PUMP STATION GEOTECHNICAL REPORT

URS

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September 16, 2008

URS Corporation
3500 N. Causeway Blvd.
Suite 900
Metairie, LA 70002

Attn: Mr. Richard Murley, PE

Re: Geotechnical Investigation and Report (Final)
LDNR Pump Station
Gramercy, Louisiana
URS File No. 10001572

Dear Mr. Murley:

We have completed our final geotechnical investigation and report for the referenced project. This report supersedes our preliminary geotechnical report dated December 11, 2007, which was prepared for general project design and budgeting purposes for the pump station. This final report and recommendations presented are based upon the updated project design information provided by your office on August 21, 2008.

This final report addresses the following geotechnical issues for the pump station:

- Pile capacity (vertical and lateral)
- Settlement of pile
- Slope stability
- Sheet pile wall as intake basin wall
- Site preparation

The field investigation information and laboratory test results presented in our preliminary report were used to develop the geotechnical recommendations outlined herein.

FURNISHED INFORMATION

Based on the provided project drawings (Appendix A), we understand the proposed pump station will be constructed north of Airline Highway as part of the Maurepas Division Canal Project. The station will be located in Gramercy, LA at the convergence of the Hope and Bourgeois Canals. The 200-feet wide conveyance channel, which will convey approximately 2,000 cfs of river water into the Maurepas Swamp, is located immediately to the west of the pump station (Figure 1).

URS Corporation
7389 Florida Boulevard, Suite 300
Baton Rouge, LA 70806
Tel: 225.922.5700
Fax: 225.922.5701

For this project, the proposed structure accommodating the pump facilities will be supported by a total of 79 precast concrete piles 14 inches square as shown in drawing Sheet 8 in the Appendix. Provided structural loading information includes maximum compressive loads for each pile of 92.6 kips. No lateral load or tensile loading information was provided.

FIELD INVESTIGATION

The subsurface investigation for this project consisted of drilling and sampling one (1) geotechnical exploratory soil boring using a track-mounted rotary drill rig to a depth of 100 feet below existing grade. In addition, one (1) Cone Penetration Test (CPT) was performed to a depth of 75 feet. The boring and sounding were performed at the approximate locations shown on the attached Test Location Plan in the Appendix B.

Relatively undisturbed 3-inch diameter tube samples were generally obtained in cohesive, fine-grained soils (ASTM D-1587), and disturbed 2-inch diameter split-spoon samples (ASTM D-1586) were obtained in coarse grained soils. Standard Penetration Tests (SPT) were performed during the split-spoon sampling. This test consists of dropping a 140-pound hammer 30 inches and recording the number of blows required to drive the sampler in three 6-inch increments. The number of blows in the final 12 inches is recorded on the boring log under the "Sampling Resistance" column. The depths at which the driven split-spoon samples were obtained are indicated as cross-hatched square symbol in the "Sample" column on the boring logs. The depth between which tube samples were obtained is shown as shaded symbols under the "Sample" column of the boring logs. For tubes in which samples were not recovered, split-spoon samples were taken immediately beneath the lost samples for visual field classification.

The CPT Log Sheet is included in the Appendix B graphically showing the cone tip resistance, friction, pore pressure, soil behavior type, and equivalent SPT N values. We highly recommend the engineer be thoroughly familiar with and fully understand the capabilities of the CPT test before using this information for design purposes in order to achieve reliable geotechnical parameters.

Ground water. Ground water was encountered at a depth of about 6.5 feet at the time of our investigation. The depth to water should be verified prior to the initiation of foundation construction, trenching or other operations adversely affected by ground water.

LABORATORY TESTING

Soil mechanics laboratory tests were performed on selected samples from the boring for use in foundation analyses. The results of all tests are shown on the boring log in Appendix B. Unconsolidated undrained tests were performed on selected samples to evaluate soil parameters for use in calculating shear strength. Consolidation tests were performed to evaluate soil past stress history. Atterberg limits determinations, water content determination tests and grain size distribution tests were also performed to classify the subsurface soils more accurately than attainable by field methods.

SUBSURFACE CONDITIONS

The subsurface conditions encountered at the site may be generally described as very soft to medium clays extending from ground surface to a depth of about 30 feet. This layer is underlain by medium silty clays and sandy clays extending to a depth of about 48 feet. Alternating layers of very soft to stiff clays and silty clays, then follow extending to the maximum explored depth of 100 feet. A detailed description of the materials encountered at the site is shown on the Soil Boring Log in the Appendix B.

PILE FOUNDATION RECOMMENDATIONS

Based upon the provided foundation drawings, we understand that 14-inch square precast concrete piles will be used to support the structural components of this project. The piles on this project will derive their compressive capacities primarily from skin resistance. The capacities presented are based upon soil-pile interaction and do not consider the structural aspects of the pile. Piles should be advanced to full penetration to develop the shown capacities. The designer should confirm the pile structural capacity for combined axial and lateral loading.

Driven Piles. Ultimate compressive capacities for single piles were computed based on 14 inches square pre-cast concrete piles. A factor of safety of 2.0 has been applied to develop the allowable capacities as presented in Table 1 below.

The piles were divided into three groups based on the provided criteria of cut off elevation shown in drawing Sheet 8 of Appendix A. The first pile group (No. 1 – 15) has a cut off elevation at 11 feet, the second group (No. 16-23) at elevation 10 feet, and the third group (No. 24-79) at elevation -9.83 feet. For determination of capacity, all pile configurations were assumed to have an embedment beginning at elevation -9.83 feet. Pile lengths should be adjusted so as to maintain proper "tip elevation" as pile butt (or pile head) elevations are adjusted.

TABLE 1

14" SQUARE PRECAST CONCRETE PILES
SINGLE ALLOWABLE PILE COMPRESSIVE CAPACITY, KIPS

Pile Tip Elev. (ft)	Pile No.		
	1-15	16-23	24-79
-40	30	30	30
-50	44	44	44
-60	59	59	59
-70	78	78	78
-80	105	105	105

Uplift capacity for concrete piles may be taken as 50 percent of the allowable axial capacity. The recommended compression capacities may be increased by 30 percent for temporary loads such as wind or seismic loads.

Negative Skin Friction. Since it appears that little or no fill is to be added in the area of the foundation piles, the predicted pile capacities assume no allowance for negative skin friction. However, if the piles are installed immediately after placement of fill, the soil will settle downward relative to the pile rather than supporting it, imparting a downward load to the pile through shear transfer at the pile-soil interface. This phenomenon, called negative skin friction, requires a reduction in allowable single pile capacity of a given length. Therefore, in all cases, fill should be placed as far in advance of any pile driving operations. If this time frame is not achievable and piles are installed immediately after placement of fill, then the design/builder's geotechnical consultant should be notified to estimate the reduction in pile capacity.

Probe Piles and Pile Test Program. We recommend a pile load test program be performed to verify the pile capacity, drivability, and finalize production pile lengths. Because results of this testing program will have an impact on the final design, it is recommended that these pile load tests be performed in the design phase, rather than immediately prior to construction. The results of these tests may determine if it is possible to reduce the total number of piles used for the project. Representative pile type, pile diameter, driving hammer, and installation procedures should be selected based on the expected production piles. **For driven piles, we recommend a dynamic load test program (PDA) in addition to static load tests to verify compressive capacity.** The dynamic load test program should be performed in general accordance with ASTM D4945. The static pile load test program should include compression, uplift, and lateral

load tests performed in general accordance with ASTM standards: compression – ASTM D1143, uplift – ASTM D3689, and lateral – ASTM D3966. For the static load tests, all piles should be allowed to "set" a minimum of 14 days prior to being loaded.

Lateral Load vs. Horizontal Deflection. Lateral load analyses were performed for individual piles using the computer program LPILE by Ensoft, Inc. Our analyses were performed to estimate the pile head deflection (or butt deflection) for various lateral loading configurations with maximum moment and its location. The piles were divided into three groups based on the provided cut off elevations as shown in drawing Sheet 8 of Appendix A. The first pile group (No. 1 – 15) has cut off elevation at 11 feet, the second group (No. 16-23) at elevation 10 feet, and the third group (No. 24-79) at elevation -9.83 feet. As shown in the drawing Sheet 8, the first and second pile groups have a considerable free-standing portion of the pile. The results of our analyses for 14 inches square precast concrete pile are provided in Tables 2 thru 7. The analyses were performed assuming free and fixed head conditions, respectively. As expected, lateral deflection of the first and second pile groups is greater than that of the third group pile due to the effect of free-standing, unsupported area of the pile.

Table 2

Pile 1-15 with Free-head
Pile Cut-Off Elev. 11 Feet

14-Inch Square Precast Concrete Pile			
Applied Lateral Load (kips)	**Lateral Butt Deflection (in)**	**Maximum Moment (in-kip)**	**Location of Max. Moment below Pile Butt (in)**
0.1	0.25	47	288
0.2	0.67	108	288
0.3	1.23	181	300
0.4	1.92	263	300
0.5	2.74	357	300
0.6	3.70	462	324
0.7	4.81	579	324

Notes:
(1) Pile lengths and tip depths are measured from elevation 11.0 feet. Pile lengths should be adjusted as to maintain proper tip depth as pile butt (cutoff) elevations are adjusted
(2) Pile length 91 ft.

Table 3

Pile 1-15 with Fixed-head
Pile Cut-Off Elev. 11 Feet

14-Inch Square Precast Concrete Pile			
Applied Lateral Load (kips)	Lateral Butt Deflection (in)	Maximum Moment (in-kip)	Location of Max. Moment below Pile Butt (in)
0.1	0.03	18	288
0.2	0.07	37	300
0.3	0.12	57	300
0.4	0.18	78	312
0.5	0.23	100	312
0.6	0.30	121	324
0.7	0.36	144	324

Notes:
(1) Pile lengths and tip depths are measured from elevation 11.0 feet. Pile lengths should be adjusted as to maintain proper tip depth as pile butt (cutoff) elevations are adjusted
(2) Pile length 91 ft.

Table 4

Pile 16-23 with Free-head
Pile Cut-Off Elev. 10 Feet

14-Inch Square Precast Concrete Pile			
Applied Lateral Load (kips)	Lateral Butt Deflection (in)	Maximum Moment (in-kip)	Location of Max. Moment below Pile Butt (in)
0.1	0.23	45	288
0.2	0.59	101	288
0.3	1.07	167	300
0.4	1.65	240	300
0.5	2.32	322	312
0.6	3.08	411	312
0.7	3.94	507	312

Notes:
(1) Pile lengths and tip depths are measured from elevation 10.0 feet. Pile lengths should be adjusted as to maintain proper tip depth as pile butt (cutoff) elevations are adjusted
(2) Pile length 90 ft.

Table 5

Pile 16-23 with Fixed-head
Pile Cut-Off Elev. 10 Feet

14-Inch Square Precast Concrete Pile			
Applied Lateral Load (kips)	Lateral Butt Deflection (in)	Maximum Moment (in-kip)	Location of Max. Moment below Pile Butt (in)
0.1	0.03	17	288
0.2	0.07	36	288
0.3	0.12	56	300
0.4	0.17	76	300
0.5	0.22	97	312
0.6	0.28	119	312
0.7	0.37	141	312

Notes:
(1) Pile lengths and tip depths are measured from elevation 10.0 feet. Pile lengths should be adjusted as to maintain proper tip depth as pile butt (cutoff) elevations are adjusted
(2) Pile length 90 ft.

Table 6

Pile 24-79 with Free-head
Pile Cut-Off Elev. -9.83 Feet

14-Inch Square Precast Concrete Pile			
Applied Lateral Load (kips)	Lateral Butt Deflection (in)	Maximum Moment (in-kip)	Location of Max. Moment below Pile Butt (in)
1.0	0.08	57	120
2.0	0.25	147	156
3.0	0.51	262	192
4.0	0.82	396	192
5.0	1.18	542	204
6.0	1.59	694	204
7.0	2.04	852	204

Notes:
(1) Pile lengths and tip depths are measured from elevation -9.83 feet. Pile lengths should be adjusted as to maintain proper tip depth as pile butt (cutoff) elevations are adjusted
(2) Pile length 70 ft.

Table 7

Pile 24-79 with Fixed-head
Pile Cut-Off Elev. -9.83 Feet

14-Inch Square Precast Concrete Pile			
Applied Lateral Load (kips)	Lateral Butt Deflection (in)	Maximum Moment (in-kip)	Location of Max. Moment below Pile Butt (in)
1.0	0.02	53	144
2.0	0.06	129	162
3.0	0.11	214	162
4.0	0.18	306	168
5.0	0.25	402	174
6.0	0.33	501	180
7.0	0.42	604	180

Notes:
(1) Pile lengths and tip depths are measured from elevation -9.83 feet. Pile lengths should be adjusted as to maintain proper tip depth as pile butt (cutoff) elevations are adjusted
(2) Pile length 70 ft.

PILE SETTLEMENT

We estimate settlement of all piles due to provided sustained structural loads (maximum axial load, 92.6 kips) to be on the order ¼ inch. These estimates were for short term deformation and does not consider elastic deformation of the piles. We estimated the short term deformation by using Load Transfer curves, sometimes refer to 't-z' curves for settlement in pile shaft interface and Q-z curves for settlement below pile tip. The values presented in Table 8 are the total short term deformation at pile butt from the Load Transfer curves. Load transfer curves for skin friction and plots between axial load and butt deflection are also provided in Appendix C. These curves and plots are for all three pile groups based on the provided criteria of cut off elevation mentioned in previous sections.

Table 8

14-Inch Square Precast Concrete Pile [1,2]	
Applied Axial Load (kips)	**Axial Butt Deflection (in)**
0.3	0.0004
3.0	0.004
15	0.02
30.0	0.04
107.0	0.26
167.0	0.69
171.0	1.20

SLOPE STABILITY

The slope stability analyses were performed using SLOPE/W software program by Geo-Slope International, Ltd. Four (4) slopes in section A of Sheet 6 of Appendix A were evaluated in our analyses. These analyses were based on a steady state seepage condition. The steady state seepage condition is for the condition when the water level reaches its non-flooding elevations and only slight water level change is expected. The analyzed slope geometry varies depending on each slope and ranges from 5:1 to 3:1. Based on provided information, the water level and elevation of canal's bottom are at elevation 3 feet and -3 feet, respectively. The calculated minimum safety factor from the analyses ranges from 4.2 to 2.4, meeting typical safety requirements for slope stability. Again, this analyses result was based on steady state seepage condition representing a non-hurricane condition. The results of our analyses are presented graphically in Appendix D.

SHEET PILE ANALYSIS FOR INTAKE BASIN WALL

As requested, steel sheet piles were analyzed for incorporation as the intake basin walls for the suction approach channel. Our analysis was based upon a top of wall elevation of 4.0 feet, and a maximum channel bottom elevation of -8.0 feet, and rapid drawdown conditions. The intake basin wall configuration is shown in section B of drawing Sheet 6 in the Appendix. For the analysis, the SPW 11 (Pile Buck) software program was used. An AZ36 steel sheet pile was considered having a section modulus of 67.0 in^3/ft, and a moment of inertia of 606.3 in^4/ft.

A cantilever type wall was analyzed which resulted in significant top of wall deflections. Cantilever sheet piling is usually driven to a sufficient depth into the ground to become fixed as a

vertical cantilever for resisting the lateral active earth pressure. Due to the excessive top of wall deflections, we consider a cantilever sheet pile system impractical for this project. Analyses were also performed for a tie back (anchored) sheet pile wall system. In the design of a tie back wall, the tie back is assumed to prevent any lateral deflection at the anchor elevation. For the analysis, the anchor was assumed to be located at a distance of 1.0 feet from the top of the sheet pile wall. Our analyses results are summarized in Table 9 below. The complete analysis results are presented in Appendix E.

Table 9

Anchored Sheet Pile Wall

Arbed AZ36 I= 606.30 in^4/ft Z = 67.00 in^3/ft				
Top of Wall Elev. (feet)	**Bottom of Wall Elev. (feet)**	**Tie Back Elev. (feet)**	**Anchor Force**	**Maximum Bending Moment**
4.0	-30.0	3.0	7.4 kips/ft	68.4 kip ft/ft

As an alternative to the tie backs, struts may also be considered spanning between the sheet piles on the opposite sides of the excavation. The struts should be designed considering the same loading conditions as the tie backs. However, the loadings for struts will be in compression rather than tension for tie backs.

Global Slope Stability. To check the global stability of the soil adjacent to a sheet pile wall, a conventional slope stability analyses was performed for Section B in drawing Sheet 6 of Appendix A. The slope stability analyses were performed also using SLOPE/W marked by Geo-Slope International, Ltd. The program is capable of searching for a minimum safety factor with an easy to use interface. The calculated minimum safety factor for this condition is 1.9, meeting typical safety requirements for the slope stability. The range of safety factors typically vary from 1.3 to 1.5 depending on design purpose. The results of the analyses are presented in Appendix E.

Bottom Heave. To check the stability of the excavated bottom from heave, Terzaghi method (1943) was used in our analyses. The estimated embedded depth of sheet pile from Table 9 is 22 feet, being acceptable for heaving stability with excavation depth of 12 feet from the ground surface.

Location of Tie Back Anchors Behind Wall. To obtain maximum efficiency, the tie back anchor locations should be outside of the active and passive soil zone. Based on the location of zero bending moment on the wall and the Rankin definition for the active and passive soil zone, the tie back anchors should be located a horizontal distance at least 34.4 feet behind the wall.

SITE PREPARATION

The sites should be stripped of any subsurface obstructions and topsoil materials, particularly loose or water-softened surface materials, general fill, vegetation, wood, roots, etc. All shallow excavations should be properly backfilled as recommended below.

URS recommends that the upper 8 inches of the subgrade be recompacted at a moisture content within 3 percent of optimum moisture content to a minimum of 95 percent of the maximum dry density obtained in the Standard Proctor Compaction Test (ASTM D698). Moisture contents to achieve recommended compaction will vary depending on material type and should be recommended by a qualified geotechnical engineer. Silty soils tend to lose strength with increasing compaction moisture content. Silty soils, if wet, when being compacted are subject to "pumping." This pumping can often be counter-acted with the addition of three to five percent cement or fly ash by volume.

Since the bearing soils are sensitive to moisture changes, the time an excavation remains open, prior to pouring the concrete foundation should be kept to a minimum. Any open excavation should be protected to prevent entry of rainwater. Also it may be necessary to install a lean concrete "mud" bottom for use as a working platform to facilitate construction during periods of inclement weather.

Structural Fill. Structural fill shall consist of a clean, select, non-expansive fill, free from excess silt, clay balls, or other deleterious matter, and having a plasticity index between 10 and 25 and a maximum liquid limit of 45. Generally, soils meeting these plasticity requirements and classified as lean clays (CL), sandy clays (CL), or clayey sands (SC) by the Unified Soil Classification System exhibit the characteristics of a desirable structural fill.

Other materials not meeting these criteria may be locally available, that satisfy the intent of the earthwork requirements. In all cases, because of possible material variations from the borrow pit and changing site conditions, we recommend that all proposed fill materials be approved by a geotechnical engineer prior to use. The fill should be placed at appropriate moisture contents and lift thickness as determined by a qualified geotechnical engineer. Each lift should be compacted to a minimum of 95 percent of the maximum dry density obtained by a Standard

Proctor Compaction Test (ASTM D698). The compaction and soil materials for each lift should be inspected and approved by an engineering technician supervised by a geotechnical engineer before another lift is added. Backfill of utility and plumbing trenches should also comply with these recommendations.

Drainage. Drainage should be maintained away from foundations both during and after construction. Foundation excavations should be left open for the shortest possible duration to minimize moisture changes in exposed bearing soils. All exposed foundation excavations should be kept free of loose or water-softened soils. Such materials should be removed prior to concrete placement.

Seepage. Seepage of water into the excavations can be handled by a system of sumps and pumps but the groundwater level should be re-confirmed prior to excavation. The slope of open cuts should meet the minimum OSHA guidelines in a dry environment. However, such slopes without sheet pile are subject to degradation and sloughing from rainfall and fluctuations in the groundwater level. Care should be exercised during shored excavations to reduce the potential for excess hydrostatic pressure to build up behind the sheet pile in the event of a heavy rainfall. Any cracks that form between the soils and sheetpile and in the soil itself should be backfilled to reduce infiltration of water behind the sheet pile.

Areal Settlement. Estimated settlements were calculated for varying fill heights to achieve an increase in site elevation. Estimated fill induced settlements are summarized in Table 9. In our settlement analysis, soil boring information and laboratory tests results from the LDNR Diversion Canal project was considered.

Table 9

Fill Height (ft)	Estimated Settlements (inches)
2	7.5
4	11.0
6	15.5

LIMITATIONS

Professional judgments and recommendations are presented in this geotechnical investigation. They are based partly on the information provided, partly on evaluations of technical information gathered, and partly on our general experience with subsurface conditions in the area. We do not

guarantee the performance of the project in any respect other than our engineering work and the judgments rendered meet the standards and care of our profession as practiced in the State of Louisiana in light of the level of investigative effort and design information available. It should be noted that the widely spaced borings may not represent potentially unfavorable subsurface conditions between borings. If such conditions become evident, additional borings should be performed to characterize these conditions for design review. The recommendations presented in this report are applicable only to this specific site and should not be used for other purposes. Attached at the end of this report is a document entitled "Important Information about your Geotechnical Engineering Report," which is published by ASFE, The Association of Engineering Firms Practicing in the Geosciences, Appendix F. This document should be considered as part of the report and should be furnished to all persons who receive part or all of this report.

We appreciate the opportunity to be of service to you on this project and will be happy to discuss any questions you may have concerning this report. We look forward to serving you again on future projects.

Very truly yours,

Beyong S. Lim, Ph.D., P.E.
Senior Geotechnical Engineer

Scott H. Slaughter, P.E.
Geotechnical Department Manager

BSL/SHS:hcl

Attachments:

Figure 1 – Site Location Map
Appendix A – Pump Station Layouts
Appendix B – Borings Log and CPT Sounding
Appendix C – Load Transfer Curves and Axial Load – Deflection Plots
Appendix D – Slope Stabilities
Appendix E – Sheet Pile Wall
Appendix F – Important Information About Your Geotechnical Engineering Report

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FIGURE

SOURCE: MICROSOFT VIRTUAL EARTH, 2007

	DESCRIPTION OF REVISION	BY	DATE
△			

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

REFERENCE DRAWINGS:

DESIGNED: CSG
DRAWN: HL
CHECKED:
DATE: 12/12/07

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
DESIGN OF DRAINAGE PUMP STATION AT HOPE CANAL

TEST LOCATION PLAN

REVISION △
PROJECT 10001431.30003
FIGURE 1

10001431--30003--001.DWG - B-6 - Wednesday, December 12, 2007 2:54:56 PM

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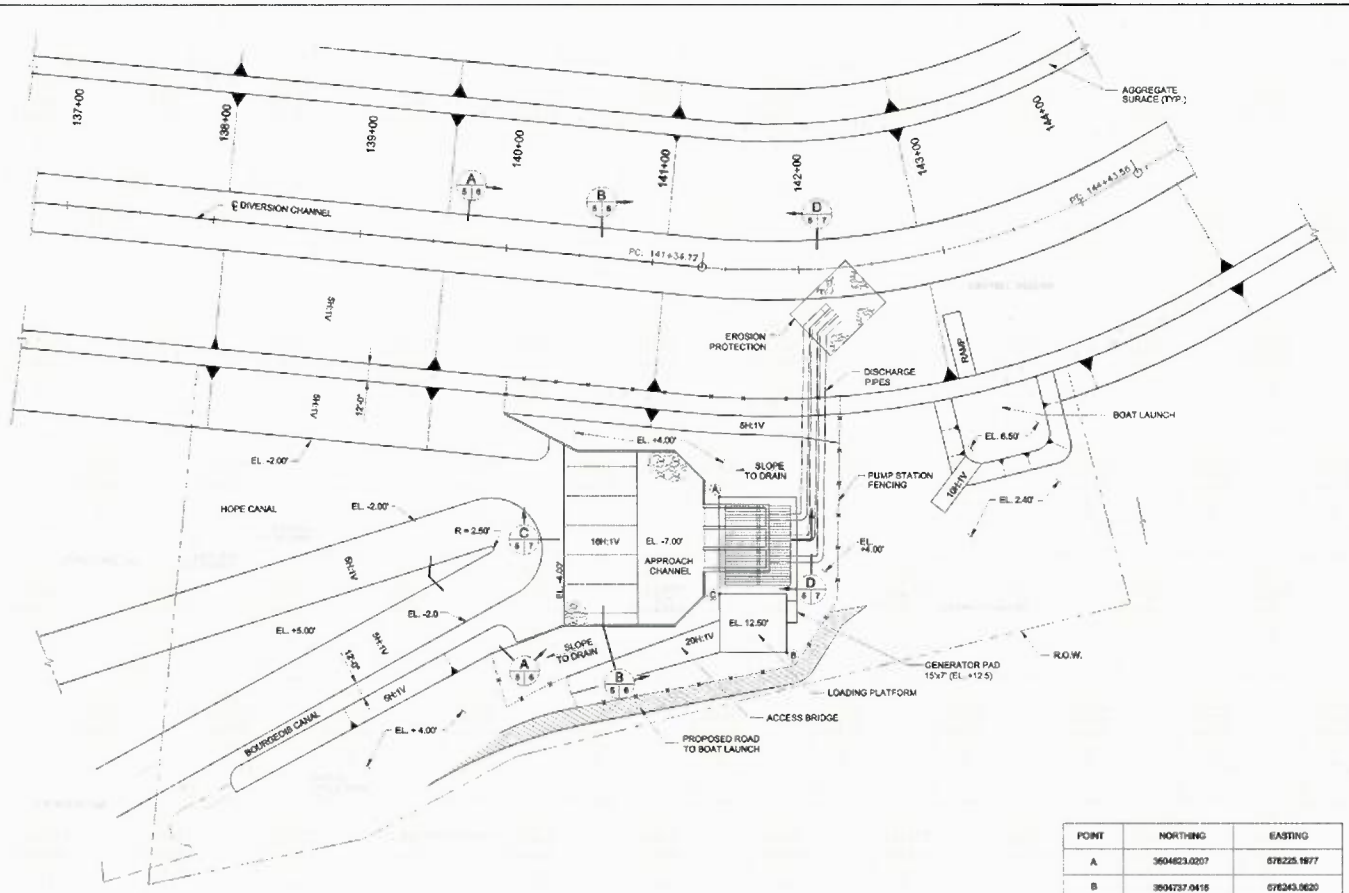
APPENDIX A

PUMP STATION LAYOUTS



POINT	NORTHING	EASTING
A	3604823.0207	676225.1977
B	3604737.0415	676243.0620
C	3604987.2222	676209.1905

LEGEND

- LEVEE CROWN
- RIP RAP
- PROPOSED ROADWAY

PROPOSED SITE PLAN

GRAPHIC SCALE
40 0 20 40 80 160
SCALE: 1"=40'

REV.	DATE	DESCRIPTION	BY

URS
3500 N. Causeway Blvd., Suite 900
Metairie, Louisiana 70002
(504) 837-6325

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
COASTAL ENGINEERING DIVISION
617 NORTH 3RD STREET
BATON ROUGE, LOUISIANA 70802

MAUREPAS DRAINAGE
PUMP STATION
ST. JOHN THE BAPTIST PARISH, LOUISIANA

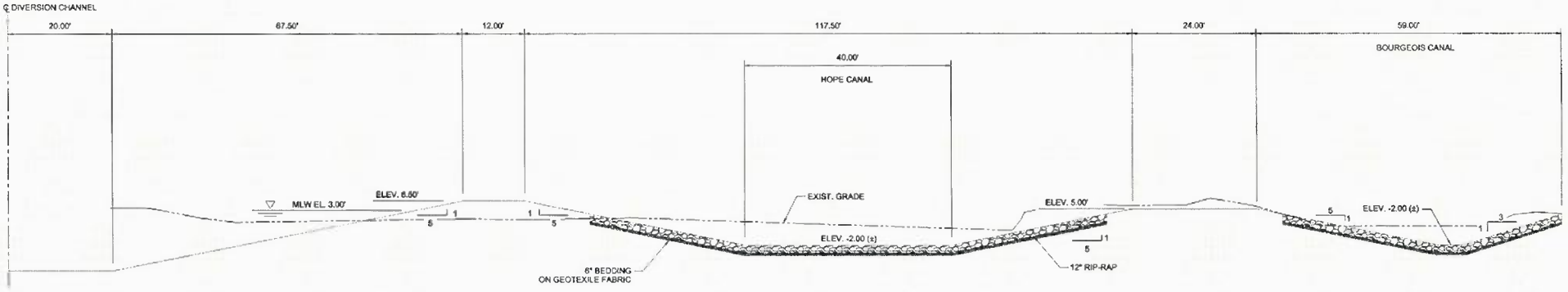
STATE PROJECT NUMBER: PO-29 2411-06-10
FEDERAL PROJECT NUMBER:

PROPOSED SITE PLAN

DATE: 07-22-08

DRAWN BY: EEW | DESIGNED BY: NC | APPROVED BY: RAM | SHEET 5

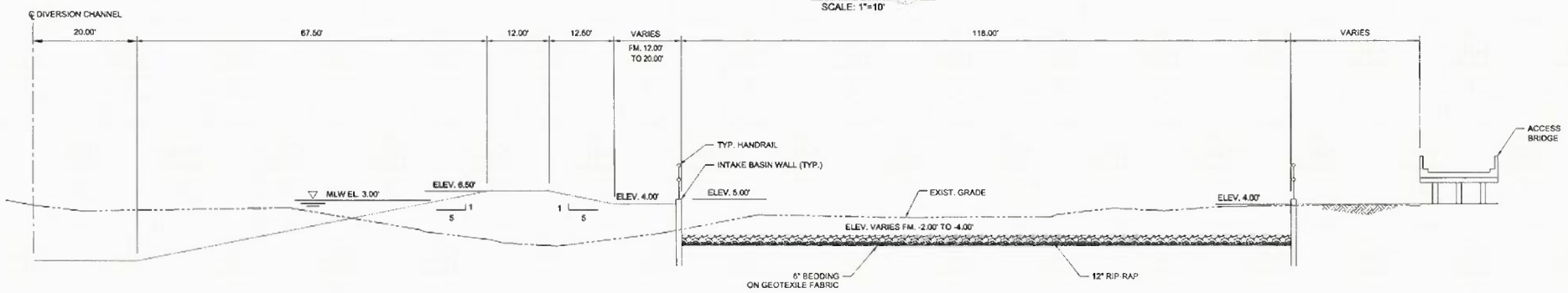
Xref C:\eric\Maurepas\plotlimits.dwg



TYPICAL CROSS SECTION - APPROACH CANALS (LOOKING NORTH)

SECTION A 6 5

SCALE: 1"=10'



TYPICAL CROSS SECTION THRU SUCTION APPROACH

SECTION B 6 5

SCALE: 1"=10'

REV.	DATE	DESCRIPTION	BY

URS

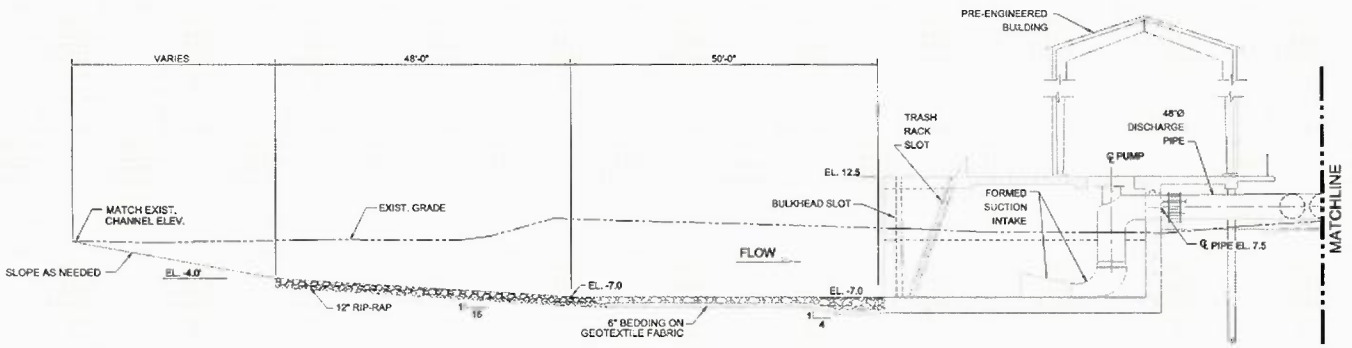
3600 N. Causeway Blvd., Suite 900
Metairie, Louisiana 70002
(504) 837-6326

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
COASTAL ENGINEERING DIVISION
617 NORTH 3RD STREET
BATON ROUGE, LOUISIANA 70802

MAUREPAS DRAINAGE
PUMP STATION
ST. JOHN THE BAPTIST PARISH, LOUISIANA

TYPICAL
CROSS SECTIONS
(SHT. 1 OF 2)

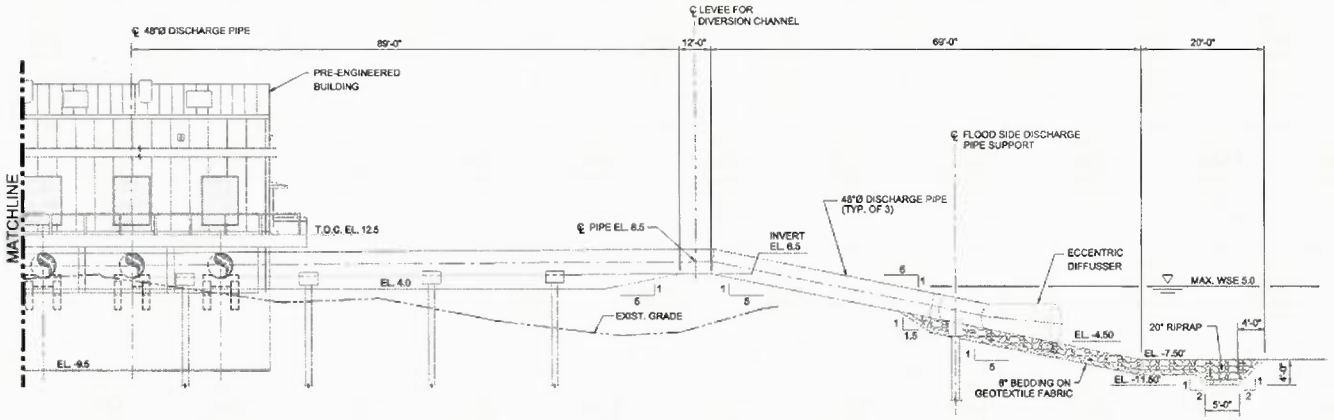
		STATE PROJECT NUMBER: PO-29 2411-06-10	
		FEDERAL PROJECT NUMBER:	DATE: 07-22-08
DRAWN BY: EEW	DESIGNED BY: NC	APPROVED BY: RAM	SHEET 6



TYPICAL CROSS SECTION OF PUMP STATION - LOOKING WEST

SECTION C (7 | 5)

SCALE: 1"=10'



TYPICAL CROSS SECTION OF 48"Ø DISCHARGE PIPE - LOOKING SOUTH

SECTION D (7 | 5)

SCALE: 1"=10'

REV.	DATE	DESCRIPTION	BY

URS

3500 N. Causeway Blvd., Suite 900
Metairie, Louisiana 70002
(504) 837-4326

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
COASTAL ENGINEERING DIVISION
617 NORTH 3RD STREET
BATON ROUGE, LOUISIANA 70802

MAUREPAS DRAINAGE
PUMP STATION
ST. JOHN THE BAPTIST PARISH, LOUISIANA

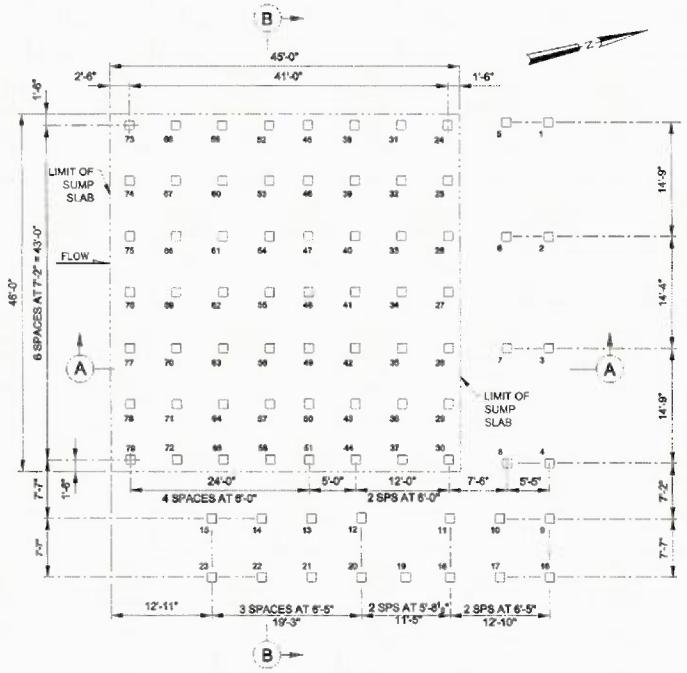
TYPICAL CROSS SECTIONS (SHT. 2 OF 2)

STATE PROJECT NUMBER: PO-29 2411-06-10

FEDERAL PROJECT NUMBER:

DATE: 07-22-08

DRAWN BY: EEW | DESIGNED BY: NC | APPROVED BY: RAM | SHEET 7

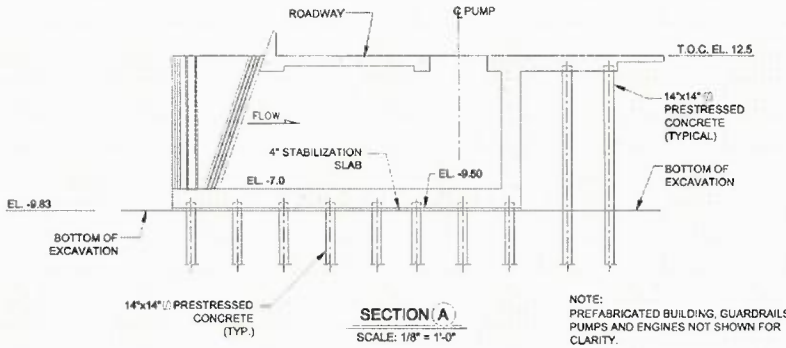


PILE LEGEND - 14"x14" PRESTRESSED CONCRETE PILES

☐ VERTICAL 79 TOTAL

PILING LAYOUT

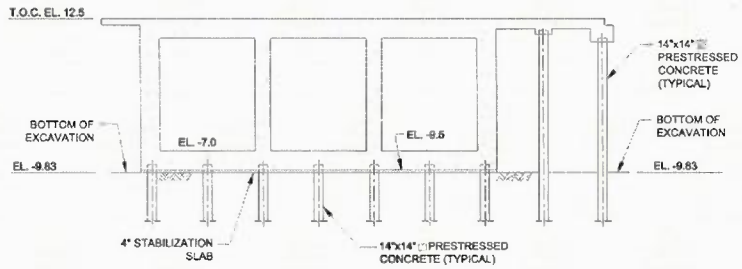
SCALE: 1/8" = 1'-0"



SECTION (A)

SCALE: 1/8" = 1'-0"

NOTE:
PREFABRICATED BUILDING, GUARDRAILS, PUMPS AND ENGINES NOT SHOWN FOR CLARITY.



SECTION (B)

SCALE: 1/8" = 1'-0"

GENERAL NOTE:

1. FOR CONCRETE PILE DETAILS, SEE DRAWING SHEET 9.

PUMPING STATION PILE SCHEDULE

PILE NO.	BATTER	CUT OFF ELEV.	TIP ELEV.	PAYMENT LENGTH (FT)
1-15	VERTICAL	11.0	-70.0	81
16-23	VERTICAL	10.0	-70.0	80
24-79	VERTICAL	-12.75	-70.0	57.25

REV.	DATE	DESCRIPTION	BY

URS
3500 N. Causeway Blvd., Suite 900
Metairie, Louisiana 70002
(504) 837-6326

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
COASTAL ENGINEERING DIVISION
617 NORTH 3RD STREET
BATON ROUGE, LOUISIANA 70802

DRAWN BY: EEW | DESIGNED BY: LBR

MAUREPAS DRAINAGE
PUMP STATION
ST. JOHN THE BAPTIST PARISH, LOUISIANA

STATE PROJECT NUMBER: PO-29 2411-06-10

FEDERAL PROJECT NUMBER:

APPROVED BY: RAM

PUMPING STATION
PILE LAYOUT
PLAN & SECTIONS

DATE: 07-22-08

SHEET 8

C:\eric\Maurepas\plotlimits.dwg

URS

APPENDIX B

BORINGS LOG AND CPT SOUNDING

Project: Lake Maurepas Pump Station Project Location: Lake Maurepas Project Number: 10001431.30003	**Log of Boring B-1** Sheet 1 of 4

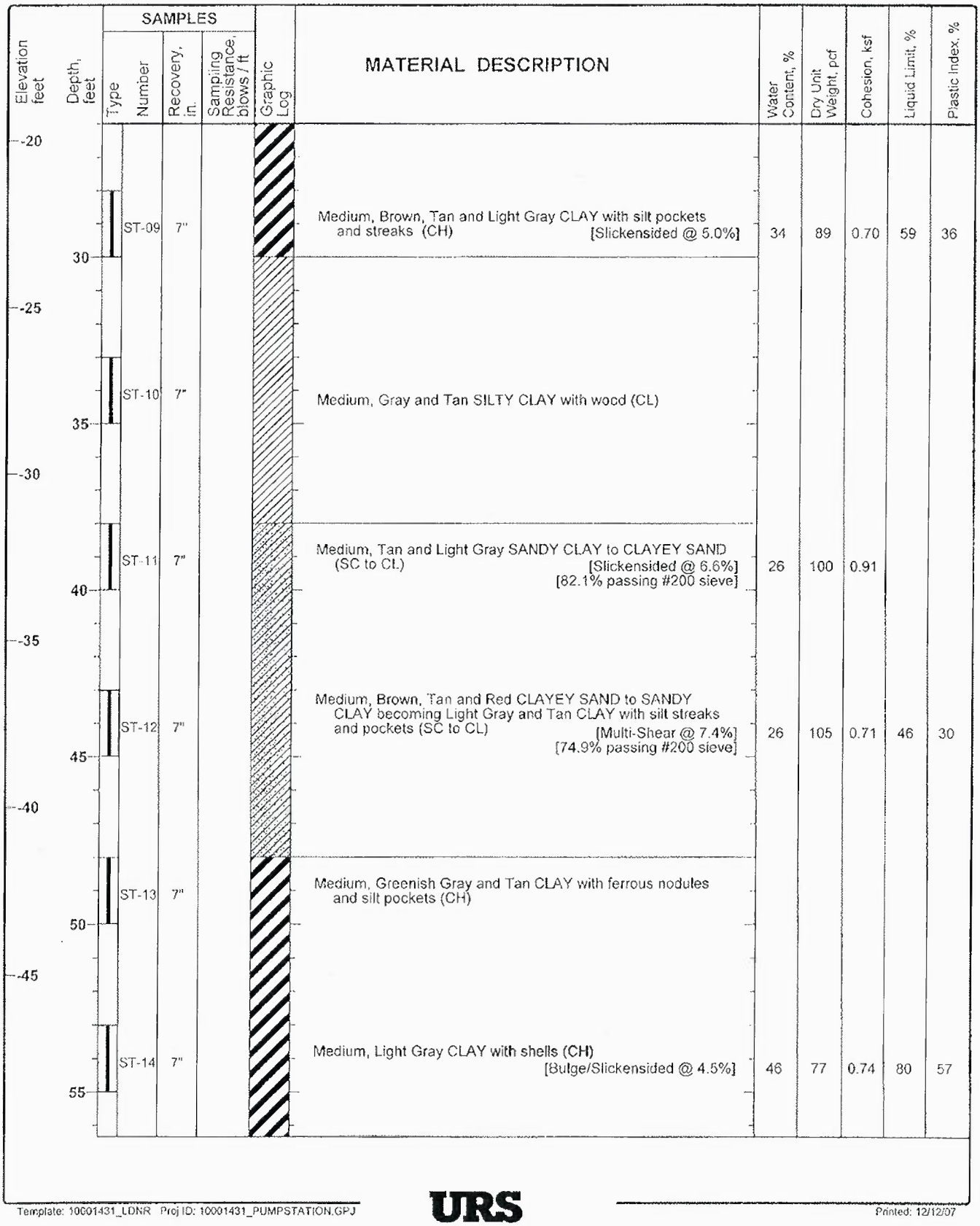
Date(s) Drilled	11/14/07 - 11/15/07	Logged By	H. Lambousy / J. Murray	Checked By	M. Shewalla
Drilling Method	Auger 0' - 6', Rotary Wash 6' - 100'	Drill Bit Size/Type	3 1/2" Wing Bit	Total Depth Drilled (feet)	100.0
Drill Rig Type	Diedrich D-50 Turbo	Drilling Contractor	SESI	Sampler Type(s)	Shelby Tube/Split Spoon
Groundwater Level and Date Measured	7' after 15 minutes	Hammer Data	140 lb Automatic	Approximate Surface Elevation	6.50 '
Location	See Test Location Plan			Borehole Backfill	Grout full depth

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Cohesion, ksf	Liquid Limit, %	Plastic Index, %
	0											
		SS	SS-01	Bag	5		Very Loose, Reddish SILT with gravel and organics (ML)					
-5		ST	ST-02	5"			Medium, Light Gray CLAY with ferrous nodules (CH)	51			105	72
	5	ST	ST-03	6"			Medium, Light Gray, Tan and Brown CLAY with ferrous nodules (CH) [Slickensided @ 5.6%]	52	71	0.74	92	64
0		ST	ST-04	7"			Soft, Light Gray CLAY with silt streaks, pockets and ferrous nodules (CH) [Bulge @ 4.0%]	68	58	0.40	109	78
		ST	ST-05	NR								
	10											
-5												
		SS	SS-06		WOH		Very Soft, Blackish Dark Gray CLAY with trace of organics (CH)	140			172	131
	15											
-10												
		SS	SS-07		WOH/4		Very Soft, Gray greenish CLAY with traces of wood, silt (CH)					
	20											
-15												
		ST	ST-08	7"			Stiff, Light Gray and Tan CLAY with calcareous and ferrous nodules and organics (CH)	27			55	33
	25											

Project: Lake Maurepas Pump Station
Project Location: Lake Maurepas
Project Number: 10001431.30003

Log of Boring B-1

Sheet 2 of 4



Elevation, feet	Depth, feet	Sample Type	Sample Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Cohesion, ksf	Liquid Limit, %	Plastic Index, %
-20	30		ST-09	7"			Medium, Brown, Tan and Light Gray CLAY with silt pockets and streaks (CH) [Slickensided @ 5.0%]	34	89	0.70	59	36
-25	35		ST-10	7"			Medium, Gray and Tan SILTY CLAY with wood (CL)					
-30	40		ST-11	7"			Medium, Tan and Light Gray SANDY CLAY to CLAYEY SAND (SC to CL) [Slickensided @ 6.6%] [82.1% passing #200 sieve]	26	100	0.91		
-35	45		ST-12	7"			Medium, Brown, Tan and Red CLAYEY SAND to SANDY CLAY becoming Light Gray and Tan CLAY with silt streaks and pockets (SC to CL) [Multi-Shear @ 7.4%] [74.9% passing #200 sieve]	26	105	0.71	46	30
-40	50		ST-13	7"			Medium, Greenish Gray and Tan CLAY with ferrous nodules and silt pockets (CH)					
-45	55		ST-14	7"			Medium, Light Gray CLAY with shells (CH) [Bulge/Slickensided @ 4.5%]	46	77	0.74	80	57

Template: 10001431_LDNR Proj ID: 10001431_PUMPSTATION.GPJ

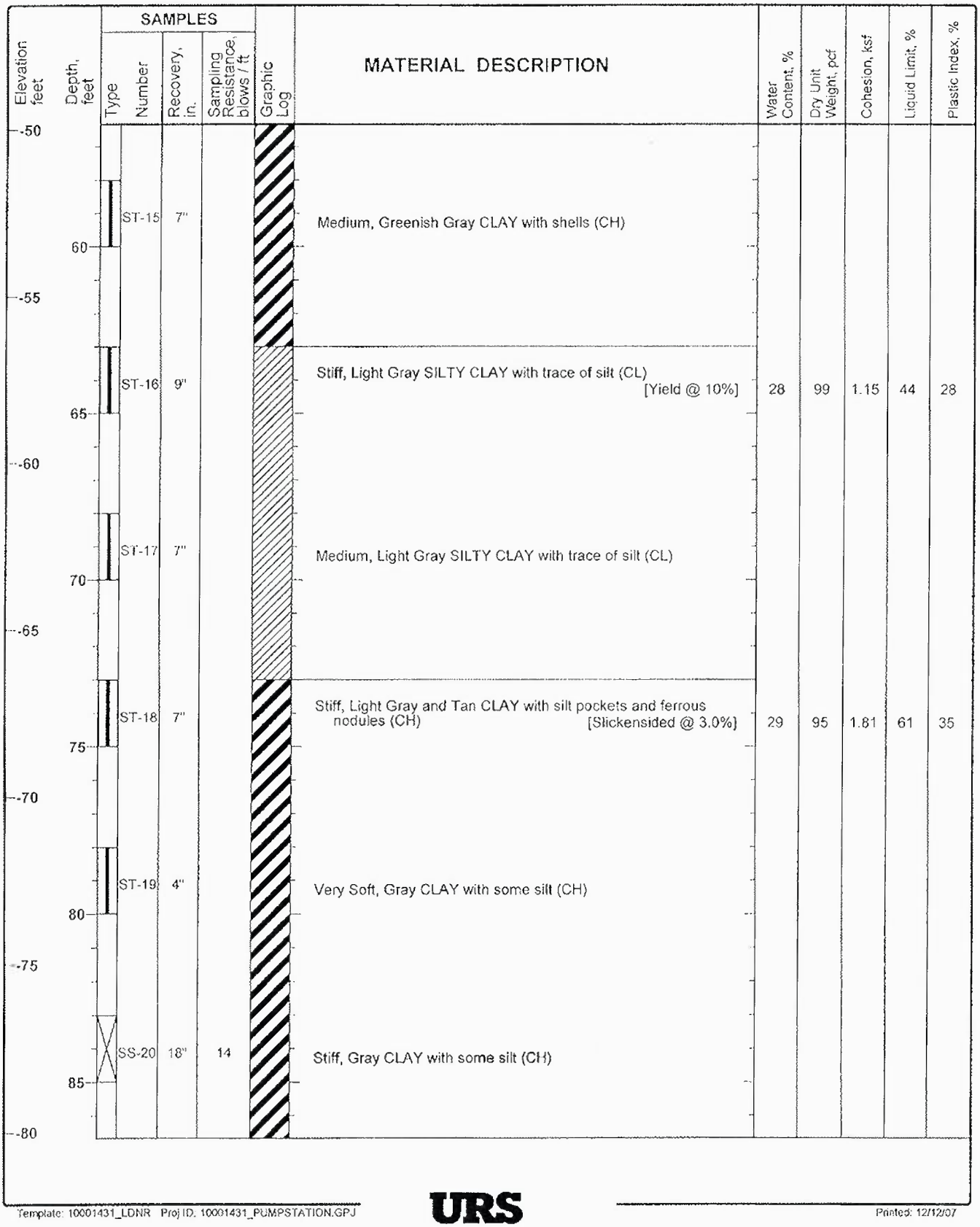
URS

Printed: 12/12/07

Project: Lake Maurepas Pump Station
Project Location: Lake Maurepas
Project Number: 10001431.30003

Log of Boring B-1

Sheet 3 of 4



Template: 10001431_LDNR Proj ID: 10001431_PUMPSTATION.GPJ

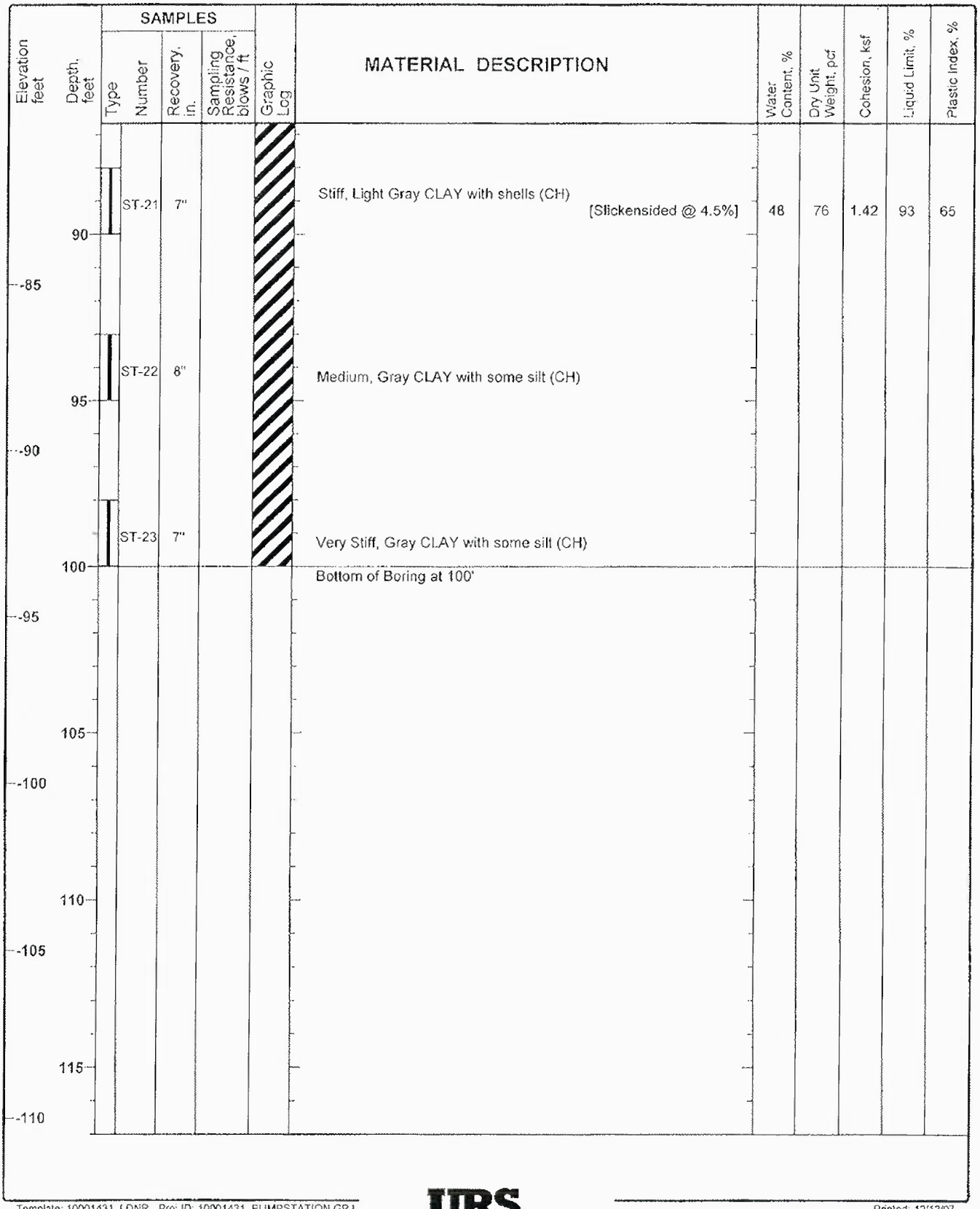
URS

Printed: 12/12/07

Project: Lake Maurepas Pump Station
Project Location: Lake Maurepas
Project Number: 10001431.30003

Log of Boring B-1

Sheet 4 of 4



Template: 10001431_LDNR Proj ID: 10001431_PUMPSTATION.GPJ

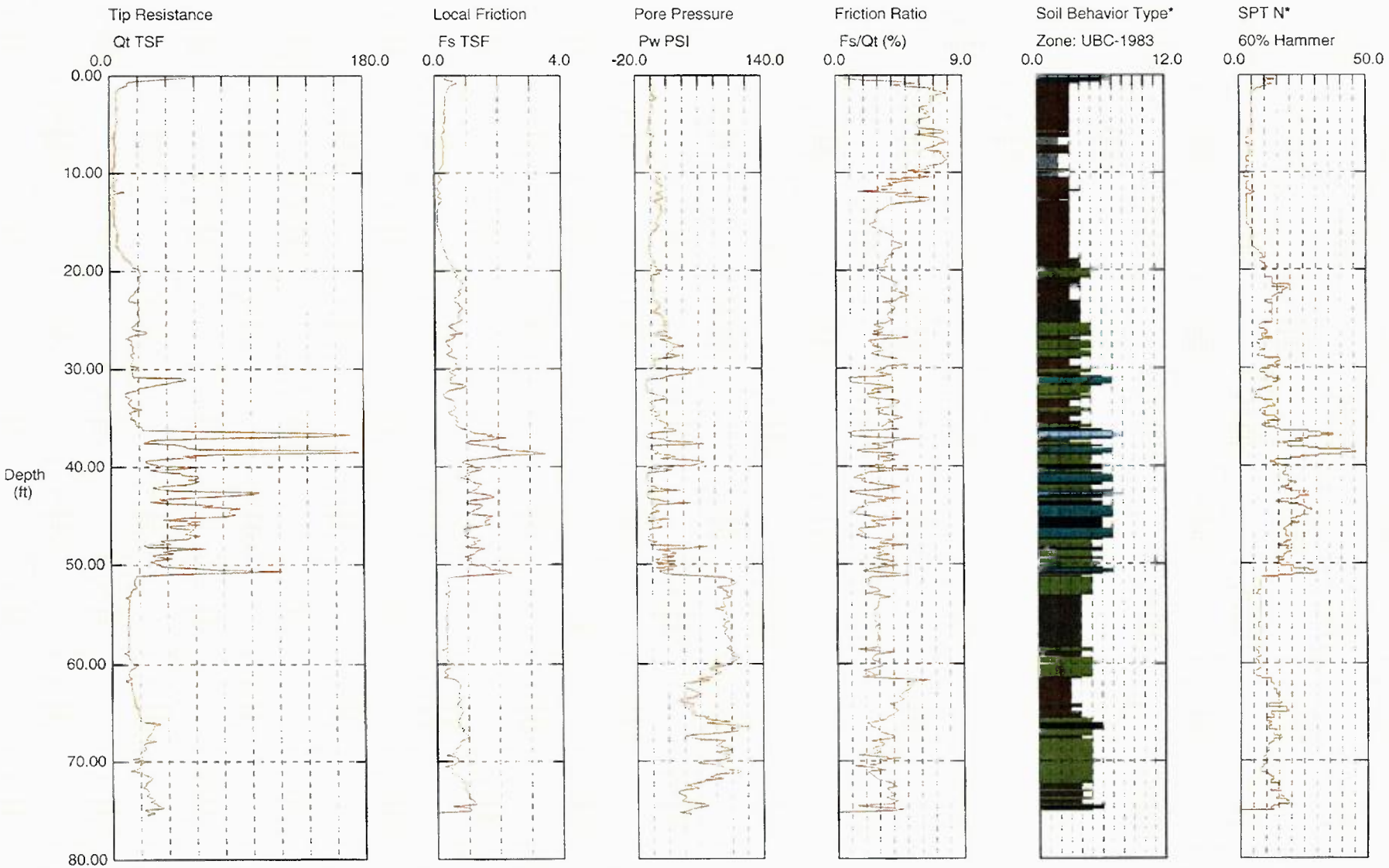
URS

Printed: 12/12/07

Southern Earth Sciences, Inc.

