



October 6, 1995

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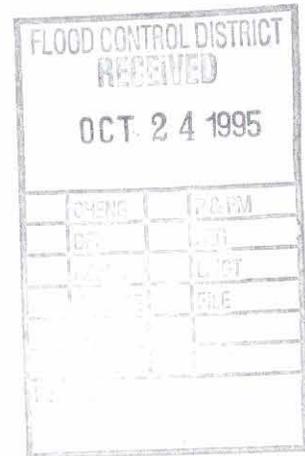
Michael Lopez, P.E.
Project Manager
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Dear Mr. Lopez:

Subject: Casandro Wash Dam (07.65)
Application Review Comments
Revised Documents

This letter presents our responses to ADWR's comments included in their letter to the District dated September 27, 1995, for the Casandro Wash Dam project. The comments are from ADWR's review of the following documents:

1. Addendum No. 1, Geotechnical Report--Volume 1, Field and Laboratory Data, dated May 15, 1995, by CH2M HILL.
2. Addendum No. 1, Casandro Wash Dam, Final Design Report, dated June 21, 1995, by CH2M HILL, including the Construction Quality Assurance (CQA) Plan.
3. Flood Control District of Maricopa County, Contract FCD 95-02, Casandro Wash Dam, Special Provisions, stamped "Draft for Review Only" and date stamped by FCDMC on June 16, 1995; by CH2M HILL.
4. Plans for the Construction of Casandro Wash Dam, FCD 95-02, 100% Submittal, dated June 8, 1995, by CH2M HILL.



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Michael Lopez, P.E.

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We have presented our responses as Addendum No. 2 to the final design report dated February 1995. Our responses reference each comment by comment number. A copy of the comments are attached. As soon as you have a chance to review our responses, we will arrange to resolve any outstanding issue so a project addendum can be issued if necessary.

The final Special Provisions and Construction Plans requested by ADWR have already been submitted to the District. It is our understanding that the District is modifying the Construction Quality Assurance Plan and will submit it to ADWR.

Please call if you have any questions.

Sincerely,

CH2M HILL



For Steve Walker

Steve Walker, P.E.

Project Manager

sww35441/gt/respond1.doc

c: David Allard/CH2M HILL/PHX
John Livingston/CH2M HILL/RDD
Tom Wolf/CH2M HILL/PHX



**Addendum No. 2
Casandro Wash Dam
Final Design Report**

***I. REVIEW COMMENTS ON ADDENDUM NO. 1, GEOTECHNICAL REPORT -
VOLUME 1***

1. The test results are presented in Appendix A of this addendum. The test results showed less than 2% change upon wetting. This low collapse potential value is a typical result for these type of soils; collapse problems are not anticipated at this site.
2. A revised Table 3.2 is included in Appendix A of this addendum. Permeability test results are included on the table.

II. REVIEW COMMENTS ON ADDENDUM NO. 1, FINAL DESIGN REPORT

1. Addendum Page 6; Acceptance Criteria, Dam Embankments.

- A. Noted.
- B. We agree that at the abutment Borings B-10, B-11, and B-12 the dam is no longer founded on the cemented silty sand that the main body of the dam is founded. At these locations the dam is typically founded on dense silty sand. This material may still meet the dam foundation criteria intended for the main part of the dam.

At the left abutment the main body of the dam extends 50 feet into the abutment material (founded on the cemented silty sand) then extends to the surface at a 1 to 1 slope. At this point, the top of dam is only a couple of feet higher than the original ground surface and the abutment is very wide. (See cross sections N 0+00, S 0+50, and S 1+00 on Sheet 26.)

At the right abutment, the dam is founded on the cemented silty sand until station 11+15. From that point the dam is less than 5 feet high (2 feet of water at 1/2 pmf level) and part of a perimeter berm. (See cross sections W 1+50, W 2+00, and W 2+50 on Sheet 28.)

While the foundation material may still meet the foundation criteria at these locations, consideration should be given to modifying the requirements based on the dam height, abutment thickness, and soil conditions encountered before continuing with deep excavation.

2. Addendum Page 6; Item 4:
 - A. Comment noted for future reference. (*Text will not be revised.*)
 - B. Complete output attached.
 - C. Comment noted for future reference.
 - D. Rainfall depths were corrected per Maricopa County procedures.
3. Addendum Page 6; Item 4:
 - A. Re: Spillway Discharge curve:
 - a. Correction added to plan sheet.
 - b. Correction added to plan sheet.
 - B. Outflow graph revised per comment.
- 3*. Addendum Page 7; Item 6: Revised EAP to be prepared by FCDMC.
4. Addendum Page 7; Item 7: The District is providing the O&M Plan.
5. Addendum Page 7; Item 8: Noted.
6. Addendum Page 7; Item 10a: The District is providing the O&M Plan.
7. Addendum Page 7; Item 10d: The seepage analysis used a permeability of 5×10^{-3} cm/sec which is more conservative than the 1×10^{-3} cm/sec maximum value from the laboratory tests.

* For ease of your review, numbering matches September 27, 1995, letter.

8. Addendum Page 11; Item 13b:

8.A.a. Earth pressures below the footings were calculated for a 1-foot strip as the sum of vertical load divided by footing width (P/A) plus the total applied moment divided by the section modulus (M/S). The total applied moment is the sum of overturning moment due to soil pressure plus the moment caused by the eccentricity of the vertical weight relative to the footing center. This approach is valid only if tensile forces do not develop at either edge of the footing (as is the case for all of the wall sections on the spillway).

It appears that ADWR's confusion is in regard to the eccentricity "e" identified in the structural calculations. The "e" identified in the calculations is the eccentricity of the vertical weight with respect to the center of the wall footing. It is not the eccentricity of the reaction on the footing base. In all cases, the reaction is located in the middle one-third of the footing width.

8.A.b. No response required.

8.B.a. Refer to the attached calculation Sheets 1 and 1A. The same results are achieved for both calculation methods and the footing steel is adequate as shown on the plans.

8.B.b. Calculations and plans are adequate as is (see 8.A.a. and 8.B.a. above).

8.B.c. Calculations and plans are adequate as is (see 8.A.a. and 8.B.a. above).

8.B.d. "Different yield steels" are not being used. Only the allowable stress in the steel is adjusted based on bar size, spacing, and cover to minimize the potential for cracking in the concrete. In general, larger bars and wider spacing require lower allowable stresses in the reinforcing steel to minimize cracking. Grade 60 reinforcing steel is assumed throughout.

8.B.e. Calculations and plans are adequate as is (see 8.A.a. and 8.B.a. above). The taller portion of the apron walls are reinforced with #6 bars at a spacing of 6 inches as indicated by Sections BB and CC ($A_s = 0.88$ square inches).

8.B.f. Calculations and plans are adequate as is (see 8.A.a. and 8.B.a. above).

8.B.g. See 8.B.d. above.

8.B.h. The stilling basin wall footing reinforcement is the same as is required at the base of the stilling basin wall and is therefore adequate. Maximum pressure that

can develop below the slab is about 220 psf (3.5-foot head to drainage system outlet). The weight of the 1.5-foot thick floor slab is 225 psf which balances the water pressure. Steel in the floor slab is for temperature and "toughness" for dynamic impact in the turbulent flow zone at the bottom of the stilling basin.

9. Addendum Page 12, Volume 1, Item 1 and Item 3:

- A. Revised Table 3.2 is included. It does not include laboratory results presented in Table A-1 of Addendum No. 1 to the geotechnical data report.
- B. The requested results for the CU-PP test are attached. The results of the UU test are not applicable to the soil types tested.

10. Addendum Page 12, Volume 1, Item 1 and Item 3:

A. Embankment Fill Material:

- a. The material sampled in TP-15, B-1 is a 3-foot layer encountered 3 to 6 feet below ground surface at the test pit location. The sample was logged as an Silty Sand (SM). Laboratory test results reported 25.6% passing the No. 200 sieve and a LL of 27 and PI of 6. This classifies as a SC-SM as indicated in WTI test results. (See plate 4, Appendix D of the Geotechnical Report Volume 1). The letter incorrectly reported the material as SP-SM.
- b. The materials tested in the direct shear included soil visually classified by WTI as SP, SP-SM and SM. Sieve analysis were performed on TP-4, B2 and TP-8, B2. These had 6 to 7.6 % fines, respectively.
- c. The intent of the design is to construct the dam of the silty sand which predominates at the site. This material would be classified as sand with silt, or silty sand. The majority of this material has between 5 and 20 percent fines. There are some clean sands at the site and we have addressed this in the special provisions by placing a minimum requirement on the amount of fines. There are also silty sand layers that can exceed 20 percent fines. While it would be our desire that this soil be combined with cleaner sand before placement, we do not feel small zones of this material will affect the overall stability of the dam. To help verify this assumption, we have evaluated the dam's stability using the lowest combined shear strength values from effective and total strength envelopes of the CU-PP test ($c=240$ psf, $\phi = 21$ degrees). The results meet the required target safety factors.

These analyses are included in Appendix A.

The special provisions will be modified so that excavated material with greater than 20% passing the No. 200 sieve will be mixed with cleaner material prior to placement in the embankment.

B. Slope Stability Analysis:

- a. See discussion of stability analysis above.
- b. We agree with ADWR that the dam should be inspected after a significant dewatering. The District is preparing the O&M manual.
- c. Noted.
- d. A partial pool stability analysis is included in Appendix A. The factor of safety is still greater than 1.5. As noted the analysis is more conservative.

C. Seepage Analysis and Chimney Drain:

- a. The seepage analysis calculated a seepage rate of 392 gpm. This was calculated based on a steady state seepage condition which requires the reservoir remain at maximum water level for in excess of 10 days. This is a very conservative assumption as the operation of the dam anticipates a full reservoir for less than 1 day. The analysis also used a conservative permeability value of 5×10^{-3} cm/sec. The calculated finger drain capacity is approximately 99 gpm with 10 feet of head.

Should the outlets become blocked and the reservoir stay full until steady state seepage conditions are reached and the drains not function, stability analysis for the downstream slope indicate a factor of safety of greater than the required 1.5.

11. Addendum Page 14, Review Comments on the Final Design Report, Item 1:

- A. See above response.

12. Addendum Page 16, Item Subsection 740.2-Materials:

- A. These items will be sent to ADWR.

III. REVIEW COMMENTS ON THE SPECIAL PROVISIONS

1. SECTION 204--EXCAVATION FOR DAM AND DETENTION BASIN PERIMETER SLOPES

A. Subsection 204.3--Dam Foundation Excavation and Overexcavation

- a. This was changed prior to final submission to the District.
- b. The trench drain below the foundation does not need to be excavated at 1:1 or flatter. The contractor can excavate this trench near vertical if he wants. The contractor will have to comply with all OSHA trench safety requirements prior to letting workers enter the trench. This could involve placing 1 foot of material prior to letting someone enter the trench. The trench would then be less than 5 feet deep.

2. SECTION 211--FILL CONSTRUCTION

A. Subsection 211.0--Description

- a. See discussion above.

B. Subsection 211.2--Placing

- a. The prepared ground surface note has been added to Subsection 211.3 - Compaction of Zone 1 first sentence as per discussions with ADWR. This was changed prior to final submission to the District.

C. Subsection 211.3--Compacting

- a. This change was made prior to final submission to the District.

3. SECTION 301--SUBGRADE PREPARATION

A. Subsection 301.1--Description

- a. This addition will be made to the contract addendum.

4. SECTION 430--LANDSCAPING AND PLANTING

A. Subsection 430.3.2--Seeding

- a. This note will be added in a contract addendum.

5. SECTION 601--TRENCH EXCAVATION, BACKFILLING AND
COMPACTION

A. Subsection 601.2.1--General

- a. This change was made prior to final submission to the District.

6. SECTION 618--STORM DRAIN CONSTRUCTION

A. Subsection 618.3--Construction Methods

- a. This change was made prior to final submission to the District.

7. SECTION 635--SPILLWAY DRAIN PIPE AND GEONET

A. Subsection 635.4--Geonet

- a. This change was made prior to final submission to the District.

IV. REVIEW COMMENTS ON THE CONSTRUCTION PLANS

1. Plan Sheet 3:

- A. There are already station tic marks on this sheet; additional tic marks would not add clarity.

2. Plan Sheet 4:

- A. There are already station tic marks on this sheet; additional tic marks would not add clarity.

- B. The finger drain centerlines will be added to the plans in a contract addendum.

- C. A note will be added to this sheet by addendum to add a MAG 120-2, Type B Survey Monument at the end of each finger drain. This monument will be slightly elevated to stick up above the ground surface 6 inches.
3. Plan Sheet 5:
- A. These will be corrected by contract addendum.
 - B. The excavation line was lowered in the final submission to the District.
4. Plan Sheet 6:
- A. This change was made prior to the final submission to the District.
5. Plan Sheet 9:
- A. The limit of Zone 2 backfill is shown in Wall Section DD. Its limit will also be shown on Section FF, Sheet 10 for clarity.
 - B. This change was made prior to the final submission to the District.
 - C. Noted
6. Plan Sheet 10:
- A. The word "still" will be changed to "stilling." The remaining changes were made prior to final submission to the District.
 - B.
 - a. This change was made prior to the final submission to the district.
 - b. This change was made prior to the final submission to the district.
 - C. This change was made prior to the final submission to the district.
 - D. Noted
7. Plan Sheet 15:
- A. This addition will be made in the contract addendum.

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8. Plan Sheet 21:

A. This is covered in Section 601 of the Special Conditions.

9. Plan Sheet 33:

A. This change was made prior to the final submission to the District.

B. This change was made prior to the final submission to the District.

***V. REVIEW COMMENTS ON THE CONSTRUCTION QUALITY ASSURANCE (CQA)
PLAN***

The District is revising the Construction Quality Assurance Plan.

Appendix A

Collapse Potential Test Results

Revised Table 3.2

Revised HEC-1

Revised Structural Calculations

CC-PP Test Results

Additional Stability Analysis

Partial Pool Stability Analysis

SOIL PROPERTIES

Boring No.	Depth (ft)	Soil Class.	Soil Property		Compression/ Consolidation		Expansion			Remarks
			Initial Dry Density (pcf)	Initial Water Content (%)	Surcharge (ksf)	Total Comp. (%)	Surcharge (ksf)	Expansion (%)	Max. Swell Pressure (ksf)	
BX-1 (ST-4)	17.5-19.5	SM-SP	99	13.5	2.2 2.2	1.7 3.4				2
BX-1 (ST-7)	30-32	SM	101	9.7						
BX-3 (ST-3)	15-17	SP	96	4.7						

NOTE: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

REMARKS

1. Compacted density (approximately 95% of ASTM D698 maximum density at moisture content slightly below optimum)
2. Submerged to approximate saturation
3. Dry Density determined from one ring of a multi-ring sample
4. Visual Classification

CASANDRO WASH

Soil Properties

Western Technologies Inc.

Job No.: 2125JE137

Plate:

Table 3-2
Summary of Laboratory Analyses
Casandro Wash Detention Basin

Test Pit/ Boring #	Depth (ft)	Sample I.D.	Classification	Field Soil Properties		Particle Size Distribution % Passing by Weight (a)		Atterberg Limits		Moisture Density Relationship		Specific Gravity	Shear Strength (b)		Triaxial Shear (c)		Permeability (f)
				Dry Density (pcf)	Moisture Content (%)	#4	#200	LL	PI	Max Dry Density (pcf)	Optimum Moisture Content (%)		C (ksf)	0 (Deg)	C (ksf)	0 (Deg)	K (cm/sec)
TP-1	5	TP-1, B-1	SW-SM		2.5	65.0	9.3										
TP-1	9	TP-1, B-2	SW								2.62						1.1E-03
TP-2	3	TP-2, B-1	SW		3.8								0.4	39			
TP-3	5	TP-3, B-1	SP		3.9	86.0	3.5										
TP-3	17	TP-3, B-2	SW-SC			67.0	11.7										
TP-4	3	TP-4, B-1	SW-SM		4.0												
TP-4	14	TP-4, B-2	SW-SM			52.0	6.0						0	45			
TP-5	7	TP-5, B-1	SM		5.8												
TP-5	16	TP-5, B-2	SW-SM			67.0	9.3										6.0E-04
TP-7	4	TP-7, B-1	SW-SM		3.9												7.6E-04
TP-7	15	TP-7, B-2	SW-SM			90.0	9.8										
TP-8	4	TP-8, B-1	SM		7.4										2.88	0	
TP-8	15	TP-8, B-2	SW-SM			71.0	7.6						0.5	40			1.2E-04
TP-9	2	TP-9, B-1	SW-SM		6.8	64.0	8.3										
TP-11	2	TP-11, B-1	SP		6.1	88.0	3.4										
TP-11	5	TP-11, B-2	SC		7.6	74.0	12.1				113.0	14.2					
TP-11	14	TP-11, B-3	SM										0	45			
TP-12	4	TP-12, B-1	SM		5.0						118.0	11.5	1.55	27			
TP-12	9	TP-12, B-2	GW-GM			37.0	6.3										1.1E-04
TP-13	4	TP-13, B-1	SP-SM										0	45			
TP-15	5	TP-15, B-1	SM		6.2	75.0	25.6	27.0	6.0						0.72	22.0	
TP-15	10	TP-15, B-2	SP														1.6E-03
TP-15	13	TP-15, B-3	SW-SM			51.0	6.3										4.2E-04
TP-16	2	TP-16, B-1	SM		4.3												
TP-16	8	TP-16, B-2	SW-SM		9.1	81.0	7.3										
TP-18	3	TP-18, B-1	SW-SM		6.9	51.0	5.4				114.0	12.9					8.3E-05
TP-18	9	TP-18, B-2	SW-SM			61.0	5.1										

Table 3-2
Summary of Laboratory Analyses
Casandro Wash Detention Basin

Test Pit/ Boring #	Depth (ft)	Sample I.D.	Classification	Field Soil Properties		Particle Size Distribution % Passing by Weight (a)		Atterberg Limits		Moisture Density Relationship		Specific Gravity	Shear Strength (b)		Triaxial Shear (c)		Permeability (f)
				Dry Density (pcf)	Moisture Content (%)	#4	#200	LL	PI	Max Dry Density (pcf)	Optimum Moisture Content (%)		C (ksf)	0 (Deg)	C (ksf)	0 (Deg)	K (cm/sec)
TP-20	3	TP-20, B-1	SW-SM		5.0	63.0	10.3			118.0	11.8	2.57					2.1E-08
TP-20	8	TP-20, B-2	SW-SM	124 (d)		69.0	11.8										
TP-21	3	TP-21, B-1	SW		5.2	74.0	4.3										
TP-21	5	TP-21, B-2	SM		5.7												
TP-22	3	TP-22, B-1	SM		4.8	86.0	18.7			120.0	11.0						1.1E-04
TP-23	5	TP-23, B-1	SW		4.6	66.0	2.7										
TP-24	2	TP-24, B-1	SW		7.9	85.0	5.9			109.0	14.6						
TP-24	2	TP-24, B-2	SW-SM		7.5	63.0	5.9										
B-1	17.5	B-1, SS-8	CL					33.0	12.0								
B-6	10	B-6, ST-5	SW	106.0	5.6												
B-10	4	B-10, ST-3	SM	98.0	9.9												
B-10	20	B-10, SC-9	SW-SM	92.0	9.6												
Sediment (e)	0		SW			90.0	3.0										

Notes:

- (a) 100% of every sample passed 2-inch sieve
- (b) Direct shear test with normal stresses of 1, 2, and 3 ksf
- (c) Triaxial shear test with confining pressures of 10, 20, and 30 psi
- (d) Sample was cemented. Density determined by paraffin coating method. (ASTM D1188)
- (e) Surface sample collected near TP-21
- (f) Permeability determined in laboratory on sample compacted to 95% of ASTM 698 at optimum moisture.

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* FLOOD HYDROGRAPH PACKAGE (HEC-1) *  
*   MAY 1991                       *  
*   VERSION 4.0.1E                 *  
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* U.S. ARMY CORPS OF ENGINEERS *  
* HYDROLOGIC ENGINEERING CENTER *  
* 609 SECOND STREET           *  
* DAVIS, CALIFORNIA 95616     *  
* (916) 756-1104              *  
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: Full Microcomputer Implementation :  
: by :  
: Haestad Methods, Inc. :  
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.
THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 2^o SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

* FINAL 1/2 PMF RUN HPMF-NLF.HC1 May, 1995
 * No low-flow outlet discharge. Modified spillway rating curve by
 * subtracting the low-flow outlet Q at El. 2155 which was 31 cfs.

*DIAGRAM

1 ID Casandro Wash Detention Dam CH2M Hill August, 1994
 2 ID Copy of HEC-1 for Q100, changed precipitation
 3 ID Revised dam location and basin grading
 * 1/2 PMF Run - routed

4 IT 5 900
 5 IO 3

6 JR FLOW .5

7 KK SAC230
 8 KM SUB-BASIN SAC230
 9 KM 6-HOUR RAINFALL, PATTERN NO. 1.53 WAS USED TO FIND TC & R FOR THIS BASIN
 10 KM THIS BASIN USED RAINFALL REDUCTION FACTOR OF .985
 11 KM BASIN FROM WICKENBERG ADMS
 12 BA .720
 13 IN 15
 14 PB 15
 15 KM THE FOLLOWING PI RECORD USES A 6-HOUR STORM - HMR#5 DISTRIBUTION
 16 PI 0.075 0.075 0.075 0.075 0.125 0.125 0.125 0.125 0.4 0.4
 17 PI 0.4 0.4 8.4 1.7 0.7 0.7 0.2 0.2 0.2 0.2
 18 PI 0.075 0.075 0.075 0.075
 19 LG .100 .250 5.200 .240 35.000
 20 UC .446 .367
 21 UA 0 5 16 30 65 77 84 90 94 97
 22 UA 100

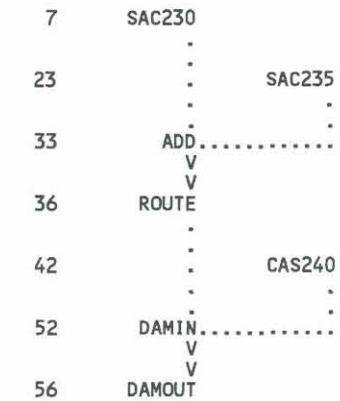
23 KK SAC235
 24 KM SUB-BASIN sac235
 25 KM 6-HOUR RAINFALL, PATTERN NO. 1.53 WAS USED TO FIND TC & R FOR THIS BASIN
 26 KM THIS BASIN USED RAINFALL REDUCTION FACTOR OF .985
 27 KM BASIN FROM WICKENBERG ADMS
 28 BA .380
 29 LG .100 .230 6.200 .150 36.000
 30 UC .450 .461
 31 UA 0 5 16 30 65 77 84 90 94 97
 32 UA 100

33 KK ADD
 34 KM ADD SAC230 & SAC235
 35 HC 2

LINE	ID	1	2	3	4	5	6	7	8	9	10
36	KK	ROUTE									
37	KM	ROUTE COMBINED HYDROGRAPH TO DAM LOCATION									
38	RS	1	FLOW -1								
39	RC	.045	.03	.045	4200	.0175					
40	RX	463.5	467.5	477.5	487.5	512.5	522.5	532.5	536.5		
41	RY	16.5	12.5	12.5	10.0	10.0	12.5	12.5	16.5		
	*										
42	KK	CAS240									
43	KM	SUB-BASIN cas240									
44	KM	6-HOUR RAINFALL, PATTERN NO. 1.53 WAS USED TO FIND TC & R FOR THIS BASIN									
45	KM	THIS BASIN USED RAINFALL REDUCTION FACTOR OF .985									
46	KM	BASIN MODIFIED FROM WICKENBERG ADMS TO REFLECT DAM LOCATION									
47	BA	.140									
48	LG	.100	.210	6.400	.140	21.000					
49	UC	.258	.232								
50	UA	0	5	16	30	65	77	84	90	94	97
51	UA	100									
	*										
52	KK	DAMIN									
53	KM	ADD ROUTED HYDROGRAPH TO CAS240									
54	KO	1									
55	HC	2									
	*										
56	KK	DAMOUT									
57	KM	Route Hydrograph Through Dam.									
58	KM										
59	RS	1	STOR	2							
60	KO	1									
	*										
61	SA	2.05	2.49	5.80	6.77	9.06	10.20	10.96	11.34	11.61	11.88
62	SA	12.09	12.31	12.81	13.31	13.81					
63	SE	2135	2137	2140	2144	2150	2153	2155	2156	2157	2158
64	SE	2159	2160	2161	2162	2163					
65	SQ	0	0	0	0	0	0	0	264	792	1508
66	SQ	2392	3419	4546	5742	6984					
	*										
67	ZZ										

SCHEMATIC DIAGRAM OF STREAM NETWORK

NPOT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW



***) RUNOFF ALSO COMPUTED AT THIS LOCATION

*
FLOOD HYDROGRAPH PACKAGE (HEC-1) *
MAY 1991 *
VERSION 4.0.1E *
*
RUN DATE 05/02/1995 TIME 11:13:46 *
*

*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*

Casandro Wash Detention Dam CH2M Hill August, 1994
Copy of HEC-1 for Q100, changed precipitation
Revised dam location and basin grading

5 IO OUTPUT CONTROL VARIABLES
 IPRNT 3 PRINT CONTROL
 IPLOT 0 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
 NMIN 5 MINUTES IN COMPUTATION INTERVAL
 IDATE 1 0 STARTING DATE
 ITIME 0000 STARTING TIME
 NQ 900 NUMBER OF HYDROGRAPH ORDINATES
 NDDATE 4 0 ENDING DATE
 NDTIME 0255 ENDING TIME
 ICENT 19 CENTURY MARK

 COMPUTATION INTERVAL 0.08 HOURS
 TOTAL TIME BASE 74.92 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF RUNOFF
 0.50

*
7 KK * SAC230 *
*

SUB-BASIN SAC230
6-HOUR RAINFALL, PATTERN NO. 1.53 WAS USED TO FIND TC & R FOR THIS BASIN

THIS BASIN USED RAINFALL REDUCTION FACTOR OF .985
 BASIN FROM WICKENBERG ADMS
 THE FOLLOWING PI RECORD USES A 6-HOUR STORM - HMR#5 DISTRIBUTION

13 IN TIME DATA FOR INPUT TIME SERIES
 JXMIN 15 TIME INTERVAL IN MINUTES
 JXDATE 1 0 STARTING DATE
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

12 BA SUBBASIN CHARACTERISTICS
 TAREA 0.72 SUBBASIN AREA

PRECIPITATION DATA

15 PB STORM 15.00 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.03	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.02	0.02
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.04	0.04	0.04	0.04	0.13	0.13	0.13	0.13	0.13	0.13
0.13	0.13	0.13	0.13	0.13	0.13	2.80	2.80	2.80	0.57
0.57	0.57	0.23	0.23	0.23	0.23	0.23	0.23	0.07	0.07
0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02
0.03	0.02								

19 LG GREEN AND AMPT LOSS RATE
 STRL 0.10 STARTING LOSS
 DTH 0.25 MOISTURE DEFICIT
 PSIF 5.20 WETTING FRONT SUCTION
 XKSAT 0.24 HYDRAULIC CONDUCTIVITY
 RTIMP 35.00 PERCENT IMPERVIOUS AREA

20 UC CLARK UNITGRAPH
 TC 0.45 TIME OF CONCENTRATION
 R 0.37 STORAGE COEFFICIENT

21 UA ACCUMULATED-AREA VS. TIME, 11 ORDINATES

0.0	5.0	16.0	30.0	65.0	77.0	84.0	90.0	94.0	97.0
100.0									

UNIT HYDROGRAPH PARAMETERS
 CLARK TC= 0.45 HR, R= 0.37 HR
 SNYDER TP= 0.29 HR, CP= 0.48

UNIT HYDROGRAPH
 26 END-OF-PERIOD ORDINATES

83.	383.	684.	750.	692.	597.	487.	387.	308.	246.
195.	156.	124.	99.	79.	62.	50.	40.	32.	25.
20.	16.	13.	10.	8.	6.				

