

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED BUILDING “INSTITUTE OF HOTEL MANAGEMENT”
FINAL PLOT NO.743, VEER SAWARKAR MARG,
DADAR W, MUMBAI 400028
FOR SHRI NISHEETH SHRIVASTAVA

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GEOTECHNICAL INVESTIGATION REPORT
PROPOSED BUILDING “INSTITUTE OF HOTEL MANAGEMENT”
FINAL PLOT NO.743, VEER SAWARKAR MARG,
DADAR W, MUMBAI 400028
FOR SHRI NISHEETH SHRIVASTAVA

1.0 INTRODUCTION

Shri Nisheeth Shrivastava plans construction of an institutional building at Dadar W, Mumbai. The proposed building will consist of single basement + G + 20 upper floors. The work of geotechnical investigation was awarded to Stone Tech. The field work and laboratory tests for the geotechnical investigation were completed by Stone Tech in February 2024. This report prepared by Geocon International Pvt Ltd presents results of the geotechnical investigation along with foundation recommendations for the proposed building.

2.0 EXPLORATION PROGRAM

2.1 Exploration Scope

Four boreholes (BH-1 to BH-4) were completed at the site as illustrated on the Borehole Location Plan in the Annexure.

2.2 Subsurface Conditions

Subsurface profile at this site generally consists of fill overlying marine sand and then by marine clay underlain by completely weathered rock and then by hard breccia bedrock. Encountered soil/rock layers are described below;

LAYER I: FILL

Fill was encountered at ground surface in the boreholes. The lower boundary of this layer was encountered at a depth of 1.5m below ground surface.

LAYER II: MARINE SAND

Brownish marine sand were encountered below fill layer in the boreholes. Based on Standard Penetration Tests (SPT) conducted within this layer, relative density of cohesion less soils (sand) was loose. The lower boundary of this layer was encountered at a depth of 6.0m below ground.

LAYER II: MARINE CLAY

Brownish marine clay was encountered at a depth of 6.0m below ground in the boreholes. Based on Standard Penetration Tests (SPT) conducted within this layer, consistency of cohesive soils (clay) was stiff to hard. The lower boundary of this layer was encountered at depths of 9.0m to 11.3m below ground.

LAYER III: COMPLETELY WEATHERED ROCK

Completely weathered rock was encountered at depths of 9.5m to 11.3m below ground surface in few boreholes. This layer is formed by the complete in-place disintegration of parent bedrock material, but still partially retains the original rock mass structure. SPT tests conducted in this layer encountered refusals. Core recoveries were less than 35%. The lower boundary of this layer was encountered at depths of 10.5m to 15.0m below ground surface.

LAYER IV: HARD BRECCIA BEDROCK

Brownish grey hard Breccia bedrock was encountered at depths of 9.0m to 15.0m below ground surface in the borehole. The bedrock was moderately to slightly weathered, generally improving with depth. Core Recoveries varied from 36% to 83.33%, while Rock Quality Designation (RQD) varied from nil to 40%. Compressive strength of rock samples ranged from 22.85 kg/cm² to 410.99 kg/cm². The borehole was terminated in this bedrock layer at a depth of 18.0m below ground surface.

3.2 Ground Water Levels

Groundwater accumulation in boreholes was monitored during and after completion of drilling activities. Groundwater was observed in boreholes at a depth of 3.0m below ground level. Seasonal and annual fluctuations in ground water levels can be expected.

3.0 FOUNDATION RECOMMENDATIONS

Proposed building with single basement should be supported on bored piles socketed in completely weathered rock encountered at depths of 9.0m to 11.3m below ground surface. Piles should be completed with temporary liners up to weathered rock. Depths to CWR and hard rock are given in Table A below.

**TABLE A
DEPTHS TO CWR AND HARD ROCK**

Borehole Numbers	Depths to CWR	Depths to Hard Rock
BH-01	9.0m	9.0m
BH-02	9.5m	10.5m
BH-03	10.5m	15.0m
BH-04	11.3m	15.0m

**TABLE B
SAFE VERTICAL DOWNWARD & LATERAL CAPACITY OF PILES**

Pile Diameter (mm)	Pile Rock Socketing In Weathered Rock	Safe Vertical Downward Capacity (tons)	Safe Lateral Capacity (tons)	Safe Uplift Capacity (tons)
600	8D	175	8	60
700		240	9	80
800		310	10.5	105
1000		485	13.5	165

Maximum total settlement of piles installed as described above will be less than 12mm.

