CHAPTER 8

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Appendix1

Observations of Specific Gravity Test

Table A1.1:Specific Gravity Test of Clayey Sample

No	Description	Sample 1	Sample 2
1	Temperature in ^{0}C	31	31
2	Weight of bottle (W_1) in g	18.57	18.50
3	Weight of bottle + Dry clayey soil (W_2) in g	28.57	28.50
4	Weight of bottle + clayey soil + water (W_3) in g	90.88	90.20
5	Weight of bottle + Water (W_4) in g	84.74	84.12

Specimen Calculations of Specific Gravity Test

From Table A1.1, set of readings for sample 1;

Specific gravity (G) of the clayey soil = $(W_2 – W_1) / [(W_4 – W_1) - (W_3 - W_2)]$

= (28.57 – 18.57) / [(84.74 – 18.57) – (90.88 – 28.57)

= 2.59

Similarly;

From Table A1.1, set of readings for sample 2;

Specific gravity (G) of the clayey soil = $(W_2 – W_1) / [(W_4 – W_1) - (W_3 - W_2)]$

= (28.50 – 18.50) / [(84.12 – 18.50) – (90.20 – 28.50)

= 2.55

Average specific gravity (G) of the clayey soil = (2.59 + 2.55)/ 2

= 2.57

Appendix2

Observations of Atterberg Limit Test

Table A2.1:Liquid Limit Test (Penetration method) of Clayey Sample

Container No.	CP4	B2	P6	9
Penetration (mm)	10.6	18.2	23.5	28.6
Weight of Container (g)	7.00	5.07	20.25	9.21
Weight of Water +Container(g)	22.37	17.73	32.06	21.15
Weight of Dry Clayey Soil+ Container (g)	16.44	12.50	27.09	16.04

Table A2.2:Plastic Limit Test of Clayey Sample

Container No.	24F	T
Weight of Wet Clayey Soil + Container (g)	24.73	20.65
Weight of Dry Clayey Soil + Container (g)	19.86	15.35
Weight of Container (g)	10.26	5.07

Specimen Calculations of Atterberg Limit Test

From Table A2.1, first set of readings for sample CP4;

Weight of Wet Clayey Soil + Container (g) = 22.37

Weight of Dry Clayey Soil + Container (g) = 16.44

Weight of Container (g) = 7.00

Weight of Water (g) = 5.93

Weight of Dry Clayey Soil (g) = 9.44

Moisture Content (%) = (5.93 / 9.44) x 100%

= 62.8 %

From Table A2.2, first set of readings for sample 24F;

Weight of Wet Clayey Soil + Container (g) = 24.73

Weight of Dry Clayey Soil + Container (g) = 19.86

Weight of Container (g) = 10.26

Weight of Water (g) = 4.87

Weight of Dry Clayey Soil (g) = 9.6

Moisture Content (%) = (4.87/9.6) x 100%

= 50.7%

Similarly, from Table A2.2, calculation for moisture content of B2, P6, 9 and 18samples can be done and tabulated below;

Table A2.3: Moisture Content Results of Liquid Limit Test

Container No.	CP4	B2	P6	9
Weight of Water (g)	5.93	5.23	4.97	5.11
Weight of Dry Clayey Soil (g)	9.44	7.43	6.84	6.83
Moisture Content (%)	62.8	70.5	72.6	74.8

Penetration method for obtaining liquid limit of sample (Moisture content Vs. Penetration) is shown graphically in Figure A2.1.

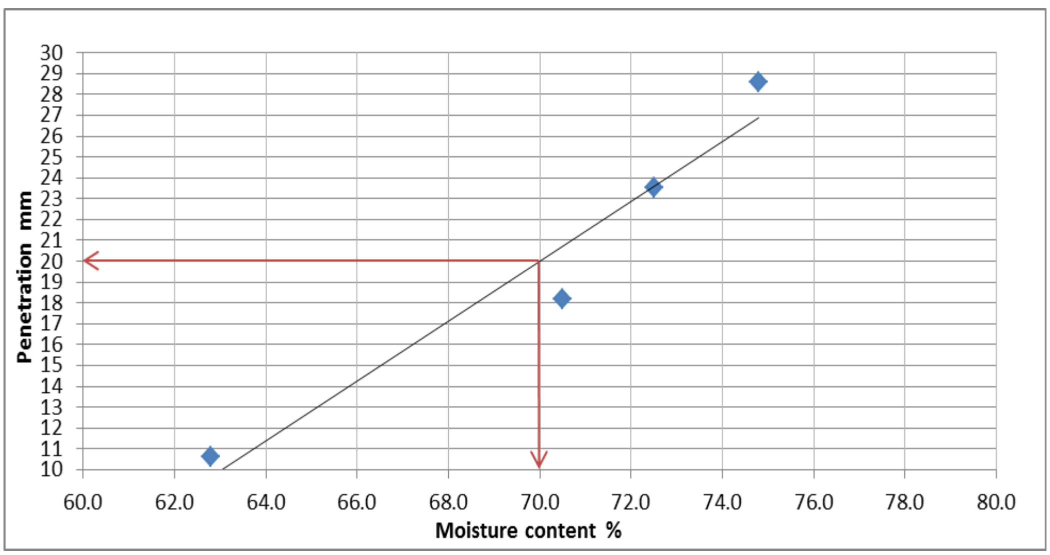

Figure A2.1: Graph of Moisture Content vs. Penetration

Then;

Liquid Limit of clayey sample (%) = 70

Table A2.4: Moisture Content Results of Plastic Limit Test

Container No.	24F	T
Weight of Water (g)	4.87	5.3
Weight of Dry Clayey Soil (g)	9.6	10.28
Moisture Content (%)	50.7	51.6

Then;

Water content of first sample (%) = 50.7

Water content of second sample (%) =51.6

Plastic Limit of Clayey sample (%) = (50.7+ 51.6)/2

= 51.2

Therefore;

Plasticity Indexof Clayey sample(%) = 70.0 - 51.2

= 18.8

Appendix3

Observations of Moisture Content Test

Table A3.1:Moisture Content Test of Clayey Model

No	Description	Top	Middle	Bottom
1	Weight of empty container (W_1) in g	5.07	7.00	20.25
2	Weight of container+ wet clayey soil (W_2) in g	24.13	23.47	39.23
3	Weight of container+ dry clayey soil (W_3) in g	16.98	17.27	32.13

Specimen Calculations of Moisture Content Test

From Table A3.1, set of readings for top sample of clayey model;

Moisture content (w) of topsample of clayey model = $[W_2 - W_3] / [W_3 - W_1]*100\%$

$= [24.13 - 16.98] / [16.98 - 5.07]*100\%$

$= 60\%$

Similarly, from Table A3.1, calculation of moisture content of middle and bottom samples of clayey model can be done and results can be as follows;

- Moisture content (w) of middle sample of clayey model = 60.3%
- Moisture content (w) of bottom sample of clayey model = 59.8%
    - Average moisture content (w) of clayey model = (60 + 60.3 + 59.8)/ 3

      = 60.03%

Appendix4

Observations of Hydrometer Analysis Test

Table A4.1: Hydrometer Analysis Test of Clayey Sample

Weight of Sample (g) = 50 Meniscus Correction C_m = 0.5 Dispersing Agent Correction C_d = 2.0		G_s = 2.57 K = 0.01246 a = 1.015
Temperature (^{0}C)	Time (min)	$R_H^{'}$
30	0.5	46.9
30	1	45.2
30	2	39.7
30	4	34.4
30	8	31.8
30	15	30.7
30	30	28.3
30	60	26.6
30	120	26.0
30	240	25.4

Specimen Calculations of Hydrometer Analysis Test

From Table A4.1, % Finer and Diameter of particle after 0.5 minute can be calculated as follows;

