BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-20 (Sheet 1)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3285.00, S= 1928.48		E.G.L.: 33.86		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 31.03.2018
Depth of Boring	35.000 M.	SPT	17	UDS	8	WS		Completed on : 02.04.2018
Type of Drilling		DCPT		DS	20	RCS		Water Struck At : 0.50 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.40 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Filled up soil with sand, rubbish etc.		G.W.T		DS1	0.50 M
Medium to stiff brownish grey clayey silt/ silty clay.		01		DS2	1.00M
				DS3	1.50M
		02		UDS1	2.00-2.45M
		03	N = 4	SPT1	3.00-3.45M
				DS4	3.00-3.45M
		04		UDS2	4.00-4.45M
		05	N = 5	SPT2	5.00-5.45M
				DS5	5.00-5.45M
		06		UDS3	6.00-6.45M
		07	N = 9	SPT3	7.00-7.45M
				DS6	7.00-7.45M
		08		UDS4	8.00-8.45M
		09	N = 14	SPT4	9.00-9.45M
				DS7	9.00-9.45M
		10		UDS5	10.00-10.45M
		11			
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.			N = 17	SPT5	11.50-11.95M
		12		DS8	11.50-11.95M
		13		UDS6	13.00-13.45M
		14			
		15	N = 18	SPT6	14.50-14.95M
				DS9	14.50-14.95M
		16		UDS7	16.00-16.45M
		17			
		18	N = 21	SPT7	17.50-17.95M
				DS10	17.50-17.95M
		19		UDS8	19.00-19.45M
		20			
		21	N = 24	SPT8	20.50-20.95M
				DS11	20.50-20.95M
		22	N = 27	SPT9	22.00-22.45M
				DS12	22.00-22.45M
		23			
		24	N = 30	SPT10	23.50-23.95M
				DS13	23.50-23.95M
Contd.....					

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET		Centre for Advanced Engineering						Bore Hole No.: BH-20 (Sheet 2)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3285.00, S= 1928.48		E.G.L.: 33.86		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS.	Commenced on : 31.03.2018
Depth of Boring	35.000 M.	SPT	17	UDS	8	WS		Completed on : 02.04.2018
Type of Drilling		DCPT		DS	20	RCS		Water Struck At : 0.50 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.40 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		26	N = 32	SPT11 DS14	25.00-25.45M 25.00-25.45M
		27	N = 36	SPT12 DS15	26.50-26.95M 26.50-26.95M
		28	N = 40	SPT13 DS16	28.00-28.45M 28.00-28.45M
		29			
		30	N = 43	SPT14 DS17	29.50-29.95M 29.50-29.95M
		31	N = 45	SPT15 DS18	31.00-31.45M 31.00-31.45M
		32			
		33	N = 48	SPT16 DS19	32.50-32.95M 32.50-32.95M
		34	N = 51	SPT17 DS20	34.55-35.00M 34.55-35.00M
Termination Depth 35.000 Mtr.		35			
		36			
		37			
		38			
		39			
		40			
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET		Centre for Advanced Engineering						Bore Hole No.: BH-22 (Sheet 1)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 2914.40, S= 1939.80		E.G.L.: 35.365		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS.	Commenced on : 16.03.2018
Depth of Boring	35.000 M.	SPT	17	UDS	8	WS		Completed on : 17.03.2018
Type of Drilling		DCPT		DS	20	RCS		Water Struck At : 1.50 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 1.40 M.

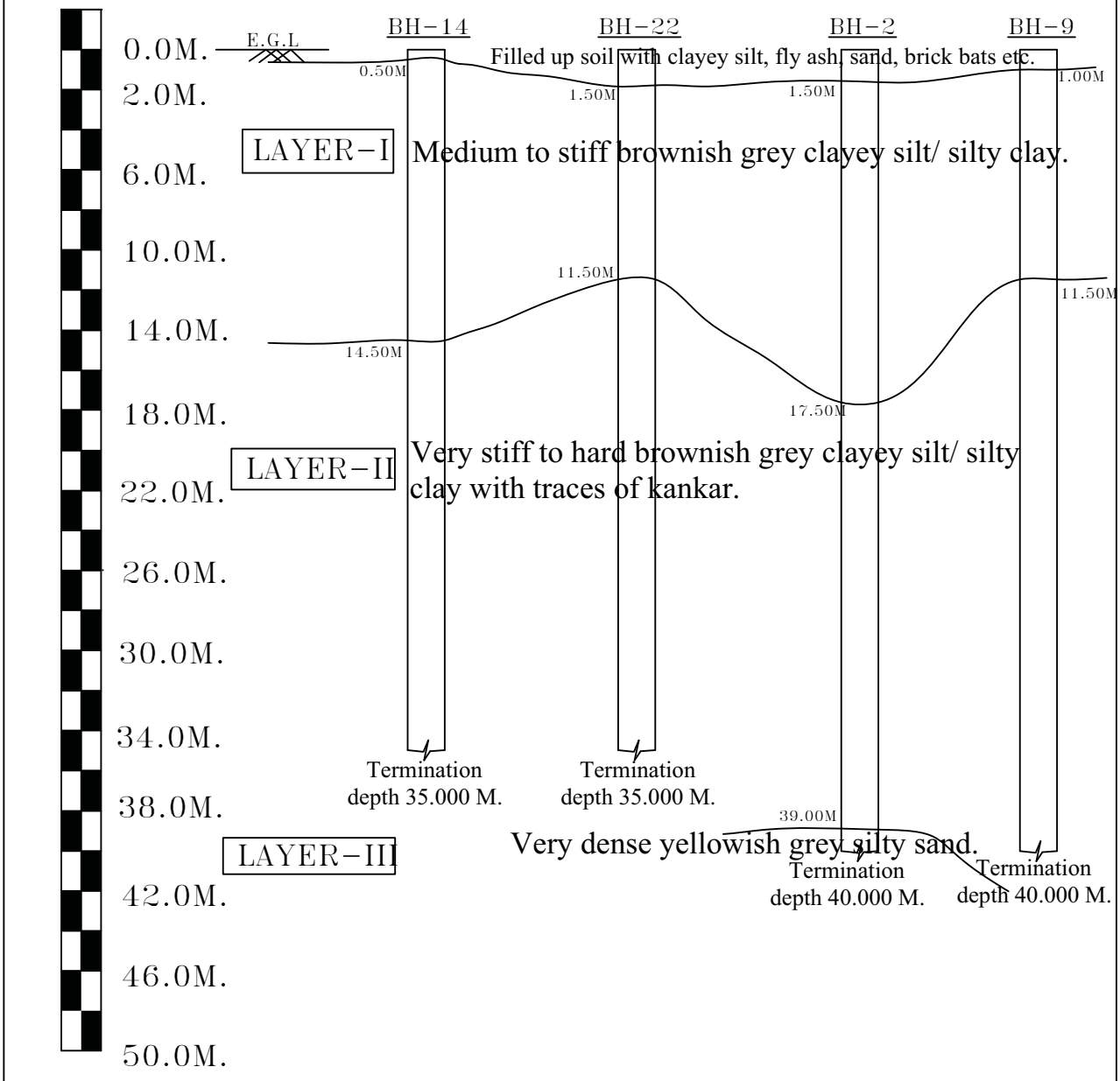
DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Filled up soil with clayey silt, fly ash, coal dust, sand, brick bats etc.		01 G.W.T		DS1	0.50 M
				DS2	1.00M
Medium to stiff brownish grey clayey silt/ silty clay.		02		DS3	1.50M
				UDS1	2.00-2.45M
		03	N = 6	SPT1	3.00-3.45M
				DS4	3.00-3.45M
		04		UDS2	4.00-4.45M
		05	N = 6	SPT2	5.00-5.45M
				DS5	5.00-5.45M
		06		UDS3	6.00-6.45M
		07	N = 8	SPT3	7.00-7.45M
				DS6	7.00-7.45M
		08		UDS4	8.00-8.45M
		09	N = 11	SPT4	9.00-9.45M
				DS7	9.00-9.45M
		10		UDS5	10.00-10.45M
		11			
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		12	N = 16	SPT5	11.50-11.95M
				DS8	11.50-11.95M
		13		UDS6	13.00-13.45M
		14			
		15	N = 20	SPT6	14.50-14.95M
				DS9	14.50-14.95M
		16		UDS7	16.00-16.45M
		17			
		18	N = 21	SPT7	17.50-17.95M
				DS10	17.50-17.95M
		19		UDS8	19.00-19.45M
		20			
		21	N = 23	SPT8	20.50-20.95M
				DS11	20.50-20.95M
		22	N = 24	SPT9	22.00-22.45M
				DS12	22.00-22.45M
		23			
		24	N = 25	SPT10	23.50-23.95M
				DS13	23.50-23.95M
Contd.....					