Depth of fixity for lateral loads will be 8.4D below pile cap.

3.1 Basement Consideration

Due to presence of marine sand and shallow ground water level, excavation side shoring with bored piles should be provided on entire perimeter of basement.

Basement floors and walls should be adequately water-proofed. Adequate uplift resistance in the form of dead weight should be provided. Maximum groundwater table for uplift design should be taken at ground surface.

3.2 Lateral Earth Pressures

Basement walls and pile shoring walls, if any, will be subjected to lateral earth pressures. Lateral earth pressure parameters for design of pile shoring walls and basement walls are given in Table B below. Hydrostatic pressures and surcharge pressures, if any, should also be considered.

**TABLE B
LATERAL EARTH PRESSURE PARAMETERS
FOR DESIGN OF PILE SHORING WALLS**

Depth	Soil Type	Unit weight	Active earth pressure coefficient	Passive earth pressure coefficient	Cohesion
0.0m- 1.5m	Fill	1.8 t/m ³	0.33	3.0	0 t/m ²
1.5m – 6.0m	Marine sand	1.8 t/m ³	0.33	3.0	0 t/m ²
6.0m – 8.5m	Marine clay	1.8 t/m ³	0.5	2.0	0 t/m ²
8.5m – 15.0m	CWR	2.1 t/m ³	0.22	4.6	0 t/m ²
Below 15.0m	Hard breccia Bedrock	2.3 t/m ³	0.17	5.8	0 t/m ²

3.1 Foundation Protection

Results of chemical analysis on groundwater samples enclosed in the Annexure, indicate that the site falls under Class 1 for sulphate concentrations and chloride concentrations (As per IS456 and as per CIRIA Sp. Publication No. 31). A 'severe' Exposure Condition was assigned to this site. Therefore, following precautions are recommended to protect subsurface concrete and reinforcement.

Type of Cement:	OPC or PPC
Minimum Grade of Reinforced Concrete:	M30
Minimum Cement Content for Piles:	400 kg/m ³
Maximum Water Cement Ratio:	0.50
Minimum Cover to Reinforcement:	50mm

4.0 FIELD EXPLORATION PROCEDURES

The sub-surface investigation was completed generally as per IS: 1892-1979. The field investigation was carried out using a rotary machine. Casing was used to support sides of borehole until sufficiently stiff strata was encountered. Standard Penetration Tests (i.e. SPT) were carried out in soil in accordance with IS 2131-1981. Using this procedure, a 2” outside diameter split-barrel sampler is driven into the soil by 63.5 kg. weight falling through 75 cm height. After an initial set of 15cm, the number of blows required to drive the sampler an additional 30 cm, is known as the “penetration resistance” or “N value”.

When SPT refusal was obtained in hard strata, rock coring was done using diamond bit and double tube core barrel to obtain rock samples. Percent Rock Core Recovery and Rock Quality Designation (%RQD) were determined. $\% RQD = 100 \times \text{Sum of length of rock pieces in cms, each having lengths greater than 10cms} / \text{Total length of core run.}$

Sincerely,

GEOCON INTERNATIONAL PVT. LTD.

Jaydeep Wagh
B.E., M.S., P.E. (Geotechnical)

REFERENCES

- 1) Foundation Analysis and Design, J.E. Bowles, McGraw Hill Publication, 5th Edition, 1996.
- 2) Canadian Foundation Engineering Manual.
- 3) Geotechnical Engineering and Evaluation, R. F. Hunt.
- 4) Foundation Design Manual, N. V. Nayak, 5th Edition, 1996.
- 5) IS:12070-1987, Code of Practice for Design and Construction of Shallow Foundations on Rock.
- 6) Bored Piling in Mumbai Region, K. R. Datye, IGC 1990.
- 7) IS14593: Code of Practice for Design of Piles Founded on Rock.

