PART-E

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RESIDENTIAL ACCOMODATION
TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28
FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI

SUBMITTED TO,

EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

SUBMITTED BY

UNITECH ENGINEERS, MUMBAI

304/305, SIDDESHWAR BUILDING, SERVICE ROAD, BANDRA (EAST), MUMBAI-400051

EMAIL-soiltesting@gmail.com PHONE NO-9819479237

JUNE 2026

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RESIDENTIAL BUILDINGS
NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI, MAHARASHTRA
FOR EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

Table of Contents

	Item	Page
1.0	INTRODUCTION	1
2.0	EXPLORATION PROGRAM	1
	2.1 Exploration Scope	1
	2.2 Subsurface Conditions	2
	2.3 Ground Water Table	3
3.0	FOUNDATION RECOMMENDATIONS	4
	3.1 Foundation Protection	5
	3.2 Basement Construction	6
	3.3 Lateral Earth pressure	7
4.0	FIELD EXPLORATION PROCEDURES	8
	References/Calculations	
	ANNEXURES	11
	Figure 1: Location Plan of Boreholes	
	Borehole Logs	
	Laboratory Test Results	

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RESIDENTIAL BUILDINGS
NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI, MAHARASHTRA
FOR EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

1.0 INTRODUCTION

Executive Engineer & SM (Civil-1) CPWD, Wadala plans construction of a buildings in Mahim (W), Mumbai. The proposed building will consist of Basement + Ground + 18 upper floors. The work of geotechnical investigation was awarded to Unitech Engineers. The field work and laboratory testing for the geotechnical investigation was completed by Unitech En in May 2026. This report prepared by Unitech Engineers presents results of the geotechnical investigation, along with foundation recommendations for the proposed buildings.

2.0 EXPLORATION PROGRAM

2.1 Exploration Scope

Four Boreholes (BH-1 to BH-4) were completed for the project as illustrated on the Borehole Location Plan in the Annexure.

2.2 Subsurface Conditions

Subsurface profile generally consists of fill overlying marine clay underlain by breccias bedrock. The encountered main soil/rock layers are described in detail 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 3.0m to 4.5m below ground surface.

LAYER II: RESIDUAL SOIL

Grayish to brownish residual soil consisting mostly of clay was encountered below fill layer in the boreholes. Based on Standard Penetration Tests (SPT) conducted within this layer, consistency of cohesive soils varied between soft to very stiff. The lower boundary of this layer was encountered at depths of 9.00m to 12.15m below existing ground surface.

LAYER III: BRECCIA BEDROCK

Brownish breccia bedrock was encountered at depths of 9.00m to 12.15m below existing ground surface. The bedrock was completely weathered to sound, generally improving with depth. Core Recoveries varied of 16% to 94%, while Rock Quality Designation (RQD) ranged

of Nil to 85%. The boreholes were terminated in this layer at depths of 21.0m to 22.5m below existing ground surface.

2.3 Ground Water Table

Ground water accumulation in the boreholes was monitored during and following completion of drilling activities. Ground water table was observed at depths between 4.65m to 5.50m below ground surface in the boreholes. Annual and seasonal fluctuations in ground water levels can also be expected to occur.

3.0 FOUNDATION RECOMMENDATIONS

Proposed building shall be supported on bored piles socketed in bedrock. Piles should be socketed 5D in weathered bedrock (Where D is pile diameter) encountered at a depth of 8.0m below existing ground surface.

Capacities of representative pile sizes are given in Table A below.

TABLE A
Safe Vertical Downward & Lateral Capacity of Piles

Pile Diameter (mm)	Safe Vertical Downward Capacity (tons)	Safe Lateral Capacity (tons)	Safe Uplift Capacity (tons)
600	140	8.5	35
700	190	10.0	50
800	250	11.5	65
900	315	13.0	85
1000	390	14.5	105

Maximum total settlement of piles installed as described above will be less than 12mm. Depth of fixity for lateral loads will be 9.0D below pile cap.

3.1 Basement Construction

Excavation sides should be sloped at a maximum slope of 1:1 (horizontal:vertical) or flatter within top 3.0m and near vertical below this depth. If adequate space is not available for this side sloping, then excavation side shoring with bored piles should be provided.

Basement floors and walls should be adequately water-proofed. Adequate uplift resistance in the form of dead weight should be provided. Maximum groundwater table for uplift design should be taken at 1.0m below ground surface.

3.2 Lateral Earth Pressures

Basement walls and pile shoring walls, if any, will be subjected to lateral earth pressures. A soil submerged unit weight (r_{sub}) and coefficient of active lateral earth pressure (k_a) of 0.8 t/m^3 and 0.5, respectively, should be utilized for design of basement walls installed without adjacent pile shoring walls. Lateral earth pressure parameters for design of pile shoring walls are given in Table A below. Hydrostatic pressures and surcharge pressures, if any, should also be considered.

