VOLUME I

APPENDICES A & B
TO
FINAL DESIGN REPORT

BAILEY SITE REMEDIATION

Orange County, Texas

PREPARED FOR:

BAILEY SITE SETTLORS COMMITTEE

PREPARED BY:

HARDING LAWSON ASSOCIATES
9800 Richmond Avenue
Suite 150
Houston, Texas 77042
713/789-8050

800566

December 1991

VOLUME I

APPENDICES A & B
TO
FINAL DESIGN REPORT

BAILEY SITE REMEDIATION

Orange County, Texas

PREPARED FOR:

BAILEY SITE SETTLORS COMMITTEE

STATE OF TEXAS
ALBERT A. JOSEPH
69990
REGISTERED
PROFESSIONAL ENGINEER

12/27/91

STATE OF TEXAS
STEPHEN D. DEL'HOMME
60882
REGISTERED
PROFESSIONAL ENGINEER

12/27/91

December 1991

APPENDIX A

GENERAL ENGINEERING CALCULATIONS

BRIDGE ABUTMENT LOADING

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 1 OF 3
JOB NO. 19559-042-12
DATE 10/24/91
COMPUTED BY SDD
CHECKED BY [illegible]

PROJECT BAILEY
SUBJECT BRIDGE ABUTMENT DESIGN LOAD

WEIGHT OF BRIDGE 24' WIDE X 50' LONG

WOOD DECKING

4"X12" = 10.93 LB/FT 50 BOARDS - 24' LONG

50 (24) (10.93) = 13,116 LBS

W24X96 BEAMS

50' LONG X 12 BEAMS X 96 LB/FT = 57,600 LBS

TRUCK (LOADED)

60,000 LBS

~~TOTAL~~ BRIDGE LOAD = 13116 + 57600 + 60000 = 130,716 LBS

ADD 20% MISC WEIGHT = 130716 + 26143 = 156,859

GROUND LOAD @ EACH ABUTMENT = ½ TOTAL LOAD = 78,430 LBS

ADD WT OF END BEAM (W12X98) =

25' X 98 LB/FT = 2450 LBS

ADD WT OF END PLATE

TRY 1" THICK X 25' X 5' WIDE = 25' X 5' X 41.89 LB/SF = 5236.25 LBS

TOTAL WT @ END OF BRIDGE

78430 + 2450 + 5236 = 86,116 LBS

SOIL PRESSURE = 86,116/25x5 = 689 PSF OK

USE 1" X 25' LONG X 5' WIDE BASE PLATE

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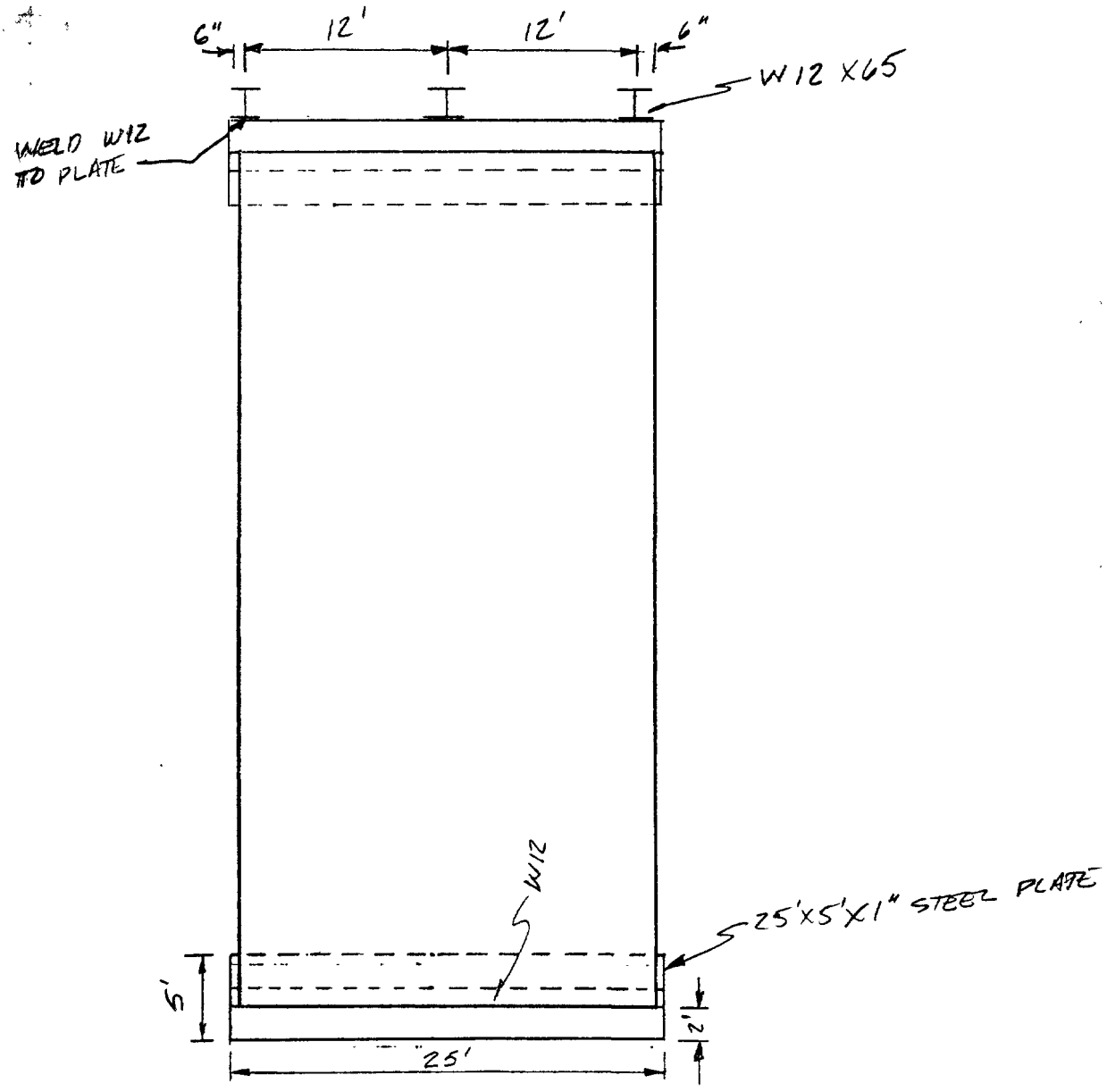
and
Environmental Services

SHEET 2 OF 3
JOB NO. P559-042.12
DATE 10/24/91
PROJECT BAILEY
COMPUTED BY SDD
SUBJECT BRIDGE LAYOUT
CHECKED BY [illegible]



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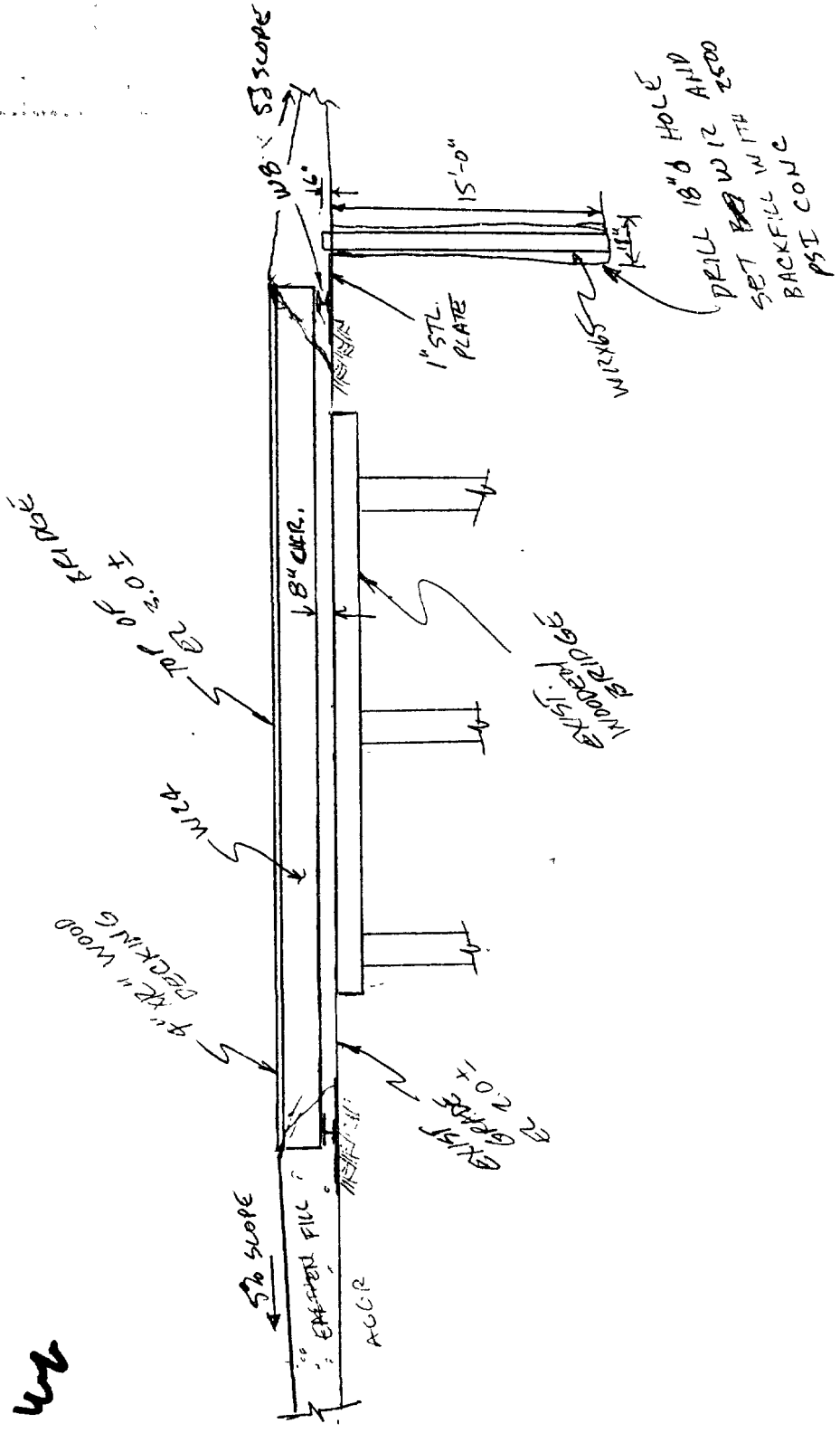
and
Environmental Services

SHEET 3 OF 3
JOB NO. 19559-042.12
DATE 10/24/91
COMPUTED BY SDD
CHECKED BY

PROJECT BAILEY
SUBJECT BRIDGE LAYOUT



ACTIVE AREA SIZE

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and
Environmental Services

SHEET 1 OF 2
JOB NO. 19539.042.12
DATE 4/13/91
PROJECT BAILEY
COMPUTED BY SDD
SUBJECT SIZE ACTIVE AREA
CHECKED BY

USE TP-40 U.S. DEPT. OF COMMERCE TO DETERMINE RAINFALL (ORANGE COUNTY)

5YR - 24 HR STORM — 7.5 INCHES

100YR - 24 HR STORM — 13 INCHES

AVG. WIDTH OF ACTIVE AREA (BETWEEN DIKES) = 180'

TRY LENGTH OF 200' ACTIVE AREA (ASSUME 100% RUNOFF)

5YR STORM

$180' \times (200') \times \left(\frac{7.5}{12}\right) = 22{,}500$ CF OR 168,300 GAL.

ALLOW 2 ACTIVE AREAS OPEN AT ONCE

$V = 22{,}500(2) = 45{,}000$ CF

- TRY 100' X 200' MODU TANK (STD HEIGHT = 4'-9")

$45{,}000 \times \frac{1}{100} \times \frac{1}{200} = 2.25'$ (2'-3")

THIS LEAVES 2.5 FT OF FREEBOARD

TRY 3 ACTIVE AREAS

$V = 22{,}500(3) = 67{,}500$ CF

WATER DEPTH $= 67{,}500 \times \frac{1}{100} \times \frac{1}{200} = 3.4'$

FREE BOARD = 1.35' FREE BOARD.

∴ ALLOW 2 ACTIVE AREAS OPEN (LEAVE ONE AS A CONTINGENCY IN CASE RE-STABILIZATION IS REQUIRED)

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and
Environmental Services

SHEET 2 OF 2
JOB NO. 19559.042.12
DATE 4/13/91
COMPUTED BY SDD
CHECKED BY GJB

PROJECT BAILEY
SUBJECT SIZE INTERMEDIATE DIKE

100 YR STORM = 13 INCHES

WATER WILL FALL ON ALL AREAS INSIDE THE TOP OF DIKE. (180' ACROSS ±)

SUBTRACT AREA OF SIDE SLOPES TO DETERMINE AVAILABLE WATER STORAGE AREA IN ACTIVE AREA.

DIKES 8' HIGH MAX. W 2:1 SIDE SLOPES 8(2) = 16'

REMOVE AREA OF 2 INNER SLOPES (-32')
(this is conservative - does not include triangular storage adjacent to dike)

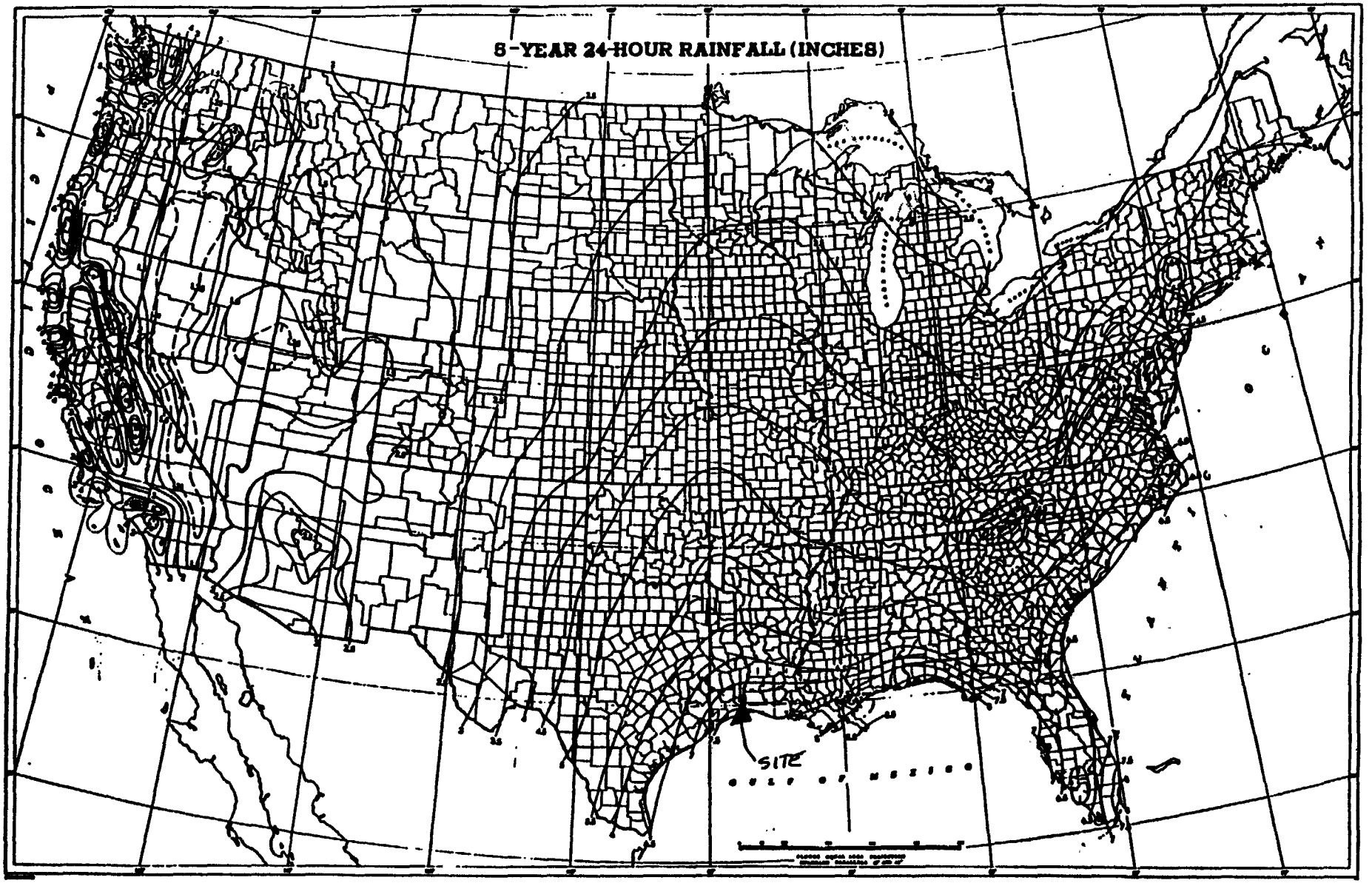
AREA AVAILABLE = (180-32)(200') = 29,600 SF

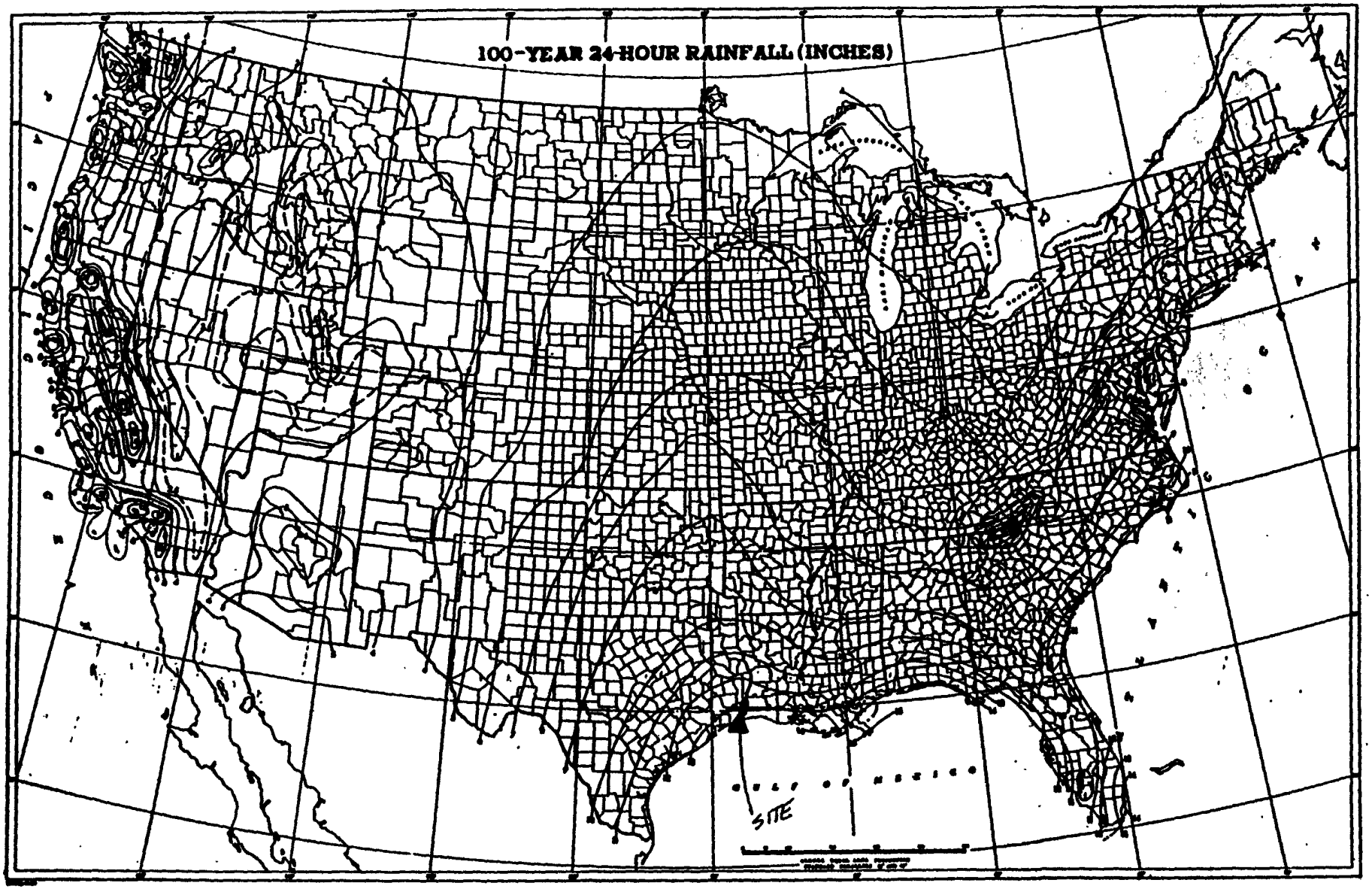
VOLUME OF WATER = $\frac{13''}{12}$(200')(180') = 39,000 CF

DEPTH OF WATER = $\frac{39,000 \text{ CF}}{29,600 \text{ SF}}$ = 1.3' DEEP

∴ SET INTERMEDIATE DIKE HEIGHT @ 18" MIN.

STORMWATER FLOW CALCULATIONS

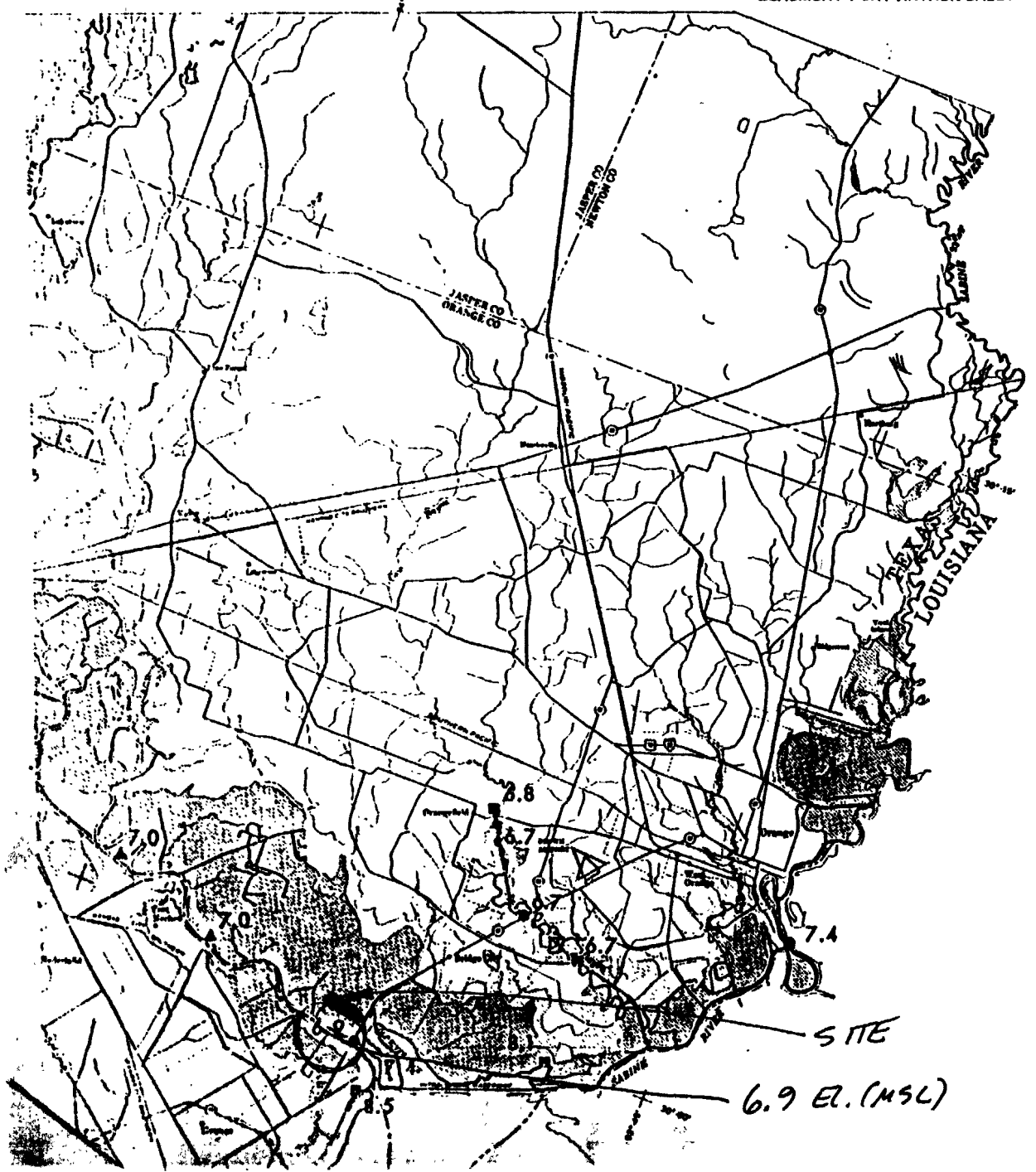

5-YEAR 24-HOUR RAINFALL (INCHES)
SITE



TP-40

ENVIRONMENTAL GEOLOGIC ATLAS,
TEXAS COASTAL ZONE
BEAUMONT-PORT ARTHUR SHEET

HIGH WATER EL. 6.9 SET DIKE HEIGHT @ 8.0 TO ALLOW FOR SETTLEMENT.



EXPLANATION

- Lower shoreface and shelf, under normal conditions a decrease in wave and current energy occurs below 8 feet, burrowing by marine organisms common, some longshore and onshore sand transport in shallow areas especially during storms, deposition of some fine suspended sediment
- Normal surf or breaker zone, high wave energy area, shifting subaqueous bars, zone extends to depth of about 8 feet, longshore and onshore transport of sand
- Area of moderate erosion or scour to slight deposition, tidal channels shift laterally by cut and fill unless artificially stabilized
- Area of rapid deposition, predominantly tidal delta accretion and aggradation
- Site of active or potential hurricane washover channel
- Shoreline, erosional
- Shoreline, depositional, accretion
- Shoreline in depositional-erosional equilibrium
- Shoreline stabilized by seawall, dredging, or other man-made structures
- Area of slow to moderate deposition within bays, predominantly suspension deposition in deeper bay, accretion in some marginal areas
- Area of active reworking and redistribution of subaqueous spoil by waves and currents
- Area inundated by marine water, Hurricane *Carla* storm surge tide
- ● 8.2 Hurricane *Carla* recording tide or river gage, high water-mark elevation, datum mean sea level
- ▲ 7.3 Hurricane *Carla* recording site, still high water-mark elevation, datum mean sea level
- ■ 9.3 Hurricane *Carla* storm surge and river flooding debris or drift line elevation, datum mean sea level

1 OF

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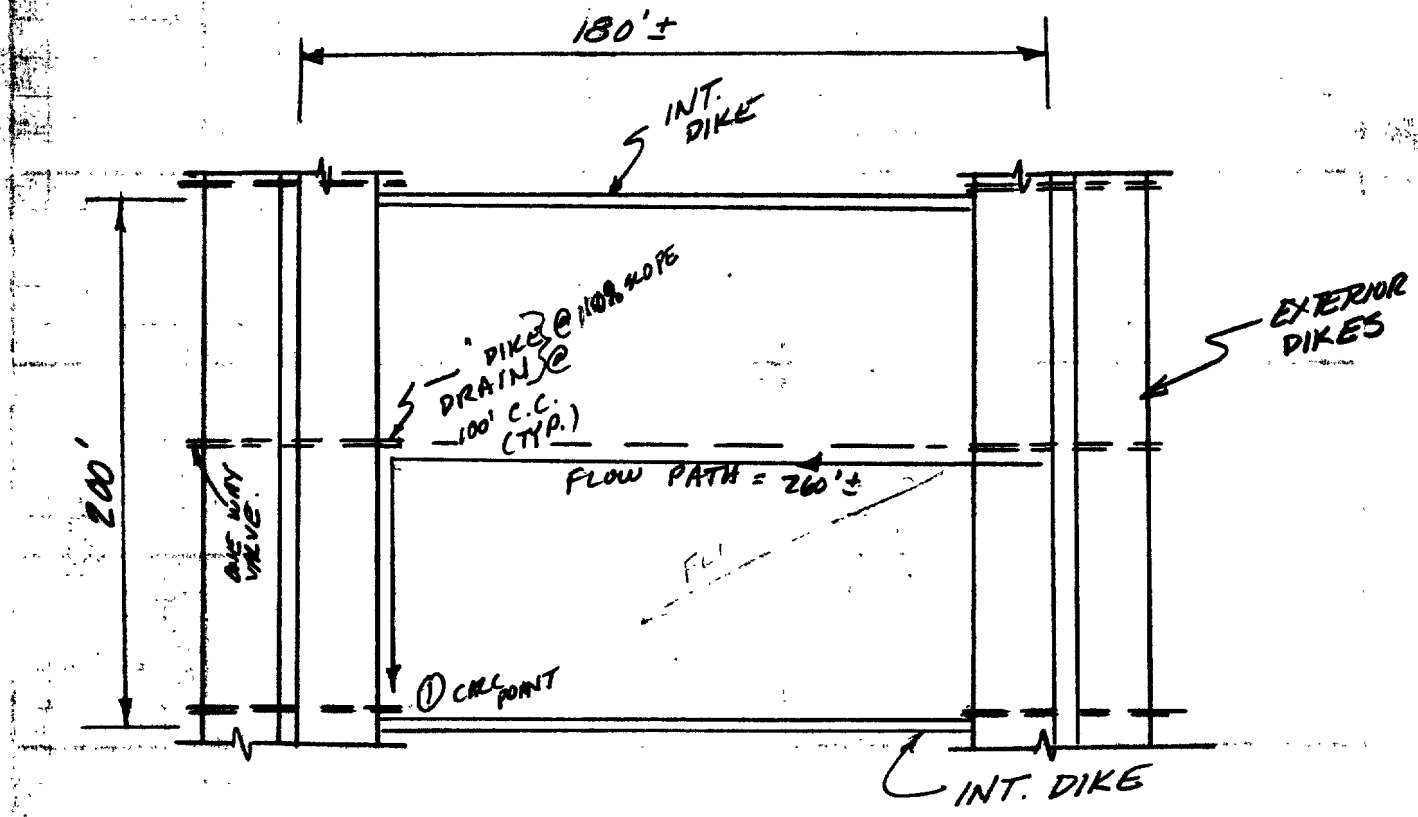
SHEET 1 OF 4
JOB NO. 19559-042-12
DATE 3/13/91
COMPUTED BY S.D.D.
CHECKED BY [illegible]

PROJECT BAILEY
SUBJECT STORMWATER FLOW THRU TEMP DIKE DRAINS



TYP. ACTIVE AREA
N.T.S.

ASSUME ALL FLOW GOES THRU ONE PIPE (WORST CASE)
USE RATIONAL METHOD AND TP 40 [illegible] TO DETERMINE PEAK FLOW RATE (SEE FOLLOWING COMPUTER PRINT OUT)

AREA = 0.41 Ac (1/2 of active area)
HYDRAULIC LENGTH = 260'±
FLOW VELOCITY = 0.25 FT/SEC

$$T_c = \frac{260}{0.25(60)} = 17.33 \text{ MIN.}$$

USE 8" STEEL LINE THROUGH DIKE, WILL HANDLE PEAK FLOW FROM

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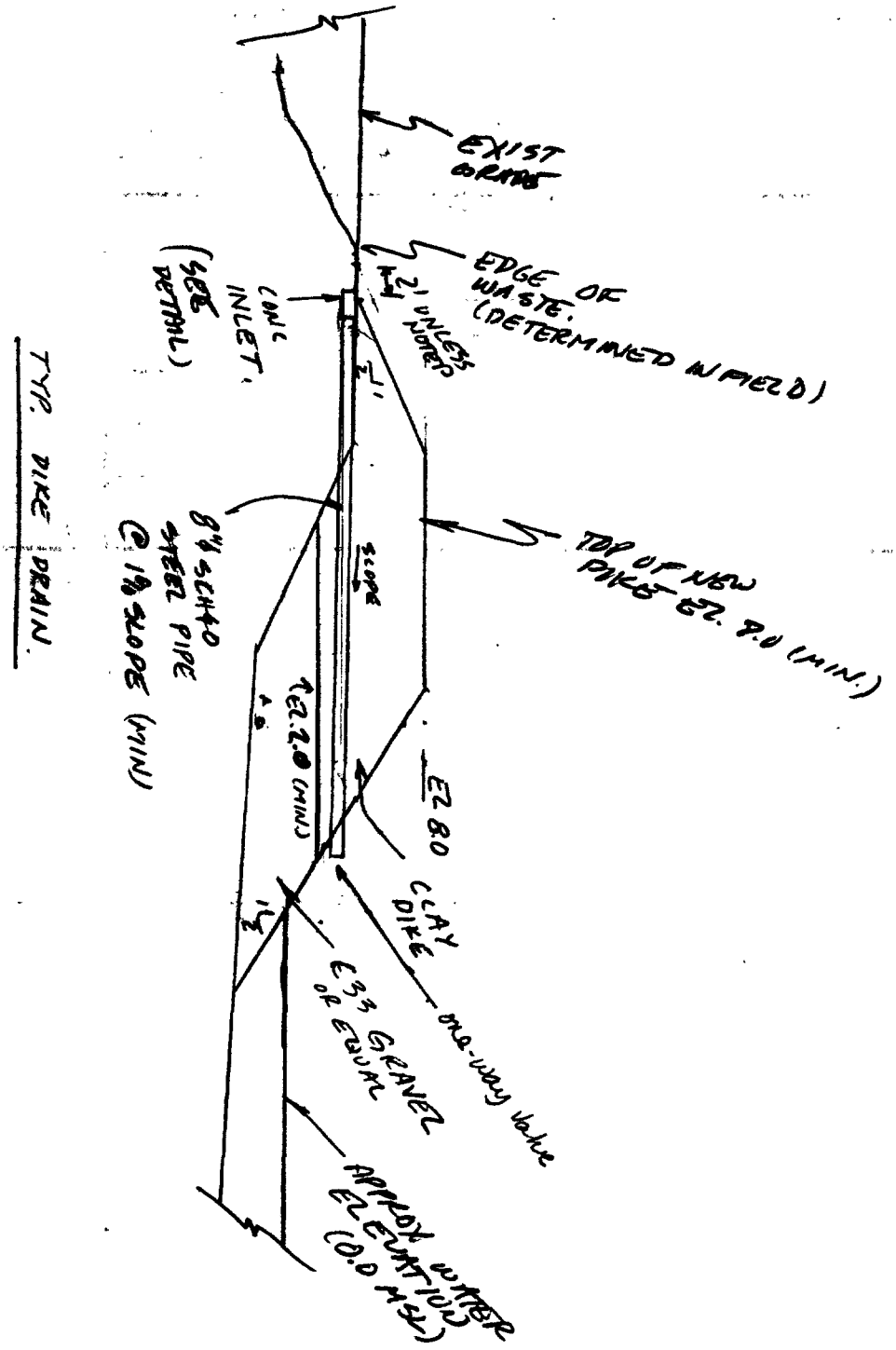
SHEET 2 OF 19
JOB NO.
DATE
PROJECT
COMPUTED BY SDD
SUBJECT
CHECKED BY



TYP. DIKE DRAIN.

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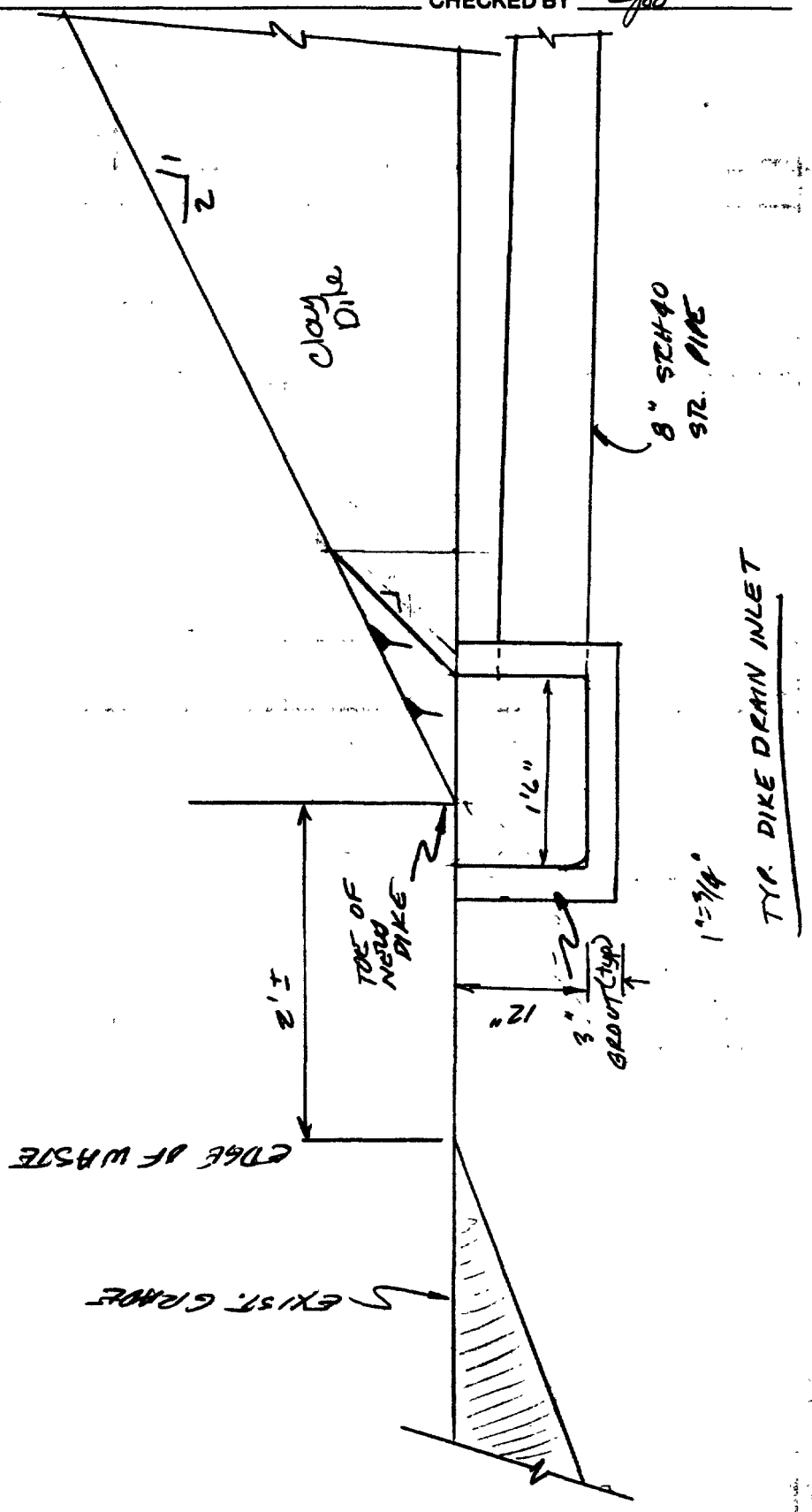
SHEET 3 OF 14
JOB NO.
DATE
PROJECT
COMPUTED BY SDD
SUBJECT
CHECKED BY



1"=3/4"

TYP. DIKE DRAIN INLET SECTION

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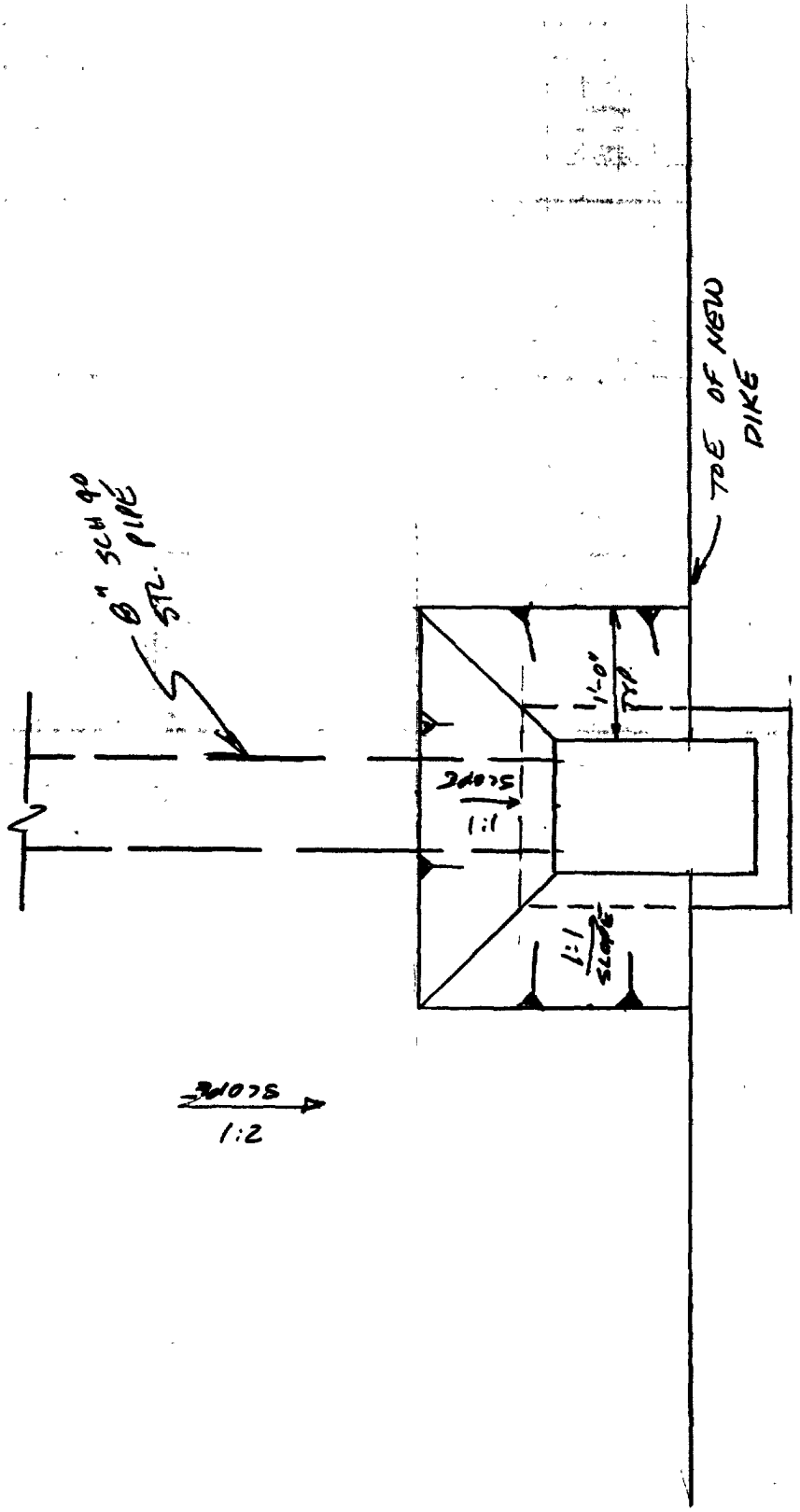
SHEET 4 OF 14
JOB NO.
DATE
COMPUTED BY STD
CHECKED BY GHS

PROJECT
SUBJECT



PLAN
3/4" = 1'-0"

5/A

RATIONAL METHOD ANALYSIS
RAINFALL INTENSITIES USING MULTIPLE-FREQUENCY I-D-F CURVES

March 13, 1991
RUNOFF CALCULATIONS
TEMP. DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
10-Year, 1-Hour TP-40 Rainfall Depth (inches).....	3.40
10-Year, 24-Hour TP-40 Rainfall Depth (inches).....	8.60
100-Year, 1-Hour TP-40 Rainfall Depth (inches).....	4.70

==========

PROGRAM RESULTS:

Ratio of 10-Year, 1-Hour to 10-Year, 24-Hour Rainfall...	39.53
Computed Storm Parameter A.....	22.16
Computed Storm Parameter B.....	7.30
Computed Storm Parameter C.....	0.73
Computed Storm Parameter X.....	1.38

Computed Rainfall Intensity (inches per hour)
for Given Storm Frequency and Duration

Storm Frequency	5 Min.	10 Min.	15 Min.	30 Min.	1 Hour	2 Hour	3 Hour	6 Hour	12 Hour	24 Hour
1 yr	7.39	5.75	4.77	3.27	2.12	1.33	1.00	0.61	0.37	0.22
2 yr	8.76	6.82	5.66	3.88	2.52	1.58	1.19	0.73	0.44	0.27
5 yr	10.58	8.24	6.84	4.69	3.04	1.91	1.44	0.88	0.53	0.32
10 yr	11.96	9.31	7.73	5.30	3.44	2.15	1.62	0.99	0.60	0.36
25 yr	13.78	10.73	8.91	6.11	3.96	2.48	1.87	1.14	0.69	0.42
50 yr	15.16	11.80	9.80	6.72	4.36	2.73	2.06	1.26	0.76	0.46
100 yr	16.53	12.87	10.69	7.33	4.75	2.98	2.24	1.37	0.83	0.50

==========

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RATIONAL METHOD ANALYSIS
RATIONAL METHOD RUNOFF COMPUTATIONS

March 13, 1991
2 YEAR STORM
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Storm Frequency (years).....	2.0
Drainage Area (acres).....	0.41
C Coefficient.....	0.45
Time of Concentration (minutes).....	17.33

==========

PROGRAM RESULTS:

Rainfall Intensity computed using Multiple-Frequency I-D-F Curves.

Rainfall Intensity (inches per hr).....	5.27
Peak Flow Rate (cfs).....	1.0

==========

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RATIONAL METHOD ANALYSIS
RATIONAL METHOD RUNOFF COMPUTATIONS

March 13, 1991
5 YEAR STORM
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Storm Frequency (years).....	5.0
Drainage Area (acres).....	0.41
C Coefficient.....	0.45
Time of Concentration (minutes).....	17.33

==========

PROGRAM RESULTS:

Rainfall Intensity computed using Multiple-Frequency I-D-F Curves.

Rainfall Intensity (inches per hr).....	6.36
Peak Flow Rate (cfs).....	1.2

==========

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8/14

RATIONAL METHOD ANALYSIS
RATIONAL METHOD RUNOFF COMPUTATIONS

March 13, 1991
10 YEAR STORM
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Storm Frequency (years).....	10.0
Drainage Area (acres).....	0.41
C Coefficient.....	0.45
Time of Concentration (minutes).....	17.33

==========

PROGRAM RESULTS:

Rainfall Intensity computed using Multiple-Frequency I-D-F Curves.

Rainfall Intensity (inches per hr).....	7.19
Peak Flow Rate (cfs).....	1.3

==========

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9/14

RATIONAL METHOD ANALYSIS
RATIONAL METHOD RUNOFF COMPUTATIONS

March 13, 1991
25 YEAR STORM
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Storm Frequency (years).....	25.0
Drainage Area (acres).....	0.41
C Coefficient.....	0.45
Time of Concentration (minutes).....	17.33

==========

PROGRAM RESULTS:

Rainfall Intensity computed using Multiple-Frequency I-D-F Curves.

Rainfall Intensity (inches per hr).....	8.28
Peak Flow Rate (cfs).....	1.5

==========

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RATIONAL METHOD ANALYSIS
RATIONAL METHOD RUNOFF COMPUTATIONS

March 13, 1991
50 YEAR STORM
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Storm Frequency (years).....	50.0
Drainage Area (acres).....	0.41
C Coefficient.....	0.45
Time of Concentration (minutes).....	17.33

==========

PROGRAM RESULTS:

Rainfall Intensity computed using Multiple-Frequency I-D-F Curves.

Rainfall Intensity (inches per hr).....	9.11
Peak Flow Rate (cfs).....	1.7

==========

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RATIONAL METHOD ANALYSIS
RATIONAL METHOD RUNOFF COMPUTATIONS

March 13, 1991
100 YEAR STORM
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Storm Frequency (years).....	100.0
Drainage Area (acres).....	0.41
C Coefficient.....	0.45
Time of Concentration (minutes).....	17.33

==========

PROGRAM RESULTS:

Rainfall Intensity computed using Multiple-Frequency I-D-F Curves.

Rainfall Intensity (inches per hr).....	9.94
Peak Flow Rate (cfs).....	1.8

==========

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12/14

PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

March 13, 1991
PIPE FLOW CALCULATIONS (6" DIA.)
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Diameter (feet).....	0.50
FHWA Chart Number (1,2 or 3).....	1
Scale Number on Chart (Type of Culvert Entrance).....	1
Manning`s Roughness Coefficient (n-value).....	0.0130
Entrance Loss Coefficient of Culvert Opening.....	0.50
Culvert Length (feet).....	50.0
Culvert Slope (feet per foot).....	0.0100

==========

PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)	
1.0	0.00	1.37	2.17	0.50	0.47	0.47	5.20	2 YR
1.2	0.00	1.82	3.14	0.50	0.49	0.49	6.16	5 YR
1.3	0.00	2.08	3.68	0.50	0.49	0.49	6.65	10 YR
1.5	0.00	2.66	4.91	0.50	0.49	0.49	7.66	25 YR
1.7	0.00	3.32	6.31	0.50	0.50	0.50	8.67	50 YR
1.8	0.00	3.68	7.07	0.50	0.50	0.50	9.17	100 YR

==========

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NO GOOD TOO SMALL

PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

March 13, 1991
PIPE FLOW CALCUALTIONS (8" DIA.)
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Diameter (feet).....	0.67
FHWA Chart Number (1,2 or 3).....	1
Scale Number on Chart (Type of Culvert Entrance).....	1
Manning`s Roughness Coefficient (n-value).....	0.0130
Entrance Loss Coefficient of Culvert Opening.....	0.50
Culvert Length (feet).....	50.0
Culvert Slope (feet per foot).....	0.0100

==========

PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)	
1.0	0.00	0.77	0.59	0.46	0.48	0.46	3.87	2YR
1.2	0.00	0.91	0.84	0.54	0.52	0.54	3.96	5 YR
1.3	0.00	0.99	0.98	0.60	0.54	0.60	3.89	10 YR
1.5	0.00	1.17	1.29	0.67	0.57	0.57	4.68	25 YR
1.7	0.00	1.37	1.63	0.67	0.60	0.60	5.11	50 YR
1.8	0.00	1.49	1.82	0.67	0.61	0.61	5.34	100 YR

==========

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SET IN 1' DEEP BOX

GOOD FOR UP TO 10 YR STORM.

14/14

PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

March 13, 1991
PIPE FLOW CALCULATIONS (12" DIA.)
TEMPORARY DIKE DRAINS
BAILEY SITE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Diameter (feet).....	1.00
FHWA Chart Number (1,2 or 3).....	1
Scale Number on Chart (Type of Culvert Entrance).....	1
Manning`s Roughness Coefficient (n-value).....	0.0130
Entrance Loss Coefficient of Culvert Opening.....	0.50
Culvert Length (feet).....	50.0
Culvert Slope (feet per foot).....	0.0100

==========

PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)	
1.0	0.00	0.60	0.29	0.36	0.42	0.36	3.89	2 YR
1.2	0.00	0.66	0.34	0.40	0.46	0.40	4.10	5 YR
1.3	0.00	0.70	0.37	0.42	0.48	0.42	4.21	10 YR
1.5	0.00	0.76	0.43	0.45	0.52	0.45	4.34	25 YR
1.7	0.00	0.83	0.50	0.49	0.55	0.49	4.47	50 YR
1.8	0.00	0.86	0.53	0.50	0.57	0.50	4.54	100 YR

==========

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TOO LARGE

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 1 OF 2
JOB NO. 19559-042.12
DATE 4/15/91
PROJECT BAILEY
COMPUTED BY STEVE D.
SUBJECT FLOW IN STORM WATER HEADER
CHECKED BY GJS

PUMPING RATE TO EMPTY ACTIVE CELL

USE 7.5 INCH RAINFALL (ASSUME 100% RUNOFF)
THIS IS THE 5 YR - 24 HR STORM.

LARGEST AREA IS ON NORTH SIDE

900' X 100' = 90,000 S.F.

VOLUME OF WATER FROM STORM

$$90{,}000\ SF \left(\frac{7.5\ IN}{12\ \frac{IN}{FT}}\right) = 56{,}250\ CF \text{ OR } 420{,}800\ GAL$$

REMOVAL TIME

$$@\ 500\ GPM = 420{,}800\ GAL \left(\frac{1}{500\ \frac{GAL}{MIN}}\right)\left(\frac{1}{60\ \frac{MIN}{HR}}\right) = \underline{14.0\ HRS}$$

$$@\ 250\ GPM = 420{,}800 \left(\frac{1}{250}\right)\left(\frac{1}{60}\right) = \underline{28\ HRS}$$ O.K. ✓

250 GPM PROBABLY MIN. ACCEPTABLE FLOW RATE TO ALLOW CONTRACTOR TO CONTINUE AFTER BIG STORM

CHECK 100 YR STORM (13 INCHES)

$$90{,}000\ SF \left(\frac{13\ IN}{12\ \frac{IN}{FT}}\right) = 97{,}500\ CF \text{ OR } 729{,}350\ GAL$$

REMOVAL TIME

$$@\ 500\ GPM = 729{,}350\ GAL \left(\frac{1}{500}\right)\left(\frac{1}{60}\right) = 24.3\ HRS$$

$$@\ 250\ GPM = 729{,}350 \left(\frac{1}{250}\right)\left(\frac{1}{60}\right) = 49\ HRS.$$

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 2 OF 2
JOB NO. 19559.042.12
DATE 4/15/91
PROJECT BAILEY
COMPUTED BY STEVE D
SUBJECT FLOW IN STORM WATER HEADER
CHECKED BY GJA

MAX DISTANCE OF HEADER ON NORTH SIDE

APPROX 2100 FEET.

ADD 15% FOR VALVES AND BENDS

TOTAL LENGTH = 2100 (1.15) = 2415 L.F.

USE CAMERON HYDRAULIC MANUAL W/ C=100 TO

DETERMINE HEAD LOSS @ 500 G.P.M.

TRY 6" ϕ I.D. PIPE

VELOCITY = 5.68 FT/SEC

HEAD LOSS = 3.36 FT/100 FT

TOTAL HEAD LOSS = $2415\left(\frac{3.36}{100}\right)$ = 81.14 FT

TRY 8" ϕ I.D. PIPE

VELOCITY = 3.19 FT/SEC
HEAD LOSS = 0.828 FT/100 FT
TOTAL HEAD LOSS = $2415\left(\frac{.828}{100}\right)$ = 20 FT

DETERMINE HEAD LOSS @ 250 GPM

TRY 6" ϕ I.D. PIPE

VELOCITY = 2.84 FT/SEC

HEAD LOSS = 0.932 FT/100 FT

TOTAL HEAD LOSS = $2415\left(\frac{.932}{100}\right)$ = 22.5 FT. O.K.

∴ USE 6" PVC HEADER @ 250 GPM W/ 23 FT HEAD (MIN.)

HEAD LOSS WILL DECREASE AS ACTIVE AREAS MOVE TOWARDS THE HOLDING POND AND SECTIONS ARE REMOVED.

ELONGATION OF FLEXIBLE MEMBRANE LINER

Harding Lawson Associates
Engineering and Environmental Services

Comment # 23

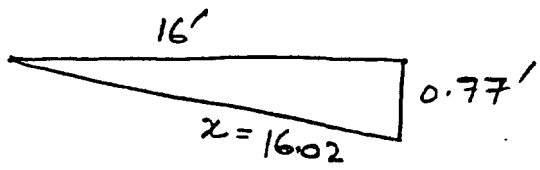
SHEET 1 OF 2
JOB NO. 19559.042.12
DATE 5/7/91
COMPUTED BY N. Khan
CHECKED BY

PROJECT Bailey disposal site.
SUBJECT Determination of elongation of FML.

Distance between location ② and location ③
Ref:- x-section analysed for settlement:

$x = 16$ ft

Differencial settlement b/w the two locations.
$= 0.77$ ft



$x = \sqrt{16^2 + 0.77^2}$

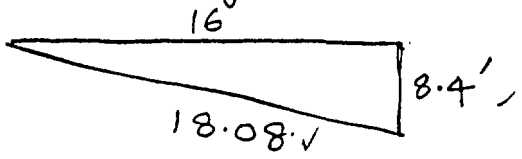
$x = 16.02$ ft ✓

% elongation of FML $= \dfrac{16.02 - 16}{16}$

$= 0.125\ \%$ ✓

Minimum elongation and yield
Ref ASTM D 638 speed C Type IV (2"/min)

To Determine the allowable differencial settlement at 13% elongation (at yield)



$\dfrac{x - 16}{16} = 0.13$

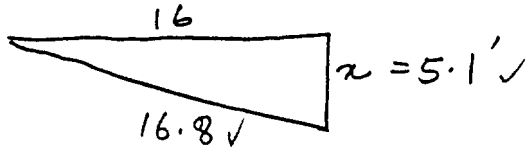
$x = 18.08'$ ✓

hypt $= \sqrt{\text{Base}^2 + \text{Perp}^2}$

$18.08^2 = 16^2 + x^2$

$x = 8.42'$

check at 5% elongation.



$x = 5.1'$

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 2 OF 2
JOB NO. 19559,042.12
DATE 5/7/91
COMPUTED BY N. Khan
CHECKED BY DY

PROJECT Bailey disposal Site
SUBJECT Elongation of FML

The elongation of FML, as calculated due to the max differencial settlement of 0.77 is about 0.13%.

whereas the elongation of FML at yield is 13% min, and elongation of FML at break is 700% min.

Therefore yielding of FML, due to the settlements calculated, is not of concern.

DETERMINATION OF SOIL PARAMETERS

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 1 OF 10
JOB NO. 19559.047.12
DATE 7/15/91
COMPUTED BY AAJ
CHECKED BY NK

PROJECT Bailey disposal site
SUBJECT Field data utilized to develop strength parameters

1- HLA borings.

Table showing subgrade pocket penetrometer value

BORING #	SUBGRADE (POCKET PEN) TSF
1	0.25
2	0.20
3	0.20
4	0.25
5	0.5 0.5
7	0.25 0.25
8	0.0
9	0.0 0.0
10	0.0
11	1.2 0.5
12	0.75 0.75
13	0.75 0.5 0
14	0.50
16	0.25
17	0.0
18	0.25
19	0.25

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Engineering
and
Environmental Services

SHEET 2 OF 10
JOB NO. 19559,047.12
DATE 7/15/91
COMPUTED BY AAJ
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PROJECT
SUBJECT

BORING #	SUBGRADE (POCKET PEN) (TSF)									
21	0.40	0.30	0.0	0.20	0.30					
22	1.0	0.90	0.30	0.40	1.0	0.70	0.50	0.20		
23	4.5+	3.30	1.50	0.80	0.0	0.40	0.80	0.30	0.70	0.40
24	2.70	1.90	0.70	0.80	0.30	0.20				
26	0.70	0.20	0.70	0.70	0.50	0.70	0.60			
27	0.0	0.80	0.25	0.25						
28	0.70	0.50	0.0	0.20	0.40					
29	0.40	0.20	0.30	0.40						
31	0.25	0.40	0.40	0.30	0.40					

TOTAL # OF VALUES = 78
(FROM BORINGS)

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 3 OF 10
JOB NO. 19559 047.12
DATE 7/15/91
COMPUTED BY AAJ
CHECKED BY NK

PROJECT
SUBJECT SUBGRADE STRENGTH DATA (FROM POCKET PEN)

HLA - TRENCHES

TRENCH #	SUBGRADE POCKET PEN (TSF)					
1	0.10	0.20				
2	0.40					
3	0.0					
5	0.25	0.25				
6	0.20					
7A	0.0	0.25				
7B	0.0	0.0				
8	1.5	0.25				
HLA-6	0.25					
HLA-20	4.5+	2.40	1.90	1.40	0.50	0.25

TOTAL # OF VALUES FROM TRENCH DATA = 20

AVERAGE OF 96 VALUES IGNORING 2 VALUES WITH 4.5+ STRENGTH

= 0.52 TSF

CONE PENETROMETER SUBGRADE DATA.

TABLE SHOWING UNDRAINED STRENGTH FROM CPT.

CPT #	SUBGRADE UNDRAINED STRENGTH SU (TSF)							
1	0.32	0.25	0.21	0.21	0.06	0.05	0.11	0.10
	0.09	0.04	0.09	0.08				
2	0.25	0.30	0.23	0.29	0.40	0.26	0.19	0.16
	0.10	0.15	0.13					
3	0.25	0.43	0.41	0.26	0.21	0.14	0.07	
	0.16	0.08	0.07					
4	0.22	0.30	0.16					
5	0.41	0.74	0.74	1.37	1.03	1.26	0.08	
	0.07							
6	0.63	0.51	0.44	0.38	0.51	0.46	0.36	
	0.29	0.31	0.21	0.47	0.27	0.13	0.13	
7	1.13	0.91	1.30	1.15	1.25	1.46	0.55	
	0.24	0.19	0.44	0.35	0.08			

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Engineering
and
Environmental Services

SHEET 5 OF 10
JOB NO. 19559.047.12
DATE 7/15/91
COMPUTED BY AAT
CHECKED BY NK

PROJECT
SUBJECT Cont from Pg 4

59

Table cont -:

CPT #	SUBGRADE UNDRAINED STRENGTH Su (TSF)						
8	0.27	0.40	1.88	0.62	0.45	0.48	0.29
	0.22	0.30	0.10	0.10			
9	0.40	0.26	0.19	0.21	0.15	0.10	0.26
	0.12	0.07	0.03				
10	0.22	0.20	0.11				
11	0.33						
11B	0.67	0.99					
11C	0.33						
12	0.45	0.80	0.31	0.21	0.54	0.64	0.13
	0.11	0.11	0.10	0.10	0.10		
14	0.39	0.22	0.25				
15	0.18	0.20	0.18	0.19	0.12	0.20	
	0.38	0.04	0.03				
16	0.14	0.16	0.32	0.32	0.05	0.05	0.28

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Engineering
and
Environmental Services

SHEET 6 OF 10
JOB NO. 19559 017.12
DATE 7/15/91
PROJECT
COMPUTED BY A-A J
SUBJECT Cont from Pg 5
CHECKED BY NIC

TOTAL # of Values = 129

SUM OF UNDRAINED STRENGTH = 1.61 + 2.46 + 2.08 + 0.68 +
5.7 + 5.1 + 9.05 + 5.11 + 1.79 + 0.53 + 0.33 +
1.66 + 0.33 + 3.6 + 0.86 + 1.52 + 1.32

⇒ 43.73 TSF

AVG. SUBGRADE STRENGTH (CPT) = 0.34 TSF

AVERAGE SUBGRADE "SU" VALUE FOR ANALYSES

Avg Pocket Penetrometer Reading for Subgrade.
= 0.52 TSF

From Laboratory Unconfined Compression Test Vs Pocket Pen. Line of Best Fit.
— P.P of 0.52 TSF Correspondonds to a qu Value of 420 psf

From CPT Su Avg data for Subgrade, Su_{avg} = 0.34 TSF

i.e $Su_{avg} = C_{avg}$ (cohesion) = 0.34 Tsf = 680 psf
25% reduction has been applied to 680 psf to account for the simplifying assumptions in the data interpretation

Now, Avg of P.P & CPT Su values

$$\Rightarrow \left[\frac{420}{2} + 510\right] \times \frac{1}{2}$$
$$= 360 \text{ psf}$$

USE $c = 300$ psf. for Stability Analyses
$\phi = 0$

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and
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SHEET 8 OF 10
JOB NO. 19559 047.12
DATE 7/15/91
COMPUTED BY AAJ
CHECKED BY NK

PROJECT
SUBJECT

LABORATORY STRENGTH DATA VS POCKET PEN DATA.

HLA BORING #	UNCONFINED COMPRESSION (psf)	POCKET PEN (TSF)
21	270	0.3
24	290	0.2
25	510	–
26	420	0.5
27	370	0.25
28	550	0.70
31	230	0.40
32	760	–

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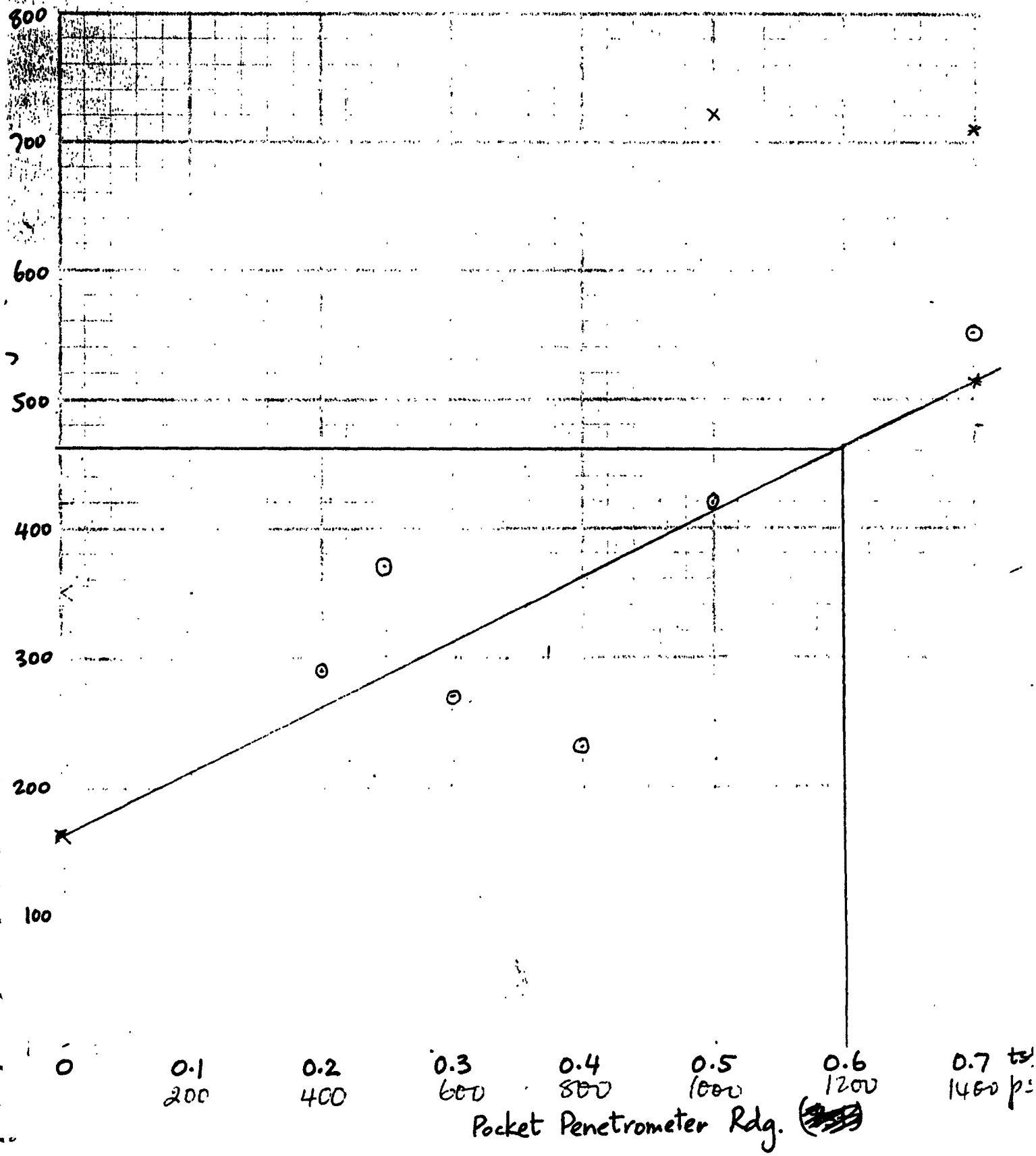
and
Environmental Services

SHEET 9 OF 10
JOB NO. 19557.047.12
DATE 3/91
COMPUTED BY AAJ
CHECKED BY NE

PROJECT BAILEY
SUBJECT Correlation between UC & PP data



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SHEET 10 OF 10
JOB NO. 19559,047.12
DATE
COMPUTED BY AAJ
CHECKED BY NK

PROJECT
SUBJECT

X Axis – Pocket Pen. Rdgs.

