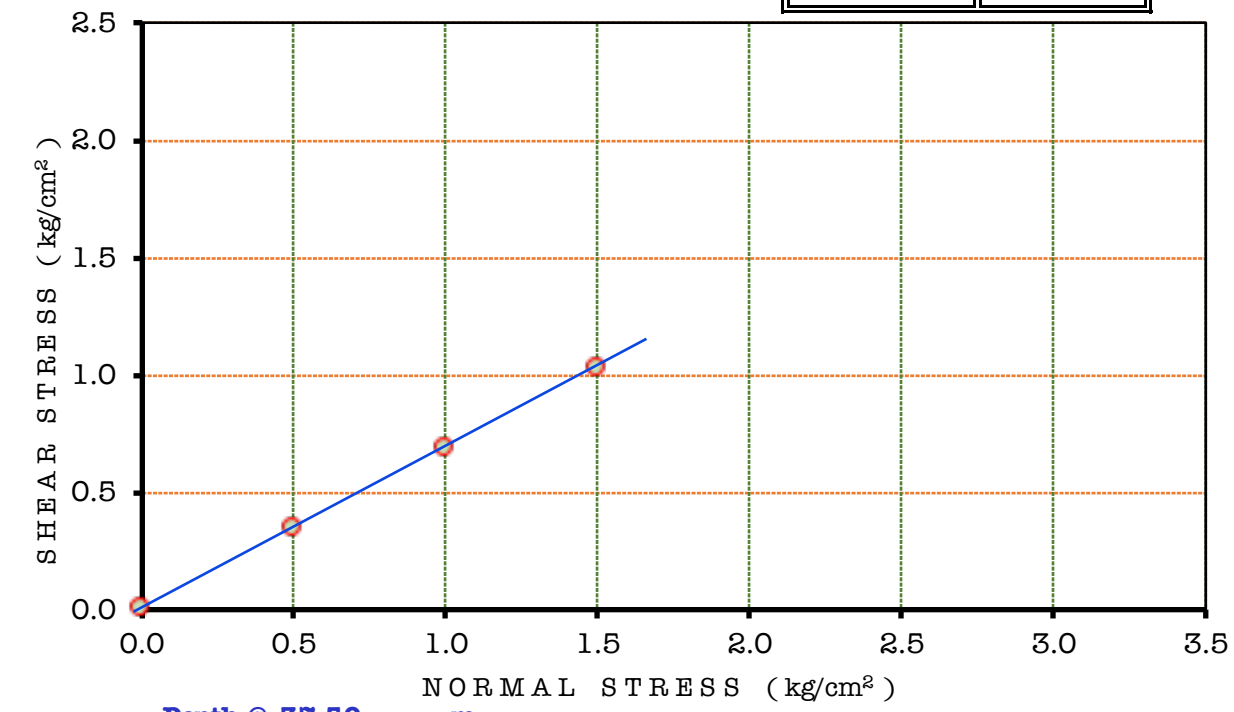
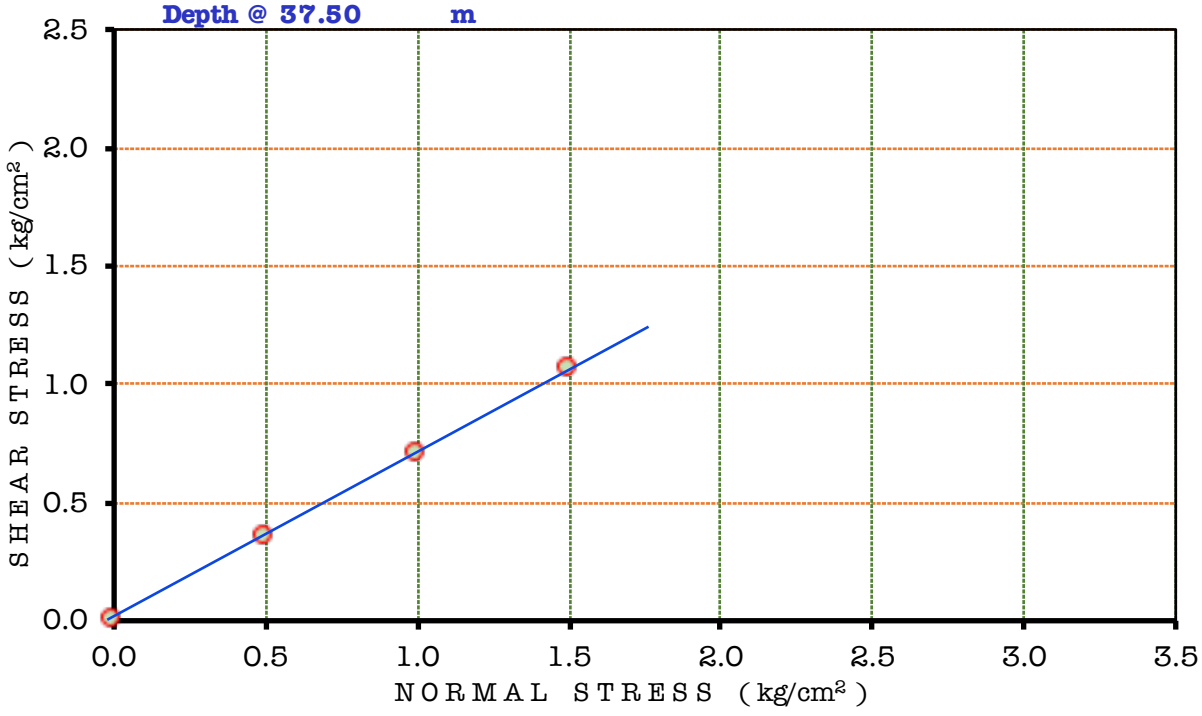
DIRECT SHEAR GRAPHS

BH.NO	7

Depth @ 34.50 m



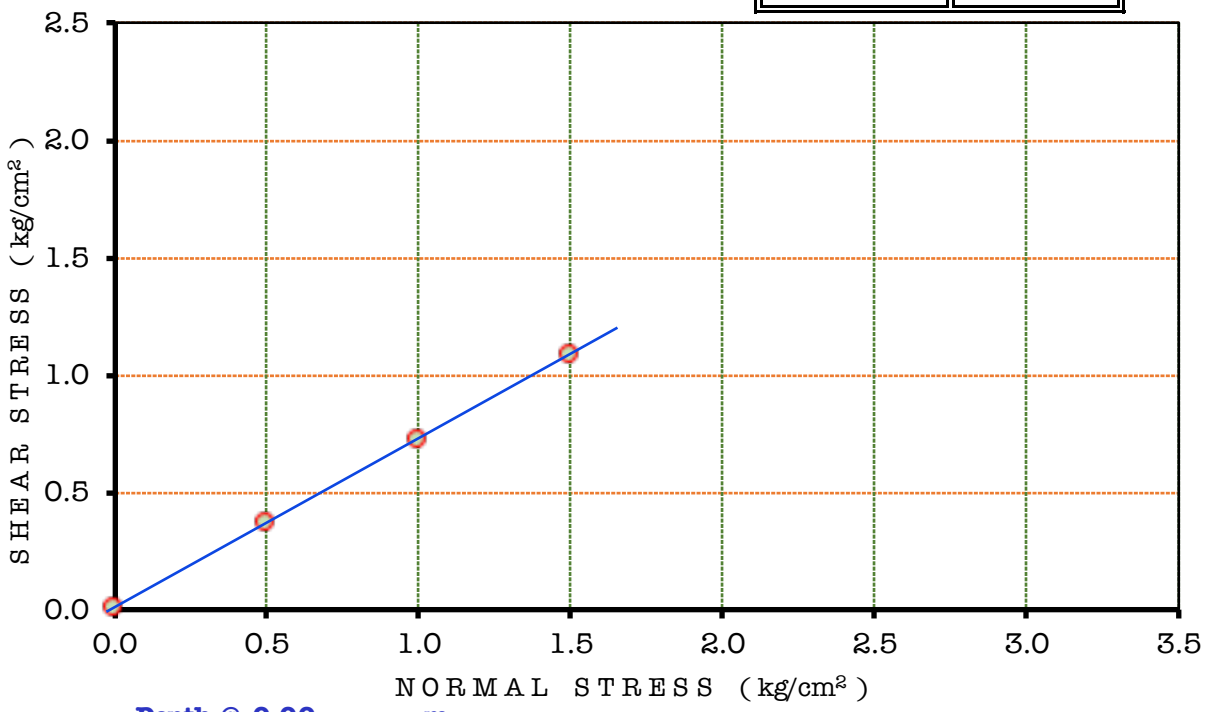
Depth @ 37.50 m



Depth of Sample ,m		**34.50**	**37.50**
Cohesion	Kg/cm^2	**0.00**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**34.40**	**35.30**

BH.NO	7

Depth @ 40.00 m

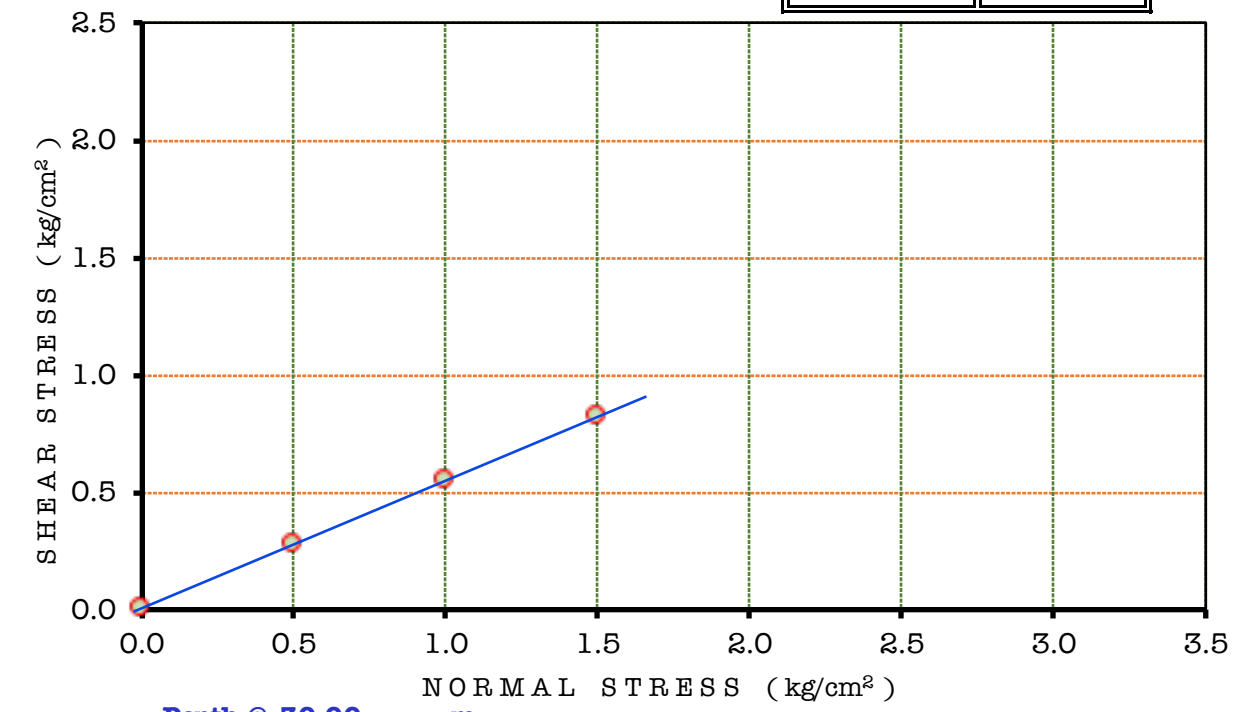


Depth @ 0.00 m

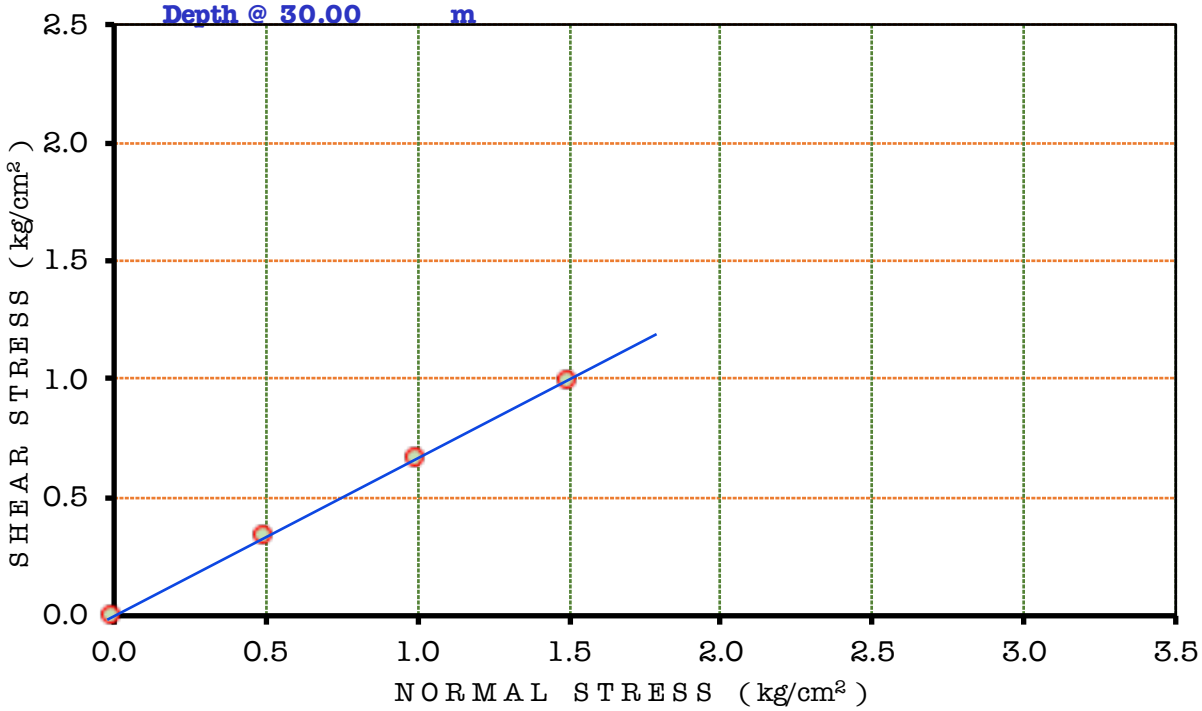
Depth of Sample ,m		**40.00**	
Cohesion	Kg/cm^2	**0.00**	
Angle of Internal Friction (ϕ)	Degree	**35.80**	

