

**GEOTECHNICAL INVESTIGATION REPORT FOR
PROPOSED DON BOSCO RECEIVING STATION BUILDING
OPP DON BOSCO SCHOOL, LINK ROAD, BORIVALI (W), MUMBAI
FOR [REDACTED] PVT. LTD.**

1.0 INTRODUCTION

[REDACTED] plans construction of a receiving station building in Borivali (W), Mumbai. The proposed building will consist of Ground + 8 upper floors. The work of Geotechnical Investigation was awarded to Perfect Geotechnics Pvt. Ltd. The field work and laboratory tests for the Geotechnical Investigation were completed by Perfect Geotechnics Pvt. Ltd. in September 2017. This report presents results of the geotechnical investigation along with foundation recommendations for proposed station building.

2.0 EXPLORATION PROGRAM

2.1 Exploration Scope

Three Boreholes (BH-1 to BH-3) and one Electrical Resistivity Test (ERT) were completed for the project as illustrated on the Borehole Location Plan in the Annexure.

2.2 Subsurface Conditions

Subsurface profile at this site generally consists of fill overlying completely weathered rock underlain by hard breccia bedrock. Encountered soil/rock layers are described below;

LAYER I: FILL

Fill, consisting mostly of clay with boulders were encountered at ground surface in the boreholes. The lower boundary of this layer was encountered at depths of 1.5m to 2.4m below ground surface.

LAYER II: COMPLETELY WEATHERED ROCK

Brownish completely weathered rock was encountered below fill layer in the boreholes. This layer is formed by the complete in-place disintegration of parent bedrock material, but still partially retains the original rock mass structure. SPT tests conducted in this layer encountered refusals. Core recoveries were typically NIL. The lower boundary of this layer was encountered at depths of 1.9m to 3.3m below ground surface.

LAYER III: HARD BRECCIA BEDROCK

Yellowish brown hard basalt bedrock was encountered at depths of 1.9m to 3.3m below ground surface in the boreholes. The bedrock was highly weathered to sound. Core Recoveries varied between 31% and 98%, while Rock Quality Designation (RQD) ranged between NIL and 97%. Compressive strength of rock core samples varied from 177 kg/cm² to 435 kg/cm². The boreholes were terminated in this bedrock layer at a depth of 10.0m below ground surface.

2.3 Ground water Levels

Groundwater accumulation in boreholes was monitored during and after completion of drilling activities. Groundwater was observed at depths of 1.9m to 2.1m below ground in boreholes. Seasonal and annual fluctuations in ground water levels can be expected.

2.4 Electrical Resistivity Tests

Five Electrical Resistivity tests (ERT-1 to ERT-5) were completed at this site as per IS 3043 by 4 pin wenner method. Results of the Electrical Resistivity test are enclosed in the Annexure. Soil resistivity's value ranged between 45.22 ohm-m and 170.82 ohm-m.

