EXPERT TESTING LABORATORY PVT. LTD.

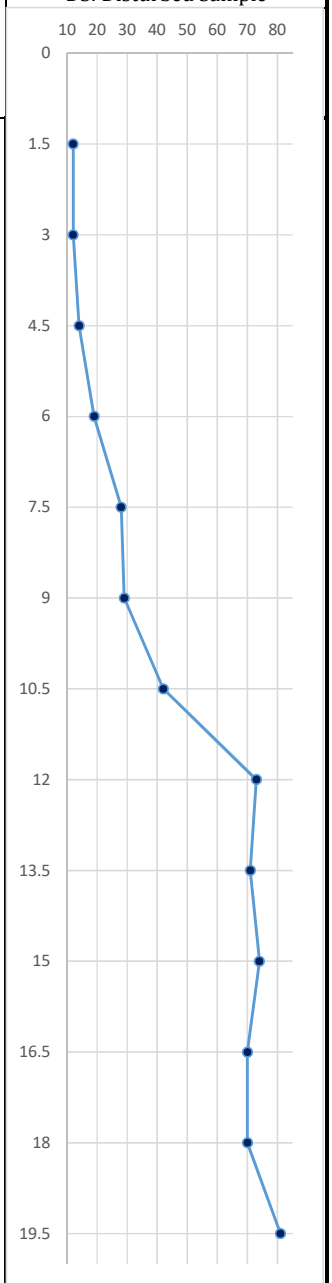
BAFAL, LALITPUR-17
Gmail: experttestlab078@gmail.com

Bore Hole Log

Pokariya 132kV transmission line	Bore Hole no: 01
Pradesh	Date: 2022/07/02-2022/07/03
Type of Boring: Rotatory drill Boring NX	Diameter of Boring: 85mm
Inclination of Boring: Vertical	Sampling Equipment: Split Sampler
Ground Water Table: 2.5m from ground	Lattitude:27°05'05.7''
Reduced Level:88m	Longitude: 84°45'16.8''

S.N.	Soil Description	Symbol	Depth(m)	DS/ UDS	Ground Water Level Depth(m)	Number of blows for 0-15	15-30	30-45	Total reorded N value
1	Light brown clay		0		4m from ground				
2			0.5						
3			1						
4	Light grey silty clay		1.5			4	5	7	12
5			2						
6			2.5						
7			3			3	5	7	12
8			3.5						
9			4						
10			4.5			5	7	7	14
11			5						
12			5.5						
13			6			6	8	11	19
14			6.5						
15			7						
16			7.5			9	12	16	28
17			8						
18			8.5						
19			9			13	18	11	29
20	Light grey silty sand		9.5						
21			10						
22			10.5			17	19	23	42
23			11						
24			11.5						
25			12			27	34	39	73
26			12.5						
27			13						
28			13.5			24	31	40	71
29			14						
30			14.5						
31			15			26	33	41	74
32			15.5						
33			16						
34			16.5			23	32	38	70
35			17						
36			17.5						
37			18			31	33	37	70
38			18.5						
39			19						
40			19.5			32	39	42	81
41			20						

DS: Disturbed Sample



Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50
		Very Loose	Loose	Mid. Dense	Dense	Very Dense
Cohesive Soil	Consistancy	0 to 2	2 to 8	8 to 16	16 to 32	> 32
		Very Soft	Soft	Stiff	Very Stiff	Hard

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

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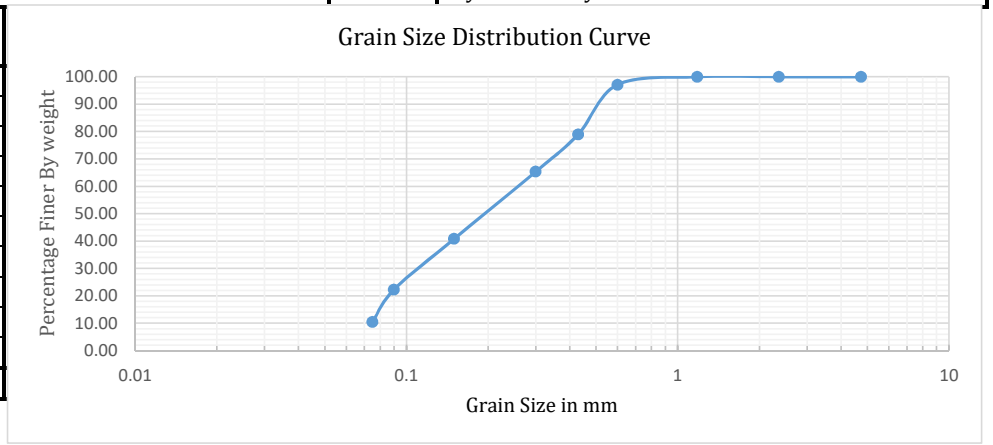
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:1.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	370.05	100.00
2	2.36	0	370.05	100.00
3	1.18	0	370.05	100.00
4	0.6	10.78	359.27	97.09
5	0.43	67.04	292.23	78.97
6	0.3	50.4	241.83	65.35
7	0.15	90.84	150.99	40.80
8	0.09	68.59	82.4	22.27
9	0.075	43.8	38.6	10.43
10	0	38.6	0	0
	Total	370.05		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			89.57
	Silt and Clays (< 0.075mm)=			10.43

D_{10} =	0.0745	D_{30} =	0.1150	D_{60} =	0.267
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	3.590	D_{50} =	0.206		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.665				

Soil Type (IS 1498:1970) :CL

CL: Silty clay with low to medium plasticity

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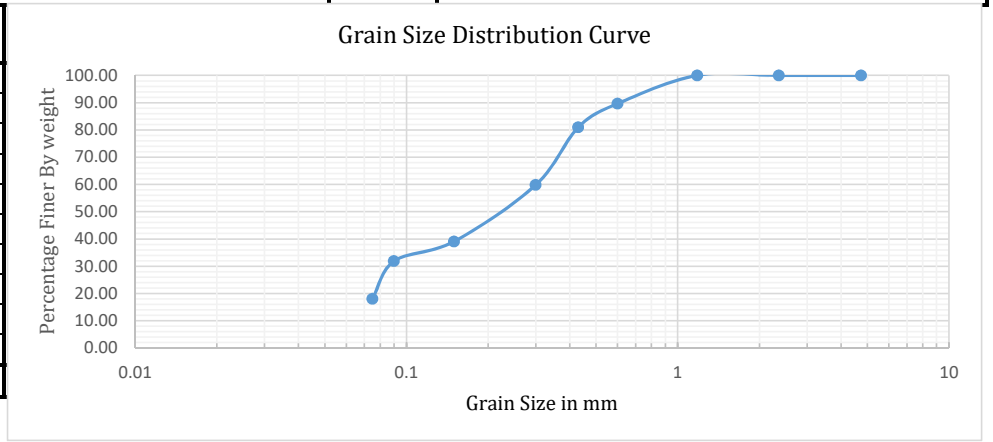
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:3m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	325.18	100.00
2	2.36	0	325.18	100.00
3	1.18	0	325.18	100.00
4	0.6	33.8	291.38	89.61
5	0.43	28.19	263.19	80.94
6	0.3	68.71	194.48	59.81
7	0.15	67.5	126.98	39.05
8	0.09	23.5	103.48	31.82
9	0.075	44.78	58.7	18.05
10	0	58.7	0	0
	Total	325.18		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			81.95
	Silt and Clays (< 0.075mm)=			18.05

D_{10} =	0.0415	D_{30} =	0.0880	D_{60} =	0.301
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	7.249	D_{50} =	0.229		
Coefficient of curvature = $C_C = \frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.619				

Soil Type (IS 1498:1970) :CL

CL: Silty clay with low to medium plasticity

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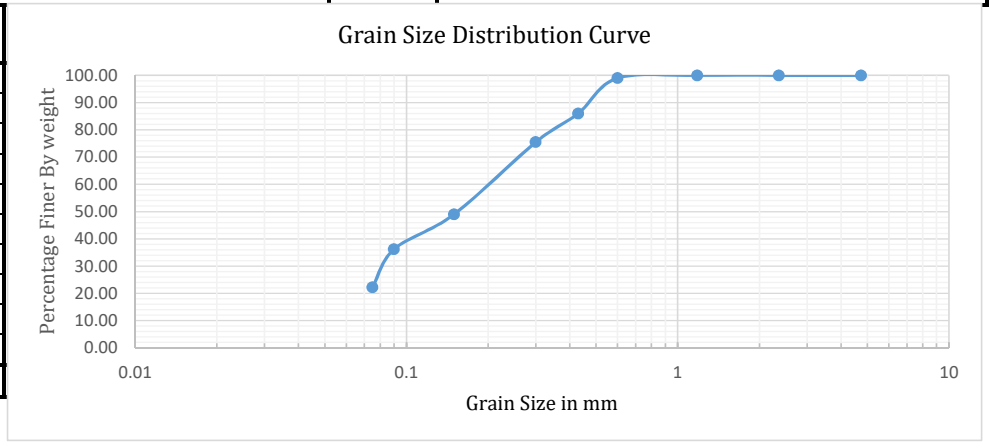
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:4.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	330.76	100.00
2	2.36	0	330.76	100.00
3	1.18	0	330.76	100.00
4	0.6	3.29	327.47	99.01
5	0.43	42.93	284.54	86.03
6	0.3	34.84	249.7	75.49
7	0.15	87.5	162.2	49.04
8	0.09	42.5	119.7	36.19
9	0.075	46.16	73.54	22.23
10	0	73.54	0	0
	Total	330.76		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			77.77
	Silt and Clays (< 0.075mm)=			22.23

D_{10} =	0.0337	D_{30} =	0.0833	D_{60} =	0.212
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	6.289	D_{50} =	0.155		
Coefficient of curvature = C_C = $= \frac{D_{30}^2}{D_{10} \cdot D_{60}}$	0.971				

Soil Type (IS 1498:1970) :CL

CL: Silty clay with low to medium plasticity

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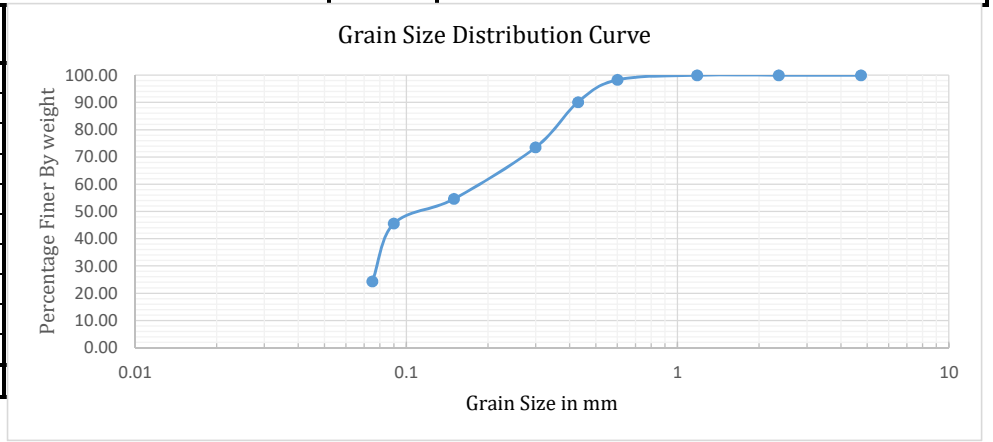
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:6m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	345.35	100.00
2	2.36	0	345.35	100.00
3	1.18	0	345.35	100.00
4	0.6	5.95	339.4	98.28
5	0.43	28.07	311.33	90.15
6	0.3	57.35	253.98	73.54
7	0.15	65.41	188.57	54.60
8	0.09	31.26	157.31	45.55
9	0.075	73.19	84.12	24.36
10	0	84.12	0	0
	Total	345.35		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			75.64
	Silt and Clays (< 0.075mm)=			24.36

D_{10} =	0.0308	D_{30} =	0.0790	D_{60} =	0.193
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	6.260	D_{50} =	0.119		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	1.051				

Soil Type (IS 1498:1970) :ML

ML: Inorganic silts with sands

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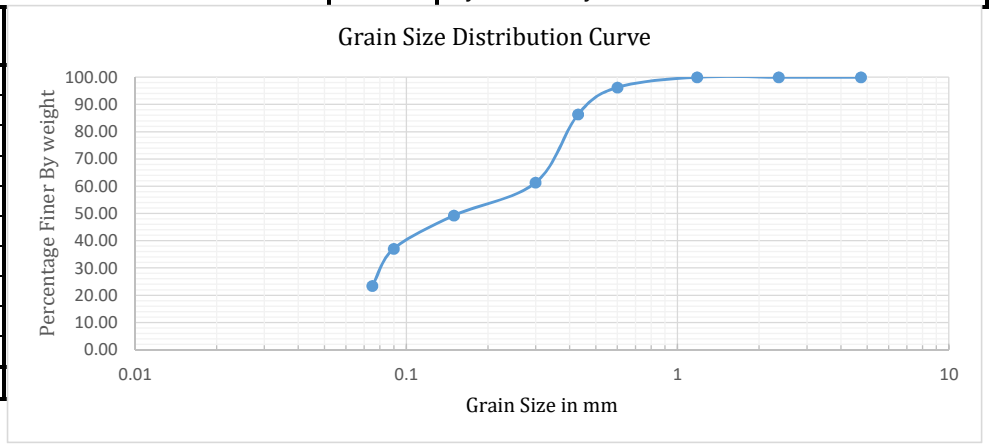
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:7.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	351.63	100.00
2	2.36	0	351.63	100.00
3	1.18	0	351.63	100.00
4	0.6	13.2	338.43	96.25
5	0.43	34.77	303.66	86.36
6	0.3	87.97	215.69	61.34
7	0.15	42.5	173.19	49.25
8	0.09	42.89	130.3	37.06
9	0.075	47.8	82.5	23.46
10	0	82.5	0	0
	Total	351.63		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			76.54
	Silt and Clays (< 0.075mm)=			23.46