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET		Centre for Advanced Engineering						Bore Hole No.: BH-22 (Sheet 2)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 2914.40, S= 1939.80		E.G.L.: 35.365		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 16.03.2018
Depth of Boring	35.000 M.	SPT	17	UDS	8	WS		Completed on : 17.03.2018
Type of Drilling		DCPT		DS	20	RCS		Water Struck At : 1.50 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 1.40 M.

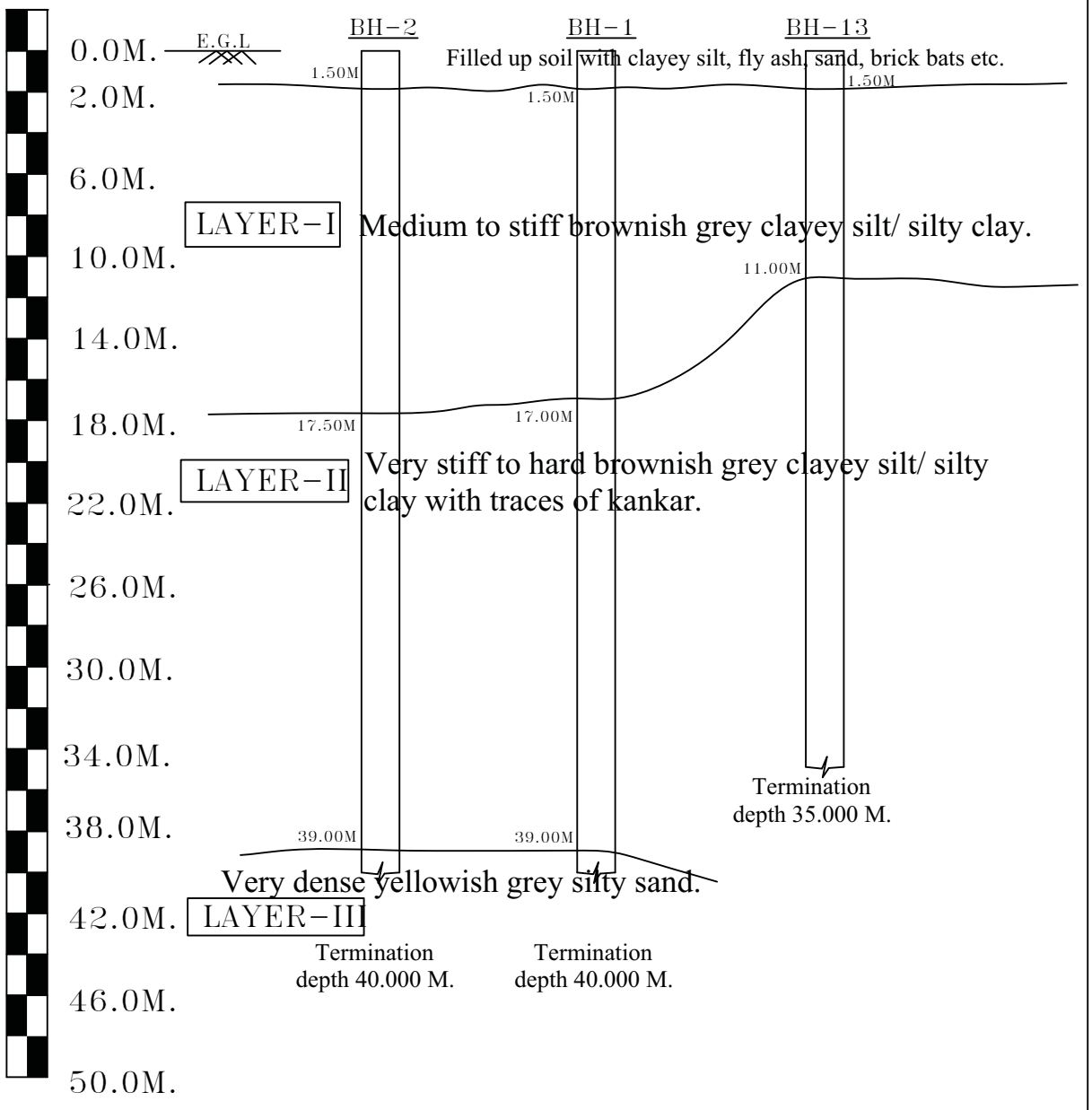
DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		26	N = 27	SPT11 DS14	25.00-25.45M 25.00-25.45M
		27	N = 29	SPT12 DS15	26.50-26.95M 26.50-26.95M
		28	N = 29	SPT13 DS16	28.00-28.45M 28.00-28.45M
		29			
		30	N = 34	SPT14 DS17	29.50-29.95M 29.50-29.95M
		31	N = 35	SPT15 DS18	31.00-31.45M 31.00-31.45M
		32			
		33	N = 36	SPT16 DS19	32.50-32.95M 32.50-32.95M
		34	N = 39	SPT17 DS20	34.55-35.00M 34.55-35.00M
Termination Depth 35.000 Mtr.		35			
		36			
		37			
		38			
		39			
		40			
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample



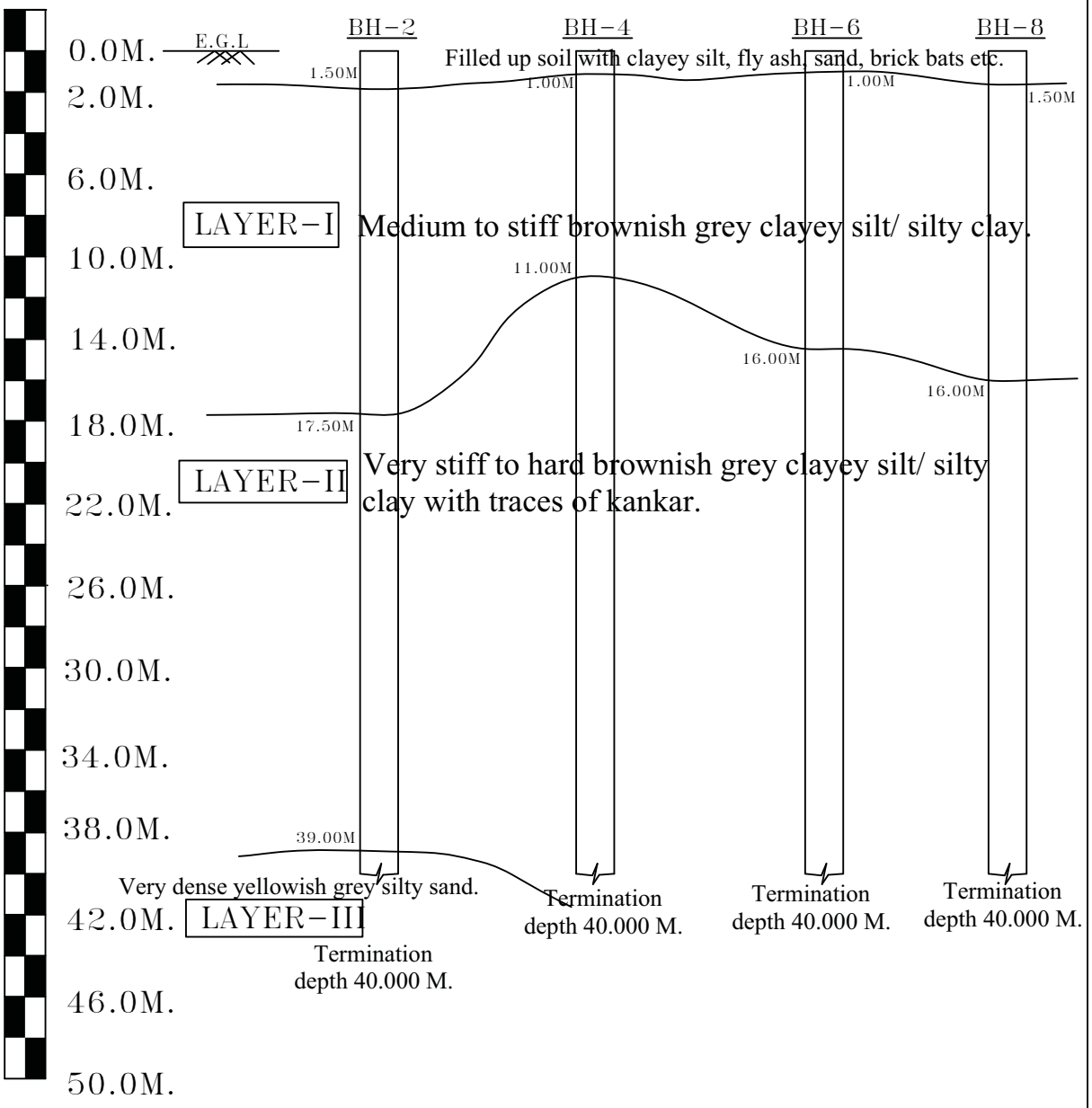
Sub-Soil Profile through BH-14, BH-22, BH-2 & BH-9

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	02	1 of 5



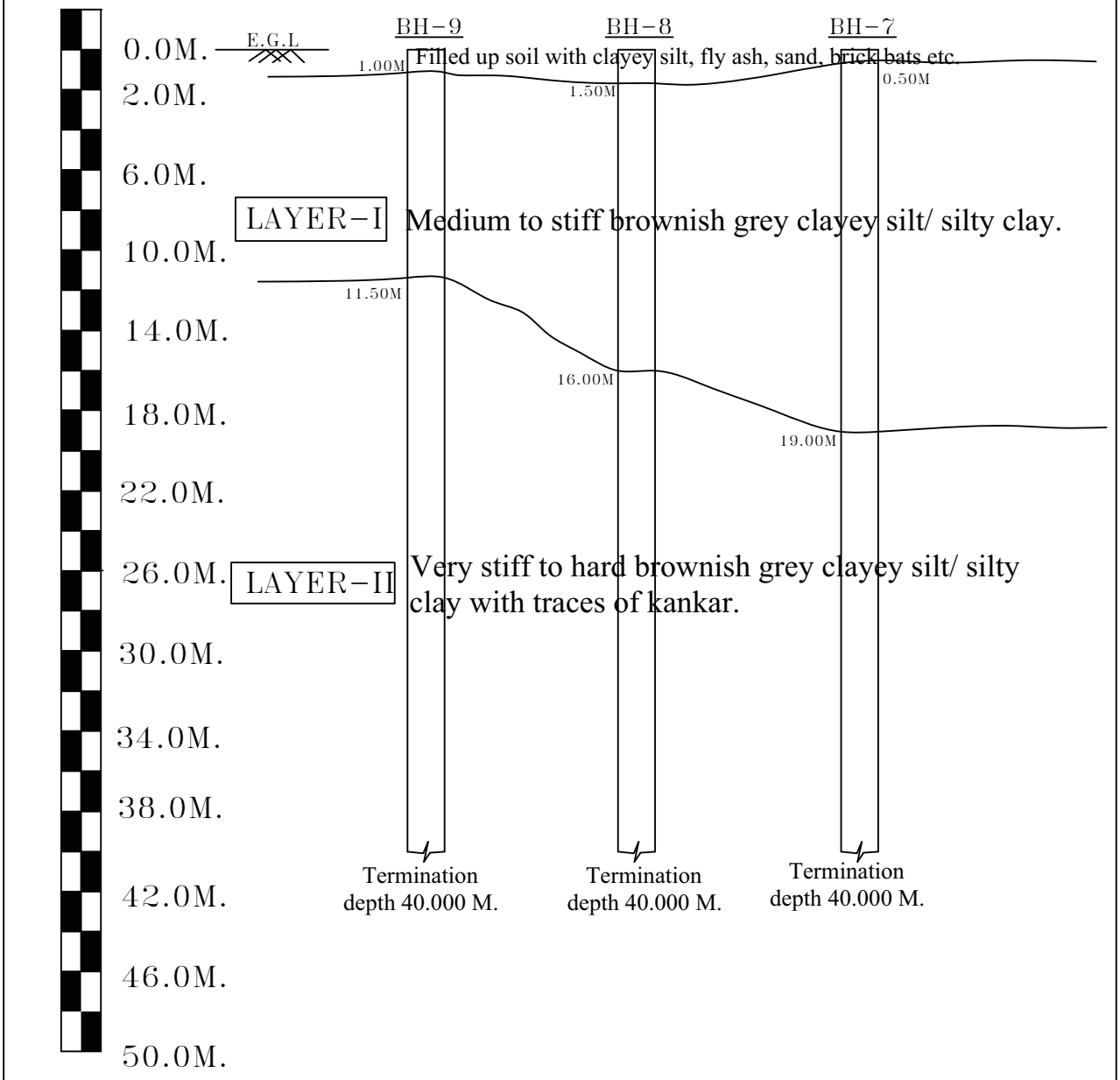
Sub-Soil Profile through BH-2, BH-1 & BH-13

