डेडीकेटेड फ्रेट कोरीडोर

DESIGN AND CONSTRUCTION OF CIVIL, STRUCTURES AND TRACK WORKS FOR SINGLE LINE RAILWAY INVOLVING FORMATION IN EMBANKMENTS/CUTTINGS, BALLAST ON FORMATION, TRACK WORKS, BRIDGES, STRUCTURES, BUILDINGS, YARDS, INTEGRATION WITH IR EXISTING RAILWAY SYSTEM AND TESTING & COMMISSIONING ON DESIGN-BUILD LUMP SUM BASIS FOR SAHNEWAL - PILKHANI SECTION OF EASTERN DEDICATED FREIGHT CORRIDOR

Contract Package: 301

ICB No. HQ/EN/EC/D-B/SAHNEWAL - PILKHANI

PART - 4 - REFERENCE DOCUMENT

GEO TECH DATA - VOLUME - 3

SAHNEWAL TO PILKHANI

From Km. 360.200 to Km. 187.500

GEO TECH DATA

YAMUNA RIVER

VOL 7/7

EMPLOYER

DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LIMITED

(A GOVERNMENT OF INDIA ENTERPRISES)

MINISTRY OF RAILWAYS

COUNTRY : INDIA

Yamuna River		
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PREFACE

This volume contains the report on detailed geotechnical investigation work for bridge on river Yamuna on the Dedicated Freight Corridor alignment.

CONTENTS

1. INTRODUCTION

Dedicated Freight Corridor Corporation India Limited (A Govt. of India Enterprise),Ambala awarded the Geotechnical investigation work along with preparation of GADs for 3 river locations vide their letter no.-UMB/EN/Tender.GI dated -04.08.2012 to M/S Arkitechno Consultants (India) Pvt. Ltd., Bhubaneswar. On receipt of the work order, ATCPL mobilized required resources at the site and carried out necessary field works. The samples collected during the field tests were sent to the testing laboratory of ATCPL of Bhubaneswar for testing.

2. SITE DESCRIPTION

The project site is located in the state of Haryana.

The project site is located in Zone-IV of Seismic zone of India as specified in IS-1893(PT-1).

3. METHODOLOGY OF INVESTIGATION

The geotechnical Investigation work broadly encompasses the following activities:-

Making boreholes, at specified locations, conducting SPT & collecting samples there form.

- Conducting various laboratory tests on samples to assess their physical/engineering properties.
- Tabulation of all observations made at the site as well as during laboratory tests in standard format.
- Analysis of observations / test results.

4. SUMMARY OF FIELD WORK

4.1 Exploratory boreholes have been drilled at the following locations & their details are presented in Appendix-1 of this report.

Table No.- 1- Borehole location and depth

Borehole No's	Depth of Boring (m)
Yamuna River	
BH-1(A2)	50.0
BH-2(P4)	50.0
BH-3(P5)	50.0
BH-4(A1)	50.0
BH-5(P6)	50.0
BH-6(P3)	50.0
BH-7(P2)	50.0
BH-8(P1)	50.0

5. SUMMARY OF LABORATORY TESTS

Soil samples have been tested for various properties as per the provision of latest versions of I.S. codes. The particular of tests are presented in Table 2 of this report.

Table no-2

SL. NO.	PARTICULARS OF TEST	IS CODE REFERENCE
FOR SOIL SAMPLE		
1.	Natural Moisture Content & Bulk Density	IS 2720 (Part - 7)
2.	Grain Size Analysis (Sieve)	IS 2720 (Part - 4)
3.	Liquid Limit and Plastic Limits	IS 2720 (Part - 5)
4.	Hydrometer Analysis	IS 2720 (Part -4)
5.	Specific Gravity	IS 2720 (Part -3)
6.	Direct Shear Test	IS 2720 (Part -13)
7.	Triaxial Shear Test	IS 2720 (Part -11)
8.	Shrinkage Limit	IS 2720 (Part -6)
9.	Free Swell Index	IS 2720 (Part - 40)
10.	Unconfined compressive strength of soil	IS 2720 (Part-10)
11.	Swell Pressure	IS 2720 (Part-40)
12.	Consolidation	IS 2720 (Part-15)

Summary of laboratory tests done on Soil samples are presented below in table no-3.

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-1(Yamuna River-Ambala)	1.5	SPT	1.81	1.61	12.27	0	82.57	17.43		14	NP	_	SM	Fine Sand	2.65	_	Nil	_	_	_	_	_	_	
	3.0	SPT	1.82	1.63	11.61	0	91.03	8.97		15	NP	_	SM		2.64	_	Nil	_	_	_	_	_	_	
	4.5	SPT	1.82	1.63	11.72	0	89.25	10.75		15	NP	_	SM		2.64	_	Nil	_	_	_	_	_	_	
	6.0	SPT	1.83	1.63	12.49	0	85.39	14.61		14	NP	_	SM		2.65	_	Nil	_	_	_	_	_	_	
	10.5	SPT	1.84	1.64	11.96	0	88.84	11.16		15	NP	_	SM		2.64	_	Nil	_	_	_	_	_	_	
	13.5	SPT	1.86	1.66	12.35	9.19	77.34	13.47		15	NP	_	SM	Fine Sand with Gravel	2.65	_	Nil	_	_	_	_	_	_	
	16.5	SPT	1.88	1.68	12.16	8.94	78.62	12.44		16	NP	_	SM		2.64	_	Nil	_	_	_	_	_	_	0.575
	18.0	SPT	1.84	1.65	11.58	0	86.19	13.81		14	NP	_	SM	Fine sand	2.64	_	Nil	_	_	_	_	_	_	
	21.0	SPT	1.86	1.67	11.44	0	87.06	12.94		15	NP	_	SM		2.65	_	Nil	_	_	_	_	_	_	
	22.5	SPT	1.89	1.68	12.60	9.87	76.83	13.3		14	NP	_	SM	Fine Sand with Gravel	2.64	_	Nil	_	_	_	_	_	_	0.573
	27.0	SPT	1.9	1.71	11.34	10.65	76.54	12.81		14	NP	_	SM		2.64	_	Nil	_	_	_	_	_	_	0.547
	30.0	SPT	2.02	1.76	14.91	17.82	12.43	13.26	56.49	37	16	21	CI	Clay with Gravel	2.7	6.83	22	0.36	_	_	_	_	_	0.536
	36.0	SPT	2.04	1.76	15.76	18.57	12.81	14.58	54.04	36	15	21	CI		2.71	_	23	0.38	_	_	_	_	_	0.538
	37.5	SPT	2.09	1.74	20.17	0.56	1.08	18.94	79.42	40	18	22	CI	Clay	2.67	8.31	27	0.43	_	_	_	_	_	0.535
	39.0	SPT	2.06	1.83	12.50	10.94	78.29	10.77		15	NP	_	SM	Fine Sand with Gravel	2.64	_	Nil	_	_	_	_	_	_	0.442
	40.5	SPT	2.09	1.86	12.08	10.41	76.53	13.06		14	NP	_	SM		2.65	_	Nil	_	_	_	_	_	_	0.421
	43.5	SPT	1.99	1.79	11.23	0	84.3	15.7		15	NP	_	SM	Fine Sand	2.64	_	Nil	_	_	_	_	_	_	0.476
	45.0	SPT	2.00	1.79	11.49	0	84.51	15.49		15	NP	_	SM		2.65	_	Nil	_	_	_	_	_	_	0.477
	48.0	SPT	1.98	1.77	11.81	11.42	76.48	12.1		14	NP	_	SM	Fine Sand with Gravel	2.65	_	Nil	_	_	_	_	_	_	0.496
	50.0	SPT	1.98	1.78	11.53	10.86	77.35	11.79		15	NP	_	SM		2.64	_	Nil	_	_	_	_	_	_	0.487

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-2(Yamuna River-Ambala)	1.5	SPT	1.81	1.61	12.41	0	73.23	26.77		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	_
	3.0	SPT	1.81	1.63	11.29	0	73.39	26.61		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	_
	4.5	SPT	1.82	1.63	11.72	0	75.18	24.82		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	_
	6.0	SPT	1.81	1.61	12.16	0	77.36	22.64		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	_
	7.5	SPT	1.82	1.63	11.65	0	78.45	21.55		14	NP	_	SM		2.64	_	_	_	_	_	_	_	_	_
	12.0	SPT	1.87	1.68	11.27	9.95	78.16	11.89		15	NP	_	SM	Fine Sand with Gravel	2.65	_	_	_	_	_	_	_	_	0.577
	15.0	SPT	1.83	1.63	12.06	0	74.68	25.32		16	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	_
	19.5	SPT	1.85	1.65	11.95	0	73.52	26.48		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	_
	21.0	SPT	1.88	1.69	11.34	11.75	77.28	10.97		15	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	0.563
	27.0	SPT	1.89	1.69	11.80	10.69	79.04	10.27		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.568
	28.5	SPT	2.01	1.74	15.37	14.28	13.29	14.18	58.25	37	17	20	CI	Clay with Gravel	2.71	6.93	22	_	_	_	_	_	_	0.555
	31.5	SPT	2.03	1.77	14.89	12.74	9.58	16.53	61.15	39	18	21	CI		2.71	_	21	0.37	_	_	_	_	_	0.534
	33.0	SPT	2.04	1.77	15.12	15.07	11.42	14.74	58.77	37	16	21	CI		2.7	_	22	0.38	_	_	_	_	_	0.524
	34.5	SPT	2.04	1.69	20.40	0	1.65	17.27	81.08	43	20	23	CI	Clay	2.67	8.34	24	0.41	_	_	_	_	_	0.576
	36.0	SPT	2.03	1.69	19.88	0	1.89	18.4	79.71	41	19	22	CI		2.68	_	25	0.42	_	_	_	_	_	0.583
	37.5	SPT	2.13	1.91	11.52	0	82.14	17.86		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	0.382
	39.0	SPT	2.05	1.83	12.26	0	83.52	16.48		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.451
	42.0	SPT	2.07	1.85	12.03	9.78	74.51	15.71		16	NP	_	SM	Fine Sand with Gravel	2.65	_	_	_	_	_	_	_	_	0.434
	46.5	SPT	2.16	1.93	11.83	11.47	75.82	12.71		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	0.367
	50.0	SPT	2.19	1.97	11.38	10.59	77.75	11.66		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.348