SAMPLE CALCULATION OF ALLOWABLE VERTICAL CAPACITY OF 600mm DIA. PILES SOCKETED 8D IN WEATHERED BEDROCK

	GL +0.0m
Layer I, Fill	
	-1.5m
Layer II, marine deposits	
	-9.0m to -11.3m
Layer III, Completely Weathered Rock	
	-9.0m to 15.0m
Layer IV, Hard breccia Bedrock	

A) SKIN FRICTION CAPACITY IN 8D ROCK SOCKET:

As per Cole and Stroud Method (Reference No. 3) for soft rock, the zero strength bedrock is assumed to be a hard cohesive soil.

Using a minimum SPT N value of 50 in the bedrock.

Allowable Skin Friction Capacity = $q_{all} = aC / F.S.$ (Reference No. 6)

Where,

$c = \text{cohesion} = N/1.5 = 50/1.5 = 33.33 \text{ t/m}^2$

$a = \text{adhesion factor}$

$F.S. = \text{Factor of Safety}$

$(a/FS) = 0.3$

Therefore, Allowable Skin Friction Capacity = $0.3 \times 33.33 = 10 \text{ t/m}^2$

Allowable Skin Friction Capacity of 600mm dia piles = $\pi DL (10) = 3.142 \times 0.6 \times 4.8\text{m} \times 10 \text{ t/m}^2 = 90 \text{ tons}$

B) END BEARING CAPACITY IN LOW STRENGTH COMPLETELY WEATHERED BEDROCK:

Using a minimum SPT N value of 150 at pile tip in the bedrock.

As per Cole and Stroud Method (Reference No. 3).

Allowable End Bearing Capacity = $q_{all} = cNc / F.S.$ (Reference No. 6)

Where,

$c = \text{cohesion} = N/1.5 = 150/1.5 = 100 \text{ t/m}^2$

$Nc = \text{Bearing Capacity Factor} = 9 \text{ for deep foundations}$

$F.S. = \text{Factor of Safety} = 3$

Therefore, Allowable End Bearing capacity = $100 \times 9 / 3 = 300 \text{ t/m}^2$

Allowable End Bearing Capacity of 600mm dia piles = $(300\pi D^2/4) = 85 \text{ tons}$

THEREFORE, TOTAL PILE CAPACITY = 90 + 85 TONS = 175 tons

CALCULATION OF LATERAL CAPACITY OF PILE

Reference: Appendix-B (Revised) of IS 2911 (Part 1/Sec. 2) - 2010.

Strata near top of pile consists mostly of clay with minimum $N = 9$
Corresponding average $C_u = N/15 = 9/15 = 0.6 \text{ kg/cm}^2$.

Unconfined compressive strength, $q_u = 2 C_u = 1.2 \text{ kg/cm}^2$

As per Table 2 of Reference mentioned above,
Corresponding Constant $k_1 = 21.6 \times 10^3 \text{ KN/m}^3 = 21.6 \text{ MN/m}^3$

Now,

$$K = \frac{k_1}{1.5} \times \frac{0.3}{D} = \frac{21.6}{1.5} \times \frac{0.3}{0.6} = 7.2 \text{ MN/m}^3$$

(Value of K in kg/cm^3 for calculation of R : $1 \text{ MN/m}^3 = 0.1 \text{ kg/cm}^3$)

For long and flexible pile, depth of fixity,

$$R = \sqrt[4]{\frac{EI}{K \times D}}$$

Where,

E = Modulus of Elasticity of pile material = $2.7 \times 10^5 \text{ kg/cm}^2$ for concrete

I = Moment of Inertia = $\pi D^4/64 \text{ cm}^2$ (D is pile diameter in cm)

Therefore,

$$R = \sqrt[4]{\frac{2.70 \times 10^5 \times \pi D^4}{64 \times 0.72 \times 60}}$$

$$R = 4.2D \quad (\text{D is pile diameter in cm})$$

Unsupported length of pile, $L_1 = 0.0 \text{ cm}$

Therefore, $L_1/R = 0.0$

FOR FIXED HEAD PILES

As per Figure 3 of Reference mentioned above,

For $L_1/R = 0.0$, $L_f/R = 2.0$

Therefore, length of fixity,

$L_f = 2.0 \times R = 8.4D$ (where D is pile diameter in cm)

