

Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala

Geotechnical Consultant

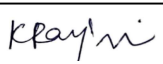


Myrtle Project And Consultancy Pvt. Ltd,
(An ISO/IEC 17025:2017 NABL Accredited Laboratory)

Lavendar Garden Front Side ,Kombaipatty,
Uyiriyal Poonga Main Road,Gorimedu,Salem -636008.
Telephone No.: 0427-4040750 / 0427- 2440366
Mobile No.: +91 8668093567
Mail ID: lab@thempac.in / reports@thempac.in

Geotechnical Investigation Report - BH 1 to BH 5

Report No. : MPAC/T&P/2026/0455
Revision : 00
Report Issued Date : 10-04-2026

Description	Prepared by	Reviewed by	Approved by
Geotechnical investigation Report- (05 BHs)			
	K.Ranjini	R.Ajantha	S.Prasath
	Design Engineer	Dy.Quality Manager	Managing Director/ Technical Manager



Client:
Cochin Port Authority
Willingdon Island,
Cochin – 682 009,
Kerala (India).



Client Consultant:
Dept. of Ocean Engineering,
IIT Madras, Guindy,
Chennai – 600 036,
Tamil Nadu (India).

Document History

This document has been issued and amended as follows:

Revision	Issue Date	Description
00	10-04-2026	Geotechnical investigation Report- (05 BHs)

Acronyms and Abbreviations

The following acronyms and abbreviations are used throughout this document:

Abbreviation	Definition
BDL	Below Detection Limit
BH	Bore Hole
Cc	Compression Index
CR	Core Recovery
Cu	Consolidated Undrained
DL	Detection Limit
DS	Disturbed Sample
FSI	Free Swell Index
IS	Indian Standards
NP	Non Plastic
RA	Reaffirmed
RQD	Rock Quality Designation
SPT	Standard Penetration Test
UCC	Unconfined Compression
UCS	Unconfined Compressive Strength
UDS	Undisturbed Sample
UU	Unconsolidated Undrained
WS	Washing Sample
WT	Water Table

Contents

S.No	Section	Page
1.0	Introduction	5
2.0	Scope of work	5
3.0	Overview	5
3.1	Methodology of Field investigation	5
3.1.1.	Boring	5
3.1.2.	Standard Penetration test	5
3.1.3.	Disturbed & Undisturbed samples	5
3.1.4.	Rock Coring	6
3.1.5.	Ground Water table	6
3.1.6.	Backfilling of boreholes	6
3.2	Laboratory Test	6
3.2.1.	For Soil	6
3.2.2.	For Rock	8
3.2.3.	Chemical Analysis	8
3.3	Geological Conditions.....	8
4.0	Field Data	9
4.1	Sub soil profile	9
	Annexure I - Borelog Figures	11
	Annexure II - Site Map	17
	Annexure III - Photographs	19

1.0 Introduction

M/S.MYRTLE PROJECT AND CONSULTANCY PVT LTD., had been awarded the work for - Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala . This report is based on Five boreholes including field and laboratory test results.

2.0 Scope of work

- a. Drilling boreholes by Rotary drilling maximum upto 41.5m as per IS: 1892 – 1979 of practice and at locations as directed by client.
- b. Conducting Standard Penetration tests in the bore holes at regular intervals of 1.5m or change in stratum as per IS: 2131-1981.
- c. Collecting undisturbed soil samples in thin walled tube sampler as per IS: 2132 – 1986 at regular interval or as directed by the Engineer-in-Charge.
- d. Collecting core samples from the bore holes as per IS: 4078 – 1980 and recording Rock Quality Designation (RQD) and Core recovery (CR).
- e. Recording of water table level in the bore holes after drilling.
- f. Conducting laboratory tests on relevant Soil /Rock samples as per IS Code specifications.
- g. Conducting Chemical tests on Soil & Water Samples.
- h. Soil classification was carried out in accordance with IS: 1498-1970 & for rock weathering was classified in accordance with IS: 4464-1985.
- i. Preparation of report summarizing the details of soil classification, analysis of test data, type of foundation etc.