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-3(Yamuna River Ambala	1.5	SPT	1.8	1.62	11.28	0	81.64	18.36		15	NP	_	SM	Fine Sand	2.65	_	_	_	_	_	_	_	_	_
	3.0	SPT	1.81	1.61	12.15	0	80.28	19.72		16	NP	_	SM		2.64	_	_	_	_	_	_	_	_	_
	4.5	SPT	1.82	1.62	12.09	0	83.51	16.49		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	_
	6.0	SPT	1.82	1.63	11.54	0	81.62	18.38		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	_
	9.0	SPT	1.85	1.64	13.01	9.3	76.38	14.32		15	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	_
	10.5	SPT	1.86	1.65	12.68	10.21	76.92	12.87		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	_
	13.5	SPT	1.88	1.67	12.3	9.87	74.57	15.56		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	0.577
	16.5	SPT	1.83	1.65	11.21	0	81.49	18.51		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	_
	18.0	SPT	1.84	1.65	11.34	0	83.53	16.47		14	NP	_	SM		2.64	_	_	_	_	_	_	_	_	_
	22.5	SPT	1.90	1.70	12.05	12.33	71.64	16.03		15	NP	_	SM	Fine Sand with Gravel	2.65	_	_	_	_	_	_	_	_	0.563
	24.0	SPT	1.84	1.65	11.47	0	81.91	18.09		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	_
	25.5	SPT	1.85	1.66	11.73	0	84.17	15.83		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	_
	28.5	SPT	2.11	1.73	21.62	0	1.63	19.04	79.33	43	20	23	CI	Clay	2.67	9.32	24	0.38	_	_	_	_	_	0.54
	30.0	SPT	2.12	1.75	20.97	0	1.39	18.28	80.33	42	20	22	CI		2.67	8.96	26	0.41	_	_	_	_	_	0.52
	31.5	SPT	1.99	1.79	11.38	11.28	76.25	12.47		15	NP	_	SM	Fine Sand with Gravel	2.65	_	_	_	_	_	_	_	_	0.48
	37.5	SPT	2.04	1.79	14.18	18.42	12.32	13.61	55.65	37	15	22	CI	Clay with Gravel	2.71	4.37	22	0.44	_	_	_	_	_	0.52
	39.0	SPT	2.06	1.79	15.09	16.94	11.83	13.44	57.79	38	17	21	CI		2.72	3.81	23	0.45	_	_	_	_	_	0.52
	40.5	SPT	1.99	1.77	12.51	9.75	75.12	15.13		15	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	0.49
	43.5	SPT	1.96	1.75	11.94	0	82.3	17.70		16	NP	_	SM	Fine Sand	2.65	_	_	_	_	_	_	_	_	0.51
	45.0	SPT	1.99	1.78	11.57	10.54	77.36	12.10		14	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	0.48
	48.0	SPT	1.99	1.78	11.62	11.06	75.89	13.05		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	0.48

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-4(Yamuna River-Saharanpur)	1.5	SPT	1.81	1.62	12.05	0	84.62	15.38		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	
	3.0	SPT	1.82	1.63	11.82	0	87.31	12.69		14	NP	_	SM		2.65	_	_	_	_	_	_	_	_	
	4.5	SPT	1.82	1.63	11.6	0	84.34	15.66		15	NP	_	SM		2.64	_	_	_	_	_	_	_	_	
	6.0	SPT	1.83	1.63	12.14	0	85.96	14.04		14	NP	_	SM		2.64	_	_	_	_	_	_	_	_	
	7.5	SPT	1.85	1.66	11.26	8.99	78.62	12.39		16	NP	_	SM	Fine Sand with Gravel	2.65	_	_	_	_	_	_	_	_	
	10.5	SPT	1.86	1.67	11.35	9.52	75.18	15.30		15	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.59
	15.0	SPT	1.83	1.63	12.28	0	82.07	17.93		16	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	
	18.0	SPT	1.85	1.65	12.17	0	83.4	16.60		15	NP	_	SM		2.65	_	_	_	_	_	_	_	_	
	21.0	SPT	1.87	1.67	11.92	10.68	79.13	10.19		14	NP	_	SM	Fine Sand with Gravel	2.65	_	_	_	_	_	_	_	_	0.59
	24.0	SPT	1.86	1.67	11.53	0	86.37	13.63		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	
	27.0	SPT	1.88	1.67	12.44	11.69	74.81	13.50		14	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	0.58
	28.5	SPT	1.89	1.70	11.38	10.54	74.48	14.98		16	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.56
	30.0	SPT	2.02	1.72	17.52	21.93	13.11	12.97	51.99	38	16	22	CI	Clay with Gravel	2.71	6.43	15	0.44	_	_	_	_	_	0.58
	33.0	SPT	2.03	1.74	16.45	19.22	11.43	13.6	55.75	40	18	22	CI		2.72	6.58	18	0.45	_	_	_	_	_	0.56
	34.5	SPT	1.98	1.76	12.63	9.86	78.42	11.72		14	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	0.50
	36.0	SPT	1.99	1.77	12.48	10.15	76.91	12.94		15	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.50
	37.5	SPT	1.85	1.66	11.32	0	84.24	15.76		15	NP	_	SM	Fine Sand	2.64	_	_	_	_	_	_	_	_	
	40.5	SPT	2.13	1.76	21.22	0	1.85	18.96	79.19	42	19	23	CI	Clay	2.66	8.73	25	0.48	_	_	_	_	_	0.51
	42.0	SPT	2.14	1.85	15.67	17.57	13.18	14.01	55.24	38	17	21	CI	Clay with Gravel	2.71	7.84	23	0.48	_	_	_	_	_	0.46
	46.5	SPT	2.09	1.88	11.31	11.32	76.59	12.09		16	NP	_	SM	Fine Sand with Gravel	2.64	_	_	_	_	_	_	_	_	0.41
	50.0	SPT	2.10	1.88	11.5	10.28	77.05	12.67		15	NP	_	SM		2.65	_	_	_	_	_	_	_	_	0.41

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-5 (Yamuna River)	1.5	SPT	1.78	1.66	7.36	1.73	81.62	16.65		18	NP	_	SM	Fine Sand	2.48									0.50
	3.0	SPT	1.78	1.67	6.83	1.81	85.43	12.76		16	NP	_	SM											
	4.5	SPT	1.78	1.66	7.28	2.23	84.74	13.03		16	NP	_	SM		2.51									
	6.0	SPT	1.86	1.72	8.16	1.97	83.61	14.42		15	NP	_	SM											
	9.0	SPT	1.81	1.68	7.93	1.86	82.73	15.41		19	NP	_	SM											
	13.5	SPT	1.87	1.75	6.64	11.73	78.26	10.01		17	NP	_	SW-SM	Fine Sand With Gravel	2.53									0.44
	16.5	SPT				14.21	76.54	9.25																
	18.0	SPT	1.84	1.65	11.28	2.26	86.73	11.01		16	NP	_	SW-SM	Fine Sand										
	22.5	SPT				16.73	82.73	0.54		18	NP	_	SP	Fine Sand With Gravel										
	24.0	SPT	1.88	1.67	12.26	3.81	84.64	11.55		16	NP	_	SW-SM	Fine Sand	2.51									0.50
	30.0	SPT				14.86	81.73	3.41		16	NP	_	SP	Fine Sand With Gravel										
	33.0	SPT	1.98	1.67	18.79	10.36	31.35	58.29		31	16	15	CL	Clay With Gravel	2.68	4.26	10	4.22						0.61
	39.0	SPT				8.73	28.24	14.81	48.22	37	18	19	CI			6.81	18							
	42.0	SPT	1.87	1.70	9.73	3.26	71.28	16.74	8.72	18	NP	_	SM	Fine Sand With Gravel	2.54									0.49

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-6 (Yamuna River)	1.5	SPT	1.68	1.58	6.43	1.59	82.71	15.70		16	NP	_	SM	Fine Sand										
	3.0	SPT	1.76	1.64	7.64	2.04	81.93	16.03		18	NP	_	SM		1.52									
	4.5	SPT	1.78	1.65	7.81	1.76	84.16	14.08							1.52									
	6.0	SPT	1.78	1.65	8.05					19	NP	_												
	7.5	SPT				1.92	82.87	15.21		18	NP	_	SM		1.55									
	13.0	SPT				13.24	77.59	9.17		17	NP	_	SW-SM	Fine Sand With Gravel										
	15.0	SPT	1.86	1.73	7.39	12.68	78.37	8.95		18	NP	_	SW-SM		1.58									
	18.0	SPT				1.64	83.50	14.86		18	NP	_	SM	Fine Sand										
	21.0	SPT				1.83	82.49	15.68		18	NP	_	SM											
	30.0	SPT	1.97	1.66	18.56	9.86	30.97	59.17		32	16	16	CL	Clay With Gravel	1.57	4.21		4.31						
	33.0	SPT	1.99	1.67	19.04	10.25	29.14	14.57	46.04	31	15	16	CL				18	4.66						
	39.0	SPT				2.13	82.46	15.41		19	NP	_	SM	Fine Sand										
	42.0	SPT				1.96	83.61	14.43		18	NP	_	SM											

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-7 (Yamuna River)	1.5	SPT	1.73	1.61	7.32	1.84	85.73	12.43		19	NP	_	SM	Fine Sand	1.53									
	3.0	SPT				2.26	83.51	14.23		19	NP	_	SM											
	4.5	SPT	1.79	1.67	6.89	1.98	84.74	13.28		18	NP	_	SM		1.54									
	6.0	SPT	1.78	1.66	7.51	2.41	81.56	16.03		18	NP	_	SM											
	9.0	SPT				2.85	79.22	17.93		19	NP	_	SW-SM		1.54									
	12.0	SPT	1.88	1.77	6.44	14.71	76.56	8.73		16	NP	_	SW-SM	Fine Sand With Gravel										
	15.0	SPT				16.28	78.53	5.19		15	NP	_	SW-SM		1.63									
	18.0	SPT				3.46	81.43	15.11		19	NP	_	SM	Fine Sand										
	21.0	SPT	1.89	1.76	7.44	1.81	83.51	14.68		19	NP	_	SM		1.54									
	24.0	SPT				12.44	81.73	5.83		16	NP	_	SW-SM	Fine Sand With Gravel										
	33.0	SPT	1.98	1.67	18.71	8.51	19.77	18.48	53.24	38	18	20	CI	Clay With Gravel				3.88						
	36.0	SPT	1.88	1.74	8.21	11.28	78.93	9.79		18	NP	_	SW-SM	Fine Sand With Gravel	1.58									
	42.0	SPT	1.91	1.75	9.44	3.76	87.53	8.71		18	NP	_	SW-SM	Fine Sand										

SUMMERY SHEET RESULTS LABORATORY TEST OF SOIL SAMPLE (TABLE NO.-3)

