Addendum No. 03, Item No. 23,
Attachment No. 02: Additional Borelog Data

Table of Contents

1) Boreholes Information

Table 1.0: Co-ordinates of the borehole location

Borehole No.	Co-ordinates (m)		RL (m)
	Easting	Northing	
PBH-01	275232.32	2109606.77	+4.746
PBH-02	275373.22	2109696.60	+4.466
PBH-03	275549.53	2109801.73	+4.148

Table 2.0: Borehole Drilling Information

Borehole No.	Duration of Investigation		Termination Depth (m)
	Start Date	End Date	
PBH-01	14-06-2019	27-07-2019	95.20 (RL -90.454)
PBH-02	26-06-2019	15-07-2019	95.20 (RL -90.734)
PBH-03	18-07-2019	08-08-2019	95.10 (RL -90.952)

Table 7.0: Stratigraphy of PBH-01

Depth (m)	Stratigraphy
0.0 – 1.5	Light Brownish Gray, **Silty CLAY** with Gravels and Rock Fragments. (Filled up materials).

Depth (m)	Stratigraphy
1.5 – 5.0	Light Brownish Gray, Firm to Hard **Sandy CLAY** with Gravels and Rock Fragments.
5.0 – 6.0	Light Brownish Gray, Highly Weathered, Weak Volcanic **TUFF**
6.0 – 18.0	Light Brownish Gray, Slightly Weathered to Fresh, weak to Strong **BRECCIA** with cavities, iron oxidation, quartz & amygdal minerals.
18.0 – 20.5	Dark Gray, Slightly weathered to Fresh, Strong to Very Strong **Fine BASALT** with quartz minerals and amygdal veins.
20.5 – 32.5	Dark Gray, Fresh, Moderately Strong to Very Strong Volcanic **BRECCIA** with chlorite, calcite, quartz and amygdal mineral inclusions.
32.5 – 56.5	Dark Gray, Slightly Weathered to Fresh, Weak to Strong Volcanic **BRECCIA** with amygdal veins and quartz/chlorite mineral inclusion.
56.5 – 59.5	Dark Gray, Moderately to Slightly weathered, Weak Volcanic **BRECCIA** with quartz amygdal minerals and **BASALT** intrusion.
59.5 – 61.0	Light Gray, Fresh, Strong **Fine BASALT** with quartz, chlorite and amygdal minerals inclusion.
61.0 – 76.0	Dark Gray, Slightly Weathered to Fresh, Strong Volcanic **BRECCIA** with quartz, chlorite and amygdal minerals as inclusion.
76.0 – 77.5	Grayish Brown, Fresh, Weak to Strong volcanic **BRECCIA** with quartz, chlorite and amygdal minerals as inclusion. **BASALT** intertrapped.
77.5 – 79.5	Greenish Gray, Fresh, Very Strong Fine Grained **BASALT** with quartz, chlorite and amygdal minerals.

Depth (m)	Stratigraphy
79.5 – 83.5	Grayish Brown, Fresh, Weak to Strong, Volcanic **BRECCIA** with quartz and amygdal minerals.
83.5 – 86.5	Grayish Brown, Fresh, Strong Volcanic **BRECCIA** with quartz and amygdal mineral veins. **BASALT** intertrapped.
86.5 – 88.0	Grayish Brown, Fresh, Strong fine **BASALT** with quartz and chlorite.
88.0 – 95.2	Greenish Gray, Fresh, Weak to Strong Volcanic **BRECCIA** with quartz and amygdal veins.

Table 8.0: Stratigraphy of PBH-02

Depth (m)	Stratigraphy
0.0 – 1.5	Light brownish gray, Silty **SAND** with Gravels & Rock Fragments
1.5 – 2.0	Gray, Hard, Sandy **CLAY** with Gravels & Rock fragments
2.0 – 2.5	Gray, Cemented **ROCK** (Filled up material)
2.5 – 3.5	Dark gray, Hard, Silty **CLAY** with rock fragments
3.5 – 4.0	Light brownish gray, weak, Highly to Moderately Weathered, volcanic **TUFF**
4.0– 7.0	Grayish brown, Weak to Strong, Highly to Moderately weathered, composite **BRECCIA** with iron oxidation along the horizontal fractures.
7.0 – 8.0	Gray, Strong, Slightly weathered to Fresh, fine grained **BASALT** with quart and chlorite
8.0 – 8.5	Brown, Weak, Moderately weathered, composite **BRECCIA**
8.5 – 13.5	Gray, Strong, Slightly weathered to Fresh, medium grained **BASALT** with quartz and chlorite as mineral inclusions and fractures.

Depth (m)	Stratigraphy
13.5 – 15.0	Gray, Strong, Slightly weathered to Fresh, Volcanic **BRECCIA** with quartz and chlorite mineral inclusions. Fractures seen.
15.0 – 22.5	Gray, Strong, Slightly weathered to fresh, medium to fine grained **BASALT** with quartz and chlorite as secondary minerals.
22.5 – 72.0	Gray, Moderately to Strong, Slightly weathered to Fresh, Volcanic **BRECCIA** with quartz, chlorite and amygdal mineral inclusions.
72.0 – 75.5	Light gray, Strong to Very Strong, Fresh, fine **BASALT** with amygdal veins, quartz and chlorite minerals.
75.5 – 79.0	Dark gray, Moderately Strong to Strong, Slightly Weathered to Fresh, Volcanic **BRECCIA** with amygdal veins and quartz minerals and minor cavities observed.
79.0 – 79.5	Gray, Very Strong, Fresh, **BASALT** with quartz, chlorite, amygdal veins.
79.5 – 82.5	Dark gray, Very Strong to Strong, Fresh, Volcanic **BRECCIA** with chlorite, quartz and amygdal veins as secondary mineral inclusion.
82.5 – 94.5	Dark gray, Strong, Slightly Weathered to Fresh, Fine **BASALT** with quartz, chlorite and amygdal veins as secondary mineral inclusion.
94.5 – 95.2	Dark gray, Strong to Very Strong, Fresh, Volcanic **BRECCIA** with quartz and amygdal minerals veins.

Table 9.0: Stratigraphy of PBH-03

Depth (m)	Stratigraphy
0.0 – 6.5	Gray, Soft to Hard, Slightly Silty **CLAY** with traces of gravels.
6.5 –9.0	Yellowish brown, Weak to Moderately Weak, Completely to Highly weathered, Volcanic **BRECCIA**
9.0 – 13.5	Light brownish gray, Weak to Moderately Strong, Highly to slightly weathered, volcanic **BRECCIA**
13.5 – 22.5	Light brownish gray, Very weak to Moderately weak, Highly weathered to slightly, volcanic **BRECCIA** with quartz and calcite/chlorite.
22.5 – 39.0	Grayish brown, weak to Strong, Slightly weathered to Fresh, volcanic **BRECCIA** with quartz and amygdal
39.0 – 42.0	Grayish brown, Strong, Slightly weathered to Fresh, Vesicular **BASALT** with quartz , chlorite and amygdaloidal minerals
42.0 – 51.0	Reddish brown, Weak to Moderately Strong, Slightly to moderately weathered to Fresh, Volcanic **BRECCIA** with quartz, chlorite, calcite minerals inclusions and amygdal veins
51.0 – 61.5	Gray, Moderately Strong to Strong, Fresh, medium grained **BASALT** with quartz and chlorite mineral
61.5 – 79.5	Light brownish gray, Moderately Weak to Strong, Fresh, Volcanic **BRECCIA** with chlorite, quartz and amygdal veins as secondary mineral inclusion
79.5 – 95.1	Dark gray, Moderately Strong to Strong, Fresh, volcanic **BRECCIA** with chlorite, quartz and amygdal veins as secondary mineral inclusion

7.0 GROUND WATER TABLE

Groundwater table was encountered in all boreholes (PBH-01 to PBH-03) during the period of investigation. The ground water table elevations are summarized in **Table 10.0.**

Table 10.0: Groundwater table Information

Borehole No.	Water Table Depth (m)	Termination Depth (m)
PBH-01	8.0 (RL -3.254)	95.20 (RL -90.454)
PBH-02	5.0 (RL -0.534)	95.20 (RL -90.734)
PBH-03	6.5 (RL -2.352)	95.10 (RL -90.952)

APPENDIX-A

i. Plate No. 1 – Location Layout

ii. Plate No. 2 - Stratigraphy Drawing

APPENDIX-A

i. Plate No. 1 – Location Layout

NOTES :–

1) ALL BOREHOLES SHALL BE DRILLED UP TO 95M DEPTH BELOW EGL.

2) INVESTIGATION SHALL BE CARRIED OUT AS PER IS 1892 GUIDELINES

3) PRESSURE METER TEST SHALL BE CONDUCTED AT EVERY 5.0 M INERVAL BELOW FOUNDATION LEVEL TO END OF BOREHOLE. LIMITING PRESSURE, SHEAR MODULUS AND YOUNGS MODULUS SHALL BE ARRIVED.

4) LAB TEST :–

(I) SOIL: ALL THE UDS/DS SOIL SAMPLES (COLLECTED AT 1.50M INTERVALS) SHALL BE TESTED FOR GRAIN SIZE ANALYSIS, ATTERBERG LIMITS, SHEAR STRENGTH PARAMETERS, ETC.

(II) ROCK: ROCK CLASSIFICATION,ROCK TESTS SUCH AS UCS (SOAKED), POINT LOAD, SPECIFIC GRAVITY, DENSITY, POROSITY & DEFORMATION MODULES ETC. SHALL BE PERFORMED ON ROCK CORES AT EVERY 5.0M INTERVAL OR AT CHANGE OF ROCK STRATA.IF IN CASE ROCK CORES OF SUFFICIENT LENGTHS ARE NOT RETRIEVED THEN POINT LOAD TEST SHALL BE PERFORMED INSTEAD OF UCS.

5) REPORT SHALL INCLUDE DETAILS OF ALL FIELD & LAB TEST RESULTS WITH FOLLOWING RECOMMENDATIONS:

(I) SBC FOR RAFT FOUNDATION AT PROPOSED FOUNDATION LEVEL.

(II) MODULUS OF SUBGRADE REACTION FOR RAFT FOUNDATION.

(IIII)RECOMMENDATION ON EARTH RETENTION SYSTEM FOR 30M DEEP EXCAVATION ALONG WITH NECESSARY ANALYSIS AND CALCULATIONS. PRECAUTIONARY MEASURES FOR EXCAVATION, DEWATERING ETC. SHALL BE INCLUDED.

(IV) TYPE OF CEMENT AND CONCRETE FOR FOUNDATION IN VIEW OF CHEMICAL PROPERTIES OF SOIL AND WATER,

1. CROSS HOLE SEISMIC TEST SHALL BE PERFORMED TO A DEPTH OF 95 BELOW EGL.

2. CROSS HOLE SEISMIC TEST SHALL BE CONDUCTED WITH ONE SOURCE AND TWO RECEIVER HOLES.

P AND S WAVES VELOCITIES SHALL BE MEASURED AT EVERY 1.0 M INTERVAL
DYNAMIC PROPERTIES SUCH AS POISSONS RATIO, MASS DENSITY,SHEAR MODULUS ETC.

SOURCE

DETAIL–A

TABLE:–1 PROPOSED BOREHOLE(PBH)

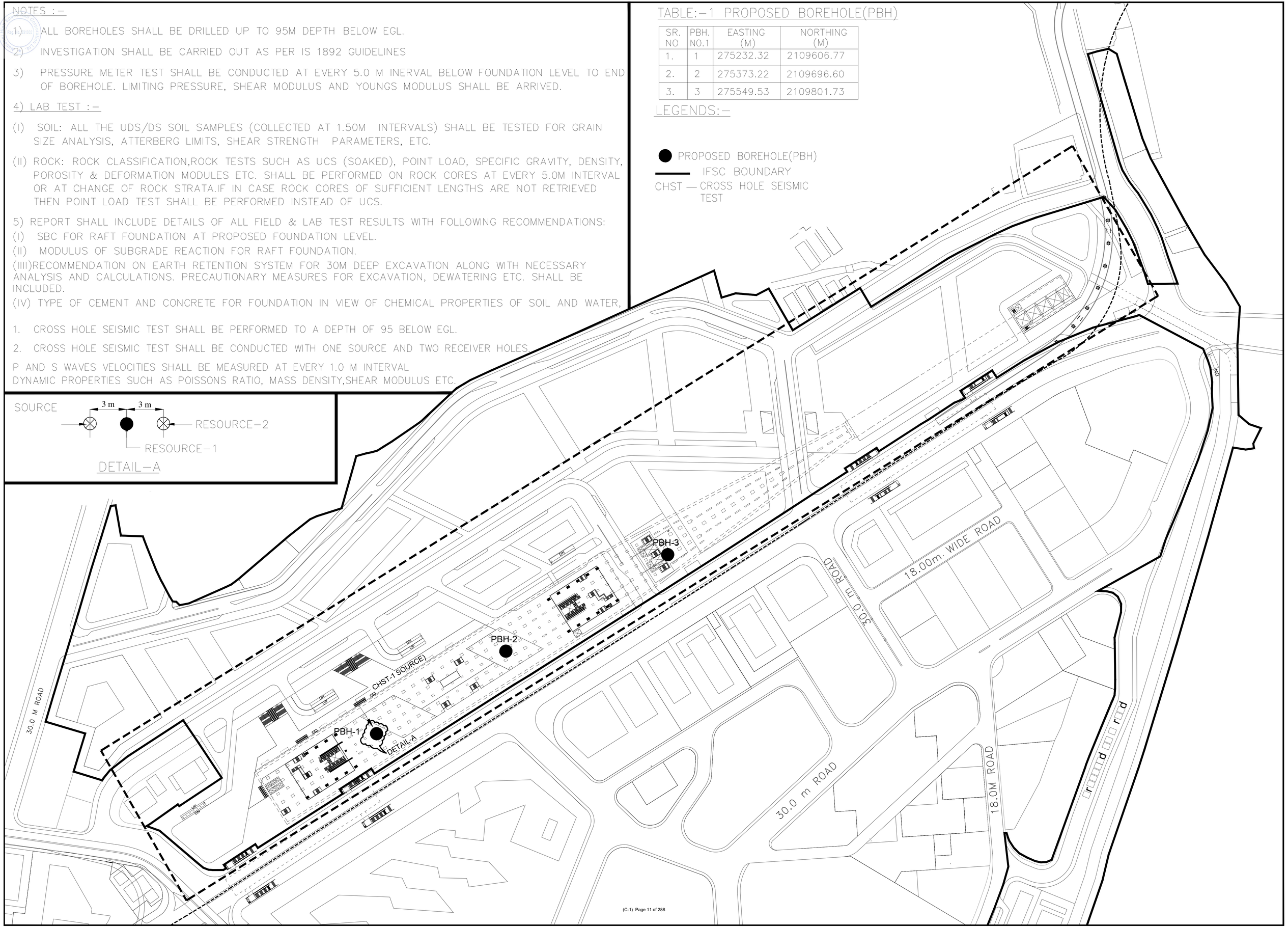
SR. NO	PBH. NO.1	EASTING (M)	NORTHING (M)
1.	1	275232.32	2109606.77
2.	2	275373.22	2109696.60
3.	3	275549.53	2109801.73

LEGENDS:–

● PROPOSED BOREHOLE(PBH)

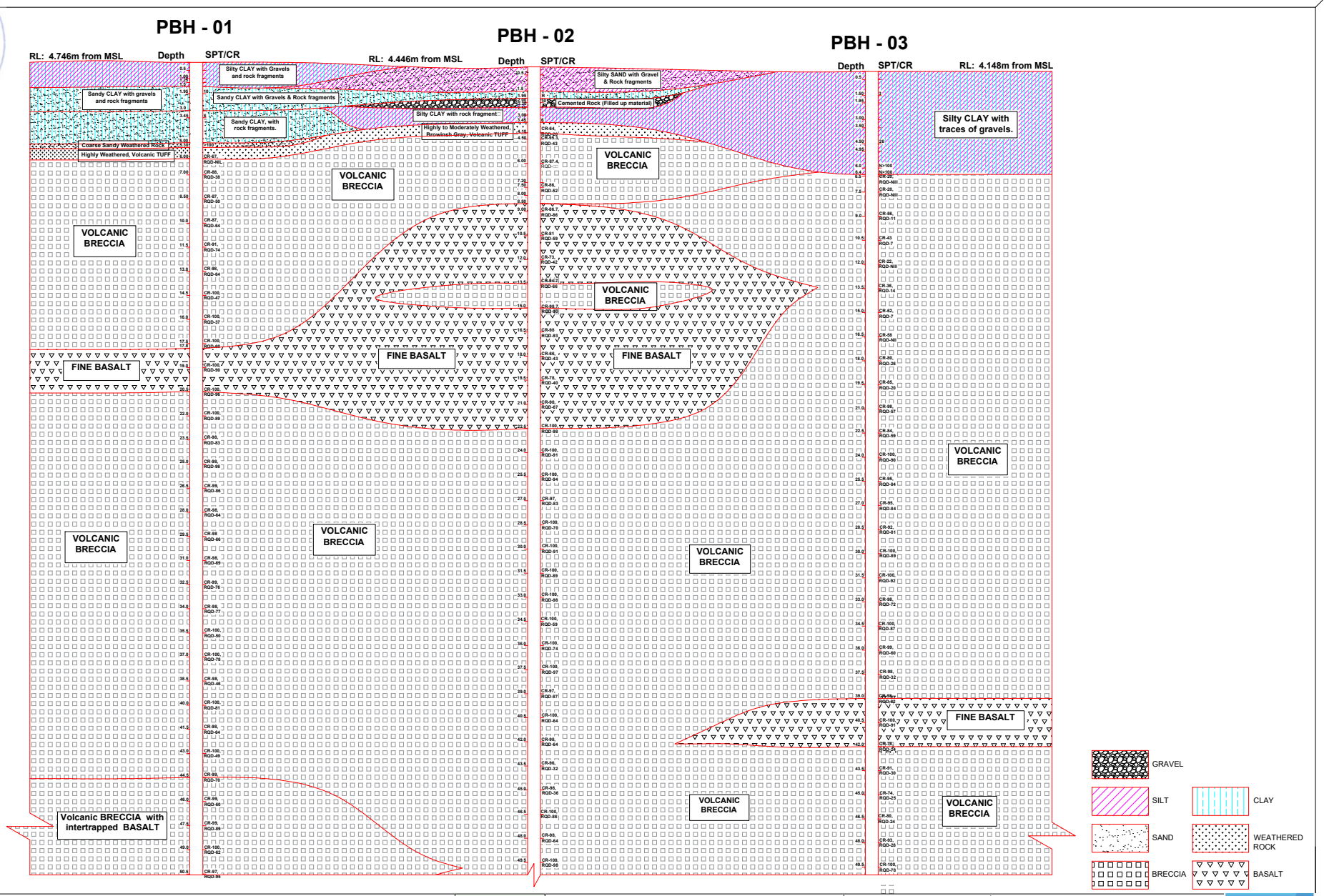
IFSC BOUNDARY

CHST — CROSS HOLE SEISMIC TEST

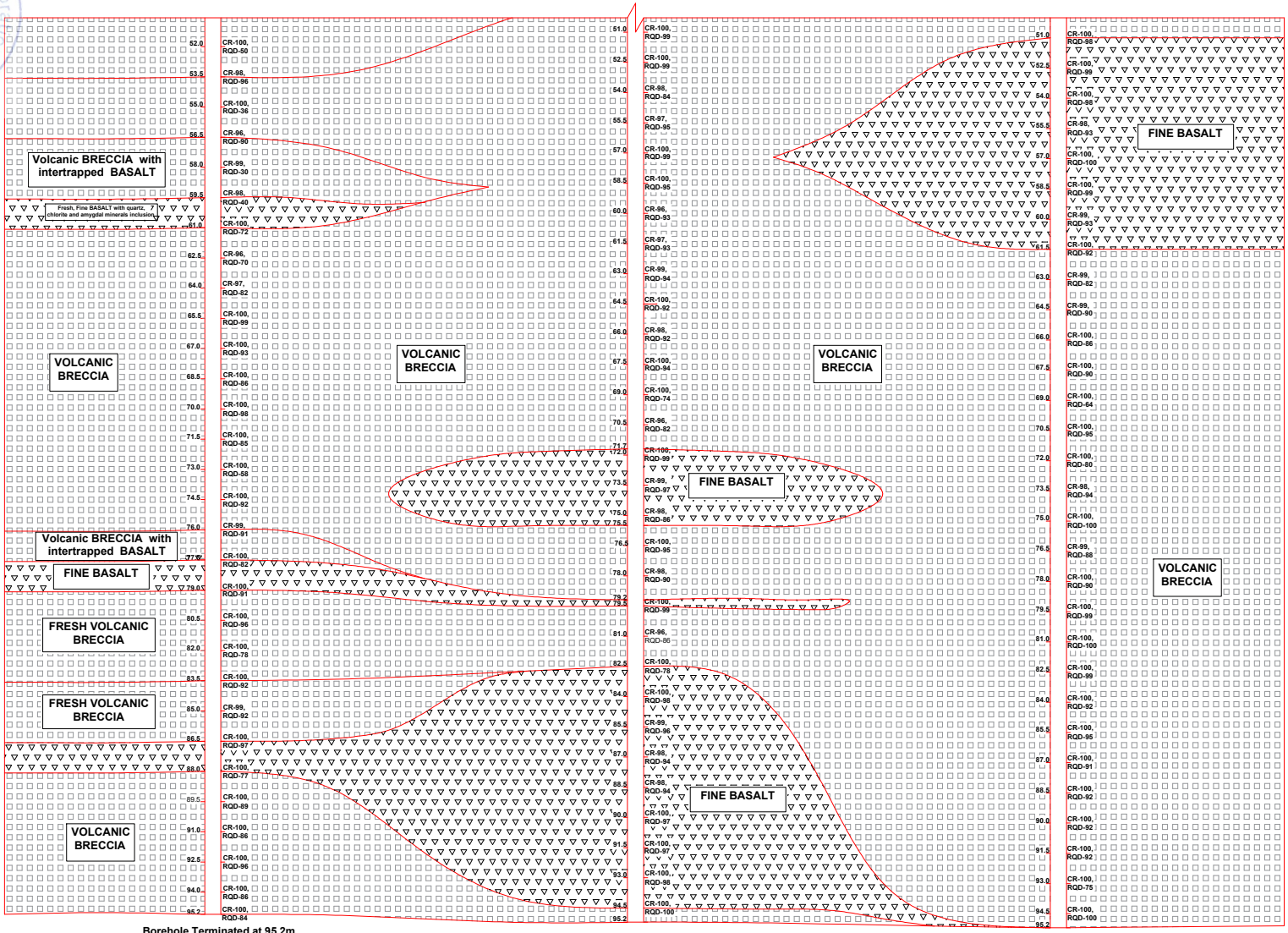


APPENDIX-A

ii. Plate No. 2 - Stratigraphy Drawing



CLIENT: NHSRCL	DRAWN BY: AND	PLATE NO: 2A	DRAWING NO.
PROJECT: GEOTECHNICAL & GEOPHYSICAL INVESTIGATION FOR NATIONAL HIGH SPEED RAIL	LOCATION: MUMBAI	SCALE - 1:200	2019-20/S-1612/VER.4



STRATIGRAPHY ALONG PBH-01, PBH-02 & PBH-03

CLIENT: NHSRCL	DRAWN BY: AND	PLATE NO: 2A	DRAWING NO.
PROJECT: GEOTECHNICAL & GEOPHYSICAL INVESTIGATION FOR NATIONAL HIGH SPEED RAIL	LOCATION: MUMBAI	SCALE - 1:200	2019-20/S-1612/VER.4

APPENDIX-B

i. Plate No. 1 – Final Borehole Logs

- PBH - 01
- PBH - 02
- PBH - 03

APPENDIX-B

- PBH - 01

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray Silty CLAY with Gravels and rock fragments. Filled up materials.			0	1	0.5							
						1		1.0							
3.246							1								
			Light brownish gray, Firm, Sandy CLAY with gravels and rock fragments	(10) 3/5/5		1.5/ 1.95	1	1.5							
								2.0							
1.746								2.5							
			Light brownish gray, Hard Sandy CLAY, with rock fragments.	(6) 4/3/3		3/ 3.45	2	3.0							
								3.5							
								4.0							
						4.5/ 4.95	3	4.5							
-0.254				(37) 9/9/28				5.0							
			Light brownish gray, Very Dense, Coarse Sandy Weathered Rock			5.25/ 5.3	4								
-0.55															
			Light brownish gray, weak, Highly Weathered, Volcanic TUFF	(N>100) 91R/R/R		5.3	1	5.5	67	Nil					
-1.254						6		6.0							
			Light brownish gray, moderately strong to strong, Moderately to Slightly weathered, BRECCIA				2	6.5	88	38					
-2.254								7.0							

Abbreviations & Symbols

- UCS : Unconfined Compression Test
- T.D. : Termination Depth
- LL : Liquid Limit
- PLI : Point Load Index
- N.I : Non Intact Core (fracture Index >10) Blank Values indicate Intact rock

- TCR : Total core recovery
- SCR : Solid core recovery
- RQD : Rock quality Designation
- SP : Small Pieces

- I : Fresh
- II : Slightly Weathered
- III : Moderately Weathered
- IV : Highly Weathered
- V : Completely Weathered
- VI : Residual Soil

- B1,B2,B3 : Bulk Samples
- S1,S2,S3 : SPT Samples
- C1,C2,C3 : Rock Cores
- D1,D2,D3 : Disturbed Samples
- U1,U2,U3 : Undisturbed Samples

Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, moderately strong to strong, Slighlty Weathered to Fresh, BRECCIA with cavities and iron oxidation			7		7.5				7.23	12.45		
							3		87	50					
-3.754						8.5		8.0							
			Light brownish gray, weak to strong, Fresh to Moderately weathered, BRECCIA with cavaties and iron oxidation					8.5							
							4	9.0	87	64					
						10		9.5							
								10.0				8.55			
							5	10.5	91	74					
						11.5		11.0							
								11.5						0.91	
							6	12.0	98	64					
-8.254						13		12.5							
			Light brownish gray, weak to strong, Slightly to Highly weathered, BRECCIA with cavities and quartz & amygdal minerals.					13.0						0.72	
							7	13.5	100	47					
								14.0							

Abbreviations & Symbols

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PLI : Point Load Index
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TCR : Total core recovery
SCR : Solid core recovery
RQD : Rock quality Designation
SP : Small Pieces

I : Fresh
II : Slightly Weathered
III : Moderately Weathered
IV : Highly Weathered
V : Completely Weathered
VI : Residual Soil

B1,B2,B3 : Bulk Samples
S1,S2,S3 : SPT Samples
C1,C2,C3 : Rock Cores
D1,D2,D3 : Disturbed Samples
U1,U2,U3 : Undisturbed Samples

Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, weak to strong, Slightly to Highly weathered, BRECCIA with cavities and quartz & amygdal minerals.			14.5		14.5	100	47					
								15.0							
							8		100	37					
								15.5							
						16		16.0							
								16.5							
							9		100	60					
								17.0							
						17.5		17.5				19.54			
-13.054			Dark gray, Strong to Very Strong, Slightly weathered to Fresh, Fine BASALT with quartz minerals and amygdal veins.					18.0							
							10		100	90					
								18.5							
						19		19.0							
								19.5							
							11		100	96					
								20.0							
-15.754						20.5		20.5				92.48			
			Dark gray Fresh, very strong to strong, Volcanic BRECCIA with quartz and amygdal minerals.						100	89					
								21.0							

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- SCR : Solid core recovery
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- SP : Small Pieces

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- U1,U2,U3 : Undisturbed Samples

Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray Fresh, very strong to strong, Volcanic BRECCIA with quartz and amygdal minerals.				12	21.5	100	89					
						22		22.0							
							13	22.5	98	83					
						23.5		23.0							
								23.5				18.23			
							14	24.0	98	98					
						25		24.5							
								25.0			4736.5				
							15	25.5	99	86					
-21.754						26.5		26.0							
			Dark gray, moderately strong to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with quartz and amygdal veins & chlorite inclusion.					26.5							
							16	27.0	98	64					
								27.5							
								28.0							

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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, moderately strong to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with quartz and amygdal veins & chlorite inclusion.			28	17	28.5	98	66					
-24.754						29.5		29.0							
			Very Strong to Strong Dark gray Fresh, Volcanic BRECCIA with chlorite, calcite, quartz and amygdal mineral inclusions.				18	29.5	98	69	4622.9	12.89	12.82	0.83	
						31		30.0							
								30.5							
							19	31.0	99	76		9.92	9.31		
-27.754						32.5		31.5							
			Dark gray, weak to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with amygdal veins and quarts mineral inclusion.				20	32.0	98	77					
								32.5							
								33.0							
								33.5							
						34		34.0							
							21	34.5	100	50					
								35.0							

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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, weak to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with amygdal veins and quarts mineral inclusion.			35.5		35.5	100	50					
							22	36.0	100	78	7066.2				
-32.254						37		36.5							
			Dark gray, strong to weak, Moderately to Slightly weathered, Volcanic BRECCIA with amygdal veins and quartz and chlorite minerals.					37.0				9.65			
							23	37.5	98	46					
						38.5		38.0							
							24	38.5	100	81					
						40		39.0							
								39.5			5348.1				
							25	40.0	98	64					
						41.5		40.5							
								41.0							
								41.5	100	49					
								42.0							

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- SCR : Solid core recovery
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- SP : Small Pieces

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- B1,B2,B3 : Bulk Samples
- S1,S2,S3 : SPT Samples
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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, strong to weak, Moderately to Slightly weathered, Volcanic BRECCIA with amygdal veins and quartz and chlorite minerals.				26	42.5	100	49					
						43		43.0				66.20			
							27	43.5	99	70					
-39.754						44.5		44.0							
			Gray, strong, Fresh Volcanic BRECCIA with amygdal veins, quartz and chlorite mineral inclusions. BASALT intertrapped.					44.5			14042.2				
							28	45.0	99	60					
						46		45.5							
							29	46.0	99	89					
						47.5		46.5				56.35			
							30	47.0	100	62					
								47.5							
								48.0							
								48.5							
								49.0							

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PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
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Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Gray, strong, Fresh Volcanic BRECCIA with amygdal veins, quartz and chlorite mineral inclusions. BASALT intertrapped.			49	31	49.5	97	95					
						50.5		50.5			6057.4			1.56	0.80
							32	51.0	100	50					
						52		52.0							
							33	52.5	98	96					
-48.754						53.5		53.0							
			Dark gray, weak, Slightly weathered to Fresh, Volcanic BRECCIA with quartz and amygdal veins as secondary mineral inclusions.				34	53.5							
								54.0	100	36					
						55		54.5							
								55.0			13991.2	8.13			
							35	55.5	96	90					
								56.0							

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SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
-51.754						56.5		56.5	96	90					
			Dark gray, weak, Moderately to Slightly weathered, Volcanic BRECCIA with quartz amygdal minerals. BASALT intrusion seen.				36	57.0	99	30					
								57.5							
						58		58.0				10.14			
							37	58.5	98	40					
								59.0							
-54.754						59.5		59.5			5430.9				
			Light gray, strong, Fresh, Fine BASALT with quartz, chlorite and amygdal minerals inclusion.				38	60.0	100	72					
								60.5							
-56.254						61		61.0							
			Dark gray,strong, Slightly Weathered to Fresh, Volcanic BRECCIA with quartz and amygdal minerals.				39	61.5	96	70					
								62.0							
						62.5		62.5				7.16			
								63.0	97	82					

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PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray,strong, Slightly Weathered to Fresh, Volcanic BRECCIA with quartz and amygdal minerals.				40	63.5	97	82					
						64		64.0							
							41	64.5	100	99					
						65.5		65.0			5166.3				
							42	65.5	100	93					
						67		66.0							
							43	66.5	100	86					
-63.754						68.5		67.0							
			Dark gray, strong to weak, Fresh, Volcanic BRECCIA with quartz, chlorite and amygdal veins.					67.5				12.78			
							44	68.0	100	98					
								68.5							
								69.0							
								69.5							
								70.0							

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SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, strong to weak, Fresh, Volcanic BRECCIA with quartz, chlorite and amygdal veins.			70	45	70.5	100	85	7073.8				
						71.5		71.0							
							46	71.5	100	58					
-68.254						73		72.0							
			Grayish brown, weak to strong, Fresh Volcanic BRECCIA with quartz, calcite, chlorite and amygdal minerals as inclusion.				47	72.5	100	92		6.55			
-69.754						74.5		73.0							
			Grayish brown, weak to strong, Fresh Volcanic BRECCIA with quartz, chlorite and amygdal minerals as inclusion.				48	73.5	99	91		4.03			
-71.254						76		74.0							
			Grayish brown, weak to strong, Fresh, volcanic BRECCIA with quartz, chlorite and amygdal minerals as inclusion. BASALT present as intertrapped				49	74.5	100	82	5255.6				
								75.0							
								75.5							
								76.0							
								76.5							
								77.0							

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SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
-72.754						77.5		77.5	100	82					
			Greenish gray, very strong, Fresh fine grained BASALT with quartz, chlorite and amygdal minerals.				50	78.0	100	91					
-74.754						79		78.5							
			Grayish brown , weak to strong, Fresh, Volcanic BRECCIA.				51	79.0	100	96					
-75.754						80.5		79.5							
			Grayish brown, weak to strong, Fresh, Volcanic BRECCIA with quartz and amygdal veins.				52	80.0	100	78	5249.3				
								80.5							
						82		81.0							
							53	81.5	100	92		31.29			
-78.754						83.5		82.0							
			Grayish brown Fresh, strong, Volcanic BRECCIA with quartz and amygdal mineral veins. BASALT intertrapped.					82.5							
								83.0							
								83.5	99	92					
								84.0							

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PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Grayish brown Fresh, strong, Volcanic BRECCIA with quartz and amygdal mineral veins. BASALT intertrapped.				54	84.5	99	92					
						85		85.0							
							55	85.5	100	97					
								86.0							
-81.754						86.5		86.5			15724.8				
			Grayish brown, strong, Fresh fine BASALT with quartz and chlorite.				56	87.0	100	77					
-83.254						88		87.5							
			Greenish gray Fresh, weak to strong, Volcanic BRECCIA with quartz and amygdal veins.					88.0				8.65			
							57	88.5	100	89					
						89.5		89.0							
								89.5			20762.4				
							58	90.0	100	86					
								90.5							
								91.0							

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PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 8	**Borehole No**	: PBH-01
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109606.77, E275232.32
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 14-06-2019 - 27-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.746
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Greenish gray Fresh, weak to strong, Volcanic BRECCIA with quartz and amygdal veins.			91		91.5							
							59		100	96					
								92.0							
-87.754						92.5		92.5							
			Light brownish gray, strong, Fresh, Volcanic BRECCIA with chlorite, quartz and amygdal minerals inclusions.					93.0							
							60		100	86					
								93.5							
						94		94.0			13013.2	9.09			
							61	94.5	100	84					
-90.454								95.0							
			Borehole terminated at 95.2m												

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APPENDIX-B

- PBH - 02

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 5	**Borehole No**	: PBH-02
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109696.60, E275373.22
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 26-06-2019 - 15-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.466
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray Silty SAND with Gravels & Rock fragments			0		0.5							
							1	1.0							
2.966						1.5/		1.5							
			Gray, hard, Sandy CLAY with Gravels & Rock fragments	(>100) 20/17/50		1.95	1								
2.516						2	1	2.0	98	0					
			Gray Cemented ROCK (Filled up material)												
1.966						2.5		2.5							
			Dark gray, hard, Silty CLAY with rock fragments				1								
						3/ 3.45		3.0							
				(36) 6/8/28			2								
1.016								3.5							
			Light brownish gray, weak, Highly to Moderately Weathered, Browinsh Gray, volcanic TUFF												
0.366						4/ 4.05	3	4.0							
			Grayish brown, weak to strong, Highly to Moderately, composite BRECCIA with iron oxidation along the horizontal fractures.	(R) 92/R/R		4.05	2		64	20					
						4.5		4.5				11.71			
							3	5.0	95.3	43					
								5.5							
						6		6.0							
							4	6.5	87.4	30					
								7.0							

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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 5	**Borehole No**	: PBH-02
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109696.60, E275373.22
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 26-06-2019 - 15-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.466
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
-2.734															
			Gray, strong, Slightly weathered to Fresh, fine grained BASALT with quart and chlorite			7.5		7.5	87.4	30					
-3.534								8.0							
			Brown, weak, Moderately weathered, composite BRECCIA				5		86	52					
-4.034								8.5							
			Gray, strong, Slightly weathered to Fresh, medium grained BASALT with quartz and chlorite as mineral inclusions and fractures.			9		9.0				16.14	14.85		
							6	9.5	86.7	86					
						10.5		10.5							
							7	11.0	81	59					
						12		11.5							
							8	12.0							
								12.5	73	42					
								13.0							
-9.034						13.5		13.5							
			Gray, strong Slightly weathered to Fresh, Volcanic BRECCIA with quartz and chlorite mineral inclusions. Fractures seen.					14.0	94.7	66					

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R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Gray, strong Slightly weathered to Fresh, Volcanic BRECCIA with quartz and chlorite mineral inclusions. Fractures seen.				9	14.5	94.7	66					
-10.534						15		15.0							
			Gray, strong, Slightly weathered to fresh, medium to fine grained BASALT with quartz and chlorite as secondary minerals.				10	15.5	98.7	90					
						16.5		16.0							
							11	16.5	98	93					
						18		17.0							
							12	17.5	66	43					
						19.5		18.0							
							13	18.5	78	40					
								19.0							
								19.5							
								20.0							
								20.5							
								21.0							

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R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Gray, strong, Slightly weathered to fresh, medium to fine grained BASALT with quartz and chlorite as secondary minerals.			21	14	21.5	90	67					
-18.034						22.5		22.5							
			Gray, very strong to strong, Fresh to Slightly weathered, Volcanic BRECCIA with quartz, chlorite and amygdal mineral inclusions.				15	23.0	100	98					
						24		24.0							
							16	24.5	100	91					
						25.5		25.0							
								25.5			15726.7	12.70	10.79		
							17	26.0	100	94					
						27		26.5							
							18	27.0	97	83					
								27.5							
								28.0							

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R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
-24.034						28.5		28.5	97	83		12.54			
			Light brownish gray, weak to strong, Fresh to Slightly weathered, Volcanic BRECCIA with quartz and amygdal mineral inclusions.				19	29.0	100	70					
						30		29.5							
								30.0			6169.5	11.18			
							20	30.5	100	91					
						31.5		31.0							
								31.5							
							21	32.0	100	89					
						33		32.5							
								33.0				21.35			
							22	33.5	100	98					
						34.5		34.0							
								34.5							
								35.0	100	59					

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R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, weak to strong, Fresh to Slightly weathered, Volcanic BRECCIA with quartz and amygdal mineral inclusions.			36	23	35.5	100	59	14375.4				
						37.5	24	36.0	100	74					
						39	25	37.5	100	97		8.21			1.37
						40.5	26	39.0	97	87					
							27	40.5	100	64					
								41.0							
								41.5							
								42.0							

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R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, weak to strong, Fresh to Slightly weathered, Volcanic BRECCIA with quartz and amygdal mineral inclusions.			42		42.5			14062.6	8.46			
							28		98	64					
								43.0							
						43.5		43.5						0.93	
								44.0							
							29		96	32					
								44.5							
						45		45.0			14093.2				
								45.5							
							30		98	36					
								46.0							
-42.034						46.5		46.5				22.11			
			Dark gray, moderately strong to strong, Slightly Weathered to Fresh Volcanic BRECCIA with quartz and chlorite minerals.					47.0							
							31		100	86					
								47.5							
						48		48.0							
								48.5							
							32		98	64					
								49.0							

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R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
-45.034			Dark gray, moderately strong to strong, Slightly Weathered to Fresh Volcanic BRECCIA with quartz and chlorite minerals.			49.5		49.5	98	64					
			Light gray, moderately strong to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with CHlorite, quartz and amygdal mineral inclusions.				33	50.0	100	98					
						51		50.5							
							34	51.0	100	99	10684.6	27.84			
						52.5		51.5							
							35	52.0	100	99					
						54		53.0							
							36	53.5	98	84		26.50			
						55.5		54.0							
								54.5							
								55.0							
								55.5	97	95	5249.8				
								56.0							

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			Light gray, moderately strong to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with CHlorite, quartz and amygdal mineral inclusions.			57	37	56.5	97	95					
						58.5	38	57.0 57.5 58.0	100	99		20.79			
						60	39	58.5 59.0 59.5	100	95		6.36			
						61.5	40	60.0 60.5 61.0	96	93					
							41	61.5 62.0 62.5 63.0	97	93	9187.3	6.82			

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			Light gray, moderately strong to strong, Fresh to Slightly Weathered, Volcanic BRECCIA with CHlorite, quartz and amygdal mineral inclusions.			63	42	63.5	99	94					
-60.034						64.5		64.0							
			Dark gray, strong, Slightly Weathered to Fresh, Volcanic BRECCIA with amygdal veins and quartz minerals and minor cavaties observed.				43	64.5				12.63			
								65.0	100	92					
						66		65.5							
							44	66.0	98	92	18383.5				
						67.5		66.5							
							45	67.0	100	94		9.90			
						69		67.5							
							46	68.0	100	74					
								68.5							
								69.0							
								69.5							
								70.0							

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Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, strong, Slightly Weathered to Fresh, Volcanic BRECCIA with amygdal veins and quartz minerals and minor cavaties observed.			70.5		70.5	100	74					
											6127.8				
								71.0							
							47		96	82					
-67.234								71.5							
			Light gray,strong to very strong, Fresh fine BASALT with amygdal veins, quartz and chlorite minerals.			72		72.0				37.13			
								72.5							
							48		100	99					
								73.0							
						73.5		73.5							
								74.0							
							49		99	97					
								74.5							
						75		75.0			3937.4				
-71.034															
								75.5							
			Dark gray, moderately strong to strong, Slightly Weathered to Fresh, Volcanic BRECCIA with amygdal veins and quartz minerals and minor cavaties observed.				50		98	86					
								76.0							
						76.5		76.5							
									100	95					
								77.0							

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- SCR : Solid core recovery
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- SP : Small Pieces

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- B1,B2,B3 : Bulk Samples
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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 5	**Borehole No**	: PBH-02
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109696.60, E275373.22
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 26-06-2019 - 15-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.466
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, moderately strong to strong, Slightly Weathered to Fresh, Volcanic BRECCIA with amygdal veins and quartz minerals and minor cavaties observed.				51	77.5	100	95					
						78		78.0							
							52	78.5	98	90					
-74.734								79.0							
-75.034			Gray, very strong, Fresh, BASALT with quartz, chlorite, amygdal veins.			79.5		79.5			6563.9	16.42			
			Dark gray, very strong to strong, Fresh, Volcanic BRECCIA with chlorite, quartz and amygdal veins as secondary mineral inclusion.				53	80.0	100	99					
						81		80.5							
							54	81.0	96	86					
-78.034						82.5		81.5							
			Dark gray, strong, Slightly Weathered to Fresh, Fine BASALT with quartz, chlorite and amygdal veins as secondary mineral inclusion.					82.0				13.19			
							55	82.5	100	78					
								83.0							
								83.5							
								84.0							

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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 5	**Borehole No**	: PBH-02
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109696.60, E275373.22
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 26-06-2019 - 15-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.466
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, strong, Slightly Weathered to Fresh, Fine BASALT with quartz, chlorite and amygdal veins as secondary mineral inclusion.			84		84.5							
							56		100	98					
								85.0							
						85.5		85.5			10475.5				
								86.0							
							57		99	96					
								86.5							
						87		87.0							
								87.5							
							58		98	94					
								88.0							
						88.5		88.5				20.47	25.65		
								89.0							
							59		98	94					
								89.5							
						90		90.0			12185.8				
								90.5							
									100	97					
							60								
								91.0							

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SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 5	**Borehole No**	: PBH-02
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109696.60, E275373.22
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 26-06-2019 - 15-07-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.466
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.2

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, strong, Slightly Weathered to Fresh, Fine BASALT with quartz, chlorite and amygdal veins as secondary mineral inclusion.			91.5		91.5	100	97					
							61	92.0	100	97					
								92.5							
						93		93.0				13.22			
							62	93.5	100	98					
-90.034						94.5		94.0							
			Dark gray, strong to very strong, Fresh, Volcanic BRECCIA with quartz and amygdal minerals veins.				63	94.5	100	100	12123.3				
-90.734								95.0							
			Borehole terminated at 95.2m												

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Job No: S-1612

APPENDIX-B

- PBH - 03

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 6.5	**Borehole No**	: PBH-03
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109801.73, E275549.53
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Gray, Soft to Hard, Slightly Silty CLAY with traces of gravels.			0		0.5							
							1	1.0							
						1.5/		1.5							
				(3) 3/1/2		1.95	1	2.0							
								2.5							
						3		3.0							
							1	3.5							
								4.0							
						4.5/		4.5							
				(26) 5/12/14		4.95	2	5.0							
								5.5							
						6/		6.0							
				(N>100) 14/18/82		6.4	3								
-2.252						6.4/	4								
-2.352			Yellowish brown,very dense Gravels and rock fragments	(N>100) 55R/R/R		6.5	1	6.5							
			Yellowish brown, weak to moderately weak, Completely to Highly weathered, Volcanic BRECCIA			6.5		7.0	20	NIL					

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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 6.5	**Borehole No**	: PBH-03
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109801.73, E275549.53
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Yellowish brown, weak to moderately weak, Completely to Highly weathered, Volcanic BRECCIA			7.5	2	7.5	20	NIL					
								8.0	20	NIL					
-4.852						9		8.5							
			Light brownish gray, weak to moderately strong, Highly to Moderately weathered, volcanic BRECCIA				3	9.0							
								9.5	56	11					
						10.5	4	10.0						0.51	
								10.5							
								11.0	43	7					
						12	5	11.5							
								12.0							
								12.5	22	NIL					
-9.352						13.5		13.0							
			Light brownish gray, very weak to weak, Highly weathered, volcanic BRECCIA with quartz and calcite				6	13.5	36	14					
								14.0							

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CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 6.5	**Borehole No**	: PBH-03
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109801.73, E275549.53
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, very weak to weak, Highly weathered, volcanic BRECCIA with quartz and calcite			15	7	14.5	36	14				0.56	
								15.0							
								15.5	62	7					
						16.5	8	16.0							
								16.5	58	NIL					
-13.852						18		17.0							
			Grayish brown, weak, Highly to Moderately weathered, volcanic BRECCIA with quartz and chlorite					17.5							
							9	18.0							
								18.5	80	26					
						19.5		19.0							
								19.5				30.77			
							10	20.0							
								20.5	85	20					
-16.852								21.0							

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Equipment	: Rotary Rig	**Water Table (m)**	: 6.5	**Borehole No**	: PBH-03
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109801.73, E275549.53
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Grayish brown, weak to moderately weak, Moderately to Slightly weathered, volcanic BRECCIA with quartz and Calcite minerals			21	11	21.5	98	57					
-18.352						22.5		22.5							
			Grayish brown, weak to strong, Slightly weathered to Fresh, volcanic BRECCIA with quartz and amygdal				12	23.0	84	59					
-19.852						24		24.0							
			Grayish brown, moderately weak to strong, Fresh to Slightly weathered, Volcanic BRECCIA with quartz , calcite and amygdal minerals				13	24.5	100	90					
						25.5		25.5							
							14	26.0	95	84					
						27		27.0				3.17			
							15	27.5	95	84					
								28.0							

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Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Grayish brown, moderately weak to strong, Fresh to Slightly weathered, Volcanic BRECCIA with quartz , calcite and amygdal minerals			28.5		28.5	95	84					
							16	29.0	92	81					
						30		29.5							
							17	30.0	100	89					
-27.352						31.5		30.5							
			Light gray, weak to strong, Fresh to slighty weathered, volcanic BRECCIA with quartz and amygdal mineral inclusions.				18	31.0	100	92					
						33		32.0				5.43			
							19	32.5	98	72					
						34.5		33.0							
								33.5	100	87					
								34.0							
								34.5							
								35.0							

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CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 6.5	**Borehole No**	: PBH-03
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109801.73, E275549.53
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light gray, weak to strong, Fresh to slighty weathered, volcanic BRECCIA with quartz and amygdal mineral inclusions.				20	35.5	100	87					
						36		36.0				2.57			
							21	36.5	99	60					
-33.352						37.5		37.0							
			Light brownish gray,moderately strong to moderately weak, Slightly to moderately weathered, Volcanic BRECCIA with quartz and chlorite				22	37.5							
								38.0	98	32					
-34.852						39		38.5							
			Grayish brown, strong,Slightly weathered to Fresh, Vesicular BASALT with quartz , chlorite and amygdaloidal minerals					39.0							
							23	39.5	98	82					
						40.5		40.0							
								40.5						1.62	
							24	41.0	100	91					
-37.852								41.5							
								42.0							

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- SP : Small Pieces

- I : Fresh
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Job No: S-1612

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PROJECT	: Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground				
CLIENT	: NHSRCL				
Equipment	: Rotary Rig	**Water Table (m)**	: 6.5	**Borehole No**	: PBH-03
Drilling Orientation	: Vertical	**Type of Core Barrel**	: NX Core Barrel	**Coordinates**	: N2109801.73, E275549.53
Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Reddish brown,weak to moderately strong, Slightly to moderately weathered to Fresh, Volcanic BRECCIA with quartz, chlorite, calcite minerals inclusions and amygdaloibal veins.			42	25	42.5	78	24	18512.9	12.14			
						43.5		43.0				3.28			
						45	26	43.5	91	30					
						46.5	27	44.0						0.36	
								44.5							
								45.0							
								45.5	74	25					
								46.0							
								46.5			1524.2				
							28	47.0	80	24					
								47.5							
						48		48.0							
							29	48.5	93	28					
								49.0							

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Drilling Method	: Hydraulic Rotary Drilling	**Type of Bit**	: TC & Diamond	**Date**	: 18-07-2019 - 08-08-2019
Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Reddish brown,weak to moderately strong, Slightly to moderately weathered to Fresh, Volcanic BRECCIA with quartz, chlorite, calcite minerals inclusions and amygdaloibal veins.			49.5		49.5	93	28		7.60			
							30	50.0	100	78					
-46.852						51		50.5							
			Gray, moderately strong to strong, Fresh, medium grained BASALT with quartz and chlorite mineral					51.0			13959.7				
							31	51.5	100	98					
						52.5		52.0				13.35	22.11		
							32	52.5	100	99					
						54		53.0							
							33	53.5	100	98					
						55.5		54.0							
								54.5			8419.8				
								55.0							
								55.5	98	93					
								56.0							

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Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Gray, moderately strong to strong, Fresh, medium grained BASALT with quartz and chlorite mineral				34	56.5	98	93					
						57		57.0							
							35	57.5	100	100					
								58.0							
						58.5		58.5				4.37	6.73		
							36	59.0	100	99					
						60		59.5							
								60.0				7.52			
							37	60.5	99	93					
-57.352						61.5		61.0							
			Light brownish gray, moderately weak to strong, Fresh, Volcanic BRECCIA with quartz and amygdal mineral					61.5				25.35	19.88		
							38	62.0	100	92					
								62.5							
								63.0							

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Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, moderately weak to strong, Fresh, Volcanic BRECCIA with quartz and amygdal mineral			63		63.5							
							39		99	82					
								64.0							
						64.5		64.5			41932.8	10.18	5.88		
								65.0							
							40		99	90					
								65.5							
						66		66.0			15738.2				
								66.5							
							41		100	86					
								67.0							
						67.5		67.5				4.58	12.61		
								68.0							
							42		100	90					
								68.5							
						69		69.0							
								69.5							
									100	64					
							43								
								70.0							

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Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, moderately weak to strong, Fresh, Volcanic BRECCIA with quartz and amygdal mineral			70.5		70.5	100	64		16.51			
							44	71.0	100	95					
						72		71.5							
								72.0			10516.4	8.45	17.65		
							45	72.5	100	80					
						73.5		73.0							
								73.5							
							46	74.0	98	94					
						75		74.5							
								75.0			26201.6				
							47	75.5	100	100					
						76.5		76.0							
								76.5				17.97			
								77.0	99	88					

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Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Light brownish gray, moderately weak to strong, Fresh, Volcanic BRECCIA with quartz and amygdal mineral				48	77.5	99	88					
						78		78.0							
							49	78.5	100	90					
								79.0							
-75.352						79.5		79.5				8.88			
			Dark gray, moderately strong to strong, Fresh, volcanic BRECCIA with chlorite, quartz and amygdal veins as secondary mineral inclusion				50	80.0	100	99					
								80.5							
						81		81.0			6985.4				
							51	81.5	100	100					
								82.0							
						82.5		82.5				12.40	20.58		
							52	83.0	100	99					
								83.5							
								84.0							

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Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, moderately strong to strong, Fresh, volcanic BRECCIA with chlorite, quartz and amygdal veins as secondary mineral inclusion			84		84.5				14.63			
							53		100	92					
						85.5		85.0							
								85.5			534.5				
							54	86.0	100	95					
						87		86.5							
								87.0							
							55	87.5	100	91					
						88.5		88.0							
								88.5							
							56	89.0	100	92					
						90		89.5							
								90.0			10470.5	19.91	17.74		
							57	90.5	100	92					
								91.0							

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Casing size	: HX/NX	**Drilling Fluid**	: Water	**R.L.(m)**	: 4.148
Casing depth (m)	: HX: 4m, NX: 4m	**Core Diameter (mm)**	: 54	**T.D.(m)**	: 95.10

R.L. (m)	Legend	Depth (m)	Description of Strata	SPT	Sampler Type	Depth (m)	Sample No.	Scale	TCR (%)	RQD (%)	Pressuremeter Modulus (MPa)	UCS Soaked (MPa)	UCS Unsoaked (MPa)	Point Load Soaked	Point Load Unsoaked
			Dark gray, moderately strong to strong, Fresh, volcanic BRECCIA with chlorite, quartz and amygdal veins as secondary mineral inclusion			91.5		91.5	100	92					
							58	92.0	100	92					
						93		92.5							
							59	93.0	100	75					
						94.5		93.5							
-90.952			Borehole terminated at 95.10m				60	94.0	100	100	13054.6	16.35	10.97		
								94.5							
								95.0							

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APPENDIX-C

i. Plate No. 1– Summary of Test Results (SOTR)

ii. Plate No. 2 – Variation of compressive strength of rock along depth

iii. Plate No. 3 – Chemical Test Results

iv. Plate No. 4 – Variation of modulus of elasticity along the depth

v. Plate No. 5 – Terms and Symbols

APPENDIX-C

i. Plate No. 1– Summary of Test Results (SOTR)

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Certificate No.: TC-6007

SUMMARY OF LABORATORY TEST RESULTS

Report No: SRTL/2019-20/TRN-30 **Date: 2-Dec-19**

ULR No:TC600719000000091P

Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS										Remarks
				CLASSIFICATION & INDEX									STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS						
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)				UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	IS Point Load Index MPa 8764: 1998 (RA-2014)	Rock Triaxial Test IS 13047: 1991, RA 2016		Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA -2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa										Angle of shearing resistance deg	Cohesion Intercept Mpa	Modulus of Elasticity Mpa	Poissons Ratio	
PBH01	UDS-01	1.00-1.25	UDS	25.40				17.92																		Refer Note-1 & 2
	SPT-01	1.50-1.95	SPT	40.81	74	24	50																			Refer Note-4
	SPT-02	3.00-3.45	SPT	23.96					51	28	21															Refer Note-3
	SPT-03	4.50-4.95	SPT	88.41					18	44	38															Refer Note-3
	18	7.00-8.50	Unsoaked														10.51	1.99	1.98	20.92	12.45						
			Soaked																		7.23						
	35	10.0-11.50	Unsoaked														8.70	1.99	1.99	17.34							
			Soaked																		8.55						
	42	11.50-13.0	Unsoaked														9.17	2.00	1.99	18.33			27	2			
	41		Soaked																			0.91					
	51	13.0-14.50	Unsoaked														12.21	2.02	2.01	24.63							
			Soaked																			0.72					
	104	17.50-19.00	Unsoaked														3.68	2.54	2.53	9.34					50310	0.21	
			Soaked																		19.54						
	110	20.5-22.00	Unsoaked														0.58	2.65	2.64	1.54							
			Soaked																		92.48						
	126	23.50-25.00	Unsoaked														11.50	2.09	2.08	23.99							
			Soaked																		18.23						
	152, 162	29.50-31.00	Unsoaked														11.31	2.07	2.07	23.43	19.56						
			Soaked																		16.28						
	160	29.50-31.00	Unsoaked														12.70	2.05	2.04	26.05							
			Soaked																			0.83					
	163, 170	31.00-32.50	Unsoaked														12.81	1.97	1.96	25.24	13.63				8185	0.20	
			Soaked																		4.59						

Note: Parameters marked with an * are not accredited by NABL

Key: UDS: Undisturbed Sample
SPT: Standard Penetration Test

Note: 1. Sample not sufficient for UU-Triaxial Test
2. Sample not sufficient for Consolidation Test
3. Sample not sufficient for Atterberg Limits
4. Sample not sufficient for Grain size Analysis
5. Sample not sufficient for UCS with Modulus Test

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Certificate No.: TC-6007

SUMMARY OF LABORATORY TEST RESULTS

Report No: SRTL/2019-20/TRN-30 **Date: 2-Dec-19**

ULR No:TC600719000000091P

Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS													ROCK PARAMETERS										Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016						STRENGTH PARAMETERS					
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Rock Triaxial Test IS 13047: 1991, RA 2016		Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	IS Point Load Index MPa 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA - 2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa							Angle of shearing resistance deg	Cohesion Intercept Mpa			Modulus of Elasticity Mpa	Poissons Ratio	
PBH01	211	37.00-38.50	Unsoaked													15.48	1.95	1.95	30.26							
			Soaked																			9.65				
	236	43.00-44.50	Unsoaked													1.31	2.71	2.70	3.54							
			Soaked																			66.20				
	259	46.00-47.50	Unsoaked													0.55	2.80	2.79	1.55					52430	0.20	
	262	47.50-49.00	Unsoaked													1.25	2.64	2.63	3.30							
			Soaked																			56.35				
	283	50.50-52.00	Unsoaked													6.47	2.12	2.11	13.74							
			Soaked																				1.56			
	284	50.50-52.00	Unsoaked													11.59	1.96	1.96	22.76				0.80			Refer Note-5
	342	58.00-59.50	Unsoaked													13.60	2.01	2.01	27.37							
			Soaked																			10.14				
	324	55.00-56.50	Unsoaked													12.81	1.96	1.95	25.08							
			Soaked																			8.13				
	346	58.00-59.50	Unsoaked													1.25	2.64	2.63	3.30							
			Soaked																			19.92				
	384	64.00-65.00	Unsoaked													13.77	1.73	1.72	23.79					9501	0.26	
	381	62.50-64.00	Unsoaked													14.55	1.92	1.91	27.89							
			Soaked																			7.16				
	404	68.50-70.00	Unsoaked													13.86	1.91	1.90	23.47							
			Soaked																			12.78				

Note: Parameters marked with an * are not accredited by NABL

Key: UDS: Undisturbed Sample
SPT: Standard Penetration Test

Note: 1. Sample not sufficient for UU-Triaxial Test
2. Sample not sufficient for Consolidation Test
3. Sample not sufficient for Atterberg Limits
4. Sample not sufficient for Grain size Analysis
5. Sample not sufficient for UCS with Modulus Test

Tested By	Checked By	Approved By
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SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

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ULR No:TC600719000000091P

Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS										Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS						
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	Point Load Index MPa IS 8764: 1998 (RA-2014)	Rock Triaxial Test IS 13047: 1991, RA 2016		Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA - 2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa										Angle of shearing resistance deg	Cohesion Intercept Mpa	Modulus of Elasticity Mpa	Poissons Ratio	
PBH01	423	73.00-74.50	Unsoaked													13.55	2.06	2.05	27.91							
			Soaked																	6.55						
	429	74.50-76.00	Soaked																	4.03						
	455	82.00-83.50	Unsoaked													5.09	2.43	2.43	12.40							
			Soaked																	31.29						
	491	88.00-89.50	Unsoaked													9.96	2.23	2.22	22.20							
			Soaked																	8.65						
	507	94.00-95.18	Unsoaked													9.69	2.15	2.15	20.68							
			Soaked																	9.09						

Note: Parameters marked with an * are not accredited by NABL

Key: UDS: Undisturbed Sample
SPT: Standard Penetration Test

Note: 1. Sample not sufficient for UU-Triaxial Test
2. Sample not sufficient for Consolidation Test
3. Sample not sufficient for Atterberg Limits
4. Sample not sufficient for Grain size Analysis
5. Sample not sufficient for UCS with Modulus Test

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SUMMARY OF LABORATORY TEST RESULTS

Report No: SRTL/2019-20/TRN-30 **Date: 2-Dec-19**

ULR No: TC600719000000091P

Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS								Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS				
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	Point Load Index MPa IS 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA - 2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa										Modulus of Elasticity Mpa	Poissons Ratio	
PBH02	UDS-01	2.50-3.00	UDS	40.97				17.35				9	14											Refer Note1
	SPT-02	3.00-3.45	SPT	59.45	67	27	40		17	14	69													
	23	4.50-6.00	Unsoaked													6.25	2.03	2.02	13.91					
			Soaked																	11.71				
	53	9.00-10.50	Unsoaked													13.37	1.96	1.96	26.27	12.64				
			Soaked																	13.94				
	118	19.50-21.00	Unsoaked																					Refer Note 2
			Soaked																					Refer Note 2
	135B, 136B	25.50-27.00	Unsoaked													10.26	2.12	2.11	21.72	19.95		24232	0.25	
			Soaked																	17.29				
	149A	28.50-30.00	Unsoaked													11.56	1.98	1.97	22.84					
			Soaked																	12.54				
	165	30.00-31.50	Unsoaked													13.00	2.02	2.01	26.20					
			Soaked																	11.18				
	177	33.00-34.50	Unsoaked													11.67	2.05	2.04	23.87					
			Soaked																	21.35				
	213	39.00-40.50	Unsoaked													12.30	2.00	1.99	24.62					
			Soaked																	8.21				
	214	39.00-40.50	Unsoaked													10.94	2.12	2.11	21.49			12639	0.19	
	240	43.50-45.00	Unsoaked													12.00	1.97	1.97	23.70		1.37			
			Soaked																					Refer Note 3

Note: Parameters marked with an * are not accredited by NABL

Key: UDS: Undisturbed Sample
SPT: Standard Penetration Test

Note: 1. Sample not sufficient for Consolidation Test
2. Sample is missing
3. Sample is not sufficient for Unconfined Compressive Strength(Soaked) Test
4. Sample is not sufficient for Unconfined Compressive Strength(UnSoaked) Test

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SUMMARY OF LABORATORY TEST RESULTS

Report No: SRTL/2019-20/TRN-30 **Date: 2-Dec-19**

ULR No: TC600719000000091P

Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS													ROCK PARAMETERS								Remarks
				CLASSIFICATION & INDEX									STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS				
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)				UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	IS Point Load Index MPa 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA - 2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa										Modulus of Elasticity Mpa	Poissons Ratio	
PBH02	241	43.50-45.00	Unsoaked														13.20	1.92	1.92	25.40					
			Soaked																			0.93			
	231	42.00-43.50	Unsoaked														13.35	1.95	1.94	26.01					
			Soaked																		8.46				
	275	46.50-48.00	Unsoaked														12.26	2.07	2.06	25.34					
			Soaked																		22.11				
	285	51.00-52.50	Unsoaked														11.27	2.06	2.06	23.25					
			Soaked																		27.84				
	296	54.00-55.50	Unsoaked														3.80	2.47	2.46	9.37					
			Soaked																		26.50				
	307	58.50-60.00	Unsoaked														11.56	2.19	2.18	25.27					Refer Note 4
			Soaked																		20.79				
	315	60.00-61.50	Unsoaked														17.06	1.82	1.82	31.10					
			Soaked																		6.36				
	324	61.50-63.00	Unsoaked														15.65	1.86	1.86	29.15	14.17				
			Soaked																		8.15				
	340	64.50-66.00	Unsoaked														15.74	1.91	1.91	30.12					
			Soaked																		12.63				
	351	67.50-69.00	Unsoaked														15.42	1.88	1.87	29.00					
			Soaked																		9.90				
	361	69.00-70.50	Unsoaked														16.52	1.77	1.77	29.28			9396	0.32	

Note: Parameters marked with an * are not accredited by NABL

Key: UDS: Undisturbed Sample
SPT: Standard Penetration Test

Note: 1. Sample not sufficient for Direct Shear Test
2. Sample not sufficient for UCS
3. Sample is not sufficient for Unconfined Compressive Strength(Soaked) Test
4. Sample is not sufficient for Unconfined Compressive Strength(UnSoaked) Test

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ULR No: TC600719000000091P

Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS								Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS				
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	IS Point Load Index MPa 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA - 2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa										Modulus of Elasticity Mpa	Poissons Ratio	
PBH02	370	72.00-73.50	Unsoaked													1.26	2.70	2.69	3.39					
			Soaked																	37.13				
	394	79.50-81.00	Unsoaked													12.09	2.02	2.01	24.40					
			Soaked																	16.42				
	406	82.50-84.00	Unsoaked													10.39	2.19	2.18	22.71					
			Soaked																	13.19				
	417	88.50-90.00	Unsoaked																	12.61				
			Soaked																	12.92				
	427B	93.00-94.50	Unsoaked													12.22	2.03	2.03	24.83					
			Soaked																	13.22				

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Key: UDS: Undisturbed Sample
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Note: 1. Sample not sufficient for Direct Shear Test
2. Sample not sufficient for UCS
3. Sample is not sufficient for Unconfined Compressive Strength(Soaked) Test
4. Sample is not sufficient for Unconfined Compressive Strength(UnSoaked) Test

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Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS								Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS				
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)								Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	Point Load Index MPa IS 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA - 2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa	Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %			Modulus of Elasticity Mpa	Poissons Ratio	
PBH03	UDS	3.00-3.50	UDS	41.17																				Refer Note-1 & 2
	SPT-02	4.50-4.95	SPT	77.03	73	24	49		2	11	87													
	SPT-03	6.00-6.40	SPT	28.71	60	27	33		35	20	45													
	11	10.50-12.00	Unsoaked													13.13	1.89	1.89	24.87					
			Soaked																		0.51			
	23	15.00-16.50	Unsoaked													10.00	2.02	2.01	20.20					
			Soaked																		0.56			
	57	19.50-21.00	Soaked																	30.77		7216	0.28	
	84	27.00-28.50	Unsoaked													9.35	2.05	2.05	19.18					
			Soaked																	8.43				
	91	27.00-28.50	Unsoaked													16.15	1.83	1.82	29.53			4178	0.29	
			Soaked																	3.17				
	121	36.00-37.50	Unsoaked													19.70	1.91	1.90	28.56					
			Soaked																	2.57				
	111	33.00-34.50	Unsoaked													8.00	1.99	1.99	15.95					
			Soaked																	5.43				
	151	42.00-43.50	Unsoaked													8.87	2.07	2.07	18.40					
			Soaked																	12.14				
	142	40.50-42.00	Unsoaked													5.36	2.21	2.20	11.85					
			Soaked																		1.62			

Note: Parameters marked with an * are not accredited by NABL.

