AP - 111

SUMMARY REPORT EVAPORATION POND REPAIRS (2)

12/17/2015

APPENDICES

APPENDIX A

Photographs

Photo #1: Pond 6 Northwest Corner After Fill Placement - Looking South

Photo #2: Pond 6 Northwest Corner After Fill Placement - Looking North

Photo #3: Pond 7/8 West Berm Under Construction - Looking North
(Note how the new crest alignment is shifted to the east)

Photo #4: Pond 11 South Berm Construction Complete - Looking North

Photo #5: Pond 12A South Berm Construction Complete - Looking West

Photo #6: Borrow area north of Pond 11 – Looking West

Photo #7: Pond 5 North Berm Under Construction, Nearly Complete - Looking East

Photo #8: Pond 6 West Berm Under Construction - Looking South

Photo #9: Pond 6 West Berm Under Construction, Nearly Complete - Looking North

Photo #10: Pond 7/8 and Pond 11 South Berms Under Construction - Looking Northeast

Photo #11: Pond 7/8 and Pond 11 South Berms Under Construction, Nearly Complete - Looking Northeast

Photo #12: Pond 7/8 and Pond 11 South Berms Under Construction, Nearly Complete - Looking Northeast

Photo #13: Density Testing Pond 7/8 with repaired Pond 6 in the background

Photo #14: Moisture conditioning soil in the borrow area.

APPENDIX B

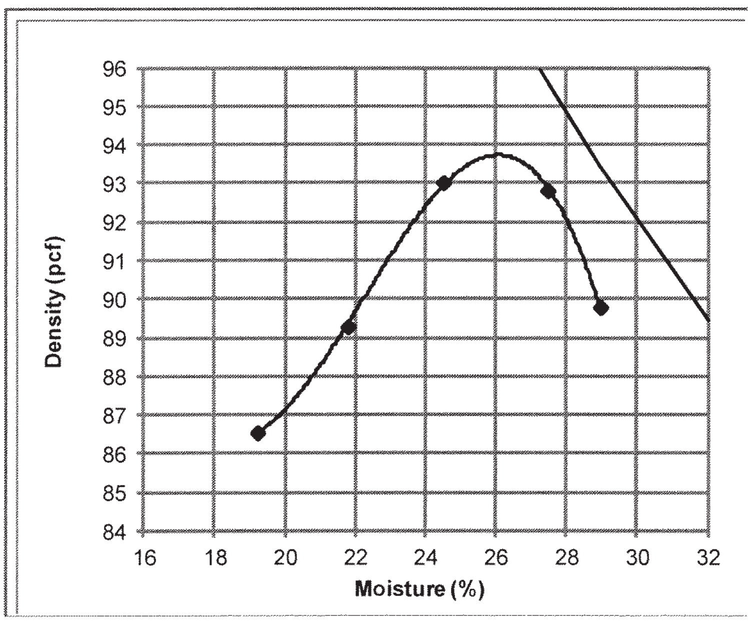
Geotechnical Data

amec

Client:	Bonaguidi Construction 3100 East Aztec Ave. Suite 5 Gallup, NM 87301-	**Report Date:**	February 03, 2015
		Project #:	14-519-00435.4
		Work Order #:	1
Attn:	Dan Bonaguidi	**Lab #:**	G5692
Project Name:	Pond 6 Dock Repair w/Engineer Firm	**Sampled By:**	Client
		Date Sampled:	1/26/2015
	Gallup, NM	**Visual Description of Material:**	Medium Dark Reddish Brown Clay
		Sample Source:	TP-1 -2.0' to 3.0'
Project Manager:	Lee Lommler		

SOILS / AGGREGATES

No Project Specification was Provided.



Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
3/4in.	100%
1/2in.	98%
3/8in.	95%
#4	80%
#10	73%
#40	67%
#50	66%
#100	63%
#200	61%

Moisture Density Relationship: (ASTM D698-07) **Method:** A

Preparation Method: Dry **Rammer Type:** Mechanical

Specific Gravity: 2.651 **Assumed**

Maximum Density: 93.7

Optimum Moisture: 26.1

(ASTM D2216-10) **Moisture Content (%):** 12.5%

Plasticity Index (ASTM D4318-10)

Liquid Limit: 65

Plastic Limit: 25

Plasticity Index: 40

Preparation Method: Dry **Liquid Limit Method:** A

PI Air Dried.

Soil Classification (ASTM D2487-10) CH

Reviewed By: ____________________

Jan

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee ()

Dan Bonaguidi (email) (1)

AMEC Environment & Infrastructure, Inc.
8519 Jefferson NE
Albuquerque, NM 87113
Tel 5058211801
Fax 5058217371

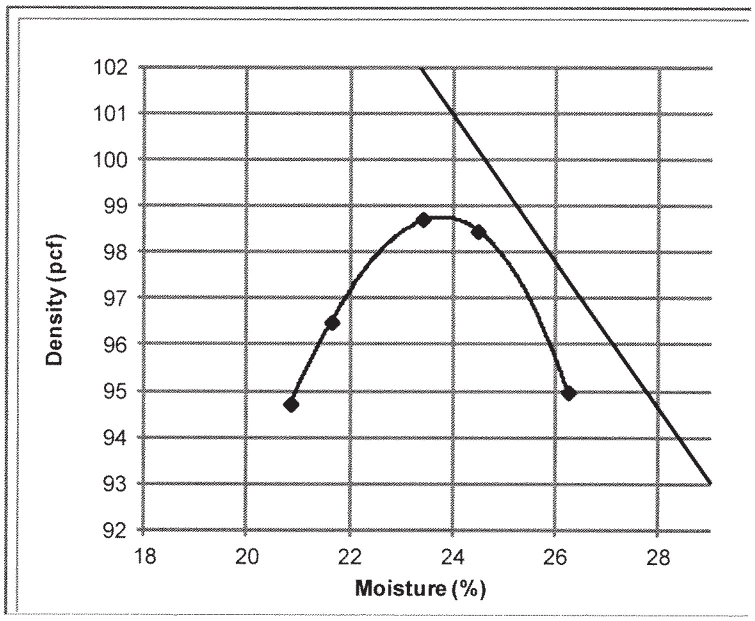
www.amec.com

amec

Client:	Bonaguidi Construction 3100 East Aztec Ave. Suite 5 Gallup, NM 87301-	**Report Date:**	February 03, 2015
		Project #:	14-519-00435.4
		Work Order #:	1
Attn:	Dan Bonaguidi	**Lab #:**	G5693
Project Name:	Pond 6 Dock Repair w/Engineer Firm	**Sampled By:**	Client
		Date Sampled:	1/26/2015
	Gallup, NM	**Visual Description of Material:**	Medium to Dark Reddish Brown Clay
Project Manager:	Lee Lommler	**Sample Source:**	TP-2 P-6 SW Corner

SOILS / AGGREGATES

No Project Specification was Provided.



Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
#4	100%
#10	96%
#40	88%
#50	84%
#100	78%
#200	74%

Moisture Density Relationship: (ASTM D698-07) **Method:** A

Preparation Method: Dry **Rammer Type:** Mechanical

Specific Gravity: 2.651 **Assumed**

Maximum Density: 98.8

Optimum Moisture: 23.8

(ASTM D2216-10)

Moisture Content (%): 26.9%

Plasticity Index (ASTM D4318-10)

Liquid Limit: 55

Plastic Limit: 23

Plasticity Index: 32

Preparation Method: Dry **Liquid Limit Method:** A

PI Air Dried.

Soil Classification (ASTM D2487-10) CH

Reviewed By: [signature]

Jan

Distribution: **Client** ☑ **File:** ☑ **Supplier:** ☑ **Email:** ☐ **Other:** Addressee ()

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Client:	Bonaguidi Construction 3100 East Aztec Ave. Suite 5 Gallup, NM 87301-	**Report Date:**	February 03, 2015
		Project #:	14-519-00435.4
		Work Order #:	1
Attn:	Dan Bonaguidi	**Lab #:**	G5694
Project Name:	Pond 6 Dock Repair w/Engineer Firm	**Sampled By:**	Client
		Date Sampled:	1/26/2015
	Gallup, NM	**Visual Description of Material:**	Medium Reddish Brown Silty Clay
		Sample Source:	TP-3
Project Manager:	Lee Lommler		

SOILS / AGGREGATES

No Project Specification was Provided.

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1 1/2in.	100%
1in.	97%
1/2in.	95%
3/8in.	94%
#4	91%
#10	89%
#40	81%
#50	75%
#100	61%
#200	50%

(ASTM D2216-10)

Moduleisture Content (%): 8.1%

Reviewed By: ______________

Jan

Distribution: **Client** ☑ **File:** ☑ **Supplier:** ☑ **Email:** ☐ **Other:** Addressee ()

Dan Bonaguidi (email) (1)

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Tel 5058211801
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ATTERBERG LIMITS
ASTM D 4318

Atterberg Limits Test
ASTM D 4318

Client:	Axis Group Inc	Boring Number:	Gallup Borrow
Job Number:	2905-3	Depth:	--
Project:	Western Refinery	Sample Number:	--
Location:	--	Test Date:	10/13/2015
Project Number:	14-107	Technician:	BDF
		Sampled Date:	6/22/2015
		Sampled By:	--
		Method:	Method A

Test Configuration

Liquid Limits Device: 1080
Material Size of Fines: -#40

Plastic Limits

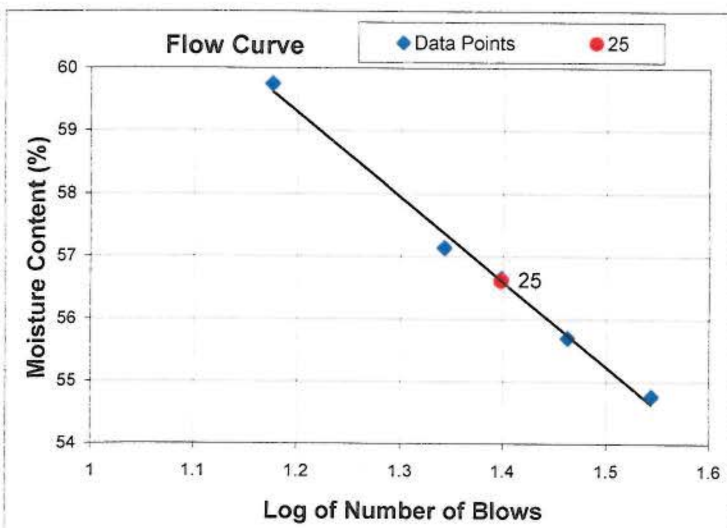
	Sample 1	Sample 2	Sample 3
Weight of Wet Soil & Pan (g):	6.387	6.404	6.414
Weight of Dry Soil & Pan (g):	5.660	5.666	5.689
Weight of Water (g):	0.727	0.738	0.725
Weight of Pan (g):	1.106	1.132	1.128
Moisture Content (%):	16.0	16.3	15.9

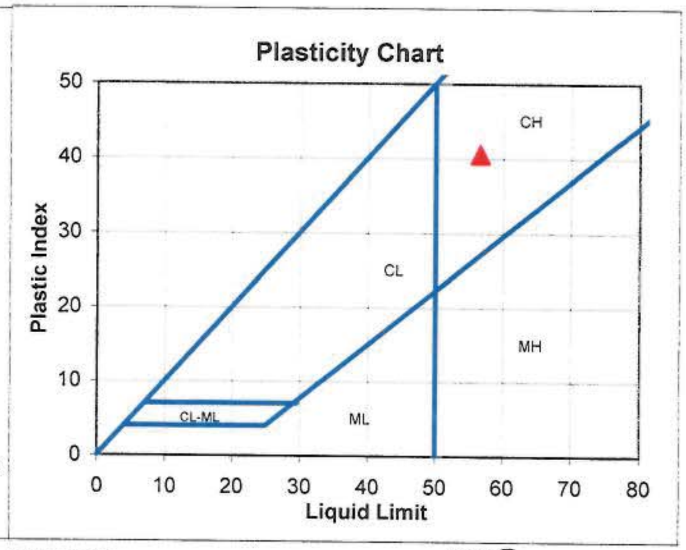
Average: 16.0%
Standard Deviation: 0.2%

Liquid Limits

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Number of Blows:	22	15	29	35	25
Weight of Wet Soil & Pan (g):	9.208	8.627	9.778	8.674	8.770
Weight of Dry Soil & Pan (g):	6.273	5.822	6.688	6.003	5.974
Weight of Water (g):	2.935	2.805	3.090	2.671	2.796
Weight of Pan (g):	1.136	1.127	1.140	1.125	1.038
Moisture Content (%):	57.1	59.7	55.7	54.8	56.6

Plastic Limit: 16
Liquid Limit: 57
Plastic Index: 41
Atterberg Classification CH





Data Entered By: NN Date: 10/14/2015
File Name: 2905_3_atterberg-ASTMD-4318-R8_0.xls

Data Checked By: CKP
Date: 10/15/15

ATT
ADVANCED TERRA TESTING

MECHANICAL ANALYSIS
ASTM D 6913

Particle Size Distribution (Gradation) of Soil Using Sieve Analysis
ASTM D 6913

Client: Axis Group Inc
Job Number: 2905-3
Project: Western Refinery
Location: --
Project Number: 14-107

Boring Number: Gallup Borrow
Depth: --
Sample Number: --
Sampled Date: --
(+) Wash Date: --
(-) Wash Date: 10/14/15

Sampled By: --
Technician: --
Technician: BDF

Grain Size Data

Hygroscopic Moisture of Fines

Weight of Wet Soil & Pan (g): 1026.36
Weight of Dry Soil & Pan (g): 1013.48
Weight of Water (g): 12.88
Weight of Pan (g): 814.67
Weight of Dry Soil (g): 198.81
Moisture (%): 6.5

Total Wet Weight of Sample (g): 211.69
Total Dry Weight of Sample (g): 198.81
Calculated Weight Plus #200 (g): 2.21
Moisture of Total Sample (%): 6.5
Percent Retained #200 Sieve (%): 1.1

Sieve Number	Sieve Size (mm)	Weight of Retained Soil & Pan (g)	Weight of Pan (g)	Weight of Retained Soil (g)	Calculated Weight of Retained Soil (g)	Percent Passing by Weight (%)
3"	**76.2**	0.00	0.00	0.00	0.00	100.0
1.5"	**38.10**	0.00	0.00	0.00	0.00	100.0
3/4"	**19.05**	0.00	0.00	0.00	0.00	100.0
3/8"	**9.525**	0.00	0.00	0.00	0.00	100.0
#4	**4.750**	0.00	0.00	0.00	0.00	100.0
#10	**2.000**	0.00	0.00	0.00	0.00	100.0
#20	**0.850**	3.14	3.13	0.01	0.01	100.0
#40	**0.425**	3.15	3.11	0.04	0.04	100.0
#60	**0.250**	3.37	3.20	0.17	0.17	99.9
#100	**0.150**	3.63	3.20	0.43	0.43	99.7
#140	**0.106**	3.72	3.19	0.53	0.53	99.4
#200	**0.075**	4.22	3.20	1.03	1.03	98.9

Wet Weight of Soil (g): 211.69
Dry Weight of Soil (g): 198.81

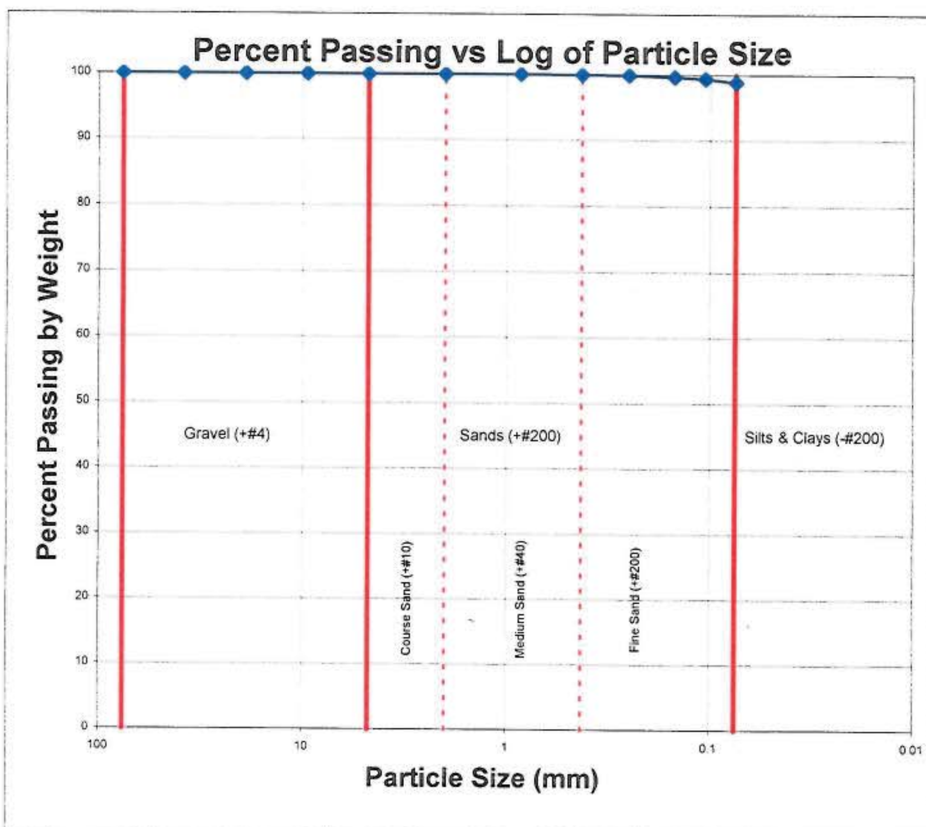
USCS Classification ASTM D 2487

Atterberg Classification: CH
Group Symbol: CH

Course-Grained Soils

Percent Gravels (%): 0.00
Percent Sands (%): 1.11
Percent Fines (%): 98.89

USCS Classification
Fat Clay



Data Entered By: NN
Date: 10/15/2015
File Name: 2905_3_grainSize-ASTM-C33-D1140-D6319-D2487-R6_0.xls

Checked By: CKP
Date: 10/15/15

ADVANCED TERRA TESTING

STANDARD PROCTOR COMPACTION

Method A, B or C

ASTM D 698

ATT ADVANCED TERRA TESTING

Compaction Test
ASTM D 698 - A

Client:	Axis Group Inc	Job number:	2905-3
Project Number:	14-107		
Project:	Western Refinery	Boring:	Gallup Borrow
Sampled by:	--	Depth:	--
Tested by:	BDF	Sample Id:	--
Location:	--	Test date:	10/13/2015

Initial conditions

Wet Wt. Pan and Soil (g):	303.57	Pf (% fines)	100.00%
Dry Wt. Pan and Soil (g):	283.49	Pc (% course)	0.00%
Wt. Water (g):	20.08	Use Correction?	No
Dish Weight:	6.54	Layers	3
Wet Wt. of Total Fines (lb):	32.19	Blows/Layer	25
Dry Wt. of total fines (lb):	30.01		
Mdc (mass dry coarse) (lb):	0		

Wt of Moisture added (ml)	360	400	320	280	440
Wt. of soil & dish (g)	368.32	262.99	392.63	373.06	351.71
Dry wt. soil & dish (g)	298.54	210.45	323.45	311.36	277.16
Net loss of moisture (g)	69.78	52.54	69.18	61.70	74.55
Wt. of dish (g)	6.97	7.02	6.98	6.98	7.01
Net wt. of dry soil (g)	291.57	203.43	316.47	304.38	270.15
Moisture Content	23.9%	25.8%	21.9%	20.3%	27.6%
Corrected Moisture Content					
Wt of soil & mold (lb)	13.84	13.79	13.74	13.66	13.73
Wt. of mold (lb)	9.78	9.78	9.78	9.78	9.78
Net wt. of wet soil (lb)	4.06	4.01	3.96	3.88	3.95
Net wt of dry soil (lb)	3.28	3.19	3.25	3.23	3.10
Dry Density, (pcf)	98.3	95.6	97.5	96.8	92.9
Corrected Dry Density (pcf)					

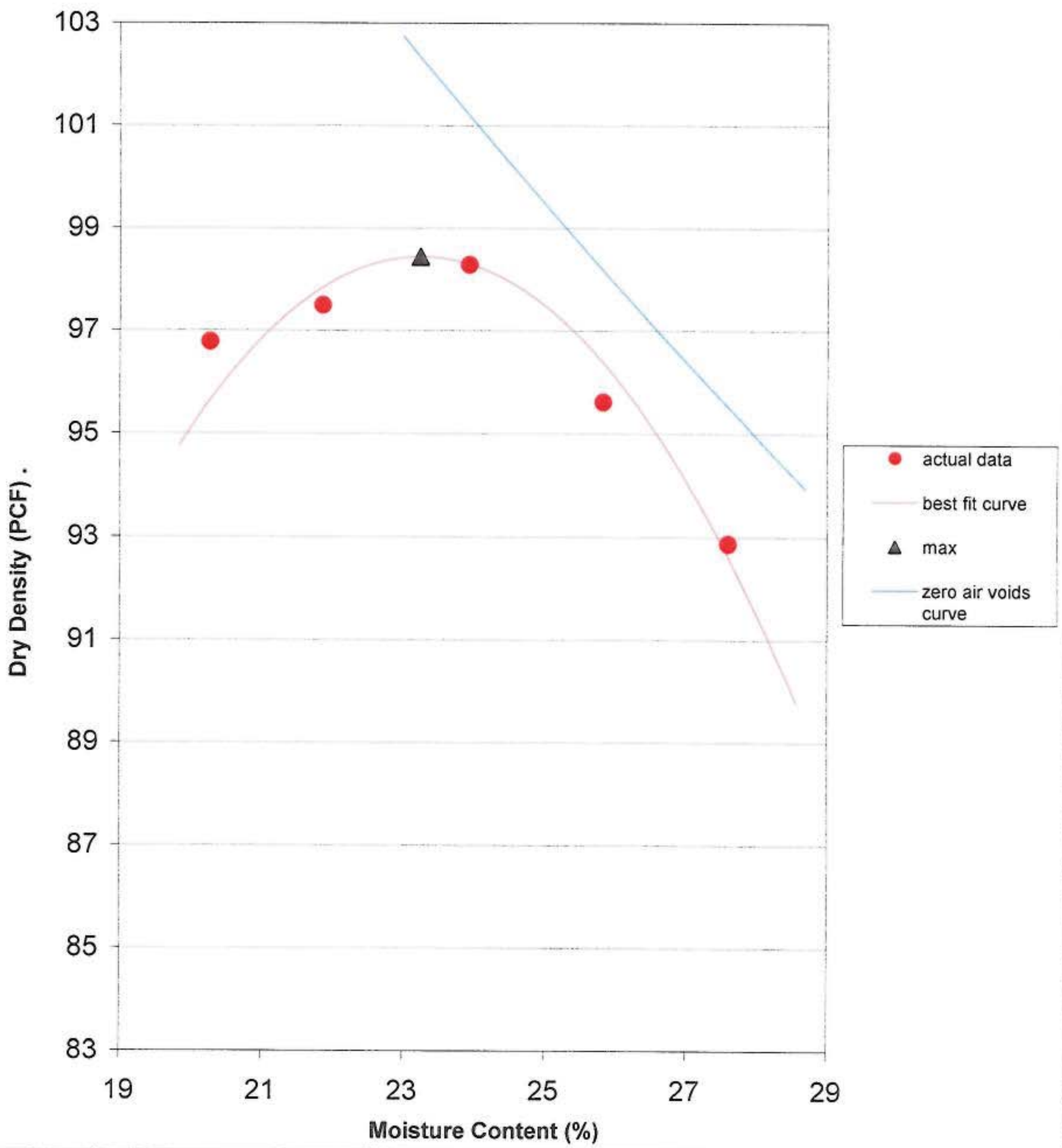
Data entry by:	NN	Date:	10/15/15
Data checked by:	SKP	Date:	10/15/15

Filename: 2905_3_Proctor_ASTMD1557_ASTMD698_R2_1.xls

Proctor Compaction Test

ASTM D 698 - A

Client:	Axis Group Inc	Job number:	2905-3
Project Number:	14-107		
Project:	Western Refinery	Boring:	Gallup Borrow
Sampled by:	--	Depth:	--
Tested by:	BDF	Sample Id:	--
Location:	--	Test date:	10/13/2015



Optimum Moisture content: 23.2 Maximum dry density: 98.4

Zero air voids curve @ SG = 2.65

Data entry by:	NN	Date:	10/15/15
Data checked by:	CKP	Date:	10/15/15
Filename	2905_3_Proctor_ASTMD1557_ASTMD698_R2_1.xls		

PERMEABILITY TRIAXIAL
Flow Pump
ASTM 5084

PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD
ASTM D 5084

CLIENT	Axis Group Inc	JOB NO.	2905-3
		Sampled By	--
BORING NO.	Gallup Borrow	Date Sampled	--
DEPTH	--	Tested By	CAL
SAMPLE NO.	--	Date Started	10/16/2015
LOCATION	--	Date Finished	10/29/2015
PROJECT	Western Refinery	CELL NUMBER	5P
PROJECT NO.	14-107	PERMEANT	Tap Water
SOIL DESCR.	Remolded -(#4)	CONFINING PRESS. (psf)	720

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	420.36	448.87
Wt. Wet Soil & Pan (g)	426.94	455.45
Wt. Dry Soil & Pan (g)	347.70	347.70
Wt. Lost Moisture (g)	79.24	107.75
Wt. of Pan Only (g)	6.58	6.58
Wt. of Dry Soil (g)	341.12	341.12
Moisture Content %	23.2	31.6
Wet Density PCF	116.7	124.2
Dry Density PCF	94.7	94.4

Init. Diameter (in)	2.408	(cm)	6.116
Init. Area (sq in)	4.554	(sq cm)	29.383
Init. Height (in)	3.012	(cm)	7.650
Vol. Bef. Consol. (cu ft)	0.00794		
Vol. After Consol. (cu ft)	0.00797		
Porosity %	47.74		

FLOW PUMP CALCULATIONS

Pump Setting	99
Velocity CM/Sec	6.53E-04
Q (cc/s)	2.09E-05
Height	3.009
Diameter	2.414
Pressure (psi)	0.402
Area after consol. (cm*cm)	29.524
Gradient	3.698
Permeability k (cm/s)	1.9E-07
Permeability k (m/s)	1.9E-09
Back Pressure (psi)	78.0
Cell Pressure (psi)	83.0
Ave. Effective Stress (psi)	4.799
Average temperature degree C:	22.5

Data entry by: NN Date: 10/30/2015
Checked by: CA Date: 11/5/15
FileName: 2905_3_OrganonFlowPumpPerm-ASTMD-5084-R3_0.xls

ATT

PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD
ASTM D 5084

CLIENT	Axis Group Inc	JOB NO.	2905-3
		Sampled By	--
BORING NO.	Gallup Borrow	Date Sampled	--
DEPTH	--	Tested By	CAL
SAMPLE NO.	--	Date Started	10/16/2015
LOCATION	--	Date Finished	10/29/2015
PROJECT	Western Refinery	CELL NUMBER	5P
PROJECT NO.	14-107	PERMEANT	Tap Water
SOIL DESCR.	Remolded -(#4)	CONFINING PRESS. (psf)	720

SATURATION DATA

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC) Close	Open	Pore Pressure (PSI) Close	Open	Change	B
40.0	38.0	2.5	13.1				
50.0	48.0	8.0	10.3	38.2	46.1	7.9	0.79
60.0	58.0	10.0	10.9	48.1	56.8	8.7	0.87
70.0	68.0	10.9	11.8	58.1	67.1	9.0	0.90
80.0	78.0	11.7	12.5	68.1	77.4	9.3	0.93
90.0		12.5	12.6	77.9	87.4	9.5	0.95

