



INDEX

Description	Page No.
1.0 Introduction	2
2.0 Field Investigation	2
2.1 Site Description	2
2.2 Bore hole Location	2
2.3 Standard penetration test	2
3.0 Laboratory Investigations	3
3.1 Index Properties	3
3.2 Engineering Properties	3
4.0 Calculation of bearing capacity	3
4.1 Bearing capacity based on shear criteria	4
4.2 Bearing capacity based on settlement criteria	5
5.0 Net Allowable bearing capacity	8
6.0 Recommendations	9
7.0 Appendix-I (Notations)	11
8.0 Appendix-II (IS Codes)	13
9.0 Appendix-III (Bore log charts)	14
10.0 Site Plan	18

1.0 INTRODUCTION

Geo-Media Engineering and Consultancy Services (Geo-Media) presents herein our geotechnical report for construction of AIIMS at Bathinda, Punjab. The purpose of this report is to assess subsurface conditions in order to provide geotechnical comments and recommendations for soil characteristics, bearing capacity and earth pressure. Attachments to this report include soil bore-logs, site plan & site pictures.

2.0 FIELD INVESTIGATIONS

2.1 SITE DESCRIPTION

Bathinda, Punjab, India is located in north western region of India and is part of Indo-Gangetic alluvial plains.

1. Geographical coordinates of Site are 30.16°N, 74.92°E
2. Site is situated in village Jodhpur Romana, Tehsil & Distt. Bathinda
3. Bathinda's climate corresponds to semi-arid with high variation between summer and winter temperatures.
4. Average annual rainfall is in a range of 20–40cm.
5. Summer temperatures can be as high as 50°C (122°F)
6. Winter temperatures as low as 0°C (32°F).
7. The level difference in site is 6.80m. Highest level of site is 161.357 & lowest level is 154.559m

The weather is generally dry, but is very humid from mid-May to the end of August. Rainfall is primarily from the south-west due to monsoon weather, and is concentrated in the period July to mid-September.

2.2 BORE HOLE LOCATION:

Four bore holes designated as BH-1, BH-2, BH-3 and BH-4 were used to carry out the desired investigations. The locations of bore holes with reduced levels is shown in site plan (See Attached).

2.3 STANDARD PENETRATION TEST

According to IS code 2131-1981 Standard penetration test was conducted at each bore hole and samples were collected at an interval of 1.5m or at a depth where there is change in strata. N values were recorded at required depths as per the code up to significant depth. N values observed in the field are corrected for both the corrections

- Overburden Pressure Correction $N_n = C_n \times N$
Where C_n is correction for overburden pressure, N = Observed no of blows.
- Dilatancy Correction : This correction is required for fine sands below water table
 $N_c = 15 + (N_n - 15) / 2$ When $N_n > 15$ N_c =corrected value.



3.0 LABORATORY INVESTIGATIONS

3.1 INDEX PROPERTIES

Following Index Properties of the soil samples collected from various depths are determined for the classification of soil.

- Particle size distribution
- Relative density
- Atterbergs limits

3.2 ENGINEERING PROPERTIES

Following Engineering Properties are determined in the laboratory from the tests mentioned against them.

- Shear Strength (c' and Φ' from direct shear test and triaxial shear test)
- Permeability (k from constant and variable head permeability test)
- Compressibility (Compaction and Consolidation test)

4.0 CALCULATION OF BEARING CAPACITY

The soil can fail either in shear or settlement. Net allowable bearing capacity will be determined with both the cases. The criteria, with minimum value will govern the bearing capacity of soil.



4.1 BEARING CAPACITY BASED ON SHEAR CRITERIA

Net ultimate bearing capacity q_{nu} as per IS code 6403--1981.

$$q_{nu} = \frac{2}{3} c' N'_c S_c d_c i_c + \gamma D_f (N_q - 1) S_q d_q i_q + 0.5 \gamma B N'_\gamma S_\gamma d_\gamma i_\gamma W' \quad (\text{local shear failure})$$

$$q_{nu} = c N_c S_c d_c i_c + \gamma D_f (N_q - 1) S_q d_q i_q + 0.5 \gamma B N_\gamma S_\gamma d_\gamma i_\gamma W' \quad (\text{General shear failure})$$

$$\text{Net safe bearing capacity } q_{ns} = q_{nu} / 2.5 \quad \Phi' = \tan^{-1} (2/3 \tan \Phi)$$

N'_c, N'_q, N'_γ are bearing capacity factors for local shear failure.