For a lateral deflection of 0.5 cm at the top of the pile,

For fixed head pile, allowable lateral load, Q_a corresponding to a deflection $Y = 0.5 \text{ cm}$,

$$Q_a = \frac{12EIY}{(L_1 + L_2)^3} = \frac{12 \times 2.7 \times 10^5 \times \pi \times D^4 \times 0.5}{64 \times (0 + 8.4D)^3}$$

$Q_a = 134 \times D \text{ kg} = 0.134D \text{ tons}$ (where D is pile diameter in cm)

CLIENT <u>SHRI NISHEETH SHRIVASTAVA</u>	PROJECT NAME <u>PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"</u>	
PROJECT NUMBER <u>23105</u>	PROJECT LOCATION <u>FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028</u>	
DATE STARTED <u>1/24/24</u>	COMPLETED <u>1/28/24</u>	GROUND ELEVATION <u>0 m</u>
DRILLING CONTRACTOR <u>Stone Tech Infra</u>	DRILLING METHOD <u>Rotary Drilling</u>	HOLE SIZE <u>100MM</u>
LOGGED BY <u>Palash Patil</u>	▽ G.W.T. <u>3 m.</u>	
CHECKED BY <u>Aniket Dudhane</u>	NOTES _____	

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲
0.0							20 40 60 80
0.5		Back Filling SOIL BOULDERS and SAND					
1.0							
1.5							
2.0		SAND	SPT 1			3-3-4-3 (7)	7
2.5							
3.0							
3.5			SPT 2			3-3-3-3 (6)	6
4.0							
4.5							
5.0			SPT 3			4-3-5-9 (8)	8
5.5							
6.0							
6.5		Brownish Stiff CLAY	SPT 4			5-7-11-74 (18)	18
7.0							
7.5							
8.0			SPT 5			8-12-19-29 (31)	31
8.5							
9.0							
9.5		Brownish Highly BRECCIA		37	24		
10.0							

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CLIENT SHRI NISHEETH SHRIVASTAVA **PROJECT NAME** PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG,
DADAR W, MUMBAI 400028

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲			
							20	40	60	80
10.0										
10.5	△ △ △	Brownish Highly BRECCIA								
11.0	△ △ △	Brownish Grayish BRECCIA with White Line- In		66	60					
11.5	△ △ △									
12.0	△ △ △									
12.5	△ △ △			69	55					
13.0	△ △ △									
13.5	△ △ △									
14.0	△ △ △	Brownish Grayish BRECCIA with White Line- In		74	71					
14.5	△ △ △									
15.0	△ △ △									
15.5	△ △ △			78	78					
16.0	△ △ △									
16.5	△ △ △									
17.0	△ △ △			83	80					
17.5	△ △ △									
18.0	△ △ △									
		Borehole terminated at a depth of 18.0 m below G.L.								

CLIENT SHRI NISHEETH SHRIVASTAVA **PROJECT NAME** PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028

DATE STARTED 1/24/24 **COMPLETED** 1/29/24 **GROUND ELEVATION** 0 m **HOLE SIZE** 100MM

DRILLING CONTRACTOR Stone Tech Infra **DRILLING METHOD** Rotary Drilling

LOGGED BY Palash Patil **G.W.T.** 3 m.

CHECKED BY Aniket Dudhane **NOTES** _____

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲
0.0							20 40 60 80
0.5		Back Filling SOIL BOULDERS and SAND					
1.0							
1.5		SAND	SPT 1			3-2-3-3 (5)	▲ 5
2.0							
2.5							
3.0			SPT 2			3-4-3-4 (7)	▲ 7
3.5							
4.0							
4.5			SPT 3			4-5-5-7 (10)	▲ 10
5.0							
5.5							
6.0			SPT 4			5-7-11-14 (18)	▲ 18
6.5							
7.0							
7.5		Brownish Stiff Residual CLAY	SPT 5			6-9-15-14 (24)	▲ 24
8.0							
8.5							
9.0		Brownish Completely Weathered Rock	SPT 6			13-41-53 (94)	▲ 94
9.5				10	0		
10.0							

