

**REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED
CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI
REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**



**CLIENT:
M/s. MODI REALTY POCHARAM LLP,
Hyderabad**

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1. INTRODUCTION

M/s. Modi Realty Pocharam LLP, Hyderabad has entrusted the work of carrying out Geotechnical Investigation for “**Proposed Construction of Residential Apartments for M/s. Modi Realty Pocharam LLP at Pocharam, Hyderabad**” to M/s. Avani Engineering Consultancy Pvt. Ltd., Hyderabad.

2. SCOPE OF WORK

The Scope of work includes the following

- Drilling of 3 No. boreholes at the proposed borehole locations as per the direction of the client.
- Excavation of 8 No. Trial Pits at the proposed locations as per the direction of the client.
- Collection of soil samples and carrying out the relevant laboratory tests on soil samples.
- Conducting Standard Penetration test (SPT) within the borehole at every 1.5m depth interval or as required.
- Preparation of Geotechnical investigation Report.

3. FIELD INVESTIGATIONS

3.1 Boreholes and Trial Pits

The fieldwork includes boring / drilling of 3 No of boreholes in soil and excavation of 8 No. Trial Pits. The details of 3 No. boreholes and 8 No. Trial Pits with respective depth of investigation are given in the table below.

List of Boreholes and Trial Pits with Depth of investigation

Sl. No.	Borehole No. / Trial Pit No.	Depth of Investigation (m)
1	BH-1	15.0
2	BH-2	15.0
3	BH-3	15.0
4	TP-1	9.0
5	TP-2	9.0
6	TP-3	9.0

7	TP-4	9.0
8	TP-5	9.0
9	TP-6	9.0
10	TP-7	9.0
11	TP-8	9.0

The location of boreholes is indicated in the layout plan and the same is given in Appendix-I.

3.2 Rotary drilling

Rotary drilling technique was adopted for advancing and cleaning out borehole in overburden soil between sample intervals. Standard penetration test (SPT) is conducted at every 1.5m interval or at change of strata.

3.3 Drilling equipment

Mechanical rigs of rotary drilling machine was used for the purpose. The rigs are well suited for the required work. The rigs are new and well-maintained.

Soil Boring: The boring was advanced by rotating drill string connected by series of drill rods. The boring diameter of 150mm was formed using a drag bit (Soil Cutter) in soil. The drag bit cuts the subsoil at the bottom of the borehole and the soil fragments were removed by drilling mud (bentonite) which is under circulation.

Bentonite slurry is used for stabilizing the borehole. Bentonite slurry deposits as a thin film on the wall of the borehole during circulation and stability of borehole is derived from its thixotropic property and the hydrostatic head of the suspension. Bentonite having liquid limit greater than 400% is used for preparing bentonite slurry.

Rock Drilling: The rock drilling was advanced by rotating drill string connected by series of drill rods. The formed diameter is of NX size using diamond bits connected through the double tube core barrel. The drill bit cuts the weathered / hard rock and the fragments of the cut materials were removed by circulating fresh water. Guide casing of size "NX" was used up to the weathered rock layer

3.4 Observation during drilling

Sampling

The samples collected from the SPT sampler are treated as disturbed samples. Immediately after collection of sample from the sampler, the sample was transferred to a double walled polythene bag. A sample label is attached and the bag is tied tightly with thread to avoid any loss of moisture.

Undisturbed Sample

Undisturbed Samples are collected in Clayey Stratum where ever possible.

Standard Penetration Test:

This test was performed as per IS 2131-1981. The split spoon sampler was lowered and driven under impact of a 63.5 kg load with a free fall of 75 cm for 45 cm penetration at the bottom of the hole. Initial 15 cm penetration is considered as seating drive and number of blows required to penetrate the sampler for remaining 30 cm (out of 45 cm mark usually driven in soil) is recorded as 'N' value at that depth.

If the sampler does not fully penetrate into soil, then the test is terminated after 50 blows and corresponding penetration is noted down.

Ground Water Table:

Observations were made for ground water in borehole during and after boring. Observed Ground water table is recorded on the borelog.

Preparation of Bore Logs:

On completion of each borehole, the soil samples were examined and logged. The final log is prepared on the basis of visual examination of soil samples and laboratory testing data. The following are observed and recorded in the borelog:

The commencement and completion date, location of borehole, elevation of top and bottom of boring, ground water table, boundaries of each soil layer that encountered, classification and description of the soil, blow count values obtained from SPT tests, collection of soil samples etc. Field borelogs are provided in Appendix-II.

4. LABORATORY TESTINGS

SOIL

Natural Moisture content

Natural moisture content of the soil samples is determined as per IS 2720 (Part 21) from the collected soil samples using oven-drying method.

Grain Size Distribution

Grain size distribution analysis was carried out by sieving method as per IS 2720 (Part 4) to determine the grain size distribution.

Atterberg's Limits

Atterberg's limits test was conducted as per IS: 2720 (Part 5) on the soil samples collected to determine the liquid limit and plastic limit.

Shear Test

Shear Test is conducted as per IS: 2720 (Part 11 / 13).

Free Swell Index

Free Swell index of soil is determined as per IS: 2720 (Part 40).

Laboratory results of soil are provided in Appendix - III.

5. SUB SURFACE PROFILE

Based on the field and laboratory test results, the general subsurface profiles encountered in the boreholes are has given below.

Borehole No. / Trial Pit No.	Depth (m)		Thickness of Layer (m)	Description of the Soil	IS Classification
	From	To			
BH-1	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	SC
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	SM / SP
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
	9.0	15.0	6.0	Weathered Rock to Hard Rock (Granite)	-

BH-2	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	SC
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	SM / SP
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
	9.0	15.0	6.0	Weathered Rock to Hard Rock (Granite)	-
BH-3	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	SC
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	SM / SP
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
	9.0	15.0	6.0	Weathered Rock to Hard Rock (Granite)	-
TP-1	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-2	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-3	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-4	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-5	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-

	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-6	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-7	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-
TP-8	0.0	3.0	3.0	Reddish Brown Clayey Sand (Murrum)	-
	3.0	6.0	3.0	Brownish Grade VI Residual Soil	-
	6.0	9.0	3.0	Completely Weathered Rock to Weathered Rock	-

The sub-surface profile is shown in Appendix-IV.

