

Sub-Soil Investigations for C/O 03 nos. 132/33 KV Transformer Bay
At GSS Rajgir under Special Plan (BRGF) scheme
of Phase - III part-II, (N-1) Rajgir (Nalanda).

Calculation of Bearing Capacity for Square Footing

Shear Failure Criterion

Depth (m)	Width (m)	c (t/m ²)	N _c	S _c	d _c	q (t/m ²)	N _{q-1}	S _q	d _q	γ (t/m ³)	N _γ	S _γ	d _γ	q _d (t/m ²)	q _s =q _d /3.0 (t/m ²)	φ (deg.)
2.0	2.0	9.00	5.93	1.30	1.21	4.04	0.31	1.20	1.00	2.02	0.24	0.80	1.00	85.8	28.60	3.00
2.0	3.0	9.00	5.93	1.30	1.14	4.04	0.31	1.20	1.00	2.02	0.24	0.80	1.00	81.1	27.02	3.00
2.0	4.0	9.00	5.93	1.30	1.11	4.04	0.31	1.20	1.00	2.02	0.24	0.80	1.00	78.7	26.25	3.00
3.0	3.0	11.50	5.93	1.30	1.21	6.15	0.31	1.20	1.00	2.05	0.24	0.80	1.00	110.1	36.69	3.00
3.0	1.5	11.50	5.93	1.30	1.42	6.15	0.31	1.20	1.00	2.05	0.24	0.80	1.00	128.6	42.87	3.00
3.0	2.0	11.50	5.93	1.30	1.32	6.15	0.31	1.20	1.00	2.05	0.24	0.80	1.00	119.3	39.77	3.00
4.0	2.5	14.50	5.93	1.30	1.34	4.36	0.31	1.20	1.00	1.09	0.24	0.80	1.00	151.4	50.46	3.00
4.0	3.0	14.50	5.93	1.30	1.28	4.36	0.31	1.20	1.00	1.09	0.24	0.80	1.00	145.1	48.37	3.00
4.0	3.0	14.50	5.93	1.30	1.28	4.36	0.31	1.20	1.00	1.09	0.24	0.80	1.00	145.1	48.37	3.00
5.0	3.0	17.00	5.93	1.30	1.35	5.35	0.31	1.20	1.00	1.07	0.24	0.80	1.00	179.4	59.80	3.00
5.0	3.0	17.00	5.93	1.30	1.35	5.35	0.31	1.20	1.00	1.07	0.24	0.80	1.00	179.4	59.80	3.00
5.0	3.0	17.00	5.93	1.30	1.35	5.35	0.31	1.20	1.00	1.07	0.24	0.80	1.00	179.4	59.80	3.00

**Sub-Soil Investigations for C/O 03 nos. 132/33 KV Transformer Bay
At GSS Raigir under Special Plan (BRGF) scheme
of Phase - III part-II, (N-1) Raigir (Nalanda).**