N_c, N_q, N_γ are bearing capacity factors for general shear failure

d_c, d_q, d_γ are the depth factors

i_c, i_q, i_γ are the Inclination factors

S_c, S_q, S_γ are the Shape factors

The assumed size of square foundation is 1.5m x 1.5m is used for the calculation of bearing capacity. The depth of foundation is taken as 1.0m w.r.t. NSL.

Properties	BH-1	BH-2	BH-3	BH-4
w'	1.00	1.00	1.00	1.00
c	0.00	0.00	0.00	0.00
γ	1.64	1.66	1.63	1.65
Φ	28.00	28.50	27.00	28.50
Φ'	19.52	19.90	18.76	19.90
N_c	14.46	14.75	13.88	14.75
N_q	6.16	6.35	5.79	6.35
N_r	5.13	5.34	4.71	5.34
S_c	1.30	1.30	1.30	1.30
S_q	1.20	1.20	1.20	1.20
S_r	0.80	0.80	0.80	0.80
d_c	1.188	1.190	1.186	1.190
$d_q = d_r$	1.094	1.095	1.093	1.095
q_u	16.63	17.49	15.28	17.39
q_{ns}	6.65	7.00	6.11	6.96



4.2 BEARING CAPACITY BASED ON SETTLEMENT CRITERIA

Both overburden and dilatancy corrections are required to be applied to the observed as per IS2131-1981. Net allowable safe bearing pressure is calculated as the allowable limits given in IS code 8009 part 1 and water table correction factor is taken into consideration.

BH-1

Depth from NSL (m)	N	Over Burden Pressure Kg /cm ²	C _n	N _n	N _c
1.00	05	0.164	1.606	8.03	8.03
1.50	07	0.248	1.468	10.28	10.28
2.00	08	0.333	1.370	10.96	10.96
2.50	08	0.418	1.293	10.35	10.35
3.00	10	0.505	1.230	12.30	12.30
4.50	12	0.772	1.088	13.06	13.06
6.00	14	1.047	0.987	13.81	13.81
7.50	17	1.179	0.947	16.10	15.55
9.00	19	1.315	0.910	17.29	16.15
10.50	24	1.459	0.875	21.01	18.01
12.00	28	1.609	0.843	23.60	19.30
13.50	28	1.759	0.813	22.76	18.88
15.00	29	1.909	0.786	22.78	18.89
16.50	32	2.062	0.760	24.31	19.66
18.00	33	2.215	0.736	24.28	19.64
19.50	35	2.370	0.713	24.97	19.98
21.00	35	2.526	0.692	24.22	19.61
22.50	38	2.686	0.671	25.51	20.26
24.00	42	2.850	0.652	27.37	21.18
25.00	43	2.959	0.639	27.48	21.24



BH-2

Depth from NSL (m)	N	Over Burden Pressure Kg /cm ²	C _n	N _n	N _c
1.00	06	0.166	1.602	9.61	9.61
1.50	08	0.251	1.464	11.71	11.71
2.00	09	0.337	1.366	12.29	12.29
2.50	09	0.423	1.290	11.61	11.61
3.00	11	0.512	1.226	13.49	13.49
4.50	10	0.774	1.087	10.87	10.87
6.00	14	0.899	1.038	14.53	14.53
7.50	19	1.034	0.991	18.82	16.91
9.00	19	1.170	0.949	18.04	16.52
10.50	21	1.310	0.912	19.14	17.07
12.00	16	1.439	0.880	14.08	14.08
13.50	18	1.574	0.850	15.30	15.30
15.00	20	1.712	0.822	16.44	15.72
16.50	26	1.859	0.795	20.66	17.83
18.00	27	2.007	0.769	20.76	17.88
19.50	31	2.159	0.744	23.08	19.04
21.00	33	2.313	0.721	23.81	19.40
22.50	35	2.472	0.699	24.47	19.74
24.00	41	2.633	0.678	27.80	21.40
25.00	43	2.740	0.665	28.59	21.79