Operator: JAV
Sounding: CPT-1
Cone Used: DDG0899

CPT Date/Time: 11/14/2007 9:39:34 AM
Location: GRAMERCY
Job Number: B07-244 LAKE MAUREPAS PUMP STATION



Maximum Depth = 75.46 feet

Depth Increment = 0.00 feet

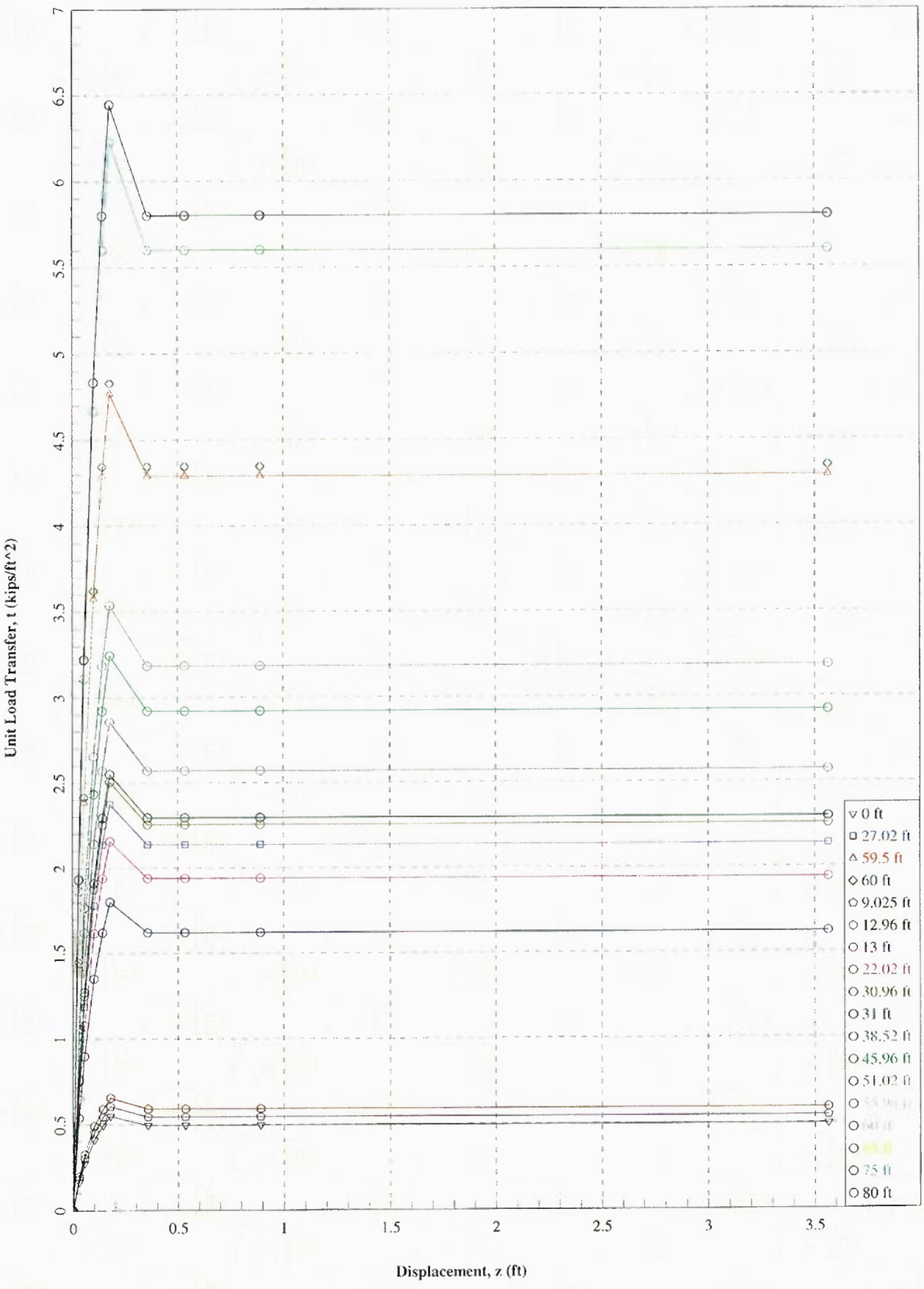
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

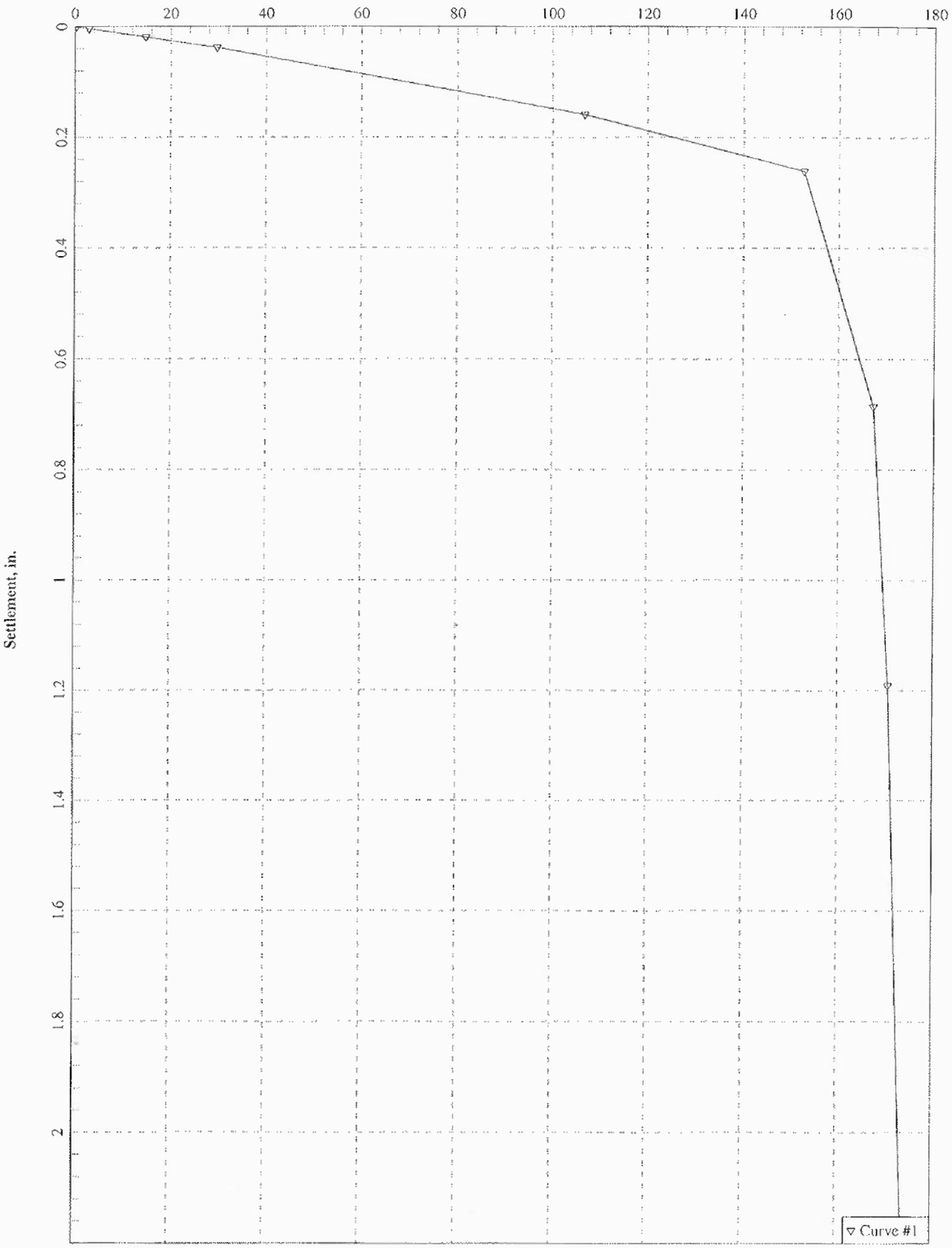
GROUND WATER ENCOUNTERED AT 10 FEET

URS

APPENDIX C

LOAD TRANSFER CURVES AND AXIAL LOAD – DEFLECTION PLOTS


Unit Load Transfer, t (kips/ft^2)
Displacement, z (ft)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
0 ft
27.02 ft
59.5 ft
60 ft
9.025 ft
12.96 ft
13 ft
22.02 ft
30.96 ft
31 ft
38.52 ft
45.96 ft
51.02 ft
75 ft
80 ft


Axial Load (kips)
0
20
40
60
80
100
120
140
160
180
Settlement, in.
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Curve #1

1

AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 4.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2004.

LDNR PUMP STATION

DESIGNER : F.Z

DATE : 12/9/07

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION	=	56.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION	=	1.36 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE	=	0.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE	=	0.00 IN.
PILE LENGTH	=	80.00 FT.
MODULUS OF ELASTICITY	=	0.300E+07 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	30.00	0.00	0.00
13.00	CLAY	0.00	30.00	0.00	0.00
13.00	CLAY	0.00	45.00	0.00	0.00
44.00	CLAY	0.00	45.00	0.00	0.00
44.00	CLAY	0.00	50.00	0.00	0.00
56.00	CLAY	0.00	50.00	0.00	0.00
56.00	CLAY	0.00	63.00	0.00	0.00
67.00	CLAY	0.00	63.00	0.00	0.00
67.00	CLAY	0.00	57.00	0.00	0.00
70.00	CLAY	0.00	57.00	0.00	0.00
70.00	CLAY	0.00	57.00	0.00	0.00
90.00	CLAY	0.00	57.00	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	0.10	0.00	0.00	0.00	0.00
9999.00	99999.00	0.10	0.00	0.00	0.00	0.00
9999.00	99999.00	0.70	0.00	0.00	0.00	0.00
9999.00	99999.00	0.70	0.00	0.00	0.00	0.00

9999.00	99999.00	0.74	0.00	0.00	0.00	0.00
9999.00	99999.00	0.74	0.00	0.00	0.00	0.00
9999.00	99999.00	1.15	0.00	0.00	0.00	0.00
9999.00	99999.00	1.15	0.00	0.00	0.00	0.00
9999.00	99999.00	1.62	0.00	0.00	0.00	0.00
9999.00	99999.00	1.62	0.00	0.00	0.00	0.00
9999.00	99999.00	1.42	0.00	0.00	0.00	0.00
9999.00	99999.00	1.42	0.00	0.00	0.00	0.00

1

****
* COMPUTATION RESULT *
****

	********** FED. HWY. METHOD **********			********** ARMY CORPS METHOD **********			********** LAMBDA 2 METHOD **********		
PILE PENETR-ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP
0.0	0.0	1.2	1.2	0.0	1.2	1.2	0.0	1.2	1.2
1.0	0.5	1.2	1.7	0.5	1.2	1.7	0.4	1.2	1.6
2.0	0.9	1.2	2.2	0.9	1.2	2.2	0.7	1.2	1.9
3.0	1.4	1.2	2.6	1.4	1.2	2.6	1.0	1.2	2.3
4.0	1.9	1.2	3.1	1.9	1.2	3.1	1.4	1.2	2.6
5.0	2.3	1.2	3.6	2.3	1.2	3.6	1.7	1.2	2.9
6.0	2.8	1.2	4.0	2.8	1.2	4.0	2.1	1.2	3.3
7.0	3.3	1.2	4.5	3.3	1.2	4.5	2.4	1.2	3.7
8.0	3.7	1.2	5.0	3.7	1.2	5.0	2.8	1.2	4.0
9.0	4.2	1.2	5.4	4.2	1.2	5.4	3.2	1.2	4.4
10.0	4.7	1.2	5.9	4.7	1.2	5.9	3.6	1.2	4.8
11.0	5.1	3.6	8.8	5.1	3.6	8.8	4.0	3.6	7.7
12.0	5.6	6.1	11.7	5.6	6.1	11.7	4.5	6.1	10.6
13.0	6.1	8.6	14.6	6.1	8.6	14.6	4.9	8.6	13.5
14.0	7.9	8.6	16.5	7.8	8.6	16.3	6.1	8.6	14.7
15.0	11.2	8.6	19.8	10.7	8.6	19.3	7.3	8.6	15.9
16.0	14.5	8.6	23.0	13.6	8.6	22.2	8.4	8.6	17.0
17.0	17.7	8.6	26.3	16.6	8.6	25.2	9.4	8.6	18.0
18.0	21.0	8.6	29.6	19.5	8.6	28.1	10.5	8.6	19.0
19.0	24.3	8.6	32.8	22.5	8.6	31.0	11.4	8.6	20.0
20.0	27.5	8.6	36.1	25.4	8.6	34.0	12.4	8.6	21.0
21.0	30.8	8.6	39.4	28.3	8.6	36.9	13.7	8.6	22.2
22.0	34.1	8.6	42.6	31.3	8.6	39.9	15.1	8.6	23.6
23.0	37.3	8.6	45.9	34.2	8.6	42.8	16.5	8.6	25.1
24.0	40.6	8.6	49.2	37.2	8.6	45.7	18.0	8.6	26.6
25.0	43.9	8.6	52.4	40.1	8.6	48.7	19.5	8.6	28.1
26.0	47.1	8.6	55.7	43.0	8.6	51.6	21.0	8.6	29.6
27.0	50.4	8.6	59.0	46.0	8.6	54.6	22.6	8.6	31.2
28.0	53.7	8.6	62.2	48.9	8.6	57.5	24.2	8.6	32.8
29.0	56.9	8.6	65.5	51.9	8.6	60.4	25.8	8.6	34.4
30.0	60.2	8.6	68.8	54.8	8.6	63.4	27.5	8.6	36.1
31.0	63.5	8.6	72.0	57.7	8.6	66.3	29.2	8.6	37.7
32.0	66.7	8.6	75.3	60.7	8.6	69.3	30.9	8.6	39.5
33.0	70.0	8.6	78.6	63.6	8.6	72.2	32.6	8.6	41.2
34.0	73.3	8.6	81.8	66.6	8.6	75.1	34.4	8.6	43.0
35.0	76.5	8.6	85.1	69.5	8.6	78.1	36.2	8.6	44.8
36.0	79.8	8.6	88.4	72.4	8.6	81.0	38.0	8.6	46.6

37.0	83.1	8.6	91.6	75.4	8.6	84.0	39.9	8.6	48.5
38.0	86.3	8.6	94.9	78.3	8.6	86.9	41.8	8.6	50.4
39.0	89.6	8.6	98.2	81.3	8.6	89.8	43.7	8.6	52.3
40.0	92.9	8.6	101.4	84.2	8.6	92.8	45.6	8.6	54.2
41.0	96.1	8.6	104.7	87.1	8.6	95.7	47.6	8.6	56.2
42.0	99.4	8.7	108.1	90.1	8.7	98.8	49.6	8.7	58.4
43.0	102.7	8.9	111.6	93.0	8.9	101.9	51.7	8.9	60.6
44.0	105.9	9.1	115.0	96.0	9.1	105.0	53.7	9.1	62.8
45.0	109.3	9.1	118.4	99.0	9.1	108.0	55.9	9.1	64.9
46.0	112.7	9.1	121.8	102.0	9.1	111.1	58.1	9.1	67.1
47.0	116.2	9.1	125.3	105.0	9.1	114.1	60.3	9.1	69.3
48.0	119.7	9.1	128.7	108.1	9.1	117.1	62.5	9.1	71.6
49.0	123.1	9.1	132.2	111.1	9.1	120.2	64.8	9.1	73.9
50.0	126.6	9.1	135.6	114.2	9.1	123.2	67.1	9.1	76.2
51.0	130.0	9.1	139.1	117.2	9.1	126.3	69.5	9.1	78.5
52.0	133.5	9.1	142.5	120.2	9.1	129.3	71.8	9.1	80.9
53.0	136.9	9.1	146.0	123.3	9.1	132.3	74.3	9.1	83.3
54.0	140.4	10.7	151.1	126.3	10.7	137.0	76.7	10.7	87.4
55.0	143.8	12.4	156.2	129.3	12.4	141.7	79.2	12.4	91.6
56.0	147.3	14.1	161.4	132.4	14.1	146.5	81.7	14.1	95.8
57.0	151.7	14.1	165.8	135.7	14.1	149.8	84.8	14.1	98.9
58.0	157.1	14.1	171.1	139.3	14.1	153.4	87.9	14.1	102.0
59.0	162.4	14.1	176.5	143.0	14.1	157.1	91.1	14.1	105.1
60.0	167.8	14.1	181.9	146.6	14.1	160.7	94.3	14.1	108.3
61.0	173.2	14.1	187.2	150.2	14.1	164.3	97.5	14.1	111.6
62.0	178.5	14.1	192.6	153.8	14.1	167.9	100.8	14.1	114.9
63.0	183.9	14.1	198.0	157.5	14.1	171.5	104.1	14.1	118.2
64.0	189.3	14.1	203.3	161.1	14.1	175.2	107.5	14.1	121.6
65.0	194.6	16.0	210.6	164.7	16.0	180.7	110.9	16.0	126.9
66.0	200.0	17.9	217.9	168.3	17.9	186.2	114.4	17.9	132.3
67.0	205.4	19.8	225.2	171.9	19.8	191.8	117.8	19.8	137.7
68.0	211.7	19.0	230.8	175.6	19.0	194.7	122.0	19.0	141.0
69.0	219.1	18.2	237.3	179.4	18.2	197.6	126.2	18.2	144.4
70.0	226.5	17.4	243.9	183.2	17.4	200.6	130.4	17.4	147.8
71.0	233.5	17.4	250.9	186.9	17.4	204.3	134.4	17.4	151.8
72.0	240.1	17.4	257.5	190.5	17.4	207.9	138.4	17.4	155.8
73.0	246.7	17.4	264.1	194.0	17.4	211.4	142.5	17.4	159.9
74.0	253.4	17.4	270.8	197.6	17.4	215.0	146.6	17.4	164.0
75.0	260.0	17.4	277.4	201.2	17.4	218.6	150.8	17.4	168.1
76.0	266.6	17.4	284.0	204.8	17.4	222.2	154.9	17.4	172.3
77.0	273.2	17.4	290.6	208.4	17.4	225.7	159.2	17.4	176.5
78.0	279.9	17.4	297.3	211.9	17.4	229.3	163.4	17.4	180.8
79.0	286.5	17.4	303.9	215.5	17.4	232.9	167.7	17.4	185.1
80.0	293.1	17.4	310.5	219.1	17.4	236.5	172.0	17.4	189.4

****
* API RP-2A (1994) *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	1.2	1.2
1.00	0.2	1.2	1.4
2.00	0.4	1.2	1.6
3.00	0.6	1.2	1.8
4.00	0.8	1.2	2.0
5.00	1.1	1.2	2.3
6.00	1.4	1.2	2.6
7.00	1.7	1.2	2.9
8.00	2.1	1.2	3.3

9.00	2.4	1.2	3.7
10.00	2.8	1.2	4.1
11.00	3.2	3.6	6.9
12.00	3.7	6.1	9.8
13.00	4.1	8.6	12.7
14.00	5.1	8.6	13.7
15.00	6.6	8.6	15.1
16.00	8.1	8.6	16.6
17.00	9.6	8.6	18.2
18.00	11.2	8.6	19.7
19.00	12.8	8.6	21.3
20.00	14.4	8.6	23.0
21.00	16.0	8.6	24.6
22.00	17.8	8.6	26.3
23.00	19.5	8.6	28.1
24.00	21.3	8.6	29.9
25.00	23.2	8.6	31.8
26.00	25.1	8.6	33.7
27.00	27.1	8.6	35.6
28.00	29.0	8.6	37.6
29.00	31.1	8.6	39.7
30.00	33.2	8.6	41.7
31.00	35.3	8.6	43.9
32.00	37.4	8.6	46.0
33.00	39.6	8.6	48.2
34.00	41.9	8.6	50.4
35.00	44.1	8.6	52.7
36.00	46.5	8.6	55.0
37.00	48.8	8.6	57.4
38.00	51.2	8.6	59.8
39.00	53.6	8.6	62.2
40.00	56.1	8.6	64.6
41.00	58.6	8.6	67.1
42.00	61.1	8.7	69.8
43.00	63.6	8.9	72.5
44.00	66.2	9.1	75.3
45.00	68.9	9.1	78.0
46.00	71.6	9.1	80.7
47.00	74.4	9.1	83.5
48.00	77.2	9.1	86.3
49.00	80.1	9.1	89.1
50.00	82.9	9.1	92.0
51.00	85.9	9.1	94.9
52.00	88.8	9.1	97.9
53.00	91.8	9.1	100.9
54.00	94.8	10.7	105.5
55.00	97.9	12.4	110.3
56.00	100.9	14.1	115.0
57.00	104.4	14.1	118.5
58.00	108.4	14.1	122.5
59.00	112.4	14.1	126.5
60.00	116.4	14.1	130.5
61.00	120.5	14.1	134.6
62.00	124.6	14.1	138.7
63.00	128.8	14.1	142.9
64.00	133.1	14.1	147.1
65.00	137.3	16.0	153.3
66.00	141.7	17.9	159.6
67.00	146.0	19.8	165.9
68.00	150.8	19.0	169.9
69.00	156.1	18.2	174.3
70.00	161.5	17.4	178.9
71.00	166.7	17.4	184.1

72.00	171.7	17.4	189.1
73.00	176.9	17.4	194.3
74.00	182.0	17.4	199.4
75.00	187.2	17.4	204.6
76.00	192.5	17.4	209.9
77.00	197.8	17.4	215.2
78.00	203.1	17.4	220.5
79.00	208.5	17.4	225.9
80.00	213.9	17.4	231.3

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

****
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING *
****

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.1654E+00	0.2852E-01
			0.2757E+00	0.5526E-01
			0.4135E+00	0.1016E+00
			0.4962E+00	0.1426E+00
			0.5513E+00	0.1783E+00
			0.4962E+00	0.3565E+00
			0.4962E+00	0.5348E+00
			0.4962E+00	0.8913E+00
			0.4962E+00	0.3565E+01
2	10	0.6525E+01		
			0.0000E+00	0.0000E+00
			0.1656E+00	0.2852E-01
			0.2760E+00	0.5526E-01
			0.4141E+00	0.1016E+00
			0.4969E+00	0.1426E+00
			0.5521E+00	0.1783E+00
			0.4969E+00	0.3565E+00
			0.4969E+00	0.5348E+00
			0.4969E+00	0.8913E+00
			0.4969E+00	0.3565E+01
3	10	0.1296E+02		
			0.0000E+00	0.0000E+00
			0.1970E+00	0.2852E-01
			0.3284E+00	0.5526E-01
			0.4926E+00	0.1016E+00
			0.5911E+00	0.1426E+00
			0.6568E+00	0.1783E+00
			0.5911E+00	0.3565E+00
			0.5911E+00	0.5348E+00
			0.5911E+00	0.8913E+00
			0.5911E+00	0.3565E+01
4	10	0.1300E+02		
			0.0000E+00	0.0000E+00
			0.5406E+00	0.2852E-01
			0.9010E+00	0.5526E-01

			0.1352E+01	0.1016E+00
			0.1622E+01	0.1426E+00
			0.1802E+01	0.1783E+00
			0.1622E+01	0.3565E+00
			0.1622E+01	0.5348E+00
			0.1622E+01	0.8913E+00
			0.1622E+01	0.3565E+01
5	10	0.2852E+02		
			0.0000E+00	0.0000E+00
			0.7255E+00	0.2852E-01
			0.1209E+01	0.5526E-01
			0.1814E+01	0.1016E+00
			0.2177E+01	0.1426E+00
			0.2418E+01	0.1783E+00
			0.2177E+01	0.3565E+00
			0.2177E+01	0.5348E+00
			0.2177E+01	0.8913E+00
			0.2177E+01	0.3565E+01
6	10	0.4396E+02		
			0.0000E+00	0.0000E+00
			0.9224E+00	0.2852E-01
			0.1537E+01	0.5526E-01
			0.2306E+01	0.1016E+00
			0.2767E+01	0.1426E+00
			0.3075E+01	0.1783E+00
			0.2767E+01	0.3565E+00
			0.2767E+01	0.5348E+00
			0.2767E+01	0.8913E+00
			0.2767E+01	0.3565E+01
7	10	0.4400E+02		
			0.0000E+00	0.0000E+00
			0.9596E+00	0.2852E-01
			0.1599E+01	0.5526E-01
			0.2399E+01	0.1016E+00
			0.2879E+01	0.1426E+00
			0.3199E+01	0.1783E+00
			0.2879E+01	0.3565E+00
			0.2879E+01	0.5348E+00
			0.2879E+01	0.8913E+00
			0.2879E+01	0.3565E+01
8	10	0.5002E+02		
			0.0000E+00	0.0000E+00
			0.1047E+01	0.2852E-01
			0.1745E+01	0.5526E-01
			0.2618E+01	0.1016E+00
			0.3141E+01	0.1426E+00
			0.3490E+01	0.1783E+00
			0.3141E+01	0.3565E+00
			0.3141E+01	0.5348E+00
			0.3141E+01	0.8913E+00
			0.3141E+01	0.3565E+01
9	10	0.5596E+02		
			0.0000E+00	0.0000E+00
			0.1120E+01	0.2852E-01
			0.1867E+01	0.5526E-01
			0.2800E+01	0.1016E+00
			0.3360E+01	0.1426E+00
			0.3733E+01	0.1783E+00
			0.3360E+01	0.3565E+00
			0.3360E+01	0.5348E+00
			0.3360E+01	0.8913E+00
			0.3360E+01	0.3565E+01
10	10	0.5600E+02		