6. TYPE OF FOUNDATION

Based on the sub-surface profile and the type of structure i.e., Residential Apartments envisaged, Open foundation can be considered.

7. SHALLOW FOUNDATION

The following section describes the method of analysis adopted to arrive at the safe bearing capacities for shallow foundation.

Bearing capacity calculation for footings resting on soil / weathered rock

In case of sandy soils, the angle of internal friction ' ϕ ' is determined by the standard penetration test as per IS: 6403. The ϕ values were used for determining the Ultimate Bearing Capacity of soil as per shear failure criteria. The ultimate bearing capacity, q_d is calculated as per equations furnished in IS: 6403 as given below.

The ultimate bearing capacity q_d is given by

$$q_{nu} = c N_c s_c d_c i_c + q (N_q - 1) s_q d_q i_q + \frac{1}{2} B \gamma N_\gamma s_\gamma d_\gamma i_\gamma w'$$

q_{nu} = Net ultimate bearing capacity

c = cohesion

ϕ = Angle of internal friction

γ = Unit weight of soil

q = Over burden pressure = depth $\times$ density = $d \times \gamma$

B = Width of the foundation

W' = Water table correction factor

N_c, N_q, N_γ = Bearing capacity factors

s_c, s_q, s_γ = Shape factors

For strip footing $s_c = s_q = s_\gamma = 1$

For rectangular footing $s_c = 1 + 0.2 \times B / L,$

$s_q = 1 + 0.2 \times B / L,$

$s_\gamma = 1 - 0.4 \times B / L,$

For square footing $s_c = 1.3, s_q = 1.2, s_\gamma = 0.8$

For circular footing $s_c = 1.3, s_q = 1.2, s_\gamma = 0.6$

d_c, d_q, d_γ = Depth factors

$d_c = 1 + 0.2 \times (D_f / B) \tan (45^\circ + \phi' / 2)$

$d_q = d_\gamma = 1$ for $\phi' < 10^\circ$

$d_q = d_\gamma = 1 + 0.1 \times (D_f / B) \tan (45^\circ + \phi' / 2)$ for $\phi' > 10^\circ$

i_c, i_q, i_γ = Inclination factors

$i_c = i_q = (1 - \alpha^\circ / 90^\circ)^2$

$i_\gamma = (1 - \alpha^\circ / \phi')^2$

α° = Inclination of the load with vertical

The Safe bearing capacity (SBC) is the maximum intensity of loading that the foundation will safely carry without the risk of shear failure of soil. Safe bearing capacity can be obtained by dividing the Ultimate Bearing Capacity (UBC) with a factor of safety of 2.5.

$$SBC = q_{nu} / 2.5$$

In the design of bearing capacity calculations the water table is assumed at foundation level and water table correction factor has been applied accordingly.

The computation of bearing capacity calculation is provided in Table - 1 to 3 of Appendix-V.

8. RECOMMENDATION

- Based on the sub-surface profile encountered for construction of Residential Apartments, Shallow Foundation can be considered.
- The proposed Residential Apartments has 2 cellars. The total depth of excavation required for 2 cellars is 6.0m to 7.5m. Excavated soil from the cellar will be of the nature of murrum, residual soil, completely weathered rock and weathered rock.
- The recommended net safe bearing capacity along with founding depth for borehole locations drilled is given in the table below.

Borehole No.	Depth of Foundation below the Bottom of Cellar Level (m)	Recommended Net Safe Bearing Capacity (t/sqm)	Foundation Stratum
BH-1 to BH-3 and TP-1 to TP-8	1.5	65.0	Completely Weathered Rock
	2.0	75.0	Completely Weathered Rock
	2.5	85.0	Completely Weathered Rock
	1.0	70.0	Weathered Rock
	1.5	80.0	Weathered Rock