D_{10} =	0.0320	D_{30} =	0.0822	D_{60} =	0.283
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	8.865	D_{50} =	0.159		
Coefficient of curvature = $C_C = \frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.746				

Soil Type (IS 1498:1970) :CL

CL: Silty clay with low to medium plasticity

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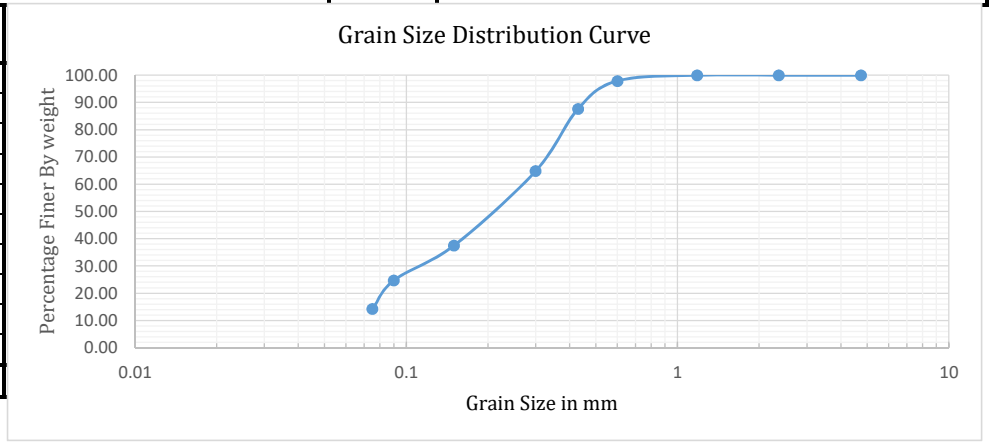
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:9m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	301.63	100.00
2	2.36	0	301.63	100.00
3	1.18	0	301.63	100.00
4	0.6	6.3	295.33	97.91
5	0.43	30.86	264.47	87.68
6	0.3	68.92	195.55	64.83
7	0.15	82.47	113.08	37.49
8	0.09	38.51	74.57	24.72
9	0.075	31.74	42.83	14.20
10	0	42.83	0	0
	Total	301.63		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			85.80
	Silt and Clays (< 0.075mm)=			14.20

D_{10} =	0.0528	D_{30} =	0.1148	D_{60} =	0.273
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	5.178	D_{50} =	0.219		
Coefficient of curvature = $C_C = \frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.912				

Soil Type (IS 1498:1970) :CL

CL: Silty clay with low to medium plasticity

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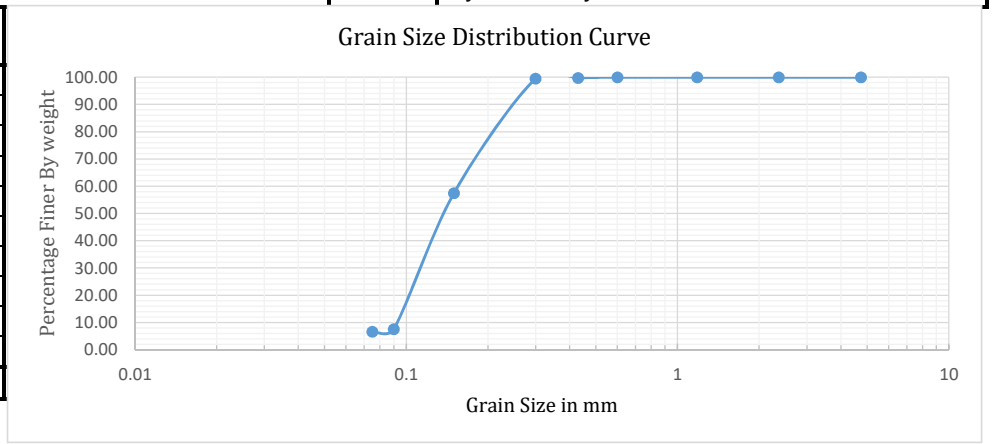
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:10.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	370.84	100.00
2	2.36	0	370.84	100.00
3	1.18	0	370.84	100.00
4	0.6	0	370.84	100.00
5	0.43	0.9	369.94	99.76
6	0.3	0.83	369.11	99.53
7	0.15	156.07	213.04	57.45
8	0.09	184.88	28.16	7.59
9	0.075	3.6	24.56	6.62
10	0	24.56	0	0
	Total	370.84		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			93.38
	Silt and Clays (< 0.075mm)=			6.62

D_{10} =	0.0929	D_{30} =	0.1170	D_{60} =	0.159
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	1.713	D_{50} =	0.141		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.926				

Soil Type (IS 1498:1970) :SP-SM

SP: poorly graded Sand
SM : Sandy Silts

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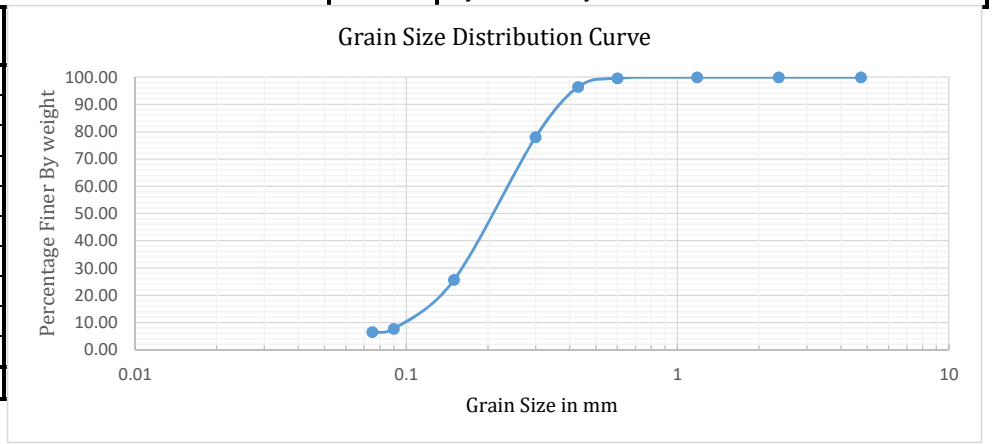
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:12m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	416.42	100.00
2	2.36	0	416.42	100.00
3	1.18	0	416.42	100.00
4	0.6	1.52	414.9	99.63
5	0.43	13.43	401.47	96.41
6	0.3	76.38	325.09	78.07
7	0.15	218.48	106.61	25.60
8	0.09	74.66	31.95	7.67
9	0.075	4.75	27.2	6.53
10	0	27.2	0	0
	Total	416.42		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			93.47
	Silt and Clays (< 0.075mm)=			6.53

D_{10} =	0.0978	D_{30} =	0.1626	D_{60} =	0.248
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	2.540	D_{50} =	0.220		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	1.088				

Soil Type (IS 1498:1970) :SP-SM

SP: poorly graded Sand
SM : Sandy Silts

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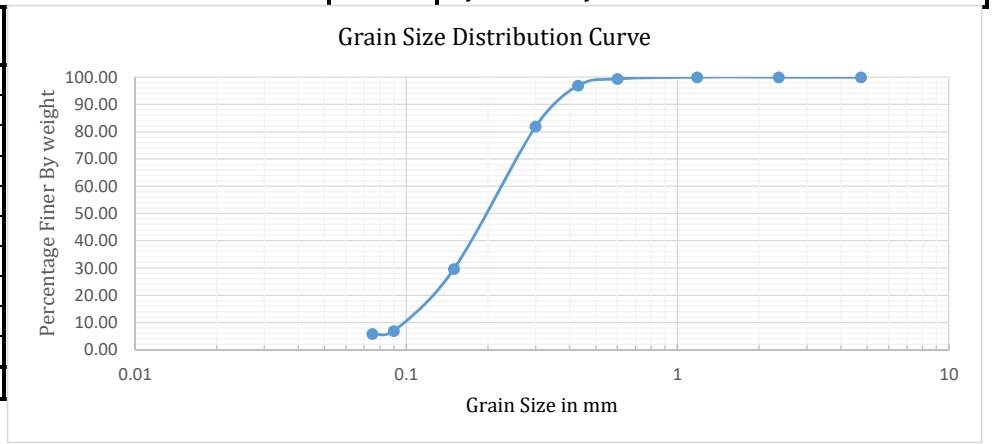
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:13.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	587.92	100.00
2	2.36	0	587.92	100.00
3	1.18	0	587.92	100.00
4	0.6	3.58	584.34	99.39
5	0.43	14.43	569.91	96.94
6	0.3	88.47	481.44	81.89
7	0.15	307.17	174.27	29.64
8	0.09	133.91	40.36	6.86
9	0.075	6.18	34.18	5.81
10	0	34.18	0	0
	Total	587.92		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			94.19
	Silt and Clays (< 0.075mm)=			5.81

D_{10} =	0.0983	D_{30} =	0.1510	D_{60} =	0.237
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	2.414	D_{50} =	0.208		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.979				

Soil Type (IS 1498:1970) :SP

SC:Clayey Sands
SP: Poorly Graded Sand

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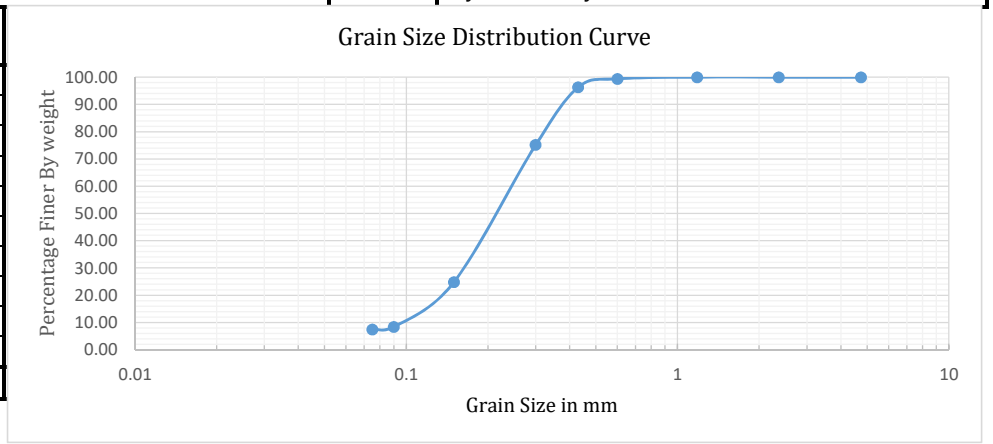
Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:15m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	419.18	100.00
2	2.36	0	419.18	100.00
3	1.18	0	419.18	100.00
4	0.6	2.52	416.66	99.40
5	0.43	12.95	403.71	96.31
6	0.3	88.72	314.99	75.14
7	0.15	211.03	103.96	24.80
8	0.09	68.83	35.13	8.38
9	0.075	3.79	31.34	7.48
10	0	31.34	0	0
	Total	419.18		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			92.52
	Silt and Clays (< 0.075mm)=			7.48

D_{10} =	0.0959	D_{30} =	0.1655	D_{60} =	0.255
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	2.657	D_{50} =	0.225		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	1.120				

Soil Type (IS 1498:1970) :SP-SM

SP: poorly graded Sand
SM : Sandy Silts

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

EXPERT TESTING LABORATORY PVT. LTD.