TABLE B
LATERAL EARTH PRESSURE PARAMETERS
FOR DESIGN OF PILE SHORING WALLS

Depth	Soil Type	Unit weight	Active earth pressure coefficient	Passive earth pressure coefficient	Cohesion
0.0m- 4.5m	FILL	1.8	0.33	3.0	0 t/m^2
4.5m-12.15m	Residual Soil	1.8	0.33	3.0	0 t/m^2
Below 12.15m	Breccia bedrock	2.3	1	1	66 t/m^2

3.3 Foundation Protection

Results of chemical analysis on soil and groundwater samples enclosed in the Annexure, indicate that the site falls under Class 1 for sulphate concentrations and chloride concentrations (As per IS456 and as per CIRIA Sp. Publication No. 31). A 'severe' Exposure Condition was assigned to this site. Therefore only following normal precautions are recommended to protect subsurface concrete and reinforcement.

Type of Cement:	OPC or PPC
Minimum Grade of Reinforced Concrete:	M30
Minimum Cement Content for piles:	400 kg/m^3
Maximum Water Cement Ratio:	0.50
Minimum Cover to Reinforcement:	50mm

4.0 FIELD EXPLORATION PROCEDURES

The sub-surface investigation was completed generally as per IS: 1892-1979. The field investigation was carried out using rotary rigs (Calyx, 8 HP, Engine). Casing was used to support sides of borehole until sufficiently stiff strata was encountered. Standard Penetration Tests (i.e. SPT) were carried out at every 1.5m vertical interval up to bedrock, in accordance with IS 2131-1981. Using this procedure, a 5 cm outside diameter split-barrel sampler is driven into the soil by 63.5 kg. weight falling through 75 cm height. After an initial set of 15cm, the number of blows required to drive the sampler an additional 30 cm, is known as the "penetration resistance" or "N value".

After SPT refusal was obtained, NX sized rock coring was done in maximum of 1.5m runs, using diamond bit and double tube core barrel. Percent Rock Core Recovery and percent Rock Quality Designation (%RQD) were determined. % RQD = 100 x Sum of length of rock pieces in cms, each having lengths greater than 10cms/Total length of core run in cms.

Sincerely,

Unitech Engineers.

_____

Rupa Jagadale
B.E (Civil) M.Tech. (Geotechnical)

REFERENCES

1) Foundation Analysis and Design, J.E. Bowles, McGraw Hill Publication, 5th Edition, 1996.

2) Canadian Foundation Engineering Manual.

3) Pile Design and Construction Practice, M. J. Tomlinson, Viewpoint Publications, 1992.

4) IS456:2000

5) Foundation Design Manual, N. V. Nayak, 5th Edition, 1996

6) Bored Piling in Mumbai Region, K. R. Datye, IGC 1990.

7) IS14593: Code of Practice for Design of Piles Founded on Rock.

SAMPLE CALCULATION OF ALLOWABLE VERTICAL CAPACITY OF 600mm DIA. PILES SOCKETED 5D IN BEDROCK:

A) SKIN FRICTION CAPACITY IN 5D ROCK SOCKET:

As per Cole and Stroud Method (Reference No. 5) for soft rock, the zero strength bedrock is assumed to be a hard cohesive soil.

Using a minimum SPT N value of 100 in the bedrock.

Allowable Skin End Bearing Capacity = q_{all} = aC / F.S. (Reference No. 5)

Where,
c = cohesion = N/1.5 = 100/1.5 = 66.67 t/m2
a = adhesion factor
F.S. = Factor of Safety
(a/FS) = 0.15
Therefore, Allowable Skin Friction Capacity = 0.15 x 66.67 = 10 t/m2
Allowable Skin Friction Capacity of 600mm dia piles = πDL (15) = 3.142 x 0.6 x 3.0m x 10 t/m2 = 56 tons

B) END BEARING CAPACITY IN LOW STRENGTH COMPLETELY WEATHERED BEDROCK:

Using a minimum SPT N value of 150 at pile tip in the bedrock.
As per Cole and Stroud Method (Reference No. 5).

Allowable End Bearing Capacity = q_{all} = cNc / F.S. (Reference No. 5)

Where,
c = cohesion = N/1.5 = 150/1.5 = 100 t/m2
Nc = Bearing Capacity Factor = 9 for deep foundations
F.S. = Factor of Safety = 3

Therefore, Allowable End Bearing capacity = 100 x 9 / 3 = 300 t/m2
Allowable End Bearing Capacity of 600mm dia piles = $(300)\pi D^2/4$ = 84 tons

THEREFORE, TOTAL PILE CAPACITY = 56 + 84 TONS = 140 tons

CALCULATION OF LATERAL CAPACITY OF PILE

Lateral Load Capacity of Bored-Cast Pile (IS 2911 Part 1/Sec - 2010)

C-4.2 The pile head deflection, y shall be computed using the following equations:

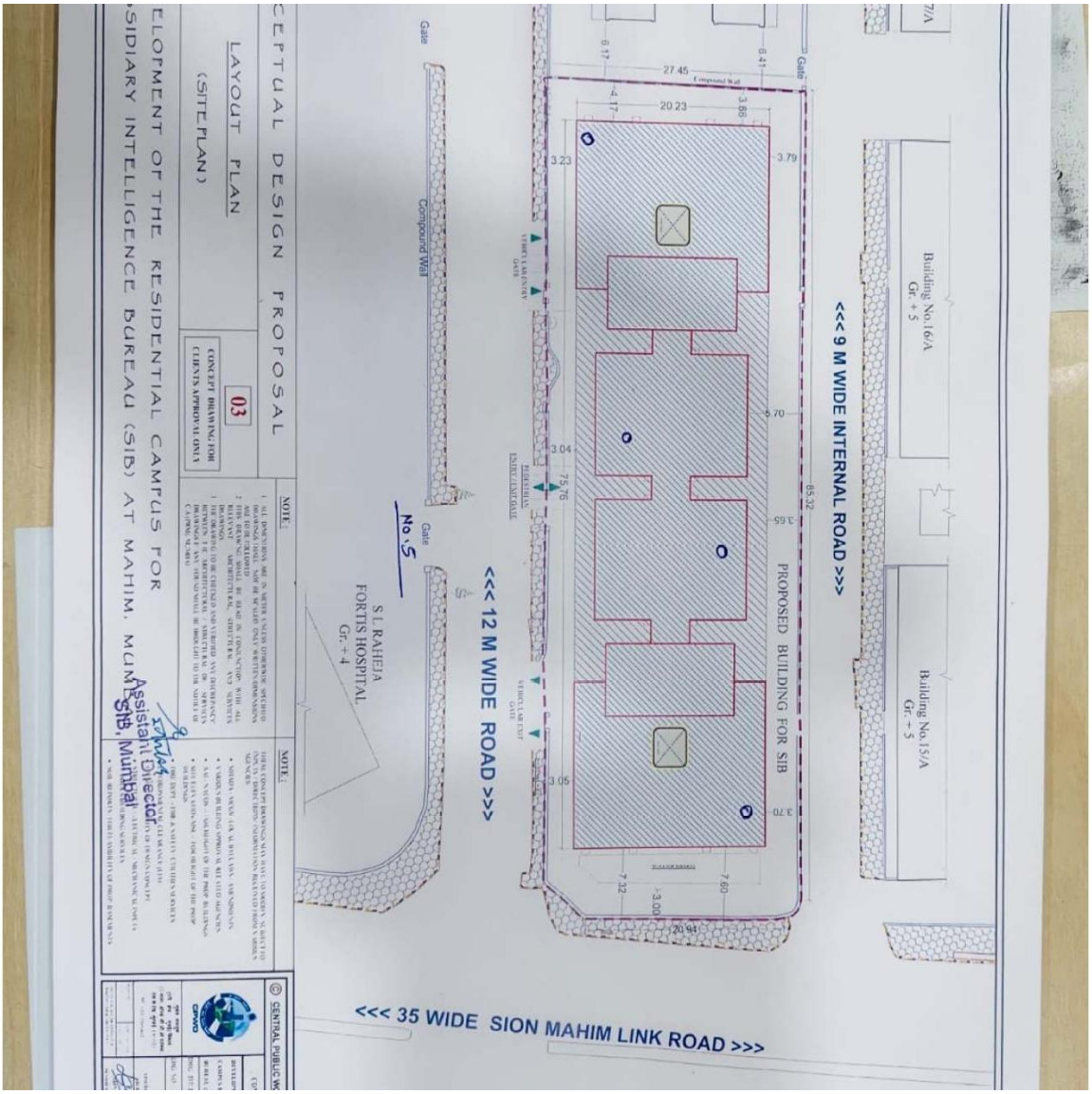
Deflection, $y = \frac{H(e+z_f)^3}{3EI} \times 10^3$ ...for free head pile

Deflection, $y = \frac{H(e+z_f)^3}{12EI} \times 10^3$ ...for fixed head pile

1.00	**Geometrical Data**				
	Type of Pile Head Considered	:	**fixed**		
	Diameter of Pile (B)	:	0.6		m
	Free standing Length of Pile (L1)	:	0		m
	Length of pile below assumed depth (Le)	:	15		m
	Grade of Concrete of Pile (M)	:	40		MN/m^2
	Young's Modulus of Concrete (E)	:	31622776.6		kN/m^2
	Moment of Inertia of Pile (I)	:	0.0064		m4
2.0	**Determination of Depth of Fixity**				
	Type of Design Soil Strata	:	clay		
	Ground Water Condition	:	submerged		
	SPT value	:	10		
	k1 (IS 2911 Part 1/Sec 2)	:	22875.00		kN/m^3
	Hence, K=((k1/1.5)*(0.3/B))	:	7625.000		kN/m^2
	R= (EI/KB)^(1/4)	:			
	R	:		2.575	
	L1/R	:	0		
	Lf/R	:	2.0		
	Depth of Fixity below Cut off (Zf)	:		5.150	m
3.0	**Determination of Lateral Load** and Moment Carrying Capacity for 0.005 m Lateral Deflection:				
	Allowable Lateral Deflection (Y)	:	0.005		m
	Lateral Load Capacity of pile, H = (Y*12EI)/(L1+Lf)^3	:		88.36	kN
	Recommended Lateral Load Carrying Capacity	:		8.8	tons

ANNEXURE

LOCATION MAP



AE(C) AE(E&M) EE(C) EE(E&M)

AE(C) AE(E&M) EE(C) EE(E&M)

BOREHOLE LOGS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-01		SHEET NO. : 1 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 10/05/2026 TO 13/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 5.50m BGL		CASING : 100mm Ø Upto 10.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
1.00	100 mm		FILLING MATERILAS WITH SOIL, DEBRIS, COBBLES, BOULDERS	0.00									
				1.50	DS-1								
2.00													
				3.00	DS-2								
3.00													
4.00				4.50	DS-3								
			BROWNISH GRAYISH SILTY CLAY	5.10	SPT-1	03	05	06	08	11			
5.00													
				6.00									
6.00				6.60	SPT-2	04	05	06	09	11			
7.00				7.50									
				8.10	SPT-3	05	07	10	13	17			
8.00													
				9.00									
9.00				9.60	SPT-4	06	08	11	14	19			
10.00													