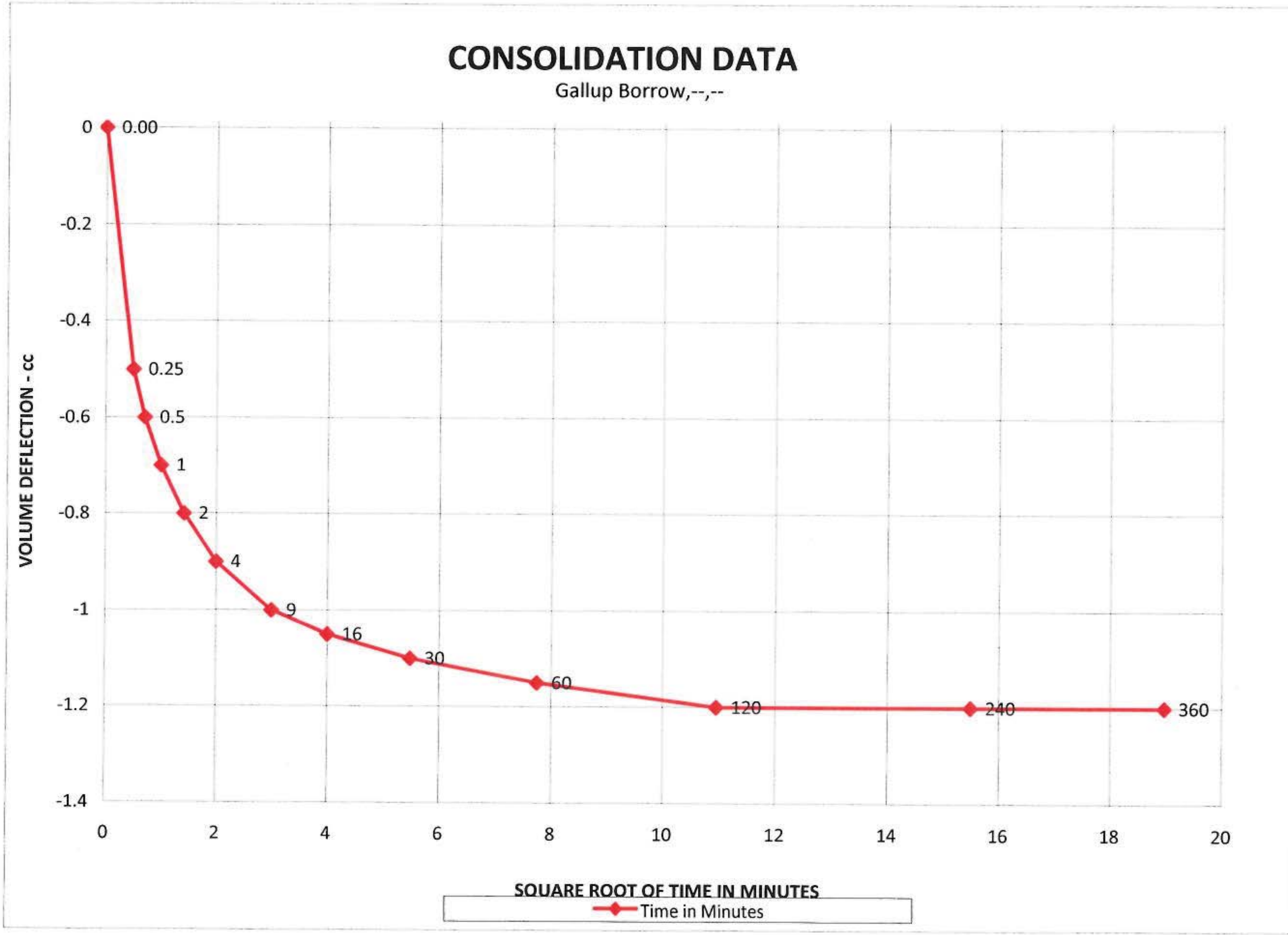
CONSOLIDATION DATA

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	12.50	0.00
0.25	0.50	13.00	-0.50
0.5	0.71	13.10	-0.60
1	1.00	13.20	-0.70
2	1.41	13.30	-0.80
4	2.00	13.40	-0.90
9	3.00	13.50	-1.00
16	4.00	13.55	-1.05
30	5.48	13.60	-1.10
60	7.75	13.65	-1.15
120	10.95	13.70	-1.20
240	15.49	13.70	-1.20
360	18.97	13.70	-1.20

Initial Height (in)	3.012	Init. Vol. (CC)	224.82
Height Change (in)	0.003	Vol. Change (CC)	11.70
Ht. After Cons. (in)	3.009	Cell Exp. (CC)	12.57
Initial Area (sq in)	4.554	Net Change (CC)	-0.87
Area After Cons. (sq in)	4.576	Cons. Vol. (CC)	225.69

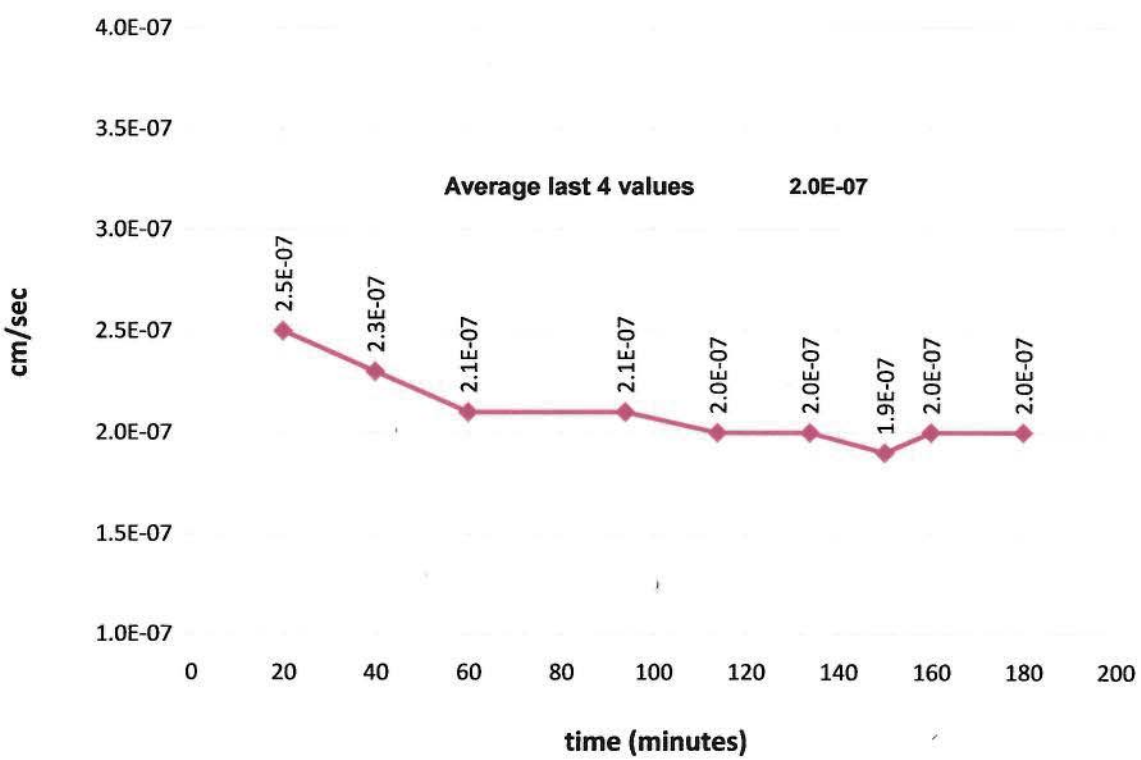
Data entry by: NN Date: 10/30/2015
Checked by: *Ca* Date: *11/5/15*
FileName: 2905_3_OrganonFlowPumpPerm-ASTMD-5084-R3_0.xls

ATT


CONSOLIDATION DATA
Gallup Borrow,--,--
VOLUME DEFLECTION - cc
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
0
2
4
6
8
10
12
14
16
18
20
0.00
0.25
0.5
1
2
4
9
16
30
60
120
240
360
SQUARE ROOT OF TIME IN MINUTES
Time in Minutes

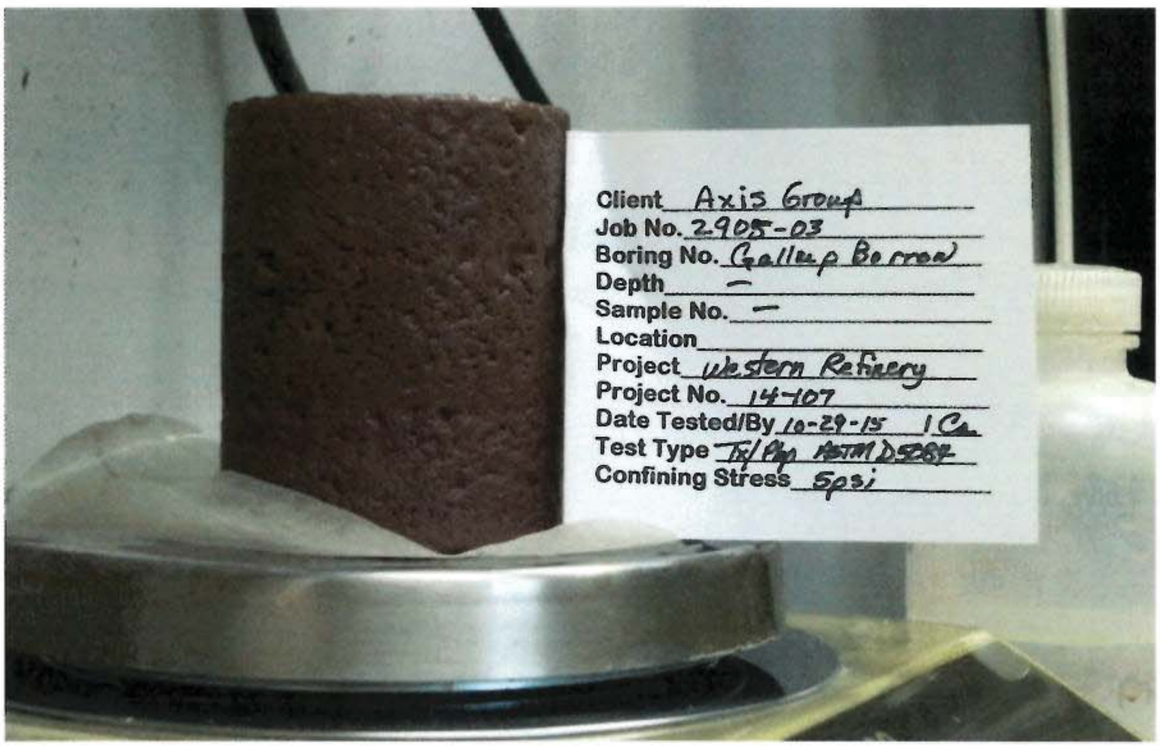
Preliminary Flow Pump Test Data
ASTM D5084 Method D

Client:	Axis Group Inc	Boring Number:	Gallup Borrow		
Job Number:	2905-3	Depth:	--		
Project:	Western Refinery	Sample Number:	--		
Location:	--	Sampled Date:	--	Sampled By:	--
Project Number:	14-107	Test Date:	10/29/2015	Technician:	CAL



Data Entered By:	CAL
Date:	10/29/2015
File Name:	2905_3_PrelimPerm_ASTMD-5084-methodD-R1_0.xls

Checked By: NN
Date: 10/30/15



Q:\Client Data File\2905\3\PICTURE\DSCF6055

amec

Client: Bonaguidi Construction
3100 East Aztec Ave.
Suite 5
Gallup, NM 87301-

Attn: Dan Bonaguidi

Project Name: Pond 6 Dock Repair w/Engineer Firm

Gallup, NM

Project Manager: Lee Lommler

Report Date: March 24, 2015

Project #: 14-519-00435.4
Report #: 40326
Tested By: Michael Martinez
Date Tested: 3/12/2015
Type of Material: Pond Berm Subgrade

Sand Cone Apparatus #: 1733
Sand Cone Appartus Calibrated Volume: 0.039

SAND CONE DENSITY TEST (ASTM D1556-07)

Moisture Density Curves Used

AMEC Lab #	Maximum Density	Optimum Moisture	Test Type / Method	Description
G5692	93.7	26.1	ASTM D698-07 / A	Medium Dark Reddish Brown Clay
G5693	98.8	23.8	ASTM D698-07 / A	Medium to Dark Reddish Brown Clay

Test #	Location	Elevation	** Reference	Density of Sand Used (pcf)	Test Hole Vol. ft³	*** % Moisture	Wet Density (pcf)	Dry Density (pcf)	Maximum Density (pcf)	% Com-paction	% Compaction Required Min	Max
01	Sta. 60+50		01	93.3	0.0930	14.1	114.7	100.5	93.7	100+		

** References the Oringinal Test Number for the Nuclear Density Test Performed
*** Moisture determined by oven-dry method (ASTM D2216).

Reviewed By
jdc

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee ()
Dan Bonaguidi (email) (1)

AMEC Environment & Infrastructure, Inc.
8519 Jefferson NE
Albuquerque, NM 87113
Tel 5058211801
Fax 5058217371

www.amec.com

amec foster wheeler

Client:	Bonaguidi Construction 3100 East Aztec Ave. Suite 5 Gallup, NM 87301-	**Report Date:**	March 24, 2015
		Project #:	14-519-00435.4
		Report #:	40326
Attn:	Dan Bonaguidi	**Tested By:**	Michael Martinez
Project Name:	Pond 6 Dock Repair w/Engineer Firm Gallup, NM	**Date Tested:**	3/12/2015
		General Location of Testing:	Pond Berm Subgrade
Project Manager:	Lee Lommler		

FIELD DENSITY TEST USING NUCLEAR DENSITY GAUGE (ASTM D6938-10)

Moisture Density Curves Used

AMEC Lab #	Maximum Density	Optimum Moisture	Test Type / Method	Description
G5692	93.7	26.1	ASTM D698-07 / A	Medium Dark Reddish Brown Clay
G5693	98.8	23.8	ASTM D698-07 / A	Medium to Dark Reddish Brown Clay

Nuclear Density Gauge

Make: Troxler
Model #: 3440-A
Serial #: 37066

Test #	Location	Elevation	Test Mode	Probe Depth (in)	% Moisture Actual	% Moisture Required (-)	% Moisture Required (+)	Wet Density (pcf)	Dry Density (pcf)	Maximum Density (pcf)	% Com-paction	% Com-paction Required Min	% Com-paction Required Max
01	Sta. 60+50	FSG -6'	D	6	13.3			108.2	95.5	93.7	100+	95	
02	Sta. 60+58	FSG -6'	D	6	19.6			109.4	91.4	93.7	98	95	
03	Sta. 60+59	FSG -6'	D	6	14.0			113.4	99.5	98.8	100+	95	

Reviewed By: ______________________
jdc

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee ()
Dan Bonaguidi (email) (1)

BTSB=Below Top of Subbase, BTOF= Below Top of Fill, FSG = Finished Subgrade, FBC = Finished Base Course, BOP = Bottom of Pipe, BOB = Bottom of Base, BOF = Bottom of Footing, OGP = Original Ground Prep
Test Mode = D for Direct Transmission and B for Backscatter Modes

AMEC Environment & Infrastructure, Inc.
8519 Jefferson NE
Albuquerque, NM 87113
Tel 5058211801
Fax 5058217371 www.amec.com

amec foster wheeler

Client:	Bonaguidi Construction 3100 East Aztec Ave. Suite 5 Gallup, NM 87301-	**Report Date:**	June 11, 2015
		Project #:	14-519-00435.4
		Work Order #:	2
		Lab #:	G5746
Attn:	Dan Bonaguidi	**Sampled By:**	Derek Martinez
Project Name:	Pond 6 Dock Repair w/Engineer Firm Gallup, NM	**Date Sampled:**	6/3/2015
		Visual Description of Material:	Reddish Clay
		Sample Source:	Side of Pond 7 & 8
Project Manager:	Lee Lommler		

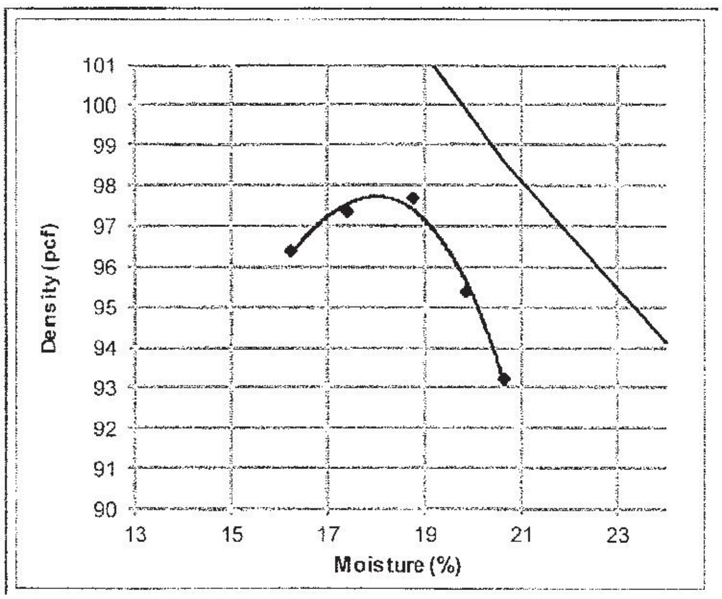
SOILS / AGGREGATES

No Project Specification was Provided.

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing



Moisture Density Relationship: (ASTM D1557-09) **Method:** A

Preparation Method: Dry **Rammer Type:** Manual

Specific Gravity: 2.35 **Assumed**

Maximum Density: 97.5

Optimum Moisture: 18.0

Reviewed By:______________________________

jdc

Distribution: Client ☑ File: ☑ Supplier: ☑ Email: ☐ Other: Addressee ()

Dan Bonaguidi (email) (1)

AMEC Environment & Infrastructure, Inc.
8519 Jefferson NE
Albuquerque, NM 87113
Tel 5058211801
Fax 5058217371

Field Density Soils Results

Report Date: June 22, 2015

amec foster wheeler

Client

Name: Bonaguidi Construction
Address: 3100 East Aztec Ave Gallup, NM 87301
Attention: Dan Bonaguidi
PO Number:
Date Tested: 6/17/2015 by Kevin Olson
General Description (Material/Location): Pond 7 & 8

Project

Name: (14-519-00435.5) Pond 7 & 8 Dock Repair w/Engineer Firm
Address: Gallup, NM
Phase: **Task:**
Manager: Abe Sandoval
Reference #: NS20975

FIELD DENSITY TEST USING NUCLEAR DENSITY GAUGE (ASTM D6938-10)

Moisture Density Curves Used

Lab/Ref. #	Maximum Density	Optimum Moisture	Test Type/ Method	Description	Source
G5746	97.5	18.0		Reddish Clay	Side of Pond 7 & 8

Nuclear Density Gauge

Make:
Model #:
Serial #: 37041

Standard Count

	Calibration	Field
Density:		2443
Moisture:		738

Test #	Location	Elevation	Test Mode	Probe Depth (in.)	% Moisture Actual	% Moisture Required (-)	% Moisture Required (+)	Wet Density (lbs/ft^3)	Dry Density (lbs/ft^3)	Maximum Density (lbs/ft^3)	% Compaction Actual	% Compaction Required Min	% Compaction Required Max
01	Sta. 43+75	FSG -1'	D	6	20.2	3	3	111.4	92.7	97.5	95	95	
02	Sta. 45+65	FSG -1.5'	D	6	20.7	3	3	114.8	95.1	97.5	98	95	

BTSB=Below Top of Subbase, BTOF= Below Top of Fill, FBC= Final Base Course, FSG = Finished Subgrade, FBC = Finished Base Course, BOP = Bottom of Pipe, BOB = Bottom of Base, BOF = Bottom of Footing, OGP = Original Ground Prep
Test Mode = D for Direct Transmission and B for Backscatter Modes

Distribution: Dan Bonaguidi
Reviewed By: Abe Sandoval

Amec Foster Wheeler Environment & Infrastructure, Inc. - 8519 Jefferson NE - Albuquerque, NM 87113
phone: (505) 821-1801 fax: (505) 821-7371

Field Density Soils Results

amec foster wheeler

Report Date: June 26, 2015

Client		Project	
Name:	Bonaguidi Construction	**Name:**	(14-519-00435.5) Pond 7 & 8 Dock Repair w/Engineer Firm
Address:	3100 East Aztec Ave Gallup, NM 87301	**Address:**	Gallup, NM
Attention:	Dan Bonaguidi	**Phase:**	**Task:**
PO Number:		**Manager:**	Abe Sandoval
Date Tested:	6/23/2015 by Kevin Olson	**Reference #:**	NS21609
General Description (Material/Location):	Dike on Pond #5		

FIELD DENSITY TEST USING NUCLEAR DENSITY GAUGE (ASTM D6938-10)

Moisture Density Curves Used

Lab/Ref. #	Maximum Density	Optimum Moisture	Test Type/ Method	Description	Source
G5746	97.5	18.0	ASTM D1557/A	Reddish Clay	Side of Pond 7 & 8

Nuclear Density Gauge

Make: Troxler
Model #: 3430
Serial #: 37041

Standard Count

	Calibration	Field
Density:		2418
Moisture:		727

Test #	Location	Elevation	Test Mode	Probe Depth (in.)	% Moisture Actual	% Moisture Required (-)	% Moisture Required (+)	Wet Density (lbs/ft^3)	Dry Density (lbs/ft^3)	Maximum Density (lbs/ft^3)	% Compaction Actual	% Compaction Required Min	% Compaction Required Max
01	Pond #5, E End, 220' W of Sign	FSG -1'	D	6	17.3	2	2	108.9	92.8	97.5	95	95	
02	Pond #5 @ Sign	FSG -1.5'	D	6	19.3	2	2	116.0	97.2	97.5	100	95	

BTSB=Below Top of Subbase, BTOF= Below Top of Fill, FBC= Final Base Course, FSG = Finished Subgrade, FBC = Finished Base Course, BOP = Bottom of Pipe, BOB = Bottom of Base, BOF = Bottom of Footing, OGP = Original Ground Prep
Test Mode = D for Direct Transmission and B for Backscatter Modes

Distribution: Dan Bonaguidi

Reviewed By: Abe Sandoval

[signature]

Amec Foster Wheeler Environment & Infrastructure, Inc. - 8519 Jefferson NE - Albuquerque, NM 87113
phone: (505) 821-1801 fax: (505) 821-7371

APPENDIX C

2002 Slope Stability Analysis

February 12, 2002

GEOTECHNICAL EVALUATION OF EVAPORATION PONDING CONTAINMENT BERMS

GIANT REFINING COMPANY
CINIZA REFINERY

FILE NO. 00-141

Submitted To:

Ms. Dorinda Mancini
Giant Refining Company
Route 3, Box 7
Gallup, New Mexico
87301

GEOTECHNICAL EVALUATION OF EVAPORATION PONDING CONTAINMENT BERMS

GIANT REFINING COMPANY
CINIZA REFINRY
GALLUP, NEW MEXICO

FILE NO: 00-141

PREPARED BY
PRECISION ENGINEERING, INC.
P.O. BOX 422
LAS CRUCES, NEW MEXICO

APPROVED BY

WILLIAM H. KINGSLEY, PE
PE NO. 8313

FEBRUARY 12, 2002

Index

Appendix Contents

1.0 General

An evaluation of the structural integrity of the evaporation lagoon berms located at the Giant Refining Company's Ciniza Refinery has been performed. There are a total of twelve (12) lagoons located in three (3) impoundment areas. Within the major impoundment areas individual lagoons are separated by interior dikes. The structural analysis of the exterior containment berms was performed using a conventional method of slices as well as finite element analyses of the berm sections. A total of thirteen (13) sections were evaluated for stability at the lagoons. Critical section locations were established based on visual inspection of the lagoons as well as a survey of the lagoon berms.

Soil profiles were established based on information obtained from ten subsurface investigation locations. Representative samples were obtained from borings through the berms. The boring depths range from fifteen (15) to twenty (20) feet. The borings were advanced using a truck-mounted CME 75 drill equipped with eight and five-eighths (8-$\frac{5}{8}$) inch outside diameter, continuous flight, hollow-stemmed auger. The borings were completed in accordance with ASTM D-1452: Standard Method for Soil Investigation and Sampling by Auger Methods.

As the auger was advanced, continuous visual inspection of cutting returns was maintained. Samples were taken at five (5) foot intervals throughout the boring and at major soil changes. Standard penetration resistance determinations were accomplished in accordance with ASTM D-1586: Standard Method for Penetration Test and Split-Barrel Sampling of Soils. Relatively undisturbed samples were obtained using Shelby tubes in accordance with ASTM D-1587: Thin-Walled Tube Sampling of Soils for Geotechnical Purposes. Following field classification, the samples were identified and transported to the laboratory for further study.

In addition to borings Dutch Cone soundings were used to evaluate the insitu soil properties and stratigraphy of the embankments and founding soils. Soundings were advanced in accordance with ASTM D-3441: Deep, Quasi-Static, Cone and Friction-Cone Penetration Tests of Soil. Soundings were taken at one (1) foot intervals from the surface through the total depth of the sounding. The soundings were advanced using the hydraulic push capabilities of the CME 75D drill unit.

The logs for the auger borings, and the boring location plan are provided in the appendix of this report. The locations of the sections used for the analysis of the berm embankments are also shown on the boring plan.

2.0 Laboratory Investigation

Representative soil samples obtained from the field investigation were examined and classified based on the Unified Classification System (ASTM D-2487) and the AASHTO Classification System (AASHTO M-145). Particle size analyses were conducted on representative samples. Moisture content determinations were made on all samples to establish moisture content profiles. Atterberg Limits were established on representative samples that exhibited a cohesive nature. All of the above indicator tests were used to aid in defining soil stratification and general insitu soil conditions. The mechanical grain size analyses and soil classification summaries are provided in the appendix of this report.

Unit weight and triaxial shear testing was performed on representative samples to determine strength properties for structural analysis of the soils in the embankments. Test results are shown in the appendix of this report. All testing was conducted in accordance with procedures outlined in the ASTM Standard Methods.

3.0 General Site and Soil Conditions

The evaporation lagoons are located at the southern edge of a broad valley formed as the result of the weathering of relatively soft shales (mudstones and siltstones) of the Petrified Forest Member of the Chinle Formation. These siltstones and mudstones of the Chinle have a high montmorillonite clay content. As a result the soils that have developed at the site are comprised of clays of moderate to high plasticity. All boring and soundings indicate the embankments have been constructed of clay taken from the valley floor. The embankments are founded on the native clays of the valley floor.

The Chinle Formation serves as the bedrock formation at this site. Generally, the formation dips to the north-northwest at approximately three (3) degrees. At the southerly edge of the lagoons the formation was encountered at approximately fifteen (15) feet below the natural ground elevation. At the northerly side of the lagoon site the formation has been encountered in past studies at a depth on the order of sixty (60) feet.

Groundwater was not encountered in any of the embankments. The only groundwater that was encountered during the investigation was a boring eight (8). This location is at the extreme southerly edge of the valley floor. During the drilling the groundwater was encountered at a depth of eighteen

(18) feet below the top of the berm. After twenty-four hours the water level had risen to slightly greater than six (6) feet below the boring elevation (top of the containment berm). At that location the berm height is approximately five (5) feet in height, making the water level approximately one (1) foot below the toe of the embankment. It should be noted that no free water was encountered during the drilling of boring eight (8) until the eighteen (18) foot depth. At that depth a water bearing sandy layer approximately two (2) feet in thickness was encountered. This sandy zone immediately overlies the Chinle Formation. The mudstone of the Chinle Formation is not water bearing. The sandy zone is a confined water bearing zone that is artesian. Nearly every boring that has been drilled to the undisturbed Chinle Formation at the Ciniza site has penetrated this overlying sand zone. The zone serves as an excellent marker for the top of the Chinle. There is no evidence of water migration at this location, or the other investigation locations, which can be attributed to leakage from the ponds.

4.0 Analysis

Thirteen (13) sections through the exterior embankments have been analyzed for stability. Both interior as well as exterior stability of the embankments has been checked. Because the interior height of the embankments are low, factors of safety for the interior slopes are very high. The controlling failure mechanism is associated with the geometry of the exterior slope (the slope that defines the outside or nonwetted face of the lagoon group).

The analyses demonstrate that the berms are structurally stable. Factors of safety against failure for the sections analyzed range from a high of 10.0 to a low of 2.5. Typical minimum desirable factors of safety for this type of structure are in the range of 1.3 to 1.5. As mentioned previously the embankments were evaluated using the method of slices (Bishop's Modified Method) as well as finite element evaluation. A computer program developed by the New York State Highway Department named SLOPES was used to evaluate the berms with Bishop's Modified Method. A program developed at the Colorado School of Mines, Geomechanics Research Center by D. V. Griffiths was used to perform the finite element evaluation. The program, named SLOPE1 is well documented in the book "Programming the Finite Element Method" by I. M. Smith and D. V. Griffiths. Plots of the finite element (FE) mesh, deflection data, and vector traces of the deflected mesh were made using a separate plotting program and are presented in the appendix of this report. The deflected mesh graphically shows the result of the FE analysis at the most critical factor of safety identified. There was excellent correlation between the two analysis types where a circular failure provided the critical factor of safety.

The program SLOPES forces a circular failure where the FE program evaluates translation of nodes of the finite element mesh. The finite element program in this respect provides a more critical evaluation of the failure mode. It may be seen with the FE program that although the higher embankments show the critical failure mode to be a circular failure, the lower embankments tended to identify settlement as a more likely failure mode. The observation is somewhat academic, however, since the associated factors of safety against failure are 2.5 at the worst. Structurally, the berms are sound.

The soils comprising the embankments were tested to evaluate their propensity for being dispersive. Pinhole dispersion testing was performed on the materials in the constructed embankments. The soils were found to be in the category of nondispersive. Piping failure is unlikely to occur in the exterior containment embankments.

5.0 Observations and Recommendations

5.1 Wave Damage

A visual examination of the ponds was performed as a portion of the field investigation. Notes made during the field observation indicated there is no obvious structural failure that is occurring on the embankments. It was noted, however, that although the lagoon depth tended to not exceed two to three feet in total depth substantial wave erosion is occurring on the interior portion of the exterior containment embankments. Similarly, wave erosion is occurring along the interior pond separation dikes. Some, generally minor, erosion is occurring on the exterior faces of the perimeter containment berms.

A conscientious effort of embankment maintenance will easily control the exterior erosion of the containment berms. Although continual maintenance of the interior wave damage on the outside containment berms could also be made, over time significant pond volume loss would be realized as material is continually added to the interior of the lagoons at wave damage locations. It is recommended that a more permanent interior wave energy dissipation system be considered.

Wave damage may be reduced by plating the active wave areas with nonerosive material such as rock, grout blankets, or similar materials. If rock is selected at this site it should be placed on a geogrid material such as Tensar®, in Maccaferri® Reno Mattresses, or similar geotextile materials. These materials will prevent the rock from sinking into the soft soils or sliding off the slope where it will be ineffective against wave damage. It is recommended that wave protection be placed such that it extends from the top of the embankment to a minimum of twenty-four (24) inches below the lowest water level.

