

# One-Dimensional Consolidation Properties of Soils ASTM D-2435



Project: BYU (Dr. Youd)

Number: M00399-003

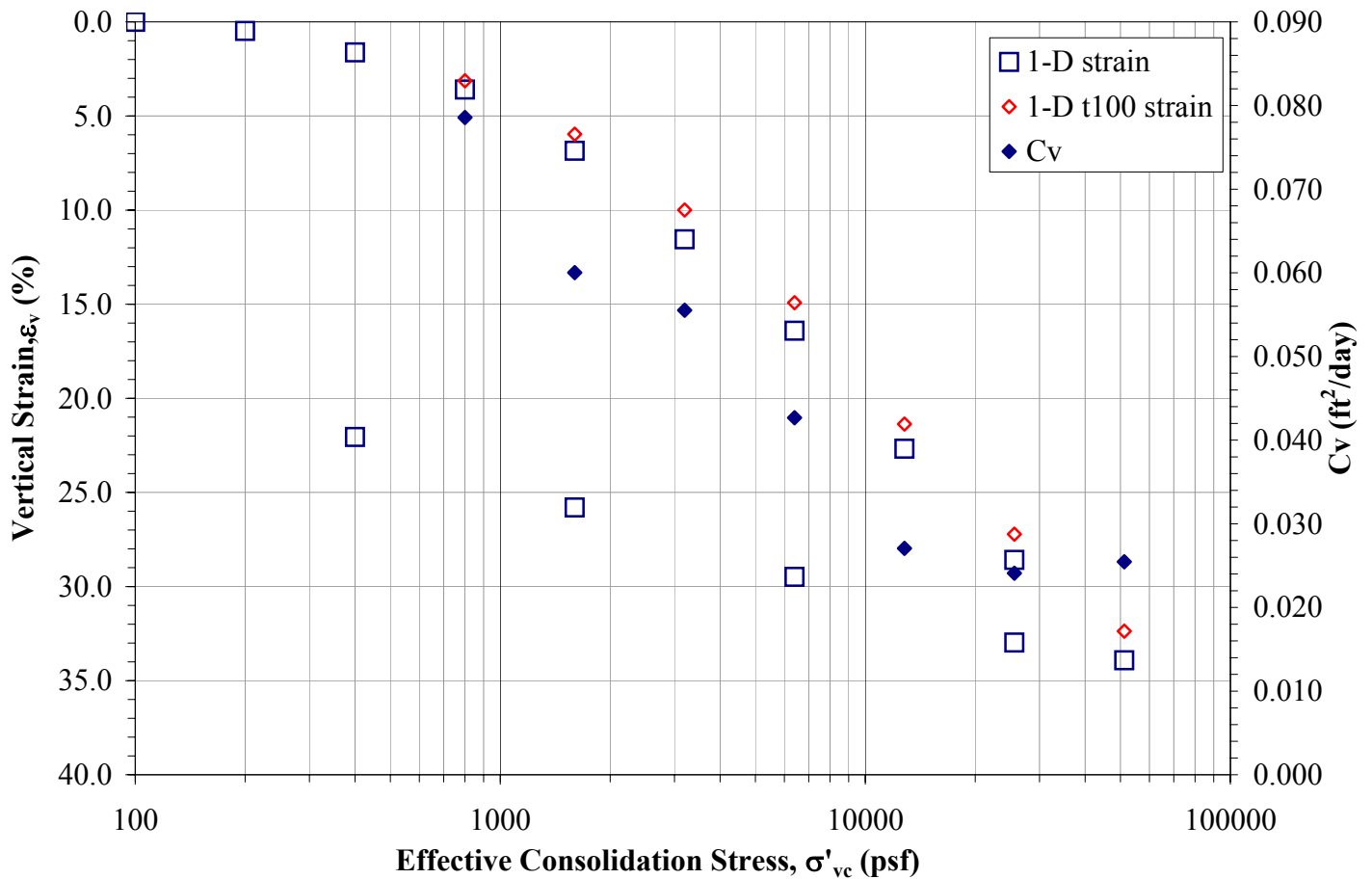
Sample: WLA D-1

Depth: 2.5-4.0 ft

	Initial	Final
Sample height, $H_0$ (in)	1.0000	0.7794
Sample Diameter, $D_0$ (in)	2.416	2.416
Moist unit weight (pcf)	108.0	121.6
Dry unit weight (pcf)	77.8	99.8
Moisture content (%)	38.9	21.8

Gs (Determined)	2.798
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Stress (psf)	Dial (in)	1-D $\epsilon_v$ (%)	Hc (in)	Void ratio e	Cv (ft <sup>2</sup> /day)	1-D $t_{100}$ $\epsilon_v$ (%)
100	0.0263	0.00	1.0000	1.245		
200	0.0311	0.48	0.9952	1.234		
400	0.0425	1.62	0.9838	1.209		
800	0.0623	3.60	0.9640	1.164	0.079	3.131
1600	0.0948	6.85	0.9315	1.091	0.060	5.965
3200	0.1418	11.55	0.8845	0.986	0.056	9.997
6400	0.1904	16.41	0.8359	0.877	0.043	14.921
12800	0.2531	22.68	0.7732	0.736	0.027	21.370
25600	0.3122	28.59	0.7141	0.603	0.024	27.217
51200	0.3655	33.92	0.6608	0.484	0.025	32.372
25600	0.3561	32.98	0.6702	0.505		
6400	0.3212	29.49	0.7051	0.583		
1600	0.2843	25.80	0.7420	0.666		
400	0.2469	22.06	0.7794	0.750		