**Settlement Criterion
Square Footing**

WT= 4.0 m		Depth (m)	Width (m)	Thick-ness of layer (mm)	Net footing pre. q (t/m ²)	Comp. Index (Cc)	Initial void ratio (e ₀)	Bulk density γ (t/m ³)	Initial eff. Pre. P ₀ (t/m ²)	Pre. Incre. ΔP (t/m ²)	poisson's ratio μ	Elastic Modulus E _s (t/m ²)	Influ. factor (I _f)	Imme. Settlement Si (mm)	Consl. Settlement Sc (mm)	Total settlement St (mm)	Corre. factor (λ)	Total corrected Settlement S (mm)	Remarks
	2.0	2.0	3.0	3.0	31.72	0.145	0.586	2.02	7.07	10.358	0.35	2000	0.82	22.824	107.4	130.3	0.68	88.6	NOT O.K.
	2.0	3.0	4.5	4.5	29.95	0.145	0.586	2.02	8.34	9.780	0.35	2000	0.82	32.326	138.7	171.0	0.68	116.3	NOT O.K.
	2.0	4.0	6.0	6.0	29.09	0.145	0.586	2.02	9.13	9.499	0.35	2000	0.82	41.863	169.8	211.7	0.68	144.0	NOT O.K.
	3.0	2.0	3.0	3.0	32.02	0.145	0.586	2.05	8.73	10.456	0.35	2000	0.82	23.04	93.8	116.8	0.68	79.5	NOT O.K.
	3.0	3.0	4.5	4.5	37.38	0.145	0.586	2.05	9.51	12.206	0.35	2000	0.82	40.345	147.5	187.8	0.68	127.7	NOT O.K.
	3.0	4.0	6.0	6.0	34.69	0.145	0.586	2.05	10.38	11.327	0.35	2000	0.82	49.922	175.7	225.6	0.68	153.4	NOT O.K.
	4.0	2.0	3.0	3.0	34.98	0.145	0.586	2.09	10.00	11.422	0.35	2000	0.82	25.17	90.8	115.9	0.68	78.8	NOT O.K.
	4.0	3.0	4.5	4.5	33.55	0.145	0.586	2.09	10.81	10.955	0.35	2000	0.82	36.211	125.0	161.2	0.68	109.6	NOT O.K.
	4.0	4.0	6.0	6.0	33.55	0.145	0.586	2.09	11.87	10.955	0.35	2000	0.82	48.282	155.7	204.0	0.68	138.7	NOT O.K.
	5.0	2.0	3.0	3.0	35.48	0.145	0.586	2.17	11.61	11.585	0.35	2000	0.82	25.53	82.4	108.0	0.68	73.4	O.K.
	5.0	3.0	4.5	4.5	35.48	0.145	0.586	2.17	12.48	11.585	0.35	2000	0.82	38.294	117.3	155.6	0.68	105.8	NOT O.K.
	5.0	4.0	6.0	6.0	35.48	0.145	0.586	2.17	13.36	11.585	0.35	2000	0.82	51.059	148.7	199.8	0.68	135.8	NOT O.K.
	2.0	2.0	3.0	3.0	25.00	0.145	0.586	2.02	7.07	8.163	0.35	2000	0.82	17.989	91.4	109.4	0.68	74.4	O.K.
	2.0	3.0	4.5	4.5	17.00	0.145	0.586	2.02	8.34	5.551	0.35	2000	0.82	18.349	91.2	109.5	0.68	74.5	O.K.
	2.0	4.0	6.0	6.0	13.00	0.145	0.586	2.02	9.13	4.245	0.35	2000	0.82	18.708	90.9	109.6	0.68	74.6	O.K.
	3.0	2.0	3.0	3.0	29.50	0.145	0.586	2.05	8.73	9.633	0.35	2000	0.82	21.227	88.6	109.8	0.68	74.7	O.K.
	3.0	3.0	4.5	4.5	19.00	0.145	0.586	2.05	9.51	6.204	0.35	2000	0.82	20.507	89.7	110.2	0.68	74.9	O.K.
	3.0	4.0	6.0	6.0	14.00	0.145	0.586	2.05	10.38	4.571	0.35	2000	0.82	20.147	86.9	107.1	0.68	72.8	O.K.
	4.0	2.0	3.0	3.0	32.50	0.145	0.586	2.09	10.00	10.612	0.35	2000	0.82	23.385	86.2	109.5	0.68	74.5	O.K.
	4.0	3.0	4.5	4.5	20.50	0.145	0.586	2.09	10.81	6.694	0.35	2000	0.82	22.126	86.1	108.2	0.68	73.6	O.K.
	4.0	4.0	6.0	6.0	16.00	0.145	0.586	2.09	11.87	5.224	0.35	2000	0.82	23.026	86.9	109.9	0.68	74.7	O.K.
	5.0	3.0	4.5	4.5	23.00	0.145	0.586	2.17	12.48	7.510	0.35	2000	0.82	24.824	84.1	109.0	0.68	74.1	O.K.
	5.0	4.0	6.0	6.0	17.50	0.145	0.586	2.17	13.36	5.714	0.35	2000	0.82	25.184	84.8	110.0	0.68	74.8	O.K.