3.0 Overview

3.1 Methodology of Field investigation

3.1.1. Boring

Boreholes were drilled by Rotary drilling upto 41.5m depth. In refusal strata, drilling was resorted by Nx size double tube core barrel with diamond bits as per IS : 1892 - 1979 of practice and as directed by Engineer-in-charge. The details of Borehole drilled, depth of the borehole, depth of water table and road level are as given in Table : 4.1.

3.1.2. Standard Penetration test

Rotary Calyx Rig was used to conduct SPT at field. In accordance with IS: 2131-1981, SPT was conducted at every change of stratum or at intervals of not more than 1.5 m depth whichever occurs earlier. It was done by connecting the split spoon sampler to SPT rod and driving it upto 45 cm using a 63.5 kg hammer falling freely from a height of 75 cm. The number of blows required to penetrate the initial 15 cm of the split spoon was ignored for seating the sampler due to possible presence of loose materials or cutting from the drilling operation. The cumulative number of blows required to penetrate the balance 30 cm out of 45 cm was termed as the SPT or N values.

3.1.3. Disturbed & Undisturbed samples

i) Conducting Standard Penetration Test at 1.5m intervals, disturbed soil samples were collected using a split spoon sampler.

ii) Undisturbed soil samples were collected in soil layers wherever possible by using thin walled sampling tube and mentioned in the respective bore logs.

3.1.4. Rock Coring

Tungsten Carbide (TC) / Diamond bits were used to drill through weathered rock / hard rock stratum. Recovered cores were measured and percentages of CR and RQD has been calculated as per below:

$$\%CR = [(\text{Length of core}) / (\text{Length of run})] * 100$$

$$\%RQD = [(\text{Length of core in pieces of 10cm \& above}) / (\text{Length of run})] * 100$$

3.1.5. Ground Water table

Water table in each borehole was noted by allowing the water table level to stabilize for minimum 24 hrs. This can be noticed after the completion of drilling activity in each borehole. The depth of water level below EGL is noted in respective bore logs.

3.1.6. Backfilling of boreholes

All boreholes were backfilled in proper way after the termination of each boreholes. (as directed by Engineer incharge)

3.2 Laboratory Test

The following tests were performed in Laboratory on soil, rock & water samples collected from field.

3.2.1. For Soil

- Grain Size Analysis- IS 2720 (Part 4) : 1985
- Hydrometer analysis - IS 2720 (Part 4) : 1985
- Bulk & Dry Density - IS 2720 (Part 29) : 1975
- Natural Moisture Content - IS 2720 (Part 2) : 1973
- Specific Gravity - IS 2720 (Part 3) : 1980
- Liquid limit & Plastic limit - IS 2720 (Part 5): 1985
- Shrinkage Limit- IS 2720 (Part 6): 1972
- Free swell Index- IS 2720 (Part 40): 1977
- Swell Pressure Test- IS 2720 (Part 41): 1977
- Direct Shear - IS 2720 (Part 13) : 1986
- Triaxial Compressive strength test (UU) - IS 2720 (Part 11) : 1993

i) Grain Size & Hydrometer Analysis - IS 2720 (Part 4): 1985

Grain Size & Hydrometer Analysis was determined from the various UD & DS soil samples collected in boreholes. Based on the proportion of the different soil constituents, the soil can be classified. The results are given in Annexure III.

ii) Bulk & Dry Density - IS 2720 (Part 29) : 1975

Density was determined from the various soil samples collected in required depth. It is defined as mass per unit volume of soil. It is expressed in kg per cubic meter. The result are given in Annexure III.

iv) Natural Moisture Content - IS 2720 (Part 2) : 1973

Moisture content was determined from the various soil samples collected in required depth. It is the ratio of weight of water to the weight of the solids in a given mass of soil. This ratio is usually expressed as percentage. The results are given in Annexure III.

