DIRECT SIMPLE SHEAR TEST (ASTM D 6528-07): Specimen Calculations & Summary

Project Number: 0411-08-1686 | Test Station No.: 5G | File Name: B-2319_UD7b

Task Number: NA | Specific Gravity: 2.660 | [X] Measured; [ ] Assumed

Type Test: SDSS | Specimen: [X] "Undisturbed"; [ ] Reconstituted; [ ] Remolded

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

Consolidation Stress Summary and Loading Summary							
Test Stage:	Max. Stress	Pre-Shear	Post Cyclic	X	Static Strain Rate = NA (%/hr or)		
Nominal Vertical Stress, σ'_v (ksf)	NA	7.2	NA		Cyclic Rate (Hz):	[ ] 0.1;	[ ] 1; Other =
Axial/Vertical Force, $P_{vr,n}$ (lbf)	NA	NA	NA	During/End of Loading		Static	Cyclic
Horizontal Force, $P_{hr,n}$ (lbf)	NA	0	NA	Change in Height, $\Delta H_{L,n}$ (mm)		NA	NA
Nominal OCR	NA	NA	NA	Change in Vol., $\Delta V_{L,n}$ (cm^3)		NA	NA
t_c,(ON,days,hrs)	NA	0.65 days	NA	Post Cy.Displ. Reset to Null Position:		[ ] Yes;	[ ] No

[ ] Undrained ambient stress applied: with Delta shear force (lbf) = NA & Duration (min) = NA & Delta disp., $\Delta d_{h,ua}$ (mm) = NA

Trimmed Specimen (TS) - Inital Water Contents over Saturation (%):

	Top, $W_{o,1}$	Botttom, $W_{o,2}$	Sides, $W_{o,3}$	Avg., $W_{o,avg}$	Selct., $W_{o,s}$	Back Cal.
W_o	19.63		20.90	20.26	20.26	20.89
S_o	89.8		92.9	91.4	91.4	92.9

Measured final mass of moist soil, $M_{t,at}$ (g)	130.22
Final mass of moist soil corrected for excess dry soil, $M_{tat,c}$ (g)	130.22

Calculated Mass of Dry Soil (g)

Initial Selected Water Content (%)	20.26
Initial , $M_{d,o}$	108.46
Final, $M_{d,at}$	107.90
Selected, M_d	108.16

Initial Back Cal. Specific Gravity (TS):

Selected S_o (%)	
Selected W_o (%)	
Specific Gravity, $G_{s,bc}$	

Height/Volume Change Summary

Variation in Height & Volume During Consol.	During Initial Consol. to $\sigma'_{v,c}$ or $\sigma'_{vc,max}$ =	During Rebound to $\sigma'_{v,c}$ =	Specimen Unloaded After Test To
Stress Units (ksf)	7.200	NA	NA
Sign Convention: (+) ΔV out & ΔH down; (-) ΔV in & ΔH up			
Delta Def. Read., $\Delta d_{ar,n}$ (mm)	0.770		
Total Equip. Comp., $\Sigma\Delta d_{afc}$ (mm)	0.000		
Corr. Total Def. $\Delta H_{c,n}$ (mm)	0.770		
ΔV_n using A_o - spec. (cm^3)	2.69		
ΔV_n using $A_{c,n}$ - app. (cm^3)	2.68		
ΔV_n using burette meas.(cm^3)	0.50		
Selected ΔV_n (cm^3)	2.69	NA	NA = ΔV_{uL}
After Test WC Corr. for ΔV during Shear & Unloading, $W_{at,c}$ (%)			NA

Lateral Confinement Area Cal. Approach (LCA); Method 1, 2, 3 or 4: 1

Calculation of ΔV_c by Different Procedures

By Selected Volumes		By Change in Mass	
ΔV_c (cm^3)	2.69	~ $M_{t,o}$ - ($M_{tat,c}$ + ΔV_L + ΔV_{uL})	
By Cal. Height & App. Area		ΔV_c (cm^3)	0.22
ΔV_c (cm^3)	2.68	**By Saturation = 100% and**	
By Cal. Ht. & Init. Spec. Area		**Spec. Unloaded to 0 Stress**	
ΔV_c (cm^3)	2.69	ΔV_c (cm^3)	NA

Back Cal. Water Content During Consol. - Based on the Consolidation Conclusions Given Below

Assumed Saturation (%)	100.00
Back Cal. WC before Loading, $W_{c,bc}$ (%)	19.86
Back Cal.WC at Max. Stress, $W_{cmax,bc}$ (%)	NA

Consolidation & Preshear Conclusions							
	ΔV_c (cm^3) =	2.69	ΔH_c (mm) =	0.770	$\varepsilon_{a,c}$ (%) =	4.13	$\Delta V_{c,max}$ (cm^3) = NA
	V_c (cm^3) =	62.26	H_c (mm) =	17.855	$\varepsilon_{v,c}$ (%) =	4.14	$\varepsilon_{ac,max}$ (%)= NA
	A_c (cm^2) =	34.87	$\Delta\gamma_c$ (mm) =	NA	γ_c (%) =	NA	Preshear: γ_{ua} (%)= NA

Summary of Specimen Physical Properties:

Specific Gravity: G_s = 2.660 Measured / Condition:	Height (mm)	Volume (cm^3)	Area (cm^2)	Water Content (%)	Total Unit Weight (pcf)	Dry Unit Weight (pcf)	Saturation (%)	Void Ratio, e
Initial (as trimmed)	18.625	64.95	34.87	20.6	125.4	104.0	92.2	0.597
After Consol.: to $\sigma'_{v,c}$	17.855	62.26	34.87	19.9	130.0	108.5	100.0	0.531
to $\sigma'_{vc,max}$	NA	NA	NA	NA	NA	NA	NA	NA

LCA-Method & Note(s): 1- Initial measured value remains constant. 4 - Based on change in height & volume.
2 - Initial measured value corrected for applied stress. NA - Not Applicable
3 - Uses measured value at appropriate stress level (NA for rings).

Calculated By: LF

Reviewed By: HP

Remarks: t95 for max stress = 3.1 min

Project Number: 0411-08-1686 | Test Type: SDSS | Test Sta. No.: 5G | File Name: B-2319_UD7b
Project Name: Exelon (Victoria) | Task No.: NA | Test No.: NA | Test Series for: NA

X Tube ☐ Field Extruded	☐ Liner ☐ Remolded	☐ Tamping	☐ Constant Effort:	Blows/Tamps per Layer =	
Boring No.: B-2319UD	☐ LPC Core	☐ Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =	
Sample No.: UD-7	Compostite No.:	☐ Pluviated:	Tamper Force (lbf)=	Drop (in.) =	
Depth (ft): 65.0 - 67.0	Specimen No.: B	☐ Kneading	☐ Undercompaction: U_{ni} (%) =	Dia. (in.) =	
☐ Spec. Selection by X-ray;	☐ Geomarine Sample		Ref. Effort= % Comp. =	± Opt.=	

Type Consolidation:	X	K_o at:	X	Incremental CRS	☐	Anisotropic at:	☐	Inclined Stress Path, $K_{c,DSS}$ 90° Stress Path	☐	Used Automated System Remarks:		
Loading Conditions:	X	Static	X	Strain	☐	Creep	X	Const, Vol./Ht	X	Without - Water	☐	Cyclic (Hz)
	☐	Dynamic	☐	Stress	☐	Post Cyclic	☐	Drained	☐	With - Bath	Rate: ☐ 0.1;	☐ Strain ☐ Stress 1; Other:

Summary of Specimen Physical Properties

Specific Gravity: G_s = 2.660 Measured Condition:	Height (mm)	Volume (cm^3)	Area (cm^2)	Water Content (%)	Unit Weight Total (pcf)	Unit Weight Dry (pcf)	Saturation (%)	LL PL PI	-200 %	Void Ratio, e
Initial	18.63	64.95	34.87	20.60	125.4	104.0	92.2	39	54.7	0.597
After Consol.: to $\sigma'_{v,c}$	17.86	62.26	34.87	19.86	130.0	108.5	100.0	17	NA	0.531
to $\sigma'_{vc,max}$	NA	NA	NA	NA	NA	NA	NA	22	NA	NA

Consolidation Stress Summary and Loading Summary

Item	Unit	Max. Stress	Pre-Shear	Post Cyclic
Vert. Consol. Stress, $\sigma'_{v,c}$:	(ksf)	NA	7.204	NA
Induced OCR:	-	NA	NA	NA
Axial Strain during Consol., $\varepsilon_{a,c}$:	%	NA	4.13	NA
Horiz. Consol. Stress, $\tau_{h,c}$:	(ksf)	NA	NA	NA
Consol. Stress Ratio, $\tau_{h,c}$ / $\sigma'_{v,c}$:	-	NA	NA	NA
Shear Strain during Consol., $\varepsilon_{h,c}$:	%	NA	NA	NA
Undr. Ambient Shear Stress, $\tau_{h,ua}$:	(ksf)	NA	NA	NA
Undr. Ambient Shear Strain, ε_{ua}:	%	NA	NA	NA

X Static Strain Rate = 4.5 %/hr.
☐ Cyclic Rate (Hz): ☐ 0.1; ☐ 1; Other =

During/End of Loading	Static	Cyclic
Change in Height, $\Delta H_{L,n}$ (mm):	NA	NA
Change in Vol., $\Delta V_{L,n}$ (cm^3):	NA	NA

Post Cy.Displ. Reset to Null Pos.: ☐ Yes; ☐ No
Number of Loading Cycles, N = NA
$\pm\tau_h$ = NA (ksf) $\pm\gamma$ = NA %
at end of cyclic loading, $\sigma'_{vcy,r}$ = NA (ksf)

Weight Top Cap, etc., M_{tc} (lbf): 1.16
Data corr. for M_{tc}: X Yes; ☐ No | Plattens with Pins: ☐ Yes; X No
☐ Wire Reinforced Membrane, Model:
X Regular Membrane with Rings
Data corr. for Membr. strength: ☐ Yes X No

Data Normalization: X Yes ☐ No Value: 7.204 (ksf)
Using Effective Vertical Stress:
X Pre-Shear Conditions ☐ Post-Cyclic Conditions
☐ Maximum Stress during Consol.

