

APPENDIX E: UC Berkeley Laboratory Testing and ILIT In-Situ Field Vane Shear Testing

A series of laboratory tests were performed at the GeoEngineering Laboratory at the University of California at Berkeley on selected “relatively undisturbed” samples that were retrieved during the field investigation in New Orleans. Tests performed included

- a) Particle size sieve analysis, ASTM D 422
- b) Atterberg Limits, ASTM D 4318
- c) Permeability Test (Falling Head Method)
- d) Direct Shear Test
- e) Laboratory Vane Shear Test

Results of these tests are presented in this Appendix.

In addition, in-situ field vane shear tests (FVST; ASTM D2573) were performed at selected locations to evaluate peak and residual undrained soil shear strengths. These results are also presented in this Appendix.

Laboratory vane shear tests were performed to assess the undrained peak and residual shear strengths of cohesive materials serving as foundations for some of the levee embankments in New Orleans. A special set of procedures were developed for the sampling and laboratory vane shear testing of the sensitive organic clayey silt layer found at the 17th Street Canal breach site. This sensitive layer was very thin (typically 3/4” to 4”), it exhibited very low undrained shear strength and high sensitivity, and it was hidden under a layer of leaves and thin roots (and often intermixed, at least in part, with this obstructing overlying layer of organic detritus.)

Filed samples were “targeted by performing borings and CPT, as necessary, to precisely determine the depth of this critical layer at any given location. An additional boring was then performed adjacent to the previous boring(s) and/or CPT, and this “targeted sampling” borehole was drilled to within approximately 6-inches of the top of the targeted layer. A three-foot long, specially modified Shelby tube was then used to “oversample” the targeted layer; this oversampling captured approximately 2 to 2.5 feet of more competent material from below the highly sensitive layer, effectively “plugging” the base of the sampler so that the overall sample could be recovered. The 3-inch diameter Shelby tubes were modified by eliminating the “overcut” at the cutting lip, so that lateral expansion of the sample as it entered the tube would be eliminated.

Once the samples had been carefully transported to the laboratory, in order to reach the desired depth the soil was carefully hand-excavated from the end of the tube in 2-inch stages using a spoon and sharp blade. After each 2-inch layer had been slowly excavated, the tube was then cut with a rotary hand pipecutter (with stiffeners to reduce oval-disturbance. The process was repeated until the characteristic layer of organic and wind blown detritus was encountered, at which point the detritus was carefully hand-picked from the tube as hand excavation

proceeded. The leaves and thin roots were carefully removed to expose the top of the targeted layer, so that the vane could be inserted.

Since this layer was very thin, to avoid pushing the vane through the layer, once the layer was encountered in the Shelby Tube the vane was only inserted so that the metal blades were completely inside the soil, but not under it. That meant that the shear strength at the top of the rotating vane was not measured, and so a correction to the conventional (e.g.: ASTM) “vane factor” was required. For the vane geometry used (see Figure E.2) the required vane correction factor was found to be 0.84 times the conventional vane factor if the vane had been adequately embedded as to register full “top of vane” shear resistance. The vane shear test was performed at a rotational rate of 2 degrees/sec; a rate selected to represent relative rate of shear displacement behavior of interest with regard to the field cases being investigated.

As part of the field investigation, Field Vane Shear Tests were also performed at the 17th Street Canal breach site and at the London Avenue Canal distressed section. The results are presented in terms of peak and residual undrained shear strength. The dimensions of the vane used for these FVST tests are shown in Figure E-3. Rates of vane rotation were 1° per minute until the peak shear strength had been well-exceeded. The vane was then rotated five times, and then the residual strength measurement was again made at a rotational rate of 1° per minute.



Figure E-1: Laboratory vane shear testing of the thin layer of sensitive organic silty clay

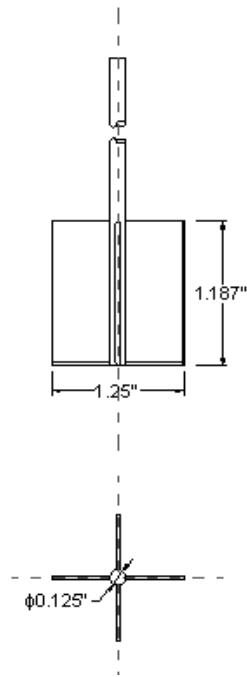


Figure E-2: Geometry and dimensions of laboratory vane

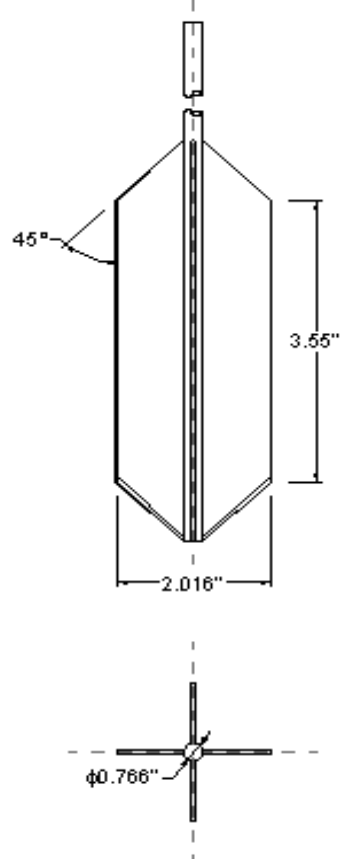


Figure E-3: Geometry and dimensions of field vane.