v) Specific Gravity - IS 2720 (Part 3) : 1980

Specific gravity of soil was determined for the required soil samples collected. It is defined as the ratio of unit weight of solid particles to the unit weight of water. The results are given in Annexure II.

vi) Direct Shear - IS 2720 (Part 13) : 1986

Specific gravity of soil was determined for the required soil samples collected. It is defined as the ratio of unit weight of solid particles to the unit weight of water. The results are given in Annexure III.

vii) Liquid limit & Plastic limit – IS 2720 (Part 5): 1985

The Liquid & Plastic limit values of the cohesive layers were determined from the Clay samples collected. The Liquid Limit is the moisture content at which a fine-grained soil can no longer flows like a liquid. The Plastic Limit is the moisture content at which a fine-grained soil can no longer be remolded without cracking. The results are given in Annexure III.

viii) Shrinkage limit – IS 2720 (Part 5): 1985

The Shrinkage limit values were determined from the various clay & silt samples collected. It is defined as the moisture content at which no further volume decrease occurs, but where the degree of saturation is still essentially 100 %. The results are given in Annexure III.

ix) Free Swell Index -IS 2720 (Part 40) : 1977

Free Swell Index values of the cohesive layers were determined from the Clay samples collected. It is the increase in volume of a soil, without any external constraints, on submergence in water. The results are given in Annexure III.

X) Swell Pressure Test : IS 2720 (Part 41): 1977

The pressure which the expansive soil exerts, when it is not allowed to swell or the volume change of the soil is arrested, is known as swelling pressure of soil. The results are given in Annexure III.

Xi) Triaxial test -IS 2720 (Part 11) : 1993

A triaxial test involves confining a cylindrical soil specimen in a pressurised cell to simulate a stress condition and then shearing to failure, in order to determine the shear strength properties of the sample. The results are given in Annexure III..

Xii) Consolidation -IS 2720 (Part 15) : 1986

Consolidation test is used to determine the rate and magnitude of soil consolidation when the soil is restrained laterally and loaded axially. The Consolidation test is also referred to as Standard Oedometer test or One-dimensional compression test. The results are given in Annexure III.

3.2.2. For Rock

Physical tests on Rock core samples:

The following tests were performed on selected rock core samples conforming to IS (relevant parts):

- Unconfined compressive strength - IS 9143 : 1979
- Point Load Index - IS 8764: 1998

i) Unconfined Compressive Strength IS 9143 : 1979

The unconfined compression test of rock samples were determined for various samples collected. It is used to derive the Unconfined Compressive Strength (UCS) of a rock specimen when load applied in one direction. The results are given in Annexure III.

ii) Point Load Index - IS 8764: 1998

Point Load Index test of rock samples were determined for various samples collected at required depths. This test consists of the application of load between two points to the fragment of rock. This is a measurement of tensile strength. The results are given in Annexure III.

3.2.3. Chemical Analysis for soil and water

- For soil (pH Value, Sulphates and Chlorides).
- For water (pH Value, Sulphates and Chlorides).

3.3 Geological Conditions

- | | | |
|------------------------------|---|--|
| a. Flood history | : | On Dec,2019 Heavy Rain occurred in Kochi District. |
| b. Earthquake history | : | On Nov,2021 Earthquake occurred in Kochi District. |
| c. Earthquake zone | : | III |
| d. Water bodies near by site | : | Big river @ 10.0m,Sea @ 1.5km |

4.0 Field data:

For Geotechnical Investigation report – 5 Boreholes were drilled as directed by Engineer incharge.