Bore Hole No	Depth (m)	Type of Sample	Density		Natural Moisture Content (%)	Gradation				Consistency			Soil		Specific gravity	Shrinkage Limit (%)	Free Swell Index (%)	Unconfined Compressive Strength (kg/cm^2)	SHEAR PARAMETERS			One Dimensional Consolidation Test		Void Ratio
			Bulk Density (gm/cc)	Dry Density (gm/cc)		Gravel content (%)	Sand Content (%)	Silt content (%)	Clay content (%)	LL (%)	PL (%)	PI (%)	IS Classification	Description					TYPE OF TEST	Cohesion (Kg/cm2)	Angle of internal Friction (Degree)	C_c	C_v (cm^2/min)	
BH-8 (Yamuna River)	1.5	SPT	1.89	1.76	7.48	1.65	84.61	13.74		16	NP	_	SM	Fine Sand	1.55									
	3.0	SPT				1.48	82.97	15.55		19	NP	_	SM											
	4.5	SPT	1.81	1.66	8.92	1.92	84.32	13.76		16	NP	_	SM											
	6.0	SPT				2.07	83.38	14.55							1.56									
	10.5	SPT	1.86	1.75	6.42	12.29	78.14	9.57		18	NP	_	SW-SM	Fine Sand With Gravel										
	12.0	SPT	1.89	1.76	7.37	13.48	80.74	5.78		16	NP	_	SW-SM		1.61									
	15.0	SPT	1.89	1.75	8.01																			
	18.0	SPT				14.56	76.88	8.56		16	NP	_	SW-SM		1.61									
	21.0	SPT	1.96	1.83	7.17	11.87	79.15	8.98		16	NP	_	SW-SM	Fine Sand With Gravel										
	24.0	SPT				12.61	80.06	7.33		16	NP	_												
	27.0	SPT	1.98	1.85	6.89	12.95	78.83	8.22							1.58									
	30.0	SPT	1.98	1.66	18.92	7.98	19.81	18.75	53.46	39	18	21	CI	Clay With Gravel			15	3.86						
	36.0	SPT				13.22	77.14	9.64		18	NP	_	SW-SM	Fine Sand With Gravel										
	42.0	SPT	1.98	1.82	8.83	1.66	81.73	16.61		19	NP	_	SM	Fine Sand	1.56									

6. DESCRIPTION OF FIELD AND LABORATORY TESTS DONE AND DATA OBTAINED.

6.1 Standard Penetration Tests (SPT)

Standard Penetration Tests (SPT) is conducted at different depths in these boreholes. SPT split spoon sampler of standard dimensions was driven into the soil from the borehole bottom at the depth of testing using 63.5 kg hammer falling from 75 cm height. The SPT weight was manually lifted to the specified height and allowed to fall freely on the anvil with the use of cathead winch with one to one and half turn of the drum. In this ways the number of blows required to penetrate the last two 15cm penetration is considered as "N" values. Blow count for the penetration of every 15cm was recorded and the N is reported as the blow count for 30cm penetration of the sampler leaving the first 15cm penetration as seating drive. When the number of blows exceeded 50 to penetrate the first or second 15cm length of the sampler, the SPT N is regarded as more than 100 as described in IS2131-1981.The test is terminated in such case and a record of penetration of the sampler under 50 blows is made.SPT refusal is recorded when there is no penetration of the sampler at any stage and also when a rebound of the sounding system is recorded. These tests were conducted at close intervals of 1.5m at various depths so that a continuous SPT N profile is available.

6.2 Laboratory tests on soil sample

6.2.1 Bulk Density

Bulk densities of soil samples are determined as per I.S 2720 (Part-9).

The in-situ bulk unit weight and dry unit weight of a soil sample is determined from the SPT sample collected from the site. It is the ratio of mass & volume. As per IS-2720 (Pt-II), the moisture content of the samples is determined.

Standard penetration tests have been conducted in bore hole locations at various depth. Split spoon samplers were used in SPT tests. The samples obtained from split spoon samplers were subjected to bulk unit weight and moisture content determination tests.

6.2.2 Natural moisture content

Moisture content of a soil is the ratio of the weights of water to the weight of dry soil. It is usually expressed as a percentage. Water content of samples collected from pits was determined as per procedure laid down in the I. S. 2720 (Part – 9). The data have been presented in the Laboratory Investigation Sheets.

6.2.3 Grain size analysis

The soil aggregate comprises of particles of different sizes in the different proportion. For classification of soil met at various depths of the boreholes, grain size analysis was conducted as per I.S 2720 (Part-4). The test results are enclosed in this report as summery of the laboratory test.

6.2.4 Hydrometer analysis

The tests have been conducted to determine the particle size distribution of soil particles. The tests have been conducted as per guidelines of IS 2720 (Part – 4). The detail procedure has been elaborated in IS: 2720(Part-4) and the test results are enclosed in this report.

6.2.5 Liquid limit, Plastic limits & Plastic index

This test is conducted to determine the consistency behavior of soil. The detail procedure has been elaborated in IS: 2720(Part -5).120g of soil sample is taken and passing it through 425 micron sieve. Thoroughly mix the soil sample with water in the evaporating dish. Place a portion of the paste in the cup of the device. & Squeeze to about 1cm at the point of maximum thickness. Cut the groove using the grooving tool. Operate the device by turning the crank at the rate of two revolutions /sec .The specimens shall be of such consistency that the number of drops required to close the groove shall be between 15 & 35 & the points on the flow curve are evenly distributed in this range.

For determination of plastic limit of soil samples, about 20g of soil sample is taken and passing it through 425 micron sieve. Then the soil sample is mix with distilled water and a soil mass is obtained. The soil mass is rolled in between the figure till the threads are 3mm diameter. At this stage soil is crumbled & reaches its plasticity. From this crumble piece water content is determined which represents the plastic limit of the sample.

6.2.6 Specific gravity

Specific gravity of the soil was determined as per I. S. (Part – 3). Values of the specific gravity of samples obtained during tests have been reported in the Laboratory Investigation Sheets.

6.2.7 Free swell index of soil

Free swell index is conducted to determine the free swell index of soil. The test is conducted as per IS 2720(Part-40). 2x10gms of oil sample taken in a two different graduated glass tube. One of the samples is filled with distilled water and another is filled with kerosene up to 60ml. & then it is allowed to attain equilibrium state of volume without change in the volume of soil. It is calculated as follows:

Free swell index, Percent $= \frac{V_{d-V_k}}{Vk} \times 100$,

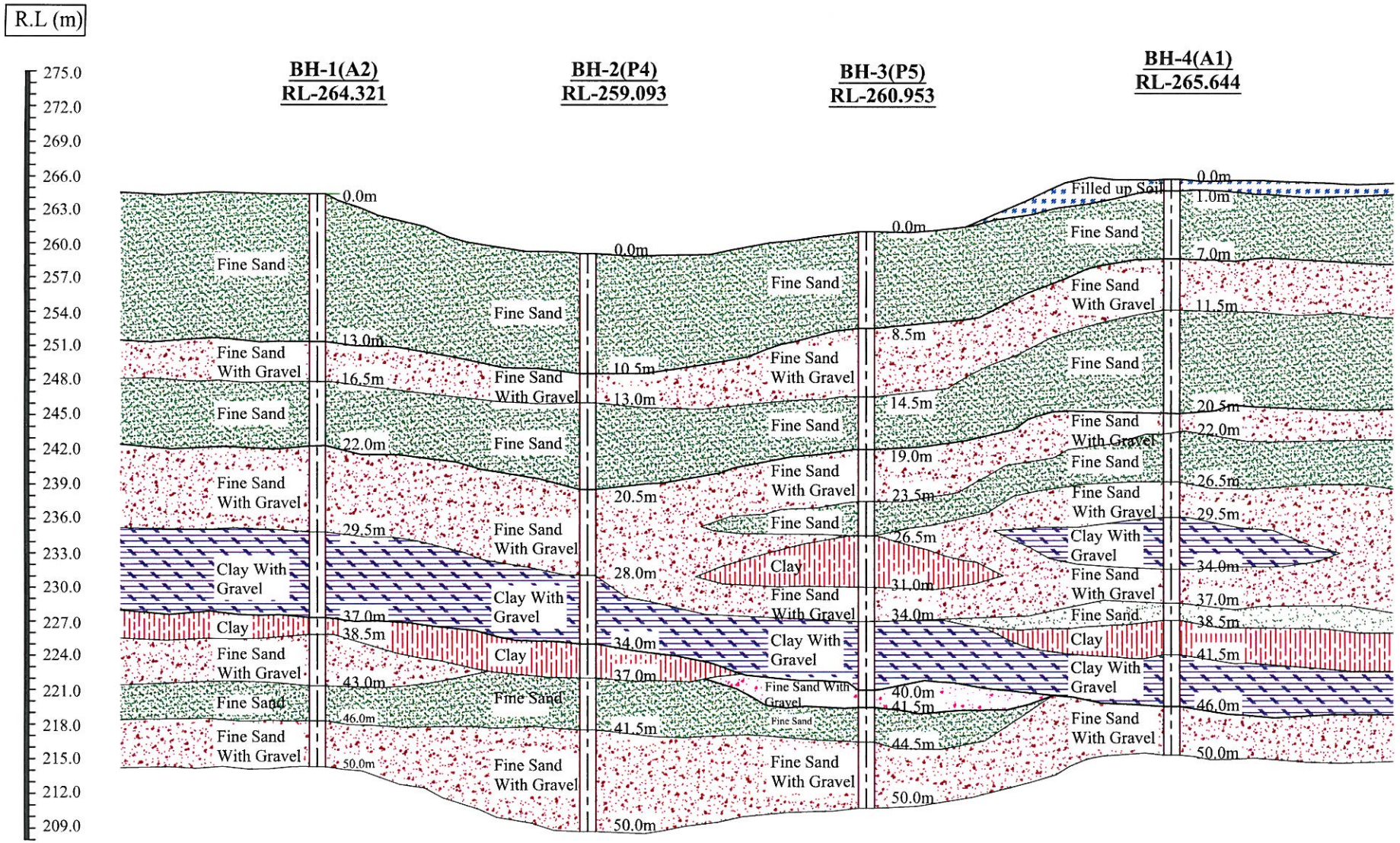
Where Vd = Volume of soil in water, Vk = Volume of soil in Kerosene.

7. Analysis of Results

a. Sub soil profile

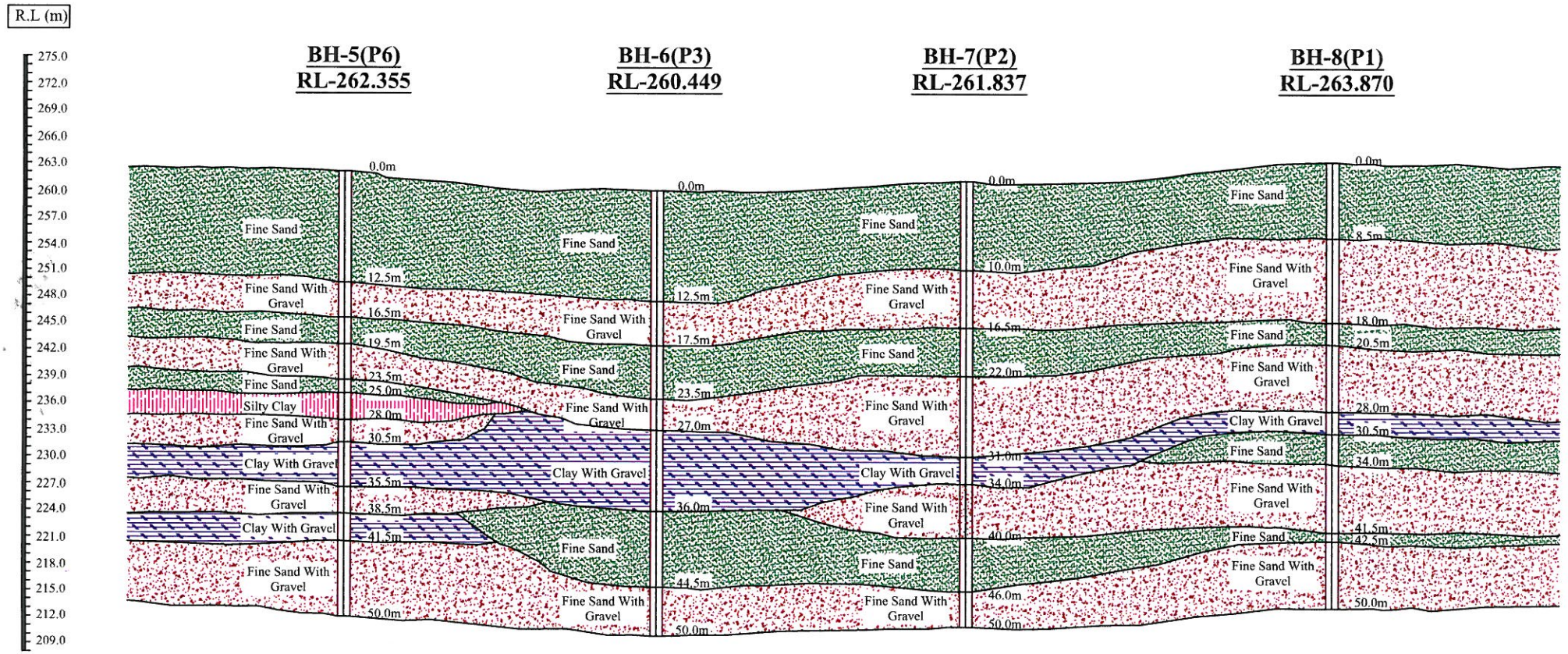
Considering the bore log details of all boreholes, the sub-soil strata at proposed sites are presented in Fig no.-1.

