at Panchkhobla, Panchmahal, 389370

SAI Geotechnical Lab

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BRIEF DETAIL OF PROJECT SITE

Client	: Ramdoot Restores Foundation		
Structural Consultant	: -		
Architech	: Jiteshbhai		
Name of Work	: Geotechnical Investigation for construction of Hunuman Temple at Panchkhobla, Panchmahal, 389370		
Project Report No.	: SGL/2024/GIR/1205-9915/17326	**Report Date**	: 11/10/2024
Job No.	: 1205-9915	**Sample No.**	: 17326
Ref. I.S Code	: IS : 2720, IS : 1892 - 2021	**Site Located**	: Vadodara Dist.
District	: Vadodara Dist.	**Depth of Borehole**	: 6.0 meter
Borehole ID	: BH-1	**Borehole In**	: Existing Ground
Diameter of Borehole	: 100 to 150mm	**Water Table**	: Not Encountered
Type of Boring	: Manual Auger Boring	**Bentonite**	: Not Applicable
Field Work Starting Date	: 27/09/2024	**Type of Casing**	: Not Applicable
Field Work Completed Date	: 27/09/2024	**Dia. of Casing**	: Not Applicable
No. of Borehole	: One	**Depth of Casing**	: Not Applicable

CONTENT

1.0 INTRODUCTION

Sub surface investigation and laboratory tests for Geotechnical Investigation for construction of Hunuman

Temple at Panchkhobla, Panchmahal, 389370 was reffered us by Ramdoot Restores Foundation

The objective of the exploration work was to determine the probable sub surface conditions such as stratification, denseness or hardness of the strata, position of ground water table etc. and to evaluate probable range of safe bearing capacity and Safe bearing pressure

- One borehole up to the depth of 6.0 meter below Existing Ground in order to know the sub surface stratification, conducting necessary field tests and to collect disturb and undisturbed soil samples for laboratory testing.
- Testing soil / rock samples in the laboratory to determine its physical and engineering properties of the soil / rock samples, and
- Analyzing all field and laboratory data to evaluate safe bearing capacity and safe bearing pressure of the soil for given foundation sizes and necessary recommendations for foundation design and construction.

2.0 SUMMARY OF BOREHOLE :

Field Work of executed boreholes is summarised as follows.

Sr. No.	Location	Borehole ID	Field Work Started on	Field Work Completed on	Water Table (below EGL)	Depth of Investigation
1	Panchkhobla, Panchmahal	BH-1	27/09/2024	27/09/2024	Not Encountered	6.0 meter

Note: Depth of borehole and no. of borehole is as directed by Client.

3.0 SUB SURFACE EXPLORATION

3.1 DRILLING:

One boreholes of 100 to 150mm diameter are drill up to the depth of 6.0 meter Where caving of the borehole occurred, casing was used to keep the borehole stable. The work was in general accordance with IS: 1892 – 2021.

3.1.1 DISTURBED SAMPLES:

Disturbed representative samples were collected, logged, labelled and placed in polythene bags.

3.1.2 UNDISTURBED SAMPLES:

Undisturbed soil samples are collected in 75 to 100 mm diameter thin walled sampler (Shelby tube) from the borehole. The sampler used for the sampling had smooth surface and appropriate area ratio and cutting edge angle thereby minimizing disturbance of soil during sampling. Samples are logged and labelled properly and transfer to the laboratory for further testing.

3.1.3 WATER TABLE:

Water table was encountered during the sub soil exploration work carried out in the month of September 2024.

Water level fluctuations due to seasonal variations, amount of rainfall, runoff and other factors were not evident at the time of filed work. Trapped of "Perched" water cold occur within low permeable strata.

3.1.4 METHOD OF SAMPLING:

Sampler is coupled together with a sampler head to form a sampling assembly. The sampler head provide a non-flexible connection between the sampling tube and the drill rods. Vent holes are provided in the sampler head to allow escape of water from the top of sampler tube during penetration. The sampling tubes are made free from dust and rust. Coating of oil is applied on both sides to obtain the undisturbed samples in best possible manner.