Where twenty four (24) inches extends below the bottom of the interior slope elevation, the slope protection material should key into the bottom of the lagoon impoundment a minimum of eight (8) inches. Because the lagoons are used as evaporation ponds the slope protection will likely be required on the entire interior face of the outside containment lagoons. Because of the lack of high quality aggregates in the Gallup area, rip-rap type energy dissipation, although permanently effective, will be costly to install.

An alternate wave protection system involves dissipation of the wave energy prior to reaching the embankment berms. Such systems involve the use of geogrids, fabrics, or liner materials constructed as a fence approximately three (3) to five (5) feet away from the wave impact area of the containment berms. It is the intent that these materials reflect or dissipate the majority of the wave energy prior to reaching the embankment material. Floating systems have also been used to reduce minor wave action. Materials such as partially submerged plastic drums have been successfully used to reduce the effects of wave action. These systems should be used to protect interior pond separation dikes as well as the exterior containment berms.

Should Giant Refining Company require assistance in design of these systems or require design review, Precision Engineering, Inc. can assist as required.

5.2 Berm Height

It was noted during the visual inspection that at some locations the impounded water level was within one (1) foot of the containment berm crest elevation. Should an interior dike be breached or high winds cause large waves the exterior containment dike could easily be overtopped. It is strongly recommended that the elevation of the water or the elevation of the exterior berms be adjusted such that the high water mark is a minimum of two (2) feet below the exterior containment berm elevation. It is further recommended that the two (2) feet of freeboard be extended to include the interior pond separation dikes as well. Should the interior dikes be breached the most westerly exterior containment dikes could be overtopped.

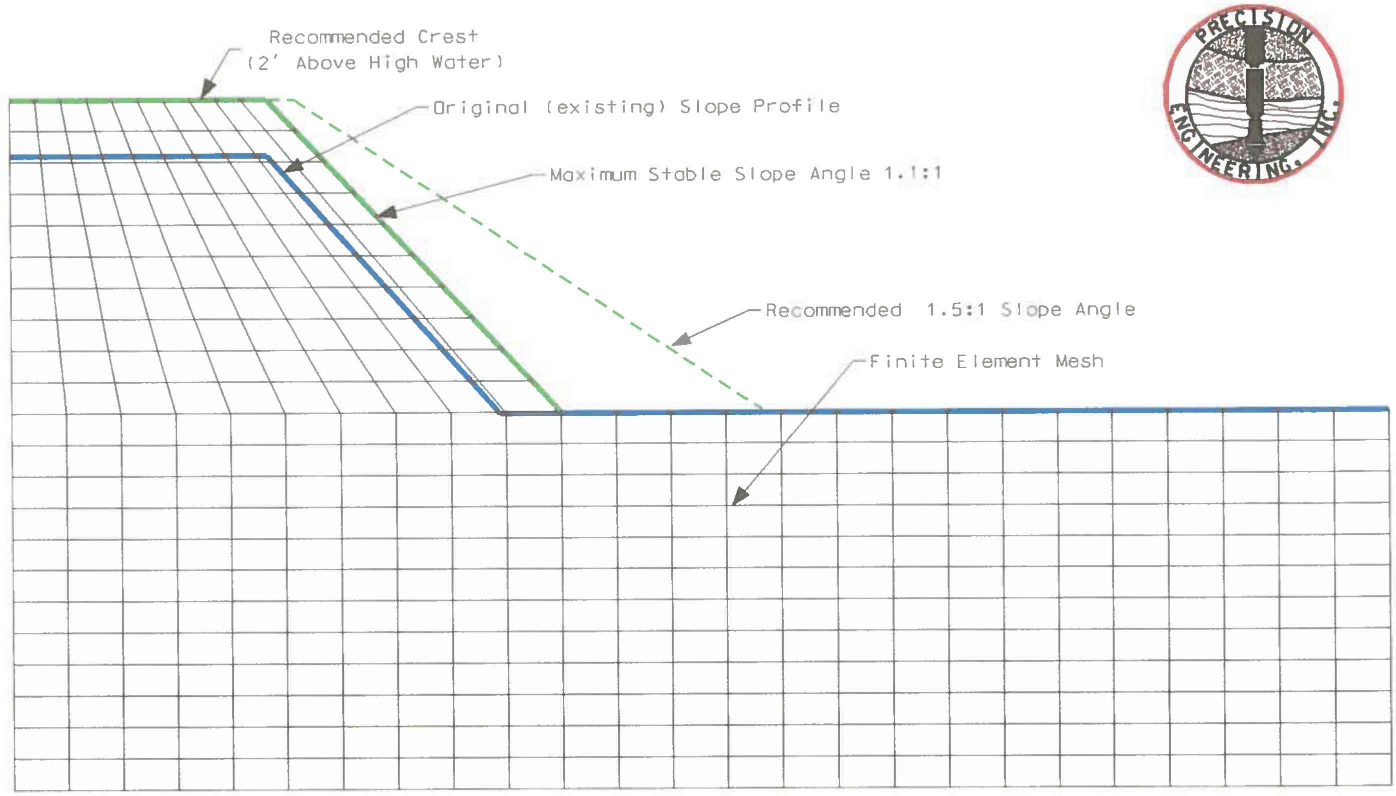
Analysis indicates that when the elevation of the top of the outside containment berms are elevated approximately two (2) feet the minimum factor of safety against failure is 2.1. This minimum critical section is represented by Section 12 on the west side of the ponds (see boring plan). The failure mechanism and associated factor of safety is illustrated in Figure 2.

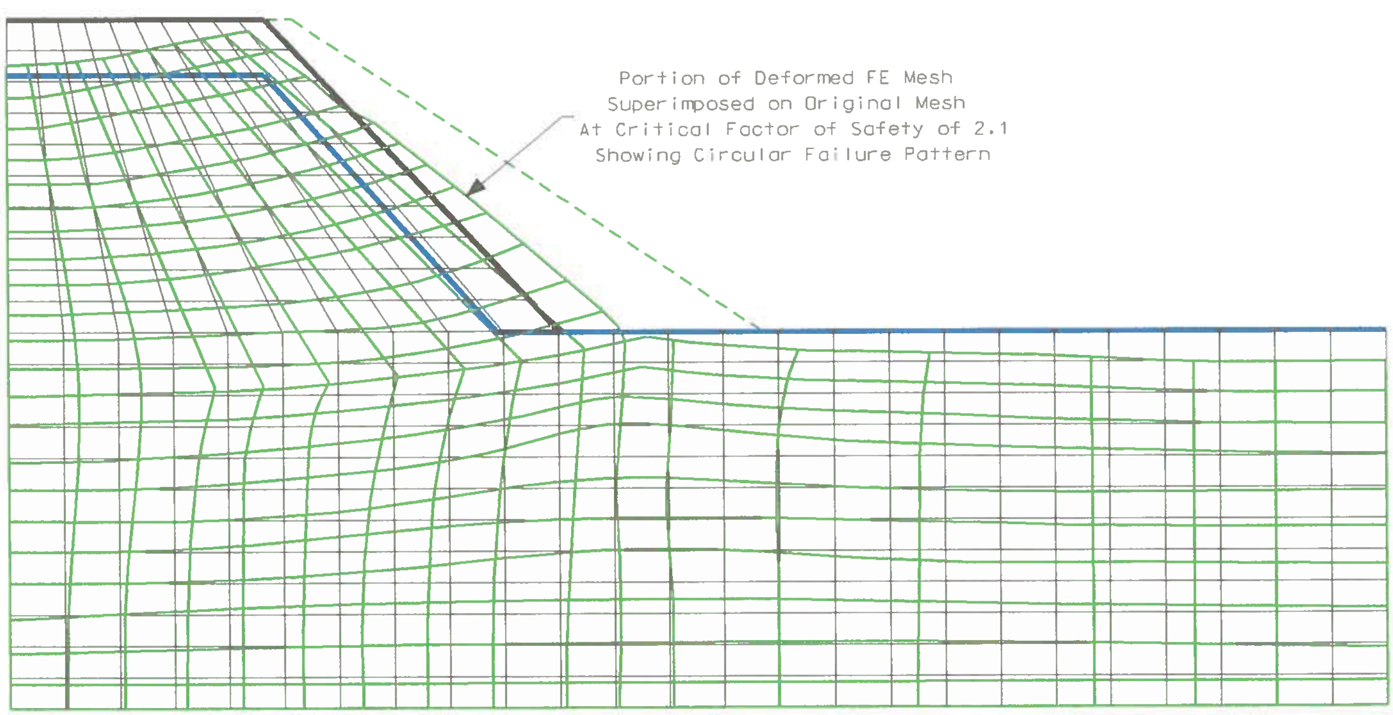
It is recommended that the berm elevations be adjusted to be two (2) feet above the maximum anticipated water level elevation. It is recommended that the minimum width of the top of the containment berms be ten (10) feet. For structural stability, the side slopes of the berms should not exceed their present slope angle after the addition of material to raise the crest elevation. It is recommended, however, that the slope angles not exceed an angle having a horizontal to vertical ratio of 1.5:1. This typically flatter slope angle will resist the development of erosion channels on the exterior face of the berms.

Soils placed to adjust the elevation of the berm crests were analyzed assuming that the material would be taken from the valley floor near the ponds. Based on material properties evaluated on other projects at the site, the soils may be taken from essentially any location on the Ciniza Refinery property. Soils imported to the site should be evaluated for stability. Soils taken from the Ciniza property may be

Figure 2 - Section 12

Critical Section and Failure Mechanism
After Elevating and Reshaping Containment Berms





taken from the "Rattlesnake" pit area or the pit used by the NMSH&TD located east of pond 9. It is recommended that material not be taken from an area within twenty feet of the final berm toe points. It is recommended that the proposed borrow material be tested for strength properties by unconsolidated, undrained triaxial shear before being approved as fill material for the containment berms.

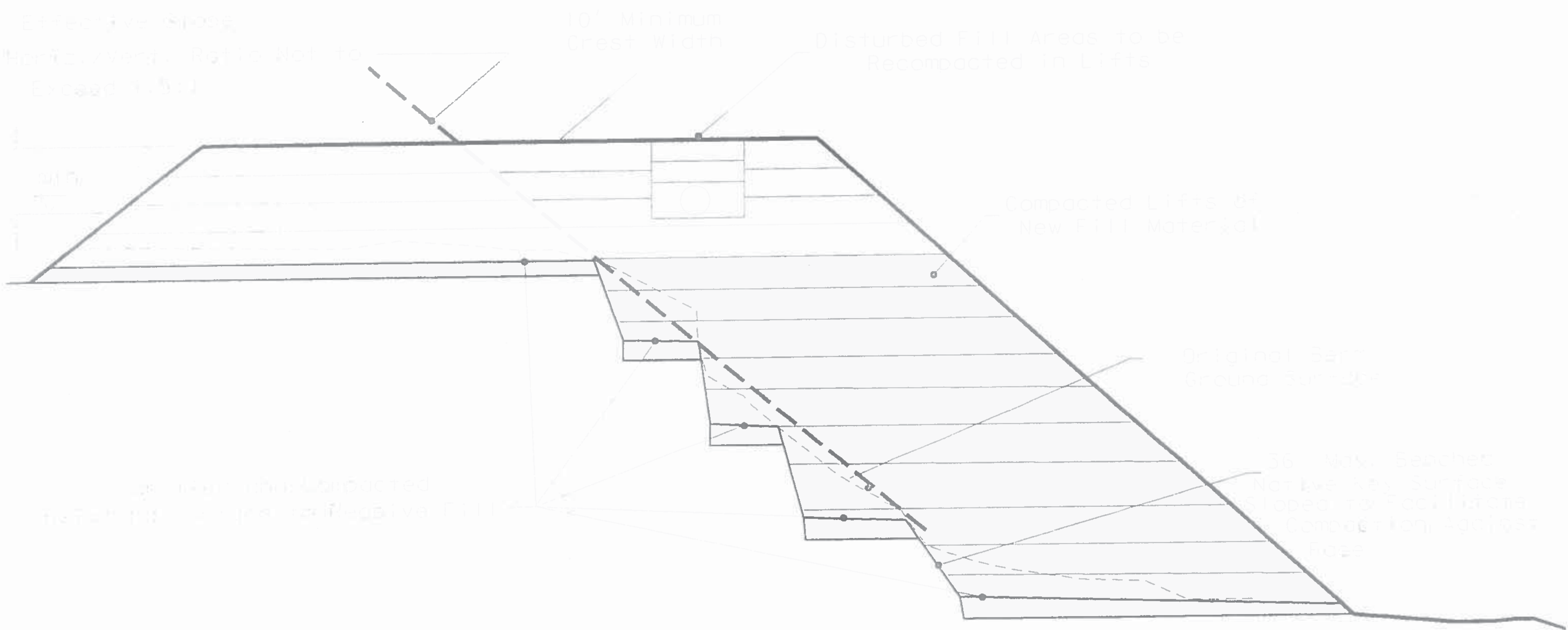
Soil placed on the berms should be keyed into the berms to provide the maximum strength. The side slopes of the existing embankments should be benched to create a horizontal surface for fill construction. This will provide structural interlock with the existing material. All new fill should be placed and compacted in lifts on the benched surfaces. Keys should be cut in the excavated slope to form horizontal benches as nearly level as is reasonable. Each bench should not exceed thirty-six (36) inches in elevation change to avoid stress concentrations within the fill. Bench cut faces may be sloped steeply to facilitate compaction adjacent to the cut face.

Fill should be placed and compacted beginning at the slope toe and progress to the top of the berm to allow for a more homogeneous new fill section. The berm will be more stable if the new slope section is constructed prior to adding height to the berms. The intent of this recommendation is illustrated in Figure 1.

New fill should be placed on existing material that has been properly prepared to receive material. The existing surface should be cleared and grubbed to remove any organic debris and oversized material. Oversized material consists of rocks or soil lumps that exceed six (6) inches in maximum dimension. The standard proctor test (ASTM D-698) should be used as the reference unit weight because the test results provide a more flexible structure that resists cracking during any potential deformation. The prepared surface should be scarified eight (8) inches and compacted to a minimum of 95% of Standard Proctor unit weight.

Figure 1

General Fill Placement on Existing Slopes



New fill soils should be processed to bring them to a moisture content approximately two (2) percent above optimum moisture content. Compaction at this moisture content will minimize the hydraulic conductivity of the lift after compaction. Under no conditions shall fill material contain vegetative or other organic debris. The fill soils should be placed and compacted in uniform lifts not to exceed eight (8) inches in compacted thickness. The soils should be compacted using pad wheeled or sheepsfoot type equipment to provide better lift interlock and minimize the potential for providing a hydraulic conduit between lifts. The new fill soils should be compacted to a minimum of 100% of Standard Proctor (ASTM D-698) unit weight.

6.0 Summary

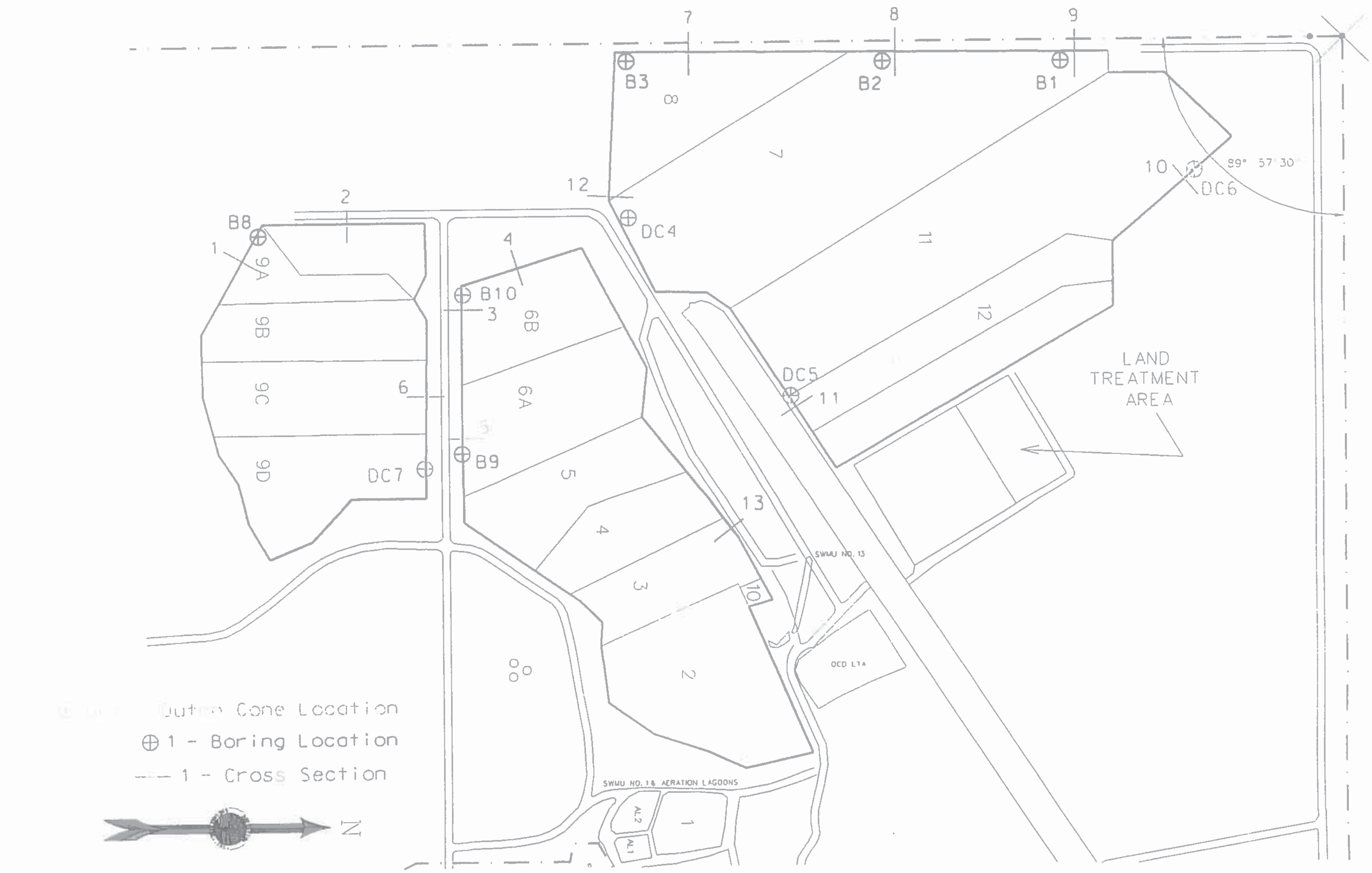
Analysis as and visual inspection of the exterior containment berms and interior lagoon separation dikes has provided the following conclusions and recommendations:

- The containment berms are structurally stable.
- There is little potential for a piping type failure through the lagoon containment berms.
- No water was detected leaking through or below the containment berms that could cause a stability or surface contamination problem.
- The interior slopes of the containment berms and lagoon separation dikes are susceptible to wave erosion. It is recommended that positive wave energy abatement systems be placed or that a continuous interior lagoon maintenance program be established. The maintenance program will likely cause substantial loss of lagoon life and wave abatement is recommended.
- The containment berms are susceptible to overtopping because of a lack of free board. It has been recommended that the berm heights be adjusted to allow for a minimum of two (2) feet of

free board above the maximum anticipated water level. Recommendations for fill placement have been provided. The freeboard area should be protected from erosion degradation.

APPENDIX

Giant Refining Company
Ciniza Refinery Evaporation Ponds
Boring Plan



Sheet: 1 OF 10

PRECISION ENGINEERING, INC.

File #: 00-141

Bore Point: SEE SITE PLAN

LOG OF TEST BORINGS

Site: CINIZA

Water Elev: NOT ENCOUNTERED

Elevation: EXISTING

Boring No.: ONE

Date: DECEMBER 06, 2000

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	SAMPLES	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	L	PI	CLASS.
38625	0.0 - 1.5	4-5-6	//////		SSS	**CLAY**, REDDISH BROWN, WET, FIRM	25.5		NP	SM/A-2-4
			//////	2.5						
38626	5.0 - 6.5	6-6-6	//////	5.0	SSS	STIFF	21.7	47	25	CH/A-7-6
			//////	7.5						
38627	10.0-11.5	4-5-6	//////	10	SSS	FIRM	22.5			
	14.5		//////							
38628	15.0-16.5	12-16-23	//-///	15	SSS	**CLAY**, SLIGHTLY SILTY, REDDISH BROWN, MOIST, HARD	13.2	53	33	CH/A-7-6
38629	20.0-21.5	7-15-19	//-///	20	SSS	SOME SILT LAMANAE	12.0			
	21.5 TOTAL DEPTH									

Size & Type of Boring: 8-1/4" ID Hollow Stemmed Auger

Logged By: WHK

PRECISION ENGINEERING, INC.

File #: 00-141

LOG OF TEST BORINGS

Bore Point: SEE SITE PLAN
WEST DYKE CENTER

Site: CINIZA

Water Elev: NOT ENCOUNTERED

Elevation: EXISTING

Boring No.: TWO

Date: DECEMBER 06, 2000

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	SAMPLES	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	L	PI	CLASS.
38630	0.0 - 1.5	3-3-3	/*/*/*		S	**CLAY**, VERY SANDY, REDDISH BROWN, WET, SOFT	26.3	30	10	CL/A-4
			/*/*/*		S					
			/*/*/*		S					
			/*/*/*							
			/*/*/*	2.5						
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*	5.0						
38631	5.0 - 7.0	SHELBY	/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*							
38632	7.0 -10.0	SHELBY	/*/*/*	7.5						
			//////			NO SAND	33.0			
			//////							
			//////							
			//////							
			//////	10						
			//////							
			//////							
			//////							
			//////							
			//////							
	13.0		//////							
			//*///			**CLAY**, SLIGHTLY SANDY, REDDISH BROWN, MOIST,				
			//*///			HARD				
			//*///							
			//*///	15						
38633	15.0-16.8	SHELBY	//*///							
			//*///							
	16.8		//*///							
	TOTAL DEPTH									
				20						

Size & Type of Boring: 8-1/4" ID Hollow Stemmed Auger

Logged By: WHK

PRECISION ENGINEERING, INC.

File #: 00-141

Bore Point: SOUTHWEST CORNER OF POND 8

LOG OF TEST BORINGS

Site: CINIZA

Water Elev: NOT ENCOUNTERED

Elevation: EXISTING

Boring No.: THREE

Date: DECEMBER 06, 2000

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	L	PI	CLASS.
38634	0.0 - 1.5	3-3-5	//*///		S	CLAY, SLIGHTLY SANDY(FINE), REDDISH BROWN,	15.8	50	36	CH/A-7-6
			//*///		S	MOIST, FIRM				
			//*///		S					
			//*///							
			//*///	2.5						
			//*///							
			//*///							
			//*///							
			//*///							
			//*///	5.0						
38635	5.0 - 6.5	3-4-3	//////		S	LITTLE TO NO SAND, WET	30.2			
			//////		S					
			//////		S					
			//////							
			//////	7.5						
			//////							
			//////							
			//////							
			//////							
			//////	10						
38636	10.0-11.5	4-4-6	//////		S		31.1	79	41	CH/A-7-5
			//////		S					
			//////		S					
			//////							
			//////							
			//////							
			//////							
			//////							
			//////							
			//////	15						
38637	15.0-16.5	4-6-9	//////		S		28.4			
			//////		S					
			//////		S					
			//////							
			//////							
			//////							
			//////							
			//////							
			//////							
			//////	20						
38638	20.0-21.5	7-15-21	//*///		S	SLIGHTLY SANDY, HARD	30.8	60	34	CH/A-7-6
			//*///		S					
			//*///		S					
	TOTAL DEPTH									

Size & Type of Boring: 8-1/4" ID Hollow Stemmed Auger

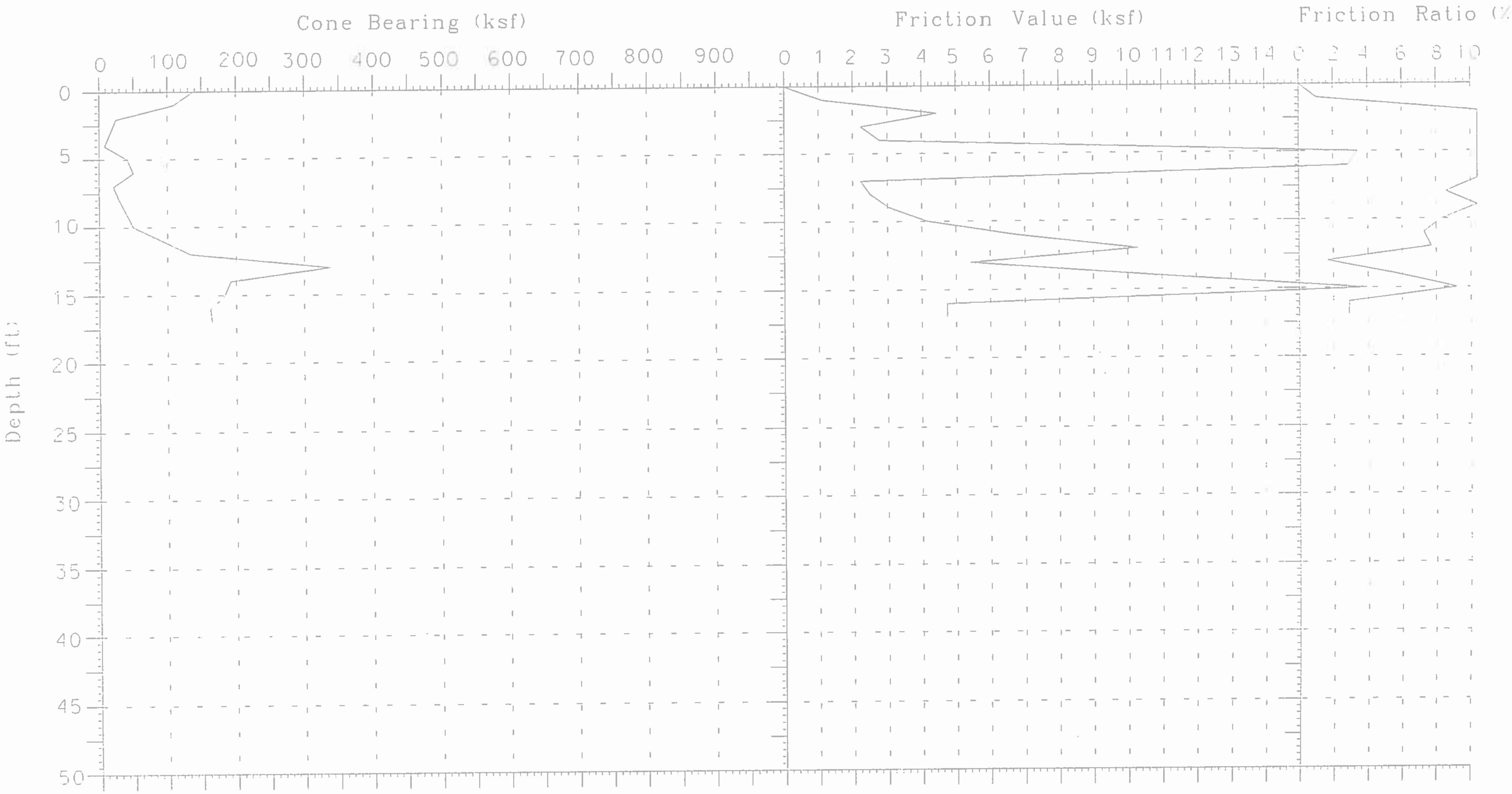
Logged By: WHK

Quasi-Static Penetration Sounding Log

ASTM D-3441

Project Location: CINIZA EVAPORATION PONDS
Sounding Date: December 6, 2000
Project Number: 00-141

