MULTISTAGE TRIAXIAL TEST: Specimen Calculations & Summary(1)

Project Number: 0411-08-1686 Cell No.: _____ File Name: B-2304UD_UD11d

Task Number: NA Specific Gravity: 2.710 [X] Measured; [ ] Assumed

Boring No.: B-2304UD Sample No.: UD11 Specimen No.: D Depth (ft): 111.0-113.0

Type Test: CIU Triaxial Specimen: [X] "Undisturbed"; [ ] Reconstituted; [ ]

Calculations Corr. for Salt (dissolved solids): [X] No or, [ ] Yes, with concentration = _____ ppm

	Inital Water Contents (WC), (W_o) over Saturation, (S_o), in (%):						Calculated Mass of Dry Soil (g)	
	Top, $W_{o,1}$	Botttom, $W_{o,2}$	Sides, $W_{o,3}$	Avg., $W_{o,avg}$	Selct., $W_{o,s}$	Back Cal., $W_{o,bc}$	Initial Selected WC, w_o (%)	30.57
W_o	32.12	30.18	29.40	30.57	30.57	24.08	Initial, $M_{d,o}$	352.29
S_o	105.2	102.2	100.9	102.8	102.8	91.1	Final, $M_{d,al}$	370.71
	Measured final mass of moist soil, $M_{t,al}$ (g)					452.88	Selected, M_d	370.71
	Final mass of moist soil corrected for excess dry soil, $M_{tal,c}$ (g)					452.88		

Consolidation Data	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	
Changes in Height (mm) and Volume (cm^3) Within Given Consolidation Stages/Columns	At Initial Seating Stress	During Back-Pressuring	1st Consol. Increment (1)	Column 2 or 3 to 1st Test Stage (1)	Column 4 to 2nd Test Stage	Column 5 to 3rd Test Stage	Column 6 to 4th Test Stage	
Sign Convention: (+) Deformation in compression or Flow out of spec.; (-) Deformation in extension (swell) or Flow into spec.								
Change in Height, $\Delta H_{c,n}$	0.04	0.27		3.01	NA	NA	NA	
Sum of changes in (+ out)	3.82	10.30		39.92	NA	NA	NA	
burette readings, $\Delta b_{r,n}$ (- in)			NA	15.27	NA	NA	NA	(2)
Theoretical $\Delta V_{cl,n} = (3V_o \times \Delta H_{c,n}/H_o)$	0.25	1.68		18.38	NA	NA	NA	
Vol. Factor, $F_v = \Delta b_{r,n} / \Delta V_{t,n}$				2.17	NA	NA	NA	
Corrected $\Delta V_{cl,n} = F_v \times \Delta V_{t,n}$			NA	0.00	NA	NA	NA	(3)
Selected $\Delta V_{c,n}$	0.25	1.68		15.92	NA	NA	NA	

Summary For Test Stages					
Test Stage:	1st = 1	2nd = 2	3rd = 3	4th = 4	
Cell Pressure, $\sigma_{c,n}$ (psi)	119.83	NA	NA	NA	Number of
Back Pressure, $U_{b,n}$ (psi)	49.65	NA	NA	NA	Test Stages = 1
Axial Force Reading, $P_{r,n}$ (lbf)	2.00	NA	NA	NA	t_{50} = 340 min
Eff. Consol. Stress (σ'_c or $\sigma'_{v,c}$) (4), (ksf)	10.20	NA	NA	NA	
t_c, ON or in [X] days [ ] hrs	5.00	NA	NA	NA	

At Final Test Stress/Stage - Summary of Calculation of ΔV_c (cm^3) by Different Procedures				
By Selected Volumes	By Saturation = 100 %	By Change in Mass (5)	For Diff. in Meas. Vol. (V_o-V_{al}),	For Selected ΔV_c, required
ΔV_c = 17.85	ΔV_c = 15.81	ΔV_c = 7.10	& corr. for ΔH_{td} ΔV_c=	G_s for S_c = 100 %: 2.751

At Final Test Stress/Stage - Consolidation Conclusions				
$\Delta H_{c,f}$ (mm) = 3.32	$\Delta V_{c,f}$ (cm^3) = 17.85	Back Cal. G_s for S=100% = 2.751	Normalized	Ht. Ch. (%) = -1.04
$\varepsilon_{ac,c}$ (%) = 2.88	$\varepsilon_{vc,f}$ (%) = 7.59		Diff. in:	Vol. Ch. (%) =

Summary of Specimen Physical Properties											
Specific Gravity: G_s = 2.710 Measured	Height	Volume	Area	Water Content	Unit Weight Total	Unit Weight Dry	Saturation	Void Ratio	Volumetric Water Content	Porosity	Skempton B parameter %(6)
Condition:	(mm)	(cm^3)	(cm^2)	(%)	(pcf)	(pcf)	(%)	e		n	
Initial:	115.42	235.17	20.37	24.08	122.11	98.41	91.1	0.716	0.3803	0.417	96.0
After Consol.: to 1st σ'_c	112.10	217.32	19.39	22.17	130.10	106.49	102.5	0.586	0.3788	0.369	
to 2nd σ'_c											
to 3rd σ'_c											
to 4th σ'_c											

Notes: (1) If the consol. stress in the 1st consol. increment & 1st test stage are equal, log the data in Column 4.

(2) The height changes occuring within each shearing and unloading stage (1 - 4) are recorded in these rows (after Column 3).

(3) The volume changes occuring within each shearing and unloading stage (1 - 4) are calculated/recorded in these rows (after Column 3).

(4) Stresses are corrected for membrane. (5) ~ $M_{t,o}$-($M_{tal,c}$+ρ_{water}x$\Delta V_{in,column1\&2}$)

(6) Initial value is after back pressuring

NA - Not Applicable ON - Over Night; WC - Water Content Remarks: Wet Method used in the Saturation Stage

Calculated By: TP Reviewed By: WED

MULTISTAGE TRIAXIAL TEST: Specimen Calculations Summary(2)

Project Number: 0411-08-1686 | Test Type: CIU Triaxial | App. No.: | File Name: B-2304UD_UD11d
Project Name: Exelon (Victoria) | Task No.: NA | Test No.: 0 | Test Series for: 0

X Tube	Field Extruded	Liner	Remolded	Tamping	Constant Effort:	Blows/Tamps per Layer =
Boring No.: B-2304UD		Reconstituted		Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =
Sample No.: UD11	Compostite No.:			Pluviated:	Tamper Force (lbf)=	Drop (in.) =
Depth (ft): 111.0-113.0	Specimen No.: D			Kneading	Undercompaction: U_{nl} (%) =	Dia. (in.) =
Spec. Selection by X-ray;	Geomarine Sample				Ref. Effort = % Comp. =	± Opt. =

Type	X Isotropic	K_o stress path	X Used automated system	Drained Axial Strain Rate, $\varepsilon_{a,rate}$ (%/hr.)=?Value
Consolidation	Anistropic	45° stress path	Remarks:	

Loading	X Static	X Undrained	X Comp.	X Strain	Stress	X Constant Cell pressure	Cyclic (Hz)	Stress	Strain
Conditions	Post Cyclic	Drained	Ext.	Stress Path		Variable Cell pressure	Rate: 0.1;	1; Other:	