BH.NO	8

Depth @ 9.00 m



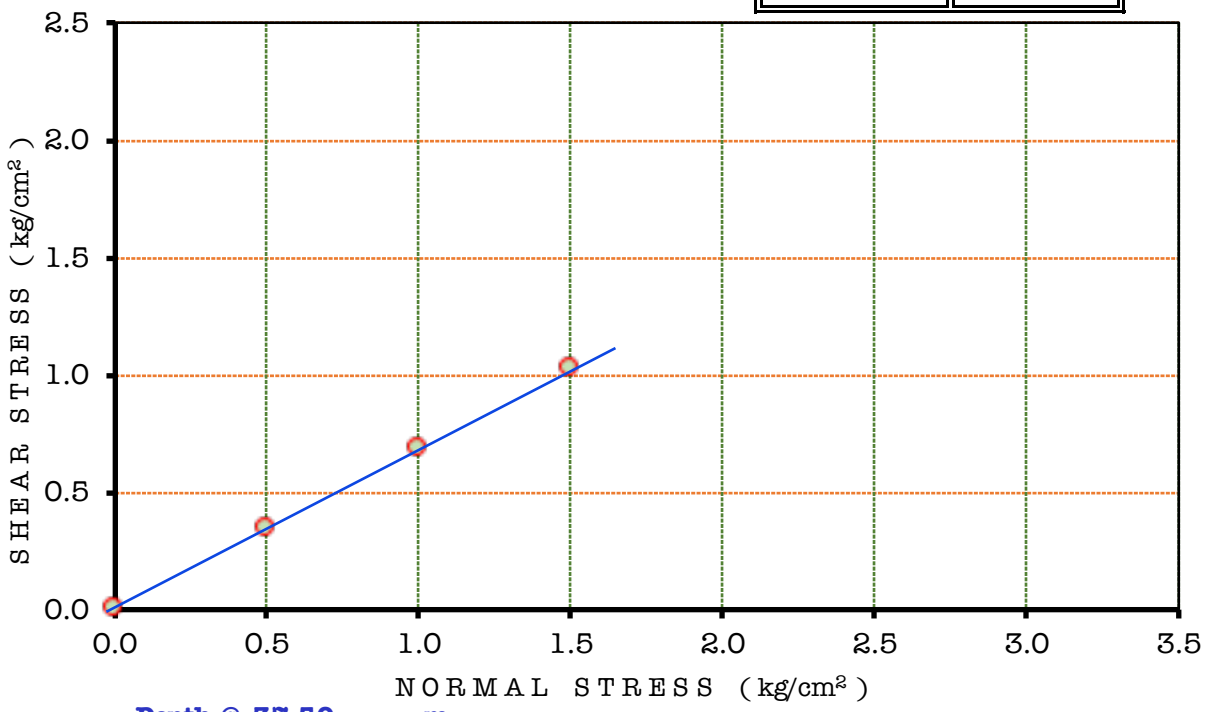
Depth @ 30.00 m



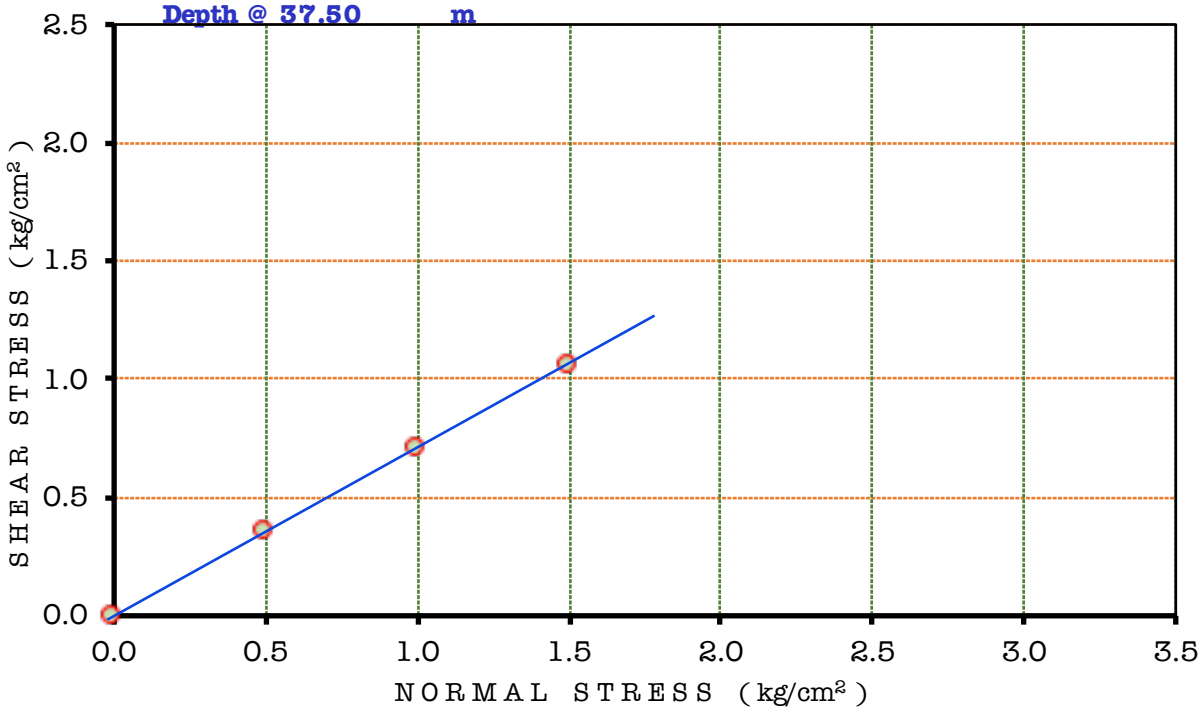
Depth of Sample ,m		**9.00**	**30.00**
Cohesion	Kg/cm^2	**0.00**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**28.50**	**33.40**

BH.NO	8

Depth @ 34.50 m



Depth @ 37.50 m

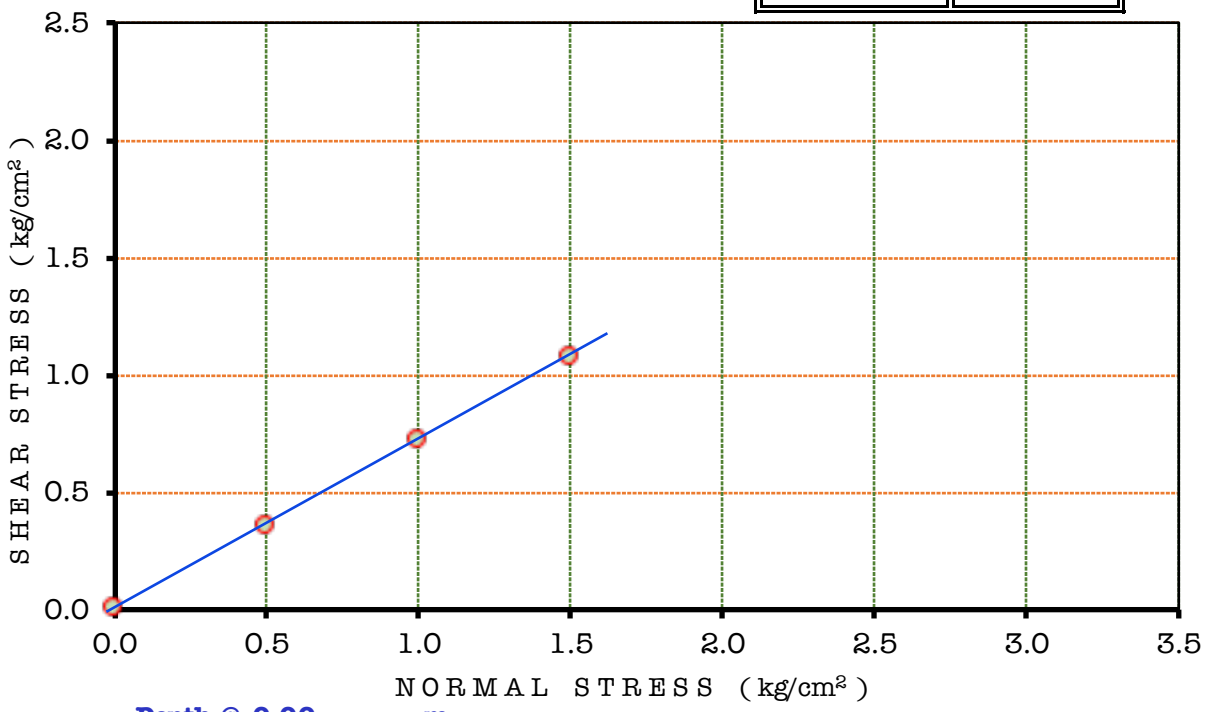


Depth of Sample ,m		**34.50**	**37.50**
Cohesion	Kg/cm^2	**0.00**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**34.20**	**35.10**

DIRECT SHEAR GRAPHS

BH.NO	8

Depth @ 40.00 m



Depth @ 0.00 m

Depth of Sample ,m		**40.00**	
Cohesion	Kg/cm^2	**0.00**	
Angle of Internal Friction (ϕ)	Degree	**35.60**	