Tested by: \_\_\_\_\_

Reviewed: \_\_\_\_\_

One-Dimensional Consolidation Time-Deformation Relationship



Project: BYU (Dr. Youd)

Number: M00399-003

Sample: WLA D-1

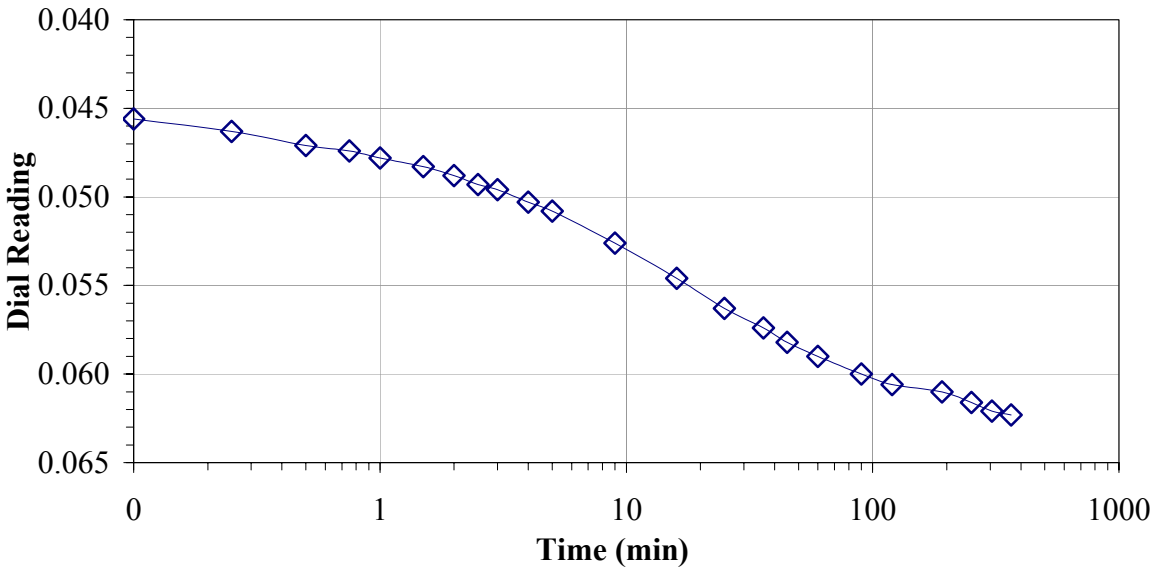
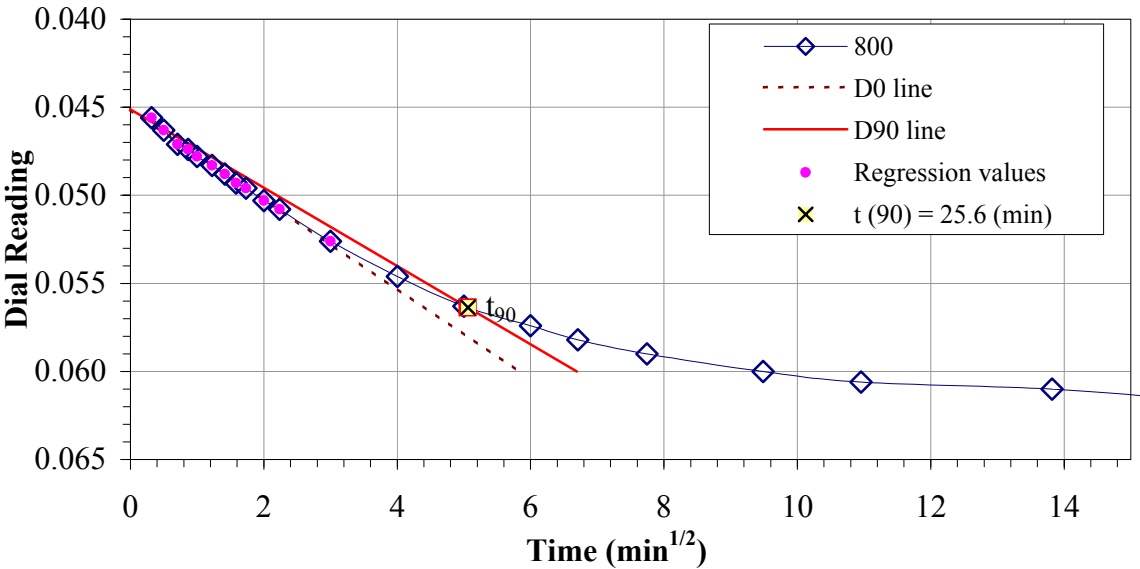
Depth: 2.5-4.0 ft

