



Report by :

CENGRS GEOTECHNICA PVT. LTD.
SOIL AND FOUNDATION EXPERTS

Report on:

**Geotechnical Investigation for
2x660 MW Khurja Super Thermal Power Project
at Khurja, Distt. Bulandshahr
Uttar Pradesh**

(Borelogs and Laboratory test results)

Submitted to:

M/s Bharat Heavy Electricals Ltd.

Plot No. 25, Sector 16A, Distt. - Gautam Budh Nagar, Noida- 201301

Project No. 219134D



BOREHOLE NO: 1

PAGE 1 OF 3

BOREHOLE NO : BH-1			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.430 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.15							
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.39 m							
COORDINATES : 721 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 18-Dec-2019			DATE OF FINISH : 19-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20	40	60	80
										PL (%) MC (%) LL (%)			
			20	40	60	80	FINES CONTENT (%) ■						
			20	40	60	80							
1		CL		Very stiff brown clayey silt, low plastic (CL)		DS-1	0.00 - 0.50						
2							SPT-1	1.00 - 1.45		18			
2.00						191.43							
3		SM		Medium dense to dense grey silty fine sand with traces of gravel (SM)		UDS-1	2.00 - 2.30						
4							SPT-2	3.00 - 3.45		14			
5							UDS-2	4.00 - 4.30					
6							SPT-3	5.00 - 5.45		15			
7							UDS-3	6.00 - 6.30					
8							SPT-4	7.00 - 7.45		18			
9							DS-2	8.00 - 8.30					
10							SPT-5	9.00 - 9.45		20			
11							DS-3	10.00 - 10.30					
12							SPT-6	10.50 - 10.95		27			
13							SPT-7	11.50 - 11.95		25			
14							DS-4	13.00 - 13.30					
15							SPT-8	13.50 - 13.95		34			
16							SPT-9	14.50 - 14.95		30			

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 1

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BOREHOLE NO : BH-1			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.430 m												
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.15												
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.39 m												
COORDINATES : 721 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav												
DATE OF START : 18-Dec-2019			DATE OF FINISH : 19-Dec-2019			CHECKED BY : Ankit Uniyal												
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲								
										20	40	60	80					
										PL (%)	MC (%)	LL (%)						
										■ FINES CONTENT (%) ■								
										20	40	60	80					
17		SM	Dense grey silty fine sand (SM)	169.93	DS-5	16.00 - 16.30			34									
					SPT-10	16.50 - 16.95												
18						SPT-11	17.50 - 17.95								40			
19						DS-6	19.00 - 19.30											
20						SPT-12	19.50 - 19.95								37			
21						SPT-13	20.50 - 20.95								42			
22						DS-7	22.00 - 22.30											
23						SPT-14	22.50 - 22.95								38			
24						CL	Very stiff brown clayey silt, low plastic (CL)	168.43						SPT-15	23.50 - 23.95			23
25																		
26		SP-SM	Dense to very dense grey fine sand (SP-SM)	168.43	DS-8	25.00 - 25.30			41									
27						SPT-16	25.50 - 25.95											
28						SPT-17	26.50 - 26.95								51			
29						DS-9	28.00 - 28.30											
30						SPT-18	28.50 - 28.95								40			
31						SPT-19	29.50 - 29.95								59			
32						DS-10	31.00 - 31.30											
						SPT-20	31.50 - 31.95								76			

PL - PLASTIC LIMIT
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Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 1

PAGE 3 OF 3

BOREHOLE NO : BH-1			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.430 m									
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.15									
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.39 m									
COORDINATES : 721 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav									
DATE OF START : 18-Dec-2019			DATE OF FINISH : 19-Dec-2019			CHECKED BY : Ankit Uniyal									
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲					
										20 40 60 80					
										PL (%) MC (%) LL (%)					
										20 40 60 80					
										■ FINES CONTENT (%) ■					
										20 40 60 80					
33		SP-SM				SPT-21	32.50 - 32.95		83						
34															
35															
35															
36		CL	35.50	Hard brown clayey silt, low plastic (CL)	157.93	SPT-23	35.50 - 35.95		39						
37															
37		SP-SM		Very dense grey fine sand (SP-SM)		DS-12	37.00 - 37.30								
38															
39															
39															
40															
41															
41															
42															
43															
44															
45															
45			45.39	Termination at 45.39 meters Depth.	148.04	SPT-29	45.00 - 45.39		101/24cm						

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-1
SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²	Degree ϕ
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)																		
1.00	1.45	SPT-1	18	18		2.00					25.1	15.7	9.4	12.0		9.0							
2.00	2.30	UDS-1			Medium dense to dense grey silty fine sand with traces of gravel (SM)		1	57	41	1						1.75	12.5	1.56					
3.00	3.45	SPT-2	14	17		- medium dense, 2.0 to 13.5 m																	
4.00	4.30	UDS-2														1.79	13.7	1.57	DS	0.5,1,1.5	0.0	31.2	
5.00	5.45	SPT-3	15	16											2.63								
6.00	6.30	UDS-3														1.83	14.5	1.60					
7.00	7.45	SPT-4	18	16																			
8.00	8.30	DS-2																					
9.00	9.45	SPT-5	20	16			1	79	20	0													
10.00	10.30	DS-3																					
10.50	10.95	SPT-6	27	19																			
11.50	11.95	SPT-7	25	18																			
13.00	13.30	DS-4																					
13.50	13.95	SPT-8	34	21	- dense, 13.5 to 17.5 m																		
14.50	14.95	SPT-9	30	20																			
16.00	16.30	DS-5																					
16.50	16.95	SPT-10	34	21																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:1

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters		
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²
17.50	17.95	SPT-11	40	23	Dense grey silty fine sand (SM)																	
19.00	19.30	DS-6																				
19.50	19.95	SPT-12	37	21																		
20.50	20.95	SPT-13	42	23																		
22.00	22.30	DS-7																				
22.50	22.95	SPT-14	38	21		23.50																
23.50	23.95	SPT-15	23	23	Very stiff brown clayey silt, low plastic (CL)	25.00																
25.00	25.30	DS-8			Dense to very dense grey fine sand (SP-SM)																	
25.50	25.95	SPT-16	41	21																		
26.50	26.95	SPT-17	51	24	- dense, 25.0 to 26.5 m																	
28.00	28.30	DS-9			- very dense, 26.5 to 28.5 m																	
28.50	28.95	SPT-18	40	20																		
29.50	29.95	SPT-19	59	26	- dense, 28.5 to 29.5 m		2	88	10	0												
31.00	31.30	DS-10			- very dense, 29.5 to 35.5 m																	
31.50	31.95	SPT-20	76	30																		
32.50	32.95	SPT-21	83	32																		
34.00	34.30	DS-11																				
34.50	34.95	SPT-22	87	33		35.50																

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.: -1

[illegible]

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-2

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			Degree ϕ	
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²		
0.00	0.50	DS-1			Very stiff brown clayey silt with traces of gravel, low plastic (CL)		2	28	57	13														
1.00	1.45	SPT-1	28	28								34.3	14.5	19.8	2.0		15.0							
2.00	2.30	UDS-1				3.00												1.79	14.2	1.57	UU	1.2,3	0.9	6.6
3.00	3.45	SPT-2	25	30	Medium dense to very dense grey silty fine sand (SM)																			
4.00	4.30	UDS-2			- medium dense, 3.0 to 7.0 m												1.82	15.1	1.58	DS	0.5,1,1.5	0.0	31.5	
5.00	5.45	SPT-3	29	30																				
6.00	6.30	UDS-3																						
7.00	7.45	SPT-4	31	22	- dense, 7.0 to 8.5 m										2.66			1.86	16.2	1.60				
8.00	8.30	DS-2																						
8.50	8.95	SPT-5	28	20	- medium dense, 8.5 to 9.0 m																			
9.00	9.45	SPT-6	34	23	- with traces of gravel, 9.0 to 10.0 m		2	81	17	0														
10.00	10.30	DS-3			- dense, 9.0 to 20.5 m																			
10.50	10.95	SPT-7	36	23																				
11.50	11.95	SPT-8	38	24																				
13.00	13.30	DS-4																						
13.50	13.95	SPT-9	41	24																				
14.50	14.95	SPT-10	44	25																				
16.00	16.30	DS-5			Dense grey silty fine sand (SM)																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-2

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²	
16.50	16.95	SPT-11	38	22	Dense grey silty fine sand (SM)																		
17.50	17.95	SPT-12	42	23																			
19.00	19.30	DS-6																					
19.50	19.95	SPT-13	44	24		20.50																	
20.50	20.95	SPT-14	31	31	Hard brown clayey silt, low plastic (CL)	22.00					27.6	17.7	9.9										
22.00	22.30	DS-7			Very dense grey fine sand (SP-SM)																		
22.50	22.95	SPT-15	51	25																			
23.50	23.95	SPT-16	53	26																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-17	56	26	- with traces of gravel, 25.5 to 26.5 m		1	89	10	0													
26.50	26.95	SPT-18	59	27																			
28.00	28.30	DS-9																					
28.50	28.95	SPT-19	63	27																			
29.50	29.95	SPT-20	67	28																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-21	69	28																			
32.50	32.95	SPT-22	73	29																			
34.00	34.30	DS-11																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-2

[illegible]

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 2

PAGE 1 OF 3

BOREHOLE NO : BH-2		BORING METHOD : Shell and Auger		GROUND ELEVATION : RL 193.530 m					
STRUCTURE: STG		SPT HAMMER USED : Automatic Trip		GROUND WATER DEPTH, m 7.30					
CHAINAGE :		BOREHOLE DIAMETER 150mm		TERMINATION DEPTH : 45.41 m					
COORDINATES : 767 E, 212 N		CASING DEPTH : 45.00 m		LOGGED BY : Mr. Gaurav					
DATE OF START : 19-Dec-2019		DATE OF FINISH : 20-Dec-2019		CHECKED BY : Ankit Uniyal					
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲ 20 40 60 80 PL (%) MC (%) LL (%) 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80
1		CL	Very stiff brown clayey silt with traces of gravel, low plastic (CL)		DS-1	0.00 - 0.50			
2					SPT-1	1.00 - 1.45		28	
3				3.00	UDS-1	2.00 - 2.30			
4			Medium dense to very dense grey silty fine sand (SM)	190.53	SPT-2	3.00 - 3.45		25	
5			- medium dense, 3.0 to 7.0 m		UDS-2	4.00 - 4.30			
6					SPT-3	5.00 - 5.45		29	
7			- dense, 7.0 to 8.5 m		UDS-3	6.00 - 6.30			
8					SPT-4	7.00 - 7.45		31	
9			- medium dense, 8.5 to 9.0 m		DS-2	8.00 - 8.30			
10			- with traces of gravel, 9.0 to 10.0 m		SPT-5	8.50 - 8.95		28	
11					SPT-6	9.00 - 9.45		34	
12			- dense, 9.0 to 20.5 m		DS-3	10.00 - 10.30			
13					SPT-7	10.50 - 10.95		36	
14					SPT-8	11.50 - 11.95		38	
15					DS-4	13.00 - 13.30			
16					SPT-9	13.50 - 13.95		41	
					SPT-10	14.50 - 14.95		44	

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 2

PAGE 2 OF 3

BOREHOLE NO : BH-2			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.530 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.30							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.41 m							
COORDINATES : 767 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20	40	60	80
										PL (%)	MC (%)	LL (%)	

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 2

PAGE 3 OF 3

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STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.30							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.41 m							
COORDINATES : 767 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
										20 40 60 80			
										■ FINES CONTENT (%) ■			
										20 40 60 80			
33		SP-SM	35.50	Very dense grey fine sand (SP-SM)	158.03	SPT-22	32.50 - 32.95		73				
34						DS-11	34.00 - 34.30						
35						SPT-23	34.50 - 34.95		75				
36		SM	45.41	Very dense grey silty fine sand (SM)	148.12	SPT-24	35.50 - 35.95		45				
37						DS-12	37.00 - 37.30						
38						SPT-25	37.50 - 37.95		70				
39						SPT-26	38.50 - 38.95		75				
40						DS-13	40.00 - 40.30						
41						SPT-27	40.50 - 40.95		83				
42						SPT-28	41.50 - 41.95		95				
43						DS-14	43.00 - 43.30						
44						SPT-29	43.50 - 43.93		100/28cm				
45													
	</												

PL - PLASTIC LIMIT
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MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



BOREHOLE NO: 3

PAGE 1 OF 3

BOREHOLE NO : BH-3			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.110 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m							
COORDINATES : 814 E, 212 N			CASING DEPTH : 44.20 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%)	MC (%)	LL (%)	
20 40 60 80 ■ FINES CONTENT (%) ■													
1		CL	2.00	Very stiff brown clayey silt with traces of gravel, low plastic (CL)	191.11	DS-1	0.00 - 0.50						
2						SPT-1	1.00 - 1.45		24				
3		SP-SM	2.00	Medium dense to dense grey fine sand (SP-SM) - medium dense, 2.0 to 14.5 m	191.11	UDS-1	2.00 - 2.30						
4						SPT-2	3.00 - 3.45		17				
5						UDS-2	4.00 - 4.30						
6						SPT-3	5.00 - 5.45		18				
7						UDS-3	6.00 - 6.30						
8						SPT-4	7.00 - 7.45		15				
9						DS-2	8.00 - 8.30						
10						SPT-5	8.50 - 8.95		18				
11						SPT-6	9.00 - 9.45		20				
12						DS-3	10.00 - 10.30						
13						SPT-7	10.50 - 10.95		21				
14						SPT-8	11.50 - 11.95		25				
15						DS-4	13.00 - 13.30						
16						SPT-9	13.50 - 13.95		24				
	SPT-10	14.50 - 14.95		36									

PL - PLASTIC LIMIT
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Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 3

PAGE 2 OF 3

BOREHOLE NO : BH-3			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.110 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m							
COORDINATES : 814 E, 212 N			CASING DEPTH : 44.20 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
										20 40 60 80			
										■ FINES CONTENT (%) ■			
										20 40 60 80			
17		SP-SM	20.50	Dense grey fine sand (SP-SM)	172.61	DS-5	16.00 - 16.30						
				SPT-11		16.50 - 16.95		30					
18						SPT-12	17.50 - 17.95		38				
19						DS-6	19.00 - 19.30						
20						SPT-13	19.50 - 19.95		43				
21						CL	22.00	Hard brown clayey silt, low plastic (CL)	171.11		SPT-14	20.50 - 20.95	
22													
23		SM	22.00	Dense to very dense grey silty fine sand (SM)		DS-7	22.00 - 22.30						
						SPT-15	22.50 - 22.95		42				
24							- dense, 22.5 to 23.5 m						
						SPT-16	23.50 - 23.95		51				
25							- very dense, 23.5 to 35.5 m						
						DS-8	25.00 - 25.30						
26							- with traces of gravel, 23.5 to 25.0 m						
						SPT-17	25.50 - 25.95		55				
27													
						SPT-18	26.50 - 26.95		65				
28													
		DS-9	28.00 - 28.30										
29													
		SPT-19	28.50 - 28.95		59								
30													
		SPT-20	29.50 - 29.95		63								
31													
		DS-10	31.00 - 31.30										
32													
						SPT-21	31.50 - 31.95		70				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 3

PAGE 3 OF 3

BOREHOLE NO : BH-3			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.110 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m							
COORDINATES : 814 E, 212 N			CASING DEPTH : 44.20 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲ 20 40 60 80 PL (%) MC (%) LL (%) 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80			
33		SM		Very dense grey silty fine sand (SM)	157.61	SPT-22	32.50 - 32.95		83				
34													
35		CL	35.50	Hard brown clayey silt, low plastic (CL)	156.11	SPT-23	34.50 - 34.95		84				
36													
37		SP-SM		Very dense grey fine sand (SP-SM)		DS-12	37.00 - 37.30						
38						SPT-25	37.50 - 37.95		81				
39						SPT-26	38.50 - 38.95		86				
40													
41						DS-13	40.00 - 40.30						
42						SPT-27	40.50 - 40.90		101/25cm				
43						SPT-28	41.50 - 41.87		102/22cm				
44													
45						DS-14	43.00 - 43.30						
						SPT-29	43.50 - 43.89		101/24cm				
			45.45	Termination at 45.45 meters Depth.	147.66	SPT-30	45.00 - 45.45		99				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-3