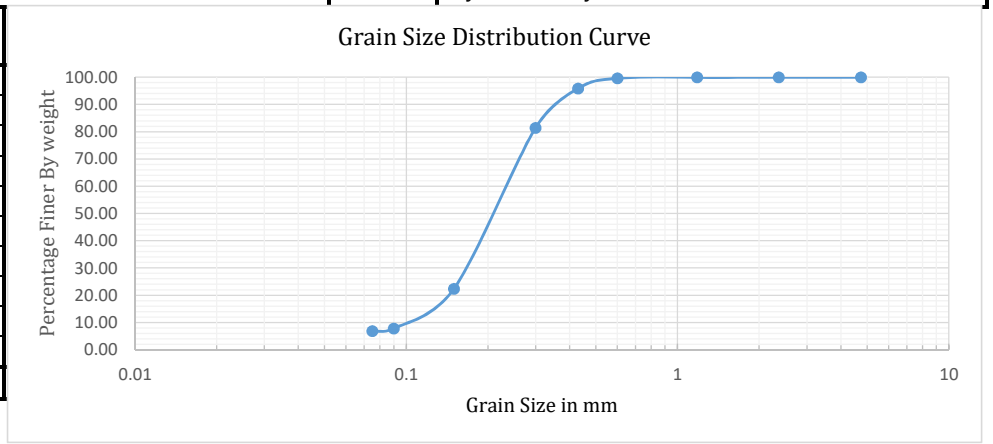
BAFAL, LALITPUR-17

Gmail: experttestlab078@gmail.com

Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:16.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	496	100.00
2	2.36	0	496	100.00
3	1.18	0	496	100.00
4	0.6	1.9	494.1	99.62
5	0.43	18.65	475.45	95.86
6	0.3	71.53	403.92	81.44
7	0.15	292.9	111.02	22.38
8	0.09	72.38	38.64	7.79
9	0.075	4.66	33.98	6.85
10	0	33.98	0	0
	Total	496		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			93.15
	Silt and Clays (< 0.075mm)=			6.85

D_{10} =	0.0991	D_{30} =	0.1693	D_{60} =	0.246
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	2.478	D_{50} =	0.220		
Coefficient of curvature = C_C = $\frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	1.179				

Soil Type (IS 1498:1970) :SP-SM

SP: poorly graded Sand
SM : Sandy Silts

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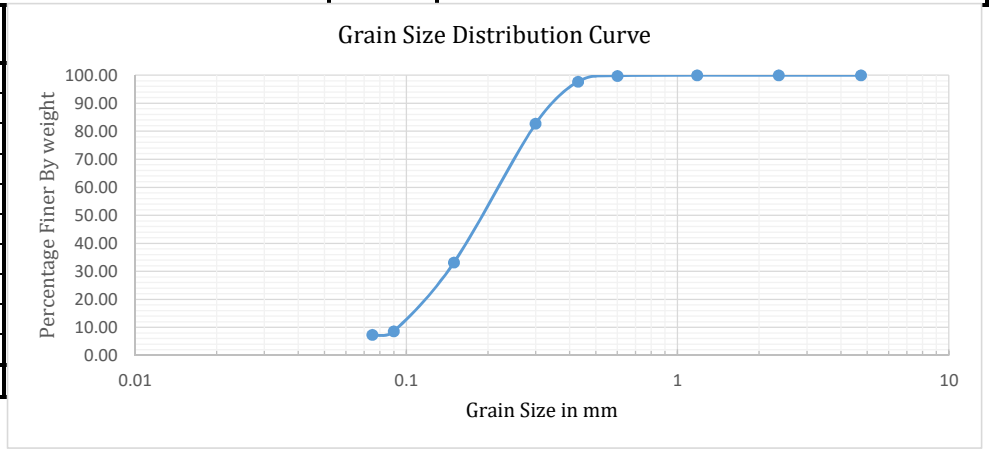
Gmail: experttestlab078@gmail.com

Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:18m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	510.06	100.00
2	2.36	0	510.06	100.00
3	1.18	0	510.06	100.00
4	0.6	1.06	509	99.79
5	0.425	10.62	498.38	97.71
6	0.3	76.68	421.7	82.68
7	0.15	252.53	169.17	33.17
8	0.09	125.12	44.05	8.64
9	0.075	6.82	37.23	7.30
10	0	37.23	0	0
	Total	510.06		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			92.70
	Silt and Clays (< 0.075mm)=			7.30

D_{10} =	0.0933	D_{30} =	0.1423	D_{60} =	0.231
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	2.478	D_{50} =	0.201		
Coefficient of curvature = $C_C = \frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	0.937				

Soil Type (IS 1498:1970) :SP-SM

SP: Poorly Graded Sand
SM : Sandy Silts

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NEC No. 6933 "CIVIL"

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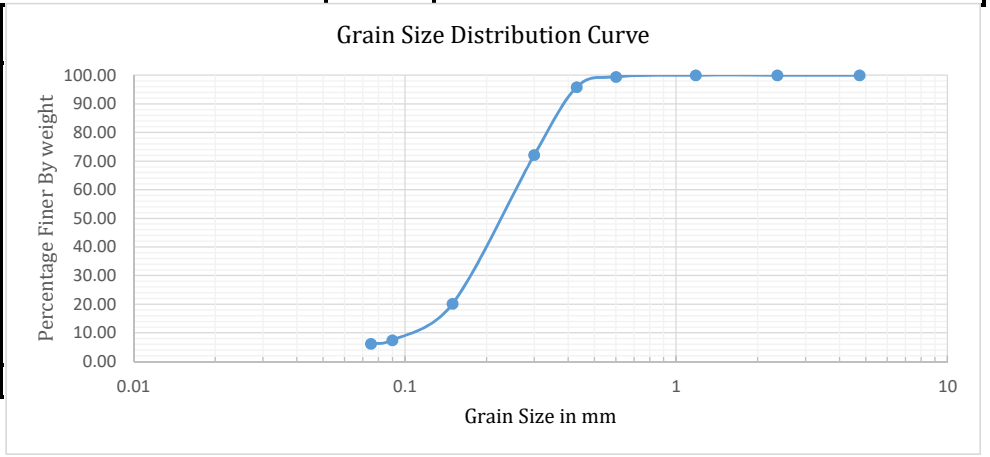
BAFAL, LALITPUR-17

Gmail: experttestlab078@gmail.com

Grain Size Analysis

Test Method: IS 2720(Part-4):1985	Bore Hole No: BH-01
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Depth:19.5m
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Soil type :
Date of test:2022_7_8	Dry Sieve Analysis

S.N.	Sieve Size (mm)	Retained weight (kg)	Passing Weight (kg)	% finer by weight
1	4.75	0	529.26	100.00
2	2.36	0	529.26	100.00
3	1.18	0	529.26	100.00
4	0.6	2.88	526.38	99.46
5	0.43	19.22	507.16	95.82
6	0.3	125.33	381.83	72.14
7	0.15	275.05	106.78	20.18
8	0.09	67.43	39.35	7.43
9	0.075	6.35	33	6.24
10	0	33	0	0
	Total	529.26		



	Gravel % (> 4.75mm)=			0.00
	Sand % (<4.75mm & >0.075mm)=			93.76
	Silt and Clays (< 0.075mm)=			6.24

D_{10} =	0.1021	D_{30} =	0.1784	D_{60} =	0.265
Coefficient of uniformity = $C_U = D_{60} / D_{10}$ =	2.595	D_{50} =	0.236		
Coefficient of curvature = $C_C = \frac{D_{30}^2}{D_{10} \cdot D_{60}}$ =	1.176				

Soil Type (IS 1498:1970) :SP-SM

SM : Sandy Silts
SP: Poorly Graded Sand

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Approved By:
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NEC No. 6933 "CIVIL"

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BAFAL, LALITPUR-17

Gmail: experttestlab078@gmail.com

Specific Gravity Determination

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line | **Date of test:2022_3_18**

Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh | **Oven Temperature: 100°C**

Test Method: IS 2720(part III):1973 | **Duration of Drying: 24hrs.**

Sample Type (Bore hole)	Depth (m)	Soil Type	Natural moisture content %	Wt. of density bottle+dry soil (gm)	Wt. of bottle+dry soil+water (gm)	Wt. of density bottle+water (gm)	Wt. of empty bottle (gm)	Specific Gravity
BH-01	1.5	CL	20.40	33.40	82.30	75.60	20.30	2.05
BH-01	3.0	CL	42.40	32.40	82.50	75.60	20.30	2.33
BH-01	4.5	CL	36.83	28.30	80.30	75.60	20.30	2.42
BH-01	6.0	ML	35.55	31.00	81.80	75.60	20.30	2.38
BH-01	7.5	ML	39.46	26.90	79.50	75.60	20.30	2.44
BH-01	9.0	CL	31.91	33.10	83.00	75.60	20.30	2.37
BH-01	10.5	SP-SM	26.06	36.40	84.90	75.60	20.30	2.37
BH-01	12.0	SP-SM	36.48	46.50	92.20	75.60	20.30	2.73
BH-01	13.5	SP	22.38	46.40	91.90	75.60	20.30	2.66
BH-01	15.0	SP-SM	23.74	40.30	87.60	75.60	20.30	2.50
BH-01	16.5	SP-SM	23.74	31.90	82.90	75.60	20.30	2.70
BH-01	18.0	SP-SM	21.84	45.30	91.10	75.60	20.30	2.63
BH-01	19.5	SP-SM	21.11	49.10	92.70	75.60	20.30	2.46

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

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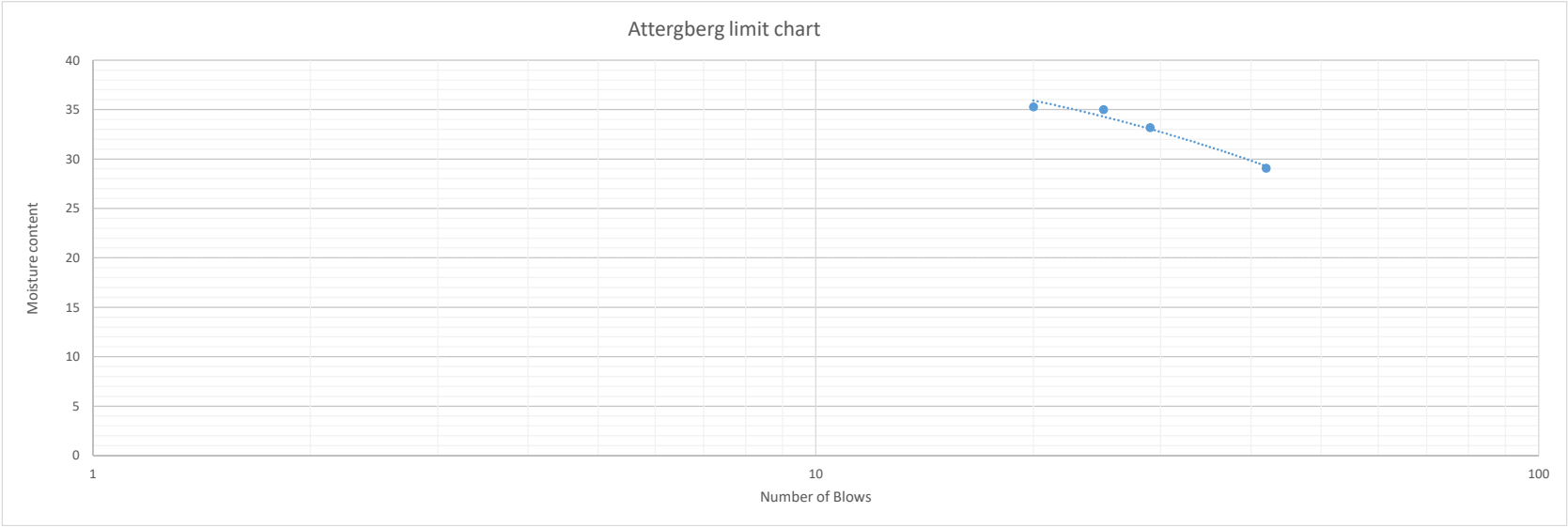
BAFAL, LALITPUR-17

Gmail: experttestlab078@gmail.com

Atterbergs Limit Test

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Period of soaking before the test:	
Soil type: CL	Bore hole: BH-01	
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Depth: 1.5 m	

Determination No.	1	2	3	4	5
Number of blows	42	29	25	20	
Container No.	C-0	C-1	C-3	C-4	
Mass of the (container +wet soil) W_1 g	148.04	150.99	154.78	155.60	
Mass of the (container + dry soil) W_2 g	138.50	139.75	141.98	142.50	
Mass of water (W_1- W_2) g	9.54	11.24	12.80	13.10	
Mass of container W_o g	105.70	105.88	105.42	105.35	
Mass to dry soil (W_2- W_o) g	32.80	33.87	36.56	37.15	
Plastic limit test result					21.70%
Moisture content (w) %	29.08536585	33.18571007	35.01094092	35.26244953	



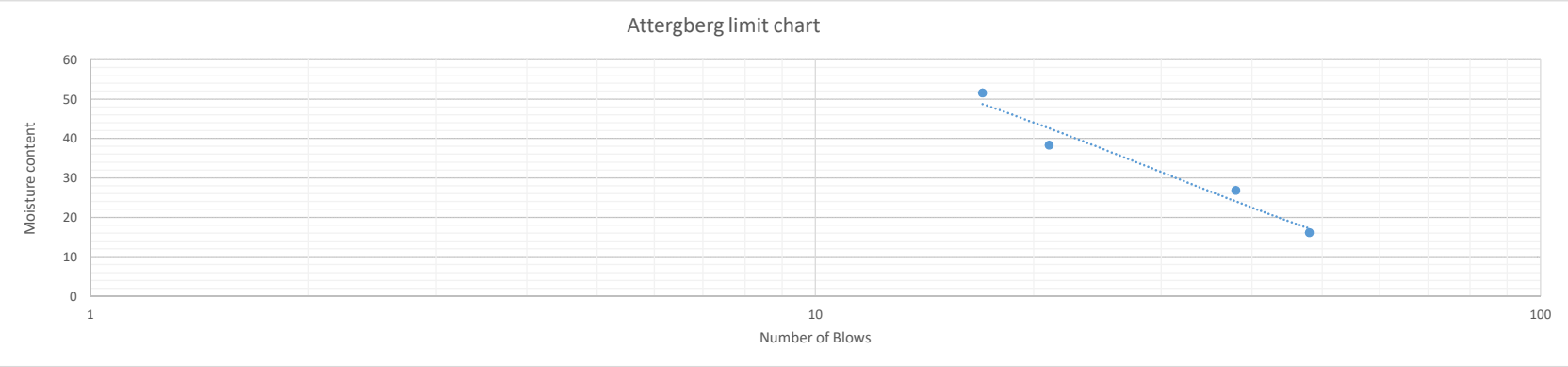
Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Atterbergs Limit Test

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Period of soaking before the test:
Soil type: CL	Bore hole: BH-01
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Depth: 3 m