Notes: See Fugro South, Inc. Notation Listing for definition of symbols and acronyms. F or G in the Test Sta. No. indicates Fugro or GEOTAC apparatus.
NA - Not Applicable

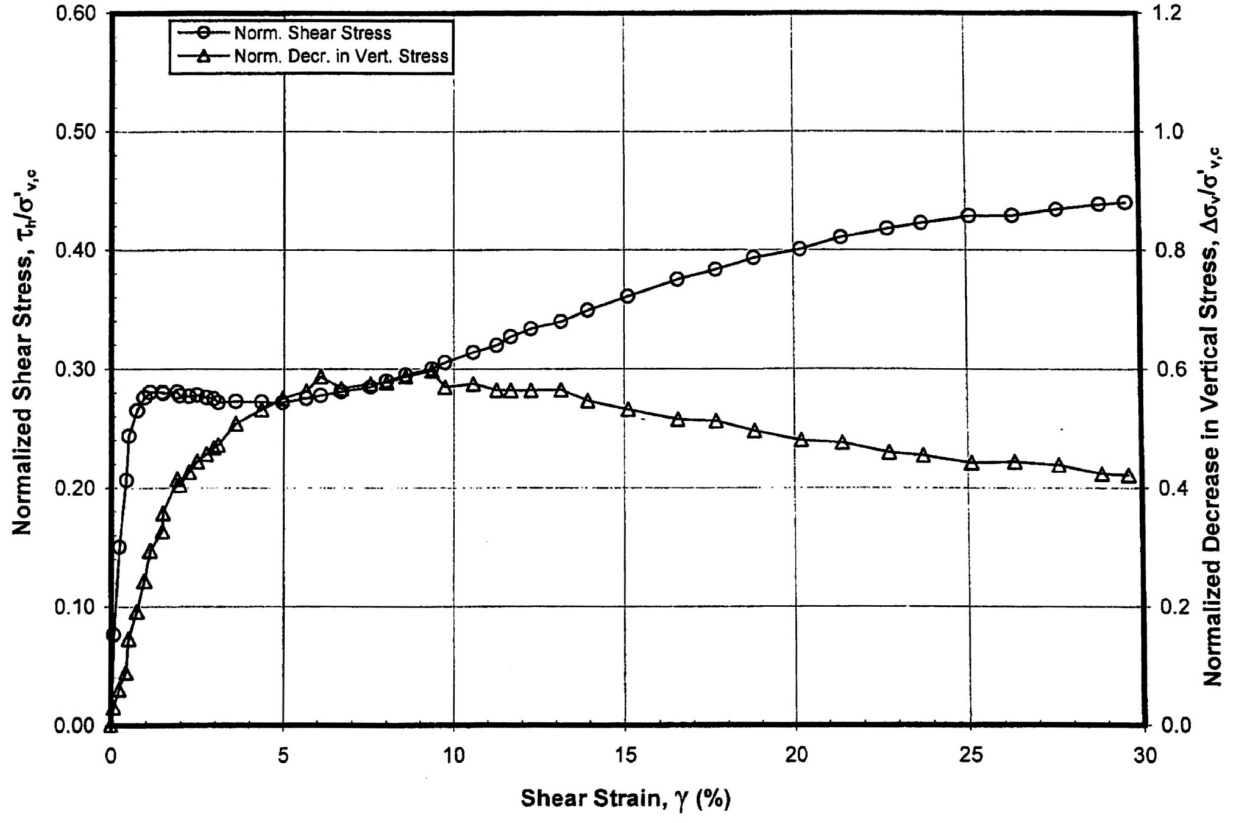
Final Visual Description and Remarks: Light Yellowish Brown Sandy Lean CLAY (CL)

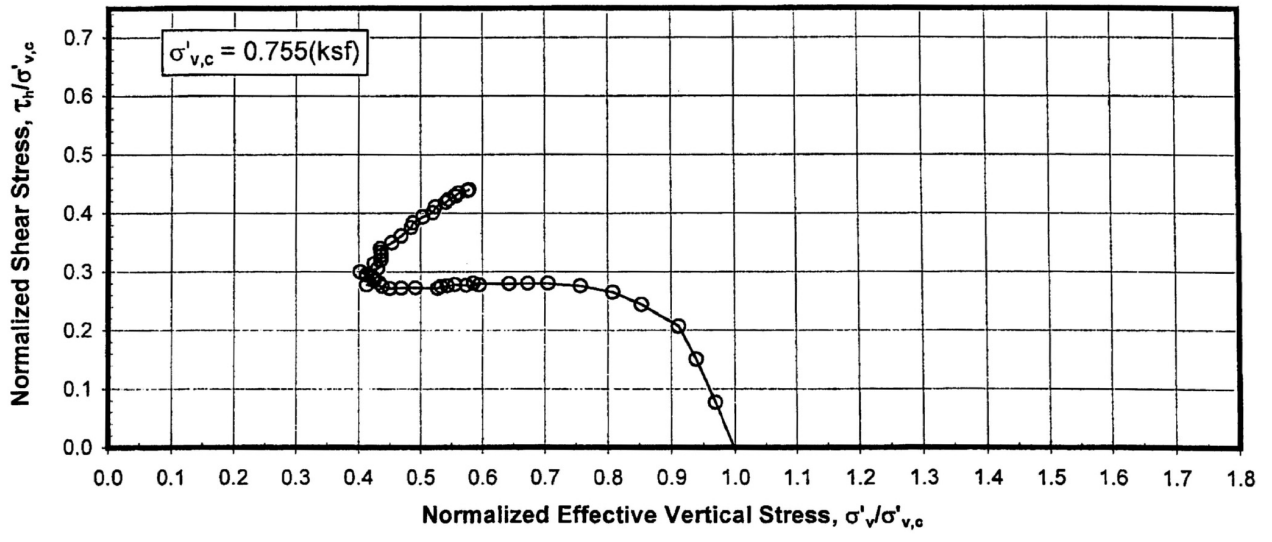
Loading Summary

	τ_h (ksf)	γ (%)	σ'_v (ksf)	τ_h/σ'_v -	$\Delta\sigma'_v/\sigma'_{v,c}$ -	$c_u/\sigma'_{v,c}$ -
at Peak Shear Stress	4.456	15.74	4.408	1.011	0.388	0.618
at Maximum Strain	3.797	29.63	3.638	1.044	0.495	-

Boring No.: B-2319UD Sample No.: UD-7B

Elapsed Time (min)	Shear Strain γ (%)	Shear Stress τ_h (ksf)	Effective Vertical Stress σ'_v (ksf)	Calulated Pore Press. Change $\Delta U = \Delta\sigma'_v$ (ksf)	Secant Shear Modulus G_s (ksf)	Tangent Modulus G_T (ksf)	Norm. Shear Stress $\tau_h/\sigma'_{v,c}$	Norm. Vert. Stress $\sigma'_v/\sigma'_{v,c}$	Norm. Decr. in V. Stress $\Delta\sigma'_v/\sigma'_{v,c}$	Stress Ratio Angle ϕ'_{DSS} (°)
0.0	0.00	0.000	7.204	0.000	-	-	0.000	1.000	0.000	0.00
2.6	0.02	0.209	7.165	0.039	906.514	664.790	0.029	0.995	0.005	1.67
5.3	0.07	0.402	7.134	0.070	585.548	319.702	0.056	0.990	0.010	3.23
7.9	0.14	0.562	7.064	0.140	394.076	239.537	0.078	0.981	0.019	4.55
10.5	0.20	0.718	7.005	0.200	355.480	245.323	0.100	0.972	0.028	5.85
13.2	0.27	0.868	6.940	0.264	324.205	207.304	0.120	0.963	0.037	7.13
15.8	0.34	1.008	6.864	0.341	294.009	180.390	0.140	0.953	0.047	8.36
18.4	0.42	1.141	6.788	0.416	272.167	164.818	0.158	0.942	0.058	9.54
21.1	0.50	1.268	6.730	0.475	253.153	151.708	0.176	0.934	0.066	10.67
23.7	0.59	1.406	6.666	0.538	236.696	155.865	0.195	0.925	0.075	11.91
26.3	0.69	1.563	6.601	0.604	226.591	164.057	0.217	0.916	0.084	13.32
29.0	0.79	1.729	6.515	0.689	218.597	166.264	0.240	0.904	0.096	14.86
31.6	0.88	1.884	6.456	0.748	213.371	155.198	0.261	0.896	0.104	16.26
34.3	0.99	2.029	6.374	0.830	205.952	135.825	0.282	0.885	0.115	17.66
36.9	1.10	2.179	6.288	0.916	197.928	121.252	0.302	0.873	0.127	19.11
39.5	1.23	2.322	6.193	1.011	189.153	104.162	0.322	0.860	0.140	20.55
42.2	1.36	2.445	6.095	1.109	180.233	95.847	0.339	0.846	0.154	21.86
44.8	1.49	2.573	5.998	1.207	172.750	96.670	0.357	0.832	0.168	23.22
52.7	1.95	3.024	5.687	1.518	154.745	78.927	0.420	0.789	0.211	28.00
60.6	2.51	3.363	5.367	1.837	133.923	48.570	0.467	0.745	0.255	32.07
68.5	3.08	3.569	5.135	2.069	115.957	30.453	0.495	0.713	0.287	34.79
76.4	3.66	3.712	4.960	2.244	101.418	21.471	0.515	0.689	0.311	36.81
84.2	4.25	3.820	4.820	2.384	89.854	16.567	0.530	0.669	0.331	38.40
92.1	4.86	3.910	4.711	2.493	80.494	12.830	0.543	0.654	0.346	39.69
100.0	5.49	3.979	4.648	2.557	72.494	10.205	0.552	0.645	0.355	40.57
107.9	6.12	4.039	4.588	2.616	66.016	8.813	0.561	0.637	0.363	41.35
115.8	6.75	4.090	4.542	2.663	60.585	7.662	0.568	0.630	0.370	42.00
123.7	7.36	4.134	4.511	2.693	56.157	6.642	0.574	0.626	0.374	42.50
131.6	8.00	4.172	4.487	2.717	52.176	6.178	0.579	0.623	0.377	42.92
139.5	8.62	4.212	4.473	2.731	48.852	5.961	0.585	0.621	0.379	43.28
147.4	9.26	4.248	4.466	2.739	45.857	5.371	0.590	0.620	0.380	43.57
155.2	9.89	4.280	4.456	2.749	43.284	4.772	0.594	0.618	0.382	43.85
163.1	10.52	4.308	4.439	2.765	40.937	3.750	0.598	0.616	0.384	44.14
171.0	11.13	4.327	4.442	2.762	38.878	5.076	0.601	0.617	0.383	44.25
181.5	11.95	4.385	4.454	2.750	36.682	4.752	0.609	0.618	0.382	44.55
197.3	13.23	4.416	4.443	2.762	33.384	2.246	0.613	0.617	0.383	44.83
213.1	14.49	4.442	4.432	2.772	30.662	1.566	0.617	0.615	0.385	45.06
228.8	15.74	4.456	4.408	2.797	28.312	0.014	0.618	0.612	0.388	45.31
244.6	16.99	4.442	4.371	2.834	26.149	-1.442	0.617	0.607	0.393	45.47
260.4	18.26	4.419	4.326	2.879	24.208	-1.937	0.613	0.600	0.400	45.61
276.2	19.54	4.393	4.275	2.929	22.477	-2.854	0.610	0.593	0.407	45.78
291.9	20.86	4.345	4.208	2.996	20.830	-3.734	0.603	0.584	0.416	45.91
307.7	22.17	4.294	4.142	3.063	19.370	-4.652	0.596	0.575	0.425	46.04
323.5	23.46	4.224	4.066	3.138	18.002	-5.657	0.586	0.564	0.436	46.09
339.3	24.76	4.148	3.985	3.220	16.752	-6.619	0.576	0.553	0.447	46.15
355.0	26.09	4.050	3.897	3.307	15.525	-7.724	0.562	0.541	0.459	46.10
370.8	27.39	3.945	3.803	3.402	14.401	-7.274	0.548	0.528	0.472	46.05
386.6	28.72	3.859	3.695	3.509	13.437	-6.644	0.536	0.513	0.487	46.24
397.1	29.63	3.797	3.638	3.567	12.816	-6.782	0.527	0.505	0.495	46.23