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PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲			
							20	40	60	80
10.0										
10.5		Brownish Grayish BRECCIA with White Line-In	□	37	7					
11.0										
11.5										
12.0										
12.5										
13.0										
13.5		Brownish Grayish Fractured BRECCIA with White Line-In	□	41	15					
14.0										
14.5										
15.0										
15.5										
16.0										
16.5		Brownish Grayish Fractured BRECCIA with White Line-In	□	52	19					
17.0										
17.5										
18.0										
18.0										
		Borehole terminated at a depth of 18.0 m below G.L.								

CLIENT SHRI NISHEETH SHRIVASTAVA **PROJECT NAME** PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028

DATE STARTED 1/30/24 **COMPLETED** 2/1/24 **GROUND ELEVATION** 0 m **HOLE SIZE** 100MM

DRILLING CONTRACTOR Stone Tech Infra **DRILLING METHOD** Rotary Drilling

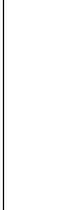
LOGGED BY Palash Patil **G.W.T.** 3 m.

CHECKED BY Aniket Dudhane **NOTES** _____

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲
0.0							20 40 60 80
0.5		Back Filling Concrete SOIL MURRUM BOULDERS and SAND					
1.0							
1.5		SAND	SPT 1			3-4-4-3 (8)	▲ 8
2.0							
2.5							
3.0			SPT 2			4-3-3-3 (6)	▲ 6
3.5							
4.0							
4.5			SPT 3			3-3-4-4 (7)	▲ 7
5.0							
5.5							
6.0		Brownish CLAY	SPT 4			4-4-5-8 (9)	▲ 9
6.5							
7.0							
7.5							
8.0		Brownish Stiff CLAY	SPT 5			6-8-11-14 (19)	▲ 19
8.5							
9.0			SPT 6			8-11-15-19 (26)	▲ 26
9.5							
10.0							

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CLIENT SHRI NISHEETH SHRIVASTAVA **PROJECT NAME** PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲				
							20	40	60	80	
10.0											
10.5		Brownish Stiff CLAY									
11.0		Brownish Completely Weathered Rock		7	0						
11.5											
12.0											
12.5		Brownish Completely Weathered Rock		20	0						
13.0											
13.5											
14.0					23	0					
14.5											
15.0											
15.5		Brownish Highly Weathered Fractured BRECCIA		40	0						
16.0											
16.5											
17.0											
17.5		Brownish Fractured BRECCIA with White Line-In		52	25						
18.0											
		Borehole terminated at a depth of 18.0 m below G.L.									

CLIENT SHRI NISHEETH SHRIVASTAVA **PROJECT NAME** PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028

DATE STARTED 3/2/24 **COMPLETED** 6/2/24 **GROUND ELEVATION** 0 m **HOLE SIZE** 100MM
DRILLING CONTRACTOR Stone Tech Infra **DRILLING METHOD** Rotary Drilling
LOGGED BY Palash Patil **W.G.T.** 3 m.
CHECKED BY Aniket Dudhane **NOTES** _____

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲	
0.0							20 40 60 80	
0.5		Back Filling SOIL MURRUM and SAND						
1.0								
1.5		SAND	SPT 1			3-3-3-3 (6)	▲ 6	
2.0								
2.5								
3.0				SPT 2			3-4-3-3 (7)	▲ 7
3.5								
4.0								
4.5			SPT 3			4-3-4-5 (7)	▲ 7	
5.0								
5.5								
6.0		Brownish Stiff CLAY	SPT 4			6-7-9-10 (16)	▲ 16	
6.5								
7.0								
7.5				SPT 5			8-11-15-17 (26)	▲ 26
8.0								
8.5								
9.0			SPT 6			9-10-15-20 (25)	▲ 25	
9.5								
10.0								