SPT N = STANDARD PENETRATION TEST VALUE RQD = ROCK QUALITY DESIGNATION UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY DS = DISTURBED SOIL SAMPLE PLI = POINT LOAD INDEX UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- CONTINUE NEXT PAGE.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-01		SHEET NO. : 2 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 10/05/2026 TO 13/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 5.50m BGL		CASING : 100mm Ø Upto 10.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
11.00	100 mm		BROWNISH GRAYISH SILTY CLAY	10.50									
				11.10	SPT-5	09	11	14	16	25			
12.00				12.00									
13.00			BROWNISH BRECCIA	13.50							22	NIL	
14.00													
15.00				15.00							48	35	
16.00				16.50							56	40	
17.00													
18.00				18.00							65	58	
19.00				19.50							75	65	
20.00											83	80	

SPT N = STANDARD PENETRATION TEST VALUE
CR = CORE RECOVERY
RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE
UDS = UNDISTURBED SOIL SAMPLE
PLI = POINT LOAD INDEX
UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 20.00m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-01		SHEET NO. : 3 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 10/05/2026 TO 13/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 5.50m BGL		CASING : 100mm Ø Upto 10.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
21.00	100 mm		BROWNISH BRECCIA	21.00							83	80	
22.00				22.50							85	85	
23.00													
24.00													
25.00													
26.00													
27.00													
28.00													
29.00													
30.00													

SPT N = STANDARD PENETRATION TEST VALUE | RQD = ROCK QUALITY DESIGNATION | UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY | DS = DISTURBED SOIL SAMPLE | PLI = POINT LOAD INDEX | UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 22.50m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-02		SHEET NO. : 1 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 14/05/2026 TO 17/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.85m BGL		CASING : 100mm Ø Upto 7.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
1.00	100 mm		FILLING MATERILAS	0.00									
				1.50	DS-1								
2.00													
				3.00	DS-2								
3.00													
				4.50	DS-3								
4.00													
				5.10	SPT-1	04	06	09	10	15			
5.00			BROWNISH GRAYISH SILTY GRAVELLY CLAY										
				6.00									
6.00				6.60	SPT-2	05	07	11	12	18			
7.00				7.50									
				8.10	SPT-3	06	09	12	14	21			
8.00													
				9.00									
9.00				9.60	SPT-4	06	11	14	15	25			
10.00													

SPT N = STANDARD PENETRATION TEST VALUE RQD = ROCK QUALITY DESIGNATION UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY DS = DISTURBED SOIL SAMPLE PLI = POINT LOAD INDEX UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- CONTINUE NEXT PAGE.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-02		SHEET NO. : 2 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 14/05/2026 TO 17/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.85m BGL		CASING : 100mm Ø Upto 7.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
11.00	100 mm		BROWNISH GRAYISH SILTY GRAVELLY CLAY	10.50									
				11.10	SPT-5	08	13	16	20	29			
12.00				12.15									
13.00			BROWNISH BRECCIA	13.50							38	15	
14.00											43	26	
15.00				15.00									
16.00				16.50							66	38	
17.00											74	56	
18.00				18.00									
19.00				19.50							78	63	
20.00											86	73	

SPT N = STANDARD PENETRATION TEST VALUE RQD = ROCK QUALITY DESIGNATION UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY DS = DISTURBED SOIL SAMPLE PLI = POINT LOAD INDEX UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 20.00m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO.	: BH-02	SHEET NO.	: 3 OF 3
LOCATION	: MAHIM (W), MUMBAI	DATE	: 14/05/2026 TO 17/05/2026
GROUND R. L.	: ±0.00m	METHOD	: ROTARY DRILLING
GROUND W. T.	: 4.85m BGL	CASING	: 100mm Ø Upto 7.00m & NX mm BGL.

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
21.00	100 mm		BROWNISH BRECCIA	21.00							86	73	
22.00				22.50							87	78	
23.00													
24.00													
25.00													
26.00													
27.00													
28.00													
29.00													
30.00													

SPT N = STANDARD PENETRATION TEST VALUE | RQD = ROCK QUALITY DESIGNATION | UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY | DS = DISTURBED SOIL SAMPLE | PLI = POINT LOAD INDEX | UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 22.50m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-03		SHEET NO. : 1 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 18/05/2026 TO 21/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.65m BGL		CASING : 100mm Ø Upto 7.50m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
1.00	100 mm		FILLING MATERILAS	0.00									
				1.50	DS-1								
2.00													
3.00				3.00	DS-2								
				3.60	SPT-1	03	05	05	07	10			
4.00													
				4.50	DS-3								
5.00				5.10	SPT-2	04	06	07	10	13			
6.00				6.00									
				6.60	SPT-3	05	07	10	13	17			
7.00			BROWNISH GRAYISH SILTY CLAY										
				7.50									
8.00				8.10	SPT-4	06	10	13	15	23			
9.00				9.00									
				9.60	SPT-5	07	12	16	20	28			
10.00													