Key: UDS: Undisturbed Sample
SPT: Standard Penetration Test

Note: 1. Sample not sufficient for UU-Triaxial Test
2. Sample not sufficient for Consolidation Test
3. Sample not sufficient for UCS with Modulus Test

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Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS								Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS				
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	Point Load Index MPa IS 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA -2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa										Modulus of Elasticity Mpa	Poissons Ratio	
PBH03	185	45.00-46.50	Unsoaked													13.04	1.91	1.90	24.87					
			Soaked																		0.36			
	186	45.00-46.50	Unsoaked													11.02	2.07	2.07	22.85		0.71			
	158	43.50-45.00	Unsoaked													14.56	2.17	2.16	25.38					
			Soaked																	3.28				
	233	49.50-51.00	Unsoaked													8.17	2.11	2.10	17.27					
			Soaked																	7.60				
	245	52.50-54.00	Unsoaked													7.35	2.16	2.15	15.84	22.11				
			Soaked																	13.35				
	257	58.50-60.00	Unsoaked													14.87	1.86	1.85	27.63	6.73				
			Soaked																	4.37				
	260	60.00-61.50	Unsoaked													11.05	2.05	2.04	22.64			19182	0.25	
			Soaked																	7.52				
	265, 266, 268	61.50-63.00	Unsoaked													5.50	2.28	2.28	12.60	14.17		12696	0.27	
			Soaked																	8.15				
	278	64.50-66.00	Unsoaked													10.73	1.99	1.98	21.40	10.18				
			Soaked																	5.88				
	290	67.50-69.00	Unsoaked													9.00	2.12	2.11	19.06	16.22				
			Soaked																	6.91				
	378	94.50-95.07	Unsoaked													10.61	2.08	2.08	22.10	11.41				
			Soaked																	13.29				

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Note: 1. Sample not sufficient for UU-Triaxial Test
2. Sample not sufficient for Consolidation Test
3. Sample not sufficient for UCS with Modulus Test

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Borehole No.	Sample No.	Sample Depth	Sample Type	SOIL PARAMETERS												ROCK PARAMETERS								Remarks
				CLASSIFICATION & INDEX								STRENGTH PARAMETERS		Consolidation IS: 2720-Part 15:1986 (RA - 2016)		PHYSICAL PROPERTIES IS 13030:1991, RA 2016				STRENGTH PARAMETERS				
				Water Content (%) IS 2720 - 2 :1973 (RA 2015)	Atterberg Limits IS: 2720-Part 5:1985 (RA 2015)			* Bulk Unit weight KN/m^3	Grain Size Distribution IS: 2720 -Part 4:1985, (RA 2015)			UU Triaxial Test IS: 2720 - Part 11 (RA-2016)		Pre Consolidation Pressure (kPa)	Compression Index Cc	Water Absorption %	Specific Gravity	Dry Density g/cc	Porosity %	Unconfined Compressive Strength MPa IS 9143: 1979, RA 2016	Point Load Index MPa IS 8764: 1998 (RA-2014)	Compresive Strength with Modulus & Poisson's IS 9221:1979 (RA -2016)		
					Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel %	Sand %	% passing 75 micron	Angle of Internal Friction deg Φ	Cohesion C kPa									Modulus of Elasticity Mpa	Poissons Ratio	
PBH03	360	90.00-91.50	Unsoaked													12.05	2.05	2.04	24.71	17.74				
			Soaked																	14.23				
	342	84.00-85.50	Unsoaked													13.21	2.00	2.00	26.45			12181	0.26	
			Soaked																	14.63				
	333	82.50-84.00	Unsoaked													10.08	2.14	2.13	21.57	20.58				
			Soaked																	12.40				
	327	79.50-81.00	Unsoaked													10.38	2.12	2.12	22.03					
			Soaked																	8.88				
	315	76.50-78.00	Unsoaked													11.34	2.09	2.09	23.72					
			Soaked																	17.97				
	306	72.00-73.50	Unsoaked													13.05	2.00	1.99	26.08	17.65				
			Soaked																	8.45				
	299	70.50-72.00	Unsoaked													10.74	2.10	2.09	22.53					
			Soaked																	16.51				
	293	69.00-70.50	Unsoaked													14.01	1.96	1.95	27.47					Refer Note-3

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Key: UDS: Undisturbed Sample
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Note: 1. Sample not sufficient for UU-Triaxial Test
2. Sample not sufficient for Consolidation Test
3. Sample not sufficient for UCS with Modulus Test

Tested By	Checked By	Approved By
MHK	CT	GR

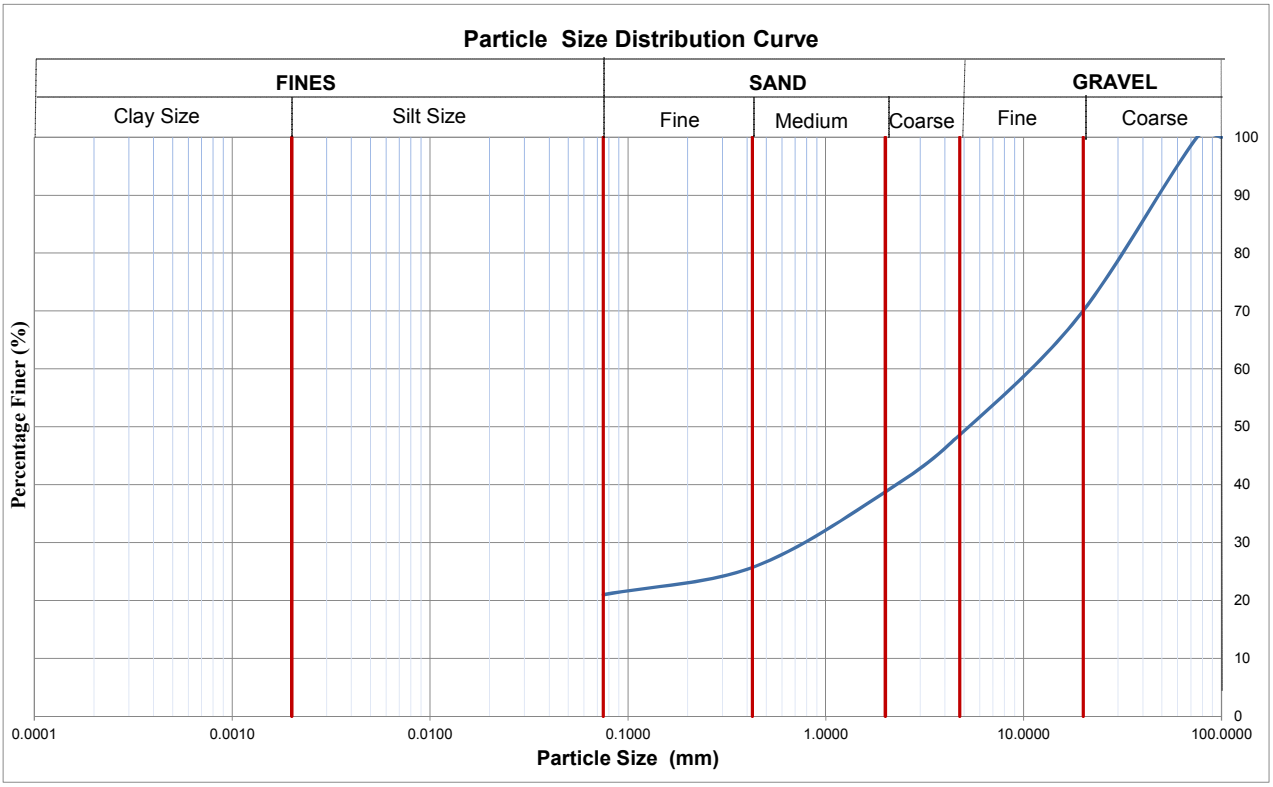
TEST PLOTS

Grain Size Analysis

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No	:	SRTL/2019-20/TRN-30
ULR No	:	TC600719000000091P
Test Method	:	Grain Size Analysis
Testing Standard	:	IS 2720 - Part IV:1985
Date of Testing	:	26/Aug/19
Sample Identification	:	S1612/PBH01/3-3.45
Sample Description	:	Sandy GRAVEL



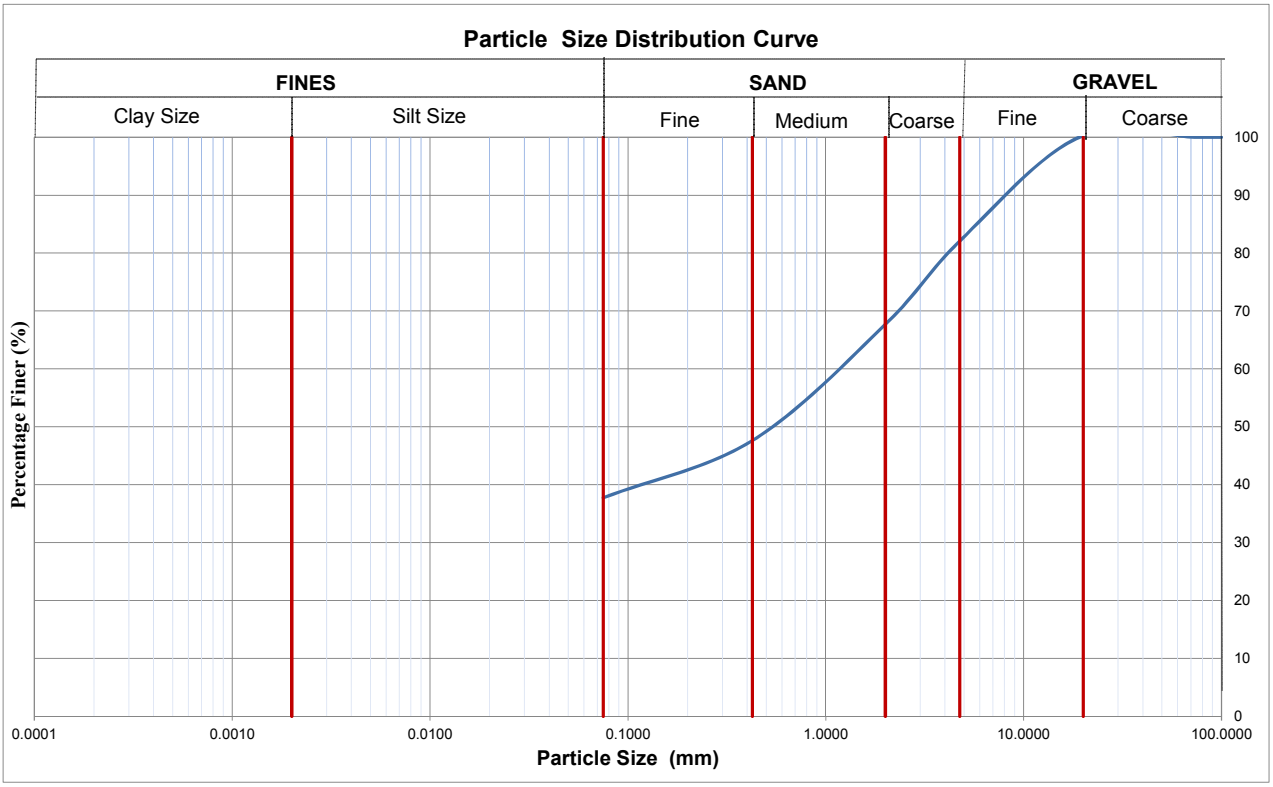
Gravel	%	**51**
Coarse Sand	%	**10**
Medium Sand	%	**13**
Fine Sand	%	**5**
Fines	%	**21**

Tested By	Checked By	Approved By
PR	CT	GR

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No	:	SRTL/2019-20/TRN-30
ULR No	:	TC600719000000091P
Test Method	:	Grain Size Analysis
Testing Standard	:	IS 2720 - Part IV:1985
Date of Testing	:	26/Aug/19
Sample Identification	:	S1612/PBH01/4.5-4.95
Sample Description	:	Silty SAND with Gravel



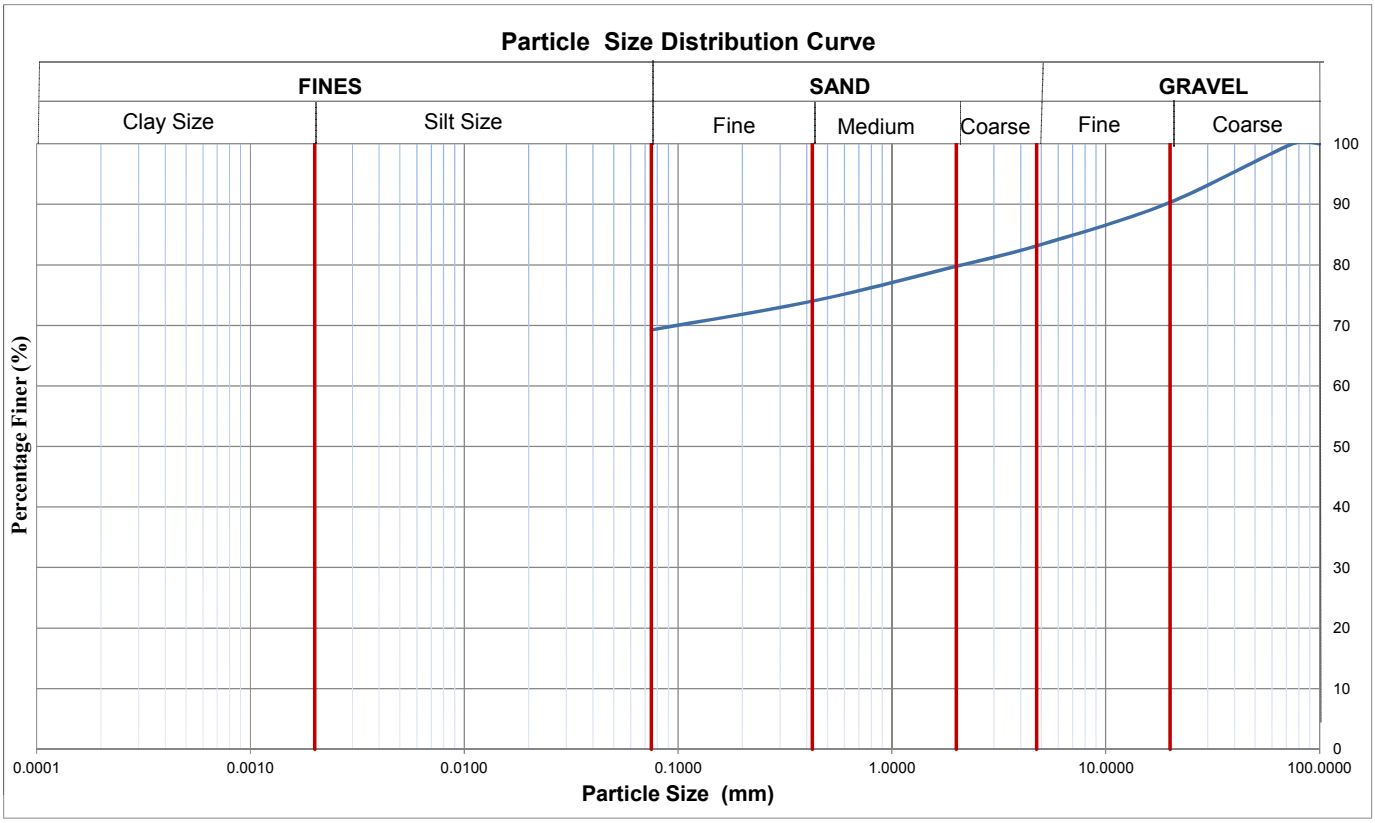
Gravel	%	**18**
Coarse Sand	%	**14**
Medium Sand	%	**20**
Fine Sand	%	**10**
Fines	%	**38**

Tested By	Checked By	Approved By
PR	CT	GR

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No	:	SRTL/2019-20/TRN-30
ULR No	:	TC600719000000091P
Test Method	:	Grain Size Analysis
Testing Standard	:	IS 2720 - Part IV:1985
Date of Testing	:	26/Aug/19
Sample Identification	:	S1612/PBH02/3-3.45
Sample Description	:	Silty CLAY with Gravel



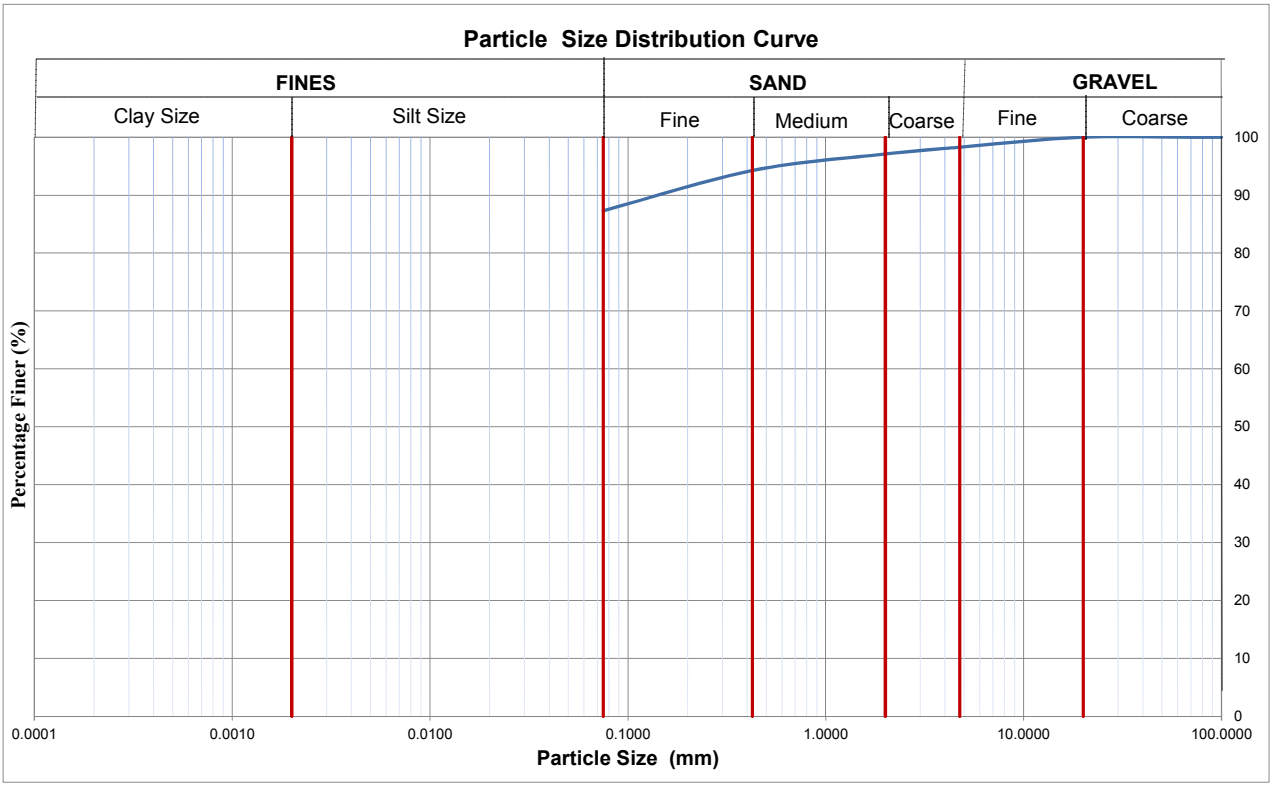
Gravel	%	**17**
Coarse Sand	%	**3**
Medium Sand	%	**6**
Fine Sand	%	**5**
Fines	%	**69**

Tested By	Checked By	Approved By
PR	CT	GR

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No	:	SRTL/2019-20/TRN-30
ULR No	:	TC600719000000091P
Test Method	:	Grain Size Analysis
Testing Standard	:	IS 2720 - Part IV:1985
Date of Testing	:	26/Aug/19
Sample Identification	:	S1612/PBH03/4.5-4.95
Sample Description	:	Silty CLAY



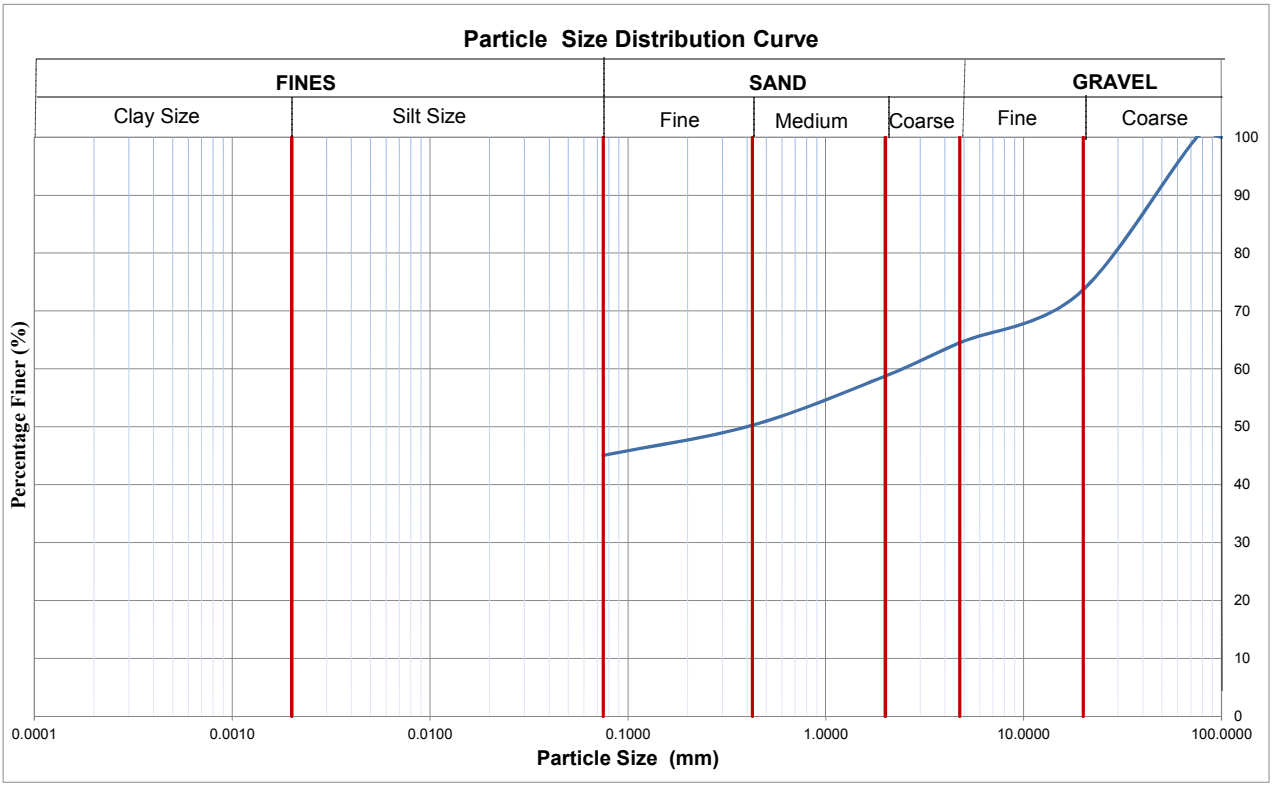
Gravel	%	**2**
Coarse Sand	%	**1**
Medium Sand	%	**3**
Fine Sand	%	**7**
Fines	%	**87**

Tested By	Checked By	Approved By
PR	CT	GR

SOIL & ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No	:	SRTL/2019-20/TRN-30
ULR No	:	TC600719000000091P
Test Method	:	Grain Size Analysis
Testing Standard	:	IS 2720 - Part IV:1985
Date of Testing	:	26/Aug/19
Sample Identification	:	S1612/PBH03/6.0-6.4
Sample Description	:	Gravelly CLAY with Sand



Gravel	%	**35**
Coarse Sand	%	**6**
Medium Sand	%	**9**
Fine Sand	%	**5**
Fines	%	**45**

Tested By	Checked By	Approved By
PR	CT	GR

Atterberg Limits

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

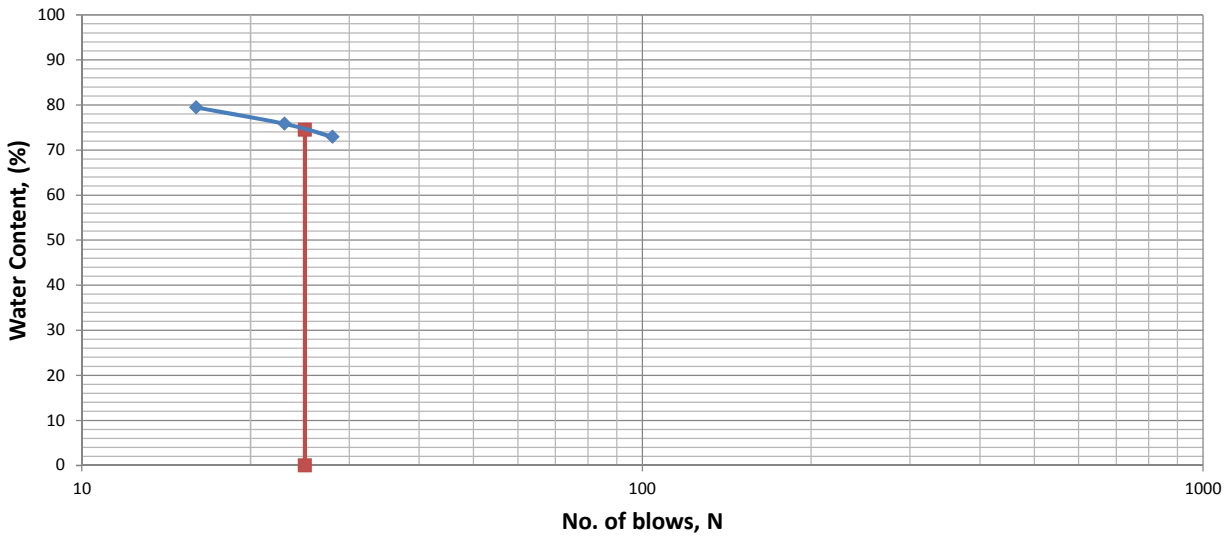
Test Method : Determination of Liquid Limit and Plastic Limit

Testing Standard : IS 2720 - PART V:1985

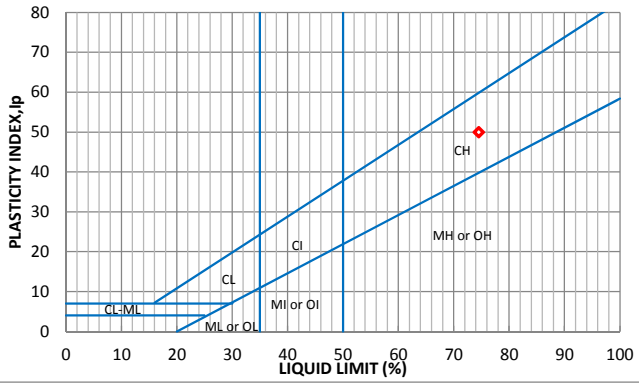
Test Details

Date of Testing	: 3-Sep-19	Lab temperature °C	: 25
Sample Identification	: S1612/PBH01/1.5-1.95	Method Used	: Mechanical Method
Period of soaking soil sample before testing	: -	History of soil sample	: Air Dried

FLOW CURVE



Test Results		
Liquid Limit, LL %	:	74
Plastic Limit, PL %	:	24
Plasticity Index, IP	:	50
Group Symbol	:	CH



Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

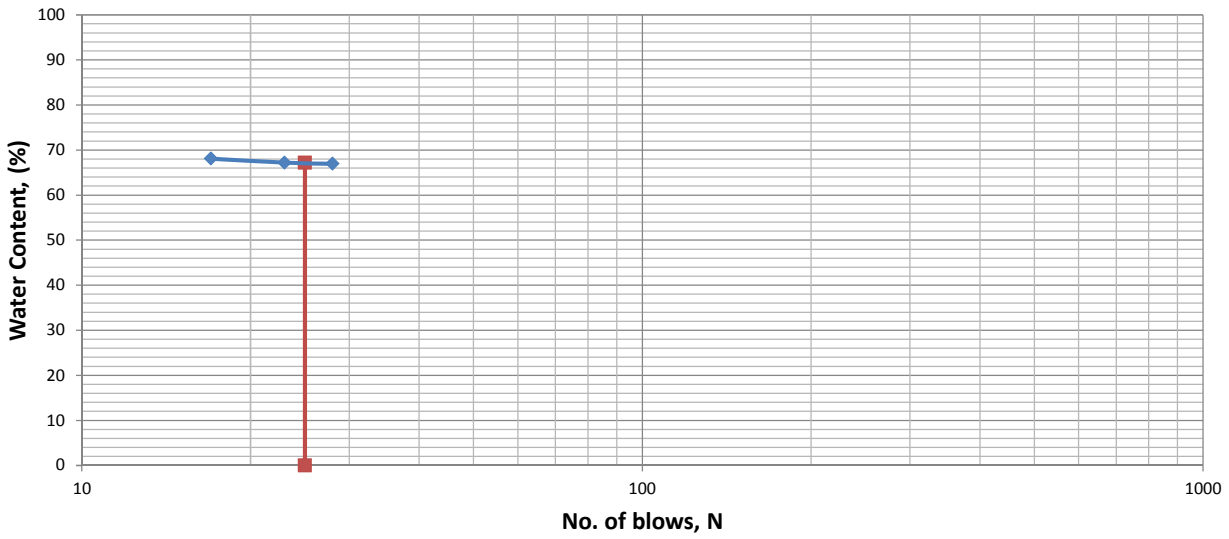
Test Method : Determination of Liquid Limit and Plastic Limit

Testing Standard : IS 2720 - PART V:1985

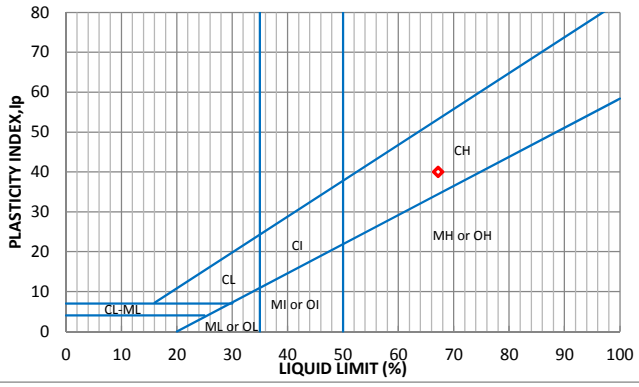
Test Details

Date of Testing	:	3-Sep-19	Lab temperature °C	:	25
Sample Identification	:	S1612/PBH02/3.0-3.45	Method Used	:	Mechanical Method
Period of soaking soil sample before testing	:	-	History of soil sample	:	Air Dried

FLOW CURVE



Test Results		
Liquid Limit, LL %	:	67
Plastic Limit, PL %	:	27
Plasticity Index, IP	:	40
Group Symbol	:	CH



Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No : SRTL/2019-20/TRN-30

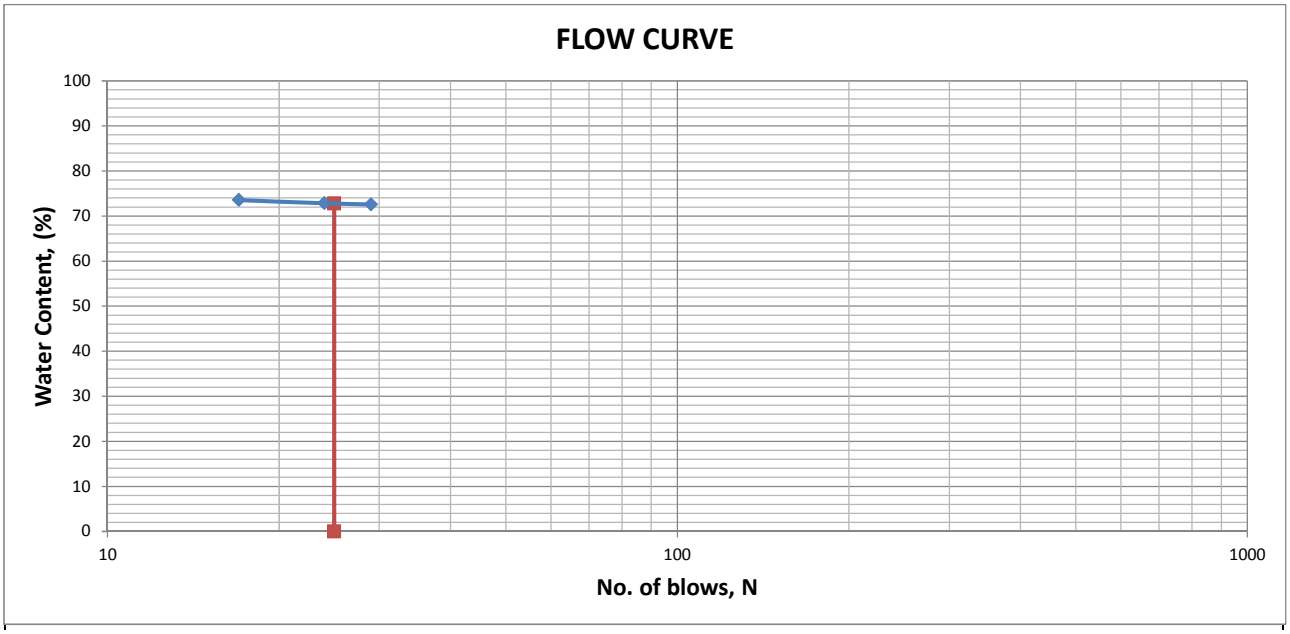
ULR No : TC600719000000091P

Test Method : Determination of Liquid Limit and Plastic Limit

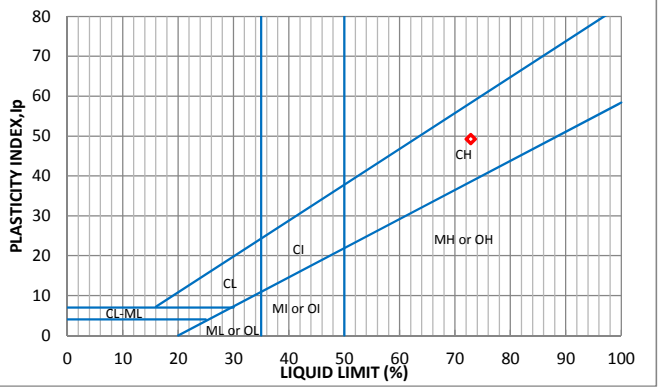
Testing Standard : IS 2720 - PART V:1985

Test Details

Date of Testing	: 29-Aug-19	Lab temperature °C	: 25
Sample Identification	: S1612/PBH03/4.50-4.95	Method Used	: Mechanical Method
Period of soaking soil sample before testing	: -	History of soil sample	: Air Dried



Test Results		
Liquid Limit, LL %	:	73
Plastic Limit, PL %	:	24
Plasticity Index, IP	:	49
Group Symbol	:	CH



Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No : SRTL/2019-20/TRN-30

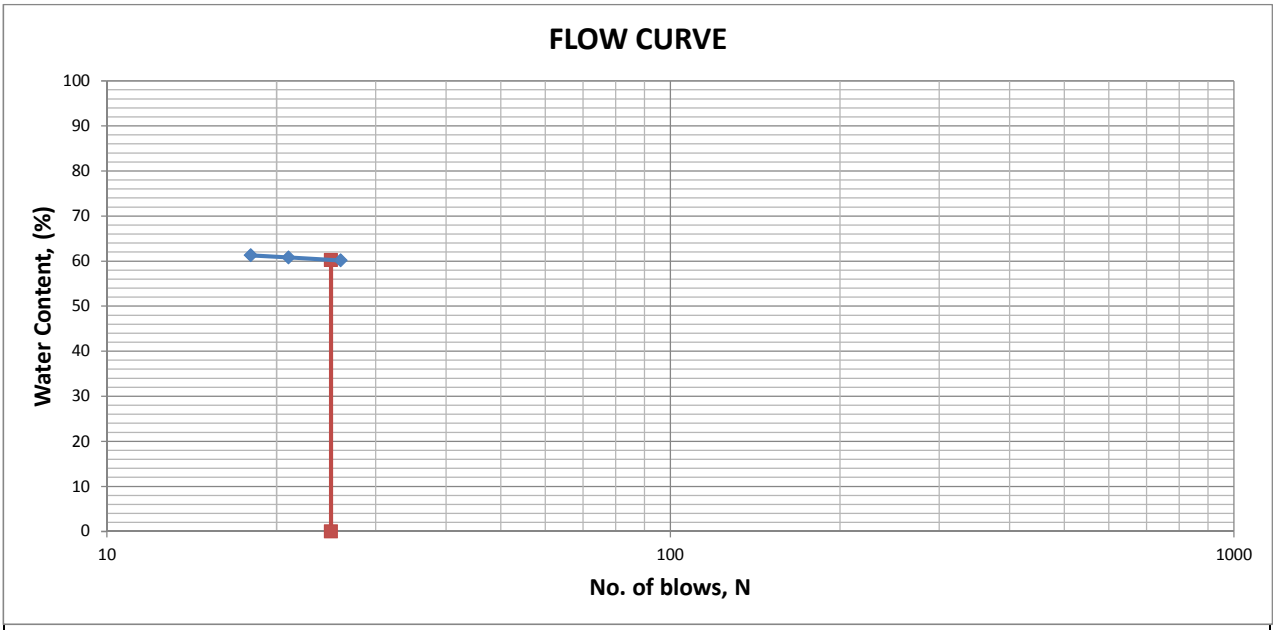
ULR No : TC600719000000091P

Test Method : Determination of Liquid Limit and Plastic Limit

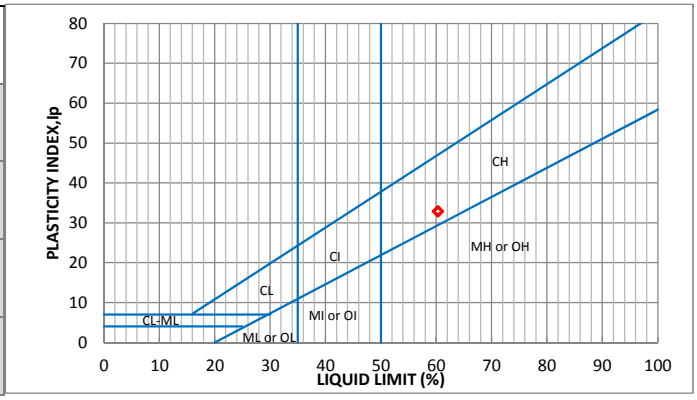
Testing Standard : IS 2720 - PART V:1985

Test Details

Date of Testing :	3-Sep-19	Lab temperature °C :	25
Sample Identification :	S1612/PBH03/6.0-6.4	Method Used :	Mechanical Method
Period of soaking soil sample before testing :		History of soil sample :	Air Dried



Test Results		
Liquid Limit, LL %	:	60
Plastic Limit, PL %	:	27
Plasticity Index, IP	:	33
Group Symbol	:	CH



Tested By	Checked By	Approved By
MHK	CT	GR

Modulus & Poisson's Ratio

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

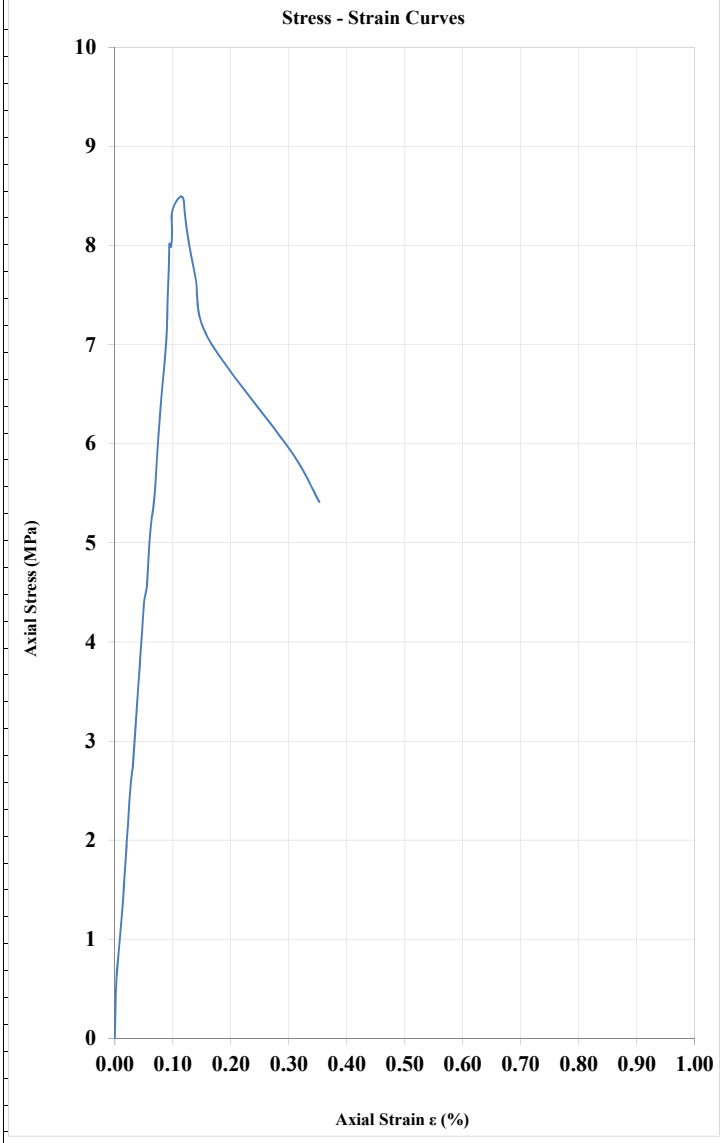
Date of testing : 30-Aug-19

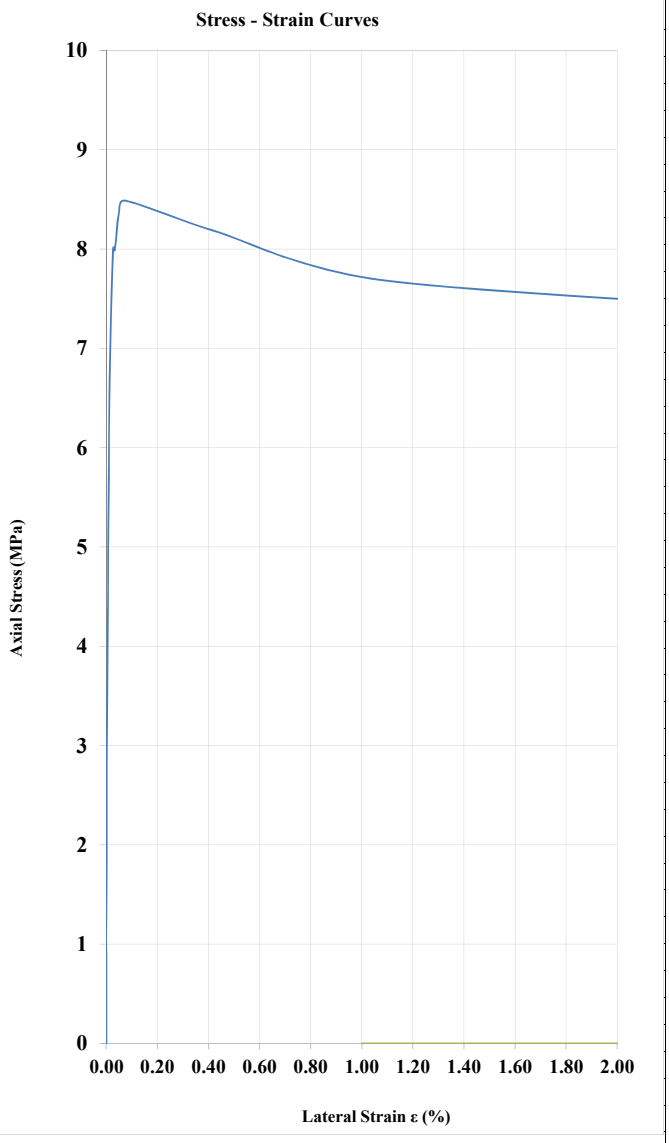
Sample ID : S1612/PBH01-169/31.0-32.5

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.4**
Area, mm^2	**2324.3**
Length, mm	**110.6**
Weight, g	**547.5**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.11	8.49	8185	0.20

Tested By	Checked By	Approved By
MHK	CT	GR

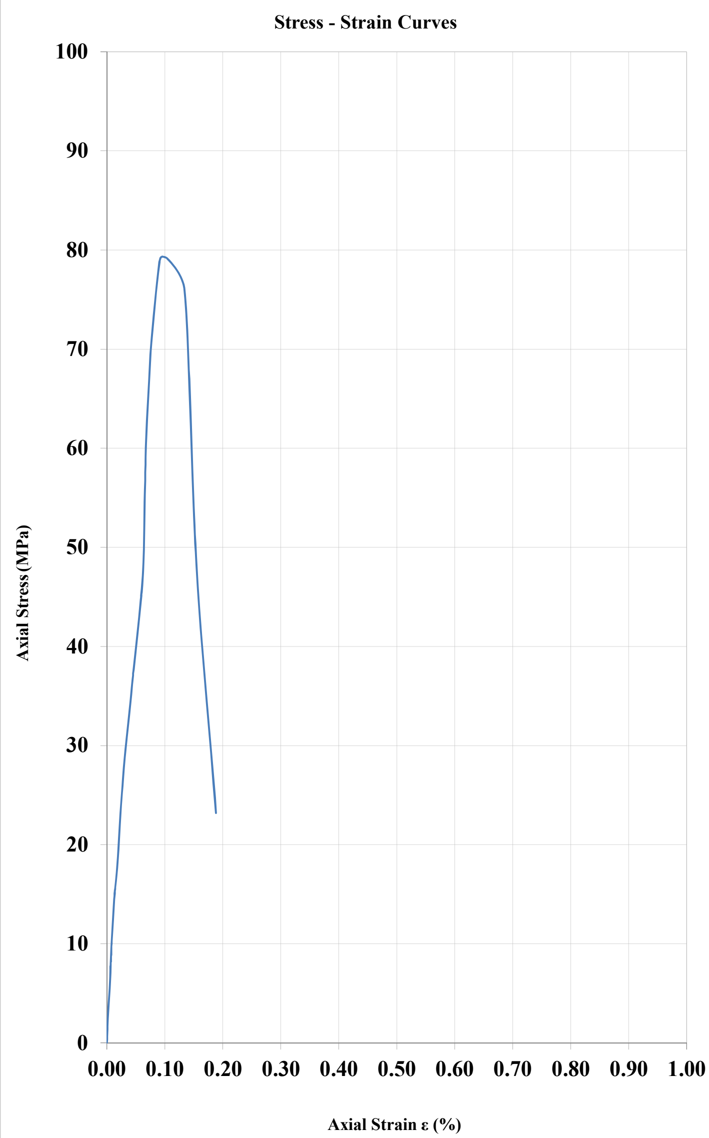
SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

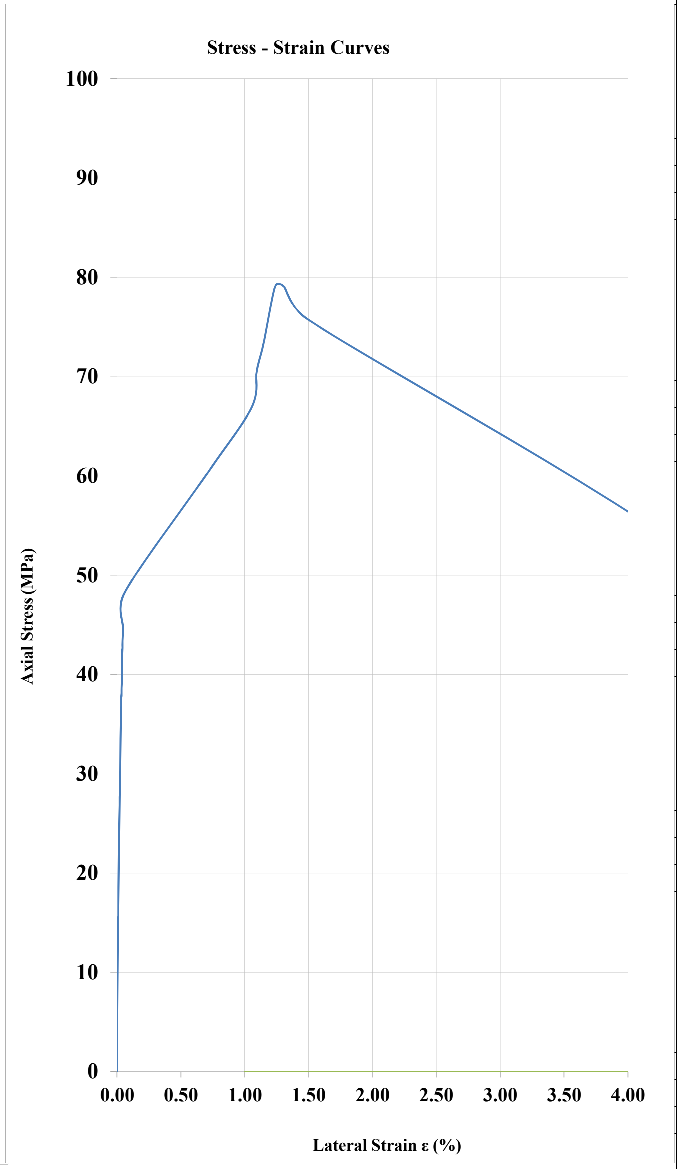
Test Report No	:	SRTL/2019-20/TRN-30
ULR No	:	TC600719000000091P
Test Method	:	IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

Date of testing	: 30-Aug-19
Sample ID	: S1612/PBH01-259/46.0-47.5
Lab Temperature	: 26.7 ^{0}C
Condition	: Unsoaked

Sample No	**I**
Diameter,mm	**54.7**
Area, mm^2	**2350.0**
Length, mm	**111**
Weight, g	**734**





Sample No	Failure Strainϵ, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.092	79.11	52430	0.20

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

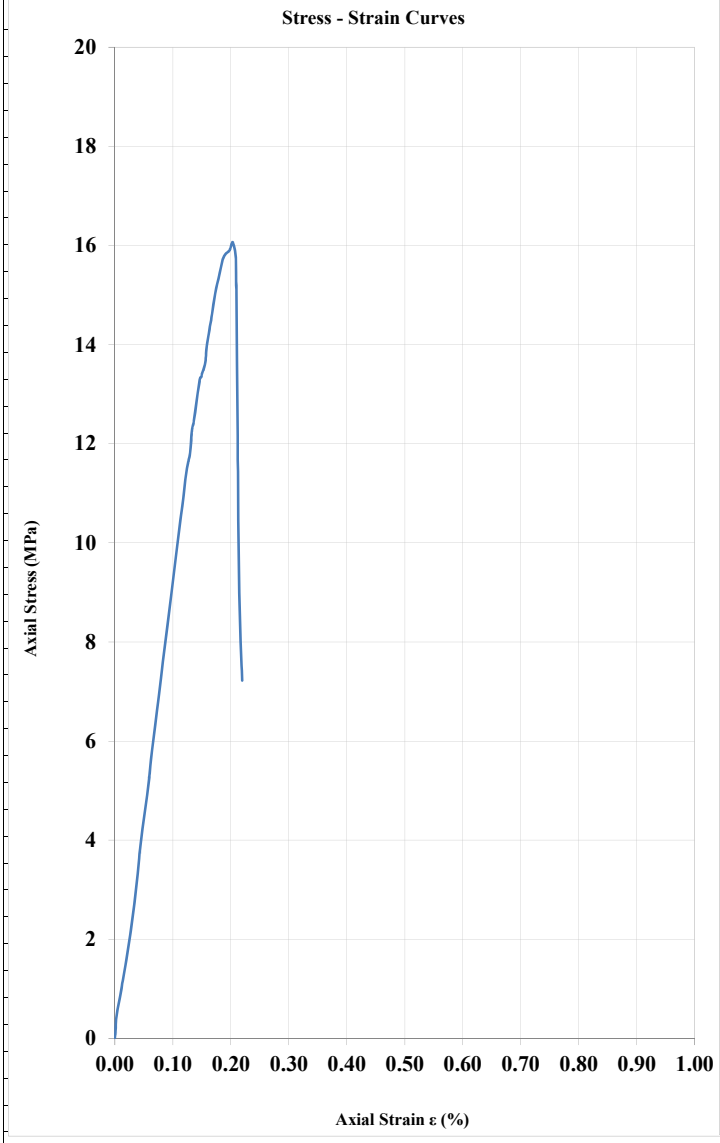
Date of testing : 30-Aug-19

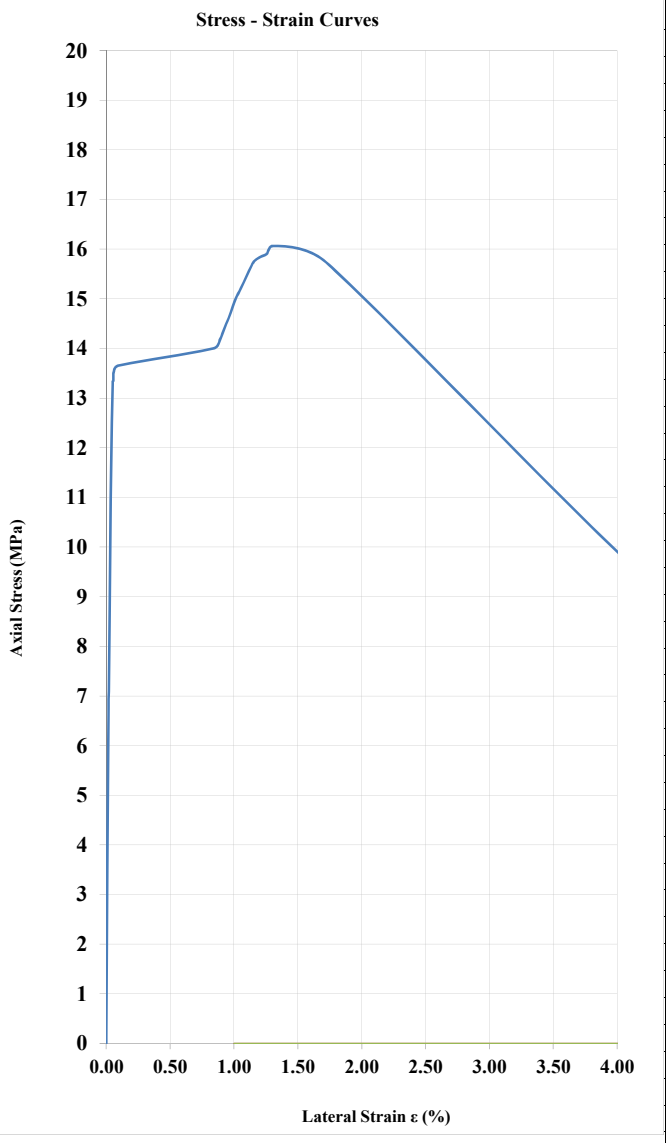
Sample ID : S1612/PBH01-384/64.0-65.0

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.7**
Area, mm^2	**2350.0**
Length, mm	**112.1**
Weight, g	**559**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.203	16.06	9501	0.26

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

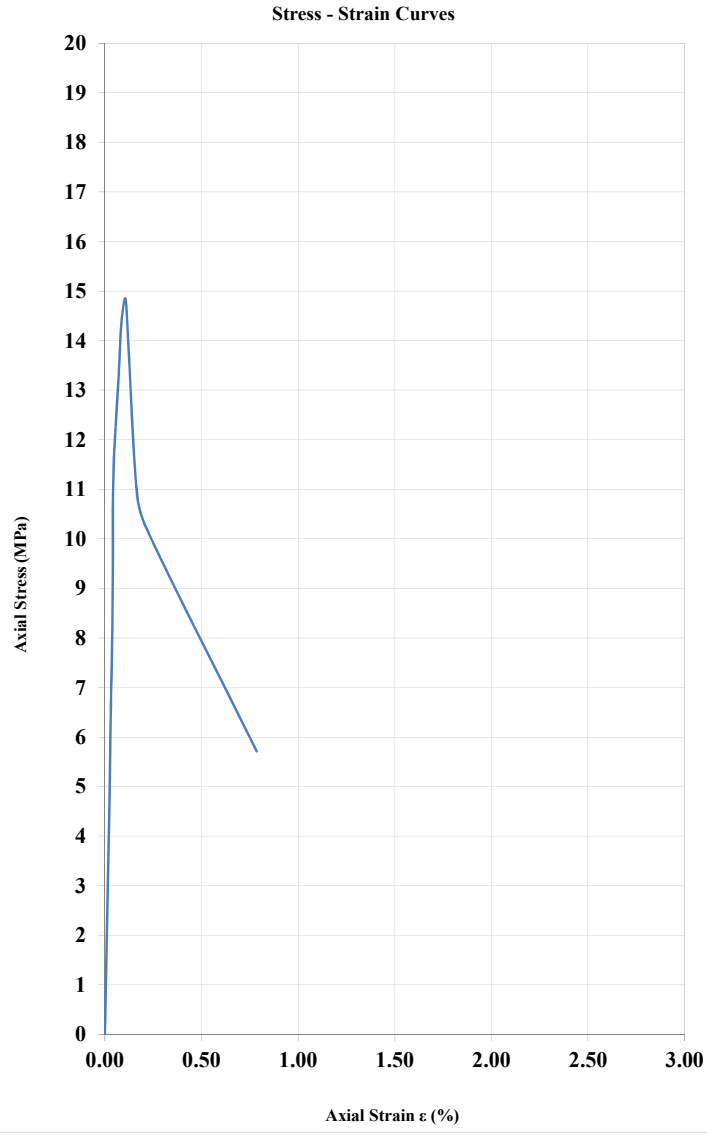
Date of testing : 23-Sep-19

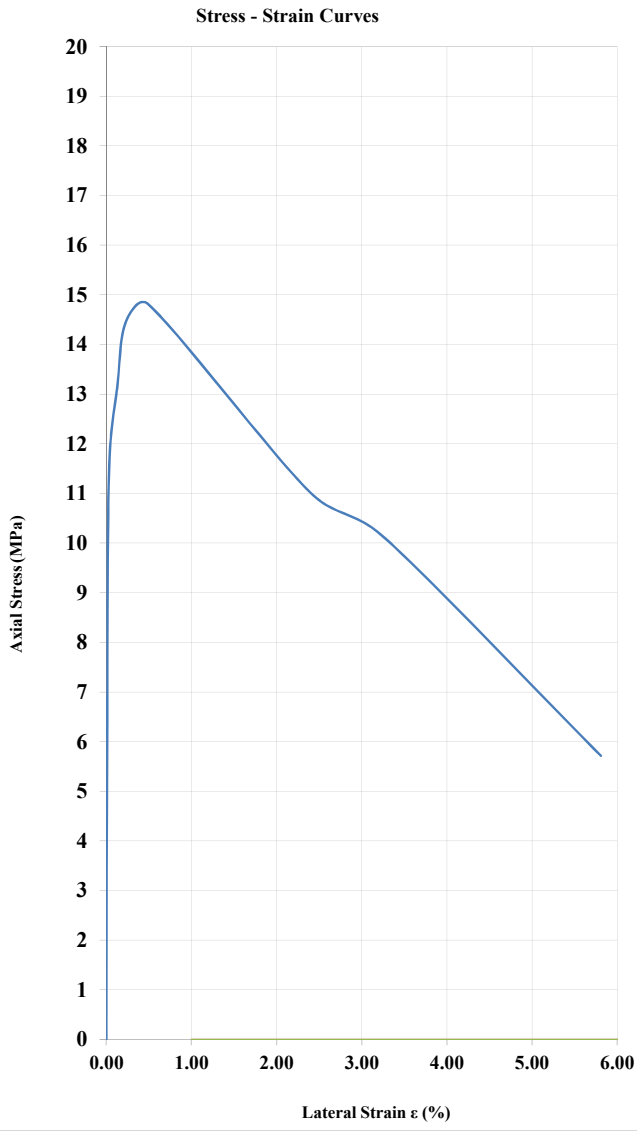
Sample ID : S1612/PBH02-136A/25.5-27

Lab Temperature : 25

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**51.6**
Area, mm^2	**2091.2**
Length, mm	**114.3**
Weight, g	**543**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.108	14.81	24232	0.25

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

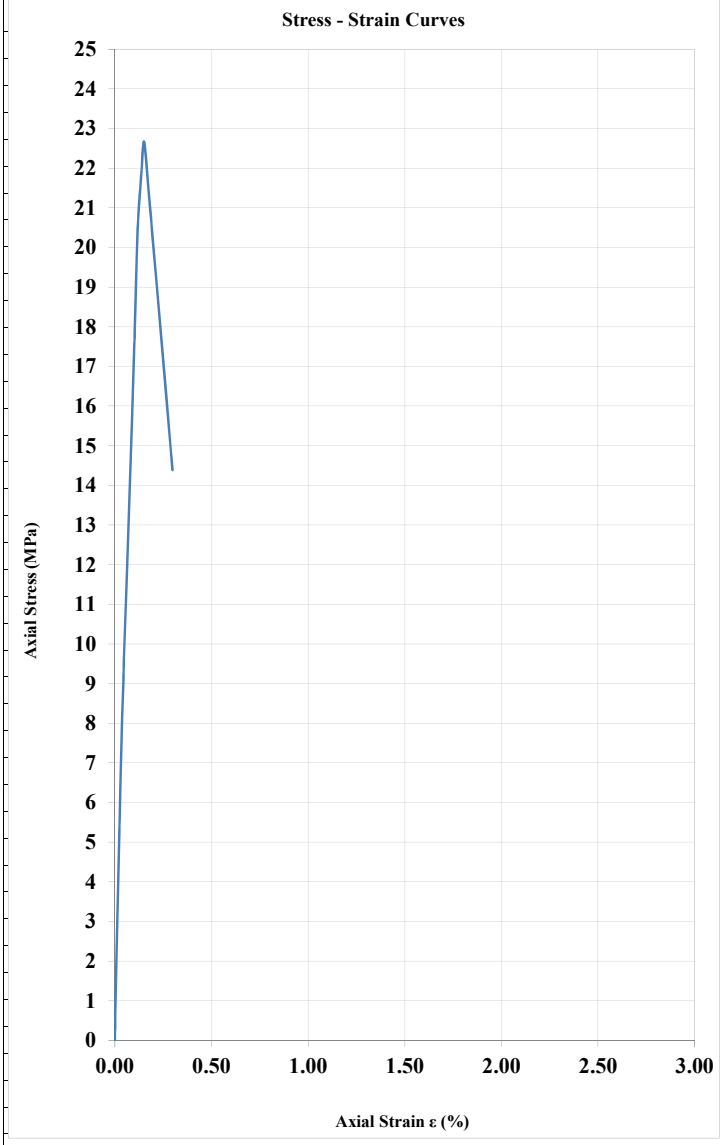
Date of testing : 23-Sep-19

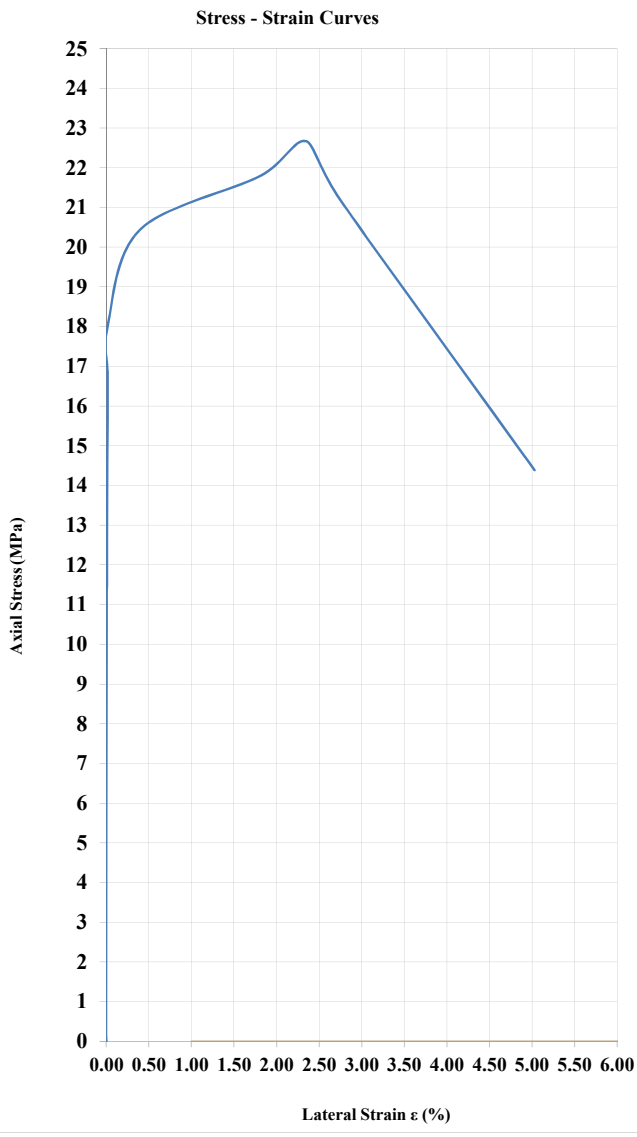
Sample ID : S1612/PBH01-214/39-40.50

Lab Temperature : 25

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**53.82**
Area, mm^2	**2275.0**
Length, mm	**114.6**
Weight, g	**612.5**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.12	22.66	12639	0.19

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

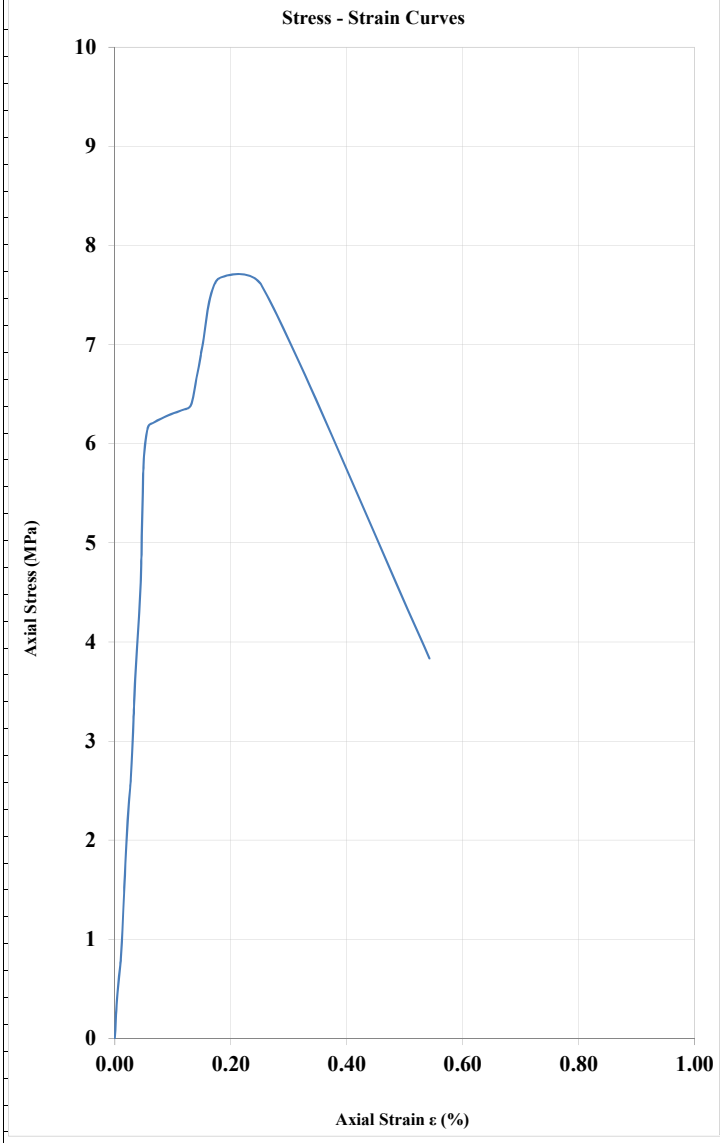
Date of testing : 30-Aug-19

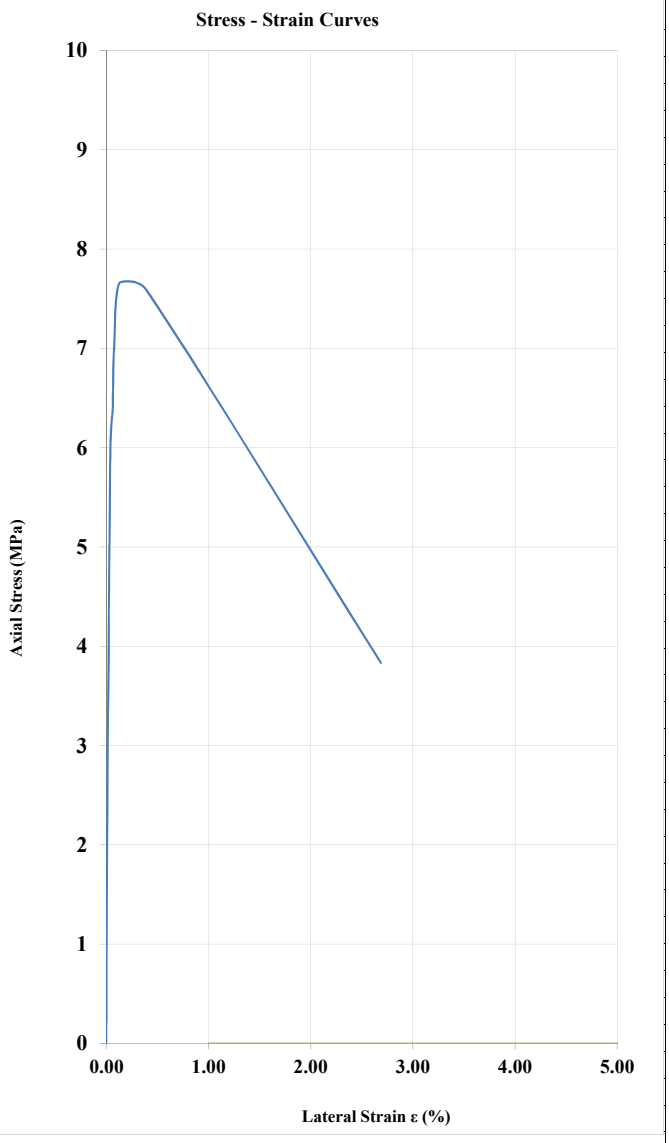
Sample ID : S1612/PBH02-361/69.0-70.5

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.7**
Area, mm^2	**2350.0**
Length, mm	**110.4**
Weight, g	**530.5**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.716	7.66	9396	0.32

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

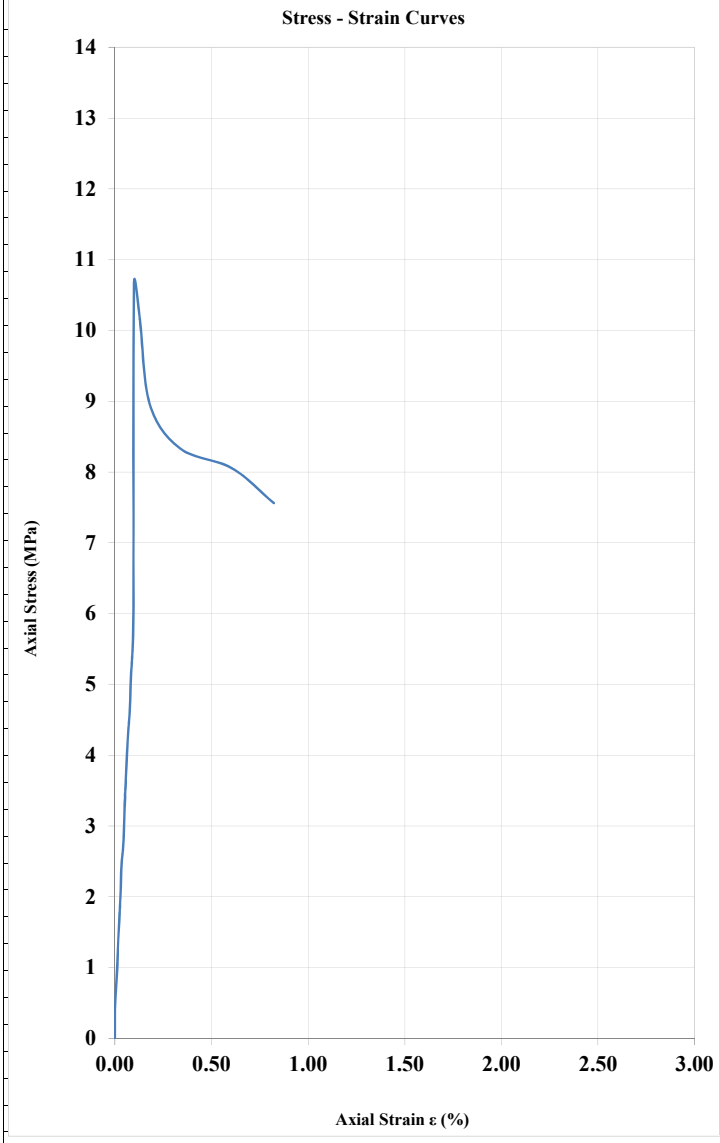
Date of testing : 23-Sep-19

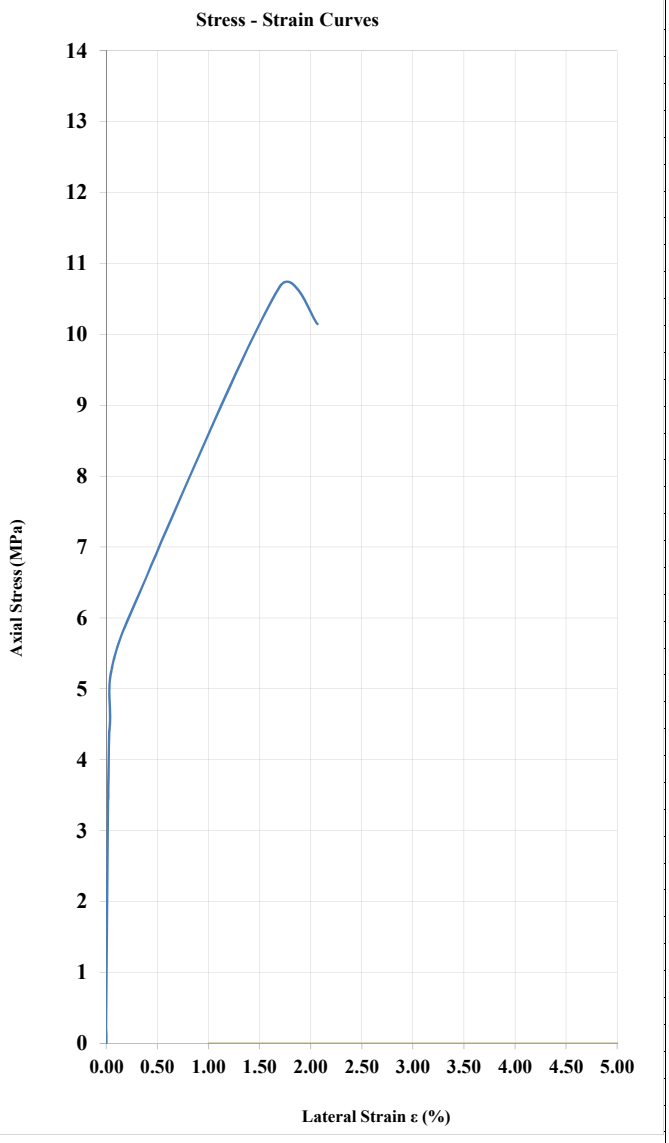
Sample ID : S1612/PBH03-57/19.5-21

Lab Temperature : 25

Condition : Unsoaked

Sample No	I
Diameter,mm	54.3
Area, mm^2	2315.7
Length, mm	114.8
Weight, g	543.5





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.10	10.67	7216	0.28

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

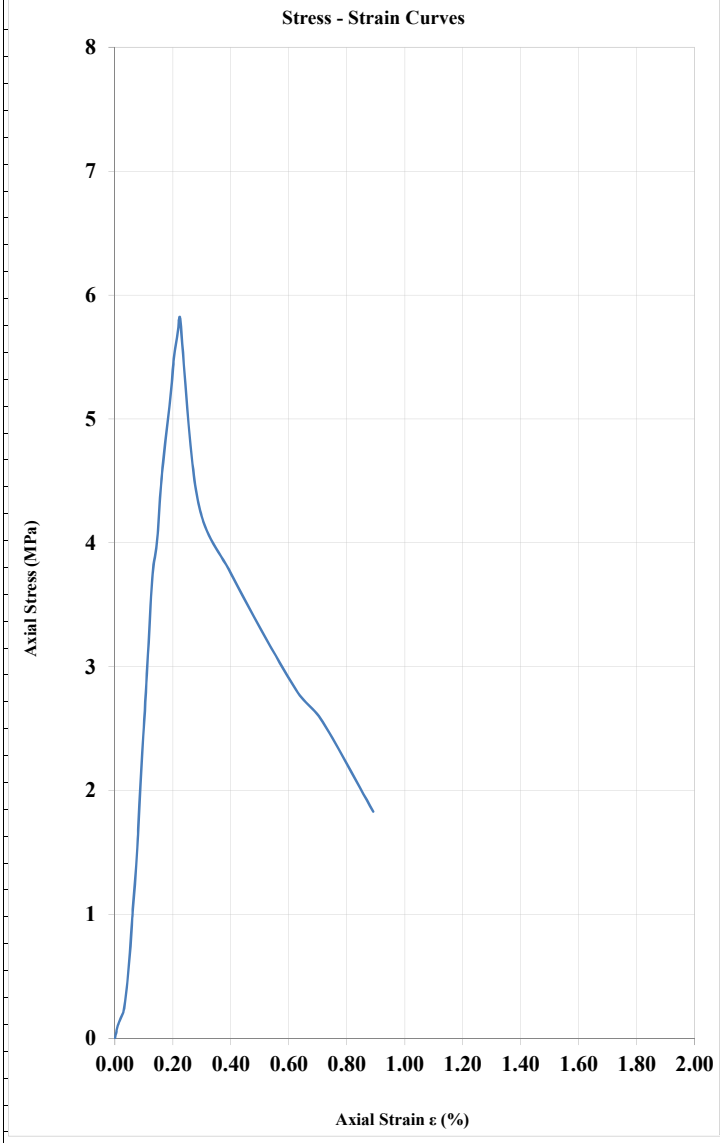
Date of testing : 30-Aug-19

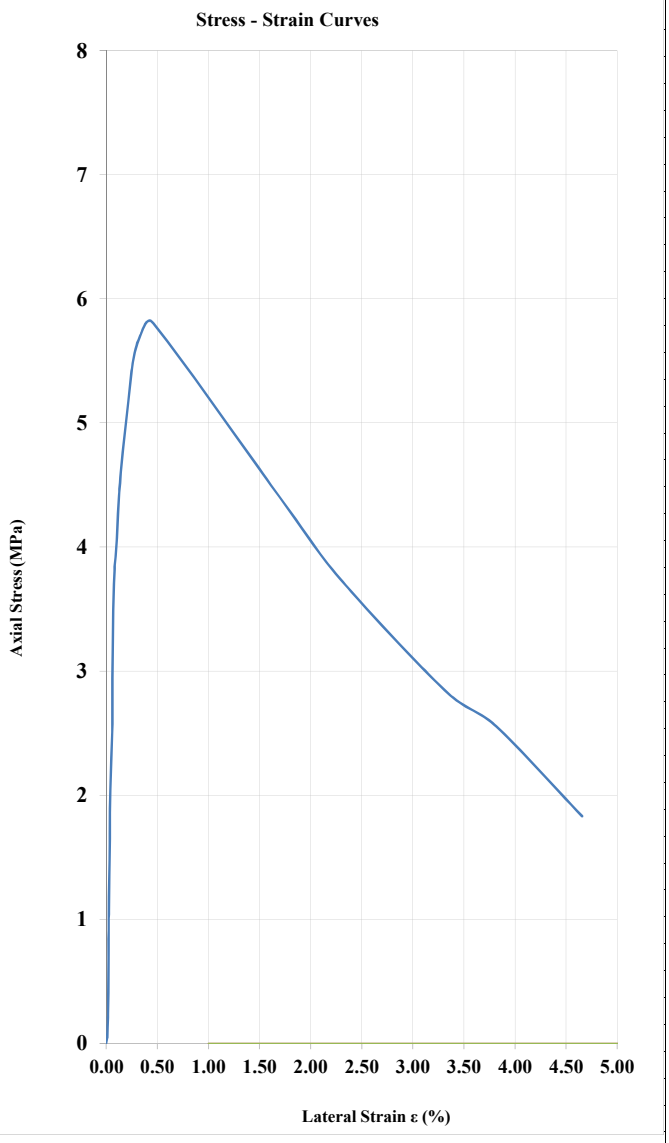
Sample ID : S1612/PBH03-91/27.0-28.5

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.5**
Area, mm^2	**2332.8**
Length, mm	**113**
Weight, g	**540**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.22	5.81	4178	0.29