The sampler is then lowered inside the bore hole on a string of rods and driven to a pre-determined level. On completion of driving the sampler is first rotated within the borehole to shear the soil sample at bottom and then pulled out. Upon removal of the sampling tubes, the length of sample in the tube is recorded. The disturbed material in the upper end of the tube, if any, is completely removed before sealing.

The soil at the lower end of the tube is trimmed to a distance of about 10 to 20 mm. After cleaning and inserting an impervious disc at each end, both ends are sealed. The empty space in the sampler, if any, is filled with the moist soil, and the ends covered with tight wrapper. The identification mark is then made on each sample.

3.2 STANDARD PENETRATION TEST:

The standard penetration tests are conducted in each bore as per IS: 2131: 1981 (Reaffirmed 2002). The split spoon sampler resting on the bottom of bore hole is allowed to sink under its own weight, then the split spoon sampler is seated 15 cm with the blows of hammer falling through 750mm. The driving assembly consists of a driving head and a 63.5 kg weight.

It is ensured that the energy of the falling weight is not reduced by friction between the drive weight and the guides or between ropes. The rods to which the sampler is attached for driving are straight, tightly coupled and straight in alignment. Thereafter the split spoon sampler is further driven by 30cm. The number of blows required to drive each 15cm penetration is recorded. The first 15cm of drive considered as seating drive. The total blows required for the second and third 15cm penetration is termed as a penetration resistance - N value. The N- values for each bore hole are given in borelogs

4.0 LABORATORY TEST

A. Laboratory Test for Soil

1. Natural Moisture Content Test (IS: 2720, 1992 Part 2)
2. Grain Size Analysis (IS: 2720, 1992 Part 4)
3. Atterberg's Limits Test (IS: 2720, Part 5 1992)
4. Specific Gravity Test (IS: 2720, Part 3 1992)
5. Free Swell Value Test (IS: 2720, Part 40 1977)
6. Swell Pressure Test (IS: 2720, Part 41, 1977)
7. Triaxial Shear Test (UU) (IS: 2720 Part 11, 1992)
8. Direct Shear Test (IS: 2720, Part 13, 1992)
9. One Dimensional Consolidation Test (IS: 2720 Part 15, 1992)

4.A.1 NATURAL MOISTURE CONTENT TEST (IS: 2720, 1992 Part 2)

Test procedure conforms to IS: 2720 - Part - 2. A moisture cup is loosely filled with soil sample and weighed with lid. It is then kept in oven with lid removed and maintained at temperature of oven at 110oC for 24 hours. The lid of the container is then replaced and the dry weight found out. The percentage of water content is calculated using the formula.

$W = ((W2 – W3) / (W3 – W1)) \times 100$

Where,

W1 = weight of container with lid, in g.

W2 = weight of container with wet soil, in g.

W3 = weight of container with dry soil, in g.

W = moisture content (%)

4.A.2 GRAIN SIZE ANALYSIS (IS: 2720, 1992 Part 4)

Testing procedure generally conforms to IS: 2720 Part 4. Both sieve and hydrometer analysis has been carried out.

Sieve Analysis: Sieve analysis is done by wet sieving method. Oven dried soil is washed through 75m IS sieve. Fraction retained was oven dried and particle size analysis carried out using sieve shaker by passing through the Required IS sieve.

Hydrometer Analysis : 50 g of soil 75m passing IS sieve was mixed with 3.3 g passing sodium hexa-meta-phosphate and 0.7g sodium carbonate and soil suspension prepared. Suspension was made up to 1000 ml distilled water and then shaken thoroughly. Hydrometer is immersed to a depth slightly below its floating position and then allowed to float freely. Hydrometer readings are taken at 10, 20, 30 and 45 sec, subsequently at 1, 2, 4, 8,15 and 30 minutes and finally at 1, 2, 4, 8 and 24 hour interval. Diameter of the particle in suspension at any sampling time‘t’ is calculated using “Stokes” formula and the percentage finer was calculated. In the semi log graph, silt and clay fractions are indicated along with coarser fractions.