Determination No.	1	2	3	4	5
Number of blows	48	38	21	17	
Container No.	C-11	C-2	C-10	C-20	
Mass of the (container +wet soil) W_1 g	151.24	143.07	152.78	152.6	
Mass of the (container + dry soil) W_2 g	144.25	135.2	139.65	136.55	
Mass of water (W_1- W_2) g	6.99	7.87	13.13	16.05	
Mass of container W_o g	101.03	105.88	105.42	105.41	
Mass to dry soil (W_2- W_o) g	43.22	29.32	34.23	31.14	
Plastic limit test result					25.2
Moisture content (w) %	16.17306802	26.84174625	38.35816535	51.54142582	



Liquid Limit (w_L) =	36.80	$w_n(N/25)^{0.121}$=	37.55740873
Flow index (I_f) =	44.71		
Plastic Limit (w_P) =	25.20		
Plasticity Index PI(%)=	11.60		

Tested By:
Sabin Poudel Khatri

Approved By:
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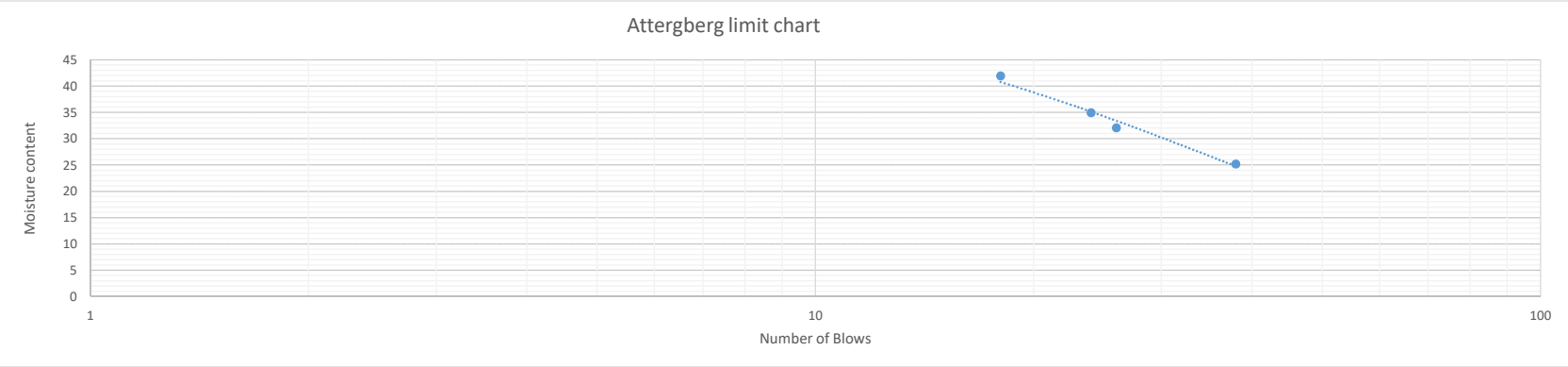
NEC No. 6933 "CIVIL"

Atterbergs Limit Test

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Period of soaking before the test:
Soil type: CL	Bore hole: BH-01
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Depth: 4.5 m

Determination No.	1	2	3	4	5
Number of blows	38	26	24	18	
Container No.	C-6	C-18	C-7	C-8	
Mass of the (container +wet soil) W_1 g	151.5	148.68	121.87	136.8	
Mass of the (container + dry soil) W_2 g	142.3	138.24	117.63	127.5	
Mass of water (W_1- W_2) g	9.2	10.44	4.24	9.3	
Mass of container W_o g	105.8	105.7	105.5	105.32	
Mass to dry soil (W_2- W_o) g	36.5	32.54	12.13	22.18	
Plastic limit test result					22.23
Moisture content (w) %	25.20547945	32.08358943	34.95465787	41.92966637	



Liquid Limit (w_L) =	33.80	$w_n(N/25)^{0.121}$=	34.78242641
Flow index (I_f) =	82.59		
Plastic Limit (w_P) =	22.23		
Plasticity Index PI(%)=	11.57		

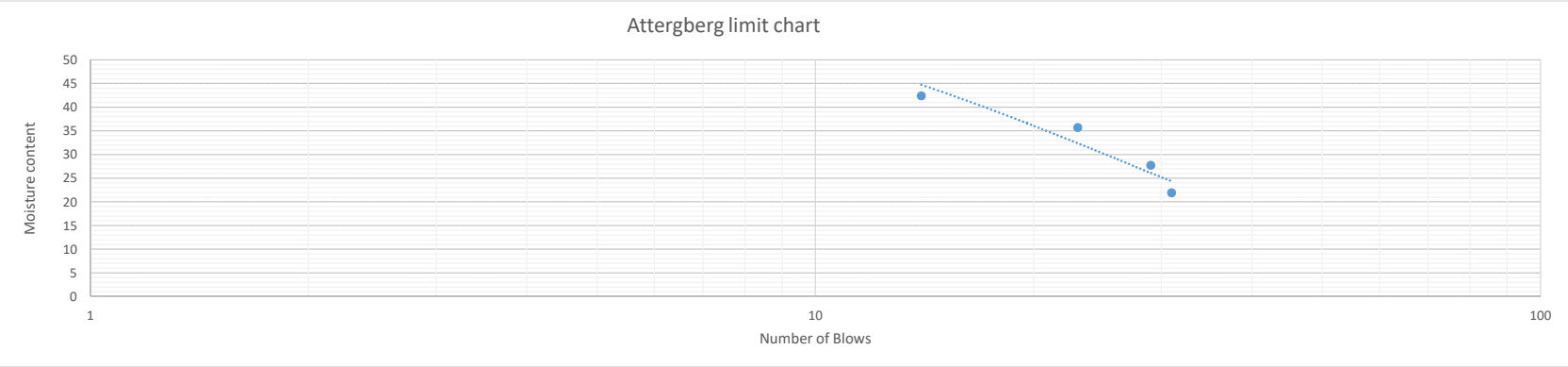
Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Atterbergs Limit Test

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Period of soaking before the test:
Soil type: ML	Bore hole: BH-01
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Depth: 7.5 m

Determination No.	1	2	3	4	5
Number of blows	31	29	23	14	
Container No.	C-5	C-14	C-25	C-20	
Mass of the (container +wet soil) W_1 g	120.6	127.28	140.49	188	
Mass of the (container + dry soil) W_2 g	117.15	123.13	132.19	154.3	
Mass of water (W_1- W_2) g	3.45	4.15	8.3	33.7	
Mass of container W_o g	101.4	108.16	108.96	74.84	
Mass to dry soil (W_2- W_o) g	15.75	14.97	23.23	79.46	
Plastic limit test result					25.02
Moisture content (w) %	21.9047619	27.72211089	35.72965992	42.41127611	



Liquid Limit (w_L) =	34.80	$w_n(N/25)^{0.121}$=	35.37098953
Flow index (I_f) =	79.54		
Plastic Limit (w_P) =	25.02		
Plasticity Index PI(%)=	9.78		

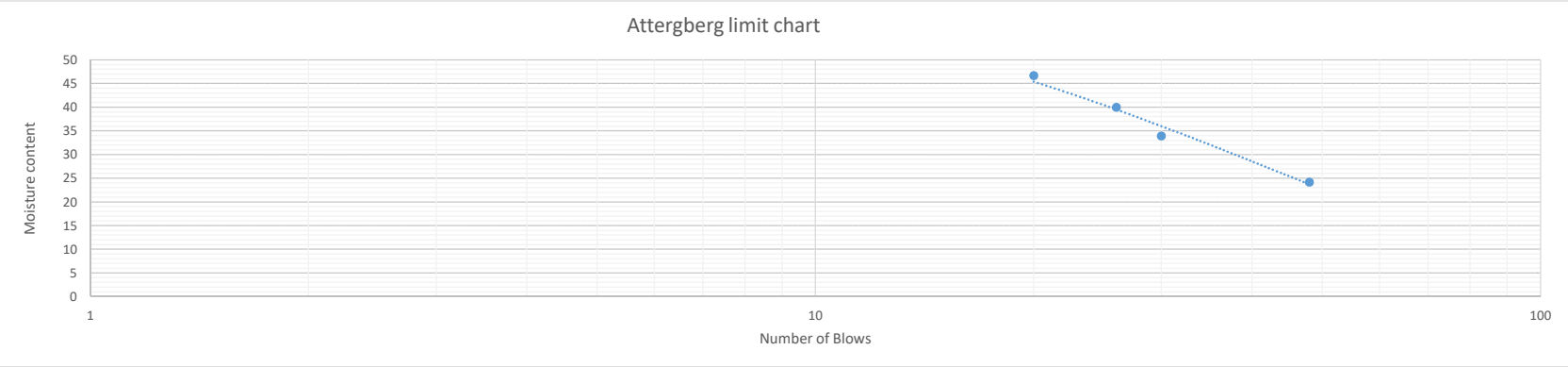
Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Atterbergs Limit Test

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Period of soaking before the test:
Soil type: CL	Bore hole: BH-01
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	Depth: 9 m

Determination No.	1	2	3	4	5
Number of blows	20	26	30	48	
Container No.	C-5	C-14	C-25	C-20	
Mass of the (container +wet soil) W_1 g	150.7	145.95	143.5	173.5	
Mass of the (container + dry soil) W_2 g	135.58	131.68	128.5	154.3	
Mass of water (W_1- W_2) g	15.12	14.27	15	19.2	
Mass of container W_o g	103.2	96	84.3	74.84	
Mass to dry soil (W_2- W_o) g	32.38	35.68	44.2	79.46	
Plastic limit test result					20.7
Moisture content (w) %	46.69549104	39.99439462	33.93665158	24.16310093	



Liquid Limit (w_L) =	38.50	$w_n(N/25)^{0.121}$=	34.69364422
Flow index (I_f) =	72.46		
Plastic Limit (w_P) =	20.70		
Plasticity Index PI(%)=	17.80		

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Moisture Content Determination (Natural)

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	**Date of test:2022_3_18**
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	**Oven Temperature: 100^{o}C**
Test Method: IS 2720(part II):1973	**Duration of Drying: 24hrs.**

Sample Type (Bore hole)	Depth (m)	Soil Type	Wt. of can+wet soil(gm)	Wt. of can+dry soil(gm)	Empty can wt.(gm)	Wt. of water (gm)	Mositure content %
BH-01	1.5	CL	120.70	116.64	96.74	4.06	20.40
BH-01	3	CL	128.46	120.93	103.17	7.53	42.40
BH-01	4.5	CL	119.12	111.88	92.22	7.24	36.83
BH-01	6	ML	137.84	130.42	109.55	7.42	35.55
BH-01	7.5	ML	96.55	87.42	64.28	9.13	39.46
BH-01	9	CL	117.13	105.36	68.48	11.77	31.91
BH-01	10.5	SP-SM	89.40	85.39	70.00	4.01	26.06
BH-01	12	SP-SM	87.76	82.08	66.51	5.68	36.48
BH-01	13.5	SP	141.54	134.17	101.24	7.37	22.38
BH-01	15	SP-SM	129.37	124.09	101.85	5.28	23.74
BH-01	16.5	SP-SM	134.69	129.76	108.99	4.93	23.74
BH-01	18	SP-SM	134.57	128.14	98.70	6.43	21.84
BH-01	19.5	SP-SM	132.76	127.30	101.43	5.46	21.11

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Bulk Density Determination

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	**Date of test:2022_3_18**
Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	**Room Temperature: 27^{o}C**
Test Method: IS 2720(part XXVIII):1973	

Sample Type (Bore hole)	Depth (m)	Soil Type	Volume of Conatiner cm^3	Wt. of container+ soil(gm)	Empty container wt.(gm)	Bulk Density (gm/cc)	Natural Mositure Content %	Dry Density (gm/cc)
BH-01	1.5	CL	106.23	215.98	15.05	1.89	20.40	1.57
BH-01	3	CL	106.23	213.28	15.05	1.87	42.40	1.31
BH-01	4.5	CL	106.23	213.18	15.05	1.87	36.83	1.36
BH-01	6	ML	106.23	212.63	15.05	1.86	35.55	1.37
BH-01	7.5	ML	106.23	211.96	15.05	1.85	39.46	1.33
BH-01	9	CL	106.23	208.68	15.05	1.82	31.91	1.38
BH-01	10.5	SP-SM	106.23	208.94	15.05	1.83	26.06	1.45
BH-01	12	SP-SM	106.23	207.55	15.05	1.81	36.48	1.33
BH-01	13.5	SP	106.23	206.23	15.05	1.80	22.38	1.47
BH-01	15	SP-SM	106.23	218.97	15.05	1.92	23.74	1.55
BH-01	16.5	SP-SM	106.23	213.74	15.05	1.87	23.74	1.51
BH-01	18	SP-SM	106.23	202.78	15.05	1.77	21.84	1.45
BH-01	19.5	SP-SM	106.23	208.72	15.05	1.82	21.11	1.51

Tested By:
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Correction for SPT value as per Skempton(1986)