*** *** *** *** ***

HYDROGRAPH AT STATION SAC230
 FOR PLAN 1, RATIO = 0.50

TOTAL RAINFALL = 15.00, TOTAL LOSS = 1.64, TOTAL EXCESS = 13.36

PEAK FLOW (CFS)	TIME (HR)	6-HR (CFS)	24-HR	72-HR	74.92-HR
6516.	3.50	1028.	258.	86.	83.
		(INCHES)	13.275	13.305	13.305

(AC-FT) 510. 511. 511. 511.

CUMULATIVE AREA = 0.72 SQ MI

*** **

HYDROGRAPH AT STATION SAC230
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.92-HR
3258.	3.50	(CFS) 514.	129.	43.	41.
		(INCHES) 6.637	6.652	6.652	6.652
		(AC-FT) 255.	255.	255.	255.

CUMULATIVE AREA = 0.72 SQ MI

23 KK

* *
* SAC235 *
* *

SUB-BASIN sac235
6-HOUR RAINFALL, PATTERN NO. 1.53 WAS USED TO FIND TC & R FOR THIS BASIN
THIS BASIN USED RAINFALL REDUCTION FACTOR OF .985
BASIN FROM WICKENBERG ADMS

SUBBASIN RUNOFF DATA

28 BA

SUBBASIN CHARACTERISTICS
TAREA 0.38 SUBBASIN AREA

PRECIPITATION DATA

15 PB

STORM 15.00 BASIN TOTAL PRECIPITATION

15 PI

INCREMENTAL PRECIPITATION PATTERN

0.03	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.02	0.02
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.04	0.04	0.04	0.04	0.13	0.13	0.13	0.13	0.13	0.13
0.13	0.13	0.13	0.13	0.13	0.13	2.80	2.80	2.80	0.57
0.57	0.57	0.23	0.23	0.23	0.23	0.23	0.23	0.07	0.07
0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02
0.03	0.02								

29 LG

GREEN AND AMPT LOSS RATE

STRTL	0.10	STARTING LOSS
DTH	0.23	MOISTURE DEFICIT
PSIF	6.20	WETTING FRONT SUCTION
XKSAT	0.15	HYDRAULIC CONDUCTIVITY
RTIMP	36.00	PERCENT IMPERVIOUS AREA

30 UC

CLARK UNITGRAPH

TC	0.45	TIME OF CONCENTRATION
R	0.46	STORAGE COEFFICIENT

31 UA

ACCUMULATED-AREA VS. TIME, 11 ORDINATES

0.0	5.0	16.0	30.0	65.0	77.0	84.0	90.0	94.0	97.0
-----	-----	------	------	------	------	------	------	------	------

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100.0

UNIT HYDROGRAPH PARAMETERS
CLARK TC= 0.45 HR, R= 0.46 HR
SNYDER TP= 0.31 HR, CP= 0.44

UNIT HYDROGRAPH
32 END-OF-PERIOD ORDINATES

35.	162.	298.	339.	324.	290.	248.	207.	172.	144.
120.	100.	84.	70.	58.	48.	40.	34.	28.	23.
20.	16.	14.	11.	9.	8.	7.	6.	5.	4.
3.	3.								

*** *** *** *** ***

HYDROGRAPH AT STATION SAC235
FOR PLAN 1, RATIO = 0.50

TOTAL RAINFALL = 15.00, TOTAL LOSS = 1.32, TOTAL EXCESS = 13.68

PEAK FLOW (CFS)	TIME (HR)	6-HR (CFS)	24-HR (INCHES)	72-HR (AC-FT)	74.92-HR (CFS)
3076.	3.50	555.	13.570	275.	45.
		139.	13.617	276.	13.617
		46.	13.617	276.	276.
					276.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SAC235
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)	6-HR (CFS)	24-HR (INCHES)	72-HR (AC-FT)	74.92-HR (CFS)
1538.	3.50	277.	6.785	138.	22.
		70.	6.808	138.	6.808
		23.	6.808	138.	6.808
					138.

CUMULATIVE AREA = 0.38 SQ MI

** *** **

* *
33 KK ADD *
* *

ADD SAC230 & SAC235

35 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

*** *** *** *** ***

HYDROGRAPH AT STATION ADD
FOR PLAN 1, RATIO = 0.50

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ICL4PRINT

PEAK FLOW (CFS) 4796.	TIME (HR) 3.50	(CFS) 791.	6-HR 791.	24-HR 198.	72-HR 66.	74.92-HR 64.
		(INCHES) 6.688	6.688	6.706	6.706	6.706
		(AC-FT) 392.	392.	393.	393.	393.

CUMULATIVE AREA = 1.10 SQ MI

*
* ROUTE *
*

ROUTE COMBINED HYDROGRAPH TO DAM LOCATION

HYDROGRAPH ROUTING DATA

38 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP FLOW TYPE OF INITIAL CONDITION
 RSVRIC -1.00 INITIAL CONDITION
 X 0.00 WORKING R AND D COEFFICIENT

39 RC NORMAL DEPTH CHANNEL
 ANL 0.045 LEFT OVERBANK N-VALUE
 ANCH 0.030 MAIN CHANNEL N-VALUE
 ANR 0.045 RIGHT OVERBANK N-VALUE
 RLNTH 4200. REACH LENGTH
 SEL 0.0175 ENERGY SLOPE
 ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	----- MAIN CHANNEL -----	+	--- RIGHT OVERBANK ---	
41 RY	ELEVATION	16.50		12.50		10.00	12.50
40 RX	DISTANCE	463.50		477.50		512.50	536.50

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.87	1.83	2.88	4.02	5.25	6.57	7.98	9.93	12.10
OUTFLOW	0.00	27.97	90.60	181.95	300.62	446.32	619.30	820.07	1082.86	1405.42
ELEVATION	10.00	10.34	10.68	11.03	11.37	11.71	12.05	12.39	12.74	13.08
STORAGE	14.29	16.51	18.75	21.01	23.29	25.60	27.93	30.28	32.65	35.05
OUTFLOW	1769.68	2172.41	2611.51	3085.39	3592.83	4132.80	4704.46	5307.08	5940.05	6602.82
ELEVATION	13.42	13.76	14.11	14.45	14.79	15.13	15.47	15.82	16.16	16.50

HYDROGRAPH AT STATION ROUTE
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS) 4700.	TIME (HR) 3.50	(CFS) 791.	6-HR 791.	24-HR 198.	72-HR 66.	74.92-HR 64.
		(INCHES) 6.682	6.682	6.706	6.706	6.706
		(AC-FT) 392.	392.	393.	393.	393.

EAK STORAGE (AC-FT) 28.	TIME (HR) 3.50	6-HR 6.	MAXIMUM AVERAGE STORAGE 24-HR 2.	72-HR 1.	74.92-HR 1.
PEAK STAGE (FEET) 15.47	TIME (HR) 3.50	6-HR 11.66	MAXIMUM AVERAGE STAGE 24-HR 10.42	72-HR 10.14	74.92-HR 10.14

CUMULATIVE AREA = 1.10 SQ MI

*** **

* *
42 KK * CAS240 *
* *

SUB-BASIN cas240
6-HOUR RAINFALL, PATTERN NO. 1.53 WAS USED TO FIND TC & R FOR THIS BASIN
THIS BASIN USED RAINFALL REDUCTION FACTOR OF .985
BASIN MODIFIED FROM WICKENBERG ADMS TO REFLECT DAM LOCATION

SUBBASIN RUNOFF DATA

47 BA SUBBASIN CHARACTERISTICS
TAREA 0.14 SUBBASIN AREA

PRECIPITATION DATA

15 PB STORM 15.00 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

0.03	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.02	0.02
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.04	0.04	0.04	0.04	0.13	0.13	0.13	0.13	0.13	0.13
0.13	0.13	0.13	0.13	0.13	0.13	2.80	2.80	2.80	0.57
0.57	0.57	0.23	0.23	0.23	0.23	0.23	0.23	0.07	0.07
0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02
0.03	0.02								

48 LG GREEN AND AMPT LOSS RATE

STRTL	0.10	STARTING LOSS
DTH	0.21	MOISTURE DEFICIT
PSIF	6.40	WETTING FRONT SUCTION
XKSAT	0.14	HYDRAULIC CONDUCTIVITY
RTIMP	21.00	PERCENT IMPERVIOUS AREA

49 UC CLARK UNITGRAPH

TC	0.26	TIME OF CONCENTRATION
R	0.23	STORAGE COEFFICIENT

50 UA ACCUMULATED-AREA VS. TIME, 11 ORDINATES

0.0	5.0	16.0	30.0	65.0	77.0	84.0	90.0	94.0	97.0
100.0									

UNIT HYDROGRAPH PARAMETERS
CLARK TC= 0.26 HR, R= 0.23 HR
SNYDER TP= 0.19 HR, CP= 0.52

UNIT HYDROGRAPH
16 END-OF-PERIOD ORIGINATES

63. 187. 231. 182. 128. 89. 62. 43. 30. 21.
15. 10. 7. 5. 3. 2.

*** **

HYDROGRAPH AT STATION CAS240
FOR PLAN 1, RATIO = 0.50

TOTAL RAINFALL = 15.00, TOTAL LOSS = 1.55, TOTAL EXCESS = 13.45

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.92-HR
1748.	3.33	201.	50.	17.	16.
		(INCHES) 13.372	13.387	13.387	13.387
		(AC-FT) 100.	100.	100.	100.

CUMULATIVE AREA = 0.14 SQ MI

*** **

HYDROGRAPH AT STATION CAS240
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.92-HR
874.	3.33	101.	25.	8.	8.
		(INCHES) 6.686	6.693	6.693	6.693
		(AC-FT) 50.	50.	50.	50.

CUMULATIVE AREA = 0.14 SQ MI

52 KK

* DAMIN *

ADD ROUTED HYDROGRAPH TO CAS240

54 KO

OUTPUT CONTROL VARIABLES

IPRNT 1 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

55 HC

HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION DAMIN
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = 0.50

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*
1		0000	1	0.	*	1		1845	226	0.	*	2		1330	451	0.	*	3		0815	676	0.	*
1		0005	2	0.	*	1		1850	227	0.	*	2		1335	452	0.	*	3		0820	677	0.	*
1		0010	3	1.	*	1		1855	228	0.	*	2		1340	453	0.	*	3		0825	678	0.	*
1		0015	4	3.	*	1		1900	229	0.	*	2		1345	454	0.	*	3		0830	679	0.	*
1		0020	5	5.	*	1		1905	230	0.	*	2		1350	455	0.	*	3		0835	680	0.	*
1		0025	6	7.	*	1		1910	231	0.	*	2		1355	456	0.	*	3		0840	681	0.	*
1		0030	7	10.	*	1		1915	232	0.	*	2		1400	457	0.	*	3		0845	682	0.	*
1		0035	8	13.	*	1		1920	233	0.	*	2		1405	458	0.	*	3		0850	683	0.	*
1		0040	9	16.	*	1		1925	234	0.	*	2		1410	459	0.	*	3		0855	684	0.	*
1		0045	10	19.	*	1		1930	235	0.	*	2		1415	460	0.	*	3		0900	685	0.	*
1		0050	11	22.	*	1		1935	236	0.	*	2		1420	461	0.	*	3		0905	686	0.	*
1		0055	12	24.	*	1		1940	237	0.	*	2		1425	462	0.	*	3		0910	687	0.	*
1		0100	13	26.	*	1		1945	238	0.	*	2		1430	463	0.	*	3		0915	688	0.	*
1		0105	14	28.	*	1		1950	239	0.	*	2		1435	464	0.	*	3		0920	689	0.	*
1		0110	15	31.	*	1		1955	240	0.	*	2		1440	465	0.	*	3		0925	690	0.	*
1		0115	16	34.	*	1		2000	241	0.	*	2		1445	466	0.	*	3		0930	691	0.	*
1		0120	17	39.	*	1		2005	242	0.	*	2		1450	467	0.	*	3		0935	692	0.	*
1		0125	18	43.	*	1		2010	243	0.	*	2		1455	468	0.	*	3		0940	693	0.	*
1		0130	19	47.	*	1		2015	244	0.	*	2		1500	469	0.	*	3		0945	694	0.	*
1		0135	20	50.	*	1		2020	245	0.	*	2		1505	470	0.	*	3		0950	695	0.	*
1		0140	21	53.	*	1		2025	246	0.	*	2		1510	471	0.	*	3		0955	696	0.	*
1		0145	22	55.	*	1		2030	247	0.	*	2		1515	472	0.	*	3		1000	697	0.	*
1		0150	23	58.	*	1		2035	248	0.	*	2		1520	473	0.	*	3		1005	698	0.	*
1		0155	24	60.	*	1		2040	249	0.	*	2		1525	474	0.	*	3		1010	699	0.	*
1		0200	25	62.	*	1		2045	250	0.	*	2		1530	475	0.	*	3		1015	700	0.	*
1		0205	26	67.	*	1		2050	251	0.	*	2		1535	476	0.	*	3		1020	701	0.	*
1		0210	27	83.	*	1		2055	252	0.	*	2		1540	477	0.	*	3		1025	702	0.	*
1		0215	28	111.	*	1		2100	253	0.	*	2		1545	478	0.	*	3		1030	703	0.	*
1		0220	29	152.	*	1		2105	254	0.	*	2		1550	479	0.	*	3		1035	704	0.	*
1		0225	30	200.	*	1		2110	255	0.	*	2		1555	480	0.	*	3		1040	705	0.	*
1		0230	31	249.	*	1		2115	256	0.	*	2		1600	481	0.	*	3		1045	706	0.	*
1		0235	32	296.	*	1		2120	257	0.	*	2		1605	482	0.	*	3		1050	707	0.	*
1		0240	33	336.	*	1		2125	258	0.	*	2		1610	483	0.	*	3		1055	708	0.	*
1		0245	34	371.	*	1		2130	259	0.	*	2		1615	484	0.	*	3		1100	709	0.	*
1		0250	35	400.	*	1		2135	260	0.	*	2		1620	485	0.	*	3		1105	710	0.	*
1		0255	36	423.	*	1		2140	261	0.	*	2		1625	486	0.	*	3		1110	711	0.	*
1		0300	37	442.	*	1		2145	262	0.	*	2		1630	487	0.	*	3		1115	712	0.	*
1		0305	38	586.	*	1		2150	263	0.	*	2		1635	488	0.	*	3		1120	713	0.	*
1		0310	39	1152.	*	1		2155	264	0.	*	2		1640	489	0.	*	3		1125	714	0.	*
1		0315	40	2270.	*	1		2200	265	0.	*	2		1645	490	0.	*	3		1130	715	0.	*
1		0320	41	3801.	*	1		2205	266	0.	*	2		1650	491	0.	*	3		1135	716	0.	*
1		0325	42	4989.	*	1		2210	267	0.	*	2		1655	492	0.	*	3		1140	717	0.	*
1		0330	43	5398.	*	1		2215	268	0.	*	2		1700	493	0.	*	3		1145	718	0.	*
1		0335	44	5240.	*	1		2220	269	0.	*	2		1705	494	0.	*	3		1150	719	0.	*
1		0340	45	4808.	*	1		2225	270	0.	*	2		1710	495	0.	*	3		1155	720	0.	*
1		0345	46	4259.	*	1		2230	271	0.	*	2		1715	496	0.	*	3		1200	721	0.	*
1		0350	47	3708.	*	1		2235	272	0.	*	2		1720	497	0.	*	3		1205	722	0.	*
1		0355	48	3221.	*	1		2240	273	0.	*	2		1725	498	0.	*	3		1210	723	0.	*
1		0400	49	2812.	*	1		2245	274	0.	*	2		1730	499	0.	*	3		1215	724	0.	*
1		0405	50	2470.	*	1		2250	275	0.	*	2		1735	500	0.	*	3		1220	725	0.	*
1		0410	51	2159.	*	1		2255	276	0.	*	2		1740	501	0.	*	3		1225	726	0.	*
1		0415	52	1864.	*	1		2300	277	0.	*	2		1745	502	0.	*	3		1230	727	0.	*
1		0420	53	1600.	*	1		2305	278	0.	*	2		1750	503	0.	*	3		1235	728	0.	*
1		0425	54	1364.	*	1		2310	279	0.	*	2		1755	504	0.	*	3		1240	729	0.	*
1		0430	55	1162.	*	1		2315	280	0.	*	2		1800	505	0.	*	3		1245	730	0.	*
1		0435	56	995.	*	1		2320	281	0.	*	2		1805	506	0.	*	3		1250	731	0.	*
1		0440	57	855.	*	1		2325	282	0.	*	2		1810	507	0.	*	3		1255	732	0.	*
1		0445	58	734.	*	1		2330	283	0.	*	2		1815	508	0.	*	3		1300	733	0.	*
1		0450	59	638.	*	1		2335	284	0.	*	2		1820	509	0.	*	3		1305	734	0.	*
1		0455	60	564.	*	1		2340	285	0.	*	2		1825	510	0.	*	3		1310	735	0.	*
1		0500	61	502.	*	1		2345	286	0.	*	2		1830	511	0.	*	3		1315	736	0.	*
1		0505	62	451.	*	1		2350	287	0.	*	2		1835	512	0.	*	3		1320	737	0.	*
1		0510	63	403.	*	1		2355	288	0.	*	2		1840	513	0.	*	3		1325	738	0.	*
1		0515	64	353.	*	2		0000	289	0.	*	2		1845	514	0.	*	3		1330	739	0.	*

1	0520	65	303.	*	2	0005	290	0.	*	2	1850	515	0.	*	3	1335	740	0.
1	0525	66	258.	*	2	0010	291	0.	*	2	1855	516	0.	*	3	1340	741	0.
1	0530	67	218.	*	2	0015	292	0.	*	2	1900	517	0.	*	3	1345	742	0.
1	0535	68	185.	*	2	0020	293	0.	*	2	1905	518	0.	*	3	1350	743	0.
1	0540	69	161.	*	2	0025	294	0.	*	2	1910	519	0.	*	3	1355	744	0.
1	0545	70	139.	*	2	0030	295	0.	*	2	1915	520	0.	*	3	1400	745	0.
1	0550	71	120.	*	2	0035	296	0.	*	2	1920	521	0.	*	3	1405	746	0.
1	0555	72	104.	*	2	0040	297	0.	*	2	1925	522	0.	*	3	1410	747	0.
1	0600	73	92.	*	2	0045	298	0.	*	2	1930	523	0.	*	3	1415	748	0.
1	0605	74	83.	*	2	0050	299	0.	*	2	1935	524	0.	*	3	1420	749	0.
1	0610	75	74.	*	2	0055	300	0.	*	2	1940	525	0.	*	3	1425	750	0.
1	0615	76	65.	*	2	0100	301	0.	*	2	1945	526	0.	*	3	1430	751	0.
1	0620	77	56.	*	2	0105	302	0.	*	2	1950	527	0.	*	3	1435	752	0.
1	0625	78	48.	*	2	0110	303	0.	*	2	1955	528	0.	*	3	1440	753	0.
1	0630	79	41.	*	2	0115	304	0.	*	2	2000	529	0.	*	3	1445	754	0.
1	0635	80	34.	*	2	0120	305	0.	*	2	2005	530	0.	*	3	1450	755	0.
1	0640	81	28.	*	2	0125	306	0.	*	2	2010	531	0.	*	3	1455	756	0.
1	0645	82	25.	*	2	0130	307	0.	*	2	2015	532	0.	*	3	1500	757	0.
1	0650	83	22.	*	2	0135	308	0.	*	2	2020	533	0.	*	3	1505	758	0.
1	0655	84	20.	*	2	0140	309	0.	*	2	2025	534	0.	*	3	1510	759	0.
1	0700	85	17.	*	2	0145	310	0.	*	2	2030	535	0.	*	3	1515	760	0.
1	0705	86	15.	*	2	0150	311	0.	*	2	2035	536	0.	*	3	1520	761	0.
1	0710	87	13.	*	2	0155	312	0.	*	2	2040	537	0.	*	3	1525	762	0.
1	0715	88	11.	*	2	0200	313	0.	*	2	2045	538	0.	*	3	1530	763	0.
1	0720	89	9.	*	2	0205	314	0.	*	2	2050	539	0.	*	3	1535	764	0.
1	0725	90	8.	*	2	0210	315	0.	*	2	2055	540	0.	*	3	1540	765	0.
1	0730	91	7.	*	2	0215	316	0.	*	2	2100	541	0.	*	3	1545	766	0.
1	0735	92	6.	*	2	0220	317	0.	*	2	2105	542	0.	*	3	1550	767	0.
1	0740	93	5.	*	2	0225	318	0.	*	2	2110	543	0.	*	3	1555	768	0.
1	0745	94	4.	*	2	0230	319	0.	*	2	2115	544	0.	*	3	1600	769	0.
1	0750	95	3.	*	2	0235	320	0.	*	2	2120	545	0.	*	3	1605	770	0.
1	0755	96	3.	*	2	0240	321	0.	*	2	2125	546	0.	*	3	1610	771	0.
1	0800	97	2.	*	2	0245	322	0.	*	2	2130	547	0.	*	3	1615	772	0.
1	0805	98	2.	*	2	0250	323	0.	*	2	2135	548	0.	*	3	1620	773	0.
1	0810	99	2.	*	2	0255	324	0.	*	2	2140	549	0.	*	3	1625	774	0.
1	0815	100	1.	*	2	0300	325	0.	*	2	2145	550	0.	*	3	1630	775	0.
1	0820	101	1.	*	2	0305	326	0.	*	2	2150	551	0.	*	3	1635	776	0.
1	0825	102	1.	*	2	0310	327	0.	*	2	2155	552	0.	*	3	1640	777	0.
1	0830	103	1.	*	2	0315	328	0.	*	2	2200	553	0.	*	3	1645	778	0.
1	0835	104	1.	*	2	0320	329	0.	*	2	2205	554	0.	*	3	1650	779	0.
1	0840	105	0.	*	2	0325	330	0.	*	2	2210	555	0.	*	3	1655	780	0.
1	0845	106	0.	*	2	0330	331	0.	*	2	2215	556	0.	*	3	1700	781	0.
1	0850	107	0.	*	2	0335	332	0.	*	2	2220	557	0.	*	3	1705	782	0.
1	0855	108	0.	*	2	0340	333	0.	*	2	2225	558	0.	*	3	1710	783	0.
1	0900	109	0.	*	2	0345	334	0.	*	2	2230	559	0.	*	3	1715	784	0.
1	0905	110	0.	*	2	0350	335	0.	*	2	2235	560	0.	*	3	1720	785	0.
1	0910	111	0.	*	2	0355	336	0.	*	2	2240	561	0.	*	3	1725	786	0.
1	0915	112	0.	*	2	0400	337	0.	*	2	2245	562	0.	*	3	1730	787	0.
1	0920	113	0.	*	2	0405	338	0.	*	2	2250	563	0.	*	3	1735	788	0.
1	0925	114	0.	*	2	0410	339	0.	*	2	2255	564	0.	*	3	1740	789	0.
1	0930	115	0.	*	2	0415	340	0.	*	2	2300	565	0.	*	3	1745	790	0.
1	0935	116	0.	*	2	0420	341	0.	*	2	2305	566	0.	*	3	1750	791	0.
1	0940	117	0.	*	2	0425	342	0.	*	2	2310	567	0.	*	3	1755	792	0.
1	0945	118	0.	*	2	0430	343	0.	*	2	2315	568	0.	*	3	1800	793	0.
1	0950	119	0.	*	2	0435	344	0.	*	2	2320	569	0.	*	3	1805	794	0.
1	0955	120	0.	*	2	0440	345	0.	*	2	2325	570	0.	*	3	1810	795	0.
1	1000	121	0.	*	2	0445	346	0.	*	2	2330	571	0.	*	3	1815	796	0.
1	1005	122	0.	*	2	0450	347	0.	*	2	2335	572	0.	*	3	1820	797	0.
1	1010	123	0.	*	2	0455	348	0.	*	2	2340	573	0.	*	3	1825	798	0.
1	1015	124	0.	*	2	0500	349	0.	*	2	2345	574	0.	*	3	1830	799	0.
1	1020	125	0.	*	2	0505	350	0.	*	2	2350	575	0.	*	3	1835	800	0.
1	1025	126	0.	*	2	0510	351	0.	*	2	2355	576	0.	*	3	1840	801	0.
1	1030	127	0.	*	2	0515	352	0.	*	3	0000	577	0.	*	3	1845	802	0.
1	1035	128	0.	*	2	0520	353	0.	*	3	0005	578	0.	*	3	1850	803	0.
1	1040	129	0.	*	2	0525	354	0.	*	3	0010	579	0.	*	3	1855	804	0.
1	1045	130	0.	*	2	0530	355	0.	*	3	0015	580	0.	*	3	1900	805	0.

