

3. Laboratory Test Results

3.1 Overall

(1) From 0.0Km to 8.0 Km (KCR/ BH#1 to KCR/BH#16)

1) Particle Size Analysis:

Total of 112 particle size analyses were performed on SPT samples and 31 on core samples. The results show that particles finer than 0.075mm sieve vary from 53% to 99% in Clay deposit and 04% to 44% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM and SC groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 112 SPT and 31 core samples. The liquid limit varies from maximum of 44% to a minimum of 21% the Plasticity Index ranges between 17 and 03%, whereas 57 No's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML groups. Such soils are Clays and Clay-Silt mixtures of low to medium plasticity.

3) Specific Gravity

The Specific Gravity of 45 SPT samples varies from 2.613 to 2.740.

4) Natural Water Content:

In 112 SPT samples the water content varies from 0.53% to 24.11%. In 46 core samples the water content was determined from 1.2% to 18.59%.

5) Bulk & Dry Density

The value of Bulk Density for 45 Core Samples ranges between 1.579 to 2.76 gm/cc (15.79 to 27.6 kN/m³).

The value of Dry Density for 45 Core Samples ranges between 1.450 to 2.530 gm/cc (14.50 to 25.30 kN/m³).

6) Direct Shear:

A total of 43 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 28° to 32°.

7) Consolidation:

Consolidation tests were performed on the 9 Undisturbed Core samples collected from CLAY layers. The Coefficient of Compressibility (Cc) value ranges from 0.16 to 0.23 while initial Void Ratio (Vo) ranges from 0.38 to 0.47.

8) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 45 core samples.

The Unconfined Compressive Strength values range as follows:

MUDSTONE Samples (21 Nos) :0.302 to 60.588 kg/cm² (0.03 to 5.9 Mpa)

SANDSTONE Samples (10 Nos) :0.664 to 20.043 kg/cm² (0.07 to 1.97 Mpa)

LIMESTONE Samples (14 Nos) :4.01 to 199.000 kg/cm² (0.39 to 19.5 Mpa)

9) Chemical Tests:

Chemical tests were performed on Soil and Water samples to determine Chloride content,

Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.004% to 0.571%
Chloride content	0.107% to 1.344%
pH value	5.0 to 7.5

The values of chemical properties of Water samples tested in the laboratory are as under:

Sulphate content	123.45 to 9448 mg/ lit
Chloride content	299.92 to 4999.86 mg/ lit
pH value	5.0 to 7.5

(2) From 8.0Km to 16.0 Km (KCR/ BH#17 to KCR/BH#33)

1) Particle Size Analysis:

Total of 166 particle size analyses were performed on SPT samples, 40 on Core soil samples and 2 Undisturbed samples. The results show that particle finer than 0.075mm sieve vary from 51% to 99% in Clay deposit and 03% to 50% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM, SC-SM, SM and SC groups and Gravels belong to GW and GC groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 166 SPT, 40 Core samples. The liquid limit varies from maximum of 45% to a minimum of 20%. The Plasticity Index ranges between 25 and 3%, whereas 36 no's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML groups. Such soils are Clays and Clay-Silt mixtures of low to medium plasticity.

3) Specific Gravity

The Specific Gravity of 148 SPT samples and 17 Core samples varies from 2.45 to 2.80.

4) Natural Water Content:

In 166 SPT samples the water content varies from 0.72% to 22.90%. In 48 Core samples the water content was determined as 0.39% to 28.17%.

5) Bulk & Dry Density

The value of Bulk Density for 42 Core Samples ranges between 1.481 to 2.53 gm/cc (14.81 to 25.3 kN/m³).

The value of Dry Density for 42 Core Samples ranges between 1.429 to 2.580 gm/cc (14.29 to 25.58 kN/m³).

6) Direct Shear:

A total of 103 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 26o to 32o.

7) Consolidation:

Consolidation tests were performed on 10 Undisturbed Core samples collected from CLAY layers. The Coefficient of Compressibility (Cc) value ranges from 0.14 to 0.23, while initial Void Ratio (Vo) ranges from 0.21 to 0.60.

8) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 42 core samples of soil and rock.

The Unconfined Compressive Strength values range as follows:

Stiff to Hard CLAY Samples (14 Nos):0.510 to 7.343 kg/cm² (0.05 to 0.72 Mpa)

MUDSTONE Samples (18 Nos):0.390 to 40.532 kg/cm²(0.039 to 3.98 Mpa)

SANDSTONE Samples (8 Nos):1.543 to 31.000 kg/cm²(0.15 to 3.04 Mpa)

LIMESTONE Samples (2 Nos):40.532 to 117.254 kg/cm²(3.98 to 11.50 Mpa)

9) Chemical Tests:

Chemical tests were performed on 19 Nos of Soil and 17 Nos of Water samples to determine Chloride content, Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.030% to 0.420%
Chloride content	0.110% to 0.700 %
pH value	5.0 to 9.0

The values of chemical properties of Water samples tested in the laboratory are as under:

Sulphate content	65.84 to 444.42 mg/lit
Chloride content	399.90 To 799.98 mg/lit
pH value	5.0 to 9.0

(3) From 16.0Km to 24.0 Km (KCR/ BH#34 to KCR/BH#49)

1) Particle Size Analysis:

Total of 122 particle size analyses were performed on SPT samples, 52 on Core samples and 2 on Undisturbed soil sample. The results show that particle finer than 0.075mm sieve vary from 50% to 99% in Clay deposit and 01% to 50% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM, SW-SM, SC-SM, SM and SC groups and Gravels belong to GW and GC-GM groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 122 SPT, 52 Core samples. The liquid limit varies from maximum of 45% to a minimum of 20%. The Plasticity Index ranges between 5 and 22, whereas 43 No's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML groups. Such soils are Clays and Clay-Silt mixtures of low to medium plasticity.

3) Specific Gravity

The Specific Gravity of 57 SPT samples varies from 2.632 to 2.719.

4) Natural Water Content:

In 122 SPT samples the water content varies from 0.26% to 21.25%. In 54 Core samples the water content was determined as 0.39% to 27.43%.

5) Bulk & Dry Density

The value of Bulk Density for 49 Core Samples ranges between 1.950 to 2.606 gm/cc (19.50 to 26.06 kN/m³).

The value of Dry Density for 49 Core Samples ranges between 1.695 to 2.400 gm/cc (16.95 to 24.00 kN/m³).

6) UU Triaxial Compression:

Unconsolidated Undrained Triaxial compression test was performed on one Undisturbed Clay sample extracted from 4.3 to 4.8m depth. The test was conducted in SOILCON Soil Mechanics Laboratory, Lahore.

The results shows that Undrained Cohesion is 0.27Mpa whereas angle of internal friction ϕ is 0.0 degrees.

7) Direct Shear:

A total of 79 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 26o to 32o.

8) Consolidation:

Consolidation tests were performed on 9 Undisturbed Core samples collected from CLAY layers. The Coefficient of Compressibility (Cc) value ranges from 0.15 to 0.26 while initial Void Ratio (Vo) values from 0.32 to 0.60.

9) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 50 core samples of soil and rock.

The Unconfined Compressive Strength values range as follows:

Stiff to Hard CLAY Samples (15 Nos):0.646 to 16.445 kg/cm² (0.64 to 1.62 Mpa)

MUDSTONE Samples (31 Nos) :0.640 to 220.14 kg/cm² (0.63 to 21.6 Mpa)

SANDSTONE Samples (4 Nos) :0.490 to 37.687 kg/cm² (0.05 to 3.70 Mpa)

10) Chemical Tests:

Chemical tests were performed on 17 Nos of Soil and 16 Nos of Water samples to determine Chloride content, Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.022% to 0.668%
Chloride content	0.043% to 0.447 %
pH value	5.5 to 7.7

The values of chemical properties of Water samples tested in the laboratory are as under:

Sulphate content	123.45 to 2197.40 mg/lit
Chloride content	119.99 To 1550 mg/lit
pH value	5.5 to 7.7

(4) From 24.0Km to 32.0 Km (KCR/ BH#50 to KCR/BH#64)

1) Particle Size Analysis:

Total of 243 particle size analyses were performed on SPT samples, 53 core samples and 14 Undisturbed soil sample. The results show that particle finer than 0.075mm sieve vary from 51% to 99% in Clay deposit and 01% to 49% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM, SW-SM, SC-SM, SM and SC groups and Gravels belong to GW and GC-GM groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 243 SPT and 53 Core samples. The liquid limit varies from maximum of 49% to a minimum of 21%. The Plasticity Index ranges between 4 and 29, whereas 119 No's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML

groups. Such soils are Clays and Clay-Silt mixtures of low to medium plasticity.

3) Specific Gravity:

The Specific Gravity of 245 SPT samples are varies from 2.262 to 2.813.

4) Natural Water Content:

In 243 SPT samples the water content varies from 2.25% to 38.21%. In 64 Core samples the water content was determined as 0.80% to 28.17%.

5) Bulk & Dry Density

The value of Bulk Density for 53 Core Samples ranges between 1.938 to 2.511 gm/cc (19.38 to 25.11 kN/m³).

The value of Dry Density for 53 Core Samples ranges between 1.656 to 2.31 gm/cc (16.56 to 23.1 kN/m³).

6) UU Triaxial Compression:

Unconsolidated Undrained Triaxial compression test was performed on 10 Undisturbed Clay sample extracted from 10 bore holes at varied horizons (min. 2.0m to max. 5.5m depth). The tests were conducted in SOILCON Soil Mechanics Laboratory, Lahore.

The results show that Undrained Cohesion ranges from 0.0 to 0.14 Mpa whereas angle of internal friction 'phi' ranges from 0.0 to 17 degrees.

7) Direct Shear:

A total of 149 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 26o to 32o.

8) Consolidation:

Consolidation tests were performed on 19 Undisturbed Core samples collected from CLAY layers. The Coefficient of Compressibility (Cc) value ranges from 0.13 to 0.28 while initial Void Ratio (Vo) ranges from 0.30 to 0.57.

9) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 53 core samples of soil and rock. The Unconfined Compressive Strength values range as follows:

Stiff to Hard CLAY Samples(26 Nos):0.541 to 11.315 kg/cm² (0.05 to 1.10Mpa)

MUDSTONE Samples (10 Nos):1.080 to 24.449 kg/cm² (0.10 to 2.4 Mpa)

SANDSTONE Samples (9 Nos):0.661 to 72.714 kg/cm² (0.06 to 7.2 Mpa)

CONGLOMERTAE Samples (8 Nos):0.590 to 166 kg/cm² (0.05 to 16.3 Mpa)

10) Chemical Tests:

Chemical tests were performed on 15 Nos of Soil and 15 Nos of Water samples to determine Chloride content, Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.027 to 0.955%
Chloride content	0.054% to 0.194%
pH value	6 to 8

The values of chemical properties of Water samples tested in the laboratory are as under:

Sulphate content	221.55 to 1300.3 mg/lit
Chloride content	28.69 to 2499.33 mg/lit
pH value	6 to 8

(5) From 32.0Km to 40.0 Km (KCR/ BH#65 to KCR/BH#81)

1) Particle Size Analysis:

Total of 63 particle size analyses were performed on SPT samples and 49 Core samples and one Undisturbed soil sample. The results show that particle finer than 0.075mm sieve vary from 50% to 99% in Clay deposit and 05% to 48% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM, SW-SM, SC-SM, SM and SC groups and Gravels belong to GW and GC-GM groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 63 SPT and 49 Core samples and one Undisturbed soil sample. The liquid limit varies from maximum of 48% to a minimum of 20%. The Plasticity Index ranges between 4 and 24, whereas 35 No's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML groups. Such soils are Clays and Clay-Silt mixtures of low to medium plastic.

3) Specific Gravity:

The Specific Gravity of 62 SPT samples varies from 2.605 to 2.721

4) Natural Water Content:

In 63 SPT samples the water content varies from 1.10% to 37.39%. In 82 Core samples the water content was determined as 0.93% to 20.60%.

5) Bulk & Dry Density

The value of Bulk Density for 83 Core Samples ranges between 1.684 to 2.897gm/cc (16.84 to 28.97 kN/m³).

The value of Dry Density for 83 Core Samples ranges between 1.406 to 2.750gm/cc (14.06 to 27.38 kN/m³).

6) UU Triaxial Compression:

Unconsolidated undrained triaxial compression test was performed on one Undisturbed Clay sample extracted from 5.30 to 5.65m depth. The test was conducted in SOILCON Soil Mechanics Laboratory, Lahore.

The test shows that Undrained Cohesion is 0.12Mpa whereas angle of internal friction ϕ is 0.0 degrees.

7) Direct Shear:

A total of 33 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 26o to 32o.

8) Consolidation:

Consolidation tests were performed on 03 Undisturbed Core samples collected from CLAY layers. The Coefficient of Compressibility (Cc) value ranges from 0.15 to 0.25 while initial Void Ratio (Vo) varies from 0.31 to 0.54.

9) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 72 core samples of soil and rock. The Unconfined Compressive Strength values range as follows:

MUDSTONE Samples (54 Nos):0.339 to 136.123kg/cm² (0.04 to 13.4 Mpa)

LIMESTONE Samples (5 Nos):11.102 to 150.099kg/cm² (1.09 to 14.71 Mpa)

SANDSTONE Samples (7 Nos):1.982 to 132.04 kg/cm² (0.20 to 12.94Mpa)
CONGLOMERATE Samples (1 Nos):166 kg/cm² (16.3 Mpa)

10) Chemical Tests:

Chemical tests were performed on 17 Nos of Soil and 17 Nos of Water samples to determine Chloride content, Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.008% to 0.889%
Chloride content	0.027% to 0.806%
pH value	5.5 to 7.5

The values of chemical properties of Water samples tested in the laboratory are as under:

Sulphate content	16.46 to 8211.04 mg/lit
Chloride content	288.43 to 1499.96 mg/lit
pH value	5.5 to 7.5

(6) From 40.0Km to 43.0 Km (KCR/ BH#82 to KCR/BH#86)

1) Particle Size Analysis:

Total of 46 particle size analyses were performed on SPT samples and 11 on Core samples. The results show that particle finer than 0.075mm sieve vary from 56% to 99% in Clay deposit and 14% to 36% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM, SC-SM, SM and SC groups and Gravels belong to GW and GC-GM groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 46 SPT and 11 Core samples. The liquid limit varies from maximum of 42% to a minimum of 22%. The Plasticity Index ranges between 7 and 19, whereas 15 No's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML groups. Such soils are Clays and Clay-Silt mixtures of low to medium plastic.

3) Specific Gravity:

The Specific Gravity of 45 SPT samples varies from 2.586 to 2.712

4) Natural Water Content:

In 44 SPT samples the water content varies from 3.22% to 26.67%. In 17 Core samples the water content was determined as 2.11% to 28.43%.

5) Bulk & Dry Density

The value of Bulk Density for Undisturbed 17 Core Samples ranges between 1.885 to 2.417gm/cc (18.85 to 24.17kN/m³).

The value of Dry Density for 17 Core Samples ranges between 1.649 to 2.367gm/cc (16.49 to 23.67 kN/m³).

6) Direct Shear:

A total of 13 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 26o to 30o.

7) Consolidation:

Consolidation tests were performed on one Undisturbed Core sample collected from CLAY layers. The Coefficient of Compressibility (Cc) value is 0.24. while initial Void Ratio (Vo) is 0.50.

8) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 17 core samples of soil and rock.

The Unconfined Compressive Strength values range as follows:

MUDSTONE Samples (12 Nos):0.954 to 134.89kg/cm² (0.10 to 13.22 Mpa)

LIMESTONE Samples (4 Nos):7.791 to 57.17kg/cm² (0.77 to 5.60 Mpa)

SANDSTONE Samples(1 Nos):3.564kg/cm² (0.35Mpa)

9) Chemical Tests:

Chemical tests were performed on 5 Nos of Soil and 5 Nos of Water samples to determine Chloride content, Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.027% to 0.301%
Chloride content	0.269% to 0.645%
pH value	5.5 to 7.5

The values of chemical properties of Water samples tested in the laboratory are as under:

Sulphate content	188.37 to 576.1 mg/lit
Chloride content	348.98 to 999.97 mg/lit
pH value	5.5 to 7.5

(7) KCR/ BH#87 to KCR/BH#90

1) Particle Size Analysis:

Total of 30 particle size analyses were performed on SPT samples and 07 Core samples and one Undisturbed soil sample. The results show that particle finer than 0.075mm sieve vary from 51% to 99% in Clay deposit and 06% to 49% in Sand deposit.

As per Unified Classification System, the Clay deposits generally fall in CL/ CL-ML group while the Sand deposits belong to SW, SW-SM, SW-SM, SC-SM, SM and SC groups and Gravels belong to GW and GC-GM groups.

2) Liquid Limit, Plastic Limit & Plasticity Index:

These tests were conducted on 30 SPT, 07 Core samples and one Undisturbed samples. The liquid limit varies from maximum of 39% to a minimum of 23%. The Plasticity Index ranges between 5 and 18, whereas 16 No's of samples are Non Plastic.

As per Unified Classification System the fine portions of soils belong to CL, ML and CL-ML groups. Such soils are Clays and Clay-Silt mixtures of low to medium plastic.

3) Specific Gravity:

The Specific Gravity of 30 SPT samples varies from 2.635 to 2.719

4) Natural Water Content:

In 30 SPT samples the water content varies from 5.03% to 24.78%. In 07 Core samples the water content was determined as 2.26% to 10.21%.

5) Bulk & Dry Density

The value of Bulk Density for 7 Core Samples ranges between 2.121 to 2.491gm/cc (21.21 to 24.91 kN/m³).

The value of Dry Density for 07 Core Samples ranges between 1.862 to 2.400gm/cc (18.62 to 24.0 kN/m³).

6) UU Triaxial Compression:

Unconsolidated undrained triaxial compression test was performed on one Undisturbed Clay sample extracted from 4.0 to 4.5m depth from KCR/BH#88A. The test was conducted in SOILCON Soil Mechanics Laboratory, Lahore.

The results shows that Undrained Cohesion is 0.015Mpa whereas angle of internal friction 'phi' is 10.0 degrees.

7) Direct Shear:

A total of 19 Direct Shear Tests were performed on remolded SPT samples. The results indicate that the angle of internal friction of SAND/ SILT varies from 26o to 32o.

8) Unconfined Compression on Core Samples:

Unconfined compression tests were conducted on 7 core samples of soil and rock. The Unconfined Compressive Strength values range as follows:

Stiff to Hard CLAY Samples(1 Nos) :0.359kg/cm² (0.04 Mpa)
 MUDSTONE Samples (4 Nos) :0.777 to 12.726kg/cm² (0.08 to 1.25 Mpa)
 SANDSTONE Samples (2 Nos) :20.728 to 25.313 kg/cm² (2.03 to 2.48 Mpa)

Results show that at relatively shallow depths the unconfined compressive strength range between 0.359 to 25.313kg/cm².

9) Chemical Tests:

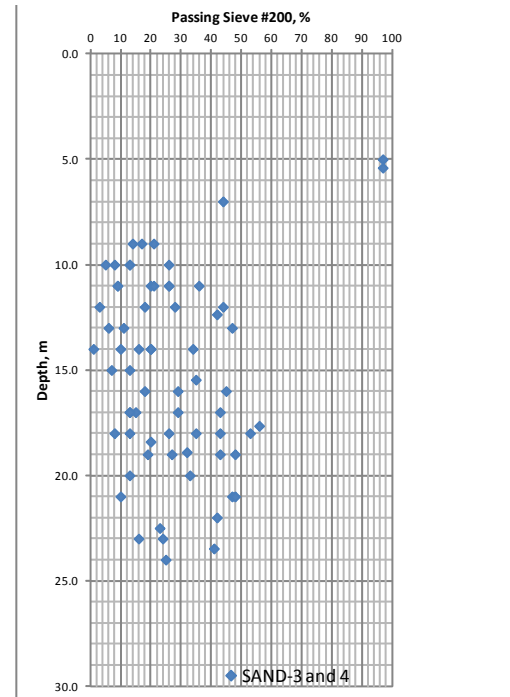
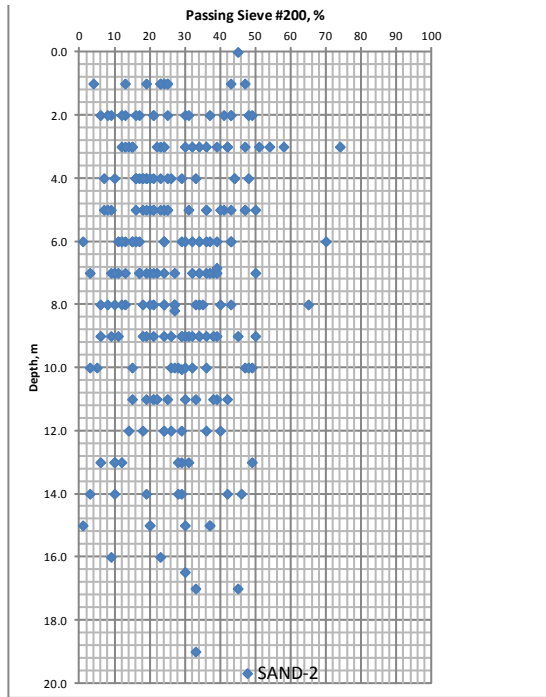
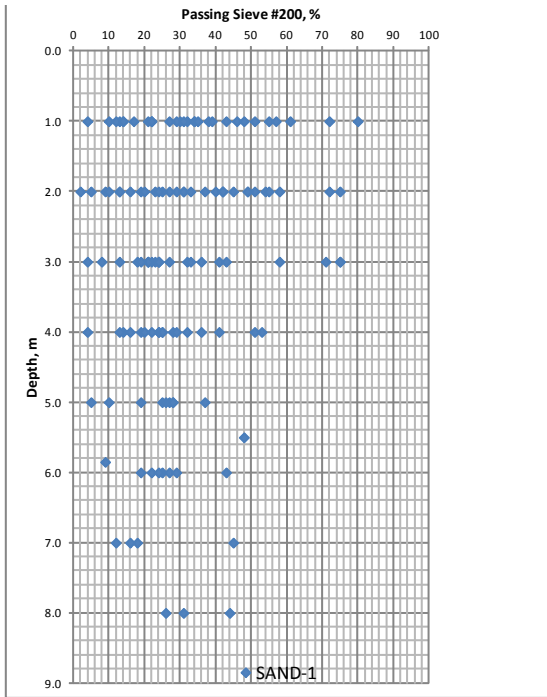
Chemical tests were performed on 4 Nos of Soil and 4 Nos of Water samples to determine Chloride content, Sulphate content, and pH.