Borehole No.	Date of Test	Co-ordinates	Borehole Termination Depth (m)	Water table (Below Ground Level) (m)
BH-01	30-03-2026 to 02-04-2026	638592.89 E 1102239.28 N	41.0m	1.0
BH-02	26-03-2026 to 29-03-2026	638790.86 E 1102168.89 N	41.0m	1.5
BH-03	20-03-2026 to 25-03-2026	638957.12 E 1102078.47 N	41.0m	1.5
BH-04	09-03-2026 to 13-03-2026	639129.23 E 1101986.79 N	41.5m	0.5
BH-05	14-03-2026 to 19-03-2026	639261.49 E 1101948.77 N	41.0m	1.0

**Note: Seasonal and annual fluctuations in ground water levels can be expected at different depths.*

4.1 Sub soil profile

Based on Borehole information, sub surface soil profile for the Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala is given below

BH NO.	Depth (m)		Type of Soil
	From	To	
BH-01	0.0	1.5	Back Filling
	1.5	6.0	Black and Brown colored Clayey SAND (SC)
	6.0	10.5	Brown colored Sand (SP)
	10.5	22.5	Black colored Silty CLAY(CL)
	22.5	36.0	Brown and Grey colored Silty CLAY(CL)
	36.0	41.0	Black Colored Sandy CLAY(CL)
BH-02	0.0	1.5	Back Filling
	1.5	7.5	Black colored Sandy CLAY(CL)
	7.5	19.5	Black colored Silty CLAY(CL)
	19.5	22.5	Black colored Sandy CLAY(CL)
	22.5	37.5	Black colored Silty CLAY(CL)
	37.5	39.0	Brown colored Silty Clay mixed with Sand(CL)
	39.0	41.0	Brown and Yellow Silty CLAY(CL)

BH-03	0.0	1.5	Back Filling
	1.5	9.0	Black colored Sandy CLAY(CL)
	9.0	18.0	Black colored Silty CLAY(CL)
	18.0	25.5	Black colored Sandy CLAY(CL)
	25.5	30.0	Brown and Black colored Silty SAND(SM)
	30.0	34.5	Brown and Black colored Silty SAND mixed with Clay (SM)
	34.5	36.0	Grey colored Silty CLAY(CL)
	36.0	37.5	Grey colored Silty SAND mixed with Gravel (SM)
	37.5	41.0	Grey colored Silty SAND (SM)
BH-04	0.0	2.5	Back Filling
	2.5	4.5	Black colored Clayey SAND(SC)
	4.5	16.5	Black colored Sandy CLAY(CL)
	16.5	22.5	Black colored Silty CLAY(CL)
	22.5	24.0	Black colored Silty CLAY(CL)
	24.0	28.5	Black colored Silty CLAY(CL)
	28.5	30.0	Black colored Sandy CLAY(CL)
	30.0	31.5	Black colored Silty CLAY(CL)
	31.5	33.0	Brown and Red colored Silty SAND(SM)
	33.0	34.5	Brown colored Silty SAND(SM)
	34.5	36.0	Brown colored Silty SAND mixed with Clay(SM)
	36.0	39.0	Brown colored Silty SAND(SM)
	39.0	41.5	Brown colored Silty SAND mixed with Clay(SM)
BH-05	0.0	1.5	Back Filling
	1.5	6.0	Black colored Sandy CLAY(CL)
	6.0	16.5	Black colored Silty CLAY(CL)
	16.5	21.0	Black colored Sandy CLAY(CL)
	21.0	22.5	Black and Brown colored Silty CLAY(CL)
	22.5	24.0	Black colored Silty CLAY(CL)
	24.0	27.0	Yellow and White colored Silty CLAY(CL)
	27.0	28.5	Black and Brown colored Silty SAND (SM)
	28.5	34.5	Black and Brown colored Sandy CLAY(CL)
	34.5	37.5	Black and Brown colored Silty SAND (SM)
	37.5	41.0	Black and Brown colored Coarse SAND (SM)

Annexure I

(Borelog Figures)

BORE LOG AND CORE LOG SHEET



Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala

MPAC PVT. LTD.

