PERMIT ISSUED

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No:	Issue Date:	CBL:
03-0217	MAR 21 2003	070 A005001

Location of Construction:	Owner Name:	Owner Address:	Phone:
54 St John St	St John Street Associates	Po Box 4821 (CITY OF PORTLAND)	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Flemming, H.B.	89 Pleasant St. South Portland	7998514
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	**Zone:**
		Alterations - Commercial	

Past Use:	Proposed Use:	Permit Fee:	Cost of Work:	CEO District:
Commercial Poultry/Food Processing	Shoring/Pilings/Underpinning to support existing structure during excavation.		$0.00	3

FIRE DEPT: ☐ Approved ☐ Denied N/A

Signature:

INSPECTION: Use Group: F2 Type: 1B 3/21/03

Signature:

Proposed Project Description:
Above

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action: ☐ Approved ☐ Approved w/Conditions ☐ Denied

Signature: Date:

Permit Taken By:	Date Applied For:
mjn	03/21/2003

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building permits do not include plumbing, septic or electrical work.
3. Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work..

Zoning Approval

Special Zone or Reviews	Zoning Appeal	Historic Preservation
☐ Shoreland	☐ Variance	☐ Not in District or Landmark
☐ Wetland	☐ Miscellaneous	☐ Does Not Require Review
☐ Flood Zone	☐ Conditional Use	☐ Requires Review
☐ Subdivision	☐ Interpretation	☐ Approved
☐ Site Plan N/A	☐ Approved	☐ Approved w/Conditions
Maj ☐ Minor ☐ MM ☐	☐ Denied	☐ Denied
Date:	Date:	Date:

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT | ADDRESS | DATE | PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE | DATE | PHONE

Form # P 04

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

CITY OF PORTLAND

BUILDING INSPECTION

PERMIT

PERMIT ISSUED

MAR 21 2003

CITY OF PORTLAND

Please Read Application And Notes, If Any, Attached

Permit Number: 030217

This is to certify that St John Street Associates/Fle[illegible]ing, H.B.

has permission to Shoring/Pilings/Underpinnin[illegible] suppor[illegible]structure dur[illegible] excavation.

AT 54 St John St

C[illegible] 070 A005001

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of buildings and structures, and of the application on file in this department.

Apply to Public Works for street line and grade if nature of work requires such information.

N[illegible]ification [illegible] inspe[illegible]n must [illegible]e g[illegible]n and w[illegible]n permis[illegible]n procu[illegible] b[illegible]re this [illegible]ding or [illegible]t thereo[illegible] la[illegible]ed or o[illegible]rwis[illegible]osed-in. [illegible] H[illegible]UR NOT[illegible]REQUIRED.

A certificate of occupancy must be procured by owner before this building or part thereof is occupied.

OTHER REQUIRED APPROVALS

Fire Dept. N/A

Health Dept. _____

Appeal Board _____

Other _____

Department Name

3/21/03

Director - Building & Inspection Services

PENALTY FOR REMOVING THIS CARD

H.B. Fleming
89 Pleasant Ave.
South Portland, ME 04106
P: 207-799-8514
F: 207-799-8538

FAX TRANSMITTAL

Total # of Pages: 7

To: APEX CONST., INC. **Re:** BARBER FOODS

Attn: JEFF TODD **Fax:** 603-323-9080

From: Dave Gifford **Date:** 3/19/03

JEFF,

RESPONSE LETTER TO ADP/S.W. COLE CONCERNS FOLLOWS.

PLEASE CALL W/ QUESTIONS.

THANKS,

DAVE

CONT: TIM BOYCE F: 657-7840

MICHAEL NUGENT F: 874-8716

H.B. FLEMING
89 PLEASANT AVE
SOUTH PORTLAND, MAINE 04106
Phone: 207-799-8514 Fax: 207-799-8538
www.HBFLEMING.com

APEX Construction, Inc.
70 Benjamin Wentworth Dr.
Chocura, NH 03817

March 19, 2003

Re: Barber Foods

Attn: Jeff Todd

Dear Jeff,

We are writing to address review comments made by Associated Design Partners, Inc. (ADP) and S.W. Cole Engineering, Inc. (SWC) regarding our Barber Foods Shoring System Design. Copies of SWC's letter dated 3/10/03 and ADP's letter dated 3/11/03 are included for reference.

We will address the review comments made by SWC first, then those of ADP.

- Push Blocks for rakes appear undersized.
  - As per SWC's recommendation, we will utilize push blocks sized at 7' long x 7' deep x 3' thick.
- Calculation for control of Bottom Heave.
  - It is our understanding that structural fill will be brought on site to fill to grade for proposed footings and slabs. We feel that the structural fill, along with the fact that our sheet piles are extending to EL 4, will preclude any possible bottom heaving. Any further concern for bottom heaving is a site issue and should be brought to the site contractor's attention.
- Sheet piles should extend to EL 4.
  - Sheets will be long enough to extend to EL 4.
- Procedure to fill potential voids below Building #54.
  - Any potential voids identified prior to removing the shoring system should be filled with flowable fill.
- Procedure for testing of Anchor Rods.
  - As noted on our original Shoring System Plan Drawing, Design Load of the Helical Anchors is 42 kips. 25% of the anchors will be tested to 70 kips. All anchors will be pre-loaded to the Design Load of 42 kips. Our testing and pre-loading procedure utilizes a 50-ton jack to tension the anchors to the required load. The anchors are then "locked off" using the appropriate hardware.
- Establishment of Monitoring Points

- Monitoring points will be established on Building #54 and will be monitored prior to, during, and following construction.

- Calculations for Building #54 showing sliding, overturning, and stability calculations.
  - These calculations are not necessary because at no time will the footing be unearthed as a whole. Excavation will extend to the top of footing only and any further excavation required to install footing hanger brackets will be localized.
- Vibration monitoring
  - Vibration monitoring will take place during the initial installation of both sheet piles and H piles.
- Concern for condition of used shoring components.
  - All shoring components will be in good used shape. If any holes are present in sheet piles, they will be patched.
- Factor of Safety for DSI Threadbar.
  - DSI Threadbar does not call for a Factor of Safety of 4.0. Rawl-Studs do. We propose using 8 ea. 7/8" x 8" Rawl-Studs with a minimum embedment depth of 5.75" instead of the previously proposed 6 ea. Rawl-Studs. (See attached calculations)
- Rawl-Stud spacing and failure cone concerns.
  - All installed Rawl-Studs will be spaced at a minimum of 9" between bolts and rows. As the attached design recommendations from Powers Fasteners indicates, a spacing of 8.75" for 7/8" diameter mechanical anchors allows for a load reduction factor of 1.0.

We trust that this letter and attached calculations/references are adequate in addressing the concerns raised by both Associated Design Partners and S.W. Cole. If you have any questions or concerns, please feel free to contact us.

Regards,

Dave Gifford

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

02-0956.1
March 10, 2003

EER, Inc.
Attn: Steve Dyer / Bob Larsen
Via Hand Delivery

Subject: Barber Foods Pretreatment Building
Shoring Plan Review Comments

Dear Steve / Bob:

Following are our comments from review of Shoring/Underpinning Plans prepared by H.B. Fleming, dated February 7, 2003.

1) Push Block for rakes appear undersized. Recommend Safety Factor of 1.5 (min)
2) Calculation for control of Bottom Heave should be included. Sheetpiles should extend to minimum tip elevation of 4-feet.
3) Procedure to fill potential voids below Bldg #54 footings prior to removal of underpinning elements should be identified in the plan.
4) Details on procedure for testing of anchor rods should be outlined. Recommend procedure outlined by Post-Tension Institute for Soil and Rock Anchors
5) Monitoring points should be established on Bldg #54 to establish baseline for movement, monitor during construction and at-least once post-construction
6) Calculations of Bldg #54 footing should show sliding, overturning and stability calculations for unearthed footing condition.
7) Include vibration monitoring in plan during sheetpile and H-pile installation/removal.
8) Concern for condition of used shoring components. For example, holes in sheetpile could contribute to ground loss.

As discussed, S.W.COLE ENGINEERING, INC will be on-site on a part-time basis to observe shoring and underpinning activities as scheduled by EER, INC. We trust this letter meets your current needs.

Sincerely,

S.W.COLE ENGINEERING, INC.

Timothy J. Boyce, P.E.

Gray, ME Office
786 Portland Road, Gray, ME 04039-9586 • Tel (207) 657-2866 • Fax (207) 657-2840 • E-Mail infogray@swcole.com • www.swcole.com
Other offices in Augusta, Bangor, and Caribou, Maine & Somersworth, New Hampshire

ASSOCIATED DESIGN PARTNERS INC.
80 Leighton Road • Falmouth, Maine 04105
Office: 207.878.1751
Fax: 207.878.1788
e-mail: adp@maine.rr.com

March 11, 2003

02005

H.B. Fleming
Attn: Dean Sciaraffa
89 Pleasant Street
South Portland, ME 04106

RE: Barber Foods Wastewater Pre-Treatment Building
Shoring System/Underpinning Design

Dear Dean,

The following is Associated Design Partners, Inc. review comments for the Shoring System/Underpinning Design Submittal dated February 7, 2003 for the above referenced project.