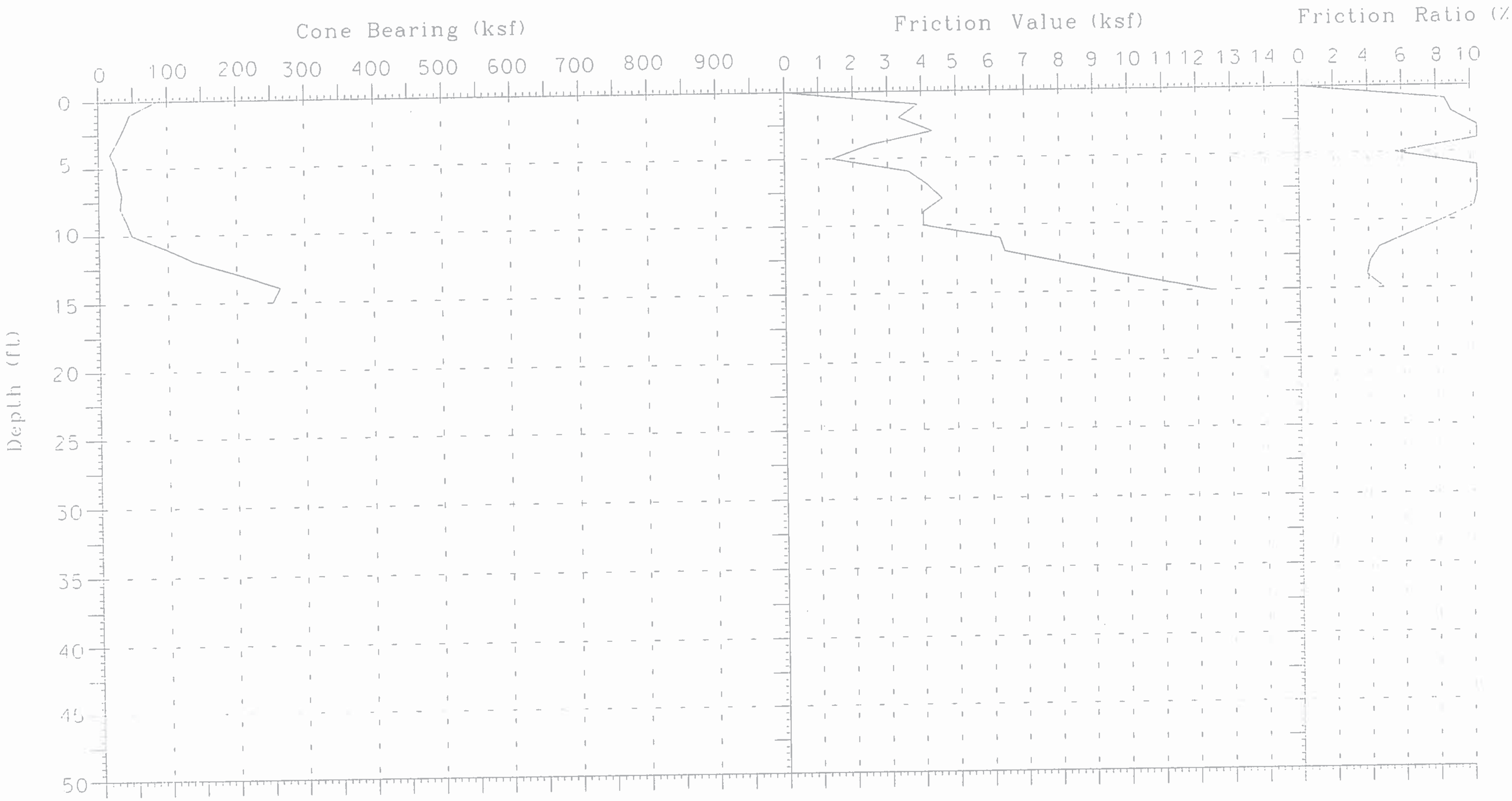
Sounding Number: 4
Sounding Location: see plan



Quasi-Static Penetration Sounding Log
ASTM D-3441

Project Location: CINIZA EVAPORATION PONDS
Sounding Date: December 7, 2000
Project Number: 00-141

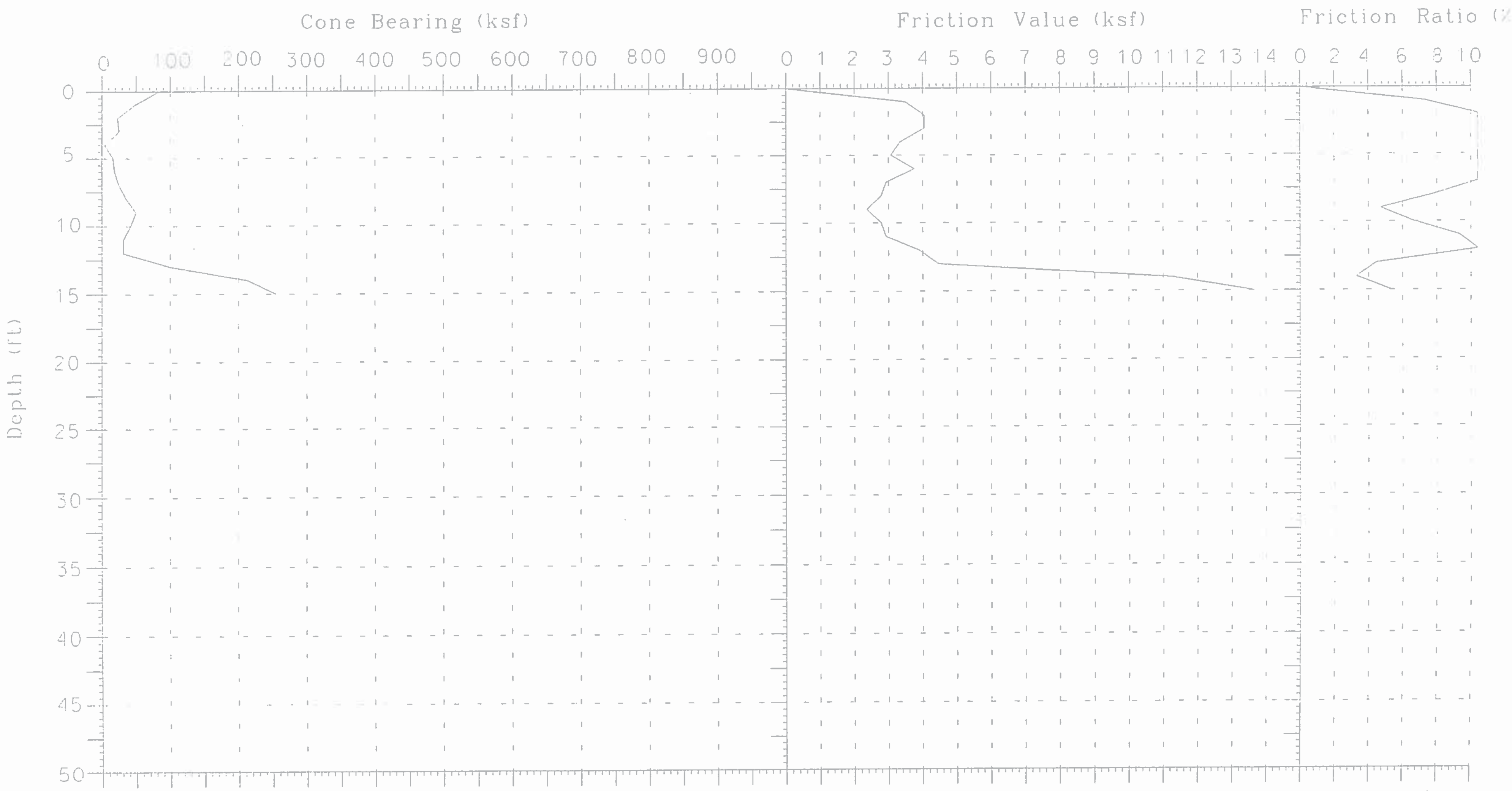
Sounding Number: 5
Sounding Location: see plan



Quasi-Static Penetration Sounding Log
ASTM D-3441

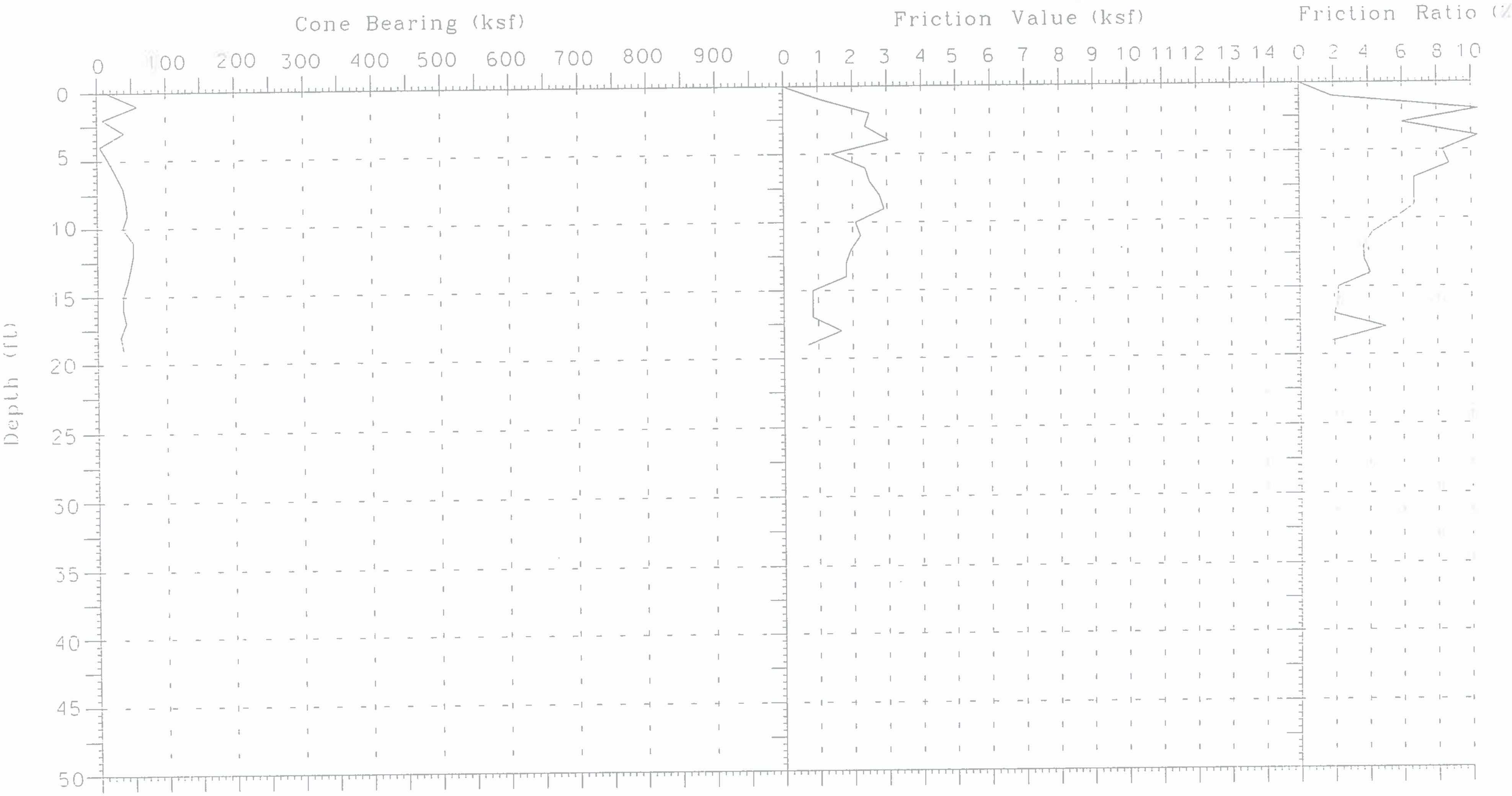
Project Location: CINIZA EVAPORATION PONDS
Sounding Date: December 7, 2000
Project Number: 00-141

Sounding Number: 6
Sounding Location: see plan



Quasi-Static Penetration Sounding Log
ASTM D-3441

Project Location: CINIZA EVAPORATION PONDS
Sounding Date: December 7, 2000
Project Number: 00-141
Sounding Number: 7
Sounding Location: see plan



PRECISION ENGINEERING, INC.

File #: 00-141

Bore Point: SOUTHWEST CORNER OF POND 9A

LOG OF TEST BORINGS

Site: CINIZA

Water Elev: 18'

Elevation: EXISTING

Boring No.: EIGHT

Date: DECEMBER 07, 2000

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	L	PI	CLASS.
38639	0.0 - 1.5	4-4-10	/*/*/*		S	CLAY, VERY SANDY(FINE), REDDISH BROWN, WET,	23.1	50	36	CH/A-7-6
			/*/*/*		S	STIFF				
			/*/*/*		S					
			/*/*/*							
			/*/*/*	2.5						
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*	5.0						
38640	5.0 - 7.0	SHELBY	//////			LITTLE TO NO SAND SAND, FIRM				
			//////							
			//////							
			//////							
			//////	7.5						
			//////							
			//////							
			//////							
			//////							
			//////	10						
38641	10.0-11.5	3-5-6	//*///		S	SLIGHTLY SANDY	32.2	79	41	CH/A-7-5
			//*///		S					
			//*///		S					
			//*///							
			//*///							
			//*///							
			//*///							
			//*///							
			//*///							
			//*///	15						
38642	15.0-16.5	3-5-5	/*/*/*		S	VERY SANDY	20.1			CH/A-7-6
			/*/*/*		S					
			/*/*/*		S					
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*			WATER BEARING AT 18', WATER RISES TO 6'2"				
			/*/*/*			AFTER 24-HOURS AND STABILIZES				
			/*/*/*							
			/*/*/*	20						
38643	20.0-21.2	0-	/*//*/		S	SANDY	24.7	60	34	
		0-	/*//*/		S					
	21.2-21.5	6	/*//*/		S	MUDSTONE, REDDISH BROWN W/SOME GREEN MOTTLING,				
	TOTAL DEPTH					DRY, HARD				

Size & Type of Boring: 8-1/4" ID Hollow Stemmed Auger

Logged By: WHK

Sheet: 9 OF 10

PRECISION ENGINEERING, INC.

File #: 00-141

LOG OF TEST BORINGS

Bore Point: CENTER OF SOUTH SIDE OF POND 6A

Water Elev: NOT ENCOUNTERED

Boring No.: NINE

Site: CINIZA

Elevation: EXISTING

Date: DECEMBER 07, 2000

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE,CONDITION,COLOR,GRAINSIZE,ETC.)	%M	L	PI	CLASS.
38644	0.0 - 3.0	GRAB	/*/*/*		G	CLAY, VERY SANDY, REDDISH BROWN, MOIST, FIRM	14.0	41	25	CL/A-4
			/*/*/*		G					
			/*/*/*		G					
			/*/*/*		G					
			/*/*/*	2.5	G					
			/*/*/*		G					
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*	5.0						
38645	5.0 - 7.0	SHELBY	/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*							
			/*/*/*	7.5						
			//////							
			//////							
			//////							
			//////							
			//////	10						
			//////							
			//////							
			//////							
			//////							
38646	12.0-14.0	GRAB	//////		G	WET	27.4			
			//////		G					
			//*///		G					
			//*///		G					
			//*///							
			//*///	15						
38647	15.0-16.0	SHELBY	//*///							
			//*///							
38648	16.0-17.0	SHELBY	//*///			SOFT				
	17.0									
	TOTAL DEPTH									
				20						

Size & Type of Boring: 8-1/4" ID Hollow Stemmed Auger

Logged By: WHK

Sheet: 10 OF 10

PRECISION ENGINEERING, INC.

File #: 00-141

Bore Point: SOUTHWEST CORNER OF POND 6B

LOG OF TEST BORINGS

Site: CINIZA

Water Elev:

Elevation: EXISTING

Boring No.: TEN

Date: DECEMBER 07, 2000

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	L	PI	CLASS.
38649	0.0 - 3.0	GRAB	/*//*/		G	**CLAY**, SANDY, REDDISH BROWN, MOIST, FIRM	18.2	52	32	CH/A-7-6
			/*//*/		G					
			/*//*/		G					
			/*//*/		G					
			/*//*/	2.5	G					
			/*//*/		G					
			/*//*/							
			/*//*/							
			/*//*/							
			/*//*/	5.0						
38650	5.0 - 7.0	SHELBY	/*//*/			WET				
			/*//*/							
			/*//*/							
			/*//*/							
38651	7.0 - 10.0	GRAB	//////	7.5	G	LITTLE TO NO SAND, SOFTER AND REDDER 7' TO 10'	37.9	82	40	CH/A-7-5
			//////		G					
			//////		G					
			//////		G					
			//////		G					
			//////	10	G					
	10.0-13.0	GRAB	//////		G					
			//////		G					
			//////		G					
			//////		G					
			//////		G	WET				
			//////		G					
			//////		G					
			//////							
			//////							
			//////	15						
38652	15.0-17.0	SHELBY	//////			**CLAY**, REDDISH BROWN, WET, FIRM, SOME 1/2" ROOT MATTER				
			//////							
			//////							
	17.0		//////							
	TOTAL DEPTH									
				20						

Size & Type of Boring: 8-1/4" ID Hollow Stemmed Auger

Logged By: WHK

PRECISION ENGINEERING, INC.
P. O. BOX 422,
LAS CRUCES, NEW MEXICO 88004
(505)523-7674

MECHANICAL GRAIN SIZE ANALYSIS SUMMARY

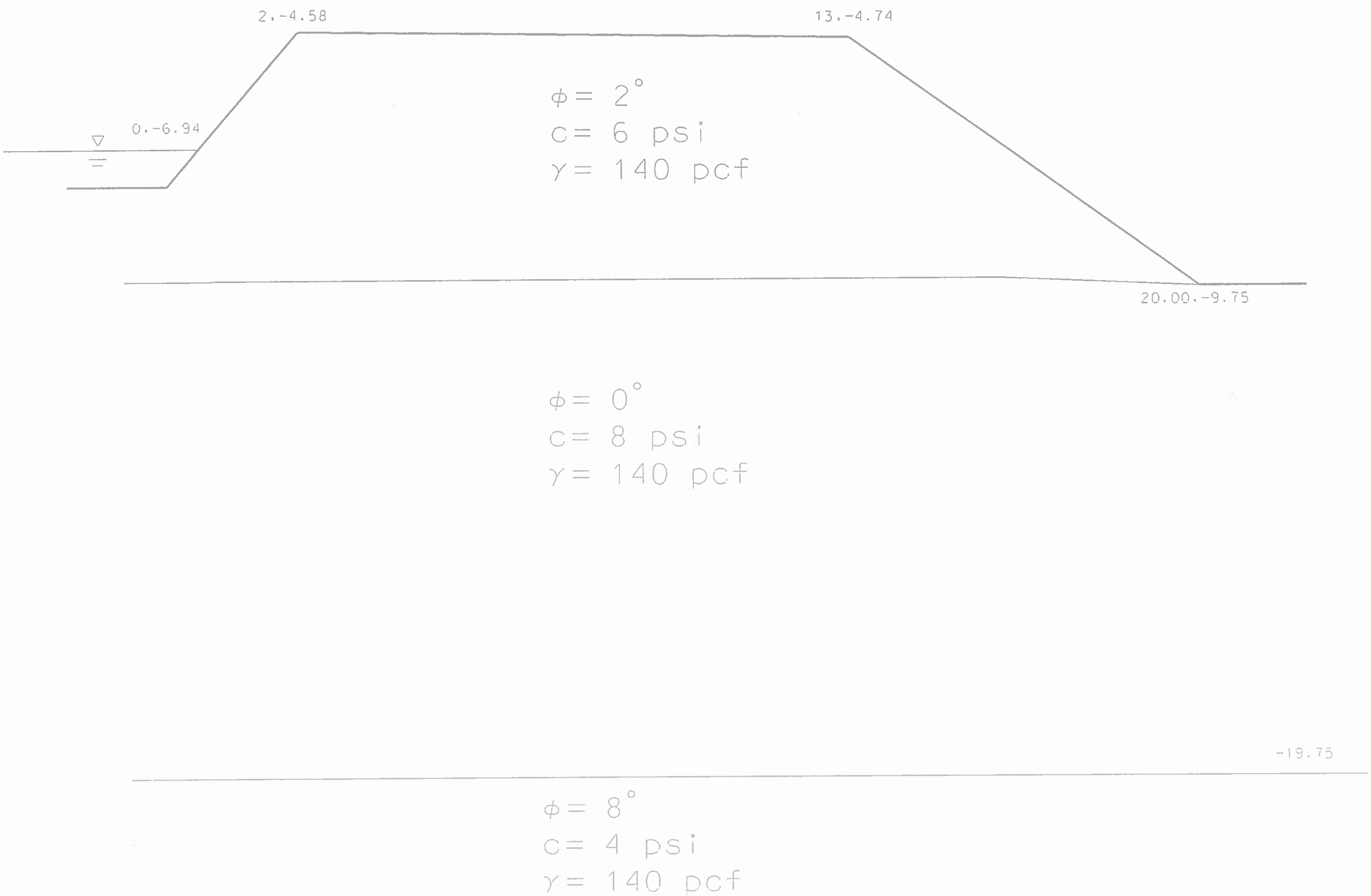
PROJECT: GIANT REFINING
CINIZA EVAPORATION PONDS
FILE NO: 00-141

LOCATION: CINIZA, NM
DATE: DECEMBER 06, 2000

BORING NO.	LAB NO.	DEPTH FEET		SIEVE ANALYSIS % PASSING												ATTERBERG LIMITS		MOIST. CONTENT	USCS CLASS.	AASHTO CLASS.
				1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#140	#200	LL	PI			
1	38625	0.0- 1.5																25.5		
1	38626	5.0- 6.5													92.4	47	25	21.7	CL	A-7-6
1	38627	10.0-11.5																22.5		
1	38628	15.0-16.5													86.6	53	33	13.2	CH	A-7-6
1	38629	20.0-21.5																12.0		
2	38630	0.0- 1.5													59.3	30	10	26.3	CL	A-4
2	38631	5.0- 7.0																		
2	38632	7.0-10.0																33.0		
2	38633	15.0-16.8																		
3	38634	0.0- 1.5													83.2	50	36	15.8	CH	A-7-6
3	38635	5.0- 6.5																30.2		
3	38636	10.0-11.5													97.4	79	41	31.1	CH	A-7-5
3	38637	15.0-16.5																28.4		
3	38638	20.0-21.5													88.1	60	34	30.8	CH	A-7-6
8	38639	0.0- 1.5																23.1		
8	38640	5.0- 7.0																		
8	38641	10.0-11.5													85.2	72	42	32.2	CH	A-7-6
8	38642	15.0-16.5													61.6	42	19	20.1	CL	A-7-6
8	38643	20.0-21.2																24.7		
9	38644	0.0- 3.0													64.0	41	25	14.0	CL	A-7-6
9	38645	5.0- 7.0																		
9	38646	12.0-14.0																27.4		
9	38647	15.0-16.0																		
9	38648	16.0-17.0																		
10	38649	0.0- 1.5													64.7	52	32	18.2	CH	A-7-6
10	38650	2.5- 4.0																		
10	38651	5.0- 6.0													93.7	82	40	37.9	CH	A-7-5
10	38652	6.0- 6.5																		

Section 1

Factor Of Safety = 5.5



Section 1 Profile

```
w1=   11.00
s1=    7.00
w2=   20.00
h1=    7.00
h2=   13.00

nx1=    7
nx2=    7
ny1=    7
ny2=   13
```

Group	phi	c	psi	gamma	e	v
1	2.00	864.00	0.00	140.00	0.1000E+06	0.30
2	0.00	1152.00	0.00	145.00	0.1000E+06	0.30
3	8.00	576.00	0.00	135.00	0.1000E+06	0.30

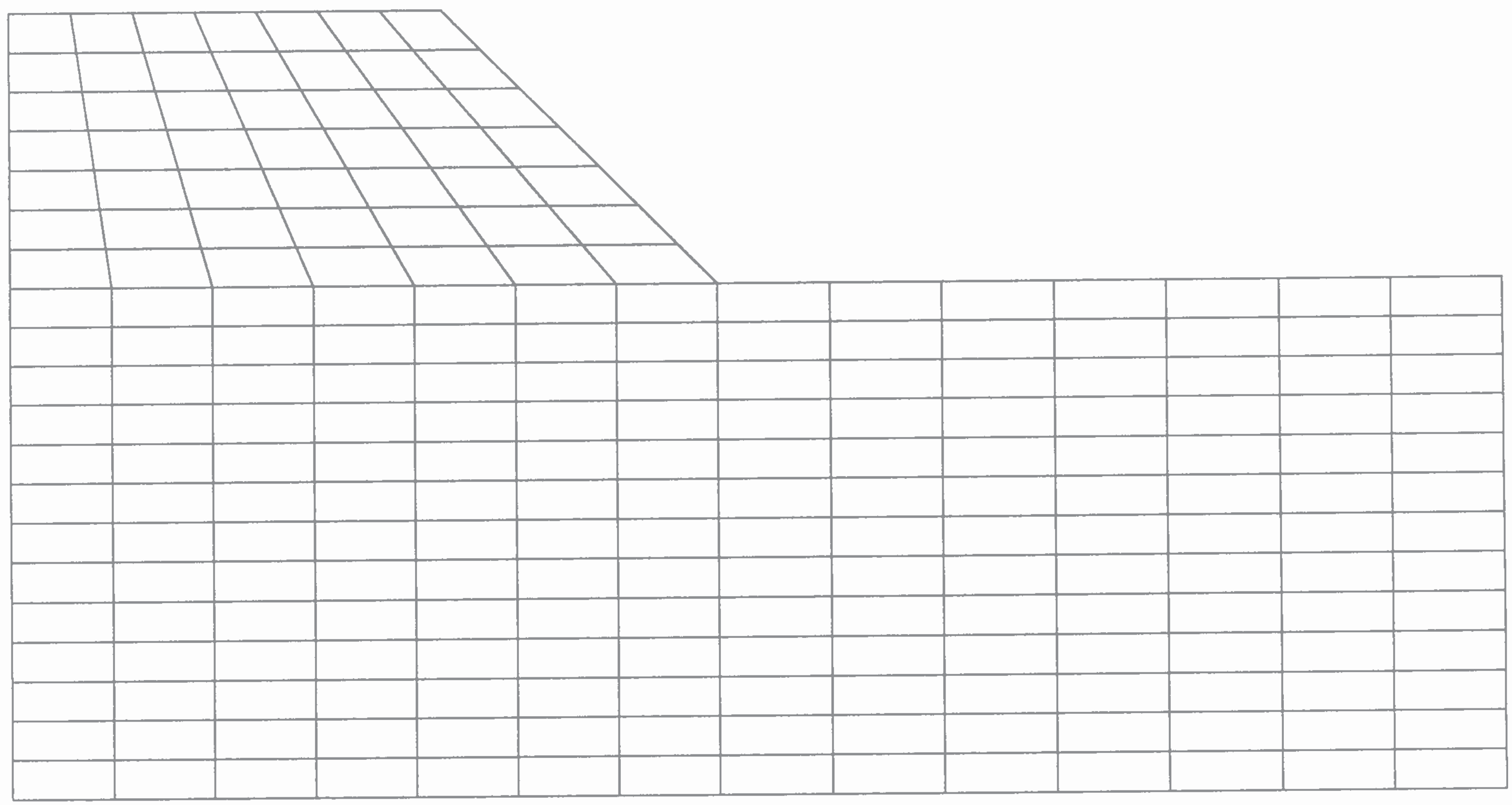
Property group assigned to each element

```
  1   1   1   1   1   1   1
  1   1   1   1   1   1   1
  1   1   1   1   1   1   1
  1   1   1   1   1   1   1
  1   1   1   1   1   1   1
  2   2   2   2   2   2   2
  2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2   2   2   2   2   2   2   2   2   2   2
  3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3   3   3   3   3   3   3   3   3   3   3
```

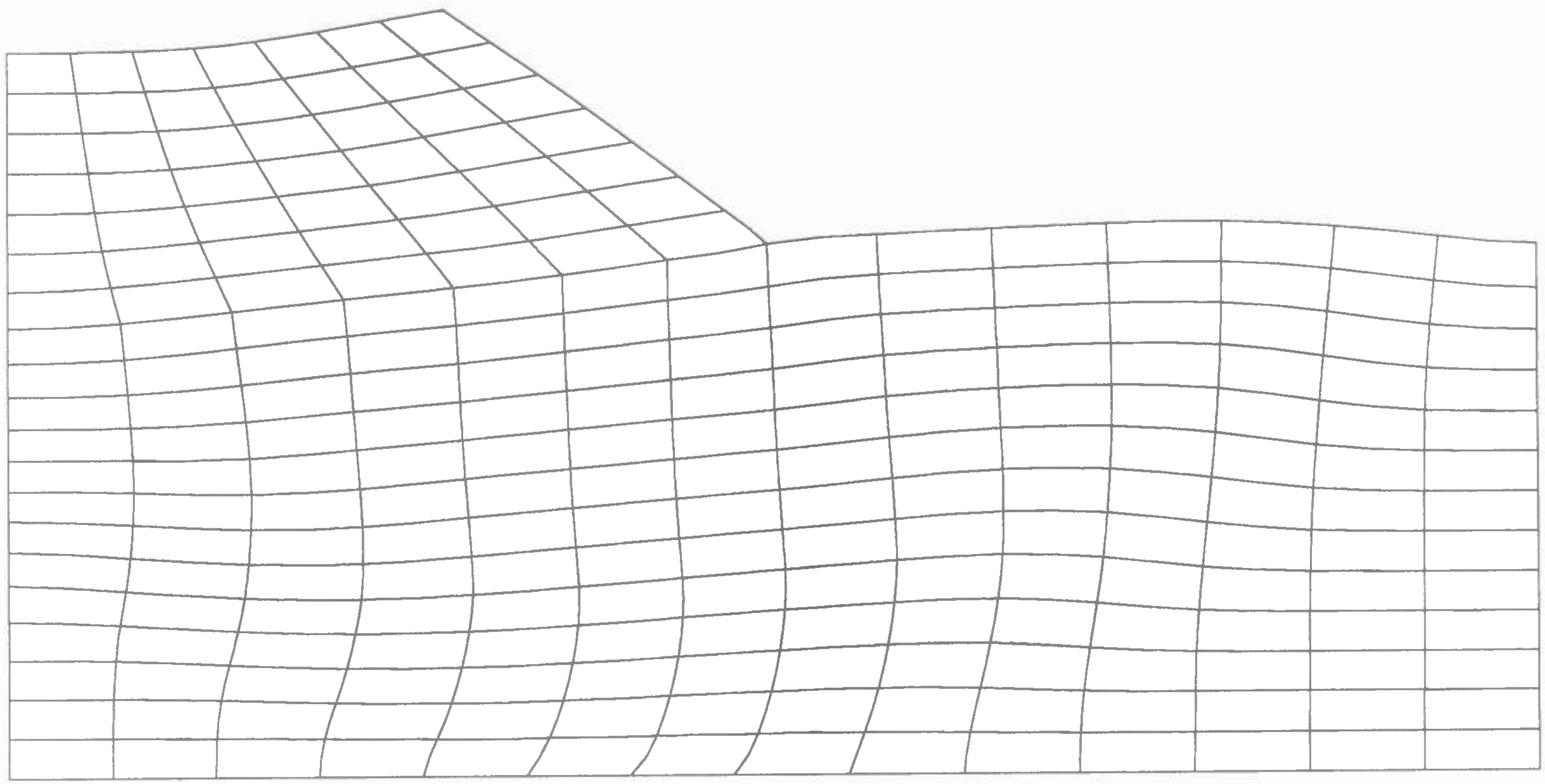
```
tol=  0.000100
limit= 1000
```

trial factor	max displacement	iterations
0.4500E+01	0.4536E+00	51
0.5000E+01	0.4976E+00	74
0.5250E+01	0.5456E+00	162
0.5500E+01	0.2521E+01	1000