b. The soil profile as observed from the borelog details mainly consists mostly of sandy soil strata with clayey soil strata at certain locations. However no rock bed has been encountered within the depth of exploration.



SUB SOIL PROFILE OF YAMUNA RIVER

Fig No.-1(a)



SUB SOIL PROFILE OF YAMUNA RIVER
Fig No.-1(b)

c. Ground water table

Ground water table has been encountered at the boreholes within the depth of boring during the period of exploration. However, seasonal & annual variation in the ground water table may occur. The depth of ground water is presented in table no.4.

Table no. – 4

Yamuna River

Borehole No's	Termination Depth (m)	Depth of Ground Water Table from E.G.L (m)
BH-1(A2)	50.0	7.55
BH-2(P4)	50.0	0.10
BH-3(P5)	50.0	2.95
BH-4(A1)	50.0	4.25
BH-5(P6)	50.0	1.20
BH-6(P3)	50.0	1.50
BH-7(P2)	50.0	0.20
BH-8(P1)	50.0	0.40

8. DESIGN GEOTECHNICAL PARAMETER

The Design Geotechnical Parameters for all borehole locations have been arrived at by analyzing the subsoil profiles and the same are presented in Table no.-5.

DESIGN GEOTECHNICAL PARAMETERS

Table No.-5

Yamuna River

Reference Boreholes: BH-1(A2)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m^2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to 13.0m	16	-	32°	1
Layer-2	Fine Sand with gravel	13.0m to 22.0m	25**	-	35** (Restricted)	1
Layer-3	Fine Sand with gravel	22.0m to 29.5m	25**	-	35** (Restricted)	1
Layer-4	Clay with gravel	29.5m to 38.5m	41	20.00*	0	1
Layer-5	Fine Sand with gravel	38.5m to 50.0m	25**	-	35** (Restricted)	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-2(P4)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m^2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to10.5m	7	-	30	1
Layer-2	Fine sand with gravel	10.5m to28.0m	25**	-	35** (Restricted)	1
Layer-3	Clay with Gravel	28.0m to 34.0m	N>50	20.00*	0	1
Layer-4	Clay	34.0m to 37.0m	49	20.00*	0	1
Layer-5	Fine Sand	37.0m to 50.0m	23	-	34	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-3(P5)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m^2)	Angle of internal friction, Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to 8.5m	9	-	30	1
Layer-2	Fine Sand with Gravel	8.5m to 26.5m	25**	-	35 ** (Restricted)	1
Layer-3	Clay	26.5m to 31.0m	46	20.00*	0	1
Layer-4	Fine Sand with Gravel	31.0m to 34.0m	25**	-	35** (Restricted)	1
Layer-5	Clay with Gravel	34.0m to 40.0m	N>50	20.00*	0	1
Layer-6	Fine Sand with Gravel	40.0m to 50.0m	25**	-	35** (Restricted)	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-4(A1)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Filled up Soil	GL to 1.0m	-	-	-	1
Layer-2	Fine Sand with gravel	1.0m to 7.0m	14	-	32	1
Layer-3	Fine Sand with gravel	7.0m to 20.5m	24	-	35	1
Layer-4	Fine Sand with gravel	20.5m to 29.5m	25**	-	35** (Restricted)	1
Layer-5	Clay with Gravel	29.5m to 34.0m	N>50	20.00*	0	1
Layer-6	Fine Sand with gravel	34.0m to 38.5m	25**	-	35** (Restricted)	1
Layer-7	Clay with gravel	38.5m to 46.0m	N>50	20.00*	0	1
Layer-8	Fine Sand with Gravel	46.0m to 50.0m	25**	-	35** (Restricted)	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-5(P6)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to 12.5m	10	-	30	1
Layer-2	Fine Sand with gravel	12.5m to 25.0m	24	-	35	1
Layer-3	Silty Clay	25.0m to 28.0m	32	20.00*	-	1
Layer-4	Fine Sand with gravel	28.0 to 30.5m	25**	-	35** (Restricted)	1
Layer-5	Clay with Gravel	30.5m to 35.5m	N>50	20.00*	-	1
Layer-6	Fine Sand with gravel	35.5m to 38.5m	25**	-	35** (Restricted)	1
Layer-7	Clay with gravel	38.5m to 41.5m	25**	-	35** (Restricted)	1
Layer-8	Fine Sand with Gravel	41.5m to 44.5m	25**	-	35** (Restricted)	1
Layer-9	Fine Sand with Gravel	44.5m to 50.0m	25**	-	35** (Restricted)	1

Note: - *Cohesion has been restricted to $20t/m^2$.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-6(P3)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to 12.5m	9	-	30	1
Layer-2	Fine Sand with gravel	12.5m to 23.5m	25**	-	35** (Restricted)	1
Layer-3	Fine Sand with gravel	23.5m to 27.0m	25**		35** (Restricted)	1
Layer-4	Clay with Gravel	27.0m to 36.0m	N>50	20.00*	-	1
Layer-5	Fine Sand	36.0m to 46.0m	23	-	34	1
Layer-6	Fine Sand with gravel	46.0m to 50.0m	25**	-	35** (Restricted)	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-7(P2)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to 10.0m	9	-	30	1
Layer-2	Fine Sand with gravel	10.0m to 25.0m	25**	-	35 ** (Restricted)	1
Layer-3	Fine Sand with gravel	25.0m to 28.0m	25**	-	35** (Restricted)	1
Layer-4	Fine Sand with gravel	28.0m to 29.5m	25**	-	35** (Restricted)	1
Layer-5	Fine Sand with gravel	29.5m to 31.0m	25**	-	35** (Restricted)	1
Layer-6	Clay with Gravel	31.0m to 34.0m	N>50	20.00*	-	1
Layer-7	Fine Sand with gravel	34.0m to 47.5m	25**	-	35** (Restricted)	1
Layer-8	Fine Sand with gravel	47.5m to 50.0m	25**	-	35** (Restricted)*	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

Reference Boreholes: BH-8(P1)

Layer	Sub-strata	Depth below GL (m)	SPT 'N' value (Avg)	Cohesion, C (t/m2)	Angle of internal friction,Ø (degree)	Submerged density (t/m^3)
Layer-1	Fine Sand	GL to 8.5m	8	-	30	1
Layer-2	Fine Sand with gravel	8.5m to 28.0m	25**		35** (Restricted)	1
Layer-3	Clay with Gravel	28.0m to 30.5m	N>50	20.00*	-	1
Layer-4	Fine Sand	30.5m to 38.5m	25**	-	35** (Restricted)	1
Layer-5	Fine Sand with gravel	38.5m to 41.5m	25**	-	35** (Restricted)	1
Layer-6	Fine Sand	41.5m to 44.5m	25**	-	35** (Restricted)	1
Layer-7	Fine Sand with gravel	44.5m to 50.0m	25**	-	35** (Restricted)	1

Note:-* Cohesion has been restricted to 20t/m^2.

****The value of Ø has been restricted to 35° which corresponds to N value of 25.**

9. RECOMMENDED FOUNDATION STRUCTURE

9.1 Considering the presence of clay soil & sandy soil layers & heavy weight transmitted by the bridg structure, it is recommended to provide well foundations to support the abutment & piers.

9.2 It is recommended to provide 9.0m dia well foundation at these locations.

9.3 The safe bearing capacity (considering shear failure) & safe bearing pressure (considering 50 & 75mmsettlement) of the well foundation structure have been computed as per the recommendations of IS-6403-1981 & IS-8009(Pt-1)-1976.

9.4 However the designer may adopted suitable foundation system considering the requirements c superstructure.

10. WELL FOUNDATION

10.1.1. As per the directive from the client the soil samples obtained from boreholes drilled subsequently were given to M/s Dr. Ghuman and Gupta Geotech Consultants, Chandigarh for silt factor calculation .The reports presented by M/s Dr.Ghuman and Gupta Geotech Consultants, Chandigarh along with the copy of letter from the client dated-27.12.2013 are enclosed with this report vide appendix no-IV.

10.1.2 It is observed that silt factor data obtained from M/s Dr.Ghuman and Gupta Geotech Consultants do not cover all the borehole locations. In order to calculate the scour depth at the bridge site the minimum value of silt factor (0.71) as recommended by M/s Dr.Ghuman and Gupta Geotech Consultants has been adopted for calculation purposes in this report.

10.1.3 Considering the hydraulic data the maximum scour level has been found out & presented in table no.-6.In determination of SBC & SBP, soil strata in between EGL & maximum scour level has been taken to be ineffective.

Table No.-6

Yamuna River

Bore hole Location	Existing Ground Level(m)	Maximum Scour Depth(m)	Maximum Scour Level(m)
BH-1(A2)	264.321	18.54	252.91
BH-2(P4)	259.093	29.19	242.25
BH-3(P5)	260.953	29.19	242.25
BH-4(A1)	265.644	18.54	252.91
BH-5(P6)	262.355	29.19	242.25
BH-6(P3)	260.499	29.19	242.25
BH-7(P2)	261.837	29.19	242.25
BH-8(P1)	263.870	29.19	242.25

10.2 Determination of the depth of the well foundation has been done considering the criteria of provision of minimum grip length as per clause no-705-3.1 of IRC -78:2000.Acordingly the depth of well foundation satisfying these criteria shall be as follows-

Abutments -22.0m

Piers-32.0m

10.3 The SBC (shear failure) & SBP (50mm & 75mm settlement) for each location have been computed & Presented in table no.-7.