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N**	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters				
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²	Degree ϕ	
0.00	0.50	DS-1			Very stiff brown clayey silt with traces of gravel, low plastic (CL)																			
1.00	1.45	SPT-1	24	24			2.00	2	20	60	18	29.8	18.5	11.3	17.0		13.33							
2.00	2.30	UDS-1			Medium dense to dense grey fine sand (SP-SM)												1.92	19.9	1.60					
3.00	3.45	SPT-2	17	20		- medium dense, 2.0 to 14.5 m																		
4.00	4.30	UDS-2																						
5.00	5.45	SPT-3	18	19																				
6.00	6.30	UDS-3																						
7.00	7.45	SPT-4	15	14																				
8.00	8.30	DS-2																						
8.50	8.95	SPT-5	18	16																				
9.00	9.45	SPT-6	20	17																				
10.00	10.30	DS-3																						
10.50	10.95	SPT-7	21	17			0	90	10	0														
11.50	11.95	SPT-8	25	18																				
13.00	13.30	DS-4																						
13.50	13.95	SPT-9	24	17																				
14.50	14.95	SPT-10	36	22	- dense, 14.5 to 20.5 m																			
16.00	16.30	DS-5																						

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-3

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _v kg/cm ²	
16.50	16.95	SPT-11	30	19	Dense grey fine sand (SP-SM)																		
17.50	17.95	SPT-12	38	22											2.65								
19.00	19.30	DS-6																					
19.50	19.95	SPT-13	43	23		20.50																	
20.50	20.95	SPT-14	35	35	Hard brown clayey silt, low plastic (CL)	22.00					29.8	18.7	11.0										
22.00	22.30	DS-7			Dense to very dense grey silty fine sand (SM)																		
22.50	22.95	SPT-15	42	22	- dense, 22.5 to 23.5 m																		
23.50	23.95	SPT-16	51	25	- very dense, 23.5 to 35.5 m		2	78	20	0													
25.00	25.30	DS-8			- with traces of gravel, 23.5 to 25.0 m																		
25.50	25.95	SPT-17	55	26																			
26.50	26.95	SPT-18	65	29																			
28.00	28.30	DS-9																					
28.50	28.95	SPT-19	59	26																			
29.50	29.95	SPT-20	63	27																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-21	70	29																			
32.50	32.95	SPT-22	83	32																			
34.00	34.30	DS-11																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-3

SUMMARY OF LABORATORY TEST RESULTS

Depth, m	Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			Degree ϕ
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure ₃ kg/cm ²	kg/cm ²	
34.50	34.95 SPT-23	84	32	Very dense grey silty fine sand (SM)	35.50																	
35.50	35.95 SPT-24	43	43	Hard brown clayey silt, low plastic (CL)	37.00						30.0	18.0	12.0									
37.00	37.30 DS-12			Very dense grey fine sand (SP-SM)																		
37.50	37.95 SPT-25	81	30																			
38.50	38.95 SPT-26	86	31			0	88	12	0													
40.00	40.30 DS-13																					
40.50	40.90 SPT-27	101/25cm																				
41.50	41.87 SPT-28	102/22cm																				
43.00	43.30 DS-14																					
43.50	43.89 SPT-29	101/24cm																				
45.00	45.45 SPT-30	99	32		45.45																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 4

PAGE 1 OF 3

BOREHOLE NO : BH-4			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.060 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.80							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.36 m							
COORDINATES : 860 E, 212 N			CASING DEPTH : 44.10 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 18-Dec-2019			DATE OF FINISH : 19-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%)	MC (%)	LL (%)	
20 40 60 80 ■ FINES CONTENT (%) ■													
1		CL	5.00	Very stiff brown clayey silt, low plastic (CL)	188.06	DS-1	0.00 - 0.50		25				
						SPT-1	1.00 - 1.45						
2							UDS-1	2.00 - 2.30					
3							SPT-2	3.00 - 3.45					17
							UDS-2	4.00 - 4.30					
5													
6		SP	5.00 to 13.5 m	Medium dense to dense grey fine sand (SP)	188.06	SPT-3	5.00 - 5.45		15				
							UDS-3	6.00 - 6.30					
7													
						SPT-4	7.00 - 7.45					18	
8							DS-2	8.00 - 8.30					
9							SPT-5	9.00 - 9.45					17
							DS-3	10.00 - 10.30					
11							SPT-6	10.50 - 10.95					24
12							SPT-7	11.50 - 11.95					25
13							DS-4	13.00 - 13.30					
14							SPT-8	13.50 - 13.95					34
15		SPT-9	14.50 - 14.95		25								
16													

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 4

PAGE 2 OF 3

BOREHOLE NO : BH-4			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.060 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.80						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.36 m						
COORDINATES : 860 E, 212 N			CASING DEPTH : 44.10 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 18-Dec-2019			DATE OF FINISH : 19-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%)	MC (%)	LL (%)
20 40 60 80 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80												
17		SP	Dense grey fine sand (SP)	172.56	DS-5	16.00 - 16.30						
SPT-10					16.50 - 16.95		44					
SPT-11					17.50 - 17.95		49					
DS-6					19.00 - 19.30							
SPT-12					19.50 - 19.95		46					
21		CL	Hard brown clayey silt, low plastic (CL)	170.56	SPT-13	20.50 - 20.95		31				
22		SM	Dense to very dense grey silty fine sand (SM)	170.56	DS-7	22.00 - 22.30						
23			- dense, 22.5 to 23.5 m		SPT-14	22.50 - 22.95		49				
24		- very dense, 23.5 to 34.5 m	SPT-15	23.50 - 23.95		61						
25		DS-8	25.00 - 25.30									
26		SPT-16	25.50 - 25.95		67							
27		SPT-17	26.50 - 26.95		55							
28		DS-9	28.00 - 28.30									
29		SPT-18	28.50 - 28.95		59							
30		SPT-19	29.50 - 29.95		64							
31		DS-10	31.00 - 31.30									
32	SPT-20	31.50 - 31.95		55								

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

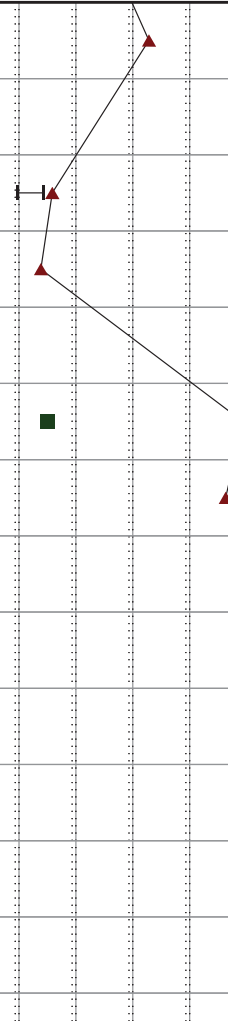
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 4

PAGE 3 OF 3

BOREHOLE NO : BH-4			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.060 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.80							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.36 m							
COORDINATES : 860 E, 212 N			CASING DEPTH : 44.10 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 18-Dec-2019			DATE OF FINISH : 19-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%)	MC (%)	LL (%)	
										20	40	60	80
										■ FINES CONTENT (%) ■			
										20	40	60	80
33		SM				SPT-21	32.50 - 32.95		67				
34													
		CL	34.50		158.56	DS-11	34.00 - 34.30						
35				Hard brown clayey silt, low plastic (CL)			SPT-22	34.50 - 34.95		33			
			35.50		157.56								
36				Medium dense to very dense grey silty fine sand (SM)			SPT-23	35.50 - 35.95		29			
37													
				- medium dense, 35.5 to 37.5 m			DS-12	37.00 - 37.30					
38						SPT-24	37.50 - 37.95		100				
				- very dense, 37.5 to 45.36 m									
39						SPT-25	38.50 - 38.95		94				
40		SM				DS-13	40.00 - 40.30						
							SPT-26	40.50 - 40.93		101/28cm			
41													
							SPT-27	41.50 - 41.91		101/26cm			
42													
							DS-14	43.00 - 43.30					
43						SPT-28	43.50 - 43.89		101/24cm				
44													
45													
							SPT-29	45.00 - 45.36		101/21cm			
			45.36	Termination at 45.36 meters Depth.	147.70								

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-4

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ		
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	c_u kg/cm ²			
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)																				
1.00	1.45	SPT-1	25	25						29.5	9.1	20.4													
2.00	2.30	UDS-1															1.74	8.8	1.60						
3.00	3.45	SPT-2	17	17					4																
4.00	4.30	UDS-2			Medium dense to dense grey fine sand (SP)	5.00	0	34	62								1.81	16.5	1.55						
5.00	5.45	SPT-3	15	16																					
6.00	6.30	UDS-3																							
7.00	7.45	SPT-4	18	16														1.93	23.5	1.56					
8.00	8.30	DS-2																							
9.00	9.45	SPT-5	17	15																					
10.00	10.30	DS-3																							
10.50	10.95	SPT-6	24	18																					
11.50	11.95	SPT-7	25	18			1	95	4	0															
13.00	11.30	DS-4																							
13.50	13.95	SPT-8	34	22		- dense, 13.5 to 14.5																			
14.50	14.95	SPT-9	25	18		- medium dense, 14.5 to 20.5 m																			
16.00	16.30	DS-5																							
16.50	16.95	SPT-10	44	25																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-4

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Type of test	Confining Pressure ₃ kg/cm ²	C _u kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
17.50	17.95	SPT-11	49	27	Dense grey fine sand (SP)																		
19.00	19.30	DS-6																					
19.50	19.95	SPT-12	46	25		20.50																	
20.50	20.95	SPT-13	31	31	Hard brown clayey silt, low plastic (CL)	22.50					28.3	9.2	19.0										
22.00	22.30	DS-7			Dense to very dense grey silty fine sand (SM)																		
22.50	22.95	SPT-14	49	25	- dense, 22.5 to 23.5 m																		
23.50	23.95	SPT-15	61	29	- very dense, 23.5 to 34.5 m																		
25.00	25.30	DS-8																					
25.50	25.95	SPT-16	67	30																			
26.50	26.95	SPT-17	55	26			0	82	18	0													
28.00	28.30	DS-9																					
28.50	28.95	SPT-18	59	27																			
29.50	29.95	SPT-19	64	28																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-20	55	24																			
32.50	32.95	SPT-21	67	28																			
34.00	34.30	DS-11				34.50																	
34.50	34.95	SPT-22	33	33	Hard brown clayey silt, low plastic (CL)	35.50					28.6	19.4	9.2										

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.: -4

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure ₂ kg/cm ²	C ₂ kg/cm ²	Degree ϕ
35.50	35.95	SPT-23	29	16	Medium dense to very dense grey silty fine sand (SM)																		
37.00	37.30	DS-12			- medium dense, 35.5 to 37.5 m																		
37.50	37.95	SPT-24	100	36	- very dense, 37.5 to 45.36 m		0	70	28	2													
38.50	38.95	SPT-25	94	33																			
40.00	40.30	DS-13																					
40.50	40.93	SPT-26	101/28cm																				
41.50	41.91	SPT-27	101/26cm																				
43.00	43.30	DS-14																					
43.50	43.89	SPT-28	101/24cm																				
45.00	45.36	SPT-29	101/21cm			45.36																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 5

PAGE 1 OF 3

BOREHOLE NO : BH-5			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.110 m									
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.45									
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.37 m									
COORDINATES : 907 E, 212 N			CASING DEPTH : 44.00 m			LOGGED BY : Mr. Gaurav									
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal									
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲					
										20	40	60	80		
										PL (%)	MC (%)	LL (%)			
										20	40	60	80		
										■ FINES CONTENT (%) ■					
										20	40	60	80		
1		CL	3.00	Hard brown clayey silt, low plastic (CL)	190.11	DS-1	0.00 - 0.50								
2				SPT-1		1.00 - 1.45		42							
3				UDS-1		2.00 - 2.30									
4		CL	3.00 to 10.5 m	Medium dense to dense grey silty fine sand (SM)		SPT-2	3.00 - 3.45		27						
5				UDS-2	4.00 - 4.30										
6				SPT-3	5.00 - 5.45		20								
7				UDS-3	6.00 - 6.30										
8				SPT-4	7.00 - 7.45		17								
9				DS-2	8.00 - 8.30										
10				SPT-5	8.50 - 8.95		19								
11				SPT-6	9.00 - 9.45		25								
12				DS-3	10.00 - 10.30										
13				SPT-7	10.50 - 10.95		31								
14				SPT-8	11.50 - 11.95		20								
15				DS-4	13.00 - 13.30										
16				SPT-9	13.50 - 13.95		25								
				SPT-10	14.50 - 14.95		31								

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 5

PAGE 2 OF 3

BOREHOLE NO : BH-5			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.110 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.45						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.37 m						
COORDINATES : 907 E, 212 N			CASING DEPTH : 44.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%) MC (%) LL (%)		
										20 40 60 80		
										■ FINES CONTENT (%) ■		
										20 40 60 80		
17		CL SM SM	16.50 20.50	Medium dense to dense grey silty fine sand (SM) - medium dense, 16.5 to 17.5 m - dense, 17.5 to 20.5 m	172.61	DS-5	16.00 - 16.30					
SPT-11						16.50 - 16.95		28				
SPT-12						17.50 - 17.95		37				
DS-6						19.00 - 19.30						
SPT-13						19.50 - 19.95		37				
SPT-14						20.50 - 20.95		25				
21		SM	22.00	Dense to very desne grey silty fine sand with traces of gravel (SM) - dense, 22.0 to 26.5 m - very dense, 26.5 to 35.5 m	171.11	DS-7	22.00 - 22.30					
SPT-15						22.50 - 22.95		40				
SPT-16						23.50 - 23.95		43				
DS-8						25.00 - 25.30						
SPT-17						25.50 - 25.95		46				
SPT-18						26.50 - 25.95		51				
DS-9						28.00 - 28.30						
SPT-19						28.50 - 28.95		59				
SPT-20						29.50 - 29.95		55				
DS-10						31.00 - 31.30						
SPT-21						31.50 - 31.95		65				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 5

PAGE 3 OF 3

BOREHOLE NO : BH-5			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.110 m																	
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.45																	
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.37 m																	
COORDINATES : 907 E, 212 N			CASING DEPTH : 44.00 m			LOGGED BY : Mr. Gaurav																	
DATE OF START : 19-Dec-2019			DATE OF FINISH : 20-Dec-2019			CHECKED BY : Ankit Uniyal																	
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲													
										20 40 60 80													
										PL (%) MC (%) LL (%)													
										20 40 60 80													
										■ FINES CONTENT (%) ■													
										20 40 60 80													
33		SM		Very desne grey silty fine sand (SM)		SPT-22	32.50 - 32.95		70														
34						DS-11	34.00 - 34.30																
35						SPT-23	34.50 - 34.95		81														
35.50			35.50		157.61																		
36		CL		Hard brown clayey silt, low plastic (CL)		SPT-24	35.50 - 35.95		41														
37																							
37.00			37.00		156.11																		
38		SM		Very dense grey silty fine sand with traces of gravel (SM)		DS-12	37.00 - 37.30																
39						SPT-25	37.50 - 37.95		95														
40						SPT-26	38.50 - 38.93		101/28cm														
41						DS-13	40.00 - 40.30																
42						SPT-27	40.50 - 40.95		101														
43						SPT-28	41.50 - 41.91		101/26cm														
44						DS-14	43.00 - 43.30																
45						SPT-29	43.50 - 43.90		101/25cm														
								45.37						147.74	SPT-30	45.00 - 45.37		102/22cm					
				Termination at 45.37 meters Depth.																			