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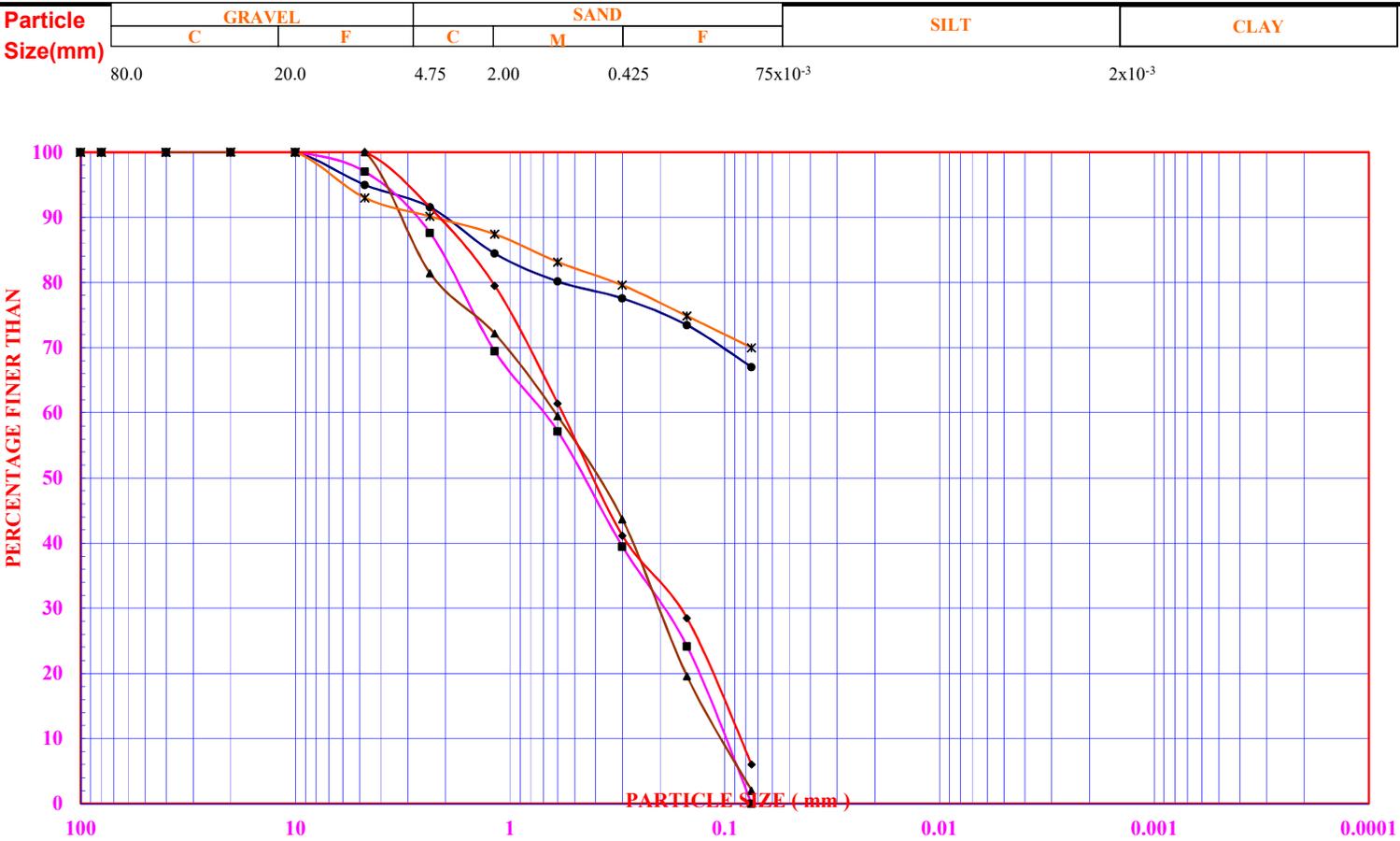
CLIENT SHRI NISHEETH SHRIVASTAVA **PROJECT NAME** PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
PROJECT NUMBER 23105 **PROJECT LOCATION** FINAL PLOT NO.743, VEER SAWARKAR MARG, DADAR W, MUMBAI 400028

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	CORE RECOVERY %	RECOVERY % (ROD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲	
							20	40 60 80
10.0								
10.5		Brownish Residual Stiff CLAY	SPT 7			16-28-39-50 (67)		67
11.0								
11.5		Brownish Highly Weathered Rock		11	0			
12.0								
12.5		Brownish Highly Weathered BRECCIA		26	7			
13.0								
13.5								
14.0				30	0			
14.5								
15.0								
15.5				38	0			
16.0								
16.5								
17.0		Brownish Grayish BRECCIA with White Line-In		50	40			
17.5								
18.0								
		Borehole terminated at a depth of 18.0 m below G.L.						