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

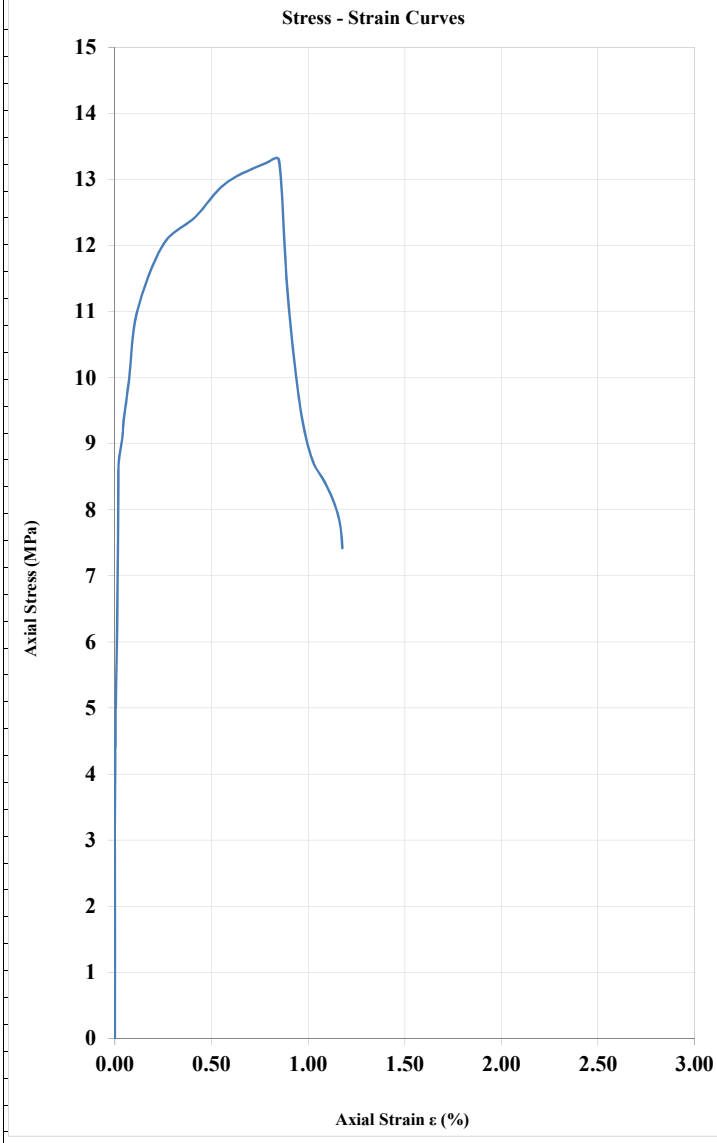
Date of testing : 30-Aug-19

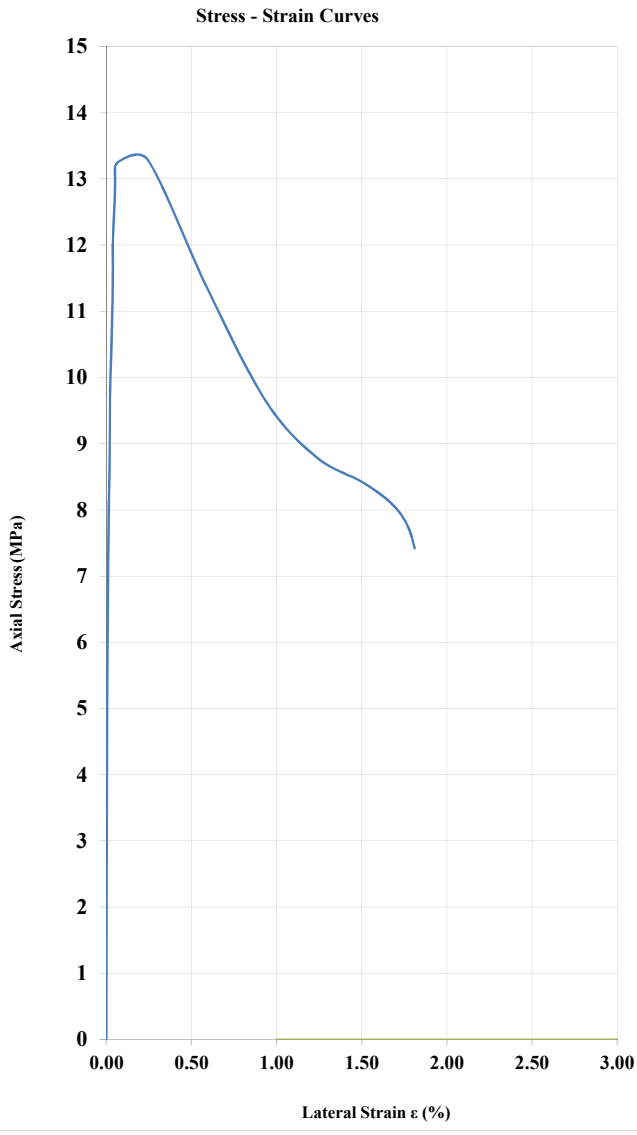
Sample ID : S1612/PBH03-260/60.0-61.5

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.5**
Area, mm^2	**2332.8**
Length, mm	**113**
Weight, g	**540**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.8	13.29	19182	0.25

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

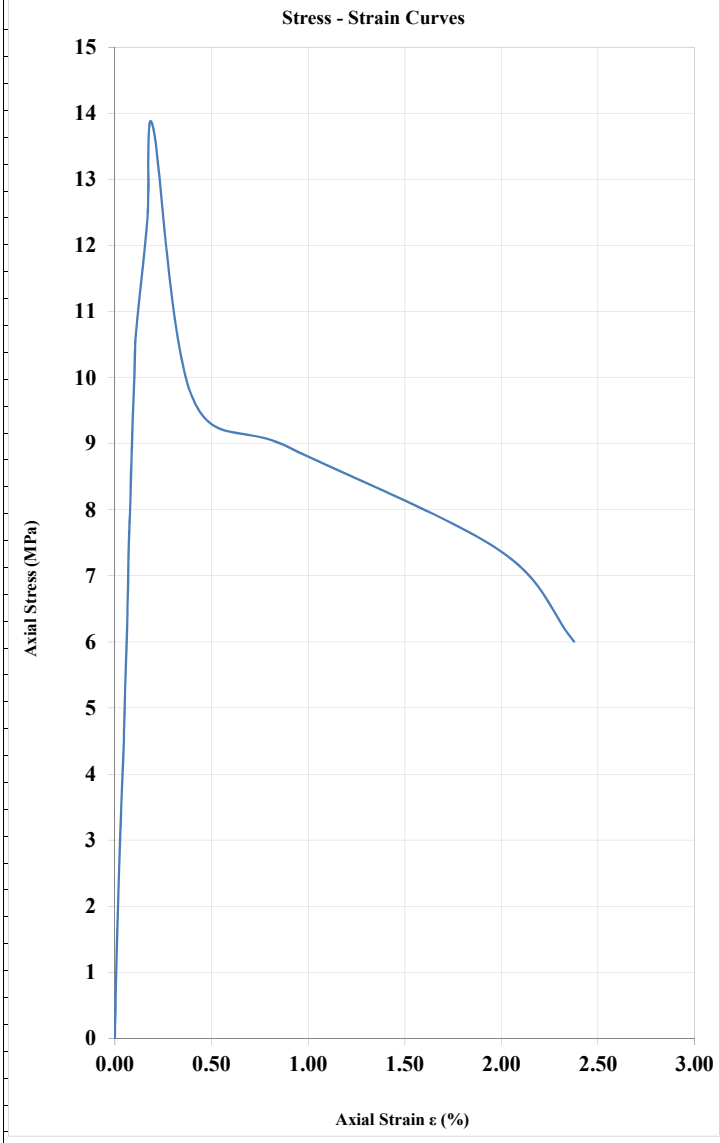
Date of testing : 30-Aug-19

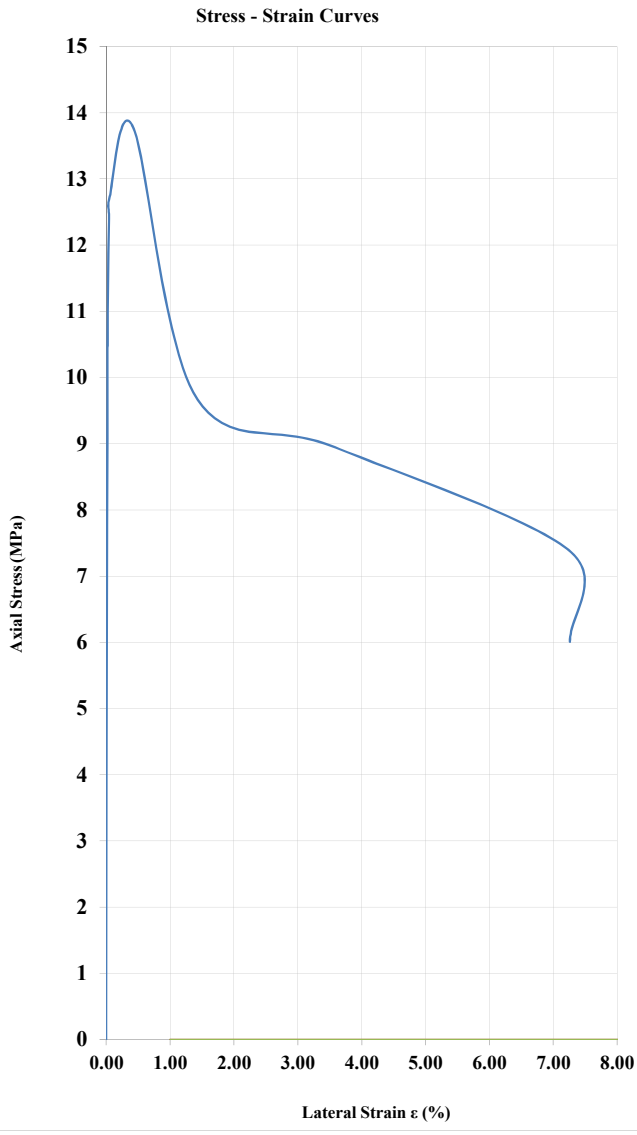
Sample ID : S1612/PBH03-268/61.5-63.0

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.3**
Area, mm^2	**2315.7**
Length, mm	**115.3**
Weight, g	**637.5**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.208	13.77	12696	0.27

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

Test Report No : SRTL/2019-20/TRN-30

ULR No : TC600719000000091P

Test Method : IS: 9221:1979 Method for Determination of Modulus of Elasticity and Poisson's Ratio in Uniaxial Compression

Test Data

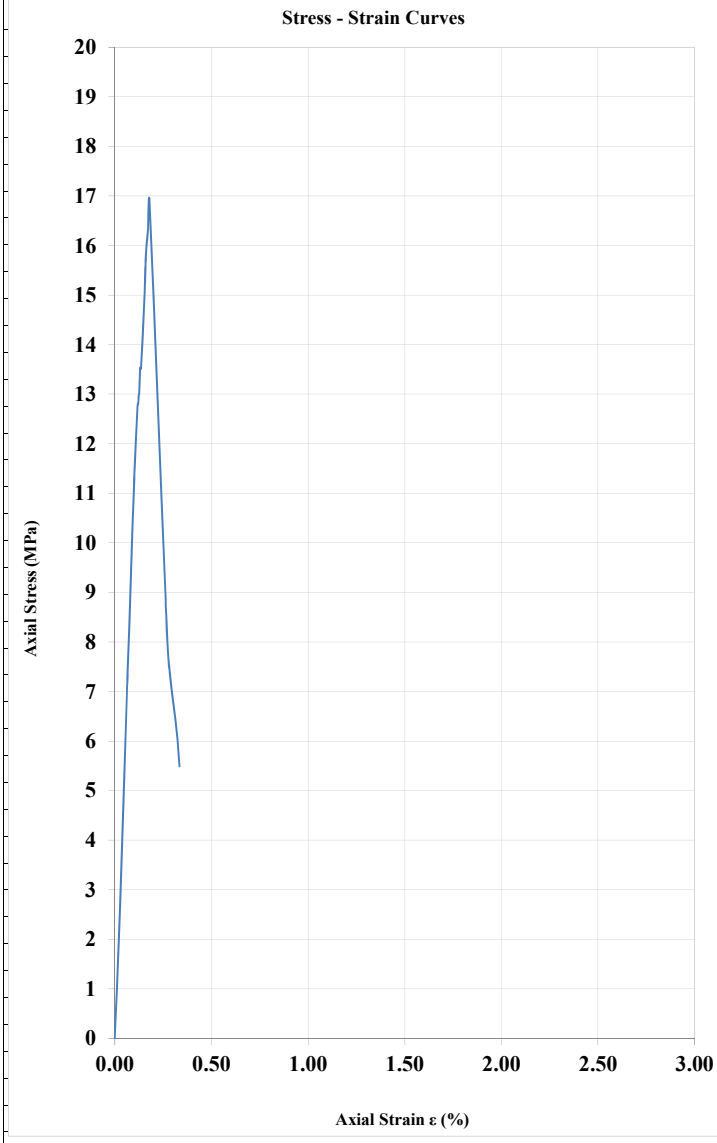
Date of testing : 30-Aug-19

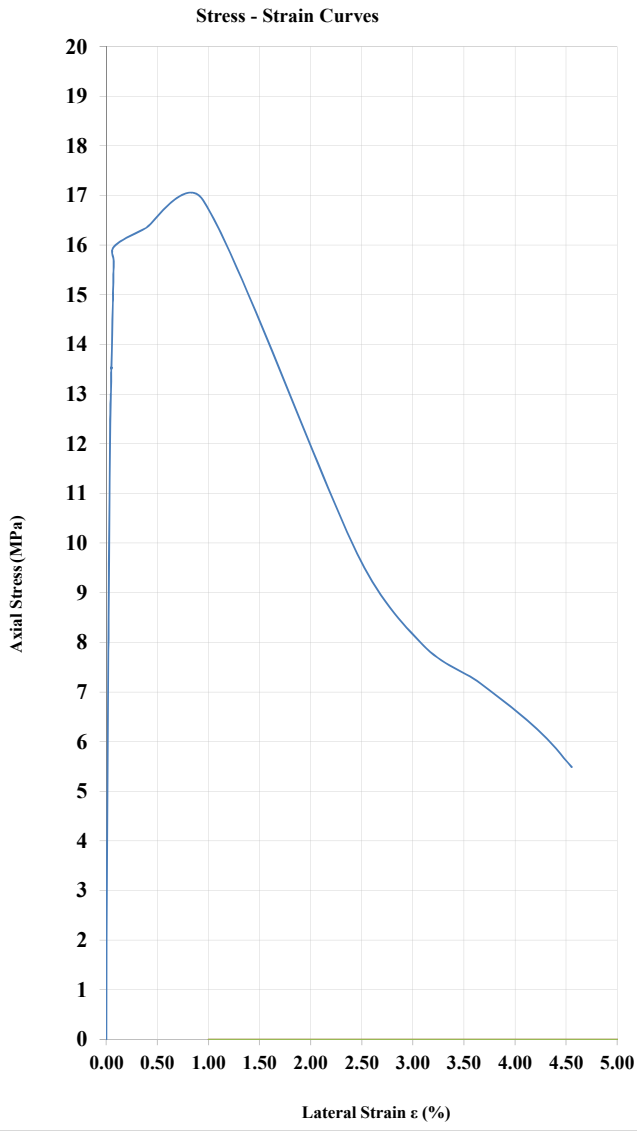
Sample ID : S1612/PBH03-342/84.0-85.5

Lab Temperature : 26.7 ^{0}C

Condition : Unsoaked

Sample No	**I**
Diameter,mm	**54.2**
Area, mm^2	**2307.2**
Length, mm	**111.3**
Weight, g	**572**





Sample No	Failure Strainc, %	Failure Stress σ_d, (MPa)	Youngs Modulus, E (MPa)	Poissons Ratio, μ
I	0.179	16.90	12181	0.26

Tested By	Checked By	Approved By
MHK	CT	GR

SOIL AND ROCK TESTING LABORATORY
SARATHY GEOTECH & ENGINEERING SERVICES PVT. LTD.,

TEST REPORT

Test Report No	:	SRTL/2019-20/TRN30
ULR No.	:	TC600719000000091P
Test Method	:	Method for Determination of Strength for Rock Materials in Triaxial Compression
Testing Standard	:	IS 13047:1991 (Reaffirmed 2016)

Laboratory Information

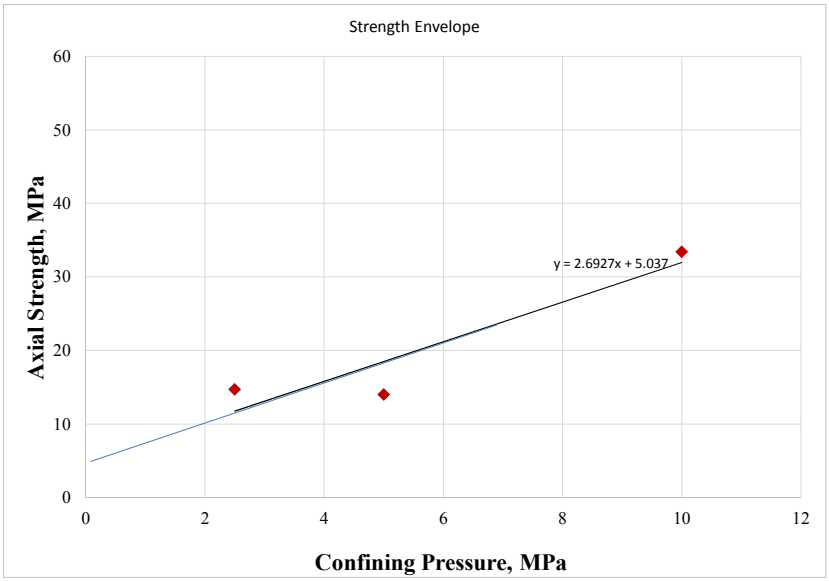
Date of Testing : 28-Nov-19 Lab Temperature °C : 28

Test Data

Sample ID	:	S1612/PBH-01/11.5-13.0
Sample Description	:	
Source of sample	:	supplied by customer
Storage History	:	-
Type of Machine Used	:	Compression Testing Machine

Sample No	I	II	III	IV	V
Diameter,mm	54.6	54.6	54.7		
Area, mm^2	2341.40	2341.40	2349.98		
Height, mm	117.8	117.5	116.5		
Weight, g	597	593.5	591		
Density (g/cc)	2.16	2.16	2.16		

Confining Pressure,σ_3 MPa	I	II	III		
	2.5	5	10		



Sample No	Confining Pressure Mpa	Axial Strength Mpa	Failure Type
I	2.5	14.73	Multiple Fracture
II	5.0	14.05	Multiple Fracture
III	10.0	33.45	Multiple Fracture

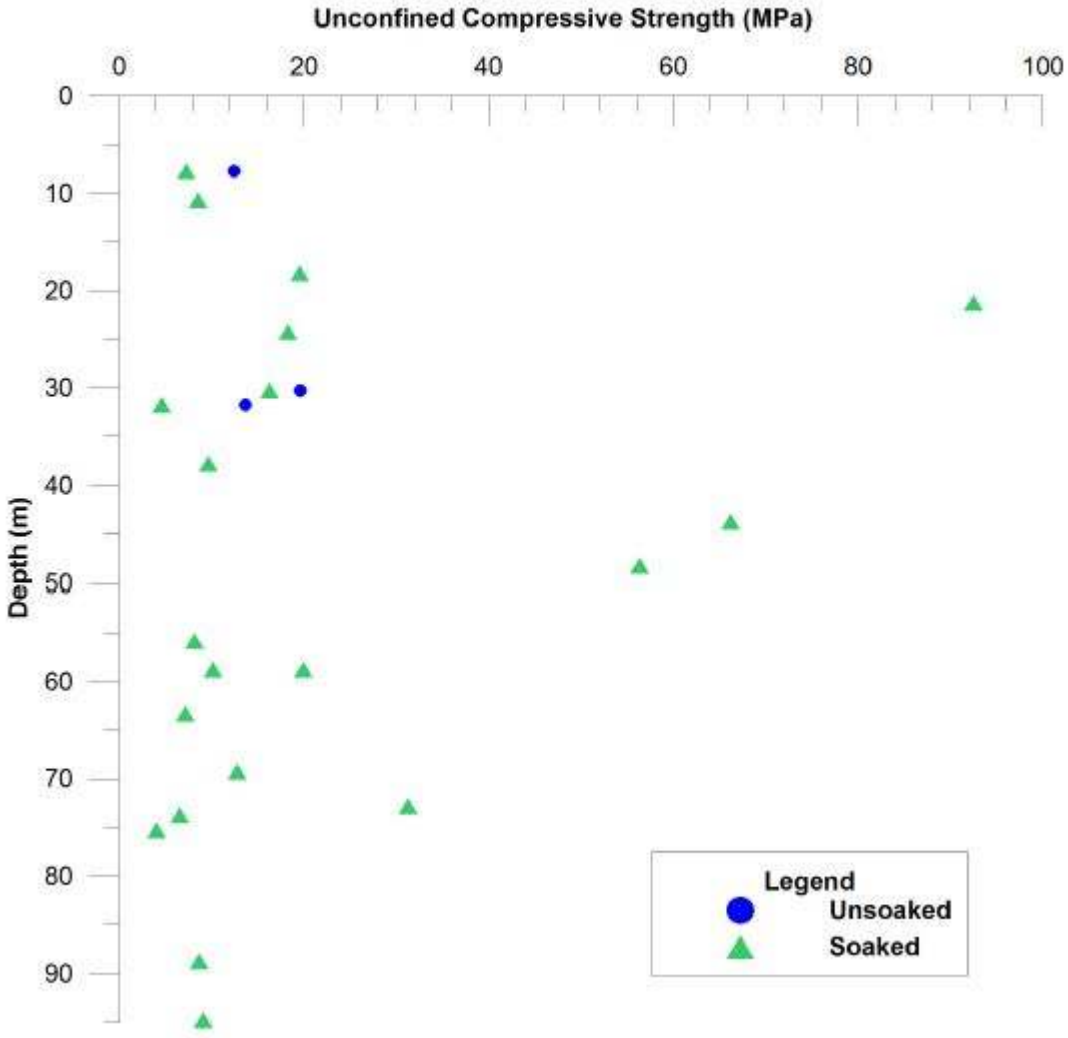
Angle of Internal Friction (deg)	:	27
Apparent Cohesion (MPa)	:	2

Tested By	Checked By	Approved By
MHK	CT	GR

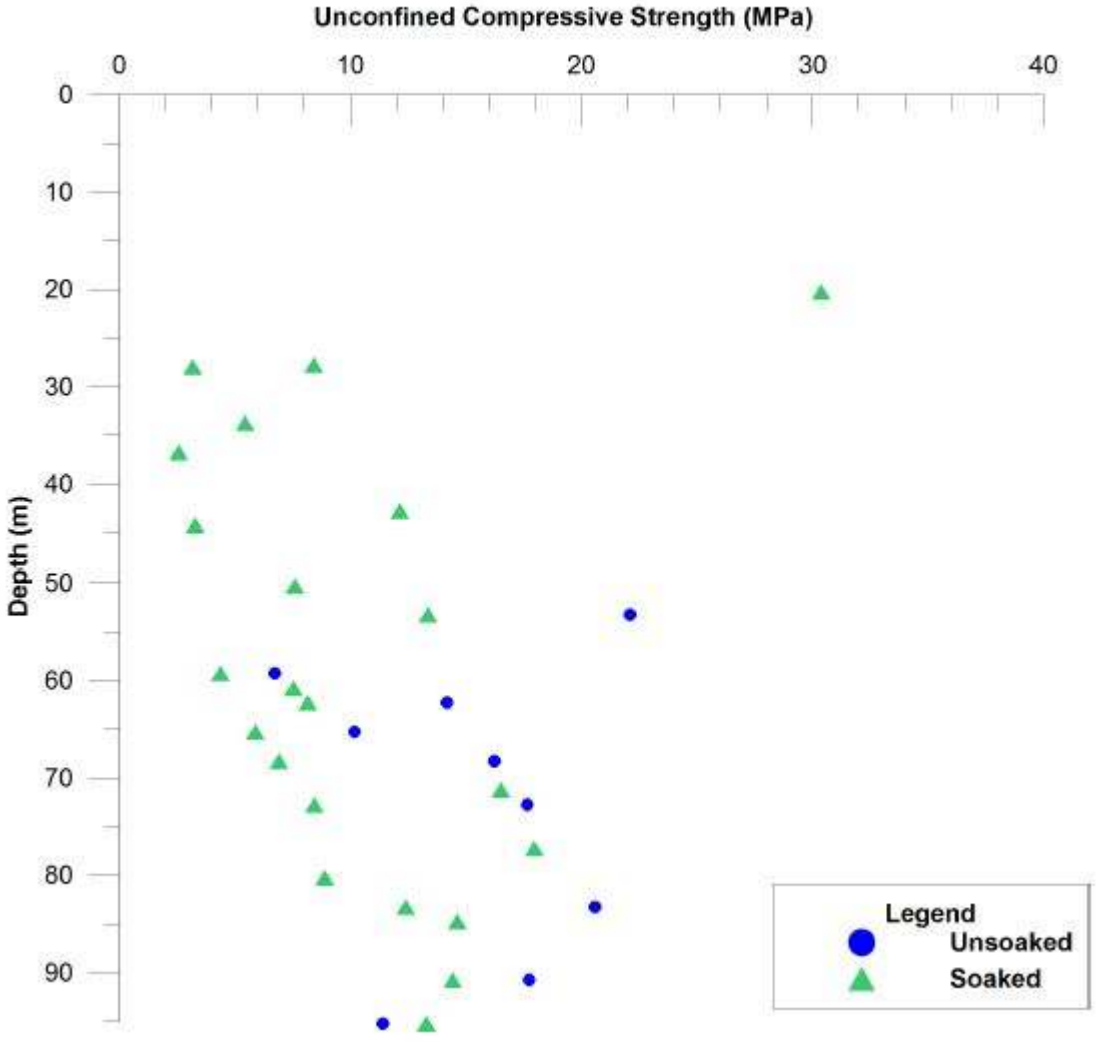
APPENDIX-C

ii. Plate No. 2 – Variation of compressive strength of rock along depth

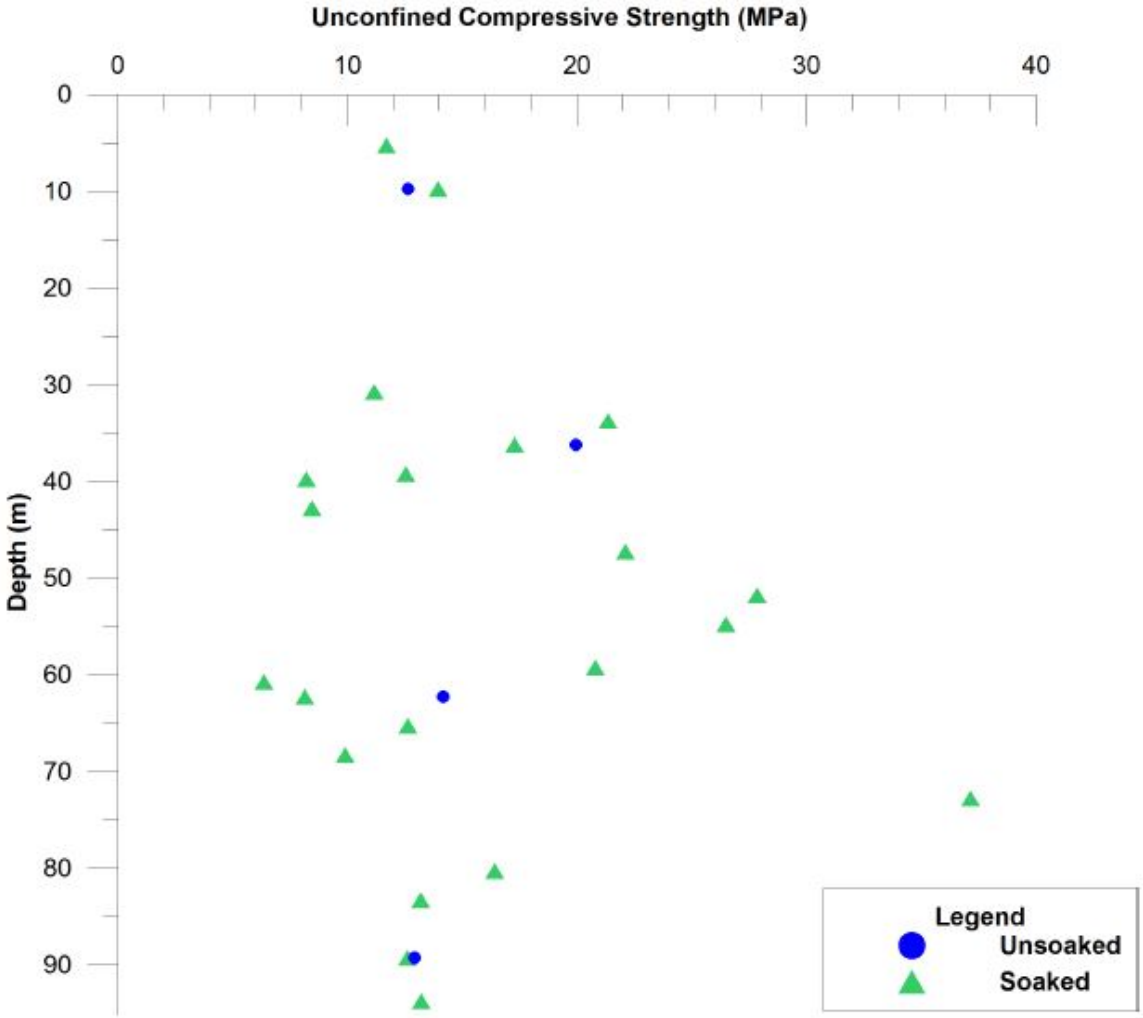
Compressive Strength of Rock along Depth for PBH-01



Compressive Strength of Rock along Depth for PBH-03



Compressive Strength of Rock along Depth for PBH-02



APPENDIX-C

iii. Plate No. 3 – Chemical Test Results

JAY GAJANAN GEOTECHNICS
SOIL MECHANICS LABORATORY

Certificate No. : TC-7943

Address: Shop No. 07, Ground Floor, Cosmos Hills, Opposite Upvan Lake, Pokharan Road No. 01, Upvan, Thane (W) 400606.
E-mail : jaygajanan@jaygajanan.in | URL : www.jaygajanan.in | Tel.: 022-25800035 | Mob.: 09967233499.

TEST REPORT ON WATER SAMPLES

Test Report No. : ULR- TC794319000000278F **Page No.** : 1 of 1
Customer Name & address : NHSRCL.
Project : Geotechnical and Geophysical Investigation for National High Speed Rail Corporation limited at BKC MMRDA ground.

Unique Sample ID : L19041001.
Sample Description : BH No. – PBH - 1, Depth: 95 m from EGL, Water Sample
Quantity & Condition : Good & Sufficient
Receipt Date : 14.09.2019 **Report Date** : 19.09.2019

NOTE : Samples as supplied by customer have been tested in laboratory and results as below refer only to the sample tested. Hence no sampling information is included. Results relate only to items tested. This test report is valid of and under the conditions specified herein.

Sr. No.	Test Parameter		Test Method	Acceptance Criteria including UOM	Observed Value	Remarks
1	Chemical Analysis	pH value	IS 3025 : Part 11, 1983, Reaff. 2017	---	7.11	---
2		Sulphate content, ppm	IS 3025 : Part 24, 1986, Reaff. 2014	---	237.847	---
3		Chloride content, ppm	IS 3025 : Part 32, 1988, Reaff. 2014	---	583.365	---

Specific Environmental conditions during test if any: Temperature for test is 27°C.

Opinion and interpretation if any: ---

FOR JAY GAJANAN GEOTECHNICS

Siddhi Sawant
Technical Manager

JAY GAJANAN GEOTECHNICS
SOIL MECHANICS LABORATORY

Certificate No. : TC-7943

Address: Shop No. 07, Ground Floor, Cosmos Hills, Opposite Upvan Lake, Pokharan Road No. 01, Upvan, Thane (W) 400606.
E-mail : jaygajanan@jaygajanan.in | URL : www.jaygajanan.in | Tel.: 022-25800035 | Mob.: 09967233499.

TEST REPORT ON WATER SAMPLES

Test Report No. : ULR- TC794319000000279F **Page No.** : 1 of 1
Customer Name & address : NHSRCL.
Project : Geotechnical and Geophysical Investigation for National High Speed Rail Corporation limited at BKC MMRDA ground.

Unique Sample ID : L19041002
Sample Description : BH No. – PBH - 2, Depth: 95 m from EGL, Water Sample
Quantity & Condition : Good & Sufficient
Receipt Date : 14.09.2019 **Report Date** : 19.09.2019

NOTE : Samples as supplied by customer have been tested in laboratory and results as below refer only to the sample tested. Hence no sampling information is included. Results relate only to items tested. This test report is valid of and under the conditions specified herein.

Sr. No.	Test Parameter		Test Method	Acceptance Criteria including UOM	Observed Value	Remarks
1	Chemical Analysis	pH value	IS 3025 : Part 11, 1983, Reaff. 2017	---	7.24	---
2		Sulphate content, ppm	IS 3025 : Part 24, 1986, Reaff. 2014	---	339.488	---
3		Chloride content, ppm	IS 3025 : Part 32, 1988, Reaff. 2014	---	294.093	---

Specific Environmental conditions during test if any: Temperature for test is 27°C.

Opinion and interpretation if any: ---

FOR JAY GAJANAN GEOTECHNICS

Siddhi Sawant
Technical Manager

JAY GAJANAN GEOTECHNICS
SOIL MECHANICS LABORATORY

Certificate No. : TC-7943

Address: Shop No. 07, Ground Floor, Cosmos Hills, Opposite Upvan Lake, Pokharan Road No. 01, Upvan, Thane (W) 400606.
E-mail : jaygajanan@jaygajanan.in | URL : www.jaygajanan.in | Tel.: 022-25800035 | Mob.: 09967233499.

TEST REPORT ON WATER SAMPLES

Test Report No. : ULR- TC794319000000280F **Page No.** : 1 of 1
Customer Name & address : NHSRCL.
Project : Geotechnical and Geophysical Investigation for National High Speed Rail Corporation limited at BKC MMRDA ground

Unique Sample ID : L19041003
Sample Description : BH No. – PBH - 3, Depth: 95 m from EGL Water Sample
Quantity & Condition : Good & Sufficient
Receipt Date : 14.09.2019 **Report Date** : 19.09.2019

NOTE : Samples as supplied by customer have been tested in laboratory and results as below refer only to the sample tested. Hence no sampling information is included. Results relate only to items tested. This test report is valid of and under the conditions specified herein.

Sr. No.	Test Parameter		Test Method	Acceptance Criteria including UOM	Observed Value	Remarks
1	Chemical Analysis	pH value	IS 3025 : Part 11, 1983, Reaff. 2017	---	7.42	---
2		Sulphate content, ppm	IS 3025 : Part 24, 1986, Reaff. 2014	---	462.114	---
3		Chloride content, ppm	IS 3025 : Part 32, 1988, Reaff. 2014	---	448.371	---

Specific Environmental conditions during test if any: Temperature for test is 27°C.

Opinion and interpretation if any: ---

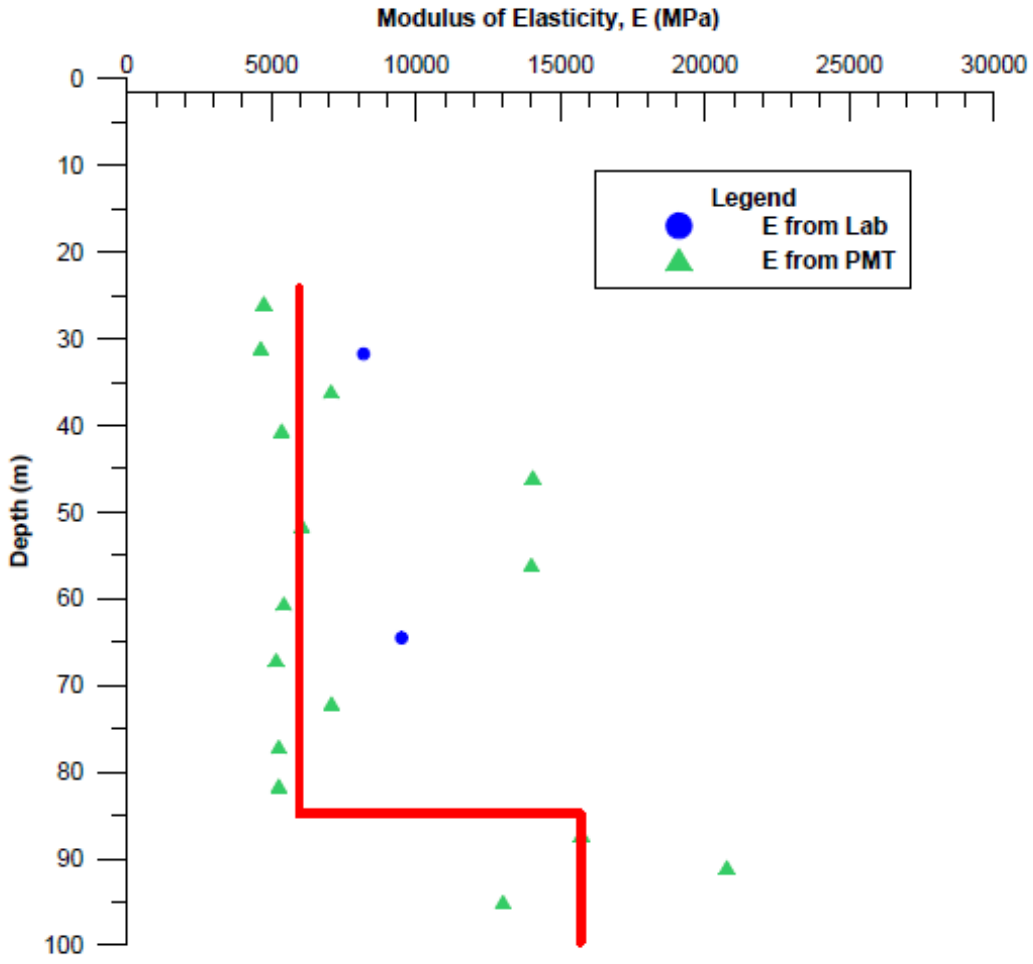
FOR JAY GAJANAN GEOTECHNICS

Siddhi Sawant
Technical Manager

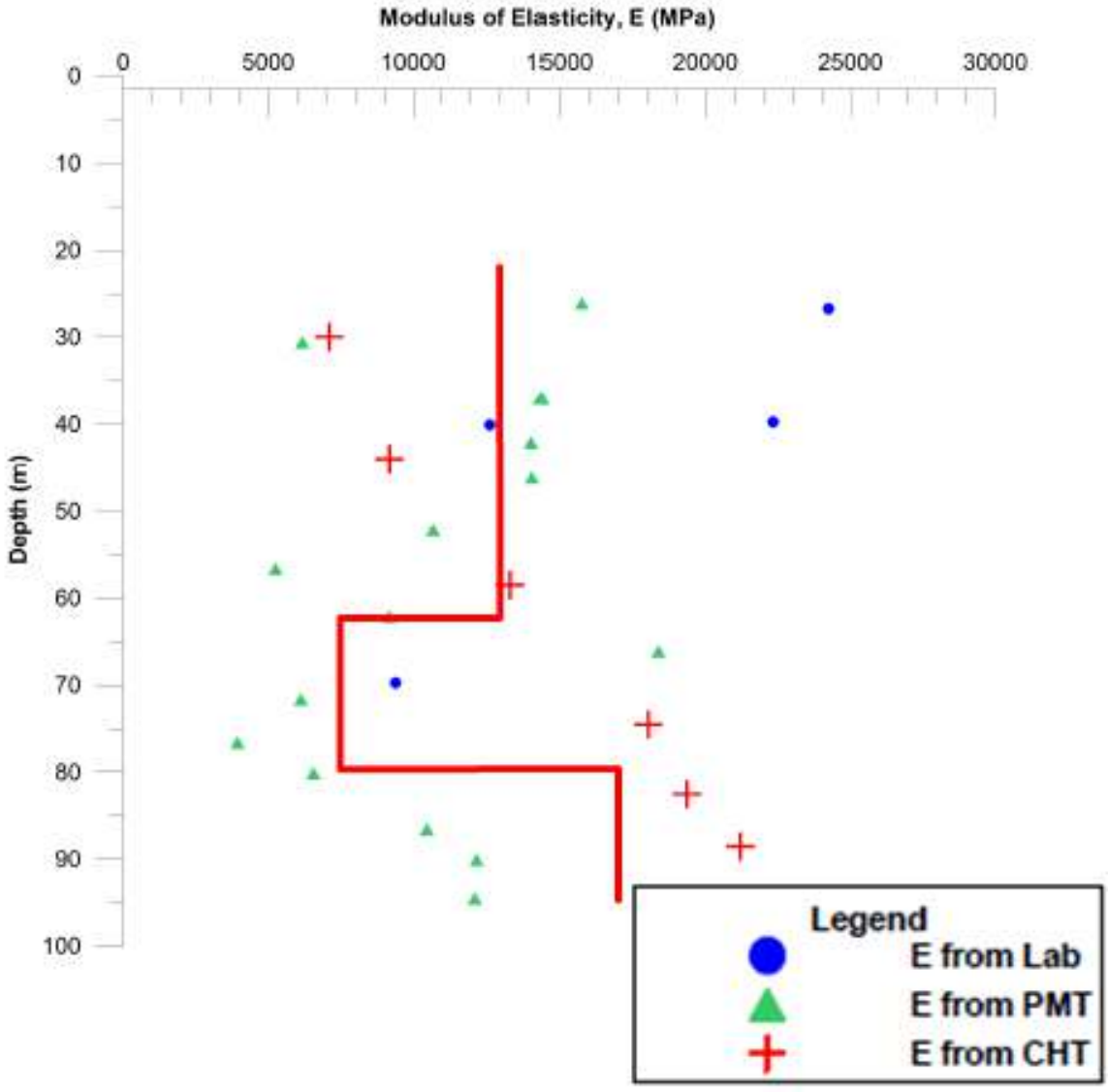
APPENDIX-C

iv. Plate No. 4 – Variation of modulus of elasticity along the depth

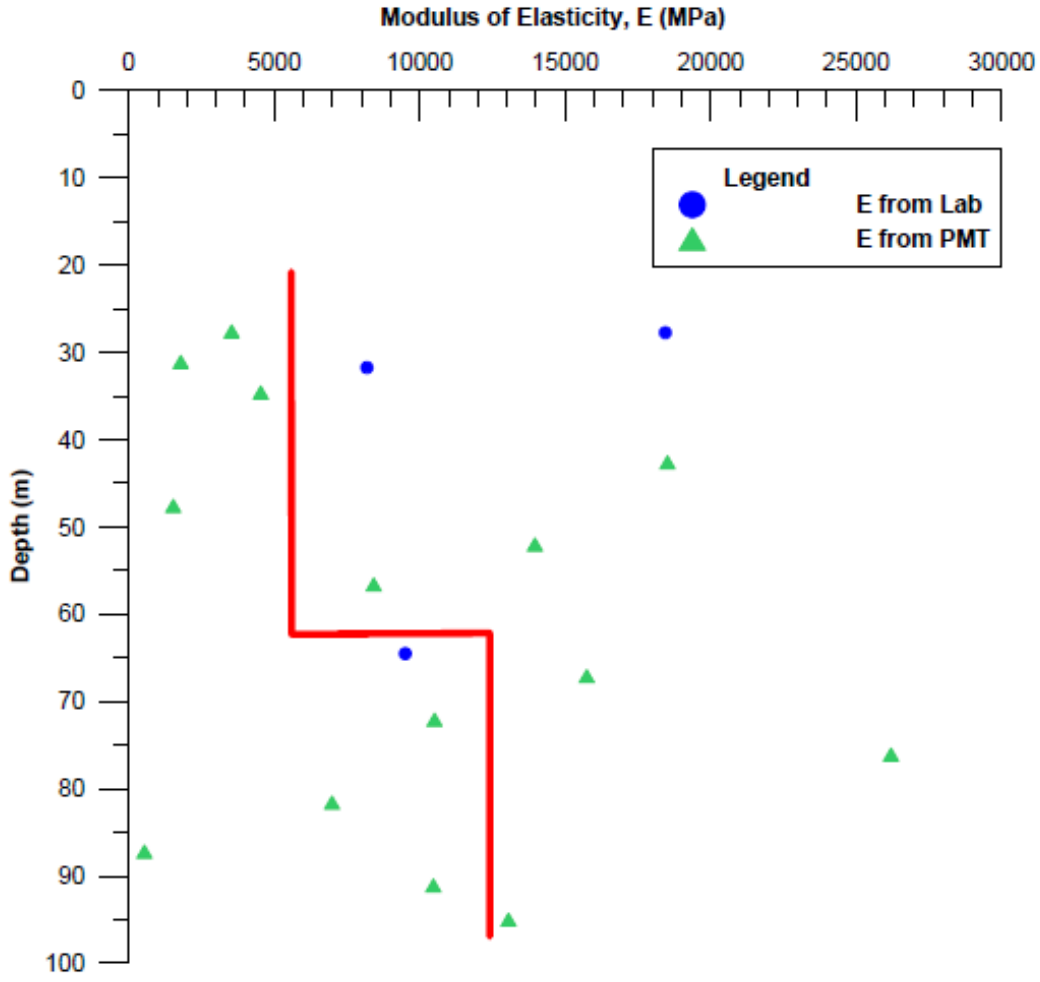
Modulus of Elasticity along Depth for PBH-01



Modulus of Elasticity along Depth for PBH-02



Modulus of Elasticity along Depth for PBH-03



APPENDIX-C

v. Plate No. 5 – Terms and Symbols

TERMS AND SYMBOLS USED ON LOGS

SOIL TYPES


Sand


Silt


Clay


Gravel


Weathered/disintegrated rock


Rock


Fill

SAMPLER TYPE


Thin-Walled Tube


Split-Barrel


No-Recovery

STRENGTH OF COHESIVE SOIL

Consistency	ASTM Undrained Shear Strength (kN/m^2)	(ksf)
Very soft	< 12.5	< 0.25
Soft	12.5 to 25	0.25 to 0.5
Firm	25 to 50	0.5 to 1.0
Stiff	50 to 100	1.0 to 2.0
Very stiff	100 to 200	2.0 to 4.0
Hard	> 200	> 4.0

RELATIVE DENSITY OF GRANULAR SOIL

Estimated Natural Density	Estimated Relative Density	SPT N Value
Very loose	0.00 to 0.15	0 to 4
Loose	0.15 to 0.35	4 to 10
Medium dense	0.35 to 0.65	10 to 30
Dense	0.65 to 0.85	30 to 50
Very dense	0.85 to 1.00	> 50

SOIL GRAIN SIZE

B.I.S. STANDARD

COBBLES	GRAVEL			SAND			SILT			CLAY
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	
60	20	6	2	0.6	0.2	0.06	0.02	0.006	0.002	

SOIL GRAIN SIZE IN MILLIMETERS

ASTM STANDARD

U.S. STANDARD SIEVE

3"	3/4"	4	10	40	200

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
75	19	4.75	2.00	0.425	0.075	

SOIL GRAIN SIZE IN MILLIMETERS

SECONDARY CONSTITUENTS

	ASTM D 2487-93		BS 5930 : 1981
Traces	Particles are present but estimated to be less than 5%	w/occasional	less than 5%
Few	5 to 10% of particles present	with	5 to 20%
Little	15 to 25% of particles present	w/some	20 to 35%
Some	30 to 45% of particles present	sandy/gravelly	35 to 65%

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 3 mm (1/8 inch) thick extending through the sample.
Seam	Inclusion 3 mm (1/8 inch) to 76 mm (3 inches) thick extending through the sample.
Layer	Inclusion greater than 76 mm (3 inches) thick extending through the sample.
Laminated	Soil sample composed of alternating partings of seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Composed of 12 to 50% material which is soluble in dilute hydrochloric acid.
Carbonate	Composed of more than 50% material which is soluble in dilute hydrocholoric acid.
Well Cemented	Sample can not be manually broken down but individual grains can be dislodged.
Slightly Cemented	Sample can be broken down manually without difficulty and individual grains can be dislodged.
Moderately Cemented	Intermediate between slightly and well cemented.
Coralline	Composed predominantly of recognizable and intact coral pieces and fragments.
Shelly	Composed predominantly of recognizable and intact shell pieces and fragments.

APPENDIX-D

i. Plate No. 1– Geological Log

ii. Plate No. 2– RMR Calculation

iii. Plate No. 3– Sample Calculation

APPENDIX-D

i. Plate No. 1– Geological Log

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	**CO-ORDINATES** N: 2109606.77 , E:275232.32	**DRILLING METHOD** : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	**GROUND WATER LEVEL** - 8 Mtr wrt EGL	**TYPES OF CORE BARREL** : NX Core Barrel
DATE COMPLETED : 27.07.2019	**SHEET No**- 1 of 16	**CASING SIZES** : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	**BOREHOLE ORIENTATION** : Vertical	**TYPE OF BIT** : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
0	1	DS		Brownish Gray Silty **CLAY** with Gravels and rock fragments. Filled up materials.																										
1.00	1.5	UDS		**UDS** sample collected																										
1.5	1.95	SPT		Stiff, Brownish Gray, Sandy CLAY with gravels and weathered rock		3	5	5	10																					
3	3.45	SPT		Firm, Brownish Gray,Sandy **CLAY** with gravels and rock fragments		4	3	3	6																					
4.5	4.95	SPT		Hard, Brownish Gray,Sandy **CLAY** with rock fragments.		9	9	28	37																					
5.25	5.30	SPT		Very Dense, Brownish Gray, Coarse Sandy **weathered Rock**		91R			N>100																					
5.3	6	Core		Highly weathered, Brownish Gray, weak , Volcanic **TUFF**						6					Slightly rough and highly weathered surface, seperation 1-5mm thickness opening, Spacing of discontinuities < 0.06 m						67	0									

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 2of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
6	7			Moderately to Slightly weathered, Brownish Gray, moderately strong to strong composite **BRECCIA**						6	2				Slightly rough moderately to highly weathered surface, separation 1-5 mm. Spacing of discontinuity:0.3m-1.3m						88	38	10	39	III/II		25			Gray	Intertrappean Belt
7	8.5			Slightly weathered to Fresh, Brownish Gray, moderately strong to strong, composite **BRECCIA** with cavities and iron oxidation						4	4										87	50	8	38	II/I		25				
8.5	10			Slightly to Moderately weathered, Brownish Gray, weak to strong, composite **BRECCIA** with cavaties and iron oxidation						4	6	1									87	64	9	38	II/I		25				
10	11.5			Fresh to Slightly weathered, Brownish Gray, moderately weak to weak, composite **BRECCIA** with cavities and iron oxidation							5	1			Slightly rough moderately to highly weathered surface, seperation 1-5 mm. Spacing of discontinuity:>3m						91	74	5	35	I/II		25				
11.5	13			Slightly to Moderately weathered, Brownish Gray, weak to strong, composite **BRECCIA** with cavaties and iron oxidation						7	2										98	64	9	36	II/I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 3 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
13	14.5			Slightly to Moderately weathered, Brownish Gray,weak to strong, volcanic **BRECCIA** with cavities and quartz & amygdal minerals						11	2	1									100	47	10	39	II/III		20			Gray	Intertrappean Belt
14.5	16			Moderately to Highly weathered, Grayish Brown, moderately strong to weak, volcanic **BRACCIA** with cavities and quartz minerals						15	4				Slightly rough highly weathered surface, seperation 1-5 mm opening. Spacing of discontinuities >3m						100	37	10	39	III/IV		20				
16	17.5									9	5										100	60	10	39	III/IV		20				
17.5	19			(17.5-17.8)m- Slightly weathered to Fresh, Brownish Gray, volcanic **BRECCIA**. (17.8-19)m- Slightly weathered to Fresh, Dark Gray, strong, fine BASALT with quartz minerals and amygdal veins.						3	3	3			No discontinuities						100	90	8	30	II/I		20				
19	20.5			Fresh, Dark Gray to Light Gray, very strong, fine **BASALT** with quartz minerals and amygdal veins.							2	1	1								100	96	3	29	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 4 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
20.5	22			Fresh, Light to Dark Gray,very strong to strong, volcanic **BRECCIA** with quartz and amygdal minerals.						2	1	2	1		No discontinuities						100	89	5	28	I		20			Gray	Intertrappean Belt
22	23.5									2	1	3			Slightly rough highly weathered surface, seperation 1-5 mm opening. Spacing of discontinuities >3m						98	83	5	30	I		20				
23.5	25									2	2	3									98	98	6	30	I		20				
25	26.5									2	3		1		No discontinuities						99	86	6	28	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 5 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
26.5	28			Fresh to slightly weathered, Dark Gray, moderately strong to strong, Volcanic **BRECCIA** with quartz and amygdal veins & chlorite inclusion						7		2			Slickensided wall, , seperation 1-5 mm opening. Spacing of discontinuities :2m						98	64	8	38	I/II		20			Gray	Intertrappean Belt
28	29.5									6	2	2									98	66	8	37	I/II		20				
29.5	31			Fresh, Dark Gray,very strong to strong, volcanic **BRECCIA** with chlorite, calcite, quatz and amygdal mineral inclusions.						6	4	1			No discontinuities						98	69	10	39	I		20				
31	32.5									4	4	1									99	76	6	31	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 6 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
32.5	34			Fresh to slightly weathered, Dark Gray, weak to strong, volcanic **BRECCIA** with amygdal veins and quartz mineral inclusion.						3	4	1			Slightly rough slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuities :3m.						98	77	7	39	I/II		20			Gray	Intertrappean Belt
34	35.5									9	6									100	50	10	39	I/II		20				
35.5	37									4		2								100	78	7	33	II/I		20				
37	38.5			Moderately to slightly weathered, Dark Gray, strong to weak, volcanic **BRECCIA** with amygdal veins and quartz and chlorite minerals.						9	5				No discontinuities						98	46	10	38	III/II		20				

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NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 7 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
38.5	40			Slightly weathered to Fresh, Gray, strong, volcanic **BRECCIA** with quartz, chlorite and amygdal veins						2	4	2			Slightly rough slightly weathered, seperation 1-5 mm .Spacing of discontinuity >3m						100	81	7	38	II/I		20			Gray	Intertrappean Belt
40	41.5									1	2	2									98	64	6	39	I/II		20				
41.5	43									5	4	1									100	49	6	39	II/III		20				
43	44.5									5	4	1									99	70	7	39	II/III		20				

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NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 8 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
44.5	46			Fresh, Gray, strong, volcanic BRECCIA with amygdal veins, quartz and chlorite mineral inclusions. **BASALT** intertrapped						5	5				Slightly rough and moderately to slightly weathered surface, closely spaced ,seperation 1-5 mm opening. Spacing of discontinuities:1m						99	60	5	30	I		25			Gray	Intertrappean Belt
46	47.5									1	2	3									99	89	5	39	I		25				
47.5	49									4	3	2									100	62	6	38	I		25				
49	50.5									2		3									97	95	4	28	I		25				

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PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 9 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
50.5	52			Slightly weathered to Fresh, Dark Gray, weak to strong, volcanic **BRECCIA** with quartz, amygdal veins and chlorite mineral inclusions. **BASALT** intertrapped.						8	4	1			Slightly rough and moderately to slightly weathered surface, closely spaced, seperation 1-5 mm opening. Spacing of discontinuities 1.3m-3m						100	50	10	39	II/I		25			Gray	Intertrappean Belt
52	53.5										3	3									98	96	6	36	II/I		25				
53.5	55			Slightly to Moderately weathered, Dark Gray, weak , volcanic **BRECCIA** with quartz and amygdal veins as secondary mineral inclusions.						13	3										100	36	10	39	II/III		25				
55	56.5									13	2										96	90	4	37	II/III		25				

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PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 10 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
56.5	58			Moderately to Slightly weathered, Dark Gray, weak , Volcanic BRECCIA with quartz amygdal minerals. **BASALT** intrusion seen						16	2				Fracture zone at 56.5m, No discontinuous joints.						99	30	10	39	III/II		25			Gray	Intertrappean Belt
58	59.5									12	5									98	40	10	38	III/II		25				
59.5	61			Fresh , Light Gray , strong, fine **BASALT** with quartz , chlorite and amygdal minerals inclusion.						5	5	1			Rough and slightly weathered surface, closely spaced, 1-5 mm opening. Spacing of discontinuities :2m						100	72	5	35	I		25				
61	62.5			Slightly weathered to Fresh, Dark Gray, strong, Volcanic **BRECCIA** with quartz and amygdal minerals.						3	1	1									96	70	6	35	II/I		25				

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PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 11 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
62.5	64			Fresh, Dark Gray, strong to weak, Volcanic **BRECCIA** with quartz and amygdal mineral inclusions.						3	4	2			No discontinuities						97	82	6	33	I		25			Gray	Intertrappean Belt
64	65.5										4		1								100	99	6	28	I		25				
65.5	67									2		4									100	93	4	29	I		25				
67	68.5									4	1		3								100	86	5	36	I		25				

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PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 12 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS		SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
68.5	70				Fresh, Dark Gray, strong to weak, volcanic **BRECCIA** with quartz , chlorite and amygdal veins.							1	1	1		Slightly rough, slightly weathered surface, separation 1-5 mm wide opening, Spacing of discontinuities >3m						100	98	2	28	I		30			Gray	Intertrappean Belt
70	71.5										1	6	1									100	85	7	29	I		30				
71.5	73										4		2									100	58	5	33	I		30				
73	74.5				Fresh , Grayish Brown, waek to strong, Volcanic **BRECCIA** with quartz, calcite , chlorite and amygdal minerals as inclusion.						1	3	2									100	92	5	36	I/II		30				

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NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 13 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS		SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
74.5	76				Fresh, Grayish Brown, weak to strong, volcanic **BRECCIA** with quartz, chlorite and amygdal minerals as inclusion.						1	1	1	1		Slightly rough, Slightly weathered surface, closely spaced 1-5 mm opening. Spacing of discontinuities:1.5m						99	91	2	25	I		30			Gray	Intertrappean Belt
76	77.5				Fresh, Grayish Brown, weak to strong, volcanic **BRECCIA** with quartz, chlorite and amygdal minerals as inclusion. **BASALT** present as intertrapped						4	1	3									100	82	5	30	I		30				
77.5	79				Fresh, Greenish Gray, very strong , fine grained **BASALT** with quartz, chlorite and amygdal minerals						1	2	2			Slightly rough, Slightly weathered surface, closely spaced 1-5 mm opening. Spacing of discontinuities:>2m						100	91	2	30	I		30				
79	80.5				(79-79.50)m - Fresh , Greenish Gray, very strong, fine **BASALT** with quartz and chlorite minerals. (79.5-80.5)m- Fresh, Grayish Brown, weak to strong, volcanic **BRECCIA**						1	3	3									100	96		29	II/I		30				

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NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 14 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS		SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
80.5	82				Fresh, Grayish Brown, weak to strong, volcanic **BRECCIA** with quartz and amygdal veins.						1	3	2			Slightly rough, Slightly weathered surface, closely spaced, 1-5 mm . Spacing of discontinuities 1-2.5m						100	78	4	34	I		35			Gray	Intertrappean Belt
82	83.5											3	1	1								100	92	4	30	I		35				
83.5	85				Fresh, Greenish to Grayish Brown, strong, volcanic **BRECCIA** with quartz and amygdal mineral veins. BASALT intertrapped.						1	3	2										99	92		27	I		35				
85	86.5											2	3									100	97	4	25	I		35				

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PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 15 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS		SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
86.5	88				Fresh, Greenish Gray, strong, fine **BASALT** with quartz and chlorite.						5	6	1			Slightly rough, Slightly weathered surface, closely spaced opening. Spacing of discontinuities:>2m						100	77	8	28	I		35			Gray	Intertrappean Belt
88	89.5										3	5	1									100	89	7	30	I		35				
89.5	91				Fresh, Greenish Gray, weak to strong, volcanic **BRECCIA** with quartz and amygdal veins							1	3									100	86	3	25	I		35				
91	92.5												2	3		No discontinuities						100	96	4	27	I		35				

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NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-01

JOB NO : S 1612	CO-ORDINATES N: 2109606.77 , E:275232.32	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 14.06.2019	GROUND WATER LEVEL - 8 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 27.07.2019	SHEET No- 16 of 16	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS		SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
92.5	94				Fresh, Light to Brownish Gray, strong, volcanic **BRECCIA** with chlorite , quartz and amygdal minerals inclusions.						2		4			Slightly rough, slightly weathered surface, closely spaced opening. Spacing of discontinuities 1m->2m						100	86	3	28	I		30			Gray	Intertrappean Belt
94	95.1										5	1	2									100	84	4	22	I		30				

PBH-01 is terminated at 95.18 m as per scope of work

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | **CO-ORDINATES** N: 2109696.60 , E:275373.22 | **DRILLING METHOD : Hydraulic Rotary Drilling**

DATE STARTED : 26.06.2019 | **GROUND WATER LEVEL -** 5 Mtr wrt EGL | **TYPES OF CORE BARREL : NX Core Barrel**

DATE COMPLETED : 15.07.2019 | **SHEET No-** 1 of 16 | **CASING SIZES : HX - 4 Mtr , NX- 4 Mtr**

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | **BOREHOLE ORIENTATION : Vertical** | **TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
0	1.5	DS		Brownish Gray Silty **SAND** (Murrum) with Gravels and rock fragments																										
1.5	1.85	SPT		Hard, Gray, Sandy **CLAY** with Gravels and Rock fragments		20	17	50R	N>100																					
2.5	3	UDS		**UDS** sample collected																										
3	3.45	SPT		Hard, Dark Gray, silty **CLAY** with rock fragments		6	8	28	36																					
4	4.05	SPT		Very Dense,Brownish Gray,weathered **Rock** fragments		92R			N>100																					
4	4.5	Core		(4-4.10)m-Highly to Moderately weathered, Brownish Gray, weak,volcanic TUFF.(4.10-4.50)m-Moderately to Slightly weathered, Grayish Brown,weak,Composite **BRECCIA** with iron oxidation.						4	1				Slightly rough, moderately to highly weathered surface , seperation 1-5 mm opening						64	20								

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

DATE STARTED : 26.06.2019

DATE COMPLETED : 15.07.2019

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

CO-ORDINATES N: 2109696.60 , E:275373.22

GROUND WATER LEVEL - 5 Mtr wrt EGL

SHEET No- 2 of 16

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
4.5	6			Highly to Moderately, Grayish Brown, weak to strong,composite **BRECCIA** with iron oxidation along the horizontal fractures.						12	4				Slightly rough, highly weathered surface , seperation 1-5 mm opening. Fractured zone.						95	43	10	39	IV/III		20			Gray	Intertrappean Belt
6	7.5			(6-7.2)m- Moderately to Highly weathered,Grayish Brown, weak, composite **BRECCIA**.(7.2-7.5)m-Fresh, Gray, strong, fine grained **BASALT** with quart and chlorite .						14	1	1									87	30	10	39	III/IV		20				
7.5	9			(7.5-8)m-Slightly weathered to Fresh,strong fine **BASALT**.(8-8.50)m-Moderately weathered, Brown, weak composite **BRECCIA**.(8.5-9)m-Slightly weathered,Gray, medium grained **BASALT** with quartz mineral						6	3	1									86	52	9	39	II/I		20				
9	10.5			Slightly weathered to Fresh,strong,medium grained **BASALT** with quartz and chlorite as mineral inclusions and fractures.						0	4	1			Slightly rough, moderate weathered surface , seperation 1-5 mm opening. Discontinuity spacing:1m						87	86	7	39	II/I		20				
10.5	12									4	4	1									81	59	9							
12	13.5									8	4										73	42	10							
13.5	15			Slightly weathered to Fresh, Gray, strong, Volcanic **BRECCIA** with quartz and chlorite mineral inclusions.Fracrtures seen.						5	1	2	1								95	66	10	39	II/I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | CO-ORDINATES N: 2109696.60 , E:275373.22 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 26.06.2019 | GROUND WATER LEVEL - 5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 15.07.2019 | SHEET No- 3 of 16 | CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
15	16.5			Slighty weathered to fresh, Gray, strong, medium to fine grained **BASALT** with quartz and chlorite as secondary minerals.						2	3	2			Slightly rough, moderately to highly weathered surface , seperation 1-5 mm opening. Spacing of discontinuties : 0.2m->3m						99	90	7	37							Gray	Intertrappean Belt
16.5	18									2	5	2									98	93	9	39	II/I		20				
18	19..5									5		2							66			43	7	39	II/I		20				
19.5	21									8	4									78		40	10	39	II/I		20				
21	22.5									2	2	1									90	67	5	39	II/I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | **CO-ORDINATES** N: 2109696.60 , E:275373.22 | **DRILLING METHOD : Hydraulic Rotary Drilling**

DATE STARTED : 26.06.2019 | **GROUND WATER LEVEL -** 5 Mtr wrt EGL | **TYPES OF CORE BARREL : NX Core Barrel**

DATE COMPLETED : 15.07.2019 | **SHEET No-** 4 of 16 | **CASING SIZES : HX - 4 Mtr , NX- 4 Mtr**

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | **BOREHOLE ORIENTATION : Vertical** | **TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
22.5	24			Fresh to Slightly weathered,Gray very strong to strong, volcanic **BRECCIA** with quartz , chlorite and amygdal mineral inclusions.						0	2	2			Rough and slightly weathered surface, sepertion 1-5 mm wide opening. Spacing of discontinuties:1.5m						100	98	6	39	I/II		20			Gray	Intertrappean Belt
24	25.5									1	3	2									100	91	10	37	I/II		20				
25.5	27											3			Rough and slightly weathered surface, separation 1-5 mm wide opening. Spacing of discontinuities >2m						100	94	7	36	I/II		20				
27	28.5									1	4	2									97	83	6	36	I/II		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

DATE STARTED : 26.06.2019

DATE COMPLETED : 15.07.2019

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

CO-ORDINATES N: 2109696.60 , E:275373.22

GROUND WATER LEVEL - 5 Mtr wrt EGL

SHEET No- 5 of 16

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
28.5	30			Fresh to Slightly, Brownish Gray, moderately strong to strong, volcanic **BRECCIA** with quartz and amygdal mineral inclusion.						2	2	2			Slickensided wall rock surface, seperation 1-5 mm opening. Spacing of discontinuties:>2m						100	70	6	39	I/II		20			Gray	Intertrappean Belt
30	31.5									8	5									100	91	10	37	I/II		20				
31.5	33			Fresh to slighty weathered, Dark to Light Gray,weak to strong, volcanic **BRECCIA** with quartz and amygdal mineral inclusions.						4	1	3									100	89	7	36	I/II		20				
33	34.5									1	2	3								100	98	6	36	I/II		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

DATE STARTED : 26.06.2019

DATE COMPLETED : 15.07.2019

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

CO-ORDINATES N: 2109696.60 , E:275373.22

GROUND WATER LEVEL - 5 Mtr wrt EGL

SHEET No- 6 of 16

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
34.5	36			Fresh to Slightly, Brownish Gray, moderately strong to strong, volcanic **BRECCIA** with quartz and amygdal mineral inclusion.						6	6				Slightly rough, slightly weathered surface , seperation 1-5 mm opening. Spacing of discontinuties:>2.2->3m						100	59	10	39	II/I		20			Gray	Intertrappean Belt
36	37.5									3	7										100	74	10	36	II/I		20				
37.5	39			Fresh to slightly weathered, Dark to Light Gray,weak to strong, volcanic **BRECCIA** with quartz and amygdal mineral inclusions.							5	2									100	97	7	33	II/I		20				
39	40.5										3	2									97	87	6	36	II/I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | **CO-ORDINATES** N: 2109696.60 , E:275373.22 | **DRILLING METHOD : Hydraulic Rotary Drilling**

DATE STARTED : 26.06.2019 | **GROUND WATER LEVEL -** 5 Mtr wrt EGL | **TYPES OF CORE BARREL : NX Core Barrel**

DATE COMPLETED : 15.07.2019 | **SHEET No-** 7 of 16 | **CASING SIZES : HX - 4 Mtr , NX- 4 Mtr**

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | **BOREHOLE ORIENTATION : Vertical** | **TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
40.5	42			Fresh to Slightly weathered, Dark Gray, moderately strong to strong Volcanic **BRECCIA** with quartz, chlorite and amygdal mineals.						4	4	1			Slightly rough, slightly weathered surface , separation 1-5 mm opening. Spacing of discontinuities:>1.5m						100	64	8	38	I/II		20			Gray	Intertrappean Belt
42	43.5									6	6										98	64	10	39	I/II		20				
43.5	45			Slightly to Moderately weathered, Dark Gray, weak to moderately strong Volcanic **BRECCIA** with amygdal veins and quartz minerals.						14	3				mechanical fractures, Slightly rough, slightly weathered surface , seperation 1-5 mm opening.Spacing of discontinuties:>3m						96	32	10	39	II/III		20				
45	46.5									12	5										98	36	10	39	II/III		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

CO-ORDINATES N: 2109696.60 , E:275373.22

DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 26.06.2019

GROUND WATER LEVEL - 5 Mtr wrt EGL

TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 15.07.2019

SHEET No- 8 of 16

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

BOREHOLE ORIENTATION : Vertical

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
46.5	48			Slightly weathered to Fresh, Dark Gray to Gray, Moderately strong to strong Volcanic **BRECCIA** with quartz and chlorite minerals						1		4			Slightly rough, slightly weathered surface , seperation 1-5 mm wide opening, Spacing of discontinuties >3m						100	86	5	30	II/I		25			Gray	Intertrappean Belt
48	49.5										1	2									98	64	3	39	II/I		25				
49.5	51			Fresh, Dark Gray to Light Gray, Moderately weak to strong, volcanic **BRECCIA** with chlorite, quartz and amygdal mineral inclusions.							1	2									100	98	3	30	I		25				
51	52.5										1	3									100	99	4	29	I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | **CO-ORDINATES** N: 2109696.60 , E:275373.22 | **DRILLING METHOD : Hydraulic Rotary Drilling**

DATE STARTED : 26.06.2019 | **GROUND WATER LEVEL -** 5 Mtr wrt EGL | **TYPES OF CORE BARREL : NX Core Barrel**

DATE COMPLETED : 15.07.2019 | **SHEET No-** 9 of 16 | **CASING SIZES : HX - 4 Mtr , NX- 4 Mtr**

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | **BOREHOLE ORIENTATION : Vertical** | **TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
52.5	54			Fresh, Dark Gray ,Moderately strong to strong, volcanic **BRECCIA** with chlorite, quartz and amygdal mineral inclusions.							2	1	1		Rough , slightly weathered surface, separation 1-2 mm opening, Spacing of discontinuities 1m - >3m						100	99	4	30	I		25			Gray	Intertrappean Belt
54	55.5									2	2	2								98	84	6	34	I		25				
55.5	57										2	3								97	95	5	32	I		25				
57	58.5										2	2								100	99	4	29	I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

CO-ORDINATES N: 2109696.60 , E:275373.22

DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 26.06.2019

GROUND WATER LEVEL - 5 Mtr wrt EGL

TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 15.07.2019

SHEET No- 10 of 16

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

BOREHOLE ORIENTATION : Vertical

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
58.5	60			Slightly weathered to Fresh, Dark Gray, Moderately strong to strong, Volcanic **BRECCIA** with quartz, chlorite and amygdal minerals.							1	3			Rough , slightly weathered surface, separation 1-2 mm opening. Spacing of discontinuities:>3m						100	95	4	32	II/I		25			Gray	Intertrappean Belt
60	61.5										4	2									96	93	5	34	II/I		25				
61.5	63										2	3									97	93	5	35	II/I		25				
63	64.5									1	4	2									99	94	6	35	II/I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | **CO-ORDINATES** N: 2109696.60 , E:275373.22 | **DRILLING METHOD : Hydraulic Rotary Drilling**

DATE STARTED : 26.06.2019 | **GROUND WATER LEVEL -** 5 Mtr wrt EGL | **TYPES OF CORE BARREL : NX Core Barrel**

DATE COMPLETED : 15.07.2019 | **SHEET No-** 11 of 16 | **CASING SIZES : HX - 4 Mtr , NX- 4 Mtr**

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | **BOREHOLE ORIENTATION : Vertical** | **TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
64.5	66			Slightly weathered to Fresh, Dark Gray, strong Volcanic **BRECCIA** with amygdal veins and quartz minerals and minor cavaties observed						1	2	2	1		Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties >1.5m						100	92	6	36	II/I		25			Gray	Intertrappean Belt
66	67.5									2	3	1									98	92	6	36	II/I		25				
67.5	69										3	3									100	94	4	35	II/I		25				
69	70.5										1	2									100	74	5	36	II/I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

DATE STARTED : 26.06.2019

DATE COMPLETED : 15.07.2019

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

CO-ORDINATES N: 2109696.60 , E:275373.22

GROUND WATER LEVEL - 5 Mtr wrt EGL

SHEET No- 12 of 16

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
70.5	72			(70.5-71.7)m- Slightly weathered to Fresh, Dark Gray, strong, Volcanic **BRECCIA** with minor cavaties. (71.7-72)m- Fresh,Gray,strong fine **BASALT** with quartz and amygdal							2	3			Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties 1m->3m						96	82	4	36	II/I		30			Gray	Intertrappean Belt
72	73.5			Fresh, Light Gray, very strong to strong, fine **BASALT** with amygdal veins , quartz and chlorite minerals									1								100	99	1	34	I		30				
73.5	75			Fresh, Light Gray, strong to very strong, fine **BASALT** with quartz tree and amygdal minerals present.							3	3									99	97	4	35	I		30				
75	76.5			(75-75.50)m- Fresh, Light Gray,very strong to strong, fine **BASALT**.Slickenslide present.(75.5-76.5)m- Slightly weathered, Dark Gray, Moderately strong to strong Volcanic **BRECCIA** with quartz and amygdal mineral veins						3	4	2			Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties :> 1m						98	86	5	36	I/II		30				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612