1	1050	131	0.	*	2	0535	356	0.	*	3	0020	581	0.	*	3	1905	806	0.
1	1055	132	0.	*	2	0540	357	0.	*	3	0025	582	0.	*	3	1910	807	0.
1	1100	133	0.	*	2	0545	358	0.	*	3	0030	583	0.	*	3	1915	808	0.
1	1105	134	0.	*	2	0550	359	0.	*	3	0035	584	0.	*	3	1920	809	0.
1	1110	135	0.	*	2	0555	360	0.	*	3	0040	585	0.	*	3	1925	810	0.
1	1115	136	0.	*	2	0600	361	0.	*	3	0045	586	0.	*	3	1930	811	0.
1	1120	137	0.	*	2	0605	362	0.	*	3	0050	587	0.	*	3	1935	812	0.
1	1125	138	0.	*	2	0610	363	0.	*	3	0055	588	0.	*	3	1940	813	0.
1	1130	139	0.	*	2	0615	364	0.	*	3	0100	589	0.	*	3	1945	814	0.
1	1135	140	0.	*	2	0620	365	0.	*	3	0105	590	0.	*	3	1950	815	0.
1	1140	141	0.	*	2	0625	366	0.	*	3	0110	591	0.	*	3	1955	816	0.
1	1145	142	0.	*	2	0630	367	0.	*	3	0115	592	0.	*	3	2000	817	0.
1	1150	143	0.	*	2	0635	368	0.	*	3	0120	593	0.	*	3	2005	818	0.
1	1155	144	0.	*	2	0640	369	0.	*	3	0125	594	0.	*	3	2010	819	0.
1	1200	145	0.	*	2	0645	370	0.	*	3	0130	595	0.	*	3	2015	820	0.
1	1205	146	0.	*	2	0650	371	0.	*	3	0135	596	0.	*	3	2020	821	0.
1	1210	147	0.	*	2	0655	372	0.	*	3	0140	597	0.	*	3	2025	822	0.
1	1215	148	0.	*	2	0700	373	0.	*	3	0145	598	0.	*	3	2030	823	0.
1	1220	149	0.	*	2	0705	374	0.	*	3	0150	599	0.	*	3	2035	824	0.
1	1225	150	0.	*	2	0710	375	0.	*	3	0155	600	0.	*	3	2040	825	0.
1	1230	151	0.	*	2	0715	376	0.	*	3	0200	601	0.	*	3	2045	826	0.
1	1235	152	0.	*	2	0720	377	0.	*	3	0205	602	0.	*	3	2050	827	0.
1	1240	153	0.	*	2	0725	378	0.	*	3	0210	603	0.	*	3	2055	828	0.
1	1245	154	0.	*	2	0730	379	0.	*	3	0215	604	0.	*	3	2100	829	0.
1	1250	155	0.	*	2	0735	380	0.	*	3	0220	605	0.	*	3	2105	830	0.
1	1255	156	0.	*	2	0740	381	0.	*	3	0225	606	0.	*	3	2110	831	0.
1	1300	157	0.	*	2	0745	382	0.	*	3	0230	607	0.	*	3	2115	832	0.
1	1305	158	0.	*	2	0750	383	0.	*	3	0235	608	0.	*	3	2120	833	0.
1	1310	159	0.	*	2	0755	384	0.	*	3	0240	609	0.	*	3	2125	834	0.
1	1315	160	0.	*	2	0800	385	0.	*	3	0245	610	0.	*	3	2130	835	0.
1	1320	161	0.	*	2	0805	386	0.	*	3	0250	611	0.	*	3	2135	836	0.
1	1325	162	0.	*	2	0810	387	0.	*	3	0255	612	0.	*	3	2140	837	0.
1	1330	163	0.	*	2	0815	388	0.	*	3	0300	613	0.	*	3	2145	838	0.
1	1335	164	0.	*	2	0820	389	0.	*	3	0305	614	0.	*	3	2150	839	0.
1	1340	165	0.	*	2	0825	390	0.	*	3	0310	615	0.	*	3	2155	840	0.
1	1345	166	0.	*	2	0830	391	0.	*	3	0315	616	0.	*	3	2200	841	0.
1	1350	167	0.	*	2	0835	392	0.	*	3	0320	617	0.	*	3	2205	842	0.
1	1355	168	0.	*	2	0840	393	0.	*	3	0325	618	0.	*	3	2210	843	0.
1	1400	169	0.	*	2	0845	394	0.	*	3	0330	619	0.	*	3	2215	844	0.
1	1405	170	0.	*	2	0850	395	0.	*	3	0335	620	0.	*	3	2220	845	0.
1	1410	171	0.	*	2	0855	396	0.	*	3	0340	621	0.	*	3	2225	846	0.
1	1415	172	0.	*	2	0900	397	0.	*	3	0345	622	0.	*	3	2230	847	0.
1	1420	173	0.	*	2	0905	398	0.	*	3	0350	623	0.	*	3	2235	848	0.
1	1425	174	0.	*	2	0910	399	0.	*	3	0355	624	0.	*	3	2240	849	0.
1	1430	175	0.	*	2	0915	400	0.	*	3	0400	625	0.	*	3	2245	850	0.
1	1435	176	0.	*	2	0920	401	0.	*	3	0405	626	0.	*	3	2250	851	0.
1	1440	177	0.	*	2	0925	402	0.	*	3	0410	627	0.	*	3	2255	852	0.
1	1445	178	0.	*	2	0930	403	0.	*	3	0415	628	0.	*	3	2300	853	0.
1	1450	179	0.	*	2	0935	404	0.	*	3	0420	629	0.	*	3	2305	854	0.
1	1455	180	0.	*	2	0940	405	0.	*	3	0425	630	0.	*	3	2310	855	0.
1	1500	181	0.	*	2	0945	406	0.	*	3	0430	631	0.	*	3	2315	856	0.
1	1505	182	0.	*	2	0950	407	0.	*	3	0435	632	0.	*	3	2320	857	0.
1	1510	183	0.	*	2	0955	408	0.	*	3	0440	633	0.	*	3	2325	858	0.
1	1515	184	0.	*	2	1000	409	0.	*	3	0445	634	0.	*	3	2330	859	0.
1	1520	185	0.	*	2	1005	410	0.	*	3	0450	635	0.	*	3	2335	860	0.
1	1525	186	0.	*	2	1010	411	0.	*	3	0455	636	0.	*	3	2340	861	0.
1	1530	187	0.	*	2	1015	412	0.	*	3	0500	637	0.	*	3	2345	862	0.
1	1535	188	0.	*	2	1020	413	0.	*	3	0505	638	0.	*	3	2350	863	0.
1	1540	189	0.	*	2	1025	414	0.	*	3	0510	639	0.	*	3	2355	864	0.
1	1545	190	0.	*	2	1030	415	0.	*	3	0515	640	0.	*	4	0000	865	0.
1	1550	191	0.	*	2	1035	416	0.	*	3	0520	641	0.	*	4	0005	866	0.
1	1555	192	0.	*	2	1040	417	0.	*	3	0525	642	0.	*	4	0010	867	0.
1	1600	193	0.	*	2	1045	418	0.	*	3	0530	643	0.	*	4	0015	868	0.
1	1605	194	0.	*	2	1050	419	0.	*	3	0535	644	0.	*	4	0020	869	0.
1	1610	195	0.	*	2	1055	420	0.	*	3	0540	645	0.	*	4	0025	870	0.
1	1615	196	0.	*	2	1100	421	0.	*	3	0545	646	0.	*	4	0030	871	0.

1	1620	197	0.	*	2	1105	422	0.	*	3	0550	647	0.	*	4	0035	872	0.
1	1625	198	0.	*	2	1110	423	0.	*	3	0555	648	0.	*	4	0040	873	0.
1	1630	199	0.	*	2	1115	424	0.	*	3	0600	649	0.	*	4	0045	874	0.
1	1635	200	0.	*	2	1120	425	0.	*	3	0605	650	0.	*	4	0050	875	0.
1	1640	201	0.	*	2	1125	426	0.	*	3	0610	651	0.	*	4	0055	876	0.
1	1645	202	0.	*	2	1130	427	0.	*	3	0615	652	0.	*	4	0100	877	0.
1	1650	203	0.	*	2	1135	428	0.	*	3	0620	653	0.	*	4	0105	878	0.
1	1655	204	0.	*	2	1140	429	0.	*	3	0625	654	0.	*	4	0110	879	0.
1	1700	205	0.	*	2	1145	430	0.	*	3	0630	655	0.	*	4	0115	880	0.
1	1705	206	0.	*	2	1150	431	0.	*	3	0635	656	0.	*	4	0120	881	0.
1	1710	207	0.	*	2	1155	432	0.	*	3	0640	657	0.	*	4	0125	882	0.
1	1715	208	0.	*	2	1200	433	0.	*	3	0645	658	0.	*	4	0130	883	0.
1	1720	209	0.	*	2	1205	434	0.	*	3	0650	659	0.	*	4	0135	884	0.
1	1725	210	0.	*	2	1210	435	0.	*	3	0655	660	0.	*	4	0140	885	0.
1	1730	211	0.	*	2	1215	436	0.	*	3	0700	661	0.	*	4	0145	886	0.
1	1735	212	0.	*	2	1220	437	0.	*	3	0705	662	0.	*	4	0150	887	0.
1	1740	213	0.	*	2	1225	438	0.	*	3	0710	663	0.	*	4	0155	888	0.
1	1745	214	0.	*	2	1230	439	0.	*	3	0715	664	0.	*	4	0200	889	0.
1	1750	215	0.	*	2	1235	440	0.	*	3	0720	665	0.	*	4	0205	890	0.
1	1755	216	0.	*	2	1240	441	0.	*	3	0725	666	0.	*	4	0210	891	0.
1	1800	217	0.	*	2	1245	442	0.	*	3	0730	667	0.	*	4	0215	892	0.
1	1805	218	0.	*	2	1250	443	0.	*	3	0735	668	0.	*	4	0220	893	0.
1	1810	219	0.	*	2	1255	444	0.	*	3	0740	669	0.	*	4	0225	894	0.
1	1815	220	0.	*	2	1300	445	0.	*	3	0745	670	0.	*	4	0230	895	0.
1	1820	221	0.	*	2	1305	446	0.	*	3	0750	671	0.	*	4	0235	896	0.
1	1825	222	0.	*	2	1310	447	0.	*	3	0755	672	0.	*	4	0240	897	0.
1	1830	223	0.	*	2	1315	448	0.	*	3	0800	673	0.	*	4	0245	898	0.
1	1835	224	0.	*	2	1320	449	0.	*	3	0805	674	0.	*	4	0250	899	0.
1	1840	225	0.	*	2	1325	450	0.	*	3	0810	675	0.	*	4	0255	900	0.

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW	74.92-HR
5398.	3.50	6-HR 891. 24-HR 224. 72-HR 75. 74.92-HR 72.	6.705
(INCHES)	(AC-FT)	6.681 442.	6.705 443.

CUMULATIVE AREA = 1.24 SQ MI

* *
56 KK * DAMOUT *
* *

Route Hydrograph Through Dam.

60 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

59 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC 2.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

61 SA	AREA	2.0 12.1	2.5 12.3	5.8 12.8	6.8 13.3	9.1 13.8	10.2	11.0	11.3	11.6	11.9
63 SE	ELEVATION	2135.00 2159.00	2137.00 2160.00	2140.00 2161.00	2144.00 2162.00	2150.00 2163.00	2153.00	2155.00	2156.00	2157.00	2158.00
65 SQ	DISCHARGE	0. 2392.	0. 3419.	0. 4546.	0. 5742.	0. 6984.	0.	0.	264.	792.	1508.

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	4.53	16.62	41.74	89.06	117.93	139.09	150.24	161.71	173.46
ELEVATION	2135.00	2137.00	2140.00	2144.00	2150.00	2153.00	2155.00	2156.00	2157.00	2158.00
STORAGE	185.44	197.64	210.20	223.26	236.82					
ELEVATION	2159.00	2160.00	2161.00	2162.00	2163.00					

HYDROGRAPH AT STATION DAMOUT
PLAN 1, RATIO = 0.50

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	2.0	2135.9	*	2		0100	301	0.	139.1	2155.0	*	3		0200	601	0.	139.1	2155.0
1		0005	2	0.	2.0	2135.9	*	2		0105	302	0.	139.1	2155.0	*	3		0205	602	0.	139.1	2155.0
1		0010	3	0.	2.0	2135.9	*	2		0110	303	0.	139.1	2155.0	*	3		0210	603	0.	139.1	2155.0
1		0015	4	0.	2.0	2135.9	*	2		0115	304	0.	139.1	2155.0	*	3		0215	604	0.	139.1	2155.0
1		0020	5	0.	2.0	2135.9	*	2		0120	305	0.	139.1	2155.0	*	3		0220	605	0.	139.1	2155.0
1		0025	6	0.	2.1	2135.9	*	2		0125	306	0.	139.1	2155.0	*	3		0225	606	0.	139.1	2155.0
1		0030	7	0.	2.1	2135.9	*	2		0130	307	0.	139.1	2155.0	*	3		0230	607	0.	139.1	2155.0
1		0035	8	0.	2.2	2136.0	*	2		0135	308	0.	139.1	2155.0	*	3		0235	608	0.	139.1	2155.0
1		0040	9	0.	2.3	2136.0	*	2		0140	309	0.	139.1	2155.0	*	3		0240	609	0.	139.1	2155.0
1		0045	10	0.	2.4	2136.1	*	2		0145	310	0.	139.1	2155.0	*	3		0245	610	0.	139.1	2155.0
1		0050	11	0.	2.6	2136.1	*	2		0150	311	0.	139.1	2155.0	*	3		0250	611	0.	139.1	2155.0
1		0055	12	0.	2.7	2136.2	*	2		0155	312	0.	139.1	2155.0	*	3		0255	612	0.	139.1	2155.0
1		0100	13	0.	2.9	2136.3	*	2		0200	313	0.	139.1	2155.0	*	3		0300	613	0.	139.1	2155.0
1		0105	14	0.	3.1	2136.4	*	2		0205	314	0.	139.1	2155.0	*	3		0305	614	0.	139.1	2155.0
1		0110	15	0.	3.3	2136.5	*	2		0210	315	0.	139.1	2155.0	*	3		0310	615	0.	139.1	2155.0
1		0115	16	0.	3.5	2136.6	*	2		0215	316	0.	139.1	2155.0	*	3		0315	616	0.	139.1	2155.0
1		0120	17	0.	3.8	2136.7	*	2		0220	317	0.	139.1	2155.0	*	3		0320	617	0.	139.1	2155.0
1		0125	18	0.	4.1	2136.8	*	2		0225	318	0.	139.1	2155.0	*	3		0325	618	0.	139.1	2155.0
1		0130	19	0.	4.4	2136.9	*	2		0230	319	0.	139.1	2155.0	*	3		0330	619	0.	139.1	2155.0
1		0135	20	0.	4.7	2137.0	*	2		0235	320	0.	139.1	2155.0	*	3		0335	620	0.	139.1	2155.0
1		0140	21	0.	5.1	2137.1	*	2		0240	321	0.	139.1	2155.0	*	3		0340	621	0.	139.1	2155.0
1		0145	22	0.	5.4	2137.2	*	2		0245	322	0.	139.1	2155.0	*	3		0345	622	0.	139.1	2155.0
1		0150	23	0.	5.8	2137.3	*	2		0250	323	0.	139.1	2155.0	*	3		0350	623	0.	139.1	2155.0
1		0155	24	0.	6.2	2137.4	*	2		0255	324	0.	139.1	2155.0	*	3		0355	624	0.	139.1	2155.0
1		0200	25	0.	6.6	2137.5	*	2		0300	325	0.	139.1	2155.0	*	3		0400	625	0.	139.1	2155.0
1		0205	26	0.	7.1	2137.6	*	2		0305	326	0.	139.1	2155.0	*	3		0405	626	0.	139.1	2155.0
1		0210	27	0.	7.6	2137.8	*	2		0310	327	0.	139.1	2155.0	*	3		0410	627	0.	139.1	2155.0
1		0215	28	0.	8.3	2137.9	*	2		0315	328	0.	139.1	2155.0	*	3		0415	628	0.	139.1	2155.0
1		0220	29	0.	9.2	2138.2	*	2		0320	329	0.	139.1	2155.0	*	3		0420	629	0.	139.1	2155.0
1		0225	30	0.	10.4	2138.5	*	2		0325	330	0.	139.1	2155.0	*	3		0425	630	0.	139.1	2155.0
1		0230	31	0.	11.9	2138.8	*	2		0330	331	0.	139.1	2155.0	*	3		0430	631	0.	139.1	2155.0
1		0235	32	0.	13.8	2139.3	*	2		0335	332	0.	139.1	2155.0	*	3		0435	632	0.	139.1	2155.0
1		0240	33	0.	16.0	2139.8	*	2		0340	333	0.	139.1	2155.0	*	3		0440	633	0.	139.1	2155.0
1		0245	34	0.	18.4	2140.3	*	2		0345	334	0.	139.1	2155.0	*	3		0445	634	0.	139.1	2155.0
1		0250	35	0.	21.1	2140.7	*	2		0350	335	0.	139.1	2155.0	*	3		0450	635	0.	139.1	2155.0
1		0255	36	0.	23.9	2141.2	*	2		0355	336	0.	139.1	2155.0	*	3		0455	636	0.	139.1	2155.0
1		0300	37	0.	26.9	2141.6	*	2		0400	337	0.	139.1	2155.0	*	3		0500	637	0.	139.1	2155.0

1	0305	38	0.	30.4	2142.2	* 2	0405	338	0.	139.1	2155.0	* 3	0505	638	0.	139.1	2155.0
1	0310	39	0.	36.4	2143.2	* 2	0410	339	0.	139.1	2155.0	* 3	0510	639	0.	139.1	2155.0
1	0315	40	0.	48.2	2144.8	* 2	0415	340	0.	139.1	2155.0	* 3	0515	640	0.	139.1	2155.0
1	0320	41	0.	69.1	2147.5	* 2	0420	341	0.	139.1	2155.0	* 3	0520	641	0.	139.1	2155.0
1	0325	42	0.	99.4	2151.1	* 2	0425	342	0.	139.1	2155.0	* 3	0525	642	0.	139.1	2155.0
1	0330	43	0.	135.2	2154.6	* 2	0430	343	0.	139.1	2155.0	* 3	0530	643	0.	139.1	2155.0
1	0335	44	1162.	167.8	2157.5	* 2	0435	344	0.	139.1	2155.0	* 3	0535	644	0.	139.1	2155.0
1	0340	45	2699.	189.1	2159.3	* 2	0440	345	0.	139.1	2155.0	* 3	0540	645	0.	139.1	2155.0
1	0345	46	3529.	198.9	2160.1	* 2	0445	346	0.	139.1	2155.0	* 3	0545	646	0.	139.1	2155.0
1	0350	47	3744.	201.3	2160.3	* 2	0450	347	0.	139.1	2155.0	* 3	0550	647	0.	139.1	2155.0
1	0355	48	3612.	199.8	2160.2	* 2	0455	348	0.	139.1	2155.0	* 3	0555	648	0.	139.1	2155.0
1	0400	49	3335.	196.6	2159.9	* 2	0500	349	0.	139.1	2155.0	* 3	0600	649	0.	139.1	2155.0
1	0405	50	3023.	192.9	2159.6	* 2	0505	350	0.	139.1	2155.0	* 3	0605	650	0.	139.1	2155.0
1	0410	51	2704.	189.2	2159.3	* 2	0510	351	0.	139.1	2155.0	* 3	0610	651	0.	139.1	2155.0
1	0415	52	2393.	185.5	2159.0	* 2	0515	352	0.	139.1	2155.0	* 3	0615	652	0.	139.1	2155.0
1	0420	53	2125.	181.8	2158.7	* 2	0520	353	0.	139.1	2155.0	* 3	0620	653	0.	139.1	2155.0
1	0425	54	1865.	178.3	2158.4	* 2	0525	354	0.	139.1	2155.0	* 3	0625	654	0.	139.1	2155.0
1	0430	55	1621.	175.0	2158.1	* 2	0530	355	0.	139.1	2155.0	* 3	0630	655	0.	139.1	2155.0
1	0435	56	1416.	172.0	2157.9	* 2	0535	356	0.	139.1	2155.0	* 3	0635	656	0.	139.1	2155.0
1	0440	57	1246.	169.2	2157.6	* 2	0540	357	0.	139.1	2155.0	* 3	0640	657	0.	139.1	2155.0
1	0445	58	1089.	166.6	2157.4	* 2	0545	358	0.	139.1	2155.0	* 3	0645	658	0.	139.1	2155.0
1	0450	59	949.	164.3	2157.2	* 2	0550	359	0.	139.1	2155.0	* 3	0650	659	0.	139.1	2155.0
1	0455	60	828.	162.3	2157.1	* 2	0555	360	0.	139.1	2155.0	* 3	0655	660	0.	139.1	2155.0
1	0500	61	740.	160.6	2156.9	* 2	0600	361	0.	139.1	2155.0	* 3	0700	661	0.	139.1	2155.0
1	0505	62	668.	159.0	2156.8	* 2	0605	362	0.	139.1	2155.0	* 3	0705	662	0.	139.1	2155.0
1	0510	63	602.	157.6	2156.6	* 2	0610	363	0.	139.1	2155.0	* 3	0710	663	0.	139.1	2155.0
1	0515	64	541.	156.3	2156.5	* 2	0615	364	0.	139.1	2155.0	* 3	0715	664	0.	139.1	2155.0
1	0520	65	483.	155.0	2156.4	* 2	0620	365	0.	139.1	2155.0	* 3	0720	665	0.	139.1	2155.0
1	0525	66	427.	153.8	2156.3	* 2	0625	366	0.	139.1	2155.0	* 3	0725	666	0.	139.1	2155.0
1	0530	67	375.	152.7	2156.2	* 2	0630	367	0.	139.1	2155.0	* 3	0730	667	0.	139.1	2155.0
1	0535	68	328.	151.6	2156.1	* 2	0635	368	0.	139.1	2155.0	* 3	0735	668	0.	139.1	2155.0
1	0540	69	286.	150.7	2156.0	* 2	0640	369	0.	139.1	2155.0	* 3	0740	669	0.	139.1	2155.0
1	0545	70	255.	149.9	2156.0	* 2	0645	370	0.	139.1	2155.0	* 3	0745	670	0.	139.1	2155.0
1	0550	71	237.	149.1	2155.9	* 2	0650	371	0.	139.1	2155.0	* 3	0750	671	0.	139.1	2155.0
1	0555	72	218.	148.3	2155.8	* 2	0655	372	0.	139.1	2155.0	* 3	0755	672	0.	139.1	2155.0
1	0600	73	200.	147.5	2155.8	* 2	0700	373	0.	139.1	2155.0	* 3	0800	673	0.	139.1	2155.0
1	0605	74	183.	146.8	2155.7	* 2	0705	374	0.	139.1	2155.0	* 3	0805	674	0.	139.1	2155.0
1	0610	75	167.	146.1	2155.6	* 2	0710	375	0.	139.1	2155.0	* 3	0810	675	0.	139.1	2155.0
1	0615	76	152.	145.5	2155.6	* 2	0715	376	0.	139.1	2155.0	* 3	0815	676	0.	139.1	2155.0
1	0620	77	138.	144.9	2155.5	* 2	0720	377	0.	139.1	2155.0	* 3	0820	677	0.	139.1	2155.0
1	0625	78	125.	144.4	2155.5	* 2	0725	378	0.	139.1	2155.0	* 3	0825	678	0.	139.1	2155.0
1	0630	79	113.	143.9	2155.4	* 2	0730	379	0.	139.1	2155.0	* 3	0830	679	0.	139.1	2155.0
1	0635	80	102.	143.4	2155.4	* 2	0735	380	0.	139.1	2155.0	* 3	0835	680	0.	139.1	2155.0
1	0640	81	91.	142.9	2155.3	* 2	0740	381	0.	139.1	2155.0	* 3	0840	681	0.	139.1	2155.0
1	0645	82	81.	142.5	2155.3	* 2	0745	382	0.	139.1	2155.0	* 3	0845	682	0.	139.1	2155.0
1	0650	83	73.	142.2	2155.3	* 2	0750	383	0.	139.1	2155.0	* 3	0850	683	0.	139.1	2155.0
1	0655	84	65.	141.8	2155.2	* 2	0755	384	0.	139.1	2155.0	* 3	0855	684	0.	139.1	2155.0
1	0700	85	58.	141.5	2155.2	* 2	0800	385	0.	139.1	2155.0	* 3	0900	685	0.	139.1	2155.0
1	0705	86	52.	141.3	2155.2	* 2	0805	386	0.	139.1	2155.0	* 3	0905	686	0.	139.1	2155.0
1	0710	87	46.	141.0	2155.2	* 2	0810	387	0.	139.1	2155.0	* 3	0910	687	0.	139.1	2155.0
1	0715	88	41.	140.8	2155.2	* 2	0815	388	0.	139.1	2155.0	* 3	0915	688	0.	139.1	2155.0
1	0720	89	36.	140.6	2155.1	* 2	0820	389	0.	139.1	2155.0	* 3	0920	689	0.	139.1	2155.0
1	0725	90	32.	140.4	2155.1	* 2	0825	390	0.	139.1	2155.0	* 3	0925	690	0.	139.1	2155.0
1	0730	91	28.	140.3	2155.1	* 2	0830	391	0.	139.1	2155.0	* 3	0930	691	0.	139.1	2155.0
1	0735	92	25.	140.1	2155.1	* 2	0835	392	0.	139.1	2155.0	* 3	0935	692	0.	139.1	2155.0
1	0740	93	22.	140.0	2155.1	* 2	0840	393	0.	139.1	2155.0	* 3	0940	693	0.	139.1	2155.0
1	0745	94	19.	139.9	2155.1	* 2	0845	394	0.	139.1	2155.0	* 3	0945	694	0.	139.1	2155.0
1	0750	95	17.	139.8	2155.1	* 2	0850	395	0.	139.1	2155.0	* 3	0950	695	0.	139.1	2155.0
1	0755	96	15.	139.7	2155.1	* 2	0855	396	0.	139.1	2155.0	* 3	0955	696	0.	139.1	2155.0
1	0800	97	13.	139.6	2155.0	* 2	0900	397	0.	139.1	2155.0	* 3	1000	697	0.	139.1	2155.0
1	0805	98	11.	139.6	2155.0	* 2	0905	398	0.	139.1	2155.0	* 3	1005	698	0.	139.1	2155.0
1	0810	99	10.	139.5	2155.0	* 2	0910	399	0.	139.1	2155.0	* 3	1010	699	0.	139.1	2155.0
1	0815	100	9.	139.5	2155.0	* 2	0915	400	0.	139.1	2155.0	* 3	1015	700	0.	139.1	2155.0
1	0820	101	7.	139.4	2155.0	* 2	0920	401	0.	139.1	2155.0	* 3	1020	701	0.	139.1	2155.0
1	0825	102	6.	139.4	2155.0	* 2	0925	402	0.	139.1	2155.0	* 3	1025	702	0.	139.1	2155.0
1	0830	103	6.	139.3	2155.0	* 2	0930	403	0.	139.1	2155.0	* 3	1030	703	0.	139.1	2155.0