Sub-Soil Investigations for C/O 03 nos. 132/33 KV Transformer Bay
at GSS Sheikhpura under Special Plan (BRGF) scheme of Phase-III part-II, (N-1), Sheikhpura

Calculation of Bearing Capacity for Square Footing

Shear Failure Criterion

Depth (m)	Width (m)	c (t/m ²)	N _c	S _c	d _c	q (t/m ²)	N _{q-1}	S _q	d _q	γ (t/m ³)	N _γ	S _γ	d _γ	q _d (t/m ²)	q _s =q _d /3.0 (t/m ²)	φ (deg.)
2.0	2.0	9.00	5.93	1.30	1.21	4.02	0.31	1.20	1.00	2.01	0.24	0.80	1.00	85.8	28.60	3.00
* 2.0	3.0	9.00	5.93	1.30	1.14	4.02	0.31	1.20	1.00	2.01	0.24	0.80	1.00	81.0	27.02	3.00
2.0	4.0	9.00	5.93	1.30	1.11	4.02	0.31	1.20	1.00	2.01	0.24	0.80	1.00	78.7	26.24	3.00
3.0	3.0	9.60	6.07	1.30	1.21	6.12	0.37	1.20	1.00	2.04	0.29	0.80	1.00	95.1	31.68	3.50
3.0	1.5	9.60	6.07	1.30	1.43	6.12	0.37	1.20	1.00	2.04	0.29	0.80	1.00	110.9	36.98	3.50
3.0	2.0	9.60	6.07	1.30	1.32	6.12	0.37	1.20	1.00	2.04	0.29	0.80	1.00	103.0	34.32	3.50
4.0	2.5	10.00	6.07	1.30	1.34	4.24	0.37	1.20	1.00	1.06	0.29	0.80	1.00	107.9	35.95	3.50
4.0	3.0	10.00	6.07	1.30	1.28	4.24	0.37	1.20	1.00	1.06	0.29	0.80	1.00	103.4	34.48	3.50
4.0	3.0	10.00	6.07	1.30	1.28	4.24	0.37	1.20	1.00	1.06	0.29	0.80	1.00	103.4	34.48	3.50
5.0	3.0	10.40	6.21	1.30	1.36	5.35	0.43	1.20	1.00	1.07	0.34	0.80	1.00	117.1	39.04	4.00
5.0	3.0	10.40	6.21	1.30	1.36	5.35	0.43	1.20	1.00	1.07	0.34	0.80	1.00	117.1	39.04	4.00
5.0	3.0	10.40	6.21	1.30	1.36	5.35	0.43	1.20	1.00	1.07	0.34	0.80	1.00	117.1	39.04	4.00

**Sub-Soil Investigations for C/O 03 nos. 132/33 KV Transformer Bay
at GSS Sheikhpura under Special Plan (BRGF) scheme of Phase-III part-II, (N-1), Sheikhpura**