1. The attachment of the "DSI threadbar" at the existing building foundation wall (section D-D) has a calculated factor of safety of 1.88. The minimum factor of safety required is 4.00 +/- 0.33. This factor of safety may require the use of chemical anchors instead of expansion bolts.
2. Detail 4 of the above referenced attachment, does not provide the minimum spacing between bolts in a row, or the minimum spacing between rows of bolts. Bolt spacing should be selected to minimize overlap of the failure cone. The allowable load per bolt should be adjusted accordingly based on the overlap of the failure cone.

Also attached are comments from S.W. Cole Engineering, Inc. for the above referenced project.

Please call should you have any questions.

Sincerely,

James A. Thibodeau, P.E.
President
Senior Engineer
Associated Design Partners, Inc.

cc: Steve Dyer, Environmental Engineering & Remediation, Inc.
Jeff Todd, Apex Construction

REVISED RAWL-STUD ANALYSIS : BARBER FOODS 3/19/03

LOAD ON CONNECTION : 38.65 K

7/8" x 8" RAWL-STUD w/ 5.75" (MIN.) EMBEDMENT

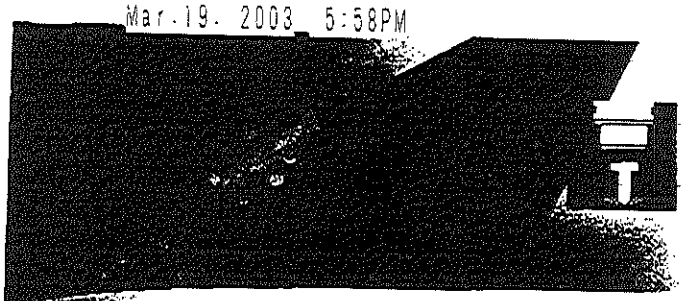
ALLOWABLE LOAD PER RAWL-STUD : $\frac{20.4\ ^{K}}{4}$ (SHEAR) = 5.1 K

8 EA. RAWL STUDS

ALLOWABLE TOTAL CAPACITY = 8 (5.1 K) = 40.8 K

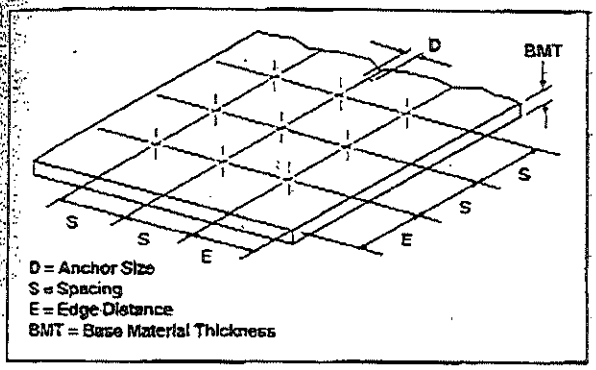
40.8 > 38.65 → O.K.

* RAWL-STUDS SPACED 9" MIN. BET. BOLTS & RODS. *



BASE MATERIAL THICKNESS

The minimum recommended thickness of solid concrete or masonry base material, BMT, when using a mechanical or adhesive anchor typically is 125% of the embedment to be used. For example, when installing an anchor to a depth of 4", the base material should be at least 5" thick. Conversely, the maximum embedment should be 80% of the base material thickness. If a concrete slab is 10" thick, an 8" depth would be the maximum recommended anchor embedment. This does not apply to products designed for installation in hollow base materials as noted in the individual anchor sections.



D = Anchor Size
S = Spacing
E = Edge Distance
BMT = Base Material Thickness

SPACING AND EDGE DISTANCE FOR MECHANICAL ANCHORS

The published ultimate load capacities for mechanical anchors are based on testing conducted at the spacing and edge distance required to obtain the maximum load. For reduced spacing or edge distance, the following factors should be applied. These factors are cumulative as shown in the upcoming Design Example.

SPACING - MECHANICAL ANCHOR

To obtain the maximum load in tension or shear, a spacing, S, of 10 anchor diameters (10D) or greater should be used. The minimum recommended anchor spacing, S, is 5 anchor diameters (5D) at which point the load should be reduced by 50%. Anchor spacing closer or less than 5 diameters (5D) needs to be field tested. Actual base material conditions will determine any applicable reduction factor. The following table lists the load reduction factor, Rs, for each anchor diameter, D, based on the center to center anchor spacing.

ANCHOR SIZE D	ANCHOR SPACING, S (INCHES) TENSION AND SHEAR					
	10D	9D	8D	7D	6D	5D
6-32	1-3/8	1-1/4	1-1/8	1	7/8	3/4
8-32	1-5/8	1-1/2	1-3/8	1-1/8	1	7/8
10-24	1-7/8	1-3/4	1-1/2	1-3/8	1-1/8	1
3/16	1-7/8	1-3/4	1-1/2	1-3/8	1-1/8	
1/4	2-1/2	2-1/4	2	1-3/4	1-1/2	1-1/4
5/16	3-1/8	2-7/8	2-1/2	2-1/4	1-7/8	1-5/8
3/8	3-3/4	3-3/8	3	2-5/8	2-1/4	1-7/8
1/2	5	4-1/2	4	3-1/2	3	2-1/2
5/8	6-1/4	5-5/8	5	4-3/8	3-3/4	3-1/8
3/4	7-1/2	6-3/4	6	5-1/4	4-1/2	3-3/4
7/8	8-3/4	7-7/8	7	6-1/8	5-1/4	4-3/8
1	10	9	8	7	6	5
1-1/4	12-1/2	11-1/4	9	8-3/4	7-1/2	6-1/4

EDGE DISTANCE FOR MALE-STYLE ANCHORS

EDGE DISTANCE - TENSION LOADS FOR MALE ANCHORS

For tension loads, an edge distance, E, of 12 diameters (12D) or greater should be used to obtain the maximum tension load. The minimum recommended edge distance, E, is 5 diameters (5D) at which point the tension load should be reduced by 20%. Edge distances closer or less than 5 diameters (5D) need to be field tested. Actual base material conditions will determine any applicable reduction factor. The following table lists the load reduction factor, Re, for each anchor diameter, D, based on the anchor center to edge distance.

ANCHOR SIZE D	EDGE DISTANCE, E (INCHES) TENSION ONLY							
	12D	11D	10D	9D	8D	7D	6D	5D
3/16	2-1/4	2-1/8	1-7/8	1-3/4	1-1/2	1-3/8	1-1/8	1
1/4	3	2-3/4	2-1/2	2-1/4	2	1-3/4	1-1/2	1-1/4
5/16	3-3/4	3-1/2	3-1/8	2-7/8	2-1/2	2-1/4	1-7/8	1-5/8
3/8	4-1/2	4-1/8	3-3/4	3-3/8	3	2-5/8	2-1/4	1-7/8
1/2	6	5-1/2	5	4-1/2	4	3-1/2	3	2-1/2
5/8	7-1/2	6-7/8	6-1/4	5-5/8	5	4-3/8	3-3/4	3-1/8
3/4	9	8-1/4	7-1/2	6-3/4	6	5-1/4	4-1/2	3-3/4
7/8	10-1/2	9-5/8	8-3/4	7-7/8	7	6-1/8	5-1/4	4-3/8
1	12	11	10	9	8	7	6	5
1-1/4	15	13-7/8	12-1/2	11-1/4	9	8-3/4	7-1/2	6-1/4
Re	1.00	0.97	0.94	0.91	0.89	0.86	0.83	0.80

EDGE DISTANCE, SHEAR LOADS, FOR MALE ANCHORS

For shear loads, an edge distance, E, of 12 anchor diameters (12D) or greater should be used to obtain the maximum load. The minimum recommended edge distance, E, is 5 anchor diameters (5D) at which point the shear load should be reduced by 50%. Edge distances closer or less than 5 diameters (5D) need to be field tested. Actual base material conditions will determine any applicable reduction factor. The following table lists the load reduction factor, Re, for each anchor diameter, D, based on the anchor center to edge distance.

ANCHOR SIZE D	EDGE DISTANCE, E (INCHES) SHEAR ONLY							
	12D	11D	10D	9D	8D	7D	6D	5D
3/16	2-1/4	2-1/8	1-7/8	1-3/4	1-1/2	1-3/8	1-1/8	1
1/4	3	2-3/4	2-1/2	2-1/4	2	1-3/4	1-1/2	1-1/4
5/16	3-3/4	3-1/2	3-1/8	2-7/8	2-1/2	2-1/4	1-7/8	1-5/8
3/8	4-1/2	4-1/8	3-3/4	3-3/8	3	2-5/8	2-1/4	1-7/8
1/2	6	5-1/2	5	4-1/2	4	3-1/2	3	2-1/2
5/8	7-1/2	6-7/8	6-1/4	5-5/8	5	4-3/8	3-3/4	3-1/8
3/4	9	8-1/4	7-1/2	6-3/4	6	5-1/4	4-1/2	3-3/4
7/8	10-1/2	9-5/8	8-3/4	7-7/8	7	6-1/8	5-1/4	4-3/8
1	12	11	10	9	8	7	6	5
1-1/4	15	13-7/8	12-1/2	11-1/4	9	8-3/4	7-1/2	6-1/4
Re	1.00	0.93	0.86	0.79	0.71	0.64	0.57	0.50

EDGE DISTANCE FOR FEMALE-STYLE ANCHORS

EDGE DISTANCE, TENSION LOADS FOR FEMALE ANCHORS

Female style expansion anchors, especially deformation controlled types, usually develop a higher initial compressive force when compared to male style anchors. These anchors apply this load over a larger bearing area, therefore, a greater minimum edge distance must be used to prevent cracking of the base material during installation and as load is applied.