Hydrometer reading $R_H^{'}$ = 46.9

After Meniscus correction R_H = 46.9 + 0.5 (C_m = 0.5 g/l)
= 47.4

Value of L from table provided with the hydrometer = 8.5

Diameter of a particle from Stroke's law D $= K\sqrt{\frac{L}{t}}$

(K = 0.01246 at 30^{0}C temperature and 2.57 specific gravity of clay particles according to table provided with the hydrometer)

$$= 0.01246\sqrt{\frac{8.5}{0.5}}$$

$$= 0.05137 \text{ mm} \rightarrow 0.051 \text{ mm}$$

After dispersing agent correction $R = R_H - C_d = R_H^{'} - (C_d - C_m)$

$= 47.4 – 2$ ($C_d = 2$ g/l)

$= 45.4$

Percentage of soil remaining in suspension $P = \frac{Ra}{W} \times 100\,\%$

(a= 1.015 at 2.57 specific gravity of soil particles and taken as 1.0)

$$= \frac{45.4 \times 1.0}{50} \times 100\%$$

% Finer = 90.7 %

Similarly, from Table A4.1, calculation for % Finer and Diameter of particle can be obtained after 1 min, 2 min, 4 min, 8 min, 15 min, 30 min, 1 hr, 2 hrs and 4 hrs respectively and tabulated below;

Table A4.2:Results of Hydrometer Analysis Test

Time (min)	$R_H^{'}$	$R_H = R_H^{'} + C_m$	L (cm)	**L/t**	D (mm)	$R = R_H - C_d$	% Finer $P = \frac{Ra}{W} \times 100$
0.5	46.9	47.4	8.5	17	0.051	45.4	90.7
1	45.2	45.7	8.8	8.8	0.044	43.7	87.4
2	39.7	40.2	9.7	4.85	0.032	38.2	76.4
4	34.4	34.9	10.6	2.65	0.022	32.9	65.8
8	31.8	32.3	11.1	1.3875	0.015	30.3	60.5
15	30.7	31.2	11.2	0.7467	0.011	29.2	58.4
30	29.9	29.4	11.5	0.3833	0.008	27.4	54.8
60	29.3	28.8	11.9	0.1983	0.006	26.8	53.5
120	29.0	28.5	11.95	0.099583	0.004	26.5	52.9
240	29.2	28.2	12.0	0.05	0.002	26.2	52.3

Finally, Graph of Percentage of Finer vs. Particle Size (Diameter of particle) can be drawn.

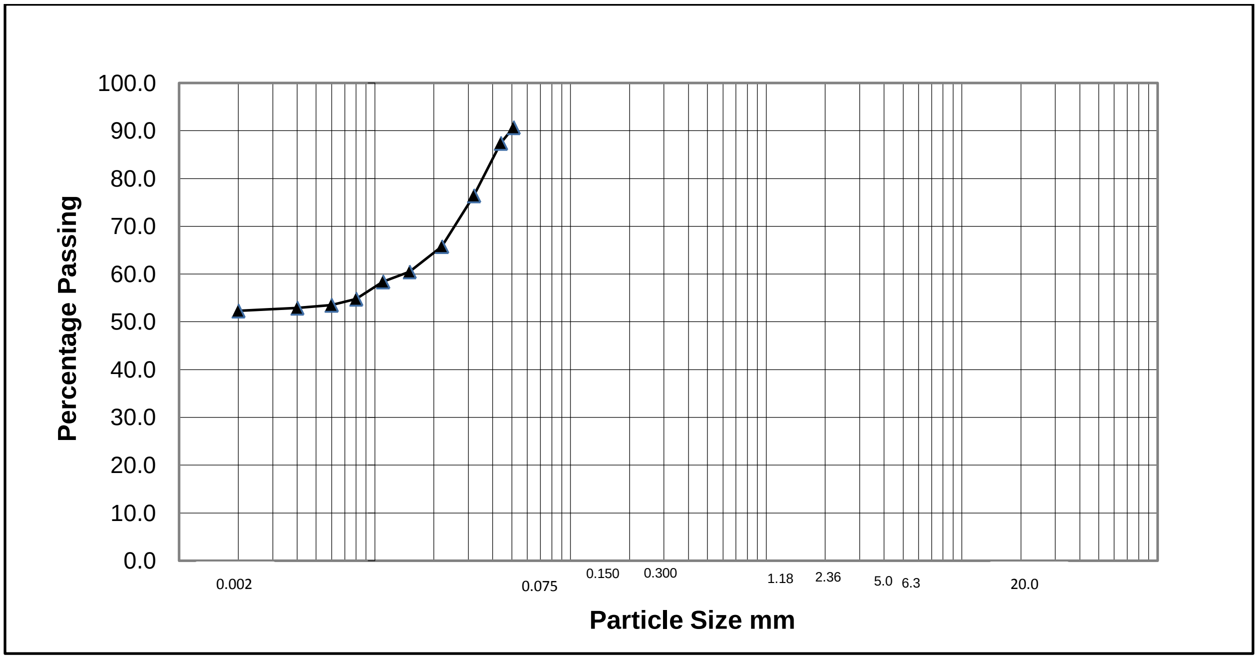

Figure A4.1:Graph of Percentage of Finer vs. Particle Size (Diameter of particle)

From above details of hydrometer analysis test, activity of soil(A) can be calculated as follows;

Activity of soil(A) = Plasticity Index / Percent of clay-sized particles (less than 2 µm)

= 18.8 / 52.3

= 0.36

Appendix 5

Observations of Standard Proctor Compaction Test

- Mass of the mould = 1.954 kg
- Volume of the mould = 944* 10^{-6} kg m^{-3}

Table A5.1: Standard Proctor Compaction Test of Clayey Sample

No	Mass of the mould + soil (g)	Mass of empty can (g)		Mass of wet soil + can (g)	
		Top sample	Bottom sample	Top sample	Bottom sample
1	3.493	9.83	9.17	141.35	165.04
2	3.550	9.54	9.34	142.70	167.45
3	3.648	10.24	9.80	150.80	158.50
4	3.749	10.58	10.50	134.36	140.60
5	3.757	9.56	10.80	144.56	145.70
6	3.751	11.78	9.45	157.80	160.46
7	3.671	10.70	11.96	147.30	150.40

Specimen Calculations of Standard Proctor Compaction Test

For first sample;

Mass of the soil = (Mass of the mould + soil) – (Mass of the mould)

= 3.493 kg -1.954 kg

= 1.539 kg

Bulk density = (Mass of the soil) / (Volume of the mould)

= 1.539 / 944* 10^{-6} kg m^{-3}

= 1629.98 kg m-3

Moisture content for top sample = (Mass of the wet soil + can) – (Mass of the dry soil + can) *100 / (Mass of the dry soil + can – Mass of the can)

= (141.35 - 124.93) * 100% / (124.93 – 9.83)

= 14.27 %

Moisture content for bottom sample $= \frac{(165.04 - 145.47)}{(145.47 - 9.17)} * 100$

$= 14.36\%$

Average moisture content $= \frac{14.27 + 14.36}{2}$

$= 14.315\%$

Dry density $= \frac{\text{Bulk density}}{(1 + \text{moisture content})}$

$= \frac{1629.98}{1+0.14315}$

$= 1425.87 \text{ kg m}^{-3}$

Similarly, from Table A5.1, calculation for Dry Density and Moisture Content of other samples can be obtained and tabulated below;

Table A5.2:Dry Density and Moisture Contentof Other Samples

Dry Density(kg m^{-3})	Moisture Content(%)
1425.87	14.315
1455.10	16.155
1513.62	18.555
1576.71	20.610
1556.45	22.730
1543.55	23.315
1437.24	26.585

Calculation for Dry density at 100% saturation (theoretical) to plot zero air void line can be done using equation - 02;

$$\rho_{d,\max} = \frac{G \rho_w}{1 + wG}$$ Equation - 02 ←

Where;

Specific Gravity (G) = 2.57

Density of Water (P_W) =1000 kg m^{-3}

w = Moisture Content

For sample 01,

$$\text{Dry density} = \frac{2.57 \times 1000}{(1 + 0.14315 \times 2.57)}$$

$$= 1878.79 \text{ kg m}^{-3}$$

Similarly values of dry density at 100% saturation can be calculated at different moisture content and tabulated below.