Depth of water table(m) 2.5

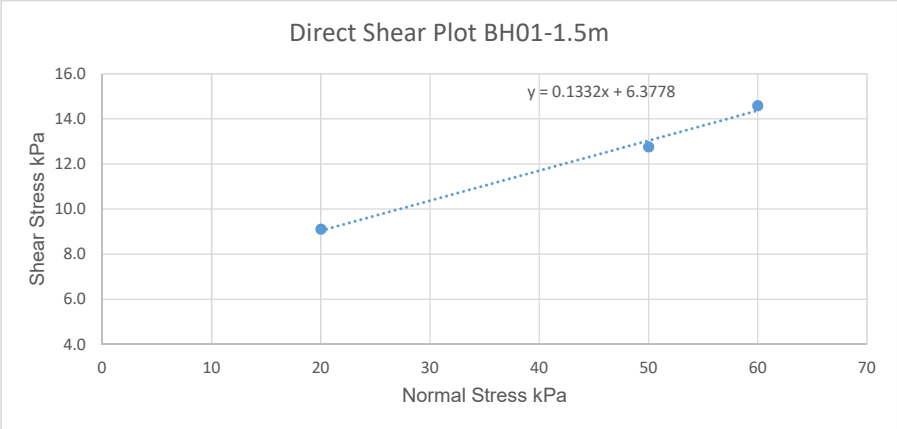
S.N.	Bore Hole	Depth (m)	Type of Soil	Unit Weight of Soil (kN/m^3)	SPT value Recorded N_{60}	Hammer Efficiency E_m	Bore Dia Correction C_B	Sampler Correction Cs	Rod Length Correction C_R	Corrected SPT Value N_{60}	Overburden Correction C_N	Overburden and Dialatancy Corrected SPT $(N_1)_{60}$	Remarks
1	BH-01	1.5	CL	18.56	12	0.55	1	1	0.7	11	1.9	14.60	SPT
2	BH-01	3	CL	18.31	12	0.55	1	1	0.75	11	1.41	11.65	SPT
3	BH-01	4.5	CL	18.3	14	0.55	1	1	0.85	12.8	1.25	13.64	SPT
4	BH-01	6	ML	18.25	19	0.55	1	1	0.95	17.4	1.12	16.75	SPT
5	BH-01	7.5	ML	18.18	28	0.55	1	1	0.95	25.7	0.99	19.61	SPT
6	BH-01	9	CL	17.88	29	0.55	1	1	0.95	26.6	0.92	19.10	SPT
7	BH-01	10.5	SP-SM	17.91	42	0.55	1	1	1	38.5	0.81	23.16	SPT
8	BH-01	12	SP-SM	17.78	73	0.55	1	1	1	66.9	0.68	30.33	SPT
9	BH-01	13.5	SP	17.65	71	0.55	1	1	1	65.1	0.65	28.59	SPT
10	BH-01	15	SP-SM	18.83	74	0.55	1	1	1	67.8	0.61	28.02	SPT
11	BH-01	16.5	SP-SM	18.35	70	0.55	1	1	1	64.2	0.59	26.32	SPT
12	BH-01	18	SP-SM	17.34	70	0.55	1	1	1	64.2	0.56	25.59	SPT
13	BH-01	19.5	SP-SM	17.88	81	0.55	1	1	1	74.3	0.52	26.80	SPT

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 1.5m	PRG factor: 0.00328
Soil type:CL	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	9.1	2	6.38	7.59	
2	50	12.8	3			
3	60	14.6	3			



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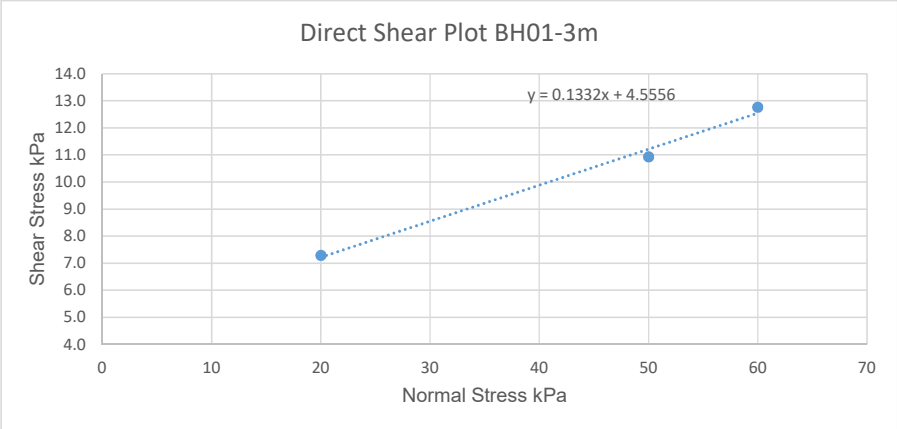
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 3m	PRG factor: 0.00328
Soil type:CL	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	7.3	2	4.56	7.59	
2	50	10.9	7			
3	60	12.8	7			



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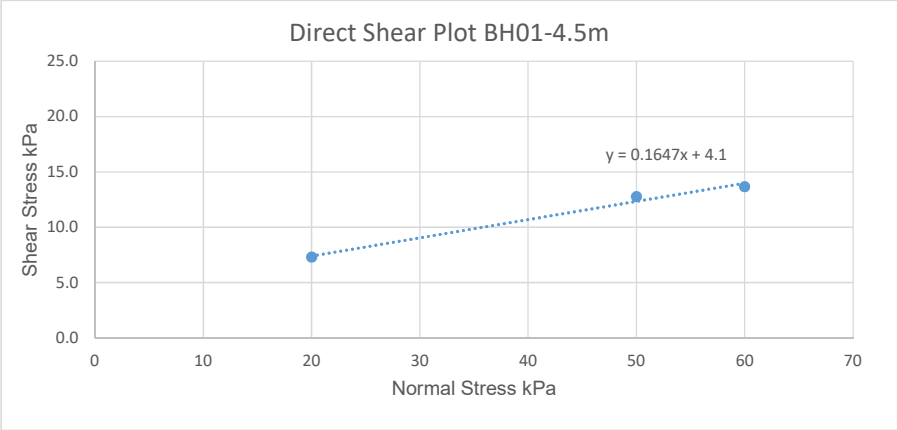
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 4.5m	PRG factor: 0.00328
Soil type:CL	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	7.3	2	4.10	9.35	
2	50	12.8	4			
3	60	13.7	5			



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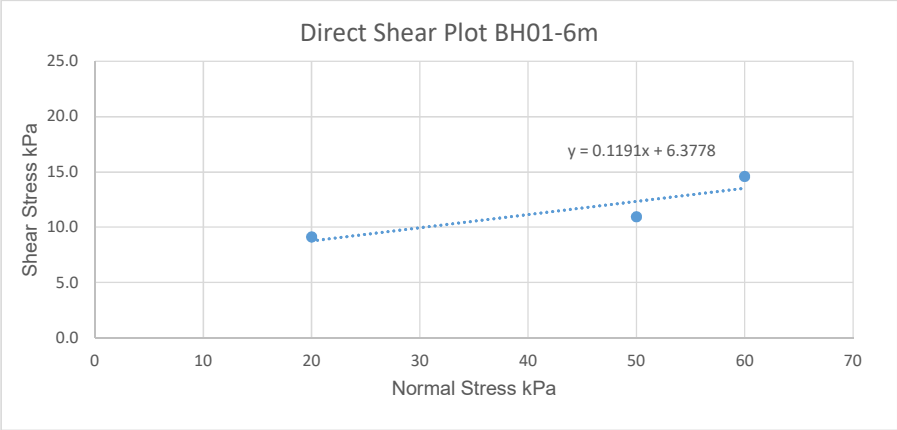
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 6m	PRG factor: 0.00328
Soil type:ML	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	9.1	1	6.38	6.79	
2	50	10.9	5			
3	60	14.6	5.5			



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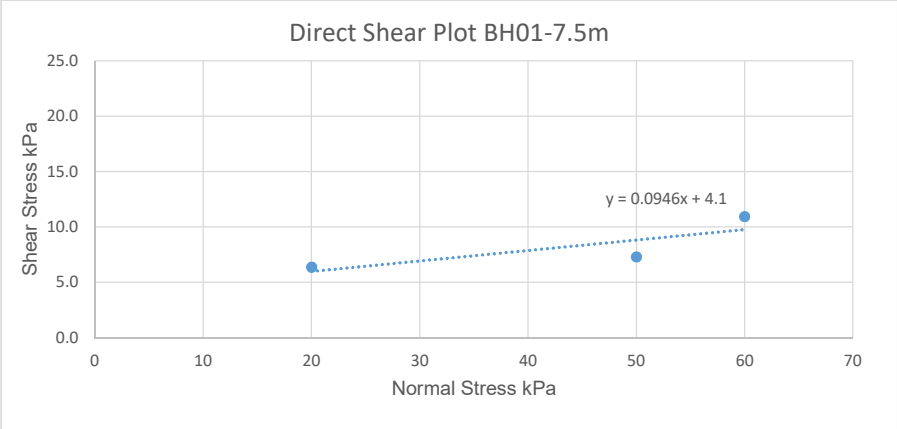
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 7.5m	PRG factor: 0.00328
Soil type:ML	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	6.4	2	4.10	5.40	
2	50	7.3	3			
3	60	10.9	3.5			



Tested By:
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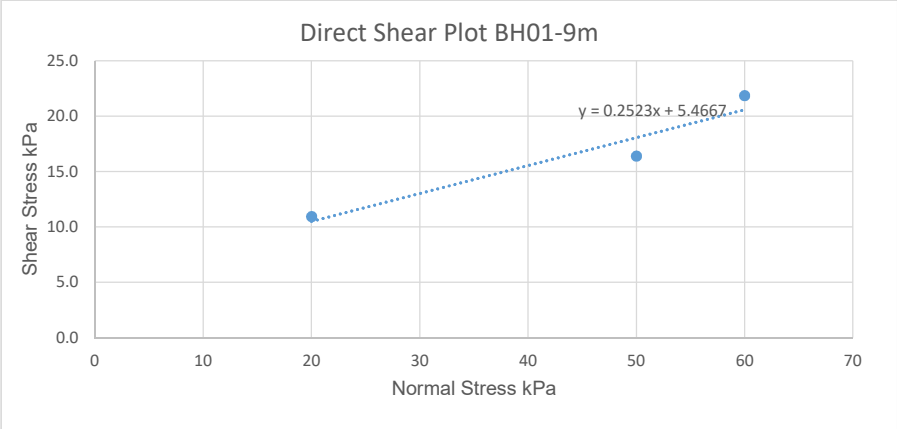
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 9m	PRG factor: 0.00328
Soil type:CL	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	10.9	4	5.47	14.16	
2	50	16.4	7			
3	60	21.9	7.5			



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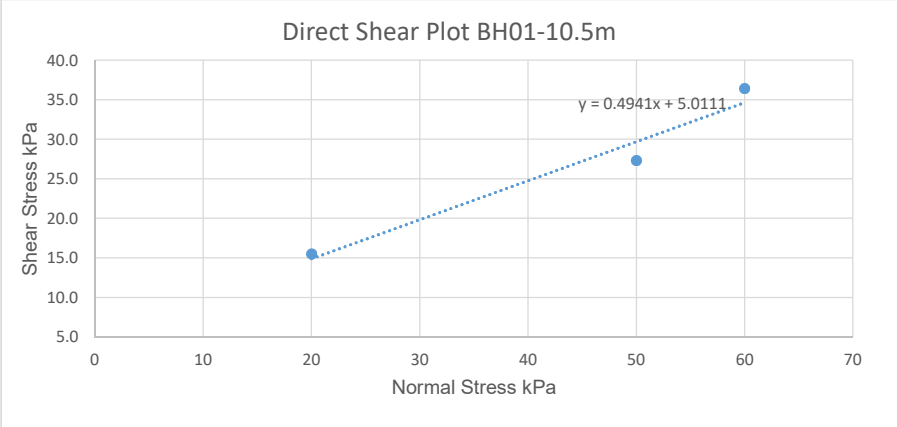
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 10.5m	PRG factor: 0.00328
Soil type:SP-SM	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	15.5	2	5.01	26.29	
2	50	27.3	3			
3	60	36.4	4			



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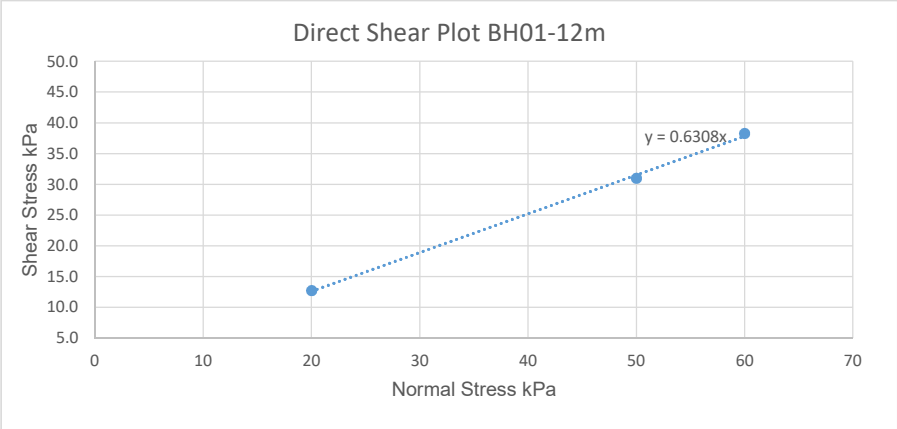
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 12m	PRG factor: 0.00328
Soil type:SP-SM	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	12.8	1	0.00	32.24	
2	50	31.0	4			
3	60	38.3	5			