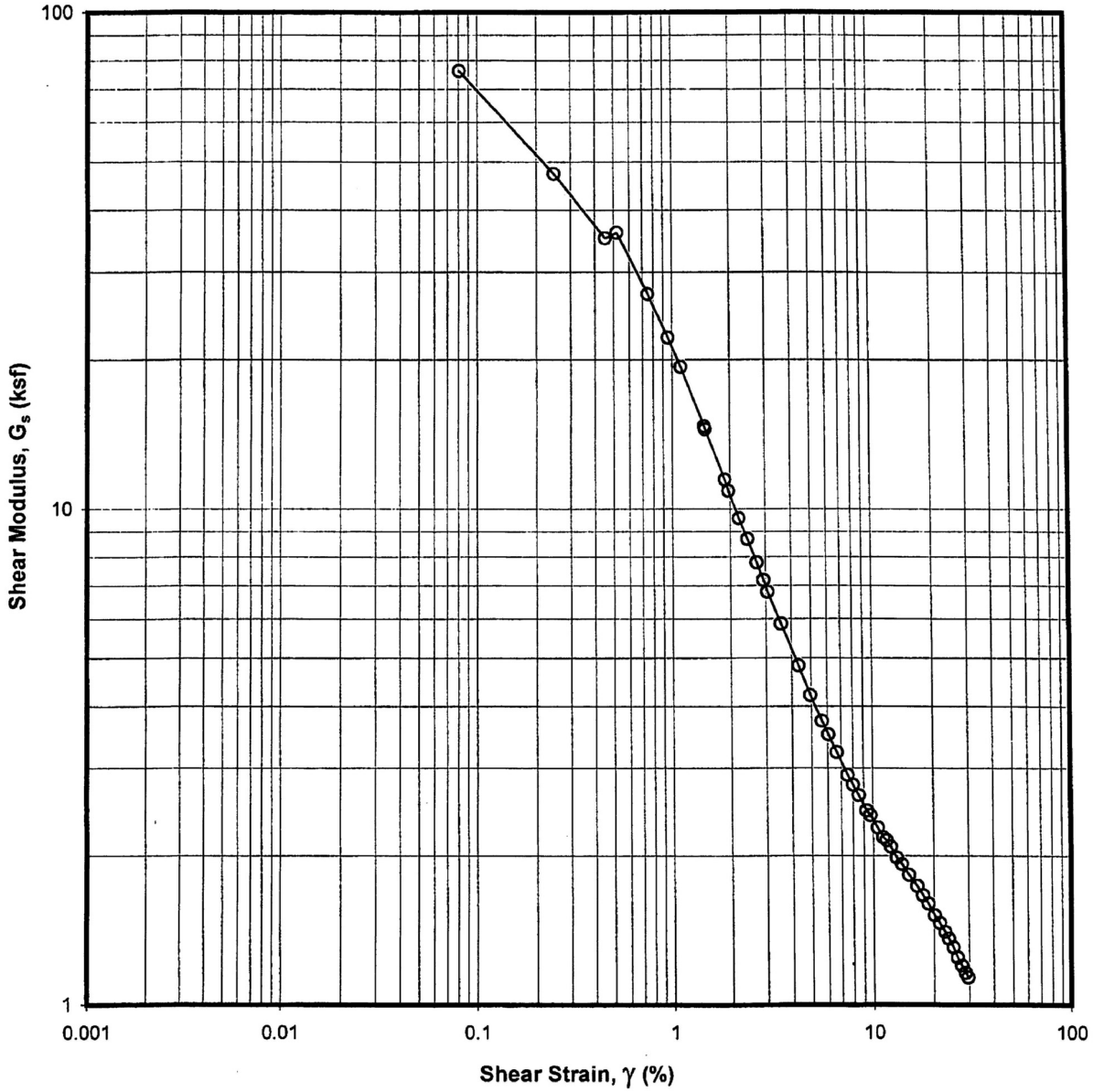
STATIC DSS TEST

K_o Consolidation - OCR = NA

Sample: UD-1B - Depth: 3.5 - 5.2 ft

Boring B-2321UD

KAW 7/16/08



STATIC DSS TEST

K_o Consolidation - OCR = NA

Sample: UD-1B - Depth: 3.5 - 5.2 ft

Boring B-2321UD

KAW 7/16/08

DIRECT SIMPLE SHEAR TEST (ASTM D 6528-07): Specimen Setup / Take Down

Project Number: 0411-08-1686 | Test Type: SDSS | Sta. No.: 11G | File Name: B-2321_UD1b
Task No.: NA | Assign, $\sigma'_{v,c}$ = 0.72 ksf | $K_{c,DSS}$ ($\tau_{h,c}$ / $\sigma'_{v,c}$)= NA
Project Name: Exelon (Victoria) | Induced OCR = NA | $K_{ub,DSS}$ ($\tau_{hu,b}$ / $\sigma'_{v,c}$) = NA
Test No.: NA | Test Series for/on: NA | Type Stage: NA = NA , NA , NA & 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-2321UD	[ ] LPC Core	[ ] Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =	
Sample No.: UD-1	Compostite No.:	[ ] Pluviated:	Tamper Force (lbf)=	Drop (in.) =	
Depth (ft): 3.5 - 5.2	Specimen No.: B	[ ] Kneading	[ ] Undercompaction:	U_{ni} (%) =	Dia. (in.) =
[ ] Spec. Selection by X-ray;	[ ] Geomarine Sample		Ref. Effort=	% Comp. =	± Opt.=

Type Consolidation:	[X] K_o at:	[X] Incremental CRS	; [ ] Anisotropic at:	[ ] Inclined Stress Path, $K_{c,DSS}$ [ ] 90° Stress Path	[ ] Used Automated System Remarks:									
Loading Conditions:	[X] Static [ ] Rapid	[X] Strain [ ] Stress	[ ] Creep [ ] Post Cyclic	[X] Const, Vol./Ht [ ] Drained	[X] Without - Water [ ] With - Bath	[ ] Cyclic (Hz) Rate: [ ] 0.1;	[ ] Strain [ ] Stress 1; Other:							

Water Content (WC);	Initial - Trimming Location			Final, W_{at} (see below)
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	
Container No.	592	957	4201	4096
Mass Moist Soil + Cont. (g)	88.23	157.62	70.01	86.09
Mass Dry Soil + Container (g)	80.21	138.59	63.30	75.72
Mass Container (g)	31.71	32.13	30.35	30.62
WATER CONTENT (%)	16.54	17.88	20.36	22.99
Avg. Initial WC, $W_{o,avg}$ (%)	18.26	Final W_{at}: [X] Slice ; [ ]		Whole Spec.

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

Soil and Ring Masses	Initial	Final
Mass Moist Soil + Tare (g)	310.10	131.83
Mass Tare (g)	186.86	4.04
Mass Moist Soil, $M_{t,o}$ $Mt_{,at}$ (g)	123.24	127.79
Excess Dry Soil (soil not included in final mass above)		
Container No.		
Mass Dry Soil + Container (g)		
Mass Container (g)		
Mass Excess Dry Soil (g)	0.00	

Specimen Trimming:

[ ] Trimming Ring for Fugro Apparatus | NL3 | Large-ring ID #
[X] Trimming Ring for NGI Apparatus | | Small-ring ID #

$H_{s,t}$ (mm):	18.53	$A_{s,t}$ (cm^2):	34.87
$D_{s,t}$ (mm) :	66.63	$V_{s,t}$ (cm^3):	64.60

Remarks:

[ ] Free Standing by Wire Saw Lathe or Reconstituted Spec. (mm)

	Height (H_{tr})	Diameter (D_o)		Remarks:
1	18.540	1-T	NA	
2	18.530	2-M	NA	
3	18.520	3-B	NA	
4	18.520	1'-T	NA	For Free Standing
5	18.500	2'-M	NA	or Reconstituted Spec.:
Avg.		3'-B	NA	A_{tr} (cm^2): NA
=	18.525	Avg	NA	V_{tr} (cm^3): NA

Note: NA indicates not applicable.
F or G in the Sta. No. indicates Fugro or GEOTAC apparatus.

