EE Engineering Construction Services
Geotechnical Investigation and Design, Non-Destructive Testing,
Topographic Surveying, Design of Structures, Planning and Design of Highways,
Construction Supervision and Project Management, Academic Projects

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Gold Medal (VSSUT, Burla),
MNICEE (IIT Kanpur), AMIE, MIRC, MIGS, MISCA, MMGKC (NMCG)
Managing Director

Report No: EEECS /GTE/Modi Kowkoor/21/2018-19
Date: 05-11-2018

SOIL REPORT FOR THE PROPOSED RESIDENTIAL BUILDING COMNPLEX AT KOWKOOR, HYDERABAD, TELANGANA

1. **Introduction:** Modi Properties has proposed to construct a Residential Building Complex at Kowkoor, Hyderabad. Modi Properties has requested EE Engineering Construction Services for soil investigation to be conducted and to provide recommendations for the site on foundation. In this regard, Geotechnical expert has visited the proposed site and soil samples (Disturbed and Undisturbed) were collected. This report presents the details of soil investigation carried out and the test results and recommendations for the foundation.

2. **About the proposed site**: Proposed site is located at Kowkoor, Hyderabad. The size of proposed site is 2 Acres. Proposed site is generally a level ground without any outcrop of boulders.

3. **About the Project**: The proposed project consists of construction of Residential Building with 2 cellars + 6 floors. The proposed structure is a RCC framed structure.

4. **Soil Investigation**: Soil investigation for the site include inspection of soil from the trial pits, Collection of Disturbed and undisturbed soil samples and conducting laboratory Tests. Seven pits were considered at the site for investigation. From each trial pit one disturbed soil sample and one Undisturbed soil sample were collected. Trial pit locations are shown in Figure 1.

   4.1 **Laboratory Tests**: Laboratory tests were conducted for classification of soil and strength parameters.

Plot No. 150, Kavuri Hills, Phase-2, Madhapur, Hyderabad Telangana-500033.
8247376887, 9000800622
rakesh.eeecs@gmail.com
MSME UAN : TS02E0004169, Registration No. : 006115465, Entrepreneurs Memorandum No: 280062205761

4.1.1 **Laboratory Tests on Disturbed Soil Samples**: Total of 7 Disturbed soil samples were collected from the 7 trial pits made. On each disturbed soil sample Specific Gravity Tests and Grain size distribution tests were conducted.

4.1.2 Specific gravity test was conducted as per IS: 2720 Part 3 and Grain size distribution tests were conducted as per IS: 2720 Part 4. The results of the test conducted on Disturbed soil sample are presented in Table – 1.

4.1.2 Laboratory Tests on Undisturbed soil Sample: Seven undisturbed soil samples were collected. On each of the undisturbed soil sample the following tests were conducted:

1) Density Tests
2) Moisture Content Test
3) Direct Shear Test

1) **Density Test**: The field dry density test was conducted on the Undisturbed soil sample as per the procedure laid-down in IS: 2720 Part 29.
2) **Moisture Content Test**: The field moisture content of the Undisturbed soil was measured as per IS: 2720 Part 2.
3) **Direct Shear Test** was conducted under three normal stress of 0.5 Kg/cm^2 , 1.0Kg/cm^2 and 1.5Kg/cm^2. Test was conducted at the field moisture content. The test procedure adopted is as per IS: 2720 Part 13.

The results of the above test conducted on Undisturbed soil samples are presented in Table 2.

5. **Soil Profile:** Based on the site inspection and laboratory test results presented in Table - 1and 2 and the soil profile at the site observed in the Six trial pits are presented in Fig.2 to Fig 8. The general soil profile consists of Black clayey soil up to 0.4m below ground level followed by Sandy Soil with clay binder to a depth of 1.5m below ground level. Further, between 1.5m to 2.5m Medium Dense Moorum soil exists. Beyond 2.5m up to 3.5m, Very dense Moorum soil is observed. There was no groundwater table observed within the

explored depth of 3.5 m below ground level. Further, it is observed that Clayey layer is extended to larger depths in the Eastern side of the proposed site.