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-5

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ	
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	kg/cm ²		
0.00	0.50	DS-1			Hard brown clayey silt, low plastic (CL)																			
1.00	1.45	SPT-1	42	42			0	13	68	19	30.7	20.7	10.0											
2.00	2.30	UDS-1				3.00												1.76	14.5	1.54				
3.00	3.45	SPT-2	27	33	Medium dense to dense grey silty fine sand (SM) - medium dense, 3.0 to 10.5 m									2.66										
4.00	4.30	UDS-2																1.80	16.5	1.55				
5.00	5.45	SPT-3	20	21																				
6.00	6.30	UDS-3																						
7.00	7.45	SPT-4	17	16													1.86	18.5	1.57	DS	0.5,1,1.5	0.0	31.2	
8.00	8.30	DS-2																						
8.50	8.95	SPT-5	19	16																				
9.00	9.45	SPT-6	25	19																				
10.00	10.30	DS-3																						
10.50	10.95	SPT-7	31	21	- dense, 10.5 to 11.5 m																			
11.50	11.95	SPT-8	20	16	- with traces of gravel, 11.5 to 13.0 m		1	85	14	0														
13.00	13.30	DS-4			- medium dense, 11.5 to 14.5 m																			
13.50	13.95	SPT-9	25	18																				
14.50	14.95	SPT-10	31	20	- dense, 14.5 to 16.5 m																			
16.00	16.30	DS-5																						

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-5

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Type of test	Confining Pressure, kg/cm ²	C _u , kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
16.50	16.95	SPT-11	28	19	Medium dense to dense grey silty fine sand (SM)																		
17.50	17.95	SPT-12	37	22	medium dense, 16.5 to 17.5 m																		
19.00	19.30	DS-6			- dense, 17.5 to 20.5 m																		
19.50	19.95	SPT-13	37	21		20.50																	
20.50	20.95	SPT-14	25	25	Very stiff brown clayey silt, low plastic (CL)	22.00					31.0	20.4	10.6										
22.00	22.30	DS-7			Dense to very dense grey silty fine sand with traces of gravel (SM)																		
22.50	22.95	SPT-15	40	22	- dense, 22.0 to 26.5 m																		
23.50	23.95	SPT-16	43	23																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-17	46	23																			
26.50	25.95	SPT-18	51	24	- very dense, 26.5 to 35.5 m		1	81	18	0													
28.00	28.30	DS-9																					
28.50	28.95	SPT-19	59	26																			
29.50	29.95	SPT-20	55	25																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-21	65	27																			
32.50	32.95	SPT-22	70	29																			
34.00	34.30	DS-11																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-5

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²	
34.50	34.95	SPT-23	81	31	Very desne grey silty fine sand (SM)	35.50																	
35.50	35.95	SPT-24	41	41	Hard brown clayey silt, low plastic (CL)	37.00					31.2	18.8	12.4										
37.00	37.30	DS-12			Very dense grey silty fine sand with traces of gravel (SM)																		
37.50	37.95	SPT-25	95	34																			
38.50	38.93	SPT-26	101/28cm																				
40.00	40.30	DS-13																					
40.50	40.95	SPT-27	101	34																			
41.50	41.91	SPT-28	101/26cm																				
43.00	43.30	DS-14																					
43.50	43.90	SPT-29	101/25cm				2	81	17	0													
45.00	45.37	SPT-30	102/22cm			45.37																	
				</																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 6

PAGE 1 OF 3

BOREHOLE NO : BH-6			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.060 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.12						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.42 m						
COORDINATES : 954 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
									20 40 60 80			
									PL (%)	MC (%)	LL (%)	
									20	40	60	80
									■ FINES CONTENT (%) ■			
									20	40	60	80
1		CI	Very stiff to hard brown clayey silt, medium plastic (CI)	188.06	DS-1	0.00 - 0.50		39				
			SPT-1		1.00 - 1.45							
2					UDS-1	2.00 - 2.30						
3					SPT-2	3.00 - 3.45						17
4					DS-2	4.00 - 4.30						
5												
6		SM	Medium dense to dense grey silty fine sand with traces of gravel (SM)		SPT-3	5.00 - 5.45		13				
					DS-3	6.00 - 6.30						
7					SPT-4	7.00 - 7.45						15
8					DS-4	8.00 - 8.30						
9					SPT-5	8.50 - 8.95						17
					SPT-6	9.00 - 9.45						19
10												
					DS-5	10.00 - 10.30						
11					SPT-7	10.50 - 10.95						21
12		SPT-8	11.50 - 11.95		24							
13												
		DS-6	13.00 - 13.30									
14												
		SPT-9	13.95 - 13.95		26							
15			- dense, 14.5 to 20.5 m		SPT-10	14.50 - 14.95		32				
16												

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 6

PAGE 2 OF 3

BOREHOLE NO : BH-6			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.060 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.12						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.42 m						
COORDINATES : 954 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%) MC (%) LL (%) 20 40 60 80		
■ FINES CONTENT (%) ■												
17		SM	20.50	Dense grey silty fine sand (SM)	172.56	DS-7	16.00 - 16.30					
SPT-11						16.50 - 16.95		34				
SPT-12						17.50 - 17.95		37				
DS-8						19.00 - 19.30						
SPT-13						19.50 - 19.95		40				
21		SP-SM	31.50	Dense to very dense grey fine sand with traces of gravel (SP-SM) - dense, 20.5 to 25.5 m - very dense, 25.5 to 31.5 m	161.56	SPT-14	20.50 - 20.95			44		
DS-9						22.00 - 22.30						
SPT-15						22.50 - 22.95		47				
SPT-16						23.50 - 23.95		49				
DS-10						25.00 - 25.30						
SPT-17						25.50 - 25.95		53				
SPT-18						26.50 - 26.95		57				
DS-11	28.00 - 28.30											
SPT-19	28.50 - 28.95		62									
SPT-20	29.50 - 29.95		63									
DS-12	31.00 - 31.30											
SPT-21	31.50 - 31.95		65									

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 6

PAGE 3 OF 3

BOREHOLE NO : BH-6				BORING METHOD : Shell and Auger				GROUND ELEVATION : RL 193.060 m					
STRUCTURE: STG				SPT HAMMER USED : Automatic Trip				GROUND WATER DEPTH, m 7.12					
CHAINAGE :				BOREHOLE DIAMETER 150mm				TERMINATION DEPTH : 45.42 m					
COORDINATES : 954 E, 212 N				CASING DEPTH : 45.00 m				LOGGED BY : Mr. Gaurav					
DATE OF START : 20-Dec-2019				DATE OF FINISH : 21-Dec-2019				CHECKED BY : Ankit Uniyal					
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
20 40 60 80													
■ FINES CONTENT (%) ■													
20 40 60 80													
33		SM	45.42	Very dense grey silty fine sand (SM)	147.64	SPT-22	32.50 - 32.95		69				
34													
35						DS-13	34.00 - 34.30						
36						SPT-23	34.50 - 34.95		72				
37													
38						SPT-24	35.50 - 35.95		27				
39													
40						DS-14	37.00 - 37.30						
41						SPT-25	37.50 - 37.95		77				
42													
43						SPT-26	38.50 - 38.95		82				
44													
45						DS-15	40.00 - 40.30						
						SPT-27	40.50 - 40.95		89				
						SPT-28	41.50 - 41.95		95				
	DS-16	43.00 - 43.30											
	SPT-29	43.50 - 43.95		99									
			45.42	Termination at 45.42 meters Depth.		SPT-30	45.00 - 45.42		100/27cm				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-6

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	kg/cm ²	Degree ϕ
0.00	0.50	DS-1			Very stiff to hard brown clayey silt; medium plastic (CI)	1.00																	
1.00	1.45	SPT-1	39	39			0	15	69	16													
2.00	2.30	UDS-1															1.79	15.4	1.55	UU	1,2,3	0.8	5.2
3.00	3.45	SPT-2	17	17							35.3	21.0	14.3	19.0		18.9							
4.00	4.30	DS-2				5.00											1.84	17.8	1.56				
5.00	5.45	SPT-3	13	13	Medium dense to dense grey silty fine sand with traces of gravel (SM)								2.67										
6.00	6.30	DS-3			- medium dense, 5.0 to 14.5 m												1.90	18.5	1.60				
7.00	7.45	SPT-4	15	14																			
8.00	8.30	DS-4																					
8.50	8.95	SPT-5	17	15																			
9.00	9.45	SPT-6	19	16			2	69	28	1													
10.00	10.30	DS-5																					
10.50	10.95	SPT-7	21	17																			
11.50	11.95	SPT-8	24	18																			
13.00	13.30	DS-6																					
13.95	13.95	SPT-9	26	18																			
14.50	14.95	SPT-10	32	20	- dense, 14.5 to 20.5 m																		
16.00	16.30	DS-7																					

* Outside NABL scope.

DS; Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-6

SUMMARY OF LABORATORY TEST RESULTS

Depth, m	To	Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density g/cm ³	Moisture Content, %	Dry Density g/cm ³	Shear Strength Parameters			Degree ϕ
							Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	kg/cm ²	
16.50	16.95	SPT-11	34	21	Dense grey silty fine sand (SM)																		
17.50	17.95	SPT-12	37	22																			
19.00	19.30	DS-8																					
19.50	19.95	SPT-13	40	22		20.50																	
20.50	20.95	SPT-14	44	23	Dense to very dense grey fine sand with traces of gravel (SP-SM)		1	89	10	0													
22.00	22.30	DS-9			- dense, 20.5 to 25.5 m																		
22.50	22.95	SPT-15	47	24																			
23.50	23.95	SPT-16	49	24																			
25.00	25.30	DS-10																					
25.50	25.95	SPT-17	53	25	- very dense, 25.5 to 31.5 m																		
26.50	26.95	SPT-18	57	26																			
28.00	28.30	DS-11																					
28.50	28.95	SPT-19	62	27																			
29.50	29.95	SPT-20	63	27																			
31.00	31.30	DS-12				31.50																	
31.50	31.95	SPT-21	65	27	Very dense grey silty fine sand (SM)		0	86	14	0													
32.50	32.95	SPT-22	69	28																			
34.00	34.30	DS-13																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-6

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N**	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Type of test	Shear Strength Parameters		
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)											Confining Pressure kg/cm ²	C _u kg/cm ²	Degree ϕ
34.50	34.95	SPT-23	72	28	Very dense grey silty fine sand (SM)																		
35.50	35.95	SPT-24	27	15																			
37.00	37.30	DS-14																					
37.50	37.95	SPT-25	77	29																			
		SPT-26	82	30																			
40.00	40.30	DS-15																					
40.50	40.95	SPT-27	89	31																			
41.50	41.95	SPT-28	95	32																			
43.00	43.30	DS-16																					
43.50	43.95	SPT-29	99	32																			
45.00	45.42	SPT-30	100/27cm		45.42																		

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 7

PAGE 1 OF 3

BOREHOLE NO : BH-7			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.160 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.13						
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.4 m						
COORDINATES : 1001 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
									20	40	60	80
									PL (%)	MC (%)	LL (%)	
20 40 60 80 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80												
1		CL	Hard brown clayey silt, low plastic (CL)		DS-1	0.00 - 0.50						
2					SPT-1	1.00 - 1.45		64				
3		SM	Medium dense to dense grey silty fine sand with traces of gravel (SM)	191.16	UDS-1	2.00 - 2.30						
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 7

PAGE 2 OF 3

BOREHOLE NO : BH-7			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.160 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.13							
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.4 m							
COORDINATES : 1001 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20	40	60	80
										PL (%) MC (%) LL (%)			
20 40 60 80													
■ FINES CONTENT (%) ■													
20 40 60 80													
17		SM	19.00	Dense grey silty fine sand (SM)	174.16	DS-5	16.00 - 16.30						
SPT-11						16.50 - 16.95		33					
18						SPT-12	17.50 - 17.95		39				
19													
20		SP-SM		Very dense grey fine sand (SP-SM)		DS-6	19.00 - 19.30						
						SPT-13	19.50 - 19.95		96				
21						SPT-14	20.50 - 20.85		102/ 20cm				
22													
						DS-7	22.00 - 22.30						
23						SPT-15	22.50 - 22.95		54				
24						SPT-16	23.50 - 23.95		59				
25													
						DS-8	25.00 - 25.30						
26						SPT-17	25.50 - 25.95		55				
27						SPT-18	26.50 - 26.95		65				
28													
	DS-9	28.00 - 28.30											
29	SPT-19	28.50 - 28.95		80									
30	SPT-20	29.50 - 29.95		66									
31													
	DS-10	31.00 - 31.30											
32	SPT-21	31.50 - 31.95		77									

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 7

PAGE 3 OF 3

BOREHOLE NO : BH-7			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.160 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.13							
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.4 m							
COORDINATES : 1001 E, 212 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%)	MC (%)	LL (%)	
										20	40	60	80
										■ FINES CONTENT (%) ■			
										20	40	60	80
33		SP-SM	33.50 - 35.50	Very dense grey fine sand (SP-SM)	157.66	SPT-22	32.50 - 32.95		83				
34						DS-11	34.00 - 34.30						
35						SPT-23	34.50 - 34.95		75				
36						SPT-24	35.50 - 35.95		88				
37		SM	35.50 - 45.40	Very dense grey silty fine sand (SM)	147.76	DS-12	37.00 - 37.30						
38						SPT-25	37.50 - 37.95		86				
39						SPT-26	38.50 - 38.95		95				
40						DS-13	40.00 - 40.30						
41						SPT-27	40.50 - 40.95		98				
42						SPT-28	41.50 - 41.95		99				
43						DS-14	43.00 - 43.30						
44						SPT-29	43.50 - 43.93		100/ 28cm				
45						SPT-30	45.00 - 45.40		100/ 25cm				
			45.40			147.76			Termination at 45.40 meters Depth.				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water Table

DISTURBED SAMPLE (DS)

Standard Penetration Test (SPT)

UNDISTURBED SAMPLE (UDS)



Borehole No.: 7
SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure ₃ kg/cm ²	C _u kg/cm ²	Degree ϕ
0.00	0.50	DS-1			Hard brown clayey silt, low plastic (CL)										25								
1.00	1.45	SPT-1	64	64	Medium dense to dense grey silty fine sand with traces of gravel (SM)	2.00					33.1	19.5	13.5	16									
2.00	2.30	UDS-1																1.72	11.8	1.54			
3.00	3.45	SPT-2	14	17	Medium dense, 2.0 to 13.5 m																		
4.00	4.30	UDS-2															1.76	12.9	1.56	DS	0.5,1,1.5	0.0	30.6
5.00	5.45	SPT-3	20	21																			
6.00	6.30	UDS-3															1.80	13.7	1.58				
7.00	7.45	SPT-4	17	15			4	76	20	0													
8.00	8.30	DS-2																					
8.50	8.95	SPT-5	20	17																			
9.00	9.45	SPT-6	21	17																			
10.00	10.30	DS-3																					
10.50	10.95	SPT-7	22	17										2.64									
11.50	11.95	SPT-8	25	18																			
13.00	13.30	DS-4																					
13.50	13.95	SPT-9	35	22	- dense, 13.5 to 14.5 m																		
14.50	14.95	SPT-10	29	19	- medium dense, 14.5 to 16.5 m																		
16.00	16.30	DS-5			Dense grey silty fine sand (SM)																		

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-7
SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Type of test	Confining Pressure ₃ kg/cm ²	C _u kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
16.50	16.95	SPT-11	33	20	Dense grey silty fine sand (SM)		0	83	17	0													
17.50	17.95	SPT-12	39	22		19.00																	
19.00	19.30	DS-6			Very dense grey fine sand (SP-SM)																		
19.50	19.95	SPT-13	96	43																			
20.50	20.85	SPT-14	102/ 20cm																				
22.00	22.30	DS-7																					
22.50	22.95	SPT-15	54	26																			
23.50	23.95	SPT-16	59	28																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-17	55	26																			
26.50	26.95	SPT-18	65	29																			
28.00	28.30	DS-9																					
28.50	28.95	SPT-19	80	33			1	90	9	0													
29.50	29.95	SPT-20	66	28																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-21	77	31																			
32.50	32.95	SPT-22	83	32																			
34.00	34.30	DS-11																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-7

[illegible]

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 8

PAGE 1 OF 3

BOREHOLE NO : BH-8			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.100 m			
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.10			
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.42 m			
COORDINATES : 977 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav			
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal			
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲ 20 40 60 80 PL (%) MC (%) LL (%) 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80
1		CL	Very stiff brown clayey silt, low plastic (CL)	191.10	DS-1	0.00 - 0.50		17	
2					SPT-1	1.00 - 1.45			
3		SM	Medium dense to dense grey silty fine sand (SM) - medium dense, 2.0 to 13.5 m		UDS-1	2.00 - 2.30			
4					SPT-2	3.00 - 3.45			
5					UDS-2	4.00 - 4.30			
6					SPT-3	5.00 - 5.45			
7					UDS-3	6.00 - 6.30			
8					SPT-4	7.00 - 7.45			
9					DS-2	8.00 - 8.30			
10					SPT-5	8.50 - 8.95			
11					SPT-6	9.00 - 9.45			
12					DS-3	10.00 - 10.30			
13					SPT-7	10.50 - 10.95			
14					SPT-8	11.50 - 11.95			
15					DS-4	13.00 - 13.30			
16					SPT-9	13.50 - 13.95			
	SPT-10	14.50 - 14.95							