Particle-Size Analysis

ASTM D 422

Project Name: New Orleans Levee Investigation

Tested By: Julien Cohen-Waeber

Date: 04/07/06

Project No.: _____

Input By: Julien Cohen-Waeber

Date: 04/07/06

Boring No.: LAC-BOR-1

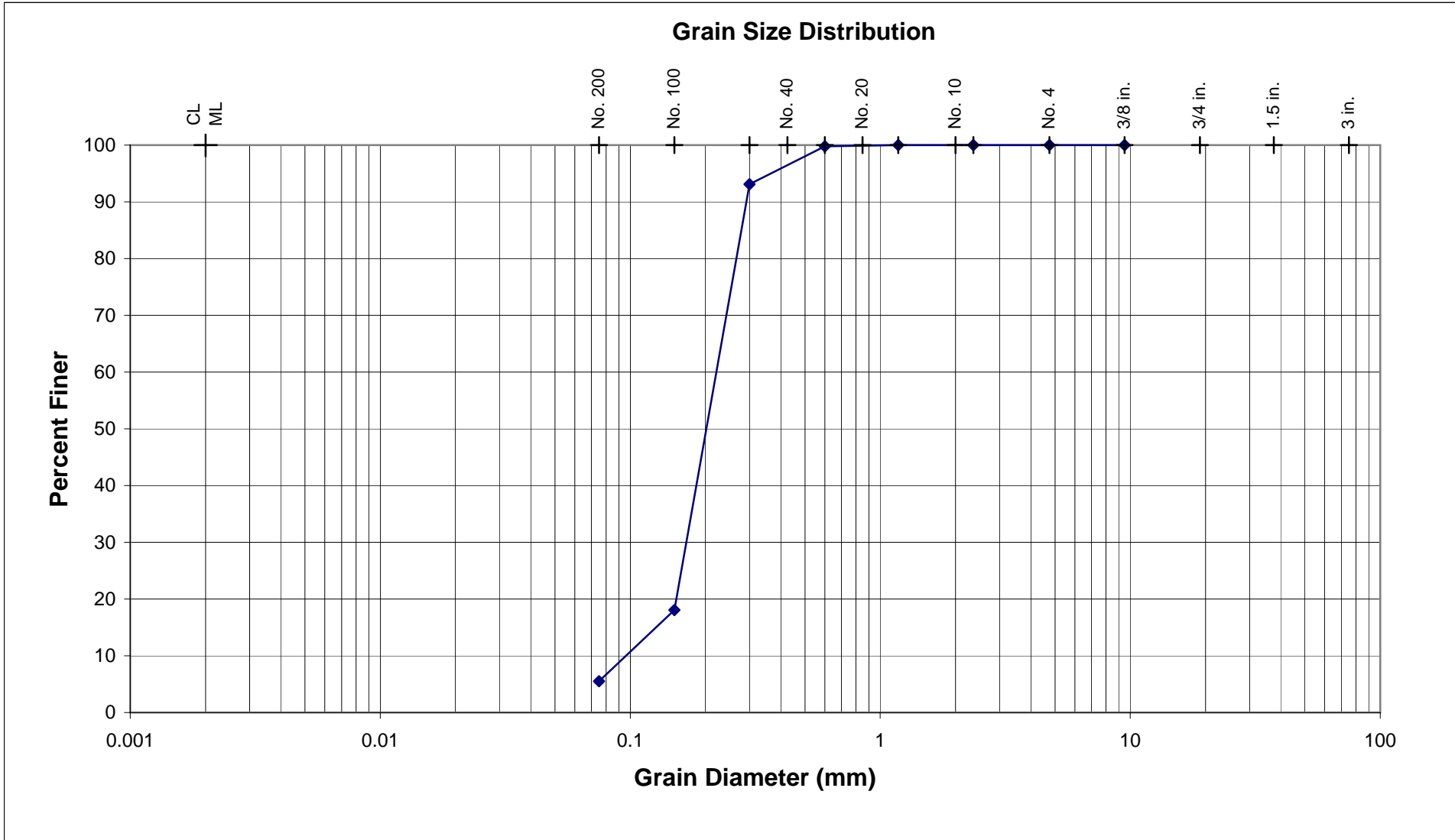
Checked By: Diego Cobos-Roa

Sample No.: LAC-BOR-1-2

Depth (ft.): 9.5

Soil Identification: Poorly Graded Sand (SP), Grey, with trace clay

% Sand: 94.5 % Silt: NA % Clay: trace USCS: SP





Particle-Size Analysis

ASTM D 422

Project Name: New Orleans Levee Investigation

Tested By: Julien Cohen-Waeber

Date: 04/07/06

Project No. : _____

Input By: Julien Cohen-Waeber

Date: 04/07/06

Boring No.: LAC-BOR-1

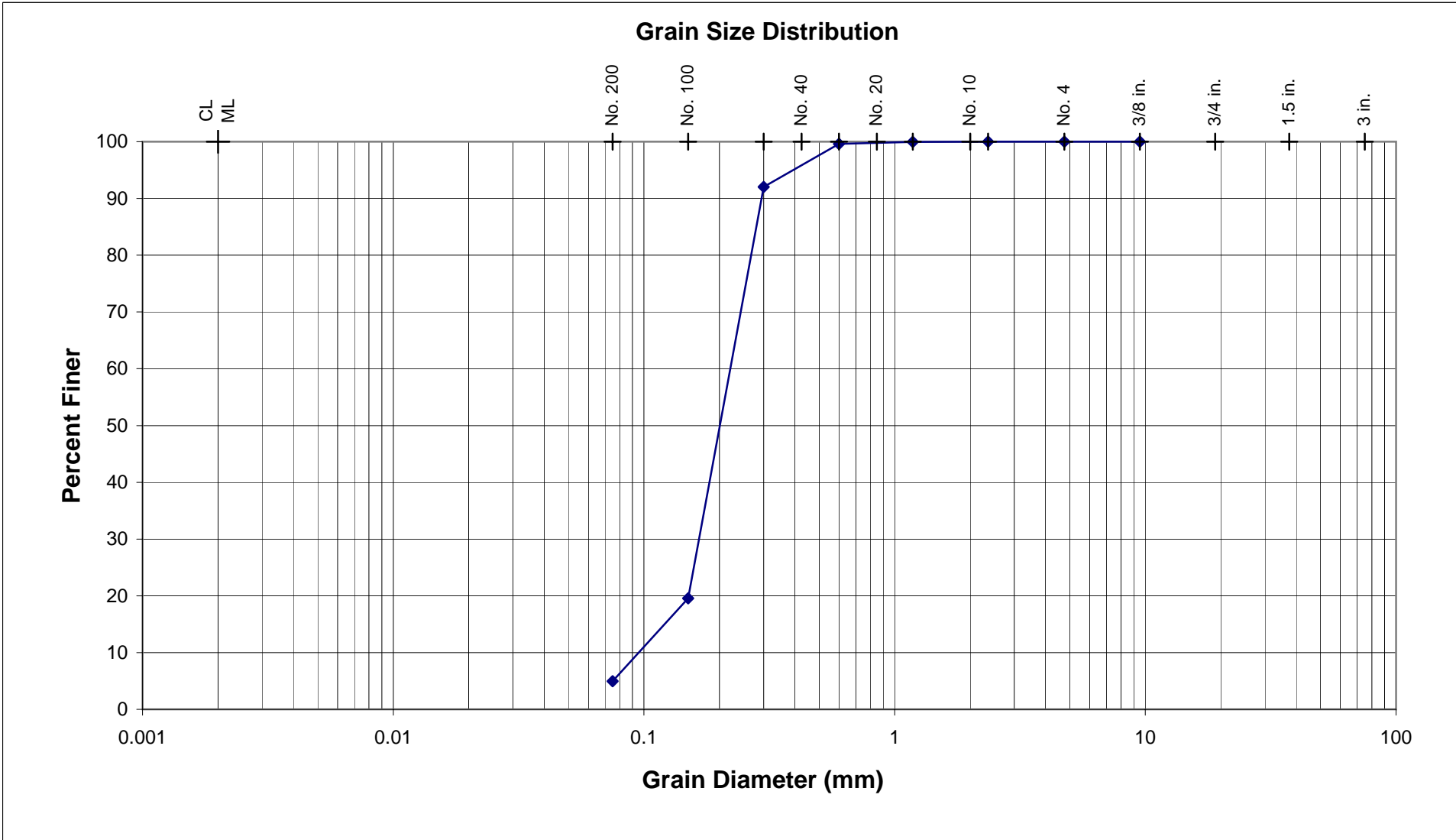
Checked By: Diego Cobos-Roa

Sample No.: LAC-BOR-1-2

Depth (ft.) 10.0

Soil Identification: Poorly Graded Sand (SP) Grey, with trace Clay

% Sand: 95.1 % Silt: NA % Clay: trace USCS: (SP) Poorly Graded Sand





ATTERBERG LIMITS

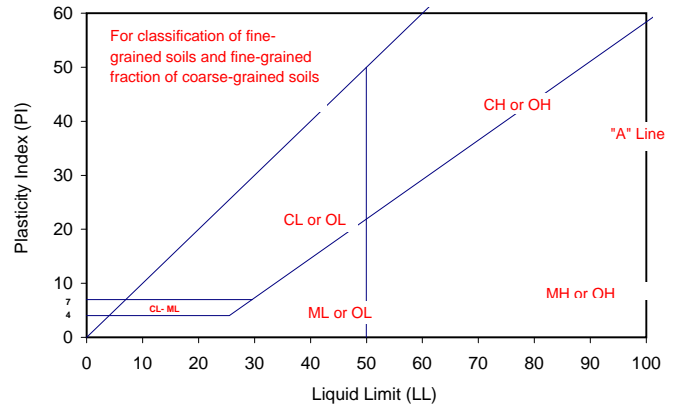
ASTM D 4318

Project Name: New Orleans Levee Investigation Tested By: Julien Cohen-Waeber Date: 04/13/06
 Boring No.: 17-BOR-6 Input By: Julien Cohen-Waeber Date: 05/14/06
 Sample No.: 17-BOR-6-2 Checked By: Adda Athanasopoulos
 Lab Vane Test No.: NOVANE24 Elevation (ft.): -15.3
 Soil Identification: Grey Silty Clay (CL) trace fine sand, with few shells.

TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				42	27	15	
Wet Wt. of Soil + Cont. (g)				37.30	36.80	35.00	
Dry Wt. of Soil + Cont. (g)				31.40	30.70	29.20	
Wt. of Container (g)				15.90	16.20	16.10	
Moisture Content (%) [Wn]				38.06	42.07	44.27	

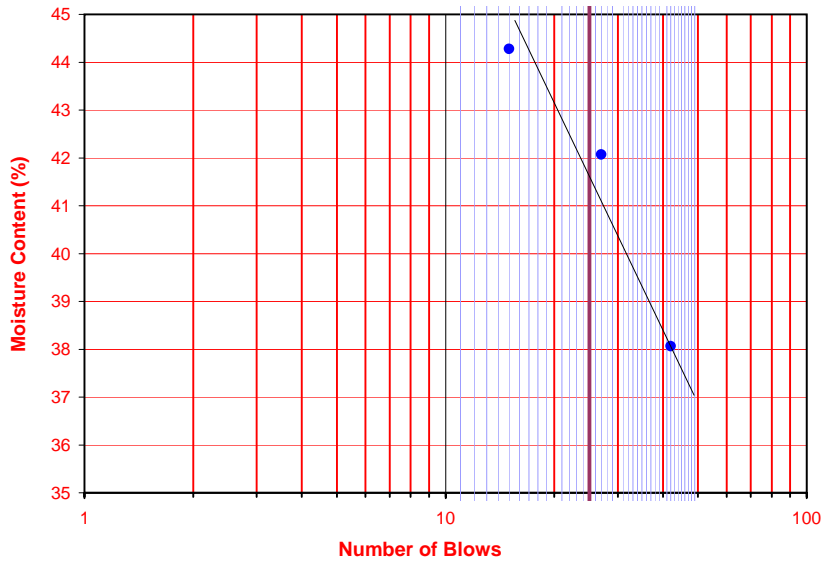
Liquid Limit	41.6
Plastic Limit	
Plasticity Index	
Classification	

PI at "A" - Line = $0.73(LL-20)$ =
 One - Point Liquid Limit Calculation
 $LL = Wn(N/25)^{0.12}$



PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





ATTERBERG LIMITS

ASTM D 4318

Project Name:	<u>New Orleans Levee Investigation</u>	Tested By:	<u>Julien Cohen-Waeber</u>	Date:	<u>04/13/06</u>
Boring No.:	<u>LAC-BOR-2</u>	Input By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/14/06</u>
Sample No.:	<u>LAC-BOR-2-3</u>	Checked By:	<u>Adda Athanasopoulos</u>		
Lab Vane Test No.:	<u>NOVANE30</u>	Elevation (ft.):	<u>-13.0</u>		
Soil Identification:	<u>Grey Sandy Clay (CL) very Sandy</u>				

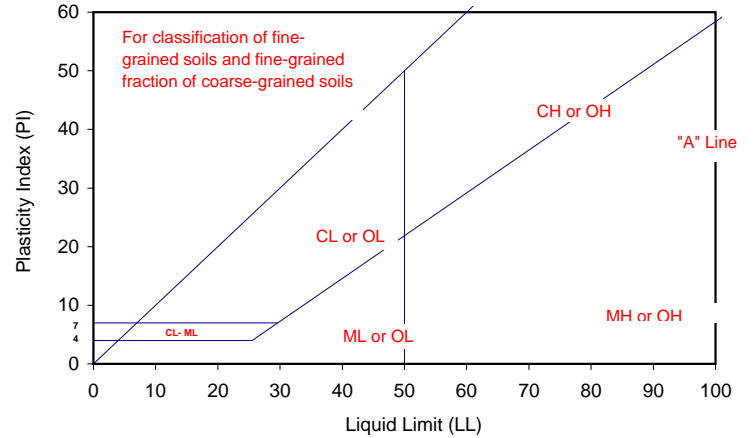
TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				19	23	41	12
Wet Wt. of Soil + Cont. (g)				40.00	32.20	36.00	35.60
Dry Wt. of Soil + Cont. (g)				33.50	27.80	30.90	30.00
Wt. of Container (g)				16.10	15.60	15.20	16.00
Moisture Content (%) [W _n]				37.36	36.07	32.48	40.00

Liquid Limit	35.5
Plastic Limit	
Plasticity Index	
Classification	

PI at "A" - Line = $0.73(LL-20)$ =

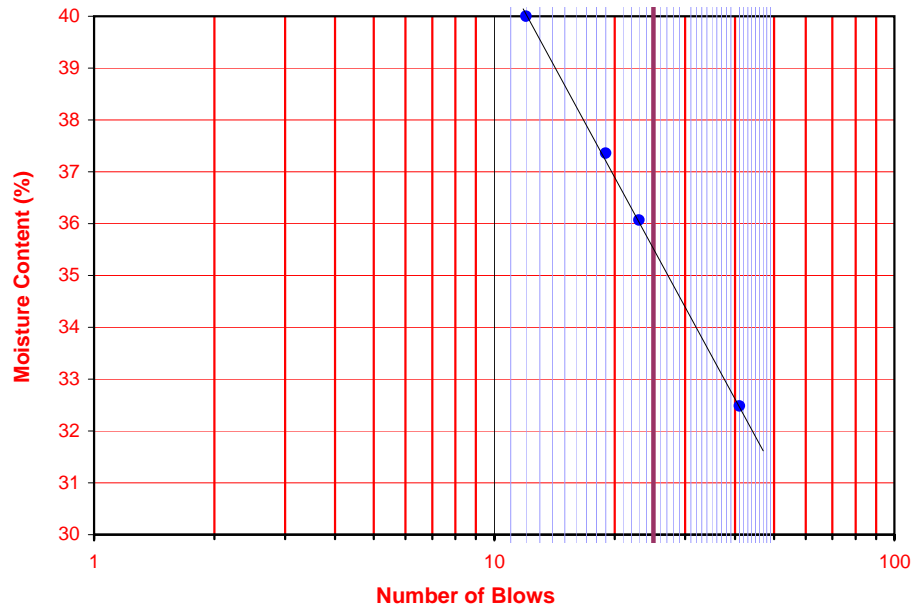
One - Point Liquid Limit Calculation

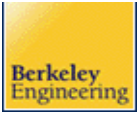
$$LL = W_n(N/25)^{0.12}$$



PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





ATTERBERG LIMITS

ASTM D 4318

Project Name: New Orleans Levee Investigation Tested By: Julien Cohen-Waeber Date: 04/13/06
 Boring No.: 17-BOR-6 Input By: Julien Cohen-Waeber Date: 05/14/06
 Sample No.: 17-BOR-6-3 Checked By: Adda Athanasopoulos
 Lab Vane Test No.: NOVANE39 Elevation (ft.): -18.0
 Soil Identification: Grey Clay with trace Silt (CH) High Plasticity, few shells.

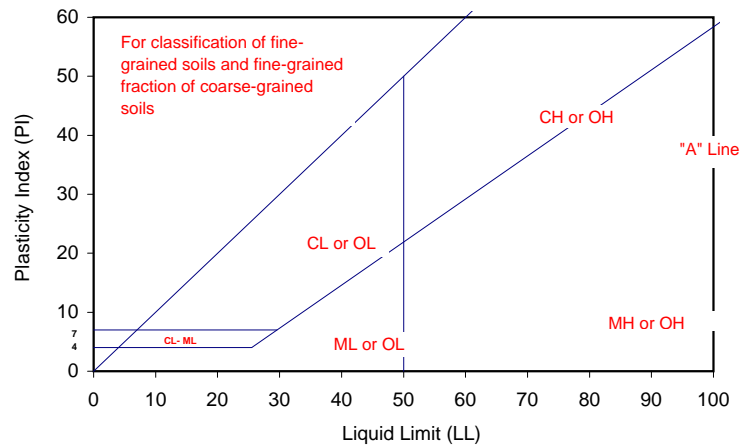
TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				38	21	15	
Wet Wt. of Soil + Cont. (g)				33.60	32.60	33.70	
Dry Wt. of Soil + Cont. (g)				25.80	25.20	25.40	
Wt. of Container (g)				16.10	16.10	15.70	
Moisture Content (%) [W _n]				80.41	81.32	85.57	

Liquid Limit	81.7
Plastic Limit	
Plasticity Index	
Classification	

PI at "A" - Line = $0.73(LL-20)$ =

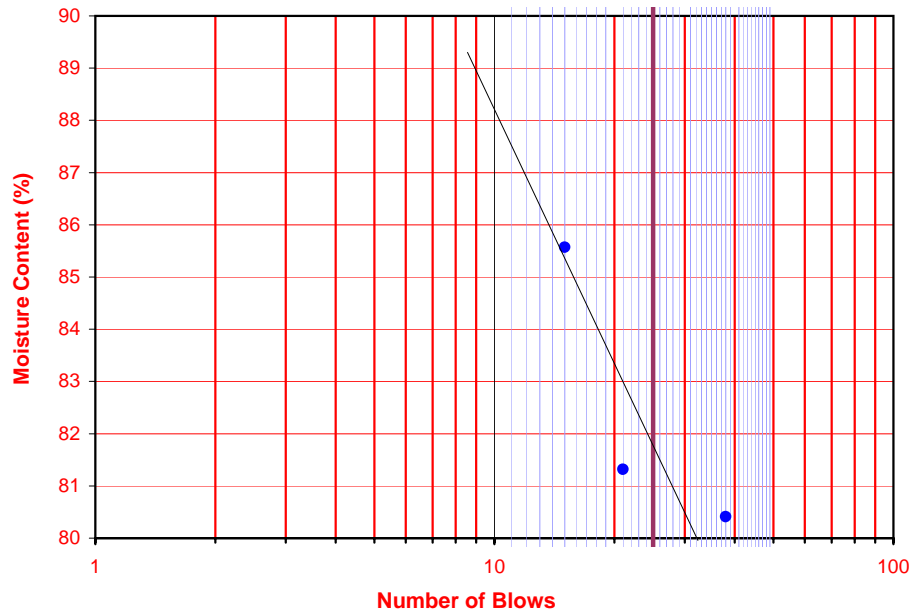
One - Point Liquid Limit Calculation

$$LL = W_n(N/25)^{0.12}$$



PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





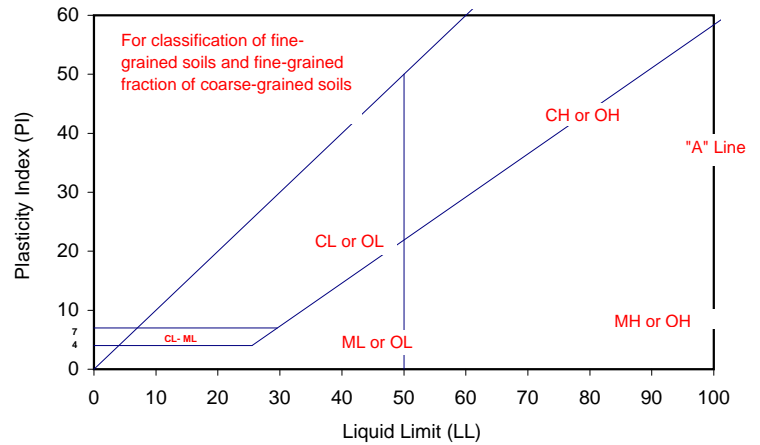
ATTERBERG LIMITS

ASTM D 4318

Project Name: <u>New Orleans Levee Investigation</u>	Tested By: <u>Julien Cohen-Waeber</u>	Date: <u>04/13/06</u>
Boring No.: <u>17-BOR-6</u>	Input By: <u>Julien Cohen-Waeber</u>	Date: <u>05/14/06</u>
Sample No.: <u>17-BOR-6-3</u>	Checked By: <u>Adda Athanasopoulos</u>	
Lab Vane Test No.: <u>NOVANE40</u>	Elevation (ft.): <u>-18.3</u>	
Soil Identification: <u>Grey Clay (CH) High Plasticity.</u>		

TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				39	27	14	
Wet Wt. of Soil + Cont. (g)				32.30	32.70	31.80	
Dry Wt. of Soil + Cont. (g)				25.50	25.50	24.80	
Wt. of Container (g)				15.90	15.30	15.60	
Moisture Content (%) [W _n]				70.83	70.59	76.09	

Liquid Limit	72.5
Plastic Limit	
Plasticity Index	
Classification	



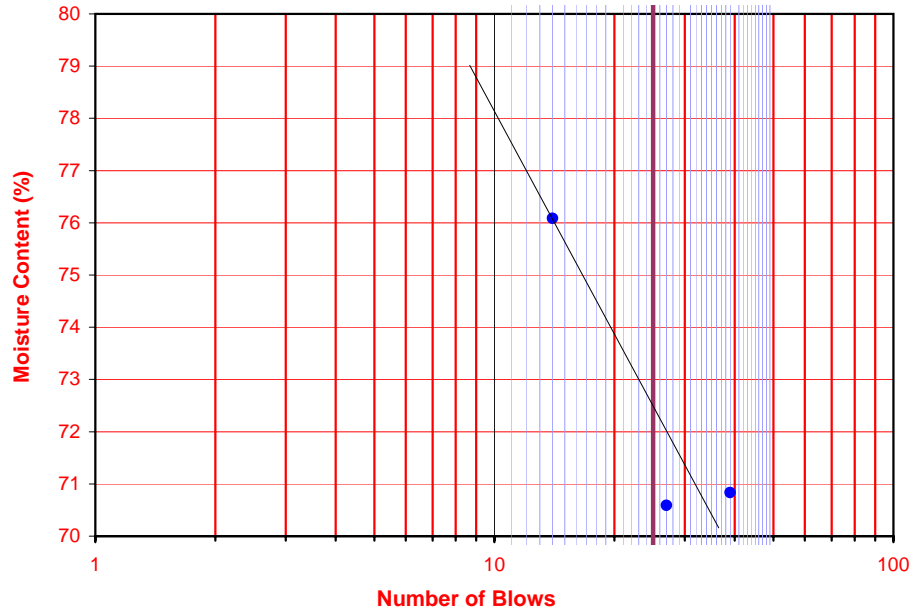
PI at "A" - Line = $0.73(LL-20)$ =

One - Point Liquid Limit Calculation

$$LL = W_n(N/25)^{0.12}$$

PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





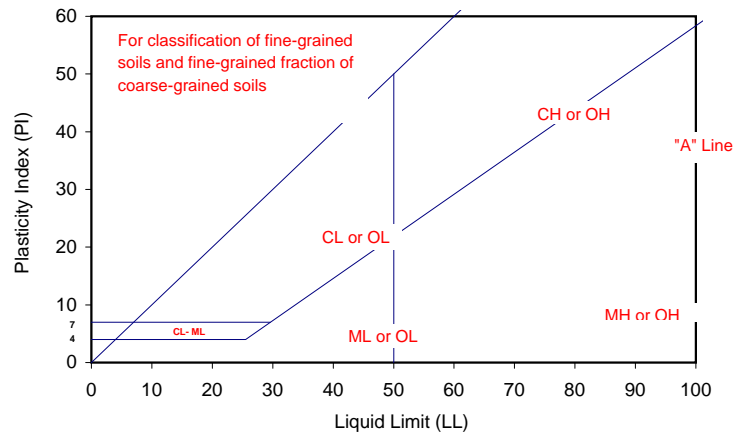
ATTERBERG LIMITS

ASTM D 4318

Project Name: <u>New Orleans Levee Investigation</u>	Tested By: <u>Julien Cohen-Waeber</u>	Date: <u>04/15/06</u>
Boring No.: <u>17-BOR-6</u>	Input By: <u>Julien Cohen-Waeber</u>	Date: <u>05/14/06</u>
Sample No.: <u>17-BOR-6-3</u>	Checked By: <u>Adda Athanasopoulos</u>	
Lab Vane Test No.: <u>NOVANE41</u>	Elevation (ft.): <u>-18.5</u>	
Soil Identification: <u>Grey Silty Clay (CL) plastic.</u>		

TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				48	22	15	
Wet Wt. of Soil + Cont. (g)				34.30	32.60	34.30	
Dry Wt. of Soil + Cont. (g)				28.20	26.50	27.70	
Wt. of Container (g)				16.10	15.60	16.00	
Moisture Content (%) [W _n]				50.41	55.96	56.41	

Liquid Limit	54.2
Plastic Limit	
Plasticity Index	
Classification	



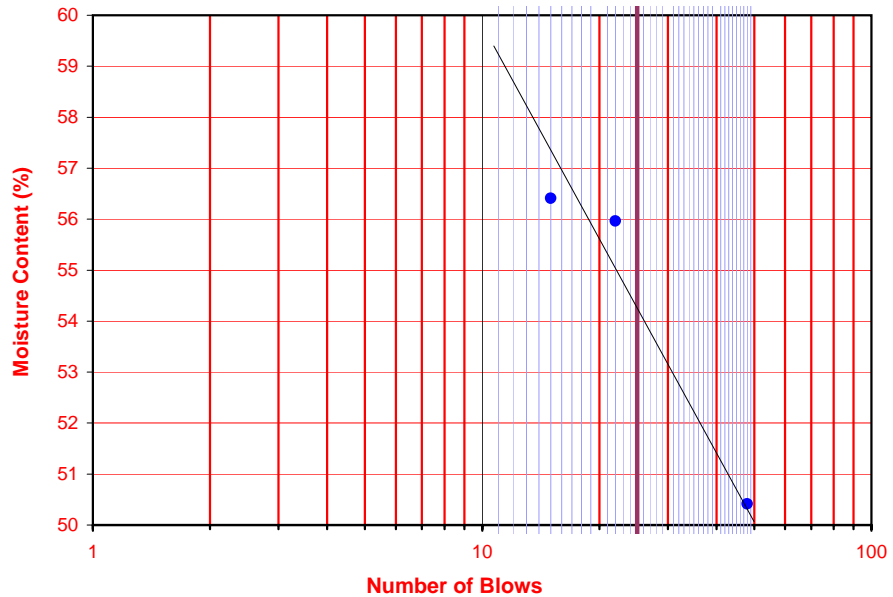
PI at "A" - Line = $0.73(LL-20)$ =

One - Point Liquid Limit Calculation

$$LL = W_n(N/25)^{0.12}$$

PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





ATTERBERG LIMITS

ASTM D 4318

Project Name: <u>New Orleans Levee Investigation</u>	Tested By: <u>Julien Cohen-Waeber</u>	Date: <u>04/15/06</u>
Boring No.: <u>17-BOR-6</u>	Input By: <u>Julien Cohen-Waeber</u>	Date: <u>05/14/06</u>
Sample No.: <u>17-BOR-6-3</u>	Checked By: <u>Adda Athanasopoulos</u>	
Lab Vane Test No.: <u>NOVANE42</u>	Elevation (ft.): <u>-18.9</u>	
Soil Identification: <u>Grey Silty Clay (CL) very plastic</u>		

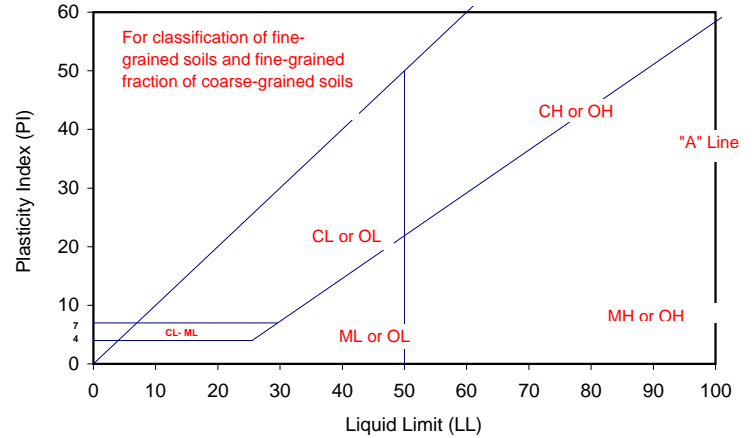
TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				44	31	17	
Wet Wt. of Soil + Cont. (g)				33.10	32.40	31.00	
Dry Wt. of Soil + Cont. (g)				26.00	25.70	24.40	
Wt. of Container (g)				15.60	15.90	15.70	
Moisture Content (%) [W _n]				68.27	68.37	75.86	

Liquid Limit	72.0
Plastic Limit	
Plasticity Index	
Classification	

PI at "A" - Line = $0.73(LL-20)$ =

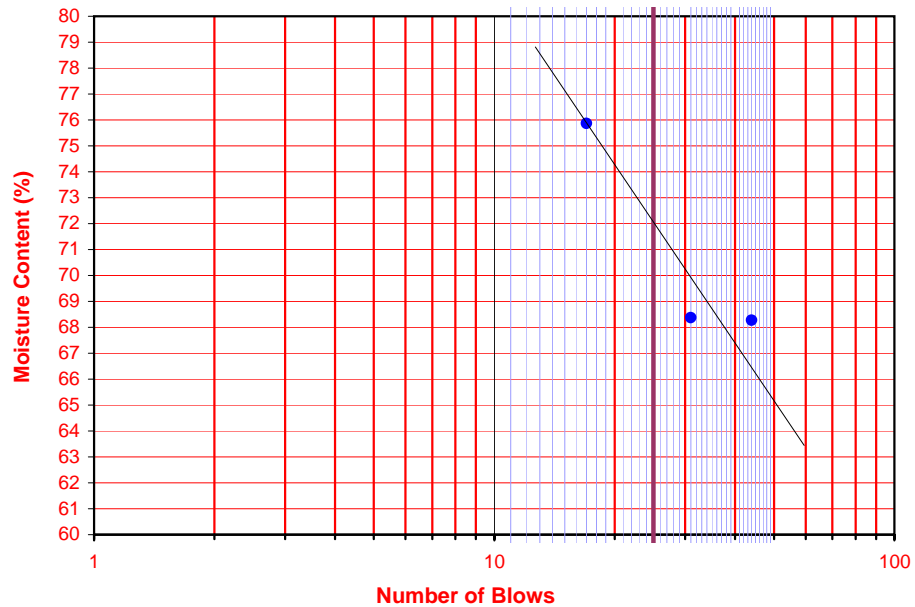
One - Point Liquid Limit Calculation

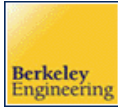
$$LL = W_n(N/25)^{0.12}$$



PROCEDURES USED

- Wet Preparation
 Multipoint - Wet
- Dry Preparation
 Multipoint - Dry
- Procedure A
 Multipoint Test
- Procedure B
 One-point Test





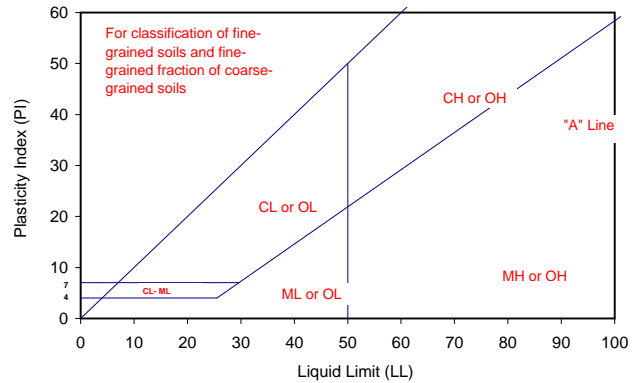
ATTERBERG LIMITS

ASTM D 4318

Project Name: New Orleans Levee Investigation Tested By: Julien Cohen-Waeber Date: 04/15/06
 Boring No.: LAC-BOR-1A Input By: Julien Cohen-Waeber Date: 05/14/06
 Sample No.: LAC-BOR-1A-1 Checked By: Adda Athanasopoulos
 Lab Vane Test No.: NOVANE49 Elevation (ft.) -10.7
 Soil Identification: Black to Dark Grey Silty Clay (CL), with organics

TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				36	32	23	15
Wet Wt. of Soil + Cont. (g)				26.70	29.00	26.10	30.10
Dry Wt. of Soil + Cont. (g)				18.90	20.10	19.00	20.30
Wt. of Container (g)				15.40	16.00	15.90	16.00
Moisture Content (%) [Wn]				222.86	217.07	229.03	227.91

