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RWCD Floodway - Reach 6
Contract No. E10101276000
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Contract No. E10101276000
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Job No. 2125J108

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300 West Boston Avenue
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(702) 382-7483

UTAH

St. George
Sunshine Plaza
430 West, 145 North
St. George, Utah 84770
(801) 628-2883

WESTERN TECHNOLOGIES INC.

3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
(602) 437-3737

Greiner Engineering Sciences, Inc.
3240 East Camelback Road
Phoenix, Arizona 85018

November 25, 1985

Attn: Mr. Michael S. Shapiro
Project Manager

Re: Soil Mechanics Report (Final)
RWCD Floodway - Reach 6
Contract No. E10101276000

Job No. 2125J108

Our final soil mechanics report for the above project is attached. The work was performed according to our contract dated April 15, 1985.

Thirty-two backhoe pits were excavated along the alignment at the locations shown on the accompanying plan sheets. Samples obtained during the exploration were shipped to the SCS Soil Mechanics Laboratory in Lincoln, Nebraska on May 28, 1985. The laboratory test data is included hereinafter.

Erosion and bank slope stability analyses were performed using the field and laboratory test data. Bank slope stability was adequate in all cases. Erosive conditions were indicated along the portion of the reach south of Higley Road. Recommendations are presented for channel bank and bed protection. Laboratory test results for dispersion indicated potential problems on several of the samples tested.

Greiner Engineering Sciences
Job No. 2125J108

This final soil mechanics report completes the Phase III services for this project. If you have any questions concerning this information, please do not hesitate to contact us.

Sincerely,
WESTERN TECHNOLOGIES INC.
Geotechnical Services

Craig P. Wiedeman, P.E.

Reviewed by: Kenneth L. Ricker, P.E.

jh

Copies to: Addressee (8)

Greiner Engineering Sciences, Inc.
Job No. 2125J108

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INTRODUCTION

This report contains the results of our geotechnical investigation for the proposed RWCD Floodway - Reach 6 located along the existing Roosevelt Irrigation Canal between Brown Road and Broadway Road in Maricopa County, Arizona. The purpose of these services is to provide information and recommendations regarding:

- Subsurface conditions
- Erosion stability
- Slope stability
- Excavation conditions
- Site preparation
- Earthwork procedures

PROPOSED CONSTRUCTION

Reach 6 will start approximately 300 feet north of Brown Road (Sta. 29+45) and will extend to the existing structure at Broadway Road (Sta. 156+00). The floodway will run parallel to the east side of the existing Roosevelt Irrigation Canal. New roadway crossings will be designed at Brown Road and Higley Road/Apache Trail. The existing bridge structure at University Drive will remain. The bottom width of the floodway will vary from 26 feet to 110 feet with 3:1 side slopes (horizontal:vertical) along a majority of the reach and 2:1 side slopes near the structures. The design flow for this reach will vary from 300 to 2400 cfs with a maximum flow depth of 7.5 feet. Average invert slope is anticipated to be 0.00015 ft/ft with maximum slopes of 0.0035 ft/ft from Sta. 122+00 to Sta. 127+00 and 0.0053 ft/ft at Broadway Road Bridge. Sta. 122+00 to 127+00 is the area of the Higley Road/Apache Trail roadway crossings. A permanent crossing structure is presently being designed for this area. The proposed canal at Broadway Road Bridge will have 2:1 side slopes and a 30-foot bottom width.

SITE CONDITIONS

At the time of the field investigation, a majority of the reach had been cleared and some grading and excavation had taken place. A detailed description of site conditions recorded during the field investigation is included in the geologic report for this project.

SCOPE OF SERVICES

Thirty-two pits were excavated to depths of 7 to 17 feet at the locations shown on the plan sheets. During exploration, subsoils were examined visually and sampled at selected intervals.

Soil samples were shipped to the SCS Soil Mechanics Laboratory in Lincoln, Nebraska on May 28, 1985. The following tests were requested on selected samples:

- Sieve analysis
- Hydrometer analysis
- Specific gravity
- Atterberg limits
- Unconfined compression
- Direct shear
- Standard proctor
- Water content
- Dry density
- Dispersion characteristics
- Soluble salts
- Sodium content
- Calcium content
- Sulfate content
- Gypsum content

Test results were utilized in the development of the conclusions and recommendations presented in this report.

INTERPRETATION OF CONDITIONS

Subsoil Conditions: As presented on Logs of Borings included in the geologic report, surface soils and subsoils to the full depth of exploration consisted primarily of sandy clays and clayey sands of medium to high density and generally low plasticity. Zones of light to heavy calcite cementation were encountered along the entire alignment. The cementation tended to increase with depth. Some isolated areas of silty sand and sandy silts were encountered throughout the alignment, and small areas of medium to high plasticity clay existed at the surface near locations of recent inflows. A groundwater table was not encountered in any test pit at the time of exploration.

Laboratory Testing: All laboratory testing for this project was performed by the SCS Soil Mechanics Laboratory in Lincoln, Nebraska. Test results indicate that the native subsoils exhibit low to moderate shear strengths at existing water contents. In some cases, shear strengths were considerably reduced when the water content is increased. Dispersion characteristics were variable with several samples exhibiting high dispersion. The test results, as received, are included in the Appendix.

Erosion Analysis: An erosion analysis was performed using the tractive power method as outlined in the SCS Publication "Design of Open Channels" (TR-25). Flows of 10 year frequency in the as-built condition, one-half the 100 year frequency in the as-built condition, and the 100 year frequency in the aged condition were analyzed.

Hydraulic data for the erosion analysis was provided by Greiner Engineering and is included in the Appendix. The following soil parameters were obtained from the laboratory testing performed by the SCS:

Station	Pit No.	Particle Size (mm) D_{50}	D_{65}	D_{75}	Unconfined Compressive Strength (psf)*
37+00	VI-2	0.060	0.25	1.40	1220
45+00	VI-4	0.350	1.10	1.80	
53+00	VI-6	0.067	0.17	0.42	
61+00	VI-8	0.065	0.11	0.42	
77+00	VI-12	0.500	1.80	3.00	1060
85+00	VI-14	0.060	0.25	0.42	
93+00	VI-16	0.061	0.16	0.60	
101+00	VI-18	0.061	0.11	0.42	
109+00	VI-20	0.085	0.70	1.60	1340
117+00	VI-22	0.105	0.80	1.70	
119+00	VI-23	0.074	0.55	1.40	440
127+00	VI-25	0.055	0.15	0.70	560
133+00	VI-27	0.074	0.22	0.70	400
141+00	VI-29	0.068	0.25	1.30	
149+00	VI-31	1.100	2.50	3.50	

*Water percolated though sample prior to testing

The reach was broken down for the analysis into four segments based upon average flow velocities and channel bottom widths. The first segment extended from Brown Road to University Drive (Sta. 32+60 to Sta. 90+60). A sample from Pit VI-2 was selected as representative of a majority of this segment. All flow conditions in this segment plotted well within the non-erosive zone of Figure 6-15 (TR-25). The second segment was from University Drive to Apache Trail (Sta. 90+60 to Sta. 122+00). A sample from Pit VI-23 was

representative for this segment. All flow conditions in the second segment also plotted well within the non-erosive zone. The third segment consisted of the Higley Road/Apache Trail roadway crossing (Sta. 122+00 to Sta. 127+00). Pit VI-25 was located in this area and was the sample used in the analysis for this segment. Due to the steeper invert slope and higher mean velocities (5.76 to 8.99 fps) that will occur in this segment, erosive conditions were indicated by the analysis. This will be remedied by the roadway crossing structure proposed for this portion of the reach. The fourth segment extended from Higley Road to Broadway Road (Sta. 127+00 to Sta. 156+00). A sample from Pit VI-27 was selected as representative for the fourth segment. Potential erosion problems were indicated for the 100 year flow condition on this segment of the reach. A mean velocity of 3.23 fps was calculated by Greiner for the 100 year flow in this portion of the reach. Hydraulic data for the Broadway Road Bridge was received following the preparation of the preliminary report. The additional analysis for this area also indicated erosive conditions due to the high mean velocities (9.04 to 11.01 fps) calculated for Sta. 155+25 to Sta. 156+75.

Based on this analysis, erosion protection is recommended for the portion of the reach from Higley Road to Broadway Road (Sta. 127+00 to 155+25) and under the existing Broadway Road Bridge (Sta. 155+25 to Sta. 156+75). The high velocities around the Higley Road/Apache Trail crossing will be remedied by a permanent structure. The cohesion values given in Figure 6-15 are for saturated soil conditions. Since the flooded samples tested for this project did not exhibit 100 percent saturation, only areas which plotted well away from the "S-Line" were considered non-erosive. It should be noted that the hydraulic data supplied for use in the erosion analysis was preliminary in nature, and the velocities may vary as the channel design is finalized. The erosion analysis for the final design should be revised accordingly.

Slope Stability Analysis: Slope stability of the channel banks was analyzed by means of the Simplified Bishop Method using a computer program named REAME (Rotational Eqilibrium Analysis of Multilayered Embankments). Different geometrics of cut/fill areas were considered as shown on the diagrams included in the Appendix. Each section was analyzed for as-built, full-flow, and rapid drawdown conditions. Seismic forces were included in all the analyses. The following results were obtained from direct shear testing performed by the SCS:

Description	Pit No.	Tested ϕ(degrees)	Tested C(psf)	Average ϕ(degrees)	Average C(psf)
Undisturbed:					
In-place Moisture	VI-8	37.0	825		
				40.0	675
	VI-31	43.0	525		
Flooded	VI-6	26.5	150		
	VI-10	33.0	200		
				27.1	656
	VI-14	24.5	1450		
	VI-18	24.5	825		
Compacted:					
Optimum Moisture	VI-17	31.0	600		

The following values were used in the analyses for each condition specified:

Condition	ϕ(degrees)	C(psf)
Cut (dry)	35.0	500
Cut (wet)	25.0	150
Fill (dry)	30.0	600
Fill (wet)	20.0	300

As can be seen from this tabulation, the strength values used in the analysis were of a conservative nature and in all cases were at or below the minimum values obtained from the testing. Calculated safety factors ranged from 1.14 to 4.88. Factors of safety were less than 1.5 only with rapid drawdown and seismic effects acting simultaneously. This is considered a remote possibility. Based on this analysis, it does not appear that bank stability will be a problem if embankments are constructed as recommended herein.

Dispersion: The dispersion testing results presented by the SCS for this project covered the full range from non-dispersive to highly dispersive characteristics (see Figure 1 in the laboratory test data). The samples showing moderate to high dispersion occurred randomly throughout the entire length of the reach. No concentrated areas in either the horizontal or vertical directions were discovered. Due to the random nature of the dispersion characteristics, it does not appear that complete treatment of dispersive soils would be feasible during construction. It should be noted, however, that erosion maintenance may be increased due to the presence of the random dispersive soil areas.

Some of the treatments for dispersive soils include removal and replacement, recompaction to a higher density, and moisture barriers in dispersive areas. Due to the random nature of the dispersive soil areas along the reach, a single treatment for the entire alignment is not feasible. Attempts should be made during construction to identify individual dispersive areas and provide specific treatment for these areas. Particular attention should be paid to structures such as inlets and pipes. Dispersive soils in these areas will result in much quicker erosion than would otherwise occur which could create a loss of structural support if left unattended.

Earthwork:

- Site Clearing:

  1. Strip and remove all existing vegetation, debris, fill piles, spoil piles, and any other deleterious materials from the canal alignment. All exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

  2. In the previous citrus grove area located on the east side of the proposed alignment from Brown Road to Sta. 76+00, thoroughly clean and remove all remaining stumps and large roots in tree pit areas.

  3. In embankment fill areas, any existing slopes steeper than 5:1 (horizontal:vertical) should be benched to reduce the potential for slippage between the existing slopes and the new compacted fills. Benches should be level and wide enough to accommodate compaction and earth moving equipment. (See Figure 1 at the end of the text.)

- Excavation:

  1. We anticipate that a majority of the excavations for the proposed construction can be accomplished with conventional equipment.

  2. On-site clayey soils may pump or become unworkable at high water contents. Workability may be improved by scarifying and drying. Overexcavation of wet zones and replacement with granular materials may be necessary. The use of lightweight excavation and compaction equipment may be required to minimize subgrade pumping.

3. Some of the deeper heavily cemented soils may require specialized excavation equipment such as track mounted excavators with single-tooth rippers.

- Embankment Fill Area Preparation:

1. Following site clearing and any required benching, scarify, moisten or dry as required, and compact all subgrade soils in embankment fill areas to a minimum depth of 10 inches. The subgrade preparation should be accomplished in a manner which will result in uniform water contents and densities after compaction.

2. All subgrade soils should be compacted to a minimum of 95 percent of maximum density as determined in accordance with ASTM D698 within a moisture range of 3 percent below to 3 percent above optimum.

- Materials:

1. Clean on-site soils placed at the recommended moisture conditions or imported materials may be used as embankment fill material.

2. Due to the absence of a grading plan at the time of this report, detailed swell testing was not performed, but it is anticipated that a majority of the clean on-site soils placed at the recommended moisture conditions or imported materials may be used as backfill around structures. Soil used as backfill should exhibit a maximum expansive potential of 1.5 percent when measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about 3 percent below optimum and submerged. If feasible during construction, dispersion testing should

performed on soils to be used as backfill. Soils exhibiting moderate to high dispersion potential should not be used as backfill around structures.

3. Any imported soils should conform to the following:

- Gradation (ASTM C136): percent finer by weight

6"	100
4"	70-100
No. 4 Sieve	50-100
No. 200 Sieve	60 (max)

- Maximum soluble sulfates(%) 0.10

- <u>Placement and Compaction</u>:

1. Place and compact embankment fill and backfill in horizontal lifts, using equipment and procedures that will produce recommended water contents and densities throughout the lift.

2. Uncompacted embankment fill lifts should not exceed 12 inches.

3. Uncompacted backfill lifts should not exceed 8 inches.

4. Embankment fill and backfill should be compacted to a minimum of 95 percent of maximum density as determined in accordance with ASTM D698.

5. On-site and imported soils should be compacted within a moisture range of 3 percent below to 3 percent above optimum.

- Ground Compaction and Shrinkage Factors: A change in the ground surface elevation of 2 to 4 inches can occur by compaction of the surface soils to a 12 inch depth and to an average density of 95 percent of the ASTM D698 maximum dry density. The following tabulation presents the relationship between location of on-site material and approximate shrinkage of excavated soils placed in compacted fills at an average of 95 percent relative compaction:

Location	Estimated Shrinkage (%)
Brown Road to Sta. 70+00	16.0 - 18.0
Sta. 70+00 to Sta. 106+00	12.0 - 14.0
Sta. 106+00 to Broadway Road	10.0 - 12.0

An average value of 14.5 percent should be used for earthwork computations. The estimated shrinkages consider only material densification and do not consider other effects such as transport, wind, overcompaction, or compaction of subsoils to greater depths. The variety of soils encountered and rapid lateral change in soil characteristics will affect the accuracy of the estimates at individual locations.

- Compliance: Recommendations for compacted fills or prepared subgrade depend upon compliance with "Earthwork" recommendations. To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer.

CHANNEL BANK/BED PROTECTION

Channel bank and bed protection is recommended for the portion of the reach from Higley Road through the Broadway Road Bridge due to the relatively high velocities which occur in this area. Some of

the more common methods of erosion protection include: removal to a specified depth and replacement with a less erosive material, plain and/or grouted rip-rap, gabions, soil-cement, gunite, and Portland Cement concrete. The particular method used for protection should provide acceptable hydraulic characteristics.

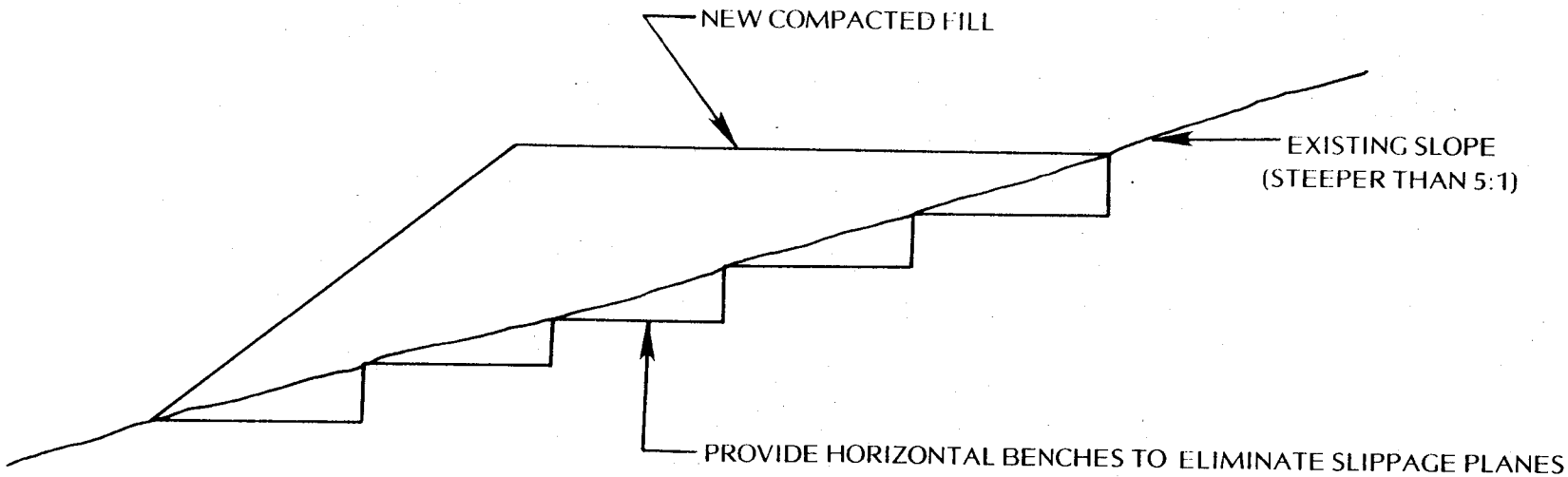
For the portion of the reach between Higley Road and the Broadway Road Bridge, soil-cement is recommended for erosion protection. A minimum 1 foot thickness of soil-cement cover should be placed on the channel bottom. Horizontal placement should be used on the bank areas which usually results in a minimum width of 8 feet to allow for proper equipment access. Soil-cement could be produced using on-site soils. Based on the characteristics of these soils, it is anticipated that 12 to 14 percent (by weight) cement will be required. More granular, imported soils would require lower cement contents. The actual cement content for the soil to be used should be determined from a 12 cycle wet-dry test performed in accordance with ASTM D559 using a maximum weight loss of 8 percent. The cement content determined by this method should be increased by 2 percent to help resist erosion. Compaction moisture contents should be maintained very close to optimum to allow for proper hydration of cement and to minimize shrinkage cracking. Excessive cracking will require surface sealing. Soil-cement may be constructed using traveling mixing machines and/or central mixing plants. A batch-type pugmill or rotary drum mixer would probably be a more efficient and effective method for this application. Compaction should be performed as soon as possible after wet mixing. Excessive time delays can impede compaction and make specified densities difficult to attain. Soil-cement material should be compacted to a minimum of 98 percent of maximum dry density at optimum moisture content as determined in accordance with ASTM D558. Soil-cement areas should be cured for a minimum of 7 days following compaction.

Due to the high velocities (9.04 to 11.02 fps) and limited headroom present at the Broadway Road Bridge, a concrete lining is recommended for protection at the crossing. The lining should be a minimum of 3 inches thick and keyed into the soil to a minimum depth of 1 foot at the upstream end.

Prepared By_____ Date_____ Checked By_____ Date_____

JOB NO. 2125J108

FIGURE NO. 1



NO SCALE

EXAMPLE — BENCHING OF EXISTING SLOPES

United States
Department of
Agriculture

Soil
Conservation
Service

201 E. Indianola
Suite 200
Phoenix, Arizona 85012

July 30, 1985

Michael S. Shapiro
Greiner Engineering Services, Inc.
340 East Camelback Road
Phoenix, Arizona 85018

RE: RWCD, Reach-6 Contract #53-9457-5-00469

Dear Mr. Shapiro:

Enclosed are two copies of the soil test results for the subject site.

As stated in the letter of transmital from Lorn Dunnigan the clay mineralogy test, which was requested by the SCS, will be completed in September by the National Soil Survey Laboratory. To pursue the completion of Phase 3 in a timely matter the soil mechanics report may be supplemented when this information becomes available.

If there are any questions about the test results please contact me.

Sincerely,

Donald E. Paulus

Donald E. Paulus
Government Representative

cc: Bill Payne
Ralph Arrington

United States Department of Agriculture

Soil Conservation Service

Midwest National Technical Center
Soil Mechanics Laboratory
512 South 7th Street
Lincoln, NE 68508-2919

Subject: ENG - Soil Mechanics - Arizona (WF-08)
RWCD Floodway - Reach #6
Maricopa County

Date: July 26, 1985

To: Ralph M. Arrington
State Conservation Engineer
SCS, Phoenix, AZ

File Code: 210-22

The test data requested on samples submitted from the subject site are attached except for the clay mineralogy tests which are scheduled by the National Soil Survey Laboratory to be completed in September.

Where possible, two unconfined compression tests were made on each sample. One test was made at natural water content and the second test was made after percolating water through the test specimen.

Lorn P. Dunnigan

LORN P. DUNNIGAN
Head, Soil Mechanics Laboratory

Attachments:
Form SCS-ENG-354, Soil Mechanics Laboratory Data, 13 sheets
Form SCS-ENG-355A and -355B, Triaxial Shear Test Data, 10 tests, 16 sheets
Form SCS-ENG-352, Compaction and Penetration Resistance, 6 sheets
Form SCS 366, Direct Shear Test, 7 sheets
Figure 1, Plot of Total Dissolved Salts Vs Percent Sodium, 1 sheet
Chemical Data Provided by NSSL Dated July 19, 1985, 3 sheets

cc:
Ralph M. Arrington (Original + 3 copies)
Jack C. Stevenson, Head, Engineering Staff, WNTC, SCS, Portland, OR (ltr only)
Clifton E. Deal, Soil Mechanics Engineer, Engineering Staff, WNTC, SCS, Portland, OR

SCS-ENG-354
REV. 3-70
FILE CODE ENG-13-10

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MECHANICS LABORATORY DATA
SHEET 1 OF 13

05-30-85

ARIZONA

LABORATORY SAMPLE NUMBER	FIELD NUMBER	LOCATION AND DESCRIPTION		DEPTH	FIELD CLASSIFICATION	MECHANICAL ANALYSIS GRAIN SIZE DISTRIBUTION EXPRESSED AS PERCENT FINER BY DRY WEIGHT: FINES 0.005 mm	FINES 0.002	FINES 0.005	FINES 0.010	FINES #200 0.074	SAND #140 0.105	SAND #100 0.150	SAND #60 0.250	SAND #40 0.420	SAND #20 0.840	SAND #10 2.0	GRAVEL 3/8" 9.525	GRAVEL 1/2" 12.7	GRAVEL 3/4" 19.05	GRAVEL 1" 25.4	GRAVEL 1 1/2" 38.1	GRAVEL 3" 76.2 mm	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	UNIFIED CLASSIFICATION	SOLUBLE SALTS %	DISPERSION % FINER SILT	MOISTURE - DENSITY RELATIONSHIPS ☐ STANDARD ☐ MODIFIED: DRY DENS.	MOISTURE - DENSITY RELATIONSHIPS: MAX. γd pcf	MOISTURE - DENSITY RELATIONSHIPS: OPT. %	UNDISTURBED SAMPLE DATA γd g/cc	UNDISTURBED SAMPLE DATA w %	Gs	SPECIAL TESTS: Resistivity Ohm-Cm	SPECIAL TESTS: pH / Na %	SPECIAL TESTS: TDS MEQ/LITER	SPECIAL TESTS: % or AS RECD	SPECIAL TESTS: Remarks
85W		RWCD Floodway, Reach #6																																				
1356	VI-1	34+00, 90'Lt	L. Bag	0-1.0'		16	16	23	56	69	80	92	94	97	100								25	5	CL-ML		Tr.						2.67				5.23	1
1357	VI-1	" "	L. Bag	2.0'-3.0'		16	20	28	56	69	78	88	91	95	100								23	7	CL-ML		10						2.68				5.40	2
1358	VI-1	" "	L. Bag	9.0'-10.0'		18	24	32	49	56	62	71	75	80	85	94	98	99	100								Tr										8.34	2
1359	VI-2	37+00 ℄	Undist	8.0'-9.0'																											1.45	11.2	2.66					
1360	VI-2	" "	L. Bag	10.0'-11.0'		16	24	31	47	54	58	65	68	73	80	93	99	99	100								Tr.										10.66	1
1361	VI-3	41+00, 75'Rt	L. Bag	0-1.0'		12	13	17	40	56	72	97	99	100													Tr.							1480	7.33 / 22.7	12.6	3.07	1

SCS-ENG-3
Rev. 3-70
File Code ENG-13-10

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MECHANICS LABORATORY DATA
Sheet 2 of 13

05-30-85

ARIZONA

RWCD Floodway, Reach #6

Laboratory Sample Number	Field Number	Location and Description	Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines					Sand						Gravel						Atterberg Limits LL	PL	Unified Classification	Soluble Salts %	Dispersion % Finer Disp	Moisture-Density Relationships ☐ Standard ☐ Modified: Max. γ_d pcf	Optimum %	Undisturbed Sample Data: γ_d g/cc	%	G_s	Special Tests				
85W					0.002 mm	0.005	0.02	0.05	0.100 0.074	0.149 0.105	0.250 0.177	0.42	0.59	0.84	2.0	4.76	3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	2" 50.8 mm													96% AS Dec'10	Coloring
1362	VI-3	41+00, 75'Rt L. Bag	1.0'-2.0'		31	39	56	80	88						100												3								18.05	2
1363	VI-3	" " L. Bag	2.0'-3.0'				not	Received																											
1364	VI-3	" " L. Bag	6.0'-7.0'		20	21	24	40	53	61	70	74	80	89	97	99	100						27	11	CL		Tr					2.68			10.20	1
1365	VI-3	" " L. Bag	10.0'-11.0'		16	23	30	38	47	50	56	59	64	74	98	98	99	100					45	13	SM		Tr					2.68			13.97	1
1366	VI-4	45+00 ℄ L. Bag	4.0'-5.0'		15	15	19	30	36	41	48	52	61	77	94	99	99	100									Tr								8.34	2
1367	VI-4	" " Undist	12.0'-13.0'																																

SCS-ENG-354
Rev. 3-70
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U. S. DEPARTMENT OF AGRICULTURE
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SOIL MECHANICS LABORATORY DATA
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05-30-85 ARIZONA

Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: 0.002 mm	0.005	0.010	0.020	#200 0.074	Sand: #140 0.105	#100 0.150	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	Gravel: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	Atterberg Limits: L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships (Standard / Modified): Density pcf	Max. γd pcf	%	Undisturbed Sample Data: γd pcf	%	Gs	Special Tests: Resistivity ohms-cm	pH / Na %	T.D.S. meq/liter	% Sol as CaCO3	Classification
85W		RWCD Floodway, Reach #6																																						
1368	VI-5	49+00, 100'Lt	L. Bag	5.0'-6.0'		18	23	28	41	53	58	66	68	73	81	94	99	100						35	14	CL		TR						2.65				8.05	2
1369	VI-6	53+00 ℄	L. Bag	1.0'-2.0'		17	19	24	42	59	66	75	79	85	93	99	100							24	9	CL		15						2.68	1910	7.59 / 65.1	10.6	8.09	3
																									DRY DENSITY < NO. 4				①	121.5	11.5									
1370	VI-6	" "	Undist	4.0'-5.0'		18	19	26	40	52	59	70	75	82	88	96	99	100						28	11	CL		TR				149	17.5	2.66					2
1371	VI-7	57+00, 75'Rt	L. Bag	0-1.0		16	19	26	58	82	92	97	98	99	100																							7.36	
1372	VI-7	" "	L. Bag	2.0'-3.0'		35	37	42	58	66	72	78	81	86	91	96	98	99	99	99	100							TR							1540	7.56 / 523	8.2	1293	1
1373	VI-7	" "	L. Bag	3.0'-4.0'																																				

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SOIL MECHANICS LABORATORY DATA
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RWCD Floodway - Reach #6

Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: #200 0.074	#140 0.105	#100 0.149	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	Sand: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2	Gravel: Atterberg Limits L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships ☐ Standard ☐ Modified: Curve No.	Max. γd pcf	Opt. %	Undisturbed Sample Data γd pcf	%	Gs	Special Tests: Resistivity Ohms-Cm	pH / Na %		%2μ as Rec'd	Code
85W																																			
1374	VI-7	57+00, 75'Rt	L. Bag	7.0'-8.0'		18	26	35	45	55	60	66	69	74	80	92	98	100					45	15	ML		Tr.						2.67				15.01	1
1375	VI-8	61+00 ℄	L. Bag	0-1.0'		24	33	57	84	93					100								39	17	CL								2.67				3.84	
1376	VI-8	" "	Undist	6.0'-7.0'		18	23	31	42	58	64	71	74	78	89	97	100						44	20	CL		Tr.				1.51	10.1	2.65					1
1377	VI-8	" "	L. Bag	11.0'-12.0'		15	21	28	39	44	47	53	56	61	69	96	96	98	100								Tr.										11.84	1
1378	VI-9	65+00, 100'Lt	L. Bag	0.0-1.5'		15	17	22	38	51	58	67	71	77	85	95	98	98	99	99	100						40										5.74	4
1379	VI-9	" "	L. Bag	3.0'-4.0'		31	32	35	49	61	67	74	77	82	89	98	100										39							1880	7.86 / 89.1	5.5	17.51	2

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RWCD Floodway, Reach #6

Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines					Sand						Gravel						Atterberg Limits LL	PI	Unified Classification	Soluble Salts %	Oven-Dry % Moist Soil	Moisture-Density Relationships (☒ Standard ☐ Modified): Curve No.	Max. γd pcf	Opt. %	Undisturbed Sample Data: γd g/cc	%	Gs	Special Tests: Resistivity ohm-cm	pH / Na %		% Ret. As Rec'd	Calcium
						#200 0.074	#140 0.105	#80 0.177	#40 0.42	#20 0.84	#10 2.0	#4 4.76	3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	2" 50.8	3" 76.2																		
85W		RWCD Floodway, Reach #6																																				
1380	VI-9	65+00, 100'Lt	L. Bag	9.0'-10.0'		15	22	28	38	45	48	53	55	61	72	90	98	100					43	16	SM		Tr.					2.65				11.59	1
1381	VI-10	69+00 ℄	L. Bag	1.0'-2.0'		18	18	21	34	45	51	60	64	70	80	95	99	100					29	14	SC		45					2.69	2320	7.98 / 90.7	5.4	11.53	4
																											Dry Density < No. 4	②	121.0	11.5							
1382	VI-10	" "	L. Bag	4.0'-5.0'		21	23	26	40	53	60	71	73	78	87	96	99	100									Tr.									5.83	1
1383	VI-10	" "	Undist	10.0'-11.0'																																		
1384	VI-11	73+00, 75'Rt	L. Bag	3.0'-4.0'		30	33	37	51	67	74	82	85	88	95	99	100						41	22	CL		31					2.68				13.21	4
1385	VI-11	" "	L. Bag	10.0'-11.0'		20	28	35	48	60	65	72	75	80	89	95	99	100									3									14.08	1