1	0835	104	5.	139.3	2155.0	*	2	0935	404	0.	139.1	2155.0	*	3	1035	704	0.	139.1	2155.0
1	0840	105	4.	139.3	2155.0	*	2	0940	405	0.	139.1	2155.0	*	3	1040	705	0.	139.1	2155.0
1	0845	106	4.	139.2	2155.0	*	2	0945	406	0.	139.1	2155.0	*	3	1045	706	0.	139.1	2155.0
1	0850	107	3.	139.2	2155.0	*	2	0950	407	0.	139.1	2155.0	*	3	1050	707	0.	139.1	2155.0
1	0855	108	3.	139.2	2155.0	*	2	0955	408	0.	139.1	2155.0	*	3	1055	708	0.	139.1	2155.0
1	0900	109	2.	139.2	2155.0	*	2	1000	409	0.	139.1	2155.0	*	3	1100	709	0.	139.1	2155.0
1	0905	110	2.	139.2	2155.0	*	2	1005	410	0.	139.1	2155.0	*	3	1105	710	0.	139.1	2155.0
1	0910	111	2.	139.2	2155.0	*	2	1010	411	0.	139.1	2155.0	*	3	1110	711	0.	139.1	2155.0
1	0915	112	1.	139.2	2155.0	*	2	1015	412	0.	139.1	2155.0	*	3	1115	712	0.	139.1	2155.0
1	0920	113	1.	139.1	2155.0	*	2	1020	413	0.	139.1	2155.0	*	3	1120	713	0.	139.1	2155.0
1	0925	114	1.	139.1	2155.0	*	2	1025	414	0.	139.1	2155.0	*	3	1125	714	0.	139.1	2155.0
1	0930	115	1.	139.1	2155.0	*	2	1030	415	0.	139.1	2155.0	*	3	1130	715	0.	139.1	2155.0
1	0935	116	1.	139.1	2155.0	*	2	1035	416	0.	139.1	2155.0	*	3	1135	716	0.	139.1	2155.0
1	0940	117	1.	139.1	2155.0	*	2	1040	417	0.	139.1	2155.0	*	3	1140	717	0.	139.1	2155.0
1	0945	118	1.	139.1	2155.0	*	2	1045	418	0.	139.1	2155.0	*	3	1145	718	0.	139.1	2155.0
1	0950	119	0.	139.1	2155.0	*	2	1050	419	0.	139.1	2155.0	*	3	1150	719	0.	139.1	2155.0
1	0955	120	0.	139.1	2155.0	*	2	1055	420	0.	139.1	2155.0	*	3	1155	720	0.	139.1	2155.0
1	1000	121	0.	139.1	2155.0	*	2	1100	421	0.	139.1	2155.0	*	3	1200	721	0.	139.1	2155.0
1	1005	122	0.	139.1	2155.0	*	2	1105	422	0.	139.1	2155.0	*	3	1205	722	0.	139.1	2155.0
1	1010	123	0.	139.1	2155.0	*	2	1110	423	0.	139.1	2155.0	*	3	1210	723	0.	139.1	2155.0
1	1015	124	0.	139.1	2155.0	*	2	1115	424	0.	139.1	2155.0	*	3	1215	724	0.	139.1	2155.0
1	1020	125	0.	139.1	2155.0	*	2	1120	425	0.	139.1	2155.0	*	3	1220	725	0.	139.1	2155.0
1	1025	126	0.	139.1	2155.0	*	2	1125	426	0.	139.1	2155.0	*	3	1225	726	0.	139.1	2155.0
1	1030	127	0.	139.1	2155.0	*	2	1130	427	0.	139.1	2155.0	*	3	1230	727	0.	139.1	2155.0
1	1035	128	0.	139.1	2155.0	*	2	1135	428	0.	139.1	2155.0	*	3	1235	728	0.	139.1	2155.0
1	1040	129	0.	139.1	2155.0	*	2	1140	429	0.	139.1	2155.0	*	3	1240	729	0.	139.1	2155.0
1	1045	130	0.	139.1	2155.0	*	2	1145	430	0.	139.1	2155.0	*	3	1245	730	0.	139.1	2155.0
1	1050	131	0.	139.1	2155.0	*	2	1150	431	0.	139.1	2155.0	*	3	1250	731	0.	139.1	2155.0
1	1055	132	0.	139.1	2155.0	*	2	1155	432	0.	139.1	2155.0	*	3	1255	732	0.	139.1	2155.0
1	1100	133	0.	139.1	2155.0	*	2	1200	433	0.	139.1	2155.0	*	3	1300	733	0.	139.1	2155.0
1	1105	134	0.	139.1	2155.0	*	2	1205	434	0.	139.1	2155.0	*	3	1305	734	0.	139.1	2155.0
1	1110	135	0.	139.1	2155.0	*	2	1210	435	0.	139.1	2155.0	*	3	1310	735	0.	139.1	2155.0
1	1115	136	0.	139.1	2155.0	*	2	1215	436	0.	139.1	2155.0	*	3	1315	736	0.	139.1	2155.0
1	1120	137	0.	139.1	2155.0	*	2	1220	437	0.	139.1	2155.0	*	3	1320	737	0.	139.1	2155.0
1	1125	138	0.	139.1	2155.0	*	2	1225	438	0.	139.1	2155.0	*	3	1325	738	0.	139.1	2155.0
1	1130	139	0.	139.1	2155.0	*	2	1230	439	0.	139.1	2155.0	*	3	1330	739	0.	139.1	2155.0
1	1135	140	0.	139.1	2155.0	*	2	1235	440	0.	139.1	2155.0	*	3	1335	740	0.	139.1	2155.0
1	1140	141	0.	139.1	2155.0	*	2	1240	441	0.	139.1	2155.0	*	3	1340	741	0.	139.1	2155.0
1	1145	142	0.	139.1	2155.0	*	2	1245	442	0.	139.1	2155.0	*	3	1345	742	0.	139.1	2155.0
1	1150	143	0.	139.1	2155.0	*	2	1250	443	0.	139.1	2155.0	*	3	1350	743	0.	139.1	2155.0
1	1155	144	0.	139.1	2155.0	*	2	1255	444	0.	139.1	2155.0	*	3	1355	744	0.	139.1	2155.0
1	1200	145	0.	139.1	2155.0	*	2	1300	445	0.	139.1	2155.0	*	3	1400	745	0.	139.1	2155.0
1	1205	146	0.	139.1	2155.0	*	2	1305	446	0.	139.1	2155.0	*	3	1405	746	0.	139.1	2155.0
1	1210	147	0.	139.1	2155.0	*	2	1310	447	0.	139.1	2155.0	*	3	1410	747	0.	139.1	2155.0
1	1215	148	0.	139.1	2155.0	*	2	1315	448	0.	139.1	2155.0	*	3	1415	748	0.	139.1	2155.0
1	1220	149	0.	139.1	2155.0	*	2	1320	449	0.	139.1	2155.0	*	3	1420	749	0.	139.1	2155.0
1	1225	150	0.	139.1	2155.0	*	2	1325	450	0.	139.1	2155.0	*	3	1425	750	0.	139.1	2155.0
1	1230	151	0.	139.1	2155.0	*	2	1330	451	0.	139.1	2155.0	*	3	1430	751	0.	139.1	2155.0
1	1235	152	0.	139.1	2155.0	*	2	1335	452	0.	139.1	2155.0	*	3	1435	752	0.	139.1	2155.0
1	1240	153	0.	139.1	2155.0	*	2	1340	453	0.	139.1	2155.0	*	3	1440	753	0.	139.1	2155.0
1	1245	154	0.	139.1	2155.0	*	2	1345	454	0.	139.1	2155.0	*	3	1445	754	0.	139.1	2155.0
1	1250	155	0.	139.1	2155.0	*	2	1350	455	0.	139.1	2155.0	*	3	1450	755	0.	139.1	2155.0
1	1255	156	0.	139.1	2155.0	*	2	1355	456	0.	139.1	2155.0	*	3	1455	756	0.	139.1	2155.0
1	1300	157	0.	139.1	2155.0	*	2	1400	457	0.	139.1	2155.0	*	3	1500	757	0.	139.1	2155.0
1	1305	158	0.	139.1	2155.0	*	2	1405	458	0.	139.1	2155.0	*	3	1505	758	0.	139.1	2155.0
1	1310	159	0.	139.1	2155.0	*	2	1410	459	0.	139.1	2155.0	*	3	1510	759	0.	139.1	2155.0
1	1315	160	0.	139.1	2155.0	*	2	1415	460	0.	139.1	2155.0	*	3	1515	760	0.	139.1	2155.0
1	1320	161	0.	139.1	2155.0	*	2	1420	461	0.	139.1	2155.0	*	3	1520	761	0.	139.1	2155.0
1	1325	162	0.	139.1	2155.0	*	2	1425	462	0.	139.1	2155.0	*	3	1525	762	0.	139.1	2155.0
1	1330	163	0.	139.1	2155.0	*	2	1430	463	0.	139.1	2155.0	*	3	1530	763	0.	139.1	2155.0
1	1335	164	0.	139.1	2155.0	*	2	1435	464	0.	139.1	2155.0	*	3	1535	764	0.	139.1	2155.0
1	1340	165	0.	139.1	2155.0	*	2	1440	465	0.	139.1	2155.0	*	3	1540	765	0.	139.1	2155.0
1	1345	166	0.	139.1	2155.0	*	2	1445	466	0.	139.1	2155.0	*	3	1545	766	0.	139.1	2155.0
1	1350	167	0.	139.1	2155.0	*	2	1450	467	0.	139.1	2155.0	*	3	1550	767	0.	139.1	2155.0
1	1355	168	0.	139.1	2155.0	*	2	1455	468	0.	139.1	2155.0	*	3	1555	768	0.	139.1	2155.0
1	1400	169	0.	139.1	2155.0	*	2	1500	469	0.	139.1	2155.0	*	3	1600	769	0.	139.1	2155.0

1	1405	170	0.	139.1	2155.0	*	2	1505	470	0.	139.1	2155.0	*	3	1605	770	0.	139.1	2155.0
1	1410	171	0.	139.1	2155.0	*	2	1510	471	0.	139.1	2155.0	*	3	1610	771	0.	139.1	2155.0
1	1415	172	0.	139.1	2155.0	*	2	1515	472	0.	139.1	2155.0	*	3	1615	772	0.	139.1	2155.0
1	1420	173	0.	139.1	2155.0	*	2	1520	473	0.	139.1	2155.0	*	3	1620	773	0.	139.1	2155.0
1	1425	174	0.	139.1	2155.0	*	2	1525	474	0.	139.1	2155.0	*	3	1625	774	0.	139.1	2155.0
1	1430	175	0.	139.1	2155.0	*	2	1530	475	0.	139.1	2155.0	*	3	1630	775	0.	139.1	2155.0
1	1435	176	0.	139.1	2155.0	*	2	1535	476	0.	139.1	2155.0	*	3	1635	776	0.	139.1	2155.0
1	1440	177	0.	139.1	2155.0	*	2	1540	477	0.	139.1	2155.0	*	3	1640	777	0.	139.1	2155.0
1	1445	178	0.	139.1	2155.0	*	2	1545	478	0.	139.1	2155.0	*	3	1645	778	0.	139.1	2155.0
1	1450	179	0.	139.1	2155.0	*	2	1550	479	0.	139.1	2155.0	*	3	1650	779	0.	139.1	2155.0
1	1455	180	0.	139.1	2155.0	*	2	1555	480	0.	139.1	2155.0	*	3	1655	780	0.	139.1	2155.0
1	1500	181	0.	139.1	2155.0	*	2	1600	481	0.	139.1	2155.0	*	3	1700	781	0.	139.1	2155.0
1	1505	182	0.	139.1	2155.0	*	2	1605	482	0.	139.1	2155.0	*	3	1705	782	0.	139.1	2155.0
1	1510	183	0.	139.1	2155.0	*	2	1610	483	0.	139.1	2155.0	*	3	1710	783	0.	139.1	2155.0
1	1515	184	0.	139.1	2155.0	*	2	1615	484	0.	139.1	2155.0	*	3	1715	784	0.	139.1	2155.0
1	1520	185	0.	139.1	2155.0	*	2	1620	485	0.	139.1	2155.0	*	3	1720	785	0.	139.1	2155.0
1	1525	186	0.	139.1	2155.0	*	2	1625	486	0.	139.1	2155.0	*	3	1725	786	0.	139.1	2155.0
1	1530	187	0.	139.1	2155.0	*	2	1630	487	0.	139.1	2155.0	*	3	1730	787	0.	139.1	2155.0
1	1535	188	0.	139.1	2155.0	*	2	1635	488	0.	139.1	2155.0	*	3	1735	788	0.	139.1	2155.0
1	1540	189	0.	139.1	2155.0	*	2	1640	489	0.	139.1	2155.0	*	3	1740	789	0.	139.1	2155.0
1	1545	190	0.	139.1	2155.0	*	2	1645	490	0.	139.1	2155.0	*	3	1745	790	0.	139.1	2155.0
1	1550	191	0.	139.1	2155.0	*	2	1650	491	0.	139.1	2155.0	*	3	1750	791	0.	139.1	2155.0
1	1555	192	0.	139.1	2155.0	*	2	1655	492	0.	139.1	2155.0	*	3	1755	792	0.	139.1	2155.0
1	1600	193	0.	139.1	2155.0	*	2	1700	493	0.	139.1	2155.0	*	3	1800	793	0.	139.1	2155.0
1	1605	194	0.	139.1	2155.0	*	2	1705	494	0.	139.1	2155.0	*	3	1805	794	0.	139.1	2155.0
1	1610	195	0.	139.1	2155.0	*	2	1710	495	0.	139.1	2155.0	*	3	1810	795	0.	139.1	2155.0
1	1615	196	0.	139.1	2155.0	*	2	1715	496	0.	139.1	2155.0	*	3	1815	796	0.	139.1	2155.0
1	1620	197	0.	139.1	2155.0	*	2	1720	497	0.	139.1	2155.0	*	3	1820	797	0.	139.1	2155.0
1	1625	198	0.	139.1	2155.0	*	2	1725	498	0.	139.1	2155.0	*	3	1825	798	0.	139.1	2155.0
1	1630	199	0.	139.1	2155.0	*	2	1730	499	0.	139.1	2155.0	*	3	1830	799	0.	139.1	2155.0
1	1635	200	0.	139.1	2155.0	*	2	1735	500	0.	139.1	2155.0	*	3	1835	800	0.	139.1	2155.0
1	1640	201	0.	139.1	2155.0	*	2	1740	501	0.	139.1	2155.0	*	3	1840	801	0.	139.1	2155.0
1	1645	202	0.	139.1	2155.0	*	2	1745	502	0.	139.1	2155.0	*	3	1845	802	0.	139.1	2155.0
1	1650	203	0.	139.1	2155.0	*	2	1750	503	0.	139.1	2155.0	*	3	1850	803	0.	139.1	2155.0
1	1655	204	0.	139.1	2155.0	*	2	1755	504	0.	139.1	2155.0	*	3	1855	804	0.	139.1	2155.0
1	1700	205	0.	139.1	2155.0	*	2	1800	505	0.	139.1	2155.0	*	3	1900	805	0.	139.1	2155.0
1	1705	206	0.	139.1	2155.0	*	2	1805	506	0.	139.1	2155.0	*	3	1905	806	0.	139.1	2155.0
1	1710	207	0.	139.1	2155.0	*	2	1810	507	0.	139.1	2155.0	*	3	1910	807	0.	139.1	2155.0
1	1715	208	0.	139.1	2155.0	*	2	1815	508	0.	139.1	2155.0	*	3	1915	808	0.	139.1	2155.0
1	1720	209	0.	139.1	2155.0	*	2	1820	509	0.	139.1	2155.0	*	3	1920	809	0.	139.1	2155.0
1	1725	210	0.	139.1	2155.0	*	2	1825	510	0.	139.1	2155.0	*	3	1925	810	0.	139.1	2155.0
1	1730	211	0.	139.1	2155.0	*	2	1830	511	0.	139.1	2155.0	*	3	1930	811	0.	139.1	2155.0
1	1735	212	0.	139.1	2155.0	*	2	1835	512	0.	139.1	2155.0	*	3	1935	812	0.	139.1	2155.0
1	1740	213	0.	139.1	2155.0	*	2	1840	513	0.	139.1	2155.0	*	3	1940	813	0.	139.1	2155.0
1	1745	214	0.	139.1	2155.0	*	2	1845	514	0.	139.1	2155.0	*	3	1945	814	0.	139.1	2155.0
1	1750	215	0.	139.1	2155.0	*	2	1850	515	0.	139.1	2155.0	*	3	1950	815	0.	139.1	2155.0
1	1755	216	0.	139.1	2155.0	*	2	1855	516	0.	139.1	2155.0	*	3	1955	816	0.	139.1	2155.0
1	1800	217	0.	139.1	2155.0	*	2	1900	517	0.	139.1	2155.0	*	3	2000	817	0.	139.1	2155.0
1	1805	218	0.	139.1	2155.0	*	2	1905	518	0.	139.1	2155.0	*	3	2005	818	0.	139.1	2155.0
1	1810	219	0.	139.1	2155.0	*	2	1910	519	0.	139.1	2155.0	*	3	2010	819	0.	139.1	2155.0
1	1815	220	0.	139.1	2155.0	*	2	1915	520	0.	139.1	2155.0	*	3	2015	820	0.	139.1	2155.0
1	1820	221	0.	139.1	2155.0	*	2	1920	521	0.	139.1	2155.0	*	3	2020	821	0.	139.1	2155.0
1	1825	222	0.	139.1	2155.0	*	2	1925	522	0.	139.1	2155.0	*	3	2025	822	0.	139.1	2155.0
1	1830	223	0.	139.1	2155.0	*	2	1930	523	0.	139.1	2155.0	*	3	2030	823	0.	139.1	2155.0
1	1835	224	0.	139.1	2155.0	*	2	1935	524	0.	139.1	2155.0	*	3	2035	824	0.	139.1	2155.0
1	1840	225	0.	139.1	2155.0	*	2	1940	525	0.	139.1	2155.0	*	3	2040	825	0.	139.1	2155.0
1	1845	226	0.	139.1	2155.0	*	2	1945	526	0.	139.1	2155.0	*	3	2045	826	0.	139.1	2155.0
1	1850	227	0.	139.1	2155.0	*	2	1950	527	0.	139.1	2155.0	*	3	2050	827	0.	139.1	2155.0
1	1855	228	0.	139.1	2155.0	*	2	1955	528	0.	139.1	2155.0	*	3	2055	828	0.	139.1	2155.0
1	1900	229	0.	139.1	2155.0	*	2	2000	529	0.	139.1	2155.0	*	3	2100	829	0.	139.1	2155.0
1	1905	230	0.	139.1	2155.0	*	2	2005	530	0.	139.1	2155.0	*	3	2105	830	0.	139.1	2155.0
1	1910	231	0.	139.1	2155.0	*	2	2010	531	0.	139.1	2155.0	*	3	2110	831	0.	139.1	2155.0
1	1915	232	0.	139.1	2155.0	*	2	2015	532	0.	139.1	2155.0	*	3	2115	832	0.	139.1	2155.0
1	1920	233	0.	139.1	2155.0	*	2	2020	533	0.	139.1	2155.0	*	3	2120	833	0.	139.1	2155.0
1	1925	234	0.	139.1	2155.0	*	2	2025	534	0.	139.1	2155.0	*	3	2125	834	0.	139.1	2155.0
1	1930	235	0.	139.1	2155.0	*	2	2030	535	0.	139.1	2155.0	*	3	2130	835	0.	139.1	2155.0

1	1935	236	0.	139.1	2155.0	*	2	2035	536	0.	139.1	2155.0	*	3	2135	836	0.	139.1	2155.0
1	1940	237	0.	139.1	2155.0	*	2	2040	537	0.	139.1	2155.0	*	3	2140	837	0.	139.1	2155.0
1	1945	238	0.	139.1	2155.0	*	2	2045	538	0.	139.1	2155.0	*	3	2145	838	0.	139.1	2155.0
1	1950	239	0.	139.1	2155.0	*	2	2050	539	0.	139.1	2155.0	*	3	2150	839	0.	139.1	2155.0
1	1955	240	0.	139.1	2155.0	*	2	2055	540	0.	139.1	2155.0	*	3	2155	840	0.	139.1	2155.0
1	2000	241	0.	139.1	2155.0	*	2	2100	541	0.	139.1	2155.0	*	3	2200	841	0.	139.1	2155.0
1	2005	242	0.	139.1	2155.0	*	2	2105	542	0.	139.1	2155.0	*	3	2205	842	0.	139.1	2155.0
1	2010	243	0.	139.1	2155.0	*	2	2110	543	0.	139.1	2155.0	*	3	2210	843	0.	139.1	2155.0
1	2015	244	0.	139.1	2155.0	*	2	2115	544	0.	139.1	2155.0	*	3	2215	844	0.	139.1	2155.0
1	2020	245	0.	139.1	2155.0	*	2	2120	545	0.	139.1	2155.0	*	3	2220	845	0.	139.1	2155.0
1	2025	246	0.	139.1	2155.0	*	2	2125	546	0.	139.1	2155.0	*	3	2225	846	0.	139.1	2155.0
1	2030	247	0.	139.1	2155.0	*	2	2130	547	0.	139.1	2155.0	*	3	2230	847	0.	139.1	2155.0
1	2035	248	0.	139.1	2155.0	*	2	2135	548	0.	139.1	2155.0	*	3	2235	848	0.	139.1	2155.0
1	2040	249	0.	139.1	2155.0	*	2	2140	549	0.	139.1	2155.0	*	3	2240	849	0.	139.1	2155.0
1	2045	250	0.	139.1	2155.0	*	2	2145	550	0.	139.1	2155.0	*	3	2245	850	0.	139.1	2155.0
1	2050	251	0.	139.1	2155.0	*	2	2150	551	0.	139.1	2155.0	*	3	2250	851	0.	139.1	2155.0
1	2055	252	0.	139.1	2155.0	*	2	2155	552	0.	139.1	2155.0	*	3	2255	852	0.	139.1	2155.0
1	2100	253	0.	139.1	2155.0	*	2	2200	553	0.	139.1	2155.0	*	3	2300	853	0.	139.1	2155.0
1	2105	254	0.	139.1	2155.0	*	2	2205	554	0.	139.1	2155.0	*	3	2305	854	0.	139.1	2155.0
1	2110	255	0.	139.1	2155.0	*	2	2210	555	0.	139.1	2155.0	*	3	2310	855	0.	139.1	2155.0
1	2115	256	0.	139.1	2155.0	*	2	2215	556	0.	139.1	2155.0	*	3	2315	856	0.	139.1	2155.0
1	2120	257	0.	139.1	2155.0	*	2	2220	557	0.	139.1	2155.0	*	3	2320	857	0.	139.1	2155.0
1	2125	258	0.	139.1	2155.0	*	2	2225	558	0.	139.1	2155.0	*	3	2325	858	0.	139.1	2155.0
1	2130	259	0.	139.1	2155.0	*	2	2230	559	0.	139.1	2155.0	*	3	2330	859	0.	139.1	2155.0
1	2135	260	0.	139.1	2155.0	*	2	2235	560	0.	139.1	2155.0	*	3	2335	860	0.	139.1	2155.0
1	2140	261	0.	139.1	2155.0	*	2	2240	561	0.	139.1	2155.0	*	3	2340	861	0.	139.1	2155.0
1	2145	262	0.	139.1	2155.0	*	2	2245	562	0.	139.1	2155.0	*	3	2345	862	0.	139.1	2155.0
1	2150	263	0.	139.1	2155.0	*	2	2250	563	0.	139.1	2155.0	*	3	2350	863	0.	139.1	2155.0
1	2155	264	0.	139.1	2155.0	*	2	2255	564	0.	139.1	2155.0	*	3	2355	864	0.	139.1	2155.0
1	2200	265	0.	139.1	2155.0	*	2	2300	565	0.	139.1	2155.0	*	4	0000	865	0.	139.1	2155.0
1	2205	266	0.	139.1	2155.0	*	2	2305	566	0.	139.1	2155.0	*	4	0005	866	0.	139.1	2155.0
1	2210	267	0.	139.1	2155.0	*	2	2310	567	0.	139.1	2155.0	*	4	0010	867	0.	139.1	2155.0
1	2215	268	0.	139.1	2155.0	*	2	2315	568	0.	139.1	2155.0	*	4	0015	868	0.	139.1	2155.0
1	2220	269	0.	139.1	2155.0	*	2	2320	569	0.	139.1	2155.0	*	4	0020	869	0.	139.1	2155.0
1	2225	270	0.	139.1	2155.0	*	2	2325	570	0.	139.1	2155.0	*	4	0025	870	0.	139.1	2155.0
1	2230	271	0.	139.1	2155.0	*	2	2330	571	0.	139.1	2155.0	*	4	0030	871	0.	139.1	2155.0
1	2235	272	0.	139.1	2155.0	*	2	2335	572	0.	139.1	2155.0	*	4	0035	872	0.	139.1	2155.0
1	2240	273	0.	139.1	2155.0	*	2	2340	573	0.	139.1	2155.0	*	4	0040	873	0.	139.1	2155.0
1	2245	274	0.	139.1	2155.0	*	2	2345	574	0.	139.1	2155.0	*	4	0045	874	0.	139.1	2155.0
1	2250	275	0.	139.1	2155.0	*	2	2350	575	0.	139.1	2155.0	*	4	0050	875	0.	139.1	2155.0
1	2255	276	0.	139.1	2155.0	*	2	2355	576	0.	139.1	2155.0	*	4	0055	876	0.	139.1	2155.0
1	2300	277	0.	139.1	2155.0	*	3	0000	577	0.	139.1	2155.0	*	4	0100	877	0.	139.1	2155.0
1	2305	278	0.	139.1	2155.0	*	3	0005	578	0.	139.1	2155.0	*	4	0105	878	0.	139.1	2155.0
1	2310	279	0.	139.1	2155.0	*	3	0010	579	0.	139.1	2155.0	*	4	0110	879	0.	139.1	2155.0
1	2315	280	0.	139.1	2155.0	*	3	0015	580	0.	139.1	2155.0	*	4	0115	880	0.	139.1	2155.0
1	2320	281	0.	139.1	2155.0	*	3	0020	581	0.	139.1	2155.0	*	4	0120	881	0.	139.1	2155.0
1	2325	282	0.	139.1	2155.0	*	3	0025	582	0.	139.1	2155.0	*	4	0125	882	0.	139.1	2155.0
1	2330	283	0.	139.1	2155.0	*	3	0030	583	0.	139.1	2155.0	*	4	0130	883	0.	139.1	2155.0
1	2335	284	0.	139.1	2155.0	*	3	0035	584	0.	139.1	2155.0	*	4	0135	884	0.	139.1	2155.0
1	2340	285	0.	139.1	2155.0	*	3	0040	585	0.	139.1	2155.0	*	4	0140	885	0.	139.1	2155.0
1	2345	286	0.	139.1	2155.0	*	3	0045	586	0.	139.1	2155.0	*	4	0145	886	0.	139.1	2155.0
1	2350	287	0.	139.1	2155.0	*	3	0050	587	0.	139.1	2155.0	*	4	0150	887	0.	139.1	2155.0
1	2355	288	0.	139.1	2155.0	*	3	0055	588	0.	139.1	2155.0	*	4	0155	888	0.	139.1	2155.0
2	0000	289	0.	139.1	2155.0	*	3	0100	589	0.	139.1	2155.0	*	4	0200	889	0.	139.1	2155.0
2	0005	290	0.	139.1	2155.0	*	3	0105	590	0.	139.1	2155.0	*	4	0205	890	0.	139.1	2155.0
2	0010	291	0.	139.1	2155.0	*	3	0110	591	0.	139.1	2155.0	*	4	0210	891	0.	139.1	2155.0
2	0015	292	0.	139.1	2155.0	*	3	0115	592	0.	139.1	2155.0	*	4	0215	892	0.	139.1	2155.0
2	0020	293	0.	139.1	2155.0	*	3	0120	593	0.	139.1	2155.0	*	4	0220	893	0.	139.1	2155.0
2	0025	294	0.	139.1	2155.0	*	3	0125	594	0.	139.1	2155.0	*	4	0225	894	0.	139.1	2155.0
2	0030	295	0.	139.1	2155.0	*	3	0130	595	0.	139.1	2155.0	*	4	0230	895	0.	139.1	2155.0
2	0035	296	0.	139.1	2155.0	*	3	0135	596	0.	139.1	2155.0	*	4	0235	896	0.	139.1	2155.0
2	0040	297	0.	139.1	2155.0	*	3	0140	597	0.	139.1	2155.0	*	4	0240	897	0.	139.1	2155.0
2	0045	298	0.	139.1	2155.0	*	3	0145	598	0.	139.1	2155.0	*	4	0245	898	0.	139.1	2155.0
2	0050	299	0.	139.1	2155.0	*	3	0150	599	0.	139.1	2155.0	*	4	0250	899	0.	139.1	2155.0
2	0055	300	0.	139.1	2155.0	*	3	0155	600	0.	139.1	2155.0	*	4	0255	900	0.	139.1	2155.0

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	74.92-HR
3744.	3.83	(CFS)	618.	154.	51.	49.
		(INCHES)	4.631	4.632	4.632	4.632
		(AC-FT)	306.	306.	306.	306.

EAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)		6-HR	24-HR	72-HR	74.92-HR
201.	3.83		153.	143.	140.	134.

