Direct Shear Test

Test date:	2025-11-09
Group no.:	1-2

Normal load:	25 kN
Sample size:	0.0036 m^2

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
0.1	0.004	0.731	-0.88	-0.24
0.2	0.106	0.744	20.16	5.60
0.3	0.209	0.758	28.58	7.94
0.4	0.316	0.760	34.19	9.50
0.5	0.425	0.769	39.10	10.86
0.6	0.541	0.780	42.60	11.83
0.7	0.646	0.779	46.11	12.81
0.8	0.761	0.789	49.96	13.88
0.9	0.865	0.788	53.12	14.76
1.0	0.966	0.786	54.87	15.24
1.1	1.073	0.784	56.98	15.83
1.2	1.190	0.787	60.48	16.80
1.3	1.303	0.785	61.89	17.19
1.4	1.414	0.779	61.89	17.19
1.5	1.524	0.784	64.52	17.92
1.6	1.644	0.777	64.87	18.02
1.7	1.771	0.764	65.74	18.26
1.8	1.873	0.762	66.62	18.51
1.9	1.994	0.755	68.37	18.99
2.0	2.117	0.743	69.78	19.38
2.1	2.246	0.740	70.65	19.63
2.2	2.364	0.733	72.41	20.11
2.3	2.492	0.720	72.76	20.21
2.4	2.595	0.719	73.28	20.36
2.5	2.725	0.712	72.41	20.11
2.6	2.826	0.699	70.13	19.48
2.7	2.960	0.702	72.76	20.21
2.8	3.084	0.695	75.39	20.94
2.9	3.212	0.683	76.26	21.18
3.0	3.343	0.683	76.79	21.33
3.1	3.467	0.670	77.66	21.57
3.2	3.603	0.665	77.66	21.57
3.3	3.731	0.661	78.02	21.67
3.4	3.833	0.654	77.14	21.43
3.5	3.966	0.658	78.02	21.67
3.6	4.093	0.653	77.14	21.43
3.7	4.195	0.652	77.14	21.43

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
3.8	4.320	0.652	78.02	21.67
3.9	4.445	0.640	77.66	21.57
4.0	4.546	0.643	77.14	21.43
4.1	4.671	0.635	77.66	21.57
4.2	4.800	0.631	77.66	21.57
4.3	4.928	0.631	77.66	21.57
4.4	5.057	0.621	77.14	21.43
4.5	5.159	0.624	76.79	21.33
4.6	5.291	0.619	76.79	21.33
4.7	5.393	0.617	75.91	21.09
4.8	5.525	0.614	75.91	21.09
4.9	5.628	0.614	75.39	20.94
5.0	5.760	0.610	74.51	20.70
5.1	5.865	0.616	74.51	20.70
5.2	5.996	0.630	74.16	20.60
5.3	6.106	0.645	72.76	20.21
5.4	6.209	0.661	72.41	20.11
5.5	6.310	0.680	72.41	20.11
5.6	6.443	0.696	71.53	19.87
5.7	6.546	0.707	71.88	19.97
5.8	6.676	0.717	71.88	19.97
5.9	6.782	0.725	71.00	19.72
6.0	6.911	0.738	71.53	19.87
6.1	7.014	0.740	70.65	19.63
6.2	7.149	0.756	70.65	19.63
6.3	7.274	0.763	72.41	20.11
6.4	7.376	0.778	72.41	20.11
6.5	7.501	0.787	72.41	20.11
6.6	7.606	0.800	72.41	20.11
6.7	7.732	0.818	71.88	19.97
6.8	7.835	0.837	72.41	20.11
6.9	7.962	0.864	72.41	20.11
7.0	8.090	0.876	72.76	20.21
7.1	8.191	0.889	72.76	20.21
7.2	8.321	0.904	73.63	20.45
7.3	8.449	0.909	73.63	20.45
7.4	8.550	0.922	74.16	20.60
7.5	8.680	0.935	74.51	20.70
7.6	8.782	0.939	74.51	20.70
7.7	8.911	0.953	74.51	20.70
7.8	9.013	0.954	75.04	20.84
7.9	9.143	0.972	75.04	20.84