Stress: 800 (psf)

Time rate consolidation data

Data Summary	
$H_{DR}$	= 0.4870 (in)
Slope of $t_{int}$ line	= 0.00255 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00222 (dial/min <sup>1/2</sup> )
$D_0$	= 0.05 (dial)
$D(90)$	= 0.0564 (dial)
$D(100)$	= 0.05761 (dial)
$t(90)$	= 25.6 (min)
$C_v$	= 0.008 (in <sup>2</sup> /min)
$C_v$	= 0.08 (ft <sup>2</sup> /day)

Time (min)	Dial Reading (cc)
0	
0.1	0.0456
0.25	0.0463
0.5	0.0471
0.75	0.0474
1	0.0478
1.5	0.0483
2	0.0488
2.5	0.0493
3	0.0496
4	0.0503
5	0.0508
9	0.0526
16	0.0546
25	0.0563
36	0.0574
45	0.0582
60	0.059
90	0.06
120	0.0606
191	0.061
252	0.0616
305	0.0621
365	0.0623



One-Dimensional Consolidation Time-Deformation Relationship



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Number: M00399-003

Sample: WLA D-1

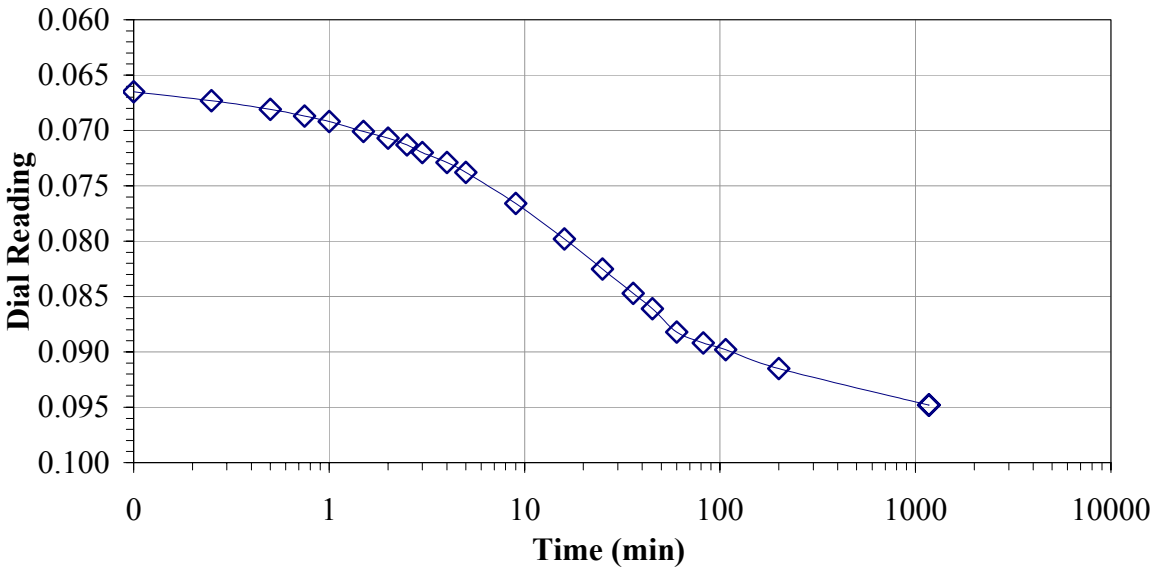
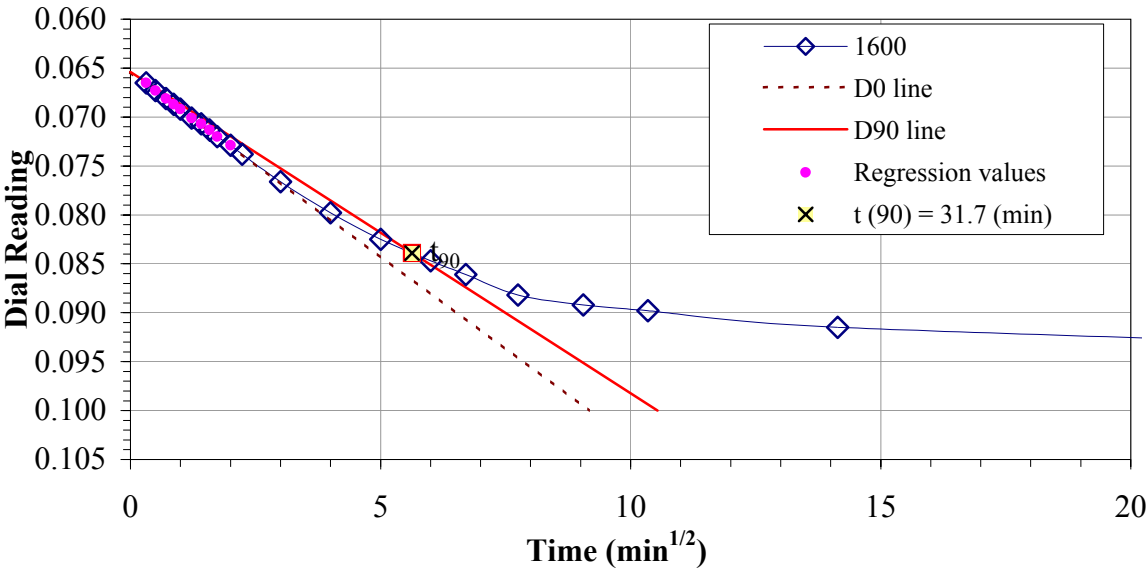
Depth: 2.5-4.0 ft