			0.0000E+00	0.0000E+00
			0.1376E+01	0.2852E-01
			0.2293E+01	0.5526E-01
			0.3439E+01	0.1016E+00
			0.4127E+01	0.1426E+00
			0.4585E+01	0.1783E+00
			0.4127E+01	0.3565E+00
			0.4127E+01	0.5348E+00
			0.4127E+01	0.8913E+00
			0.4127E+01	0.3565E+01
11	10	0.6152E+02		
			0.0000E+00	0.0000E+00
			0.1468E+01	0.2852E-01
			0.2446E+01	0.5526E-01
			0.3669E+01	0.1016E+00
			0.4403E+01	0.1426E+00
			0.4892E+01	0.1783E+00
			0.4403E+01	0.3565E+00
			0.4403E+01	0.5348E+00
			0.4403E+01	0.8913E+00
			0.4403E+01	0.3565E+01
12	10	0.6696E+02		
			0.0000E+00	0.0000E+00
			0.1559E+01	0.2852E-01
			0.2599E+01	0.5526E-01
			0.3898E+01	0.1016E+00
			0.4678E+01	0.1426E+00
			0.5198E+01	0.1783E+00
			0.4678E+01	0.3565E+00
			0.4678E+01	0.5348E+00
			0.4678E+01	0.8913E+00
			0.4678E+01	0.3565E+01
13	10	0.6700E+02		
			0.0000E+00	0.0000E+00
			0.1851E+01	0.2852E-01
			0.3085E+01	0.5526E-01
			0.4628E+01	0.1016E+00
			0.5553E+01	0.1426E+00
			0.6170E+01	0.1783E+00
			0.5553E+01	0.3565E+00
			0.5553E+01	0.5348E+00
			0.5553E+01	0.8913E+00
			0.5553E+01	0.3565E+01
14	10	0.6853E+02		
			0.0000E+00	0.0000E+00
			0.1868E+01	0.2852E-01
			0.3113E+01	0.5526E-01
			0.4669E+01	0.1016E+00
			0.5603E+01	0.1426E+00
			0.6226E+01	0.1783E+00
			0.5603E+01	0.3565E+00
			0.5603E+01	0.5348E+00
			0.5603E+01	0.8913E+00
			0.5603E+01	0.3565E+01
15	10	0.6996E+02		
			0.0000E+00	0.0000E+00
			0.1884E+01	0.2852E-01
			0.3141E+01	0.5526E-01
			0.4711E+01	0.1016E+00
			0.5653E+01	0.1426E+00
			0.6281E+01	0.1783E+00
			0.5653E+01	0.3565E+00
			0.5653E+01	0.5348E+00

			0.5653E+01	0.8913E+00
			0.5653E+01	0.3565E+01
16	10	0.7000E+02		
			0.0000E+00	0.0000E+00
			0.1784E+01	0.2852E-01
			0.2974E+01	0.5526E-01
			0.4461E+01	0.1016E+00
			0.5353E+01	0.1426E+00
			0.5948E+01	0.1783E+00
			0.5353E+01	0.3565E+00
			0.5353E+01	0.5348E+00
			0.5353E+01	0.8913E+00
			0.5353E+01	0.3565E+01
17	10	0.8003E+02		
			0.0000E+00	0.0000E+00
			0.1934E+01	0.2852E-01
			0.3223E+01	0.5526E-01
			0.4835E+01	0.1016E+00
			0.5802E+01	0.1426E+00
			0.6446E+01	0.1783E+00
			0.5802E+01	0.3565E+00
			0.5802E+01	0.5348E+00
			0.5802E+01	0.8913E+00
			0.5802E+01	0.3565E+01
18	10	0.8996E+02		
			0.0000E+00	0.0000E+00
			0.1934E+01	0.2852E-01
			0.3223E+01	0.5526E-01
			0.4835E+01	0.1016E+00
			0.5802E+01	0.1426E+00
			0.6446E+01	0.1783E+00
			0.5802E+01	0.3565E+00
			0.5802E+01	0.5348E+00
			0.5802E+01	0.8913E+00
			0.5802E+01	0.3565E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1087E+01	0.8913E-02
0.2174E+01	0.1783E-01
0.4349E+01	0.3565E-01
0.8698E+01	0.2317E+00
0.1305E+02	0.7487E+00
0.1566E+02	0.1301E+01
0.1740E+02	0.1783E+01
0.1740E+02	0.2674E+01
0.1740E+02	0.3565E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.2951E+00	0.3793E-03	0.1220E-01	0.1000E-03
0.2951E+01	0.3793E-02	0.1220E+00	0.1000E-02

0.1480E+02	0.1898E-01	0.6099E+00	0.5000E-02
0.2962E+02	0.3805E-01	0.1220E+01	0.1000E-01
0.1068E+03	0.1586E+00	0.4667E+01	0.5000E-01
0.1527E+03	0.2610E+00	0.5776E+01	0.1000E+00
0.1674E+03	0.6859E+00	0.1095E+02	0.5000E+00
0.1707E+03	0.1191E+01	0.1423E+02	0.1000E+01
0.1739E+03	0.2196E+01	0.1740E+02	0.2000E+01

****
* COMPUTE INTERNALLY-GENERATED LOAD-TRANSFER *
* (t-z) CURVES FOR VERIFICATION *
****

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.1654E+00	0.2852E-01
			0.2757E+00	0.5526E-01
			0.4135E+00	0.1016E+00
			0.4962E+00	0.1426E+00
			0.5513E+00	0.1783E+00
			0.4962E+00	0.3565E+00
			0.4962E+00	0.5348E+00
			0.4962E+00	0.8913E+00
			0.4962E+00	0.3565E+01
2	10	0.2702E+02		
			0.0000E+00	0.0000E+00
			0.7124E+00	0.2852E-01
			0.1187E+01	0.5526E-01
			0.1781E+01	0.1016E+00
			0.2137E+01	0.1426E+00
			0.2375E+01	0.1783E+00
			0.2137E+01	0.3565E+00
			0.2137E+01	0.5348E+00
			0.2137E+01	0.8913E+00
			0.2137E+01	0.3565E+01
3	10	0.5950E+02		
			0.0000E+00	0.0000E+00
			0.1431E+01	0.2852E-01
			0.2385E+01	0.5526E-01
			0.3577E+01	0.1016E+00
			0.4292E+01	0.1426E+00
			0.4769E+01	0.1783E+00
			0.4292E+01	0.3565E+00
			0.4292E+01	0.5348E+00
			0.4292E+01	0.8913E+00
			0.4292E+01	0.3565E+01
4	10	0.6000E+02		
			0.0000E+00	0.0000E+00
			0.1449E+01	0.2852E-01
			0.2415E+01	0.5526E-01
			0.3623E+01	0.1016E+00
			0.4347E+01	0.1426E+00
			0.4830E+01	0.1783E+00
			0.4347E+01	0.3565E+00
			0.4347E+01	0.5348E+00
			0.4347E+01	0.8913E+00
			0.4347E+01	0.3565E+01
5	10	0.9025E+01		

			0.0000E+00	0.0000E+00
			0.1818E+00	0.2852E-01
			0.3031E+00	0.5526E-01
			0.4546E+00	0.1016E+00
			0.5455E+00	0.1426E+00
			0.6062E+00	0.1783E+00
			0.5455E+00	0.3565E+00
			0.5455E+00	0.5348E+00
			0.5455E+00	0.8913E+00
			0.5455E+00	0.3565E+01
6	10	0.1296E+02		
			0.0000E+00	0.0000E+00
			0.1970E+00	0.2852E-01
			0.3284E+00	0.5526E-01
			0.4926E+00	0.1016E+00
			0.5911E+00	0.1426E+00
			0.6568E+00	0.1783E+00
			0.5911E+00	0.3565E+00
			0.5911E+00	0.5348E+00
			0.5911E+00	0.8913E+00
			0.5911E+00	0.3565E+01
7	10	0.1300E+02		
			0.0000E+00	0.0000E+00
			0.5406E+00	0.2852E-01
			0.9010E+00	0.5526E-01
			0.1352E+01	0.1016E+00
			0.1622E+01	0.1426E+00
			0.1802E+01	0.1783E+00
			0.1622E+01	0.3565E+00
			0.1622E+01	0.5348E+00
			0.1622E+01	0.8913E+00
			0.1622E+01	0.3565E+01
8	10	0.2202E+02		
			0.0000E+00	0.0000E+00
			0.6468E+00	0.2852E-01
			0.1078E+01	0.5526E-01
			0.1617E+01	0.1016E+00
			0.1940E+01	0.1426E+00
			0.2156E+01	0.1783E+00
			0.1940E+01	0.3565E+00
			0.1940E+01	0.5348E+00
			0.1940E+01	0.8913E+00
			0.1940E+01	0.3565E+01
9	10	0.3096E+02		
			0.0000E+00	0.0000E+00
			0.7518E+00	0.2852E-01
			0.1253E+01	0.5526E-01
			0.1879E+01	0.1016E+00
			0.2255E+01	0.1426E+00
			0.2506E+01	0.1783E+00
			0.2255E+01	0.3565E+00
			0.2255E+01	0.5348E+00
			0.2255E+01	0.8913E+00
			0.2255E+01	0.3565E+01
10	10	0.3100E+02		
			0.0000E+00	0.0000E+00
			0.7649E+00	0.2852E-01
			0.1275E+01	0.5526E-01
			0.1912E+01	0.1016E+00
			0.2295E+01	0.1426E+00
			0.2550E+01	0.1783E+00
			0.2295E+01	0.3565E+00
			0.2295E+01	0.5348E+00

			0.2295E+01	0.8913E+00
			0.2295E+01	0.3565E+01
11	10	0.3852E+02		
			0.0000E+00	0.0000E+00
			0.8568E+00	0.2852E-01
			0.1428E+01	0.5526E-01
			0.2142E+01	0.1016E+00
			0.2570E+01	0.1426E+00
			0.2856E+01	0.1783E+00
			0.2570E+01	0.3565E+00
			0.2570E+01	0.5348E+00
			0.2570E+01	0.8913E+00
			0.2570E+01	0.3565E+01
12	10	0.4596E+02		
			0.0000E+00	0.0000E+00
			0.9742E+00	0.2852E-01
			0.1624E+01	0.5526E-01
			0.2435E+01	0.1016E+00
			0.2922E+01	0.1426E+00
			0.3247E+01	0.1783E+00
			0.2922E+01	0.3565E+00
			0.2922E+01	0.5348E+00
			0.2922E+01	0.8913E+00
			0.2922E+01	0.3565E+01
13	10	0.5102E+02		
			0.0000E+00	0.0000E+00
			0.1062E+01	0.2852E-01
			0.1769E+01	0.5526E-01
			0.2654E+01	0.1016E+00
			0.3185E+01	0.1426E+00
			0.3539E+01	0.1783E+00
			0.3185E+01	0.3565E+00
			0.3185E+01	0.5348E+00
			0.3185E+01	0.8913E+00
			0.3185E+01	0.3565E+01
14	10	0.5596E+02		
			0.0000E+00	0.0000E+00
			0.1120E+01	0.2852E-01
			0.1867E+01	0.5526E-01
			0.2800E+01	0.1016E+00
			0.3360E+01	0.1426E+00
			0.3733E+01	0.1783E+00
			0.3360E+01	0.3565E+00
			0.3360E+01	0.5348E+00
			0.3360E+01	0.8913E+00
			0.3360E+01	0.3565E+01
15	10	0.6000E+02		
			0.0000E+00	0.0000E+00
			0.1449E+01	0.2852E-01
			0.2415E+01	0.5526E-01
			0.3623E+01	0.1016E+00
			0.4347E+01	0.1426E+00
			0.4830E+01	0.1783E+00
			0.4347E+01	0.3565E+00
			0.4347E+01	0.5348E+00
			0.4347E+01	0.8913E+00
			0.4347E+01	0.3565E+01
16	10	0.6800E+02		
			0.0000E+00	0.0000E+00
			0.1868E+01	0.2852E-01
			0.3113E+01	0.5526E-01
			0.4669E+01	0.1016E+00
			0.5603E+01	0.1426E+00

			0.6226E+01	0.1783E+00
			0.5603E+01	0.3565E+00
			0.5603E+01	0.5348E+00
			0.5603E+01	0.8913E+00
			0.5603E+01	0.3565E+01
17	10	0.7500E+02		
			0.0000E+00	0.0000E+00
			0.1867E+01	0.2852E-01
			0.3112E+01	0.5526E-01
			0.4668E+01	0.1016E+00
			0.5602E+01	0.1426E+00
			0.6225E+01	0.1783E+00
			0.5602E+01	0.3565E+00
			0.5602E+01	0.5348E+00
			0.5602E+01	0.8913E+00
			0.5602E+01	0.3565E+01
18	10	0.8000E+02		
			0.0000E+00	0.0000E+00
			0.1934E+01	0.2852E-01
			0.3223E+01	0.5526E-01
			0.4835E+01	0.1016E+00
			0.5802E+01	0.1426E+00
			0.6446E+01	0.1783E+00
			0.5802E+01	0.3565E+00
			0.5802E+01	0.5348E+00
			0.5802E+01	0.8913E+00
			0.5802E+01	0.3565E+01

URS

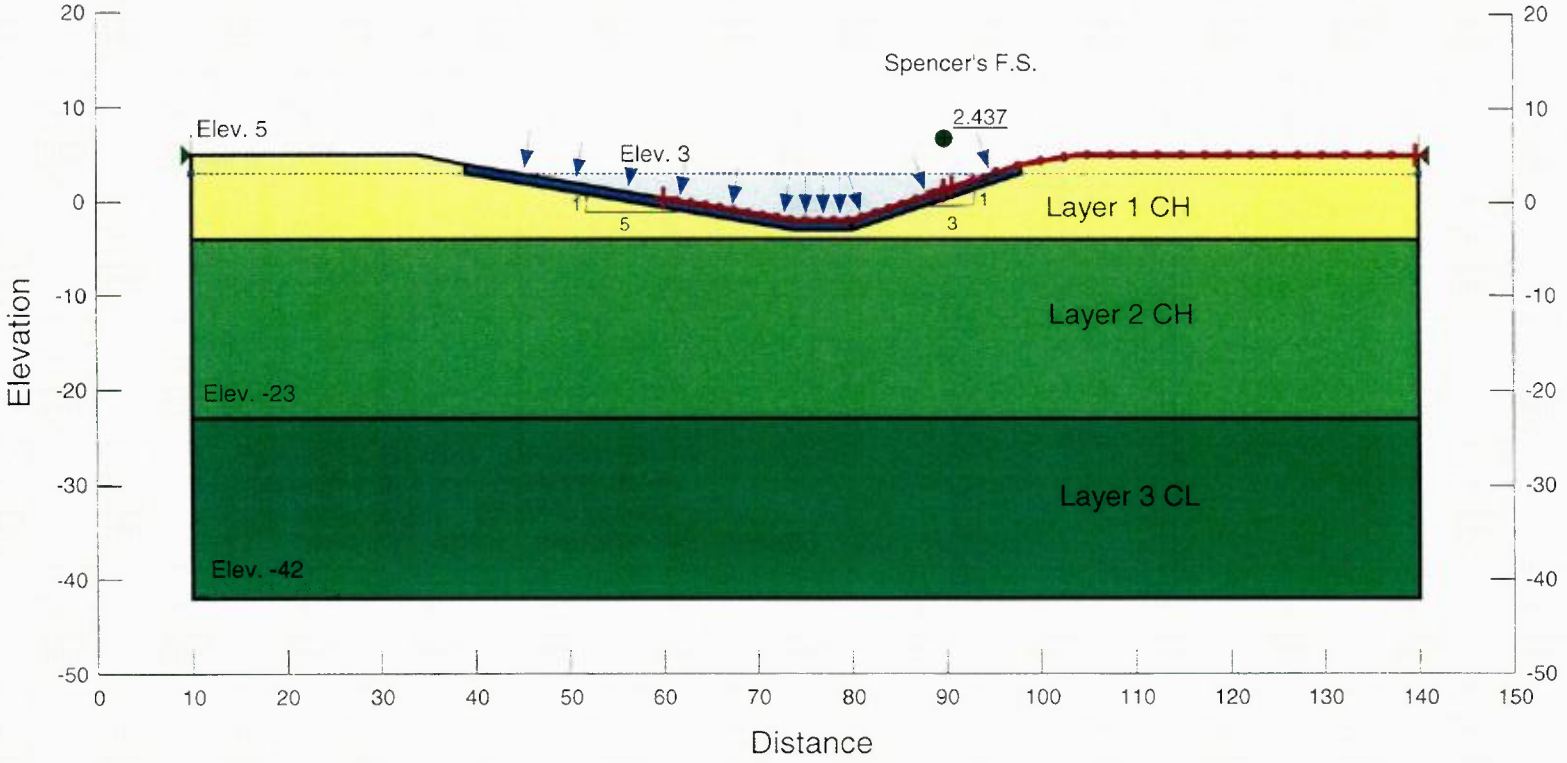
APPENDIX D

SLOPE STABILITIES

Maurepas Drainage Pump Station, LA

Slope Stability Analysis for East Side of Bourgeois Canal in Section-A (Right slope)

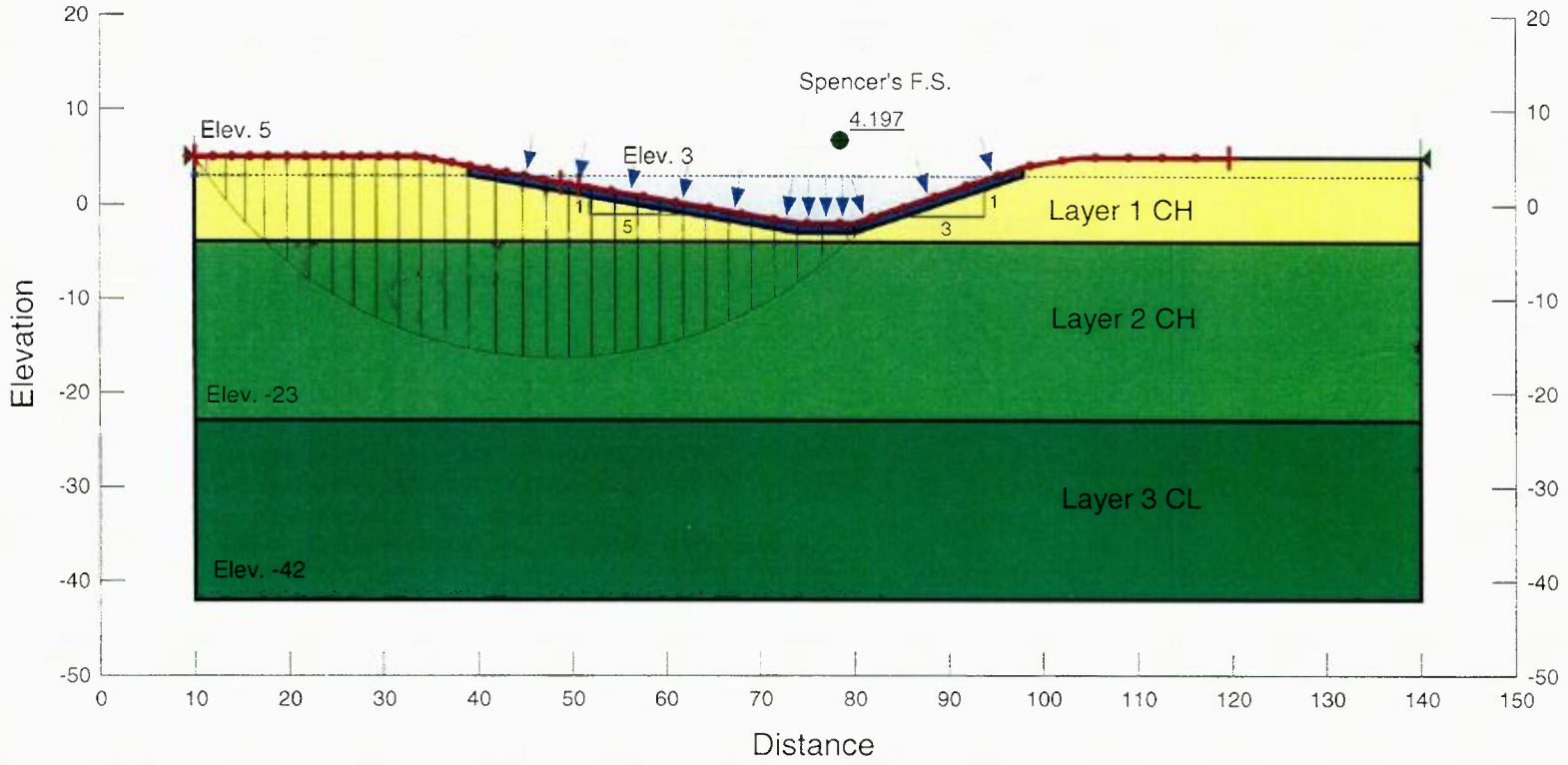
Name: Riprap (12") Unit Weight: 150 pcf Cohesion: 0 psf Phi: 40 °
Name: Layer 1 Unit Weight: 90 pcf Cohesion: 600 psf
Name: Layer 2 Unit Weight: 92.4 pcf Cohesion: 100 psf
Name: Layer 3 Unit Weight: 107.4 pcf Cohesion: 700 psf



Maurepas Drainage Pump Station, LA

Slope Stability Analysis for West Side of Bourgeois Canal in Section-A (Left slope)

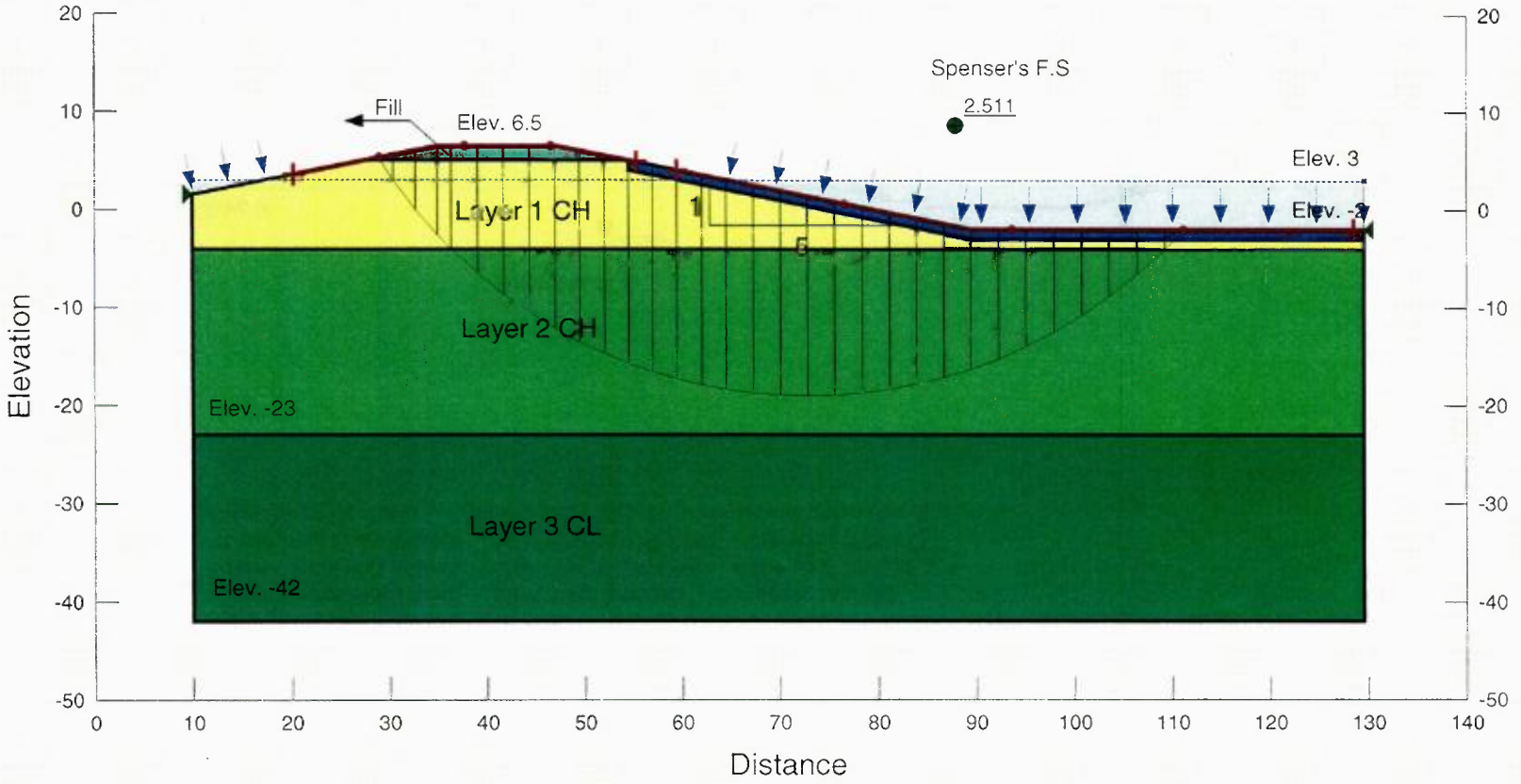
Name: Riprap (12") Unit Weight: 150 pcf Cohesion: 0 psf Phi: 40 °
Name: Layer 1 Unit Weight: 90 pcf Cohesion: 600 psf
Name: Layer 2 Unit Weight: 92.4 pcf Cohesion: 100 psf
Name: Layer 3 Unit Weight: 107.4 pcf Cohesion: 700 psf