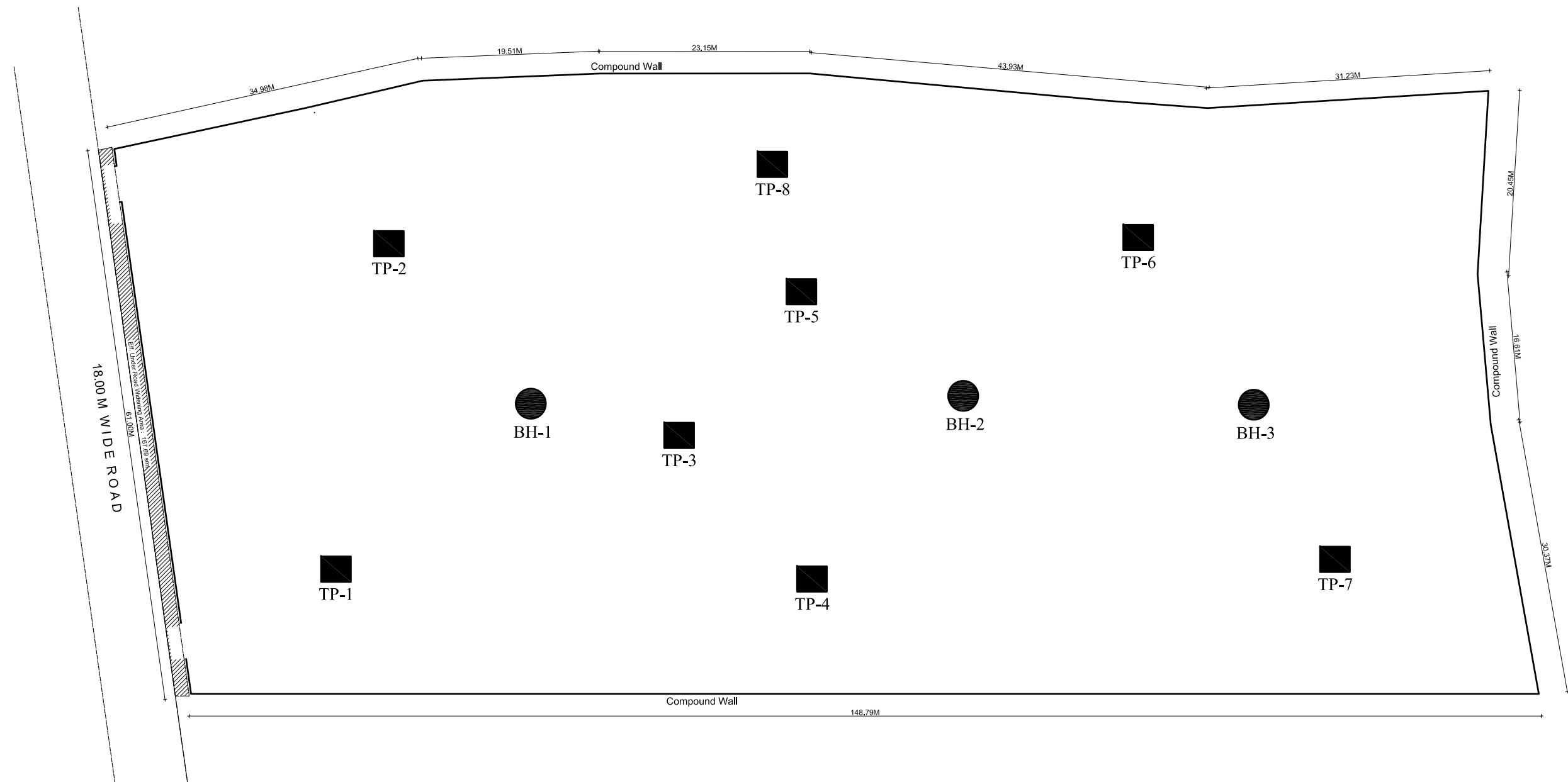
- In general the foundation stratum at a depth of 6.0m to 9.0m below the existing ground is of the nature of Completely Weathered Rock / Weathered Rock.
- The foundation stratum at a depth of 9.0m to 12.0m below the existing ground is of the nature of Weathered Rock / Hard Rock.
- Each foundation at the time of construction shall be judged suitable for the type of stratum i.e., Completely Weathered Rock / Weathered Rock and bearing capacity taken accordingly.
- Any variation in the foundation stratum shall be brought to the notice of the Geotechnical Engineer.

G. SATEESH KUMAR
Geotechnical Engineer

**APPENDIX-I
LOCATION PLAN**

FIGURE-1: LOCATION PLAN SHOWING BOREHOLES AND TRIAL PITS

PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD



APPENDIX-II BORE LOGS

TABLE-1: BORELOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Boring method : Rotary with mud circulation		Record of BH-1		BH-1
Boring equipment: Calyx		Water level: Not encountered upto the drilled depth	Date Commenced : Date Completed :	20.01.2019 21.01.2019
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL				
1.5	DS	Reddish Brown Clayey Sand (Murrum)	3.0	SC
3.0	DS			
4.5	DS	Brownish Grade VI Residual Soil		
6.0	DS		6.0	SM / SP
6.0 to 9.0	Core	Completely Weathered Rock to Weathered Rock	9.0	-
9.0 to 12.0	Core			
12.0 to 15.0	Core	Weathered Rock to Hard Rock (Granite)	15.0	-

TABLE-2: BORELOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Boring method : Rotary with mud circulation		Record of BH-2		BH-2
Boring equipment: Calyx		Water level: Not encountered upto the drilled depth	Date Commenced : Date Completed :	22.01.2019 23.01.2019
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)	3.0	SC
1.5	DS			
3.0	DS	Brownish Grade VI Residual Soil	6.0	SM / SP
4.5	DS			
6.0	DS			
6.0 to 9.0	Core	Completely Weathered Rock to Weathered Rock	9.0	-
9.0 to 12.0	Core	Weathered Rock to Hard Rock (Granite)	15.0	-
12.0 to 15.0	Core			

TABLE-4: TRIAL PIT LOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Method - Trial Pit Excavation by JCB		Record of TP-1		TP-1
		Water level: Not encountered upto the excavated depth	Date Commenced : Date Completed :	22.01.2019 22.01.2019
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)		
1.5	DS		3.0	-
3.0	DS	Brownish Grade VI Residual Soil		
4.5	DS		6.0	-
6.0	DS	Completely Weathered Rock to Weathered Rock		
7.5	DS			
9.0	DS		9.0	-

TABLE-5: TRIAL PIT LOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Method - Trial Pit Excavation by JCB		Record of TP-2		TP-2
		Water level: Not encountered upto the excavated depth	Date Commenced : 22.01.2019 Date Completed : 22.01.2019	
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)		
1.5	DS		3.0	-
3.0	DS	Brownish Grade VI Residual Soil		
4.5	DS		6.0	-
6.0	DS	Completely Weathered Rock to Weathered Rock		
7.5	DS			
9.0	DS		9.0	-

TABLE-6: TRIAL PIT LOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Method - Trial Pit Excavation by JCB		Record of TP-3		TP-3
		Water level: Not encountered upto the excavated depth	Date Commenced : 22.01.2019	
			Date Completed : 22.01.2019	
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)		
1.5	DS		3.0	-
3.0	DS	Brownish Grade VI Residual Soil		
4.5	DS		6.0	-
6.0	DS	Completely Weathered Rock to Weathered Rock		
7.5	DS			
9.0	DS		9.0	-

TABLE-9: TRIAL PIT LOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Method - Trial Pit Excavation by JCB		Record of TP-6		TP-6
		Water level: Not encountered upto the excavated depth	Date Commenced : 22.01.2019 Date Completed : 22.01.2019	
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)		
1.5	DS		3.0	-
3.0	DS	Brownish Grade VI Residual Soil		
4.5	DS		6.0	-
6.0	DS	Completely Weathered Rock to Weathered Rock		
7.5	DS			
9.0	DS		9.0	-