BH-3

Depth from NSL (m)	N	Over Burden Pressure Kg /cm ²	C _n	N _n	N _c
1.00	04	0.163	1.608	6.43	6.43
1.50	05	0.246	1.471	7.36	7.36
2.00	07	0.330	1.373	9.61	9.61
2.50	07	0.414	1.297	9.08	9.08
3.00	08	0.500	1.234	9.87	9.87
4.50	13	0.773	1.088	14.15	14.15
6.00	13	0.897	1.038	13.50	13.50
7.50	16	1.025	0.994	15.90	15.90
9.00	16	1.154	0.954	15.26	15.13
10.50	19	1.290	0.917	17.42	16.21
12.00	19	1.427	0.883	16.78	15.89
13.50	22	1.568	0.851	18.73	16.87
15.00	27	1.716	0.821	22.17	18.59
16.50	29	1.816	0.802	23.27	19.13
18.00	32	2.020	0.767	24.53	19.77
19.50	33	2.173	0.742	24.49	19.75
21.00	34	2.329	0.719	24.45	19.72
22.50	36	2.488	0.697	25.09	20.05
24.00	42	2.650	0.676	28.39	21.69
25.00	44	2.759	0.662	29.15	22.07



BH-4

Depth from NSL (m)	N	Over Burden Pressure Kg /cm ²	C _n	N _n	N _c
1.00	04	0.163	1.608	6.43	6.43
1.50	05	0.246	1.471	7.36	7.36
2.00	07	0.330	1.373	9.61	9.61
2.50	07	0.414	1.297	9.08	9.08
3.00	08	0.500	1.234	9.87	9.87
4.50	13	0.773	1.088	14.15	14.15
6.00	13	0.897	1.038	13.50	13.50
7.50	16	1.025	0.994	15.90	15.90
9.00	16	1.154	0.954	15.26	15.13
10.50	19	1.290	0.917	17.42	16.21
12.00	19	1.427	0.883	16.78	15.89
13.50	22	1.568	0.851	18.73	16.87
15.00	27	1.716	0.821	22.17	18.59
16.50	29	1.816	0.802	23.27	19.13
18.00	32	2.020	0.767	24.53	19.77
19.50	33	2.173	0.742	24.49	19.75
21.00	34	2.329	0.719	24.45	19.72
22.50	36	2.488	0.697	25.09	20.05
24.00	42	2.650	0.676	28.39	21.69
25.00	44	2.759	0.662	29.15	22.07

Bore Hole	N _c	Net allowable pressure q _{np} t/m ²
BH-1	10.83	19.52
BH-2	11.60	21.43
BH-3	9.42	16.00
BH-4	11.58	21.39

5.0 NET ALLOWABLE BEARING CAPACITY

The net safe bearing capacity is the least of the bearing capacity based on above two criteria and its value is given in the following table.

Bore Hole	Net safe bearing capacity q _{ns} t/m ²	Net safe pressure q _{np} t/m ²	Net Allowable Bearing Capacity (t /m ²)
1	6.65	19.52	6.65
2	7.00	21.43	7.00
3	6.11	16.00	6.11
4	6.96	21.39	6.96

Geo Media Engineering & Consultancy Services

(An ISO 9001:2008 Certified Company)

Opp. I.T.I., Mansa Road, Bathinda-151001 Phone: 0164-5012700 (O), Fax: 0164-2222636,
 Cell: 9569670700, 9780143902 Email: geomediaengineering@gmail.com, Website: www.geomediaengg.com

6.0 RECOMMENDATIONS

i) Net allowable bearing capacity is given in following table:

Sr. No.	Depth of foundation w.r.t NSL (m)	Size of Foundation (m)	Type of Foundation	Net Allowable Bearing Capacity(t/m ²)	Gross Safe Bearing Capacity(t/m ²)
1	1.00	1.00	Strip	5.31	6.94
2	1.00	1.5 x 1.5	Square	6.11	6.96
3	1.00	2.0 x 2.0	Square	6.64	8.27
4	1.50	1.5 x 1.5	Square	9.27	11.73
5	1.50	2.0 x 2.0	Square	9.73	12.19
6	2.00	1.5 x 1.5	Square	13.38	16.68
7	2.00	2.0 x 2.0	Square	13.71	17.01
8	2.50	1.5 x 1.5	Square	17.66	22.07
9	2.50	2.0 x 2.0	Square	16.85	20.99
10	3.00	1.5 x 1.5	Square	23.69	28.69
11	3.00	2.0 x 2.0	Square	23.70	28.70
12	1.00	20.0 x 70.0	Rect. Raft	19.11	20.74
13	1.50	20.0 x 70.0	Rect. Raft	19.46	21.92
14	2.00	20.0 x 70.0	Rect. Raft	20.22	23.59
15	2.50	20.0 x 70.0	Rect. Raft	21.06	25.20
16	3.00	20.0 x 70.0	Rect. Raft	21.20	26.31