6. **Bearing Capacity Calculations:** Bearing capacity was computed for a depth of 4 m below ground level. While calculating the bearing capacity it is assumed that the submerged density of soil γ = 1.0 t/cum and Square footing of size (B) of 2.0 m. The bearing capacity is calculated using the Terzaghi Bearing capacity formula as shown below:

$$SBC = (1.3\,CN_c + (N_q-1)\,\gamma\,D_f + 0.4\,\gamma\,B\,N_\gamma)/FS \qquad \text{------- (Eq. 1)}$$

Where

SBC = Safe Bearing Capacity (T/Sqm)

C= Cohesion (T/Sqm)

N_c , N_q, and N_γ = Terzaghi Bearing Capacity factors

Df = Depth of Foundation (m)

B = Width of foundation (m) (assumed 2.0m)

FS = Factor of safety (3.0)

Bearing Capacity for 4.0m depth of foundation: From the Table -1 the for a depth of 4.0 m the minimum C and Φ are as follows

C = 0.10 T/Sq.m

$\Phi = 33^o$

D_f = 4.0m

For $\Phi = 33^o$ the bearing Capacity factors are

N_c = 39.726, N_q = 27.34, and N_γ = 37.778

Substituting the above values in Eq. 1 the SBC at 4.0 m depth below ground level works out to 48.25 T/Sqm.

RECOMMENDATIONS

Based on the type of the structure, properties of soils, site inspection and visual examination of soil samples, the following recommendation are made

1. **Bearing Capacity**: Keeping in view the strength parameters a safe bearing capacity of **45 T/Sqm** is recommended at the depth of 4 m below ground level for the Very dense Moorum soil.
2. **Other Recommendations**: If at any location the suggested soil is not observed the depth of foundation may be suitably increased.
3. It is recommended not to expose the foundation pits for a long time especially not to expose to rain water.
4. Bed concrete has to be laid as soon as the foundation depth is reached.

E. Rakesh Reddy

Managing Director
EE Engineering Construction Services

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINICEE (IIT Kanpur),AMIE, MIRO, MIGS, MMGKC (NMCG)
Managing Director
EE Engineering Construction Services

Plot No. 150, Kavuri Hills Phase-2, Madhapur, Hyderabad, Telangana-500033.
Phone: 9000800622 Email: rakesh.eeecs@gmail.com
MSME UAN : TS02E0004169 Registration No. : 006115465 Entrepreneurs Memorandum No: 280062205761

Table 1. Classification Test Results

SI.No	Trial Pit	Depth (m) below GL	Specific Gravity	Grain Size Distribution					Soil Classification
				Gravel (>4.75mm)	Coarse Sand (4.75 – 2)mm	Medium Sand (2 – 0.425)mm	Fine Sand (0.425-0.075)mm	Silt and Clay (<0.075mm)	
1.	TP 1	3.0	2.65	5	30	42	15	8	SP
2.	TP 2	3.10	2.63	8	40	34	13	5	SP
3.	TP 3	2.9	2.66	3	32	44	11	10	SP
4.	TP 4	3.0	2.67	9	40	22	21	8	SP
5.	TP 5	3.2	2.64	6	39	30	18	7	SP
6.	TP 6	3.1	2.66	7	41	34	12	6	SP
7.	TP 7	3.1	2.65	10	28	35	18	9	SP

E. Rakesh Reddy

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EE Engineering Construction Services

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Table 2. Density and Strength Test Results

S.No	Trial Pit No	Depth (m)	Field Dry Density (g/cc)	Moisture Content (%)	C (Kg/cm^2)	Φ (Degrees)
1.	TP 1	3.0	1.95	10.5	0.0	35
2.	TP 2	3.10	2.05	9.80	0.01	34
3.	TP 3	2.9	1.98	10.35	0.015	33
4.	TP 4	3.0	2.10	11.01	0.01	33
5.	TP 5	3.2	1.92	10.05	0.13	35
6.	TP 6	3.1	2.10	11.23	0.02	34
7.	TP 7	3.1	2.05	10.20	0.015	34