TABLE-10: TRIAL PIT LOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Method - Trial Pit Excavation by JCB		Record of TP-7		TP-7
		Water level: Not encountered upto the excavated depth	Date Commenced : 22.01.2019	
			Date Completed : 22.01.2019	
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)	3.0	-
1.5	DS			
3.0	DS	Brownish Grade VI Residual Soil	6.0	-
4.5	DS			
6.0	DS	Completely Weathered Rock to Weathered Rock	9.0	-
7.5	DS			
9.0	DS			

TABLE-11: TRIAL PIT LOG				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Method - Trial Pit Excavation by JCB		Record of TP-8		TP-8
		Water level: Not encountered upto the excavated depth	Date Commenced : 22.01.2019	
			Date Completed : 22.01.2019	
Samples and In-situ test		Description of Strata	Depth From EGL	Soil Group
Depth (m)	Type & Value			
EGL		Reddish Brown Clayey Sand (Murrum)	3.0	-
1.5	DS			
3.0	DS	Brownish Grade VI Residual Soil	6.0	-
4.5	DS			
6.0	DS	Completely Weathered Rock to Weathered Rock	9.0	-
7.5	DS			
9.0	DS			

APPENDIX-III
LABORATORY TEST RESULTS

TABLE-1: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)	SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
								GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
									COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)		
BH-1	1.5	-	DS	12.5	36	17	19	3.5	21.7	32.5	18.3	24.0	SC	-	-	-	-	-	-
BH-1	3.0	-	DS	10.3	NP	NP	NP	13.7	17.3	41.2	14.2	13.6	SM	-	-	-	-	-	-
BH-1	4.5	-	DS	9.7	NP	NP	NP	18.9	28.9	37.3	12.7	2.2	SP	-	-	-	-	-	-
BH-1	6.0	-	DS	Completely Weathered Rock to Weathered Rock															
BH-1	7.5	-	DS	Completely Weathered Rock to Weathered Rock															
BH-1	9.0	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-1	10.5	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-1	12.0	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-1	13.5	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-1	15.0	-	DS	Weathered Rock to Hard Rock (Granite)															

Note: NP indicates Non-Plastic Soil

TABLE-2: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)	SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
								GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
									COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)		
BH-2	1.5	-	DS	15.2	39	19	20	6.8	18.9	36.7	15.2	22.4	SC	-	-	-	-	-	-
BH-2	3.0	-	DS	13.8	NP	NP	NP	15.9	21.2	37.8	12.4	12.7	SM	-	-	-	-	-	-
BH-2	4.5	-	DS	10.1	NP	NP	NP	13.5	32.2	35.1	17.3	1.9	SP	-	-	-	-	-	-
BH-2	6.0	-	DS	Completely Weathered Rock to Weathered Rock															
BH-2	7.5	-	DS	Completely Weathered Rock to Weathered Rock															
BH-2	9.0	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-2	10.5	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-2	12.0	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-2	13.5	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-2	15.0	-	DS	Weathered Rock to Hard Rock (Granite)															

Note: NP indicates Non-Plastic Soil

TABLE-3: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)	SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
								GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
									COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)		
BH-3	1.5	-	DS	16.8	39	19	20	9.3	13.5	32.1	15.8	29.3	SC	-	-	-	-	-	-
BH-3	3.0	-	DS	14.5	NP	NP	NP	11.5	18.9	38.2	10.5	20.9	SM	-	-	-	-	-	-
BH-3	4.5	-	DS	12.2	NP	NP	NP	21.8	28.9	37.2	10.5	1.6	SP	-	-	-	-	-	-
BH-3	6.0	-	DS	Completely Weathered Rock to Weathered Rock															
BH-3	7.5	-	DS	Completely Weathered Rock to Weathered Rock															
BH-3	9.0	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-3	10.5	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-3	12.0	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-3	13.5	-	DS	Weathered Rock to Hard Rock (Granite)															
BH-3	15.0	-	DS	Weathered Rock to Hard Rock (Granite)															

Note: NP indicates Non-Plastic Soil

TABLE-4: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-1	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-1	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-1	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-1	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-1	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-1	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-5: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-2	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-2	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-2	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-2	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-2	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-2	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-6: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-3	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-3	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-3	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-3	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-3	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-3	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-7: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-4	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-4	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-4	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-4	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-4	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-4	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-8: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-5	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-5	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-5	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-5	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-5	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-5	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-9: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-6	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-6	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-6	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-6	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-6	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-6	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-10: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-7	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-7	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-7	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-7	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-7	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-7	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