- ii) Above tables indicate that soil is capable of taking loads at 1m, 1.5m, 2.0m, 2.5m depth w.r.t NSL. Only economy criteria will decide about the depth of foundation by the structural engineer as per the requirements.
- iii) Strip/Isolated footing is recommended for the boundary wall.
- iv) Isolated footings are recommended for the buildings.
- v) Bearing Capacity is calculated at various depths. Please see table at S. No.(i).
- vi) Virgin soil need not to be removed from geotechnical requirements as the soil is capable of taking load of super structure. Soil can be removed to fulfill the gradient requirements. It is further added that soil becomes stronger as depth w.r.t NSL increases.
- vii) Ground improvements are not required.
- viii) As the site is not levelled and have approximately an elevation difference of 6.8m. Highest R.L. of site is 161.357 & lowest level is 154.559m
- ix) R.L of parking area of adjoining Fish market is 156.512m. Locally available soil from the site is suitable for the filling in low lying areas. The soil should be compacted at optimum



moisture content to achieve more than 95% maximum dry unit weight at site by using smooth wheel roller or sheep foot rollers.

- x) Water table is shown on bore log charts.
- xi) Bore log charts are attached.
- xii) For pile foundation the capacity of piles with varied depth & size of pile has been tabulated below. Actual pile load carrying capacity can be calculated by conducting pile load test on test pile:-

Diameter of pile (cm)	Pile length (m)	Load carrying capacity of straight pile in tones	Load carrying capacity of double under rammed pile in tones
50	10	63.90	79.87
50	12	77.77	97.22
50	15	101.45	126.81

For
Geo Media Engineering &
Consultancy Services
Bathinda 13/12/2015

Geo Media Engineering & Consultancy Services

(An ISO 9001:2008 Certified Company)

Opp. I.T.I., Mansa Road, Bathinda-151001 Phone: 0164-5012700 (O), Fax: 0164-2222636,
Cell: 9569670700, 9780143902 Email: geomediaengineering@gmail.com, Website: www.geomediaengg.com



Appendix I

N'_C, N'_q, N'_γ	=	Bearing capacity factors for local shear failure.
N_C, N_q, N_γ	=	Bearing capacity factors for general shear failure.
S_C, S_q, S_γ	=	Shape factors.
d_C, d_q, d_γ	=	Depth factors.
W'	=	Water table correction factor.
N	=	Observed SPT value.
N_N	=	Normalised SPT value.
C_N	=	Correction factor.
N_c	=	Corrected N value
γ	=	Bulk unit weight.
γ'	=	Submerged unit weight
γ_d	=	Dry unit weight.
γ_{sat}	=	Saturated unit weight.
G	=	Specific gravity of soil.
LL	=	Liquid Limit.
PL	=	Plastic Limit.
PI	=	Plasticity Index.
GSF	=	General shear failure.
LSF	=	Local shear failure.
q_u	=	Unconfined compressive strength.
c_u	=	Un-drained shear strength
c_c	=	Compression index
B	=	Width of foundation
L	=	Length of foundation
D_f	=	Depth of foundation
H	=	Thickness of clayey layer
B_t	=	Top width of sandy layer
H	=	Thickness of sandy layer
q	=	Effective surcharge
Φ'	=	Angle of shearing resistance
Φ'_m	=	Mobilised angle of shearing resistance
c'	=	Cohesion intercept
$SSWL$	=	Sub soil water level
q_u	=	Ultimate bearing capacity
q_{nu}	=	Net ultimate bearing capacity
q_{ns}	=	Net safe bearing capacity against shear failure
q_{np}	=	Net safe bearing pressure against settlement failure
q_a	=	Allowable bearing capacity
WT	=	Water Table
GW	=	Well graded gravels