The values of chemical properties of Soil samples tested in the laboratory are as under:

Sulphate content	0.058% to 0.274%
Chloride content	0.302% to 0.645%
pH value	6 to 8.5

The values of chemical properties of Water samples tested in the laboratory are as under:

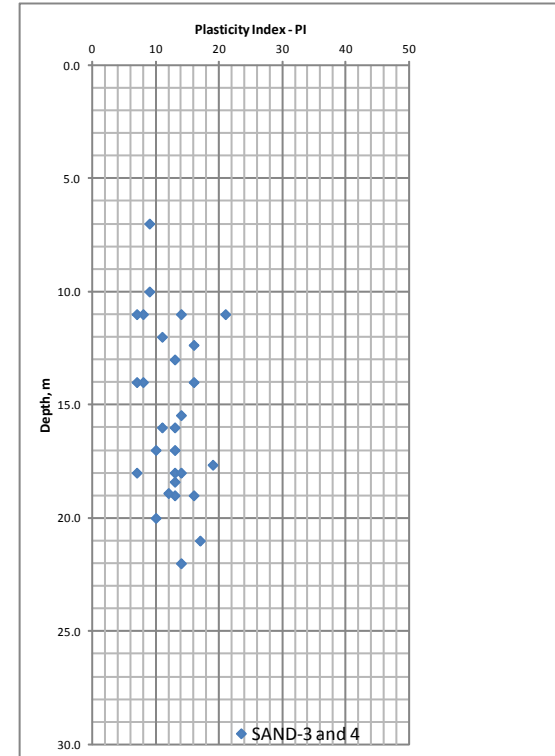
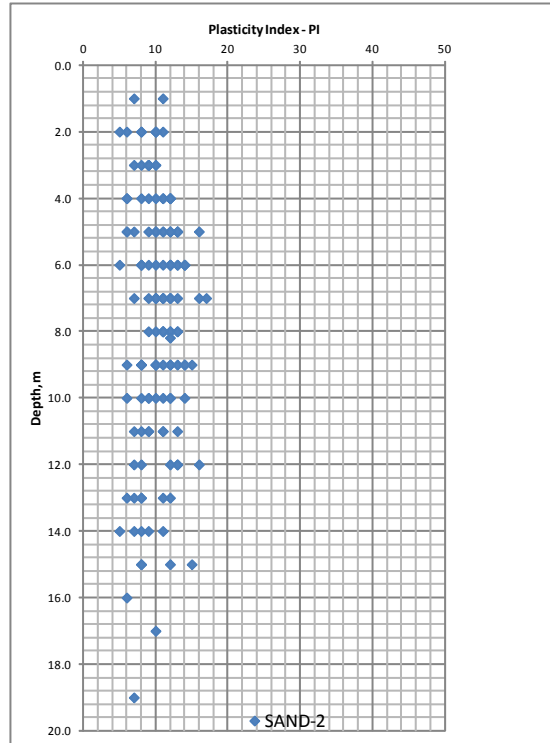
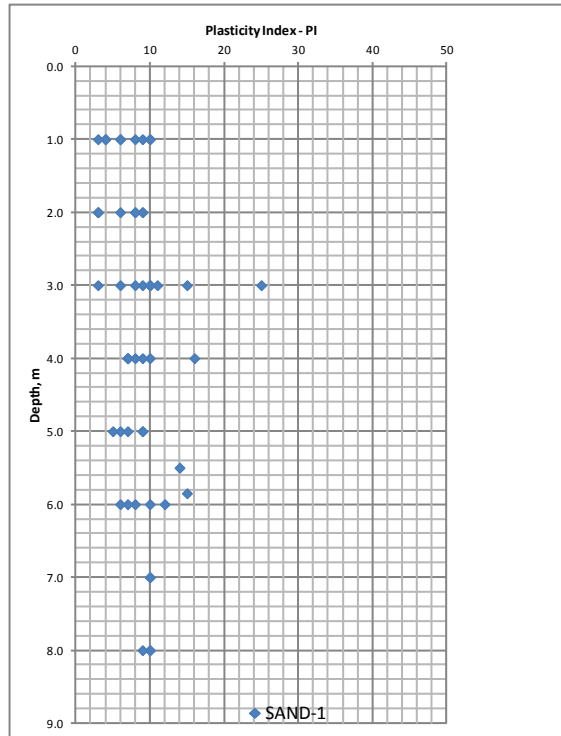
Sulphate content	189.29 to 1473.2 mg/lit
Chloride content	684.39 to 7099.79 mg/lit
pH value	6 to 8.5



Note: Data also includes % Passing Sieve #200 for SILT within these dept

Passing Sieve #200 vs Depth – SAND LAYERS

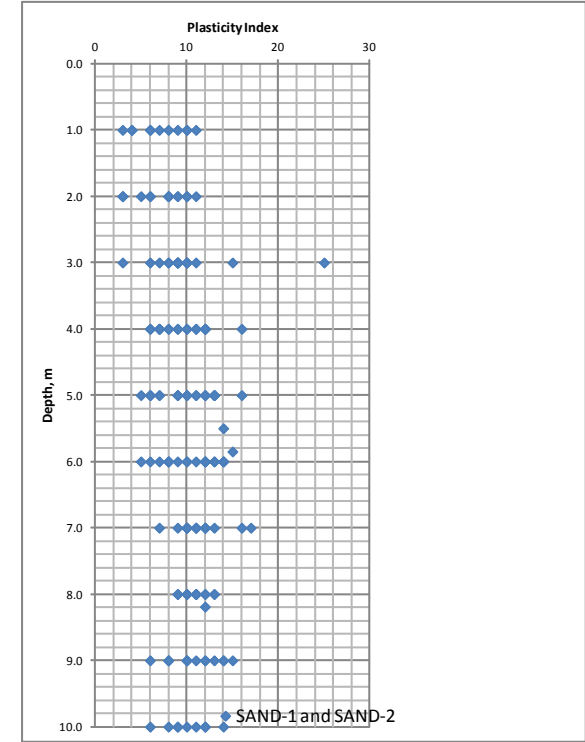
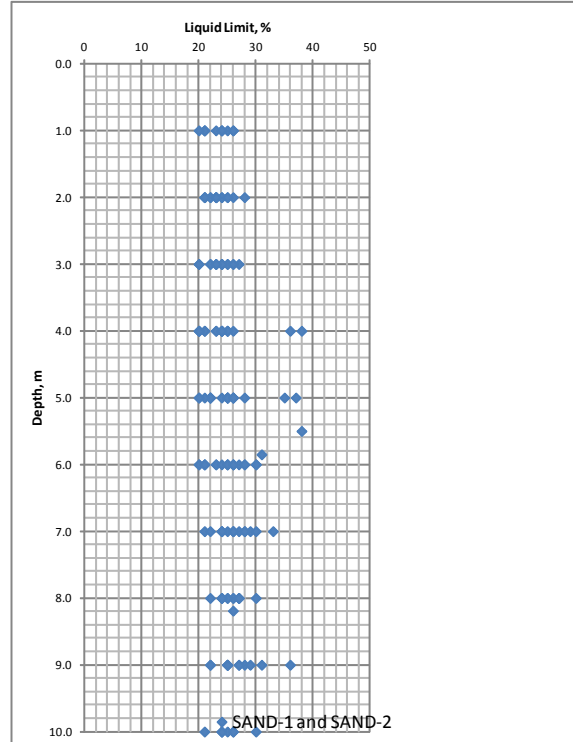
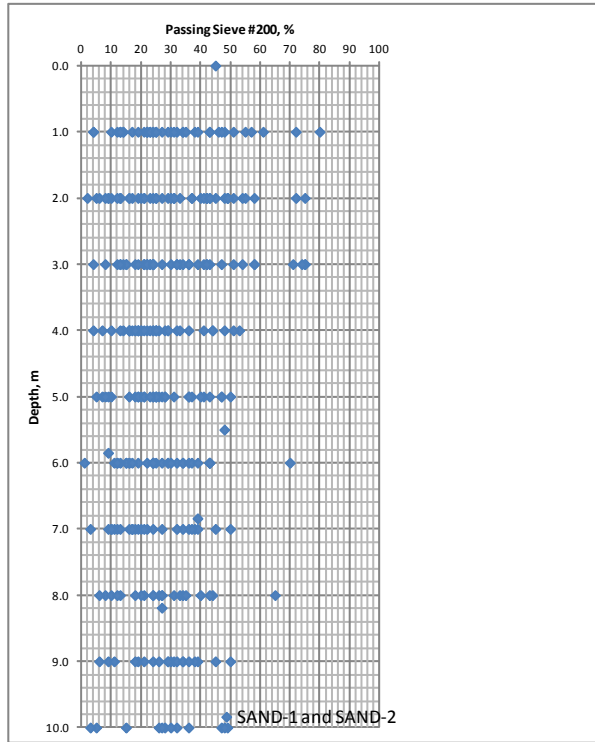
Source: JICA Study Team



Note: Data also includes % Passing Sieve #200 for SILT within these depths.

Source: JICA Study Team

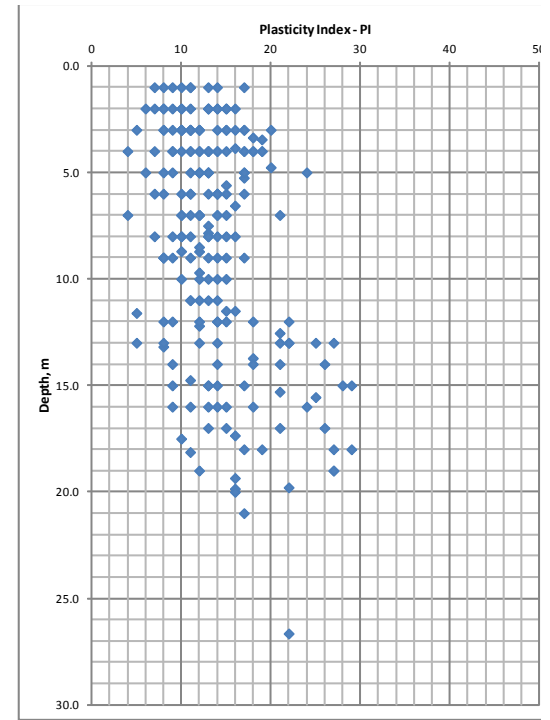
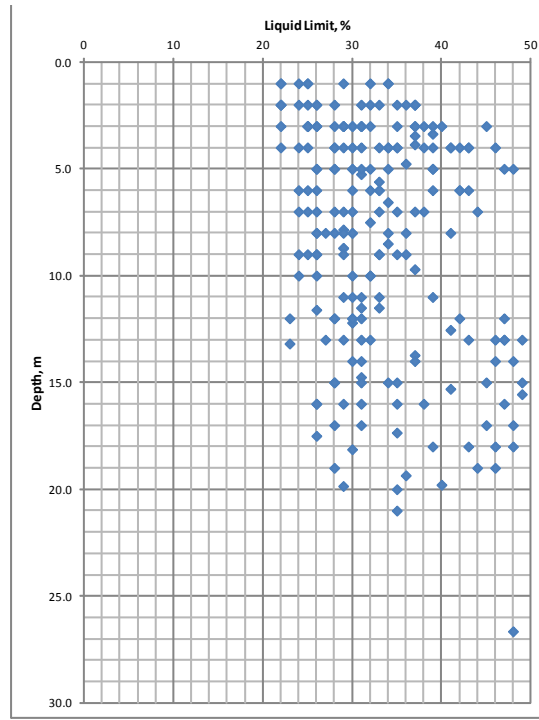
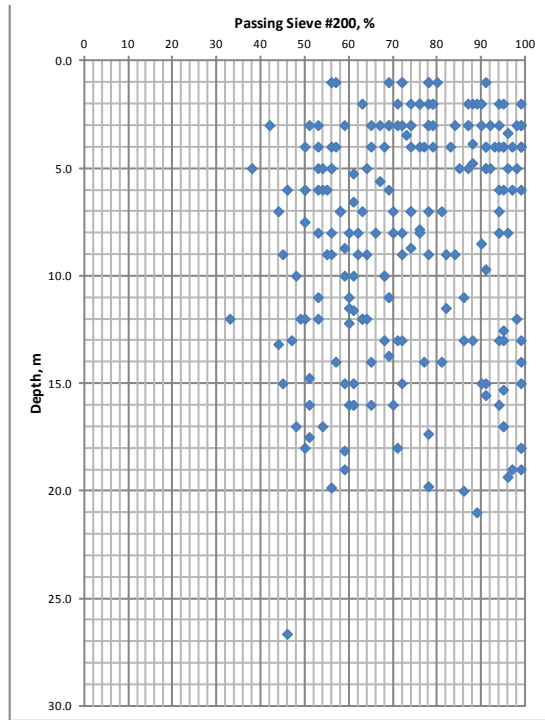
Plasticity vs Depth – SAND LAYERS



Note: Data also includes % Passing Sieve #200 for SILT within these depths.

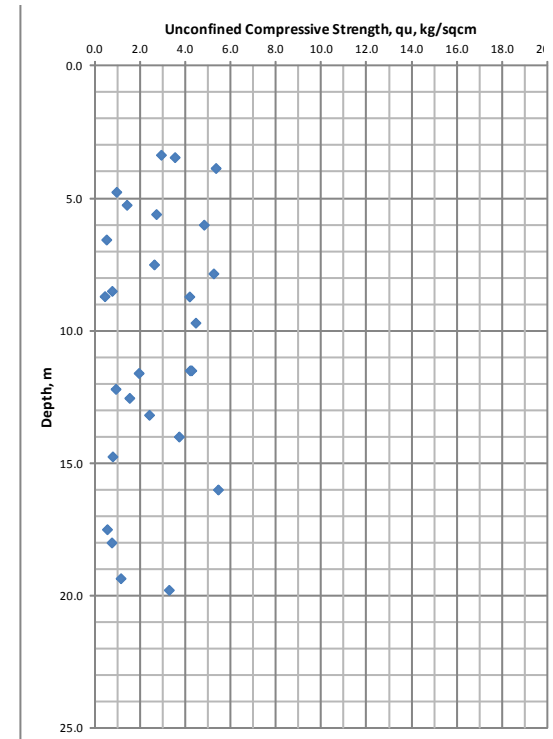
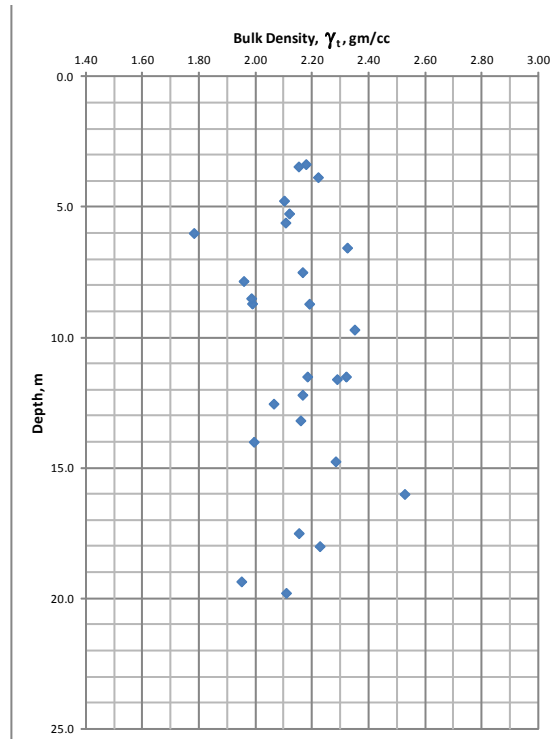
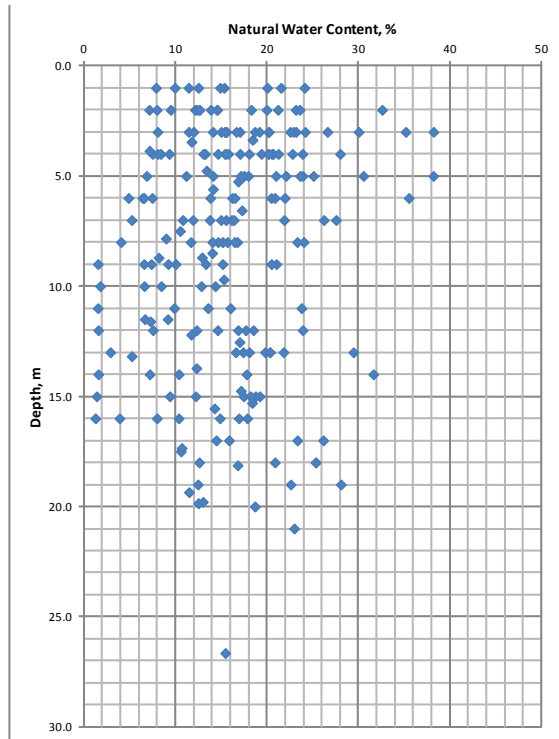
Source: JICA Study Team

Passing Sieve #200, LL, PI vs Depth – SAND-1 and SAND-2 Combined Data for Top 10m depth



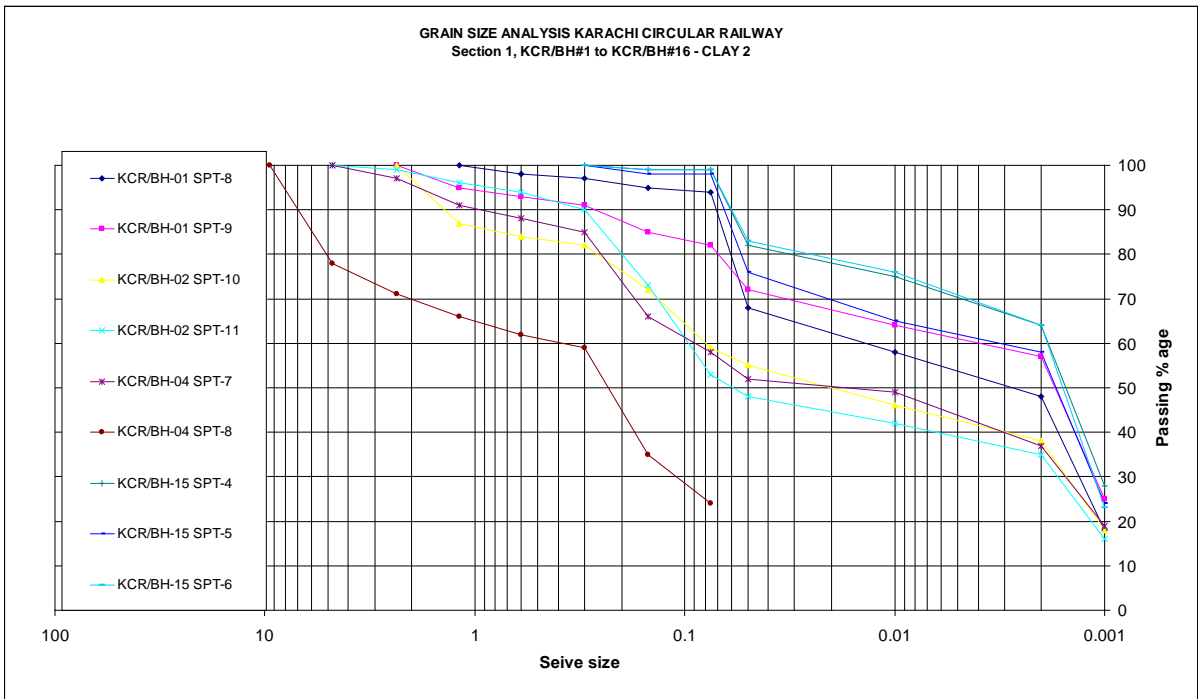
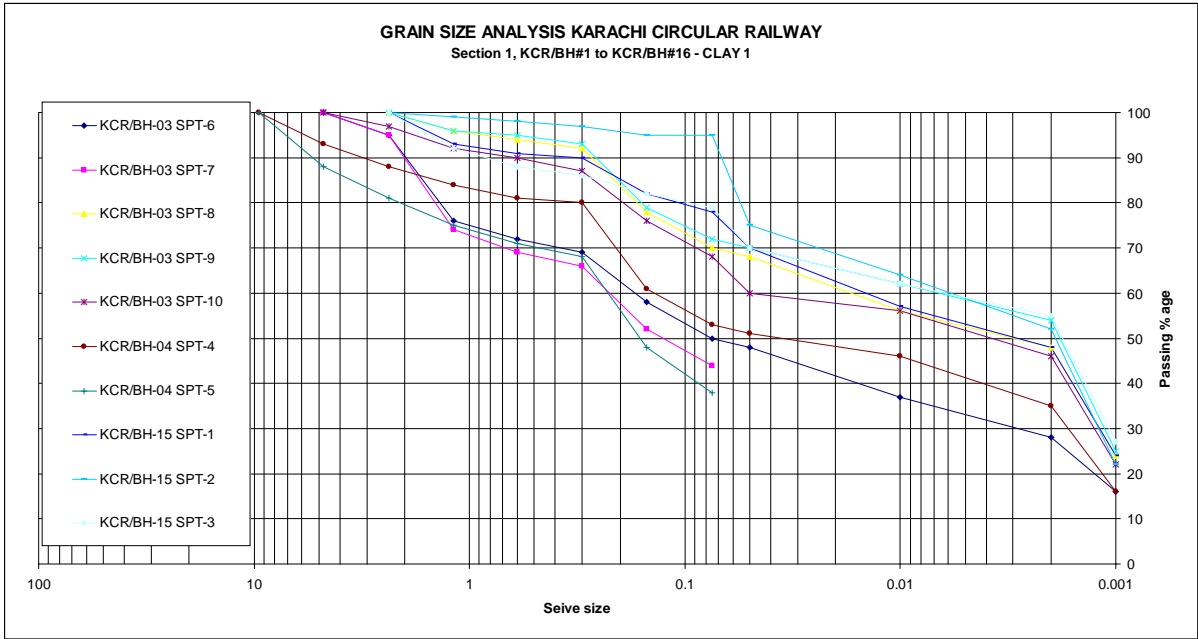
Source: JICA Study Team