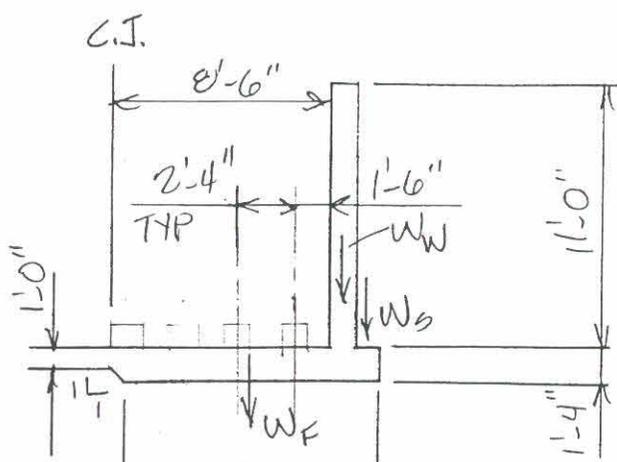
PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
(FEET)	(HR)		6-HR	24-HR	72-HR	74.92-HR
2160.29	3.83		2156.19	2155.30	2155.02	2154.33

CUMULATIVE AREA = 1.24 SQ MI

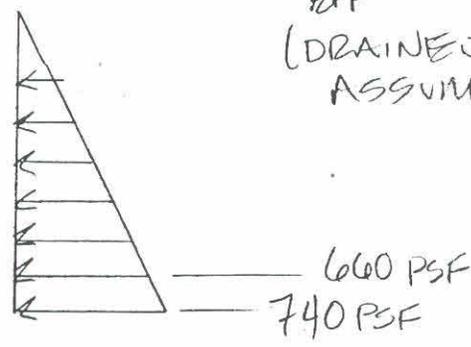
PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

PERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS	
				RATIO 1	0.50
YDROGRAPH AT	SAC230	0.72	1	FLOW	3258.
				TIME	3.50
YDROGRAPH AT	SAC235	0.38	1	FLOW	1538.
				TIME	3.50
2 COMBINED AT	ADD	1.10	1	FLOW	4796.
				TIME	3.50
OUTED TO	ROUTE	1.10	1	FLOW	4700.
				TIME	3.50
				** PEAK STAGES IN FEET **	
			1	STAGE	15.47
				TIME	3.50
YDROGRAPH AT	CAS240	0.14	1	FLOW	874.
				TIME	3.33
2 COMBINED AT	DAMIN	1.24	1	FLOW	5398.
				TIME	3.50
OUTED TO	DAMOUT	1.24	1	FLOW	3744.
				TIME	3.83
				** PEAK STAGES IN FEET **	
			1	STAGE	2160.29
				TIME	3.83

** NORMAL END OF HEC-1 ***



$\gamma_{eff} = 60 \text{ PCF}$
(DRAINED CONDITION ASSUMED)



$$M_{OT} = \frac{0.74 (12.33^2)}{6} = 18.75 \text{ k}$$

COMPONENT	WT	X	WT · X
$W_w = (1)(11)(.150) = 1.65 \text{ k/ft}$		8.67	14.30
$W_f = (1.33)(10.17)(.150) = 2.03 \text{ k/ft}$		5.08	10.32
$W_s = (1)(11)(.120) = 1.32 \text{ k/ft}$		9.07	12.76
	$\Sigma = 5.00$		$\Sigma = 37.38$

$= M_{REST}$

$$SF = \frac{M_{REST}}{M_{OT}} = \frac{37.38}{18.75} = 1.99 \text{ OK}$$

$$\bar{x} = \frac{37.38}{5.00} = 7.48' ; e = 7.48 - \frac{10.17}{2} = 2.40'$$

$$q = \frac{P}{A} \pm \frac{M}{S} \quad S = \frac{bd^2}{6} = \frac{1(10.17^2)}{6} = 17.2$$

$$q = \frac{5.00}{10.17} \pm \frac{18.75 - (5.00)(2.40)}{17.2} = \begin{cases} 940 \text{ PSF} \\ 99 \\ 48 \text{ PSF} \end{cases}$$

ALT. CALL. METHOD

REF SHT 1:

$$M_{OT} = 18.75 \text{ k}$$

$$M_{REST} = 37.38 \text{ k}$$

$$\Sigma V = 5.00 \text{ k}$$

$$X = \frac{37.38 - 18.75}{5.00} = 3.73'$$

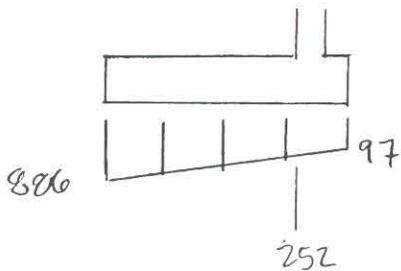
$$e = \frac{10.17}{2} - 3.73 = 1.36'$$

(WITHIN MIDDLE 1/3)

$$P = \frac{\Sigma V}{B} \left(1 \pm \frac{6e}{B} \right)$$

$$= \frac{5.00}{10.17} \left(1 \pm \frac{6(1.36)}{10.17} \right) = \begin{cases} 886 \text{ PSF} \\ 97 \text{ PSF} \end{cases}$$

FOOTING REINF



$$M = (252 \text{ PSF}) \left(\frac{8.17^2}{2} \right) + \frac{1}{2} (634) \left(\frac{2}{3} \right) (8.17^2) = 22.52 \text{ k}$$

$$A_s = \frac{22.52}{1.59(12.56)} = 1.13 \text{ IN}^2/\text{FT}$$

$$A_{s \text{ PROVIDED}} = \begin{matrix} 0.88 & + & 0.44 & = & 1.32 \text{ IN}^2/\text{FT} & \underline{\underline{OK}} \\ \#6 @ 6 & & \#6 @ 12 & & & \end{matrix}$$



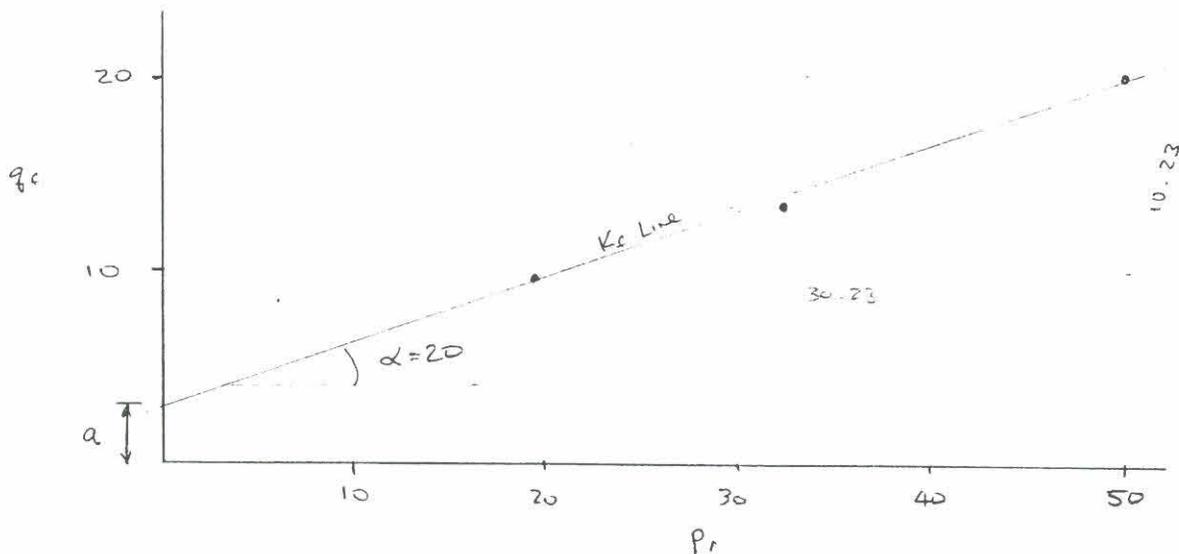
TRIAxIAL COMPRESSION TEST RESULTS

CONFINING PRESSURE (psi)	PEAK AXIAL STRESS (psi)	PEAK q (psi)	VALUE OF p \rightarrow PEAK q (psi)	$\frac{\sigma_1}{\sigma_3}$	ϕ_{CR}	ϕ
10	29.57	9.79	19.79	2.96	59.83	23.65
20	45.15	12.58	32.58	2.26	56.39	22.78
30	70.05	20.02	50.02	2.34	56.83	23.66

$$q = \frac{\sigma_1 - \sigma_3}{2}$$

Avg = 23.36
FROM MOHR'S CIRCLE $\phi = 22^\circ$
 $c = 720 \text{ psf}$

$$p = \frac{\sigma_1 + \sigma_3}{2}$$

Plot K_f Line

$$\sin \phi = \tan \alpha$$

$$\alpha = 20^\circ \therefore \phi = 21^\circ$$

$$c = \frac{q}{\cos \phi} = c = \frac{3}{\cos 20} = 3.2 \text{ psi} = 460 \text{ psf}$$

using CRITICAL ϕ

$$\frac{\sigma_1}{\sigma_3} = \tan^2 \phi_{cr}$$

see Table For ϕ_{cr}

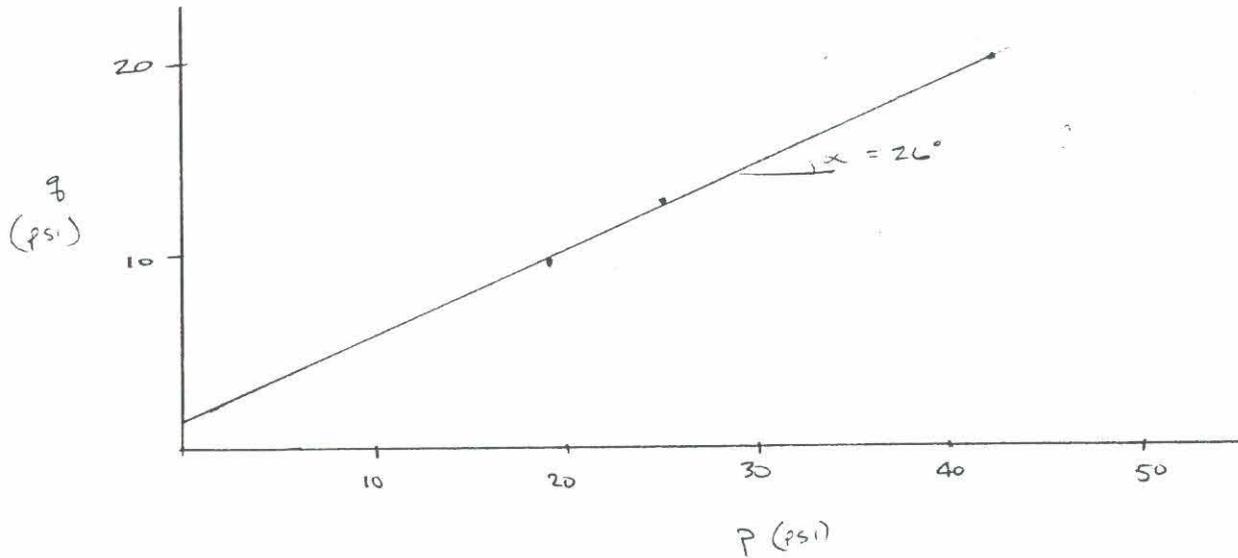
$$\phi_{cr} = 45 + \frac{\phi}{2}$$

$$\phi = (\phi_{cr} - 45) \times 2$$

see Table For ϕ

EFFECTIVE STRESS RESULTS

σ_3 psi	σ_1 psi	q psi	P psi	$\frac{\sigma_1}{\sigma_3}$	ϕ_{cr} degree	ϕ degree
8.98	28.56	9.79	18.77	3.18	60.72	31.4
12.89	38.04	12.57	25.46	2.95	59.80	29.6
22.17	62.22	26.63	42.20	2.81	59.18	28.36

29.8°From Mohr Circle $\phi = 25^\circ$
 $c = 330 \text{ psf}$ 

$$\sin \alpha = \tan \alpha$$

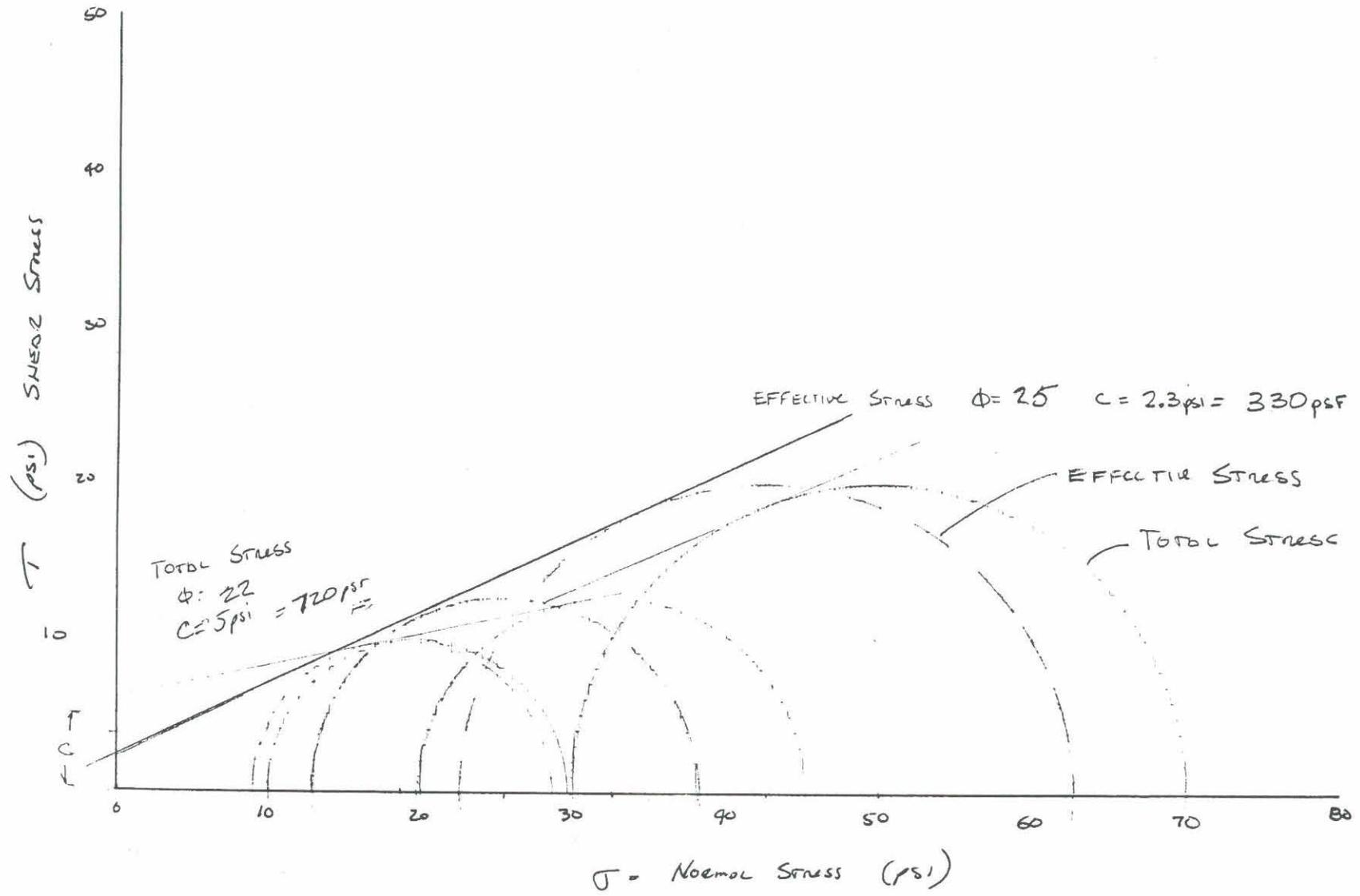
$$\alpha = \sin^{-1} \tan \alpha = \underline{29.2^\circ}$$

$$\bar{c} = \frac{a}{\cos \alpha} = \frac{1.5}{\cos 29} = 1.72 \text{ psi} = \underline{247 \text{ psf}}$$



LABORATORY SHEAR STRENGTH
 TP 15 B-1

SHEET NO. 3 of DATE 6/5/55
 PROJECT NO. SWW 35441.GT. 40



** PCSTABL5 **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 09-19-95
Time of Run: 11:21am
Run By: DJA
Input Data Filename: P:CWD6C
Output Filename: P:CWD6C.OUT
Plotted Output Filename: P:CWD6C.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Downstream Steady State No Drains

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	30.00	97.00	30.00	3
2	97.00	30.00	197.50	63.50	1
3	197.50	63.50	211.50	63.50	1
4	211.50	63.50	300.00	34.00	1
5	300.00	34.00	400.00	34.00	3
6	97.00	30.00	103.00	24.00	3
7	103.00	24.00	194.50	24.00	3
8	194.50	24.00	198.40	22.00	3
9	198.40	22.00	198.50	60.00	2
10	198.50	60.00	202.40	60.00	2
11	202.40	60.00	202.50	22.00	2
12	202.50	22.00	210.50	22.00	3
13	210.50	22.00	214.50	24.00	3
14	214.50	24.00	290.00	24.00	3
15	290.00	24.00	300.00	34.00	3
16	198.40	22.00	202.50	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	0.0	40.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	30.00
2	97.00	30.00
3	127.00	40.00
4	198.50	59.00
5	202.40	59.00
6	220.40	60.20
7	400.00	60.20

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between $X = 50.00$ ft. and $X = 150.00$ ft.

Each Surface Terminates Between $X = 150.00$ ft. and $X = 225.00$ ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is $Y = 0.00$ ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.61	35.67
3	130.60	35.99
4	137.44	37.50
5	143.92	40.15
6	149.84	43.88
7	155.04	48.56
8	155.88	49.63

Circle Center At $X = 125.3$; $Y = 76.4$ and Radius, 40.7

*** 1.507 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.59	35.51
3	130.58	35.72
4	137.43	37.19
5	143.90	39.87
6	149.78	43.67
7	154.88	48.46
8	155.69	49.56

Circle Center At $X = 125.9$; $Y = 74.2$ and Radius, 38.7

*** 1.517 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	30.00
2	89.98	27.79
3	96.80	26.22
4	103.74	25.30
5	110.73	25.04
6	117.72	25.44
7	124.64	26.49
8	131.43	28.19
9	138.03	30.53
10	144.38	33.47
11	150.43	37.00
12	156.11	41.09
13	161.38	45.69
14	166.20	50.77
15	168.64	53.88

Circle Center At X = 110.0 ; Y = 99.2 and Radius, 74.2

*** 1.537 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	30.00
2	90.18	28.56
3	97.10	27.45
4	104.05	26.69
5	111.04	26.28
6	118.04	26.21
7	125.04	26.48
8	132.01	27.10
9	138.94	28.07
10	145.82	29.37
11	152.62	31.02
12	159.34	33.00
13	165.95	35.31
14	172.43	37.94
15	178.78	40.89
16	184.98	44.15
17	191.00	47.71
18	196.84	51.56
19	202.49	55.70
20	207.92	60.12
21	211.64	63.45

Circle Center At X = 116.0 ; Y = 167.8 and Radius, 141.6

*** 1.558 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.60	35.56
3	130.59	35.39
4	137.57	36.02
5	144.41	37.47
6	151.05	39.70
7	157.38	42.69
8	163.32	46.39
9	168.78	50.77
10	173.44	55.48

Circle Center At X = 128.6 ; Y = 95.4 and Radius, 60.0

*** 1.559 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.43	34.74
3	130.42	34.46
4	137.31	35.73
5	143.74	38.49
6	149.41	42.60
7	154.03	47.85
8	154.80	49.27

Circle Center At X = 128.2 ; Y = 65.9 and Radius, 31.5

*** 1.598 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.34	34.46
3	130.30	33.63
4	137.28	34.10
5	144.06	35.85
6	150.39	38.83
7	156.07	42.92
8	160.89	47.99
9	163.62	52.21

Circle Center At X = 131.3 ; Y = 71.3 and Radius, 37.7

*** 1.644 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.11	30.00
2	68.04	29.03
3	75.01	28.30
4	81.99	27.79
5	88.98	27.51
6	95.98	27.45
7	102.98	27.63
8	109.97	28.04
9	116.94	28.67
10	123.89	29.53
11	130.80	30.62
12	137.68	31.93
13	144.50	33.47
14	151.28	35.23
15	157.99	37.21
16	164.64	39.41
17	171.21	41.83
18	177.70	44.46
19	184.09	47.30
20	190.39	50.35
21	196.59	53.60
22	202.68	57.06
23	208.65	60.71
24	212.43	63.19

Circle Center At X = 94.1 ; Y = 241.4 and Radius, 213.9

*** 1.659 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.11	30.00
2	68.10	29.62
3	75.10	29.42
4	82.10	29.39
5	89.10	29.55
6	96.09	29.88
7	103.07	30.39
8	110.04	31.07
9	116.98	31.94
10	123.91	32.98
11	130.80	34.19
12	137.66	35.59
13	144.48	37.15
14	151.26	38.89
15	158.00	40.80
16	164.68	42.88
17	171.31	45.13
18	177.88	47.55
19	184.38	50.13
20	190.82	52.88
21	197.19	55.79
22	203.48	58.86
23	209.69	62.10
24	211.95	63.35

Circle Center At X = 79.6 ; Y = 304.6 and Radius, 275.2

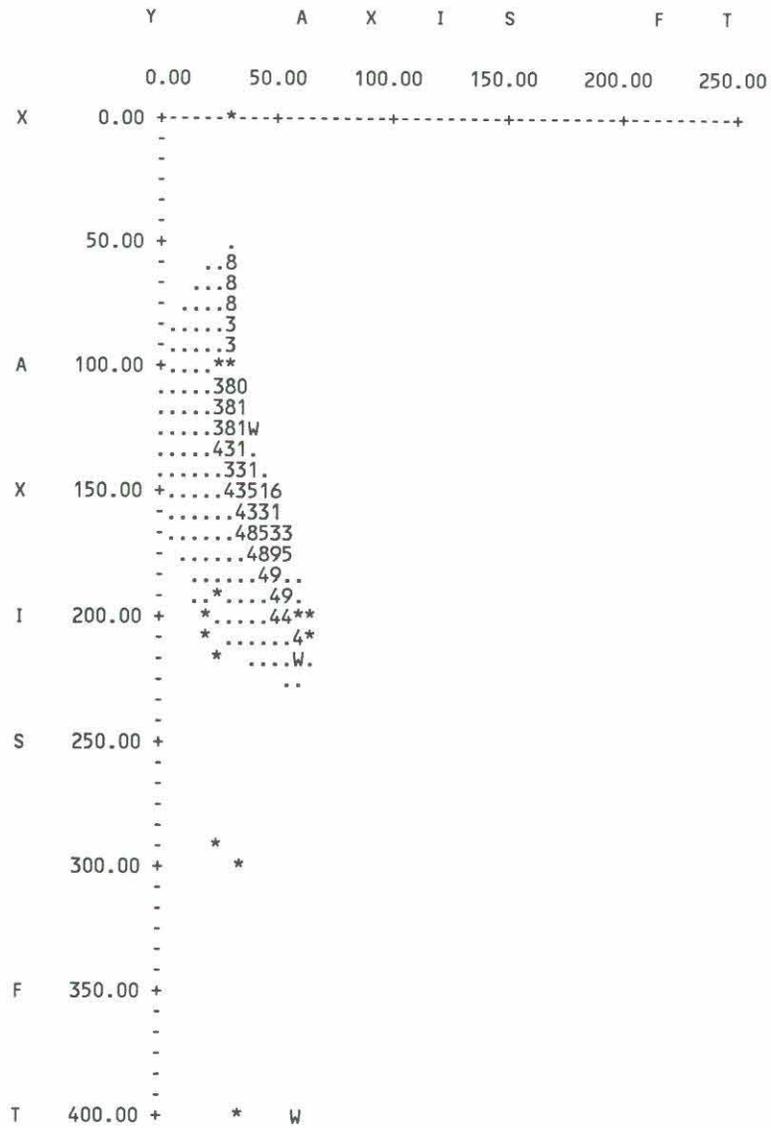
*** 1.670 ***

Failure Surface Specified By 12 Coordinate Points

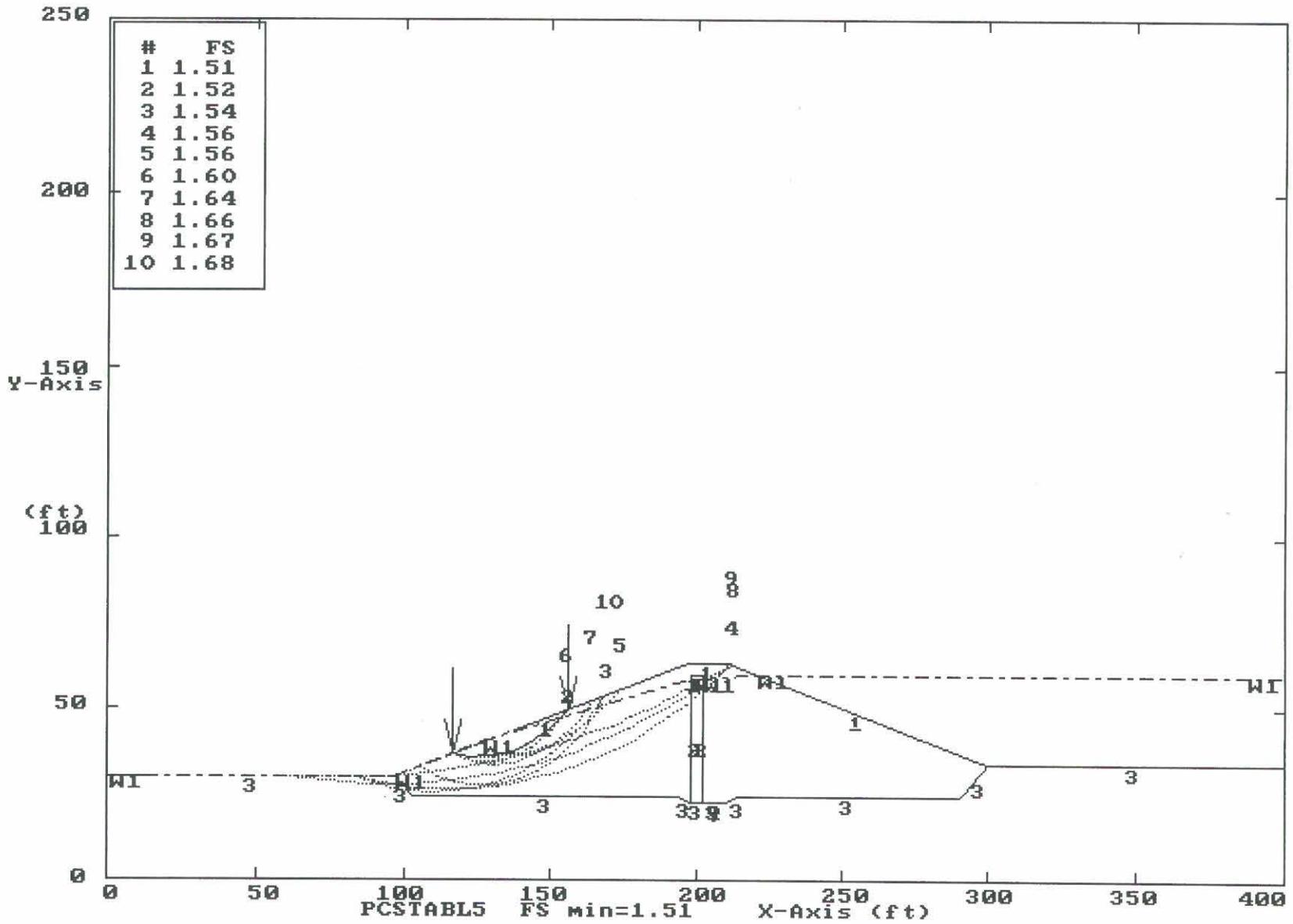
Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	32.85
2	111.94	29.98
3	118.69	28.14
4	125.65	27.39
5	132.64	27.73
6	139.50	29.16
7	146.04	31.66
8	152.11	35.14
9	157.56	39.53
10	162.25	44.73
11	166.07	50.59
12	167.35	53.45

Circle Center At X = 127.0 ; Y = 71.9 and Radius, 44.5

*** 1.677 ***



asandro Wash Dam ownstream Steady State No Drains
 Ten Most Critical. P:CWD6C.PLT By: DJA 9-19-95 1:21am



** PCSTABL5 **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 10-17-95
Time of Run: 7:27am
Run By: DJA
Input Data Filename: P:CWD1A
Output Filename: P:CWD1A.OUT
Plotted Output Filename: P:CWD1A.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Upstream Steady State Seepage

Partial Pool

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	34.00	100.00	34.00	3
2	100.00	34.00	188.50	63.50	1
3	188.50	63.50	202.50	63.50	1
4	202.50	63.50	303.50	30.00	1
5	303.50	30.00	400.00	30.00	3
6	100.00	34.00	110.00	24.00	3
7	110.00	24.00	185.50	24.00	3
8	185.50	24.00	189.50	22.00	3
9	189.50	22.00	197.50	22.00	3
10	197.50	22.00	197.60	60.00	2
11	197.60	60.00	201.50	60.00	2
12	201.50	60.00	201.60	22.00	2
13	201.60	22.00	205.50	24.00	3
14	205.50	24.00	297.00	24.00	3
15	297.00	24.00	303.00	30.00	3
16	197.50	22.00	201.60	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	0.0	40.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	43.00
2	117.00	43.00
3	197.60	43.00
4	201.50	43.00
5	303.00	30.00
6	400.00	30.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft.
and X = 150.00 ft.