GP	=	Poorly graded gravels
GM	=	Silty gravels
GC	=	Clayey gravels
SW	=	Well graded Sand
SP	=	Poorly graded Sand
GM	=	Silty Sand
GC	=	Clayey Sand
CL	=	Clay of low compressibility
ML	=	Silt of low compressibility
CI	=	Clay of medium compressibility
MI	=	Silt of medium compressibility
CH	=	Clay of high compressibility
MH	=	Silt of high compressibility
S_t	=	Total settlement
S_a	=	Allowable settlement
S_o	=	Settlement due to net unit foundation loading intensity
BH	=	Bore hole
OBP	=	overburden pressure
NSL	=	Natural surface level
C_1	=	Correction factor for depth of foundation embedment
C_2	=	Correction factor for creep in soils
I_z	=	Influence factor
E_s	=	Modulus of elasticity
ESL	=	Existing Site Level





Appendix-II



I. S. Codes

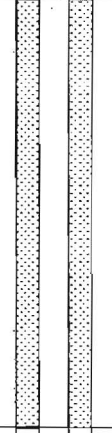

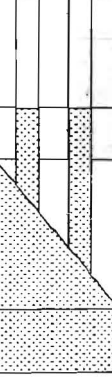
Following IS Codes are used for the testing and calculations in this report.



1. IS:1904-1986, "Design & Construction of Foundation in Soils, General Requirements."
2. IS:2131-1981, "Method for Standard Penetration Test for Soil."
3. IS:2720-Part-2 1973, "Determination of Water Content."
4. IS:2720-Part-3 1980, "Determination of Specific gravity-Fine-grained soils."
5. IS:2720-Part-4 1975, "Grain size analysis."
6. IS:2720-Part-5 1970, "Determination of Liquid and Plastic Limits."
7. IS:2720-Part-13 1982, "Direct Shear Test"
8. IS:2720-Part-15 1986, "Determination of Consolidation Properties."
9. IS:6403-1981, "Code of Practice for Determination of Bearing Capacity of Shallow Foundation"
10. IS:8009-Part 2-1980, "Code of Practice for calculations of settlement of Foundation-Deep Foundation subjected To Symmetrical Static Vertical Loading."
11. IS:8763-1978, "Guide for Undisturbed Sampling of Sand."
12. IS:9259-1979, "Specifications for Liquid Limit Apparatus for Soils."
13. IS:9640-1981, "Specifications for Split-spoon Sampler."

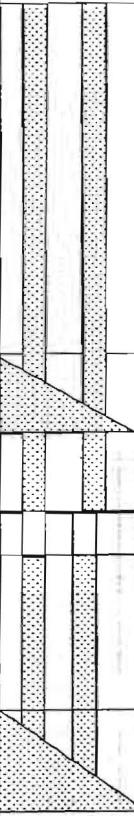

Soil Profile	GEO MEDIA ENGINEERING AND CONSULTANCY SERVICES, BATHINDA			Bore Chart
 GEO MEDIA	CONSTRUCTION OF AIIMS AT BATHINDA, PUNJAB.			
	W.T.DEPTH: 5.7m wrt NSL	Bore Hole No. 01 OF 04	Testing Date:-09.12.2015 to 14.12.2015	
	Ref. No. : 1965	Dated : 02.12.2015	IS Ref.: IS 2131,2720(2,4,5,7,10,13,15)	
	Remarks:-----			