Plasticity vs Depth – SAND LAYERS



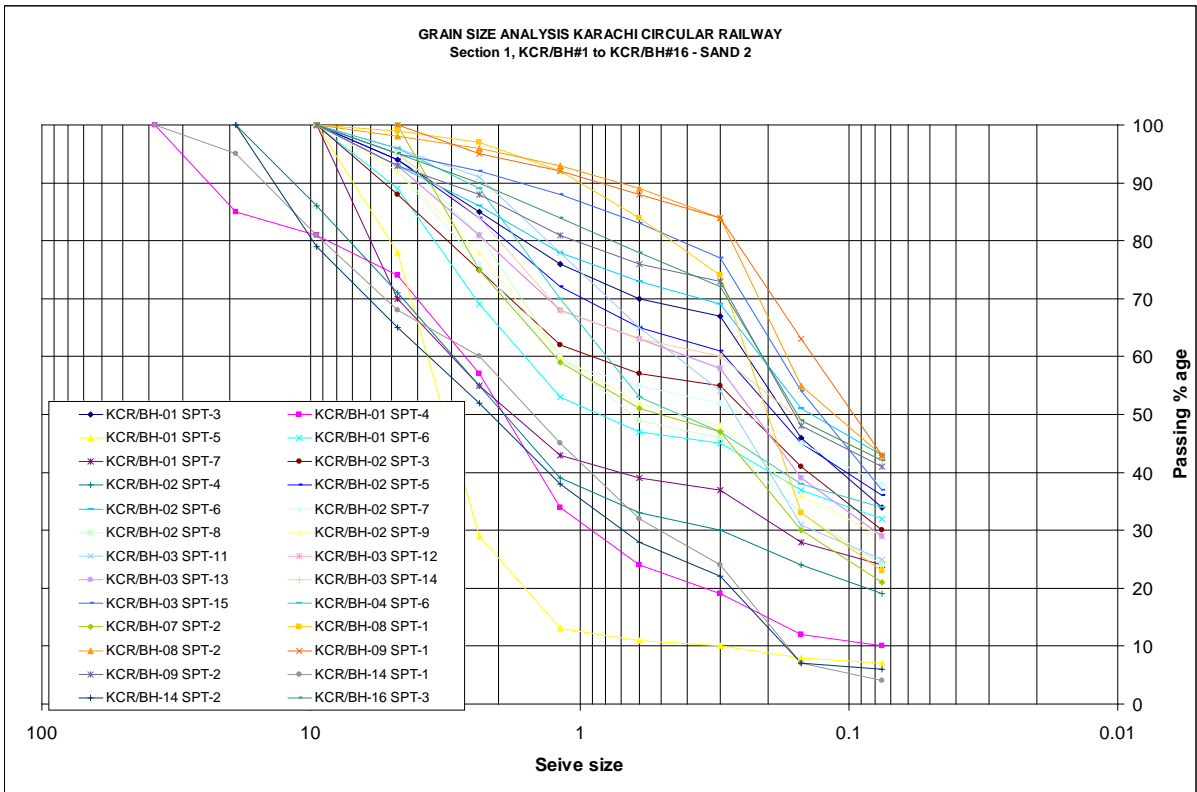
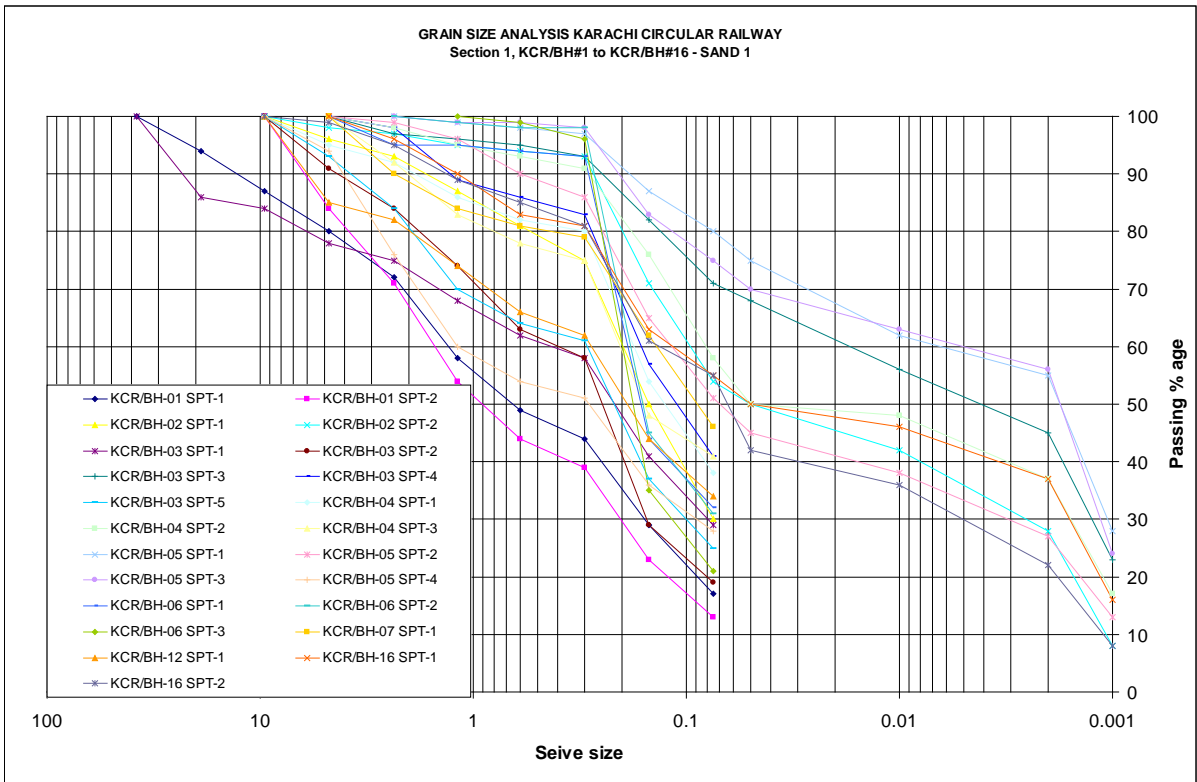
wn, γ_t and q_u vs Depth- CLAY LAYERS

Source: JICA Study Team



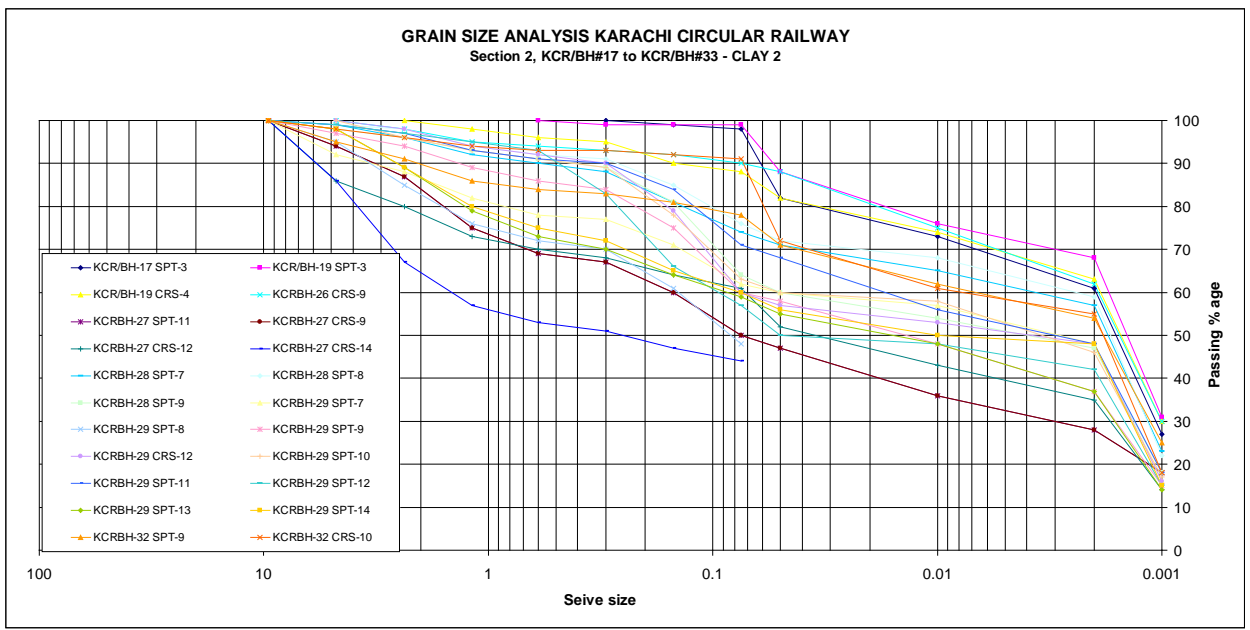
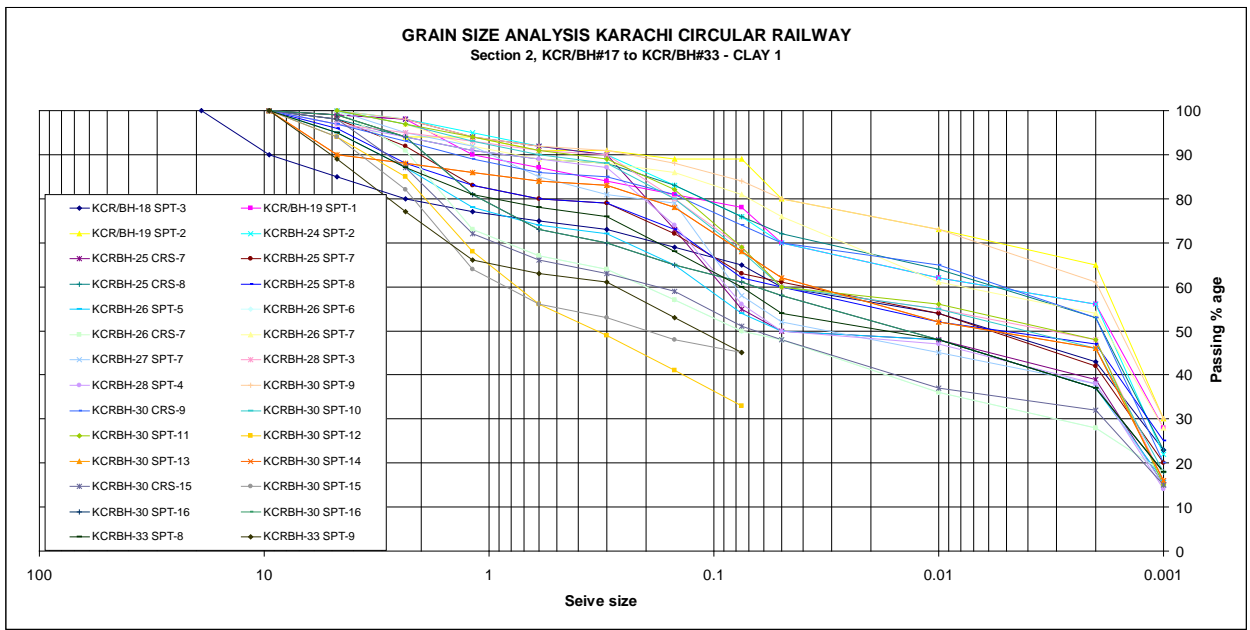
Source: JICA Study Team

Grains size analysis result (BH-1 to BH-16, CLAY)



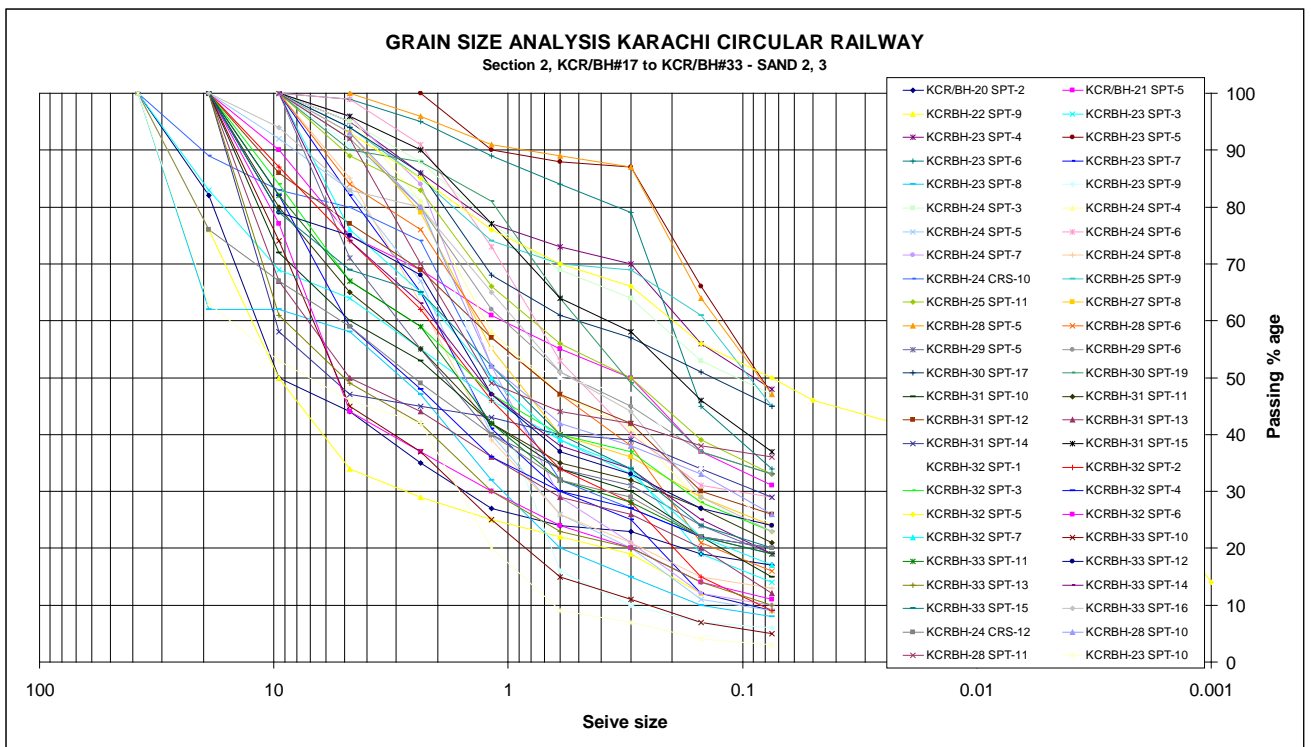
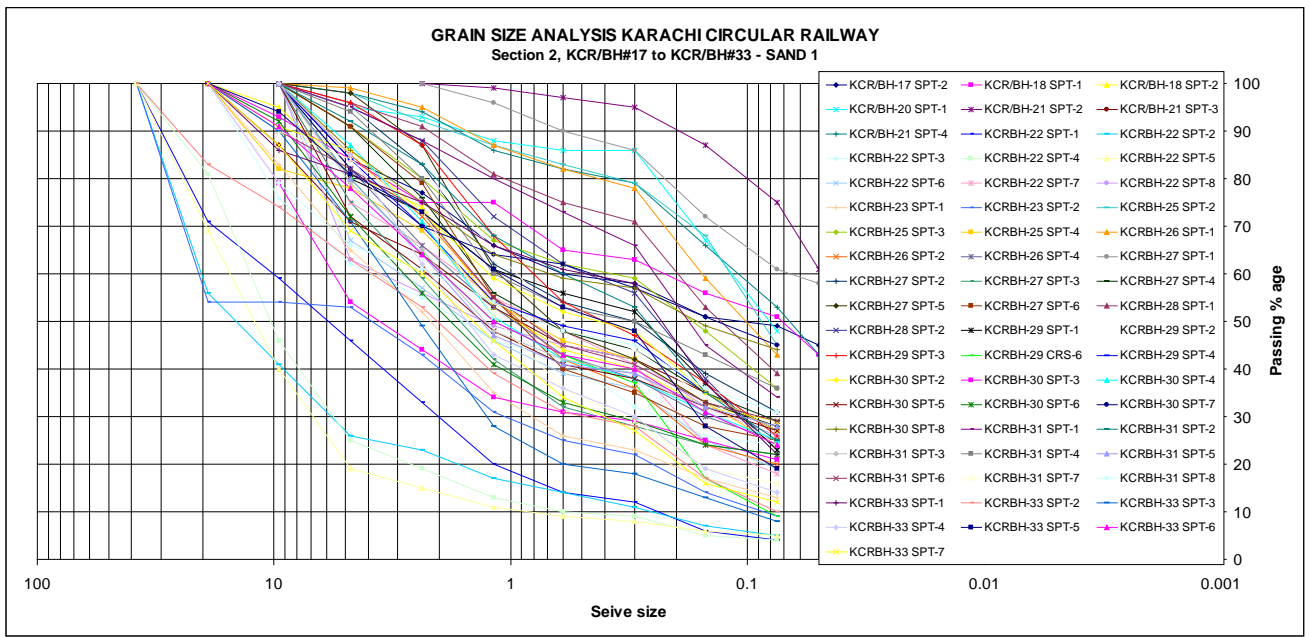
Source: JICA Study Team

Grains size analysis result (BH-1 to BH-16, SAND)