Table A5.3:Dry DensityValuesat 100% Saturation

Sample No	Moisture Content (%)	Dry Density (kg m^{-3})
01	14.315	1878.79
02	16.155	1815.99
03	18.555	1740.13
04	20.610	1680.07
05	22.730	1622.27
06	23.315	1607.05
07	26.585	1526.85

Appendix 6

Observations of Consolidation Test

Table A6.1:Clayey Sample Details

Test method		**BS 1377 : Part5 :1990 :3**		Date	30-Oct-16
			Particle density	2.57	Mg/m^3
DIMENSIONS		Initial specimen	Overall Change	Final Specimen	Specimen preparation method
Diameter	D mm	50.00		50.00	
Area	A mm^2	1963.50		1963.50	
Height	H mm	H_o 20.00	0.000	17.668	
Volume	V cm^3	39.27	0.00	39.27	

Table A6.2:Consolidation Test of Clayey Sample

Time(min)	Settlement Corresponding to the Different Loads			
	First Day 25 kPa	Second Day 50 kPa	Third Day 75 kPa	Fourth Day 100 kPa
0	0.000	1.160	1.666	2.020
0.25	0.212	1.202	1.690	2.040
0.5	0.236	1.210	1.698	2.044
1	0.262	1.218	1.712	2.050
2	0.298	1.232	1.721	2.058
4	0.360	1.252	1.742	2.068
8	0.436	1.286	1.764	2.082
15	0.502	1.328	1.790	2.100
30	0.626	1.392	1.822	2.128
60	0.772	1.462	1.858	2.162
120	0.938	1.532	1.898	2.208
240	1.052	1.586	1.936	2.240
1440	1.160	1.666	2.020	2.332

Specimen Calculations of Consolidation Test

Table A6.3:SpecimensCalculation

WEIGHINGS		Initial specimen (a)	(b)	Final specimen (c)
Wet soil + ~~ring~~ + tray	g	50.80	142.22	67.92
Dry soil + ~~ring~~ +tray	g	38.92	122.85	53.82
Ring + tray	g	19.23	90.73	30.53
Wet soil	g	m_o 31.57	m_o 51.49	37.39
Dry soil	g	m_d 19.69	m_d 32.12	m_d 23.3
Water	g	11.88	19.37	14.10
Moisture content (measured)	%	60.3	60.3	61.0
Moisture content (from trimmings)	%	w_o	60.3	
Density	Mg/m^3		1.31	0.95
Dry density	Mg/m^3		0.82	0.59
Voids ratio		e_o	2.143	3.35
Degree of saturation	%	S_o	72.4	46.9
Height of solids	H_S mm		6.36	4.07

Table A6.4:Consolidation TestCalculation

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
Increment No. N	Pressure P kPa	Cumulative Compression (ΔH-Y)	Consolidated height H = Ho-(ΔH-Y)	Voids ratio e= $\frac{H-H_S}{H_S}$	Incremental height change $\delta H = H_1 - H_2$ mm	pressure change δp kPa	$m_v = \frac{\delta H}{H_1} \frac{1000}{\delta p}$ m^2/MN	t_{90} min	$\bar{H} = 1/2(H_1+H_2)$ mm	c_V $\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/Year$	k $=c_v*m_v*\gamma_w$ $*10^{-7}$mm/s (Clay range)
0	0	0	20.000	2.143							
L1	25.000	1.160	18.840	1.960	1.160	25.00	2.320	43.560	19.420	0.961	7
L2	50.000	1.666	18.334	1.881	0.506	25.00	1.074	88.360	18.587	0.434	1
L3	75.000	2.020	17.980	1.825	0.354	25.00	0.772	100.000	18.157	0.366	1
L4	100.000	2.332	17.668	1.776	0.312	25.00	0.694	141.610	17.824	0.249	1

According to above calculations, Consolidation test graphs of clayey sample can be drawn as follow.