Liquid Limit	222.5
Plastic Limit	
Plasticity Index	
Classification	

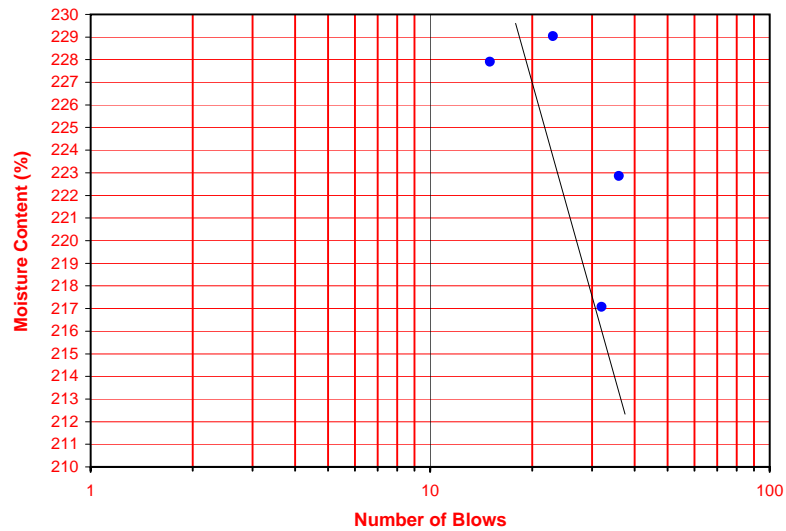


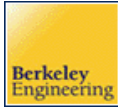
PI at "A" - Line = $0.73(LL-20)$ 147.825

One - Point Liquid Limit Calculation
 $LL = Wn(N/25)^{0.12}$

PROCEDURES USED

- Wet Preparation
 Multipoint - Wet
- Dry Preparation
 Multipoint - Dry
- Procedure A
 Multipoint Test
- Procedure B
 One-point Test





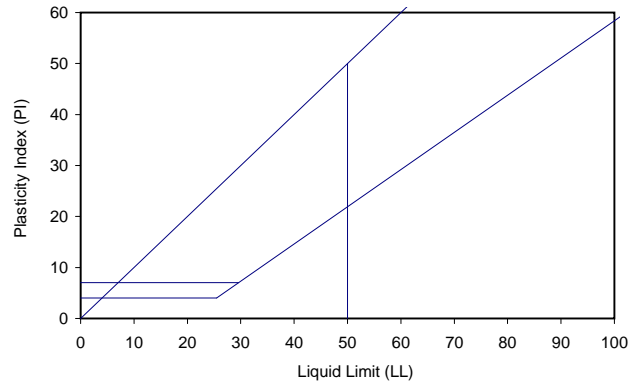
ATTERBERG LIMITS

ASTM D 4318

Project Name: New Orleans Levee Investigation Tested By: Julien Cohen-Waeber Date: 04/13/06
 Boring No.: LAC-BOR-1A Input By: Julien Cohen-Waeber Date: 05/14/06
 Sample No.: LAC-BOR-1A-1 Checked By: Adda Athanasopoulos
 Lab Vane Test No.: NOVANE52 Elevation (ft.) -11.2
 Soil Identification: Grey to Dark Grey, Sandy Clay (CL) Trace Organics

TEST NO.	PLASTIC LIMIT			LIQUID LIMIT			
	1	2	3	1	2	3	4
Number of Blows [N]				27	22	15	
Wet Wt. of Soil + Cont. (g)				33.80	36.50	38.60	
Dry Wt. of Soil + Cont. (g)				28.10	30.40	31.40	
Wt. of Container (g)				15.60	15.90	16.10	
Moisture Content (%) [Wn]				45.60	42.07	47.06	

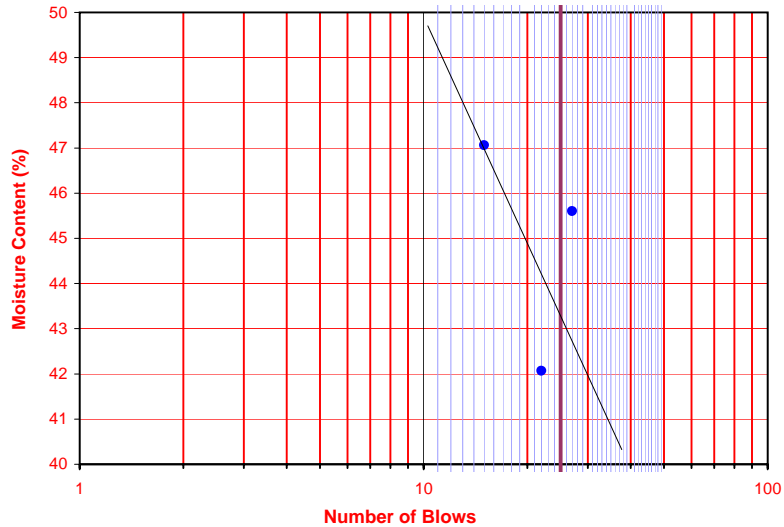
Liquid Limit	43.3
Plastic Limit	
Plasticity Index	
Classification	



PI at "A" - Line = $0.73(LL-20)$ =
 One - Point Liquid Limit Calculation
 $LL = Wn(N/25)^{0.12}$

PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





DIRECT SHEAR TEST

Project Name:	<u>New Orleans Levee Investigation</u>	Tested By:	<u>Julien Cohen-Waeber</u>	Date:	<u>04/30/06</u>
Boring No.:	<u>LACW-BOR-1</u>	Input By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/14/06</u>
Sample No.:	<u>LACW-BOR-1-2</u>	Checked By:	<u>Adda Athanasopoulos</u>		
Lab Test No.:	<u>1</u>	Elevation (ft.):	<u>-14.8</u>		
Soil Identification:	<u>Grey Silty Sandy Clay (CL)</u>				

SHRP_Equipment_Corporation
Automatic_Testing_System_v.3.11

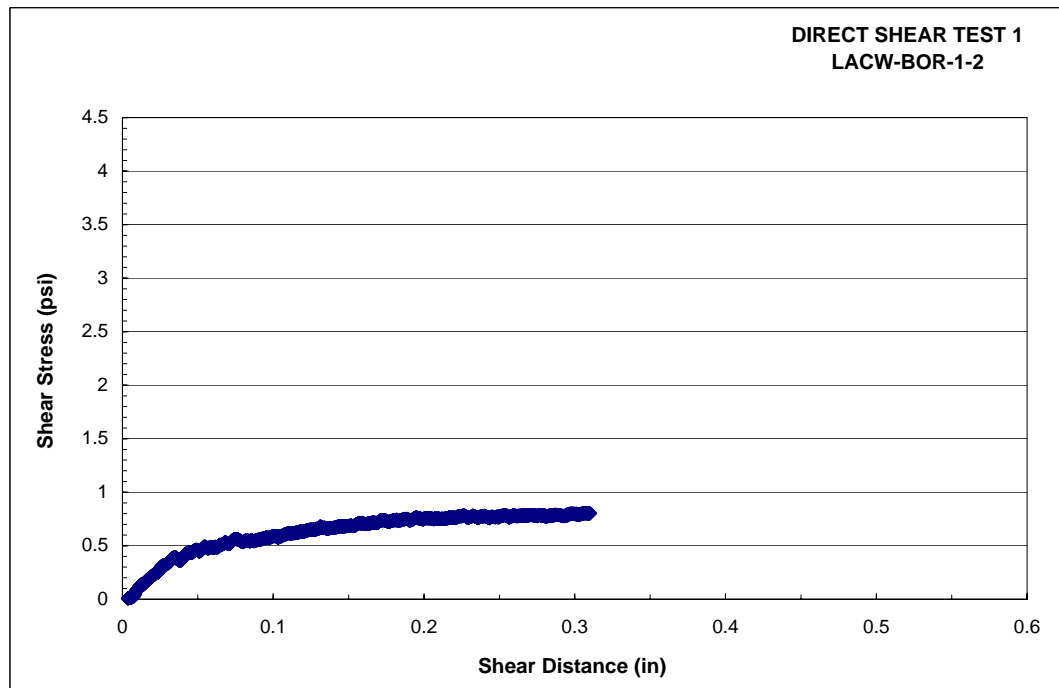
1

OVERBURDEN: 4.5 divs
 248.1231 psf

SHEAR RATE:	4.1E-05 in/s
TOTAL DISP:	0.3065 in
MAX SHEAR STRESS:	0.804 psi
	115.776 psf
S_{u,DS}	57.888 psf
approx S_{u,TX}	75.3 psf

Displacements	
initial (in)	final (in)
0.5635	0.87

Total Time (sec)
7476





DIRECT SHEAR TEST

Project Name:	<u>New Orleans Levee Investigation</u>	Tested By:	<u>Julien Cohen-Waeber</u>	Date:	<u>04/30/06</u>
Boring No.:	<u>LACW-BOR-1</u>	Input By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/14/06</u>
Sample No.:	<u>LACW-BOR-1-2</u>	Checked By:	<u>Adda Athanasopoulos</u>		
Lab Test No.:	<u>2</u>	Elevation (ft.):	<u>-15.4</u>		
Soil Identification:	<u>Grey Silty Sand (SM)</u>				

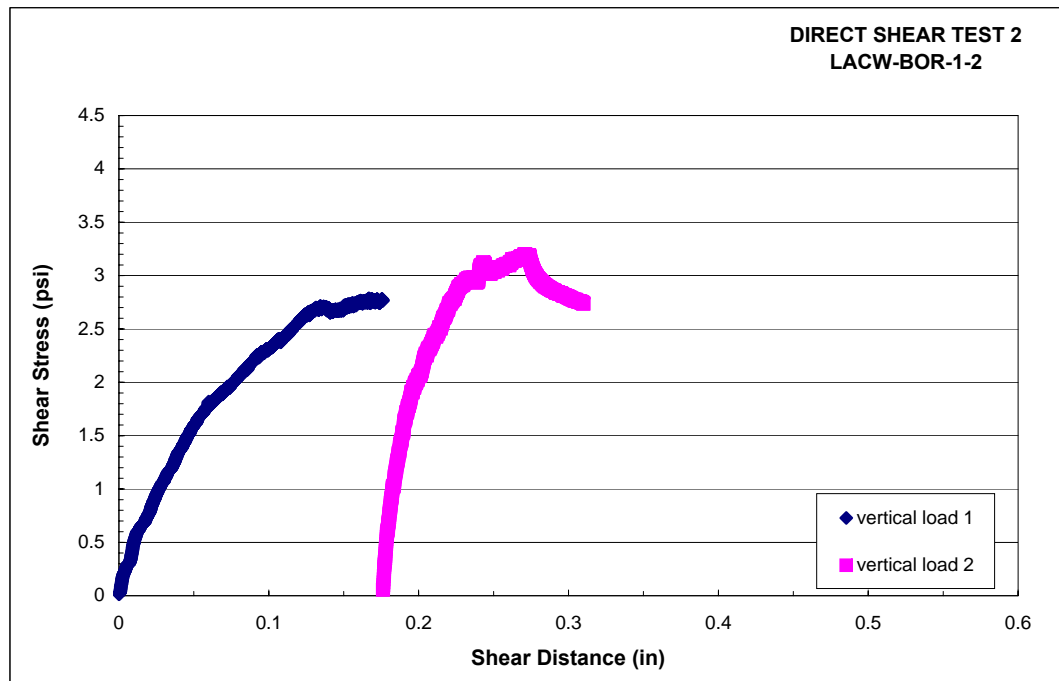
SHRP_Equipment_Corporation
Automatic_Testing_System_v.3.11

	1		2	
OVERBURDEN:	0.9		18 divs	
	856.6892		1965.489 psf	

SHEAR RATE:	3.17E-05 in/s
TOTAL DISP:	0.31 in
MAX SHEAR STRESS:	2.76 psi
	397.44 psf
Φ	25 deg

Displacements	
initial (in)	final (in)
0.476	0.786

Total Time (sec)
9780





DIRECT SHEAR TEST

Project Name: New Orleans Levee Investigation
Boring No.: LACW-BOR-1
Sample No.: LACW-BOR-1-2
Lab Test No.: 3
Soil Identification: Grey Sand with Clay and Silt (SP)

Tested By: Julien Cohen-Waeber Date: 05/01/06
Input By: Julien Cohen-Waeber Date: 05/14/06
Checked By: Adda Athanasopoulos
Elevation (ft.): -15.8

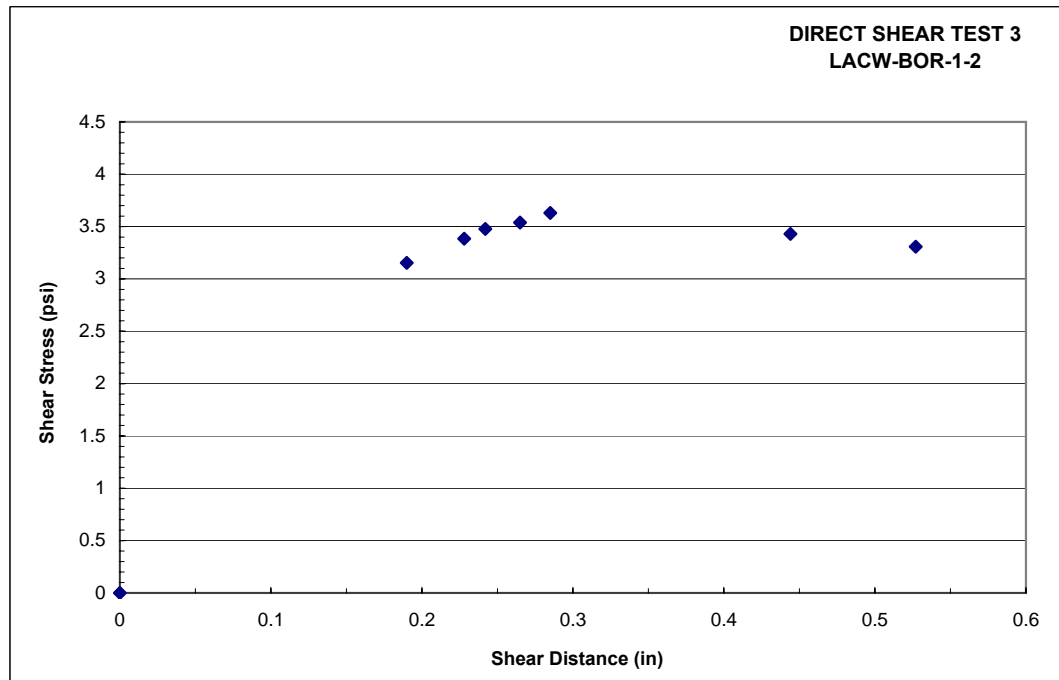
SHRP_Equipment_Corporation
Automatic_Testing_System_v.3.11