Estimated Initial Unit Weight

Total, $\gamma_{t,o}$ (lb/ft^3)= 119.10 | Dry, $\gamma_{d,o}$ (lb/ft^3)= 100.71

Specimen Lateral Confinement by:

[ ] **Wire Reinforced, Model:** Thickness (mm) =

Stress Level	Dia. by PiTape (mm) Meas.	Corr.	Area, $A_{c,n}$ (cm^2)	(in^2)
0				
$\sigma'_{v,c}$				
$\sigma'_{v,max}$				

[X] **Regular Membrane with Ring Set No.** 11 | ID, Rings (mm)
Thickness (mm): Top: 0.62 , | = 67.24
[ ] Single Bottom: 0.59 , | Corr. for mem.
[X] Double Membr. Thick. = 0.30 | = 66.630
Area Ring with mem., A_o (cm^2)= 34.87 ; (in^2)= 5.405
Mass Top Cap, etc., M_{tc} = 525.4 g, 1.16 lbf
Data corr. for M_{tc}: [X] Yes; [ ] No | Plattens with Pins: [ ] Yes; [X] No

Final Visual Description: Dark Gray Sandy Lean CLAY (CL)

Other Remarks :

Trim./ Recon. By: HC | Setup By: HC | Take Down By: HC
Date: 3/24/2008 | Date: 3/24/2008 | Date: 3/26/2008
Prelim. Calc. By: HC | Final Calc. By: LF | Reviewed By: HP

Specimen Take Down: [X] Spec. removed right after shearing | Remarks:
[ ] Spec. unloaded to zero stress with access to water

DIRECT SIMPLE SHEAR TEST (ASTM D 6528-07): Specimen Calculations & Summary

Project Number: 0411-08-1686 | Test Station No.: 11G | File Name: B-2321_UD1b

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

Type Test: SDSS | Specimen: [X] "Undisturbed"; [ ] Reconstituted; [ ] Remolded

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

Consolidation Stress Summary and Loading Summary

Test Stage:	Max. Stress	Pre-Shear	Post Cyclic
Nominal Vertical Stress, σ'_v (ksf)	NA	0.72	NA
Axial/Vertical Force, $P_{vr,n}$ (lbf)	NA	NA	NA
Horizontal Force, $P_{hr,n}$ (lbf)	NA	0	NA
Nominal OCR	NA	NA	NA
t_c,(ON,days,hrs)	NA	0.98 days	NA

[X] Static Strain Rate = NA (%/hr or

Cyclic Rate (Hz): [ ] 0.1; [ ] 1; Other =

During/End of Loading	Static	Cyclic
Change in Height, $\Delta H_{L,n}$ (mm)	NA	NA
Change in Vol., $\Delta V_{L,n}$ (cm^3)	NA	NA
Post Cy.Displ. Reset to Null Position:	[ ] Yes;	[ ] No

[ ] Undrained ambient stress applied: with Delta shear force (lbf) = NA & Duration (min) = NA & Delta disp., $\Delta d_{h,ua}$ (mm) = NA

Trimmed Specimen (TS) - Inital Water Contents over Saturation (%):

	Top, $W_{o,1}$	Botttom, $W_{o,2}$	Sides, $W_{o,3}$	Avg., $W_{o,avg}$	Selct., $W_{o,s}$	Back Cal.
W_o	16.54	17.88	20.36	18.26	18.26	18.61
S_o	68.7	72.2	78.1	73.1	73.1	74.0

Measured final mass of moist soil, $M_{t,at}$ (g)	127.79
Final mass of moist soil corrected for excess dry soil, $M_{tat,c}$ (g)	127.79

Calculated Mass of Dry Soil (g)

Initial Selected Water Content (%)	18.26
Initial , $M_{d,o}$	104.21
Final, $M_{d,at}$	103.90
Selected, M_d	104.06

Initial Back Cal. Specific Gravity (TS):

Selected S_o (%)	
Selected W_o (%)	
Specific Gravity, $G_{s,bc}$	

Height/Volume Change Summary

Variation in Height & Volume During Consol.	During Initial Consol. to $\sigma'_{v,c}$ or $\sigma'_{vc,max}$ =	During Rebound to $\sigma'_{v,c}$ =	Specimen Unloaded After Test To
Stress Units (ksf)	0.720	NA	NA
Sign Convention: (+) ΔV out & ΔH down; (-) ΔV in & ΔH up			
Delta Def. Read., $\Delta d_{ar,n}$ (mm)	0.050		
Total Equip. Comp., $\Sigma\Delta d_{afc}$ (mm)	0.000		
Corr. Total Def. $\Delta H_{c,n}$ (mm)	0.050		
ΔV_n using A_o - spec. (cm^3)	0.17		
ΔV_n using $A_{c,n}$ - app. (cm^3)	0.17		
ΔV_n using burette meas.(cm^3)	-2.80		
Selected ΔV_n (cm^3)	0.17	NA	NA = ΔV_{uL}
After Test WC Corr. for ΔV during Shear & Unloading, $W_{at,c}$ (%)			NA

Calculation of ΔV_c by Different Procedures

By Selected Volumes		By Change in Mass	
ΔV_c (cm^3)	0.17	~ $M_{t,o}$ - ($M_{tat,c}$ + ΔV_L + ΔV_{uL})	
By Cal. Height & App. Area		ΔV_c (cm^3)	-4.55
ΔV_c (cm^3)	0.17	By Saturation = 100% and	
By Cal. Ht. & Init. Spec. Area		Spec. Unloaded to 0 Stress	
ΔV_c (cm^3)	0.17	ΔV_c (cm^3)	NA

Lateral Confinement Area Cal. Approach (LCA); Method 1, 2, 3 or 4: 1

Back Cal. Water Content During Consol. - Based on the Consolidation Conclusions Given Below

Assumed Saturation (%)	100.00
Back Cal. WC before Loading, $W_{c,bc}$ (%)	24.90
Back Cal.WC at Max. Stress, $W_{cmax,bc}$ (%)	NA

Consolidation & Preshear Conclusions	ΔV_c (cm^3) =	0.18	ΔH_c (mm) =	0.050	$\varepsilon_{a,c}$ (%) =	0.27	$\Delta V_{c,max}$ (cm^3) = NA
	V_c (cm^3) =	64.42	H_c (mm) =	18.475	$\varepsilon_{v,c}$ (%) =	0.28	$\varepsilon_{ac,max}$ (%)= NA
	A_c (cm^2) =	34.87	$\Delta\gamma_c$ (mm) =	NA	γ_c (%) =	NA	Preshear: γ_{ua} (%)= NA

Summary of Specimen Physical Properties:

Specific Gravity: G_s = 2.710 Measured **Condition:**	Height (mm)	Volume (cm^3)	Area (cm^2)	Water Content (%)	Total Unit Weight (pcf)	Dry Unit Weight (pcf)	Saturation (%)	Void Ratio, e
Initial (as trimmed)	18.525	64.60	34.87	18.4	119.1	100.6	73.5	0.682
After Consol.: to $\sigma'_{v,c}$	18.475	64.42	34.87	24.9	125.9	100.8	100.0	0.678
After Consol.: to $\sigma'_{vc,max}$	NA	NA	NA	NA	NA	NA	NA	NA

LCA-Method: 1- Initial measured value remains constant. 4 - Based on change in height & volume.

& Note(s) 2 - Initial measured value corrected for applied stress. NA - Not Applicable

3 - Uses measured value at appropriate stress level (NA for rings).

Calculated By: LF

Reviewed By: HP

Remarks: t95 for max stress = 1.5 min

Project Number: 0411-08-1686	Test Type: SDSS	Test Sta. No.: 11G	File Name: B-2321_UD1b
Project Name: Exelon (Victoria)	Task No.: NA	Test No.: NA	Test Series for: NA

[X] Tube [ ] Field Extruded	[ ] Liner [ ] Remolded	[ ] Tamping	[ ] Constant Effort:	Blows/Tamps per Layer =	
Boring No.: B-2321UD	[ ] LPC Core	[ ] Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =	
Sample No.: UD-1	Compostite No.:	[ ] Pluviated:	Tamper Force (lbf)=	Drop (in.) =	
Depth (ft): 3.5 - 5.2	Specimen No.: B	[ ] Kneading	[ ] Undercompaction: U_{ni} (%) =	Dia. (in.) =	
[ ] Spec. Selection by X-ray;	[ ] Geomarine Sample	[ ]	Ref. Effort=	% Comp. =	± Opt.=

Type Consolidation:	[X]	K_o at:	[X]	Incremental CRS	[ ]	Anisotropic at:	[ ]	Inclined Stress Path, $K_{c,DSS}$ 90° Stress Path	[ ]	Used Automated System Remarks:							
Loading Conditions:	[X]	Static	[X]	Strain	[ ]	Creep	[X]	Const, Vol./Ht	[X]	Without - Water	[ ]	Cyclic (Hz)	[ ]	Strain	[ ]	Stress	
	[ ]	Dynamic	[ ]	Stress	[ ]	Post Cyclic	[ ]	Drained	[ ]	With - Bath	Rate: [ ]	0.1;	[ ]	1; Other:			

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 (%)	LL PL PI	-200 %	Void Ratio, e
Initial	18.53	64.60	34.87	18.44	119.1	100.6	73.5	42	70.1	0.682
After to $\sigma'_{v,c}$	18.48	64.42	34.87	24.90	125.9	100.8	100.0	13	NA	0.678
Consol.: to $\sigma'_{vc,max}$	NA	NA	NA	NA	NA	NA	NA	29	NA	NA