Consolidation Test Graphs

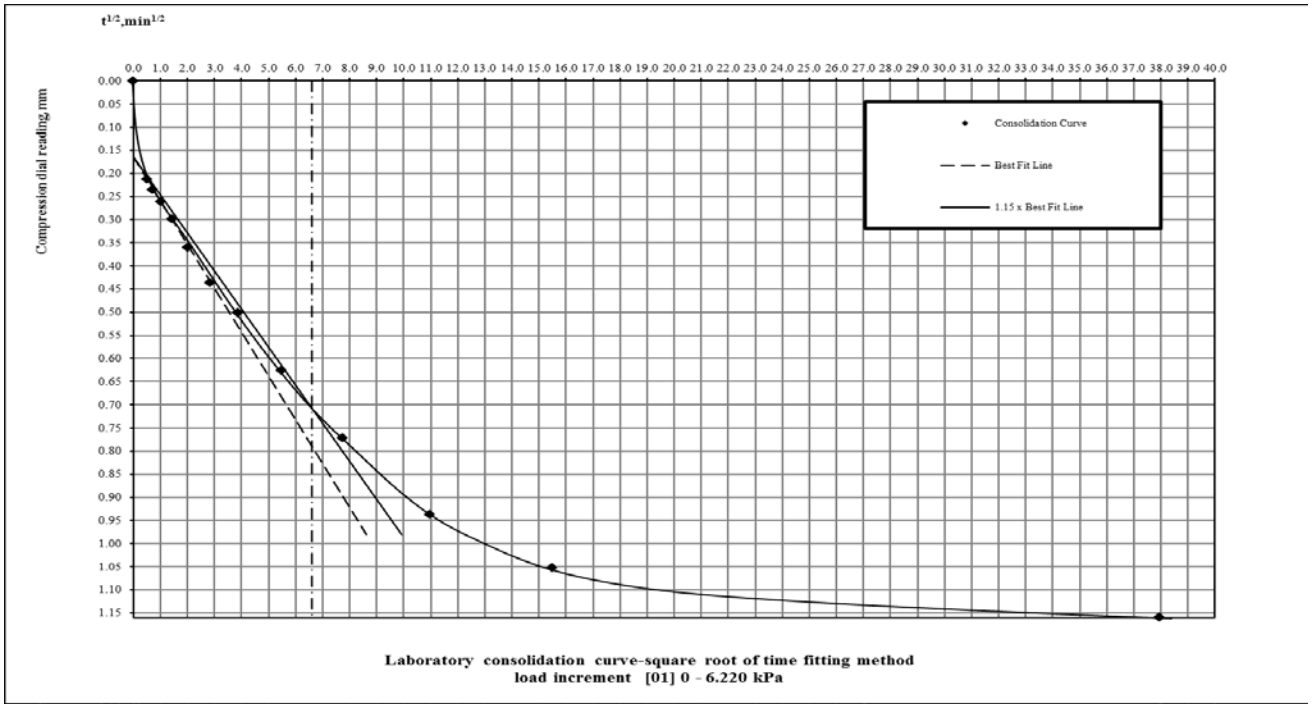

Figure A6.1: Consolidation Graph for 25 kPa Load

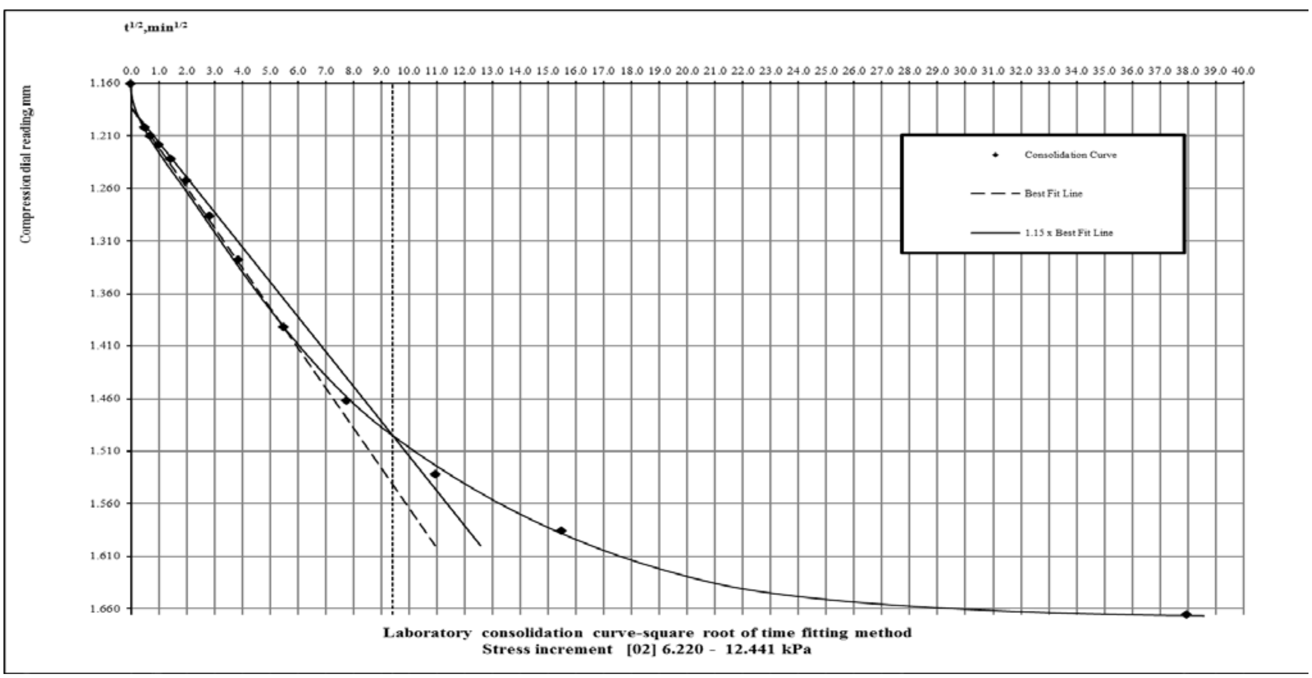

Figure A6.2: Consolidation Graph for 50 kPa Load

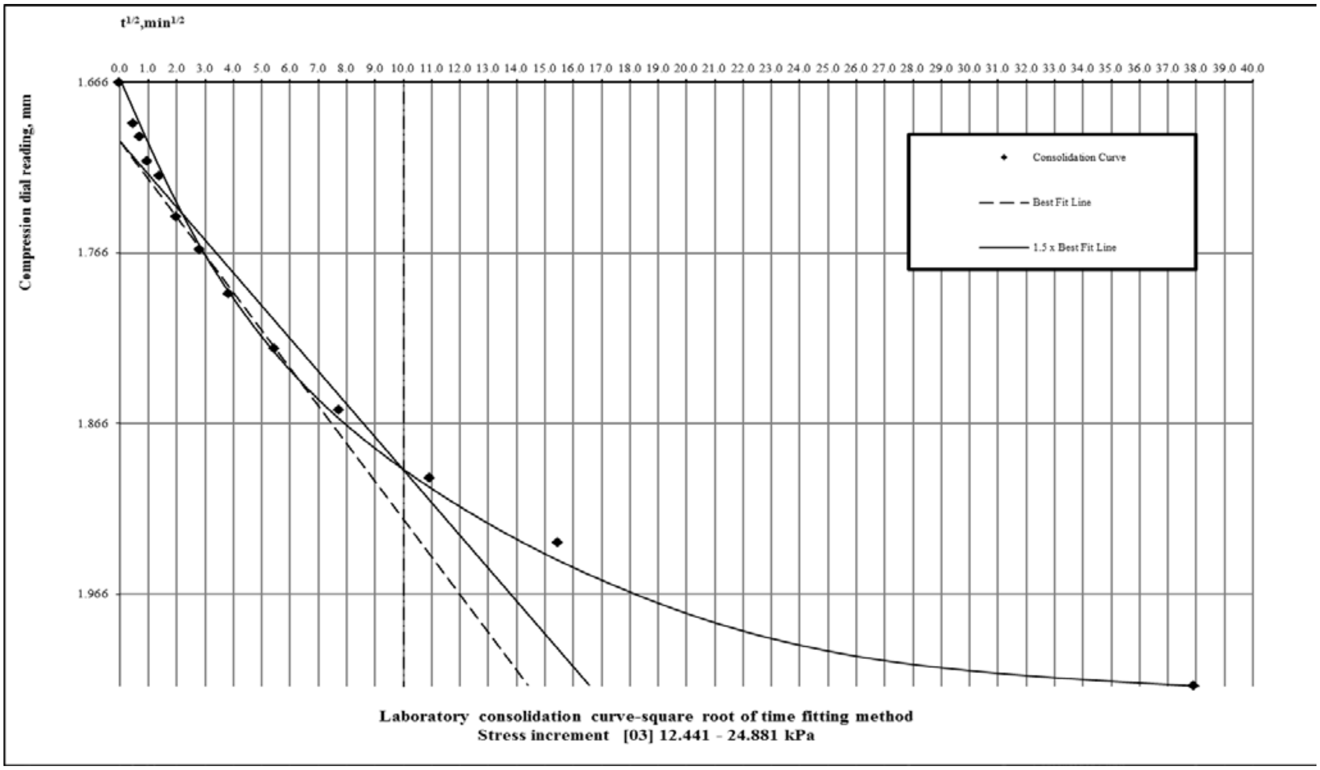

Figure A6.3: Consolidation Graph for 75 kPa Load

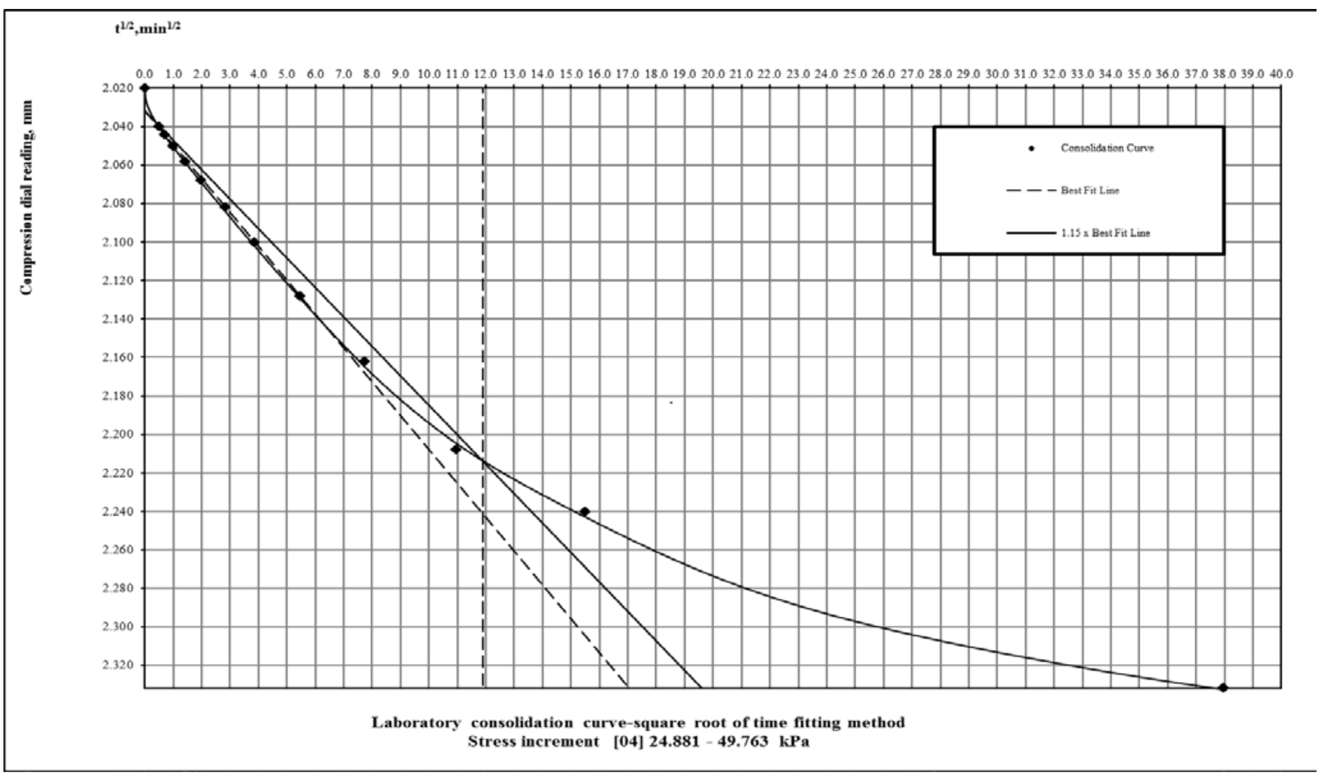

Figure A6.4: Consolidation Graph for 100 kPa Load

Appendix 7

Observations of Organic Content Test

- The mass of an empty, clean, and dry porcelain dish (M_P)(g)= 40.32
- The mass of the dish and soil specimen (M_{PDS})(g)= 49.73
- The mass of the dish containing the ash (burned soil) (M_{PA})(g) = 48.60

Specimen Calculations of Organic Content Test

The mass of the dry soil (M_D) = M_{PDS} - M_P
= 49.73 – 40.32
=9.41g

The mass of the ashed (burned) soil (M_A) = M_{PA} - M_P
= 48.60 - 40.32
= 8.28 g

The mass of organic matter(M_O) = M_D – M_A
= 9.41- 8.28
= 1.13 g

The organic matter (content) (*OM*) = (M_O/M_D)*100
= 1.13 / 9.41
= 12%

The organic matter (content) of given clayey sample is 12%.

Appendix 8

Observations of AIV, ACV and LAAV Tests

Table A8.1: Aggregate Impact Value Test of Concrete Debris

Test No.	1	2
Weight of sample (g)	248.6	248.2
Weight of sample passing 2.36 mm sieve after test (g)	78.8	75.2
Weight of sample retained on 2.36 mm sieve after test (g)	169.8	173.0

Table A8.2: Aggregate Impact Value Test of Aggregates

Test No.	1	2
Weight of sample (g)	303.4	303.4
Weight of sample passing 2.36 mm sieve after test (g)	74.7	77.0
Weight of sample retained on 2.36 mm sieve after test (g)	228.4	226.5

Specimen Calculation

From Table A8.1, 2nd set of readings,

Weight of sample in standard measure = 248.2 g

Weight of sample passing 2.36 mm sieve after test = 75.2 g

Weight of sample retained on 2.36 mm sieve after test = 158.3 g

Hence, Aggregate Impact Value of concrete debris = 30.3 %

Similarly,

From 1st set of readings, Aggregate Impact Value = 31.7 %

Hence, Average Aggregate Impact Value of concrete debris = 31 %

Note: Plaster debris sample was not be prepared for Aggregate Impact Value Test as it was broken into small particles when preparing sample.

Table A8.3: Aggregate Crushing Value Test of Concrete Debris

Test No.	1	2
Weight of sample in standard measure (g)	2181	2185
Weight of sample passing 2.36 mm sieve after test (g)	761	767
Weight of sample retained on 2.36 mm sieve after test (g)	1414	1410

Table A8.4: Aggregate Crushing Value Test of Aggregates

Test No.	1	2
Weight of sample in standard measure (g)	2185	2189
Weight of sample passing 2.36 mm sieve after test (g)	546	556
Weight of sample retained on 2.36 mm sieve after test (g)	1634	1629

Specimen Calculation

From Table A8.3, 2nd set of readings,

Weight of sample in standard measure = 2185 g

Weight of sample passing 2.36 mm sieve after test = 767 g

Weight of sample retained on 2.36 mm sieve after test = 1410 g

Hence, Aggregate Crushing Value of concrete debris = 767/2185 x 100

= 35.1 %

Similarly,

From 1st set of readings, Aggregate Crushing Value = 34.9 %