Specific Gravity: G_s = 2.710 Measured	Height	Volume	Area	Water Content	Unit Weight Total	Unit Weight Dry	Saturation	Void Ratio	Skempton B parameter %(1)
Condition:	(mm)	(cm^3)	(cm^2)	(%)	(pcf)	(pcf)	(%)	e	
Initial:	115.42	235.17	20.37	24.08	122.11	98.41	91.12	0.72	96.0
After Consol.: to 1st σ'_c	112.10	217.32	19.39	22.17	130.10	106.49	102.52	0.59	
to 2nd σ'_c									
to 3rd σ'_c									
to 4th σ'_c									

Unit for Stresses: (ksf)

Consolidation Stress Summary and Loading Summary

Item	Unit	1st Stage	2nd Stage	3rd Stage	4th Stage
Axial Strain during Consol., $\varepsilon_{a,c}$:	%	2.878	NA	NA	NA
Vol. Strain during Consol., $\varepsilon_{v,c}$:	%	7.590	NA	NA	NA
Effective Vertical Stress, σ'_v	(ksf)	10.196	NA	NA	NA
Effective Horizontal Stress, σ'_h:	(ksf)	10.133	NA	NA	NA
Consol. Stress Ratio, k (σ'_h / σ'_v) :	-	0.994			
Induced OCR :	-	1.00	NA	NA	NA
Eff. Average Stress, (σ'_v + σ'_h)/2 :	(ksf)	20.328			
Eff. Mean Stress, (σ'_v + 2*σ'_h)/3 :	(ksf)	10.154			
Undr. Ambient Shear Stress, τ_{ba} :	(ksf)	NA	NA	NA	NA
Undr. Ambient Shear Strain, $\varepsilon_{a,ua}$	%	NA	NA	NA	NA

Notes: See Fugro South, Inc. Notation Listing for definition of symbols and acronyms.

(1) Initial B is after saturation

NA - Not Applicable

Membrane Correction

Type: Bulge
Modulus: 150.0 psi
Diameter: 47.11 mm
Thickness: 0.33 mm

Area Correction

Type: Bulge

Stage	Area Corr. Const.:	Final Area (cm^2):
1st	1.479	25.52
2nd		
3rd		
4th		

Filter Paper Correction

Type: None | Type Strips: Sprial #1
Strips: 8
Force: 0.000 lbf/strip

Final Visual Description and Remarks: Mottled Pale Yellow and Yellow Fat CLAY (CH)

Loading Summary

Stage	Stress Status	ε_a (%)	q (ksf)	p' (ksf)	ΔU (ksf)	σ_1' (ksf)	σ_3' (ksf)
1st	Max Shear Stress	1.85	2.366	4.511	7.989	6.877	2.146
	Max Obliquity	2.98	2.124	3.741	8.511	5.865	1.616
2nd	Max Shear Stress						
	Max Obliquity						
3rd	Max Shear Stress						
	Max Obliquity						
4th	Max Shear Stress						
	Max Obliquity						

Remarks: Stain Rate (%/min) = 1.18E-03

STAGE 1

Project: 0411-08-1686 Boring No.: B-2304UD Depth (ft.): 111.0-113.0
Test Type: CIU Triaxial Sample No.: UD11 Stage No.: 1
Specimen No.: D

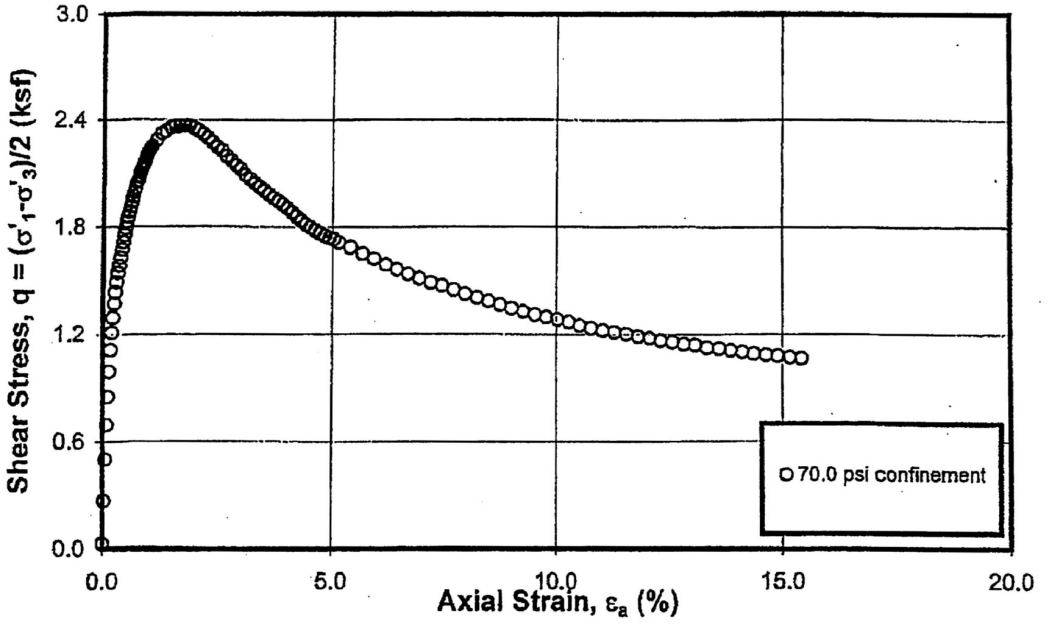
Elapsed Time (min)	Axial Strain ε_a (%)	q (ksf)	p' (ksf)	Excess PWP, ΔU (ksf)	Volume Change (cm^3)	Obliquity σ'_1/σ'_3 -	A_f -	E_S (ksf)	E_T (ksf)
0.0	0.000	0.032	10.164	0.000	0.000	1.006	0.000	-	-
15.0	0.026	0.270	10.082	0.320	0.000	1.055	0.672	1850.5	1833.1
30.0	0.051	0.503	10.022	0.616	0.000	1.106	0.650	1833.1	1648.4
45.0	0.077	0.693	9.898	0.927	0.000	1.151	0.701	1715.8	1354.4
60.0	0.103	0.851	9.779	1.202	0.000	1.191	0.735	1593.8	1159.3
75.0	0.129	0.992	9.647	1.480	0.000	1.229	0.770	1493.3	1014.1
90.0	0.154	1.112	9.486	1.760	0.000	1.266	0.814	1400.6	846.1
105.0	0.180	1.209	9.324	2.020	0.000	1.298	0.857	1308.4	702.1
120.0	0.206	1.293	9.151	2.275	0.000	1.329	0.902	1226.0	627.2
135.0	0.231	1.370	8.991	2.514	0.000	1.360	0.938	1157.0	551.0
150.0	0.257	1.434	8.804	2.779	0.000	1.389	0.985	1091.0	468.0
165.0	0.283	1.491	8.622	2.993	0.000	1.418	1.028	1031.7	416.3
180.0	0.309	1.541	8.487	3.189	0.000	1.444	1.055	978.6	358.9
195.0	0.334	1.583	8.325	3.396	0.000	1.470	1.093	928.2	335.2
210.0	0.360	1.627	8.167	3.595	0.000	1.498	1.126	886.7	356.7
225.0	0.386	1.675	8.042	3.771	0.000	1.526	1.146	852.1	340.8
240.0	0.411	1.715	7.911	3.947	0.000	1.554	1.169	818.4	310.1
255.0	0.437	1.754	7.751	4.126	0.000	1.585	1.200	788.3	307.1
270.0	0.463	1.794	7.639	4.291	0.000	1.614	1.216	761.6	295.8
285.0	0.489	1.830	7.506	4.461	0.000	1.645	1.239	736.5	244.1
300.1	0.514	1.857	7.371	4.615	0.000	1.674	1.265	709.9	207.4
315.1	0.540	1.884	7.236	4.781	0.000	1.704	1.290	686.1	220.9
330.1	0.566	1.914	7.113	4.930	0.000	1.736	1.311	665.4	216.3
345.1	0.591	1.939	6.990	5.084	0.000	1.768	1.332	645.2	214.2
360.1	0.617	1.969	6.881	5.221	0.000	1.802	1.347	627.8	214.5
375.1	0.643	1.995	6.759	5.361	0.000	1.837	1.367	610.8	186.9
390.1	0.668	2.017	6.668	5.485	0.000	1.867	1.381	593.9	211.3
405.1	0.694	2.049	6.577	5.605	0.000	1.905	1.389	581.2	172.2
420.1	0.720	2.061	6.471	5.722	0.000	1.935	1.410	563.8	149.4
435.1	0.746	2.087	6.387	5.835	0.000	1.971	1.419	551.4	171.6
450.1	0.771	2.105	6.313	5.928	0.000	2.001	1.429	537.6	131.6
465.1	0.797	2.121	6.226	6.031	0.000	2.034	1.442	524.3	121.6
480.1	0.823	2.136	6.143	6.134	0.000	2.067	1.455	511.6	133.3
495.1	0.848	2.155	6.048	6.239	0.000	2.107	1.469	500.6	115.0
510.1	0.874	2.166	5.987	6.313	0.000	2.134	1.478	488.3	145.1
525.1	0.900	2.193	5.906	6.418	0.000	2.181	1.485	480.3	153.3
540.1	0.926	2.205	5.857	6.481	0.000	2.208	1.491	469.7	101.0
555.1	0.951	2.219	5.790	6.560	0.000	2.242	1.500	459.8	95.8