DATE STARTED : 26.06.2019

DATE COMPLETED : 15.07.2019

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL

CO-ORDINATES N: 2109696.60 , E:275373.22

GROUND WATER LEVEL - 5 Mtr wrt EGL

SHEET No- 13 of 16

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
76.5	78			Slightly weathered to Fresh,Dark Gray, Moderately strong to strong, Volcanic **BRECCIA** with amygdal and quartz veins with chlorite inclusion								4			Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties >3m						100	95	2	32	II/I		100			Gray	Intertrappean Belt
78	79.5			Slightly weathered to Fresh,Dark Gray, Moderately strong to strong, Volcanic **BRECCIA**.(79.2-79.5)m-Fresh, Gray,very strong BASALT with quartz, chlorite, amygdal veins						1	4	2									98	90	3	33	II/I		100				
79.5	81			Fresh, Dark Gray, very strong to strong, volcanic **BRECCIA** with chlorite, quartz and amygdal veins as secondary mineral inclusion							2	3									100	99	2	32	II/I		100				
81	82.5										2	2									96	86	2	34	II/I		100				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | CO-ORDINATES N: 2109696.60 , E:275373.22 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 26.06.2019 | GROUND WATER LEVEL - 5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 15.07.2019 | SHEET No- 14 of 16 | CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
82.5	84			Slightly weathered to Fresh, Dark Gray, strong, Fine **BASALT** with quartz, chlorite and amygdal veins as secondary mineral inclusion						1	2	2			No discontinuities						100	78	2	32	II/I		80			Gray	Intertrappean Belt
84	85.5										1	1	1								100	98	2	30	II/I		80				
85.5	87											2	1								99	96	2	30	II/I		80				
87	88.5											1	1								98	94		31	II/I		80				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | CO-ORDINATES N: 2109696.60 , E:275373.22 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 26.06.2019 | GROUND WATER LEVEL - 5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 15.07.2019 | SHEET No- 15 of 16 | CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
88.5	90			Fresh , Dark Gray,strong to very strong, Volcanic **BRECCIA** with amygdal veins , quartz and chlorite as secondary minearal inclusion								3			Slightly rough, slightly weathered surface, seperation.Spacing of discontinuties>3m						98	94	1	29	I		80			Gray	Intertrappean Belt
90	91.5										1	2								100	97	2	30	I		80				
91.5	93										1	1	1							100	97	2	25	I		75				
93	94.5											2	1							100	98	2	27	I		75				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-02

JOB NO : S 1612 | CO-ORDINATES N: 2109696.60 , E:275373.22 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 26.06.2019 | GROUND WATER LEVEL - 5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 15.07.2019 | SHEET No- 16 of 16 | CASING SIZES : HX - 4 Mtr , NX- 4 Mtr

TOTAL DRILLED DEPTH : 95.20 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
94.5	95.2			Fresh, Dark Gray,strong to very strong, volcanic **BRECCIA** with quartz and amygdal mineral veins								3			No discontinuities						100	100	1	26	I		50			Gray	Intertrappean Belt

PBH-02 is Terminated at 95.20 m from EGL as per Scope of work

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 1 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
0	1.5	DS		Gray, slightly Sandy Silty CLAY																										
1.5	1.95	SPT		No sample recovery		3	1	2	3																					
3	3.5	UDS		UDS sample collected																										
4.5	4.95	SPT		Very stiff, Gray, Silty CLAY with traces of gravels		5	12	14	26																					
6	6.40	SPT		Very Hard, Grayish Brown,silty CLAY with traces of gravels		14	18	82	N>10																					
6.4	6.50	SPT		Very Dense, Yellowish Brown Gravels and rock fragments.		55R			N>100																					
6.5	7.5	Core		Completely to Highly weathered, Light Yellowish to Brown, weak, volcanic BRECCIA						0	0	0	0	0	Slightly rough, highly weathered surface, separation 1-5 mm opening, Highly fractured zone						20	0	10							

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | **CO-ORDINATES** N: 2109801.73 , E:275549.53 | **DRILLING METHOD : Hydraulic Rotary Drilling**

DATE STARTED : 18.07.2019 | **GROUND WATER LEVEL -** 6.5 Mtr wrt EGL | **TYPES OF CORE BARREL : NX Core Barrel**

DATE COMPLETED : 08.08.2019 | **SHEET No-** 2 of 15 | **CASING SIZES : HX - 5 Mtr , NX- 5 Mtr**

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | **BOREHOLE ORIENTATION : Vertical** | **TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY		STANDARD PENETRATION TEST RECORD				LENGTH OF CORE PIECES, cm					STRUCTURAL CONDITIONS	PERCENTAGE CORE RECOVERY						RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
				DESCRIPTION	SYMBOL	150mm	300mm	450mm	N-VALUE	<10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	DESCRIPTION	0	20	40	60	80	100										
7.5	9			Completely to Highly weathered, Light Yellowish to Gray, weak, volcanic BRECCIA						0	0	0			Highly fractured zone.						20	0	10	42	V/IV		20			Gray	Intertrappean Belt
9	10.5			Highly to Moderately weathered, Yellowish Gray, Weak to Moderately strong, volcanic BRECCIA						6	1				Slightly rough, moderately to highly weathered surface, separation 1-5 mm wide opening,. Highly fractured zone.						56	11	10	40	IV/III						
10.5	12									5	1	0									43	7	10	40	IV/III		20				
12	13.5			Completely to Highly weathered, Gray, very weak, volcanic BRECCIA						2	0	0									22	0	10	38	V/IV		20				
13.5	15			Highly weathered, Brownish Gray, very weak to weak, volcanic BRECCIA with quartz and calcite						0	2	0									36	14	10	42	IV		20				
15	16.5									9	1										62	7	10	40	IV		20				
16.5	18									5	1										58	0	10		IV		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612

DATE STARTED : 18.07.2019

DATE COMPLETED : 08.08.2019

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL

CO-ORDINATES N: 2109801.73 , E:275549.53

GROUND WATER LEVEL - 6.5 Mtr wrt EGL

SHEET No- 3 of 15

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
18	19.5			Highly to Moderately weathered, Gray to Brown, Weak , volcanic BRECCIA with quartz and chlorite						11	0	1			Slightly rough, highly weathered surface, separation 1-5 mm opening. Spacing of discontinuities :>3m						80	26	8	37							Intertrappean Belt
19.5	21									11	0	1									85	20	10	39	IV/III		20			Gray	
21	22.5			Moderately to Slightly weathered, Gray to Brown, weak to moderately weak, volcanic BRECCIA with quartz and Calcite minerals						7	2	0									98	57	7	35	III/II		20				
22.5	24			Slightly weathered to Fresh, Gray to Brown, weak to strong, volcanic BRECCIA with quartz and amygdal						1	0	3									84	59	6	37	II/I		20				
24	25.5			Fresh, Gray to Brown, moderately weak to strong, volcanic BRECCIA with quartz, chlorite and amygdal						1	0	3									100	90	3	33	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground
NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612	**CO-ORDINATES N: 2109801.73 , E:275549.53**	**DRILLING METHOD : Hydraulic Rotary Drilling**
DATE STARTED : 18.07.2019	**GROUND WATER LEVEL - 6.5 Mtr wrt EGL**	**TYPES OF CORE BARREL : NX Core Barrel**
DATE COMPLETED : 08.08.2019	**SHEET No- 4 of 15**	**CASING SIZES : HX - 5 Mtr , NX- 5 Mtr**
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	**BOREHOLE ORIENTATION : Vertical**	**TYPE OF BIT : TC & Diamond Bit**

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
25.5	27			Fresh, Grayish Brown, moderately weak to strong, Volcanic BRECCIA with quartz , chlorite and amygdal minerals present.						1	0	3			Slightly rough, slightly weathered surface, separation 1-5 mm opening. Spacing of discontinuities :1.5m						95	84	3	32	I		20			Gray	Intertrappean Belt
27	28.5			Fresh to Slightly weathered, Grayish Brown, moderately strong to strong, Volcanic BRECCIA with quartz , calcite and amygdal						2		2									95	84	4	30	I/II		20				
28.5	30									2	1	3									92	81	4	36	I/II		20				
30	31.5			Fresh, Grayish Brown, moderately weak to strong, Volcanic BRECCIA with quartz , chlorite and amygdal minerals present.						1	4	2			No discontinuities						100	89	3	29	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 5 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
31.5	33			Fresh to slighty weathered, Dark to Light Gray,weak to strong, volcanic BRECCIA with quartz and amygdal mineral inclusions.						2	0	2			Slightly rough, slightly weathered surface, separation 1-5 mm opening. Spacing of discontinuities >2m						100	92	3	29	I		20			Gray	Intertrappean Belt
33	34.5									3	2	2									98	72	4	30	I		20				
34.5	36									3	3	2									100	87	5	32	I		20				
36	37.5									7	3	1									99	60	7	36	I/II		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 6 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
37.5	39			Slightly to moderately weathered, Brownish Gray, moderately strong to moderately weak, Volcanic BRECCIA with quartz and chlorite						11	3				Slightly rough, slightly weathered surface, seperation 1-5 mm opening.Spacing of discontinuties:1.5m.						98	32	10	39	II/III		20			Gray	Intertrappean Belt
39	40.5			Slightly weathered to Fresh, Grayish Brown, strong, Vesicular BASALT with quartz , chlorite and amygdaloidal minerals						2	2	2									98	82	6	31	II/I		20				
40.5	42									2	1	3									100	91	5	33	II/I		20				
42	43.5			Slightly to moderately weathered, Reddish Brown, weak to moderately strong, Volcanic BRECCIA with quartz and chlorite						9	1										78	24	10	39	II/III		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 7 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
43.5	45			Moderately to Slightly weathered, Reddish Brown, very weak to weak, Volcanic BRECCIA with quartz and calcite mineral inclusions.						21	2	0			No discontinuities						91	30	10	39	III/II		20			Gray	Intertrappean Belt
45	46.5									18	2	0									74	25	10	39	III/II		20				
46.5	48									20	2	0									80	24	10	39	III/II		20				
48	49.5									7	1	1									93	28	10	39	II/III		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 8 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
49.5	51			Slightly weathered to Fresh, Brownish Gray, weak to moderately weak, Volcanic BRECCIA with quartz and amygdaloidal veins.						4	4	2			Slightly rough, slightly weathered surface, seperation 1-5 mm opening.Spacing of discontinuties:1.2m						100	78	8	34	II/I		25				
51	52.5			Fresh, Gray, moderately strong to strong, medium grained BASALT with quartz and chlorite mineral						1	0	2			Slightly rough, slightly weathered surface, separation 1-5 mm opening. Spacing of discontinuities:>3m						100	98	3	27	I		25			Gray	Intertrappean Belt
52.5	54									0	0	2	1								100	99	2	24	I		25				
54	55.5									0	0	1	1								100	98	4	29	I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612	CO-ORDINATES N: 2109801.73 , E:275549.53	DRILLING METHOD : Hydraulic Rotary Drilling
DATE STARTED : 18.07.2019	GROUND WATER LEVEL - 6.5 Mtr wrt EGL	TYPES OF CORE BARREL : NX Core Barrel
DATE COMPLETED : 08.08.2019	SHEET No- 9 of 15	CASING SIZES : HX - 5 Mtr , NX- 5 Mtr
TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL	BOREHOLE ORIENTATION : Vertical	TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
55.5	57			Fresh, Dark Gray to Gray,moderately strong to strong, medium grained BASALT with quartz and chlorite minerals						1	2	4			No discontinuities						98	93	4	26	I		25			Gray	Intertrappean Belt
57	58.5									0	0	3									100	100	1	25	I		25				
58.5	60									1	2	2	1								100	99	2	27	I		25				
60	61.5									2	1	3	1								99	93	4	29	I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 10 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
61.5	63			Fresh, Browinish Gray, moderately strong to strong, Volcanic BRECCIA with quartz and amygdal mineral						1	1	3			Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties> 3m						100	92	4	29	I		25			Gray	Intertrappean Belt
63	64.5									2	0	3									99	82	4	30	I		25				
64.5	66									0	2	3	1								99	90	4	30	I		25				
66	67.5									0	2	3	1								100	86	4	31	I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 11 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
67.5	69			Fresh, Gray, moderately strong , Volcanic BRECCIA with quartz and amygdal mineral inclusions						0	2	3			Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties >3m						100	90	4	31	I		25			Gray	Intertrappean Belt
69	70.5			Moderately to Slightly weathered, Gray, moderately weak to strong, Volcanic BRECCIA with quartz and amygdal mineral inclusions.						4	2	1									100	64	6	34	III/II		25				
70.5	72			Fresh, Dark Gray, moderately weak to strong, Volcanic BRECCIA with quartz ,chlorite and amygdal						0	2	2	1								100	95	3	28	I		25				
72	73.5									2	1	3	1								100	80	4	32	I		25				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 12 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
73.5	75			Fresh, Dark Gray, moderately weak to strong, Volcanic BRECCIA with quartz, chlorite and amygdal						0	0	3			Slightly rough, slightly weathered surface, seperation 1-5 mm opening. Spacing of discontinuties >3m						98	94	2	26	I		30			Gray	Intertrappean Belt
75	76.5									0	0	1	1								100	100	1	25	I		30				
76.5	78									1	2	3									99	88	5	29	I		30				
78	79.5									0	2	3									100	90	4	29	I		30				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 13 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
79.5	81			Fresh, Dark Gray, very strong to strong, volcanic BRECCIA with chlorite, quartz and amygdal veins as secondary mineral inclusion						2	2	1	1		No discontinuities						100	99	2	27	I		20			Gray	Intertrappean Belt
81	82.5									0	0	3									100	100	1	24	I		20				
82.5	84									0	0	4									100	99	3	32	I		20				
84	85.5									0	0	4									100	92	2	34	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612 | CO-ORDINATES N: 2109801.73 , E:275549.53 | DRILLING METHOD : Hydraulic Rotary Drilling

DATE STARTED : 18.07.2019 | GROUND WATER LEVEL - 6.5 Mtr wrt EGL | TYPES OF CORE BARREL : NX Core Barrel

DATE COMPLETED : 08.08.2019 | SHEET No- 14 of 15 | CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL | BOREHOLE ORIENTATION : Vertical | TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY DESCRIPTION	SYMBOL	STANDARD PENETRATION TEST RECORD 150mm	300mm	450mm	N-VALUE	LENGTH OF CORE PIECES, cm <10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	STRUCTURAL CONDITIONS DESCRIPTION	PERCENTAGE CORE RECOVERY 0	20	40	60	80	100	RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
85.5	87			Fresh, Dark Gray, moderately weak to strong, Volcanic BRECCIA with quartz, chlorite and amygdal						0	0	3			Slightly rough, slightly weathered surface.Spacing of discontinuties >3m						100	95	2	27	I		20			Gray	Intertrappean Belt
87	88.5									0	2	1	1								100	91	3	30	I		20				
88.5	90									0	3	2	0								100	92	4	30	I		20				
90	91.5									0	2	1	1								100	92	4	31	I		20				

SARATHY GEOTECH & ENGINEERING SERVICE PVT LTD

PROJECT : Geotechnical & Geophysical Investigation for National High Speed Rail Corridor at BKC MMRDA Ground

NAME OF THE CLIENT : NHSRCL

GEOLOGICAL LOG OF DRILL HOLE : PBH-03

JOB NO : S 1612

DATE STARTED : 18.07.2019

DATE COMPLETED : 08.08.2019

TOTAL DRILLED DEPTH : 95.18 Mtr w.r.t EGL

CO-ORDINATES N: 2109801.73 , E:275549.53

GROUND WATER LEVEL - 6.5 Mtr wrt EGL

SHEET No- 15 of 15

BOREHOLE ORIENTATION : Vertical

DRILLING METHOD : Hydraulic Rotary Drilling

TYPES OF CORE BARREL : NX Core Barrel

CASING SIZES : HX - 5 Mtr , NX- 5 Mtr

TYPE OF BIT : TC & Diamond Bit

DEPTH FROM(m)	DEPTH TO (m)	IN-SUIT TESTS	SAMPLE TYPE	LITHOLOGY		STANDARD PENETRATION TEST RECORD				LENGTH OF CORE PIECES, cm					STRUCTURAL CONDITIONS	PERCENTAGE CORE RECOVERY						RQD, %	FRACTURAL INDEX	PENETRATION RATE, mm/min	WEATHERING Gr	CASING	DRILL WATER LOSS, %	PRESSUREMETER MODULUS MPs	LUGEON VALUE	COLOUR OF RETURN WATER	SPECIAL COSERVATIONS AND REMARKS
				DESCRIPTION	SYMBOL	150mm	300mm	450mm	N-VALUE	<10 mm	10 - 15 mm	25 - 75 mm	75 -	100 mm	DESCRIPTION	0	20	40	60	80	100										
91.5	93			Fresh, Dark Gray, moderately weak to strong, Volcanic BRECCIA with quartz and chlorite minerals						2	2	1	1		No discontinuities						100	92	4	25	II/I		25			Gray	Intertrappean Belt
93	94.5									5	4	1									100	75	5	33	II/I		25				
94.5	95.1									0	0	1	0								100	100	0	25	I		25				

PBH-03 is Terminated at 95.10 m from EGL as per Scope of work

APPENDIX-D

ii. Plate No. 2 – RMR Calculation

Rock Mass Rating (RMR)

RMR value for each run of rock cores is done based on field and laboratory parameters with reference to IS 13365 Part 1. Following parameters are considered for rock mass rating:

1. Uniaxial compressive strength of rock material
2. Rock quality designation (RQD)
3. Spacing of discontinuities
4. Condition of discontinuities
5. Groundwater conditions

Data sheet for rating of rock mass as per IS 133365 is provided below:

I STRENGTH OF INTACT ROCK MATERIAL (MPa)

	Compressive Strength	*Point Load Strength*	*Rating*
Exceptionally strong	>250	>8	15
Very strong	100-250	4-8	12
Strong	50-100	2-4	7
Average	25-50	1-2	4
Weak	10-25	Use of uniaxial compressive	2
Very weak	2-10	strength is preferred	1
Extremely weak	<2		0

II ROCK QUALITY DESIGNATION (*RQD*)

	RQD	*Rating*
Excellent	90-100	20
Good	75- 90	17
Fair	50-75	13
Poor	25-50	8
Very poor	< 25	3

III SPACING OF DISCONTINUITIES

	Spacing, m	*Rating*
Very wide	> 2	20
Wide	0.6-2	15
Moderate	0.2-0.6	10
Close	0.06-0.2	8
Very close	< 0.06	5

IV CONDITION OF DISCONTINUITIES					
Very rough and un-weathered wall rock, tight and discon-tinuous, no separation	Rough and slightly weathered wall rock surface, separation <1 mm		Slightly rough and moderately to highly weathered wall rock surface, separation <1 mm	Slickensided wall rock surface or 1-5 mm thick gauge or 1-5 mm wide open-ing, continuous discontinuity	5 mm thick soft gauge 5 mm wide continuous discontinuity
Rating 30	25		20	10	0
V GROUND WATER CONDITION					
Inflow per 10 m tunnel length, (litre/min)	none	<10	10-25	25-125	>125
Joint water pressure/major principal stress	0	0-0.1	0.1-0.2	0.2-0.5	>0.5
General description	Completely dry	Damp	Wet	Dripping	Flowing
Rating	15	10	7	4	0

Following tables describes the parameter and rating for all three boreholes.

RMR Classification of PBH-01

Depth(m)		UCS (MPa)	Point Load (MPa)	Rating	RQD	Rating	Spacing of Discontinuities (m)	Rating	Condition of Discontinuities (Rating)	Ground Water Condition (Rating)	RMR	Class	Classification of Rock Mass
25	30	13		2	70	13	2m	15	20	7	**57**	III	**Fair**
30	34	10		1	76	17	2-3m	20	20	7	**65**	II	**Good**
34	41.5	10		1	64	13	>3m	20	20	7	**61**		
41.5	50	62		7	70	13	1m-3m	15	20	7	**62**		
50	55		1.5	4	45	8	1.3	15	20	7	**54**	III	**Fair**
55	60	10		2	45	8	>3m	20	20	7	**57**		
60	67	7		1	85	17	1-3m	15	20	7	**60**	II	**Good**
67	71.5	13		2	90	17	>3m	20	20	7	**66**		
71.5	79	5		1	82	17	1.5m	15	20	7	**60**		
79	86.5	31		4	91	20	1-2m	15	20	7	**66**		
86.5	95.1	9		1	88	17	2m	15	20	10	**63**		

* Slightly rough, weathered surface
**Wet to Damp

RMR Classification of PBH-02

Depth(m)		UCS (MPa)	Point Load (MPa)	Rating	RQD	Rating	Spacing of Discontinuities (m)	Rating	Condition of Discontinuities (Rating)	Ground Water Condition (Rating)	RMR	Class	Classification of Rock Mass
25.5	31.5	12		2	85	17	>2m	20	10	7	**56**	**III**	**Fair**
31.5	39	21		2	83	17	2-3m	20	10	7	**56**		
39	43.5	8		1	71	13	1.5m	15	20	7	**56**		
43.5	46.5		1.1	4	34	8	>3m	20	20	7	**59**		
46.5	49.5	22		2	75	13	>3m	20	20	7	**62**	**II**	**Good**
49.5	60	27		2	95	20	1-3m	15	20	7	**64**		
60	64.5	6		1	93	20	>3m	20	20	7	**68**		
64.5	70.5	11		2	88	17	>1.5m	20	20	7	**66**		
70.5	80	37		4	91	20	>3m	20	20	7	**71**		
80	95.2	17		2	94	20	>3m	20	20	10	**72**		

RMR Classification of PBH-03

Depth(m)		UCS (MPa)	Point Load (MPa)	Rating	RQD	Rating	Spacing of Discontinuities (m)	Rating	Condition of Discontinuities (Rating)	Ground Water Condition (Rating)	RMR	Class	Classification of Rock Mass
25.5	34.5	7		1	84	17	0.5-1.5m	15	10	7	50	III	Fair
34.5	42	3		1	70	13	0.6-2m	15	20	7	56		
42	49.5	8		1	27	8	>3m	15	20	7	51		
49.5	52.5	7		1	88	17	1.2m	20	20	7	65	II	Good
52.5	58.5	22		2	97	20	>3m	20	20	7	69		
58.5	61.5	7		1	96	20	>3m	15	20	7	63		
61.5	79.5	15		2	87	20	>3m	20	20	7	69		
79.5	82.5	9		1	99	20	>3m	20	20	7	68		
82.5	95.2	16		2	92	20	>3m	15	20	10	67		

APPENDIX-E

- **Pressuremeter Test**

4.0 RESULTS

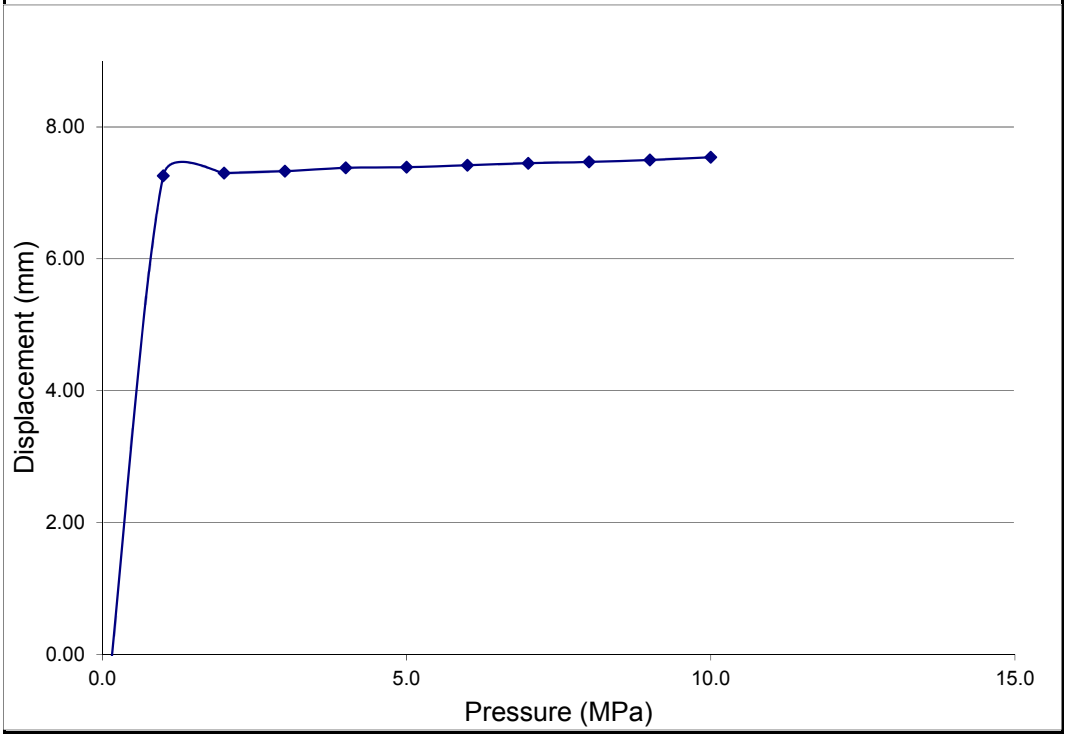
Test results at three (03) borehole locations are summarized in below tables.

PBH-01			
Depth	**K (Kg/cm)**	**E (Kg/cm2)**	**G (Kg/cm2)**
94.40-95.00	25000	132697	86253
90.40-91.00	40000	211718	137616
86.60-87.20	30000	160348	104226
81.00-81.60	10000	53527	34792
76.50-77.10	10000	53592	34835
71.50-72.10	13333	72132	46886
60.00-60.60	10000	55380	35997
66.50-67.10	10000	52682	34243
55.50-56.10	26666	142670	92735
51.00-51.60	11428	61768	40149
45.40-46.00	26666	143190	93073
40.00-40.60	10000	54535	35447
35.50-36.10	13333	72054	46835
30.50-31.10	8571	47139	30640
25.30-25.90	8571	48298	31394
PBH-02			
Depth	**K (Kg/cm)**	**E (Kg/cm2)**	**G (Kg/cm2)**
93.90-94.50	23333	123623	80355
89.50-90.10	23333	124260	80769
85.00-86.60	20000	106821	69433
79.50-80.10	12500	66933	43506
76.00-76.60	7500	40150	26097

71.00-71.60	11666	62486	40616
65.50-66.10	35000	187460	121849
61.50-62.10	17500	93684	60894
56.00-56.60	10000	53534	34797
51.50-52.10	20000	108953	70819
45.50-46.10	26666	143710	93411
41.50-42.10	26666	143398	93209
36.50-37.10	26666	146588	95282
30.00-30.60	11666	62911	40892
25.50-26.10	30000	160368	104239
PBH-03			
Depth	**K (Kg/cm)**	**E (Kg/cm2)**	**G (Kg/cm2)**
94.40-95.00	25000	133120	86528
90.50-91.10	20000	106769	69399
86.00-86.60	1000	5450	3543
81.00-81.60	13333	71231	46300
75.40-76.00	50000	267182	173668
71.50-72.10	20000	107237	69704
66.50-67.10	30000	160485	104315
60.50-66.10	80000	427596	277937
56.00-56.60	15000	85858	55808
51.40-52.00	25000	142350	92527
47.00-47.60	2666.666667	15542	10102
42.00-42.60	35000	188779	122706
34.00-34.60	8571.428571	46281.8571	30083.2071
30.50-31.10	3333.333333	18260.6667	11869.4333
27.00-27.60	6666.666667	36092.3333	23460.0167

- **Calculation Sheets and Graphs**

Project:	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.			
Field Calibration of Probe				Date: 01.08.2019
S.No	**Pressure**	**Displacement (Rp)**	**Pressure Variation (P ' = P-1)**	**Thickness variation volume (R' = Rp -Rp1)**
	(Mpa)	**(mm)**	**(Mpa)**	**(mm)**
1				
2	0.0	-1.49		
3	1.0	7.26	0.0	0.00
4	2.0	7.30	1.0	0.04
5	3.0	7.33	2.0	0.07
6	4.0	7.38	3.0	0.12
7	5.0	7.39	4.0	0.13
8	6.0	7.42	5.0	0.16
9	7.0	7.45	6.0	0.19
10	8.0	7.47	7.0	0.21
11	9.0	7.50	8.0	0.24
12	10.0	7.54	9.0	0.28



K	**35**
S	**3014.546333**

Thickness Variation	Pressure Variation
x	y
0.24	9.00
0.04	2.00

PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	01.08.2019
LOCATION		TEST DEPTH (m)	94.40-95.00
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.30	22.20	-0.03	22.23	38.13
2	15	0.15	1.50	-0.69	22.81	-0.02	22.83	38.49
3	15	0.15	1.50	-0.69	22.81	-0.02	22.83	38.49
4	15	0.15	1.50	-0.69	22.81	-0.02	22.83	38.49
5	15	0.30	3.00	0.31	23.81	-0.02	23.83	39.09
6	15	0.30	3.00	0.31	23.81	-0.02	23.83	39.09
7	15	0.30	3.00	0.31	23.81	-0.02	23.83	39.09
8	15	0.45	4.50	1.72	25.22	-0.02	25.24	39.96
9	15	0.45	4.50	1.72	25.22	-0.02	25.24	39.96
10	15	0.45	4.50	1.72	25.22	-0.02	25.24	39.96
11		0.50	5.00	2.26	25.76	-0.01	25.77	40.30
12		1.00	10.00	3.03	26.53	0.00	26.53	40.79
13		2.00	20.00	3.10	26.60	0.03	26.57	40.82
14		3.00	30.00	3.13	26.63	0.06	26.57	40.82
15		4.00	40.00	3.17	26.67	0.09	26.58	40.83
16		5.00	50.00	3.21	26.71	0.11	26.60	40.83
17		6.00	60.00	3.24	26.74	0.14	26.60	40.83
18		7.00	70.00	3.27	26.77	0.17	26.60	40.84
19		8.00	80.00	3.29	26.79	0.20	26.59	40.83
20		9.00	90.00	3.32	26.82	0.23	26.59	40.83
21		10.00	100.00	3.35	26.85	0.26	26.59	40.83
22		11.00	110.00	3.37	26.87	0.29	26.58	40.83
23		12.00	120.00	3.40	26.90	0.31	26.59	40.83
24								
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3014.546		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

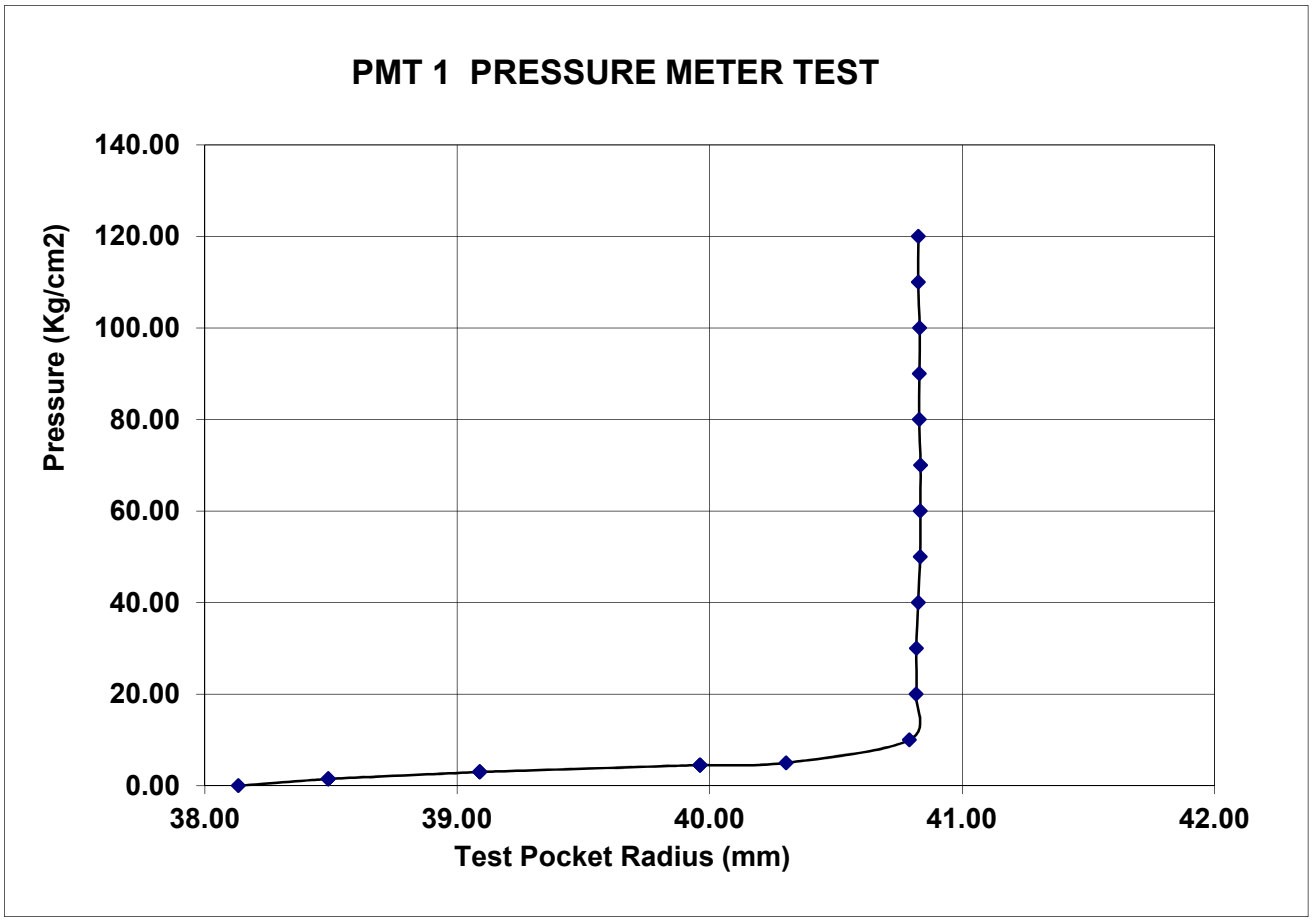
PMT: 1 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	70.00	
Δ P (Kg/cm2) =	50.00	
Intial Radius (mm) =	40.82	
Final Radius (mm) =	40.84	
Δ R(cm) =	0.002	
r(cm)=	4.083	γ = 0.3

Calculations

K= ΔP/ΔR =	25000	
E=(1+γ)rK=	132697.5000	(kg/cm2)
G= E/2(1+γ)=	86253.3750	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	01.08.2019
LOCATION		TEST DEPTH (m)	90.40-91.00
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	S.W TO FRESH BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.08	22.42	-0.03	22.45	38.26
2	15	0.15	1.50	-0.39	23.11	-0.02	23.13	38.67
3	15	0.15	1.50	-0.38	23.12	-0.02	23.14	38.67
4	15	0.15	1.50	-0.38	23.12	-0.02	23.14	38.67
5	15	0.30	3.00	0.71	24.21	-0.02	24.23	39.33
6	15	0.30	3.00	0.71	24.21	-0.02	24.23	39.33
7	15	0.30	3.00	0.71	24.21	-0.02	24.23	39.33
8	15	0.45	4.50	2.23	25.73	-0.02	25.75	40.29
9	15	0.45	4.50	2.23	25.73	-0.02	25.75	40.29
10	15	0.45	4.50	2.23	25.73	-0.02	25.75	40.29
11		0.50	5.00	2.68	26.18	-0.01	26.19	40.57
12		1.00	10.00	2.89	26.39	0.00	26.39	40.70
13		2.00	20.00	2.94	26.44	0.03	26.41	40.71
14		3.00	30.00	2.97	26.47	0.06	26.41	40.71
15		4.00	40.00	2.99	26.49	0.09	26.40	40.71
16		5.00	50.00	3.04	26.54	0.11	26.43	40.72
17		6.00	60.00	3.06	26.56	0.14	26.42	40.72
18		7.00	70.00	3.09	26.59	0.17	26.42	40.72
19		8.00	80.00	3.10	26.60	0.20	26.40	40.71
20		9.00	90.00	3.14	26.64	0.23	26.41	40.71
21		10.00	100.00	3.17	26.67	0.26	26.41	40.71
22		11.00	110.00	3.21	26.71	0.29	26.42	40.72
23		12.00	120.00	3.24	26.74	0.31	26.43	40.72
24								
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3014.546		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

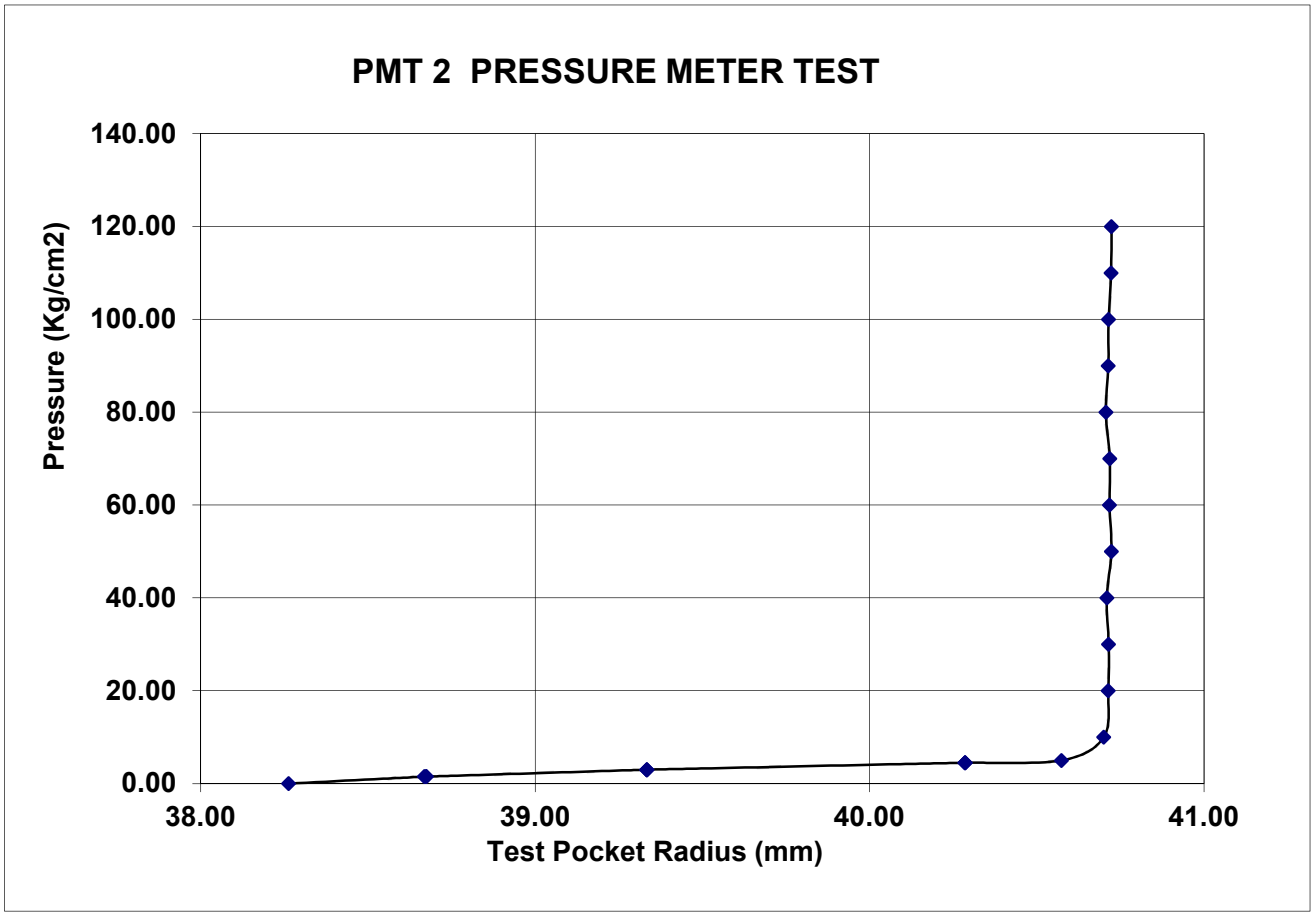
PMT: 2 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00		
Final Pressure P2 (Kg/ cm2) =	60.00		
Δ P (Kg/cm2) =	40.00		
Intial Radius (mm) =	40.71		
Final Radius (mm) =	40.72		
Δ R(cm) =	**0.001**		
r(cm)=	4.0715		**γ =** 0.3

Calculations

K= ΔP/ΔR =	40000	
E=(1+γ)rK=	211718.0000	(kg/cm2)
G= E/2(1+γ)=	137616.7000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	01.08.2019
LOCATION		TEST DEPTH (m)	86.60-87.20
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	S.W TO FRESH BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.09	22.41	-0.03	22.44	38.26
2	15	0.15	1.50	-0.16	23.34	-0.02	23.36	38.81
3	15	0.15	1.50	-0.15	23.35	-0.02	23.37	38.81
4	15	0.15	1.50	-0.15	23.35	-0.02	23.37	38.81
5	15	0.30	3.00	1.15	24.65	-0.02	24.67	39.61
6	15	0.30	3.00	1.15	24.65	-0.02	24.67	39.61
7	15	0.30	3.00	1.15	24.65	-0.02	24.67	39.61
8	15	0.45	4.50	2.71	26.21	-0.02	26.23	40.59
9	15	0.45	4.50	2.71	26.21	-0.02	26.23	40.59
10	15	0.45	4.50	2.71	26.21	-0.02	26.23	40.59
11		0.50	5.00	3.20	26.70	-0.01	26.71	40.91
12		1.00	10.00	3.49	26.99	0.00	26.99	41.09
13		2.00	20.00	3.55	27.05	0.03	27.02	41.11
14		3.00	30.00	3.59	27.09	0.06	27.03	41.12
15		4.00	40.00	3.61	27.11	0.09	27.02	41.11
16		5.00	50.00	3.65	27.15	0.11	27.04	41.12
17		6.00	60.00	3.68	27.18	0.14	27.04	41.12
18		7.00	70.00	3.70	27.20	0.17	27.03	41.12
19		8.00	80.00	3.72	27.22	0.20	27.02	41.11
20		9.00	90.00	3.76	27.26	0.23	27.03	41.12
21		10.00	100.00	3.79	27.29	0.26	27.03	41.12
22		11.00	110.00	3.80	27.30	0.29	27.01	41.11
23		12.00	120.00	3.83	27.33	0.31	27.02	41.11
24								
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3014.546		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

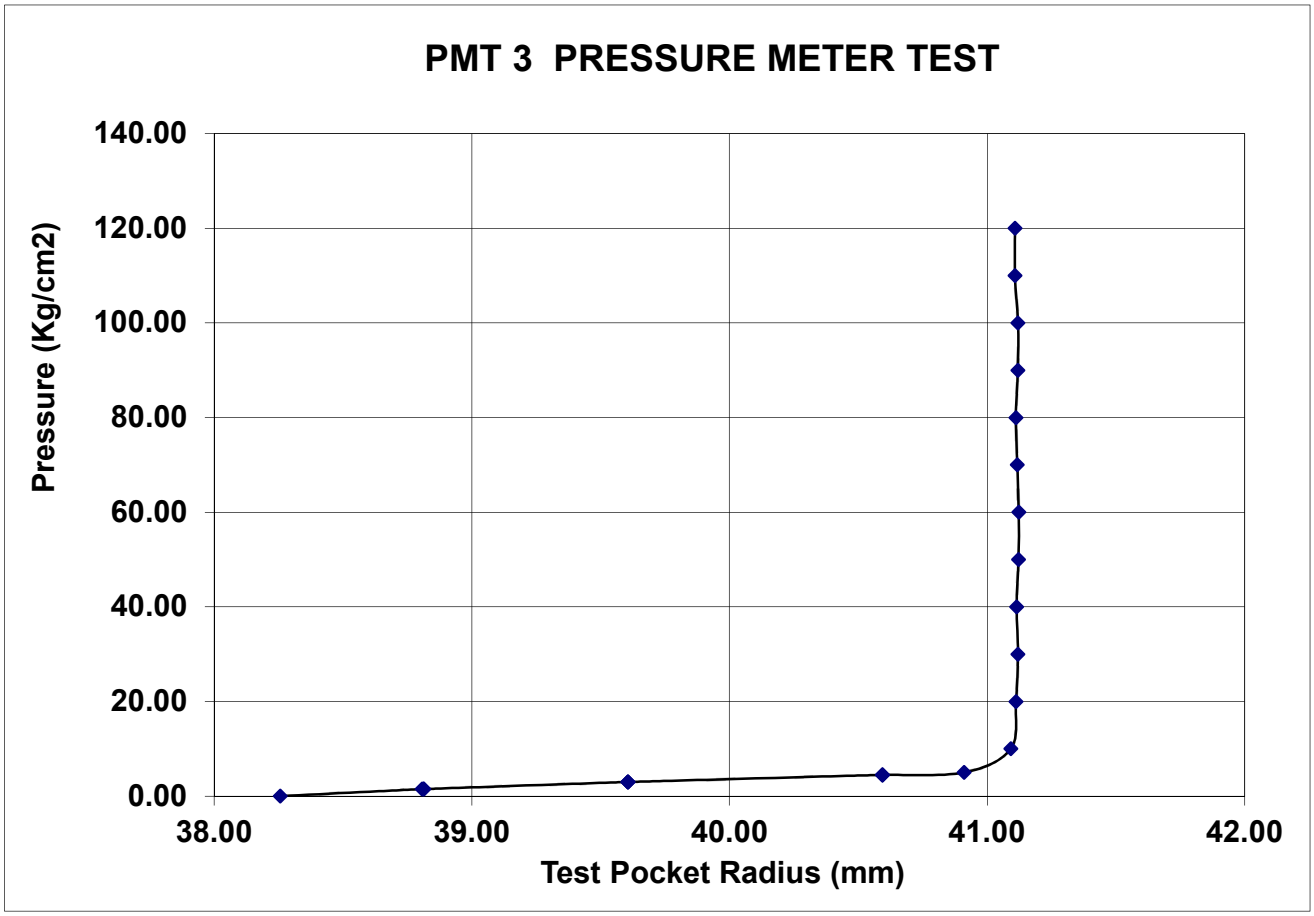
PMT: 3 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	50.00	
Δ P (Kg/cm2) =	30.00	
Intial Radius (mm) =	41.11	
Final Radius (mm) =	41.12	
Δ R(cm) =	**0.001**	
r(cm)=	4.1115	**γ =** 0.3

Calculations

K= ΔP/ΔR =	30000	
E=(1+γ)rK=	160348.5000	(kg/cm2)
G= E/2(1+γ)=	104226.5250	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	01.08.2019
LOCATION		TEST DEPTH (m)	81.00-81.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W TO S.W BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.09	22.41	-0.03	22.44	38.26
2	15	0.15	1.50	0.39	23.89	-0.02	23.91	39.14
3	15	0.15	1.50	0.39	23.89	-0.02	23.91	39.14
4	15	0.15	1.50	0.39	23.89	-0.02	23.91	39.14
5	15	0.30	3.00	1.80	25.30	-0.02	25.32	40.01
6	15	0.30	3.00	1.80	25.30	-0.02	25.32	40.01
7	15	0.30	3.00	1.80	25.30	-0.02	25.32	40.01
8	15	0.45	4.50	3.31	26.81	-0.02	26.83	40.98
9	15	0.45	4.50	3.31	26.81	-0.02	26.83	40.98
10	15	0.45	4.50	3.31	26.81	-0.02	26.83	40.98
11		0.50	5.00	3.36	26.86	-0.01	26.87	41.02
12		1.00	10.00	3.45	26.95	0.00	26.95	41.07
13		2.00	20.00	3.51	27.01	0.03	26.98	41.09
14		3.00	30.00	3.65	27.15	0.06	27.09	41.16
15		4.00	40.00	3.71	27.21	0.09	27.12	41.18
16		5.00	50.00	3.75	27.25	0.11	27.14	41.19
17		6.00	60.00	3.78	27.28	0.14	27.14	41.19
18		7.00	70.00	3.79	27.29	0.17	27.12	41.18
19		8.00	80.00	3.81	27.31	0.20	27.11	41.17
20		9.00	90.00	3.84	27.34	0.23	27.11	41.17
21		10.00	100.00	3.87	27.37	0.26	27.11	41.17
22		11.00	110.00	3.91	27.41	0.29	27.12	41.18
23		12.00	120.00	3.94	27.44	0.31	27.13	41.18
24								
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3014.546		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

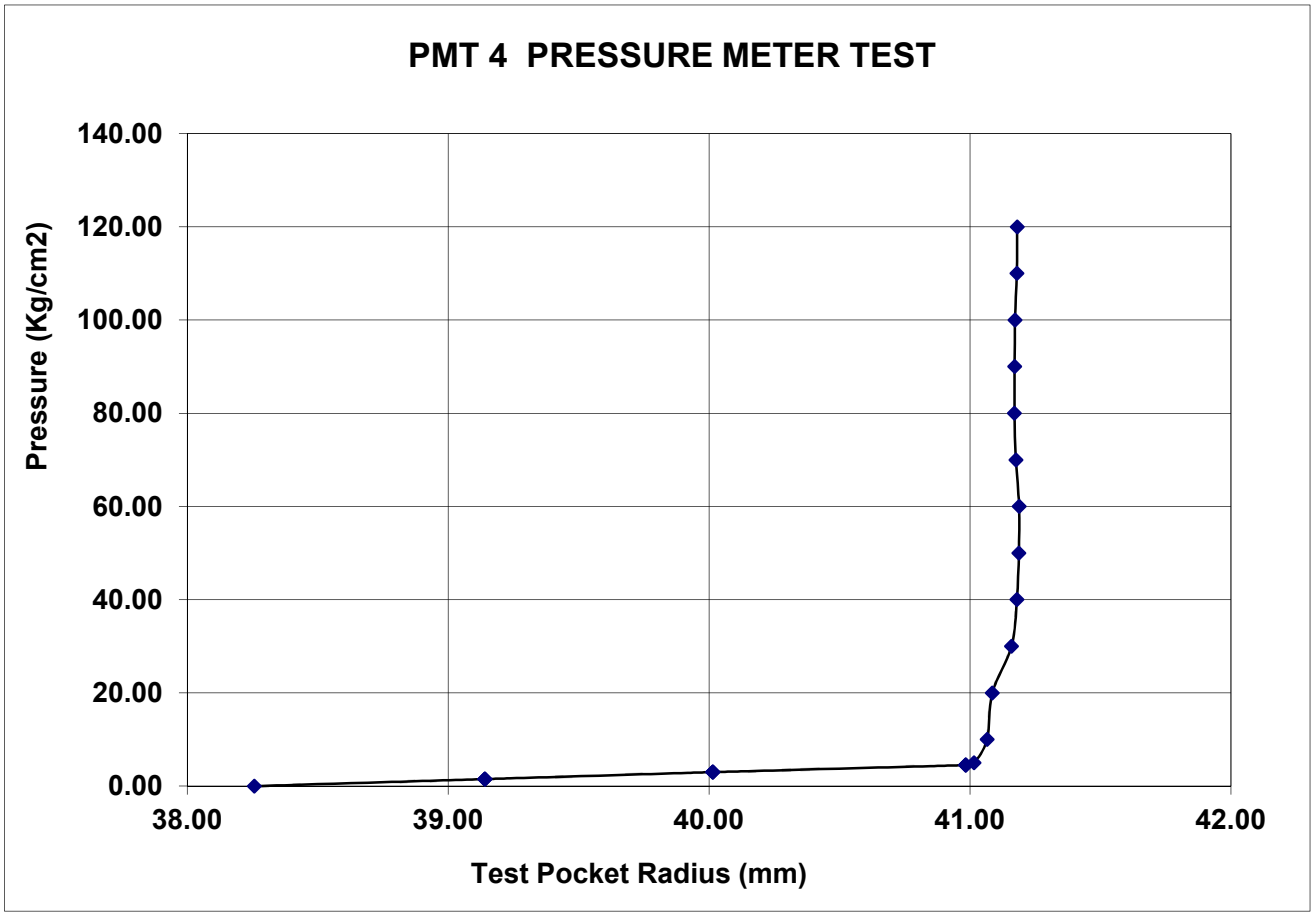
PMT: 4 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00	
Final Pressure P2 (Kg/ cm2) =	60.00	
Δ P (Kg/cm2) =	30.00	
Intial Radius (mm) =	41.16	
Final Radius (mm) =	41.19	
Δ R(cm) =	**0.003**	
r(cm)=	4.1175	**γ =** 0.3

Calculations

K= ΔP/ΔR =	10000	
E=(1+γ)rK=	53527.5000	(kg/cm2)
G= E/2(1+γ)=	34792.8750	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	01.08.2019
LOCATION		TEST DEPTH (m)	76.50-77.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.77	22.73	-0.03	22.76	38.44
2	15	0.15	1.50	0.75	24.25	-0.02	24.27	39.36
3	15	0.15	1.50	0.76	24.26	-0.02	24.28	39.37
4	15	0.15	1.50	0.76	24.26	-0.02	24.28	39.37
5	15	0.30	3.00	2.30	25.80	-0.02	25.82	40.33
6	15	0.30	3.00	2.30	25.80	-0.02	25.82	40.33
7	15	0.30	3.00	2.30	25.80	-0.02	25.82	40.33
8	15	0.45	4.50	3.56	27.06	-0.02	27.08	41.15
9	15	0.45	4.50	3.56	27.06	-0.02	27.08	41.15
10	15	0.45	4.50	3.57	27.07	-0.02	27.09	41.15
11		0.50	5.00	3.60	27.10	-0.01	27.11	41.17
12		1.00	10.00	3.65	27.15	0.00	27.15	41.20
13		2.00	20.00	3.69	27.19	0.03	27.16	41.20
14		3.00	30.00	3.73	27.23	0.06	27.17	41.21
15		4.00	40.00	3.78	27.28	0.09	27.19	41.23
16		5.00	50.00	3.81	27.31	0.11	27.20	41.23
17		6.00	60.00	3.85	27.35	0.14	27.21	41.23
18		7.00	70.00	3.90	27.40	0.17	27.23	41.25
19		8.00	80.00	3.93	27.43	0.20	27.23	41.25
20		9.00	90.00	3.97	27.47	0.23	27.24	41.26
21		10.00	100.00	4.00	27.50	0.26	27.24	41.26
22		11.00	110.00	4.05	27.55	0.29	27.26	41.27
23		12.00	120.00	4.09	27.59	0.31	27.28	41.28
24								
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29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3014.546		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

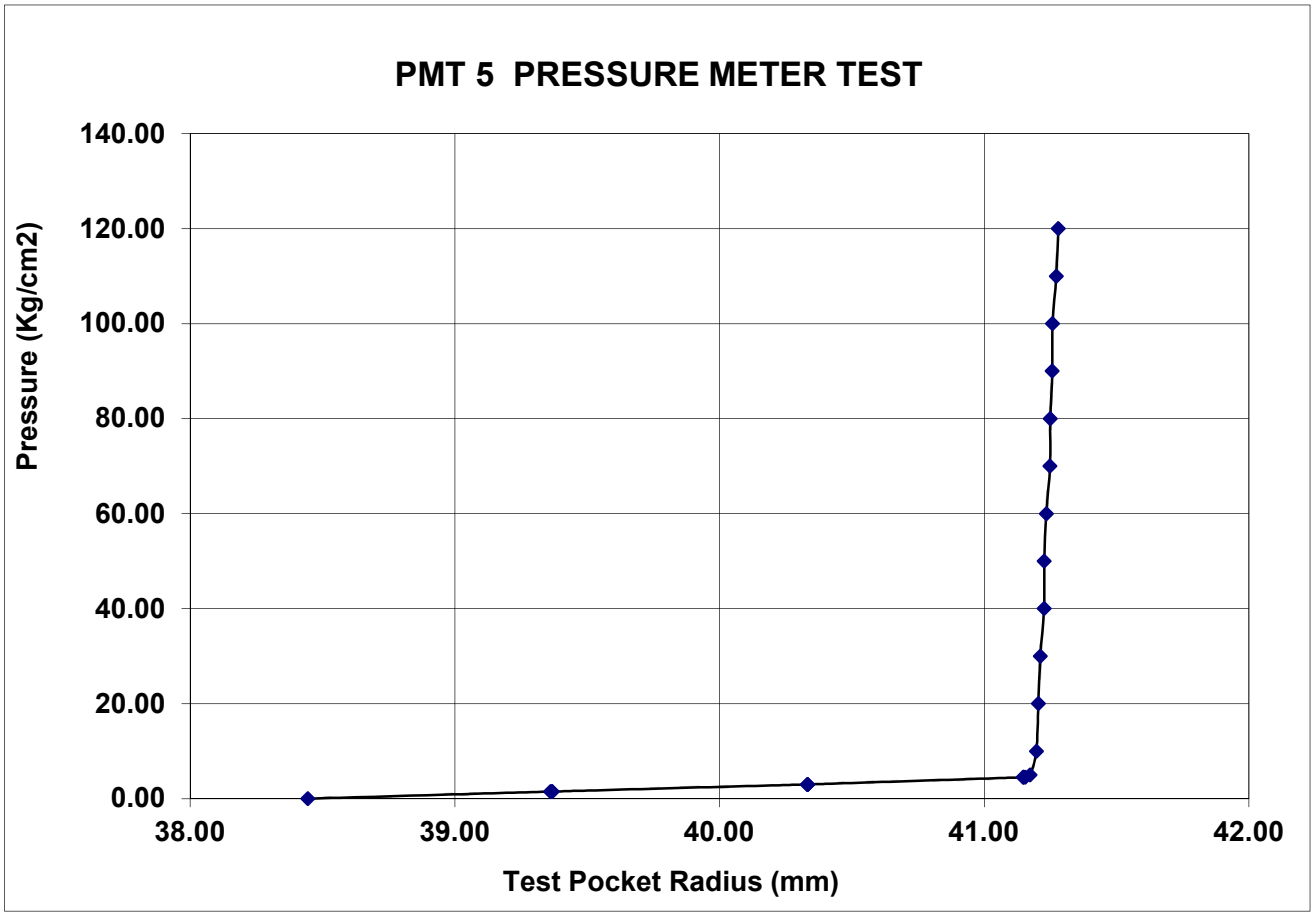
PMT: 5 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	70.00	
Δ P (Kg/cm2) =	50.00	
Intial Radius (mm) =	41.20	
Final Radius (mm) =	41.25	
Δ R(cm) =	**0.005**	
r(cm)=	4.1225	**γ =** 0.3

Calculations

K= ΔP/ΔR =	10000	
E=(1+γ)rK=	53592.5000	(kg/cm2)
G= E/2(1+γ)=	34835.1250	(kg/cm2)

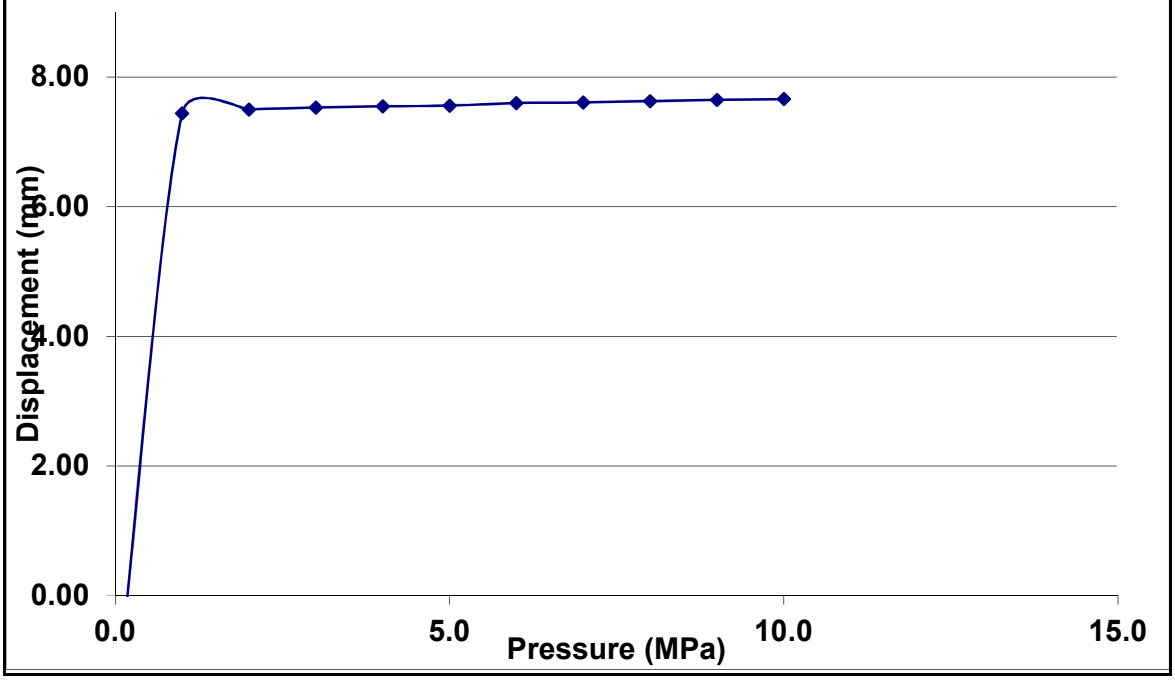


Project:	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.

Field Calibration of Probe

Date: 08.08.2019

S.No	Pressure (Mpa)	Displacement (Rp) (mm)	Pressure Variation (P ' = P-1) (Mpa)	Thickness variation volume (R' = Rp -Rp1) (mm)
1				
2	0.0	-1.82		
3	1.0	7.44	0.0	0.00
4	2.0	7.50	1.0	0.06
5	3.0	7.53	2.0	0.09
6	4.0	7.55	3.0	0.11
7	5.0	7.56	4.0	0.12
8	6.0	7.60	5.0	0.16
9	7.0	7.61	6.0	0.17
10	8.0	7.63	7.0	0.19
11	9.0	7.65	8.0	0.21
12	10.0	7.66	9.0	0.22



K	46.666667
S	3059.8409

Thickness Variation	Pressure Variation
x	y
0.21	9.00
0.06	2.00

PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	71.50-72.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.62	21.88	-0.02	21.90	38.13
2	15	0.15	1.50	-1.01	22.49	-0.02	22.51	38.48
3	15	0.15	1.50	-1.01	22.49	-0.02	22.51	38.48
4	15	0.15	1.50	-1.01	22.49	-0.02	22.51	38.48
5	15	0.30	3.00	-0.05	23.45	-0.02	23.47	39.05
6	15	0.30	3.00	-0.05	23.45	-0.02	23.47	39.05
7	15	0.30	3.00	-0.05	23.45	-0.02	23.47	39.05
8	15	0.45	4.50	1.23	24.73	-0.01	24.74	39.83
9	15	0.45	4.50	1.23	24.73	-0.01	24.74	39.83
10	15	0.45	4.50	1.23	24.73	-0.01	24.74	39.83
11		0.50	5.00	1.74	25.24	-0.01	25.25	40.15
12		1.00	10.00	3.91	27.41	0.00	27.41	41.54
13		2.00	20.00	3.97	27.47	0.02	27.45	41.57
14		3.00	30.00	4.01	27.51	0.04	27.47	41.58
15		4.00	40.00	4.06	27.56	0.06	27.50	41.60
16		5.00	50.00	4.10	27.60	0.09	27.51	41.61
17		6.00	60.00	4.13	27.63	0.11	27.52	41.62
18		7.00	70.00	4.16	27.66	0.13	27.53	41.62
19		8.00	80.00	4.19	27.69	0.15	27.54	41.63
20		9.00	90.00	4.23	27.73	0.17	27.56	41.64
21		10.00	100.00	4.28	27.78	0.19	27.59	41.66
22		11.00	110.00	4.30	27.80	0.21	27.59	41.66
23		12.00	120.00	4.33	27.83	0.24	27.59	41.66
24		13.00	130.00	4.37	27.87	0.26	27.61	41.68
25		14.00	140.00	4.46	27.96	0.28	27.68	41.72
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

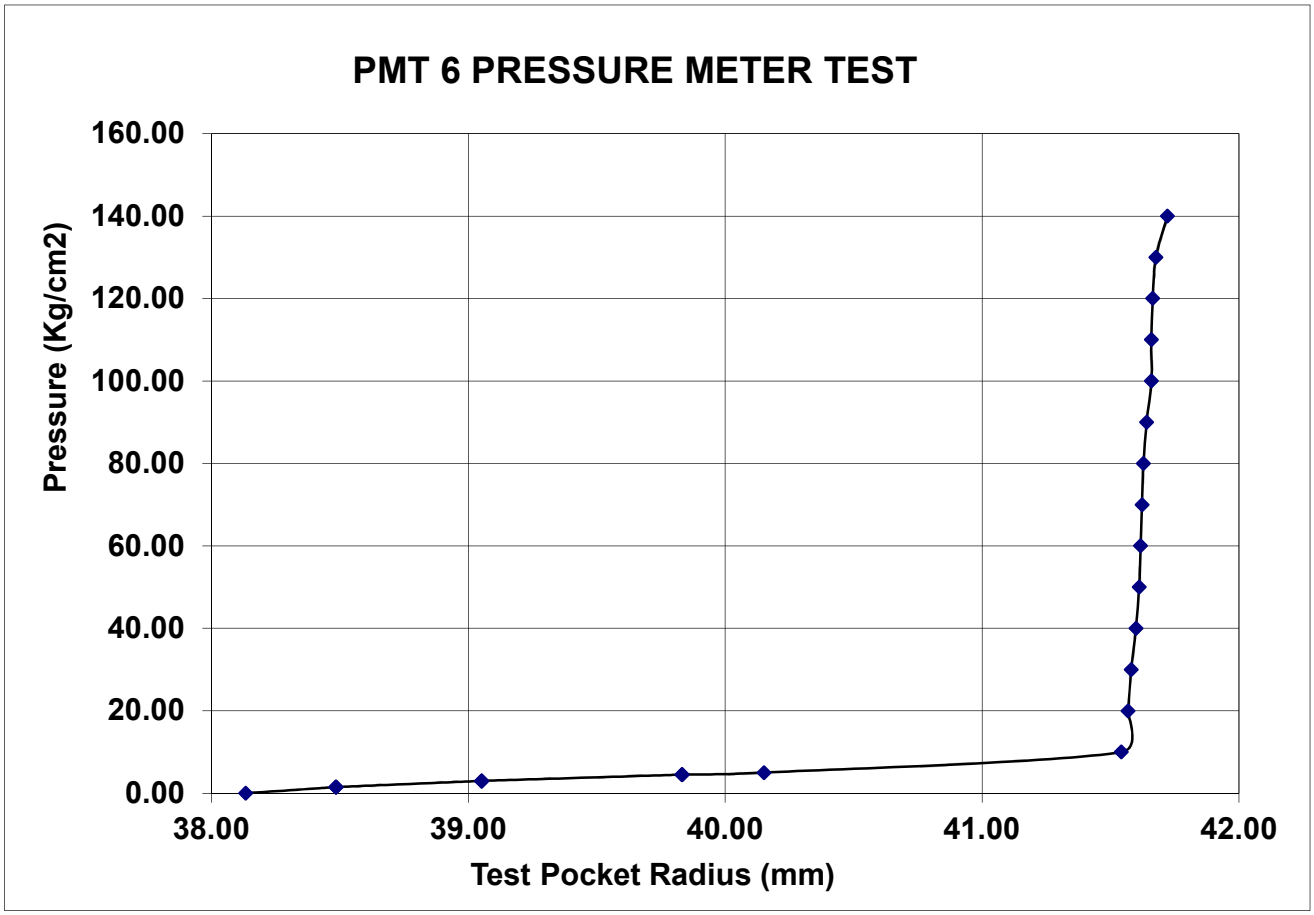
PMT: 6 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	80.00	
Δ P (Kg/cm2) =	40.00	
Intial Radius (mm) =	41.60	
Final Radius (mm) =	41.63	
Δ R(cm) =	**0.003**	
r(cm)=	4.1615	**γ =** 0.3

Calculations

K= ΔP/ΔR =	13333.33333	
E=(1+γ)rK=	72132.6667	(kg/cm2)
G= E/2(1+γ)=	46886.2333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	60.00-60.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.23	22.27	-0.02	22.29	38.36
2	15	0.15	1.50	-0.25	23.25	-0.02	23.27	38.93
3	15	0.15	1.50	-0.25	23.25	-0.02	23.27	38.93
4	15	0.15	1.50	-0.25	23.25	-0.02	23.27	38.93
5	15	0.30	3.00	1.17	24.67	-0.02	24.69	39.80
6	15	0.30	3.00	1.17	24.67	-0.02	24.69	39.80
7	15	0.30	3.00	1.17	24.67	-0.02	24.69	39.80
8	15	0.45	4.50	2.71	26.21	-0.01	26.22	40.77
9	15	0.45	4.50	2.71	26.21	-0.01	26.22	40.77
10	15	0.45	4.50	2.71	26.21	-0.01	26.22	40.77
11		0.50	5.00	3.47	26.97	-0.01	26.98	41.26
12		1.00	10.00	5.41	28.91	0.00	28.91	42.55
13		2.00	20.00	5.44	28.94	0.02	28.92	42.55
14		3.00	30.00	5.48	28.98	0.04	28.94	42.57
15		4.00	40.00	5.51	29.01	0.06	28.95	42.57
16		5.00	50.00	5.56	29.06	0.09	28.97	42.59
17		6.00	60.00	5.60	29.10	0.11	28.99	42.60
18		7.00	70.00	5.62	29.12	0.13	28.99	42.60
19		8.00	80.00	5.67	29.17	0.15	29.02	42.62
20		9.00	90.00	5.70	29.20	0.17	29.03	42.63
21		10.00	100.00	5.71	29.21	0.19	29.02	42.62
22		11.00	110.00	5.75	29.25	0.21	29.04	42.63
23		12.00	120.00	5.78	29.28	0.24	29.04	42.64
24		13.00	130.00	5.81	29.31	0.26	29.05	42.64
25		14.00	140.00	5.84	29.34	0.28	29.06	42.65
26								
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=46.66		
		Expansion Correction S (mm2)= 3059.84		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

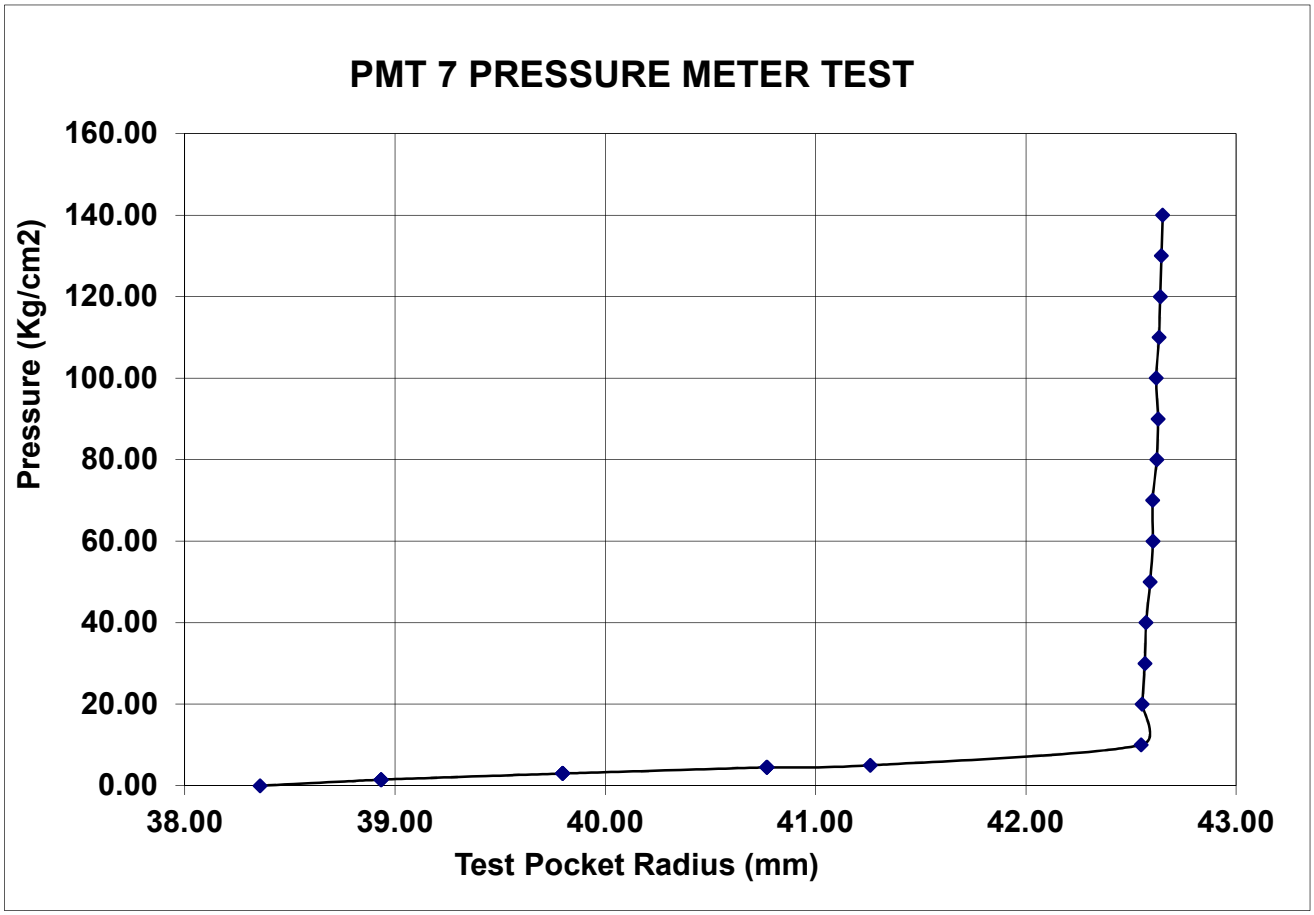
PMT: 7 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00	
Final Pressure P2 (Kg/ cm2) =	90.00	
Δ P (Kg/cm2) =	60.00	
Intial Radius (mm) =	42.57	
Final Radius (mm) =	42.63	
Δ R(cm) =	**0.006**	
r(cm)=	4.26	**γ =** 0.3

Calculations

K= ΔP/ΔR =	10000	
E=(1+γ)rK=	55380.0000	(kg/cm2)
G= E/2(1+γ)=	35997.0000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	66.50-67.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.29	22.21	-0.02	22.23	38.32
2	15	0.15	1.50	-0.61	22.89	-0.02	22.91	38.72
3	15	0.15	1.50	-0.61	22.89	-0.02	22.91	38.72
4	15	0.15	1.50	-0.61	22.89	-0.02	22.91	38.72
5	15	0.30	3.00	0.47	23.97	-0.02	23.99	39.37
6	15	0.30	3.00	0.47	23.97	-0.02	23.99	39.37
7	15	0.30	3.00	0.47	23.97	-0.02	23.99	39.37
8	15	0.45	4.50	2.01	25.51	-0.01	25.52	40.32
9	15	0.45	4.50	2.01	25.51	-0.01	25.52	40.32
10	15	0.45	4.50	2.01	25.51	-0.01	25.52	40.32
		0.50	5.00	2.59	26.09	-0.01	26.10	40.69
11		1.00	10.00	3.56	27.06	0.00	27.06	41.31
12		2.00	20.00	3.59	27.09	0.02	27.07	41.32
13		3.00	30.00	3.65	27.15	0.04	27.11	41.34
14		4.00	40.00	3.67	27.17	0.06	27.11	41.34
15		5.00	50.00	3.70	27.20	0.09	27.11	41.35
16		6.00	60.00	3.73	27.23	0.11	27.12	41.35
17		7.00	70.00	3.76	27.26	0.13	27.13	41.36
18		8.00	80.00	3.80	27.30	0.15	27.15	41.37
19		9.00	90.00	3.83	27.33	0.17	27.16	41.38
20		10.00	100.00	3.86	27.36	0.19	27.17	41.38
21		11.00	110.00	3.90	27.40	0.21	27.19	41.39
22		12.00	120.00	3.93	27.43	0.24	27.19	41.40
23		13.00	130.00	3.97	27.47	0.26	27.21	41.41
24		13.84	138.40	4.00	27.50	0.28	27.22	41.42
25								
26								
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=46.66		
		Expansion Correction S (mm2)= 3059.84		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