GRAIN SIZE DISTRIBUTION ANALYSIS

PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
 FINAL PLOT NO.743, VEER SAWARKAR MARG,

CLIENT: M/S. SHRI NISHEETH SHRIVASTAVA



SOIL TEST DATA SHEET As per IS 2720 Part 3, 4, 5, 40



PROJECT:

GEOTECHNICAL INVESTIGATION FOR PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
FINAL PLOT NO.743, VEER SAWARKAR MARG,
DADAR W, MUMBAI 400028

CLIENT:

M/S. SHRI NISHEETH SHRIVASTAVA

DATE: 13.02.2024

Bore Hole No.	Depth in m.	Sample Type UD / D	Density gm/ cm ³		Natural Moisture Content, w %	Soil Classification (I.S)	Mechanical Analysis				Consistency Limits				Shear Strength Test			Unconfined Compression Test Kg/cm ²	free swell index	Verical Consolidation		Specific Gravity	Remarks
			Wet Density	Dry Density			Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index, I _p %	Shrinkage Limit %	Shrinkage Ratio	Cohesion C _u kg/cm ²	Degree ϕ			Comp. Index C _{cv} (Lab)	Initial Void Ratio		
BH-01	3.00-3.60	SPT-2	-	-	-	CI	5	28	67	36	15	21	-	-	-	-	-	-	-	-	-	-	
BH-01	7.50-8.10	SPT-5	-	-	-	SM	3	97	0	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH-02	1.50-2.10	SPT-1	-	-	-	SM	0	98	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH-02	7.50-8.10	SPT-5	-	-	-	CI	7	23	70	41	15	26	-	-	-	-	-	-	-	-	-	-	
BH-03	3.00-3.60	SPT-2	-	-	-	SM	0	94	6	-	-	-	-	-	-	-	-	-	-	-	-	-	

CHEM : Chemical Analysis COMP : Compaction Test DS : Direct Shear K : Permeability Test FSI : Free Swell Test	Tuu : Triaxial Test (Unconsolidated Undrained) Tcu : Triaxial Test (Consolidated Undrained) Tcd : Triaxial Test (Consolidated Drained) NP : Non Plastic SL : Shrikage Limit Test	SP : Swelling Pressure or Swelling Potential Test SPT : Standard Penetration Test Sample UDS : Undisturbed Soil Sample VL : Laboratory Vane Shear Test UC : Unconfined Compression Test	ϕ : Angle of Internal Friction Cc : Undrained Cohesion ϕ' : Effective Angle of Internal Friction Cc' : Effective Cohesion -----> : Combined Silt + Clay
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Job. No. : **L-24/1327**

SOIL TEST DATA SHEET As per IS 2720 Part 3, 4, 5, 40



PROJECT:

GEOTECHNICAL INVESTIGATION FOR PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
FINAL PLOT NO.743, VEER SAWARKAR MARG,
DADAR W, MUMBAI 400028

CLIENT:

M/S. SHRI NISHEETH SHRIVASTAVA

DATE: 13.02.2024

Bore Hole No.	Depth in m.	Sample Type UD / D	Density gm/ cm ³		Natural Moisture Content, w %	Soil Classification (I.S)	Mechanical Analysis				Consistency Limits				Shear Strength Test			Unconfined Compression Test Kg/cm ²	free swell index	Verical Consolidation		Specific Gravity	Remarks	
			Wet Density	Dry Density			Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index, I _p %	Shrinkage Limit %	Shrinkage Ratio	Cohesion C _u kg/cm ²	Degree ϕ			Comp. Index C _{cv} (Lab)	Initial Void Ratio			
BH-03	7.50-8.10	SPT-5	-	-	-	CL	0	25	75	34	16	18	-	-	-	-	-	-	-	-	-	-	-	
BH-04	4.50-5.10	SPT-3	-	-	-	SM	0	96	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH-04	9.00-9.60	SPT-6	-	-	-	CI	0	21	79	49	26	23	-	-	-	-	-	-	-	-	-	-	-	