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Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: 0.005 mm	0.002 mm	0.005	0.02	0.08	0.200 0.074	Sand: 0.400 0.105	0.800 0.210	0.840 0.42	0.841 0.84	0.841 1.68	0.841 4.76	Gravel: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	Atterberg Limits: L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships ☐ Standard ☐ Modified: Curve No.	Max. γ_d pcf	w_o %	Undisturbed Sample Data: γ_d g/cc	w_o %	G_s	Special Tests: Resistivity ohm-cm	pH Na %	T.D.S. Meq/Liter	% Sr as Rec'd	Density
85W		RWCD Floodway, Reach #6																																					
1386	VI-12	77+00 ℄	Undist	2.0'-3.0'																											1.63	13.1							
1387	VI-12	" "	L. Bag	9.0'-10.0'		15	20	22	29	38	42	46	49	55	67	86	97	99	100								Tr.											8.64	1
1388	VI-13	81+00, 100'Lt	L. Bag	2.0'-3.0'		9	11	13	23	35	41	48	52	62	75	93	99	100									29						2610	7.87 9.07	7.5	5.42	4
1389	VI-13	" "	L. Bag	9.0'-10.0'		19	26	34	46	58	63	70	72	76	84	95	99	100					45	17	ML		Tr.										2.66		13.46	1
1390	VI-14	85+00 ℄	Undist	5.0'-6.0'		16	25	35	48	54	58	65	68	74	82	93	99	100					49	19	ML		Tr.				1.50	15.1	2.64						1
1391	VI-14	" "	L. Bag	12.0'-13.0'		17	22	27	29	46	50	56	59	65	76	91	98	99	100								14											10.81	1

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Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: #200 0.074	#100 0.149	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	Sand: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2	Gravel	Atterberg Limits: L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships: Standard / Modified: Curve No.	Max. γd pcf	Opt. %	Undisturbed Sample Data: γd pcf	%	Gs	Special Tests: Hydrometer % finer 0.005 mm	pH	T.D.S. Meq/Liter	% Ca As Base	Sand %
85W		RWCD Floodway, Reach #6																																	
1392	VI-15	89+00, 75'Rt	L. Bag	3.0'-4.0'		15	18	22	40	56	66	80	84	88	94	99	100				22	6	CL-ML		52						2.66				10.80	4
1393	VI-15	" "	L. Bag	5.0'-6.0'		16	18	20	42	63	75	93	96	99	100										50							1790	7.66 / 80.0	25	12.68	4
1394	VI-15	" "	L. Bag	7.0'-8.0'		24	25	27	38	52	57	65	68	74	82	95	99	99	100						10										12.84	1
1395	VI-16	93+00 ℄	L. Bag	0.0-1.0'		11	11	12	25	36	48	70	75	81	88	96	98	99	100			NON PLASTIC	SM		Tr.						2.64				5.48	3
1396	VI-16	" "	Undist	9.0'-10.0'		16	17	28	41	55	61	68	72	78	90	99	100				40	19	CL		Tr						2.65					1
1397	VI-17	97+00, 100'Lt	L. Bag	2.0'-3.0'		13	13	17	34	53	61	70	73	79	87	96	99	100			22	4	CL-ML		7						2.66	1160	7.54 / 89.4	20.8	33.4	3

DRY DENSITY < 110.0 (3) 124.5 10.5

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Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: 0.002 mm	0.005	0.02	0.05	0.200 0.074	Sand: #100 0.149	#60 0.250	#40 0.42	#30 0.59	#20 0.84	#10 2.0	#4 4.76	Gravel: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	Atterberg Limits: L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships ☒ Standard ☐ Modified: Curve No.	Max. γd pcf	Opt. %	Undisturbed Sample Data: γd pcf	%	Gs	Special Tests: Resistivity Ohm-cm	pH / Na %	T.D.S. MEQ/LITER	% Sat. As Rec'd	Class
85W		RWCD Floodway, Reach #6																																						
1398	VI-17	97+00, 100'Lt	L. Bag	7.0'-8.0'		23	25	30	44	54	58	65	67	72	81	95	99	100										Tr.											8.55	1
1399	VI-18	101+00, ℄	L. Bag	0-1.0		52	71	87	97	100														79	50	CH								2.67					6.87	
1400	VI-18	" "	L. Bag	1.0'-2.0'		27	27	31	45	58	65	73	76	80	86	97	100							38	21	CL		Tr.						2.67	2440	7.37 / 22.9	3.5	12.90	4-2
																													DRY DENSITY < NO. 8	4	112.5	15.0									
1401	VI-18	" "	Undist	3.0'-4.0'		14	17	24	38	46	54	65	70	76	85	94	98	100						33	14	SC						1.60	11.1	2.65					1
1402	VI-19	105+00, 70'Rt	L. Bag	0.0-1.0'		8	8	11	21	31	34	41	39	53	68	88	97	99	100					21	3	SM		Tr.						2.65	3380	7.84 / 32.2	5.9	2.66	1
1403	VI-19	" "	L. Bag	4.0'-5.0'		17	18	22	42	62	71	80	83	87	92	99	100							27	11	CL		5						2.66				7.58	2

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Laboratory Sample Number	Field Number	Location and Description	Depth	Field Classification	Mechanical Analysis — Grain Size Distribution Expressed as Percent Finer by Dry Weight: Fines 0.002 mm	Fines 0.005	Fines 0.01	Fines 0.02	Fines #200 0.074	Sand #140 0.105	Sand #60 0.250	Sand #40 0.42	Sand #20 0.84	Sand #10 2.0	Sand #4 4.76	Gravel 3/8" 9.525	Gravel 1/2" 12.7	Gravel 3/4" 19.05	Gravel 1" 25.4	Gravel 1 1/2" 38.1	Gravel 3" 76.2	Atterberg Limits: L.L.	Atterberg Limits: P.I.	Unified Classification	Soluble Salts %	Dis-Persion % Moist Soil	Moisture-Density Relationships (☐ Standard ☐ Modified): Curve No.	Max. γ_d pcf	w_o %	Undisturbed Sample Data: γ_d pcf	w_o %	G_s	Special Tests: Resistivity Ohms-cm	pH	T.D.S. Meq/Liter	% Sat as Rec'd	Other
85W		RWCD Floodway - Reach #6																																				
1404	VI-19	105+00, 70'Rt L. Bag	8.0'-9.0'		26	28	34	48	62	69	76	78	83	99	97	100										TF											12.61	1
1405	VI-20	109+00, ℄ Undist	3.0'-4.0'																											1.44	16.8	2.65						
1406	VI-20	" " L. Bag	6.0'-7.0'		19	22	28	38	48	53	59	62	67	78	92	99	100					45	19	SC		TF						2.66					11.60	1
1407	VI-21	113+00, 100'Lt L. Bag	0.0-1.0'		11	11	16	32	45	52	62	66	72	81	90	94	96	98	100														1260	7.42 / 33.5	24.3		257	
1408	VI-21	" " L. Bag	5.0'-6.0'		20	20	24	38	55	62	72	75	80	88	97	100																					3.60	
1409	VI-22	117+00 ℄ L. Bag	0.0-1.0'		17	17	23	43	64	72	82	85	87	91	99	100										TF											8.64	1

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Laboratory Sample Number	Field Number	Location and Description	Depth	Field Classification	Mechanical Analysis: Grain Size Distribution (Expressed as Percent Finer by Dry Weight) Fines 0.002 mm	0.005	0.01	0.02	0.074	Sand 0.100	0.250	0.42	0.84	1.19	2.0	Gravel 3/8" 9.51	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2	Atterberg Limits LL	PI	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships ☒ Standard ☐ Modified: Dry Density	Max. γd pcf	Opt. %	Undisturbed Sample Data γd g/cc	Opt. %	Gs	Special Tests: Permeability cm/sec	pH Na %	T.D.S. MEQ/LITER	%w As Rec'd	Class
85W		RWCD Floodway - Reach #6																																				
1410	VI-22	117+00 ℄ L. Bag	3.0'-4.0'		20	20	23	34	45	50	56	59	66	78	95	99	100					39	21	SC		TT						2.65				8.11	1
1411	VI-22	" " Undist	8.0'-9.0'																																			
1412	VI-23	119+00 ℄ Undist	0.0-1.0'																											1.30	16.2	2.66						
1413	VI-23	" " L. Bag	3.0'-4.0'		27	28	30	38	50	54	61	63	69	80	94	99	100					58	32	SC		17						2.64	2080	7.89 / 81.3	4.8	14.71	1
																											DRY DENSITY < NO. 4	(5)	105.5	17.0								
1414	VI-24	121+00, 60'Rt L. Bag	0.0-1.0'		1	1	2	3	6	7	10	17	33	57	83	97	99	100																		0.29	
1415	VI-24	" " L. Bag	3.0'-4.0'		17	19	23	40	56	64	76	80	86	93	98	100										20										6.63	4

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Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines 0.002 mm	Fines 0.005	Fines 0.02	Fines 0.05	Fines 0.074	Sand #140 0.105	Sand #60 0.250	Sand #40 0.42	Sand #20 0.84	Sand #10 2.0	Sand #4 4.76	Gravel 3/8" 9.525	Gravel 1/2" 12.7	Gravel 3/4" 19.05	Gravel 1" 25.4	Gravel 1 1/2" 38.1	Gravel 3" 76.2	Atterberg Limits LL	Atterberg Limits PI	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships ☐ Standard ☐ Modified: Curve No.	Max. γd pcf	Opt. %	Undisturbed Sample Data γd pcf	Undisturbed Sample Data %	Gs	Special Tests: Resistivity Saturated	pH / Na %	T.D.S. Meq/Liter	% Sr As Rec'd	Check
85W		RWCD Floodway - Reach #6																																					
1416	VI-24	121+00, 60'Rt	L. Bag	6.0'-7.0'		22	28	37	49	56	64	76	80	85	96	100							50	26	CL Lan CH		Tr.						2.65					12.25	1
1417	VI-25	127+00 ℄	Undist	3.0'-4.0'																											1.95	11.2	2.66						
1418	VI-25	" "	L. Bag	9.0'-10.0'		22	26	32	46	57	62	70	72	77	86	96	100										Tr.											10.52	1
1419	VI-26	129+00, 70'Lt	L. Bag	2.0'-3.0'		2	2	3	4	7	8	14	21	36	52	81	96	98	100				NON PLASTIC		SW-SM								2.63	10620	2.62 7.0	3.0	1.45	
1420	VI-26	" "	L. Bag	3.0'-4.0'		27	29	35	51	66	71	79	82	86	91	97	99	100					43	20	CL		Tr.						2.67					14.48	1
1421	VI-27	133+00, ℄	Undist	2.0'-3.0'																											1.32	4.2	2.65						

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RWCD Floodway - Reach #6

Laboratory Sample Number	Field Number	Location and Description		Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: #200 0.074 mm	#140 0.105	#100 0.149	#60 0.250	Sand: #40 0.42	#30 0.59	#20 0.84	#16 1.19	#8 2.38	Gravel: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	Atterberg Limits: L.L.	P.I.	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships: Standard / Modified: Curve No.	Max. γd pcf	Opt. %	Undisturbed Sample Data: γd g/cm³	Opt. %	Gs	Special Tests: Resistivity Ohms-cm	pH / Na %	T.D.S. meq/liter	% Sat. Ads. Quick	Classification
85W																																				
1422	VI-27	133+00, ℄	L. Bag	9.0'-10.0'		17	20	24	37	51	58	67	71	77	86	96	99	100								Tr.										4.52	1
1423	VI-28	137+00, 60'Rt	L. Bag	4.0'-5.0'		22	24	33	48	63	68	76	78	83	90	98	100					41	18	CL		Tr.						2.63				13.85	1
1424	VI-29	141+00, ℄	Undist	5.0'-6.0'																																	
1425	VI-29	" "	L. Bag	7.0'-8.0'		19	25	30	41	53	58	65	67	72	81	93	99	100								Tr.										11.25	1
1426	VI-30	145+00, 70'Lt	L. Bag	6.0'-7.0'		17	17	20	33	49	57	69	73	80	89	97	100									Tr.										5.93	1
1427	VI-31	149+00 ℄	L. Bag	1.0-2.0'		21	22	24	38	54	63	72	75	80	89	97	100					29	13	CL		Tr.						2.64	2610	7.38 / 1.46	4.1	6.00	1
																										DRY DENSITY < 90.4		②	1200	12.5							

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05-30-85 ARIZONA

Laboratory Sample Number	Field Number	Location and Description	Depth	Field Classification	Mechanical Analysis: Grain Size Distribution Expressed as Percent Finer by Dry Weight — Fines: 0.005 mm	0.002 mm	0.005	0.010	0.020	Sand: #100 0.149	#80 0.177	#60 0.250	#40 0.42	#20 0.84	#10 2.0	#4 4.76	Gravel: 3/8" 9.525	1/2" 12.7	3/4" 19.05	1" 25.4	1 1/2" 38.1	3" 76.2 mm	Atterberg Limits: LL	PI	Unified Classification	Soluble Salts %	Dispersion % Moist Soil	Moisture-Density Relationships ☐ Standard ☐ Modified: Curve No.	Max. γd pcf	Wo %	Undisturbed Sample Data: γd g/cm³	Wo %	Gs	Special Tests			% ZnO As ZnCl2	Comments
85W		RWCD Floodway - Reach #6																																				
1428	VI-31	149+00, ℄ Undist	9.0'-10.0'		10	12	15	23	30	33	38	41	47	61	85	97	99	100				38	19	SC		Tr.				1.63	2.8	2.66					1
1429	VI-32	154+00, 50'Rt L. Bag	2.0'-3.0'		30	31	35	46	59	65	74	77	84	91	98	100										Tr.										297	1
1430	VI-32	" " L. Bag	7.0'-8.0'		21	27	34	48	61	67	73	76	80	89	97	99	100					39	18	CL		Tr.						2.64				8.21	1

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 1350

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 37+00, ℄
FIELD SAMPLE NO: III-2	DEPTH: 8.0'-9.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

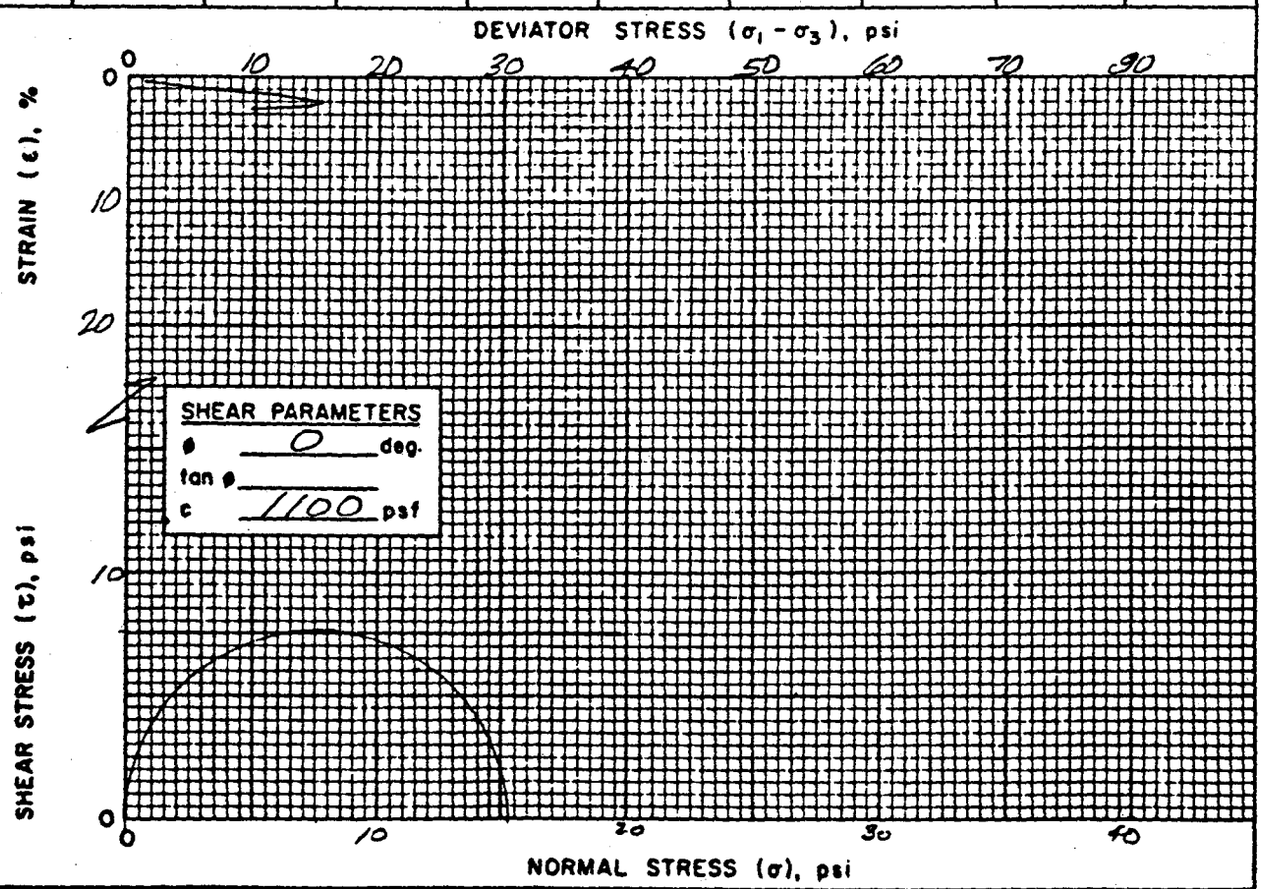
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.45			11.2		11.2		0	15.3	1.9



REMARKS TESTED @ NAT. H_2O

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1359

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 37+00 ℄
FIELD SAMPLE NO	DEPTH	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

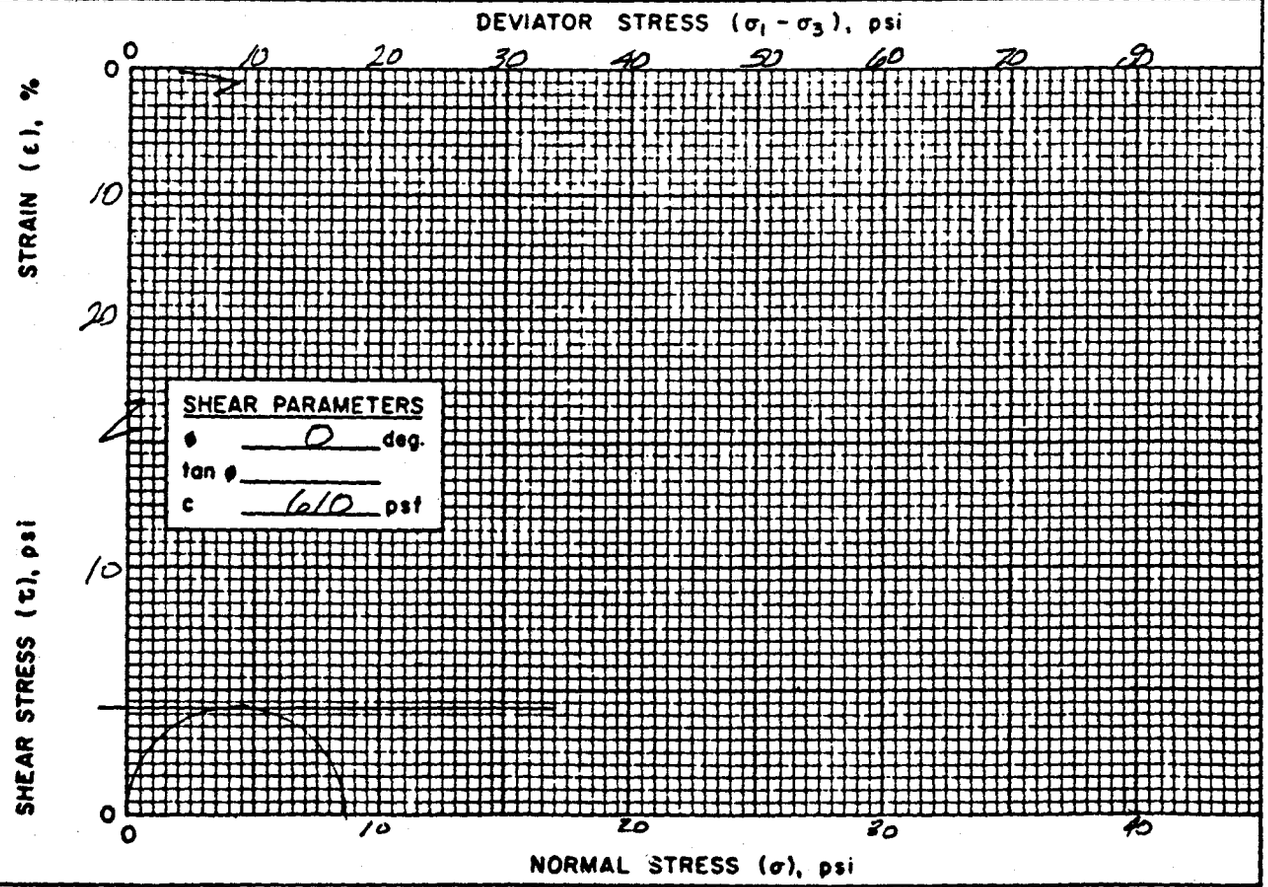
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.48			24.5		24.5			8.6	1.0



REMARKS Percolated Water Through the Test specimen prior to test

RHH

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 1369

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE	SAMPLE LOCATION
RUCO FLOODWAY REC. #6, ARIZONA	53+00 ℄

FIELD SAMPLE NO	DEPTH	GEOLOGIC ORIGIN
VI-6	1.0'-2.0'	

TYPE OF SAMPLE	TESTED AT	APPROVED BY	DATE
COMPACTED	S.M.L., LINCOLN		

INDEX TEST DATA

USCS CL ; LL 24 ; PI 9

% FINER (mm): 0.002 17 ; 0.005 19 ; 0.074 (# 200) 59

G_s (-#4) 2.68 ; G_s (+#4) _____

STANDARD: γ_d MAX. 121.5 pcf ; w_o 11.5 %

MODIFIED: γ_d MAX. _____ pcf ; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 " ; DIAMETER 1.4 "

MATERIALS TESTED PASSED #4 SIEVE

METHOD OF PREPARATION STATIC 2 LAYER COMPACTION

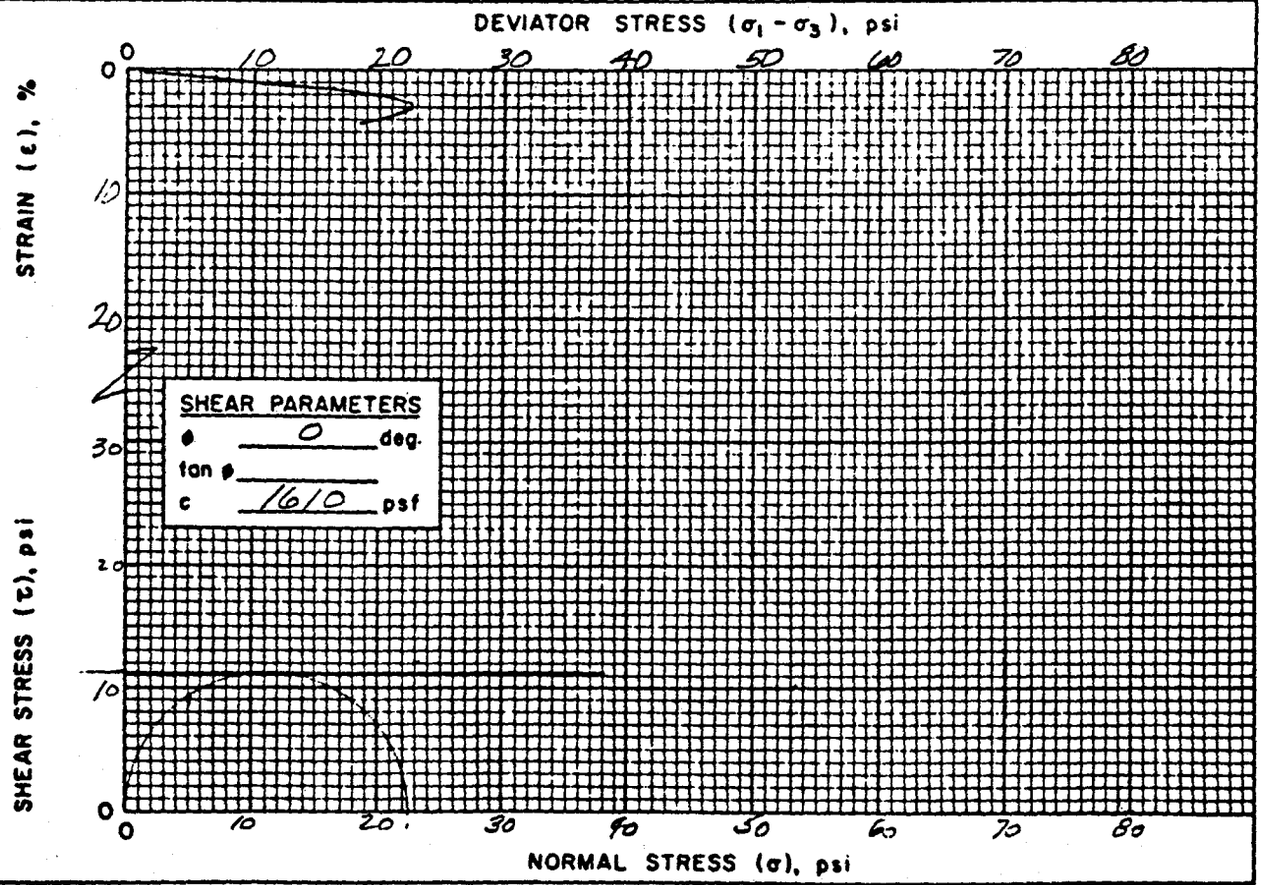
MOLDING MOISTURE 11.6 %

MOLDED AT 95.0% OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY INITIAL pcf ☒ g/cc ☐	DRY DENSITY CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, % START OF TEST	MOISTURE CONTENT, % DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, % END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
115.4			11.6		11.6		0	22.4	3.1



REMARKS

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

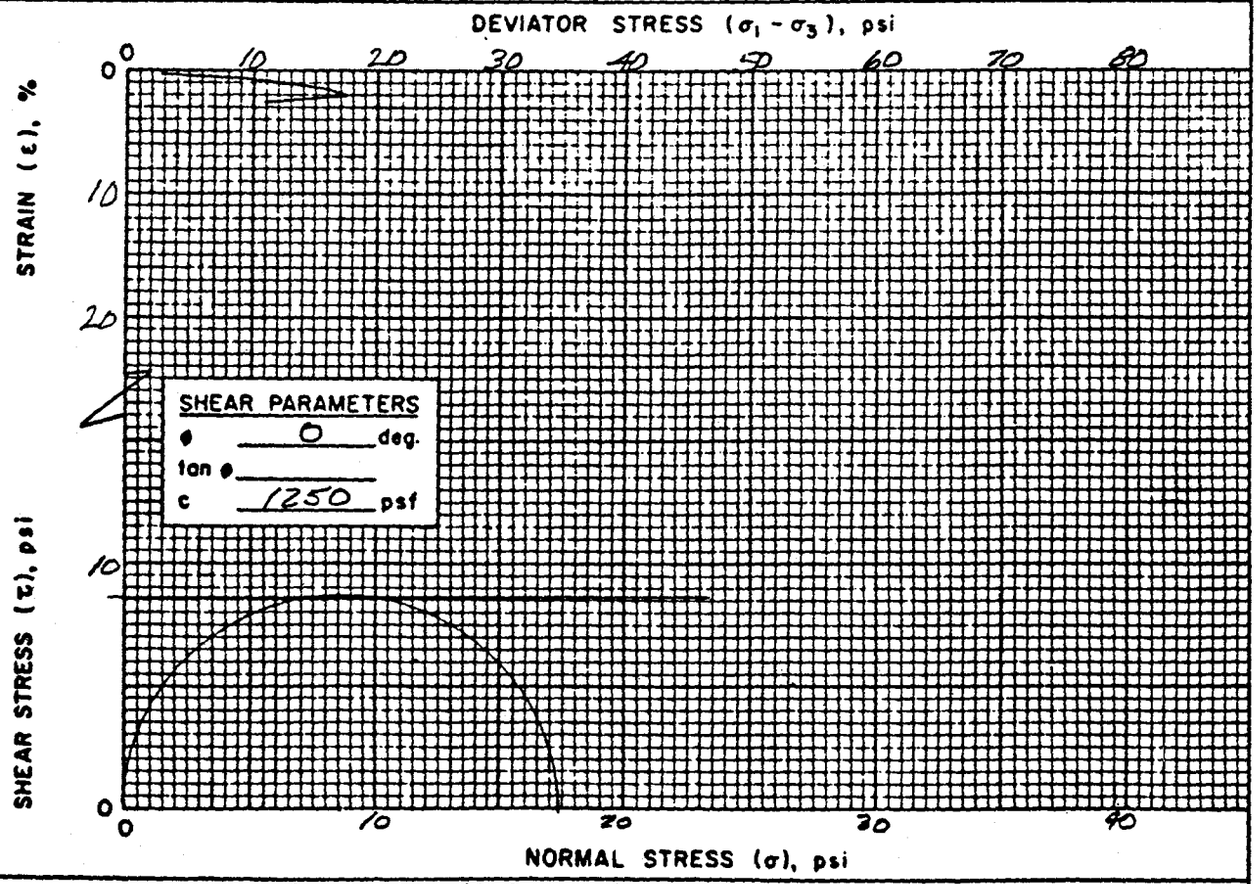
LABORATORY NO 85W 1386

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: PWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 77+00 ℄
FIELD SAMPLE NO: II-12	DEPTH: 2.0'-3.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA	SPECIMEN DATA	TYPE OF TEST
USCS _____; LL _____; PI _____	HEIGHT 3.0 "; DIAMETER 1.4 "	UU ☐
% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____	MATERIALS TESTED PASSED _____ SIEVE	CU ☐
G_s (-#4) _____; G_s (+#4) _____	METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE	$\overline{CU}$ ☐
STANDARD: γ_d MAX. _____ pcf; w_o _____ %	MOLDING MOISTURE _____ %	CD ☐
MODIFIED: γ_d MAX. _____ pcf; w_o _____ %	MOLDED AT _____ % OF γ_d MAXIMUM	