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 8

PAGE 2 OF 3

BOREHOLE NO : BH-8			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.100 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.10						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.42 m						
COORDINATES : 977 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%)	MC (%)	LL (%)
20 40 60 80 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80												
17		SM	Dense grey silty fine sand (SM)	172.60	DS-5	16.00 - 16.30						
SPT-11					16.50 - 16.95		38					
SPT-12					17.50 - 17.95		41					
DS-6					19.00 - 19.30							
SPT-13					19.50 - 19.95		44					
20.50												
21		CL	Hard brown clayey silt, low plastic (CL)	171.10	SPT-14	20.50 - 20.95		38				
22					22.00							
23		SP-SM	Dense to very dense grey fine sand (SP-SM)	171.10	DS-7	22.00 - 22.30						
- dense, 22.0 to 25.5 m					SPT-15	22.50 - 22.95		46				
SPT-16			23.50 - 23.95			49						
DS-8			25.00 - 25.30									
- very dense, 25.5 to 35.5 m			SPT-17		25.50 - 25.95		52					
SPT-18			26.50 - 26.95			56						
DS-9			28.00 - 28.30									
SPT-19			28.50 - 28.95			60						
SPT-20			29.50 - 29.95			62						
DS-10			31.00 - 31.30									
32					SPT-21	31.50 - 31.95		64				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 8

PAGE 3 OF 3

BOREHOLE NO : BH-8			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.100 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.10							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.42 m							
COORDINATES : 977 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 20-Dec-2019			DATE OF FINISH : 21-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%)	MC (%)	LL (%)	
										20	40	60	80
										■ FINES CONTENT (%) ■			
										20	40	60	80
33		SP-SM	35.50	Very dense grey fine sand (SP-SM)	157.60	SPT-22	32.50 - 32.95		68				
34													
35		CL	37.00	Hard brown clayey silt, low plastic (CL)	156.10	SPT-23	34.50 - 34.95		70				
36													
37		SP-SM		Very dense grey fine sand (SP-SM)		DS-12	37.00 - 37.30						
38													
39													
40		SP-SM				SPT-25	37.50 - 37.95		72				
41													
42		SP-SM				SPT-26	38.50 - 38.95		81				
43													
44		SP-SM				DS-13	40.00 - 40.30						
45													
45.42						SPT-27	40.50 - 40.95		87				
						SPT-28	41.50 - 41.95		94				
		SP-SM				DS-14	43.00 - 43.30						
45													
						SPT-29	43.50 - 43.95		98				
						SPT-30	45.00 - 45.42		100/27cm				
Termination at 45.42 meters Depth.													

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-8

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ	
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	kg/cm ²		
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)					29.5	18.0	11.5	15.0			9.0								
1.00	1.45	SPT-1	17	17			2.00		18	56	16													
2.00	2.30	UDS-1			Medium dense to dense grey silty fine sand (SM)													1.77	13.5	1.56	DS	0.5,1,1.5	0.0	30.9
3.00	3.45	SPT-2	19	23		- medium dense, 2.0 to 13.5 m																		
4.00	4.30	UDS-2													2.65									
5.00	5.45	SPT-3	20	21																				
6.00	6.30	UDS-3																						
7.00	7.45	SPT-4	18	16														1.85	15.7	1.60				
8.00	8.30	DS-2																						
8.50	8.95	SPT-5	21	17																				
9.00	9.45	SPT-6	25	19																				
10.00	10.30	DS-3																						
10.50	10.95	SPT-7	27	19																				
11.50	11.95	SPT-8	29	20				0	84	16	0													
13.00	13.30	DS-4																						
13.50	13.95	SPT-9	31	20	- dense, 13.5 to 20.5 m																			
14.50	14.95	SPT-10	35	22																				
16.00	16.30	DS-5																						

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-8

SUMMARY OF LABORATORY TEST RESULTS

Depth, m	To From	Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
							Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²	
16.50	16.95	SPT-11	38	22	Dense grey silty fine sand (SM)																		
17.50	17.95	SPT-12	41	23																			
19.00	19.30	DS-6																					
19.50	19.95	SPT-13	44	24		20.50																	
20.50	20.95	SPT-14	38	38	Hard brown clayey silt, low plastic (CL)	22.00					28.6	18.5	10.1										
22.00	22.30	DS-7			Dense to very dense grey fine sand (SP-SM)																		
22.50	22.95	SPT-15	46	24	- dense, 22.0 to 25.5 m																		
23.50	23.95	SPT-16	49	24																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-17	52	25	- very dense, 25.5 to 35.5 m																		
26.50	26.95	SPT-18	56	26																			
28.00	28.30	DS-9					2	91	7	0													
28.50	28.95	SPT-19	60	27																			
29.50	29.95	SPT-20	62	27																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-21	64	27																			
32.50	32.95	SPT-22	68	28																			
34.00	34.30	DS-11																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-8

SUMMARY OF LABORATORY TEST RESULTS

Depth, m	To From	Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
							Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure ₃ kg/cm ²	c_u kg/cm ²	
34.50	34.95	SPT-23	70	28	Very dense grey fine sand (SP-SM)	35.50																	
35.50	35.95	SPT-24	32	32	Hard brown clayey silt, low plastic (CL)	37.00					30.0	19.5	10.5										
37.00	37.30	DS-12			Very dense grey fine sand (SP-SM)																		
37.50	37.95	SPT-25	72	27																			
38.50	38.95	SPT-26	81	30																			
40.00	40.30	DS-13																					
40.50	40.95	SPT-27	87	30			1	89	10	0													
41.50	41.95	SPT-28	94	32																			
43.00	43.30	DS-14																					
43.50	43.95	SPT-29	98	32																			
45.00	45.42	SPT-30	100/27cm			45.42																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 9

PAGE 1 OF 4

BOREHOLE NO : BH-9			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m6.90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
COORDINATES : 930 E, 200 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
DATE OF START : 21-Dec-2019			DATE OF FINISH : 23-Dec-2019			CHECKED BY : Ankit Uniyal																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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1		CL	2.00	Very stiff brown clayey silt, low plastic (CL)	191.04	DS-1	0.00 - 0.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 9

PAGE 2 OF 4

BOREHOLE NO : BH-9			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90						
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m						
COORDINATES : 930 E, 200 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 21-Dec-2019			DATE OF FINISH : 23-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%) MC (%) LL (%)		
20 40 60 80												
■ FINES CONTENT (%) ■												
20 40 60 80												
17		SM	16.50 - 26.50	Medium dense to dense grey silty fine sand (SM)	166.54	DS-5	16.00 - 16.30		29			
SPT-11				16.50 - 16.95								
SPT-12				17.50 - 17.95			32					
DS-6				19.00 - 19.30								
SPT-13				19.50 - 19.95			33					
SPT-14				20.50 - 20.95			35					
DS-7				22.00 - 22.30								
SPT-15				22.50 - 22.95			39					
SPT-16				23.50 - 23.95			42					
DS-8				25.00 - 25.30								
SPT-17				25.50 - 25.95			44					
SPT-18				26.50 - 26.95			48					
DS-9				28.00 - 28.30								
SPT-19				28.50 - 28.95			52					
SPT-20				29.50 - 29.95			54					
DS-10				31.00 - 31.30								
SPT-21	31.50 - 31.95		58									

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 9

PAGE 3 OF 4

BOREHOLE NO : BH-9			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90							
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m							
COORDINATES : 930 E, 200 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 21-Dec-2019			DATE OF FINISH : 23-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
										20	40	60	80
										■ FINES CONTENT (%) ■			
										20	40	60	80
33		SP-SM	Very dense grey fine sand - SP-SM, 34.5 to 46.5 m - with traces of gravel, 35.5 to 37.0 m			SPT-22	32.50 - 32.95		61				
34						DS-11	34.00 - 34.30						
35						SPT-23	34.50 - 34.95		65				
36						SPT-24	35.50 - 35.95		67				
37						DS-12	37.00 - 37.30						
38						SPT-25	37.50 - 37.95		71				
39						SPT-26	38.50 - 38.95		73				
40						DS-13	40.00 - 40.30						
41						SPT-27	40.50 - 40.95		75				
42						SPT-28	41.50 - 41.95		80				
43						DS-14	43.00 - 43.30						
44						SPT-29	43.50 - 43.95		86				
45						SPT-30	44.50 - 44.95		89				
46						DS-15	46.00 - 46.30						
47		SP	- SP, 46.5 to 50.0 m			SPT-31	46.50 - 46.95		92				
48						SPT-32	47.50 - 47.95		94				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 9

PAGE 4 OF 4

BOREHOLE NO : BH-9			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90							
CHAINAGE : -			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m							
COORDINATES : 930 E, 200 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 21-Dec-2019			DATE OF FINISH : 23-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
20 40 60 80													
■ FINES CONTENT (%) ■													
20 40 60 80													
49		SP											
50		CL	50.00		143.04								
			50.42	Brown clayey silt, low plastic (CL)	142.62	SPT-33	50.00 - 50.42		100/27cm				
			Termination at 50.42 meters Depth.										
		</											

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water Table

DISTURBED SAMPLE (DS)

Standard Penetration Test (SPT)

UNDISTURBED SAMPLE (UDS)



Borehole No.:9

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²	Degree ϕ
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)					32.1	16.5	15.6	15										
1.00	1.45	SPT-1	25	25		2.00										17							
2.00	2.30	UDS-1				Medium dense grey silty fine sand (SM)											1.75	12.8	1.55				
3.00	3.45	SPT-2	10	12																			
4.00	4.30	UDS-2															1.79	13.9	1.57				
5.00	5.45	SPT-3	11	11																			
6.00	6.30	UDS-3															1.84	14.7	1.60				
7.00	7.45	SPT-4	12	11																			
8.00	8.30	DS-2																					
8.50	8.95	SPT-5	13	12																			
9.00	9.45	SPT-6	16	14																			
10.00	10.30	DS-3																					
10.50	10.95	SPT-7	18	15																			
11.50	11.95	SPT-8	21	17			0	87	13	0													
13.00	13.30	DS-4																					
13.50	13.95	SPT-9	23	17																			
14.50	14.95	SPT-10	26	18																			
16.00	16.30	DS-5																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:9

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Type of test	Confining Pressure ₃ kg/cm ²	C _u kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
16.50	16.95	SPT-11	29	19	Medium dense to dense grey silty fine sand (SM)																		
17.50	17.95	SPT-12	32	20	- medium dense, 16.5 to 17.5 m																		
19.00	19.30	DS-6			- dense, 17.5 to 26.5 m																		
19.50	19.95	SPT-13	33	20																			
20.50	20.95	SPT-14	35	20																			
22.00	22.30	DS-7																					
22.50	22.95	SPT-15	39	21																			
23.50	23.95	SPT-16	42	22																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-17	44	22		26.50																	
26.50	26.95	SPT-18	48	23	Dense to very dense grey fine sand (SP-SM0)		0	90	10	0													
28.00	28.30	DS-9																					
28.50	28.95	SPT-19	52	24	- dense, 26.5 to 28.5 m																		
29.50	29.95	SPT-20	54	24	- very dense, 28.5 to 50.0 m																		
31.00	31.30	DS-10																					
31.50	31.95	SPT-21	58	25																			
32.50	32.95	SPT-22	61	26																			
34.00	34.30	DS-11																					

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:9

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Type of test	Confining Pressure ₃ kg/cm ²	C _u kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
34.50	34.95	SPT-23	65	26	Very dense grey fine sand																		
35.50	35.95	SPT-24	67	27	- SP-SM, 34.5 to 46.5 m		1	91	8	0													
37.00	37.30	DS-12			- with traces of gravel, 35.5 to 37.0 m																		
37.50	37.95	SPT-25	71	27																			
38.50	38.95	SPT-26	73	27																			
40.00	40.30	DS-13																					
40.50	40.95	SPT-27	75	27																			
41.50	41.95	SPT-28	80	28																			
43.00	43.30	DS-14																					
43.50	43.95	SPT-29	86	29																			
44.50	44.95	SPT-30	89	30																			
46.00	46.30	DS-15																					
46.50	46.95	SPT-31	92	30	- SP, 46.5 to 50.0 m		0	96	4	0													
47.50	47.95	SPT-32	94	30																			
49.00	49.30	DS-16				50.00																	
50.00	50.42	SPT-33	100/ 27cm		Hard brown clayey silt, low plastic (CL)	50.42					33.8	18.9	14.8										

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 10

PAGE 1 OF 3

BOREHOLE NO : BH-10			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.01							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m							
COORDINATES : 883 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 16-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20	40	60	80
										PL (%)	MC (%)	LL (%)	
										20	40	60	80
										■ FINES CONTENT (%) ■			
										20	40	60	80
1		CL	3.00	Very stiff brown clayey silt, low plastic (CL)	190.04	DS-1	0.00 - 0.50		23				
SPT-1						1.00 - 1.45							
UDS-1						2.00 - 2.30							
3		SM	3.00	Medium dense to dense grey silty fine sand (SM) - medium dense, 3.0 to 14.5 m - with traces of gravel, 5.0 to 6.0 m	190.04	SPT-2	3.00 - 3.45		15				
4						UDS-2	4.00 - 4.30						
5						SPT-3	5.00 - 5.45						
6						UDS-3	6.00 - 6.30						
7						SPT-4	7.00 - 7.45		15				
8						UDS-4	8.00 - 8.30						
9						SPT-5	9.00 - 9.45						
10						DS-2	10.00 - 10.30		17				
11						SPT-6	10.50 - 10.95						
12						SPT-7	11.50 - 11.95						24
13						DS-3	13.00 - 13.30						
14						SPT-8	13.50 - 13.95		27				
15						SPT-9	14.50 - 14.95						
16													

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 10

PAGE 2 OF 3

BOREHOLE NO : BH-10			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m									
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.01									
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m									
COORDINATES : 883 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav									
DATE OF START : 16-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal									
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲					
										20 40 60 80					
										PL (%)	MC (%)	LL (%)			
20 40 60 80 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80															
17		SM	20.50	Dense grey silty fine sand (SM)	172.54	DS-4	16.00 - 16.30								
SPT-10						16.50 - 16.95		33							
SPT-11						17.50 - 17.95		37							
DS-5						19.00 - 19.30									
SPT-12						19.50 - 19.95		39							
21		CL	22.50	Hard brown clayey silt, low plastic (CL)	170.54	SPT-13	20.50 - 20.95		42						
DS-6						22.00 - 22.30									
23		SP-SM	- dense, 22.5 to 25.5 m	- very dense, 25.5 to 45.45 m		SPT-14	22.50 - 22.95		46						
SPT-15						23.50 - 23.95		49							
DS-7						25.00 - 25.30									
SPT-16						25.50 - 25.95		53							
SPT-17						26.50 - 26.95		55							
29							DS-8	28.00 - 28.30			SPT-18	28.50 - 28.95		60	
SPT-19											29.50 - 29.95		63		
DS-9											31.00 - 31.30				
SPT-20											31.50 - 31.95		66		

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 10

PAGE 3 OF 3

BOREHOLE NO : BH-10			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.040 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.01							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m							
COORDINATES : 883 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 16-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%)	MC (%)	LL (%)	
										20	40	60	80
										■ FINES CONTENT (%) ■			
										20	40	60	80
33		SP-SM	Very dense grey fine sand (SP-SM)			SPT-21	32.50 - 32.95		67				
34						DS-10	34.00 - 34.30						
35						SPT-22	34.50 - 34.95		70				
36						SPT-23	35.50 - 35.95		75				
37						DS-11	37.00 - 37.30						
38						SPT-24	37.50 - 37.95		80				
39						SPT-25	38.50 - 38.95		83				
40						DS-12	40.00 - 40.30						
41						SPT-26	40.50 - 40.95		86				
42						SPT-27	41.50 - 41.95		87				
43						DS-13	43.00 - 43.30						
44						SPT-28	43.50 - 43.95		91				
45						SPT-29	44.50 - 44.95		97				
								45.45	Termination at 45.45 meters Depth.		147.59	SPT-30	45.00 - 45.45