Maurepas Drainage Pump Station, LA

Slope Stability Analysis for West Side of Hope Canal in Section-A

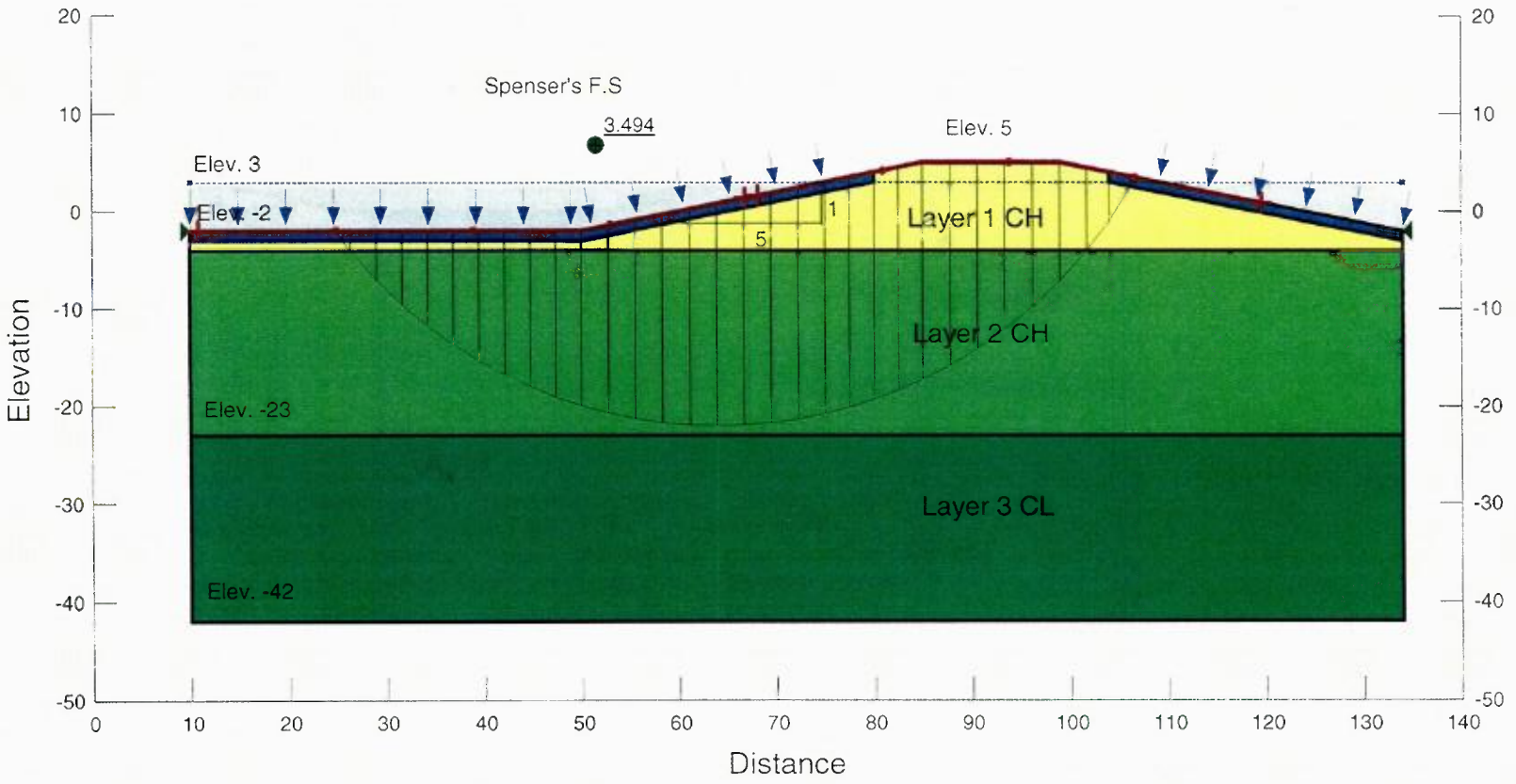
Name: Layer 1 Model: Undrained (Phi=0) Unit Weight: 90 pcf Cohesion: 600 psf
Name: Layer 2 Model: Undrained (Phi=0) Unit Weight: 92.4 pcf Cohesion: 100 psf
Name: Riprap (12") Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion: 0 psf Phi: 40 °
Name: Fill Model: Undrained (Phi=0) Unit Weight: 117 pcf Cohesion: 600 psf
Name: Layer 3 Model: Undrained (Phi=0) Unit Weight: 107.4 pcf Cohesion: 700 psf



Maurepas Drainage Pump Station, LA

Slope Stability Analysis for East Side of Hope Canal in Section-A

Name: Layer 1 Model: Undrained (Phi=0) Unit Weight: 90 pcf Cohesion: 600 psf
Name: Layer 2 Model: Undrained (Phi=0) Unit Weight: 92.4 pcf Cohesion: 100 psf
Name: Layer 3 Model: Undrained (Phi=0) Unit Weight: 107.4 pcf Cohesion: 700 psf
Name: Riprap Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion: 0 psf Phi: 40 °



URS

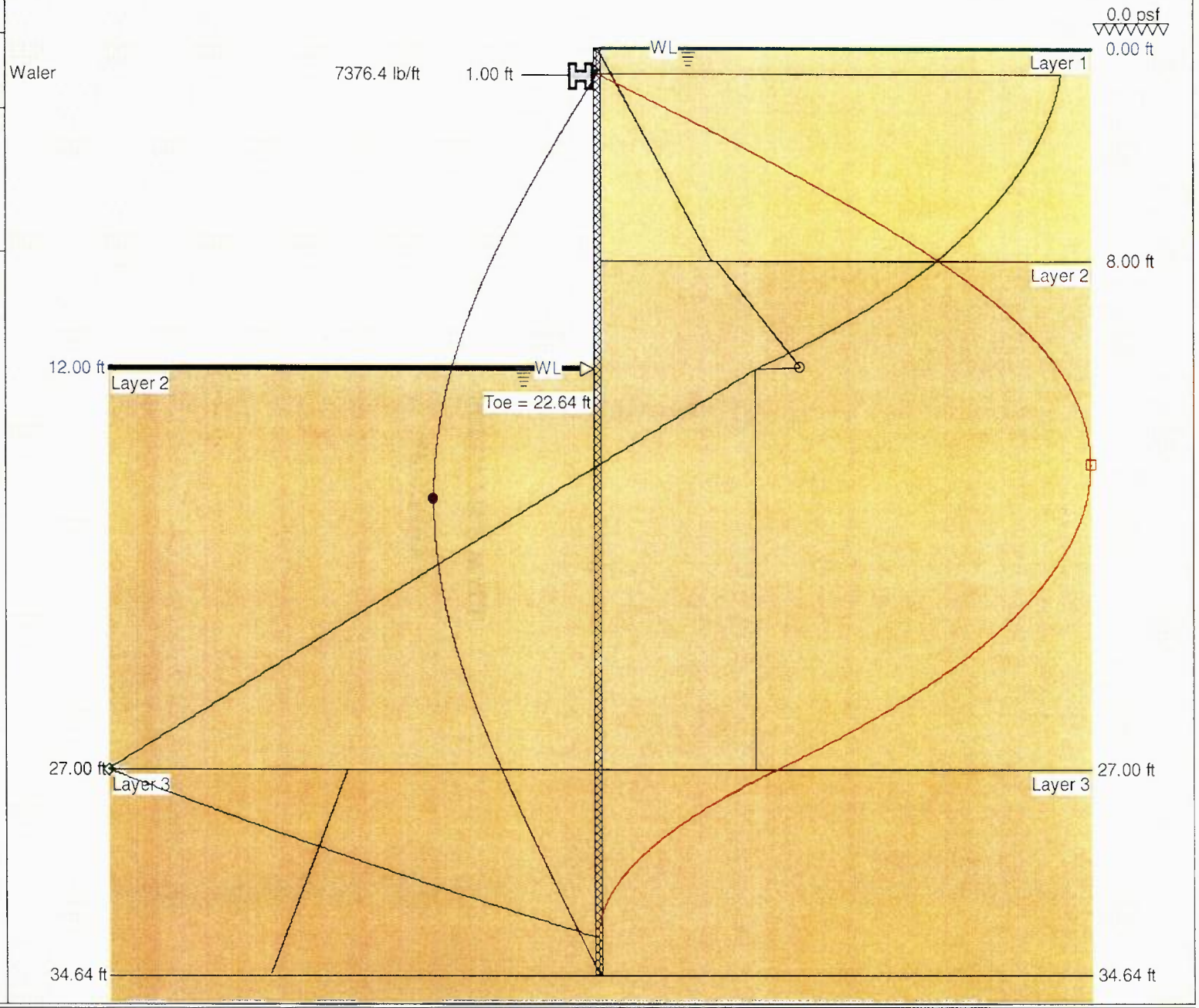
APPENDIX E

SHEET PILE WALL

Title: Anchored Sheet Pile Wall Design (FS=1.3)
Page: 1
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3

	Maximum	d (ft)
○	889.6 psf	12.00
□	68445.2 ftlb/ft	15.67
◇	7810.3 lb/ft	27.02
●	0.7 in	16.94



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Email: piebuck@pilebuck.com
Web: www.pilebuck.com

Title: Anchored Sheet Pile Wall Design (FS=1.3)
Page: 2
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3

Input Data

Depth Of Excavation = 12.00 ft
Surcharge = 0.0 psf
Depth Of Active Water = 0.00 ft
Depth Of Passive Water = 12.00 ft
Water Density = 62.40 pcf
Minimum Fluid Density = 62.40 pcf

Soil Profile

Depth (ft)	Soil Name	γ(pcf)	γ'(pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Layer 1	90.00	42.40	600.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
8.00	Layer 2	92.40	30.00	100.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
27.00	Layer 3	107.40	45.00	700.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00

Solution

Sheet

Sheet Name	I (in⁴/ft)	E (psi)	Z (in³/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
Arbed AZ36	606.30	3.04E+07	67.00	25000.0	139417.1	0.00	22.64	34.64

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
1.00	Waler	7376.4

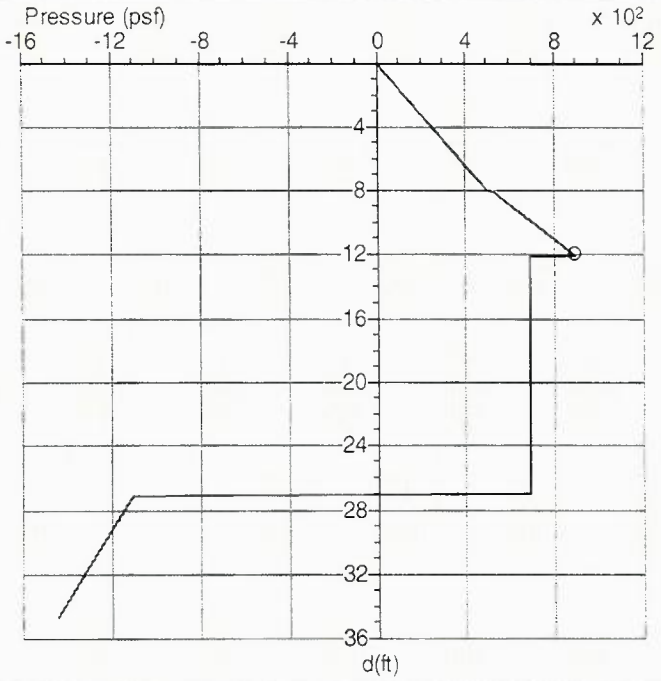
Maxima

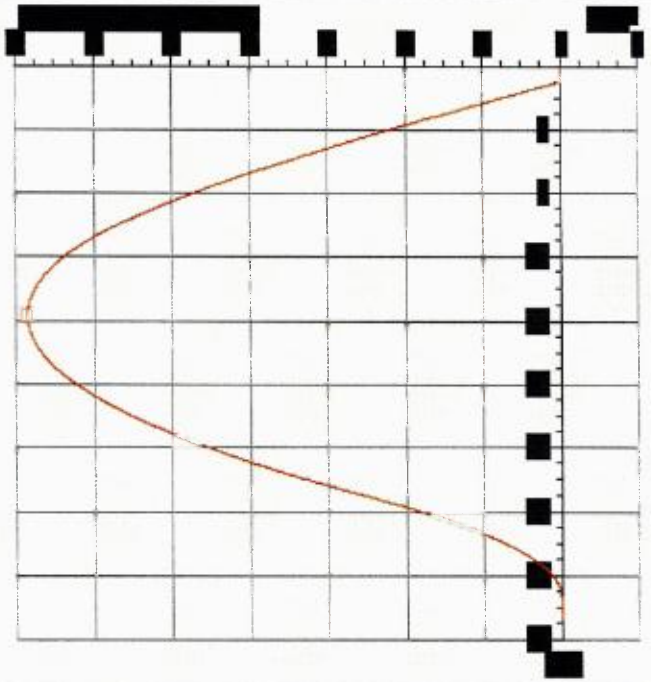
	Maximum	Depth
Bending Moment	68445.2 ftlb/ft	15.67 ft
Deflection	0.7 in	16.94 ft
Pressure	889.6 psf	12.00 ft
Shear Force	7810.3 lb/ft	27.02 ft

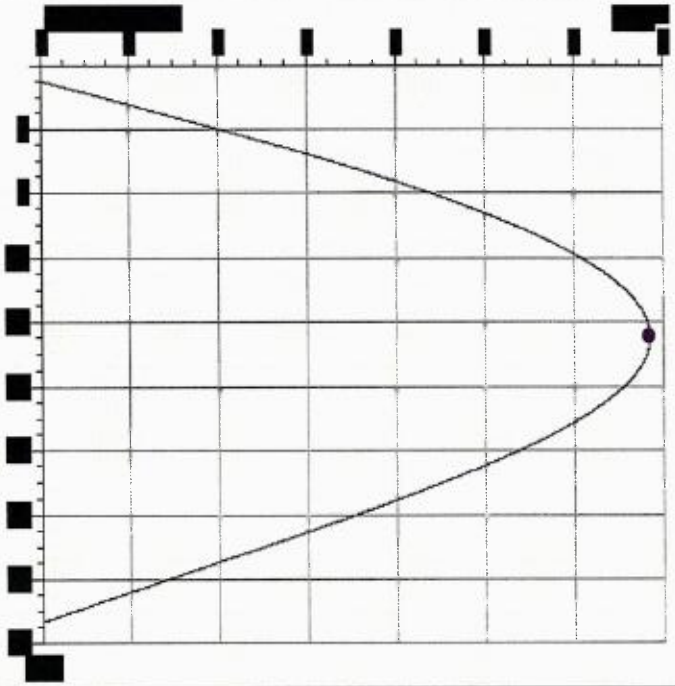
Title: Anchored Sheet Pile Wall Design (FS=1.3)
Page: 3
Date: 9.18.08

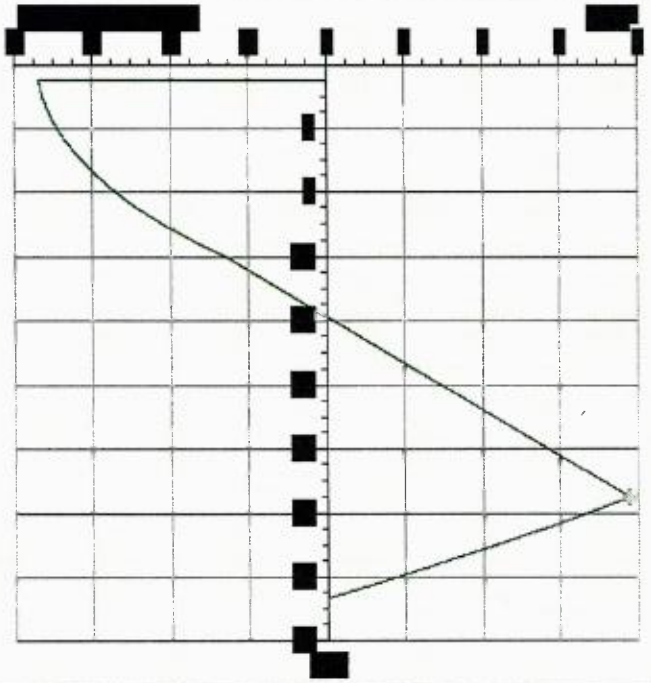
Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3

Maximum		d (ft)
○	889.6 psf	12.00
□	68445.2 ftlb/ft	15.67
◇	7810.3 lb/ft	27.02
●	0.7 in	16.94









SPW911, v2.00

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Web: www.pilebuck.com

Title: Anchored Sheet Pile Wall Design (FS=1.3)
Page: 4
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3

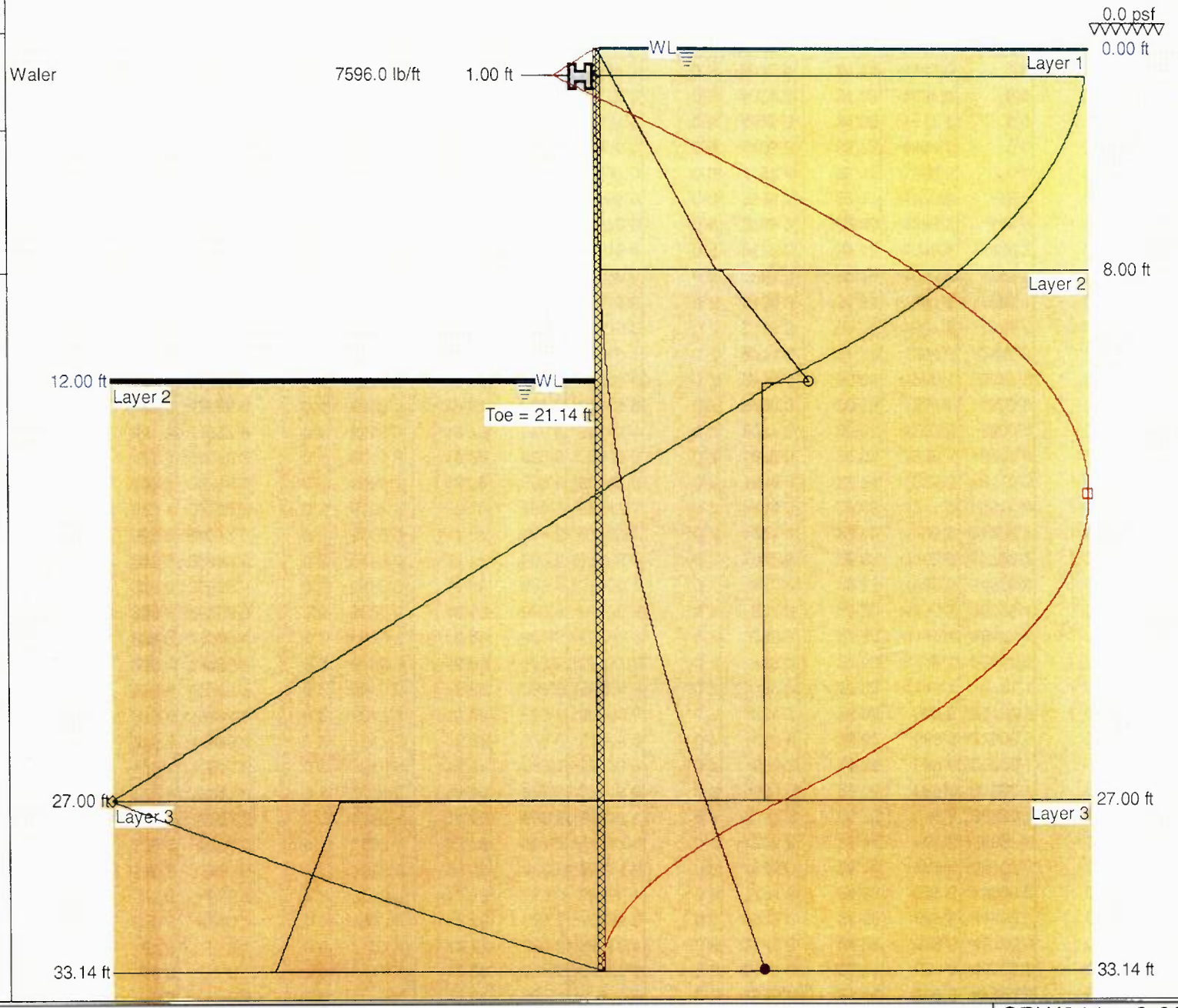
depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	0.0	0.0	0.0	0.0	11.65	858.4	-62936.5	0.6	-2844.3	23.30	689.6	-48646.8	0.6	5262.3
0.31	19.8	0.4	0.0	3.4	11.96	887.7	-63807.8	0.6	-2566.6	23.60	689.6	-47123.5	0.6	5461.4
0.61	39.6	3.1	0.0	13.1	12.26	689.6	-64505.6	0.6	-2361.8	23.91	689.6	-45382.7	0.5	5680.4
0.92	57.6	9.1	0.0	27.4	12.57	689.6	-65205.1	0.6	-2142.8	24.22	689.6	-43740.9	0.5	5879.4
1.23	77.5	-1930.7	0.0	-7327.2	12.88	689.6	-65836.2	0.6	-1923.8	24.52	689.6	-41869.7	0.5	6098.4
1.53	97.3	-4296.2	0.0	-7299.2	13.18	689.6	-66350.7	0.6	-1724.8	24.83	689.6	-39930.2	0.5	6317.4
1.84	115.3	-6437.9	0.1	-7268.3	13.49	689.6	-66851.4	0.6	-1505.8	25.14	689.6	-38107.8	0.5	6516.4
2.15	135.1	-8782.2	0.1	-7228.2	13.79	689.6	-67247.4	0.7	-1306.8	25.44	689.6	-36037.9	0.5	6735.4
2.45	153.1	-10901.3	0.1	-7186.4	14.10	689.6	-67617.7	0.7	-1087.8	25.75	689.6	-33899.7	0.5	6954.4
2.76	172.9	-13217.0	0.1	-7134.3	14.41	689.6	-67919.8	0.7	-868.8	26.06	689.6	-31896.7	0.4	7153.4
3.07	192.7	-15514.8	0.1	-7076.0	14.71	689.6	-68135.1	0.7	-669.7	26.36	689.6	-29628.1	0.4	7372.4
3.37	210.8	-17586.4	0.2	-7017.5	15.02	689.6	-68306.8	0.7	-450.8	26.67	689.6	-27506.5	0.4	7571.5
3.68	230.6	-19844.2	0.2	-6947.1	15.33	689.6	-68403.6	0.7	-251.7	26.98	689.6	-25107.5	0.4	7790.4
3.99	250.4	-22078.2	0.2	-6870.5	15.63	689.6	-68444.8	0.7	-32.7	27.28	-1115.1	-22721.1	0.4	7490.2
4.29	268.4	-24086.7	0.2	-6795.3	15.94	689.6	-68417.8	0.7	186.2	27.59	-1128.1	-20647.6	0.4	7166.2
4.60	288.2	-26269.4	0.2	-6706.7	16.25	689.6	-68333.9	0.7	385.3	27.90	-1142.4	-18473.5	0.4	6805.5
4.90	306.2	-28228.0	0.3	-6620.6	16.55	689.6	-68176.5	0.7	604.3	28.20	-1155.3	-16595.4	0.3	6473.7
5.21	326.0	-30352.1	0.3	-6520.0	16.86	689.6	-67950.7	0.7	823.2	28.51	-1169.6	-14638.8	0.3	6104.4
5.52	345.9	-32442.6	0.3	-6413.0	17.17	689.6	-67686.3	0.7	1022.3	28.82	-1183.9	-12798.2	0.3	5730.5
5.82	363.9	-34312.0	0.3	-6310.3	17.47	689.6	-67330.1	0.7	1241.3	29.12	-1196.9	-11226.7	0.3	5386.7
6.13	383.7	-36332.6	0.3	-6191.3	17.78	689.6	-66947.1	0.7	1440.3	29.43	-1211.2	-9611.4	0.3	5004.2
6.44	403.5	-38313.5	0.4	-6066.1	18.09	689.6	-66460.6	0.7	1659.3	29.74	-1225.5	-8116.3	0.3	4617.1
6.74	421.5	-40078.2	0.4	-5946.8	18.39	689.6	-65905.8	0.7	1878.3	30.04	-1238.5	-6862.4	0.2	4261.3
7.05	441.3	-41977.9	0.4	-5809.5	18.70	689.6	-65342.1	0.7	2077.3	30.35	-1252.8	-5600.4	0.2	3865.6
7.36	459.3	-43665.4	0.4	-5679.2	19.01	689.6	-64656.9	0.7	2296.3	30.65	-1265.8	-4560.9	0.2	3501.9
7.66	479.1	-45476.5	0.4	-5530.0	19.31	689.6	-63903.4	0.7	2515.3	30.96	-1280.1	-3537.3	0.2	3097.5
7.97	499.0	-47238.1	0.4	-5374.4	19.62	689.6	-63159.1	0.7	2714.3	31.27	-1294.3	-2640.5	0.2	2688.6
8.28	546.3	-48794.0	0.5	-5220.9	19.93	689.6	-62275.2	0.7	2933.3	31.57	-1307.3	-1936.6	0.2	2312.9
8.58	575.7	-50451.7	0.5	-5042.3	20.23	689.6	-61412.3	0.7	3132.3	31.88	-1321.6	-1286.1	0.1	1895.3
8.89	602.3	-51907.2	0.5	-4871.9	20.54	689.6	-60398.0	0.6	3351.3	32.19	-1335.9	-766.6	0.1	1473.2
9.20	631.7	-53448.8	0.5	-4675.6	20.85	689.6	-59315.4	0.6	3570.3	32.49	-1348.9	-409.3	0.1	1085.5
9.50	661.0	-54925.3	0.5	-4469.9	21.15	689.6	-58272.0	0.6	3769.3	32.80	-1363.2	-143.9	0.1	654.7
9.81	687.7	-56208.5	0.5	-4274.9	21.46	689.6	-57059.0	0.6	3988.3	33.11	-1376.2	-19.8	0.1	259.1
10.12	717.0	-57552.2	0.5	-4051.4	21.76	689.6	-55897.0	0.6	4187.4	33.41	-1390.5	0.0	0.1	0.0
10.42	746.4	-58822.0	0.6	-3818.7	22.07	689.6	-54553.6	0.6	4406.3	33.72	-1404.8	0.0	0.0	0.0
10.73	773.0	-59909.6	0.6	-3599.0	22.38	689.6	-53141.9	0.6	4625.3	34.03	-1417.7	0.0	0.0	0.0
11.04	802.4	-61029.9	0.6	-3348.5	22.68	689.6	-51799.2	0.6	4824.4	34.33	-1432.0	0.0	0.0	0.0
11.34	829.1	-61976.7	0.6	-3112.6	22.99	689.6	-50257.1	0.6	5043.4	34.64	-1445.0	0.0	0.0	0.0

SPW911, v2.00

Title: Anchored Sheet Pile Wall Design (FS=1.0)
Page: 1
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: No Earth Support

	Maximum	d (ft)
○	889.6 psf	12.00
□	65438.4 ftlb/ft	16.07
◇	7584.5 lb/ft	27.01
●	1.9 in	33.11



SPW911, v2.00

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Title: Anchored Sheet Pile Wall Design (FS=1.0)
Page: 2
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: No Earth Support

Input Data

Depth Of Excavation = 12.00 ft
Surcharge = 0.0 psf
Depth Of Active Water = 0.00 ft
Depth Of Passive Water = 12.00 ft
Water Density = 62.40 pcf
Minimum Fluid Density = 62.40 pcf

Soil Profile

Depth (ft)	Soil Name	γ(pcf)	γ'(pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Layer 1	90.00	42.40	600.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
8.00	Layer 2	92.40	30.00	100.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
27.00	Layer 3	107.40	45.00	700.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00

Solution

Sheet

Sheet Name	I (in⁴/ft)	E (psi)	Z (in³/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
Arbed AZ36	606.30	3.04E+07	67.00	25000.0	139417.1	0.00	21.14	33.14

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
1.00	Waler	7596.0

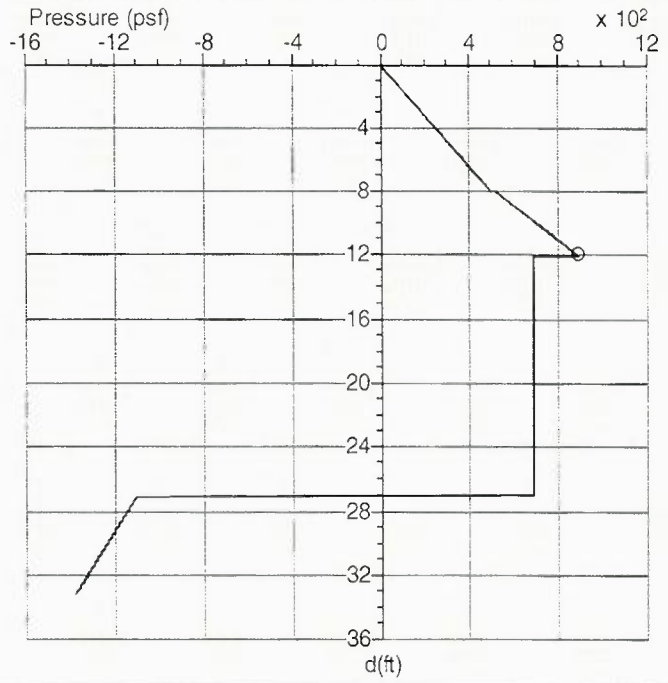
Maxima

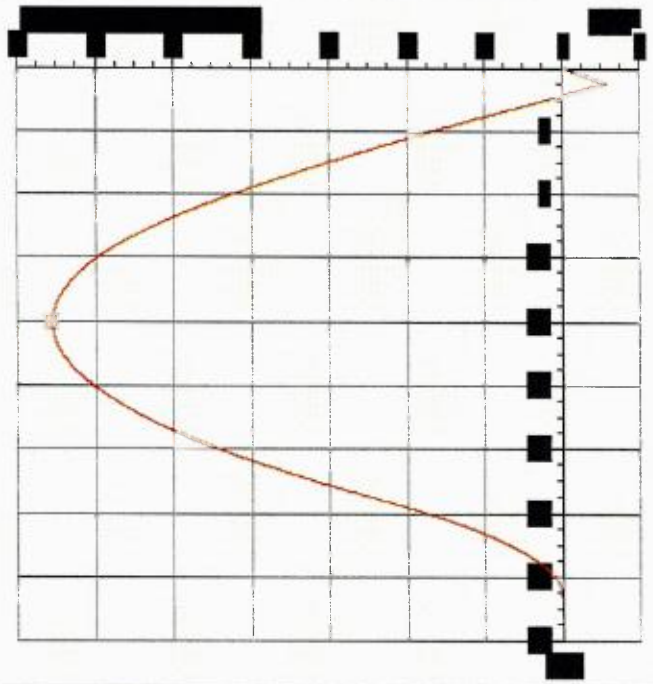
	Maximum	Depth
Bending Moment	65438.4 ftlb/ft	16.07 ft
Deflection	1.9 in	33.11 ft
Pressure	889.6 psf	12.00 ft
Shear Force	7584.5 lb/ft	27.01 ft