1

OVERBURDEN:	0.9 divs
	856.6892 psf
SHEAR RATE:	4.88E-05 in/s
TOTAL DISP:	0.527 in
MAX SHEAR STRESS:	3.631 psi
	522.864 psf
ϕ	31.3 deg

Displacements	
initial (in)	final (in)
0.33	0.857

Total Time (sec)
10800





DIRECT SHEAR TEST

Project Name: New Orleans Levee Investigation Tested By: Julien Cohen-Waeber Date: 05/01/06
Boring No.: LAC-BOR-4 Input By: Julien Cohen-Waeber Date: 05/14/06
Sample No.: LAC-BOR-4-5 Checked By: Adda Athanasopoulos
Lab Test No.: 4 Elevation (ft.): -19.9
Soil Identification: Grey Silty Clay (CL)

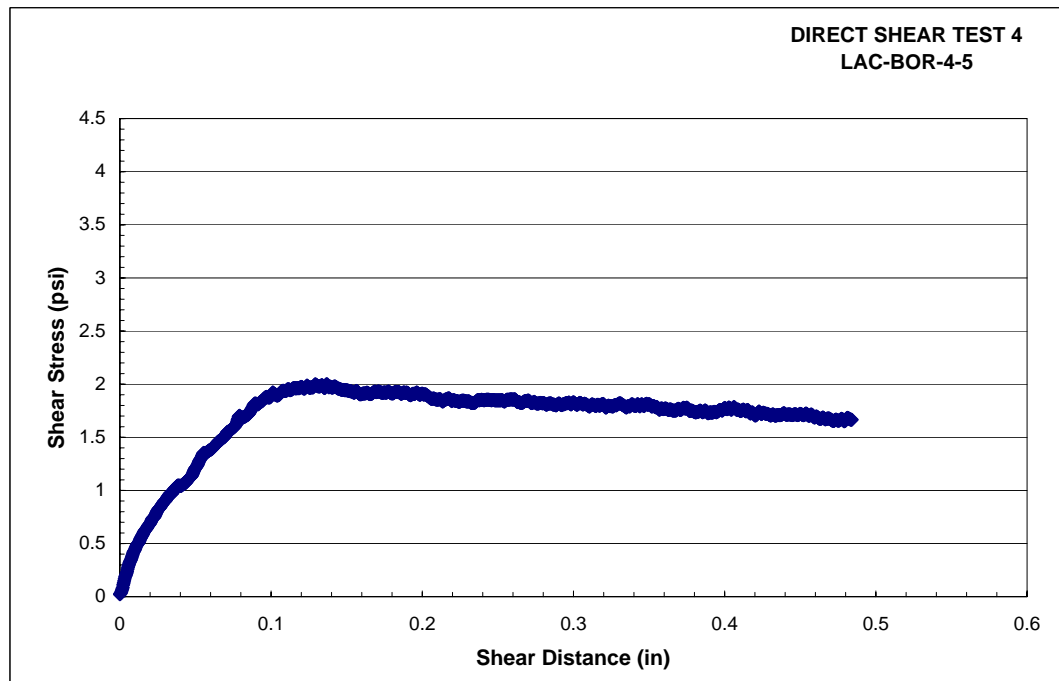
SHRP_Equipment_Corporation
Automatic_Testing_System_v.3.11

1
OVERBURDEN: 0.9 divs
856.6892 psf

SHEAR RATE:	0.000106 in/s
TOTAL DISP:	0.484 in
MAX SHEAR STRESS:	1.9992 psi
	287.8848 psf
Su,DS	143.9424 psf
approx Su,TX	187.1 psf

Displacements	
initial (in)	final (in)
0.404	0.888

Total Time (sec)
4551





DIRECT SHEAR TEST

Project Name:	<u>New Orleans Levee Investigation</u>	Tested By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/01/06</u>
Boring No.:	<u>LAC-BOR-4</u>	Input By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/14/06</u>
Sample No.:	<u>LAC-BOR-4-5</u>	Checked By:	<u>Adda Athanasopoulos</u>		
Lab Test No.:	<u>5</u>	Elevation (ft.):	<u>-20.5</u>		
Soil Identification:	<u>Grey Silty Clay with trace Sand (CL)</u>				

SHRP_Equipment_Corporation
Automatic_Testing_System_v.3.11

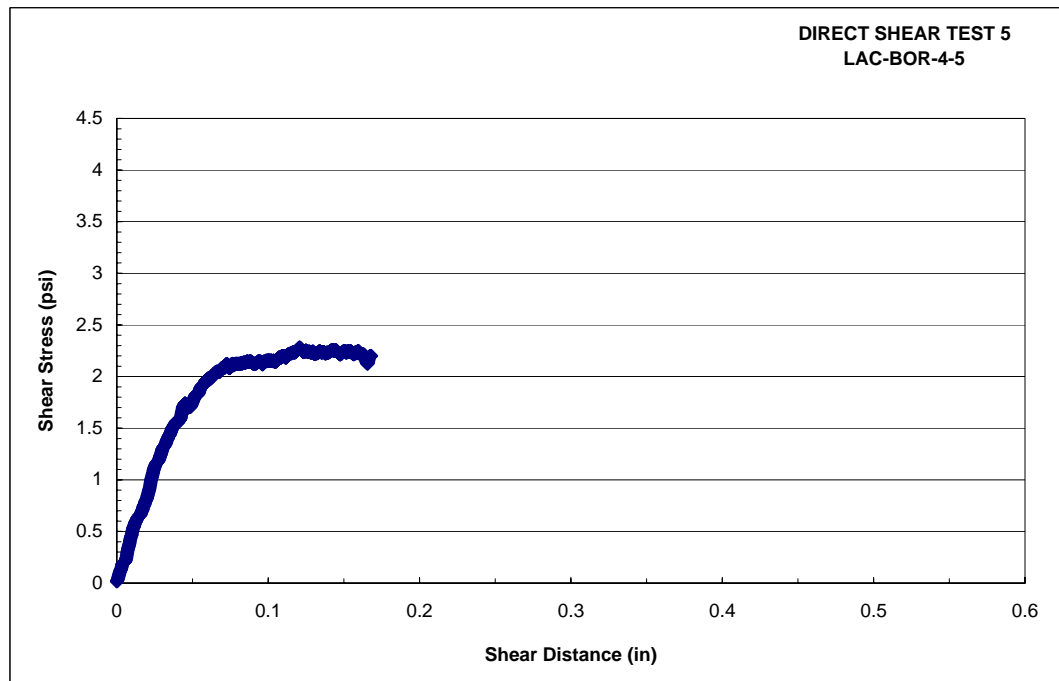
1

OVERBURDEN: 0.9 divs
 856.6892 psf

SHEAR RATE:	6.05E-05 in/s
TOTAL DISP:	0.168 in
MAX SHEAR STRESS:	2.2512 psi
	324.1728 psf
Su,DS	162.0864 psf
approx Su,TX	210.7 psf

Displacements	
initial (in)	final (in)
0.29	0.458

Total Time (sec)
2775





DIRECT SHEAR TEST

Project Name: New Orleans Levee Investigation
 Boring No.: LAC-BOR-2
 Sample No.: LAC-BOR-2-3
 Lab Test No.: 6
 Soil Identification: Grey Sandy Clay / Clayey Sand (SC/CL),

Tested By: Julien Cohen-Waeber Date: 05/01/06
 Input By: Julien Cohen-Waeber Date: 05/14/06
 Checked By: Adda Athanasopoulos
 Elevation (ft.): -15.4

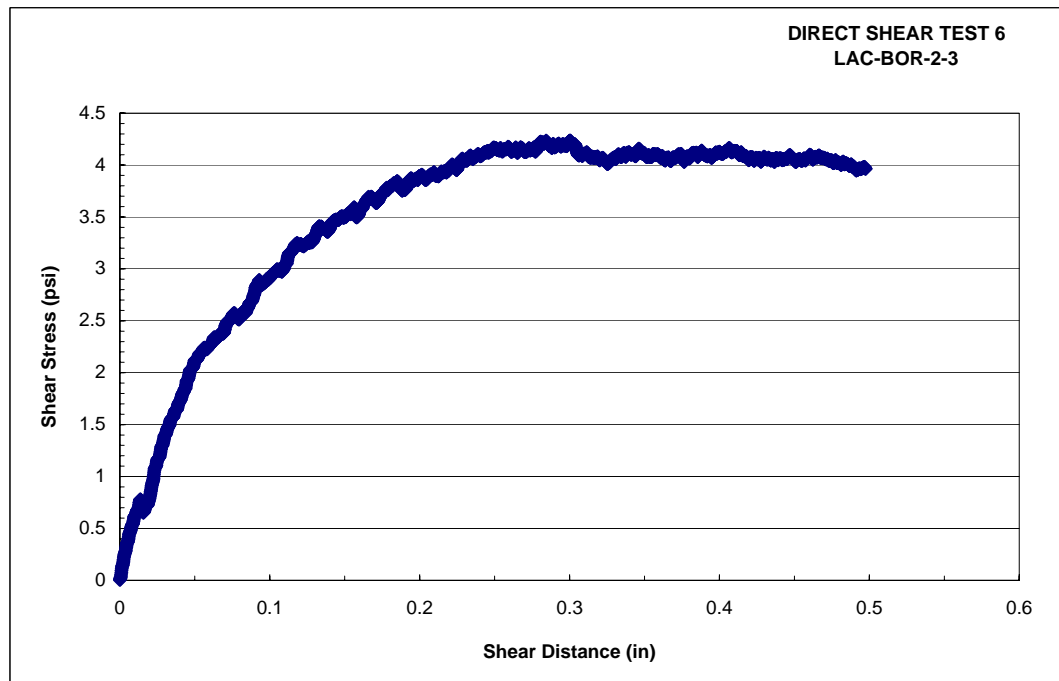
SHRP_Equipment_Corporation
 Automatic_Testing_System_v.3.11

OVERBURDEN: 1
 0.9 divs
 856.6892 psf

SHEAR RATE:	5.22E-05 in/s
TOTAL DISP:	0.4975 in
MAX SHEAR STRESS:	4.1868 psi
Su,DS	602.8992 psf
Su,DS	301.4496 psf
approx Su,TX	391.9 psf

Displacements	
initial (in)	final (in)
0.4955	0.993

Total Time (sec)
9522





PERMEABILITY TEST (FALLING HEAD METHOD)

Project Name: New Orleans Levee Investigation Tested By: Julien Cohen-Waeber Date: 05/06/06
 Boring No.: LAC-BOR-2 Input By: Julien Cohen-Waeber Date: 05/14/06
 Sample No.: LAC-BOR-2-3 Checked By: Adda Athanasopoulos
 Lab Test No.: 1 Elevation (ft.): -15.1
 Soil Identification: Grey Silty Sand (SM) Fine Sand.