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
8.0	9.269	0.977	75.39	20.94
8.1	9.371	0.990	76.26	21.18
8.2	9.498	1.005	75.91	21.09
8.3	9.600	1.009	75.91	21.09
8.4	9.728	1.026	77.14	21.43
8.5	9.854	1.034	77.66	21.57
8.6	9.958	1.048	78.02	21.67
8.7	10.085	1.054	78.54	21.82
8.8	10.213	1.061	78.89	21.91
8.9	10.348	1.080	78.89	21.91
9.0	10.476	1.092	78.54	21.82
9.1	10.578	1.103	78.02	21.67
9.2	10.704	1.113	78.89	21.91
9.3	10.834	1.123	79.42	22.06
9.4	10.962	1.139	79.42	22.06
9.5	11.065	1.144	79.42	22.06
9.6	11.196	1.156	79.77	22.16

Direct Shear Test

Test date:	2025-11-09
Group no.:	3-4

Normal load:	50 kN
Sample size:	0.0036 m^2

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
0.1	-0.006	0.466	-0.88	-0.24
0.2	0.101	0.511	45.23	12.56
0.3	0.202	0.543	54.00	15.00
0.4	0.316	0.561	66.62	18.51
0.5	0.433	0.573	68.37	18.99
0.6	0.549	0.587	79.42	22.06
0.7	0.668	0.584	89.41	24.84
0.8	0.790	0.589	94.32	26.20
0.9	0.908	0.587	99.93	27.76
1.0	1.023	0.592	105.19	29.22
1.1	1.139	0.595	110.45	30.68
1.2	1.250	0.598	112.20	31.17
1.3	1.372	0.605	115.71	32.14
1.4	1.488	0.597	118.86	33.02
1.5	1.606	0.601	123.25	34.24
1.6	1.718	0.593	127.98	35.55
1.7	1.835	0.593	129.38	35.94
1.8	1.961	0.586	130.26	36.18
1.9	2.075	0.583	134.64	37.40
2.0	2.196	0.574	136.75	37.99
2.1	2.313	0.570	137.27	38.13
2.2	2.431	0.565	142.53	39.59
2.3	2.550	0.556	144.64	40.18
2.4	2.678	0.557	145.51	40.42
2.5	2.797	0.547	149.02	41.39
2.6	2.924	0.547	152.17	42.27
2.7	3.045	0.537	154.80	43.00
2.8	3.177	0.539	156.91	43.59
2.9	3.303	0.528	160.06	44.46
3.0	3.432	0.529	161.29	44.80
3.1	3.564	0.517	160.41	44.56
3.2	3.696	0.517	163.04	45.29
3.3	3.827	0.504	164.80	45.78
3.4	3.954	0.502	166.55	46.26
3.5	4.055	0.491	166.20	46.17
3.6	4.183	0.481	165.32	45.92
3.7	4.285	0.478	164.80	45.78

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
3.8	4.413	0.466	165.32	45.92
3.9	4.515	0.467	164.80	45.78
4.0	4.645	0.453	165.67	46.02
4.1	4.779	0.454	164.80	45.78
4.2	4.881	0.450	163.57	45.44
4.3	5.012	0.443	162.17	45.05
4.4	5.116	0.447	161.82	44.95
4.5	5.217	0.441	162.69	45.19
4.6	5.348	0.438	161.29	44.80
4.7	5.452	0.441	161.29	44.80
4.8	5.580	0.434	161.29	44.80
4.9	5.682	0.441	161.29	44.80
5.0	5.782	0.437	160.94	44.71
5.1	5.911	0.438	159.54	44.32
5.2	6.012	0.440	158.31	43.97
5.3	6.142	0.439	159.54	44.32
5.4	6.247	0.440	158.66	44.07
5.5	6.383	0.449	157.43	43.73
5.6	6.514	0.450	157.78	43.83
5.7	6.646	0.579	140.25	38.96
5.8	6.768	0.594	153.40	42.61
5.9	6.872	0.622	152.52	42.37
6.0	6.973	0.643	152.52	42.37
6.1	7.102	0.677	152.52	42.37
6.2	7.204	0.701	150.77	41.88
6.3	7.332	0.731	152.17	42.27
6.4	7.435	0.754	153.93	42.76
6.5	7.559	0.774	154.80	43.00
6.6	7.662	0.798	156.03	43.34
6.7	7.788	0.812	156.91	43.59
6.8	7.920	0.834	157.78	43.83
6.9	8.046	0.850	158.66	44.07
7.0	8.148	0.864	159.54	44.32
7.1	8.249	0.871	159.54	44.32
7.2	8.373	0.897	160.06	44.46
7.3	8.498	0.908	161.29	44.80
7.4	8.601	0.930	161.29	44.80
7.5	8.726	0.944	161.29	44.80
7.6	8.829	0.959	160.41	44.56
7.7	8.955	0.978	159.54	44.32
7.8	9.084	0.992	161.29	44.80
7.9	9.215	1.016	160.06	44.46

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
8.0	9.342	1.031	161.29	44.80
8.1	9.444	1.050	161.29	44.80
8.2	9.574	1.058	159.54	44.32
8.3	9.678	1.065	157.78	43.83
8.4	9.806	1.076	156.56	43.49
8.5	9.911	1.086	156.03	43.34
8.6	10.040	1.097	154.80	43.00
8.7	10.143	1.095	153.05	42.51
8.8	10.279	1.103	152.17	42.27
8.9	10.407	1.109	152.52	42.37
9.0	10.510	1.131	152.17	42.27
9.1	10.638	1.138	151.30	42.03
9.2	10.743	1.152	151.65	42.12
9.3	10.873	1.155	152.17	42.27
9.4	10.979	1.169	150.77	41.88
9.5	11.109	1.173	150.77	41.88
9.6	11.215	1.188	150.42	41.78
9.7	11.323	1.186	149.54	41.54
9.8	11.452	1.198	149.54	41.54
9.9	11.583	1.205	150.77	41.88
10.0	11.717	1.219	149.89	41.64

Direct Shear Test

Test date:	2025-11-09
Group no.:	5-6

Normal load:	100 kN
Sample size:	0.0036 m^2

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
0.1	-0.004	0.794	-0.53	-0.15
0.2	0.101	0.839	82.05	22.79
0.3	0.202	0.873	96.42	26.78
0.4	0.310	0.910	108.34	30.10
0.5	0.413	0.944	118.86	33.02
0.6	0.525	0.968	128.86	35.79
0.7	0.628	0.982	136.40	37.89
0.8	0.732	1.006	140.25	38.96
0.9	0.844	1.021	148.14	41.15
1.0	0.955	1.034	153.40	42.61
1.1	1.065	1.047	160.41	44.56
1.2	1.172	1.058	166.20	46.17
1.3	1.274	1.065	168.83	46.90
1.4	1.382	1.072	171.81	47.72
1.5	1.484	1.082	174.96	48.60
1.6	1.595	1.082	183.73	51.04
1.7	1.700	1.087	185.48	51.52
1.8	1.804	1.091	185.48	51.52
1.9	1.909	1.094	188.46	52.35
2.0	2.009	1.097	192.50	53.47
2.1	2.111	1.100	194.60	54.06
2.2	2.214	1.104	199.51	55.42
2.3	2.322	1.106	199.51	55.42
2.4	2.427	1.108	204.77	56.88
2.5	2.530	1.109	207.75	57.71
2.6	2.642	1.112	207.75	57.71
2.7	2.752	1.117	208.63	57.95
2.8	2.863	1.114	211.78	58.83
2.9	2.971	1.120	213.88	59.41
3.0	3.085	1.122	217.04	60.29
3.1	3.197	1.119	216.51	60.14
3.2	3.305	1.120	218.79	60.78
3.3	3.419	1.122	221.42	61.51
3.4	3.526	1.121	221.42	61.51
3.5	3.628	1.124	221.77	61.60
3.6	3.742	1.124	222.30	61.75
3.7	3.853	1.119	225.81	62.72

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
3.8	3.967	1.120	226.16	62.82
3.9	4.080	1.122	226.16	62.82
4.0	4.193	1.116	224.05	62.24
4.1	4.295	1.117	222.30	61.75
4.2	4.401	1.117	223.53	62.09
4.3	4.502	1.118	222.30	61.75
4.4	4.612	1.118	224.93	62.48
4.5	4.723	1.119	227.56	63.21
4.6	4.834	1.114	231.42	64.28
4.7	4.942	1.113	233.17	64.77
4.8	5.052	1.118	236.33	65.65
4.9	5.160	1.113	236.33	65.65
5.0	5.275	1.112	234.57	65.16
5.1	5.388	1.117	236.33	65.65
5.2	5.503	1.116	233.17	64.77
5.3	5.615	1.110	232.82	64.67
5.4	5.717	1.116	231.07	64.18
5.5	5.827	1.112	229.31	63.70
5.6	5.930	1.113	232.82	64.67
5.7	6.046	1.115	231.07	64.18
5.8	6.160	1.110	234.05	65.01
5.9	6.264	1.116	234.57	65.16
6.0	6.375	1.112	235.45	65.40
6.1	6.480	1.115	234.57	65.16
6.2	6.593	1.112	231.94	64.43
6.3	6.696	1.117	234.57	65.16
6.4	6.808	1.112	233.17	64.77
6.5	6.912	1.113	233.70	64.92
6.6	7.014	1.116	232.82	64.67
6.7	7.131	1.118	231.07	64.18
6.8	7.246	1.120	232.82	64.67
6.9	7.360	1.117	231.07	64.18
7.0	7.463	1.120	231.07	64.18
7.1	7.575	1.124	230.54	64.04
7.2	7.677	1.124	231.42	64.28
7.3	7.788	1.127	230.54	64.04
7.4	7.891	1.130	229.31	63.70
7.5	7.998	1.128	231.07	64.18
7.6	8.099	1.135	231.42	64.28
7.7	8.211	1.131	231.07	64.18
7.8	8.315	1.138	231.07	64.18
7.9	8.428	1.134	231.42	64.28

Time (min)	Shear Disp. (mm)	Normal Disp. (mm)	Shear Force (N)	Shear Stress (kPa)
8.0	8.544	1.140	230.19	63.94
8.1	8.647	1.144	232.82	64.67
8.2	8.761	1.142	231.94	64.43
8.3	8.875	1.144	231.94	64.43
8.4	8.989	1.148	236.33	65.65
8.5	9.091	1.152	233.70	64.92
8.6	9.193	1.156	229.31	63.70
8.7	9.295	1.158	230.19	63.94
8.8	9.406	1.160	232.82	64.67
8.9	9.522	1.160	231.42	64.28
9.0	9.625	1.164	232.82	64.67
9.1	9.741	1.171	232.82	64.67
9.2	9.842	1.169	231.07	64.18
9.3	9.955	1.173	236.33	65.65
9.4	10.071	1.178	238.08	66.13
9.5	10.184	1.178	233.17	64.77
9.6	10.299	1.178	236.33	65.65
9.7	10.416	1.184	236.33	65.65
9.8	10.530	1.187	235.80	65.50
9.9	10.645	1.190	237.55	65.99
10.0	10.759	1.193	235.80	65.50
10.1	10.860	1.195	232.82	64.67