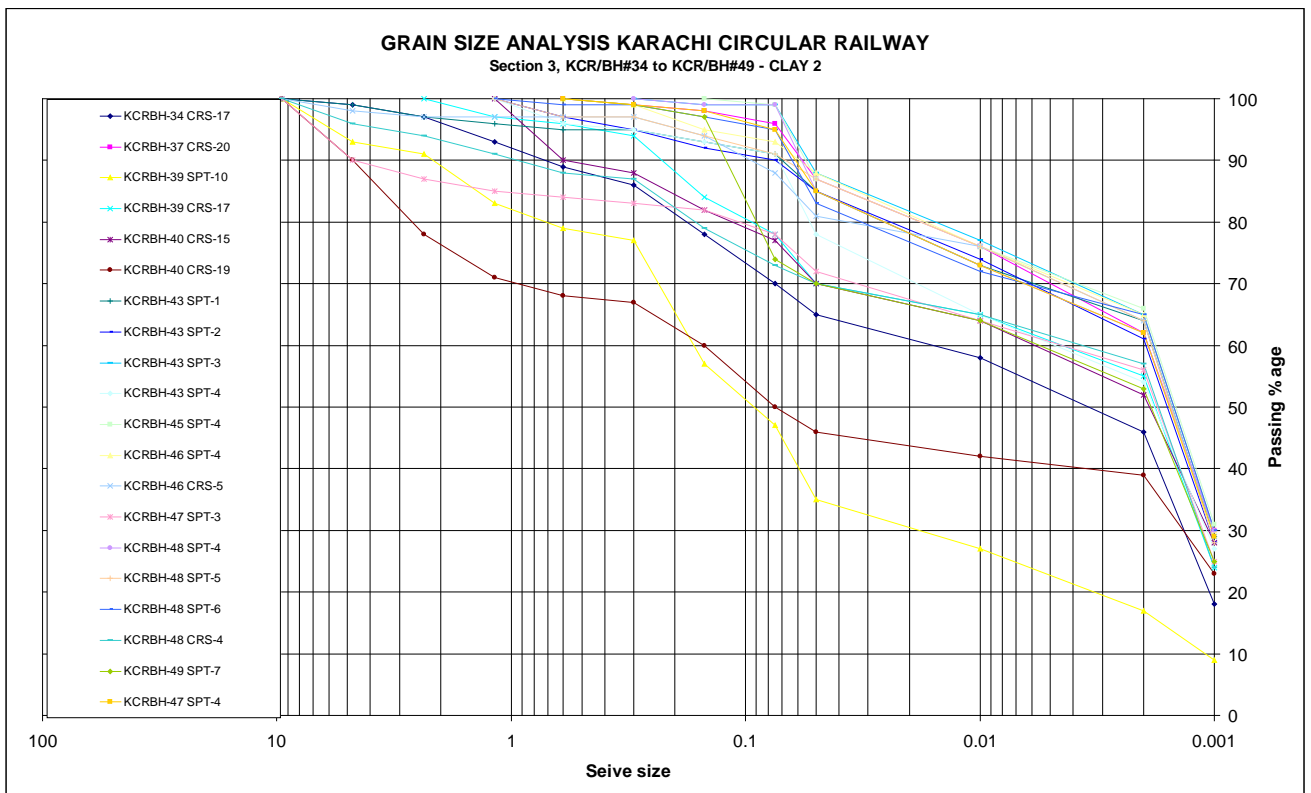
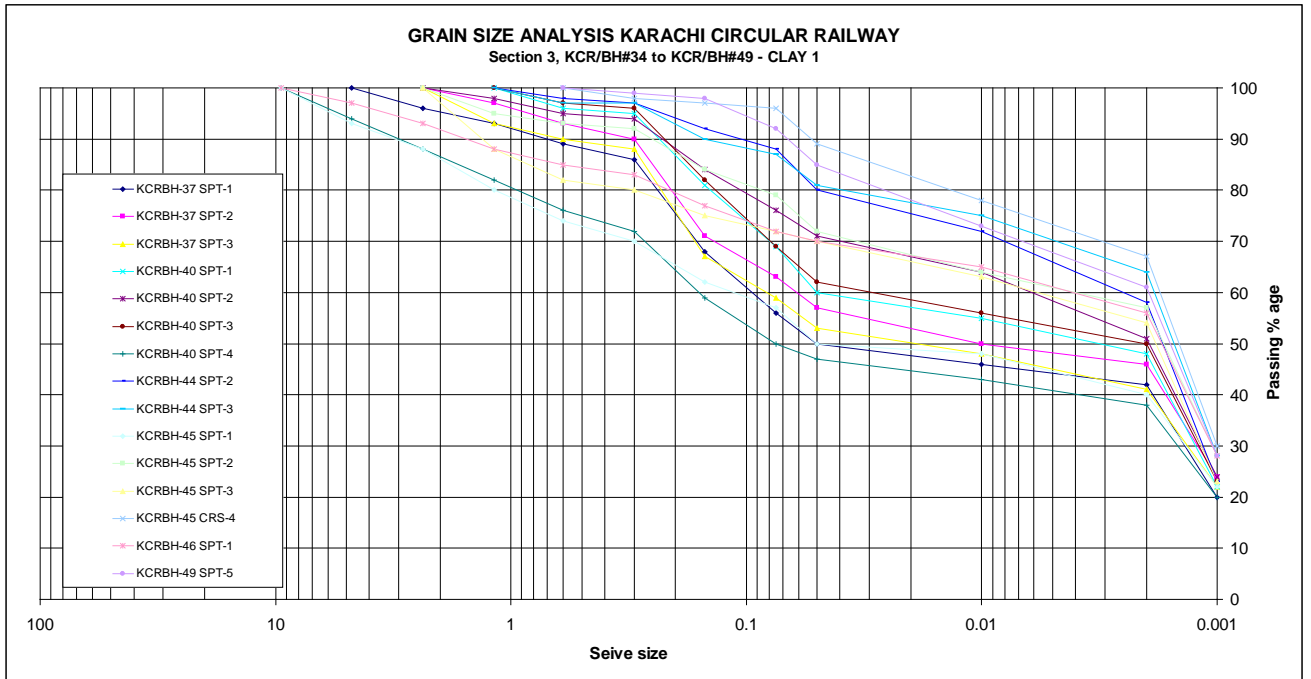
Source: JICA Study Team

Grains size analysis result (BH-17 to BH-33, CLAY)



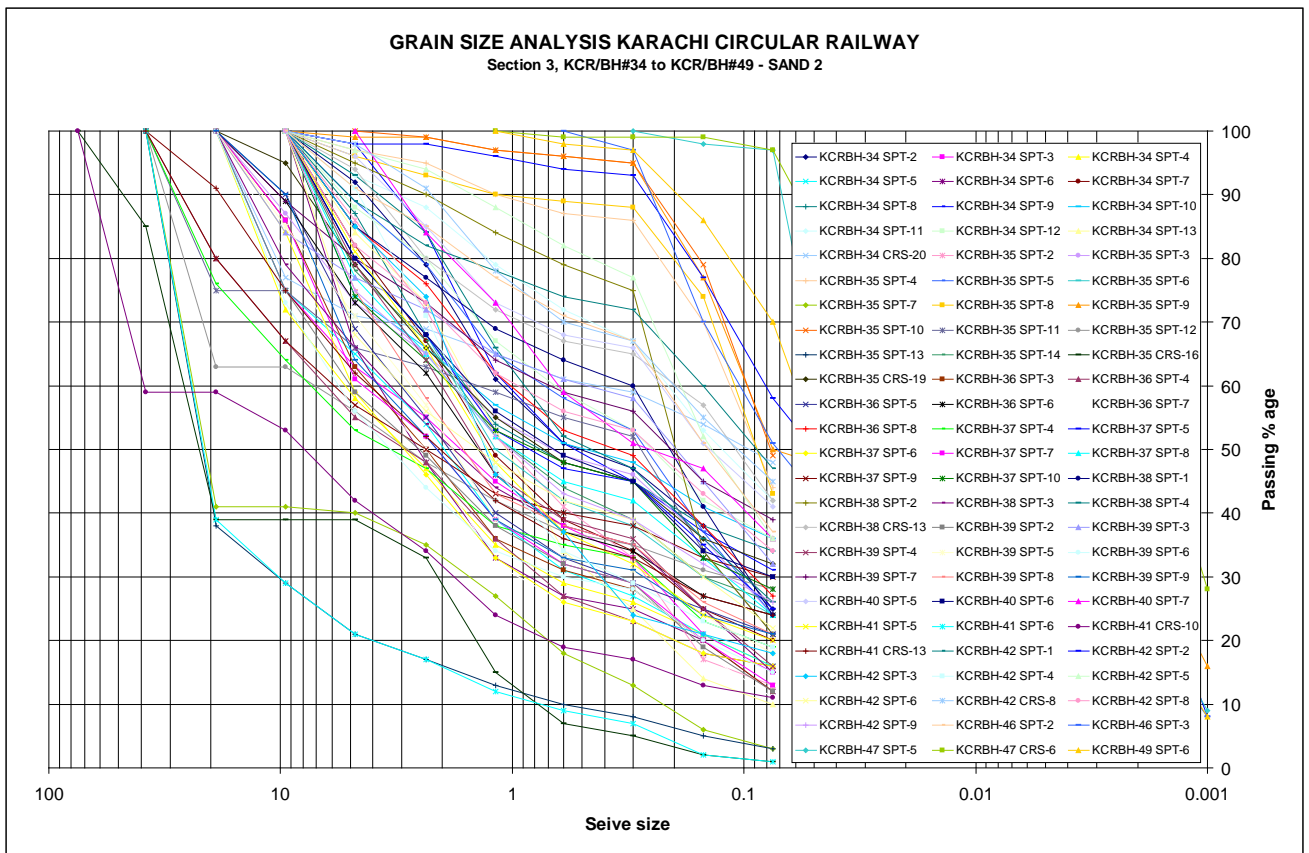
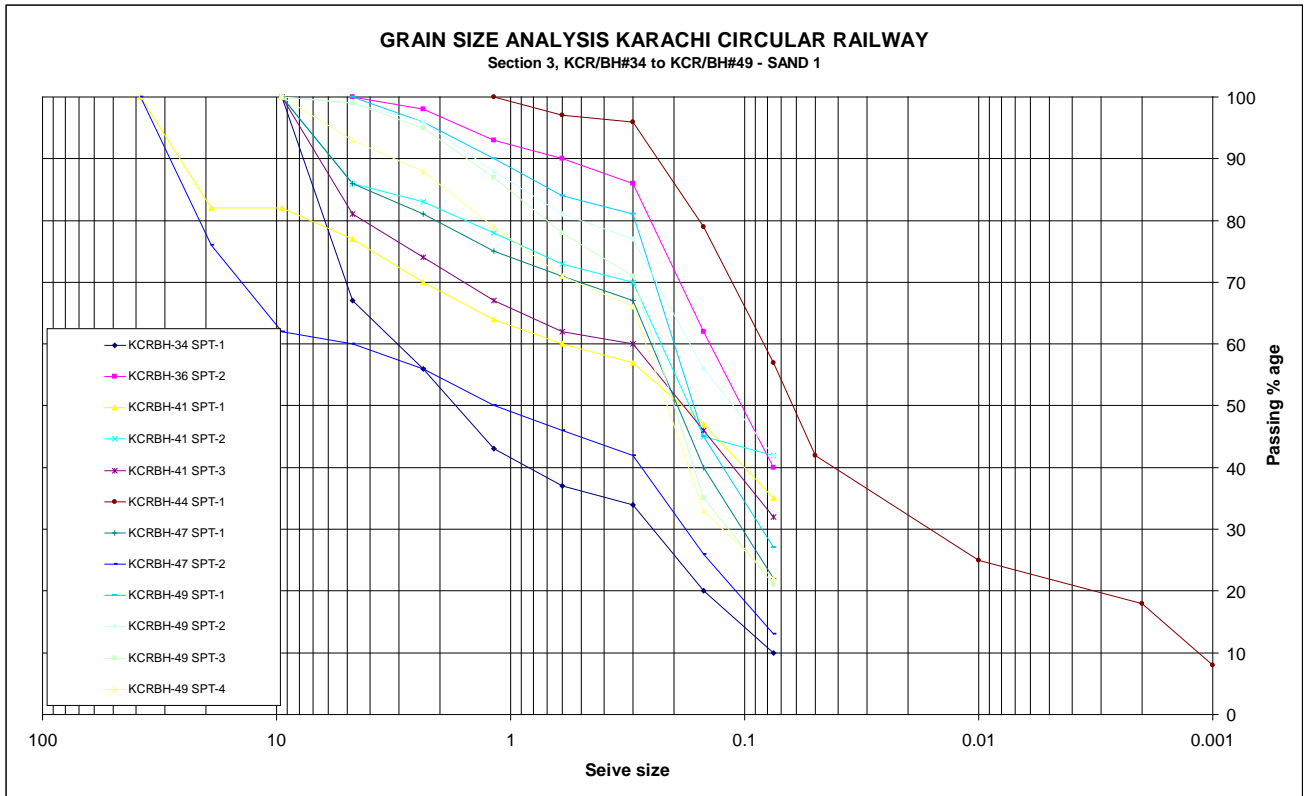
Source: JICA Study Team

Grains size analysis result (BH-17 to BH-33, SAND)



Source: JICA Study Team

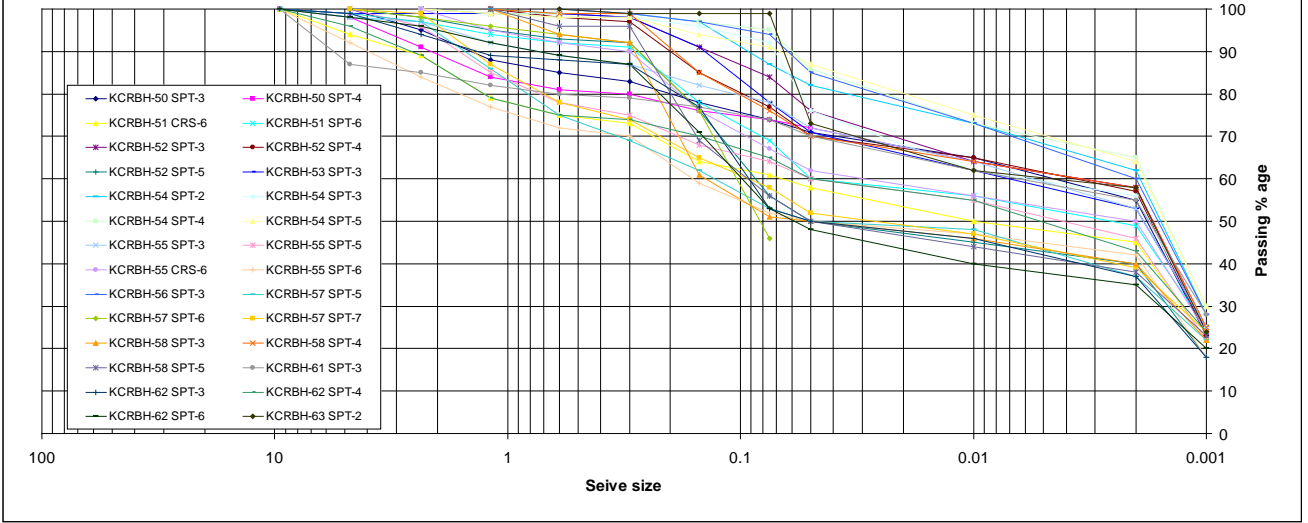
Grains size analysis result (BH-34 to BH-49, CLAY)



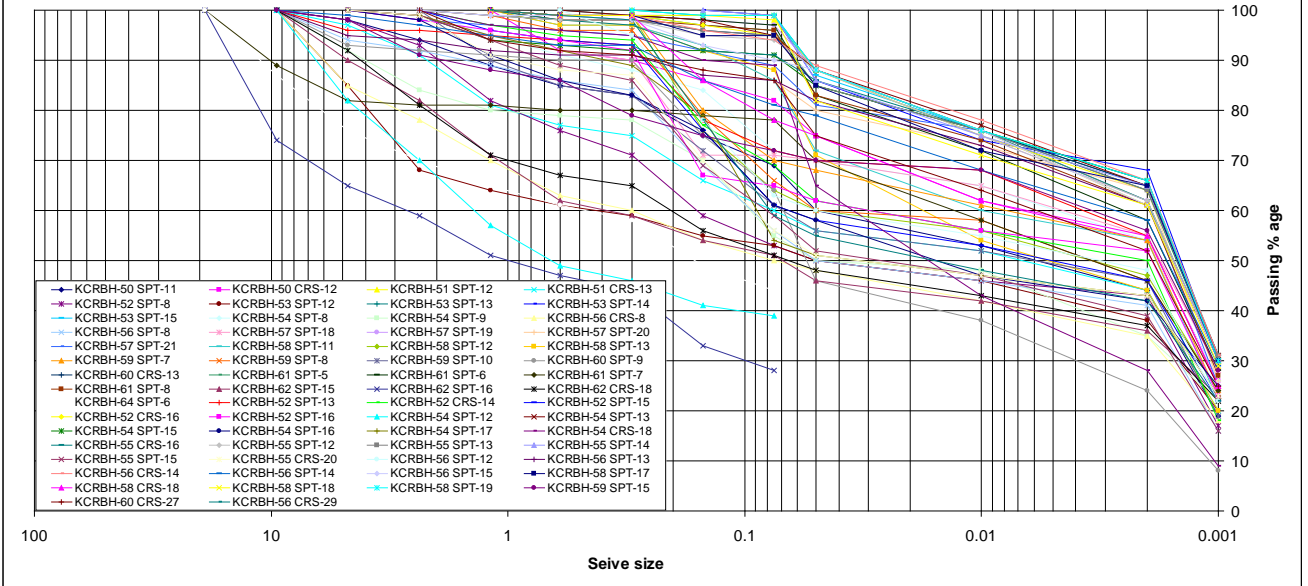
Source: JICA Study Team

Grains size analysis result (BH-34 to BH-49, SAND)

GRAIN SIZE ANALYSIS KARACHI CIRCULAR RAILWAY
Section 4, KCR/BH#49 to KCR/BH#64 - CLAY 1

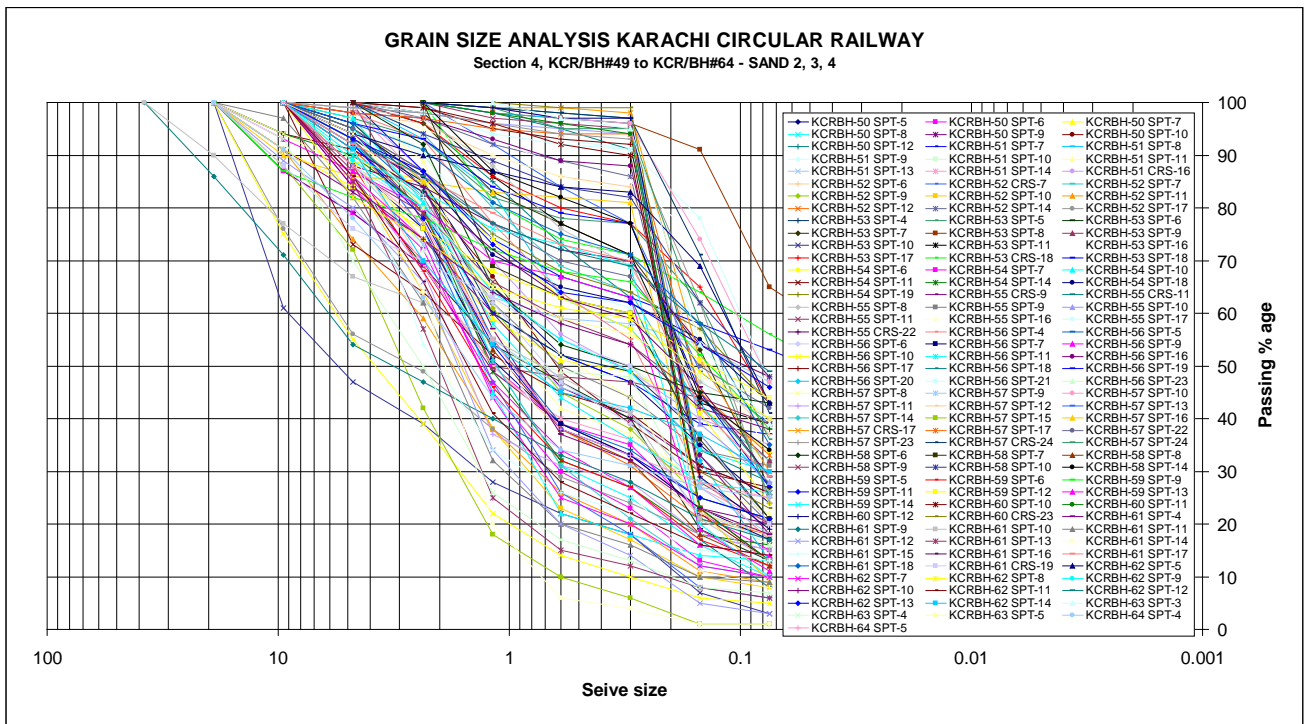
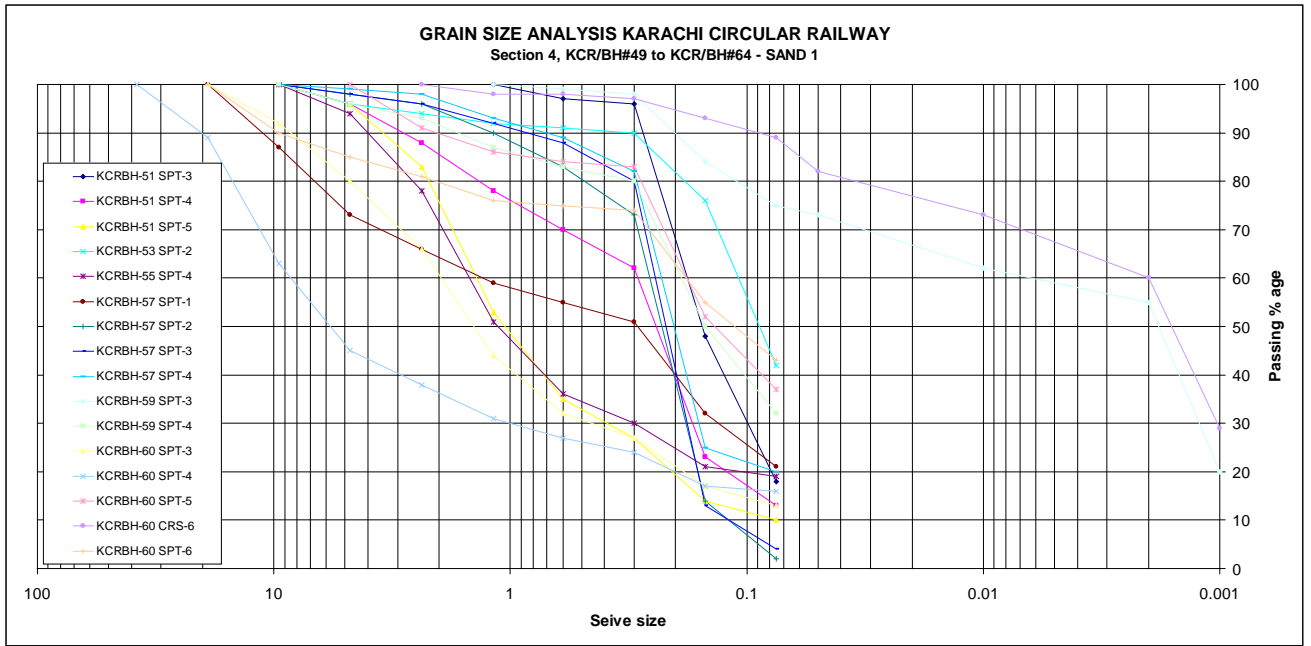