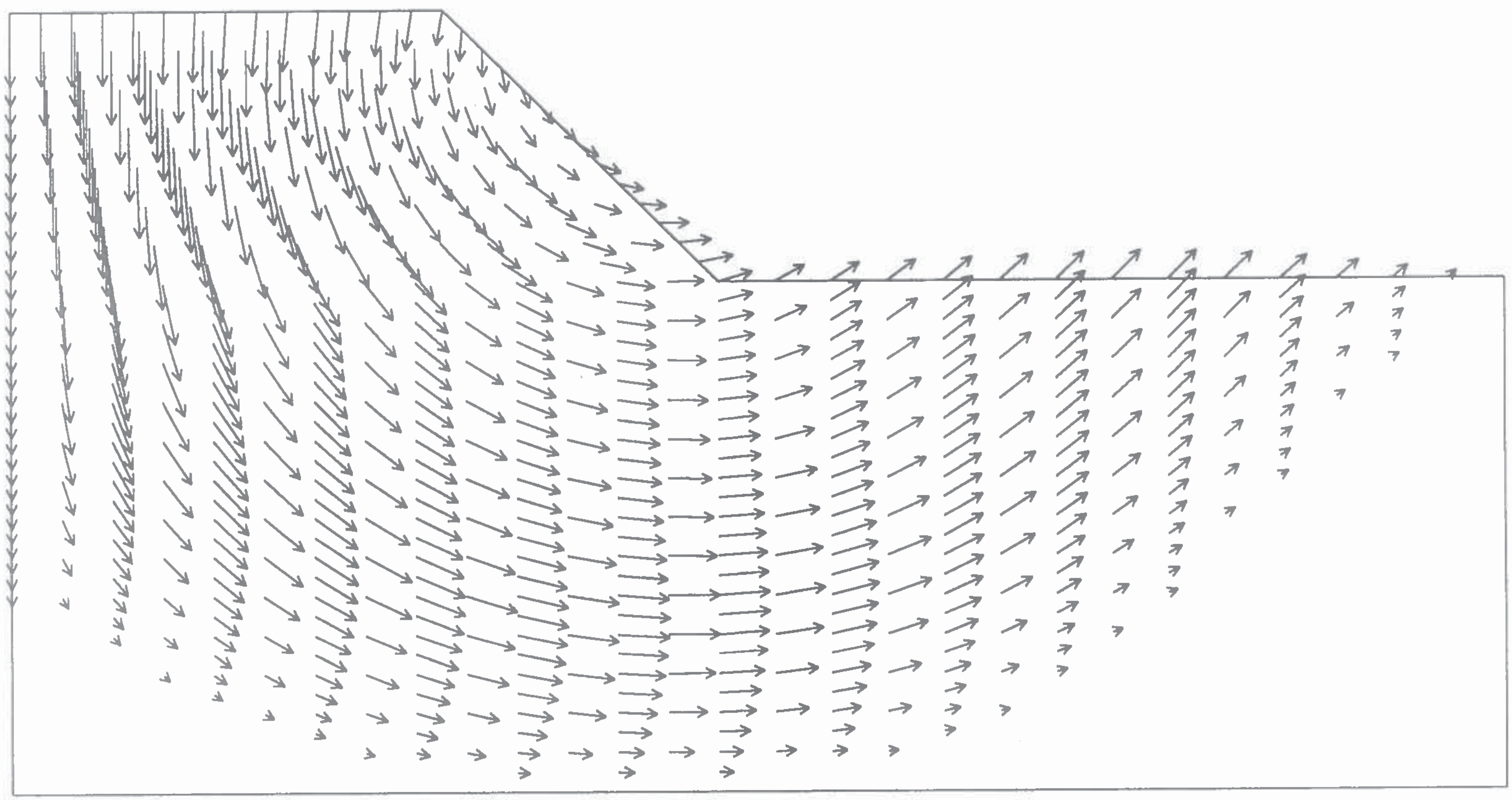
Section 1
Mesh



Section 1
Deformed Mesh

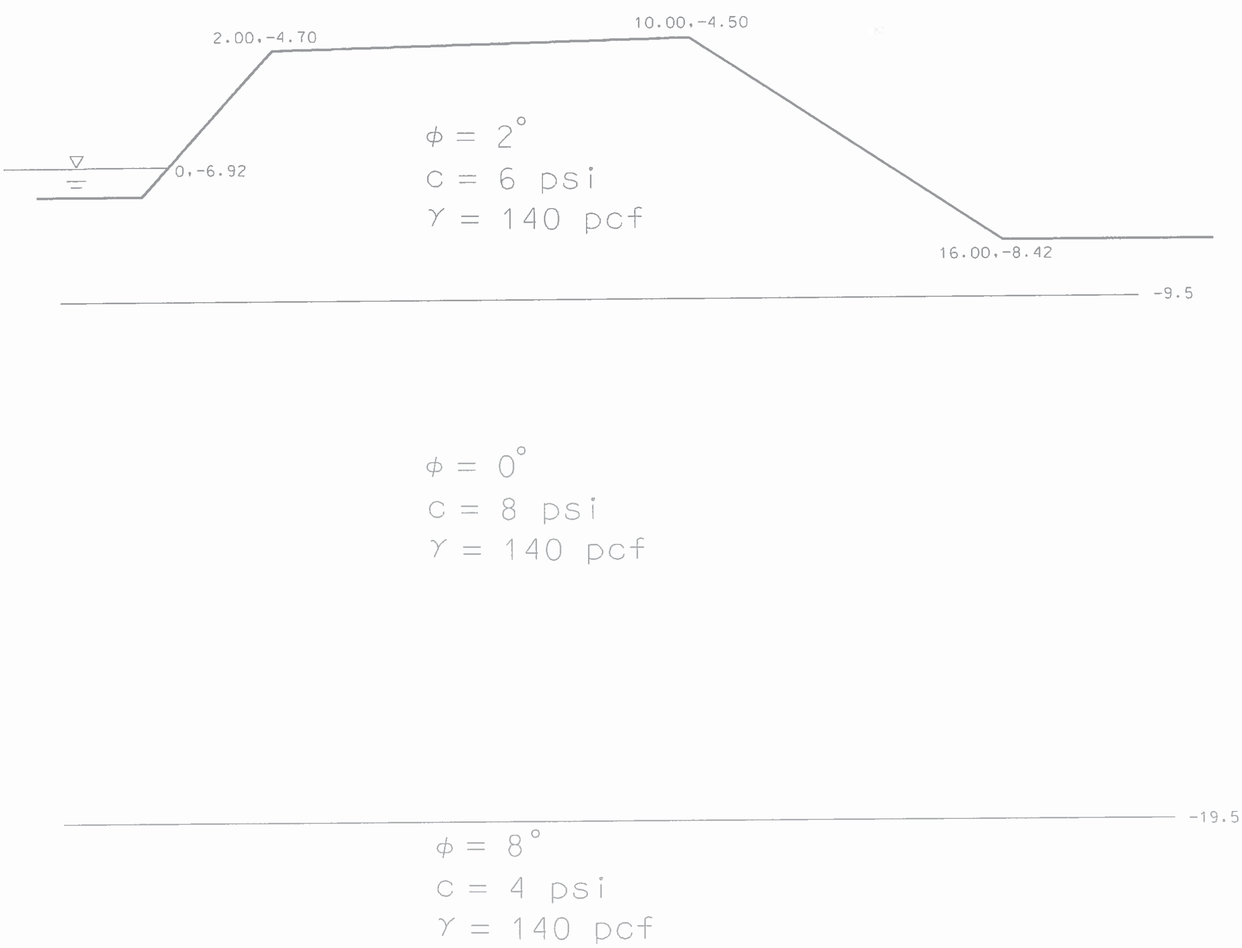


Section 1
Vector Trace



Section 2

Factor Of Safety = 10.0



Section 2 Profile

```
w1=    8.00
s1=    6.00
w2=   20.00
h1=    4.10
h2=   10.00

nx1=    6
nx2=   10
ny1=    4
ny2=   10
```

Group	phi	c	psi	gamma	e	v
1	2.00	864.00	0.00	140.00	0.1000E+06	0.30
2	0.00	1152.00	0.00	145.00	0.1000E+06	0.30
3	8.00	576.00	0.00	135.00	0.1000E+06	0.30

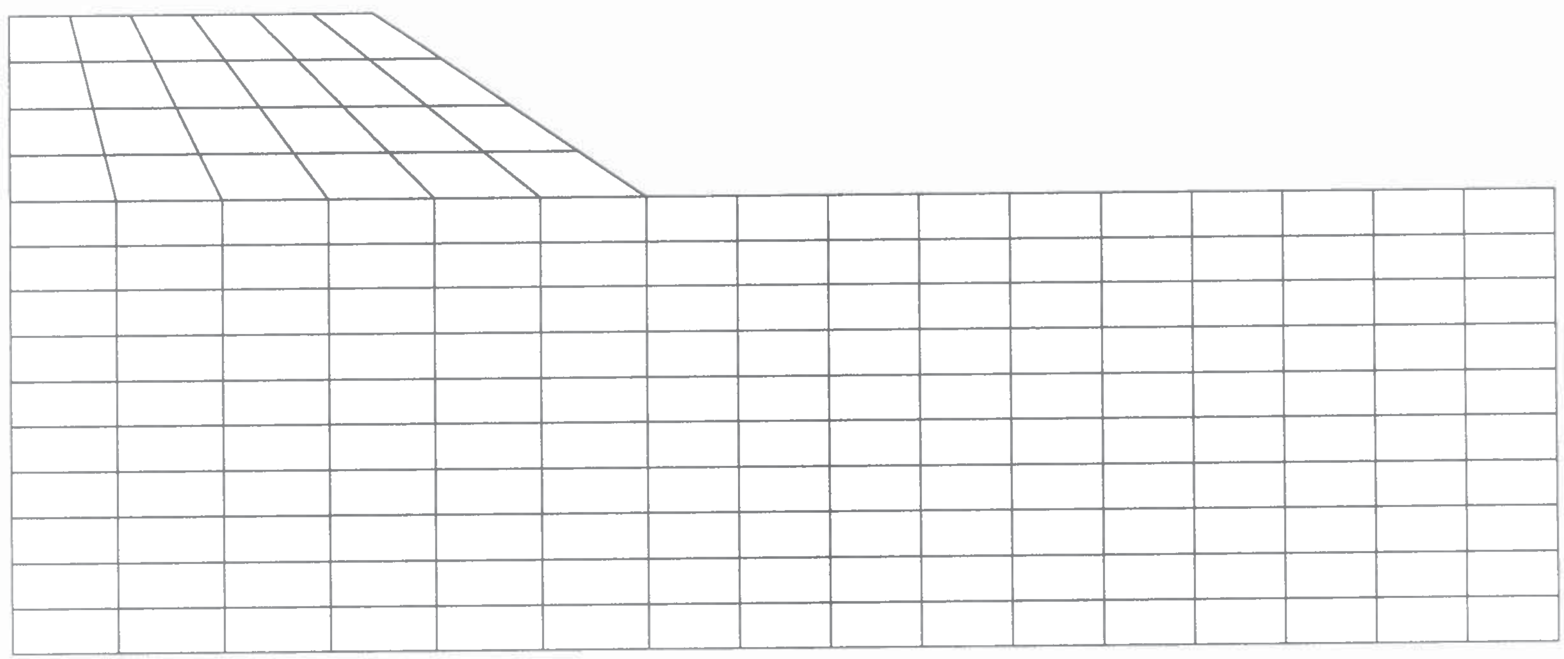
Property group assigned to each element

```
   1   1   1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
```

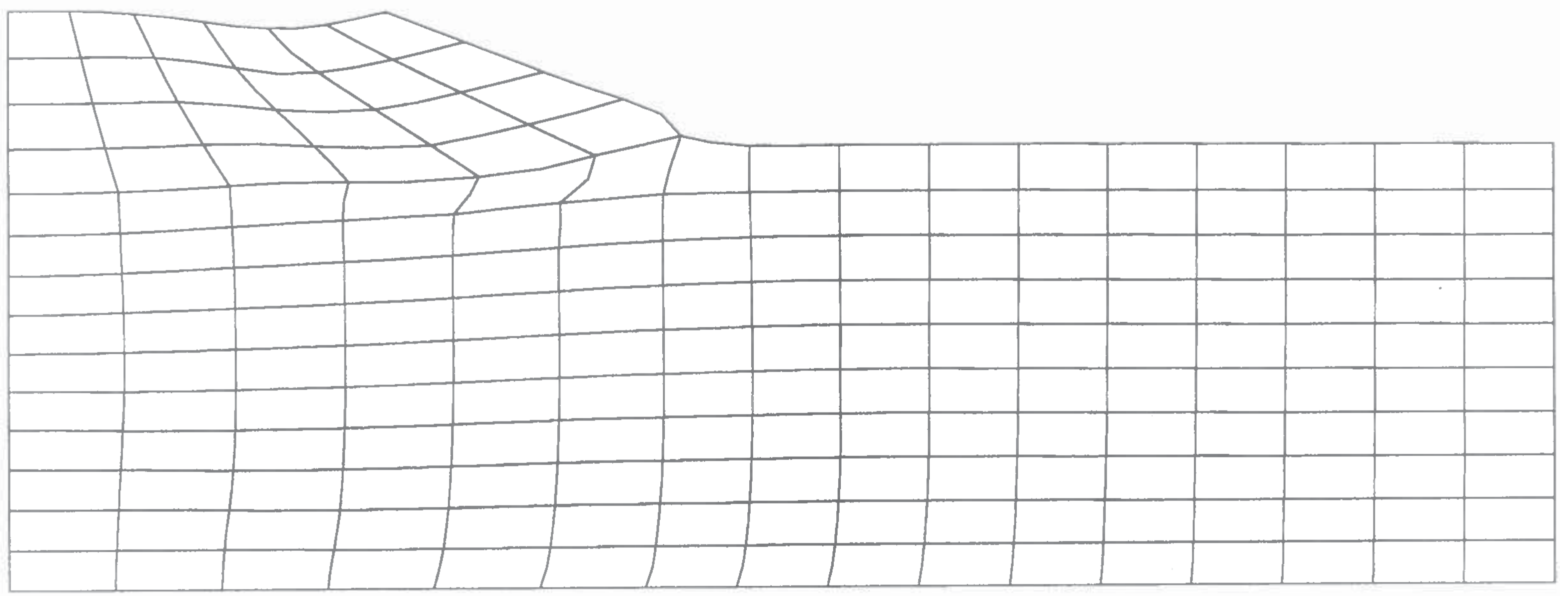
```
tol=  0.000100
limit= 1000
```

trial factor	max displacement	iterations
0.9000E+01	0.2518E+00	83
0.9500E+01	0.2638E+00	182
0.1000E+02	0.3798E+00	1000

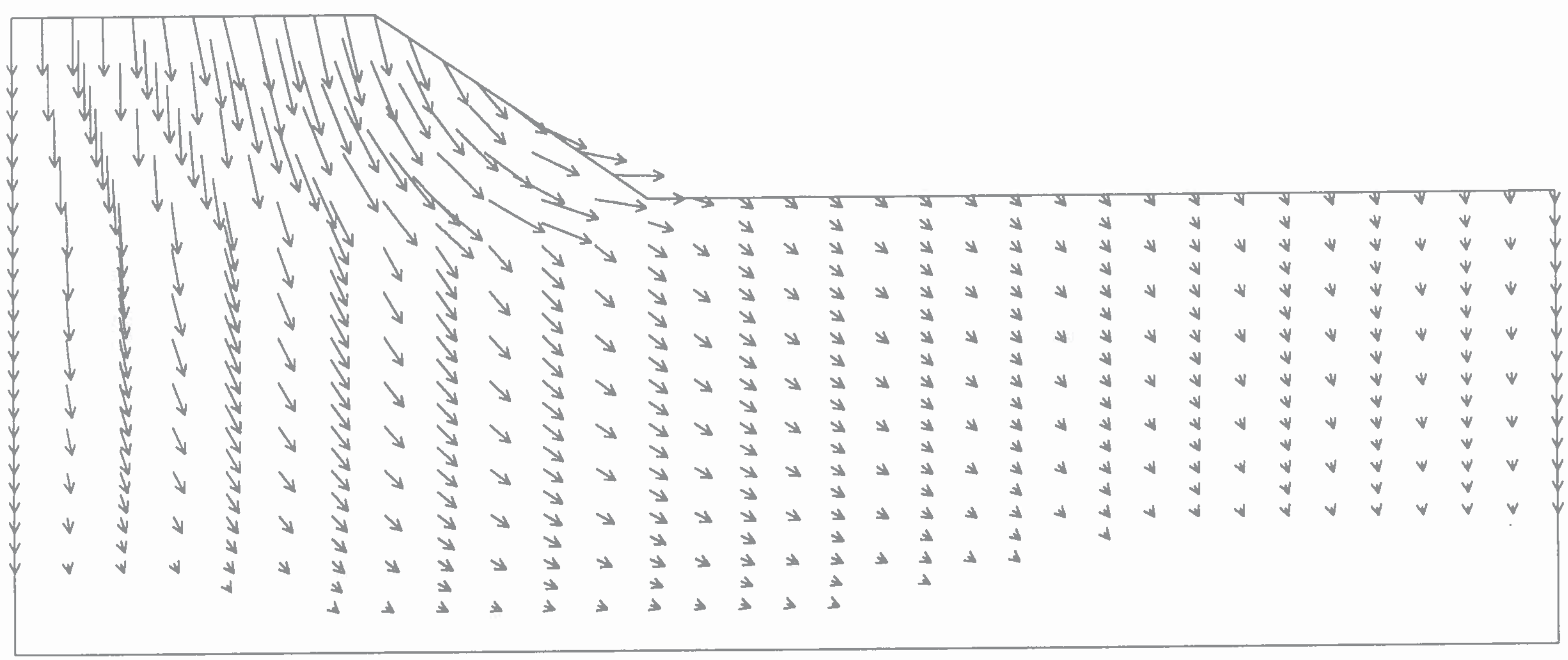
Section 2
Mesh



Section 2
Deformed Mesh

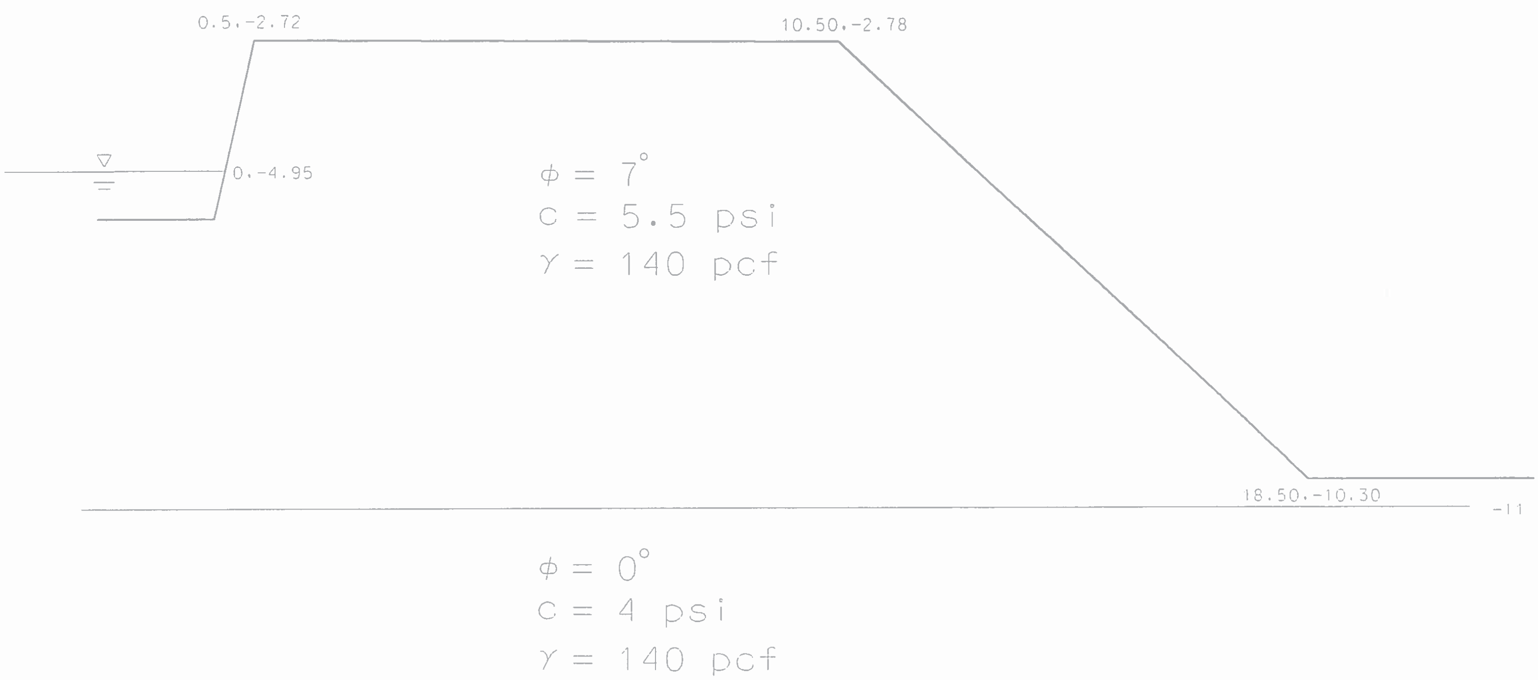


Section 2
Vector Trace



Section 3

Factor Of Safety = 3.0

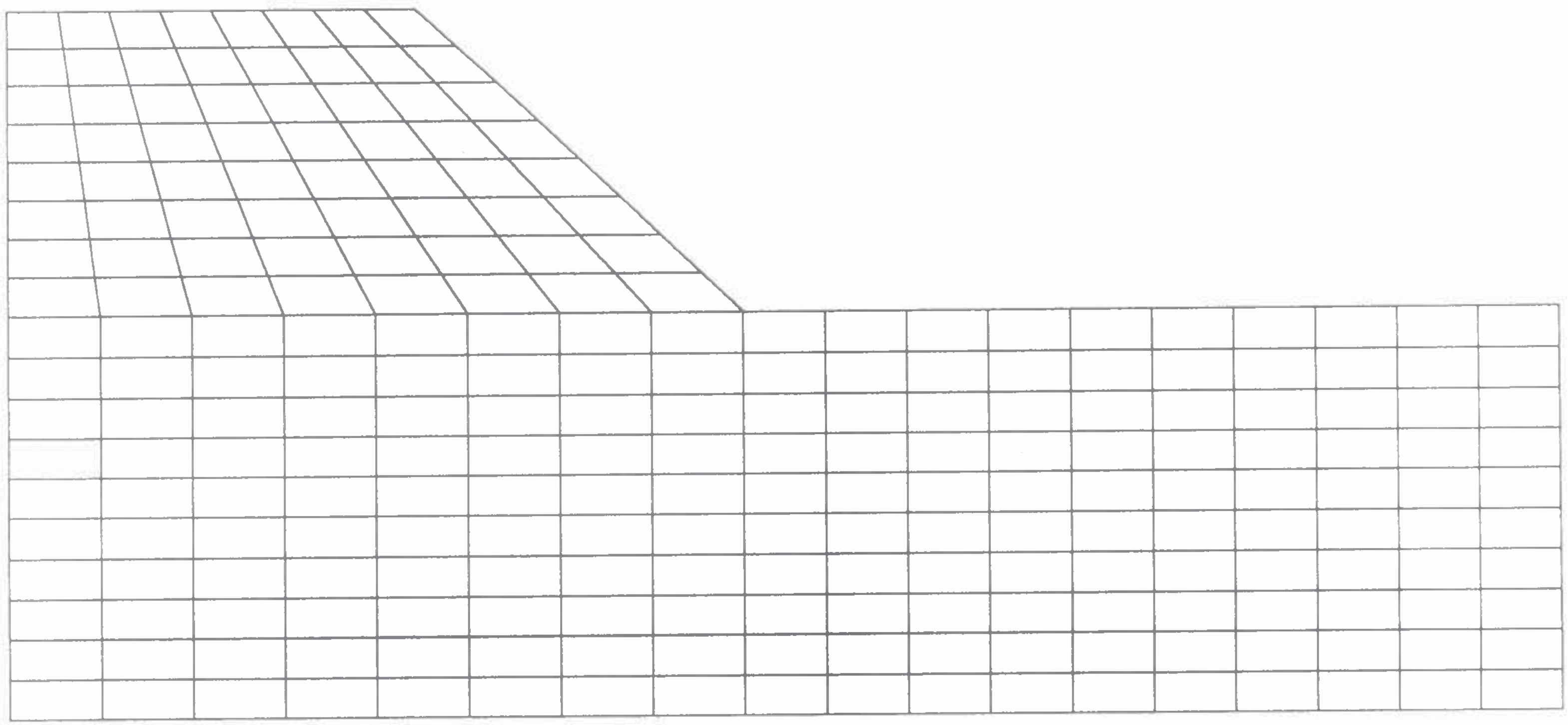


```
Section 3 Profile

w1=   10.00
s1=    8.00
w2=   20.00
h1=    7.50
h2=   10.00

nx1=    8
nx2=   10
ny1=    8
ny2=   10

Group  phi       c      psi    gamma       e          v
  1    7.00  792.00    0.00  140.00  0.1000E+06    0.30
  2    0.00  576.00    0.00  130.00  0.1000E+06    0.30

Property group assigned to each element
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2

tol=  0.000100
```

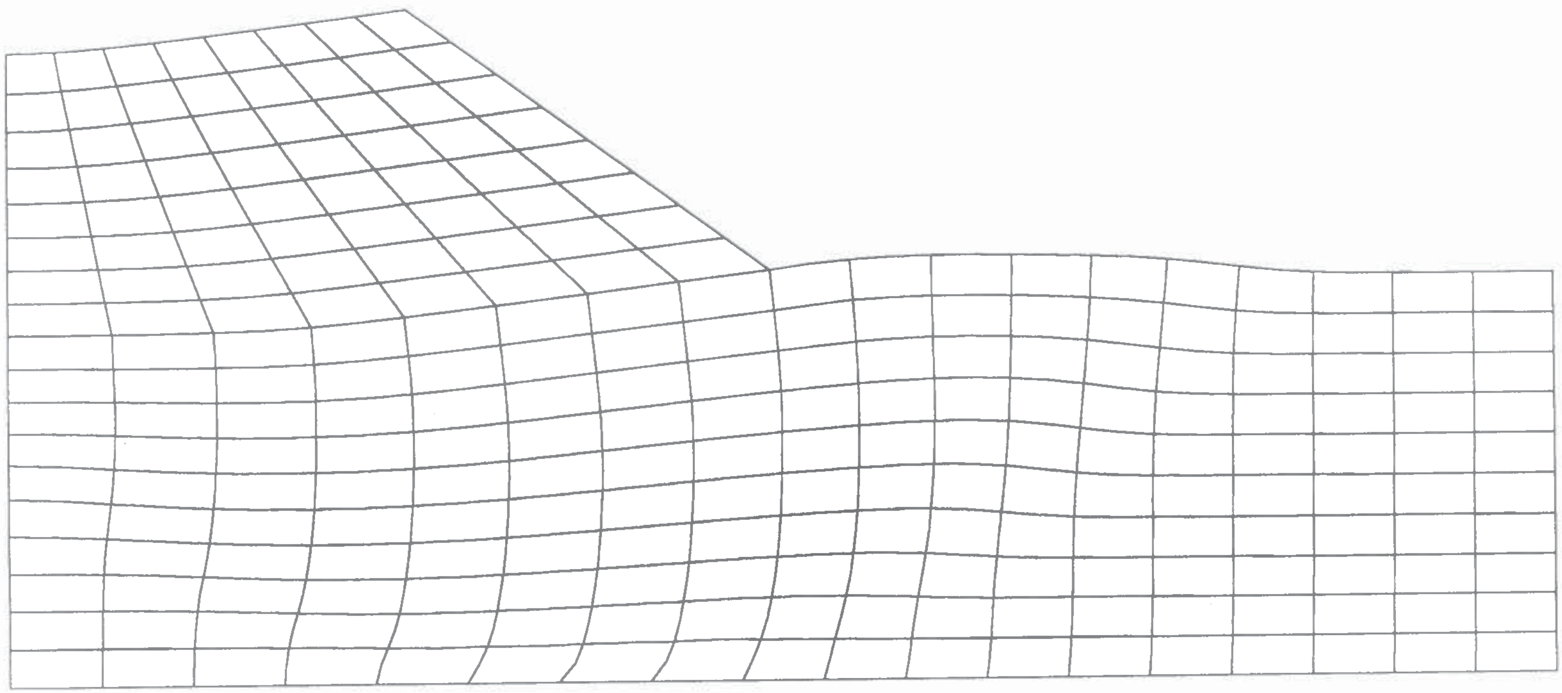
limit= 1000

trial factor	max displacement	iterations
0.2000E+01	0.2554E+00	40
0.2500E+01	0.3177E+00	62
0.2750E+01	0.3490E+00	70
0.3000E+01	0.8735E+00	1000