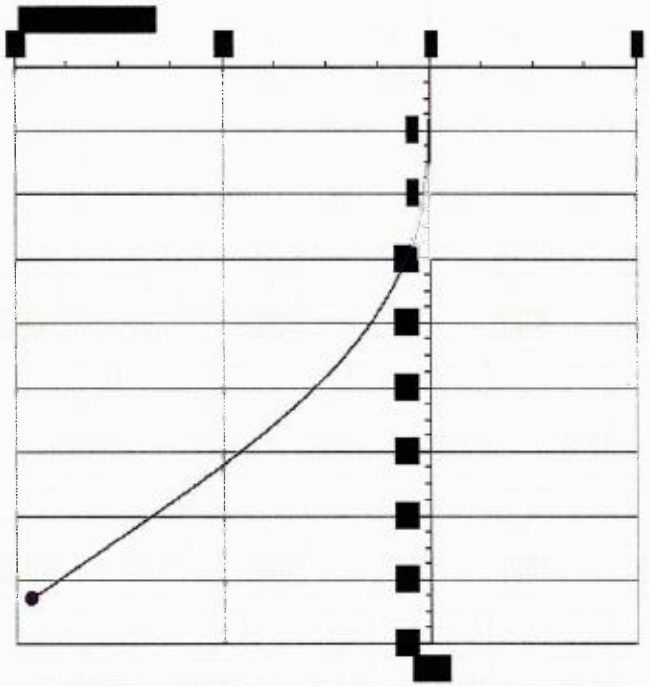
Title: Anchored Sheet Pile Wall Design (FS=1.0)
Page: 3
Date: 9.18.08

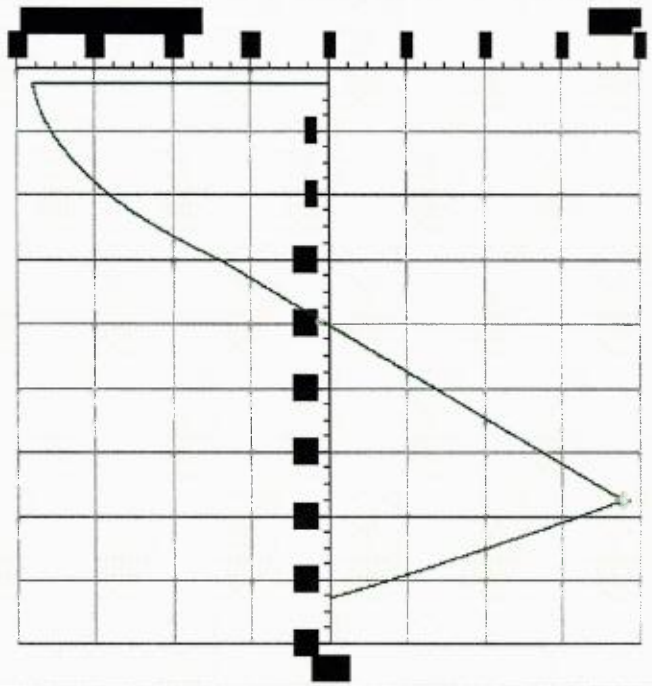
Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: No Earth Support

Maximum		d (ft)
○	889.6 psf	12.00
□	65438.4 ftlb/ft	16.07
◇	7584.5 lb/ft	27.01
●	1.9 in	33.11









SPW911, v2.00

Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

Title: Anchored Sheet Pile Wall Design (FS=1.0)
Page: 4
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: No Earth Support

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	0.0	193.3	0.0	0.0	11.14	811.7	-57012.7	-0.1	-3486.4	22.29	689.6	-52036.6	-0.8	4347.0
0.29	19.0	1792.1	0.0	3.1	11.44	839.8	-58050.0	-0.1	-3235.1	22.58	689.6	-50823.0	-0.8	4537.5
0.59	37.9	3552.5	0.0	12.0	11.73	865.3	-58926.1	-0.1	-2999.3	22.88	689.6	-49427.2	-0.8	4747.0
0.88	55.1	5156.1	0.0	25.1	12.02	689.6	-59813.7	-0.1	-2737.5	23.17	689.6	-48103.2	-0.8	4937.4
1.17	74.1	4334.0	0.0	-7551.0	12.32	689.6	-60628.0	-0.1	-2528.0	23.46	689.6	-46586.0	-0.9	5146.9
1.47	93.1	2037.0	0.0	-7525.3	12.61	689.6	-61313.0	-0.1	-2337.5	23.76	689.6	-45005.1	-0.9	5356.4
1.76	110.3	-44.0	0.0	-7497.0	12.90	689.6	-62005.8	-0.1	-2128.0	24.05	689.6	-43512.8	-0.9	5546.8
2.05	129.2	-2323.3	0.0	-7460.4	13.20	689.6	-62580.4	-0.2	-1937.6	24.34	689.6	-41810.4	-1.0	5756.3
2.35	146.5	-4385.3	0.0	-7422.1	13.49	689.6	-63151.7	-0.2	-1728.1	24.64	689.6	-40044.4	-1.0	5965.8
2.64	165.4	-6640.7	0.0	-7374.4	13.78	689.6	-63659.4	-0.2	-1518.6	24.93	689.6	-38383.8	-1.0	6156.2
2.93	184.4	-8881.0	0.0	-7321.0	14.08	689.6	-64065.7	-0.2	-1328.2	25.22	689.6	-36496.3	-1.0	6365.7
3.23	201.6	-10903.1	0.0	-7267.5	14.37	689.6	-64451.8	-0.2	-1118.7	25.51	689.6	-34725.2	-1.1	6556.1
3.52	220.6	-13109.7	0.0	-7203.1	14.66	689.6	-64747.7	-0.2	-928.3	25.81	689.6	-32716.2	-1.1	6765.6
3.81	239.5	-15296.1	0.0	-7133.0	14.96	689.6	-65012.4	-0.2	-718.8	26.10	689.6	-30643.6	-1.1	6975.1
4.11	256.8	-17264.7	0.0	-7064.2	15.25	689.6	-65213.4	-0.2	-509.3	26.39	689.6	-28704.2	-1.2	7165.6
4.40	275.7	-19407.7	0.0	-6983.0	15.54	689.6	-65340.9	-0.3	-318.8	26.69	689.6	-26510.1	-1.2	7375.0
4.69	293.0	-21334.0	0.0	-6904.3	15.84	689.6	-65420.5	-0.3	-109.4	26.98	689.6	-24460.3	-1.2	7565.5
4.99	311.9	-23427.1	0.0	-6812.1	16.13	689.6	-65436.4	-0.3	100.1	27.27	-1114.1	-22194.0	-1.3	7278.4
5.28	330.9	-25491.7	0.0	-6714.3	16.42	689.6	-65395.6	-0.3	290.6	27.57	-1127.7	-20026.3	-1.3	6937.8
5.57	348.1	-27342.3	0.0	-6620.3	16.72	689.6	-65290.1	-0.3	500.1	27.86	-1140.2	-18145.8	-1.3	6624.4
5.87	367.1	-29347.3	0.0	-6511.4	17.01	689.6	-65138.8	-0.3	690.5	28.15	-1153.8	-16177.6	-1.4	6275.8
6.16	386.0	-31318.7	0.0	-6396.7	17.30	689.6	-64911.8	-0.4	900.0	28.45	-1167.5	-14315.9	-1.4	5923.0
6.45	403.3	-33080.1	0.0	-6287.5	17.60	689.6	-64621.0	-0.4	1109.5	28.74	-1179.9	-12716.7	-1.4	5598.7
6.75	422.2	-34982.2	0.0	-6161.9	17.89	689.6	-64301.5	-0.4	1299.9	29.03	-1193.6	-11061.5	-1.5	5238.0
7.04	439.4	-36677.8	0.0	-6042.6	18.18	689.6	-63889.3	-0.4	1509.4	29.33	-1206.0	-9652.2	-1.5	4906.5
7.33	458.4	-38504.3	0.0	-5906.0	18.48	689.6	-63413.5	-0.4	1718.9	29.62	-1219.7	-8208.1	-1.5	4537.9
7.63	477.4	-40288.7	0.0	-5763.6	18.77	689.6	-62925.7	-0.5	1909.3	29.91	-1233.4	-6876.5	-1.6	4165.1
7.92	494.6	-41872.8	0.0	-5629.2	19.06	689.6	-62328.3	-0.5	2118.8	30.21	-1245.8	-5764.5	-1.6	3822.6
8.21	541.2	-43571.5	0.0	-5470.4	19.36	689.6	-61730.1	-0.5	2309.3	30.50	-1259.5	-4651.1	-1.6	3441.9
8.50	566.8	-45072.9	0.0	-5317.1	19.65	689.6	-61011.2	-0.5	2518.8	30.79	-1273.1	-3653.7	-1.7	3057.1
8.80	594.8	-46674.6	0.0	-5140.2	19.94	689.6	-60228.8	-0.6	2728.3	31.09	-1285.6	-2848.8	-1.7	2703.6
9.09	622.9	-48221.6	0.0	-4954.9	20.24	689.6	-59462.2	-0.6	2918.7	31.38	-1299.2	-2076.7	-1.7	2310.8
9.38	648.4	-49578.5	0.0	-4779.0	20.53	689.6	-58558.2	-0.6	3128.2	31.67	-1311.7	-1478.6	-1.8	1950.1
9.68	676.5	-51014.0	-0.1	-4577.4	20.82	689.6	-57681.2	-0.6	3318.6	31.97	-1325.3	-936.2	-1.8	1549.4
9.97	704.6	-52387.3	-0.1	-4367.2	21.12	689.6	-56655.8	-0.7	3528.1	32.26	-1339.0	-516.0	-1.8	1144.5
10.26	730.1	-53579.7	-0.1	-4168.8	21.41	689.6	-55566.7	-0.7	3737.6	32.55	-1351.4	-241.0	-1.9	772.8
10.56	758.2	-54827.1	-0.1	-3942.3	21.70	689.6	-54521.4	-0.7	3928.0	32.85	-1365.1	-57.6	-1.9	360.0
10.85	783.7	-55900.6	-0.1	-3729.1	22.00	689.6	-53310.8	-0.7	4137.5	33.14	-1377.5	-1.1	-1.9	19.2

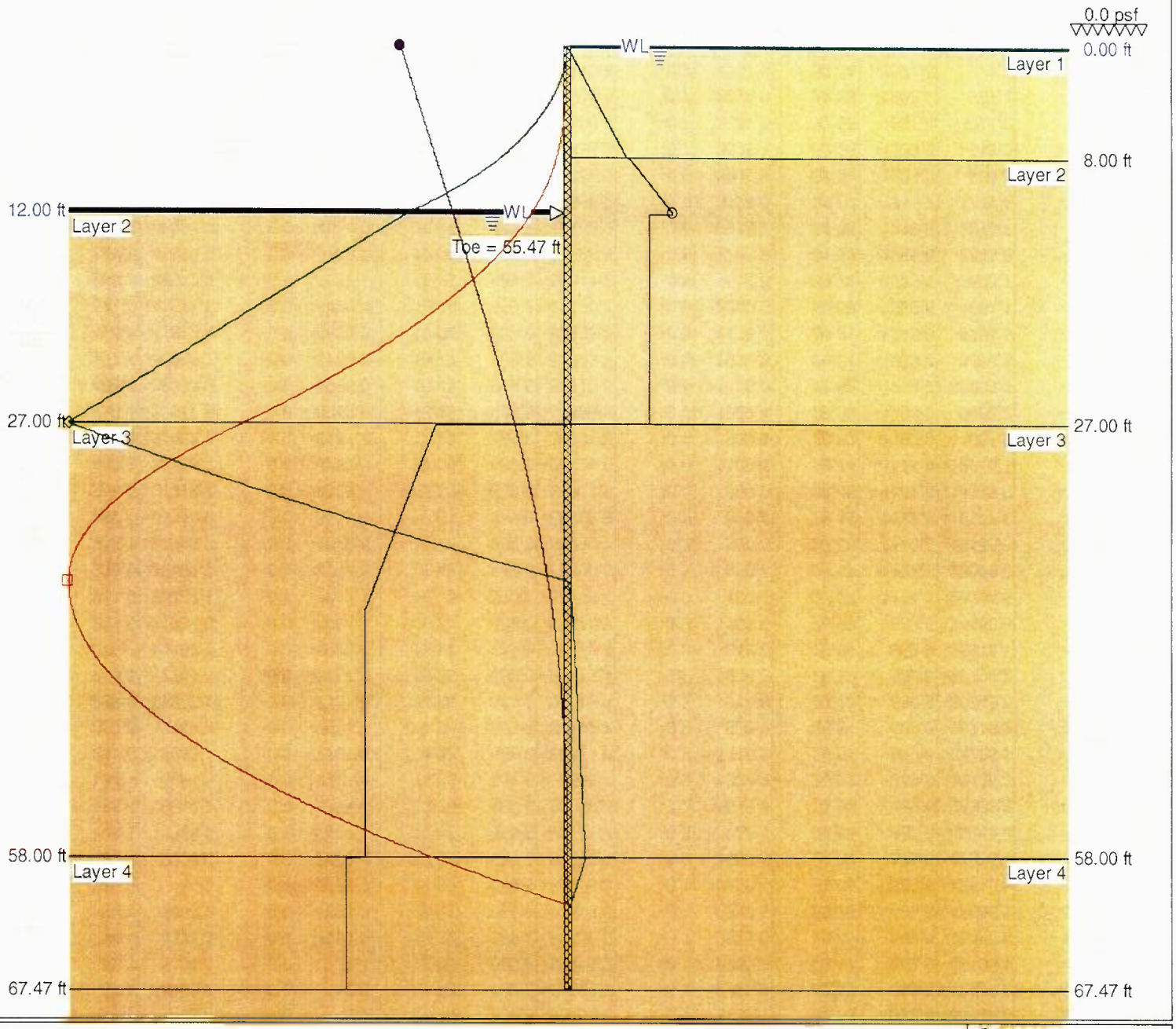
SPW911, v2.00

Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

Title: Cantilever Sheet Pile Wall Design (FS=1.3)
Page: 1
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3
Toe: Cantilever

Maximum		d (ft)
○	889.6 psf	12.00
□	260170.9 ftlb/ft	38.29
◇	15219.8 lb/ft	27.04
●	28.1 in	0.00



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Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

Title: Cantilever Sheet Pile Wall Design (FS=1.3)
Page: 2
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3
Toe: Cantilever

Input Data

Depth Of Excavation = 12.00 ft Depth Of Active Water = 0.00 ft Water Density = 62.40 pcf
Surcharge = 0.0 psf Depth Of Passive Water = 12.00 ft Minimum Fluid Density = 62.40 pcf

Soil Profile

Depth (ft)	Soil Name	γ(pcf)	γ'(pcf)	C (psf)	C_a (psf)	ϕ(°)	δ(°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Layer 1	90.00	42.40	600.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
8.00	Layer 2	92.40	30.00	100.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
27.00	Layer 3	107.40	45.00	700.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
58.00	Layer 4	112.40	50.00	740.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00

Solution

Sheet

Sheet Name	I (in^4/ft)	E (psi)	Z (in^3/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
Arbed AZ36	606.30	3.04E+07	67.00	25000.0	139417.1	0.00	55.47	67.47

Maxima

	Maximum	Depth
Bending Moment	260170.9 ftlb/ft	38.29 ft
Deflection	28.1 in	0.00 ft
Pressure	889.6 psf	12.00 ft
Shear Force	15219.8 lb/ft	27.04 ft

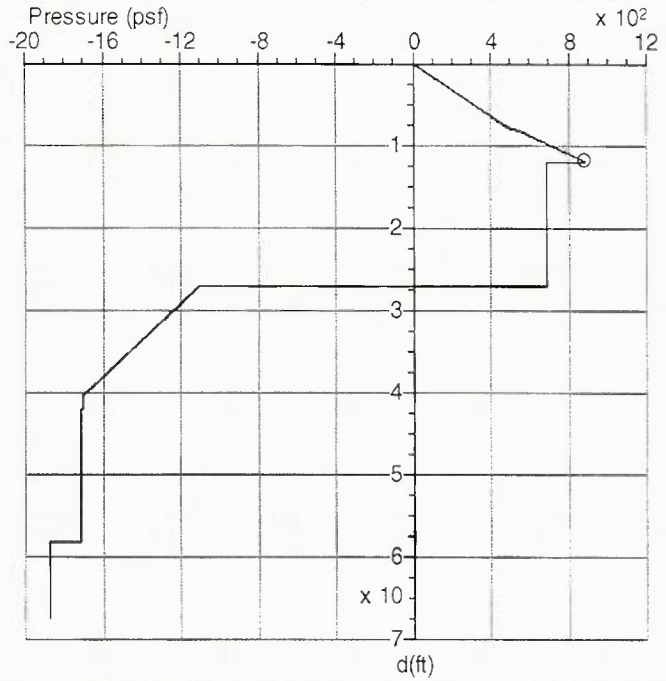
SPW911, v2.00

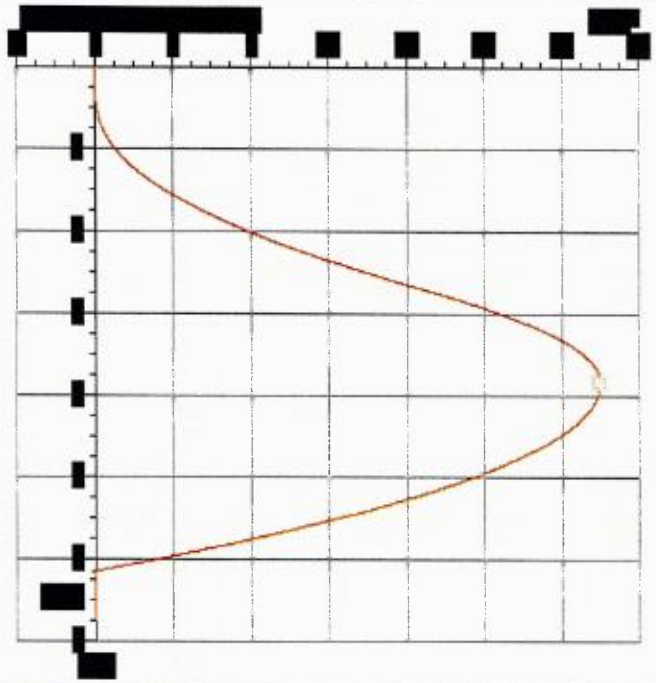
Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

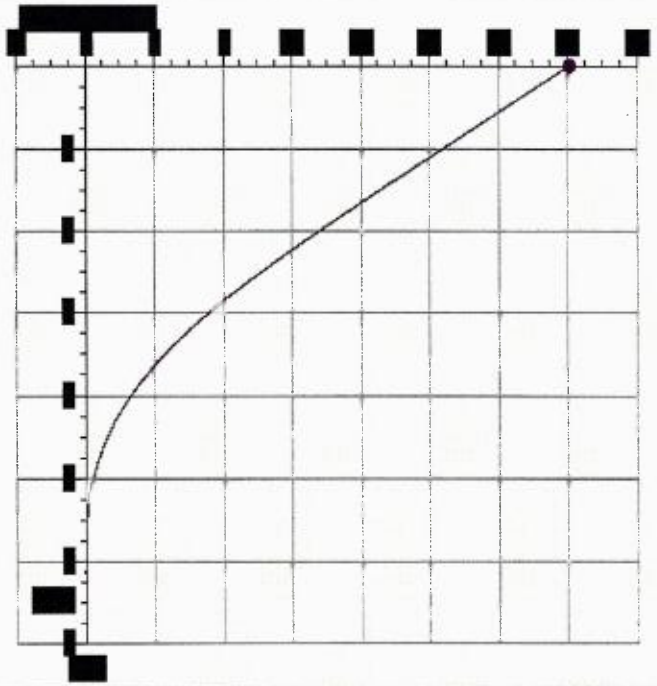
Title: Cantilever Sheet Pile Wall Design (FS=1.3)
Page: 3
Date: 9.18.08

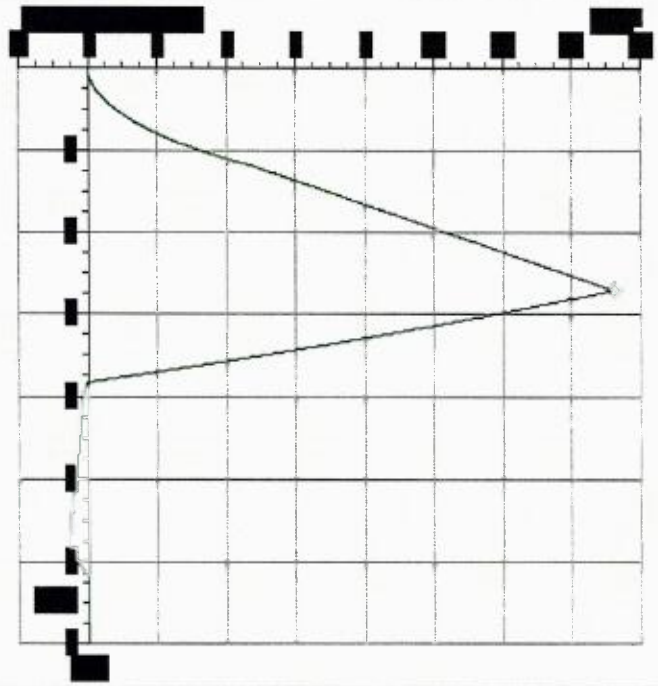
Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3
Toe: Cantilever

Maximum		d (ft)
○	889.6 psf	12.00
□	260170.9 ftlb/ft	38.29
◇	15219.8 lb/ft	27.04
●	28.1 in	0.00









SPW911, v2.00

Title: Cantilever Sheet Pile Wall Design (FS=1.3)
Page: 4
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.3
Toe: Cantilever