Each Surface Terminates Between X = 150.00 ft.
and X = 225.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	123.61	38.67
3	130.60	38.98
4	137.44	40.47
5	143.93	43.09
6	149.88	46.78
7	155.11	51.43
8	156.14	52.71

Circle Center At X = 125.3 ; Y = 79.7 and Radius, 41.1

*** 2.337 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	123.59	38.51
3	130.59	38.71
4	137.43	40.16
5	143.91	42.81
6	149.81	46.58
7	154.95	51.34
8	155.92	52.64

Circle Center At X = 126.0 ; Y = 77.5 and Radius, 39.0

*** 2.344 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	123.43	37.74
3	130.42	37.45
4	137.31	38.71
5	143.75	41.44
6	149.44	45.52
7	154.09	50.76
8	154.96	52.32

Circle Center At X = 128.2 ; Y = 69.1 and Radius, 31.7

*** 2.417 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	123.60	38.56
3	130.59	38.36
4	137.57	38.94
5	144.43	40.31
6	151.10	42.45
7	157.49	45.32
8	163.50	48.89
9	169.08	53.12
10	174.15	57.95
11	175.04	59.01

Circle Center At X = 128.9 ; Y = 100.3 and Radius, 62.0

*** 2.423 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	123.34	37.46
3	130.29	36.61
4	137.28	37.05
5	144.07	38.75
6	150.43	41.66
7	156.16	45.69
8	161.06	50.69
9	164.22	55.41

Circle Center At X = 131.4 ; Y = 74.8 and Radius, 38.2

*** 2.477 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	35.85
2	111.94	32.98
3	118.69	31.13
4	125.65	30.35
5	132.64	30.66
6	139.50	32.04
7	146.07	34.48
8	152.17	37.90
9	157.68	42.22
10	162.44	47.35
11	166.36	53.15
12	168.00	56.67

Circle Center At X = 127.2 ; Y = 75.4 and Radius, 45.0

*** 2.564 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	34.00
2	89.98	31.79
3	96.79	30.20
4	103.73	29.25
5	110.72	28.93
6	117.71	29.25
7	124.65	30.21
8	131.46	31.80
9	138.11	34.01
10	144.52	36.82
11	150.65	40.20
12	156.44	44.13
13	161.85	48.58
14	166.83	53.50
15	170.08	57.36

Circle Center At X = 110.7 ; Y = 105.3 and Radius, 76.4

*** 2.572 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	35.85
2	111.82	32.74
3	118.43	30.43
4	125.28	28.96
5	132.25	28.36
6	139.25	28.63
7	146.15	29.78
8	152.86	31.78
9	159.27	34.60
10	165.27	38.20
11	170.78	42.52
12	175.70	47.49
13	179.97	53.04
14	183.51	59.08
15	184.89	62.30

Circle Center At X = 133.6 ; Y = 84.3 and Radius, 56.0

*** 2.594 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	34.00
2	89.64	30.97
3	96.22	28.57
4	103.00	26.82
5	109.91	25.73
6	116.90	25.32
7	123.89	25.59
8	130.83	26.53
9	137.64	28.15
10	144.26	30.42
11	150.63	33.32
12	156.69	36.82
13	162.39	40.90
14	167.65	45.51
15	172.45	50.60
16	176.73	56.14
17	179.46	60.49

Circle Center At X = 117.6 ; Y = 97.4 and Radius, 72.1

*** 2.683 ***

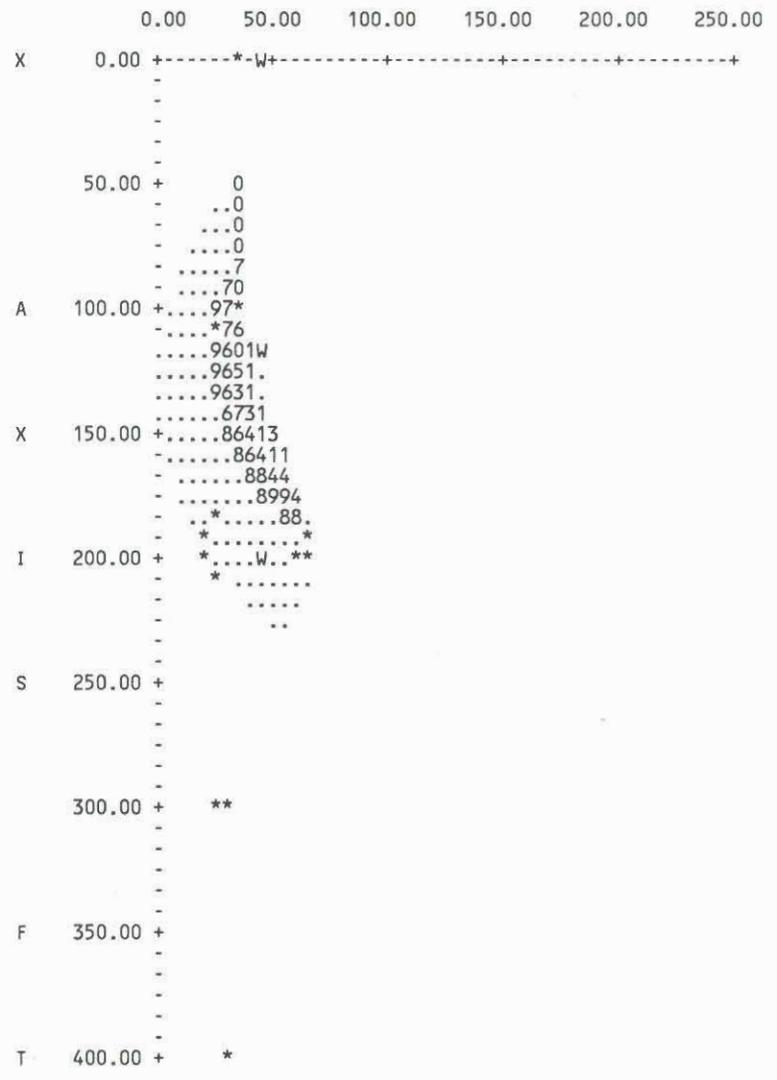
Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.00	34.00
2	56.97	33.35
3	63.96	32.91
4	70.95	32.67
5	77.95	32.66
6	84.95	32.85
7	91.94	33.25
8	98.91	33.87
9	105.86	34.69
10	112.78	35.73
11	119.67	36.97
12	126.52	38.43
13	133.32	40.08
14	140.07	41.95
15	146.76	44.01
16	153.38	46.28
17	159.93	48.75
18	166.40	51.41
19	172.79	54.27
20	179.10	57.32
21	185.30	60.56
22	190.54	63.50

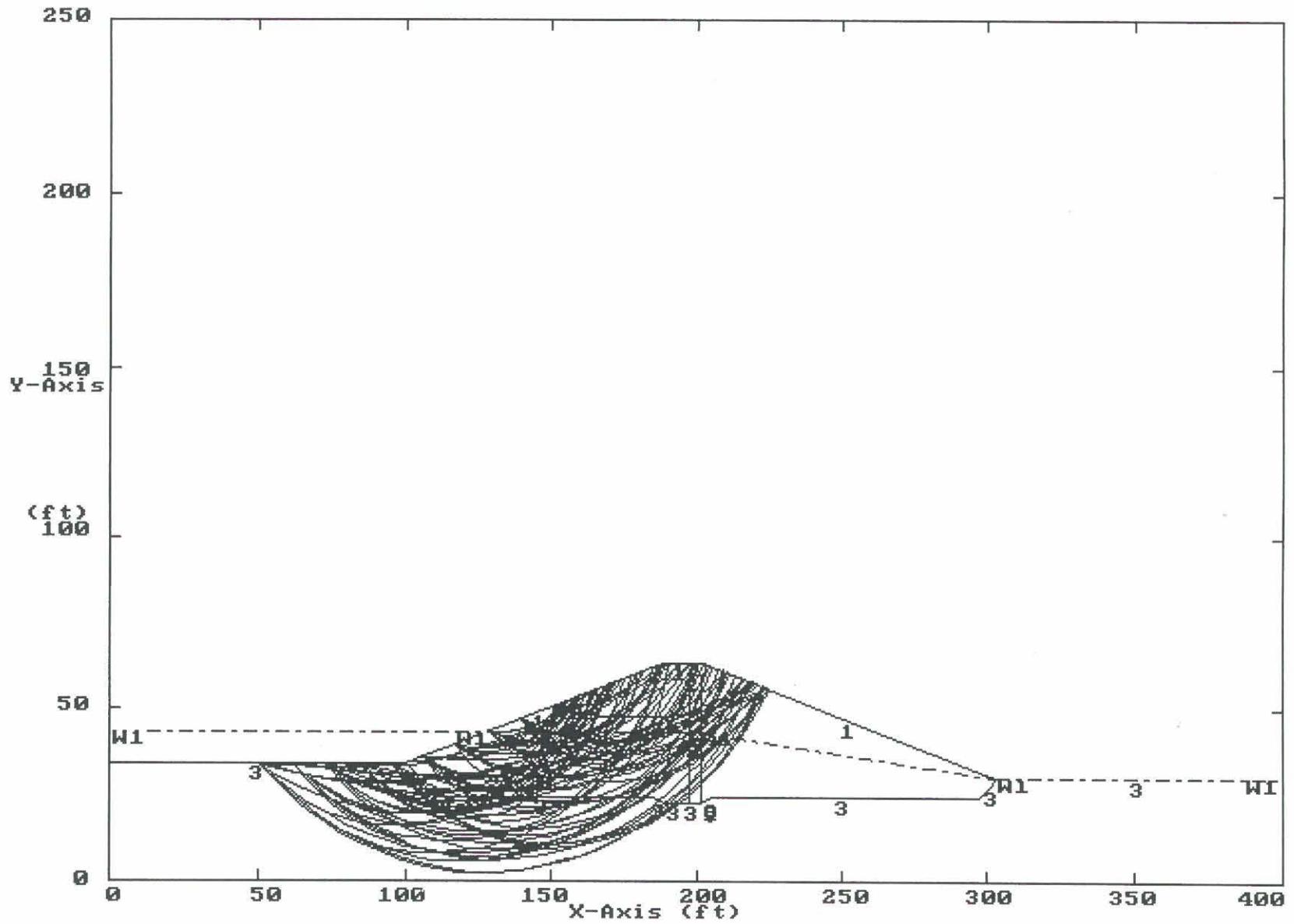
Circle Center At X = 75.1 ; Y = 264.2 and Radius, 231.5

*** 2.685 ***

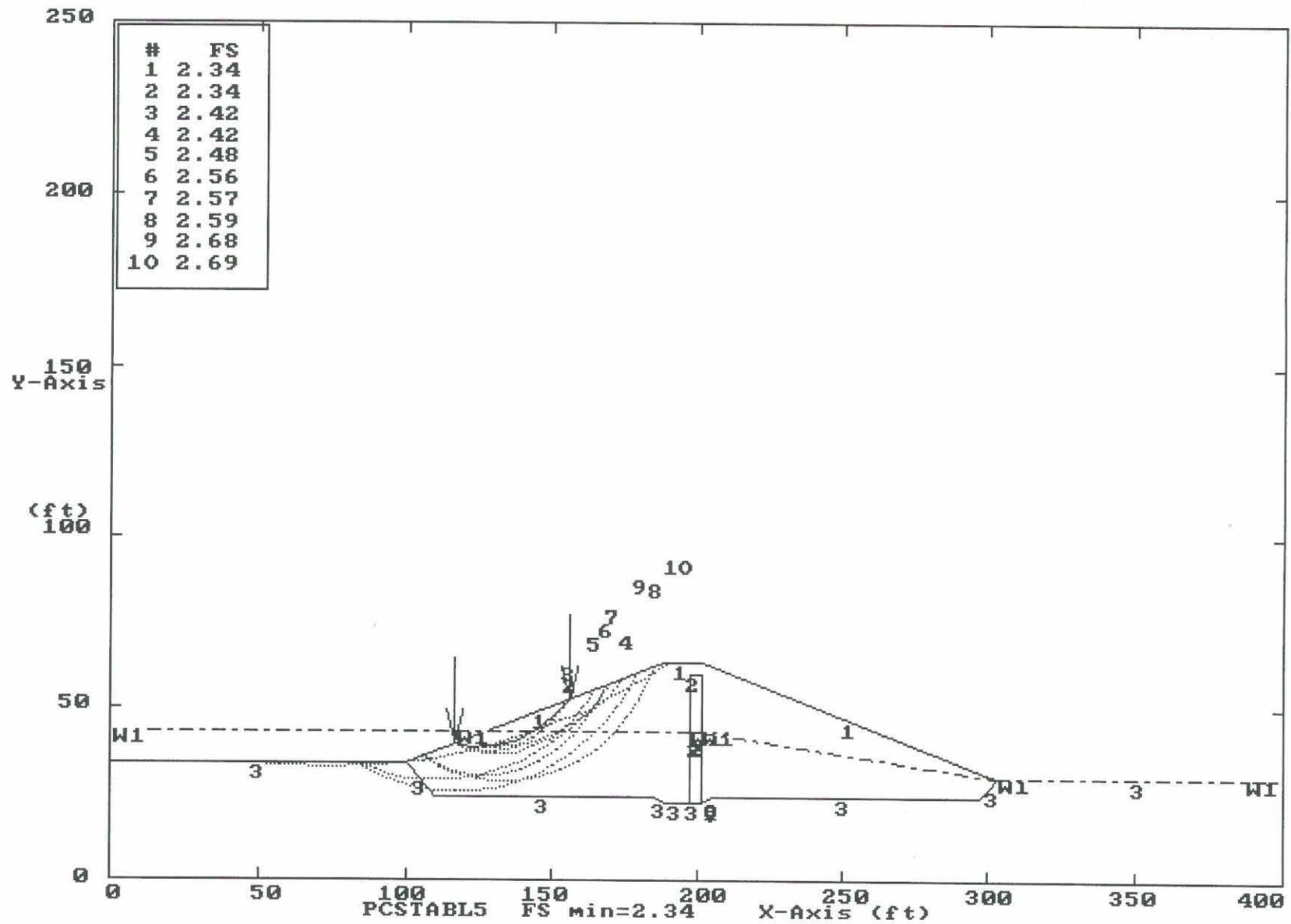
Y A X I S F T



asandro Wash Dam pstream Steady State Seepage
All surfaces evaluated. P:CWD1A.PLT By: DJA 0-17-95 :27am



asandro Wash Dam pstream Steady State Seepage
 Ten Most Critical. P:CMD1A.PLT By: DJA 0-17-95 :27am



** PCSTABL5 **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 10-17-95
Time of Run: 6:36am
Run By: DJA
Input Data Filename: P:CWD1A
Output Filename: P:CWD1A.OUT
Plotted Output Filename: P:CWD1A.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Upstream Steady State Seepage

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	34.00	100.00	34.00	3
2	100.00	34.00	188.50	63.50	1
3	188.50	63.50	202.50	63.50	1
4	202.50	63.50	303.50	30.00	1
5	303.50	30.00	400.00	30.00	3
6	100.00	34.00	110.00	24.00	3
7	110.00	24.00	185.50	24.00	3
8	185.50	24.00	189.50	22.00	3
9	189.50	22.00	197.50	22.00	3
10	197.50	22.00	197.60	60.00	2
11	197.60	60.00	201.50	60.00	2
12	201.50	60.00	201.60	22.00	2
13	201.60	22.00	205.50	24.00	3
14	205.50	24.00	297.00	24.00	3
15	297.00	24.00	303.00	30.00	3
16	197.50	22.00	201.60	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	240.0	21.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	60.20
2	178.60	60.20
3	197.60	59.00
4	201.50	33.00
5	303.00	30.00
6	400.00	30.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft.
and X = 130.00 ft.

Each Surface Terminates Between X = 130.00 ft.
and X = 225.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.67	34.00
2	83.52	32.56
3	90.43	31.43
4	97.38	30.62
5	104.36	30.12
6	111.36	29.95
7	118.36	30.10
8	125.34	30.57
9	132.30	31.36
10	139.21	32.46
11	146.06	33.88
12	152.85	35.61
13	159.54	37.65
14	166.14	40.00
15	172.62	42.64
16	178.97	45.58
17	185.18	48.81
18	191.24	52.31
19	197.13	56.10
20	202.85	60.14
21	205.76	62.42

Circle Center At X = 111.6 ; Y = 182.9 and Radius, 152.9

*** 2.714 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	112.22	38.07
2	118.23	34.49
3	124.64	31.66
4	131.34	29.64
5	138.24	28.44
6	145.23	28.09
7	152.21	28.60
8	159.08	29.96
9	165.73	32.14
10	172.07	35.11
11	177.99	38.83
12	183.42	43.25
13	188.27	48.30
14	192.47	53.90
15	195.96	59.97

16 197.45 63.50
Circle Center At X = 144.6 ; Y = 85.5 and Radius, 57.4

*** 2.770 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	103.33	35.11
2	109.46	31.73
3	115.95	29.09
4	122.69	27.22
5	129.61	26.16
6	136.61	25.91
7	143.58	26.49
8	150.44	27.88
9	157.10	30.05
10	163.45	33.00
11	169.41	36.66
12	174.90	41.00
13	179.85	45.95
14	184.19	51.45
15	187.85	57.42
16	190.66	63.50

Circle Center At X = 135.2 ; Y = 85.6 and Radius, 59.7

*** 2.781 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	112.22	38.07
2	118.96	36.18
3	125.82	34.77
4	132.76	33.85
5	139.75	33.43
6	146.75	33.51
7	153.72	34.08
8	160.64	35.15
9	167.46	36.70
10	174.16	38.74
11	180.70	41.25
12	187.04	44.22
13	193.15	47.63
14	199.01	51.46
15	204.57	55.71
16	209.83	60.33
17	210.37	60.89

Circle Center At X = 142.2 ; Y = 131.8 and Radius, 98.4

*** 2.896 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	103.33	35.11
2	109.67	32.14
3	116.23	29.68
4	122.96	27.76
5	129.82	26.38
6	136.77	25.55
7	143.76	25.29
8	150.76	25.59
9	157.71	26.44
10	164.56	27.85
11	171.28	29.81
12	177.83	32.29
13	184.15	35.30
14	190.21	38.80
15	195.97	42.77
16	201.40	47.20
17	206.45	52.04
18	211.10	57.27
19	213.14	59.97

Circle Center At X = 143.6 ; Y = 112.6 and Radius, 87.3

*** 2.913 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.00	44.00
2	136.60	41.67
3	143.42	40.07
4	150.37	39.22
5	157.36	39.12
6	164.33	39.78
7	171.19	41.19
8	177.86	43.32
9	184.25	46.17
10	190.30	49.69
11	195.94	53.85
12	201.09	58.58
13	204.74	62.76

Circle Center At X = 154.8 ; Y = 103.8 and Radius, 64.7

*** 2.948 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.78	34.00
2	74.52	32.11
3	81.34	30.52
4	88.22	29.23
5	95.15	28.24
6	102.11	27.56
7	109.10	27.18
8	116.10	27.11
9	123.10	27.34
10	130.08	27.89
11	137.02	28.73
12	143.93	29.89
13	150.78	31.34
14	157.55	33.09
15	164.25	35.14
16	170.85	37.48
17	177.33	40.10
18	183.70	43.01
19	189.94	46.19
20	196.02	49.65
21	201.96	53.37
22	207.72	57.34
23	211.79	60.42

Circle Center At X = 114.2 ; Y = 186.8 and Radius, 159.7

*** 2.950 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.56	34.00
2	92.15	31.65
3	98.86	29.66
4	105.67	28.05
5	112.56	26.82
6	119.51	25.97
7	126.50	25.51
8	133.50	25.43
9	140.49	25.74
10	147.46	26.44
11	154.37	27.52
12	161.22	28.98
13	167.97	30.82
14	174.61	33.03
15	181.12	35.60
16	187.48	38.53
17	193.67	41.80
18	199.66	45.42
19	205.45	49.36
20	211.01	53.61
21	216.33	58.16
22	216.91	58.72

Circle Center At X = 131.4 ; Y = 152.0 and Radius, 126.6

*** 2.966 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	34.00
2	100.43	30.36
3	106.77	27.39
4	113.39	25.13
5	120.22	23.58
6	127.17	22.79
7	134.17	22.74
8	141.13	23.46
9	147.98	24.92
10	154.63	27.10
11	161.00	30.00
12	167.03	33.56
13	172.63	37.75
14	177.76	42.52
15	182.33	47.82
16	186.31	53.58
17	189.65	59.73
18	191.19	63.50

Circle Center At X = 131.1 ; Y = 87.5 and Radius, 64.8

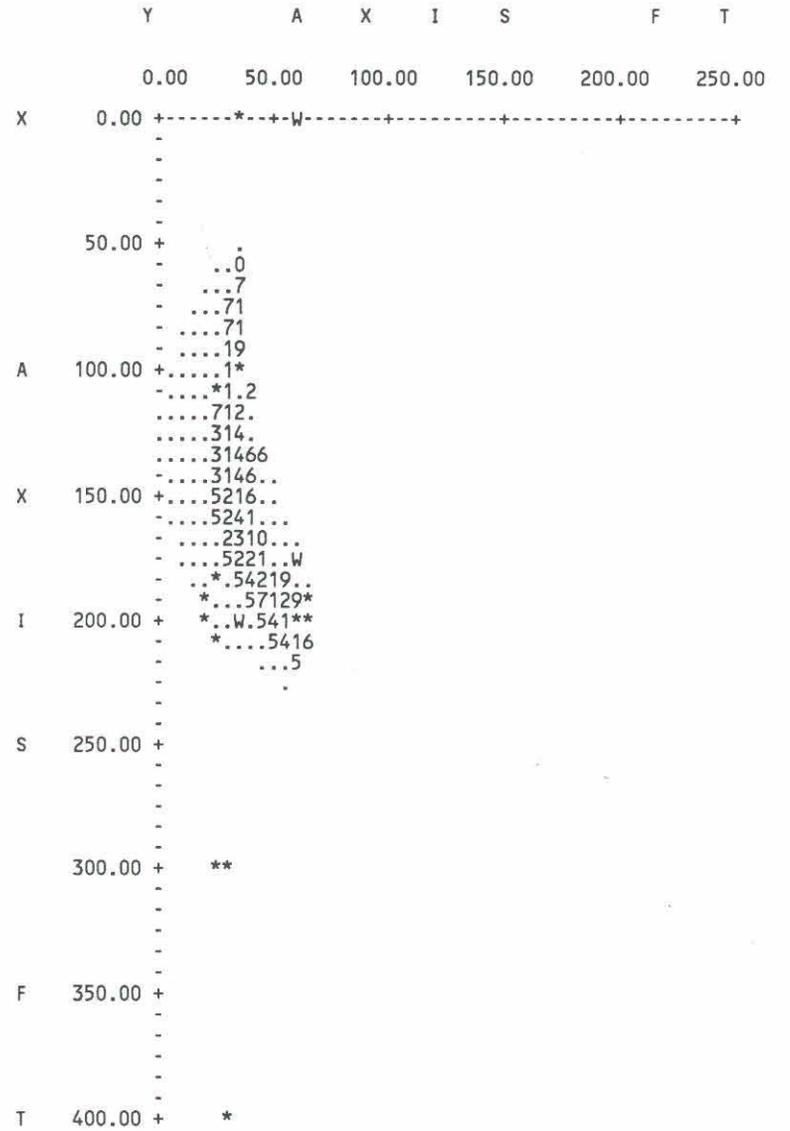
*** 3.055 ***

Failure Surface Specified By 24 Coordinate Points

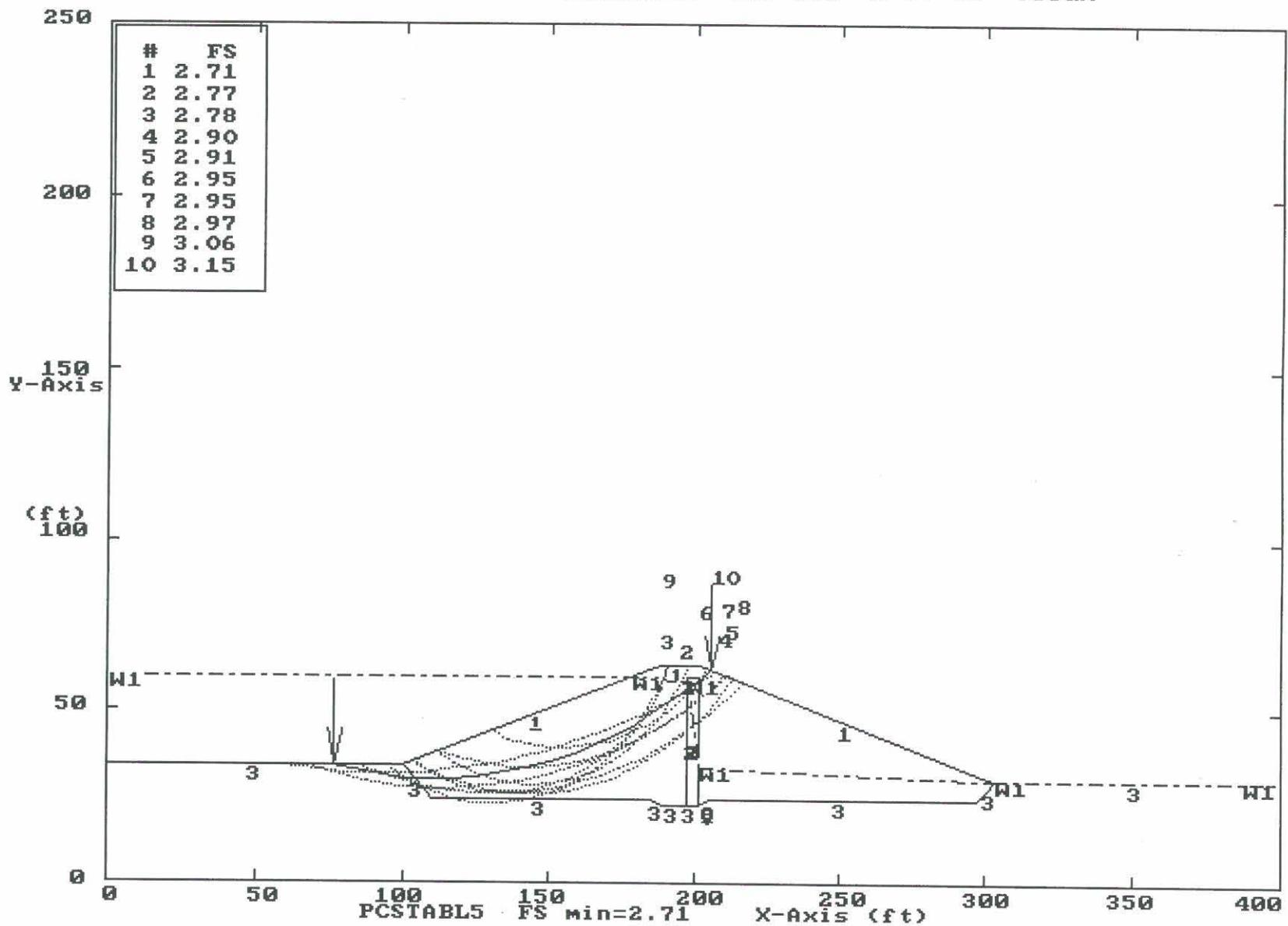
Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.89	34.00
2	65.82	33.03
3	72.78	32.28
4	79.76	31.74
5	86.75	31.42
6	93.75	31.31
7	100.75	31.41
8	107.74	31.73
9	114.72	32.26
10	121.68	33.00
11	128.62	33.96
12	135.52	35.13
13	142.38	36.51
14	149.20	38.09
15	155.97	39.89
16	162.67	41.89
17	169.32	44.10
18	175.89	46.51
19	182.38	49.12
20	188.80	51.93
21	195.12	54.93
22	201.35	58.12
23	207.48	61.51
24	207.85	61.73

Circle Center At X = 93.9 ; Y = 260.0 and Radius, 228.7

*** 3.152 ***



asandro Wash Dam pstream Steady State Seepage
 Ten Most Critical. P:CWD1A.PLT By: DJA 0-17-95 :36am



** PCSTABL5 **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 10-17-95
Time of Run: 6:43am
Run By: DJA
Input Data Filename: P:CWD2
Output Filename: P:CWD2.OUT
Plotted Output Filename: P:CWD2.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Upstream Steady State Seepage-Seismic

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	34.00	100.00	34.00	3
2	100.00	34.00	188.50	63.50	1
3	188.50	63.50	202.50	63.50	1
4	202.50	63.50	303.50	30.00	1
5	303.50	30.00	400.00	30.00	3
6	100.00	34.00	110.00	24.00	3
7	110.00	24.00	185.50	24.00	3
8	185.50	24.00	189.50	22.00	3
9	189.50	22.00	197.50	22.00	3
10	197.50	22.00	197.60	60.00	2
11	197.60	60.00	201.50	60.00	2
12	201.50	60.00	201.60	22.00	2
13	201.60	22.00	205.50	24.00	3
14	205.50	24.00	297.00	24.00	3
15	297.00	24.00	303.00	30.00	3
16	197.50	22.00	201.60	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	240.0	21.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	60.20
2	178.60	60.20
3	197.60	59.00
4	201.50	33.00
5	303.00	30.00
6	400.00	30.00

A Horizontal Earthquake Loading Coefficient Of 0.100 Has Been Assigned

A Vertical Earthquake Loading Coefficient Of 0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft. and X = 150.00 ft.