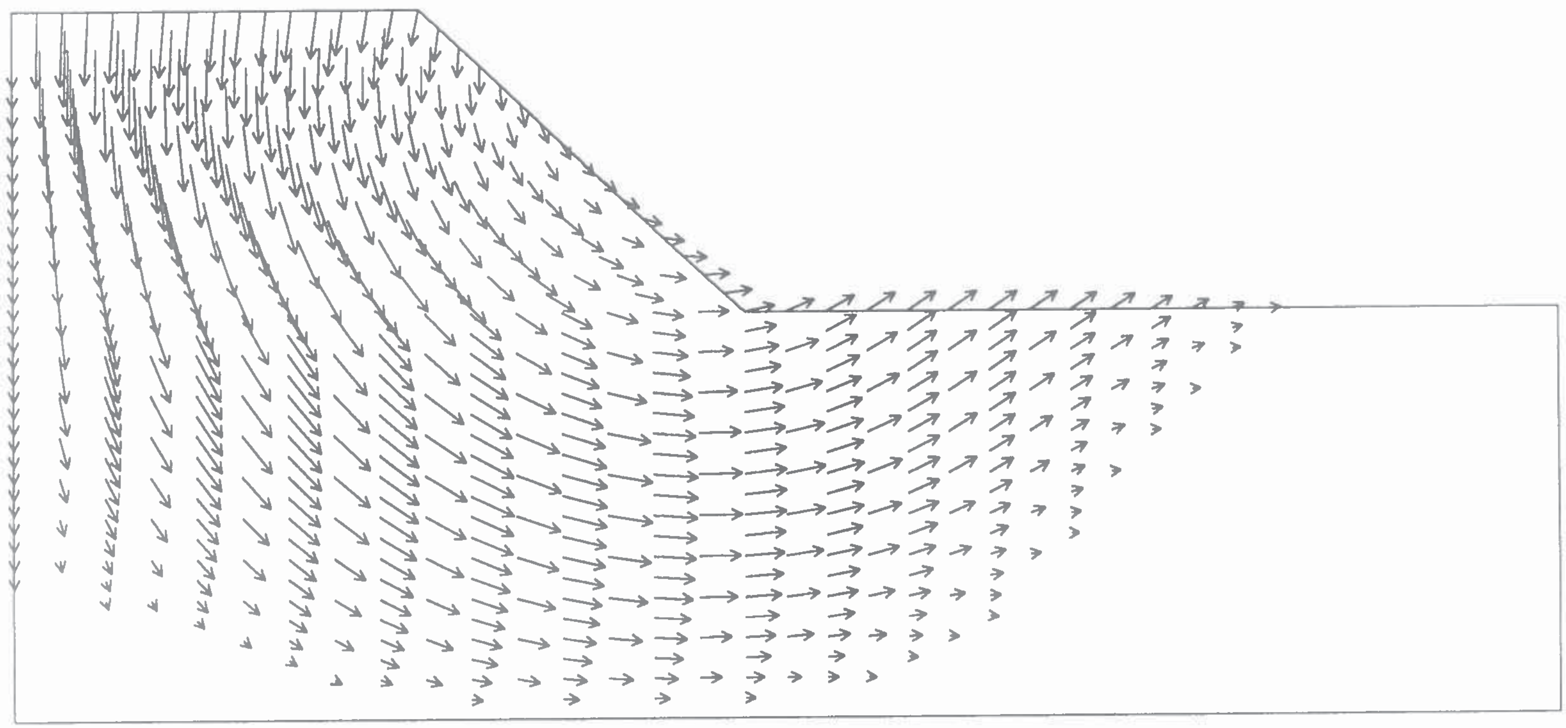
Section 3
Mesh



Section 3
Deformed Mesh

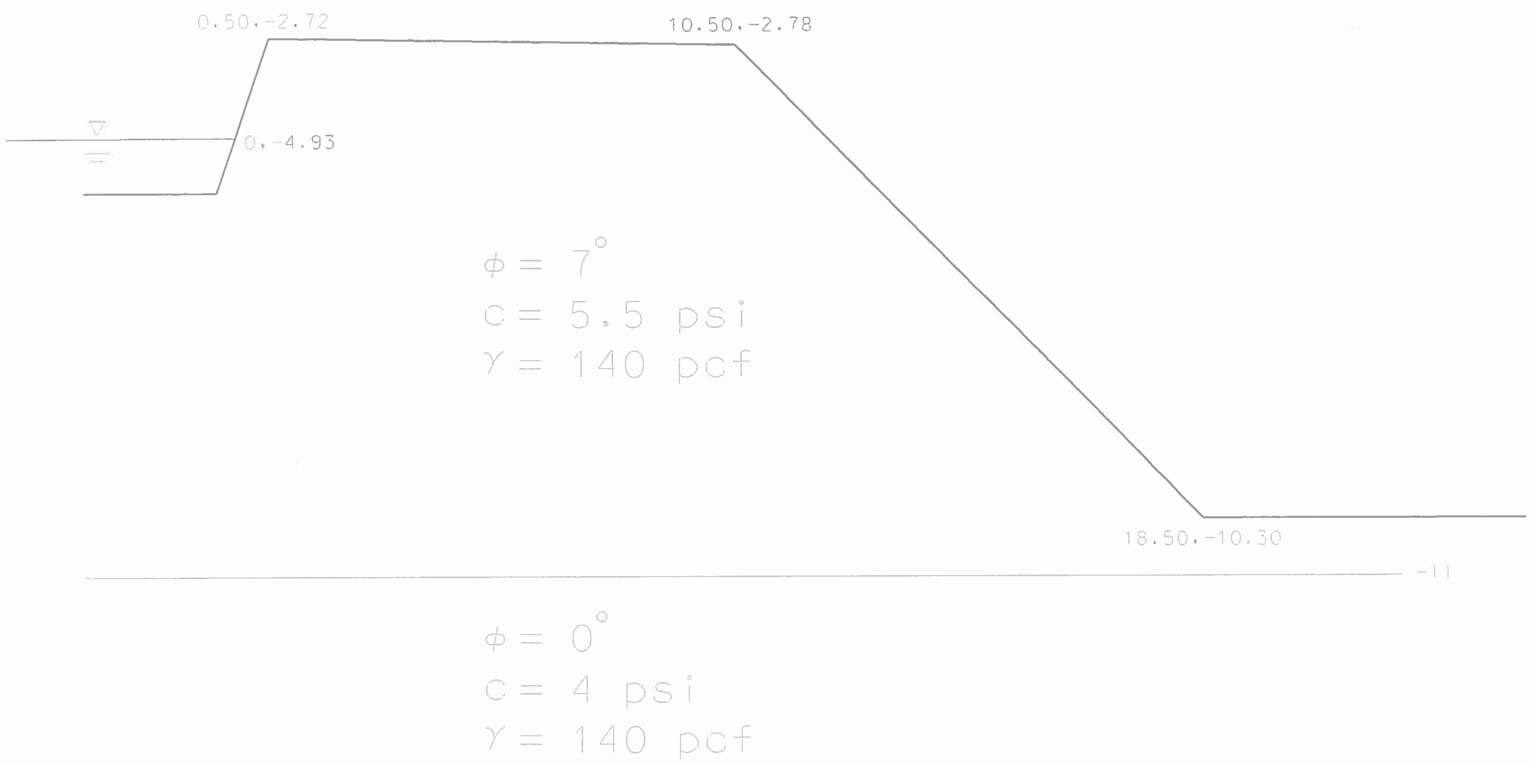


Section 3
Vector Trace



Section 4

Factor Of Safety = 3.0

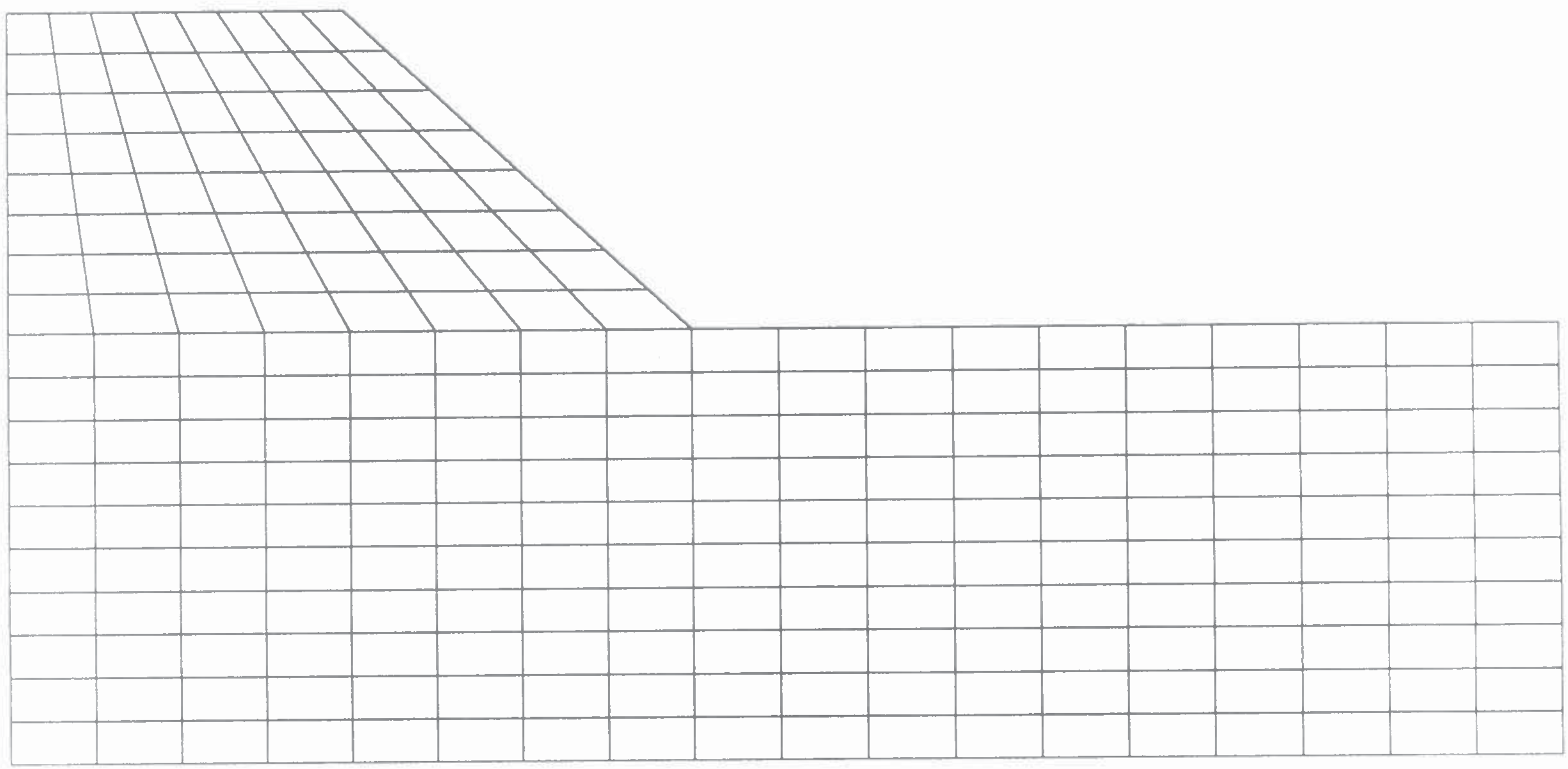


```
Section 4 Profile

w1=    7.75
s1=    8.00
w2=   20.00
h1=    7.50
h2=   10.00

nx1=    8
nx2=   10
ny1=    8
ny2=   10

Group  phi      c       psi    gamma      e          v
  1    7.00  792.00    0.00  140.00  0.1000E+06    0.30
  2    0.00  576.00    0.00  130.00  0.1000E+06    0.30

Property group assigned to each element
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1
   2   2   2   2   2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2

 tol=  0.000100
```

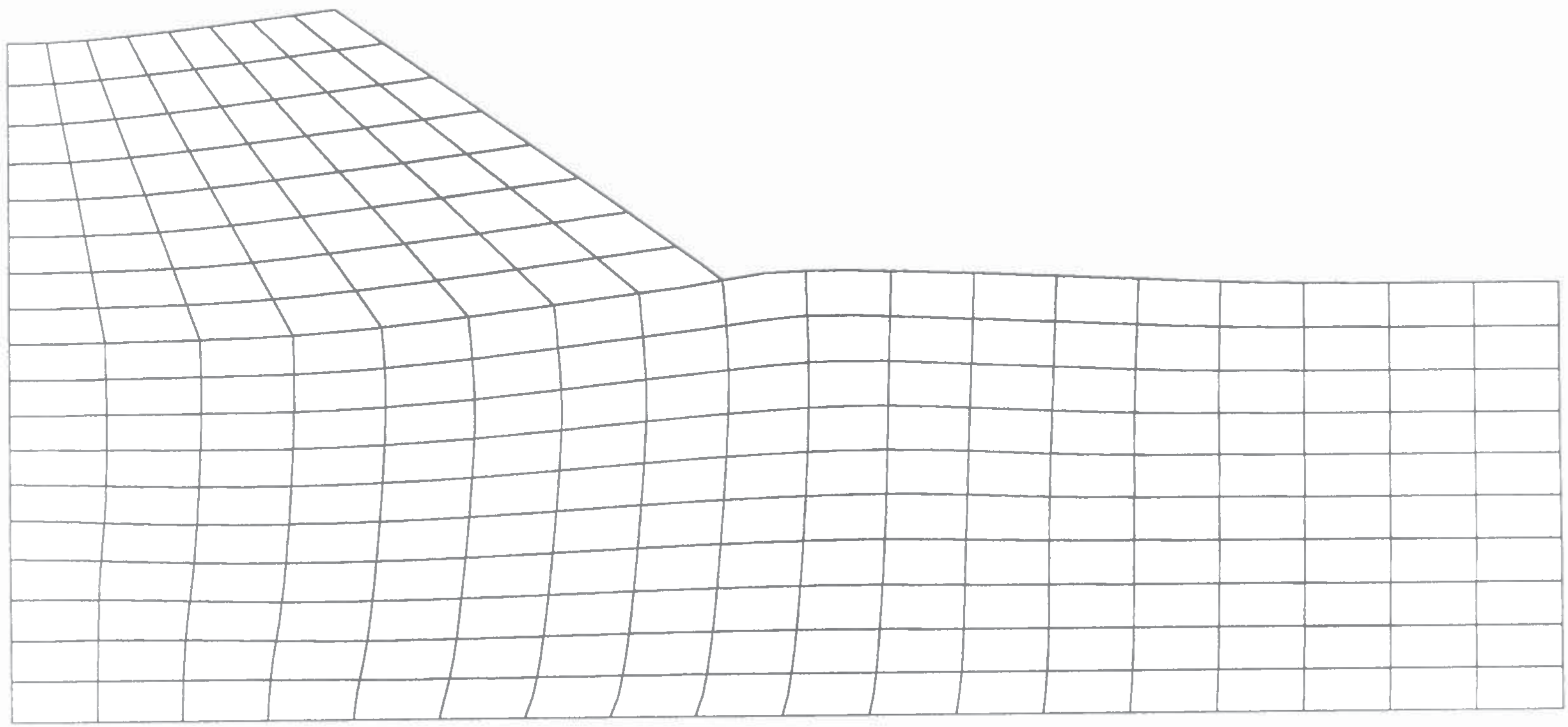
limit= 1000

trial factor	max displacement	iterations
0.2000E+01	0.2529E+00	37
0.2500E+01	0.3136E+00	56
0.2750E+01	0.3458E+00	65
0.3000E+01	0.6995E+00	1000

Section 4
Mesh

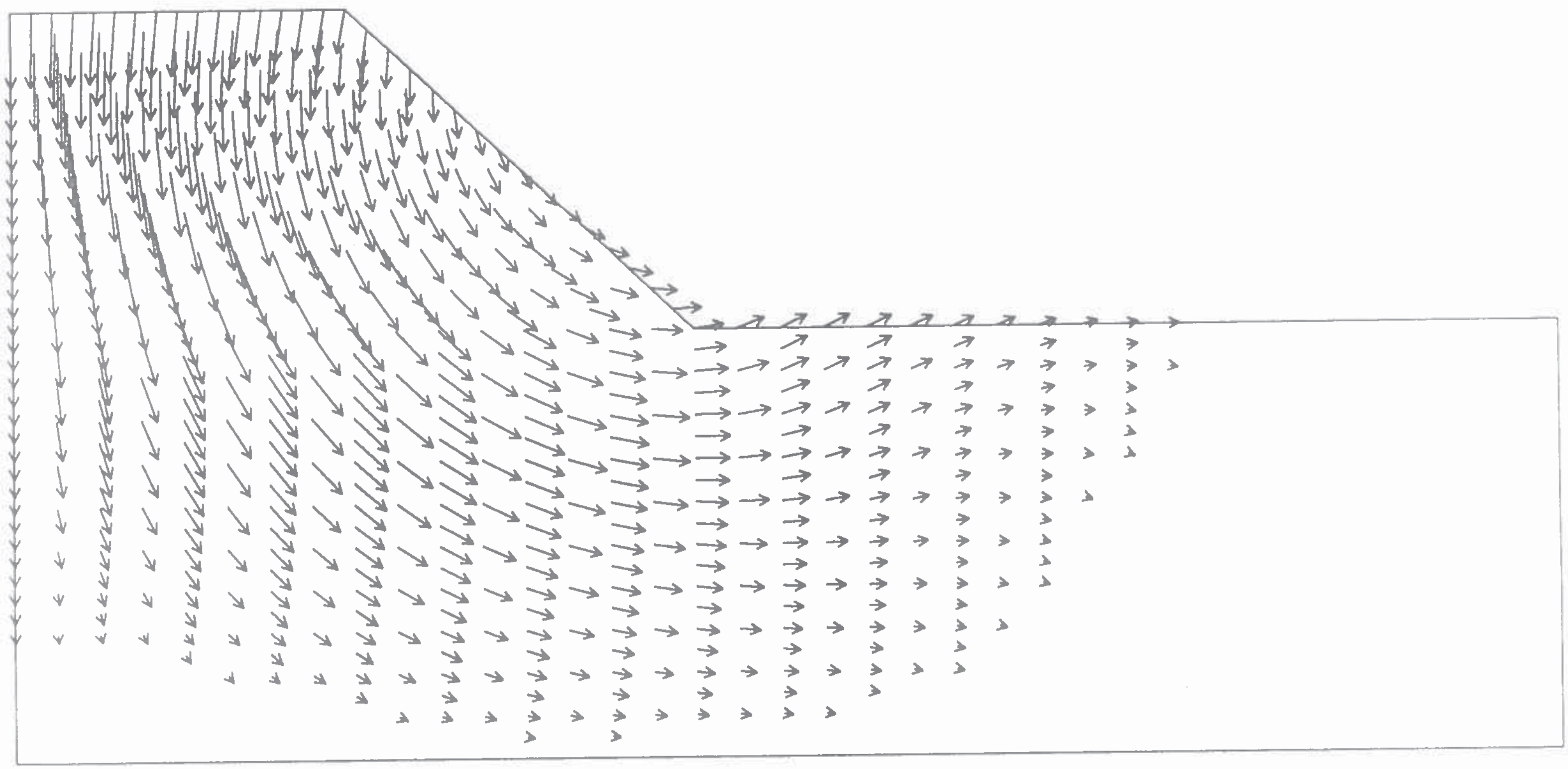


Section 4
Deformed Mesh



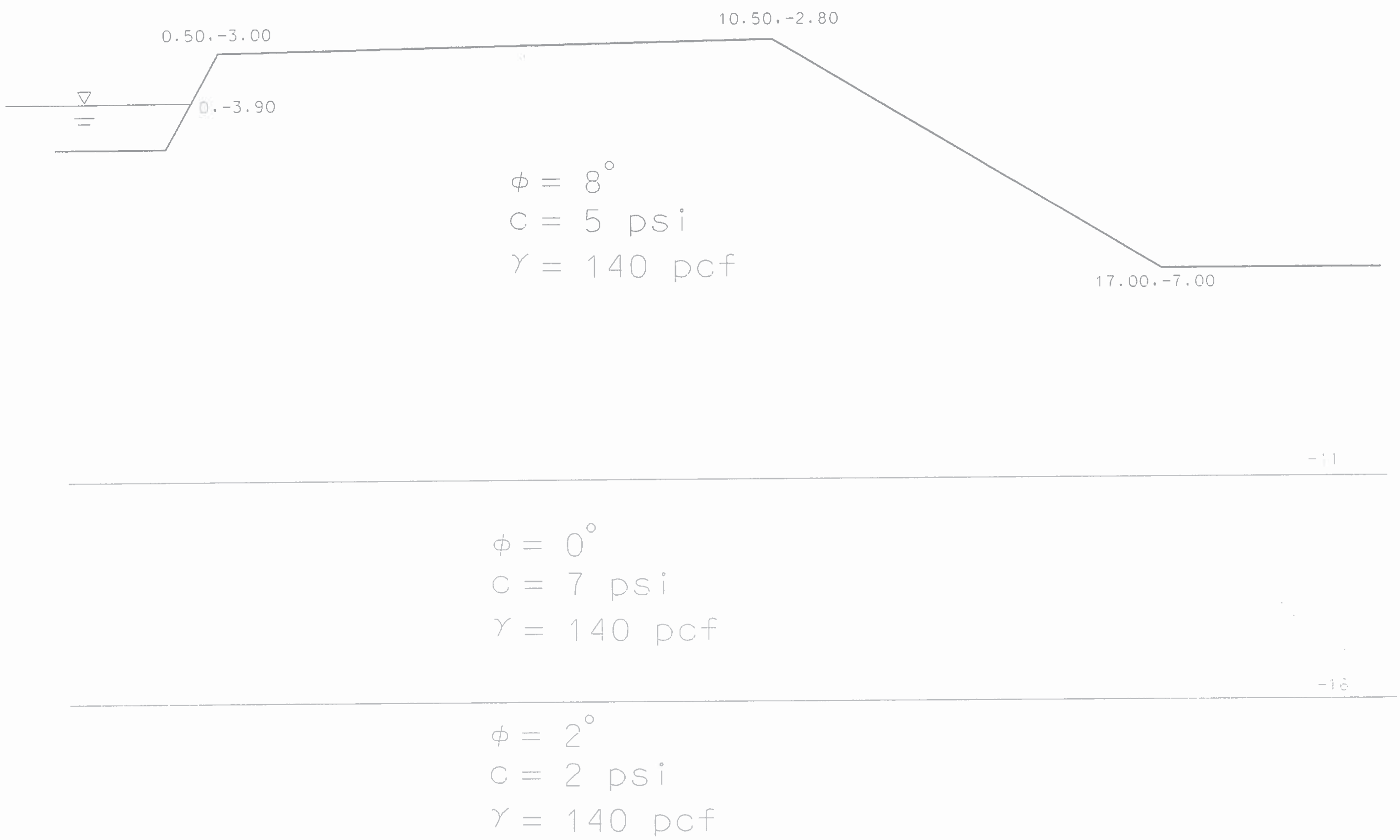
Section 4

Vector Trace



Section 5

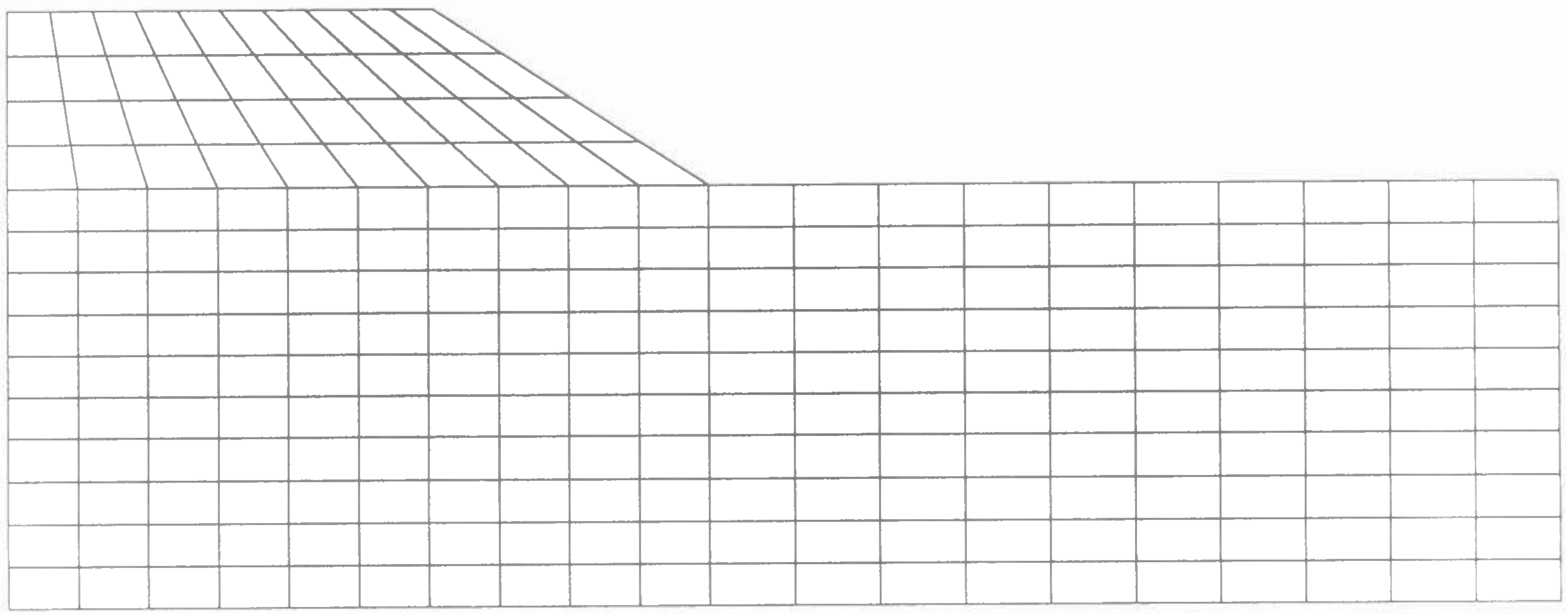
Factor Of Safety = 6.2



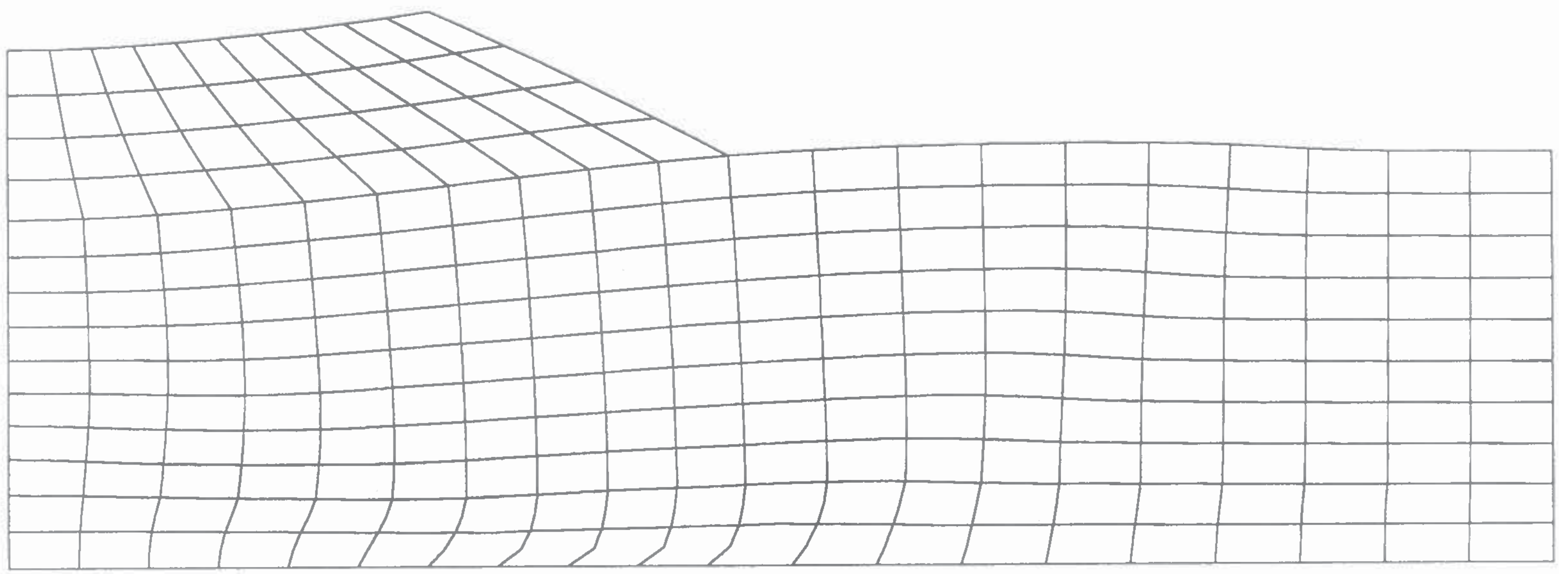
```
Section 5 Profile

w1=   10.00
s1=    6.50
w2=   20.00
h1=    4.20
h2=   10.00

nx1=   10
nx2=   10
ny1=    4
ny2=   10

Group  phi      c       psi    gamma      e           v
  1    8.00  720.00    0.00  140.00  0.1000E+06    0.30
  2    0.00 1008.00    0.00  140.00  0.1000E+06    0.30
  3    2.00  288.00    0.00  140.00  0.1000E+06    0.30

Property group assigned to each element
   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
 3   3   3   3
   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
 3   3   3   3

tol=  0.000100
limit= 1000

      trial factor    max displacement   iterations
```