DRY DENSITY INITIAL pcf ☐ g/cc ☒	DRY DENSITY CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, % START OF TEST	MOISTURE CONTENT, % DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, % END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.63			13.1		13.1		0	17.4	2.0



REMARKS TESTED @ NAT. H_2O

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1386

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: ENCO FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 77+00, E
FIELD SAMPLE NO: II-12	DEPTH: 2.0'-3.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA

USCS _____ ; LL _____ ; PI _____

% FINER (mm): 0.002 _____ ; 0.005 _____ ; 0.074 (#200) _____

G_s (-#4) _____ ; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf ; w_0 _____ %

MODIFIED: γ_d MAX. _____ pcf ; w_0 _____ %

SPECIMEN DATA

HEIGHT 3.0 " ; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

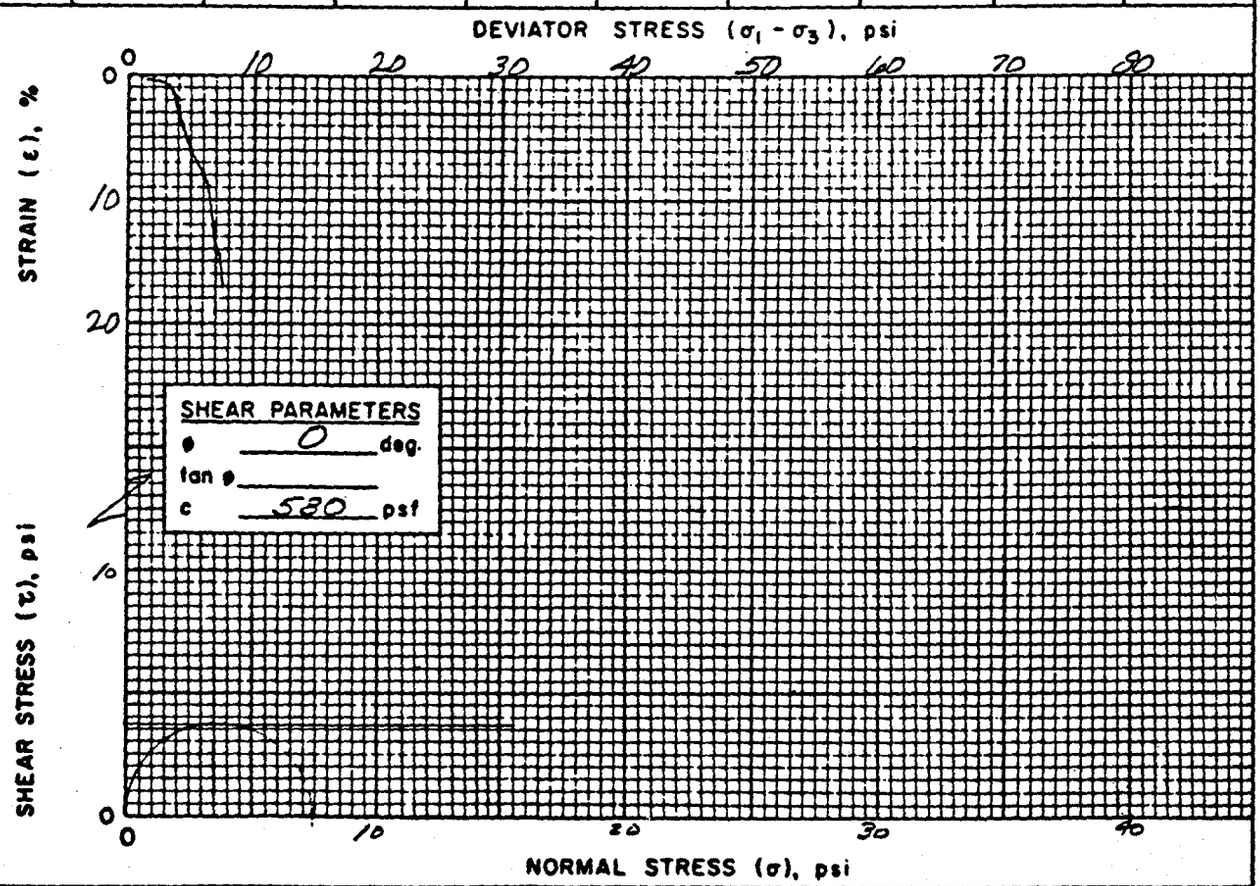
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.61			18.8				0	7.4	15.0



REMARKS Percolated Water through the Test Specimen prior to test

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1400

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: EWCO FLOODWAY REACH #6, ARIZONA
SAMPLE LOCATION: 101+00 ℄

FIELD SAMPLE NO: VI-18
DEPTH: 1.0'-2.0'
GEOLOGIC ORIGIN:

TYPE OF SAMPLE: COMPACTED
TESTED AT: S.M.L., LINCOLN
APPROVED BY:
DATE:

INDEX TEST DATA

USCS CL ; LL 38 ; PI 21
% FINER (mm): 0.002 27 ; 0.005 27 ;
0.074 (#200) 58
G_s (-#4) 2.67 ; G_s (+#4)
STANDARD: γ_d MAX. 112.5 pcf ; w_o 15.0 %
MODIFIED: γ_d MAX. pcf ; w_o %

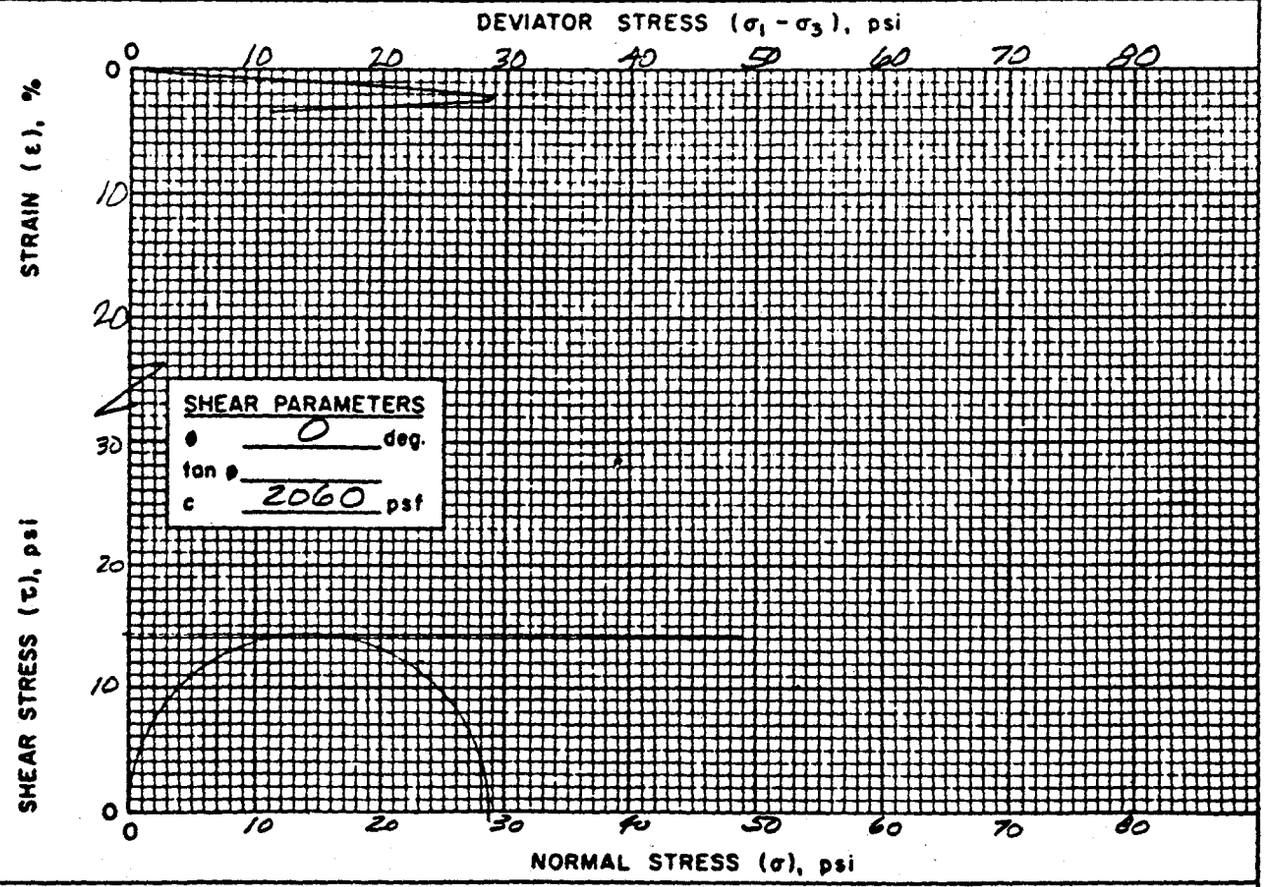
SPECIMEN DATA

HEIGHT 3.0 " ; DIAMETER 1.4 "
MATERIALS TESTED PASSED #4 SIEVE
METHOD OF PREPARATION STATIC 2 LAYER COMPACTION
MOLDING MOISTURE 15.2 %
MOLDED AT 95.0 % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY INITIAL pcf ☒ g/cc ☐	DRY DENSITY CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, % START OF TEST	MOISTURE CONTENT, % DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, % END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ϵ (%)
106.9			15.2		15.2		0	28.7	2.2



REMARKS

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 1405

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: PWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 109+00, ℄
FIELD SAMPLE NO: VI-20	DEPTH: 3.0'-4.0'	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

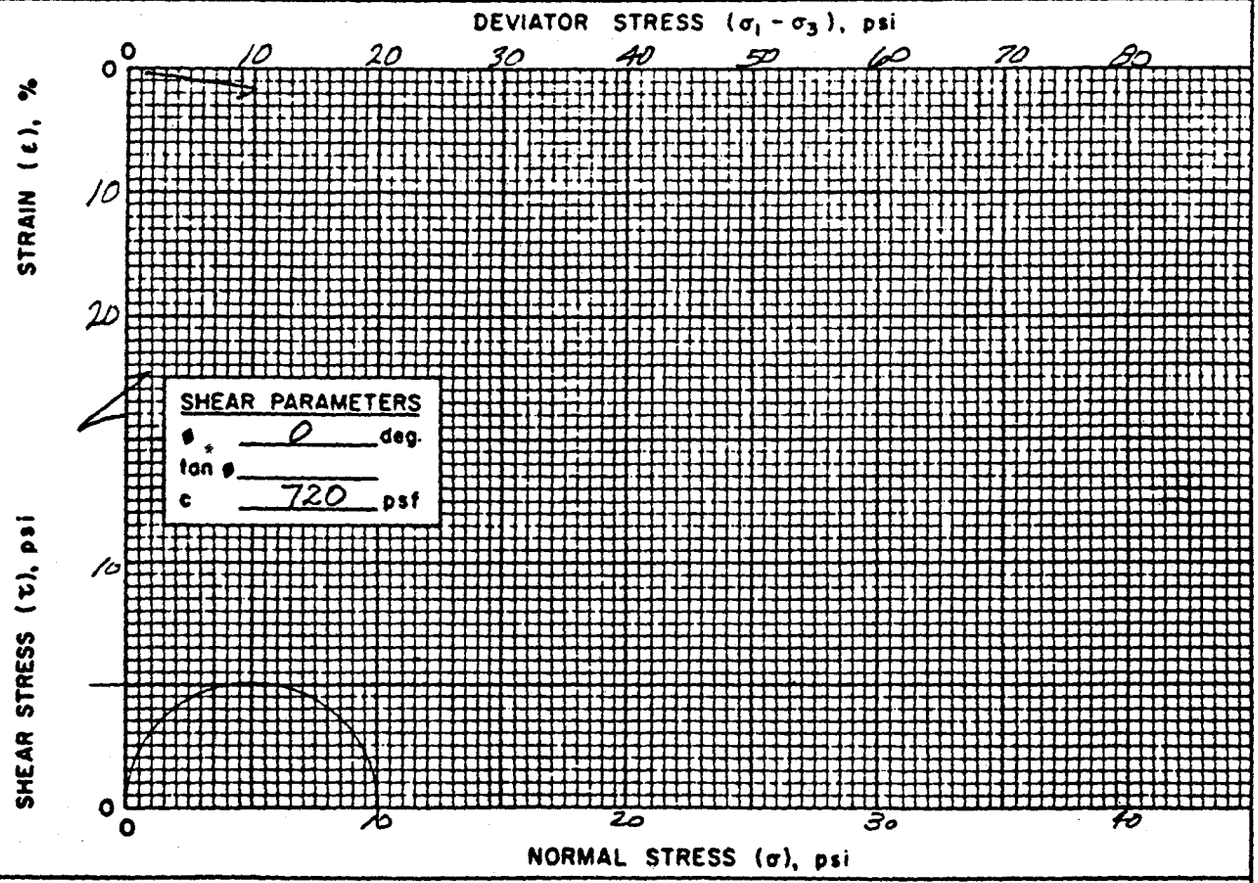
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.44			16.8		16.8		0	10.0	1.7



REMARKS TESTED @ NAT. H_2O

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1405

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY, REACH #6, ARIZONA			SAMPLE LOCATION: 109+00 ℄
FIELD SAMPLE NO: VI-2C	DEPTH: 3.0'-4.0'	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

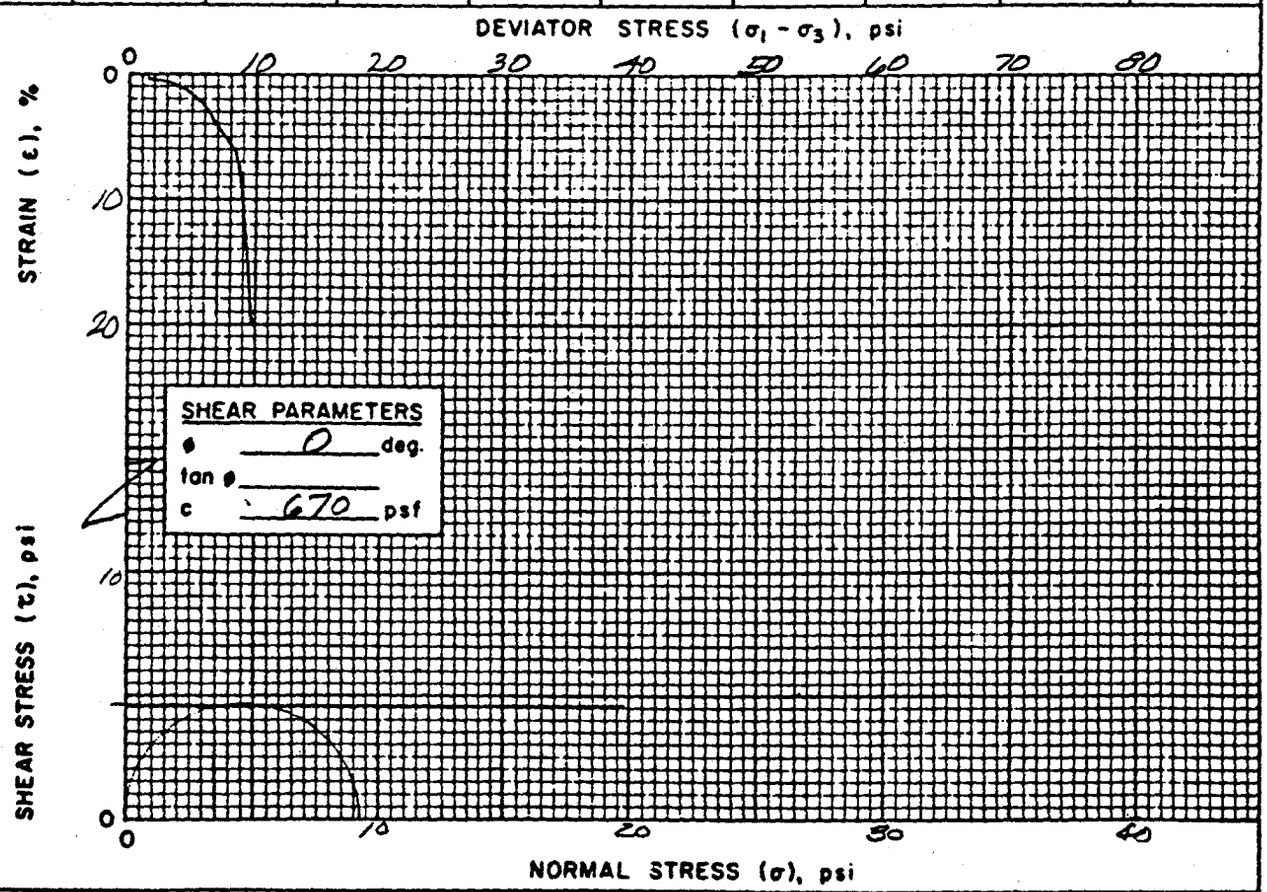
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

- UU ☐
- CU ☐
- $\overline{CU}$ ☐
- CD ☐

DRY DENSITY: INITIAL (pcf ☐ g/cc ☒)	DRY DENSITY: CONSOLIDATED (pcf ☐ g/cc ☐)		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.44			24.4		24.4		0	9.3	15.0



REMARKS Percolated water through the test specimen prior to test

RHH

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1412

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH 6, ARIZONA			SAMPLE LOCATION: 119+00 E
FIELD SAMPLE NO: VI-23	DEPTH: 0.0-1.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED ___ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

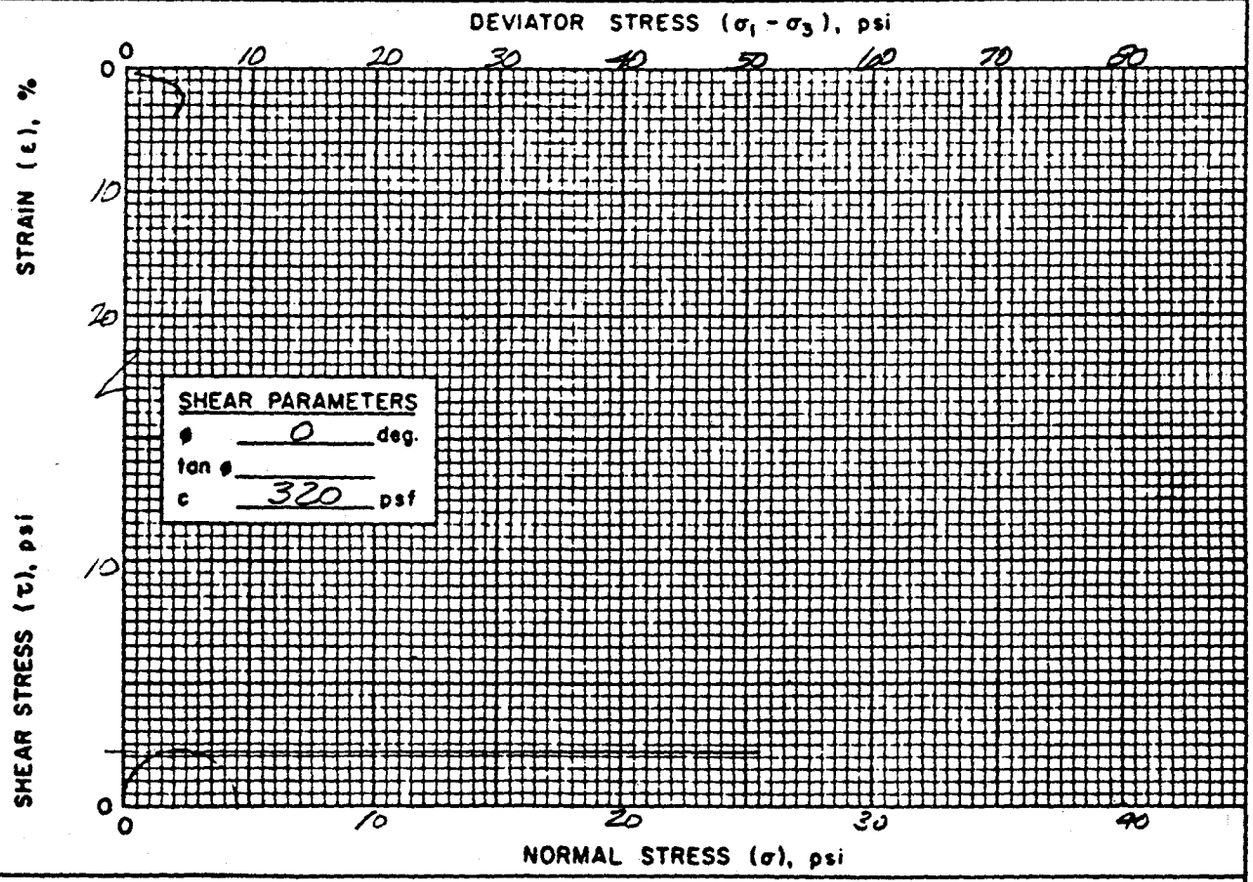
MOLDING MOISTURE _____ %

MOLDED AT ____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.30			16.2		16.2		0	4.5	2.2



REMARKS TESTED @ NAT. H_2O

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1412

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 119+00
FIELD SAMPLE NO: VI-23	DEPTH: 0.0-1.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (# 200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

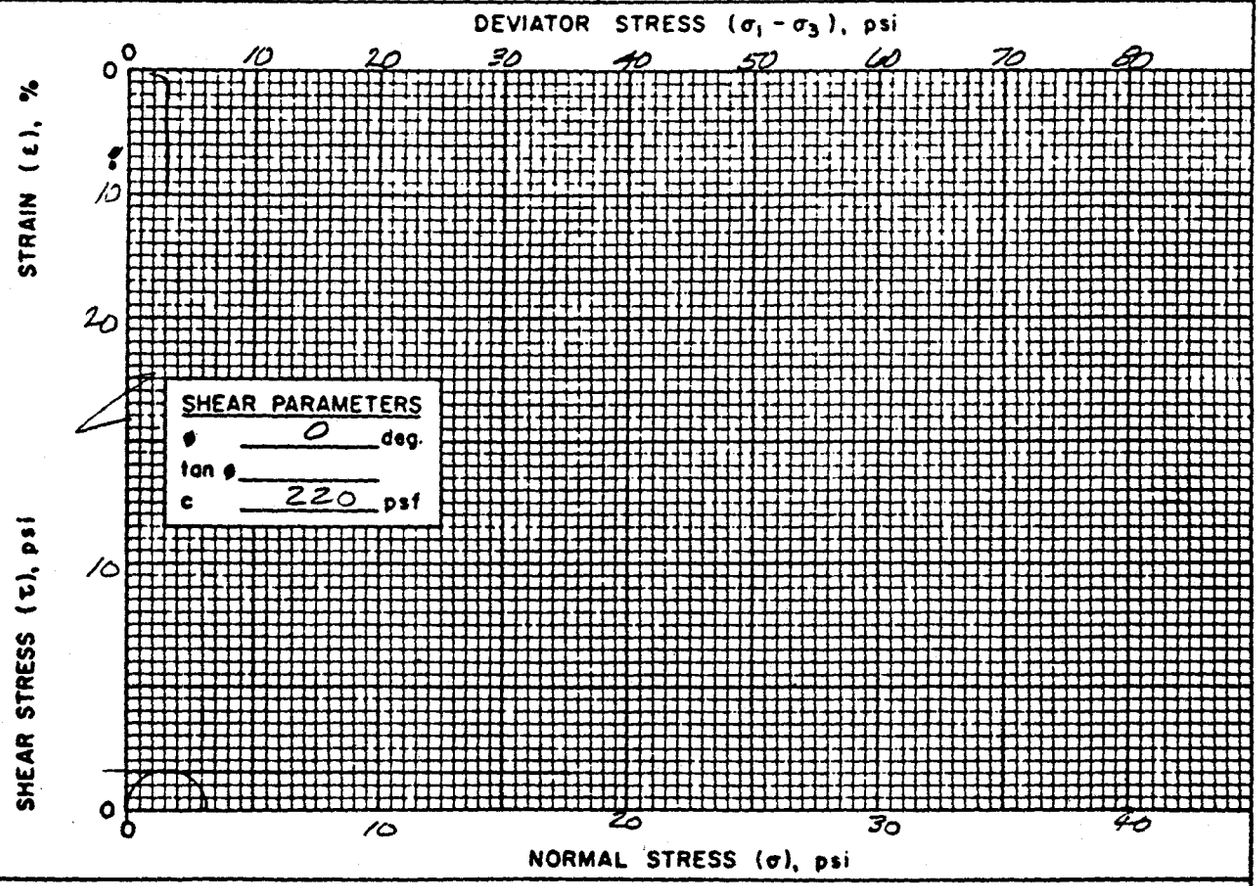
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.35			30.1		30.1		0	3.1	1.0



REMARKS Percolated water through the Test specimen prior to test.

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1413

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: PWCC FLOODWAY REACH #6, ARIZONA
SAMPLE LOCATION: 119+00 ℄

FIELD SAMPLE NO: II - 23
DEPTH: 3.0 - 14.0'
GEOLOGIC ORIGIN:

TYPE OF SAMPLE: COMPACTED
TESTED AT: S.M.L., LINCOLN
APPROVED BY:
DATE:

INDEX TEST DATA

USCS SC ; LL 58 ; PI 32
% FINER (mm): 0.002 27 ; 0.005 28 ;
0.074 (#200) 50
G_s (-#4) 2.64 ; G_s (+#4) _____
STANDARD: γ_d MAX. 105.5 pcf; w_o 17.0 %
MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

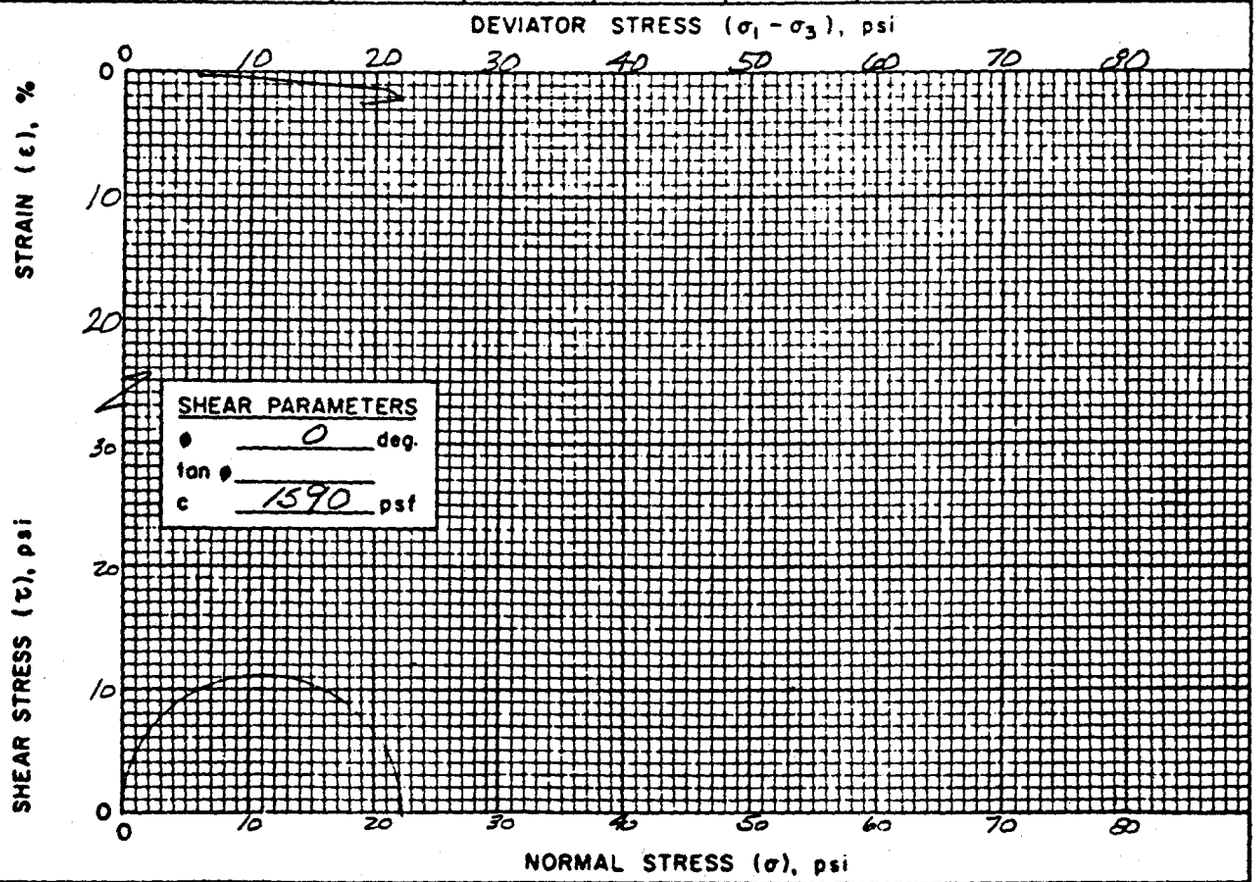
SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "
MATERIALS TESTED PASSED #4 SIEVE
METHOD OF PREPARATION STATIC 2 LAYER COMPACTION
MOLDING MOISTURE 16.9 %
MOLDED AT 95.3% OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY			MOISTURE CONTENT, %			TIME OF CONSOLIDATION (hrs)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
INITIAL pcf ☒ g/cc ☐	CONSOLIDATED pcf ☐ g/cc ☐		START OF TEST	DEG. OF SAT. AT START OF TEST	END OF TEST				
100.5			16.9		16.9		0	22.1	2.1



REMARKS

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1417

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 127+00 ℄
FIELD SAMPLE NO: VI-25	DEPTH: 3.0'-4.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: Undisturbed	TESTED AT	APPROVED BY	DATE