TABLE-11: SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES

**PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD**

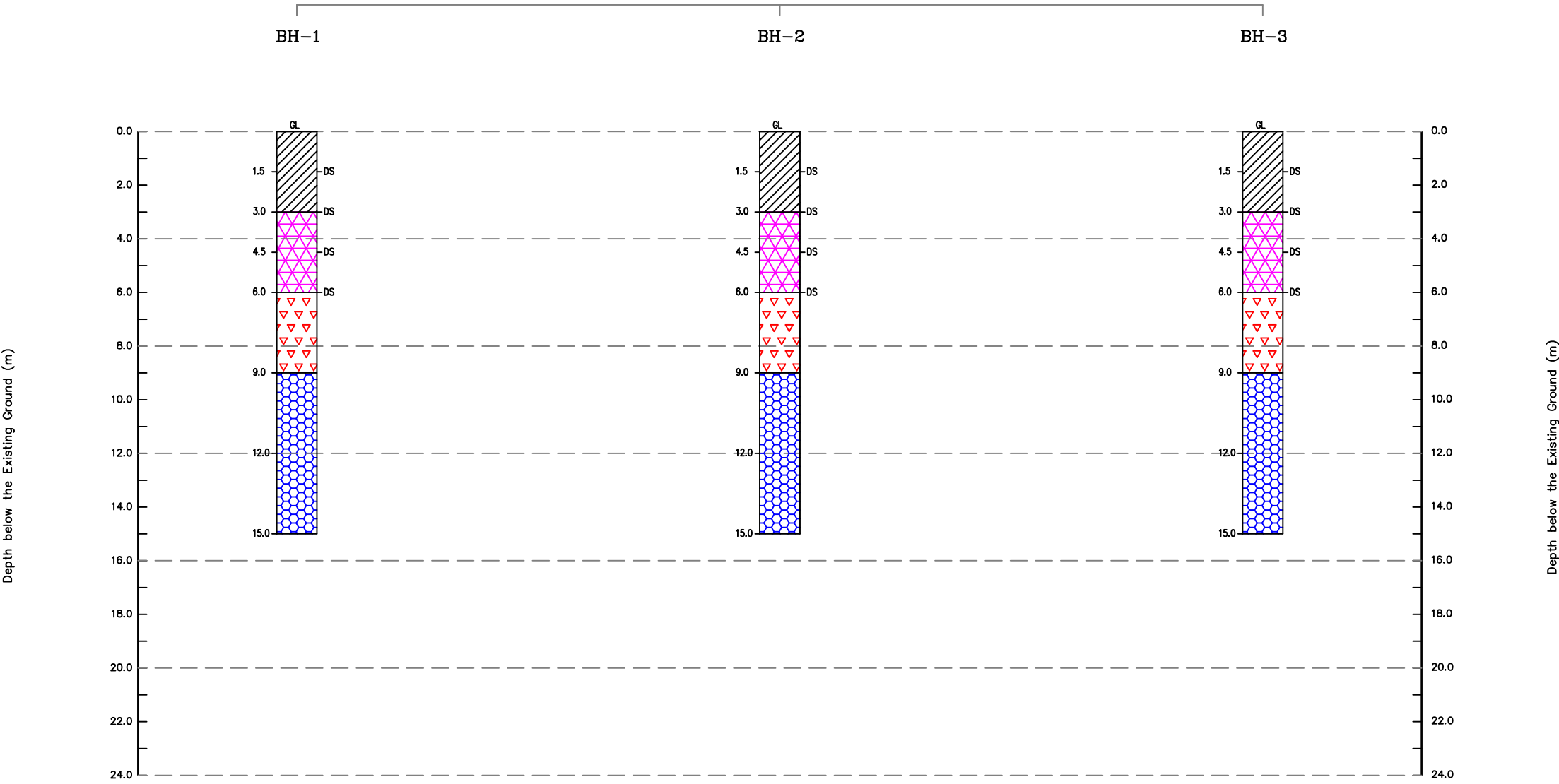
BOREHOLE / TRAIL PIT NO.	DEPTH (m)		SPT / UD	TYPE OF SAMPLE	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					IS CLASSIFICATION	SWELLING INDEX (%)	BULK DENSITY (g/cc)	DRY DENSITY (g/cc)	SHEAR TEST		
									GRAVEL (%)	SAND			SILT & CLAY (%)					TYPE OF TEST	COHESION INTERCEPT (t/sqm)	ANGLE OF INTERNAL FRICTION (°)
										COARSE (%)	MEDIUM (%)	FINE (%)								
Test Method				IS 2720 (Part 2)	IS 2720 (Part 5)			IS 2720 (Part 4)					IS: 1498	IS 2720 (Part 40)	SP 36 (Part 2)		IS 2720 (Part 11 / 13)			
TP-8	1.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-8	3.0	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-8	4.5	-	DS	Soil Stratum Excavated upto Bottom of Cellar Level																
TP-8	6.0	-	DS	Completely Weathered Rock to Weathered Rock																
TP-8	7.5	-	DS	Completely Weathered Rock to Weathered Rock																
TP-8	9.0	-	DS	Completely Weathered Rock to Weathered Rock																