Consolidation Stress Summary and Loading Summary							
Item	Unit	Max. Stress	Pre-Shear	Post Cyclic	[X] Static Strain Rate = 5.0 %/hr.		
Vert. Consol. Stress, $\sigma'_{v,c}$:	(ksf)	NA	0.755	NA	[ ] Cyclic Rate (Hz): [ ] 0.1; [ ] 1; Other =		
Induced OCR:	-	NA	NA	NA	During/End of Loading	Static	Cyclic
Axial Strain during Consol., $\varepsilon_{a,c}$:	%	NA	0.27	NA	Change in Height, $\Delta H_{L,n}$ (mm):	NA	NA
Horiz. Consol. Stress, $\tau_{h,c}$:	(ksf)	NA	NA	NA	Change in Vol., $\Delta V_{L,n}$ (cm^3):	NA	NA
Consol. Stress Ratio, $\tau_{h,c}$ / $\sigma'_{v,c}$:	-	NA	NA	NA	Post Cy.Displ. Reset to Null Pos.: [ ] Yes; [ ] No		
Shear Strain during Consol., $\varepsilon_{h,c}$:	%	NA	NA	NA	Number of Loading Cycles, N = NA		
Undr. Ambient Shear Stress, $\tau_{h,ua}$:	(ksf)	NA	NA	NA	$\pm\tau_h$ = NA (ksf) $\pm\gamma$ = NA %		
Undr. Ambient Shear Strain, ε_{ua}:	%	NA	NA	NA	at end of cyclic loading, $\sigma'_{vcy,r}$ = NA (ksf)		

Weight Top Cap, etc., M_{tc} (lbf): 1.16		Data Normalization: [X] Yes [ ] No	Value: 0.755 (ksf)
Data corr. for M_{tc}: [X] Yes; [ ] No	Plattens with Pins: [ ] Yes; [X] No	Using Effective Vertical Stress:	
[ ] Wire Reinforced Membrane, Model:	Data corr. for Membr. strength	[X] Pre-Shear Conditions	[ ] Post-Cyclic Conditions
[X] Regular Membrane with Rings	[ ] Yes [X] No	[ ] Maximum Stress during Consol.	

Notes: See Fugro South, Inc. Notation Listing for definition of symbols and acronyms. F or G in the Test Sta. No. indicates Fugro or GEOTAC apparatus.

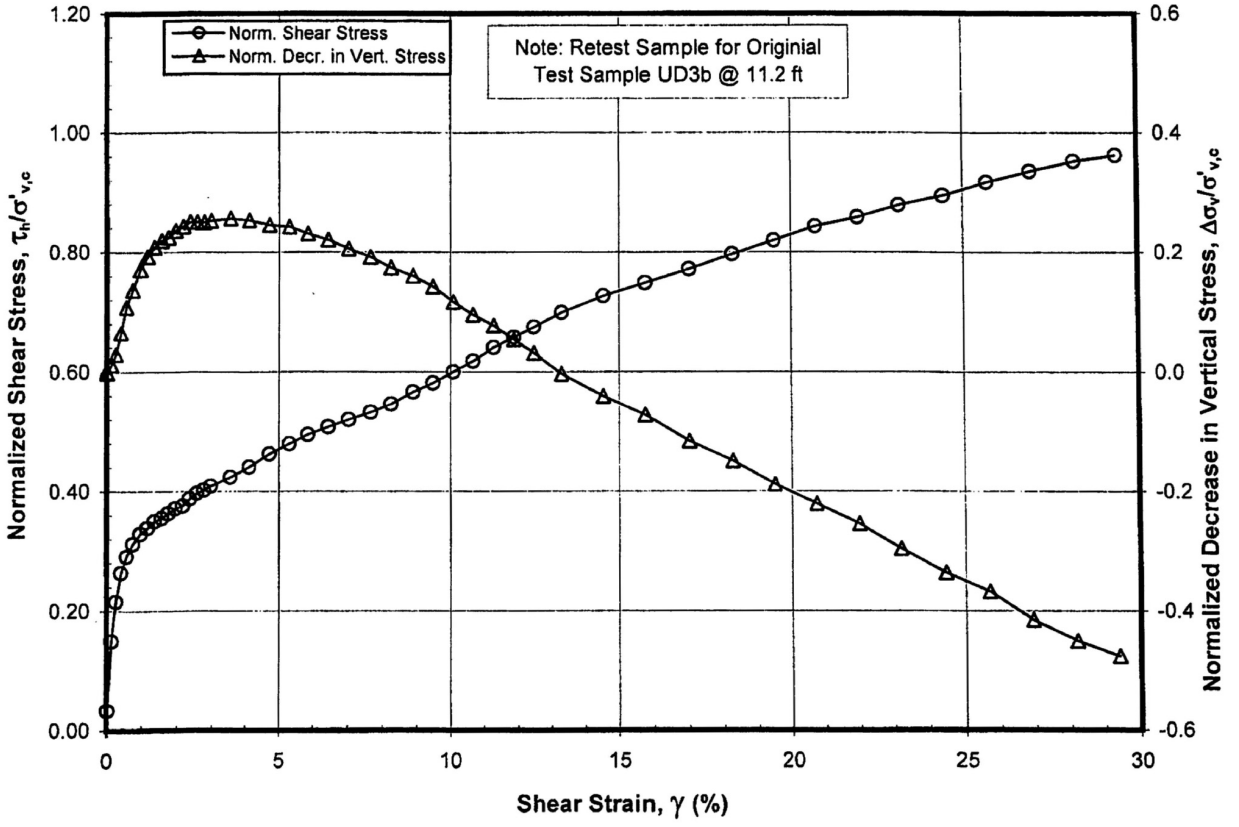
NA - Not Applicable

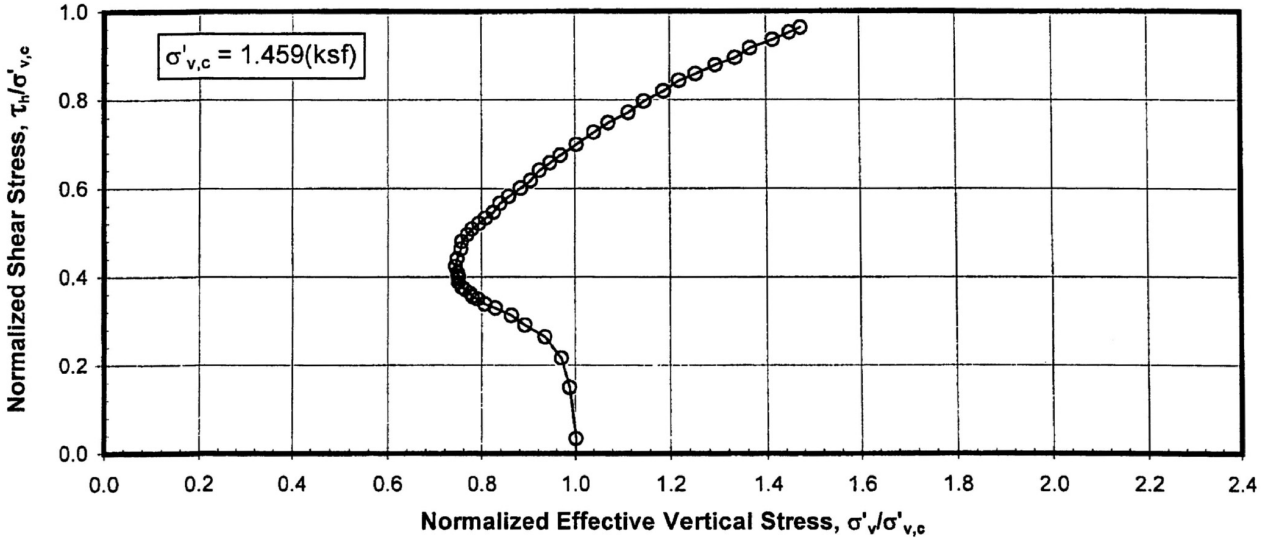
Final Visual Description and Remarks: Dark Gray Sandy Lean CLAY (CL)

Loading Summary						
	τ_h (ksf)	γ (%)	σ'_v (ksf)	τ_h/σ'_v -	$\Delta\sigma'_v/\sigma'_{v,c}$ -	$c_v/\sigma'_{v,c}$ -
at Peak Shear Stress	0.332	29.63	0.437	0.761	0.421	0.440
at Maximum Strain	0.332	29.63	0.437	0.761	0.421	-