REDUCED LEVEL (m)	DEPTH FROM NSL (m)	SYMBOLIC REPRESENTATION	GRAIN SIZE ANALYSIS (%)			I.S. CLASSIFICATION	CONSISTENCY CHARACTERISTICS (%)		BULK UNIT WEIGHT γ (t/m ³)	STRENGTH PROPERTIES		S.P.T. VALUE (OBSERVED)		REMARKS
			GRAVEL	SAND	SILT & CLAY		L.L.	P.I.		C' (t/m ²)	ϕ°	N	GRAPHICAL	
154.5	1.00		0.00	72.16	27.84	SM	NP	NP	1.64	0.00	28.00	05		SILTY SAND
154.0	1.50		0.00	73.06	26.94	SM	NP	NP	1.68	0.00	29.00	07		
153.5	2.00		0.00	69.00	31.00	SM	NP	NP	1.70	0.00	29.25	08		
153.0	2.50		0.00	67.24	32.76	SM	NP	NP	1.70	0.00	29.25	08		
152.5	3.00		0.00	71.52	28.48	SM	NP	NP	1.74	0.00	29.75	10		
151.0	4.50		0.00	86.18	13.82	SM	NP	NP	1.78	0.00	30.25	12		SILT OF LOW COMPRESSIBILITY SILTY SAND
149.5	6.00		0.00	43.64	56.36	ML	NP	NP	1.83	0.00	30.75	14		
148.0	7.50		0.00	48.66	51.34	ML	NP	NP	1.88	0.00	31.00	17		
146.5	9.00		0.00	66.72	33.28	SM	NP	NP	1.91	0.00	31.25	19		
145.0	10.50		0.00	96.92	03.08	SP	NP	NP	1.96	—	—	24		
143.5	12.00		0.00	97.56	02.44	SP	NP	NP	2.00	—	—	28		POORLY GRADED SAND-SILTY SAND
142.0	13.50		0.00	95.56	04.44	SP	NP	NP	2.00	—	—	28		
140.5	15.00		0.00	96.60	03.40	SP	NP	NP	2.00	—	—	29		
139.0	16.50		0.00	83.80	16.20	SM	NP	NP	2.02	—	—	32		
137.5	18.00		0.00	85.44	14.56	SM	NP	NP	2.02	—	—	33		
136.0	19.50		0.00	94.52	05.48	SP-SM	NP	NP	2.03	—	—	35		POORLY GRADED SAND-SILTY SAND
134.5	21.00		0.00	93.11	06.89	SP-SM	NP	NP	2.04	—	—	35		
133.0	22.50		0.00	94.09	05.91	SP-SM	NP	NP	2.07	—	—	38		
131.5	24.00		0.00	96.78	03.22	SP	NP	NP	2.09	—	—	42		
130.5	25.00		0.00	97.23	02.77	SP	NP	NP	2.09	—	—	43		

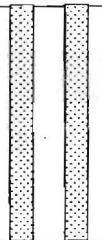



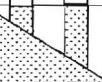

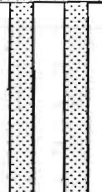
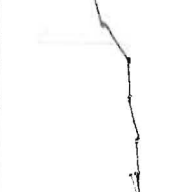
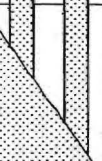

Soil Profile	GEO MEDIA ENGINEERING AND CONSULTANCY SERVICES, BATHINDA			Bore Chart
 GEO MEDIA	CONSTRUCTION OF AIIMS AT BATHINDA, PUNJAB.			 T-2028
	W.T.DEPTH: 5.0m wrt NSL	Bore Hole No. 01 OF 04	Testing Date:-10.12.2015 to 14.12.2015	
	Ref. No. : 1965	Dated : 02.12.2015	IS Ref.: IS 2131,2720(2,4,5,7,10,13,15)	
	Remarks:-----			

REDUCED LEVEL (m)	DEPTH FROM NSL (m)	SYMBOL IC REPRESENTATION	GRAIN SIZE ANALYSIS (%)			I.S. CLASSIFICATION	CONSISTENCY CHARACTERISTICS (%)		BULK UNIT WEIGHT	STRENGTH PROPERTIES		S.P.T. VALUE (OBSERVED)		REMARKS
			GRAVEL	SAND	SILT & CLAY		L.L	P.I.		C' (t/m ²)	φ°	N	GRAPHICAL	
153.8	1.00		0.00	69.03	30.97	SM	NP	NP	1.66	0.00	28.50	06		SILTY SAND
153.3	1.50		0.00	65.36	34.64	SM	NP	NP	1.70	0.00	29.25	08		
152.8	2.00		0.00	70.06	29.94	SM	NP	NP	1.72	0.00	29.50	09		
152.3	2.50		0.00	71.35	28.65	SM	NP	NP	1.72	0.00	29.50	09		
151.8	3.00		0.00	63.90	36.10	SM	NP	NP	1.77	0.00	30.00	11		
150.3	4.50		0.00	83.40	16.60	SM	NP	NP	1.75	0.00	29.75	10		
148.8	6.00		0.00	86.36	13.64	SM	NP	NP	1.83	0.00	30.75	14		
147.3	7.50		0.00	79.92	20.08	SM	NP	NP	1.90	0.00	31.25	19		
145.8	9.00		0.00	80.14	19.86	SM	NP	NP	1.91	0.00	31.25	19		
144.3	10.50		0.00	84.26	15.74	SM	NP	NP	1.93	—	—	21		
142.8	12.00		0.00	14.00	86.00	ML	NP	NP	1.86	—	—	16	SILT OF LOW COMPRESSIBILITY	
141.3	13.50		0.00	23.96	76.04	ML	NP	NP	1.90	—	—	18		
139.8	15.00		0.00	07.98	92.02	ML	23.56	4.11	1.92	—	—	20	SILTY SAND	
138.3	16.50		0.00	86.74	13.26	SM	NP	NP	1.98	—	—	26		
136.8	18.00		0.00	89.10	10.90	SP-SM	NP	NP	1.99	—	—	27	POORLY GRADED SAND-SILTY SAND	
135.3	19.50		0.00	90.56	09.44	SP-SM	NP	NP	2.01	—	—	31		
133.8	21.00		0.00	94.71	05.29	SP-SM	NP	NP	2.03	—	—	33	POORLY GRADED SAND	
132.3	22.50		0.00	93.86	06.14	SP-SM	NP	NP	2.06	—	—	35		
130.8	24.00		0.00	97.02	02.98	SP	NP	NP	2.07	—	—	41		
129.8	25.00		0.00	98.74	01.26	SP	NP	NP	2.07	—	—	43		