Stress: 1600 (psf)

Time rate consolidation data

Data Summary	
$H_{DR}$	= 0.4739 (in)
Slope of $t_{int}$ line	= 0.00378 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00328 (dial/min <sup>1/2</sup> )
$D_0$	= 0.07 (dial)
$D(90)$	= 0.0839 (dial)
$D(100)$	= 0.08595 (dial)
$t(90)$	= 31.7 (min)
$C_v$	= 0.006 (in <sup>2</sup> /min)
$C_v$	= 0.06 (ft <sup>2</sup> /day)

Time (min)	Dial Reading (cc)
0	
0.1	0.0665
0.25	0.0673
0.5	0.0681
0.75	0.0687
1	0.0692
1.5	0.0701
2	0.0707
2.5	0.0713
3	0.072
4	0.0729
5	0.0738
9	0.0766
16	0.0798
25	0.0825
36	0.0847
45	0.0861
60	0.0882
82	0.0892
107	0.0898
200	0.0915
1166	0.0948
1174	0.0948



One-Dimensional Consolidation Time-Deformation Relationship



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Number: M00399-003

Sample: WLA D-1

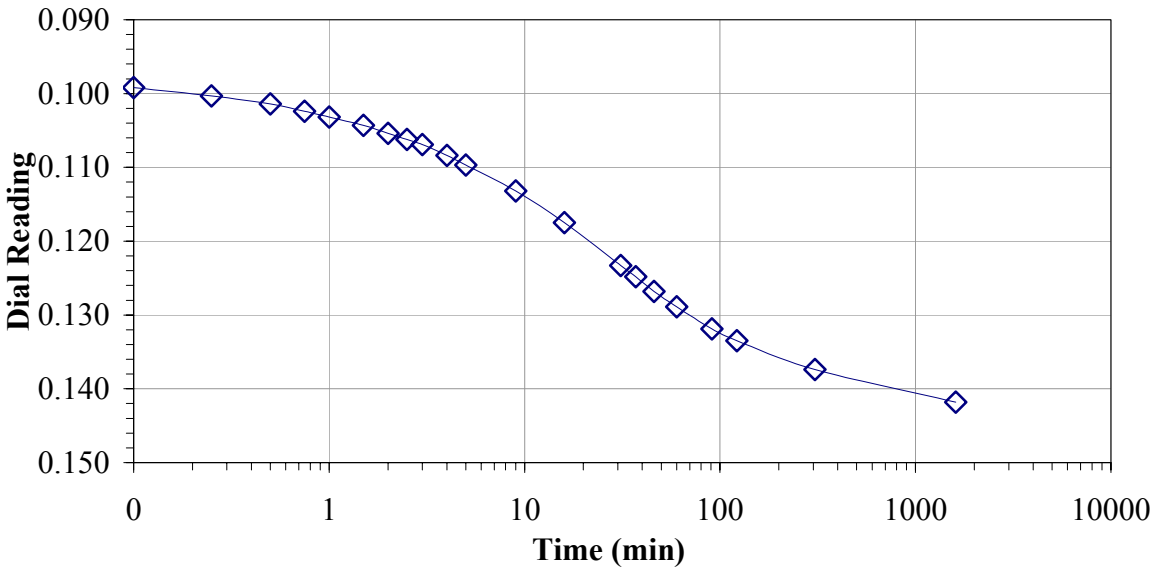
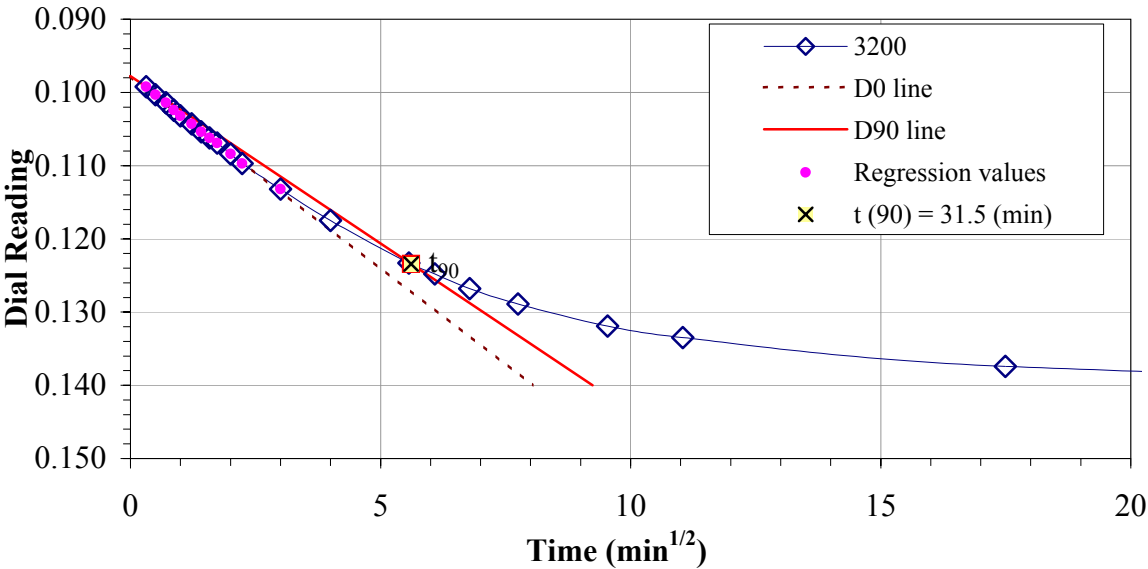
Depth: 2.5-4.0 ft