Each Surface Terminates Between X = 150.00 ft. and X = 225.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	34.00
2	90.18	32.56
3	97.09	31.43
4	104.04	30.61
5	111.03	30.12
6	118.02	29.94
7	125.02	30.08
8	132.01	30.54
9	138.96	31.32
10	145.88	32.41
11	152.73	33.82
12	159.52	35.54
13	166.22	37.57
14	172.82	39.90
15	179.31	42.53
16	185.67	45.45
17	191.89	48.66
18	197.96	52.15
19	203.86	55.91
20	209.59	59.93
21	210.69	60.78

Circle Center At X = 118.4 ; Y = 183.5 and Radius, 153.5

*** 1.594 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	122.80	36.17
3	129.27	33.50
4	135.99	31.57
5	142.90	30.41
6	149.89	30.03
7	156.87	30.43
8	163.77	31.62
9	170.50	33.57
10	176.96	36.26
11	183.07	39.67
12	188.77	43.73
13	193.98	48.41
14	198.62	53.65
15	202.65	59.37

16 204.54 62.82
Circle Center At X = 149.8 ; Y = 92.3 and Radius, 62.3

*** 1.696 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	34.00
2	101.04	31.65
3	107.76	29.68
4	114.58	28.11
5	121.48	26.94
6	128.44	26.18
7	135.43	25.82
8	142.43	25.87
9	149.41	26.33
10	156.36	27.20
11	163.24	28.47
12	170.04	30.14
13	176.73	32.20
14	183.29	34.65
15	189.69	37.48
16	195.92	40.67
17	201.95	44.23
18	207.76	48.13
19	213.34	52.36
20	218.66	56.91
21	219.61	57.82

Circle Center At X = 138.1 ; Y = 145.8 and Radius, 120.0

*** 1.703 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	39.56
2	122.65	35.92
3	129.04	33.06
4	135.73	31.01
5	142.62	29.80
6	149.62	29.46
7	156.60	30.00
8	163.46	31.39
9	170.09	33.63
10	176.39	36.67
11	182.27	40.47
12	187.63	44.97
13	192.39	50.11
14	196.48	55.79
15	199.83	61.94
16	200.44	63.50

Circle Center At X = 148.8 ; Y = 85.7 and Radius, 56.3

*** 1.718 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	34.00
2	78.90	31.91
3	85.67	30.11
4	92.50	28.61
5	99.40	27.39
6	106.34	26.47
7	113.31	25.85
8	120.30	25.53
9	127.30	25.51
10	134.30	25.79
11	141.27	26.37
12	148.22	27.24
13	155.12	28.42
14	161.96	29.88
15	168.74	31.64
16	175.43	33.69
17	182.03	36.02
18	188.53	38.63
19	194.91	41.52
20	201.15	44.68
21	207.26	48.10
22	213.21	51.78
23	219.00	55.71
24	221.15	57.31

Circle Center At X = 124.3 ; Y = 188.9 and Radius, 163.5

*** 1.764 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	34.00
2	79.07	32.55
3	85.97	31.35
4	92.90	30.38
5	99.86	29.67
6	106.85	29.20
7	113.84	28.97
8	120.84	29.00
9	127.84	29.27
10	134.82	29.78
11	141.78	30.54
12	148.71	31.55
13	155.59	32.80
14	162.43	34.30
15	169.21	36.03
16	175.93	38.00
17	182.57	40.21
18	189.13	42.65
19	195.60	45.32
20	201.98	48.22
21	208.24	51.34

22 214.39 54.68
23 219.69 57.80

Circle Center At X = 116.7 ; Y = 227.4 and Radius, 198.4

*** 1.765 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	35.85
2	111.82	32.74
3	118.43	30.43
4	125.28	28.96
5	132.25	28.36
6	139.25	28.63
7	146.15	29.78
8	152.86	31.78
9	159.27	34.60
10	165.27	38.20
11	170.78	42.52
12	175.70	47.49
13	179.97	53.04
14	183.51	59.08
15	184.89	62.30

Circle Center At X = 133.6 ; Y = 84.3 and Radius, 56.0

*** 1.790 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	34.00
2	101.06	31.70
3	107.78	29.76
4	114.60	28.19
5	121.50	27.00
6	128.45	26.18
7	135.44	25.75
8	142.44	25.70
9	149.43	26.04
10	156.40	26.75
11	163.31	27.84
12	170.15	29.32
13	176.91	31.16
14	183.55	33.37
15	190.06	35.94
16	196.42	38.86
17	202.61	42.12
18	208.62	45.72
19	214.42	49.64
20	219.99	53.87
21	223.23	56.62

Circle Center At X = 139.8 ; Y = 153.7 and Radius, 128.0

*** 1.790 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	34.00
2	89.64	30.97
3	96.22	28.57
4	103.00	26.82
5	109.91	25.73
6	116.90	25.32
7	123.89	25.59
8	130.83	26.53
9	137.64	28.15
10	144.26	30.42
11	150.63	33.32
12	156.69	36.82
13	162.39	40.90
14	167.65	45.51
15	172.45	50.60
16	176.73	56.14
17	179.46	60.49

Circle Center At X = 117.6 ; Y = 97.4 and Radius, 72.1

*** 1.820 ***

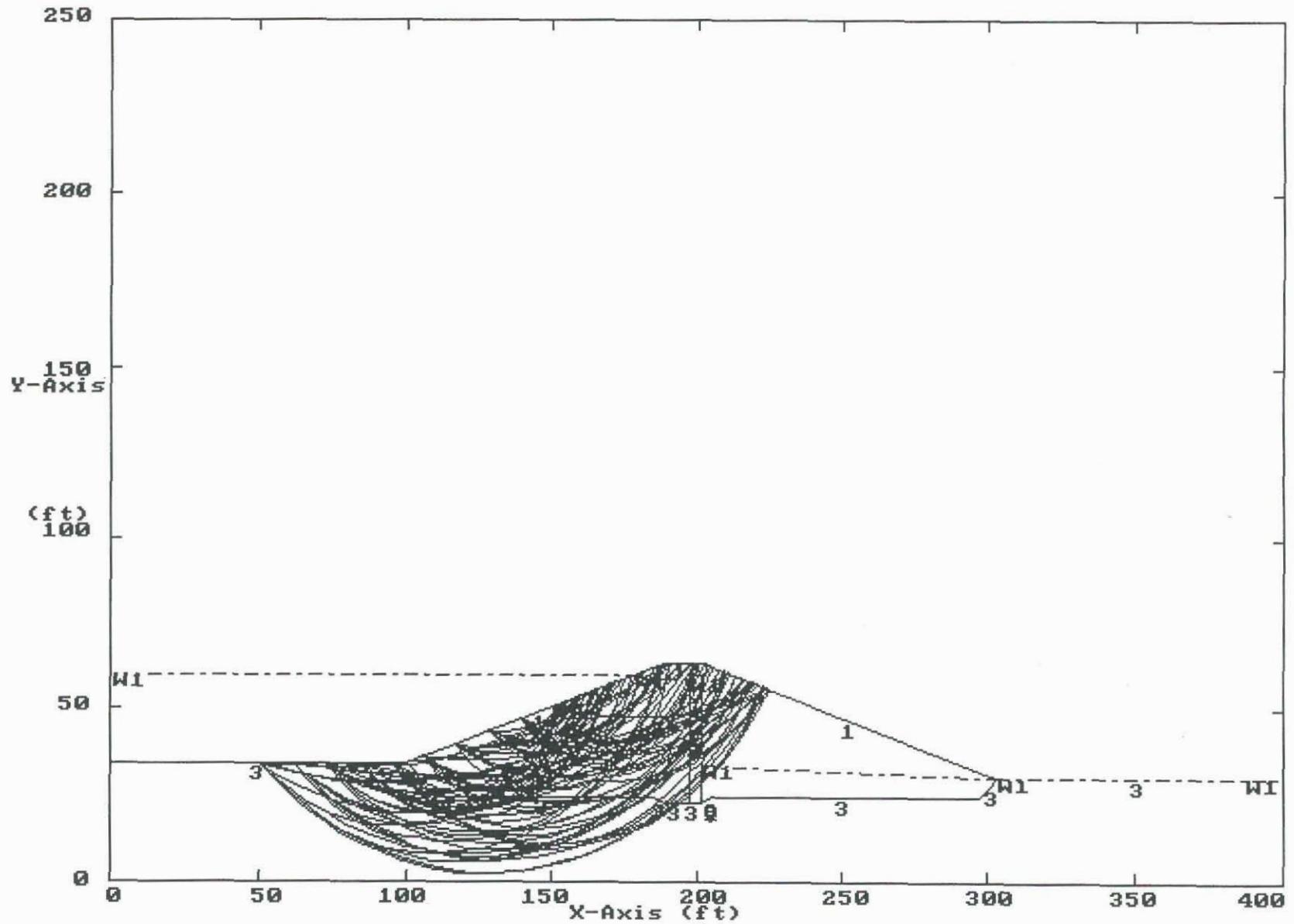
Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	127.78	43.26
2	133.77	39.64
3	140.23	36.94
4	147.01	35.21
5	153.97	34.49
6	160.97	34.80
7	167.84	36.12
8	174.44	38.44
9	180.64	41.70
10	186.29	45.84
11	191.27	50.75
12	195.49	56.34
13	198.84	62.49
14	199.21	63.50

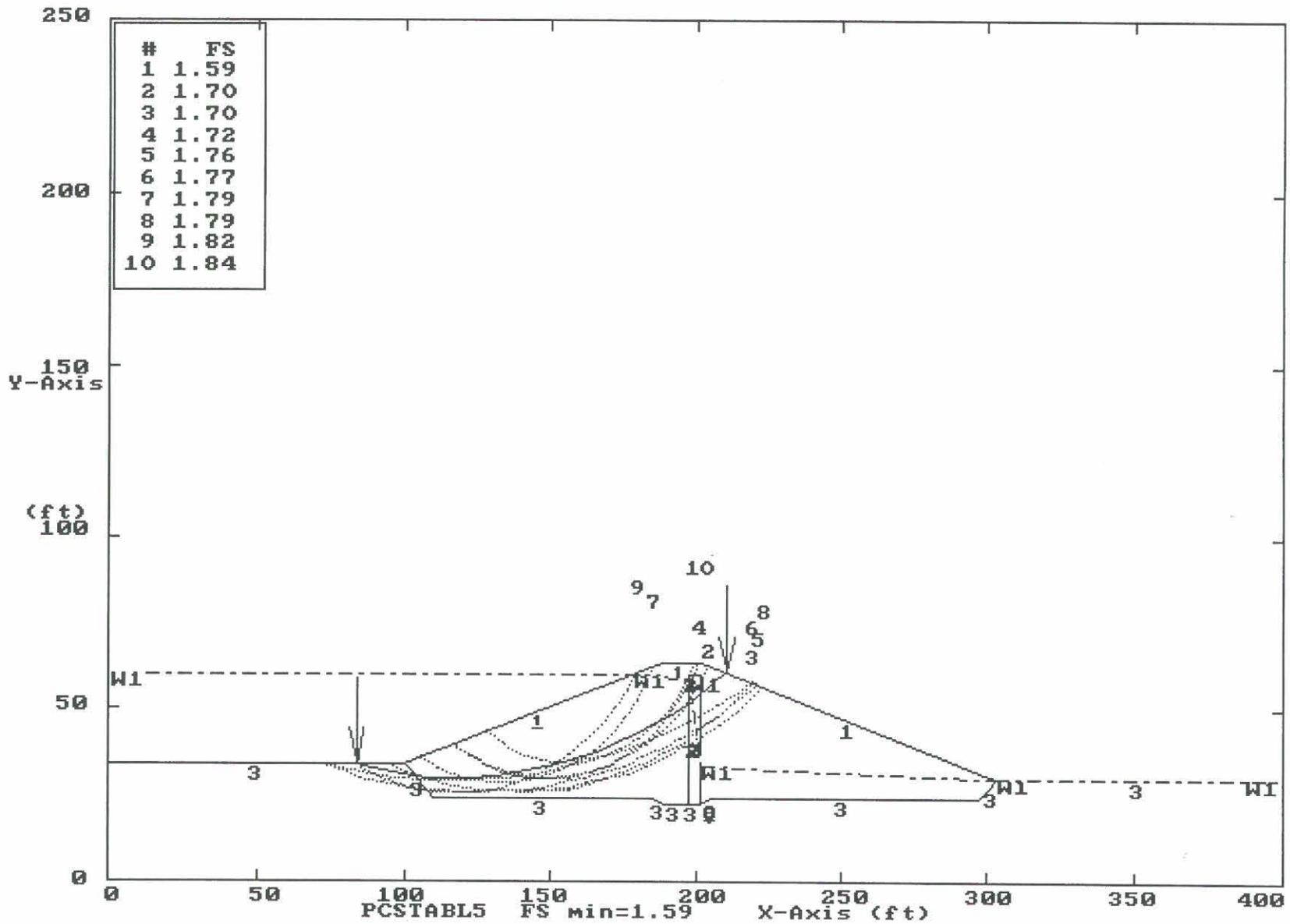
Circle Center At X = 155.4 ; Y = 82.2 and Radius, 47.7

*** 1.838 ***

asandro Wash Dam pstream Steady State Seepage-Seismic
All surfaces evaluated. P:CWD2.PLT By: DJA 0-17-95 :43am



asandro Wash Dam pstream Steady State Seepage-Seismic
 Ten Most Critical. P:CWD2.PLT By: DJA 0-17-95 :43am



** PCSTABL5 **
by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 10-17-95
Time of Run: 6:48am
Run By: DJA
Input Data Filename: P:CWD3A
Output Filename: P:CWD3A.OUT
Plotted Output Filename: P:CWD3A.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Upstream Steady State Seepage
Rispig Draw

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	34.00	100.00	34.00	3
2	100.00	34.00	188.50	63.50	1
3	188.50	63.50	202.50	63.50	1
4	202.50	63.50	303.50	30.00	1
5	303.50	30.00	400.00	30.00	3
6	100.00	34.00	110.00	24.00	3
7	110.00	24.00	185.50	24.00	3
8	185.50	24.00	189.50	22.00	3
9	189.50	22.00	197.50	22.00	3
10	197.50	22.00	197.60	60.00	2
11	197.60	60.00	201.50	60.00	2
12	201.50	60.00	201.60	22.00	2
13	201.60	22.00	205.50	24.00	3
14	205.50	24.00	297.00	24.00	3
15	297.00	24.00	303.00	30.00	3
16	197.50	22.00	201.60	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	240.0	21.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	34.00
2	100.00	34.00
3	178.60	60.20
4	197.60	59.00
5	201.50	33.00
6	303.00	30.00
7	400.00	30.00

Piezometric Surface No. 2 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	60.20
2	178.60	60.20
3	197.60	59.00
4	201.50	33.00
5	303.00	30.00
6	400.00	30.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft.
and X = 130.00 ft.

Each Surface Terminates Between X = 130.00 ft.
and X = 225.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	103.33	35.11
2	109.46	31.73
3	115.95	29.09
4	122.69	27.22
5	129.61	26.16
6	136.61	25.91
7	143.58	26.49
8	150.44	27.88
9	157.10	30.05
10	163.45	33.00
11	169.41	36.66
12	174.90	41.00
13	179.85	45.95
14	184.19	51.45
15	187.85	57.42
16	190.66	63.50

Circle Center At X = 135.2 ; Y = 85.6 and Radius, 59.7

*** 1.347 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.67	34.00
2	83.52	32.56
3	90.43	31.43
4	97.38	30.62
5	104.36	30.12
6	111.36	29.95
7	118.36	30.10
8	125.34	30.57
9	132.30	31.36
10	139.21	32.46
11	146.06	33.88
12	152.85	35.61
13	159.54	37.65
14	166.14	40.00
15	172.62	42.64
16	178.97	45.58
17	185.18	48.81
18	191.24	52.31
19	197.13	56.10
20	202.85	60.14

21 205.76 62.42

Circle Center At X = 111.6 ; Y = 182.9 and Radius, 152.9

*** 1.396 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	112.22	38.07
2	118.23	34.49
3	124.64	31.66
4	131.34	29.64
5	138.24	28.44
6	145.23	28.09
7	152.21	28.60
8	159.08	29.96
9	165.73	32.14
10	172.07	35.11
11	177.99	38.83
12	183.42	43.25
13	188.27	48.30
14	192.47	53.90
15	195.96	59.97
16	197.45	63.50

Circle Center At X = 144.6 ; Y = 85.5 and Radius, 57.4

*** 1.421 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.56	34.00
2	92.15	31.65
3	98.86	29.66
4	105.67	28.05
5	112.56	26.82
6	119.51	25.97
7	126.50	25.51
8	133.50	25.43
9	140.49	25.74
10	147.46	26.44
11	154.37	27.52
12	161.22	28.98
13	167.97	30.82
14	174.61	33.03
15	181.12	35.60
16	187.48	38.53
17	193.67	41.80
18	199.66	45.42
19	205.45	49.36
20	211.01	53.61
21	216.33	58.16
22	216.91	58.72

Circle Center At X = 131.4 ; Y = 152.0 and Radius, 126.6

*** 1.484 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	34.00
2	100.43	30.36
3	106.77	27.39
4	113.39	25.13
5	120.22	23.58
6	127.17	22.79
7	134.17	22.74
8	141.13	23.46
9	147.98	24.92
10	154.63	27.10
11	161.00	30.00
12	167.03	33.56
13	172.63	37.75
14	177.76	42.52
15	182.33	47.82
16	186.31	53.58
17	189.65	59.73
18	191.19	63.50

Circle Center At X = 131.1 ; Y = 87.5 and Radius, 64.8

*** 1.488 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	103.33	35.11
2	109.67	32.14
3	116.23	29.68
4	122.96	27.76
5	129.82	26.38
6	136.77	25.55
7	143.76	25.29
8	150.76	25.59
9	157.71	26.44
10	164.56	27.85
11	171.28	29.81
12	177.83	32.29
13	184.15	35.30
14	190.21	38.80
15	195.97	42.77
16	201.40	47.20
17	206.45	52.04
18	211.10	57.27
19	213.14	59.97

Circle Center At X = 143.6 ; Y = 112.6 and Radius, 87.3

*** 1.496 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.78	34.00
2	74.52	32.11
3	81.34	30.52
4	88.22	29.23
5	95.15	28.24
6	102.11	27.56
7	109.10	27.18
8	116.10	27.11
9	123.10	27.34
10	130.08	27.89
11	137.02	28.73
12	143.93	29.89
13	150.78	31.34
14	157.55	33.09
15	164.25	35.14
16	170.85	37.48
17	177.33	40.10
18	183.70	43.01
19	189.94	46.19
20	196.02	49.65
21	201.96	53.37
22	207.72	57.34
23	211.79	60.42

Circle Center At X = 114.2 ; Y = 186.8 and Radius, 159.7

*** 1.502 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.56	34.00
2	91.82	30.88
3	98.40	28.49
4	105.21	26.85
5	112.15	25.98
6	119.15	25.90
7	126.12	26.60
8	132.96	28.08
9	139.59	30.32
10	145.93	33.29
11	151.90	36.95
12	157.42	41.26
13	162.42	46.16
14	166.84	51.59
15	170.62	57.48
16	170.66	57.55

Circle Center At X = 116.4 ; Y = 88.1 and Radius, 62.3

*** 1.512 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	112.22	38.07
2	118.21	34.46
3	124.70	31.81
4	131.51	30.21
5	138.49	29.68
6	145.47	30.25
7	152.27	31.90
8	158.74	34.58
9	164.70	38.24
10	170.03	42.78
11	174.59	48.09
12	178.26	54.05
13	180.97	60.51
14	181.09	61.03

Circle Center At X = 138.3 ; Y = 74.6 and Radius, 44.9

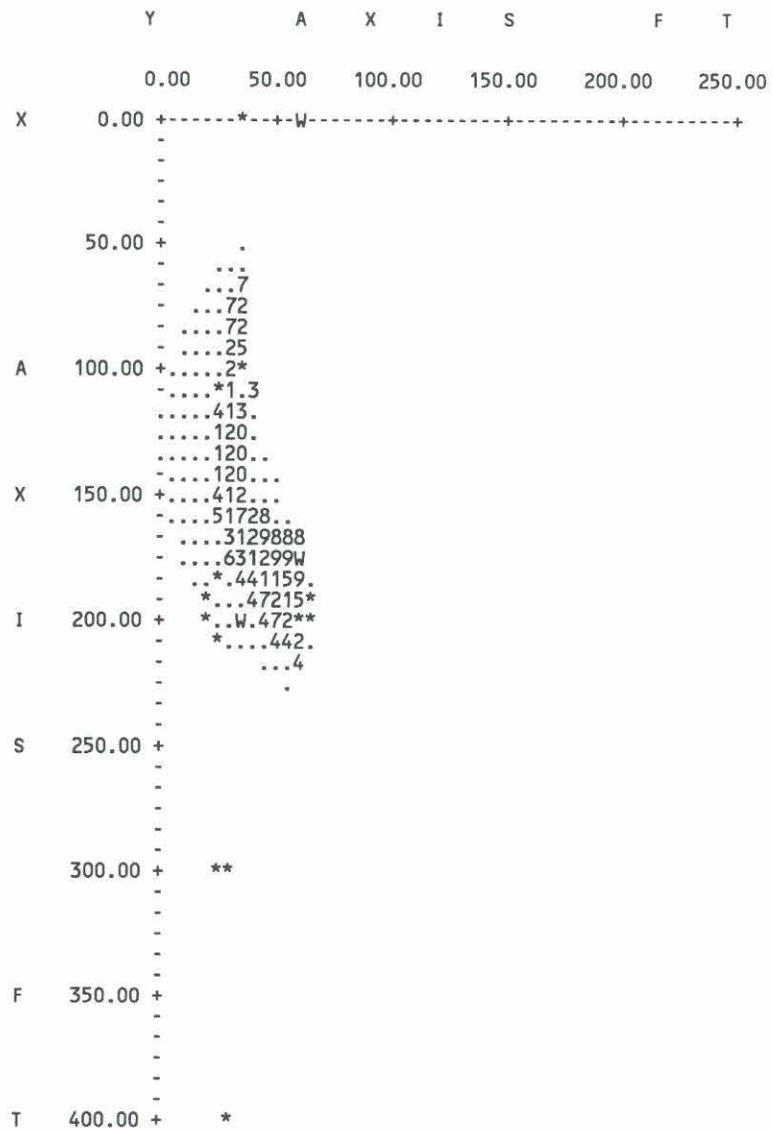
*** 1.512 ***

Failure Surface Specified By 17 Coordinate Points

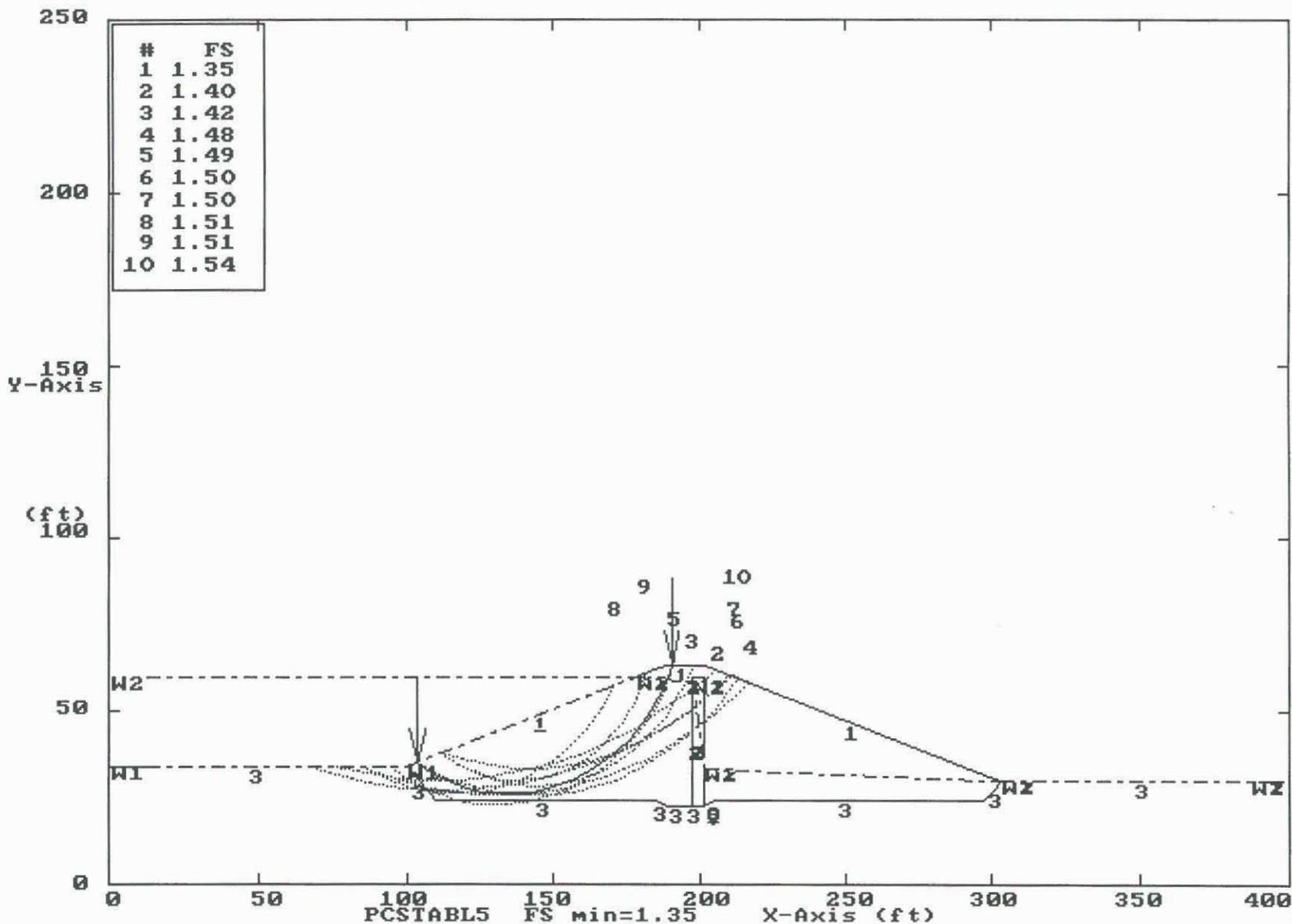
Point No.	X-Surf (ft)	Y-Surf (ft)
1	112.22	38.07
2	118.96	36.18
3	125.82	34.77
4	132.76	33.85
5	139.75	33.43
6	146.75	33.51
7	153.72	34.08
8	160.64	35.15
9	167.46	36.70
10	174.16	38.74
11	180.70	41.25
12	187.04	44.22
13	193.15	47.63
14	199.01	51.46
15	204.57	55.71
16	209.83	60.33
17	210.37	60.89

Circle Center At X = 142.2 ; Y = 131.8 and Radius, 98.4

*** 1.537 ***



asandro Wash Dam pstream Steady State Seepage
 Ten Most Critical. P:CWD3A.PLT By: DJA 0-17-95 :48am



** PCSTABL5 **
by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 10-17-95
Time of Run: 6:54am
Run By: DJA
Input Data Filename: P:CWD4A
Output Filename: P:CWD4A.OUT
Plotted Output Filename: P:CWD4A.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Downstream Steady State

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	30.00	97.00	30.00	3
2	97.00	30.00	197.50	63.50	1
3	197.50	63.50	211.50	63.50	1
4	211.50	63.50	300.00	34.00	1
5	300.00	34.00	400.00	34.00	3
6	97.00	30.00	103.00	24.00	3
7	103.00	24.00	194.50	24.00	3
8	194.50	24.00	198.40	22.00	3
9	198.40	22.00	198.50	60.00	2
10	198.50	60.00	202.40	60.00	2
11	202.40	60.00	202.50	22.00	2
12	202.50	22.00	210.50	22.00	3
13	210.50	22.00	214.50	24.00	3
14	214.50	24.00	290.00	24.00	3
15	290.00	24.00	300.00	34.00	3
16	198.40	22.00	202.50	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	240.0	21.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	30.00
2	97.00	30.00
3	198.50	33.00
4	202.40	59.00
5	220.40	60.20
6	400.00	60.20

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft.
and X = 150.00 ft.