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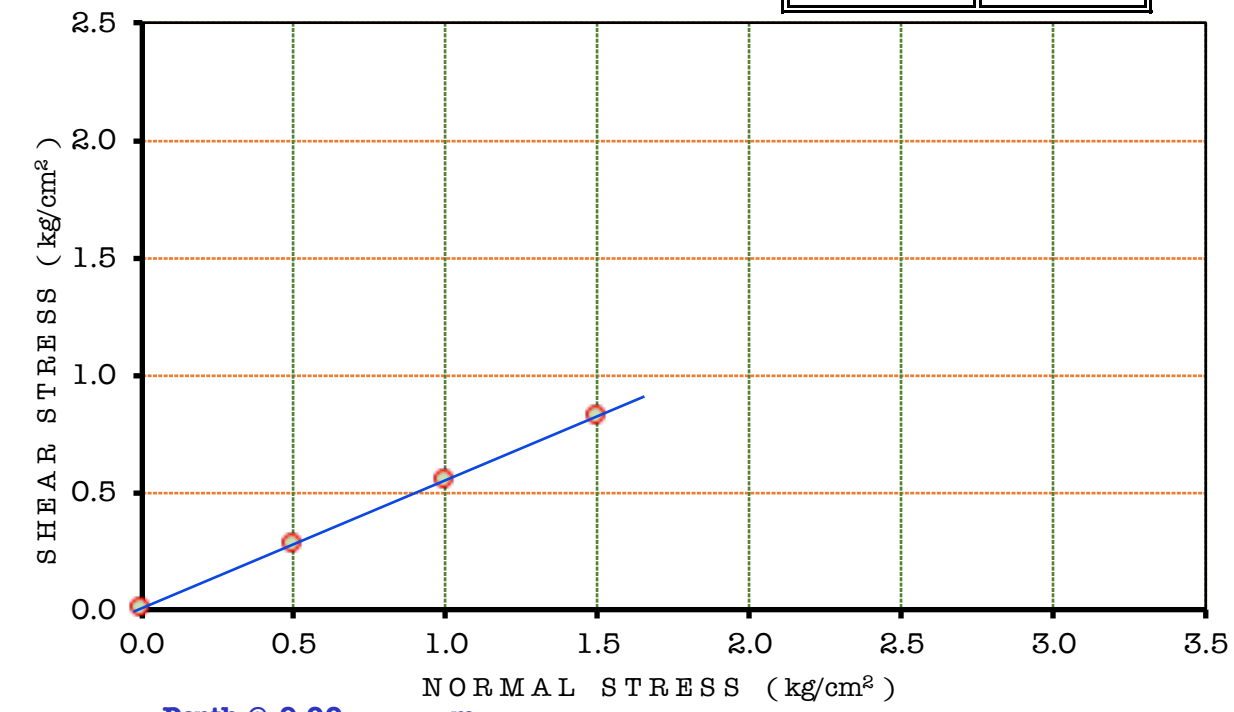
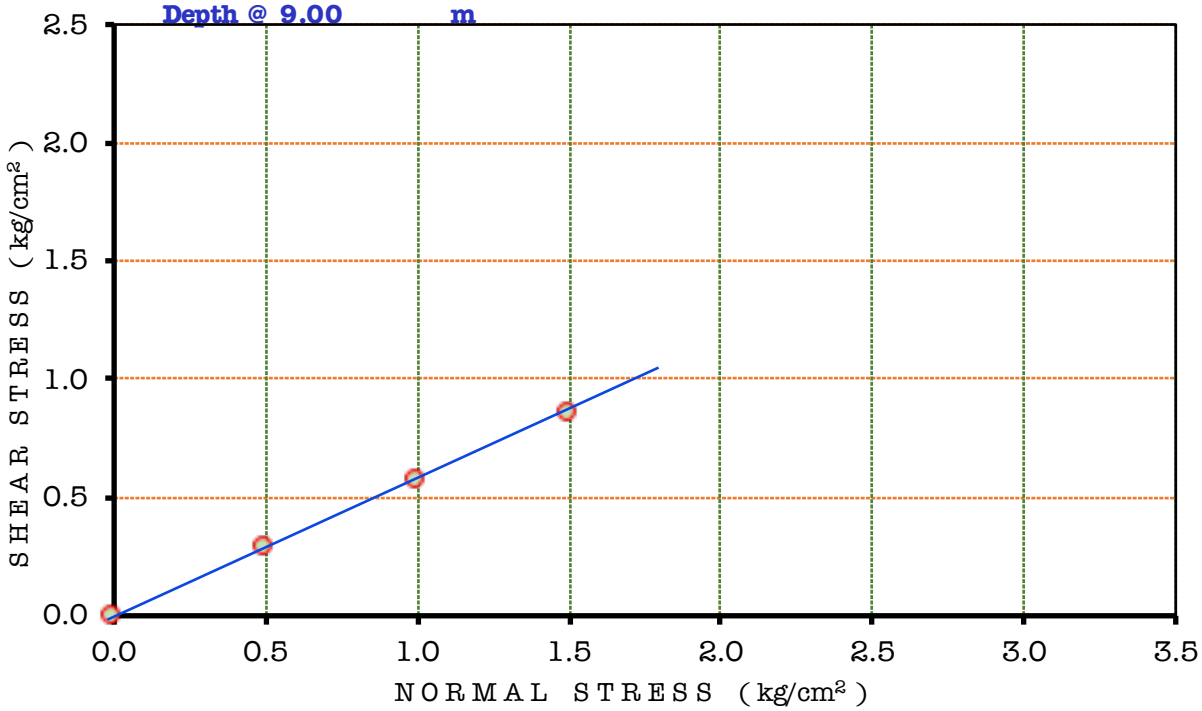
DIRECT SHEAR GRAPHS

BH.NO	9

Depth @ 6.00 m



Depth @ 9.00 m



Depth of Sample ,m		**6.00**	**9.00**
Cohesion	Kg/cm^2	**0.02**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**28.50**	**29.50**

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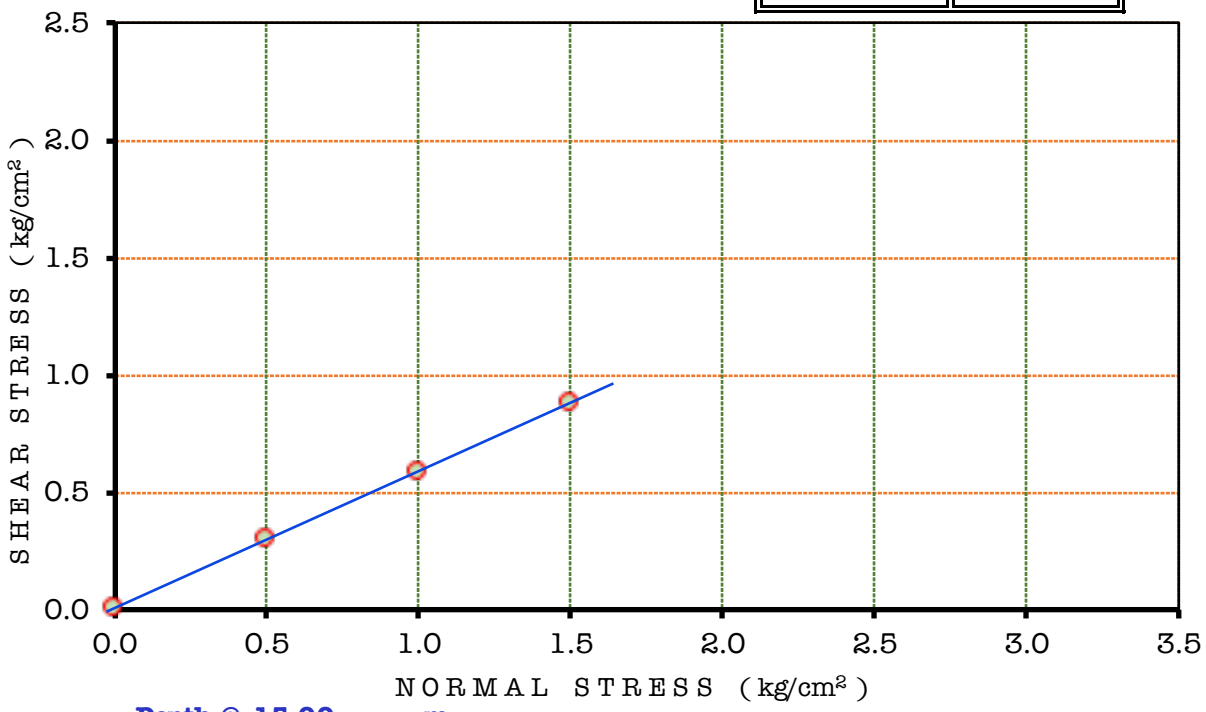
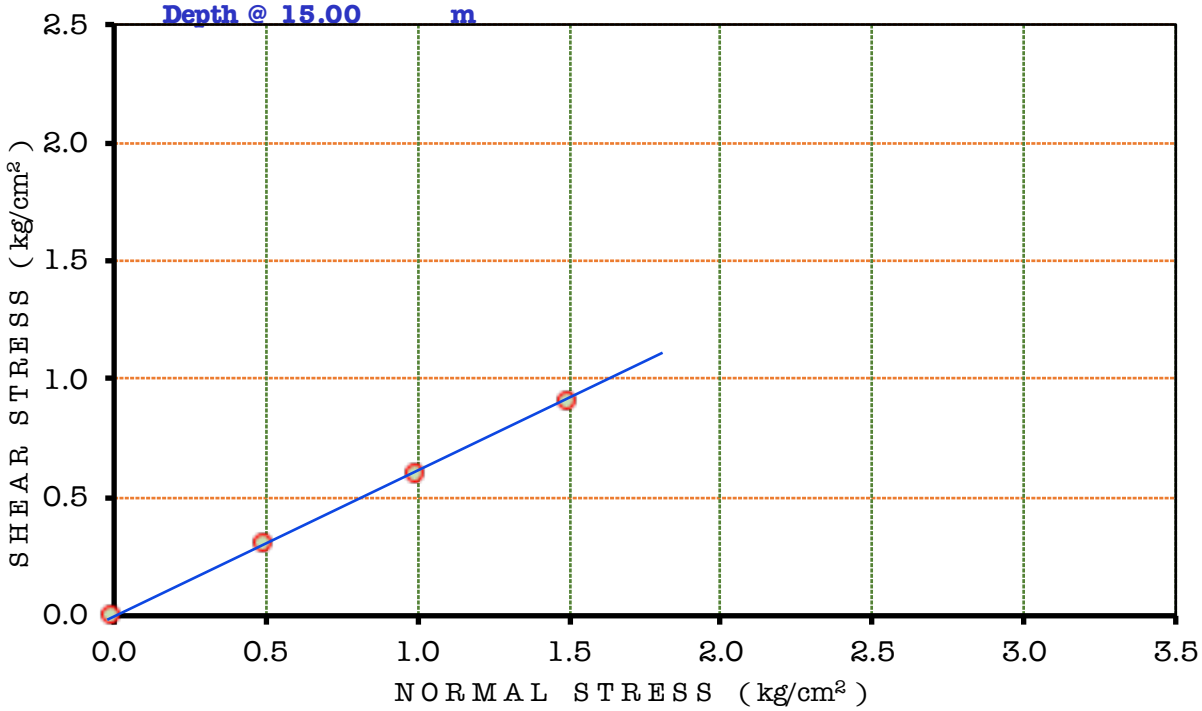
DIRECT SHEAR GRAPHS