0.5800E+01	0.2946E+00	127
0.6000E+01	0.3065E+00	168
0.6100E+01	0.3191E+00	252
0.6200E+01	0.3918E+00	1000

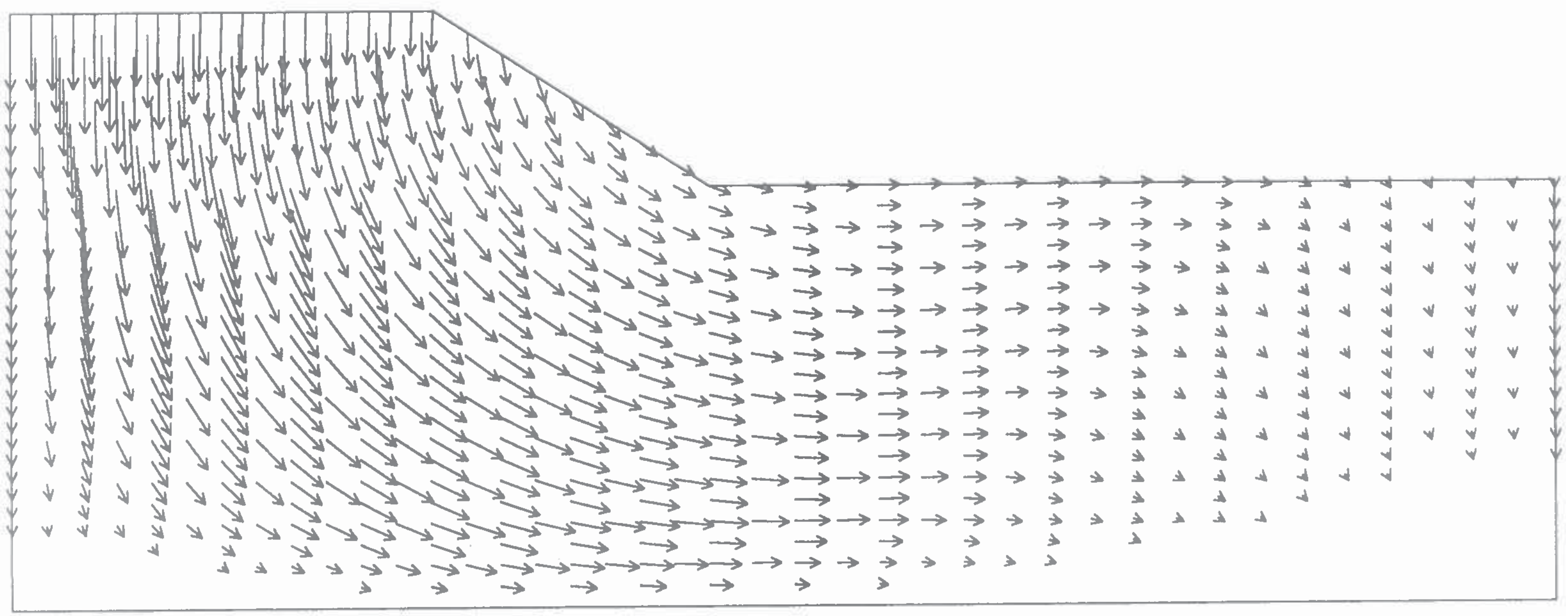
Section 5
Mesh



Section 5
Deformed Mesh

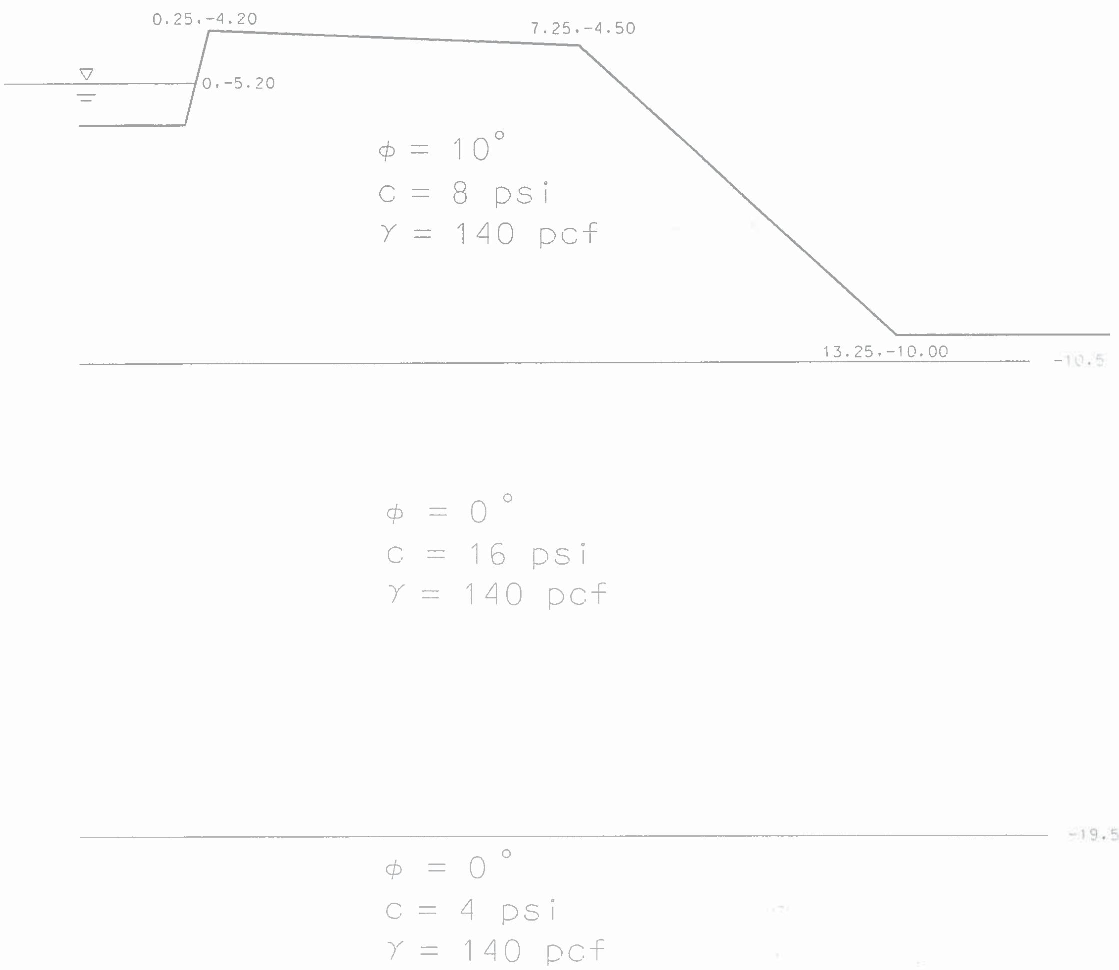


Section 5
Vector Trace



Section 6

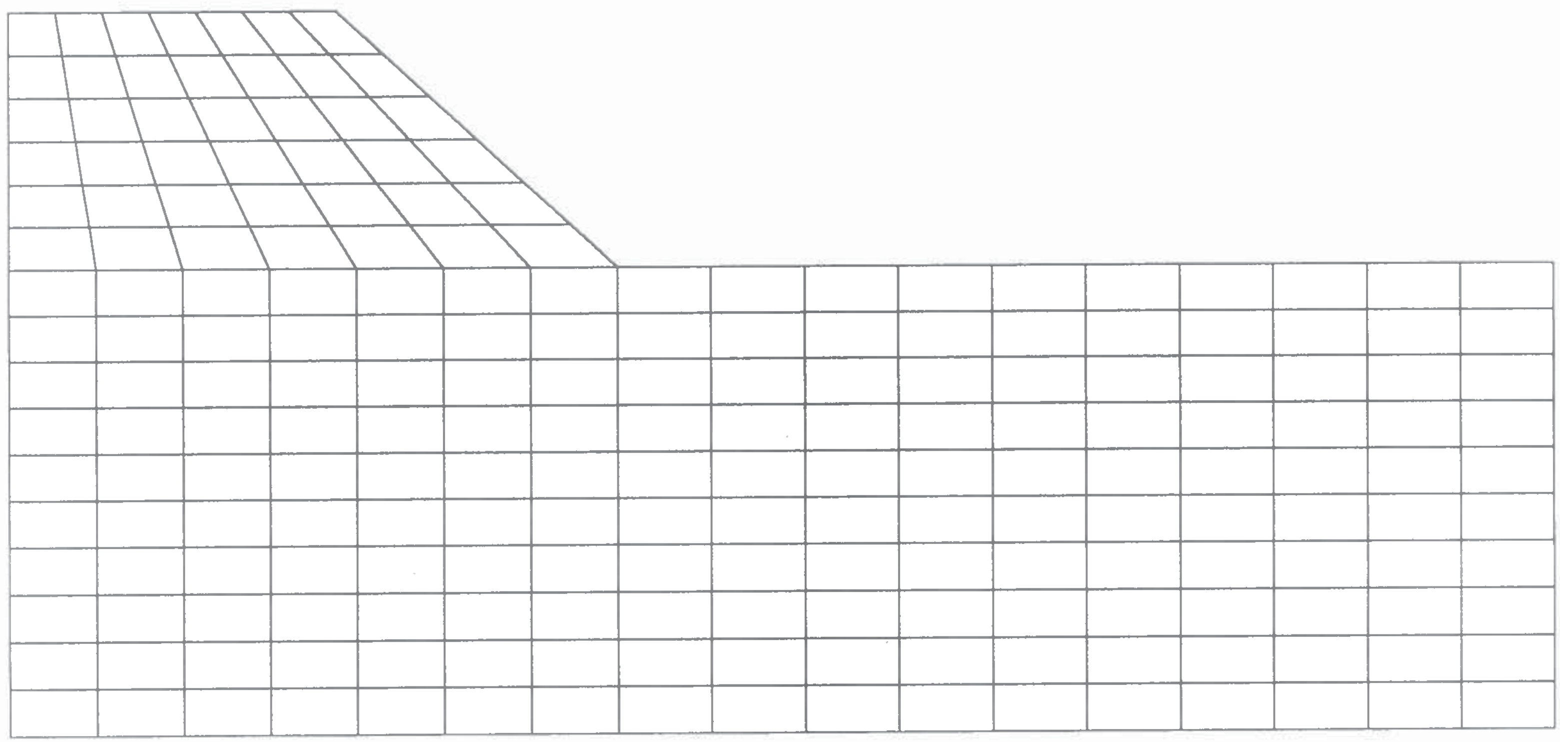
Factor Of Safety = 10.0



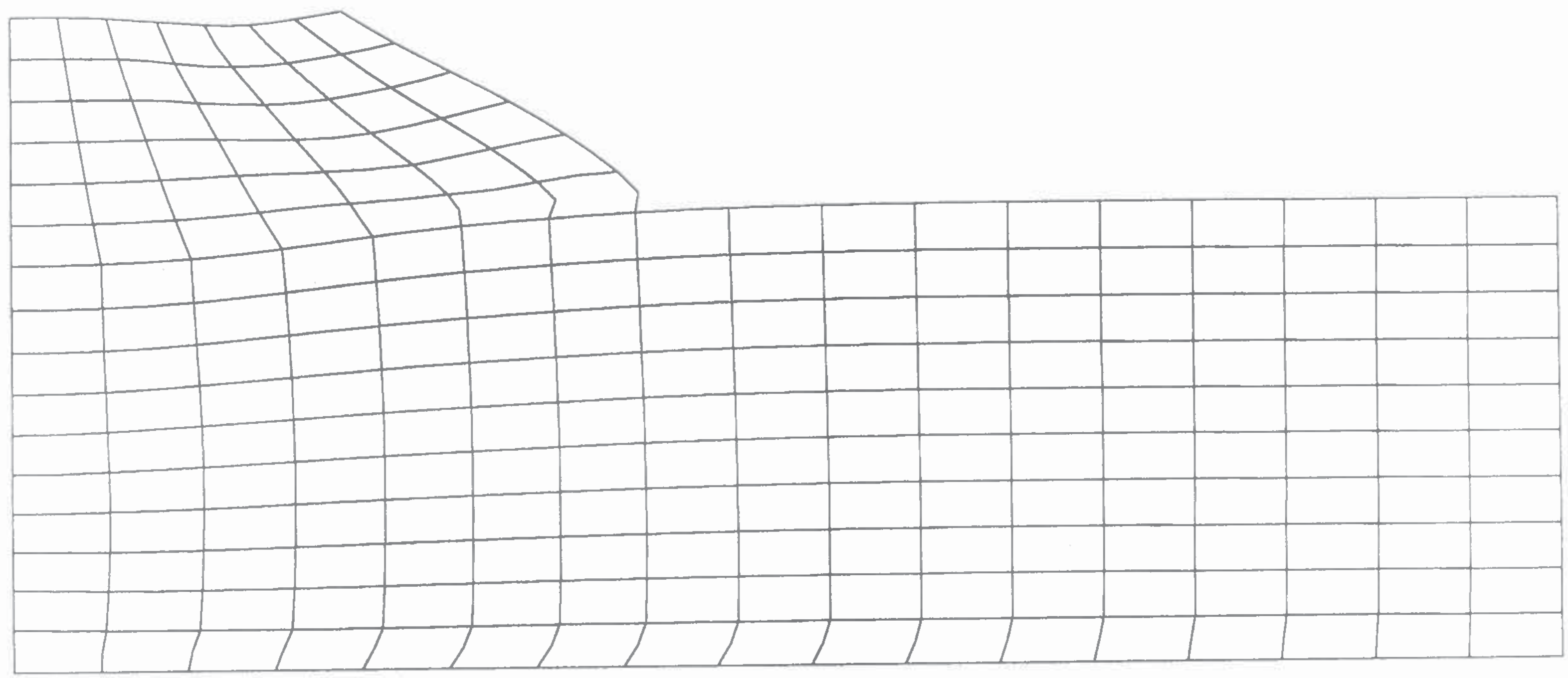
```
Section 6 Profile

w1=    7.00
s1=    6.00
w2=   20.00
h1=    5.50
h2=   10.00

nx1=    7
nx2=   10
ny1=    6
ny2=   10

Group  phi       c       psi    gamma       e           v
  1   10.00 1152.00     0.00  140.00  0.1000E+06    0.30
  2    0.00 2304.00     0.00  140.00  0.1000E+06    0.30
  3    0.00  576.00     0.00  140.00  0.1000E+06    0.30

Property group assigned to each element
   1   1   1   1   1   1   1
   1   1   1   1   1   1   1
   1   1   1   1   1   1   1
   1   1   1   1   1   1   1
   1   1   1   1   1   1   1
   1   1   1   1   1   1   1
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2
   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3

tol=  0.000100
limit= 1000
```

trial factor	max displacement	iterations
0.9000E+01	0.3093E+00	149
0.1000E+02	0.3472E+00	324
0.1010E+02	0.3636E+00	584
0.1020E+02	0.4050E+00	1000

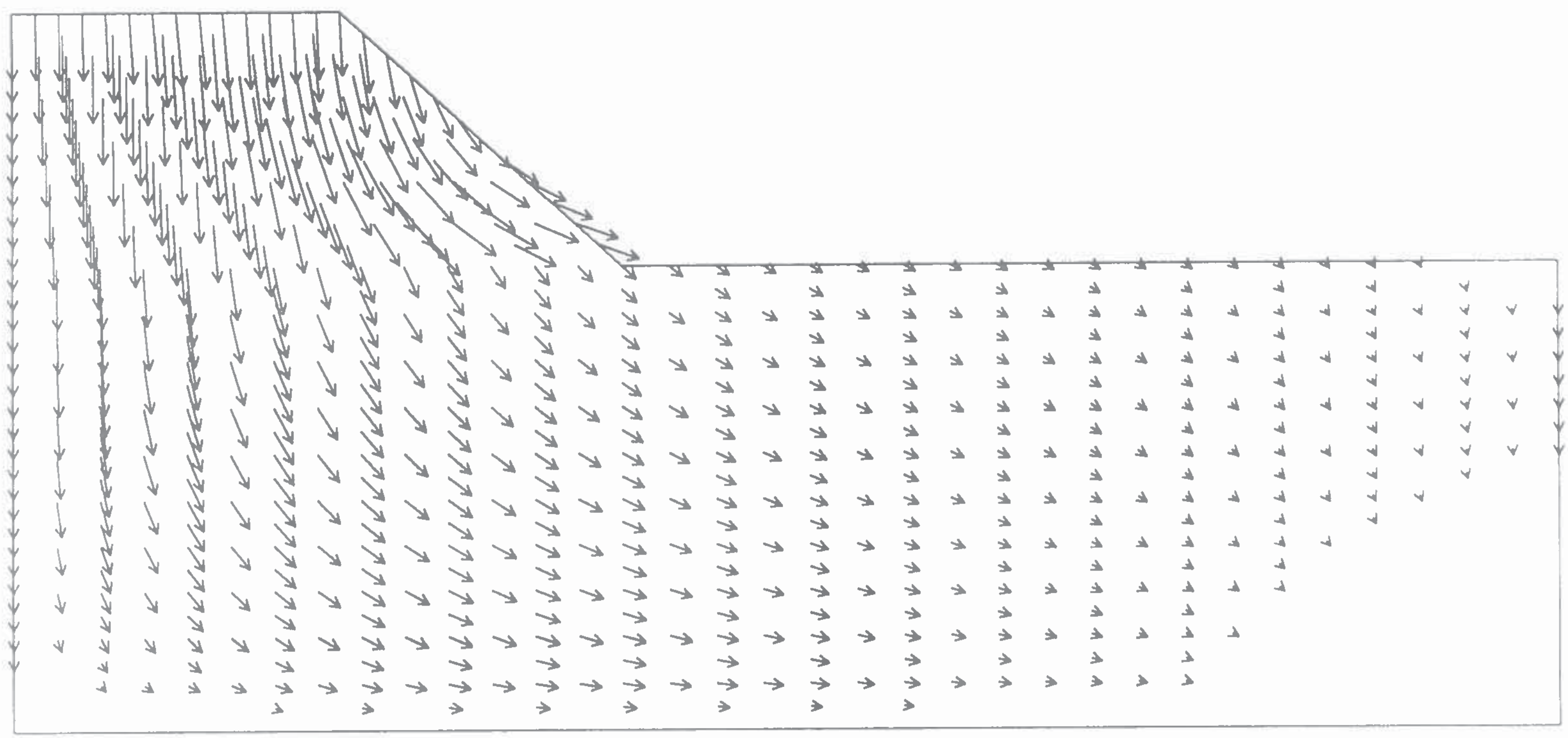
Section 6
Mesh



Section 6
Deformed Mesh

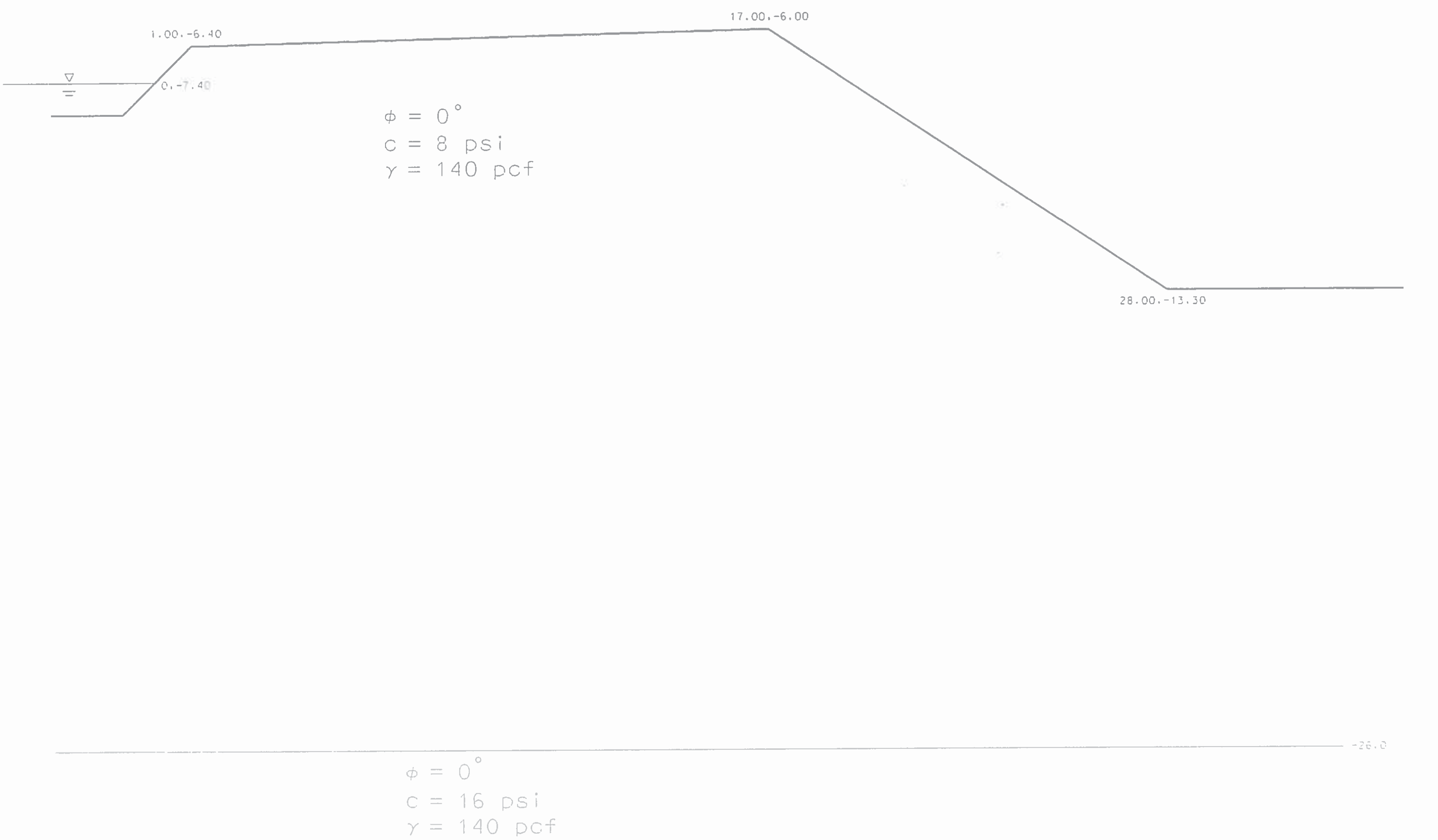


Section 6
Vector Trace



Section 7

Factor Of Safety = 6.0



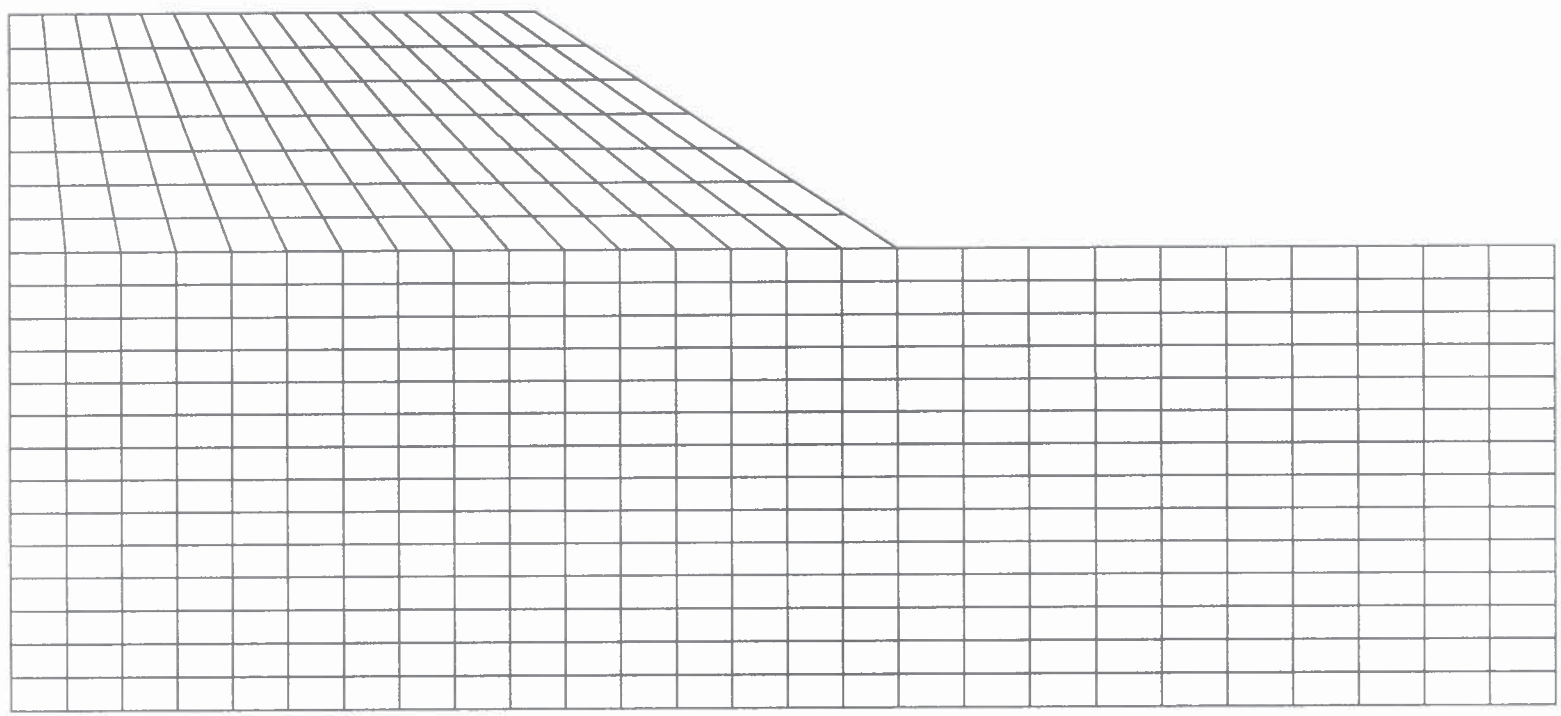
```
Section 7 Profile

w1=   16.00
s1=   11.00
w2=   20.00
h1=    7.30
h2=   14.00

nx1=   16
nx2=   10
ny1=    7
ny2=   14

Group  phi       c      psi    gamma       e           v
  1    0.00 1152.00    0.00  140.00  0.1000E+06    0.30

Property group assigned to each element
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1   1   1   1   1
```

```
    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 1    1    1    1
    1    1    1    1    1    1
    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 1    1    1    1
    1    1    1    1    1    1
    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 1    1    1    1
    1    1    1    1    1    1
    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 1    1    1    1
    1    1    1    1    1    1
    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 1    1    1    1
    1    1    1    1    1    1
    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 1    1    1    1
    1    1    1    1    1    1
```