Each Surface Terminates Between X = 150.00 ft.
and X = 225.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	30.00
2	90.18	28.56
3	97.10	27.45
4	104.05	26.69
5	111.04	26.28
6	118.04	26.21
7	125.04	26.48
8	132.01	27.10
9	138.94	28.07
10	145.82	29.37
11	152.62	31.02
12	159.34	33.00
13	165.95	35.31
14	172.43	37.94
15	178.78	40.89
16	184.98	44.15
17	191.00	47.71
18	196.84	51.56
19	202.49	55.70
20	207.92	60.12
21	211.64	63.45

Circle Center At X = 116.0 ; Y = 167.8 and Radius, 141.6

*** 1.879 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	30.00
2	79.07	28.55
3	85.97	27.37
4	92.91	26.46
5	99.88	25.81
6	106.87	25.44
7	113.87	25.34
8	120.87	25.51
9	127.85	25.95
10	134.82	26.66
11	141.75	27.64
12	148.64	28.89
13	155.47	30.41
14	162.24	32.19
15	168.94	34.23

16	175.55	36.52
17	182.07	39.08
18	188.48	41.88
19	194.78	44.93
20	200.96	48.22
21	207.00	51.75
22	212.91	55.51
23	218.66	59.50
24	220.15	60.62

Circle Center At X = 113.0 ; Y = 205.9 and Radius, 180.5

*** 1.949 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	30.00
2	89.98	27.79
3	96.80	26.22
4	103.74	25.30
5	110.73	25.04
6	117.72	25.44
7	124.64	26.49
8	131.43	28.19
9	138.03	30.53
10	144.38	33.47
11	150.43	37.00
12	156.11	41.09
13	161.38	45.69
14	166.20	50.77
15	168.64	53.88

Circle Center At X = 110.0 ; Y = 99.2 and Radius, 74.2

*** 2.075 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.11	30.00
2	68.04	29.03
3	75.01	28.30
4	81.99	27.79
5	88.98	27.51
6	95.98	27.45
7	102.98	27.63
8	109.97	28.04
9	116.94	28.67
10	123.89	29.53
11	130.80	30.62
12	137.68	31.93
13	144.50	33.47
14	151.28	35.23
15	157.99	37.21
16	164.64	39.41
17	171.21	41.83
18	177.70	44.46
19	184.09	47.30
20	190.39	50.35
21	196.59	53.60
22	202.68	57.06
23	208.65	60.71
24	212.43	63.19

Circle Center At X = 94.1 ; Y = 241.4 and Radius, 213.9

*** 2.124 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	32.85
2	111.82	29.74
3	118.44	27.44
4	125.29	26.01
5	132.27	25.46
6	139.26	25.81
7	146.15	27.04
8	152.83	29.14
9	159.18	32.07
10	165.11	35.79
11	170.52	40.23
12	175.32	45.33
13	179.43	51.00
14	182.79	57.14
15	183.45	58.82

Circle Center At X = 133.1 ; Y = 80.3 and Radius, 54.9

*** 2.133 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	30.00
2	78.90	27.91
3	85.67	26.14
4	92.52	24.67
5	99.43	23.53
6	106.38	22.70
7	113.36	22.19
8	120.36	22.01
9	127.35	22.15
10	134.34	22.62
11	141.30	23.40
12	148.21	24.50
13	155.06	25.92
14	161.84	27.66
15	168.54	29.71
16	175.13	32.06
17	181.61	34.72
18	187.96	37.67
19	194.16	40.91
20	200.21	44.43
21	206.09	48.23
22	211.79	52.29
23	217.29	56.61
24	221.44	60.19

Circle Center At X = 120.8 ; Y = 173.8 and Radius, 151.8

*** 2.157 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	122.80	33.17
3	129.28	30.53
4	136.02	28.65
5	142.94	27.57
6	149.93	27.30
7	156.91	27.84
8	163.78	29.19
9	170.44	31.33
10	176.82	34.22
11	182.81	37.84
12	188.34	42.13
13	193.34	47.03
14	197.73	52.48
15	201.46	58.40
16	203.90	63.50

Circle Center At X = 148.8 ; Y = 87.5 and Radius, 60.2

*** 2.172 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.00	33.58
3	129.58	31.18
4	136.34	29.36
5	143.23	28.15
6	150.21	27.55
7	157.21	27.57
8	164.18	28.21
9	171.07	29.46
10	177.82	31.31
11	184.38	33.75
12	190.70	36.76
13	196.73	40.31
14	202.42	44.38
15	207.73	48.94
16	212.62	53.95
17	217.05	59.37
18	218.31	61.23

Circle Center At X = 153.5 ; Y = 106.8 and Radius, 79.3

*** 2.200 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	30.00
2	101.04	27.65
3	107.76	25.71
4	114.60	24.20
5	121.51	23.11
6	128.48	22.46
7	135.48	22.25
8	142.48	22.47
9	149.45	23.14
10	156.36	24.23
11	163.19	25.75
12	169.92	27.70
13	176.51	30.06
14	182.93	32.83
15	189.18	36.00
16	195.21	39.55
17	201.01	43.47
18	206.55	47.74
19	211.82	52.35
20	216.79	57.28
21	219.84	60.72

Circle Center At X = 135.4 ; Y = 134.3 and Radius, 112.1

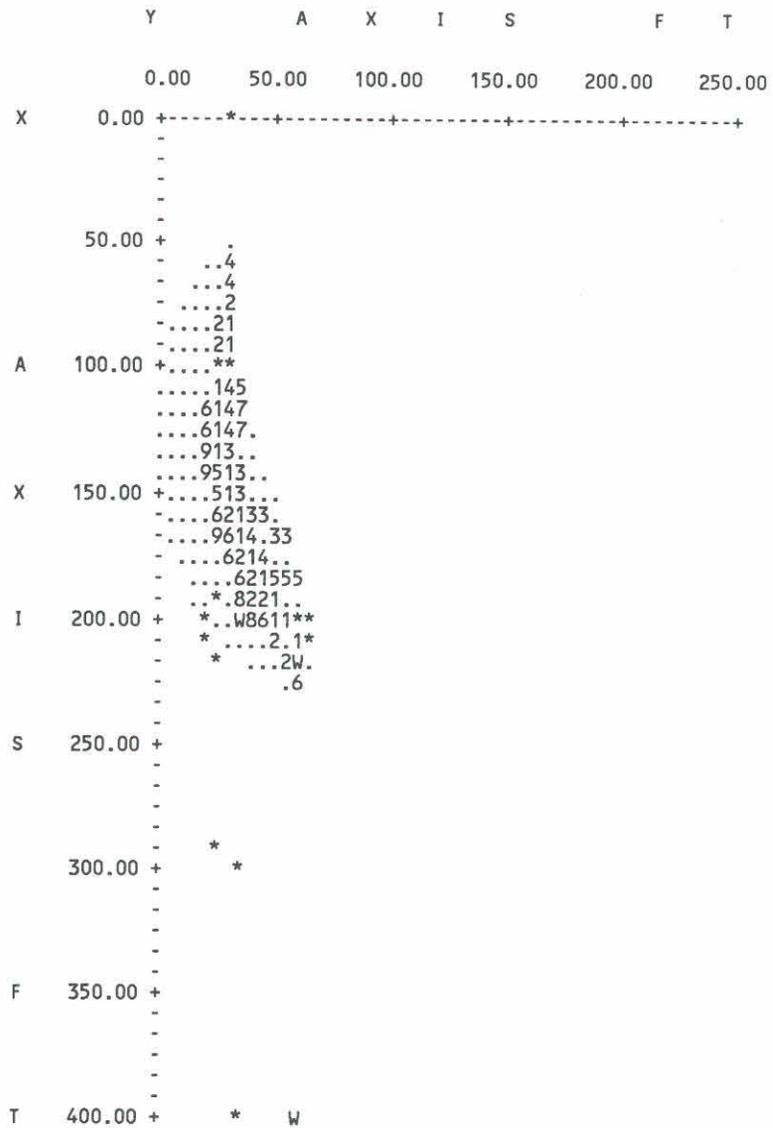
*** 2.227 ***

Failure Surface Specified By 19 Coordinate Points

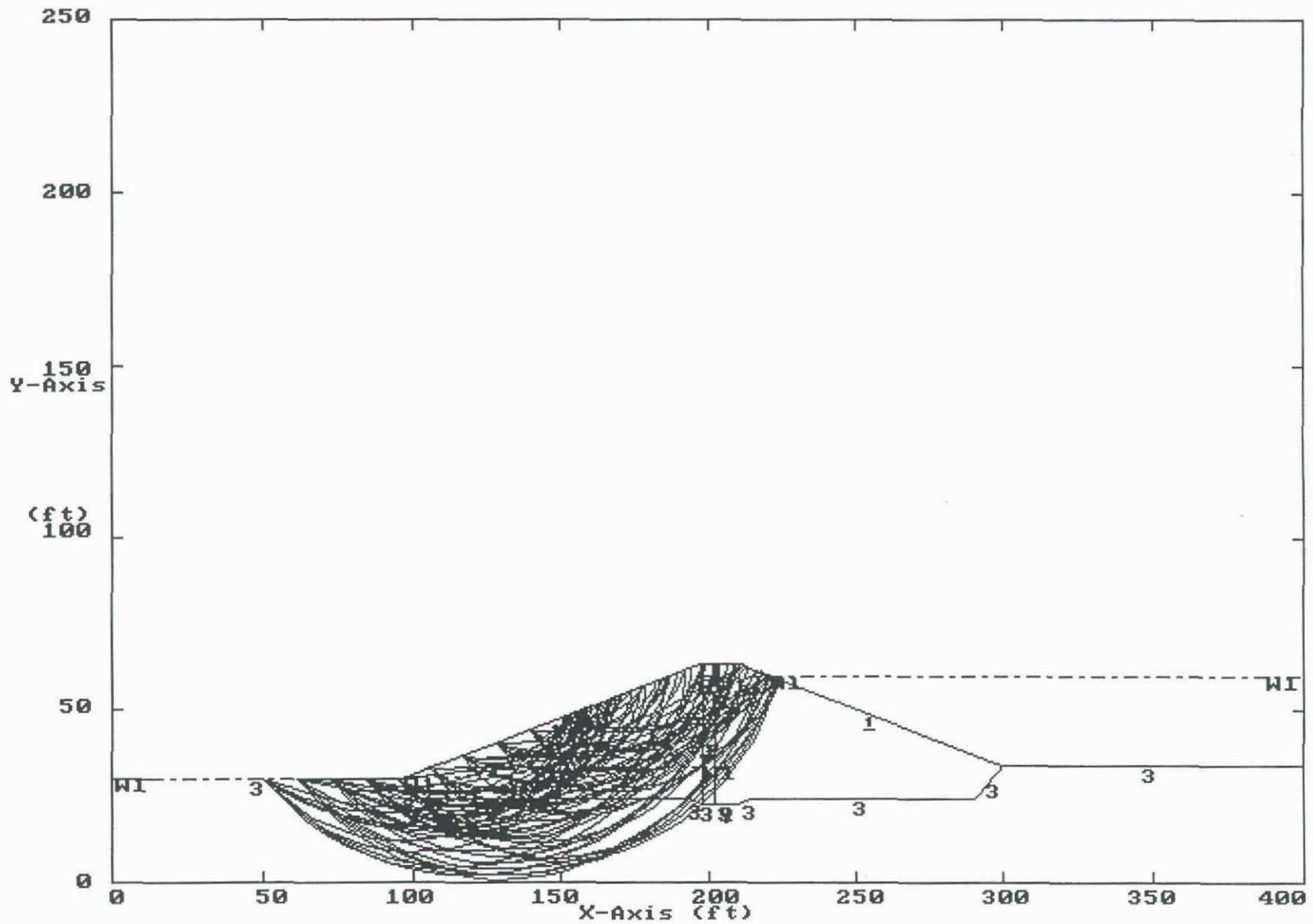
Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	32.85
2	112.54	32.32
3	119.53	32.04
4	126.53	32.03
5	133.53	32.29
6	140.51	32.80
7	147.46	33.58
8	154.39	34.62
9	161.26	35.92
10	168.09	37.48
11	174.85	39.30
12	181.54	41.37
13	188.14	43.69
14	194.65	46.25
15	201.06	49.06
16	207.37	52.11
17	213.55	55.39
18	219.60	58.91
19	221.56	60.15

Circle Center At X = 123.3 ; Y = 217.9 and Radius, 185.8

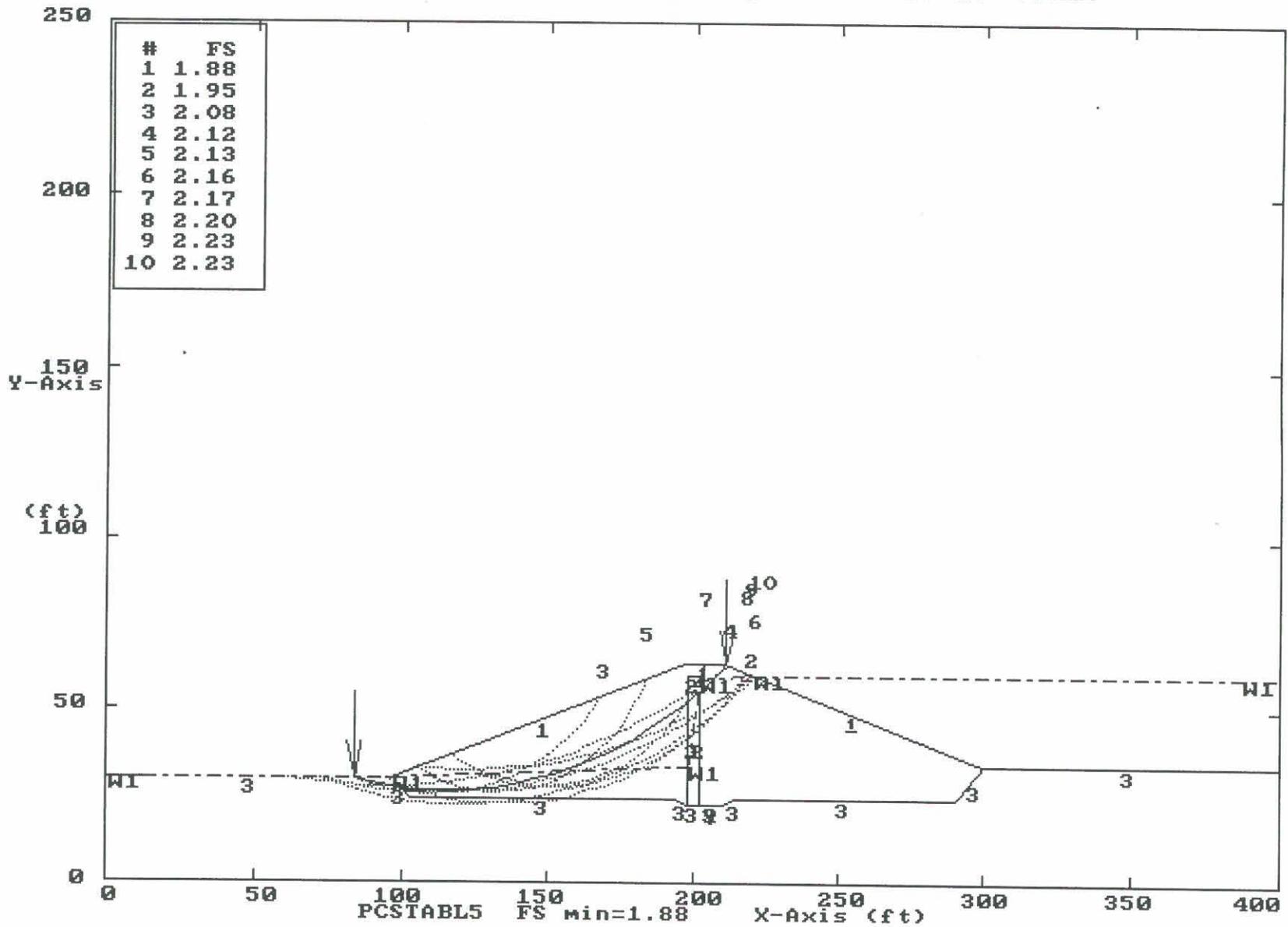
*** 2.232 ***



asandro Wash Dam ownstream Steady State
All surfaces evaluated. P:CWD4A.PLT By: DJA 0-17-95 :54am



asandro Wash Dam ownstream Steady State
 Ten Most Critical. P:CWD4A.PLT By: DJR 0-17-95 :54am



** PCSTABL5 **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 10-17-95
Time of Run: 7:03am
Run By: DJA
Input Data Filename: P:CWD5A
Output Filename: P:CWD5A.OUT
Plotted Output Filename: P:CWD5A.PLT

PROBLEM DESCRIPTION Casandro Wash Dam
Downstream Steady State Seismic

BOUNDARY COORDINATES

5 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	30.00	97.00	30.00	3
2	97.00	30.00	197.50	63.50	1
3	197.50	63.50	211.50	63.50	1
4	211.50	63.50	300.00	34.00	1
5	300.00	34.00	400.00	34.00	3
6	97.00	30.00	103.00	24.00	3
7	103.00	24.00	194.50	24.00	3
8	194.50	24.00	198.40	22.00	3
9	198.40	22.00	198.50	60.00	2
10	198.50	60.00	202.40	60.00	2
11	202.40	60.00	202.50	22.00	2
12	202.50	22.00	210.50	22.00	3
13	210.50	22.00	214.50	24.00	3
14	214.50	24.00	290.00	24.00	3
15	290.00	24.00	300.00	34.00	3
16	198.40	22.00	202.50	22.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	240.0	21.0	0.00	0.0	1
2	120.0	130.0	0.0	40.0	0.00	0.0	1
3	120.0	140.0	0.0	40.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	30.00
2	97.00	30.00
3	198.50	33.00
4	202.40	59.00
5	220.40	60.20
6	400.00	60.20

A Horizontal Earthquake Loading Coefficient Of 0.100 Has Been Assigned

A Vertical Earthquake Loading Coefficient Of 0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between $X = 50.00$ ft.
and $X = 150.00$ ft.

Each Surface Terminates Between $X = 150.00$ ft.
and $X = 225.00$ ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is $Y = 0.00$ ft.

7.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	30.00
2	90.18	28.56
3	97.10	27.45
4	104.05	26.69
5	111.04	26.28
6	118.04	26.21
7	125.04	26.48
8	132.01	27.10
9	138.94	28.07
10	145.82	29.37
11	152.62	31.02
12	159.34	33.00
13	165.95	35.31
14	172.43	37.94
15	178.78	40.89
16	184.98	44.15
17	191.00	47.71
18	196.84	51.56
19	202.49	55.70
20	207.92	60.12
21	211.64	63.45

Circle Center At $X = 116.0$; $Y = 167.8$ and Radius, 141.6

*** 1.391 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	30.00
2	79.07	28.55
3	85.97	27.37
4	92.91	26.46
5	99.88	25.81
6	106.87	25.44
7	113.87	25.34
8	120.87	25.51
9	127.85	25.95
10	134.82	26.66
11	141.75	27.64
12	148.64	28.89
13	155.47	30.41
14	162.24	32.19
15	168.94	34.23

16	175.55	36.52
17	182.07	39.08
18	188.48	41.88
19	194.78	44.93
20	200.96	48.22
21	207.00	51.75
22	212.91	55.51
23	218.66	59.50
24	220.15	60.62

Circle Center At X = 113.0 ; Y = 205.9 and Radius, 180.5

*** 1.403 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	30.00
2	89.98	27.79
3	96.80	26.22
4	103.74	25.30
5	110.73	25.04
6	117.72	25.44
7	124.64	26.49
8	131.43	28.19
9	138.03	30.53
10	144.38	33.47
11	150.43	37.00
12	156.11	41.09
13	161.38	45.69
14	166.20	50.77
15	168.64	53.88

Circle Center At X = 110.0 ; Y = 99.2 and Radius, 74.2

*** 1.543 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	30.00
2	78.90	27.91
3	85.67	26.14
4	92.52	24.67
5	99.43	23.53
6	106.38	22.70
7	113.36	22.19
8	120.36	22.01
9	127.35	22.15
10	134.34	22.62
11	141.30	23.40
12	148.21	24.50
13	155.06	25.92
14	161.84	27.66
15	168.54	29.71
16	175.13	32.06
17	181.61	34.72
18	187.96	37.67
19	194.16	40.91
20	200.21	44.43
21	206.09	48.23
22	211.79	52.29
23	217.29	56.61
24	221.44	60.19

Circle Center At X = 120.8 ; Y = 173.8 and Radius, 151.8

*** 1.549 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.11	30.00
2	68.04	29.03
3	75.01	28.30
4	81.99	27.79
5	88.98	27.51
6	95.98	27.45
7	102.98	27.63
8	109.97	28.04
9	116.94	28.67
10	123.89	29.53
11	130.80	30.62
12	137.68	31.93
13	144.50	33.47
14	151.28	35.23
15	157.99	37.21
16	164.64	39.41
17	171.21	41.83
18	177.70	44.46
19	184.09	47.30
20	190.39	50.35
21	196.59	53.60
22	202.68	57.06
23	208.65	60.71
24	212.43	63.19

Circle Center At X = 94.1 ; Y = 241.4 and Radius, 213.9

*** 1.551 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	32.85
2	112.54	32.32
3	119.53	32.04
4	126.53	32.03
5	133.53	32.29
6	140.51	32.80
7	147.46	33.58
8	154.39	34.62
9	161.26	35.92
10	168.09	37.48
11	174.85	39.30
12	181.54	41.37
13	188.14	43.69
14	194.65	46.25
15	201.06	49.06
16	207.37	52.11
17	213.55	55.39
18	219.60	58.91
19	221.56	60.15

Circle Center At X = 123.3 ; Y = 217.9 and Radius, 185.8

*** 1.599 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	36.56
2	123.00	33.58
3	129.58	31.18
4	136.34	29.36
5	143.23	28.15
6	150.21	27.55
7	157.21	27.57
8	164.18	28.21
9	171.07	29.46
10	177.82	31.31
11	184.38	33.75
12	190.70	36.76
13	196.73	40.31
14	202.42	44.38
15	207.73	48.94
16	212.62	53.95
17	217.05	59.37
18	218.31	61.23

Circle Center At X = 153.5 ; Y = 106.8 and Radius, 79.3

*** 1.602 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	32.85
2	111.82	29.74
3	118.44	27.44
4	125.29	26.01
5	132.27	25.46
6	139.26	25.81
7	146.15	27.04
8	152.83	29.14
9	159.18	32.07
10	165.11	35.79
11	170.52	40.23
12	175.32	45.33
13	179.43	51.00
14	182.79	57.14
15	183.45	58.82

Circle Center At X = 133.1 ; Y = 80.3 and Radius, 54.9

*** 1.611 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	30.00
2	101.04	27.65
3	107.76	25.71
4	114.60	24.20
5	121.51	23.11
6	128.48	22.46
7	135.48	22.25
8	142.48	22.47
9	149.45	23.14
10	156.36	24.23
11	163.19	25.75
12	169.92	27.70
13	176.51	30.06
14	182.93	32.83
15	189.18	36.00
16	195.21	39.55
17	201.01	43.47
18	206.55	47.74
19	211.82	52.35
20	216.79	57.28
21	219.84	60.72

Circle Center At X = 135.4 ; Y = 134.3 and Radius, 112.1

*** 1.630 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.00	30.00
2	56.69	27.93
3	63.45	26.12
4	70.27	24.54
5	77.14	23.22
6	84.06	22.16
7	91.01	21.34
8	97.99	20.78
9	104.99	20.48
10	111.99	20.43
11	118.98	20.64
12	125.97	21.11
13	132.93	21.83
14	139.86	22.80
15	146.75	24.03
16	153.60	25.50
17	160.38	27.23
18	167.10	29.21
19	173.73	31.42
20	180.29	33.88
21	186.75	36.58
22	193.10	39.52
23	199.35	42.68
24	205.47	46.07

25	211.47	49.68
26	217.33	53.51
27	223.05	57.55
28	224.97	59.01

Circle Center At X = 109.8 ; Y = 211.7 and Radius, 191.3

*** 1.631 ***

	Y	A	X	I	S	F	T
	0.00	50.00	100.00	150.00	200.00	250.00	
X	0.00	+	-----*	-----+	-----+	-----+	-----+
	50.00	+	0				
			.5				
			.05				
			.02				
			.021				
			.021				
A	100.00	+	0**				
			.0156				
			.4157				
			.4157				
			.913				
			.9413				
X	150.00	+	.413				
			.42133				
			.9415.33				
			.4215				
			.421888				
			.7221				
I	200.00	+	*.W7411**				
			.02.1				
			*.2W.				
			.4				
S	250.00	+					
	300.00	+	*				*
F	350.00	+					
T	400.00	+	*				W

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 Ten Most Critical. P:CWD5A.PLT By: DJA 0-17-95 :03am