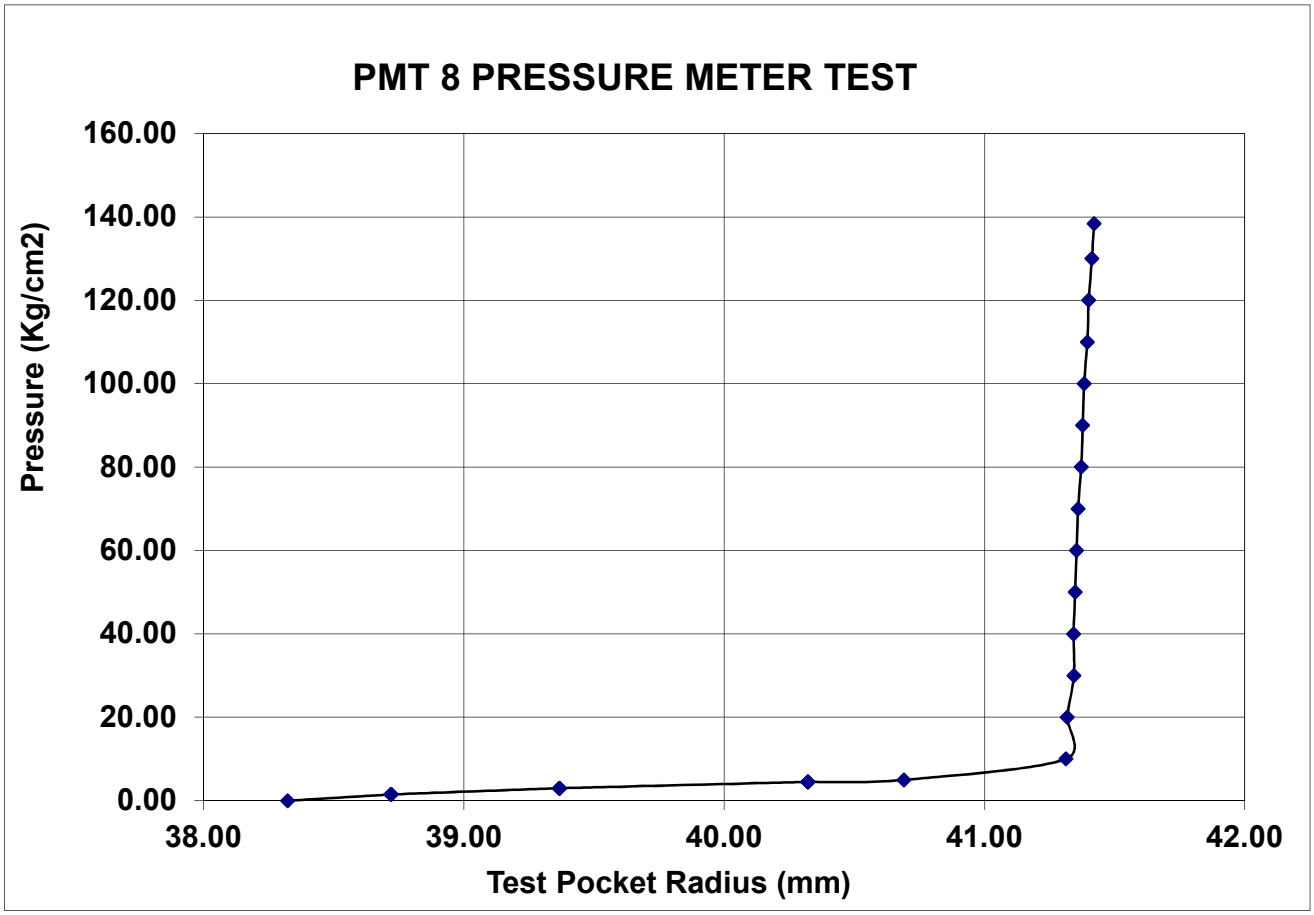
PMT: 8 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	10.00		
Final Pressure P2 (Kg/ cm2) =	20.00		
Δ P (Kg/cm2) =	10.00		
Intial Radius (mm) =	40.52		
Final Radius (mm) =	40.53		
Δ R(cm) =	**0.001**		
r(cm)=	4.0525		**γ =** 0.3

Calculations

K= ΔP/ΔR =	10000	
E=(1+γ)rK=	52682.5000	(kg/cm2)
G= E/2(1+γ)=	34243.6250	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	55.50-56.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. ROCK		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.06	22.44	-0.02	22.46	38.46
2	15	0.15	1.50	-0.09	23.41	-0.02	23.43	39.03
3	15	0.15	1.50	-0.09	23.41	-0.02	23.43	39.03
4	15	0.15	1.50	-0.09	23.41	-0.02	23.43	39.03
5	15	0.30	3.00	1.39	24.89	-0.02	24.91	39.93
6	15	0.30	3.00	1.39	24.89	-0.02	24.91	39.93
7	15	0.30	3.00	1.39	24.89	-0.02	24.91	39.93
8	15	0.45	4.50	3.02	26.52	-0.01	26.53	40.97
9	15	0.45	4.50	3.02	26.52	-0.01	26.53	40.97
10	15	0.45	4.50	3.02	26.52	-0.01	26.53	40.97
		0.50	5.00	3.21	26.71	-0.01	26.72	41.09
11		1.00	10.00	3.28	26.78	0.00	26.78	41.13
12		2.00	20.00	3.31	26.81	0.02	26.79	41.14
13		3.00	30.00	3.34	26.84	0.04	26.80	41.14
14		4.00	40.00	3.37	26.87	0.06	26.81	41.15
15		5.00	50.00	3.40	26.90	0.09	26.81	41.15
16		6.00	60.00	3.42	26.92	0.11	26.81	41.15
17		7.00	70.00	3.45	26.95	0.13	26.82	41.16
18		8.00	80.00	3.46	26.96	0.15	26.81	41.15
19		9.00	90.00	3.48	26.98	0.17	26.81	41.15
20		10.00	100.00	3.50	27.00	0.19	26.81	41.15
21		11.00	110.00	3.55	27.05	0.21	26.84	41.17
22		12.00	120.00	3.57	27.07	0.24	26.83	41.16
23		13.00	130.00	3.60	27.10	0.26	26.84	41.17
24		14.00	140.00	3.65	27.15	0.28	26.87	41.19
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

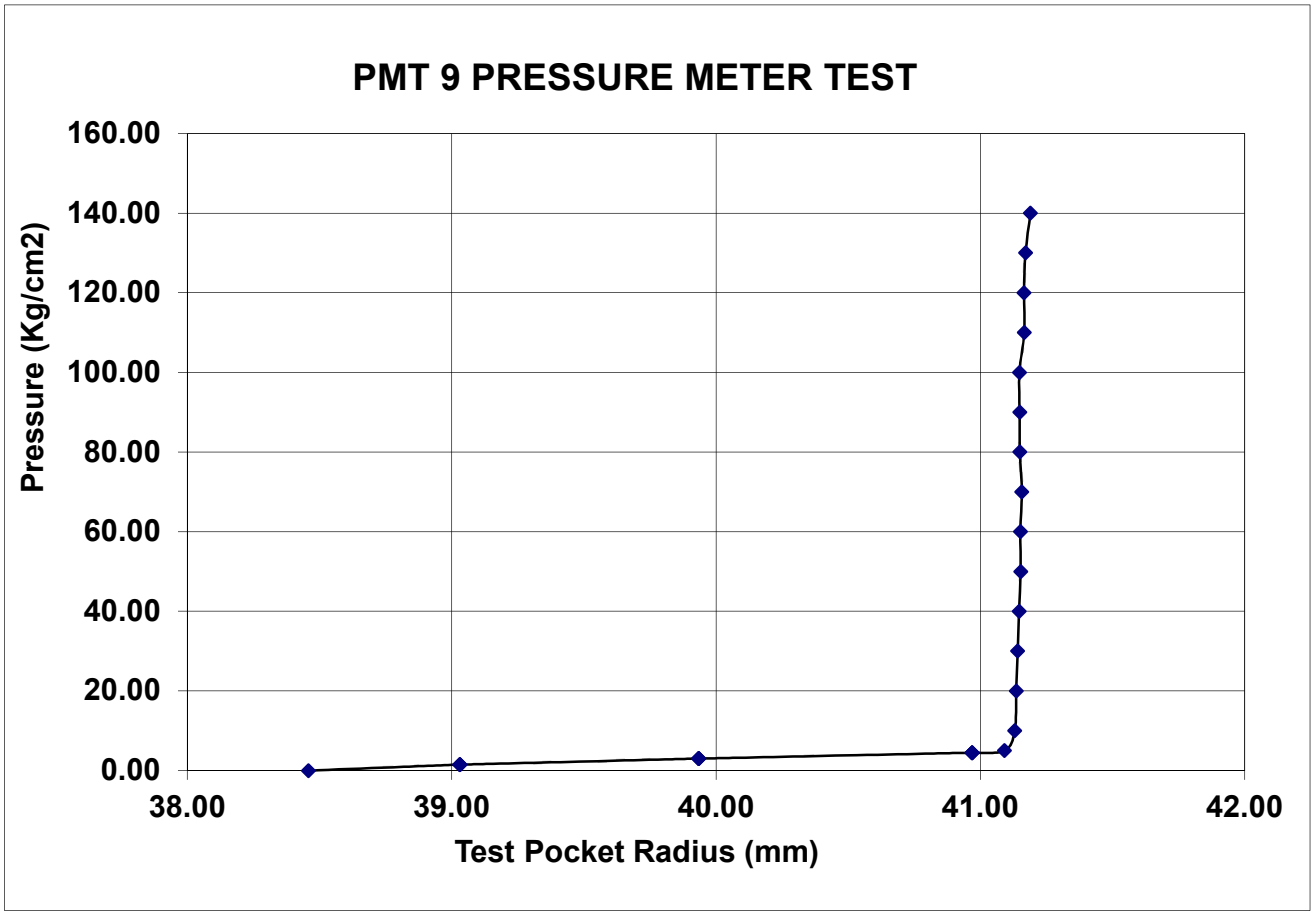
PMT: 9 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00	
Final Pressure P2 (Kg/ cm2) =	110.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	41.14	
Final Radius (mm) =	41.17	
Δ R(cm) =	**0.003**	
r(cm)=	4.1155	**γ =** 0.3

Calculations

K= ΔP/ΔR =	26666.66667	
E=(1+γ)rK=	142670.6667	(kg/cm2)
G= E/2(1+γ)=	92735.9333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	51.00-51.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.80	22.70	-0.02	22.72	38.61
2	15	0.15	1.50	0.56	24.06	-0.02	24.08	39.42
3	15	0.15	1.50	0.56	24.06	-0.02	24.08	39.42
4	15	0.15	1.50	0.56	24.06	-0.02	24.08	39.42
5	15	0.30	3.00	2.26	25.76	-0.02	25.78	40.48
6	15	0.30	3.00	2.26	25.76	-0.02	25.78	40.48
7	15	0.30	3.00	2.26	25.76	-0.02	25.78	40.48
8	15	0.45	4.50	3.74	27.24	-0.01	27.25	41.44
9	15	0.45	4.50	3.74	27.24	-0.01	27.25	41.44
10	15	0.45	4.50	3.74	27.24	-0.01	27.25	41.44
		0.50	5.00	3.80	27.30	-0.01	27.31	41.48
11		1.00	10.00	3.88	27.38	0.00	27.38	41.52
12		2.00	20.00	3.93	27.43	0.02	27.41	41.54
13		3.00	30.00	3.98	27.48	0.04	27.44	41.56
14		4.00	40.00	4.00	27.50	0.06	27.44	41.56
15		5.00	50.00	4.02	27.52	0.09	27.43	41.56
16		6.00	60.00	4.06	27.56	0.11	27.45	41.57
17		7.00	70.00	4.09	27.59	0.13	27.46	41.58
18		8.00	80.00	4.12	27.62	0.15	27.47	41.58
19		9.00	90.00	4.17	27.67	0.17	27.50	41.60
20		10.00	100.00	4.20	27.70	0.19	27.51	41.61
21		11.00	110.00	4.23	27.73	0.21	27.52	41.61
22		12.00	120.00	4.26	27.76	0.24	27.52	41.62
23		13.00	130.00	4.30	27.80	0.26	27.54	41.63
24		14.00	140.00	4.34	27.84	0.28	27.56	41.64
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

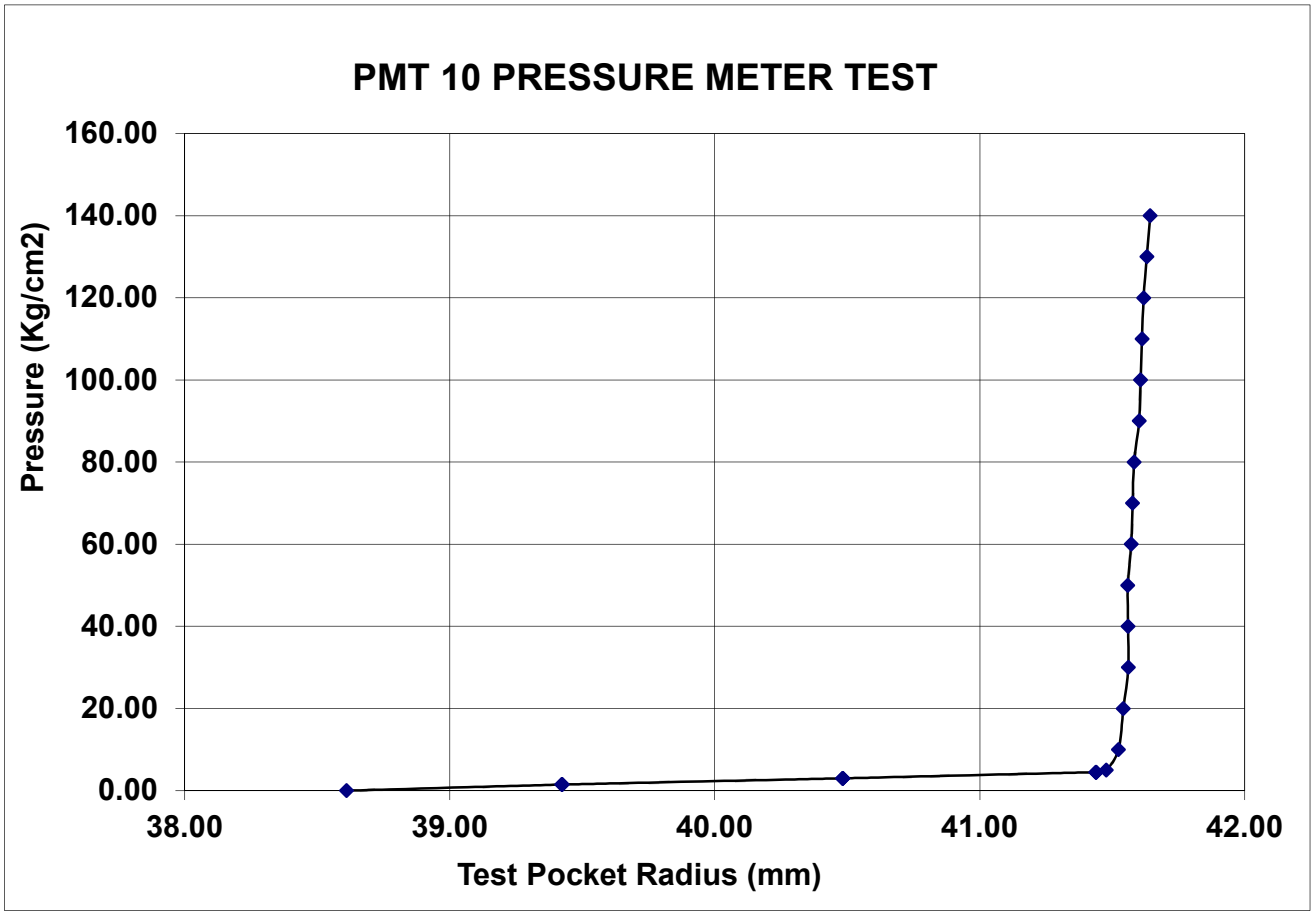
PMT: 10 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	41.54	
Final Radius (mm) =	41.61	
Δ R(cm) =	**0.007**	
r(cm)=	4.1575	**γ =** 0.3

Calculations

K= ΔP/ΔR =	11428.57143	
E=(1+γ)rK=	61768.5714	(kg/cm2)
G= E/2(1+γ)=	40149.5714	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	45.40-46.00
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.75	22.75	-0.02	22.77	38.64
2	15	0.15	1.50	0.98	24.48	-0.02	24.50	39.68
3	15	0.15	1.50	0.98	24.48	-0.02	24.50	39.68
4	15	0.15	1.50	0.98	24.48	-0.02	24.50	39.68
5	15	0.30	3.00	2.90	26.40	-0.02	26.42	40.89
6	15	0.30	3.00	2.90	26.40	-0.02	26.42	40.89
7	15	0.30	3.00	2.90	26.40	-0.02	26.42	40.89
8	15	0.45	4.50	3.12	26.62	-0.01	26.63	41.03
9	15	0.45	4.50	3.12	26.62	-0.01	26.63	41.03
10	15	0.45	4.50	3.12	26.62	-0.01	26.63	41.03
		0.50	5.00	3.48	26.98	-0.01	26.99	41.27
11		1.00	10.00	3.51	27.01	0.00	27.01	41.28
12		2.00	20.00	3.55	27.05	0.02	27.03	41.29
13		3.00	30.00	3.58	27.08	0.04	27.04	41.30
14		4.00	40.00	3.61	27.11	0.06	27.05	41.30
15		5.00	50.00	3.63	27.13	0.09	27.04	41.30
16		6.00	60.00	3.67	27.17	0.11	27.06	41.31
17		7.00	70.00	3.69	27.19	0.13	27.06	41.31
18		8.00	80.00	3.71	27.21	0.15	27.06	41.31
19		9.00	90.00	3.73	27.23	0.17	27.06	41.31
20		10.00	100.00	3.77	27.27	0.19	27.08	41.32
21		11.00	110.00	3.79	27.29	0.21	27.08	41.32
22		12.00	120.00	3.81	27.31	0.24	27.07	41.32
23		13.00	130.00	3.84	27.34	0.26	27.08	41.33
24		14.00	140.00	3.87	27.37	0.28	27.09	41.33
25								
26								
27								
28								
29								

Calculation Notes:	**Type Of Probe**	**1**	
Membrane Calibration Constants	**Thickness Correction K :Mn/m2/mm=46.66**		
	Expansion Correction S (mm2)= 3059.84		
	Job No	**Prepared by**	**Cheked By**
	1612	Vaibhav	Prasad

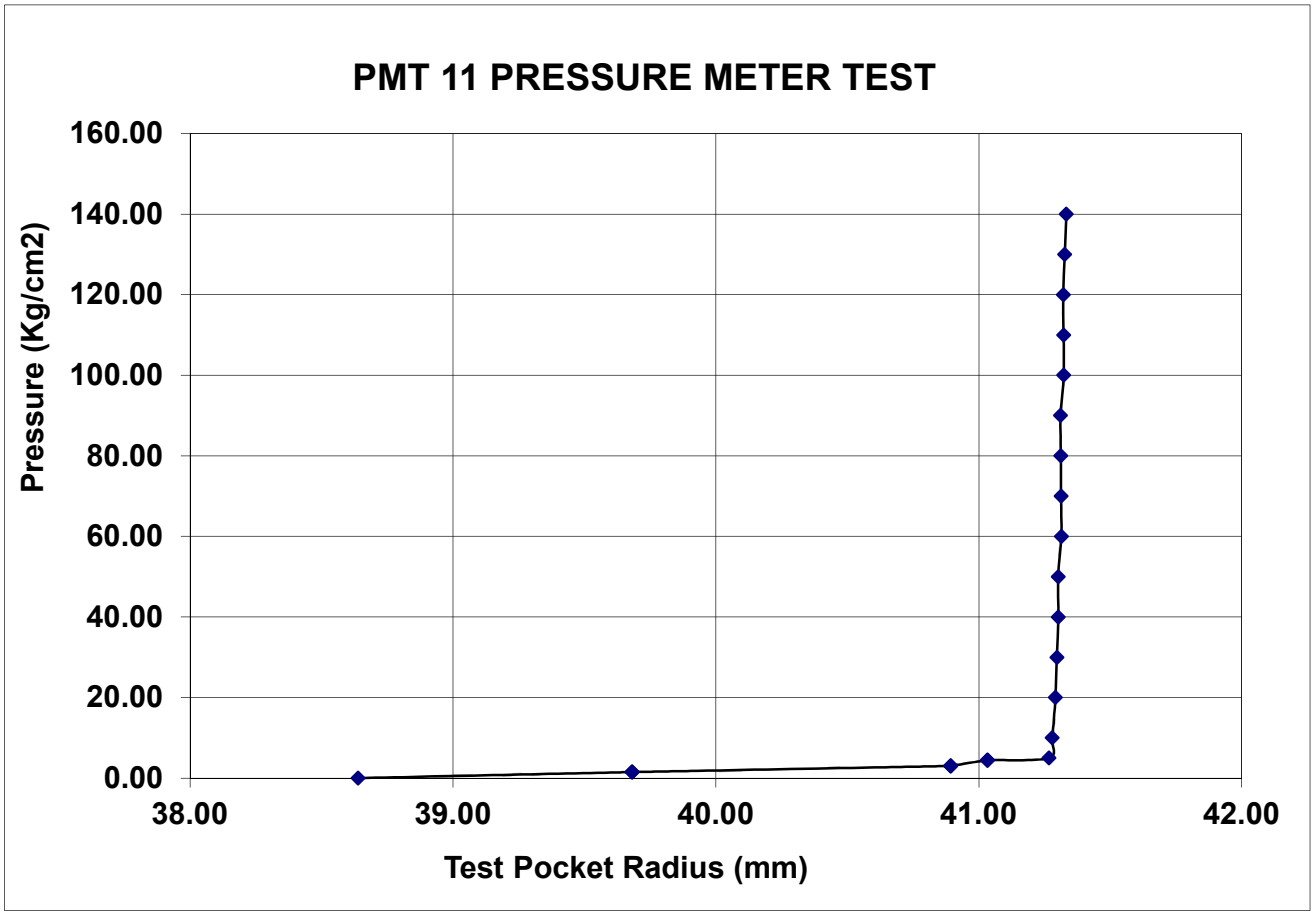
PMT: 11 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	41.29	
Final Radius (mm) =	41.32	
Δ R(cm) =	**0.003**	
r(cm)=	4.1305	**γ =** 0.3

Calculations

K= ΔP/ΔR =	26666.66667	
E=(1+γ)rK=	143190.6667	(kg/cm2)
G= E/2(1+γ)=	93073.9333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	40.00-40.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.56	22.94	-0.02	22.96	38.75
2	15	0.15	1.50	1.17	24.67	-0.02	24.69	39.80
3	15	0.15	1.50	1.17	24.67	-0.02	24.69	39.80
4	15	0.15	1.50	1.17	24.67	-0.02	24.69	39.80
5	15	0.30	3.00	3.31	26.81	-0.02	26.83	41.16
6	15	0.30	3.00	3.31	26.81	-0.02	26.83	41.16
7	15	0.30	3.00	3.31	26.81	-0.02	26.83	41.16
8	15	0.45	4.50	4.10	27.60	-0.01	27.61	41.68
9	15	0.45	4.50	4.10	27.60	-0.01	27.61	41.68
10	15	0.45	4.50	4.10	27.60	-0.01	27.61	41.68
		0.50	5.00	4.30	27.80	-0.01	27.81	41.81
11		1.00	10.00	4.44	27.94	0.00	27.94	41.89
12		2.00	20.00	4.50	28.00	0.02	27.98	41.92
13		3.00	30.00	4.55	28.05	0.04	28.01	41.94
14		4.00	40.00	4.59	28.09	0.06	28.03	41.95
15		5.00	50.00	4.62	28.12	0.09	28.03	41.96
16		6.00	60.00	4.66	28.16	0.11	28.05	41.97
17		7.00	70.00	4.70	28.20	0.13	28.07	41.98
18		8.00	80.00	4.72	28.22	0.15	28.07	41.98
19		9.00	90.00	4.78	28.28	0.17	28.11	42.01
20		10.00	100.00	4.81	28.31	0.19	28.12	42.01
21		11.00	110.00	4.86	28.36	0.21	28.15	42.03
22		12.00	120.00	4.91	28.41	0.24	28.17	42.05
23		13.00	130.00	4.94	28.44	0.26	28.18	42.06
24		14.00	140.00	5.03	28.53	0.28	28.25	42.10
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

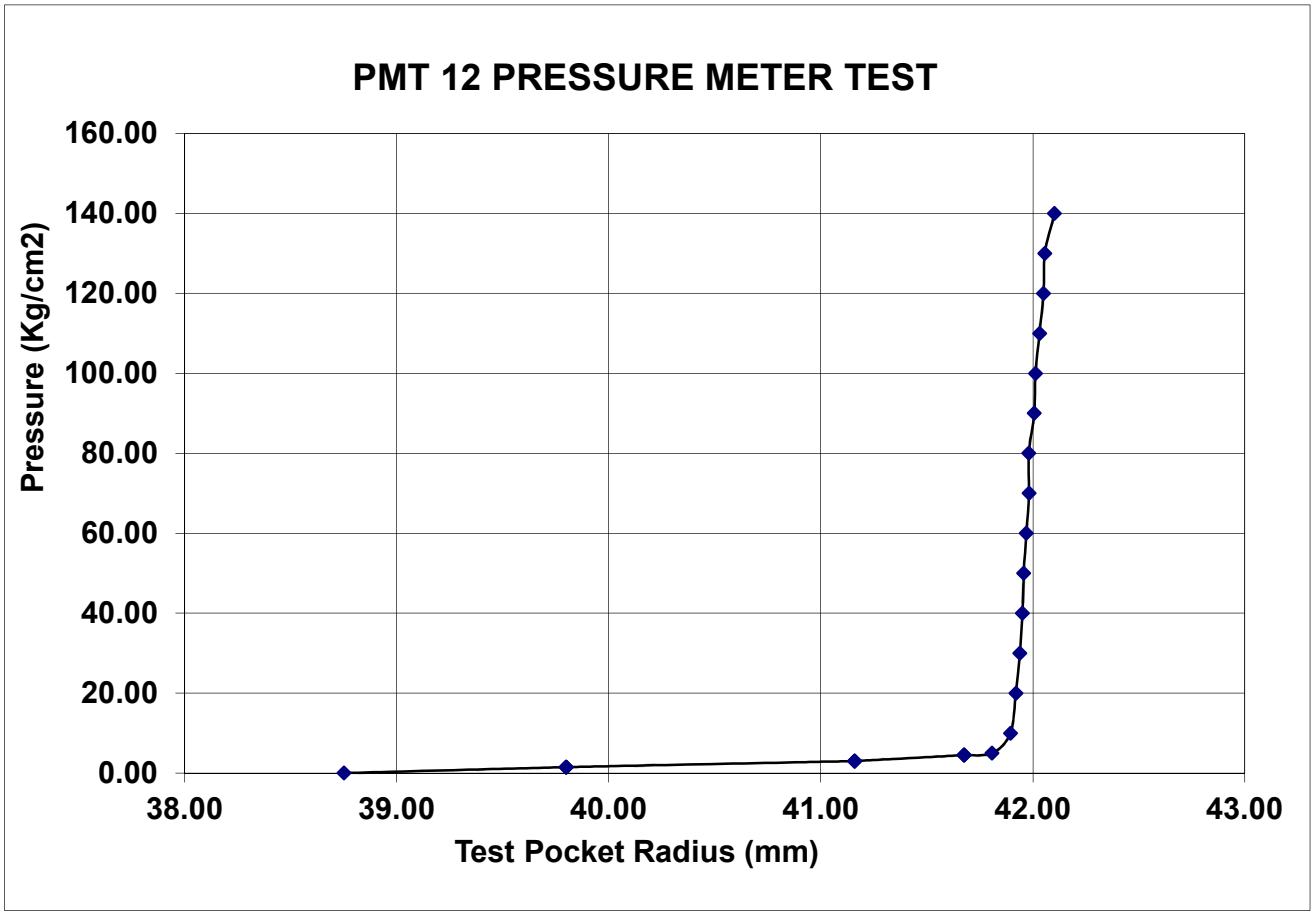
PMT: 12 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00		
Final Pressure P2 (Kg/ cm2) =	80.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.92		
Final Radius (mm) =	41.98		
Δ R(cm) =	**0.006**		
r(cm)=	4.195		**γ =** 0.3

Calculations

K= ΔP/ΔR =	10000	
E=(1+γ)rK=	54535.0000	(kg/cm2)
G= E/2(1+γ)=	35447.7500	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	35.50-36.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.42	23.08	-0.02	23.10	38.83
2	15	0.15	1.50	1.93	25.43	-0.02	25.45	40.28
3	15	0.15	1.50	1.93	25.43	-0.02	25.45	40.28
4	15	0.15	1.50	1.93	25.43	-0.02	25.45	40.28
5	15	0.30	3.00	3.62	27.12	-0.02	27.14	41.36
6	15	0.30	3.00	3.62	27.12	-0.02	27.14	41.36
7	15	0.30	3.00	3.62	27.12	-0.02	27.14	41.36
8	15	0.45	4.50	3.72	27.22	-0.01	27.23	41.43
9	15	0.45	4.50	3.72	27.22	-0.01	27.23	41.43
10	15	0.45	4.50	3.72	27.22	-0.01	27.23	41.43
		0.50	5.00	3.82	27.32	-0.01	27.33	41.49
11		1.00	10.00	3.9	27.40	0.00	27.40	41.54
12		2.00	20.00	3.93	27.43	0.02	27.41	41.54
13		3.00	30.00	3.97	27.47	0.04	27.43	41.55
14		4.00	40.00	4.00	27.50	0.06	27.44	41.56
15		5.00	50.00	4.03	27.53	0.09	27.44	41.57
16		6.00	60.00	4.07	27.57	0.11	27.46	41.58
17		7.00	70.00	4.10	27.60	0.13	27.47	41.58
18		8.00	80.00	4.13	27.63	0.15	27.48	41.59
19		9.00	90.00	4.16	27.66	0.17	27.49	41.59
20		10.00	100.00	4.19	27.69	0.19	27.50	41.60
21		11.00	110.00	4.24	27.74	0.21	27.53	41.62
22		12.00	120.00	4.27	27.77	0.24	27.53	41.62
23		13.00	130.00	4.31	27.81	0.26	27.55	41.64
24		13.84	138.40	4.34	27.84	0.28	27.56	41.64
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

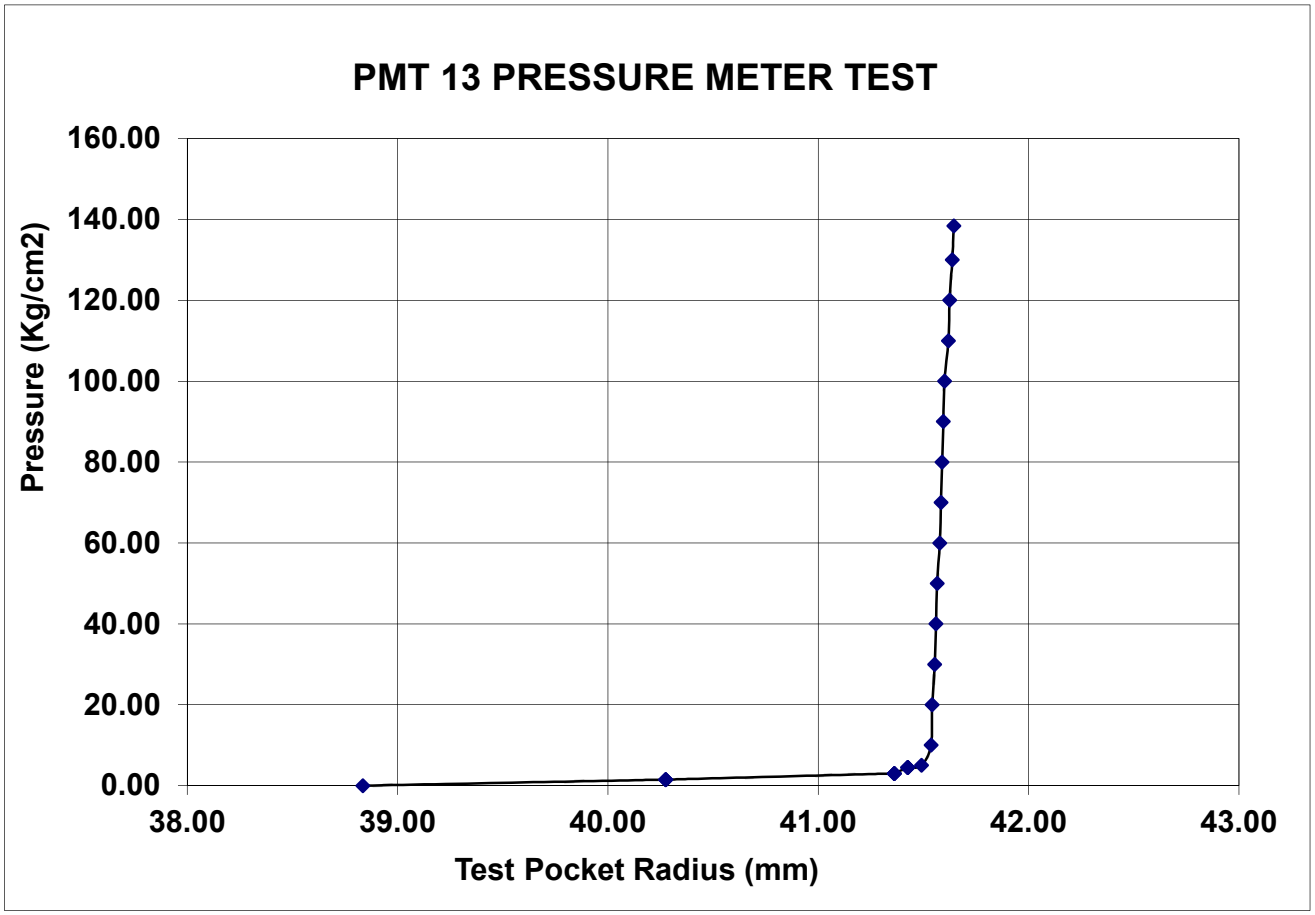
PMT: 13 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	41.54	
Final Radius (mm) =	41.6	
Δ R(cm) =	**0.006**	
r(cm)=	4.157	**γ =** 0.3

Calculations

K= ΔP/ΔR =	13333.33333	
E=(1+γ)rK=	72054.6667	(kg/cm2)
G= E/2(1+γ)=	46835.5333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	30.50-31.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.35	23.15	-0.02	23.17	38.88
2	15	0.15	1.50	2.50	26.00	-0.02	26.02	40.64
3	15	0.15	1.50	2.50	26.00	-0.02	26.02	40.64
4	15	0.15	1.50	2.50	26.00	-0.02	26.02	40.64
5	15	0.30	3.00	4.58	28.08	-0.02	28.10	42.00
6	15	0.30	3.00	4.58	28.08	-0.02	28.10	42.00
7	15	0.30	3.00	4.58	28.08	-0.02	28.10	42.00
8	15	0.45	4.50	4.65	28.15	-0.01	28.16	42.04
9	15	0.45	4.50	4.65	28.15	-0.01	28.16	42.04
10	15	0.45	4.50	4.65	28.15	-0.01	28.16	42.04
		0.50	5.00	4.80	28.30	-0.01	28.31	42.14
11		1.00	10.00	4.9	28.40	0.00	28.40	42.20
12		2.00	20.00	5.00	28.50	0.02	28.48	42.26
13		3.00	30.00	5.04	28.54	0.04	28.50	42.27
14		4.00	40.00	5.06	28.56	0.06	28.50	42.27
15		5.00	50.00	5.10	28.60	0.09	28.51	42.28
16		6.00	60.00	5.14	28.64	0.11	28.53	42.29
17		7.00	70.00	5.17	28.67	0.13	28.54	42.30
18		8.00	80.00	5.20	28.70	0.15	28.55	42.30
19		9.00	90.00	5.27	28.77	0.17	28.60	42.34
20		10.00	100.00	5.30	28.80	0.19	28.61	42.34
21		11.00	110.00	5.32	28.82	0.21	28.61	42.34
22		12.00	120.00	5.37	28.87	0.24	28.63	42.36
23		13.00	130.00	5.43	28.93	0.26	28.67	42.39
24		14.00	140.00	5.45	28.95	0.28	28.67	42.39
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

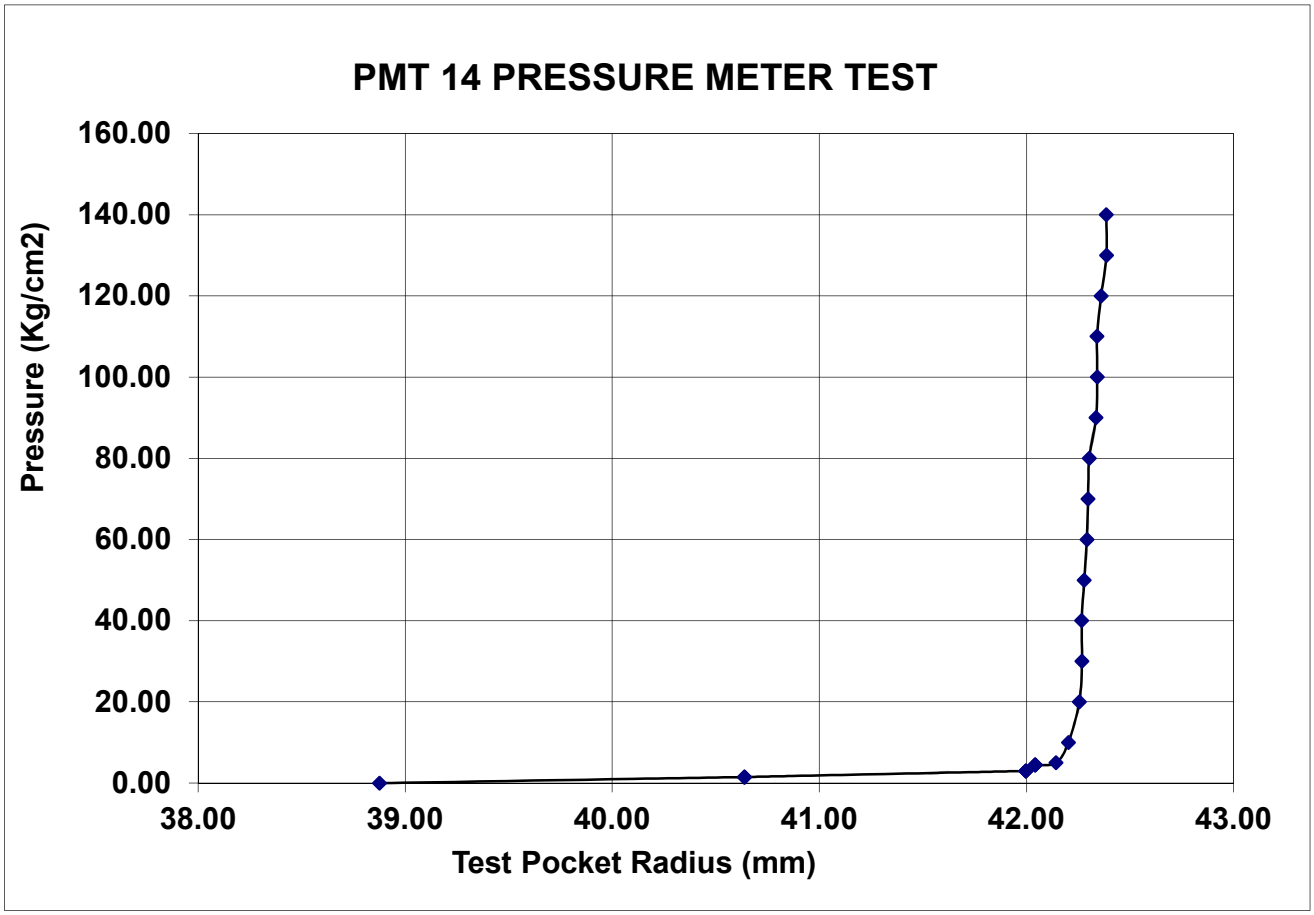
PMT: 14 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	60.00	
Intial Radius (mm) =	42.27	
Final Radius (mm) =	42.34	
Δ R(cm) =	**0.007**	
r(cm)=	4.2305	**γ =** 0.3

Calculations

K= ΔP/ΔR =	8571.428571	
E=(1+γ)rK=	47139.8571	(kg/cm2)
G= E/2(1+γ)=	30640.9071	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-01	DATE	08.08.2019
LOCATION		TEST DEPTH (m)	25.30-25.90
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	M.W. BRECCIA		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.22	23.28	-0.02	23.30	38.95
2	15	0.15	1.50	3.18	26.68	-0.02	26.70	41.08
3	15	0.15	1.50	3.18	26.68	-0.02	26.70	41.08
4	15	0.15	1.50	3.18	26.68	-0.02	26.70	41.08
5	15	0.30	3.00	5.61	29.11	-0.02	29.13	42.69
6	15	0.30	3.00	5.61	29.11	-0.02	29.13	42.69
7	15	0.30	3.00	5.61	29.11	-0.02	29.13	42.69
8	15	0.45	4.50	6.40	29.90	-0.01	29.91	43.23
9	15	0.45	4.50	6.40	29.90	-0.01	29.91	43.23
10	15	0.45	4.50	6.40	29.90	-0.01	29.91	43.23
		0.50	5.00	6.42	29.92	-0.01	29.93	43.25
11		1.00	10.00	6.48	29.98	0.00	29.98	43.28
12		2.00	20.00	6.51	30.01	0.02	29.99	43.29
13		3.00	30.00	6.55	30.05	0.04	30.01	43.30
14		4.00	40.00	6.58	30.08	0.06	30.02	43.31
15		5.00	50.00	6.61	30.11	0.09	30.02	43.31
16		6.00	60.00	6.66	30.16	0.11	30.05	43.33
17		7.00	70.00	6.70	30.20	0.13	30.07	43.34
18		8.00	80.00	6.73	30.23	0.15	30.08	43.35
19		9.00	90.00	6.78	30.28	0.17	30.11	43.37
20		10.00	100.00	6.81	30.31	0.19	30.12	43.38
21		11.00	110.00	6.84	30.34	0.21	30.13	43.38
22		12.00	120.00	6.88	30.38	0.24	30.14	43.40
23		13.00	130.00	6.93	30.43	0.26	30.17	43.42
24		14.00	140.00	6.99	30.49	0.28	30.21	43.44
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=46.66		
	Expansion Correction S (mm2)= 3059.84		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

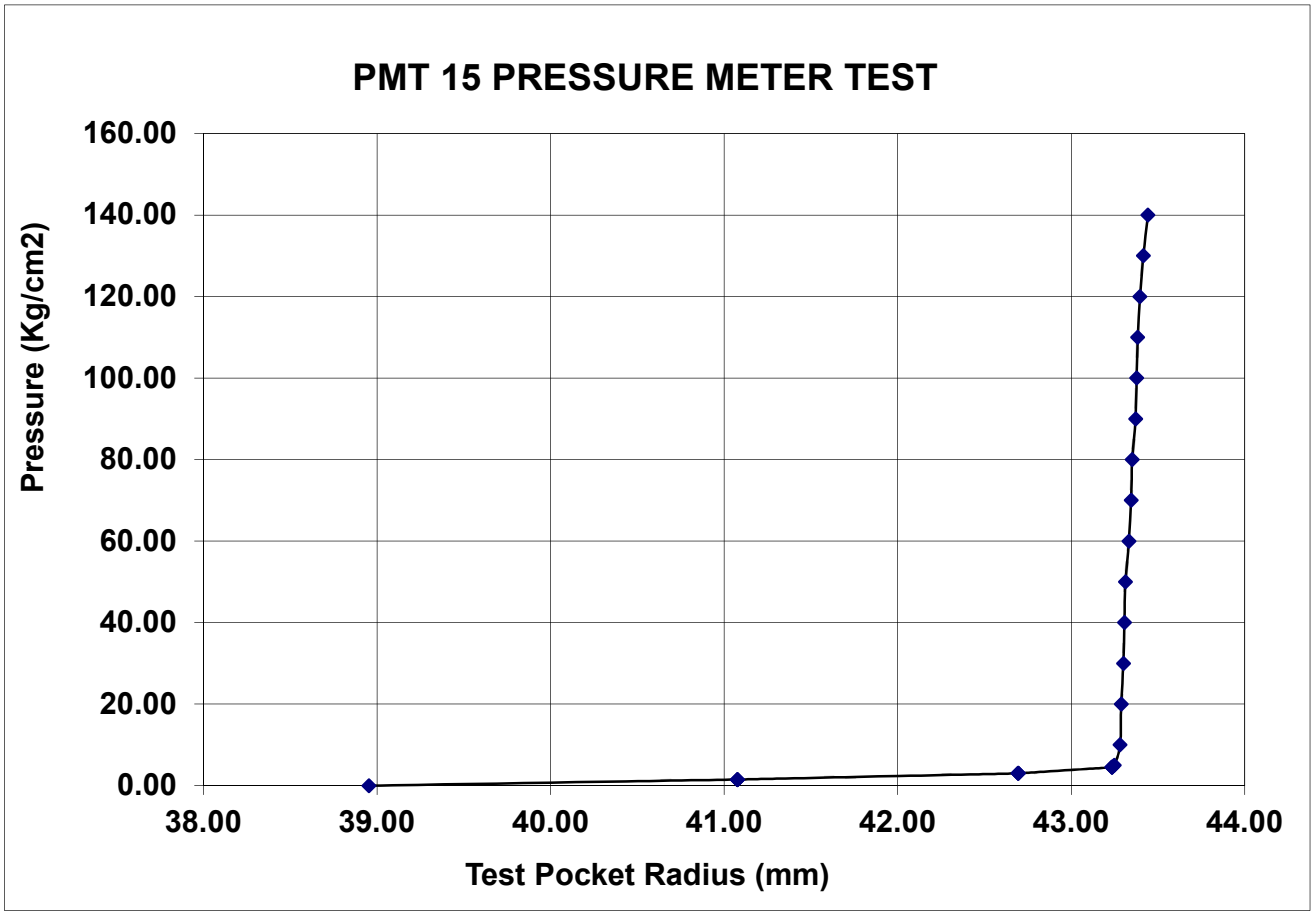
PMT: 15 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	60.00	
Intial Radius (mm) =	43.31	
Final Radius (mm) =	43.38	
Δ R(cm) =	**0.007**	
r(cm)=	4.3345	**γ =** 0.3

Calculations

K= ΔP/ΔR =	8571.428571	
E=(1+γ)rK=	48298.7143	(kg/cm2)
G= E/2(1+γ)=	31394.1643	(kg/cm2)

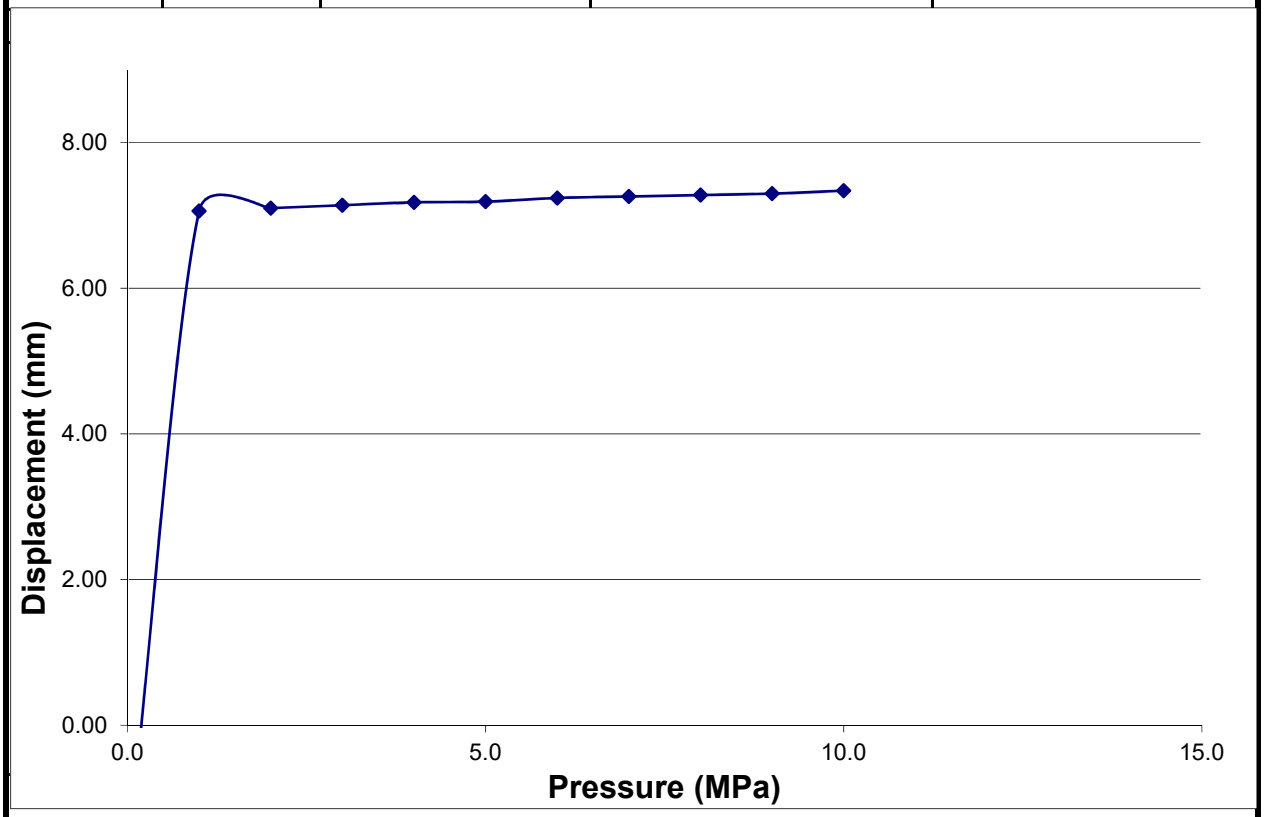


Project:	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.

Field Calibration of Probe

Date: 23.08.2019

S.No	Pressure (Mpa)	Displacement (Rp) (mm)	Pressure Variation (P ' = P-1) (Mpa)	Thickness variation volume (R' = Rp -Rp1) (mm)
1				
2	0.0	-1.87		
3	1.0	7.06	0.0	0.00
4	2.0	7.10	1.0	0.04
5	3.0	7.14	2.0	0.08
6	4.0	7.18	3.0	0.12
7	5.0	7.19	4.0	0.13
8	6.0	7.24	5.0	0.18
9	7.0	7.26	6.0	0.20
10	8.0	7.28	7.0	0.22
11	9.0	7.30	8.0	0.24
12	10.0	7.34	9.0	0.28



K	35
S	3066.643992

Thickness Variation	Pressure Variation
x	y
0.24	9.00
0.04	2.00

PRESSURE METER TEST								
PROJECT		Geo Technical & Geo Physical Investigation Work For Bullet Train At BK						
NAME OF CLIENT		NHSRCL			SIZE OF BOREHOLE (mm)			Nx
BOREHOLE NO.		PBH-02			DATE			23.08.2019
LOCATION					TEST DEPTH (m)			93.90-94.50
RL (m)					FINAL DEPTH (m)			95.00
TYPE OF STRATA		Fresh To S.W.						
Sr No	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacemer Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.70	21.80	-0.03	21.83	38.12
2	15	0.15	1.50	-1.25	22.25	-0.02	22.27	38.38
3	15	0.15	1.50	-1.24	22.26	-0.02	22.28	38.38
4	15	0.15	1.50	-1.24	22.26	-0.02	22.28	38.38
5	15	0.30	3.00	-0.30	23.20	-0.02	23.22	38.93
6	15	0.30	3.00	-0.30	23.20	-0.02	23.22	38.93
7	15	0.30	3.00	-0.30	23.20	-0.02	23.22	38.93
8	15	0.45	4.50	1.29	24.79	-0.02	24.81	39.90
9	15	0.45	4.50	1.29	24.79	-0.02	24.81	39.90
10	15	0.45	4.50	1.29	24.79	-0.02	24.81	39.90
11		0.50	5.00	1.90	25.40	-0.01	25.41	40.28
12		1.00	10.00	2.58	26.08	0.00	26.08	40.70
13		2.00	20.00	2.65	26.15	0.03	26.12	40.73
14		3.00	30.00	2.69	26.19	0.06	26.13	40.74
15		4.00	40.00	2.72	26.22	0.09	26.13	40.74
16		5.00	50.00	2.75	26.25	0.11	26.14	40.74
17		6.00	60.00	2.80	26.30	0.14	26.16	40.75
18		7.00	70.00	2.83	26.33	0.17	26.16	40.75
19		8.00	80.00	2.87	26.37	0.20	26.17	40.76
20		9.00	90.00	2.90	26.40	0.23	26.17	40.76
21		10.00	100.00	2.94	26.44	0.26	26.18	40.77
22		11.00	110.00	2.97	26.47	0.29	26.18	40.77
23		12.00	120.00	2.99	26.49	0.31	26.18	40.77
24		13.00	130.00	3.02	26.52	0.34	26.18	40.77
25		14.00	140.00	3.05	26.55	0.37	26.18	40.77
26		15.00	150.00	3.08	26.58	0.40	26.18	40.77
27								
28								
29								
Calculation Notes:					Type Of Prob	1		
Membrane Calibration Constants					Thickness Correction K :Mn/m2/mm=35			
					Expansion Correction S (mm2)= 3066.644			
						Job No	Prepared by	Cheked By
						1612	Vaibhav	Prasad

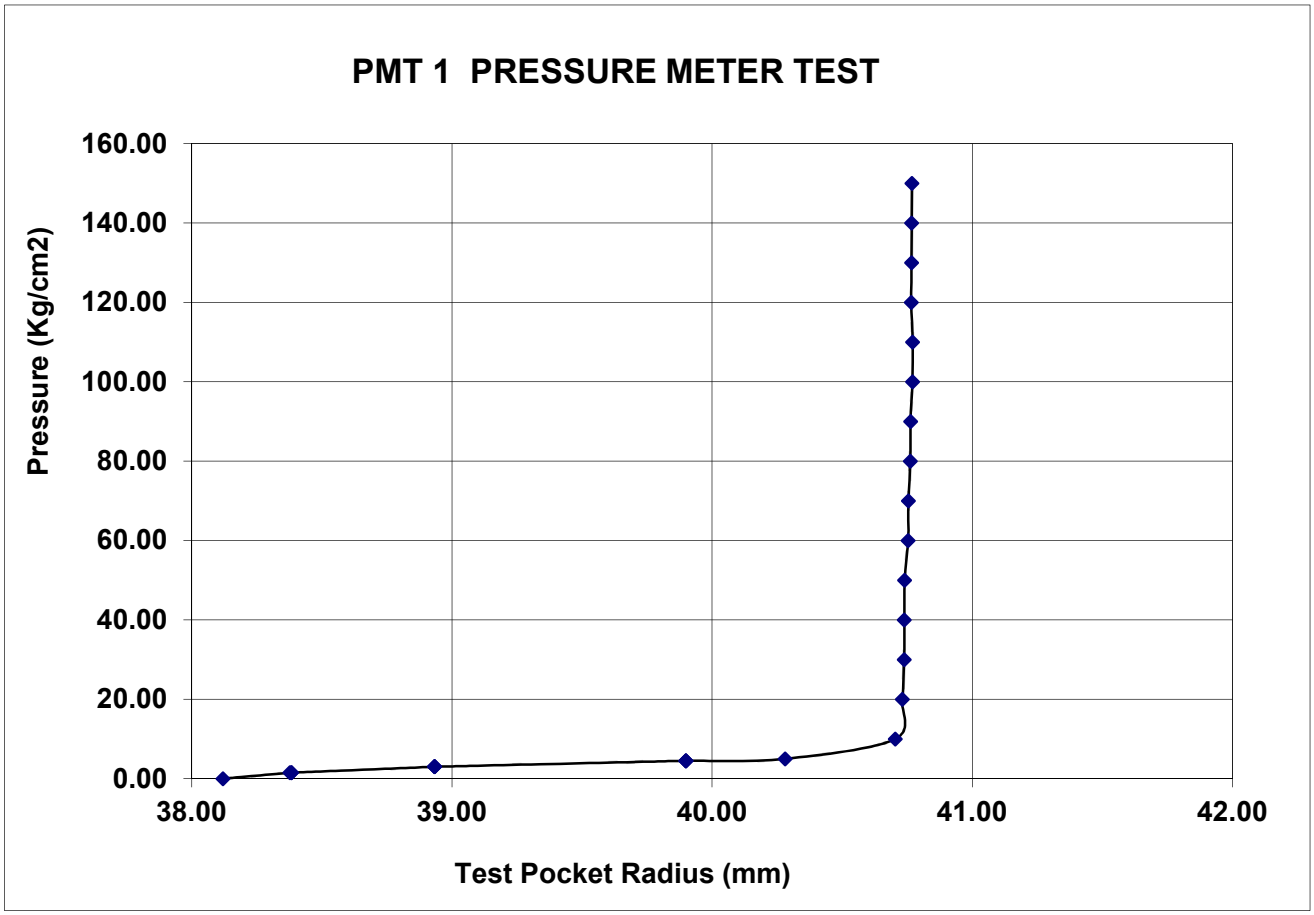
PMT: 1 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	70.00		
Intial Radius (mm) =	40.74		
Final Radius (mm) =	40.77		
Δ R(cm) =	**0.003**		
r(cm)=	4.0755		**γ =** 0.3

Calculations

K= ΔP/ΔR =	23333.33333	
E=(1+γ)rK=	123623.5000	(kg/cm2)
G= E/2(1+γ)=	80355.2750	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	89.50-90.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.65	21.85	-0.03	21.88	38.15
2	15	0.15	1.50	-0.58	22.92	-0.02	22.94	38.77
3	15	0.15	1.50	-0.58	22.92	-0.02	22.94	38.77
4	15	0.15	1.50	-0.58	22.92	-0.02	22.94	38.77
5	15	0.30	3.00	0.65	24.15	-0.02	24.17	39.51
6	15	0.30	3.00	0.65	24.15	-0.02	24.17	39.51
7	15	0.30	3.00	0.65	24.15	-0.02	24.17	39.51
8	15	0.45	4.50	2.10	25.60	-0.02	25.62	40.41
9	15	0.45	4.50	2.10	25.60	-0.02	25.62	40.41
10	15	0.45	4.50	2.10	25.60	-0.02	25.62	40.41
11		0.50	5.00	2.27	25.77	-0.01	25.78	40.51
12		1.00	10.00	2.93	26.43	0.00	26.43	40.93
13		2.00	20.00	2.99	26.49	0.03	26.46	40.95
14		3.00	30.00	3.02	26.52	0.06	26.46	40.95
15		4.00	40.00	3.05	26.55	0.09	26.46	40.95
16		5.00	50.00	3.11	26.61	0.11	26.50	40.97
17		6.00	60.00	3.13	26.63	0.14	26.49	40.97
18		7.00	70.00	3.18	26.68	0.17	26.51	40.98
19		8.00	80.00	3.21	26.71	0.20	26.51	40.98
20		9.00	90.00	3.23	26.73	0.23	26.50	40.98
21		10.00	100.00	3.27	26.77	0.26	26.51	40.98
22		11.00	110.00	3.30	26.80	0.29	26.51	40.98
23		12.00	120.00	3.34	26.84	0.31	26.53	40.99
24		13.00	130.00	3.36	26.86	0.34	26.52	40.99
25		14.00	140.00	3.40	26.90	0.37	26.53	40.99
26		15.00	150.00	3.43	26.93	0.40	26.53	40.99
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

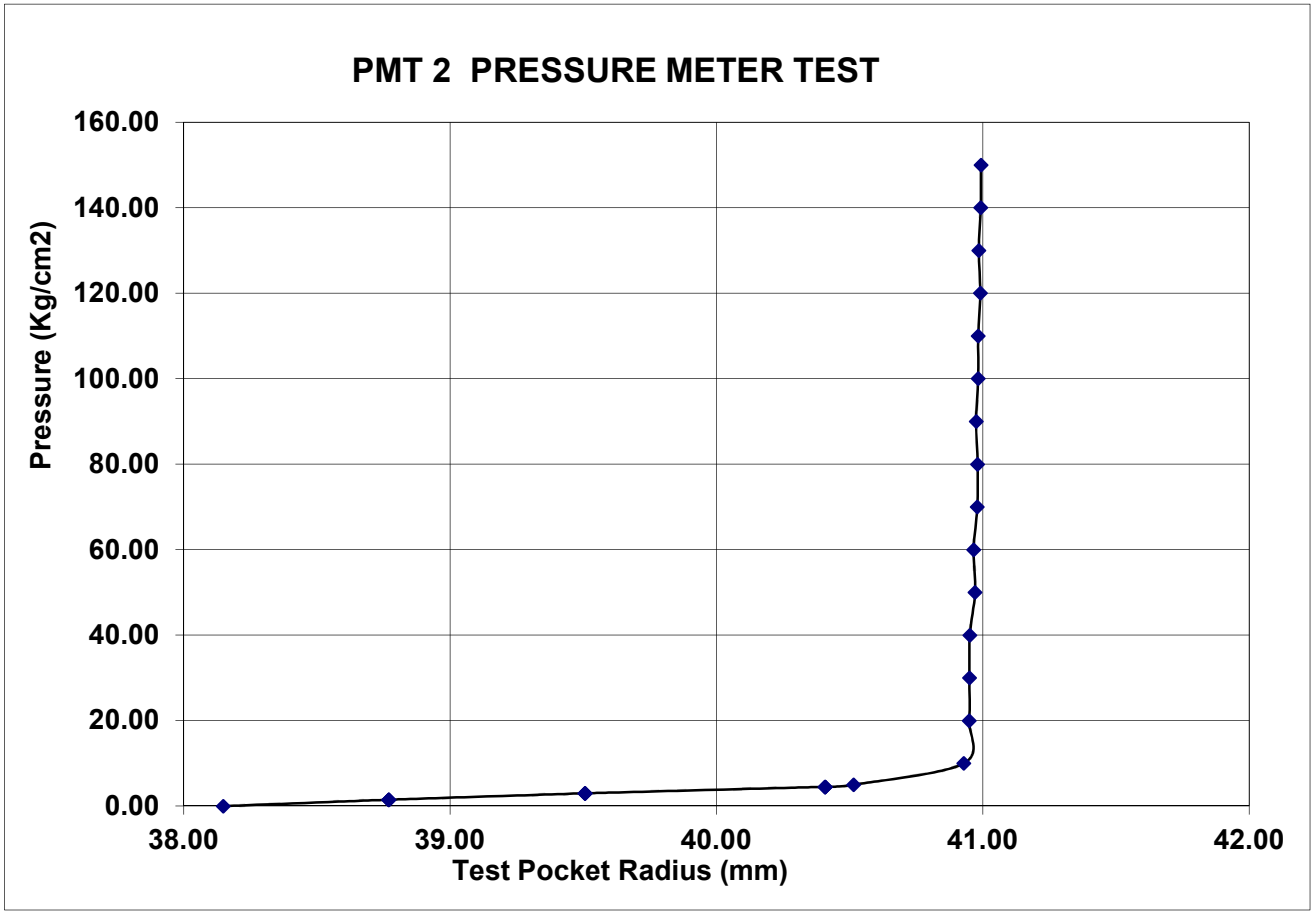
PMT: 2 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	70.00		
Intial Radius (mm) =	40.95		
Final Radius (mm) =	40.98		
Δ R(cm) =	**0.003**		
r(cm)=	4.0965		**γ =** 0.3

Calculations

K= ΔP/ΔR =	23333.33333	
E=(1+γ)rK=	124260.5000	(kg/cm2)
G= E/2(1+γ)=	80769.3250	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	85.00-86.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.44	22.06	-0.03	22.09	38.27
2	15	0.15	1.50	-0.52	22.98	-0.02	23.00	38.80
3	15	0.15	1.50	-0.52	22.98	-0.02	23.00	38.80
4	15	0.15	1.50	-0.52	22.98	-0.02	23.00	38.80
5	15	0.30	3.00	0.34	23.84	-0.02	23.86	39.32
6	15	0.30	3.00	0.34	23.84	-0.02	23.86	39.32
7	15	0.30	3.00	0.34	23.84	-0.02	23.86	39.32
8	15	0.45	4.50	1.74	25.24	-0.02	25.26	40.18
9	15	0.45	4.50	1.74	25.24	-0.02	25.26	40.18
10	15	0.45	4.50	1.74	25.24	-0.02	25.26	40.18
11		0.50	5.00	2.30	25.80	-0.01	25.81	40.53
12		1.00	10.00	3.06	26.56	0.00	26.56	41.01
13		2.00	20.00	3.11	26.61	0.03	26.58	41.03
14		3.00	30.00	3.18	26.68	0.06	26.62	41.05
15		4.00	40.00	3.24	26.74	0.09	26.65	41.07
16		5.00	50.00	3.26	26.76	0.11	26.65	41.07
17		6.00	60.00	3.31	26.81	0.14	26.67	41.08
18		7.00	70.00	3.34	26.84	0.17	26.67	41.08
19		8.00	80.00	3.38	26.88	0.20	26.68	41.09
20		9.00	90.00	3.43	26.93	0.23	26.70	41.10
21		10.00	100.00	3.45	26.95	0.26	26.69	41.10
22		11.00	110.00	3.50	27.00	0.29	26.71	41.11
23		12.00	120.00	3.52	27.02	0.31	26.71	41.11
24		13.00	130.00	3.57	27.07	0.34	26.73	41.12
25		14.00	140.00	3.61	27.11	0.37	26.74	41.13
26		15.00	150.00	3.65	27.15	0.40	26.75	41.14
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

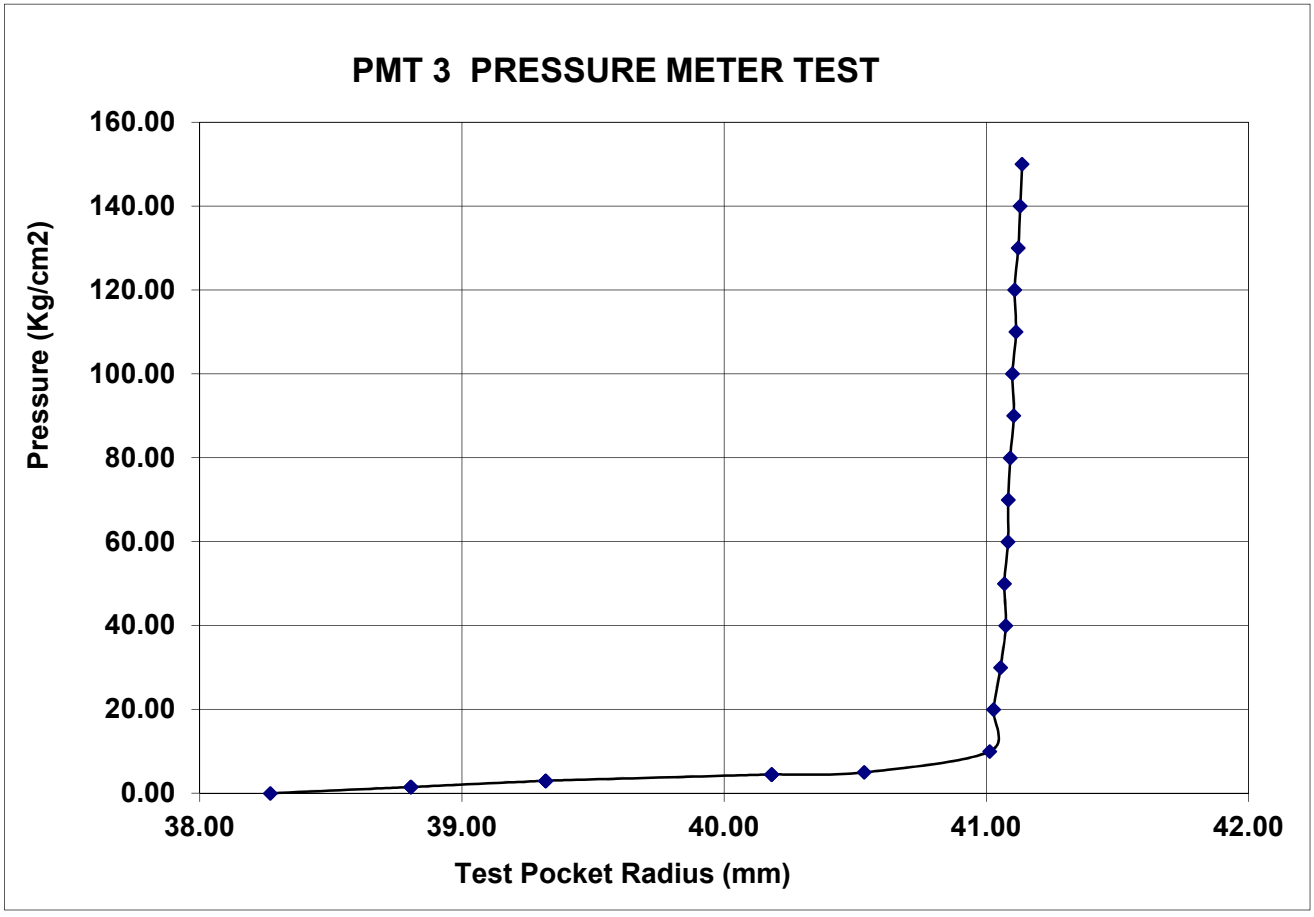
PMT: 3 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.07		
Final Radius (mm) =	41.1		
Δ R(cm) =	**0.003**		
r(cm)=	4.1085		**γ =** 0.3

Calculations

K= ΔP/ΔR =	20000	
E=(1+γ)rK=	106821.0000	(kg/cm2)
G= E/2(1+γ)=	69433.6500	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	79.50-80.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.34	22.16	-0.03	22.19	38.32
2	15	0.15	1.50	-0.52	22.98	-0.02	23.00	38.80
3	15	0.15	1.50	-0.52	22.98	-0.02	23.00	38.80
4	15	0.15	1.50	-0.52	22.98	-0.02	23.00	38.80
5	15	0.30	3.00	0.38	23.88	-0.02	23.90	39.34
6	15	0.30	3.00	0.38	23.88	-0.02	23.90	39.34
7	15	0.30	3.00	0.38	23.88	-0.02	23.90	39.34
8	15	0.45	4.50	1.86	25.36	-0.02	25.38	40.25
9	15	0.45	4.50	1.86	25.36	-0.02	25.38	40.25
10	15	0.45	4.50	1.86	25.36	-0.02	25.38	40.25
11		0.50	5.00	2.43	25.93	-0.01	25.94	40.61
12		1.00	10.00	3.24	26.74	0.00	26.74	41.13
13		2.00	20.00	3.28	26.78	0.03	26.75	41.13
14		3.00	30.00	3.33	26.83	0.06	26.77	41.15
15		4.00	40.00	3.40	26.90	0.09	26.81	41.17
16		5.00	50.00	3.45	26.95	0.11	26.84	41.19
17		6.00	60.00	3.50	27.00	0.14	26.86	41.20
18		7.00	70.00	3.53	27.03	0.17	26.86	41.20
19		8.00	80.00	3.56	27.06	0.20	26.86	41.20
20		9.00	90.00	3.60	27.10	0.23	26.87	41.21
21		10.00	100.00	3.64	27.14	0.26	26.88	41.22
22		11.00	110.00	3.70	27.20	0.29	26.91	41.24
23		12.00	120.00	3.75	27.25	0.31	26.94	41.25
24		13.00	130.00	3.79	27.29	0.34	26.95	41.26
25		14.00	140.00	3.84	27.34	0.37	26.97	41.28
26		15.00	150.00	3.93	27.43	0.40	27.03	41.32
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