4.A.3 ATTERBERG'S LIMITS TEST (IS: 2720, Part 5 1992)

Liquid limit and Plastic limit test on cohesive and semi cohesive samples has been done as per procedure in IS 2720 (Part 5).

Liquid Limit : Liquid limit and plastic limit test on cohesive has been done as per procedure in IS 2720 (Part 5) using the more "reliable cone penetrometer", method where errors of grove cutting involved in Casagrande's device are minimized. In cone penetrometer test about 200 g of passing 425m sieve is taken mixed with requisite water, placed in cup and compacted lightly in 3 layers. The tip of penetrometer is adjusted such that it just touches soil surface. The needle is allowed to plunge slowly under its own weight for 5 seconds and penetration in mm is recorded. The water content is adjusted such that penetration is between 20-30mm. The following relationship is used to evaluate liquid limit.

Plastic Limit: About 15g of oven dried soil passing through 425m sieve is mixed with sufficient quantity of water to become plastic enough to be easily shaped into a ball. A portion of this ball is rolled on a glass plate with the palm into a thread of uniform diameter of 3mm. The corresponding water content represents the plastic limit of the soil.

Plastic Index: PI = Liquid limit – Plastic limit.

Shrinkage Limit (IS : 2720, Part 6, 1992): It is the maximum water content expressed as percentage of oven-dry weight at which any further reduction in water content will not cause a decrease in volume of the soil mass is calculated as follows:

$SL = W - ((V - V_0) / W_0) \times 100$

Where,

SL = Shrinkage limit in %.

W = Moisture content of wet soil pat in %.

V = Volume of wet soil pat in ml.

V_0 = Volume of dry soil pat in ml.

W_0 = Weight of oven-dried soil pat in gm.

4.A.4 SPECIFIC GRAVITY TEST (IS: 2720, Part 3 1992)

The specific gravity of soil solids is determined by a 50 ml density bottle. The weight (W1) of the empty dry bottle is taken first. A sample of oven-dried soil about 10-20 g cooled in a desiccators, is put in the bottle, and weight (W2) of the bottle and the soil taken. The bottle is then filled with distilled water gradually removing the entrapped air either by applying (W3) of the bottle, soil and water (full up to the top) is then taken. Finally the bottle is emptied completely and thoroughly washed and clean water is filled to the top and the weight (W4) is taken.

$G = (W2 – W1) / [(W4 – W1) – (W3 – W2)]$

4.A.5 FREE SWELL INDEX (IS: 2720, Part 40 1977)

Free Swell Index Test was conformed as per IS: 2720 – Part – 40 - 1977. In this test 10 gm of soil passing IS sieve 425 m is taken. Two graduated cylinders of 25 ml capacity are taken. One cylinder is filled with Kerosene oil and the other

with distilled water and soil. Remove entrapped air by shaking well and stirring using a glass rod. Allow the soil in both the jars to settle for a sufficient time (not less than 24 hours) for the soil sample to attain equilibrium state of volume without any further changes. Free swell index is calculated as follows:

$F.S.I (\%) = [(Vd – Vk) / Vk] \times 100$

Where,

Vd = The volume of soil sample read from the graduated cylinder containing distilled water.

Vk = The volume of soil sample read from the graduated cylinder containing Kerosene.

4.A.6 SWELL PRESSURE TEST (IS: 2720, Part 41, 1977)

The swell pressure tests are carried out at field dry density with zero percent moisture content and by constant and volume method. An oven dry soil specimen is compacted into the specimen ring with the specimen kept in between two porous stone saturated in boiling water providing a filter paper between the soil specimen and the porous stones. The loading block is then positioned centrally on the top of the porous stone. The assembly is then placed on the platen of loading unit. The load measuring proving ring is attached to the load frame and placed in contact with the consolidation cell without any eccentricity. A direct strain measuring dial gauge is fitted to the cell. The specimen is then inundated with distilled water and allowed to swell. The initial reading of the proving ring s noted. The swelling of the specimen with increasing volume is obtained in the strain measuring load gauge. The specimen is kept at constant volume by adjusting the strain dial gauge always at original reading. This adjustment is done at every 0.1mm of swell or earlier. The swell pressure is then calculated frm the difference between the final and initial dial readings of the proving ring. Swell pressure (Kg/cm^2) is calculated as follows: SP = ((Final Dial Gauge reading - Initial Dial Gauge reading) / Area of specimen) x Calibration factor of the proving ring.