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

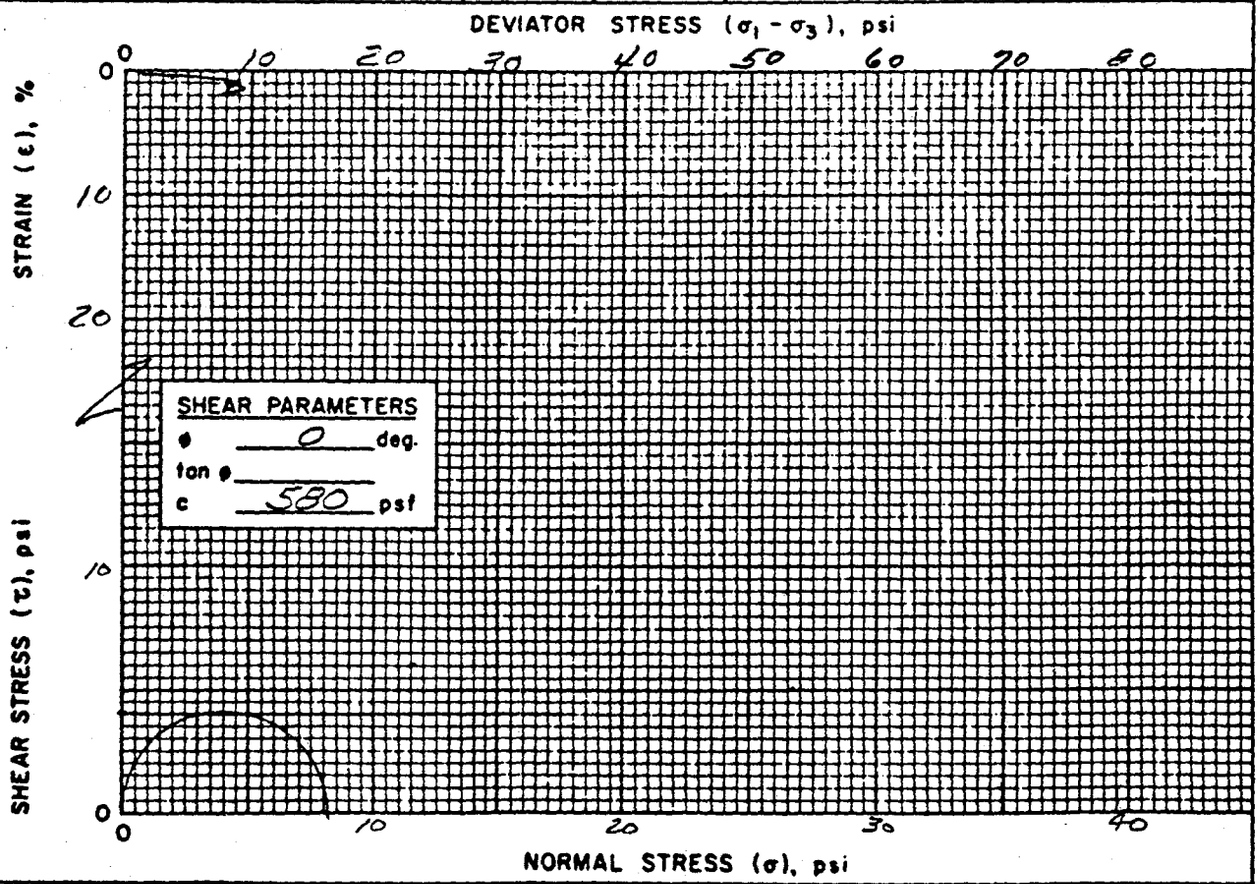
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY			MOISTURE CONTENT, %			TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
INITIAL pcf ☐ g/cc ☒	CONSOLIDATED pcf ☐ g/cc ☐		START OF TEST	DEG. OF SAT. AT START OF TEST	END OF TEST				
1.45			11.2		11.2		0	8.1	1.2



REMARKS Nat. H_2O

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 147

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 127+00, E
FIELD SAMPLE NO: VI-25	DEPTH: 3.0' - 4.0	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (# 200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

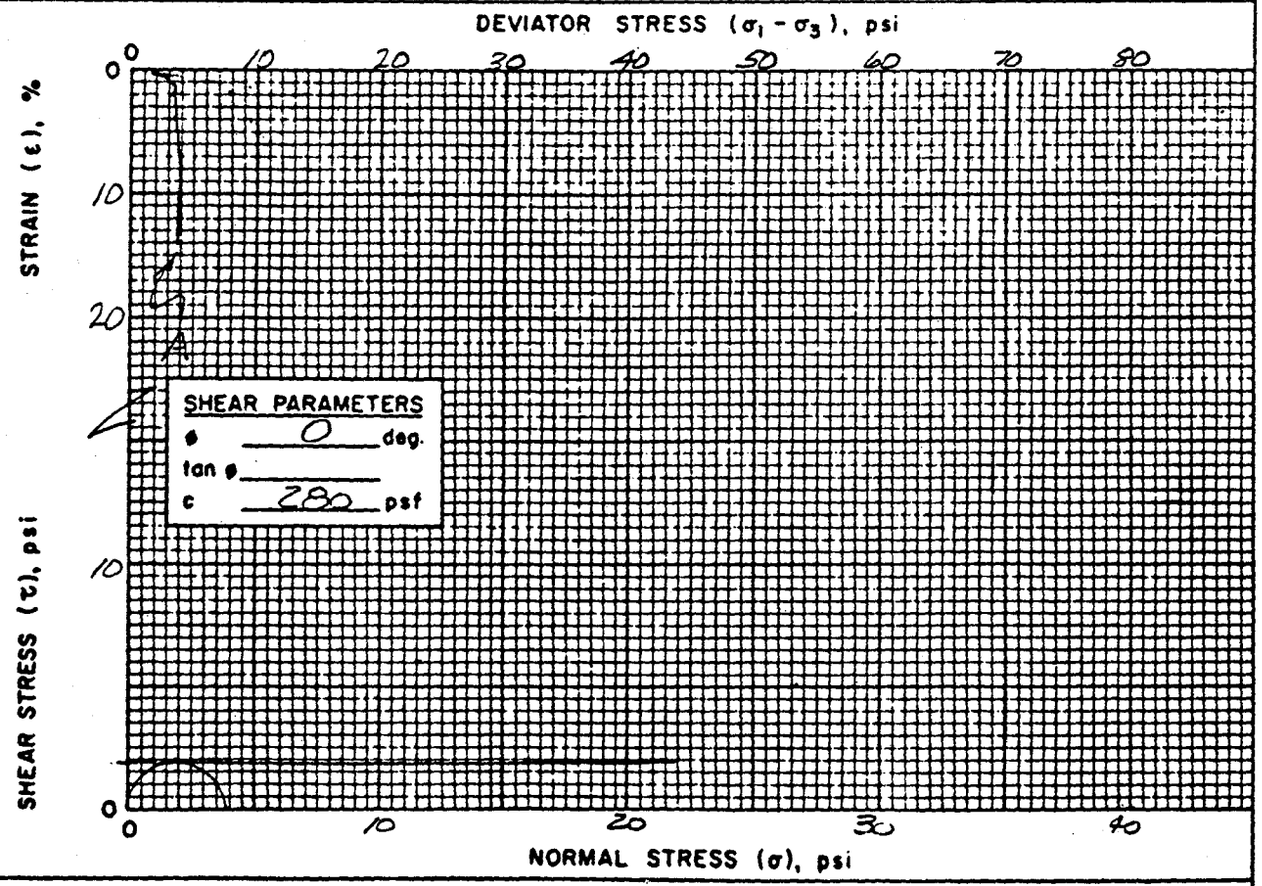
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.47			22.4					3.9	8.0



REMARKS Percolated Water through the Test specimen prior to test

RHH

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

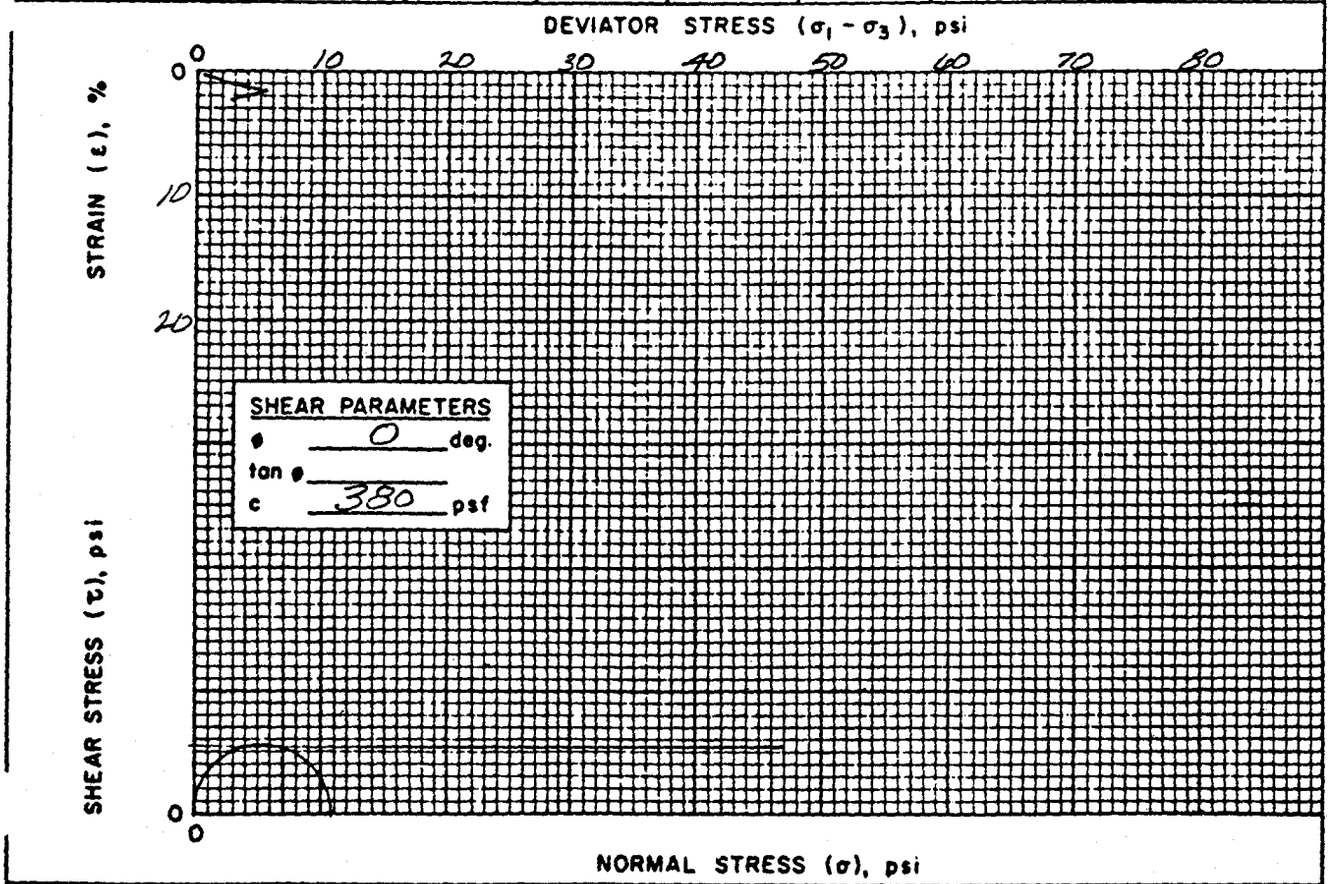
LABORATORY NO 85W1421

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 133+00, ℄
FIELD SAMPLE NO.: VI-27	DEPTH: 2.0'-3.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA	SPECIMEN DATA	TYPE OF TEST
USCS _____; LL _____; PI _____	HEIGHT 3.0 "; DIAMETER 1.4 "	
% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____	MATERIALS TESTED PASSED _____ SIEVE	UU ☐
G_s (-#4) _____; G_s (+#4) _____	METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE	CU ☐
STANDARD: γ_d MAX. _____ pcf; w_o _____ %	MOLDING MOISTURE _____ %	$\overline{CU}$ ☐
MODIFIED: γ_d MAX. _____ pcf; w_o _____ %	MOLDED AT _____ % OF γ_d MAXIMUM	CD ☐

DRY DENSITY: INITIAL pcf ☐ g/cc ☒	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.32			4.2				0	5.4	1.5



REMARKS TESTED @ NAT. H_2O

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1421

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD Floodway-Reach 6, Arizona			SAMPLE LOCATION: 133+00, ℄
FIELD SAMPLE NO: VI-27	DEPTH ✓	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

INDEX TEST DATA

USCS _____; LL _____; PI _____

% FINER (mm): 0.002 _____; 0.005 _____; 0.074 (#200) _____

G_s (-#4) _____; G_s (+#4) _____

STANDARD: γ_d MAX. _____ pcf; w_o _____ %

MODIFIED: γ_d MAX. _____ pcf; w_o _____ %

SPECIMEN DATA

HEIGHT 3.0 "; DIAMETER 1.4 "

MATERIALS TESTED PASSED _____ SIEVE

METHOD OF PREPARATION TRIMMED FROM AN UNDISTURBED CORE

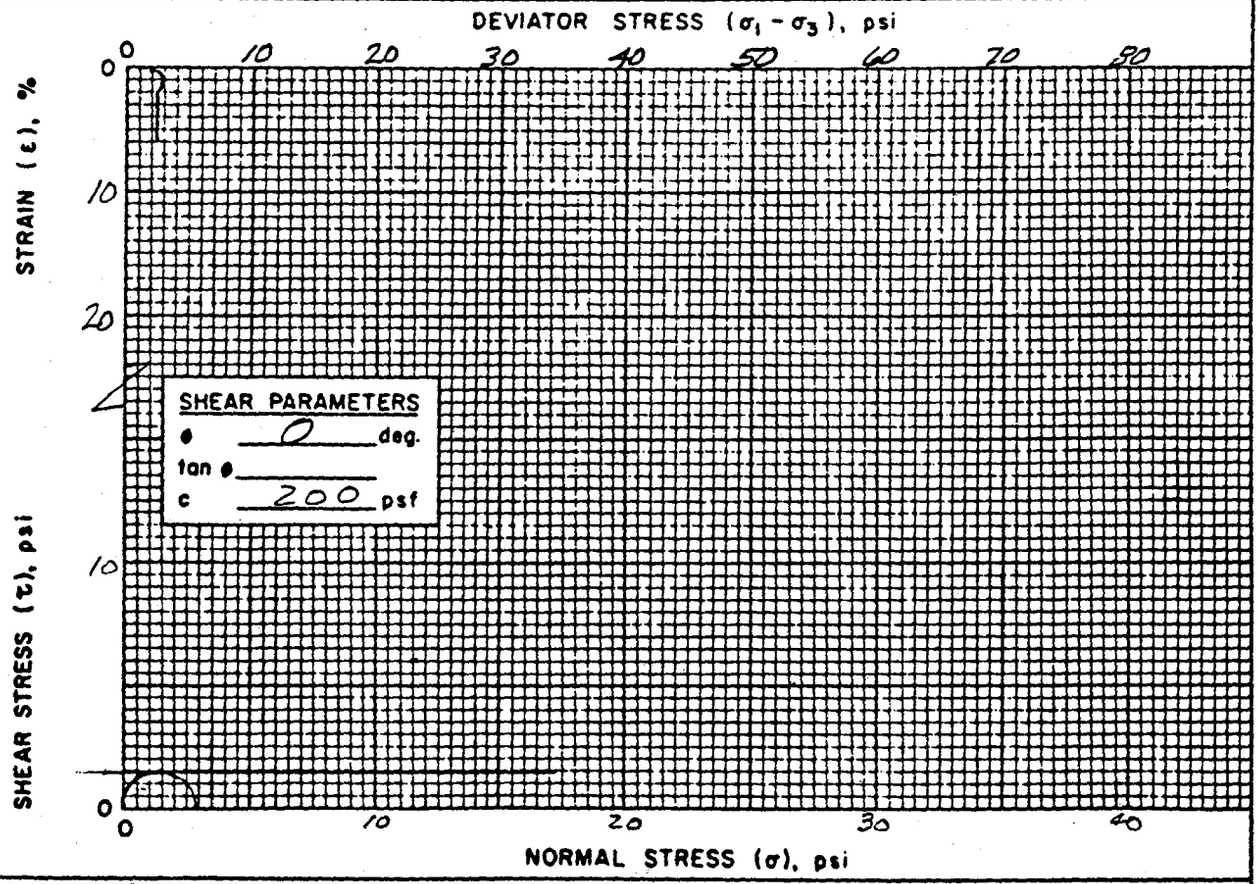
MOLDING MOISTURE _____ %

MOLDED AT _____ % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL (pcf ☐ g/cc ☒)	DRY DENSITY: CONSOLIDATED (pcf ☐ g/cc ☐)		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
1.46			20.0				0	2.9	1.0



REMARKS Percolated water through the test specimen prior to test.

RH

SCS-ENG-355A (Rev. 3-70)
FILE CODE ENG-22

LABORATORY NO. 85W1427

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST

PROJECT and STATE: RWCD FLOODWAY BERCHNS, ARIZONA			SAMPLE LOCATION: 149+00 E
FIELD SAMPLE NO: VI-31	DEPTH: 1.0'-3.0'	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: COMPACTED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

INDEX TEST DATA

USCS CL ; LL 29 ; PI 13
% FINER (mm): 0.002 21 ; 0.005 22 ; 0.074 (#200) 54
G_s (-#4) 2.64 ; G_s (+#4) _____
STANDARD: γ_d MAX. 120.0 pcf ; w_o 12.5 %
MODIFIED: γ_d MAX. _____ pcf ; w_o _____ %

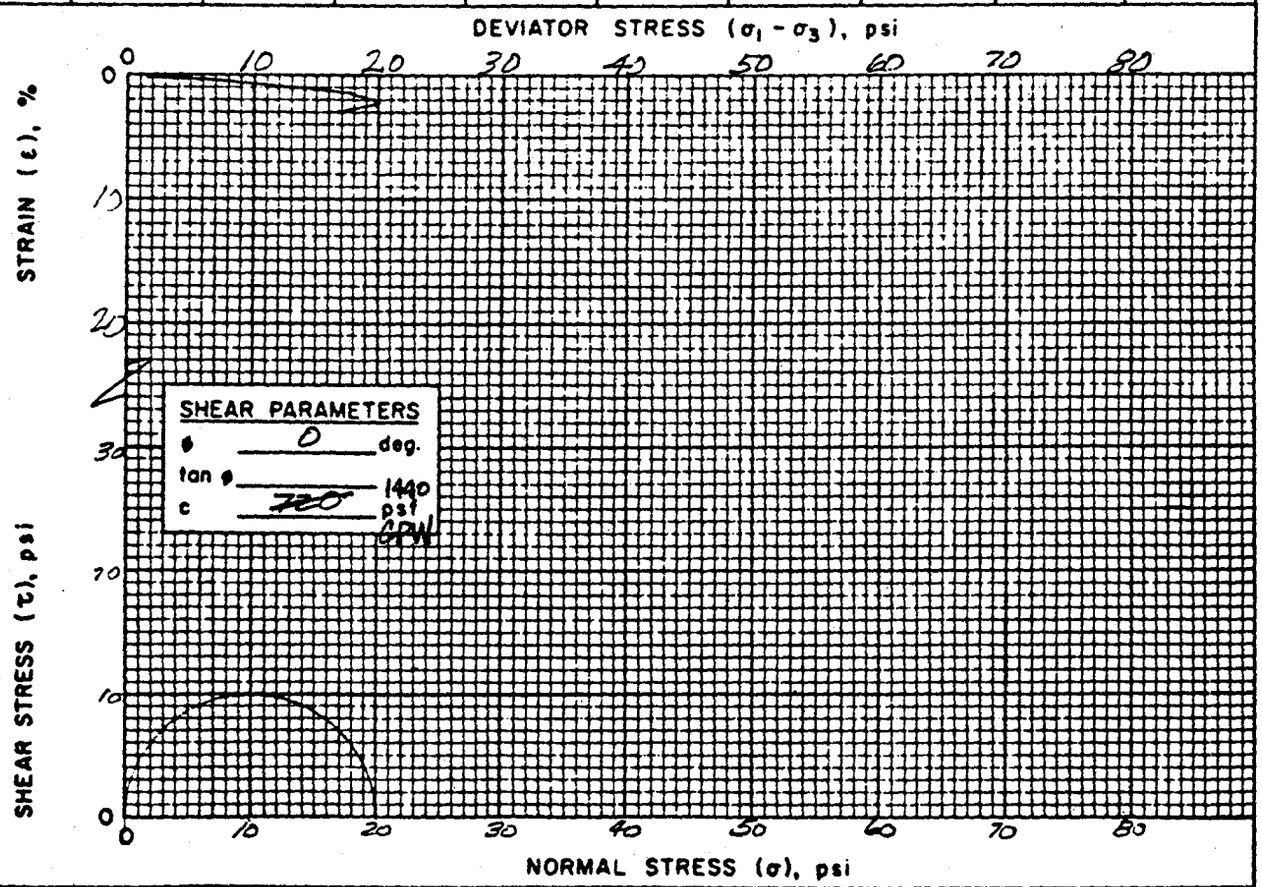
SPECIMEN DATA

HEIGHT 3.0 " ; DIAMETER 1.4 "
MATERIALS TESTED PASSED #4 SIEVE
METHOD OF PREPARATION STATIC 2 LAYER COMPACTION
MOLDING MOISTURE 12.4 %
MOLDED AT 95.2 % OF γ_d MAXIMUM

TYPE OF TEST

UU ☐
CU ☐
$\overline{CU}$ ☐
CD ☐

DRY DENSITY: INITIAL pcf ☒ g/cc ☐	DRY DENSITY: CONSOLIDATED pcf ☐ g/cc ☐		MOISTURE CONTENT, %: START OF TEST	MOISTURE CONTENT, %: DEG. OF SAT. AT START OF TEST	MOISTURE CONTENT, %: END OF TEST	TIME OF CONSOLIDATION (hrs.)	MINOR PRINCIPAL STRESS σ_3 (psi)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRAIN AT FAILURE, ε (%)
114.2			12.4		12.4		0	20.0	2.1



REMARKS

SCS-ENG-352 (REV. 3-70)
RLE CODE ENG-22

LABORATORY NO 85W1369

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT and STATE: RWCD Flood way, Reach 6, Arizona

FIELD SAMPLE NO.	LOCATION	DEPTH
VI-6	53+00 ℄	1.0'-2.0'

GEOLOGIC ORIGIN	TESTED AT	APPROVED BY	DATE
	SML		

CLASSIFICATION CL LL 24 PI 9

MAX. PARTICLE SIZE INCLUDED IN TEST < #4

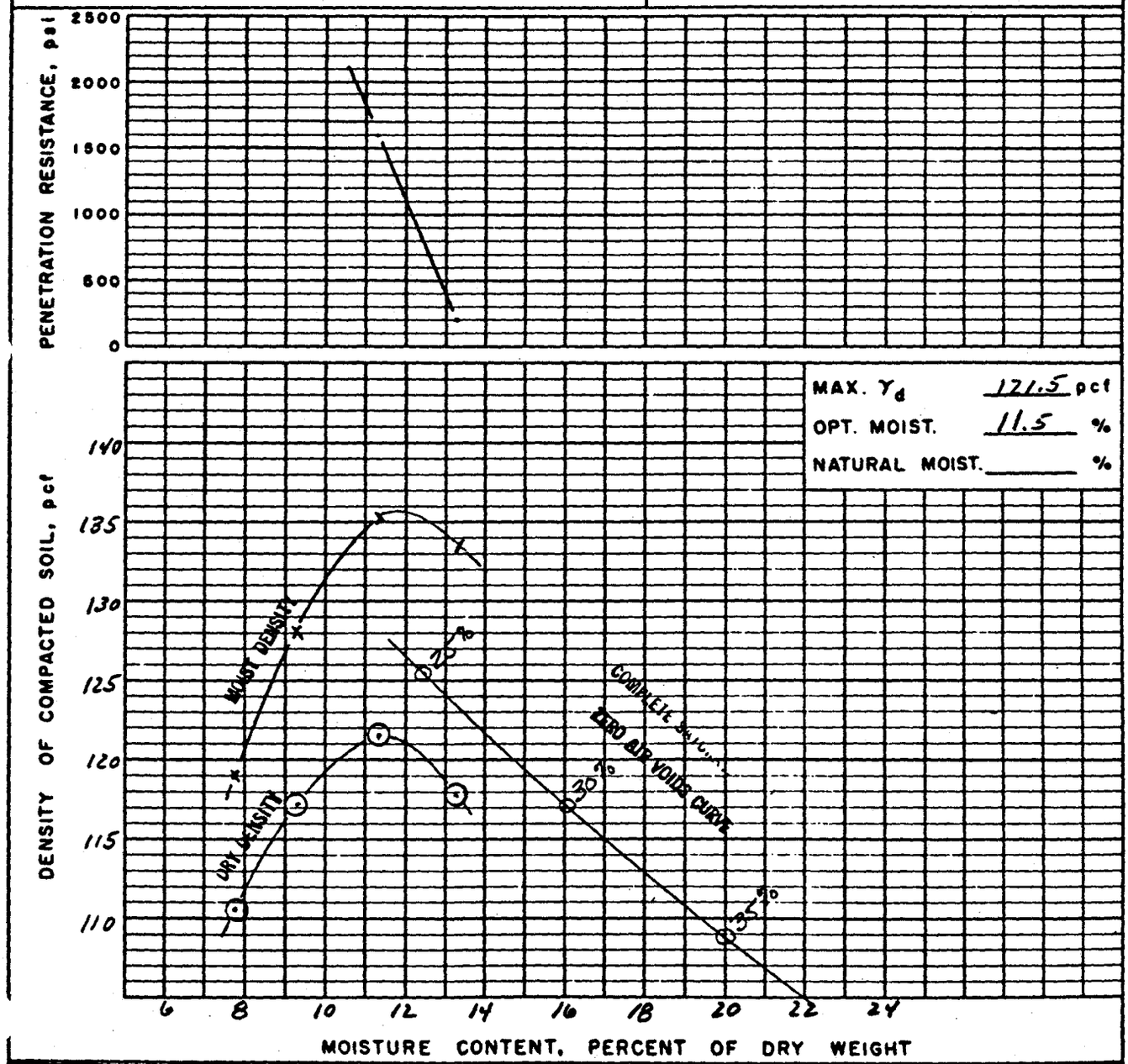
SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.68 ; PLUS NO. 4 ____

CURVE NO. 1 OF 6

STD. (ASTM D-698) ☒; METHOD A

MOD. (ASTM D-1557) ☐; METHOD ____

OTHER TEST ☐ (SEE REMARKS)



REMARKS

SCS-ENG-352 (REV. 3-70)
FILE CODE ENG-22

LABORATORY NO BSW 1381

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT and STATE: RWCD Floodway - Reach 6, Arizona

FIELD SAMPLE NO.	LOCATION	DEPTH
VI-10	69+00 ℄	1.0'-2.0'

GEOLOGIC ORIGIN	TESTED AT	APPROVED BY	DATE
	SML		

CLASSIFICATION SC LL 29 PI 14

MAX. PARTICLE SIZE INCLUDED IN TEST < #4 "

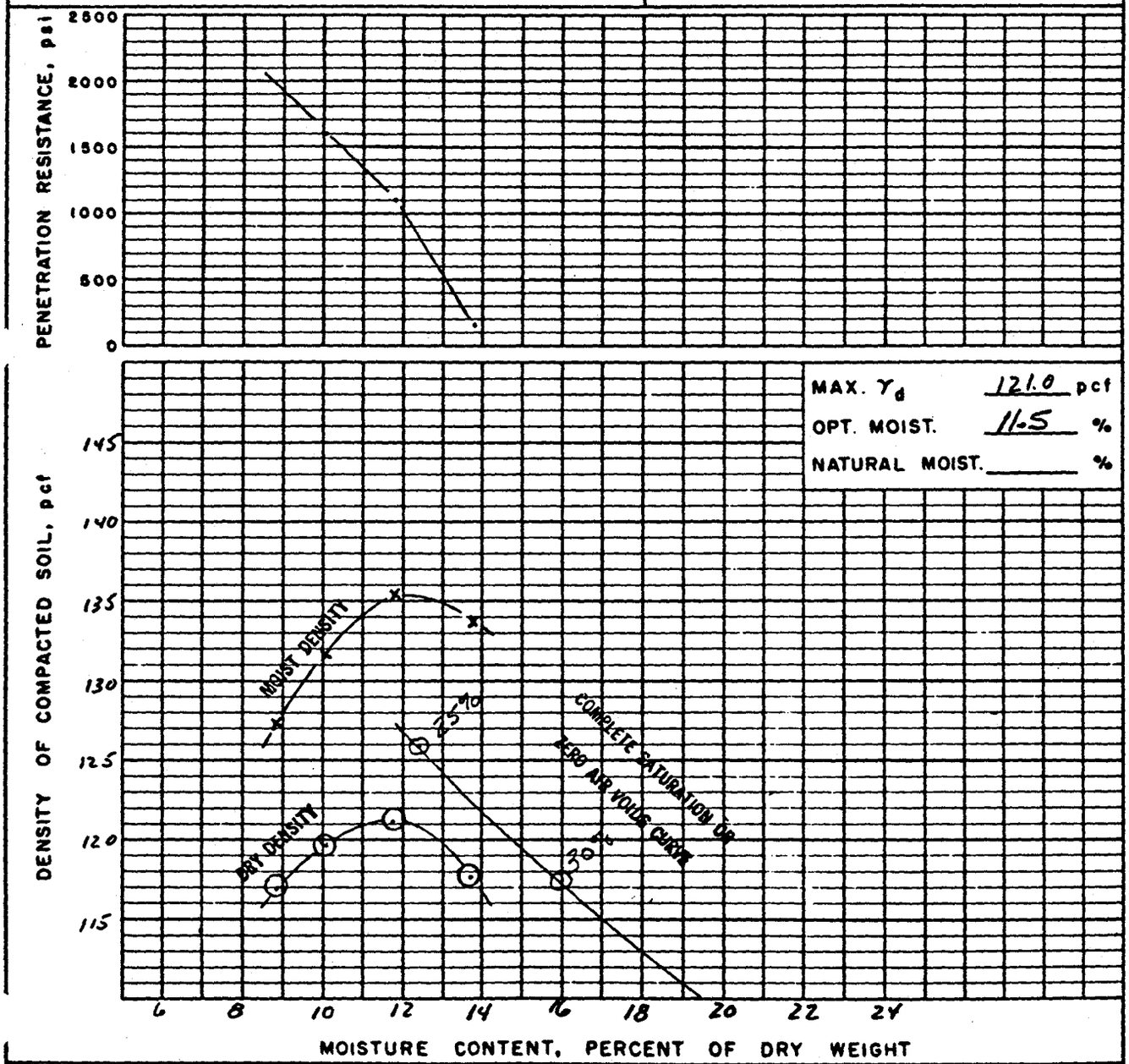
SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.69 ; PLUS NO. 4 ____