Y Axis – U C Strengths

0.50 712
0.80 828

X	Y	XY	X^2
0.70	712		
0.30	270	81	0.09
0.20	290	58	0.04
0.50	420	210	0.25
0.25	370	92.5	0.0625
0.70	550	385	0.49
0.40	230	92	0.16
		918.50 (3)	1.09 (6)

TO (1) $\Sigma X_i = 2.35$ $\Sigma Y = 2130$ (4) STO

(2) $\bar{X} = 0.392$ $\bar{Y} = 355$ (5)

Line of Best Fit $y = b_0 + b_1(x)$

$$b_0 = \frac{\Sigma y_i}{n} - b_1 \frac{\Sigma x_i}{n} = \bar{y} - b_1 \bar{x}$$

$$b_1 = \frac{n \Sigma x_i y_i - (\Sigma x_i)(\Sigma y_i)}{n \Sigma x_i^2 - (\Sigma x_i)^2}$$

$$= \frac{6(918.50) - 2.35 \times 2130}{6(1.09) - (2.35)^2} = 489.59$$

$$b_0 = \frac{2130}{6} - 489.59 \frac{2.35}{6}$$

$$= 355 - 191.76 = 163.24$$

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Engineering
and
Environmental Services

SHEET 1 OF 4
JOB NO. 19559,047.12
DATE 7/15/91
COMPUTED BY AAJ
CHECKED BY N.K

PROJECT
SUBJECT WASTE STRENGTH DATA FROM HLA BORINGS

TABLE SHOWING WASTE STRENGTH DATA

HLA BORINGS –

BORING #	WASTE (POCKET PEN) TSF				
1	0.0	0.0			
2	0.0	0.0			
3	0.0				
4	0.0	0.0	0.0	0.0	
5	0.25				
8	0.0				
13	1.5	2.5	0.5	0.5	
16	0.5	0.25			
21	4.5	2.9	1.5	0.7	0.25
25	4.5+	4.5+	2.8		
26	1.2	0.5	0.2		
27	4.5+				
28	1.0	1.75	0.40		
29	1.9	2.1	0.0		
31	1.9	0.0			

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 2 OF 4
JOB NO. 19559,047.12
DATE 7/15/91
COMPUTED BY AAJ
CHECKED BY NK

PROJECT
SUBJECT WASTE DATA / HLA TRENCHES.

HLA - TRENCHES.

TRENCH #	WASTE (POCKET PEN) TSF	
7B	0.0	
8	1.0	1.5
HLA-20	2.9	

AVERAGE OF 25 VALUES IGNORING 12 VALUES WITH STRENGTH > 1.5 = 0.47 TSF

11.75

Harding Lawson Associates
Engineering
and
Environmental Services

SHEET 3 OF 4
JOB NO. 19559,047.12
DATE 7/15/91
PROJECT
COMPUTED BY A.AJ
SUBJECT
CHECKED BY NK

CONE PENETROMETER DATA / WASTE STRENGTH

CPT #	WASTE UNDRAINED SHEAR STRENGTH (TSF)
1	1.10 0.57 0.71 0.47
2	0.68 0.44 0.30
3	0.85 0.78 0.49
4	1.93 0.92
5	0.39 0.92 1.30 1.08
6	2.62 1.33
7	0.97 1.07
8	1.1 0.97 0.78 0.66
9	0.99 0.92 0.47 0.65 0.59 0.54
10	1.87 0.79
11	0.34 0.30 0.23 0.19 0.14 0.82
11B	0.52 0.25 0.23 0.23 0.17
11C	0.46 0.40 0.30 0.16 0.17
12	1.8 1.52 0.53 1.72
14	1.41 0.59 0.58

TOTAL VALUES = 55

AVERAGE OF 49 VALUES - IGNORING 6 VALUES >1.5

$\Rightarrow 30.85/49 = 0.63$ TSF

AVERAGE Su VALUES FROM POCKET PEN AND CPT DATA FOR THE WASTE

25% reduction in the CPT Su strength is applied to account for the simplifying assumptions in the data interpretation $\Rightarrow 0.75 \times 0.63 = 0.47$ TSF

Average undrained strength due to pocket pen and CPT

$$Su = c\,[\text{cohesion}] = \left[\frac{470}{2} + 940\right] \times \frac{1}{2}$$

$$= 587 \approx 585 \text{ psf.}$$

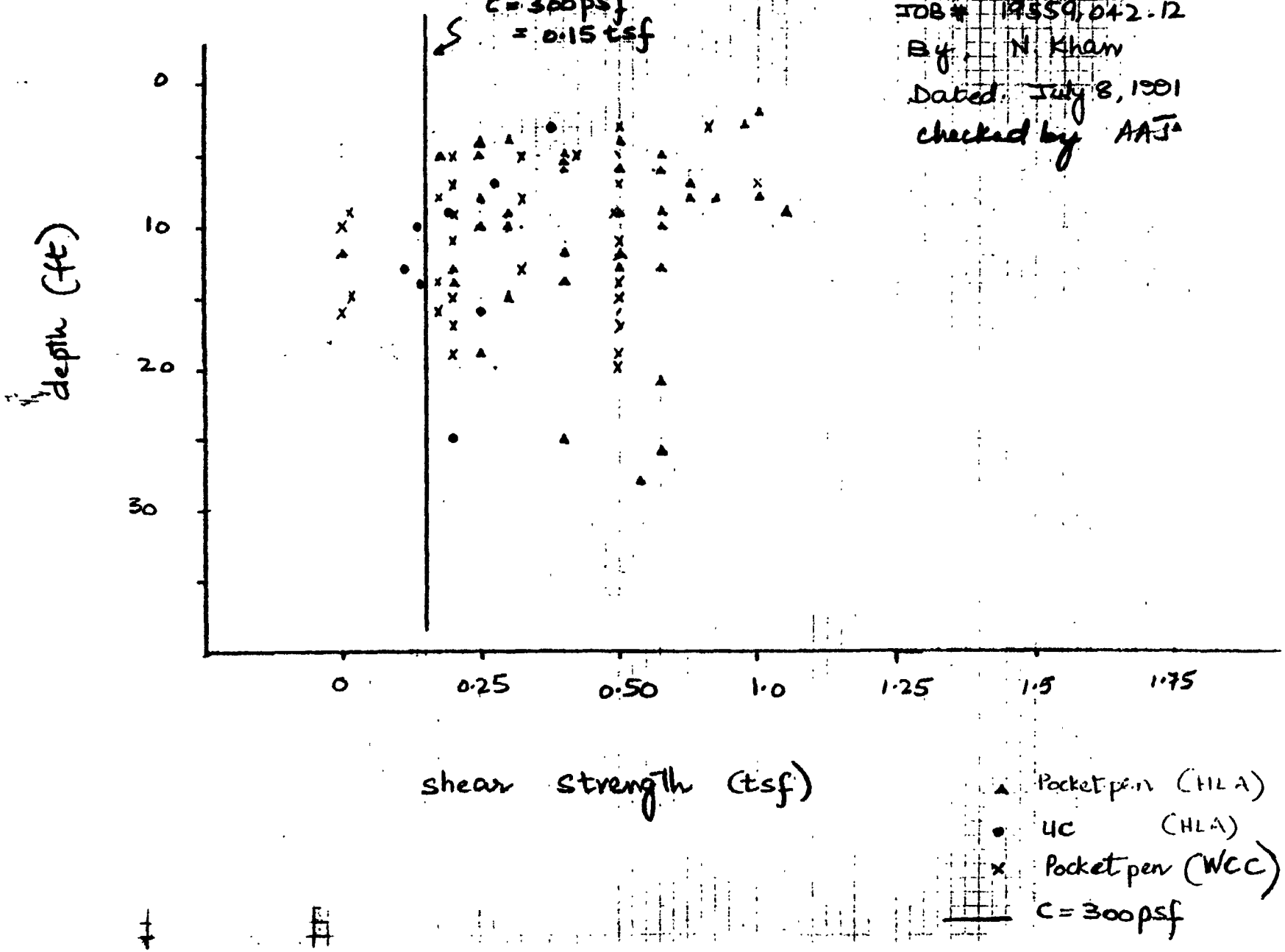
For stability analyses use cohesion for Unstabilized waste same as the soft subgrade.

ie $c = 300$ psf.

& $\phi = 0$

GRAPHICAL REPRESENTATION OF STRENGTH DATA

BAILEY DISPOSAL SITE
JOB # 19559.042.12
By: N. Khan
Dated: July 8, 1991
checked by AAJ



REMEDIAL DESIGN
WATER QUALITY SAMPLING
MW-8 AND POND A

ANALYTICAL RESULTS

SUPERNATANT FROM SOIL/WATER MIXTURE AT 5:1 RATIO

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-01A
Invoice #: 404930
Report Date: 11/21/91

Project # 19559,045.12
MW-8
Water
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:08:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Silver total METHOD 272.2	ND mg/L	0.0003	11/13/91	WFL
Arsenic total METHOD 206.2	0.006 mg/L	0.006	11/13/91	WFL
Calcium total METHOD 6010	981 mg/L	6	11/19/91	DQ
Cadmium total METHOD 6010	0.037 mg/L	0.009	11/20/91	DQ
Chromium total METHOD 6010	0.09 mg/L	0.02	11/15/91	DQ
Mercury, total METHOD_245.1	ND mg/L	0.002	11/13/91	DAO
Lead, Total METHOD 239.2	0.027 mg/L	0.006	11/12/91	WFL
Acid Digestion-Total EPA 4.1.3 G	Complete		11/08/91	PB
Acid Digestion-Total EPA 4.1.3 P	Complete		11/10/91	PB/CG
Selenium total METHOD 270.2	ND mg/L	0.06	11/15/91	WFL

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-01C
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
MW-8
Water
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:08:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Oil and Grease METHOD 413.1	324 mg/L	1	11/07/91	FM/SG
Volume	1000 ml		11/07/91	FM/SG

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

ORGANICS ANALYSIS DATA SHEET

Laboratory Name:	SPL Houston	Concentration:	LOW	Date Extracted:	11/08/91
Lab Sample ID:	F11108901D	Sample Matrix:	WATER	Date Analyzed:	11/12/91
Client Sample ID:	MW-8	Percent Moisture:		Dilution Factor:	50

PENTACHLOROPHENOL

CAS Number		ug/L	CAS Number		ug/L
87-86-5	Pentachlorophenol	2500 <	85-01-8	Phenanthrene	500 <

The Lab ID for data on this page is B108901.

< - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-01F
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
MW-8
Water
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:08:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Organic Carbon Total METHOD 415.2	7920 mg/L	200	11/08/91	EPM

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-01G
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
MW-8
Water
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:08:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
pH METHOD 150.1	5.42 pH units		11/07/91	KEW

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Jo Gail Simmons

F111433-01A
Invoice #: 405040
Report Date: 11/27/91

19559,045.12
MW-8 5:1 Dilution
Harding Lawson
Bailey Site
Orange, Texas

Date Received: 11/26/91
Date Collected: 11/03/91 14:00:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Total Dissolved Solids METHOD 160.1	21053 mg/L	1	11/26/91	KEW

SPL ENVIRONMENTAL LABORATORIES, INC.

ANALYTICAL RESULTS

SUPERNATANT FROM WATER/SOIL MIXTURE AT 10:1 RATIO

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-01E
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
MW-8 § 10:1 Water Soil
Water
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:08:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Total Dissolved Solids METHOD 160.1	20697 mg/L	1	11/12/91	MGV

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

ANALYTICAL RESULTS

MONITOR WELL 8

SPL

ANALYTICAL RESULTS

Volatile Organics by USEPA Method 8240

Client ID:	MW-8 19559,045.12	Matrix:	WATER	Received:	06-Nov-91
SPL ID:	P11108901AB	Dilution:	10	Extracted:	**********
Analyst:	JC	% Moisture:	NA	Analyzed:	16-Nov-91
		Level:	LOW		

Compound	Concentration, ug/L Amount	MDL
Acetone	430	100
Benzene	290	50
Bromodichloromethane	ND	50
Bromoform	ND	50
Bromomethane	ND	100
2-Butanone	ND	200
Carbon Disulfide	ND	50
Carbon Tetrachloride	ND	50
Chlorobenzene	ND	50
Chloroethane	ND	100
2-Chloroethylvinylether	ND	100
Chloroform	ND	50
Chloromethane	ND	100
Dibromochloromethane	ND	50
1,1-Dichloroethane	ND	50
1,2-Dichloroethane	ND	50
1,1-Dichloroethene	ND	50
Trans-1,2-Dichloroethene	93	50
1,2-Dichloropropane	ND	50
Cis-1,3-Dichloropropene	ND	50
Trans-1,3-Dichloropropene	ND	50
Ethylbenzene	1600	50
2-Hexanone	130	100
4-Methyl-2-Pentanone	ND	100
Methylene Chloride	63	50
Styrene	1600	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	50
Toluene	110	50
1,1,1-Trichloroethane	ND	50
1,1,2-Trichloroethane	ND	50
Trichloroethene	68	50
Trichlorofluoromethane	ND	50
Vinyl Acetate	ND	100
Vinyl Chloride	ND	100
Total Xylenes	ND	50

SURROGATES	
1,2-Dichloroethane-D4	83% Recovery
Toluene-D8	109% Recovery
4-Bromofluorobenzene	87% Recovery

ND-Not Detected. MDL-Method detection limit.

ANALYTICAL RESULTS

SOIL FROM SAMPLE AREA 4

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-02A
Invoice #: 404930
Report Date: 11/21/91

Project # 19559,045.12
Area 4
Soil
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:30:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Silver total METHOD 7761	0.22 mg/L	0.04	11/13/91	WFL
Arsenic total METHOD 7060	28 mg/Kg	8	11/13/91	WFL
Calcium total METHOD 6010	3430 mg/Kg	70	11/19/91	DQ
Cadmium total METHOD 6010	4 mg/Kg	1	11/20/91	DQ
Chromium total METHOD 6010	23 mg/Kg	2	11/18/91	DQ
Mercury, Total METHOD_7471	ND mg/Kg	0.4	11/19/91	JM
Moisture, E.P.A. CLP SOW	19 wt. %	19	11/07/91	KEW
Acid Digestion-Solid,GF METHOD 3050	Complete		11/08/91	PB
Acid Digestion-Solid,ICP METHOD 3050	Complete		11/09/91	PB
Lead, Total METHOD 7421	11.6 mg/Kg	0.8	11/12/91	WFL
Selenium, Total METHOD 7740	ND mg/Kg	0.8	11/11/91	WFL

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-02B
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
Area 4
Soil
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:30:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Oil and Grease METHOD 413.2	370 mg/Kg	10	11/07/91	LB

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-02C
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
Area 4
Soil
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:30:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
Total Organic Carbon METHOD 9060	4380 mg/Kg	100	11/12/91	ALRS

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

Harding Lawson Associates
9800 Richmond Suite # 150
Houston, Texas 77042
Attn: Steve Delhomme

F111089-02D
Invoice #: 404930
Report Date: 11/20/91

Project # 19559,045.12
Area 4
Soil
Bailey Site - Orange, TX

Date Received: 11/06/91
Date Collected: 11/03/91 14:30:00

Test Name Method	Result Units	Detection Limit	Date Started	Analyst
pH METHOD 9045	7.63 pH units		11/07/91	KEW

ND = Parameter analyzed for but not detected. The reported limit is the minimum attainable detection limit for the sample.

SPL ENVIRONMENTAL LABORATORIES, INC.

K E Y S T O N E L A B - H O U S T O N

Reported on 25-MAR-1991 at 15:40.

SAMPLE ID : H91-03.106-002
SAMPLE NAME: SW-2

DATE COLLECTED: 14-MAR-1991
DATE RECEIVED : 15-MAR-1991

SAMPLING POINT:
MATRIX : WATER

Component name	Result	Units
CONVENTIONAL CHEMISTRIES		
BOD (5 day)	8.0	mg/L
Chemical Oxygen Demand	40.0	mg/L
Oil and Grease	<1.0	mg/L
pH	7.34	pH units
Total Dissolved Solids	590	mg/L
Total Suspended Solids	140	mg/L

K E Y S T O N E L A B - H O U S T O N

Reported on 25-MAR-1991 at 15:40.

SAMPLE ID : H91-03.106-003
SAMPLE NAME: SW-1

DATE COLLECTED: 14-MAR-1991
DATE RECEIVED : 15-MAR-1991

SAMPLING POINT:
MATRIX : WATER

Component name	Result	Units
METALS		
Silver	<5.0	ug/L
Arsenic	<36.0	ug/L
Beryllium	<1.0	ug/L
Cadmium	<5.0	ug/L
Chromium	14.0	ug/L
Copper	11.0	ug/L
Mercury	<0.2	ug/L
Nickel	<20.0	ug/L
Lead	<49.0	ug/L
Antimony	<24.0	ug/L
Selenium	<49.0	ug/L
Thallium	<110	ug/L
Zinc	66.0	ug/L

KEYSTONE DC # ---- 8

INST ID: 4020

SAMPLE NUMBER: SW-1

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.
LAB SAMPLE ID NO.: 910310603
SAMPLE MATRIX: WATER
DATA RELEASE AUTHORIZED BY:

CASE NO.: ---
INITIAL CALIBRATION DATE: 03/13/91
CONTRACT NO.: --
DATE SAMPLE RECEIVED: 03/15/91

VOLATILES

CONCENTRATION: LOW
DATE ANALYZED: 03/19/91

DATAFILE: RU03106V03
DILUTION FACTOR: 1.00

	COMPOUND	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C010	CHLOROMETHANE	10 U	
C015	BROMOMETHANE	10 U	
C020	VINYL CHLORIDE	10 U	
C025	CHLOROETHANE	10 U	
C030	METHYLENE CHLORIDE	5 U	
C045	1,1-DICHLOROETHENE	5 U	
C050	1,1-DICHLOROETHANE	5 U	
C053	1,2-DICHLOROETHENE (TOTAL)	5 U	
C060	CHLOROFORM	5 U	
C065	1,2-DICHLOROETHANE	5 U	
C115	1,1,1-TRICHLOROETHANE	5 U	
C120	CARBON TETRACHLORIDE	5 U	
C130	BROMODICHLOROMETHANE	5 U	
C140	1,2-DICHLOROPROPANE	5 U	
C143	CIS-1,3-DICHLOROPROPENE	5 U	
C150	TRICHLOROETHENE	5 U	
C155	DIBROMOCHLOROMETHANE	5 U	
C160	1,1,2-TRICHLOROETHANE	5 U	
C165	BENZENE	5 U	
C172	TRANS-1,3-DICHLOROPROPENE	5 U	
C175	2-CHLOROETHYLVINYLETHER	10 U	
C180	BROMOFORM	5 U	
C220	TETRACHLOROETHENE	5 U	
C225	1,1,2,2-TETRACHLOROETHANE	5 U	
C230	TOLUENE	5 U	
C235	CHLOROBENZENE	5 U	
C240	ETHYLBENZENE	5 U	
C265	TRICHLOROFLUOROMETHANE	10 U	
C275	ACRYLONITRILE	10 U	
C360	ACROLEIN	100 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

KEYSTONE DC # ---- 8

INST ID: 4530 SAMPLE NUMBER: SW-1

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE
LAB SAMPLE ID NO.: 910310603
SAMPLE MATRIX: WATER
DATA RELEASE AUTHORIZED BY: RG

CASE NO.: ---
QC REPORT NO.: 03/18/91
CONTRACT NO.: --
DATE SAMPLE RECEIVED: 03/15/91

SEMIVOLATILES

CONCENTRATION: LOW
DATE EXTRACTED: 03/16/91
DATE ANALYZED: 03/19/91

DATAFILE: 4U03106C03A
DILUTION FACTOR: 2.0

	COMPOUND	NPDES #	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C315	PHENOL	10A	20 U	
C325	BIS(2-CHLOROETHYL)ETHER	11B	20 U	
C330	2-CHLOROPHENOL	1A	20 U	
C335	1,3-DICHLOROBENZENE	21B	20 U	
C340	1,4-DICHLOROBENZENE	22B	20 U	
C350	1,2-DICHLOROBENZENE	20B	20 U	
C360	BIS(2-CHLOROISOPROPYL)ETHER	12B	20 U	
C370	N-NITROSODIPROPYLAMINE	42B	20 U	
C375	HEXACHLOROETHANE	36B	20 U	
C410	NITROBENZENE	40B	20 U	
C415	ISOPHORONE	38B	20 U	
C420	2-NITROPHENOL	6A	20 U	
C425	2,4-DIMETHYLPHENOL	3A	20 U	
C435	BIS(2-CHLOROETHOXY)METHANE	10B	20 U	
C440	2,4-DICHLOROPHENOL	2A	20 U	
C445	1,2,4-TRICHLOROBENZENE	46B	20 U	
C450	NAPHTHALENE	39B	20 U	
C460	HEXACHLOROBUTADIENE	34B	20 U	
C465	P-CHLORO-M-CRESOL	8A	20 U	
C510	HEXACHLOROCYCLOPENTADIENE	35B	20 U	
C515	2,4,6-TRICHLOROPHENOL	11A	20 U	
C525	2-CHLORONAPHTHALENE	16B	20 U	
C535	DIMETHYL PHTHALATE	25B	20 U	
C540	ACENAPHTHYLENE	2B	20 U	
C550	ACENAPHTHENE	1B	20 U	
C555	2,4-DINITROPHENOL	5A	100 U	
C560	4-NITROPHENOL	7A	100 U	
C570	2,4-DINITROTOLUENE	27B	20 U	
C543	2,6-DINITROTOLUENE	28B	20 U	
C580	DIETHYL PHTHALATE	24B	20 U	
C585	4-CHLOROPHENYL PHENYL ETHER	17B	20 U	
C590	FLUORENE	32B	20 U	
C610	4,6-DINITRO-2-METHYLPHENOL	4A	100 U	
C615	N-NITROSODIPHENYLAMINE	43B	20 U	
C625	4-BROMOPHENYL PHENYL ETHER	14B	20 U	
C630	HEXACHLOROBENZENE	33B	20 U	
C635	PENTACHLOROPHENOL	9A	100 U	
C640	PHENANTHRENE	44B	20 U	
C645	ANTHRACENE	3B	20 U	

KEYSTONE DC # ---- 8

SAMPLE NUMBER: SW-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 4U03106C03A

	COMPOUND	NPDES #	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C650	DI-N-BUTYL PHTHALATE	26B	20 U	
C655	FLUORANTHENE	31B	20 U	
C715	PYRENE	45B	20 U	
C720	BUTYL BENZYL PHTHALATE	15B	20 U	
C725	3,3'-DICHLOROBENZIDINE	23B	40 U	
C730	BENZO(A)ANTHRACENE	5B	20 U	
C745	BIS(2-ETHYLHEXYL)PHTHALATE	13B	20 U	
C740	CHRYSENE	18B	20 U	
C760	DI-N-OCTYL PHTHALATE	29B	20 U	
C765	BENZO(B)FLUORANTHENE	7B	20 U	
C770	BENZO(K)FLUORANTHENE	9B	20 U	
C775	BENZO(A)PYRENE	6B	20 U	
C780	INDENO(1,2,3-CD)PYRENE	37B	20 U	
C785	DIBENZO(A,H)ANTHRACENE	19B	20 U	
C790	BENZO(GHI)PERYLENE	8B	20 U	
C310	N-NITROSODIMETHYLAMINE	41B	20 U	
C710	BENZIDINE	4B	200 U	
C620	1,2-DIPHENYL-HYDRAZINE	30B	20 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

INST ID: 4020 SAMPLE NUMBER: MW-8

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.
LAB SAMPLE ID NO.: 910310604
SAMPLE MATRIX: WATER
DATA RELEASE AUTHORIZED BY: .....

CASE NO.: ---
INITIAL CALIBRATION DATE: 03/13/91
CONTRACT NO.: --
DATE SAMPLE RECEIVED: 03/15/91

VOLATILES

CONCENTRATION: LOW
DATE ANALYZED: 03/19/91

DATAFILE: RU03106V04
DILUTION FACTOR: 10.00

	COMPOUND	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C010	CHLOROMETHANE	100 U	
C015	BROMOMETHANE	100 U	
C020	VINYL CHLORIDE	100 U	
C025	CHLOROETHANE	100 U	
C030	METHYLENE CHLORIDE	50 U	
C045	1,1-DICHLOROETHENE	50 U	
C050	1,1-DICHLOROETHANE	50 U	
C053	1,2-DICHLOROETHENE (TOTAL)	50 U	
C060	CHLOROFORM	50 U	
C065	1,2-DICHLOROETHANE	50	39 J
C115	1,1,1-TRICHLOROETHANE	50 U	
C120	CARBON TETRACHLORIDE	50 U	
C130	BROMODICHLOROMETHANE	50 U	
C140	1,2-DICHLOROPROPANE	50 U	
C143	CIS-1,3-DICHLOROPROPENE	50 U	
C150	TRICHLOROETHENE	50	81
C155	DIBROMOCHLOROMETHANE	50 U	
C160	1,1,2-TRICHLOROETHANE	50 U	
C165	BENZENE	50	290
C172	TRANS-1,3-DICHLOROPROPENE	50 U	
C175	2-CHLOROETHYLVINYLETHER	100 U	
C180	BROMOFORM	50 U	
C220	TETRACHLOROETHENE	50 U	
C225	1,1,2,2-TETRACHLOROETHANE	50 U	
C230	TOLUENE	50	110
C235	CHLOROBENZENE	50 U	
C240	ETHYLBENZENE	50	2200
C265	TRICHLOROFLUOROMETHANE	100 U	
C275	ACRYLONITRILE	100 U	
C360	ACROLEIN	1000 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

KEYSTONE DC # ---- 8

SAMPLE NUMBER: MW-8

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 4U03106C04A

	COMPOUND	NPDES #	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C650	DI-N-BUTYL PHTHALATE	26B	3000	U
C655	FLUORANTHENE	31B	3000	U
C715	PYRENE	45B	3000	U
C720	BUTYL BENZYL PHTHALATE	15B	3000	U
C725	3,3'-DICHLOROBENZIDINE	23B	6000	U
C730	BENZO(A)ANTHRACENE	5B	3000	U
C745	BIS(2-ETHYLHEXYL)PHTHALATE	13B	3000	U
C740	CHRYSENE	18B	3000	U
C760	DI-N-OCTYL PHTHALATE	29B	3000	U
C765	BENZO(B)FLUORANTHENE	7B	3000	U
C770	BENZO(K)FLUORANTHENE	9B	3000	U
C775	BENZO(A)PYRENE	6B	3000	U
C780	INDENO(1,2,3-CD)PYRENE	37B	3000	U
C785	DIBENZO(A,H)ANTHRACENE	19B	3000	U
C790	BENZO(GHI)PERYLENE	8B	3000	U
C310	N-NITROSODIMETHYLAMINE	41B	3000	U
C710	BENZIDINE	4B	30000	U
C620	1,2-DIPHENYL-HYDRAZINE	30B	3000	U

U = UNDETECTED AT THE LISTED DETECTION LIMIT
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

K E Y S T O N E L A B - H O U S T O N

Reported on 25-MAR-1991 at 15:40.

SAMPLE ID : H91-03.106-001
SAMPLE NAME: LAB BLANK

DATE COLLECTED: 14-MAR-1991
DATE RECEIVED : 15-MAR-1991

SAMPLING POINT: QA_QC
MATRIX : WATER

Component name	Result	Units
METALS		
Silver	<5.0	ug/L
Arsenic	<36.0	ug/L
Beryllium	<1.0	ug/L
Cadmium	<5.0	ug/L
Chromium	<5.0	ug/L
Copper	4.8	ug/L
Mercury	<0.2	ug/L
Nickel	<20.0	ug/L
Lead	<49.0	ug/L
Antimony	<24.0	ug/L
Selenium	<49.0	ug/L
Thallium	<110	ug/L
Zinc	<3.0	ug/L
CONVENTIONAL CHEMISTRIES		
BOD (5 day)	0.92	mg/L
Chemical Oxygen Demand	<20.0	mg/L
Oil and Grease	<1.0	mg/L
pH	6.12	pH units
Total Dissolved Solids	<10	mg/L
Total Suspended Solids	<10	mg/L

KEYSTONE DC # ---- 8

INST ID: 4020

SAMPLE NUMBER: VBLK

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.
LAB SAMPLE ID NO.: 91---
SAMPLE MATRIX: WATER
DATA RELEASE AUTHORIZED BY:

CASE NO.: ---
INITIAL CALIBRATION DATE: 03/13/91
CONTRACT NO.: --
DATE SAMPLE RECEIVED: ---

VOLATILES

CONCENTRATION: LOW
DATE ANALYZED: 03/19/91

DATAFILE: RB0319V01
DILUTION FACTOR: 1.00

	COMPOUND	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C010	CHLOROMETHANE	10 U	
C015	BROMOMETHANE	10 U	
C020	VINYL CHLORIDE	10 U	
C025	CHLOROETHANE	10 U	
C030	METHYLENE CHLORIDE	5 U	
C045	1,1-DICHLOROETHENE	5 U	
C050	1,1-DICHLOROETHANE	5 U	
C053	1,2-DICHLOROETHENE (TOTAL)	5 U	
C060	CHLOROFORM	5 U	
C065	1,2-DICHLOROETHANE	5 U	
C115	1,1,1-TRICHLOROETHANE	5 U	
C120	CARBON TETRACHLORIDE	5 U	
C130	BROMODICHLOROMETHANE	5 U	
C140	1,2-DICHLOROPROPANE	5 U	
C143	CIS-1,3-DICHLOROPROPENE	5 U	
C150	TRICHLOROETHENE	5 U	
C155	DIBROMOCHLOROMETHANE	5 U	
C160	1,1,2-TRICHLOROETHANE	5 U	
C165	BENZENE	5 U	
C172	TRANS-1,3-DICHLOROPROPENE	5 U	
C175	2-CHLOROETHYLVINYLETHER	10 U	
C180	BROMOFORM	5 U	
C220	TETRACHLOROETHENE	5 U	
C225	1,1,2,2-TETRACHLOROETHANE	5 U	
C230	TOLUENE	5 U	
C235	CHLOROBENZENE	5 U	
C240	ETHYLBENZENE	5 U	
C265	TRICHLOROFLUOROMETHANE	10 U	
C275	ACRYLONITRILE	10 U	
C360	ACROLEIN	100 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

KEYSTONE DC # ---- 8

INST ID: 4530 SAMPLE NUMBER: SBLK

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE
LAB SAMPLE ID NO.: 91--
SAMPLE MATRIX: WATER
DATA RELEASE AUTHORIZED BY: ...

CASE NO.: ---
QC REPORT NO.: 03/18/91
CONTRACT NO.: --
DATE SAMPLE RECEIVED: .....

SEMIVOLATILES

CONCENTRATION: LOW
DATE EXTRACTED: ....03/16/91...
DATE ANALYZED: 03/19/91

DATAFILE: 4B0316C01A
DILUTION FACTOR: .....1.0...

	COMPOUND	NPDES #	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C315	PHENOL	10A	10 U	
C325	BIS(2-CHLOROETHYL)ETHER	11B	10 U	
C330	2-CHLOROPHENOL	1A	10 U	
C335	1,3-DICHLOROBENZENE	21B	10 U	
C340	1,4-DICHLOROBENZENE	22B	10 U	
C350	1,2-DICHLOROBENZENE	20B	10 U	
C360	BIS(2-CHLOROISOPROPYL)ETHER	12B	10 U	
C370	N-NITROSODIPROPYLAMINE	42B	10 U	
C375	HEXACHLOROETHANE	36B	10 U	
C410	NITROBENZENE	40B	10 U	
C415	ISOPHORONE	38B	10 U	
C420	2-NITROPHENOL	6A	10 U	
C425	2,4-DIMETHYLPHENOL	3A	10 U	
C435	BIS(2-CHLOROETHOXY)METHANE	10B	10 U	
C440	2,4-DICHLOROPHENOL	2A	10 U	
C445	1,2,4-TRICHLOROBENZENE	46B	10 U	
C450	NAPHTHALENE	39B	10 U	
C460	HEXACHLOROBUTADIENE	34B	10 U	
C465	P-CHLORO-M-CRESOL	8A	10 U	
C510	HEXACHLOROCYCLOPENTADIENE	35B	10 U	
C515	2,4,6-TRICHLOROPHENOL	11A	10 U	
C525	2-CHLORONAPHTHALENE	16B	10 U	
C535	DIMETHYL PHTHALATE	25B	10 U	
C540	ACENAPHTHYLENE	2B	10 U	
C550	ACENAPHTHENE	1B	10 U	
C555	2,4-DINITROPHENOL	5A	50 U	
C560	4-NITROPHENOL	7A	50 U	
C570	2,4-DINITROTOLUENE	27B	10 U	
C543	2,6-DINITROTOLUENE	28B	10 U	
C580	DIETHYL PHTHALATE	24B	10 U	
C585	4-CHLOROPHENYL PHENYL ETHER	17B	10 U	
C590	FLUORENE	32B	10 U	
C610	4,6-DINITRO-2-METHYLPHENOL	4A	50 U	
C615	N-NITROSODIPHENYLAMINE	43B	10 U	
C625	4-BROMOPHENYL PHENYL ETHER	14B	10 U	
C630	HEXACHLOROBENZENE	33B	10 U	
C635	PENTACHLOROPHENOL	9A	50 U	
C640	PHENANTHRENE	44B	10 U	
C645	ANTHRACENE	3B	10 U	

KEYSTONE DC # ---- 8

SAMPLE NUMBER: SBLK

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 4B0316C01A

	COMPOUND	NPDES #	DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND (MICROGRAMS / LITER)
C650	DI-N-BUTYL PHTHALATE	26B	10 U	
C655	FLUORANTHENE	31B	10 U	
C715	PYRENE	45B	10 U	
C720	BUTYL BENZYL PHTHALATE	15B	10 U	
C725	3,3'-DICHLOROBENZIDINE	23B	20 U	
C730	BENZO(A)ANTHRACENE	5B	10 U	
C745	BIS(2-ETHYLHEXYL)PHTHALATE	13B	10 U	
C740	CHRYSENE	18B	10 U	
C760	DI-N-OCTYL PHTHALATE	29B	10 U	
C765	BENZO(B)FLUORANTHENE	7B	10 U	
C770	BENZO(K)FLUORANTHENE	9B	10 U	
C775	BENZO(A)PYRENE	6B	10 U	
C780	INDENO(1,2,3-CD)PYRENE	37B	10 U	
C785	DIBENZO(A,H)ANTHRACENE	19B	10 U	
C790	BENZO(GHI)PERYLENE	8B	10 U	
C310	N-NITROSODIMETHYLAMINE	41B	10 U	
C710	BENZIDINE	4B	100 U	
C620	1,2-DIPHENYL-HYDRAZINE	30B	10 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

Harding Lawson Associates
9800 Richmond Avenue, Suite 150
Houston, Texas 77042
713/789-8050
Telecopy: 713/789-1029

CHAIN OF CUSTODY FORM

Lab: Keystone

Samplers: MARK K WESTCOTT

Job Number: 19559.040.12

Name/Location: Bailey

Project Manager: Steve Del'Homme

Recorder: Mark K Westcott (Signature Required)

SOURCE CODE		MATRIX: Water	Sediment	Soil	Oil		#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	ICE		HCL	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene	Total Petrol. Hydrocarb.	Oil & Gas	COD	BOD	TDS, TSS, PH	Semi Volat.	VOA	metals			
1	7	X						X					91	00	0001	91	03	14	1315	SW-2 1 Amber								X								
1	7	X						X					91	00	0002	91	03	14	1315	SW-2 1 Amber									X							
1	7	X								X			91	00	0003	91	03	14	1315	SW-2 1 plastic										X						
1	7	X								X			91	00	0004	91	03	14	1315	SW-2 1 plastic											X					
1	7	X								2			91	00	0005	91	03	14	1540	SW-1 2 Amber												X				
1	7	X								2		X	91	00	0006	91	03	14	1540	SW-1 2 VOA													X			
1	7	X							X				91	00	0007	91	03	14	1540	SW-1 1 plastic														X		
2	3	X								2		X	91	00	0008	91	03	14	1710	MW-8 2 VOA *													X			
2	3	X								2			91	00	0009	91	03	14	1710	MW-8 2 Amber *												X				
2	3	X								X			91	00	0010	91	03	14	1710	MW-8 1 plastic *														X		

*- Level C

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
Mark K Westcott	13 Sys Richard Eli	3/15/91 4:15pm.
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
METHOD OF SHIPMENT		

Laboratory Copy White · Project Office Copy Yellow · Field or Office Copy Pink

6533

Harding Lawson Associates
9800 Richmond Avenue, Suite 150
Houston, Texas 77042
713/789-8050
Telecopy: 713/789-1029

CHAIN OF CUSTODY FORM

Lab: Keystone

Samplers: MARK K WESTCOTT

Job Number: 19559.040.12

Name/Location: Bailey

Project Manager: Steve Del Homme

Recorder: Mark K Westcott (Signature Required)

SOURCE CODE	MATRIX: Water	MATRIX: Sediment	MATRIX: Soil	MATRIX: Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	Ice	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene	Total Petrol. Hydrocarb.	Semi Volat.
23	X							X	91	00	0009	91	03	14	1710	MW-8 * 1 Amber								X

* Level C

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
Mark K Westcott	Richard Eti	3/14/91 5:15
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
METHOD OF SHIPMENT		

Laboratory Copy White — Project Office Copy Yellow — Field or Office Copy Pink

6533

APPENDIX B

SLOPE STABILITY ANALYSES

Case	Description	Factor of Safety
1	Short term with unstabilized waste in place, water at the dike crest, without truck load. One layer of geogrid installed	1.38 (inboard)

CASE 1

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        124.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      88.
9.        135.      86.5
10.       182.      88.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      88.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       131.      90.
24.       163.      92.
25.       151.2     98.
26.       147.      88.
27.       177.      90.
999.
9.
1.        2.        2.
2.        23.       6.
23.       3.        1.
3.        4.        1.
4.        27.       1.
27.       10.       6.
10.       8.        3.
8.        16.       1.
16.       17.       1.
10.       6.        2.
6.        7.        2.
7.        8.        2.
23.       27.       6.
2.        9.        2.
9.        26.       2.
26.       10.       2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .073      .3        0.        1.1       0.6
4.        .11       .5        0.        1.1       0.0
5.        .00001    1.        0.        1.1       0.0
6.        .125      0.        34.       1.1       0.9
99.
4.        0.        0.0624
50.       98.
148.      98.
160.      56.
286.      56.
```

- Validity of data
- Reasonableness of Result

Checked by N. Khan
Date 8/9/91

Case 1

```
0.
0.      1.      0.      .05
90.0    131.5   176.    3.52    1.      1.5
20.
56.5
76.5
20.
SEARCH
175.    110.    20.     20.
```

Case 1

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-05-1991
TIME 15:15

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	162.00	98.00	.0000	1	*
5	162.00	98.00	177.00	90.00	-.5333	1	*
6	177.00	90.00	182.00	88.00	-.4000	6	*
7	182.00	88.00	258.00	88.00	.0000	3	*
8	258.00	88.00	271.00	98.00	.7692	1	*
9	271.00	98.00	286.00	98.00	.0000	1	*
10	182.00	88.00	221.50	78.00	-.2532	2	
11	221.50	78.00	229.00	84.50	.8667	2	
12	229.00	84.50	258.00	88.00	.1207	2	
13	131.00	90.00	177.00	90.00	.0000	6	
14	124.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	147.00	88.00	.1250	2	
16	147.00	88.00	182.00	88.00	.0000	2	
17	258.00	88.00	286.00	88.00	.0000	2	
18	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	98.00
2	148.00	98.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	90.00	131.50	176.00	100.

Case-1

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	3.52	3.52	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 175.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 175.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.468	1.468	1.468	1322.4	.000	29
52.50	1.450	1.450	1.450	1279.1	.000	29
51.50	1.432	1.432	1.432	1237.7	.000	30
50.50	1.415	1.415	1.415	1194.5	.000	28
49.50	1.399	1.399	1.399	1151.9	.000	28
48.50	1.384	1.384	1.384	1108.5	.000	28
47.50	1.392	1.392	1.388	1065.3	.004	28
49.25	1.395	1.395	1.395	1141.0	.000	28
49.00	1.391	1.391	1.391	1130.1	.000	28
48.75	1.388	1.388	1.388	1119.3	.000	28
48.25	1.382	1.382	1.382	1097.8	.000	28
48.00	1.384	1.384	1.384	1086.9	.000	28
47.75	1.387	1.387	1.386	1076.1	.001	28
46.50	1.414	1.414	1.398	1020.8	.016	27
45.50	1.442	1.442	1.412	975.0	.029	26
44.50	1.470	1.470	1.427	932.0	.044	26
43.50	1.502	1.502	1.442	889.4	.060	24
42.50	1.540	1.540	1.462	845.6	.078	24
41.50	1.584	1.584	1.485	801.6	.099	23
40.50	1.630	1.630	1.509	759.3	.122	23
39.50	1.679	1.679	1.531	718.9	.147	22
38.50	1.739	1.739	1.563	676.8	.176	22
37.50	1.799	1.799	1.598	634.7	.201	21
36.50	1.844	1.844	1.635	594.8	.210	21
35.50	1.895	1.895	1.676	555.4	.220	21
34.50	1.955	1.955	1.724	515.7	.232	21
33.50	2.085	2.085	1.838	474.4	.248	20

THE LOWEST FACTOR OF SAFETY WAS 1.382 AT R = 48.25.

X = 195.00 , Y = 110.00 :

FS	FS	FS	DRIVING	DELTA FS

Case 1

RADIUS	GEOGRIDS AT WORK STRESS	GEOGRIDS AT ULT STRESS	WITHOUT GEOGRIDS	MOMENT: KIP-FT/FT	DUE TO GEOGRIDS	# SLICES
53.50	1.990	1.990	1.855	1254.5	.134	28
52.50	2.029	2.029	1.890	1195.6	.139	28
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	2.081	2.081	1.937	1134.1	.144	28
50.50	2.161	2.161	2.010	1072.9	.151	28
49.50	2.212	2.212	2.055	1013.1	.157	27
48.50	2.257	2.257	2.093	953.7	.164	26
47.50	2.313	2.313	2.141	894.9	.172	25
46.50	2.382	2.382	2.201	835.0	.181	25
45.50	2.439	2.439	2.248	778.5	.191	24
44.50	2.506	2.506	2.304	724.0	.202	22
43.50	2.591	2.591	2.376	669.4	.215	22
42.50	2.703	2.703	2.473	613.6	.230	21
41.50	2.847	2.847	2.599	557.9	.248	22
40.50	3.005	3.005	2.735	504.0	.269	22
39.50	3.153	3.153	2.861	454.8	.293	19
38.50	3.377	3.377	3.054	403.4	.323	19
37.50	3.711	3.711	3.345	349.2	.365	17
36.50	4.082	4.082	3.668	301.1	.415	18
35.50	4.557	4.557	4.077	254.5	.479	18
34.50	5.081	5.081	4.515	210.9	.565	17
33.50	5.804	5.804	5.116	169.1	.689	14

THE LOWEST FACTOR OF SAFETY WAS 1.990 AT R = 53.50.

X = 155.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	2.612	2.612	2.612	742.1	.000	28
52.50	2.616	2.616	2.616	708.0	.000	28
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	2.621	2.621	2.621	674.6	.000	28
50.50	2.625	2.625	2.625	642.0	.000	28
49.50	2.623	2.623	2.623	611.4	.000	27
48.50	2.640	2.640	2.640	577.5	.000	26
50.25	2.626	2.626	2.626	634.0	.000	28
50.00	2.627	2.627	2.627	626.0	.000	28
49.75	2.628	2.628	2.628	618.1	.000	28
49.25	2.626	2.626	2.626	603.3	.000	27
49.00	2.628	2.628	2.628	595.2	.000	27
48.75	2.638	2.638	2.638	585.3	.000	26
47.50	2.646	2.646	2.646	547.2	.000	26
46.50	2.651	2.651	2.651	517.7	.000	26
45.50	2.657	2.657	2.657	489.0	.000	26
44.50	2.655	2.655	2.655	462.1	.000	25
43.50	2.670	2.670	2.670	433.1	.000	24
45.25	2.647	2.647	2.647	483.7	.000	25
45.00	2.650	2.650	2.650	476.4	.000	25
44.75	2.653	2.653	2.653	469.2	.000	25
44.25	2.658	2.658	2.658	455.0	.000	25
44.00	2.668	2.668	2.668	446.4	.000	24
43.75	2.669	2.669	2.669	439.8	.000	24
42.50	2.673	2.673	2.673	407.3	.000	24
41.50	2.673	2.673	2.673	382.3	.000	24
40.50	2.678	2.678	2.678	357.6	.000	23
39.50	2.682	2.682	2.682	333.6	.000	23

Case 1

38.50	2.695	2.695	2.695	309.2	.000	22
37.50	2.713	2.713	2.713	285.5	.000	22
36.50	2.738	2.738	2.738	262.2	.000	21
35.50	2.796	2.796	2.796	237.2	.000	21
34.50	2.889	2.889	2.889	211.4	.000	19
33.50	2.971	2.971	2.971	189.0	.000	19

THE LOWEST FACTOR OF SAFETY WAS 2.612 AT R = 53.50.

X = 175.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.707	1.707	1.707	1803.2	.000	29
72.50	1.687	1.687	1.687	1756.7	.000	29
71.50	1.666	1.666	1.666	1710.8	.000	29
70.50	1.645	1.645	1.645	1665.9	.000	29
69.50	1.625	1.625	1.625	1618.8	.000	29
68.50	1.607	1.607	1.607	1570.3	.000	28
67.50	1.587	1.587	1.587	1523.3	.000	27
66.50	1.570	1.570	1.570	1473.4	.000	25
65.50	1.549	1.549	1.549	1427.8	.000	24
64.50	1.532	1.532	1.532	1379.7	.000	25
63.50	1.517	1.517	1.517	1329.8	.000	25
62.50	1.503	1.503	1.503	1279.2	.000	24
61.50	1.492	1.492	1.492	1227.0	.000	23
60.50	1.481	1.481	1.481	1175.5	.000	23
59.50	1.471	1.471	1.471	1124.4	.000	23
58.50	1.509	1.509	1.498	1072.1	.011	22
60.25	1.479	1.479	1.479	1162.7	.000	23
60.00	1.476	1.476	1.476	1149.9	.000	23
59.75	1.474	1.474	1.474	1137.1	.000	23
59.25	1.476	1.476	1.476	1111.3	.000	23
59.00	1.483	1.483	1.481	1099.5	.002	22
58.75	1.496	1.496	1.490	1085.8	.006	22
57.50	1.565	1.565	1.533	1017.9	.032	22
56.50	1.629	1.629	1.573	964.0	.056	21
55.50	1.701	1.701	1.617	910.8	.084	21
54.50	1.779	1.779	1.664	859.6	.116	19
53.50	1.876	1.876	1.722	806.0	.154	19

THE LOWEST FACTOR OF SAFETY WAS 1.471 AT R = 59.50.

X = 175.00 , Y = 90.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.

Case ①

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 59.50.

X = 180.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.396	1.396	1.396	1394.4	.000	30
52.50	1.391	1.391	1.391	1347.4	.000	31
51.50	1.408	1.408	1.399	1297.8	.009	30
53.25	1.393	1.393	1.393	1382.3	.000	30
53.00	1.390	1.390	1.390	1369.9	.000	30
52.75	1.389	1.389	1.389	1360.1	.000	31
52.25	1.395	1.395	1.393	1335.1	.002	31
52.00	1.400	1.400	1.396	1321.6	.004	30
51.75	1.404	1.404	1.397	1309.7	.007	30
50.50	1.429	1.429	1.409	1247.8	.020	29
49.50	1.453	1.453	1.421	1198.8	.032	29
48.50	1.479	1.479	1.434	1150.3	.044	28
47.50	1.511	1.511	1.452	1099.5	.059	27
46.50	1.546	1.546	1.471	1049.8	.074	26
45.50	1.584	1.584	1.492	1000.9	.092	26
44.50	1.625	1.625	1.514	952.4	.111	26
43.50	1.668	1.668	1.536	905.8	.133	25
42.50	1.723	1.723	1.566	856.6	.157	24
41.50	1.766	1.766	1.596	809.7	.170	24
40.50	1.806	1.806	1.629	763.5	.177	24
39.50	1.851	1.851	1.666	717.6	.185	24
38.50	1.906	1.906	1.712	670.4	.194	23
37.50	2.009	2.009	1.803	623.7	.205	23
36.50	2.084	2.084	1.867	578.8	.217	23
35.50	2.155	2.155	1.926	535.8	.229	23
34.50	2.234	2.234	1.989	491.3	.244	20
33.50	2.329	2.329	2.066	446.7	.263	20

THE LOWEST FACTOR OF SAFETY WAS 1.389 AT R = 52.75.

X = 170.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.618	1.618	1.618	1198.4	.000	28
52.50	1.593	1.593	1.593	1162.9	.000	28
51.50	1.567	1.567	1.567	1128.2	.000	28
50.50	1.543	1.543	1.543	1092.2	.000	28
49.50	1.517	1.517	1.517	1057.3	.000	26

Case ①

48.50	1.496	1.496	1.496	1020.1	.000	26
47.50	1.475	1.475	1.475	983.1	.000	26
46.50	1.454	1.454	1.454	946.1	.000	26
45.50	1.436	1.436	1.436	907.8	.000	25
44.50	1.419	1.419	1.419	869.6	.000	25
43.50	1.410	1.410	1.410	832.1	.000	25
42.50	1.433	1.433	1.421	794.3	.012	25
44.25	1.415	1.415	1.415	860.2	.000	25
44.00	1.410	1.410	1.410	850.9	.000	25
43.75	1.408	1.408	1.408	841.5	.000	25
43.25	1.415	1.415	1.413	822.6	.002	25
43.00	1.421	1.421	1.415	813.2	.005	25
42.75	1.427	1.427	1.418	803.8	.009	25
41.50	1.465	1.465	1.437	755.7	.028	25
40.50	1.502	1.502	1.456	716.7	.046	24
39.50	1.541	1.541	1.475	679.8	.066	23
38.50	1.589	1.589	1.500	641.7	.089	22
37.50	1.642	1.642	1.528	604.1	.114	22
36.50	1.705	1.705	1.561	566.2	.144	21
35.50	1.769	1.769	1.592	531.2	.177	20
34.50	1.849	1.849	1.634	495.0	.216	20
33.50	1.934	1.934	1.679	459.6	.254	20

THE LOWEST FACTOR OF SAFETY WAS 1.408 AT R = 43.75.

X = 175.00 , Y = 115.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
58.50	1.523	1.523	1.523	1449.6	.000	29
57.50	1.503	1.503	1.503	1406.5	.000	28
56.50	1.480	1.480	1.480	1367.2	.000	27
55.50	1.464	1.464	1.464	1321.6	.000	26
54.50	1.445	1.445	1.445	1279.1	.000	27
53.50	1.428	1.428	1.428	1235.1	.000	26
52.50	1.411	1.411	1.411	1191.4	.000	26
51.50	1.397	1.397	1.397	1145.8	.000	26
50.50	1.387	1.387	1.387	1100.0	.000	25
49.50	1.407	1.407	1.398	1055.2	.009	25
51.25	1.395	1.395	1.395	1133.2	.000	25
51.00	1.392	1.392	1.392	1122.1	.000	25
50.75	1.388	1.388	1.388	1111.1	.000	25
50.25	1.390	1.390	1.390	1088.8	.000	25
50.00	1.395	1.395	1.392	1077.6	.002	25
49.75	1.400	1.400	1.395	1066.4	.005	25
48.50	1.436	1.436	1.413	1009.4	.023	25
47.50	1.467	1.467	1.429	965.0	.038	24
46.50	1.508	1.508	1.452	917.7	.056	23
45.50	1.551	1.551	1.475	872.2	.076	22
44.50	1.600	1.600	1.501	827.1	.099	22
43.50	1.655	1.655	1.530	782.3	.124	22
42.50	1.716	1.716	1.563	737.7	.153	20
41.50	1.788	1.788	1.602	692.9	.186	19
40.50	1.862	1.862	1.643	649.8	.219	19
39.50	1.919	1.919	1.689	607.4	.229	19
38.50	1.985	1.985	1.743	565.1	.242	19

THE LOWEST FACTOR OF SAFETY WAS 1.387 AT R = 50.50.

X = 175.00 , Y = 105.00 :

Case (1)

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.430	1.430	1.430	1178.6	.000	29
47.50	1.413	1.413	1.413	1137.7	.000	29
46.50	1.398	1.398	1.398	1095.2	.000	29
45.50	1.410	1.410	1.405	1052.2	.005	28
47.25	1.409	1.409	1.409	1126.9	.000	29
47.00	1.406	1.406	1.406	1116.3	.000	29
46.75	1.402	1.402	1.402	1105.7	.000	29
46.25	1.401	1.401	1.401	1083.2	.000	28
46.00	1.402	1.402	1.402	1072.8	.000	28
45.75	1.406	1.406	1.404	1062.5	.003	28
44.50	1.426	1.426	1.410	1011.1	.016	28
43.50	1.447	1.447	1.419	969.1	.027	28
42.50	1.471	1.471	1.431	927.1	.040	28
41.50	1.500	1.500	1.446	884.0	.054	26
40.50	1.529	1.529	1.460	843.3	.070	25
39.50	1.565	1.565	1.478	801.6	.087	25
38.50	1.604	1.604	1.497	760.4	.106	25
37.50	1.649	1.649	1.521	718.6	.128	24
36.50	1.691	1.691	1.540	680.4	.151	23
35.50	1.745	1.745	1.567	640.6	.178	23
34.50	1.782	1.782	1.596	601.6	.187	23
33.50	1.821	1.821	1.627	563.6	.195	23
32.50	1.868	1.868	1.664	525.2	.204	22
31.50	1.924	1.924	1.710	487.3	.214	22
30.50	2.038	2.038	1.810	449.2	.228	22
29.50	2.110	2.110	1.868	413.6	.242	22
28.50	2.155	2.155	1.898	379.0	.257	20

THE LOWEST FACTOR OF SAFETY WAS 1.398 AT R = 46.50.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 175.00.
Y = 110.00.
RADIUS OF CRITICAL CIRCLE = 48.25.

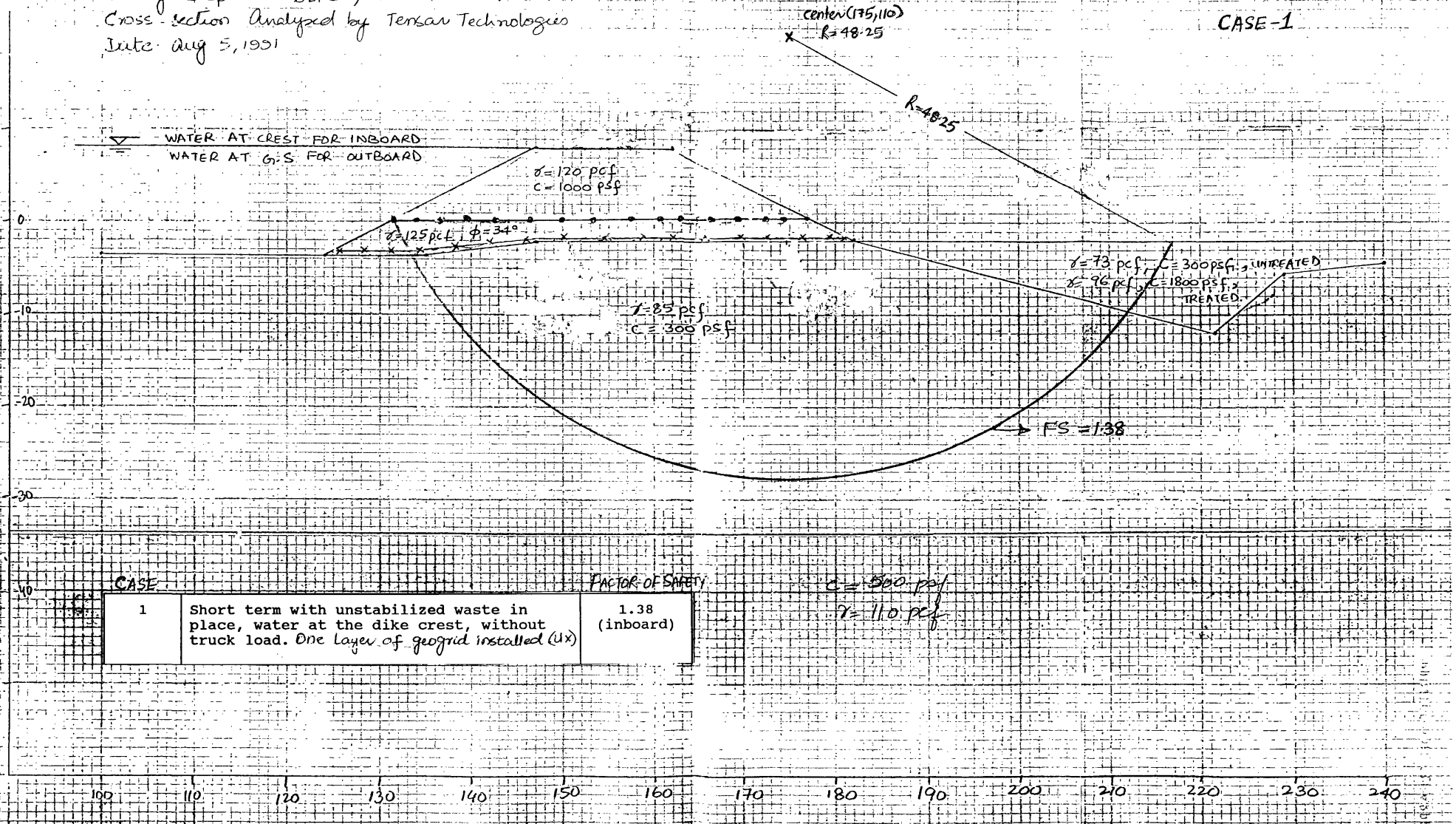
MINIMUM FS = 1.382 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.382.
FS (UNREINFORCED) = 1.382.
TOTAL DRIVING MOMENT = 1097.78 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 61.75.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
CRITICAL CIRCLE DOES NOT INTERSECT TENSAR GEOGRIDS.

CALCULATIONS HAVE BEEN COMPLETED.

Bailey Disposal site, JOB # 19559.042.12
Cross-section Analyzed by Tensar Technologies
Date Aug 5, 1991

CASE-1



CASE		FACTOR OF SAFETY
1	Short term with unstabilized waste in place, water at the dike crest, without truck load. One layer of geogrid installed (UX)	1.38 (inboard)

c = 500 psf
γ = 110 pcf

Scale 1"=10'

Case	Description	Factor of Safety
1A	Case 1, but with the truck load	1.28 (inboard)

CASE 1A

- Validity of data
- Reasonableness of results

Checked by N. Khan
Date: 8/9/91

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0      0.
1.       50.      86.5
2.       124.     86.5
3.       147.     98.
4.       162.     98.
5.       182.     92.
6.       221.5    78.
7.       229.     84.5
8.       258.     88.
9.       135.     86.5
10.      182.     88.
11.      50.      56.5
12.      286.     56.5
13.      168.     99.5
14.      221.5    100.5
15.      266.     99.5
16.      271.     98.
17.      286.     98.
18.      286.     88.
19.      151.30   99.
20.      157.20   99.
21.      157.30   98.
22.      121.     92.
23.      131.     90.
24.      163.     92.
25.      151.2    98.
26.      147.     88.
27.      177.     90.
999.
13.
1.       2.       2.
2.       23.      6.
23.      3.       1.
3.       25.      1.
25.      19.      5.
19.      20.      5.
20.      21.      5.
21.      4.       1.
4.       27.      1.
27.      10.      6.
10.      8.       3.
8.       16.      1.
16.      17.      1.
10.      6.       2.
6.       7.       2.
7.       8.       2.
25.      21.      1.
23.      27.      6.
2.       9.       2.
9.       26.      2.
26.      10.      2.
8.       18.      2.
11.      12.      4.
999.
1.       .12      1.       0.       1.1      0.7
2.       .085     .3       0.       1.1      0.6
3.       .073     .3       0.       1.1      0.6
4.       .11      .5       0.       1.1      0.0
5.       .712     1.0      0.       1.1      0.0
6.       .125     0.       34.      1.1      0.9
99.
```

```
4.      0.      0.0624
50.     98.
148.    98.
160.    56.
286.    56.
0.
0.      1.      0.      .05
90.0    131.5   176.    3.52    1.      1.5
20.
56.5
76.5
20.
SEARCH
175.    110.    20.     20.
```

Case (1A)

Case 1A

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-05-1991
TIME 15:18

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	151.20	98.00	.0000	1	*
5	151.20	98.00	151.30	99.00	9.9994	5	*
6	151.30	99.00	157.20	99.00	.0000	5	*
7	157.20	99.00	157.30	98.00	-9.9994	5	*
8	157.30	98.00	162.00	98.00	.0000	1	*
9	162.00	98.00	177.00	90.00	-.5333	1	*
10	177.00	90.00	182.00	88.00	-.4000	6	*
11	182.00	88.00	258.00	88.00	.0000	3	*
12	258.00	88.00	271.00	98.00	.7692	1	*
13	271.00	98.00	286.00	98.00	.0000	1	*
14	182.00	88.00	221.50	78.00	-.2532	2	
15	221.50	78.00	229.00	84.50	.8667	2	
16	229.00	84.50	258.00	88.00	.1207	2	
17	151.20	98.00	157.30	98.00	.0000	1	
18	131.00	90.00	177.00	90.00	.0000	6	
19	124.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	147.00	88.00	.1250	2	
21	147.00	88.00	182.00	88.00	.0000	2	
22	258.00	88.00	286.00	88.00	.0000	2	
23	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	98.00
2	148.00	98.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 1A

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	90.00	131.50	176.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	3.52	3.52	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 175.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 175.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.375	1.375	1.375	1411.0	.000	29
52.50	1.356	1.356	1.356	1367.8	.000	29
51.50	1.336	1.336	1.336	1326.4	.000	30
50.50	1.317	1.317	1.317	1283.1	.000	28
49.50	1.298	1.298	1.298	1240.6	.000	28
48.50	1.281	1.281	1.281	1197.2	.000	28
47.50	1.285	1.285	1.281	1153.9	.004	28
49.25	1.294	1.294	1.294	1229.6	.000	28
49.00	1.290	1.290	1.290	1218.7	.000	28
48.75	1.286	1.286	1.286	1207.9	.000	28
48.25	1.278	1.278	1.278	1186.4	.000	28
48.00	1.279	1.279	1.279	1175.6	.000	28
47.75	1.281	1.281	1.280	1164.7	.001	28
46.50	1.300	1.300	1.286	1109.4	.015	27
45.50	1.321	1.321	1.294	1063.7	.027	26
44.50	1.342	1.342	1.302	1020.6	.040	26
43.50	1.365	1.365	1.310	978.0	.055	24
42.50	1.393	1.393	1.322	934.3	.071	24
41.50	1.425	1.425	1.336	890.2	.089	23
40.50	1.459	1.459	1.350	848.0	.109	23
39.50	1.493	1.493	1.362	807.5	.131	22
38.50	1.536	1.536	1.380	765.4	.156	22
37.50	1.577	1.577	1.401	723.4	.176	21
36.50	1.604	1.604	1.421	683.5	.183	21
35.50	1.633	1.633	1.443	644.0	.190	21
34.50	1.667	1.667	1.469	604.3	.198	21
33.50	1.753	1.753	1.544	563.0	.209	20

THE LOWEST FACTOR OF SAFETY WAS 1.278 AT R = 48.25.

Case 1A

X = 195.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.746	1.746	1.628	1428.6	.118	28
52.50	1.770	1.770	1.649	1369.7	.121	28
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	1.803	1.803	1.678	1308.2	.125	28
50.50	1.857	1.857	1.727	1247.0	.130	28
49.50	1.885	1.885	1.751	1187.2	.134	27
48.50	1.920	1.920	1.781	1127.8	.139	26
47.50	1.962	1.962	1.817	1069.0	.145	25
46.50	1.998	1.998	1.847	1009.1	.151	25
45.50	2.022	2.022	1.864	952.6	.157	24
44.50	2.159	2.159	1.991	874.6	.168	23
43.50	2.285	2.285	2.102	788.6	.183	23
42.50	2.422	2.422	2.221	702.3	.201	22
41.50	2.644	2.644	2.419	616.6	.224	23
40.50	2.917	2.917	2.662	533.6	.254	23
-- 2 FAILURE SURFACES FOR R= 39.50 (IDENTIFIED LEFT TO RIGHT)						
39.50	21.915	21.915	21.915	1.3	.000	6
39.50	3.153	3.153	2.861	454.8	.293	19
38.50	3.377	3.377	3.054	403.4	.323	19
37.50	3.711	3.711	3.345	349.2	.365	17
36.50	4.082	4.082	3.668	301.1	.415	18
35.50	4.557	4.557	4.077	254.5	.479	18
34.50	5.081	5.081	4.515	210.9	.565	17
33.50	5.804	5.804	5.116	169.1	.689	14

THE LOWEST FACTOR OF SAFETY WAS 1.746 AT R = 53.50.