For tension loads, an edge distance, E, of 12 diameters (12D) or greater should be used to obtain the maximum tension load. The minimum recommended

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

02-0956.1
March 10, 2003

EER, Inc.
Attn: Steve Dyer / Bob Larsen
Via Hand Delivery

Subject: Barber Foods Pretreatment Building
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As discussed, S.W.COLE ENGINEERING, INC will be on-site on a part-time basis to observe shoring and underpinning activities as scheduled by EER, INC. We trust this letter meets your current needs.

Sincerely,

S.W.COLE ENGINEERING, INC.

Timothy J. Boyce, P.E.

GRAY, ME OFFICE
286 Portland Road, Gray, ME 04039-9586 ▪ Tel (207) 657-2866 ▪ Fax (207) 657-2840 ▪ E-Mail infogray@swcole.com ▪ www.swcole.com
Other offices in Augusta, Bangor, and Caribou, Maine & Somersworth, New Hampshire

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Shoring System/Underpinning Design

for

APEX Construction, Inc.

Barber Foods

Portland, ME

February 7, 2003

DEAN A. SCIARAFFA No. 5035 REGISTERED PROFESSIONAL ENGINEER

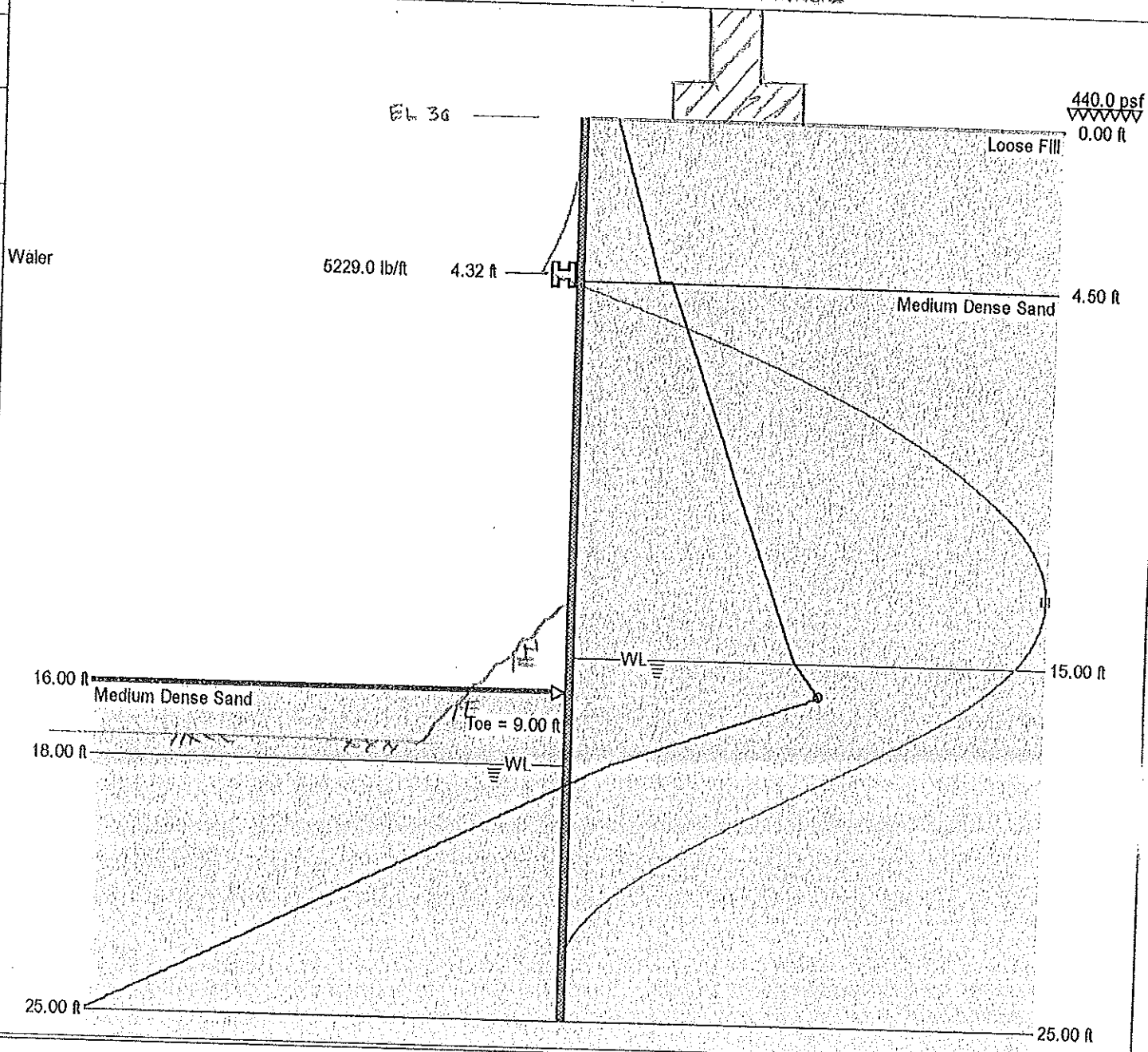
2/7/03

Date: 2.5.03

Sheet: SPZ-16
Pressure: Rankine
FOS: 1.7

Maximum	d (ft)
○ 860.3 psf	16.00
□ 20734.2 ftlb/ft	13.13

EAST WALL @ 4' SOIL SURCHARGE



H.B. Fleming

89 Pleasant Ave.
South Portland, ME 04106
Tel: 207-799-8514
Fax: 207-799-8538

SPW911, v2.00

© 2001, Pile Buck®, Inc.

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

EAST WALL

Date: 2.5.03

Sheet: SPZ-16
Pressure: Rankine
FOS: 1.7

Input Data

Depth Of Excavation = 16.00 ft
Surcharge = 440.0 psf
Depth Of Active Water = 15.00 ft
Depth Of Passive Water = 18.00 ft
Water Density = 62.43 pcf
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	Loose Fill	128.00	66.00	0.0	0.0	35.0	0.0	0.27	0.00	3.69	0.00
4.50	Medium Dense Sand	140.00	87.60	0.0	0.0	30.0	0.0	0.31	0.00	3.20	0.00
26.00	Medium Dense Sand	140.00	77.60	0.0	0.0	21.0	0.0	0.30	0.00	3.30	0.00
35.00	Dense Till	150.00	87.60	0.0	0.0	40.0	0.0	0.22	0.00	4.60	0.00

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)
SPZ-16	54.36	3.04E+07	13.21	34720.0	38175.4	0.00	9.00	25.00

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
4.32	Waler	5229.0

Maxima

	Maximum	Depth
Bending Moment	20707.6 ftlb/ft	13.13 ft
Deflection	0.9 in	14.02 ft
Pressure	860.3 psf	16.00 ft
Shear Force	4386.8 lb/ft	4.32 ft

H.B. Fleming
89 Pleasant Ave.
South Portland, ME 04106
Tel: 207-799-8514
Fax: 207-799-8538

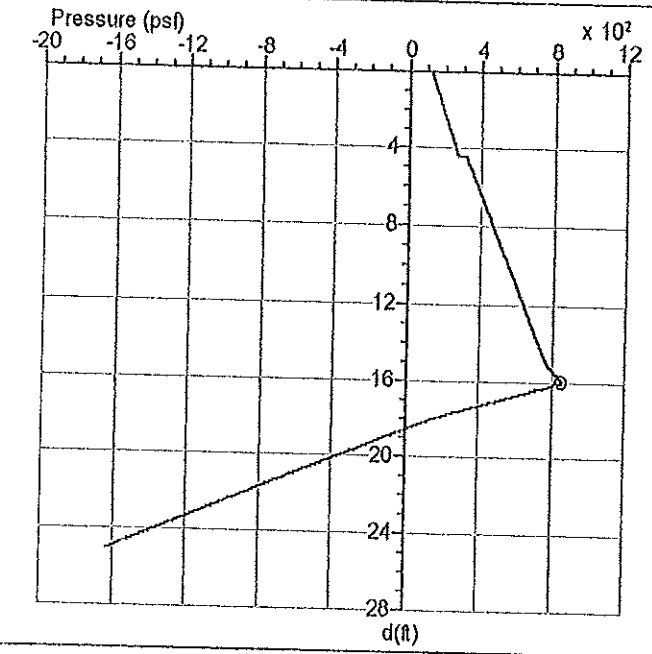
SPW911, v2.00
© 2001, File Buck®, Inc.
Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