Sample Dimintions:			
		1	2
Beaker wt:	285.28 g	Soil Height:	14.92 15.08 cm
wt Beaker + dry Soil:	534.99 g		
wt Soil:	249.71 g	avg height:	15 cm
Beaker Diam:	3.7846 cm		
Beaker Area:	11.249 cm ²		
Sample Density:	1.480 g/cm ³		

Water Cylinder:			
	1	2	
Volume:	775	1570 cc	
Drop in water Level:	30	60 cm ²	
Cylinder Area:	25.833	26.17 cm ²	
Avg Area:	26 cm ²		

TEST DATA AND RESULTS:

Test No.	Height			Time		HYDRAULIC CONDUCTIVITY	
	h ₀ cm	h ₁ cm	h ₂ cm	h ₀ to h ₁ s	h ₀ to h ₂ s	k ₍₀₋₁₎ cm/s	k ₍₀₋₂₎ cm/s
1	160	130	100	2625	6105	2.74E-03	2.67E-03
2	160	130	100	2435	5810	2.96E-03	2.80E-03



PERMEABILITY TEST (FALLING HEAD METHOD)

Project Name:	<u>New Orleans Levee Investigation</u>	Tested By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/06/06</u>
Boring No.:	<u>LAC-BOR-2</u>	Input By:	<u>Julien Cohen-Waeber</u>	Date:	<u>05/14/06</u>
Sample No.:	<u>LAC-BOR-2-3</u>	Checked By:	<u>Adda Athanasopoulos</u>		
Lab Test No.:	<u>2</u>	Elevation (ft.):	<u>-15.9</u>		
Soil Identification:	<u>Grey Silty Sand (SM) Fine Sand.</u>				

Sample Dimensions:		1	2
Beaker wt:	285.28 g	Soil Height:	13.652 cm
wt Beaker + dry Soil:	534.99 g		13.653 cm
wt Soil:	249.71 g	avg height:	13.6525 cm
Beaker Diam:	3.7846 cm		
Beaker Area:	11.249 cm ²		
Sample Density:	1.626 g/cm ³		

Water Cylinder:		1	2
Volume:	775	1570 cc	
Drop in water Level:	30	60 cm ²	
Cylinder Area:	25.833	26.17 cm ²	
Avg Area:	26 cm ²		

TEST DATA AND RESULTS:

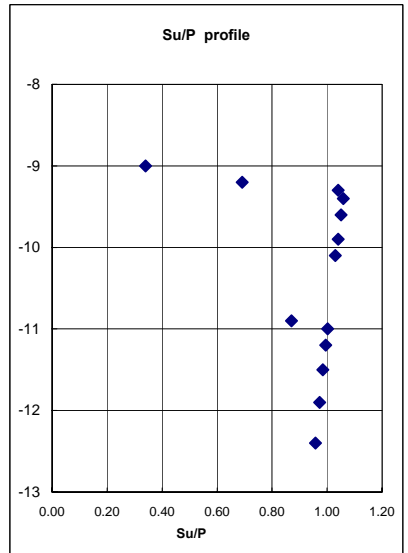
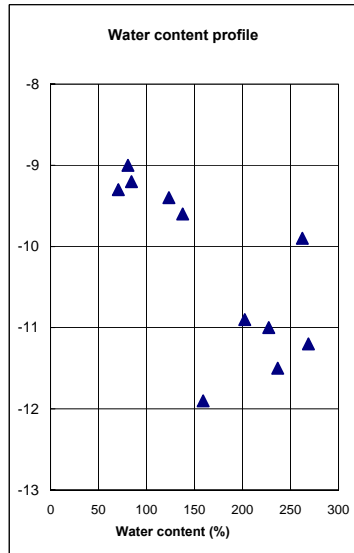
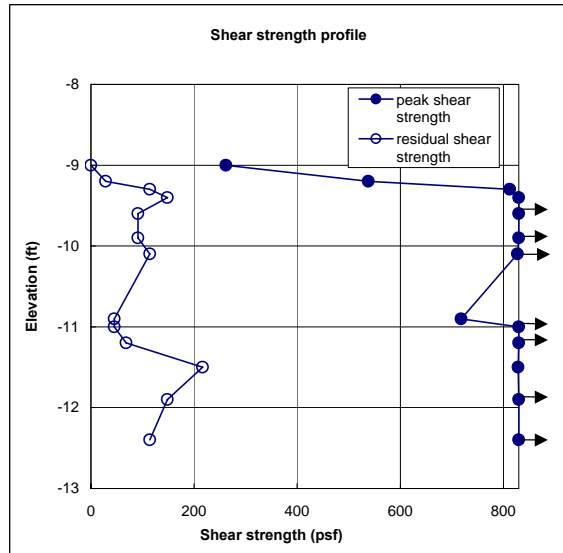
Test No.	Height			Time		HYDRAULIC CONDUCTIVITY	
	h ₀ cm	h ₁ cm	h ₂ cm	h ₀ to h ₁ s	h ₀ to h ₂ s	k ₍₀₋₁₎ cm/s	k ₍₀₋₂₎ cm/s
1	160	130	100	7905	19515	8.29E-04	7.60E-04



Project Name: **New Orleans Levee Investigation**
 Project No. :
 Boring No.: **17-BOR-2**
 Sample No.: **17-BOR-2-4 and 17-BOR-2-5**

Tested By: **Diego Cobos-Roa**
Adda Athanasopoulos
 Depth (ft): **12 to 16.5**
 G.E. (ft): **3.8**
 W.T. (ft): **-1**

vane test #	elevation (ft)	measured		corrected*		material	w (%)	σ'_{vo} (psf)	Su/P
		peak (psf)	residual (psf)	peak (psf)	residual (psf)				
N.O. Vane1	-9	230	0	262.2	0	CH/OH	80.8	773	0.34
N.O. Vane2	-9.2	472	25	538.08	28.5	CH/OH	84.2	778	0.69
N.O. Vane3	-9.3	713	100	812.82	114	CH/OH	70.8	781	1.04
N.O. Vane4	-9.4	728	130	829.92	148.2	CH/OH	123.2	784	1.06
N.O. Vane5	-9.6	728	80	829.92	91.2	CH/OH	137.6	789	1.05
N.O. Vane6	-9.9	728	80	829.92	91.2	CH/OH	262.2	798	1.04
N.O. Vane7	-10.1	726	100	827.64	114	CH/OH		803	1.03
N.O. Vane31	-10.9	630	40	718.2	45.6	very fibrous marsh	202.4	825	0.87
N.O. Vane32	-11	728	40	829.92	45.6	very fibrous marsh	227.2	828	1.00
N.O. Vane33	-11.2	728	60	829.92	68.4	very fibrous marsh, roots, wood	268.7	834	1.00
N.O. Vane34	-11.5	727	190	828.78	216.6	very fibrous marsh, roots, wood	236.5	842	0.98
N.O. Vane35	-11.9	728	130	829.92	148.2	very fibrous marsh, roots, wood	159.1	853	0.97
N.O. Vane36	-12.4	728	100	829.92	114	very fibrous marsh, roots, wood	328.7	867	0.96



* See text, page E-1.

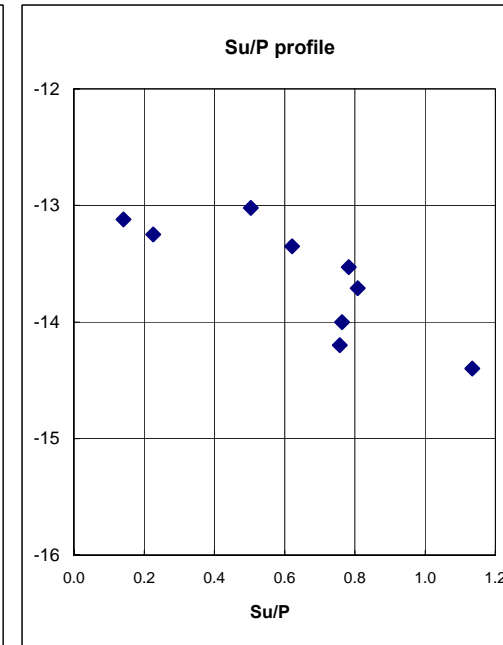
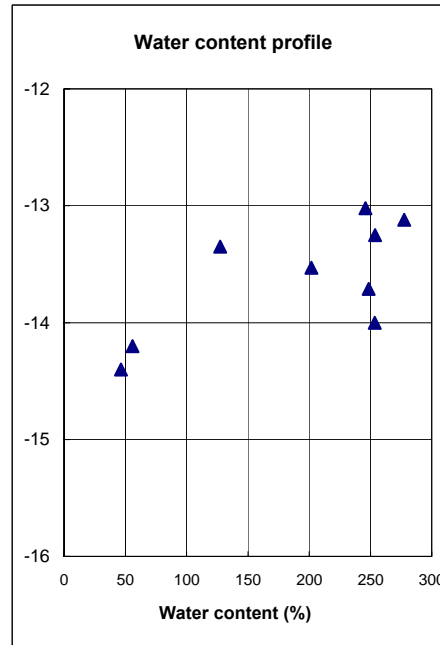
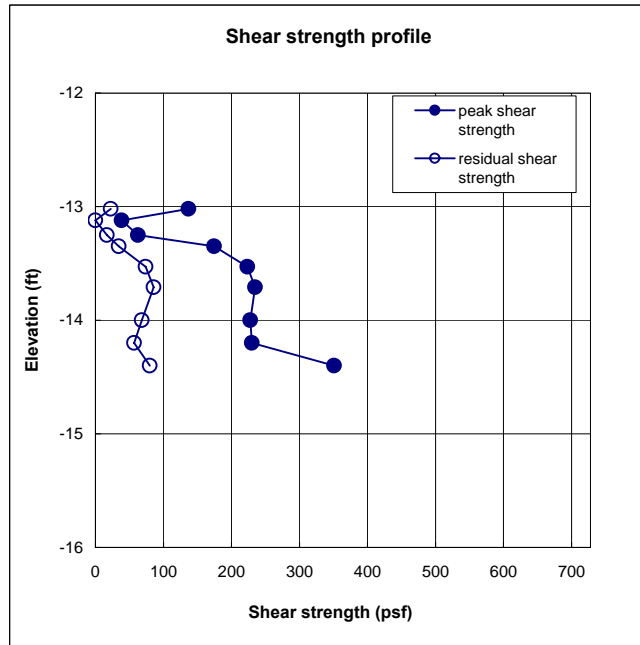
** *italic indicates maximum reading for the laboratory vane device*



Project Name: **New Orleans Levee Investigation**
 Project No. :
 Boring No.: **17-BOR-3**
 Sample No.: **17-BOR-3-2**

Tested By: **Diego Cobos-Roa**
Adda Athanasopoulos
 Depth (ft): **6 to 8**
 G.E. (ft): **-6.6**
 W.T. (ft): **-8**

vane test #	elevation (ft)	measured		corrected*		soil description	w (%)	σ'_{vo} (psf)	Su/P
		peak (psf)	residual (psf)	peak (psf)	residual (psf)				
N.O. Vane8	-13.02	120	20	136.8	22.8	marsh	246	271.6	0.50
N.O. Vane9	-13.12	34	0	38.76	0	marsh	277.6	274.3	0.14
N.O. Vane10	-13.25	55	15	62.7	17.1	marsh	253.9	277.9	0.23
N.O. Vane11	-13.35	153	30	174.42	34.2	marsh	127.4	280.7	0.62
N.O. Vane12	-13.53	196	65	223.44	74.1	marsh, (+CH)	201.7	285.6	0.78
N.O. Vane13	-13.71	206	75	234.84	85.5	CH w/OH	248.6	290.6	0.81
N.O. Vane14	-14	200	60	228	68.4	CH w/OH	253.5	298.6	0.76
N.O. Vane15	-14.2	202	50	230.28	57	CH	56	304.1	0.76
N.O. Vane16	-14.4	308	70	351.12	79.8	CH	46.6	309.6	1.13



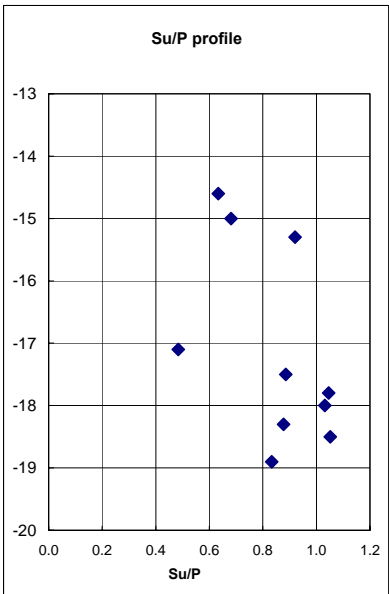
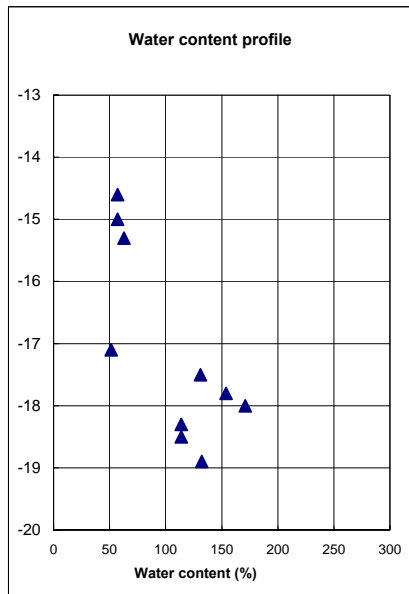
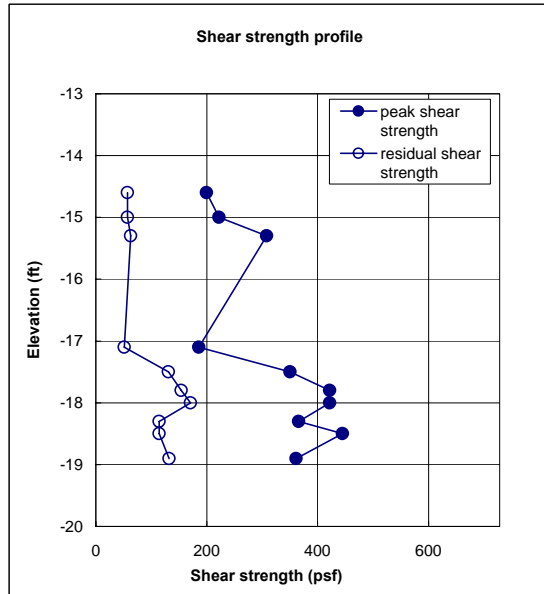
* See text, page E-1.