X = 155.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	2.601	2.601	2.601	745.3	.000	28
52.50	2.604	2.604	2.604	711.2	.000	28
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	2.608	2.608	2.608	677.8	.000	28
50.50	2.612	2.612	2.612	645.2	.000	28
49.50	2.610	2.610	2.610	614.6	.000	27
48.50	2.625	2.625	2.625	580.7	.000	26
50.25	2.613	2.613	2.613	637.2	.000	28
50.00	2.614	2.614	2.614	629.2	.000	28
49.75	2.615	2.615	2.615	621.3	.000	28
49.25	2.612	2.612	2.612	606.5	.000	27
49.00	2.614	2.614	2.614	598.4	.000	27
48.75	2.624	2.624	2.624	588.5	.000	26
47.50	2.630	2.630	2.630	550.4	.000	26
46.50	2.635	2.635	2.635	520.9	.000	26
45.50	2.639	2.639	2.639	492.2	.000	26
44.50	2.637	2.637	2.637	465.3	.000	25
43.50	2.651	2.651	2.651	436.3	.000	24
45.25	2.629	2.629	2.629	486.9	.000	25
45.00	2.632	2.632	2.632	479.6	.000	25
44.75	2.635	2.635	2.635	472.4	.000	25

Case 1A

44.25	2.639	2.639	2.639	458.2	.000	25
44.00	2.649	2.649	2.649	449.6	.000	24
43.75	2.650	2.650	2.650	443.0	.000	24
42.50	2.652	2.652	2.652	410.5	.000	24
41.50	2.651	2.651	2.651	385.5	.000	24
40.50	2.654	2.654	2.654	360.8	.000	23
42.25	2.652	2.652	2.652	404.2	.000	24
42.00	2.652	2.652	2.652	397.9	.000	24
41.75	2.651	2.651	2.651	391.7	.000	24
41.25	2.652	2.652	2.652	379.3	.000	23
41.00	2.653	2.653	2.653	373.1	.000	23
40.75	2.654	2.654	2.654	366.9	.000	23
39.50	2.656	2.656	2.656	336.8	.000	23
38.50	2.667	2.667	2.667	312.4	.000	22
37.50	2.683	2.683	2.683	288.7	.000	22
36.50	2.705	2.705	2.705	265.4	.000	21
35.50	2.759	2.759	2.759	240.4	.000	21
34.50	2.846	2.846	2.846	214.6	.000	19
33.50	2.921	2.921	2.921	192.3	.000	19

THE LOWEST FACTOR OF SAFETY WAS 2.601 AT R = 53.50.

X = 175.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.627	1.627	1.627	1891.9	.000	29
72.50	1.606	1.606	1.606	1845.4	.000	29
71.50	1.584	1.584	1.584	1799.5	.000	29
70.50	1.562	1.562	1.562	1754.6	.000	29
69.50	1.541	1.541	1.541	1707.4	.000	29
68.50	1.521	1.521	1.521	1658.9	.000	28
67.50	1.500	1.500	1.500	1611.9	.000	27
66.50	1.481	1.481	1.481	1562.0	.000	25
65.50	1.459	1.459	1.459	1516.4	.000	24
64.50	1.439	1.439	1.439	1468.4	.000	25
63.50	1.422	1.422	1.422	1418.5	.000	25
62.50	1.405	1.405	1.405	1367.9	.000	24
61.50	1.391	1.391	1.391	1315.6	.000	23
60.50	1.377	1.377	1.377	1264.2	.000	23
59.50	1.363	1.363	1.363	1213.0	.000	23
58.50	1.393	1.393	1.383	1160.7	.010	22
60.25	1.374	1.374	1.374	1251.4	.000	23
60.00	1.370	1.370	1.370	1238.6	.000	23
59.75	1.367	1.367	1.367	1225.8	.000	23
59.25	1.367	1.367	1.367	1200.0	.000	23
59.00	1.372	1.372	1.370	1188.2	.002	22
58.75	1.382	1.382	1.377	1174.4	.006	22
57.50	1.439	1.439	1.410	1106.5	.029	22
56.50	1.491	1.491	1.440	1052.6	.051	21
55.50	1.549	1.549	1.473	999.5	.076	21
54.50	1.612	1.612	1.507	948.2	.105	19
53.50	1.689	1.689	1.550	894.7	.139	19

THE LOWEST FACTOR OF SAFETY WAS 1.363 AT R = 59.50.

X = 175.00 , Y = 90.00 :

	FS	FS	FS	DRIVING	DELTA FS

Case 1A

RADIUS	GEOGRIDS AT WORK STRESS	GEOGRIDS AT ULT STRESS	WITHOUT GEOGRIDS	MOMENT: KIP-FT/FT	DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 59.50.

X = 180.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.294	1.294	1.294	1504.4	.000	30
52.50	1.286	1.286	1.286	1457.5	.000	31
51.50	1.298	1.298	1.290	1407.8	.009	30
53.25	1.290	1.290	1.290	1492.3	.000	30
53.00	1.286	1.286	1.286	1479.9	.000	30
52.75	1.285	1.285	1.285	1470.1	.000	31
52.25	1.288	1.288	1.286	1445.1	.002	31
52.00	1.292	1.292	1.288	1431.6	.004	30
51.75	1.295	1.295	1.289	1419.7	.006	30
50.50	1.313	1.313	1.295	1357.8	.018	29
49.50	1.330	1.330	1.302	1308.8	.029	29
48.50	1.349	1.349	1.309	1260.4	.041	28
47.50	1.373	1.373	1.320	1209.5	.053	27
46.50	1.398	1.398	1.331	1159.9	.067	26
45.50	1.426	1.426	1.343	1110.9	.083	26
44.50	1.456	1.456	1.356	1062.4	.100	26
43.50	1.487	1.487	1.368	1015.8	.118	25
42.50	1.525	1.525	1.386	966.6	.139	24
41.50	1.554	1.554	1.404	919.7	.150	24
40.50	1.577	1.577	1.423	873.5	.155	24
39.50	1.604	1.604	1.443	827.6	.160	24
38.50	1.636	1.636	1.469	780.4	.167	23
37.50	1.704	1.704	1.530	733.7	.175	23
36.50	1.747	1.747	1.565	688.8	.182	23
35.50	1.811	1.811	1.619	645.8	.191	23
34.50	1.868	1.868	1.667	601.3	.202	20
33.50	1.916	1.916	1.703	556.7	.213	20

THE LOWEST FACTOR OF SAFETY WAS 1.285 AT R = 52.75.

Case 1A

X = 170.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.532	1.532	1.532	1265.7	.000	28
52.50	1.506	1.506	1.506	1230.2	.000	28
51.50	1.479	1.479	1.479	1195.4	.000	28
50.50	1.453	1.453	1.453	1159.5	.000	28
49.50	1.426	1.426	1.426	1124.6	.000	26
48.50	1.403	1.403	1.403	1087.4	.000	26
47.50	1.381	1.381	1.381	1050.4	.000	26
46.50	1.358	1.358	1.358	1013.4	.000	26
45.50	1.337	1.337	1.337	975.1	.000	25
44.50	1.317	1.317	1.317	936.9	.000	25
43.50	1.304	1.304	1.304	899.4	.000	25
42.50	1.321	1.321	1.310	861.6	.011	25
44.25	1.312	1.312	1.312	927.5	.000	25
44.00	1.307	1.307	1.307	918.2	.000	25
43.75	1.303	1.303	1.303	908.8	.000	25
43.25	1.307	1.307	1.306	889.9	.002	25
43.00	1.312	1.312	1.307	880.5	.005	25
42.75	1.316	1.316	1.308	871.0	.008	25
41.50	1.344	1.344	1.319	822.9	.026	25
40.50	1.373	1.373	1.331	784.0	.042	24
39.50	1.401	1.401	1.341	747.1	.060	23
38.50	1.437	1.437	1.357	709.0	.080	22
37.50	1.477	1.477	1.374	671.4	.103	22
36.50	1.523	1.523	1.394	633.5	.129	21
35.50	1.569	1.569	1.412	598.5	.157	20
34.50	1.626	1.626	1.436	562.3	.190	20
33.50	1.685	1.685	1.463	526.9	.222	20

THE LOWEST FACTOR OF SAFETY WAS 1.303 AT R = 43.75.

X = 175.00 , Y = 115.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
58.50	1.435	1.435	1.435	1538.2	.000	29
57.50	1.414	1.414	1.414	1495.2	.000	28
56.50	1.390	1.390	1.390	1455.8	.000	27
55.50	1.372	1.372	1.372	1410.3	.000	26
54.50	1.351	1.351	1.351	1367.7	.000	27
53.50	1.332	1.332	1.332	1323.8	.000	26
52.50	1.313	1.313	1.313	1280.0	.000	26
51.50	1.297	1.297	1.297	1234.4	.000	26
50.50	1.283	1.283	1.283	1188.7	.000	25
49.50	1.297	1.297	1.289	1143.8	.008	25
51.25	1.294	1.294	1.294	1221.9	.000	25
51.00	1.290	1.290	1.290	1210.8	.000	25
50.75	1.285	1.285	1.285	1199.7	.000	25
50.25	1.285	1.285	1.285	1177.5	.000	25
50.00	1.288	1.288	1.286	1166.3	.002	25
49.75	1.293	1.293	1.288	1155.1	.005	25
48.50	1.319	1.319	1.299	1098.0	.021	25
47.50	1.343	1.343	1.308	1053.6	.035	24

Case 1A

46.50	1.374	1.374	1.323	1006.3	.051	23
45.50	1.407	1.407	1.338	960.9	.069	22
44.50	1.444	1.444	1.355	915.7	.089	22
43.50	1.485	1.485	1.374	870.9	.112	22
42.50	1.531	1.531	1.394	826.4	.137	20
41.50	1.584	1.584	1.419	781.5	.165	19
40.50	1.637	1.637	1.444	738.4	.192	19
39.50	1.673	1.673	1.473	696.0	.200	19
38.50	1.714	1.714	1.505	653.7	.209	19

THE LOWEST FACTOR OF SAFETY WAS 1.283 AT R = 50.50.

X = 175.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.330	1.330	1.330	1267.2	.000	29
47.50	1.310	1.310	1.310	1226.3	.000	29
46.50	1.293	1.293	1.293	1183.9	.000	29
45.50	1.300	1.300	1.295	1140.8	.005	28
47.25	1.306	1.306	1.306	1215.6	.000	29
47.00	1.302	1.302	1.302	1204.9	.000	29
46.75	1.298	1.298	1.298	1194.3	.000	29
46.25	1.295	1.295	1.295	1171.8	.000	28
46.00	1.295	1.295	1.295	1161.5	.000	28
45.75	1.297	1.297	1.295	1151.1	.002	28
44.50	1.311	1.311	1.296	1099.8	.014	28
43.50	1.325	1.325	1.300	1057.8	.025	28
42.50	1.342	1.342	1.306	1015.7	.037	28
41.50	1.363	1.363	1.314	972.6	.049	26
40.50	1.383	1.383	1.320	932.0	.063	25
39.50	1.408	1.408	1.330	890.3	.078	25
38.50	1.435	1.435	1.340	849.1	.095	25
37.50	1.467	1.467	1.353	807.2	.114	24
36.50	1.495	1.495	1.361	769.0	.134	23
35.50	1.531	1.531	1.375	729.2	.156	23
34.50	1.552	1.552	1.390	690.3	.163	23
33.50	1.572	1.572	1.404	652.2	.168	23
32.50	1.596	1.596	1.422	613.9	.174	22
31.50	1.626	1.626	1.445	575.9	.181	22
30.50	1.698	1.698	1.508	537.9	.191	22
29.50	1.733	1.733	1.534	502.2	.199	22
28.50	1.771	1.771	1.561	467.6	.210	20

THE LOWEST FACTOR OF SAFETY WAS 1.293 AT R = 46.50.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:

X = 175.00.

Y = 110.00.

RADIUS OF CRITICAL CIRCLE = 48.25.

MINIMUM FS = 1.278 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.278.

FS (UNREINFORCED) = 1.278.

TOTAL DRIVING MOMENT = 1186.42 KIP-FT/FT

CRITICAL CIRCLE EXTENDS TO ELEVATION 61.75.

ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :

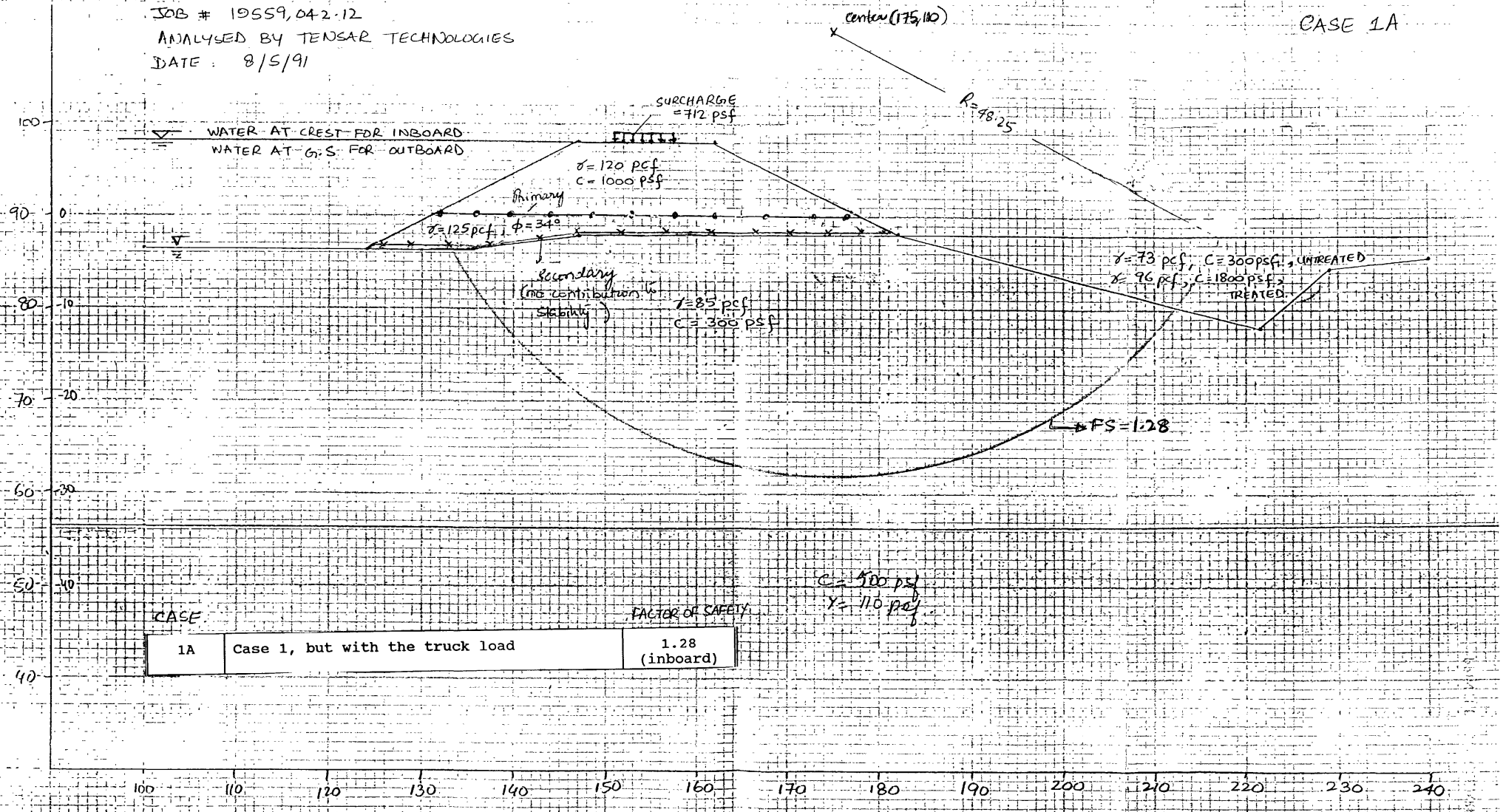
CRITICAL CIRCLE DOES NOT INTERSECT TENSAR GEOGRIDS.

CALCULATIONS HAVE BEEN COMPLETED.

Case 1A

BAILEY DISPOSAL SITE
JOB # 19559,042.12
ANALYSED BY TENSAR TECHNOLOGIES
DATE : 8/5/91

CASE 1A



CASE		FACTOR OF SAFETY
1A	Case 1, but with the truck load	1.28 (inboard)

Case	Description	Factor of Safety
2	Short term with unstabilized waste in place, water at existing grade, without the truck load.	1.49 (outboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0      0.
1.       50.      86.5
2.       124.     86.5
3.       147.     98.
4.       162.     98.
5.       182.     92.
6.       221.5    78.
7.       229.     84.5
8.       258.     88.
9.       135.     86.5
10.      182.     88.
11.      50.      56.5
12.      286.     56.5
13.      168.     99.5
14.      221.5    100.5
15.      266.     99.5
16.      271.     98.
17.      286.     98.
18.      286.     88.
19.      151.30   99.
20.      157.20   99.
21.      157.30   98.
22.      121.     92.
23.      131.     90.
24.      163.     92.
25.      151.2    98.
26.      147.     88.
27.      177.     90.
999.
9.
1.       2.       2.
2.       23.      6.
23.      3.       1.
3.       4.       1.
4.       27.      1.
27.      10.      6.
10.      8.       3.
8.       16.      1.
16.      17.      1.
10.      6.       2.
6.       7.       2.
7.       8.       2.
23.      27.      6.
2.       9.       2.
9.       26.      2.
26.      10.      2.
8.       18.      2.
11.      12.      4.
999.
1.       .12      1.       0.       1.1      0.7
2.       .085     .3       0.       1.1      0.6
3.       .073     .3       0.       1.1      0.6
4.       .11      .5       0.       1.1      0.0
5.       .00001   1.       0.       1.1      0.0
6.       .125     0.       34.      1.1      0.9
99.
4.       0.       0.0624
50.      60.
148.     60.
160.     60.
286.     60.
```

Case 2

Validity of data &
Reasonableness of result
checked by N. Khan
Date 8/9/91

```
0.
0.        0.        0.        .05
20.
56.5
76.5
20.
SEARCH
130.      110.      20.       20.
```

2

2

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-05-1991
TIME 15:01

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	162.00	98.00	.0000	1	*
5	162.00	98.00	177.00	90.00	-.5333	1	*
6	177.00	90.00	182.00	88.00	-.4000	6	*
7	182.00	88.00	258.00	88.00	.0000	3	*
8	258.00	88.00	271.00	98.00	.7692	1	*
9	271.00	98.00	286.00	98.00	.0000	1	*
10	182.00	88.00	221.50	78.00	-.2532	2	
11	221.50	78.00	229.00	84.50	.8667	2	
12	229.00	84.50	258.00	88.00	.1207	2	
13	131.00	90.00	177.00	90.00	.0000	6	
14	124.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	147.00	88.00	.1250	2	
16	147.00	88.00	182.00	88.00	.0000	2	
17	258.00	88.00	286.00	88.00	.0000	2	
18	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	60.00
2	148.00	60.00
3	160.00	60.00
4	286.00	60.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

2

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 130.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 130.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.685	1151.462	29
52.50	1.632	1136.840	28
51.50	1.582	1119.576	28
50.50	1.553	1098.954	28
49.50	1.537	1076.251	28
48.50	1.524	1051.434	27
47.50	1.509	1026.825	26
46.50	1.504	997.368	26
45.50	1.500	966.669	26
44.50	1.499	934.441	25
43.50	1.498	902.762	24
42.50	1.509	865.760	24
44.25	1.499	926.248	25
44.00	1.500	917.953	25
43.75	1.496	911.865	24
43.25	1.500	893.652	24
43.00	1.502	884.531	24
42.75	1.505	875.183	24
41.50	1.522	828.102	24
40.50	1.536	789.991	22
39.50	1.557	750.783	22
38.50	1.585	709.751	22
37.50	1.627	665.736	22
36.50	1.674	621.627	21
35.50	1.723	578.461	21
34.50	1.773	535.733	20
33.50	1.822	491.542	18

THE LOWEST FACTOR OF SAFETY WAS 1.496 AT R = 43.75.

X = 150.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	7.670	252.808	29
52.50	7.388	250.653	28
51.50	7.192	245.749	28
50.50	6.995	240.879	28
49.50	6.795	236.049	28
48.50	6.600	231.037	27
47.50	6.342	228.184	26
46.50	6.151	223.047	26
45.50	5.958	217.920	26
44.50	5.775	212.427	25
43.50	5.507	209.961	24
42.50	5.318	204.678	24
41.50	5.122	199.609	24

40.50	4.940	193.814	23
39.50	4.719	189.581	23
38.50	4.470	186.368	21
37.50	4.332	178.776	21
36.50	4.211	170.548	20
35.50	4.121	161.080	20
34.50	4.066	150.535	20
33.50	4.050	139.973	20

2

THE LOWEST FACTOR OF SAFETY WAS 4.050 AT R = 33.50.

X = 110.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.947	1243.131	28
52.50	1.983	1173.536	27

D(FS)/DR IS NEGATIVE AT RMAX.

51.50	2.024	1104.224	27
50.50	2.078	1035.945	26
49.50	2.134	968.258	25
48.50	2.178	904.975	23
47.50	2.243	841.317	23
46.50	2.316	778.890	23
45.50	2.412	716.026	22
44.50	2.528	654.344	22
43.50	2.641	596.769	22
42.50	2.761	541.342	20
41.50	2.947	483.567	20
40.50	3.169	428.013	18
39.50	3.430	374.229	18
38.50	3.714	322.779	17
37.50	4.046	273.599	16
36.50	4.472	227.336	15
35.50	5.005	185.242	15
34.50	5.686	147.362	15
33.50	6.619	113.004	14

THE LOWEST FACTOR OF SAFETY WAS 1.947 AT R = 53.50.

X = 130.00, Y = 130.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
73.50	2.493	1234.053	29
72.50	2.416	1226.291	29
71.50	2.336	1219.948	27
70.50	2.261	1211.590	27
69.50	2.185	1203.524	27
68.50	2.110	1195.656	27
67.50	2.035	1187.883	27
66.50	1.962	1179.045	25
65.50	1.895	1167.505	25
64.50	1.832	1153.583	25
63.50	1.774	1137.138	25
62.50	1.722	1117.164	25
61.50	1.684	1094.141	24
60.50	1.675	1070.841	23
59.50	1.678	1041.120	23
61.25	1.683	1088.019	24
61.00	1.681	1081.716	24
60.75	1.675	1077.955	23
60.25	1.676	1063.602	23

60.00	1.676	1056.237	23
59.75	1.677	1048.743	23
58.50	1.685	1009.291	23
57.50	1.697	975.140	22
56.50	1.717	938.631	22
55.50	1.746	898.566	22
54.50	1.786	855.966	21
53.50	1.834	812.201	21

2

THE LOWEST FACTOR OF SAFETY WAS 1.675 AT R = 60.50.

X = 130.00, Y = 90.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 60.50.

X = 135.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	2.057	942.561	30
52.50	1.978	936.425	29
51.50	1.893	933.032	27
50.50	1.825	923.130	27
49.50	1.760	911.974	27
48.50	1.698	899.265	26
47.50	1.638	885.452	26
46.50	1.588	867.855	26
45.50	1.569	848.330	26
44.50	1.554	826.717	25
43.50	1.537	805.948	24
42.50	1.531	780.206	24
41.50	1.528	753.386	24
40.50	1.528	725.089	23
42.25	1.530	773.605	24
42.00	1.529	766.935	24
41.75	1.529	760.197	24
41.25	1.528	746.502	24
41.00	1.527	739.544	24
40.75	1.528	732.109	23

39.50	1.527	698.019	22
38.50	1.539	665.900	22
40.25	1.529	717.983	23
40.00	1.529	710.788	23
39.75	1.530	703.501	23
39.25	1.529	690.020	22
39.00	1.532	682.017	22
38.75	1.536	674.010	22
37.50	1.558	632.671	22
36.50	1.578	599.358	21
35.50	1.604	565.641	20
34.50	1.640	530.275	20
33.50	1.694	492.125	20

2

THE LOWEST FACTOR OF SAFETY WAS 1.527 AT R = 39.50.

X = 125.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.549	1298.697	29
52.50	1.533	1273.473	28
51.50	1.527	1241.270	28
50.50	1.523	1207.737	28
49.50	1.520	1172.768	28
48.50	1.521	1136.166	27
50.25	1.522	1199.135	28
50.00	1.521	1190.440	28
49.75	1.521	1181.652	28
49.25	1.520	1163.785	28
49.00	1.520	1154.601	27
48.75	1.521	1145.439	27
47.50	1.522	1099.130	26
46.50	1.534	1056.917	26
45.50	1.545	1014.730	25
44.50	1.562	970.923	24
43.50	1.582	925.985	24
42.50	1.613	878.005	24
41.50	1.653	828.068	24
40.50	1.695	778.215	23
39.50	1.737	729.180	22
38.50	1.772	679.694	21
37.50	1.816	628.682	20
36.50	1.875	577.173	19
35.50	1.928	529.468	19
34.50	1.966	485.669	19
33.50	2.032	440.685	17

THE LOWEST FACTOR OF SAFETY WAS 1.520 AT R = 49.25.

X = 130.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
58.50	1.861	1185.033	28
57.50	1.799	1174.384	27
56.50	1.740	1162.529	27
55.50	1.684	1148.962	27
54.50	1.630	1133.527	27
53.50	1.583	1114.534	27
52.50	1.560	1092.961	26
51.50	1.546	1069.407	26
50.50	1.531	1045.832	25

2

49.50	1.526	1016.822	25
48.50	1.524	986.259	24
47.50	1.524	954.519	24
49.25	1.525	1009.353	25
49.00	1.525	1001.534	24
48.75	1.524	993.945	24
48.25	1.523	978.476	24
48.00	1.523	970.593	24
47.75	1.523	962.608	24
46.50	1.528	920.783	24
45.50	1.540	883.778	24
44.50	1.558	845.012	23
43.50	1.577	806.325	23
42.50	1.601	766.630	22
41.50	1.635	724.671	22
40.50	1.682	679.491	21
39.50	1.735	634.193	21
38.50	1.796	588.812	21

THE LOWEST FACTOR OF SAFETY WAS 1.523 AT R = 48.00.

X = 130.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
48.50	1.557	1096.804	29
47.50	1.540	1074.014	29
46.50	1.526	1049.353	29
45.50	1.509	1025.608	28
44.50	1.503	995.795	27
43.50	1.498	965.307	27
42.50	1.495	933.723	27
41.50	1.494	900.726	27
40.50	1.497	866.788	25
42.25	1.494	925.639	27
42.00	1.494	917.473	27
41.75	1.494	909.222	27
41.25	1.495	892.033	27
41.00	1.491	885.687	26
40.75	1.494	876.181	25
39.50	1.506	829.700	25
38.50	1.517	792.102	24
37.50	1.532	753.568	24
36.50	1.553	713.835	23
35.50	1.585	673.171	22
34.50	1.628	630.110	22
33.50	1.666	587.918	21
32.50	1.682	546.728	19
31.50	1.711	504.264	19
30.50	1.758	462.446	18
29.50	1.819	420.928	18
28.50	1.853	383.356	17

THE LOWEST FACTOR OF SAFETY WAS 1.491 AT R = 41.00.

X = 130.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
43.50	1.526	1011.011	28
42.50	1.522	980.301	28
41.50	1.519	948.868	28
40.50	1.515	916.540	27

39.50	1.514	882.973	27
38.50	1.517	849.186	26
40.25	1.514	908.398	27
40.00	1.513	900.195	27
39.75	1.513	891.740	27
39.25	1.515	874.137	27
39.00	1.511	868.055	26
38.75	1.516	858.517	26
37.50	1.521	811.375	25
36.50	1.532	772.815	24
35.50	1.543	734.086	24
34.50	1.557	694.528	24
33.50	1.605	654.327	23
32.50	1.641	611.099	21
31.50	1.617	569.827	20
30.50	1.634	528.772	20
32.25	1.644	600.824	21
32.00	1.608	591.040	20
31.75	1.612	580.375	20
31.25	1.621	559.396	20
31.00	1.625	549.078	20
30.75	1.629	538.871	20
29.50	1.652	489.083	20
28.50	1.711	448.965	19
27.50	1.759	412.740	18
26.50	1.730	377.432	16
25.50	1.764	342.871	16
27.25	1.705	404.520	16
27.00	1.714	395.376	16
26.75	1.722	386.347	16
26.25	1.738	368.629	16
26.00	1.747	359.936	16
25.75	1.756	351.350	16
24.50	1.802	309.947	15
23.50	1.856	277.520	15

THE LOWEST FACTOR OF SAFETY WAS 1.511 AT R = 39.00.

X = 135.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
48.50	1.821	923.229	28
47.50	1.757	912.178	28
46.50	1.695	900.076	28
45.50	1.635	886.809	28
44.50	1.587	869.494	27
43.50	1.567	850.346	27
42.50	1.550	829.486	27
41.50	1.535	807.001	27
40.50	1.520	784.410	25
39.50	1.514	758.141	25
38.50	1.510	730.964	25
37.50	1.509	702.770	25
36.50	1.507	674.606	23
35.50	1.521	642.202	23
37.25	1.509	695.544	25
37.00	1.510	687.743	24
36.75	1.511	680.230	24
36.25	1.509	666.694	22
36.00	1.513	658.506	23
35.75	1.517	650.339	23
34.50	1.531	610.187	22

2

33.50	1.548	577.180	22
32.50	1.571	543.267	21
31.50	1.600	509.597	20
30.50	1.653	472.459	20
29.50	1.710	435.373	19
28.50	1.756	400.434	18

2

THE LOWEST FACTOR OF SAFETY WAS 1.507 AT R = 36.50.

X = 125.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
48.50	1.530	1199.705	29
47.50	1.527	1164.620	29
46.50	1.526	1128.202	29
45.50	1.524	1092.032	28
44.50	1.537	1049.535	27
46.25	1.526	1118.862	29
46.00	1.527	1109.091	29
45.75	1.522	1102.463	28
45.25	1.528	1081.353	28
45.00	1.531	1070.709	28
44.75	1.534	1060.123	28
43.50	1.546	1007.162	26
42.50	1.560	963.628	26
41.50	1.578	919.043	26
40.50	1.600	874.488	24
39.50	1.642	824.809	24
38.50	1.678	775.848	23
37.50	1.696	728.310	22
36.50	1.720	679.299	20
35.50	1.751	630.936	21
34.50	1.803	583.396	20
33.50	1.843	538.020	20
32.50	1.857	495.796	17
31.50	1.904	453.668	17
30.50	1.962	412.031	17
29.50	2.059	370.170	17
28.50	2.164	330.706	16

THE LOWEST FACTOR OF SAFETY WAS 1.522 AT R = 45.75.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:

X = 130.00.

Y = 105.00.

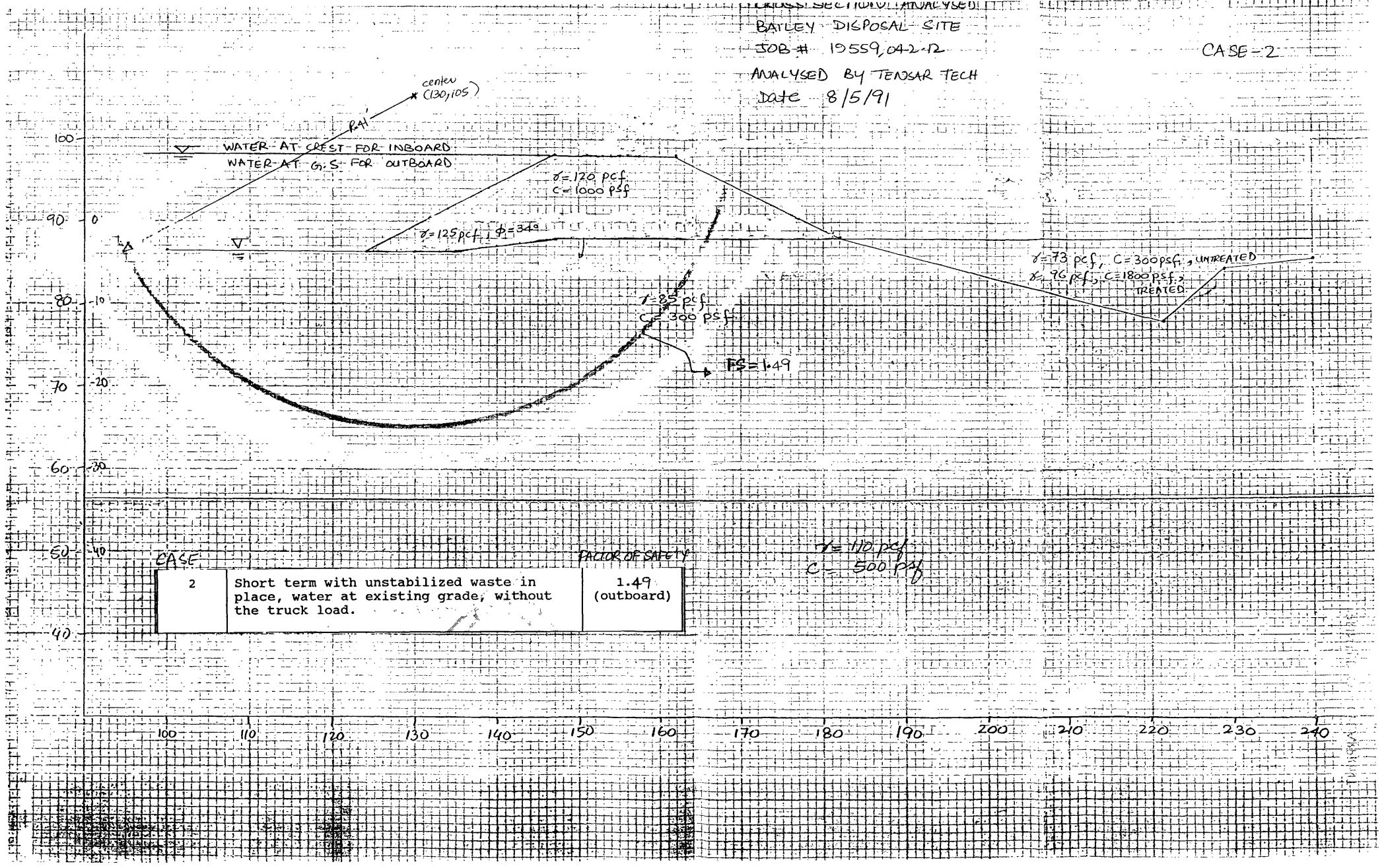
RADIUS OF CRITICAL CIRCLE = 41.00.

MINIMUM FACTOR OF SAFETY = 1.491.

CALCULATIONS HAVE BEEN COMPLETED.

CROSS SECTION ANALYSED
BATLEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY TENSAR TECH
Date 8/5/91

CASE-2



CASE		FACTOR OF SAFETY
2	Short term with unstabilized waste in place, water at existing grade, without the truck load.	1.49 (outboard)

Case	Description	Factor of Safety
2A	Case 2, but with the truck load.	1.33 (outboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0     0.
1.      50.     86.5
2.      124.    86.5
3.      147.    98.
4.      162.    98.
5.      182.    92.
6.      221.5   78.
7.      229.    84.5
8.      258.    88.
9.      135.    86.5
10.     182.    88.
11.     50.     56.5
12.     286.    56.5
13.     168.    99.5
14.     221.5   100.5
15.     266.    99.5
16.     271.    98.
17.     286.    98.
18.     286.    88.
19.     151.30  99.
20.     157.20  99.
21.     157.30  98.
22.     121.    92.
23.     131.    90.
24.     163.    92.
25.     151.2   98.
26.     147.    88.
27.     177.    90.
999.
13.
1.      2.      2.
2.      23.     6.
23.     3.      1.
3.      25.     1.
25.     19.     5.
19.     20.     5.
20.     21.     5.
21.     4.      1.
4.      27.     1.
27.     10.     6.
10.     8.      3.
8.      16.     1.
16.     17.     1.
10.     6.      2.
6.      7.      2.
7.      8.      2.
25.     21.     1.
23.     27.     6.
2.      9.      2.
9.      26.     2.
26.     10.     2.
8.      18.     2.
11.     12.     4.
999.
1.      .12     1.      0.      1.1     0.7
2.      .085    .3      0.      1.1     0.6
3.      .073    .3      0.      1.1     0.6
4.      .11     .5      0.      1.1     0.0
5.      .712    1.0     0.      1.1     0.0
6.      .125    0.      34.     1.1     0.9
99.
```

Case 2A

Validity of data &
Reasonableness of result
Checked by N. Khan
Date: 8/9/91

```
4.      0.      0.0624
50.     56.
148.    56.
160.    56.
286.    56.
0.
0.      0.      0.      .05
20.
56.5
76.5
20.
SEARCH
130.    110.    20.     20.
```

2A

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

2A

DATE 08-05-1991
TIME 15:09

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	151.20	98.00	.0000	1	*
5	151.20	98.00	151.30	99.00	9.9994	5	*
6	151.30	99.00	157.20	99.00	.0000	5	*
7	157.20	99.00	157.30	98.00	-9.9994	5	*
8	157.30	98.00	162.00	98.00	.0000	1	*
9	162.00	98.00	177.00	90.00	-.5333	1	*
10	177.00	90.00	182.00	88.00	-.4000	6	*
11	182.00	88.00	258.00	88.00	.0000	3	*
12	258.00	88.00	271.00	98.00	.7692	1	*
13	271.00	98.00	286.00	98.00	.0000	1	*
14	182.00	88.00	221.50	78.00	-.2532	2	
15	221.50	78.00	229.00	84.50	.8667	2	
16	229.00	84.50	258.00	88.00	.1207	2	
17	151.20	98.00	157.30	98.00	.0000	1	
18	131.00	90.00	177.00	90.00	.0000	6	
19	124.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	147.00	88.00	.1250	2	
21	147.00	88.00	182.00	88.00	.0000	2	
22	258.00	88.00	286.00	88.00	.0000	2	
23	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	56.00
2	148.00	56.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

2A

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 130.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 130.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.546	1255.058	29
52.50	1.495	1240.436	28
51.50	1.448	1223.172	28
50.50	1.419	1202.550	28
49.50	1.402	1179.847	28
48.50	1.386	1155.030	27
47.50	1.370	1130.421	26
46.50	1.361	1100.964	26
45.50	1.354	1070.266	26
44.50	1.349	1038.037	25
43.50	1.342	1006.358	24
42.50	1.346	969.356	24
44.25	1.348	1029.844	25
44.00	1.347	1021.549	25
43.75	1.342	1015.461	24
43.25	1.343	997.248	24
43.00	1.343	988.127	24
42.75	1.344	978.779	24
41.50	1.351	931.698	24
40.50	1.356	893.587	22
39.50	1.365	854.379	22
38.50	1.380	813.347	22
37.50	1.405	769.332	22
36.50	1.432	725.223	21
35.50	1.457	682.057	21
34.50	1.500	639.329	20
33.50	1.546	595.138	18

THE LOWEST FACTOR OF SAFETY WAS 1.342 AT R = 43.75.

X = 150.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	7.156	270.965	29
52.50	6.889	268.809	28
51.50	6.698	263.905	28
50.50	6.505	259.035	28
49.50	6.310	254.205	28
48.50	6.119	249.194	27
47.50	5.875	246.340	26
46.50	5.688	241.202	26

2A

45.50	5.500	236.076	26
44.50	5.320	230.583	25
43.50	5.069	228.117	24
42.50	4.885	222.834	24
41.50	4.695	217.765	24
40.50	4.517	211.970	23
39.50	4.307	207.737	23
38.50	4.074	204.524	21
37.50	3.933	196.932	21
36.50	3.805	188.704	20
35.50	3.703	179.236	20
34.50	3.628	168.691	20
33.50	3.584	158.129	20

THE LOWEST FACTOR OF SAFETY WAS 3.584 AT R = 33.50.

X = 110.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.688	1432.167	28
52.50	1.706	1362.572	27

D(FS)/DR IS NEGATIVE AT RMAX.

51.50	1.743	1293.260	27
50.50	1.778	1224.981	26
49.50	1.808	1157.294	25
48.50	1.875	1089.463	25
47.50	1.980	991.710	24
46.50	2.090	895.819	24
45.50	2.216	800.203	23
44.50	2.406	706.481	23
43.50	2.625	617.578	23
42.50	2.761	541.342	20
41.50	2.947	483.567	20
40.50	3.169	428.013	18
39.50	3.430	374.229	18
38.50	3.714	322.779	17
37.50	4.046	273.599	16
36.50	4.472	227.336	15
35.50	5.005	185.242	15
34.50	5.686	147.362	15
33.50	6.619	113.004	14

THE LOWEST FACTOR OF SAFETY WAS 1.688 AT R = 53.50.

X = 130.00, Y = 130.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
73.50	2.300	1337.649	29
72.50	2.228	1329.887	29
71.50	2.153	1323.544	27
70.50	2.083	1315.186	27
69.50	2.012	1307.120	27
68.50	1.942	1299.252	27
67.50	1.871	1291.479	27
66.50	1.803	1282.641	25
65.50	1.740	1271.101	25
64.50	1.681	1257.179	25
63.50	1.626	1240.734	25
62.50	1.576	1220.760	25
61.50	1.538	1197.737	24
60.50	1.527	1174.437	23

2A

59.50	1.525	1144.716	23
58.50	1.527	1112.887	23
60.25	1.526	1167.198	23
60.00	1.526	1159.833	23
59.75	1.525	1152.339	23
59.25	1.525	1136.961	23
59.00	1.526	1129.072	23
58.75	1.526	1121.048	23
57.50	1.533	1078.736	22
56.50	1.545	1042.227	22
55.50	1.564	1002.162	22
54.50	1.591	959.562	21
53.50	1.624	915.797	21

THE LOWEST FACTOR OF SAFETY WAS 1.525 AT R = 59.50.

X = 130.00, Y = 90.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
-- 2 FAILURE SURFACES FOR R= 28.50 (IDENTIFIED LEFT TO RIGHT)
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 59.50.

X = 135.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.892	1024.797	30
52.50	1.819	1018.662	29
51.50	1.740	1015.268	27
50.50	1.676	1005.366	27
49.50	1.614	994.210	27
48.50	1.555	981.501	26
47.50	1.499	967.688	26
46.50	1.450	950.091	26
45.50	1.430	930.566	26
44.50	1.413	908.953	25
43.50	1.394	888.183	24
42.50	1.384	862.442	24
41.50	1.377	835.622	24

2A

40.50	1.371	807.325	23
39.50	1.364	780.255	22
38.50	1.368	748.136	22
40.25	1.370	800.219	23
40.00	1.369	793.024	23
39.75	1.369	785.737	23
39.25	1.365	772.256	22
39.00	1.366	764.253	22
38.75	1.367	756.246	22
37.50	1.377	714.907	22
36.50	1.385	681.594	21
35.50	1.397	647.877	20
34.50	1.416	612.511	20
33.50	1.447	574.361	20

THE LOWEST FACTOR OF SAFETY WAS 1.364 AT R = 39.50.

X = 125.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
53.50	1.412	1423.653	29
52.50	1.395	1398.429	28
51.50	1.386	1366.226	28
50.50	1.379	1332.693	28
49.50	1.373	1297.724	28
48.50	1.369	1261.122	27
47.50	1.366	1224.086	26
46.50	1.371	1181.873	26
48.25	1.369	1251.678	27
48.00	1.365	1244.598	26
47.75	1.365	1234.349	26
47.25	1.367	1213.607	26
47.00	1.368	1203.029	26
46.75	1.369	1192.448	26
45.50	1.374	1139.686	25
44.50	1.382	1095.879	24
43.50	1.392	1050.941	24
42.50	1.410	1002.961	24
41.50	1.433	953.024	24
40.50	1.458	903.171	23
39.50	1.480	854.136	22
38.50	1.510	804.650	21
37.50	1.547	753.638	20
36.50	1.576	702.129	19
35.50	1.597	654.424	19
34.50	1.603	610.625	19
33.50	1.715	547.829	18

THE LOWEST FACTOR OF SAFETY WAS 1.365 AT R = 48.00.

X = 130.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
58.50	1.712	1288.629	28
57.50	1.654	1277.980	27
56.50	1.598	1266.125	27
55.50	1.544	1252.558	27
54.50	1.494	1237.123	27
53.50	1.448	1218.130	27
52.50	1.424	1196.557	26
51.50	1.409	1173.003	26

2A

50.50	1.393	1149.428	25
49.50	1.384	1120.418	25
48.50	1.378	1089.855	24
47.50	1.373	1058.115	24
46.50	1.372	1024.379	24
45.50	1.377	987.374	24
47.25	1.373	1049.920	24
47.00	1.372	1041.617	24
46.75	1.372	1033.202	24
46.25	1.373	1015.164	24
46.00	1.374	1005.925	24
45.75	1.375	996.661	24
44.50	1.386	948.608	23
43.50	1.396	909.921	23
42.50	1.408	870.226	22
41.50	1.428	828.267	22
40.50	1.456	783.087	21
39.50	1.487	737.789	21
38.50	1.523	692.408	21

THE LOWEST FACTOR OF SAFETY WAS 1.372 AT R = 46.75.

X = 130.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
48.50	1.423	1200.400	29
47.50	1.405	1177.610	29
46.50	1.389	1152.949	29
45.50	1.370	1129.204	28
44.50	1.361	1099.391	27
43.50	1.352	1068.902	27
42.50	1.345	1037.319	27
41.50	1.339	1004.322	27
40.50	1.336	970.384	25
39.50	1.338	933.296	25
41.25	1.338	995.629	27
41.00	1.333	989.283	26
40.75	1.334	979.777	25
40.25	1.337	961.021	25
40.00	1.338	951.705	25
39.75	1.338	942.455	25
38.50	1.340	895.698	24
37.50	1.345	857.164	24
36.50	1.354	817.431	23
35.50	1.371	776.767	22
34.50	1.395	733.706	22
33.50	1.413	691.514	21
32.50	1.411	650.324	19
31.50	1.435	607.860	19
33.25	1.415	681.193	21
33.00	1.415	671.103	21
32.75	1.410	661.039	19
32.25	1.411	639.695	19
32.00	1.416	629.063	19
31.75	1.425	618.402	19
30.50	1.467	566.042	18
29.50	1.493	524.524	18
28.50	1.494	486.952	17

THE LOWEST FACTOR OF SAFETY WAS 1.333 AT R = 41.00.

X = 130.00, Y = 100.00:

2A

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
43.50	1.384	1114.607	28
42.50	1.376	1083.897	28
41.50	1.368	1052.464	28
40.50	1.360	1020.136	27
39.50	1.354	986.569	27
38.50	1.350	952.782	26
37.50	1.347	914.971	25
36.50	1.349	876.411	24
38.25	1.346	943.547	25
38.00	1.346	934.043	25
37.75	1.347	924.518	25
37.25	1.348	905.402	25
37.00	1.348	895.809	25
36.75	1.349	886.010	24
35.50	1.350	837.682	24
34.50	1.353	798.124	24
33.50	1.383	757.923	23
32.50	1.400	714.695	21
31.50	1.365	673.423	20
30.50	1.363	632.368	20
29.50	1.368	592.679	20
31.25	1.364	662.992	20
31.00	1.364	652.674	20
30.75	1.363	642.467	20
30.25	1.362	622.373	20
30.00	1.361	612.478	20
29.75	1.360	602.664	20
28.50	1.411	552.561	19
27.50	1.429	516.336	18
26.50	1.482	465.873	17
25.50	1.556	412.799	17
24.50	1.644	362.076	16
23.50	1.718	312.562	16

THE LOWEST FACTOR OF SAFETY WAS 1.346 AT R = 38.25.

X = 135.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
48.50	1.672	1005.465	28
47.50	1.612	994.414	28
46.50	1.553	982.312	28
45.50	1.496	969.045	28
44.50	1.450	951.730	27
43.50	1.428	932.582	27
42.50	1.409	911.722	27
41.50	1.393	889.237	27
40.50	1.375	866.646	25
39.50	1.365	840.377	25
38.50	1.356	813.200	25
37.50	1.349	785.006	25
36.50	1.342	756.842	23
35.50	1.347	724.438	23
37.25	1.348	777.780	25
37.00	1.347	769.979	24
36.75	1.347	762.466	24
36.25	1.342	748.930	22
36.00	1.344	740.742	23
35.75	1.345	732.575	23

34.50	1.347	692.423	22
33.50	1.353	659.416	22
32.50	1.362	625.503	21
31.50	1.374	591.833	20
30.50	1.404	554.695	20
29.50	1.434	517.609	19
28.50	1.452	482.670	18

2A

THE LOWEST FACTOR OF SAFETY WAS 1.342 AT R = 36.50.

X = 125.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
48.50	1.385	1324.661	29
47.50	1.378	1289.576	29
46.50	1.373	1253.158	29
45.50	1.367	1216.988	28
44.50	1.372	1174.491	27
46.25	1.372	1243.818	29
46.00	1.372	1234.047	29
45.75	1.366	1227.419	28
45.25	1.369	1206.308	28
45.00	1.370	1195.665	28
44.75	1.371	1185.079	28
43.50	1.374	1132.118	26
42.50	1.379	1088.584	26
41.50	1.387	1043.999	26
40.50	1.398	999.444	24
39.50	1.424	949.765	24
38.50	1.443	900.804	23
37.50	1.444	853.266	22
36.50	1.449	804.255	20
35.50	1.485	755.892	21
34.50	1.510	708.352	20
33.50	1.522	662.976	20
32.50	1.590	611.477	18
31.50	1.674	546.564	18
30.50	1.747	482.856	18
29.50	1.885	419.635	18
28.50	2.070	359.523	17

THE LOWEST FACTOR OF SAFETY WAS 1.366 AT R = 45.75.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:

X = 130.00.

Y = 105.00.

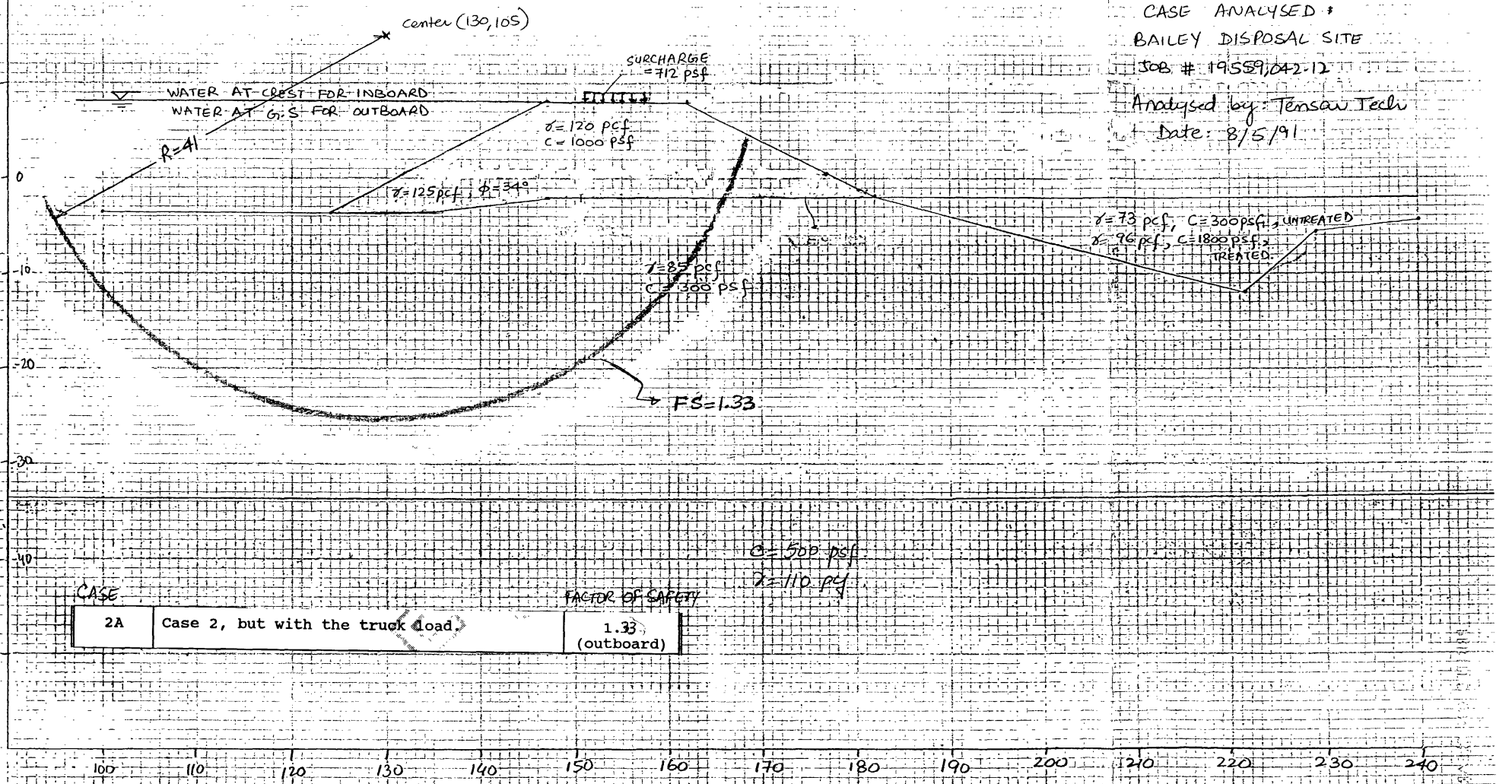
RADIUS OF CRITICAL CIRCLE = 41.00.

MINIMUM FACTOR OF SAFETY = 1.333.

CALCULATIONS HAVE BEEN COMPLETED.

CASE 2A

CASE ANALYSED:
BAILEY DISPOSAL SITE
JOB # 19559,042-12
Analysed by: Tensar Tech
Date: 8/5/91



CASE		FACTOR OF SAFETY
2A	Case 2, but with the truck load.	1.33 (outboard)

Case	Description	Factor of Safety
3	Short term with waste excavated and water at the existing grade, without the truck load and with 5 layers of geogrid installed.	1.42 (inboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0     0.
1.      50.     86.5
2.      108.    86.5
3.      147.    98.
4.      162.    98.
5.      182.    92.
6.      221.5   78.
7.      229.    84.5
8.      258.    92.
9.      135.    86.5
10.     174.    92.
11.     50.     56.5
12.     286.    56.5
13.     168.    99.5
14.     221.5   100.5
15.     266.    99.5
16.     271.    98.
17.     286.    98.
18.     286.    92.
19.     151.30  99.
20.     157.20  99.
21.     157.30  98.
22.     121.    92.
23.     135.    92.
24.     163.    92.
25.     151.2   98.
26.     115.    90.
27.     160.    90.
999.
12.
1.      2.      2.
2.      26.     6.
26.     22.     1.
22.     23.     1.
23.     3.      1.
3.      4.      1.
4.      10.     1.
10.     6.      2.
6.      7.      2.
7.      8.      2.
8.      16.     1.
16.     17.     1.
26.     27.     6.
2.      9.      2.
9.      27.     2.
27.     10.     2.
8.      18.     2.
11.     12.     4.
999.
1.      .12     1.      0.      1.1     0.7
2.      .085    .3      0.      1.1     0.6
3.      .096    1.8     0.      1.1     0.6
4.      .11     .5      0.      1.1     0.0
5.      .00001  1.      0.      1.1     0.0
6.      .125    0.      34.     1.1     0.9
99.
4.      0.      0.0624
50.     90.
148.    90.
160.    60.
286.    60.
```

CASE 3

- Validity of data
- Reasonableness of det Result

checked by N. Khan.
date 8/9/91