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-10

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ	
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	c_u kg/cm ²		
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)																			
1.00	1.45	SPT-1	23	23								15.0												
2.00	2.30	UDS-1				3.00											1.75	9.4	1.60					
3.00	3.45	SPT-2	15	18		Medium dense to dense grey silty fine sand (SM)																		
4.00	4.30	UDS-2			- medium dense, 3.0 to 14.5 m								2.68				1.80	14.3	1.57					
5.00	5.45	SPT-3	14	15	- with traces of gravel, 5.0 to 6.0 m		2	61	36	1														
6.00	6.30	UDS-3															1.86	18.1	1.57					
7.00	7.45	SPT-4	15	14																				
8.00	8.30	UDS-4															1.96	24.3	1.58					
9.00	9.45	SPT-5	17	15																				
10.00	10.30	DS-2																						
10.50	10.95	SPT-6	21	17																				
11.50	11.95	SPT-7	24	18																				
13.00	13.30	DS-3																						
13.50	13.95	SPT-8	27	19																				
14.50	14.95	SPT-9	30	20	- dense, 14.5 to 20.5 m		0	81	19	0														
16.00	16.30	DS-4																						
16.50	16.95	SPT-10	33	20																				

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-10

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Type of test	Confining Pressure, kg/cm ²	C _u , kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
17.50	17.95	SPT-11	37	22	Dense grey silty fine sand (SM)																		
19.00	19.30	DS-5																					
19.50	19.95	SPT-12	39	22		20.50																	
20.50	20.95	SPT-13	42	42	Hard brown clayey silt, low plastic (CL)	22.00					29.9	21.6	8.3										
22.00	22.30	DS-6			Dense to very dense grey fine sand (SP-SM)																		
22.50	22.95	SPT-14	46	24	- dense, 22.5 to 25.5 m																		
23.50	23.95	SPT-15	49	24			0	91	9	0													
25.00	25.30	DS-7																					
25.50	25.95	SPT-16	53	25	- very dense, 25.5 to 45.45 m																		
26.50	26.95	SPT-17	55	26																			
28.00	28.30	DS-8																					
28.50	28.95	SPT-18	60	27																			
29.50	29.95	SPT-19	63	27																			
31.00	31.30	DS-9																					
31.50	31.95	SPT-20	66	28																			
32.50	32.95	SPT-21	67	27																			
34.00	34.30	DS-10																					
34.50	34.95	SPT-22	70	28																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-10

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	
35.50	35.95	SPT-23	75	29	Very dense grey fine sand (SP-SM)		1	92	7	0													
37.00	37.30	DS-11																					
37.50	37.95	SPT-24	80	30																			
38.50	38.95	SPT-25	83	30																			
40.00	40.30	DS-12																					
40.50	40.95	SPT-26	86	30																			
41.50	41.95	SPT-27	87	30																			
43.00	43.30	DS-13																					
43.50	43.95	SPT-28	91	31																			
44.50	44.95	SPT-29	97	32																			
45.00	45.45	SPT-30	98	32		45.45																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 11

PAGE 1 OF 3

BOREHOLE NO : BH-11			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.090 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.30						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.36 m						
COORDINATES : 837 E, 200 N			CASING DEPTH : 44.80 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 15-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
									20	40	60	80
									PL (%)	MC (%)	LL (%)	
20 40 60 80 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80												
1		CL	Stiff brown clayey silt, low plastic (CL)	190.09	DS-1	0.00 - 0.50		15				
2			SPT-1		1.00 - 1.45							
3			UDS-1		2.00 - 2.30							
4		SM	Medium dense grey silty fine sand (SM)	180.09	SPT-2	3.00 - 3.45		11				
5			UDS-2		4.00 - 4.30							
6			SPT-3		5.00 - 5.45		16					
7			UDS-3		6.00 - 6.30							
8			SPT-4		7.00 - 7.45		15					
9			DS-2		8.00 - 8.30							
10			SPT-5		9.00 - 9.45		18					
11			DS-3		10.00 - 10.30							
12			SPT-6		10.50 - 10.95		21					
13			SPT-7		11.50 - 11.95					19		
14					SP-SM	Medium dense to very dense grey fine sand (SP-SM)	DS-4				13.00 - 13.30	
15						- medium dense, 13.0 to 14.5 m	SPT-8			13.50 - 13.95		
16	- dense, 14.5 to 26.5 m	SPT-9		14.50 - 14.95			34					

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 11

PAGE 2 OF 3

BOREHOLE NO : BH-11				BORING METHOD : Shell and Auger				GROUND ELEVATION : RL 193.090 m					
STRUCTURE: STG				SPT HAMMER USED : Automatic Trip				GROUND WATER DEPTH, m 6.30					
CHAINAGE :				BOREHOLE DIAMETER 150mm				TERMINATION DEPTH : 45.36 m					
COORDINATES : 837 E, 200 N				CASING DEPTH : 44.80 m				LOGGED BY : Mr. Gaurav					
DATE OF START : 15-Dec-2019				DATE OF FINISH : 17-Dec-2019				CHECKED BY : Ankit Uniyal					
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
										20 40 60 80			
■ FINES CONTENT (%) ■													
20 40 60 80													
17		SP-SM	Dense to very dense grey fine sand (SP-SM)	- dense, 17.5 to 26.5 m		DS-5	16.00 - 16.30						
					SPT-10	16.50 - 16.95		30					
18						SPT-11	17.50 - 17.95		36				
19						DS-6	19.00 - 19.30						
20						SPT-12	19.50 - 19.95		43				
21						SPT-13	20.50 - 20.95		39				
22						DS-7	22.00 - 22.30						
23						SPT-14	22.50 - 22.95		40				
24						SPT-15	23.50 - 23.95		43				
25						DS-8	25.00 - 25.30						
26				SPT-16	25.50 - 25.95		46						
27				SPT-17	26.50 - 26.95		53						
28				DS-9	28.00 - 28.30								
29				SPT-18	28.50 - 28.95		59						
30				SPT-19	29.50 - 29.95		69						
31				DS-10	31.00 - 31.30								
32				SPT-20	31.50 - 31.95		63						

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 11

PAGE 3 OF 3

BOREHOLE NO : BH-11			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.090 m																
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.30																
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.36 m																
COORDINATES : 837 E, 200 N			CASING DEPTH : 44.80 m			LOGGED BY : Mr. Gaurav																
DATE OF START : 15-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal																
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲												
										20 40 60 80												
										PL (%) MC (%) LL (%)												
										20 40 60 80												
										■ FINES CONTENT (%) ■												
										20 40 60 80												
		SP-SM	32.50		160.59																	
33		SM	Very dense grey silty fine sand (SM)			SPT-21	32.50 - 32.95		73													
34																						
						DS-11	34.00 - 34.30															
35						SPT-22	34.50 - 34.95		75													
36						SPT-23	35.50 - 35.95		78													
37						DS-12	37.00 - 37.30															
38						SPT-24	37.50 - 37.95		95													
39						SPT-25	38.50 - 38.95		99													
40						DS-13	40.00 - 40.30															
41						SPT-26	40.50 - 40.92		101/27cm													
42		SPT-27	41.50 - 41.87		101/22cm																	
43		DS-14	43.00 - 43.30																			
44		SPT-28	43.50 - 43.90		101/25cm																	
45																						
			45.36	Termination at 45.36 meters Depth.	147.73	SPT-29	45.00 - 45.36		101/21cm													

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-11

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			Degree ϕ	
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	C _u kg/cm ²		
0.00	0.50	DS-1			Stiff brown clayey silt, low plastic (CL)																			
1.00	1.45	SPT-1	15	15							33.9	20.7	13.2	22.0		17.5								
2.00	2.30	UDS-1				3.00											1.71	9.4	1.56					
3.00	3.45	SPT-2	11	13	Medium dense grey silty fine sand (SM)																			
4.00	4.30	UDS-2																	1.79	15.0	1.56			
5.00	5.45	SPT-3	16	17			0	78	22	0														
6.00	6.30	UDS-3																						
7.00	7.45	SPT-4	15	14																				
8.00	8.30	DS-2																						
9.00	9.45	SPT-5	18	16																				
10.00	10.30	DS-3																						
10.50	10.95	SPT-6	21	17																				
11.50	11.95	SPT-7	19	16		13.00	1	82	17	0														
13.00	13.30	DS-4			Medium dense to very dense grey fine sand (SP-SM)																			
13.50	13.95	SPT-8	26	18		- medium dense, 13.0 to 14.5 m																		
14.50	14.95	SPT-9	34	21		- dense, 14.5 to 26.5 m																		
16.00	16.30	DS-5																						
16.50	16.95	SPT-10	30	20																				

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-11

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	
17.50	17.95	SPT-11	36	22	Dense to very dense grey fine sand (SP-SM)																		
19.00	19.30	DS-6			- dense, 17.5 to 26.5 m																		
19.50	19.95	SPT-12	43	24																			
20.50	20.95	SPT-13	39	22																			
22.00	22.30	DS-7																					
22.50	22.95	SPT-14	40	22			1	89	10	0													
23.50	23.95	SPT-15	43	23																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-16	46	23																			
26.50	26.95	SPT-17	53	25	- very dense, 26.5 to 32.5 m																		
28.00	28.30	DS-9																					
28.50	28.95	SPT-18	59	26																			
29.50	29.95	SPT-19	69	29																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-20	63	27		32.50																	
32.50	32.95	SPT-21	73	30	Very dense grey silty fine sand (SM)		0	52	46	2													
34.00	34.30	DS-11																					
34.50	34.95	SPT-22	75	29																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-11

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density gms/cm ³	Moisture Content, %	Dry Density g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	kg/cm ²	
35.50	35.95	SPT-23	78	30	Very dense grey silty fine sand (SM)																		
37.00	37.30	DS-12																					
37.50	37.95	SPT-24	95	34																			
38.50	38.95	SPT-25	99	35																			
40.00	40.30	DS-13																					
40.50	40.92	SPT-26	101/27cm																				
41.50	41.87	SPT-27	101/22cm																				
43.00	43.30	DS-14																					
43.50	43.90	SPT-28	101/25cm																				
45.00	45.36	SPT-29	101/21cm			45.36																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 12

PAGE 1 OF 3

BOREHOLE NO : BH-12			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.120 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.20						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m						
COORDINATES : 790 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 14-Dec-2019			DATE OF FINISH : 15-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
									20 40 60 80			
									PL (%) MC (%) LL (%)			
20 40 60 80												
■ FINES CONTENT (%) ■												
20 40 60 80												
1		CL	Very stiff brown clayey silt, low plastic (CL)	190.12	DS-1	0.00 - 0.50		22				
					SPT-1	1.00 - 1.45						
2					UDS-1	2.00 - 2.30						
3		SM	Medium desne to dense grey silty fine sand (SM) - medium dense, 3.0 to 14.5 m 									

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

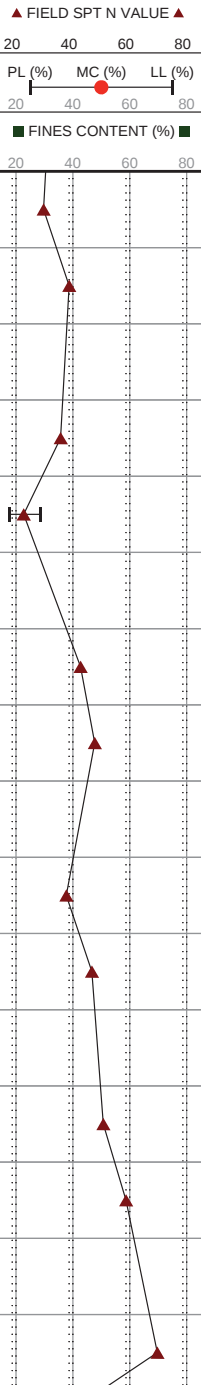
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 12

PAGE 2 OF 3

BOREHOLE NO : BH-12			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.120 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.20							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 45.45 m							
COORDINATES : 790 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 14-Dec-2019			DATE OF FINISH : 15-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%) 20 40 60 80			
■ FINES CONTENT (%) ■													
17		SM	20.50	Dense grey silty fine sand (SM)	172.62	DS-6	16.00 - 16.30						
SPT-10						16.50 - 16.95		31					
SPT-11						17.50 - 17.95		40					
DS-7						19.00 - 19.30							
SPT-12						19.50 - 19.95		37					
21		CL	22.00	Very stiff brown clayey silt, low plastic (CL)	171.12	SPT-13	20.50 - 20.95		24				
23		SP	28.50	Dense to very dense grey fine sand (SP) - dense, 22.0 to 28.5 m - very dense, 28.5 to 32.5 m	170.00	DS-8	22.00 - 22.30						
SPT-14						22.50 - 22.95		44					
SPT-15						23.50 - 23.95		49					
DS-9						25.00 - 25.50							
SPT-16						25.50 - 25.95		39					
SPT-17						26.50 - 26.95		48					
DS-10						28.00 - 28.30							
SPT-18						28.50 - 28.95		52					
SPT-19						29.50 - 29.95		60					
DS-11						31.00 - 31.30							
SPT-20						31.50 - 31.95		71					

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 12

PAGE 3 OF 3

BOREHOLE NO : BH-12			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.120 m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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COORDINATES : 790 E, 200 N			CASING DEPTH : 45.00 m			LOGGED BY : Mr. Gaurav																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-12

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Type of test	Confining Pressure, kg/cm ²	kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)						29.5	18.5	11.0										
1.00	1.45	SPT-1	22	22																			
2.00	2.30	UDS-1				3.00																	
3.00	3.45	SPT-2	16	19	Medium dense to dense grey silty fine sand (SM)			56	43	1							1.75	12.9	1.55				
4.00	4.30	UDS-2			- medium dense, 3.0 to 14.5 m		0										1.79	13.5	1.58				
5.00	5.45	SPT-3	14	15																			
6.00	6.30	DS-2													2.67								
7.00	7.45	SPT-4	17	16																			
8.00	8.30	DS-3																					
9.00	9.45	SPT-5	19	16			0	63	36	1													
10.00	10.30	DS-4																					
10.50	10.95	SPT-6	21	17																			
11.50	11.95	SPT-7	24	18																			
13.00	13.30	DS-5																					
13.50	13.95	SPT-8	28	19																			
14.50	14.95	SPT-9	34	22	- dense, 14.5 to 20.5 m																		
16.00	16.30	DS-6																					
16.50	16.95	SPT-10	31	20																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-12

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Type of test	Confining Pressure, kg/cm ²	C _u , kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
17.50	17.95	SPT-11	40	23	Dense grey silty fine sand (SM)																		
19.00	19.30	DS-7				20.50																	
19.50	19.95	SPT-12	37	21																			
20.50	20.95	SPT-13	24	24	Very stiff brown clayey silt, low plastic (CL)	22.00					28.4	17.8	10.6										
22.00	22.30	DS-8			Dense to very dense grey fine sand (SP)																		
22.50	22.95	SPT-14	44	23	- dense, 22.0 to 28.5 m																		
23.50	23.95	SPT-15	49	25																			
25.00	25.50	DS-9																					
25.50	25.95	SPT-16	39	21				93	3	0													
26.50	26.95	SPT-17	48	23			4																
28.00	28.30	DS-10																					
28.50	28.95	SPT-18	52	24	- very dense, 28.5 to 32.5 m																		
29.50	29.95	SPT-19	60	27																			
31.00	31.30	DS-11																					
31.50	31.95	SPT-20	71	29		32.50																	
32.50	32.95	SPT-21	31	31	Hard brown clayey silt, low plastic (CL)	34.00					29.7	18.6	11.0										
34.00	34.30	DS-12			Very dense grey silty fine sand (SM)																		
34.50	34.95	SPT-22	50	22																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-12

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	
35.50	37.95	SPT-23	55	23	Very dense grey silty fine sand (SM)																		
37.00	37.30	DS-13																					
37.50	37.95	SPT-24	73	28	- with gravel, 37.5 to 38.5 m		7	71	21	1													
38.50	38.95	SPT-25	70	27																			
40.00	40.30	DS-14																					
40.50	40.95	SPT-26	85	30																			
41.50	41.95	SPT-27	89	31																			
43.00	43.30	DS-15																					
43.50	43.95	SPT-28	82	28																			
45.00	45.45	SPT-29	89	30		45.45																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 13