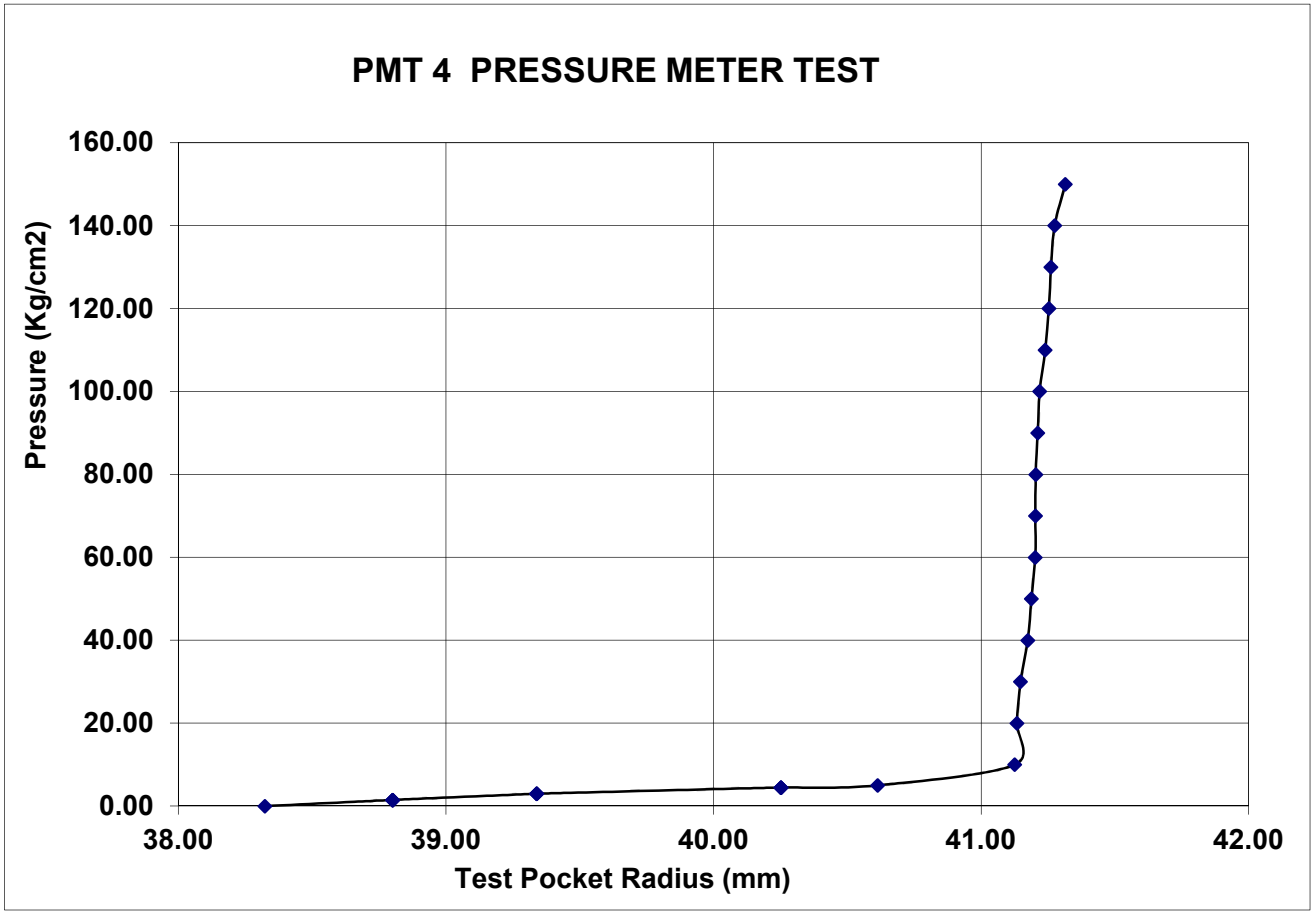
PMT: 4 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	90.00	
Δ P (Kg/cm2) =	50.00	
Intial Radius (mm) =	41.17	
Final Radius (mm) =	41.21	
Δ R(cm) =	**0.004**	
r(cm)=	4.119	**γ =** 0.3

Calculations

K= ΔP/ΔR =	12500	
E=(1+γ)rK=	66933.7500	(kg/cm2)
G= E/2(1+γ)=	43506.9375	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	76.00-76.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.21	22.29	-0.03	22.32	38.40
2	15	0.15	1.50	-0.29	23.21	-0.02	23.23	38.94
3	15	0.15	1.50	-0.29	23.21	-0.02	23.23	38.94
4	15	0.15	1.50	-0.29	23.21	-0.02	23.23	38.94
5	15	0.30	3.00	0.76	24.26	-0.02	24.28	39.57
6	15	0.30	3.00	0.76	24.26	-0.02	24.28	39.57
7	15	0.30	3.00	0.76	24.26	-0.02	24.28	39.57
8	15	0.45	4.50	2.41	25.91	-0.02	25.93	40.60
9	15	0.45	4.50	2.41	25.91	-0.02	25.93	40.60
10	15	0.45	4.50	2.41	25.91	-0.02	25.93	40.60
11		0.50	5.00	2.91	26.41	-0.01	26.42	40.92
12		1.00	10.00	3.21	26.71	0.00	26.71	41.11
13		2.00	20.00	3.24	26.74	0.03	26.71	41.11
14		3.00	30.00	3.28	26.78	0.06	26.72	41.11
15		4.00	40.00	3.35	26.85	0.09	26.76	41.14
16		5.00	50.00	3.38	26.88	0.11	26.77	41.14
17		6.00	60.00	3.43	26.93	0.14	26.79	41.16
18		7.00	70.00	3.48	26.98	0.17	26.81	41.17
19		8.00	80.00	3.53	27.03	0.20	26.83	41.18
20		9.00	90.00	3.59	27.09	0.23	26.86	41.21
21		10.00	100.00	3.64	27.14	0.26	26.88	41.22
22		11.00	110.00	3.67	27.17	0.29	26.88	41.22
23		12.00	120.00	3.70	27.20	0.31	26.89	41.22
24		13.00	130.00	3.75	27.25	0.34	26.91	41.23
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3066.644		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

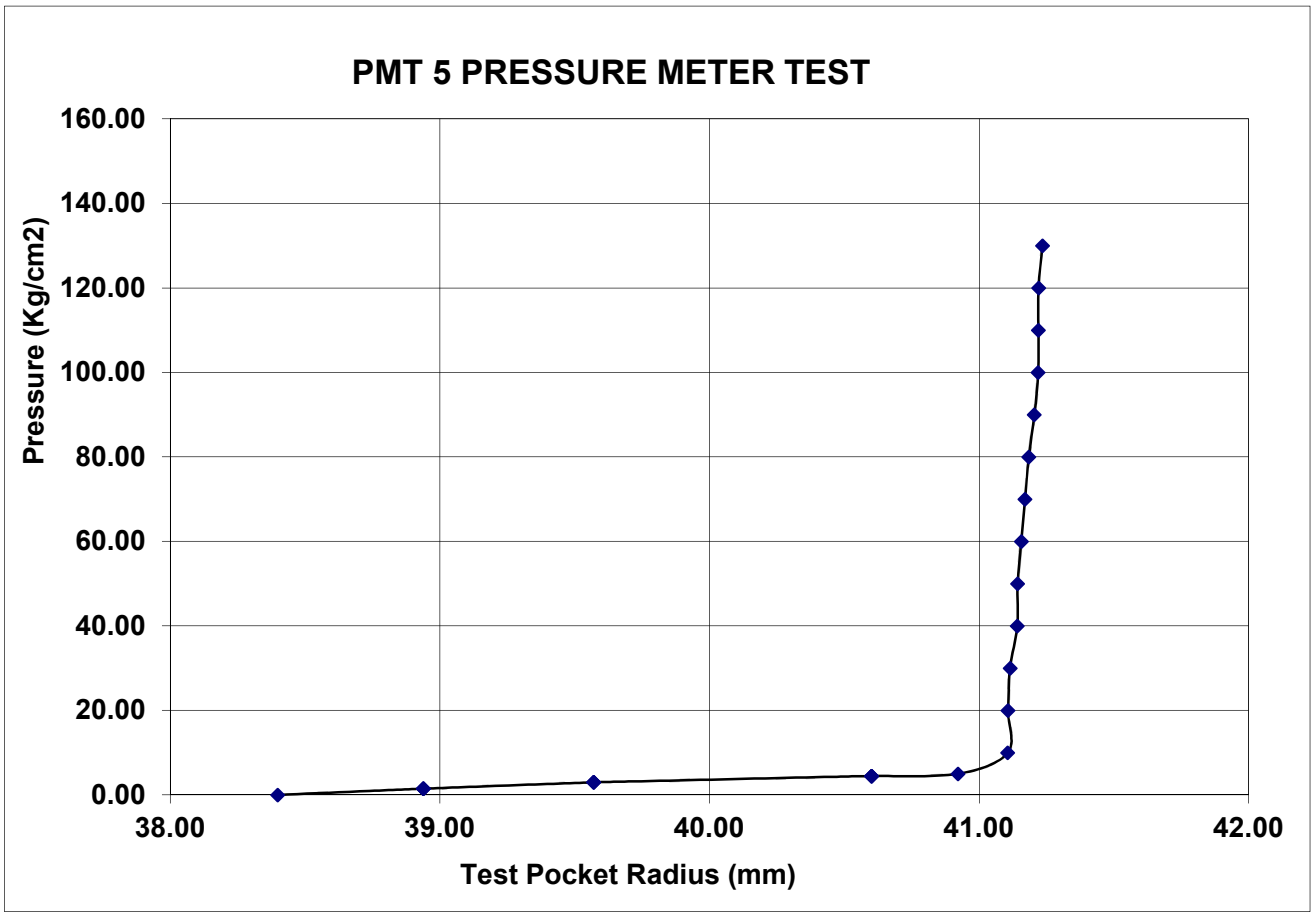
PMT: 5 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.14		
Final Radius (mm) =	41.22		
Δ R(cm) =	**0.008**		
r(cm)=	4.118		**γ =** 0.3

Calculations

K= ΔP/ΔR =	7500	
E=(1+γ)rK=	40150.5000	(kg/cm2)
G= E/2(1+γ)=	26097.8250	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	71.00-71.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.17	22.33	-0.03	22.36	38.42
2	15	0.15	1.50	0.01	23.51	-0.02	23.53	39.12
3	15	0.15	1.50	0.01	23.51	-0.02	23.53	39.12
4	15	0.15	1.50	0.01	23.51	-0.02	23.53	39.12
5	15	0.30	3.00	1.31	24.81	-0.02	24.83	39.91
6	15	0.30	3.00	1.31	24.81	-0.02	24.83	39.91
7	15	0.30	3.00	1.31	24.81	-0.02	24.83	39.91
8	15	0.45	4.50	3.15	26.65	-0.02	26.67	41.08
9	15	0.45	4.50	3.15	26.65	-0.02	26.67	41.08
10	15	0.45	4.50	3.15	26.65	-0.02	26.67	41.08
11		0.50	5.00	3.27	26.77	-0.01	26.78	41.15
12		1.00	10.00	3.30	26.80	0.00	26.80	41.17
13		2.00	20.00	3.34	26.84	0.03	26.81	41.17
14		3.00	30.00	3.37	26.87	0.06	26.81	41.17
15		4.00	40.00	3.42	26.92	0.09	26.83	41.19
16		5.00	50.00	3.48	26.98	0.11	26.87	41.21
17		6.00	60.00	3.51	27.01	0.14	26.87	41.21
18		7.00	70.00	3.53	27.03	0.17	26.86	41.20
19		8.00	80.00	3.58	27.08	0.20	26.88	41.22
20		9.00	90.00	3.62	27.12	0.23	26.89	41.22
21		10.00	100.00	3.65	27.15	0.26	26.89	41.23
22		11.00	110.00	3.68	27.18	0.29	26.89	41.23
23		12.00	120.00	3.71	27.21	0.31	26.90	41.23
24		13.00	130.00	3.74	27.24	0.34	26.90	41.23
25		14.00	140.00	3.77	27.27	0.37	26.90	41.23
26		15.00	150.00	3.81	27.31	0.40	26.91	41.24
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3066.644		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

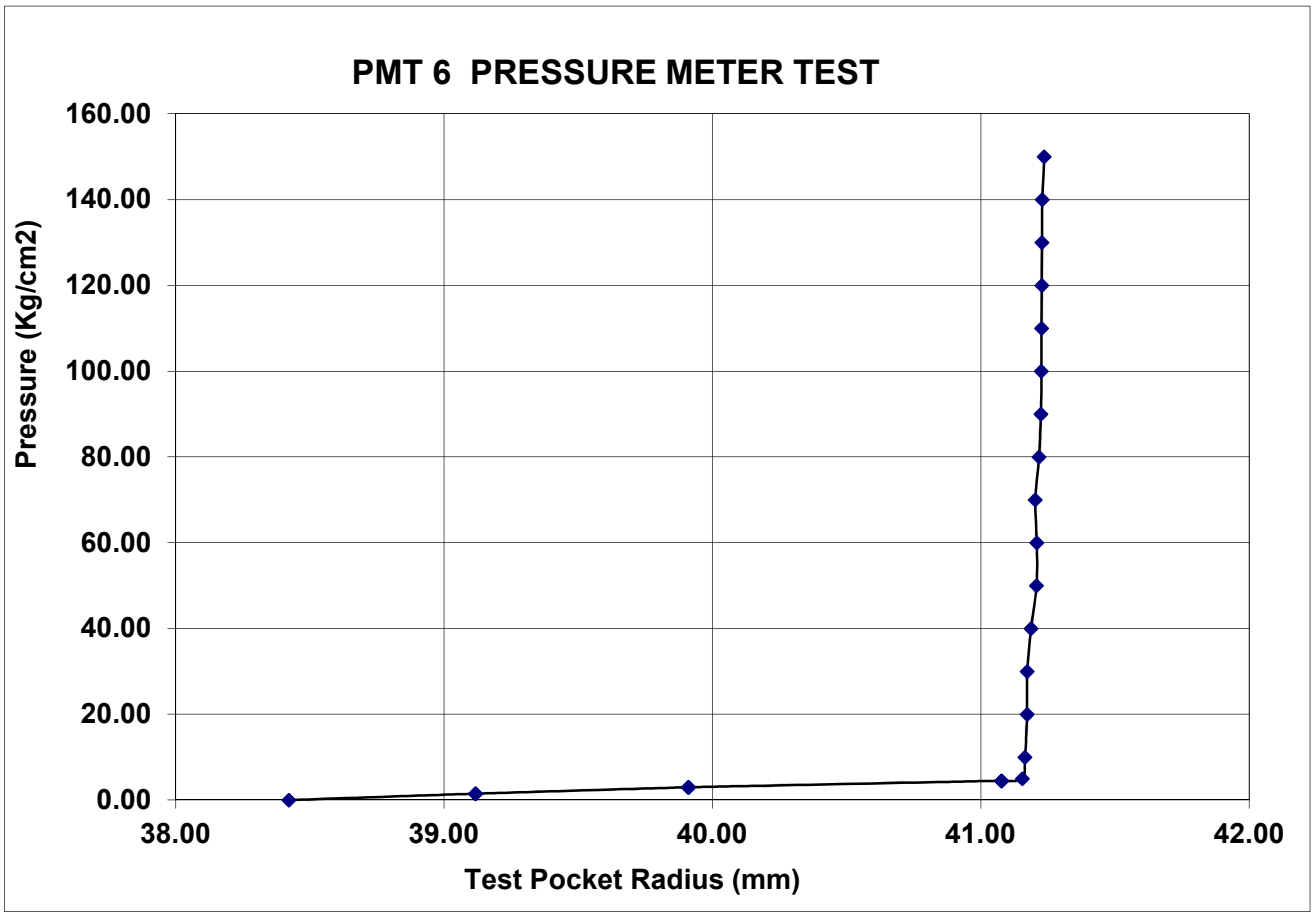
PMT: 6 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	70.00	
Intial Radius (mm) =	41.17	
Final Radius (mm) =	41.23	
Δ R(cm) =	**0.006**	
r(cm)=	4.12	**γ =** 0.3

Calculations

K= ΔP/ΔR =	11666.66667	
E=(1+γ)rK=	62486.6667	(kg/cm2)
G= E/2(1+γ)=	40616.3333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	65.50-66.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Rock		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.12	22.38	-0.03	22.41	38.45
2	15	0.15	1.50	-0.34	23.16	-0.02	23.18	38.91
3	15	0.15	1.50	-0.34	23.16	-0.02	23.18	38.91
4	15	0.15	1.50	-0.34	23.16	-0.02	23.18	38.91
5	15	0.30	3.00	0.60	24.10	-0.02	24.12	39.47
6	15	0.30	3.00	0.60	24.10	-0.02	24.12	39.47
7	15	0.30	3.00	0.60	24.10	-0.02	24.12	39.47
8	15	0.45	4.50	2.09	25.59	-0.02	25.61	40.40
9	15	0.45	4.50	2.09	25.59	-0.02	25.61	40.40
10	15	0.45	4.50	2.09	25.59	-0.02	25.61	40.40
11		0.50	5.00	2.66	26.16	-0.01	26.17	40.76
12		1.00	10.00	3.31	26.81	0.00	26.81	41.17
13		2.00	20.00	3.35	26.85	0.03	26.82	41.18
14		3.00	30.00	3.39	26.89	0.06	26.83	41.19
15		4.00	40.00	3.44	26.94	0.09	26.85	41.20
16		5.00	50.00	3.48	26.98	0.11	26.87	41.21
17		6.00	60.00	3.51	27.01	0.14	26.87	41.21
18		7.00	70.00	3.54	27.04	0.17	26.87	41.21
19		8.00	80.00	3.57	27.07	0.20	26.87	41.21
20		9.00	90.00	3.59	27.09	0.23	26.86	41.21
21		10.00	100.00	3.63	27.13	0.26	26.87	41.21
22		11.00	110.00	3.66	27.16	0.29	26.87	41.21
23		12.00	120.00	3.69	27.19	0.31	26.88	41.21
24		13.00	130.00	3.71	27.21	0.34	26.87	41.21
25		14.00	140.00	3.74	27.24	0.37	26.87	41.21
26		15.00	150.00	3.79	27.29	0.40	26.89	41.22
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

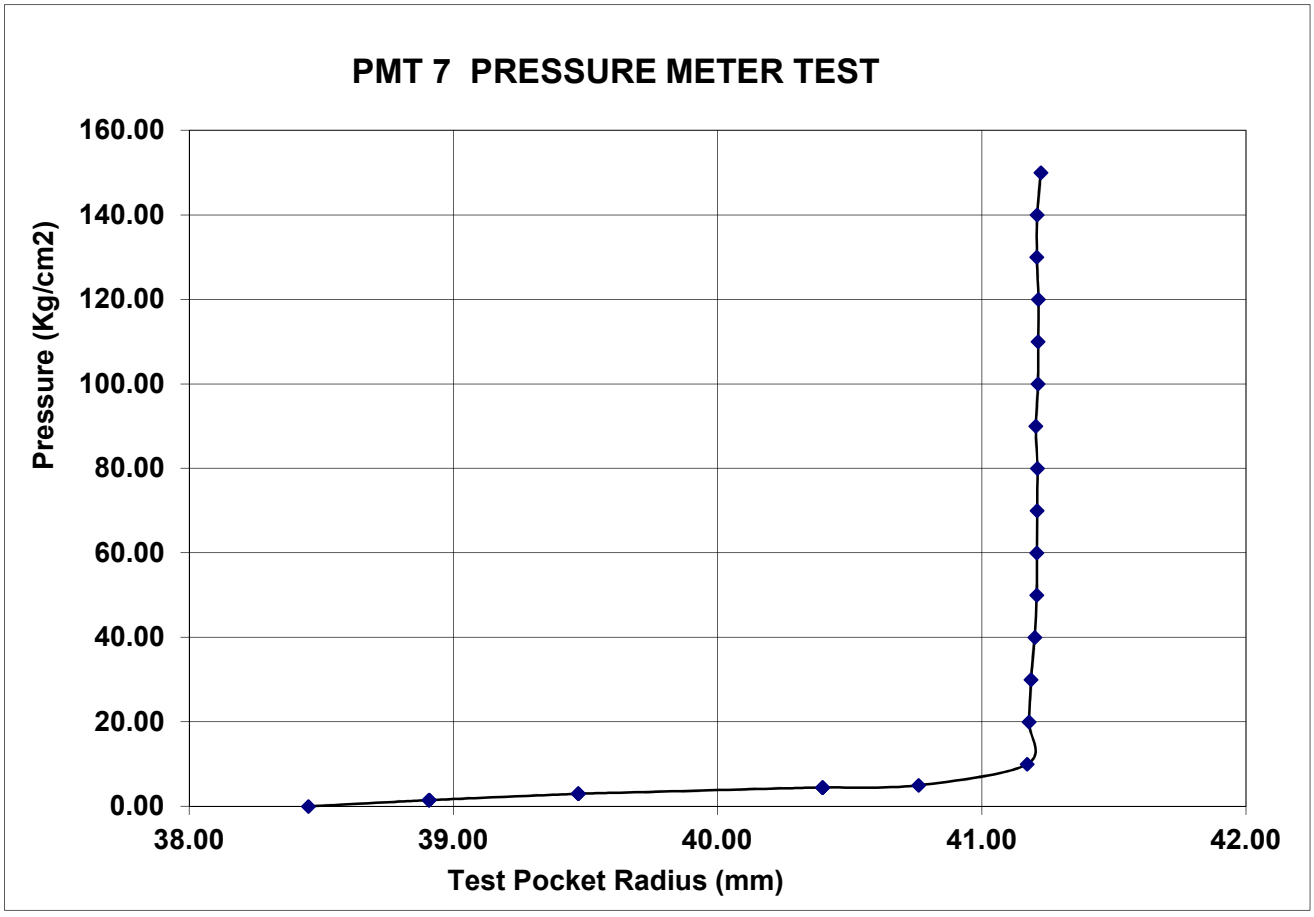
PMT: 7 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	70.00		
Intial Radius (mm) =	41.19		
Final Radius (mm) =	41.21		
Δ R(cm) =	**0.002**		
r(cm)=	4.12		**γ =** 0.3

Calculations

K= ΔP/ΔR =	35000	
E=(1+γ)rK=	187460.0000	(kg/cm2)
G= E/2(1+γ)=	121849.0000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	61.50-62.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.08	22.42	-0.03	22.45	38.47
2	15	0.15	1.50	-0.28	23.22	-0.02	23.24	38.94
3	15	0.15	1.50	-0.28	23.22	-0.02	23.24	38.94
4	15	0.15	1.50	-0.28	23.22	-0.02	23.24	38.94
5	15	0.30	3.00	0.91	24.41	-0.02	24.43	39.66
6	15	0.30	3.00	0.91	24.41	-0.02	24.43	39.66
7	15	0.30	3.00	0.91	24.41	-0.02	24.43	39.66
8	15	0.45	4.50	2.53	26.03	-0.02	26.05	40.68
9	15	0.45	4.50	2.53	26.03	-0.02	26.05	40.68
10	15	0.45	4.50	2.53	26.03	-0.02	26.05	40.68
11		0.50	5.00	3.05	26.55	-0.01	26.56	41.01
12		1.00	10.00	3.28	26.78	0.00	26.78	41.15
13		2.00	20.00	3.32	26.82	0.03	26.79	41.16
14		3.00	30.00	3.35	26.85	0.06	26.79	41.16
15		4.00	40.00	3.40	26.90	0.09	26.81	41.17
16		5.00	50.00	3.45	26.95	0.11	26.84	41.19
17		6.00	60.00	3.49	26.99	0.14	26.85	41.20
18		7.00	70.00	3.51	27.01	0.17	26.84	41.19
19		8.00	80.00	3.56	27.06	0.20	26.86	41.20
20		9.00	90.00	3.57	27.07	0.23	26.84	41.19
21		10.00	100.00	3.61	27.11	0.26	26.85	41.20
22		11.00	110.00	3.63	27.13	0.29	26.84	41.19
23		12.00	120.00	3.66	27.16	0.31	26.85	41.19
24		13.00	130.00	3.70	27.20	0.34	26.86	41.20
25		14.00	140.00	3.71	27.21	0.37	26.84	41.19
26		15.00	150.00	3.75	27.25	0.40	26.85	41.20
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

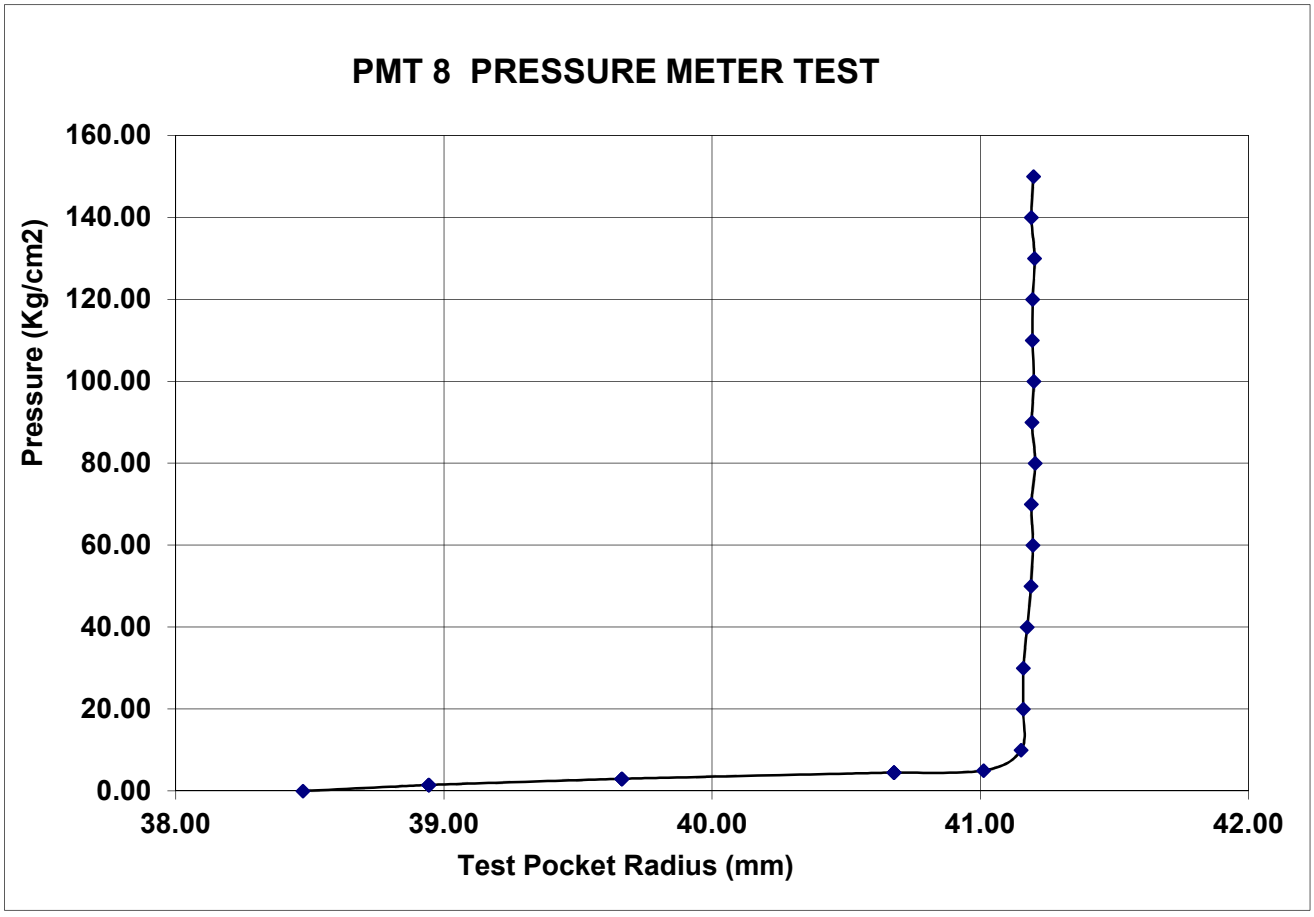
PMT: 8 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	70.00		
Intial Radius (mm) =	41.16		
Final Radius (mm) =	41.2		
Δ R(cm) =	**0.004**		
r(cm)=	4.118		**γ =** 0.3

Calculations

K= ΔP/ΔR =	17500	
E=(1+γ)rK=	93684.5000	(kg/cm2)
G= E/2(1+γ)=	60894.9250	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	56.00-56.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.85	22.65	-0.03	22.68	38.61
2	15	0.15	1.50	0.12	23.62	-0.02	23.64	39.18
3	15	0.15	1.50	0.12	23.62	-0.02	23.64	39.18
4	15	0.15	1.50	0.12	23.62	-0.02	23.64	39.18
5	15	0.30	3.00	1.37	24.87	-0.02	24.89	39.95
6	15	0.30	3.00	1.37	24.87	-0.02	24.89	39.95
7	15	0.30	3.00	1.37	24.87	-0.02	24.89	39.95
8	15	0.45	4.50	3.09	26.59	-0.02	26.61	41.04
9	15	0.45	4.50	3.09	26.59	-0.02	26.61	41.04
10	15	0.45	4.50	3.09	26.59	-0.02	26.61	41.04
11		0.50	5.00	3.12	26.62	-0.01	26.63	41.06
12		1.00	10.00	3.24	26.74	0.00	26.74	41.13
13		2.00	20.00	3.27	26.77	0.03	26.74	41.13
14		3.00	30.00	3.32	26.82	0.06	26.76	41.14
15		4.00	40.00	3.37	26.87	0.09	26.78	41.15
16		5.00	50.00	3.42	26.92	0.11	26.81	41.17
17		6.00	60.00	3.47	26.97	0.14	26.83	41.18
18		7.00	70.00	3.51	27.01	0.17	26.84	41.19
19		8.00	80.00	3.54	27.04	0.20	26.84	41.19
20		9.00	90.00	3.58	27.08	0.23	26.85	41.20
21		10.00	100.00	3.62	27.12	0.26	26.86	41.21
22		11.00	110.00	3.66	27.16	0.29	26.87	41.21
23		12.00	120.00	3.68	27.18	0.31	26.87	41.21
24		13.00	130.00	3.72	27.22	0.34	26.88	41.22
25		14.00	140.00	3.75	27.25	0.37	26.88	41.22
26		15.00	150.00	3.79	27.29	0.40	26.89	41.22
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

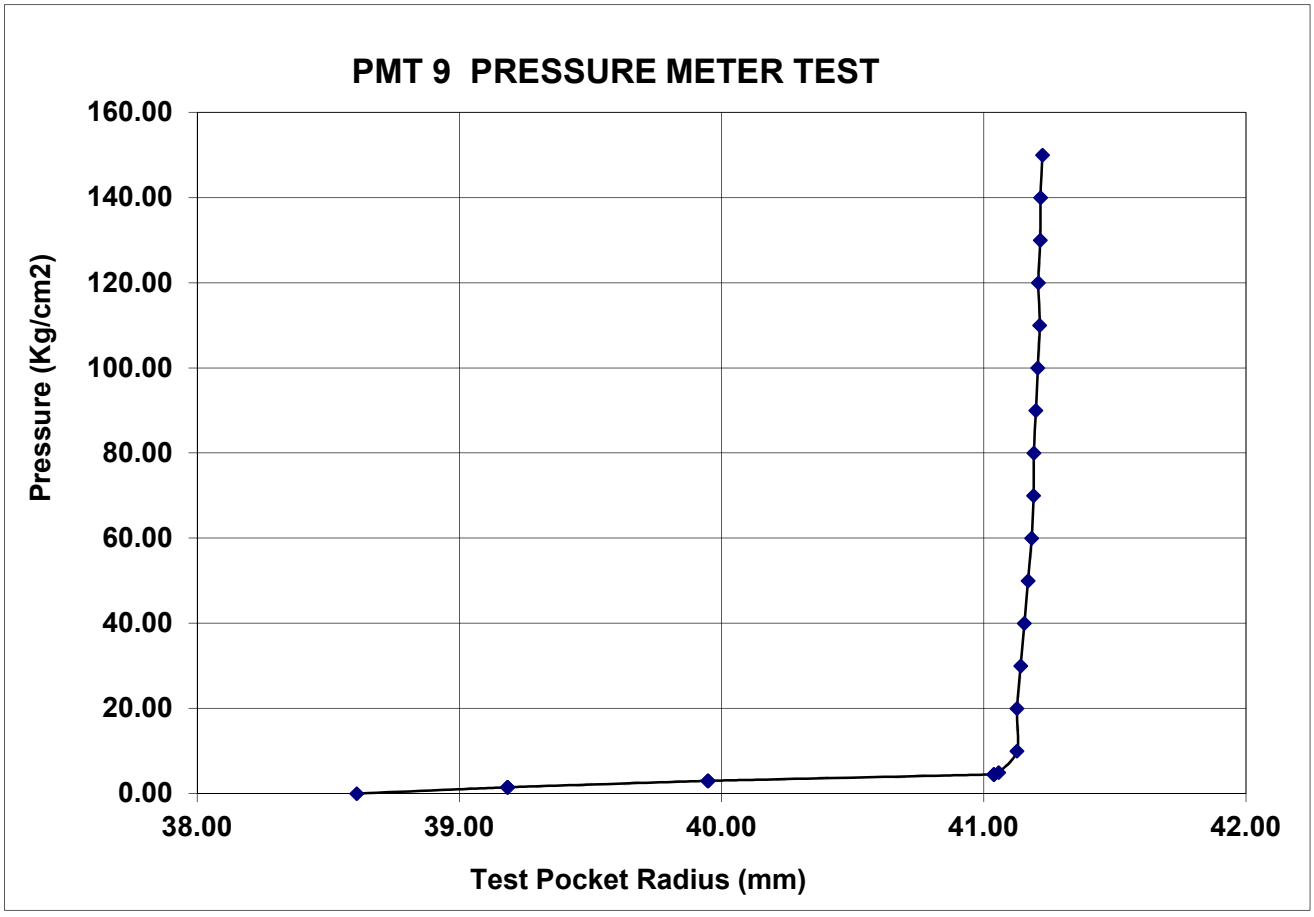
PMT: 9 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.15		
Final Radius (mm) =	41.21		
Δ R(cm) =	**0.006**		
r(cm)=	4.118		**γ =** 0.3

Calculations

K= ΔP/ΔR =	10000	
E=(1+γ)rK=	53534.0000	(kg/cm2)
G= E/2(1+γ)=	34797.1000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	51.50-52.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.75	22.75	-0.03	22.78	38.67
2	15	0.15	1.50	0.29	23.79	-0.02	23.81	39.29
3	15	0.15	1.50	0.29	23.79	-0.02	23.81	39.29
4	15	0.15	1.50	0.29	23.79	-0.02	23.81	39.29
5	15	0.30	3.00	1.57	25.07	-0.02	25.09	40.07
6	15	0.30	3.00	1.57	25.07	-0.02	25.09	40.07
7	15	0.30	3.00	1.57	25.07	-0.02	25.09	40.07
8	15	0.45	4.50	3.81	27.31	-0.02	27.33	41.51
9	15	0.45	4.50	3.81	27.31	-0.02	27.33	41.51
10	15	0.45	4.50	3.81	27.31	-0.02	27.33	41.51
11		0.50	5.00	4.18	27.68	-0.01	27.69	41.75
12		1.00	10.00	4.37	27.87	0.00	27.87	41.87
13		2.00	20.00	4.42	27.92	0.03	27.89	41.88
14		3.00	30.00	4.46	27.96	0.06	27.90	41.89
15		4.00	40.00	4.50	28.00	0.09	27.91	41.90
16		5.00	50.00	4.54	28.04	0.11	27.93	41.91
17		6.00	60.00	4.58	28.08	0.14	27.94	41.91
18		7.00	70.00	4.61	28.11	0.17	27.94	41.92
19		8.00	80.00	4.64	28.14	0.20	27.94	41.92
20		9.00	90.00	4.68	28.18	0.23	27.95	41.92
21		10.00	100.00	4.71	28.21	0.26	27.95	41.92
22		11.00	110.00	4.73	28.23	0.29	27.94	41.92
23		12.00	120.00	4.77	28.27	0.31	27.96	41.93
24		13.00	130.00	4.80	28.30	0.34	27.96	41.93
25		14.00	140.00	4.82	28.32	0.37	27.95	41.92
26		15.00	150.00	4.85	28.35	0.40	27.95	41.92
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

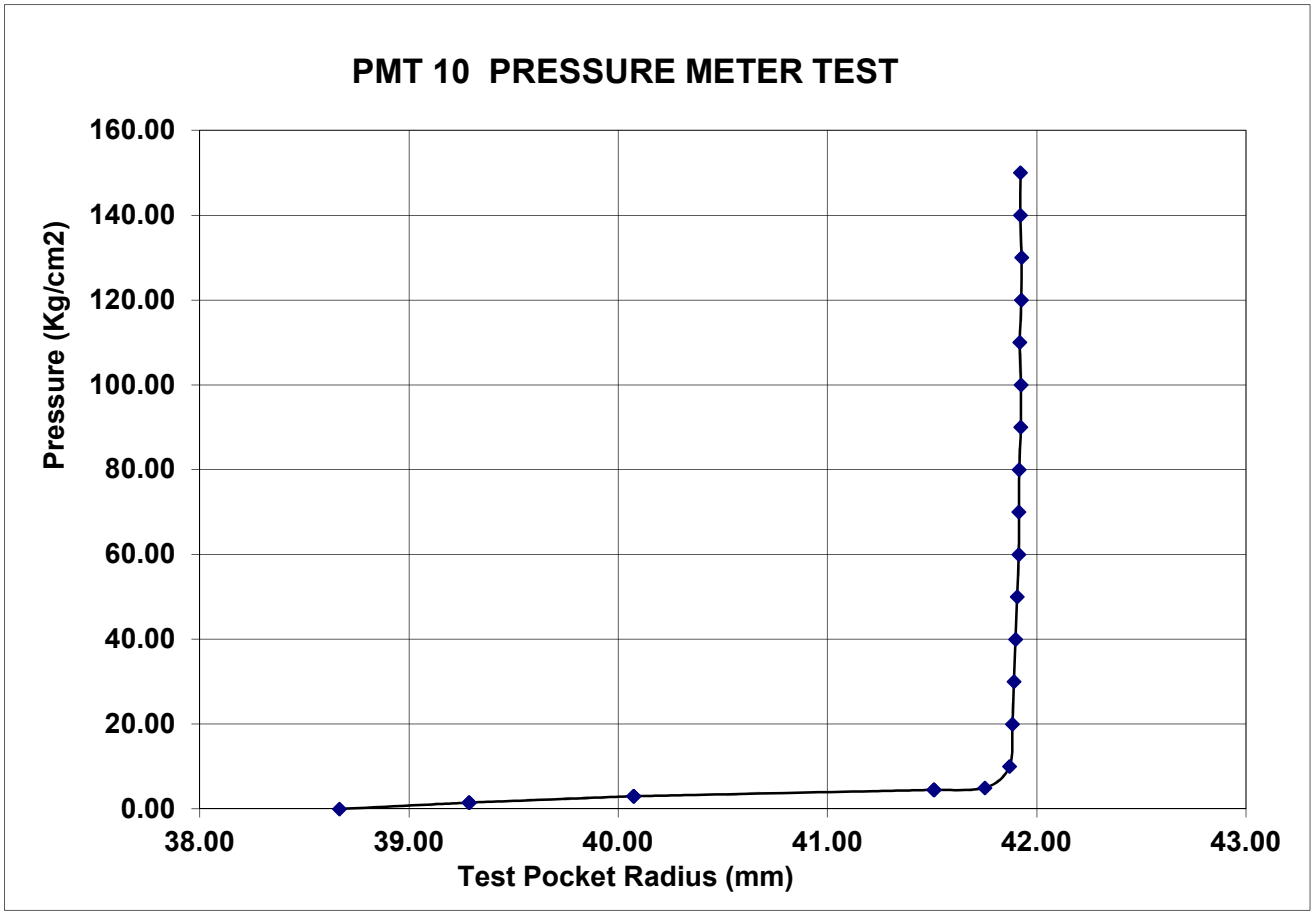
PMT: 10 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	90.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.89		
Final Radius (mm) =	41.92		
Δ R(cm) =	**0.003**		
r(cm)=	4.1905		**γ =** 0.3

Calculations

K= ΔP/ΔR =	20000	
E=(1+γ)rK=	108953.0000	(kg/cm2)
G= E/2(1+γ)=	70819.4500	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	45.50-46.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.45	23.05	-0.03	23.08	38.85
2	15	0.15	1.50	0.71	24.21	-0.02	24.23	39.54
3	15	0.15	1.50	0.71	24.21	-0.02	24.23	39.54
4	15	0.15	1.50	0.71	24.21	-0.02	24.23	39.54
5	15	0.30	3.00	2.47	25.97	-0.02	25.99	40.64
6	15	0.30	3.00	2.47	25.97	-0.02	25.99	40.64
7	15	0.30	3.00	2.47	25.97	-0.02	25.99	40.64
8	15	0.45	4.50	3.62	27.12	-0.02	27.14	41.38
9	15	0.45	4.50	3.62	27.12	-0.02	27.14	41.38
10	15	0.45	4.50	3.62	27.12	-0.02	27.14	41.38
11		0.50	5.00	3.68	27.18	-0.01	27.19	41.42
12		1.00	10.00	3.71	27.21	0.00	27.21	41.43
13		2.00	20.00	3.75	27.25	0.03	27.22	41.44
14		3.00	30.00	3.78	27.28	0.06	27.22	41.44
15		4.00	40.00	3.81	27.31	0.09	27.22	41.44
16		5.00	50.00	3.84	27.34	0.11	27.23	41.44
17		6.00	60.00	3.89	27.39	0.14	27.25	41.46
18		7.00	70.00	3.92	27.42	0.17	27.25	41.46
19		8.00	80.00	3.95	27.45	0.20	27.25	41.46
20		9.00	90.00	4.00	27.50	0.23	27.27	41.47
21		10.00	100.00	4.03	27.53	0.26	27.27	41.47
22		11.00	110.00	4.06	27.56	0.29	27.27	41.48
23		12.00	120.00	4.08	27.58	0.31	27.27	41.47
24		13.00	130.00	4.11	27.61	0.34	27.27	41.47
25		14.00	140.00	4.13	27.63	0.37	27.26	41.47
26		15.00	150.00	4.16	27.66	0.40	27.26	41.47
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3066.644		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

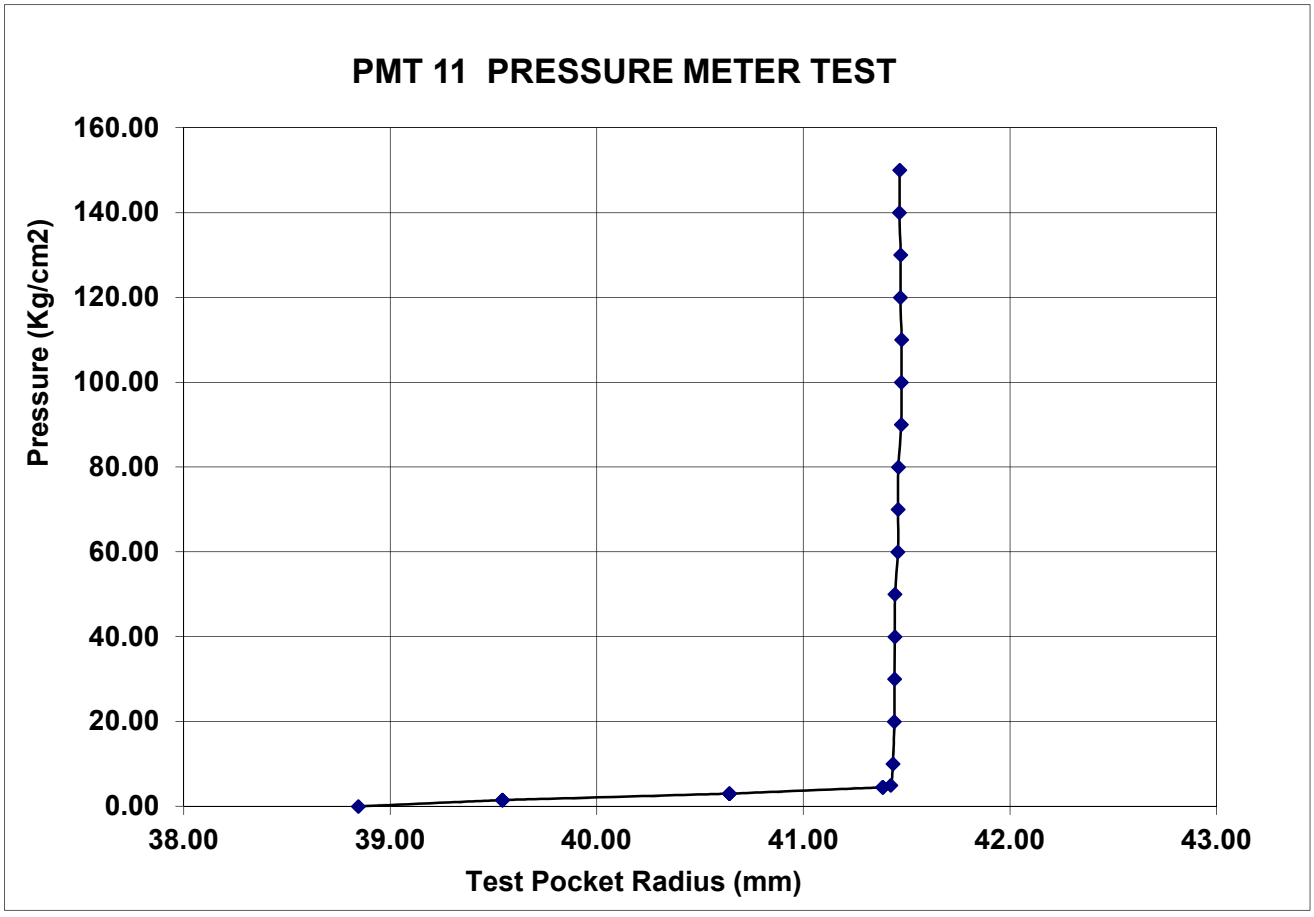
PMT: 11 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	41.44	
Final Radius (mm) =	41.47	
Δ R(cm) =	**0.003**	
r(cm)=	4.1455	**γ =** 0.3

Calculations

K= ΔP/ΔR =	26666.66667	
E=(1+γ)rK=	143710.6667	(kg/cm2)
G= E/2(1+γ)=	93411.9333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	41.50-42.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.62	22.88	-0.03	22.91	38.74
2	15	0.15	1.50	0.85	24.35	-0.02	24.37	39.63
3	15	0.15	1.50	0.85	24.35	-0.02	24.37	39.63
4	15	0.15	1.50	0.85	24.35	-0.02	24.37	39.63
5	15	0.30	3.00	2.76	26.26	-0.02	26.28	40.83
6	15	0.30	3.00	2.76	26.26	-0.02	26.28	40.83
7	15	0.30	3.00	2.76	26.26	-0.02	26.28	40.83
8	15	0.45	4.50	3.51	27.01	-0.02	27.03	41.31
9	15	0.45	4.50	3.51	27.01	-0.02	27.03	41.31
10	15	0.45	4.50	3.51	27.01	-0.02	27.03	41.31
11		0.50	5.00	3.55	27.05	-0.01	27.06	41.34
12		1.00	10.00	3.59	27.09	0.00	27.09	41.35
13		2.00	20.00	3.64	27.14	0.03	27.11	41.37
14		3.00	30.00	3.67	27.17	0.06	27.11	41.37
15		4.00	40.00	3.70	27.20	0.09	27.11	41.37
16		5.00	50.00	3.73	27.23	0.11	27.12	41.37
17		6.00	60.00	3.77	27.27	0.14	27.13	41.38
18		7.00	70.00	3.80	27.30	0.17	27.13	41.38
19		8.00	80.00	3.83	27.33	0.20	27.13	41.38
20		9.00	90.00	3.86	27.36	0.23	27.13	41.38
21		10.00	100.00	3.88	27.38	0.26	27.12	41.38
22		11.00	110.00	3.92	27.42	0.29	27.13	41.38
23		12.00	120.00	3.94	27.44	0.31	27.13	41.38
24		13.00	130.00	3.98	27.48	0.34	27.14	41.39
25		14.00	140.00	4.01	27.51	0.37	27.14	41.39
26		15.00	150.00	4.05	27.55	0.40	27.15	41.39
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

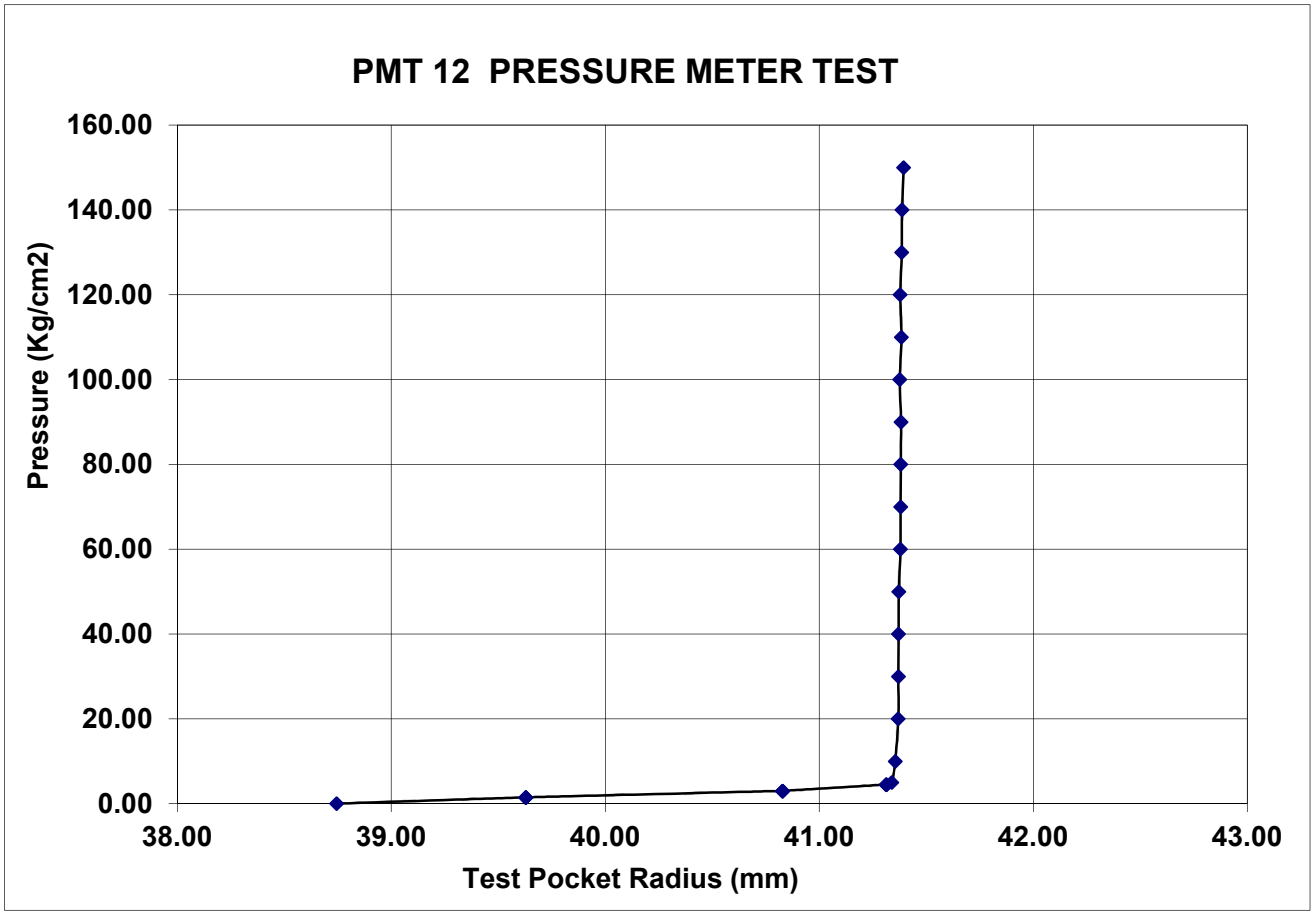
PMT: 12 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	10.00		
Final Pressure P2 (Kg/ cm2) =	90.00		
Δ P (Kg/cm2) =	80.00		
Intial Radius (mm) =	41.35		
Final Radius (mm) =	41.38		
Δ R(cm) =	**0.003**		
r(cm)=	4.1365		**γ =** 0.3

Calculations

K= ΔP/ΔR =	26666.66667	
E=(1+γ)rK=	143398.6667	(kg/cm2)
G= E/2(1+γ)=	93209.1333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	36.50-37.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.25	23.25	-0.03	23.28	38.96
2	15	0.15	1.50	1.45	24.95	-0.02	24.97	40.00
3	15	0.15	1.50	1.45	24.95	-0.02	24.97	40.00
4	15	0.15	1.50	1.45	24.95	-0.02	24.97	40.00
5	15	0.30	3.00	3.48	26.98	-0.02	27.00	41.30
6	15	0.30	3.00	3.48	26.98	-0.02	27.00	41.30
7	15	0.30	3.00	3.48	26.98	-0.02	27.00	41.30
8	15	0.45	4.50	4.81	28.31	-0.02	28.33	42.17
9	15	0.45	4.50	4.81	28.31	-0.02	28.33	42.17
10	15	0.45	4.50	4.81	28.31	-0.02	28.33	42.17
11		0.50	5.00	4.89	28.39	-0.01	28.40	42.23
12		1.00	10.00	4.93	28.43	0.00	28.43	42.24
13		2.00	20.00	4.97	28.47	0.03	28.44	42.25
14		3.00	30.00	5.01	28.51	0.06	28.45	42.26
15		4.00	40.00	5.06	28.56	0.09	28.47	42.27
16		5.00	50.00	5.09	28.59	0.11	28.48	42.28
17		6.00	60.00	5.13	28.63	0.14	28.49	42.28
18		7.00	70.00	5.16	28.66	0.17	28.49	42.28
19		8.00	80.00	5.19	28.69	0.20	28.49	42.28
20		9.00	90.00	5.24	28.74	0.23	28.51	42.30
21		10.00	100.00	5.28	28.78	0.26	28.52	42.31
22		11.00	110.00	5.31	28.81	0.29	28.52	42.31
23		12.00	120.00	5.33	28.83	0.31	28.52	42.30
24		13.00	130.00	5.37	28.87	0.34	28.53	42.31
25		14.00	140.00	5.42	28.92	0.37	28.55	42.32
26		15.00	150.00	5.45	28.95	0.40	28.55	42.33
27								
28								
29								

Calculation Notes:	Type Of Probe	1		
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35			
	Expansion Correction S (mm2)= 3066.644			
	Job No	Prepared by	Cheked By	
	1612	Vaibhav	Prasad	

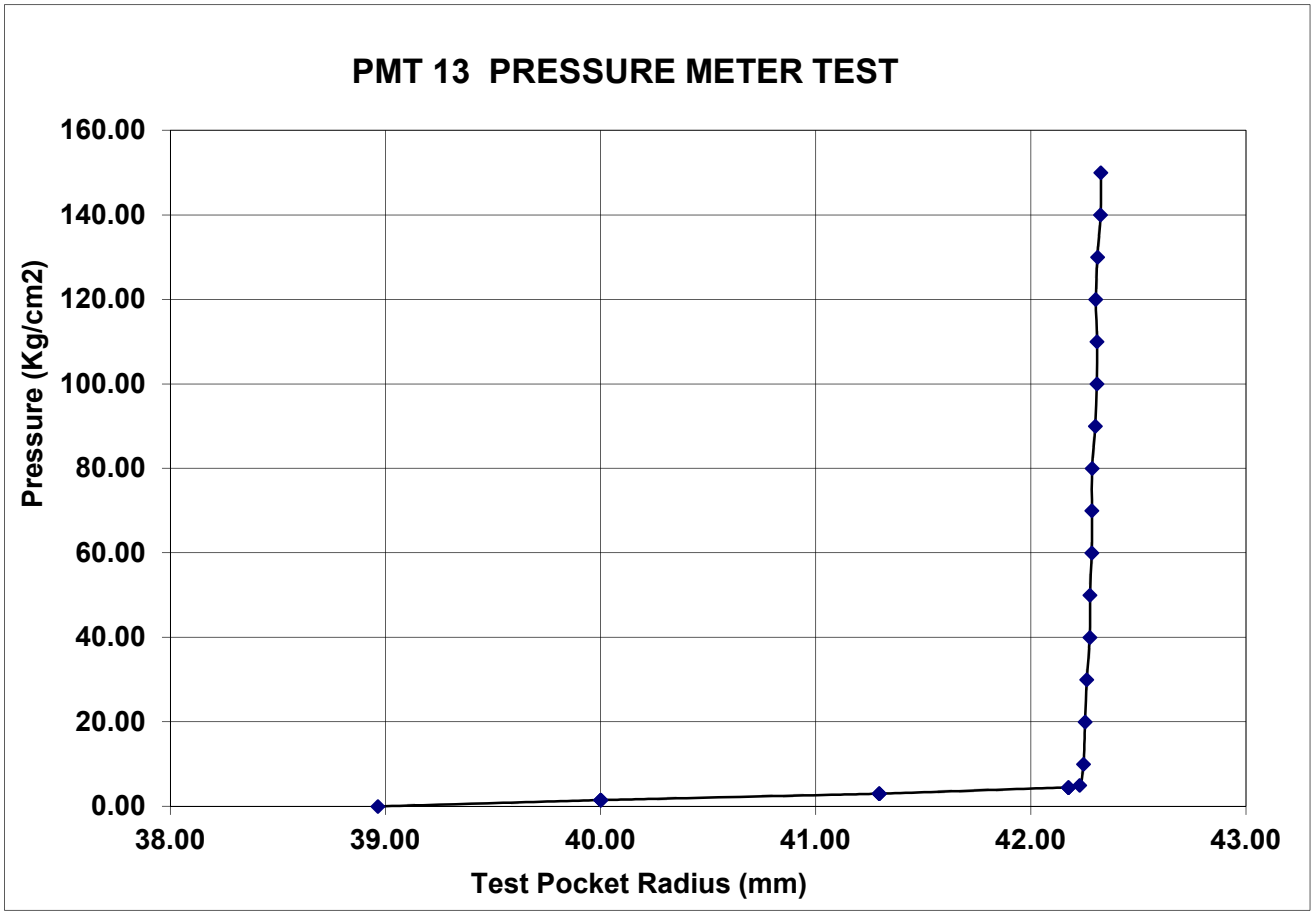
PMT: 13 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	120.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	42.27	
Final Radius (mm) =	42.3	
Δ R(cm) =	**0.003**	
r(cm)=	4.2285	**γ =** 0.3

Calculations

K= ΔP/ΔR =	26666.66667	
E=(1+γ)rK=	146588.0000	(kg/cm2)
G= E/2(1+γ)=	95282.2000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	30.00-30.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.15	23.35	-0.03	23.38	39.02
2	15	0.15	1.50	1.96	25.46	-0.02	25.48	40.32
3	15	0.15	1.50	1.96	25.46	-0.02	25.48	40.32
4	15	0.15	1.50	1.96	25.46	-0.02	25.48	40.32
5	15	0.30	3.00	3.51	27.01	-0.02	27.03	41.32
6	15	0.30	3.00	3.51	27.01	-0.02	27.03	41.32
7	15	0.30	3.00	3.51	27.01	-0.02	27.03	41.32
8	15	0.45	4.50	3.68	27.18	-0.02	27.20	41.42
9	15	0.45	4.50	3.68	27.18	-0.02	27.20	41.42
10	15	0.45	4.50	3.68	27.18	-0.02	27.20	41.42
11		0.50	5.00	3.69	27.19	-0.01	27.20	41.43
12		1.00	10.00	3.71	27.21	0.00	27.21	41.43
13		2.00	20.00	3.74	27.24	0.03	27.21	41.43
14		3.00	30.00	3.80	27.30	0.06	27.24	41.45
15		4.00	40.00	3.84	27.34	0.09	27.25	41.46
16		5.00	50.00	3.90	27.40	0.11	27.29	41.48
17		6.00	60.00	3.94	27.44	0.14	27.30	41.49
18		7.00	70.00	3.98	27.48	0.17	27.31	41.50
19		8.00	80.00	4.02	27.52	0.20	27.32	41.51
20		9.00	90.00	4.07	27.57	0.23	27.34	41.52
21		10.00	100.00	4.09	27.59	0.26	27.33	41.51
22		11.00	110.00	4.11	27.61	0.29	27.32	41.51
23		12.00	120.00	4.15	27.65	0.31	27.34	41.52
24		13.00	130.00	4.17	27.67	0.34	27.33	41.51
25		14.00	140.00	4.21	27.71	0.37	27.34	41.52
26		15.00	150.00	4.27	27.77	0.40	27.37	41.54
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3066.644		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

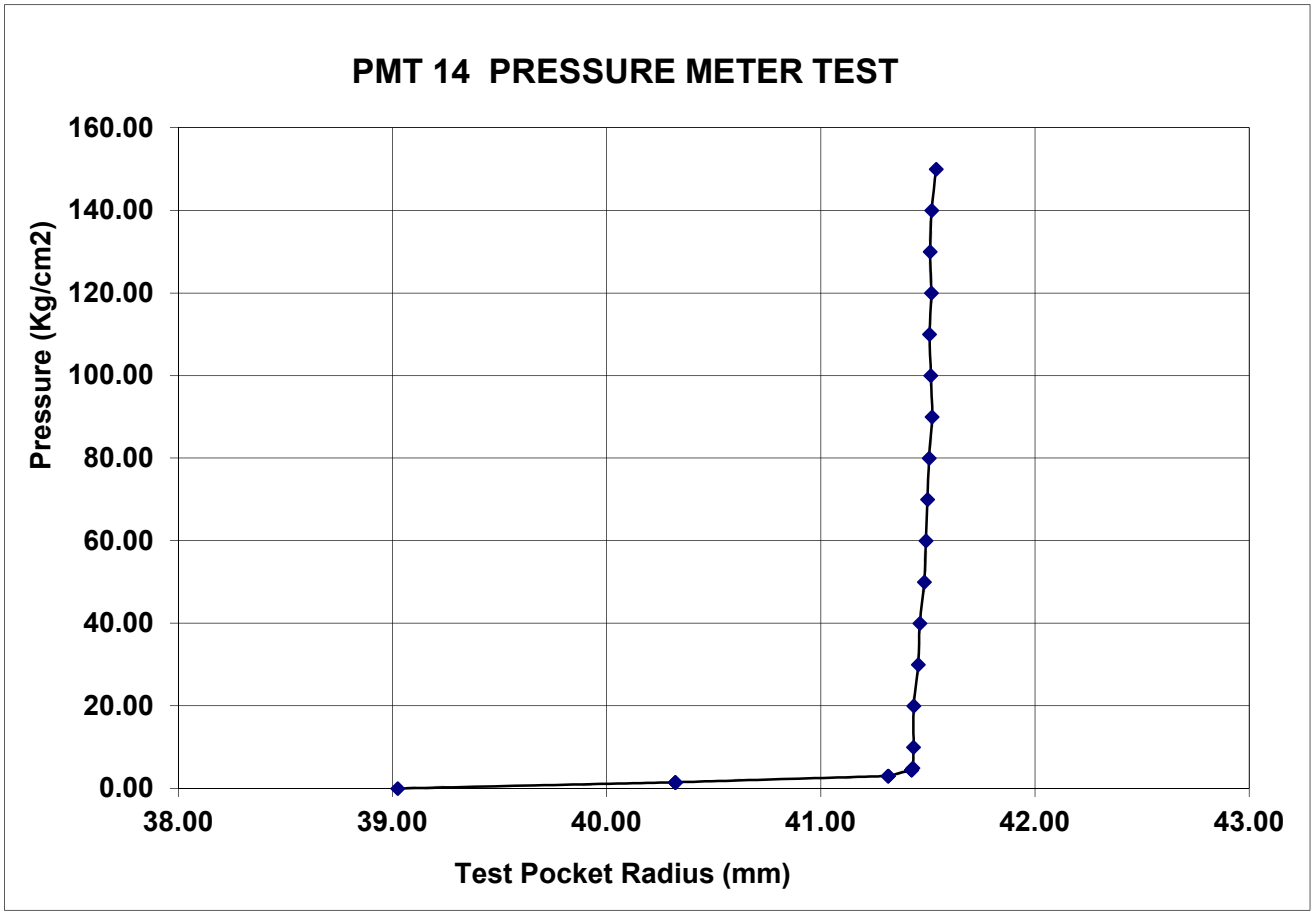
PMT: 14 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	70.00	
Intial Radius (mm) =	41.45	
Final Radius (mm) =	41.51	
Δ R(cm) =	**0.006**	
r(cm)=	4.148	**γ =** 0.3

Calculations

K= ΔP/ΔR =	11666.66667	
E=(1+γ)rK=	62911.3333	(kg/cm2)
G= E/2(1+γ)=	40892.3667	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-02	DATE	23.08.2019
LOCATION		TEST DEPTH (m)	25.50-26.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.10	23.40	-0.03	23.43	39.05
2	15	0.15	1.50	2.19	25.69	-0.02	25.71	40.47
3	15	0.15	1.50	2.19	25.69	-0.02	25.71	40.47
4	15	0.15	1.50	2.19	25.69	-0.02	25.71	40.47
5	15	0.30	3.00	3.12	26.62	-0.02	26.64	41.06
6	15	0.30	3.00	3.12	26.62	-0.02	26.64	41.06
7	15	0.30	3.00	3.12	26.62	-0.02	26.64	41.06
8	15	0.45	4.50	3.16	26.66	-0.02	26.68	41.08
9	15	0.45	4.50	3.16	26.66	-0.02	26.68	41.08
10	15	0.45	4.50	3.16	26.66	-0.02	26.68	41.08
11		0.50	5.00	3.18	26.68	-0.01	26.69	41.10
12		1.00	10.00	3.21	26.71	0.00	26.71	41.11
13		2.00	20.00	3.26	26.76	0.03	26.73	41.12
14		3.00	30.00	3.30	26.80	0.06	26.74	41.13
15		4.00	40.00	3.32	26.82	0.09	26.73	41.12
16		5.00	50.00	3.35	26.85	0.11	26.74	41.12
17		6.00	60.00	3.38	26.88	0.14	26.74	41.12
18		7.00	70.00	3.42	26.92	0.17	26.75	41.13
19		8.00	80.00	3.45	26.95	0.20	26.75	41.13
20		9.00	90.00	3.48	26.98	0.23	26.75	41.13
21		10.00	100.00	3.50	27.00	0.26	26.74	41.13
22		11.00	110.00	3.52	27.02	0.29	26.73	41.12
23		12.00	120.00	3.54	27.04	0.31	26.73	41.12
24		13.00	130.00	3.57	27.07	0.34	26.73	41.12
25		14.00	140.00	3.61	27.11	0.37	26.74	41.13
26		15.00	150.00	3.64	27.14	0.40	26.74	41.13
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3066.644		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

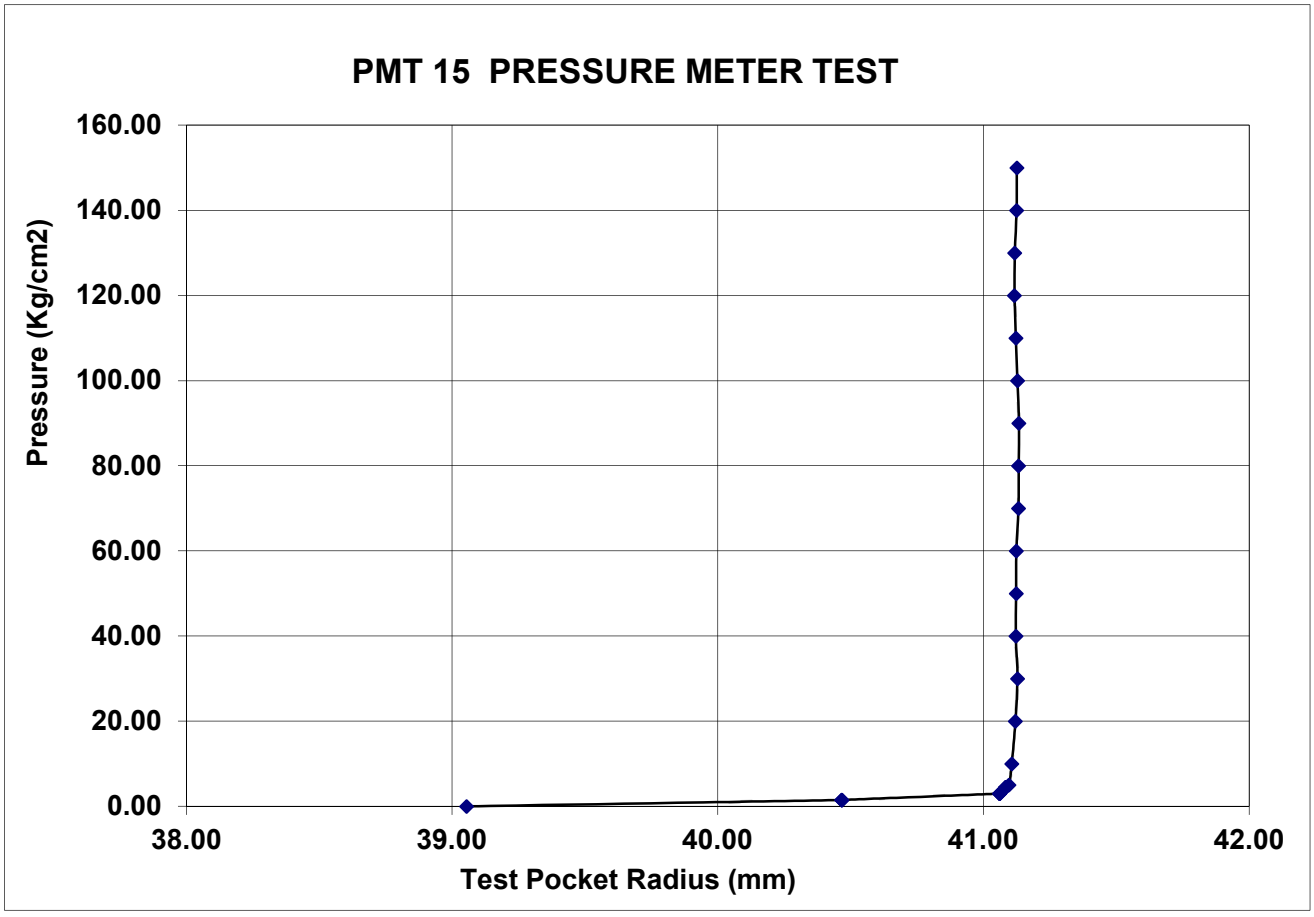
PMT: 15 PRESSURE METER TEST

Observation from Graph

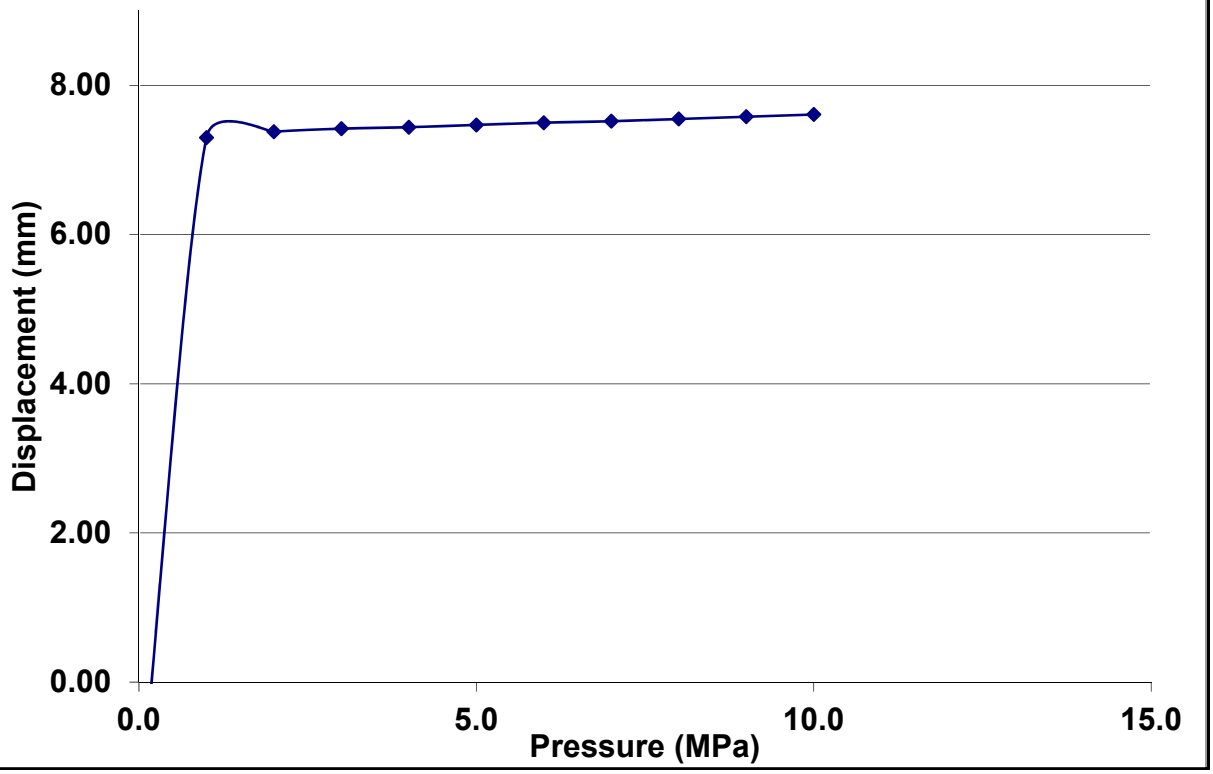
Intial Pressure P1 (Kg/ cm2) =	10.00		
Final Pressure P2 (Kg/ cm2) =	70.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.11		
Final Radius (mm) =	41.13		
Δ R(cm) =	**0.002**		
r(cm)=	4.112		**γ =** 0.3

Calculations

K= ΔP/ΔR =	30000	
E=(1+γ)rK=	160368.0000	(kg/cm2)
G= E/2(1+γ)=	104239.2000	(kg/cm2)



Project:	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.			
	Field Calibration of Probe			Date: 09.08.2019
S.No	Pressure (Mpa)	Displacement (Rp) (mm)	Pressure Variation (P ' = P-1) (Mpa)	Thickness variation volume (R' = Rp -Rp1) (mm)
1				
2	0.0	-1.84		
3	1.0	7.30	0.0	0.00
4	2.0	7.38	1.0	0.08
5	3.0	7.42	2.0	0.12
6	4.0	7.44	3.0	0.14
7	5.0	7.47	4.0	0.17
8	6.0	7.50	5.0	0.20
9	7.0	7.52	6.0	0.22
10	8.0	7.55	7.0	0.25
11	9.0	7.58	8.0	0.28
12	10.0	7.61	9.0	0.31



K	35
S	3062.564005

Thickness Variation	Pressure Variation
x	y
0.28	9.00
0.08	2.00

PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	94.40-95.00
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.84	21.66	-0.03	21.69	38.02
2	15	0.15	1.50	-1.18	22.32	-0.02	22.34	38.40
3	15	0.15	1.50	-1.18	22.32	-0.02	22.34	38.40
4	15	0.15	1.50	-1.18	22.32	-0.02	22.34	38.40
5	15	0.30	3.00	-0.15	23.35	-0.02	23.37	39.01
6	15	0.30	3.00	-0.15	23.35	-0.02	23.37	39.01
7	15	0.30	3.00	-0.15	23.35	-0.02	23.37	39.01
8	15	0.45	4.50	1.22	24.72	-0.02	24.74	39.84
9	15	0.45	4.50	1.22	24.72	-0.02	24.74	39.84
10	15	0.45	4.50	1.22	24.72	-0.02	24.74	39.84
11		0.50	5.00	1.74	25.24	-0.01	25.25	40.16
12		1.00	10.00	2.93	26.43	0.00	26.43	40.91
13		2.00	20.00	2.97	26.47	0.03	26.44	40.92
14		3.00	30.00	3.02	26.52	0.06	26.46	40.93
15		4.00	40.00	3.07	26.57	0.09	26.48	40.95
16		5.00	50.00	3.10	26.60	0.11	26.49	40.95
17		6.00	60.00	3.13	26.63	0.14	26.49	40.95
18		7.00	70.00	3.18	26.68	0.17	26.51	40.96
19		8.00	80.00	3.21	26.71	0.20	26.51	40.96
20		9.00	90.00	3.24	26.74	0.23	26.51	40.97
21		10.00	100.00	3.27	26.77	0.26	26.51	40.97
22		11.00	110.00	3.30	26.80	0.29	26.51	40.97
23		12.00	120.00	3.33	26.83	0.31	26.52	40.97
24		13.00	130.00	3.37	26.87	0.34	26.53	40.98
25		14.00	140.00	3.40	26.90	0.37	26.53	40.98
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