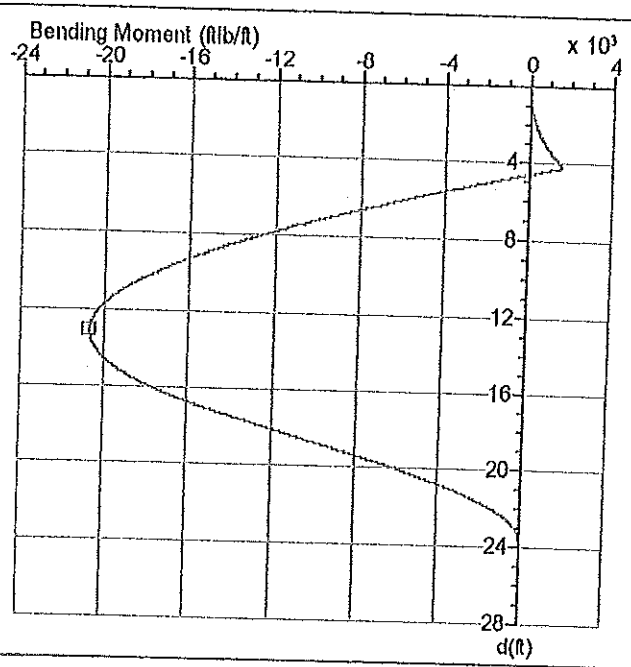
EAST WALL

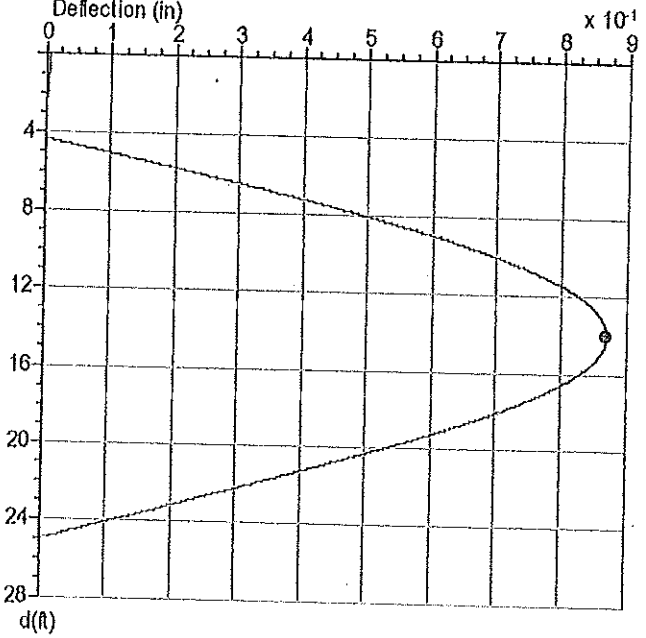
Date: 2.5.03

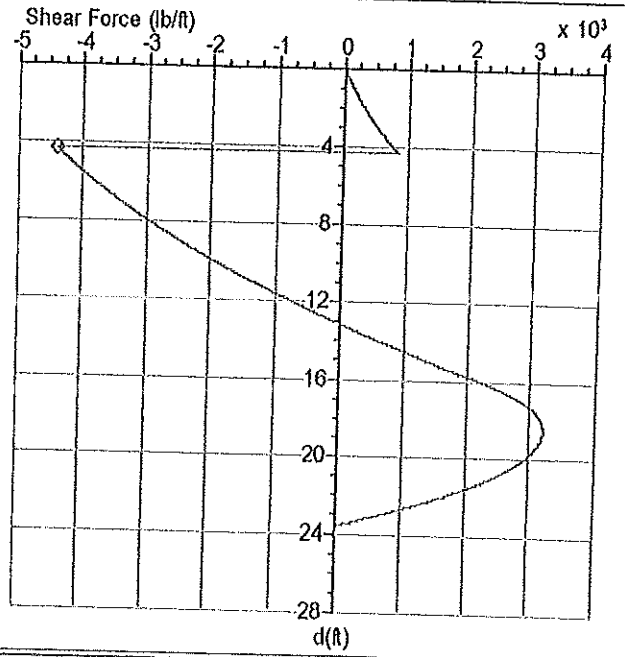
Sheet: SPZ-16
Pressure: Rankine
FOS: 1.7

	Maximum	d (ft)
○	860.3 psf	16.00
□	20707.6 ftlb/ft	13.13
◇	4385.8 lb/ft	4.32
●	0.9 in	14.02









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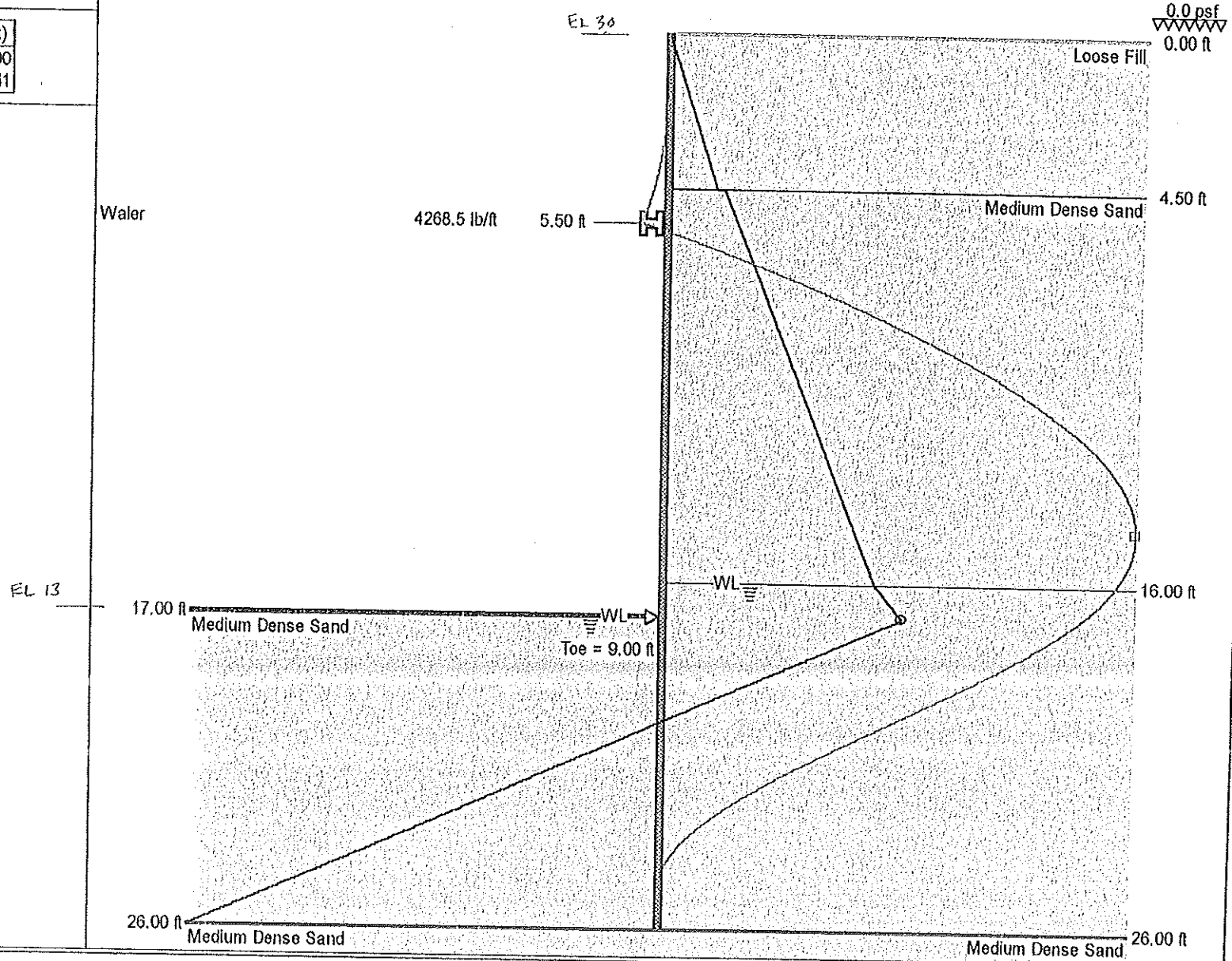
South Wall

Date: 2.3.03
Sheet: SPZ-16
Pressure: Rankine
FOS: 1.7

Maximum	d (ft)
○ 767.3 psf	17.00
□ 18528.8 ftlb/ft	14.41



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South Wall

Date: 2.3.03

Sheet: SPZ-16
Pressure: Rankine
FOS: 1.7

Input Data

Depth Of Excavation = 17.00 ft
Surcharge = 0.0 psf
Depth Of Active Water = 16.00 ft
Depth Of Passive Water = 17.00 ft
Water Density = 62.43 pcf
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	Loose Fill	128.00	66.00	0.0	0.0	35.0	0.0	0.27	0.00	3.69	0.00
4.50	Medium Dense Sand	140.00	87.60	0.0	0.0	30.0	0.0	0.31	0.00	3.20	0.00
26.00	Medium Dense Sand	140.00	77.60	0.0	0.0	21.0	0.0	0.30	0.00	3.30	0.00
35.00	Dense Till	150.00	87.60	0.0	0.0	40.0	0.0	0.22	0.00	4.60	0.00