PAGE 1 OF 4

BOREHOLE NO : BH-13			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.570 m			
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90			
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.38 m			
COORDINATES : 743 E, 200 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav			
DATE OF START : 14-Dec-2019			DATE OF FINISH : 16-Dec-2019			CHECKED BY : Ankit Uniyal			
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲ 20 40 60 80 PL (%) MC (%) LL (%) 20 40 60 80 ■ FINES CONTENT (%) ■
1		CL	Very stiff brown clayey silt, low plastic (CL)		DS-1	0.00 - 0.50		25	
2					SPT-1	1.00 - 1.45			
3					UDS-1	2.00 - 2.30			
4					SPT-2	3.00 - 3.45			
5		SM	Medium dense to dense grey silty fine sand (SM) - medium dense, 4.0 to 14.5 m	189.57 	UDS-2	4.00 - 4.30		16	
6					SPT-3	5.00 - 5.45			
7					UDS-3	6.00 - 6.30			
8					SPT-4	7.00 - 7.45			
9					DS-2	8.00 - 8.30			
10					SPT-5	9.00 - 9.45			
11					DS-3	10.00 - 10.30			
12					SPT-6	10.50 - 10.95			
13					SPT-7	11.50 - 11.95			
14					DS-4	13.00 - 13.30			
15					SPT-8	13.50 - 13.95			
16					SPT-9	14.50 - 14.95			
			- dense, 14.5 to 20.5 m						

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

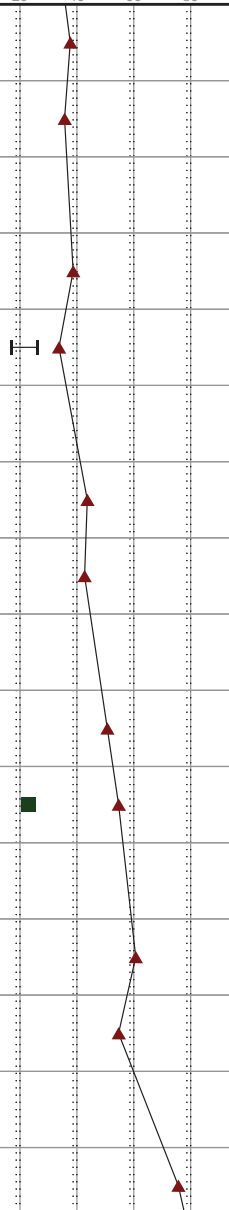
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 13

PAGE 2 OF 4

BOREHOLE NO : BH-13				BORING METHOD : Shell and Auger				GROUND ELEVATION : RL 193.570 m						
STRUCTURE: STG				SPT HAMMER USED : Automatic Trip				GROUND WATER DEPTH, m 6.90						
CHAINAGE :				BOREHOLE DIAMETER 150mm				TERMINATION DEPTH : 50.38 m						
COORDINATES : 743 E, 200 N				CASING DEPTH : 50.00 m				LOGGED BY : Mr. Gaurav						
DATE OF START : 14-Dec-2019				DATE OF FINISH : 16-Dec-2019				CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲				
										20 40 60 80				
										PL (%) MC (%) LL (%) 20 40 60 80				
											■ FINES CONTENT (%) ■			
											20 40 60 80			
17		SM	20.50	Dense grey silty fine sand (SM)	173.07	DS-5	16.00 - 16.30							
SPT-10						16.50 - 16.95		39						
SPT-11						17.50 - 17.95		37						
DS-6						19.00 - 19.30								
20		CL	22.00	Hard brown clayey silt, low plastic (CL)	171.57	SPT-12	19.50 - 19.95		40					
SPT-13						20.50 - 20.95		35						
DS-7						22.00 - 22.30								
23		SM	22.00	Dense to very dense grey silty fine sand (SM) - dense, 22.0 to 25.5 m - very dense, 25.5 to 50.38 m	171.57	SPT-14	22.50 - 22.95		45					
SPT-15						23.50 - 23.95		44						
DS-8						25.00 - 25.30								
SPT-16						25.50 - 25.95		52						
SPT-17						26.50 - 26.95		56						
DS-9						28.00 - 28.30								
SPT-18						28.50 - 28.95		62						
SPT-19	29.50 - 29.95		56											
31		SM	22.00		171.57	DS-10	31.00 - 31.30							
32						SPT-20	31.50 - 31.95		77					

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 13

PAGE 3 OF 4

BOREHOLE NO : BH-13				BORING METHOD : Shell and Auger				GROUND ELEVATION : RL 193.570 m													
STRUCTURE: STG				SPT HAMMER USED : Automatic Trip				GROUND WATER DEPTH, m 6.90													
CHAINAGE :				BOREHOLE DIAMETER 150mm				TERMINATION DEPTH : 50.38 m													
COORDINATES : 743 E, 200 N				CASING DEPTH : 50.00 m				LOGGED BY : Mr. Gaurav													
DATE OF START : 14-Dec-2019				DATE OF FINISH : 16-Dec-2019				CHECKED BY : Ankit Uniyal													
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲											
										20 40 60 80											
										PL (%) MC (%) LL (%) 20 40 60 80											
											■ FINES CONTENT (%) ■										
											20 40 60 80										
33				Dense to very dense grey silty fine sand (SM)		SPT-21	32.50 - 32.95		83												
34							DS-11	34.00 - 34.30													
35							SPT-22	34.50 - 34.95		89											
36							SPT-23	35.50 - 35.95		42											
37							DS-12	37.00 - 37.30													
38							SPT-24	37.50 - 37.95		94											
39							SPT-25	38.50 - 38.92		101/27cm											
40							DS-13	40.00 - 40.30													
41							SPT-26	40.50 - 40.91		101/26cm											
42							SPT-27	41.50 - 41.95		99											
43				- dense, 35.5 to 38.5 m		DS-14	43.00 - 43.30		01/25cm												
44							SPT-28	43.50 - 43.90													
45							SPT-29	44.50 - 44.95		90											
46							DS-15	46.00 - 46.30													
47							SPT-30	46.50 - 46.92		101/27cm											
48							SPT-31	47.50 - 47.90		101/25cm											

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 13

PAGE 4 OF 4

BOREHOLE NO : BH-13			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.570 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.38 m							
COORDINATES : 743 E, 200 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 14-Dec-2019			DATE OF FINISH : 16-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
										20 40 60 80			
										■ FINES CONTENT (%) ■			
										20 40 60 80			
49		SM	50.38	Termination at 50.38 meters Depth.	143.19								
DS-16						49.00 - 49.30							
50						SPT-32	50.00 - 50.38		102/23cm				

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-13

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	c_u , kg/cm ²	
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)																		
1.00	1.45	SPT-1	25	25							29.1	22.9	6.2	15.0		10.5							
2.00	2.30	UDS-1															1.74	8.9	1.60				
3.00	3.45	SPT-2	19	19		4.00	0	44	52	4													
4.00	4.30	UDS-2			Medium dense to dense grey silty fine sand (SM)												1.83	16.3	1.57	DS	0.5, 1.1, 1.5	0.0	30.7
5.00	5.45	SPT-3	18	19	19 - medium dense, 4.0 to 14.5 m																		
6.00	6.30	UDS-3													2.65		1.90	20.3	1.58				
7.00	7.45	SPT-4	16	15																			
8.00	8.30	DS-2																					
9.00	9.45	SPT-5	16	15																			
10.00	10.30	DS-3																					
10.50	10.95	SPT-6	19	16																			
11.50	11.95	SPT-7	23	18			0	71	28	1													
13.00	13.30	DS-4																					
13.50	13.95	SPT-8	28	19																			
14.50	14.95	SPT-9	32	21	21 - dense, 14.5 to 20.5 m																		
16.00	16.30	DS-5																					
16.50	16.95	SPT-10	39	23																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-13

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Type of test	Confining Pressure, kg/cm ²	C _u , kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
17.50	17.95	SPT-11	37	22	Dense grey silty fine sand (SM)																		
19.00	19.30	DS-6																					
19.50	19.95	SPT-12	40	23		20.50																	
20.50	20.95	SPT-13	35	35	Hard brown clayey silt, low plastic (CL)	22.00					26.0	16.9	9.1										
22.00	22.30	DS-7			Dense to very dense grey silty fine sand (SM)																		
22.50	22.95	SPT-14	45	24	- dense, 22.0 to 25.5 m																		
23.50	23.95	SPT-15	44	23																			
25.00	25.30	DS-8																					
25.50	25.95	SPT-16	52	25	- very dense, 25.5 to 50.38 m																		
26.50	26.95	SPT-17	56	26			0	77	23	0													
28.00	28.30	DS-9																					
28.50	28.95	SPT-18	62	27																			
29.50	29.95	SPT-19	56	25																			
31.00	31.30	DS-10																					
31.50	31.95	SPT-20	77	31																			
32.50	32.95	SPT-21	83	33																			
34.00	34.30	DS-11																					
34.50	34.95	SPT-22	89	34			1	76	23	0													

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-13

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, g/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	
35.50	35.95	SPT-23	42	20	Dense to very dense grey silty fine sand (SM)																		
37.00	37.30	DS-12			- dense, 35.5 to 38.5 m																		
37.50	37.95	SPT-24	94	34																			
38.50	38.92	SPT-25	101/27cm		- very dense, 38.5 to 50.38																		
40.00	40.30	DS-13																					
40.50	40.91	SPT-26	101/26cm																				
41.50	41.95	SPT-27	99	34																			
43.00	43.30	DS-14	101/25cm																				
43.50	43.90	SPT-28																					
44.50	44.95	SPT-29	90	30																			
46.00	46.30	DS-15																					
46.50	46.92	SPT-30	101/27cm																				
47.50	47.90	SPT-31	101/25cm																				
49.00	49.30	DS-16																					
50.00	50.38	SPT-32	102/23cm			50.38																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 14

PAGE 1 OF 3

BOREHOLE NO : BH-14			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.360 m											
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90											
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.45 m											
COORDINATES : 703 E, 200 N			CASING DEPTH : 38.00 m			LOGGED BY : Mr. Gaurav											
DATE OF START : 09-Dec-2019			DATE OF FINISH : 11-Dec-2019			CHECKED BY : Ankit Uniyal											
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲							
										20 40 60 80							
										PL (%)	MC (%)	LL (%)					
										20	40	60	80				
										■ FINES CONTENT (%) ■							
										20	40	60	80				
1		SM	Medium dense to dense grey silty fine sand (SM)	- medium dense, 0.0 to 13.5 m		DS-1	0.00 - 0.50		16								
SPT-1						1.00 - 1.45											
UDS-1						2.00 - 2.30											
SPT-2						3.00 - 3.45		13									
UDS-2						4.00 - 4.30											
SPT-3						5.00 - 5.45						19					
UDS-3						6.00 - 6.30											
SPT-4						7.00 - 7.45							21				
UDS-4						8.00 - 8.30											
SPT-5						9.00 - 9.45								26			
DS-2						10.00 - 10.30											
SPT-6						10.50 - 10.95									28		
SPT-7						11.50 - 11.95										30	
DS-3						13.00 - 13.30											
SPT-8						13.50 - 13.95											31
SPT-9						14.50 - 14.95											
- dense, 13.5 to 20.5 m																	

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

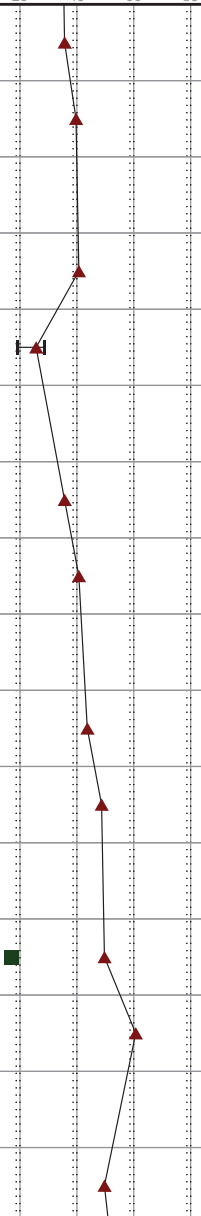
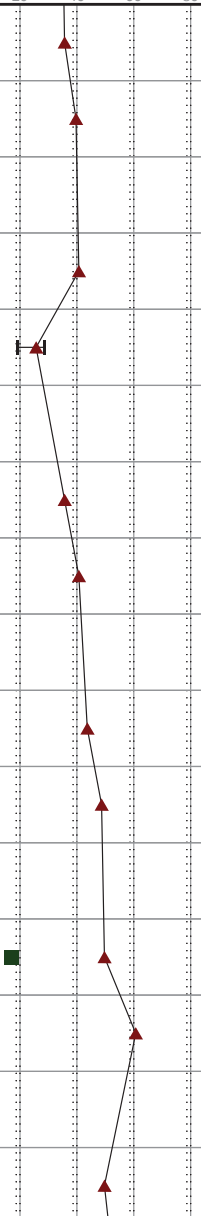
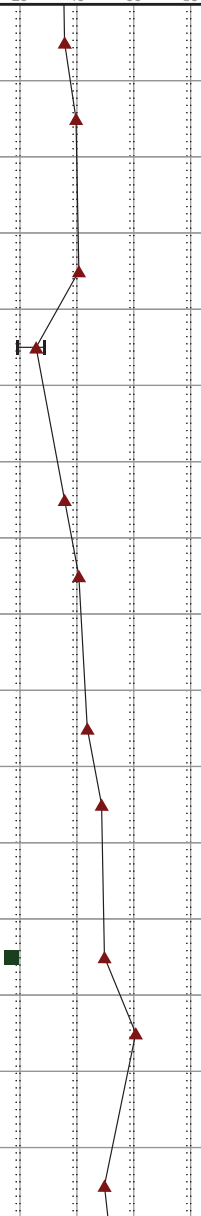
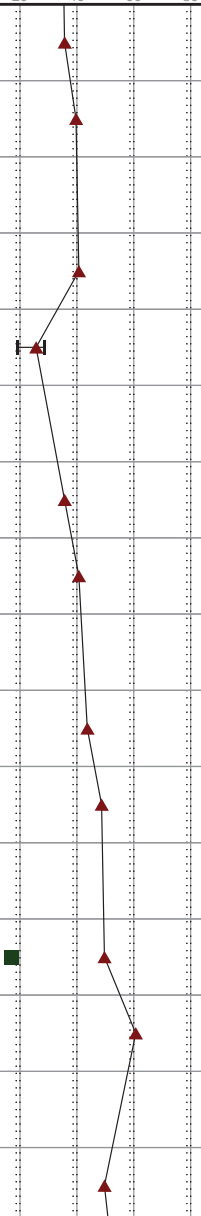
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 14

PAGE 2 OF 3

BOREHOLE NO : BH-14			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.360 m										
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90										
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.45 m										
COORDINATES : 703 E, 200 N			CASING DEPTH : 38.00 m			LOGGED BY : Mr. Gaurav										
DATE OF START : 09-Dec-2019			DATE OF FINISH : 11-Dec-2019			CHECKED BY : Ankit Uniyal										
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲						
										20 40 60 80						
										PL (%) MC (%) LL (%) 20 40 60 80						
■ FINES CONTENT (%) ■																
17		SM	172.86	Dense grey silty fine sand (SM)	172.86	DS-4	16.00 - 16.30		37							
SPT-10						16.50 - 16.95										
SPT-11						17.50 - 17.95		41								
DS-5						19.00 - 19.30										
SPT-12						19.50 - 19.95		42								
20.50																
21		CL	171.36	Very stiff brown clayey silt, low plastic (CL)	171.36	SPT-13	20.50 - 20.95		27							
22																
22		SP-SM	164.86	Dense grey fine sand (SP-SM)	164.86	DS-6	22.00 - 22.30		37							
23						SPT-14	22.50 - 22.95									
24						SPT-15	23.50 - 23.95				42					
25						DS-7	25.00 - 25.30									
26						SPT-16	25.50 - 25.95				45					
27						SPT-17	26.50 - 26.95				50					
28						DS-8	28.00 - 28.30									
28.50																
29						SM	164.86	Very dense grey silty fine sand (SM)			164.86	SPT-18	28.50 - 28.95		51	
30												SPT-19	29.50 - 29.95		62	
31	DS-9	31.00 - 31.30														
32	SPT-20	31.50 - 31.95		51												

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 14

PAGE 3 OF 3

BOREHOLE NO : BH-14			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.360 m					
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.90					
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.45 m					
COORDINATES : 703 E, 200 N			CASING DEPTH : 38.00 m			LOGGED BY : Mr. Gaurav					
DATE OF START : 09-Dec-2019			DATE OF FINISH : 11-Dec-2019			CHECKED BY : Ankit Uniyal					
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲ 20 40 60 80 PL (%) MC (%) LL (%) 20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80	
33		SM				SPT-21	32.50 - 32.95		54		
34											
35							DS-10	34.00 - 34.30			
35.50			35.50	Very stiff brown clayey silt, low plastic (CL)	157.86	SPT-22	34.50 - 34.95		55		
36		CL					SPT-23	35.50 - 35.95		27	
37											
37.50						DS-11	37.00 - 37.30				
38		SM		Dense grey silty fine sand (SM)	155.86	SPT-24	37.50 - 37.95		43		
39							SPT-25	38.50 - 38.95		46	
40							SPT-26	40.00 - 40.45		47	
			40.45	Termination at 40.45 meters Depth.	152.91						