Hence, Average Aggregate Crushing Value of concrete debris = 35 %

Note: Plaster debris sample was not be prepared for Aggregate Crushing Value Test as it broken to small particles when preparing sample

Table A8.5: Los Angeles Abrasive Value Test of Concrete Debris

Test No.	1	2
Total Weight of sample (g)	5000	5000
Weight of sample passing 1.7 mm sieve after test (g)	2130	2070
Weight of sample retained on 1.7 mm sieve after test (g)	2870	2930

Table A8.6: Los Angeles Abrasive Value Test of Aggregates

Test No.	1	2
Total Weight of sample (g)	5000	5000
Weight of sample passing 1.7 mm sieve after test (g)	1596	1544
Weight of sample retained on 1.7 mm sieve after test (g)	3400	3449

Specimen Calculation

From Table A8.5, 2^{nd} set of readings,

Total weight of sample (W1 g) = 5000 g

Weight retained on 1.7 mm sieve after rotation (W2 g) = 2699 g

Weight passing 1.7 mm sieve after rotation (W2 g) = 2271 g

Hence, Los Angeles Abrasion Value = 41.4 %

Similarly,

From 1^{st} set of readings, Los Angeles Abrasion Value = 42.6 %

Hence, Average Los Angeles Abrasion Value of concrete debris = 42 %

Note: Plaster debris sample was not be prepared for Los Angeles Abrasive Value Test as it broken to small particles when preparing sample.

Appendix 9

Observations of Slake Durability Test

Table A9.1: Slake Durability Test of Brick Debris

Test date	Initial	After one month	After two months
Weight of sample, dry weight basis(g)	500	500	500
Weight retained after 1st cycle, dry weight basis(g)	416	413	412
Weight retained after 2nd cycle, dry weight basis(g)	357	353	346

Table A9.2: Slake Durability Test of Concrete Debris

Test date	Initial	After one month	After two months
Weight of sample, dry weight basis(g)	500	500	500
Weight retained after 1st cycle, dry weight basis(g)	479	481	485
Weight retained after 2nd cycle, dry weight basis(g)	464	470	477

Table A9.3: Slake Durability Test of Plaster Debris

Test date	Initial	After one month	After two months
Weight of sample, dry weight basis(g)	500	500	500
Weight retained after 1st cycle, dry weight basis(g)	460	481	479
Weight retained after 2nd cycle, dry weight basis(g)	459	465	467

Specimen Calculations of Slake Durability Test

From Table A9.1, Initial set of readings;

Weight of sample,dry weight basis (g) = 500 g

Weight retained after 1st cycle, dry weight basis (g) = 416 g

Hence, Slake Indexof Brick debris after 1st cycle =(416/500)x100 %

= 83.2 %

Weight retained after 2ndcycle, dry weight basis (g) = 357 g

Hence, Slake Index of Brick debris after 2ndcycle = (357/500)x100%

=71.4 %

Similarly;

From after one month set of readings,

Slake Index of Brick debrisafter 1st cycle=82.6 %
Slake Index of Brick debris after 2nd cycle = 70.6 %

From after two months set of readings,

Slake Index of Brick debrisafter 1st cycle= 82.4 %
Slake Index of Brick debris after 2nd cycle = 69.2 %

Similarly, calculation was done for concrete block debris and cement plaster separately and values are tabulated below;