Note: NP indicates Non-Plastic Soil

APPENDIX-IV SUB-SURFACE PROFILE

FIGURE-1: SUB-SURFACE PROFILE

PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD



LEGEND



CLAYEY SAND



RESIDUAL SOIL



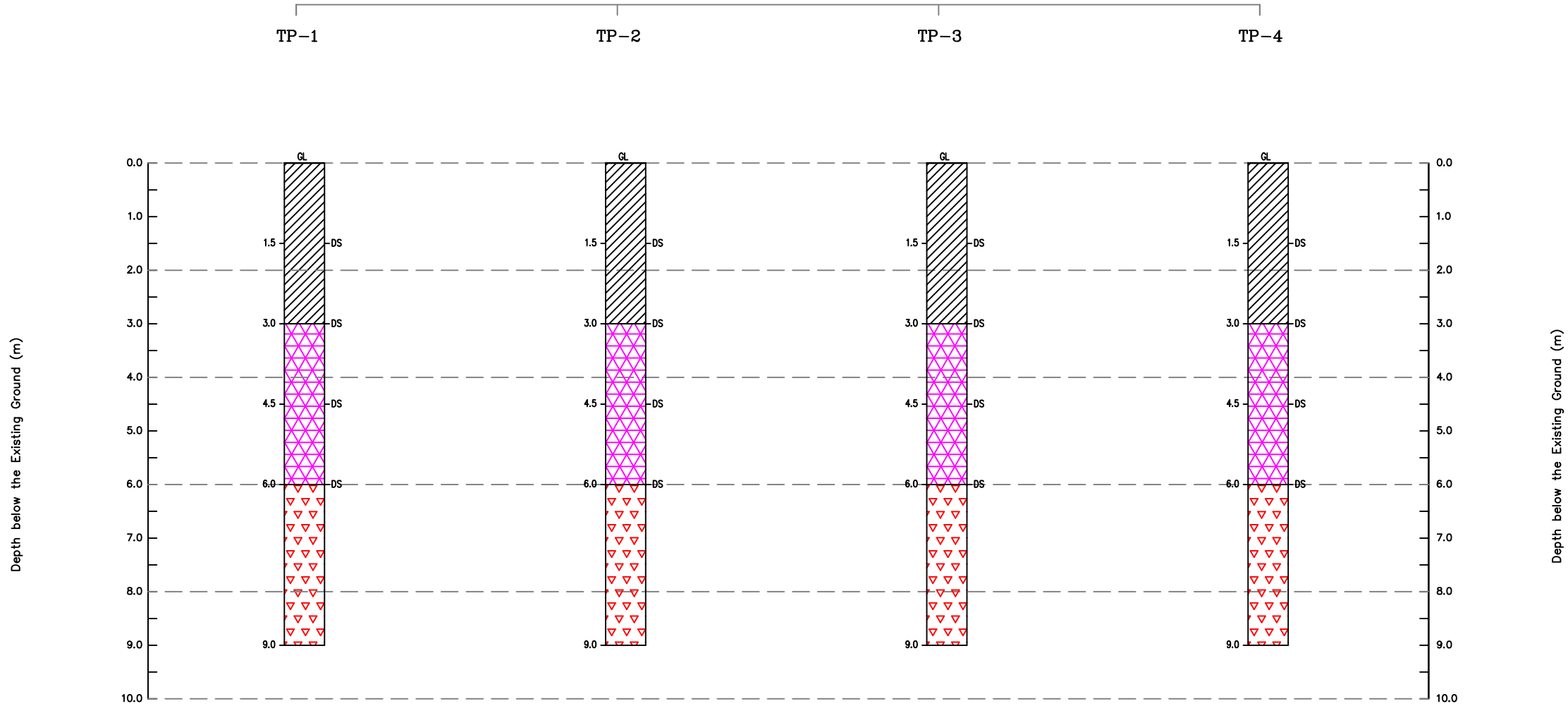
COMPLETELY WEATHERED ROCK
/ WEATHERED ROCK



WEATHERED ROCK / HARD ROCK

FIGURE-2: SUB-SURFACE PROFILE

PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD

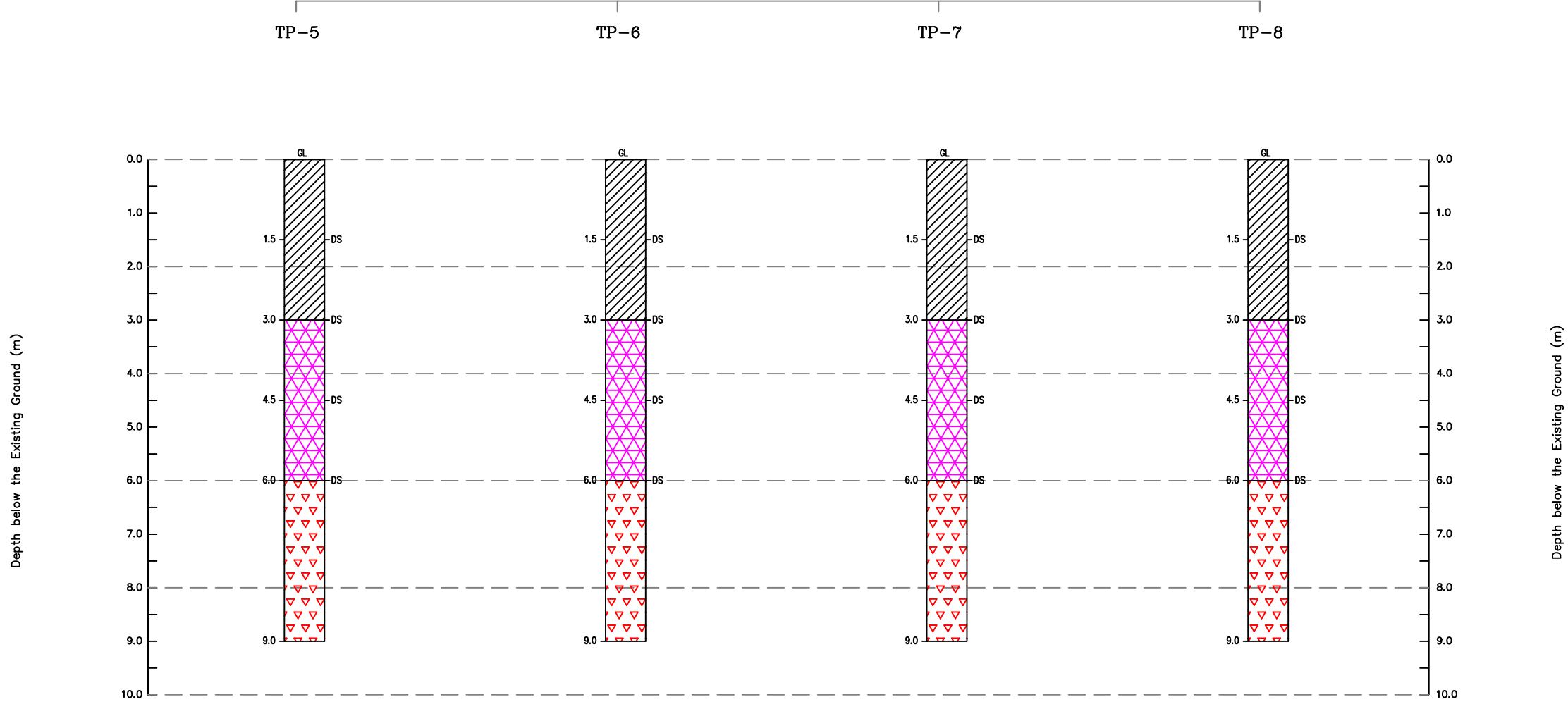


NOTE: TRIAL PITS ARE EXCAVATED FROM 6.0m DEPTH AFTER THE COMPLETION OF EXCAVATION OF GROUND UPTO BOTTOM OF CELLAR FLOOR LEVEL
THERE IS SEEPAGE OF WATER FROM ADJACENT AGRICULTURE LAND AND ALSO DUE TO THE PONDING OF RAIN WATER