BH.NO:

1

DEPTH OF WATER TABLE :

1.0m

BORE HOLE DIAMETER:

150mm/75mm

LAND MARK DETAILS :

Q5 to Q9 at Ernakulam Wharf -BH1

DATE OF START & FINISH :

30-03-2026 to 02-04-2026

BORE HOLE TERMINATION:

41.0m

LADTITUDE & LONGITUDE :

638592.89 E 1102239.28 N

Depth (m)		Thickness of Layer (m)	Type	Description	Profile	SPT Test				Depth Vs N Value	Core Recovery (%)	RQD (%)	Remarks
From	To					0.0 -0.15 m	0.15 - 0.30 m	0.30 -0.45 m	N Value				
0.0	1.5	1.5	DS	Back Filling		-	-	-	-		-	-	-
1.5	3.0		SPT	Black and Brown colored Clayey SAND (SC)		3	5	7	12		-	-	-
3.0	4.5	4.5	SPT			7	7	7	14		-	-	-
4.5	6.0		SPT			8	7	8	15		-	-	-
6.0	7.5		SPT	Brown colored Sand (SP)		6	7	6	13		-	-	-
7.5	9.0	4.5	SPT			7	6	6	12		-	-	-
9.0	10.5		SPT			10	8	6	14		-	-	-
10.5	12.0		SPT	Black colored Silty CLAY(CL)		1	2	4	6		-	-	-
12.0	13.5		UDS			-	-	-	-		-	-	-
13.5	15.0		SPT			9	14	10	24		-	-	-
15.0	16.5		SPT			8	11	16	27		-	-	-
16.5	18.0		SPT			2	2	3	5		-	-	-
18.0	19.5		UDS			-	-	-	-		-	-	-
19.5	21.0		SPT			2	3	3	6		-	-	-
21.0	22.5		SPT			3	4	5	9		-	-	-
22.5	24.0		SPT	Brown and Grey colored Silty CLAY(CL)		8	9	11	20		-	-	-
24.0	25.5		UDS			-	-	-	-		-	-	-
25.5	27.0		SPT			8	8	16	24		-	-	-
27.0	28.5		SPT			10	10	12	22		-	-	-
28.5	30.0		UDS			-	-	-	-		-	-	-
30.0	31.5		SPT			11	10	13	23		-	-	-
31.5	33.0		SPT			10	12	15	27		-	-	-
33.0	34.5		SPT			13	15	19	34		-	-	-
34.5	36.0		UDS	Black Colored Sandy CLAY(CL)		-	-	-	-		-	-	-
36.0	37.5		SPT			11	14	17	31		-	-	-
37.5	39.0	5.0	SPT			7	6	7	13		-	-	-
39.0	41.0		SPT			16	21	25	46		-	-	-


 Director Signatory
 (Dy. Quality Manager)

PAGE 12

BORE LOG AND CORE LOG SHEET



Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala

MPAC PVT. LTD.

BH.NO:

2

DEPTH OF WATER TABLE :

1.5m

BORE HOLE DIAMETER:

150mm/75mm

LAND MARK DETAILS :

Q5 to Q9 at Ernakulam Wharf -BH2

DATE OF START & FINISH :

26-03-2026 to 29-03-2026

BORE HOLE TERMINATION:

41.0m

LATITUDE & LONGITUDE :