SPT N = STANDARD PENETRATION TEST VALUE
CR = CORE RECOVERY
RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE
UDS = UNDISTURBED SOIL SAMPLE
PLI = POINT LOAD INDEX
UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- CONTINUE NEXT PAGE.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-03		SHEET NO. : 2 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 18/05/2026 TO 21/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.65m BGL		CASING : 100mm Ø Upto 7.50m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
			BROWNISH GRAYISH SILTY CLAY	10.50									
11.00				11.00	SPT-6	08	14	18	22	32			
12.00	100 mm		BROWNISH BRECCIA	12.00							16	NIL	
13.00				13.50							33	NIL	
14.00													
15.00				15.00							54	28	
16.00				16.50							67	54	
17.00													
18.00				18.00							73	65	
19.00				19.50							87	80	
20.00											94	75	

SPT N = STANDARD PENETRATION TEST VALUE RQD = ROCK QUALITY DESIGNATION UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY DS = DISTURBED SOIL SAMPLE PLI = POINT LOAD INDEX UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 20.00m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO.	: BH-03	SHEET NO.	: 3 OF 3
LOCATION	: MAHIM (W), MUMBAI	DATE	: 18/05/2026 TO 21/05/2026
GROUND R. L.	: ±0.00m	METHOD	: ROTARY DRILLING
GROUND W. T.	: 4.65m BGL	CASING	: 100mm Ø Upto 7.50m & NX mm BGL.

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
21.00	100 mm		BROWNISH BRECCIA	21.00							94	75	
22.00													
23.00													
24.00													
25.00													
26.00													
27.00													
28.00													
29.00													
30.00													

SPT N = STANDARD PENETRATION TEST VALUE | RQD = ROCK QUALITY DESIGNATION | UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY | DS = DISTURBED SOIL SAMPLE | PLI = POINT LOAD INDEX | UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 21.00m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-04		SHEET NO. : 1 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 07/05/2026 TO 10/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.75m BGL		CASING : 100mm Ø Upto 10.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
1.00	100 mm		FILLING MATERILAS	0.00									
				1.50	DS-1								
2.00													
3.00				3.00	DS-2								
				3.60	SPT-1	03	06	07	10	13			
4.00				4.50									
				5.10	SPT-2	04	08	11	16	19			
5.00													
6.00			GRAYISH BROWNISH SILTY GRAVELLY CLAY	6.00									
				6.60	SPT-3	06	09	13	17	22			
7.00				7.50									
				8.10	SPT-4	08	11	15	19	26			
8.00													
9.00				9.00									
10.00			BROWNISH BRECCIA								30	NIL	

SPT N = STANDARD PENETRATION TEST VALUE
CR = CORE RECOVERY
RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE
UDS = UNDISTURBED SOIL SAMPLE
PLI = POINT LOAD INDEX
UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- CONTINUE NEXT PAGE.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-04		SHEET NO. : 2 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 07/05/2026 TO 10/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.75m BGL		CASING : 100mm Ø Upto 10.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
				10.50							30	NIL	
11.00	100 mm										47	13	
12.00				12.00									
13.00				13.50							50	33	
14.00											58	42	
15.00			BROWNISH BRECCIA	15.00									
16.00				16.50							74	58	
17.00											83	64	
18.00				18.00									
19.00				19.50							87	76	
20.00											85	68	

SPT N = STANDARD PENETRATION TEST VALUE RQD = ROCK QUALITY DESIGNATION UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY DS = DISTURBED SOIL SAMPLE PLI = POINT LOAD INDEX UCS=UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 20.00m Below GL.

M/s. UNITECH ENGINEERS

CLIENT : EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT : GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM (W), MUMBAI

BORE HOLE NO. : BH-04		SHEET NO. : 3 OF 3	
LOCATION : MAHIM (W), MUMBAI		DATE : 07/05/2026 TO 10/05/2026	
GROUND R. L. : ±0.00m		METHOD : ROTARY DRILLING	
GROUND W. T. : 4.75m BGL		CASING : 100mm Ø Upto 10.00m & NX mm BGL.	

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
21.00	100 mm		BROWNISH BRECCIA	21.00							85	68	
22.00													
23.00													
24.00													
25.00													
26.00													
27.00													
28.00													
29.00													
30.00													

SPT N = STANDARD PENETRATION TEST VALUE RQD = ROCK QUALITY DESIGNATION UDS = UNDISTURBED SOIL SAMPLE

CR = CORE RECOVERY DS = DISTURBED SOIL SAMPLE PLI = POINT LOAD INDEX UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS :- BORE HOLE TERMINATED AT DEPTH 21.00m Below GL.

M/s. UNITECH ENGINEERS

LABORATORY TEST RESULTS

GEOCON INTERNATIONAL PVT. LTD.

SHOP NO. 02, JOYBELLE APARTMENT, MORI ROAD, MAHIM (W), 420016.