Table A9.4: Initial Values of Slake Durability Test of Different Type of Debris

Sample name	Initial weight,dry weight basis (g)	Weight retained after 1st cycle, dry weight basis (g)	% Weight retained after 1st cycle, dry weight basis	Weight retained after 2nd cycle, dry weight basis (g)	% Weight retained after 2nd cycle, dry weight basis
Concrete	500	479	95.8	464	92.8
Plaster	500	460	92.0	459	91.8
Brick	500	416	83.2	357	71.4

Table A9.5:Values of Slake Durability Test of Different Type of Debris after One Month

Sample name	Initial weight,dry weight basis (g)	Weight retained after 1st cycle, dry weight basis (g)	% Weight retained after 1st cycle, dry weight basis	Weight retained after 2nd cycle, dry weight basis (g)	% Weight retained after 2nd cycle, dry weight basis
Concrete	500	481	96.2	470	94.0
Plaster	500	481	96.2	465	93.0
Brick	500	413	82.6	353	70.6

Table A9.6:Values of Slake Durability Test of Different Type of Debrisafter Two Months

Sample name	Initial weight,dry weight basis (g)	Weight retained after 1st cycle, dry weight basis (g)	% Weight retained after 1st cycle, dry weight basis	Weight retained after 2nd cycle, dry weight basis (g)	% Weight retained after 2nd cycle, dry weight basis
Concrete	500	485	97.0	477	95.4
Plaster	500	479	95.8	467	93.4
Brick	500	412	82.4	346	69.2

These valuescan be shown graphically in Figure A9.1, FigureA9.2 and FigureA9.3.

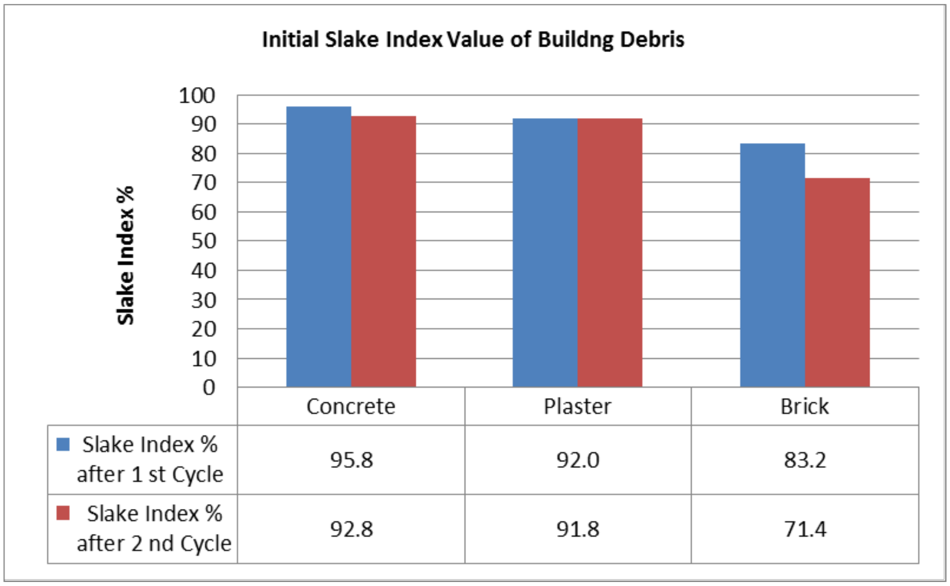

Figure A9.1:Initial Slake Index Values of Different Type of Debris

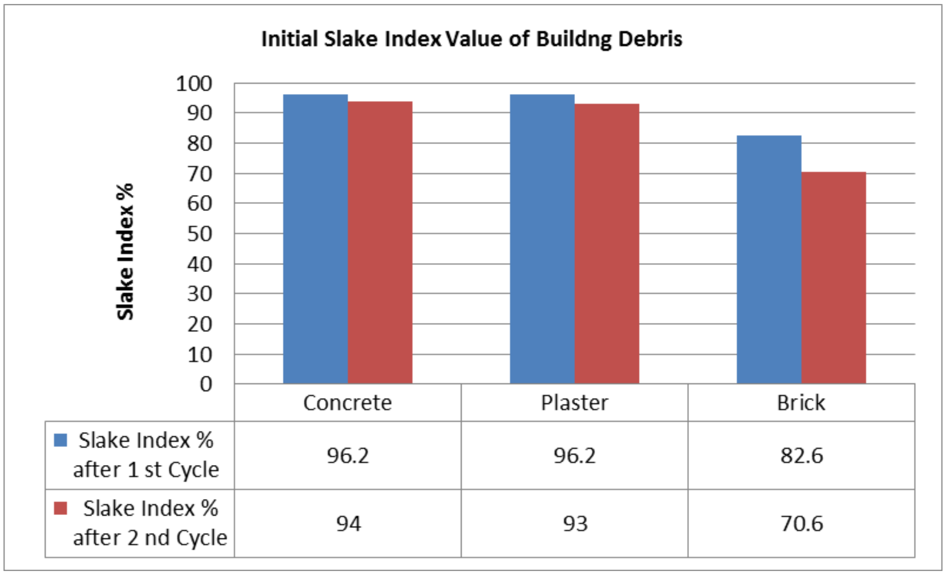

Figure A9.2:Slake Index Values of Different Type of Debris after One Month

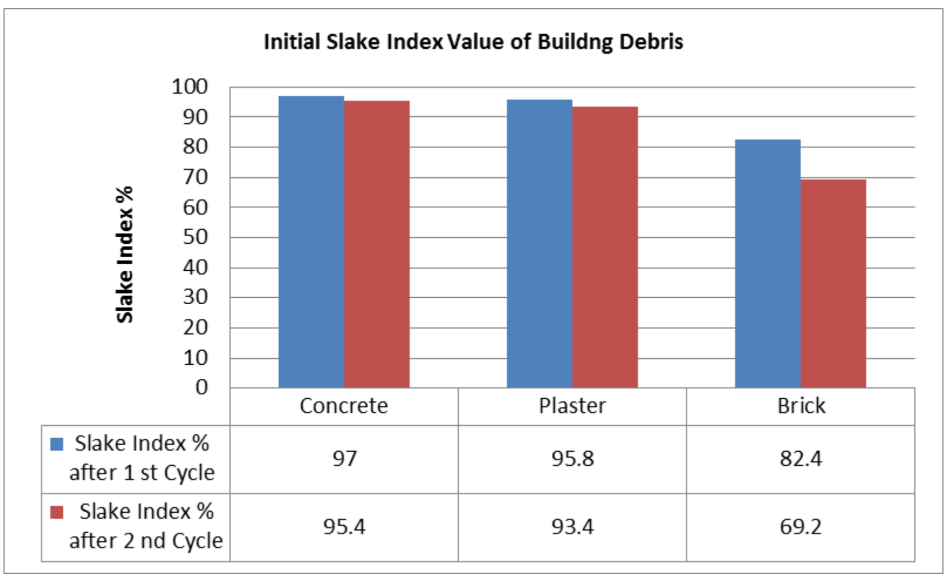

Figure A9.3:Slake Index Values of Different Type of Debris after Two Months

Appendix 10

Observations of Compressive Strength Test

Table A10.1:Compressive Strength Test of Concrete

Penetration of Plunger (cm)	Dial Reading of proving ring
0	0
0.125	1
0.25	2
0.375	2
0.5	3
0.625	3
0.75	3
0.875	3
1	4
1.125	4
1.25	4
1.375	4
1.5	4
1.625	4
1.75	5
1.875	5
2	5
2.125	5
2.25	5
2.375	5
2.5	5
2.625	5
2.875	6
3	6
3.125	6
3.25	6
3.375	6
3.5	7
3.625	7
3.75	7
3.875	7
4	7
4.125	7
4.25	8
4.375	8
4.5	8
4.625	8
4.75	8
4.875	9
5	9
5.125	9
5.25	9
5.375	10
5.5	10
5.625	10
5.75	10
5.875	10
6	10

Table A10.2:Compressive Strength Test of Aggregate

Penetration of Plunger (cm)	Dial Reading of proving ring
0	0
0.125	1
0.25	1
0.375	2
0.5	3
0.625	4
0.75	5
0.875	6
1	6
1.125	6
1.25	7
1.375	7
1.5	7
1.625	7
1.75	7
1.875	8
2	8
2.125	8
2.25	8
2.375	8
2.5	8
2.625	9
2.75	9
2.875	9
3	9
3.125	9
3.25	10
3.375	10
3.5	10
3.625	10
3.75	10
3.875	10
4	11
4.125	11
4.25	11
4.375	11
4.5	11
4.625	12
4.75	12
4.875	12
5	12
5.125	12
5.25	12
5.375	12
5.5	13
5.625	13
5.75	13
5.875	13
6	13

Table A10.3:Compressive Strength Test of Brick

Penetration of Plunger (cm)	Dial Reading of proving ring
0	0
0.125	1
0.25	1
0.375	1
0.5	1
0.625	1
0.75	1
0.875	1
1	1
1.125	1
1.25	1
1.375	1
1.5	1
1.625	1
1.75	2
1.875	2
2	2
2.125	2
2.25	2
2.375	2
2.5	2
2.625	2
2.75	2
2.875	2
3	2
3.125	2
3.25	3
3.375	3
3.5	3
3.625	3
3.75	3
3.875	3
4	3
4.125	3
4.25	3
4.375	3
4.5	3
4.625	3
4.75	3
4.875	4
5	4
5.125	4
5.25	4
5.375	4
5.5	4
5.625	4
5.75	4
5.875	4
6	4

Table A10.4:Compressive Strength Test of Plaster

Penetration of Plunger (cm)	Dial Reading of proving ring
0	0
0.125	1
0.25	1
0.375	1
0.5	2
0.625	2
0.75	2
0.875	3
1	3
1.125	3
1.25	3
1.375	3
1.5	3
1.625	3
1.75	4
1.875	4
2	4
2.125	4
2.25	4
2.375	4
2.5	4
2.625	4
2.75	5
2.875	5
3	5
3.125	5
3.25	5
3.375	5
3.5	5
3.625	5
3.75	5
3.875	5
4	5
4.125	5
4.25	5
4.375	5
4.5	5
4.625	6
4.75	6
4.875	6
5	6
5.125	6
5.25	6
5.375	6
5.5	6
5.625	6
5.75	6
5.875	6
6	6

Table A10.5:Compressive Strength Test of Clay

Penetration of Plunger (cm)	Dial Reading of proving ring
0	0
0.125	1
0.25	2
0.375	2
0.5	3
0.625	3
0.75	3
0.875	3
1	4
1.125	4
1.25	4
1.375	4
1.5	4
1.625	4
1.75	5
1.875	5
2	5
2.125	5
2.25	6
2.375	6
2.5	6
2.625	6
2.75	6
2.875	6
3	6
3.125	7
3.25	7
3.375	7
3.5	7
3.625	7
3.75	7
3.875	8
4	8
4.125	8
4.25	8
4.375	8
4.5	8
4.625	8
4.75	8
4.875	9
5	9
5.125	9
5.25	9
5.375	9
5.5	9
5.625	9
5.75	10
5.875	10
6	10

Appendix 11

Values of Compressive Strength Test

Table A11.1: Compressive Strength Values of Concrete

Penetration of Plunger (cm)	Dial Reading of proving ring	Actual Load (kN)
0	0	0.03
0.125	1	0.05
0.25	2	0.07
0.375	2	0.07
0.5	3	0.09
0.625	3	0.09
0.75	3	0.09
0.875	3	0.09
1	4	0.11
1.125	4	0.11
1.25	4	0.11
1.375	4	0.11
1.5	4	0.11
1.625	4	0.11
1.75	5	0.13
1.875	5	0.13
2	5	0.13
2.125	5	0.13
2.25	5	0.13
2.375	5	0.13
2.5	5	0.13
2.625	5	0.13
2.875	6	0.15
3	6	0.15
3.125	6	0.15
3.25	6	0.15
3.375	6	0.15
3.5	7	0.17
3.625	7	0.17
3.75	7	0.17
3.875	7	0.17
4	7	0.17
4.125	7	0.17
4.25	8	0.19
4.375	8	0.19
4.5	8	0.19
4.625	8	0.19
4.75	8	0.19
4.875	9	0.21
5	9	0.21
5.125	9	0.21
5.25	9	0.21
5.375	10	0.23
5.5	10	0.23
5.625	10	0.23
5.75	10	0.23
5.875	10	0.23
6	10	0.23

Table A11.2: Compressive Strength Values of Aggregate

Penetration of Plunger (cm)	Dial Reading of proving ring	Actual Load KN
0	0	0.03
0.125	1	0.05
0.25	1	0.05
0.375	2	0.07
0.5	3	0.09
0.625	4	0.11
0.75	5	0.13
0.875	6	0.15
1	6	0.15
1.125	6	0.15
1.25	7	0.17
1.375	7	0.17
1.5	7	0.17
1.625	7	0.17
1.75	7	0.17
1.875	8	0.19
2	8	0.19
2.125	8	0.19
2.25	8	0.19
2.375	8	0.19
2.5	8	0.19
2.625	9	0.21
2.75	9	0.21
2.875	9	0.21
3	9	0.21
3.125	9	0.21
3.25	10	0.23
3.375	10	0.23
3.5	10	0.23
3.625	10	0.23
3.75	10	0.23
3.875	10	0.23
4	11	0.25
4.125	11	0.25
4.25	11	0.25
4.375	11	0.25
4.5	11	0.25
4.625	12	0.27
4.75	12	0.27
4.875	12	0.27
5	12	0.27
5.125	12	0.27
5.25	12	0.27
5.375	12	0.27
5.5	13	0.29
5.625	13	0.29
5.75	13	0.29
5.875	13	0.29
6	13	0.29

Table A11.3: Compressive Strength Values of Brick

Penetration of Plunger (cm)	Dial Reading of proving ring	Actual Load KN
0	0	0.03
0.125	1	0.05
0.25	1	0.05
0.375	1	0.05
0.5	1	0.05
0.625	1	0.05
0.75	1	0.05
0.875	1	0.05
1	1	0.05
1.125	1	0.05
1.25	1	0.05
1.375	1	0.05
1.5	1	0.05
1.625	1	0.05
1.75	2	0.07
1.875	2	0.07
2	2	0.07
2.125	2	0.07
2.25	2	0.07
2.375	2	0.07
2.5	2	0.07
2.625	2	0.07
2.75	2	0.07
2.875	2	0.07
3	2	0.07
3.125	2	0.07
3.25	3	0.09
3.375	3	0.09
3.5	3	0.09
3.625	3	0.09
3.75	3	0.09
3.875	3	0.09
4	3	0.09
4.125	3	0.09
4.25	3	0.09
4.375	3	0.09
4.5	3	0.09
4.625	3	0.09
4.75	3	0.09
4.875	4	0.11
5	4	0.11
5.125	4	0.11
5.25	4	0.11
5.375	4	0.11
5.5	4	0.11
5.625	4	0.11
5.75	4	0.11
5.875	4	0.11
6	4	0.11

Table A11.4:Compressive Strength Values of Plaster

Penetration of Plunger (cm)	Dial Reading of proving ring	Actual Load KN
0	0	0.03
0.125	1	0.05
0.25	1	0.05
0.375	1	0.05
0.5	2	0.07
0.625	2	0.07
0.75	2	0.07
0.875	3	0.09
1	3	0.09
1.125	3	0.09
1.25	3	0.09
1.375	3	0.09
1.5	3	0.09
1.625	3	0.09
1.75	4	0.11
1.875	4	0.11
2	4	0.11
2.125	4	0.11
2.25	4	0.11
2.375	4	0.11
2.5	4	0.11
2.625	4	0.11
2.75	5	0.13
2.875	5	0.13
3	5	0.13
3.125	5	0.13
3.25	5	0.13
3.375	5	0.13
3.5	5	0.13
3.625	5	0.13
3.75	5	0.13
3.875	5	0.13
4	5	0.13
4.125	5	0.13
4.25	5	0.13
4.375	5	0.13
4.5	5	0.13
4.625	6	0.15
4.75	6	0.15
4.875	6	0.15
5	6	0.15
5.125	6	0.15
5.25	6	0.15
5.375	6	0.15
5.5	6	0.15
5.625	6	0.15
5.75	6	0.15
5.875	6	0.15
6	6	0.15