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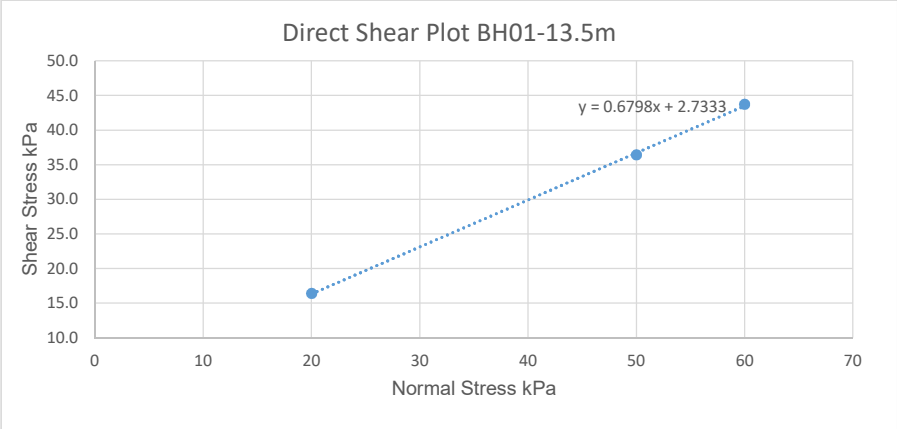
Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 13.5m	PRG factor: 0.00328
Soil type:SP	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	16.4	0.8	2.73	34.21	
2	50	36.4	2			
3	60	43.7	4			



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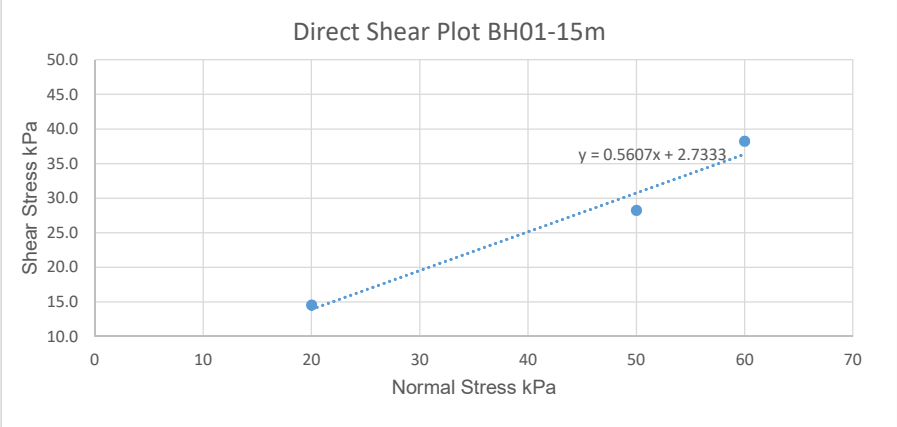
NEC No. 6933 "CIVIL"

Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 15m	PRG factor: 0.00328
Soil type:SP-SM	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	14.6	0.8	2.73	29.28	
2	50	28.2	2			
3	60	38.3	4			



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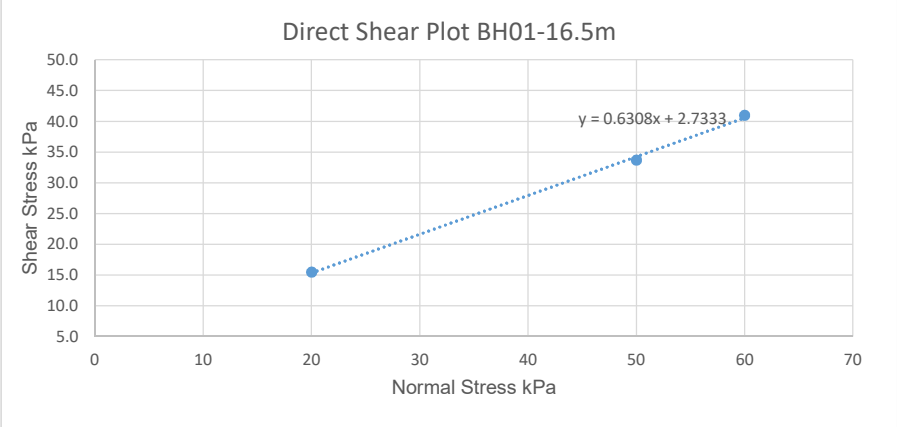
Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 16.5m	PRG factor: 0.00328
Soil type:SP-SM	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	15.5	0.8	2.73	32.24	
2	50	33.7	2			
3	60	41.0	4			



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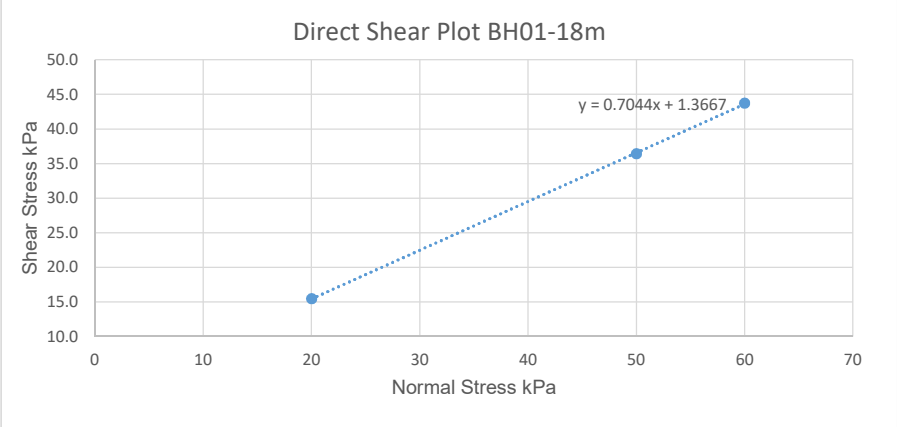
Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 18m	PRG factor: 0.00328
Soil type: SP-SM	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	15.5	1.5	1.37	35.16	
2	50	36.4	2			
3	60	43.7	3.5			



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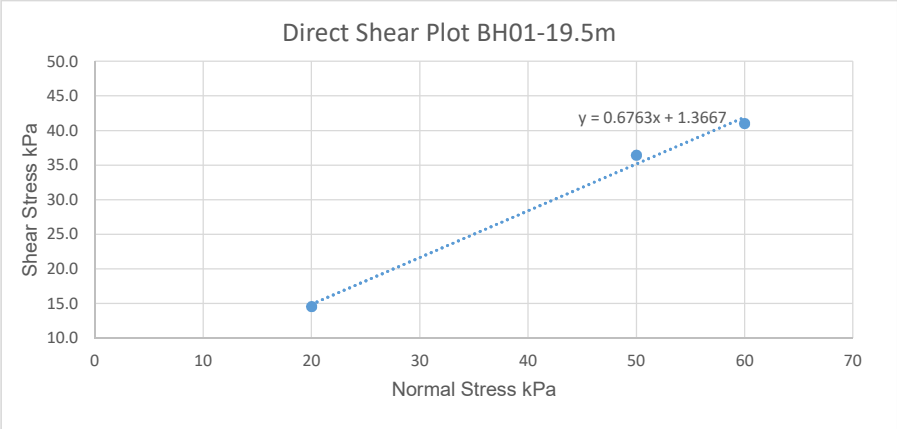
Direct shear test Results	
Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh
Test Method: IS 2720 part 13:1986	Specimen Plan dimension: 0.06m X 0.06m
Bore hole No: BH01	Thickness of specimen: 25mm
Depth(m) : 19.5m	PRG factor: 0.00328
Soil type: SP-SM	Rate of loading: 1.14 mm/m

S.No.	Normal Stress (kN/m^2)	Shear Strength (kN/m^2)	Shear Displacement(mm)	Cohesion 'C' (kN/m^2)	Internal friction angle (φ) degree	Remarks
1	20	14.6	1	1.37	34.07	
2	50	36.4	2.5			
3	60	41.0	3			



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NEC No. 6933 "CIVIL"

Design Input Data (Summary)

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line	Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh		
	Ground Water Level	2.5	m

S.N.	Bore Hole	Depth(m)	Soil Type	Field SPT	Bulk unit weight(γ)kN/m^3	Specific Gravity(G)	D_{50} (mm)	Moisture Content(w)%	Modulus of Deformation kN/m^2	Sub Grade Modulus kN/m3 B=0.3m	Initial Void Ratio(e)	Saturated unit weight(γ_{sat})kN/m^3	N_{60}	$(N1)_{60}$	Field Based		Lab Based		Design	
															φ	C (kPa)	φ	C (kPa)	φ	C (kPa)
1	BH-01	1.5	CL	12	18.56	2.05	0.21	20.40	5572.88	21169.5	0.3	10.1	11.00	14.60	22.7	0	7.59	6.38	7.585	6.38
2	BH-01	3	CL	12	18.31	2.33	0.23	42.4	5572.88	21169.5	0.78	9.94	11.00	11.6	22.1	0	7.59	4.56	7.585	4.56
3	BH-01	4.5	CL	14	18.31	2.33	0.16	42.40	6501.69	24697.8	0.78	9.94	12.83	13.6	22.5	0	9.35	4.10	9.353	4.1
4	BH-01	6	CL	19	18.3	2.42	0.12	36.83	8823.72	33518.4	0.78	9.96	17.42	16.7	23.2	0	6.79	6.38	6.794	6.38
5	BH-01	7.5	ML	28	18.25	2.38	0.16	35.55	13003.4	49395.5	0.73	9.97	25.67	19.6	23.8	0	5.40	4.10	5.405	4.1
6	BH-01	9	ML	29	18.18	2.44	0.22	39.46	13467.8	51159.7	0.84	9.96	26.58	19.1	23.7	0	14.16	5.47	14.16	5.47
7	BH-01	10.5	CL	42	17.88	2.37	0.14	31.91	19505.1	74093.3	0.72	9.99	38.50	23.2	24.5	0	26.29	5.01	26.29	5.01
8	BH-01	12	SP-SM	73	17.91	2.37	0.22	26.06	33901.7	128781	0.64	10	66.92	30.3	26	0	32.24	0.00	32.24	0
9	BH-01	13.5	SP-SM	71	17.78	2.73	0.21	36.48	32972.8	125253	1.06	9.98	65.08	28.6	25.7	0	34.21	2.73	34.21	2.73
10	BH-01	15	SP	74	17.65	2.66	0.23	22.38	34366.1	130545	0.81	10.1	67.83	28	25.5	0	29.28	2.73	29.28	2.73
11	BH-01	16.5	SP-SM	70	18.83	2.50	0.2	23.74	32508.4	123489	0.61	10.1	64.17	26.3	25.2	0	32.24	2.73	32.24	2.73
12	BH-01	18	SP-SM	70	18.35	2.70	0.2	23.74	32508.4	123489	0.78	10.1	64.17	25.6	25	0	35.16	1.37	35.16	1.37
13	BH-01	19.5	SP-SM	81	17.34	2.63	0.23	21.84	37616.9	142894	0.81	10.1	74.25	26.8	25.3	0	34.07	1.37	34.07	1.37

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Approved By:
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Determination of bearing capacity of open shallow foundation

Depth of water table= 2.5 m

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W_1') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
2	2	1	11.00	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.95	27.32	45.87	163.12	374.00
		1.5	11.00	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	94.28	31.43	**59.26**	**168.02**	**374.00**
		2	11.00	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	106.62	35.54	72.65	186.22	374.00
		3	11.00	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	112.68	37.56	83.17	186.22	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	150.44	50.15	104.25	201.74	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1.2	1	1	1	1	1	0.5	195.06	65.02	127.62	217.26	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1.2	1	1	1	1	1	0.5	181.53	60.51	131.59	294.85	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1.2	1	1	1	1	1	0.5	137.01	45.67	125.19	331.92	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.3	1	1	1	1	1	0.5	310.01	103.34	191.26	327.67	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.3	1.2	1.17	1	1	1	0.5	710.48	236.83	333.13	323.41	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.5	1.2	1.25	1	1	1	0.5	3339.68	1113.23	1217.60	392.10	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.5	1.3	1.27	1	1	1	0.5	3727.86	1242.62	1355.06	392.10	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.7	1.3	1.33	1	1	1	0.5	8276.80	2758.93	2879.47	513.38	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.7	1.4	1.37	1	1	1	0.5	11636.86	3878.95	4007.46	483.93	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.8	1.4	1.4	1	1	1	0.5	12774.02	4258.01	4394.48	483.93	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.8	1.4	1.39	1	1	1	0.5	7390.66	2463.55	2607.87	474.35	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.9	1.4	1.44	1	1	1	0.5	12792.70	4264.23	4417.57	445.51	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.9	1.5	1.47	1	1	1	0.5	13838.98	4612.99	4775.35	445.51	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	2	1.5	1.52	1	1	1	0.5	20211.96	6737.32	6908.22	433.27	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	2.1	1.5	1.54	1	1	1	0.5	18128.09	6042.70	6221.12	453.67	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
3	3	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.54	27.18	45.74	142.01	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.60	31.20	**59.03**	**153.53**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	105.67	35.22	72.33	156.09	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	111.65	37.22	82.82	170.16	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	148.99	49.66	103.77	184.34	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	193.17	64.39	126.99	198.52	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	178.67	59.56	130.64	269.42	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	135.20	45.07	124.59	303.30	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.2	1	1	1	1	1	0.5	306.19	102.06	189.99	299.41	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	673.65	224.55	320.85	295.52	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.3	1.2	1.17	1	1	1	0.5	3110.89	1036.96	1141.33	358.28	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.4	1.2	1.18	1	1	1	0.5	3453.14	1151.05	1263.49	358.28	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.4	1.2	1.22	1	1	1	0.5	7597.23	2532.41	2652.95	469.11	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.5	1.2	1.25	1	1	1	0.5	10586.07	3528.69	3657.19	442.20	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.5	1.3	1.27	1	1	1	0.5	11557.22	3852.41	3988.88	442.20	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.5	1.3	1.26	1	1	1	0.5	6689.46	2229.82	2374.13	433.44	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.6	1.3	1.29	1	1	1	0.5	11481.67	3827.22	3980.56	407.09	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.6	1.3	1.31	1	1	1	0.5	12360.69	4120.23	4282.59	407.09	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.7	1.3	1.35	1	1	1	0.5	17912.60	5970.87	6141.76	395.90	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.7	1.4	1.36	1	1	1	0.5	16013.26	5337.75	5516.18	414.54	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
4	4	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.40	27.13	45.69	132.18	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.33	31.11	**58.94**	**146.53**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	105.26	35.09	72.20	142.25	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	111.20	37.07	82.67	152.33	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	148.34	49.45	103.55	175.94	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	192.31	64.10	126.70	189.47	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	177.30	59.10	130.19	257.14	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	134.34	44.78	124.30	289.47	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	304.38	101.46	189.38	285.76	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.2	1.1	1.08	1	1	1	0.5	655.41	218.47	314.77	282.05	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.2	1.1	1.12	1	1	1	0.5	2997.54	999.18	1103.55	341.95	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.3	1.1	1.14	1	1	1	0.5	3316.81	1105.60	1218.05	341.95	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.3	1.2	1.17	1	1	1	0.5	7259.98	2419.99	2540.53	447.72	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.4	1.2	1.18	1	1	1	0.5	10063.98	3354.66	3483.16	422.04	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.4	1.2	1.2	1	1	1	0.5	10952.12	3650.71	3787.18	422.04	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.4	1.2	1.2	1	1	1	0.5	6340.41	2113.47	2257.79	413.68	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.4	1.2	1.22	1	1	1	0.5	10828.70	3609.57	3762.90	388.53	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.5	1.2	1.23	1	1	1	0.5	11624.08	3874.69	4037.05	388.53	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.5	1.3	1.26	1	1	1	0.5	16766.67	5588.89	5759.79	377.85	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.5	1.3	1.27	1	1	1	0.5	14959.10	4986.37	5164.79	395.64	911.13