Boring No.: B-2321UD Sample No.: UD-1B

Elapsed Time (min)	Shear Strain γ (%)	Shear Stress τ_h (ksf)	Effective Vertical Stress σ'_v (ksf)	Calulated Pore Press. Change $\Delta U = \Delta\sigma'_v$ (ksf)	Secant Shear Modulus G_s (ksf)	Tangent Modulus G_T (ksf)	Norm. Shear Stress $\tau_h/\sigma'_{v,c}$	Norm. Vert. Stress $\sigma'_v/\sigma'_{v,c}$	Norm. Decr. in V. Stress $\Delta\sigma'_v/\sigma'_{v,c}$	Stress Ratio Angle ϕ'_{DSS} (°)
0.0	0.00	-0.004	0.755	0.000	-	-	-0.005	1.000	0.000	-0.29
2.5	0.08	0.058	0.732	0.023	76.202	54.787	0.077	0.969	0.031	4.51
5.0	0.25	0.114	0.709	0.046	47.329	26.924	0.150	0.939	0.061	9.09
7.5	0.45	0.156	0.688	0.067	35.128	31.310	0.206	0.911	0.089	12.76
9.9	0.52	0.184	0.645	0.110	36.028	24.585	0.244	0.854	0.146	15.93
12.4	0.75	0.200	0.610	0.145	27.136	5.493	0.265	0.808	0.192	18.16
14.9	0.96	0.208	0.572	0.183	22.132	3.029	0.276	0.757	0.243	20.03
17.4	1.11	0.212	0.533	0.222	19.335	1.027	0.280	0.706	0.294	21.66
19.8	1.47	0.211	0.508	0.247	14.673	-1.446	0.280	0.673	0.327	22.59
22.3	1.48	0.211	0.486	0.269	14.461	-1.321	0.279	0.643	0.357	23.48
24.8	1.88	0.212	0.442	0.313	11.453	-1.432	0.280	0.586	0.414	25.58
27.3	1.96	0.209	0.450	0.305	10.865	-1.612	0.277	0.596	0.404	24.96
29.7	2.22	0.209	0.433	0.322	9.561	0.083	0.277	0.574	0.426	25.74
32.2	2.46	0.210	0.420	0.335	8.690	-0.075	0.278	0.556	0.444	26.54
34.7	2.73	0.208	0.411	0.344	7.785	-0.457	0.276	0.544	0.456	26.91
37.2	2.94	0.207	0.403	0.352	7.177	-1.122	0.275	0.533	0.467	27.26
39.7	3.07	0.205	0.399	0.356	6.794	-0.816	0.272	0.528	0.472	27.22
47.1	3.58	0.206	0.371	0.384	5.861	0.051	0.273	0.492	0.508	29.01
54.5	4.34	0.205	0.354	0.401	4.821	-0.060	0.272	0.469	0.531	30.14
62.0	4.96	0.205	0.340	0.415	4.208	0.166	0.272	0.450	0.550	31.11
69.4	5.67	0.208	0.331	0.424	3.734	0.403	0.275	0.438	0.562	32.14
76.8	6.09	0.210	0.312	0.443	3.505	0.413	0.278	0.413	0.587	33.91
84.2	6.69	0.212	0.327	0.428	3.227	0.378	0.281	0.433	0.567	32.94
91.7	7.54	0.215	0.321	0.434	2.901	0.563	0.285	0.425	0.575	33.81
99.1	8.01	0.219	0.319	0.436	2.775	0.748	0.290	0.423	0.577	34.39
106.6	8.57	0.223	0.312	0.443	2.642	0.595	0.295	0.413	0.587	35.54
114.0	9.35	0.226	0.304	0.451	2.461	0.778	0.300	0.403	0.597	36.64
121.4	9.74	0.231	0.325	0.430	2.407	0.917	0.305	0.431	0.569	35.33
128.8	10.58	0.237	0.321	0.434	2.275	0.704	0.314	0.425	0.575	36.41
136.3	11.27	0.241	0.329	0.426	2.175	0.992	0.320	0.436	0.564	36.24
143.7	11.68	0.247	0.329	0.426	2.146	1.080	0.327	0.436	0.564	36.83
151.1	12.28	0.252	0.329	0.426	2.082	0.684	0.333	0.436	0.564	37.39
158.6	13.15	0.256	0.329	0.426	1.979	0.728	0.340	0.436	0.564	37.95
168.5	13.94	0.264	0.343	0.412	1.919	0.830	0.349	0.454	0.546	37.58
183.3	15.12	0.272	0.354	0.401	1.827	0.747	0.361	0.468	0.532	37.62
198.2	16.56	0.283	0.366	0.389	1.734	0.661	0.375	0.485	0.515	37.73
213.0	17.66	0.290	0.368	0.387	1.661	0.610	0.384	0.488	0.512	38.17
227.9	18.81	0.297	0.381	0.374	1.599	0.516	0.393	0.504	0.496	37.97
242.7	20.21	0.302	0.393	0.362	1.515	0.499	0.400	0.520	0.480	37.59
257.6	21.42	0.310	0.396	0.359	1.464	0.523	0.410	0.525	0.475	38.04
272.4	22.77	0.316	0.408	0.347	1.403	0.394	0.418	0.541	0.459	37.69
287.3	23.76	0.319	0.412	0.343	1.359	0.353	0.423	0.546	0.454	37.76
302.2	25.10	0.324	0.421	0.334	1.305	0.182	0.429	0.558	0.442	37.55
317.0	26.34	0.324	0.420	0.335	1.245	0.161	0.429	0.556	0.444	37.65
331.9	27.62	0.328	0.424	0.331	1.201	0.284	0.434	0.562	0.438	37.70
346.7	28.88	0.331	0.435	0.320	1.160	0.213	0.439	0.577	0.423	37.27
356.6	29.63	0.332	0.437	0.318	1.135	0.162	0.440	0.579	0.421	37.26





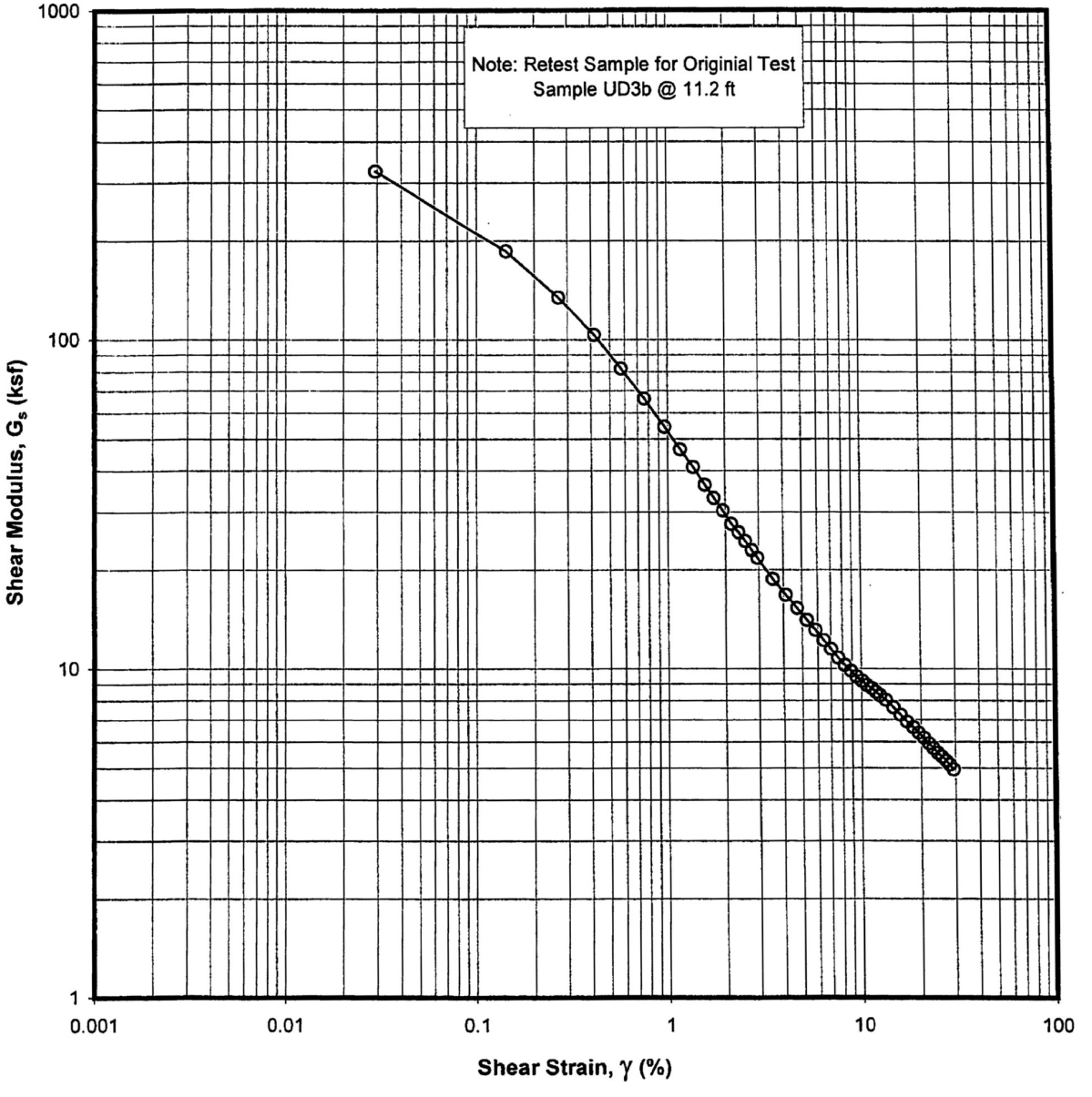
STATIC DSS TEST

K_o Consolidation - OCR = NA

Sample: UD-3B - Depth: 10.0 - 11.7 ft

Boring B-2321UD

KAW 7/16/08



STATIC DSS TEST

K_o Consolidation - OCR = NA

Sample: UD-3B - Depth: 10.0 - 11.7 ft

Boring B-2321UD

KAW 7/16/08

DIRECT SIMPLE SHEAR TEST (ASTM D 6528-07): Specimen Setup / Take Down

Project Number: 0411-08-1686 | Test Type: SDSS | Sta. No.: 7G | File Name: B-2321_UD3e
Task No.: NA | Assign, $\sigma'_{v,c}$ = 1.49 ksf | $K_{c,DSS}$ ($\tau_{h,c}$ / $\sigma'_{v,c}$) = NA
Project Name: Exelon (Victoria) | Induced OCR = NA | $K_{ub,DSS}$ ($\tau_{hu,b}$ / $\sigma'_{v,c}$) = NA
Test No.: NA | Test Series for/on: NA | Type Stage: NA = NA , NA , NA & 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-2321UD	[ ] LPC Core	[ ] Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =	
Sample No.: UD-3	Compostite No.:	[ ] Pluviated:	Tamper Force (lbf)=	Drop (in.) =	
Depth (ft): 10.0 - 11.7	Specimen No.: B	[ ] Kneading	[ ] Undercompaction:	U_{ni} (%) =	Dia. (in.) =
[ ] Spec. Selection by X-ray;	[ ] Geomarine Sample		Ref. Effort=	% Comp. =	± Opt.=

Type Consolidation:	[X] K_o at:	[X] Incremental CRS	; [ ] Anisotropic at:	[ ] Inclined Stress Path, $K_{c,DSS}$ [ ] 90° Stress Path	[ ] Used Automated System Remarks:									
Loading Conditions:	[X] Static [ ] Rapid	[X] Strain [ ] Stress	[ ] Creep [ ] Post Cyclic	[X] Const, Vol./Ht [ ] Drained	[X] Without - Water [ ] With - Bath	[ ] Cyclic (Hz) Rate: [ ] 0.1;	[ ] Strain [ ] Stress 1; Other:							

Water Content (WC);	Initial - Trimming Location			Final, W_{at} (see below)
	Top ($W_{o,1}$)	Bottom ($W_{o,2}$)	Sides ($W_{o,3}$)	
Container No.	997	4096	5005	4201
Mass Moist Soil + Cont. (g)	51.89	137.04	64.36	80.80
Mass Dry Soil + Container (g)	49.25	121.56	59.26	72.51
Mass Container (g)	31.62	30.61	31.53	30.35
WATER CONTENT (%)	14.97	17.02	18.39	19.66
Avg. Initial WC, $W_{o,avg}$ (%)	16.80	Final W_{at}: [X] Slice ; [ ] Whole Spec.		
[ ] See attached data sheet(s) for additional water contents				