Stress: 3200 (psf)

Time rate consolidation data

Data Summary	
$H_{DR}$	= 0.4540 (in)
Slope of $t_{int}$ line	= 0.00525 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00457 (dial/min <sup>1/2</sup> )
$D_0$	= 0.10 (dial)
$D(90)$	= 0.1234 (dial)
$D(100)$	= 0.12627 (dial)
$t(90)$	= 31.5 (min)
$C_v$	= 0.006 (in <sup>2</sup> /min)
$C_v$	= 0.06 (ft <sup>2</sup> /day)

Time (min)	Dial Reading (cc)
0	
0.1	0.0992
0.25	0.1003
0.5	0.1014
0.75	0.1024
1	0.1032
1.5	0.1043
2	0.1054
2.5	0.1062
3	0.1069
4	0.1084
5	0.1097
9	0.1132
16	0.1175
31	0.1233
37	0.1248
46	0.1268
60	0.1289
91	0.1319
122	0.1335
306	0.1374
1606	0.1418



One-Dimensional Consolidation Time-Deformation Relationship

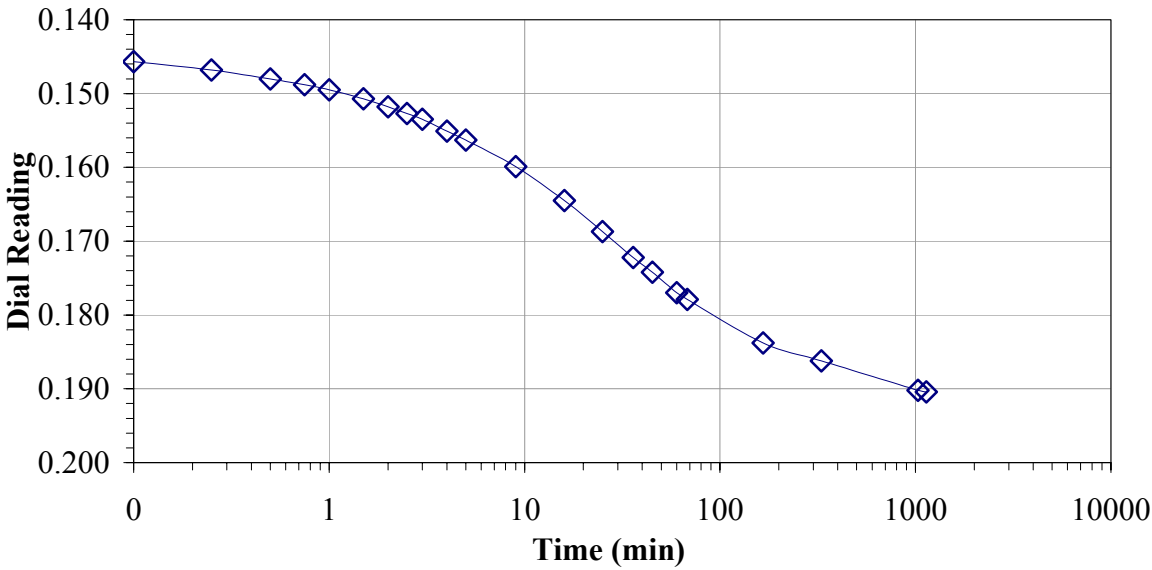
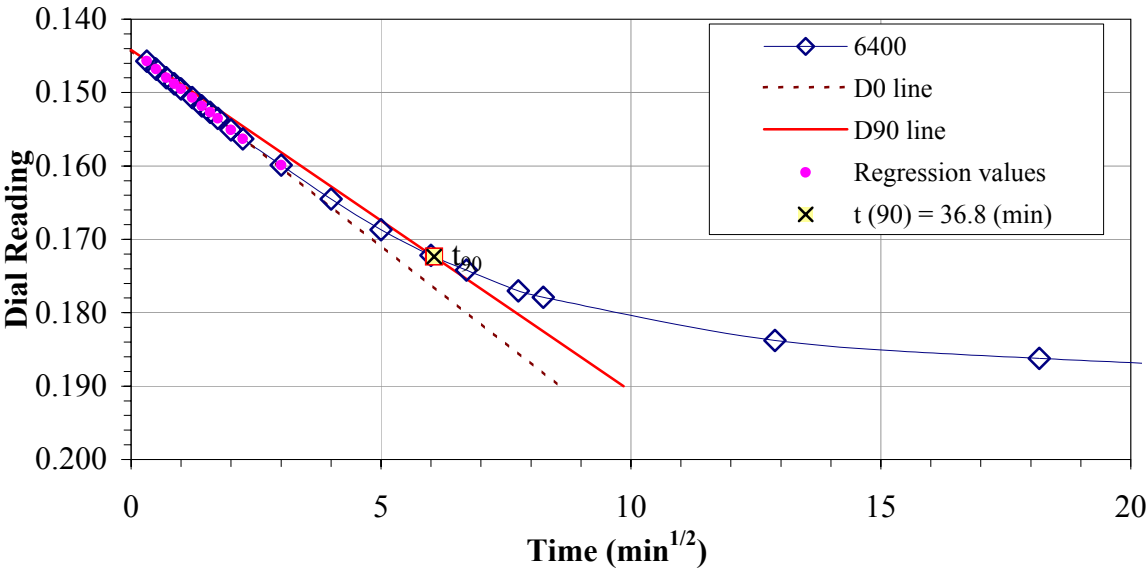


