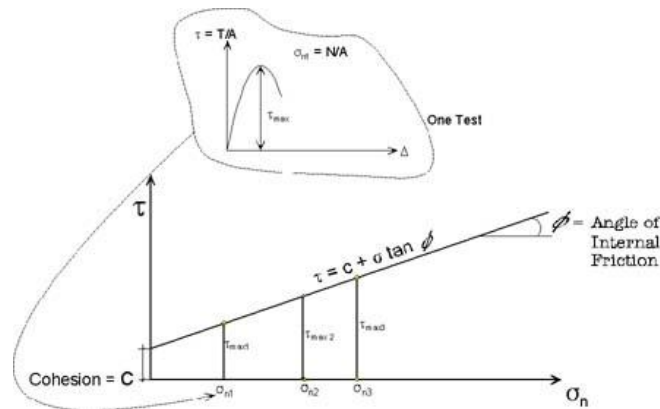
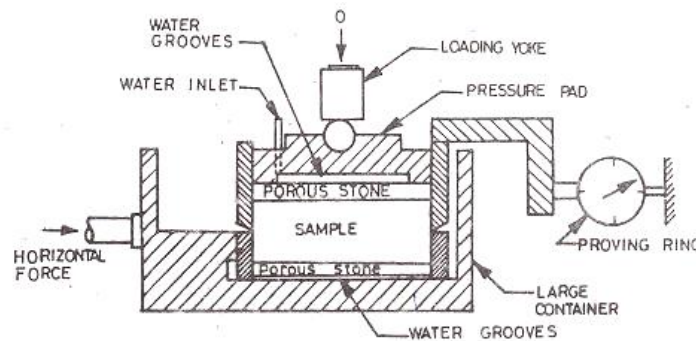


Given:

Direct Shear Test Results for Sandy Soil Samples.

Item	Quantity
Specimen Length, L (in)	2
Specimen Width, B (in)	2
Specimen Height, H (in)	1.31
Mass of Porcelain dish + dry sand (before use), M_1 (g)	540.3
Mass of Porcelain dish + dry sand (after use), M_2 (g)	397.2
Dry unit weight of specimen, γ_d (pcf)	104
Specific gravity of soil solids, G_s	2.66
Void ratio, e	0.596

Plot the Shear Stress vs. Horizontal Displacement for the three tests and determine the shear strength parameters (ϕ). The test sample was dry sand.



Test # 1						
Normal effective stress (psi)	X 10 ⁻¹ Horizontal Displacement (in)	Vertical Displacement* (in)	No. of div in Proving Ring Dial Gauge	Proving Ring Cali- bration Factor (lb/div.)	Shear Force S (lb)	Shear Stress τ (psi)
3.95	0	0	0.00	0.31	0.00	0.00
3.95	0.1	0.001	25.99	0.31	8.06	2.01
3.95	0.2	0.002	28.59	0.31	8.86	2.22
3.95	0.3	0.004	29.89	0.31	9.27	2.32
3.95	0.4	0.006	29.89	0.31	9.27	2.32
3.95	0.5	0.008	31.19	0.31	9.67	2.42
3.95	0.6	0.009	32.49	0.31	10.07	2.52
3.95	0.7	0.01	32.49	0.31	10.07	2.52
3.95	0.8	0.01	32.49	0.31	10.07	2.52
3.95	0.9	0.009	32.49	0.31	10.07	2.52
3.95	1	0.008	35.09	0.31	10.88	2.72
3.95	1.1	0.008	35.09	0.31	10.88	2.72
3.95	1.2	0.008	36.39	0.31	11.28	2.82
3.95	1.3	0.008	37.26	0.31	11.55	2.89
3.95	1.4	0.008	37.26	0.31	11.55	2.89
3.95	1.5	0.008	38.99	0.31	12.09	3.02
3.95	1.6	0.008	40.29	0.31	12.49	3.12
3.95	1.7	0.008	41.59	0.31	12.89	3.22
3.95	1.8	0.008	41.59	0.31	12.89	3.22
3.95	1.9	0.008	40.29	0.31	12.49	3.12
3.95	2	0.008	42.89	0.31	13.30	3.32
3.95	2.1	0.008	42.89	0.31	13.30	3.32
3.95	2.2	0.008	44.19	0.31	13.70	3.42
3.95	2.3	0.008	44.19	0.31	13.70	3.42
3.95	2.4	0.008	44.19	0.31	13.70	3.42
3.95	2.5	0.008	44.19	0.31	13.70	3.42
3.95	2.6	0.008	44.19	0.31	13.70	3.42
3.95	2.7	0.008	44.19	0.31	13.70	3.42
3.95	2.8	0.008	44.19	0.31	13.70	3.42
3.95	2.9	0.008	44.19	0.31	13.70	3.42
3.95	3	0.008	44.19	0.31	13.70	3.42
3.95	3.1	0.008	44.19	0.31	13.70	3.42
3.95	3.2	0.008	44.19	0.31	13.70	3.42
3.95	3.3	0.008	44.19	0.31	13.70	3.42
3.95	3.4	0.008	44.19	0.31	13.70	3.42
3.95	3.5	0.008	44.19	0.31	13.70	3.42
3.95	3.6	0.008	44.19	0.31	13.70	3.42
3.95	3.7	0.008	44.19	0.31	13.70	3.42

Test # 2

Normal effective stress (psi)	X 10 ⁻¹ Horizontal Displacement (in)	Vertical Displacement* (in)	No. of div in Proving Ring Dial Gauge	Proving Ring Cali- bration Factor (lb/div.)	Shear Force S (lb)	Shear Stress τ (psi)
11.86	0	0	0.00	0.31	0.00	0.00
11.86	0.1	0.001	38.99	0.31	12.09	3.02
11.86	0.2	0.002	51.98	0.31	16.12	4.03
11.86	0.3	0.004	59.78	0.31	18.53	4.63
11.86	0.4	0.006	64.98	0.31	20.14	5.04
11.86	0.5	0.008	70.18	0.31	21.76	5.44
11.86	0.6	0.009	74.08	0.31	22.96	5.74
11.86	0.7	0.01	77.98	0.31	24.17	6.04
11.86	0.8	0.01	79.28	0.31	24.58	6.14
11.86	0.9	0.009	82.31	0.31	25.52	6.38
11.86	1	0.008	84.48	0.31	26.19	6.55
11.86	1.1	0.008	87.07	0.31	26.99	6.75
11.86	1.2	0.008	89.67	0.31	27.80	6.95
11.86	1.3	0.008	90.97	0.31	28.20	7.05
11.86	1.4	0.008	96.34	0.31	29.87	7.47
11.86	1.5	0.008	94.87	0.31	29.41	7.35
11.86	1.6	0.008	97.47	0.31	30.22	7.55
11.86	1.7	0.008	98.77	0.31	30.62	7.65
11.86	1.8	0.008	98.77	0.31	30.62	7.65
11.86	1.9	0.008	98.77	0.31	30.62	7.65
11.86	2	0.008	102.67	0.31	31.83	7.96
11.86	2.1	0.008	102.67	0.31	31.83	7.96
11.86	2.2	0.008	102.67	0.31	31.83	7.96
11.86	2.3	0.008	102.67	0.31	31.83	7.96
11.86	2.4	0.008	102.67	0.31	31.83	7.96
11.86	2.5	0.008	102.67	0.31	31.83	7.96
11.86	2.6	0.008	102.67	0.31	31.83	7.96
11.86	2.7	0.008	102.67	0.31	31.83	7.96
11.86	2.8	0.008	102.67	0.31	31.83	7.96
11.86	2.9	0.008	102.67	0.31	31.83	7.96
11.86	3	0.008	102.67	0.31	31.83	7.96
11.86	3.1	0.008	102.67	0.31	31.83	7.96
11.86	3.2	0.008	102.67	0.31	31.83	7.96
11.86	3.3	0.008	102.67	0.31	31.83	7.96
11.86	3.4	0.008	102.67	0.31	31.83	7.96
11.86	3.5	0.008	102.67	0.31	31.83	7.96
11.86	3.6	0.008	102.67	0.31	31.83	7.96
11.86	3.7	0.008	102.67	0.31	31.83	7.96

Test # 3

Normal effective stress (psi)	X 10 ⁻¹ Horizontal Displacement (in)	Vertical Displacement* (in)	No. of div in Proving Ring Dial Gauge	Proving Ring Cali- bration Factor (lb/div.)	Shear Force S (lb)	Shear Stress τ (psi)
23.71	0		0.00	0.31	0.00	0.00
23.71	0.1		51.98	0.31	16.12	4.03
23.71	0.2		63.68	0.31	19.74	4.94
23.71	0.3		75.38	0.31	23.37	5.84
23.71	0.4		81.44	0.31	25.25	6.31
23.71	0.5		87.07	0.31	26.99	6.75
23.71	0.6		92.70	0.31	28.74	7.18
23.71	0.7		97.47	0.31	30.22	7.55
23.71	0.8		100.07	0.31	31.02	7.76
23.71	0.9		102.24	0.31	31.69	7.92
23.71	1		103.97	0.31	32.23	8.06
23.71	1.1		105.27	0.31	32.63	8.16
23.71	1.2		109.17	0.31	33.84	8.46
23.71	1.3		118.27	0.31	36.66	9.17
23.71	1.4		129.96	0.31	40.29	10.07
23.71	1.5		136.88	0.31	42.43	10.61
23.71	1.6		136.88	0.31	42.43	10.61
23.71	1.7		140.36	0.31	43.51	10.88
23.71	1.8		142.96	0.31	44.32	11.08
23.71	1.9		144.26	0.31	44.72	11.18
23.71	2		147.29	0.31	45.66	11.41
23.71	2.1		148.16	0.31	45.93	11.48
23.71	2.2		150.76	0.31	46.73	11.68
23.71	2.3		150.76	0.31	46.73	11.68
23.71	2.4		153.36	0.31	47.54	11.89
23.71	2.5		156.82	0.31	48.62	12.15
23.71	2.6		157.69	0.31	48.88	12.22
23.71	2.7		157.69	0.31	48.88	12.22
23.71	2.8		158.55	0.31	49.15	12.29
23.71	2.9		159.85	0.31	49.55	12.39
23.71	3		161.15	0.31	49.96	12.49
23.71	3.1		163.75	0.31	50.76	12.69
23.71	3.2		167.21	0.31	51.84	12.96
23.71	3.3		167.21	0.31	51.84	12.96
23.71	3.4		167.21	0.31	51.84	12.96
23.71	3.5		167.21	0.31	51.84	12.96
23.71	3.6		167.21	0.31	51.84	12.96
23.71	3.7		167.21	0.31	51.84	12.96
23.71	3.8		167.21	0.31	51.84	12.96
23.71	3.9		167.21	0.31	51.84	12.96
23.71	4		167.21	0.31	51.84	12.96