Soil and Ring Masses	Initial	Final
Mass Moist Soil + Tare (g)	317.92	135.94
Mass Tare (g)	186.87	4.38
Mass Moist Soil, $M_{t,o}$ $Mt_{,at}$ (g)	131.05	131.56
Excess Dry Soil (soil not included in final mass above)		
Container No.		
Mass Dry Soil + Container (g)		
Mass Container (g)		
Mass Excess Dry Soil (g)	0.00	

Specimen Trimming:

[ ] Trimming Ring for Fugro Apparatus — NL3 — Large-ring ID #
[X] Trimming Ring for NGI Apparatus — Small-ring ID #

$H_{s,t}$ (mm): 18.60 | $A_{s,t}$ (cm^2): 34.87
$D_{s,t}$ (mm): 66.63 | $V_{s,t}$ (cm^3): 64.86

Remarks:

[ ] Free Standing by Wire Saw Lathe or Reconstituted Spec. (mm)

	Height (H_{tr})	Diameter (D_o)		Remarks:
1	18.650	1-T	NA	
2	18.590	2-M	NA	
3	18.580	3-B	NA	
4	18.570	1'-T	NA	For Free Standing
5	18.580	2'-M	NA	or Reconstituted Spec.:
	Avg.	3'-B	NA	A_{tr} (cm^2): NA
=	18.600	Avg	NA	V_{tr} (cm^3): NA

Note: NA indicates not applicable.
F or G in the Sta. No. indicates Fugro or GEOTAC apparatus.

Estimated Initial Unit Weight

Total, $\gamma_{t,o}$ (lb/ft^3)= 126.14 | Dry, $\gamma_{d,o}$ (lb/ft^3)= 108.00

Specimen Lateral Confinement by:

[ ] Wire Reinforced, Model: Thickness (mm) =

Stress Level	Dia. by PiTape (mm) Meas.	Corr.	Area, $A_{c,n}$ (cm^2)	(in^2)
0				
$\sigma'_{v,c}$				
$\sigma'_{v,max}$				

[X] Regular Membrane with Ring Set No. 7 — ID, Rings (mm)
Thickness (mm): Top: 0.60 , — = 67.22
[ ] Single Bottom: 0.58 , — Corr. for mem.
[X] Double Membr. Thick. = 0.30 = 66.630
Area Ring with mem., $A_{o:}$ (cm^2)= 34.87 ; (in^2)= 5.405
Mass Top Cap, etc., M_{tc} = 527.2 g, 1.16 lbf
Data corr. for M_{tc}: [X] Yes; [ ] No Plattens with Pins: [ ] Yes; [X] No

Final Visual Description: Mottled Very Pale Brown and Brownish Yellow Fat CLAY (CH)

Other Remarks : Retest Sample for Originial Test Sample UD3b @ 11.2 ft

Trim./ Recon. By: HC | Setup By: HC | Take Down By: HC
Date: 4/16/2008 | Date: 4/16/2008 | Date: 4/17/2008
Prelim. Calc. By: LF | Final Calc. By: LF | Reviewed By: HP HP

Specimen Take Down: [X] Spec. removed right after shearing
[ ] Spec. unloaded to zero stress with access to water
Remarks:

KAW 7/16/08

DIRECT SIMPLE SHEAR TEST (ASTM D 6528-07): Specimen Calculations & Summary

Project Number: 0411-08-1686 | Test Station No.: 7G | File Name: B-2321_UD3e

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

Type Test: SDSS | Specimen: [X] "Undisturbed"; [ ] Reconstituted; [ ] Remolded

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

Consolidation Stress Summary and Loading Summary							
Test Stage:	Max. Stress	Pre-Shear	Post Cyclic	X	Static Strain Rate = NA (%/hr or)		
Nominal Vertical Stress, σ'_v (ksf)	NA	1.44	NA		Cyclic Rate (Hz): [ ] 0.1; [ ] 1; Other =		
Axial/Vertical Force, $P_{vr,n}$ (lbf)	NA	NA	NA		During/End of Loading	Static	Cyclic
Horizontal Force, $P_{hr,n}$ (lbf)	NA	0	NA		Change in Height, $\Delta H_{L,n}$ (mm)	NA	NA
Nominal OCR	NA	NA	NA		Change in Vol., $\Delta V_{L,n}$ (cm^3)	NA	NA
t_c,(ON,days,hrs)	NA	0.68 days	NA		Post Cy.Displ. Reset to Null Position:	[ ] Yes;	[ ] No

[ ] Undrained ambient stress applied: with Delta shear force (lbf) = NA & Duration (min) = NA & Delta disp., $\Delta d_{h,ua}$ (mm) = NA

Trimmed Specimen (TS) - Inital Water Contents over Saturation (%):						
	Top, $W_{o,1}$	Botttom, $W_{o,2}$	Sides, $W_{o,3}$	Avg., $W_{o,avg}$	Selct., $W_{o,s}$	Back Cal.
W_o	14.97	17.02	18.39	16.80	16.80	19.20
S_o	75.2	81.4	85.2	80.7	80.8	87.3
Measured final mass of moist soil, $M_{t,at}$ (g)						131.56
Final mass of moist soil corrected for excess dry soil, $M_{tat,c}$ (g)						131.56

Calculated Mass of Dry Soil (g)	
Initial Selected Water Content (%)	16.80
Initial , $M_{d,o}$	112.20
Final, $M_{d,at}$	109.94
Selected, M_d	111.07

Initial Back Cal. Specific Gravity (TS):	
Selected S_o (%)	
Selected W_o (%)	
Specific Gravity, $G_{s,bc}$	

Height/Volume Change Summary				
Variation in Height & Volume During Consol.	During Initial Consol. to $\sigma'_{v,c}$ or $\sigma'_{vc,max}$ =	During Rebound to $\sigma'_{v,c}$ =	Specimen Unloaded After Test To	
Stress Units (ksf)	1.440	NA	NA	
Sign Convention: (+) ΔV out & ΔH down; (-) ΔV in & ΔH up				
Delta Def. Read., $\Delta d_{ar,n}$ (mm)	0.180			
Total Equip. Comp., $\Sigma\Delta d_{afc}$ (mm)	0.000			
Corr. Total Def. $\Delta H_{c,n}$ (mm)	0.180			
ΔV_n using A_o - spec. (cm^3)	0.63			
ΔV_n using $A_{c,n}$ - app. (cm^3)	0.63			
ΔV_n using burette meas.(cm^3)	-3.70			
Selected ΔV_n (cm^3)	0.63	NA	NA	= ΔV_{uL}
After Test WC Corr. for ΔV during Shear & Unloading, $W_{at,c}$ (%)			NA	

Lateral Confinement Area Cal. Approach (LCA); Method 1, 2, 3 or 4: 1

Calculation of ΔV_c by Different Procedures			
By Selected Volumes		By Change in Mass	
ΔV_c (cm^3)	0.63	~ $M_{t,o}$ - ($M_{tat,c}$ + ΔV_L + ΔV_{uL})	
By Cal. Height & App. Area		ΔV_c (cm^3)	-0.51
ΔV_c (cm^3)	0.63	By Saturation = 100% and	
By Cal. Ht. & Init. Spec. Area		Spec. Unloaded to 0 Stress	
ΔV_c (cm^3)	0.63	ΔV_c (cm^3)	NA

Back Cal. Water Content During Consol. - Based on the Consolidation Conclusions Given Below	
Assumed Saturation (%)	100.00
Back Cal. WC before Loading, $W_{c,bc}$ (%)	20.82
Back Cal.WC at Max. Stress, $W_{cmax,bc}$ (%)	NA

Consolidation & Preshear Conclusions								
	ΔV_c (cm^3) =	0.63	ΔH_c (mm) =	0.180	$\varepsilon_{a,c}$ (%) =	0.97	$\Delta V_{c,max}$ (cm^3) =	NA
	V_c (cm^3) =	64.23	H_c (mm) =	18.420	$\varepsilon_{v,c}$ (%) =	0.98	$\varepsilon_{ac,max}$ (%)=	NA
	A_c (cm^2) =	34.87	$\Delta\gamma_c$ (mm) =	NA	γ_c (%) =	NA	Preshear: γ_{ua} (%)=	NA

Summary of Specimen Physical Properties:								
Specific Gravity: G_s = 2.710 Measured	Height	Volume	Area	Water Content	Total Unit Weight	Dry Unit Weight	Saturation	Void Ratio,
Condition:	(mm)	(cm^3)	(cm^2)	(%)	(pcf)	(pcf)	(%)	e
Initial (as trimmed)	18.600	64.86	34.87	18.0	126.1	106.9	84.1	0.583
After to $\sigma'_{v,c}$	18.420	64.23	34.87	20.8	130.4	108.0	100.0	0.567
Consol.: to $\sigma'_{vc,max}$	NA	NA	NA	NA	NA	NA	NA	NA

LCA-Method: 1- Initial measured value remains constant. 4 - Based on change in height & volume. Calculated By: LF

& Note(s) 2 - Initial measured value corrected for applied stress. NA - Not Applicable Reviewed By: HP

3 - Uses measured value at appropriate stress level (NA for rings).