638790.86 E 1102168.89 N

Depth (m)		Thickness of Layer (m)	Type	Description	Profile	SPT Test				Depth Vs N Value	Core Recovery (%)	RQD (%)	Remarks
From	To					0.0 -0.15 m	0.15 - 0.30 m	0.30 -0.45 m	N Value				
0.0	1.5	1.5	DS	Back Filling		-	-	-	-		-	-	-
1.5	3.0	6.0	SPT	Black colored Sandy CLAY(CL)		6	4	1	5		-	-	-
3.0	4.5		UDS			-	-	-	-		-	-	UDS failed
4.5	6.0		SPT			8	4	6	10		-	-	-
6.0	7.5		SPT			4	6	7	13		-	-	-
7.5	9.0	12.0	SPT	Black colored Silty CLAY(CL)		1	2	2	4		-	-	-
9.0	10.5		SPT			2	2	3	5		-	-	-
10.5	12.0		SPT			1	2	3	5		-	-	-
12.0	13.5		UDS			-	-	-	-		-	-	-
13.5	15.0		SPT			3	3	4	7		-	-	-
15.0	16.5		SPT			3	6	11	17		-	-	-
16.5	18.0		SPT			11	6	9	15		-	-	-
18.0	19.5		UDS			-	-	-	-		-	-	-
19.5	21.0	3.0	SPT	Black colored Sandy CLAY(CL)		10	12	14	26		-	-	-
21.0	22.5		SPT			20	27	36	63		-	-	-
22.5	24.0	15.0	SPT	Black colored Silty CLAY(CL)		11	11	14	25		-	-	-
24.0	25.5		UDS			-	-	-	-		-	-	-
25.5	27.0		SPT			9	11	15	26		-	-	-
27.0	28.5		SPT			11	12	12	24		-	-	-
28.5	30.0		SPT			11	16	20	36		-	-	-
30.0	31.5		UDS			-	-	-	-		-	-	-
31.5	33.0		SPT			12	14	15	29		-	-	-
33.0	34.5		SPT			11	14	16	30		-	-	-
34.5	36.0		UDS			-	-	-	-		-	-	-
36.0	37.5		SPT			10	10	13	23		-	-	-
37.5	39.0	1.5	SPT	Brown colored Silty Clay mixed with Sand(CL)		10	8	10	18		-	-	-
39.0	41.0	2.0	SPT	Brown and Yellow Silty CLAY(CL)		32	28	13	41		-	-	-


 Director, Geotechnical Engineering
 (Dy. Quality Manager)

BORE LOG AND CORE LOG SHEET



Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala

MPAC PVT. LTD.

BH.NO:

3

DEPTH OF WATER TABLE : 1.5m

BORE HOLE DIAMETER: 150mm/75mm

LAND MARK DETAILS : Q5 to Q9 at Ernakulam Wharf -BH3

DATE OF START & FINISH : 20-03-2026 to 25-03-2026

BORE HOLE TERMINATION: 41.0m

LATITUDE & LONGITUDE : 638957.12 E 1102078.47 N

Depth (m)		Thickness of Layer (m)	Type	Description	Profile	SPT Test				Depth Vs N Value	Core Recovery (%)	RQD (%)	Remarks
From	To					0.0 -0.15 m	0.15 - 0.30 m	0.30 -0.45 m	N Value				
0.0	1.5	1.5	DS	Back Filling		-	-	-	-		-	-	-
1.5	3.0		SPT	Black colored Sandy CLAY(CL)		2	2	3	5		-	-	-
3.0	4.5		UDS			-	-	-	-		-	-	UDS failed
4.5	6.0	7.5	SPT			2	1	1	2		-	-	-
6.0	7.5		SPT			2	1	1	2		-	-	Sample failed
7.5	9.0		SPT			2	2	1	3		-	-	-
9.0	10.5		UDS	Black colored Silty CLAY(CL)		-	-	-	-		-	-	-
10.5	12.0		SPT			1	1	2	3		-	-	-
12.0	13.5		SPT			1	2	2	4		-	-	-
13.5	15.0		UDS			-	-	-	-		-	-	-
15.0	16.5		SPT			3	3	4	7		-	-	-
16.5	18.0		SPT	Black colored Sandy CLAY(CL)		2	2	3	5		-	-	-
18.0	19.5		UDS			-	-	-	-		-	-	UDS failed
19.5	21.0		SPT			1	8	15	23		-	-	-
21.0	22.5	7.5	SPT			5	4	6	10		-	-	-
22.5	24.0		SPT			5	6	8	14		-	-	-
24.0	25.5		UDS	Brown and Black colored Silty SAND(SM)		-	-	-	-		-	-	-
25.5	27.0		SPT			8	9	11	20		-	-	-
27.0	28.5	4.5	SPT			8	14	21	35		-	-	-
28.5	30.0		UDS			-	-	-	-		-	-	UDS failed
30.0	31.5		SPT			10	10	10	20		-	-	-
31.5	33.0	4.5	SPT	Brown and Black colored Silty SAND mixed with Clay (SM)		9	9	11	20		-	-	-
33.0	34.5		UDS			-	-	-	-		-	-	-
34.5	36.0	1.5	SPT	Grey colored Silty CLAY(CL)		4	14	21	35		-	-	-
36.0	37.5	1.5	SPT	Grey colored Silty SAND mixed with Gravel (SM)		50	Rebound		>100		-	-	-
37.5	39.0	3.5	SPT	Grey colored Silty SAND (SM)		8	10	14	24		-	-	-
39.0	41.0		SPT			50	Rebound		>100		-	-	-