ROCK TEST RESULT

CUSTOMER NAME	: EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA		
PROJECT	: PROPOSED RESIDENTIAL ACCOMODATIO NTYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI		
ULR NO.	: ---	**SAMPLE RECEIVED DATE**	: 19.05.2026
REPORT NO.	: GIPL/CPWD/MAY/01	**CONDITION OF SAMPLE**	: Acceptable
JOB NO.	: **L-26-4135**	**TESTING DURATION**	: 20.05.2026 TO 22.05.2026
NO. OF SAMPLE TESTED	: 08	**REPORT DATE**	: 22.05.2026
SAMPLE IDENTIFICATION	: ROCK	***LOCATION**	: Mahim (W)

Test Method Refrences										IS 9143 1979	IS:9221 1971	IS:8764 1998	IS:10082 1981	IS:13030 1991		IS:1124 1974	IS:1122 1974	
Sr. No.	**Lab ID No.**	**BH NO.**	**Piece No.**	**Depth, in (m)**	**Diameter, cm**	**Height, cm**	**H : D**	**Condition of Test**	**Failure Load**	**Uniaxial Compressive Strength**	**Modulus of Elasticity**	**Point Load Index**	**Brazilian Test**	**Dry Density**	**Porosity**	**Water Absorption**	**Specific Gravity**	**Remark**
					cm	cm			Kn	kg/cm^2	kg/cm^2	kg/cm^2	kg/cm^2	kg/m^3	%	%		
1	R-0019	BH-01	3	13.50-15.00	5.35	11.26	2.10	Soaked	8.5	38.56	-	-	-	1.98	4.72	2.39	-	-
2	R-0020	BH-01	17	18.00-19.50	5.06	11.20	2.21	Soaked	10.7	54.26	-	-	-	1.98	4.42	2.24	-	-
3	R-0021	BH-02	3	12.00-13.50	5.40	8.55	1.58	Soaked	0.3	-	-	1.09	-	1.96	6.10	3.11	-	-
4	R-0022	BH-02	24	18.00-19.50	5.36	10.27	1.92	Soaked	18.1	81.80	-	-	-	2.06	4.29	2.08	-	-
5	R-0023	BH-03	9	13.50-15.00	5.18	7.21	1.39	Soaked	0.6	-	-	2.32	-	2.07	5.23	2.53	-	-
6	R-0024	BH-03	48	18.00-19.50	5.41	10.20	1.89	Soaked	27.1	120.22	-	-	-	2.22	2.96	1.34	-	-
7	R-0025	BH-04	5	10.50-12.00	5.32	7.97	1.50	Soaked	0.2	-	-	0.74	-	1.87	6.75	3.60	-	-
8	R-0026	BH-04	46	16.50-18.00	5.36	10.05	1.88	Soaked	11.4	51.52	-	-	-	1.94	5.27	2.72	-	-

Note: 1. The above results refre/relate only to the sample submitted for testing.
2. No report shall be reproduced in part or full without written approval of this laboratory.
3. Any query regarding report may be reported immediately.
4. Any correction invalidates this report.
5. Tests performed under controlled room temprature $27^0c \pm 2^0c$
6. * Means data provided by customer

Checked By : Harshal S. Desale

AE(C) AE(E&M) EE(C) EE(E&M)

GEOCON INTERNATIONAL PVT. LTD. MUMBAI

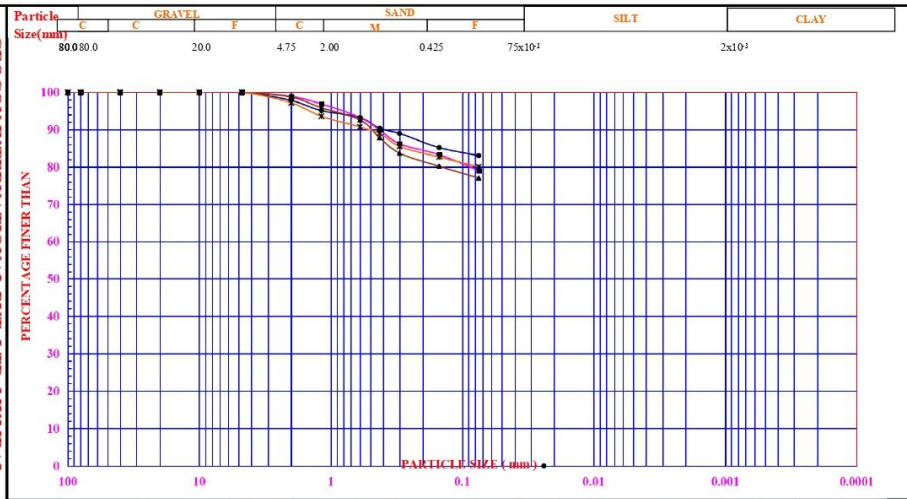
ISO 9001:2015

Job No. : : L-26-4135

GRAIN SIZE DISTRIBUTION ANALYSIS

PROJECT: PROPOSED RESIDENTIAL ACCOMODATIONTYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM W. MUMBAI

CLIENT: EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA



Symbol	* BH NO.	* Depth in (m)	Classify--cation (IS)	Gravel %	Sand %	Silt & Clay %	f_{10}% mm	f_{30}% mm	f_{60}% mm	Coeff. of Uniformity, $C_u = D_{60} / D_{10}$	Shrinkage Limit %	Liquid Limit, W_L	Plastic Limit, W_P	Plasticity Index, I_P	Remarks
●—●	BH-01	3.00-4.50	**CH**	0	17	83	-	-	-	-	-	63	29	34	SPT-2
■—■	BH-02	4.50-6.00	**CH**	0	21	79	-	-	-	-	-	58	25	33	SPT-1
▲—▲	BH-03	4.50-6.00	**CH**	0	23	77	-	-	-	-	-	55	24	31	SPT-3
✳—✳	BH-04	4.50-5.10	**CH**	0	20	80	-	-	-	-	-	59	28	31	SPT-3
——															

GEOCON INTERNATIONAL PVT. LTD.