BH.NO	9

Depth @ 12.00 m



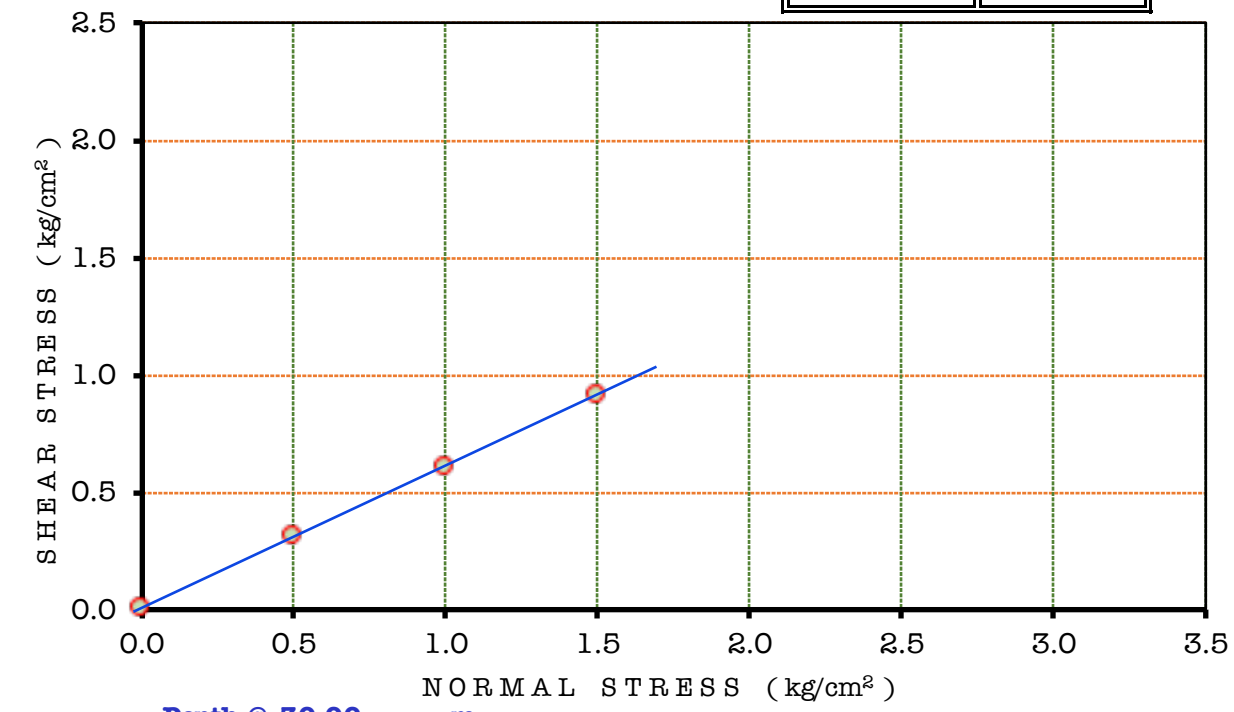
Depth @ 15.00 m



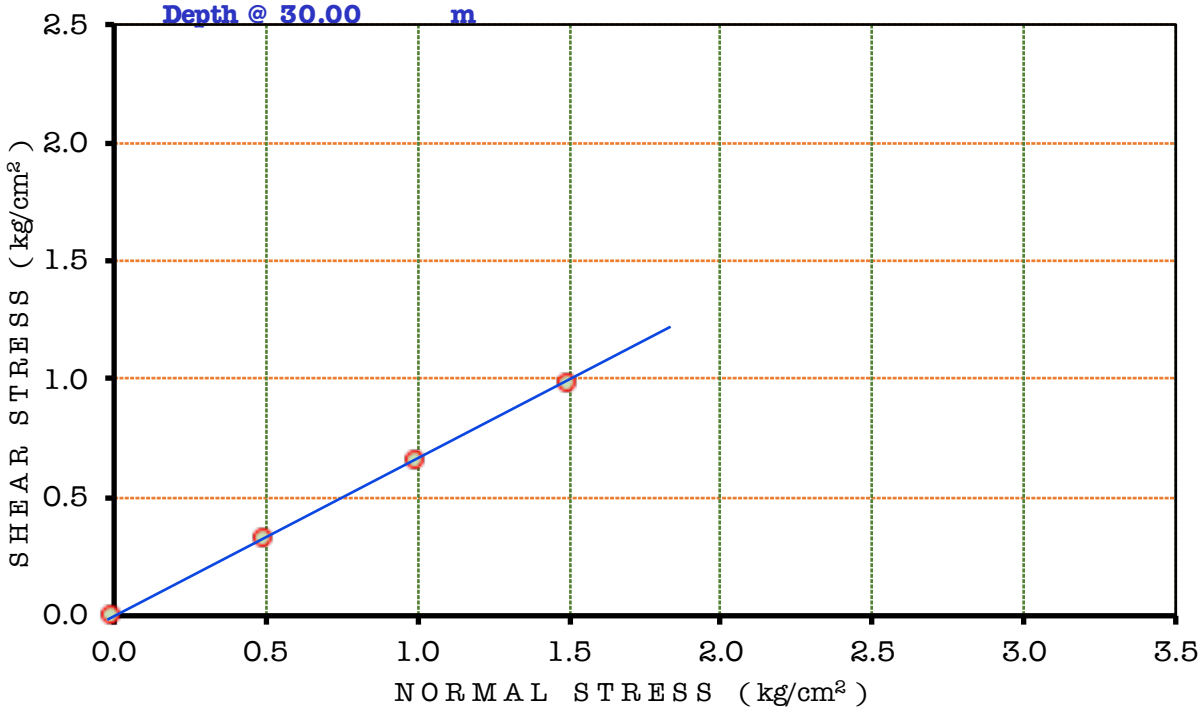
Depth of Sample ,m		**12.00**	**15.00**
Cohesion	Kg/cm^2	**0.00**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**30.30**	**30.90**

BH.NO	9

Depth @ 19.50 m



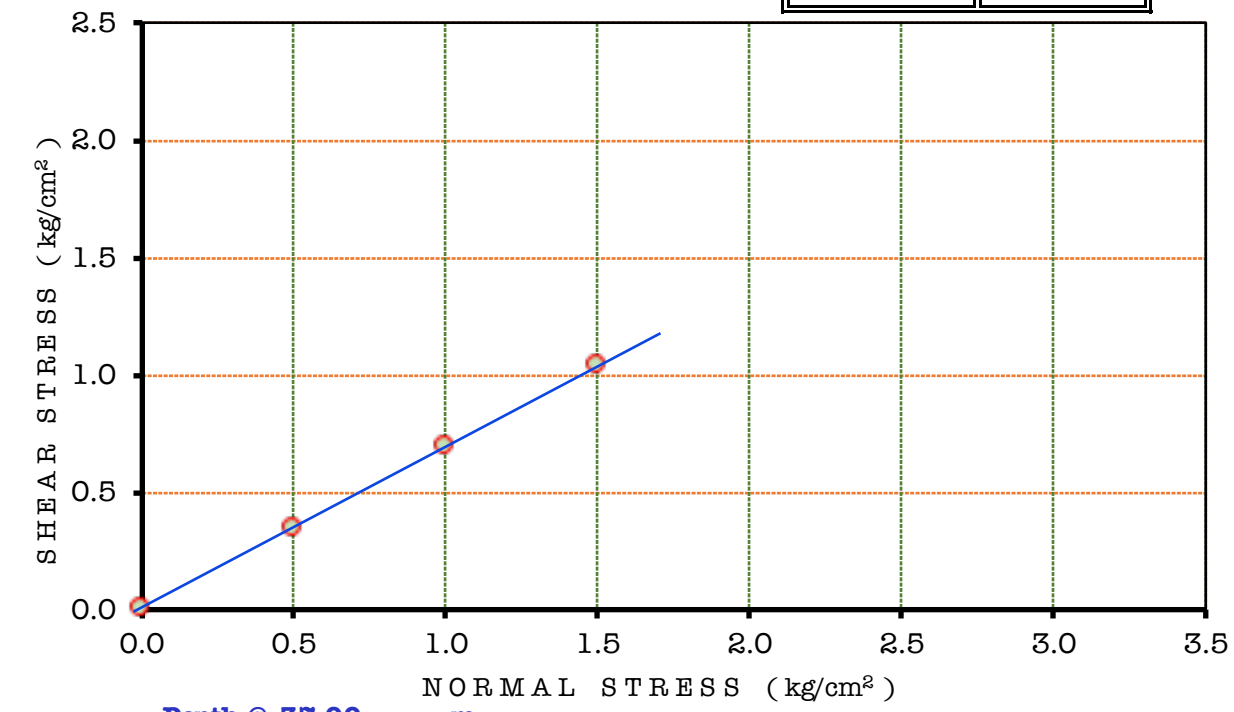
Depth @ 30.00 m



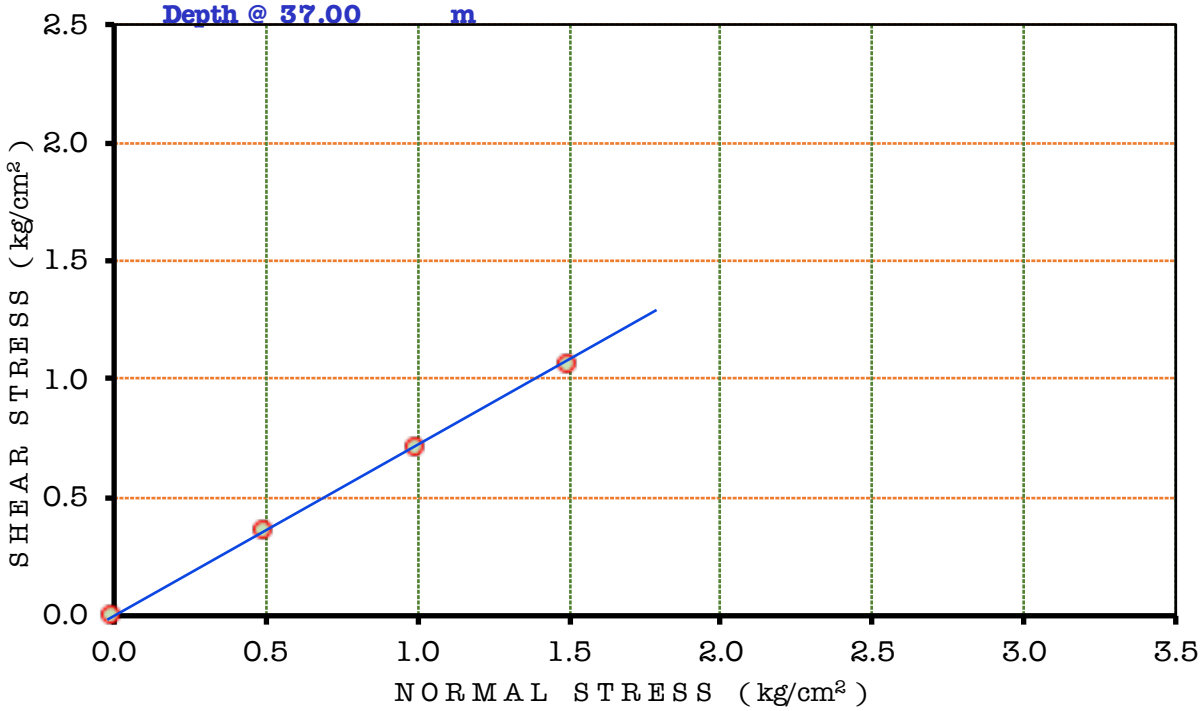
Depth of Sample ,m		**19.50**	**30.00**
Cohesion	Kg/cm^2	**0.00**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**31.20**	**33.20**

BH.NO	9

Depth @ 34.00 m



Depth @ 37.00 m

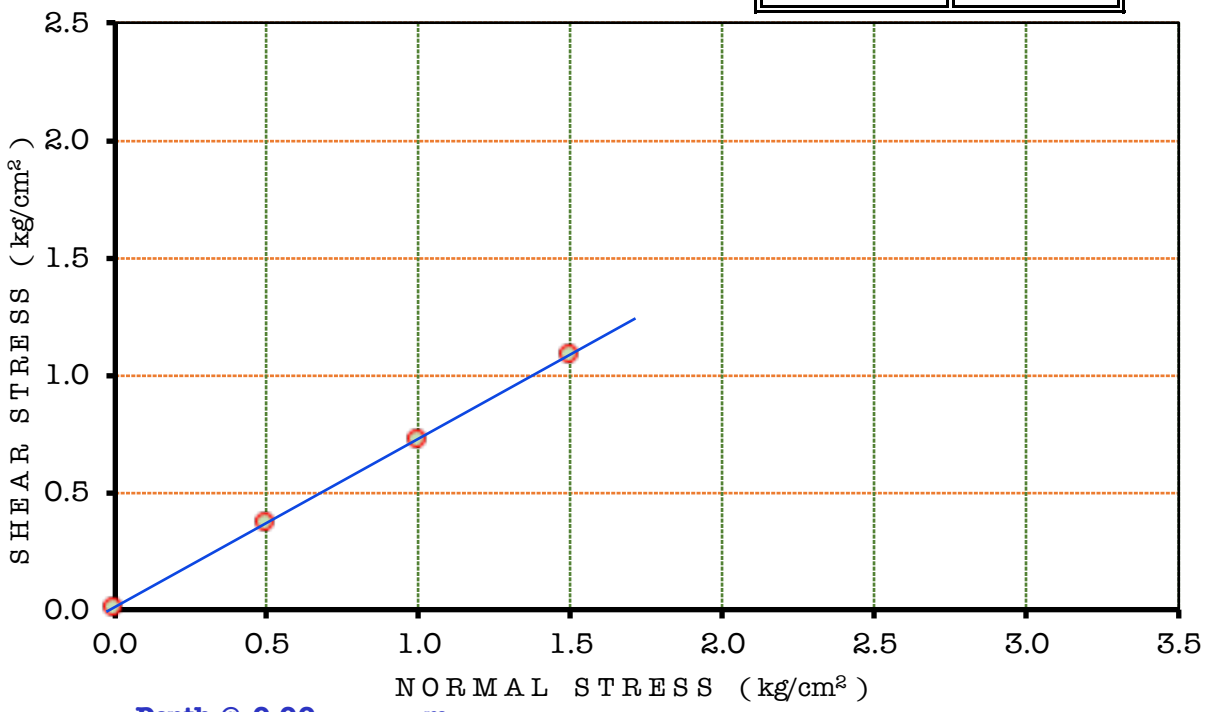


Depth of Sample ,m		**34.00**	**37.00**
Cohesion	Kg/cm^2	**0.00**	**0.00**
Angle of Internal Friction (ϕ)	Degree	**34.60**	**35.20**

DIRECT SHEAR GRAPHS

BH.NO	9

Depth @ 40.00 m



Depth @ 0.00 m

Depth of Sample ,m		**40.00**	
Cohesion	Kg/cm^2	**0.00**	
Angle of Internal Friction (ϕ)	Degree	**35.70**	

ANNEXURE -VII

LIQUEFACTION ANALYSIS

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LIQUEFACTION ANALYSIS

EQ Zone	=	III	E_h	=	0.80	f	=	0.88	**BH.NO**	
a_{max}/g	=	0.16	C_d	=	0.75	Mw	=	7.00		
K(alpha)	=	1.00	C_s	=	1.00	MSF	=	1.19	**5**	
Yb	=	17.90 Kn	C_b	=	1.05	Critical Water Table	=	3.60 m		
						Pa	=	95.8 KN/m^2		