 Director Signatory
(Dy. Quality Manager)

PAGE 14

BORE LOG AND CORE LOG SHEET



Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala

MPAC PVT. LTD.

BH.NO:

4

DEPTH OF WATER TABLE :

0.5m

BORE HOLE DIAMETER:

150mm/75mm

LAND MARK DETAILS :

Q5 to Q9 at Ernakulam Wharf -BH4

DATE OF START & FINISH :

09-03-2026 to 13-03-2026

BORE HOLE TERMINATION:

41.5m

LADTTITUDE & LONGITUDE :

639129.23 E 1101986.79 N

Depth (m)		Thickness of Layer (m)	Type	Description	Profile	SPT Test				Depth Vs N Value	Core Recovery (%)	ROD (%)	Remarks
From	To					0.0 -0.15 m	0.15 - 0.30 m	0.30 -0.45 m	N Value				
0.0	2.5	2.5	DS	Back Filling		-	-	-	-		-	-	-
2.5	4.5	2.0	SPT	Black colored Clayey SAND(SC)		9	9	7	16		-	-	-
4.5	6.0	12.0	SPT	Black colored Sandy CLAY(CL)		1	2	3	5		-	-	-
6.0	7.5		SPT			0	1	1	2		-	-	-
7.5	9.0		SPT			1	1	1	2		-	-	-
9.0	10.5		SPT			2	2	2	4		-	-	-
10.5	12.0		SPT			2	3	3	6		-	-	-
12.0	13.5		SPT			2	3	3	6		-	-	-
13.5	15.0		SPT			0	1	2	3		-	-	-
15.0	16.5		SPT			2	3	3	6		-	-	-
16.5	18.0	6.0	SPT	Black colored Silty CLAY(CL)		0	1	1	2		-	-	-
18.0	19.5		SPT			1	2	2	4		-	-	-
19.5	21.0		SPT			2	3	3	6		-	-	-
21.0	22.5		SPT			2	2	3	5		-	-	-
22.5	24.0	1.5	UDS	Black colored Silty CLAY(CL)		-	-	-	-		-	-	UDS failed
24.0	25.5	4.5	SPT	Black colored Silty CLAY(CL)		2	2	2	4		-	-	-
25.5	27.0		SPT			3	3	2	5		-	-	-
27.0	28.5		SPT			2	3	3	6		-	-	-
28.5	30.0	1.5	SPT	Black colored Sandy CLAY(CL)		15	20	24	44		-	-	-
30.0	31.5	1.5	SPT	Black colored Silty CLAY(CL)		17	22	30	52		-	-	-
31.5	33.0	1.5	SPT	Brown and Red colored Silty SAND(SM)		11	13	19	32		-	-	-
33.0	34.5	1.5	UDS	Brown colored Silty SAND(SM)		-	-	-	-		-	-	-
34.5	36.0	1.5	SPT	Brown colored Silty SAND mixed with Clay(SM)		13	14	17	31		-	-	-
36.0	37.5	3.0	SPT	Brown colored Silty SAND(SM)		9	14	19	33		-	-	-
37.5	39.0		SPT			15	18	21	39		-	-	-
39.0	41.5	2.5	SPT	Brown colored Silty SAND mixed with Clay(SM)		12	13	11	24		-	-	-



Authorised Signatory
(Dy Quality Manager)
PAGE 15

BORE LOG AND CORE LOG SHEET



Geotechnical Investigation Report for Refurbishment and strengthening of Q5 to Q9 at Ernakulam Wharf - Kerala

MPAC PVT. LTD.