**Settlement Criterion
Square Footing**

WT=	Depth (m)	Width (m)	Thick- ness of layer (mm)	Net footing pre. q (t/m ²)	Comp. Index (Cc)	Initial void ratio (e ₀)	Bulk density γ (t/m ³)	Initial eff. Pre. P ₀ (t/m ²)	Pre. Incr. ΔP (t/m ²)	poiss- on's ratio μ	Elastic Modulu s E _s (t/m ²)	Influ. factor (I _f)	Imme. Settle- ment S _i (mm)	Consl. Settle- ment S _c (mm)	Total settle- ment S _t (mm)	Corre. factor (λ)	Total corrected Settlement S (mm)	Remarks
	2.0	2.0	3.0	28.60	0.162	0.568	2.01	7.04	9.339	0.35	2000	0.82	20.579	113.7	134.3	0.68	91.3	NOT O.K.
	2.0	3.0	4.5	27.02	0.162	0.568	2.01	8.29	8.823	0.35	2000	0.82	29.163	146.3	175.5	0.68	119.3	NOT O.K.
	2.0	4.0	6.0	26.24	0.162	0.568	2.01	9.08	8.568	0.35	2000	0.82	37.762	178.9	216.7	0.68	147.3	NOT O.K.
	3.0	2.0	3.0	31.68	0.162	0.568	2.04	8.68	10.344	0.35	2000	0.82	22.795	105.6	128.4	0.68	87.3	NOT O.K.
	3.0	3.0	4.5	36.98	0.162	0.568	2.04	9.46	12.075	0.35	2000	0.82	39.913	166.1	206.0	0.68	140.1	NOT O.K.
	3.0	4.0	6.0	34.32	0.162	0.568	2.06	9.83	11.739	0.35	2000	0.82	49.39	198.5	247.8	0.68	168.5	NOT O.K.
	4.0	2.0	3.0	35.95	0.162	0.568	2.06	10.63	11.259	0.35	2000	0.82	37.215	145.9	183.1	0.68	124.5	NOT O.K.
	4.0	3.0	4.5	34.48	0.162	0.568	2.06	11.45	11.259	0.35	2000	0.82	49.62	184.3	234.0	0.68	159.1	NOT O.K.
	4.0	4.0	6.0	34.48	0.162	0.568	2.07	10.96	12.748	0.35	2000	0.82	28.091	103.9	132.0	0.68	89.7	NOT O.K.
	5.0	2.0	3.0	39.04	0.162	0.568	2.07	11.76	12.748	0.35	2000	0.82	42.137	148.3	190.4	0.68	129.5	NOT O.K.
	5.0	3.0	4.5	39.04	0.162	0.568	2.07	12.56	12.748	0.35	2000	0.82	56.182	188.6	244.8	0.68	166.4	NOT O.K.
	5.0	4.0	6.0	39.04	0.162	0.568	2.07	7.04	7.020	0.35	2000	0.82	15.47	93.2	108.6	0.68	73.9	O.K.
	2.0	2.0	3.0	21.50	0.162	0.568	2.01	8.29	4.898	0.35	2000	0.82	16.19	93.7	109.9	0.68	74.7	O.K.
	2.0	3.0	4.5	15.00	0.162	0.568	2.01	9.08	3.755	0.35	2000	0.82	16.55	93.2	109.7	0.68	74.6	O.K.
	2.0	4.0	6.0	11.50	0.162	0.568	2.01	8.68	8.327	0.35	2000	0.82	18.349	90.5	108.9	0.68	74.0	O.K.
	3.0	2.0	3.0	25.50	0.162	0.568	2.04	9.46	5.388	0.35	2000	0.82	17.809	91.0	108.8	0.68	74.0	O.K.
	3.0	3.0	4.5	16.50	0.162	0.568	2.04	10.28	4.082	0.35	2000	0.82	17.989	90.0	108.0	0.68	73.4	O.K.
	3.0	4.0	6.0	12.50	0.162	0.568	2.06	9.83	9.306	0.35	2000	0.82	20.507	89.7	110.2	0.68	74.9	O.K.
	4.0	2.0	3.0	28.50	0.162	0.568	2.06	10.63	5.878	0.35	2000	0.82	19.428	88.9	108.3	0.68	73.7	O.K.
	4.0	3.0	4.5	18.00	0.162	0.568	2.06	11.45	4.408	0.35	2000	0.82	19.428	87.7	107.1	0.68	72.8	O.K.
	4.0	4.0	6.0	13.50	0.162	0.568	2.07	10.96	9.959	0.35	2000	0.82	21.946	87.0	109.0	0.68	74.1	O.K.
	5.0	2.0	3.0	30.50	0.162	0.568	2.07	11.76	6.367	0.35	2000	0.82	21.047	87.4	108.4	0.68	73.7	O.K.
	5.0	3.0	4.5	19.50	0.162	0.568	2.07	12.56	4.898	0.35	2000	0.82	21.587	88.6	110.2	0.68	75.0	O.K.
	5.0	4.0	6.0	15.00	0.162	0.568	2.07											O.K.