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	02	2 of 5



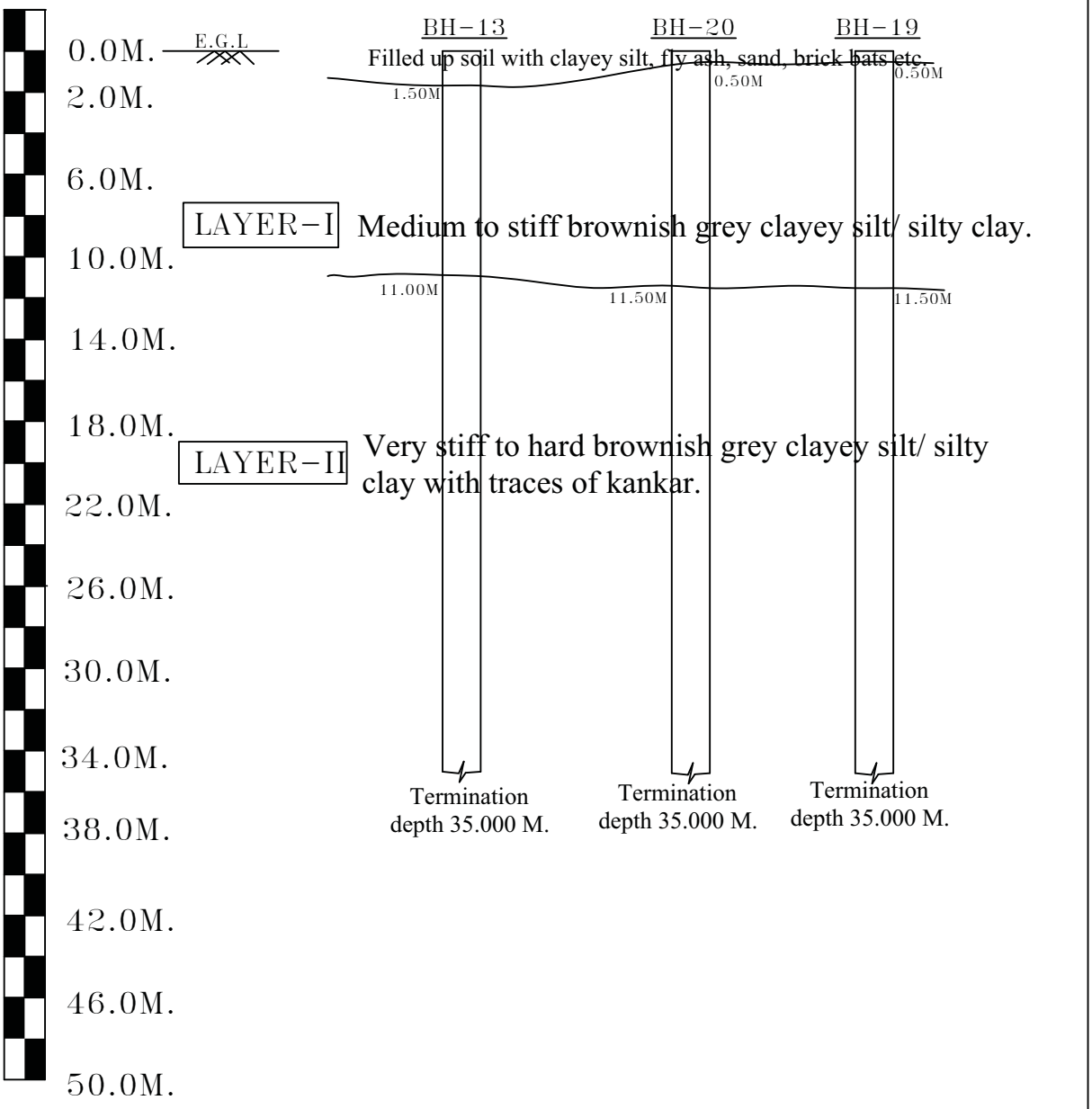
Sub-Soil Profile through BH-2, BH-4, BH-6 & BH-8