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)
SPZ-16	54.36	3.04E+07	13.21	34720.0	38175.4	0.00	9.00	26.00

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
5.50	Waler	4268.8

Maxima

	Maximum	Depth
Bending Moment	18529.1 ftlb/ft	14.41 ft
Pressure	767.3psf	17.00 ft
Shear Force	3715.9lb/ft	5.50 ft

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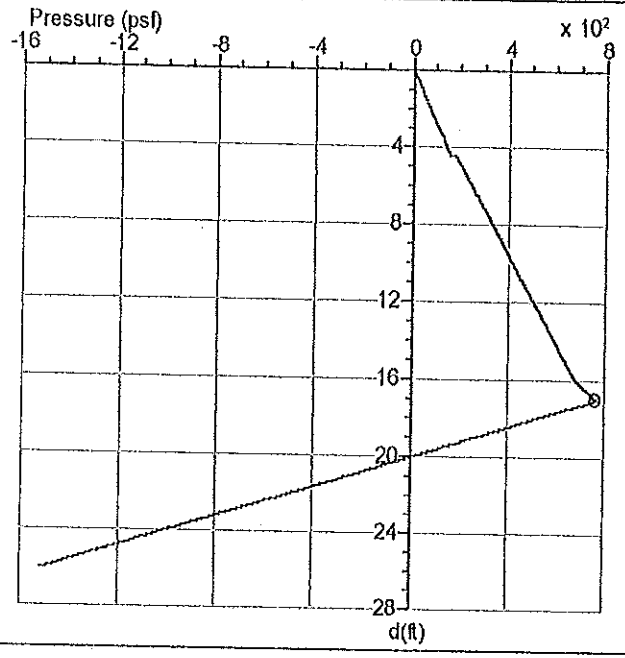
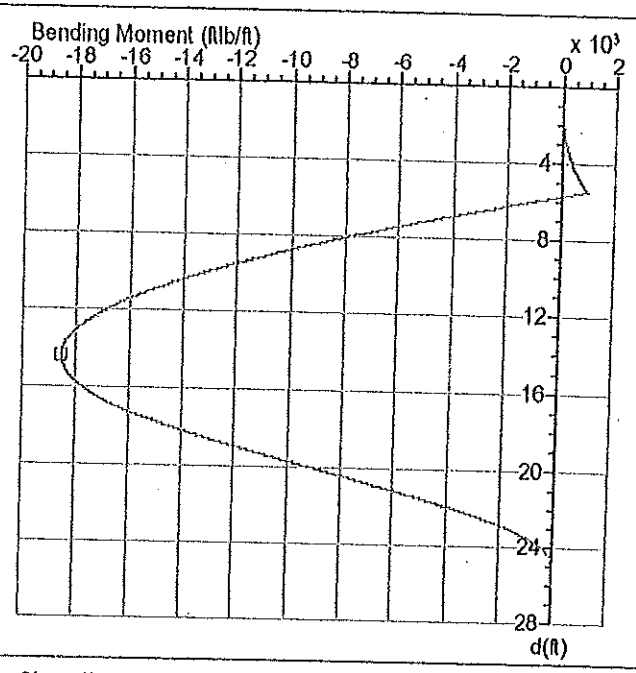
South Wall

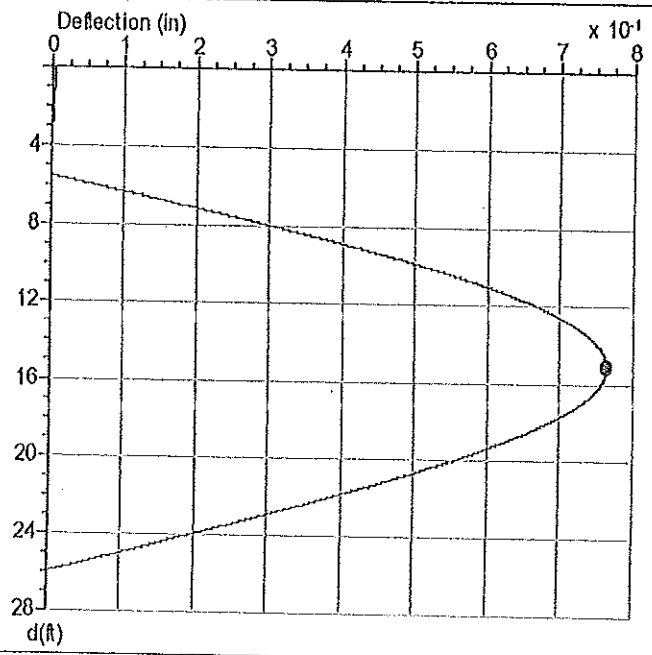
Date: 2.3.03

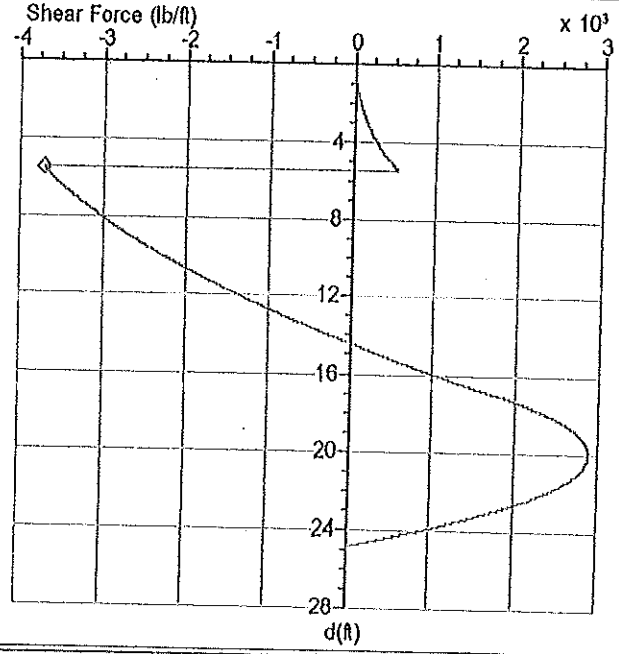
Sheet: SPZ-16
Pressure: Rankine
FOS: 1.7

	Maximum	d (ft)
○	767.3 psf	17.00
□	18529.1 ftlb/ft	14.41
◇	3715.9 lb/ft	5.50
⊗	0.8 in	15.15









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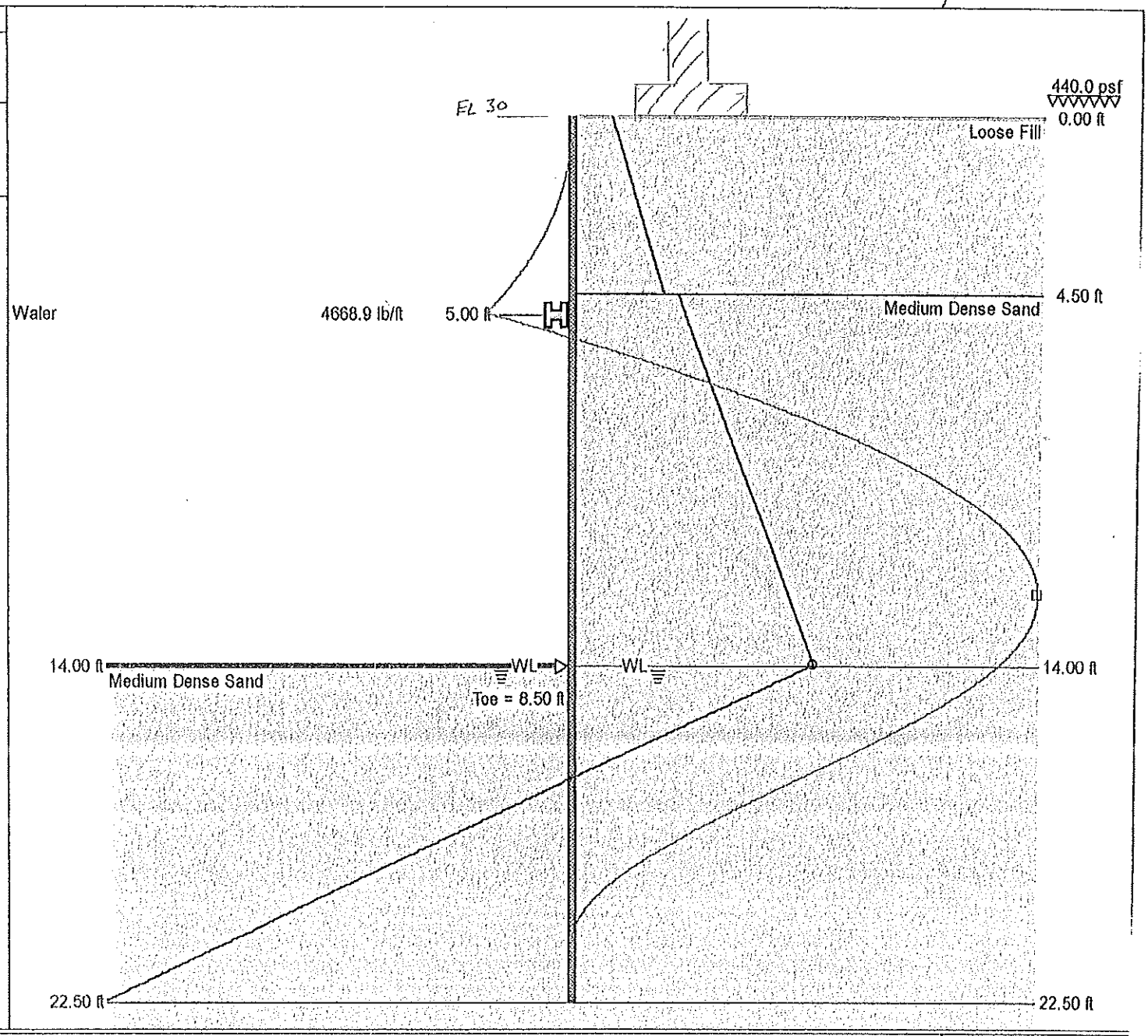
NORTH WALL - 14 CUT ALONG EXISTING FTG.; 4' SOIL SURCHARGE