Depth (m)	Soil Type	Fines Content (FC), %	N Value	$C_{60}=E_h.C_d.Cs.C_b$	Corrected N Value N_{60}	Total Overburden Stress (σ_{vo}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (σ'_{vo}) kN/m^2	Stress Reduction Factor (rd)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio (CRR 7.5)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction(FS)	Status of Liquefaction
1.50	CI	82	20	0.6750	13.50	26.85	0.00	26.85	0.989	0.103	1.70	22.95	0.50	1.20	28.04	0.371	1.00	0.442	4.30	Non-liquefiable
3.00	SP-SM	15	22	0.6885	15.15	53.70	0.00	53.70	0.977	0.102	1.34	20.23	2.50	1.05	23.70	0.268	1.00	0.320	3.10	Non-liquefiable
6.00	SP-SM	13	24	0.7156	17.17	107.40	0.00	107.40	0.954	0.099	0.94	16.22	1.89	1.04	18.70	0.200	0.99	0.235	2.40	Non-liquefiable
9.00	SP-SM	12	30	0.7427	22.28	161.10	0.00	161.10	0.931	0.097	0.77	17.18	1.55	1.03	19.27	0.207	0.94	0.231	2.40	Non-liquefiable
12.00	SP-SM	6	43	0.7698	33.10	214.80	0.00	214.80	0.854	0.089	0.67	22.10	0.03	1.00	22.23	0.245	0.91	0.266	3.00	Non-liquefiable
13.50	CI	72	21	0.7833	16.45	241.65	0.00	241.65	0.814	0.085	0.63	10.36	0.50	1.20	12.93	0.140	0.89	0.149	1.80	Not Safe
16.50	CI	81	22	0.8104	17.83	295.35	0.00	295.35	0.733	0.076	0.57	10.15	0.50	1.20	12.68	0.138	0.87	0.143	1.90	Not Safe
19.50	CI	78	36	0.8375	30.15	349.05	0.00	349.05	0.653	0.068	0.52	15.79	0.50	1.20	19.45	0.209	0.86	0.213	3.10	Non-liquefiable
22.50	CI	78	41	0.865	35.45	402.75	0.00	402.75	0.573	0.060	0.49	17.29	0.50	1.20	21.24	0.231	0.84	0.232	3.90	Non-liquefiable
25.50	CI	80	34	0.8917	30.32	456.45	0.00	456.45	0.493	0.051	0.46	13.89	0.50	1.20	17.16	0.183	0.83	0.181	3.50	Non-liquefiable
30.00	SP-SM	5	53	0.9323	49.41	537.00	0.00	537.00	0.373	0.039	0.42	20.87	0.00	1.00	20.87	0.226	0.81	0.220	5.70	Non-liquefiable

NOTES :

a_{max}	:	Peak Ground Acceleration	MSF	:	Magnitude Scaling Factor	C_s	:	Sample Correction Factor
g	:	Acceleration due to Gravity	Kσ	:	Overburden Correction Factor	C_b	:	Bore Hole Diameter Correction
r_d	:	Stress Reduction Factor	C_d	:	Drill Rod Length Correction Factor	E_h	:	Hammer Efficiency Correction

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LIQUEFACTION ANALYSIS

EQ Zone	=	III	E_h	=	0.80	f	=	0.88	**BH.NO**
a_{max}/g	=	0.16	C_d	=	0.75	Mw	=	7.00	**7**
K(alpha)	=	1.00	C_s	=	1.00	MSF	=	1.19	
Yb	=	17.50 Kn	C_b	=	1.05	Critical Water Table	=	3.60 m	
						Pa	=	95.8 KN/m^2	

Depth (m)	Soil Type	Fines Content (FC), %	N Value	$C_{60}=E_h.C_d.Cs.C_b$	Corrected N Value N_{60}	Total Overburden Stress (σ_{vo}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (σ'_{vo}) kN/m^2	Stress Reduction Factor (rd)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio (CRR 7.5)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction(FS)	Status of Liquefaction
1.50	CI	87	15	0.67	10.12	26.25	0.00	26.25	0.99	0.10	1.70	17.21	0.50	1.20	21.15	0.230	1.00	0.275	2.70	Non-liquefiable
6.00	CI	82	14	0.72	10.02	105.00	0.00	105.00	0.95	0.10	0.95	9.57	0.50	1.20	11.98	0.131	0.99	0.155	1.60	Not Safe
7.50	SP-SM	31	14	0.73	10.21	131.25	0.00	131.25	0.94	0.10	0.85	8.72	4.77	1.16	14.91	0.159	0.96	0.183	1.90	Not Safe
12.00	CI	88	14	0.77	10.78	210.00	0.00	210.00	0.85	0.09	0.68	7.28	0.50	1.20	9.23	0.106	0.91	0.116	1.30	Not Safe
15.00	CI	80	26	0.80	20.72	262.50	0.00	262.50	0.77	0.08	0.60	12.51	0.50	1.20	15.52	0.165	0.89	0.175	2.20	Non-liquefiable
18.00	CI	82	36	0.82	29.66	315.00	0.00	315.00	0.69	0.07	0.55	16.36	0.50	1.20	20.13	0.217	0.87	0.224	3.10	Non-liquefiable
21.00	CI	83	22	0.85	18.72	367.50	0.00	367.50	0.61	0.06	0.51	9.56	0.50	1.20	11.97	0.131	0.85	0.133	2.10	Not Safe
24.00	CI	79	36	0.88	31.61	420.00	0.00	420.00	0.53	0.06	0.48	15.10	0.50	1.20	18.61	0.199	0.84	0.199	3.60	Non-liquefiable
27.00	CI	82	41	0.91	37.12	472.50	0.00	472.50	0.45	0.05	0.45	16.71	0.50	1.20	20.55	0.222	0.83	0.219	4.60	Non-liquefiable
30.00	CI	11	59	0.93	55.01	525.00	0.00	525.00	0.37	0.04	0.43	23.49	1.21	1.03	25.32	0.298	0.82	0.290	7.50	Non-liquefiable
30.00	SDR	7	100	0.93	93.23	525.00	0.00	525.00	0.37	0.04	0.43	39.82	0.12	1.01	40.28	0.134	0.82	0.131	3.40	Non-liquefiable

NOTES :

a_{max}	:	Peak Ground Acceleration	MSF	:	Magnitude Scaling Factor	C_s	: Sample Correction Factor
g	:	Acceleration due to Gravity	Kσ	:	Overburden Correction Factor	C_b	: Bore Hole Diameter Correction
r_d	:	Stress Reduction Factor	C_d	:	Drill Rod Length Correction Factor	E_h	: Hammer Efficiency Correction

ANNEXURE -VIII

CHEMICAL TEST ANALYSIS

SOIL SAMPLES

BH.NO	Depth,m	Sulphate Content (SO3) ,%	Chloride Content ,%	pH Value
3	9.00	0.15	0.07	8.10
	15.00	0.19	0.06	8.10
	23.50	0.11	0.04	8.20
5	16.50	0.19	0.02	8.13
	22.50	0.15	0.05	8.10
7	12.00	0.19	0.07	8.10
	18.00	0.14	0.08	8.10
9	3.00	0.19	0.04	8.20
	21.00	0.18	0.07	8.20

WATER SAMPLES

BH.NO	Sulphate Content mg/l (SO3)	Chloride Content, mg/l	pH Value
3	376.00	342.00	7.46
7	369.00	347.00	7.52
5	375.00	386.00	7.55

PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19

Class	Concentration of Sulphates, expressed as SO3 In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

ANNEXURE -IX

SAFE AXIAL COMPRESSIVE PILE CAPACITY

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	1

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	Adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle

Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 600 mm

Pile Surface Area, A_s = 1.88 m^2/m length

Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10.0 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 2.70 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m		Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
	From	To									
1	0.00	2.50	Silty Clay (CI)	5.60	4.30	1.73	0.75	0.50			
2	2.50	14.50	Fine Sand(SP-SM)	0.02	28.60	1.83	1.00	0.50	9.00	17.04	18.24
3	14.50	23.50	Silty Clay (CI)	5.70	6.71	1.78	0.75	0.50	9.00	1.83	0.67
4	23.50	40.0	Residual Soil(SDR)	0.00	36.00	1.97	1.26	0.50		61.31	56.31

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 1

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.0	-	1											
2.50	-	2											
2.70	-	2											
10.00	**0.00**	2	0.0	28.6	0.83	0.00 1.87			0.00				
14.50	**4.50**	3	5.7	6.71	0.78	3.74 4.32	1.03	8.73	8.73				
16.00	**6.00**	3	5.7	6.71	0.78	4.91 4.91	3.23	9.14	17.9				
20.0	**10.0**	3	5.7	6.71	0.78	4.91 4.91	3.28	24.75	42.6	60.4	17.09	59.71	**23.88**
23.5	**13.5**	4	0.0	36	0.97	4.91 4.91	3.28	21.66	64.3	60.4	17.09	81.37	**32.55**
25.0	**15.0**	4	0.0	36	0.97	4.91 4.91	4.49	12.70	77.0	253.0	71.52	148.50	**59.4**
30.0	**20.0**	4	0.0	36	0.97	4.91 4.91	4.49	42.3	119.3	317.1	89.66	208.96	**83.6**
35.0	**25.0**	4	0.0	36	0.97	4.91 4.91	4.49	42.3	162	317	90	251.28	**100.5**
40.0	**30.0**	4	0.0	36	0.97	4.91 4.91	4.49	42.3	204	317	90	294	**117.4**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	2

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle

Pile cut-off Level (COL) : 10.00 m

Pile Diameter ,D : 600 mm

Pile Surface Area, A_s = 1.88 m^2/m length

Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : 0.0 m

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 0.0 m

i.e. 6.0 m below 0.0 m

Design Water Table Depth: 3.0 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	1.50	Silty Clay (CI)	6.30	5.87	1.76	0.75	0.50			
2	1.50	15.00	Fine Sand(SP-SM)	0.00	29.5	1.86	1.00	0.50		19.5	20.81
3	15.00	27.00	Silty Clay (CI)	6.70	7.6	1.78	0.75	0.50	9.00	1.98	0.79
4	27.00	40.00	Residual Soil(SDR)	0.00	34.2	1.96	1.21	0.50		43.69	42.36

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 2

Depth Below GL, m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1			1.76	0.00							
						1.32							
1.50	-	2			1.86	2.64							
						4.04							
3.00	-	2			0.86	5.43							
						5.43							
10.0	**0.00**	2	0.0	29.5	0.86	5.43			0.00				
						5.43							
15.0	**5.00**	3	6.7	7.58	0.78	5.43	3.07	28.95	28.95				
						5.43							
20.0	**10.00**	3	6.7	7.58	0.78	5.43	3.89	36.68	65.63	71.2	20.1	85.8	**34.3**
						5.43							
25.0	**15.00**	3	6.7	7.58	0.78	5.43	3.89	36.68	102.32	71.2	20.1	122.5	**49.0**
						5.43							
27.0	**17.00**	4	0.0	34.2	0.96	5.43	3.89	14.7	116.99	71.2	20.1	137.1	**54.9**
						5.43							
30.0	**20.0**	4	0.0	34.2	0.96	5.43	4.47	25.2	142.2	249.5	70.5	212.8	**85.1**
						5.43							
35.0	**25.0**	4	0.0	34.2	0.96	5.43	4.47	42.1	184.3	249.5	70.5	254.9	**101.9**
						5.4							
40.0	**30.0**					5.43	4.47	42.1	226	249	71	296.9	**118.8**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	3

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 600 mm

Pile Surface Area, A_s = 1.88 m^2/m length Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 2.90 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.0	7.50	Silty Clay (CI)	5.00	5.68	1.76	0.75	0.50	9.00	1.67	0.53
2	7.50	10.50	Fine Sand+Clay	2.80	15.40	1.78	0.75	0.50	9.00	4.1	2.81
3	10.50	29.0	Silty Clay (CI)	6.50	7.75	1.76	1.05	0.50	9.00	2.01	0.82
4	29.00	40.0	Hard Rock	0.00	40.00	1.99	1.50	0.50		130.2	109.41

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 3

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
2.90	-	1											
7.50	-	2											
10.0	**0.00**	2	2.8	15.4	0.78	0.00							
10.5	**0.5**	3	6.5	7.75	0.76	0.20 0.39	1.44	1.36	1.36				
16.0	**6.0**	3	6.5	7.75	0.76	2.48 4.57	3.60	37.37	38.73				
20.0	**10.0**	3	6.5	7.75	0.76	4.57 4.57	3.90	29.43	68.15	67.9	19.2	87.3	**34.9**
25.0	**15.0**	3	6.5	7.75	0.76	4.57 4.57	3.90	36.8	104.94	67.9	19.2	124.1	**49.7**
29.0	**19.0**	3	6.5	7.75	0.76	4.57 4.57	3.90	29.4	134.37	68	19.2	153.6	**61.4**
30.0	**20.0**	4	0.0	40	0.99	4.57 4.57	5.75	10.8	145.2	348	98.3	243.5	**97.4**
35.0	**25.0**	4	0.0	40	0.99	4.6 4.57	5.75	54.2	199	627	177	376.79	**150.7**
40.0	**30.0**	4	0.0	40	0.99	4.57 4.57	5.75	54.2	254	627	177	431	**172.4**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	4

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : **600 mm**

Pile Surface Area, A_s = 1.88 m^2/m length Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 3.4 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	3.00	Silty Clay (CI)	6.50	5.32	1.71	0.75	0.50			
2	3.00	15.00	Fine Sand(SP-SM)	0.26	30.00	1.83	1.02	0.50	9.00	20.95	22.40
3	15.0	28.0	Silty Clay (CI)	5.20	8.33	1.80	0.75	0.50	9.00	2.12	0.91
4	28.0	40.0	Residual Soil(SDR)	0.00	34.50	1.95	1.23	0.5		46.23	44.40