Sub-Soil Investigations for C/O 03 nos. 132/33 KV Transformer Bay
at GSS Ekangarsarai under Special Plan (BRGF) scheme
of Phase -III part-II, (N-1), Ekangarsarai (Nalanda).

Calculation of Bearing Capacity for Square Footing
Shear Failure Criterion

Depth (m)	Width (m)	c (t/m ²)	N _c	S _c	d _c	q (t/m ²)	N _{q-1}	S _q	d _q	γ (t/m ³)	N _γ	S _γ	d _γ	q _d (t/m ²)	q _s =q _d /3.0 (t/m ²)	φ (deg.)
2.0	2.0	4.70	6.36	1.30	1.22	4.02	0.50	1.20	1.00	2.01	0.39	0.80	1.00	50.1	16.70	4.50
2.0	3.0	4.70	6.36	1.30	1.14	4.02	0.50	1.20	1.00	2.01	0.39	0.80	1.00	47.5	15.83	4.50
2.0	4.0	4.70	6.36	1.30	1.11	4.02	0.50	1.20	1.00	2.01	0.39	0.80	1.00	46.3	15.43	4.50
3.0	3.0	4.80	6.21	1.30	1.21	6.00	0.43	1.20	1.00	2.00	0.34	0.80	1.00	50.7	16.91	4.00
3.0	1.5	4.80	6.21	1.30	1.43	6.00	0.43	1.20	1.00	2.00	0.34	0.80	1.00	58.8	19.60	4.00
3.0	2.0	4.80	6.21	1.30	1.32	6.00	0.43	1.20	1.00	2.00	0.34	0.80	1.00	54.7	18.24	4.00
4.0	2.5	5.00	6.07	1.30	1.34	3.96	0.37	1.20	1.00	0.99	0.29	0.80	1.00	54.8	18.28	3.50
4.0	3.0	5.00	6.07	1.30	1.28	3.96	0.37	1.20	1.00	0.99	0.29	0.80	1.00	52.6	17.54	3.50
4.0	3.0	5.00	6.07	1.30	1.28	3.96	0.37	1.20	1.00	0.99	0.29	0.80	1.00	52.6	17.54	3.50
5.0	3.0	6.70	5.93	1.30	1.35	5.00	0.31	1.20	1.00	1.00	0.24	0.80	1.00	71.9	23.96	3.00
5.0	3.0	6.70	5.93	1.30	1.35	5.00	0.31	1.20	1.00	1.00	0.24	0.80	1.00	71.9	23.96	3.00
5.0	3.0	6.70	5.93	1.30	1.35	5.00	0.31	1.20	1.00	1.00	0.24	0.80	1.00	71.9	23.96	3.00

Sub-Soil Investigations for C/O 03 nos. 132/33 KV Transformer Bay
at GSS Ekangarsarai under Special Plan (BRGF) scheme
of Phase -III part-II, (N-1), Ekangarsarai (Nalanda).