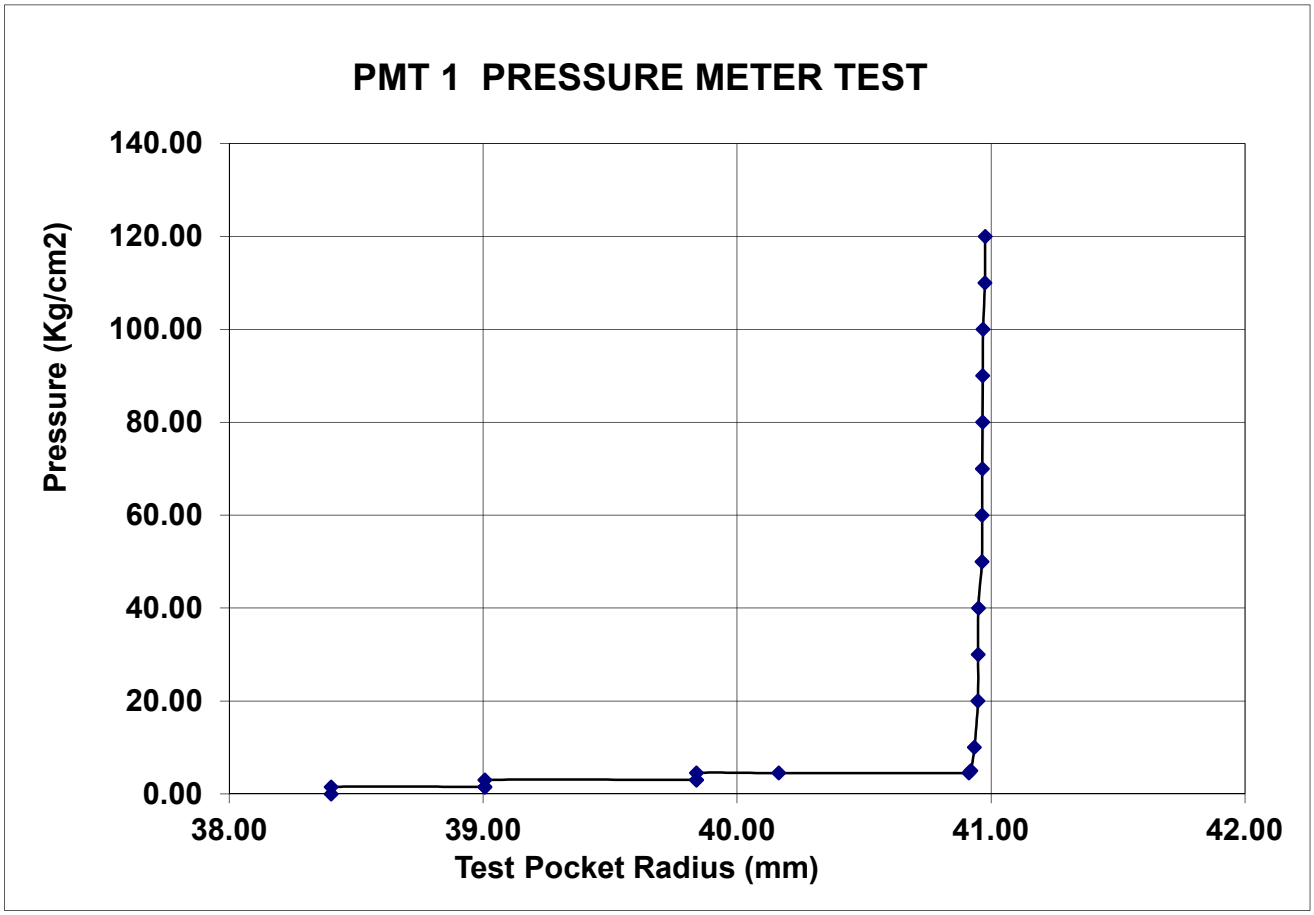
PMT: 1 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	90.00		
Δ P (Kg/cm2) =	50.00		
Intial Radius (mm) =	40.95		
Final Radius (mm) =	40.97		
Δ R(cm) =	**0.002**		
r(cm)=	4.096		**γ =** 0.3

Calculations

K= ΔP/ΔR =	25000	
E=(1+γ)rK=	133120.0000	(kg/cm2)
G= E/2(1+γ)=	86528.0000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	90.50-91.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.51	21.99	-0.03	22.02	38.21
2	15	0.15	1.50	-0.41	23.09	-0.02	23.11	38.85
3	15	0.15	1.50	-0.41	23.09	-0.02	23.11	38.85
4	15	0.15	1.50	-0.41	23.09	-0.02	23.11	38.85
5	15	0.30	3.00	0.42	23.92	-0.02	23.94	39.35
6	15	0.30	3.00	0.42	23.92	-0.02	23.94	39.35
7	15	0.30	3.00	0.42	23.92	-0.02	23.94	39.35
8	15	0.45	4.50	1.88	25.38	-0.02	25.40	40.25
9	15	0.45	4.50	1.88	25.38	-0.02	25.40	40.25
10	15	0.45	4.50	1.88	25.38	-0.02	25.40	40.25
11		0.50	5.00	2.39	25.89	-0.01	25.90	40.58
12		1.00	10.00	3.08	26.58	0.00	26.58	41.01
13		2.00	20.00	3.12	26.62	0.03	26.59	41.02
14		3.00	30.00	3.18	26.68	0.06	26.62	41.04
15		4.00	40.00	3.23	26.73	0.09	26.64	41.05
16		5.00	50.00	3.27	26.77	0.11	26.66	41.06
17		6.00	60.00	3.30	26.80	0.14	26.66	41.06
18		7.00	70.00	3.34	26.84	0.17	26.67	41.07
19		8.00	80.00	3.36	26.86	0.20	26.66	41.06
20		9.00	90.00	3.40	26.90	0.23	26.67	41.07
21		10.00	100.00	3.44	26.94	0.26	26.68	41.08
22		11.00	110.00	3.46	26.96	0.29	26.67	41.07
23		12.00	120.00	3.49	26.99	0.31	26.68	41.07
24		13.00	130.00	3.53	27.03	0.34	26.69	41.08
25		14.00	140.00	3.56	27.06	0.37	26.69	41.08
26								
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3062.564		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

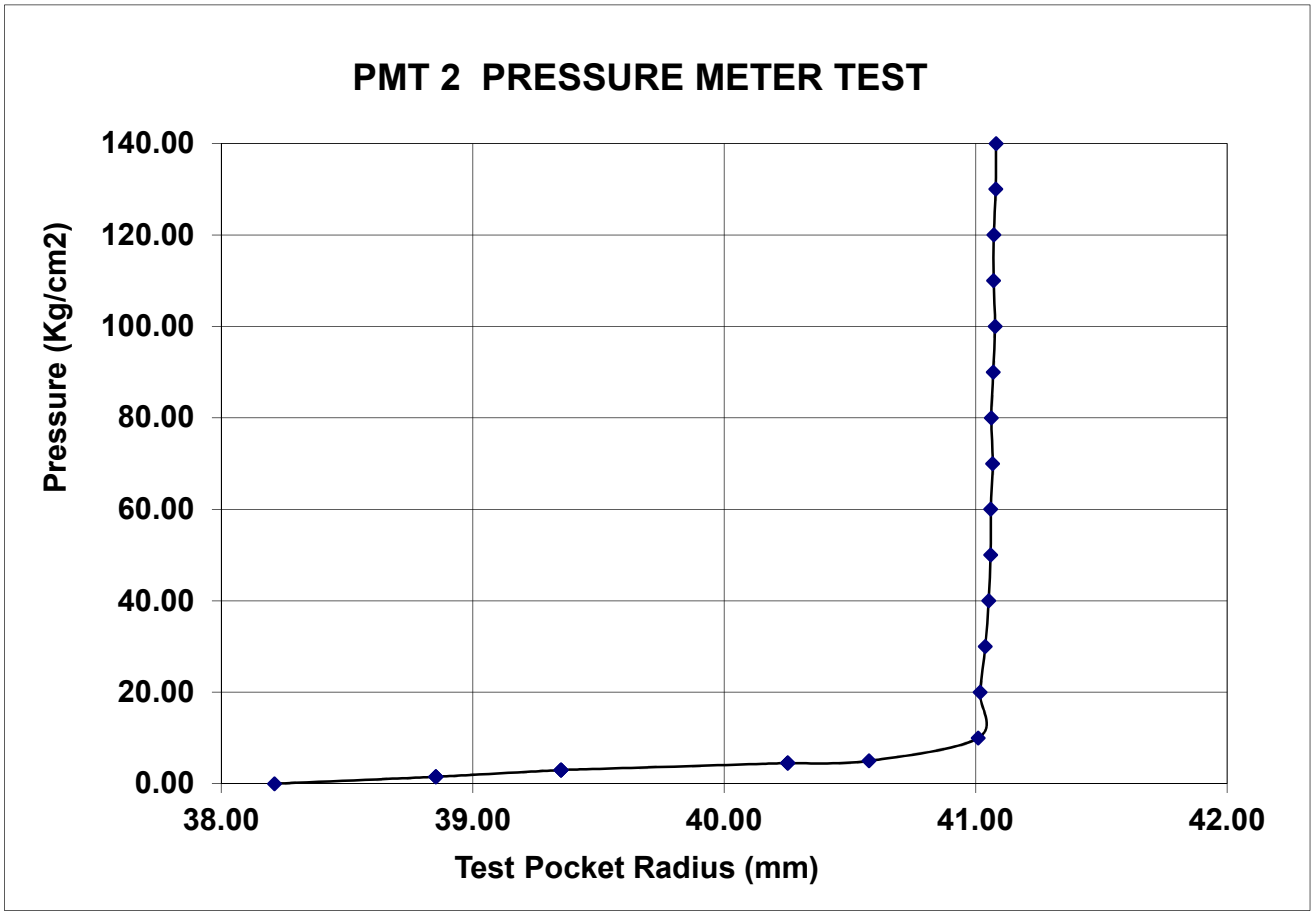
PMT: 2 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.05		
Final Radius (mm) =	41.08		
Δ R(cm) =	**0.003**		
r(cm)=	4.1065		**γ =** 0.3

Calculations

K= ΔP/ΔR =	20000	
E=(1+γ)rK=	106769.0000	(kg/cm2)
G= E/2(1+γ)=	69399.8500	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	86.00-86.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.42	22.08	-0.03	22.11	38.26
2	15	0.15	1.50	-0.55	22.95	-0.02	22.97	38.77
3	15	0.15	1.50	-0.55	22.95	-0.02	22.97	38.77
4	15	0.15	1.50	-0.55	22.95	-0.02	22.97	38.77
5	15	0.30	3.00	0.49	23.99	-0.02	24.01	39.39
6	15	0.30	3.00	0.49	23.99	-0.02	24.01	39.39
7	15	0.30	3.00	0.49	23.99	-0.02	24.01	39.39
8	15	0.45	4.50	1.93	25.43	-0.02	25.45	40.28
9	15	0.45	4.50	1.93	25.43	-0.02	25.45	40.28
10	15	0.45	4.50	1.93	25.43	-0.02	25.45	40.28
11		0.50	5.00	2.39	25.89	-0.01	25.90	40.58
12		1.00	10.00	3.55	27.05	0.00	27.05	41.32
13		2.00	20.00	3.71	27.21	0.03	27.18	41.40
14		3.00	30.00	3.88	27.38	0.06	27.32	41.50
15		4.00	40.00	4.12	27.62	0.09	27.53	41.63
16		5.00	50.00	4.36	27.86	0.11	27.75	41.78
17		6.00	60.00	4.57	28.07	0.14	27.93	41.90
18		7.00	70.00	4.71	28.21	0.17	28.04	41.97
19		8.00	80.00	4.85	28.35	0.20	28.15	42.04
20		9.00	90.00	5.02	28.52	0.23	28.29	42.14
21		10.00	100.00	5.18	28.68	0.26	28.42	42.23
22		11.00	110.00	5.43	28.93	0.29	28.64	42.38
23		12.00	120.00	5.76	29.26	0.31	28.95	42.58
24		13.00	130.00	6.16	29.66	0.34	29.32	42.83
25		13.84	138.40	6.24	29.74	0.37	29.37	42.87
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

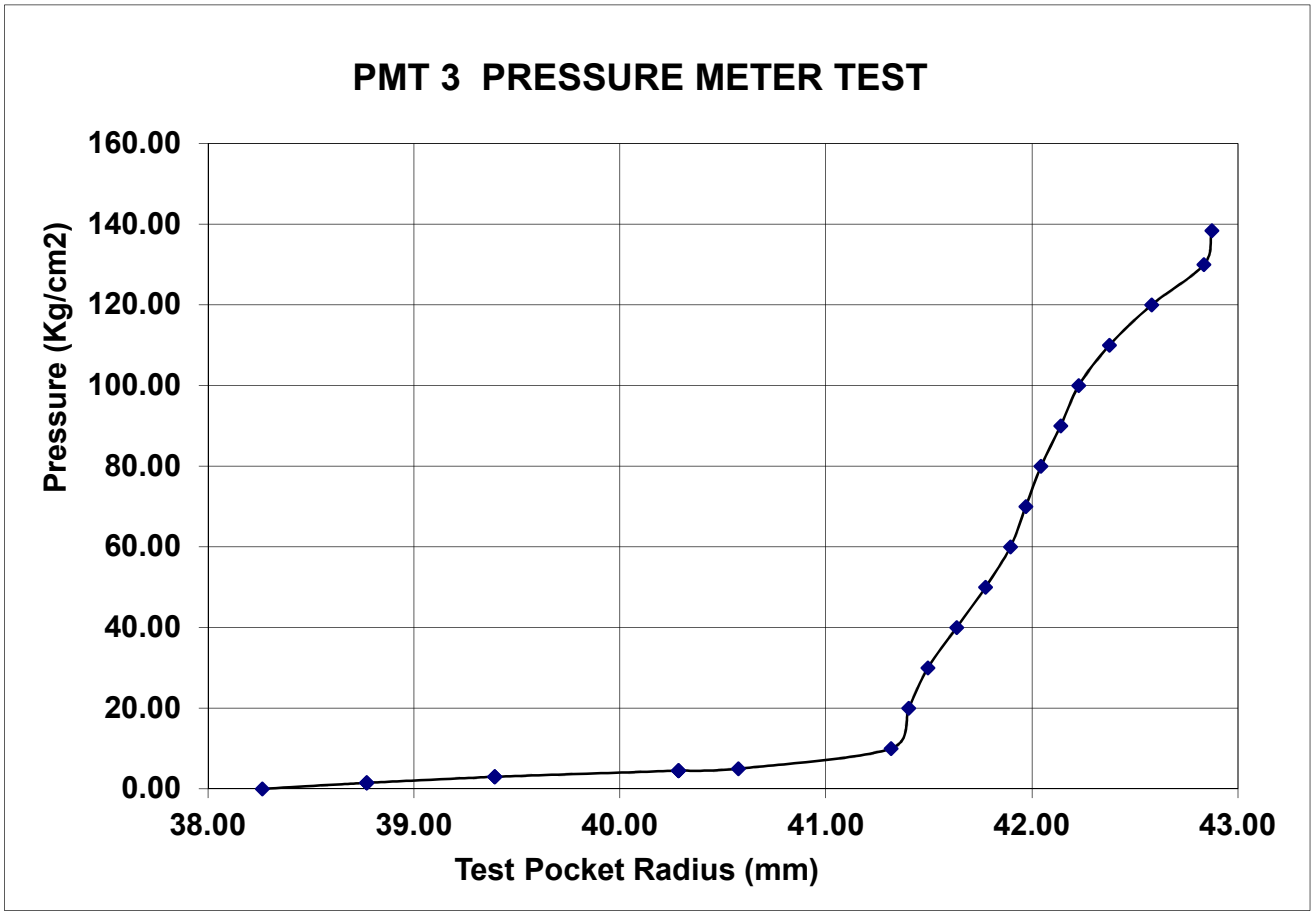
PMT: 3 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.63		
Final Radius (mm) =	42.23		
Δ R(cm) =	**0.06**		
r(cm)=	4.193		**γ =** 0.3

Calculations

K= ΔP/ΔR =	1000	
E=(1+γ)rK=	5450.9000	(kg/cm2)
G= E/2(1+γ)=	3543.0850	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	81.00-81.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.32	22.18	-0.03	22.21	38.32
2	15	0.15	1.50	0.11	23.61	-0.02	23.63	39.17
3	15	0.15	1.50	0.11	23.61	-0.02	23.63	39.17
4	15	0.15	1.50	0.11	23.61	-0.02	23.63	39.17
5	15	0.30	3.00	1.32	24.82	-0.02	24.84	39.90
6	15	0.30	3.00	1.32	24.82	-0.02	24.84	39.90
7	15	0.30	3.00	1.32	24.82	-0.02	24.84	39.90
8	15	0.45	4.50	2.81	26.31	-0.02	26.33	40.85
9	15	0.45	4.50	2.81	26.31	-0.02	26.33	40.85
10	15	0.45	4.50	2.81	26.31	-0.02	26.33	40.85
11		0.50	5.00	2.91	26.41	-0.01	26.42	40.91
12		1.00	10.00	3.01	26.51	0.00	26.51	40.96
13		2.00	20.00	3.15	26.65	0.03	26.62	41.04
14		3.00	30.00	3.25	26.75	0.06	26.69	41.08
15		4.00	40.00	3.27	26.77	0.09	26.68	41.08
16		5.00	50.00	3.31	26.81	0.11	26.70	41.09
17		6.00	60.00	3.35	26.85	0.14	26.71	41.09
18		7.00	70.00	3.39	26.89	0.17	26.72	41.10
19		8.00	80.00	3.43	26.93	0.20	26.73	41.11
20		9.00	90.00	3.46	26.96	0.23	26.73	41.11
21		10.00	100.00	3.48	26.98	0.26	26.72	41.10
22		11.00	110.00	3.51	27.01	0.29	26.72	41.10
23		12.00	120.00	3.54	27.04	0.31	26.73	41.10
24		13.00	130.00	3.57	27.07	0.34	26.73	41.11
25		14.00	140.00	3.61	27.11	0.37	26.74	41.11
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

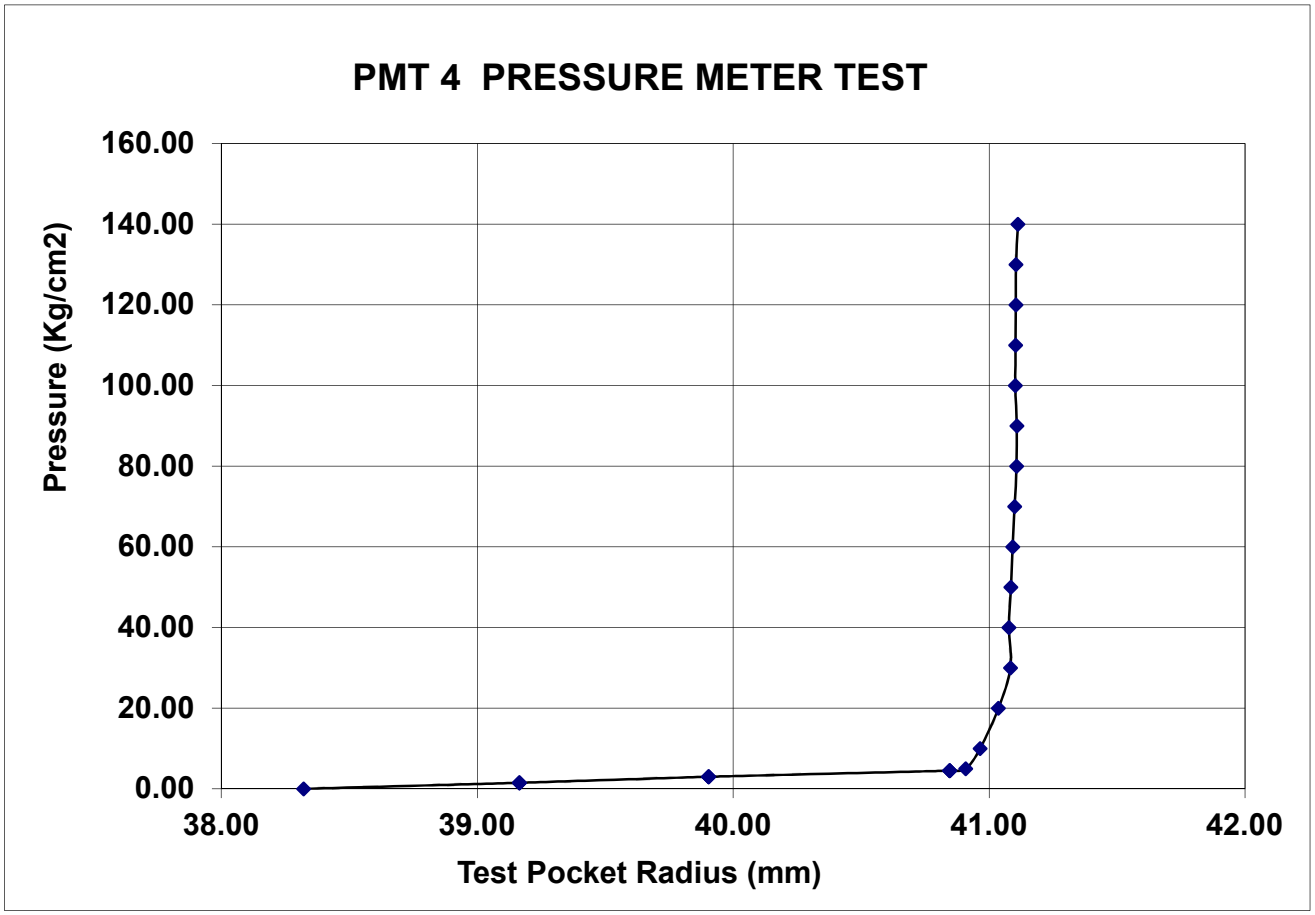
PMT: 4 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	80.00	
Δ P (Kg/cm2) =	40.00	
Intial Radius (mm) =	41.08	
Final Radius (mm) =	41.11	
Δ R(cm) =	**0.003**	
r(cm)=	4.1095	**γ =** 0.3

Calculations

K= ΔP/ΔR =	13333.33333	
E=(1+γ)rK=	71231.3333	(kg/cm2)
G= E/2(1+γ)=	46300.3667	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	75.40-76.00
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.21	22.29	-0.03	22.32	38.39
2	15	0.15	1.50	-0.48	23.02	-0.02	23.04	38.81
3	15	0.15	1.50	-0.48	23.02	-0.02	23.04	38.81
4	15	0.15	1.50	-0.48	23.02	-0.02	23.04	38.81
5	15	0.30	3.00	0.22	23.72	-0.02	23.74	39.23
6	15	0.30	3.00	0.22	23.72	-0.02	23.74	39.23
7	15	0.30	3.00	0.22	23.72	-0.02	23.74	39.23
8	15	0.45	4.50	1.68	25.18	-0.02	25.20	40.13
9	15	0.45	4.50	1.68	25.18	-0.02	25.20	40.13
10	15	0.45	4.50	1.68	25.18	-0.02	25.20	40.13
11		0.50	5.00	2.24	25.74	-0.01	25.75	40.48
12		1.00	10.00	3.21	26.71	0.00	26.71	41.09
13		2.00	20.00	3.25	26.75	0.03	26.72	41.10
14		3.00	30.00	3.27	26.77	0.06	26.71	41.10
15		4.00	40.00	3.30	26.80	0.09	26.71	41.10
16		5.00	50.00	3.33	26.83	0.11	26.72	41.10
17		6.00	60.00	3.38	26.88	0.14	26.74	41.11
18		7.00	70.00	3.40	26.90	0.17	26.73	41.11
19		8.00	80.00	3.44	26.94	0.20	26.74	41.11
20		9.00	90.00	3.45	26.95	0.23	26.72	41.10
21		10.00	100.00	3.47	26.97	0.26	26.71	41.10
22		11.00	110.00	3.50	27.00	0.29	26.71	41.10
23		12.00	120.00	3.55	27.05	0.31	26.74	41.11
24		13.00	130.00	3.56	27.06	0.34	26.72	41.10
25		14.00	140.00	3.60	27.10	0.37	26.73	41.11
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

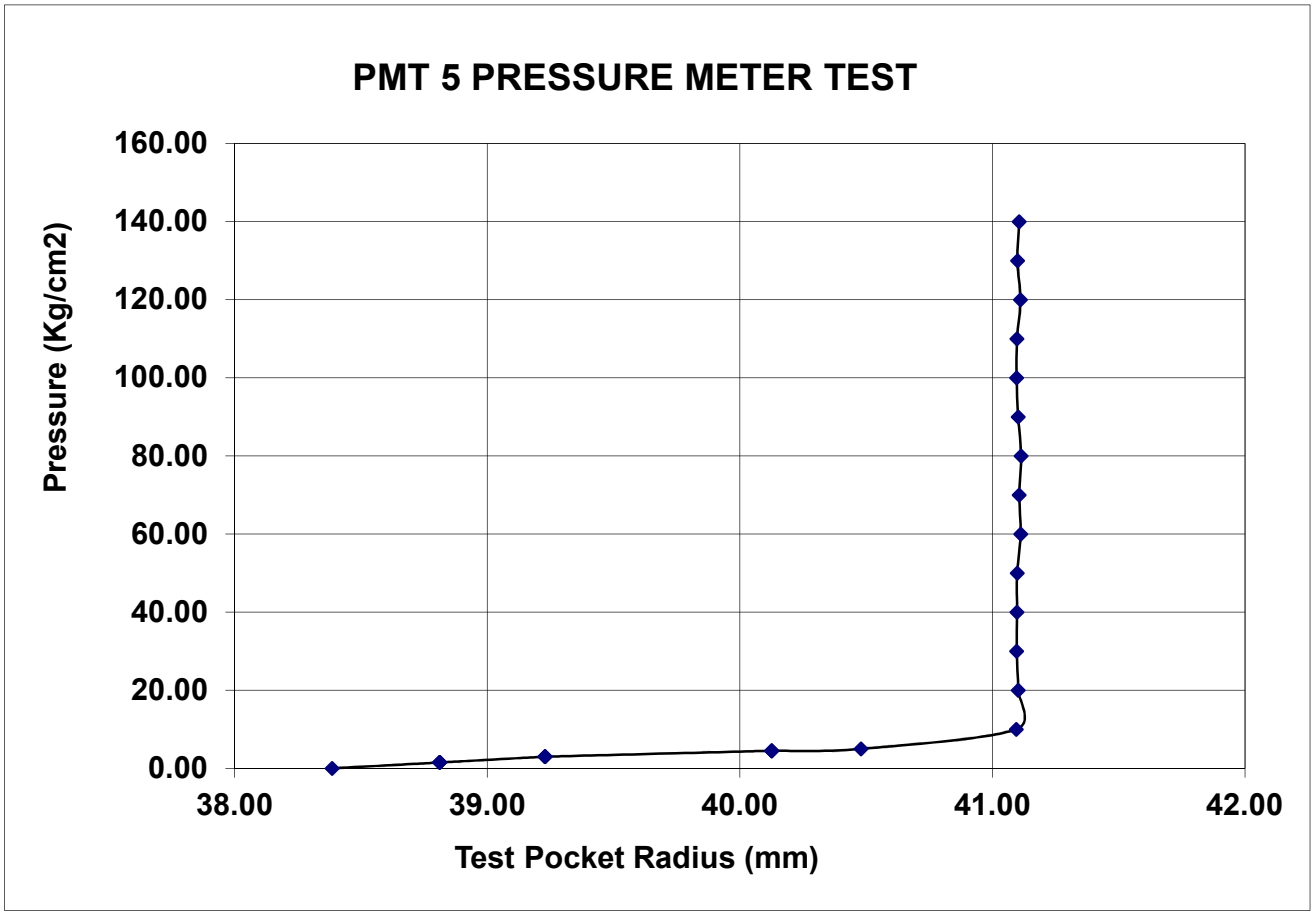
PMT: 5 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	80.00		
Δ P (Kg/cm2) =	50.00		
Intial Radius (mm) =	41.10		
Final Radius (mm) =	41.11		
Δ R(cm) =	**0.001**		
r(cm)=	4.1105		**γ =** 0.3

Calculations

K= ΔP/ΔR =	50000	
E=(1+γ)rK=	267182.5000	(kg/cm2)
G= E/2(1+γ)=	173668.6250	(kg/cm2)



PROJECT			Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.					
NAME OF CLIENT			NHSRCL		SIZE OF BOREHOLE (mm)			Nx
BOREHOLE NO.			PBH-03		DATE			09.08.2019
LOCATION					TEST DEPTH (m)			71.50-72.10
RL (m)					FINAL DEPTH (m)			95.00
TYPE OF STRATA			Fresh To S.W. Breccia					
Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.12	22.38	-0.03	22.41	38.44
2	15	0.15	1.50	-0.67	22.83	-0.02	22.85	38.70
3	15	0.15	1.50	-0.67	22.83	-0.02	22.85	38.70
4	15	0.15	1.50	-0.67	22.83	-0.02	22.85	38.70
5	15	0.30	3.00	0.68	24.18	-0.02	24.20	39.51
6	15	0.30	3.00	0.68	24.18	-0.02	24.20	39.51
7	15	0.30	3.00	0.68	24.18	-0.02	24.20	39.51
8	15	0.45	4.50	2.27	25.77	-0.02	25.79	40.50
9	15	0.45	4.50	2.27	25.77	-0.02	25.79	40.50
10	15	0.45	4.50	2.27	25.77	-0.02	25.79	40.50
11		0.50	5.00	2.89	26.39	-0.01	26.40	40.90
12		1.00	10.00	3.39	26.89	0.00	26.89	41.21
13		2.00	20.00	3.44	26.94	0.03	26.91	41.23
14		3.00	30.00	3.46	26.96	0.06	26.90	41.22
15		4.00	40.00	3.50	27.00	0.09	26.91	41.23
16		5.00	50.00	3.56	27.06	0.11	26.95	41.25
17		6.00	60.00	3.59	27.09	0.14	26.95	41.25
18		7.00	70.00	3.62	27.12	0.17	26.95	41.25
19		8.00	80.00	3.67	27.17	0.20	26.97	41.26
20		9.00	90.00	3.71	27.21	0.23	26.98	41.27
21		10.00	100.00	3.75	27.25	0.26	26.99	41.28
22		11.00	110.00	3.78	27.28	0.29	26.99	41.28
23		12.00	120.00	3.81	27.31	0.31	27.00	41.28
24		13.00	130.00	3.87	27.37	0.34	27.03	41.30
25		14.00	140.00	3.92	27.42	0.37	27.05	41.32
26								
27								
28								
29								
Calculation Notes:					Type Of Probe	1		
Membrane Calibration Constants					Thickness Correction K :Mn/m2/mm=35			
					Expansion Correction S (mm2)= 3062.564			
						Job No	Prepared by	Cheked By
						1612	Vaibhav	Prasad

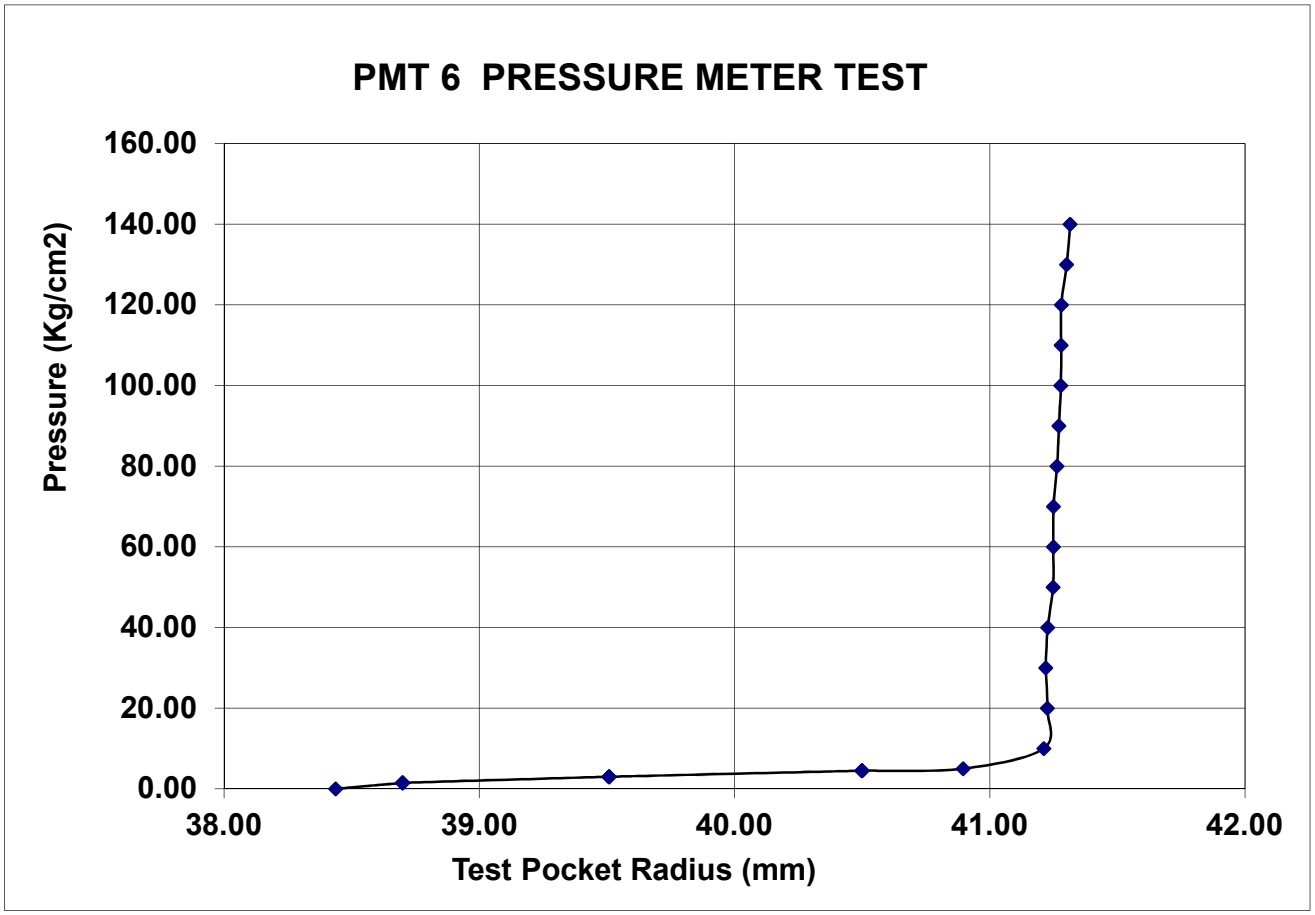
PMT: 6 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00		
Final Pressure P2 (Kg/ cm2) =	80.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.23		
Final Radius (mm) =	41.26		
Δ R(cm) =	**0.003**		
r(cm)=	4.1245		**γ =** 0.3

Calculations

K= ΔP/ΔR =	20000	
E=(1+γ)rK=	107237.0000	(kg/cm2)
G= E/2(1+γ)=	69704.0500	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	66.50-67.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.08	22.42	-0.03	22.45	38.46
2	15	0.15	1.50	-0.24	23.26	-0.02	23.28	38.95
3	15	0.15	1.50	-0.24	23.26	-0.02	23.28	38.95
4	15	0.15	1.50	-0.24	23.26	-0.02	23.28	38.95
5	15	0.30	3.00	1.10	24.60	-0.02	24.62	39.77
6	15	0.30	3.00	1.10	24.60	-0.02	24.62	39.77
7	15	0.30	3.00	1.10	24.60	-0.02	24.62	39.77
8	15	0.45	4.50	2.91	26.41	-0.02	26.43	40.91
9	15	0.45	4.50	2.91	26.41	-0.02	26.43	40.91
10	15	0.45	4.50	2.91	26.41	-0.02	26.43	40.91
11		0.50	5.00	3.13	26.63	-0.01	26.64	41.05
12		1.00	10.00	3.26	26.76	0.00	26.76	41.13
13		2.00	20.00	3.28	26.78	0.03	26.75	41.12
14		3.00	30.00	3.31	26.81	0.06	26.75	41.12
15		4.00	40.00	3.36	26.86	0.09	26.77	41.14
16		5.00	50.00	3.39	26.89	0.11	26.78	41.14
17		6.00	60.00	3.42	26.92	0.14	26.78	41.14
18		7.00	70.00	3.45	26.95	0.17	26.78	41.14
19		8.00	80.00	3.48	26.98	0.20	26.78	41.14
20		9.00	90.00	3.51	27.01	0.23	26.78	41.14
21		10.00	100.00	3.57	27.07	0.26	26.81	41.16
22		11.00	110.00	3.59	27.09	0.29	26.80	41.16
23		12.00	120.00	3.61	27.11	0.31	26.80	41.15
24		13.00	130.00	3.66	27.16	0.34	26.82	41.16
25		14.00	140.00	3.68	27.18	0.37	26.81	41.16
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

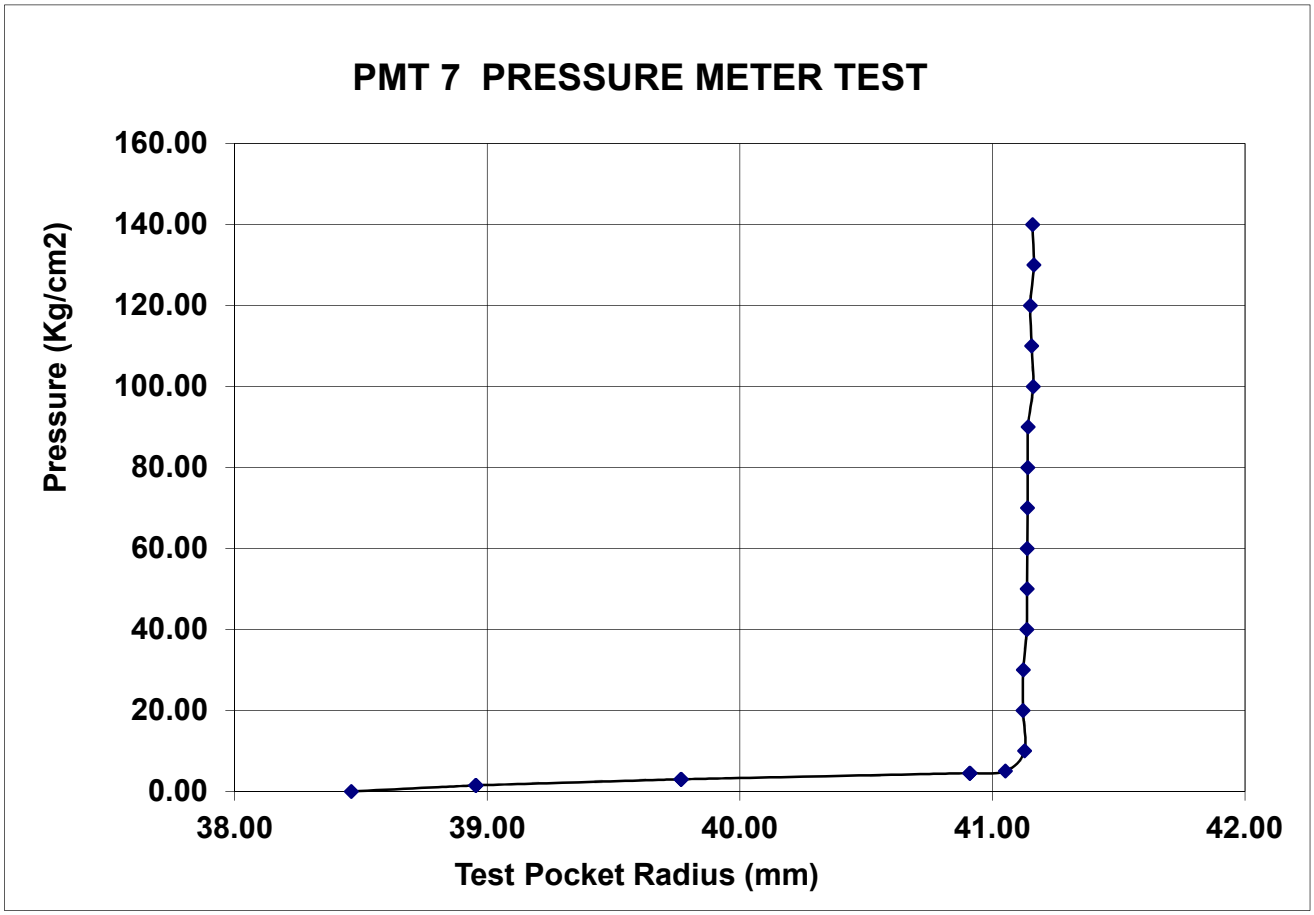
PMT: 7 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00		
Final Pressure P2 (Kg/ cm2) =	100.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	41.14		
Final Radius (mm) =	41.16		
Δ R(cm) =	**0.002**		
r(cm)=	4.115		**γ =** 0.3

Calculations

K= ΔP/ΔR =	30000	
E=(1+γ)rK=	160485.0000	(kg/cm2)
G= E/2(1+γ)=	104315.2500	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	60.50-61.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-1.06	22.44	-0.03	22.47	38.47
2	15	0.15	1.50	0.35	23.85	-0.02	23.87	39.31
3	15	0.15	1.50	0.35	23.85	-0.02	23.87	39.31
4	15	0.15	1.50	0.35	23.85	-0.02	23.87	39.31
5	15	0.30	3.00	1.69	25.19	-0.02	25.21	40.14
6	15	0.30	3.00	1.69	25.19	-0.02	25.21	40.14
7	15	0.30	3.00	1.69	25.19	-0.02	25.21	40.14
8	15	0.45	4.50	3.18	26.68	-0.02	26.70	41.09
9	15	0.45	4.50	3.18	26.68	-0.02	26.70	41.09
10	15	0.45	4.50	3.18	26.68	-0.02	26.70	41.09
11		0.50	5.00	3.19	26.69	-0.01	26.70	41.09
12		1.00	10.00	3.24	26.74	0.00	26.74	41.11
13		2.00	20.00	3.26	26.76	0.03	26.73	41.11
14		3.00	30.00	3.30	26.80	0.06	26.74	41.12
15		4.00	40.00	3.32	26.82	0.09	26.73	41.11
16		5.00	50.00	3.36	26.86	0.11	26.75	41.12
17		6.00	60.00	3.39	26.89	0.14	26.75	41.12
18		7.00	70.00	3.40	26.90	0.17	26.73	41.11
19		8.00	80.00	3.44	26.94	0.20	26.74	41.11
20		9.00	90.00	3.48	26.98	0.23	26.75	41.12
21		10.00	100.00	3.51	27.01	0.26	26.75	41.12
22		11.00	110.00	3.55	27.05	0.29	26.76	41.13
23		12.00	120.00	3.57	27.07	0.31	26.76	41.12
24		13.00	130.00	3.60	27.10	0.34	26.76	41.13
25		14.00	140.00	3.63	27.13	0.37	26.76	41.13
26								
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3062.564		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

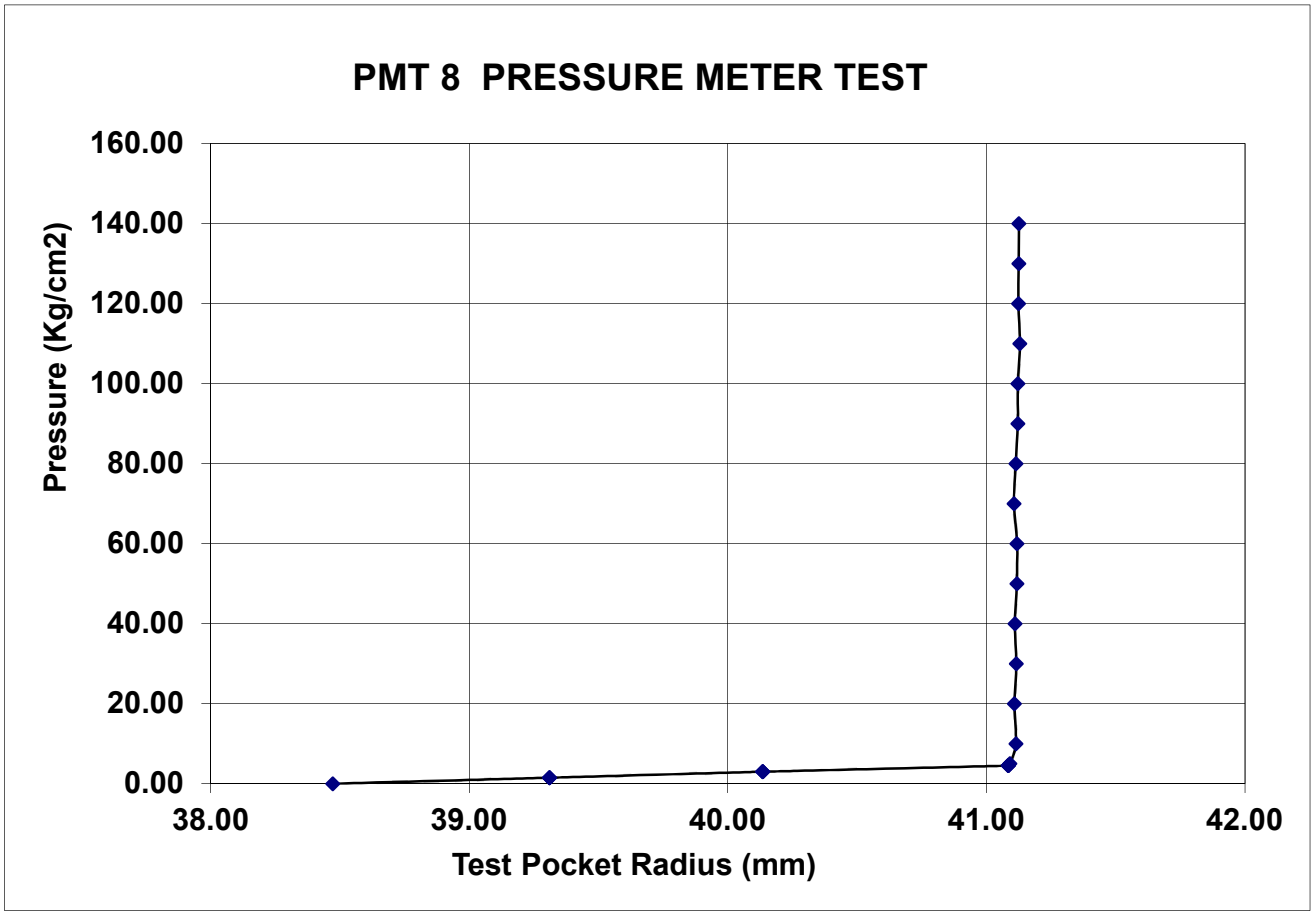
PMT: 8 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	80.00	
Intial Radius (mm) =	41.11	
Final Radius (mm) =	41.12	
Δ R(cm) =	**0.001**	
r(cm)=	4.1115	**γ =** 0.3

Calculations

K= ΔP/ΔR =	80000	
E=(1+γ)rK=	427596.0000	(kg/cm2)
G= E/2(1+γ)=	277937.4000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	56.00-56.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	0.91	24.41	-0.03	24.44	39.66
2	15	0.15	1.50	0.71	24.21	-0.02	24.23	39.53
3	15	0.15	1.50	0.71	24.21	-0.02	24.23	39.53
4	15	0.15	1.50	0.71	24.21	-0.02	24.23	39.53
5	15	0.30	3.00	2.46	25.96	-0.02	25.98	40.62
6	15	0.30	3.00	2.46	25.96	-0.02	25.98	40.62
7	15	0.30	3.00	2.46	25.96	-0.02	25.98	40.62
8	15	0.45	4.50	4.51	28.01	-0.02	28.03	41.96
9	15	0.45	4.50	4.51	28.01	-0.02	28.03	41.96
10	15	0.45	4.50	4.51	28.01	-0.02	28.03	41.96
11		0.50	5.00	5.45	28.95	-0.01	28.96	42.59
12		1.00	10.00	7.47	30.97	0.00	30.97	43.98
13		2.00	20.00	7.53	31.03	0.03	31.00	44.00
14		3.00	30.00	7.57	31.07	0.06	31.01	44.01
15		4.00	40.00	7.61	31.11	0.09	31.02	44.02
16		5.00	50.00	7.64	31.14	0.11	31.03	44.02
17		6.00	60.00	7.67	31.17	0.14	31.03	44.02
18		7.00	70.00	7.71	31.21	0.17	31.04	44.03
19		8.00	80.00	7.76	31.26	0.20	31.06	44.05
20		9.00	90.00	7.79	31.29	0.23	31.06	44.05
21		10.00	100.00	7.83	31.33	0.26	31.07	44.06
22		11.00	110.00	7.85	31.35	0.29	31.06	44.05
23		12.00	120.00	7.87	31.37	0.31	31.06	44.04
24		13.00	130.00	7.91	31.41	0.34	31.07	44.05
25		14.00	140.00	7.93	31.43	0.37	31.06	44.05
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

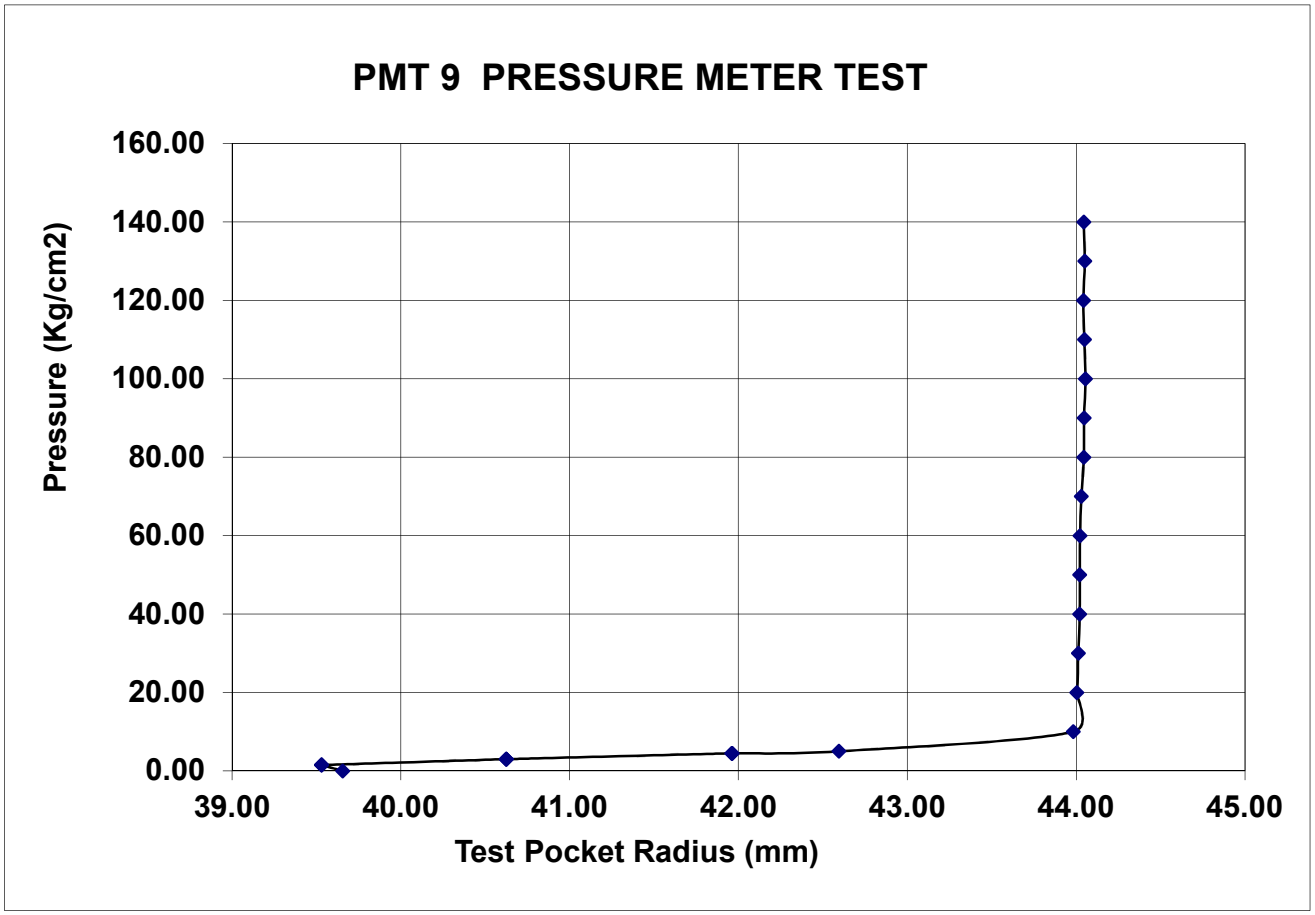
PMT: 9 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00		
Final Pressure P2 (Kg/ cm2) =	90.00		
Δ P (Kg/cm2) =	60.00		
Intial Radius (mm) =	44.01		
Final Radius (mm) =	44.05		
Δ R(cm) =	**0.004**		
r(cm)=	4.403		**γ =** 0.3

Calculations

K= ΔP/ΔR =	15000	
E=(1+γ)rK=	85858.5000	(kg/cm2)
G= E/2(1+γ)=	55808.0250	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	51.40-52.00
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.82	22.68	-0.03	22.71	38.61
2	15	0.15	1.50	1.25	24.75	-0.02	24.77	39.86
3	15	0.15	1.50	1.25	24.75	-0.02	24.77	39.86
4	15	0.15	1.50	1.25	24.75	-0.02	24.77	39.86
5	15	0.30	3.00	2.66	26.16	-0.02	26.18	40.75
6	15	0.30	3.00	2.66	26.16	-0.02	26.18	40.75
7	15	0.30	3.00	2.66	26.16	-0.02	26.18	40.75
8	15	0.45	4.50	5.05	28.55	-0.02	28.57	42.32
9	15	0.45	4.50	5.05	28.55	-0.02	28.57	42.32
10	15	0.45	4.50	5.05	28.55	-0.02	28.57	42.32
11		0.50	5.00	5.99	29.49	-0.01	29.50	42.96
12		1.00	10.00	7.15	30.65	0.00	30.65	43.76
13		2.00	20.00	7.20	30.70	0.03	30.67	43.77
14		3.00	30.00	7.25	30.75	0.06	30.69	43.79
15		4.00	40.00	7.28	30.78	0.09	30.69	43.79
16		5.00	50.00	7.32	30.82	0.11	30.71	43.80
17		6.00	60.00	7.35	30.85	0.14	30.71	43.80
18		7.00	70.00	7.39	30.89	0.17	30.72	43.81
19		8.00	80.00	7.43	30.93	0.20	30.73	43.81
20		9.00	90.00	7.45	30.95	0.23	30.72	43.81
21		10.00	100.00	7.47	30.97	0.26	30.71	43.80
22		11.00	110.00	7.51	31.01	0.29	30.72	43.81
23		12.00	120.00	7.53	31.03	0.31	30.72	43.80
24		13.00	130.00	7.56	31.06	0.34	30.72	43.80
25		14.00	140.00	7.59	31.09	0.37	30.72	43.81
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		
	Job No	Prepared by	Cheked By
	1612	Vaibhav	Prasad

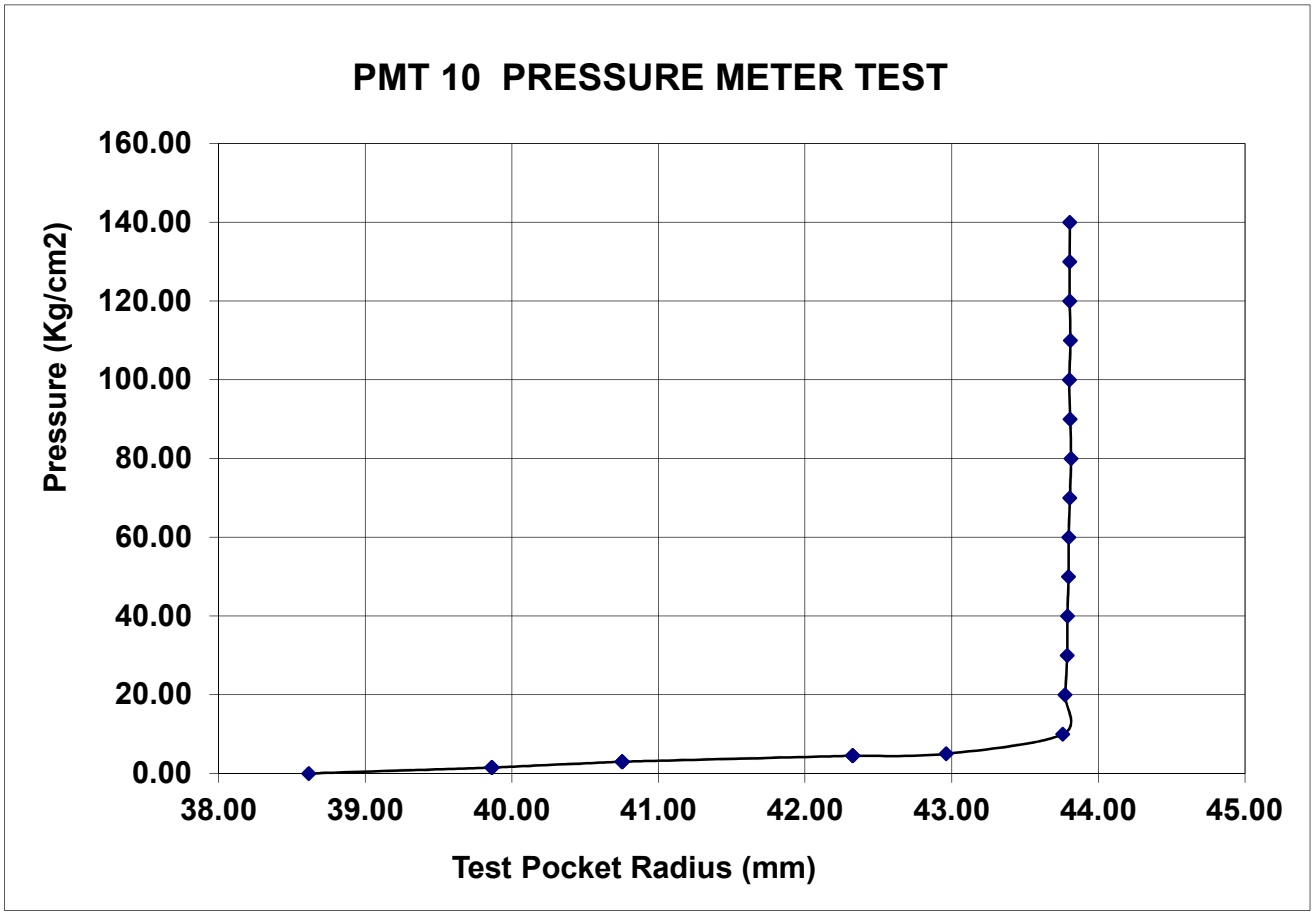
PMT: 10 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	90.00	
Δ P (Kg/cm2) =	50.00	
Intial Radius (mm) =	43.79	
Final Radius (mm) =	43.81	
Δ R(cm) =	**0.002**	
r(cm)=	4.38	**γ =** 0.3

Calculations

K= ΔP/ΔR =	25000	
E=(1+γ)rK=	142350.0000	(kg/cm2)
G= E/2(1+γ)=	92527.5000	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	47.00-47.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.51	22.99	-0.03	23.02	38.80
2	15	0.15	1.50	1.64	25.14	-0.02	25.16	40.11
3	15	0.15	1.50	1.64	25.14	-0.02	25.16	40.11
4	15	0.15	1.50	1.64	25.14	-0.02	25.16	40.11
5	15	0.30	3.00	3.56	27.06	-0.02	27.08	41.34
6	15	0.30	3.00	3.56	27.06	-0.02	27.08	41.34
7	15	0.30	3.00	3.56	27.06	-0.02	27.08	41.34
8	15	0.45	4.50	6.16	29.66	-0.02	29.68	43.08
9	15	0.45	4.50	6.16	29.66	-0.02	29.68	43.08
10	15	0.45	4.50	6.16	29.66	-0.02	29.68	43.08
11		0.50	5.00	7.06	30.56	-0.01	30.57	43.70
12		1.00	10.00	8.50	32.00	0.00	32.00	44.71
13		2.00	20.00	8.59	32.09	0.03	32.06	44.76
14		3.00	30.00	8.65	32.15	0.06	32.09	44.78
15		4.00	40.00	8.68	32.18	0.09	32.09	44.78
16		5.00	50.00	8.73	32.23	0.11	32.12	44.80
17		6.00	60.00	8.92	32.42	0.14	32.28	44.91
18		7.00	70.00	9.05	32.55	0.17	32.38	44.99
19		8.00	80.00	9.28	32.78	0.20	32.58	45.13
20		9.00	90.00	9.39	32.89	0.23	32.66	45.19
21		10.00	100.00	9.51	33.01	0.26	32.75	45.26
22		11.00	110.00	9.60	33.10	0.29	32.81	45.30
23								
24								
25								
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

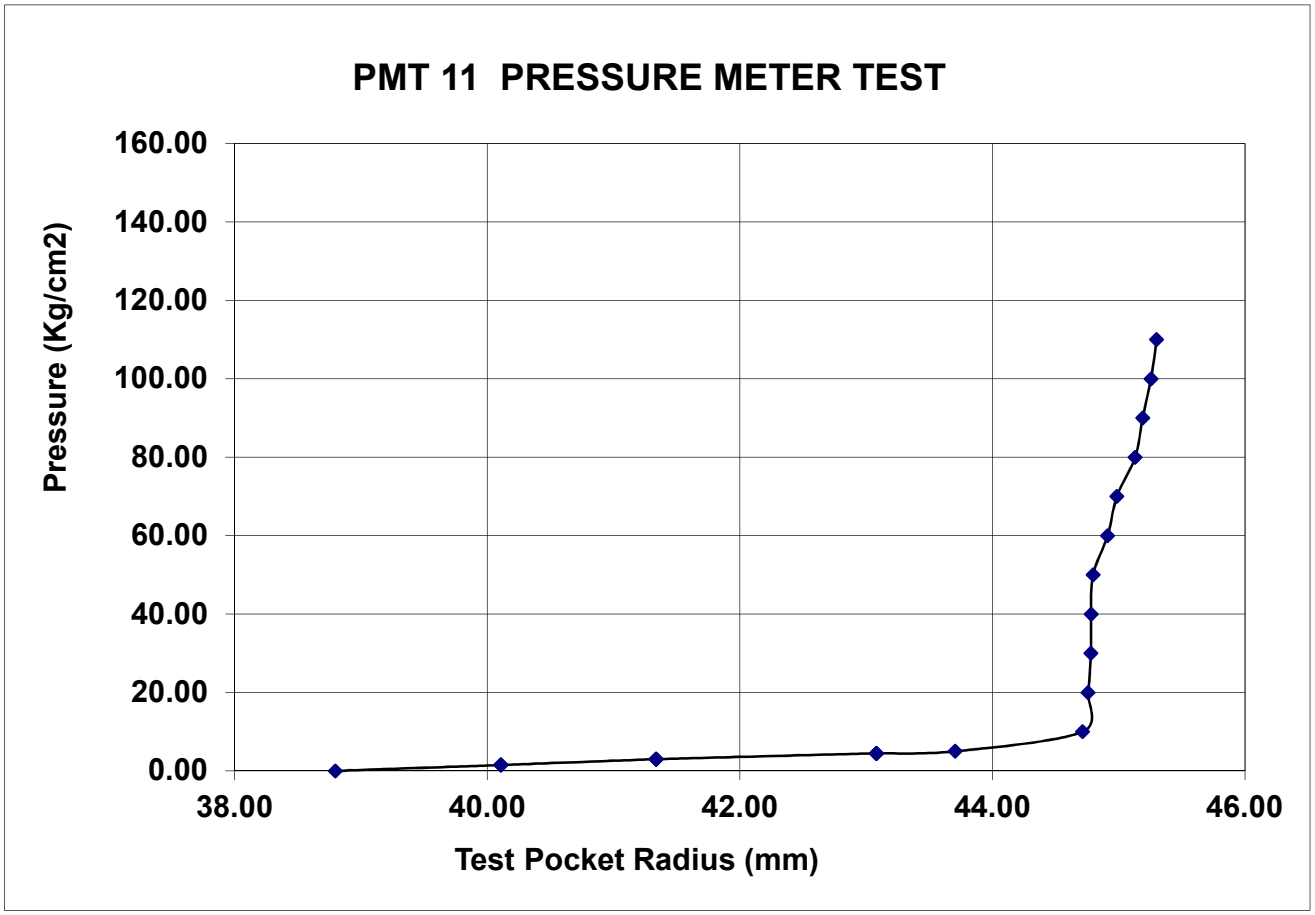
PMT: 11 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	20.00	
Final Pressure P2 (Kg/ cm2) =	60.00	
Δ P (Kg/cm2) =	40.00	
Intial Radius (mm) =	44.76	
Final Radius (mm) =	44.91	
Δ R(cm) =	**0.015**	
r(cm)=	4.4835	**γ =** 0.3

Calculations

K= ΔP/ΔR =	2666.666667	
E=(1+γ)rK=	15542.8000	(kg/cm2)
G= E/2(1+γ)=	10102.8200	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	42.00-42.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.21	23.29	-0.03	23.32	38.98
2	15	0.15	1.50	1.92	25.42	-0.02	25.44	40.28
3	15	0.15	1.50	1.92	25.42	-0.02	25.44	40.28
4	15	0.15	1.50	1.92	25.42	-0.02	25.44	40.28
5	15	0.30	3.00	3.66	27.16	-0.02	27.18	41.40
6	15	0.30	3.00	3.66	27.16	-0.02	27.18	41.40
7	15	0.30	3.00	3.66	27.16	-0.02	27.18	41.40
8	15	0.45	4.50	3.71	27.21	-0.02	27.23	41.43
9	15	0.45	4.50	3.71	27.21	-0.02	27.23	41.43
10	15	0.45	4.50	3.71	27.21	-0.02	27.23	41.43
11		0.50	5.00	3.75	27.25	-0.01	27.26	41.46
12		1.00	10.00	3.80	27.30	0.00	27.30	41.48
13		2.00	20.00	3.83	27.33	0.03	27.30	41.48
14		3.00	30.00	3.86	27.36	0.06	27.30	41.48
15		4.00	40.00	3.88	27.38	0.09	27.29	41.48
16		5.00	50.00	3.91	27.41	0.11	27.30	41.48
17		6.00	60.00	3.94	27.44	0.14	27.30	41.48
18		7.00	70.00	3.97	27.47	0.17	27.30	41.48
19		8.00	80.00	4.02	27.52	0.20	27.32	41.49
20		9.00	90.00	4.05	27.55	0.23	27.32	41.49
21		10.00	100.00	4.08	27.58	0.26	27.32	41.50
22		11.00	110.00	4.10	27.60	0.29	27.31	41.49
23		12.00	120.00	4.12	27.62	0.31	27.31	41.48
24		13.00	130.00	4.16	27.66	0.34	27.32	41.49
25		14.00	140.00	4.20	27.70	0.37	27.33	41.50
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

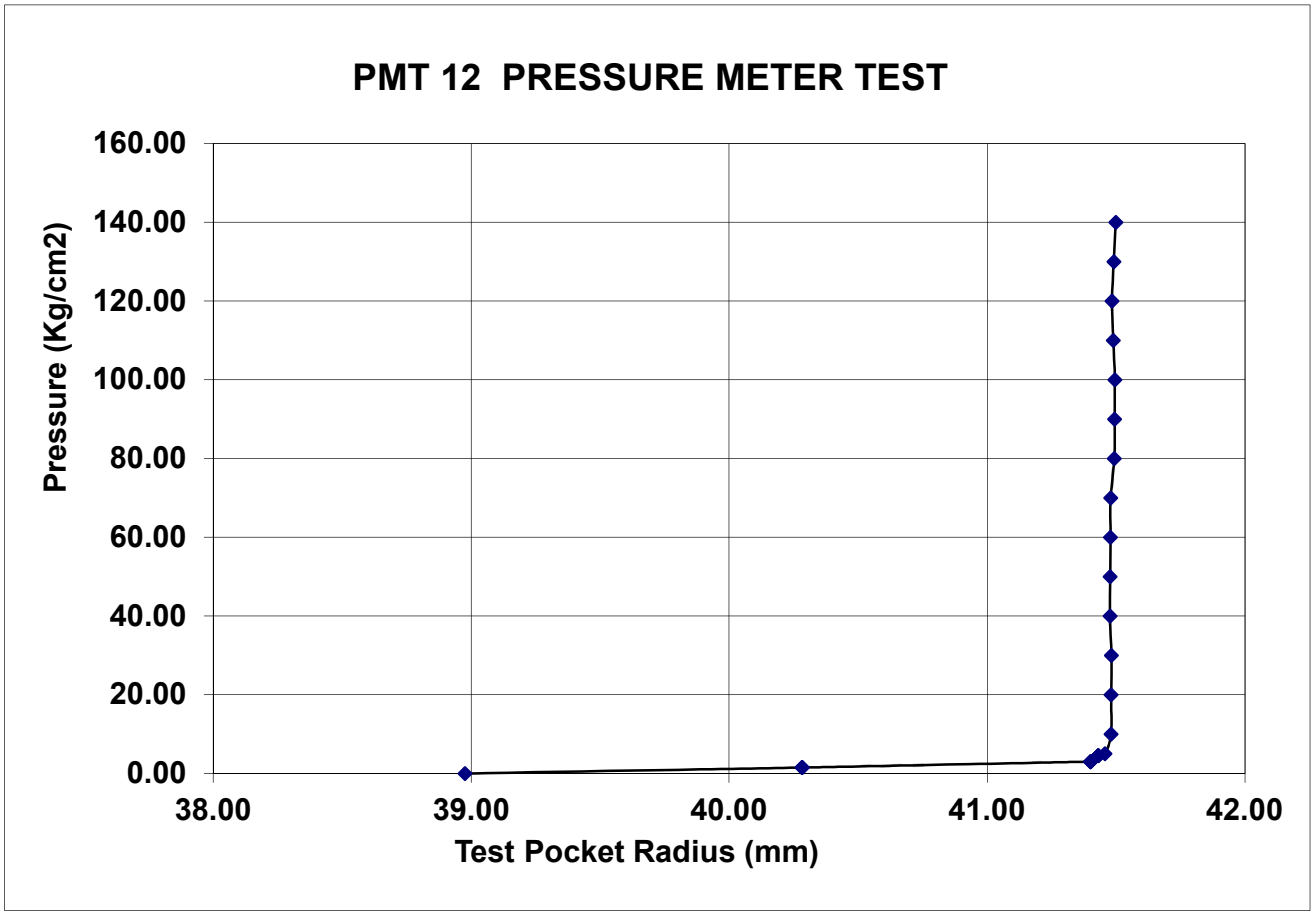
PMT: 12 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	30.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	70.00	
Intial Radius (mm) =	41.48	
Final Radius (mm) =	41.5	
Δ R(cm) =	**0.002**	
r(cm)=	4.149	**γ =** 0.3

Calculations

K= ΔP/ΔR =	35000	
E=(1+γ)rK=	188779.5000	(kg/cm2)
G= E/2(1+γ)=	122706.6750	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	34.00-34.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.12	23.38	-0.03	23.41	39.03
2	15	0.15	1.50	2.78	26.28	-0.02	26.30	40.83
3	15	0.15	1.50	2.78	26.28	-0.02	26.30	40.83
4	15	0.15	1.50	2.78	26.28	-0.02	26.30	40.83
5	15	0.30	3.00	3.72	27.22	-0.02	27.24	41.44
6	15	0.30	3.00	3.72	27.22	-0.02	27.24	41.44
7	15	0.30	3.00	3.72	27.22	-0.02	27.24	41.44
8	15	0.45	4.50	3.75	27.25	-0.02	27.27	41.46
9	15	0.45	4.50	3.75	27.25	-0.02	27.27	41.46
10	15	0.45	4.50	3.75	27.25	-0.02	27.27	41.46
11		0.50	5.00	3.79	27.29	-0.01	27.30	41.48
12		1.00	10.00	3.81	27.31	0.00	27.31	41.49
13		2.00	20.00	3.84	27.34	0.03	27.31	41.49
14		3.00	30.00	3.90	27.40	0.06	27.34	41.51
15		4.00	40.00	3.92	27.42	0.09	27.33	41.50
16		5.00	50.00	3.96	27.46	0.11	27.35	41.51
17		6.00	60.00	3.99	27.49	0.14	27.35	41.51
18		7.00	70.00	4.05	27.55	0.17	27.38	41.53
19		8.00	80.00	4.11	27.61	0.20	27.41	41.55
20		9.00	90.00	4.17	27.67	0.23	27.44	41.57
21		10.00	100.00	4.20	27.70	0.26	27.44	41.57
22		11.00	110.00	4.25	27.75	0.29	27.46	41.59
23		12.00	120.00	4.27	27.77	0.31	27.46	41.58
24		13.00	130.00	4.31	27.81	0.34	27.47	41.59
25		14.00	140.00	4.36	27.86	0.37	27.49	41.60
26								
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3062.564		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