CURVE NO. 2 OF 6

STD. (ASTM D-698) ☒; METHOD A

MOD. (ASTM D-1557) ☐; METHOD ____

OTHER TEST ☐ (SEE REMARKS)



REMARKS

SCS-ENG-352 (REV. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 1397

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT and STATE: RWCD Floodway Reach 6 Arizona

FIELD SAMPLE NO.	LOCATION	DEPTH
II-17	97+00, 100' Lt	2.0'-3.0'

GEOLOGIC ORIGIN	TESTED AT	APPROVED BY	DATE
	SML		

CLASSIFICATION CL-ML LL 22 PI 4

MAX. PARTICLE SIZE INCLUDED IN TEST < #4 "

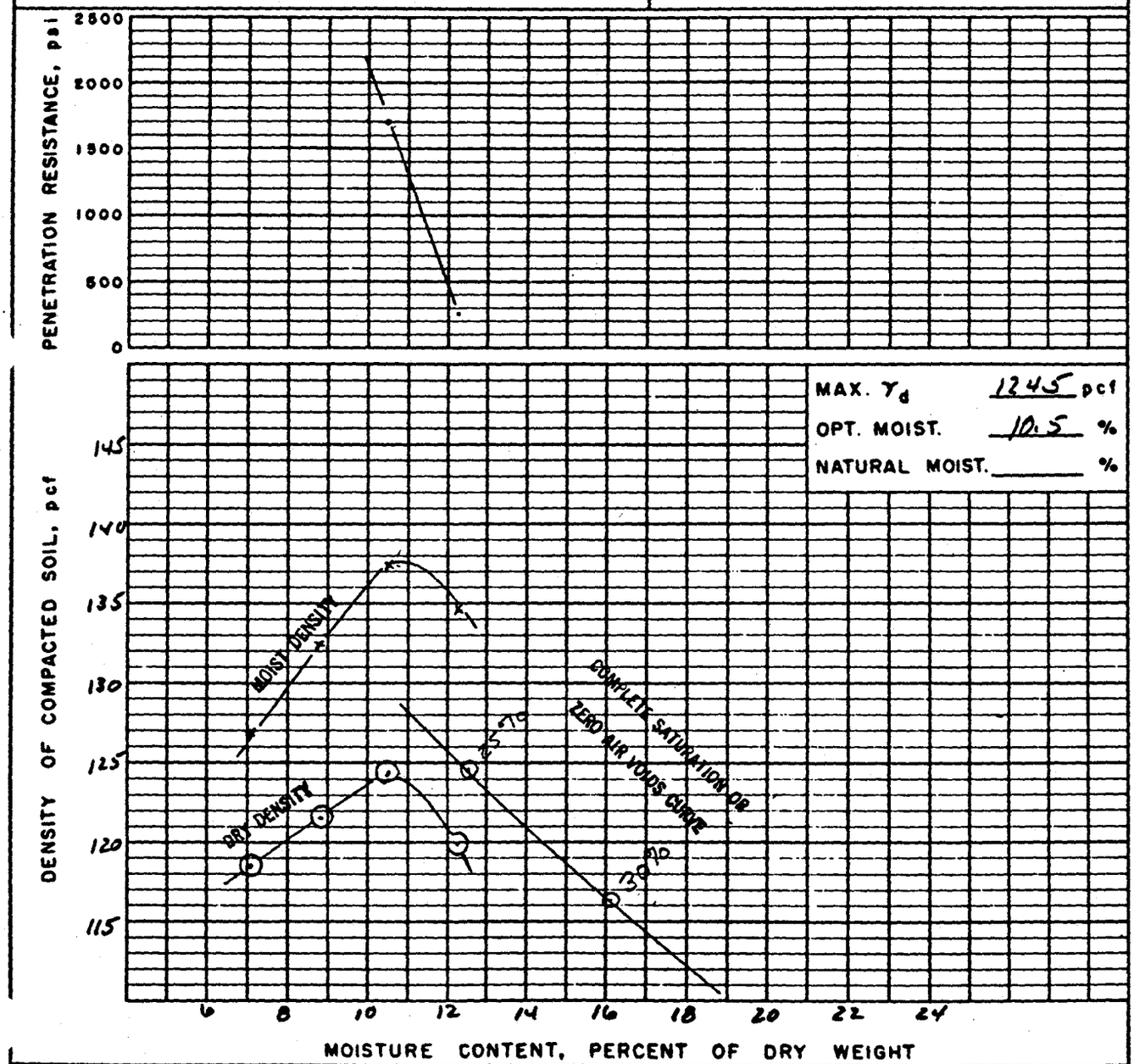
SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.66 ; PLUS NO. 4 ____

CURVE NO. 3 OF 6

STD. (ASTM D-698) ☒; METHOD A

MOD. (ASTM D-1557) ☐; METHOD ____

OTHER TEST ☐ (SEE REMARKS)



MAX. γ_d 124.5 pcf

OPT. MOIST. 10.5 %

NATURAL MOIST. ____ %

REMARKS

SCS-ENG-352 (REV. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W1400

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT and STATE: RWCD Floodway Reach 6 Arizona

FIELD SAMPLE NO.	LOCATION	DEPTH
VI-18	101+00 ℄	1.0'-2.0'

GEOLOGIC ORIGIN	TESTED AT	APPROVED BY	DATE
	SML		

CLASSIFICATION CL LL 38 PI 21

MAX. PARTICLE SIZE INCLUDED IN TEST < #4 "

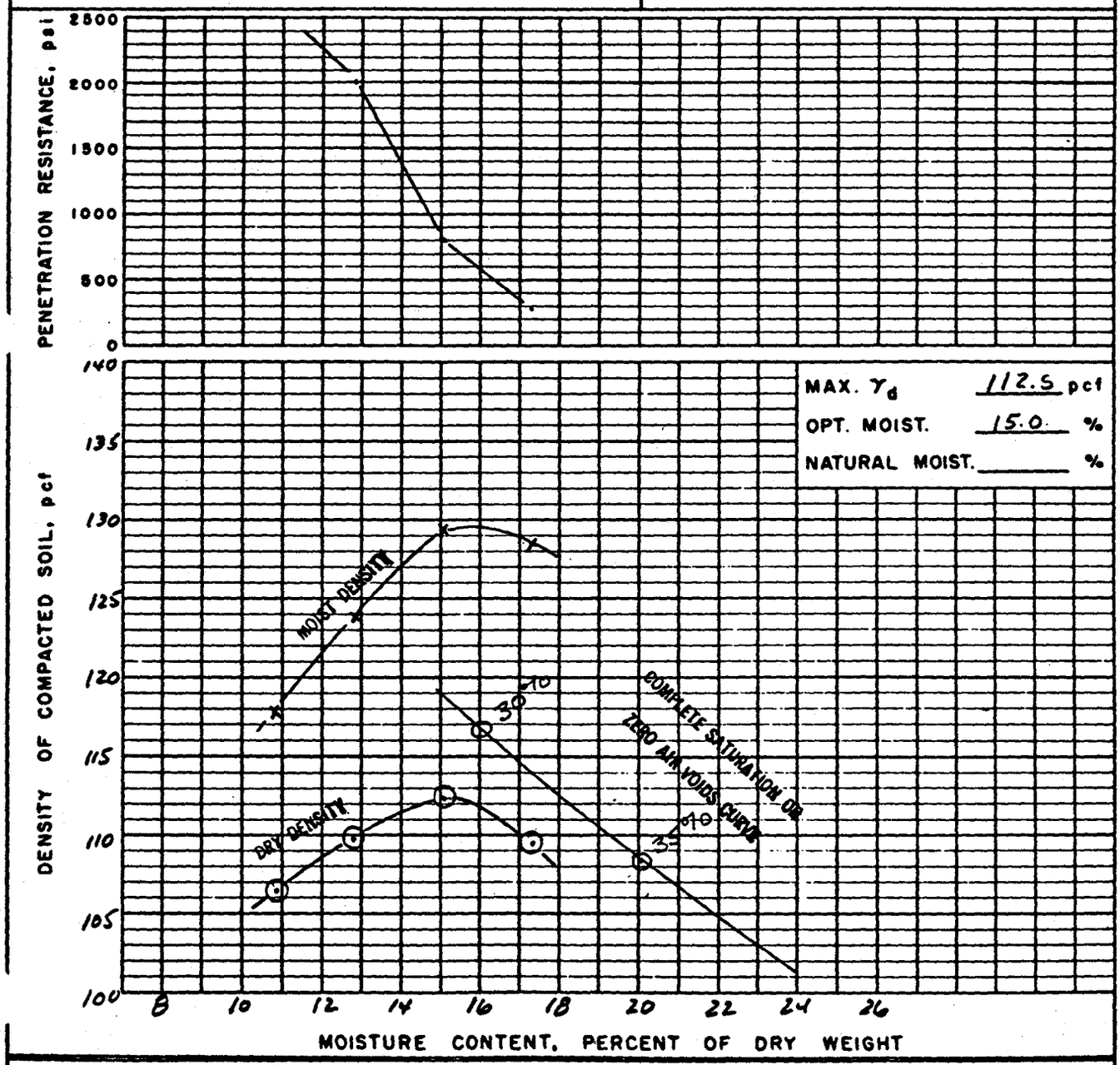
SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.67 ; PLUS NO. 4 ____

CURVE NO. 4 OF 6

STD. (ASTM D-698) ☒; METHOD A

MOD. (ASTM D-1557) ☐; METHOD ____

OTHER TEST ☐ (SEE REMARKS)



REMARKS

SCS-ENG-352 (REV. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 1413

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT and STATE: RWCD Floodway Reach 6 Arizona

FIELD SAMPLE NO.: VI-23 | LOCATION: 119+00 ℄ | DEPTH: 3.0'-4.0'

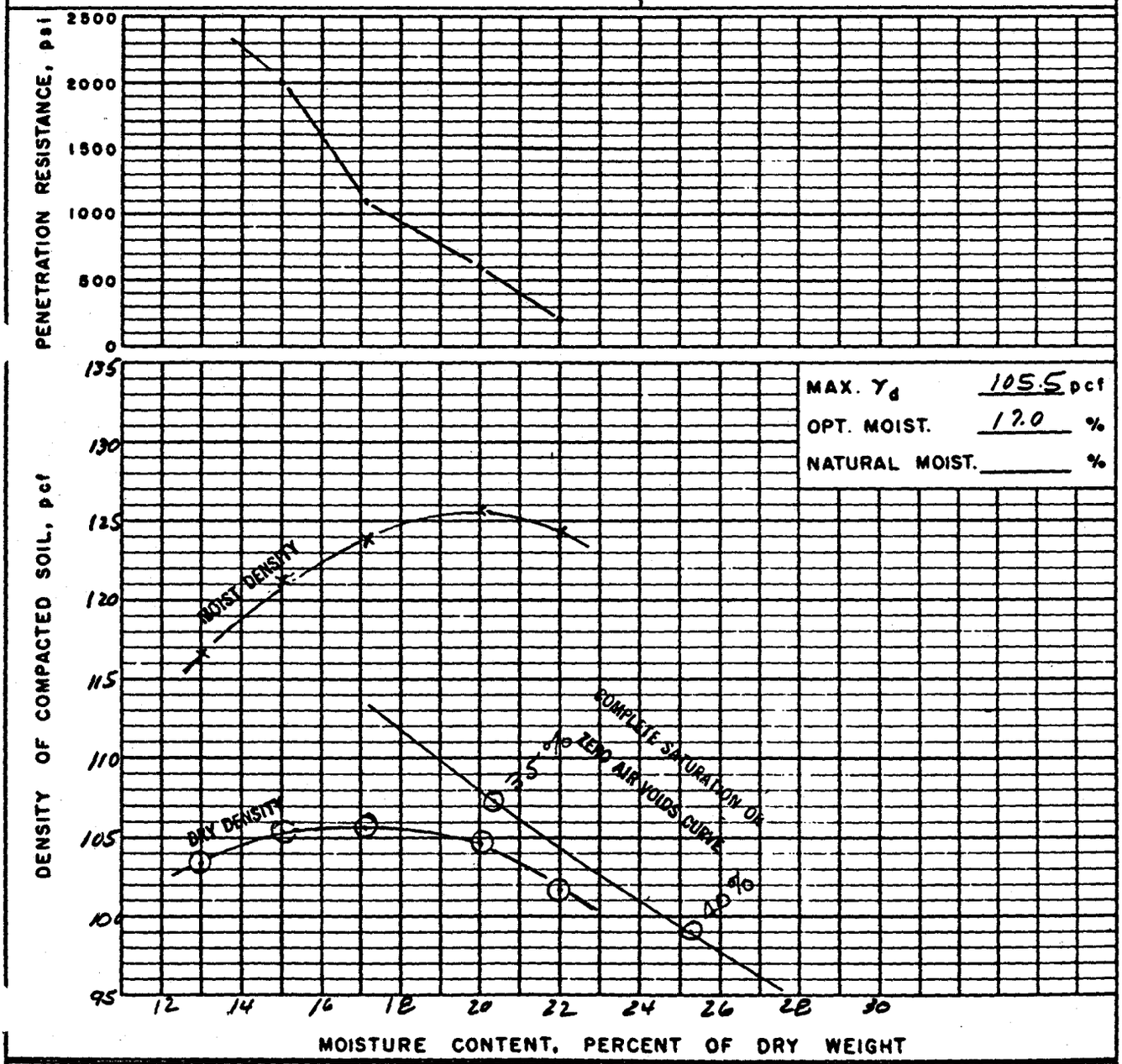
GEOLOGIC ORIGIN: | TESTED AT: SML | APPROVED BY: | DATE:

CLASSIFICATION SC LL 58 PI 32 | CURVE NO. 5 OF 6

MAX. PARTICLE SIZE INCLUDED IN TEST < #4 " | STD. (ASTM D-698) ☒; METHOD A

SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.64 / PLUS NO. 4 | MOD. (ASTM D-1557) ☐; METHOD

OTHER TEST ☐ (SEE REMARKS)



REMARKS

SCS-ENG-352 (REV. 3-70)
FILE CODE ENG-22

LABORATORY NO 85W 1427

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT and STATE: RWCD Floodway Reach 6 Arizona

FIELD SAMPLE NO.	LOCATION	DEPTH
VI-31	149+00	1.0'-2.0'

GEOLOGIC ORIGIN	TESTED AT	APPROVED BY	DATE
	SWL		

CLASSIFICATION CL LL 29 PI 13

MAX. PARTICLE SIZE INCLUDED IN TEST < #4 "

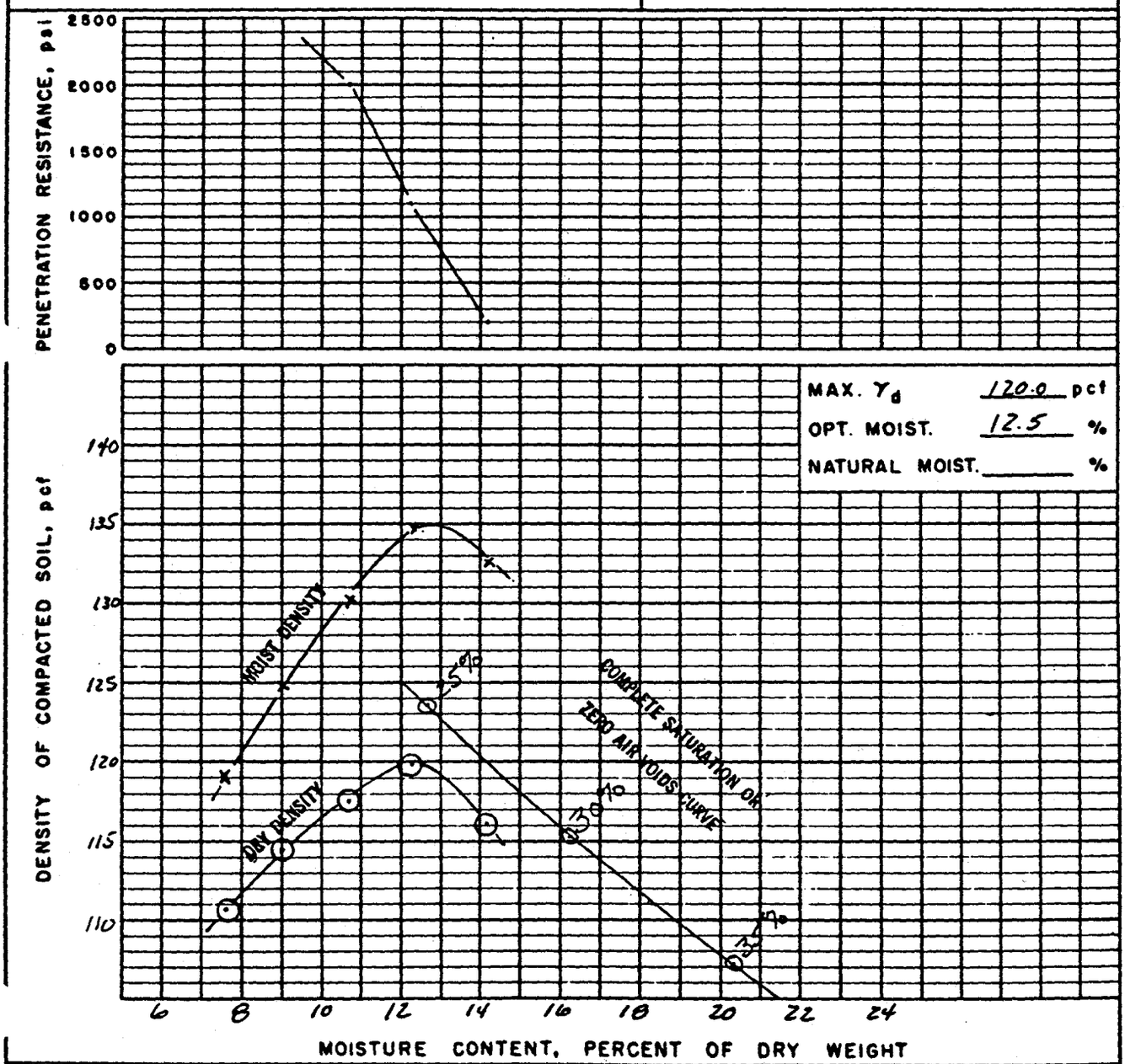
SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.64 ; PLUS NO. 4 ____

CURVE NO. 6 OF 6

STD. (ASTM D-698) ☒; METHOD A

MOD. (ASTM D-1557) ☐; METHOD ____

OTHER TEST ☐ (SEE REMARKS)



REMARKS

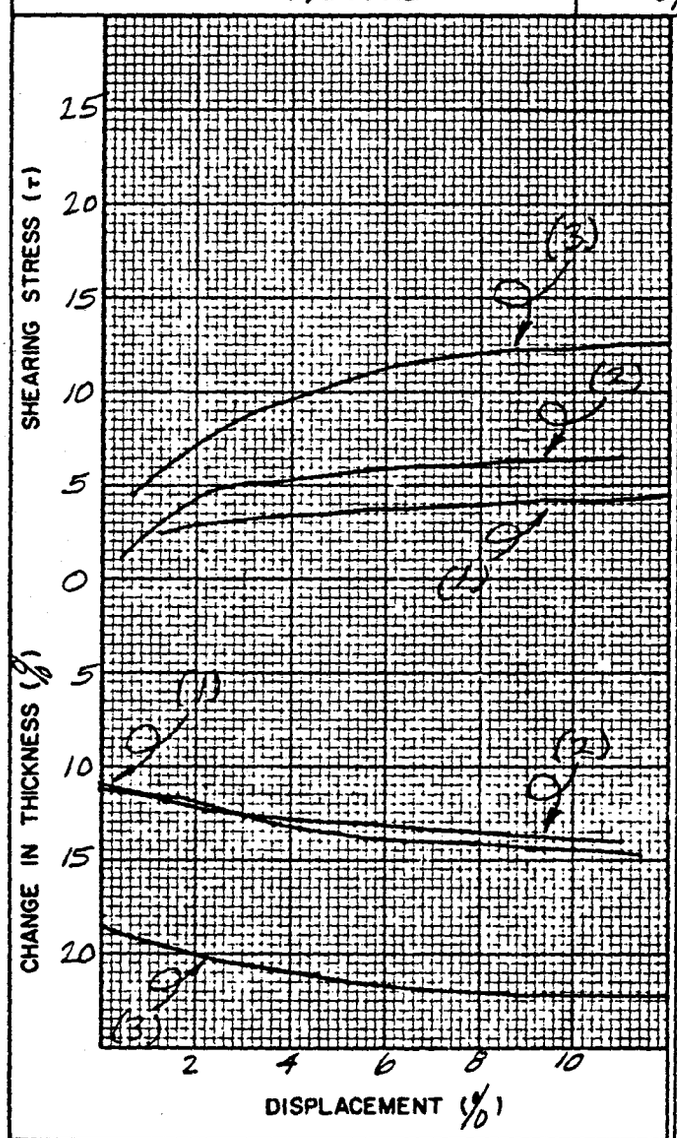
form SCS 366
9-64

LABORATORY NO. 85W 1370

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

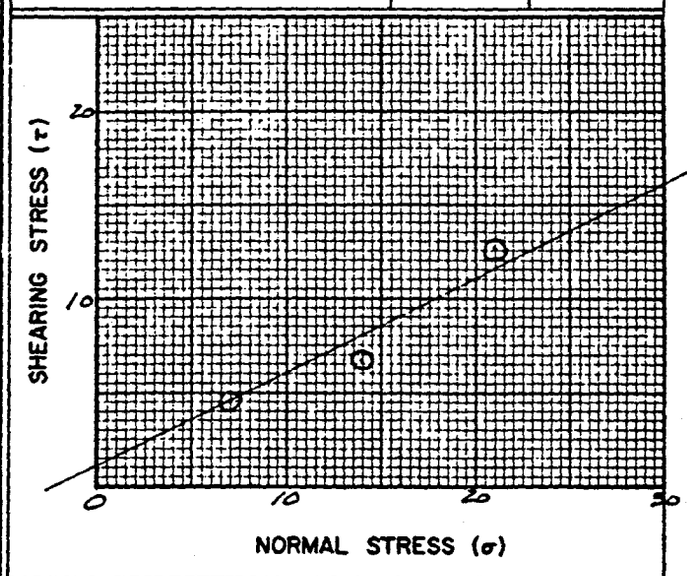
PROJECT and STATE: RWCD Floodway Reach #6, Arizona			SAMPLE LOCATION: 53+00 ℄
FIELD SAMPLE NO.: VI-6	DEPTH: 4.0'-5.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

CLASSIFICATION: CL	LL 28	PI 11	SPECIFIC GRAVITY
TYPE OF TEST: Consolidated Quick	CONTROL: STRAIN	$G_s(-)$ #4	2.66
RATE OF LOADING (in/min.): 0.0006	MOISTURE CONDITION: FLOODED	$G_s(+)$ #4	
TYPE OF SPECIMEN: ROUND	AREA (sq in.): 4.9	THICKNESS (in.): 1.0	G_m(bulk)(+) #4



TEST NO.	1	2	3	4
INIT MOISTURE, %	7	14	21	
DRY DENSITY, ☒ g/cc ☐ pcf	1.50	1.54	1.42	
INIT. VOID RATIO				
TEST DURATION, (min.)	472	458	469	
FINAL MOISTURE, %	18.5	17.2	16.7	
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	4.5	6.6	12.6	

SHEAR VALUES	ϕ	C
AT MAXIMUM STRESS	26.5	150



REMARKS

RHH

Form SCS 366
9-64

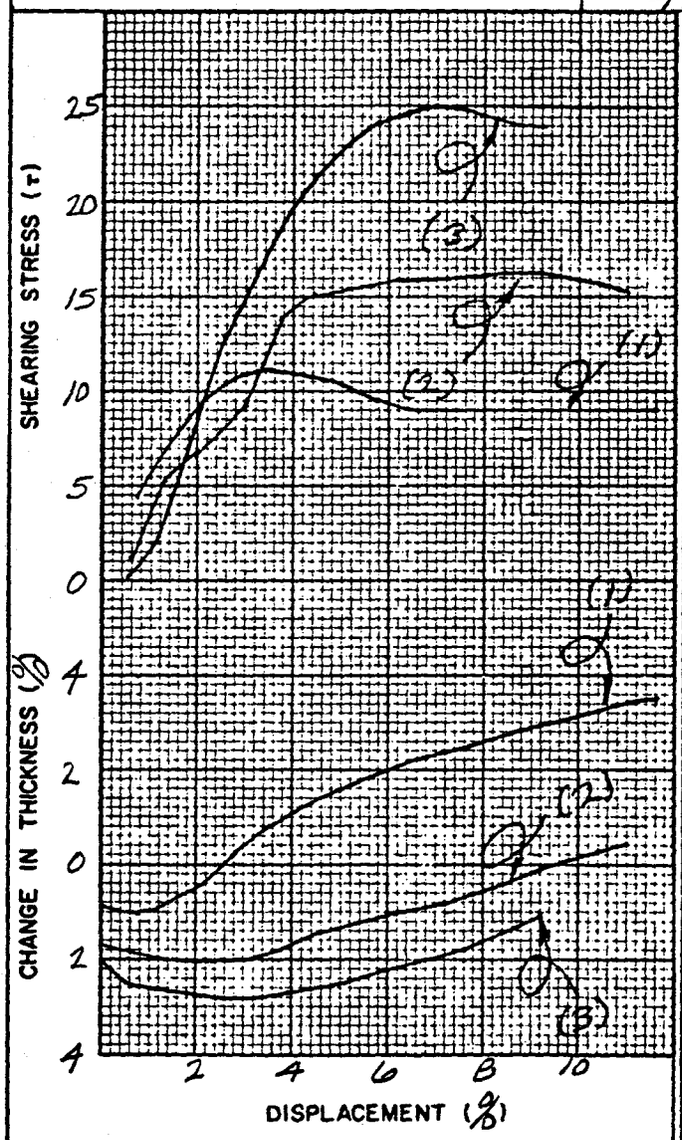
LABORATORY NO 85W 1376

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

PROJECT and STATE: RWCO FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION
FIELD SAMPLE NO.: VI -8	DEPTH: 6.0' - 7.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

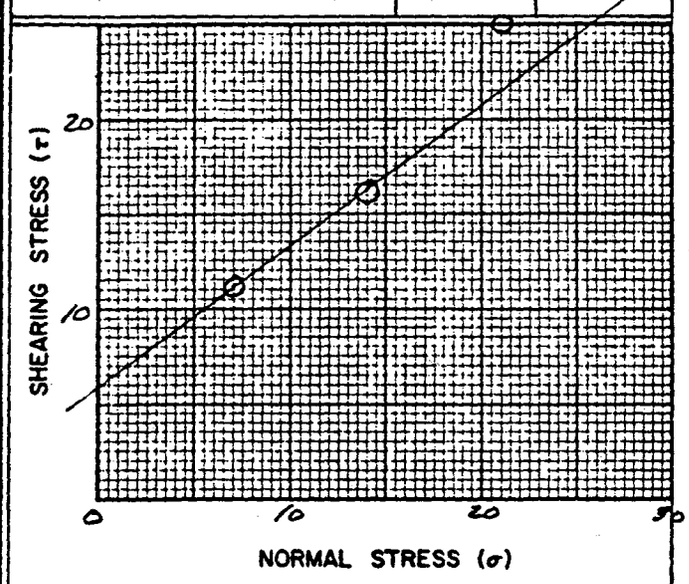
CLASSIFICATION: CL LL 44 PI 20

TYPE OF TEST: Consolidated Quick	CONTROL: STRAIN	SPECIFIC GRAVITY $G_s(-)$ #4	2.65
RATE OF LOADING (in/min.): 0.0006	MOISTURE CONDITION: NAT. H_2O	$G_s(+)$ #4	
TYPE OF SPECIMEN: ROUND	AREA (sq.in.): 4.9	THICKNESS (in.): 1.0	G_m(bulk)(+) #4



TEST NO.	1	2	3	4
INIT MOISTURE, %	12.2	12.2	12.2	
DRY DENSITY g/cc pcf	1.48	1.48	1.57	
INIT. VOID RATIO				
TEST DURATION, (min)	455	428	383	
FINAL MOISTURE, %				
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	11.2	16.3	25.0	

SHEAR VALUES	ϕ	C
AT MAXIMUM STRESS	37	825



REMARKS

RHH

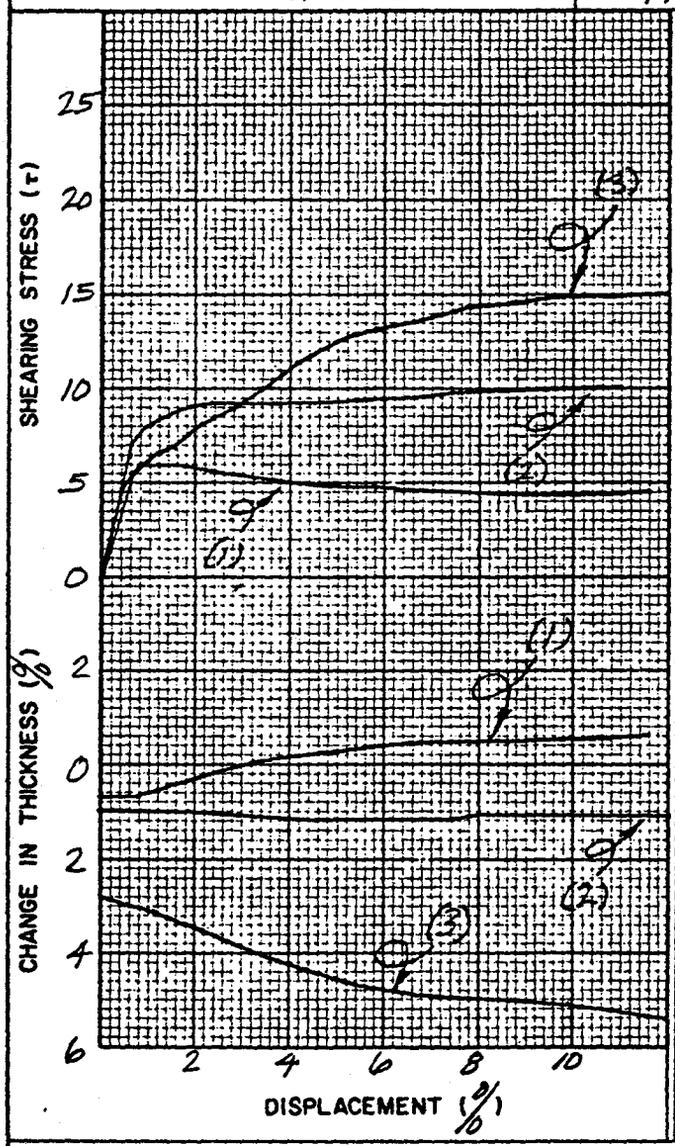
Form SCS 366
9-64

LABORATORY NO. BSW1381

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

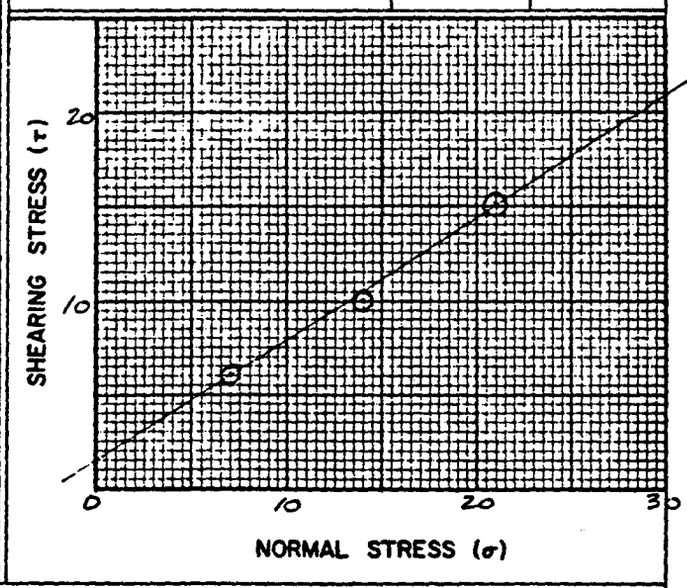
PROJECT and STATE: RWCD Floodway Reach 6 Arizona			SAMPLE LOCATION: 69+00 ℄
FIELD SAMPLE NO.: JT-10	DEPTH: 1.0'-2.0'	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