Soil Profile	GEO MEDIA ENGINEERING AND CONSULTANCY SERVICES, BATHINDA			Bore Chart
 GEO MEDIA	CONSTRUCTION OF AIIMS AT BATHINDA, PUNJAB.			
	W.T.DEPTH: 4.7m wrt NSL	Bore Hole No. 03 OF 04	Testing Date:-11.12.2015 to 14.12.2015	
	Ref. No. : 1965	Dated : 02.12.2015	IS Ref.: IS 2131,2720(2,4,5,7,10,13,15)	
	Remarks:-----			

REDUCED LEVEL (m)	DEPTH FROM NSL (m)	SYMBOLIC REPRESENTATION	GRAIN SIZE ANALYSIS (%)			I.S. CLASSIFICATION	CONSISTENCY CHARACTERISTICS (%)		BULK UNIT WEIGHT γ (t/m^3)	STRENGTH PROPERTIES		S.P.T. VALUE (OBSERVED)		REMARKS
			GRAVEL	SAND	SILT & CLAY		L.L	P.I.		C' (t/m^2)	ϕ°	N	GRAPHICAL	
154.1	1.00		0.00	65.16	34.84	SM	NP	NP	1.63	0.00	27.00	04		SILTY SAND
153.6	1.50		0.00	65.05	34.95	SM	NP	NP	1.65	0.00	28.00	05		
153.1	2.00		0.00	66.24	33.76	SM	NP	NP	1.68	0.00	29.00	07		
152.6	2.50		0.00	68.60	31.40	SM	NP	NP	1.69	0.00	29.00	07		
152.1	3.00		0.00	62.36	37.64	SM	NP	NP	1.71	0.00	29.25	08		
150.6	4.50		0.00	76.78	23.22	SM	NP	NP	1.82	0.00	30.50	13		
149.1	6.00		0.00	79.86	20.14	SM	NP	NP	1.83	0.00	30.50	13		
147.6	7.50		0.00	80.98	19.02	SM	NP	NP	1.85	0.00	31.00	16		
146.1	9.00		0.00	91.90	08.10	SP-SM	NP	NP	1.86	0.00	31.00	16		POORLY GRADED SAND-SILTY SAND
144.6	10.50		0.00	94.42	05.58	SP-SM	NP	NP	1.91	0.00	31.75	19		
143.1	12.00		0.00	87.80	12.20	SM	NP	NP	1.91	0.00	31.75	19		SILTY SAND
141.6	13.50		0.00	86.52	13.48	SM	NP	NP	1.94	0.00	32.00	22		SILT OF LOW COMPRESSIBILITY
140.1	15.00		0.00	09.86	90.14	ML	23.05	4.02	1.99	0.00	32.75	27		SILTY SAND
139.1	16.00		0.00	74.42	25.58	SM	NP	NP	2.00	0.00	33.00	29		
137.1	18.00		0.00	87.79	12.21	SM	NP	NP	2.02	0.00	33.00	32		
135.6	19.50		0.00	67.96	32.04	SM	NP	NP	2.02	0.00	33.25	33		
134.1	21.00		0.00	79.10	20.90	SM	NP	NP	2.04	0.00	33.50	34		POORLY GRADED SAND-SILTY SAND
132.6	22.50		0.00	91.56	08.44	SP-SM	NP	NP	2.06	0.00	33.50	36		
131.1	24.00		0.00	94.34	05.66	SP-SM	NP	NP	2.08	0.00	34.25	42		
130.1	25.00		0.00	93.67	06.33	SP-SM	NP	NP	2.09	0.00	34.50	44		