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-14

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	c_u , kg/cm ²	
0.00	0.50	DS-1			Medium dense to dense grey silty fine sand (SM)																		
1.00	1.45	SPT-1	16	25	- medium dense, 0.0 to 13.5 m		7	51	33	9													
2.00	2.30	UDS-1															1.73	12.5	1.54				
3.00	3.45	SPT-2	13	16																			
4.00	4.30	UDS-2															1.76	13.7	1.55				
5.00	5.45	SPT-3	19	20											2.63								
6.00	6.30	UDS-3															1.80	14.5	1.57	DS	0.5,1,1.5	0.0	31.9
7.00	7.45	SPT-4	21	18																			
8.00	8.30	UDS-4															1.83	15.8	1.58				
9.00	9.45	SPT-5	26	20																			
10.00	10.30	DS-2																					
10.50	10.95	SPT-6	28	20																			
11.50	11.95	SPT-7	30	21																			
13.00	13.30	DS-3																					
13.50	13.95	SPT-8	31	21	- dense, 13.5 to 20.5 m		1	65	33	1													
14.50	14.95	SPT-9	36	22																			
16.00	16.30	DS-4																					
16.50	16.95	SPT-10	37	22																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-14

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ g/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure ₃ kg/cm ²	kg/cm ²	
17.50	17.95	SPT-11	41	23	Dense grey silty fine sand (SM)																		
19.00	19.30	DS-5																					
19.50	19.95	SPT-12	42	23		20.50																	
20.50	20.95	SPT-13	27	27	Very stiff brown clayey silt, low plastic (CL)	22.00					28.5	19.2	9.4										
22.00	22.30	DS-6			Dense grey fine sand (SP-SM)																		
22.50	22.95	SPT-14	37	21																			
23.50	23.95	SPT-15	42	22																			
25.00	25.30	DS-7																					
25.50	25.95	SPT-16	45	23																			
26.50	26.95	SPT-17	50	24																			
28.00	28.30	DS-8				28.50																	
28.50	28.95	SPT-18	51	24	Very dense grey silty fine sand (SM)		0	83	17	0													
29.50	29.95	SPT-19	62	27																			
31.00	31.30	DS-9																					
31.50	31.95	SPT-20	51	23																			
32.50	32.95	SPT-21	54	24			3	83	14	0													
34.00	34.30	DS-10																					
34.50	34.95	SPT-22	55	24		35.50																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-14

[illegible]

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 15

PAGE 1 OF 3

BOREHOLE NO : BH-15			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.350 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.3 m						
COORDINATES : 703 E, 178 N			CASING DEPTH : 38 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 08-Dec-2019			DATE OF FINISH : 09-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
									20 40 60 80			
									PL (%) MC (%) LL (%) 20 40 60 80			
■ FINES CONTENT (%) ■												
1		CL	Very stiff brown clayey silt, low plastic (CL)	190.35	DS-1	0.00 - 0.50		19				
SPT-1					1.00 - 1.45							
2					UDS-1	2.00 - 2.30						
3												
4		SM	Medium dense to dense grey silty fine sand (SM) - medium dense, 3.0 to 9.0 m - with traces of gravel, 5.0 to 6.0 m - dense, 9.0 to 17.5m		SPT-2	3.00 - 3.45		21				
5					UDS-2	4.00 - 4.30						
6					SPT-3	5.00 - 5.45					22	
7					UDS-3	6.00 - 6.30						
8					SPT-4	7.00 - 7.45					23	
9					DS-2	8.00 - 8.30						
10					SPT-5	9.00 - 9.45					31	
11					DS-3	10.00 - 10.30						
12					SPT-6	10.50 - 10.95					37	
13					SPT-7	11.50 - 11.95						39
14					DS-4	13.00 - 13.30						
15					SPT-8	13.50 - 13.95					41	
16					SPT-9	14.50 - 14.95						44

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

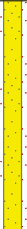
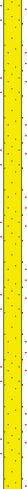
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 15

PAGE 2 OF 3

BOREHOLE NO : BH-15			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.350 m									
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18									
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.3 m									
COORDINATES : 703 E, 178 N			CASING DEPTH : 38 m			LOGGED BY : Mr. Gaurav									
DATE OF START : 08-Dec-2019			DATE OF FINISH : 09-Dec-2019			CHECKED BY : Ankit Uniyal									
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲					
										20 40 60 80					
										PL (%) MC (%) LL (%) 20 40 60 80					
										■ FINES CONTENT (%) ■					
										20 40 60 80					
17		SM	19.50	Dense grey silty fine sand (SM)	173.85	DS-5	16.00 - 16.30								
SPT-10						16.50 - 16.95		46							
18		CL	22.50	Hard brown clayey silt, low plastic (CL)	170.85	SPT-11	17.50 - 17.95		47						
19		CL	22.50	Hard brown clayey silt, low plastic (CL)	170.85	DS-6	19.00 - 19.30								
20						SPT-12	19.50 - 19.95		49						
21						SPT-13	20.50 - 20.95		51						
22															
23		SP-SM	22.50	Very dense grey fine sand	170.85	DS-7	22.00 - 22.30								
24						SPT-14	22.50 - 22.95		53						
25															
26		SP-SM	22.50	- SP-SM, 22.5 to 32.5 m	170.85	SPT-15	23.50 - 23.95		53						
27															
28															
29		SP-SM	22.50	- with gravel, 23.5 to 25.0 m	170.85	DS-8	25.00 - 25.30								
30						SPT-16	25.50 - 25.95		54						
31															
32		SP-SM	22.50	- with gravel, 23.5 to 25.0 m	170.85	SPT-17	26.50 - 26.95		58						
33															
34															
35		SP-SM	22.50	- with gravel, 23.5 to 25.0 m	170.85	DS-9	28.00 - 28.30								
36						SPT-18	28.50 - 28.95		57						
37															
38		SP-SM	22.50	- with gravel, 23.5 to 25.0 m	170.85	SPT-19	29.50 - 29.95		54						
39															
40															
41		SP-SM	22.50	- with gravel, 23.5 to 25.0 m	170.85	DS-10	31.00 - 31.30								
42						SPT-20	31.50 - 31.95		49						
43															

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 15

PAGE 3 OF 3

BOREHOLE NO : BH-15			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.350 m								
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18								
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.3 m								
COORDINATES : 703 E, 178 N			CASING DEPTH : 38 m			LOGGED BY : Mr. Gaurav								
DATE OF START : 08-Dec-2019			DATE OF FINISH : 09-Dec-2019			CHECKED BY : Ankit Uniyal								
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲				
										20 40 60 80				
										PL (%) MC (%) LL (%)				
										20 40 60 80				
										■ FINES CONTENT (%) ■				
										20 40 60 80				
		SP-SM	32.50		160.85									
33		SP	- SP, 32.5 to 35.5 m		SPT-21	32.50 - 32.95		54						
34					DS-11	34.00 - 34.30								
35					SPT-22	34.50 - 34.95		43						
36				Very dense grey fine sand (SP)	SPT-23	35.50 - 35.95		30						
37				37.00	156.35									
38		CL	Very stiff brown clayey silt, low plastic (CL)		DS-12	37.00 - 37.30								
					SPT-24	37.50 - 37.95		28						
39		SP-SM	38.50	154.85	SPT-25	38.50 - 38.95		47						
40				40.30	153.05	DS-13	40.00 - 40.30							
				Termination at 40.30 meters Depth.										

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



CENGRS

Borehole No.:-15

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N**	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			
							Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	φ Degree
0.00	0.50	DS-1			Very stiff brown clayey silt, low plastic (CL)					28.5	15.6	12.9											
1.00	1.45	SPT-1	19	19																			
2.00	2.30	UDS-1				3.00																	
3.00	3.45	SPT-2	21	25	Medium dense to dense grey silty fine sand (SM)																		
4.00	4.30	UDS-2			- medium dense, 3.0 to 9.0 m																		
5.00	5.45	SPT-3	22	23			1	53	44	2													
6.00	6.30	UDS-3			- with traces of gravel, 5.0 to 6.0 m																		
7.00	7.45	SPT-4	23	19																			
8.00	8.30	DS-2																					
9.00	9.45	SPT-5	31	22	- dense, 9.0 to 17.5m																		
10.00	10.30	DS-3																					
10.50	10.95	SPT-6	37	24																			
11.50	11.95	SPT-7	39	25																			
13.00	13.30	DS-4																					
13.50	13.95	SPT-8	41	25			0	78	22	0													
14.50	14.95	SPT-9	44	26																			
16.00	16.30	DS-5																					
16.50	16.95	SPT-10	46	26																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



CENGRS

Borehole No.:-15

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm³	Moisture Content, %	Dry Density, g/cm³	Shear Strength Parameters				
							Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm²	C, kg/cm²	φ Degree	
17.50	17.95	SPT-11	47	26	Dense grey silty fine sand (SM)	19.50																		
19.00	19.30	DS-6																						
19.50	19.95	SPT-12	49	49	Hard brown clayey silt, low plastic (CL)	22.50					30.9	15.3	15.6											
20.50	20.95	SPT-13	51	51																				
22.00	22.30	DS-7																						
22.50	22.95	SPT-14	53	26	Very dense grey fine sand																			
23.50	23.95	SPT-15	53	26	- SP-SM, 22.5 to 32.5 m		7	87	6	0														
25.00	25.30	DS-8			- with gravel, 23.5 to 25.0 m																			
25.50	25.95	SPT-16	54	26																				
26.50	26.95	SPT-17	58	27																				
28.00	28.30	DS-9																						
28.50	28.95	SPT-18	57	26																				
29.50	29.95	SPT-19	54	25																				
31.00	31.30	DS-10																						
31.50	31.95	SPT-20	49	23																				
32.50	32.95	SPT-21	54	24	- SP, 32.5 to 35.5 m			0	97	3	0													
34.00	34.30	DS-11																						
34.50	34.95	SPT-22	43	20																				

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-15

SUMMARY OF LABORATORY TEST RESULTS

[illegible]

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 16

PAGE 1 OF 3

BOREHOLE NO : BH-16			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.520 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.05						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.45 m						
COORDINATES : 721 E, 170 N			CASING DEPTH : 40.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 08-Dec-2019			DATE OF FINISH : 09-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
									20 40 60 80			
									PL (%) MC (%) LL (%) 20 40 60 80			
■ FINES CONTENT (%) ■												
1		CL	Very stiff brown clayey silt, low plastic (CL)		DS-1	0.00 - 0.50						
2				SPT-1	1.00 - 1.45		20					
3				UDS-1	2.00 - 2.30							
3			3.00	190.52								
4		SM	Medium dense to dense grey silty fine sand (SM)		SPT-2	3.00 - 3.45		21				
5			- medium dense, 3.0 to 11.5 m		UDS-2	4.00 - 4.30						
6				SPT-3	5.00 - 5.45		23					
7				UDS-3	6.00 - 6.30							
8				SPT-4	7.00 - 7.45		26					
9				UDS-4	8.00 - 8.30							
10				SPT-5	9.00 - 9.45		25					
11				DS-2	10.00 - 10.30							
12				SPT-6	10.50 - 10.95		25					
13				SPT-7	11.50 - 11.95		32					
14				DS-3	13.00 - 13.30							
15				SPT-8	13.50 - 13.95		31					
16				SPT-9	14.50 - 14.95		37					

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

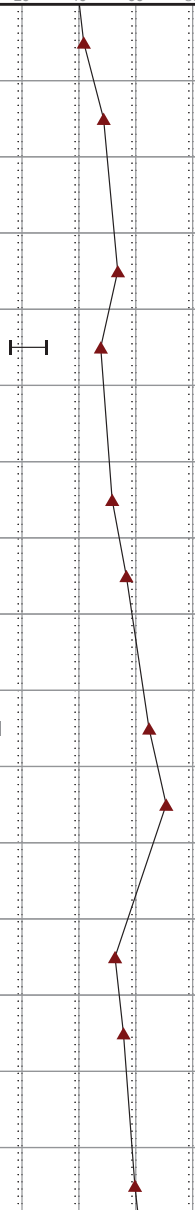
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 16

PAGE 2 OF 3

BOREHOLE NO : BH-16			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.520 m								
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.05								
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.45 m								
COORDINATES : 721 E, 170 N			CASING DEPTH : 40.00 m			LOGGED BY : Mr. Gaurav								
DATE OF START : 08-Dec-2019			DATE OF FINISH : 09-Dec-2019			CHECKED BY : Ankit Uniyal								
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲				
										20 40 60 80				
										PL (%)	MC (%)	LL (%)		
										20 40 60 80				
										■ FINES CONTENT (%) ■				
										20 40 60 80				
17		SM	20.50	Very dense grey silty fine sand (SM)	173.02	DS-4	16.00 - 16.30							
SPT-10						16.50 - 16.95		43						
SPT-11						17.50 - 17.95		50						
DS-5						19.00 - 19.30								
SPT-12						19.50 - 19.95		55						
21		CL	22.00	Hard brown clayey silt, low plastic (CL)	171.52	SPT-13	20.50 - 20.95		49					
22		SP-SM	22.00	Very dense grey fine sand (SP-SM) - with traces of gravel, 25.5 to 26.5 m	171.52	DS-6	22.00 - 22.30							
SPT-14						22.50 - 22.95		53						
SPT-15						23.50 - 23.95		58						
DS-7						25.00 - 25.30								
SPT-16						25.50 - 25.95		66						
SPT-17						26.50 - 26.95		72						
DS-8						28.00 - 28.30								
SPT-18						28.50 - 28.95		54						
SPT-19						29.50 - 29.95		57						
DS-9						31.00 - 31.30								
SPT-20						31.50 - 31.95		61						

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

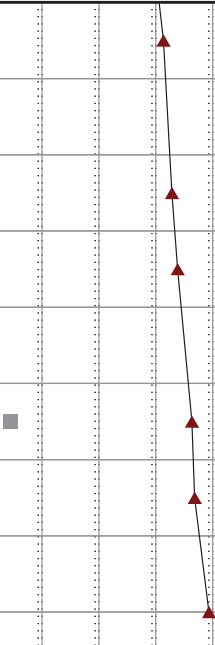
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 16

PAGE 3 OF 3

BOREHOLE NO : BH-16			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.520 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 7.05							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 40.45 m							
COORDINATES : 721 E, 170 N			CASING DEPTH : 40.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 08-Dec-2019			DATE OF FINISH : 09-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
										20 40 60 80			
										■ FINES CONTENT (%) ■			
										20 40 60 80			
33		SP-SM	Very dense grey fine sand (SP-SM) - with traces of gravel, 37.5 to 38.5 m	153.07	SPT-21	32.50 - 32.95		64					
34					DS-10	34.00 - 34.30							
35					SPT-22	34.50 - 34.95		67					
36					SPT-23	35.50 - 35.95		69					
37					DS-11	37.00 - 37.30							
38					SPT-24	37.50 - 37.95		74					
39					SPT-25	38.50 - 38.95		75					
40					SPT-26	40.00 - 40.45		80					
Termination at 40.45 meters Depth.													