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Managing Director
EE Engineering Construction Services

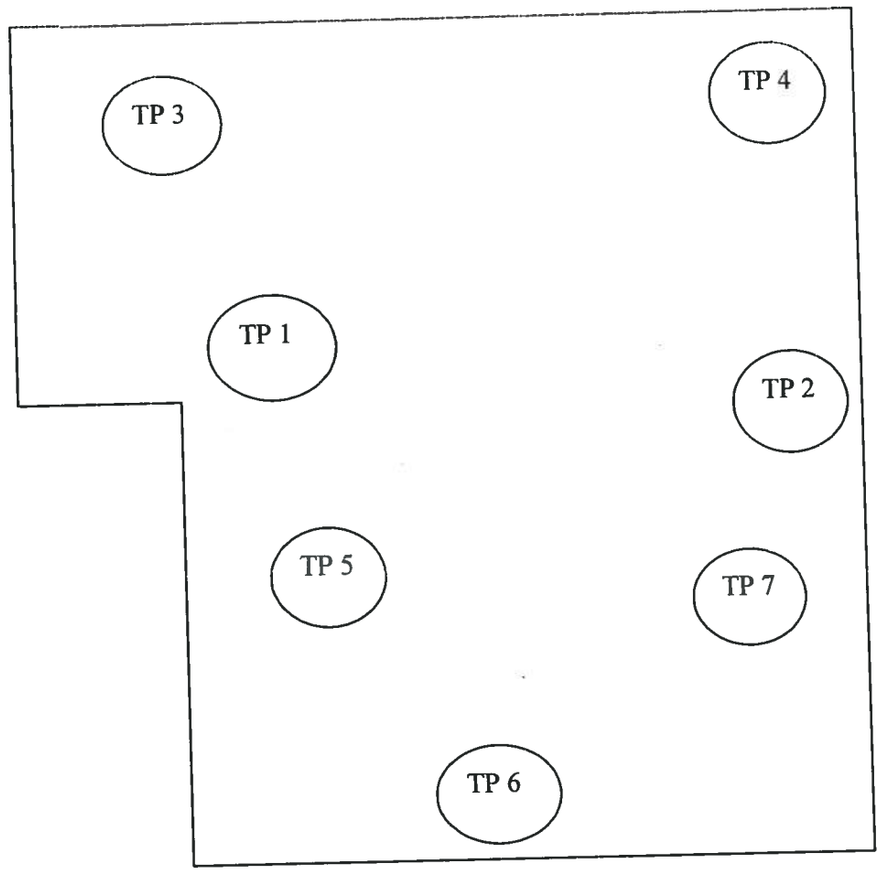

Fig 1. Location of Trial Pits (Foundation Pits)