GRAIN SIZE ANALYSIS KARACHI CIRCULAR RAILWAY
Section 4, KCR/BH#49 to KCR/BH#64 - CLAY 2, 3



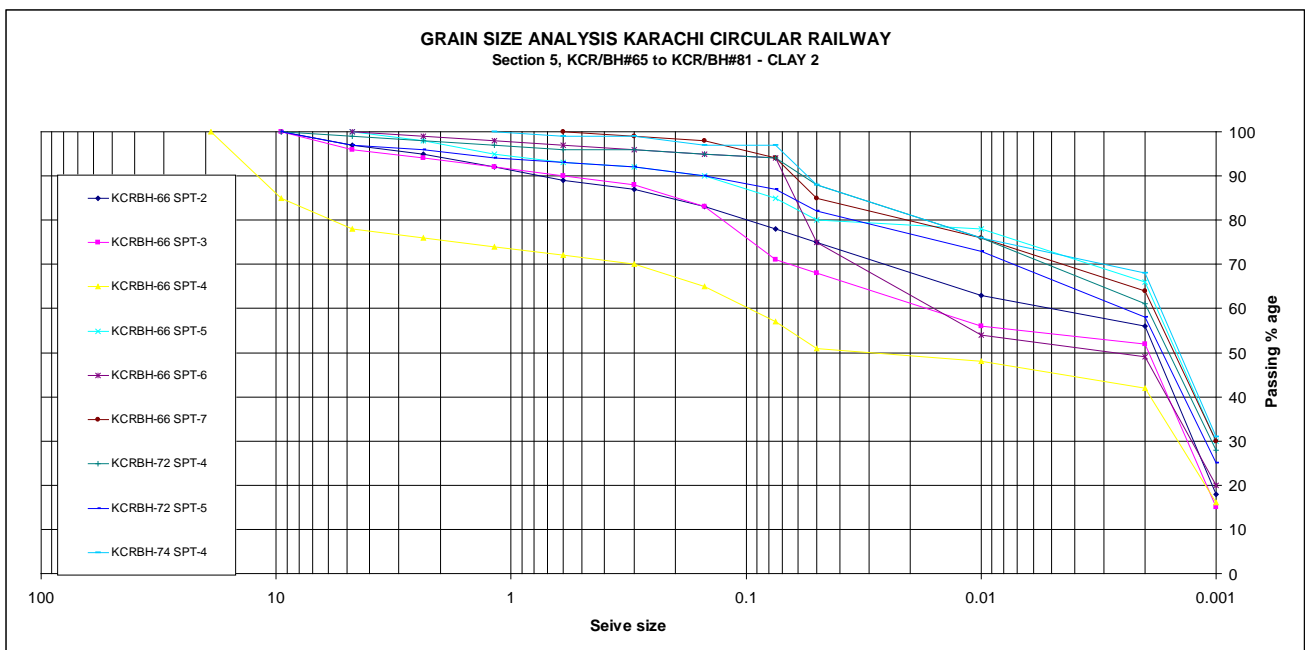
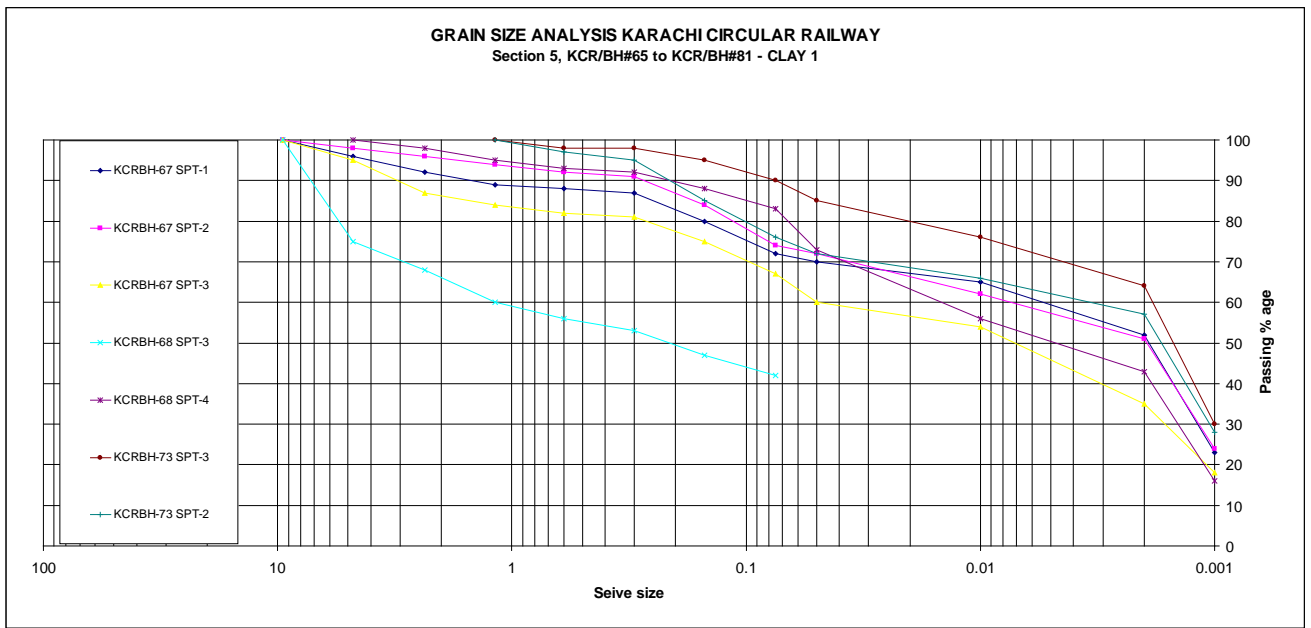
Source: JICA Study Team

Grains size analysis result (BH-49 to BH-64, CLAY)



Source: JICA Study Team

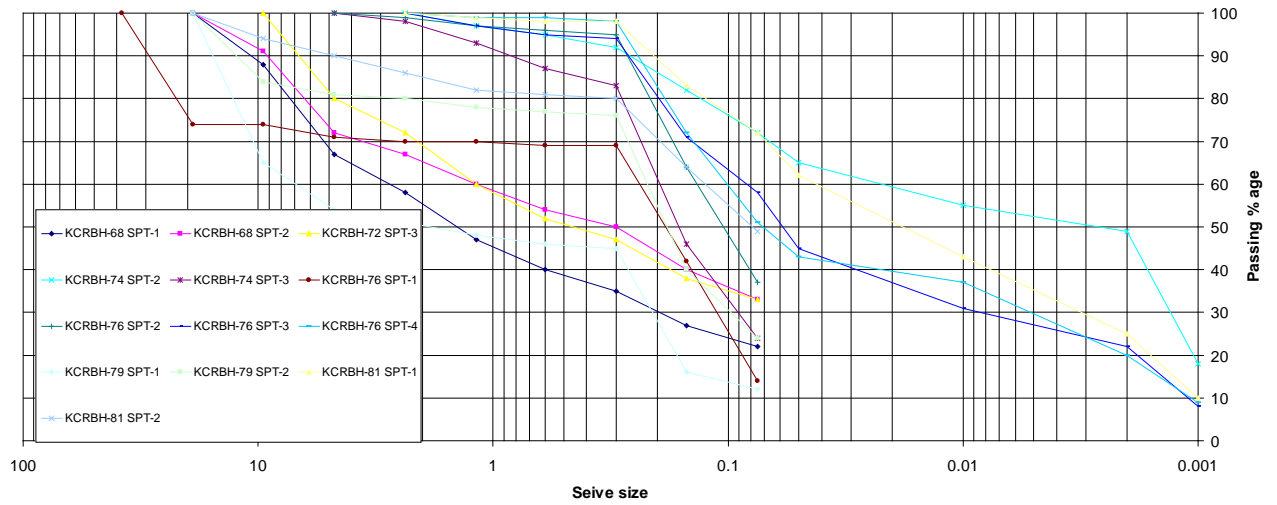
Grains size analysis result (BH-49 to BH-64, SAND)



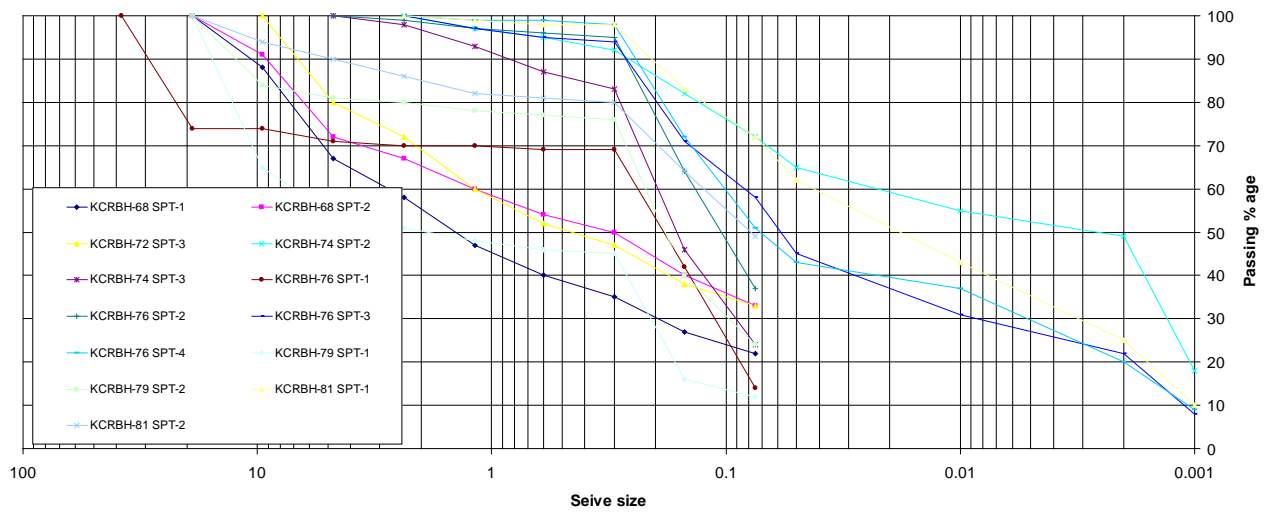
Source: JICA Study Team

Grains size analysis result (BH-65 to BH-81, CLAY)

GRAIN SIZE ANALYSIS KARACHI CIRCULAR RAILWAY
Section 5, KCR/BH#65 to KCR/BH#81 - SAND 1

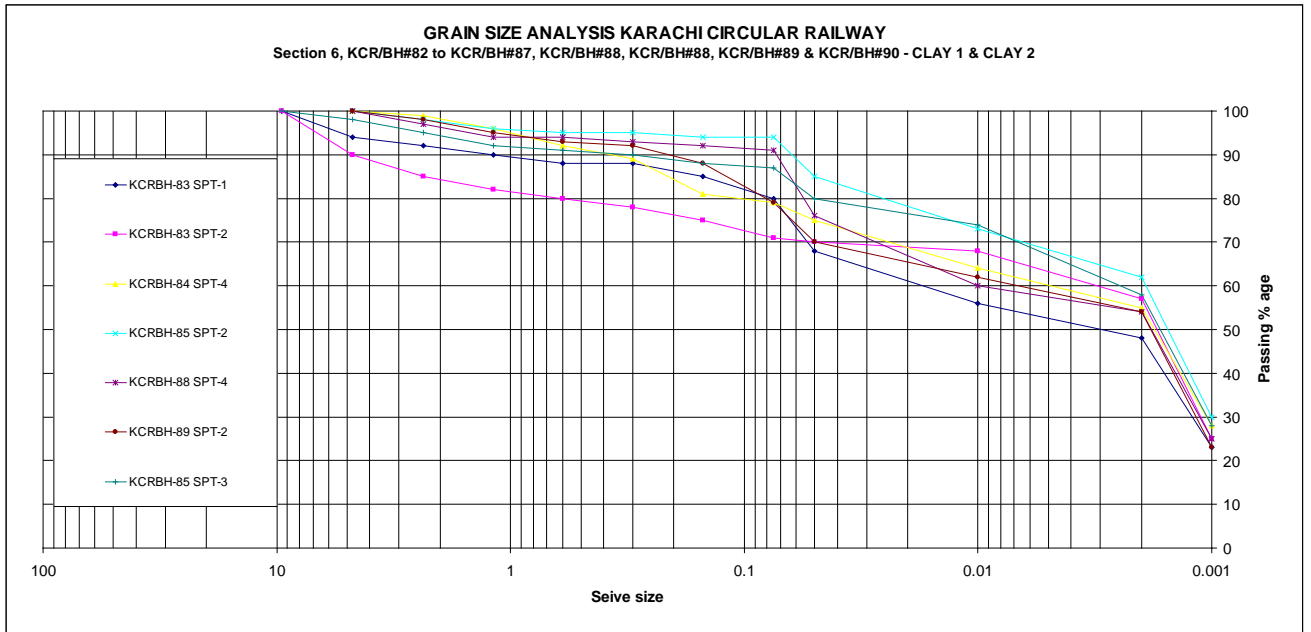


GRAIN SIZE ANALYSIS KARACHI CIRCULAR RAILWAY
Section 5, KCR/BH#65 to KCR/BH#81 - SAND 2



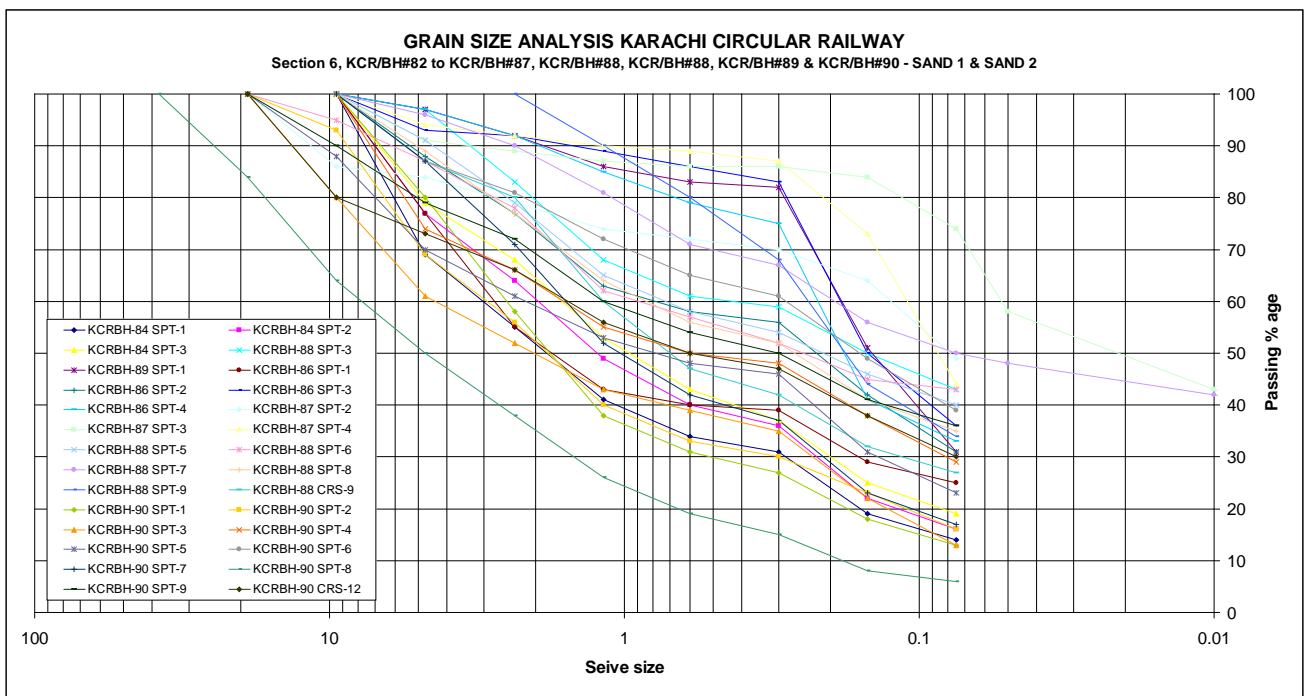
Source: JICA Study Team

Grains size analysis result (BH-65 to BH-81, SAND)



Source: JICA Study Team

Grains size analysis result (BH-82 to BH-90, CLAY)



Source: JICA Study Team

Grains size analysis result (BH-82 to BH-90, SAND)

3.2 Summary

CLIENT: The JICA Study Team
PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.
SUMMARY OF LABORATORY TEST RESULTS

Sr. No.	Borehole #	Sample #	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	Cohesion (kN/m ²)	Angle of Internal Friction (°)	Direct Shear (kg/cm ²)	Compression Index (C _c)	Unconfined Compression Strength (kg/cm ²)	pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter	
							LL	PI															
1	KCR/BH-01	SPT-1	1.0	SM	SAND 1	17	Non-Plastic	2.65	0.53						0.0	28		6.5	0.107				
2	KCR/BH-01	SPT-2	2.0	SM	SAND 1	13	Non-Plastic	2.65	0.53						0.0	30							
3	KCR/BH-01	SPT-3	3.0	SC	SAND 2	34	26	9	2.65	8.62					5.0	30							
4	KCR/BH-01	SPT-4	4.0	SM	SAND 2	7	Non-Plastic	2.65	6.56						0.0	32							
5	KCR/BH-01	SPT-5	5.0	SM	SAND 2	7	Non-Plastic	2.65	5.58						0.0	32							
6	KCR/BH-01	SPT-6	6.0	SC	SAND 2	32	26	10	2.64	9.01					5.0	30							
7	KCR/BH-01	SPT-7	7.0	SC	SAND 2	24	28	10	2.64	8.62					5.0	30							
8	KCR/BH-01	SPT-8	8.0	ML	CLAY 2	94	41	13	2.66	11.69						0.19							
9	KCR/BH-01	CRS-9	8.57 - 8.67	ML	CLAY 2	82	36	13	2.65	6.57													
10	KCR/BH-01	SPT-9	9.0	CL	CLAY 2	87	36	14	2.65	11.91													
11	KCR/BH-01	SPT-10	10.0	ROCK	MUDSTONE 1	85	39	12															
12	KCR/BH-01	SPT-11	11.0	ROCK	MUDSTONE 1	85	39	12															
13	KCR/BH-01	CRS-11	11.0 - 12.0	ROCK	MUDSTONE 1	74	34	11		2.53													
14	KCR/BH-01	SPT-12	12.0	ROCK	MUDSTONE 1	89	37	11															
15	KCR/BH-01	SPT-13	13.0	ROCK	MUDSTONE 1	89	37	11															
16	KCR/BH-01	SPT-14	14.0	ROCK	MUDSTONE 1	95	38	13															
17	KCR/BH-01	SPT-15	15.0	ROCK	MUDSTONE 1	88	33	10															
18	KCR/BH-01	SPT-16	16.0	ROCK	MUDSTONE 1	82	31	8		7.62	2.33	2.17											
19	KCR/BH-01	CRS-17	16.56 - 16.72	ROCK	MUDSTONE 1	85	34	15		2.69													
20	KCR/BH-01	SPT-17	17.0	ROCK	MUDSTONE 1	85	34	15															
21	KCR/BH-01	Water		Water																			
22	KCR/BH-02	SPT-1	1.0	SM	SAND 1	30	Non-Plastic		10.06						0.0	28							
23	KCR/BH-02	SPT-2	2.0	ML	SAND 1	54	Non-Plastic		12.96						0.0	28							
24	KCR/BH-02	SPT-3	3.0	SC	SAND 2	30	26	9		6.24					5.0	30							
25	KCR/BH-02	SPT-4	4.0	SC	SAND 2	36	26	10		3.11					0.0	32							
26	KCR/BH-02	SPT-5	5.0	SC	SAND 2	43	30	13		8.04					5.0	30							
27	KCR/BH-02	SPT-6	6.0	SC	SAND 2	38	33	17		4.78					5.0	32							
28	KCR/BH-02	SPT-7	7.0	SC	SAND 2	24	27	11		5.32					0.0	30							
29	KCR/BH-02	SPT-8	8.0	SC	SAND 2	29	36	15		6.11					0.0	32							
30	KCR/BH-02	SPT-9	9.0	SC	SAND 2	59	32	14		6.60													
31	KCR/BH-02	SPT-10	10.0	CL	CLAY 2	53	33	11		13.57													
32	KCR/BH-02	SPT-11	11.0	CL	CLAY 2	83	34	11		17.17													
33	KCR/BH-02	SPT-12	12.0	ROCK	MUDSTONE 1	87	33	12		11.65	2.17	1.94											
34	KCR/BH-02	CRS-13	12.70 - 12.90	ROCK	MUDSTONE 1	87	33	12															
35	KCR/BH-02	SPT-13	13.0	ROCK	MUDSTONE 1	78	32	9		14.98													
36	KCR/BH-02	SPT-14	14.0	ROCK	MUDSTONE 1	72	32	8		9.90													
37	KCR/BH-02	SPT-15	15.0	ROCK	MUDSTONE 1	81	Non-Plastic		3.28														
38	KCR/BH-02	CRS-16	15.61 - 15.73	ROCK	SANDSTONE 1	66	32	11		3.65	2.14	2.06											
39	KCR/BH-02	SPT-16	16.0	ROCK	SANDSTONE 1	75	Non-Plastic		10.78														
40	KCR/BH-02	SPT-17	17.0	ROCK	SANDSTONE 1	*																	
41	KCR/BH-02	SPT-18	18.0	ROCK	SANDSTONE 1	*																	
42	KCR/BH-02	SPT-19	19.0	ROCK	SANDSTONE 1	*																	
43	KCR/BH-02	Water		Water																		156.37	1099.96

CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORATORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing#200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (kN/m ²)	Angle of Internal Friction (°)	σ _v (kg/cm ²)	σ _h (kg)		qu (Kg/cm ²)	Strain %					
44	KCR/BH-03	SPT-1	1.0	SM	SAND 1	29	Non-Plastic			2.80					0.0	28								
45	KCR/BH-03	SPT-2	2.0	SM	SAND 1	19	Non-Plastic			3.32					0.0	28								
46	KCR/BH-03	SPT-3	3.0	CL	SAND 1	71	24	11		11.43									5.5		0.107			
47	KCR/BH-03	SPT-4	4.0	SM	SAND 1	41	Non-Plastic			9.47					0.0	30								
48	KCR/BH-03	SPT-5	5.0	SM	SAND 1	25	Non-Plastic			8.06					0.0	30								
49	KCR/BH-03	SPT-6	6.0	CL	CLAY 1	50	26	11		6.42														
50	KCR/BH-03	SPT-7	7.0	SC	CLAY 1	44	25	12		11.92														
51	KCR/BH-03	SPT-8	8.0	CL	CLAY 1	70	26	10		4.06									5.5	0.075	0.107			
52	KCR/BH-03	CRS-9	8.38 - 8.57	CL	CLAY 1												0.20							
53	KCR/BH-03	SPT-9	9.0	CL	CLAY 1	72	24	11		10.04														
54	KCR/BH-03	CRS-10	9.68 - 9.98	CL	CLAY 1												0.22							
55	KCR/BH-03	SPT-10	10.0	CL	CLAY 1	68	26	12		12.83														
56	KCR/BH-03	SPT-11	11.0	SM	SAND 2	25	Non-Plastic			6.21				0.0	32									
57	KCR/BH-03	SPT-12	12.0	SC	SAND 2	29	26	13		11.30				5.0	30									
58	KCR/BH-03	SPT-13	13.0	SC	SAND 2	29	24	12		6.48				5.0	30									
59	KCR/BH-03	SPT-14	14.0	SC	SAND 2	42	27	11		5.60				8.0	30									
60	KCR/BH-03	SPT-15	15.0	SC	SAND 2	37	29	12		8.95				5.0	30									
61	KCR/BH-03	SPT-16	16.0	ROCK	SANDSTONE 1	21	Non-Plastic			4.92														
62	KCR/BH-03	SPT-17	17.0	ROCK	LIMESTONE 1																			
63	KCR/BH-03	SPT-18	18.0	ROCK	LIMESTONE 1																			
64	KCR/BH-03	CRS-18	17.41-17.61	ROCK	LIMESTONE 1				10.13	1.58	1.58						4.0	2.1						
65	KCR/BH-03	SPT-19	19.0	ROCK	MUDSTONE 2																			
66	KCR/BH-03	CRS-20	19.43 - 19.63	ROCK	MUDSTONE 2	84	32	9		9.52	2.48	2.48						23.2	3.3					
67	KCR/BH-03	Water																				123.45	1399.96	
68	KCR/BH-04	SPT-1	1.0	SM	SAND 1	38	Non-Plastic			4.56				0.0	28				7.5					
69	KCR/BH-04	SPT-2	2.0	CL	SAND 1	58	24	9		3.44									6.5	0.106	0.537			
70	KCR/BH-04	SPT-3	3.0	SM	SAND 1	41	Non-Plastic			2.17														
71	KCR/BH-04	SPT-4	4.0	CL	CLAY 1	53	31	14		7.51														
72	KCR/BH-04	SPT-5	5.0	SC	CLAY 1	38	26	12		6.86				5.0	28									
73	KCR/BH-04	SPT-6	6.0	SM	SAND 2	34	Non-Plastic			0.65				0.0	32									
74	KCR/BH-04	SPT-7	7.0	CL	CLAY 2	58	29	14		5.23														
75	KCR/BH-04	SPT-8	8.0	SM	CLAY 2	24	Non-Plastic			3.56				0.0	32									
76	KCR/BH-04	SPT-9	9.0	ROCK	MUDSTONE 1	60	37	16		1.13														
77	KCR/BH-04	CRS-11	10.88 - 11.0	ROCK	SANDSTONE 1	22	26	12		12.55	2.12	1.88						7.5	1.2					
78	KCR/BH-04	CRS-20	19.53 - 19.75	ROCK	SANDSTONE 1	28	31	14		16.84	1.97	1.68						0.7	3.7					
79	KCR/BH-04	Water																				238.68	2199.93	

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORATORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)	c' (Kg/cm ²)	φ (deg)		Compressibility Index (C _c)	qu (Kg/cm ²)					
80	KCR/BH-05	SPT-1	1.0	ML	SAND 1	80	23	4	2.63	7.35									5.5	0.088	0.183			
81	KCR/BH-05	SPT-2	2.0	ML	SAND 1	51	23	3	2.66	12.81														
82	KCR/BH-05	CRS-3	2.75 - 2.90	ML	SAND 1											0.16								
83	KCR/BH-05	SPT-3	3.0	ML	SAND 1	75	24	3	2.64	18.20														
84	KCR/BH-05	SPT-4	4.0	SC	SAND 1	28	23	9	2.62	16.41														
85	KCR/BH-05	SPT-5	5.0	ROCK	LIMESTONE 1	29	27	12	2.71	10.36														
86	KCR/BH-05	SPT-6	6.0	ROCK	LIMESTONE 1	30	Non-Plastic		2.62	7.97														
87	KCR/BH-05	SPT-7	7.0	ROCK	LIMESTONE 1	28	Non-Plastic		2.61	21.28														
88	KCR/BH-05	CRS-8	7.67 - 7.81	ROCK	SANDSTONE 1	14	Non-Plastic		18.59		2.12	1.79					2.9	1.9						
89	KCR/BH-05	SPT-8	8.0	ROCK	SANDSTONE 1	27	40	13	2.63	10.39														
90	KCR/BH-05	CRS-9	8.74 - 8.88	ROCK	SANDSTONE 1	14	Non-Plastic		14.22		2.00	1.75					2.8	2.0						
91	KCR/BH-05	SPT-9	9.0	ROCK	SANDSTONE 1	19	Non-Plastic		2.64	16.78														
92	KCR/BH-05	SPT-10	10.0	ROCK	SANDSTONE 1																			
93	KCR/BH-05	SPT-11	11.0	ROCK	SANDSTONE 1																			
94	KCR/BH-05	CRS-12	11.63 - 11.80	ROCK	MUDSTONE 2	95	38	13		14.58	1.98	1.73					3.0	1.5						
95	KCR/BH-05	SPT-12	12.0	ROCK	MUDSTONE 3																			
96	KCR/BH-05	SPT-13	13.0	ROCK	MUDSTONE 4																			
97	KCR/BH-05	SPT-14	14.0	ROCK	SANDSTONE 1																			
98	KCR/BH-05	CRS-19	18.40-18.65	ROCK	SANDSTONE 1	21	Non-Plastic			20.34	2.07	1.72					0.8	5.1						
99	KCR/BH-05	Water																						
100	KCR/BH-06	SPT-1	1.0	SM	SAND 1	32	Non-Plastic		2.65	11.77					0.0	28			5.4			215	1245	
101	KCR/BH-06	SPT-2	2.0	SM	SAND 1	31	Non-Plastic		2.67	22.33					0.0	30			5.0	0.110	0.236			
102	KCR/BH-06	SPT-3	3.0	SM	SAND 1	21	Non-Plastic		2.66	23.53					0.0	30								
103	KCR/BH-06	SPT-4	4.0	ROCK	SANDSTONE 1	30	Non-Plastic		2.68	18.88														
104	KCR/BH-06	CRS-6	5.0 - 6.0	ROCK	SANDSTONE 1	25	Non-Plastic		8.49		1.91	1.76					2.3	1.3						
105	KCR/BH-06	SPT-6	6.0	ROCK	SANDSTONE 1	24	Non-Plastic		17.58															
106	KCR/BH-06	CRS-14	13.43 - 13.60	ROCK	MUDSTONE 2	78	31	11		10.09	2.14	1.95					4.5	2.0				288	866	
107	KCR/BH-06	Water																						
108	KCR/BH-07	SPT-1	1.0	SC	SAND 1	46	26	8	2.65	8.02					0.0	28			5.2					
109	KCR/BH-07	SPT-2	2.0	SM	SAND 2	21	Non-Plastic		2.66	17.62					0.0	30								
110	KCR/BH-07	SPT-3	3.0	ROCK	SANDSTONE 1	40	Non-Plastic		2.68	18.03									5.0	0.142	0.537			
111	KCR/BH-07	SPT-4	4.0	ROCK	SANDSTONE 1	41	Non-Plastic		2.67	20.05														
112	KCR/BH-07	SPT-5	5.0	ROCK	SANDSTONE 1	33	Non-Plastic		2.68	19.40														
113	KCR/BH-07	SPT-6	6.0	ROCK	SANDSTONE 1																			
114	KCR/BH-07	CRS-7	6.30 - 6.43	ROCK	SANDSTONE 1	14	Non-Plastic			14.55	2.14	1.87					11.6	2.1						
115	KCR/BH-07	SPT-7	7.0	ROCK	SANDSTONE 1																			
116	KCR/BH-07	CRS-14	13.33 - 13.46	ROCK	SANDSTONE 1	9	Non-Plastic			13.05	2.17	1.92					20.0	1.2				234	668	
117	KCR/BH-07	Water																						

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORATORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear	Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter	
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)			σ _c (Kg/cm ²)	Strain %						
118	KCR/BH-08	SPT-1	1.0	SM	SAND 2	23	Non-Plastic			18.34				0.0	32									
119	KCR/BH-08	SPT-2	2.0	SM	SAND 2	43	Non-Plastic			10.65				0.0	32									
120	KCR/BH-08	SPT-3	3.0	ROCK	LIMESTONE 1	15	Non-Plastic			0.57														
121	KCR/BH-08	SPT-4	4.0	ROCK	LIMESTONE 1	77	39	13		10.90									5.5	0.330	1.344			
122	KCR/BH-08	SPT-5	5.0	ROCK	MUDSTONE 1	83	35	13		9.06														
123	KCR/BH-08	SPT-6	6.0	ROCK	MUDSTONE 1	90	35	10		13.20														
124	KCR/BH-08	CRS-7	6.50 - 6.63	ROCK	MUDSTONE 1	81	43	17		13.50														
125	KCR/BH-08	CRS-7	6.50 - 6.63	ROCK	MUDSTONE 1					13.50	2.16	1.89					3.8	2.1						
126	KCR/BH-08	SPT-7	7.0	ROCK	MUDSTONE 1	85	36	12		14.11														
127	KCR/BH-08	SPT-8	8.0	ROCK	MUDSTONE 1	79	41	12		8.17														
128	KCR/BH-08	SPT-9	9.0	ROCK	MUDSTONE 1	79	44	19		13.09														
129	KCR/BH-08	SPT-10	10.0	ROCK	MUDSTONE 1	42	Non-Plastic			1.11														
130	KCR/BH-08	CRS-12	11.0 - 11.13	ROCK	LIMESTONE 2	17	Non-Plastic			1.15														
131	KCR/BH-08	CRS-12	11.0 - 11.13	ROCK	LIMESTONE 2					1.15	2.22	2.11					14.7	2.5						
132	KCR/BH-08	CRS-14	13.0 - 13.18	ROCK	MUDSTONE 2	75	Non-Plastic			7.36	2.40	2.24					17.5	2.2						
133	KCR/BH-08	Water																	7.5			206	800	
134	KCR/BH-09	SPT-1	1.0	SM	SAND 2	43	Non-Plastic			3.18				0.0	30				5.0	0.327	0.269			
135	KCR/BH-09	SPT-2	2.0	SM	SAND 2	41	Non-Plastic			10.31				0.0	32									
136	KCR/BH-09	SPT-3	3.0	ROCK	LIMESTONE 1	84	32	10		12.30														
137	KCR/BH-09	SPT-4	4.0	ROCK	LIMESTONE 1	92	30	9		13.02														
138	KCR/BH-09	SPT-5	5.0	ROCK	MUDSTONE 1	88	28	8		12.50														
139	KCR/BH-09	SPT-6	6.0	ROCK	MUDSTONE 1	92	40	15		16.10														
140	KCR/BH-09	CRS-6	5.26 - 5.36	ROCK	MUDSTONE 1	91	33	12		15.07	1.97	1.71					1.8	3.6						
141	KCR/BH-09	SPT-7	7.0	ROCK	MUDSTONE 1	87	38	12		16.80														
142	KCR/BH-09	SPT-8	8.0	ROCK	MUDSTONE 1	99	39	14		17.40														
143	KCR/BH-09	CRS-10	9.15 - 9.32	ROCK	MUDSTONE 1	82	39	14																
144	KCR/BH-09	CRS-10	9.15 - 9.32	ROCK	MUDSTONE 1					13.37	2.46	2.17					2.2	1.3						
145	KCR/BH-09	CRS-13	13.0 - 14.0	ROCK	LIMESTONE 2		Non-Plastic			3.86	2.47	2.38					86.3	3.6						
146	KCR/BH-09	CRS-15	14.32 - 14.46	ROCK	MUDSTONE 2					3.49	2.34	2.26					60.6	2.0						
147	KCR/BH-09	CRS-15	14.64 - 14.84	ROCK	MUDSTONE 2		29	10																
148	KCR/BH-09	Water																	7.5			1580	2000	
149	KCR/BH-10	SPT-1	1.0	ROCK	LIMESTONE 1																			
150	KCR/BH-10	CRS-2	1.77 - 1.90	ROCK	LIMESTONE 1					1.20	2.34	2.31					199.0	0.4						
151	KCR/BH-10	CRS-6	5.38 - 5.53	ROCK	MUDSTONE 1	97	36	6		7.68	2.23	2.07					18.3	4.3						
152	KCR/BH-10	CRS11	10.05 - 10.15	ROCK	LIMESTONE 2	91	34	9		7.18	2.20	2.05					48.1	5.3						
153	KCR/BH-10	CRS-12	11.0 - 11.22	ROCK	LIMESTONE 2	92	38	14		3.58	2.46	2.37					128.8	5.4						
154	KCR/BH-10	CRS-15	14.12 - 14.32	ROCK	LIMESTONE 2	38	Non-Plastic			5.25	2.27	2.15					49.6	3.0						
155	KCR/BH-10	Water																	6.0			255	1500	

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORATORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)	c' (Kg/cm ²)	σ (kg)		Compressibility Index (C _c)	qu (Kg/cm ²)					
156	KCR/BH-11	CRS-2	1.0 - 2.0	ROCK	LIMESTONE 1				2.50	2.18	2.13						90.5	7.7						
157	KCR/BH-11	CRS-5	4.0 - 5.0	ROCK	LIMESTONE 1				5.04	1.92	1.83						19.3	3.1						
158	KCR/BH-11	CRS-9	8.30 - 8.42	ROCK	MUDSTONE 1				8.90	2.05	1.88						1.4	4.7	6.5	0.571	0.161			
159	KCR/BH-11	CRS-14	13.0 - 14.0	ROCK	MUDSTONE 2				14.60	2.37	2.06						1.3	5.7						
160	KCR/BH-11	Water																	6.5			1630	300	
161	KCR/BH-12	SPT-1	1.0	SM	SAND 1	34	Non-Plastic	2.74	22.08										6.0	0.327	0.430			
162	KCR/BH-12	SPT-2	2.0	ROCK	LIMESTONE 1	44	22	7	2.71	20.48														
163	KCR/BH-12	CRS-6	5.29 - 5.40	ROCK	MUDSTONE 2	89	27	12	10.85	1.61	1.45						0.3	3.7						
164	KCR/BH-12	CRS-15	14.48 - 14.66	ROCK	MUDSTONE 2	59	Non-Plastic		12.17	1.92	1.71						1.2	3.6						
165	KCR/BH-12	Water																	6.0			1564	4000	
166	KCR/BH-13	SPT-1	2.0	ROCK	LIMESTONE 1	72	Non-Plastic	2.71	16.99										6.0	0.221	0.649			
167	KCR/BH-13	SPT-2	3.0	ROCK	MUDSTONE 1	74	Non-Plastic	2.66	18.44															
168	KCR/BH-13	CRS-8	7.0 - 8.0	ROCK	MUDSTONE 1				12.93	1.99	1.77						4.0	4.0						
169	KCR/BH-13	CRS-15	14.0 - 15.0	ROCK	MUDSTONE 1	64	Non-Plastic		13.06	2.16	1.91						2.3	8.3						
170	KCR/BH-13	Water																	6.0			9448	5000	
171	KCR/BH-14	SPT-1	1.0	SP	SAND 2	4	Non-Plastic	2.68	13.04						0.0	30			6.0	0.049	0.591			
172	KCR/BH-14	SPT-2	2.0	SP	SAND 2	6	Non-Plastic	2.67	9.09						0.0	32								
173	KCR/BH-14	SPT-3	3.0	ROCK	LIMESTONE 1	28	30	13	2.64	14.29														
174	KCR/BH-14	CRS-6	5.46 - 5.59	ROCK	LIMESTONE 1				5.16	2.02	1.92						110.3	4.0						
175	KCR/BH-14	CRS-11	10.33 - 10.55	ROCK	MUDSTONE 1	96	44	13	15.79	2.10	1.81						1.6	0.9						
176	KCR/BH-14	CRS-13	12.25 - 12.37	ROCK	LIMESTONE 2	19	Non-Plastic		9.44															
177	KCR/BH-14	CRS-13	12.25 - 12.37	ROCK	LIMESTONE 2				9.44	2.48	2.27						63.0	3.5						
178	KCR/BH-14	Water																	6.5			655	898	
179	KCR/BH-15	SPT-1	1.0	CL	CLAY 1	78	25	8	2.65	24.11														
180	KCR/BH-15	SPT-2	2.0	CL-ML	CLAY 1	95	28	6	2.65	21.21									6.5	0.185	0.430			
181	KCR/BH-15	SPT-3	3.0	CL	CLAY 1	79	31	10	2.70	15.41														
182	KCR/BH-15	CRS-4	3.70 - 3.82	CL	CLAY 1																			
183	KCR/BH-15	SPT-4	4.0	ML	CLAY 2	99	38	11	2.63	19.40							0.22							
184	KCR/BH-15	CRS-5	4.71 - 4.84	ML	CLAY 2																			
185	KCR/BH-15	SPT-5	5.0	ML	CLAY 2	98	39	11	2.62	20.99							0.23							
186	KCR/BH-15	CRS-6	5.87 - 6.0	ML	CLAY 2																			
187	KCR/BH-15	SPT-6	6.0	ML	CLAY 2	99	42	10	2.65	20.87							0.21							
188	KCR/BH-15	CRS-10	9.50 - 9.62	ROCK	LIMESTONE 1	22	28	8	7.18	2.26	2.11						9.0	5.0						
189	KCR/BH-15	CRS-12	11.37 - 11.50	ROCK	LIMESTONE 1				4.27	2.38	2.28						59.8	4.2						
190	KCR/BH-15	CRS-14	13.81 - 13.93	ROCK	LIMESTONE 2				8.25	2.19	2.02						70.4	3.4						
191	KCR/BH-15	Water																	6.5			255	1000	