Soil Profile	GEO MEDIA ENGINEERING AND CONSULTANCY SERVICES, BATHINDA			Bore Chart
 GEO MEDIA	CONSTRUCTION OF AIIMS AT BATHINDA, PUNJAB.			 T-2025
	W.T.DEPTH: 5.8m wrt NSL	Bore Hole No. 04 OF 04	Testing Date:-12.12.2015 to 14.12.2015	
	Ref. No. : 1965	Dated : 02.12.2015	IS Ref.: IS 2131,2720(2,4,5,7,10,13,15)	
	Remarks:-----			

REDUCED LEVEL (m)	DEPTH FROM NSL (m)	SYMBOL IC REPRESENTATION	GRAIN SIZE ANALYSIS (%)			I.S. CLASSIFICATION	CONSISTENCY CHARACTERISTICS (%)		BULK UNIT WEIGHT γ (t/m^3)	STRENGTH PROPERTIES		S.P.T. VALUE (OBSERVED)		REMARKS
			GRAVEL	SAND	SILT & CLAY		L.L	P.I.		C' (t/m^2)	ϕ°	N	GRAPHICAL	
156.6	1.00		0.00	63.46	36.54	SM	NP	NP	1.65	0.00	28.50	06		SILTY SAND
156.1	1.50		0.00	66.32	33.68	SM	NP	NP	1.67	0.00	29.00	07		
155.6	2.00		0.00	64.94	35.06	SM	NP	NP	1.68	0.00	29.00	07		
155.1	2.50		0.00	65.80	34.20	SM	NP	NP	1.70	0.00	29.50	08		
154.6	3.00		0.00	64.58	35.42	SM	NP	NP	1.75	0.00	29.50	10		
153.1	4.50		0.00	07.84	92.16	ML	25.78	4.58	1.85	0.05	31.00	16		SILT OF LOW COMPRESSIBILITY
151.6	6.00		0.00	02.86	97.14	ML	26.89	5.37	1.92	0.05	31.25	20		
150.1	7.50		0.00	03.86	96.14	ML	26.09	4.94	1.95	0.05	32.00	23		
148.6	9.00		0.00	90.58	09.42	SP-SM	NP	NP	1.96	0.00	32.00	24		POORLY GRADED SAND-SILTY SAND
147.1	10.50		0.00	92.84	07.16	SP-SM	NP	NP	1.95	—	—	25		
145.6	12.00		0.00	86.74	13.26	SM	NP	NP	2.00	—	—	28		
144.1	13.50		0.00	84.58	15.42	SM	NP	NP	2.04	—	—	34		SILTY SAND
142.6	15.00		0.00	87.73	12.27	SM	NP	NP	2.04	—	—	34		
141.1	16.50		0.00	86.76	13.24	SM	NP	NP	2.06	—	—	36		
139.6	18.00		0.00	85.44	14.56	SM	NP	NP	2.06	—	—	37		
138.1	19.50		0.00	94.29	05.71	SP-SM	NP	NP	2.07	—	—	39		
136.6	21.00		0.00	91.81	08.19	SP-SM	NP	NP	2.08	—	—	40		POORLY GRADED SAND-SILTY SAND
135.1	22.50		0.00	93.72	06.28	SP-SM	NP	NP	2.08	—	—	41		
133.6	24.00		0.00	92.57	07.43	SP-SM	NP	NP	2.09	—	—	43		
132.6	25.00		0.00	94.78	05.22	SP-SM	NP	NP	2.09	—	—	45		

SITE PLAN OF SOIL INVESTIGATION FOR PROPOSED SITE OF AIIMS BATHINDA PUNJAB.