CLASSIFICATION: SC	LL 29	PI 14	SPECIFIC GRAVITY
TYPE OF TEST: Consolidated Quick	CONTROL: STRAIN	$G_s(-)$ #4	2.69
RATE OF LOADING (in/min.): 0.0006	MOISTURE CONDITION: FLOODED	$G_s(+)$ #4	
TYPE OF SPECIMEN: ROUND	AREA (sq. in.): 4.9	THICKNESS (in.): 1.0	G_m(bulk)(+) #4



TEST NO.	1	2	3	4
INIT MOISTURE, %	12.0	12.0	12.0	
DRY DENSITY, ☒ g/cc ☐ pcf	1.86	1.85	1.84	
INIT. VOID RATIO				
TEST DURATION, (min)	483	469	469	
FINAL MOISTURE, %	14.8	14.4	13.6	
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	6.1	10.1	15.1	

SHEAR VALUES	ϕ	C
AT MAXIMUM STRESS	33	200



REMARKS

RHH

Form SCS 368
9-64

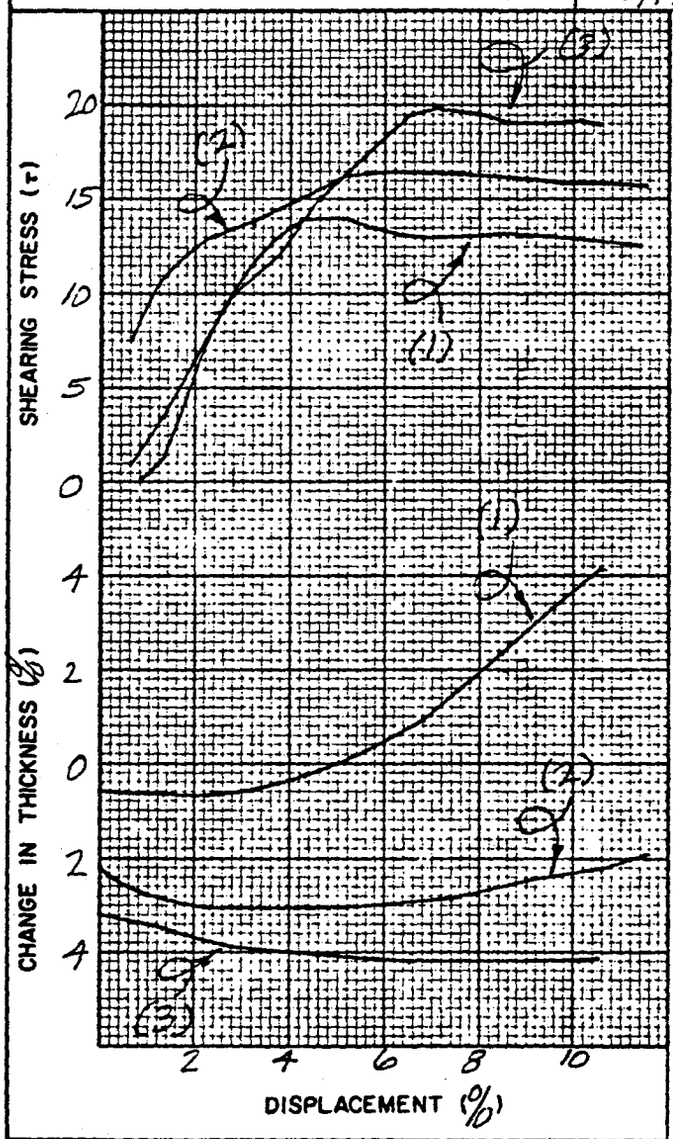
LABORATORY NO 85W 1390

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

PROJECT and STATE: PWCO FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION 85+00 ℄
FIELD SAMPLE NO. III-14	DEPTH 5.0'-6.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE UNDISTURBED	TESTED AT S.M.L., LINCOLN	APPROVED BY	DATE

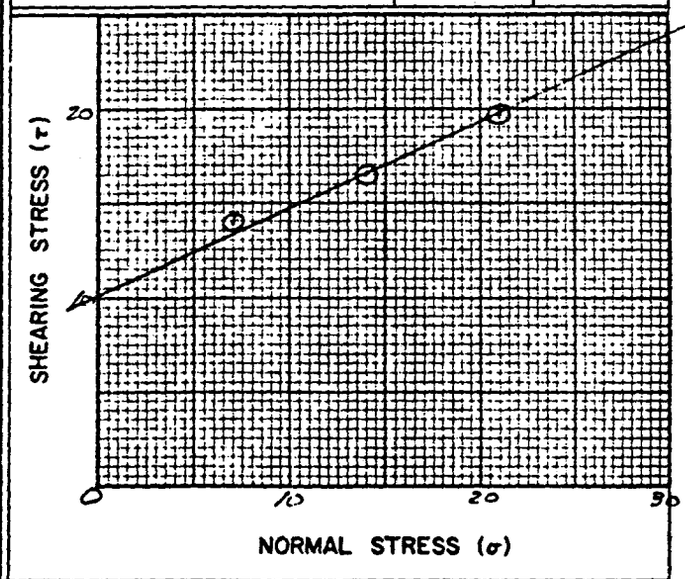
CLASSIFICATION ML LL 49 PI 19

TYPE OF TEST Consolidated Quick	CONTROL STRAIN	SPECIFIC GRAVITY $G_s(-)$ #4	2.64
RATE OF LOADING (in/min) 0.0006	MOISTURE CONDITION FLOODED	$G_s(+)$ #4	
TYPE OF SPECIMEN ROUND	AREA (sq in) 4.9 / THICKNESS (in) 1.0	G_m(bulk)(+) #4	



TEST NO.	1	2	3	4
INIT MOISTURE, %	15.1	15.1	15.1	
DRY DENSITY, ☒ g/cc ☐ pcf	1.55	1.47	1.48	
INIT. VOID RATIO				
TEST DURATION, (min)	443	448	437	
FINAL MOISTURE, %	20.6	26.4	27.4	
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	14.0	16.5	19.8	

SHEAR VALUES	ϕ	C
AT MAXIMUM STRESS	24.5	1450



REMARKS

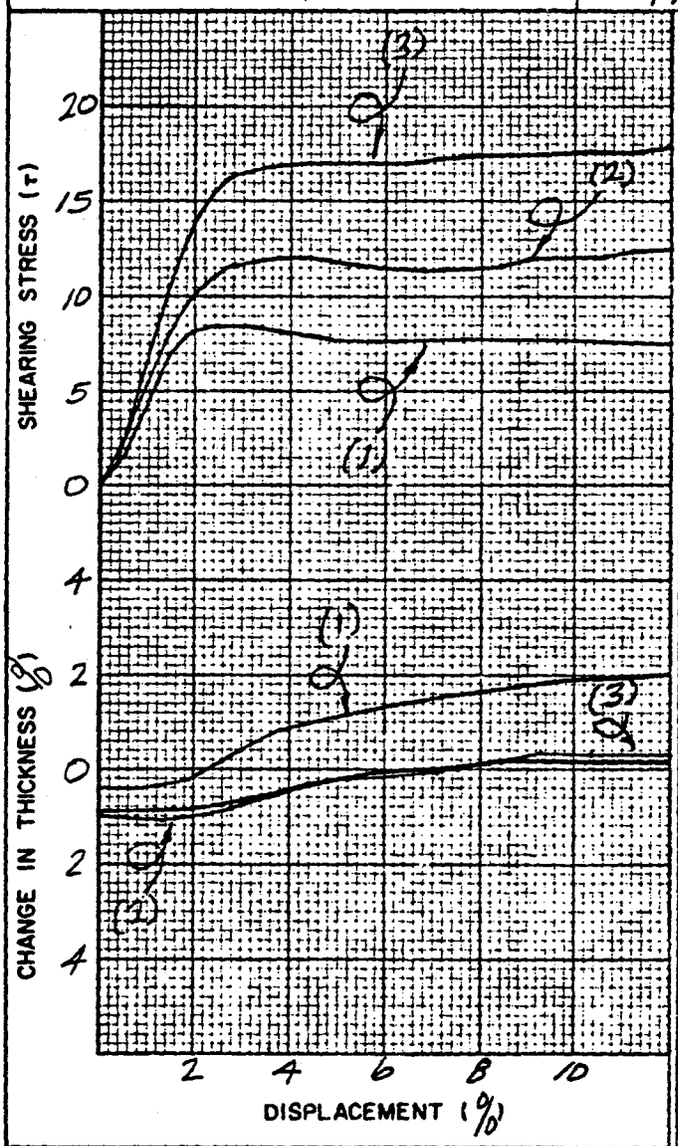
Form SCS 366
9-64

LABORATORY NO. 85W 1397

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

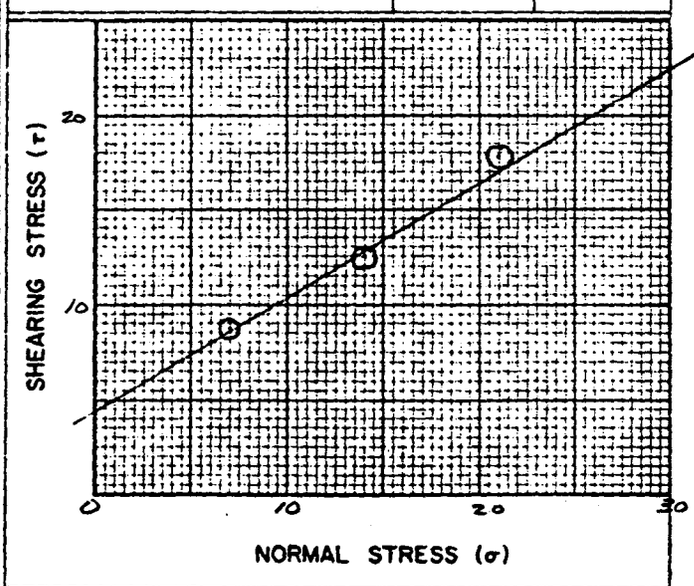
PROJECT and STATE: RWCD Floodway, Reach 6, Arizona			SAMPLE LOCATION: 97+00, 100' Lt
FIELD SAMPLE NO.: VI-17	DEPTH: 2.0'-3.0'	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: COMPACTED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

CLASSIFICATION: CL-ML	LL 22 PI 4		SPECIFIC GRAVITY
TYPE OF TEST: Consolidated Quick		CONTROL: STRAIN	$G_s(-)$ #4: 2.66
RATE OF LOADING (in/min.): 0.0018	MOISTURE CONDITION: OPT.		$G_s(+)$ #4:
TYPE OF SPECIMEN: ROUND	AREA (sq. in.): 4.9	THICKNESS (in.): 1.0	G_m(bulk)(+) #4:



TEST NO.	1	2	3	4
INIT MOISTURE, %	10.6	10.6	10.6	
DRY DENSITY, ☐ g/cc ☒ pcf	118.6	118.6	118.6	
INIT VOID RATIO				
TEST DURATION, (min)	167	167	167	
FINAL MOISTURE, %	11.0	10.3	10.3	
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	8.7	12.5	17.8	

SHEAR VALUES	Ø	C
AT MAXIMUM STRESS	31	600



REMARKS

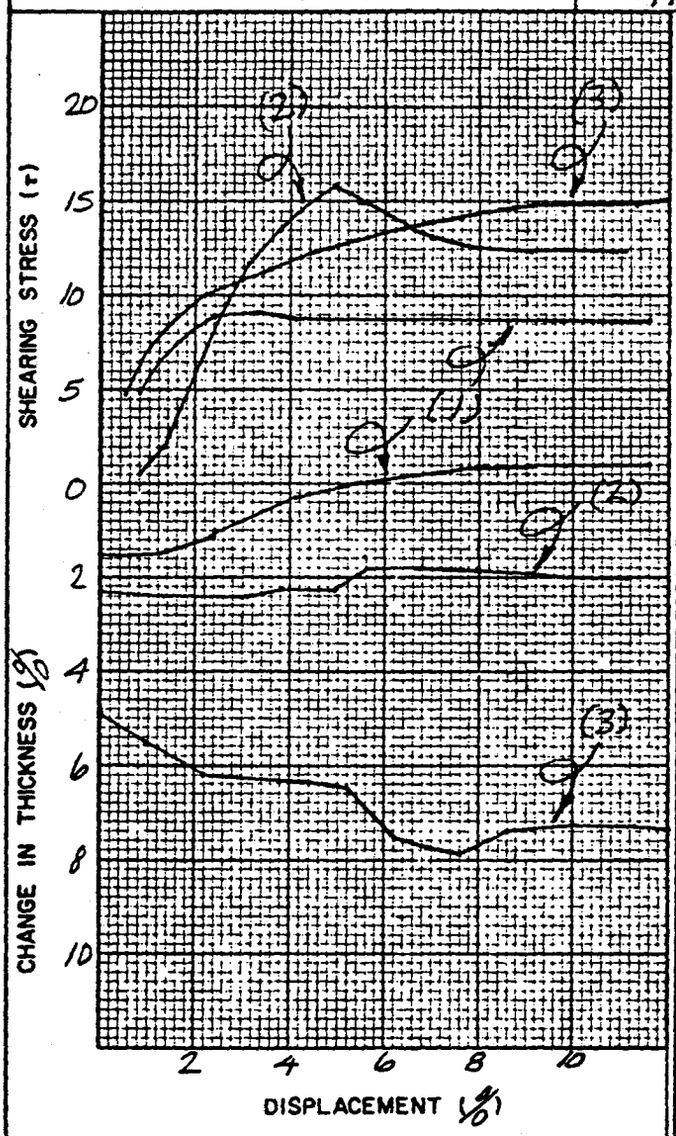
Form SCS 366
9-64

LABORATORY NO. 85W1401

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

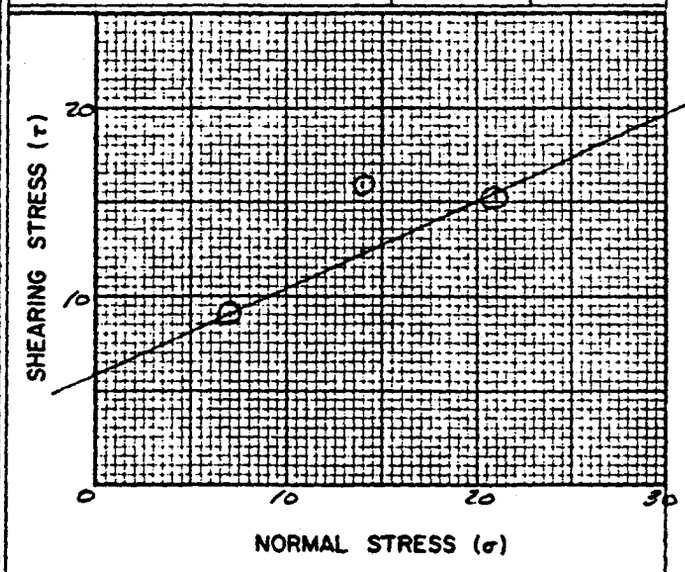
PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 101+00, ℄
FIELD SAMPLE NO.: VI-18	DEPTH: 3.0'-4.0'	GEOLOGIC ORIGIN:	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY:	DATE:

CLASSIFICATION: SC	LL 33	PI 14	SPECIFIC GRAVITY
TYPE OF TEST: Consolidated Quick	CONTROL: STRAIN	$G_s(-)$ #4	2.65
RATE OF LOADING (in/min.): 0.0006	MOISTURE CONDITION: FLOODED	$G_s(+)$ #4	
TYPE OF SPECIMEN: ROUND	AREA (sq in): 4.9	THICKNESS (in): 1.0	G_m(bulk)(+) #4



TEST NO.	1	2	3	4
INIT MOISTURE, %	11.1	11.1	11.1	
DRY DENSITY, ☒ g/cc ☐ pcf	1.58	1.60	1.60	
INIT VOID RATIO				
TEST DURATION, (min)	455	462	469	
FINAL MOISTURE, %	16.6	16.1	18.8	
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	9.0	15.8	15.1	

SHEAR VALUES	Ø	C
AT MAXIMUM STRESS	24.5	825



REMARKS

RSH

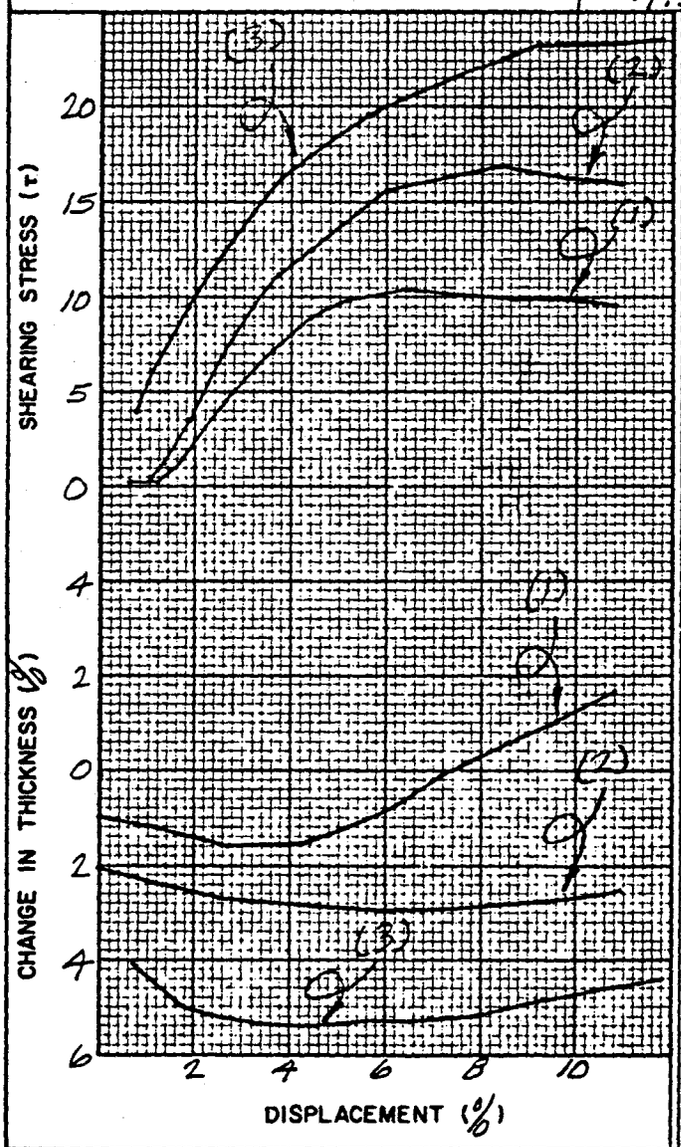
Form SCS 366
9-64

LABORATORY NO. 85W1428

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	DIRECT SHEAR TEST

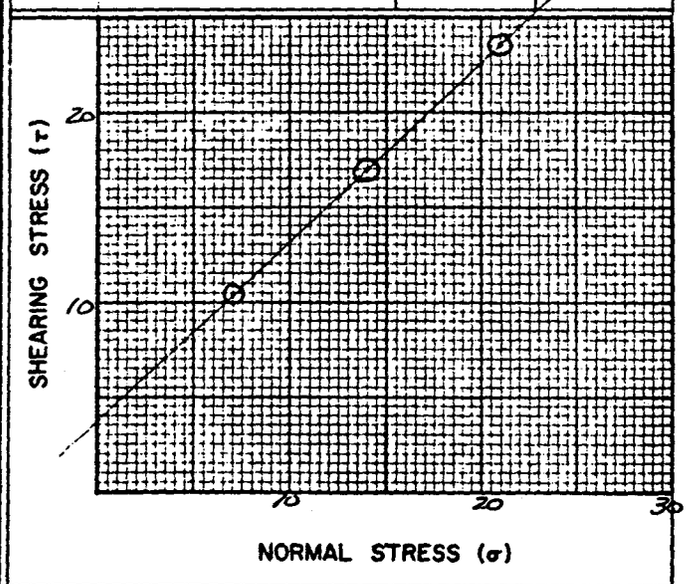
PROJECT and STATE: RWCD FLOODWAY REACH #6, ARIZONA			SAMPLE LOCATION: 149+00, ℄
FIELD SAMPLE NO.: VI-31	DEPTH: 9.0'-10.0'	GEOLOGIC ORIGIN	
TYPE OF SAMPLE: UNDISTURBED	TESTED AT: S.M.L., LINCOLN	APPROVED BY	DATE

CLASSIFICATION: SC	LL 38 PI 19		SPECIFIC GRAVITY
TYPE OF TEST: Consolidated Quick	CONTROL: STRAIN	$G_s(-)$ #4	2.66
RATE OF LOADING (in/min.): 0.0006	MOISTURE CONDITION: NAT. H_2O	$G_s(+)$ #4	
TYPE OF SPECIMEN: ROUND	AREA (sq.in.): 4.9	THICKNESS (in.): 1.0	G_m(bulk)(+) #4



TEST NO.	1	2	3	4
INIT MOISTURE, %	2.8	2.8	2.8	
DRY DENSITY, ☒ g/cc ☐ pcf	1.65	1.62	1.63	
INIT. VOID RATIO				
TEST DURATION, (min)	450	453	461	
FINAL MOISTURE, %				
NORMAL STRESS	7	14	21	
MAX. SHEAR STRESS	10.4	16.9	23.6	

SHEAR VALUES	ϕ	C
AT MAXIMUM STRESS	43	525



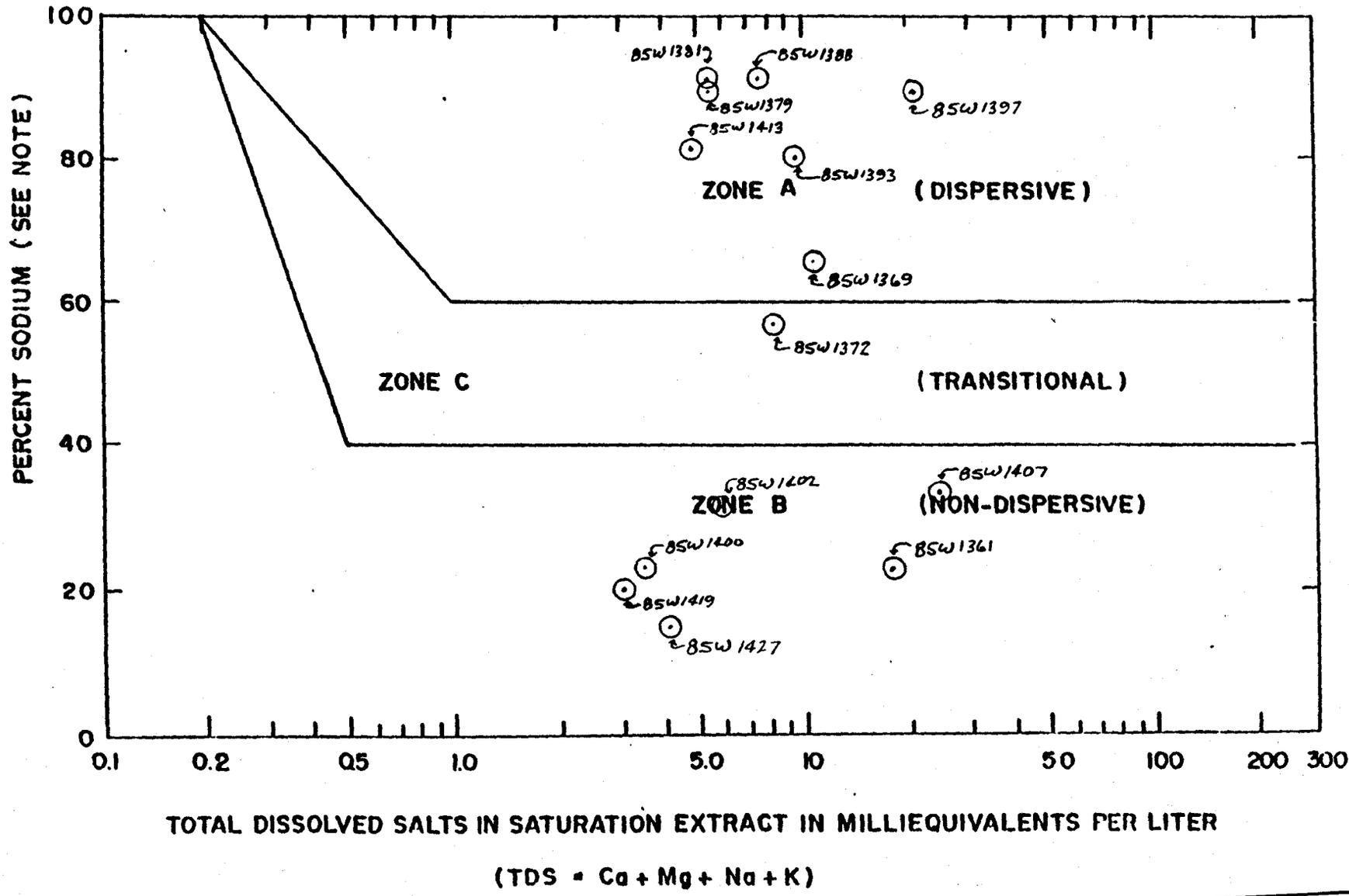
REMARKS

State: ARIZONA

Site: RWCD FLOODWAY - REACH #6

FIGURE 1

NOTE: PERCENT SODIUM (MEQ./LITER) = $\frac{Na(100)}{Ca+Mg+Na+K}$



United States Department of Agriculture

Soil Conservation Service

Midwest National Technical Center
Federal Building, Room 345
100 Centennial Mall North
Lincoln, NE 68508-3866

FTS 541-5363; Commercial 402-471-5363

Subject: Soil Analysis (RT85-SM201)

Date: July 19, 1985

To: Lorn Dunnigan, Head
Soil Mechanics Laboratory
512 South 7th Street
SCS, Lincoln, NE 68508

File code: 430-13-5

Attached is the chemical data requested. Clay mineralogy should be available in September.