Table No.-7

Yamuna River

Location	E.G.L (m)	Founding Depth (m)	Founding RL(m)	Founding stratum	SBC (shear failure) (t/m2)	Safe Bearing Pressure Considering Settlement of	
						50mm (t/m^2)	75 mm (t/m^2)
BH-1(A2)	264.321	22.0	242.321	Fine sand With Gravel	264.87	30.65	45.97
BH-2(P4)	259.093	32.0	227.093	Clay With Gravel	71.46	32.61	48.92
BH-3(P5)	260.953	32.0	228.953	Fine Sand with Gravel	438.86	20.83	31.25
BH-4(A1)	265.644	22.0	243.644	Fine Sand With Gravel	298.61	29.32	43.97
BH-5(P6)	262.355	32.0	230.355	Clay With Gravel	67.58	22.88	34.31
BH-6(P3)	260.499	32.0	228.499	Clay With Gravel	69.85	32.55	48.82
BH-7(P2)	261.837	32.0	229.837	Clay With Gravel	68.20	35.84	53.76
BH-8(P1)	263.870	32.0	231.870	Fine Sand	260.49	38.82	58.23

11. RECOMMENDATIONS

Based on the field and laboratory investigations, the following recommendations are made.

11.1 The project area lies in the Zone-IV of the seismic zone as per IS.1893 (pt- 1):2002.

11.2 Depending on the sub-surface formation, it is proposed to provide well foundation for the superstructure. It is recommended to provide well of 9.0m dia at all locations.

11.3 The allowable Bearing Pressure considering shear failure & settlement of 50mm/75mm for each location have been computed & presented in table no.-8.

11.4 However the designer may adopt suitable parameters for design of foundation considering the super structure requirements and economy aspects.

Table No-8

Yamuna River

Location	E.G.L (m)	Founding Depth (m)	Founding RL(m)	Allowable Bearing Pressure Considering shear failure and Settlement of	
				50mm (t/m2)	75 mm (t/m2)
BH-1(A2)	264.321	22.0	242.321	30.0	45.0
BH-2(P4)	259.093	32.0	227.093	32.0	48.0
BH-3(P5)	260.953	32.0	228.953	20.0	31.0
BH-4(A1)	265.644	22.0	243.644	29.0	43.0
BH-5(P6)	262.355	32.0	230.355	22.0	34.0
BH-6(P3)	260.499	32.0	228.499	32.0	48.0

Location	E.G.L (m)	Founding Depth (m)	Founding RL(m)	Allowable Bearing Pressure Considering shear failure and Settlement of	
				50mm (t/m2)	75 mm (t/m2)
BH-7(P2)	261.837	32.0	229.837	35.0	53.0
BH-8(P1)	263.870	32.0	231.870	38.0	58.0

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Bhubaneswar.

12. REFERENCES

Sl No	Code No	Title
1	IS: 1498 - 1970	Classification and Identification of Soils for general Engineering Purposes.
2	IS: 1892 - 1979	Code of Practice for Subsurface Investigation for Foundation.
3	IS: 1893 (P-1) - 2002	Criteria for earthquake Resistant Design of Structures
4	IS: 2131-1991 reaffirmed 1997)	Method of Standard Penetration Test for Soils.
5	IS: 2720 (Relevant parts)	Method of Test for Soils (Relevant Parts).
6	IS: 6403-1981(Reaffirmed 1997)	Code of practice for determination of Bearing capacity of Shallow foundations.
7	IS: 8009 (Part-I)-1976	Code of practice for calculation of settlements of foundations.
8	IS: 4968 (Part-III)	Method for Subsurface Sounding for Soils - Static Cone Penetration Test.
9	IRC 78-2000	Standard Specifications Code of Practice for Road Bridges Section - VII
10		**Bowles, J.E,** Foundation Analysis and design, McGraw-Hill, New York.
11		**Nayak, N.V,** Foundation design manual, Dhanpat Rai Publications, New Delhi.
12		**Tomlinson**, M.J, Foundation Design and Construction, ELBS, 5TH edition.

Appendix -I

(Field Borelog Details and SPT 'N' Correction)

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 264.321
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 7.55
Bore Hole No	: BH-1(A2)	Date of commencement	: 04.10.12
Location	: Yamuna River, Near Abutment, Towards Ambala	Date of Completion	: 11.10.12
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50	Fine Sand		0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	3	4	5	9	15						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	5	5	6	11	15						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50			4.5	SPT	4	5	7	12	15						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	4	6	9	15	16						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	6	9	10	19	18						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	5	8	8	16	16						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	9	11	12	23	19						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50			12.0	SPT	8	10	15	25	19						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50	Fine Sand with Gravel		13.5	SPT	11	15	22	37	25						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50			15.0	SPT	15	19	23	42	26						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	14	22	29	51	29						Sample Collected

4684

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 264.321
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 7.55
Bore Hole No.	: BH-1(A2)	Date of commencement	: 04.10.12
Location	: Yamuna River, Near Abutment, Towards Ambala	Date of Completion	: 11.10.12
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
16.50	17.00	0.50			17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50			18.0	SPT	16	21	26	47	26						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50	Fine Sand		19.5	SPT	15	25	33	58	30						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50			21.0	SPT	16	23	39	62	32						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50			22.5	SPT	27	34	41	75	36						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50			24.0	SPT	24	40	43	83	37						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50			25.5	SPT	34	52	N>100 9cm Penetration								DS Taken
25.50	26.00	0.50	Fine Sand with Gravel		26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	30	39	46	85	35						Sample Collected
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50			28.5	SPT	42	63	N>100 4cm Penetration								DS Taken
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	19	23	26	49							Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50			31.0	DS											DS Taken
31.00	31.50	0.50			31.5	SPT	20	25	33	58							Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	18	30	39	69							Sample Collected
33.00	33.50	0.50	Clay with Gravel		33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken
34.00	34.50	0.50			34.5	SPT	23	34	45	79							Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	20	34	38	72							Sample Collected
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken

4685

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 264.321
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 7.55
Bore Hole No.	: BH-1(A2)	Date of commencement	: 04.10.12
Location	: : Yamuna River, Near Abutment, Towards Ambala	Date of Completion	: 11.10.12
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
37.00	37.50	0.50	Clay		37.5	SPT	15	24	30	54							Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50	Fine Sand with Gravel		39.0	SPT	21	34	40	74	29						Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50			40.5	SPT	30	39	48	87	32						Sample Collected
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50			42.0	SPT	43	N>100	9cm Penetration								DS Taken
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50	Fine Sand		43.5	SPT	25	34	42	76	29						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50			45.0	SPT	30	38	40	78	27						Sample Collected
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50	Fine Sand with Gravel		46.5	SPT	43	52	N>100 2cm Penetration								DS Taken
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	39	50	N>100 6cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	59	N>100	8cm Penetration								DS Taken

4636

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 259.093
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.10
Bore Hole No.	: BH-2(P4)	Date of commencement	: 04.10.12
Location	: : Yamuna River, Near Pier, Towards Ambala	Date of Completion	: 11.10.12
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corrected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50			0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	1	1	2	3	5						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	1	2	2	4	6						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50			4.5	SPT	2	2	4	6	7						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50	Fine Sand		5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	1	2	9	3	4						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	3	3	4	7	8						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	3	4	7	11	12						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	4	5	8	13	13						Sample Collected
10.50	11.00	0.50			11.0	SPT	9	14	19	33	24						Sample Collected
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50	Fine Sand with Gravel		12.0	SPT	13	18	26	44	28						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50			13.5	SPT	10	16	18	34	23						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50	Fine Sand		15.0	SPT	12	19	22	41	26						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	12	25	31	56	31						Sample Collected

4687

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 259.093	
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.10	
Bore Hole No	: BH-2(P4)	Date of commencement	: 04.10.12	
Location	: Yamuna River, Near Pier, Towards Ambala	Date of Completion	: 11.10.12	
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das	
Dia of Bore	: 150mm in soil			
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel			

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					Remarks
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corrected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
16.50	17.00	0.50	Fina Sand		17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50			18.0	SPT	17	29	38	67	34						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	10	30	32	62	32						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50	Fine Sand with Gravel		21.0	SPT	31	40	44	84	40						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50			22.5	SPT	36	49	N>100 10cm Penetration								DS Taken
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50			24.0	SPT	32	37	49	86	38						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50			25.5	SPT	29	35	38	73	33						Sample Collected
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	42	N>100	4cm Penetration								DS Taken
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50	Clay with Gravel		28.5	SPT	17	22	24	46							Sample Collected
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	21	27	39	66							Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50			31.0	DS											DS Taken

4688

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 259.093	
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.10	
Bore Hole No.	: BH-2(P4)	Date of commencement	: 04.10.12	
Location	: : Yamuna River, Near Pier, Towards Ambala	Date of Completion	: 11.10.12	
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das	
Dia of Bore	: 150mm in soil			
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel			

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corrected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
31.00	31.50	0.50	Clay with Gravel		31.5	SPT	16	29	43	72							Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	18	31	42	73							Sample Collected
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken
34.00	34.50	0.50	Clay		34.5	SPT	16	22	34	56							Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	13	18	25	43							Sample Collected
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50	Fine Sand		37.5	SPT	15	16	19	35	17						Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50			39.0	SPT	18	24	27	51	21						Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50			40.5	SPT	22	28	39	67	26						Sample Collected
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50	Fine Sand with Gravel		42.0	SPT	28	34	41	75	28						Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50			43.5	SPT	29	31	36	67	25						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50			45.0	SPT	38	45	N>100 3cm Penetration								DS Taken
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50			46.5	SPT	50	N>100	2cm Penetration								DS Taken
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	47	N>100	4cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	62	N>100	2cm Penetration								DS Taken

4689

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 260.953
roject	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 2.95
Bore Hole No.	: BH-3(P5)	Date of commencement	: 12.10.12
Location	: : Yamuna River, Near Pier, Towards Ambala	Date of Completion	: 15.10.12
ype of Boring	: Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	: 150mm in soil		
ype of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					Remarks
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50			0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	1	1	1	2	3						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	2	2	3	5	7						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50	Fine Sand		4.5	SPT	2	4	5	9	11						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	3	5	6	11	13						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	3	5	5	10	11						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	8	13	16	29	23						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	11	17	21	38	26						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50	Fine Sand with Gravel		12.0	SPT	14	19	24	43	27						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50			13.5	SPT	13	21	29	50	31						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50			15.0	SPT	11	16	16	32	22						Sample Collected
15.00	15.50	0.50	Fine Sand		15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	13	14	22	36	22						Sample Collected

4690

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 260.953
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 2.95
Bore Hole No.	: BH-3(P5)	Date of commencement	: 12.10.12
Location	: : Yamuna River, Near Pier, Towards Ambala	Date of Completion	: 15.10.12
Type of Boring	: Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
16.50	17.00	0.50			17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50	Fine Sand		18.0	SPT	16	19	28	47	26						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	25	31	40	71	36						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50			21.0	SPT	29	33	45	78	38						Sample Collected
21.00	21.50	0.50	Fine Sand with Gravel		21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50			22.5	SPT	27	39	51	90	41						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50			24.0	SPT	19	25	37	62	30						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50	Fine Sand		25.5	SPT	23	32	35	67	31						Sample Collected
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	12	19	24	43							Sample Collected
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50			28.5	SPT	15	22	25	47							Sample Collected
28.50	29.00	0.50	Clay		29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	13	21	29	50							Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50			31.0	DS											DS Taken
31.00	31.50	0.50			31.5	SPT	30	55	N>100 7cm Penetration								DS Taken
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50	Fine Sand with Gravel		33.0	SPT	37	69	N>100 4cm Penetration								DS Taken
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken

4691

Client	:	DFCC	Existing Ground Lvl. (RL in Mtr)	: 260.953
Project	:	G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 2.95
ore Hole No.	:	BH-3(P5)	Date of commencement	: 12.10.12
Location	:	Yamuna River, Near Pier, Towards Ambala	Date of Completion	: 15.10.12
Type of Boring	:	Rotary Drilling	Conducted By	: T.K Das
Dia of Bore	:	150mm in soil		
Type of Sampler used	:	UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
34.00	34.50	0.50	Clay with Gravel		34.5	SPT	20	31	38	69							Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	23	30	43	73							Sample Collected
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50			37.5	SPT	21	29	38	67							Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50			39.0	SPT	22	32	45	77							Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50	Fine Sand with Gravel		40.5	SPT	30	61	N>100 5cm Penetration								DS Taken
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50	Fine Sand		42.0	SPT	25	37	37	74	27						Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50			43.5	SPT	28	36	43	79	28						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50	Fine Sand with Gravel		45.0	SPT	39	56	N>100 7cm Penetration								DS Taken
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50			46.5	SPT	30	42	50	92	29						Sample Collected
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	44	69	N>100 4cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	59	N>100	7cm Penetration								DS Taken

4692

BORE LOG DETAILS

Client	:	DFCC	Existing Ground Lvl. (RL in Mtr)	:	265.644
Project	:	G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	:	4.25
Bore Hole No.	:	BH-4(A1)	Date of commencement	:	12.10.12
Location	:	Yamuna River, Near Abutment, Towards Saharanpur	Date of Completion	:	15.10.12
Type of Boring	:	Rotary Drilling	Conducted By	:	T.K Das
Dia of Bore	:	150mm in soil			
Type of Sampler used	:	UDS/Split spoon Sampler/Core barrel			

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50	Filled up Bricks		0.5												
0.50	1.00	0.50			1.0												
1.00	1.50	0.50	Fine Sand		1.5	SPT	2	3	3	6	10						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	4	5	7	12	16						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50			4.5	SPT	3	4	7	11	13						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	5	7	9	16	17						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50	Fine Sand with Gravel		7.5	SPT	10	13	17	30	24						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	12	18	19	37	27						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	15	15	20	35	25						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50	Fine Sand		12.0	SPT	11	13	16	29	21						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50			13.5	SPT	11	15	17	32	22						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50			15.0	SPT	13	16	20	36	24						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	10	19	21	40	24						Sample Collected

4693

Client	:	DFCC	Existing Ground Lvl. (RL in Mtr)	:	265.644
Project	:	G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	:	4.25
Bore Hole No.	:	BH-4(A1)	Date of commencement	:	12.10.12
Location	: :	Yamuna River, Near Abutment, Towards Saharanpur	Date of Completion	:	15.10.12
Type of Boring	:	Rotary Drilling	Conducted By	:	T.K Das
Dia of Bore	:	150mm in soil			
Type of Sampler used	:	UDS/Split spoon Sampler/Core barrel			

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
16.50	17.00	0.50	Fine Sand		17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50			18.0	SPT	14	23	26	49	27						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	16	21	30	51	28						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50	Fine Sand with Gravel		21.0	SPT	24	32	39	71	35						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50	Fine Sand		22.5	SPT	17	23	31	54	28						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50			24.0	SPT	19	28	40	68	32						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50			25.5	SPT	23	30	39	69	31						Sample Collected
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50	Fine Sand with Gravel		27.0	SPT	27	38	42	80	34						Sample Collected
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50			28.5	SPT	33	42	51	93	37						Sample Collected
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50	Clay with Gravel		30.0	SPT	21	26	32	58							Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50			31.0	DS											DS Taken
31.00	31.50	0.50			31.5	SPT	23	30	30	60							Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	20	32	33	65							Sample Collected
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken

4694

Client	:	DFCC	Existing Ground Lvl. (RL in Mtr)	:	265.644
Project	:	G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	:	4.25
Bore Hole No	:	BH-4(A1)	Date of commencement	:	12.10.12
Location	:	Yamuna River, Near Abutment, Towards Saharanpur	Date of Completion	:	15.10.12
Type of Boring	:	Rotary Drilling	Conducted By	:	T.K Das
Dia of Bore	:	150mm in soil			
Type of Sampler used	:	UDS/Split spoon Sampler/Core barrel			

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
34.00	34.50	0.50	Fine Sand With Gravel		34.5	SPT	29	38	41	79	28						Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	42	N>100	10cm Penetration								DS Taken
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50	Fine Sand		37.5	SPT	30	30	40	70	27						Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50	Clay		39.0	SPT	19	27	32	59							Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50			40.5	SPT	24	30	37	67							Sample Collected
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50	Clay with Gravel		42.0	SPT	29	36	40	76							Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50			43.5	SPT	25	33	39	72							Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50			45.0	SPT	29	37	42	79							Sample Collected
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50	Fine Sand with Gravel		46.5	SPT	38	58	N>100 6cm Penetration								DS Taken
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	69	N>100	9cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	61	N>100	7cm Penetration								DS Taken

4695

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 262.355
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 1.20
Bore Hole No	: BH-5(P6)	Date of commencement	: 24.04.2013
		Date of Completion	: 27.04.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50			0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	1	1	1	2	3						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	1	1	2	3	4						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50			4.5	SPT	1	2	3	5	6						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	2	3	3	6	6						Sample Collected
6.00	6.50	0.50	Fine Sand		6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	2	4	6	10	11						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	3	7	12	19	17						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	3	9	12	21	17						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50			12.0	SPT	9	15	17	32	22						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50			13.5	SPT	8	21	22	43	26						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50	Fine Sand with Gravel		15.0	SPT	12	13	19	32	21						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	13	18	18	36	22						Sample Collected

4696

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 262.355
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 1.20
Bore Hole No.	: BH-5(P6)	Date of commencement	: 24.04.2013
		Date of Completion	: 27.04.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
16.50	17.00	0.50	Fine Sand		17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50			18.0	SPT	11	13	15	28	18						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	13	14	17	31	19						Sample Collected
19.50	20.00	0.50	Fine Sand with Gravel		20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50			21.0	SPT	12	25	28	53	27						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50			22.5	SPT	16	37	45	82	38						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50	Fine Sand		24.0	SPT	11	24	32	56	27						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50	Silty Clay		25.5	SPT	8	15	19	34							Sample Collected
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	11	15	16	31							Sample Collected
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50	Fine Sand With Gravel		28.5	SPT	12	27	40	67	29						Sample Collected
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	19	40	52	92	36						Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50	Clay with Gravel		31.0	DS											DS Taken
31.00	31.50	0.50			31.5	SPT	13	23	30	53							Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	15	21	34	55							Sample Collected
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken
34.00	34.50	0.50			34.5	SPT	12	25	29	54							Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 262.355
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 1.20
Bore Hole No.	: BH-5(P6)	Date of commencement	: 24.04.2013
		Date of Completion	: 27.04.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
35.50	36.00	0.50	Fine Sand with Gravel		36.0	SPT	32	59	7cm Penetration N>100								DS Taken
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50			37.5	SPT	28	63	5cm Penetration N>100								DS Taken
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50	Clay with Gravel		39.0	SPT	15	25	32	57							Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50			40.5	SPT	19	29	31	60							Sample Collected
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50	Fine Sand with Gravel		42.0	SPT	17	33	42	75	27						Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50			43.5	SPT	29	39	53	92	30						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50			45.0	SPT	30	51	9cm Penetration N>100								DS Taken
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50			46.5	SPT	42	62	N>100 4cm Penetration								DS Taken
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	65	N>100	6cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	59	N>100	4cm Penetration								DS Taken

4698

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 260.449
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 1.50
Bore Hole No.	: BH-6(P3)	Date of commencement	: 29.04.2013
		Date of Completion	: 02.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corrected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50	Fine Sand		0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	1	2	2	4	7						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	1	2	3	5	7						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50			4.5	SPT	3	3	4	7	8						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	2	3	6	9	10						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	2	3	5	8	8						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	4	5	6	11	11						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	3	5	8	13	12						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50			12.0	SPT	6	8	10	18	15						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50	Fine Sand with Gravel		13.0	SPT	11	14	15	29	20						Sample Collected
13.00	13.50	0.50			13.5	SPT	13	15	18	33	22						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50			15.0	SPT	19	21	22	43	26						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	15	21	36	57	31						Sample Collected
16.50	17.00	0.50			17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken

4690

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 260.449	
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 1.50	
Bore Hole No.	: BH-6(P3)	Date of commencement	: 29.04.2013	
		Date of Completion	: 02.05.2013	
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain	
Dia of Bore	: 150mm in soil			
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel			

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corrected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
17.50	18.00	0.50	Fine Sand		18.0	SPT	21	21	24	45	25						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	23	23	26	49	26						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50			21.0	SPT	20	28	29	57	29						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50			22.5	SPT	21	27	32	59	29						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50	Fine Sand With Gravel		24.0	SPT	29	38	47	85	38						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50			25.5	SPT	31	37	43	80	35						Sample Collected
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	33	43	6cm PenetrationN>100								DS Taken
27.00	27.50	0.50	Clay with Gravel		27.5	SPT	19	23	26	49							Sample Collected
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50			28.5	SPT	13	19	22	41							Sample Collected
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	21	22	26	48							Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50			31.0	DS											DS Taken
31.00	31.50	0.50			31.5	SPT	19	28	29	57							Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	21	29	32	61							Sample Collected
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken
34.00	34.50	0.50			34.5	SPT	27	34	25	59							Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	19	32	40	72							Sample Collected

4700

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 260.449
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 1.50
Bore Hole No.	: BH-6(P3)	Date of commencement	: 29.04.2013
		Date of Completion	: 02.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corrected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
36.00	36.50	0.50	Fine Sand		36.5	SPT	12	23	29	52	22						Sample Collected
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50			37.5	SPT	19	21	24	45	20						Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50			39.0	SPT	17	25	28	53	22						Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50			40.5	SPT	21	25	42	67	25						Sample Collected
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50			42.0	SPT	23	25	44	69	25						Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50			43.5	SPT	19	31	33	64	23						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50	Fine Sand With Gravel		45.0	SPT	24	39	51	90	29						Sample Collected
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50			46.5	SPT	32	35	N>100 9cm Penetration								DS Taken
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	30	61	N>100 6cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	41		N>100 11cm Penetration								DS Taken

4701

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 261.837
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.20
Bore Hole No	: BH-7(P2)	Date of commencement	: 03.05.2013
		Date of Completion	: 06.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50	Fine Sand		0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	1	2	2	4	7						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	1	3	4	7	9						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50			4.5	SPT	2	3	3	6	7						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	2	3	5	8	9						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	4	5	7	12	13						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	3	5	6	11	11						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50	Fine Sand With Gravel		10.5	SPT	12	15	19	34	24						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50			12.0	SPT	13	19	20	39	25						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50			13.5	SPT	16	21	27	48	29						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50			15.0	SPT	19	21	25	46	27						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	21	23	30	53	29						Sample Collected