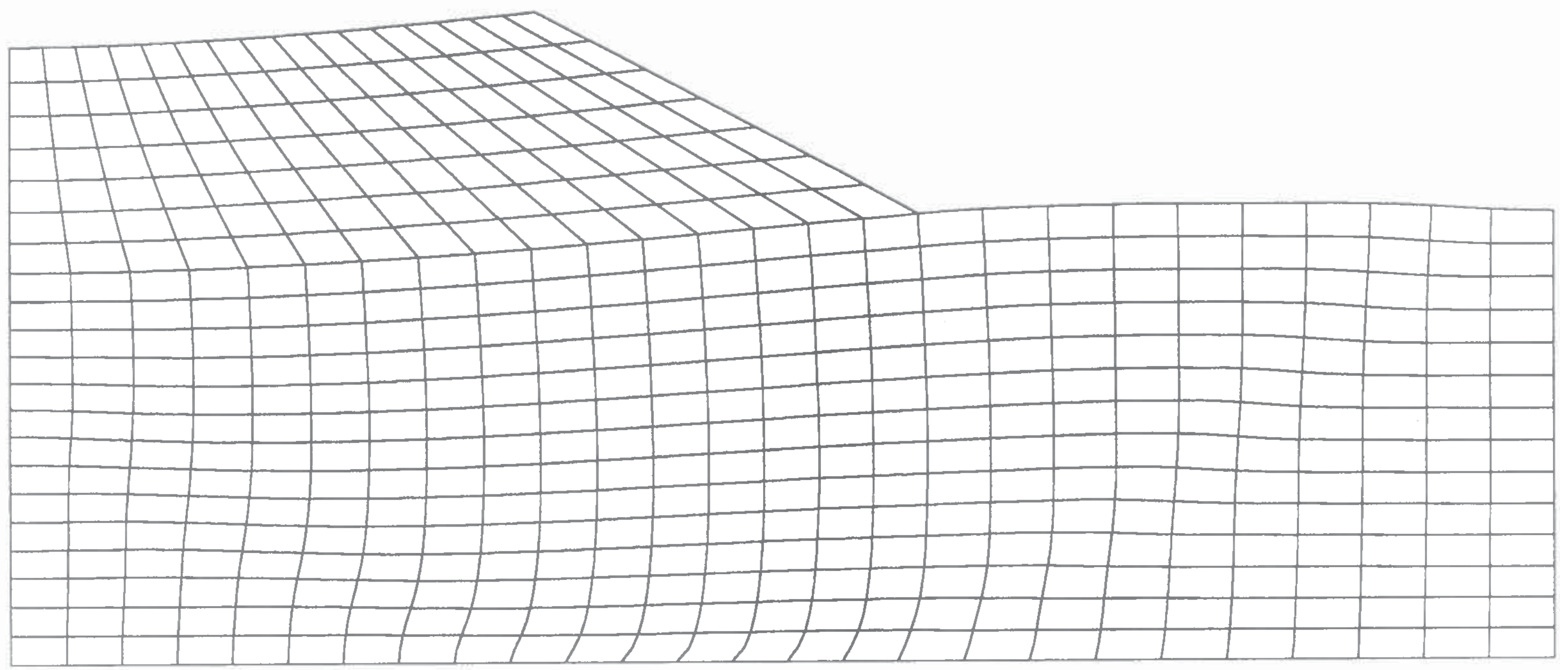
tol= 0.000100
limit= 1000

trial factor	max displacement	iterations
0.5500E+01	0.5128E+00	74
0.5700E+01	0.5294E+00	83
0.5800E+01	0.5405E+00	93
0.5900E+01	0.5552E+00	110
0.6000E+01	0.6942E+00	1000

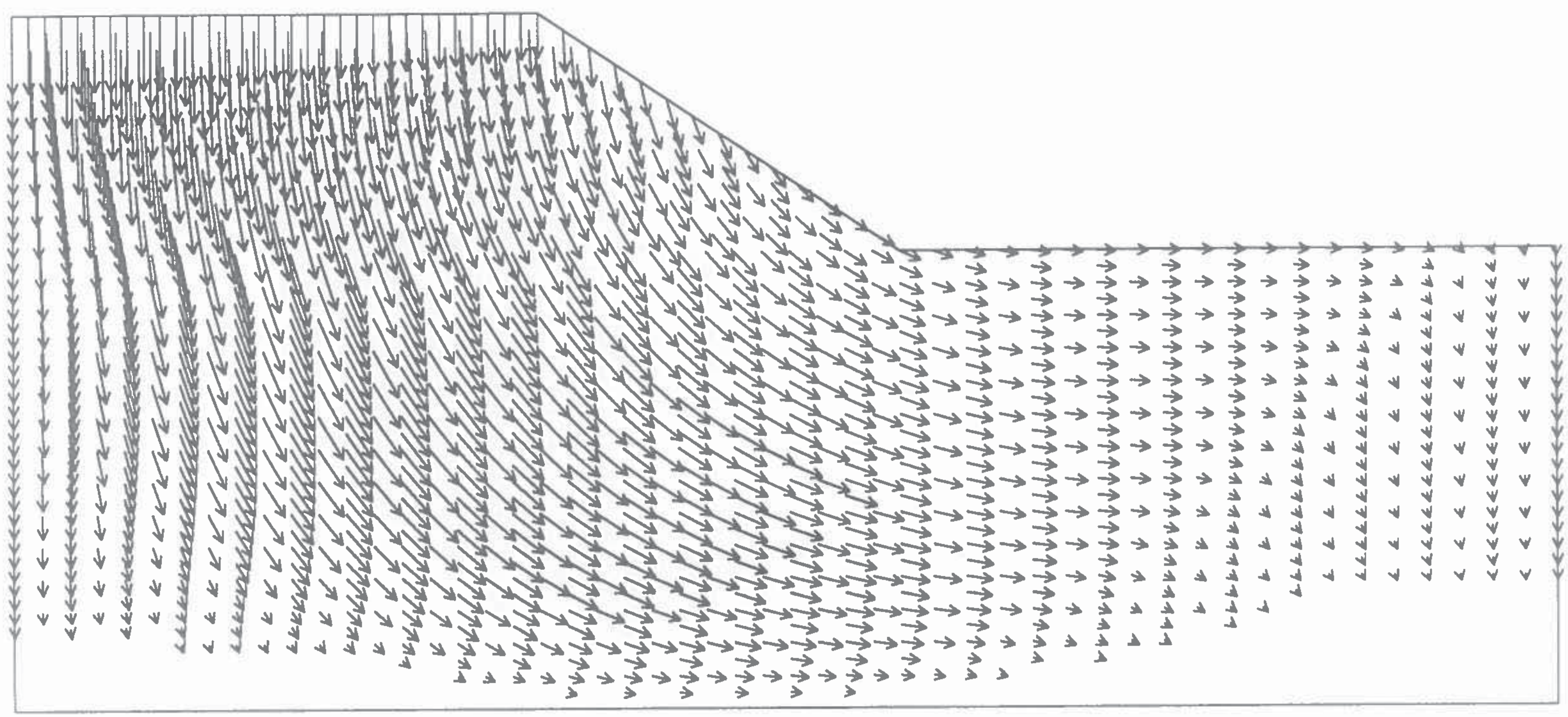
Section 7
Mesh



Section 7
Deformed Mesh

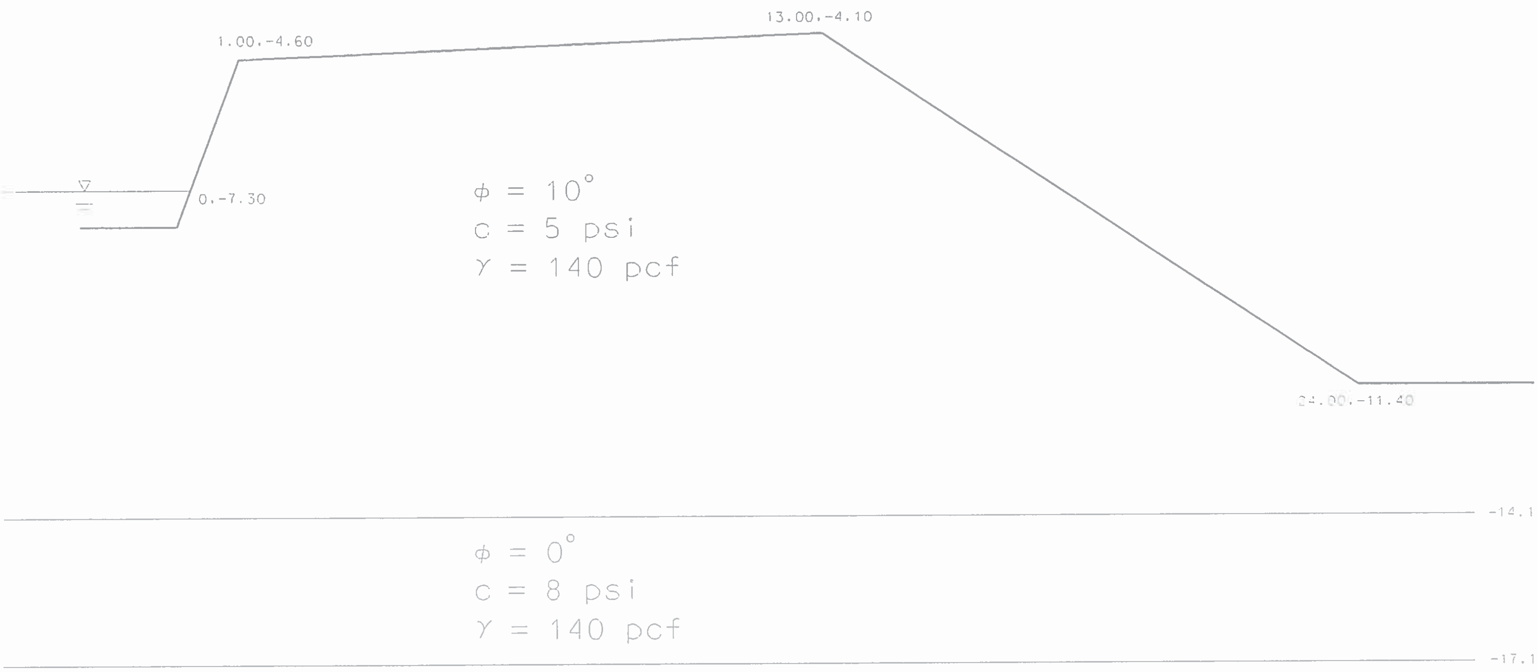


Section 7
Vector Trace



Section 8

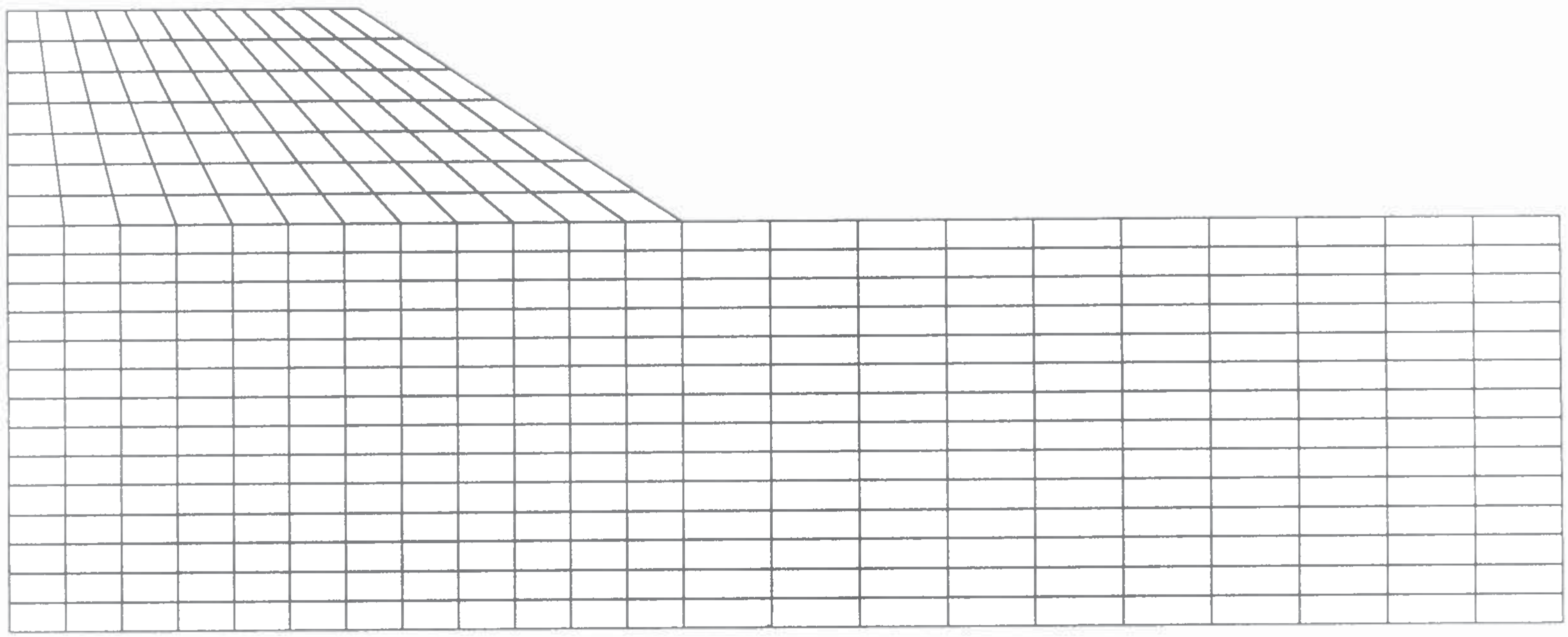
Factor Of Safety = 4.9



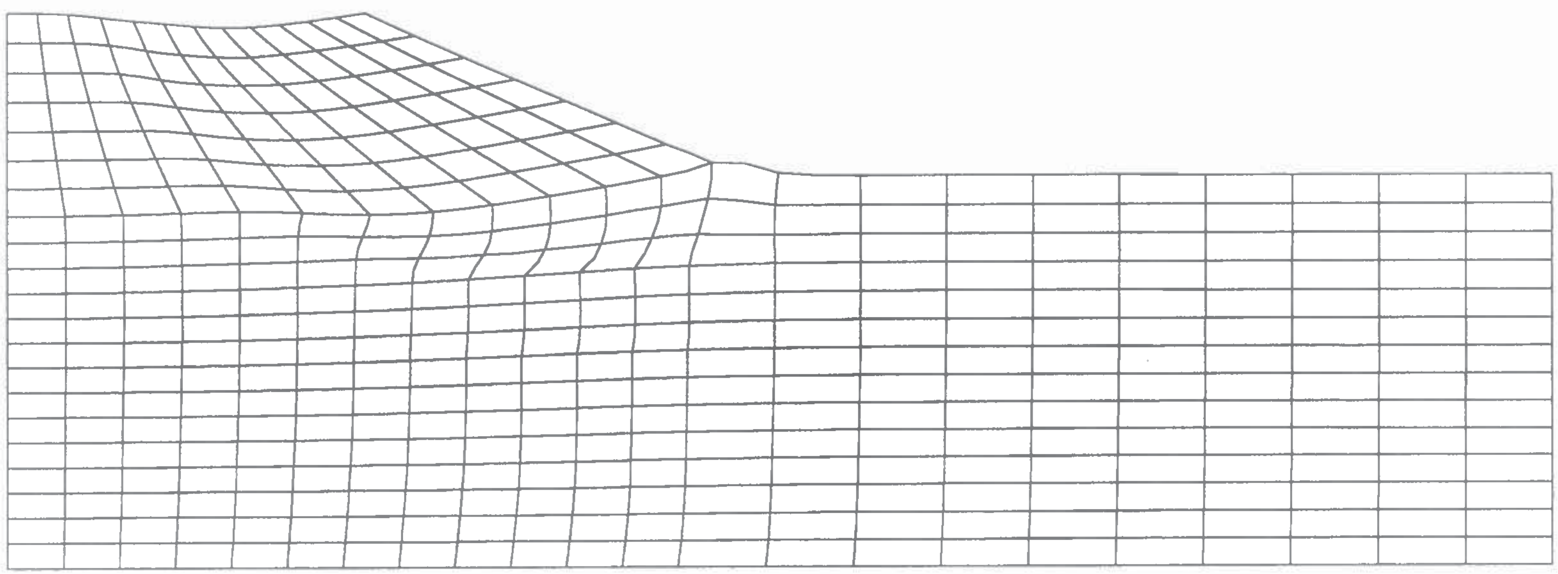
```
Section 8 Profile

w1=   12.00
s1=   11.00
w2=   30.00
h1=    7.30
h2=   14.00

nx1=   12
nx2=   10
ny1=    7
ny2=   14

Group  phi       c      psi    gamma      e          v
  1   10.00  720.00    0.00  140.00  0.1000E+06    0.30
  2    0.00 1152.00    0.00  140.00  0.1000E+06    0.30
  3    0.00 2304.00    0.00  140.00  0.1000E+06    0.30

Property group assigned to each element
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
 1   1   1   1
   1   1
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   2   2
   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
 2   2   2   2
   2   2
   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
 3   3   3   3
   3   3
   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
```

```
  3   3   3   3
    3   3
    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3
    3   3
    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3
    3   3
    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3
    3   3
    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3
    3   3
    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3
    3   3
    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
  3   3   3   3
    3   3

tol=  0.000100
limit= 1000

      trial factor    max displacement   iterations
      0.4600E+01      0.3695E+00            55
      0.4700E+01      0.3768E+00            89
      0.4800E+01      0.3859E+00           151
      0.4900E+01      0.4922E+00          1000
```

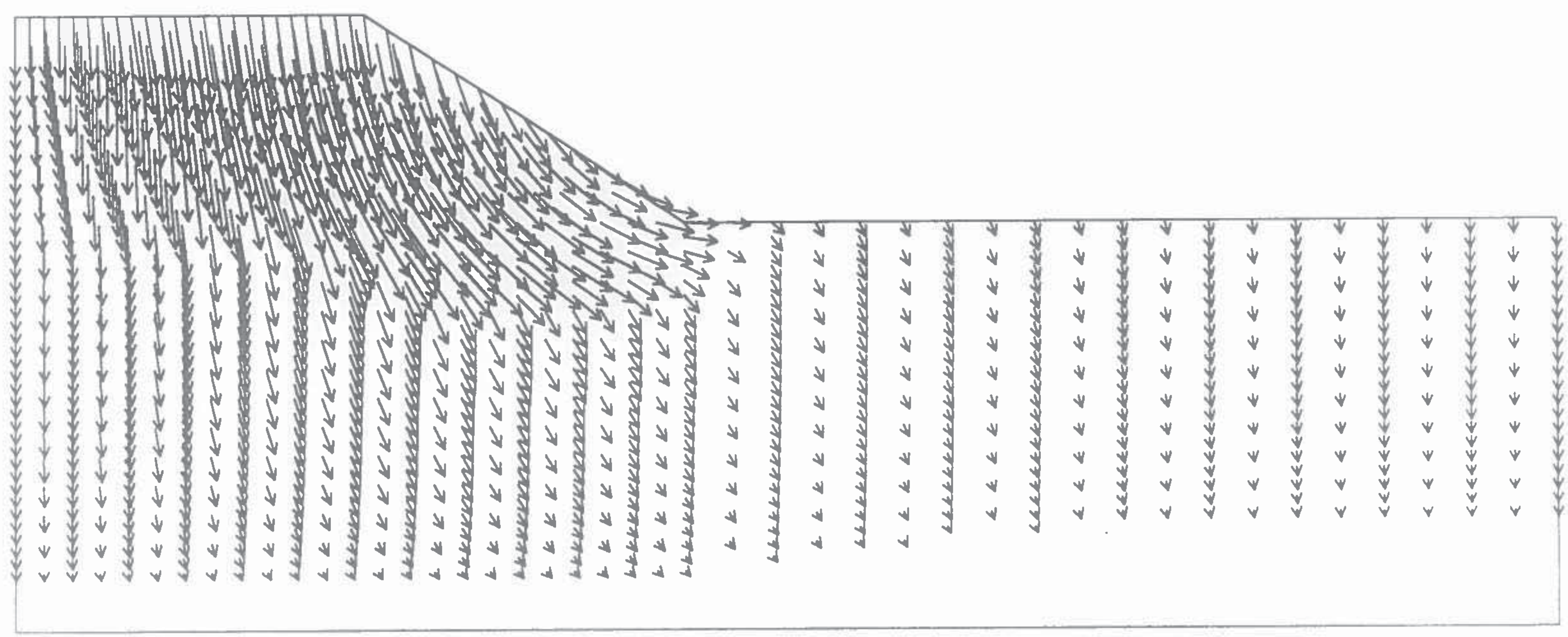
Section 8
Mesh



Section 8
Deformed Mesh

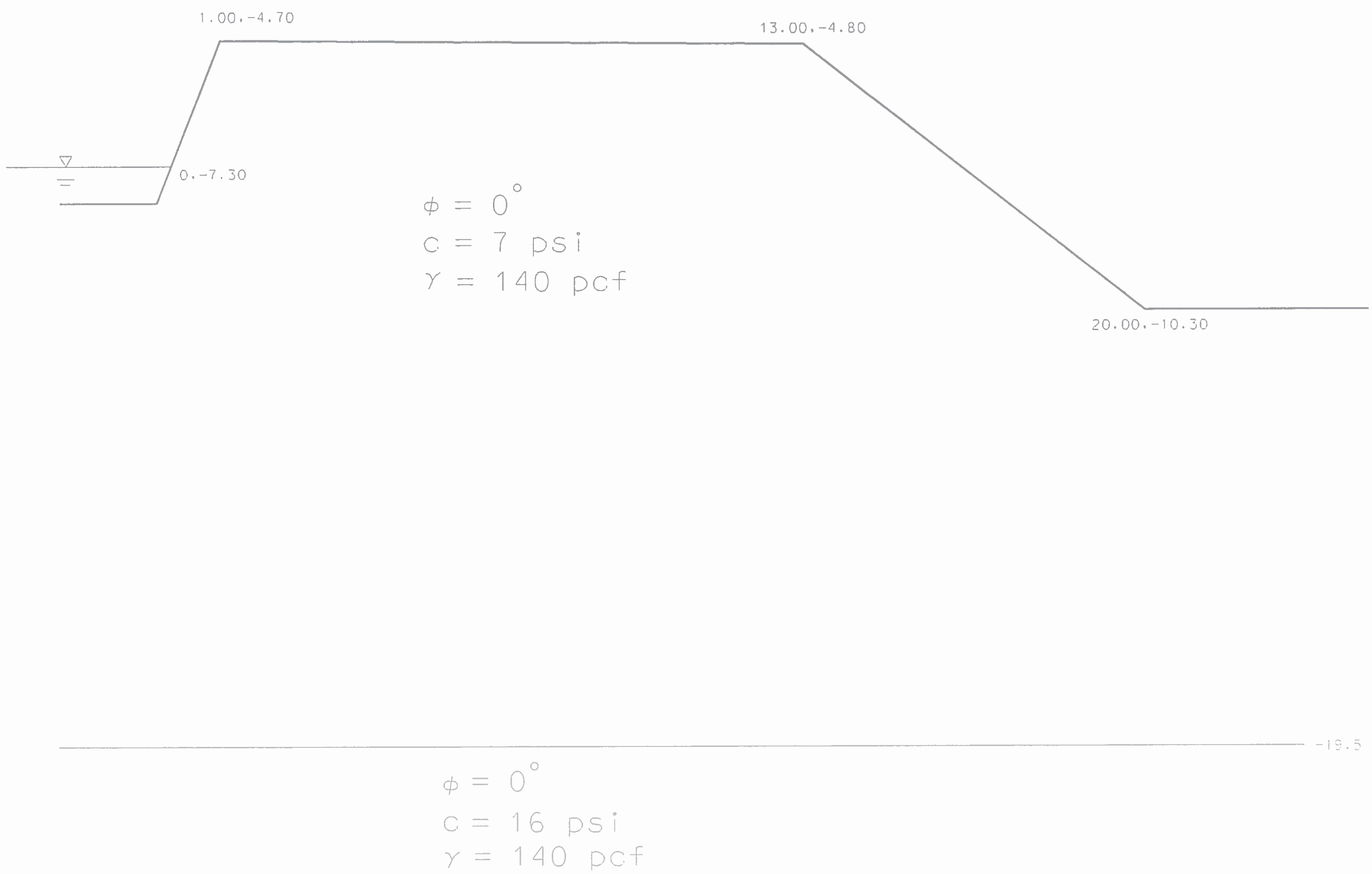


Section 8
Vector Trace



Section 9

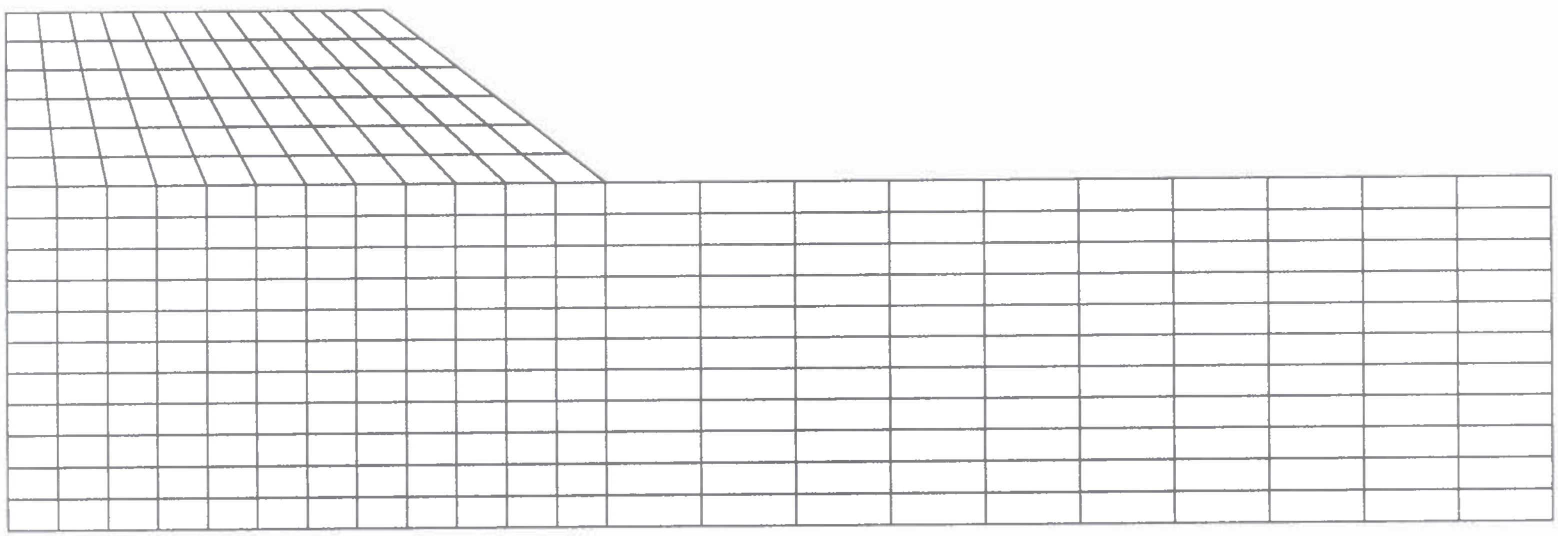
Factor Of Safety = 7.0



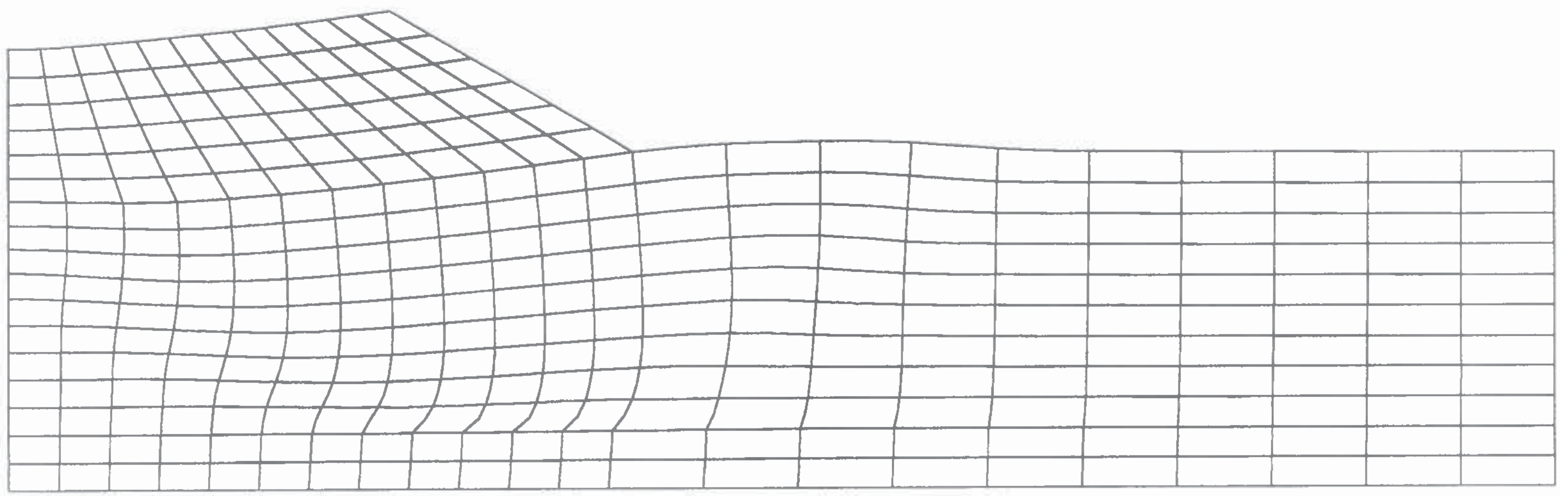
```
Section 9 Profile

w1=   12.00
s1=    7.00
w2=   30.00
h1=    5.50
h2=   11.00

nx1=   12
nx2=   10
ny1=    6
ny2=   11

Group  phi       c       psi    gamma       e           v
  1    0.00 1008.00     0.00  140.00  0.1000E+06     0.30
  2    0.00 2304.00     0.00  140.00  0.1000E+06     0.30

Property group assigned to each element
    1   1   1   1   1   1   1   1   1   1   1   1
    1   1   1   1   1   1   1   1   1   1   1   1
    1   1   1   1   1   1   1   1   1   1   1   1
    1   1   1   1   1   1   1   1   1   1   1   1
    1   1   1   1   1   1   1   1   1   1   1   1
    1   1   1   1   1   1   1   1   1   1   1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
```

```
    1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   1   1
    1   1
    2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2
    2   2
    2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
  2   2   2   2
    2   2

tol=  0.000100
limit= 1000

      trial factor    max displacement   iterations
      0.6500E+01       0.3177E+00           100
      0.6600E+01       0.3227E+00           104
      0.6700E+01       0.3283E+00           111
      0.6800E+01       0.3352E+00           122
      0.6900E+01       0.3451E+00           149
      0.7000E+01       0.4483E+00          1000
```

Section 9
Mesh



Section 9
Deformed Mesh



Section 9

Vector Trace