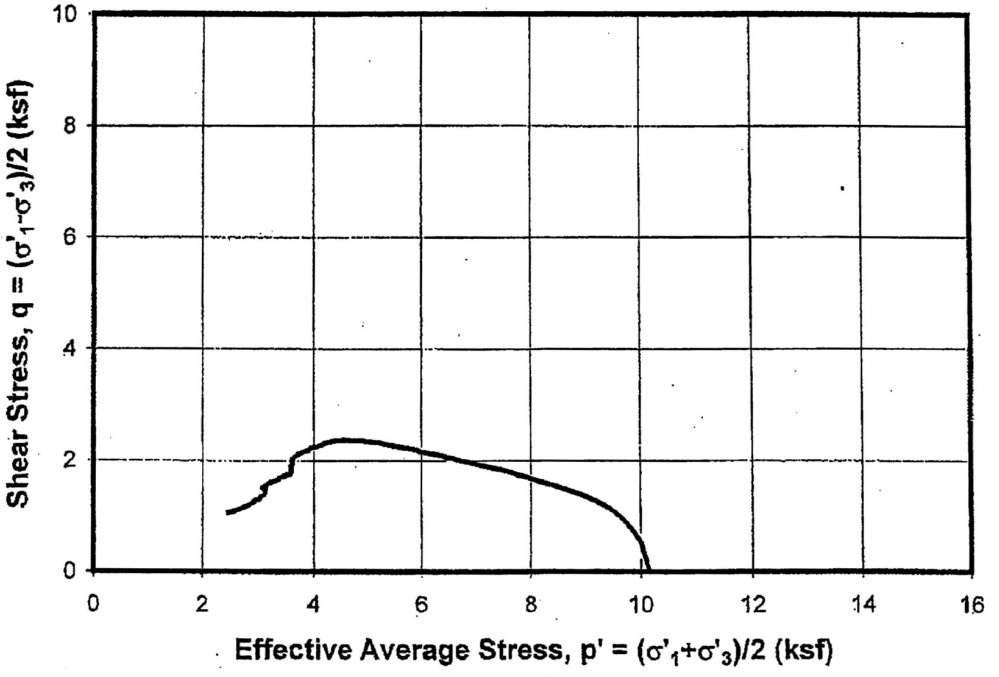
STAGE 1

Elapsed Time (min)	Axial Strain ε_a (%)	q (ksf)	p' (ksf)	Excess PWP, ΔU (ksf)	Volume Change (cm^3)	Obliquity σ'_1/σ'_3 -	A_f -	E_S (ksf)	E_T (ksf)
570.1	0.977	2.230	5.735	6.633	0.000	2.273	1.507	450.0	90.8
585.1	1.003	2.242	5.658	6.716	0.000	2.313	1.519	440.9	76.4
600.1	1.028	2.250	5.616	6.772	0.000	2.336	1.525	431.3	64.8
660.1	1.131	2.286	5.413	7.013	0.000	2.462	1.554	398.5	70.2
720.1	1.234	2.322	5.233	7.225	0.000	2.595	1.577	371.1	49.6
780.1	1.337	2.337	5.069	7.399	0.000	2.711	1.605	344.9	32.1
840.1	1.440	2.355	4.934	7.555	0.000	2.826	1.626	322.7	24.8
900.1	1.543	2.362	4.811	7.692	0.000	2.929	1.648	302.2	9.4
960.1	1.645	2.364	4.694	7.810	0.000	3.030	1.672	283.5	2.3
1020.1	1.748	2.365	4.617	7.883	0.000	3.100	1.689	266.9	1.0
1080.1	1.851	2.366	4.511	7.989	0.000	3.205	1.711	252.2	-8.8
1140.1	1.954	2.356	4.390	8.110	0.000	3.317	1.742	237.9	-25.1
1200.1	2.057	2.340	4.312	8.170	0.000	3.373	1.768	224.4	-33.9
1260.1	2.160	2.321	4.253	8.206	0.000	3.402	1.791	212.0	-40.9
1320.1	2.263	2.298	4.175	8.256	0.000	3.448	1.821	200.3	-44.6
1380.1	2.365	2.275	4.134	8.272	0.000	3.448	1.844	189.7	-46.9
1440.1	2.468	2.249	4.059	8.329	0.000	3.486	1.876	179.7	-45.5
1500.1	2.571	2.228	3.955	8.398	0.000	3.582	1.913	170.9	-51.7
1560.1	2.674	2.196	3.923	8.404	0.000	3.543	1.942	161.9	-55.5
1620.1	2.777	2.171	3.869	8.451	0.000	3.558	1.971	154.1	-49.0
1680.1	2.880	2.146	3.792	8.486	0.000	3.606	2.007	146.8	-45.6
1740.1	2.982	2.124	3.741	8.511	0.000	3.628	2.035	140.3	-53.8
1800.1	3.085	2.091	3.710	8.530	0.000	3.582	2.067	133.5	-53.6
1860.1	3.188	2.069	3.664	8.547	0.000	3.595	2.095	127.8	-44.1
1920.1	3.291	2.045	3.638	8.546	0.000	3.568	2.121	122.4	-43.4
1980.1	3.394	2.024	3.620	8.536	0.000	3.537	2.142	117.4	-40.6
2040.1	3.497	2.003	3.614	8.520	0.000	3.487	2.161	112.8	-42.1
2100.1	3.599	1.981	3.614	8.505	0.000	3.427	2.180	108.3	-41.3
2160.1	3.702	1.961	3.609	8.492	0.000	3.380	2.199	104.2	-37.3
2220.1	3.805	1.943	3.626	8.450	0.000	3.308	2.210	100.4	-33.0
2280.1	3.908	1.927	3.635	8.429	0.000	3.257	2.222	97.0	-35.3
2340.1	4.011	1.906	3.621	8.434	0.000	3.224	2.245	93.5	-43.7
2400.1	4.114	1.882	3.583	8.430	0.000	3.214	2.278	90.0	-46.6
2460.1	4.216	1.858	3.580	8.390	0.000	3.159	2.302	86.7	-45.9
2520.1	4.319	1.835	3.603	8.370	0.000	3.076	2.319	83.5	-43.4
2580.1	4.422	1.814	3.590	8.358	0.000	3.042	2.344	80.6	-36.8
2640.1	4.525	1.797	3.583	8.346	0.000	3.013	2.364	78.0	-33.0
2700.1	4.628	1.780	3.607	8.312	0.000	2.948	2.375	75.6	-32.8
2760.1	4.731	1.763	3.600	8.298	0.000	2.920	2.395	73.2	-28.9
2820.1	4.833	1.750	3.587	8.304	0.000	2.906	2.414	71.1	-22.1
2880.1	4.936	1.741	3.532	8.335	0.000	2.943	2.440	69.2	-16.8
2940.1	5.039	1.733	3.480	8.378	0.000	2.984	2.465	67.5	-25.8
3000.1	5.142	1.714	3.474	8.373	0.000	2.948	2.488	65.4	-29.3