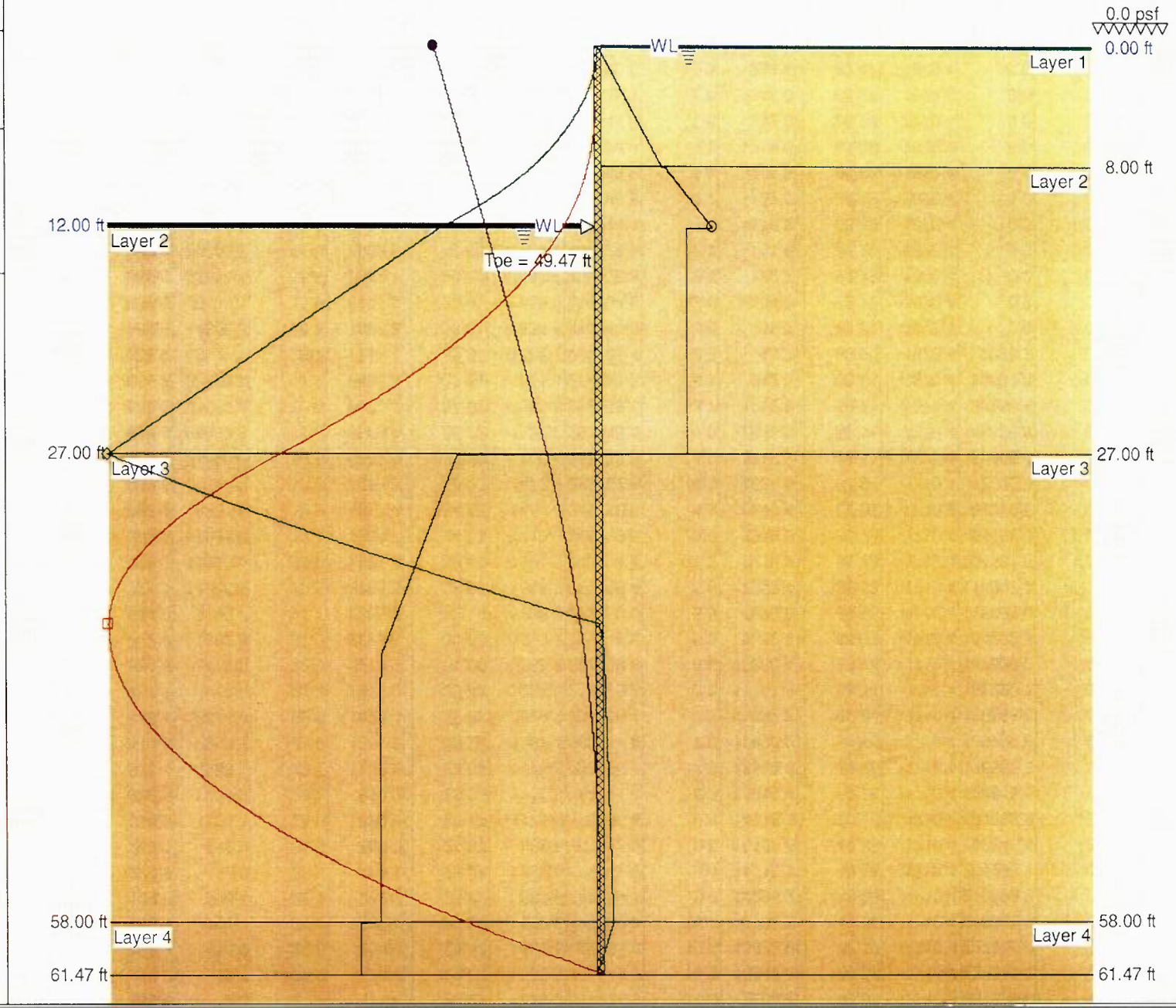
depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	0.0	0.0	28.1	0.0	22.69	689.6	109742.4	11.7	12234.3	45.38	-1710.4	235806.3	1.2	-271.7
0.60	38.6	2.3	27.7	12.8	23.29	689.6	117428.9	11.3	12660.8	45.98	-1710.4	231535.8	1.1	-283.7
1.19	77.2	19.4	27.2	49.7	23.88	689.6	124645.7	10.9	13048.5	46.57	-1710.4	226919.3	0.9	-297.1
1.79	112.3	60.2	26.8	104.0	24.48	689.6	132835.8	10.5	13475.0	47.17	-1710.4	221956.9	0.8	-309.1
2.39	150.9	146.4	26.4	186.4	25.08	689.6	141289.8	10.1	13901.5	47.77	-1710.4	216648.3	0.7	-322.4
2.99	189.5	290.4	25.9	292.7	25.67	689.6	149204.1	9.7	14289.2	48.36	-1710.4	210993.7	0.7	-335.7
3.58	224.5	483.8	25.5	410.1	26.27	689.6	158161.6	9.4	14715.7	48.96	-1710.4	204993.1	0.6	-347.8
4.18	263.1	778.9	25.0	562.0	26.87	689.6	166533.8	9.0	15103.5	49.56	-1710.4	198646.5	0.5	-361.1
4.78	298.2	1134.1	24.6	720.8	27.47	-1123.5	175835.4	8.6	14718.6	50.15	-1710.4	191092.9	0.4	-374.4
5.37	336.8	1634.2	24.2	918.2	28.06	-1151.3	184741.4	8.3	14014.4	50.75	-1710.4	184915.1	0.4	-386.5
5.97	375.4	2263.1	23.7	1139.6	28.66	-1176.6	192455.9	7.9	13359.3	51.35	-1710.4	176582.9	0.3	-399.8
6.57	410.5	2959.1	23.3	1361.5	29.26	-1204.4	200511.9	7.6	12622.2	51.95	-1710.4	169799.6	0.3	-411.9
7.16	449.1	3874.9	22.8	1628.4	29.85	-1229.7	207436.1	7.2	11937.2	52.54	-1710.4	160688.8	0.2	-425.2
7.76	487.7	4962.6	22.4	1919.2	30.45	-1257.6	214603.3	6.9	11167.3	53.14	-1710.4	152222.7	0.2	-438.5
8.36	554.9	6113.9	22.0	2213.2	31.05	-1285.4	221289.6	6.6	10380.1	53.74	-1710.4	144530.9	0.1	-450.6
8.96	612.0	7582.8	21.5	2575.6	31.65	-1310.7	226941.6	6.3	9649.6	54.33	-1710.4	134252.3	0.1	-463.9
9.55	664.0	9120.7	21.1	2935.8	32.24	-1338.5	232680.0	5.9	8829.6	54.93	-1710.4	125955.0	0.1	-476.0
10.15	721.1	11055.5	20.6	3365.8	32.84	-1366.3	237906.4	5.6	7992.4	55.53	-1710.4	114897.7	0.1	-489.3
10.75	778.3	13266.1	20.2	3831.0	33.44	-1391.7	242204.4	5.3	7216.4	56.13	-1710.4	104701.3	0.0	-502.6
11.34	830.2	15533.6	19.8	4284.7	34.03	-1419.5	246423.8	5.0	6346.3	56.72	-1710.4	94158.9	0.0	-514.7
11.94	887.4	18331.5	19.3	4817.4	34.63	-1444.8	249788.8	4.8	5540.4	57.32	-1710.4	83270.5	0.0	-528.0
12.54	689.6	21437.2	18.9	5255.2	35.23	-1472.6	252962.4	4.5	4637.5	57.92	-1710.4	72036.0	0.0	-541.3
13.14	689.6	24490.0	18.5	5642.9	35.82	-1500.4	255572.8	4.2	3717.3	58.51	-1870.4	60455.4	0.0	-481.5
13.73	689.6	28099.9	18.0	6069.4	36.42	-1525.8	257448.0	4.0	2865.9	59.11	-1870.4	48528.9	0.0	-395.8
14.33	689.6	31610.5	17.6	6457.1	37.02	-1553.6	258953.5	3.7	1912.9	59.71	-1870.4	36256.4	0.0	-318.0
14.93	689.6	35723.9	17.2	6883.6	37.62	-1581.4	259864.7	3.5	942.6	60.31	-1870.4	23637.8	0.0	-232.3
15.52	689.6	40101.1	16.7	7310.1	38.21	-1606.7	260168.4	3.3	45.7	60.90	-1870.4	9028.2	0.0	-146.7
16.12	689.6	44309.3	16.3	7697.8	38.81	-1634.5	260046.0	3.0	-55.7	61.50	-1870.4	0.0	0.0	-68.8
16.72	689.6	49190.1	15.9	8124.3	39.41	-1659.9	259594.5	2.8	-104.0	62.10	-1870.4	0.0	0.0	0.0
17.32	689.6	53856.1	15.5	8512.1	40.00	-1687.7	258809.8	2.6	-140.7	62.69	-1870.4	0.0	0.0	0.0
17.91	689.6	59240.5	15.0	8938.6	40.60	-1704.7	257523.5	2.4	-161.3	63.29	-1870.4	0.0	0.0	0.0
18.51	689.6	64888.8	14.6	9365.1	41.20	-1705.9	256224.1	2.2	-176.3	63.89	-1870.4	0.0	0.0	0.0
19.11	689.6	70252.5	14.2	9752.8	41.80	-1707.3	254165.9	2.1	-192.0	64.48	-1870.4	0.0	0.0	0.0
19.70	689.6	76404.3	13.8	10179.3	42.39	-1708.6	252263.2	1.9	-205.5	65.08	-1870.4	0.0	0.0	0.0
20.30	689.6	82820.0	13.3	10605.8	42.99	-1709.9	249764.9	1.7	-219.6	65.68	-1870.4	0.0	0.0	0.0
20.90	689.6	88881.2	12.9	10993.5	43.59	-1710.4	246541.5	1.6	-233.0	66.28	-1870.4	0.0	0.0	0.0
21.49	689.6	95800.5	12.5	11420.0	44.18	-1710.4	243732.1	1.4	-245.0	66.87	-1870.4	0.0	0.0	0.0
22.09	689.6	102319.6	12.1	11807.8	44.78	-1710.4	239730.6	1.3	-258.4	67.47	-1870.4	0.0	0.0	0.0

SPW911, v2.00

Title: Cantilever Sheet Pile Wall Design (FS=1.0)
Page: 1
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: Cantilever

Maximum		d (ft)
○	889.6 psf	12.00
□	260235.1 ftlb/ft	38.27
◇	15222.1 lb/ft	27.05
●	28.2 in	0.00



SPW911, v2.00

Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

Title: Cantilever Sheet Pile Wall Design (FS=1.0)
Page: 2
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: Cantilever

Input Data

Depth Of Excavation = 12.00 ft
Surcharge = 0.0 psf
Depth Of Active Water = 0.00 ft
Depth Of Passive Water = 12.00 ft
Water Density = 62.40 pcf
Minimum Fluid Density = 62.40 pcf

Soil Profile

Depth (ft)	Soil Name	γ(pcf)	γ'(pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Layer 1	90.00	42.40	600.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
8.00	Layer 2	92.40	30.00	100.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
27.00	Layer 3	107.40	45.00	700.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00
58.00	Layer 4	112.40	50.00	740.0	0.0	0.0	0.0	1.00	2.00	1.00	2.00

Solution

Sheet

Sheet Name	I (in^4/ft)	E (psi)	Z (in^3/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
Arbed AZ36	606.30	3.04E+07	67.00	25000.0	139417.1	0.00	49.47	61.47

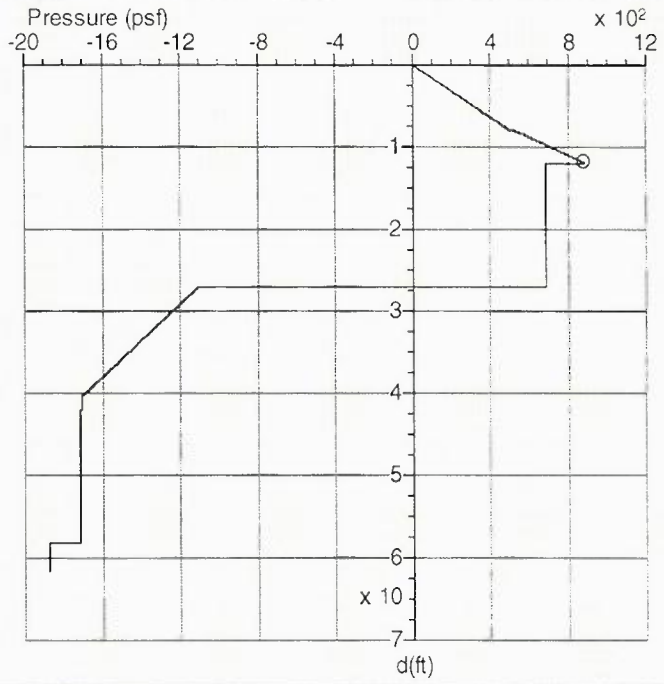
Maxima

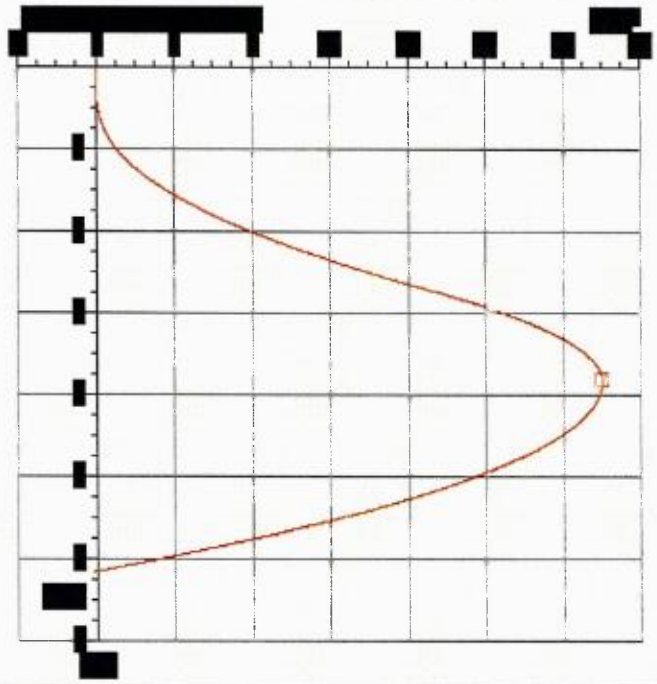
	Maximum	Depth
Bending Moment	260235.1 ftlb/ft	38.27 ft
Deflection	28.2 in	0.00 ft
Pressure	889.6 psf	12.00 ft
Shear Force	15222.1 lb/ft	27.05 ft

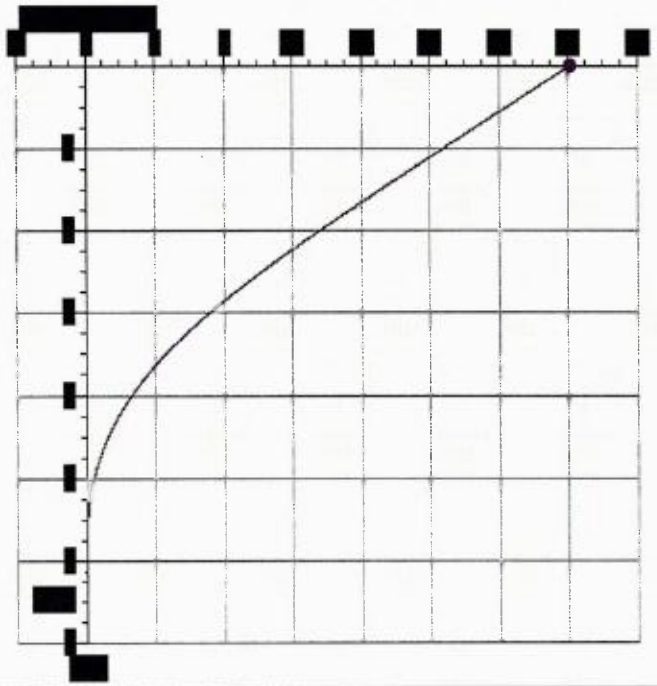
Title: Cantilever Sheet Pile Wall Design (FS=1.0)
Page: 3
Date: 9.18.08

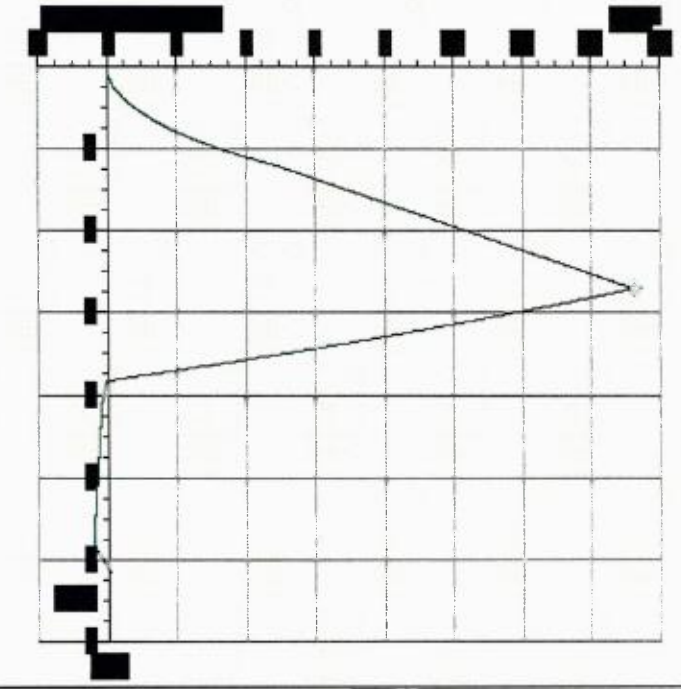
Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: Cantilever

Maximum		d (ft)
○	889.6 psf	12.00
□	260235.1 ftlb/ft	38.27
◇	15222.1 lb/ft	27.05
●	28.2 in	0.00









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Email: piebuck@pilebuck.com
Web: www.pilebuck.com

Title: Cantilever Sheet Pile Wall Design (FS=1.0)
Page: 4
Date: 9.18.08

Sheet: Arbed AZ36
Pressure: Rankine
FOS: 1.0
Toe: Cantilever

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	0.0	0.0	28.1	0.0	20.67	689.6	86501.6	13.1	10841.5	41.35	-1706.3	255764.0	2.2	-161.8
0.54	35.2	1.8	27.7	10.6	21.22	689.6	92710.6	12.7	11230.1	41.89	-1707.5	254033.0	2.0	-170.9
1.09	70.3	14.7	27.3	41.3	21.76	689.6	98545.1	12.4	11583.4	42.43	-1708.7	252015.5	1.9	-180.3
1.63	102.3	45.5	26.9	86.3	22.30	689.6	105172.1	12.0	11972.0	42.98	-1709.8	249711.4	1.7	-188.3
2.18	137.5	110.8	26.5	154.8	22.85	689.6	112018.1	11.6	12360.6	43.52	-1710.4	247120.4	1.6	-196.5
2.72	172.6	219.6	26.1	243.0	23.39	689.6	118431.8	11.2	12713.9	44.07	-1710.4	244242.6	1.5	-204.5
3.26	204.6	365.9	25.7	340.5	23.94	689.6	125695.9	10.9	13102.5	44.61	-1710.4	241077.7	1.4	-211.9
3.81	239.8	589.2	25.3	466.6	24.48	689.6	132489.6	10.5	13455.7	45.15	-1710.4	237625.7	1.2	-219.9
4.35	271.7	857.9	24.9	598.4	25.03	689.6	140171.7	10.2	13844.3	45.70	-1710.4	233398.9	1.1	-228.0
4.90	306.9	1236.1	24.5	762.3	25.57	689.6	148072.8	9.8	14232.9	46.24	-1710.4	229860.0	1.0	-235.3
5.44	342.1	1711.8	24.1	946.1	26.11	689.6	155445.6	9.5	14586.2	46.79	-1710.4	224986.9	0.9	-243.4
5.98	374.0	2238.3	23.7	1130.3	26.66	689.6	163764.6	9.1	14974.8	47.33	-1710.4	220945.3	0.8	-250.7
6.53	409.2	2931.0	23.3	1351.9	27.20	-1110.3	171503.1	8.8	15051.9	47.87	-1710.4	215425.8	0.7	-258.8
7.07	444.3	3753.7	22.9	1593.2	27.75	-1135.7	179823.5	8.5	14418.4	48.42	-1710.4	210214.4	0.6	-266.9
7.62	476.3	4623.8	22.5	1829.9	28.29	-1161.1	187783.1	8.1	13770.7	48.96	-1710.4	205418.8	0.6	-274.2
8.16	538.2	5725.7	22.1	2112.6	28.83	-1184.1	194699.4	7.8	13169.4	49.51	-1710.4	198929.7	0.5	-282.2
8.70	585.5	6873.6	21.7	2401.6	29.38	-1209.5	201948.2	7.5	12494.3	50.05	-1710.4	193631.4	0.4	-289.6
9.25	637.6	8314.2	21.3	2747.6	29.92	-1234.8	208812.9	7.2	11805.0	50.59	-1710.4	186496.1	0.4	-297.6
9.79	689.7	9957.2	20.9	3122.9	30.47	-1257.9	214713.4	6.9	11165.9	51.14	-1710.4	179848.4	0.3	-305.7
10.34	737.0	11640.5	20.5	3489.5	31.01	-1283.2	220822.5	6.6	10449.3	51.68	-1710.4	172913.2	0.3	-313.0
10.88	789.1	13716.0	20.1	3920.8	31.55	-1306.3	226023.1	6.3	9785.4	52.23	-1710.4	165690.9	0.2	-321.0
11.42	841.1	16042.1	19.7	4381.4	32.10	-1331.6	231347.5	6.0	9041.5	52.77	-1710.4	158181.4	0.2	-329.1
11.97	888.5	18388.1	19.3	4825.7	32.64	-1357.0	236249.0	5.7	8283.4	53.31	-1710.4	150384.7	0.2	-336.4
12.51	689.6	21212.2	18.9	5224.5	33.19	-1380.1	240331.2	5.5	7581.7	53.86	-1710.4	142300.4	0.1	-344.5
13.06	689.6	23970.2	18.5	5577.8	33.73	-1405.4	244403.1	5.2	6796.2	54.40	-1710.4	133929.1	0.1	-351.8
13.60	689.6	27213.0	18.1	5966.4	34.27	-1430.8	248028.6	4.9	5996.5	54.95	-1710.4	125270.4	0.1	-359.8
14.14	689.6	30674.8	17.7	6355.0	34.82	-1453.8	250930.5	4.7	5257.0	55.49	-1710.4	115186.2	0.1	-367.9
14.69	689.6	34011.9	17.4	6708.3	35.36	-1479.2	253681.6	4.4	4430.0	56.03	-1710.4	107091.4	0.0	-375.2
15.23	689.6	37891.7	16.9	7096.9	35.91	-1502.2	255775.3	4.2	3665.7	56.58	-1710.4	96360.6	0.0	-383.3
15.78	689.6	41608.9	16.6	7450.2	36.45	-1527.6	257622.8	4.0	2811.4	57.12	-1710.4	86516.8	0.0	-391.3
16.32	689.6	45906.9	16.2	7838.8	36.99	-1553.0	258985.2	3.7	1942.8	57.67	-1710.4	76385.4	0.0	-398.6
16.86	689.6	50423.8	15.8	8227.4	37.54	-1576.0	259796.1	3.5	1140.7	58.21	-1870.4	65966.6	0.0	-382.1
17.41	689.6	54720.1	15.4	8580.6	38.08	-1601.4	260210.1	3.3	244.8	58.75	-1870.4	56614.5	0.0	-307.4
17.95	689.6	59655.0	15.0	8969.2	38.63	-1624.4	260192.3	3.1	-33.3	59.30	-1870.4	44267.1	0.0	-225.3
18.50	689.6	64808.9	14.6	9357.8	39.17	-1649.8	259902.4	2.9	-83.3	59.84	-1870.4	32986.5	0.0	-143.2
19.04	689.6	69684.3	14.2	9711.1	39.71	-1675.1	259247.1	2.7	-119.0	60.39	-1870.4	21418.6	0.0	-68.6
19.58	689.6	75256.2	13.8	10099.7	40.26	-1698.2	258493.9	2.5	-139.1	60.93	-1870.4	9563.3	0.0	13.5
20.13	689.6	80511.6	13.5	10453.0	40.80	-1705.1	257208.8	2.4	-151.1	61.47	-1870.4	-1045.6	0.0	80.7

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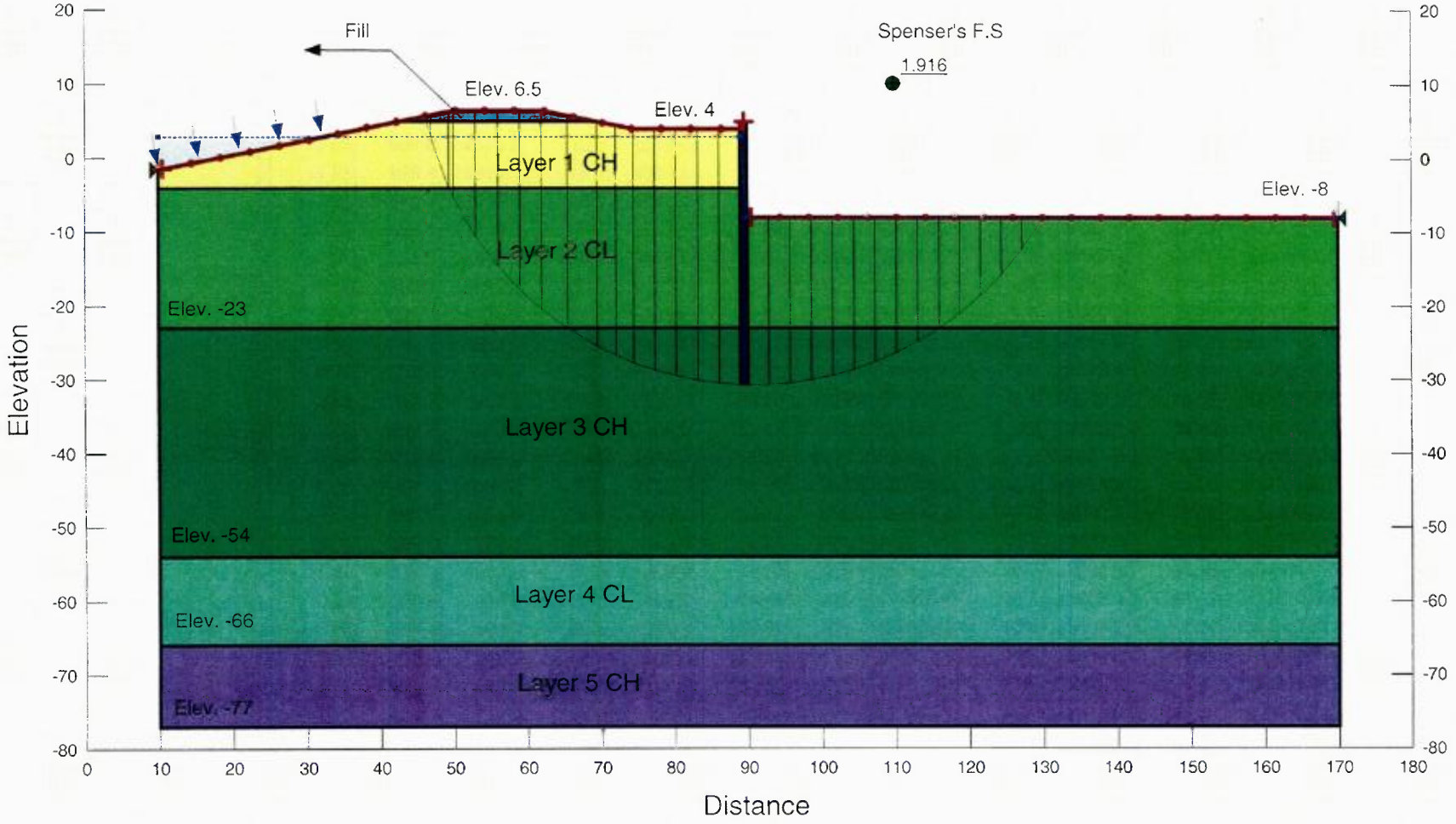
Maurepas Drainage Pump Station, LA

Global Slope Stability Analysis for Sheet Pile Wall

Name: Layer 1 Model: Undrained (Phi=0) Unit Weight: 90 pcf Cohesion: 600 psf
Name: Layer 2 Model: Undrained (Phi=0) Unit Weight: 92.4 pcf Cohesion: 100 psf
Name: Layer 3 Model: Undrained (Phi=0) Unit Weight: 107.4 pcf Cohesion: 700 psf
Name: Layer 4 Model: Undrained (Phi=0) Unit Weight: 112.4 pcf Cohesion: 740 psf
Name: Fill Model: Undrained (Phi=0) Unit Weight: 115 pcf Cohesion: 600 psf
Name: Wall Model: Undrained (Phi=0) Unit Weight: 150 pcf Cohesion: 40000 psf
Name: Layer 5 Model: Undrained (Phi=0) Unit Weight: 125.4 pcf Cohesion: 1150 psf



URS

APPENDIX F

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

IMPORTANT INFORMATION
ABOUT YOUR
GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/ The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities; and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage,* to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

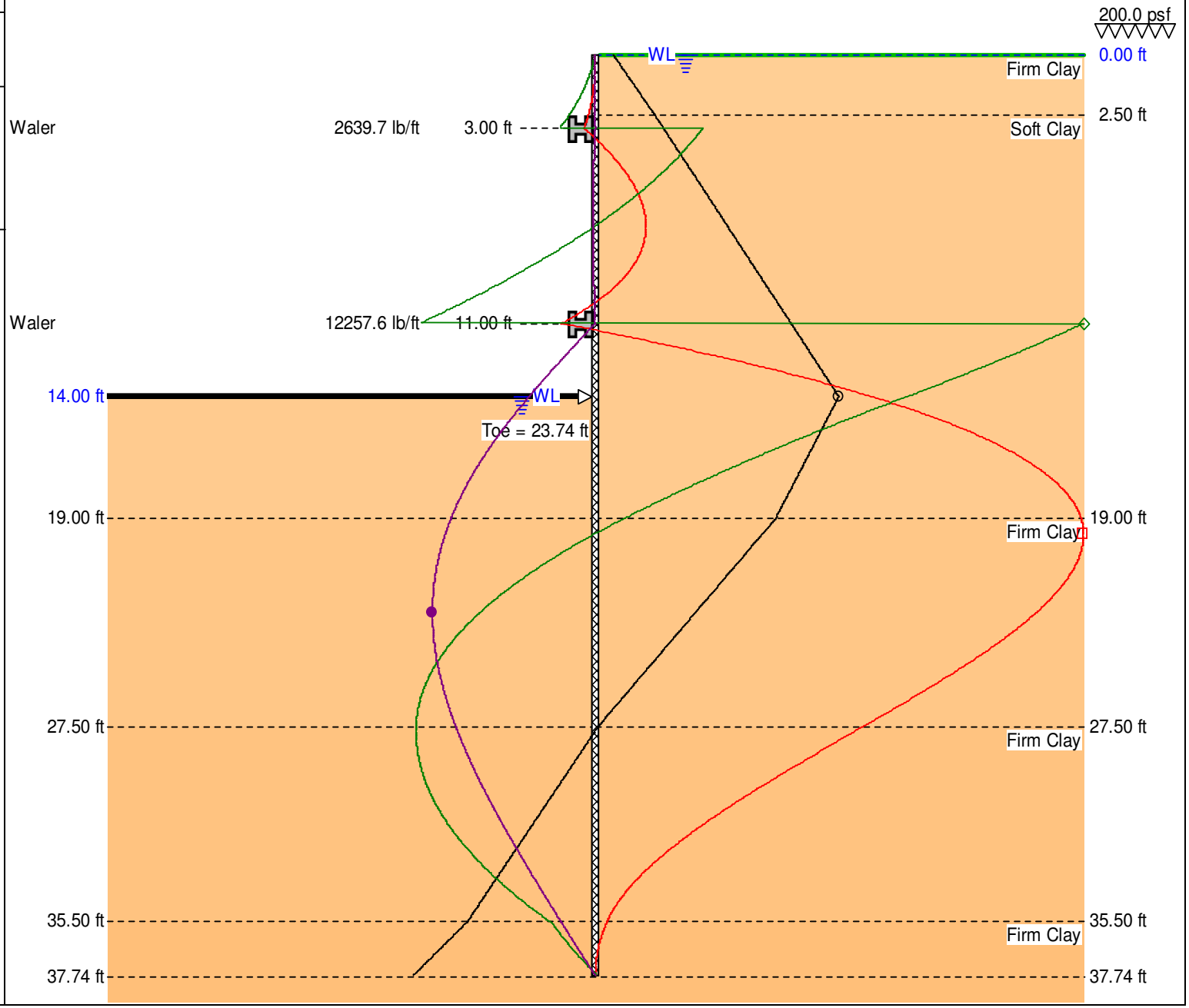
GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