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 4

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
3.00	-	2											
3.40	-	2											
10.0	**0.0**	2	0.3	30	0.83	0.00							
15.0	**5.0**	3	5.2	8.33	0.80	2.08 4.15	1.35	12.74	12.74				
16.0	**6.0**	3	5.2	8.33	0.80	4.55 4.95	3.10	5.84	18.58				
20.0	**10.0**	3	5.2	8.33	0.80	4.95 4.95	3.14	23.70	42.29	57.5	16.3	58.5	**23.4**
25.0	**15.0**	3	5.2	8.33	0.80	4.95 4.95	3.14	29.63	71.9	57.5	16.3	88.2	**35.3**
28.0	**18.0**	4	0.0	34.5	0.95	4.95 4.95	3.14	17.78	89.7	57.5	16.3	106.0	**42.4**
30.0	**20.0**	4	0.0	34.5	0.95	4.95 4.95	4.18	15.8	105.5	241.5	68.3	173.7	**69.5**
35.0	**25.0**	4	0.0	34.5	0.95	5.0 4.95	4.18	39.4	145	241	68	213.2	**85.3**
40.0	**30.0**	4	0.0	34.5	0.95	4.95 4.95	4.18	39.4	184	241	68	253	**101.0**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	5

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : **600 mm**

Pile Surface Area, A_s = 1.88 m^2/m length Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 3.3 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.0	1.50	Silty Clay (CI)	6.50	4.80	1.67	0.75	0.50			
2	1.50	12.0	Fine Sand(SP-SM)	0.20	28.80	1.80	1.00	0.50	9.00	17.55	18.78
3	12.0	27.0	Silty Clay (CI)	5.30	7.75	1.76	0.75	0.50	9.00	2.01	0.82
4	27.0	40.0	Residual Soil(SDR)	0.00	34.80	1.95	1.24	0.50		48.92	46.54

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 5

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.0	-	1											
1.50	-	2											
3.30	-	2											
10.0	**0.0**	2	0.2	28.8	0.80	0.00			0.00				
12.0	**2.0**	3	5.3	7.75	0.76	0.80 1.60	0.54	2.04	2.04				
16.0	**6.0**	3	5.3	7.75	0.76	3.12 4.64	2.97	22.38	24.42				
20.0	**10.0**	3	5.3	7.75	0.76	4.64 4.64	3.12	23.55	47.97	57.2	16.2	64.1	**25.7**
25.0	**15.0**	3	5.3	7.75	0.76	4.64 4.64	3.12	29.4	77.41	57.2	16.2	93.6	**37.4**
27.0	**17.0**	4	0.0	34.8	0.95	4.64 4.64	3.12	11.8	89.18	57.2	16.2	105.4	**42.1**
30.0	**20.0**	4	0.0	34.8	0.95	4.64 4.64	4.00	22.6	111.8	240.2	67.9	179.7	**71.9**
35.0	**25.0**	4	0.0	34.8	0.95	4.6 4.64	4.00	37.7	149	240	68	217.41	**87.0**
40.0	**30.0**					4.64 4.64	4.00	37.7	187	240	68	255	**102.0**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	6

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 600 mm

Pile Surface Area, A_s = 1.88 m^2/m length Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 3.6 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	14.50	Silty Clay (CI)	5.30	6.67	1.81	0.75	0.50	9.00	1.82	0.66
2	14.5	22.5	Fine Sand(SP-SM)	0.00	29.50	1.84	1.00	0.50		19.46	20.81
3	22.5	27.0	Silty Clay (CI)	5.00	7.20	1.77	0.75	0.50	9.00	1.91	0.74
4	27.0	40.0	Residual Soil(SDR)	0.00	35.20	1.95	1.26	0.50		52.74	49.57

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 6

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
3.60	-	1											
10.0	**0.00**	1	5.3	6.67	0.81	0.00							
14.5	**4.5**	2	0.0	29.5	0.84	1.82 3.65	2.81	23.83	23.83				
16.0	**6.0**	2	0.0	29.5	0.84	4.28 4.91	2.42	6.84	30.67				
20.0	**10.0**	2	0.0	29.5	0.84	4.91 4.91	2.78	20.92	51.60	54.6	15.4	67.0	**26.8**
22.5	**12.5**	3	5.0	7.2	0.77	4.91 4.91	2.78	13.08	64.67	54.6	15.4	80.1	**32.0**
25.0	**15.0**	3	5.0	7.2	0.77	4.91 4.91	2.96	14.0	78.64	54.6	15.4	94.1	**37.6**
27.0	**17.0**	4	0.0	35.2	0.95	4.91 4.91	2.96	11.2	89.8	54.6	15.4	105.2	**42.1**
30.0	**20.0**	4	0.0	35.2	0.95	4.91 4.91	4.36	24.7	114.5	272.8	77.1	191.6	**76.6**
35.0	**25.0**	4	0.0	35.2	0.95	4.9 4.91	4.36	41.1	156	273	77.1	232.7	**93.1**
40.0	**30.0**					4.91 4.91	4.36	41.1	197	273	77	274	**109.5**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	7

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle

Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : **600 mm**

Pile Surface Area, A_s = 1.88 m^2/m length

Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 3.2 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	7.00	Silty Clay (CI)	6.40	6.06	1.75	0.75	0.50	9.00	1.73	0.58
2	7.00	8.50	Fine Sand(SP-SM)	0.00	28.30	1.84	1.00	0.50		16.31	17.46
3	8.50	27.0	Silty Clay (CI)	5.10	8.75	1.81	0.75	0.50	9.00	2.20	1.0
4	27.00	40.0	Residual Soil(SDR)	0.00	35.20	1.96	1.26	0.50		52.74	49.57

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 7

Depth Below GL, m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.0	-												
		1											
3.2	-												
		1											
7.0	-												
		2											
8.5	-					0.00							
		3	5.1	8.75		0.00							
10.0	**0.0**					0.00	0.00	0.00	0.00				
		3	5.1	8.75	0.81	2.43							
16.0	**6.0**					4.86	2.83	32.01	32.01				
		3	5.1	8.75	0.81	4.86							
20.0	**10.0**					4.86	3.11	23.46	55.47	56.8	16.1	71.5	**28.6**
		3	5.1	8.75	0.81	4.86							
25.0	**15.0**					4.86	3.11	29.3	84.79	56.8	16.1	100.9	**40.3**
		3	5.1	8.75	0.81	4.86							
27.0	**17.0**					4.86	3.11	11.7	96.52	56.8	16.1	112.6	**45.0**
		4	0.0	35.2	0.96	4.86							
30.0	**20.0**					4.86	4.32	24.4	120.9	270.6	76.5	197.5	**79.0**
		4	0.0	35.2	0.96	4.9							
35.0	**25.0**					4.86	4.32	40.7	162	271	77	238.2	**95.3**
		4	0.0	35.2	0.96	4.86							
40.0	**30.0**					4.86	4.32	40.7	202	271	77	279	**111.6**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	8

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 600 mm

Pile Surface Area, A_s = 1.88 m^2/m length Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 3.0 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	7.00	Silty Clay (CI)	6.10	5.90	1.76	0.75	0.50	9.00	1.70	0.56
2	7.0	9.0	Fine Sand(SP-SM)	0.00	28.50	1.83	1.00	0.50		16.8	17.98
3	9.0	27.0	Silty Clay (CI)	5.40	8.73	1.80	0.75	0.50	9.00	2.20	0.98
4	27.0	40.0	Residual Soil(SDR)	0.00	35.00	1.97	1.25	0.50		50.79	48.03

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO	8

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
3.00	-	1											
7.00	-	2											
9.0	-	3	5.4	8.73		0.00							
10.0	**0.0**	3	5.4	8.73	0.80	0.00	0.00	0.00	0.0				
16.0	**6.0**	3	5.4	8.73	0.80	4.80	2.98	33.66	33.7				
20.0	**10.0**	3	5.4	8.73	0.80	4.80	3.25	24.53	58.2	59.4	16.8	75.0	**30.0**
25.0	**15.0**	3	5.4	8.73	0.80	4.80	3.25	30.7	88.8	59.4	16.8	105.6	**42.3**
27.0	**17.0**	4	0.0	35	0.97	4.80	3.25	12.3	101.1	59.4	16.8	117.9	**47.2**
30.0	**20.0**	4	0.0	35	0.97	4.80	4.20	23.8	124.9	257.8	72.9	197.8	**79.10**
35.0	**25.0**	4	0.0	35	0.97	4.80	4.20	39.6	164.5	257.8	72.9	237.3	**94.9**
40.0	**30.0**					4.80	4.20	39.6	204.1	257.8	72.9	276.9	**110.8**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	9

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 600 mm

Pile Surface Area, A_s = 1.88 m^2/m length Pile cross-section Area, A_p = 0.283 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 6.0 m below 10.0 m

i.e. 16.0 m below 0.0 m

Design Water Table Depth: 3.3 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	4.00	Silty Clay (CI)	6.30	5.60	1.69	0.75	0.50			
2	4.00	20.0	Fine Sand(SP-SM)	0.00	30.80	1.86	1.03	0.50		23.0	25.23
3	20.0	30.0	Silty Clay (CI)	5.20	8.30	1.75	1.06	0.50	9.00	2.11	0.91
4	30.0	40.0	Residual Soil(SDR)	0.00	35.20	1.96	1.26	0.50		52.74	49.57

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 600 mm

BH.NO 9

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
3.30	-	1											
4.00	-	2											
10.0	**0.0**	2	0.0	30.8	0.86	0.00							
16.0	**6.0**	2	0.0	30.8	0.86	2.58 5.16	1.58	17.92	17.9				
20.0	**10.0**	3	5.2	8.3	0.75	5.16 5.16	3.17	23.89	41.8	57.9	16.4	58.2	**23.3**
25.0	**15.0**	3	5.2	8.3	0.75	5.16 5.16	3.40	32.02	73.8	57.9	16.4	90.2	**36.1**
30.0	**20.0**	4	0.0	35.2	0.96	5.16 5.16	3.40	32.0	105.9	57.9	16.4	122.2	**48.9**
35.0	**25.0**	4	0.0	35.2	0.96	5.16 5.16	4.59	43.2	149.1	286.4	81.0	230.1	**92.0**
40.0	**30.0**					5.16 5.16	4.59	43.2	192.3	286.4	80.98	273.29	**109.31**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

1000 mm Dia

GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF BUILDINGS FOR AMARAVATI LOCAL HEAD OFFICE AND OTHER OUTFITS AT AMARAVATI,ANDHRA PRADESH.

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	1

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle

Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 1000 mm

Pile Surface Area, A_s = 3.14 m^2/m length

Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10.0 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 2.70 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	2.50	Silty Clay (CI)	5.60	4.30	1.73	0.75	0.50			
2	2.50	14.50	Fine Sand(SP-SM)	0.02	28.60	1.83	1.00	0.50	9.00	17.04	18.24
3	14.50	23.50	Silty Clay (CI)	5.70	6.71	1.78	0.75	0.50	9.00	1.83	0.67
4	23.50	#####	Residual Soil(SDR)	0.00	35.10	1.97	1.26	0.50		51.76	48.79

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 1

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.0	-	1											
2.50	-	2											
2.70	-	2											
10.00	**0.00**	2	0.0	28.6	0.83	0.00 1.87			0.00				
14.50	**4.5**	3	5.7	6.71	0.78	3.74 5.88	1.03	14.56	14.56				
#####	**10.0**	3	5.7	6.71	0.78	8.03 8.03	3.37	58.21	72.8	66.2	52.03	124.80	**49.92**
23.5	**13.5**	4	0.0	35.1	0.97	8.03 8.03	3.56	39.12	111.9	66.2	52.03	163.92	**65.57**
25.0	**15.0**	4	0.0	35.1	0.97	8.03 8.03	7.11	33.49	145.4	252.7	198.44	343.82	**137.53**
30.0	**20.0**	4	0.0	35.1	0.97	8.03 8.03	7.11	111.63	257.0	439.0	######	601.81	**240.7**
35.0	**25.0**	4	0.0	35.1	0.97	8.03 8.03	7.11	111.6	368.6	439.0	######	713.44	**285.4**
40.0	**30.0**	4	0.0	35.1	0.97	8.03 8.03	7.11	111.6	480	439	345	825.06	**330.0**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	2

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle

Pile cut-off Level (COL) : 10.00 m

Pile Diameter ,D : 1000 mm

Pile Surface Area, A_s = 3.14 m^2/m length

Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : 0.0 m

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 0.0 m

i.e. 10.0 m below 0.0 m

Design Water Table Depth: 3.0 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	1.50	Silty Clay (CI)	6.30	5.87	1.76	0.75	0.50			
2	1.50	15.00	Fine Sand(SP-SM)	0.00	29.5	1.86	1.00	0.50		19.5	20.81
3	15.00	27.00	Silty Clay (CI)	6.70	7.6	1.78	0.75	0.50	9.00	1.98	0.79
4	27.00	40.00	Residual Soil(SDR)	0.00	34.2	1.96	1.21	0.50		43.69	42.36