STAGE 1

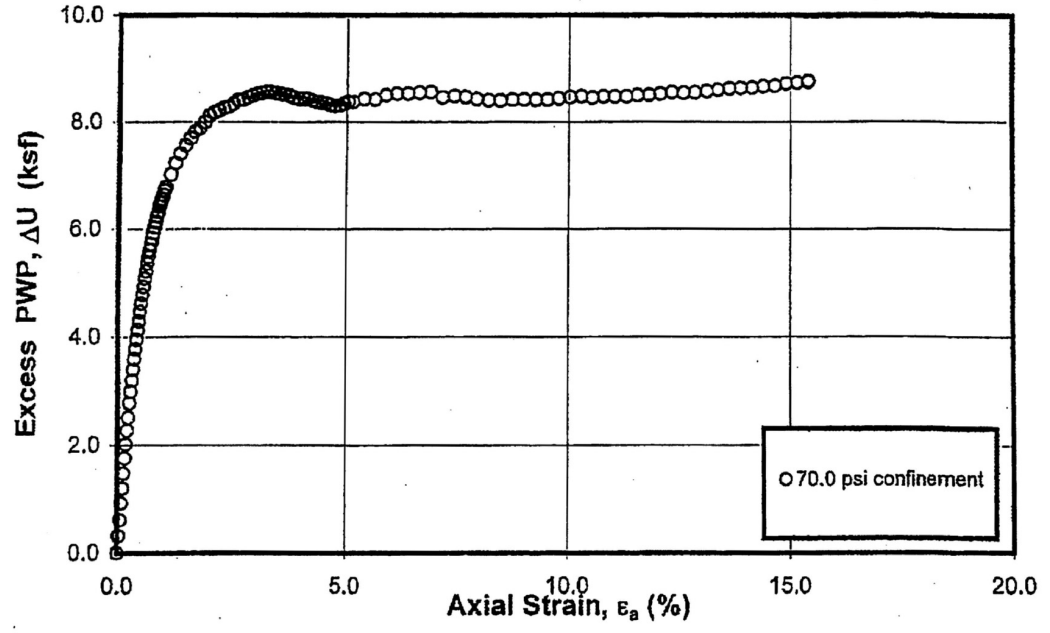
Elapsed Time (min)	Axial Strain ε_a (%)	q (ksf)	p' (ksf)	Excess PWP, ΔU (ksf)	Volume Change (cm^3)	Obliquity σ'_1/σ'_3 -	A_f -	E_S (ksf)	E_T (ksf)
3150.1	5.399	1.686	3.387	8.425	0.000	2.981	2.549	61.3	-24.8
3300.1	5.656	1.650	3.372	8.417	0.000	2.918	2.598	57.2	-25.0
3450.1	5.913	1.621	3.263	8.497	0.000	2.975	2.671	53.8	-24.3
3600.1	6.170	1.588	3.204	8.524	0.000	2.966	2.736	50.4	-23.7
3750.1	6.427	1.560	3.173	8.525	0.000	2.935	2.787	47.6	-20.7
3900.1	6.685	1.535	3.132	8.542	0.000	2.921	2.839	45.0	-19.4
4050.1	6.942	1.510	3.088	8.554	0.000	2.915	2.893	42.6	-18.4
4200.1	7.199	1.487	3.157	8.453	0.000	2.782	2.907	40.4	-15.1
4350.1	7.456	1.472	3.137	8.476	0.000	2.768	2.940	38.6	-15.3
4500.1	7.713	1.448	3.124	8.460	0.000	2.728	2.985	36.7	-17.9
4650.1	7.970	1.426	3.131	8.429	0.000	2.672	3.023	35.0	-16.7
4800.1	8.227	1.405	3.134	8.406	0.000	2.625	3.059	33.4	-15.5
4950.1	8.484	1.386	3.125	8.397	0.000	2.594	3.099	31.9	-15.7
5100.1	8.741	1.365	3.091	8.418	0.000	2.581	3.153	30.5	-15.8
5250.1	8.998	1.345	3.061	8.418	0.000	2.568	3.204	29.2	-14.3
5400.1	9.256	1.328	3.041	8.419	0.000	2.550	3.247	28.0	-13.5
5550.1	9.513	1.311	3.036	8.417	0.000	2.519	3.287	26.9	-12.1
5700.1	9.770	1.297	2.998	8.438	0.000	2.525	3.332	25.9	-10.6
5850.1	10.027	1.283	2.955	8.462	0.000	2.536	3.380	25.0	-10.6
6000.1	10.284	1.270	2.928	8.480	0.000	2.532	3.422	24.1	-13.1
6150.1	10.541	1.250	2.942	8.451	0.000	2.477	3.465	23.1	-13.5
6300.1	10.798	1.235	2.897	8.472	0.000	2.486	3.519	22.3	-10.1
6450.2	11.055	1.224	2.884	8.475	0.000	2.474	3.553	21.6	-8.8
6600.2	11.312	1.212	2.868	8.476	0.000	2.465	3.589	20.9	-8.3
6750.2	11.569	1.202	2.843	8.495	0.000	2.466	3.626	20.2	-9.0
6900.2	11.826	1.189	2.821	8.504	0.000	2.458	3.671	19.6	-8.9
7050.2	12.084	1.180	2.790	8.527	0.000	2.465	3.712	19.0	-8.6
7200.2	12.341	1.167	2.757	8.555	0.000	2.469	3.762	18.4	-8.4
7350.2	12.598	1.158	2.755	8.541	0.000	2.450	3.789	17.9	-8.0
7500.2	12.855	1.147	2.737	8.548	0.000	2.442	3.831	17.3	-7.1
7650.2	13.112	1.140	2.706	8.571	0.000	2.455	3.865	16.9	-8.6
7800.2	13.369	1.124	2.662	8.596	0.000	2.462	3.932	16.3	-8.0
7950.2	13.626	1.119	2.638	8.621	0.000	2.475	3.960	16.0	-5.9
8100.2	13.883	1.109	2.616	8.630	0.000	2.472	4.002	15.5	-6.7
8250.2	14.140	1.102	2.604	8.637	0.000	2.468	4.031	15.1	-6.7
8400.2	14.397	1.092	2.560	8.668	0.000	2.488	4.086	14.7	-6.1
8550.2	14.655	1.086	2.556	8.674	0.000	2.478	4.107	14.4	-4.4
8700.2	14.912	1.081	2.505	8.712	0.000	2.517	4.151	14.1	-5.8
8850.2	15.169	1.071	2.476	8.731	0.000	2.525	4.197	13.7	-5.3
9000.2	15.426	1.067	2.459	8.767	0.000	2.533	4.221	13.4	-27.1
9003.4	15.431	1.066	2.461	8.750	0.000	2.528	4.225	13.4	-50.8