Date: 2.3.03
Sheet: SPZ-16
Pressure: Rankine
FOS: 1.9

Maximum	d (ft)
○ 733.1 psf	14.00
□ 12620.1 ftlb/ft	12.24



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NORTH WALL (SURCHARGE)

Date: 2.3.03

Sheet: SPZ-16
Pressure: Rankine

Input Data

Depth Of Excavation = 14.00 ft
Surcharge = 440.0 psf
Depth Of Active Water = 14.00 ft
Depth Of Passive Water = 14.00 ft
Water Density = 62.43 pcf
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	Loose Fill	128.00	66.00	0.0	0.0	35.0	0.0	0.27	0.00	3.69	0.00
4.50	Medium Dense Sand	140.00	87.60	0.0	0.0	30.0	0.0	0.31	0.00	3.20	0.00
26.00	Medium Dense Sand	140.00	77.60	0.0	0.0	21.0	0.0	0.30	0.00	3.30	0.00
35.00	Dense Till	150.00	87.60	0.0	0.0	40.0	0.0	0.22	0.00	4.60	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)
SPZ-16	54.36	3.04E+07	13.21	34720.0	38175.4	0.00	8.50	22.50

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
5.00	Waler	4669.0

Maxima

	Maximum	Depth
Bending Moment	12620.0 ftlb/ft	12.24 ft
Pressure	733.1 psf	14.00 ft
Shear Force	3614.3 lb/ft	5.01 ft

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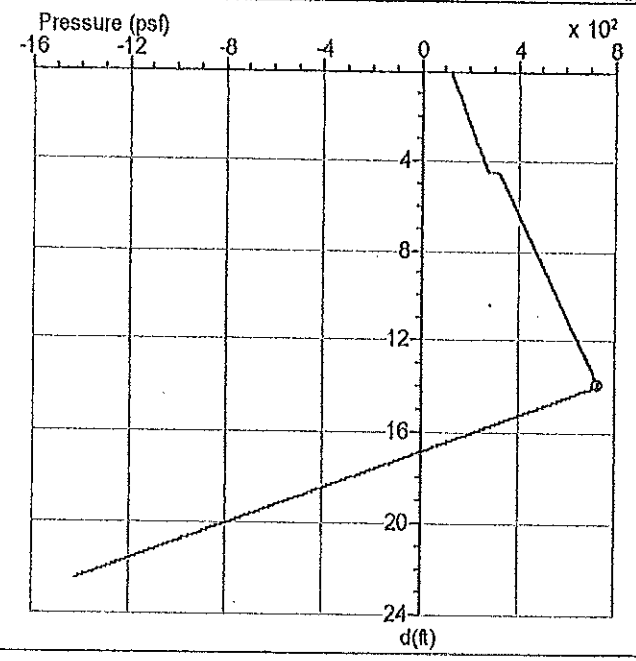
NORTH WALL (SURCHARGE)

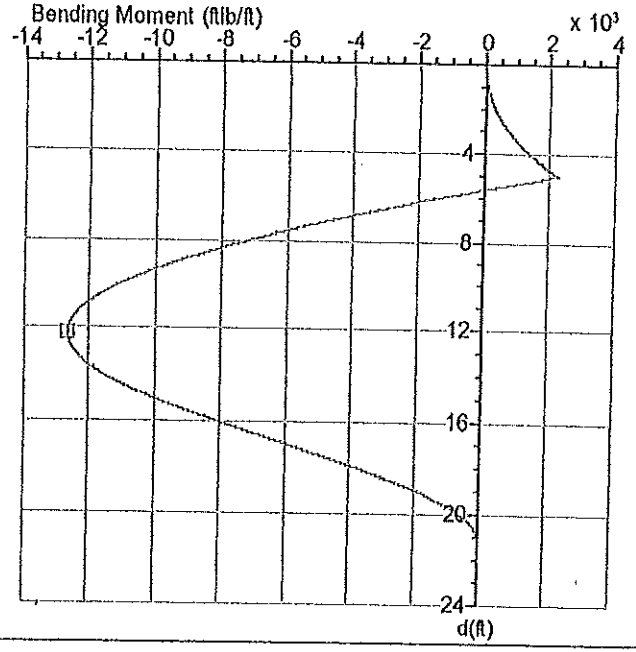
Date: 2.3.03

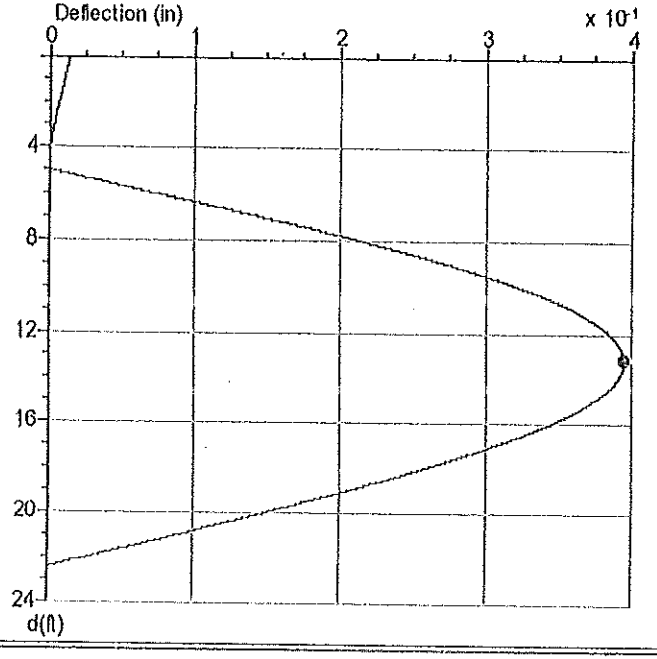
Sheet: SPZ-16

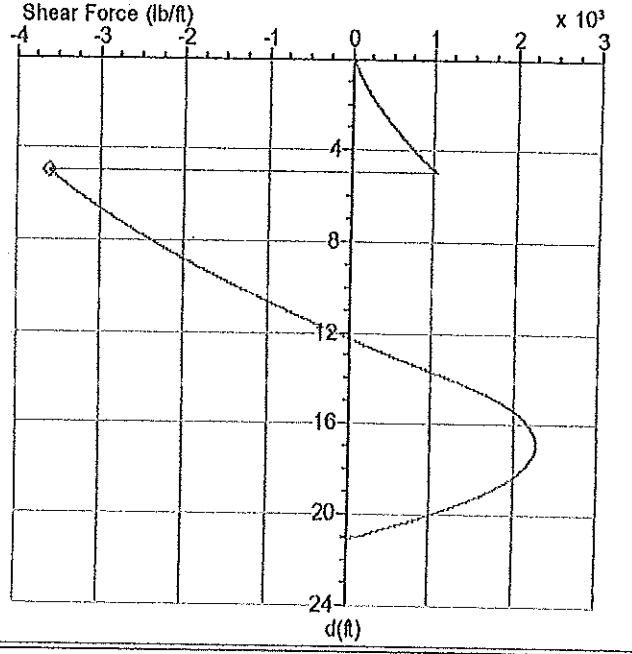
Pressure: Rankine

Maximum	d (ft)
○ 733.1 psf	14.00
□ 12620.0 ftlb/ft	12.24
◇ 3614.3 lb/ft	5.01
● 0.4 in	13.22