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 2

Depth Below GL, m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1			1.76	0.00							
						1.32							
1.50	-	2			1.86	2.64							
						4.04							
3.00	-	2			0.86	5.43							
						8.44							
10.0	**0.00**	2	0.0	29.5	0.86	11.45			0.00				
						11.45							
15.0	**5.00**	3	6.7	7.58	0.78	11.45	6.48	101.76	101.76				
						11.45							
20.0	**10.00**	3	6.7	7.58	0.78	11.45	4.49	70.57	172.33	83.3	65.4	237.7	**95.1**
						11.45							
25.0	**15.00**	3	6.7	7.58	0.78	11.45	4.49	70.57	242.90	83.3	65.4	308.3	**123.3**
						11.45							
27.0	**17.00**	4	0.0	34.2	0.96	11.45	4.49	28.2	271.13	83.3	65.4	336.5	**134.6**
						11.45							
30.0	**20.0**	4	0.0	34.2	0.96	11.45	9.42	88.7	359.9	520.6	408.9	768.8	**307.5**
						11.45							
35.0	**25.0**	4	0.0	34.2	0.96	11.45	9.42	147.9	507.8	520.6	408.9	916.7	**366.7**
						11.5							
40.0	**30.0**					11.45	9.42	147.9	656	521	409	1064.6	**425.8**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	3

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 1000 mm

Pile Surface Area, A_s = 3.14 m^2/m length Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 2.90 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m		Soil	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
	From	To	Classification								
1	0.0	7.50	Silty Clay (CI)	5.00	5.68	1.76	0.75	0.50	9.00	1.67	0.53
2	7.50	10.50	Fine Sand+Clay	2.80	15.40	1.78	0.75	0.50	9.00	4.1	2.81
3	10.50	29.0	Silty Clay (CI)	6.50	7.75	1.76	1.05	0.50	9.00	2.01	0.82
4	29.00	40.0	Hard Rock	0.00	40.00	1.99	1.50	0.50		130.2	109.41

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 3

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
2.90	-	1											
7.50	-	2											
10.00	**0.00**	2	2.8	15.4	0.78	0.00							
10.5	**0.5**	3	6.5	7.75	0.76	0.20 0.39	1.44	2.26	2.26				
20.0	**10.0**	3	6.5	7.75	0.76	4.00 7.61	3.82	114.06	116.32	74.1	58.2	174.5	**69.8**
25.0	**15.0**	3	6.5	7.75	0.76	7.61 7.61	4.34	68.13	184.45	74.1	58.2	242.7	**97.1**
29.0	**19.0**	4	0.0	40	0.99	7.61 7.61	4.34	54.5	238.96	74.1	58.2	297.2	**118.9**
30.0	**20.0**	4	0.0	40	0.99	7.61 7.61	9.58	30.1	269.05	398	312.3	581	**232.6**
35.0	**25.0**	4	0.0	40	0.99	7.61 7.61	9.58	150.5	419.5	1045	820.5	1240	**496.0**
40.0	**30.0**	4	0.0	40	0.99	7.6 7.61	9.58	150.5	570	1045	820	1390	**556.2**

MEDIN GEO ENGINEERING

SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	4

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : **1000 mm**

Pile Surface Area, A_s = 3.14 m^2/m length Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to 10 pile diameters, i.e. 10.0 m below 10.0 m

become constant below : i.e. 20.0 m below 0.0 m

Design Water Table Depth: 3.4 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	3.00	Silty Clay (CI)	6.50	5.32	1.71	0.75	0.50			
2	3.00	15.00	Fine Sand(SP-SM)	0.26	30.00	1.83	1.02	0.50	9.00	20.95	22.40
3	15.00	28.0	Silty Clay (CI)	5.20	8.33	1.80	0.75	0.50	9.00	2.12	0.91
4	28.0	40.0	Residual Soil(SDR)	0.00	34.50	1.95	1.23	0.5		46.23	44.40

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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GEO ENGINEERING

SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 4

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
3.00	-	2											
3.40	-	2											
10.0	**0.0**	2	0.3	30	0.83	0.00							
15.0	**5.0**	3	5.2	8.33	0.80	2.08 4.15	1.35	21.24	21.24				
20.0	**10.0**	3	5.2	8.33	0.80	6.15 8.15	3.28	51.45	72.69	64.5	50.6	123.3	**49.3**
25.0	**15.0**	3	5.2	8.33	0.80	8.15 8.15	3.49	54.90	127.58	64.5	50.6	178.2	**71.3**
28.0	**18.0**	4	0.0	34.5	0.95	8.15 8.15	3.49	32.94	160.5	64.5	50.6	211.1	**84.5**
30.0	**20.0**	4	0.0	34.5	0.95	8.15 8.15	6.89	43.29	203.8	286.8	225.2	429.0	**171.6**
35.0	**25.0**	4	0.0	34.5	0.95	8.15 8.15	6.89	108.2	312.0	397.9	312.5	624.5	**249.8**
40.0	**30.0**	4	0.0	34.5	0.95	8.2 8.15	6.89	108.2	420	398	312	732.7	**293.1**

MEDIN GEO ENGINEERING

SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	5

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1\,to\,n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5DgN_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : **1000 mm**

Pile Surface Area, A_s = 3.14 m^2/m length Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 3.3 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.0	1.50	Silty Clay (CI)	6.50	4.80	1.67	0.75	0.50			
2	1.50	12.0	Fine Sand(SP-SM)	0.20	28.80	1.80	1.00	0.50	9.00	17.55	18.78
3	12.0	27.0	Silty Clay (CI)	5.30	7.75	1.76	0.75	0.50	9.00	2.01	0.82
4	27.0	40.0	Residual Soil(SDR)	0.00	34.80	1.95	1.24	0.50		48.92	46.54

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 5

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.0	-												
		1											
1.50	-												
		2											
3.30	-												
		2											
10.0	**0.0**					0.00			0.00				
		2	0.2	28.8	0.80	0.80							
12.0	**2.0**					1.60	0.54	3.39	3.39				
		3	5.3	7.75	0.76	4.64							
20.0	**10.0**					7.68	3.12	78.50	81.90	63.5	49.8	131.7	**52.7**
		3	5.3	7.75	0.76	7.68							
25.0	**15.0**					7.68	3.43	53.94	135.84	63.5	49.8	185.7	**74.3**
		3	5.3	7.75	0.76	7.68							
27.0	**17.0**					7.68	3.43	21.6	157.41	63.5	49.8	207.3	**82.9**
		4	0.0	34.8	0.95	7.68							
30.0	**20.0**					7.68	6.62	62.4	219.79	397.8	312.4	532.2	**212.9**
		4	0.0	34.8	0.95	7.68							
35.0	**25.0**					7.68	6.62	104.0	323.8	397.8	312.4	636.2	**254.5**
		4	0.0	34.8	0.95	7.7							
40.0	**30.0**					7.68	6.62	104.0	428	398	312	740.14	**296.1**

MEDIN GEO ENGINEERING

SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	6

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 1000 mm

Pile Surface Area, A_s = 3.14 m^2/m length Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 3.6 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	14.50	Silty Clay (CI)	5.30	6.67	1.81	0.75	0.50	9.00	1.82	0.66
2	14.5	22.5	Fine Sand(SP-SM)	0.00	29.50	1.84	1.00	0.50		19.46	20.81
3	22.5	27.0	Silty Clay (CI)	5.00	7.20	1.77	0.75	0.50	9.00	1.91	0.74
4	27.0	40.0	Residual Soil(SDR)	0.00	35.20	1.95	1.26	0.50		52.74	49.57

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

MEDIN GEO ENGINEERING

SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 6

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	γ_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-												
		1											
3.60	-												
		1											
10.00	**0.00**					0.00							
		1	5.3	6.67	0.81	1.82							
14.5	**4.5**					3.65	2.81	39.72	39.72				
		2	0.0	29.5	0.84	5.96							
20.0	**10.0**					8.27	3.37	58.22	97.94	61.1	48.0	145.9	**58.4**
		2	0.0	29.5	0.84	8.27							
22.5	**12.5**					8.27	4.68	36.73	134.66	61.1	48.0	182.7	**73.1**
		3	5.0	7.2	0.77	8.27							
25.0	**15.0**					8.27	3.28	25.79	160.45	61.1	48.0	208.4	**83.4**
		3	5.0	7.2	0.77	8.27							
27.0	**17.0**					8.27	3.28	20.6	181.08	61.1	48	229.1	**91.6**
		4	0.0	35.2	0.95	8.27							
30.0	**20.0**					8.27	7.35	69.2	250.3	459.4	361	611.2	**244.5**
		4	0.0	35.2	0.95	8.27							
35.0	**25.0**					8.27	7.35	115.4	365.7	459.4	361	726.6	**290.6**
		4	0.0	35.2	0.95	8.3							
40.0	**30.0**					8.27	7.35	115.4	481	459	361	841.9	**336.8**

MEDIN GEO ENGINEERING SERVICES

SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	7

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle

Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 1000 mm

Pile Surface Area, A_s = 3.14 m^2/m length

Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 3.2 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	7.00	Silty Clay (CI)	6.40	6.06	1.75	0.75	0.50	9.00	1.73	0.58
2	7.00	8.50	Fine Sand(SP-SM)	0.00	28.30	1.84	1.00	0.50		16.31	17.46
3	8.50	27.0	Silty Clay (CI)	5.10	8.75	1.81	0.75	0.50	9.00	2.20	1.0
4	27.00	40.0	Residual Soil(SDR)	0.00	35.20	1.96	1.26	0.50		52.74	49.57

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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GEO ENGINEERING SERVICES

SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 7

Depth Below GL, m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.0	-												
		1											
3.2	-												
		1											
7.0	-												
		2											
8.5	-					0.00							
		3	5.1	8.75		0.00							
10.0	**0.0**					0.00	0.00	0.00	0.00				
		3	5.1	8.75	0.81	4.05							
20.0	**10.0**					8.10	3.02	94.80	94.80	64.1	50.4	145.2	**58.1**
		3	5.1	8.75	0.81	8.10							
25.0	**15.0**					8.10	3.49	54.74	149.54	64.1	50.4	199.9	**80.0**
		3	5.1	8.75	0.81	8.10							
27.0	**17.0**					8.10	3.49	21.9	171.44	64.1	50.4	221.8	**88.7**
		4	0.0	35.2	0.96	8.10							
30.0	**20.0**					8.10	7.20	67.9	239.29	451.0	354.2	593.5	**237.4**
		4	0.0	35.2	0.96	8.10							
35.0	**25.0**					8.10	7.20	113.1	352.4	451.0	354.2	706.6	**282.6**
		4	0.0	35.2	0.96	8.1							
40.0	**30.0**					8.10	7.20	113.1	465	451	354	819.7	**327.9**

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	8

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : **1000 mm**

Pile Surface Area, A_s = 3.14 m^2/m length Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 3.0 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	7.00	Silty Clay (CI)	6.10	5.90	1.76	0.75	0.50	9.00	1.70	0.56
2	7.0	9.0	Fine Sand(SP-SM)	0.00	28.50	1.83	1.00	0.50		16.8	17.98
3	9.0	27.0	Silty Clay (CI)	5.40	8.73	1.80	0.75	0.50	9.00	2.20	0.98
4	27.0	40.0	Residual Soil(SDR)	0.00	35.00	1.97	1.25	0.50		50.79	48.03

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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GEO ENGINEERING

SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 8

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-												
		1											
3.00	-												
		1											
7.00	-												
		2											
9.0	-												
		3	5.4	8.73		0.00							
10.0	**0.0**					0.00	0.00	0.00	0.0				
		3	5.4	8.73	0.80	4.00							
20.0	**10.0**					8.00	3.16	99.30	99.3	66.6	52.3	151.6	**60.6**
		3	5.4	8.73	0.80	8.00							
25.0	**15.0**					8.00	3.62	56.88	156.2	66.6	52.3	208.5	**83.4**
		3	5.4	8.73	0.80	8.00							
27.0	**17.0**					8.00	3.62	22.8	178.9	66.6	52.3	231.2	**92.5**
		4	0.0	35	0.97	8.00							
30.0	**20.0**					8.00	7.00	66.0	244.9	429.6	337.4	582.4	**232.9**
		4	0.0	35	0.97	8.00							
35.0	**25.0**					8.00	7.00	110.0	354.9	429.6	337.4	692.3	**276.9**
		4	0.0	35	0.97	8.0							
40.0	**30.0**					8.00	7.00	110.0	465	430	337	802.3	**320.9**