SHOP NO. 02, JOYBELLE APARTMENT, MORI ROAD, MAHIM (W), 420016.

SOIL TEST RESULT

CUSTOMER NAME	: EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA		
PROJECT	: PROPOSED RESIDENTIAL ACCOMODATIO NTYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI		
ULR NO.	: ---	**SAMPLE RECEIVED DATE**	: 19.05.2026
REPORT NO.	: GIPL/CPWD/MAY/01	**CONDITION OF SAMPLE**	: Acceptable
JOB NO.	: **L-26-4135**	**TESTING DURATION**	: 20.05.2026 TO 22.05.2026
NO. OF SAMPLE TESTED	: 04	**REPORT DATE**	: 22.05.2026
SAMPLE IDENTIFICATION	: Soil	**LOCATION**	: Mahim (W)

Test Method Refrences					IS 2720 Part-2-1973		IS 2720 Part-4 1985				IS 2720 Part-5 1985			IS 2720 Part-6 1972	IS 2720 Part 40 1977	IS 2720 Part-3 (Sec.1) 1980	Remarks
							Grain Size Analysis / Hydrometer Analysis				Consistancy Limits						
Sr. No.	Lab ID.	* BH NO.	* Depth in (m)	* Sample Type UD / D	Natural Moisture Content, w %	Bulk Sensity kg/cm^3	Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %	Plasticity Index, I_p %	Shrinkage Limit %	free swell index %	Specific Gravity	
1	S-4094	BH-01	3.00-4.50	SPT-2	-	-	0	17	83		63	29	34	-	-	-	-
2	S-4095	BH-02	4.50-6.00	SPT-1	-	-	0	21	79		58	25	33	-	-	-	-
3	S-4096	BH-03	4.50-6.00	SPT-3	-	-	0	23	77		55	24	31	-	-	-	-
4	S-4097	BH-04	4.50-5.10	SPT-3	-	-	0	20	80		59	28	31	-	-	-	-

Note:

1. The above results refre/relate only to the sample submitted for testing.
2. No report shall be reproduced in part or full without written approval of this laboratory.
3. Any query regarding report may be reported immediately.
4. Any correction invalidates this this report.
5. Tests performed under controlled room temprature/humidity.
6. * As data provided by customer.

Checked By : Harshal Desale

AE(C) AE(E&M) EE(C) EE(E&M)

GEOCON INTERNATIONAL PVT. LTD.

SHOP NO. 02, JOYBELLE APARTMENT, MORI ROAD, MAHIM (W), 420016.

WATER / SOIL CHEMICAL TEST RESULT

CUSTOMER NAME	: EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA		
PROJECT	: PROPOSED RESIDENTIAL ACCOMODATIO NTYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI		
ULR NO.	: ---	**SAMPLE RECEIVED DATE**	: 19.05.2026
REPORT NO.	: GIPL/CPWD/MAY/01	**CONDITION OF SAMPLE**	: Acceptable
JOB NO.	: **L-26-4135**	**TESTING DURATION**	: 20.05.2026 TO 22.05.2026
NO. OF SAMPLE TESTED	: 01	**REPORT DATE**	: 22.05.2026
SAMPLE IDENTIFICATION	: Water	**LOCATION**	: Mahim (W)

Test Method Refrences						CHEMICAL TEST ON WATER			CHEMICAL TEST ON SOIL			Remark
						IS 3025 PART-11 2022	IS 3025 PART-24 SEC-1 2022	IS 3025 PART-32 1988	IS 2720 PART-26 1987	IS 2720 PART-27 1977	BS 1377 PART-3 CLAUSE-9 2018	
Sr. No.	Lab ID No.	BH NO.	Piece/ Sample No.	Depth, in (m)	Type Of Sample Water / Soil	pH- Electrometric Method	Sulphate Content $BaSO_4$ - Gravimetric Method	Chloride Content - Argentometric Method	pH- Electrometric Method	Total Soluble Sulphate –Precipitation Method	Water Soluble Chloride Content	
						-	mg/l	mg/l	-	%	%	
1	W-1836	BH-02	-	-	Water	7.48	33.03	116.46	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-		-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-

Note: 1. The above results refre/relate only to the sample submitted for testing.
2. No report shall be reproduced in part or full without written approval of this laboratory.
3. Any query regarding report may be reported immediately.
4. Any correction invalidates this report.
5. Tests performed under controlled room temprature $27^0c \pm 2^0c$
6. * Means data provided by customer

Prepared & Aprroved By:
Harshal Desale
(Quality/Technical Manager)

AE(C) AE(E&M) EE(C) EE(E&M)

AE(C) AE(E&M) EE(C) EE(E&M)

CORE BOX PHOTOS

CORE BOX PHOTOGRAPHS

CLIENT:- EXECUTIVE ENGINEER & SM (CIVIL-1) CPWD, WADALA

PROJECT:-PROPOSED RESIDENTIAL ACCOMODATION TYPE-III 58, TYPE-IV 30 AND TRANSIT ACCOMODATION-28 FOR SIB NEAR S L RAHEJA HOSPITAL, MAHIM W, MUMBAI