```
0.
0.      6.      0.      .05
86.5    109     135.    4.      1.      1.5
90.25   130.    155.    4.      1.      1.5
90.5    117.    157.    4.00    1.      1.5
91.0    119.    161.    4.00    1.      1.5
91.5    120.    165.    4.00    1.      1.5
92.5    138.    172.    4.00    1.      1.5
20.
56.5
76.5
20.
SEARCH
175.    130.    20.     20.
```

Case 3

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

Case 3

DATE 08-06-1991
TIME 16:48

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	108.00	86.50	.0000	2	*
2	108.00	86.50	115.00	90.00	.5000	6	*
3	115.00	90.00	121.00	92.00	.3333	1	*
4	121.00	92.00	135.00	92.00	.0000	1	*
5	135.00	92.00	147.00	98.00	.5000	1	*
6	147.00	98.00	162.00	98.00	.0000	1	*
7	162.00	98.00	174.00	92.00	-.5000	1	*
8	174.00	92.00	221.50	78.00	-.2947	2	*
9	221.50	78.00	229.00	84.50	.8667	2	*
10	229.00	84.50	258.00	92.00	.2586	2	*
11	258.00	92.00	271.00	98.00	.4615	1	*
12	271.00	98.00	286.00	98.00	.0000	1	*
13	115.00	90.00	160.00	90.00	.0000	6	
14	108.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	160.00	90.00	.1400	2	
16	160.00	90.00	174.00	92.00	.1429	2	
17	258.00	92.00	286.00	92.00	.0000	2	
18	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	90.00
2	148.00	90.00
3	160.00	60.00
4	286.00	60.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	86.50	109.00	135.00	100.
2	90.25	130.00	155.00	100.
3	90.50	117.00	157.00	100.
4	91.00	119.00	161.00	100.
5	91.50	120.00	165.00	100.
6	92.50	138.00	172.00	100.

Case 3

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	4.00	4.00	1.5
2	4.00	4.00	1.5
3	4.00	4.00	1.5
4	4.00	4.00	1.5
5	4.00	4.00	1.5
6	4.00	4.00	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 175.00, INITIAL Y = 130.00.
DELX = 20.00, DELY = 20.00.

X = 175.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.505	1.505	1.451	2086.0	.054	31
72.50	1.486	1.486	1.419	2049.4	.067	31
71.50	1.479	1.479	1.398	2008.7	.082	31
70.50	1.477	1.477	1.379	1963.3	.098	30
69.50	1.435	1.435	1.297	1894.2	.138	28
68.50	1.514	1.514	1.324	1806.9	.190	28
70.25	1.463	1.463	1.361	1949.1	.102	29
70.00	1.450	1.450	1.338	1934.4	.112	29
69.75	1.416	1.416	1.291	1915.7	.125	28
69.25	1.455	1.455	1.303	1872.5	.151	28
69.00	1.474	1.474	1.310	1850.5	.164	28
68.75	1.494	1.494	1.317	1828.7	.177	28
67.50	1.607	1.607	1.351	1722.0	.256	27
66.50	1.722	1.722	1.384	1633.4	.339	26
65.50	1.819	1.819	1.408	1548.4	.411	25
64.50	1.905	1.905	1.425	1466.4	.480	25
63.50	1.959	1.959	1.442	1387.5	.517	25
62.50	1.978	1.978	1.457	1312.9	.521	24
61.50	2.002	2.002	1.475	1238.0	.526	23
60.50	2.020	2.020	1.490	1168.9	.530	23
59.50	2.067	2.067	1.505	1102.9	.562	23
58.50	2.157	2.157	1.519	1040.1	.638	22
57.50	2.274	2.274	1.539	978.3	.735	22
56.50	2.379	2.379	1.563	919.3	.816	21

55.50	2.445	2.445	1.584	865.1	.860	21
54.50	2.534	2.534	1.629	815.7	.905	19
53.50	2.661	2.661	1.703	763.5	.958	19

THE LOWEST FACTOR OF SAFETY WAS 1.416 AT R = 69.75.

case 3

X = 195.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	2.220	2.220	1.796	1894.9	.424	30
72.50	2.202	2.202	1.748	1878.5	.454	30
71.50	2.158	2.158	1.703	1860.6	.455	30
70.50	2.130	2.130	1.673	1837.5	.458	28
69.50	2.113	2.113	1.653	1814.3	.460	28
68.50	2.097	2.097	1.634	1788.5	.463	27
67.50	2.116	2.116	1.624	1753.3	.492	27
69.25	2.109	2.109	1.648	1807.6	.461	28
69.00	2.101	2.101	1.640	1804.4	.461	27
68.75	2.099	2.099	1.637	1796.6	.462	27
68.25	2.095	2.095	1.631	1780.1	.464	27
68.00	2.101	2.101	1.628	1771.5	.473	27
67.75	2.109	2.109	1.626	1762.5	.483	27
66.50	2.153	2.153	1.619	1710.9	.533	26
65.50	2.192	2.192	1.616	1668.2	.576	26
64.50	2.233	2.233	1.616	1620.7	.616	26
63.50	2.254	2.254	1.622	1568.3	.632	26
62.50	2.285	2.285	1.634	1509.0	.651	25
61.50	2.325	2.325	1.652	1446.2	.673	25
60.50	2.373	2.373	1.674	1379.6	.699	25
59.50	2.436	2.436	1.705	1307.2	.731	24
58.50	2.463	2.463	1.744	1232.2	.719	24
-- 2 FAILURE SURFACES FOR R= 57.50 (IDENTIFIED LEFT TO RIGHT)						
57.50	2.286	2.286	1.598	1156.0	.688	20
57.50	15.815	15.815	15.815	8.1	.000	6
56.50	2.329	2.329	1.691	1043.4	.638	19
-- 2 FAILURE SURFACES FOR R= 58.25 (IDENTIFIED LEFT TO RIGHT)						
58.25	2.224	2.224	1.525	1242.2	.700	21
58.25	7.643	7.643	7.643	29.2	.000	6
-- 2 FAILURE SURFACES FOR R= 58.00 (IDENTIFIED LEFT TO RIGHT)						
58.00	2.251	2.251	1.550	1213.5	.702	21
58.00	9.220	9.220	9.220	21.0	.000	6
-- 2 FAILURE SURFACES FOR R= 57.75 (IDENTIFIED LEFT TO RIGHT)						
57.75	2.274	2.274	1.576	1184.9	.698	21
57.75	11.638	11.638	11.638	13.9	.000	6
-- 2 FAILURE SURFACES FOR R= 57.25 (IDENTIFIED LEFT TO RIGHT)						
57.25	2.297	2.297	1.620	1127.5	.676	20
57.25	24.735	24.735	24.735	3.6	.000	6
-- 2 FAILURE SURFACES FOR R= 57.00 (IDENTIFIED LEFT TO RIGHT)						
57.00	2.309	2.309	1.645	1098.2	.665	19
57.00	56.574	56.574	56.574	.8	.000	6
56.75	2.319	2.319	1.668	1070.6	.652	19
55.50	2.422	2.422	1.792	938.4	.630	19
54.50	2.548	2.548	1.911	837.5	.637	19
53.50	2.696	2.696	2.062	737.8	.633	17

THE LOWEST FACTOR OF SAFETY WAS 2.095 AT R = 68.25.

X = 155.00 , Y = 130.00 :

Case 3

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	3.560	3.560	3.560	812.0	.000	31
72.50	3.633	3.633	3.633	767.2	.000	30
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	3.717	3.717	3.717	722.2	.000	30
70.50	3.799	3.799	3.799	680.0	.000	30
69.50	3.880	3.880	3.880	640.3	.000	30
68.50	3.969	3.969	3.969	601.1	.000	29
67.50	4.027	4.027	4.027	568.6	.000	28
66.50	4.093	4.093	4.093	536.4	.000	28
65.50	4.148	4.148	4.148	506.8	.000	28
64.50	4.193	4.193	4.193	479.6	.000	28
63.50	4.233	4.233	4.233	453.9	.000	28
62.50	4.311	4.311	4.279	428.6	.032	26
61.50	4.414	4.414	4.336	403.5	.078	26
60.50	4.531	4.531	4.397	379.1	.133	26
59.50	4.667	4.667	4.468	355.4	.200	26
58.50	4.820	4.820	4.539	332.8	.280	25
57.50	5.061	5.061	4.677	307.4	.384	24
56.50	5.308	5.308	4.802	285.4	.506	24
55.50	5.726	5.726	5.068	262.8	.658	24
54.50	6.329	6.329	5.424	238.5	.905	24
53.50	7.061	7.061	5.830	215.0	1.231	23

THE LOWEST FACTOR OF SAFETY WAS 3.560 AT R = 73.50.

X = 175.00 , Y = 150.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
93.50	1.983	1.983	1.983	2222.9	.000	31
92.50	1.913	1.913	1.913	2220.4	.000	31
91.50	1.849	1.849	1.848	2212.8	.001	29
90.50	1.801	1.801	1.789	2199.0	.012	29
89.50	1.759	1.759	1.734	2179.4	.025	29
88.50	1.723	1.723	1.684	2153.9	.038	29
87.50	1.693	1.693	1.640	2120.9	.053	28
86.50	1.670	1.670	1.599	2081.9	.071	28
-- 2 FAILURE SURFACES FOR R= 85.50 (IDENTIFIED LEFT TO RIGHT)						
85.50	1.499	1.499	1.409	2052.2	.090	25
85.50	15.851	15.851	15.851	15.6	.000	6
84.50	1.546	1.546	1.431	1957.2	.115	25
86.25	1.666	1.666	1.590	2071.1	.076	28
86.00	1.661	1.661	1.581	2060.0	.081	28
85.75	1.658	1.658	1.572	2048.6	.086	28
-- 2 FAILURE SURFACES FOR R= 85.25 (IDENTIFIED LEFT TO RIGHT)						
85.25	1.508	1.508	1.412	2028.4	.096	25
85.25	26.948	26.948	26.948	6.4	.000	6
-- 2 FAILURE SURFACES FOR R= 85.00 (IDENTIFIED LEFT TO RIGHT)						
85.00	1.518	1.518	1.416	2004.7	.102	25
85.00 F.O.S. VERY LARGE (SUMWSA LESS THAN .01)						
84.75	1.530	1.530	1.422	1981.0	.108	25
83.50	1.616	1.616	1.472	1862.1	.144	25
82.50	1.720	1.720	1.518	1766.6	.202	24
81.50	1.825	1.825	1.569	1668.8	.256	23
80.50	1.974	1.974	1.620	1574.8	.354	23

Case 3

79.50	2.160	2.160	1.679	1480.6	.481	23
78.50	2.335	2.335	1.719	1389.3	.615	21
77.50	2.455	2.455	1.757	1299.4	.697	21
76.50	2.511	2.511	1.797	1212.4	.714	20
75.50	2.557	2.557	1.834	1131.8	.722	20
74.50	2.659	2.659	1.876	1053.2	.782	20
73.50	2.870	2.870	1.926	978.4	.943	20

THE LOWEST FACTOR OF SAFETY WAS 1.499 AT R = 85.50.

X = 175.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.617	1.617	1.271	1501.5	.347	29
52.50	1.624	1.624	1.277	1431.6	.347	29
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	1.630	1.630	1.282	1364.4	.348	29
50.50	1.634	1.634	1.286	1300.0	.348	29
49.50	1.637	1.637	1.289	1238.0	.348	27
48.50	1.656	1.656	1.291	1178.9	.365	27
47.50	1.684	1.684	1.292	1122.6	.392	27
46.50	1.712	1.712	1.290	1068.8	.422	27
45.50	1.759	1.759	1.291	1016.2	.467	27
44.50	1.787	1.787	1.293	965.9	.494	26
43.50	1.812	1.812	1.300	920.1	.512	24
42.50	1.858	1.858	1.326	872.9	.532	24
41.50	1.910	1.910	1.355	826.2	.555	24
40.50	1.984	1.984	1.388	778.9	.596	23
39.50	2.079	2.079	1.419	735.2	.661	22
38.50	2.194	2.194	1.459	689.4	.734	22
37.50	2.320	2.320	1.504	644.5	.816	22
36.50	2.438	2.438	1.556	599.4	.882	21
35.50	2.546	2.546	1.610	556.6	.935	20
34.50	2.672	2.672	1.674	513.4	.998	21
33.50	2.833	2.833	1.760	469.3	1.073	21

THE LOWEST FACTOR OF SAFETY WAS 1.617 AT R = 53.50.

X = 180.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.627	1.627	1.496	2161.4	.130	30
72.50	1.622	1.622	1.451	2124.5	.172	30
71.50	1.662	1.662	1.433	2084.6	.228	29
73.25	1.605	1.605	1.464	2152.9	.141	30
73.00	1.611	1.611	1.460	2143.7	.151	30
72.75	1.617	1.617	1.455	2134.3	.161	30
72.25	1.633	1.633	1.447	2114.6	.186	30
72.00	1.646	1.646	1.443	2104.3	.204	30
71.75	1.654	1.654	1.437	2095.8	.217	29
70.50	1.711	1.711	1.420	2036.9	.291	29
69.50	1.742	1.742	1.401	1984.2	.341	27
68.50	1.761	1.761	1.378	1931.3	.383	27
67.50	1.755	1.755	1.355	1876.2	.401	27

-- 2 FAILURE SURFACES FOR R= 66.50 (IDENTIFIED LEFT TO RIGHT)

Case 3

66.50	1.624	1.624	1.229	1819.0	.395	23
66.50 F.O.S. VERY LARGE (SUMWSA LESS THAN .01)						
65.50	1.638	1.638	1.241	1727.2	.397	23
67.25	1.748	1.748	1.349	1862.1	.399	27
67.00	1.739	1.739	1.342	1850.3	.397	26
66.75	1.721	1.721	1.325	1835.6	.396	25
66.25	1.628	1.628	1.232	1795.7	.396	23
66.00	1.631	1.631	1.235	1772.6	.396	23
65.75	1.635	1.635	1.238	1749.8	.396	23
64.50	1.651	1.651	1.253	1639.1	.398	23
63.50	1.679	1.679	1.265	1553.3	.414	22
62.50	1.732	1.732	1.275	1472.6	.457	22
61.50	1.811	1.811	1.289	1393.0	.522	22
60.50	1.893	1.893	1.304	1317.8	.589	22
59.50	1.939	1.939	1.320	1246.2	.618	22
58.50	1.998	1.998	1.349	1176.8	.650	20
57.50	2.077	2.077	1.395	1112.1	.682	19
56.50	2.170	2.170	1.451	1044.7	.720	19
55.50	2.322	2.322	1.513	978.3	.809	19
54.50	2.505	2.505	1.583	912.6	.922	19
53.50	2.716	2.716	1.664	847.0	1.052	18

THE LOWEST FACTOR OF SAFETY WAS 1.605 AT R = 73.25.

X = 170.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.514	1.514	1.501	1905.7	.013	31
72.50	1.489	1.489	1.465	1834.2	.024	30
71.50	1.505	1.505	1.469	1761.8	.036	30
73.25	1.488	1.488	1.472	1889.4	.016	31
73.00	1.481	1.481	1.463	1870.9	.018	30
72.75	1.485	1.485	1.464	1852.5	.021	30
72.25	1.493	1.493	1.466	1816.0	.027	30
72.00	1.497	1.497	1.467	1797.9	.030	30
71.75	1.501	1.501	1.468	1779.8	.033	30
70.50	1.524	1.524	1.473	1690.6	.050	30
69.50	1.544	1.544	1.477	1621.8	.067	29
68.50	1.572	1.572	1.486	1550.8	.086	29
67.50	1.614	1.614	1.506	1480.6	.108	28
66.50	1.670	1.670	1.537	1412.5	.133	28
65.50	1.759	1.759	1.572	1344.7	.187	28
64.50	1.871	1.871	1.611	1275.7	.260	28
63.50	1.992	1.992	1.650	1209.1	.342	27
62.50	2.155	2.155	1.697	1139.8	.458	26
61.50	2.300	2.300	1.735	1072.9	.565	25
60.50	2.425	2.425	1.762	1008.6	.663	25
59.50	2.500	2.500	1.786	948.5	.715	24
58.50	2.542	2.542	1.816	887.7	.726	23
57.50	2.577	2.577	1.841	832.3	.735	23
56.50	2.608	2.608	1.865	779.7	.743	23
55.50	2.728	2.728	1.890	729.2	.838	23
54.50	2.898	2.898	1.918	681.6	.980	22
53.50	3.097	3.097	1.955	635.6	1.142	21

THE LOWEST FACTOR OF SAFETY WAS 1.481 AT R = 73.00.

X = 175.00 , Y = 135.00 :

Case 3

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
78.50	1.591	1.591	1.558	2150.6	.033	30
77.50	1.563	1.563	1.518	2120.3	.045	29
76.50	1.539	1.539	1.481	2087.3	.058	29
75.50	1.521	1.521	1.448	2049.0	.073	29
74.50	1.514	1.514	1.425	2006.4	.089	29
73.50	1.420	1.420	1.313	1954.0	.107	26
72.50	1.492	1.492	1.341	1865.2	.151	26
74.25	1.515	1.515	1.422	1994.9	.093	29
74.00	1.517	1.517	1.419	1983.1	.098	29
73.75	1.500	1.500	1.398	1969.7	.102	27
73.25	1.432	1.432	1.320	1931.8	.112	26
73.00	1.448	1.448	1.327	1909.6	.122	26
72.75	1.470	1.470	1.334	1887.5	.136	26
71.50	1.584	1.584	1.374	1774.0	.209	25
70.50	1.680	1.680	1.406	1687.3	.274	24
69.50	1.808	1.808	1.442	1599.2	.366	24
68.50	1.922	1.922	1.471	1512.1	.450	23
67.50	2.018	2.018	1.492	1428.1	.525	23
66.50	2.077	2.077	1.513	1347.1	.563	21
65.50	2.103	2.103	1.534	1269.8	.569	21
64.50	2.129	2.129	1.554	1196.0	.574	21
63.50	2.152	2.152	1.574	1125.5	.578	21
62.50	2.251	2.251	1.595	1057.1	.656	21
61.50	2.390	2.390	1.624	989.7	.767	20
60.50	2.538	2.538	1.651	929.0	.887	20
59.50	2.621	2.621	1.682	871.4	.939	20
58.50	2.709	2.709	1.718	819.2	.991	18

THE LOWEST FACTOR OF SAFETY WAS 1.420 AT R = 73.50.

X = 175.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.451	1.451	1.373	2000.8	.078	32
67.50	1.452	1.452	1.359	1956.5	.093	31
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.444	1.444	1.307	1900.3	.137	30
65.50	1.472	1.472	1.288	1818.3	.183	29
67.25	1.451	1.451	1.347	1944.7	.103	31
67.00	1.450	1.450	1.336	1930.3	.114	30
66.75	1.447	1.447	1.322	1916.3	.125	30
66.25	1.436	1.436	1.288	1881.9	.148	30
66.00	1.436	1.436	1.276	1860.8	.160	29
65.75	1.454	1.454	1.282	1839.5	.171	29
64.50	1.564	1.564	1.313	1734.2	.251	29
63.50	1.664	1.664	1.338	1651.3	.326	28
62.50	1.745	1.745	1.356	1567.8	.389	27
61.50	1.815	1.815	1.370	1487.4	.445	27
60.50	1.858	1.858	1.384	1409.4	.474	26
59.50	1.871	1.871	1.395	1337.7	.477	25
58.50	1.888	1.888	1.408	1266.4	.480	25
57.50	1.902	1.902	1.420	1198.3	.482	25
56.50	1.931	1.931	1.431	1133.3	.500	25
55.50	1.993	1.993	1.442	1070.5	.552	24

54.50	2.082	2.082	1.452	1011.9	.630	23
53.50	2.181	2.181	1.467	954.9	.714	23
52.50	2.233	2.233	1.483	901.0	.751	23
51.50	2.302	2.302	1.512	848.7	.790	21
50.50	2.390	2.390	1.561	801.2	.829	20
49.50	2.499	2.499	1.624	750.8	.876	20
48.50	2.674	2.674	1.694	701.2	.981	20

Case 3

THE LOWEST FACTOR OF SAFETY WAS 1.436 AT R = 66.00.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 175.00.
Y = 130.00.
RADIUS OF CRITICAL CIRCLE = 69.75.

MINIMUM FS = 1.416 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.416.
FS (UNREINFORCED) = 1.291.
TOTAL DRIVING MOMENT = 1915.74 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 60.25.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
86.50 (PULL OUT STRESS = 3.08 KIPS/FT)
90.50 (PULL OUT STRESS = .48 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.

CASE-3

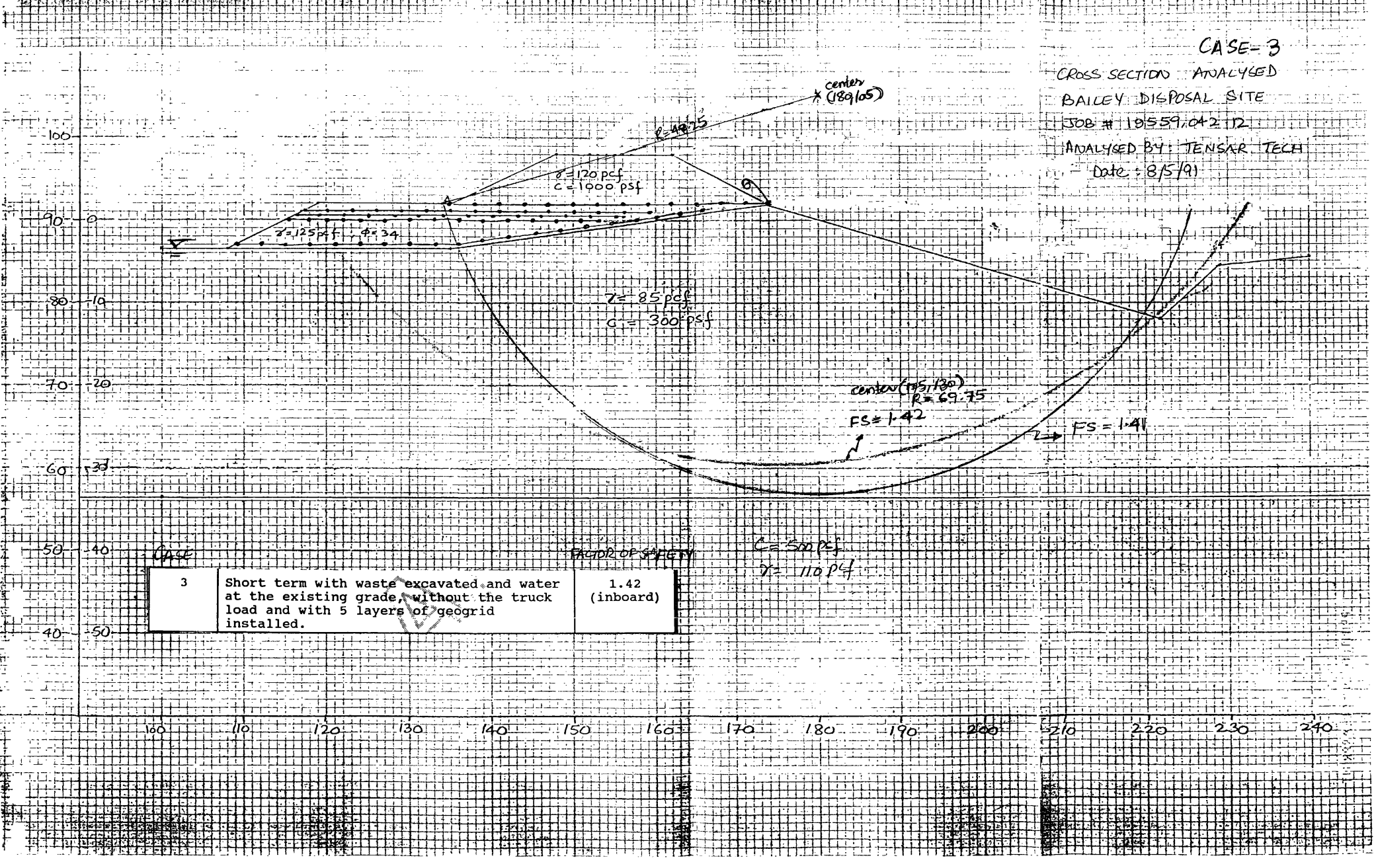
CROSS SECTION ANALYSED

BAILEY DISPOSAL SITE

JOB # 19559.042.12

ANALYSED BY: TENSAR TECH

Date: 8/5/91



CASE		FACTOR OF SAFETY
3	Short term with waste excavated and water at the existing grade, without the truck load and with 5 layers of geogrid installed.	1.42 (inboard)

Case	Description	Factor of Safety
3A	Case 3, but with the truck load.	1.35 (inboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        108.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      92.
9.        135.      86.5
10.       174.      92.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      92.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       135.      92.
24.       163.      92.
25.       151.2     98.
26.       115.      90.
27.       160.      90.
999.
16.
1.        2.        2.
2.        26.       6.
26.       22.       1.
22.       23.       1.
23.       3.        1.
3.        25.       1.
25.       19.       5.
19.       20.       5.
20.       21.       5.
21.       4.        1.
4.        10.       1.
10.       6.        2.
6.        7.        2.
7.        8.        2.
8.        16.       1.
16.       17.       1.
25.       21.       1.
26.       27.       6.
2.        9.        2.
9.        27.       2.
27.       10.       2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .096      1.8       0.        1.1       0.6
4.        .11       .5        0.        1.1       0.0
5.        .712      1.        0.        1.1       0.0
6.        .125      0.        34.       1.1       0.9
99.
```

Case 3A

- Validity of data
- Reasonableness of result

Checked by N. Khan
Date 8/9/91

```
4.      0.      0.0624
50.     90.
148.    90.
160.    70.
286.    70.
0.
0.      6.      0.      .05
86.5    109     135.    4.      1.      1.5
90.25   130.    155.    4.      1.      1.5
90.5    117.    157.    4.00    1.      1.5
91.0    119.    161.    4.00    1.      1.5
91.5    120.    165.    4.00    1.      1.5
92.5    138.    172.    4.00    1.      1.5
20.
56.5
76.5
20.
SEARCH
180.    100.    20.     20.
```

Case 3A

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

Case 3A

DATE 08-06-1991
TIME 16:25

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	108.00	86.50	.0000	2	*
2	108.00	86.50	115.00	90.00	.5000	6	*
3	115.00	90.00	121.00	92.00	.3333	1	*
4	121.00	92.00	135.00	92.00	.0000	1	*
5	135.00	92.00	147.00	98.00	.5000	1	*
6	147.00	98.00	151.20	98.00	.0000	1	*
7	151.20	98.00	151.30	99.00	9.9994	5	*
8	151.30	99.00	157.20	99.00	.0000	5	*
9	157.20	99.00	157.30	98.00	-9.9994	5	*
10	157.30	98.00	162.00	98.00	.0000	1	*
11	162.00	98.00	174.00	92.00	-.5000	1	*
12	174.00	92.00	221.50	78.00	-.2947	2	*
13	221.50	78.00	229.00	84.50	.8667	2	*
14	229.00	84.50	258.00	92.00	.2586	2	*
15	258.00	92.00	271.00	98.00	.4615	1	*
16	271.00	98.00	286.00	98.00	.0000	1	*
17	151.20	98.00	157.30	98.00	.0000	1	
18	115.00	90.00	160.00	90.00	.0000	6	
19	108.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	160.00	90.00	.1400	2	
21	160.00	90.00	174.00	92.00	.1429	2	
22	258.00	92.00	286.00	92.00	.0000	2	
23	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	90.00
2	148.00	90.00
3	160.00	70.00
4	286.00	70.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 3A

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	86.50	109.00	135.00	100.
2	90.25	130.00	155.00	100.
3	90.50	117.00	157.00	100.
4	91.00	119.00	161.00	100.
5	91.50	120.00	165.00	100.
6	92.50	138.00	172.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	4.00	4.00	1.5
2	4.00	4.00	1.5
3	4.00	4.00	1.5
4	4.00	4.00	1.5
5	4.00	4.00	1.5
6	4.00	4.00	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 175.00, INITIAL Y = 130.00.
DELX = 20.00, DELY = 20.00.

X = 175.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.444	1.444	1.392	2174.7	.052	31
72.50	1.424	1.424	1.360	2138.1	.064	31
71.50	1.417	1.417	1.338	2097.3	.078	31
70.50	1.413	1.413	1.319	2051.9	.094	30
69.50	1.371	1.371	1.239	1982.8	.132	28
68.50	1.443	1.443	1.262	1895.5	.181	28
70.25	1.399	1.399	1.301	2037.8	.098	29
70.00	1.386	1.386	1.279	2023.0	.107	29
69.75	1.353	1.353	1.233	2004.4	.120	28
69.25	1.389	1.389	1.244	1961.1	.145	28
69.00	1.407	1.407	1.250	1939.2	.157	28
68.75	1.425	1.425	1.256	1917.3	.169	28
67.50	1.528	1.528	1.284	1810.6	.244	27
66.50	1.633	1.633	1.312	1722.0	.321	26
65.50	1.720	1.720	1.331	1637.1	.389	25
64.50	1.796	1.796	1.343	1555.0	.452	25
63.50	1.841	1.841	1.354	1476.2	.486	25
62.50	1.852	1.852	1.364	1401.6	.488	24
61.50	1.867	1.867	1.376	1326.6	.491	23

60.50	1.877	1.877	1.385	1257.5	.492	23
59.50	1.912	1.912	1.392	1191.5	.520	23
58.50	1.987	1.987	1.398	1128.7	.589	22
57.50	2.084	2.084	1.410	1066.9	.674	22
56.50	2.168	2.168	1.424	1008.0	.745	21
55.50	2.216	2.216	1.435	953.8	.781	21
54.50	2.284	2.284	1.468	904.4	.816	19
53.50	2.382	2.382	1.524	852.1	.859	19

Case 3A

THE LOWEST FACTOR OF SAFETY WAS 1.353 AT R = 69.75.

X = 195.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	2.032	2.032	1.644	2069.0	.388	30
72.50	2.014	2.014	1.599	2052.6	.415	30
71.50	1.973	1.973	1.557	2034.7	.416	30
70.50	1.945	1.945	1.527	2011.6	.418	28
69.50	1.927	1.927	1.507	1988.4	.420	28
68.50	1.910	1.910	1.488	1962.6	.422	27
67.50	1.924	1.924	1.476	1927.3	.448	27
69.25	1.923	1.923	1.502	1981.7	.420	28
69.00	1.915	1.915	1.495	1978.5	.420	27
68.75	1.913	1.913	1.491	1970.7	.421	27
68.25	1.908	1.908	1.485	1954.2	.423	27
68.00	1.912	1.912	1.482	1945.5	.431	27
67.75	1.918	1.918	1.479	1936.6	.439	27
66.50	1.953	1.953	1.469	1885.0	.484	26
65.50	1.984	1.984	1.462	1842.3	.522	26
64.50	2.015	2.015	1.458	1794.8	.557	26
63.50	2.028	2.028	1.459	1742.4	.569	26
62.50	2.047	2.047	1.463	1683.1	.584	25
61.50	2.074	2.074	1.473	1620.3	.601	25
60.50	2.106	2.106	1.485	1553.7	.621	25
59.50	2.164	2.164	1.518	1481.3	.646	24
58.50	2.177	2.177	1.545	1406.3	.632	24
-- 2 FAILURE SURFACES FOR R= 57.50 (IDENTIFIED LEFT TO RIGHT)						
57.50	2.003	2.003	1.404	1330.1	.599	20
57.50	15.815	15.815	15.815	8.1	.000	6
56.50	2.010	2.010	1.462	1217.5	.548	19
-- 2 FAILURE SURFACES FOR R= 58.25 (IDENTIFIED LEFT TO RIGHT)						
58.25	1.968	1.968	1.353	1416.3	.616	21
58.25	7.643	7.643	7.643	29.2	.000	6
-- 2 FAILURE SURFACES FOR R= 58.00 (IDENTIFIED LEFT TO RIGHT)						
58.00	1.986	1.986	1.370	1387.6	.616	21
58.00	9.220	9.220	9.220	21.0	.000	6
-- 2 FAILURE SURFACES FOR R= 57.75 (IDENTIFIED LEFT TO RIGHT)						
57.75	1.999	1.999	1.389	1358.9	.611	21
57.75	11.638	11.638	11.638	13.9	.000	6
-- 2 FAILURE SURFACES FOR R= 57.25 (IDENTIFIED LEFT TO RIGHT)						
57.25	2.005	2.005	1.418	1301.6	.588	20
57.25	24.735	24.735	24.735	3.6	.000	6
-- 2 FAILURE SURFACES FOR R= 57.00 (IDENTIFIED LEFT TO RIGHT)						
57.00	2.008	2.008	1.433	1272.2	.575	19
57.00	56.574	56.574	56.574	.8	.000	6
56.75	2.009	2.009	1.447	1244.7	.562	19
55.50	2.054	2.054	1.521	1112.5	.532	19
54.50	2.109	2.109	1.581	1011.6	.528	19
53.50	2.293	2.293	1.772	896.3	.521	18

THE LOWEST FACTOR OF SAFETY WAS 1.908 AT R = 68.25.

X = 155.00 , Y = 130.00 :

Case 3A

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	3.546	3.546	3.546	815.2	.000	31
72.50	3.617	3.617	3.617	770.4	.000	30
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	3.700	3.700	3.700	725.4	.000	30
70.50	3.781	3.781	3.781	683.2	.000	30
69.50	3.860	3.860	3.860	643.5	.000	30
68.50	3.948	3.948	3.948	604.3	.000	29
67.50	4.005	4.005	4.005	571.8	.000	28
66.50	4.069	4.069	4.069	539.6	.000	28
65.50	4.122	4.122	4.122	510.0	.000	28
64.50	4.165	4.165	4.165	482.8	.000	28
63.50	4.204	4.204	4.204	457.1	.000	28
62.50	4.279	4.279	4.247	431.8	.031	26
61.50	4.379	4.379	4.301	406.7	.077	26
60.50	4.493	4.493	4.361	382.3	.132	26
59.50	4.626	4.626	4.428	358.6	.198	26
58.50	4.774	4.774	4.496	336.0	.278	25
57.50	5.008	5.008	4.629	310.6	.380	24
56.50	5.249	5.249	4.748	288.6	.500	24
55.50	5.657	5.657	5.007	266.0	.650	24
54.50	6.244	6.244	5.351	241.7	.893	24
53.50	6.957	6.957	5.744	218.2	1.213	23

THE LOWEST FACTOR OF SAFETY WAS 3.546 AT R = 73.50.

X = 175.00 , Y = 150.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
93.50	1.907	1.907	1.907	2311.6	.000	31
92.50	1.840	1.840	1.840	2309.1	.000	31
91.50	1.778	1.778	1.777	2301.4	.001	29
90.50	1.731	1.731	1.719	2287.7	.012	29
89.50	1.690	1.690	1.666	2268.1	.024	29
88.50	1.654	1.654	1.618	2242.5	.037	29
87.50	1.625	1.625	1.574	2209.6	.051	28
86.50	1.602	1.602	1.534	2170.5	.068	28
-- 2 FAILURE SURFACES FOR R= 85.50 (IDENTIFIED LEFT TO RIGHT)						
85.50	1.437	1.437	1.350	2140.9	.086	25
85.50	15.851	15.851	15.851	15.6	.000	6
84.50	1.479	1.479	1.369	2045.8	.110	25
86.25	1.597	1.597	1.525	2159.8	.073	28
86.00	1.593	1.593	1.515	2148.7	.077	28
85.75	1.589	1.589	1.507	2137.3	.082	28
-- 2 FAILURE SURFACES FOR R= 85.25 (IDENTIFIED LEFT TO RIGHT)						
85.25	1.445	1.445	1.353	2117.0	.092	25
85.25	26.948	26.948	26.948	6.4	.000	6
-- 2 FAILURE SURFACES FOR R= 85.00 (IDENTIFIED LEFT TO RIGHT)						
85.00	1.453	1.453	1.356	2093.3	.098	25
85.00 F.O.S. VERY LARGE (SUMWSA LESS THAN .01)						

84.75	1.465	1.465	1.361	2069.6	.104	25
83.50	1.542	1.542	1.405	1950.7	.137	25
82.50	1.637	1.637	1.445	1855.2	.193	24
81.50	1.732	1.732	1.489	1757.5	.243	23
80.50	1.868	1.868	1.533	1663.4	.335	23
79.50	2.037	2.037	1.583	1569.2	.454	23
78.50	2.194	2.194	1.616	1477.9	.578	21
77.50	2.297	2.297	1.644	1388.0	.653	21
76.50	2.339	2.339	1.674	1301.1	.665	20
75.50	2.370	2.370	1.700	1220.4	.670	20
74.50	2.451	2.451	1.729	1141.8	.722	20
73.50	2.630	2.630	1.765	1067.1	.865	20

Case 3A

THE LOWEST FACTOR OF SAFETY WAS 1.437 AT R = 85.50.

X = 175.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.527	1.527	1.199	1590.2	.327	29
52.50	1.529	1.529	1.202	1520.2	.327	29
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	1.530	1.530	1.203	1453.1	.327	29
50.50	1.529	1.529	1.203	1388.6	.326	29
49.50	1.527	1.527	1.202	1326.7	.324	27
48.50	1.539	1.539	1.200	1267.5	.339	27
50.25	1.526	1.526	1.201	1374.8	.325	28
50.00	1.526	1.526	1.201	1359.0	.325	28
49.75	1.527	1.527	1.202	1341.9	.325	27
49.25	1.526	1.526	1.202	1311.6	.324	27
49.00	1.529	1.529	1.201	1296.7	.327	27
48.75	1.534	1.534	1.201	1282.0	.333	27
47.50	1.560	1.560	1.196	1211.2	.364	27
46.50	1.581	1.581	1.191	1157.5	.390	27
45.50	1.617	1.617	1.187	1104.9	.430	27
44.50	1.636	1.636	1.184	1054.6	.452	26
43.50	1.651	1.651	1.185	1008.7	.467	24
42.50	1.686	1.686	1.202	961.6	.483	24
41.50	1.723	1.723	1.222	914.8	.501	24
40.50	1.780	1.780	1.244	867.6	.535	23
39.50	1.854	1.854	1.264	823.9	.590	22
38.50	1.942	1.942	1.291	778.1	.651	22
37.50	2.037	2.037	1.320	733.2	.718	22
36.50	2.122	2.122	1.353	688.1	.769	21
35.50	2.193	2.193	1.386	645.2	.807	20
34.50	2.276	2.276	1.424	602.0	.851	21
33.50	2.380	2.380	1.477	558.0	.903	21

THE LOWEST FACTOR OF SAFETY WAS 1.526 AT R = 49.25.

X = 180.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.548	1.548	1.423	2271.4	.124	30
72.50	1.542	1.542	1.379	2234.6	.163	30
71.50	1.578	1.578	1.361	2194.7	.217	29

Case 3A

73.25	1.527	1.527	1.393	2262.9	.134	30
73.00	1.532	1.532	1.388	2253.7	.144	30
72.75	1.537	1.537	1.384	2244.3	.153	30
72.25	1.552	1.552	1.375	2224.6	.177	30
72.00	1.564	1.564	1.371	2214.3	.193	30
71.75	1.571	1.571	1.365	2205.8	.206	29
70.50	1.623	1.623	1.347	2146.9	.276	29
69.50	1.650	1.650	1.327	2094.2	.323	27
68.50	1.666	1.666	1.303	2041.3	.363	27
67.50	1.658	1.658	1.279	1986.2	.379	27

-- 2 FAILURE SURFACES FOR R= 66.50 (IDENTIFIED LEFT TO RIGHT)

66.50	1.531	1.531	1.159	1929.1	.373	23

66.50 F.O.S. VERY LARGE (SUMWSA LESS THAN .01)

65.50	1.540	1.540	1.167	1837.2	.373	23
67.25	1.650	1.650	1.273	1972.1	.377	27
67.00	1.641	1.641	1.266	1960.3	.375	26
66.75	1.624	1.624	1.250	1945.6	.373	25
66.25	1.533	1.533	1.161	1905.7	.373	23
66.00	1.536	1.536	1.163	1882.6	.373	23
65.75	1.538	1.538	1.165	1859.8	.373	23
64.50	1.547	1.547	1.174	1749.1	.373	23
63.50	1.567	1.567	1.180	1663.3	.387	22
62.50	1.611	1.611	1.185	1582.6	.425	22
61.50	1.677	1.677	1.194	1503.0	.484	22
60.50	1.746	1.746	1.202	1427.8	.544	22
59.50	1.780	1.780	1.212	1356.2	.568	22
58.50	1.826	1.826	1.232	1286.8	.594	20
57.50	1.888	1.888	1.268	1222.1	.621	19
56.50	1.962	1.962	1.311	1154.7	.651	19
55.50	2.086	2.086	1.358	1088.3	.727	19
54.50	2.234	2.234	1.411	1022.6	.823	19
53.50	2.402	2.402	1.470	957.0	.932	18

THE LOWEST FACTOR OF SAFETY WAS 1.527 AT R = 73.25.

X = 170.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.463	1.463	1.450	1973.0	.013	31
72.50	1.436	1.436	1.413	1901.5	.023	30
71.50	1.450	1.450	1.415	1829.1	.035	30
73.25	1.437	1.437	1.421	1956.6	.015	31
73.00	1.430	1.430	1.412	1938.2	.018	30
72.75	1.433	1.433	1.413	1919.8	.020	30
72.25	1.439	1.439	1.413	1883.3	.026	30
72.00	1.443	1.443	1.414	1865.1	.029	30
71.75	1.446	1.446	1.414	1847.1	.032	30
70.50	1.465	1.465	1.417	1757.9	.049	30
69.50	1.483	1.483	1.418	1689.1	.064	29
68.50	1.507	1.507	1.424	1618.1	.082	29
67.50	1.544	1.544	1.441	1547.9	.103	28
66.50	1.594	1.594	1.467	1479.7	.127	28
65.50	1.675	1.675	1.496	1412.0	.178	28
64.50	1.776	1.776	1.530	1343.0	.247	28
63.50	1.887	1.887	1.562	1276.4	.324	27
62.50	2.034	2.034	1.602	1207.1	.433	26
61.50	2.163	2.163	1.632	1140.2	.532	25
60.50	2.272	2.272	1.651	1075.9	.622	25
59.50	2.334	2.334	1.666	1015.8	.668	24

58.50	2.362	2.362	1.687	955.0	.675	23
57.50	2.383	2.383	1.703	899.5	.680	23
56.50	2.400	2.400	1.716	846.9	.684	23
55.50	2.497	2.497	1.729	796.5	.768	23
54.50	2.637	2.637	1.744	748.9	.892	22
53.50	2.799	2.799	1.766	702.9	1.033	21

THE LOWEST FACTOR OF SAFETY WAS 1.430 AT R = 73.00.

Case 3A

X = 175.00 , Y = 135.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
78.50	1.528	1.528	1.496	2239.2	.032	30
77.50	1.500	1.500	1.457	2209.0	.043	29
76.50	1.476	1.476	1.421	2176.0	.055	29
75.50	1.457	1.457	1.388	2137.7	.070	29
74.50	1.450	1.450	1.365	2095.1	.085	29
73.50	1.358	1.358	1.255	2042.6	.102	26
72.50	1.424	1.424	1.280	1953.9	.144	26
74.25	1.451	1.451	1.362	2083.5	.089	29
74.00	1.452	1.452	1.358	2071.7	.093	29
73.75	1.435	1.435	1.338	2058.3	.098	27
73.25	1.369	1.369	1.261	2020.4	.108	26
73.00	1.384	1.384	1.267	1998.3	.116	26
72.75	1.404	1.404	1.274	1976.1	.130	26
71.50	1.508	1.508	1.308	1862.6	.199	25
70.50	1.596	1.596	1.335	1775.9	.261	24
69.50	1.712	1.712	1.366	1687.8	.346	24
68.50	1.815	1.815	1.389	1600.8	.425	23
67.50	1.899	1.899	1.404	1516.7	.495	23
66.50	1.948	1.948	1.419	1435.7	.529	21
65.50	1.965	1.965	1.433	1358.4	.532	21
64.50	1.981	1.981	1.446	1284.6	.535	21
63.50	1.994	1.994	1.458	1214.2	.536	21
62.50	2.076	2.076	1.471	1145.8	.606	21
61.50	2.193	2.193	1.489	1078.3	.704	20
60.50	2.316	2.316	1.506	1017.6	.810	20
59.50	2.377	2.377	1.525	960.1	.853	20
58.50	2.443	2.443	1.548	907.8	.895	18

THE LOWEST FACTOR OF SAFETY WAS 1.358 AT R = 73.50.

X = 175.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.389	1.389	1.314	2089.4	.075	32
67.50	1.389	1.389	1.300	2045.1	.089	31
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.379	1.379	1.248	1989.0	.131	30
65.50	1.403	1.403	1.228	1906.9	.175	29
67.25	1.387	1.387	1.288	2033.4	.099	31
67.00	1.386	1.386	1.277	2018.9	.109	30
66.75	1.383	1.383	1.263	2004.9	.120	30
66.25	1.371	1.371	1.230	1970.6	.142	30
66.00	1.370	1.370	1.218	1949.5	.152	29

65.75	1.386	1.386	1.223	1928.1	.163	29
64.50	1.488	1.488	1.248	1822.9	.239	29
63.50	1.579	1.579	1.270	1739.9	.309	28
62.50	1.651	1.651	1.283	1656.4	.369	27
61.50	1.712	1.712	1.292	1576.1	.420	27
60.50	1.748	1.748	1.302	1498.0	.446	26
59.50	1.755	1.755	1.307	1426.4	.447	25
58.50	1.763	1.763	1.315	1355.0	.448	25
57.50	1.770	1.770	1.321	1286.9	.449	25
56.50	1.790	1.790	1.326	1222.0	.464	25
55.50	1.840	1.840	1.330	1159.1	.510	24
54.50	1.913	1.913	1.334	1100.5	.579	23
53.50	1.995	1.995	1.341	1043.5	.654	23
52.50	2.032	2.032	1.348	989.6	.684	23
51.50	2.082	2.082	1.367	937.4	.715	21
50.50	2.150	2.150	1.404	889.8	.746	20
49.50	2.234	2.234	1.450	839.4	.784	20
48.50	2.372	2.372	1.501	789.8	.871	20

Case 3A

THE LOWEST FACTOR OF SAFETY WAS 1.370 AT R = 66.00.

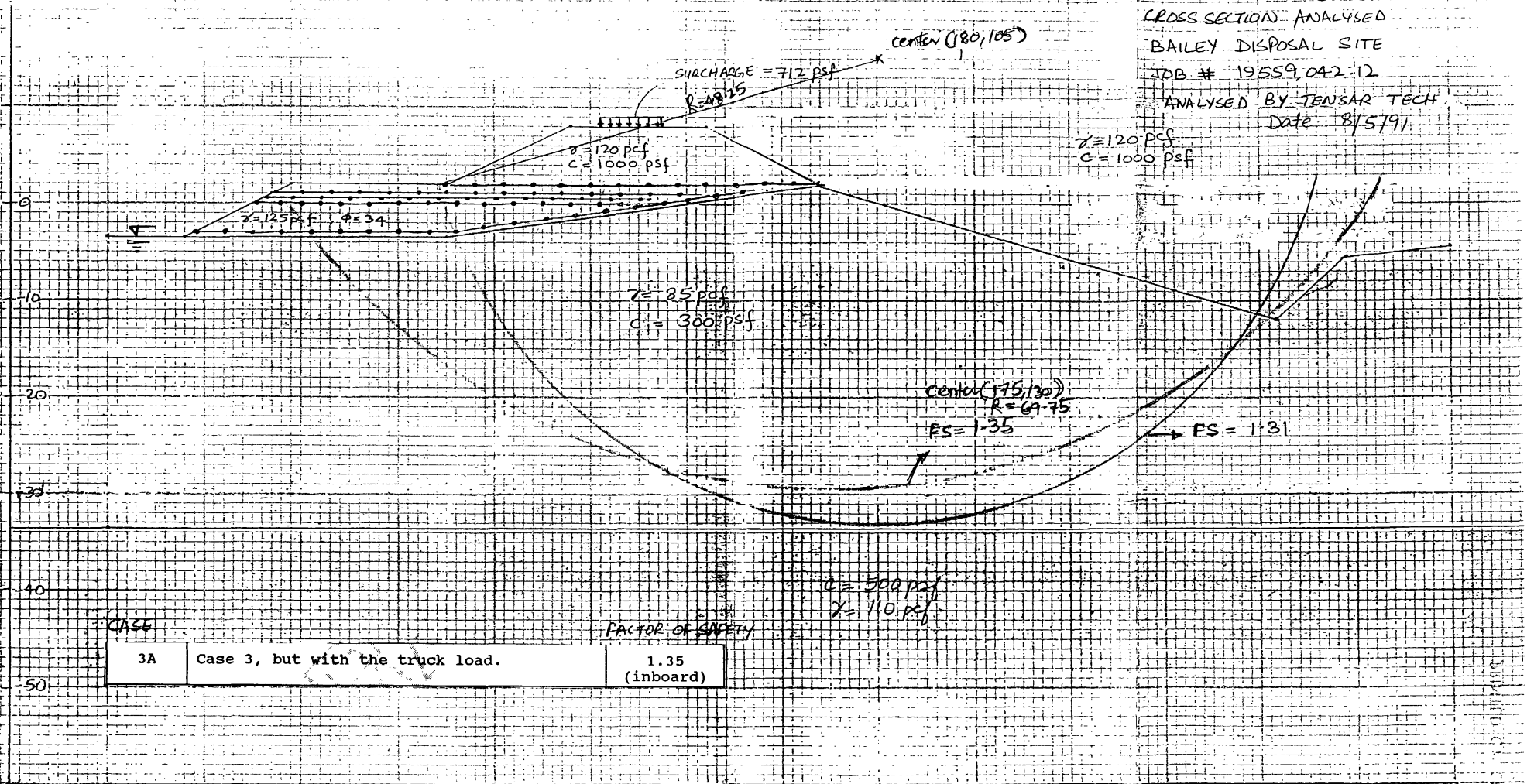
SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 175.00.
Y = 130.00.
RADIUS OF CRITICAL CIRCLE = 69.75.

MINIMUM FS = 1.353 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.353.
FS (UNREINFORCED) = 1.233.
TOTAL DRIVING MOMENT = 2004.39 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 60.25.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
86.50 (PULL OUT STRESS = 3.08 KIPS/FT)
90.50 (PULL OUT STRESS = .48 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.

CASE 3A
CROSS SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042.12
ANALYSED BY TENSAR TECH
Date: 8/5/94



CASE		FACTOR OF SAFETY
3A	Case 3, but with the truck load.	1.35 (inboard)

Case	Description	Factor of Safety
4	Short term, with waste excavated and water above the existing grade (in case of flood) without the truck load and with 5 layers of geogrid installed.	1.31 (inboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        108.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      92.
9.        135.      86.5
10.       174.      92.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      92.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       135.      92.
24.       163.      92.
25.       151.2     98.
26.       115.      90.
27.       160.      90.
999.
12.
1.        2.        2.
2.        26.       6.
26.       22.       1.
22.       23.       1.
23.       3.        1.
3.        4.        1.
4.        10.       1.
10.       6.        2.
6.        7.        2.
7.        8.        2.
8.        16.       1.
16.       17.       1.
26.       27.       6.
2.        9.        2.
9.        27.       2.
27.       10.       2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .096      1.8       0.        1.1       0.6
4.        .11       .5        0.        1.1       0.0
5.        .00001    1.        0.        1.1       0.0
6.        .125      0.        34.       1.1       0.9
99.
4.        0.        0.0624
50.       94.
148.      94.
160.      79.
286.      79.
```

CASE 4

- validity of data
- Reasonableness of Result

Checked by
A. Khan
Date 8/9/91

```
0.
0.      6.      0.      .05
86.5    109     135.    4.      1.      1.5
90.25   130.    155.    4.      1.      1.5
90.5    117.    157.    4.00    1.      1.5
91.0    119.    161.    4.00    1.      1.5
91.5    120.    165.    4.00    1.      1.5
92.5    138.    172.    4.00    1.      1.5
20.
56.5
76.5
20.
SEARCH
170.    125.    20.     20.
```

Case 4

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-06-1991
TIME 16:46

Case 4

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	108.00	86.50	.0000	2	*
2	108.00	86.50	115.00	90.00	.5000	6	*
3	115.00	90.00	121.00	92.00	.3333	1	*
4	121.00	92.00	135.00	92.00	.0000	1	*
5	135.00	92.00	147.00	98.00	.5000	1	*
6	147.00	98.00	162.00	98.00	.0000	1	*
7	162.00	98.00	174.00	92.00	-.5000	1	*
8	174.00	92.00	221.50	78.00	-.2947	2	*
9	221.50	78.00	229.00	84.50	.8667	2	*
10	229.00	84.50	258.00	92.00	.2586	2	*
11	258.00	92.00	271.00	98.00	.4615	1	*
12	271.00	98.00	286.00	98.00	.0000	1	*
13	115.00	90.00	160.00	90.00	.0000	6	
14	108.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	160.00	90.00	.1400	2	
16	160.00	90.00	174.00	92.00	.1429	2	
17	258.00	92.00	286.00	92.00	.0000	2	
18	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	94.00
2	148.00	94.00
3	160.00	79.00
4	286.00	79.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	86.50	109.00	135.00	100.
2	90.25	130.00	155.00	100.
3	90.50	117.00	157.00	100.
4	91.00	119.00	161.00	100.
5	91.50	120.00	165.00	100.
6	92.50	138.00	172.00	100.

case 4

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	4.00	4.00	1.5
2	4.00	4.00	1.5
3	4.00	4.00	1.5
4	4.00	4.00	1.5
5	4.00	4.00	1.5
6	4.00	4.00	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 170.00, INITIAL Y = 125.00.
DELX = 20.00, DELY = 20.00.

X = 170.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.312	1.312	1.281	1977.7	.031	31
67.50	1.331	1.331	1.289	1891.6	.043	30
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.352	1.352	1.296	1808.5	.055	29
65.50	1.378	1.378	1.308	1723.1	.069	29
64.50	1.416	1.416	1.331	1639.5	.085	29
63.50	1.462	1.462	1.360	1558.0	.102	29
62.50	1.540	1.540	1.392	1477.4	.148	28
61.50	1.631	1.631	1.426	1399.2	.206	28
60.50	1.734	1.734	1.461	1323.2	.273	28
59.50	1.869	1.869	1.498	1249.9	.371	27
58.50	1.988	1.988	1.529	1176.6	.459	26
57.50	2.097	2.097	1.554	1105.3	.543	25
56.50	2.169	2.169	1.576	1038.6	.593	25
55.50	2.201	2.201	1.597	975.8	.604	24
54.50	2.238	2.238	1.621	913.8	.617	24
53.50	2.278	2.278	1.647	853.8	.631	23
52.50	2.344	2.344	1.669	798.5	.675	23
51.50	2.471	2.471	1.696	743.9	.776	23
50.50	2.619	2.619	1.720	694.3	.899	22
49.50	2.754	2.754	1.745	648.1	1.009	22
48.50	2.854	2.854	1.778	601.6	1.076	21

THE LOWEST FACTOR OF SAFETY WAS 1.312 AT R = 68.50.

Case 4

X = 190.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.804	1.804	1.481	2023.4	.323	31
67.50	1.792	1.792	1.449	1986.7	.342	31
66.50	1.790	1.790	1.421	1945.9	.370	29
65.50	1.790	1.790	1.392	1906.4	.397	29
64.50	1.766	1.766	1.364	1867.8	.402	29
63.50	1.757	1.757	1.349	1825.6	.408	28
62.50	1.761	1.761	1.345	1777.9	.416	27
64.25	1.761	1.761	1.357	1857.6	.404	29
64.00	1.758	1.758	1.353	1847.2	.405	28
63.75	1.757	1.757	1.351	1836.5	.407	28
63.25	1.757	1.757	1.348	1814.3	.410	28
63.00	1.760	1.760	1.348	1800.4	.412	27
62.75	1.760	1.760	1.346	1789.0	.414	27
61.50	1.762	1.762	1.339	1734.2	.423	26
60.50	1.795	1.795	1.340	1682.8	.456	26
59.50	1.837	1.837	1.341	1630.1	.496	26
58.50	1.887	1.887	1.346	1572.9	.541	25
57.50	1.936	1.936	1.354	1513.3	.582	25
-- 2 FAILURE SURFACES FOR R= 56.50 (IDENTIFIED LEFT TO RIGHT)						
56.50	1.835	1.835	1.236	1456.2	.599	22
56.50	22.465	22.465	22.465	7.4	.000	6
55.50	1.920	1.920	1.286	1362.2	.634	22
57.25	1.943	1.943	1.356	1497.7	.586	25
57.00	1.951	1.951	1.359	1481.8	.591	25
56.75	1.959	1.959	1.362	1465.7	.596	25
-- 2 FAILURE SURFACES FOR R= 56.25 (IDENTIFIED LEFT TO RIGHT)						
56.25	1.856	1.856	1.248	1432.7	.608	22
56.25	74.171	74.171	74.171	1.5	.000	6
56.00	1.877	1.877	1.260	1409.2	.616	22
55.75	1.898	1.898	1.273	1385.8	.625	22
54.50	2.031	2.031	1.353	1264.6	.677	22
53.50	2.151	2.151	1.425	1167.2	.726	21
52.50	2.286	2.286	1.505	1073.1	.782	21
51.50	2.395	2.395	1.598	979.4	.796	21
50.50	2.496	2.496	1.703	886.5	.793	20
49.50	2.542	2.542	1.803	796.7	.739	20
48.50	2.643	2.643	1.914	712.0	.729	19

THE LOWEST FACTOR OF SAFETY WAS 1.757 AT R = 63.50.

X = 150.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	3.487	3.487	3.487	760.9	.000	31
67.50	3.607	3.607	3.607	708.2	.000	30
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	3.722	3.722	3.722	660.5	.000	30
65.50	3.831	3.831	3.831	616.7	.000	29
64.50	3.964	3.964	3.964	572.5	.000	29
63.50	4.103	4.103	4.103	530.7	.000	29
62.50	4.260	4.260	4.260	489.9	.000	28

Case 4

61.50	4.402	4.402	4.402	453.9	.000	28
60.50	4.535	4.535	4.535	421.4	.000	27
59.50	4.693	4.693	4.693	389.0	.000	27
58.50	4.851	4.851	4.851	359.1	.000	27
57.50	5.032	5.032	5.032	329.8	.000	26
56.50	5.186	5.186	5.186	304.4	.000	26
55.50	5.385	5.385	5.346	280.7	.039	25
54.50	5.693	5.693	5.588	255.0	.105	25
53.50	6.062	6.062	5.873	230.1	.189	25
52.50	6.566	6.566	6.266	204.4	.300	24
51.50	7.093	7.093	6.656	182.1	.437	23
50.50	7.874	7.874	7.253	158.0	.621	23
49.50	8.861	8.861	7.993	135.2	.868	22
48.50	10.485	10.485	9.264	112.4	1.221	23

THE LOWEST FACTOR OF SAFETY WAS 3.487 AT R = 68.50.

X = 170.00 , Y = 145.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
88.50	1.620	1.620	1.620	2458.7	.000	30
87.50	1.587	1.587	1.587	2413.3	.000	29
86.50	1.554	1.554	1.554	2367.8	.000	29
85.50	1.522	1.522	1.522	2318.8	.000	29
-- 2 FAILURE SURFACES FOR R= 84.50 (IDENTIFIED LEFT TO RIGHT)						
84.50	1.378	1.378	1.378	2270.5	.000	25
84.50	62.269	62.269	62.269	4.0	.000	5
83.50	1.400	1.400	1.389	2170.4	.011	25
85.25	1.514	1.514	1.514	2306.0	.000	29
85.00	1.507	1.507	1.507	2292.7	.000	29
84.75	1.498	1.498	1.498	2282.1	.000	28
84.25	1.383	1.383	1.380	2246.0	.003	25
84.00	1.388	1.388	1.383	2220.7	.005	25
83.75	1.394	1.394	1.386	2195.5	.008	25
82.50	1.425	1.425	1.402	2070.7	.023	25
81.50	1.454	1.454	1.416	1972.3	.038	25
80.50	1.487	1.487	1.433	1875.2	.055	25
79.50	1.526	1.526	1.452	1777.6	.074	25
78.50	1.570	1.570	1.475	1680.7	.095	24
77.50	1.623	1.623	1.504	1588.2	.120	24
76.50	1.702	1.702	1.554	1497.0	.148	24
75.50	1.817	1.817	1.610	1407.6	.207	23
74.50	1.933	1.933	1.673	1318.7	.260	23
73.50	2.116	2.116	1.741	1231.5	.375	22
72.50	2.346	2.346	1.815	1148.0	.531	22
71.50	2.568	2.568	1.870	1068.3	.698	20
70.50	2.732	2.732	1.921	989.8	.811	20
69.50	2.820	2.820	1.973	915.2	.847	20
68.50	2.903	2.903	2.030	843.3	.874	19

THE LOWEST FACTOR OF SAFETY WAS 1.378 AT R = 84.50.

X = 170.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

Case 4

48.50	1.764	1.764	1.409	1192.7	.354	29
47.50	1.794	1.794	1.417	1133.0	.377	28

D(FS)/DR IS NEGATIVE AT RMAX.

46.50	1.809	1.809	1.428	1073.3	.381	28
45.50	1.823	1.823	1.438	1016.2	.385	28
44.50	1.838	1.838	1.449	960.4	.389	27
43.50	1.843	1.843	1.451	911.2	.392	26
42.50	1.858	1.858	1.459	861.0	.399	26
41.50	1.899	1.899	1.464	813.5	.434	26
40.50	1.942	1.942	1.469	767.2	.472	25
39.50	1.982	1.982	1.469	725.2	.513	25
38.50	2.042	2.042	1.475	683.1	.567	25
37.50	2.069	2.069	1.478	644.3	.591	25
36.50	2.110	2.110	1.496	609.9	.614	23
35.50	2.173	2.173	1.530	572.7	.643	22
34.50	2.237	2.237	1.564	538.2	.673	22
33.50	2.342	2.342	1.601	504.8	.742	22
32.50	2.451	2.451	1.632	474.4	.819	21
31.50	2.593	2.593	1.680	441.1	.912	20
30.50	2.741	2.741	1.728	410.0	1.013	20
29.50	2.859	2.859	1.781	379.6	1.078	20
28.50	2.988	2.988	1.841	349.8	1.147	19

THE LOWEST FACTOR OF SAFETY WAS 1.764 AT R = 48.50.

X = 175.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.342	1.342	1.273	2152.7	.069	32
67.50	1.347	1.347	1.267	2093.5	.080	31

D(FS)/DR IS NEGATIVE AT RMAX.

66.50	1.341	1.341	1.222	2023.9	.119	30
65.50	1.367	1.367	1.206	1931.3	.161	29
67.25	1.346	1.346	1.257	2078.2	.089	31
67.00	1.346	1.346	1.247	2060.4	.099	30
66.75	1.344	1.344	1.235	2043.1	.109	30
66.25	1.335	1.335	1.206	2000.7	.129	30
66.00	1.335	1.335	1.195	1977.4	.140	29
65.75	1.351	1.351	1.201	1954.3	.150	29
64.50	1.447	1.447	1.231	1838.2	.216	29
63.50	1.545	1.545	1.257	1746.7	.288	28
62.50	1.626	1.626	1.275	1655.3	.351	27
61.50	1.697	1.697	1.291	1567.2	.406	27
60.50	1.743	1.743	1.307	1481.5	.436	26
59.50	1.762	1.762	1.320	1402.4	.442	25
58.50	1.785	1.785	1.336	1323.7	.449	25
57.50	1.807	1.807	1.351	1248.4	.455	25
56.50	1.844	1.844	1.366	1176.3	.478	25
55.50	1.914	1.914	1.382	1106.4	.533	24
54.50	2.012	2.012	1.400	1039.0	.612	23
53.50	2.111	2.111	1.415	978.0	.696	23
52.50	2.166	2.166	1.432	918.8	.734	23
51.50	2.243	2.243	1.466	859.5	.777	21
50.50	2.340	2.340	1.521	807.4	.819	20
49.50	2.460	2.460	1.590	753.0	.870	20
48.50	2.642	2.642	1.664	701.4	.977	20

THE LOWEST FACTOR OF SAFETY WAS 1.335 AT R = 66.00.

case 4

X = 165.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.517	1.517	1.517	1687.3	.000	31
67.50	1.529	1.529	1.525	1614.5	.004	31
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.549	1.549	1.535	1542.5	.015	29
65.50	1.572	1.572	1.546	1471.9	.027	29
64.50	1.598	1.598	1.557	1402.7	.041	29
63.50	1.628	1.628	1.571	1334.8	.057	29
62.50	1.659	1.659	1.584	1269.2	.075	28
61.50	1.700	1.700	1.605	1200.1	.095	27
60.50	1.753	1.753	1.635	1135.2	.118	27
59.50	1.822	1.822	1.678	1071.7	.144	27
58.50	1.929	1.929	1.725	1009.9	.203	27
57.50	2.064	2.064	1.779	948.2	.285	27
56.50	2.214	2.214	1.838	887.7	.376	26
55.50	2.416	2.416	1.896	831.1	.520	25
54.50	2.605	2.605	1.950	774.8	.656	24
53.50	2.778	2.778	1.991	720.9	.787	24
52.50	2.899	2.899	2.033	669.6	.867	24
51.50	2.970	2.970	2.077	620.5	.893	22
50.50	3.040	3.040	2.120	574.4	.920	22
49.50	3.111	3.111	2.163	531.0	.948	22
48.50	3.293	3.293	2.212	488.8	1.081	22

THE LOWEST FACTOR OF SAFETY WAS 1.517 AT R = 68.50.

X = 170.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.338	1.338	1.326	2157.5	.012	31
72.50	1.319	1.319	1.298	2069.6	.021	30
71.50	1.339	1.339	1.307	1980.2	.032	30
73.25	1.317	1.317	1.303	2134.7	.014	31
73.00	1.312	1.312	1.295	2112.9	.016	30
72.75	1.316	1.316	1.297	2091.2	.019	30
72.25	1.324	1.324	1.300	2047.4	.024	30
72.00	1.329	1.329	1.302	2024.9	.027	30
71.75	1.334	1.334	1.304	2002.6	.029	30
70.50	1.362	1.362	1.317	1891.6	.045	30
69.50	1.386	1.386	1.327	1805.2	.059	29
68.50	1.416	1.416	1.341	1717.1	.075	29
67.50	1.457	1.457	1.364	1630.1	.093	28
66.50	1.509	1.509	1.397	1546.7	.112	28
65.50	1.591	1.591	1.433	1465.2	.158	28
64.50	1.692	1.692	1.473	1384.1	.219	28
63.50	1.801	1.801	1.513	1306.9	.288	27
62.50	1.959	1.959	1.560	1228.4	.399	26
61.50	2.099	2.099	1.598	1153.6	.501	25
60.50	2.223	2.223	1.626	1081.7	.597	25
59.50	2.302	2.302	1.652	1014.1	.651	24
58.50	2.352	2.352	1.685	946.0	.667	23
57.50	2.396	2.396	1.714	883.2	.683	23
56.50	2.441	2.441	1.743	823.5	.698	23

55.50	2.573	2.573	1.776	765.3	.797	23
54.50	2.748	2.748	1.810	711.1	.937	22
53.50	2.943	2.943	1.847	660.3	1.096	21

Case 4

THE LOWEST FACTOR OF SAFETY WAS 1.312 AT R = 73.00.

X = 170.00 , Y = 135.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
78.50	1.446	1.446	1.446	2278.0	.000	30
77.50	1.412	1.412	1.408	2229.3	.004	28
76.50	1.334	1.334	1.321	2148.9	.013	26
75.50	1.352	1.352	1.328	2058.4	.024	26
77.25	1.392	1.392	1.386	2213.0	.006	27
77.00	1.365	1.365	1.357	2195.3	.008	27
76.75	1.329	1.329	1.319	2171.7	.010	26
76.25	1.338	1.338	1.322	2126.3	.015	26
76.00	1.342	1.342	1.324	2103.6	.018	26
75.75	1.347	1.347	1.326	2081.0	.021	26
74.50	1.375	1.375	1.339	1965.9	.036	26
73.50	1.402	1.402	1.352	1873.1	.051	25
72.50	1.433	1.433	1.367	1781.7	.066	25
71.50	1.466	1.466	1.382	1692.1	.084	25
70.50	1.514	1.514	1.410	1604.4	.104	25
69.50	1.575	1.575	1.449	1518.5	.126	25
68.50	1.676	1.676	1.493	1432.4	.183	24
67.50	1.775	1.775	1.538	1351.4	.238	23
66.50	1.915	1.915	1.587	1270.8	.328	23
65.50	2.095	2.095	1.641	1191.7	.454	23
64.50	2.259	2.259	1.682	1114.9	.577	22
63.50	2.389	2.389	1.716	1041.6	.673	20
62.50	2.469	2.469	1.752	971.1	.717	20
61.50	2.523	2.523	1.788	904.0	.735	20
60.50	2.578	2.578	1.825	840.2	.754	20
59.50	2.698	2.698	1.866	778.1	.832	20
58.50	2.912	2.912	1.916	718.0	.996	19

THE LOWEST FACTOR OF SAFETY WAS 1.329 AT R = 76.75.

X = 175.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.376	1.376	1.328	2279.9	.049	31
72.50	1.365	1.365	1.305	2225.1	.060	31
71.50	1.365	1.365	1.293	2166.8	.072	31
70.50	1.366	1.366	1.281	2105.3	.085	30
72.25	1.363	1.363	1.300	2211.0	.063	31
72.00	1.362	1.362	1.296	2196.5	.066	31
71.75	1.363	1.363	1.295	2181.8	.069	31
71.25	1.366	1.366	1.291	2151.7	.075	31
71.00	1.368	1.368	1.290	2136.4	.078	31
70.75	1.370	1.370	1.289	2120.9	.081	31
69.50	1.329	1.329	1.209	2021.4	.119	28
68.50	1.402	1.402	1.235	1925.0	.167	28
70.25	1.354	1.354	1.266	2087.4	.088	29

Case 4

70.00	1.342	1.342	1.245	2069.0	.097	29
69.75	1.311	1.311	1.203	2045.2	.108	28
69.25	1.347	1.347	1.215	1997.4	.131	28
69.00	1.364	1.364	1.222	1973.2	.143	28
68.75	1.383	1.383	1.228	1949.2	.154	28
67.50	1.482	1.482	1.263	1829.3	.219	27
66.50	1.595	1.595	1.296	1731.1	.299	26
65.50	1.691	1.691	1.321	1637.8	.370	25
64.50	1.777	1.777	1.339	1547.6	.438	25
63.50	1.834	1.834	1.358	1460.8	.476	25
62.50	1.860	1.860	1.375	1378.3	.484	24
61.50	1.890	1.890	1.397	1295.6	.493	23
60.50	1.917	1.917	1.415	1218.9	.501	23
59.50	1.972	1.972	1.434	1145.4	.538	23
58.50	2.070	2.070	1.454	1074.5	.617	22
57.50	2.189	2.189	1.477	1006.8	.713	22
56.50	2.294	2.294	1.501	942.6	.794	21
55.50	2.367	2.367	1.526	881.3	.841	21
54.50	2.468	2.468	1.577	825.2	.891	19
53.50	2.606	2.606	1.657	768.4	.949	19

THE LOWEST FACTOR OF SAFETY WAS 1.311 AT R = 69.75.

X = 180.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.515	1.515	1.401	2298.9	.113	30
72.50	1.515	1.515	1.364	2248.8	.151	30
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	1.550	1.550	1.353	2197.2	.197	29
70.50	1.604	1.604	1.345	2139.5	.259	29
69.50	1.640	1.640	1.330	2077.9	.309	27
68.50	1.664	1.664	1.311	2016.4	.353	27
67.50	1.666	1.666	1.293	1952.8	.373	27
-- 2 FAILURE SURFACES FOR R= 66.50 (IDENTIFIED LEFT TO RIGHT)						
66.50	1.548	1.548	1.178	1885.9	.371	23
66.50 F.O.S. VERY LARGE (SUMMSA LESS THAN .01)						
65.50	1.564	1.564	1.189	1789.6	.375	23
67.25	1.661	1.661	1.289	1936.7	.372	27
67.00	1.654	1.654	1.283	1922.7	.371	26
66.75	1.639	1.639	1.268	1906.0	.370	25
66.25	1.552	1.552	1.181	1861.5	.372	23
66.00	1.556	1.556	1.183	1837.4	.373	23
65.75	1.560	1.560	1.186	1813.4	.374	23
64.50	1.582	1.582	1.203	1694.6	.379	23
63.50	1.615	1.615	1.217	1601.0	.398	22
62.50	1.675	1.675	1.231	1512.3	.444	22
61.50	1.759	1.759	1.250	1423.3	.510	22
60.50	1.841	1.841	1.265	1344.0	.576	22
59.50	1.889	1.889	1.282	1266.1	.607	22
58.50	1.955	1.955	1.314	1188.8	.641	20
57.50	2.039	2.039	1.364	1119.1	.675	19
56.50	2.141	2.141	1.425	1046.9	.716	19
55.50	2.296	2.296	1.490	978.5	.806	19
54.50	2.480	2.480	1.560	912.6	.920	19
53.50	2.691	2.691	1.641	847.0	1.050	18

THE LOWEST FACTOR OF SAFETY WAS 1.515 AT R = 73.50.

Case 4

X = 175.00 , Y = 135.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
78.50	1.432	1.432	1.403	2388.0	.030	30
77.50	1.417	1.417	1.377	2338.3	.041	29
76.50	1.404	1.404	1.352	2286.2	.052	29
75.50	1.394	1.394	1.330	2229.1	.064	29
74.50	1.394	1.394	1.316	2168.0	.077	29
73.50	1.310	1.310	1.218	2097.2	.092	26
72.50	1.375	1.375	1.245	1997.3	.129	26
74.25	1.396	1.396	1.315	2152.1	.081	29
74.00	1.398	1.398	1.314	2136.0	.084	29
73.75	1.384	1.384	1.295	2118.4	.088	27
73.25	1.321	1.321	1.225	2072.2	.096	26
73.00	1.335	1.335	1.231	2047.2	.104	26
72.75	1.355	1.355	1.238	2022.3	.117	26
71.50	1.455	1.455	1.278	1894.3	.178	25
70.50	1.545	1.545	1.310	1796.0	.235	24
69.50	1.670	1.670	1.347	1697.8	.323	24
68.50	1.783	1.783	1.377	1601.9	.406	23
67.50	1.879	1.879	1.399	1509.4	.480	23
66.50	1.942	1.942	1.422	1420.0	.520	21
65.50	1.975	1.975	1.445	1334.5	.530	21
64.50	2.008	2.008	1.468	1252.6	.540	21
63.50	2.042	2.042	1.491	1174.1	.550	21
62.50	2.149	2.149	1.518	1097.4	.631	21
61.50	2.290	2.290	1.550	1022.7	.740	20
60.50	2.436	2.436	1.577	956.6	.859	20
59.50	2.524	2.524	1.610	891.7	.914	20
58.50	2.625	2.625	1.652	831.4	.973	18

THE LOWEST FACTOR OF SAFETY WAS 1.310 AT R = 73.50.

X = 175.00 , Y = 140.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
83.50	1.503	1.503	1.491	2473.6	.013	30
82.50	1.480	1.480	1.458	2433.2	.022	30
81.50	1.461	1.461	1.428	2387.9	.033	30
80.50	1.446	1.446	1.401	2336.1	.045	29
79.50	1.435	1.435	1.377	2280.1	.058	29
78.50	1.426	1.426	1.355	2219.5	.071	29
77.50	1.318	1.318	1.232	2158.9	.086	26
76.50	1.366	1.366	1.262	2054.6	.104	25
78.25	1.424	1.424	1.349	2203.7	.075	29
78.00	1.424	1.424	1.346	2187.6	.078	29
77.75	1.427	1.427	1.345	2171.1	.082	29
77.25	1.330	1.330	1.240	2132.7	.090	26
77.00	1.341	1.341	1.246	2107.6	.094	25
76.75	1.353	1.353	1.254	2081.0	.099	25
75.50	1.448	1.448	1.296	1948.9	.151	25
74.50	1.526	1.526	1.333	1845.6	.193	24
73.50	1.641	1.641	1.372	1743.2	.269	24
72.50	1.785	1.785	1.416	1642.5	.369	24
71.50	1.917	1.917	1.449	1543.1	.468	22

Case 4

70.50	2.013	2.013	1.473	1451.3	.539	21
69.50	2.069	2.069	1.501	1360.6	.568	21
68.50	2.110	2.110	1.529	1273.8	.580	21
67.50	2.151	2.151	1.558	1190.8	.593	21
66.50	2.248	2.248	1.592	1108.5	.656	20
65.50	2.405	2.405	1.628	1031.7	.778	20
64.50	2.575	2.575	1.662	961.8	.913	20
63.50	2.699	2.699	1.703	893.3	.995	20

THE LOWEST FACTOR OF SAFETY WAS 1.318 AT R = 77.50.

X = 180.00 , Y = 135.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
78.50	1.526	1.526	1.454	2401.7	.071	31
77.50	1.499	1.499	1.415	2353.9	.084	30
76.50	1.517	1.517	1.401	2306.8	.115	30
78.25	1.499	1.499	1.424	2390.7	.074	31
78.00	1.498	1.498	1.421	2379.6	.077	31
77.75	1.497	1.497	1.417	2368.1	.080	31
77.25	1.498	1.498	1.411	2342.5	.087	30
77.00	1.502	1.502	1.408	2330.9	.094	30
76.75	1.509	1.509	1.405	2319.0	.104	30
75.50	1.548	1.548	1.391	2254.6	.157	30
74.50	1.581	1.581	1.381	2200.0	.201	29
73.50	1.643	1.643	1.375	2137.9	.268	28
72.50	1.686	1.686	1.362	2075.4	.324	27
71.50	1.719	1.719	1.344	2010.1	.375	27
-- 2 FAILURE SURFACES FOR R=		70.50	(IDENTIFIED LEFT TO RIGHT)			
70.50	1.607	1.607	1.210	1950.6	.398	23
70.50	31.943	31.943	31.943	6.7	.000	6
69.50	1.628	1.628	1.225	1847.7	.403	23
71.25	1.722	1.722	1.339	1993.4	.382	27
71.00	1.725	1.725	1.335	1976.6	.390	27
70.75	1.728	1.728	1.331	1959.6	.398	27
70.25	1.612	1.612	1.213	1924.6	.399	23
70.00	1.618	1.618	1.217	1898.8	.400	23
69.75	1.623	1.623	1.221	1873.2	.402	23
68.50	1.650	1.650	1.241	1746.1	.409	22
67.50	1.673	1.673	1.258	1648.5	.415	22
66.50	1.721	1.721	1.275	1554.4	.447	22
65.50	1.808	1.808	1.295	1460.9	.513	22
64.50	1.907	1.907	1.316	1374.1	.591	22
63.50	1.990	1.990	1.338	1291.3	.652	21
62.50	2.051	2.051	1.361	1211.3	.690	21
61.50	2.139	2.139	1.410	1137.1	.729	19
60.50	2.254	2.254	1.479	1062.4	.775	19
59.50	2.403	2.403	1.559	987.7	.844	18
58.50	2.612	2.612	1.640	920.0	.971	18

THE LOWEST FACTOR OF SAFETY WAS 1.497 AT R = 77.75.

X = 170.00 , Y = 135.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

Case 4

78.50	1.446	1.446	1.446	2278.0	.000	30
77.50	1.412	1.412	1.408	2229.3	.004	28
76.50	1.334	1.334	1.321	2148.9	.013	26
75.50	1.352	1.352	1.328	2058.4	.024	26
77.25	1.392	1.392	1.386	2213.0	.006	27
77.00	1.365	1.365	1.357	2195.3	.008	27
76.75	1.329	1.329	1.319	2171.7	.010	26
76.25	1.338	1.338	1.322	2126.3	.015	26
76.00	1.342	1.342	1.324	2103.6	.018	26
75.75	1.347	1.347	1.326	2081.0	.021	26
74.50	1.375	1.375	1.339	1965.9	.036	26
73.50	1.402	1.402	1.352	1873.1	.051	25
72.50	1.433	1.433	1.367	1781.7	.066	25
71.50	1.466	1.466	1.382	1692.1	.084	25
70.50	1.514	1.514	1.410	1604.4	.104	25
69.50	1.575	1.575	1.449	1518.5	.126	25
68.50	1.676	1.676	1.493	1432.4	.183	24
67.50	1.775	1.775	1.538	1351.4	.238	23
66.50	1.915	1.915	1.587	1270.8	.328	23
65.50	2.095	2.095	1.641	1191.7	.454	23
64.50	2.259	2.259	1.682	1114.9	.577	22
63.50	2.389	2.389	1.716	1041.6	.673	20
62.50	2.469	2.469	1.752	971.1	.717	20
61.50	2.523	2.523	1.788	904.0	.735	20
60.50	2.578	2.578	1.825	840.2	.754	20
59.50	2.698	2.698	1.866	778.1	.832	20
58.50	2.912	2.912	1.916	718.0	.996	19

THE LOWEST FACTOR OF SAFETY WAS 1.329 AT R = 76.75.

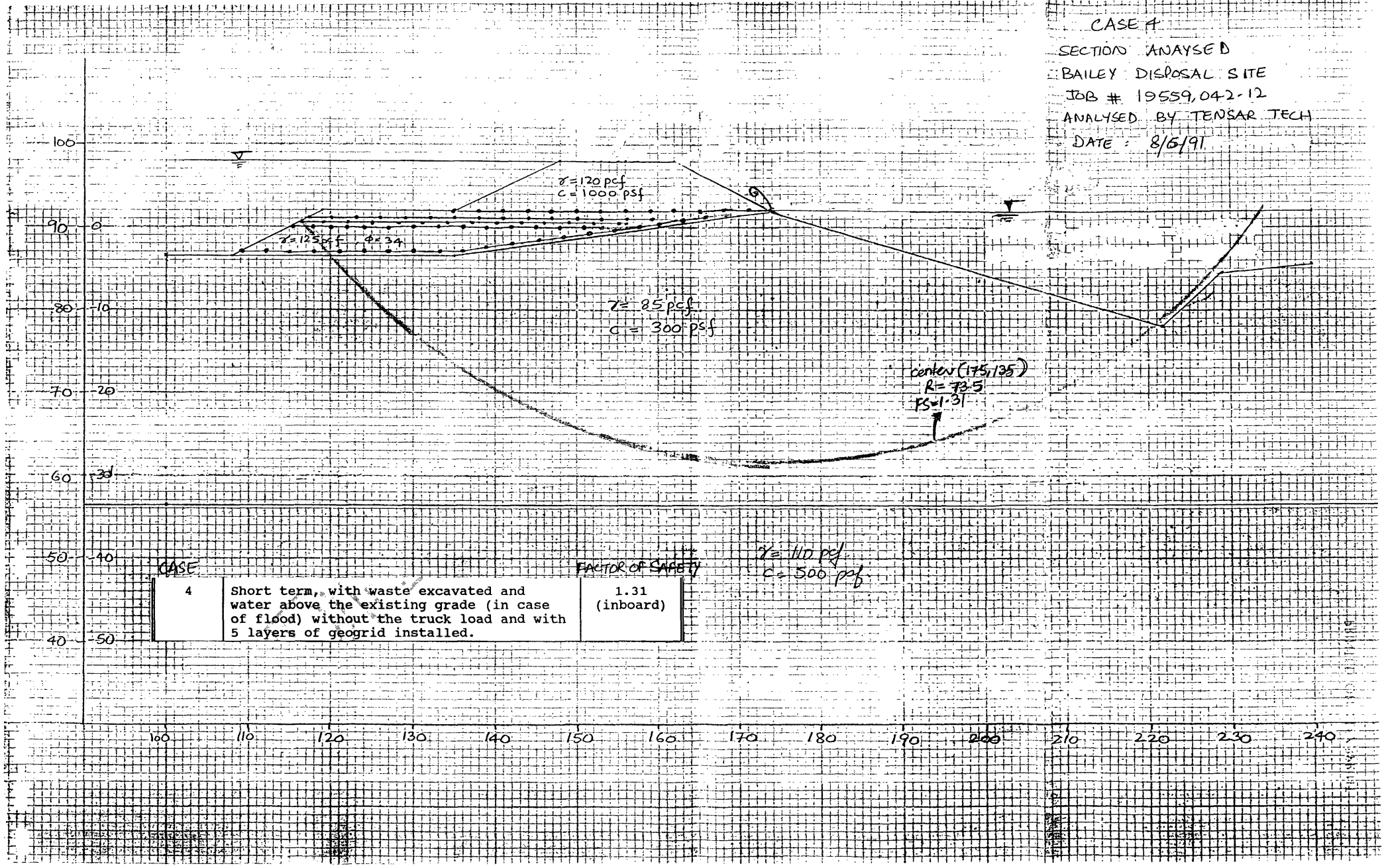
SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 175.00.
Y = 135.00.
RADIUS OF CRITICAL CIRCLE = 73.50.

MINIMUM FS = 1.310 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.310.
FS (UNREINFORCED) = 1.218.
TOTAL DRIVING MOMENT = 2097.18 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 61.50.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
86.50 (PULL OUT STRESS = 2.62 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.

CASE 4
SECTION ANAYSED
BAILEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY TENSAR TECH
DATE : 8/6/91



CASE		FACTOR OF SAFETY
4	Short term, with waste excavated and water above the existing grade (in case of flood) without the truck load and with 5 layers of geogrid installed.	1.31 (inboard)

Case	Description	Factor of Safety
4A	Case 4, but with the truck load.	1.29 (inboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        108.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      92.
9.        135.      86.5
10.       174.      92.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      92.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       135.      92.
24.       163.      92.
25.       151.2     98.
26.       115.      90.
27.       160.      90.
999.
16.
1.        2.        2.
2.        26.       6.
26.       22.       1.
22.       23.       1.
23.       3.        1.
3.        25.       1.
25.       19.       5.
19.       20.       5.
20.       21.       5.
21.       4.        1.
4.        10.       1.
10.       6.        2.
6.        7.        2.
7.        8.        2.
8.        16.       1.
16.       17.       1.
25.       21.       1.
26.       27.       6.
2.        9.        2.
9.        27.       2.
27.       10.       2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .096      1.8       0.        1.1       0.6
4.        .11       .5        0.        1.1       0.0
5.        .712      1.        0.        1.1       0.0
6.        .125      0.        34.       1.1       0.9
99.
```

CASE 4A

- Validity of data
- Reasonableness of Result

Checked by N. Khan
Date 8/19/91

```
4.      0.      0.0624
50.     98.
148.    98.
160.    87.5
286.    87.5
0.
0.      6.      0.      .05
86.5    109     135.    4.      1.      1.5
90.25   130.    155.    4.      1.      1.5
90.5    117.    157.    4.00    1.      1.5
91.0    119.    161.    4.00    1.      1.5
91.5    120.    165.    4.00    1.      1.5
92.5    138.    172.    4.00    1.      1.5
20.
56.5
76.5
20.
SEARCH
170.    125.    20.     20.
```

Case 4A

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

Case 4A

DATE 08-06-1991
TIME 16:41

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	108.00	86.50	.0000	2	*
2	108.00	86.50	115.00	90.00	.5000	6	*
3	115.00	90.00	121.00	92.00	.3333	1	*
4	121.00	92.00	135.00	92.00	.0000	1	*
5	135.00	92.00	147.00	98.00	.5000	1	*
6	147.00	98.00	151.20	98.00	.0000	1	*
7	151.20	98.00	151.30	99.00	9.9994	5	*
8	151.30	99.00	157.20	99.00	.0000	5	*
9	157.20	99.00	157.30	98.00	-9.9994	5	*
10	157.30	98.00	162.00	98.00	.0000	1	*
11	162.00	98.00	174.00	92.00	-.5000	1	*
12	174.00	92.00	221.50	78.00	-.2947	2	*
13	221.50	78.00	229.00	84.50	.8667	2	*
14	229.00	84.50	258.00	92.00	.2586	2	*
15	258.00	92.00	271.00	98.00	.4615	1	*
16	271.00	98.00	286.00	98.00	.0000	1	*
17	151.20	98.00	157.30	98.00	.0000	1	
18	115.00	90.00	160.00	90.00	.0000	6	
19	108.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	160.00	90.00	.1400	2	
21	160.00	90.00	174.00	92.00	.1429	2	
22	258.00	92.00	286.00	92.00	.0000	2	
23	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	94.00
2	148.00	94.00
3	160.00	81.00
4	286.00	81.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 4A

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	86.50	109.00	135.00	100.
2	90.25	130.00	155.00	100.
3	90.50	117.00	157.00	100.
4	91.00	119.00	161.00	100.
5	91.50	120.00	165.00	100.
6	92.50	138.00	172.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	4.00	4.00	1.5
2	4.00	4.00	1.5
3	4.00	4.00	1.5
4	4.00	4.00	1.5
5	4.00	4.00	1.5
6	4.00	4.00	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 175.00, INITIAL Y = 125.00.
DELX = 20.00, DELY = 20.00.