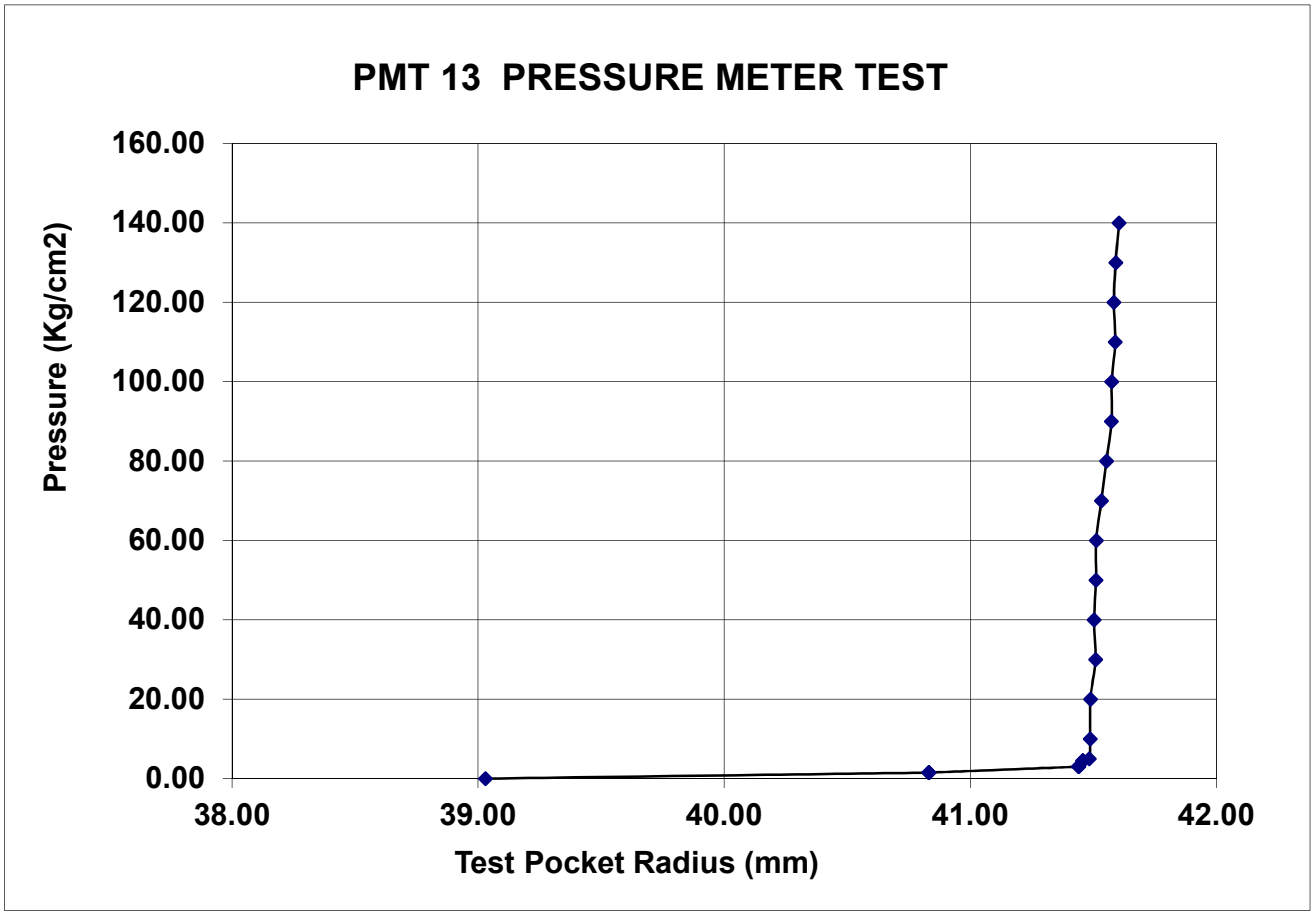
PMT: 13 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	60.00	
Intial Radius (mm) =	41.50	
Final Radius (mm) =	41.57	
Δ R(cm) =	**0.007**	
r(cm)=	4.1535	**γ =** 0.3

Calculations

K= ΔP/ΔR =	8571.428571	
E=(1+γ)rK=	46281.8571	(kg/cm2)
G= E/2(1+γ)=	30083.2071	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	30.50-31.10
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.08	23.42	-0.03	23.45	39.05
2	15	0.15	1.50	3.01	26.51	-0.02	26.53	40.98
3	15	0.15	1.50	3.01	26.51	-0.02	26.53	40.98
4	15	0.15	1.50	3.01	26.51	-0.02	26.53	40.98
5	15	0.30	3.00	4.46	27.96	-0.02	27.98	41.93
6	15	0.30	3.00	4.46	27.96	-0.02	27.98	41.93
7	15	0.30	3.00	4.46	27.96	-0.02	27.98	41.93
8	15	0.45	4.50	4.51	28.01	-0.02	28.03	41.96
9	15	0.45	4.50	4.51	28.01	-0.02	28.03	41.96
10	15	0.45	4.50	4.51	28.01	-0.02	28.03	41.96
11		0.50	5.00	4.55	28.05	-0.01	28.06	41.99
12		1.00	10.00	4.60	28.10	0.00	28.10	42.01
13		2.00	20.00	4.66	28.16	0.03	28.13	42.03
14		3.00	30.00	4.73	28.23	0.06	28.17	42.06
15		4.00	40.00	4.79	28.29	0.09	28.20	42.08
16		5.00	50.00	4.87	28.37	0.11	28.26	42.12
17		6.00	60.00	4.94	28.44	0.14	28.30	42.14
18		7.00	70.00	5.02	28.52	0.17	28.35	42.18
19		8.00	80.00	5.08	28.58	0.20	28.38	42.20
20		9.00	90.00	5.15	28.65	0.23	28.42	42.23
21		10.00	100.00	5.26	28.76	0.26	28.50	42.28
22		11.00	110.00	5.33	28.83	0.29	28.54	42.31
23		12.00	120.00	5.43	28.93	0.31	28.62	42.36
24		13.00	130.00	5.56	29.06	0.34	28.72	42.43
25		14.00	140.00	5.73	29.23	0.37	28.86	42.52
26								
27								
28								
29								

Calculation Notes:		Type Of Probe	1	
Membrane Calibration Constants		Thickness Correction K :Mn/m2/mm=35		
		Expansion Correction S (mm2)= 3062.564		
		Job No	Prepared by	Cheked By
		1612	Vaibhav	Prasad

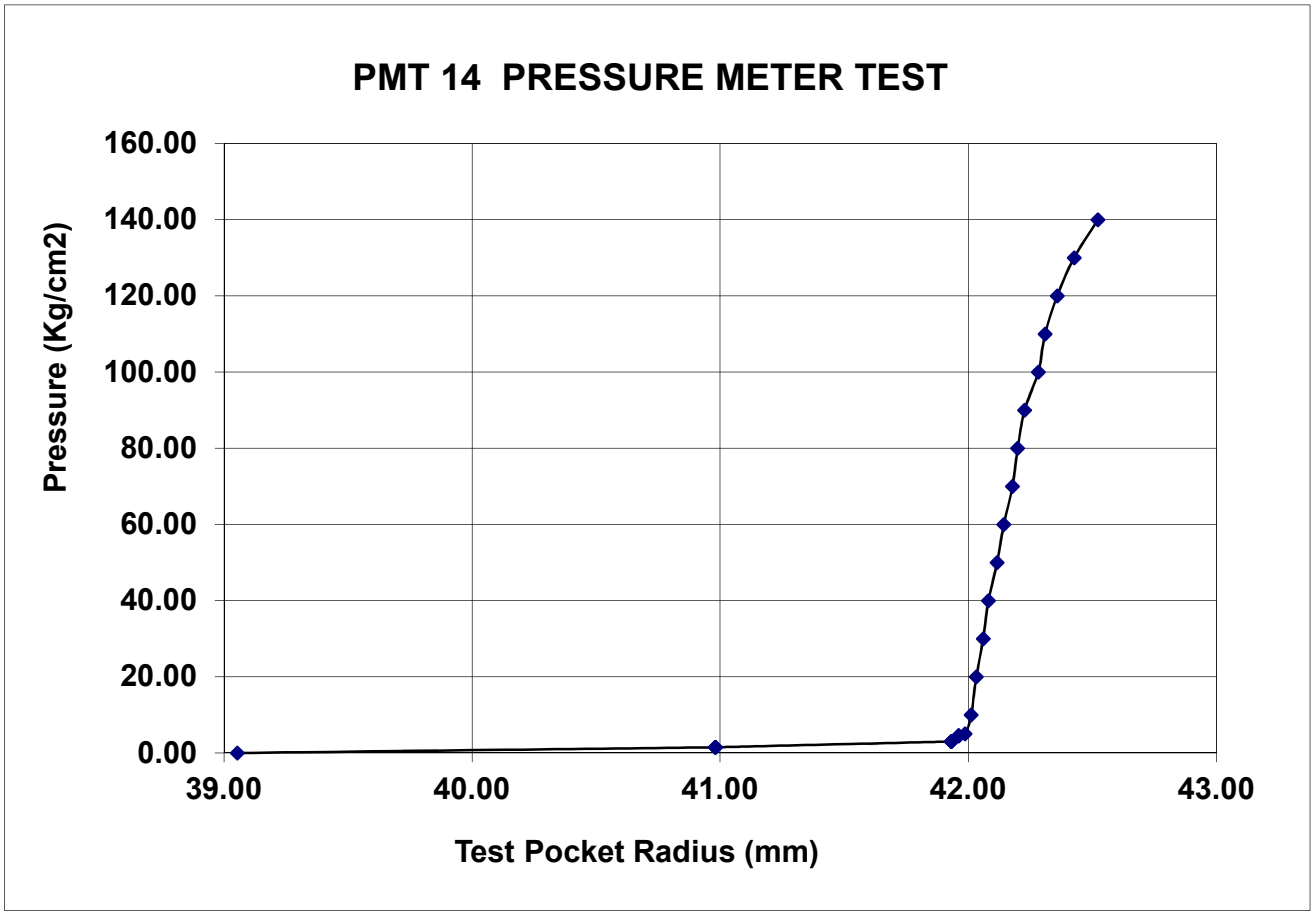
PMT: 14 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	80.00	
Δ P (Kg/cm2) =	40.00	
Intial Radius (mm) =	42.08	
Final Radius (mm) =	42.2	
Δ R(cm) =	**0.012**	
r(cm)=	4.214	**γ =** 0.3

Calculations

K= ΔP/ΔR =	3333.333333	
E=(1+γ)rK=	18260.6667	(kg/cm2)
G= E/2(1+γ)=	11869.4333	(kg/cm2)



PRESSURE METER TEST

PROJECT	Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.		
NAME OF CLIENT	NHSRCL	SIZE OF BOREHOLE (mm)	Nx
BOREHOLE NO.	PBH-03	DATE	09.08.2019
LOCATION		TEST DEPTH (m)	27.00-27.60
RL (m)		FINAL DEPTH (m)	95.00
TYPE OF STRATA	Fresh To S.W. Breccia		

Sr No.	Time in sec.	Pressure P (MPa)	Pressure P' (Kg/Cm2)	Displacement Display Value Rn	Inner Radius Display Value Ri =Rn+23.5	Thickness Correction Volume PG= P"/K	Reference inner Radius Rs =Ri-PG	Test Pocket Radius R= SQRT (Rs2+S/π)
		(Mpa)	(Kg/Cm2)	(mm)	(mm)		(mm)	(mm)
1	0	0.00	0.00	-0.01	23.49	-0.03	23.52	39.10
2	15	0.15	1.50	1.76	25.26	-0.02	25.28	40.18
3	15	0.15	1.50	1.70	25.20	-0.02	25.22	40.14
4	15	0.15	1.50	1.70	25.20	-0.02	25.22	40.14
5	15	0.30	3.00	1.90	25.40	-0.02	25.42	40.27
6	15	0.30	3.00	1.90	25.40	-0.02	25.42	40.27
7	15	0.30	3.00	1.90	25.40	-0.02	25.42	40.27
8	15	0.45	4.50	2.38	25.88	-0.02	25.90	40.57
9	15	0.45	4.50	2.38	25.88	-0.02	25.90	40.57
10	15	0.45	4.50	2.38	25.88	-0.02	25.90	40.57
11		0.50	5.00	3.00	26.50	-0.01	26.51	40.97
12		1.00	10.00	3.80	27.30	0.00	27.30	41.48
13		2.00	20.00	3.94	27.44	0.03	27.41	41.55
14		3.00	30.00	4.00	27.50	0.06	27.44	41.57
15		4.00	40.00	4.06	27.56	0.09	27.47	41.60
16		5.00	50.00	4.11	27.61	0.11	27.50	41.61
17		6.00	60.00	4.15	27.65	0.14	27.51	41.62
18		7.00	70.00	4.21	27.71	0.17	27.54	41.64
19		8.00	80.00	4.27	27.77	0.20	27.57	41.66
20		9.00	90.00	4.32	27.82	0.23	27.59	41.67
21		10.00	100.00	4.38	27.88	0.26	27.62	41.69
22		11.00	110.00	4.45	27.95	0.29	27.66	41.72
23		12.00	120.00	4.48	27.98	0.31	27.67	41.72
24		13.00	130.00	4.57	28.07	0.34	27.73	41.76
25		14.00	140.00	4.62	28.12	0.37	27.75	41.78
26								
27								
28								
29								

Calculation Notes:	Type Of Probe	1	
Membrane Calibration Constants	Thickness Correction K :Mn/m2/mm=35		
	Expansion Correction S (mm2)= 3062.564		

Job No	Prepared by	Cheked By
1612	Vaibhav	Prasad

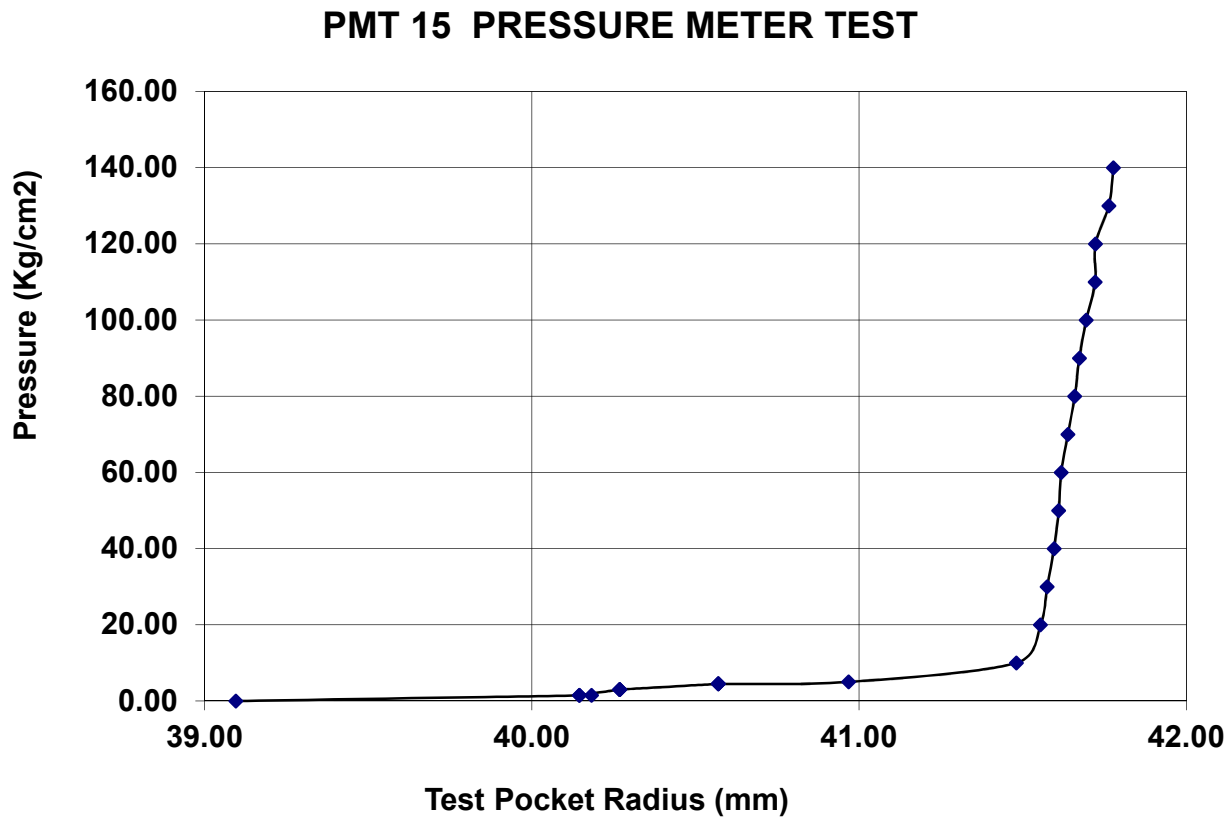
PMT: 15 PRESSURE METER TEST

Observation from Graph

Intial Pressure P1 (Kg/ cm2) =	40.00	
Final Pressure P2 (Kg/ cm2) =	100.00	
Δ P (Kg/cm2) =	60.00	
Intial Radius (mm) =	41.60	
Final Radius (mm) =	41.69	
Δ R(cm) =	**0.009**	
r(cm)=	4.1645	**γ =** 0.3

Calculations

K= ΔP/ΔR =	6666.666667	
E=(1+γ)rK=	36092.3333	(kg/cm2)
G= E/2(1+γ)=	23460.0167	(kg/cm2)



APPENDIX-F

- Permeability Test

Borehole Location	Test Length (m)	Lugeon Value	Conductivity Classification	Flow Behavior Based on Lugeon pattern	Condition of Rock Mass Discontinuities
PBH-01	5.5 – 8.5	4	Low	Turbulent	Tight
	15.0 – 18.0	4	Low	Turbulent	Tight
	29.0 – 32.0	5	Low	Turbulent	Tight
PBH-02	4.0 – 7.0	28	Medium	Wash Out	Some Open
	18.0 – 21.0	5	Moderate	Dilation	Few Partly Open
	30.0 – 33.0	7	Moderate	Wash-Out	Few Partly Open
PBH-03	6.50 – 9.50	5	Moderate	Turbulent	Few Partly Open
	16.5 – 19.5	4	Low	Dilation	Tight
	29.0 – 32.0	2	Low	Wash Out	Tight

- **Calculation Sheets and Graphs**

PACKER PERMEABILITY TEST

Project : **Geotechnical & Geophysical investigation work for Bullet Train at BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-01**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **5.50** To **8.50** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Above WaterTable**

Date : **20/09/2019**

Bore Hole : **PBH-01**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **8.00**

H_1 (m) : **0.00**

H_2 (m) : **8.00**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	8.00	1.50	2.300	15.0	78.10	5.21	1.736	7.546	7.55E-05
2	3.00	0.00	8.00	3.00	3.800	15.0	85.10	5.67	1.891	4.977	4.98E-05
3	3.00	0.00	8.00	5.00	5.800	15.0	114.90	7.66	2.553	4.402	4.40E-05
4	3.00	0.00	8.00	3.00	3.800	15.0	79.70	5.31	1.771	4.661	4.66E-05
5	3.00	0.00	8.00	1.50	2.300	15.0	76.00	5.07	1.689	7.343	7.34E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 5.800 Kg/cm^2

Q_0 : Q_t / t = 7.660 lit / min

Q : Q_0 / L = 2.553 lit/min/m

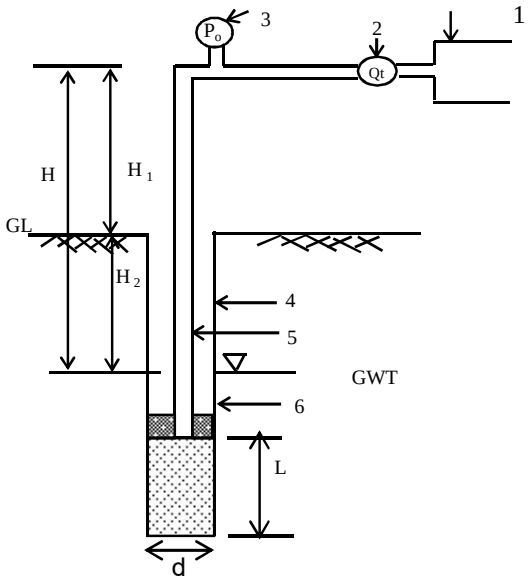
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

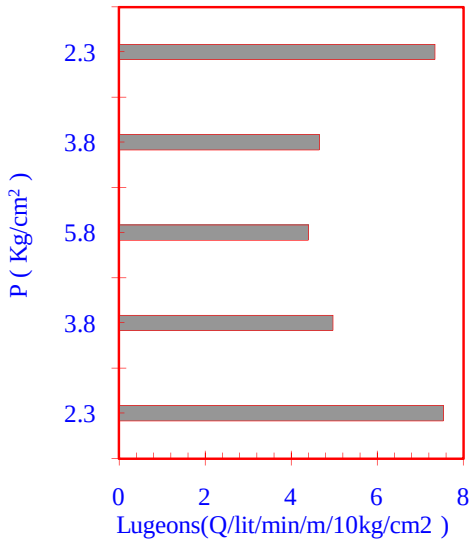
= **4.402** lit/min/m/10Kg/cm^2

Group : **B**

Classification : **TURBULENT FLOW**

Average Lugeon





1 :- Pump
2 :- Flow Meter
3 :- Pressure Gauge
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = $H_1 + H_2$
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geotechnical & Geophysical investigation work for Bullet Train at BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-01**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **15.00** To **18.00** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **20/09/2019**

Bore Hole : **PBH-01**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **8.00**

H_1 (m) : **0.00**

H_2 (m) : **8.00**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	8.00	1.50	2.300	15.0	51.60	3.44	1.147	4.986	4.99E-05
2	3.00	0.00	8.00	3.00	3.800	15.0	76.00	5.07	1.689	4.444	4.44E-05
3	3.00	0.00	8.00	5.00	5.800	15.0	104.30	6.95	2.318	3.996	4.00E-05
4	3.00	0.00	8.00	3.00	3.800	15.0	87.80	5.85	1.951	5.135	5.13E-05
5	3.00	0.00	8.00	1.50	2.300	15.0	74.40	4.96	1.653	7.188	7.19E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 5.800 Kg/cm^2

Q_0 : Q_t / t = 6.950 lit / min

Q : Q_0 / L = 2.318 lit/min/m

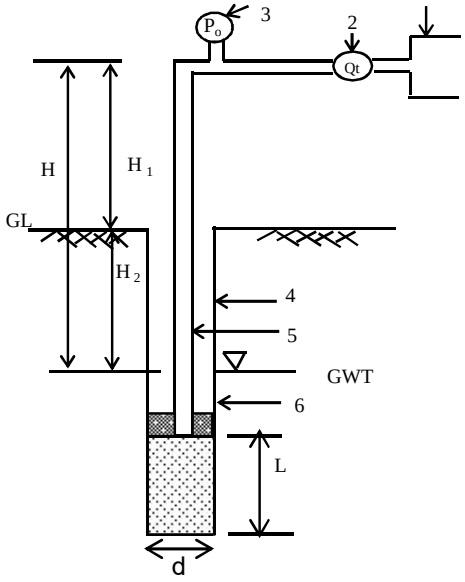
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

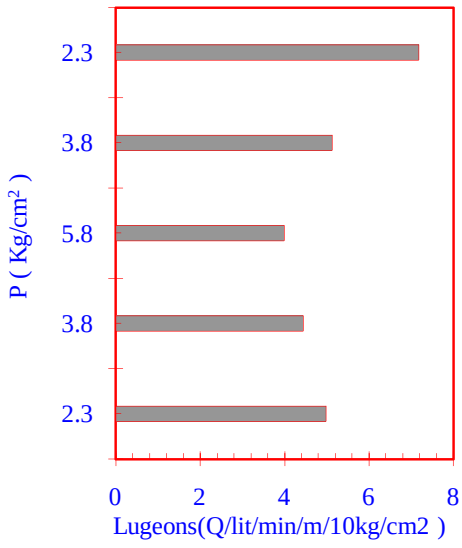
= **3.996** lit/min/m/10Kg/cm^2

Group : **B**

Classification : **TURBULENT FLOW**

Average Lugeon





1 :- Pump
2 :- Flow Meter
3 :- Pressure Gauge
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = $H_1 + H_2$
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geotechnical & Geophysical investigation work for Bullet Train at BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-01**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **29.00** To **32.00** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **20/09/2019**

Bore Hole : **PBH-01**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **8.00**

H_1 (m) : **0.00**

H_2 (m) : **8.00**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	8.00	1.50	2.300	15.0	65.40	4.36	1.453	6.319	6.32E-05
2	3.00	0.00	8.00	3.00	3.800	15.0	89.60	5.97	1.991	5.240	5.24E-05
3	3.00	0.00	8.00	5.00	5.800	15.0	128.40	8.56	2.853	4.920	4.92E-05
4	3.00	0.00	8.00	3.00	3.800	15.0	91.70	6.11	2.038	5.363	5.36E-05
5	3.00	0.00	8.00	1.50	2.300	15.0	77.30	5.15	1.718	7.469	7.47E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 5.800 Kg/cm^2

Q_0 : Q_t / t = 8.560 lit / min

Q : Q_0 / L = 2.853 lit/min/m

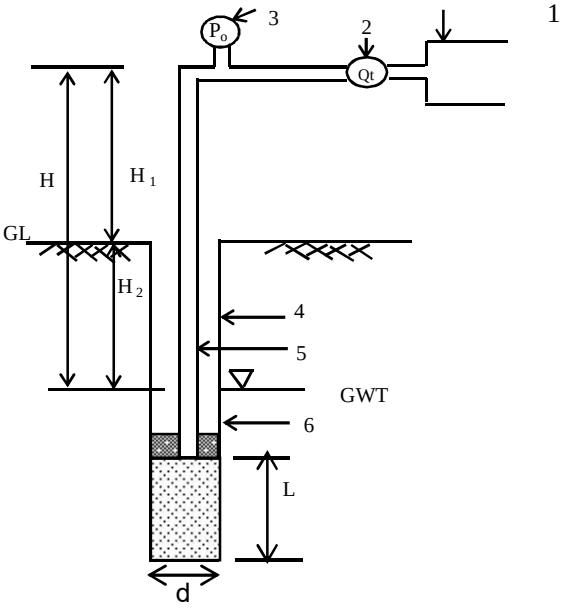
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

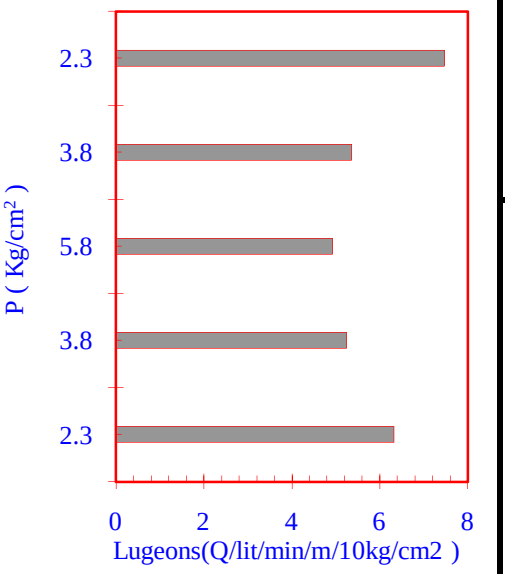
= **4.920** lit/min/m/10Kg/cm^2

Group : **B**

Classification : **TURBULENT FLOW**

Average Lugeon





1 :- Pump
2 :- Flow Meter
3 :- Pressure Gauge
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = $H_1 + H_2$
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-02**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **4.00** To **7.00** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **03/09/2019**

Bore Hole : **PBH-02**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **5.00**

H_1 (m) : **0.00**

H_2 (m) : **5.00**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	5.00	1.50	2.000	15.0	247.10	16.47	5.491	27.456	2.75E-04
2	3.00	0.00	5.00	3.00	3.500	15.0	274.80	18.32	6.107	17.448	1.74E-04
3	3.00	0.00	5.00	5.00	5.500	15.0	464.30	30.95	10.318	18.760	1.88E-04
4	3.00	0.00	5.00	3.00	3.500	15.0	251.70	16.78	5.593	15.981	1.60E-04
5	3.00	0.00	5.00	1.50	2.000	15.0	173.10	11.54	3.847	19.233	1.92E-04

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 2.000 Kg/cm^2

Q_0 : Q_t / t = 16.470 lit / min

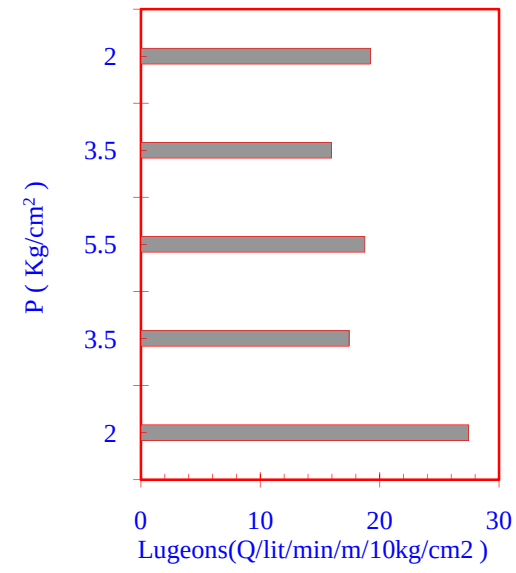
Q : Q_0 / L = 5.491 lit/min/m

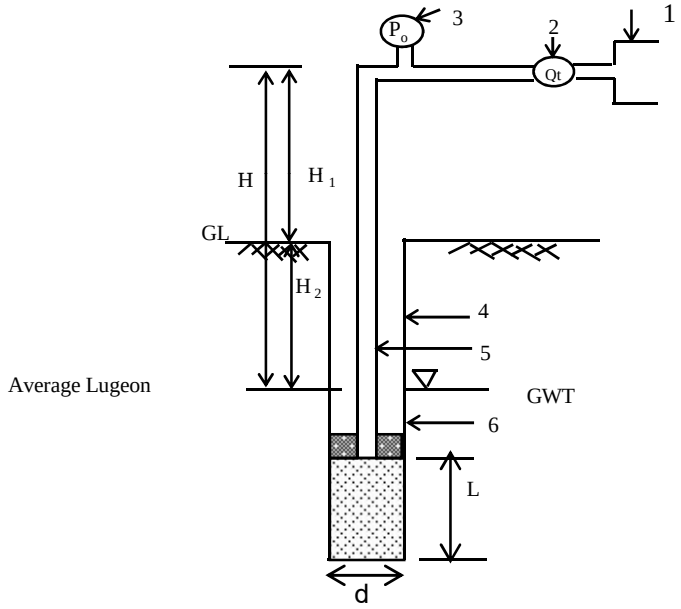
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

= **27.456** lit/min/m/10Kg/cm^2

Group : **D**

Classification : **WASH OUT**





1 :- Pump
2 :- Flow Meter
3 :- Pressure Gaug
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value lit/min/m/10Kg/cr
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = H_1 + H_2
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-02**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **18.00** To **21.00** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **03/09/2019**

Bore Hole : **PBH-02**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **5.00**

H_1 (m) : **0.00**

H_2 (m) : **5.00**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	5.00	1.50	2.000	15.0	59.00	3.93	1.311	6.556	6.56E-05
2	3.00	0.00	5.00	3.00	3.500	15.0	94.10	6.27	2.091	5.975	5.97E-05
3	3.00	0.00	5.00	5.00	3.000	15.0	115.40	7.69	2.564	8.548	8.55E-05
4	3.00	0.00	5.00	3.00	3.500	15.0	102.70	6.85	2.282	6.521	6.52E-05
5	3.00	0.00	5.00	1.50	2.000	15.0	48.80	3.25	1.084	5.422	5.42E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 2.000 Kg/cm^2

Q_0 : Q_t / t = 3.250 lit / min

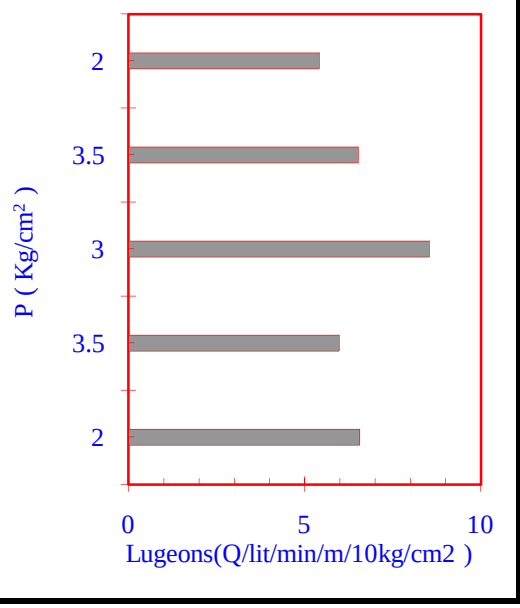
Q : Q_0 / L = 1.084 lit/min/m

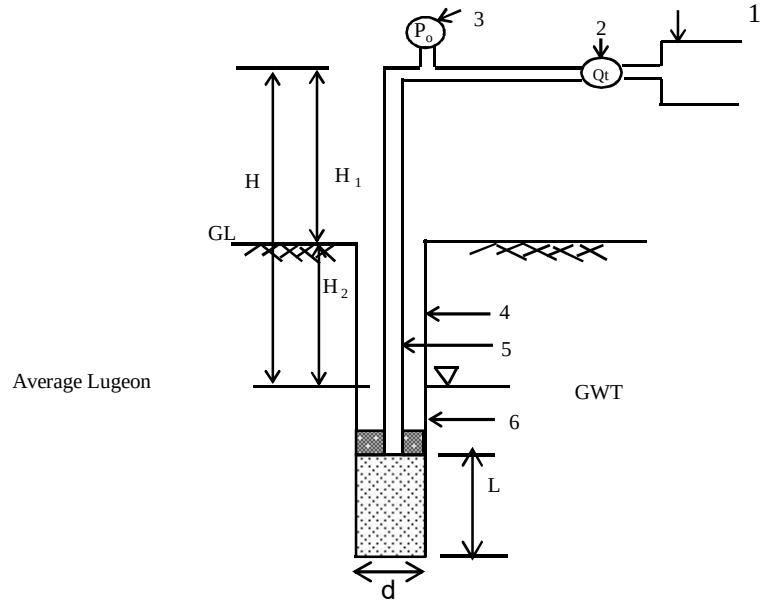
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

= **5.422** lit/min/m/10Kg/cm^2

Group : **C**

Classification : **DILATION**





1 :- Pump
2 :- Flow Meter
3 :- Pressure Gauge
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = $H_1 + H_2$
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-02**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **30.00** To **33.00** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **03/09/2019**

Bore Hole : **PBH-02**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **5.00**

H_1 (m) : **0.00**

H_2 (m) : **5.00**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	5.00	1.50	2.000	15.0	59.40	3.96	1.320	6.600	6.60E-05
2	3.00	0.00	5.00	3.00	3.500	15.0	111.30	7.42	2.473	7.067	7.07E-05
3	3.00	0.00	5.00	5.00	5.500	15.0	134.50	8.97	2.989	5.434	5.43E-05
4	3.00	0.00	5.00	3.00	3.500	15.0	50.30	3.35	1.118	3.194	3.19E-05
5	3.00	0.00	5.00	1.50	2.000	15.0	33.50	2.23	0.744	3.722	3.72E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 3.000 Kg/cm^2

Q_0 : Q_t / t = 7.420 lit / min

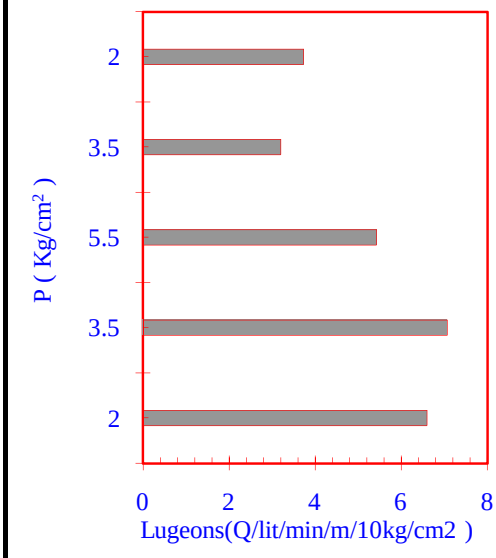
Q : Q_0 / L = 2.473 lit/min/m

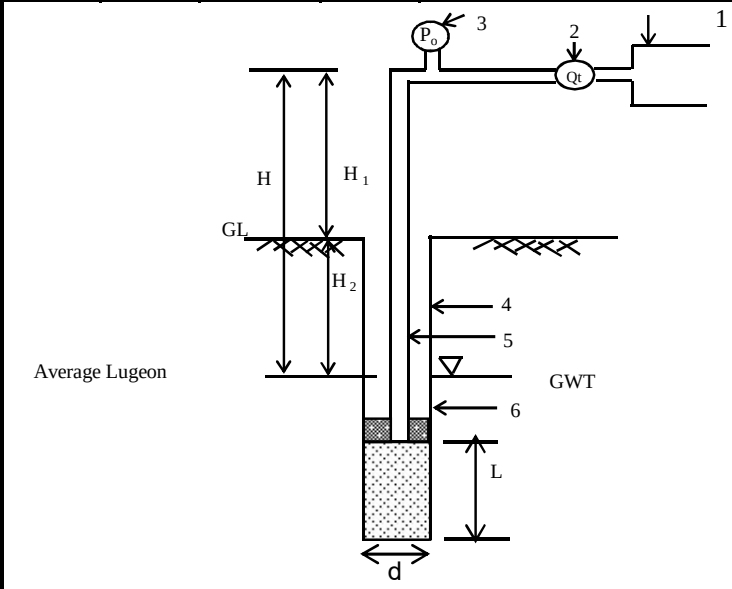
Lugeon :- $\frac{Q * 1 \text{ Mpa}}{\text{Test Pressure i.e. P}}$

= **7.067** lit/min/m/10Kg/cm^2

Group : **D**

Classification : **WASH-OUT**





1 :- Pump

2 :- Flow Meter

3 :- Pressure Gauge

4 :- Drill Hole

5 :- Injection Pipe

6 :- Packer

Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2

k :- Permeability in cm/sec

P_o :- Gauge Pressure

H_1 :- Height of Pressure Gauge

H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface

P :- Effective Pressure

P :- P_0+H/10 or H = H_1 + H_2

t :- Injection Time

Q_t :- Water Volume (in lit) During time t

Q_0 :- Water Volume (lit /min)

L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-03**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **6.50** To **9.50** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **05/09/2019**

Bore Hole : **PBH-03**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **6.50**

H_1 (m) : **0.00**

H_2 (m) : **6.50**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	6.50	1.50	2.150	15.0	78.00	5.20	1.733	8.062	8.06E-05
2	3.00	0.00	6.50	3.00	3.650	15.0	101.70	6.78	2.260	6.192	6.19E-05
3	3.00	0.00	6.50	5.00	5.650	15.0	127.80	8.52	2.840	5.027	5.03E-05
4	3.00	0.00	6.50	3.00	3.650	15.0	93.80	6.25	2.084	5.711	5.71E-05
5	3.00	0.00	6.50	1.50	2.150	15.0	78.20	5.21	1.738	8.083	8.08E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 5.650 Kg/cm^2

Q_0 : Q_t / t = 8.520 lit / min

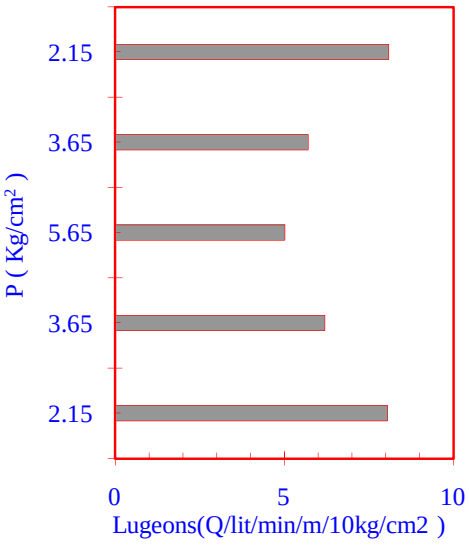
Q : Q_0 / L = 2.840 lit/min/m

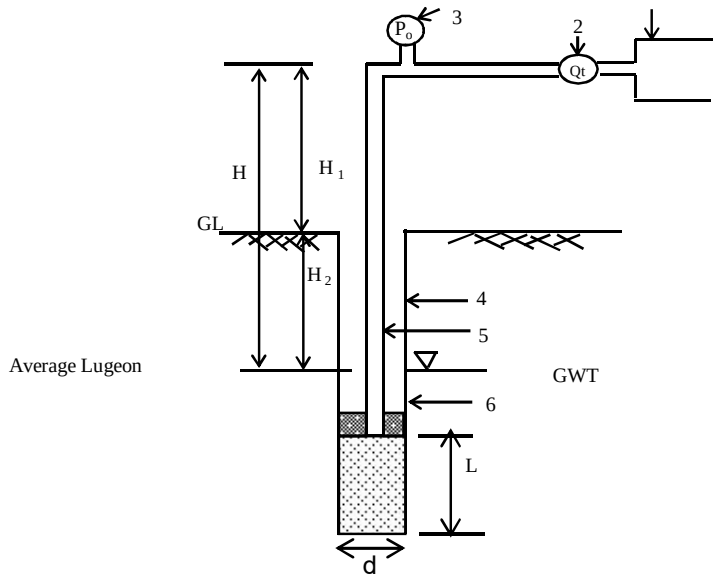
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

= **5.027** lit/min/m/10Kg/cm^2

Group : **B**

Classification : **TURBULENT FLOW**





1 :- Pump
2 :- Flow Meter
3 :- Pressure Gauge
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = $H_1 + H_2$
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-03**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **16.50** To **19.50** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **05/09/2019**

Bore Hole : **PBH-03**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **6.50**

H_1 (m) : **0.00**

H_2 (m) : **6.50**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	6.50	1.50	2.150	15.0	26.60	1.77	0.591	2.749	2.75E-05
2	3.00	0.00	6.50	3.00	3.650	15.0	37.90	2.53	0.842	2.307	2.31E-05
3	3.00	0.00	6.50	5.00	5.650	15.0	102.00	6.80	2.267	4.012	4.01E-05
4	3.00	0.00	6.50	3.00	3.650	15.0	59.20	3.95	1.316	3.604	3.60E-05
5	3.00	0.00	6.50	1.50	2.150	15.0	38.70	2.58	0.860	4.000	4.00E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 4.012 Kg/cm^2

Q_0 : Q_t / t = 6.800 lit / min

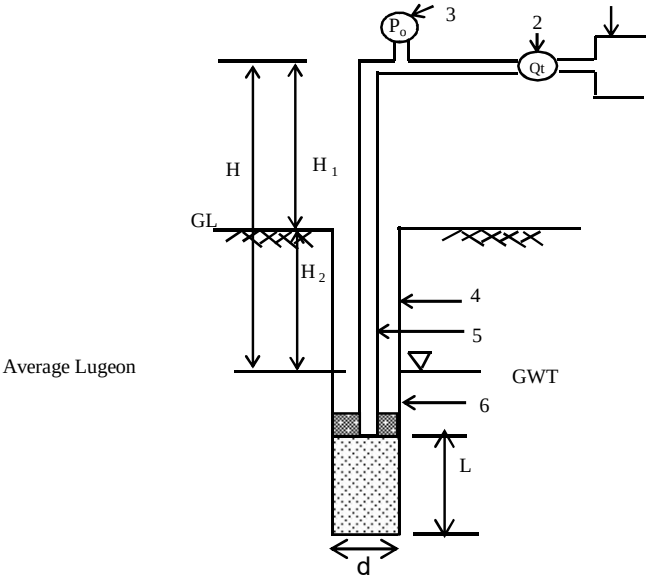
Q : Q_0 / L = 2.267 lit/min/m

Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$

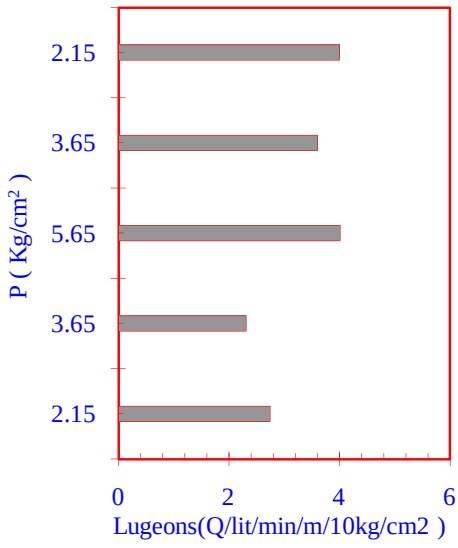
= **4.012** lit/min/m/10Kg/cm^2

Group : **C**

Classification : **DILATION**



Average Lugeon



1 :- Pump
2 :- Flow Meter
3 :- Pressure Gauge
4 :- Drill Hole
5 :- Injection Pipe
6 :- Packer
Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2
k :- Permeability in cm/sec

P_o :- Gauge Pressure
H_1 :- Height of Pressure Gauge
H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface
P :- Effective Pressure
P :- P_0+H/10 or H = $H_1 + H_2$
t :- Injection Time
Q_t :- Water Volume (in lit) During time t
Q_0 :- Water Volume (lit /min)
L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

PACKER PERMEABILITY TEST

Project : **Geo Technical & Geo Physical Investigation Work For Bullet Train At BKC.**

Client : **NHSRCL**

Elevation :

Location : **AT PBH-03**

Coordinate :

Inclination : **90.00 (Deg. With Horizontal)**

Test Section : **29.00** To **32.00** m

Length of Test Section :- **3.00** m

Type of Test : **Double Packer Test**

Test Location : **Test Below Water Table**

Date : **05/09/2019**

Bore Hole : **PBH-03**

Depth of Bore Hole(m) : **95.00**

Diameter (mm) : **NX**

Water Table (m) : **6.50**

H_1 (m) : **0.00**

H_2 (m) : **6.50**

Sr. No.	L (m)	H_1 (m)	H_2 (m)	P_0 Kg / cm^2	P Kg / cm^2	t (min)	Q_t (lit)	Q_o (lit/min)	Q lit/min/m	Lugeon	k (cm/sec)
1	3.00	0.00	6.50	1.50	2.150	15.0	16.70	1.11	0.371	1.726	1.73E-05
2	3.00	0.00	6.50	3.00	3.650	15.0	21.50	1.43	0.478	1.309	1.31E-05
3	3.00	0.00	6.50	5.00	5.650	15.0	40.00	2.67	0.889	1.573	1.57E-05
4	3.00	0.00	6.50	3.00	3.650	15.0	25.30	1.69	0.562	1.540	1.54E-05
5	3.00	0.00	6.50	1.50	2.150	15.0	14.10	0.94	0.313	1.457	1.46E-05

Sample Calculation :-

As per IS - 5529

P : $P_0 + H_1 + H_2$ = 2.150 Kg/cm^2

Q_0 : Q_t / t = 1.110 lit / min

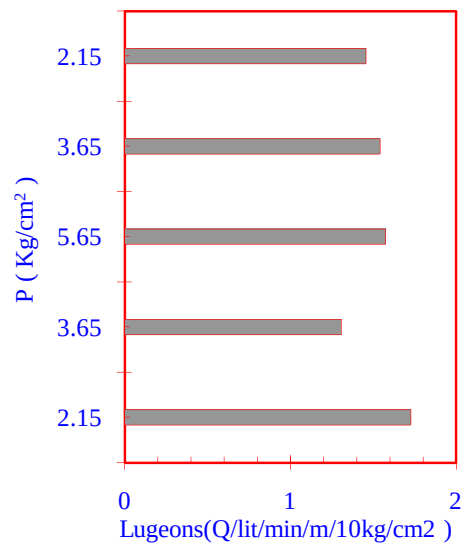
Q : Q_0 / L = 0.371 lit/min/m

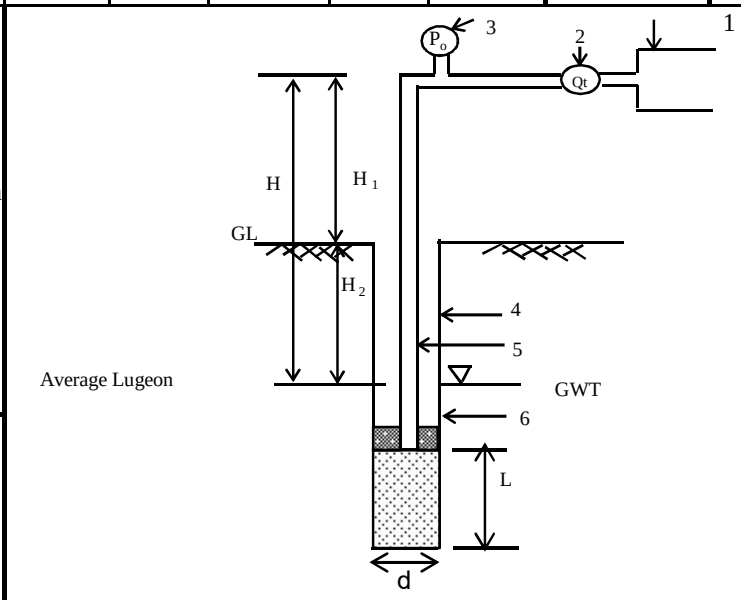
Lugeon :- $\frac{Q * 1\ Mpa}{\text{Test Pressure i.e. P}}$ lit/min/m/10Kg/cm^2

= **1.726**

Group : **D**

Classification : **WASH OUT**





1 :- Pump

2 :- Flow Meter

3 :- Pressure Gauge

4 :- Drill Hole

5 :- Injection Pipe

6 :- Packer

Lugeon :- Lugeon Value in lit/min/m/10Kg/cm^2

k :- Permeability in cm/sec

P_o :- Gauge Pressure

H_1 :- Height of Pressure Gauge

H_2 :- Depth of Ground Water or Mid of Test Section to Ground Surface

P :- Effective Pressure

P :- P_0+H/10 or H = $H_1 + H_2$

t :- Injection Time

Q_t :- Water Volume (in lit) During time t

Q_0 :- Water Volume (lit /min)

L :- Test section

SARATHY GEOTECH AND ENGINEERING SERVICES PVT.LTD

APPENDIX-G

- Cross Hole Test

1.0 GENERAL

Cross-hole survey was conducted on 23rd September 2019 in one (01) exploratory borehole location viz. PBH-02. The purpose of seismic cross-hole survey was to map subsurface stratification along with in-situ shear wave velocity profiling at a drilled location up to of 95 m EGL using 03 boreholes configuration (01 borehole for source and 02 boreholes for receivers). Location of the test site is shown in Fig.1.

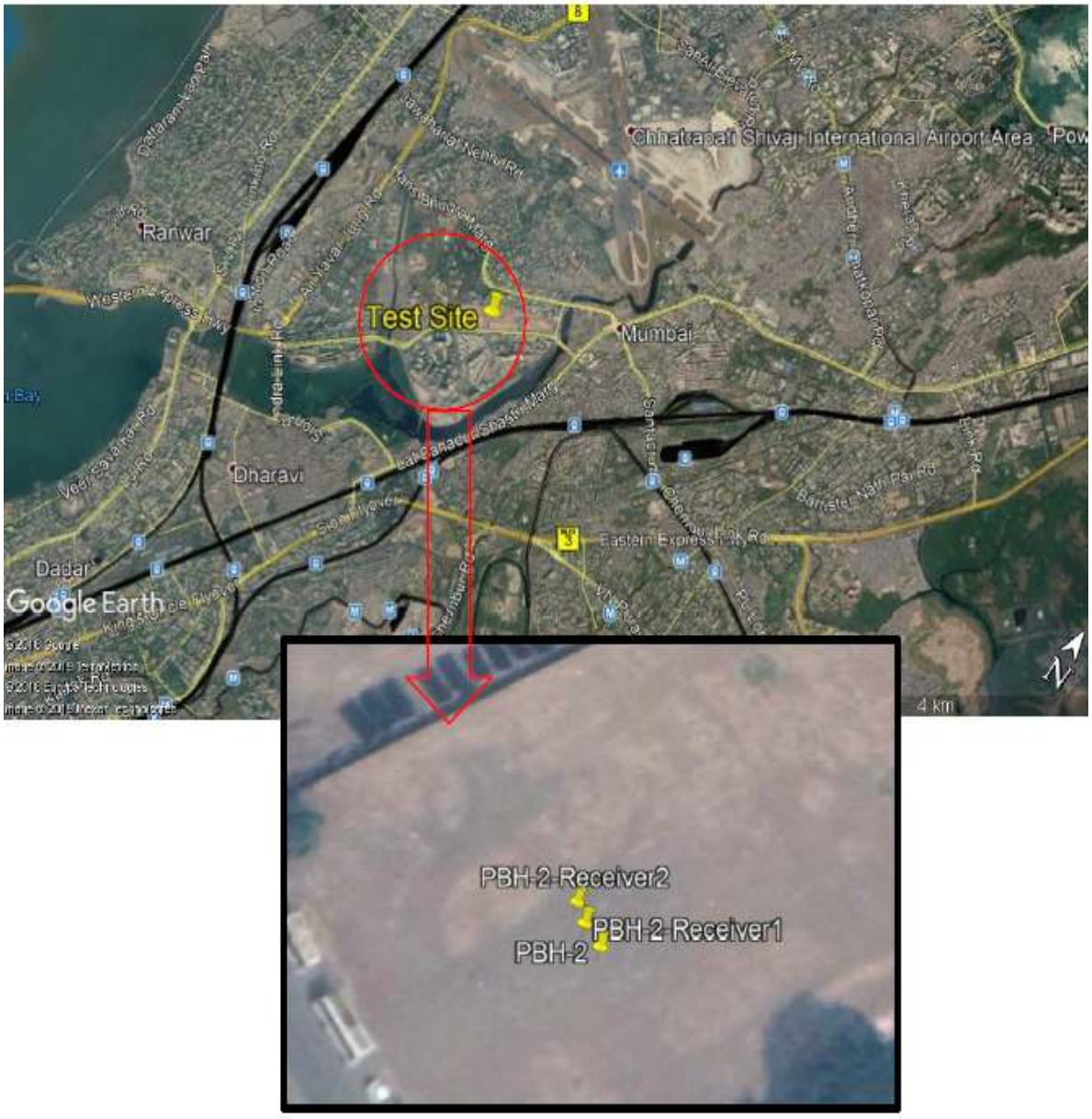


Fig 1: Tentative Location of Cross Hole Test Site

wave travel time pertaining to each shot depth, the computed velocities, mechanical properties of soil, and the interpreted interface depths are all tabulated and shown in graphical view in the following discussions.

For calculation of dynamic parameters, the obtained value of bulk density from laboratory tests are around 2250 kg/m3.

A) SOIL DYNAMIC PARAMETERS

The soil dynamic parameters have been calculated using average P & S wave velocities obtained and applying the formulae discussed in Section 5.1. These parameters are dependent on the bulk density of the formations through which the seismic waves propagate. The bulk density values as discussed in the Section 6.0 have been used to calculate soil dynamic parameters. The computed dynamic parameters have been shown in Table-1. Their variation with depth has also been shown in graphical form as hereunder.

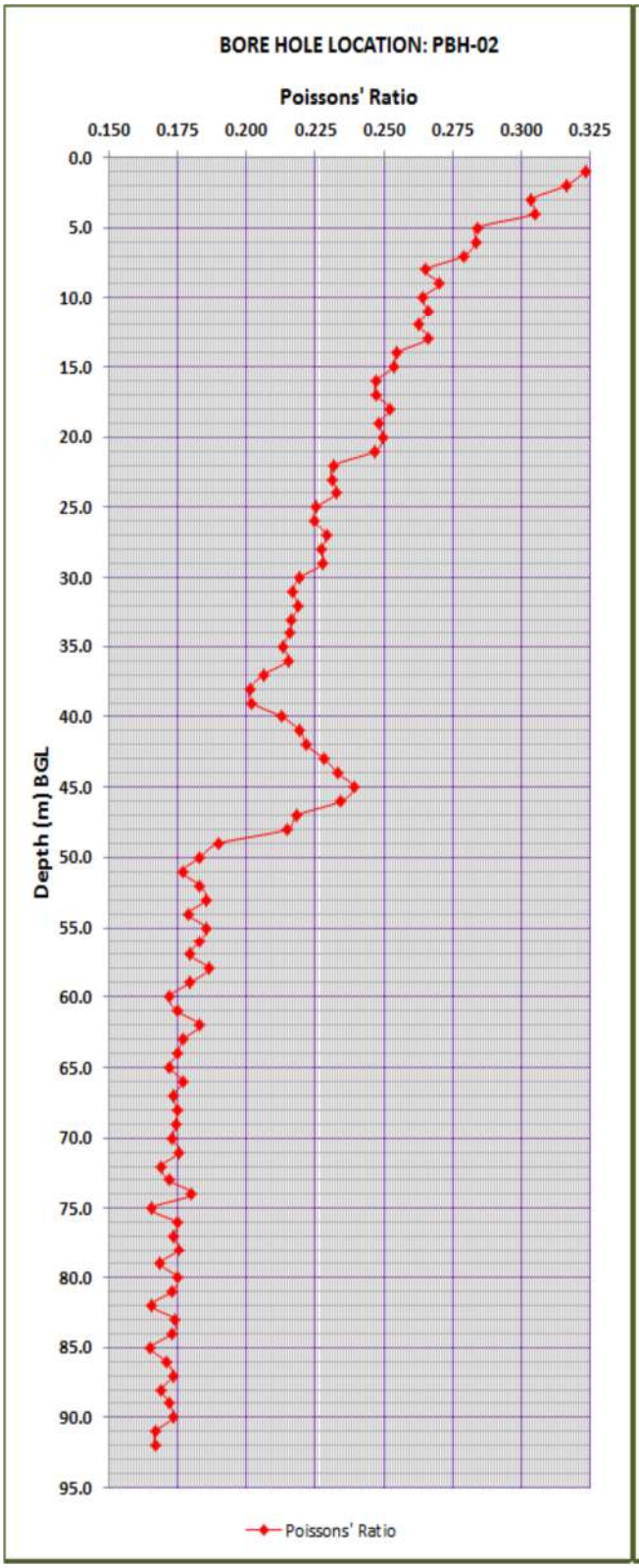
Table 1

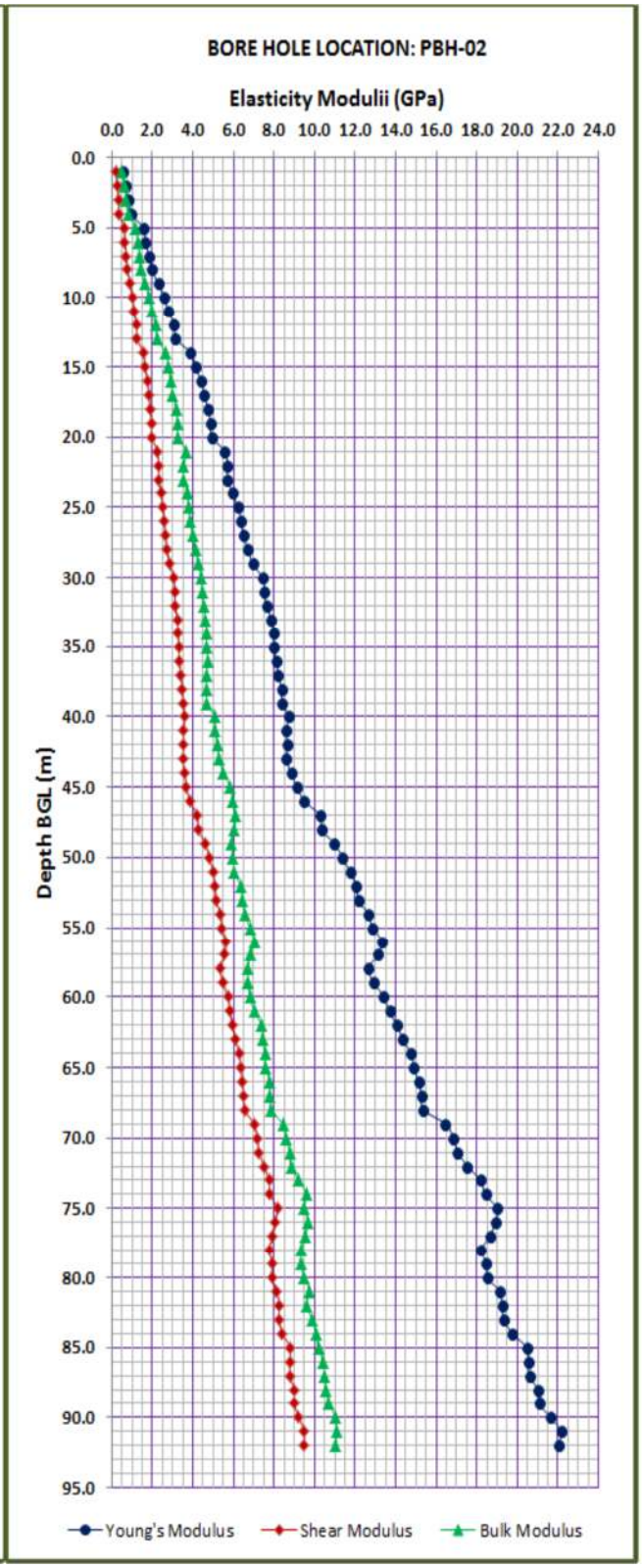
COMPUTATION OF SOIL DYNAMIC PARAMETERS								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Mean Vp / Vs (m/S)	Bulk Density (kg/m^3)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
1.0	299	586	1.957	2250	0.323	0.533	0.202	0.503
2.0	335	646	1.929	2250	0.316	0.664	0.252	0.602
3.0	377	710	1.883	2250	0.304	0.835	0.32	0.708
4.0	400	755	1.887	2250	0.305	0.939	0.36	0.802
5.0	515	938	1.82	2250	0.284	1.535	0.598	1.183
6.0	535	973	1.819	2250	0.283	1.652	0.644	1.271
7.0	562	1016	1.807	2250	0.279	1.819	0.711	1.373
8.0	590	1044	1.769	2250	0.265	1.982	0.783	1.408
9.0	632	1125	1.782	2250	0.27	2.279	0.897	1.652
10.0	673	1189	1.766	2250	0.264	2.579	1.02	1.82
11.0	698	1237	1.771	2250	0.266	2.779	1.097	1.98
12.0	736	1297	1.762	2250	0.262	3.077	1.219	2.159
13.0	743	1315	1.771	2250	0.266	3.142	1.241	2.238
14.0	830	1447	1.743	2250	0.255	3.891	1.55	2.646
15.0	855	1488	1.741	2250	0.254	4.122	1.644	2.789
16.0	884	1526	1.726	2250	0.247	4.387	1.759	2.893
17.0	901	1556	1.726	2250	0.247	4.561	1.828	3.009

COMPUTATION OF SOIL DYNAMIC PARAMETERS								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Mean Vp / Vs (m/S)	Bulk Density (kg/m^3)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
18.0	915	1590	1.737	2250	0.252	4.72	1.885	3.174
19.0	931	1609	1.728	2250	0.248	4.872	1.952	3.225
20.0	935	1619	1.731	2250	0.25	4.92	1.968	3.276
21.0	997	1719	1.725	2250	0.247	5.573	2.235	3.669
22.0	1013	1715	1.692	2250	0.232	5.693	2.311	3.537
23.0	1015	1717	1.691	2250	0.231	5.713	2.32	3.542
24.0	1035	1754	1.694	2250	0.233	5.947	2.412	3.708
25.0	1062	1783	1.68	2250	0.225	6.217	2.537	3.773
26.0	1076	1806	1.679	2250	0.225	6.378	2.603	3.866
27.0	1081	1824	1.687	2250	0.229	6.463	2.629	3.977
28.0	1102	1855	1.683	2250	0.227	6.708	2.733	4.099
29.0	1121	1889	1.685	2250	0.228	6.949	2.83	4.257
30.0	1163	1940	1.668	2250	0.219	7.424	3.044	4.408
31.0	1173	1952	1.663	2250	0.217	7.539	3.097	4.44
32.0	1179	1965	1.667	2250	0.219	7.623	3.127	4.517
33.0	1198	1992	1.662	2250	0.216	7.86	3.231	4.619
34.0	1207	2006	1.661	2250	0.216	7.976	3.28	4.676
35.0	1211	2006	1.656	2250	0.213	8.004	3.298	4.652
36.0	1217	2019	1.66	2250	0.215	8.095	3.331	4.735
37.0	1229	2019	1.644	2250	0.206	8.194	3.397	4.647
38.0	1244	2034	1.635	2250	0.201	8.362	3.48	4.664
39.0	1246	2040	1.636	2250	0.202	8.402	3.495	4.699
40.0	1264	2092	1.656	2250	0.213	8.714	3.592	5.059
41.0	1251	2086	1.668	2250	0.219	8.583	3.519	5.1
42.0	1255	2100	1.673	2250	0.222	8.664	3.545	5.192
43.0	1248	2104	1.686	2250	0.228	8.615	3.507	5.287
44.0	1261	2138	1.695	2250	0.233	8.828	3.579	5.515
45.0	1280	2186	1.708	2250	0.239	9.141	3.689	5.838
46.0	1308	2220	1.698	2250	0.234	9.497	3.847	5.959
47.0	1370	2282	1.666	2250	0.218	10.285	4.221	6.084
48.0	1375	2282	1.659	2250	0.215	10.336	4.254	6.041
49.0	1432	2314	1.616	2250	0.19	10.977	4.613	5.898
50.0	1462	2348	1.606	2250	0.183	11.382	4.811	5.986
51.0	1489	2376	1.596	2250	0.177	11.739	4.988	6.054
52.0	1504	2415	1.606	2250	0.183	12.049	5.092	6.338
53.0	1510	2429	1.609	2250	0.185	12.161	5.13	6.441

COMPUTATION OF SOIL DYNAMIC PARAMETERS								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Mean Vp / Vs (m/S)	Bulk Density (kg/m^3)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
54.0	1542	2466	1.599	2250	0.179	12.62	5.353	6.55
55.0	1552	2498	1.609	2250	0.185	12.855	5.422	6.811
56.0	1582	2539	1.606	2250	0.183	13.316	5.629	7.004
57.0	1573	2517	1.6	2250	0.179	13.139	5.57	6.832
58.0	1538	2477	1.61	2250	0.186	12.628	5.323	6.706
59.0	1561	2498	1.6	2250	0.179	12.938	5.485	6.727
60.0	1594	2533	1.589	2250	0.172	13.402	5.718	6.808
61.0	1609	2564	1.593	2250	0.175	13.694	5.829	7.017
62.0	1624	2607	1.605	2250	0.183	14.041	5.935	7.381
63.0	1646	2628	1.596	2250	0.177	14.358	6.1	7.411
64.0	1669	2659	1.593	2250	0.175	14.734	6.271	7.552
65.0	1681	2672	1.589	2250	0.172	14.91	6.361	7.578
66.0	1690	2696	1.596	2250	0.177	15.115	6.423	7.793
67.0	1701	2706	1.591	2250	0.173	15.281	6.513	7.794
68.0	1704	2715	1.593	2250	0.175	15.356	6.536	7.87
69.0	1765	2810	1.592	2250	0.174	16.46	7.008	8.426
70.0	1786	2840	1.59	2250	0.173	16.836	7.176	8.584
71.0	1796	2863	1.594	2250	0.176	17.058	7.255	8.764
72.0	1826	2894	1.584	2250	0.169	17.546	7.505	8.835
73.0	1857	2949	1.588	2250	0.172	18.177	7.757	9.229
74.0	1863	2982	1.601	2250	0.18	18.428	7.808	9.601
75.0	1904	3007	1.579	2250	0.165	19.011	8.157	9.467
76.0	1892	3013	1.593	2250	0.175	18.914	8.05	9.693
77.0	1878	2988	1.591	2250	0.173	18.632	7.939	9.509
78.0	1856	2958	1.594	2250	0.176	18.218	7.749	9.358
79.0	1875	2970	1.584	2250	0.169	18.49	7.911	9.302
80.0	1872	2982	1.593	2250	0.175	18.527	7.885	9.5
81.0	1903	3026	1.59	2250	0.173	19.116	8.149	9.743
82.0	1916	3026	1.579	2250	0.165	19.247	8.259	9.585
83.0	1912	3044	1.592	2250	0.174	19.322	8.228	9.884
84.0	1935	3077	1.59	2250	0.173	19.754	8.421	10.069
85.0	1975	3119	1.579	2250	0.165	20.459	8.779	10.186
86.0	1976	3136	1.587	2250	0.171	20.569	8.785	10.414
87.0	1976	3143	1.591	2250	0.173	20.608	8.783	10.512
88.0	1998	3166	1.585	2250	0.169	21.005	8.983	10.583
89.0	1999	3177	1.589	2250	0.172	21.084	8.995	10.715

COMPUTATION OF SOIL DYNAMIC PARAMETERS								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Mean Vp / Vs (m/S)	Bulk Density (kg/m^3)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
90.0	2025	3221	1.591	2250	0.173	21.648	9.225	11.045
91.0	2054	3249	1.581	2250	0.167	22.16	9.496	11.086
92.0	2049	3240	1.582	2250	0.167	22.039	9.443	11.028





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B) FORMATION INTERFACES

Formation interfaces down the depth at the borehole location have been marked by noting sudden variation in the seismic wave velocities. Thus, stratigraphic differentiation has been arrived at as shown in the Table-2. The average seismic velocities and the average values of soil dynamic parameters corresponding to these formations have also been shown graphically.

Table 2

SUMMARY OF FORMATION INTERFACES AND SOIL DYNAMIC PARAMETERS FOR LOCATION PBH-02								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Seismic Velocities		Soil Dynamic Parameters			
			S-Wave Vs (m/Sec)	P-Wave Vp (m/Sec)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
1	299	586	353	674	0.312	0.743	0.283	0.654
2	335	646						
3	377	710						
4	400	755						
4.5 m								
5	515	938	551	993	0.278	1.747	0.684	1.308
6	535	973						
7	562	1016						
8	590	1044						
8.5 m								
9	632	1125	696	1233	0.266	2.771	1.095	1.97
10	673	1189						
11	698	1237						
12	736	1297						
13	743	1315						
13.5 m								
14	830	1447	893	1548	0.25	4.496	1.798	3.002
15	855	1488						
16	884	1526						
17	901	1556						
18	915	1590						
19	931	1609						
20	935	1619						
20.5 m								

SUMMARY OF FORMATION INTERFACES AND SOIL DYNAMIC PARAMETERS FOR LOCATION PBH-02								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Seismic Velocities		Soil Dynamic Parameters			
			S-Wave Vs (m/Sec)	P-Wave Vp (m/Sec)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
21	997	1719	1135	1897	0.221	7.111	2.915	4.236
22	1013	1715						
23	1015	1717						
24	1035	1754						
25	1062	1783						
26	1076	1806						
27	1081	1824						
28	1102	1855						
29	1121	1889						
30	1163	1940						
31	1173	1952						
32	1179	1965						
33	1198	1992						
34	1207	2006						
35	1211	2006						
36	1217	2019						
37	1229	2019						
38	1244	2034						
39	1246	2040						
39.5 m								
40	1264	2092	1290	2166	0.225	9.185	3.75	5.564
41	1251	2086						
42	1255	2100						
43	1248	2104						
44	1261	2138						
45	1280	2186						
46	1308	2220						
47	1370	2282						
48	1375	2282						
48.5 m								
49	1432	2314	1583	2533	0.179	13.335	5.655	6.928

SUMMARY OF FORMATION INTERFACES AND SOIL DYNAMIC PARAMETERS FOR LOCATION PBH-02								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Seismic Velocities		Soil Dynamic Parameters			
			S-Wave Vs (m/Sec)	P-Wave Vp (m/Sec)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
50	1462	2348						
51	1489	2376						
52	1504	2415						
53	1510	2429						
54	1542	2466						
55	1552	2498						
56	1582	2539						
57	1573	2517						
58	1538	2477						
59	1561	2498						
60	1594	2533						
61	1609	2564						
62	1624	2607						
63	1646	2628						
64	1669	2659						
65	1681	2672						
66	1690	2696						
67	1701	2706						
68	1704	2715						
68.5 m								
69	1765	2810	1847	2938	0.173	18.025	7.683	9.189
70	1786	2840						
71	1796	2863						
72	1826	2894						
73	1857	2949						
74	1863	2982						
75	1904	3007						
76	1892	3013						
77	1878	2988						
78	1856	2958						
79	1875	2970						
80	1872	2982						
80.5 m								

SUMMARY OF FORMATION INTERFACES AND SOIL DYNAMIC PARAMETERS FOR LOCATION PBH-02								
Depth BGL (m)	Mean Vp (m/S)	Mean Vs (m/S)	Seismic Velocities		Soil Dynamic Parameters			
			S-Wave Vs (m/Sec)	P-Wave Vp (m/Sec)	Poisson's Ratio	Youngs Modulus (GPa)	Shear Modulus (GPa)	Bulk Modulus (GPa)
81	1903	3026	1916	3043	0.171	19.36	8.264	9.82
82	1916	3026						
83	1912	3044						
84	1935	3077						
84.5 m								
85	1975	3119	2007	3119	0.17	21.197	9.061	10.696
86	1976	3136						
87	1976	3143						
88	1998	3166						
89	1999	3177						
90	2025	3221						
91	2054	3249						
92	2049	3240						

C) CONCLUSION

Seismic Cross-hole test was performed at the location PBH-02 to investigate subsurface stratigraphic sequence based on seismic profiling using one source and two receiver boreholes. Based on the P and S wave velocities derived from the cross-hole observation and further calculation of various elastic parameters, it is inferred that the soil under the test site up to 92 m depth has the following distinct formations:

Depth Range (m)	S-wave Velocity Range (m/S)	P-wave Velocity Range (m/S)	Tentative Formation Type
0 - 4.5	299 - 400	586 – 755	Topsoil, Sand / Clay, gravel / rock
4.5 – 8.5	515 - 590	938 – 1044	
8.5 - 13.5	632 - 743	1125 – 1315	Weathered Volcanic Breccia / Weathered Basalt
13.5 – 20.5	830 - 935	1447 – 1619	
20.5 – 39.5	997 - 1246	1715 – 2040	Breccia / Slightly Weathered basaltic rocks
39.5 – 48.5	1264 - 1375	2086 – 2282	Breccia / Slightly Weathered to Fresh Basalt
48.5 – 68.5	1432 - 1704	2314 – 2715	Basaltic rock with slight weathering / Fresh basalt
68.5 – 80.5	1765 - 1904	2810 – 3013	Slightly weathered to Fresh Basalt
80.5 – 84.5	1903 - 1935	3026 – 3077	
84.5 – 92.0	1975 - 2054	3119 – 3249	

SUMMARY OF FORMATION INTERFACES AND SOIL DYNAMIC PARAMETERS FOR LOCATION PBH-02