E - Rakesh Reddy

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINICEE (IIT Kanpur),AMIE MIRO, MIGS, MMGKC (NMCG)
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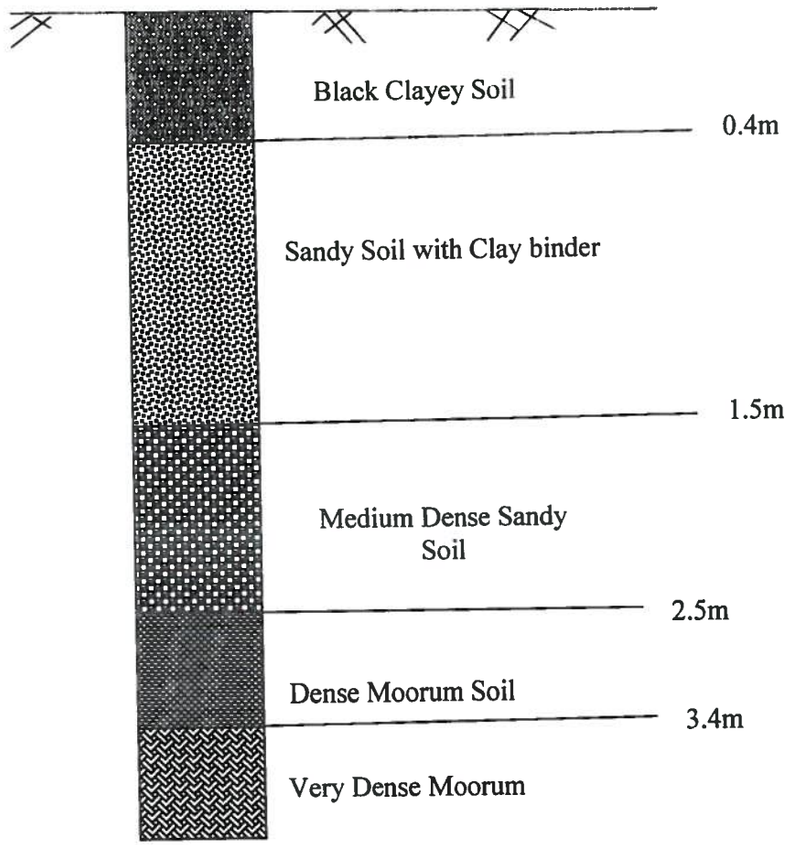

Fig. 2 Soil Profile for Foundation Pit 1

E. Rakesh Reddy

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINICEE (IIT Kanpur),AMIE MIRO. MIGS, MMGKC (NMCG)
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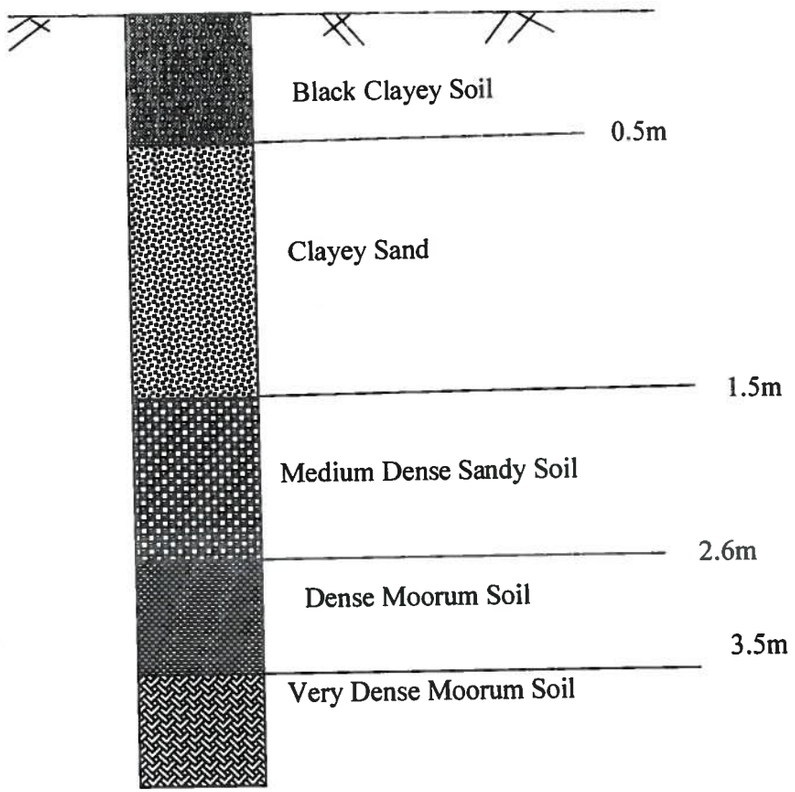

Fig. 3 Soil Profile for Foundation Pit 2

E. Rakesh Reddy

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINICEE (IIT Kanpur),AMIE, MIRO, MIGS, MMGKC (NMCG)
Managing Director
EE Engineering Construction Services