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	02	3 of 5



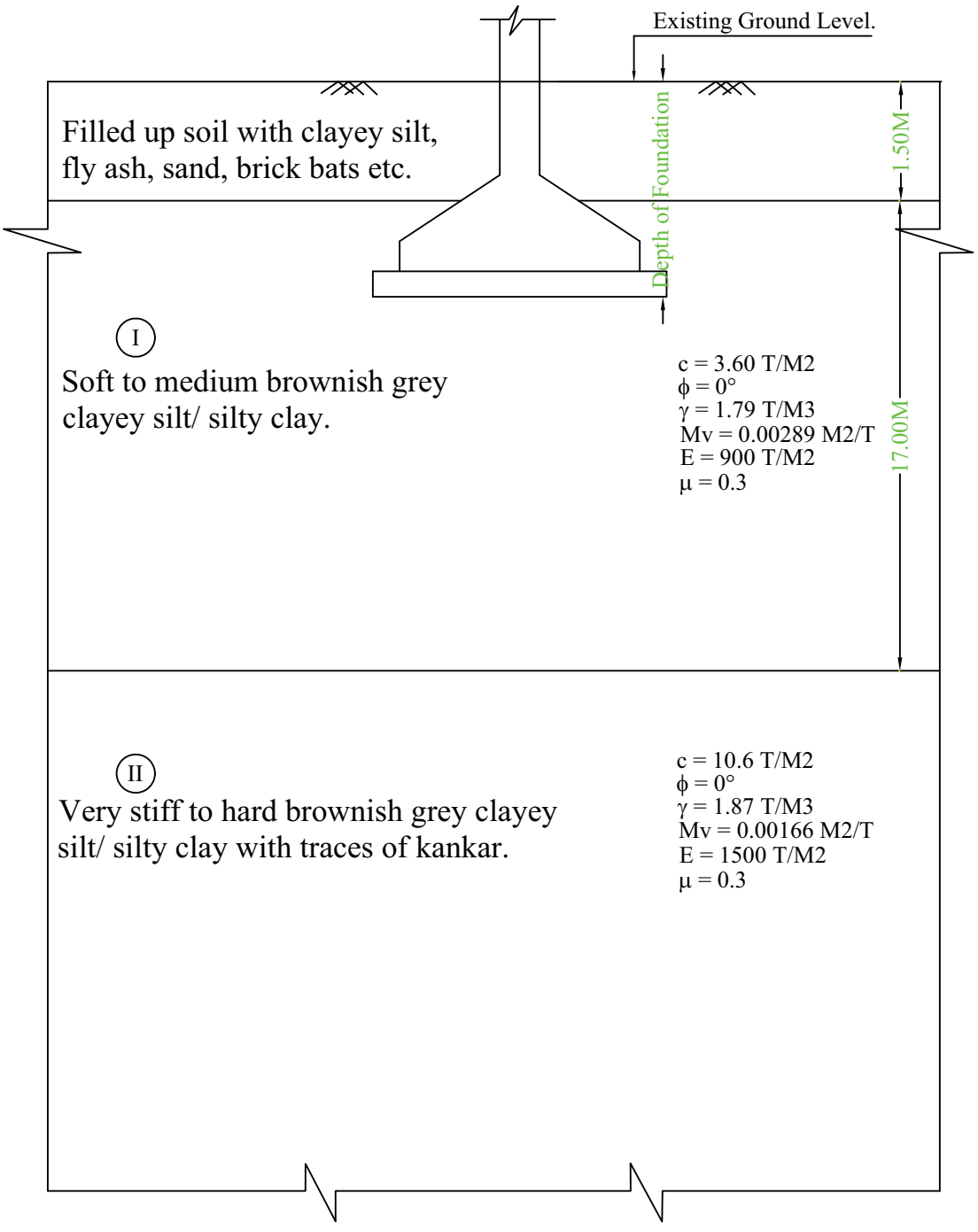
Sub-Soil Profile through BH-9, BH-8 & BH-7

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	02	4 of 5



Sub-Soil Profile through BH-13, BH-20 & BH-19

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	02	5 of 5



Foundation Model

Scale :- N.T.S.

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	03	1 of 2

DETERMINATION OF BEARING CAPACITY:-

The Net Ultimate Bearing Capacity is given by:

$$q_{ult} = C.Nc.sc.dc.ic + q.(Nq-1).sq.dq.iq + 0.5\gamma.B.N\gamma.s\gamma.d\gamma.i\gamma.W'$$

[Ref. Clause 5.1.2(a), IS 6403:1981 (2002)

Where,

Nc, Nq and Nγ are bearing capacity factors,
sc, sq and sγ are shape factors,
dc, dq and dγ are depth factors,
ic, iq and iγ are inclination factors,
C = Cohesion
q = Overburden pressure,
γ = Effective density below foundation.
B = Width of foundation,
W' = Water Table Correction Factor.

Size of Footing = 3.00M X 3 .00M
Cohesion,C = 3.60 t/sqm
Density, γ = 1.84 t/sqm

Bearing Capacity Factor

For φ = 0 degree, the bearing capacity factors are:

Nc = 5.14
Nq = 1.00 Ref: Table-1 of IS: 6403-1981(2002)
Nγ = 0.00

Foundation Diamentions

Depth of Foundation= Df = 2.50 M (below EGL)
Width of Foundation= B = 3.00 M
Length of Foundation= L = 3.00 M

Now q = (γ - 1) x Df = 0.84 x 2.5 = 2.1 t/sqm

Shape factors are [IS:6403 - 1981]

sc = 1.30 sq = 1.20 sγ = 0.80

Depth factors are [IS:6403 - 1981]

dc = 1.17 dq = 1.00 dγ = 1.00

Computed Net Ultimate Bearing Capacity = 28.13 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 11.25 t/sqm