CHEM : Chemical Analysis COMP : Compaction Test DS : Direct Shear K : Permeability Test FSI : Free Swell Test	T _{uu} : Triaxial Test (Unconsolidated Undrained) T _{cu} : Triaxial Test (Consolidated Undrained) T _{cd} : Triaxial Test (Consolidated Drained) NP : Non Plastic SL : Shrikage Limit Test	SP : Swelling Pressure or Swelling Potential Test SPT : Standard Penetration Test Sample UDS : Undisturbed Soil Sample VL : Laboratory Vane Shear Test UC : Unconfined Compression Test	ϕ : Angle of Internal Friction C _c : Undrained Cohesion ϕ' : Effective Angle of Internal Friction C _{c'} : Effective Cohesion -----> : Combined Silt + Clay
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TEST RESULTS OF ROCK CORES As per IS 9143, 8764, 13030



CLIENT: M/S. SHRI NISHEETH SHRIVASTAVA

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED BUILDING "INSTITUTE OF HOTEL MANAGEMENT"
FINAL PLOT NO.743, VEER SAWARKAR MARG,
DADAR W, MUMBAI 400028**

Date : 13.02.2024

Sr. No.	Bore Hole No.	Core No.	Depth, m	Diameter, cm	Height, cm	H : D (1:H/D)	Correction Factor	Condition of Test	Failure Load	Uniaxial Compressive Strength	Modulus of Elasticity	Point Load Index	Brazilian Test	Porosity	Water Absorption	Dry Density	Specific Gravity	Remark
				cm	cm				kN	kg/cm ²	kg/cm ²	kg/cm ²	kg/cm ²	%	%	gm/cm ³		
1	BH-01	7	10.50-12.00	5.51	11.06	2.01	1.00	Soaked	96.1	410.99	-	-	-	4.88	1.91	2.55		Veins
2	BH-02	18	12.00-13.50	5.59	8.75	1.57	1.00	Soaked	3.0	-	-	9.8	-	7.67	3.71	2.07		
3	BH-02	27	15.00-16.50	5.00	10.74	2.15	1.00	Soaked	4.4	22.85	-	-	-	5.31	2.44	2.17		Veins
4	BH-03	8	13.50-15.00	5.39	8.86	1.64	1.00	Soaked	1.3	-	-	4.6	-	1.55	0.69	2.25		
5	BH-03	25	16.50-18.00	5.39	11.21	2.08	1.00	Soaked	30.4	135.86	-	-	-	1.38	0.58	2.39		
6	BH-04	4	12.00-13.50	5.40	6.76	1.25	1.00	Soaked	0.3	-	-	1.0	-	1.47	0.66	2.22		Veins
7	BH-04	26	16.50-18.00	5.43	10.82	1.99	1.00	Soaked	27.8	122.42	-	-	-	1.70	0.71	2.40		

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Job. No. : L-24/1327

Checked by: ANIKET

CHEMICAL TEST RESULT OF GROUND WATER SAMPLES.



As per IS 3025 Part 11, 24, 32

Date: 13.02.2024

CLIENT: M/S. SHRI NISHEETH SHRIVASTAVA
 GEOTECHNICAL INVESTIGATION FOR PROPOSED BUILDING “INSTITUTE OF HOTEL MANAGEMENT”
 PROJECT: FINAL PLOT NO.743, VEER SAWARKAR MARG,
 DADAR W, MUMBAI 400028

SR NO.	BH NO.	Depth	TYPE OF SAMPLE	pH ELECTROMETRICALLY	SULPHATE AS SO ₃ ppm	CHLORIDE AS Cl ppm	REMARKS
				* Limit between 6.3 to 8.5	* Limit <400ppm Maximum	* Limit <2000ppm Maximum	
1	BH-04	3.00	Water	7.66	176.26	855.23	

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Checked By	Aniket