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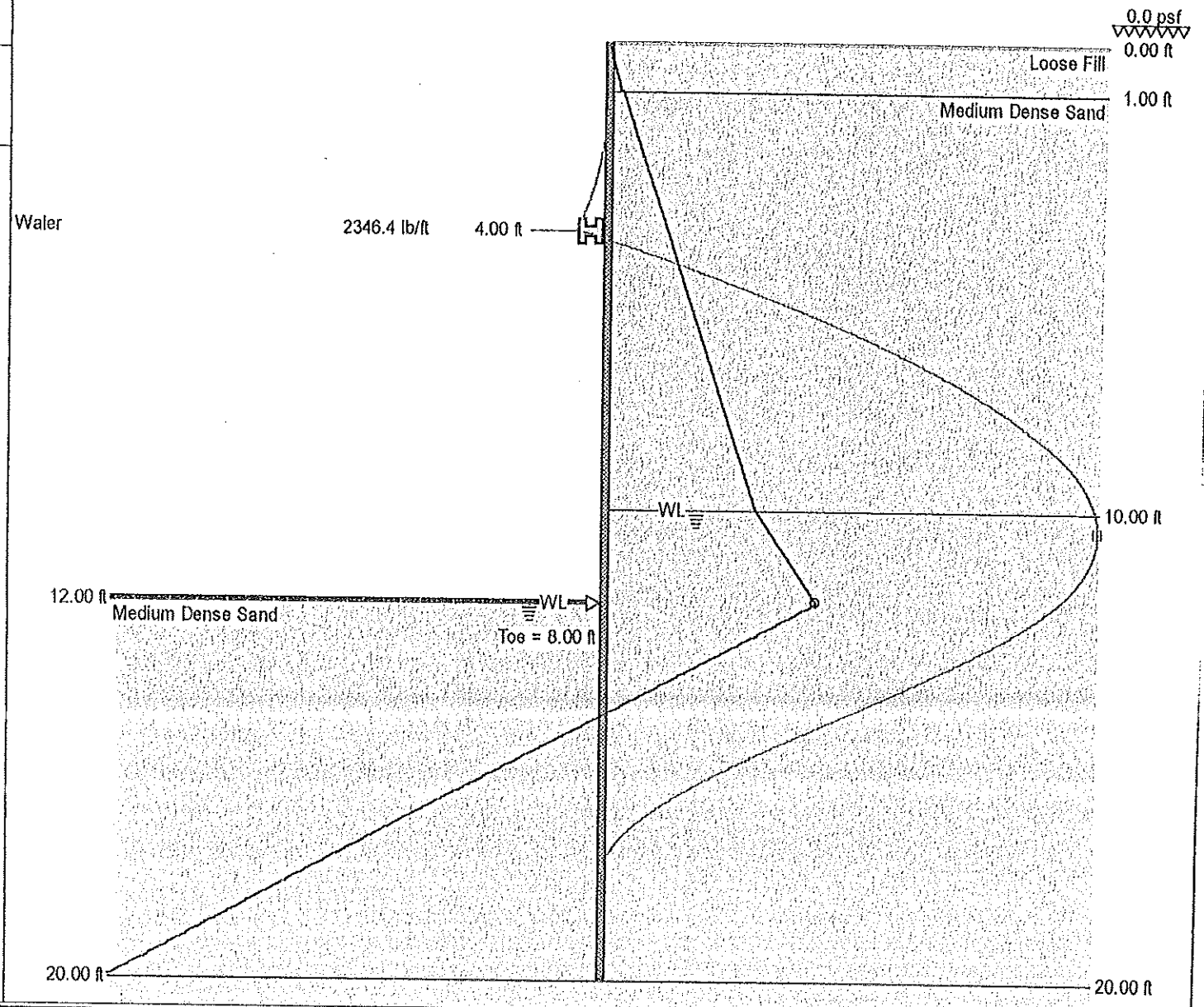
NORTH WALL – 12' CUT ; NO SURCHARGE

Date: 2.3.03
Sheet: SPZ-16
Pressure: Rankine
FOS: 2.9
Toe: Free Earth Support

	Maximum	d (ft)
○	609.5 psf	12.00
□	7232.2 ftlb/ft	10.45



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NORTH WALL (No SURCHARGE)

Date: 2.3.03
Sheet: SPZ-16
Pressure: Rankine
FOS: 2.9
Toe: Free Earth Support

Input Data

Depth Of Excavation = 12.00 ft
Surcharge = 0.0 psf
Depth Of Active Water = 10.00 ft
Depth Of Passive Water = 12.00 ft
Water Density = 62.43 pcf
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	Loose Fill	128.00	66.00	0.0	0.0	35.0	0.0	0.27	0.00	3.69	0.00
1.00	Medium Dense Sand	140.00	87.60	0.0	0.0	30.0	0.0	0.31	0.00	3.20	0.00
22.50	Medium Dense Sand	140.00	77.60	0.0	0.0	21.0	0.0	0.30	0.00	3.30	0.00
35.00	Dense Till	150.00	87.60	0.0	0.0	40.0	0.0	0.22	0.00	4.60	0.00

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)
SPZ-16	54.36	3.04E+07	13.21	34720.0	38175.4	0.00	8.00	20.00

Load Model: Area Distribution

Supports

Depth (ft)	Type	Linear Load (lb/ft)
4.00	Waler	2346.4

Maxima

	Maximum	Depth
Bending Moment	7232.4 ftlb/ft	10.47 ft
Pressure	609.5 psf	12.00 ft
Shear Force	2010.7 lb/ft	4.00 ft

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EAST WALL

Sheet Pile Stress Analysis	
Maximum Moment (ft-lb/ft)	20,734
Steel Grade in Sheets (ksi)	50,000
Allowable Stress in Sheets (psi)	33,500
Required Section Modulus (in^3)	7.43
Sheet Pile Section to be Used	SPZ-16
Section Modulus/ft of Wall (in^3)	13.2

Wale Analysis	
Linear Load (lb/ft)	5,229
Length between supports (ft)	16.0
Maximum Moment in Wale (ft-lb)	167,328
Grade of Steel in Wales (psi)	50,000
Required Section Modulus (in^3)	59.9
Wale Section to be Used	HP12x53
Section Modulus of Selected Section (in^3)	66.8
Selected Section Moment of Inertia (in^4)	393
Max Deflection (in)	0.68
l/300	0.64

SOUTH WALL

Sheet Pile Stress Analysis	
Maximum Moment (ft-lb/ft)	18,530
Steel Grade in Sheets (ksi)	50,000
Allowable Stress in Sheets (psi)	33,500
Required Section Modulus (in^3)	6.64
Sheet Pile Section to be Used	SPZ-16
Section Modulus/ft of Wall (in^3)	13.2

Wale Analysis	
Linear Load (lb/ft)	4,269
Length between supports (ft)	10.0
Maximum Moment in Wale (ft-lb)	53,363
Grade of Steel in Wales (psi)	50,000
Required Section Modulus (in^3)	19.1
Wale Section to be Used	HP12x53
Section Modulus of Selected Section (in^3)	66.8
Selected Section Moment of Inertia (in^4)	393
Max Deflection (in)	0.08
l/300	0.40

NORTH WALL (SURCHARGE)

Sheet Pile Stress Analysis	
Maximum Moment (ft-lb/ft)	12,621
Steel Grade in Sheets (ksi)	50,000
Allowable Stress in Sheets (psi)	33,500
Required Section Modulus (in^3)	4.52
Sheet Pile Section to be Used	SPZ-16
Section Modulus/ft of Wall (in^3)	13.2

Wale Analysis	
Linear Load (lb/ft)	4,669
Length between supports (ft)	15.0
Maximum Moment in Wale (ft-lb)	131,316
Grade of Steel in Wales (psi)	50,000
Required Section Modulus (in^3)	47.0
Wale Section to be Used	HP12x53
Section Modulus of Selected Section (in^3)	66.8
Selected Section Moment of Inertia (in^4)	393
Max Deflection (in)	0.47
l/300	0.60