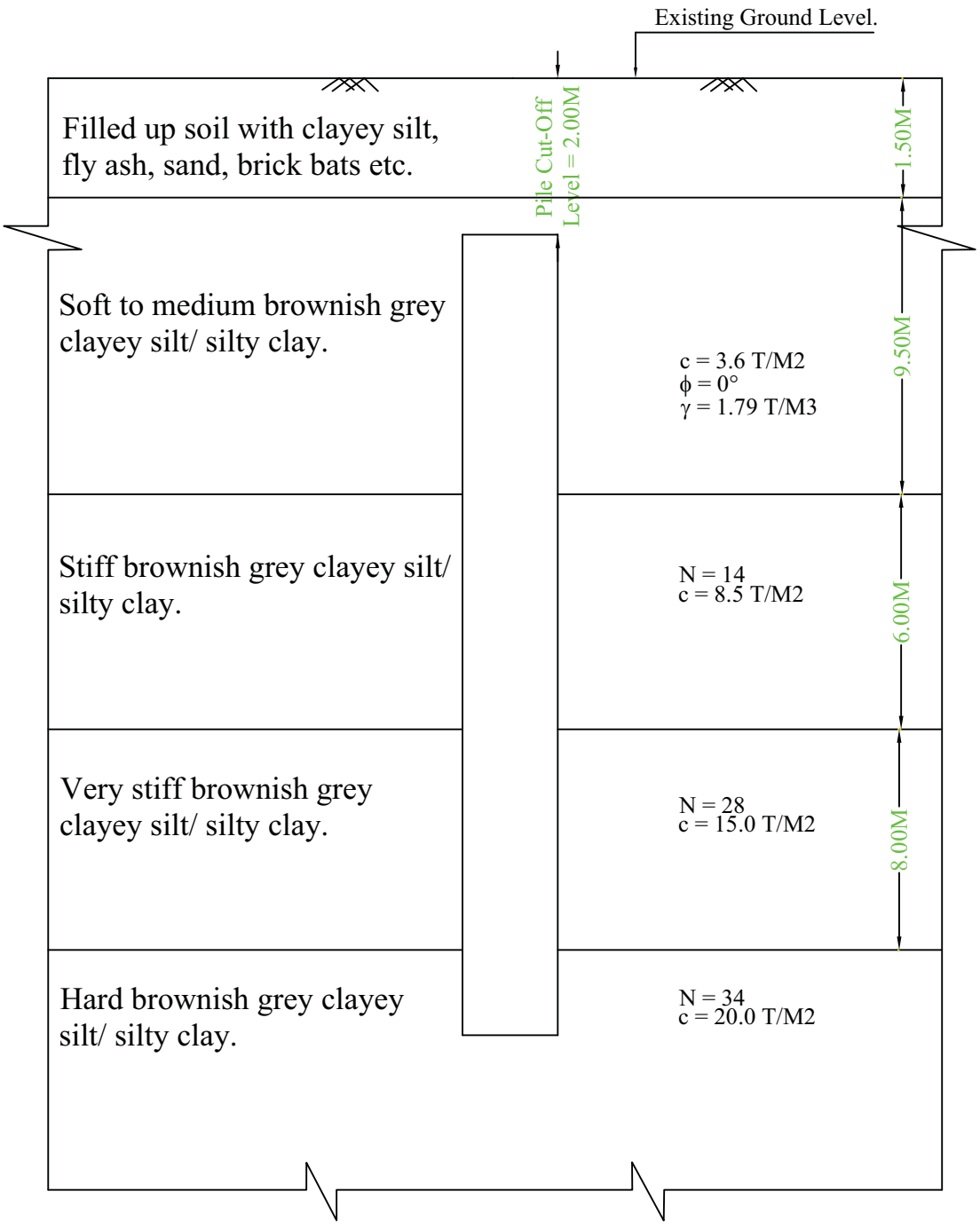
SETTLEMENT CALCULATION:-

Depth of Foundation= Df = 2.50 M (below EGL)
Width of Foundation= B = 3.00 M
Length of Foundation= L = 3.00 M
Net base Pressure, P = 11.25 t/sqm

Strata	From	To (M)	Thickness of compressible	Mid depth below Founding	ΔP	Young's Modulus	Poisson's Ratio μ	Mvc	Influence Factor I	Elastic settlement	Consolidation Settlement	Pore Water Pressure Factor	Corrected Consolidation Settlement	Total Corrected Settlement
	(m)	(m)	(m)	(m)	t/sqm	t/sqm		sqm/t		mm	mm		mm	mm
I	2.50	8.50	6.00	3.00	2.81	900	0.3	0.00289	0.95	**32.42**	**48.77**	0.70	34.14	66.56

Total Settlement	66.56
Depth Correction Factor	0.77
Rigidity Correction Factor	1.00
Hence, corrected Total Settlement =	**51.30**

The calculated settlement is beyond the settlement limit of 40mm
Hence, Recommended bearing capacity for 40mm settlement is = 8.77 t/sqm



Pile Model

Scale :- N.T.S.

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	ESP UNIT AREA	1582	03	2 of 2

Ultimate Skin Friction Capacity

Project: Geo-technical investigation pertaining to associated civil works for retrofitting of ESPs for ESP R & M 4X210 MW (U#1,2,3&4) Kahalgaon STPP, NTPC, Bhagalpur, Bihar.
Location: Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Layer No: **1**
Soil Description Soft to medium brownish grey clayey silt/ silty clay.

Sl.No	Pile Dia , D	Pile-Depth of termination wrt FGL	Depth of layer top from EGL	Depth of layer bottom from EGL	Reduction factor, α (Note1 IS 2911(Part1/Sec2)	Average Cohesion along the length of the pile in this layer, C	Surface area of the pile shaft in this layer, A_s	Ultimate Skin friction capacity of the shaft in this layer, $Q_{su} = \alpha * C * A_S$
	m	m	m	m		T/m^2	m^2	
1	0.600	29.000	2.000	11.000	1	3.6	16.965	61.073
2	0.760	29.000	2.000	11.000	1	3.6	21.488	77.359

Ultimate Skin Friction Capacity

Project: Geo-technical investigation pertaining to associated civil works for retrofitting of ESPs for ESP R & M 4X210 MW (U#1,2,3&4) Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Location: Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Layer No: **2**

Soil Description Stiff brownish grey clayey silt/ silty clay with traces of kankar.

Sl.No	Pile Dia , **D**	Pile-Depth of termination wrt FGL	Depth of layer top from EGL	Depth of layer bottom from EGL	Reduction factor, α (Note1 IS 2911(Part1/Sec2)	Average Cohesion along the length of the pile in this layer, **C**	Surface area of the pile shaft in this layer, A_s	Ultimate Skin friction capacity of the shaft in this layer, $Q_{su} = \alpha * C * A_S$
	m	m	m	m		T/m^2	m^2	
1	0.600	29.000	11.000	17.000	0.55	8.5	11.310	52.873
2	0.760	29.000	11.000	17.000	0.55	8.5	14.326	66.972

Ultimate Skin Friction Capacity

Project: Geo-technical investigation pertaining to associated civil works for retrofitting of ESPs for ESP R & M 4X210 MW (U#1,2,3&4) Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Location: Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Layer No: **3**

Soil Description Very stiff brownish grey clayey silt/ silty clay with traces of kankar.

Sl.No	Pile Dia , **D**	Pile-Depth of termination wrt FGL	Depth of layer top from EGL	Depth of layer bottom from EGL	Reduction factor, α (Note1 IS 2911(Part1/Sec2)	Average Cohesion along the length of the pile in this layer, **C**	Surface area of the pile shaft in this layer, A_s	Ultimate Skin friction capacity of the shaft in this layer, $Q_{su} = \alpha^*C^*A_S$
	m	m	m	m		T/m^2	m^2	
1	0.600	29.000	17.000	25.000	0.3	15.0	15.080	67.858
2	0.760	29.000	17.000	25.000	0.3	15.0	19.101	85.954

Ultimate Skin Friction Capacity

Project: Geo-technical investigation pertaining to associated civil works for retrofitting of ESPs for ESP R & M 4X210 MW (U#1,2,3&4) Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Location: Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Layer No: **4**

Soil Description Hard brownish grey clayey silt/ silty clay with traces of kankar.

Sl.No	Pile Dia , **D**	Pile-Depth of termination wrt FGL	Depth of layer top from EGL	Depth of layer bottom from EGL	Reduction factor, α (Note1 IS 2911(Part1/Sec2)	Average Cohesion along the length of the pile in this layer, **C**	Surface area of the pile shaft in this layer, A_s	Ultimate Skin friction capacity of the shaft in this layer, $Q_{su} = \alpha * C * A_S$
	m	m	m	m		T/m^2	m^2	
1	0.600	29.000	25.000	29.000	0.28	20.0	7.540	42.223
2	0.760	29.000	25.000	29.000	0.28	20.0	9.550	53.482

Ultimate End Bearing capacity

Project: Geo-technical investigation pertaining to associated civil works for retrofitting of ESPs for ESP R & M 4X210 MW (U#1,2,3&4) Kahalgaon STPP, NTPC, Bhagalpur, Bihar.
Location: Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Layer No: 2
Soil Description Hard brownish grey clayey silt/ silty clay with traces of kankar.