Project: BYU (Dr. Youd)  
Number: M00399-003  
Sample: WLA D-1  
Depth: 2.5-4.0 ft  
Stress: 6400 (psf)

Time rate consolidation data

Data Summary	
$H_{DR}$	= 0.4301 (in)
Slope of $t_{int}$ line	= 0.00535 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00465 (dial/min <sup>1/2</sup> )
$D_0$	= 0.14 (dial)
$D(90)$	= 0.1724 (dial)
$D(100)$	= 0.17551 (dial)
$t(90)$	= 36.8 (min)
$C_v$	= 0.004 (in <sup>2</sup> /min)
$C_v$	= 0.04 (ft <sup>2</sup> /day)

Time (min)	Dial Reading (cc)
0	
0.1	0.1457
0.25	0.1468
0.5	0.148
0.75	0.1488
1	0.1495
1.5	0.1507
2	0.1518
2.5	0.1527
3	0.1535
4	0.1551
5	0.1563
9	0.1599
16	0.1645
25	0.1687
36	0.1722
45	0.1742
60	0.177
68	0.1779
166	0.1838
330	0.1862
1030	0.1902
1138	0.1904



One-Dimensional Consolidation Time-Deformation Relationship



Project: BYU (Dr. Youd)

Number: M00399-003

Sample: WLA D-1

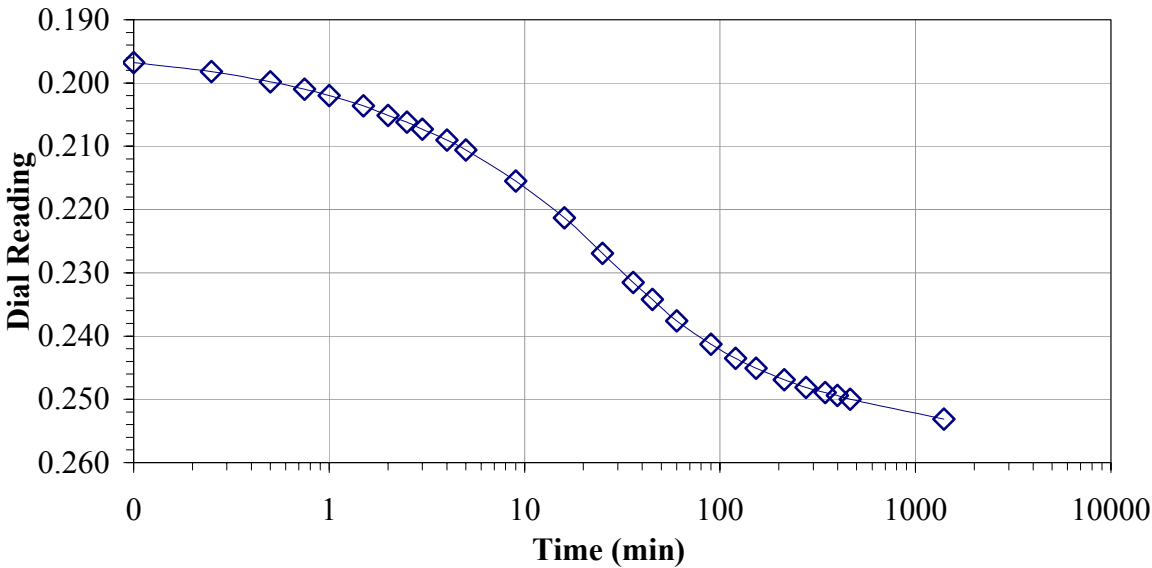
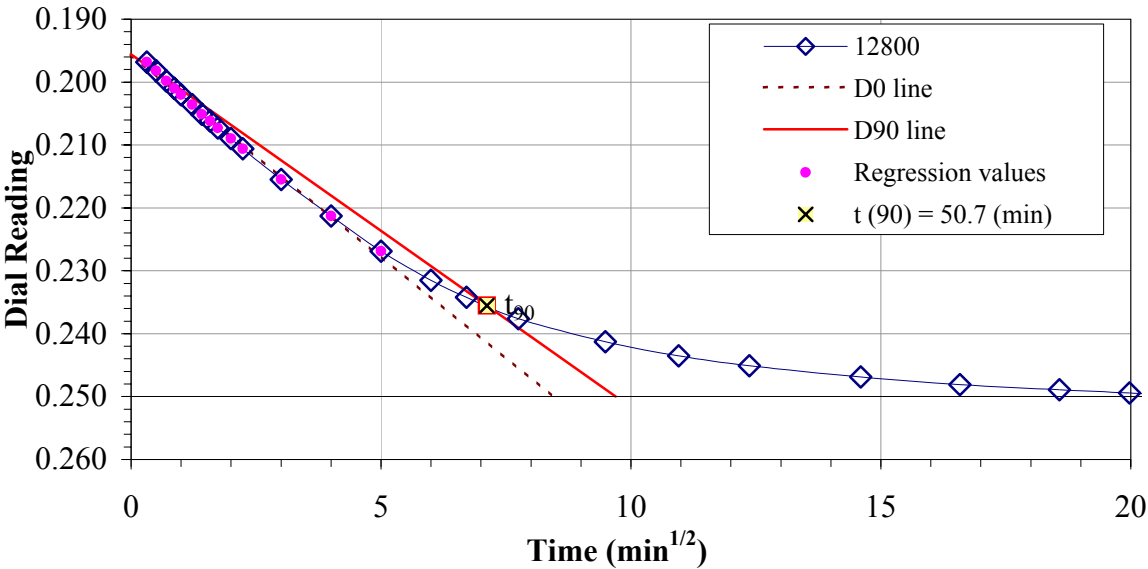
Depth: 2.5-4.0 ft