BH-01 (DEPTH = 0.00m TO 22.50m) BOX NO. 1 OF 1



M/s. UNITECH ENGINEERS

CORE BOX PHOTOGRAPHS

BH-02 (DEPTH = 0.00m TO 22.50m) BOX NO. 1 OF 1



BH-03 (DEPTH = 0.00m TO 21.00m) BOX NO. 1 OF 1



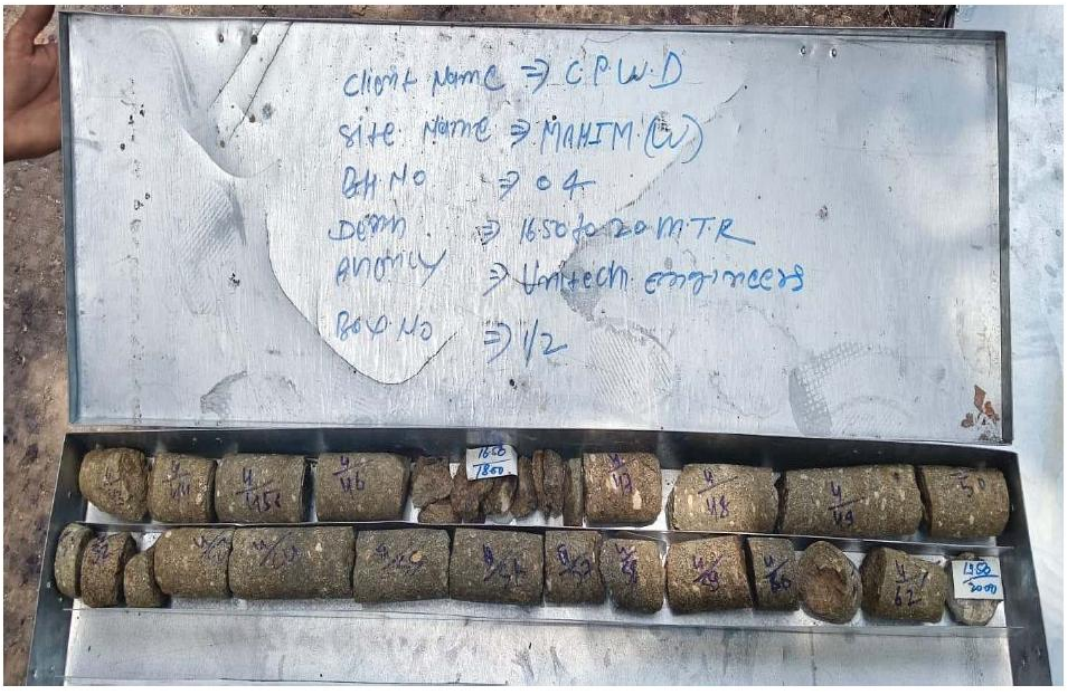
M/s. UNITECH ENGINEERS

CORE BOX PHOTOGRAPHS

BH-04 (DEPTH = 0.00m TO 16.50m) BOX NO. 1 OF 2



BH-04 (DEPTH = 16.50m TO 21.0m) BOX NO. 2 OF 2



M/s. UNITECH ENGINEERS

LIST OF DRAWINGS

S.No	Drawing No.	Name of Drawing
Podium and Basement (Parking + Services)		
1	909/P-74/CA(MUMBAI)/2024/03	Layout Plan
2	912/P-74/CA(MUMBAI)/2024/06	Level-1 Basement-Services
3	913/P-74/CA(MUMBAI)/2024/07	Level+0 stilt/Gr. Level-Services + Parking +Office
4	914/P-74/CA(MUMBAI)/2024/08	Level + 1 Podium Parking
5	915/P-74/CA(MUMBAI)/2024/09	Level + 2nd Podium Parking
6	916/P-74/CA(MUMBAI)/2024/10	Level + 3rd Podium Parking
7	917/P-74/CA(MUMBAI)/2024/11	Level + 4th Podium Parking
8	918/P-74/CA(MUMBAI)/2024/12	Level + 5th Podium Parking
Building Drawings (Type-III& IV Residential quarters)		
9	919/P-74/CA(MUMBAI)/2024/13	Level + 6th Podium Top-Recreational area
10	920/P-74/CA(MUMBAI)/2024/14	Level + 7th Refuge Area Plan-7th + Transit
11	921/P-74/CA(MUMBAI)/2024/15	Level +8th to 11th-Typical Floor Plan - (III & Transit Units)
12	922/P-74/CA(MUMBAI)/2024/16	Level + 12th, 13th & 15th to 17th-Typical Floor Plan-(III & IV Units)
13	923/P-74/CA(MUMBAI)/2024/17	Level +14 Refuge Area Plan-(14) +Transit Accommodation
14	924/P-74/CA(MUMBAI)/2024/18	Level+18th-Top floor plan
15	925/P-74/CA(MUMBAI)/2024/19	Terrace level plan
16	926/P-74/CA(MUMBAI)/2024/20	Typical Unit Plion-Type-III+IV+ Guest Suites
SECTION/ ELEVATION/VIEW		
17	927/P-74/CA(MUMBAI)/2024/21	Section at-A-A"

Note -Above Concept Drawings attached separately