4.A.7 TRIAXIAL SHEAR TEST (UU) (IS: 2720 Part 11, 1992)

The extracted specimen is then placed in triaxial cell pedestal. The cell is assembled and placed on loading machine. A cell pressure through an operating fluid (oil) was applied. The plunger was made to have proper contact with specimen. A compressive force at a constant strain rate of 1.25 mm/min is applied, till the failure occurred within a period of 5-15 minutes or rill the failure of 20% strain was removed, cell chamber cleaned and test continued on a new specimen.

The test was repeated on three different specimens at three different cell pressures as per standard practice. Mohr-Coulomb envelopes were drawn for three stress values recorded and total stress parameters interpreted from the Mohr-Coulomb graph.

4.A.6 DIRECT SHEAR TEST (IS: 2720, Part 13, 1992)

Direct shear test is carried out using shear box with the specimens (60mm x 60mm). Specimen with plain grid plate at the bottom of the specimen and plain grid plate at the top of the specimen is fitted into position in the shear box housing and assembly placed on the load frame. The serrations of the grid plates are kept at right angle to the direction of shear. The loading pad is kept on the top grid plate. The required normal stress is applied and the rate of longitudinal displacement shear stress application so adjusted that no drainage can occur in the sample during the test (1.25mm/min.). The upper part of the shear box is raised such that a gap of about 1mm is left between the two parts of the box. The test is conducted by applying horizontal shear load to failure or to 20 percent longitudinal displacement whichever occurs first. The test is repeated on identical specimens.

4.A.9 ONE DIMENSIONAL CONSOLIDATION TEST (IS: 2720 Part 15, 1992)

Consolidation test was done to evaluate compressibility behavior of stiff / hard clayey silt.Procedure is described below. The empty consolidation ring W1 is weighed. Representative sample for testing is extruded and cut off, care being taken to ensure that the two plane faces of the resulting soil disc are parallel to each other. The soil sample thus obtained is trimmed flush with the top and bottom edges of the ring. A sample of soil similar to that in the ring taken from the trimmings is used for determining moisture content. The thickness of the specimen (Ho) is measured and it is weighed immediately (W2). The bottom porous stone is centered on the base of the consolidation cell. The ring and specimen is placed centrally on the bottom porous stone and then the loading cap is placed on top. The consolidometer is placed in position in the loading device and suitably adjusted. The dial gauge is then clamped into position for recording the relative movement between the base of the consolidation cell and the loading cap. A seating pressure of 0.05 kg/cm2 is applied to the specimen. The consolidation cell is filled with distilled water. The specimen is then allowed to reach equilibrium for 24 hrs. The test is continued using a loading sequence, which would successively apply stress of 0.25, 0.5, 1.0, 2.0 , 4.0, 8.0 kg/cm2 etc. on the soil specimen For each loading increment, after application of load, readings of the dial gauge are taken using a time sequence such as 0, 0.25, 4, 6.25, 9, 12.25, 16, 20.25, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225 min etc. up to 24 hr or 1. 1/4, 1/2, 1, 2, 4, 8, 15, 30, 60min, 2, 4, 8 and 24hr. These time sequences facilitate plotting of thickness or change of thickness of specimen against square root of time or against log time. The loading increment is left until readings become more or less constant. On completion of the final loading stage the specimen is unloaded by suitable pressure decrements. Dial gauge readings are taken as necessary during each stage of unloading. On completion of the decrement, the water is siphoned out of the cell and the consolidometer is rapidly dismantled after release of the final load. The specimen, preferably within the ring, is wiped free of water, weighed (W3) and thereafter placed in the oven for drying. Following drying, the specimen plus ring is reweighed (W4). E-log P curve is drawn and consolidation parameters deduced.