Stress: 12800 (psf)

Time rate consolidation data

Data Summary	
$H_{DR}$	= 0.4023 (in)
Slope of $t_{int}$ line	= 0.00645 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00561 (dial/min <sup>1/2</sup> )
$D_0$	= 0.20 (dial)
$D(90)$	= 0.2356 (dial)
$D(100)$	= 0.24 (dial)
$t(90)$	= 50.7 (min)
$C_v$	= 0.003 (in <sup>2</sup> /min)
$C_v$	= 0.03 (ft <sup>2</sup> /day)

Time (min)	Dial Reading (cc)
0	
0.1	0.1968
0.25	0.1982
0.5	0.1998
0.75	0.201
1	0.202
1.5	0.2036
2	0.2051
2.5	0.2062
3	0.2073
4	0.209
5	0.2106
9	0.2155
16	0.2213
25	0.2269
36	0.2315
45	0.2342
60	0.2376
90	0.2413
120	0.2435
153	0.2451
213	0.2469
275	0.2481
345	0.2489
399	0.2494
463	0.25
1396	0.2531



One-Dimensional Consolidation Time-Deformation Relationship



Project: BYU (Dr. Youd)

Number: M00399-003

Sample: WLA D-1

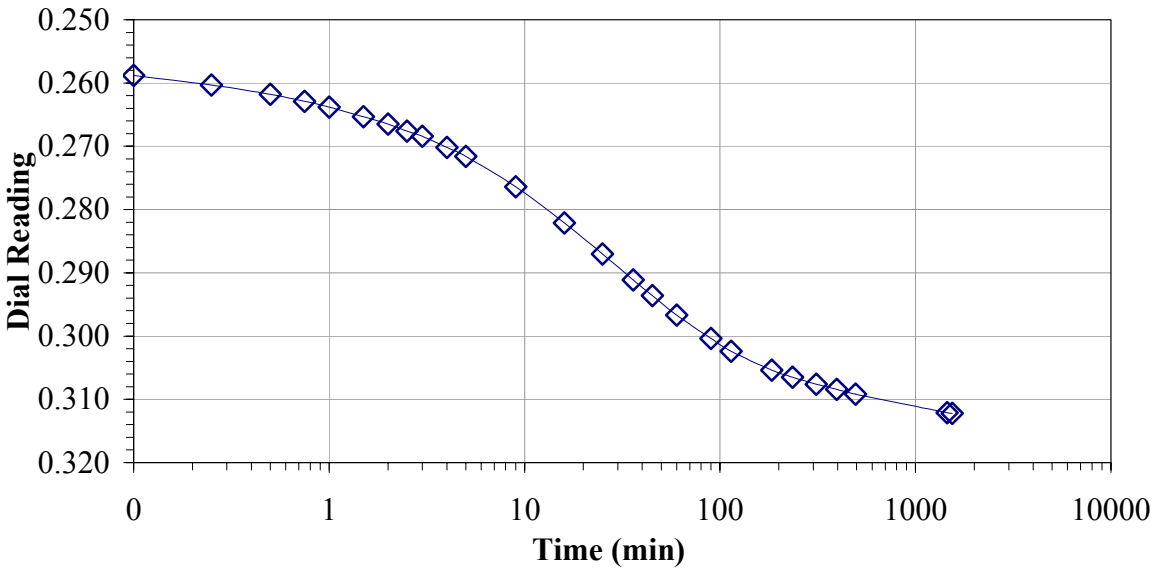
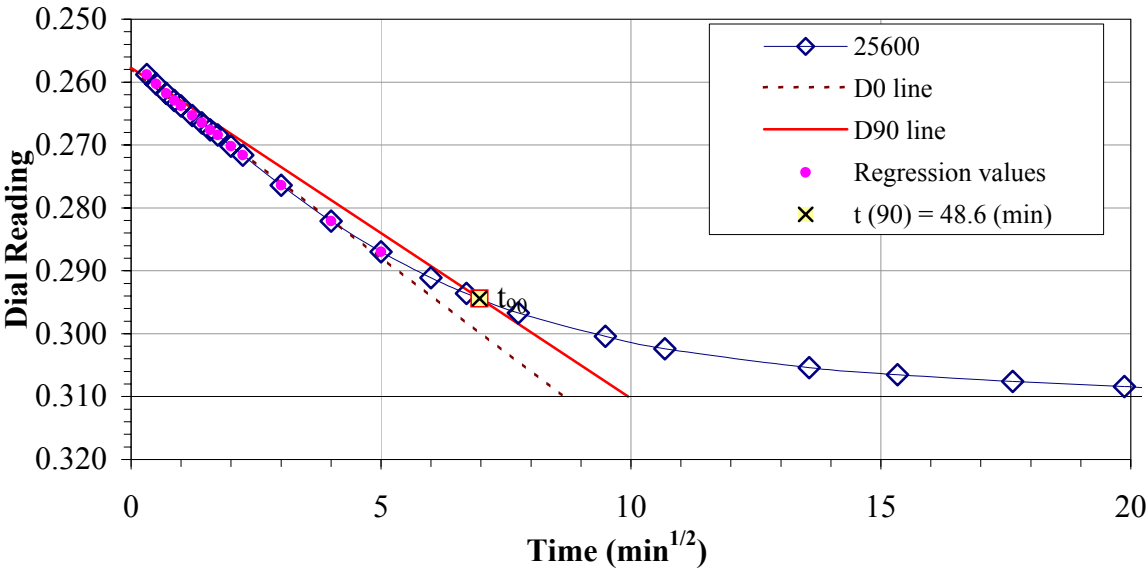
Depth: 2.5-4.0 ft

Stress: 25600 (psf)

Time rate consolidation data

Data Summary	
$H_{DR}$	= 0.3718 (in)
Slope of $t_{int}$ line	= 0.00605 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00526 (dial/min <sup>1/2</sup> )
$D_0$	= 0.26 (dial)
$D(90)$	= 0.2944 (dial)
$D(100)$	= 0.29847 (dial)
$t(90)$	= 48.6 (min)