Plot No. 150, Kavuri Hills Phase-2, Madhapur, Hyderabad, Telangana-500033.
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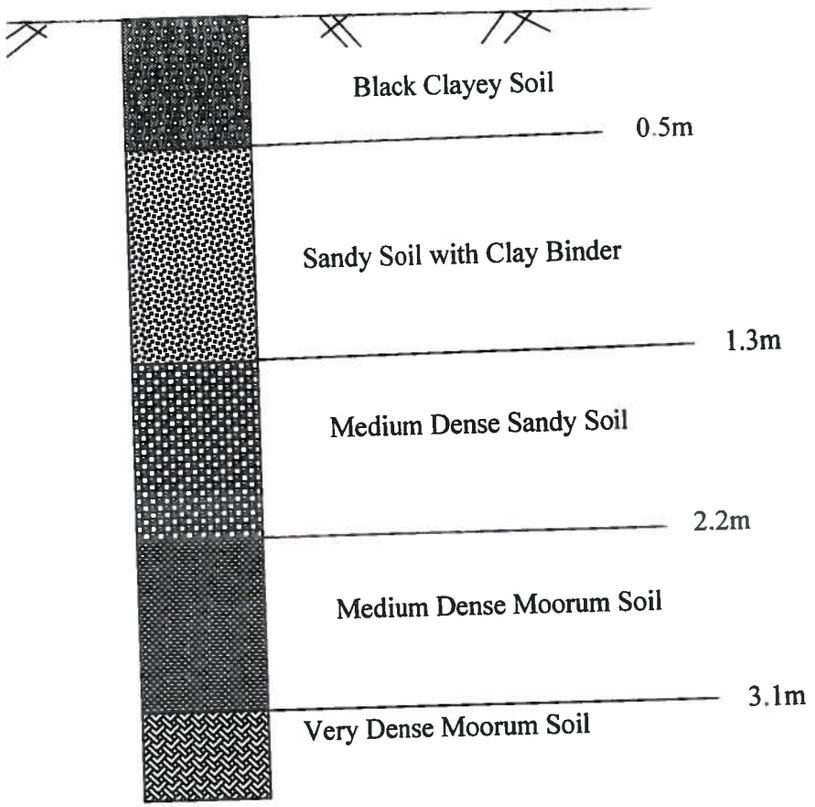

Fig. 4 Soil Profile for Foundation Pit 3

E. Rakesh Reddy

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINIGEE (IIT Kanpur),AMIE MIRO, MIGS, MMGKC (NMCG)
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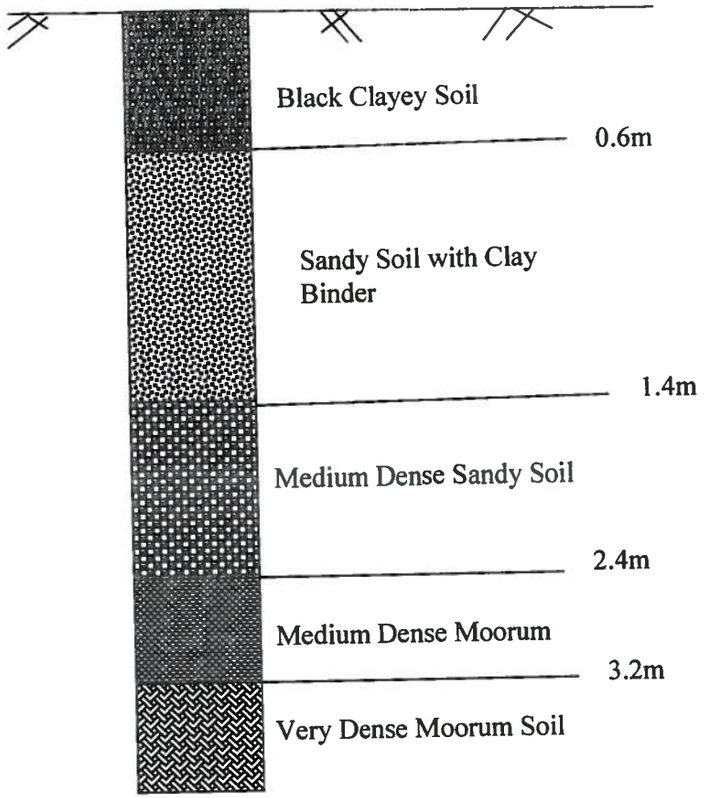

