



7943 PECUE LANE SUITE A BATON ROUGE, LA 70809 TEL (225) 291-2700 FAX (225) 291-2788

TO: Saiia Construction, LLC
 324 Commons Drive
 Birmingham, AL 35209
 Tel # : (205) 290 - 0400
 ATTENTION: Gary Wilford

DATE: October 29, 2008
 JOB NAME: International Paper Riegelwood
 Cell 1 South Expansion
 TRANSMITTAL NUMBER: 05
 ESI PROJECT NUMBER: 08-08-1240

WE ARE SENDING YOU ATTACHED UNDER SEPARATE COVER VIA _____ THE FOLLOWING ITEMS:
 SHOP DRAWINGS PRINTS PLANS SAMPLES SPECIFICATIONS
 COPY OF LETTER CHANGE ORDER _____

COPIES	DATE	DRAWING NO.	REV.	DESCRIPTION	ACTION (*)
1	10/29/08			Friction Angle Test Results GCL/Subgrade, GCL/60 HDT, 60 HDT/Composite, Composite/60 HDT	

ACTION (*)

AS - AS REQUESTED FA - FOR APPROVAL _____
 F - FILE RC - REVIEW & COMMENT _____

COMMENTS: _____

SENT VIA:

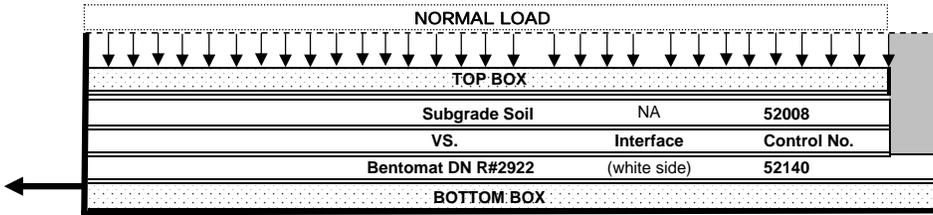
E-MAIL MAIL OVERNIGHT HAND DELIVERY OTHER

COPY BY: Kevin Simms

TO: _____

If enclosures are not as noted, please notify us at once.....

TEST CONFIGURATION 1



TEST CONDITIONS:

SAMPLE PREPARATION:

- The TOP box contained the soil .
 Specimens were cut along machine direction to 14" x 17" for the BOTTOM box, with effective test area of 12" x 12".
- Soil specimen was compacted as received.
- Specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7-pairs).

HYDRATION:

- The GCL specimens were hydrated for 24 hrs at 150 psf

CONSOLIDATION:

- Each set of specimen was consolidated under wet condition for 24 hrs @ normal load before shearing.
- Normal loads were applied using bladder for the highest load, dead weight for the medium load and for the lowest load.

SHEAR TEST:

- Shear test was conducted @ 0.040 in/ min.
- Sheared @ minimum 3.0 inch horizontal displacement.
- The test specimens were sheared at wet condition .
- Test were performed in general accordance with ASTM D6243 / ASTM D5321 using Brainard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

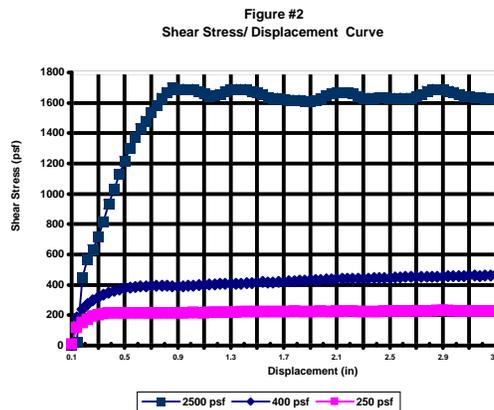
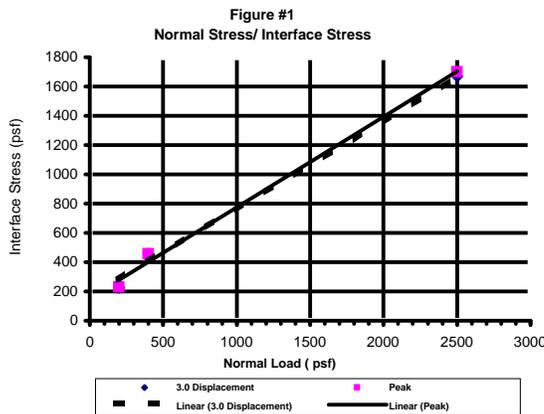
TEST RESULTS:

Normal Stresses Applied		GCL Moisture Content		PEAK STRENGTH		POST- PEAK STRENGTH AT <u>3.0</u> INCHES	
		Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psi)	(psf)	(%)	(%)	(psf)	(degrees)	(psf)	(degrees)
1.39	200	20	134	229	49	228	49
2.78	400	20	125	458	49	458	49
17.36	2,500	20	105	1698	34	1671	34
Note: N/A - Not Applicable		COHESION (psf) :		155		158	
		COEFFICIENT OF FRICTION :		0.62		0.61	
		FRICTION ANGLE (degrees) :		31.8		31.3	

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

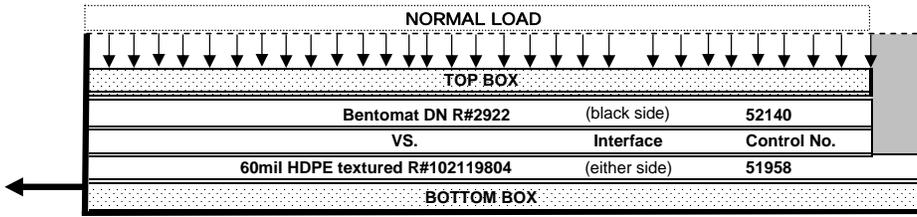
- Sliding occurred between the two interfacing surfaces.
- No tilting of the system or any abnormalities observed during and after the test.
- Superficial abrasion on the geosynthetic interfacing side (typical to all loads).



INTERFACE SHEAR TEST RESULT (ASTM D5321/6243)
PGL Job No. G081375

Reviewed By: _____
 Date: 10/28/2008

TEST CONFIGURATION 2



TEST CONDITIONS:

SAMPLE PREPARATION:

- Specimens were cut along machine direction to 14" x 19" for the upper box, and 14" x 17" for the lower box, with an effective test area of 12" x 12".
- Specimens were cut along machine direction to 14" x 17" for the BOTTOM box, with effective test area of 12" x 12".
- Specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7-pairs).

HYDRATION:

- The GCL specimens were hydrated for 24 hrs at 150 psf

CONSOLIDATION:

- Each set of specimen was consolidated under wet condition for 24 hrs @ normal load before shearing.
- Normal loads were applied using bladder for the highest load, dead weight for the medium load and lowest load.

SHEAR TEST:

- Shear test was conducted @ 0.040 in/ min.
- Sheared @ minimum 3.0 inch horizontal displacement.
- The test specimens were sheared at wet condition .
- Test were performed in general accordance with ASTM D6243 / ASTM D5321 using Brainard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

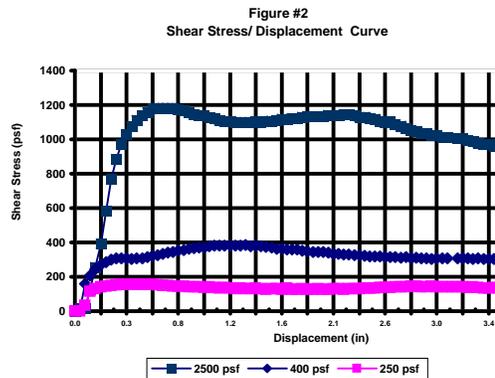
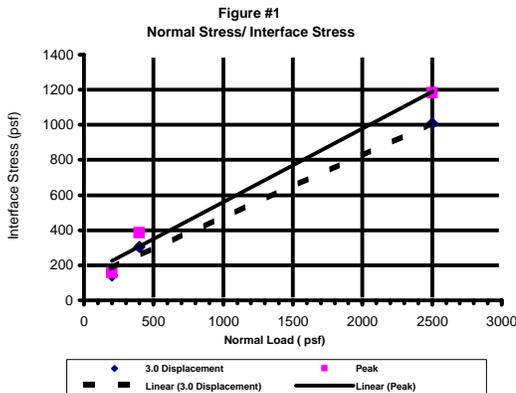
TEST RESULTS:

Normal Stresses Applied		Moisture Content		Asperity Heights		PEAK STRENGTH		POST- PEAK STRENGTH AT <u>3.0</u> INCHES	
		Before	After	Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psi)	(psf)	(%)	(%)	(mils)	(mils)	(psf)	(degrees)	(psf)	(degrees)
1.39	200	20	125	17	16	156	38	142	35
2.78	400	20	119	25	24	385	44	306	37
17.36	2,500	20	103	26	24	1183	25	1010	22
Note: N/A - Not Applicable		COHESION (psf) :				141		114	
		COEFFICIENT OF FRICTION :				0.42		0.36	
		FRICTION ANGLE (degrees) :				22.7		19.8	

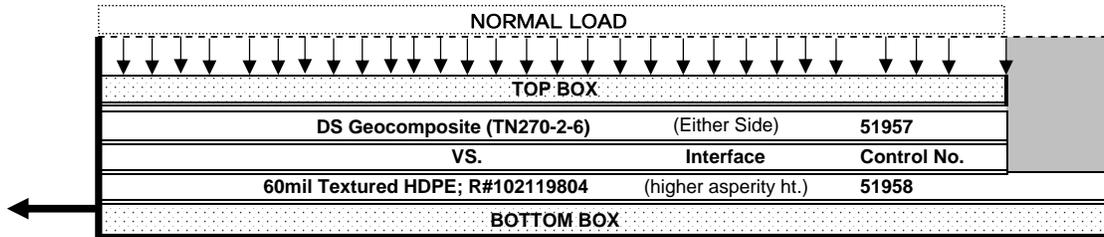
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

- Sliding occurred between the two interfacing surfaces.
- No tilting of the system or any abnormalities observed during and after the test.
- Superficial abrasion on the geosynthetic interfacing sides (typical to all loads).



TEST CONFIGURATION 3



TEST CONDITIONS:

SAMPLE PREPARATION:

- Specimens were cut along machine direction to 14" x 19" for the upper box, and 14" x 17" for the lower box, with an effective test area of 12" x 12".
- Specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7-pairs).

CONSOLIDATION:

- Each set of specimen was consolidated under wet condition for 2 hours @ normal load before shearing.
- Normal loads were applied using bladder for the highest load, dead weight for the intermediate loads and dead weight for the lowest load.

SHEAR TEST:

- Shear test was conducted @ 0.200 in/ min.
- Sheared @ minimum 3.0 inch horizontal displacement.
- The test specimens were sheared in wet condition
- Test were performed in general accordance with ASTM D6243 / ASTM D5321 using Brainard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

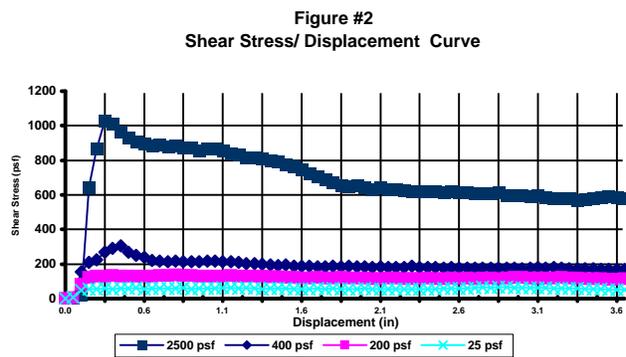
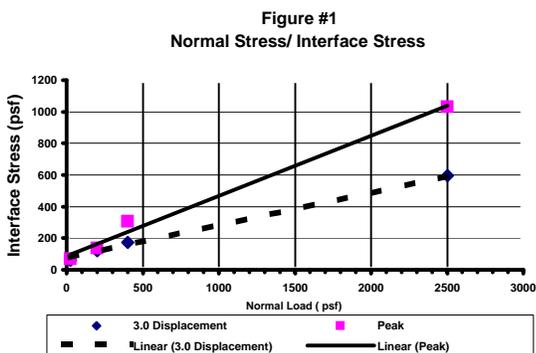
TEST RESULTS:

Normal Stresses Applied		Asperity Heights		PEAK STRENGTH		POST- PEAK STRENGTH AT <u>3.0</u> INCHES	
		Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psi)	(psf)	(mils)	(mils)	(psf)	(degrees)	(psf)	(degrees)
0.17	25	18	17	67	70	62	68
1.39	200	18	17	135	34	120	31
2.78	400	17	16	305	37	173	23
17.36	2,500	18	15	1030	22	595	13
Note: N/A - Not Applicable		COHESION (psf) :		87		74	
		COEFFICIENT OF FRICTION :		0.38		0.21	
		FRICTION ANGLE (degrees) :		20.8		11.8	

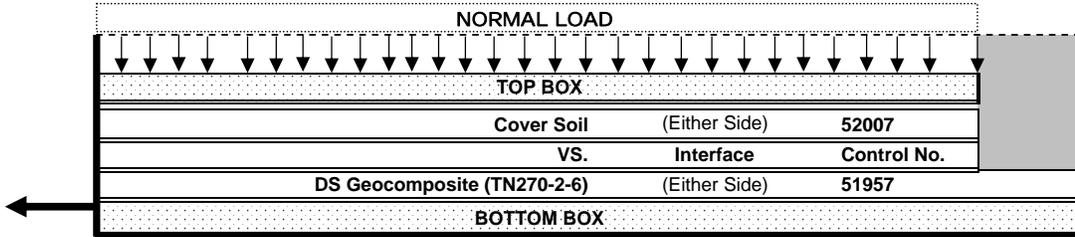
NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

- Sliding occurred between the two interfacing surfaces.
- No tilting of the system or any abnormalities observed during and after the test.
- Superficial abrasion on the geosynthetics contact sides (typical to all loads).



TEST CONFIGURATION 4



TEST CONDITIONS:

SAMPLE PREPARATION:

- The TOP box contained the soil.
Specimens were cut along machine direction to 14" x 17" for the BOTTOM box, with effective test area of 12" x 12".
- The Maximum Dry Density (MDD) of the soil is **111 pcf** at **13%** Optimum Moisture Content (OMC).
- Soil specimen was remolded to **99.9 pcf**; i.e., **90.00%** of MDD.
- Specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7-pairs).

CONSOLIDATION:

- Each set of specimen was consolidated under **wet** condition for **24 hours** @ normal load before shearing.
- Normal loads were applied using **bladder** for the highest load, **dead weight** for the intermediate loads and **dead weight** for the lowest load.

SHEAR TEST:

- Shear test was conducted @ **0.040** in/ min.
- Sheared @ minimum **3.0** inch horizontal displacement.
- The test specimens were sheared in **wet** condition
- Test were performed in general accordance with ASTM D6243 / ASTM D5321 using Brainard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

TEST RESULTS:

Normal Stresses Applied		Moisture Content		PEAK STRENGTH		POST- PEAK STRENGTH AT 3.0 INCHES	
		Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psi)	(psf)	(%)	(%)	(psf)	(degrees)	(psf)	(degrees)
0.17	25	13	22	64	69	64	69
1.39	200	13	20	244	51	240	50
2.78	400	13	17	383	44	383	44
17.36	2,500	13	16	1636	33	1636	33
Note: N/A - Not Applicable		COHESION (psf) :		99		98	
		COEFFICIENT OF FRICTION :		0.62		0.62	
		FRICTION ANGLE (degrees) :		31.7		31.7	

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

- No tilting of the system or any abnormalities observed during and after the test.
- Superficial abrasion on the geosynthetics interfacing sides (typical to all loads).
- Sliding occurred between the two interfacing surfaces.