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Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
5	5	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.36	27.12	45.68	126.50	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.21	31.07	**58.90**	**142.41**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	105.06	35.02	72.13	134.34	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	110.98	36.99	82.60	142.17	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1	1	1	1	1	1	0.5	148.01	49.34	103.44	162.50	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	191.87	63.96	126.55	184.14	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	176.52	58.84	129.93	249.90	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	133.85	44.62	124.14	281.33	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	303.36	101.12	189.04	277.72	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.1	1.1	1.07	1	1	1	0.5	644.61	214.87	311.17	274.11	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.2	1.1	1.1	1	1	1	0.5	2930.36	976.79	1081.16	332.33	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	3235.85	1078.62	1191.06	332.33	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	7059.67	2353.22	2473.76	435.12	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.3	1.1	1.15	1	1	1	0.5	9753.36	3251.12	3379.62	410.17	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.3	1.2	1.16	1	1	1	0.5	10591.70	3530.57	3667.04	410.17	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.3	1.2	1.16	1	1	1	0.5	6132.23	2044.08	2188.39	402.04	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.4	1.2	1.18	1	1	1	0.5	10438.95	3479.65	3632.99	377.60	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.4	1.2	1.19	1	1	1	0.5	11184.15	3728.05	3890.41	377.60	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.4	1.2	1.21	1	1	1	0.5	16082.11	5360.70	5531.60	367.23	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.4	1.2	1.22	1	1	1	0.5	14329.19	4776.40	4954.82	384.51	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
6	6	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.38	27.13	45.68	122.81	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.18	31.06	**58.89**	**139.69**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	104.97	34.99	72.10	129.22	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	110.88	36.96	82.57	135.62	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1	1	1	1	1	1	0.5	147.84	49.28	103.38	153.86	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	191.62	63.87	126.47	173.16	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	176.04	58.68	129.76	245.14	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	133.55	44.52	124.04	275.96	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	302.74	100.91	188.84	272.43	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.1	1.1	1.06	1	1	1	0.5	637.53	212.51	308.81	268.89	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.2	1.1	1.08	1	1	1	0.5	2886.26	962.09	1066.46	325.99	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.2	1.1	1.09	1	1	1	0.5	3182.57	1060.86	1173.30	325.99	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	6927.82	2309.27	2429.81	426.83	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.2	1.1	1.12	1	1	1	0.5	9548.48	3182.83	3311.33	402.35	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	10353.61	3451.20	3587.68	402.35	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	5994.47	1998.16	2142.47	394.38	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.3	1.1	1.15	1	1	1	0.5	10180.81	3393.60	3546.94	370.40	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.3	1.2	1.16	1	1	1	0.5	10892.56	3630.85	3793.21	370.40	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.3	1.2	1.17	1	1	1	0.5	15628.24	5209.41	5380.31	360.22	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.4	1.2	1.18	1	1	1	0.5	13911.42	4637.14	4815.56	377.18	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
7	7	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.43	27.14	45.70	120.22	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.19	31.06	**58.90**	**137.77**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	104.95	34.98	72.09	125.63	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	110.84	36.95	82.55	131.04	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1	1	1	1	1	1	0.5	147.76	49.25	103.35	147.83	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1	1	1	1	1	1	0.5	191.50	63.83	126.43	165.51	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1	1	1	1	1	1	0.5	175.72	58.57	129.66	233.20	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1	1	1	1	1	1	0.5	133.36	44.45	123.97	272.16	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	302.34	100.78	188.71	268.67	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.1	1	1.05	1	1	1	0.5	632.58	210.86	307.16	265.19	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.1	1.1	1.07	1	1	1	0.5	2855.36	951.79	1056.16	321.51	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.2	1.1	1.08	1	1	1	0.5	3145.10	1048.37	1160.81	321.51	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.09	1	1	1	0.5	6835.10	2278.37	2398.90	420.95	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	9404.02	3134.67	3263.18	396.81	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	10185.44	3395.15	3531.62	396.81	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	5896.97	1965.66	2109.97	388.95	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	9997.88	3332.63	3485.96	365.30	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	10685.74	3561.91	3724.27	365.30	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.3	1.1	1.15	1	1	1	0.5	15306.19	5102.06	5272.96	355.26	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.3	1.2	1.15	1	1	1	0.5	13614.87	4538.29	4716.71	371.99	911.13

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Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
8	8	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.50	27.17	45.72	118.30	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.23	31.08	**58.91**	**136.33**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	104.96	34.99	72.10	122.99	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	110.85	36.95	82.55	127.67	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1	1	1	1	1	1	0.5	147.73	49.24	103.35	143.39	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1	1	1	1	1	1	0.5	191.44	63.81	126.41	159.89	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1	1	1	1	1	1	0.5	175.51	58.50	129.59	224.41	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1	1	1	1	1	1	0.5	133.23	44.41	123.93	260.98	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	302.09	100.70	188.62	265.88	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.1	1	1.04	1	1	1	0.5	628.96	209.65	305.95	262.43	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.1	1.1	1.06	1	1	1	0.5	2832.70	944.23	1048.60	318.16	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.1	1.1	1.07	1	1	1	0.5	3117.52	1039.17	1151.62	318.16	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.08	1	1	1	0.5	6766.83	2255.61	2376.15	416.57	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.2	1.1	1.09	1	1	1	0.5	9297.33	3099.11	3227.61	392.68	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.2	1.1	1.1	1	1	1	0.5	10060.96	3353.65	3490.12	392.68	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.2	1.1	1.1	1	1	1	0.5	5824.62	1941.54	2085.85	384.90	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	9861.95	3287.32	3440.65	361.50	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.12	1	1	1	0.5	10531.89	3510.63	3672.99	361.50	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	15066.52	5022.17	5193.07	351.57	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.3	1.1	1.13	1	1	1	0.5	13394.07	4464.69	4643.11	368.12	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
10	10	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	81.68	27.23	45.78	115.64	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	93.36	31.12	**58.95**	**134.34**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	105.05	35.02	72.13	119.34	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1	1	1	1	1	1	0.5	110.93	36.98	82.58	123.03	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1	1	1	1	1	1	0.5	147.79	49.26	103.37	137.29	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1	1	1	1	1	1	0.5	191.47	63.82	126.42	152.16	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1	1	1	1	1	1	0.5	175.29	58.43	129.51	212.35	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1	1	1	1	1	1	0.5	133.10	44.37	123.89	245.64	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	301.85	100.62	188.54	248.99	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.1	1	1.03	1	1	1	0.5	624.10	208.03	304.33	252.17	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.1	1	1.05	1	1	1	0.5	2802.23	934.08	1038.45	313.50	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	1.1	1.1	1.05	1	1	1	0.5	3080.16	1026.72	1139.16	313.50	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.1	1.1	1.07	1	1	1	0.5	6674.29	2224.76	2345.30	410.48	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.1	1.1	1.07	1	1	1	0.5	9151.91	3050.64	3179.14	386.93	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	1.2	1.1	1.08	1	1	1	0.5	9890.64	3296.88	3433.35	386.93	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	1.2	1.1	1.08	1	1	1	0.5	5725.19	1908.40	2052.71	379.27	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.09	1	1	1	0.5	9674.70	3224.90	3378.24	356.21	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	1.2	1.1	1.09	1	1	1	0.5	10319.55	3439.85	3602.21	356.21	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	1.2	1.1	1.1	1	1	1	0.5	14735.49	4911.83	5082.73	346.42	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	1.2	1.1	1.11	1	1	1	0.5	13088.86	4362.95	4541.37	362.73	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
1	1	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	83.44	27.81	46.37	238.74	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	96.58	32.19	**60.03**	**215.41**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.1	1	1	1	1	1	0.5	109.72	36.57	73.68	238.74	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.2	1.2	0.6	1.2	1	1	1	1	1	0.5	116.01	38.67	84.28	238.74	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.2	1.2	0.6	1.2	1	1	1	1	1	0.5	155.08	51.69	105.80	258.64	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.2	1.2	0.6	1.3	1	1	1	1	1	0.5	201.06	67.02	129.62	278.53	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.2	1.2	0.6	1.3	1	1	1	1	1	0.5	190.31	63.44	134.52	378.01	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.2	1.2	0.6	1.3	1	1	1	1	1	0.5	142.57	47.52	127.05	425.54	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.2	1.2	0.6	1.5	1	1	1	1	1	0.5	321.80	107.27	195.19	420.08	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.2	1.2	0.6	1.7	1.3	1.33	1	1	1	0.5	821.71	273.90	370.20	414.63	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	2	1.5	1.5	1	1	1	0.5	4030.20	1343.40	1447.77	502.69	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.2	1.2	0.6	2.1	1.5	1.55	1	1	1	0.5	4556.21	1518.74	1631.18	502.69	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	2.3	1.7	1.66	1	1	1	0.5	10325.69	3441.90	3562.43	658.18	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.2	1.2	0.6	2.5	1.7	1.74	1	1	1	0.5	14802.40	4934.13	5062.64	620.42	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.2	1.2	0.6	2.6	1.8	1.8	1	1	1	0.5	16437.60	5479.20	5615.67	620.42	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.2	1.2	0.6	2.6	1.8	1.79	1	1	1	0.5	9500.50	3166.83	3311.15	608.14	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	2.8	1.9	1.88	1	1	1	0.5	16735.95	5578.65	5731.99	571.17	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.2	1.2	0.6	2.9	1.9	1.94	1	1	1	0.5	18284.04	6094.68	6257.04	571.17	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.2	1.2	0.6	3.1	2	2.04	1	1	1	0.5	27125.02	9041.67	9212.57	555.47	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.2	1.2	0.6	3.2	2.1	2.08	1	1	1	0.5	24485.54	8161.85	8340.27	581.62	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Length of footing L(m)	Breadth of footing B(m)	Depth of footing D_f(m)	Corrected SPT value (N_{60})	Design Shear strength parameter lab test		Design Shear strength parameter field test		Unit weight of soil (γ) kN/m^3	Effective Surge Charge at surface of footing kPa	Bearing Capacity Factors (Table 1 of IS6403:1981			Bearing Capacity Factors (Table 1 of IS6403:1981			Shape Factors (Table 2 of IS6403:1981			Depth Factors (cl. 5.1.2.2 of IS6403:1981			Inclination Factors (cl. 5.1.2.3 of IS6403:1981			Effect of water factor (W') cl. 15.1.2.4 of IS6403	Ultimate bearing capacity general shear failure (q_{ult}) kPa	Net allowable bearing capacity (q_{na}) kPa for FOS 3.0	Gross allowable bearing capacity (q_{na}) kPa for FOS 3.0	Safe bearing capacity based on settelement 40mm (qsafe) kPa	Safe allowable bearing capacity from SPT value kPa
				C kPa	φ	C kPa	φ			Nc	Nq	N_γ	N_c'	Nq'	Nγ'	Sc	Sq	S_γ	d_c	d_q	d_γ	i_c	i_q	i_γ						
1	0.5	1	11	6.38	7.59	0	22.7	18.56	18.555	7.5	2	0.85	6.5	1.59	0.47	1.1	1.1	0.8	1.1	1	1	1	1	1	0.5	79.41	26.47	45.03	363.34	374.00
		1.5	11	6.38	7.59	0	22.7	18.56	27.833	7.5	2	0.85	6.5	1.59	0.47	1.1	1.1	0.8	1.2	1	1	1	1	1	0.5	92.93	30.98	**58.81**	**327.82**	**374.00**
		2	11	6.38	7.59	0	22.7	18.56	37.11	7.5	2	0.85	6.5	1.59	0.47	1.1	1.1	0.8	1.2	1	1	1	1	1	0.5	106.46	35.49	72.60	363.34	374.00
		3	11	4.56	7.59	0	22.1	18.3	45.606	7.5	2	0.85	6.5	1.59	0.47	1.1	1.1	0.8	1.3	1	1	1	1	1	0.5	112.65	37.55	83.16	363.34	374.00
		4	11.92	4.33	8.47	0	22.3	18.3	54.102	7.8	2.2	0.98	6.7	1.7	0.56	1.1	1.1	0.8	1.5	1	1	1	1	1	0.5	150.91	50.30	104.40	393.62	405.17
		5	12.83	4.1	9.35	0	22.5	18.3	62.598	8.1	2.4	1.12	7	1.8	0.65	1.1	1.1	0.8	1.6	1	1	1	1	1	0.5	195.57	65.19	127.79	423.89	436.33
		6	17.42	6.38	6.79	0	23.2	18.3	71.085	7.2	1.9	0.73	6.4	1.52	0.41	1.1	1.1	0.8	1.6	1	1	1	1	1	0.5	190.72	63.57	134.66	575.29	592.17
		7	19.61	4.1	5.4	0	23.8	18.2	79.521	6.6	1.6	0.51	6.1	1.41	0.33	1.1	1.1	0.8	1.7	1	1	1	1	1	0.5	141.03	47.01	126.53	647.62	666.62
		8	19.36	4.78	9.78	0	23.7	18.2	87.926	8.3	2.4	1.19	7.1	1.86	0.69	1.1	1.1	0.8	2	1	1	1	1	1	0.5	316.89	105.63	193.55	639.32	658.08
		9	19.10	5.47	14.2	0	23.7	18.2	96.3	11	3.7	2.41	8.2	2.4	1.16	1.1	1.1	0.8	2.3	1.7	1.67	1	1	1	0.5	957.78	319.26	415.56	631.02	649.53
		10	23.16	5.01	26.3	0	24.5	17.9	104.37	23	13	13.9	14	5.57	4.47	1.1	1.1	0.8	3	2	2	1	1	1	0.5	4964.04	1654.68	1759.05	765.03	787.48
		11	23.16	5.01	26.3	0	24.5	17.9	112.44	23	13	13.9	14	5.57	4.47	1.1	1.1	0.8	3.2	2.1	2.1	1	1	1	0.5	5698.92	1899.64	2012.08	765.03	787.48
		12	30.33	0	32.2	0	26	17.9	120.54	37	25	33.9	18	8.88	8.58	1.1	1.1	0.8	3.6	2.3	2.32	1	1	1	0.5	13230.96	4410.32	4530.86	1001.66	1031.06
		13	28.59	2.73	34.2	0	25.7	17.8	128.5	44	31	44	20	10.2	10.3	1.1	1.1	0.8	4	2.5	2.48	1	1	1	0.5	19384.84	6461.61	6590.12	944.21	971.92
		14	28.59	2.73	34.2	0	25.7	17.8	136.47	44	31	44	20	10.2	10.3	1.1	1.1	0.8	4.2	2.6	2.59	1	1	1	0.5	21797.01	7265.67	7402.14	944.21	971.92
		15	28.02	2.73	29.3	0	25.5	17.7	144.32	29	17	20.7	16	6.9	6.04	1.1	1.1	0.8	4.2	2.6	2.58	1	1	1	0.5	12582.77	4194.26	4338.57	925.51	952.67
		16	26.32	2.73	32.2	0	25.2	18.8	153.34	37	25	33.9	18	8.88	8.58	1.1	1.1	0.8	4.5	2.8	2.76	1	1	1	0.5	22580.51	7526.84	7680.17	869.25	894.75
		17	26.32	2.73	32.2	0	25.2	18.8	162.36	37	25	33.9	18	8.88	8.58	1.1	1.1	0.8	4.7	2.9	2.87	1	1	1	0.5	24919.66	8306.55	8468.91	869.25	894.75
		18	25.59	1.37	35.2	0	25	18.3	170.9	47	34	50	21	11.1	11.5	1.1	1.1	0.8	5.1	3.1	3.07	1	1	1	0.5	37553.67	12517.9	12688.8	845.36	870.17
		19	26.80	1.37	34.1	0	25.3	17.3	178.42	43	31	43.3	20	10.1	10.2	1.1	1.1	0.8	5.3	3.2	3.15	1	1	1	0.5	34113.61	11371.2	11549.6	885.16	911.13