$C_v$	= 0.002 (in <sup>2</sup> /min)
$C_v$	= 0.02 (ft <sup>2</sup> /day)

Time (min)	Dial Reading (cc)
0	
0.1	0.2588
0.25	0.2603
0.5	0.2618
0.75	0.2629
1	0.2638
1.5	0.2653
2	0.2665
2.5	0.2676
3	0.2684
4	0.2702
5	0.2716
9	0.2764
16	0.2821
25	0.287
36	0.2911
45	0.2936
60	0.2967
90	0.3004
114	0.3024
184	0.3054
235	0.3065
311	0.3076
395	0.3084
493	0.3092
1453	0.3121
1542	0.3122



One-Dimensional Consolidation Time-Deformation Relationship

Project: BYU (Dr. Youd)  
Number: M00399-003  
Sample: WLA D-1  
Depth: 2.5-4.0 ft  
Stress: 51200 (psf)



Time rate consolidation data

Time (min)	Dial Reading (cc)
0	
0.1	0.3178
0.25	0.3191
0.5	0.3204
0.75	0.3214
1	0.3223
1.5	0.3236
2	0.3247
2.5	0.3257
3	0.3266
4	0.3281
5	0.3293
9	0.3332
16	0.338
25	0.3422
36	0.3458
45	0.3481
60	0.351
90	0.3548
135	0.3578
190	0.3596
254	0.3609
372	0.3623
1260	0.3655
1287	0.3655

Data Summary	
$H_{DR}$	= 0.3437 (in)
Slope of $t_{int}$ line	= 0.0055 (dial/min <sup>1/2</sup> )
Slope of $t_{90}$ line	= 0.00478 (dial/min <sup>1/2</sup> )
$D_0$	= 0.32 (dial)
$D(90)$	= 0.3467 (dial)
$D(100)$	= 0.35002 (dial)
$t(90)$	= 39.3 (min)
$C_v$	= 0.003 (in <sup>2</sup> /min)
$C_v$	= 0.03 (ft <sup>2</sup> /day)