Bob Jordan

ROBERT H. JORDAN
Analytical Staff Leader
National Soil Survey Laboratory

Attachments

cc:
C. S. Holzhey, Head, NSSL, MNTC, SCS, Lincoln, NE

DESIGNATED

S. LED AS:

S 85 - -

DATE 07/15/85

SAMPLE NO. 85T7432-7438
PEDON NO. 85T 70
PROJECT NO. 85T 27

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SML-LINCOLN

GENERAL METHODS 1B1A, 2A1, 2B

-1-- -2-- -3-- -4-- -5-- -6-- -7-- -8-- -9-- -10- -11- -12- -13- -14- -15- -16- -17- -18- -19- -20-

SAMPLE NO.	HZN NO.	DEPTH (CM)	SML NO.	(- - -TOTAL - - -) CLAY LT .002	SILT .002 -.05	SAND .05 -2	(- -CLAY- -) FINE LT .0002	CO3 LT .002	(- -SILT- -) FINE .002 -.02	COARSE .02 -.05	(- - - - -SAND- - - - - -) VF .05 -.10	F .10 -.25	M .25 -.50	C .5 -1	VC 1 -2	(-COARSE FRACTIONS(MM)-) (>2MM) - - - - WEIGHT - - - - 2 -5	5 -20	20 -75	.1- 75	WT PCT OF WHOLE SOIL
				<- - - - - - - - - - - - - PCT OF <2MM (3A1) - - - - - - - - - - - - - ->												<- PCT OF <75MM (3B1)->				
857432	1S	0- 0	85W1361													--	--	--		--
857433	2S	0- 0	85W1369													--	--	--		--
857434	3S	0- 0	85W1372													--	--	--		--
857435	4S	0- 0	85W1379													--	--	--		--
857436	5S	0- 0	85W1381													--	--	--		--
857437	6S	0- 0	85W1388													--	--	--		--
857438	7S	0- 0	85W1393													--	--	--		--

SAMPLE NO.	HZN NO.	(- NH4OAC EXTRACTABLE BASES -) CA 5B5A 6N2E	MG 5B5A 6O2D	NA 5B5A 6P2B	K 5B5A 6Q2B	SUM BASES	ACID-ITY 6H5A	(- -CEC- -) SUM CATS 5A3A	NH4-OAC 5A8B	EXCH NA 5D2	SAR 5E	BASE SATURATION SUM 5C3	NH4OAC 5C1	CO3 AS CACO3 <2MM 6E1G	RES. OHMS /CM 8E1	CASO4 AS GYPSUM <2MM 6F1A	<20MM 6F4	(- - - -PH - - -) SAT PASTE 8C1B	CACL2 .01M 8C1F	8C1F
		<- - - - - - - - - - -MEQ / 100 G - - - - - - - - - - ->								PCT		<- -PCT- >		PCT		<- -PCT ->			1:2	
857432	1										2				1480	—		7.3		
857433	2										5				1910	—		7.6		
857434	3										4				1540	—		7.6		
857435	4										10				1880	—		7.9		
857436	5										11				2320	—		8.0		
857437	6										12				2610	—		7.9		
857438	7										8				1790	—		7.7		

SAMPLE NO.	HZN NO.	(- - - - - - - -WATER EXTRACTED FROM SATURATED PASTE- - - - - - - - - -) CA 6N1B	MG 6O1B	NA 6P1B	K 6Q1B	CO3 6I1B	HCO3 6J1B	CL 6K1C	SO4 6L1C	NO3 6M1C	H2O 8A	TOTAL SALTS EST. 8D5	ELEC. COND. 8A3A	(- - - - - - - -MINERALOGY - - - - - - - - -) (- - - - - - - CLAY - - - - - - -) (- - - - X-RAY - - - -) 7A2I	7A2I	7A2I	7A2I	(- -DTA - -) 7A3	7A3	TOTAL DOM RES WEATH 7B1A	7B1A
		<- - - - - - - - - - -MEQ / LITER - - - - - - - - - ->									<- -PCT ->		/CM	<- RELATIVE AMOUNTS ->				<- - - - -PCT - - - ->			
857432	1	10.6	2.5	4.0	0.5	—	2.7	6.9	1.4	5.9	33.9	TR	0.83								
857433	2	2.2	1.0	6.9	0.5	—	4.5	3.4	1.8	--	31.6	TR	1.06								
857434	3	2.6	0.8	4.7	0.1	--	3.1	3.2	1.1	0.2	57.9	TR	0.83								
857435	4	0.4	0.1	4.9	0.1	—	4.0	0.4	0.9	--	55.9	TR	0.52								
857436	5	0.3	0.1	4.9	0.1	—	4.3	0.4	0.7	--	34.2	TR	0.52								
857437	6	0.5	0.1	6.8	0.1	--	5.5	0.5	1.2	--	22.5	TR	0.70								
857438	7	1.3	0.4	7.6	0.2	—	3.7	3.8	1.4	--	31.8	TR	1.01								

ANALYSES: S= ALL ON SIEVED <2MM BASIS

DESIGNATED

SAMPLED AS:

- -

DATE 07/15/85

SAMPLE NO. 85T7439-7445
PEDON NO. 85T 71
PROJECT NO. 85T 27

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SBL-LINCOLN

GENERAL METHODS 1B1A, 2A1, 2B

SAMPLE NO.	HZN NO.	DEPTH (CM)	SML NO.	TOTAL CLAY LT .002	TOTAL SILT .002 -.05	TOTAL SAND .05 -2	CLAY FINE LT .0002	CLAY CO3 LT .002	SILT FINE .002 -.02	SILT COARSE .02 -.05	SAND VF .05 -.10	SAND F .10 -.25	SAND M .25 -.50	SAND C .5 -1	SAND VC 1 -2	COARSE FRACTIONS (MM) WEIGHT 2 -5	5 -20	20 -75	.1- 75	(>2MM) WT PCT OF WHOLE SOIL
				<- PCT OF <2MM (3A1) ->												<- PCT OF <75MM (3B1) ->				
857439	1S	0- 0	85W1397													--	--	--		--
857440	2S	0- 0	85W1400													--	--	--		--
857441	3S	0- 0	85W1402													--	--	--		--
857442	4S	0- 0	85W1407													--	--	--		--
857443	5S	0- 0	85W1413													--	--	--		--
857444	6S	0- 0	85W1419													--	--	--		--
857445	7S	0- 0	85W1427													--	--	--		--

SAMPLE NO.	HZN NO.	NH4OAC EXTRACTABLE BASES CA 5B5A 6N2E	MG 5B5A 6O2D	NA 5B5A 6P2B	K 5B5A 6Q2B	SUM BASES	ACIDITY 6H5A	CEC SUM CATS 5A3A	CEC NH4-OAC 5A8B	EXCH NA 5D2 PCT	SAR 5E	BASE SATURATION SUM 5C3	BASE SATURATION NH4OAC 5C1	CO3 AS CACO3 <2MM 6E1G PCT	RES. OHMS /CM 8E1	CASO4 AS GYPSUM <2MM 6F1A	CASO4 AS GYPSUM <20MM 6F4	PH SAT PASTE 8C1B	PH CACL2 .01M 1:2 6C1F	8C1F
		<- MEQ / 100 G ->										<- PCT ->				<- PCT ->				
857439	1										20				1160	—		7.5		
857440	2										1				2410	—		7.4		
857441	3										3				3380	—		7.8		
857442	4										3				1260	—		7.4		
857443	5										6				2080	—		7.9		
857444	6										1				10620	—		7.6		
857445	7										TR				2610	—		7.4		

SAMPLE NO.	HZN NO.	WATER EXTRACTED FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1B	K 6Q1B	CO3 6I1B	HCO3 6J1B	CL 6K1C	SO4 6L1C	NO3 6M1C	H2O 8A	TOTAL SALTS EST. 8D5	ELEC. COND. 8A3A MMHOS /CM	MINERALOGY CLAY X-RAY 7A2I	7A2I	7A2I	7A2I	DTA 7A3	7A3	TOTAL RES 7B1A	DOM WEATH 7B1A
		<- MEQ / LITER ->									<- PCT ->			<- RELATIVE AMOUNTS ->				<- PCT ->			
857439	1	1.5	0.3	18.6	0.4	—	4.2	8.2	4.0	4.4	28.9	TR	2.31								
857440	2	2.1	0.4	0.8	0.2	—	2.1	0.8	0.5	0.2	45.5	TR	0.36								
857441	3	0.9	0.2	1.9	2.9	—	4.3	0.6	0.9	--	21.1	TR	0.66								
857442	4	12.1	3.5	8.1	0.6	—	2.9	4.2	16.1	--	27.0	TR	2.19								
857443	5	0.7	0.1	3.9	0.1	—	3.3	0.6	0.7	0.2	57.6	TR	0.49								
857444	6	1.7	0.4	0.6	0.3	—	2.1	0.4	0.6	0.2	22.3	TR	0.31								
857445	7	2.6	0.7	0.6	0.2	—	2.7	0.5	0.7	0.1	34.3	TR	0.41								

ANALYSES: S= ALL ON SIEVED <2MM BASIS

Greiner Engineering

Letter of Transmittal

Greiner Engineering Sciences, Inc.

A Greiner Engineering, Inc. Company

☐ 2590 North Alvernon Way
Tucson, Arizona 85712
602 327-3413

☒ 3240 East Camelback
Phoenix, Arizona 85018
602 275-5400

To Western Technologies Inc.
3737 East Broadway Rd.
Phoenix, Az. 85036

Attn: Craig Weideman

Date 8/19/85

Subject RWCD Reach 6 for erosion analysis

Reference # E101012 Please refer to this number in all correspondence.

Attached please find:

Items 1/1 Hydraulic parameters of the channel per SCS prelim. plans based on as-built and aged conditions at Q_{100}, Q_{100}(50%) & Q_{10}

For
- ✓ Review and approval/comment
- ✓ Signature and return
- ✓ Appropriate action
- As requested
- For your information

Remarks

We are happy to be of service.

Sincerely yours,

Greiner Engineering Sciences, Inc.

By

Copy

Job KWCW E101012 0515

Description Summary For Soil Mechanics Analysis - Reach #6 S.C.S.

Calculated by M.C. Date

Checked by Date

Sheet No. of

Section Description	Station to station	Invert Slope FT/FT [2]	Discharges [1] Q_{100} cfs	$\frac{1}{2}Q_{100}$ cfs	Q_{10} cfs	n=0.0225 As-built Condition [2] d ft	A ft²	V fps	V ft³/L.F.	n=0.025 Aged Condition [2] d ft	A ft²	V fps	V ft³/L.F.
375 ft North Of Brown Rd To Brown Rd	28+85		297			4.8	193.9	1.51	193.9	5.1	210.6	1.41	210.6
	32+60	0.0001		149		3.3	118.5	1.23	118.5	3.55	130.1	1.15	130.1
	b = 26'				75	2.3	75.7	1.0	75.7	2.45	81.7	0.94	81.7
Brown Rd to Adobe	32+60		1601			7.25	737.7	2.16	737.7	7.7	793.9	2.01	793.9
	62+00	0.0001		800		4.9	464	1.72	464	5.2	497.1	1.6	497.1
	b = 80'				401	3.3	296.7	1.36	296.7	3.5	316.8	1.27	316.8
Adobe to ¼ mile South	62+00		1594			7.25	737.7	2.16	737.7	7.7	793.9	2.01	793.9
	75+20	0.0001		797		4.9	464	1.72	464	5.2	497.1	1.6	497.1
	b = 80'				399	3.3	296.7	1.36	296.7	3.5	316.8	1.27	316.8
¼ mile South to University	75+20		1682			7.5	768.8	2.2	768.8	7.95	825.6	2.05	825.6
	90+60	0.0001		841		5.1	486	1.76	486	5.35	513.9	1.63	513.9
	b = 80'				421	3.4	306.7	1.39	306.7	3.6	326.9	1.29	326.9
University to Apache	90+60		1965			6.2	797.3	2.49	797.3	6.55	849.2	2.31	849.2
	122+00	0.00015		983		4.1	501.4	1.94	501.4	4.4	542.1	1.82	542.1
	b = 110'				484	2.7	318.9	1.50	318.9	2.9	344.2	1.41	344.2
Apache to S.E. of Higley	122+00		1965			4.6	215.3	8.99	215.3	4.9	233.7	8.38	233.7
	~127+00	0.0035		983		3.2	136.2	7.34	136.2	3.4	146.9	6.83	146.9
	b = 35'				484	2.1	82.5	5.76	82.5	2.25	87.4	5.39	87.4
Higley to Broadway	~127+00		2361			6.2	673.8	3.46	673.8	6.6	724.7	3.23	724.7
	156+00	0.0003		1181		4.2	430.9	2.75	430.9	4.45	459.9	2.56	459.9
	b = 90'				1014	3.85	391	2.61	391	4.1	417.4	2.44	417.4
Broadway to 500' South	156+00		3350			7.6	857.3	3.89	857.3	8.1	925.8	3.63	925.8
	161+00	0.0003		1675		5.1	537	3.08	537	5.4	573.5	2.87	573.5
	b = 90'				1317	4.4	454	2.82	454	4.75	495.2	2.66	495.2

[1] Discharges utilized are most conservative values from both the 1974 and 1985 TR-20 Flood Routing studies by S.C.S.

[2] Values derived From Mannings Equation. Channel geometry is from 1974 Preliminary design For Reach 6 by S.C.S.

Greiner Engineering Sciences, Inc.
Tucson 602 327-3413
Phoenix 602 275-5400
Greiner Engineering

Greiner Engineering

Letter of Transmittal

Greiner Engineering Sciences, Inc.

A Greiner Engineering, Inc. Company

☐ 2590 North Alvernon Way
Tucson, Arizona 85712
602 327-3413

☒ 3240 East Camelback
Phoenix, Arizona 85018
602 275-5400

To Western Technologies Inc.
3737 E. Broadway Rd.
Phoenix, Az. 85036

Attn. Craig Wiedaman

Date 10/7/85

Subject RWCD Reach 6 additional information for Soil Mechanics Analysis (slope stability analysis)

Reference # E101012 Please refer to this number in all correspondence.

Attached please find:

Items 1/3 hydraulic information for University Drive and Broadway Road Bridge.

For
- ____ Review and approval/comment
- ____ Signature and return
- ____ Appropriate action
- ✓ As requested
- ____ For your information

Remarks If you have any questions please contact Michael Shapiro.

We are happy to be of service.

Sincerely yours,

Greiner Engineering Sciences, Inc.

By [signature]

Copy

Section Descriptions	Station to Station	Invert Slope[2] ft/ft	Discharges[1] Q_{100} cfs	50% Q_{100} cfs	Q_{10} cfs	n=0.0225[2] As-built Condition d ft	A ft²	V fps	V ft³/LF	n=0.025[2] Aged Condition d ft	A ft²	V fps	V ft³/LF
University Drive Bridge	90+44.51-91+83.23	0.0001	1550			6.15	752.1	2.06	752.1	6.54	804.9	1.93	804.9
				775		4.09	483.4	1.61	483.4	4.35	516.3	1.50	516.3
					460	3.00	348.0	1.32	348.0	3.19	371.3	1.24	371.3
Broadway Road Bridge	155+24.98-156+75.02	0.0053	2400			5.05	202.5	11.87	202.5	5.35	217.7	11.02	217.7
				1200		3.42	126.0	9.54	126.0	3.63	135.3	8.88	135.3
					1014	3.11	112.6	9.04	112.6	3.30	120.3	8.40	120.3

Note: Side slopes for both bridge are 2:1
The bottom width is 110 ft. for the University Bridge and the bottom width is 30 ft. for the Broadway Rd. Bridge

1 Discharges utilized are from final hydrology meeting w/ SCS used Alt. No. 3 conditions.

2 Values derived from mannings equation and channel geometry is from as-built bridge plans and normal depth.

Greiner Engineering

Greiner Engineering Sciences, Inc.
Tucson 602 327-3413
Phoenix 602 275-5400

Job: WLD Roadway Elements
Description: Additional Information for Soil Mechanics Analysis
Calculated by: M. Shapiro Date: 10/7/85
Checked by: Gary Ball Date: 10/7/85
Sheet No. 1 of 3

Greiner Engineering Sciences, Inc.
Job No. 2125J108

EROSION ANALYSIS SUMMARY

Location	Condition	Allowable Tractive Power (lbs/ft sec)	Calculated Tractive Power (lbs/ft sec)
Sta. 28+85 to Sta. 90+60	Q10 (as-built)	3.0	0.0126
	1/2Q100 (as-built)	3.0	0.0227
	Q100 (aged)	3.0	0.0363
Sta. 90+60 to Sta. 122+00	Q10 (as-built)	0.24	0.0182
	1/2Q100 (as-built)	0.24	0.0349
	Q100 (aged)	0.24	0.0547
Sta. 122+00 to Sta. 127+00	Q10 (as-built)	0.42	0.7891
	1/2Q100 (as-built)	0.42	1.5216
	Q100 (aged)	0.42	2.2484
Sta. 127+00 to Sta. 156+00	Q10 (as-built)	0.18	0.0752
	1/2Q100 (as-built)	0.18	0.0844
	Q100 (aged)	0.18	0.1263
Broadway Road Bridge	Q10(as-built)	0.18	2.5258

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/26/85		Q_{10} (as-built) Sta. 28+85 to 90+60
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 421 cfs
b = 80 ft
z = 3 :1
n = 0.0225
d = 3.4 ft
V = 1.39 f/s

Se = 0.00015 f/f
T water = 70 °F.
UC Strength = 1220 lbs/ft²
Sample No. = VI - 2 (8-9)
Station = 28+85 to 90+60

d_{75} = 1.4 MM
d_{65} = 0.25 MM
d_{50} = 0.060 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (For 0.1 mm)

1. $\tau = \left(\dfrac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$

ρ = 1.936 $\dfrac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(1.39)^3}{(32.2)(\cancel{1.7}\ 1.07 \times 10^{-5})(0.00015)} = \cancel{3.27}\ 5.20 \times 10^7$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{1.39}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.00015)}} = 1104.2 \checkmark$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{23.2}\ 23.7 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{1.39}{\cancel{23.1}\ 23.7}\right)^2 1.936 = \cancel{0.0069}\ 0.0067 \text{ psf}$$

JHC 11/8/85

STATE		PROJECT
BY	DATE	Q_{10} (as-built) Sta. 28+35 to 30+60
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{30}{3.4} = 23.53$ ✓

$\tau_b/\tau = 1.3$ (Fig. 6-13)

$\tau_b = (0.00\cancel{4}67)(1.3) = 0.00\cancel{70}87$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{1134.04}{30} = 14.18$ ✓

$\tau_{bc}/\tau_b = 1.05$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.00\cancel{70}87)(1.05) = 0.00\cancel{93}91$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{[illegible]}{[illegible]} = 2.79$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(0.00\cancel{93}91 - 0.00\cancel{70}87) + (0.00\cancel{93}87) = 0.00\cancel{93}91$ psf

JAE 11/6/95

STATE AZ		PROJECT
BY	DATE	Q10 (as-built) Sta 23+35 to 90+60
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{30}{3.4} = 23.53$ ✓.

$\tau_s/\tau = 1.15$ ✓ (Fig. 6-12)

$\tau_s = (0.0067)(1.15) = 0.0077$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{1134.04}{30} = 14.18$ ✓.

$\tau_{sc}/\tau_s = 1.05$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.0077)(1.05) = 0.0081$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.48}{80} = 2.49$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0081 - 0.0077) + (0.0077) = 0.0081$ psf

JAC 1/10/85

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Sta. 28+85 to 90+60
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

T.P. = τ_b, bc, ctc x V

τ_b = (~~0.0010~~ 0.0087) (1.39) = ~~0.0125~~ 0.0121

τ_{bc} = (~~0.0075~~ 0.0091) ( ) = ~~0.0132~~ 0.0126

τ_{bt} = (~~0.0075~~ 0.0091) ( ) = ~~0.0132~~ 0.0126

τ_s = (~~0.0079~~ 0.0077) ( ) = ~~0.0140~~ 0.0107

τ_{sc} = (~~0.0083~~ 0.0081) ( ) = ~~0.0145~~ 0.0113

τ_{st} = (~~0.0083~~ 0.0081) (1.39) = ~~0.0145~~ 0.0113

9. Check each against Fig. 6-15

UCS = 1220 psf C = 610 psf

τ all. = 3.0 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

JWL 11/3/95

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY	DATE 8/26/85		1/2 Q_{100} (as-built) Sta. 28+85 to 90+60
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 341 cfs
b = 30 ft
z = 3 :1
n = 0.0225
d = 5.1 ft
V = 1.76 f/s

S_e = 0.00015 f/f
T water = 70 °F.
UC Strength = 1220 lbs/ft²
Sample No. = VI - 2 (8-9)
Station = 28+85 to 90+60

d_{75} = 1.4 MM
d_{65} = 0.25 MM
d_{50} = 0.060 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

ρ = 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = 1.07×10^{-5} ~~1.7×10^{-5}~~ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(1.76)^3}{(32.2)(1.07 \times 10^{-5})(0.00015)} = 1.05 \times 10^8 \quad (\cancel{6.64 \times 10^7})$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{1.76}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.00015)}} = 1393.3$$

$$\frac{V}{\sqrt{\tau/\rho}} = 25.2 \quad (\cancel{24.2}) \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{1.76}{25.2}\right)^2 1.936 = 0.0094 \quad (\cancel{0.0102}) \text{ psf}$$

JHC 9/85

STATE		PROJECT
BY	DATE	½ Q100 (as-built) Sta. 28+85 to 90+60
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{30}{5.1} = 15.69$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (0.0094 \cancel{0.0102})(1.3) = 0.0123 \cancel{0.0133}$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{1134.04}{30} = 14.18$ ✓

$\tau_{bc}/\tau_b = 1.05$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.0123 \cancel{0.0133})(1.05) = 0.0129 \cancel{0.0139}$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.48}{30} = 2.49$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)\left(\frac{0.0129 - 0.0123}{\cancel{0.0139 - 0.0133}}\right) + \left(\frac{0.0123}{\cancel{0.0133}}\right) = 0.0129 \cancel{0.0139}$ psf

7/k 7/7/5

STATE AZ		PROJECT
BY	DATE	½ Q100 (as-built) Sta. 28+85 to 90+60
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{80}{5.1} = 15.69$ ✓.

$\tau_s/\tau = 1.15$ ✓ (Fig. 6-12)

$\tau_s = (0.0034\ \cancel{0.0102})(1.15) = 0.0108\ \cancel{0.0117}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{1134.04}{80} = 14.18$ ✓.

$\tau_{sc}/\tau_s = 1.05$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.0108\ \cancel{0.0117})(1.05) = 0.0114\ \cancel{0.0123}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.48}{80} = 2.49$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0114 - 0.0108\ \cancel{0.0123 - 0.0117}) + (0.0108\ \cancel{0.0117}) = 0.0114\ \cancel{0.0123}$ psf

gmc 11/1/85

STATE AZ	PROJECT
BY / DATE	½ Q_{100} (as-built) Sta. 28+85 to 90+60
SUBJECT TRACTIVE POWER TR-25	SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

$\tau_b = ($ 0.0123 ~~0.0133~~ $)($ 1.76 $) =$ 0.0216 ~~0.0234~~

$\tau_{bc} = ($ 0.0129 ~~0.0139~~ $)($ $) =$ 0.0227 ~~0.0245~~

$\tau_{bt} = ($ 0.0129 ~~0.0139~~ $)($ $) =$ 0.0227 ~~0.0245~~

$\tau_s = ($ 0.0108 ~~0.0117~~ $)($ $) =$ 0.0190 ~~0.0206~~

$\tau_{sc} = ($ 0.0114 ~~0.0123~~ $)($ $) =$ 0.0201 ~~0.0216~~

$\tau_{st} = ($ 0.0114 ~~0.0123~~ $)($ 1.76 $) =$ 0.0201 ~~0.0216~~

9. Check each against Fig. 6-15

UCS = 1220 psF c = 610 psF

τ all. = 3.0 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

TAC 11/1/85

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/26/85		Q_{100} (aged) Sta. 28+85 to 90+60
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 1682 cfs
b = 80 ft
z = 3 :1
n = 0.025
d = 7.95 ft
V = 2.05 f/s

Se = 0.00015 f/f
τ water = 70 °F.
UC Strength = 1220 lbs/ft²
Sample No. = VI - 2 (8-9)
Station = 28+85 to 90+60

d_{75} = 1.4 MM
d_{65} = 0.25 MM
d_{50} = 0.060 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $\tau = \left(\dfrac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$

ρ = 1.936 $\dfrac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = 1.07×10^{-5} ~~1.7×10^{-5}~~ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(2.05)^3}{(32.2)(\cancel{1.7 \times 10^{-5}})(0.00015)} = \cancel{1.05} \; 1.67 \times 10^8$$

1.07×10^{-5}

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{2.05}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.00015)}} = 1628.7$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{25.1} \; 26 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{2.05}{\cancel{25.1} \; 26}\right)^2 1.936 = \cancel{0.0129} \; 0.0130 \text{ psf}$$

STATE		PROJECT
BY	DATE	Q_{100} (aged) Sta. 28+85 to 90+60
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{80}{7.95} = 10.06$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (\cancel{0.0129}\ 0.0130)(1.3) = 0.016\cancel{8}\,9$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{1134.04}{80} = 14.18$

$\tau_{bc}/\tau_b = 1.05$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.016\cancel{8}\,9)(1.05) = 0.017\cancel{6}\,7$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.48}{80} = 2.49$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(0.017\cancel{6}\,7 - 0.016\cancel{8}\,9) + (0.016\cancel{8}\,9) = 0.017\cancel{6}\,7$ psf

TMC 11/7/95

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 28+85 to 90+60
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{80}{7.95} = \underline{10.06}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (\overset{0.0130}{\cancel{0.0129}})(1.15) = \underline{\overset{0.0150}{\cancel{0.0148}}}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{1134.04}{80} = \underline{14.18}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.05}$ ✓ (Fig. 6-5)

$\tau_{sc} = (\overset{0.0150}{\cancel{0.0148}})(1.05) = \underline{0.015\overset{8}{\cancel{6}}}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.48}{80} = \underline{2.49}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{1.0}$ (Fig. 6-6)

$\tau_{st} = (1.0)(0.015\overset{8}{\cancel{6}} - 0.01\overset{50}{\cancel{48}}) + (0.01\overset{50}{\cancel{48}}) = \underline{0.015\overset{8}{\cancel{6}}}$ psf

TAC 11/7/85

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 28+85 to 90+60
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

τ_b = (0.0198) (2.05) = 0.0346

τ_{bc} = (0.0176) ( ) = 0.0363

τ_{bt} = (0.0176) ( ) = 0.0363

τ_s = (0.0148) ( ) = 0.0308

τ_{sc} = (0.0158) ( ) = 0.0320

τ_{st} = (0.0158) (2.05) = 0.0320

9. Check each against Fig. 6-15

UCS = 1220 psf c = 610 psf

τ all. = 3.0 lbs/ft. sec.

All p[illegible] Non-Erosive Zone ✓

JAE 11/7/85

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/26/85		Q_{10} (as-built) Sta. 90+60 to 122+00
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4"$ Use τ as REF. STRESS

Q = 484 cfs
b = 110 ft
z = 3 :1
n = 0.0225
d = 2.7 ft
V = 1.50 f/s

Se = 0.00015 f/f
τ water = 70 °F.
UC Strength = 440 lbs/ft²
Sample No. = VI - 23 (0-1)
Station = 90+60 to 122+00.

d_{75} = 1.4 MM
d_{65} = 0.55 MM
d_{50} = 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

ρ = 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = 1.07×10^{-5} ~~1.7×10^{-5}~~ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(1.50)^3}{(32.2)(\cancel{1.7}\ 1.07 \times 10^{-5})(0.00015)} = \cancel{4.11}\ 6.53 \times 10^7$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{1.50}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.00015)}} = 1191.7 \checkmark$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{23.4}\ 24.3 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{1.50}{\cancel{23.4}\ 24.3}\right)^2 1.936 = \cancel{0.0080}\ 0.0074 \text{ psf}$$

JAC 11/7/85

STATE		PROJECT
BY	DATE	Q10 (as-built) Sta. 90+60 to 122+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{110}{2.7} = 40.7$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (0.00\overset{74}{\cancel{80}})(1.3) = 0.0\overset{096}{\cancel{104}}$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{314.43}{110} = 7.40$ ✓

$\tau_{bc}/\tau_b = 1.26$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.0\overset{096}{\cancel{104}})(1.26) = 0.0\overset{121}{\cancel{131}}$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{\text{[illegible]}}{\text{[illegible]}} = 1.81$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(0.0\overset{121}{\cancel{131}} - 0.0\overset{096}{\cancel{104}}) + (0.0\overset{096}{\cancel{104}}) = 0.0\overset{121}{\cancel{131}}$ psf

JAC 11/7/85

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{110}{2.7} = \underline{40.7}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (0.00\overset{74}{\cancel{80}})(1.15) = \underline{0.00\overset{85}{\cancel{92}}}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{110} = \underline{7.40}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.26}$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.00\overset{85}{\cancel{92}})(1.26) = \underline{0.0\overset{107}{\cancel{116}}}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st}-\tau_s}{\tau_{sc}-\tau_s}\right)(\tau_{sc}-\tau_s)+\tau_s$

$L_c/b = \frac{199.00}{110} = \underline{1.81}$ ✓.