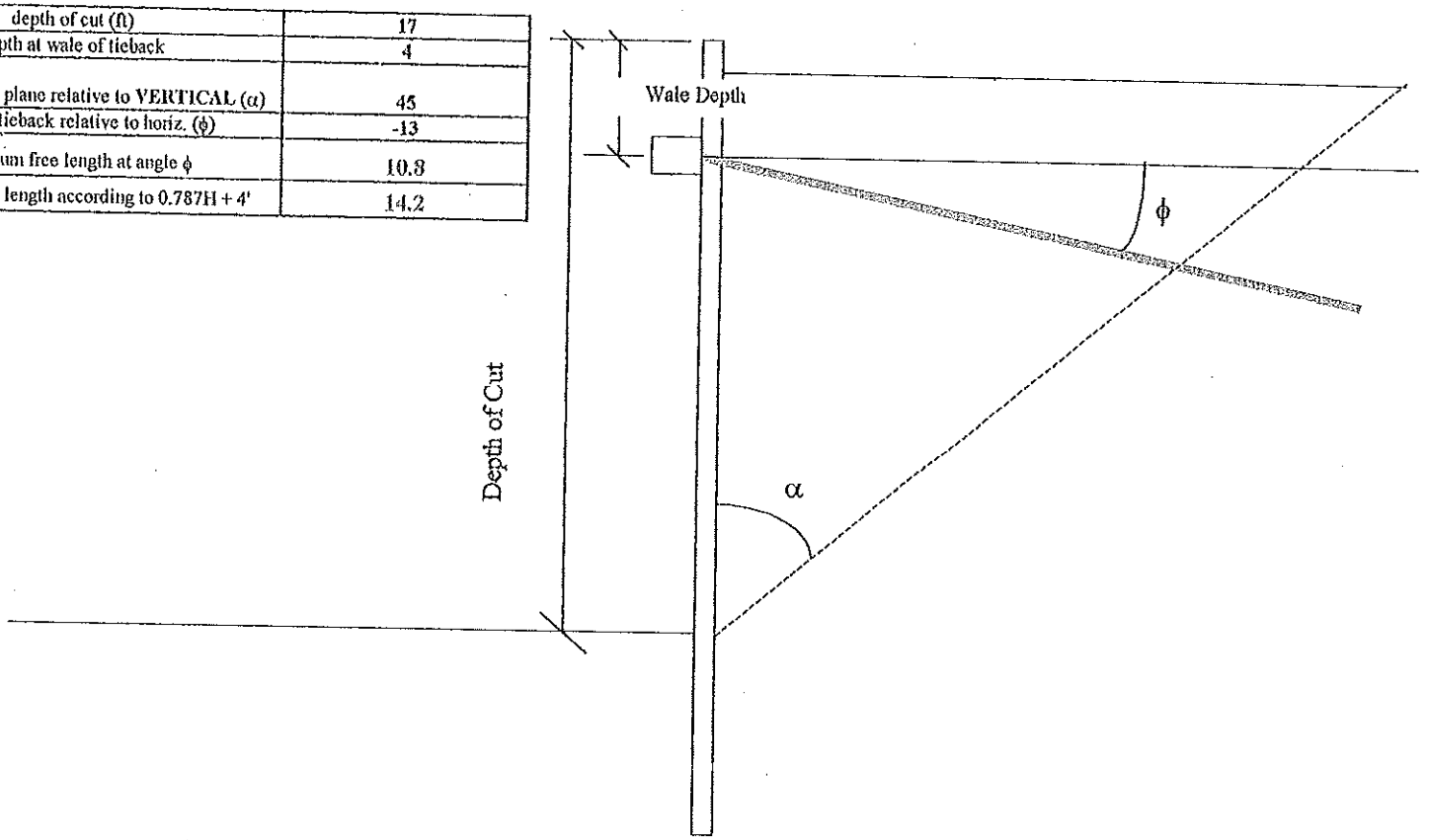
NORTH WALL (NO SURCHARGE)

Sheet Pile Stress Analysis	
Maximum Moment (ft-lb/ft)	7,233
Steel Grade in Sheets (ksi)	50,000
Allowable Stress in Sheets (psi)	33,500
Required Section Modulus (in^3)	2.59
Sheet Pile Section to be Used	SPZ-16
Section Modulus/ft of Wall (in^3)	13.2

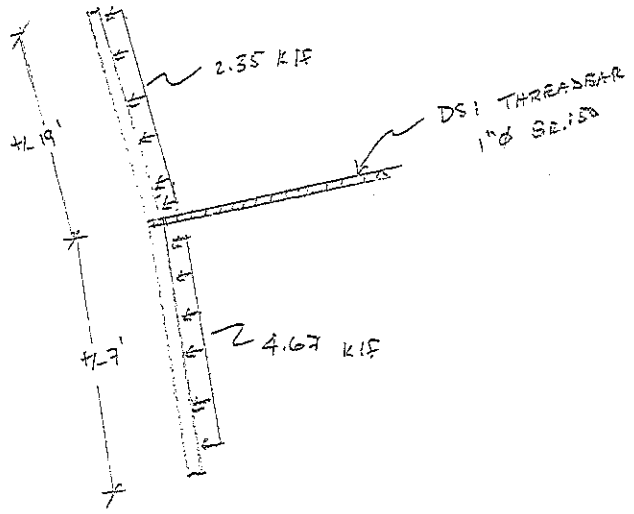
Wale Analysis	
Linear Load (lb/ft)	2,347
Length between supports (ft)	20.0
Maximum Moment in Wale (ft-lb)	117,350
Grade of Steel in Wales (psi)	50,000
Required Section Modulus (in^3)	42.0
Wale Section to be Used	HP12x53
Section Modulus of Selected Section (in^3)	66.8
Selected Section Moment of Inertia (in^4)	393
Max Deflection (in)	0.74
l/300	0.80

Screw Anchor Minimum Free Length Calculation – BASED ON WORST CASE SCENARIO OF EACH WALL

depth of cut (ft)	17
depth at wale of tieback	4
Angle of failure plane relative to VERTICAL (α)	45
Angle of tieback relative to horiz. (ϕ)	-13
Minimum free length at angle ϕ	10.8
Minimum free length according to 0.787H + 4'	14.2



TIE ROD ANALYSIS BARBER FOODS 2/7/03



LOADING:

$$\frac{19'(2.35\ KLF)}{2} = 22.3^{K}$$

$$\frac{7'(4.67\ KLF)}{2} = 16.35^{K}$$

$$\Sigma = 38.65^{K}$$

1"Ø GR.150 ULT. STRENGTH = 127.5^K

DESIGN STRENGTH = 127.5 (0.6)

= 76.5^K

$$F.S. = 76.5/38.7 = 1.97$$

RAWL - STUD SHEAR LOAD:

RAWL-STUD 7/8"Ø x 8" 5 3/4" EMBEDMENT IN 2,000 psi CONC.

$$38.7^{K}/6\ BOLTS = 6.5^{K}/BOLT$$

RAWL - STUD ULT. SHEAR STRENGTH = 20.4 K

DESIGN STRENGTH = 0.6(20.4)

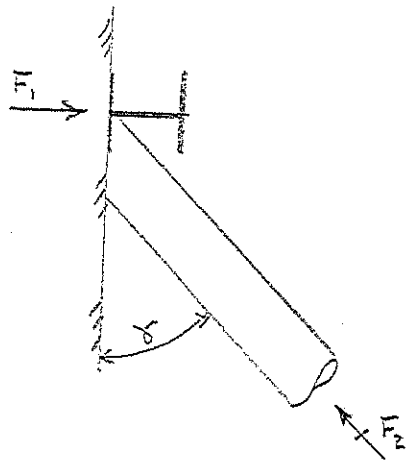
= 12.24 K

$$F.S. = 12.24/6.5 = 1.88$$

RAKE ANALYSIS

BARBER FOODS

2/7/03



$F_1 = 5.23\ KLF\left(16'\right) = 83.68^K \Rightarrow 84^K$

$\gamma = 45^\circ$ (WORST CASE)

$F_2 = \dfrac{F_1}{\cos\gamma} = \dfrac{84^K}{\cos 45} = 118.8^K \Rightarrow 119^K$

DESIGN STRENGTH OF RAKE

MEMBER: 12.75" O.D. x 0.375" WALL A252 Gr. 2 (min.)

$A_g = 14.58\ in^2$ $\quad F_y = 35{,}000\ psi$

$E = 29{,}000\ ksi$ $\quad K = 1$

$l = 18'$ $\quad r = 4.38"$

$$\lambda_c = \frac{Kl}{r\pi}\sqrt{\frac{F_y}{E}} = \frac{18(12)}{4.38(\pi)}\left(\frac{35}{29{,}000}\right)^{0.5}$$

$\lambda_c = 0.545$

$F_{cr} = \left(0.658^{\lambda_c^2}\right) F_y$

$F_{cr} = 30{,}903\ psi$

$P_n = A_g F_{cr}$

$P_n = 14.58\ in^2\left(30{,}903\ psi\right)$

$P_n = 450{,}565\ lb$

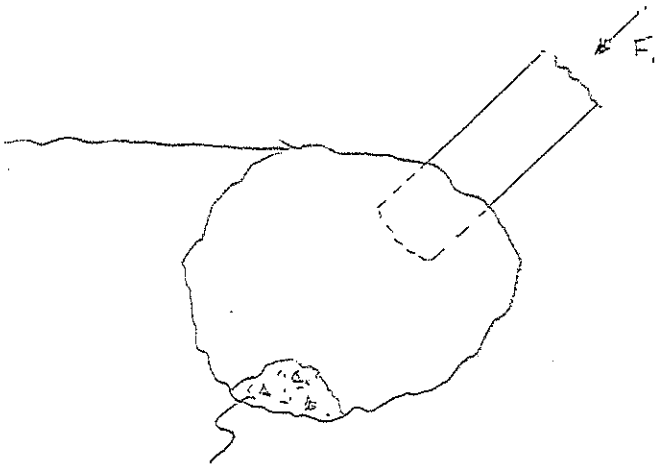
$\phi = 0.7$

$\phi P_n = 0.7\left(450.5^K\right)$

$\phi P_n = 315^K$

$\dfrac{315^K}{119^K} = 2.65 \Rightarrow O.K.$

PUSH BLOCK CAPACITY — BARBER FOODS — 2/7/03



$F_1 = 119^K$

$119^K / 9\,SF = 13.2\ KSF$

$$q_{ULT} = \frac{NS}{10}\left(C_{w_1} + C_{w_2}\left(\frac{D_f}{B}\right)\right) R_I$$

$$= \frac{12(3')}{10}\left(1 + 1\left(\frac{3}{3}\right)\right) 1$$

$q_{ULT} = 7.2\ tsf$

$q_{ULT} = 14.4\ KSF$

$F.S. = 14.4 / 13.2 = 1.09$ ∴ O.K.