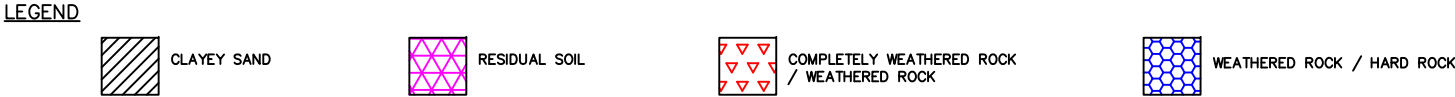
LEGEND			
	CLAYEY SAND		RESIDUAL SOIL
	COMPLETELY WEATHERED ROCK / WEATHERED ROCK		WEATHERED ROCK / HARD ROCK

FIGURE-3: SUB-SURFACE PROFILE

PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF
RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD



NOTE: TRIAL PITS ARE EXCAVATED FROM 6.0m DEPTH AFTER THE COMPLETION OF EXCAVATION OF GROUND UPTO BOTTOM OF CELLAR FLOOR LEVEL
THERE IS SEEPAGE OF WATER FROM ADJACENT AGRICULTURE LAND AND ALSO DUE TO THE PONDING OF RAIN WATER



APPENDIX-V COMPUTATIONS

Table-1 : COMPUTATION OF NET SAFE BEARING CAPACITY AS PER IS: 6403				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Depth of Foundation = 1.5m below the bottom of cellar ground level				
1	Type of Failure	Genral Shear Failure		
2	Foundation Strata	Completely Weathered Rock / Weathered Rock		
3	Type of Foundation	Isolated		
4	Width of foundation (B)	2.0	m	
5	Length of foundation (L)	2.0	m	
6	Depth of Foundation, D_f	1.5	m	
7	Average SPT corrected N'' Value below the foundation depth and Zone of influence of 1.5 to 2.0B m depth.	>100		
8a	Angle of Internal Friction by correlating SPT N'' Value with Phi values as per Figure-1 of IS: 6403, ϕ	40.0		
8b	Limiting Angle of Internal Friction taking Grain Size and other factors into consideration, ϕ	39.0	deg	
9	Cohesive Strength of Soil, c	0.0	T/sqm	
10	Unit Weight of Overburden Soil, γ	1.85	T/cum	
11	Over burden pressure soil	1.28		
12	Bearing Capacity Factors Range			
13	Bearing Capacity Factor, N_c (Table 1 of 6403)	69.47		
14	Bearing Capacity Factor, N_q (Table 1 of 6403)	58.02		
15	Bearing Capacity Factor, N_γ (Table 1 of 6403)	97.13		
16	Depth Factor, d_c	$= 1 + (0.2 \times D_f / B) \times \text{Sqrt}(N_\phi)$	1.31	
17	Depth Factor, d_q	$= (1 \text{ if } \phi < 10) \text{ else, } 1 + ((0.1 \times D_f / B) \times \text{Sqrt}(N_\phi))$	1.16	
18	Depth Factor, d_γ	$= (1 \text{ if } \phi < 10) \text{ else, } 1 + ((0.1 \times D_f / B) \times \text{Sqrt}(N_\phi))$	1.16	
19	Shape Factor, s_c	Constant $= 1 + 0.2 \times B / L$	1.20	
20	Shape Factor, s_q	Constant $= 1 + 0.2 \times B / L$	1.20	
21	Shape Factor, s_γ	Constant $= 1 - 0.4 \times B / L$	0.60	
22	Inclination Factor, i_c	$= (1 - \alpha / 90)^2$	1.00	
23	Inclination Factor, i_q	$= (1 - \alpha / 90)^2$	1.00	
24	Inclination Factor, i_γ	$= (1 - \alpha / \phi)^2$	1.00	
25	Water Table Correction Factor, W'	Constant	0.50	
26	Ultimate Bearing Capacity Component, UBC1	$= c N_c s_c d_c i_c$	0.00	T/sqm
27	Ultimate Bearing Capacity Component, UBC2	$= q (N_q - 1) s_q d_q i_q$	101.20	T/sqm
28	Ultimate Bearing Capacity Component, UBC3	$= 0.5 B \gamma N_\gamma s_\gamma d_\gamma i_\gamma W'$	62.53	T/sqm
29	Net Ultimate Bearing Capacity, UBC	$= \text{UBC1} + \text{UBC2} + \text{UBC3}$	163.73	T/sqm
30	Net SBC with Factor of Safety of 2.5	$= \text{UBC} / 2.5$	65.49	T/sqm
		Say	65.5	T/sqm