5. 0 SAFE BEARING CAPACITY

Looking to the proposed type of project, site conditions and sub soil stratification, RCC Open Foundation is recommended along with safe bearing capacity and safe bearing pressure at different depths. Intensity of bearable load determined as soil bearing capacity (SBC) and soil bearing pressure (SBP) on soil.

SBC BASED ON SHEAR :- The ultimate net bearing capacity is evaluated after taking into consideration of shape factor and depth factor of the foundation in accordance with I.S. 6403-1981. The net bearing capacity worked out using the following equation.

$$Q = C\,N_c\,S_c\,d_c + q\,(N_q - 1)\,S_q\,d_q + 0.5\,B\,g\,N_g\,S_g\,d_g$$

Where,

c	=	**Cohesion**
q	=	**Overburden Pressure**
g	=	**Density**
B	=	**Width of the Footing**
N_c, N_q, N_g	=	**Bearing capacity Factor**
S_c, S_q, S_g	=	**Shape Factor**
d_c, d_q, d_g	=	**Depth Factor**

Following parameters are adopted for the evaluation of bearing capacity for shallow foundation.

Properties	
Cohesion (kg/cm^2)	0.10
Angle of Internal Friction (Degree)	20
Dry Density (in gm/cc)	1.558
Specific Gravity	2.566
Coefficient of Volume Change, mV	0.015
Factor of Safety	2.5
Void ratio, e (Computed)	0.6470
Type of Shear Failure Considered	Intermediate Shear Failure

Thus,Intermediate Shear Failure was considered for safe bearing capacity computation. The net safe bearing capacity for various sizes of individual footings having vertical static load intensity is evaluated as in TABLE-1 , SAFE BEARING CAPACITY AND SAFE BEARING PRESSURE .

TABLE- 1 , SAFE BEARING CAPACITY AND SAFE BEARING PRESSURE

Foundation Details			Safe Bearing Capacity **(SBC)** in t/m^2	Safe Bearing Pressure for 50 mm Settlement **(SBP)** in t/m^2	Recommended Safe Bearing Capacity in t/m^2
Type	Depth	Size in (Mtr.)			
RCC Open Foundation	2.00	1.5 x1.5	16.49	+17.0	**16.0**
		2.0 x 2.0	16.17		
	2.50	1.5 x1.5	19.23	+20.0	**18.0**
		2.0 x 2.0	18.62		

Note :

1) Minimum value of SBC & SBP shall be considered in design of foundation.

2) Dewatering Techniques is required if water table is encounted during the time of excavation.

6. CONCLUSION & RECOMMENDATION

1. The present report covers the Geotechnical investigation carried out of One borehole Location at Panchkobla, Panchmahal.

2. Based on the proposed type of project, bore log data, Laboratory test results RCC Open Isolated Foundation is suggested along with their Safe Bearing Capacities considering factor of safety of 2.5 as shown in Table - I.

3. Suitability of Soil for back filling: The top layer of soil is of Low Swelling characteristic, which is suitable for structural back filling and the same shall be compacted at 95% of MDD.

4 Water table was not considered in the analysis of SBC as it was not encountered.

5. Settlement computed from Coefficient of volume change 'mv' for consolidated soil as per I.S.8009, Part I for50mm permissible settlement

6. Foundation Should not be Laid over Expansive, Black or Filled up Soil.

7. The above report is based on the soil strata encountered at site upto depth of Investigation i.e. Up to 6.0 meter.

8. At founding level, care to be taken that "Gentle Slope" should be maintained for the deposition of excavated material and necessary shoring arrangement may be done if required.

9. Scope of work does not cover detailed design of foundation or visits by soil testing agency before or after execution of work. If the same is required, it shall be arranged seperately.

10. Adjoing super structure or sub structure if any,shall be adequately protected against structural failure during excavation work specially for foundation trenches.

11. Details regarding location of borehole ,depth of Investigation & number of borehole is given by client / site incharge.

12. The above recommendations are based on the collected field data, laboratory tests results conducted on soil samples recovered from the test locations. However if the actual subsoil condition during execution vary from what has been represented in this report, the client/agency may be referred to us for suggestions.