Remarks: t95 for max stress = 2.4 min

Project Number: 0411-08-1686 | Test Type: SDSS | Test Sta. No.: 7G | File Name: B-2321_UD3e
Project Name: Exelon (Victoria) | Task No.: NA | Test No.: NA | Test Series for: NA

[X] Tube [ ] Field Extruded	[ ] Liner [ ] Remolded	[ ] Tamping	[ ] Constant Effort:	Blows/Tamps per Layer =	
Boring No.: B-2321UD	[ ] LPC Core	[ ] Impact/Rammer	Rammer Wgt.(lbf)=	No. Layers =	
Sample No.: UD-3	Compostite No.:	[ ] Pluviated:	Tamper Force (lbf)=	Drop (in.) =	
Depth (ft): 10.0 - 11.7	Specimen No.: B	[ ] Kneading	[ ] Undercompaction:	U_{ni} (%) =	Dia. (in.) =
[ ] Spec. Selection by X-ray;	[ ] Geomarine Sample	[ ]	Ref. Effort=	% Comp. =	± Opt.=

Type Consolidation:	[X]	K_o at:	[X]	Incremental	[ ]	Anisotropic at:	[ ]	Inclined Stress Path, $K_{c,DSS}$	[ ]	Used Automated System						
	[ ]		[ ]	CRS			[ ]	90° Stress Path		Remarks:						
Loading Conditions:	[X]	Static	[X]	Strain	[ ]	Creep	[X]	Const, Vol./Ht	[X]	Without - Water	[ ]	Cyclic (Hz)	[ ]	Strain	[ ]	Stress
	[ ]	Dynamic	[ ]	Stress	[ ]	Post Cyclic	[ ]	Drained	[ ]	With - Bath	Rate: [ ]	0.1;	[ ]	1; Other:		

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 (%)	LL PL PI	-200 %	Void Ratio, e
Initial	18.60	64.86	34.87	17.99	126.1	106.9	84.1	51	93.5	0.583
After Consol.: to $\sigma'_{v,c}$	18.42	64.23	34.87	20.82	130.4	108.0	100.0	16	NA	0.567
to $\sigma'_{vc,max}$	NA	NA	NA	NA	NA	NA	NA	35	NA	NA

Consolidation Stress Summary and Loading Summary

Item	Unit	Max. Stress	Pre-Shear	Post Cyclic
Vert. Consol. Stress, $\sigma'_{v,c}$:	(ksf)	NA	1.459	NA
Induced OCR:	-	NA	NA	NA
Axial Strain during Consol., $\varepsilon_{a,c}$:	%	NA	0.97	NA
Horiz. Consol. Stress, $\tau_{h,c}$:	(ksf)	NA	NA	NA
Consol. Stress Ratio, $\tau_{h,c}$ / $\sigma'_{v,c}$:	-	NA	NA	NA
Shear Strain during Consol., $\varepsilon_{h,c}$:	%	NA	NA	NA
Undr. Ambient Shear Stress, $\tau_{h,ua}$:	(ksf)	NA	NA	NA
Undr. Ambient Shear Strain, ε_{ua}:	%	NA	NA	NA

[X] Static Strain Rate = 4.8 %/hr.
[ ] Cyclic Rate (Hz): [ ] 0.1; [ ] 1; Other =

During/End of Loading	Static	Cyclic
Change in Height, $\Delta H_{L,n}$ (mm):	NA	NA
Change in Vol., $\Delta V_{L,n}$ (cm^3):	NA	NA
Post Cy.Displ. Reset to Null Pos.:	[ ] Yes;	[ ] No

Number of Loading Cycles, N = NA
$\pm\tau_h$ = NA (ksf) $\pm\gamma$ = NA %
at end of cyclic loading, $\sigma'_{vcy,r}$ = NA (ksf)

Weight Top Cap, etc., M_{tc} (lbf): 1.16
Data corr. for M_{tc}: [X] Yes; [ ] No | Plattens with Pins: [ ] Yes; [X] No
[ ] Wire Reinforced Membrane, Model:
[X] Regular Membrane with Rings
Data corr. for Membr. strength: [ ] Yes [X] No

Data Normalization: [X] Yes [ ] No Value: 1.459 (ksf)
Using Effective Vertical Stress:
[X] Pre-Shear Conditions [ ] Post-Cyclic Conditions
[ ] Maximum Stress during Consol. [ ]

Notes: See Fugro South, Inc. Notation Listing for definition of symbols and acronyms. F or G in the Test Sta. No. indicates Fugro or GEOTAC apparatus.
NA - Not Applicable

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

Loading Summary

	τ_h (ksf)	γ (%)	σ'_v (ksf)	τ_h/σ'_v -	$\Delta\sigma'_v/\sigma'_{v,c}$ -	$c_u/\sigma'_{v,c}$ -
at Peak Shear Stress	1.405	29.40	2.154	0.652	-0.476	0.963
at Maximum Strain	1.405	29.40	2.154	0.652	-0.476	-

Boring No.: B-2321UD Sample No.: UD-3B

Elapsed Time (min)	Shear Strain γ (%)	Shear Stress τ_h (ksf)	Effective Vertical Stress σ'_v (ksf)	Calulated Pore Press. Change $\Delta U = \Delta\sigma'_v$ (ksf)	Secant Shear Modulus G_s (ksf)	Tangent Modulus G_T (ksf)	Norm. Shear Stress $\tau_h/\sigma'_{v,c}$	Norm. Vert. Stress $\sigma'_v/\sigma'_{v,c}$	Norm. Decr. in V. Stress $\Delta\sigma'_v/\sigma'_{v,c}$	Stress Ratio Angle ϕ'_{DSS} (°)
0.0	0.00	-0.047	1.459	0.000	-	-	-0.032	1.000	0.000	-1.86
2.5	0.03	0.048	1.462	-0.003	324.960	237.169	0.033	1.002	-0.002	1.89
5.0	0.14	0.218	1.442	0.017	185.578	112.971	0.149	0.988	0.012	8.59
7.4	0.27	0.315	1.417	0.043	134.450	61.772	0.216	0.971	0.029	12.52
9.9	0.42	0.385	1.364	0.095	103.288	35.836	0.264	0.935	0.065	15.74
12.4	0.58	0.424	1.301	0.158	81.702	20.929	0.290	0.892	0.108	18.04
14.9	0.76	0.455	1.260	0.199	66.067	14.432	0.312	0.863	0.137	19.87
17.4	0.97	0.480	1.210	0.249	54.300	9.343	0.329	0.829	0.171	21.63
19.9	1.17	0.494	1.178	0.282	46.372	7.761	0.338	0.807	0.193	22.74
22.4	1.36	0.510	1.156	0.304	40.908	6.144	0.350	0.792	0.208	23.83
24.8	1.56	0.518	1.139	0.320	36.141	5.038	0.355	0.781	0.219	24.45
27.3	1.75	0.529	1.132	0.328	33.028	6.207	0.363	0.775	0.225	25.07
29.8	1.95	0.542	1.115	0.345	30.244	4.507	0.371	0.764	0.236	25.92
32.3	2.16	0.548	1.105	0.354	27.548	5.781	0.376	0.757	0.243	26.38
34.8	2.36	0.565	1.094	0.365	25.988	7.624	0.387	0.750	0.250	27.30
37.3	2.56	0.578	1.094	0.365	24.454	5.121	0.396	0.750	0.250	27.86
39.8	2.76	0.586	1.094	0.365	22.905	4.475	0.401	0.750	0.250	28.15
42.3	2.96	0.596	1.091	0.368	21.736	4.485	0.408	0.748	0.252	28.65
49.7	3.55	0.618	1.086	0.374	18.726	4.003	0.423	0.744	0.256	29.64
57.2	4.12	0.643	1.090	0.369	16.732	4.823	0.440	0.747	0.253	30.51
64.6	4.72	0.674	1.102	0.357	15.289	4.773	0.462	0.755	0.245	31.46
72.1	5.31	0.699	1.105	0.354	14.060	4.155	0.479	0.758	0.242	32.32
79.5	5.87	0.722	1.123	0.337	13.105	3.605	0.495	0.769	0.231	32.74
87.0	6.45	0.740	1.137	0.322	12.206	3.155	0.507	0.779	0.221	33.06
94.4	7.04	0.759	1.159	0.300	11.454	2.971	0.520	0.794	0.206	33.21
101.9	7.67	0.776	1.180	0.279	10.745	3.082	0.532	0.809	0.191	33.34
109.3	8.26	0.796	1.205	0.254	10.213	4.034	0.546	0.826	0.174	33.47
116.8	8.89	0.826	1.225	0.234	9.820	4.197	0.566	0.840	0.160	33.99
124.3	9.48	0.848	1.251	0.208	9.440	4.140	0.581	0.858	0.142	34.12
131.7	10.09	0.875	1.288	0.171	9.150	4.424	0.600	0.883	0.117	34.20
139.2	10.68	0.901	1.320	0.139	8.880	4.935	0.617	0.905	0.095	34.31
146.6	11.27	0.934	1.347	0.112	8.706	4.869	0.640	0.923	0.077	34.74
154.1	11.87	0.959	1.381	0.078	8.476	4.210	0.657	0.946	0.054	34.77
161.5	12.46	0.984	1.414	0.045	8.278	4.258	0.674	0.969	0.031	34.83
171.5	13.30	1.019	1.465	-0.006	8.024	3.776	0.699	1.004	-0.004	34.83
186.4	14.54	1.061	1.519	-0.060	7.622	2.950	0.727	1.041	-0.041	34.93
201.3	15.77	1.092	1.565	-0.106	7.229	2.615	0.749	1.072	-0.072	34.92
216.2	17.01	1.125	1.628	-0.169	6.895	2.796	0.771	1.116	-0.116	34.65
231.1	18.26	1.162	1.676	-0.217	6.624	2.838	0.796	1.149	-0.149	34.73
246.0	19.48	1.195	1.734	-0.275	6.380	2.736	0.819	1.189	-0.189	34.57
260.9	20.73	1.230	1.782	-0.322	6.160	2.277	0.843	1.221	-0.221	34.62
275.8	21.98	1.252	1.830	-0.371	5.914	2.124	0.858	1.254	-0.254	34.38
290.7	23.19	1.282	1.891	-0.432	5.732	2.143	0.878	1.296	-0.296	34.13
305.6	24.46	1.305	1.951	-0.491	5.531	2.261	0.895	1.337	-0.337	33.79
320.5	25.69	1.338	1.996	-0.537	5.394	2.428	0.917	1.368	-0.368	33.84
335.4	26.92	1.365	2.065	-0.606	5.247	2.072	0.935	1.415	-0.415	33.47
350.3	28.18	1.390	2.117	-0.658	5.100	1.610	0.952	1.451	-0.451	33.28
365.2	29.40	1.405	2.154	-0.695	4.941	1.261	0.963	1.476	-0.476	33.12