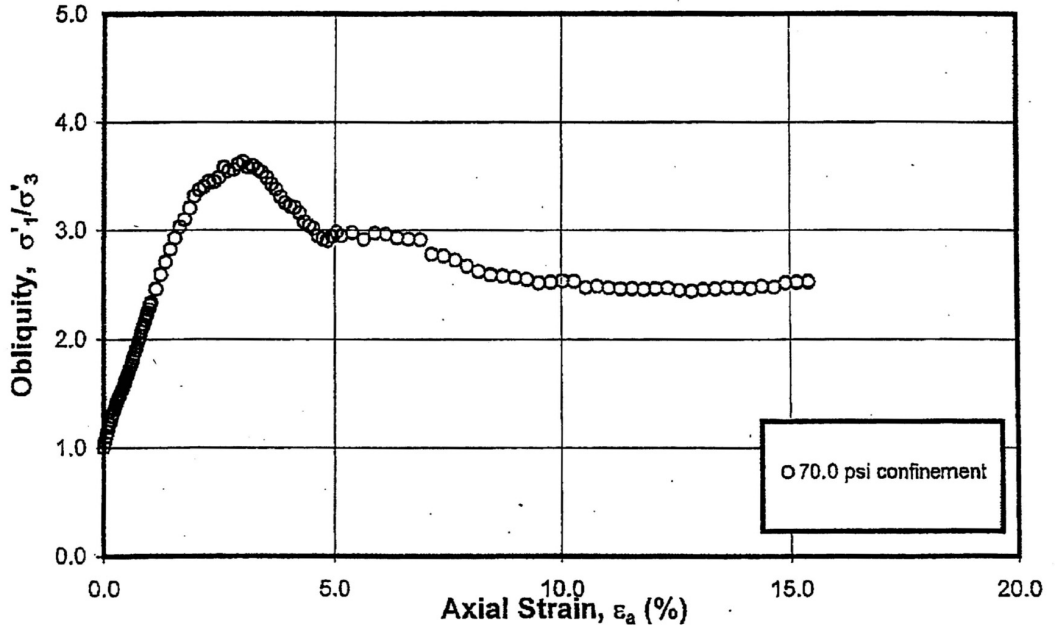




UNDRAINED TRIAXIAL COMPRESSION TEST
Isotropically Consolidated
Sample: UD11D - Depth: 111.0-113.0 ft
Boring B-2304UD

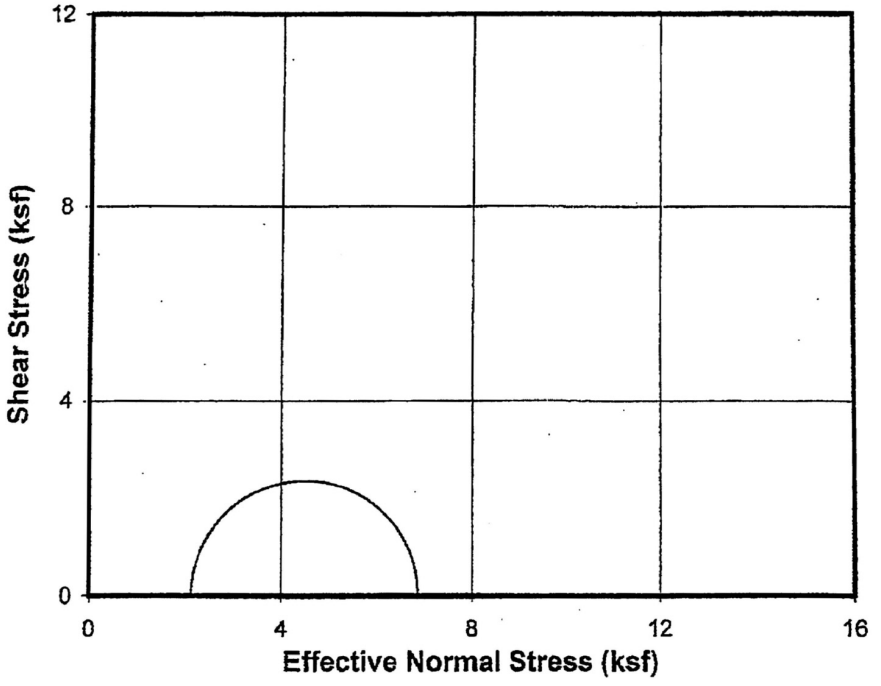
Reviewed By: WID

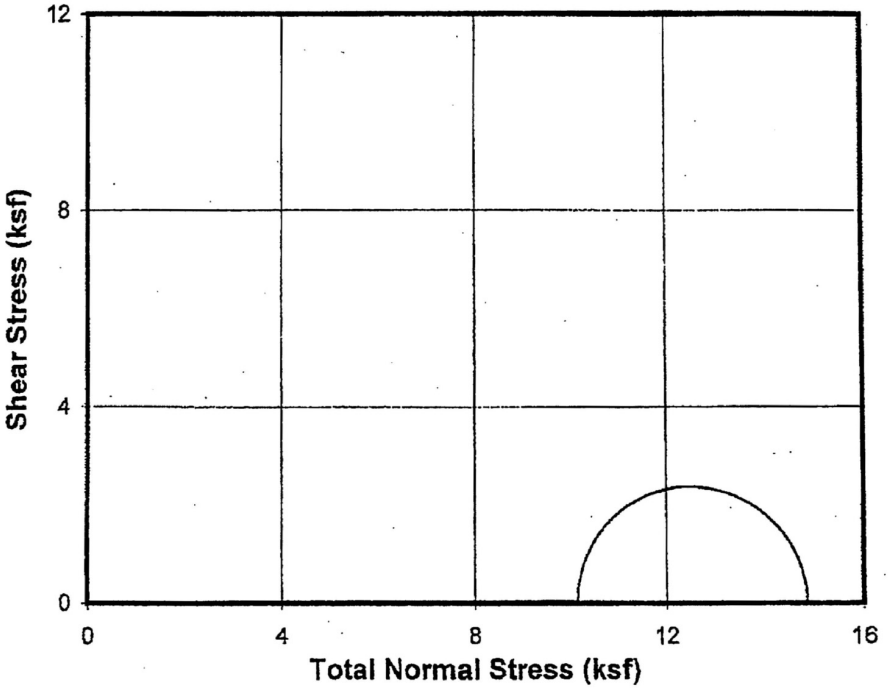




UNDRAINED TRIAXIAL COMPRESSION TEST
Isotropically Consolidated
Sample: UD11D - Depth: 111.0-113.0 ft
Boring B-2304UD