3.0 FOUNDATION RECOMMENDATIONS

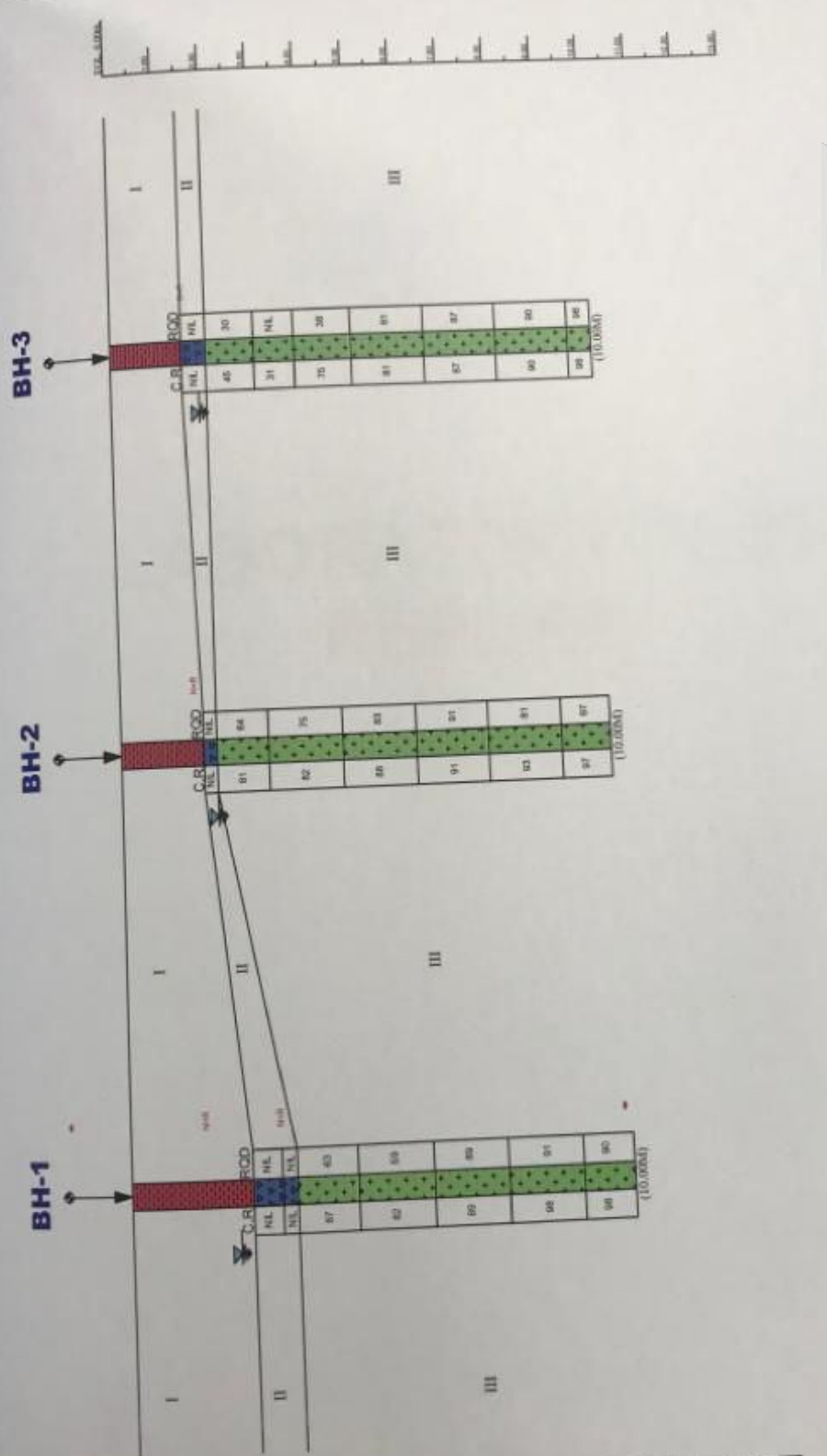
Hard bedrock was encountered at depths of 1.9m to 3.3m below ground surface. Spread foundations for proposed station building supported on this hard bedrock can be designed for a maximum net allowable bearing capacity of 100 t/m². Minimum footing width should be 1.0m. Hard rock founding strata can be identified as it offers complete refusal to bucket excavators. Depths to hard rock are given in Table A below.

**TABLE A
 DEPTHS TO BEDROCK**

BOREHOLE NUMBER	DEPTHS TO COMPLETELY WEATHERED ROCK	DEPTHS TO HARD ROCK
BH-1	2.4m	3.3m
BH-2	1.5m	1.9m
BH-3	1.5m	2.0m

Alternately, proposed station building can be supported on completely weathered rock (CWR) encountered at depths of 1.5m to 2.4m for net allowable bearing capacity of 40 t/m².

Maximum settlement of foundations will be less than 12mm. Modulus of subgrade reaction of 8300 t/m³ and 3300 t/m³ can be utilized for design of foundations on hard rock and CWR, respectively. Excavation sides should be sloped at a maximum slope of 1:1 (horizontal: vertical) or flatter. Excavated soils can be used for backfilling.



LEGEND LAYERS :

- = GROUNDWATER LEVEL
- I = FILLING
- II = COMPLETELY WEATHERED ROCK
- III = HARD BRECCIA BEDROCK

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SUB-SURFACE PROFILE THROUGH BORE HOLES FOR PROPOSED
DOK HOSCO RECEIVING STATION BUILDING AT BOHVALIWA, MUMBAI

Drawn By: Date: August 2017
Appr. by: Mr. Manoj Kumar Scale: Not To Scale

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JECT: Geotechnical Investigation with respect to Don Bosco Receiving Station Building (G+8) at Borivali (W), Mumbai.

RE HOLE NO. : BH-3

SHEET NO. : 1

ATION : Opp. Don Bosco School, Link Road,
Borivali (W), Mumbai.