Table A11.5:Compressive Strength Values of Clay

Penetration of Plunger (cm)	Dial Reading of proving ring	Actual Load KN
0	0	0.03
0.125	1	0.05
0.25	2	0.07
0.375	2	0.07
0.5	3	0.09
0.625	3	0.09
0.75	3	0.09
0.875	3	0.09
1	4	0.11
1.125	4	0.11
1.25	4	0.11
1.375	4	0.11
1.5	4	0.11
1.625	4	0.11
1.75	5	0.13
1.875	5	0.13
2	5	0.13
2.125	5	0.13
2.25	6	0.15
2.375	6	0.15
2.5	6	0.15
2.625	6	0.15
2.75	6	0.15
2.875	6	0.15
3	6	0.15
3.125	7	0.17
3.25	7	0.17
3.375	7	0.17
3.5	7	0.17
3.625	7	0.17
3.75	7	0.17
3.875	8	0.19
4	8	0.19
4.125	8	0.19
4.25	8	0.19
4.375	8	0.19
4.5	8	0.19
4.625	8	0.19
4.75	8	0.19
4.875	9	0.21
5	9	0.21
5.125	9	0.21
5.25	9	0.21
5.375	9	0.21
5.5	9	0.21
5.625	9	0.21
5.75	10	0.23
5.875	10	0.23
6	10	0.23

Appendix 12

Observations of Vane Shear Test

Table A12.1: Vane Shear Test at 80 mm Distancefrom Center of Model Initially

Test Location	Test Depth (mm)	Shear Strength(divisions) fromApparatus for Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
80 mm from center of model	0	20	20	21	19	7.5
80 mm from center of model	80	26	24	23	22	11

Table A12.2:Vane Shear Test at 35 mm Distancefrom Center of Model Initially

Test Location	Test Depth (mm)	Shear Strength(divisions) fromApparatus for Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
35 mm from center of model	0	24	24	24	23.5	12
35 mm from center of model	80	32	30	31	29	16

Table A12.3:Vane Shear Test at 80 mm Distancefrom Center of Model with Load after 07 Days Soaked Period

Test Location	Test Depth (mm)	Shear Strength(divisions) fromApparatus for Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
80 mm from center of model	0	26	21	22	20	10
80 mm from center of model	80	36	32	34	34	13

Table A12.4:Vane Shear Test at 35 mm Distancefrom Center of Model with Load after 07 Days Soaked Period

Test Location	Test Depth (mm)	Shear Strength(divisions) fromApparatus for Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
35 mm from center of model	0	34	31	30	32	14
35 mm from center of model	80	40	39	37	38	22

Table A12.5:Vane Shear Test at 80 mm Distancefrom Center of Model with Load after One Month Soaked Period

Test Location	Test Depth (mm)	Shear Strength(divisions) fromApparatus for Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
80 mm from center of model	0	31	30	29	29	13
80 mm from center of model	80	42	37	36	36	17

Table A12.6:Vane Shear Test at 35 mm Distancefrom Center of Model with Load after One Month Soaked Period

Test Location	Test Depth (mm)	Shear Strength(divisions) fromApparatus for Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
35 mm from center of model	0	37	36	34	36	17
35 mm from center of model	80	45	43	39	42	24

Appendix 13

Shear Strength Values of Clay Surrounding

Table A13.1:Shear Strength Valuesat 80 mm Distancefrom Center of Model Initially

Test Location	Test Depth (mm)	Shear Strength(kPa) of Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
80 mm from center of model	0	6	6	6	5	2
80 mm from center of model	80	7	7	6	6	3

Table A13.2:Shear Strength Valuesat 35 mm Distancefrom Center of Model Initially

Test Location	Test Depth (mm)	Shear Strength(kPa) of Clay Surrounding				
		Aggregate	Concrete	Plaster	Brick	Clay
35 mm from center of model	0	7	7	7	6.5	3
35 mm from center of model	80	9	8	9	8	4

Table A13.3:Shear Strength Valuesat 80 mm Distancefrom Center of Model with Load after 07 Days Soaked Period

Test Location	Test Depth (mm)	Shear Strength(kPa) of Clay Surrounding with load(8 kg) after 07 days				
		Aggregate	Concrete	Plaster	Brick	Clay
20 mm from edge of model	0	7	6	6	6	3
20 mm from edge of model	80	10	9	9	9	4

Table A13.4:Shear Strength Valuesat 35 mm Distancefrom Center of Model with Load after 07 Days Soaked Period

Test Location	Test Depth (mm)	Shear Strength(kPa) of Clay Surrounding with load(8 kg) after 07 days				
		Aggregate	Concrete	Plaster	Brick	Clay
35 mm from center of model	0	9	9	8	9	4
35 mm from center of model	80	11	11	10	11	6

Table A13.5:Shear Strength Valuesat 80 mm Distancefrom Center of Model with Load after One Month Soaked Period

Test Location	Test Depth (mm)	Shear Strength(kPa) of Clay Surrounding with load(8 kg) after One Month				
		Aggregate	Concrete	Plaster	Brick	Clay
20 mm from edge of model	0	9	8	8	8	4
20 mm from edge of model	80	12	10	10	10	5

Table A13.6:Shear Strength Valuesat 35 mm Distancefrom Center of Model with Load after One Month Soaked Period

Test Location	Test Depth (mm)	Shear Strength(kPa) of Clay Surrounding with load(8 kg) after One Month				
		Aggregate	Concrete	Plaster	Brick	Clay
35 mm from center of model	0	10	10	9	10	5
35 mm from center of model	80	13	12	11	12	7

Appendix 14

Table A14.1: Shear Strength Calibration Chart for the 33 mm Blade

Divisions	kPa	Divisions	kPa	Divisions	kPa	Divisions	kPa
1	0	36	10	71	20	106	30
2	1	37	10	72	20	107	30
3	1	38	11	73	20	108	30
4	1	39	11	74	21	109	30
5	1	40	11	75	21	110	31
6	2	41	11	76	21	111	31
7	2	42	12	77	21	112	31
8	2	43	12	78	22	113	31
9	3	44	12	79	22	114	32
10	3	45	13	80	22	115	32
11	3	46	13	81	23	116	32
12	3	47	13	82	23	117	33
13	4	48	13	83	23	118	33
14	4	49	14	84	23	119	33
15	4	50	14	85	24	120	33
16	4	51	14	86	24	121	34
17	5	52	14	87	24	122	34
18	5	53	15	88	25	123	34
19	5	54	15	89	25	124	35
20	6	55	15	90	25	125	35
21	6	56	16	91	25	126	35
22	6	57	16	92	26	127	35
23	6	58	16	93	26	128	36
24	7	59	16	94	26	129	36
25	7	60	17	95	26	130	36
26	7	61	17	96	27	131	36
27	8	62	17	97	27	132	37
28	8	63	18	98	27	133	37
29	8	64	18	99	28	134	37
30	8	65	18	100	28	135	38
31	9	66	18	101	28	136	38
32	9	67	19	102	28	137	38
33	9	68	19	103	29	138	38
34	9	69	19	104	29	139	39
35	10	70	20	105	29	140	39

Appendix 15

Figure A15.1: Construction Debris

Figure A15.2: Concrete Debris

Figure A15.3: Brick Debris

Figure A15.4: Cement Plaster Debris