Reviewed By: WKD





UNDRAINED TRIAXIAL COMPRESSION TEST
Isotropically Consolidated- Mohr's Circles
Sample: UD11D - Depth: 111.0-113.0 ft
Boring B-2304UD

Reviewed By: WFA

TRIAXIAL TEST (ASTM D 4767-04): Specimen Setup / Take Down

Project Number: 0411-08-1686 | Test Type: CIU Triaxial | Cell No.: TRX-6 | File Name: 2304UD_UD1

Task No.: NA | Test Stress(es), σ'_c or $\sigma'_{v,c}$ = 10.80 , NA , NA & NA ksf

Project Name: Exelon (Victoria) | k ($\sigma'_{h,c}$ / $\sigma'_{v,c}$) = 1.00 | Induced OCR = 1.00 | K_{ua} ($\sigma_{d,ua}/2\sigma'_{v,c}$) = NA

Assig. Remarks: | Specific Gravity: 2.710 [X] Meas.; [ ] Assumed

[X] Tube [ ] Field Extruded	[ ] Liner [ ] Remolded	[ ] Tamping	[ ] Constant Effort:	Blows/Tamps per Layer =
Boring No.: B-2304UD	[ ] Reconstituted	[ ] Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =
Sample No.: UD13	Compostite No.:	[ ] Pluviated:	Tamper Force (lbf)=	Drop (in.) =
Depth (ft): 121.0-123.0	Specimen No.: c	[ ] Kneading	[ ] Undercompaction: U_{ni} (%) =	Dia. (in.) =
[ ] Spec. Selection by X-ray;	[ ] Geomarine Sample		Ref. Effort = % Comp. =	± Opt. =

Type Consolidation :	[X] Isotropic / [ ] Anistropic	[ ] K_o stress path / [ ] 45° stress path	[X] Used automated system:	Drained Axial Strain Rate, $\varepsilon_{a,rate}$ (%/h) = NA
			Remarks:	

Loading Conditions :	[X] Static / [ ] Post Cyclic	[X] Undrained / [ ] Drained	[X] Comp. / [ ] Ext.	[X] Strain / [ ] Stress Path	[X] Constant Cell Pressure / [ ] Variable Cell Pressure	[ ] Cyclic (Hz) Rate: [ ] 0.1;	[ ] Stress / [ ] Strain 1; Other:								

Water Content (WC);	Initial - Trimming Location			Final, W_{at}
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	(see below)
Container No	990	5018	2033A	4145
Mass Moist Soil + Cont. (g)	81.49	81.39	81.38	133.74
Mass Dry Soil + Container (g)	72.88	72.72	72.61	116.18
Mass Container (g)	32.30	31.32	30.66	29.98
Water Content, $W_{o,n}$ (%)	21.22	20.94	20.91	20.37
Avg. Initial WC, $W_{o,avg}$ (%)	21.02	Final (W_{at}):	[X] Slice ; [ ]	Whole Spec.

[ ] See attached data sheet(s) for additional water contents

SOIL MASSES:	Initial	Final
Moist + Tare (etc.)(g)	484.65	490.47
Tare (etc.) (g)	0.00	0.00
Mass Moist Spec., M_{tn} (g)	484.65	490.47
Excess Dry Soil (soil not included in final mass measurement)		
Container No.		
Mass Dry Soil + Cont. (g)		
Mass Container (g)		
Mass Excess Dry Soil, $M_{d,es}$ (g)		0.00

Specimen Dimensions, (mm)

	Height			Dia., X indicates with membrane		
	Initial (H_o)	Final (H_{at})		Initial (D_o)	Final (D_{at})	
GB	100.000	92.000	1 T	50.10	53.50	For
1	15.33	4.23	2 M	50.10	51.60	Wedge
2	15.35	5.26	3 B	50.10	52.00	Failure
3	15.27	5.30	1'T		60.10	= d_{max}
4	15.23	5.15	2'M		60.80	= d_{min}
5	15.25	5.20	3'B			= Δd
Avg.	115.29	97.03	Avg.	50.10	55.60	xxxxx

Measuring Devices:				
Pi Tape:	[X]	Dia	$A_o = \pi D^2/400$ (cm^2)	19.71
Calipers:	[ ] Ht.;	[ ] Dia	V_o (cm^3)	227.27
			$A_{atb,m}=\pi (D^*_{at})^2/400$ (cm^2)	24.43
Dial Comparator	[X] Ht.;	[ ] Dia	$A_{atw,m}=(d_{min}-\Delta d)d_{max}\pi/400$ (cm^2)	NA
Remarks: ID# PI-002			$D^*_{at}=(D_T+2D_M+D_B)/4$ (mm)	55.77

Estimated Initial Unit Weight

Total, $\gamma_{t,o}$ (lb/ft^3) = 133.13 | Dry, $\gamma_{d,o}$ (lb/ft^3)= 110.00

Membrane / Filter Paper / Apparatus

Membrane (mm):		Top	Bottom
Number:	Thickness:	0.70	0.58
= 1	[ ] Single; [X] Double	0.69	0.57
	Circumference ($C_{rm,o}$)	149.0	150.0
		Total Thickness	Dia.($C_{rm,o}/\pi$)
	Average:	0.32	47.59

Filter Paper: Top + Bottom: [ ] Yes ; [X] No

Filter Strips: [X] Yes ; [ ] No Number = 8

Type of Filter Strips [ ] Vertical: ¼ in. & Whatman #54

[X] Sprial: ¼ in. & Whatman #1

Apparatus: Mass Top Cap, M_{tc} = 53.4 g, 0.12 lbf

Mass Displ. System, M_{ds} (cap, dial, piston, etc.) = NA g, NA lbf

Top Cap Attached: [ ] Yes; [X] No; | Piston Dia.(in.) [X] ½; [ ] ¾; [ ] | Load Cell: [ ] External [X] Internal

Top Cap - Rotation [ ] Fixed,<1°; [X] Limited,<5°; [ ] Unlimited, >5°

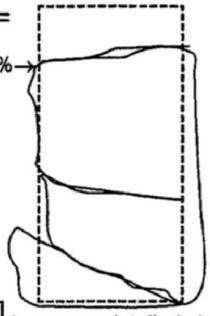
With: [ ] Frictionless End Caps; [ ] Lat. Movement Top Cap

[ ] Internal LVDT Jacket

[ ] Photo Taken.