For **SAI Geotechnical Lab, Vadodara**

Authorized Signatory

BORE LOG

(As per IS : 1892-1979, 4453-1980 & 4464-1967)

Job No	1205-9915
Date	11/10/2024

Project	:	Geotechnical Investigation for construction of Hunuman Temple at Panchkhobla, Panchmahal, 389370			
Client	:	Ramdoot Restores Foundation	Borehole	:	BH-1
Location	:	Panchkhobla, Panchmahal	Depth of Borehole	:	6.0 meter
Dia of Borehole	:	100 to 150mm	Date of Starting	:	27/09/2024
Depth of GWT	:	Not Encountered	Date of Completion	:	27/09/2024

Scale (m)	Depth (m)	Log	Description	Sample No.	Type	Depth (m) From	Depth (m)	SPT 'N' Value 15	15	15	N' Value	SPT V/s Depth Graph	Remarks / Other tests
1	1.5		Filled Up	17326/1	DS	0.0	0.5						
				17326/2	DS/UDS	1.00	1.45						
2	6.0		Brownish to Yellowish Clayey Sand of Low Plasticity with Little Gravels	17326/3	SPT	1.50	1.95	8	9	12	21	21	
3				17326/4	DS/UDS	2.50	3.00						
4				17326/5	SPT	3.00	3.45	9	11	12	23	23	
				17326/6	DS/UDS	4.00	4.45						
5				17326/7	SPT	4.50	4.95	10	12	14	26	26	
6				17326/8	DS/UDS	5.50	6.00						
7				17326/9	SPT	6.00	6.45	13	15	17	32	32	
				17326/10	DS/UDS	5.50	6.00						
8													
9													
10													
11													
12													
13													
14													
15													

UDS : Undisturb Sample
DS : Disturbed sample
N : Penetration Resistance Value
N' :Corrected Penetration Resistance Value

CR : Core Recovery
RQD : Rock Quality Designation
PR : Rate of Penetration in Rock

GWT : Ground Wate Table
SPT : Standard Penetration Test
WS :Wash Sample

Prepared By	Checked / Approved By	M/s Sai Geotechnical Lab
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GENERAL SUMMARY OF GEO-TECHNICAL INVESTIGATION FOR Panchkhobla, Panchmahal SITE

BH-1

Sr. No.	Sample No.	I.S Classification of Soil	Type	Depth in mt	Atterberg's Limit			Grain Size Analysis			Shear Parameter		Settlement Parameter	Swelling Parameter		Sp. Gravity	F.D.D.	F.M.C.
					L.L.	P.L.	P.I.	G	S	M & C	C	ϕ	mv	F.S.	S.P.			
					%	%	%	%	%	%	Kg/cm^2	Degree	cm^2/kg	%	Kg/cm^2		gm/cc	%
1	Filled Up																	
2	17326/4	SC	DS/ UDS	2.5	29.6	22.0	7.6	4	42	54	0.10	20	-	22	0.035	2.566	1.558	10.1
3	17326/6	SC	DS/ UDS	4.0	29.5	20.7	8.8	6	38	56	-	-	0.015			2.569	1.561	9.8
4	17326/8	SC	DS/ UDS	5.5	30.2	21.5	8.7	7	38	55	-	-	-	-	-	2.572	1.569	11.2
5	17326/10	SC	DS/ UDS	7.0	31.1	23.6	7.5	5	38	57	-	-	-	-	-	2.577	1.572	10.7

Abbrivation :

LL	Liquid Limit (%)	C	Cohession (Kg/Sq.cm)	Cc	Compression Index	F.S.	Free Swell Index (%)
PL	Plastic Limit (%)	ϕ	Angle of Internal Friction (Degree)	Pc	Preconsolidation Pressure (Kg/Sq.cm)	S.P.	Swelling Pressure (Kg/Sq.cm.)
PI	Plasticity Index (%)	F.D.D	Field Dry Density (gm/cc)	F.M.C	Field Moisutre Content (%)	G	Gravel
						S	Sand
NP	Non Plastic			UCS	Unconfined Compressive Strength (Kg/Sq.cm)	M	Silt
						C	Clay

Tested By :- VP

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Calculation of SBC of soil as per IS: 6403(Part I) - 1981