Project Name: **New Orleans Levee Investigation**
 Project No. :
 Boring No.: **17-BOR-6**
 Sample No.: **17-BOR-6-2 and 17-BOR-6-3**

Tested By: **Diego Cobos-Roa**
Adda Athanasopoulos
 Depth (ft): **7.5 to 12**
 G.E. (ft): **-6.6**
 W.T. (ft): **-8**

vane test #	elevation (ft)	measured		corrected*		soil description	w (%)	σ'_{vo} (psf)	Su/P
		peak (psf)	residual (psf)	peak (psf)	residual (psf)				
N.O. Vane22	-14.6	175	50	199.5	57	grey CH, traces organic, shells	90.4	315.16	0.63
N.O. Vane23	-15	195	50	222.3	57	grey CH, traces organic, shells	60.9	326.2	0.68
N.O. Vane24	-15.3	270	55	307.8	62.7	grey CH (some silt), less shells	40.8	334.48	0.92
N.O. Vane25	-17.1	163	45	185.82	51.3	light grey CL/CH, some silt	73.4	384.16	0.48
N.O. Vane26	-17.5	307	115	349.98	131.1	grey CH	95.5	395.2	0.89
N.O. Vane27	-17.8	370	135	421.8	153.9	grey CH	84.7	403.48	1.05
N.O. Vane39	-18	370	150	421.8	171	grey CH	55.8	409	1.03
N.O. Vane40	-18.3	321	100	365.94	114	grey CH	83.5	417.28	0.88
N.O. Vane41	-18.5	390	100	444.6	114	grey CH	61.4	422.8	1.05
N.O. Vane42	-18.9	317	116	361.38	132.24	grey CH	88.9	433.84	0.83



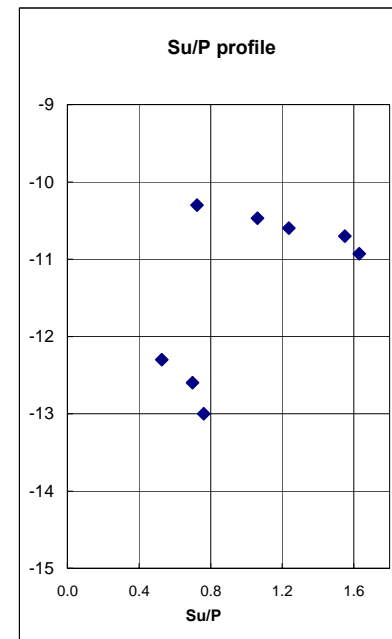
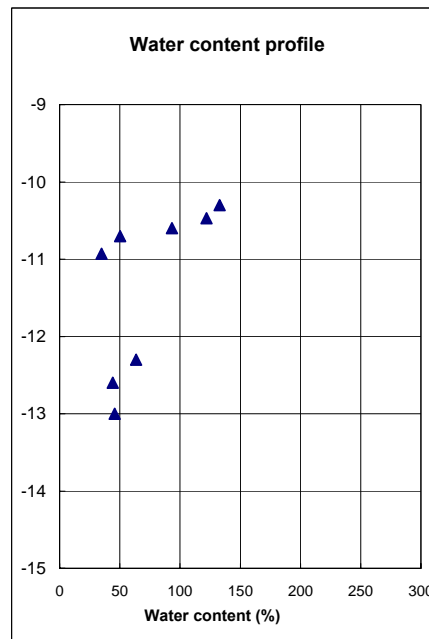
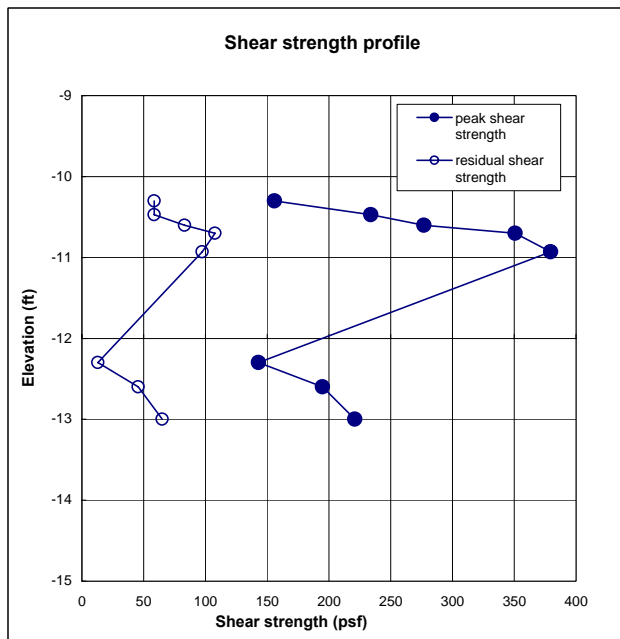
*See text, page E-1.



Project Name: **New Orleans Levee Investigation**
 Project No. :
 Boring No.: **LAC-BOR-2**
 Sample No.: **LAC-BOR-2-2 and LAC-BOR-2-3**

Tested By: **Diego Cobos-Roa**
Adda Athanasopoulos
 Depth (ft): **6 to 10**
 G.E. (ft): **-6.4**
 W.T. (ft): **-8**

vane test #	elevation (ft)	measured		corrected*		soil description	water content (%)	σ'_{vo} (psf)	Su/P
		peak (psf)	residual (psf)	peak (psf)	residual (psf)				
N.O. Vane17	-10.3	136.8	51.3	155.952	58.482	gray-black CH, org. matter, wood, org. odor	132.8	215.48	0.72
N.O. Vane18	-10.47	205.2	51.3	233.928	58.482	gray-black CH, org. matter, wood, org. odor	122	220.172	1.06
N.O. Vane19	-10.6	242.82	72.96	276.8148	83.1744	gray-black CH, org. matter, wood, org. odor	93.3	223.76	1.24
N.O. Vane20	-10.7	307.8	94.62	350.892	107.8668	gray CH w/ traces black org. matter	50.2	226.52	1.55
N.O. Vane21	-10.93	332.88	85.5	379.4832	97.47	gray clayey silt	34.7	232.868	1.63
N.O. Vane28	-12.3	125.4	11.4	142.956	12.996	gray CH w/ traces black org. matter	63.5	270.68	0.53
N.O. Vane29	-12.6	171	39.9	194.94	45.486	grey CH	44.2	278.96	0.70
N.O. Vane30	-13	193.8	57	220.932	64.98	gray clayey silt	45.6	290	0.76



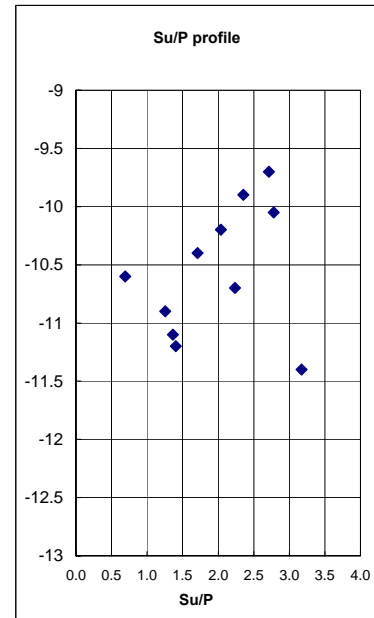
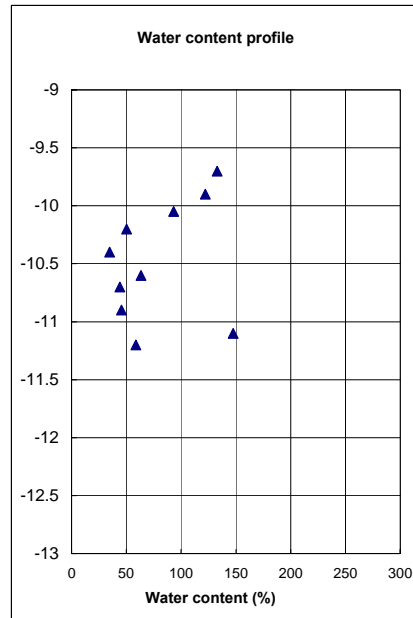
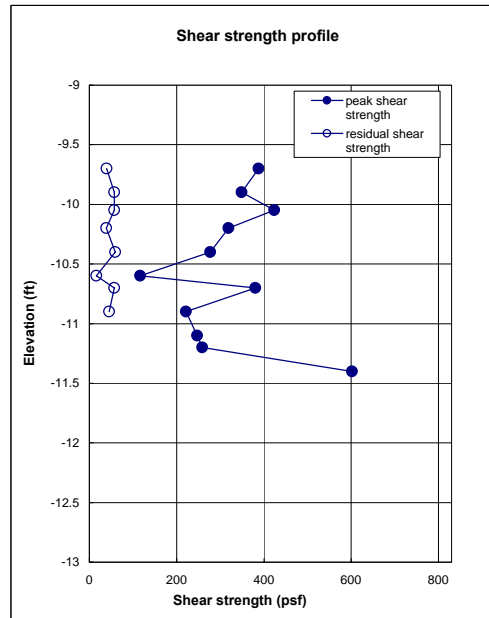
*See text, page E-1.



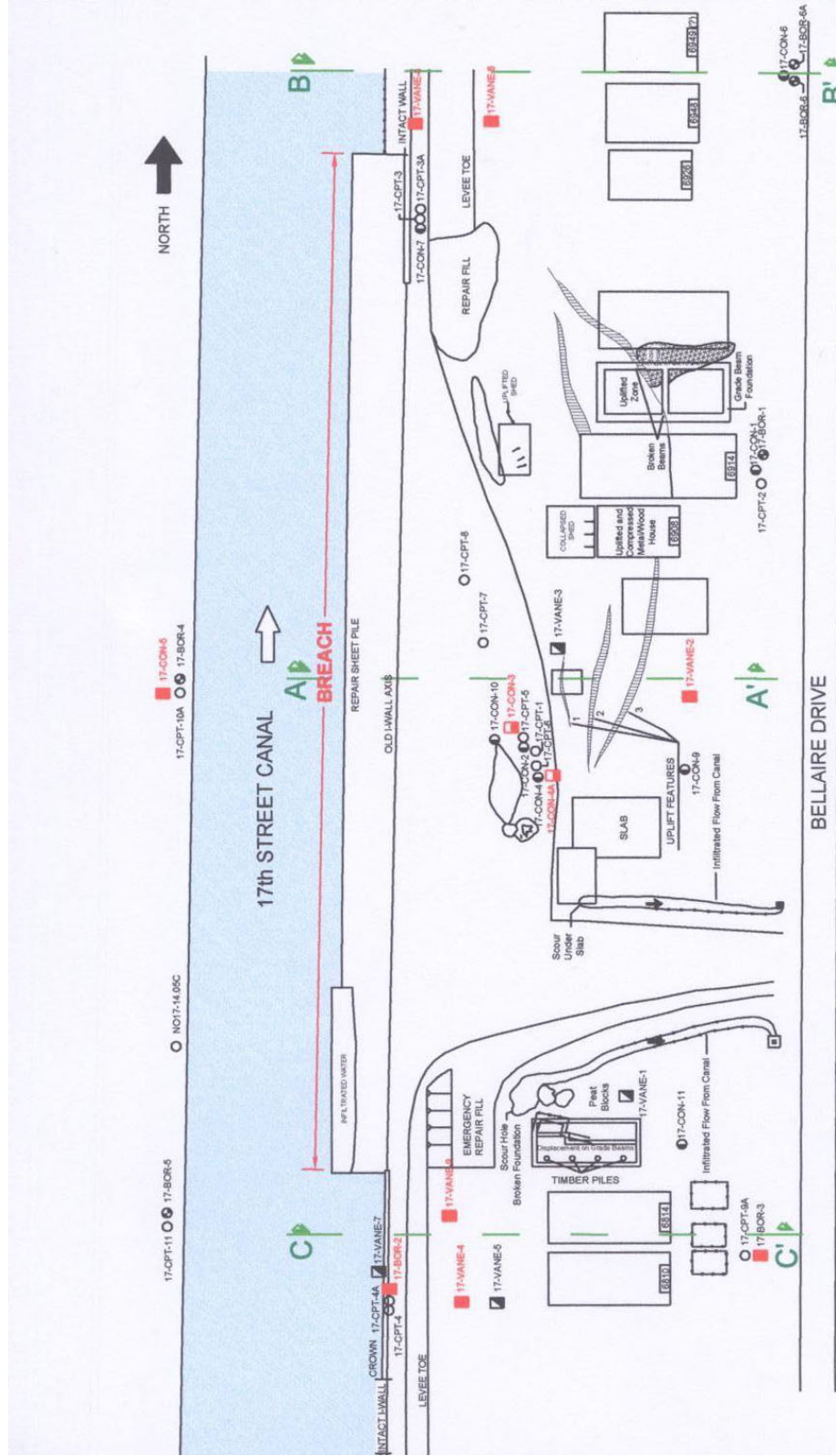
Project Name: **New Orleans Levee Investigation**
 Project No. :
 Boring No.: **LAC-BOR-1A**
 Sample No.: **LAC-BOR-1A-1**

Tested By: **Diego Cobos-Roa**
Adda Athanasopoulos
 Depth (ft): **2 to 4**
 G.E. (ft): **-7.7**
 W.T. (ft): **-9**

corrected									
vane test #	depth (ft)	peak (psf)	residual (psf)	peak (psf)	residual (psf)	soil description	water content (%)	σ'_{vo} (psf)	Su/P
NO VANE 43	-9.7	340	35	387.6	39.9	matter, wood, org. odor	132.8	142.82	2.71
NO VANE 44	-9.9	306	50	348.84	57	matter, wood, org. odor	122	148.34	2.35
NO VANE 45	-10.05	372	50	424.08	57	matter, wood, org. odor	93.3	152.48	2.78
NO VANE 46	-10.2	280	34	319.2	38.76	gray CH w/ traces black org. matter	50.2	156.62	2.04
NO VANE 47	-10.4	243	52	277.02	59.28	gray clayey silt	34.7	162.14	1.71
NO VANE 48	-10.6	102	14	116.28	15.96	gray CH w/ traces black org. matter	63.5	167.66	0.69
NO VANE 49	-10.7	334	50	380.76	57	grey CH	44.2	170.42	2.23
NO VANE 50	-10.9	194	40	221.16	45.6	gray clayey silt	45.6	175.94	1.26
NO VANE 51	-11.1	217	50	247.38	57	gray clayey silt	147.4	181.46	1.36
NO VANE 52	-11.2	227	56	258.78	63.84	gray clayey silt	58.6	184.22	1.40
NO VANE 53	-11.4	528	10	601.92	11.4	gray clayey silt		189.74	3.17



*See text, page E-1.