Sl.No	Pile Dia , **D**	Total Length of Pile, **L**	Depth of layer top from EGL	Depth of layer bottom from EGL	Average Cohesion at the pile tip, C_P	Cross sectional area of the pile tip, A_P	Bearing capacity factor, N_C	UltimateEnd bearing capacityat pile tip, $Q_{Bu} = A_P * N_C * C_P$
	m	m	m	m	T/m^2	m^2		T
1	0.600	29.000	25.000	29.000	20.0	0.283	9.000	50.894
2	0.760	29.000	25.000	29.000	20.0	0.454	9.000	81.656

Horizontal Shear Capacity of Pile

Sample Calculation:-

C Value	=	**0.36**	Kg/cm^2
Pile-Depth of termination wrt FGL	=	**29.00**	m
Cut-off Level of Pile	=	**2.00**	m
Dia of Pile (D)	=	**0.600**	m
fck, for M25 grade of concrete	=	25	N/mm^2
$\mathbf{E_p}$ = E_{conc} = Young's modulas	=	25000	MN/m^2
$\mathbf{I_p}$ (Moment of inertia of the pile cross-section)	=	0.00636	m^4
Neglecting the effect of steel we get $\mathbf{E_pI_p}$	=	159	$MN.m^2$
$\boldsymbol{\eta_h}$ = Modulas of Subgrade Reaction	=	1.400	MN/m^3

From Reese and Matlock (1956) for fixed head pile deflection ρ_z is given as

$\rho_z = (A_P\text{-}0.93B_P) \times [(Q_h \times T^3)/E_pI_p]$…… (A)

Where, ρ_z is deflection

A_P and B_P are co-efficients given by Matlock and Reese for different Z values

$Z = (z/T)$ …… (B)

z = depth of pile top

T is given as $T = (E_pI_p/\eta_h)^{1/5}$……(C)

Q_h = Horizontal Force at depth z

Therefore, T	=	2.577	m, From equation (C)
For cut-off length of pile of 2M, z	=	2.000	m
Therefore, z/T	=	0.7762	From equation (B)

So, For Z = 0.7762 we get, from the table proposed by Matlock and Reese

A_P = 1.249

B_P = 0.564

From equation A, we get $Qh = (\rho_z \times E_P.I_P)/[(A_P\text{-}0.93B_P)*T^3]$

For an allowable deflection of 5mm we get allowable horizontal capacity as

Qh = 0.064147432 MN

= 6.55 T

Recommended Pile Capacity

Project: Geo-technical investigation pertaining to associated civil works for retrofitting of ESPs for ESP R & M 4X210 MW (U#1,2,3&4) Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Location: Kahalgaon STPP, NTPC, Bhagalpur, Bihar.

Sl.No	Pile Dia , D	Pile-Depth of termination wrt FGL	Skin friction from layer 1	Skin friction from layer 2	Skin friction from layer 3	Skin friction from layer 4	End Bearing	Total	F.O.S	Allowable Pile Capacity	Recommemded Pile Capacity in Compression	Recommemded Pile Capacity in Pull-Out	Recommemded Pile Capacity in Horizontal Shear
	m	m	T	T	T	T	T	T		T	T	T	T
1	0.600	29.000	61.073	52.873	67.858	42.223	50.894	**274.921**	2.5	109.968	**109**	**45**	**6.55**
2	0.760	29.000	77.359	66.972	85.954	53.482	81.656	**365.424**	2.5	146.170	**146**	**57**	**8.88**

CHIMNEY AREA

Total four (4) boreholes were sunk in this area, viz borehole marked BH-10, BH-11, BH-12 & BH-21. From the general sub soil profile it has been observed that the top soil is filled up followed by the first layer (i.e. Layer-I) consisting soft brownish grey clayey silt/ silty clay. The second layer (i.e. Layer-II) is medium to stiff brownish grey clayey silt/ silty clay with traces of kankar. The third layer (i.e. Layer-III) is very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar and continues up to the explored depth.

Discussion and Recommendation:

From the general profile of the subsoil it has been observed that the maximum thickness of top layer is 18.5m and minimum thickness is 10.00m. For lightly to medium loaded structures, shallow foundation has been proposed to rest in layer-I i.e. medium to stiff brownish grey clayey silt/ silty clay. Table-2A may be referred for adopting safe bearing capacity.

Table 2A

Recommended Bearing Capacity from Shear and Settlement Criteria

Depth of Foundation below NGL (Mtr)	Net Allowable Bearing Pressure (T/Sqm)		
	Isolated / Strip for a permissible settlement of 40 mm		Rafts (width > & = 6m) for a permissible settlement of 75mm
	width upto 3.0m	width >3 & < 6m	
2.50	6.00	4.00	5.00
3.00	8.00	4.00	6.00
4.00	8.00	5.00	6.00
5.00	8.00	5.00	6.00

Pile foundation has also been recommended for foundation system of heavily loaded structures. Pile capacities in compression, pull-out and horizontal shear for different diameter of pile are indicated in the Table-2B. It is further recommended to check the Settlement of the pile groups during design of structure and carry out initial pile load test for load under compression, pull-out and horizontal shear, in order to confirm the recommended pile capacities and to take corrective measures, if required.

Table-2B

Recommended Pile Capacity

Sl.No	Pile Dia , D	Total Length of Pile, L	Cut-off Level	Recommended Pile Capacity in Compression	Recommended Pile Capacity in Pull-Out	Recommended Pile Capacity in Horizontal Shear
	Mtr	Mtr.	Mtr.	T	T	T
1	0.600	29.000	2.000	**105**	**29**	**5.62**
2	0.760	29.000	2.000	**141**	**37**	**7.87**

Recommended pile capacity in pull-out for 600mm dia pile has been restricted up to 20T as per the technical specification.

BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-10 (Sheet 1)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3053.00, S= 2014.80		E.G.L.: 33.85		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 21.03.2018
Depth of Boring	40.000 M.	SPT	21	UDS	8	WS		Completed on : 23.03.2018
Type of Drilling		DCPT		DS	24	RCS		Water Struck At : 0.90 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.83 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Filled up soil with clayey silt, sand, brick bats etc.		G.W.T		DS1	0.50 M
		01		DS2	1.00M
				DS3	1.50M
Soft brownish grey clayey silt/ silty clay.		02		UDS1	2.00-2.45M
		03	N = 3	SPT1	3.00-3.45M
				DS4	3.00-3.45M
		04		UDS2	4.00-4.45M
Medium to stiff brownish grey clayey silt/ silty clay with traces of kankar.		05	N = 4	SPT2	5.00-5.45M
				DS5	5.00-5.45M
		06		UDS3	6.00-6.45M
		07	N = 5	SPT3	7.00-7.45M
				DS6	7.00-7.45M
		08		UDS4	8.00-8.45M
		09	N = 6	SPT4	9.00-9.45M
				DS7	9.00-9.45M
		10		UDS5	10.00-10.45M
		11			
		12	N = 10	SPT5	11.50-11.95M
				DS8	11.50-11.95M
		13		UDS6	13.00-13.45M
		14			
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		15	N = 18	SPT6	14.50-14.95M
				DS9	14.50-14.95M
		16		UDS7	16.00-16.45M
		17			
		18	N = 26	SPT7	17.50-17.95M
				DS10	17.50-17.95M
		19		UDS8	19.00-19.45M
		20			
		21	N = 32	SPT8	20.50-20.95M
				DS11	20.50-20.95M
		22	N = 38	SPT9	22.00-22.45M
				DS12	22.00-22.45M
		23			
		24	N = 41	SPT10	23.50-23.95M
				DS13	23.50-23.95M
Contd.....					