DATE : 25/08/2017 TO 28/08/2017

OUND R. L. : 0.000M

METHOD : ROTARY DRILLING

OUND W. T. : 1.90 MTR BGL

CASING : 1.50 MTR BGL

JOB NO. : 2196

DIA. OF BORE HOLE	LOG	STRATA DESCRIPTION	SAMPLE		BLOWS/15cm				SPT N	C R %	RQD %	OTHER TESTS
			DEPTH (m)	TYPE	15	30	45	60				
100MM		Filling Clay With Boulders	0.00									
		Yellowish Brown Completely weathered rock	1.50 1.83	SPT-1	46	X	X	X	R	NIL	NIL	
NX		Yellowish Brown Soft Breccia Rock	2.00							45	30	
		Yellowish Brown Breccia Rock	3.00							31	NIL	
		Yellowish Brown Breccia Rock	3.80							75	38	
		Brownish Fresh Breccia Rock	5.00							81	81	
		Brownish Fresh Breccia Rock	6.50							87	87	
		Brownish Fresh Breccia Rock	8.00							90	90	
			9.50						96	96		
			10.00									

T N = STANDARD PENETRATION TEST VALUE
C = CORE RECOVERY

RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE

UDS = UNDISTURBED SOIL SAMPLE
VST = VANE SHEAR TEST

REMARKS : BOREHOLE TERMINATED AT 10.00M BGL.

NOT TO SCALE

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Proposed Don Bosco School Building (G+8) at Borivali (W), Mumbai.

PROJECT: Geotechnical	SHEET NO. : 1
HOLE NO. : BH-2	DATE : 22/08/2017 TO 24/08/2017
LOCATION : Opp. Don Bosco School, Link Road, Borivali (W), Mumbai.	METHOD : ROTARY DRILLING
IND R. L. : 0.000M	CASING : 1.70 MTR BGL
IND W. T. : 1.95 MTR BGL	JOB NO. : 2196

DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE				BLOWS/15cm	SPT N	C R %	RQD %	OTHER TESTS	
			DEPTH (m)	TYPE	15	30						45
100MM	[Red hatched pattern]	Filling Clay With Boulders	0.00									
			1.50									
NX	[Green hatched pattern]	Yellowish Brown Completely weathered rock	1.70	SPT-1	11	48	X	X	R	NIL	NIL	
		Yellowish Brown Fresh Breccia Rock	1.75								81	64
			1.90								82	75
			3.00								88	83
			4.50								91	91
			6.00								93	81
			7.50								97	97
			9.00									
			9.75									
			9.90									
10.00												
		Light Gray Basalt Rock										

STANDARD PENETRATION TEST VALUE
RECOVERY

RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE

UDS = UNDISTURBED SOIL SAMPLE
VST = VANE SHEAR TEST

WORKS : BOREHOLE TERMINATED AT 10.00M BGL.
PROJECT GEOTECHNICS PVT. LTD. NAVI MUMBAI

NOT TO SCALE

T: _____

Project: Geotechnical Investigation work for proposed Don Bosco Receiving Station Building (G+8) at Borivali (W), Mumbai.

BOREHOLE NO. : BH-1	SHEET NO. : 1
LOCATION : Opp. Don Bosco School, Link Road, Borivali (W), Mumbai.	DATE : 23/08/2017 TO 25/08/2017
D.R.L. : 0.000M	METHOD : ROTARY DRILLING
D.W.T. : 2.10 MTR BGL	CASING : 2.40 MTR BGL
	JOB NO. : 2196

DIA OF BOREHOLE	LOG.	STRATA DESCRIPTION	SAMPLE				SPT N	C R %	RQD %	OTHER TESTS		
			DEPTH (m)	TYPE	15	30					45	60
100MM	[Red pattern]	Filling Clay With Boulders	0.00									
			1.50									
			1.80	SPT-1	16	38	X	X	R			
	[Blue pattern]	Brownish Completely weathered rock	2.40						NIL	NIL		
			3.00									
	NX	[Green pattern]	Yellowish Brown Fresh Breccia Rock	3.05	SPT-2	45	X	X	X	R	NIL	NIL
				3.30								
				4.50							87	63
				6.00							82	59
				7.50							89	89
			9.00					98	91			
			10.00					98	90			

N = STANDARD PENETRATION TEST VALUE
CR = CORE RECOVERY

RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE

UDS = UNDISTURBED SOIL SAMPLE
VST = VANE SHEAR TEST

MARKS : BOREHOLE TERMINATED AT 10.00M BGL.

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