Client: Lake Maurepas Pump Station
Page: 1
Date: 9.9.13
Sheet: PZ27 50Ksi
Pressure: Coulomb
FOS: 1.3

Maximum		d (ft)
○	1204.0 psf	14.00
□	35123.6 ftlb/ft	19.62
◇	9022.2 lb/ft	11.00
●	0.7 in	22.83

TRS Structure
Section A - S-Case



URS Corporation
7389 Florida Blvd, Suite 300
Baton Rouge, LA 70806
Tel: 225-922-5700

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Client: Lake Maurepas Pump Station
Page: 2
Date: 9.9.13
Sheet: PZ27 50Ksi
Pressure: Coulomb
FOS: 1.3
TRS Structure
Section A - S-Case

Input Data

Depth Of Excavation = 14.00 ft Depth Of Active Water = 0.00 ft Water Density = 64.00 pcf
Surcharge = 200.0 psf Depth Of Passive Water = 14.00 ft Minimum Fluid Density = 31.82 pcf

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ(°)	δ(°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Firm Clay	108.00	44.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
2.50	Soft Clay	98.00	34.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
19.00	Firm Clay	120.00	56.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
27.50	Firm Clay	108.00	44.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
35.50	Firm Clay	130.00	66.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
44.50	Firm Clay	112.00	48.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
60.50	Firm Clay	125.00	61.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
75.50	Soft Clay	98.00	34.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00
83.00	Firm Clay	112.00	48.00	0.0	0.0	23.0	0.0	0.44	0.00	2.28	0.00

Solution

Sheet

Sheet Name	I (in^4/ft)	E (psi)	Z (in^3/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
PZ27 50Ksi	187.50	3.04E+07	31.00	32500.1	83958.2	0.00	23.74	37.74

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
3.00	Waler	2639.7
11.00	Waler	12257.6

Maxima

	Maximum	Depth
Bending Moment	35123.6 ftlb/ft	19.62 ft
Deflection	0.7 in	22.83 ft
Pressure	1204.0 psf	14.00 ft
Shear Force	9022.2 lb/ft	11.00 ft

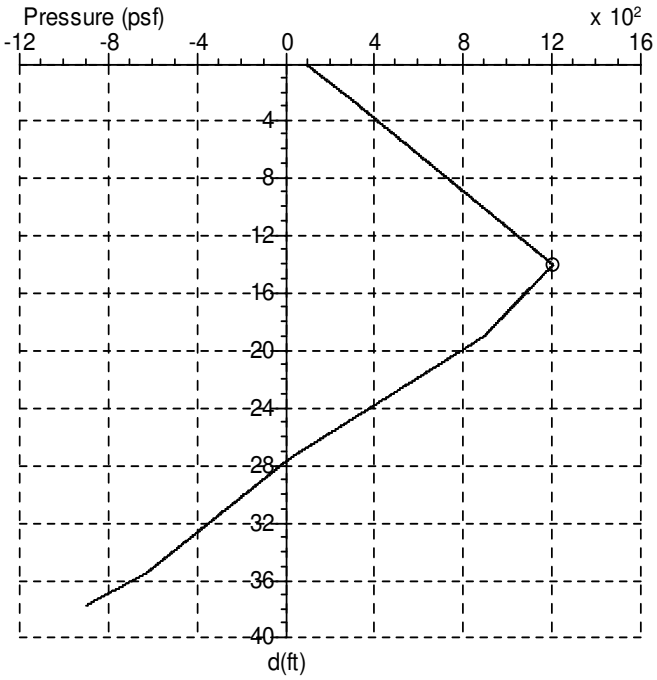
URS Corporation
7389 Florida Blvd, Suite 300
Baton Rouge, LA 70806
Tel: 225-922-5700

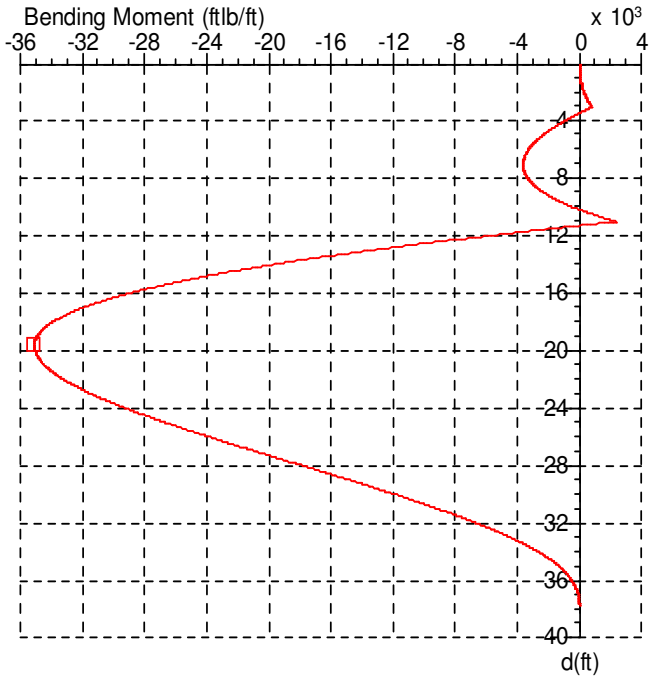
Client: Lake Maurepas Pump Station
Page: 3
Date: 9.9.13

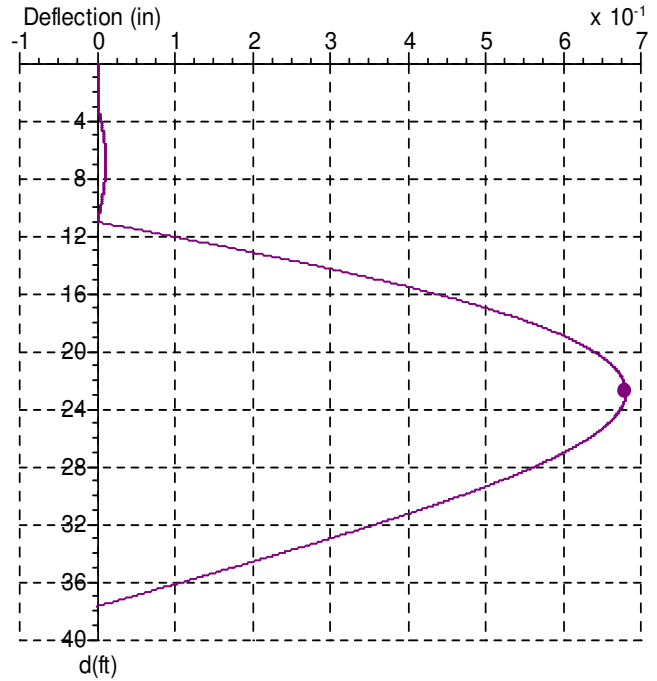
Sheet: PZ27 50Ksi
Pressure: Coulomb
FOS: 1.3

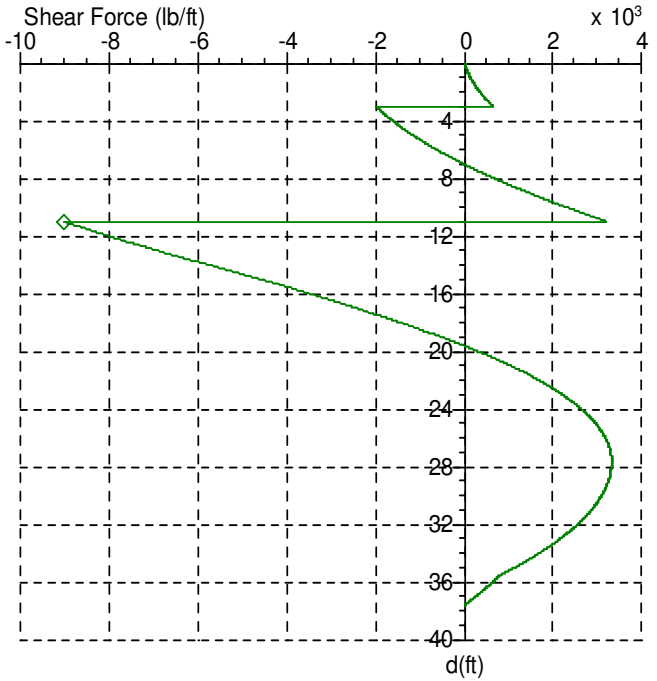
Maximum		d (ft)
○	1204.0 psf	14.00
□	35123.6 ftlb/ft	19.62
◇	9022.2 lb/ft	11.00
●	0.7 in	22.83

TRS Structure
Section A - S-Case









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7389 Florida Blvd, Suite 300
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Tel: 225-922-5700

SPW911, v2.39

Client: Lake Maurepas Pump Station
Page: 4
Date: 9.9.13

Sheet: PZ27 50Ksi
Pressure: Coulomb
FOS: 1.3

TRS Structure
Section A - S-Case

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	90.6	0.0	0.0	2.9	12.69	1102.2	-11405.4	0.2	-7262.3	25.38	231.2	-25501.2	0.6	3056.7
0.33	116.8	5.5	0.0	36.0	13.02	1129.5	-13846.3	0.2	-6875.9	25.71	198.8	-24608.6	0.6	3123.8
0.67	145.7	25.2	0.0	82.1	13.36	1154.3	-15948.6	0.2	-6516.4	26.05	163.2	-23606.1	0.6	3185.9
1.00	171.9	58.5	0.0	132.7	13.69	1181.6	-18129.7	0.3	-6111.9	26.38	130.8	-22679.0	0.6	3231.6
1.34	200.7	115.3	0.0	197.8	14.03	1200.9	-20170.1	0.3	-5698.4	26.72	95.1	-21645.6	0.6	3270.1
1.67	229.6	196.5	0.0	273.0	14.36	1181.2	-21901.3	0.3	-5324.1	27.05	59.5	-20601.7	0.6	3296.3
2.00	255.8	294.7	0.0	350.1	14.69	1159.6	-23671.4	0.3	-4919.6	27.38	27.1	-19646.9	0.6	3309.4
2.34	284.6	432.5	0.0	444.4	15.03	1139.9	-25160.6	0.4	-4558.3	27.72	-3.4	-18593.9	0.6	3312.8
2.67	310.1	587.9	0.0	538.7	15.36	1118.3	-26669.1	0.4	-4168.1	28.05	-31.4	-17541.2	0.6	3306.4
3.01	337.4	794.7	0.0	-1988.2	15.70	1096.6	-28044.5	0.4	-3785.4	28.39	-56.8	-16587.1	0.5	3292.1
3.34	364.7	125.2	0.0	-1866.3	16.03	1077.0	-29181.4	0.4	-3443.9	28.72	-84.8	-15543.7	0.5	3267.2
3.67	389.5	-445.6	0.0	-1747.4	16.36	1055.3	-30309.6	0.5	-3075.5	29.05	-110.3	-14603.2	0.5	3236.1
4.01	416.8	-1028.9	0.0	-1607.5	16.70	1035.6	-31226.0	0.5	-2747.0	29.39	-138.3	-13580.2	0.5	3192.7
4.34	444.2	-1562.3	0.0	-1458.1	17.03	1014.0	-32116.4	0.5	-2392.9	29.72	-166.3	-12572.5	0.5	3139.5
4.68	469.0	-2001.1	0.0	-1314.2	17.37	992.4	-32886.0	0.5	-2046.2	30.06	-191.8	-11672.2	0.5	3082.8
5.01	496.3	-2430.0	0.0	-1146.8	17.70	972.7	-33483.0	0.5	-1737.5	30.39	-219.8	-10702.0	0.4	3011.2
5.34	521.1	-2768.5	0.0	-986.4	18.03	951.0	-34029.2	0.6	-1405.1	30.72	-245.2	-9841.0	0.4	2937.7
5.68	548.4	-3081.2	0.0	-801.0	18.37	929.4	-34462.0	0.6	-1080.2	31.06	-273.2	-8919.7	0.4	2847.6
6.01	575.8	-3328.1	0.0	-606.1	18.70	909.7	-34759.3	0.6	-791.4	31.39	-301.2	-8028.4	0.4	2747.8
6.35	600.6	-3492.8	0.0	-420.8	19.04	885.8	-34983.1	0.6	-480.8	31.73	-326.7	-7246.8	0.4	2648.7
6.68	627.9	-3605.3	0.0	-207.9	19.37	853.4	-35094.8	0.6	-207.8	32.06	-354.7	-6421.5	0.4	2530.4
7.01	655.2	-3642.5	0.0	14.5	19.70	817.7	-35121.0	0.6	80.7	32.39	-382.7	-5635.1	0.3	2402.4
7.35	680.1	-3607.9	0.0	224.8	20.04	782.1	-35055.1	0.6	356.8	32.73	-408.2	-4956.7	0.3	2277.6
7.68	707.4	-3491.0	0.0	465.2	20.37	749.7	-34920.5	0.6	597.2	33.06	-436.2	-4253.4	0.3	2131.2
8.01	732.2	-3310.2	0.0	692.0	20.71	714.0	-34693.8	0.7	849.8	33.40	-461.6	-3655.6	0.3	1989.6
8.35	759.5	-3026.5	0.0	950.4	21.04	678.4	-34388.5	0.7	1090.1	33.73	-489.6	-3046.6	0.3	1824.6
8.68	786.8	-2650.6	0.0	1218.3	21.37	646.0	-34046.2	0.7	1297.8	34.06	-517.6	-2491.4	0.2	1650.0
9.02	811.7	-2226.0	0.0	1470.0	21.71	610.3	-33601.9	0.7	1514.5	34.40	-543.1	-2036.0	0.2	1482.8
9.35	839.0	-1664.9	0.0	1755.9	22.04	577.9	-33139.6	0.7	1700.8	34.73	-571.1	-1592.2	0.2	1289.6
9.68	863.8	-1066.5	0.0	2024.0	22.37	542.3	-32570.6	0.7	1894.0	35.07	-599.1	-1211.2	0.2	1086.8
10.02	891.1	-308.1	0.0	2328.0	22.71	506.7	-31941.9	0.7	2074.9	35.40	-624.6	-922.0	0.1	894.0
10.35	918.4	558.4	0.0	2641.4	23.04	474.2	-31321.9	0.7	2228.6	35.73	-662.9	-665.1	0.1	732.1
10.69	943.3	1442.9	0.0	2934.5	23.38	438.6	-30590.2	0.7	2385.9	36.07	-701.1	-467.6	0.1	622.9
11.02	970.6	2137.6	0.0	-8991.7	23.71	406.2	-29883.0	0.7	2518.3	36.40	-743.1	-287.7	0.1	495.9
11.35	997.9	-906.0	0.0	-8650.8	24.04	370.6	-29062.7	0.7	2652.0	36.73	-785.1	-149.2	0.1	361.5
11.69	1022.7	-3569.9	0.1	-8332.7	24.38	334.9	-28201.5	0.7	2773.5	37.07	-823.3	-61.3	0.0	232.8
12.02	1050.0	-6383.7	0.1	-7973.8	24.71	302.5	-27386.6	0.7	2873.2	37.40	-865.3	-8.6	0.0	84.3
12.36	1074.9	-8833.2	0.1	-7639.3	25.05	266.9	-26458.6	0.7	2971.1	37.74	-899.7	0.0	0.0	0.0

URS Corporation

7389 Florida Blvd, Suite 300
Baton Rouge, LA 70806
Tel: 225-922-5700

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-SEPTEMBER-2013 TIME: 16:01:32

****
* INPUT DATA *
****

I.--HEADING
'LAKE MAUREPAS - PUMP STATION
'SHEET PILE WALL - S-CASE

II.--CONTROL
CANTILEVER WALL DESIGN
FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.50
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.50

III.--WALL DATA
ELEVATION AT TOP OF WALL = 1.00 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	1.00

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	-4.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
108.00	108.00	23.00	0.00	17.00	0.00	1.50	0.00	DEF	DEF
98.00	98.00	23.00	0.00	17.00	0.00	-15.00	0.00	DEF	DEF
120.00	120.00	23.00	0.00	17.00	0.00	-23.50	0.00	DEF	DEF
108.00	108.00	23.00	0.00	17.00	0.00	-33.50	0.00	DEF	DEF
130.00	130.00	23.00	0.00	17.00	0.00	-40.50	0.00	DEF	DEF
112.00	112.00	23.00	0.00	17.00	0.00	-56.50	0.00	DEF	DEF
125.00	125.00	23.00	0.00	17.00	0.00	-71.50	0.00	DEF	DEF
98.00	98.00	23.00	0.00	17.00	0.00	-76.50	0.00	DEF	DEF
112.00	112.00	23.00	0.00	17.00	0.00			DEF	DEF

V.B.--LEFTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
98.00	98.00	23.00	0.00	17.00	0.00	-15.00	0.00	DEF	DEF
120.00	120.00	23.00	0.00	17.00	0.00	-23.50	0.00	DEF	DEF
108.00	108.00	23.00	0.00	17.00	0.00	-33.50	0.00	DEF	DEF
130.00	130.00	23.00	0.00	17.00	0.00	-40.50	0.00	DEF	DEF
112.00	112.00	23.00	0.00	17.00	0.00	-53.50	0.00	DEF	DEF
125.00	125.00	23.00	0.00	17.00	0.00	-71.50	0.00	DEF	DEF
98.00	98.00	23.00	0.00	17.00	0.00	-76.50	0.00	DEF	DEF
112.00	125.00	23.00	0.00	17.00	0.00			DEF	DEF

VI.--WATER DATA
UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = -0.50 (FT)
LEFTSIDE ELEVATION = -0.50 (FT)
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 8-SEPTEMBER-2013 TIME: 16:01:34

****
* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'LAKE MAUREPAS - PUMP STATION
'SHEET PILE WALL - S-CASE

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY COULOMB COEFFICIENTS
AND THEORY OF ELLASTICITY EQUATIONS FOR SURCHARGE LOADS.

LEFTSIDE SOIL PRESSURES DETERMINED BY COULOMB COEFFICIENTS
AND THEORY OF ELLASTICITY EQUATIONS FOR SURCHARGE LOADS.

				<------NET------>			
	NET	<---LEFTSIDE--->		(SOIL + WATER)		<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	PASSIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	81.4	353.4	81.4	353.4
-0.5	0.0	0.0	0.0	108.6	471.2	108.6	471.2
-1.0	0.0	0.0	0.0	135.7	589.0	135.7	589.0
-2.0	0.0	0.0	0.0	190.0	824.5	190.0	824.5
-3.0	0.0	0.0	0.0	244.3	1060.1	244.3	1060.1
-4.0	0.0	0.0	0.0	298.6	1295.7	298.6	1295.7
-5.0	0.0	77.7	17.9	275.2	1513.4	352.9	1531.3
-6.0	0.0	155.3	35.8	251.9	1731.1	407.2	1766.9
-7.0	0.0	233.0	53.7	228.5	1948.8	461.5	2002.5
-8.0	0.0	310.6	71.6	205.1	2166.5	515.8	2238.1
-9.0	0.0	388.3	89.5	181.8	2384.2	570.0	2473.6
-10.0	0.0	465.9	107.4	158.4	2601.8	624.3	2709.2
-11.0	0.0	543.6	125.3	135.0	2819.5	678.6	2944.8
-12.0	0.0	621.2	143.2	111.7	3037.2	732.9	3180.4
-13.0	0.0	698.9	161.1	88.3	3254.9	787.2	3416.0
-14.0	0.0	776.6	179.0	64.9	3472.6	841.5	3651.6
-15.0	0.0	854.2	196.9	41.6	3690.3	895.8	3887.1
-15.6	0.0	927.4	213.7	0.0	3810.7	927.4	4024.4
-16.0	0.0	979.9	225.8	-29.8	3896.9	950.1	4122.7
-17.0	0.0	1105.5	254.8	-101.1	4103.5	1004.4	4358.3
-18.0	0.0	1231.1	283.7	-172.5	4310.2	1058.7	4593.9
-19.0	0.0	1356.8	312.7	-243.8	4516.8	1113.0	4829.5
-20.0	0.0	1482.4	341.6	-315.2	4723.4	1167.2	5065.1
-21.0	0.0	1608.1	370.6	-386.5	4930.1	1221.5	5300.6
-22.0	0.0	1733.7	399.5	-457.9	5136.7	1275.8	5536.2
-23.0	0.0	1859.4	428.5	-529.3	5343.3	1330.1	5771.8
-23.5	0.0	1922.2	443.0	-564.9	5446.6	1357.3	5889.6
-24.0	0.0	1971.9	454.4	-587.5	5553.0	1384.4	6007.4
-25.0	0.0	2071.4	477.4	-632.7	5765.6	1438.7	6243.0
-26.0	0.0	2170.9	500.3	-677.9	5978.3	1493.0	6478.6
-27.0	0.0	2270.3	523.2	-723.1	6191.0	1547.3	6714.2
-28.0	0.0	2369.8	546.1	-768.2	6403.6	1601.6	6949.7
-29.0	0.0	2469.3	569.0	-813.4	6616.3	1655.9	7185.3
-30.0	0.0	2568.7	592.0	-858.6	6828.9	1710.1	7420.9
-31.0	0.0	2668.2	614.9	-903.8	7041.6	1764.4	7656.5
-32.0	0.0	2767.7	637.8	-948.9	7254.3	1818.7	7892.1
-33.0	0.0	2867.1	660.7	-994.1	7466.9	1873.0	8127.7
-33.5	0.0	2916.9	672.2	-1016.7	7573.3	1900.2	8245.4
-34.0	0.0	2990.6	689.2	-1063.3	7674.1	1927.3	8363.2

-35.0	0.0	3138.1	723.2	-1156.5	7875.7	1981.6	8598.8

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 8-SEPTEMBER-2013 TIME: 16:01:35

****
* SUMMARY OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'LAKE MAUREPAS - PUMP STATION
'SHEET PILE WALL - S-CASE

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY COULOMB COEFFICIENTS
AND THEORY OF ELLASTICITY EQUATIONS FOR SURCHARGE LOADS.

LEFTSIDE SOIL PRESSURES DETERMINED BY COULOMB COEFFICIENTS
AND THEORY OF ELLASTICITY EQUATIONS FOR SURCHARGE LOADS.

WALL BOTTOM ELEV. (FT) : -35.31
PENETRATION (FT) : 31.31

MAX. BEND. MOMENT (LB-FT) : 4.0180E+04
AT ELEVATION (FT) : -24.27

MAX. SCALED DEFL. (LB-IN^3): 2.8848E+10
AT ELEVATION (FT) : 1.50

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-SEPTEMBER-2013 TIME: 16:01:35

****
* COMPLETE OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'LAKE MAUREPAS - PUMP STATION
'SHEET PILE WALL - S-CASE

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
1.50	0.0000E+00	0.	2.8848E+10	0.00
1.00	-5.5879E-09	0.	2.8231E+10	0.00
0.00	1.3573E+01	41.	2.6996E+10	81.44
-0.50	4.5242E+01	88.	2.6378E+10	108.58
-1.00	1.0406E+02	149.	2.5761E+10	135.73
-2.00	3.3027E+02	312.	2.4526E+10	190.02
-3.00	7.4649E+02	529.	2.3292E+10	244.31
-4.00	1.4070E+03	801.	2.2059E+10	298.60
-5.00	2.3532E+03	1088.	2.0829E+10	275.23
-6.00	3.5746E+03	1351.	1.9602E+10	251.87
-7.00	5.0479E+03	1591.	1.8382E+10	228.50
-8.00	6.7497E+03	1808.	1.7171E+10	205.14
-9.00	8.6566E+03	2002.	1.5972E+10	181.77
-10.00	1.0745E+04	2172.	1.4787E+10	158.41
-11.00	1.2992E+04	2319.	1.3621E+10	135.04
-12.00	1.5375E+04	2442.	1.2478E+10	111.68
-13.00	1.7868E+04	2542.	1.1361E+10	88.31
-14.00	2.0451E+04	2619.	1.0275E+10	64.95
-15.00	2.3098E+04	2672.	9.2239E+09	41.58
-15.58	2.4659E+04	2684.	8.6297E+09	0.00
-16.00	2.5778E+04	2678.	8.2131E+09	-29.77
-17.00	2.8429E+04	2612.	7.2469E+09	-101.13
-18.00	3.0979E+04	2475.	6.3298E+09	-172.48
-19.00	3.3356E+04	2267.	5.4661E+09	-243.84
-20.00	3.5490E+04	1988.	4.6601E+09	-315.19
-21.00	3.7308E+04	1637.	3.9154E+09	-386.55
-22.00	3.8740E+04	1215.	3.2351E+09	-457.90
-23.00	3.9714E+04	721.	2.6216E+09	-529.25
-23.50	4.0006E+04	448.	2.3405E+09	-564.93
-24.00	4.0159E+04	159.	2.0767E+09	-587.52
-25.00	4.0017E+04	-451.	1.6011E+09	-632.70
-26.00	3.9242E+04	-1106.	1.1946E+09	-677.88
-27.00	3.7790E+04	-1806.	8.5580E+08	-723.06
-28.00	3.5614E+04	-2552.	5.8219E+08	-768.23
-29.00	3.2670E+04	-3343.	3.7000E+08	-813.41
-30.00	2.8913E+04	-4179.	2.1414E+08	-858.59

-31.00	2.4298E+04	-5060.	1.0813E+08	-903.77
-32.00	1.8778E+04	-5986.	4.3976E+07	-948.95
-33.00	1.2310E+04	-6958.	1.2131E+07	-994.13
-33.23	1.0664E+04	-7190.	8.1966E+06	-1004.64
-33.50	8.7193E+03	-7305.	4.8967E+06	147.95
-34.00	5.1751E+03	-6692.	1.4307E+06	2303.41
-35.00	3.5313E+02	-2233.	4.9034E+03	6614.33
-35.31	0.0000E+00	0.	0.0000E+00	7937.54

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
1.50	0.	0.	0.	0.	0.
1.00	0.	0.	0.	0.	0.
0.00	0.	0.	0.	81.	353.
-0.50	0.	0.	0.	109.	471.
-1.00	0.	0.	0.	136.	589.
-2.00	0.	0.	0.	190.	825.
-3.00	0.	0.	0.	244.	1060.
-4.00	0.	0.	0.	299.	1296.
-5.00	0.	78.	18.	353.	1531.
-6.00	0.	155.	36.	407.	1767.
-7.00	0.	233.	54.	461.	2002.
-8.00	0.	311.	72.	516.	2238.
-9.00	0.	388.	89.	570.	2474.
-10.00	0.	466.	107.	624.	2709.
-11.00	0.	544.	125.	679.	2945.
-12.00	0.	621.	143.	733.	3180.
-13.00	0.	699.	161.	787.	3416.
-14.00	0.	777.	179.	842.	3652.
-15.00	0.	854.	197.	896.	3887.
-15.58	0.	927.	214.	927.	4024.
-16.00	0.	980.	226.	950.	4123.
-17.00	0.	1106.	255.	1004.	4358.
-18.00	0.	1231.	284.	1059.	4594.
-19.00	0.	1357.	313.	1113.	4829.
-20.00	0.	1482.	342.	1167.	5065.
-21.00	0.	1608.	371.	1222.	5301.
-22.00	0.	1734.	400.	1276.	5536.
-23.00	0.	1859.	428.	1330.	5772.
-23.50	0.	1922.	443.	1357.	5890.
-24.00	0.	1972.	454.	1384.	6007.
-25.00	0.	2071.	477.	1439.	6243.
-26.00	0.	2171.	500.	1493.	6479.

-27.00	0.	2270.	523.	1547.	6714.
-28.00	0.	2370.	546.	1602.	6950.
-29.00	0.	2469.	569.	1656.	7185.
-30.00	0.	2569.	592.	1710.	7421.
-31.00	0.	2668.	615.	1764.	7656.
-32.00	0.	2768.	638.	1819.	7892.
-33.00	0.	2867.	661.	1873.	8128.
-33.23	0.	2890.	666.	1886.	8182.
-33.50	0.	2917.	672.	1900.	8245.
-34.00	0.	2991.	689.	1927.	8363.
-35.00	0.	3138.	723.	1982.	8599.
-35.31	0.	3286.	757.	2036.	8834.
-37.00	0.	3433.	791.	2090.	9070.