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)	σ _v (kg/cm ²)	σ _h (kg)		σ _u (kg/cm ²)	Strain %					
192	KCR/BH-16	SPT-1	1.0	CL-ML	SAND 1	55	21	6	2.70	14.89					3.0	28								
193	KCR/BH-16	SPT-2	2.0	ML	SAND 1	55	Non-Plastic		2.64	15.68					0.0	28								
194	KCR/BH-16	SPT-3	3.0	SM	SAND 2	42	Non-Plastic		2.64	17.82					0.0	30				6.5	0.071	0.537		
195	KCR/BH-16	CRS-6	5.88-6.0	ROCK	SANDSTONE 1	65	Non-Plastic		14.55	2.67	2.33							3.6	4.2					
196	KCR/BH-16	CRS-8	7.50-7.65	ROCK	MUDSTONE 2	92	36	13	13.62	2.24	1.97							2.4	4.2					
197	KCR/BH-16	SPT-4	9.0	ROCK	MUDSTONE 2	63	34	11	2.65	14.08														
198	KCR/BH-16	CRS-14	13.65 - 13.78	ROCK	MUDSTONE 2	99	29	6	7.96	2.06	1.91							12.7	4.6					
199	KCR/BH-16	Water																		7.4			198	800
200	KCR/BH-17	SPT-1	1.0	CL-ML	GARBAGE	70	23	5	2.66	2.11														
201	KCR/BH-17	SPT-2	2.0	SC-SM	SAND 1	49	21	6	2.68	11.02					5.0	28								
202	KCR/BH-17	CRS-3	2.84 - 2.98	CL	CLAY 2												0.14							
203	KCR/BH-17	SPT-3	3.0	CL	CLAY 2	98	29	8	2.64	16.65														
204	KCR/BH-17	CRS-4	3.83 - 4.0	ROCK	MUDSTONE 1	99	29	7	12.58	2.19	1.94							6.5	13.1					
205	KCR/BH-17	SPT-4	4.0	ROCK	MUDSTONE 1	97	27	5	2.62	15.74									6.5	0.119	0.269			
206	KCR/BH-17	CRS-6	5.85 - 6.0	ROCK	MUDSTONE 1	98	28	5	13.52	2.18	1.92							2.1	6.8					
207	KCR/BH-17	CRS-8	7.85 - 7.96	ROCK	LIMESTONE 1				4.21	2.37	2.27							40.5	3.3					
208	KCR/BH-17	CRS-13	12.63 - 12.77	ROCK	MUDSTONE 2	69	28	7	0.39	1.48	1.48							0.4	5.9					
209	KCR/BH-17	Water																		6.5			444	400
210	KCR/BH-18	SPT-1	1.0	ML	SAND 1	51	21	4	2.64	12.94									6.5	0.040	0.537			
211	KCR/BH-18	SPT-2	2.0	SM	SAND 1	29	21	3	2.67	10.53					3.0	28								
212	KCR/BH-18	SPT-3	3.0	CL	CLAY 1	65	29	10	2.60	15.56														
213	KCR/BH-18	CRS-4	3.86-4.00	CL	CLAY 1												0.14							
214	KCR/BH-18	SPT-4	4.0	ROCK	MUDSTONE 1	94	31	9	2.64	14.09									6.5	0.040	0.537			
215	KCR/BH-18	SPT-5	5.0	ROCK																				
216	KCR/BH-18	SPT-6	6.0	ROCK	MUDSTONE 1	81	29	6	2.69	22.57														
217	KCR/BH-18	SPT-7	7.0																					
218	KCR/BH-18	CRS-5	4.38 - 4.52	ROCK	MUDSTONE 1	82	29	9	14.03	2.17	1.91							1.3	5.1					
219	KCR/BH-18	CRS-8	7.80 - 7.90	ROCK	MUDSTONE 1	67	27	6	14.20	2.06	1.81							0.8	7.9					
220	KCR/BH-18	CRS-12	11.01 - 1.14	ROCK	MUDSTONE 1	95	30	7	9.83	2.26	2.05							12.5	3.9					
221	KCR/BH-18	CRS-14	13.59 - 13.72	ROCK	MUDSTONE 1	84	29	5	15.53	2.23	1.93							0.9	6.5					
222	KCR/BH-18	Water																		6.8			148	800
223	KCR/BH-19	SPT-1	1.0	CL	CLAY 1	78	34	17	2.63	21.54									6.0	0.221	0.699			
224	KCR/BH-19	SPT-2	2.0	CL	CLAY 1	89	37	14	2.63	12.65														
225	KCR/BH-19	SPT-3	3.0	CL	CLAY 2	99	45	20	2.65	22.56														
226	KCR/BH-19	CRS-4	3.86 - 4.0	CL	CLAY 2	88	37	16	7.18	2.22	2.07						0.20	5.3	7.1					
227	KCR/BH-19	SPT-4	4.0	ROCK	MUDSTONE 1	98	39	18	2.66	17.77									6.0	0.221	0.699			
228	KCR/BH-19	SPT-5	5.0	ROCK																				
229	KCR/BH-19	CRS-14	13.15 - 13.27	ROCK	SANDSTONE 1	65	Non-Plastic		4.76	2.03	2.02							15.7	2.6					
230	KCR/BH-19	Water																		6.5			156	700

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CLIENT: The JICA Study Team
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SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/ Rock	Layer Designation	Passing#200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear	Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/ Liter	Chloride Content in Water mg/ Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)			σ _c (Kg/cm ²)	σ ₁ (Kg)					
231	KCR/BH-20	SPT-1	1.0	SM	SAND 1	48	Non-Plastic		2.65	12.20													
232	KCR/BH-20	SPT-2	2.0	GC	SAND 2	17	24	10	2.68	13.24													
233	KCR/BH-20	SPT-3	3.0	ROCK	SANDSTONE 1	71	21	4	2.65	17.75													
234	KCR/BH-20	SPT-4	4.0	ROCK	SANDSTONE 1	45	Non-Plastic		2.69	23.83													
235	KCR/BH-20	CRS-9	8.0 - 9.0	ROCK	MUDSTONE 2	69	Non-Plastic		0.62														
236	KCR/BH-20	CRS-11	10.0 - 11.0	ROCK	SANDSTONE 2	34	Non-Plastic		4.31	1.93	1.85						17.1	2.3					
237	KCR/BH-20	Water																				145	515
238	KCR/BH-21	SPT-1	1.0	GM	BACK FILLED	24	Non-Plastic		2.71	5.00									6.0				
239	KCR/BH-21	SPT-2	2.0	ML	SAND 1	75	Non-Plastic		2.65	12.17													
240	KCR/BH-21	SPT-3	3.0	SM	SAND 1	27	Non-Plastic		2.67	9.97													
241	KCR/BH-21	SPT-4	4.0	ML	SAND 1	53	Non-Plastic		2.66	18.51									5.0	0.119	0.269		
242	KCR/BH-21	SPT-5	5.0	SM	SAND 2	31	Non-Plastic		2.67	10.81													
243	KCR/BH-21	SPT-6	6.0	ROCK	SANDSTONE	8	Non-Plastic		2.68	12.23													
244	KCR/BH-21	CRS-10	9.64 - 9.84	ROCK	MUDSTONE 1	64	Non-Plastic		11.48	2.22	1.99							0.7	4.4				
245	KCR/BH-21	CRS-11	10.0 - 10.15	ROCK	MUDSTONE 1	85	Non-Plastic		8.35	2.12	1.96							1.0	2.5				
246	KCR/BH-21	Water																				214	600
247	KCRBH-22	SPT-1	1.0	GW	SAND 1	4	Non-Plastic		2.72	10.85													
248	KCRBH-22	SPT-2	2.0	GW	SAND 1	5	Non-Plastic		2.71	19.57													
249	KCRBH-22	SPT-3	3.0	GC	SAND 1	24	25	10	2.67	15.83													
250	KCRBH-22	SPT-4	4.0	GW	SAND 1	4	24	7	2.68	14.46													
251	KCRBH-22	SPT-5	5.0	GW	SAND 1	5	22	6	2.68	16.00													
252	KCRBH-22	SPT-6	6.0	SM	SAND 1	19	Non-Plastic		2.71	10.29													
253	KCRBH-22	SPT-7	7.0	SC	SAND 1	18	24	10	2.70	15.69													
254	KCRBH-22	SPT-8	8.0	SC	SAND 1	26	26	10	2.69	18.95													
255	KCRBH-22	SPT-9	9.0	GC	SAND 2	9	25	8	2.68	12.99													
256	KCRBH-22	CRS-14	13.70 - 13.87	ROCK	MUDSTONE 2	96	36	14	20.31	2.14	1.78							0.5	3.9				
257	KCRBH-22	Water																				178	614
258	KCRBH-23	SPT-1	1.0	GC	SAND 1	13	25	10	2.62	17.88													
259	KCRBH-23	SPT-2	2.0	GW-GC	SAND 1	9	23	8	2.71	12.32													
260	KCRBH-23	SPT-3	3.0	GC	SAND 2	14	24	9	2.58	15.89													
261	KCRBH-23	SPT-4	4.0	SC	SAND 2	48	25	8	2.45	17.22													
262	KCRBH-23	SPT-5	5.0	SC	SAND 2	47	28	10	2.59	16.26													
263	KCRBH-23	SPT-6	6.0	SC	SAND 2	34	24	8	2.59	11.92													
264	KCRBH-23	SPT-7	7.0	SW-SM	SAND 2	9	Non-Plastic		2.65	19.51													
265	KCRBH-23	SPT-8	8.0	SW-SM	SAND 2	8	Non-Plastic		2.75	12.79													
266	KCRBH-23	SPT-9	9.0	SW-SM	SAND 2	6	Non-Plastic		2.58	14.93													
267	KCRBH-23	SPT-10	10.0	GW	Sandy GRAVELS	3	Non-Plastic		2.66	13.36													
268	KCRBH-23	SPT-11	11.0	ROCK	CONGLOMERATE	11	Non-Plastic		2.61	14.30													
269	KCRBH-23	CRS-13	12.0 - 13.0	ROCK	CONGLOMERATE	10	Non-Plastic																
270	KCRBH-23	CRS-15	14.0 - 15.0	ROCK	CONGLOMERATE	9	25	11															
271	KCRBH-23	Water																				181	542

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear	Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/ Liter	Chloride Content in Water mg/ Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)			σ _c (Kg/cm ²)	σ ₁ (Kg)					
272	KCRBH-24	SPT-1	1.0	SM	BACK FILLED	38	Non-Plastic		2.69	4.16													
273	KCRBH-24	CRS-2	1.85-2.0	CL	CLAY 1										0.17								
274	KCRBH-24	SPT-2	2.0	CL	CLAY 1	76	26	9	2.72	7.98									7.5	0.057	0.537		
275	KCRBH-24	SPT-3	3.0	SC	SAND 2	47	23	9	2.65	3.99				5.0	28								
276	KCRBH-24	SPT-4	4.0	SC	SAND 2	23	22	9	2.68	4.68				3.0	30								
277	KCRBH-24	SPT-5	5.0	SW-SM	SAND 2	9	Non-Plastic		2.71	5.79				0.0	32								
278	KCRBH-24	SPT-6	6.0	SC	SAND 2	29	25	8	2.72	6.74				5.0	30								
279	KCRBH-24	SPT-7	7.0	SW-SM	SAND 2	10	Non-Plastic		2.71	3.40				0.0	32								
280	KCRBH-24	SPT-8	8.0	SW-SM	SAND 2	13	24	10	2.72	6.56				3.0	30								
281	KCRBH-24	CRS-10	9.0 - 10.0	SC	SAND 2	19	31	13		2.12													
282	KCRBH-24	CRS-12	11.0 - 12.0	GC	SAND 3	20	30	14	3.54	2.22	2.14						3.9	2.9					
283	KCRBH-24	CRS-16	15.0 - 16.0	ROCK	SANDSTONE 1	34	29	12	4.93	1.72	1.64						4.0	1.5					
284	KCRBH-24	CRS-18	17.33 - 17.46	ROCK	MUDSTONE 1	79	30	10	12.29	2.14	1.91						3.0	5.1					
285	KCRBH-24	Water																				165	800
286	KCRBH-25	SPT-1	1.0	SM	GARBAGE	43	Non-Plastic		2.71	6.20				0.0	28								
287	KCRBH-25	SPT-2	2.0	SM	SAND 1	45	Non-Plastic		2.65	3.00				0.0	28				6.5	0.053	0.430		
288	KCRBH-25	SPT-3	3.0	SC	SAND 1	36	22	25	2.72	11.43				3.0	26								
289	KCRBH-25	SPT-4	4.0	SC	SAND 1	24	21	8	2.69	9.18				5.0	28								
290	KCRBH-25	SPT-5	5.0		SAND 1																		
291	KCRBH-25	SPT-6	6.0		CLAY 1																		
292	KCRBH-25	CRS-7	6.0 - 7.0	CL-ML	CLAY 1	55	25	7		6.57	1.78	1.67					4.8	5.5					
293	KCRBH-25	SPT-7	7.0	CL	CLAY 1	63	28	12	2.66	14.98													
294	KCRBH-25	CRS-8	7.84 - 8.0	SC-SM	CLAY 1	76	29	13	8.98	1.96	1.80				0.17		5.2	6.3					
295	KCRBH-25	SPT-8	8.0	CL	CLAY 1	62	34	16	2.71	14.67													
296	KCRBH-25	SPT-9	9.0	SC	SAND 2	45	28	10	2.66	12.17													
297	KCRBH-25	CRS-10	9.10-9.50	SM	SAND 2					12.17	1.60	1.43					2.1	7.2					
298	KCRBH-25	SPT-10	10.0	SM	SAND 2																		
299	KCRBH-25	SPT-11	11.0	SC-SM	SAND 2	33	25	7	2.66	9.27													
300	KCRBH-25	CRS-18	17.0 - 18.0	ROCK	MUDSTONE 2	73	27	5	15.34	2.44	2.11						1.3	4.3					
301	KCRBH-25	Water																				158	498

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear	Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)			σ _c (Kg/cm ²)	σ ₃ (kg)					
302	KCRBH-26	SPT-1	1.0	SC	SAND 1	43	24	9	2.80	5.88													
303	KCRBH-26	SPT-2	2.0	SM	SAND 1	20	Non-Plastic		2.74	10.89													
304	KCRBH-26	SPT-3	3.0		SAND 1																		
305	KCRBH-26	SPT-4	4.0	SM	SAND 1	25	Non-Plastic		2.79	7.98													
306	KCRBH-26	SPT-5	5.0	CL	CLAY 1	54	28	12	2.77	14.11													
307	KCRBH-26	SPT-6	6.0	CL	CLAY 1	50	32	14	2.75	13.83													
308	KCRBH-26	CRS-7	6.56 - 6.70	CL	CLAY 1	61	34	16		17.27	2.32	1.98			0.15	0.5	2.3						
309	KCRBH-26	SPT-7	7.0	CL	CLAY 1	81	35	15	2.68	16.16													
310	KCRBH-26	SPT-8	8.0		CLAY 2																		
311	KCRBH-26	CRS-9	8.50 - 8.67	CL	CLAY 2	90	34	12		14.04	1.99	1.74			0.23	0.8	8.6						
312	KCRBH-26	SPT-9	11.0	ROCK	SANDSTONE 1	58	30	15	2.74	11.29													
313	KCRBH-26	SPT-10	12.0	ROCK	SANDSTONE 1	51	35	16	2.72	13.96													
314	KCRBH-26	SPT-11	13.0	ROCK	SANDSTONE 1	28	Non-Plastic		2.71	17.02													
315	KCRBH-26	CRS-14	13.63 - 13.75	ROCK	SANDSTONE 1				2.06	2.40	2.35						62.3	4.1					
316	KCRBH-26	CRS-18	17.07 - 17.20	ROCK	LIMESTONE 2				3.43	1.84	1.78						117.3	4.4					
317	KCRBH-26	CRS-20	19.0 - 20.0	ROCK	MUDSTONE 3	87	38	15		3.43	2.24	2.16					1.9	4.2					
318	KCRBH-26	Water																	6.5			149	503
319	KCRBH-27	SPT-1	1.0	ML	SAND 1	61	24	3	2.66	11.52									6.0	0.146	0.269		
320	KCRBH-27	SPT-2	2.0	SM	SAND 1	31	Non-Plastic		2.71	1.33													
321	KCRBH-27	SPT-3	3.0	SC	SAND 1	22	25	9	2.74	9.87													
322	KCRBH-27	SPT-4	4.0	SC-SM	SAND 1	29	23	7	2.69	3.67													
323	KCRBH-27	SPT-5	5.0	SC-SM	SAND 1	28	22	7	2.68	10.23													
324	KCRBH-27	SPT-6	6.0	SC	SAND 1	25	23	8	2.75	12.54													
325	KCRBH-27	SPT-7	7.0	CL	CLAY 1	58	24	10	2.65	10.81													
326	KCRBH-27	CRS-9	8.71 - 8.82	CL	CLAY 1	59	29	12		8.18	2.19	2.02					4.2	5.0					
327	KCRBH-27	SPT-8	9.0	SC-SM	SAND 2	24	22	6	2.69	14.87													
328	KCRBH-27	SPT-9	10.0																				
329	KCRBH-27	SPT-10	11.0																				
330	KCRBH-27	CRS-12	11.61 - 11.72	CL-ML	CLAY 2	61	26	5		7.27	2.29	2.13					1.9	5.3					
331	KCRBH-27	SPT-11	12.0	SC	CLAY 2	50	28	9	2.66	14.62													
332	KCRBH-27	CRS-14	13.18 - 13.28	CL	CLAY 2	44	23	8	5.24	2.16	2.05						2.4	8.0					
333	KCRBH-27	CRS-18	17.0 - 18.0	ROCK	CONGLOMERATE 2	22	25	10	5.54														
334	KCRBH-27	Water																	6.5			158	612

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (kN/m ²)	Angle of Internal Friction (°)	σ _v (kg/cm ²)	σ _h (kg)		q _u (Kg/cm ²)	Strain %					
335	KCRBH-28	SPT-1	1.0	SC-SM	SAND 1	39	21	6	2.63	7.42					3.0	26			6.5	0.106	0.430			
336	KCRBH-28	SPT-2	2.0	SM	SAND 1	23	Non	Plastic	2.72	7.21					0.0	28								
337	KCRBH-28	SPT-3	3.0	CL-ML	CLAY 1	69	22	5	2.71	17.05														
338	KCRBH-28	SPT-4	4.0	CL-ML	CLAY 1	56	22	4	2.70	15.78														
339	KCRBH-28	SPT-5	5.0	SC-SM	SAND 2	47	21	6	2.66	14.88					3.0	28								
340	KCRBH-28	SPT-6	6.0	SM	SAND 2	16	Non	Plastic	2.69	10.49					0.0	30								
341	KCRBH-28	SPT-7	7.0	CL	CLAY 2	74	30	10	2.68	15.53														
342	KCRBH-28	SPT-8	8.0	CL	CLAY 2	76	29	9	2.61	16.48														
343	KCRBH-28	SPT-9	9.0	CL	CLAY 2	64	26	8	2.71	20.50														
344	KCRBH-28	SPT-10	10.0	SC	SAND 3	26	27	9	2.71	13.93														
345	KCRBH-28	SPT-11	11.0	SC	SAND 3	36	25	8	2.71	12.26														
346	KCRBH-28	SPT-12	12.0																					
347	KCRBH-28	CRS-13	12.76 - 12.88	ROCK	SANDSTONE 1					16.04	2.53	2.18						1.5	10.0					
348	KCRBH-28	SPT-13	13.0	ROCK	SANDSTONE 1																			
349	KCRBH-28	CRS-17	16.60 - 16.75	ROCK	SANDSTONE 1	41	30	9		7.20	2.33	2.18												
350	KCRBH-28	Water																				165	800	
351	KCRBH-29	CRS-1	1.0 - 2.0	SM	BACK FILLED	12	Non	Plastic		2.54														
352	KCRBH-29	SPT-1	3.0	SM	SAND 1	23	Non	Plastic	2.70	1.76				0.0	32			6.0	0.358	0.540				
353	KCRBH-29	SPT-2	4.0	SM	SAND 1	24	Non	Plastic	2.72	0.39				0.0	32									
354	KCRBH-29	SPT-3	5.0	SM	SAND 1	26	Non	Plastic	2.71	0.34				0.0	32									
355	KCRBH-29	CRS-6	5.85 - 6.0	SW-SM	SAND 1	9	31	15		11.58	2.15	1.93					4.2	9.6						
356	KCRBH-29	SPT-4	6.0	SC	SAND 1	27	26	12	2.71	0.66				5.0	30									
357	KCRBH-29	SPT-5	7.0	SM	SAND 2	19	Non	Plastic	2.72	0.72				0.0	32									
358	KCRBH-29	SPT-6	8.0	SC	SAND 2	33	25	11	2.72	0.75				5.0	30									
359	KCRBH-29	SPT-7	9.0	CL	CLAY 2	62	33	15	2.73	1.54														
360	KCRBH-29	SPT-8	10.0	SC	CLAY 2	48	32	15	2.68	1.79														
361	KCRBH-29	SPT-9	11.0	CL	CLAY 2	60	31	14	2.65	1.54														
362	KCRBH-29	CRS-12	11.50 - 11.68	CL	CLAY 2	60	31	15		6.67	2.32	2.17				0.22	4.3	3.2						
363	KCRBH-29	SPT-10	12.0	CL	CLAY 2	63	30	15	2.70	1.58														
364	KCRBH-29	SPT-11	13.0	CL	CLAY 2	71	32	14	2.67	2.90														
365	KCRBH-29	SPT-12	14.0	CL	CLAY 2	57	30	14	2.71	1.59														
366	KCRBH-29	SPT-13	15.0	CL	CLAY 2	59	28	13	2.61	1.40														
367	KCRBH-29	SPT-14	16.0	CL	CLAY 2	60	29	14	2.70	1.26														
368	KCRBH-29	Water																	6.5			153	524	