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)



Borehole No.:-16

SUMMARY OF LABORATORY TEST RESULTS

Depth, m	Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	φ Degree
0.00	0.50	DS-1		Very stiff brown clayey silt, low plastic (CL)						29.0	11.2	17.8										
1.00	1.45	SPT-1	20																			
2.00	2.30	UDS-1			3.00					27.8	17.5	10.3				1.78	11.5	1.60	UU	1.2,3	0.7	4.3
3.00	3.45	SPT-2	21	Medium dense to dense grey silty fine sand (SM)																		
4.00	4.30	UDS-2		- medium dense, 3.0 to 11.5 m												1.77	12.7	1.57				
5.00	5.45	SPT-3	23			0	64	34	2					2.65								
6.00	6.30	UDS-3														1.82	13.4	1.60	DS	0.5,1,1.5	0.0	31.7
7.00	7.45	SPT-4	26																			
8.00	8.30	UDS-4														1.87	15.3	1.62				
9.00	9.45	SPT-5	25																			
10.00	10.30	DS-2																				
10.50	10.95	SPT-6	25	18																		
11.50	11.95	SPT-7	32	21	- dense, 11.5 to 17.5 m	0	81	19	0													
13.00	13.30	DS-3																				
13.50	13.95	SPT-8	31	20																		
14.50	14.95	SPT-9	37	22																		
16.00	16.30	DS-4																				
16.50	16.95	SPT-10	43	24																		

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-16

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm³	Moisture Content, %	Dry Density, g/cm³	Shear Strength Parameters				
							Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm²	kg/cm²	φ Degree	
17.50	17.95	SPT-11	50	27	Very dense grey silty fine sand (SM)																			
19.00	19.30	DS-5																						
19.50	19.95	SPT-12	55	28		20.50																		
20.50	20.95	SPT-13	49	49	Hard brown clayey silt, low plastic (CL)	22.00																		
22.00	22.30	DS-6					Very dense grey fine sand (SP-SM)																	
22.50	22.95	SPT-14	53	26																				
23.50	23.95	SPT-15	58	28																				
25.00	25.30	DS-7																						
25.50	25.95	SPT-16	66	30	- with traces of gravel, 25.5 to 26.5 m		3	87	10	0														
26.50	26.95	SPT-17	72	31																				
28.00	28.30	DS-8																						
28.50	28.95	SPT-18	54	25																				
29.50	29.95	SPT-19	57	25																				
31.00	31.30	DS-9																						
31.50	31.95	SPT-20	61	26																				
32.50	32.95	SPT-21	64	27																				
34.00	34.30	DS-10																						
34.50	34.95	SPT-22	67	27																				

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



SUMMARY OF LABORATORY TEST RESULTS

[illegible]

DS: Direct shear test- Consolidated Drained

UU: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 17

PAGE 1 OF 4

BOREHOLE NO : BH-17			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.200 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.10							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m							
COORDINATES : 760 E, 170 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 14-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲				
									20 40 60 80				
									PL (%) MC (%) LL (%)				
									20 40 60 80				
									■ FINES CONTENT (%) ■				
									20 40 60 80				
1		CL	Very stiff brown clayey silt with traces of gravel, low plastic (CL)		DS-1	0.00 - 0.50		17					
					SPT-1	1.00 - 1.45							
2						UDS-1	2.00 - 2.30						
3						SPT-2	3.00 - 3.45						
4			4.00	189.20									
5		SM	Medium dense to very dense grey silty fine sand (SM) - medium dense, 4.0 to 16.5 m		UDS-2	4.00 - 4.30		23					
6						SPT-3	5.00 - 5.45			24			
7						UDS-3	6.00 - 6.30						
8						SPT-4	7.00 - 7.45			20			
9						UDS-4	8.00 - 8.30						
10						SPT-5	9.00 - 9.45			23			
11						DS-2	10.00 - 10.30						
12						SPT-6	10.50 - 10.95			27			
13						SPT-7	11.50 - 11.95			29			
14						DS-3	13.00 - 13.30						
15						SPT-8	13.50 - 13.95						
16						SPT-9	14.50 - 14.95						

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 17

PAGE 2 OF 4

BOREHOLE NO : BH-17			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.200 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.10						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m						
COORDINATES : 760 E, 170 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 14-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%) MC (%) LL (%)		
										20 40 60 80		
										■ FINES CONTENT (%) ■		
										20 40 60 80		
17		SM	- dense, 16.5 to 26.5 m		DS-4	16.00 - 16.30						
			SPT-10	16.50 - 16.95		33						
18			Dense to very dense grey silty fine sand (SM)		SPT-11	17.50 - 17.95		37				
19			- dense, 17.5 to 26.5 m		DS-5	19.00 - 19.30						
20				SPT-12	19.50 - 19.95		38					
21				SPT-13	20.50 - 20.95		41					
22				DS-6	22.00 - 22.30							
23				SPT-14	22.50 - 22.95		44					
24				SPT-15	23.50 - 23.95		46					
25				DS-7	25.00 - 25.30							
26				SPT-16	25.50 - 25.95		46					
27			- very dense, 26.5 to 31.5 m		SPT-17	26.50 - 26.95		52				
28				DS-8	28.00 - 28.30							
29				SPT-18	28.50 - 28.95		55					
30				SPT-19	29.50 - 29.95		59					
31				DS-9	31.00 - 31.30							
32			SP	Very dense grey fine sand (SP)		SPT-20	31.50 - 31.95		63			

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 17

PAGE 3 OF 4

BOREHOLE NO : BH-17			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.200 m						
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.10						
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 50.42 m						
COORDINATES : 760 E, 170 N			CASING DEPTH : 50.00 m			LOGGED BY : Mr. Gaurav						
DATE OF START : 14-Dec-2019			DATE OF FINISH : 17-Dec-2019			CHECKED BY : Ankit Uniyal						
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲		
										20 40 60 80		
										PL (%) MC (%) LL (%)		
										20 40 60 80		
										■ FINES CONTENT (%) ■		
										20 40 60 80		
33		SP	Very dense grey fine sand (SP)			SPT-21	32.50 - 32.95		65			
34												
35						DS-10	34.00 - 34.30				68	
36						SPT-22	34.50 - 34.95				72	
37												
38						SPT-23	35.50 - 35.95				75	
39												
40						DS-11	37.00 - 37.30				77	
41						SPT-24	37.50 - 37.95				80	
42												
43						SPT-25	38.50 - 38.95				85	
44												
45						DS-12	40.00 - 40.30				88	
46						SPT-26	40.50 - 40.95				91	
47												
48						SPT-27	41.50 - 41.95				97	
		DS-13	43.00 - 43.30			100						
		SPT-28	43.50 - 43.95									
		SPT-29	44.50 - 44.95									
		DS-14	46.00 - 46.30									
		SPT-30	46.50 - 46.95									
		SPT-31	47.50 - 47.95									

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 17

PAGE 4 OF 4

BOREHOLE NO : BH-17			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.200 m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water Table

DISTURBED SAMPLE (DS)

Standard Penetration Test (SPT)

UNDISTURBED SAMPLE (UDS)



Borehole No.:-17
SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ		
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure kg/cm ²	kg/cm ²			
0.00	0.50	DS-1			Very stiff brown clayey silt with traces of gravel, low plastic (CL)					29.5	18.5	11.0	16.0		7.0										
1.00	1.45	SPT-1	17	17																					
2.00	2.30	UDS-1																							
3.00	3.45	SPT-2	22	22	Medium dense to very dense grey silty fine sand (SM)	4.00	2	29	64	5									1.75	12.9	1.55	UU	1.2,3	0.6	4.3
4.00	4.30	UDS-2													2.66				1.77	13.6	1.56				
5.00	5.45	SPT-3	23	24		- medium dense, 4.0 to 16.5 m																			
6.00	6.30	UDS-3																							
7.00	7.45	SPT-4	24	19															1.83	18.4	1.55				
8.00	8.30	UDS-4																							
9.00	9.45	SPT-5	16	15			1	66	32	1									1.95	25.0	1.56				
10.00	10.30	DS-2																							
10.50	10.95	SPT-6	20	16																					
11.50	11.95	SPT-7	23	18																					
13.00	13.30	DS-3																							
13.50	13.95	SPT-8	27	19																					
14.50	14.95	SPT-9	29	19																					
16.00	16.30	DS-4																							
16.50	16.95	SPT-10	33	21	- dense, 16.5 to 26.5 m																				

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-17
SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density ₃ gms/cm ³	Moisture Content, %	Dry Density ₃ g/cm ³	Type of test	Confining Pressure ₃ kg/cm ²	C _u kg/cm ²	Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)													
17.50	17.95	SPT-11	37	22	Dense to very dense grey silty fine sand (SM)																		
19.00	19.30	DS-5			- dense, 17.5 to 26.5 m																		
19.50	19.95	SPT-12	38	22																			
20.50	20.95	SPT-13	41	23			3	74	23	0													
22.00	22.30	DS-6																					
22.50	22.95	SPT-14	44	23																			
23.50	23.95	SPT-15	46	24																			
25.00	25.30	DS-7																					
25.50	25.95	SPT-16	46	23																			
26.50	26.95	SPT-17	52	25	- very dense, 26.5 to 31.5 m																		
28.00	28.30	DS-8																					
28.50	28.95	SPT-18	55	25																			
29.50	29.95	SPT-19	59	26																			
31.00	31.30	DS-9				31.50																	
31.50	31.95	SPT-20	63	27	Very dense grey fine sand (SP)		1	97	2	0													
32.50	32.95	SPT-21	65	27																			
34.00	34.30	DS-10																					
34.50	34.95	SPT-22	68	27																			

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



Borehole No.:-17

SUMMARY OF LABORATORY TEST RESULTS

Depth, m		Sample Type	Field Value N*	Corrected Value N**	SOIL DESCRIPTION	Strata Break	Grain Size Analysis				Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Shrinkage Limit, %	Specific Gravity	Free Swell Index, %	Bulk Density, gms/cm ³	Moisture Content, %	Dry Density, g/cm ³	Shear Strength Parameters			Degree ϕ
From	To						Gravel (%)	Sand (%)	Silt (%)	Clay (%)										Type of test	Confining Pressure, kg/cm ²	kg/cm ²	
35.50	35.95	SPT-23	72	28	Very dense grey fine sand (SP)																		
37.00	37.30	DS-11																					
37.50	37.95	SPT-24	75	29																			
38.50	38.95	SPT-25	77	29																			
40.00	40.30	DS-12																					
40.50	40.95	SPT-26	80	29																			
41.50	41.95	SPT-27	85	30																			
43.00	43.30	DS-13																					
43.50	43.95	SPT-28	88	30																			
44.50	44.95	SPT-29	91	30																			
46.00	46.30	DS-14																					
46.50	46.95	SPT-30	97	31																			
47.50	47.95	SPT-31	100	32																			
49.00	49.30	DS-15																					
50.00	50.42	SPT-32	100/27cm			50.42																	

* Outside NABL scope.

DS: Direct shear test- Consolidated Drained

UUT: Unconsolidated undrained triaxial shear test



BOREHOLE NO: 18

PAGE 1 OF 4

BOREHOLE NO : BH-18			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.140 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 55.38 m							
COORDINATES : 782 E, 185 N			CASING DEPTH : 55.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 15-Dec-2019			DATE OF FINISH : 18-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20	40	60	80
										PL (%)	MC (%)	LL (%)	
20 40 60 80 ■ FINES CONTENT (%) ■ 20 40 60 80													
1		CL	Very stiff brown clayey silt, low plastic (CL)	189.14	DS-1	0.00 - 0.50							
					SPT-1	1.00 - 1.45		19					
2						UDS-1	2.00 - 2.30						
3						SPT-2	3.00 - 3.45		13				
4		SM	Medium dense to dense grey silty fine sand (SM) - medium dense, 4.0 to 13.5 m	185.14		UDS-2	4.00 - 4.30						
5						SPT-3	5.00 - 5.45		15				
6						UDS-3	6.00 - 6.30						
7						SPT-4	7.00 - 7.45		17				
8													
9						SP-SM	Medium dense to dense grey fine sand with traces of gravels (SP-SM) - medium dense, 8.0 to 14.5 m - dense, 13.5 to 16.5 m - dense, 14.5 to 20.5 m		DS-2	8.00 - 8.30			
	SPT-5	8.50 - 8.95		18									
	SPT-6	9.00 - 9.45		22									
10		DS-3	10.00 - 10.30										
11		SPT-7	10.50 - 10.95						23				
12		SPT-8	11.50 - 11.95						27				
13													
14		DS-4	13.00 - 13.30										
		SPT-9	13.50 - 13.95						30				
15		SPT-10	14.50 - 14.95						33				
16													

PL - PLASTIC LIMIT
LL - LIQUID LIMIT
MC - MOISTURE CONTENT

Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 18

PAGE 2 OF 4

BOREHOLE NO : BH-18			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.140 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 55.38 m							
COORDINATES : 782 E, 185 N			CASING DEPTH : 55.00 m			LOGGED BY : Mr. Gaurav							
DATE OF START : 15-Dec-2019			DATE OF FINISH : 18-Dec-2019			CHECKED BY : Ankit Uniyal							
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%) 20 40 60 80			
■ FINES CONTENT (%) ■													
20 40 60 80													
17		SP-SM	20.50	Dense grey fine sand (SP-SM)	172.64	DS-5	16.00 - 16.30						
SPT-11						16.50 - 16.95		38					
SPT-12						17.50 - 17.95		41					
DS-6						19.00 - 19.30							
SPT-13						19.50 - 19.95		46					
SPT-14						20.50 - 20.95		49					
DS-7	22.00 - 22.30												
SPT-15	22.50 - 22.95		53										
SPT-16	23.50 - 23.95		56										
DS-8	25.00 - 25.30												
SPT-17	25.50 - 25.95		58										
SPT-18	26.50 - 26.95		61										
DS-9	28.00 - 28.30												
SPT-19	28.50 - 28.95		65										
SPT-20	29.50 - 29.95		68										
DS-10	31.00 - 31.30												
SPT-21	31.50 - 31.95		71										
- with gravel, 31.5 to 32.5 m													

PL - PLASTIC LIMIT
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Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 18

PAGE 3 OF 4

BOREHOLE NO : BH-18			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.140 m										
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18										
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 55.38 m										
COORDINATES : 782 E, 185 N			CASING DEPTH : 55.00 m			LOGGED BY : Mr. Gaurav										
DATE OF START : 15-Dec-2019			DATE OF FINISH : 18-Dec-2019			CHECKED BY : Ankit Uniyal										
DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	FIELD SPT N VALUE ▲						
										20 40 60 80						
										PL (%)	MC (%)	LL (%)				
										20 40 60 80	■ FINES CONTENT (%) ■					
										20 40 60 80						
33		SP	35.50	Very dense grey fine sand (SP)	157.64	SPT-22	32.50 - 32.95		73							
34																
35																
36		CL	37.00	Hard brown clayey silt, low plastic (CL)	156.14	SPT-24	35.50 - 35.95		80							
37																
38		SP-SM		Very dense grey fine sand (SP-SM)		DS-12	37.00 - 37.30									
39						SPT-25	37.50 - 37.95		82							
40																
41						SPT-26	38.50 - 38.95		86							
42																
43						DS-13	40.00 - 40.30									
44						SPT-27	40.50 - 40.95		91							
45																
46						SPT-28	41.50 - 41.95		94							
47																
48						DS-14	43.00 - 43.30									
						SPT-29	43.50 - 43.95		96							
	SPT-30	44.50 - 44.95		99												
	DS-15	46.00 - 46.30														
	SPT-31	46.50 - 46.95		99												
	SPT-32	47.50 - 47.93		100/28cm												

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Ground Water
Table

DISTURBED SAMPLE
(DS)

Standard Penetration
Test (SPT)

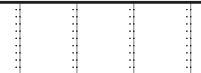
UNDISTURBED
SAMPLE (UDS)

(Continued Next Page)



BOREHOLE NO: 18

PAGE 4 OF 4

BOREHOLE NO : BH-18			BORING METHOD : Shell and Auger			GROUND ELEVATION : RL 193.140 m							
STRUCTURE: STG			SPT HAMMER USED : Automatic Trip			GROUND WATER DEPTH, m 6.18							
CHAINAGE :			BOREHOLE DIAMETER 150mm			TERMINATION DEPTH : 55.38 m							
COORDINATES : 782 E, 185 N			CASING DEPTH : 55.00 m			LOGGED BY : Mr. Gaurav							
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DEPTH (m)	GRAPHICAL LOG	SYMBOL	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	FIELD N VALUES	▲ FIELD SPT N VALUE ▲			
										20 40 60 80			
										PL (%) MC (%) LL (%)			
20 40 60 80													
■ FINES CONTENT (%) ■													
20 40 60 80													
49		SP-SM	Very dense grey fine sand (SP-SM)	137.76		DS-16	49.00 - 49.30		100/27cm				
					SPT-33	49.50 - 49.92							
50													
51					SPT-34	50.50 - 50.90		100/25cm					
52													
53					DS-17	52.00 - 52.30							
					SPT-35	52.50 - 52.91		101/26cm					
54													
					SPT-36	53.50 - 53.89		100/24cm					
55													
			55.38	Termination at 55.38 meters Depth.		SPT-37	55.00 - 55.38		100/23cm				

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Ground Water
Table

DISTURBED SAMPLE
(DS)

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UNDISTURBED
SAMPLE (UDS)