Failure Sketch

ε_a= 20%



Failure Mode: [ ] Bulge [X] Wedge [ ] Parabolic

Wedge/Bulge Ht.= NA (mm)

NA - Not Applicable

GB - Gage Block

Other Remarks:

LL=62 PL=18 PI=44

Final Visual Classification: Mottled Pale Yellow and Yellow Fat CLAY (CH)

planes

Trimmed / Reconstituted By: AW | Set Up By: TP | Taken Down By: AW

Date: 3/24/2008 | Date: 3/24/2008 | Date: 4/14/2008

Prelim. Calc. By: TP | Final Calc. By: TP | Reviewed By: WJR

[ ] See more detailed sketch on attached sheet. Remarks:

KAW 6/13/08

MULTISTAGE TRIAXIAL TEST: Specimen Calculations & Summary(1)

Project Number: 0411-08-1686 Cell No.: TRX-6 File Name: 2304UD_UD13c
Task Number: NA Specific Gravity: 2.710 [X] Measured; [##] Assumed
Boring No.: B-2304UD Sample No.: UD13 Specimen No.: c Depth (ft): 121.0-123.0
Type Test: CIU Triaxial Specimen: [X] "Undisturbed"; [ ] Reconstituted; [ ]
Calculations Corr. for Salt (dissolved solids): [X] No or, [ ] Yes, with concentration = _____ ppm

	Inital Water Contents (WC), (W_o) over Saturation, (S_o), in (%):						Calculated Mass of Dry Soil (g)	
	Top, $W_{o,1}$	Botttom, $W_{o,2}$	Sides, $W_{o,3}$	Avg., $W_{o,avg}$	Selct., $W_{o,s}$	Back Cal., $W_{o,bc}$	Initial Selected WC, w_o (%)	21.02
W_o	21.22	20.94	20.91	21.02	21.02	18.94	Initial , $M_{d,o}$	400.47
S_o	106.9	106.2	106.1	106.4	106.4	100.9	Final, $M_{d,at}$	407.46
	Measured final mass of moist soil, $M_{t,at}$ (g)					490.47	Selected, M_d	407.46
	Final mass of moist soil corrected for excess dry soil, $M_{tat,c}$ (g)					490.47		

Consolidation Data	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	
Changes in Height (mm) and Volume (cm^3) Within Given Consolidation Stages/Columns	At Initial Seating Stress	During Back-Pressuring	1st Consol. Increment (1)	Column 2 or 3 to **1st Test** Stage (1)	Column 4 to **2nd Test** Stage	Column 5 to **3rd Test** Stage	Column 6 to **4th Test** Stage	
Sign Convention: (+) Deformation in compression or Flow out of spec.; (-) Deformation in extension (swell) or Flow into spec.								
Change in Height, $\Delta H_{c,n}$	0.66	0.98		1.43	NA	NA	NA	
Sum of changes in (+ out)	0.18			15.49	NA	NA	NA	
burette readings, $\Delta b_{r,n}$ (- in)		-9.31	NA	16.03	NA	NA	NA	(2)
Theoretical $\Delta V_{ct,n} = (3V_o \times \Delta H_{c,n}/H_o)$	3.91	5.78		8.44	NA	NA	NA	
Vol. Factor, $F_v = \Delta b_{r,n} / \Delta V_{t,n}$				1.84	NA	NA	NA	
Corrected $\Delta V_{ct,n} = F_v \times \Delta V_{t,n}$			NA	0.00	NA	NA	NA	(3)
Selected $\Delta V_{c,n}$	0.18	-9.31		4.49	NA	NA	NA	

Summary For Test Stages					
Test Stage:	1st = 1	2nd = 2	3rd = 3	4th = 4	
Cell Pressure, $\sigma_{c,n}$ (psi)	164.84	NA	NA	NA	Number of
Back Pressure, $U_{b,n}$ (psi)	89.97	NA	NA	NA	Test Stages = 1
Axial Force Reading, $P_{r,n}$ (lbf)	2.00	NA	NA	NA	t_{50} = 200 min
Eff. Consol. Stress (σ'_c or $\sigma'_{v,c}$) (4), (ksf)	10.83	NA	NA	NA	
t_c, ON or in [X] days [ ] hrs	12.00	NA	NA	NA	

At Final Test Stress/Stage - Summary of Calculation of ΔV_c (cm^3) by Different Procedures

By Selected Volumes	By Saturation = 100 %	By Change in Mass (5)	For Diff. in Meas. Vol. (V_o-V_{at}),	For Selected ΔV_c, required
ΔV_c = -4.64	ΔV_c = -6.52	ΔV_c = 3.47	& corr. for ΔH_{td} ΔV_c=	G_s for S_c = 100 %: 2.744

At Final Test Stress/Stage - Consolidation Conclusions

$\Delta H_{c,f}$ (mm) = 3.07	$\Delta V_{c,f}$ (cm^3) = -4.64	Back Cal. G_s for S=100% = 2.744	Normalized	Ht. Ch. (%) =	0.73
$\varepsilon_{ac,c}$ (%) = 2.66	$\varepsilon_{vc,f}$ (%) = -2.04		Diff. in:	Vol. Ch. (%) =	

Summary of Specimen Physical Properties

Specific Gravity: G_s = 2.710 Measured Condition:	Height (mm)	Volume (cm^3)	Area (cm^2)	Water Content (%)	Unit Weight Total (pcf)	Unit Weight Dry (pcf)	Saturation (%)	Void Ratio e	Volumetric Water Content	Porosity n	Skempton B para-meter %(6)
Initial:	115.29	227.27	19.71	18.94	133.13	111.92	100.9	0.509	0.3402	0.337	94.0
After to 1st σ'_c	112.22	231.91	20.67	20.37	132.03	109.68	102.3	0.540	0.3586	0.351	
Consol.: to 2nd σ'_c											
to 3rd σ'_c											
to 4th σ'_c											

Notes: (1) If the consol. stress in the 1st consol. increment & 1st test stage are equal, log the data in Column 4.
(2) The height changes occuring within each shearing and unloading stage (1 - 4) are recorded in these rows (after Column 3).
(3) The volume changes occuring within each shearing and unloading stage (1 - 4) are calculated/recorded in these rows (after Column 3).
(4) Stresses are corrected for membrane. (5) ~ $M_{t,o}$-($M_{tat,c}$+ρ_{water}x$\Delta V_{in,column1\&2}$)
(6) Initial value is after back pressuring
NA - Not Applicable ON - Over Night WC - Water Content Remarks: Wet Method used in the Saturation Stage

Calculated By: TP Reviewed By: HP

MULTISTAGE TRIAXIAL TEST: Specimen Calculations Summary(2)

Project Number: 0411-08-1686 | Test Type: CIU Triaxial | App. No.: TRX-6 | File Name: 2304UD_UD1:
Project Name: Exelon (Victoria) | Task No.: NA | Test No.: 0 | Test Series for: 0

X Tube	Field Extruded	Liner	Remolded	Tamping	Constant Effort: Blows/Tamps per Layer =
Boring No.: B-2304UD		Reconstituted		Impact/Rammer	Rammer Wgt.(lbf)= No. Layers =
Sample No.: UD13	Compostite No.:			Pluviated:	Tamper Force (lbf)= Drop (in.) =
Depth (ft): 121.0-123.0	Specimen No.: c			Kneading	Undercompaction: U_{ni} (%) = Dia. (in.) =
Spec. Selection by X-ray;	Geomarine Sample				Ref. Effort = % Comp. = ± Opt. =

Type	X Isotropic	K_o stress path	X Used automated system	Drained Axial Strain Rate, $\varepsilon_{a,rate}$ (%/hr.)= NA
Consolidation	Anistropic	45° stress path	Remarks:	

Loading	X Static	X Undrained	X Comp.	X Strain	Stress	X Constant Cell pressure	Cyclic (Hz)	Stress	Strain
Conditions:	Post Cyclic	Drained	Ext.	Stress Path		Variable Cell pressure	Rate: 0.1;	1;	Other:

Specific Gravity: G_s = 2.710 Measured	Height	Volume	Area	Water Content	Unit Weight Total	Unit Weight Dry	Saturation	Void Ratio	Skempton B para-meter %(1)
Condition:	(mm)	(cm^3)	(cm^2)	(%)	(pcf)	(pcf)	(%)	e	
Initial:	115.29	227.27	19.71	18.94	133.13	111.92	100.87	0.51	94.0
After to 1st σ'_c	112.22	231.91	20.67	20.37	132.03	109.68	102.29	0.54	
Consol.: to 2nd σ'_c									
to 3rd σ'_c									
to 4th σ'_c									

Unit for Stresses: (ksf)

Consolidation Stress Summary and Loading Summary

Item	Unit	1st Stage	2nd Stage	3rd Stage	4th Stage
Axial Strain during Consol., $\varepsilon_{a,c}$:	%	2.659	NA	NA	NA
Vol. Strain during Consol., $\varepsilon_{v,c}$:	%	-2.042	NA	NA	NA
Effective Vertical Stress, σ'_v	(ksf)	10.826	NA	NA	NA
Effective Horizontal Stress, σ'_h:	(ksf)	10.796	NA	NA	NA
Consol. Stress Ratio, k (σ'_h / σ'_v) :	-	0.997			
Induced OCR :	-	1.00	NA	NA	NA
Eff. Average Stress, (σ'_v + σ'_h)/2 :	(ksf)	21.622			
Eff. Mean Stress, (σ'_v + 2*σ'_h)/3 :	(ksf)	10.806			
Undr. Ambient Shear Stress, τ_{ba} :	(ksf)	NA	NA	NA	NA
Undr. Ambient Shear Strain, $\varepsilon_{a,ua}$	%	NA	NA	NA	NA

Notes: See Fugro South, Inc. Notation Listing for definition of symbols and acronyms.

(1) Initial B is after saturation

NA - Not Applicable

Membrane Correction

Type: Bulge
Modulus: 150.0 psi
Diameter: 47.59 mm
Thickness: 0.32 mm

Area Correction

Type: Bulge

Stage	Area Corr. Const.:	Final Area (cm^2):
1st	1.351	24.43
2nd		
3rd		
4th		

Filter Paper Correction

Type: None | Type Strips: Sprial #1
Strips: 8
Force: 0.000 lbf/strip

Final Visual Description and Remarks: Mottled Pale Yellow and Yellow Fat CLAY (CH)

Loading Summary

Stage	Stress Status	ε_a (%)	q (ksf)	p' (ksf)	ΔU (ksf)	σ_1' (ksf)	σ_3' (ksf)
1st	Max Shear Stress	4.65	4.118	10.813	4.101	14.931	6.694
	Max Obliquity	4.01	4.106	10.777	4.115	14.883	6.672
2nd	Max Shear Stress						
	Max Obliquity						
3rd	Max Shear Stress						
	Max Obliquity						
4th	Max Shear Stress						
	Max Obliquity						

Remarks: Stain Rate (%/min) = 2.00E-03

STAGE 1

Project: 0411-08-1686 Boring No.: B-2304UD Depth (ft.): 121.0-123.0

Test Type: CIU Triaxial Sample No.: UD13 Stage No.: 1

Specimen No.: c

Elapsed Time (min)	Axial Strain ε_a (%)	q (ksf)	p' (ksf)	Excess PWP, ΔU (ksf)	Volume Change (cm^3)	Obliquity σ'_1/σ'_3 -	A_f -	E_S (ksf)	E_T (ksf)
0.0	0.000	0.015	10.811	0.000	0.000	1.003	0.000	-	-
30.0	0.053	0.057	10.772	0.073	0.000	1.011	0.971	156.3	229.4
60.0	0.107	0.114	10.741	0.162	0.000	1.021	0.857	184.2	167.3
90.0	0.160	0.179	10.728	0.255	0.000	1.034	0.754	204.3	269.1
120.0	0.214	0.245	10.710	0.319	0.000	1.047	0.720	214.5	327.6
149.4	0.266	0.335	10.712	0.409	0.000	1.064	0.655	240.0	-30637.3
159.5	0.293	0.378	10.737	0.433	0.000	1.073	0.602	248.0	397.4
179.5	0.346	0.471	10.749	0.513	0.000	1.092	0.569	263.3	290.5
199.5	0.400	0.567	10.759	0.592	0.000	1.111	0.547	275.8	406.5
219.5	0.453	0.665	10.770	0.681	0.000	1.132	0.531	286.6	384.0
239.5	0.507	0.801	10.832	0.769	0.000	1.160	0.487	310.1	659.0
259.5	0.561	1.045	10.921	0.911	0.000	1.212	0.446	367.3	1122.2
279.5	0.614	1.344	11.084	1.052	0.000	1.276	0.398	432.9	1065.0
299.5	0.668	1.614	11.177	1.223	0.000	1.337	0.385	478.9	1039.0
319.5	0.721	1.885	11.277	1.397	0.000	1.401	0.375	518.5	939.2
339.6	0.775	2.134	11.366	1.556	0.000	1.462	0.369	547.0	788.2
359.6	0.828	2.326	11.394	1.728	0.000	1.513	0.374	557.9	734.7
379.6	0.882	2.501	11.388	1.895	0.000	1.563	0.384	563.8	656.8
399.6	0.935	2.674	11.403	2.064	0.000	1.613	0.389	568.5	654.2
419.6	0.989	2.864	11.429	2.230	0.000	1.669	0.392	576.3	684.7
439.6	1.042	3.000	11.404	2.386	0.000	1.714	0.401	572.8	418.9
459.6	1.096	3.125	11.376	2.535	0.000	1.757	0.409	567.6	466.0
509.6	1.230	3.432	11.349	2.874	0.000	1.867	0.421	555.7	392.8
589.6	1.444	3.753	11.284	3.251	0.000	1.997	0.437	517.9	220.3
669.6	1.658	3.943	11.240	3.494	0.000	2.081	0.445	473.9	136.5
749.6	1.872	4.037	11.157	3.673	0.000	2.134	0.457	429.8	67.2
829.6	2.086	4.086	11.064	3.817	0.000	2.171	0.469	390.3	30.0
909.7	2.300	4.091	10.969	3.904	0.000	2.189	0.481	354.4	-7.2
989.7	2.514	4.091	10.940	3.939	0.000	2.195	0.484	324.3	1.3
1069.7	2.728	4.073	10.872	3.999	0.000	2.198	0.492	297.5	-7.4
1149.7	2.942	4.088	10.871	4.005	0.000	2.205	0.493	276.9	4.3
1229.7	3.156	4.088	10.856	4.019	0.000	2.208	0.495	258.1	-7.1
1309.7	3.370	4.096	10.826	4.040	0.000	2.217	0.498	242.2	6.9
1389.7	3.584	4.095	10.800	4.083	0.000	2.221	0.501	227.7	5.4
1469.7	3.798	4.104	10.807	4.088	0.000	2.224	0.500	215.3	-3.1
1549.7	4.012	4.106	10.777	4.115	0.000	2.231	0.504	203.9	15.4
1629.7	4.226	4.106	10.797	4.106	0.000	2.227	0.502	193.6	-9.3
1709.7	4.440	4.102	10.785	4.105	0.000	2.228	0.503	184.1	4.9