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-10 (Sheet 2)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3053.00, S= 2014.80		E.G.L.: 33.85		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 21.03.2018
Depth of Boring	40.000 M.	SPT	21	UDS	8	WS		Completed on : 23.03.2018
Type of Drilling		DCPT		DS	24	RCS		Water Struck At : 0.90 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.83 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		26	N = 44	SPT11 DS14	25.00-25.45M 25.00-25.45M
		27	N = 44	SPT12 DS15	26.50-26.95M 26.50-26.95M
		28	N = 46	SPT13 DS16	28.00-28.45M 28.00-28.45M
		29			
		30	N = 49	SPT14 DS17	29.50-29.95M 29.50-29.95M
		31	N = 50	SPT15 DS18	31.00-31.45M 31.00-31.45M
		32			
		33	N = 53	SPT16 DS19	32.50-32.95M 32.50-32.95M
		34	N = 55	SPT17 DS20	34.00-34.95M 34.00-34.95M
		35			
		36	N = 60	SPT18 DS21	35.50-35.95M 35.50-35.95M
		37	N = 63	SPT19 DS22	37.00-37.45M 37.00-37.45M
		38			
		39	N = 66	SPT20 DS23	38.50-38.95M 38.50-38.95M
		40	N = 70	SPT21 DS24	39.55-40.00M 39.55-40.00M
Termination Depth 40.000 Mtr.		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-11 (Sheet 1)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3129.00, S= 1995.70		E.G.L.: 33.41		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 24.03.2018
Depth of Boring	40.000 M.	SPT	21	UDS	8	WS		Completed on : 25.03.2018
Type of Drilling		DCPT		DS	24	RCS		Water Struck At : 0.85 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.78 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Filled up soil with clayey silt, sand, stone pieces etc.		G.W.T 01		DS1	0.50 M
				DS2	1.00M
				DS3	1.50M
Soft brownish grey clayey silt/ silty clay.		02		UDS1	2.00-2.45M
		03	N = 3	SPT1	3.00-3.45M
				DS4	3.00-3.45M
Medium to stiff brownish grey clayey silt/ silty clay.		04		UDS2	4.00-4.45M
		05	N = 6	SPT2	5.00-5.45M
				DS5	5.00-5.45M
		06		UDS3	6.00-6.45M
		07	N = 7	SPT3	7.00-7.45M
				DS6	7.00-7.45M
		08		UDS4	8.00-8.45M
		09	N = 9	SPT4	9.00-9.45M
				DS7	9.00-9.45M
		10		UDS5	10.00-10.45M
		11			
		12	N = 12	SPT5	11.50-11.95M
				DS8	11.50-11.95M
		13		UDS6	13.00-13.45M
		14			
		15	N = 15	SPT6	14.50-14.95M
				DS9	14.50-14.95M
		16		UDS7	16.00-16.45M
		17			
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		18	N = 16	SPT7	17.50-17.95M
				DS10	17.50-17.95M
		19		UDS8	19.00-19.45M
		20			
		21	N = 18	SPT8	20.50-20.95M
				DS11	20.50-20.95M
		22	N = 22	SPT9	22.00-22.45M
				DS12	22.00-22.45M
		23			
		24	N = 25	SPT10	23.50-23.95M
				DS13	23.50-23.95M
Contd.....					

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET		Centre for Advanced Engineering						Bore Hole No.: BH-11 (Sheet 2)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3129.00, S= 1995.70		E.G.L.: 33.41		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 24.03.2018
Depth of Boring	40.000 M.	SPT	21	UDS	8	WS		Completed on : 25.03.2018
Type of Drilling		DCPT		DS	24	RCS		Water Struck At : 0.85 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.78 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		26	N = 28	SPT11	25.00-25.45M
				DS14	25.00-25.45M
		27	N = 31	SPT12	26.50-26.95M
				DS15	26.50-26.95M
		28	N = 34	SPT13	28.00-28.45M
				DS16	28.00-28.45M
		29			
		30	N = 38	SPT14	29.50-29.95M
				DS17	29.50-29.95M
		31	N = 41	SPT15	31.00-31.45M
				DS18	31.00-31.45M
		32			
		33	N = 43	SPT16	32.50-32.95M
				DS19	32.50-32.95M
		34	N = 47	SPT17	34.00-34.95M
				DS20	34.00-34.95M
		35			
		36	N = 47	SPT18	35.50-35.95M
				DS21	35.50-35.95M
		37	N = 48	SPT19	37.00-37.45M
				DS22	37.00-37.45M
		38			
		39	N = 52	SPT20	38.50-38.95M
				DS23	38.50-38.95M
			N = 55	SPT21	39.55-40.00M
Termination Depth 40.000 Mtr.		40		DS24	39.55-40.00M
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-12 (Sheet 1)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3286.00, S= 1974.20		E.G.L.: 33.86		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 29.03.2018
Depth of Boring	40.000 M.	SPT	21	UDS	8	WS		Completed on : 31.03.2018
Type of Drilling		DCPT		DS	24	RCS		Water Struck At : 0.50 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.40 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Filled up soil with clayey silt, sand, stone pieces, brickbats etc.		G.W.T		DS1	0.50 M
Soft brownish grey clayey silt/ silty clay.		01		DS2	1.00M
				DS3	1.50M
		02		UDS1	2.00-2.45M
		03	N = 3	SPT1	3.00-3.45M
				DS4	3.00-3.45M
Medium to stiff brownish grey clayey silt/ silty clay.		04		UDS2	4.00-4.45M
		05	N = 6	SPT2	5.00-5.45M
				DS5	5.00-5.45M
		06		UDS3	6.00-6.45M
		07	N = 8	SPT3	7.00-7.45M
				DS6	7.00-7.45M
		08		UDS4	8.00-8.45M
		09	N = 11	SPT4	9.00-9.45M
				DS7	9.00-9.45M
		10		UDS5	10.00-10.45M
		11			
		12	N = 13	SPT5	11.50-11.95M
				DS8	11.50-11.95M
		13		UDS6	13.00-13.45M
		14			
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		15	N = 18	SPT6	14.50-14.95M
				DS9	14.50-14.95M
		16		UDS7	16.00-16.45M
		17			
		18	N = 20	SPT7	17.50-17.95M
				DS10	17.50-17.95M
		19		UDS8	19.00-19.45M
		20			
		21	N = 22	SPT8	20.50-20.95M
				DS11	20.50-20.95M
		22	N = 26	SPT9	22.00-22.45M
				DS12	22.00-22.45M
		23			
		24	N = 28	SPT10	23.50-23.95M
				DS13	23.50-23.95M
Contd.....					

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample