Date: 12/9/14

Preliminary Results of soil test for Cell-Crete Sample Batch 1

Tests Conducted

1. Direct Shear Test
2. Unconfined Compression Test
3. Direct Simple Shear Test
4. Cyclic Simple Shear Test

All tests were conducted on dry samples.

Rest results

1. Direct Shear Test

Effective normal stresses applied: 3.6, 7.2, 14.5, 50.8 psi

Dry unit weight of soil samples

Range: 18.7-20.3 pcf

Average: 19.5 pcf

Average cohesion: 17.6 psi

Average Friction Angle: 30.0 degrees

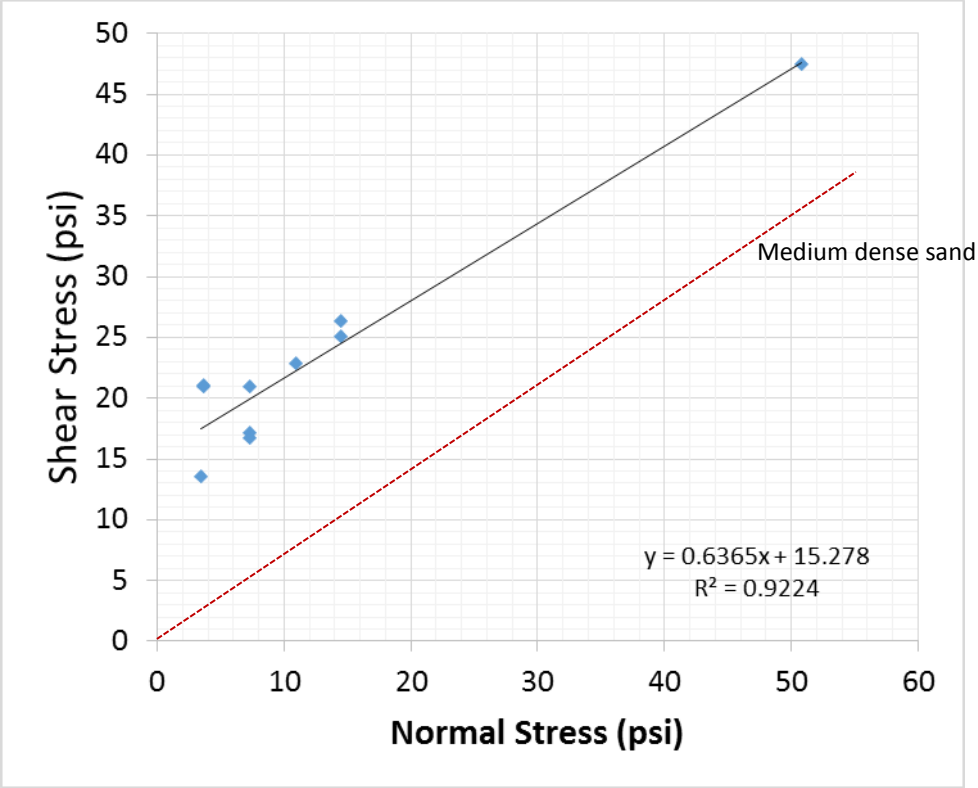

Figure 1: Shear envelope for all tested samples

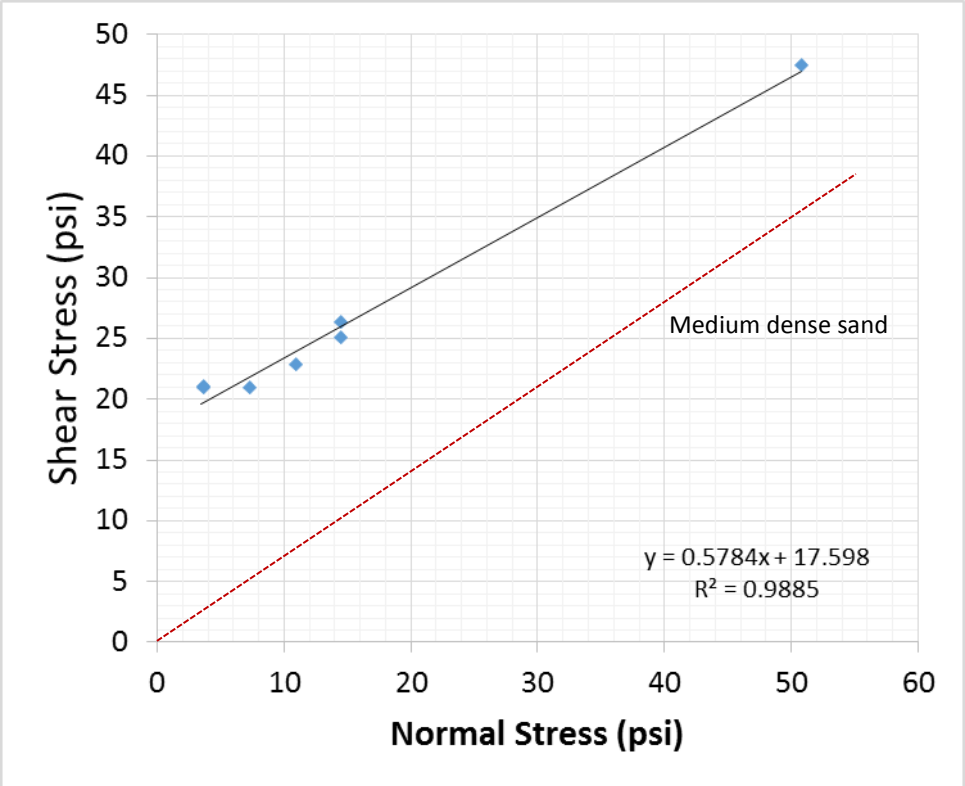

Figure 2: Shear envelope based on 6 best samples

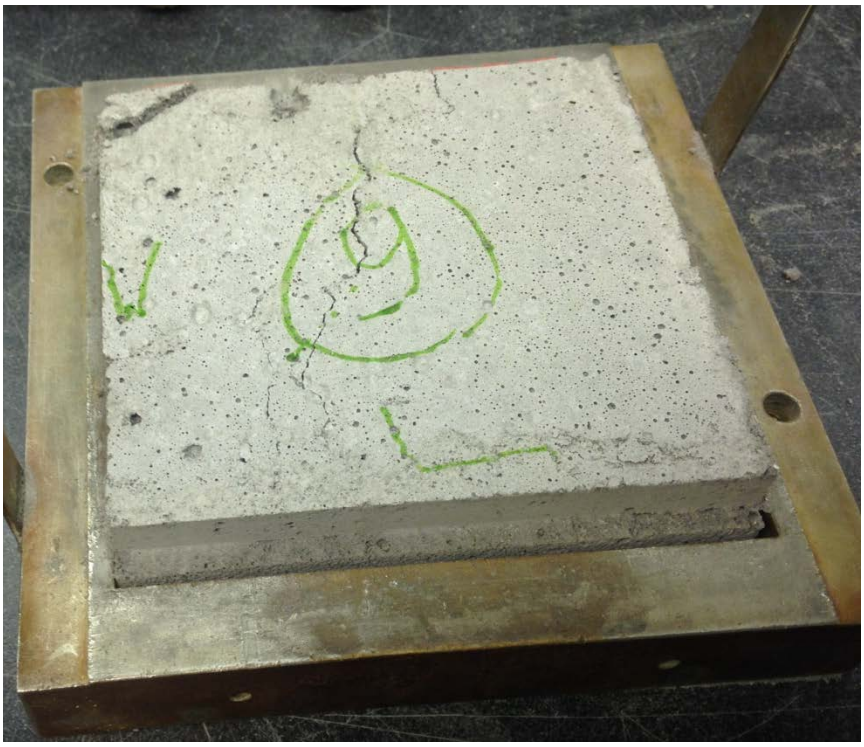

Figure 3: Sample after completion of direct shear test

Figure 4: Close view of the sample after completion of direct shear test

2. Unconfined Compression Test

Unconfined Compressive Strength

Range:	51.5-72.8 psi
Average	63.5 psi

Dry unit weights

Range:	20.8-24.1 pcf
Average:	22.5 pcf

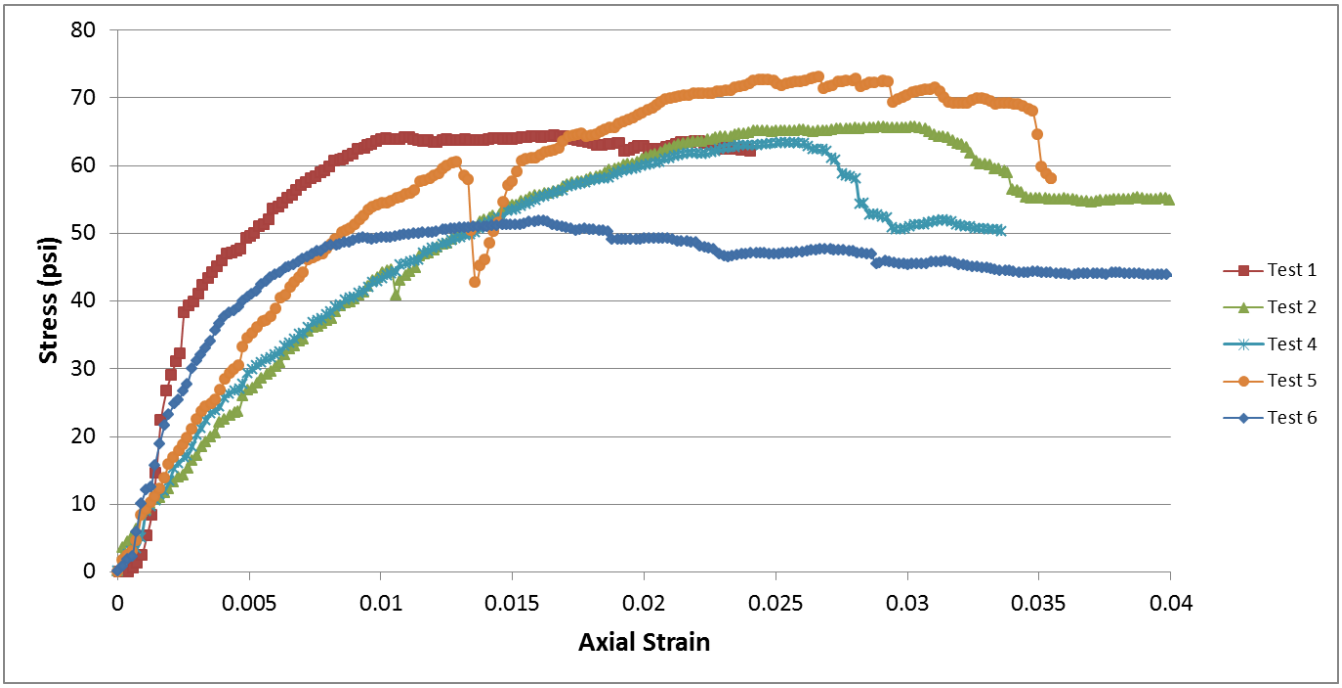

Figure 5: Typical deviator stress-strain curves

Figure 6: Cracking pattern observed during unconfined compression test

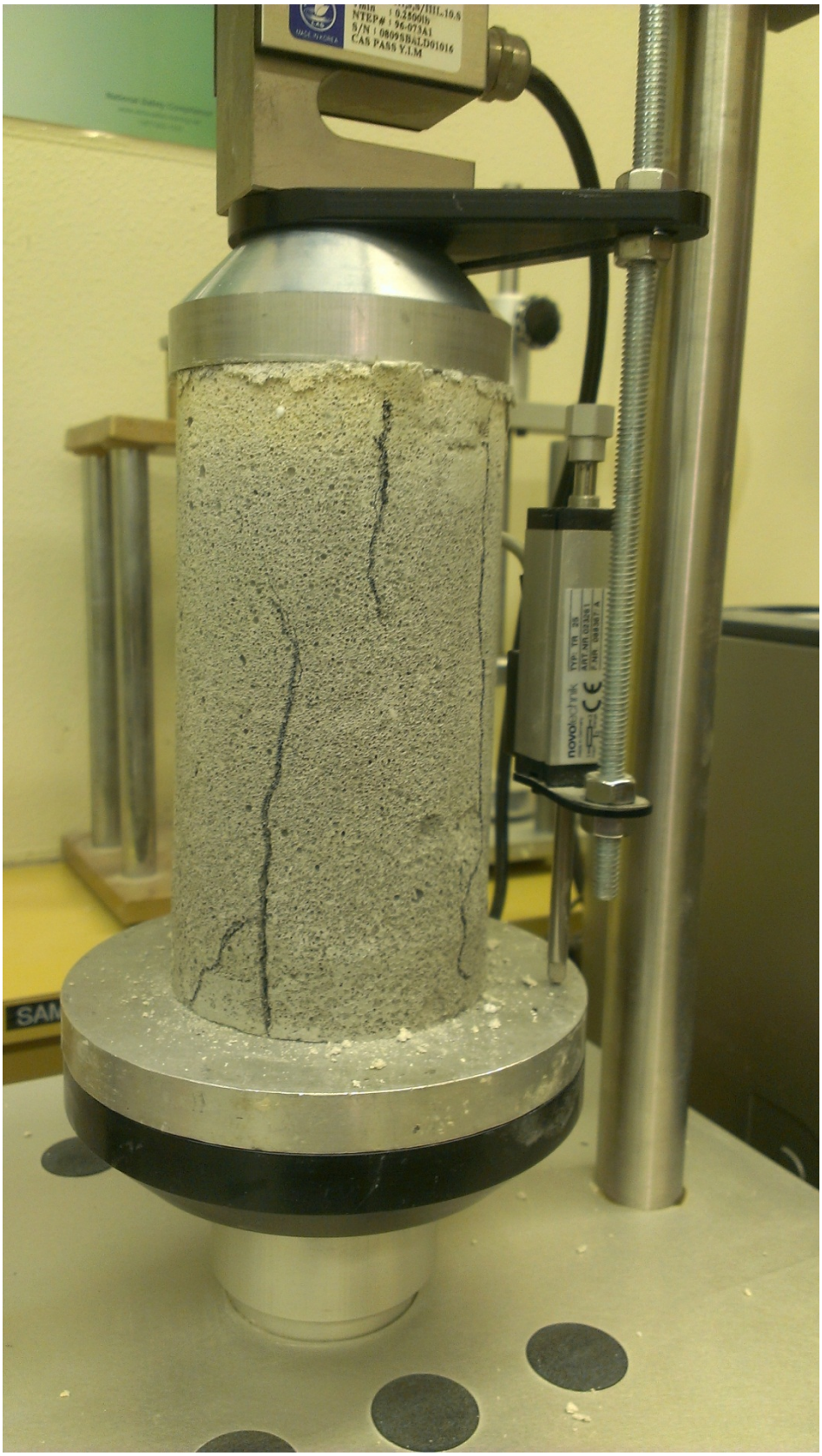

Figure 7: Cracking pattern observed during unconfined compression test

3. Direct Simple Shear Test

Consolidation pressures applied: 3.5, 6.9, 13.9, 50.8 psi

Dry unit weight of soil samples

Range: 19.3-21.3 pcf

Average: 20.3 pcf

Average cohesion (drained): 0.9 psi

Average Friction Angle (drained): 34.9 degrees

Average cohesion (undrained): 1.9 psi

Average Friction Angle (undrained): 17.6 degrees

Undrained Strength Ratio:

Range: 0.34-0.62

Average: 0.50

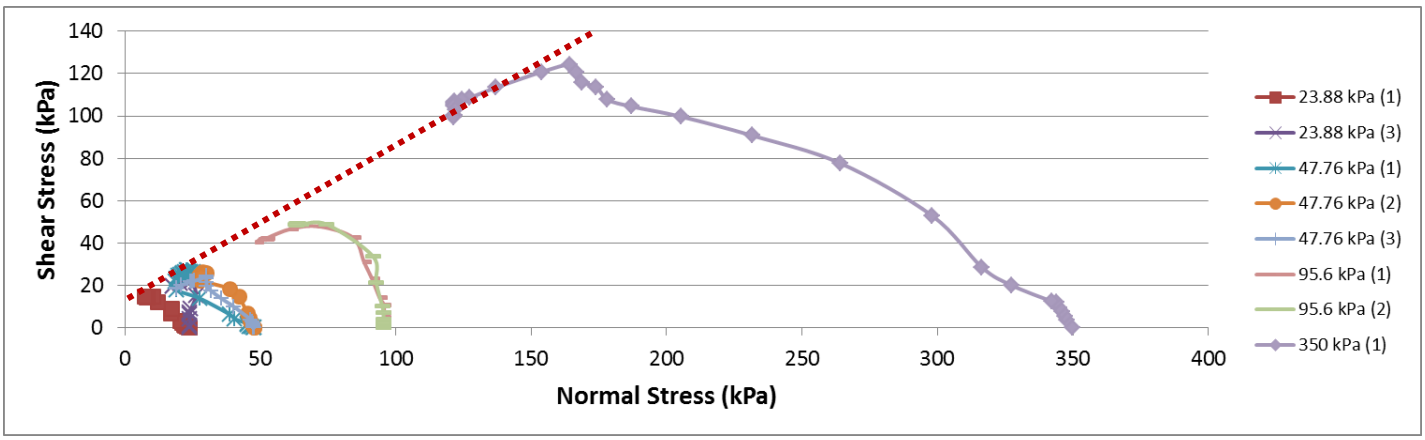

Figure 8: Stress path obtained from the DSS test

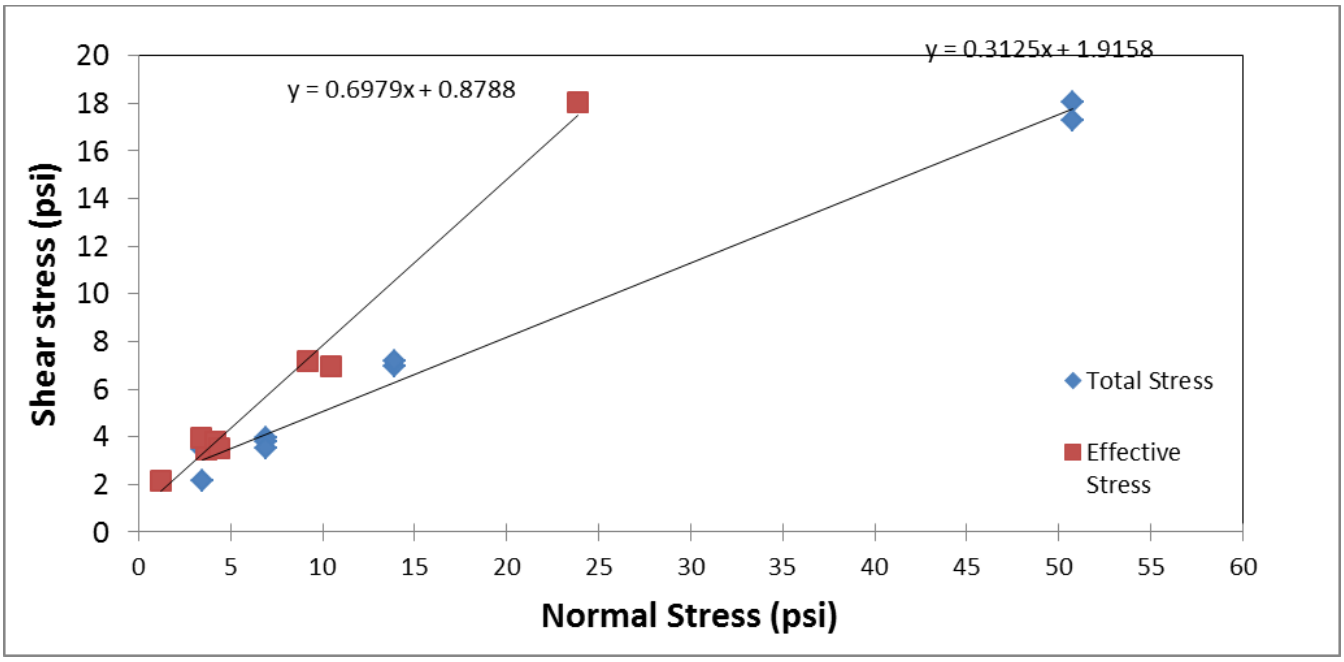

Figure 9: Total and effective stress shear envelopes obtained from the DSS test

Figure 10: test specimen after completion of the test

4. Cyclic Simple Shear Test

Consolidation pressures applied: 500, 1000, 2000, 7310 psf

Double amplitude shear strain applied:

0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50 %

Dry unit weight of soil samples

Range: 19.3-21.3 pcf

Average: 20.3 pcf

G_{max}: varied with test (Figures 12 and 13; Tables 1 and 2)

G/Gmax: Varied with test (Figure 14)

Damping ratio: Varied with test (Figure 15)

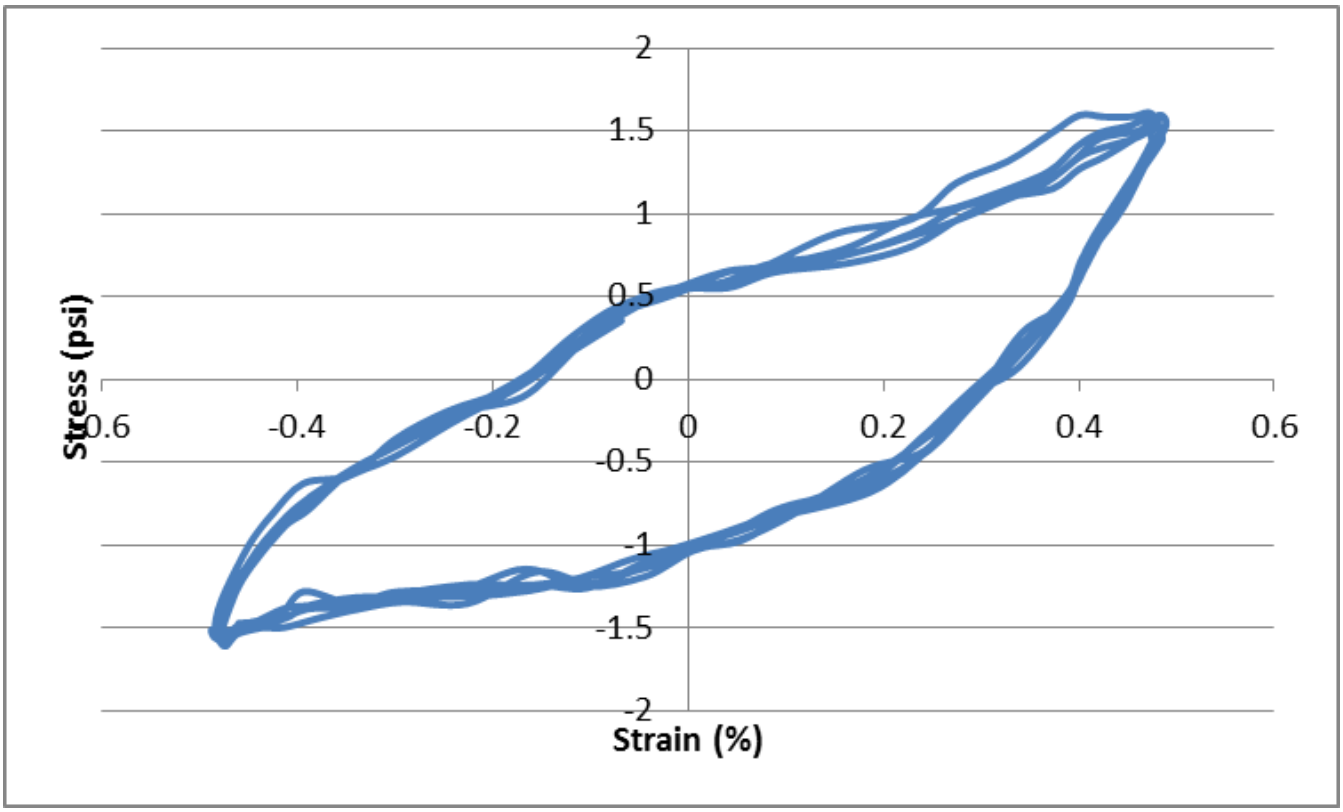

Figure 11: Typical cyclic shear stress- shear strain curve and hysteresis loop

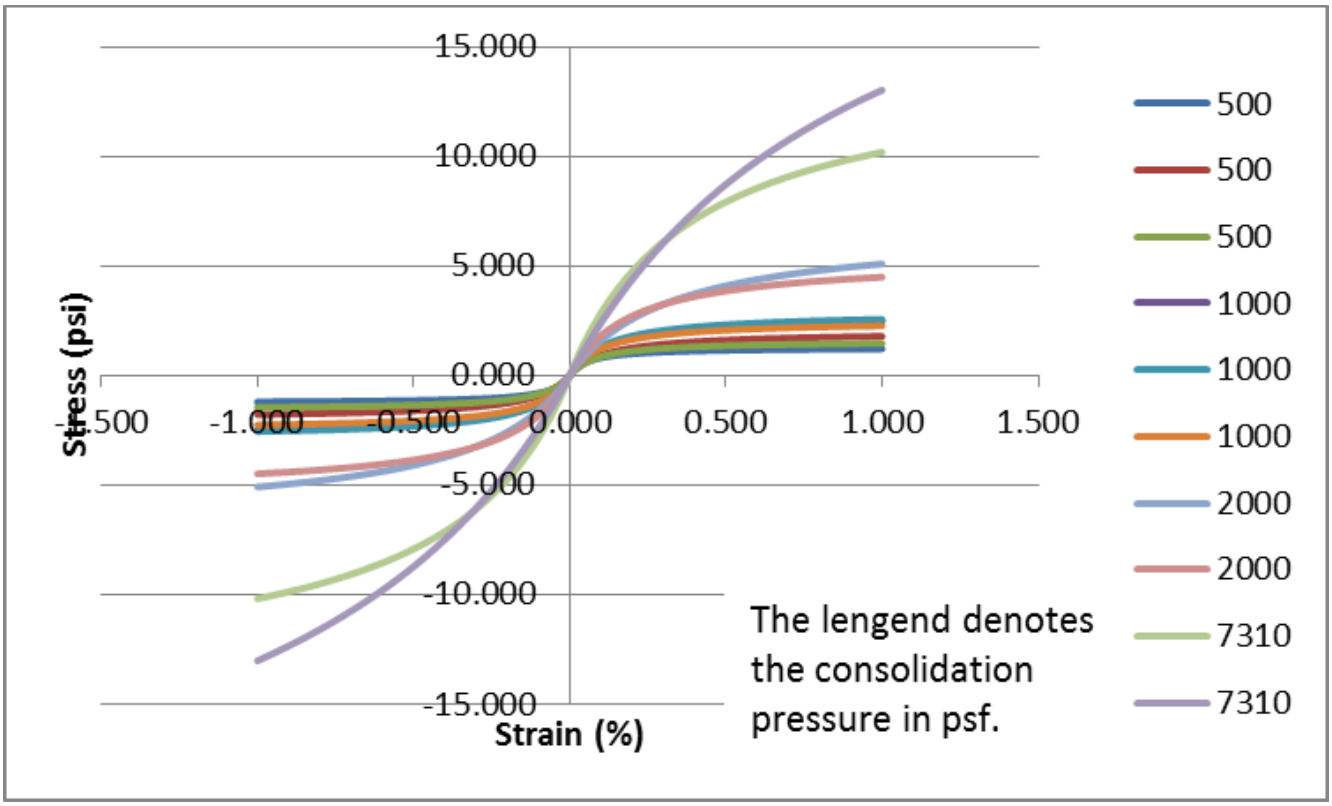

Figure 12: Backbone curves obtained for all samples tested at different consolidation pressures

Table 1: Values of Gmax at different consolidation pressures

Sample No.	1	2	8	9	5	11	12	14	17	19
Dry Density (pcf)	20.30	21.33	20.74	20.44	19.33	20.34	20.21	19.94	19.68	19.33
Consol. Stress (psf)	500	500	500	1000	1000	1000	2000	2000	7310	7310
G_{max} (psi)	2201.03	1695.06	1867.26	2373.46	2432.57	2402.50	2092.47	2747.34	3554.54	2641.46

Table 2: Hyperbola curve fitting parameters backbones curves in all samples

Curve Fitting Parameters for Hyperbolic Backbone Curve										
a	1.28	1.99	1.59	2.77	2.86	2.50	6.73	5.36	14.29	25.69
b	0.06	0.12	0.08	0.12	0.12	0.10	0.32	0.20	0.40	0.97

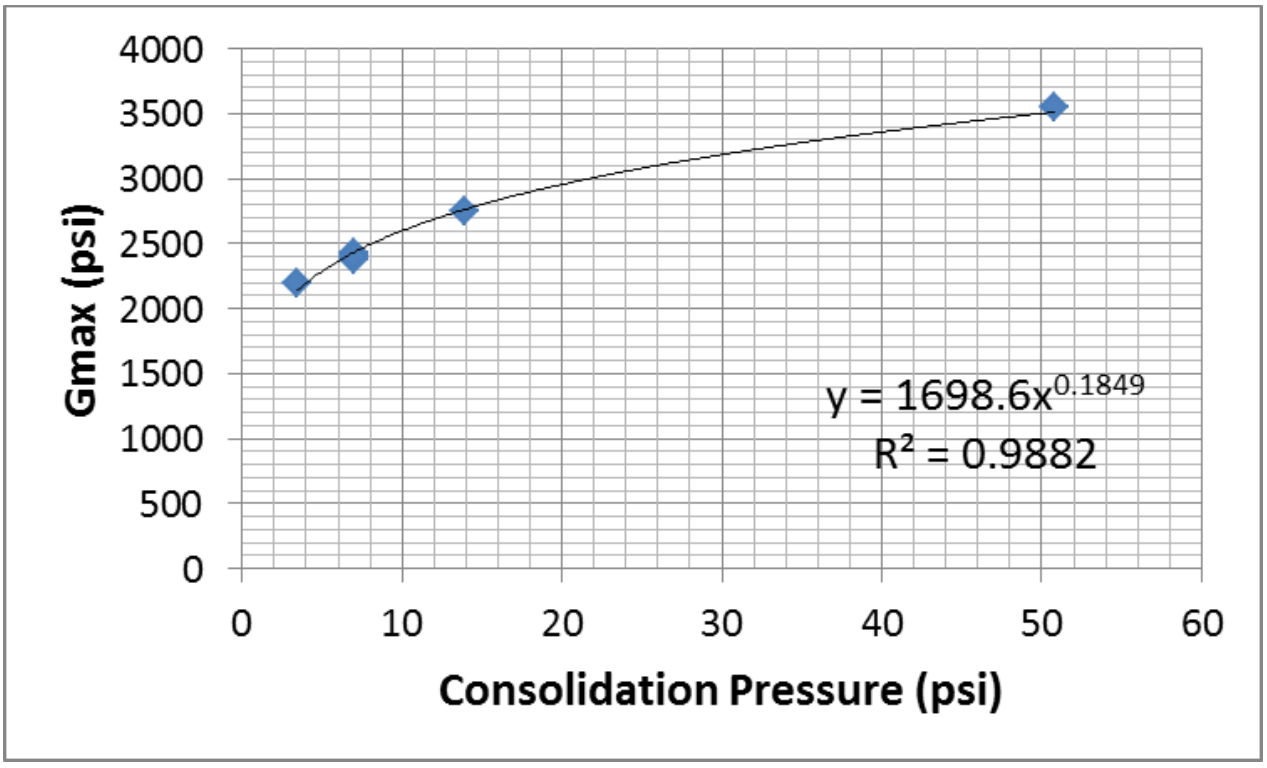

Figure 13: Variation of Gmax with consolidation pressures

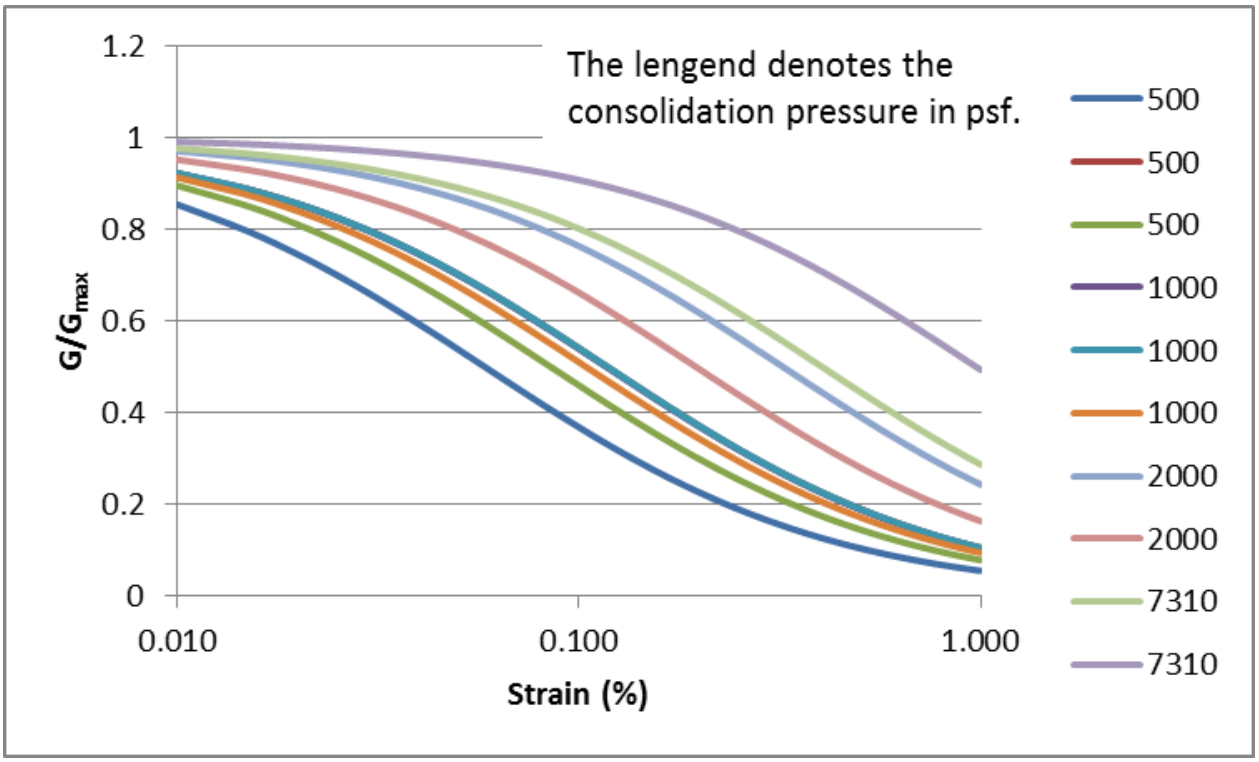

Figure 14: G/Gmax curves obtained for all samples tested at different consolidation pressures