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORATORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)	c' (Kg/cm ²)	φ (deg)		Compressibility Index (Cc)	qu (Kg/cm ²)					
369	KCRBH-30	SPT-1	1.0	SM	BACK FILLED	28	Non	Plastic	2.69	13.04					0.0	26			6.5	0.124	0.537			
370	KCRBH-30	SPT-2	2.0	SM	SAND 1	27	Non	Plastic	2.71	4.33					0.0	30								
371	KCRBH-30	SPT-3	3.0	SC	SAND 1	21	22	8	2.69	7.74					3.0	28								
372	KCRBH-30	SPT-4	4.0	SC-SM	SAND 1	25	21	7	2.70	6.43					2.0	30								
373	KCRBH-30	SPT-5	5.0	SC	SAND 1	27	22	9	2.66	7.22					4.0	30								
374	KCRBH-30	SPT-6	6.0	SC-SM	SAND 1	22	20	6	2.72	8.26					3.0	30								
375	KCRBH-30	SPT-7	7.0	SC	SAND 1	45	25	10	2.68	7.47					5.0	30								
376	KCRBH-30	SPT-8	8.0	SC	SAND 1	44	26	10	2.65	8.36					5.0	30								
377	KCRBH-30	CRS-9	8.70 - 8.87	CL	CLAY 1	74	29	10	12.92	1.99	1.76					0.23	0.4	3.3						
378	KCRBH-30	SPT-9	9.0	CL	CLAY 1	84	35	14	2.63	7.37														
379	KCRBH-30	SPT-10	10.0	CL	CLAY 1	68	30	13	2.66	8.45														
380	KCRBH-30	SPT-11	11.0	CL	CLAY 1	69	29	13	2.68	9.88														
381	KCRBH-30	SPT-12	12.0	SC	CLAY 1	33	23	8	2.71	12.32														
382	KCRBH-30	SPT-13	13.0	CL	CLAY 1	68	29	8	2.61	17.41														
383	KCRBH-30	SPT-14	14.0	CL	CLAY 1	65	31	9	2.69	10.38														
384	KCRBH-30	CRS-15	14.75 - 14.90	CL	CLAY 1	51	31	11	17.17	2.28	1.95					0.8	4.7							
385	KCRBH-30	SPT-15	15.0	SC	CLAY 1	45	28	9	2.72	9.40														
386	KCRBH-30	SPT-16	16.0	CL	CLAY 1	61	26	9	2.71	10.37														
387	KCRBH-30	SPT-17	17.0	SC	SAND 2	45	32	10	2.71	8.04														
388	KCRBH-30	SPT-19	19.0	SC-SM	SAND 2	33	29	7	2.71	18.81														
389	KCRBH-30	Water																	6.8			173	500	
390	KCRBH-31	SPT-1	1.0	SM	SAND 1	34	Non	Plastic	2.67	5.42					0.0	28			6.0	0.058	0.430			
391	KCRBH-31	SPT-2	2.0	SM	SAND 1	25	Non	Plastic	2.70	6.67					0.0	28								
392	KCRBH-31	SPT-3	3.0	SM	SAND 1	24	Non	Plastic	2.71	5.36					0.0	32								
393	KCRBH-31	SPT-4	4.0	SM	SAND 1	36	Non	Plastic	2.69	7.69					0.0	32								
394	KCRBH-31	SPT-5	5.0	SC	SAND 1	28	22	9	2.70	7.41					3.0	30								
395	KCRBH-31	SPT-6	6.0	SC	SAND 1	29	23	10	2.66	11.47					3.0	30								
396	KCRBH-31	SPT-7	7.0	SM	SAND 1	16	Non	Plastic	2.71	13.53					0.0	32								
397	KCRBH-31	SPT-8	8.0	SC	SAND 1	31	25	9	2.71	13.17					3.0	30								
398	KCRBH-31	SPT-9	9.0	CL	CLAY 1	56	25	8	2.66	9.21														
399	KCRBH-31	SPT-10	10.0	SC	SAND 2	15	26	8	2.70	16.98					2.0	30								
400	KCRBH-31	SPT-11	11.0	SC	SAND 2	21	22	8	2.71	13.69					3.0	30								
401	KCRBH-31	SPT-12	12.0	SC	SAND 2	26	23	8	2.71	15.14					3.0	30								
402	KCRBH-31	SPT-13	13.0	GC	SAND 2	12	25	7	2.70	22.90					2.0	31								
403	KCRBH-31	SPT-14	14.0	GC	SAND 2	29	26	8	2.71	14.97					3.0	30								
404	KCRBH-31	SPT-15	15.0	SC	SAND 2	37	25	8	2.72	16.57					4.0	30								
405	KCRBH-31	SPT-16	16.0	ROCK	MUDSTONE 1	28	25	7	2.69	14.14														
406	KCRBH-31	CRS-17	16.60 - 16.71	ROCK	MUDSTONE 1	70	33	10	14.21	2.44	2.13					4.6	12.9							
407	KCRBH-31	SPT-17	17.0	ROCK	SANDSTONE 1	20	30	9	2.69	22.77														
408	KCRBH-31	SPT-18	18.0	ROCK	MUDSTONE 2	51	32	10	2.68	28.17														
409	KCRBH-31	CRS-19	18.30 - 18.44	ROCK	MUDSTONE 2				9.00	2.06	1.89					31.6	1.4					181	500	
410	KCRBH-31	Water																	9.0					

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear	Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)			σ _c (Kg/cm ²)	σ ₁ (Kg)					
411	KCRBH-32	SPT-1	1.0	SC-SM	SAND 2	24	20	7	2.72	1.89									6.0	0.080	0.269		
412	KCRBH-32	SPT-2	2.0	SW-SM	SAND 2	9	Non	Plastic	2.70	6.19													
413	KCRBH-32	SPT-3	3.0	SC-SM	SAND 2	23	20	7	2.70	4.77													
414	KCRBH-32	SPT-4	4.0	GC	SAND 2	20	20	6	2.70	5.17													
415	KCRBH-32	SPT-5	5.0	SC-SM	SAND 2	50	25	7	2.71	4.52													
416	KCRBH-32	SPT-6	6.0	GW-GM	SAND 2	11	21	5	2.71	10.82													
417	KCRBH-32	SPT-7	7.0	SC-SM	SAND 2	17	21	7	2.71	11.30													
418	KCRBH-32	SPT-8	8.0																				
419	KCRBH-32	SPT-9	9.0	CL	CLAY 2	78	29	9	2.69	13.32													
420	KCRBH-32	CRS-10	9.70 - 9.85	CL	CLAY 2	91	37	12		15.30	2.35	2.04				0.19	4.5	6.4					
421	KCRBH-32	SPT-10	10.0	ROCK	MUDSTONE 1	61	34	14	2.72	8.88													
422	KCRBH-32	SPT-11	11.0	ROCK	MUDSTONE 1	96	35	13	2.72	17.11													
423	KCRBH-32	SPT-12	12.0	ROCK	MUDSTONE 1	96	36	12	2.69	9.27													
424	KCRBH-32	CRS-13	12.80 - 12.90	ROCK	MUDSTONE 1	98	35	13		14.90	2.43	2.12					8.8	5.7					
425	KCRBH-32	CRS-16	15.55 - 15.70	ROCK	MUDSTONE 1	92	32	11		15.10	2.10	1.82					1.7	8.5					
426	KCRBH-32	CRS-20	19.70 - 19.85	ROCK	MUDSTONE 1	98	36	15		16.30	2.09	1.79					13.2	3.0					
427	KCRBH-32	Water																	7.5			165	500
428	KCRBH-33	SPT-1	1.0	SM	SAND 1	22	Non-Plastic		2.71	8.95													
429	KCRBH-33	SPT-2	2.0	SW-SM	SAND 1	10	Non-Plastic		2.70	10.22									6.0	0.106	0.537		
430	KCRBH-33	SPT-3	3.0	GW-GM	SAND 1	8	Non-Plastic		2.70	14.48													
431	KCRBH-33	SPT-4	4.0	SC-SM	SAND 1	14	20	7	2.65	13.27													
432	KCRBH-33	SPT-5	5.0	SC-SM	SAND 1	19	20	5	2.61	15.47													
433	KCRBH-33	SPT-6	6.0	SC-SM	SAND 1	24	21	7	2.72	17.34													
434	KCRBH-33	SPT-7	7.0	SM	SAND 1	12	Non-Plastic		2.71	19.37													
435	KCRBH-33	SPT-8	8.0	CL	CLAY 1	60	28	11	2.70	16.77													
436	KCRBH-33	SPT-9	9.0	SC	CLAY 1	45	26	8	2.72	21.04													
437	KCRBH-33	SPT-10	10.0	SW-SM	SAND 2	5	Non-Plastic		2.71	14.45													
438	KCRBH-33	SPT-11	11.0	SM	SAND 2	19	Non-Plastic		2.70	17.55													
439	KCRBH-33	SPT-12	12.0	SC-SM	SAND 2	24	20	7	2.65	14.59													
440	KCRBH-33	SPT-13	13.0	GW-GM	SAND 2	10	21	6	2.67	14.88													
441	KCRBH-33	SPT-14	14.0	SC-SM	SAND 2	19	23	7	2.65	19.99													
442	KCRBH-33	SPT-15	15.0	SC	SAND 2	20	23	8	2.65	15.42													
443	KCRBH-33	SPT-16	16.0	SC-SM	SAND 2	23	21	6	2.71	19.48													
444	KCRBH-33	CRS-20	19.18 - 19.30	ROCK	SANDSTONE						2.50	2.46						95.0	0.5				
445	KCRBH-33	Water																	7.2			66	800

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORATORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear	Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (kN/m ²)	Angle of Internal Friction (°)			σ _u (Kg/cm ²)	Strain %					
446	KCRBH-34	SPT-1	1.0	SM	SAND 1	10	Non-Plastic		2.71	1.24													
447	KCRBH-34	SPT-2	2.0	SM	SAND 2	25	Non-Plastic		2.71	8.66									5.5	0.027	0.275		
448	KCRBH-34	SPT-3	3.0	SC	SAND 2	15	20	8	2.71	8.74													
449	KCRBH-34	SPT-4	4.0	GC-GM	SAND 2	16	20	6	2.69	11.34													
450	KCRBH-34	SPT-5	5.0	SC	SAND 2	16	20	6	2.66	8.64													
451	KCRBH-34	SPT-6	6.0	GC	SAND 2	12	20	9	2.68	16.06													
452	KCRBH-34	SPT-7	7.0	SM	SAND 2	20	Non-Plastic		2.67	14.38													
453	KCRBH-34	SPT-8	8.0	SC	SAND 2	34	24	9	2.68	14.56													
454	KCRBH-34	SPT-9	9.0	SC	SAND 2	31	25	8	2.71	16.68													
455	KCRBH-34	SPT-10	10.0	SC-SM	SAND 2	36	21	6	2.72	12.05													
456	KCRBH-34	SPT-11	11.0	SC	SAND 2	42	27	9	2.70	19.80													
457	KCRBH-34	SPT-12	12.0	SC	SAND 2	36	35	16	2.71	13.02													
458	KCRBH-34	SPT-13	13.0	SW-SC	SAND 2	10	26	11	2.70	17.75													
459	KCRBH-34	CRS-17	16.0 - 17.0	CL	CLAY 2	70	35	13		3.90	2.53	2.38					5.4	5.5					
460	KCRBH-34	CRS-20	19.0 - 20.0	SC	SAND 3	48	34	13		8.86	2.39	2.26					1.4	2.7					
461	KCRBH-34	Water																				543	1016
462	KCRBH-35	SPT-1	1.0	SM	BACK FILLED	26	Non-Plastic		2.71	7.26													
463	KCRBH-35	SPT-2	2.0	SM	SAND 2	13	Non-Plastic		2.71	2.39													
464	KCRBH-35	SPT-3	3.0	SC	SAND 2	24	23	10	2.72	9.38									6.5	0.102	0.447		
465	KCRBH-35	SPT-4	4.0	SM	SAND 2	44	Non-Plastic		2.66	9.20													
466	KCRBH-35	SPT-5	5.0	SC	SAND 2	24	26	13	2.69	6.82													
467	KCRBH-35	SPT-6	6.0	SC	SAND 2	24	25	12	2.70	9.71													
468	KCRBH-35	SPT-7	7.0	SW	SAND 2	3	Non-Plastic		2.70	9.12													
469	KCRBH-35	SPT-8	8.0	SM	SAND 2	43	Non-Plastic		2.65	10.04													
470	KCRBH-35	SPT-9	9.0	SC	SAND 2	50	25	12	2.71	9.42													
471	KCRBH-35	SPT-10	10.0	SC	SAND 2	49	24	9	2.72	10.14													
472	KCRBH-35	SPT-11	11.0	SC	SAND 2	21	23	9	2.71	9.54													
473	KCRBH-35	SPT-12	13.0	SC	SAND 2	28	25	8	2.70	5.29													
474	KCRBH-35	SPT-13	14.0	SW	SAND 2	3	22	5	2.65	8.43													
475	KCRBH-35	SPT-14	18.0	SC-SM	SAND 3	26	24	7	2.71	12.85													
476	KCRBH-35	CRS-16	15.0 - 16.0	GW	SAND 3	7	Non-Plastic			0.26													
477	KCRBH-35	CRS-19	18.90 - 19.0	SC	SAND 3	32	28	12		11.98	2.15	1.92					0.6	5.9					
478	KCRBH-35	Water																				354	613
479	KCRBH-36	SPT-2	2.0	SC	SAND 1	40	23	8	2.71	16.57													
480	KCRBH-36	SPT-3	3.0	SM	SAND 2	12	Non-Plastic		2.71	7.48													
481	KCRBH-36	SPT-4	4.0	SC	SAND 2	16	26	12	2.72	8.77													
482	KCRBH-36	SPT-5	5.0	SC	SAND 2	21	25	13	2.70	10.85													
483	KCRBH-36	SPT-6	6.0	SC	SAND 2	24	27	13	2.65	10.84													
484	KCRBH-36	SPT-7	7.0	SW-SC	SAND 2	11	26	11	2.65	17.17													
485	KCRBH-36	SPT-8	8.0	SM	SAND 2	27	Non-Plastic		2.70	16.24													
486	KCRBH-36	CRS-15	14.79 - 15.0	ROCK	MUDSTONE 1	97	32	9		16.19	2.14	1.84					11.8	4.8					
487	KCRBH-36	CRS-18	17.30 - 17.43	ROCK	MUDSTONE 1	82	34	10		15.75	1.96	1.70					1.3	5.3					
488	KCRBH-36	Water																				477	703

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CLIENT: The JICA Study Team
 PROJECT: Preparatory Survey (II) on Karachi Circular Railway Revival Project in Karachi.

SUMMARY OF LABORTORY TEST RESULTS

Sr.No.	Borehole#	Sample#	Depth (m)	Classification of Soil/Rock	Layer Designation	Passing #200 %	Atterberg Limit		Specific Gravity of Soil	Moisture Content %	Bulk Density (gm/cc)	Dry Density (gm/cc)	UU/Triaxial Compression Test		Direct Shear		Consolidation	Unconfined Compression Strength		pH Value	Sulphate Content in Soil %	Chloride Content in Soil %	Sulphate Content in Water mg/Liter	Chloride Content in Water mg/Liter
							LL	PI					Cohesion (Mpa)	Angle of Internal Friction (°)	c' (Kg/cm ²)	φ (deg)		Compressibility Index (C _c)	qu (Kg/cm ²)					
489	KCRBH-37	SPT-1	1.0	CL	CLAY 1	56	24	10	2.69	12.52									6.5	0.385	0.058			
490	KCRBH-37	SPT-2	2.0	CL	CLAY 1	63	22	11	2.63	7.15														
491	KCRBH-37	SPT-3	3.0	CL	CLAY 1	59	25	11	2.64	15.45														
492	KCRBH-37	SPT-4	4.0	GC	SAND 2	19	25	12	2.65	15.19														
493	KCRBH-37	SPT-5	5.0	SC	SAND 2	25	25	13	2.67	20.66					3.0	30								
494	KCRBH-37	SPT-6	6.0	GC	SAND 2	16	25	12	2.66	13.21														
495	KCRBH-37	SPT-7	7.0	SM	SAND 2	13	Non-Plastic		2.67	11.55														
496	KCRBH-37	SPT-8	8.0	SC	SAND 2	24	30	12	2.65	16.19														
497	KCRBH-37	SPT-9	9.0	GC	SAND 2	30	27	14	2.66	10.74														
498	KCRBH-37	SPT-10	10.0	SC	SAND 2	28	30	14	2.70	12.94														
499	KCRBH-37	CRS-20	19.35 - 19.46	CL	CLAY 2	96	36	16		11.50	1.95	1.75				0.26	1.1	4.3						
500	KCRBH-37	Water																	6.5			244	377	
501	KCRBH-38	SPT-1	1.0	SM	SAND 2	24	Non-Plastic		2.71	3.57					0.0	32								
502	KCRBH-38	SPT-2	2.0	SM	SAND 2	21	Non-Plastic		2.70	4.40					0.0	32								
503	KCRBH-38	SPT-3	3.0	SM	SAND 2	15	Non-Plastic		2.71	9.65					0.0	32			5.5	0.394	0.054			
504	KCRBH-38	SPT-4	4.0	SC	SAND 2	26	24	11	2.69	20.31					5.0	30								
505	KCRBH-38	CRS-13	12.36 - 12.48	SC	SAND 3	42	31	16		9.76	2.61	2.37					0.8	7.8						
506	KCRBH-38	CRS-18	17.31 - 17.45	ROCK	SANDSTONE	53	35	16		13.53	2.13	1.87					0.5	3.4						
507	KCRBH-38	Water																	6.5			2197	800	
508	KCRBH-39	SPT-1	1.0	SC	BACK FILLED	43	24	10	2.71	9.92					8.0	30			6.5	0.102	0.054			
509	KCRBH-39	SPT-2	2.0	GC	SAND 2	12	23	10	2.69	13.03					3.0	30								
510	KCRBH-39	SPT-3	3.0	SM	SAND 2	32	Non-Plastic		2.68	8.83					0.0	32								
511	KCRBH-39	SPT-4	4.0	SM	SAND 2	16	Non-Plastic		2.66	12.92					0.0	32								
512	KCRBH-39	SPT-5	5.0	SC	SAND 2	18	26	12	2.70	9.02					3.0	30								
513	KCRBH-39	SPT-6	6.0	GC	SAND 2	15	30	14	2.71	8.12					3.0	30								
514	KCRBH-39	SPT-7	7.0	SC	SAND 2	39	29	16	2.72	10.64					5.0	30								
515	KCRBH-39	SPT-8	8.0	SC	SAND 2	21	27	13	2.66	12.07					5.0	30								
516	KCRBH-39	SPT-9	9.0	SC	SAND 2	21	25	10	2.68	11.82					5.0	30								
517	KCRBH-39	SPT-10	13.0	CL	CLAY 2	47	31	12	2.68	18.07					5.0	30								
518	KCRBH-39	CRS-17	16.79-17.0	CL	CLAY 2	78	40	22		13.02	2.11	1.87					0.20	3.3	8.1					
519	KCRBH-39	Water																	7.5			255	800	
520	KCRBH-40	SPT-1	1.0	CL	CLAY 1	69	25	11	2.63	15.33														
521	KCRBH-40	SPT-2	2.0	CL	CLAY 1	76	22	10	2.70	12.32									6.5	0.022	0.097			
522	KCRBH-40	SPT-3	3.0	CL	CLAY 1	69	25	11	2.70	8.06														
523	KCRBH-40	SPT-4	4.0	CL	CLAY 1	50	25	11	2.68	15.42					8.0	28								
524	KCRBH-40	SPT-5	5.0	SC	SAND 2	41	24	10	2.62	12.83					5.0	30								
525	KCRBH-40	SPT-6	6.0	SC	SAND 2	30	25	12	2.65	11.12					5.0	30								
526	KCRBH-40	SPT-7	7.0	SC	SAND 2	36	24	13	2.69	12.79					5.0	30								
527	KCRBH-40	CRS-15	14.0 - 15.0	CL	CLAY 2	77	37	18		7.20	1.99	1.86					3.7	3.5						
528	KCRBH-40	CRS-19	18.0 - 18.15	CL	CLAY 2	50	39	17		12.60	2.23	1.98					0.15	0.7	7.4					
529	KCRBH-40	Water																	6.5			387	600	

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