SAFE BEARING CAPACITY

Shape of footing	=		
Depth of footing	D =	2.00	m
Width of footing	B =	2.00	m
Length of footing	L =	2.00	m
Cohesion	C =	0.10	kg/cm^2
Angle of Int.Friction	Φ =	20	degrees
Specific Gravity	G =	2.566	
Inclination Angle	a =	**0**	degrees
Correction Factor for Water Table	=	**1.0**	
Dry Density	Yd =	1.558	gm/cc
Factor of Safety	=	2.5	

Plate - 3

Sample calculation

d, s, i	depth factor	shape factor	inclination factor
dc, sc, ic	1.286	1.300	1.000
dq, sq, iq	1.143	1.200	1.000
dg,sg,ig	1.143	0.800	1.000

Void Ratio eo = $\frac{G \times Yw}{Yd} - 1$

= 0.6470 **it is > 0.55 & < 0.75**

hence it is an intermediate shear failure

F' = **Tan^{-1}(0.67 tan F)**

= 13.70

	N'	N''	N
c =	0.00	12.633	0.00
q =	0.00	5.022	0.00
Y =	0.00	3.882	0.00

q_{un} = cNcScdcic + q(Nq-1) Sqdqiq + 0.5 BYNYsYdYiY W'

for general shear failure

= **0.00** q_{ns} = **0.00 t/m^2**

q_{un} = 0.67cN'cScdcic + q(N'q-1) Sqdqiq + 0.5 BYN'YsYdYiY W'

for local shear failure

= **0.00** q_{ns} = **0.00 t/m^2**

q_{un} = cN''cScdcic + q(N''q-1) Sqdqiq + 0.5 BYN''YsYdYiY W'

for intermediate shear failure

= **40.42 t/m^2** q_{ns} = **16.17 t/m^2**

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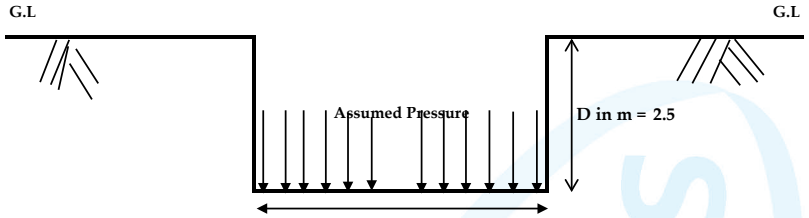
(NABL ACCREDIATED TESTING LAB)
ISO : 17025

Safe Bearing pressure calculated for 50mm permissible as per I.S.8009 Part I for consolidated soil as shown in Plate - 4

Plate - 4



Location:- Panchkhobla, Panchmahal

Allowable Settlement = 50mm

B =	2.0	mtr	Width of Foundation
H =	4.0	mtr	Total Thickness of compressible strata
L=	2.0	mtr	Length of foundation
L/B =	1.0		
$D / \sqrt{LB}$ =	1.250		
$\sqrt{LB} / D$ =	0.800		

Assume pressure p = 32.13 t/m^2

3.21 kg/cm^2

Immediate Settlement = $S_i = [(pxB(1-\mu^2)x (Iw)/(E_s)]$

where,

p = Intensity of pressure	=	3.213	in kg/cm^2
B = Least lateral dimension	=	200	in cm
μ = Poisson' ratio	=	0.200	
E_s = Modulus of elasticity of soil	=	250	in kg/cm^2
I_w =Influence factor	=	1.120	
Si = Immediate Settlement	=	27.641	in mm

Zi in m	B/2 Zi	L/2 Zi	I_B	Total I_B	D **P** Kg/cm^2	H cm	mv cm^2/kg	Settlement, mv x **Dp x H mm**	Pore Pressure Correction factor	consolidation settlement, Sc in mm	Rigidity factor	Depth factor
2.0	0.5	0.5	0.085	0.34	1.09	400	0.015	65.55	0.7	45.89	1	0.68

Total Settlement = 50.00 mm

Hence the asssumed foundation pressure of 32t/sq.mt is safe for the allowable settlement of 50mm