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GEO ENGINEERING SERVICES

SAFE AXIAL COMPRESSIVE PILE CAPACITY

BH.NO	9

COMPUTATION OF SAFE AXIAL **COMPRESSIVE PILE CAPACITY** BY STATIC ANALYSIS

Analysis in accordance with IRC- 78, 2000 and IS 2911 Part 1 Section 2-1979 Reaffirmed 1997

Pile Type : Bored Cast in Situ RCC Pile **Loading :** Axial Compression

The safe pile capacity is computed as :

$$Q_{safe}=(1/FS)\{S_{1to\ n}[(ac+pktand)A_sL]+[(cN_c+pN_q+0.5D\,g\,N_g)A_p]\}$$

where :

Q_{safe}	=	Safe axial pile capacity, Tonnes	FS	=	Factor of safety
a	=	adhesion factor	p	=	Overburden pressure, T/m^2
d	=	Friction angle between soil and pile, degrees (= f)	L	=	Pile segment length in selected layer
c	=	Cohesion intercept, T/m^2	k	=	Earth pressure coefficient
g	=	Effective density of soil, T/m^3	D	=	Pile diameter
N_c, N_q, N_g	=	Bearing capacity factors, which are a function off	A_s	=	Pile surface area per m length
n	=	Number of layers	A_p	=	Pile end bearing area

Pile Cross section : Circle Pile cut-off Level (COL) : 10.0 m

Pile Diameter ,D : 1000 mm

Pile Surface Area, A_s = 3.14 m^2/m length Pile cross-section Area, A_p = 0.785 m^2

Overburden Pressure to be considered below : COL

Consider overburden pressure to become constant below : 10 pile diameters, i.e. 10.0 m below 10.0 m

i.e. 20.0 m below 0.0 m

Design Water Table Depth: 3.3 m

Factor of Safety : 2.50 as per IS 1904-1986

Layer No.	Depth,m From	Depth,m To	Soil Classification	c, T/m^2	f (=d)°	g, T/m^3	k	a	N_c	N_q	N_g
1	0.00	4.00	Silty Clay (CI)	6.30	5.60	1.69	0.75	0.50	9.00	1.66	0.52
2	4.00	20.0	Fine Sand(SP-SM)	0.00	30.80	1.86	1.03	0.50		23.0	25.23
3	20.00	3.0	Silty Clay (CI)	5.20	8.30	1.75	1.06	0.50			
4	3.00	40.0	Residual Soil(SDR)	0.00	35.20	1.96	1.26	0.50		52.74	49.57

Pile Capacity Calculation at following Pile Length(s) below cut-off Level (m)	10.0	15.0	20.0	25.0	30.0

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SAFE AXIAL COMPRESSIVE PILE CAPACITY

Pile Dia = 1000 mm

BH.NO 9

Depth Below GL , m	Pile Length below COL, m	Layer No.	Soil Parameters			Overburden Pressure	Unit Skin Friction	Skin Friction in Layer	Cumulative Skin Friction	Unit End Bearing	Total End Bearing	Ult. Pile Capacity	Safe Pile Capacity
			c, T/m^2	f (=d), degrees	g_{eff}, T/m^3	T/m^2	T/m^2	Tonnes	Tonnes	T/m^2	Tonnes	Tonnes	Tonnes
0.00	-	1											
3.30	-	1											
4.00	-	2											
10.0	**0.0**	2	0.0	30.8	0.86	0.00 4.30 8.60	2.64	82.94	82.9	209.0	164.2	247.1	**98.8**
20.0	**10.0**	4	0.0	35.2	0.96	8.60 8.60	7.64	120.07	203.0	477.4	374.9	577.9	**231.2**
25.0	**15.0**	4	0.0	35.2	0.96	8.60 8.60	7.64	120.07	323.1	477.4	374.9	698.0	**279.2**
30.0	**20.0**	4	0.0	35.2	0.96	8.60 8.60	7.64	120.1	443.2	477.4	374.9	818.1	**327.2**
35.0	**25.0**	4	0.0	35.2	0.96	8.60 8.60	7.64	120.1	563.2	477.4	374.9	938.1	**375.3**
40.0	**30.0**												

ANNEXURE -X

PULL OUT CAPACITY OF PILE

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-1

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	417.98	kN
		=	559.28	
Factor Of Safty	FOS	=	**2.50**	
		=	223.71	kN
Uplift capacity of Piles @20.0m		=	**37.10**	Tonnes
Uplift capacity of Piles @25.00 m		=	**54.57**	Tonnes
Uplift capacity of Piles @30.0m		=	**72.04**	Tonnes
Uplift capacity of Piles @35.0m		=	**89.51**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**22.37**	**37.10**	**54.57**	**72.04**	**89.51**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-2

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	643.66	kN
		=	784.96	
Factor Of Safty	FOS	=	**2.50**	
		=	313.98	kN
Uplift capacity of Piles @20.0m		=	**47.20**	Tonnes
Uplift capacity of Piles @25.00 m		=	**64.27**	Tonnes
Uplift capacity of Piles @30.0m		=	**82.19**	Tonnes
Uplift capacity of Piles @35.0m		=	**100.11**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**31.40**	**47.20**	**64.27**	**82.19**	**100.11**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-3

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	668.36	kN
		=	809.66	
Factor Of Safty	FOS	=	**2.50**	
		=	323.86	kN
Uplift capacity of Piles @20.0m		=	**48.23**	Tonnes
Uplift capacity of Piles @25.00 m		=	**65.44**	Tonnes
Uplift capacity of Piles @30.0m		=	**88.12**	Tonnes
Uplift capacity of Piles @35.0m		=	**110.80**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**32.39**	**48.23**	**65.44**	**88.12**	**110.80**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-4

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	414.69	kN
		=	555.99	
Factor Of Safty	FOS	=	**2.50**	
		=	222.40	kN
Uplift capacity of Piles @20.0m		=	**35.27**	Tonnes
Uplift capacity of Piles @25.00 m		=	**49.85**	Tonnes
Uplift capacity of Piles @30.0m		=	**66.73**	Tonnes
Uplift capacity of Piles @35.0m		=	**83.62**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**22.24**	**35.27**	**49.85**	**66.73**	**83.62**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-5

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	470.41	kN
		=	611.71	
Factor Of Safty	FOS	=	**2.50**	
		=	244.68	kN
Uplift capacity of Piles @20.0m		=	**37.43**	Tonnes
Uplift capacity of Piles @25.00 m		=	**52.33**	Tonnes
Uplift capacity of Piles @30.0m		=	**68.53**	Tonnes
Uplift capacity of Piles @35.0m		=	**84.73**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**24.47**	**37.43**	**52.33**	**68.53**	**84.73**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-6

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	505.99	kN
		=	647.29	
Factor Of Safty	FOS	=	**2.50**	
		=	258.92	kN
Uplift capacity of Piles @20.0m		=	**37.91**	Tonnes
Uplift capacity of Piles @25.00 m		=	**53.38**	Tonnes
Uplift capacity of Piles @30.0m		=	**70.91**	Tonnes
Uplift capacity of Piles @35.0m		=	**88.44**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**25.89**	**37.91**	**53.38**	**70.91**	**88.44**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-7

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	543.96	kN
		=	685.26	
Factor Of Safty	FOS	=	**2.50**	
		=	274.11	kN
Uplift capacity of Piles @20.0m		=	**40.33**	Tonnes
Uplift capacity of Piles @25.00 m		=	**55.92**	Tonnes
Uplift capacity of Piles @30.0m		=	**73.30**	Tonnes
Uplift capacity of Piles @35.0m		=	**90.69**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**27.41**	**40.33**	**55.92**	**73.30**	**90.69**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-8

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	570.63	kN
		=	711.93	
Factor Of Safty	FOS	=	**2.50**	
		=	284.77	kN
Uplift capacity of Piles @20.0m		=	**41.92**	Tonnes
Uplift capacity of Piles @25.00 m		=	**57.46**	Tonnes
Uplift capacity of Piles @30.0m		=	**74.40**	Tonnes
Uplift capacity of Piles @35.0m		=	**91.35**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**28.48**	**41.92**	**57.46**	**74.40**	**91.35**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-9

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	0.60	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.2826	
Length of the Pile		=	20.00	m
	Wp		141.30	kN
	Qu	=	Qs+Wp	
	Qs	=	409.96	kN
		=	551.26	
Factor Of Safty	FOS	=	**2.50**	
		=	220.50	kN
Uplift capacity of Piles @20.0m		=	**36.03**	Tonnes
Uplift capacity of Piles @25.00 m		=	**50.00**	Tonnes
Uplift capacity of Piles @30.0m		=	**68.37**	Tonnes
Uplift capacity of Piles @35.0m		=	**86.74**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**22.05**	**36.03**	**50.00**	**68.37**	**86.74**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-1

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	713.59	kN
		=	1106.09	
Factor Of Safty	FOS	=	**2.50**	
		=	442.44	kN
Uplift capacity of Piles @20.0m		=	**76.65**	Tonnes
Uplift capacity of Piles @25.00 m		=	**124.36**	Tonnes
Uplift capacity of Piles @30.0m		=	**172.08**	Tonnes
Uplift capacity of Piles @35.0m		=	**219.79**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**44.24**	**76.65**	**124.36**	**172.08**	**219.79**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-2

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	1689.98	kN
		=	2082.48	
Factor Of Safty	FOS	=	**2.50**	
		=	832.99	kN
Uplift capacity of Piles @20.0m		=	**114.91**	Tonnes
Uplift capacity of Piles @25.00 m		=	**164.71**	Tonnes
Uplift capacity of Piles @30.0m		=	**226.66**	Tonnes
Uplift capacity of Piles @35.0m		=	**288.60**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**83.30**	**114.91**	**164.71**	**226.66**	**288.60**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-3

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	1140.69	kN
		=	1533.19	
Factor Of Safty	FOS	=	**2.50**	
		=	613.28	kN
Uplift capacity of Piles @20.0m		=	**91.98**	Tonnes
Uplift capacity of Piles @25.00 m		=	**129.09**	Tonnes
Uplift capacity of Piles @30.0m		=	**192.03**	Tonnes
Uplift capacity of Piles @35.0m		=	**254.98**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**61.33**	**91.98**	**129.09**	**192.03**	**254.98**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-4

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	712.80	kN
		=	1105.30	
Factor Of Safty	FOS	=	**2.50**	
		=	442.12	kN
Uplift capacity of Piles @20.0m		=	**69.67**	Tonnes
Uplift capacity of Piles @25.00 m		=	**103.50**	Tonnes
Uplift capacity of Piles @30.0m		=	**149.88**	Tonnes
Uplift capacity of Piles @35.0m		=	**196.25**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**44.21**	**69.67**	**103.50**	**149.88**	**196.25**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-5

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	803.13	kN
		=	1195.63	
Factor Of Safty	FOS	=	**2.50**	
		=	478.25	kN
Uplift capacity of Piles @20.0m		=	**72.91**	Tonnes
Uplift capacity of Piles @25.00 m		=	**109.77**	Tonnes
Uplift capacity of Piles @30.0m		=	**154.48**	Tonnes
Uplift capacity of Piles @35.0m		=	**199.18**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**47.83**	**72.91**	**109.77**	**154.48**	**199.18**

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PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-6

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	505.99	kN
		=	898.49	
Factor Of Safty	FOS	=	**2.50**	
		=	359.40	kN
Uplift capacity of Piles @20.0m		=	**50.47**	Tonnes
Uplift capacity of Piles @25.00 m		=	**68.45**	Tonnes
Uplift capacity of Piles @30.0m		=	**88.50**	Tonnes
Uplift capacity of Piles @35.0m		=	**108.54**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**35.94**	**50.47**	**68.45**	**88.50**	**108.54**

MEDINI
GEO ENGINEERING SERVICES

PULL OUT CAPACITY FOR PILE FOUNDATION

Analysis in accordance with IS 2911 Part 1 sec 2 - 2010

BH-7

Pile Type		=	Bored Cast in Situ	
Pile Cross-section		=	Circle	
Pile Dia	(D)	=	1.00	m
Pile Length below GL	L	=	20.00	m
Unsupported length of Pile	L1	=	0.00	m
Taking Unit Weight of Concrete		=	25	KN/mm^3
Self Weight of the Pile, Wp		=	Ap.L.γp	
Area of the Pile	Ap	=	0.7850	
Length of the Pile		=	20.00	m
	Wp		392.50	kN
	Qu	=	Qs+Wp	
	Qs	=	929.65	kN
		=	1322.15	
Factor Of Safty	FOS	=	**2.50**	
		=	528.86	kN
Uplift capacity of Piles @20.0m		=	**78.28**	Tonnes
Uplift capacity of Piles @25.00 m		=	**117.42**	Tonnes
Uplift capacity of Piles @30.0m		=	**165.70**	Tonnes
Uplift capacity of Piles @35.0m		=	**213.99**	Tonnes

Pile Depth Below GL(m)	**20.00**	**25.00**	**30.00**	**35.00**	**40.00**
Uplift Capacity(Ton)	**52.89**	**78.28**	**117.42**	**165.70**	**213.99**