LEGEND ○ 17-CPT-# Core Penetration Test ● 17-CON-# Continuous Boring ⊗ 17-BOR-# Geotechnical Boring ▣ 17-VANE Field Vane Test ■ Sheared ■ Unsheared (Weak Zone) --- Fence	
17th Street Canal APPROXIMATE ILIT BORING, CPT, VANE LOCATIONS New Orleans, Louisiana	
SIZE DATE 05/06/2006	DWG NO. 17th Boring & CPT Plan
SCALE Not Drawn To Scale	SHEET



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BORING NUMBER 17-VANE-1

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/11/06 **COMPLETED** 4/11/06 **GROUND ELEVATION** -6 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES South end of breach, East of emergency repair fill. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲			
								20	40	60	80
0								PL	MC	LL	
								60	120	180	240
								□ FINES CONTENT (%) □			
								20	40	60	80
0											
5		CH: Gray CH and black organic matter (mixing zone).	1			176.2	47				
		CH: Gray CH and black organic matter (mixing zone).	2			152.7	70.5				
		CH: Gray CH and black organic matter (mixing zone).	3			199.7	82.2				
		CH: Gray CH and black organic matter (mixing zone).	4			164.4	82.2				
10		CH: Gray CH and black organic matter (mixing zone).	5			187.9	94				
		CH: Gray CH, high PI. Bottom of hole at 10.7 feet.	6			199.7	94				



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BORING NUMBER 17-VANE-2

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 3/12/06 **COMPLETED** 3/12/06 **GROUND ELEVATION** -6.44 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES Center of breach, outside disturbed area (by school bus). **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲			
								PL	MC	LL	
0								20	40	60	80
		Fill	7			364.1	23.5	60	120	180	240
5		Marsh	8			158.6	41.1				
		Marsh	9			47.0	5.9				
		CH: Gray CH and black organic matter (mixing zone).	10			23.5	11.7				
		CH: Very soft, high PI, gray CH.	11			35.2	23.5				
		CH: Soft, gray CH.	12			105.7	47.0				
		Bottom of hole at 8.4 feet.									



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BORING NUMBER 17-VANE-3

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 3/13/06 **COMPLETED** 3/13/06 **GROUND ELEVATION** -1.78 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES North-East of displaced block. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲					
								20	40	60	80		
0													
5		Fill Fill mixing with fibrous organic clay. Marsh	13			411.1	23.5						
			14			328.9	82.2						
			15			164.4	23.5						
10		CH: Gray CH and black organic matter (mixing zone).	16			105.7	11.7						
		CH: Very soft, high PI, gray CH.	17			117.5	35.2						
		CH: Soft, gray CH.	18			140.9	52.9						
		Bottom of hole at 12.5 feet.											



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BORING NUMBER 17-VANE-4

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/8/06 **COMPLETED** 4/8/06 **GROUND ELEVATION** -6 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES South end of breach, levee toe. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲			
								20	40	60	80
0								PL	MC	LL	
								60	120	180	240
								□ FINES CONTENT (%) □			
								20	40	60	80
5		Non-engineered CL fill. Very fibrous marsh, wood. Black organic matter.	19 20 21			117.5 305.4 82.2	23.5 23.5 7				
		Black organic matter, roots, wood. Black organic matter. Black organic matter mixing with gray clay. Bottom of hole at 9.3 feet.	22 23 24			115.1 124.5 187.9	37.6 18.8 51.7				



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BORING NUMBER 17-VANE-5

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/8/06 **COMPLETED** 4/8/06 **GROUND ELEVATION** -6 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES South end of breach, levee toe. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲				
								20	40	60	80	
								PL	MC	LL		
								60	120	180	240	
								□ FINES CONTENT (%) □				
								20	40	60	80	
0												
5		Organic matter.	25			152.7	23.5					
		CH/OH	26			176.2	44.6					
		CH/OH	27			164.4	35.2					
		CH/OH	28			129.2	47					
		Marsh, contact with gray CH.	29			52.9	11.7					
		Gray CH, traces organic. Bottom of hole at 8.4 feet.	30			164.4	72.8					



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BORING NUMBER 17-VANE-6

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/9/06 **COMPLETED** 4/9/06 **GROUND ELEVATION** -5 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES North end of breach, levee toe, 6949 Bellaire St. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲	
								PL	MC LL
								20 40 60 80	60 120 180 240
								□ FINES CONTENT (%) □	
								20 40 60 80	
0									
5		Organic matter.	31			234.9	70.5		
		Organic matter, strong odor	32			187.9	47		
		Organic matter.	33			150.3	30.5		
		Organic matter.	34			211.4	47		
		Intermixing of black organic with gray clay.	35			129.2	47		
		Intermixing of black organic with gray clay. Bottom of hole at 9.6 feet.	36			129.2	52.9		



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BORING NUMBER 17-VANE-7

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/11/06 **COMPLETED** 4/11/06 **GROUND ELEVATION** 3.8 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES South end of breach, levee crest. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲			
								20	40	60	80
0								PL	MC	LL	
								60	120	180	240
								□ FINES CONTENT (%) □			
								20	40	60	80
5											
10		Non-engineered CL fill.	37			446.3	94				
		Non-engineered CL fill.	38			123.3	49.3				
		Dark gray CH, traces organic.	39			111.6	49.3				
		Dark gray CH, traces organic, top of marsh.	40			152.7	65.8				
15		Marsh, wood.	41			246.7	47				
		Black organic matter.	42			129.2	44.6				
		Bottom of hole at 15.2 feet.									

GEOTECH BH PLOTS ILIT - FIELD VANES, 17TH STREET.GPJ GINT US LAB.GDT 5/4/06



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BORING NUMBER 17-VANE-8

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/11/06 **COMPLETED** 4/11/06 **GROUND ELEVATION** 4 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES North end of breach, levee crest. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲					
								20	40	60	80		
0													
5													
10													
15		Gray, silty, sandy CL, traces black organic. Organic matter, 80% wood. Organic matter, 80% wood. Bottom of hole at 16.6 feet.	43			352.4	94						
			44			211.4	70.5						
			45			47	29.4						

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BORING NUMBER 17-VANE-9

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** 17th Street Canal (East)
PROJECT NUMBER _____ **PROJECT LOCATION** 17th Street Canal, New Orleans, Louisiana
DATE STARTED 4/11/06 **COMPLETED** 4/11/06 **GROUND ELEVATION** -6 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES South end of breach, levee toe. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲	
								PL	MC LL
0								20 40 60 80	
5		Black organic matter, mixing with gray CH.	46			176.2	35.2	60 120 180 240	
		Dark gray CH, traces organic.	47			54	28.2		
		Dark gray CH, traces organic.	48			39.9	16.4		
10		Gray CH (fibrous). Bottom of hole at 10.0 feet.	49			129.2	54		



Base map: IPET

LEGEND

- London 2006 ILIT Field Vane
- London 2006 ILIT Boring and Cone Penetration Test
- LAC-BOR-#: Boring
- LAC-CON-#: Continuous Boring
- LAC-CPT-#: Cone Penetration Test

**LONDON AVENUE CANAL (NORTH)
APPROXIMATE ILIT BORING, CPT, VANE LOCATIONS
New Orleans, Louisiana**

SIZE	DATE 05/04/2006	DWG NO. LACSitePlan	REV
SCALE	Not Drawn To Scale		SHEET



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BORING NUMBER LAC-VANE-1

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal

PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana

DATE STARTED 3/15/06 **COMPLETED** 3/15/06 **GROUND ELEVATION** -4.68 ft **HOLE SIZE** _____

DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**

DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---

LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---

NOTES LAC (East)- at max. tilt of wall, by the swimming pool **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲				
								20	40	60	80	
								PL	MC	LL		
								60	120	180	240	
								□ FINES CONTENT (%) □				
								20	40	60	80	
0												
		Organic silty clay, some roots. Bottom of hole at 2.5 feet.	1			199.7	11.7					



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BORING NUMBER LAC-VANE-2

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal
PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana
DATE STARTED 3/15/06 **COMPLETED** 3/15/06 **GROUND ELEVATION** -4.0 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES LAC (East)- between swimming pool and toe of levee **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲	
								PL	MC LL
0								20 40 60 80	
5		Organic clay. Organic matter mixing with gray clay. Gray clay with organic matter. Bottom of hole at 5.2 feet.	2			105.7	35.2	60 120 180 240	
			3			140.9	52.9		
			4			47.0	2.3		

GEOTECH BH PLOTS ILIT - FIELD VANES, LONDON AVE CANAL GPJ GINT US LAB.GDT 5/4/06



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BORING NUMBER LAC-VANE-3

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal
PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana
DATE STARTED 3/15/06 **COMPLETED** 3/15/06 **GROUND ELEVATION** -3.0 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES LAC (East)- south end of rockfill, at levee toe. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲				
								20	40	60	80	
								PL	MC	LL		
								60	120	180	240	
								□ FINES CONTENT (%) □				
								20	40	60	80	
0												
5		Stiff marsh.	5			540.3	35.2					
		Organic matter mixing with gray clay.	6			199.7	35.2					
		High PI gray clay, traces of organic matter.	7			94	5.9					
		High PI gray clay, traces of organic matter. Bottom of hole at 7.1 feet.	8			94	5.9					



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BORING NUMBER LAC-VANE-4

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal
PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana
DATE STARTED 4/10/06 **COMPLETED** 4/10/06 **GROUND ELEVATION** 4.3 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES LAC North (East)- south end of rockfill, levee crest. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲			
								20	40	60	80
0								PL	MC	LL	
								60	120	180	240
								☐ FINES CONTENT (%) ☐			
								20	40	60	80
5											
10											
15		Marsh with dark gray CH.	9			117.5	58.7				
		Marsh with dark gray CH, wood. Bottom of hole at 15.2 feet.	10			105.71	11.75				

GEOTECH BH PLOTS ILIT - FIELD VANES, LONDON AVE CANAL GPJ GINT US LAB.GDT 5/4/06



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BORING NUMBER LAC-VANE-5

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal

PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana

DATE STARTED 4/10/06 **COMPLETED** 4/10/06 **GROUND ELEVATION** 4.3 ft **HOLE SIZE** _____

DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**

DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---

LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---

NOTES LAC North (East)- south end of rockfill, levee crest. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲			
								20	40	60	80
0								PL	MC	LL	
								60	120	180	240
								☐ FINES CONTENT (%) ☐			
								20	40	60	80
5											
10		Marsh with dark gray CH.				129.2	65.8				
		Marsh with dark gray CH, wood. Bottom of hole at 11.4 feet.				199.7	23.5				

GEOTECH BH PLOTS ILIT - FIELD VANES, LONDON AVE CANAL GPJ GINT US LAB.GDT 5/4/06



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BORING NUMBER LAC-VANE-6

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal
PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana
DATE STARTED 4/10/06 **COMPLETED** 4/10/06 **GROUND ELEVATION** -6.5 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES LAC North (East)- south end of rockfill, 50ft from levee toe. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲					
								20	40	60	80		
0													
5		Marsh, roots.	13			117.5	23.5						
		Marsh, roots.	14			70.5	23.5						
		Organic clay, sandy at the tip. Bottom of hole at 5.8 feet.	15			25.8	11.7						

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BORING NUMBER LAC-VANE-7

CLIENT ILIT (Independent Levee Investigation Team) **PROJECT NAME** London Avenue Canal
PROJECT NUMBER _____ **PROJECT LOCATION** London Avenue Canal, New Orleans, Louisiana
DATE STARTED 4/10/06 **COMPLETED** 4/10/06 **GROUND ELEVATION** -6.5 ft **HOLE SIZE** _____
DRILLING CONTRACTOR _____ **GROUND WATER LEVELS:**
DRILLING METHOD Field Vane **AT TIME OF DRILLING** ---
LOGGED BY A. Athanasopoulos **CHECKED BY** D. Cobos-Roa **AT END OF DRILLING** ---
NOTES LAC North (East)- 6060 & 6078 Warrington St., 50' from levee toe. **AFTER DRILLING** ---

Depth (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	Peak Strength (psf)	Residual Strength (psf)	▲ SPT N VALUE ▲	
								PL	MC LL
0								20 40 60 80	60 120 180 240
5		Dar brown-black silty organic clay. Organic clay. Mixing of black and gray organic clay. Dark brown organic clay. Bottom of hole at 5.0 feet.	18			152.7	35.2		
			16			108.1	35.2		
			19			140.9	21.1		
			17			117.5	35.2		