4702

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 261.837
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.20
Bore Hole No.	: BH-7(P2)	Date of commencement	: 03.05.2013
		Date of Completion	: 06.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
16.50	17.00	0.50	Fine Sand		17.0	SPT	13	19	22	41	24						Sample Collected
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50			18.0	SPT	14	18	21	39	23						Sample Collected
18.00	18.50	0.50			18.5	DS											DS Taken
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	13	21	21	42	23						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50			21.0	SPT	17	23	28	51	27						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50	Fine Sand With Gravel		22.5	SPT	17	29	33	62	30						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50			24.0	SPT	24	34	43	77	35						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50			25.5	SPT	35	49	10 cm PenetrationN>100								DS Taken
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	33	54	8cm Penetration N>100								DS Taken
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50			28.5	SPT	27	39	54	93	37						Sample Collected
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	41	64	N>100 6cm Penetration								DS Taken
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50			31.0	DS											DS Taken
31.00	31.50	0.50	Clay With Gravel		31.5	SPT	14	24	28	52							Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	13	21	29	50							Sample Collected
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken

4703

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 261.837
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.20
Bore Hole No.	: BH-7(P2)	Date of commencement	: 03.05.2013
		Date of Completion	: 06.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
34.00	34.50	0.50	Fine Sand With Gravel		34.5	SPT	19	34	44	78	31						Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	28	41	48	89	33						Sample Collected
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50			37.5	SPT	31	43	49	92	33						Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50			39.0	SPT	27	43	47	90	32						Sample Collected
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50	Fine Sand		40.5	SPT	23	31	52	83	30						Sample Collected
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50			42.0	SPT	20	33	37	70	25						Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50			43.0	DS											DS Taken
43.00	43.50	0.50			43.5	SPT	29	33	40	73	25						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50			45.0	SPT	25	32	46	78	26						Sample Collected
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50	Fine Sand With Gravel		46.5	SPT	31	44	54	98	30						Sample Collected
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	43	63	N>100 5cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	40	68	N>100 4cm Penetration								DS Taken

4704

BORE LOG DETAILS

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 263.870
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.40
Bore Hole No.	: BH-8(P1)	Date of commencement	: 07.05.2013
		Date of Completion	: 10.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
0.00	0.50	0.50			0.5	DS											DS Taken
0.50	1.00	0.50			1.0	DS											DS Taken
1.00	1.50	0.50			1.5	SPT	1	1	2	3	5						Sample Collected
1.50	2.00	0.50			2.0	DS											DS Taken
2.00	2.50	0.50			2.5	DS											DS Taken
2.50	3.00	0.50			3.0	SPT	2	2	3	5	7						Sample Collected
3.00	3.50	0.50			3.5	DS											DS Taken
3.50	4.00	0.50			4.0	DS											DS Taken
4.00	4.50	0.50	Fine Sand		4.5	SPT	2	4	5	9	10						Sample Collected
4.50	5.00	0.50			5.0	DS											DS Taken
5.00	5.50	0.50			5.5	DS											DS Taken
5.50	6.00	0.50			6.0	SPT	2	4	4	8	9						Sample Collected
6.00	6.50	0.50			6.5	DS											DS Taken
6.50	7.00	0.50			7.0	DS											DS Taken
7.00	7.50	0.50			7.5	SPT	3	4	7	11	12						Sample Collected
7.50	8.00	0.50			8.0	DS											DS Taken
8.00	8.50	0.50			8.5	DS											DS Taken
8.50	9.00	0.50			9.0	SPT	9	14	15	29	22						Sample Collected
9.00	9.50	0.50			9.5	DS											DS Taken
9.50	10.00	0.50			10.0	DS											DS Taken
10.00	10.50	0.50			10.5	SPT	11	15	18	33	23						Sample Collected
10.50	11.00	0.50			11.0	DS											DS Taken
11.00	11.50	0.50			11.5	DS											DS Taken
11.50	12.00	0.50			12.0	SPT	9	16	16	32	22						Sample Collected
12.00	12.50	0.50			12.5	DS											DS Taken
12.50	13.00	0.50			13.0	DS											DS Taken
13.00	13.50	0.50	Fine Sand With Gravel		13.5	SPT	13	20	22	42	26						Sample Collected
13.50	14.00	0.50			14.0	DS											DS Taken
14.00	14.50	0.50			14.5	DS											DS Taken
14.50	15.00	0.50			15.0	SPT	19	19	25	44	26						Sample Collected
15.00	15.50	0.50			15.5	DS											DS Taken
15.50	16.00	0.50			16.0	DS											DS Taken
16.00	16.50	0.50			16.5	SPT	21	25	32	57	31						Sample Collected
16.50	17.00	0.50			17.0	DS											DS Taken
17.00	17.50	0.50			17.5	DS											DS Taken
17.50	18.00	0.50			18.0	SPT	21	29	33	62	32						Sample Collected

4705

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 263.870
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.40
Bore Hole No.	: BH-8(P1)	Date of commencement	: 07.05.2013
		Date of Completion	: 10.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
18.00	18.50	0.50	Fine Sand		18.5	SPT	14	19	21	40	23						Sample Collected
18.50	19.00	0.50			19.0	DS											DS Taken
19.00	19.50	0.50			19.5	SPT	17	22	26	48	26						Sample Collected
19.50	20.00	0.50			20.0	DS											DS Taken
20.00	20.50	0.50			20.5	DS											DS Taken
20.50	21.00	0.50	Fine Sand With Gravel		21.0	SPT	19	26	29	55	28						Sample Collected
21.00	21.50	0.50			21.5	DS											DS Taken
21.50	22.00	0.50			22.0	DS											DS Taken
22.00	22.50	0.50			22.5	SPT	18	30	33	63	31						Sample Collected
22.50	23.00	0.50			23.0	DS											DS Taken
23.00	23.50	0.50			23.5	DS											DS Taken
23.50	24.00	0.50			24.0	SPT	27	32	46	78	35						Sample Collected
24.00	24.50	0.50			24.5	DS											DS Taken
24.50	25.00	0.50			25.0	DS											DS Taken
25.00	25.50	0.50			25.5	SPT	29	33	39	72	32						Sample Collected
25.50	26.00	0.50			26.0	DS											DS Taken
26.00	26.50	0.50			26.5	DS											DS Taken
26.50	27.00	0.50			27.0	SPT	31	38	43	81	35						Sample Collected
27.00	27.50	0.50			27.5	DS											DS Taken
27.50	28.00	0.50			28.0	DS											DS Taken
28.00	28.50	0.50	Clay Wth Gravel		28.5	SPT	16	23	25	48							Sample Collected
28.50	29.00	0.50			29.0	DS											DS Taken
29.00	29.50	0.50			29.5	DS											DS Taken
29.50	30.00	0.50			30.0	SPT	17	22	34	56							Sample Collected
30.00	30.50	0.50			30.5	DS											DS Taken
30.50	31.00	0.50	Fine Sand		31.0	SPT	20	20	30	50	24						Sample Collected
31.00	31.50	0.50			31.5	SPT	19	22	26	48	22						Sample Collected
31.50	32.00	0.50			32.0	DS											DS Taken
32.00	32.50	0.50			32.5	DS											DS Taken
32.50	33.00	0.50			33.0	SPT	22	27	30	57	25						Sample Collected
33.00	33.50	0.50			33.5	DS											DS Taken
33.50	34.00	0.50			34.0	DS											DS Taken

4796

Client	: DFCC	Existing Ground Lvl. (RL in Mtr)	: 263.870
Project	: G.I. for 3 nos Important Bridges	Depth of Ground Water from EGL (in Mtr)	: 0.40
Bore Hole No.	: BH-8(P1)	Date of commencement	: 07.05.2013
		Date of Completion	: 10.05.2013
Type of Boring	: Rotary Drilling	Conducted By	: Binayak Swain
Dia of Bore	: 150mm in soil		
Type of Sampler used	: UDS/Split spoon Sampler/Core barrel		

Depth(m)		Length of Run	Description of Strata	Log of Bore	Sampling		SPT					Details of Rock Core					
From	To				Depth	Type	Blows Required for Penetration of depth			N value (Observed)	N Corected	Total Length (cm)	No of Pieces	Length of core greater than 10cm	% of Core Recovery	RQD Value (%)	Remarks
							0 - 15 cm	15 - 30 cm	30 - 45 cm								
34.00	34.50	0.50	Fine Sand With Gravel		34.5	SPT	22	32	45	77	30						Sample Collected
34.50	35.00	0.50			35.0	DS											DS Taken
35.00	35.50	0.50			35.5	DS											DS Taken
35.50	36.00	0.50			36.0	SPT	29	44	44	88	33						Sample Collected
36.00	36.50	0.50			36.5	DS											DS Taken
36.50	37.00	0.50			37.0	DS											DS Taken
37.00	37.50	0.50			37.5	SPT	25	35	47	82	30						Sample Collected
37.50	38.00	0.50			38.0	DS											DS Taken
38.00	38.50	0.50			38.5	DS											DS Taken
38.50	39.00	0.50			39.0	SPT	35	57	N>100 9cm Penetration								DS Taken
39.00	39.50	0.50			39.5	DS											DS Taken
39.50	40.00	0.50			40.0	DS											DS Taken
40.00	40.50	0.50			40.5	SPT	41	67	N>100 7cm Penetration								DS Taken
40.50	41.00	0.50			41.0	DS											DS Taken
41.00	41.50	0.50			41.5	DS											DS Taken
41.50	42.00	0.50	Fine Sand		42.0	SPT	27	38	39	77	27						Sample Collected
42.00	42.50	0.50			42.5	DS											DS Taken
42.50	43.00	0.50	Fine Sand With Gravel		43.0	SPT	30	41	48	89	30						Sample Collected
43.00	43.50	0.50			43.5	SPT	28	46	51	97	31						Sample Collected
43.50	44.00	0.50			44.0	DS											DS Taken
44.00	44.50	0.50			44.5	DS											DS Taken
44.50	45.00	0.50			45.0	SPT	38	57	N>100 11 cm Penetration								DS Taken
45.00	45.50	0.50			45.5	DS											DS Taken
45.50	46.00	0.50			46.0	DS											DS Taken
46.00	46.50	0.50			46.5	SPT	34	61	N>100 8 cm Penetration								DS Taken
46.50	47.00	0.50			47.0	DS											DS Taken
47.00	47.50	0.50			47.5	DS											DS Taken
47.50	48.00	0.50			48.0	SPT	52		N>100 9cm Penetration								DS Taken
48.00	48.50	0.50			48.5	DS											DS Taken
48.50	49.00	0.50			49.0	DS											DS Taken
49.00	49.50	0.50			49.5	DS											DS Taken
49.50	50.00	0.50			50.0	SPT	59		N>100 5cm Penetration								DS Taken