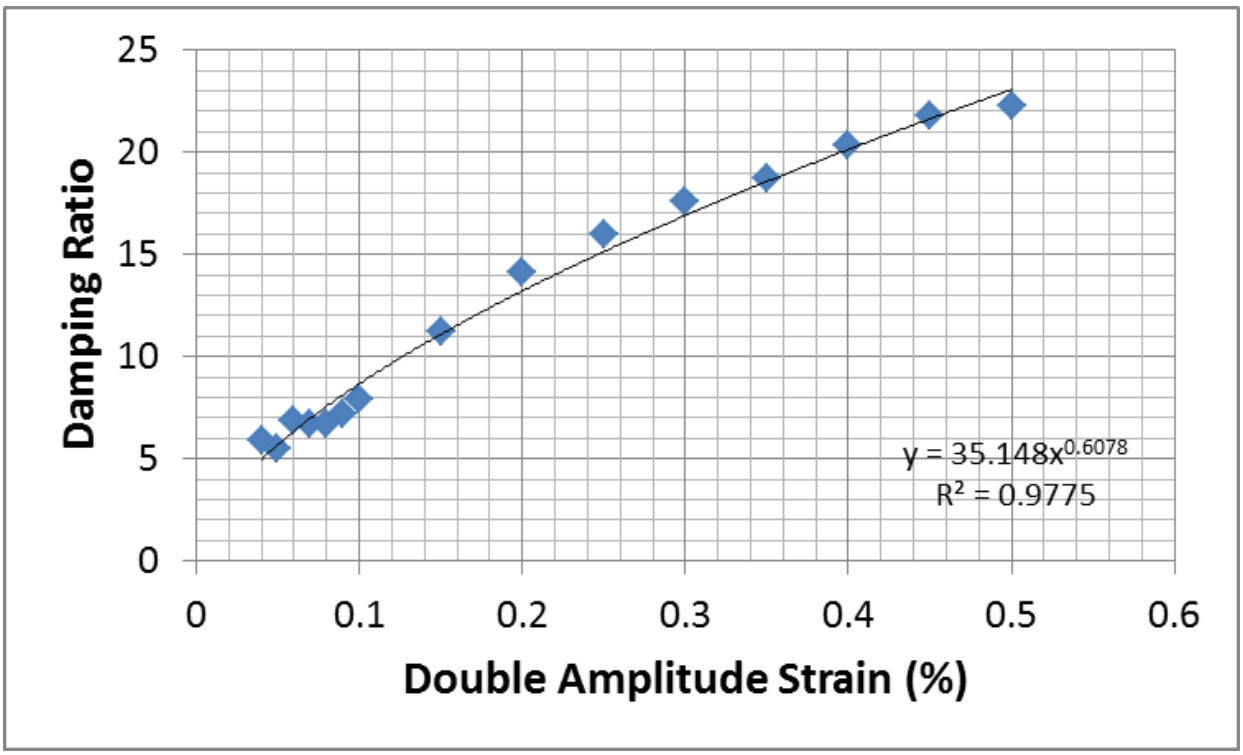

Figure 15: Typical variation of damping ratio with double amplitude cyclic strain obtained for sample #2 (consolidation pressure of 500 psf).

Figure 16: Photograph of a sample after cyclic simple shear test.