Fig. 5 Soil Profile for Foundation Pit 4

E. Rakesh Reddy
Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINICEE (IIT Kanpur) AMIE MIRO, MIGS, MMGKC (NMCG)
Managing Director
EE Engineering Construction Services

Plot No. 150, Kavuri Hills Phase-2, Madhapur, Hyderabad, Telangana-500033.
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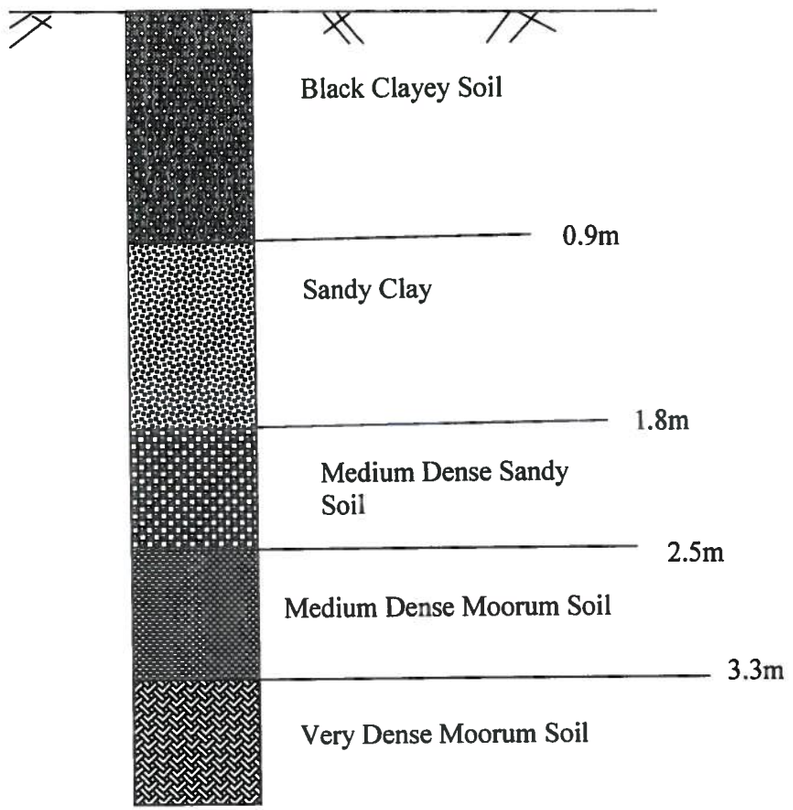

Fig. 6 Soil Profile for Foundation Pit 5

E. Rakesh Reddy

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
MINICEE (IIT Kanpur),AMIE, MIRO, MIGS, MMGKC (NMCG)
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Plot No. 150, Kavuri Hills Phase-2, Madhapur, Hyderabad, Telangana-500033.
Phone: 9000800622 Email: rakesh.eeecs@gmail.com
MSME UAN : TS02E0004169 Registration No. : 006115465 Entrepreneurs Memorandum No: 28006220576