X = 175.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.320	1.320	1.252	2188.3	.067	32
67.50	1.324	1.324	1.245	2129.1	.079	31
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.317	1.317	1.201	2059.6	.117	30
65.50	1.337	1.337	1.179	1975.5	.158	29
67.25	1.323	1.323	1.235	2113.8	.088	31
67.00	1.319	1.319	1.222	2101.4	.097	30
66.75	1.320	1.320	1.213	2079.6	.107	30
66.25	1.310	1.310	1.183	2039.3	.127	30
66.00	1.308	1.308	1.171	2017.9	.137	29
65.75	1.322	1.322	1.175	1996.7	.147	29
64.50	1.406	1.406	1.196	1891.7	.210	29
63.50	1.492	1.492	1.214	1809.0	.279	28
62.50	1.560	1.560	1.223	1725.3	.336	27
61.50	1.618	1.618	1.231	1643.6	.387	27
60.50	1.652	1.652	1.238	1563.5	.413	26
59.50	1.660	1.660	1.243	1488.6	.417	25
58.50	1.673	1.673	1.252	1412.0	.421	25
57.50	1.687	1.687	1.261	1337.0	.425	25

56.50	1.714	1.714	1.270	1265.0	.444	25
55.50	1.772	1.772	1.278	1195.1	.493	24
54.50	1.853	1.853	1.289	1127.7	.564	23
53.50	1.935	1.935	1.297	1066.7	.638	23
52.50	1.975	1.975	1.305	1007.4	.669	23
51.50	2.032	2.032	1.328	948.2	.704	21
50.50	2.108	2.108	1.369	896.0	.738	20
49.50	2.200	2.200	1.421	841.6	.779	20
48.50	2.344	2.344	1.476	790.0	.868	20

Case 4A

THE LOWEST FACTOR OF SAFETY WAS 1.308 AT R = 66.00.

X = 195.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.895	1.895	1.510	2016.7	.385	31
67.50	1.879	1.879	1.492	1988.7	.387	30
66.50	1.869	1.869	1.478	1954.6	.391	29
65.50	1.859	1.859	1.462	1924.8	.397	28
64.50	1.880	1.880	1.452	1887.7	.428	28
66.25	1.866	1.866	1.475	1946.8	.392	29
66.00	1.864	1.864	1.471	1938.8	.393	29
65.75	1.858	1.858	1.465	1934.1	.393	28
65.25	1.865	1.865	1.460	1915.3	.405	28
65.00	1.870	1.870	1.457	1906.1	.412	28
64.75	1.875	1.875	1.455	1897.0	.420	28
63.50	1.904	1.904	1.444	1847.9	.460	28
62.50	1.934	1.934	1.439	1802.3	.495	27
61.50	1.955	1.955	1.435	1755.9	.520	27
60.50	1.965	1.965	1.435	1705.2	.530	26
59.50	1.982	1.982	1.439	1649.3	.543	27
58.50	2.013	2.013	1.453	1586.6	.560	26
57.50	2.043	2.043	1.465	1523.2	.578	26
56.50	2.087	2.087	1.488	1456.5	.599	26
55.50	2.116	2.116	1.521	1383.8	.595	25
54.50	2.117	2.117	1.537	1308.4	.580	24
-- 2 FAILURE SURFACES FOR R= 53.50 (IDENTIFIED LEFT TO RIGHT)						
53.50	1.905	1.905	1.384	1240.8	.522	21
53.50	16.278	16.278	16.278	8.5	.000	6
52.50	1.914	1.914	1.425	1146.7	.489	21
54.25	2.106	2.106	1.539	1289.3	.567	24
54.00	2.095	2.095	1.541	1270.2	.553	24
-- 2 FAILURE SURFACES FOR R= 53.75 (IDENTIFIED LEFT TO RIGHT)						
53.75	1.907	1.907	1.374	1265.1	.534	21
53.75	13.125	13.125	13.125	13.1	.000	6
-- 2 FAILURE SURFACES FOR R= 53.25 (IDENTIFIED LEFT TO RIGHT)						
53.25	1.903	1.903	1.394	1216.9	.509	21
53.25	25.310	25.310	25.310	4.0	.000	6
-- 2 FAILURE SURFACES FOR R= 53.00 (IDENTIFIED LEFT TO RIGHT)						
53.00	1.900	1.900	1.404	1193.2	.496	21
53.00	77.973	77.973	77.973	.6	.000	6
52.75	1.907	1.907	1.414	1169.8	.492	21
51.50	1.935	1.935	1.460	1057.1	.475	21
50.50	2.105	2.105	1.625	940.1	.480	19
49.50	2.267	2.267	1.783	815.6	.484	18
48.50	2.466	2.466	1.979	694.9	.487	18

THE LOWEST FACTOR OF SAFETY WAS 1.858 AT R = 65.75.

Case 4A

X = 155.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	2.457	2.457	2.457	1067.1	.000	30
67.50	2.501	2.501	2.501	1009.3	.000	30
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	2.544	2.544	2.544	954.2	.000	30
65.50	2.587	2.587	2.587	901.8	.000	30
64.50	2.624	2.624	2.624	853.4	.000	29
63.50	2.672	2.672	2.672	803.9	.000	28
62.50	2.710	2.710	2.710	759.4	.000	28
61.50	2.746	2.746	2.746	717.4	.000	28
60.50	2.779	2.779	2.779	677.5	.000	28
59.50	2.821	2.821	2.810	640.0	.011	27
58.50	2.904	2.904	2.866	598.8	.038	26
57.50	2.988	2.988	2.918	560.8	.070	26
56.50	3.086	3.086	2.977	523.7	.108	26
55.50	3.200	3.200	3.046	487.2	.154	26
54.50	3.331	3.331	3.124	451.6	.206	25
53.50	3.502	3.502	3.232	414.3	.270	24
52.50	3.725	3.725	3.381	380.1	.344	24
51.50	4.013	4.013	3.579	346.6	.434	24
50.50	4.487	4.487	3.824	312.9	.663	24
49.50	4.949	4.949	4.103	280.9	.846	24
48.50	5.718	5.718	4.440	249.7	1.278	22

THE LOWEST FACTOR OF SAFETY WAS 2.457 AT R = 68.50.

X = 175.00 , Y = 145.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
88.50	1.564	1.564	1.564	2583.5	.000	30
87.50	1.534	1.534	1.527	2546.7	.006	29
86.50	1.508	1.508	1.492	2508.4	.016	29
85.50	1.486	1.486	1.459	2464.9	.027	29
84.50	1.468	1.468	1.429	2416.1	.038	29
83.50	1.454	1.454	1.403	2360.2	.051	28
82.50	1.444	1.444	1.379	2299.5	.065	28
-- 2 FAILURE SURFACES FOR R= 81.50 (IDENTIFIED LEFT TO RIGHT)						
81.50	1.312	1.312	1.232	2245.3	.080	25
81.50	23.588	23.588	23.588	10.6	.000	6
80.50	1.352	1.352	1.255	2147.0	.098	25
82.25	1.442	1.442	1.373	2283.6	.069	28
82.00	1.440	1.440	1.367	2267.4	.072	28
81.75	1.438	1.438	1.362	2250.9	.076	28
-- 2 FAILURE SURFACES FOR R= 81.25 (IDENTIFIED LEFT TO RIGHT)						
81.25	1.320	1.320	1.236	2220.8	.084	25
81.25	49.136	49.136	49.136	3.3	.000	6
81.00	1.331	1.331	1.242	2196.1	.089	25
80.75	1.341	1.341	1.248	2171.5	.093	25
79.50	1.403	1.403	1.282	2048.7	.121	25
78.50	1.487	1.487	1.313	1949.7	.174	24
77.50	1.572	1.572	1.348	1850.1	.224	24
76.50	1.707	1.707	1.384	1752.2	.323	23
75.50	1.844	1.844	1.422	1654.8	.422	22

Case 4A

74.50	1.961	1.961	1.444	1559.0	.518	21
73.50	2.040	2.040	1.469	1463.8	.571	21
72.50	2.076	2.076	1.494	1372.6	.582	21
71.50	2.114	2.114	1.521	1284.0	.593	20
70.50	2.190	2.190	1.548	1199.7	.642	20
69.50	2.343	2.343	1.578	1119.7	.765	20
68.50	2.510	2.510	1.608	1046.2	.902	20

THE LOWEST FACTOR OF SAFETY WAS 1.312 AT R = 81.50.

X = 175.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.430	1.430	1.158	1433.5	.272	29
47.50	1.425	1.425	1.154	1373.0	.271	28
46.50	1.441	1.441	1.153	1311.6	.288	28
48.25	1.429	1.429	1.157	1417.8	.272	29
48.00	1.425	1.425	1.154	1404.6	.271	28
47.75	1.425	1.425	1.154	1388.7	.271	28
47.25	1.427	1.427	1.154	1357.4	.273	28
47.00	1.431	1.431	1.153	1342.0	.278	28
46.75	1.436	1.436	1.153	1326.7	.283	28
45.50	1.460	1.460	1.150	1252.5	.310	28
44.50	1.480	1.480	1.147	1194.6	.333	27
43.50	1.507	1.507	1.144	1138.2	.363	27
42.50	1.525	1.525	1.144	1082.8	.381	27
41.50	1.543	1.543	1.150	1032.7	.393	26
40.50	1.572	1.572	1.165	983.3	.407	24
39.50	1.604	1.604	1.182	934.4	.421	24
38.50	1.652	1.652	1.201	887.1	.451	24
37.50	1.715	1.715	1.220	841.6	.495	24
36.50	1.778	1.778	1.237	798.3	.541	23
35.50	1.854	1.854	1.261	752.4	.593	22
34.50	1.919	1.919	1.285	708.7	.634	22
33.50	1.974	1.974	1.311	665.9	.663	22
32.50	2.035	2.035	1.339	623.5	.695	22
31.50	2.112	2.112	1.378	579.6	.734	21
30.50	2.212	2.212	1.435	537.0	.777	21
29.50	2.299	2.299	1.476	497.0	.823	21
28.50	2.374	2.374	1.499	459.1	.875	20

THE LOWEST FACTOR OF SAFETY WAS 1.425 AT R = 47.50.

X = 180.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.520	1.520	1.318	2241.4	.202	33
67.50	1.534	1.534	1.281	2187.2	.252	31
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.558	1.558	1.263	2127.8	.296	30
65.50	1.568	1.568	1.243	2069.2	.325	30
64.50	1.558	1.558	1.224	2008.8	.334	30
63.50	1.532	1.532	1.201	1949.2	.331	28
62.50	1.441	1.441	1.110	1873.3	.331	26
61.50	1.444	1.444	1.112	1790.7	.332	26

Case 4A

63.25	1.514	1.514	1.183	1933.0	.331	28
63.00	1.493	1.493	1.163	1914.5	.331	27
62.75	1.459	1.459	1.129	1894.3	.331	27
62.25	1.441	1.441	1.110	1852.4	.331	26
62.00	1.442	1.442	1.111	1831.7	.331	26
61.75	1.443	1.443	1.111	1811.1	.332	26
60.50	1.458	1.458	1.114	1710.2	.345	26
59.50	1.493	1.493	1.115	1631.7	.377	26
58.50	1.542	1.542	1.119	1552.9	.423	24
57.50	1.598	1.598	1.123	1478.9	.475	24
56.50	1.624	1.624	1.127	1408.2	.497	24
55.50	1.658	1.658	1.139	1337.4	.519	23
54.50	1.715	1.715	1.171	1266.2	.543	23
53.50	1.776	1.776	1.207	1197.7	.569	21
52.50	1.871	1.871	1.247	1129.9	.624	21
51.50	1.989	1.989	1.288	1065.5	.701	21
50.50	2.120	2.120	1.334	1002.1	.787	21
49.50	2.252	2.252	1.384	939.4	.868	21
48.50	2.363	2.363	1.442	876.1	.921	20

THE LOWEST FACTOR OF SAFETY WAS 1.441 AT R = 62.50.

X = 170.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.294	1.294	1.263	2005.5	.031	31
67.50	1.306	1.306	1.264	1927.8	.042	30
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.319	1.319	1.265	1853.3	.054	29
65.50	1.338	1.338	1.270	1774.5	.067	29
64.50	1.368	1.368	1.286	1696.4	.082	29
63.50	1.407	1.407	1.308	1619.2	.099	29
62.50	1.473	1.473	1.332	1544.0	.142	28
61.50	1.556	1.556	1.360	1466.3	.196	28
60.50	1.650	1.650	1.390	1390.5	.260	28
59.50	1.774	1.774	1.421	1317.2	.352	27
58.50	1.880	1.880	1.446	1243.9	.434	26
57.50	1.976	1.976	1.464	1172.6	.512	25
56.50	2.037	2.037	1.480	1105.8	.557	25
55.50	2.059	2.059	1.493	1043.0	.565	24
54.50	2.084	2.084	1.509	981.1	.575	24
53.50	2.111	2.111	1.526	921.1	.585	23
52.50	2.161	2.161	1.538	865.8	.623	23
51.50	2.266	2.266	1.554	811.2	.712	23
50.50	2.387	2.387	1.567	761.6	.820	22
49.50	2.494	2.494	1.580	715.4	.914	22
48.50	2.566	2.566	1.598	668.9	.968	21

THE LOWEST FACTOR OF SAFETY WAS 1.294 AT R = 68.50.

X = 165.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.488	1.488	1.488	1720.0	.000	31
67.50	1.495	1.495	1.490	1652.2	.004	31

D(FS)/DR IS NEGATIVE AT RMAX.

66.50	1.506	1.506	1.492	1586.7	.014	29
65.50	1.525	1.525	1.499	1517.5	.026	29
64.50	1.548	1.548	1.508	1448.6	.040	29
63.50	1.574	1.574	1.518	1380.7	.055	29
62.50	1.601	1.601	1.528	1315.1	.072	28
61.50	1.637	1.637	1.545	1246.1	.092	27
60.50	1.684	1.684	1.571	1181.1	.113	27
59.50	1.747	1.747	1.609	1117.7	.138	27
58.50	1.845	1.845	1.650	1055.9	.195	27
57.50	1.968	1.968	1.696	994.2	.272	27
56.50	2.104	2.104	1.747	933.6	.357	26
55.50	2.289	2.289	1.797	877.1	.493	25
54.50	2.459	2.459	1.840	820.7	.619	24
53.50	2.611	2.611	1.871	766.8	.740	24
52.50	2.713	2.713	1.902	715.5	.811	24
51.50	2.765	2.765	1.933	666.4	.832	22
50.50	2.814	2.814	1.962	620.4	.852	22
49.50	2.862	2.862	1.990	576.9	.872	22
48.50	3.009	3.009	2.021	534.7	.988	22

THE LOWEST FACTOR OF SAFETY WAS 1.488 AT R = 68.50.

Case 4A

X = 170.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.332	1.332	1.321	2165.9	.012	31
72.50	1.308	1.308	1.287	2087.7	.021	30
71.50	1.320	1.320	1.288	2009.0	.032	30
73.25	1.309	1.309	1.295	2146.8	.014	31
73.00	1.303	1.303	1.287	2127.1	.016	30
72.75	1.305	1.305	1.287	2107.4	.019	30
72.25	1.311	1.311	1.287	2068.0	.024	30
72.00	1.314	1.314	1.287	2048.4	.026	30
71.75	1.317	1.317	1.288	2028.7	.029	30
70.50	1.335	1.335	1.290	1930.1	.044	30
69.50	1.351	1.351	1.293	1852.2	.058	29
68.50	1.372	1.372	1.300	1771.1	.073	29
67.50	1.405	1.405	1.316	1690.2	.089	28
66.50	1.449	1.449	1.341	1611.5	.108	28
65.50	1.521	1.521	1.370	1532.1	.151	28
64.50	1.613	1.613	1.404	1451.4	.209	28
63.50	1.713	1.713	1.439	1374.2	.274	27
62.50	1.857	1.857	1.479	1295.7	.378	26
61.50	1.983	1.983	1.509	1220.9	.474	25
60.50	2.092	2.092	1.530	1148.9	.562	25
59.50	2.159	2.159	1.548	1081.4	.610	24
58.50	2.195	2.195	1.572	1013.3	.623	23
57.50	2.226	2.226	1.592	950.5	.634	23
56.50	2.256	2.256	1.610	890.8	.646	23
55.50	2.364	2.364	1.631	832.6	.733	23
54.50	2.510	2.510	1.653	778.3	.857	22
53.50	2.670	2.670	1.675	727.6	.995	21

THE LOWEST FACTOR OF SAFETY WAS 1.303 AT R = 73.00.

X = 170.00 , Y = 120.00 :

Case 4A

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
63.50	1.300	1.300	1.246	1832.5	.054	29
62.50	1.318	1.318	1.252	1756.9	.066	29
D(FS)/DR IS NEGATIVE AT RMAX.						
61.50	1.348	1.348	1.269	1681.9	.079	29
60.50	1.386	1.386	1.288	1608.1	.098	29
59.50	1.453	1.453	1.308	1535.1	.144	29
58.50	1.530	1.530	1.332	1461.0	.198	28
57.50	1.620	1.620	1.358	1388.2	.262	28
56.50	1.730	1.730	1.385	1316.6	.344	28
55.50	1.814	1.814	1.398	1247.4	.415	26
54.50	1.887	1.887	1.412	1179.7	.475	26
53.50	1.932	1.932	1.426	1113.6	.506	25
52.50	1.951	1.951	1.437	1052.2	.514	25
51.50	1.966	1.966	1.446	994.2	.520	24
50.50	1.983	1.983	1.456	937.5	.527	24
49.50	2.016	2.016	1.465	883.6	.551	24
48.50	2.086	2.086	1.473	831.4	.612	23
47.50	2.187	2.187	1.486	780.1	.701	23
46.50	2.285	2.285	1.490	736.4	.795	22
45.50	2.334	2.334	1.497	693.3	.837	22
44.50	2.402	2.402	1.519	650.1	.882	20
43.50	2.498	2.498	1.569	611.2	.928	20

THE LOWEST FACTOR OF SAFETY WAS 1.300 AT R = 63.50.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 170.00.
Y = 125.00.
RADIUS OF CRITICAL CIRCLE = 68.50.

MINIMUM FS = 1.294 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.294.
FS (UNREINFORCED) = 1.263.
TOTAL DRIVING MOMENT = 2005.45 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 56.50.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
86.50 (PULL OUT STRESS = .93 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.

CASE 4A

CASE 4A

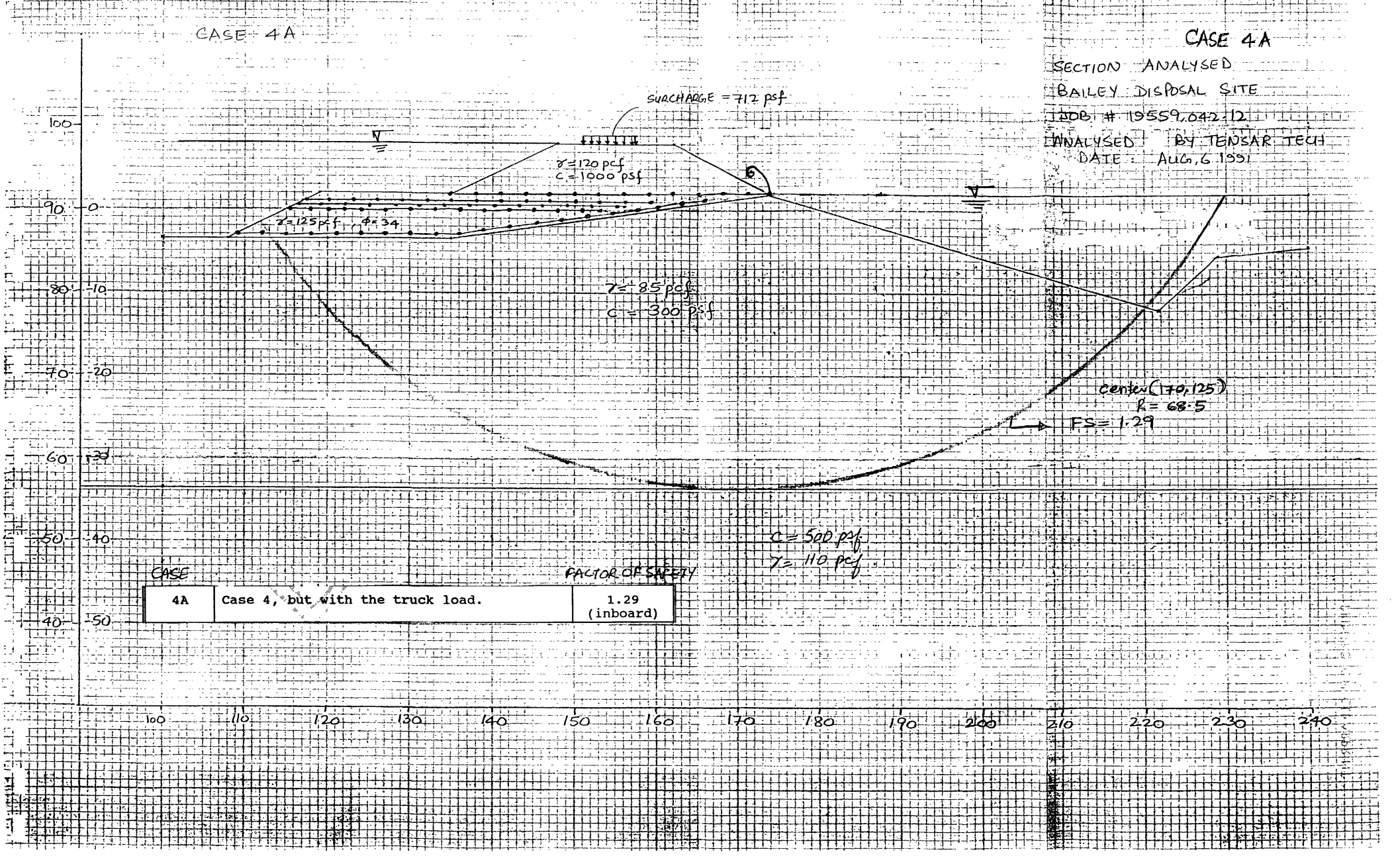
SECTION ANALYSED

BAILEY DISPOSAL SITE

JOB # 19559.042.12

ANALYSED BY TENSAR TECH

DATE: AUG. 6 1991



CASE		FACTOR OF SAFETY
4A	Case 4, but with the truck load.	1.29 (inboard)

Case	Description	Factor of Safety
5	Short term with stabilized waste, water at dike crest without the truck load and 1 layer of geogrid installed.	1.77 (inboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        124.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      88.
9.        135.      86.5
10.       182.      88.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      88.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       131.      90.
24.       163.      92.
25.       151.2     98.
26.       147.      88.
27.       177.      90.
999.
9.
1.        2.        2.
2.        23.       6.
23.       3.        1.
3.        4.        1.
4.        27.       1.
27.       10.       6.
10.       8.        3.
8.        16.       1.
16.       17.       1.
10.       6.        2.
6.        7.        2.
7.        8.        2.
23.       27.       6.
2.        9.        2.
9.        26.       2.
26.       10.       2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .096      1.8       0.        1.1       0.6
4.        .11       .5        0.        1.1       0.0
5.        .00001    1.        0.        1.1       0.0
6.        .125      0.        34.       1.1       0.9
99.
4.        0.        0.0624
50.       98.
148.      98.
160.      56.
286.      56.
```

CASE 5

- Validity of data
- Reasonableness of Result

Checked by N. Khan
Date: 8/9/91

```
0.
0.      1.      0.      .05
90.0    131.5   176.    3.52    1.      1.5
20.
56.5
76.5
20.
SEARCH
190.    125.    20.     20.
```

Case 5

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-06-1991
TIME 17:00

Case 5

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	162.00	98.00	.0000	1	*
5	162.00	98.00	177.00	90.00	-.5333	1	*
6	177.00	90.00	182.00	88.00	-.4000	6	*
7	182.00	88.00	258.00	88.00	.0000	3	*
8	258.00	88.00	271.00	98.00	.7692	1	*
9	271.00	98.00	286.00	98.00	.0000	1	*
10	182.00	88.00	221.50	78.00	-.2532	2	
11	221.50	78.00	229.00	84.50	.8667	2	
12	229.00	84.50	258.00	88.00	.1207	2	
13	131.00	90.00	177.00	90.00	.0000	6	
14	124.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	147.00	88.00	.1250	2	
16	147.00	88.00	182.00	88.00	.0000	2	
17	258.00	88.00	286.00	88.00	.0000	2	
18	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	98.00
2	148.00	98.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 5

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	90.00	131.50	176.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	3.52	3.52	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 190.00, INITIAL Y = 125.00.
DELX = 20.00, DELY = 20.00.

X = 190.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.770	1.770	1.770	1675.4	.000	31
67.50	1.808	1.808	1.800	1619.2	.008	30
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.851	1.851	1.831	1566.2	.020	29
65.50	1.903	1.903	1.869	1509.7	.034	29
64.50	1.961	1.961	1.911	1452.7	.050	29
63.50	2.027	2.027	1.960	1393.6	.067	27
62.50	2.096	2.096	2.011	1337.4	.086	27
61.50	2.169	2.169	2.062	1283.2	.107	26
60.50	2.257	2.257	2.126	1225.1	.131	26
59.50	2.357	2.357	2.199	1165.9	.158	25
58.50	2.460	2.460	2.277	1109.2	.183	25
57.50	2.555	2.555	2.364	1052.1	.191	25
56.50	2.727	2.727	2.528	994.8	.199	27
55.50	3.645	3.645	3.437	940.3	.207	25
54.50	3.808	3.808	3.591	884.5	.218	25
53.50	3.945	3.945	3.717	828.7	.228	24
52.50	4.105	4.105	3.865	771.5	.241	21
51.50	4.279	4.279	4.026	717.7	.254	22
50.50	4.490	4.490	4.220	661.1	.270	21
49.50	4.715	4.715	4.425	604.3	.290	21
48.50	4.978	4.978	4.666	548.5	.313	19

THE LOWEST FACTOR OF SAFETY WAS 1.770 AT R = 68.50.

X = 210.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	5.161	5.161	4.899	876.3	.262	31
67.50	5.057	5.057	4.796	869.6	.261	31

Case 5

66.50	4.910	4.910	4.650	866.6	.259	30
65.50	4.690	4.690	4.432	861.5	.258	29
64.50	4.504	4.504	4.245	847.4	.259	27
63.50	4.394	4.394	4.129	817.4	.265	26
62.50	4.339	4.339	4.063	774.8	.277	26
61.50	4.327	4.327	4.033	720.4	.294	26
60.50	4.385	4.385	4.065	653.8	.320	25
62.25	4.332	4.332	4.052	762.3	.280	26
62.00	4.328	4.328	4.044	749.0	.284	26
61.75	4.326	4.326	4.037	735.1	.289	26
61.25	4.330	4.330	4.031	704.9	.299	26
61.00	4.336	4.336	4.030	688.6	.306	26
60.75	4.343	4.343	4.031	671.5	.312	26
59.50	4.752	4.752	4.399	584.9	.353	25
58.50	5.257	5.257	4.860	512.5	.397	23
57.50	5.944	5.944	5.488	439.3	.456	22
56.50	6.797	6.797	6.266	372.1	.531	22
55.50	7.977	7.977	7.342	306.9	.635	22
54.50	9.556	9.556	8.771	244.5	.785	21
53.50	12.043	12.043	11.013	183.1	1.030	18
52.50	15.407	15.407	14.267	132.2	1.140	18
51.50	20.721	20.721	19.546	89.7	1.175	17
50.50	31.416	31.416	30.229	53.6	1.187	17
49.50	61.121	61.121	60.100	24.6	1.020	16
48.50	234.831	234.831	234.831	5.7	.000	16

THE LOWEST FACTOR OF SAFETY WAS 4.326 AT R = 61.75.

X = 170.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	2.960	2.960	2.960	1362.7	.000	30
67.50	2.921	2.921	2.921	1327.8	.000	29
66.50	2.872	2.872	2.872	1298.3	.000	28
65.50	2.831	2.831	2.831	1264.5	.000	28
64.50	2.788	2.788	2.788	1232.1	.000	28
63.50	2.742	2.742	2.742	1200.1	.000	28
62.50	2.694	2.694	2.694	1169.4	.000	27
61.50	2.645	2.645	2.645	1138.5	.000	26
60.50	2.595	2.595	2.595	1108.0	.000	26
59.50	2.547	2.547	2.547	1076.2	.000	25
58.50	2.494	2.494	2.494	1046.2	.000	24
57.50	2.451	2.451	2.451	1012.4	.000	24
56.50	2.410	2.410	2.410	977.9	.000	24
55.50	2.371	2.371	2.371	942.5	.000	24
54.50	2.337	2.337	2.337	905.0	.000	23
53.50	2.304	2.304	2.304	867.3	.000	23
52.50	2.275	2.275	2.275	827.7	.000	22
51.50	2.294	2.294	2.283	789.1	.012	21
53.25	2.296	2.296	2.296	857.8	.000	23
53.00	2.288	2.288	2.288	848.4	.000	23
52.75	2.280	2.280	2.280	838.9	.000	23
52.25	2.273	2.273	2.273	818.1	.000	22
52.00	2.277	2.277	2.277	808.3	.001	22
51.75	2.287	2.287	2.281	798.2	.006	22
50.50	2.345	2.345	2.309	747.0	.036	20
49.50	2.397	2.397	2.333	706.9	.065	19
48.50	2.462	2.462	2.364	665.9	.098	20

THE LOWEST FACTOR OF SAFETY WAS 2.273 AT R = 52.25.

X = 190.00 , Y = 145.00 :

Case 5

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
88.50	1.869	1.869	1.869	2165.0	.000	30
87.50	1.862	1.862	1.862	2115.9	.000	29
86.50	1.864	1.864	1.864	2058.5	.000	28
88.25	1.867	1.867	1.867	2152.3	.000	30
88.00	1.866	1.866	1.866	2139.4	.000	30
87.75	1.862	1.862	1.862	2129.6	.000	29
87.25	1.862	1.862	1.862	2102.1	.000	29
87.00	1.865	1.865	1.865	2085.4	.000	28
86.75	1.864	1.864	1.864	2072.0	.000	28
85.50	1.866	1.866	1.866	2003.6	.000	28
84.50	1.871	1.871	1.871	1947.3	.000	28
83.50	1.880	1.880	1.880	1889.3	.000	28
82.50	1.895	1.895	1.895	1826.8	.000	27
81.50	1.912	1.912	1.912	1766.5	.000	27
80.50	1.937	1.937	1.937	1705.1	.000	27
79.50	2.012	2.012	1.999	1639.7	.013	27
78.50	2.102	2.102	2.070	1572.0	.032	26
77.50	2.199	2.199	2.146	1507.5	.053	26
76.50	2.309	2.309	2.231	1441.7	.077	26
75.50	2.431	2.431	2.326	1376.9	.105	24
74.50	2.577	2.577	2.440	1308.0	.137	23
73.50	2.978	2.978	2.805	1240.6	.173	24
72.50	3.702	3.702	3.487	1175.8	.214	24
71.50	4.225	4.225	3.998	1112.9	.227	23
70.50	4.377	4.377	4.140	1048.4	.237	23
69.50	4.631	4.631	4.381	982.9	.250	23
68.50	4.871	4.871	4.606	912.4	.265	21

THE LOWEST FACTOR OF SAFETY WAS 1.862 AT R = 87.25.

X = 190.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	2.319	2.319	2.175	1023.3	.144	31
47.50	2.383	2.383	2.233	970.7	.149	30
D(FS)/DR IS NEGATIVE AT RMAX.						
46.50	2.446	2.446	2.291	921.7	.155	30
45.50	2.524	2.524	2.363	870.2	.161	30
44.50	2.657	2.657	2.488	816.7	.169	30
43.50	2.825	2.825	2.648	768.7	.176	29
42.50	3.128	3.128	2.943	717.6	.185	27
41.50	3.597	3.597	3.403	671.0	.194	27
40.50	3.710	3.710	3.506	626.3	.204	27
39.50	3.795	3.795	3.580	581.1	.215	26
38.50	3.894	3.894	3.667	538.8	.227	23
37.50	4.020	4.020	3.778	496.7	.241	23
36.50	4.142	4.142	3.886	458.6	.256	23
35.50	4.352	4.352	4.076	415.6	.276	22
34.50	4.597	4.597	4.298	374.7	.299	21
33.50	4.779	4.779	4.456	339.1	.323	20

32.50	5.055	5.055	4.702	302.7	.353	19
31.50	5.407	5.407	5.017	267.2	.390	18
30.50	5.956	5.956	5.513	229.6	.443	17
29.50	6.599	6.599	6.092	195.2	.507	17
28.50	7.308	7.308	6.720	163.8	.588	16

Case 5

THE LOWEST FACTOR OF SAFETY WAS 2.319 AT R = 48.50.

X = 195.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.903	1.903	1.854	1649.5	.049	30
67.50	1.958	1.958	1.894	1588.4	.065	29

D(FS)/DR IS NEGATIVE AT RMAX.

66.50	2.019	2.019	1.937	1527.0	.082	29
65.50	2.083	2.083	1.981	1467.8	.101	28
64.50	2.159	2.159	2.037	1404.2	.123	28
63.50	2.246	2.246	2.099	1339.4	.147	27
62.50	2.332	2.332	2.164	1277.6	.168	27
61.50	2.410	2.410	2.236	1215.7	.174	27
60.50	2.498	2.498	2.317	1153.5	.181	27
59.50	2.602	2.602	2.413	1088.9	.189	26
58.50	2.759	2.759	2.560	1024.9	.199	26
57.50	2.896	2.896	2.687	961.3	.209	26
56.50	3.047	3.047	2.826	899.2	.221	25
55.50	3.233	3.233	2.999	834.2	.234	24
54.50	3.436	3.436	3.185	769.0	.251	23
53.50	4.004	4.004	3.735	704.9	.269	24
52.50	5.191	5.191	4.905	647.5	.286	23
51.50	5.502	5.502	5.193	588.4	.309	24
50.50	5.843	5.843	5.508	532.8	.335	20
49.50	6.286	6.286	5.919	476.7	.367	20
48.50	6.836	6.836	6.429	421.0	.407	19

THE LOWEST FACTOR OF SAFETY WAS 1.903 AT R = 68.50.

X = 185.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.840	1.840	1.840	1646.9	.000	30
67.50	1.841	1.841	1.841	1598.6	.000	29

D(FS)/DR IS NEGATIVE AT RMAX.

66.50	1.841	1.841	1.841	1553.0	.000	29
65.50	1.845	1.845	1.845	1504.9	.000	29
67.25	1.840	1.840	1.840	1587.3	.000	29
67.00	1.840	1.840	1.840	1575.9	.000	29
66.75	1.840	1.840	1.840	1564.5	.000	29
66.25	1.841	1.841	1.841	1541.2	.000	29
66.00	1.842	1.842	1.842	1529.1	.000	29
65.75	1.844	1.844	1.844	1517.0	.000	29
64.50	1.852	1.852	1.852	1456.2	.000	29
63.50	1.891	1.891	1.886	1404.6	.006	28
62.50	1.943	1.943	1.923	1356.0	.019	27
61.50	2.006	2.006	1.971	1303.6	.035	27
60.50	2.076	2.076	2.024	1250.9	.052	27

Case 5

59.50	2.415	2.415	2.343	1198.1	.072	27
58.50	2.920	2.920	2.826	1150.2	.093	26
57.50	2.973	2.973	2.856	1103.4	.117	25
56.50	3.043	3.043	2.899	1053.7	.144	24
55.50	3.129	3.129	2.954	1001.3	.175	22
54.50	3.205	3.205	3.004	953.8	.201	23
53.50	3.274	3.274	3.065	904.3	.209	23
52.50	3.357	3.357	3.140	853.4	.217	23
51.50	3.506	3.506	3.279	802.0	.227	22
50.50	3.633	3.633	3.394	748.9	.239	21
49.50	3.770	3.770	3.519	697.6	.251	20
48.50	3.936	3.936	3.670	645.4	.266	20

THE LOWEST FACTOR OF SAFETY WAS 1.840 AT R = 68.50.

X = 190.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.778	1.778	1.778	1813.8	.000	29
72.50	1.782	1.782	1.782	1759.4	.000	29
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	1.791	1.791	1.791	1701.8	.000	28
70.50	1.822	1.822	1.818	1647.2	.005	28
69.50	1.875	1.875	1.857	1589.5	.018	28
68.50	1.934	1.934	1.901	1530.8	.033	28
67.50	1.999	1.999	1.949	1472.0	.050	28
66.50	2.073	2.073	2.005	1411.5	.068	26
65.50	2.153	2.153	2.063	1353.1	.089	26
64.50	2.238	2.238	2.125	1296.1	.113	25
63.50	2.343	2.343	2.203	1233.9	.139	24
62.50	2.454	2.454	2.285	1175.1	.169	24
61.50	2.573	2.573	2.378	1115.8	.195	24
60.50	2.879	2.879	2.677	1055.1	.202	25
59.50	3.739	3.739	3.529	999.5	.210	24
58.50	3.906	3.906	3.687	942.0	.220	23
57.50	4.050	4.050	3.820	883.3	.230	23
56.50	4.214	4.214	3.972	825.0	.242	23
55.50	4.411	4.411	4.155	765.3	.256	22
54.50	4.644	4.644	4.371	705.7	.273	22
53.50	4.925	4.925	4.632	645.2	.293	20

THE LOWEST FACTOR OF SAFETY WAS 1.778 AT R = 73.50.

X = 190.00 , Y = 120.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
63.50	1.846	1.846	1.821	1530.9	.025	30
62.50	1.894	1.894	1.855	1476.2	.039	30
D(FS)/DR IS NEGATIVE AT RMAX.						
61.50	1.946	1.946	1.893	1421.0	.053	29
60.50	2.007	2.007	1.938	1363.1	.069	28
59.50	2.069	2.069	1.982	1308.8	.087	28
58.50	2.133	2.133	2.026	1257.1	.107	27
57.50	2.211	2.211	2.082	1201.0	.129	27
56.50	2.301	2.301	2.148	1143.1	.153	26

55.50	2.388	2.388	2.214	1088.8	.173	26
54.50	2.469	2.469	2.289	1034.1	.180	26
53.50	2.562	2.562	2.375	979.1	.187	26
52.50	2.856	2.856	2.661	924.0	.195	26
51.50	3.638	3.638	3.433	868.9	.205	25
50.50	3.753	3.753	3.538	816.2	.215	25
49.50	3.872	3.872	3.647	765.7	.225	23
48.50	4.032	4.032	3.793	711.0	.239	22
47.50	4.195	4.195	3.941	657.1	.254	21
46.50	4.370	4.370	4.099	604.6	.272	21
45.50	4.563	4.563	4.273	553.9	.290	21
44.50	4.827	4.827	4.513	501.0	.314	19
43.50	5.100	5.100	4.760	452.9	.340	17

Case 5

THE LOWEST FACTOR OF SAFETY WAS 1.846 AT R = 63.50.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 190.00.
Y = 125.00.
RADIUS OF CRITICAL CIRCLE = 68.50.

MINIMUM FS = 1.770 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.770.
FS (UNREINFORCED) = 1.770.
TOTAL DRIVING MOMENT = 1675.35 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 56.50.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
CRITICAL CIRCLE DOES NOT INTERSECT TENSAR GEOGRIDS.

CALCULATIONS HAVE BEEN COMPLETED.

CASE 5

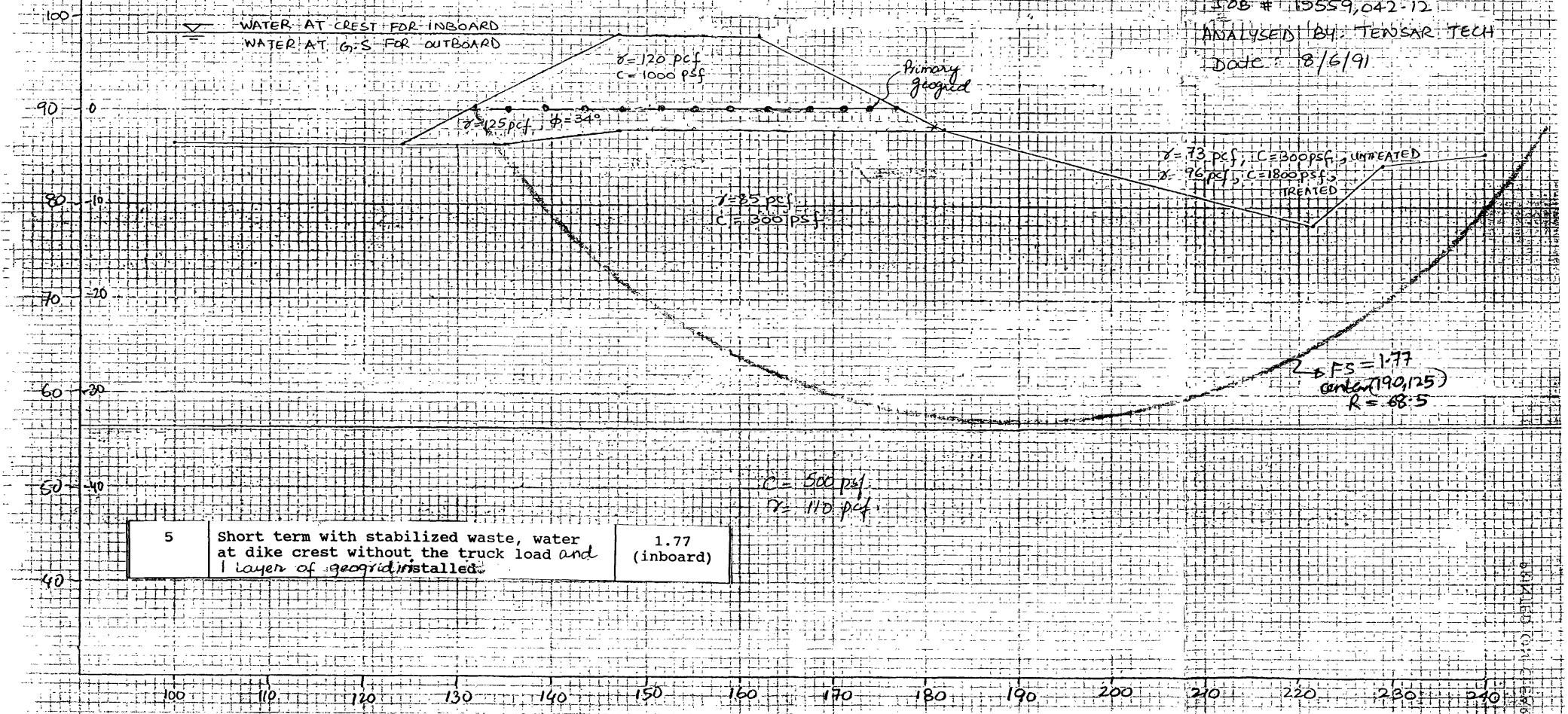
SECTION ANALYSED

BAILEY DISPOSAL SITE

JOB # 13559,042-12

ANALYSED BY: TENSAR TECH

Date: 8/6/91



5	Short term with stabilized waste, water at dike crest without the truck load and 1 layer of geogrid installed.	1.77 (inboard)

Case	Description	Factor of Safety
5A	Case 5, but with the truck load.	1.62 (inboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0     0.
1.      50.     86.5
2.      124.    86.5
3.      147.    98.
4.      162.    98.
5.      182.    92.
6.      221.5   78.
7.      229.    84.5
8.      258.    88.
9.      135.    86.5
10.     182.    88.
11.     50.     56.5
12.     286.    56.5
13.     168.    99.5
14.     221.5   100.5
15.     266.    99.5
16.     271.    98.
17.     286.    98.
18.     286.    88.
19.     151.30  99.
20.     157.20  99.
21.     157.30  98.
22.     121.    92.
23.     131.    90.
24.     163.    92.
25.     151.2   98.
26.     147.    88.
27.     177.    90.
999.
13.
1.      2.      2.
2.      23.     6.
23.     3.      1.
3.      25.     1.
25.     19.     5.
19.     20.     5.
20.     21.     5.
21.     4.      1.
4.      27.     1.
27.     10.     6.
10.     8.      3.
8.      16.     1.
16.     17.     1.
10.     6.      2.
6.      7.      2.
7.      8.      2.
25.     21.     1.
23.     27.     6.
2.      9.      2.
9.      26.     2.
26.     10.     2.
8.      18.     2.
11.     12.     4.
999.
1.      .12     1.      0.      1.1     0.7
2.      .085    .3      0.      1.1     0.6
3.      .096    1.8     0.      1.1     0.6
4.      .11     .5      0.      1.1     0.0
5.      .712    1.0     0.      1.1     0.0
6.      .125    0.      34.     1.1     0.9
99.
4.      0.      0.0624
50.     98.
148.    98.
```

CASE 5A

- Validity of data
- Reasonableness of result

checked by N. Khan
Date 8/9/91

```
160.     56.
286.     56.
0.
0.       1.       0.       .05
90.0     131.5    176.     3.52     1.       1.5
20.
56.5
76.5
20.
SEARCH
190.     125.     20.      20.
```

Case 5A

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

case 5A

DATE 08-06-1991
TIME 17:00

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	151.20	98.00	.0000	1	*
5	151.20	98.00	151.30	99.00	9.9994	5	*
6	151.30	99.00	157.20	99.00	.0000	5	*
7	157.20	99.00	157.30	98.00	-9.9994	5	*
8	157.30	98.00	162.00	98.00	.0000	1	*
9	162.00	98.00	177.00	90.00	-.5333	1	*
10	177.00	90.00	182.00	88.00	-.4000	6	*
11	182.00	88.00	258.00	88.00	.0000	3	*
12	258.00	88.00	271.00	98.00	.7692	1	*
13	271.00	98.00	286.00	98.00	.0000	1	*
14	182.00	88.00	221.50	78.00	-.2532	2	
15	221.50	78.00	229.00	84.50	.8667	2	
16	229.00	84.50	258.00	88.00	.1207	2	
17	151.20	98.00	157.30	98.00	.0000	1	
18	131.00	90.00	177.00	90.00	.0000	6	
19	124.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	147.00	88.00	.1250	2	
21	147.00	88.00	182.00	88.00	.0000	2	
22	258.00	88.00	286.00	88.00	.0000	2	
23	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	98.00
2	148.00	98.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 5A

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	90.00	131.50	176.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	3.52	3.52	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 190.00, INITIAL Y = 125.00.
DELX = 20.00, DELY = 20.00.

X = 190.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.622	1.622	1.622	1828.1	.000	31
67.50	1.652	1.652	1.645	1771.9	.007	30
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.686	1.686	1.668	1719.0	.018	29
65.50	1.728	1.728	1.697	1662.4	.031	29
64.50	1.774	1.774	1.729	1605.5	.045	29
63.50	1.826	1.826	1.766	1546.3	.060	27
62.50	1.881	1.881	1.804	1490.1	.077	27
61.50	1.937	1.937	1.842	1436.0	.096	26
60.50	2.006	2.006	1.889	1377.9	.116	26
59.50	2.083	2.083	1.944	1318.6	.139	25
58.50	2.161	2.161	2.000	1261.9	.161	25
57.50	2.230	2.230	2.064	1204.8	.166	25
56.50	2.363	2.363	2.190	1147.5	.172	27
55.50	3.134	3.134	2.956	1093.0	.178	25
54.50	3.245	3.245	3.060	1037.2	.186	25
53.50	3.332	3.332	3.139	981.4	.193	24
52.50	3.474	3.474	3.272	924.2	.201	21
51.50	3.592	3.592	3.382	870.4	.210	22
50.50	3.717	3.717	3.496	813.8	.220	21
49.50	3.839	3.839	3.607	757.0	.232	21
48.50	3.922	3.922	3.678	701.2	.245	19

THE LOWEST FACTOR OF SAFETY WAS 1.622 AT R = 68.50.

X = 210.00 , Y = 125.00 :

FS	FS	FS	DRIVING	DELTA FS

Case 5A

RADIUS	GEOGRIDS AT WORK STRESS	GEOGRIDS AT ULT STRESS	WITHOUT GEOGRIDS	MOMENT: KIP-FT/FT	DUE TO GEOGRIDS	# SLICES
68.50	4.103	4.103	3.896	1114.5	.207	31
67.50	4.021	4.021	3.815	1107.7	.206	31
66.50	3.902	3.902	3.697	1104.8	.204	30
65.50	3.724	3.724	3.521	1099.6	.203	29
64.50	3.598	3.598	3.395	1083.7	.203	29
63.50	3.624	3.624	3.409	1012.3	.215	27
65.25	3.681	3.681	3.479	1097.3	.203	29
65.00	3.641	3.641	3.438	1094.3	.203	29
64.75	3.601	3.601	3.399	1090.5	.203	29
64.25	3.617	3.617	3.412	1069.7	.205	28
64.00	3.623	3.623	3.415	1050.8	.208	28
63.75	3.623	3.623	3.411	1031.7	.211	27
62.50	3.707	3.707	3.475	924.8	.232	27
61.50	3.852	3.852	3.596	826.3	.256	27
60.50	4.095	4.095	3.803	716.3	.292	26
59.50	4.707	4.707	4.365	604.6	.341	26
58.50	5.257	5.257	4.860	512.5	.397	23
57.50	5.944	5.944	5.488	439.3	.456	22
56.50	6.797	6.797	6.266	372.1	.531	22
55.50	7.977	7.977	7.342	306.9	.635	22
54.50	9.556	9.556	8.771	244.5	.785	21
53.50	12.043	12.043	11.013	183.1	1.030	18
52.50	15.407	15.407	14.267	132.2	1.140	18
51.50	20.721	20.721	19.546	89.7	1.175	17
50.50	31.416	31.416	30.229	53.6	1.187	17
49.50	61.121	61.121	60.100	24.6	1.020	16
48.50	234.831	234.831	234.831	5.7	.000	16

THE LOWEST FACTOR OF SAFETY WAS 3.598 AT R = 64.50.

X = 170.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	2.820	2.820	2.820	1430.0	.000	30
67.50	2.780	2.780	2.780	1395.0	.000	29
66.50	2.730	2.730	2.730	1365.6	.000	28
65.50	2.688	2.688	2.688	1331.8	.000	28
64.50	2.644	2.644	2.644	1299.3	.000	28
63.50	2.597	2.597	2.597	1267.4	.000	28
62.50	2.547	2.547	2.547	1236.6	.000	27
61.50	2.497	2.497	2.497	1205.8	.000	26
60.50	2.446	2.446	2.446	1175.3	.000	26
59.50	2.397	2.397	2.397	1143.4	.000	25
58.50	2.344	2.344	2.344	1113.5	.000	24
57.50	2.299	2.299	2.299	1079.7	.000	24
56.50	2.255	2.255	2.255	1045.2	.000	24
55.50	2.213	2.213	2.213	1009.8	.000	24
54.50	2.175	2.175	2.175	972.2	.000	23
53.50	2.138	2.138	2.138	934.6	.000	23
52.50	2.104	2.104	2.104	895.0	.000	22
51.50	2.113	2.113	2.103	856.4	.011	21
53.25	2.129	2.129	2.129	925.1	.000	23
53.00	2.120	2.120	2.120	915.7	.000	23
52.75	2.110	2.110	2.110	906.2	.000	23
52.25	2.100	2.100	2.100	885.4	.000	22
52.00	2.102	2.102	2.101	875.6	.001	22

51.75	2.109	2.109	2.103	865.4	.006	22
50.50	2.150	2.150	2.117	814.3	.033	20
49.50	2.188	2.188	2.129	774.2	.059	19
48.50	2.235	2.235	2.146	733.2	.089	20

Case 5A

THE LOWEST FACTOR OF SAFETY WAS 2.100 AT R = 52.25.

X = 190.00 , Y = 145.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
88.50	1.746	1.746	1.746	2317.8	.000	30
87.50	1.737	1.737	1.737	2268.6	.000	29
86.50	1.736	1.736	1.736	2211.2	.000	28
85.50	1.734	1.734	1.734	2156.3	.000	28
84.50	1.735	1.735	1.735	2100.0	.000	28
86.25	1.735	1.735	1.735	2197.6	.000	28
86.00	1.735	1.735	1.735	2184.0	.000	28
85.75	1.734	1.734	1.734	2170.2	.000	28
85.25	1.734	1.734	1.734	2142.4	.000	28
85.00	1.734	1.734	1.734	2128.4	.000	28
84.75	1.734	1.734	1.734	2114.2	.000	28
83.50	1.739	1.739	1.739	2042.1	.000	28
82.50	1.749	1.749	1.749	1979.5	.000	27
81.50	1.759	1.759	1.759	1919.2	.000	27
80.50	1.778	1.778	1.778	1857.9	.000	27
79.50	1.840	1.840	1.828	1792.5	.012	27
78.50	1.916	1.916	1.887	1724.8	.029	26
77.50	1.996	1.996	1.948	1660.2	.048	26
76.50	2.087	2.087	2.017	1594.4	.070	26
75.50	2.187	2.187	2.093	1529.6	.095	24
74.50	2.307	2.307	2.184	1460.8	.123	23
73.50	2.650	2.650	2.496	1393.4	.154	24
72.50	3.275	3.275	3.086	1328.6	.190	24
71.50	3.714	3.714	3.515	1265.6	.199	23
70.50	3.820	3.820	3.613	1201.1	.207	23
69.50	4.006	4.006	3.790	1135.7	.216	23
68.50	4.196	4.196	3.969	1065.1	.227	21

THE LOWEST FACTOR OF SAFETY WAS 1.734 AT R = 85.25.

X = 190.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	2.017	2.017	1.891	1176.0	.125	31
47.50	2.058	2.058	1.929	1123.5	.129	30
D(FS)/DR IS NEGATIVE AT RMAX.						
46.50	2.097	2.097	1.964	1074.4	.133	30
45.50	2.146	2.146	2.009	1023.0	.137	30
44.50	2.236	2.236	2.093	969.4	.142	30
43.50	2.353	2.353	2.206	921.4	.147	29
42.50	2.576	2.576	2.423	870.4	.153	27
41.50	2.961	2.961	2.802	823.7	.159	27
40.50	3.014	3.014	2.850	779.1	.165	27
39.50	3.039	3.039	2.868	733.8	.171	26
38.50	3.229	3.229	3.046	669.6	.184	24

Case 5A

37.50	3.432	3.432	3.231	600.4	.201	24
36.50	3.639	3.639	3.419	536.0	.220	24
35.50	3.944	3.944	3.699	467.4	.246	23
34.50	4.376	4.376	4.096	401.5	.279	22
33.50	4.842	4.842	4.521	341.7	.321	22
32.50	5.055	5.055	4.702	302.7	.353	19
31.50	5.407	5.407	5.017	267.2	.390	18
30.50	5.956	5.956	5.513	229.6	.443	17
29.50	6.599	6.599	6.092	195.2	.507	17
28.50	7.308	7.308	6.720	163.8	.588	16

THE LOWEST FACTOR OF SAFETY WAS 2.017 AT R = 48.50.

X = 195.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.721	1.721	1.676	1823.6	.044	30
67.50	1.764	1.764	1.706	1762.5	.058	29
D(FS)/DR IS NEGATIVE AT RMAX.						
66.50	1.812	1.812	1.738	1701.0	.074	29
65.50	1.861	1.861	1.770	1641.9	.090	28
64.50	1.920	1.920	1.811	1578.3	.109	28
63.50	1.987	1.987	1.857	1513.5	.130	27
62.50	2.051	2.051	1.903	1451.7	.147	27
61.50	2.107	2.107	1.955	1389.8	.152	27
60.50	2.169	2.169	2.012	1327.6	.157	27
59.50	2.242	2.242	2.079	1263.0	.163	26
58.50	2.355	2.355	2.185	1199.0	.170	26
57.50	2.449	2.449	2.272	1135.4	.177	26
56.50	2.581	2.581	2.395	1073.3	.186	25
55.50	2.726	2.726	2.531	1008.3	.195	24
54.50	2.857	2.857	2.651	943.1	.205	23
53.50	3.272	3.272	3.055	879.0	.216	24
52.50	4.141	4.141	3.914	821.6	.226	23
51.50	4.243	4.243	4.004	762.5	.239	24
50.50	4.639	4.639	4.377	683.4	.261	21
49.50	5.160	5.160	4.865	591.7	.296	21
48.50	5.856	5.856	5.514	501.1	.342	20

THE LOWEST FACTOR OF SAFETY WAS 1.721 AT R = 68.50.