4707

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N")
	0.0						
BH-1(A2)	1.5	1.00	1.50	1.72	9	15	15
	3.0	1.00	3.00	1.40	11	15	15
	4.5	1.00	4.50	1.22	12	15	15
	6.0	1.00	6.00	1.18	15	18	16
	7.5	1.00	7.50	1.10	19	21	18
	9.0	1.00	9.00	1.06	16	17	16
	10.5	1.00	10.50	0.98	23	23	19
	12.0	1.00	12.00	0.92	25	23	19
	13.5	1.00	13.50	0.93	37	34	25
	15.0	1.00	15.00	0.90	42	38	26
	16.5	1.00	16.50	0.83	51	42	29
	18.0	1.00	18.00	0.80	47	38	26
	19.5	1.00	19.50	0.79	58	46	30
	21.0	1.00	21.00	0.78	62	48	32
	22.5	1.00	22.50	0.75	75	56	36
	24.0	1.00	24.00	0.72	83	60	37
	27.0	1.00	27.00	0.64	85	54	35
	39.0	1.00	39.00	0.59	74	44	29
	40.5	1.00	40.50	0.57	87	50	32
	43.5	1.00	43.50	0.56	76	43	29
	45.0	1.00	45.00	0.50	78	39	27

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N")
	0.0						
BH-2(P4)	1.5	1.00	1.50	1.72	3	5	5
	3.0	1.00	3.00	1.40	4	6	6
	4.5	1.00	4.50	1.22	6	7	7
	6.0	1.00	6.00	1.18	3	4	4
	7.5	1.00	7.50	1.10	7	8	8
	9.0	1.00	9.00	1.06	11	12	12
	10.5	1.00	10.50	0.99	13	13	13
	11.0	1.00	11.00	0.98	33	32	24
	12.0	1.00	12.00	0.92	44	40	28
	13.5	1.0	13.5	0.93	34	32	23
	15.0	1.00	15.00	0.90	41	37	26
	16.5	1.00	16.50	0.83	56	46	31
	18.0	1.00	18.00	0.80	67	54	34
	19.5	1.00	19.50	0.79	62	49	32
	21.0	1.00	21.00	0.78	84	66	40
	24.0	1.00	24.00	0.72	86	62	38
	25.5	1.00	25.50	0.69	73	50	33
	37.5	1.00	37.50	0.55	35	19	17
	39.0	1.00	39.00	0.52	51	27	21
	40.5	1.00	40.50	0.56	67	38	26
	42.0	1.00	42.00	0.54	75	41	28
	43.5	1.00	43.50	0.51	67	34	25

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
	0.0						
BH-3(P5)	1.5	1.00	1.50	1.72	2	3	3
	3.0	1.00	3.00	1.40	5	7	7
	4.5	1.00	4.50	1.22	9	11	11
	6.0	1.00	6.00	1.18	11	13	13
	7.5	1.00	7.50	1.10	10	11	11
	9.0	1.00	9.00	1.06	29	31	23
	10.5	1.00	10.50	0.98	38	37	26
	12.0	1.00	12.00	0.92	43	40	27
	13.5	1.00	13.50	0.93	50	47	31
	15.0	1.00	15.00	0.90	32	29	22
	16.5	1.00	16.50	0.83	36	30	22
	18.0	1.00	18.00	0.80	47	38	26
	19.5	1.00	19.50	0.79	71	56	36
	21.0	1.00	21.00	0.78	78	61	38
	22.5	1.00	22.50	0.75	90	68	41
	24.0	1.00	24.00	0.72	62	45	30
	25.5	1.00	25.50	0.69	67	46	31
	42.0	1.00	42.00	0.54	74	40	27
	43.5	1.00	43.50	0.51	79	40	28
	46.5	1.00	46.50	0.47	92	43	29

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N")
	0.00						
BH-4(A1)	1.5	1.00	1.50	1.72	6	10	10
	3.0	1.00	3.00	1.40	12	17	16
	4.5	1.00	4.50	1.22	11	13	13
	6.0	1.00	6.00	1.18	16	19	17
	7.5	1.00	7.50	1.10	30	33	24
	9.0	1.00	9.00	1.06	37	39	27
	10.5	1.00	10.50	0.99	35	35	25
	12.0	1.00	12.00	0.92	29	27	21
	13.5	1.00	13.50	0.93	32	30	22
	15.0	1.00	15.00	0.90	36	32	24
	16.5	1.00	16.50	0.83	40	33	24
	18.0	1.00	18.00	0.80	49	39	27
	19.5	1.00	19.50	0.79	51	40	28
	21.0	1.00	21.00	0.78	71	55	35
	22.5	1.00	22.50	0.75	54	41	28
	24.0	1.00	24.00	0.72	68	49	32
	25.5	1.00	25.50	0.69	69	48	31
	27.0	1.00	27.00	0.66	80	53	34
	28.5	1.00	28.50	0.63	93	59	37
	34.5	1.00	34.50	0.59	70	41	28
	37.5	1.00	37.50	0.55	70	39	27

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
	0.00						
BH-5(P6)	1.5	1.00	1.50	1.75	2	4	3
	3.0	1.00	3.00	1.40	3	4	4
	4.5	1.00	4.50	1.22	5	6	6
	6.0	1.00	6.00	1.16	6	7	6
	7.5	1.00	7.50	1.10	10	11	11
	9.0	1.00	9.00	1.04	19	20	17
	10.5	1.00	10.50	0.98	21	21	17
	12.0	1.00	12.00	0.94	32	30	22
	13.5	1.00	13.50	0.90	43	39	26
	15.0	1.00	15.00	0.87	32	28	21
	16.5	1.00	16.50	0.83	36	30	22
	18.0	1.00	18.00	0.80	28	22	18
	19.5	1.00	19.50	0.79	31	24	19
	21.0	1.00	21.00	0.77	53	41	27
	22.5	1.00	22.50	0.75	82	62	38
	24.0	1.00	24.00	0.72	56	40	27
	28.5	1.00	28.50	0.65	67	44	29
	30.0	1.00	30.00	0.64	92	58	36
	42.0	1.00	42.00	0.52	75	39	27
	43.5	1.00	43.50	0.50	92	46	30

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N")
	0.00						
BH-6(P3)	1.5	1.00	1.50	1.75	4	7	7
	3.0	1.00	3.00	1.40	5	7	7
	4.5	1.00	4.50	1.22	7	9	8
	6.0	1.00	6.00	1.16	9	10	10
	7.5	1.00	7.50	1.10	8	9	8
	9.0	1.00	9.00	1.04	11	11	11
	10.5	1.00	10.50	0.98	13	13	12
	12.0	1.00	12.00	0.94	18	17	15
	13.0	1.00	13.00	0.92	29	27	20
	13.5	1.00	13.50	0.90	33	30	22
	15.0	1.00	15.00	0.87	43	37	26
	16.5	1.00	16.50	0.83	57	47	31
	18.0	1.00	18.00	0.80	45	36	25
	19.5	1.00	19.50	0.79	49	38	26
	21.0	1.00	21.00	0.77	57	44	29
	22.5	1.00	22.50	0.75	59	44	29
	24.0	1.00	24.00	0.72	85	61	38
	25.5	1.00	25.50	0.70	80	56	35
	36.5	1.00	36.50	0.58	52	30	22
	37.5	1.00	37.50	0.57	45	26	20
	39.0	1.00	39.00	0.56	53	29	22
	40.5	1.00	40.50	0.54	67	36	25
	42.0	1.00	42.00	0.52	69	36	25
	43.5	1.00	43.50	0.50	64	32	23
	45.0	1.00	45.00	0.49	90	44	29

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N")
	0.00						
BH-7(P2)	1.5	1.00	1.50	1.75	4	7	7
	3.0	1.00	3.00	1.40	7	10	9
	4.5	1.00	4.50	1.22	6	7	7
	6.0	1.00	6.00	1.16	8	9	9
	7.5	1.00	7.50	1.10	12	13	13
	9.0	1.00	9.00	1.04	11	11	11
	10.5	1.00	10.50	0.98	34	33	24
	12.0	1.00	12.00	0.94	39	37	25
	13.5	1.00	13.50	0.90	48	43	29
	15.0	1.00	15.00	0.87	46	40	27
	16.5	1.00	16.50	0.83	53	44	29
	17.0	1.00	17.00	0.82	41	34	24
	18.0	1.00	18.00	0.80	39	31	23
	19.5	1.00	19.50	0.79	42	33	23
	21.0	1.00	21.00	0.77	51	39	27
	22.5	1.00	22.50	0.75	62	47	30
	24.0	1.00	24.00	0.72	77	55	35
	28.5	1.00	28.50	0.65	93	60	37
	34.5	1.00	34.50	0.61	78	48	31
	36.0	1.00	36.00	0.59	89	52	33
	37.5	1.00	37.50	0.57	92	52	33
	39.0	1.00	39.00	0.56	90	50	32
	40.5	1.00	40.50	0.55	83	45	30
	42.0	1.00	42.00	0.52	70	36	25
	43.5	1.00	43.50	0.50	73	37	25
	45.0	1.00	45.00	0.49	78	38	26
	46.5	1.00	46.50	0.47	98	46	30

CALCULATIONS FOR CORRECTED SPT (N) VALUES

BOREHOLE NO	DEPTH OF SAMPLE	BULK / SUB DENSITY (t/m3) γ	OVERBURDEN PRESSURE (t/m2)	OVERBURDEN CORRECTION FACTOR (Cn)	OBSERVED SPT 'N' VALUE (N)	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N")
	0.00						
BH-8(P1)	1.5	1.00	1.50	1.75	3	5	5
	3.0	1.00	3.00	1.40	5	7	7
	4.5	1.00	4.50	1.22	9	11	10
	6.0	1.00	6.00	1.16	8	9	9
	7.5	1.00	7.50	1.10	11	12	12
	9.0	1.00	9.00	1.04	29	30	22
	10.5	1.00	10.50	0.98	33	32	23
	12.0	1.00	12.00	0.94	32	30	22
	13.5	1.00	13.50	0.90	42	38	26
	15.0	1.00	15.00	0.87	44	38	26
	16.5	1.00	16.50	0.83	57	47	31
	18.0	1.00	18.00	0.80	62	50	32
	18.5	1.00	18.50	0.80	40	32	23
	19.5	1.00	19.50	0.79	48	38	26
	21.0	1.00	21.00	0.77	55	42	28
	22.5	1.00	22.50	0.75	63	47	31
	24.0	1.00	24.00	0.72	78	56	35
	25.5	1.00	25.50	0.70	72	50	32
	27.0	1.00	27.00	0.68	81	55	35
	31.0	1.00	31.00	0.68	50	34	24
	31.5	1.00	31.50	0.62	48	30	22
	33.0	1.00	33.00	0.62	57	35	25
	34.5	1.00	34.50	0.61	77	47	30
	36.0	1.00	36.00	0.59	88	51	33
	37.5	1.00	37.50	0.57	82	47	30
	42.0	1.00	42.00	0.52	77	40	27
	43.0	1.00	43.00	0.51	89	45	30
	43.5	1.00	43.50	0.50	97	49	31

Appendix –II

(Sample Calculation)