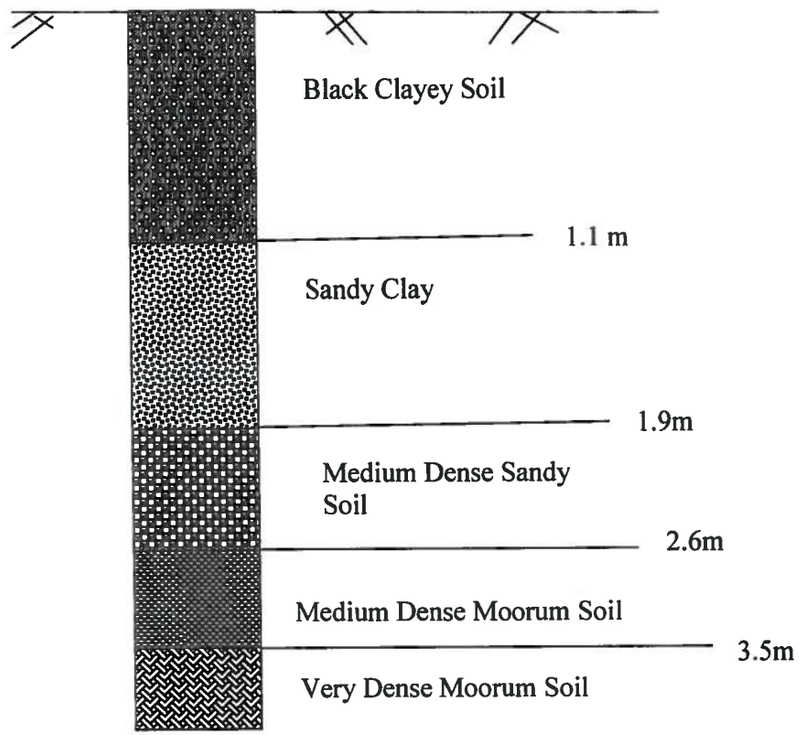

Fig. 7 Soil Profile for Foundation Pit 6

Eadala Rakesh Reddy
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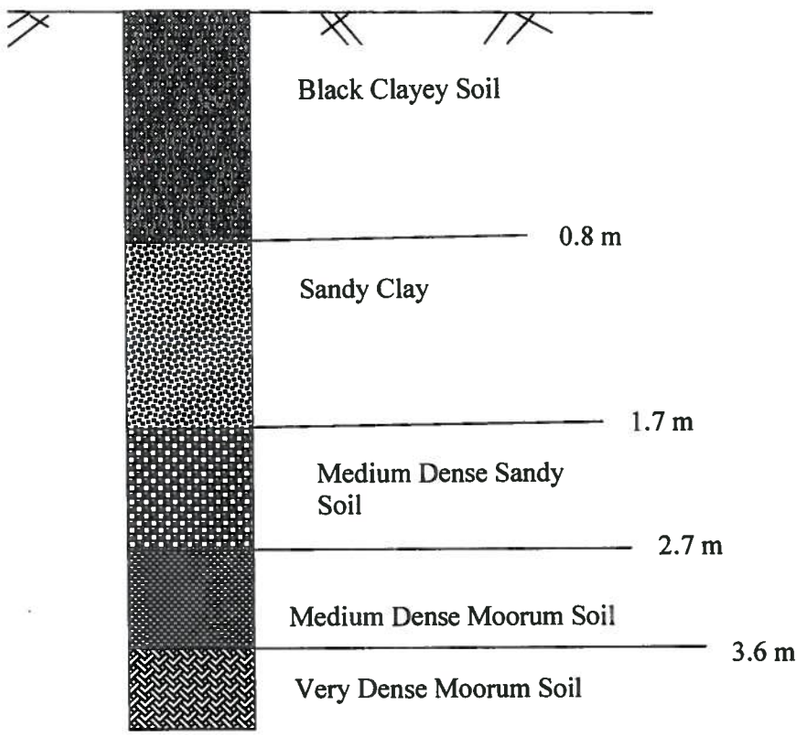

Fig. 8 Soil Profile for Foundation Pit 7

E. Rakesh Reddy

Eadala Rakesh Reddy
B.Tech (JNTUH), M.Tech-Medal (VSSUT, Burla),
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