Table-2 : COMPUTATION OF NET SAFE BEARING CAPACITY AS PER IS: 6403				
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD				
Depth of Foundation = 2.0m below the bottom of cellar ground level				
1	Type of Failure	Genral Shear Failure		
2	Foundation Strata	Completely Weathered Rock / Weathered Rock		
3	Type of Foundation	Isolated		
4	Width of foundation (B)	2.0	m	
5	Length of foundation (L)	2.0	m	
6	Depth of Foundation, D_f	2.0	m	
7	Average SPT corrected N'' Value below the foundation depth and Zone of influence of 1.5 to 2.0B m depth.	>100		
8a	Angle of Internal Friction by correlating SPT N'' Value with Phi values as per Figure-1 of IS: 6403, ϕ	40.0		
8b	Limiting Angle of Internal Friction taking Grain Size and other factors into consideration, ϕ	39.0	deg	
9	Cohesive Strength of Soil, c	0.0	T/sqm	
10	Unit Weight of Overburden Soil, γ	1.85	T/cum	
11	Over burden pressure soil	1.70		
12	Bearing Capacity Factors Range			
13	Bearing Capacity Factor, N_c (Table 1 of 6403)	69.47		
14	Bearing Capacity Factor, N_q (Table 1 of 6403)	58.02		
15	Bearing Capacity Factor, N_γ (Table 1 of 6403)	97.13		
16	Depth Factor, d_c	$= 1 + (0.2 \times D_f / B) \times \text{Sqrt}(N_\phi)$	1.42	
17	Depth Factor, d_q	$= (1 \text{ if } \phi < 10) \text{ else, } 1 + ((0.1 \times D_f / B) \times \text{Sqrt}(N_\phi))$	1.21	
18	Depth Factor, d_γ	$= (1 \text{ if } \phi < 10) \text{ else, } 1 + ((0.1 \times D_f / B) \times \text{Sqrt}(N_\phi))$	1.21	
19	Shape Factor, s_c	Constant = $1 + 0.2 \times B / L$	1.20	
20	Shape Factor, s_q	Constant = $1 + 0.2 \times B / L$	1.20	
21	Shape Factor, s_γ	Constant = $1 - 0.4 \times B / L$	0.60	
22	Inclination Factor, i_c	$= (1 - \alpha / 90)^2$	1.00	
23	Inclination Factor, i_q	$= (1 - \alpha / 90)^2$	1.00	
24	Inclination Factor, i_γ	$= (1 - \alpha / \phi)^2$	1.00	
25	Water Table Correction Factor, W'	Constant	0.50	
26	Ultimate Bearing Capacity Component, UBC1	$= c N_c s_c d_c i_c$	0.00	T/sqm
27	Ultimate Bearing Capacity Component, UBC2	$= q (N_q - 1) s_q d_q i_q$	140.75	T/sqm
28	Ultimate Bearing Capacity Component, UBC3	$= 0.5 B \gamma N_\gamma s_\gamma d_\gamma i_\gamma W'$	65.23	T/sqm
29	Net Ultimate Bearing Capacity, UBC	$= \text{UBC1} + \text{UBC2} + \text{UBC3}$	205.98	T/sqm
30	Net SBC with Factor of Safety of 2.5	$= \text{UBC} / 2.5$	82.39	T/sqm
	Say		82.4	T/sqm

Table-3 : COMPUTATION OF NET SAFE BEARING CAPACITY AS PER IS: 6403			
PROJECT: GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENTS FOR M/S. MODI REALTY POCHARAM LLP AT POCHARAM, HYDERABAD			
Depth of Foundation = 2.5m below the bottom of cellar ground level			
1	Type of Failure	Genral Shear Failure	
2	Foundation Strata	Completely Weathered Rock / Weathered Rock	
3	Type of Foundation	Isolated	
4	Width of foundation (B)	2.0	m
5	Length of foundation (L)	2.0	m
6	Depth of Foundation, D_f	2.5	m
7	Average SPT corrected N'' Value below the foundation depth and Zone of influence of 1.5 to 2.0B m depth.	>100	
8a	Angle of Internal Friction by correlating SPT N'' Value with Phi values as per Figure-1 of IS: 6403, ϕ	40.0	
8b	Limiting Angle of Internal Friction taking Grain Size and other factors into consideration, ϕ	39.0	deg
9	Cohesive Strength of Soil, c	0.0	T/sqm
10	Unit Weight of Overburden Soil, γ	1.85	T/cum
11	Over burden pressure soil	2.13	
12	Bearing Capacity Factors Range		
13	Bearing Capacity Factor, N_c (Table 1 of 6403)	69.47	
14	Bearing Capacity Factor, N_q (Table 1 of 6403)	58.02	
15	Bearing Capacity Factor, N_γ (Table 1 of 6403)	97.13	
16	Depth Factor, d_c	$= 1 + (0.2 \times D_f / B) \times \text{Sqrt}(N_\phi)$	1.52
17	Depth Factor, d_q	$= (1 \text{ if } \phi < 10) \text{ else, } 1 + ((0.1 \times D_f / B) \times \text{Sqrt}(N_\phi))$	1.26
18	Depth Factor, d_γ	$= (1 \text{ if } \phi < 10) \text{ else, } 1 + ((0.1 \times D_f / B) \times \text{Sqrt}(N_\phi))$	1.26
19	Shape Factor, s_c	Constant = $1 + 0.2 \times B / L$	1.20
20	Shape Factor, s_q	Constant = $1 + 0.2 \times B / L$	1.20
21	Shape Factor, s_γ	Constant = $1 - 0.4 \times B / L$	0.60
22	Inclination Factor, i_c	$= (1 - \alpha / 90)^\alpha$	1.00
23	Inclination Factor, i_q	$= (1 - \alpha / 90)^\alpha$	1.00
24	Inclination Factor, i_γ	$= (1 - \alpha / \phi)^\alpha$	1.00
25	Water Table Correction Factor, W'	Constant	0.50
26	Ultimate Bearing Capacity Component, UBC1	$= c N_c s_c d_c i_c$	0.00 T/sqm
27	Ultimate Bearing Capacity Component, UBC2	$= q (N_q - 1) s_q d_q i_q$	183.21 T/sqm
28	Ultimate Bearing Capacity Component, UBC3	$= 0.5 B \gamma N_\gamma s_\gamma d_\gamma i_\gamma W'$	67.92 T/sqm
29	Net Ultimate Bearing Capacity, UBC	$= \text{UBC1} + \text{UBC2} + \text{UBC3}$	251.13 T/sqm
30	Net SBC with Factor of Safety of 2.5	$= \text{UBC} / 2.5$	100.45 T/sqm
	Say	100.5	T/sqm

**APPENDIX-VI
PHOTOGRAPHS**

PHOTOGRAPHS



Photograph - 1: Excavated Trial Pit TP-1 Location



Photograph - 2: Excavated Trial Pit TP-2 Location



Photograph - 3: Excavated Trial Pit TP-3 Location



Photograph - 4: Excavated Trial Pit TP-4 Location



Photograph - 5: Excavated Trial Pit TP-5 Location



Photograph - 6: Excavated Trial Pit TP-6 Location



Photograph - 7: Excavated Trial Pit TP-7 Location



Photograph - 8: Excavated Trial Pit TP-8 Location