X = 185.00 , Y = 125.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
68.50	1.704	1.704	1.704	1778.2	.000	30
67.50	1.701	1.701	1.701	1730.0	.000	29
66.50	1.697	1.697	1.697	1684.3	.000	29
65.50	1.697	1.697	1.697	1636.2	.000	29
64.50	1.699	1.699	1.699	1587.6	.000	29
66.25	1.696	1.696	1.696	1672.6	.000	29
66.00	1.696	1.696	1.696	1660.5	.000	29
65.75	1.696	1.696	1.696	1648.4	.000	29
65.25	1.697	1.697	1.697	1624.1	.000	29
65.00	1.697	1.697	1.697	1611.9	.000	29
64.75	1.698	1.698	1.698	1599.7	.000	29

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63.50	1.729	1.729	1.724	1535.9	.005	28
62.50	1.771	1.771	1.753	1487.4	.018	27
61.50	1.822	1.822	1.790	1435.0	.032	27
60.50	1.878	1.878	1.831	1382.3	.047	27
59.50	2.175	2.175	2.111	1329.5	.065	27
58.50	2.620	2.620	2.536	1281.5	.084	26
57.50	2.656	2.656	2.552	1234.8	.105	25
56.50	2.705	2.705	2.577	1185.1	.128	24
55.50	2.765	2.765	2.611	1132.6	.154	22
54.50	2.816	2.816	2.639	1085.2	.177	23
53.50	2.858	2.858	2.675	1035.7	.182	23
52.50	2.908	2.908	2.720	984.8	.188	23
51.50	3.010	3.010	2.815	933.4	.195	22
50.50	3.088	3.088	2.885	880.2	.203	21
49.50	3.198	3.198	2.987	829.0	.212	20
48.50	3.343	3.343	3.121	776.8	.222	20

THE LOWEST FACTOR OF SAFETY WAS 1.696 AT R = 66.25.

X = 190.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.640	1.640	1.640	1966.5	.000	29
72.50	1.640	1.640	1.640	1912.1	.000	29
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	1.644	1.644	1.644	1854.5	.000	28
70.50	1.667	1.667	1.663	1799.9	.004	28
69.50	1.710	1.710	1.693	1742.2	.016	28
68.50	1.758	1.758	1.728	1683.6	.030	28
67.50	1.811	1.811	1.766	1624.7	.045	28
66.50	1.870	1.870	1.808	1564.3	.062	26
65.50	1.933	1.933	1.853	1505.8	.080	26
64.50	2.001	2.001	1.900	1448.8	.101	25
63.50	2.084	2.084	1.960	1386.6	.124	24
62.50	2.171	2.171	2.021	1327.8	.150	24
61.50	2.262	2.262	2.091	1268.5	.171	24
60.50	2.514	2.514	2.337	1207.9	.177	25
59.50	3.242	3.242	3.060	1152.2	.182	24
58.50	3.359	3.359	3.170	1094.8	.189	23
57.50	3.451	3.451	3.254	1036.0	.196	23
56.50	3.584	3.584	3.380	977.7	.205	23
55.50	3.749	3.749	3.534	918.0	.214	22
54.50	3.896	3.896	3.671	858.5	.225	22
53.50	4.068	4.068	3.830	797.9	.238	20

THE LOWEST FACTOR OF SAFETY WAS 1.640 AT R = 73.50.

X = 190.00 , Y = 120.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
63.50	1.678	1.678	1.655	1683.6	.023	30
62.50	1.716	1.716	1.681	1628.9	.035	30
D(FS)/DR IS NEGATIVE AT RMAX.						
61.50	1.757	1.757	1.709	1573.7	.048	29
60.50	1.804	1.804	1.742	1515.8	.062	28

Case 5A

59.50	1.852	1.852	1.774	1461.6	.078	28
58.50	1.901	1.901	1.805	1409.8	.095	27
57.50	1.961	1.961	1.847	1353.7	.114	27
56.50	2.029	2.029	1.894	1295.9	.135	26
55.50	2.093	2.093	1.941	1241.5	.152	26
54.50	2.150	2.150	1.994	1186.9	.157	26
53.50	2.215	2.215	2.053	1131.8	.162	26
52.50	2.450	2.450	2.282	1076.7	.168	26
51.50	3.091	3.091	2.917	1021.7	.174	25
50.50	3.159	3.159	2.978	968.9	.181	25
49.50	3.258	3.258	3.069	918.4	.188	23
48.50	3.372	3.372	3.175	863.7	.197	22
47.50	3.461	3.461	3.254	809.8	.207	21
46.50	3.551	3.551	3.333	757.3	.218	21
45.50	3.629	3.629	3.400	706.6	.228	21
44.50	3.715	3.715	3.474	653.5	.241	21
43.50	4.063	4.063	3.798	580.2	.265	18

THE LOWEST FACTOR OF SAFETY WAS 1.678 AT R = 63.50.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 190.00.
Y = 125.00.
RADIUS OF CRITICAL CIRCLE = 68.50.

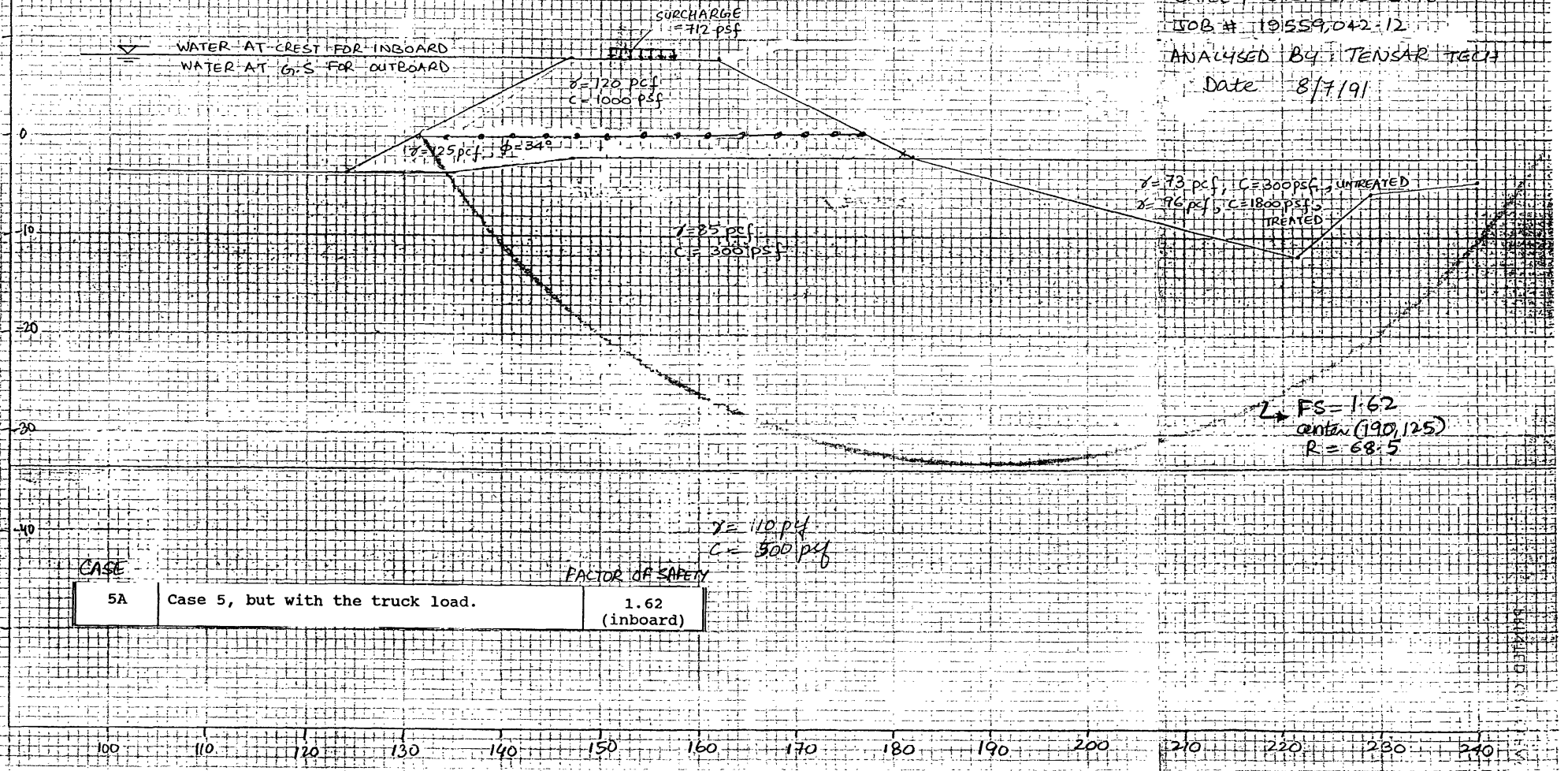
MINIMUM FS = 1.622 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.622.
FS (UNREINFORCED) = 1.622.
TOTAL DRIVING MOMENT = 1828.08 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 56.50.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
CRITICAL CIRCLE DOES NOT INTERSECT TENSAR GEOGRIDS.

CALCULATIONS HAVE BEEN COMPLETED.

Case 5A

SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY: TENSAR TECH
Date 8/7/91



CASE		FACTOR OF SAFETY
5A	Case 5, but with the truck load.	1.62 (inboard)

Case	Description	Factor of Safety
6	Short term with stabilized waste, water at existing grade without truck load and 1 layer of geogrid installed.	1.55 (outboard)

```
0.
0.      1.      0.      .05
90.0    131.5   176.    3.52    1.      1.5
20.
56.5
76.5
20.
SEARCH
130.    110.    20.     20.
```

Case 6

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

case 6

DATE 08-08-1991
TIME 08:48

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	162.00	98.00	.0000	1	*
5	162.00	98.00	177.00	90.00	-.5333	1	*
6	177.00	90.00	182.00	88.00	-.4000	6	*
7	182.00	88.00	258.00	88.00	.0000	3	*
8	258.00	88.00	271.00	98.00	.7692	1	*
9	271.00	98.00	286.00	98.00	.0000	1	*
10	182.00	88.00	221.50	78.00	-.2532	2	
11	221.50	78.00	229.00	84.50	.8667	2	
12	229.00	84.50	258.00	88.00	.1207	2	
13	131.00	90.00	177.00	90.00	.0000	6	
14	124.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	147.00	88.00	.1250	2	
16	147.00	88.00	182.00	88.00	.0000	2	
17	258.00	88.00	286.00	88.00	.0000	2	
18	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	56.00
2	148.00	56.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	90.00	131.50	176.00	100.

TENSAR GEOGRID STRENGTH DATA:

Case 6

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	3.52	3.52	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 130.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 130.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.685	1.685	1.685	1151.5	.000	29
52.50	1.632	1.632	1.632	1136.8	.000	28
51.50	1.582	1.582	1.582	1119.6	.000	28
50.50	1.553	1.553	1.553	1099.0	.000	28
49.50	1.552	1.552	1.537	1076.3	.015	28
48.50	1.563	1.563	1.524	1051.4	.039	27
50.25	1.549	1.549	1.549	1093.5	.000	28
50.00	1.548	1.548	1.545	1087.9	.004	28
49.75	1.550	1.550	1.541	1082.1	.009	28
49.25	1.554	1.554	1.533	1070.3	.021	28
49.00	1.557	1.557	1.530	1063.9	.027	27
48.75	1.560	1.560	1.527	1057.7	.033	27
47.50	1.575	1.575	1.509	1026.8	.066	26
46.50	1.598	1.598	1.504	997.4	.094	26
45.50	1.625	1.625	1.500	966.7	.125	26
44.50	1.655	1.655	1.499	934.4	.156	25
43.50	1.657	1.657	1.498	902.8	.159	24
42.50	1.671	1.671	1.509	865.8	.163	24
41.50	1.689	1.689	1.522	828.1	.167	24
40.50	1.708	1.708	1.536	790.0	.172	22
39.50	1.734	1.734	1.557	750.8	.178	22
38.50	1.770	1.770	1.585	709.8	.184	22
37.50	1.820	1.820	1.627	665.7	.193	22
36.50	1.876	1.876	1.674	621.6	.202	21
35.50	1.935	1.935	1.723	578.5	.213	21
34.50	1.997	1.997	1.773	535.7	.224	20
33.50	2.061	2.061	1.822	491.5	.239	18

THE LOWEST FACTOR OF SAFETY WAS 1.548 AT R = 50.00.

X = 150.00 , Y = 110.00 :

FS	FS	FS	DRIVING	DELTA FS

Case 6

RADIUS	GEOGRIDS AT WORK STRESS	GEOGRIDS AT ULT STRESS	WITHOUT GEOGRIDS	MOMENT: KIP-FT/FT	DUE TO GEOGRIDS	# SLICES
53.50	8.019	8.019	8.019	283.8	.000	29
52.50	7.798	7.798	7.798	277.2	.000	28
51.50	7.644	7.644	7.644	268.2	.000	28
50.50	7.476	7.476	7.476	259.7	.000	28
49.50	7.296	7.296	7.296	251.6	.000	28
48.50	7.108	7.108	7.108	243.6	.000	27
47.50	6.844	6.844	6.844	238.1	.000	26
46.50	6.636	6.636	6.636	230.7	.000	26
45.50	6.415	6.415	6.415	223.6	.000	26
44.50	6.193	6.193	6.193	216.5	.000	25
43.50	5.873	5.873	5.873	212.6	.000	24
42.50	5.623	5.623	5.623	206.3	.000	24
41.50	5.356	5.356	5.356	200.5	.000	24
40.50	5.094	5.094	5.094	194.1	.000	23
39.50	4.784	4.784	4.784	189.6	.000	23
38.50	4.470	4.470	4.470	186.4	.000	21
37.50	4.332	4.332	4.332	178.8	.000	21
36.50	4.211	4.211	4.211	170.5	.000	20
35.50	4.121	4.121	4.121	161.1	.000	20
34.50	4.066	4.066	4.066	150.5	.000	20
33.50	4.050	4.050	4.050	140.0	.000	20

THE LOWEST FACTOR OF SAFETY WAS 4.050 AT R = 33.50.

X = 110.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	2.083	2.083	1.947	1243.1	.136	28
52.50	2.125	2.125	1.983	1173.5	.142	27
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	2.173	2.173	2.024	1104.2	.149	27
50.50	2.234	2.234	2.078	1035.9	.156	26
49.50	2.299	2.299	2.134	968.3	.164	25
48.50	2.351	2.351	2.178	905.0	.173	23
47.50	2.426	2.426	2.243	841.3	.183	23
46.50	2.511	2.511	2.316	778.9	.194	23
45.50	2.620	2.620	2.412	716.0	.208	22
44.50	2.752	2.752	2.528	654.3	.223	22
43.50	2.881	2.881	2.641	596.8	.241	22
42.50	3.022	3.022	2.761	541.3	.261	20
41.50	3.233	3.233	2.947	483.6	.286	20
40.50	3.486	3.486	3.169	428.0	.317	18
39.50	3.786	3.786	3.430	374.2	.356	18
38.50	4.118	4.118	3.714	322.8	.404	17
37.50	4.513	4.513	4.046	273.6	.467	16
36.50	4.982	4.982	4.472	227.3	.510	15
35.50	5.514	5.514	5.005	185.2	.509	15
34.50	6.192	6.192	5.686	147.4	.505	15
33.50	7.118	7.118	6.619	113.0	.499	14

THE LOWEST FACTOR OF SAFETY WAS 2.083 AT R = 53.50.

X = 130.00 , Y = 130.00 :

FS	FS	FS	DRIVING	DELTA FS

Case 6

RADIUS	GEOGRIDS AT WORK STRESS	GEOGRIDS AT ULT STRESS	WITHOUT GEOGRIDS	MOMENT: KIP-FT/FT	DUE TO GEOGRIDS	# SLICES
73.50	2.668	2.668	2.668	1243.8	.000	29
72.50	2.568	2.568	2.568	1233.3	.000	29
71.50	2.463	2.463	2.463	1224.6	.000	27
70.50	2.363	2.363	2.363	1214.4	.000	27
69.50	2.261	2.261	2.261	1205.0	.000	27
68.50	2.158	2.158	2.158	1196.2	.000	27
67.50	2.054	2.054	2.054	1188.0	.000	27
66.50	1.962	1.962	1.962	1179.0	.000	25
65.50	1.895	1.895	1.895	1167.5	.000	25
64.50	1.832	1.832	1.832	1153.6	.000	25
63.50	1.774	1.774	1.774	1137.1	.000	25
62.50	1.722	1.722	1.722	1117.2	.000	25
61.50	1.684	1.684	1.684	1094.1	.000	24
60.50	1.693	1.693	1.675	1070.8	.017	23
62.25	1.711	1.711	1.711	1111.4	.000	24
62.00	1.699	1.699	1.699	1105.8	.000	24
61.75	1.688	1.688	1.688	1100.1	.000	24
61.25	1.683	1.683	1.683	1088.0	.000	24
61.00	1.681	1.681	1.681	1081.7	.000	24
60.75	1.683	1.683	1.675	1078.0	.008	23
59.50	1.736	1.736	1.678	1041.1	.058	23
58.50	1.788	1.788	1.685	1009.3	.103	23
57.50	1.852	1.852	1.697	975.1	.154	22
56.50	1.928	1.928	1.717	938.6	.211	22
55.50	1.966	1.966	1.746	898.6	.219	22
54.50	2.012	2.012	1.786	856.0	.226	21
53.50	2.069	2.069	1.834	812.2	.235	21

THE LOWEST FACTOR OF SAFETY WAS 1.681 AT R = 61.00.

X = 130.00 , Y = 90.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 61.00.

Case 6

X = 135.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	2.094	2.094	2.094	943.0	.000	30
52.50	1.992	1.992	1.992	936.5	.000	29
51.50	1.893	1.893	1.893	933.0	.000	27
50.50	1.825	1.825	1.825	923.1	.000	27
49.50	1.760	1.760	1.760	912.0	.000	27
48.50	1.698	1.698	1.698	899.3	.000	26
47.50	1.638	1.638	1.638	885.5	.000	26
46.50	1.588	1.588	1.588	867.9	.000	26
45.50	1.572	1.572	1.569	848.3	.003	26
44.50	1.586	1.586	1.554	826.7	.032	25
46.25	1.583	1.583	1.583	863.2	.000	26
46.00	1.578	1.578	1.578	858.3	.000	26
45.75	1.573	1.573	1.573	853.4	.000	26
45.25	1.575	1.575	1.565	843.2	.010	26
45.00	1.578	1.578	1.561	837.9	.017	26
44.75	1.582	1.582	1.558	832.1	.024	25
43.50	1.600	1.600	1.537	805.9	.062	24
42.50	1.628	1.628	1.531	780.2	.096	24
41.50	1.661	1.661	1.528	753.4	.133	24
40.50	1.703	1.703	1.528	725.1	.174	23
39.50	1.717	1.717	1.527	698.0	.191	22
38.50	1.735	1.735	1.539	665.9	.196	22
37.50	1.761	1.761	1.558	632.7	.202	22
36.50	1.788	1.788	1.578	599.4	.209	21
35.50	1.821	1.821	1.604	565.6	.217	20
34.50	1.867	1.867	1.640	530.3	.227	20
33.50	1.933	1.933	1.694	492.1	.239	20

THE LOWEST FACTOR OF SAFETY WAS 1.572 AT R = 45.50.

X = 125.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.574	1.574	1.549	1298.7	.026	29
52.50	1.580	1.580	1.533	1273.5	.048	28
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	1.598	1.598	1.527	1241.3	.071	28
50.50	1.619	1.619	1.523	1207.7	.097	28
49.50	1.645	1.645	1.520	1172.8	.125	28
48.50	1.658	1.658	1.521	1136.2	.137	27
47.50	1.662	1.662	1.522	1099.1	.140	26
46.50	1.677	1.677	1.534	1056.9	.143	26
45.50	1.692	1.692	1.545	1014.7	.147	25
44.50	1.712	1.712	1.562	970.9	.151	24
43.50	1.737	1.737	1.582	926.0	.155	24
42.50	1.774	1.774	1.613	878.0	.161	24
41.50	1.820	1.820	1.653	828.1	.167	24
40.50	1.870	1.870	1.695	778.2	.175	23
39.50	1.920	1.920	1.737	729.2	.183	22
38.50	1.965	1.965	1.772	679.7	.192	21
37.50	2.020	2.020	1.816	628.7	.204	20

36.50	2.093	2.093	1.875	577.2	.217	19
35.50	2.160	2.160	1.928	529.5	.232	19
34.50	2.214	2.214	1.966	485.7	.247	19
33.50	2.298	2.298	2.032	440.7	.267	17

THE LOWEST FACTOR OF SAFETY WAS 1.574 AT R = 53.50.

Case 6

X = 130.00 , Y = 115.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
58.50	1.861	1.861	1.861	1185.0	.000	28
57.50	1.799	1.799	1.799	1174.4	.000	27
56.50	1.740	1.740	1.740	1162.5	.000	27
55.50	1.684	1.684	1.684	1149.0	.000	27
54.50	1.630	1.630	1.630	1133.5	.000	27
53.50	1.583	1.583	1.583	1114.5	.000	27
52.50	1.560	1.560	1.560	1093.0	.000	26
51.50	1.568	1.568	1.546	1069.4	.022	26
53.25	1.573	1.573	1.573	1109.2	.000	26
53.00	1.568	1.568	1.568	1103.9	.000	26
52.75	1.564	1.564	1.564	1098.5	.000	26
52.25	1.558	1.558	1.556	1087.3	.003	26
52.00	1.561	1.561	1.552	1081.5	.009	26
51.75	1.564	1.564	1.549	1075.5	.016	26
50.50	1.582	1.582	1.531	1045.8	.051	25
49.50	1.607	1.607	1.526	1016.8	.081	25
48.50	1.639	1.639	1.524	986.3	.115	24
47.50	1.676	1.676	1.524	954.5	.152	24
46.50	1.700	1.700	1.528	920.8	.172	24
45.50	1.716	1.716	1.540	883.8	.177	24
44.50	1.739	1.739	1.558	845.0	.182	23
43.50	1.764	1.764	1.577	806.3	.187	23
42.50	1.795	1.795	1.601	766.6	.194	22
41.50	1.837	1.837	1.635	724.7	.201	22
40.50	1.893	1.893	1.682	679.5	.211	21
39.50	1.956	1.956	1.735	634.2	.221	21
38.50	2.029	2.029	1.796	588.8	.233	21

THE LOWEST FACTOR OF SAFETY WAS 1.558 AT R = 52.25.

X = 130.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.557	1.557	1.557	1096.8	.000	29
47.50	1.558	1.558	1.540	1074.0	.018	29
D(FS)/DR IS NEGATIVE AT RMAX.						
46.50	1.566	1.566	1.526	1049.4	.040	29
45.50	1.572	1.572	1.509	1025.6	.063	28
44.50	1.591	1.591	1.503	995.8	.088	27
43.50	1.613	1.613	1.498	965.3	.115	27
42.50	1.637	1.637	1.495	933.7	.142	27
41.50	1.639	1.639	1.494	900.7	.145	27
40.50	1.645	1.645	1.497	866.8	.148	25
39.50	1.658	1.658	1.506	829.7	.151	25
38.50	1.672	1.672	1.517	792.1	.155	24

37.50	1.692	1.692	1.532	753.6	.160	24
36.50	1.718	1.718	1.553	713.8	.165	23
35.50	1.757	1.757	1.585	673.2	.172	22
34.50	1.808	1.808	1.628	630.1	.179	22
33.50	1.854	1.854	1.666	587.9	.188	21
32.50	1.880	1.880	1.682	546.7	.197	19
31.50	1.919	1.919	1.711	504.3	.209	19
30.50	1.980	1.980	1.758	462.4	.222	18
29.50	2.056	2.056	1.819	420.9	.238	18
28.50	2.107	2.107	1.853	383.4	.254	17

Case 6

THE LOWEST FACTOR OF SAFETY WAS 1.557 AT R = 48.50.

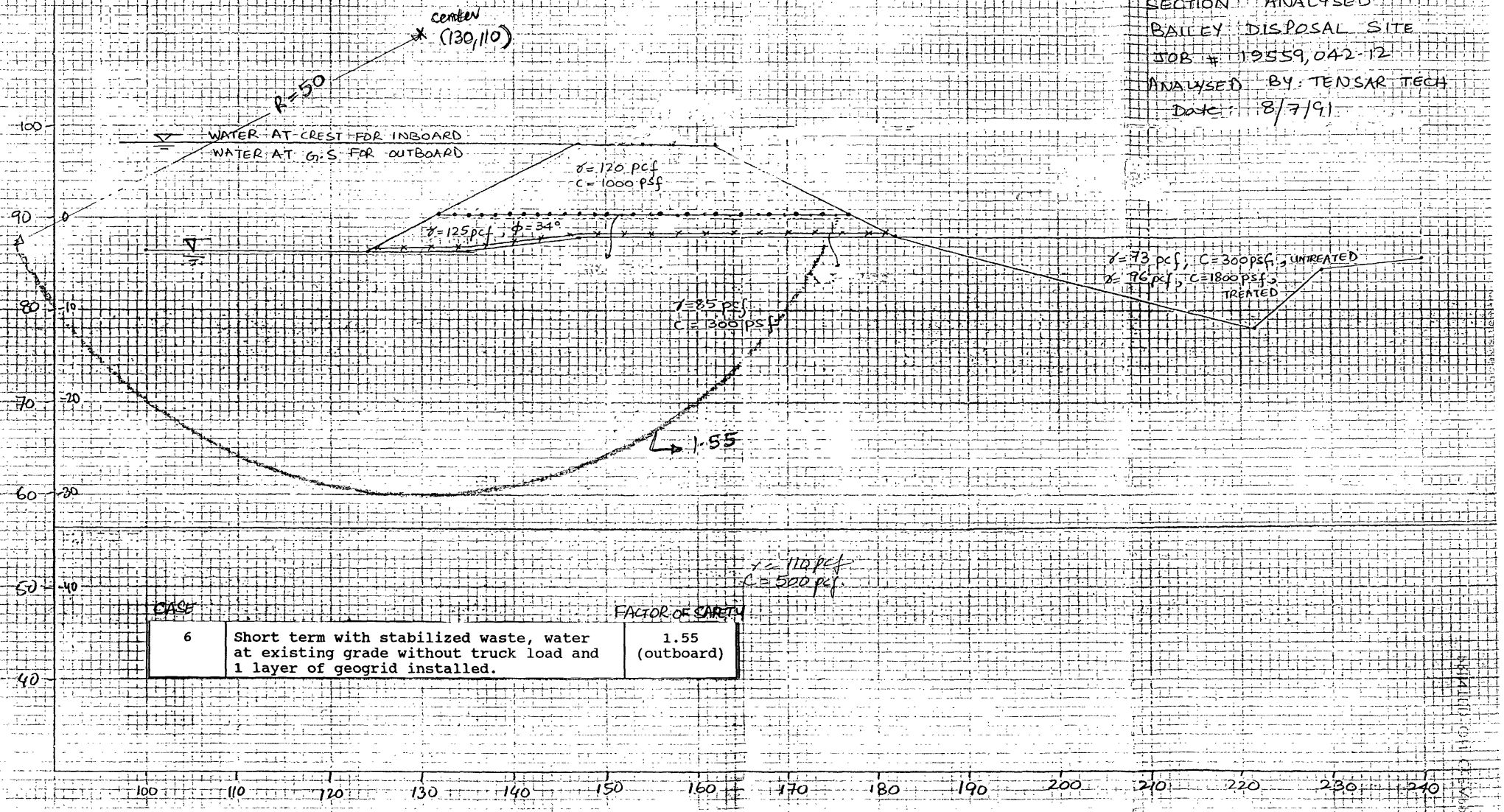
SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 130.00.
Y = 110.00.
RADIUS OF CRITICAL CIRCLE = 50.00.

MINIMUM FS = 1.548 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.548.
FS (UNREINFORCED) = 1.545.
TOTAL DRIVING MOMENT = 1087.86 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 60.00.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
90.00 (PULL OUT STRESS = .09 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.

CASE - 6
SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY: TENSAR TECH
Date: 8/7/91



CASE		FACTOR OF SAFETY
6	Short term with stabilized waste, water at existing grade without truck load and 1 layer of geogrid installed.	1.55 (outboard)

Case	Description	Factor of Safety
6A	Case 6, but with the truck load.	1.41 (outboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        124.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      88.
9.        135.      86.5
10.       182.      88.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      88.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       131.      90.
24.       163.      92.
25.       151.2     98.
26.       147.      88.
27.       177.      90.
999.
13.
1.        2.        2.
2.        23.       6.
23.       3.        1.
3.        25.       1.
25.       19.       5.
19.       20.       5.
20.       21.       5.
21.       4.        1.
4.        27.       1.
27.       10.       6.
10.       8.        3.
8.        16.       1.
16.       17.       1.
10.       6.        2.
6.        7.        2.
7.        8.        2.
25.       21.       1.
23.       27.       6.
2.        9.        2.
9.        26.       2.
26.       10.       2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .096      1.8       0.        1.1       0.6
4.        .11       .5        0.        1.1       0.0
5.        .712      1.0       0.        1.1       0.0
6.        .125      0.        34.       1.1       0.9
99.
4.        0.        0.0624
50.       56.
148.      56.
```

Case 6A

- Validity of data
- Reasonableness of result

Checked by N. Khan
Date 8/10/91

```
160.      56.
286.      56.
0.
0.        1.        0.        .05
90.0      131.5     176.      3.52      1.        1.5
20.
56.5
76.5
20.
SEARCH
130.      110.      20.       20.
```

Case 6A

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

case 6A

DATE 08-08-1991
TIME 08:50

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	151.20	98.00	.0000	1	*
5	151.20	98.00	151.30	99.00	9.9994	5	*
6	151.30	99.00	157.20	99.00	.0000	5	*
7	157.20	99.00	157.30	98.00	-9.9994	5	*
8	157.30	98.00	162.00	98.00	.0000	1	*
9	162.00	98.00	177.00	90.00	-.5333	1	*
10	177.00	90.00	182.00	88.00	-.4000	6	*
11	182.00	88.00	258.00	88.00	.0000	3	*
12	258.00	88.00	271.00	98.00	.7692	1	*
13	271.00	98.00	286.00	98.00	.0000	1	*
14	182.00	88.00	221.50	78.00	-.2532	2	
15	221.50	78.00	229.00	84.50	.8667	2	
16	229.00	84.50	258.00	88.00	.1207	2	
17	151.20	98.00	157.30	98.00	.0000	1	
18	131.00	90.00	177.00	90.00	.0000	6	
19	124.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	147.00	88.00	.1250	2	
21	147.00	88.00	182.00	88.00	.0000	2	
22	258.00	88.00	286.00	88.00	.0000	2	
23	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	56.00
2	148.00	56.00
3	160.00	56.00
4	286.00	56.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 6A

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	90.00	131.50	176.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	3.52	3.52	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 130.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 130.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.546	1.546	1.546	1255.1	.000	29
52.50	1.495	1.495	1.495	1240.4	.000	28
51.50	1.448	1.448	1.448	1223.2	.000	28
50.50	1.419	1.419	1.419	1202.6	.000	28
49.50	1.415	1.415	1.402	1179.8	.014	28
48.50	1.422	1.422	1.386	1155.0	.036	27
50.25	1.415	1.415	1.415	1197.1	.000	28
50.00	1.413	1.413	1.410	1191.5	.003	28
49.75	1.414	1.414	1.406	1185.7	.008	28
49.25	1.417	1.417	1.398	1173.9	.019	28
49.00	1.418	1.418	1.394	1167.5	.025	27
48.75	1.420	1.420	1.390	1161.3	.030	27
47.50	1.430	1.430	1.370	1130.4	.060	26
46.50	1.447	1.447	1.361	1101.0	.085	26
45.50	1.467	1.467	1.354	1070.3	.113	26
44.50	1.489	1.489	1.349	1038.0	.141	25
43.50	1.485	1.485	1.342	1006.4	.142	24
42.50	1.491	1.491	1.346	969.4	.145	24
44.25	1.489	1.489	1.348	1029.8	.141	25
44.00	1.488	1.488	1.347	1021.5	.142	25
43.75	1.484	1.484	1.342	1015.5	.142	24
43.25	1.486	1.486	1.343	997.2	.143	24
43.00	1.487	1.487	1.343	988.1	.144	24
42.75	1.489	1.489	1.344	978.8	.145	24
41.50	1.499	1.499	1.351	931.7	.149	24
40.50	1.508	1.508	1.356	893.6	.152	22
39.50	1.522	1.522	1.365	854.4	.156	22
38.50	1.541	1.541	1.380	813.3	.161	22
37.50	1.572	1.572	1.405	769.3	.167	22
36.50	1.605	1.605	1.432	725.2	.173	21
35.50	1.638	1.638	1.457	682.1	.180	21
34.50	1.688	1.688	1.500	639.3	.189	20
33.50	1.746	1.746	1.546	595.1	.199	18

THE LOWEST FACTOR OF SAFETY WAS 1.413 AT R = 50.00.

Case 6A

X = 150.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	7.537	7.537	7.537	302.0	.000	29
52.50	7.319	7.319	7.319	295.3	.000	28
51.50	7.159	7.159	7.159	286.4	.000	28
50.50	6.988	6.988	6.988	277.9	.000	28
49.50	6.805	6.805	6.805	269.7	.000	28
48.50	6.615	6.615	6.615	261.8	.000	27
47.50	6.359	6.359	6.359	256.3	.000	26
46.50	6.152	6.152	6.152	248.9	.000	26
45.50	5.934	5.934	5.934	241.8	.000	26
44.50	5.714	5.714	5.714	234.7	.000	25
43.50	5.411	5.411	5.411	230.8	.000	24
42.50	5.168	5.168	5.168	224.5	.000	24
41.50	4.911	4.911	4.911	218.6	.000	24
40.50	4.659	4.659	4.659	212.3	.000	23
39.50	4.366	4.366	4.366	207.8	.000	23
38.50	4.074	4.074	4.074	204.5	.000	21
37.50	3.933	3.933	3.933	196.9	.000	21
36.50	3.805	3.805	3.805	188.7	.000	20
35.50	3.703	3.703	3.703	179.2	.000	20
34.50	3.628	3.628	3.628	168.7	.000	20
33.50	3.584	3.584	3.584	158.1	.000	20

THE LOWEST FACTOR OF SAFETY WAS 3.584 AT R = 33.50.

X = 110.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.806	1.806	1.688	1432.2	.118	28
52.50	1.828	1.828	1.706	1362.6	.122	27
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	1.871	1.871	1.743	1293.3	.128	27
50.50	1.911	1.911	1.778	1225.0	.133	26
49.50	1.946	1.946	1.808	1157.3	.138	25
48.50	2.019	2.019	1.875	1089.5	.145	25
47.50	2.136	2.136	1.980	991.7	.156	24
46.50	2.260	2.260	2.090	895.8	.170	24
45.50	2.401	2.401	2.216	800.2	.186	23
44.50	2.613	2.613	2.406	706.5	.207	23
43.50	2.857	2.857	2.625	617.6	.232	23
42.50	3.022	3.022	2.761	541.3	.261	20
41.50	3.233	3.233	2.947	483.6	.286	20
40.50	3.486	3.486	3.169	428.0	.317	18
39.50	3.786	3.786	3.430	374.2	.356	18
38.50	4.118	4.118	3.714	322.8	.404	17
37.50	4.513	4.513	4.046	273.6	.467	16
36.50	4.982	4.982	4.472	227.3	.510	15
35.50	5.514	5.514	5.005	185.2	.509	15
34.50	6.192	6.192	5.686	147.4	.505	15
33.50	7.118	7.118	6.619	113.0	.499	14

THE LOWEST FACTOR OF SAFETY WAS 1.806 AT R = 53.50.

X = 130.00 , Y = 130.00 :

Case 6A

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	2.463	2.463	2.463	1347.4	.000	29
72.50	2.369	2.369	2.369	1336.9	.000	29
71.50	2.271	2.271	2.271	1328.2	.000	27
70.50	2.177	2.177	2.177	1318.0	.000	27
69.50	2.082	2.082	2.082	1308.6	.000	27
68.50	1.986	1.986	1.986	1299.8	.000	27
67.50	1.889	1.889	1.889	1291.6	.000	27
66.50	1.803	1.803	1.803	1282.6	.000	25
65.50	1.740	1.740	1.740	1271.1	.000	25
64.50	1.681	1.681	1.681	1257.2	.000	25
63.50	1.626	1.626	1.626	1240.7	.000	25
62.50	1.576	1.576	1.576	1220.8	.000	25
61.50	1.538	1.538	1.538	1197.7	.000	24
60.50	1.543	1.543	1.527	1174.4	.016	23
62.25	1.565	1.565	1.565	1215.0	.000	24
62.00	1.553	1.553	1.553	1209.4	.000	24
61.75	1.542	1.542	1.542	1203.7	.000	24
61.25	1.536	1.536	1.536	1191.6	.000	24
61.00	1.534	1.534	1.534	1185.3	.000	24
60.75	1.535	1.535	1.528	1181.6	.007	23
59.50	1.578	1.578	1.525	1144.7	.053	23
58.50	1.621	1.621	1.527	1112.9	.094	23
57.50	1.673	1.673	1.533	1078.7	.139	22
56.50	1.735	1.735	1.545	1042.2	.191	22
55.50	1.761	1.761	1.564	1002.2	.197	22
54.50	1.793	1.793	1.591	959.6	.202	21
53.50	1.832	1.832	1.624	915.8	.208	21

THE LOWEST FACTOR OF SAFETY WAS 1.534 AT R = 61.00.

X = 130.00 , Y = 90.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
-- 2 FAILURE SURFACES FOR R= 28.50 (IDENTIFIED LEFT TO RIGHT)
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 61.00.

X = 135.00 , Y = 110.00 :

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RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.926	1.926	1.926	1025.2	.000	30
52.50	1.831	1.831	1.831	1018.7	.000	29
51.50	1.740	1.740	1.740	1015.3	.000	27
50.50	1.676	1.676	1.676	1005.4	.000	27
49.50	1.614	1.614	1.614	994.2	.000	27
48.50	1.555	1.555	1.555	981.5	.000	26
47.50	1.499	1.499	1.499	967.7	.000	26
46.50	1.450	1.450	1.450	950.1	.000	26
45.50	1.433	1.433	1.430	930.6	.003	26
44.50	1.442	1.442	1.413	909.0	.029	25
46.25	1.445	1.445	1.445	945.4	.000	26
46.00	1.440	1.440	1.440	940.6	.000	26
45.75	1.435	1.435	1.435	935.6	.000	26
45.25	1.435	1.435	1.425	925.4	.009	26
45.00	1.437	1.437	1.421	920.1	.016	26
44.75	1.439	1.439	1.417	914.4	.022	25
43.50	1.451	1.451	1.394	888.2	.057	24
42.50	1.472	1.472	1.384	862.4	.087	24
41.50	1.497	1.497	1.377	835.6	.120	24
40.50	1.528	1.528	1.371	807.3	.157	23
39.50	1.535	1.535	1.364	780.3	.171	22
38.50	1.543	1.543	1.368	748.1	.175	22
37.50	1.556	1.556	1.377	714.9	.179	22
36.50	1.569	1.569	1.385	681.6	.184	21
35.50	1.587	1.587	1.397	647.9	.190	20
34.50	1.613	1.613	1.416	612.5	.197	20
33.50	1.652	1.652	1.447	574.4	.205	20

THE LOWEST FACTOR OF SAFETY WAS 1.433 AT R = 45.50.

X = 125.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.436	1.436	1.412	1423.7	.024	29
52.50	1.439	1.439	1.395	1398.4	.043	28
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	1.451	1.451	1.386	1366.2	.065	28
50.50	1.467	1.467	1.379	1332.7	.088	28
49.50	1.486	1.486	1.373	1297.7	.113	28
48.50	1.493	1.493	1.369	1261.1	.124	27
47.50	1.491	1.491	1.366	1224.1	.126	26
46.50	1.499	1.499	1.371	1181.9	.128	26
48.25	1.493	1.493	1.369	1251.7	.124	27
48.00	1.489	1.489	1.365	1244.6	.124	26
47.75	1.490	1.490	1.365	1234.3	.125	26
47.25	1.493	1.493	1.367	1213.6	.126	26
47.00	1.495	1.495	1.368	1203.0	.127	26
46.75	1.497	1.497	1.369	1192.4	.127	26
45.50	1.505	1.505	1.374	1139.7	.131	25
44.50	1.515	1.515	1.382	1095.9	.133	24
43.50	1.529	1.529	1.392	1050.9	.137	24
42.50	1.551	1.551	1.410	1003.0	.141	24
41.50	1.579	1.579	1.433	953.0	.146	24

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40.50	1.608	1.608	1.458	903.2	.151	23
39.50	1.636	1.636	1.480	854.1	.156	22
38.50	1.673	1.673	1.510	804.6	.163	21
37.50	1.718	1.718	1.547	753.6	.172	20
36.50	1.756	1.756	1.576	702.1	.180	19
35.50	1.786	1.786	1.597	654.4	.189	19
34.50	1.802	1.802	1.603	610.6	.199	19
33.50	1.930	1.930	1.715	547.8	.215	18

THE LOWEST FACTOR OF SAFETY WAS 1.436 AT R = 53.50.

X = 130.00 , Y = 115.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
58.50	1.712	1.712	1.712	1288.6	.000	28
57.50	1.654	1.654	1.654	1278.0	.000	27
56.50	1.598	1.598	1.598	1266.1	.000	27
55.50	1.544	1.544	1.544	1252.6	.000	27
54.50	1.494	1.494	1.494	1237.1	.000	27
53.50	1.448	1.448	1.448	1218.1	.000	27
52.50	1.424	1.424	1.424	1196.6	.000	26
51.50	1.429	1.429	1.409	1173.0	.020	26
53.25	1.438	1.438	1.438	1212.8	.000	26
53.00	1.433	1.433	1.433	1207.5	.000	26
52.75	1.429	1.429	1.429	1202.1	.000	26
52.25	1.422	1.422	1.420	1190.9	.002	26
52.00	1.424	1.424	1.416	1185.1	.008	26
51.75	1.427	1.427	1.412	1179.1	.014	26
50.50	1.439	1.439	1.393	1149.4	.046	25
49.50	1.458	1.458	1.384	1120.4	.074	25
48.50	1.482	1.482	1.378	1089.9	.104	24
47.50	1.511	1.511	1.373	1058.1	.137	24
46.50	1.527	1.527	1.372	1024.4	.155	24
45.50	1.535	1.535	1.377	987.4	.158	24
44.50	1.548	1.548	1.386	948.6	.162	23
43.50	1.562	1.562	1.396	909.9	.166	23
42.50	1.579	1.579	1.408	870.2	.171	22
41.50	1.604	1.604	1.428	828.3	.176	22
40.50	1.639	1.639	1.456	783.1	.183	21
39.50	1.678	1.678	1.487	737.8	.190	21
38.50	1.722	1.722	1.523	692.4	.199	21

THE LOWEST FACTOR OF SAFETY WAS 1.422 AT R = 52.25.

X = 130.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.423	1.423	1.423	1200.4	.000	29
47.50	1.421	1.421	1.405	1177.6	.016	29
46.50	1.425	1.425	1.389	1152.9	.036	29
48.25	1.420	1.420	1.418	1194.9	.002	29
48.00	1.420	1.420	1.413	1189.2	.007	29
47.75	1.421	1.421	1.409	1183.5	.012	29
47.25	1.422	1.422	1.400	1171.6	.021	29
47.00	1.422	1.422	1.396	1165.5	.026	29
46.75	1.423	1.423	1.392	1159.3	.031	29
45.50	1.427	1.427	1.370	1129.2	.057	28
44.50	1.440	1.440	1.361	1099.4	.080	27

Case 6A

43.50	1.456	1.456	1.352	1068.9	.104	27
42.50	1.473	1.473	1.345	1037.3	.128	27
41.50	1.469	1.469	1.339	1004.3	.130	27
40.50	1.468	1.468	1.336	970.4	.132	25
39.50	1.472	1.472	1.338	933.3	.134	25
41.25	1.469	1.469	1.338	995.6	.130	27
41.00	1.464	1.464	1.333	989.3	.130	26
40.75	1.466	1.466	1.334	979.8	.131	25
40.25	1.470	1.470	1.337	961.0	.132	25
40.00	1.471	1.471	1.338	951.7	.133	25
39.75	1.472	1.472	1.338	942.5	.134	25
38.50	1.477	1.477	1.340	895.7	.137	24
37.50	1.486	1.486	1.345	857.2	.141	24
36.50	1.498	1.498	1.354	817.4	.144	23
35.50	1.520	1.520	1.371	776.8	.149	22
34.50	1.549	1.549	1.395	733.7	.154	22
33.50	1.573	1.573	1.413	691.5	.160	21
32.50	1.577	1.577	1.411	650.3	.166	19
31.50	1.609	1.609	1.435	607.9	.174	19
30.50	1.650	1.650	1.467	566.0	.183	18
29.50	1.685	1.685	1.493	524.5	.193	18
28.50	1.696	1.696	1.494	487.0	.202	17

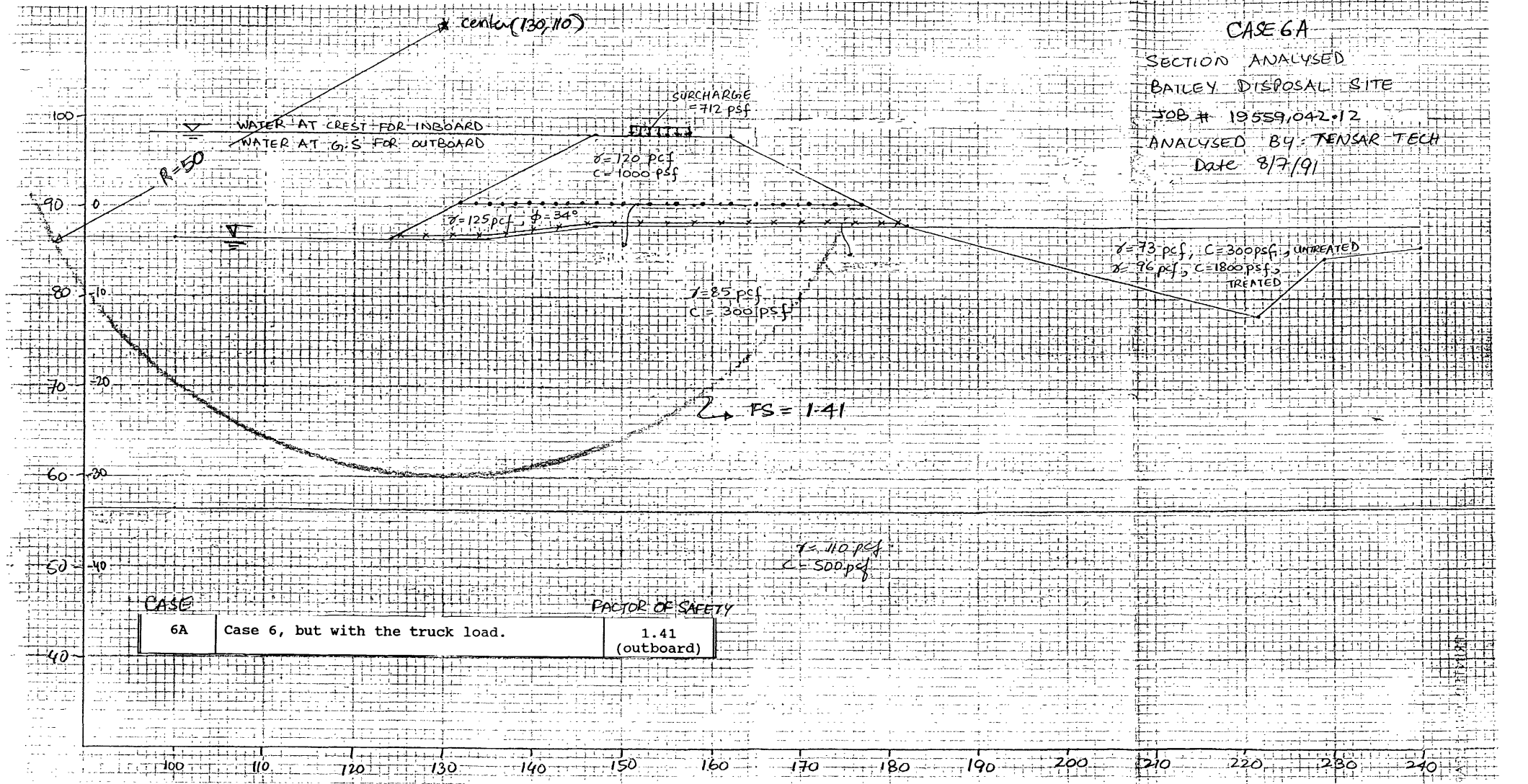
THE LOWEST FACTOR OF SAFETY WAS 1.420 AT R = 48.25.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 130.00.
Y = 110.00.
RADIUS OF CRITICAL CIRCLE = 50.00.

MINIMUM FS = 1.413 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.413.
FS (UNREINFORCED) = 1.410.
TOTAL DRIVING MOMENT = 1191.45 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 60.00.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
90.00 (PULL OUT STRESS = .09 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.



CASE		FACTOR OF SAFETY
6A	Case 6, but with the truck load.	1.41 (outboard)

Case	Description	Factor of Safety
7	Long term, i.e, with cap in place, water at existing grade, without the truck load and 1 layer of geogrid installed.	1.57 (outboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0      0.
1.       50.      86.5
2.       124.     86.5
3.       147.     98.
4.       162.     98.
5.       182.     92.
6.       221.5    78.
7.       229.     84.5
8.       258.     92.
9.       135.     86.5
10.      174.     92.
11.      50.      56.5
12.      286.     56.5
13.      168.     99.5
14.      221.5    100.5
15.      266.     99.5
16.      271.     98.
17.      286.     98.
18.      286.     92.
19.      151.30   99.
20.      157.20   99.
21.      157.30   98.
22.      121.     92.
23.      131.     90.
24.      163.     92.
25.      151.2    98.
26.      115.     90.
27.      160.     90.
999.
9.
1.       2.       2.
2.       23.      6.
23.      3.       1.
3.       4.       1.
4.       13.      1.
13.      14.      1.
14.      15.      1.
15.      16.      1.
16.      17.      1.
4.       10.      1.
10.      8.       3.
8.       16.      1.
23.      27.      6.
2.       9.       2.
9.       27.      2.
27.      10.      2.
10.      6.       2.
6.       7.       2.
7.       8.       2.
8.       18.      2.
11.      12.      4.
999.
1.       .12      1.       0.       1.1      0.7
2.       .100     .3       0.       1.1      0.6
3.       .096     1.8      0.       1.1      0.6
4.       .11      .5       0.       1.1      0.0
5.       .00001   1.       0.       1.1      0.0
6.       .125     0.       34.      1.1      0.9
99.
4.       0.       0.0624
50.      60.
```

CASE 7

- Validity of data
- Reasonableness of Result

Checked by N. Khan
Date 8/10/91

```
148.     60.
160.     60.
286.     60.
0.
0.       1.       0.       .05
92.5     138.     190.     4.00     1.       1.5
20.
56.5
76.5
20.
SEARCH
125.     110.     20.      20.
```

Case 7

Case 7

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-06-1991
TIME 17:21

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.000	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	162.00	98.00	.0000	1	*
5	162.00	98.00	168.00	99.50	.2500	1	*
6	168.00	99.50	221.50	100.50	.0187	1	*
7	221.50	100.50	266.00	99.50	-.0225	1	*
8	266.00	99.50	271.00	98.00	-.3000	1	*
9	271.00	98.00	286.00	98.00	.0000	1	*
10	162.00	98.00	174.00	92.00	-.5000	1	
11	174.00	92.00	258.00	92.00	.0000	3	
12	258.00	92.00	271.00	98.00	.4615	1	
13	131.00	90.00	160.00	90.00	.0000	6	
14	124.00	86.50	135.00	86.50	.0000	2	
15	135.00	86.50	160.00	90.00	.1400	2	
16	160.00	90.00	174.00	92.00	.1429	2	
17	174.00	92.00	221.50	78.00	-.2947	2	
18	221.50	78.00	229.00	84.50	.8667	2	
19	229.00	84.50	258.00	92.00	.2586	2	
20	258.00	92.00	286.00	92.00	.0000	2	
21	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	60.00
2	148.00	60.00
3	160.00	60.00
4	286.00	60.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

Case 7

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	92.50	138.00	190.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	4.00	4.00	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 125.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 125.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.597	1.597	1.518	1614.2	.079	31
52.50	1.593	1.593	1.511	1541.5	.082	31
51.50	1.612	1.612	1.527	1467.9	.085	31
53.25	1.596	1.596	1.516	1595.8	.080	31
53.00	1.595	1.595	1.515	1577.6	.081	31
52.75	1.594	1.594	1.513	1559.5	.081	31
52.25	1.592	1.592	1.509	1523.7	.083	30
52.00	1.598	1.598	1.514	1505.0	.084	31
51.75	1.605	1.605	1.521	1486.3	.084	31
50.50	1.629	1.629	1.541	1399.0	.088	29
49.50	1.647	1.647	1.556	1329.1	.092	28
48.50	1.672	1.672	1.576	1260.4	.096	28
47.50	1.697	1.697	1.597	1193.8	.100	28
46.50	1.727	1.727	1.623	1127.0	.104	27
45.50	1.761	1.761	1.652	1061.4	.109	27
44.50	1.798	1.798	1.683	997.6	.114	27
43.50	1.824	1.824	1.704	936.4	.120	26
42.50	1.850	1.850	1.724	877.5	.126	26
41.50	1.882	1.882	1.749	820.2	.133	25
40.50	1.909	1.909	1.769	766.6	.141	25
39.50	1.931	1.931	1.782	715.1	.149	25
38.50	1.957	1.957	1.800	666.2	.157	23
37.50	2.000	2.000	1.833	618.2	.167	22
36.50	2.050	2.050	1.872	571.5	.178	20
35.50	2.114	2.114	1.922	525.1	.191	20
34.50	2.163	2.163	1.958	482.5	.205	20
33.50	2.242	2.242	2.020	439.0	.222	17

THE LOWEST FACTOR OF SAFETY WAS 1.592 AT R = 52.25.

Case 7

X = 145.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.696	1.696	1.696	1721.3	.000	31
52.50	1.696	1.696	1.696	1645.3	.000	30
51.50	1.701	1.701	1.701	1567.0	.000	30
53.25	1.697	1.697	1.697	1701.4	.000	31
53.00	1.698	1.698	1.698	1681.6	.000	31
52.75	1.699	1.699	1.699	1661.9	.000	31
52.25	1.698	1.698	1.698	1625.6	.000	30
52.00	1.699	1.699	1.699	1605.9	.000	30
51.75	1.700	1.700	1.700	1586.4	.000	30
50.50	1.707	1.707	1.707	1489.9	.000	29
49.50	1.712	1.712	1.712	1416.2	.000	29
48.50	1.717	1.717	1.717	1344.2	.000	29
47.50	1.740	1.740	1.722	1274.0	.018	29
46.50	1.767	1.767	1.724	1207.1	.043	28
45.50	1.802	1.802	1.731	1139.3	.071	27
44.50	1.837	1.837	1.736	1074.7	.101	27
43.50	1.852	1.852	1.741	1012.0	.111	27
42.50	1.863	1.863	1.746	950.9	.117	27
41.50	1.879	1.879	1.756	889.5	.123	26
40.50	1.903	1.903	1.773	829.7	.130	26
39.50	1.927	1.927	1.790	771.9	.138	26
38.50	1.928	1.928	1.783	719.8	.145	25
37.50	1.947	1.947	1.792	666.0	.155	23
36.50	1.972	1.972	1.807	613.2	.165	22
35.50	1.997	1.997	1.820	563.3	.177	22
34.50	2.026	2.026	1.835	514.9	.191	22
33.50	2.107	2.107	1.900	465.9	.207	21

THE LOWEST FACTOR OF SAFETY WAS 1.696 AT R = 52.50.

X = 105.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	2.420	2.420	2.298	1050.1	.123	26
52.50	2.494	2.494	2.364	981.4	.130	26
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	2.575	2.575	2.437	914.6	.137	26
50.50	2.670	2.670	2.523	848.3	.146	25
49.50	2.802	2.802	2.645	779.9	.157	25
48.50	2.937	2.937	2.767	715.3	.169	25
47.50	3.067	3.067	2.884	654.7	.183	23
46.50	3.253	3.253	3.053	592.0	.200	23
45.50	3.487	3.487	3.267	530.2	.220	21
44.50	3.773	3.773	3.528	468.8	.245	21
43.50	4.079	4.079	3.803	411.0	.276	20
42.50	4.447	4.447	4.131	353.8	.316	20
41.50	4.863	4.863	4.499	302.4	.364	18
40.50	5.333	5.333	4.981	253.3	.352	18
39.50	5.860	5.860	5.572	208.8	.288	18
38.50	6.507	6.507	6.319	168.7	.188	18
37.50	7.355	7.355	7.325	132.2	.030	17
36.50	8.713	8.713	8.713	100.0	.000	17
35.50	10.710	10.710	10.710	72.4	.000	17

34.50	13.964	13.964	13.964	48.6	.000	16
33.50	19.508	19.508	19.508	29.8	.000	14

THE LOWEST FACTOR OF SAFETY WAS 2.420 AT R = 53.50.

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X = 125.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.636	1.636	1.603	2674.5	.033	29
72.50	1.661	1.661	1.605	2568.5	.056	29
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	1.687	1.687	1.606	2464.6	.081	29
70.50	1.694	1.694	1.607	2362.7	.087	29
69.50	1.699	1.699	1.609	2262.1	.090	28
68.50	1.703	1.703	1.610	2163.6	.093	27
67.50	1.709	1.709	1.613	2066.7	.097	27
66.50	1.717	1.717	1.616	1969.9	.101	27
65.50	1.721	1.721	1.616	1877.2	.105	27
64.50	1.723	1.723	1.614	1788.3	.109	25
63.50	1.728	1.728	1.614	1699.3	.114	25
62.50	1.733	1.733	1.614	1612.2	.119	25
61.50	1.758	1.758	1.633	1524.0	.125	25
60.50	1.804	1.804	1.672	1435.8	.131	25
59.50	1.852	1.852	1.713	1350.7	.138	24
58.50	1.902	1.902	1.756	1268.8	.146	24
57.50	1.959	1.959	1.804	1188.1	.155	23
56.50	2.028	2.028	1.864	1106.9	.165	23
55.50	2.105	2.105	1.929	1027.9	.176	22
54.50	2.196	2.196	2.008	949.5	.188	22
53.50	2.305	2.305	2.102	871.9	.203	22

THE LOWEST FACTOR OF SAFETY WAS 1.636 AT R = 73.50.

X = 125.00 , Y = 90.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

Case 7

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 73.50.

X = 130.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.609	1.609	1.532	1682.6	.076	32
52.50	1.594	1.594	1.516	1612.7	.079	30
51.50	1.594	1.594	1.512	1537.9	.081	30
50.50	1.593	1.593	1.508	1465.3	.084	29
49.50	1.590	1.590	1.502	1395.4	.087	29
48.50	1.586	1.586	1.495	1327.8	.091	29
47.50	1.582	1.582	1.488	1261.9	.094	28
46.50	1.607	1.607	1.509	1197.2	.098	27
48.25	1.585	1.585	1.493	1311.2	.092	29
48.00	1.583	1.583	1.491	1294.7	.092	29
47.75	1.582	1.582	1.489	1278.3	.093	29
47.25	1.590	1.590	1.495	1244.7	.095	29
47.00	1.598	1.598	1.502	1227.7	.096	29
46.75	1.605	1.605	1.508	1211.0	.097	29
45.50	1.630	1.630	1.527	1132.2	.102	27
44.50	1.651	1.651	1.545	1069.5	.107	26
43.50	1.679	1.679	1.567	1008.1	.112	26
42.50	1.707	1.707	1.590	948.5	.117	26
41.50	1.746	1.746	1.623	887.7	.123	25
40.50	1.786	1.786	1.656	829.6	.130	25
39.50	1.827	1.827	1.689	773.5	.137	25
38.50	1.857	1.857	1.712	719.5	.145	24
37.50	1.896	1.896	1.742	666.5	.155	23
36.50	1.935	1.935	1.770	616.8	.164	23
35.50	1.966	1.966	1.791	569.7	.175	24
34.50	1.994	1.994	1.807	525.1	.187	23
33.50	2.042	2.042	1.841	482.0	.201	20

THE LOWEST FACTOR OF SAFETY WAS 1.582 AT R = 47.75.

X = 135.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.630	1.630	1.556	1726.3	.074	31
52.50	1.629	1.629	1.552	1650.5	.077	31
51.50	1.627	1.627	1.547	1576.8	.079	31
50.50	1.627	1.627	1.544	1503.2	.082	30
49.50	1.634	1.634	1.549	1430.0	.085	30
51.25	1.626	1.626	1.546	1558.7	.080	31
51.00	1.626	1.626	1.546	1540.2	.081	31
50.75	1.627	1.627	1.545	1521.3	.081	30
50.25	1.627	1.627	1.544	1485.0	.083	30
50.00	1.630	1.630	1.546	1466.4	.084	30
49.75	1.632	1.632	1.548	1448.1	.085	30
48.50	1.632	1.632	1.544	1360.8	.088	30
47.50	1.619	1.619	1.528	1296.8	.092	28
46.50	1.619	1.619	1.524	1229.7	.095	28

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45.50	1.618	1.618	1.519	1164.6	.099	27
44.50	1.616	1.616	1.512	1102.1	.104	27
43.50	1.612	1.612	1.504	1041.6	.108	27
42.50	1.627	1.627	1.514	981.1	.113	27
44.25	1.615	1.615	1.510	1086.8	.105	27
44.00	1.614	1.614	1.508	1071.6	.106	27
43.75	1.613	1.613	1.506	1056.6	.107	27
43.25	1.611	1.611	1.502	1026.8	.109	27
43.00	1.609	1.609	1.499	1012.0	.110	26
42.75	1.617	1.617	1.506	996.6	.112	27
41.50	1.657	1.657	1.539	923.0	.118	25
40.50	1.682	1.682	1.558	866.1	.124	25
39.50	1.714	1.714	1.583	810.4	.131	24
38.50	1.751	1.751	1.613	756.1	.138	24
37.50	1.797	1.797	1.650	701.7	.147	23
36.50	1.847	1.847	1.691	649.4	.156	23
35.50	1.905	1.905	1.738	598.7	.167	23
34.50	1.961	1.961	1.783	550.0	.179	22
33.50	2.021	2.021	1.828	501.6	.193	21

THE LOWEST FACTOR OF SAFETY WAS 1.609 AT R = 43.00.

X = 130.00 , Y = 115.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
58.50	1.617	1.617	1.541	1949.6	.076	32
57.50	1.617	1.617	1.538	1866.9	.079	32
56.50	1.619	1.619	1.538	1784.2	.082	32
58.25	1.617	1.617	1.540	1928.9	.077	32
58.00	1.617	1.617	1.539	1908.3	.078	32
57.75	1.617	1.617	1.538	1887.7	.078	32
57.25	1.617	1.617	1.537	1846.3	.079	32
57.00	1.617	1.617	1.537	1825.8	.080	32
56.75	1.618	1.618	1.537	1805.1	.081	32
55.50	1.623	1.623	1.538	1702.9	.085	32
54.50	1.617	1.617	1.529	1628.6	.087	30
53.50	1.614	1.614	1.523	1552.7	.091	29
52.50	1.613	1.613	1.519	1477.9	.094	29
51.50	1.612	1.612	1.514	1405.2	.098	29
50.50	1.611	1.611	1.509	1334.2	.102	28
49.50	1.613	1.613	1.507	1265.1	.106	28
51.25	1.612	1.612	1.513	1387.4	.099	29
51.00	1.611	1.611	1.511	1369.7	.100	29
50.75	1.611	1.611	1.510	1352.1	.101	29
50.25	1.610	1.610	1.507	1316.9	.103	28
50.00	1.610	1.610	1.505	1299.7	.104	28
49.75	1.609	1.609	1.504	1282.7	.105	28
48.50	1.641	1.641	1.530	1197.2	.111	27
47.50	1.672	1.672	1.555	1129.1	.116	27
46.50	1.698	1.698	1.576	1064.4	.122	26
45.50	1.733	1.733	1.605	999.8	.128	25
44.50	1.773	1.773	1.638	936.4	.135	25
43.50	1.820	1.820	1.677	873.7	.143	25
42.50	1.871	1.871	1.719	813.0	.152	25
41.50	1.928	1.928	1.766	753.7	.161	24
40.50	1.984	1.984	1.811	696.0	.172	23
39.50	2.040	2.040	1.855	640.1	.185	23
38.50	2.094	2.094	1.895	587.0	.199	24

THE LOWEST FACTOR OF SAFETY WAS 1.609 AT R = 49.75.

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X = 130.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.586	1.586	1.510	1422.7	.076	31
47.50	1.582	1.582	1.504	1355.6	.078	31
46.50	1.577	1.577	1.496	1290.6	.081	30
45.50	1.587	1.587	1.503	1226.5	.084	30
47.25	1.581	1.581	1.502	1339.2	.079	31
47.00	1.580	1.580	1.500	1322.9	.080	31
46.75	1.578	1.578	1.498	1306.8	.080	31
46.25	1.575	1.575	1.493	1274.9	.082	30
46.00	1.571	1.571	1.489	1259.3	.082	29
45.75	1.577	1.577	1.494	1243.1	.083	30
44.50	1.602	1.602	1.515	1167.3	.087	29
43.50	1.618	1.618	1.528	1104.4	.090	28
42.50	1.644	1.644	1.550	1043.1	.094	28
41.50	1.670	1.670	1.571	984.1	.098	27
40.50	1.694	1.694	1.592	927.4	.103	27
39.50	1.719	1.719	1.612	873.0	.107	26
38.50	1.756	1.756	1.644	817.1	.113	26
37.50	1.778	1.778	1.659	763.7	.118	24
36.50	1.797	1.797	1.672	713.7	.125	24
35.50	1.823	1.823	1.691	665.3	.131	24
34.50	1.851	1.851	1.712	618.9	.139	24
33.50	1.864	1.864	1.718	575.8	.146	22
32.50	1.877	1.877	1.722	534.3	.155	21
31.50	1.913	1.913	1.749	494.4	.164	21
30.50	1.943	1.943	1.768	454.9	.175	19
29.50	2.003	2.003	1.815	416.8	.188	18
28.50	2.047	2.047	1.845	380.6	.202	18

THE LOWEST FACTOR OF SAFETY WAS 1.571 AT R = 46.00.

X = 130.00 , Y = 100.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
43.50	1.574	1.574	1.499	1164.8	.075	30
42.50	1.586	1.586	1.509	1107.8	.077	28
D(FS)/DR IS NEGATIVE AT RMAX.						
41.50	1.615	1.615	1.535	1047.2	.080	28
40.50	1.642	1.642	1.559	989.1	.083	28
39.50	1.667	1.667	1.580	933.7	.086	28
38.50	1.696	1.696	1.606	879.0	.090	27
37.50	1.710	1.710	1.617	828.2	.094	25
36.50	1.738	1.738	1.640	776.1	.098	25
35.50	1.758	1.758	1.655	727.3	.102	25
34.50	1.768	1.768	1.661	681.2	.107	24
33.50	1.804	1.804	1.692	637.1	.112	24
32.50	1.810	1.810	1.693	595.4	.117	23
31.50	1.776	1.776	1.653	557.0	.123	21
30.50	1.846	1.846	1.716	516.3	.129	21
32.25	1.804	1.804	1.685	585.8	.119	23
32.00	1.760	1.760	1.640	576.9	.120	21

Case 7

31.75	1.764	1.764	1.642	567.1	.121	21
31.25	1.794	1.794	1.670	546.5	.124	22
31.00	1.814	1.814	1.688	536.2	.126	22
30.75	1.833	1.833	1.705	525.8	.128	21
29.50	1.809	1.809	1.673	480.5	.136	20
28.50	1.868	1.868	1.724	442.7	.144	20
30.25	1.843	1.843	1.712	507.3	.131	21
30.00	1.800	1.800	1.667	498.9	.132	20
29.75	1.804	1.804	1.670	489.6	.134	20
29.25	1.814	1.814	1.676	471.4	.138	20
29.00	1.824	1.824	1.684	462.1	.140	20
28.75	1.846	1.846	1.704	452.3	.142	20
27.50	1.917	1.917	1.764	408.5	.153	19
26.50	1.898	1.898	1.735	373.7	.163	16
25.50	1.940	1.940	1.766	340.4	.175	16
27.25	1.865	1.865	1.710	400.5	.155	17
27.00	1.878	1.878	1.720	390.9	.158	16
26.75	1.888	1.888	1.727	382.3	.160	16
26.25	1.908	1.908	1.742	365.2	.166	16
26.00	1.919	1.919	1.750	356.8	.169	16
25.75	1.929	1.929	1.758	348.6	.172	16
24.50	1.987	1.987	1.799	308.5	.188	16
23.50	2.056	2.056	1.852	276.2	.204	15

THE LOWEST FACTOR OF SAFETY WAS 1.574 AT R = 43.50.

X = 135.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.623	1.623	1.549	1459.9	.074	32
47.50	1.628	1.628	1.552	1390.6	.076	32
D(FS)/DR IS NEGATIVE AT RMAX.						
46.50	1.614	1.614	1.535	1324.4	.079	30
45.50	1.604	1.604	1.523	1262.6	.082	29
44.50	1.603	1.603	1.519	1198.1	.085	29
43.50	1.601	1.601	1.513	1135.9	.088	29
42.50	1.598	1.598	1.506	1075.6	.091	28
41.50	1.591	1.591	1.496	1018.3	.095	28
40.50	1.615	1.615	1.516	960.3	.099	28
42.25	1.596	1.596	1.504	1061.0	.092	28
42.00	1.595	1.595	1.501	1046.6	.093	28
41.75	1.593	1.593	1.499	1032.4	.094	28
41.25	1.589	1.589	1.493	1004.2	.096	28
41.00	1.593	1.593	1.496	989.8	.097	28
40.75	1.604	1.604	1.506	974.9	.098	28
39.50	1.629	1.629	1.526	907.4	.103	27
38.50	1.652	1.652	1.544	851.2	.108	25
37.50	1.683	1.683	1.569	797.8	.113	25
36.50	1.713	1.713	1.594	746.4	.119	25
35.50	1.748	1.748	1.622	696.2	.125	25
34.50	1.783	1.783	1.650	647.5	.132	23
33.50	1.827	1.827	1.687	599.7	.140	23
32.50	1.857	1.857	1.708	554.2	.149	22
31.50	1.887	1.887	1.729	511.0	.159	22
30.50	1.936	1.936	1.766	467.8	.170	21
29.50	1.975	1.975	1.793	428.7	.182	21
28.50	2.003	2.003	1.808	391.6	.195	21

THE LOWEST FACTOR OF SAFETY WAS 1.589 AT R = 41.25.

X = 125.00 , Y = 105.00 :

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RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.631	1.631	1.552	1357.3	.079	30
47.50	1.656	1.656	1.574	1288.6	.082	30
D(FS)/DR IS NEGATIVE AT RMAX.						
46.50	1.680	1.680	1.595	1222.4	.086	30
45.50	1.704	1.704	1.615	1158.5	.089	29
44.50	1.724	1.724	1.632	1098.4	.092	28
43.50	1.759	1.759	1.663	1034.9	.096	28
42.50	1.778	1.778	1.678	974.4	.101	27
41.50	1.797	1.797	1.692	916.9	.106	26
40.50	1.815	1.815	1.705	862.3	.110	26
39.50	1.841	1.841	1.726	809.2	.116	26
38.50	1.855	1.855	1.734	759.6	.121	25
37.50	1.860	1.860	1.733	712.2	.127	23
36.50	1.898	1.898	1.764	665.2	.134	23
35.50	1.904	1.904	1.763	621.8	.141	22
34.50	1.957	1.957	1.808	577.0	.149	21
33.50	2.005	2.005	1.846	532.6	.159	20
32.50	2.027	2.027	1.858	491.8	.169	18
31.50	2.083	2.083	1.902	450.8	.181	18
30.50	2.151	2.151	1.956	410.5	.195	18
29.50	2.267	2.267	2.053	368.9	.213	17
28.50	2.392	2.392	2.158	330.1	.234	17

THE LOWEST FACTOR OF SAFETY WAS 1.631 AT R = 48.50.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:

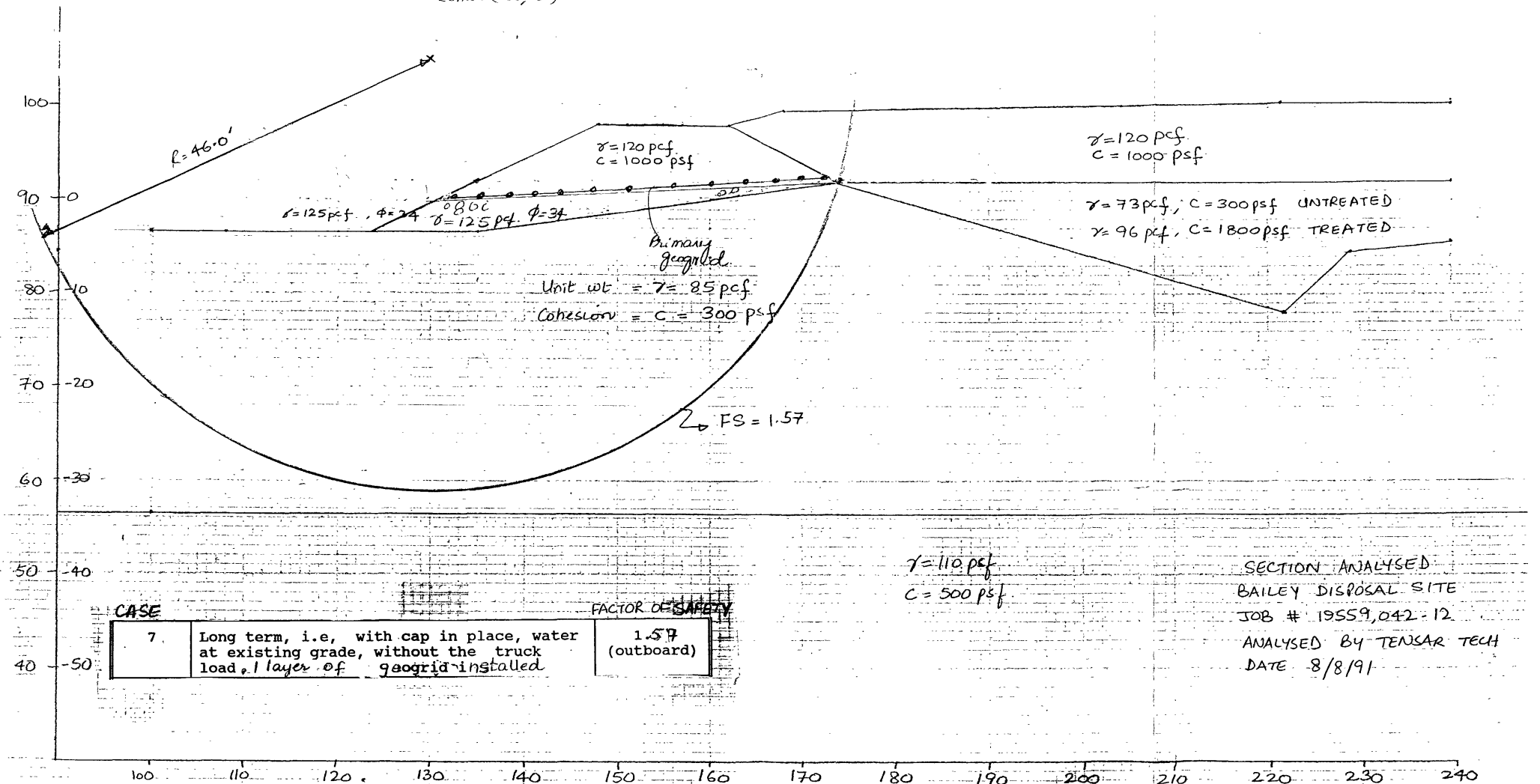
X = 130.00.
Y = 105.00.
RADIUS OF CRITICAL CIRCLE = 46.00.

MINIMUM FS = 1.571 (TENSAR GEOGRIDS AT WORKING STRESS).

FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) = 1.571.
FS (UNREINFORCED) = 1.489.
TOTAL DRIVING MOMENT = 1259.31 KIP-FT/FT
CRITICAL CIRCLE EXTENDS TO ELEVATION 59.00.
ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
92.50 (PULL OUT STRESS = 4.00 KIPS/FT)

CALCULATIONS HAVE BEEN COMPLETED.

CASE 7



CASE		FACTOR OF SAFETY
7	Long term, i.e, with cap in place, water at existing grade, without the truck load, 1 layer of geogrid installed	1.57 (outboard)

SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY TENSAR TECH
DATE 8/8/91

7A	Case 7, but with the truck load	1.52 (outboard)

```
ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1
0.
0.0       0.
1.        50.       86.5
2.        124.      86.5
3.        147.      98.
4.        162.      98.
5.        182.      92.
6.        221.5     78.
7.        229.      84.5
8.        258.      92.
9.        135.      86.5
10.       174.      92.
11.       50.       56.5
12.       286.      56.5
13.       168.      99.5
14.       221.5     100.5
15.       266.      99.5
16.       271.      98.
17.       286.      98.
18.       286.      92.
19.       151.30    99.
20.       157.20    99.
21.       157.30    98.
22.       121.      92.
23.       131.      90.
24.       163.      92.
25.       151.2     98.
26.       115.      90.
27.       160.      90.
999.
13.
1.        2.        2.
2.        23.       6.
23.       3.        1.
3.        25.       1.
25.       19.       5.
19.       20.       5.
20.       21.       5.
21.       4.        1.
4.        13.       1.
13.       14.       1.
14.       15.       1.
15.       16.       1.
16.       17.       1.
25.       21.       1.
4.        10.       1.
10.       8.        3.
8.        16.       1.
23.       27.       6.
2.        9.        2.
9.        27.       2.
27.       10.       2.
10.       6.        2.
6.        7.        2.
7.        8.        2.
8.        18.       2.
11.       12.       4.
999.
1.        .12       1.        0.        1.1       0.7
2.        .085      .3        0.        1.1       0.6
3.        .096      1.8       0.        1.1       0.6
```

Case (7A)

Validity of data
& Reasonableness of Result
Checked by M.K.
10/23/91

```
4.      .11     .5      0.      1.1     0.0
5.      .712    1.      0.      1.1     0.0
6.      .125    0.      34.     1.1     0.9
99.
4.      0.      0.0624
50.     60.
148.    60.
160.    60.
286.    60.
0.
0.      1.      0.      .05
92.5    138.    190.    4.00    1.      1.5
20.
56.5
76.5
20.
SEARCH
125.    110.    20.     20.
```

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-23-1991
TIME 13:11

ORANGE SUPEFUND$WASTE CONT.$LEFT SIDE DIKE$03/11/91$1

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	86.50	124.00	86.50	.0000	2	*
2	124.00	86.50	131.00	90.00	.5000	6	*
3	131.00	90.00	147.00	98.00	.5000	1	*
4	147.00	98.00	151.20	98.00	.0000	1	*
5	151.20	98.00	151.30	99.00	9.9994	5	*
6	151.30	99.00	157.20	99.00	.0000	5	*
7	157.20	99.00	157.30	98.00	-9.9994	5	*
8	157.30	98.00	162.00	98.00	.0000	1	*
9	162.00	98.00	168.00	99.50	.2500	1	*
10	168.00	99.50	221.50	100.50	.0187	1	*
11	221.50	100.50	266.00	99.50	-.0225	1	*
12	266.00	99.50	271.00	98.00	-.3000	1	*
13	271.00	98.00	286.00	98.00	.0000	1	*
14	151.20	98.00	157.30	98.00	.0000	1	
15	162.00	98.00	174.00	92.00	-.5000	1	
16	174.00	92.00	258.00	92.00	.0000	3	
17	258.00	92.00	271.00	98.00	.4615	1	
18	131.00	90.00	160.00	90.00	.0000	6	
19	124.00	86.50	135.00	86.50	.0000	2	
20	135.00	86.50	160.00	90.00	.1400	2	
21	160.00	90.00	174.00	92.00	.1429	2	
22	174.00	92.00	221.50	78.00	-.2947	2	
23	221.50	78.00	229.00	84.50	.8667	2	
24	229.00	84.50	258.00	92.00	.2586	2	
25	258.00	92.00	286.00	92.00	.0000	2	
26	50.00	56.50	286.00	56.50	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	60.00

2	148.00	60.00
3	160.00	60.00
4	286.00	60.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

TENSAR GEOGRID PLACEMENT:

LAYER	ELEVATION	X-LEFT	X-RIGHT	%COVERAGE
1	92.50	138.00	190.00	100.

TENSAR GEOGRID STRENGTH DATA:

LAYER	ULT STREN KIPS/FT	WRKG STREN KIPS/FT	FS-PULL OUT
1	4.00	4.00	1.5

DERATING CONSTANT FOR NEAR-TANGENT GEOGRIDS= .05

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 56.50
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 76.50

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 125.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 125.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.482	1.482	1.409	1739.2	.074	31
52.50	1.474	1.474	1.398	1666.5	.076	31
51.50	1.486	1.486	1.407	1592.8	.079	31
53.25	1.480	1.480	1.406	1720.8	.074	31
53.00	1.478	1.478	1.403	1702.6	.075	31
52.75	1.476	1.476	1.401	1684.5	.075	31
52.25	1.471	1.471	1.395	1648.7	.077	30
52.00	1.475	1.475	1.398	1630.0	.077	31
51.75	1.481	1.481	1.403	1611.3	.078	31
50.50	1.496	1.496	1.415	1524.0	.081	29
49.50	1.506	1.506	1.422	1454.1	.084	28
48.50	1.521	1.521	1.434	1385.4	.087	28
47.50	1.536	1.536	1.446	1318.8	.090	28
46.50	1.555	1.555	1.461	1252.0	.094	27
45.50	1.575	1.575	1.478	1186.4	.098	27
44.50	1.598	1.598	1.496	1122.5	.102	27
43.50	1.609	1.609	1.503	1061.4	.106	26
42.50	1.620	1.620	1.509	1002.5	.111	26
41.50	1.633	1.633	1.518	945.1	.116	25
40.50	1.642	1.642	1.521	891.5	.121	25
39.50	1.643	1.643	1.517	840.1	.126	25
38.50	1.648	1.648	1.515	791.1	.132	23
37.50	1.672	1.672	1.532	743.1	.139	22
36.50	1.694	1.694	1.547	696.5	.147	20

35.50	1.724	1.724	1.569	650.1	.155	20
34.50	1.740	1.740	1.576	607.5	.164	20
33.50	1.886	1.886	1.707	546.1	.179	18

THE LOWEST FACTOR OF SAFETY WAS 1.471 AT R = 52.25.

X = 145.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.658	1.658	1.658	1760.8	.000	31
52.50	1.657	1.657	1.657	1684.8	.000	30
51.50	1.660	1.660	1.660	1606.6	.000	30
53.25	1.659	1.659	1.659	1740.9	.000	31
53.00	1.659	1.659	1.659	1721.1	.000	31
52.75	1.660	1.660	1.660	1701.4	.000	31
52.25	1.657	1.657	1.657	1665.1	.000	30
52.00	1.658	1.658	1.658	1645.5	.000	30
51.75	1.659	1.659	1.659	1625.9	.000	30
50.50	1.663	1.663	1.663	1529.4	.000	29
49.50	1.666	1.666	1.666	1455.7	.000	29
48.50	1.668	1.668	1.668	1383.7	.000	29
47.50	1.688	1.688	1.670	1313.5	.018	29
46.50	1.711	1.711	1.669	1246.6	.042	28
45.50	1.741	1.741	1.673	1178.8	.069	27
44.50	1.772	1.772	1.674	1114.2	.098	27
43.50	1.783	1.783	1.676	1051.5	.107	27
42.50	1.788	1.788	1.676	990.4	.112	27
41.50	1.799	1.799	1.681	929.0	.118	26
40.50	1.816	1.816	1.692	869.2	.124	26
39.50	1.834	1.834	1.703	811.5	.131	26
38.50	1.828	1.828	1.690	759.3	.138	25
37.50	1.838	1.838	1.692	705.5	.146	23
39.25	1.836	1.836	1.703	797.6	.133	26
39.00	1.831	1.831	1.697	786.0	.134	25
38.75	1.830	1.830	1.695	772.5	.136	25
38.25	1.828	1.828	1.688	745.9	.140	24
38.00	1.831	1.831	1.689	732.3	.142	23
37.75	1.834	1.834	1.691	718.9	.144	23
36.50	1.853	1.853	1.698	652.7	.155	22
35.50	1.866	1.866	1.701	602.8	.166	22
34.50	1.882	1.882	1.704	554.4	.177	22
33.50	1.942	1.942	1.751	505.4	.191	21

THE LOWEST FACTOR OF SAFETY WAS 1.657 AT R = 52.50.

X = 105.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	2.049	2.049	1.947	1258.9	.102	28
52.50	2.179	2.179	2.069	1154.0	.110	27
D(FS)/DR IS NEGATIVE AT RMAX.						
51.50	2.309	2.309	2.189	1050.2	.120	27
50.50	2.448	2.448	2.317	947.6	.131	26
49.50	2.650	2.650	2.504	843.6	.145	26

48.50	2.890	2.890	2.727	744.1	.163	26
47.50	3.067	3.067	2.884	654.7	.183	23
46.50	3.252	3.252	3.052	592.2	.200	22
45.50	3.488	3.488	3.268	530.1	.220	21
44.50	3.774	3.774	3.528	468.8	.245	21
43.50	4.080	4.080	3.804	411.0	.276	20
42.50	4.447	4.447	4.131	353.8	.316	20
41.50	4.863	4.863	4.499	302.4	.364	18
40.50	5.333	5.333	4.981	253.3	.352	18
39.50	5.861	5.861	5.572	208.8	.288	18
38.50	6.507	6.507	6.319	168.7	.188	18
37.50	7.356	7.356	7.325	132.1	.030	17
36.50	8.714	8.714	8.714	100.0	.000	17
35.50	10.711	10.711	10.711	72.4	.000	17
34.50	13.966	13.966	13.966	48.6	.000	16
33.50	19.514	19.514	19.514	29.7	.000	14

THE LOWEST FACTOR OF SAFETY WAS 2.049 AT R = 53.50.

X = 125.00 , Y = 130.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
73.50	1.563	1.563	1.532	2799.5	.031	29
72.50	1.584	1.584	1.530	2693.4	.053	29
D(FS)/DR IS NEGATIVE AT RMAX.						
71.50	1.605	1.605	1.529	2589.5	.077	29
70.50	1.609	1.609	1.527	2487.7	.082	29
69.50	1.610	1.610	1.525	2387.1	.085	28
68.50	1.610	1.610	1.522	2288.5	.088	27
67.50	1.612	1.612	1.521	2191.7	.091	27
66.50	1.614	1.614	1.519	2094.9	.095	27
65.50	1.614	1.614	1.516	2002.2	.098	27
64.50	1.611	1.611	1.509	1913.3	.102	25
63.50	1.610	1.610	1.504	1824.3	.106	25
62.50	1.608	1.608	1.498	1737.2	.110	25
61.50	1.625	1.625	1.509	1648.9	.115	25
63.25	1.609	1.609	1.502	1802.3	.107	25
63.00	1.609	1.609	1.501	1780.5	.108	25
62.75	1.609	1.609	1.499	1758.8	.109	25
62.25	1.608	1.608	1.496	1715.7	.112	25
62.00	1.608	1.608	1.495	1694.3	.113	24
61.75	1.616	1.616	1.502	1671.5	.114	25
60.50	1.659	1.659	1.538	1560.8	.121	25
59.50	1.695	1.695	1.568	1475.6	.127	24
58.50	1.732	1.732	1.599	1393.8	.133	24
57.50	1.773	1.773	1.633	1313.1	.140	23
56.50	1.822	1.822	1.674	1231.9	.148	23
55.50	1.877	1.877	1.720	1152.9	.157	22
54.50	1.941	1.941	1.775	1074.5	.166	22
53.50	2.016	2.016	1.839	996.8	.178	22

THE LOWEST FACTOR OF SAFETY WAS 1.563 AT R = 73.50.

X = 125.00 , Y = 90.00 :

RADIUS	FS GEOGRIDS AT	FS GEOGRIDS AT	FS WITHOUT	DRIVING MOMENT:	DELTA FS DUE TO	# SLICES

	WORK STRESS	ULT STRESS	GEOGRIDS	KIP-FT/FT	GEOGRIDS	

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 73.50.

X = 130.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.515	1.515	1.444	1786.2	.072	32
52.50	1.498	1.498	1.424	1716.3	.074	30
51.50	1.493	1.493	1.417	1641.5	.076	30
50.50	1.487	1.487	1.409	1568.9	.079	29
49.50	1.480	1.480	1.399	1499.0	.081	29
48.50	1.471	1.471	1.387	1431.3	.084	29
47.50	1.462	1.462	1.375	1365.5	.087	28
46.50	1.479	1.479	1.388	1300.8	.090	27
48.25	1.469	1.469	1.384	1414.7	.085	29
48.00	1.466	1.466	1.381	1398.3	.086	29
47.75	1.463	1.463	1.377	1381.9	.086	29
47.25	1.468	1.468	1.380	1348.3	.088	29
47.00	1.473	1.473	1.385	1331.3	.089	29
46.75	1.479	1.479	1.389	1314.6	.089	29
45.50	1.493	1.493	1.399	1235.8	.094	27
44.50	1.505	1.505	1.408	1173.1	.097	26
43.50	1.522	1.522	1.421	1111.7	.101	26
42.50	1.539	1.539	1.434	1052.1	.105	26
41.50	1.564	1.564	1.453	991.3	.110	25
40.50	1.588	1.588	1.472	933.2	.115	25
39.50	1.611	1.611	1.490	877.1	.121	25
38.50	1.624	1.624	1.496	823.1	.127	24
37.50	1.641	1.641	1.508	770.1	.134	23
36.50	1.656	1.656	1.516	720.4	.141	23
35.50	1.664	1.664	1.515	673.3	.148	24
34.50	1.665	1.665	1.509	628.7	.156	23
33.50	1.691	1.691	1.525	585.6	.166	20

THE LOWEST FACTOR OF SAFETY WAS 1.462 AT R = 47.50.

X = 135.00 , Y = 110.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
53.50	1.556	1.556	1.485	1808.6	.071	31
52.50	1.552	1.552	1.479	1732.7	.073	31
51.50	1.546	1.546	1.471	1659.0	.075	31
50.50	1.542	1.542	1.464	1585.5	.078	30
49.50	1.545	1.545	1.464	1512.2	.081	30
51.25	1.545	1.545	1.469	1640.9	.076	31
51.00	1.544	1.544	1.467	1622.4	.077	31
50.75	1.543	1.543	1.466	1603.6	.077	30
50.25	1.542	1.542	1.463	1567.2	.079	30
50.00	1.543	1.543	1.464	1548.6	.079	30
49.75	1.544	1.544	1.465	1530.3	.080	30
48.50	1.539	1.539	1.456	1443.0	.083	30
47.50	1.523	1.523	1.437	1379.0	.086	28
46.50	1.518	1.518	1.428	1311.9	.089	28
45.50	1.512	1.512	1.419	1246.8	.093	27
44.50	1.504	1.504	1.407	1184.4	.096	27
43.50	1.494	1.494	1.394	1123.8	.100	27
42.50	1.501	1.501	1.397	1063.4	.104	27
44.25	1.501	1.501	1.404	1169.0	.097	27
44.00	1.499	1.499	1.401	1153.9	.098	27
43.75	1.497	1.497	1.398	1138.8	.099	27
43.25	1.492	1.492	1.391	1109.0	.101	27
43.00	1.488	1.488	1.386	1094.3	.102	26
42.75	1.494	1.494	1.391	1078.8	.103	27
41.50	1.522	1.522	1.413	1005.2	.109	25
40.50	1.537	1.537	1.423	948.4	.114	25
39.50	1.556	1.556	1.437	892.7	.119	24
38.50	1.579	1.579	1.454	838.4	.125	24
37.50	1.609	1.609	1.477	783.9	.131	23
36.50	1.640	1.640	1.501	731.6	.139	23
35.50	1.675	1.675	1.528	680.9	.147	23
34.50	1.706	1.706	1.551	632.3	.155	22
33.50	1.736	1.736	1.571	583.8	.165	21

THE LOWEST FACTOR OF SAFETY WAS 1.488 AT R = 43.00.

X = 130.00 , Y = 115.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
58.50	1.536	1.536	1.463	2053.2	.072	32
57.50	1.532	1.532	1.457	1970.5	.075	32
56.50	1.530	1.530	1.453	1887.8	.077	32
55.50	1.530	1.530	1.450	1806.5	.080	32
54.50	1.520	1.520	1.438	1732.2	.082	30
53.50	1.513	1.513	1.428	1656.3	.085	29
52.50	1.508	1.508	1.420	1581.5	.088	29
51.50	1.501	1.501	1.410	1508.8	.091	29
50.50	1.495	1.495	1.400	1437.8	.095	28
49.50	1.491	1.491	1.393	1368.7	.098	28
48.50	1.510	1.510	1.408	1300.8	.102	27

50.25	1.493	1.493	1.397	1420.5	.096	28
50.00	1.491	1.491	1.394	1403.3	.096	28
49.75	1.489	1.489	1.391	1386.3	.097	28
49.25	1.497	1.497	1.398	1351.0	.099	28
49.00	1.498	1.498	1.398	1336.3	.100	27
48.75	1.504	1.504	1.403	1318.4	.101	27
47.50	1.531	1.531	1.425	1232.7	.107	27
46.50	1.548	1.548	1.437	1168.0	.111	26
45.50	1.571	1.571	1.455	1103.4	.116	25
44.50	1.597	1.597	1.475	1040.0	.122	25
43.50	1.627	1.627	1.499	977.3	.128	25
42.50	1.659	1.659	1.525	916.5	.134	25
41.50	1.695	1.695	1.553	857.3	.142	24
40.50	1.727	1.727	1.576	799.6	.150	23
39.50	1.756	1.756	1.597	743.7	.159	23
38.50	1.780	1.780	1.610	690.6	.169	24

THE LOWEST FACTOR OF SAFETY WAS 1.489 AT R = 49.75.

X = 130.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.478	1.478	1.408	1526.3	.071	31
47.50	1.470	1.470	1.397	1459.1	.073	31
46.50	1.460	1.460	1.385	1394.2	.075	30
45.50	1.464	1.464	1.386	1330.1	.077	30
47.25	1.467	1.467	1.394	1442.7	.073	31
47.00	1.465	1.465	1.391	1426.5	.074	31
46.75	1.462	1.462	1.388	1410.4	.074	31
46.25	1.456	1.456	1.381	1378.5	.076	30
46.00	1.452	1.452	1.376	1362.9	.076	29
45.75	1.456	1.456	1.379	1346.7	.077	30
44.50	1.472	1.472	1.392	1270.9	.080	29
43.50	1.479	1.479	1.397	1208.0	.083	28
42.50	1.495	1.495	1.410	1146.7	.086	28
41.50	1.511	1.511	1.422	1087.7	.089	27
40.50	1.524	1.524	1.432	1031.0	.092	27
39.50	1.537	1.537	1.441	976.6	.096	26
38.50	1.559	1.559	1.459	920.7	.100	26
37.50	1.565	1.565	1.461	867.3	.104	24
36.50	1.569	1.569	1.460	817.3	.109	24
35.50	1.577	1.577	1.463	768.9	.114	24
34.50	1.585	1.585	1.466	722.5	.119	24
33.50	1.580	1.580	1.456	679.4	.124	22
32.50	1.572	1.572	1.442	637.9	.130	21
31.50	1.581	1.581	1.445	598.0	.136	21
33.25	1.578	1.578	1.452	668.9	.125	23
33.00	1.573	1.573	1.447	658.5	.127	23
32.75	1.567	1.567	1.438	648.5	.128	21
32.25	1.576	1.576	1.445	627.6	.131	21
32.00	1.580	1.580	1.447	617.5	.133	21
31.75	1.581	1.581	1.447	607.6	.134	21
30.50	1.591	1.591	1.447	558.5	.143	19
29.50	1.616	1.616	1.465	520.4	.151	18
28.50	1.625	1.625	1.465	484.2	.159	18

THE LOWEST FACTOR OF SAFETY WAS 1.452 AT R = 46.00.

X = 130.00 , Y = 100.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
43.50	1.445	1.445	1.377	1268.4	.068	30
42.50	1.451	1.451	1.380	1211.4	.070	28
D(FS)/DR IS NEGATIVE AT RMAX.						
41.50	1.470	1.470	1.397	1150.8	.073	28
40.50	1.487	1.487	1.412	1092.7	.075	28
39.50	1.500	1.500	1.422	1037.3	.078	28
38.50	1.517	1.517	1.437	982.6	.081	27
37.50	1.520	1.520	1.437	931.8	.083	25
36.50	1.533	1.533	1.447	879.7	.086	25
35.50	1.538	1.538	1.449	830.9	.090	25
34.50	1.535	1.535	1.442	784.8	.093	24
33.50	1.552	1.552	1.455	740.7	.096	24
35.25	1.538	1.538	1.448	819.2	.090	25
35.00	1.538	1.538	1.446	807.6	.091	25
34.75	1.536	1.536	1.444	796.3	.092	25
34.25	1.537	1.537	1.443	773.6	.094	24
34.00	1.544	1.544	1.449	762.3	.095	24
33.75	1.550	1.550	1.454	751.3	.096	24
32.50	1.542	1.542	1.442	698.9	.100	23
31.50	1.497	1.497	1.394	660.6	.103	21
30.50	1.537	1.537	1.429	619.8	.108	21
32.25	1.533	1.533	1.432	689.4	.101	23
32.00	1.492	1.492	1.390	680.5	.102	21
31.75	1.491	1.491	1.389	670.7	.102	21
31.25	1.508	1.508	1.404	650.1	.105	22
31.00	1.520	1.520	1.414	639.8	.106	22
30.75	1.531	1.531	1.424	629.4	.107	21
29.50	1.488	1.488	1.376	584.1	.112	20
28.50	1.519	1.519	1.402	546.3	.117	20
30.25	1.530	1.530	1.421	610.9	.109	21
30.00	1.490	1.490	1.380	602.5	.110	20
29.75	1.489	1.489	1.378	593.2	.111	20
29.25	1.486	1.486	1.373	575.0	.113	20
29.00	1.494	1.494	1.379	565.7	.114	20
28.75	1.506	1.506	1.391	555.9	.116	20
27.50	1.536	1.536	1.414	512.1	.122	19
26.50	1.600	1.600	1.468	462.1	.132	17
25.50	1.684	1.684	1.539	410.3	.146	17
24.50	1.786	1.786	1.624	360.7	.162	17
23.50	1.896	1.896	1.714	311.2	.181	16

THE LOWEST FACTOR OF SAFETY WAS 1.445 AT R = 43.50.

X = 130.00 , Y = 95.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 38.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 37.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 36.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 35.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 34.50.

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 43.50.

X = 135.00 , Y = 100.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
43.50	1.473	1.473	1.405	1281.5	.068	30
42.50	1.467	1.467	1.397	1219.5	.070	29
41.50	1.458	1.458	1.386	1160.5	.072	29
40.50	1.445	1.445	1.371	1104.3	.074	29
39.50	1.455	1.455	1.378	1049.2	.077	29
41.25	1.456	1.456	1.383	1146.2	.073	29
41.00	1.453	1.453	1.379	1132.1	.073	29
40.75	1.449	1.449	1.375	1118.1	.074	29
40.25	1.441	1.441	1.366	1090.7	.075	29
40.00	1.436	1.436	1.361	1077.3	.076	29
39.75	1.436	1.436	1.360	1063.8	.076	28
38.50	1.454	1.454	1.375	994.5	.080	27
37.50	1.461	1.461	1.379	944.1	.082	26
39.25	1.475	1.475	1.397	1034.7	.078	28
39.00	1.446	1.446	1.368	1021.7	.078	27
38.75	1.450	1.450	1.371	1008.0	.079	27
38.25	1.458	1.458	1.378	981.0	.080	27
38.00	1.451	1.451	1.370	971.6	.081	26
37.75	1.456	1.456	1.375	957.8	.081	26
36.50	1.482	1.482	1.397	890.9	.085	26
35.50	1.501	1.501	1.413	840.1	.089	26
34.50	1.517	1.517	1.425	791.5	.092	25
33.50	1.536	1.536	1.440	744.2	.096	25
32.50	1.543	1.543	1.443	699.6	.100	23
31.50	1.559	1.559	1.455	654.0	.104	22
30.50	1.564	1.564	1.455	612.9	.109	22
29.50	1.563	1.563	1.449	574.0	.114	22
28.50	1.586	1.586	1.467	536.1	.119	22
30.25	1.564	1.564	1.454	603.0	.110	22
30.00	1.563	1.563	1.452	593.3	.111	22
29.75	1.561	1.561	1.449	583.7	.112	22
29.25	1.570	1.570	1.456	564.2	.115	22
29.00	1.577	1.577	1.461	554.7	.116	22
28.75	1.582	1.582	1.464	545.4	.117	22
27.50	1.574	1.574	1.450	499.9	.124	20
26.50	1.534	1.534	1.404	467.2	.130	19

25.50	1.569	1.569	1.433	434.0	.136	19
27.25	1.558	1.558	1.433	492.1	.125	20
27.00	1.513	1.513	1.386	484.8	.126	18
26.75	1.521	1.521	1.393	476.1	.128	19
26.25	1.546	1.546	1.415	458.5	.131	19
26.00	1.557	1.557	1.424	450.1	.133	19
25.75	1.566	1.566	1.431	441.9	.135	19
24.50	1.513	1.513	1.370	403.8	.143	18
23.50	1.570	1.570	1.419	371.4	.152	17
25.25	1.555	1.555	1.418	426.6	.138	19
25.00	1.512	1.512	1.373	419.5	.139	18
24.75	1.511	1.511	1.370	411.6	.141	18
24.25	1.528	1.528	1.383	395.5	.145	18
24.00	1.542	1.542	1.395	387.3	.147	17
23.75	1.556	1.556	1.407	379.3	.149	17

THE LOWEST FACTOR OF SAFETY WAS 1.436 AT R = 39.75.

X = 140.00 , Y = 100.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
43.50	1.569	1.569	1.500	1262.5	.069	30
42.50	1.579	1.579	1.508	1200.6	.071	30
D(FS)/DR IS NEGATIVE AT RMAX.						
41.50	1.559	1.559	1.486	1140.6	.073	29
40.50	1.555	1.555	1.479	1081.9	.076	29
39.50	1.549	1.549	1.471	1024.7	.079	28
38.50	1.534	1.534	1.453	972.7	.081	27
37.50	1.529	1.529	1.444	918.6	.084	27
36.50	1.521	1.521	1.433	866.8	.088	27
35.50	1.510	1.510	1.419	817.0	.091	26
34.50	1.534	1.534	1.440	769.1	.095	26
36.25	1.519	1.519	1.430	854.2	.089	27
36.00	1.517	1.517	1.428	840.9	.090	26
35.75	1.514	1.514	1.423	828.9	.090	26
35.25	1.505	1.505	1.413	805.3	.092	26
35.00	1.499	1.499	1.406	793.8	.093	25
34.75	1.513	1.513	1.419	781.5	.094	26
33.50	1.532	1.532	1.433	722.2	.099	25
32.50	1.548	1.548	1.445	678.0	.103	24
34.25	1.555	1.555	1.460	757.0	.096	26
34.00	1.520	1.520	1.423	745.8	.097	25
33.75	1.526	1.526	1.428	733.9	.098	25
33.25	1.525	1.525	1.425	713.8	.100	24
33.00	1.532	1.532	1.432	701.7	.101	24
32.75	1.540	1.540	1.438	689.8	.102	24
31.50	1.579	1.579	1.471	631.1	.108	23
30.50	1.607	1.607	1.494	588.0	.114	23
29.50	1.633	1.633	1.514	546.4	.119	23
28.50	1.656	1.656	1.530	507.1	.126	22
27.50	1.690	1.690	1.557	467.0	.133	20
26.50	1.721	1.721	1.580	428.5	.141	19
25.50	1.739	1.739	1.589	394.0	.150	19
24.50	1.767	1.767	1.608	360.8	.159	19
23.50	1.812	1.812	1.642	328.9	.170	19

THE LOWEST FACTOR OF SAFETY WAS 1.499 AT R = 35.00.

X = 135.00 , Y = 105.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES
48.50	1.536	1.536	1.466	1542.1	.070	32
47.50	1.537	1.537	1.465	1472.9	.072	32
D(FS)/DR IS NEGATIVE AT RMAX.						
46.50	1.519	1.519	1.445	1406.6	.074	30
45.50	1.506	1.506	1.430	1344.9	.077	29
44.50	1.500	1.500	1.421	1280.3	.079	29
43.50	1.493	1.493	1.411	1218.1	.082	29
42.50	1.484	1.484	1.399	1157.8	.085	28
41.50	1.472	1.472	1.384	1100.5	.088	28
40.50	1.488	1.488	1.396	1042.5	.091	28
42.25	1.481	1.481	1.396	1143.3	.086	28
42.00	1.478	1.478	1.392	1128.9	.086	28
41.75	1.475	1.475	1.388	1114.6	.087	28
41.25	1.469	1.469	1.380	1086.5	.089	28
41.00	1.471	1.471	1.381	1072.1	.090	28
40.75	1.479	1.479	1.389	1057.2	.090	28
39.50	1.494	1.494	1.399	989.6	.095	27
38.50	1.507	1.507	1.408	933.4	.099	25
37.50	1.525	1.525	1.423	880.1	.103	25
36.50	1.543	1.543	1.436	828.6	.107	25
35.50	1.563	1.563	1.451	778.4	.112	25
34.50	1.582	1.582	1.464	729.7	.118	23
33.50	1.607	1.607	1.484	681.9	.123	23
32.50	1.617	1.617	1.487	636.4	.130	22
31.50	1.626	1.626	1.489	593.2	.137	22
30.50	1.647	1.647	1.502	550.0	.144	21
29.50	1.657	1.657	1.505	511.0	.152	21
28.50	1.655	1.655	1.494	473.9	.161	21

THE LOWEST FACTOR OF SAFETY WAS 1.469 AT R = 41.25.

X = 135.00 , Y = 95.00 :

RADIUS	FS GEOGRIDS AT WORK STRESS	FS GEOGRIDS AT ULT STRESS	FS WITHOUT GEOGRIDS	DRIVING MOMENT: KIP-FT/FT	DELTA FS DUE TO GEOGRIDS	# SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 38.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 37.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 36.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 35.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 34.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.50.

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FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    21.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    20.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    19.50.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    18.50.

THE LOWEST FACTOR OF SAFETY WAS********* AT R =    41.25.

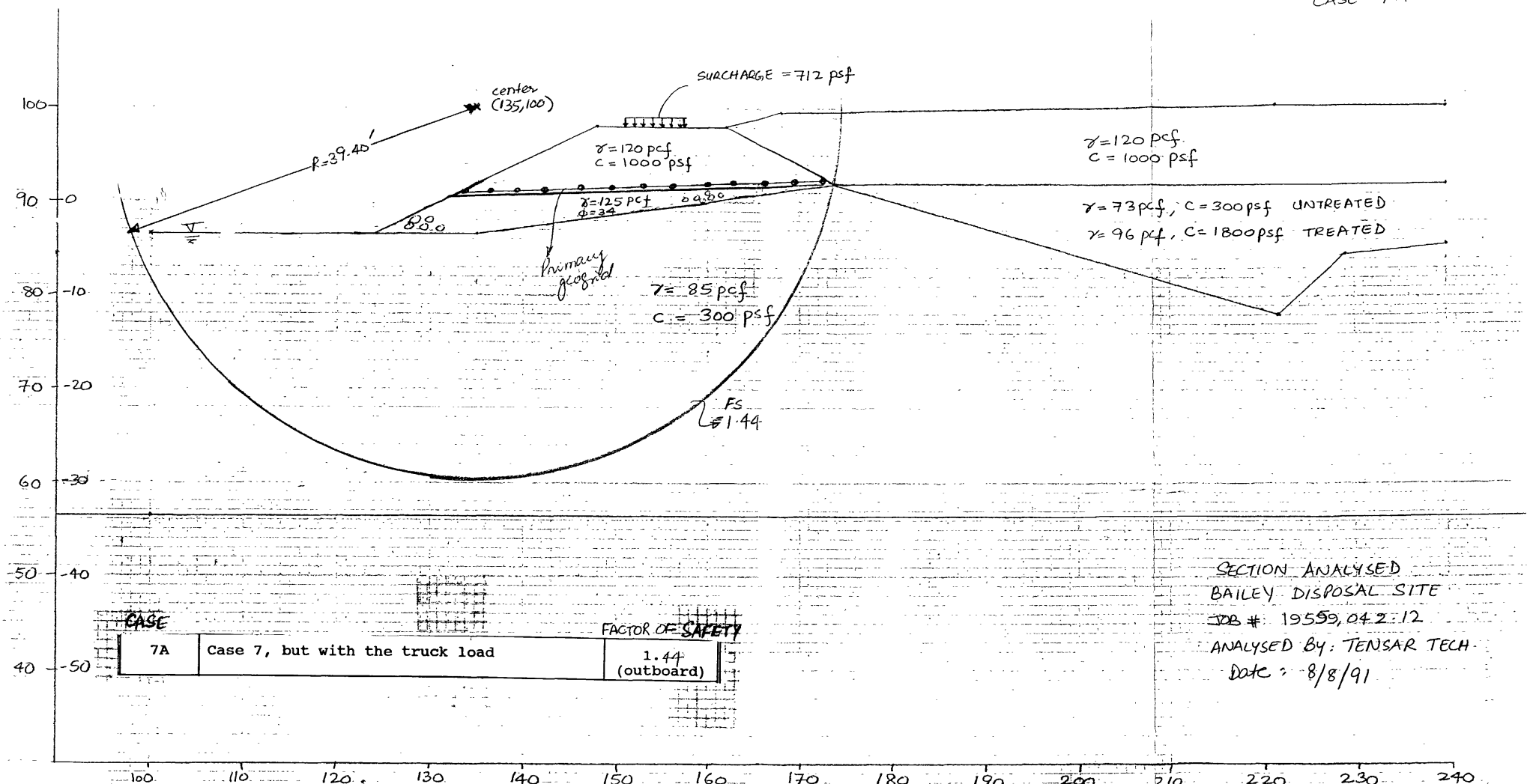

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
  X =  135.00.
  Y =  100.00.
  RADIUS OF CRITICAL CIRCLE =  39.75.

  MINIMUM FS =  1.436 (TENSAR GEOGRIDS AT WORKING STRESS).

  FS (TENSAR GEOGRIDS AT ULTIMATE STRESS) =  1.436.
  FS (UNREINFORCED) =  1.360.
  TOTAL DRIVING MOMENT =   1063.76  KIP-FT/FT
  CRITICAL CIRCLE EXTENDS TO ELEVATION   60.25.
  ELEVATION OF TENSAR GEOGRIDS INTERSECTED BY CRITICAL CIRCLE :
       92.50    (PULL OUT STRESS =     4.00 KIPS/FT )

CALCULATIONS HAVE BEEN COMPLETED.
```

CASE 7A



CASE		FACTOR OF SAFETY
7A	Case 7, but with the truck load	1.44 (outboard)

SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042:12
ANALYSED BY: TENSAR TECH
Date: 8/8/91

Case	Description	Factor of Safety
8	Short term, section at the drainage channel, water at dike crest, without the truck load	2.25 (inboard)

```
ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91
0.
0.0       0.
1.        50.000    91.00
2.        135.00    91.00
3.        149.00    98.00
4.        154.00    98.00
5.        154.20    99.00
6.        160.00    99.00
7.        160.20    98.00
8.        164.00    98.00
9.        178.00    91.00
10.       194.00    83.00
11.       250.00    83.00
12.       50.000    81.00
13.       157.50    91.00
14.       180.00    83.00
15.       50.000    61.00
16.       250.00    61.00
999.
6.
1.        2.        3.
2.        3.        1.
3.        8.        1.
8.        9.        1.
9.        10.       6.
10.       11.       2.
4.        7.        1.
12.       2.        2.
2.        13.       2.
13.       9.        6.
13.       14.       2.
14.       10.       2.
15.       16.       4.
999.
1.        .120      1.000     .0        1.1       .70
2.        .085      .300      .0        1.1       .60
3.        .073      .300      .0        1.1       .60
4.        .110      .500      .0        1.1       .00
5.        .712      1.000     .0        1.1       .00
6.        .125      .000      34.0      1.1       .90
99.
2.        0.        .0624
50.000    89.00
250.00    89.00
0.
0.        0.        .000      0.05
20.
61.00
71.00
10.
SEARCH
135.00    105.00    20.00     20.00
```

Case 8

Checked by N.K.

8/10/91

- Validity of data
- Reasonableness of the result

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

8

DATE 08-07-1991
TIME 06:50

ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	91.00	135.00	91.00	.0000	3	*
2	135.00	91.00	149.00	98.00	.5000	1	*
3	149.00	98.00	164.00	98.00	.0000	1	*
4	164.00	98.00	178.00	91.00	-.5000	1	*
5	178.00	91.00	194.00	83.00	-.5000	6	*
6	194.00	83.00	250.00	83.00	.0000	2	*
7	154.00	98.00	160.20	98.00	.0000	1	
8	50.00	81.00	135.00	91.00	.1176	2	
9	135.00	91.00	157.50	91.00	.0000	2	
10	157.50	91.00	178.00	91.00	.0000	6	
11	157.50	91.00	180.00	83.00	-.3556	2	
12	180.00	83.00	194.00	83.00	.0000	2	
13	50.00	61.00	250.00	61.00	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	89.00
2	250.00	89.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 61.00
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 71.00

THERE ARE 10 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 135.00, INITIAL Y = 105.00.
DELX = 20.00, DELY = 20.00.

8

X = 135.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	2.278	631.384	27
43.00	2.266	614.402	27
42.00	2.250	598.137	26
41.00	2.249	578.191	25
40.00	2.251	557.395	25
41.75	2.249	593.207	25
41.50	2.249	588.259	25
41.25	2.249	583.253	25
40.75	2.249	573.073	25
40.50	2.249	567.900	25
40.25	2.250	562.674	25
39.00	2.257	535.775	25
38.00	2.268	513.396	25
37.00	2.275	491.409	23
36.00	2.296	467.115	23
35.00	2.321	442.541	23
34.00	2.351	417.630	22

THE LOWEST FACTOR OF SAFETY WAS 2.249 AT R = 41.25.

X = 155.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	F.O.S. VERY LARGE (EXT. WATER DOMINATES)		
43.00	25.304	49.692	26
42.00	20.383	58.342	26
41.00	17.044	65.901	26
40.00	14.633	72.402	26
39.00	12.662	78.779	24
38.00	11.234	83.525	24
37.00	10.123	87.045	24
36.00	9.267	89.140	23
35.00	8.518	90.784	22
34.00	7.923	91.219	22

THE LOWEST FACTOR OF SAFETY WAS 7.923 AT R = 34.00.

X = 115.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	3.503	500.653	25
43.00	3.606	461.493	24
D(FS)/DR IS NEGATIVE AT RMAX.			
42.00	3.752	422.783	24
41.00	3.956	383.771	24
40.00	4.146	348.369	22
39.00	4.363	312.428	20
38.00	4.665	277.157	20
37.00	5.027	243.483	20
36.00	5.569	209.221	19
35.00	6.151	178.535	18
34.00	6.883	147.799	17

THE LOWEST FACTOR OF SAFETY WAS 3.503 AT R = 44.00.

X = 135.00, Y = 125.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
64.00	3.348	692.820	26
63.00	3.213	693.304	26
62.00	3.098	690.038	26
61.00	2.997	685.346	25
60.00	2.898	681.702	25
59.00	2.809	676.076	25
58.00	2.730	668.407	25
57.00	2.658	659.130	23
56.00	2.583	649.708	22
55.00	2.529	637.028	22
54.00	2.525	620.898	22

THE LOWEST FACTOR OF SAFETY WAS 2.525 AT R = 54.00.

X = 135.00, Y = 85.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 54.00.

X = 140.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	2.598	528.991	28
43.00	2.511	522.025	28
42.00	2.437	512.700	26
41.00	2.357	503.955	25
40.00	2.316	492.487	25
39.00	2.299	478.817	25
38.00	2.286	464.080	24
37.00	2.270	449.613	23
36.00	2.269	432.581	23
35.00	2.271	414.817	23
36.75	2.269	445.428	23
36.50	2.269	441.193	23
36.25	2.269	436.910	23
35.75	2.269	428.206	23
35.50	2.269	423.786	23
35.25	2.270	419.323	23
34.00	2.278	396.304	22

THE LOWEST FACTOR OF SAFETY WAS 2.269 AT R = 36.00.

8

X = 130.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	2.340	680.509	27
43.00	2.309	654.600	27
42.00	2.316	629.762	26
43.75	2.299	674.115	27
43.50	2.302	667.665	27
43.25	2.305	661.160	27
42.75	2.313	647.987	27
42.50	2.317	641.321	27
42.25	2.321	634.605	27
41.00	2.340	601.256	25
40.00	2.368	572.378	25
39.00	2.400	543.150	25
38.00	2.437	513.539	25
37.00	2.487	482.480	24
36.00	2.565	449.756	24
35.00	2.633	418.241	24
34.00	2.671	387.249	23

THE LOWEST FACTOR OF SAFETY WAS 2.299 AT R = 43.75.

X = 135.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	2.427	669.471	27
48.00	2.365	657.464	27
47.00	2.311	645.255	27
46.00	2.297	629.816	26
45.00	2.280	614.709	25
44.00	2.277	596.053	25
43.00	2.278	576.367	25
44.75	2.279	610.145	25
44.50	2.278	605.514	25
44.25	2.277	600.817	25
43.75	2.277	591.226	25
43.50	2.277	586.334	25
43.25	2.277	581.381	25
42.00	2.283	555.717	24
41.00	2.292	534,205	24
40.00	2.300	512.900	23
39.00	2.319	489.152	23

THE LOWEST FACTOR OF SAFETY WAS 2.277 AT R = 43.75.

X = 135.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	2.261	569.369	26
38.00	2.266	547.537	26

D(FS)/DR IS NEGATIVE AT RMAX.

37.00	2.275	524.977	26
36.00	2.287	501.757	25
35.00	2.290	479.677	24
34.00	2.314	454.429	24
33.00	2.340	429.082	23
32.00	2.367	403.751	23
31.00	2.397	378.080	23
30.00	2.474	350.179	23

29.00 2.498 323.469 21

THE LOWEST FACTOR OF SAFETY WAS 2.261 AT R = 39.00.

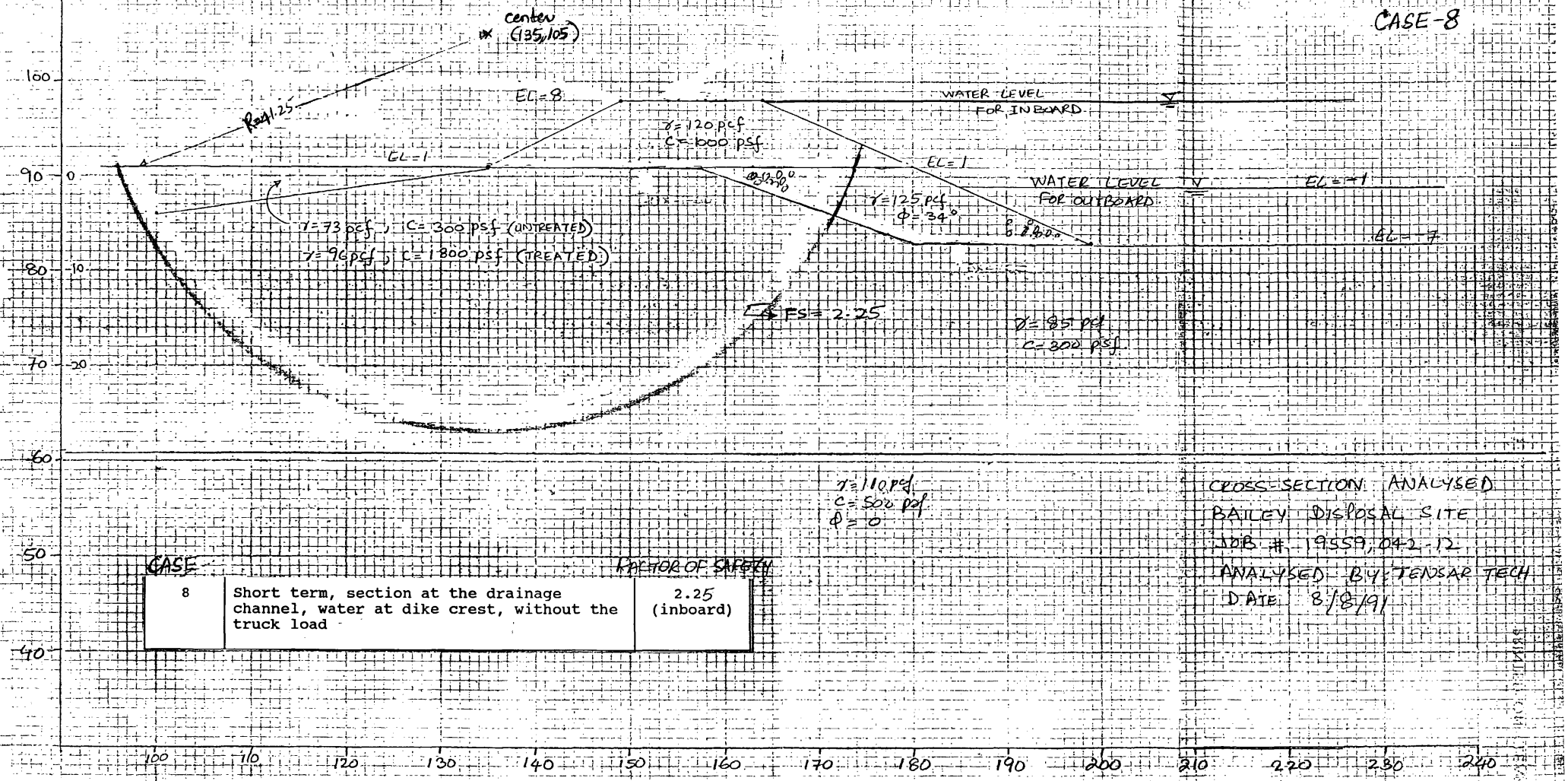
8

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 135.00.
Y = 105.00.
RADIUS OF CRITICAL CIRCLE = 41.25.
MINIMUM FACTOR OF SAFETY = 2.249.

CALCULATIONS HAVE BEEN COMPLETED.

SECTION ON THE DRAINAGE CHANNEL

CASE-8



CASE		FACTOR OF SAFETY
8	Short term, section at the drainage channel, water at dike crest, without the truck load	2.25 (inboard)

CROSS-SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY: TENSAR TECH
DATE 8/8/91

Case	Description	Factor of Safety
8A	Case 8, but with the truck load.	1.90 (inboard)

```
ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91
0.
0.0       0.
1.        50.000    91.00
2.        135.00    91.00
3.        149.00    98.00
4.        154.00    98.00
5.        154.20    99.00
6.        160.00    99.00
7.        160.20    98.00
8.        164.00    98.00
9.        178.00    91.00
10.       194.00    83.00
11.       250.00    83.00
12.       50.000    81.00
13.       157.50    91.00
14.       180.00    83.00
15.       50.000    61.00
16.       250.00    61.00
999.
10.
1.        2.        3.
2.        3.        1.
3.        4.        1.
4.        5.        5.
5.        6.        5.
6.        7.        5.
7.        8.        1.
8.        9.        1.
9.        10.       6.
10.       11.       2.
4.        7.        1.
12.       2.        2.
2.        13.       2.
13.       9.        6.
13.       14.       2.
14.       10.       2.
15.       16.       4.
999.
1.        .120      1.000     .0        1.1       .70
2.        .085      .300      .0        1.1       .60
3.        .073      .300      .0        1.1       .60
4.        .110      .500      .0        1.1       .00
5.        .712      1.000     .0        1.1       .00
6.        .125      .000      34.0      1.1       .90
99.
2.        0.        .0624
50.000    89.00
250.00    89.00
0.
0.        0.        .000      0.05
20.
61.00
71.00
10.
SEARCH
135.00    105.00    20.00     20.00
```

Case 8A

Checked by N. Khan.

Validity of data.

Date 8/10/91

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

8A

DATE 08-07-1991
TIME 06:51

ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.112	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	91.00	135.00	91.00	.0000	3	*
2	135.00	91.00	149.00	98.00	.5000	1	*
3	149.00	98.00	154.00	98.00	.0000	1	*
4	154.00	98.00	154.20	99.00	5.0001	5	*
5	154.20	99.00	160.00	99.00	.0000	5	*
6	160.00	99.00	160.20	98.00	-5.0001	5	*
7	160.20	98.00	164.00	98.00	.0000	1	*
8	164.00	98.00	178.00	91.00	-.5000	1	*
9	178.00	91.00	194.00	83.00	-.5000	6	*
10	194.00	83.00	250.00	83.00	.0000	2	*
11	154.00	98.00	160.20	98.00	.0000	1	
12	50.00	81.00	135.00	91.00	.1176	2	
13	135.00	91.00	157.50	91.00	.0000	2	
14	157.50	91.00	178.00	91.00	.0000	6	
15	157.50	91.00	180.00	83.00	-.3556	2	
16	180.00	83.00	194.00	83.00	.0000	2	
17	50.00	61.00	250.00	61.00	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	89.00
2	250.00	89.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.

THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 61.00
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 71.00

THERE ARE 10 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 135.00, INITIAL Y = 105.00.
DELX = 20.00, DELY = 20.00.

8A

X = 135.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	1.977	725.795	27
43.00	1.960	708.813	27
42.00	1.938	692.549	26
41.00	1.928	672.602	25
40.00	1.920	651.806	25
39.00	1.914	630.186	25
38.00	1.910	607.807	25
37.00	1.903	585.820	23
36.00	1.904	561.526	23
37.75	1.909	602.075	24
37.50	1.902	597.863	23
37.25	1.902	591.850	23
36.75	1.903	579.772	23
36.50	1.903	573.708	23
36.25	1.904	567.626	23
35.00	1.907	536.952	23
34.00	1.912	512.041	22

THE LOWEST FACTOR OF SAFETY WAS 1.902 AT R = 37.50.

X = 155.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	28.120	47.250	28
43.00	21.434	58.663	26
42.00	17.667	67.314	26
41.00	15.001	74.872	26
40.00	13.019	81.373	26
39.00	11.367	87.750	24
38.00	10.143	92.496	24
37.00	9.176	96.017	24
36.00	8.418	98.112	23
35.00	7.750	99.755	22
34.00	7.210	100.190	22

THE LOWEST FACTOR OF SAFETY WAS 7.210 AT R = 34.00.

X = 115.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	2.852	630.540	26
43.00	3.048	560.390	26
D(FS)/DR IS NEGATIVE AT RMAX.			
42.00	3.314	491.449	25
41.00	3.688	422.894	25
40.00	4.140	358.644	23
39.00	4.363	312.407	20
38.00	4.665	277.141	20

37.00	5.020	243.828	19
36.00	5.569	209.200	19
35.00	6.152	178.514	18
34.00	6.884	147.786	17

THE LOWEST FACTOR OF SAFETY WAS 2.852 AT R = 44.00.

8A

X = 135.00, Y = 125.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
64.00	2.945	787.231	26
63.00	2.826	787.716	26
62.00	2.723	784.449	26
61.00	2.632	779.757	25
60.00	2.543	776.113	25
59.00	2.463	770.487	25
58.00	2.390	762.818	25
57.00	2.322	753.541	23
56.00	2.252	744.119	22
55.00	2.198	731.440	22
54.00	2.187	715.309	22

THE LOWEST FACTOR OF SAFETY WAS 2.187 AT R = 54.00.

X = 135.00, Y = 85.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 54.00.

X = 140.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	2.280	602.042	28
43.00	2.200	595.076	28
42.00	2.130	585.752	26
41.00	2.055	577.006	25
40.00	2.012	565.538	25
39.00	1.989	551.868	25
38.00	1.970	537.132	24
37.00	1.947	522.664	23
36.00	1.935	505.632	23
35.00	1.925	487.868	23
34.00	1.917	469.356	22

THE LOWEST FACTOR OF SAFETY WAS 1.917 AT R = 34.00.

X = 130.00, Y = 105.00:

RADIUS FACTOR OF SAFETY DRIVING MOM NO SLICES

8A

		KIP-FT/FT	
44.00	1.995	796.280	27
43.00	1.957	770.371	27
42.00	1.952	745.533	26
41.00	1.957	717.027	25
42.75	1.957	763.758	27
42.50	1.957	757.092	27
42.25	1.958	750.376	27
41.75	1.953	738.428	26
41.50	1.954	731.339	25
41.25	1.956	724.194	25
40.00	1.964	688.149	25
39.00	1.973	658.921	25
38.00	1.984	629.310	25
37.00	2.001	598.251	24
36.00	2.036	565.528	24
35.00	2.058	534.012	24
34.00	2.053	503.021	23

THE LOWEST FACTOR OF SAFETY WAS 1.952 AT R = 42.00.

X = 135.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	2.124	763.882	27
48.00	2.065	751.875	27
47.00	2.012	739.666	27
46.00	1.993	724.227	26
45.00	1.972	709.120	25
44.00	1.961	690.464	25
43.00	1.952	670.778	25
42.00	1.946	650.128	24
41.00	1.942	628.616	24
40.00	1.936	607.311	23
39.00	1.938	583.563	23
40.75	1.941	623.102	24
40.50	1.935	619.020	23
40.25	1.936	613.180	23
39.75	1.937	601.416	23
39.50	1.937	595.493	23
39.25	1.938	589.541	23

THE LOWEST FACTOR OF SAFETY WAS 1.935 AT R = 40.50.

X = 135.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.935	663.780	26
38.00	1.928	641.948	26
37.00	1.922	619.388	26
36.00	1.919	596.168	25
35.00	1.908	574.088	24
34.00	1.910	548.840	24
35.75	1.918	590.275	25
35.50	1.917	584.345	25
35.25	1.917	578.380	25
34.75	1.908	567.783	24
34.50	1.909	561.474	24
34.25	1.909	555.159	24
33.00	1.912	523.494	23

32.00	1.912	498.162	23
31.00	1.913	472.491	23
30.00	1.944	444.590	23
29.00	1.929	417.880	21

THE LOWEST FACTOR OF SAFETY WAS 1.908 AT R = 35.00.

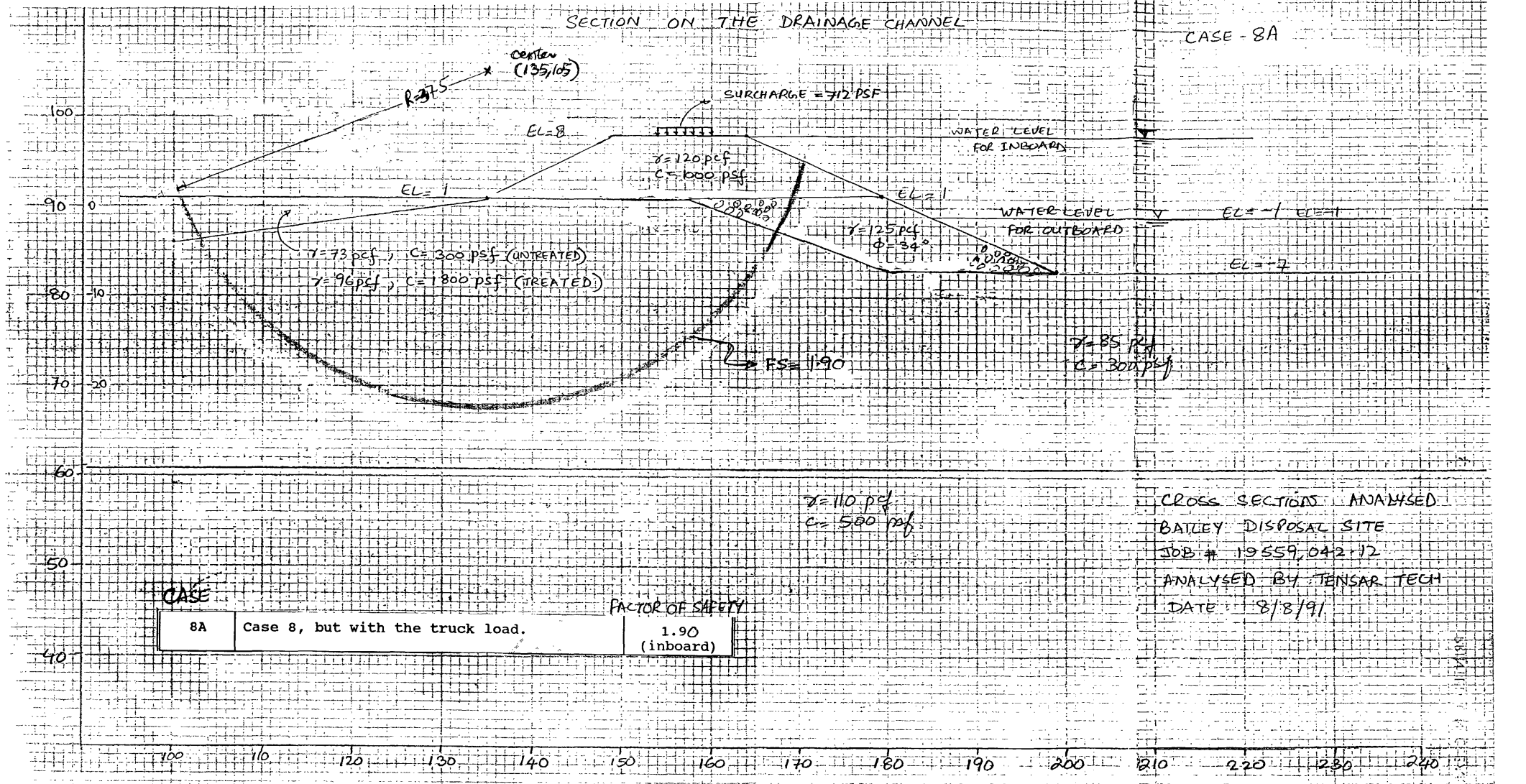
86A

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 135.00.
Y = 105.00.
RADIUS OF CRITICAL CIRCLE = 37.50.
MINIMUM FACTOR OF SAFETY = 1.902.

CALCULATIONS HAVE BEEN COMPLETED.

SECTION ON THE DRAINAGE CHANNEL

CASE - 8A



CROSS SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559.042.12
ANALYSED BY TENSAR TECH
DATE: 8/8/91

CASE		FACTOR OF SAFETY
8A	Case 8, but with the truck load.	1.90 (inboard)

Case	Description	Factor of Safety
9	Short term, section at the drainage channel, water at EL.-1 MSL, without the truck load	1.63 (outboard)

```
ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91
0.
0.0       0.
1.        50.000    91.00
2.        135.00    91.00
3.        149.00    98.00
4.        154.00    98.00
5.        154.20    99.00
6.        160.00    99.00
7.        160.20    98.00
8.        164.00    98.00
9.        178.00    91.00
10.       194.00    83.00
11.       250.00    83.00
12.       50.000    81.00
13.       157.50    91.00
14.       180.00    83.00
15.       50.000    61.00
16.       250.00    61.00
999.
6.
1.        2.        3.
2.        3.        1.
3.        8.        1.
8.        9.        1.
9.        10.       6.
10.       11.       2.
4.        7.        1.
12.       2.        2.
2.        13.       2.
13.       9.        6.
13.       14.       2.
14.       10.       2.
15.       16.       4.
999.
1.        .120      1.000     .0        1.1       .70
2.        .085      .300      .0        1.1       .60
3.        .073      .300      .0        1.1       .60
4.        .110      .500      .0        1.1       .00
5.        .712      1.000     .0        1.1       .00
6.        .125      .000      34.0      1.1       .90
99.
2.        0.        .0624
50.000    89.00
250.00    89.00
0.
0.        0.        .000      0.05
20.
61.00
81.00
20.
SEARCH
185.00    110.00    20.00     20.00
```

Case 9

Data checked by N. Khan (8/10/91)

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

9

DATE 08-07-1991
TIME 08:08

ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	91.00	135.00	91.00	.0000	3	*
2	135.00	91.00	149.00	98.00	.5000	1	*
3	149.00	98.00	164.00	98.00	.0000	1	*
4	164.00	98.00	178.00	91.00	-.5000	1	*
5	178.00	91.00	194.00	83.00	-.5000	6	*
6	194.00	83.00	250.00	83.00	.0000	2	*
7	154.00	98.00	160.20	98.00	.0000	1	
8	50.00	81.00	135.00	91.00	.1176	2	
9	135.00	91.00	157.50	91.00	.0000	2	
10	157.50	91.00	178.00	91.00	.0000	6	
11	157.50	91.00	180.00	83.00	-.3556	2	
12	180.00	83.00	194.00	83.00	.0000	2	
13	50.00	61.00	250.00	61.00	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	89.00
2	250.00	89.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 61.00
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 81.00

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 185.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

X = 185.00, Y = 110.00:

9

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.653	1003.014	28
48.00	1.641	975.867	27
47.00	1.637	944.081	26
46.00	1.634	912.002	26
45.00	1.635	878.294	26
46.75	1.636	936.219	26
46.50	1.635	928.251	26
46.25	1.634	920.178	26
45.75	1.634	903.723	26
45.50	1.634	895.345	26
45.25	1.634	886.867	26
44.00	1.637	843.724	24
43.00	1.647	806.773	24
42.00	1.660	768.909	24
41.00	1.678	730.031	24
40.00	1.705	689.701	22
39.00	1.743	647.107	22
38.00	1.774	605.832	22
37.00	1.795	562.953	20
36.00	1.822	520.901	20
35.00	1.861	478.821	20
34.00	1.891	439.522	19
33.00	1.915	402.509	18
32.00	1.981	363.284	17
31.00	2.059	325.428	17
30.00	2.158	288.482	15
29.00	2.300	251.467	14

THE LOWEST FACTOR OF SAFETY WAS 1.634 AT R = 45.75.

X = 205.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	2.422	788.234	27
48.00	2.518	728.344	26
D(FS)/DR IS NEGATIVE AT RMAX.			
47.00	2.617	671.160	26
46.00	2.723	614.875	23
45.00	2.869	558.159	22
44.00	3.062	500.242	22
43.00	3.270	444.937	22
42.00	3.486	390.035	19
41.00	3.731	338.103	19
40.00	4.011	289.900	19
39.00	4.373	242.950	18
38.00	4.779	201.571	18
37.00	5.287	162.720	18
36.00	5.872	128.819	15
35.00	6.684	97.199	15
34.00	7.790	69.629	15
33.00	9.288	47.348	12
32.00	12.891	29.007	11
31.00	19.161	16.299	9

30.00	40.568	6.178	9

29.00 F.O.S. VERY LARGE (SUMWSA LESS THAN .01)

THE LOWEST FACTOR OF SAFETY WAS 2.422 AT R = 49.00.

X = 165.00, Y = 110.00:

9

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	4.119	376.860	28
48.00	4.058	363.350	28
47.00	3.990	350.304	27
46.00	3.943	335.520	26
45.00	3.877	322.557	26
44.00	3.808	309.725	26
43.00	3.731	297.587	25
42.00	3.673	283.915	24
41.00	3.603	271.271	24
40.00	3.530	258.788	24
39.00	3.429	248.175	23
38.00	3.341	237.012	22
37.00	3.219	228.333	22
36.00	3.080	220.969	22
35.00	2.990	213.567	20
34.00	2.949	206.097	19
33.00	2.928	197.696	18
32.00	2.917	188.873	19
31.00	2.917	180.479	18
30.00	2.967	170.077	18
31.75	2.918	186.612	19
31.50	2.918	184.417	19
31.25	2.917	182.293	19
30.75	2.931	177.820	18
30.50	2.941	175.289	18
30.25	2.953	172.708	18
29.00	3.029	159.415	17

THE LOWEST FACTOR OF SAFETY WAS 2.917 AT R = 31.00.

X = 185.00, Y = 130.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
69.00	2.142	1193.604	27
68.00	2.084	1175.829	26
67.00	2.031	1154.926	26
66.00	1.978	1133.397	25
65.00	1.921	1114.424	25
64.00	1.862	1095.664	25
63.00	1.818	1076.134	24
62.00	1.801	1052.552	23
61.00	1.787	1027.530	23
60.00	1.777	1000.193	22
59.00	1.776	967.421	21
58.00	1.779	933.806	21
59.75	1.776	992.453	22
59.50	1.775	984.555	22
59.25	1.775	976.501	22
58.75	1.776	959.254	21
58.50	1.777	950.928	21
58.25	1.778	942.445	21
57.00	1.787	897.729	21
56.00	1.800	859.515	19

55.00	1.822	818.830	19
54.00	1.850	776.327	19
53.00	1.888	731.214	18
52.00	1.943	682.454	18
51.00	2.007	632.801	18
50.00	2.080	582.568	17
49.00	2.171	529.779	16

9

THE LOWEST FACTOR OF SAFETY WAS 1.775 AT R = 59.25.

X = 185.00, Y = 90.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 12.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 11.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 10.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 9.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 59.25.

X = 190.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.676	1054.598	27
48.00	1.686	1013.120	27

D(FS)/DR IS NEGATIVE AT RMAX.

47.00	1.701	969.799	26
46.00	1.717	927.020	26
45.00	1.739	882.410	26
44.00	1.771	836.296	25
43.00	1.805	788.224	24
42.00	1.825	740.747	23
41.00	1.845	693.745	23
40.00	1.880	645.459	22
39.00	1.913	599.867	22
38.00	1.932	557.605	22
37.00	1.975	513.568	20
36.00	2.031	470.806	19
35.00	2.097	428.482	20
34.00	2.191	385.967	18
33.00	2.301	345.154	17
32.00	2.419	305.774	15
31.00	2.621	263.743	13
30.00	2.873	222.060	14

29.00	3.179	183.221	13

THE LOWEST FACTOR OF SAFETY WAS 1.676 AT R = 49.00.

X = 180.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.762	881.083	28
48.00	1.728	864.165	27
47.00	1.700	847.044	26
46.00	1.678	826.578	26
45.00	1.660	804.129	26
44.00	1.647	779.236	25
43.00	1.636	754.032	24
42.00	1.631	725.874	24
41.00	1.632	695.654	23
42.75	1.634	747.129	24
42.50	1.633	740.134	24
42.25	1.632	733.048	24
41.75	1.631	718.612	24
41.50	1.631	711.263	24
41.25	1.632	703.007	23
40.00	1.629	667.170	22
39.00	1.640	634.538	22
40.75	1.633	688.214	23
40.50	1.633	680.688	23
40.25	1.634	673.078	23
39.75	1.632	659.072	22
39.50	1.634	650.933	22
39.25	1.637	642.756	22
38.00	1.655	600.636	21
37.00	1.672	567.121	21
36.00	1.701	531.874	21
35.00	1.741	495.116	19
34.00	1.785	458.616	19
33.00	1.817	422.811	18
32.00	1.848	385.283	17
31.00	1.899	347.393	17
30.00	1.940	312.334	17
29.00	1.976	280.062	17

THE LOWEST FACTOR OF SAFETY WAS 1.629 AT R = 40.00.

X = 175.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	2.157	720.337	29
48.00	2.086	706.730	27
47.00	2.020	692.095	27
46.00	1.952	678.151	27
45.00	1.883	663.868	26
44.00	1.820	651.205	25
43.00	1.785	636.903	24
42.00	1.761	619.125	24
41.00	1.742	599.252	23
40.00	1.726	578.658	23
39.00	1.713	557.097	22
38.00	1.711	532.112	21
37.00	1.713	506.801	21
38.75	1.712	551.055	22
38.50	1.713	544.302	21

38.25	1.712	538.247	21
37.75	1.711	525.899	21
37.50	1.711	519.608	21
37.25	1.712	513.242	21
36.00	1.719	480.337	21
35.00	1.729	453.365	19
34.00	1.750	424.571	19
33.00	1.778	395.150	19
32.00	1.817	365.213	18
31.00	1.872	335.511	17
30.00	1.941	305.659	16
29.00	2.007	277.890	16

9

THE LOWEST FACTOR OF SAFETY WAS 1.711 AT R = 37.75.

X = 180.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.941	921.042	29
53.00	1.882	904.855	29
52.00	1.823	888.360	28
51.00	1.759	873.889	26
50.00	1.729	857.692	26
49.00	1.706	837.853	26
48.00	1.689	815.498	25
47.00	1.673	792.140	25
46.00	1.661	767.216	24
45.00	1.658	738.454	23
44.00	1.657	709.227	23
43.00	1.661	678.442	23
44.75	1.658	731.299	23
44.50	1.657	724.042	23
44.25	1.657	716.684	23
43.75	1.658	701.672	23
43.50	1.659	694.023	23
43.25	1.660	686.279	23
42.00	1.669	646.519	21
41.00	1.684	612.878	21
40.00	1.705	578.251	21
39.00	1.735	541.809	20
38.00	1.778	504.136	19
37.00	1.831	465.067	18
36.00	1.885	427.363	18
35.00	1.960	385.572	18
34.00	1.994	347.254	16

THE LOWEST FACTOR OF SAFETY WAS 1.657 AT R = 44.25.

X = 180.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	1.682	827.810	27
43.00	1.665	804.711	26
42.00	1.650	781.039	26
41.00	1.637	756.318	25
40.00	1.634	727.477	24
39.00	1.632	698.675	24
38.00	1.633	668.638	24
39.75	1.633	720.398	24
39.50	1.632	713.237	24
39.25	1.632	705.995	24

38.75	1.632	691.277	24
38.50	1.632	683.804	24
38.25	1.632	676.257	24
37.00	1.635	638.021	22
36.00	1.646	605.562	22
35.00	1.660	572.572	22
34.00	1.680	538.278	21
33.00	1.717	503.750	20
32.00	1.748	468.196	20
31.00	1.761	432.221	18
30.00	1.777	397.873	18
29.00	1.812	363.346	18
28.00	1.858	329.430	17
27.00	1.865	299.342	17
26.00	1.896	268.759	16
25.00	1.969	238.548	15
24.00	2.034	210.793	15

9

THE LOWEST FACTOR OF SAFETY WAS 1.632 AT R = 39.00.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:

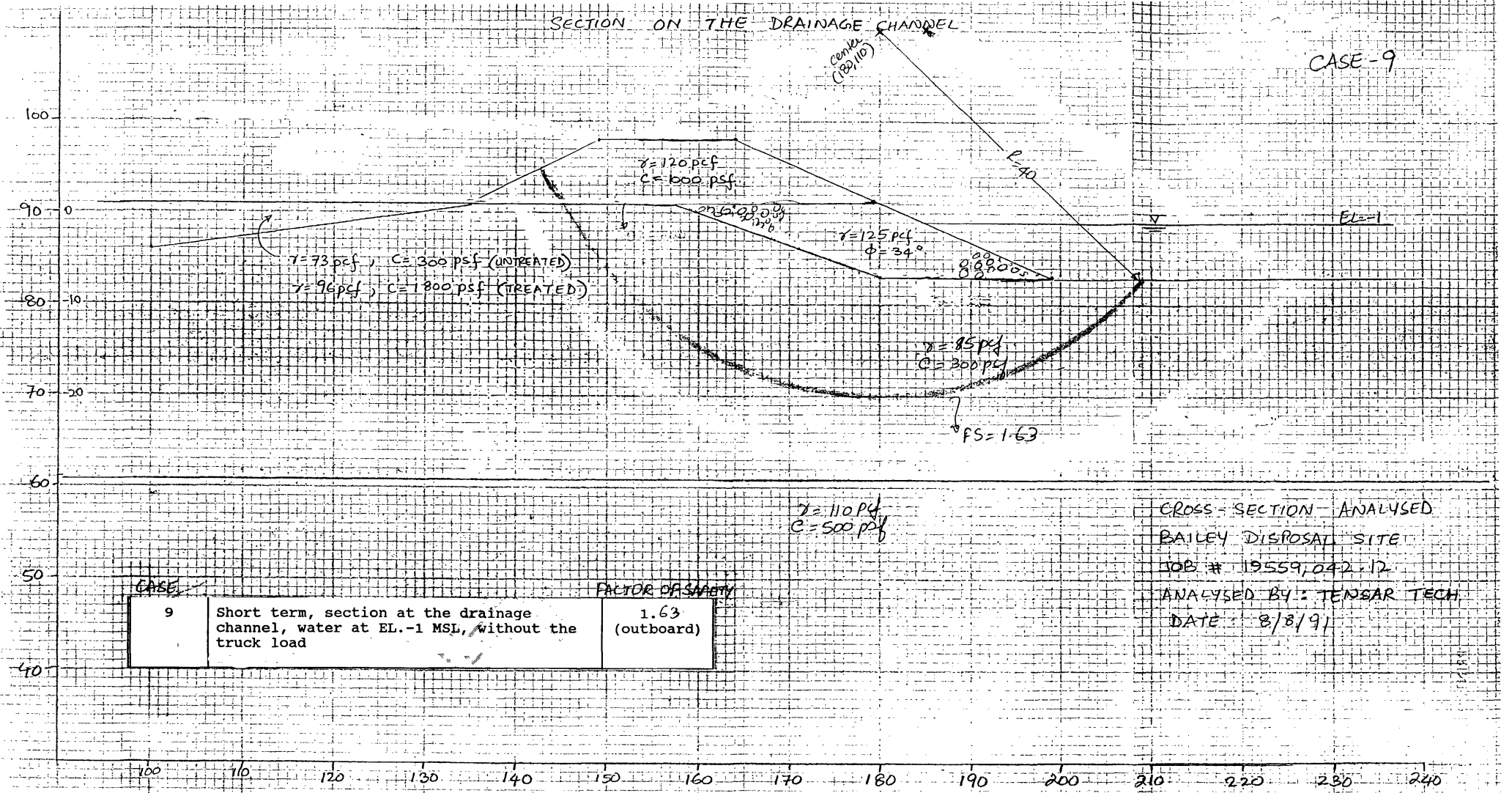
X = 180.00.

Y = 110.00.

RADIUS OF CRITICAL CIRCLE = 40.00.

MINIMUM FACTOR OF SAFETY = 1.629.

CALCULATIONS HAVE BEEN COMPLETED.



CASE		FACTOR OF SAFETY
9	Short term, section at the drainage channel, water at EL.-1 MSL, without the truck load	1.63 (outboard)

CROSS-SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042.12
ANALYSED BY: TENSAR TECH
DATE: 8/8/91

Case	Description	Factor of Safety
9A	Case 9, but with the truck load.	1.39 (outboard)

```
ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91
0.
0.0       0.
1.        50.000    91.00
2.        135.00    91.00
3.        149.00    98.00
4.        154.00    98.00
5.        154.20    99.00
6.        160.00    99.00
7.        160.20    98.00
8.        164.00    98.00
9.        178.00    91.00
10.       194.00    83.00
11.       250.00    83.00
12.       50.000    81.00
13.       157.50    91.00
14.       180.00    83.00
15.       50.000    61.00
16.       250.00    61.00
999.
10.
1.        2.        3.
2.        3.        1.
3.        4.        1.
4.        5.        5.
5.        6.        5.
6.        7.        5.
7.        8.        1.
8.        9.        1.
9.        10.       6.
10.       11.       2.
4.        7.        1.
12.       2.        2.
2.        13.       2.
13.       9.        6.
13.       14.       2.
14.       10.       2.
15.       16.       4.
999.
1.        .120      1.000     .0        1.1       .70
2.        .085      .300      .0        1.1       .60
3.        .073      .300      .0        1.1       .60
4.        .110      .500      .0        1.1       .00
5.        .712      1.000     .0        1.1       .00
6.        .125      .000      34.0      1.1       .90
99.
2.        0.        .0624
50.000    89.00
250.00    89.00
0.
0.        0.        .000      0.05
20.
61.00
81.00
20.
SEARCH
185.00    110.00    20.00     20.00
```

case 9A.

- validity of data & Reasonableness of result checked by N. Khan 8/10/91

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

9A

DATE 08-07-1991
TIME 08:08

ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.073	.300	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	91.00	135.00	91.00	.0000	3	*
2	135.00	91.00	149.00	98.00	.5000	1	*
3	149.00	98.00	154.00	98.00	.0000	1	*
4	154.00	98.00	154.20	99.00	5.0001	5	*
5	154.20	99.00	160.00	99.00	.0000	5	*
6	160.00	99.00	160.20	98.00	-5.0001	5	*
7	160.20	98.00	164.00	98.00	.0000	1	*
8	164.00	98.00	178.00	91.00	-.5000	1	*
9	178.00	91.00	194.00	83.00	-.5000	6	*
10	194.00	83.00	250.00	83.00	.0000	2	*
11	154.00	98.00	160.20	98.00	.0000	1	
12	50.00	81.00	135.00	91.00	.1176	2	
13	135.00	91.00	157.50	91.00	.0000	2	
14	157.50	91.00	178.00	91.00	.0000	6	
15	157.50	91.00	180.00	83.00	-.3556	2	
16	180.00	83.00	194.00	83.00	.0000	2	
17	50.00	61.00	250.00	61.00	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	89.00
2	250.00	89.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.

THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 61.00
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 81.00

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 185.00, INITIAL Y = 110.00.
DELX = 20.00, DELY = 20.00.

9A

X = 185.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.478	1122.203	28
48.00	1.462	1095.056	27
47.00	1.453	1063.270	26
46.00	1.445	1031.191	26
45.00	1.440	997.483	26
44.00	1.434	962.913	24
43.00	1.435	925.962	24
44.75	1.439	988.813	26
44.50	1.433	982.284	25
44.25	1.433	973.042	25
43.75	1.434	953.757	24
43.50	1.434	944.547	24
43.25	1.435	935.282	24
42.00	1.437	888.098	24
41.00	1.442	849.220	24
40.00	1.454	808.889	22
39.00	1.472	766.296	22
38.00	1.483	725.021	22
37.00	1.481	682.142	20
36.00	1.483	640.089	20
37.75	1.482	714.370	21
37.50	1.483	703.098	20
37.25	1.482	692.582	20
36.75	1.480	671.773	20
36.50	1.480	661.472	20
36.25	1.480	650.976	20
35.00	1.490	598.010	20
34.00	1.488	558.711	19
33.00	1.516	520.434	20
34.75	1.492	587.458	19
34.50	1.491	577.690	19
34.25	1.490	568.107	19
33.75	1.485	549.509	19
33.50	1.480	540.508	19
33.25	1.480	531.221	19
32.00	1.661	460.033	18
31.00	1.756	399.750	18
30.00	1.916	341.093	16
29.00	2.151	283.071	15

THE LOWEST FACTOR OF SAFETY WAS 1.433 AT R = 44.50.

X = 205.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	2.241	878.297	27
48.00	2.402	783.823	27

D(FS)/DR IS NEGATIVE AT RMAX.

47.00	2.605	692.798	27

9A

46.00	2.723	614.943	23
45.00	2.869	558.194	22
44.00	3.062	500.258	22
43.00	3.270	444.937	22
42.00	3.486	390.064	19
41.00	3.730	338.117	19
40.00	4.011	289.900	19
39.00	4.341	245.058	17
38.00	4.779	201.586	18
37.00	5.287	162.724	18
36.00	5.871	128.838	15
35.00	6.683	97.208	15
34.00	7.790	69.631	15
33.00	9.286	47.358	12
32.00	12.889	29.011	11
31.00	19.150	16.308	9
30.00	40.540	6.182	9

29.00 F.O.S. VERY LARGE (SUMMSA LESS THAN .01)

THE LOWEST FACTOR OF SAFETY WAS 2.241 AT R = 49.00.

X = 165.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	3.781	410.609	28
48.00	3.713	397.099	28
47.00	3.640	384.053	27
46.00	3.583	369.269	26
45.00	3.509	356.306	26
44.00	3.434	343.474	26
43.00	3.351	331.336	25
42.00	3.283	317.664	24
41.00	3.205	305.020	24
40.00	3.123	292.537	24
39.00	3.019	281.924	23
38.00	2.924	270.761	22
37.00	2.805	262.082	22
36.00	2.673	254.718	22
35.00	2.584	247.316	20
34.00	2.537	239.845	19
33.00	2.505	231.444	18
32.00	2.480	222.622	19
31.00	2.464	214.228	18
30.00	2.483	203.825	18
31.75	2.476	220.361	19
31.50	2.472	218.165	19
31.25	2.468	216.042	19
30.75	2.470	211.569	18
30.50	2.473	209.038	18
30.25	2.477	206.457	18
29.00	2.509	193.164	17

THE LOWEST FACTOR OF SAFETY WAS 2.464 AT R = 31.00.

X = 185.00, Y = 130.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
69.00	1.948	1312.793	27
68.00	1.892	1295.018	26
67.00	1.841	1274.115	26
66.00	1.790	1252.586	25

9A

65.00	1.735	1233.613	25
64.00	1.680	1214.853	25
63.00	1.637	1195.323	24
62.00	1.618	1171.740	23
61.00	1.601	1146.719	23
60.00	1.587	1119.382	22
59.00	1.582	1086.610	21
58.00	1.577	1052.995	21
57.00	1.577	1016.918	21
56.00	1.581	978.703	19
57.75	1.577	1044.202	21
57.50	1.577	1035.257	21
57.25	1.577	1026.161	21
56.75	1.575	1009.424	20
56.50	1.576	999.538	20
56.25	1.578	989.553	20
55.00	1.590	938.019	19
54.00	1.604	895.516	19
53.00	1.624	850.403	18
52.00	1.654	801.643	18
51.00	1.689	751.990	18
50.00	1.727	701.757	17
49.00	1.772	648.967	16

THE LOWEST FACTOR OF SAFETY WAS 1.575 AT R = 56.75.

X = 185.00, Y = 90.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 12.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 11.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 10.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 9.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 56.75.

X = 190.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.479	1195.147	27
48.00	1.481	1153.668	27

D(FS)/DR IS NEGATIVE AT RMAX.

47.00	1.486	1110.348	26
46.00	1.491	1067.568	26

9A

45.00	1.500	1022.959	26
44.00	1.516	976.845	25
43.00	1.532	928.773	24
42.00	1.534	881.296	23
41.00	1.534	834.294	23
40.00	1.544	786.008	22
39.00	1.550	740.416	22
38.00	1.543	698.154	22
37.00	1.663	635.589	21
38.75	1.550	729.521	22
38.50	1.549	718.839	22
38.25	1.547	708.381	22
37.75	1.564	687.130	21
37.50	1.608	671.689	23
37.25	1.639	653.227	21
36.00	1.773	566.844	20
35.00	1.872	499.241	21
34.00	2.038	432.162	19
33.00	2.256	367.498	18

-- 2 FAILURE SURFACES FOR R= 32.00 (IDENTIFIED LEFT TO RIGHT)
32.00 F.O.S. VERY LARGE (SUMWSA LESS THAN .01)

32.00	2.419	305.774	15
31.00	2.621	263.743	13
30.00	2.873	222.060	14
29.00	3.179	183.221	13

THE LOWEST FACTOR OF SAFETY WAS 1.479 AT R = 49.00.

X = 180.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.586	978.912	28
48.00	1.552	961.994	27
47.00	1.524	944.873	26
46.00	1.500	924.406	26
45.00	1.480	901.958	26
44.00	1.463	877.065	25
43.00	1.448	851.862	24
42.00	1.438	823.703	24
41.00	1.431	793.483	23
40.00	1.421	764.999	22
39.00	1.421	732.366	22
38.00	1.423	698.464	21
39.75	1.421	756.900	22
39.50	1.421	748.762	22
39.25	1.421	740.585	22
38.75	1.421	724.107	22
38.50	1.421	715.806	22
38.25	1.422	707.461	22
37.00	1.426	664.950	21
36.00	1.436	629.702	21
35.00	1.454	592.945	19
34.00	1.471	556.445	19
33.00	1.475	520.639	18
32.00	1.474	483.111	17
31.00	1.481	445.221	17
32.75	1.474	511.319	18
32.50	1.474	501.729	17
32.25	1.472	492.658	17
31.75	1.476	473.414	17
31.50	1.479	463.863	17
31.25	1.480	454.464	17

30.00	1.477	410.163	17
29.00	1.473	377.891	17

THE LOWEST FACTOR OF SAFETY WAS 1.421 AT R = 39.25.

9A

X = 175.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.950	796.806	29
48.00	1.882	783.199	27
47.00	1.819	768.564	27
46.00	1.754	754.620	27
45.00	1.689	740.337	26
44.00	1.629	727.673	25
43.00	1.594	713.372	24
42.00	1.567	695.594	24
41.00	1.545	675.721	23
40.00	1.525	655.127	23
39.00	1.506	633.566	22
38.00	1.496	608.581	21
37.00	1.488	583.270	21
36.00	1.483	556.806	21
35.00	1.480	529.834	19
34.00	1.483	501.039	19
35.75	1.477	551.556	20
35.50	1.479	543.961	19
35.25	1.479	536.921	19
34.75	1.480	522.701	19
34.50	1.481	515.523	19
34.25	1.482	508.302	19
33.00	1.490	471.619	19
32.00	1.503	441,682	18
31.00	1.525	411.980	17
30.00	1.554	382.128	16
29.00	1.576	354.359	16

THE LOWEST FACTOR OF SAFETY WAS 1.477 AT R = 35.75.

X = 180.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.755	1018.871	29
53.00	1.699	1002.684	29
52.00	1.642	986.189	28
51.00	1.582	971.718	26
50.00	1.552	955.521	26
49.00	1.528	935.682	26
48.00	1.508	913.327	25
47.00	1.489	889.968	25
46.00	1.473	865.045	24
45.00	1.464	836.283	23
44.00	1.457	807.056	23
43.00	1.452	776.271	23
42.00	1.450	744.348	21
41.00	1.452	710.707	21
42.75	1.448	769.902	22
42.50	1.448	761.590	22
42.25	1.449	752.613	21
41.75	1.450	736.026	21
41.50	1.451	727.646	21
41.25	1.451	719.206	21

40.00	1.458	676.080	21
39.00	1.470	639.638	20
38.00	1.489	601.965	19
37.00	1.513	562.896	18
36.00	1.534	525.192	18
35.00	1.563	483.400	18
34.00	1.556	445.083	16

9A

THE LOWEST FACTOR OF SAFETY WAS 1.448 AT R = 42.75.

X = 180.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	1.505	925.639	27
43.00	1.485	902.540	26
42.00	1.466	878.868	26
41.00	1.450	854.147	25
40.00	1.440	825.306	24
39.00	1.431	796.504	24
38.00	1.425	766.467	24
37.00	1.418	735.850	22
36.00	1.417	703.391	22
35.00	1.418	670.401	22
36.75	1.417	727.782	22
36.50	1.417	719.683	22
36.25	1.417	711.554	22
35.75	1.417	695.196	22
35.50	1.417	686.967	22
35.25	1.418	678.703	22
34.00	1.422	636.107	21
33.00	1.438	601.579	20
32.00	1.446	566.025	20
31.00	1.436	530.049	18
30.00	1.426	495.702	18
29.00	1.427	461.175	18
30.75	1.434	521.340	18
30.50	1.431	512.715	18
30.25	1.429	504.170	18
29.75	1.423	487.309	18
29.50	1.421	478.921	18
29.25	1.424	470.050	18
28.00	1.433	427.258	17
27.00	1.406	397.171	17
26.00	1.524	353.396	17
27.75	1.430	419.409	17
27.50	1.425	411.764	17
27.25	1.417	404.344	17
26.75	1.419	389.612	17
26.50	1.468	378.922	15
26.25	1.496	366.049	17
25.00	1.648	305.030	16
24.00	1.743	259.831	16

THE LOWEST FACTOR OF SAFETY WAS 1.406 AT R = 27.00.

X = 180.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.472	840.622	26
38.00	1.463	811.957	26
37.00	1.456	782.084	26

9A

36.00	1.451	750.475	25
35.00	1.439	720.618	24
34.00	1.438	687.401	24
33.00	1.436	653.325	23
32.00	1.445	619.294	23
33.75	1.437	679.060	24
33.50	1.437	670.707	24
33.25	1.437	661.549	23
32.75	1.435	645.084	23
32.50	1.433	636.826	23
32.25	1.433	628.442	23
31.00	1.424	586.467	21
30.00	1.420	549.795	20
29.00	1.411	515.943	20
28.00	1.397	483.729	20
27.00	1.409	451.180	19
28.75	1.408	507.739	20
28.50	1.404	499.636	20
28.25	1.401	491.633	20
27.75	1.392	475.921	20
27.50	1.388	468.180	20
27.25	1.398	459.446	19
26.00	1.421	420.670	19
25.00	1.478	375.179	18
24.00	1.557	329.208	18
23.00	1.704	284.559	18
22.00	1.739	243.978	16
21.00	1.967	201.772	16
20.00	2.158	163.896	14
19.00	2.109	141.127	12

THE LOWEST FACTOR OF SAFETY WAS 1.388 AT R = 27.50.

X = 180.00, Y = 95.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 34.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 27.50.

X = 185.00, Y = 100.00:

RADIUS FACTOR OF SAFETY DRIVING MOM NO SLICES

9A

		KIP-FT/FT	
39.00	1.469	897.206	27
38.00	1.469	857.906	26

D(FS)/DR IS NEGATIVE AT RMAX.

37.00	1.471	819.229	26
36.00	1.470	778.420	25
35.00	1.459	738.228	23
34.00	1.454	698.374	23
33.00	1.445	660.347	23
32.00	1.448	622.705	22
33.75	1.452	688.697	23
33.50	1.450	679.133	23
33.25	1.448	669.684	23
32.75	1.442	651.123	23
32.50	1.439	642.012	23
32.25	1.438	632.163	22
31.00	1.473	585.817	22
30.00	1.526	531.315	21
29.00	1.584	476.459	20
28.00	1.717	422.241	21
27.00	1.767	371.859	20
26.00	1.913	321.016	18
25.00	2.082	272.420	17
24.00	2.024	242.332	15
23.00	2.113	212.833	14
24.75	1.975	264.413	15
24.50	1.991	256.985	15
24.25	2.007	249.627	15
23.75	2.043	234.986	15
23.50	2.068	227.223	14
23.25	2.090	219.977	14
22.00	2.304	183.558	14
21.00	2.368	156.791	11
20.00	2.507	130.843	11
19.00	2.689	105.813	11

THE LOWEST FACTOR OF SAFETY WAS 1.438 AT R = 32.25.

X = 175.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.614	712.112	27
38.00	1.584	695.637	26
37.00	1.562	675.413	25
36.00	1.541	655.006	25
35.00	1.523	633.162	25
34.00	1.508	609.754	23
33.00	1.499	584.869	23
32.00	1.491	559.052	23
31.00	1.487	531.853	22
30.00	1.476	505.916	21
29.00	1.475	477.728	21
28.00	1.474	449.014	20
27.00	1.500	419.532	20
28.75	1.475	470.664	21
28.50	1.475	463.594	21
28.25	1.475	455.969	20
27.75	1.473	442.027	20
27.50	1.473	434.969	20
27.25	1.486	427.229	20
26.00	1.470	391.603	18

9A

25.00	1.465	361.830	18
24.00	1.454	334.550	18
23.00	1.438	309.038	17
22.00	1.472	284.129	17
23.75	1.450	328.060	18
23.50	1.446	321.697	18
23.25	1.443	315.045	17
22.75	1.438	302.974	17
22.50	1.449	296.581	17
22.25	1.461	290.253	17
21.00	1.467	262.208	17
20.00	1.548	228.053	15
21.75	1.481	278.232	17
21.50	1.486	272.599	17
21.25	1.479	267.300	17
20.75	1.494	254.173	15
20.50	1.511	245.322	15
20.25	1.529	236.617	15
19.00	1.688	194.545	16

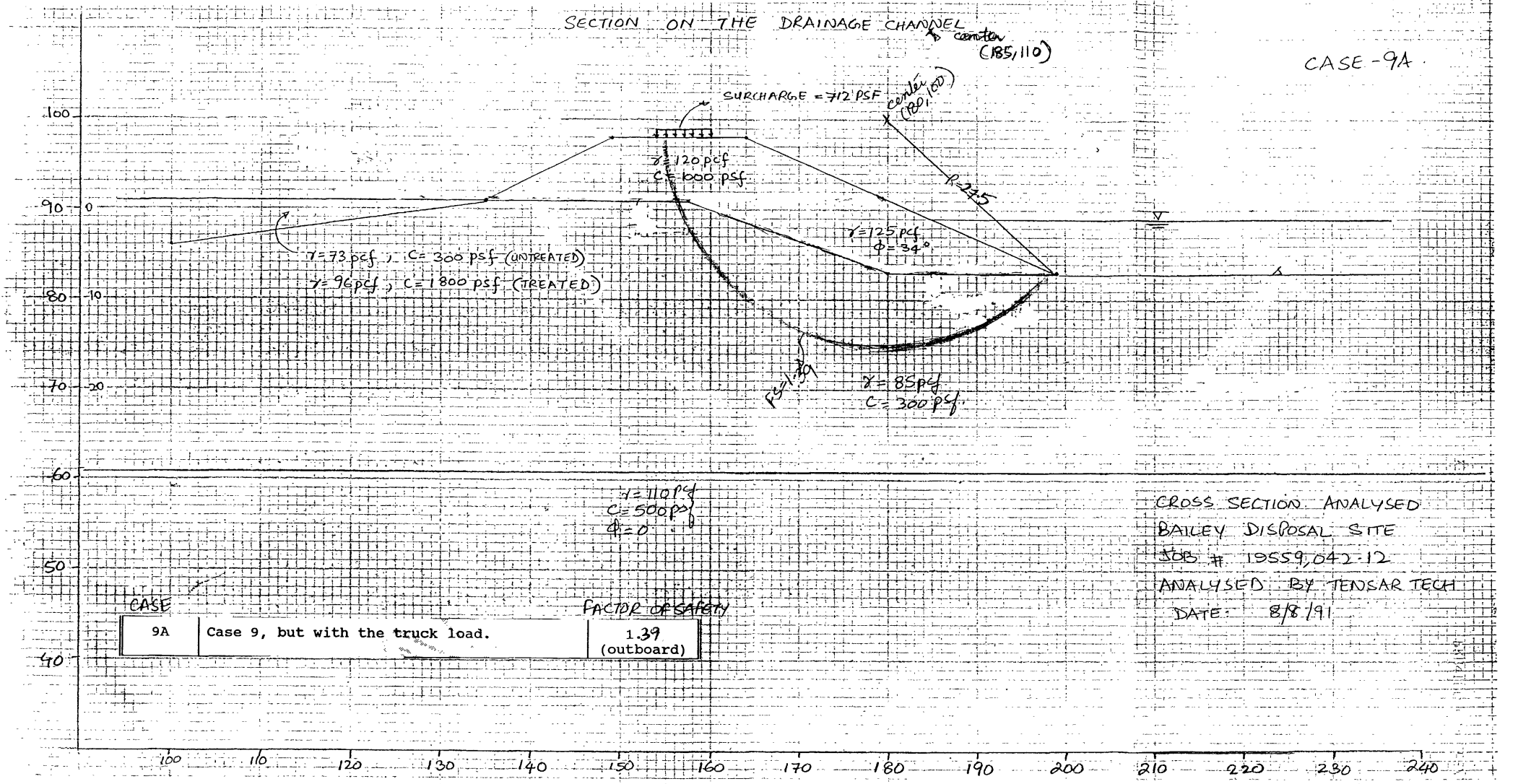
THE LOWEST FACTOR OF SAFETY WAS 1.438 AT R = 23.00.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
X = 180.00.
Y = 100.00.
RADIUS OF CRITICAL CIRCLE = 27.50.
MINIMUM FACTOR OF SAFETY = 1.388.

CALCULATIONS HAVE BEEN COMPLETED.

SECTION ON THE DRAINAGE CHANNEL

CASE -9A



CASE		FACTOR OF SAFETY
9A	Case 9, but with the truck load.	1.39 (outboard)

CROSS SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042.12
ANALYSED BY TENSAR TECH
DATE: 8/8/91

Case	Description	Factor of Safety
10	Long term, cap in place, section at the drainage channel, water at El=-1, without the truck load	1.54 (outboard)

```
ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91
0.
0.0       0.
1.        50.00     101.00
2.        143.00    99.50
3.        149.00    98.00
4.        164.00    98.00
5.        178.00    91.00
6.        194.00    83.00
7.        250.00    83.00
8.        154.00    98.00
9.        160.20    98.00
10.       50.00     91.00
11.       135.00    91.00
12.       50.00     81.00
13.       157.50    91.00
14.       180.00    83.00
15.       50.00     61.00
16.       250.00    61.00
999.
6.
1.        2.        1.
2.        3.        1.
3.        4.        1.
4.        5.        1.
5.        6.        6.
6.        7.        2.
10.       11.       3.
11.       3.        1.
12.       11.       2.
11.       13.       2.
13.       5.        6.
13.       14.       2.
14.       6.        2.
15.       16.       4.
999.
1.        .120      1.000     .0        1.1       .70
2.        .085      .300      .0        1.1       .60
3.        .096      1.800     .0        1.1       .60
4.        .110      .500      .0        1.1       .00
5.        .712      1.000     .0        1.1       .00
6.        .125      .000      34.0      1.1       .90
99.
2.        0.        .0624
50.00     89.00
250.00    89.00
0.
0.        0.        .000      .05
20.
61.00
71.00
10.
SEARCH
180.00    115.00    20.00     20.00
```

Case 10

Validity of data and Reasonableness of result checked by N. Khan (8/10/91)

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

10

DATE 08-07-1991
TIME 08:19

ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	101.00	143.00	99.50	-.0161	1	*
2	143.00	99.50	149.00	98.00	-.2500	1	*
3	149.00	98.00	164.00	98.00	.0000	1	*
4	164.00	98.00	178.00	91.00	-.5000	1	*
5	178.00	91.00	194.00	83.00	-.5000	6	*
6	194.00	83.00	250.00	83.00	.0000	2	*
7	50.00	91.00	135.00	91.00	.0000	3	
8	135.00	91.00	149.00	98.00	.5000	1	
9	50.00	81.00	135.00	91.00	.1176	2	
10	135.00	91.00	157.50	91.00	.0000	2	
11	157.50	91.00	178.00	91.00	.0000	6	
12	157.50	91.00	180.00	83.00	-.3556	2	
13	180.00	83.00	194.00	83.00	.0000	2	
14	50.00	61.00	250.00	61.00	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	89.00
2	250.00	89.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 61.00
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 71.00

THERE ARE 10 INCREMENTS BETWEEN TANGENT LEVELS

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 180.00, INITIAL Y = 115.00.
DELX = 20.00, DELY = 20.00.

10

X = 180.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.544	1501.088	26
53.00	1.550	1427.116	25
D(FS)/DR IS NEGATIVE AT RMAX.			
52.00	1.554	1357.053	25
51.00	1.558	1288.576	23
50.00	1.582	1217.087	25
49.00	1.604	1148.125	24
48.00	1.616	1085.889	23
47.00	1.634	1022.219	22
46.00	1.660	958.281	21
45.00	1.684	897.823	21
44.00	1.711	838.769	21

THE LOWEST FACTOR OF SAFETY WAS 1.544 AT R = 54.00.

X = 200.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.989	1104.890	25
53.00	2.010	1044.627	23
D(FS)/DR IS NEGATIVE AT RMAX.			
52.00	2.043	984.007	22
51.00	2.085	923.676	22
50.00	2.125	866.091	22
49.00	2.158	811.891	21
48.00	2.222	753.830	21
47.00	2.289	698.583	21
46.00	2.371	643.312	21
45.00	2.482	586.841	19
44.00	2.609	532.613	19

THE LOWEST FACTOR OF SAFETY WAS 1.989 AT R = 54.00.

X = 160.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.773	1430.571	25
53.00	1.791	1355.212	25
D(FS)/DR IS NEGATIVE AT RMAX.			
52.00	1.811	1281.251	25
51.00	1.833	1209.167	24
50.00	1.860	1136.660	23
49.00	1.887	1067.324	23
48.00	1.918	999.187	23
47.00	1.952	932.420	23
46.00	1.988	868.540	22
45.00	2.028	807.011	22
44.00	2.072	748.158	22

THE LOWEST FACTOR OF SAFETY WAS 1.773 AT R = 54.00.

10

X = 180.00, Y = 135.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
74.00	1.591	2407.510	27
73.00	1.600	2305.321	27
D(FS)/DR IS NEGATIVE AT RMAX.			
72.00	1.609	2205.633	26
71.00	1.627	2098.445	26
70.00	1.638	2000.951	26
69.00	1.650	1905.052	26
68.00	1.663	1810.755	26
67.00	1.676	1718.693	24
66.00	1.691	1627.708	24
65.00	1.706	1538.532	24
64.00	1.723	1450.014	23

THE LOWEST FACTOR OF SAFETY WAS 1.591 AT R = 74.00.

X = 180.00, Y = 95.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 34.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 74.00.

X = 185.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.590	1438.803	27
53.00	1.607	1365.312	26
D(FS)/DR IS NEGATIVE AT RMAX.			
52.00	1.616	1298.444	24
51.00	1.635	1228.571	24
50.00	1.656	1160.656	24
49.00	1.679	1093.644	23
48.00	1.702	1029.362	23
47.00	1.726	967.546	22
46.00	1.757	904.975	22
45.00	1.789	844.122	21
44.00	1.809	786.428	20

THE LOWEST FACTOR OF SAFETY WAS 1.590 AT R = 54.00.

X = 175.00, Y = 115.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
54.00	1.550	1529.770	26
53.00	1.557	1454.651	25
D(FS)/DR IS NEGATIVE AT RMAX.			

52.00	1.563	1383.029	25
51.00	1.566	1315.062	24
50.00	1.573	1245.372	24
49.00	1.582	1177.050	23
48.00	1.589	1111.926	23
47.00	1.596	1048.427	23
46.00	1.620	982.597	22
45.00	1.650	919.489	22
44.00	1.676	859.423	22

10

THE LOWEST FACTOR OF SAFETY WAS 1.550 AT R = 54.00.

X = 180.00, Y = 120.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
59.00	1.548	1724.534	26
58.00	1.551	1646.782	25
D(FS)/DR IS NEGATIVE AT RMAX.			
57.00	1.559	1566.531	24
56.00	1.565	1489.875	24
55.00	1.571	1415.014	24
54.00	1.579	1340.577	23
53.00	1.596	1267.162	23
52.00	1.621	1194.141	23
51.00	1.642	1125.871	22
50.00	1.667	1057.122	21
49.00	1.690	991.887	20

THE LOWEST FACTOR OF SAFETY WAS 1.548 AT R = 59.00.

X = 180.00, Y = 110.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
49.00	1.546	1281.103	27
48.00	1.570	1211.914	27
D(FS)/DR IS NEGATIVE AT RMAX.			
47.00	1.589	1147.085	27
46.00	1.594	1086.126	26
45.00	1.611	1025.096	24
44.00	1.631	964.972	24
43.00	1.651	906.767	24
42.00	1.673	850.312	24
41.00	1.699	794.139	23
40.00	1.721	742.013	22
39.00	1.755	688.707	22

THE LOWEST FACTOR OF SAFETY WAS 1.546 AT R = 49.00.

SUMMARY OF RESULTS FOR CRITICAL CIRCLE:

X = 180.00.

Y = 115.00.

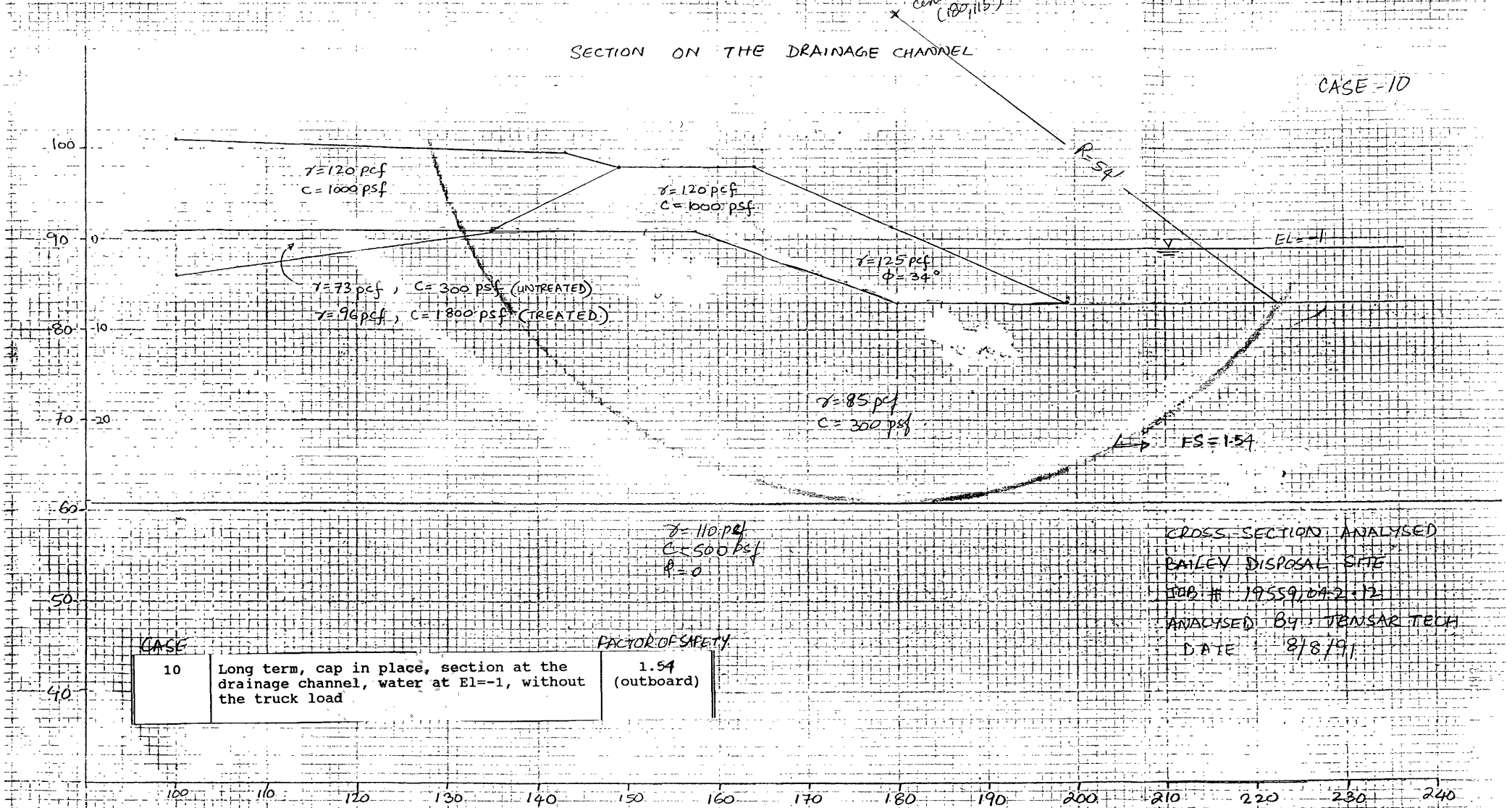
RADIUS OF CRITICAL CIRCLE = 54.00.

MINIMUM FACTOR OF SAFETY = 1.544.

CALCULATIONS HAVE BEEN COMPLETED.

SECTION ON THE DRAINAGE CHANNEL

CASE -10



CROSS SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559.04.2.12
ANALYSED BY: JENSAR TECH
DATE: 8/8/91

CASE		FACTOR OF SAFETY
10	Long term, cap in place, section at the drainage channel, water at El=-1, without the truck load	1.54 (outboard)

Case	Description	Factor of Safety
10A	Case 10 but with the truck load.	1.38 (outboard)

```
ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91
0.
0.0       0.
1.        50.00     101.00
2.        143.00    99.50
3.        149.00    98.00
4.        164.00    98.00
5.        178.00    91.00
6.        194.00    83.00
7.        250.00    83.00
8.        154.00    98.00
9.        160.20    98.00
10.       50.00     91.00
11.       135.00    91.00
12.       50.00     81.00
13.       157.50    91.00
14.       180.00    83.00
15.       50.00     61.00
16.       250.00    61.00
17.       154.1     99.
18.       160.      99.
999.
10.
1.        2.        1.
2.        3.        1.
3.        8.        1.
8.        17.       5.
17.       18.       5.
18.       9.        5.
9.        4.        1.
4.        5.        1.
5.        6.        6.
6.        7.        2.
8.        9.        1.
10.       11.       3.
11.       3.        1.
12.       11.       2.
11.       13.       2.
13.       5.        6.
13.       14.       2.
14.       6.        2.
15.       16.       4.
999.
1.        .120      1.000     .0        1.1       .70
2.        .085      .300      .0        1.1       .60
3.        .096      1.800     .0        1.1       .60
4.        .110      .500      .0        1.1       .00
5.        .712      1.000     .0        1.1       .00
6.        .125      .000      34.0      1.1       .90
99.
2.        0.        .0624
50.00     89.00
250.00    89.00
0.
0.        0.        .000      .05
20.
61.00
81.00
20.
SEARCH
180.00    100.00    20.00     20.00
```

Case 10A

Validity of data & Reasonableness of result

Checked by N. Khan

Date: 8/10/91

TENSLO1 PROGRAM - VERSION 2.1 (AUG. 9, 1989):
SLOPE STABILITY BY THE MODIFIED BISHOP METHOD.
TENSAR GEOGRID REINFORCEMENT CAN BE INCLUDED.
PROGRAM BY THE TENSAR CORPORATION, APRIL 1986.

DATE 08-07-1991
TIME 08:26

10A

ORANGE SUPERFUD$DRAINAGE CHANNEL$$8/7/91

*** UNITS - FEET AND KIPS

NO SEISMIC FORCES

SOIL INFORMATION:

NO.	GAMMA	CBAR	TAN(PHIBAR)	RU	MU
1	.120	1.000	.000	PHREATIC	.70
2	.085	.300	.000	PHREATIC	.60
3	.096	1.800	.000	PHREATIC	.60
4	.110	.500	.000	PHREATIC	.00
5	.712	1.000	.000	PHREATIC	.00
6	.125	.000	.675	PHREATIC	.90

LINE ARRAY:

NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SLOPE	SOIL	TOPLINE
1	50.00	101.00	143.00	99.50	-.0161	1	*
2	143.00	99.50	149.00	98.00	-.2500	1	*
3	149.00	98.00	154.00	98.00	.0000	1	*
4	154.00	98.00	154.10	99.00	9.9994	5	*
5	154.10	99.00	160.00	99.00	.0000	5	*
6	160.00	99.00	160.20	98.00	-5.0001	5	*
7	160.20	98.00	164.00	98.00	.0000	1	*
8	164.00	98.00	178.00	91.00	-.5000	1	*
9	178.00	91.00	194.00	83.00	-.5000	6	*
10	194.00	83.00	250.00	83.00	.0000	2	*
11	154.00	98.00	160.20	98.00	.0000	1	
12	50.00	91.00	135.00	91.00	.0000	3	
13	135.00	91.00	149.00	98.00	.5000	1	
14	50.00	81.00	135.00	91.00	.1176	2	
15	135.00	91.00	157.50	91.00	.0000	2	
16	157.50	91.00	178.00	91.00	.0000	6	
17	157.50	91.00	180.00	83.00	-.3556	2	
18	180.00	83.00	194.00	83.00	.0000	2	
19	50.00	61.00	250.00	61.00	.0000	4	

PHREATIC SURFACE COORDINATES:

NO.	X-COORD.	Y-COORD.
1	50.00	89.00
2	250.00	89.00

UNIT WEIGHT OF FLUID= .0624 KIP/FT3

NO STONE COLUMNS.

NO GEOGRIDS.

APPROXIMATELY 20. SLICES WILL BE USED AT RMAX.
THE MINIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 61.00
THE MAXIMUM TANGENT ELEVATION FOR ANY FAILURE CIRCLE IS 81.00

THERE ARE 20 INCREMENTS BETWEEN TANGENT LEVELS

10A

AUTOMATIC SEARCH FOR CRITICAL CIRCLE:
INITIAL X = 180.00, INITIAL Y = 100.00.
DELX = 20.00, DELY = 20.00.

X = 180.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.493	937.601	28
38.00	1.499	887.774	28
D(FS)/DR IS NEGATIVE AT RMAX.			
37.00	1.509	837.389	27
36.00	1.516	788.406	26
35.00	1.510	744.544	25
34.00	1.505	700.939	25
33.00	1.490	659.683	24
32.00	1.475	621.512	24
31.00	1.422	587.461	21
30.00	1.417	550.815	20
29.00	1.408	516.981	20
28.00	1.393	484.803	20
27.00	1.406	452.115	19
28.75	1.404	508.783	20
28.50	1.401	500.689	20
28.25	1.397	492.696	20
27.75	1.389	477.009	20
27.50	1.384	469.286	20
27.25	1.395	460.373	19
26.00	1.405	421.868	19
25.00	1.477	375.188	18
26.75	1.416	444.077	19
26.50	1.423	436.314	19
26.25	1.420	428.934	19
25.75	1.437	410.406	18
25.50	1.450	398.529	18
25.25	1.464	386.790	18
24.00	1.557	329.217	18
23.00	1.704	284.569	18
22.00	1.739	243.989	16
21.00	1.967	201.778	16
20.00	2.158	163.908	14
19.00	2.109	141.135	12

THE LOWEST FACTOR OF SAFETY WAS 1.384 AT R = 27.50.

X = 200.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	2.443	553.141	24
38.00	2.533	505.978	23
D(FS)/DR IS NEGATIVE AT RMAX.			
37.00	2.652	459.736	23
36.00	2.776	413.979	22
35.00	2.916	369.000	20
34.00	3.063	327.601	20

10A

33.00	3.221	288.914	20
32.00	3.400	252.336	18
31.00	3.595	218.913	18
30.00	3.806	188.175	18
29.00	4.045	159.699	16
28.00	4.296	134.339	16
27.00	4.611	110.330	16
26.00	5.067	86.908	15
25.00	5.476	68.001	15
24.00	5.960	51.632	14
23.00	6.984	37.050	12
22.00	8.466	25.653	11
21.00	10.662	16.767	9
20.00	14.626	9.685	9
19.00	26.262	3.981	7

THE LOWEST FACTOR OF SAFETY WAS 2.443 AT R = 39.00.

X = 160.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.937	750.801	29
38.00	1.971	696.959	29

D(FS)/DR IS NEGATIVE AT RMAX.

37.00	2.006	646.492	28
36.00	2.047	597.618	28
35.00	2.093	550.338	27
34.00	2.139	506.840	27
33.00	2.190	465.460	26
32.00	2.254	424.516	25
31.00	2.319	386.871	25
30.00	2.372	353.108	24
29.00	2.451	319.258	23
28.00	2.536	287.566	23
27.00	2.616	258.983	23
26.00	2.786	231.616	22
25.00	2.889	206.084	21
24.00	3.082	181.408	21
23.00	3.295	159.028	21
22.00	3.523	139.067	19
21.00	3.823	119.107	18
20.00	4.117	103.263	19
19.00	4.535	88.467	19

THE LOWEST FACTOR OF SAFETY WAS 1.937 AT R = 39.00.

X = 180.00, Y = 120.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
59.00	1.464	1823.243	28
58.00	1.463	1745.490	27
57.00	1.466	1665.237	26
58.75	1.464	1803.106	28
58.50	1.465	1783.067	28
58.25	1.465	1763.127	28
57.75	1.465	1723.977	26
57.50	1.465	1704.275	26
57.25	1.466	1684.696	26
56.00	1.468	1588.580	26
55.00	1.469	1513.719	26
54.00	1.471	1439.281	25

10A

53.00	1.481	1365.865	25
52.00	1.498	1292.843	25
51.00	1.510	1224.572	24
50.00	1.525	1155.821	23
49.00	1.537	1090.585	22
48.00	1.554	1025.575	22
47.00	1.574	961.411	21
46.00	1.593	900.246	20
45.00	1.616	839.413	20
44.00	1.643	779.511	19
43.00	1.668	722.553	19
42.00	1.691	666.244	18
41.00	1.700	611.221	17
40.00	1.695	560.741	17
39.00	1.670	515.207	17

THE LOWEST FACTOR OF SAFETY WAS 1.463 AT R = 58.00.

X = 180.00, Y = 80.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 14.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 13.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 12.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 11.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 10.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 9.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 8.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 7.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 6.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 5.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 4.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 3.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 2.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = 1.00.
TOPLINE NOT COMPLETELY DEFINED FOR R = .00.
TOPLINE NOT COMPLETELY DEFINED FOR R = -1.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R = 58.00.

X = 185.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.528	912.940	28
38.00	1.517	865.347	27
37.00	1.497	821.856	27
36.00	1.467	779.603	25
35.00	1.456	739.441	23
34.00	1.451	699.610	23
33.00	1.442	661.628	23
32.00	1.445	623.808	22
33.75	1.449	689.941	23
33.50	1.447	680.388	23
33.25	1.445	670.950	23
32.75	1.439	652.422	23
32.50	1.435	643.333	23

10A

32.25	1.434	633.525	22
31.00	1.460	587.201	22
30.00	1.526	531.314	21
29.00	1.584	476.462	20
28.00	1.717	422.243	21
27.00	1.767	371.860	20
26.00	1.913	321.020	18
25.00	2.082	272.422	17
24.00	2.024	242.335	15
23.00	2.113	212.837	14
24.75	1.975	264.416	15
24.50	1.991	256.988	15
24.25	2.007	249.630	15
23.75	2.043	234.989	15
23.50	2.068	227.227	14
23.25	2.090	219.981	14
22.00	2.304	183.561	14
21.00	2.368	156.793	11
20.00	2.507	130.844	11
19.00	2.689	105.812	11

THE LOWEST FACTOR OF SAFETY WAS 1.434 AT R = 32.25.

X = 175.00, Y = 100.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
39.00	1.464	939.030	28
38.00	1.478	886.467	28

D(FS)/DR IS NEGATIVE AT RMAX.

37.00	1.493	834.978	27
36.00	1.499	787.786	26
35.00	1.515	739.720	26
34.00	1.529	693.273	25
33.00	1.541	649.520	25
32.00	1.553	606.133	24
31.00	1.554	565.854	22
30.00	1.561	526.108	22
29.00	1.557	489.094	22
28.00	1.541	454.290	21
27.00	1.537	421.355	21
26.00	1.467	392.432	18
25.00	1.462	362.664	18
24.00	1.450	335.389	18
23.00	1.434	309.921	17
22.00	1.467	284.913	17
23.75	1.446	328.902	18
23.50	1.442	322.544	18
23.25	1.439	315.921	17
22.75	1.433	303.869	16
22.50	1.445	297.345	17
22.25	1.457	291.023	17
21.00	1.445	262.880	15
20.00	1.548	228.061	15
21.75	1.475	279.042	17
21.50	1.478	273.455	17
21.25	1.465	268.237	17
20.75	1.494	254.180	15
20.50	1.511	245.330	15
20.25	1.529	236.625	15
19.00	1.688	194.554	16

THE LOWEST FACTOR OF SAFETY WAS 1.433 AT R = 22.75.

10A

X = 180.00, Y = 105.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES
44.00	1.466	1155.669	28
43.00	1.470	1099.517	27

D(FS)/DR IS NEGATIVE AT RMAX.

42.00	1.480	1041.626	27
41.00	1.490	985.853	27
40.00	1.498	931.593	26
39.00	1.508	879.142	26
38.00	1.520	827.789	26
37.00	1.518	778.773	23
36.00	1.514	731.311	23
35.00	1.505	686.740	23
34.00	1.491	644.226	22
33.00	1.480	604.674	21
32.00	1.453	567.066	21
31.00	1.433	531.045	18
30.00	1.423	496.714	18
29.00	1.424	462.101	18
30.75	1.431	522.340	18
30.50	1.428	513.718	18
30.25	1.426	505.177	18
29.75	1.420	488.325	18
29.50	1.418	479.943	18
29.25	1.421	470.972	18
28.00	1.429	428.244	17
27.00	1.398	398.348	17
26.00	1.524	353.402	17
27.75	1.426	420.424	17
27.50	1.420	412.820	17
27.25	1.411	405.452	17
26.75	1.424	390.415	17
26.50	1.470	378.934	15
26.25	1.496	366.057	17
25.00	1.648	305.054	16
24.00	1.743	259.846	16

THE LOWEST FACTOR OF SAFETY WAS 1.398 AT R = 27.00.

X = 180.00, Y = 95.00:

RADIUS	FACTOR OF SAFETY	DRIVING MOM KIP-FT/FT	NO SLICES

FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 34.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 33.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 32.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 31.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 30.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 29.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 28.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 27.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 26.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 25.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 24.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 23.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 22.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 21.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 20.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 19.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R = 18.00.

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FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    17.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    16.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    15.00.
FAILURE SURFACE ABOVE CIRCLE CENTER FOR R =    14.00.

THE LOWEST FACTOR OF SAFETY WAS********* AT R =    27.00.
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10A

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SUMMARY OF RESULTS FOR CRITICAL CIRCLE:
  X =  180.00.
  Y =  100.00.
  RADIUS OF CRITICAL CIRCLE =  27.50.
  MINIMUM FACTOR OF SAFETY =  1.384.

CALCULATIONS HAVE BEEN COMPLETED.
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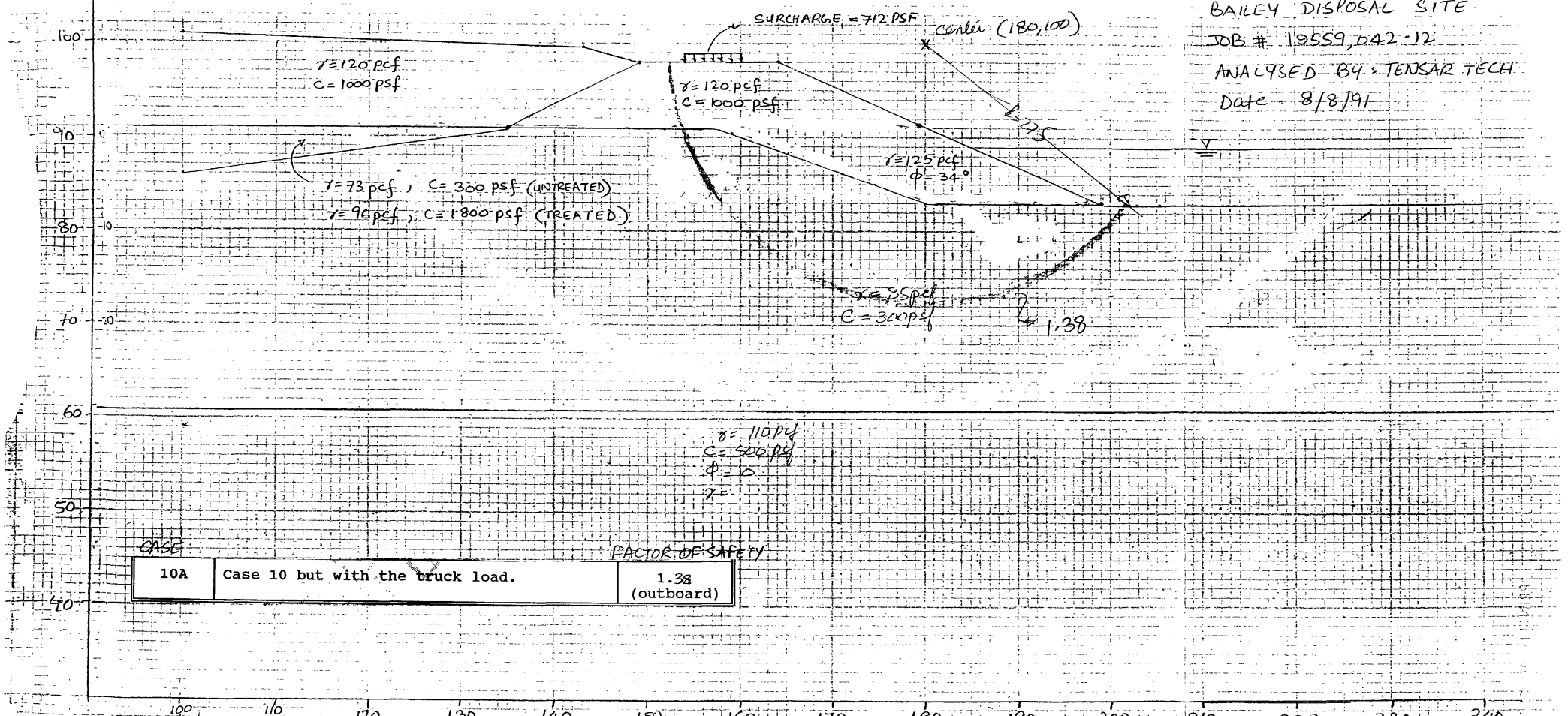
SECTION ON THE DRAINAGE CHANNEL

CASE-10A
CROSS-SECTION ANALYSED
BAILEY DISPOSAL SITE
JOB # 19559,042-12
ANALYSED BY: TENSAR TECH
Date - 8/8/91



CASE		FACTOR OF SAFETY
10A	Case 10 but with the truck load.	1.38 (outboard)