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Summary of recommended bearing capacity in kPa for shallow footing

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line

Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh

SN	Bore Hole	Depth of Footing(m)	Size of Footing								
			2m X2m	3m X 3m	4m X 4m	5m X 5m	6m X 6m	7m X 7m	8m X 8m	1m X 1m	1mX0.5m
1	BH-01	1	45.87	45.74	45.69	45.68	45.68	45.70	45.72	46.37	45.03
2	BH-01	1.5	59.26	59.03	58.94	58.90	58.89	58.90	58.91	60.03	58.81
2	BH-01	2	72.65	72.33	72.20	72.13	72.10	72.09	72.10	73.68	72.60
3	BH-01	3	83.17	82.82	82.67	82.60	82.57	82.55	82.55	84.28	83.16
4	BH-01	4	104.25	103.77	103.55	103.44	103.38	103.35	103.35	105.80	104.40
5	BH-01	5	127.62	126.99	126.70	126.55	126.47	126.43	126.41	129.62	127.79

Tested By:
Sabin Poudel Khatri

Approved By:
Geotech Er. Aanand Mishra
NEC No. 6933 "CIVIL"

Liquifaction analysis from BH-01 for PGA=0.36g , M=7.5 and GWT being at 2.5m from ground															
S.N.	Depth(m)	Corrected SPT(N60)	Soil Type	% of Fine (FC)	Unit weight of Soil(kN/m2)	Total vertical stress(σ_v) kN/m2	Effective vertical stress(σ_v')kN/m2	Over burden corrected SPT$(N_1)_{60}$	Equivalent clean sand blow count $(N_1)_{60cs}$	Stress reducttion coefficient (r_d)	Magnitude Scaling Factor(MSF)	Cyclic Stress Ratio(CSR)	Cyclic Resistance Ratio(CRR)	Factor of Saftey (FS)	Liquefaction potential Index (LPI)
1	1	11	CL	10.4	18.56	18.6	18.56	14.60	15.942	0.999	1.000	0.234	0.304	0	0
2	2	11	CL	18.1	18.56	37.1	37.11	14.60	18.697	0.991	1.000	0.232	0.516	2.23	0
3	3	11	CL	22.2	18.31	92	87.12	11.65	16.445	0.982	1.000	0.243	0.332	1.37	0
4	4	12.8	CL	24.4	18.31	165	150.5	13.64	18.662	0.972	1.000	0.25	0.512	2.05	0
5	5	12.8	CL	23.5	18.31	184	159	13.64	18.576	0.961	1.000	0.26	0.503	1.94	0
6	6	17.4	CL	14.2	18.3	202	167.5	16.75	19.726	0.949	1.000	0.268	0.651	2.43	0
7	7	25.7	ML	6.62	18.25	220	176	19.61	19.688	0.937	1.000	0.274	0.645	2.35	0
8	8	26.6	ML	6.53	18.21	238	179.5	19.10	19.175	0.924	1.000	0.287	0.574	2	0
9	9	26.6	ML	5.81	18.18	256	187.8	19.10	19.123	0.91	1.000	0.291	0.567	1.95	0
10	10	38.5	CL	6.62	17.88	274	195.9	23.16	23.242	0.896	1.000	0.294	1.714	5.84	0
11	11	38.5	CL	6.5	17.88	292	204	23.16	23.229	0.882	1.000	0.296	1.706	5.77	0
12	12	66.9	SP-SM	6.53	17.91	310	212.1	30.33	30.396	0.867	1.000	0.297	36.64	123	0
13	13	65.1	SP-SM	5.81	17.78	328	220	28.59	28.604	0.852	1.000	0.297	14.43	48.5	0
14	14	65.1	SP-SM	5.8	17.78	346	228	28.59	28.604	0.837	1.000	0.297	14.43	48.6	0
15	15	67.8	SP	7.5	17.65	363	235.8	28.02	28.255	0.822	1.000	0.296	12.2	41.1	0
16	16	64.2	SP-SM	7.1	18.83	382	244.9	26.32	26.469	0.808	1.000	0.295	5.536	18.8	0
17	17	64.2	SP-SM	6.85	18.83	401	253.9	26.32	26.428	0.793	1.000	0.293	5.444	18.6	0
18	18	64.2	SP-SM	7.3	18.35	419	262.4	25.59	25.784	0.778	1.000	0.291	4.206	14.5	0
19	19	74.3	SP-SM	6.2	17.34	437	270	26.80	26.839	0.764	1.000	0.289	6.464	22.3	0
20	20	74.3	SP-SM	6.24	17.34	454	277.5	26.80	26.842	0.75	1.000	0.287	6.472	22.5	0
															0

As liquefaction potential Index is 0, so there is very low possibility of liquefaction.

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Shettlement Calculation

Project:Pokhariya Substation , Hetauda-Parwanipur-Pokariya 132kV transmission line		Location: Pokariya Municipality -01, Parsa , Madhesh Pradesh	
		Ground Water Level(m)	2.5
Size of Footing : 2mX2m		Depth of foundation (m)=	2
Stress from foundation for settlement calculation(qu) kN/m^2=	150	Unit weight of Back fill	18

S.N.	Depth of Layer(m)	Thickness of layer (m)	Soil Type	Corrected SPT(N_{60})	Bulk unit weight(γ)kN/m^3	Effective Stress at base of footing (kN/m^2)	Over Burden Stress (kN/m^2)	Initial Void Ratio(e_o)	D_{50}	q_c/N	Cone penetration resistance value (q_c)kPa	Modulus of Elasticity of Soil (E_s)	Vertical Strian Influence Factor (I_z)	$I_{z*\Delta z}/E_s$	Esi*Δz
1	3.0-4.0	1	CL	11.0	18.31	150.00	73.22	0.78	0.21	4.20	4532.22	11330.55	0.11	0.000010	11330.55
2	4.0-5.0	1	CL	11.9	18.31	150.00	91.53	0.78	0.20	4.10	4793.00	11982.51	0.15	0.000013	11982.51
3	5.0-6.0	1	CL	12.8	18.31	150.00	109.84	0.78	0.16	4.00	5035.80	12589.50	0.25	0.000020	12589.50
4	6.0-7.0	1	CL	17.4	18.30	150.00	128.13	0.73	0.12	4.00	6834.30	17085.75	0.38	0.000022	17085.75
5	7.0-8.0	1	ML	19.6	18.25	150.00	146.38	0.84	0.16	4.00	7693.63	19234.09	0.48	0.000025	19234.09
6	8.0-9.0	1	ML	19.4	18.21	150.00	164.59	0.84	0.22	4.30	8164.63	20411.57	0.48	0.000023	20411.57
7	9.0-10.0	1	CL	19.1	18.18	150.00	182.78	0.72	0.14	4.00	7496.37	18740.92	0.30	0.000016	18740.92
8	10.0-11.0	1	CL	23.2	17.88	150.00	200.66	0.72	0.20	4.20	9542.85	23857.13	0.28	0.000012	23857.13
9	11.0-12.0	1	CL	23.2	17.88	150.00	218.54	0.64	0.22	4.20	9542.85	23857.13	0.25	0.000010	23857.13
10	12.0-13.0	1	SP-SM	30.3	17.91	150.00	236.44	0.64	0.21	4.20	12494.59	31236.47	0.23	0.000007	31236.47
11	13.0-14.0	1	SP-SM	28.6	17.78	150.00	254.22	1.06	0.23	4.30	12058.34	30145.85	0.20	0.000007	30145.85
12	14.0-15.0	1	SP-SM	28.6	17.78	150.00	272.00	0.81	0.22	4.20	11777.91	29444.79	0.18	0.000006	29444.79
13	15.0-16.0	1	SP	28.0	17.65	150.00	289.65	0.61	0.22	4.20	11544.66	28861.65	0.15	0.000005	28861.65
14	16.0-17.0	1	SP	26.3	18.8	150	308.484	0.61	0.22	4.2	10842.84	27107.088	0.15	0.000006	27107.09
15	17.0-18.0	1	SP-SM	26.3	18.83	150.00	327.32	0.78	0.20	4.20	10842.84	27107.09	0.11	0.000004	27107.09
														0.000185	18499.56

Elastic settlement from Schmertmann et. al 1978

Correction factor for emdement of foundation (C1)=		0.217	
Correction factor to account for creep in soil (C2)=		1.540	
Elastic settlement	**Se=**	**4.742**	mm

Elastic Settlement in saturated clay from Janbu et al. 1956

Elastic settlement	**Se=**	**28.296**	mm

Consolidation Settlement inclay layer

Thickness of clay layer (m)		10.000	
initial void ratio		0.900	
Compression index		0.225	
Eff. pressure at mid of clay layer before construction		421.47	
Eff. pressure at mid of clay layer after construction		571.47	
Consolidation Settlement	**S_c**	**3.269**	mm
Total Settlement	**S_t**	**31.565**	mm

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