Settlement Criterion
Square Footing

WT= 4.0 m		Depth (m)	Width (m)	Thick- ness of layer (mm)	Net footing pre. q (t/m ²)	Comp. Index (Cc)	Initial void ratio (e ₀)	Bulk density γ (t/m ³)	Initial eff. Pre. P ₀ (t/m ²)	Pre. Incr. ΔP (t/m ²)	poiss- on's ratio μ	Elastic Modulu s E _s (t/m ²)	Influ. factor (I _f)	Imme. Settle- ment S _i (mm)	Consl. Settle- ment S _c (mm)	Total settle- ment S _t (mm)	Corre. factor (λ)	Total corrected Settlement S (mm)	Remarks
		2.0	2.0	3.0	16.70	0.166	0.667	2.01	7.04	5.453	0.35	2000	0.82	12.016	74.4	86.5	0.68	58.8	O.K.
		2.0	3.0	4.5	15.83	0.166	0.667	2.01	8.29	5.169	0.35	2000	0.82	17.086	94.3	111.4	0.68	75.7	NOT O.K.
		2.0	4.0	6.0	15.43	0.166	0.667	2.01	9.04	5.038	0.35	2000	0.82	22.205	114.9	137.1	0.68	93.3	NOT O.K.
		3.0	2.0	3.0	16.91	0.166	0.667	2.00	8.50	5.522	0.35	2000	0.82	12.168	64.9	77.1	0.68	52.4	O.K.
		3.0	3.0	4.5	19.60	0.166	0.667	2.00	9.25	6.400	0.35	2000	0.82	21.155	102.3	123.5	0.68	84.0	NOT O.K.
		3.0	4.0	6.0	18.24	0.166	0.667	2.00	9.98	5.956	0.35	2000	0.82	26.249	121.4	147.7	0.68	100.4	NOT O.K.
		4.0	2.0	3.0	18.28	0.166	0.667	1.99	9.45	5.969	0.35	2000	0.82	13.153	63.5	76.7	0.68	52.2	O.K.
		4.0	3.0	4.5	17.54	0.166	0.667	1.99	10.19	5.727	0.35	2000	0.82	18.931	86.8	105.7	0.68	71.9	O.K.
		4.0	4.0	6.0	17.54	0.166	0.667	1.99	10.96	5.727	0.35	2000	0.82	25.242	109.1	134.3	0.68	91.3	NOT O.K.
		5.0	2.0	3.0	23.96	0.166	0.667	2.00	10.50	7.824	0.35	2000	0.82	17.24	72.2	89.5	0.68	60.8	O.K.
		5.0	3.0	4.5	23.96	0.166	0.667	2.00	11.25	7.824	0.35	2000	0.82	25.861	102.7	128.6	0.68	87.4	NOT O.K.
		5.0	4.0	6.0	23.96	0.166	0.667	2.00	12.00	7.824	0.35	2000	0.82	34.481	130.2	164.7	0.68	112.0	NOT O.K.
		2.0	3.0	4.5	15.50	0.166	0.667	2.01	8.29	5.061	0.35	2000	0.82	16.73	92.7	109.4	0.68	74.4	O.K.
		2.0	4.0	6.0	11.50	0.166	0.667	2.01	9.04	3.755	0.35	2000	0.82	16.55	90.1	106.7	0.68	72.5	O.K.
		3.0	3.0	4.5	17.00	0.166	0.667	2.00	9.25	5.551	0.35	2000	0.82	18.349	91.5	109.8	0.68	74.7	O.K.
		3.0	4.0	6.0	12.50	0.166	0.667	2.00	9.98	4.082	0.35	2000	0.82	17.989	89.0	107.0	0.68	72.7	O.K.
		4.0	4.0	6.0	13.50	0.166	0.667	1.99	10.96	4.408	0.35	2000	0.82	19.428	87.7	107.1	0.68	72.9	O.K.
		5.0	3.0	4.5	19.50	0.166	0.667	2.00	11.25	6.367	0.35	2000	0.82	21.047	87.3	108.3	0.68	73.7	O.K.
		5.0	4.0	6.0	14.50	0.166	0.667	2.00	12.00	4.735	0.35	2000	0.82	20.867	86.3	107.2	0.68	72.9	O.K.