BH.NO:

5

DEPTH OF WATER TABLE :

1.0m

BORE HOLE DIAMETER:

150mm/75mm

LAND MARK DETAILS :

Q5 to Q9 at Ernakulam Wharf -BH5

DATE OF START & FINISH :

14-03-2026 to 19-03-2026

BORE HOLE TERMINATION:

41.0m

LADTTITUDE & LONGITUDE :

639261.49 E 1101948.77 N

Depth (m)		Thickness of Layer (m)	Type	Description	Profile	SPT Test				Depth Vs N Value	Core Recovery (%)	ROD (%)	Remarks
From	To					0.0 -0.15 m	0.15 - 0.30 m	0.30 -0.45 m	N Value				
0.0	1.5	1.5	DS	Back Filling		-	-	-	-		-	-	-
1.5	3.0	3.0	SPT	Black colored Sandy CLAY(CL)		2	1	1	2		-	-	-
3.0	4.5		SPT			1	1	1	2		-	-	-
4.5	6.0	1.5	UDS	Black colored Sandy CLAY(CL)		-	-	-	-		-	-	-
6.0	7.5		SPT	Black colored Silty CLAY(CL)		1	2	3	5		-	-	-
7.5	9.0		SPT			1	2	2	4		-	-	-
9.0	10.5		SPT			1	2	4	6		-	-	-
10.5	12.0		SPT			1	2	1	3		-	-	-
12.0	13.5		SPT			1	2	3	5		-	-	-
13.5	15.0		SPT			2	4	5	9		-	-	-
15.0	16.5	1.5	UDS	Black colored Silty CLAY(CL)		-	-	-	-		-	-	-
16.5	18.0		SPT	Black colored Sandy CLAY(CL)		1	2	3	5		-	-	-
18.0	19.5		SPT			3	4	5	9		-	-	-
19.5	21.0	1.5	UDS	Black colored Sandy CLAY(CL)		-	-	-	-		-	-	UDS failed
21.0	22.5	1.5	SPT	Black and Brown colored Silty CLAY(CL)		4	5	3	8		-	-	-
22.5	24.0	1.5	UDS	Black colored Silty CLAY(CL)		-	-	-	-		-	-	UDS failed
24.0	25.5		SPT	Yellow and White colored Silty CLAY(CL)		4	5	3	8		-	-	-
25.5	27.0		SPT			2	4	3	7		-	-	-
27.0	28.5	1.5	UDS	Black and Brown colored Silty SAND (SM)		-	-	-	-		-	-	-
28.5	30.0		SPT	Black and Brown colored Sandy CLAY(CL)		4	6	11	17		-	-	-
30.0	31.5		SPT			11	14	12	26		-	-	-
31.5	34.5		SPT			12	11	14	25		-	-	-
34.5	36.0		SPT	Black and Brown colored Silty SAND (SM)		16	20	20	40		-	-	-
36.0	37.5		SPT			48	40	50/2cm	>100		-	-	-
37.5	39.0		SPT	Black and Brown colored Coarse SAND (SM)		42	46	50/10cm	>100		-	-	-
39.0	41.0		SPT			47	45	50/12cm	>100		-	-	-



Authorised Signatory
(Dy Quality Manager)
PAGE 16

Annexure II

(Site Keyplan)

BH No.	Easting	Northing
NBH 01	638592.89 E	1102239.28 N
NBH 02	638790.86 E	1102168.89 N
NBH 03	638957.12 E	1102078.47 N
NBH 04	639129.23 E	1101986.79 N
NBH 05	639261.49 E	1101948.77 N