$\left(\frac{\tau_{st}-\tau_s}{\tau_{sc}-\tau_s}\right) = \underline{1.0}$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0\overset{107}{\cancel{116}} - 0.00\overset{85}{\cancel{92}}) + (0.00\overset{85}{\cancel{92}}) = \underline{0.0\overset{107}{\cancel{116}}}$ psf

MC 11/7/05

STATE AZ	PROJECT
BY / DATE	Q_{10} (as-built) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25	SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_{b,\,bc,\,ctc} \times V$

τ_b = (0.0104 → 096) (1.50) = 0.0156 → 144

τ_{bc} = (0.0131 → 121) ( ) = 0.0197 → 182

τ_{bt} = (0.0131 → 121) ( ) = 0.0197 → 182

τ_s = (0.0092 → 85) ( ) = 0.0138 → 128

τ_{sc} = (0.0116 → 107) ( ) = 0.0174 → 161

τ_{st} = (0.0116 → 107) (1.50) = 0.0174 → 161

9. Check each against Fig. 6-15

UCS = 440 psf c = 220 psf

τ all. = 0.24 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

JAE 11/7/05

STATE AZ		PROJECT RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85	½ Q_{100} (as-built) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 983 cfs
b = 110 ft
z = 3 :1
n = 0.0225
d = 4.1 ft
V = 1.94 f/s

Se = 0.00015 f/f
τ water = 70 °F.
UC Strength = 440 lbs/ft²
Sample No. = VI - 23(0-1)
Station = 90+60 to 122+00
d_{75} = 1.4 MM
d_{65} = 0.55 MM
d_{50} = 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $\tau = \left(\dfrac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$

ρ = 1.936 $\dfrac{\text{lb-Sec}^2}{\text{ft}^4}$ (Fig. 6-11)

ν = 1.07×10^{-5} ~~1.7×10^{-5}~~ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(1.94)^3}{(32.2)(\cancel{1.7}\ 1.07 \times 10^{-5})(0.00015)} = 1.41 \times 10^8 \quad \cancel{8.84 \times 10^7}$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{1.94}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.00015)}} = 1541.3$$

$$\frac{V}{\sqrt{\tau/\rho}} = 25.7 \quad \cancel{24.7} \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{1.94}{\cancel{24.7}\ 25.7}\right)^2 1.936 = 0.0110 \quad \cancel{0.0119} \text{ psf}$$

JAC 11/8/85

STATE		PROJECT
BY	DATE	½ Q_{100} (as-built) Sta. 90+60 to 122+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{110}{4.1} = 26.83$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (\overset{110}{\cancel{0.0119}})(1.3) = \overset{143}{\cancel{0.0155}}$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{814.43}{110} = 7.40$ ✓

$\tau_{bc}/\tau_b = 1.26$ ✓ (Fig. 6-5)

$\tau_{bc} = (\overset{143}{\cancel{0.0155}})(1.26) = \overset{180}{\cancel{0.0195}}$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{110} = 1.81$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(\overset{180}{\cancel{0.0195}} - \overset{143}{\cancel{0.0155}}) + (\overset{143}{\cancel{0.0155}}) = \overset{180}{\cancel{0.0195}}$ psf

JAE 11/8/85

STATE AZ		PROJECT
BY	DATE	½ Q100 (as-built) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{110}{4.1} = \underline{26.83}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (0.0\cancel{149}\ 110)(1.15) = \underline{0.0\cancel{137}\ 127}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{314.43}{110} = \underline{7.40}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.26}$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.0\cancel{137}\ 127)(1.26) = \underline{0.0\cancel{172}\ 159}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{110} = \underline{1.81}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{1.0}$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0\cancel{172}\ 159 - 0.0\cancel{137}\ 127) + (0.0\cancel{137}\ 127) = \underline{0.0\cancel{172}\ 159}$ psf

mc 11/8/85

STATE AZ	PROJECT
BY / DATE	½ Q_{100} (as-built) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25	SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

τ_b = (143 ~~0.0155~~) (1.94) = 277 ~~0.0301~~

τ_{bc} = (180 ~~0.0195~~) ( ) = 349 ~~0.0378~~

τ_{bt} = (180 ~~0.0195~~) ( ) = 349 ~~0.0378~~

τ_s = (127 ~~0.0137~~) ( ) = 246 ~~0.0266~~

τ_{sc} = (159 ~~0.0172~~) ( ) = 308 ~~0.0334~~

τ_{st} = (159 ~~0.0172~~) (1.94) = 308 ~~0.0334~~

9. Check each against Fig. 6-15

UCS = 440 psF c = 220 psF

τ all. = 0.24 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

JME 11/8/85

STATE AZ		PROJECT RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85	Q_{100} (aged) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 1965 cfs
b = 110 ft
z = 3 :1
n = 0.025
d = 6.55 ft
V = 2.31 f/s

Se = 0.00015 f/f
τ water = 70 °F.
UC Strength = 440 lbs/ft²
Sample No. = VI - 23(0-1)
Station = 90+60 to 122+00
d_{75} = 1.4 MM
d_{65} = 0.55 MM
d_{50} = 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

ρ = 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(2.31)^3}{(32.2)(\cancel{1.7}\,1.07 \times 10^{-5})(0.00015)} = \cancel{1.50}\ 2.39 \times 10^8$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{2.31}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.00015)}} = 1835.3 \checkmark$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{25.6}\ 26.7 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{2.31}{\cancel{25.6}\ 26.7}\right)^2 1.936 = \cancel{0.0158}\ 0.0145 \text{ psf}$$

JME 11/8/85

STATE		PROJECT
BY	DATE	Q_{100} (aged) Sta. 90+60 to 122+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{110}{6.55} = 16.79$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (0.0158)(1.3) = 0.0205$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{814.43}{110} = 7.40$ ✓

$\tau_{bc}/\tau_b = 1.26$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.0205)(1.26) = 0.0259$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{110} = 1.81$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(0.0259 - 0.0205) + (0.0205) = 0.0259$ psf

JHC 11/3/85

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{110}{6.55} = \underline{16.79}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (0.0\cancel{158}\ 145)(1.15) = \underline{0.0\cancel{182}\ 167}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{110} = \underline{7.40}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.26}$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.0\cancel{182}\ 167)(1.26) = \underline{0.0\cancel{229}\ 210}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{110} = \underline{1.81}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{1.0}$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0\cancel{229}\ 210 - 0.0\cancel{182}\ 167) + (0.0\cancel{182}\ 167) = \underline{0.0\cancel{229}\ 210}$ psf

MAE 11/8/85

STATE AZ	PROJECT
BY / DATE	Q_{100} (aged) Sta. 90+60 to 122+00
SUBJECT TRACTIVE POWER TR-25	SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

τ_b = (~~0.0205~~ 188) (2.31) = ~~0.0470~~ 434

τ_{bc} = (~~0.0259~~ 237) ( ) = ~~0.0598~~ 547

τ_{bt} = (~~0.0259~~ 237) ( ) = ~~0.0598~~ 547

τ_s = (~~0.0187~~ 167) ( ) = ~~0.0420~~ 386

τ_{sc} = (~~0.0229~~ 210) ( ) = ~~0.0529~~ 485

τ_{st} = (~~0.0229~~ 210) (2.31) = ~~0.0529~~ 485

9. Check each against Fig. 6-15

UCS = 440 c = 220

τ all. = 0.24 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

JAR 11/5/95

STATE AZ		PROJECT RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85	Q_{10} (as-built) Sta. 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 484 cfs
b = 33 ft
z = 3 :1
n = 0.0225
d = 2.1 ft
V = 5.76 f/s

Se = 0.0035 f/f
τ water = 70 °F.
UC Strength = 560 lbs/ft²
Sample No. = VI - 25 (3-4)
Station = 122+00 to 127+00
d_{75} = 0.7 MM
d_{65} = 0.15 MM
d_{50} = 0.055 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (For 0.1 mm)

1. $\tau = \left(\dfrac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$

ρ = 1.936 $\dfrac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(5.76)^3}{(32.2)(\cancel{1.7 \times 10^{-5}})(0.0035)} = \cancel{9.97} \; 1.58 \times 10^{8}$$

1.07 × 10⁻⁵

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{5.76}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0035)}} = 947.3$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{24.9} \; 25.3 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{5.76}{\cancel{24.9}\; 25.3}\right)^2 1.936 = \cancel{0.1036} \; 1003 \text{ psf}$$

MC 11/5/85

STATE		PROJECT
BY	DATE	Q_{10} (as-built) Sta. 122+00 to 127+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{33}{2.1} = 15.71$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (0.\cancel{1036}\ 1003)(1.3) = 0.\cancel{1347}\ 1305$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{814.43}{33} = 24.68$ ✓

$\tau_{bc}/\tau_b = 1.05$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.\cancel{1347}\ 1305)(1.05) = 0.\cancel{1414}\ 1370$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{33} = 6.03$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 0.58$ ✓ (Fig. 6-6)

$\tau_{bt} = (0.58)(0.\cancel{1414}\ 1370 - 0.\cancel{1347}\ 1305) + (0.\cancel{1347}\ 1305) = 0.\cancel{1386}\ 1343$ psf

JAC 11/8/85

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Sta 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{33}{2.1} = \underline{15.71}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (\overset{1003}{\cancel{0.1036}})(1.15) = \underline{\overset{1153}{\cancel{0.1191}}}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{33} = \underline{24.68}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.05}$ ✓ (Fig. 6-5)

$\tau_{sc} = (\overset{1153}{\cancel{0.1191}})(1.05) = \underline{\overset{1211}{\cancel{0.1251}}}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{33} = \underline{6.03}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{0.58}$ ✓ (Fig. 6-6)

$\tau_{st} = (0.58)(\overset{1211}{\cancel{0.1251}} - \overset{1153}{\cancel{0.1191}}) + (\overset{1153}{\cancel{0.1191}}) = \underline{\overset{1187}{\cancel{0.1226}}}$ psf

JAC 11/9/85

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Sta. 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

$\tau_b = (1305 \; \cancel{0.1347}) (5.76) = 7517 \; \cancel{0.7759}$

$\tau_{bc} = (1370 \; \cancel{0.1414}) (\quad) = 7891 \; \cancel{0.8145}$

$\tau_{bt} = (1343 \; \cancel{0.1386}) (\quad) = 7736 \; \cancel{0.7983}$

$\tau_s = (1153 \; \cancel{0.1191}) (\quad) = 6641 \; \cancel{0.6850}$

$\tau_{sc} = (1211 \; \cancel{0.1251}) (\quad) = 6975 \; \cancel{0.7206}$

$\tau_{st} = (1187 \; \cancel{0.1226}) (5.76) = 6837 \; \cancel{0.7062}$

9. Check each against Fig. 6-15

UCS = 560 psF C = 280 psF

τ all. = 0.42 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

JAC 11/8/85

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85		½ Q_{100} (as-built) Sta. 122+00 to 127+00
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4"$ Use τ as REF. STRESS

Q = 983 cfs
b = 33 ft
z = 3 :1
n = 0.0225
d = 3.2 ft
V = 7.34 f/s

Se = 0.0035 f/f
τ water = 70 °F.
UC Strength = 560 lbs/ft²
Sample No. = VI-25 (3-4)
Station = 122+00 to 127+00

d_{75} = 0.7 MM
d_{65} = 0.15 MM
d_{50} = 0.055 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $\tau = \left(\dfrac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$

ρ = 1.936 $\dfrac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(7.34)^3}{(32.2)(\cancel{1.7 \times 10^{-5}})(0.0035)} = \cancel{2.06}\ 3.28 \times 10^8$$

1.07×10^{-5}

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{7.34}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0035)}} = 1207.2 \checkmark$$

$$\frac{V}{\sqrt{\tau/\rho}} = 26.2 \checkmark \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{7.34}{26.2}\right)^2 1.936 = 0.1519 \checkmark \text{ psf}$$

MAC 11/3/85

STATE		PROJECT
BY	DATE	½ Q100 (as-built) Sta. 122+00 to 127+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{33}{3.2} = 10.31$

$\tau_b/\tau = 1.3$ (Fig. 6-13)

$\tau_b = (0.1519)(1.3) = 0.1975$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{814.43}{33} = 24.68$

$\tau_{bc}/\tau_b = 1.05$ (Fig. 6-5)

$\tau_{bc} = (0.1975)(1.05) = 0.2073$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{33} = 6.03$

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 0.58$ (Fig. 6-6)

$\tau_{bt} = (0.58)(0.2073 - 0.1975) + (0.1975) = 0.2032$ psf

MHC

STATE AZ		PROJECT
BY	DATE	½ Q100 (as-built) Sta. 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{33}{3.2} = \underline{10.31}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (0.1519)(1.15) = \underline{0.1747}$ ✓ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{33} = \underline{24.68}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.05}$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.1747)(1.05) = \underline{0.1834}$ ✓ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{33} = \underline{6.03}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{0.58}$ ✓ (Fig. 6-6)

$\tau_{st} = (0.58)(0.1834 - 0.1747) + (0.1747) = \underline{0.1798}$ ✓ psf

TAC 11/9/85

STATE AZ	PROJECT
BY / DATE	½ Q_{100} (as-built) Sta. 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25	SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

τ_b = (0.1975) (7.34) = 1.4497

τ_{bc} = (0.2073) ( ) = 1.5216

τ_{bt} = (0.2032) ( ) = 1.4915

τ_s = (0.1747) ( ) = 1.2823

τ_{sc} = (0.1834) ( ) = 1.3462

τ_{st} = (0.1798) (7.34) = 1.3197

9. Check each against Fig. 6-15

UCS = 560 psf C = 280 psf

τ all. = 0.42 lbs/ft. sec.

All plot in ~~Non-Erosive~~ EROSIVE Zone – ~~ASF~~ ABOVE S-Line

JMC 11/8/85

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85		Q_{100} (aged) Sta. 122+00 to 127+00
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 1965 cfs
b = 33 ft
z = 3 :1
n = 0.025
d = 4.9 ft
V = 8.38 f/s

S_e = 0.0035 f/f
T water = 70 °F.
UC Strength = 560 lbs/ft²
Sample No. = VI-25 (3-4)
Station = 122+00 to 127+00
d_{75} = 0.7 MM
d_{65} = 0.15 MM
d_{50} = 0.055 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (For 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

ρ = 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(8.38)^3}{(32.2)(\cancel{1.7 \times 10^{-5}})(0.0035)} = \cancel{3.07}\ 4.88 \times 10^8$$

1.07 × 10⁻⁵

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{8.38}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0035)}} = 1378.3$$

$$\frac{V}{\sqrt{\tau/\rho}} = 26.8 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{8.38}{26.8}\right)^2 1.936 = 0.1893 \text{ psf}$$

gte 11/8/85

STATE		PROJECT
BY	DATE	Q_{100} (aged) Sta. 122+00 to 127+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{33}{4.9} = 6.73$ ✓

$\tau_b/\tau = 1.35$ ✓ (Fig. 6-13)

$\tau_b = (0.1893)(1.35) = 0.2555$ ✓ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{814.43}{33} = 24.68$ ✓

$\tau_{bc}/\tau_b = 1.05$ ✓ (Fig. 6-5)

$\tau_{bc} = (0.2555)(1.05) = 0.2683$ ✓ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{33} = 6.03$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 0.58$ ✓ (Fig. 6-6)

$\tau_{bt} = (0.58)(0.2683 - 0.2555) + (0.2555) = 0.2629$ ✓ psf

JAC 11/8/85

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{33}{4.9} = \underline{6.73}$ ✓.

$\tau_s/\tau = \underline{1.18}$ ✓ (Fig. 6-12)

$\tau_s = (0.1893)(1.18) = \underline{0.2234}$ ✓ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{33} = \underline{24.68}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.05}$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.2234)(1.05) = \underline{0.2345}$ ✓ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{33} = \underline{6.03}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{0.58}$ ✓ (Fig. 6-6)

$\tau_{st} = (0.58)(0.2345 - 0.2234) + (0.2234) = \underline{0.2299}$ ✓ psf

mc 1/8/85

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 122+00 to 127+00
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

τ_b = (0.2555 ✓) (8.38) = 2.1411

τ_{bc} = (0.2683 ✓) ( ) = 2.2484

τ_{bt} = (0.2629 ✓) ( ) = 2.2031

τ_s = (0.2234 ✓) ( ) = 1.8721

τ_{sc} = (0.2345 ✓) ( ) = 1.9651

τ_{st} = (0.2299 ✓) (8.38) = 1.9266

9. Check each against Fig. 6-15

UCS = 560 psF C = 280 psF

τ all. = 0.42 lbs/ft. sec.

All plot in ~~Non-Erosive~~ EROSIVE Zone - ~~very near~~ ABOVE S-Line

STATE AZ		PROJECT RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85	Q_{10} (as-built) Sta. 127+00 to 156+00
SUBJECT TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 1014 cfs
b = 90 ft
z = 3 :1
n = 0.0225
d = 3.85 ft
V = 2.61 f/s

Se = 0.0003 f/f
τ water = 70 °F.
UC Strength = 400 lbs/ft²
Sample No. = VI - 27 (2-3)
Station = 127+00 to 156+00

d_{75} = 0.7 MM
d_{65} = 0.22 MM
d_{50} = 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (For 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

ρ = 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(2.61)^3}{(32.2)(\cancel{1.7}\ 1.07 \times 10^{-5})(0.0003)} = \cancel{1.08}\ 1.72 \times 10^8$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{2.61}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0003)}} = 1466.3$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{24.9}\ 25.7 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{2.61}{\cancel{24.9}\ 25.7}\right)^2 1.936 = \cancel{0.0213}\ 200 \text{ psf}$$

TME 11/8/85

STATE		PROJECT
BY	DATE	Q_{10} (as-built) Sta 127+00 to 156+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{90}{3.85} = 23.38$ ✓

$\tau_b/\tau = 1.30$ ✓ (Fig. 6-13)

$\tau_b = (\overset{200}{\cancel{0.0213}})(1.30) = \overset{260}{\cancel{0.0277}}$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{314.43}{90} = 9.05$ ✓

$\tau_{bc}/\tau_b = 1.11$ ✓ (Fig. 6-5)

$\tau_{bc} = (\overset{260}{\cancel{0.0277}})(1.11) = \overset{288}{\cancel{0.0307}}$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{90} = 2.21$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(\overset{288}{\cancel{0.0307}} - \overset{260}{\cancel{0.0277}}) + (\overset{260}{\cancel{0.0277}}) = \overset{288}{\cancel{0.0307}}$ psf

TAC 11/8/85

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Sta. 127+00 to 156+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{90}{3.85} = \underline{23.38}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (\overset{200}{\cancel{0.0213}})(1.15) = \underline{\overset{230}{\cancel{0.0245}}}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{90} = \underline{9.05}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.11}$ ✓ (Fig. 6-5)

$\tau_{sc} = (\overset{230}{\cancel{0.0245}})(1.11) = \underline{\overset{255}{\cancel{0.0272}}}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{90} = \underline{2.21}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{1.0}$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(\overset{255}{\cancel{0.0272}} - \overset{230}{\cancel{0.0245}}) + (\overset{230}{\cancel{0.0245}}) = \underline{\overset{255}{\cancel{0.0272}}}$ psf

JAC 11/8/85

STATE AZ	PROJECT
BY / DATE	Q_{10} (as-built) Sta. 127+00 to 156+00
SUBJECT TRACTIVE POWER TR-25	SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_{b,\,bc,\,ctc} \times V$

τ_b = (0.0277) (2.61) = 0.0723

τ_{bc} = (0.0307) ( ) = 0.0801

τ_{bt} = (0.0309) ( ) = 0.0801

τ_s = (0.0245) ( ) = 0.0639

τ_{sc} = (0.0272) ( ) = 0.0710

τ_{st} = (0.0272) (2.61) = 0.0710

9. Check each against Fig. 6-15

UCS = 400 psf C = 200 psf

τ all. = 0.18 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

[illegible] 11/8/95

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85		1/2 Q_{100} (as-built) Sta. 127+00 to 156+00
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

$Q =$ 1181 cfs
$b =$ 90 ft
$z =$ 3 :1
$n =$ 0.0225
$d =$ 4.2 ft
$V =$ 2.75 f/s

$S_e =$ 0.0003 f/f
τ water = 70 °F.
UC Strength = 400 lbs/ft²
Sample No. = VI - 27 (2-3)
Station = 127+00 to 156+00

$d_{75} =$ 0.7 MM
$d_{65} =$ 0.22 MM
$d_{50} =$ 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

$\rho =$ 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

$\nu =$ ~~1.7~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(2.75)^3}{(32.2)(\cancel{1.7}\ 1.07 \times 10^{-5})(0.0003)} = \cancel{1.27}\ 2.01 \times 10^8$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{2.75}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0003)}} = 1544.9$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{25.4}\ 26.2 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{2.75}{\cancel{25.4}\ 26.2}\right)^2 1.936 = \cancel{0.0227}\ 0.0213 \text{ psf}$$

TAC 11/8/85

STATE		PROJECT
BY	DATE	½ Q_{100} (as-built) Sta. 127+00 to 156+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{90}{4.2} = 21.43$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (\ 0.0\cancel{227}\ 213\ )(\ 1.3\ ) = 0.0\cancel{295}\ 277$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{314.43}{90} = 9.05$ ✓

$\tau_{bc}/\tau_b = 1.11$ ✓ (Fig. 6-5)

$\tau_{bc} = (\ 0.0\cancel{275}\ 277\ )(\ 1.11\ ) = 0.0\cancel{327}\ 307$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{192.00}{90} = 2.21$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (\ 1.0\ )(0.0\cancel{327}\ 307 - 0.0\cancel{295}\ 277\ ) + (0.0\cancel{295}\ 277\ ) = 0.0\cancel{327}\ 307$ psf

JAC 11/8/85

STATE AZ	PROJECT
BY / DATE	½ Q_{100} (as-built) Sta. 127+00 to 156+00
SUBJECT TRACTIVE POWER TR-25	SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{90}{4.2} = 21.43$ ✓.

$\tau_s/\tau = 1.15$ ✓ (Fig. 6-12)

$\tau_s = (0.0\cancel{227}\ 213)(1.15) = 0.0\cancel{261}\ 245$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{814.43}{90} = 9.05$ ✓.

$\tau_{sc}/\tau_s = 1.11$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.0\cancel{261}\ 245)(1.11) = 0.0\cancel{290}\ 272$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{90} = 2.21$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0\cancel{290}\ 272 - 0.0\cancel{261}\ 245) + (0.0\cancel{261}\ 245) = 0.0\cancel{290}\ 272$ psf

STATE AZ		PROJECT
BY	DATE	½ Q_{100} (as-built) Sta. 127+00 to 156+00
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

T.P. = τ_b, bc, ctc x V

τ_b = (~~0.0295~~ 277) (2.75) = ~~0.0811~~ 762

τ_{bc} = (~~0.0327~~ 307) ( ) = ~~0.0899~~ 844

τ_{bt} = (~~0.0327~~ 307) ( ) = ~~0.0899~~ 844

τ_s = (~~0.0261~~ 245) ( ) = ~~0.0718~~ 674

τ_{sc} = (~~0.0290~~ 272) ( ) = ~~0.0798~~ 748

τ_{st} = (~~0.0290~~ 272) (2.75) = ~~0.0798~~ 748

9. Check each against Fig. 6-15

UCS = 400 psf C = 200 psf

τ all. = 0.18 lbs/ft. sec.

All plot in Non-Erosive Zone ✓

mle 11/8/85

STATE	AZ	PROJECT	RWCD Floodway - Reach 6
BY CPW	DATE 8/27/85		Q_{100} (aged) Sta. 127+00 to 156+00
SUBJECT	TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 2361 cfs
b = 90 ft
z = 3 :1
n = 0.025
d = 6.6 ft
V = 3.23 f/s

Se = 0.0003 f/f
T water = 70 °F.
UC Strength = 400 lbs/ft²
Sample No. = VI - 27 (2-3)
Station = 127+00 to 156+00

d_{75} = 0.7 MM
d_{65} = 0.22 MM
d_{50} = 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $\tau = \left(\dfrac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$

ρ = 1.936 $\dfrac{\text{lb-Sec}^2}{\text{ft}^4}$ (Fig. 6-11)

ν = ~~1.1~~ 1.07 $\times 10^{-5}$ ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(3.23)^3}{(32.2)(\cancel{1.1}\ 1.07 \times 10^{-5})(0.0003)} = \cancel{2.05}\ 3.26 \times 10^8$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{3.23}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0003)}} = 1814.6$$

$$\frac{V}{\sqrt{\tau/\rho}} = \cancel{26.3}\ 27.3 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{3.23}{\cancel{26.3}\ 27.3}\right)^2 1.936 = \cancel{0.0221}\ 0.0271 \text{ psf}$$

JAC 11/8/75

STATE		PROJECT
BY	DATE	Q_{100} (aged) Sta. 127+00 to 156+00
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{90}{4.2} = 21.43$ ✓

$\tau_b/\tau = 1.3$ ✓ (Fig. 6-13)

$\tau_b = (\cancel{0.0292}\ 0.0271)(1.3) = \cancel{0.0380}\ 0.0352$ psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b = \frac{814.43}{90} = 9.05$ ✓

$\tau_{bc}/\tau_b = 1.11$ ✓ (Fig. 6-5)

$\tau_{bc} = (\cancel{0.0380}\ 0.0352)(1.11) = \cancel{0.0421}\ 0.0391$ psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b = \frac{199.00}{90} = 2.21$ ✓

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) = 1.0$ ✓ (Fig. 6-6)

$\tau_{bt} = (1.0)(\cancel{0.0421}\ 0.0391 - \cancel{0.0380}\ 0.0352) + (\cancel{0.0380}\ 0.0352) = \cancel{0.0421}\ 0.0391$ psf

JAE 11/8/85

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 127+00 to 156+00
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{90}{4.2} = \underline{21.43}$ ✓.

$\tau_s/\tau = \underline{1.15}$ ✓ (Fig. 6-12)

$\tau_s = (0.0\cancel{272}\ 271)(1.15) = \underline{0.0\cancel{336}\ 312}$ psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b = \frac{314.43}{90} = \underline{9.05}$ ✓.

$\tau_{sc}/\tau_s = \underline{1.11}$ ✓ (Fig. 6-5)

$\tau_{sc} = (0.0\cancel{336}\ 312)(1.11) = \underline{0.0\cancel{373}\ 346}$ psf

7. $\tau_{st} = \left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right)(\tau_{sc} - \tau_s) + \tau_s$

$L_c/b = \frac{199.00}{90} = \underline{2.21}$ ✓.

$\left(\frac{\tau_{st} - \tau_s}{\tau_{sc} - \tau_s}\right) = \underline{1.0}$ ✓ (Fig. 6-6)

$\tau_{st} = (1.0)(0.0\cancel{373}\ 346 - 0.0\cancel{336}\ 312) + (0.0\cancel{336}\ 312) = \underline{0.0\cancel{373}\ 346}$ psf

gae 11/8/85

STATE AZ		PROJECT
BY	DATE	Q_{100} (aged) Sta. 127 + 00 to 156 + 00
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

T.P. = τ_b, bc, ctc x V

τ_b = (~~0.0380~~ 352) (3.23) = ~~0.1227~~ 1137

τ_{bc} = (~~0.0421~~ 391) ( ) = ~~0.1360~~ 1263

τ_{bt} = (~~0.0421~~ 391) ( ) = ~~0.1360~~ 1263

τ_s = (~~0.0336~~ 312) ( ) = ~~0.1085~~ 1008

τ_{sc} = (~~0.0373~~ 346) ( ) = ~~0.1205~~ 1118

τ_{st} = (~~0.0373~~ 346) (3.23) = ~~0.1205~~ 1118

9. Check each against Fig. 6-15

UCS = 400 psf c = 200 psf

τ all. = 0.18 lbs/ft. sec.

All plot in Non-Erosive Zone, NEAR S-LINE

JVC 11/3/85

STATE AZ		PROJECT RWCD Floodway - Reach 6
BY CPW	DATE 11/18/85	Q_{10} (as-built) Broadway Road Bridge
SUBJECT TRACTIVE POWER TR-25		SHEET 1 of 4

$d_{75} < 1/4''$ Use τ as REF. STRESS

Q = 1014 cfs
b = 30 ft
z = 2 :1
n = 0.0225
d = 3.11 ft
V = 9.04 f/s

Se = 0.0053 f/f
τ water = 70 °F.
UC Strength = 400 lbs/ft²
Sample No. = VI-27 (2-3)
Station = 155+25 to 156+75

d_{75} = 0.7 MM
d_{65} = 0.22 MM
d_{50} = 0.074 MM
$K_s = d_{65}$ in ft = 3.28×10^{-4} (for 0.1 mm)

1. $$\tau = \left(\frac{\frac{V^2 \rho}{V}}{\sqrt{\tau/\rho}}\right)^2$$

ρ = 1.936 $\frac{lb\text{-}Sec^2}{ft^4}$ (Fig. 6-11)

ν = 1.07×10^{-5} ft/Sec (Fig. 6-11)

$$\frac{V^3}{g \nu S_e} = \frac{(9.04)^3}{(32.2)(1.07 \times 10^{-5})(0.0053)} = 4.05 \times 10^8$$

$$\frac{V}{\sqrt{g K_s S_e}} = \frac{9.04}{\sqrt{(32.2)(3.28 \times 10^{-4})(0.0053)}} = 1208.3$$

$$\frac{V}{\sqrt{\tau/\rho}} = 26.5 \quad \text{(Fig. 6-9)}$$

$$\tau = \left(\frac{9.04}{26.5}\right)^2 1.936 = 0.2253 \text{ psf}$$

STATE		PROJECT
BY	DATE	Q_{10} (as-built) Broadway Road Bridge
SUBJECT	TRACTIVE POWER TR-25	SHEET 2 of 4

2. $\tau_b = \tau\,(\tau_b/\tau)$

$b/d = \frac{30}{3.11} =$ 9.65

$\tau_b/\tau =$ 1.24 (Fig. 6-13)

$\tau_b = ($ 0.2253 $)($ 1.24 $) =$ 0.2794 psf

3. $\tau_{bc} = \tau_b\,(\tau_{bc}/\tau_b)$

$R_c/b =$ _____ = _____

$\tau_{bc}/\tau_b =$ _____ (Fig. 6-5)

$\tau_{bc} = ($ $)($ $) =$ — psf

4. $\tau_{bt} = \left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right)(\tau_{bc} - \tau_b) + \tau_b$

$L_c/b =$ _____ = _____

$\left(\frac{\tau_{bt} - \tau_b}{\tau_{bc} - \tau_b}\right) =$ _____ (Fig. 6-6)

$\tau_{bt} = ($ $)($ $) + ($ $) =$ — psf

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Broadway Road Bridge
SUBJECT TRACTIVE POWER TR-25		SHEET 3 of 4

5. $\tau_s = \tau\,(\tau_s/\tau)$

$b/d = \frac{30}{3.11} = 9.65$.

$\tau_s/\tau =$ 0.98 (Fig. 6-12)

$\tau_s = (0.2253)(0.98) =$ 0.2208 psf

6. $\tau_{sc} = \tau_s \left(\frac{\tau_{sc}}{\tau_s}\right)$

$R_c/b =$ ____ = ____.

$\tau_{sc}/\tau_s =$ ____ (Fig. 6-5)

$\tau_{sc} = (\quad)(\quad) =$ — psf

7. $\tau_{st} = \left(\frac{\tau_{st}-\tau_s}{\tau_{sc}-\tau_s}\right)(\tau_{sc}-\tau_s)+\tau_s$

$L_c/b =$ ____ = ____.

$\left(\frac{\tau_{st}-\tau_s}{\tau_{sc}-\tau_s}\right) =$ ____ (Fig. 6-6)

$\tau_{st} = (\quad)(\quad)+(\quad) =$ — psf

STATE AZ		PROJECT
BY	DATE	Q_{10} (as-built) Broadway Road Bridge
SUBJECT TRACTIVE POWER TR-25		SHEET 4 of 4

8. Calculate Tractive Power

$T.P. = \tau_b, bc, ctc \times V$

τ_b = (0.2794) (9.04) = 2.5258

τ_{bc} = (–) ( ) = –

τ_{bt} = (–) ( ) = –

τ_s = (0.2208) ( ) = 1.9960

τ_{sc} = (–) ( ) = –

τ_{st} = (–) (9.04) = –

9. Check each against Fig. 6-15

UCS = 400 psf C = 200 psf

τ all. = 0.18 lbs/ft. sec.

Both plot in Erosive Zone

Greiner Engineering Sciences, Inc.
Job No. 2125J108

SLOPE STABILITY ANALYSIS
SUMMARY

Computer Program: REAME (Rotational Equilibrium Analysis of Multilayered Embankments) from "Stability Analysis of Earth Slopes," by Yang H. Huang (University of Kentucky)

Cases 1 - 9: East Embankment - 3:1 Slope (typical)

Cases 10 - 18: East Embankment near Structures - 2:1 Slope (typical) (Equivalent Vehicle Load at Top of Slope)

Soil Profiles: Cut Section
Cut/Fill Section - bottom of embankment
Cut/Fill Section - middle of embankment

Soil Properties	Native Dry	Native Wet	Fill Dry	Fill Wet
ϕ (degrees)	35.0	25.0	30.0	20.0
C (psf)	500	150	600	300
γ (pcf)	105.2	140.8	118.5	139.4

Case No.(1)	Condition(2)	Soil Profile	Safety Factor
1	No Flow	Cut Section	4.88
2	Full Flow	Cut Section	2.11
3	Rapid Drawdown	Cut Section	1.48
3A(3)	Rapid Drawdown	Cut Section	1.46

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Case No.[1]	Condition[2]	Soil Profile	Safety Factor
4	No Flow	Cut/Fill Section (bottom)	4.60
5	Full Flow	Cut/Fill Section (bottom)	2.07
6	Rapid Drawdown	Cut/Fill Section (bottom)	1.56
7	No Flow	Cut/Fill Section (middle)	4.72
8	Full Flow	Cut/Fill Section (middle)	2.16
9	Rapid Drawdown	Cut/Fill Section (middle)	1.52
10	No Flow	Cut Section	3.83
11	Full Flow	Cut Section	1.65
12	Rapid Drawdown	Cut Section	1.14
13	No Flow	Cut/Fill Section (bottom)	3.73
14	Full Flow	Cut/Fill Section (bottom)	1.79
15	Rapid Drawdown	Cut/Fill Section (bottom)	1.34
16	No Flow	Cut/Fill Section (middle)	3.73
17	Full Flow	Cut/Fill Section (middle)	1.73
18	Rapid Drawdown	Cut/Fill Section (middle)	1.24

Notes: (1) Case Nos. 1-9 3:1 slope
Case Nos. 10-18 2:1 slope with equivalent vehicle load
(2) Seismic coefficient of 0.1g applied to all analyses
(3) Phreatic surface raised from Case 3

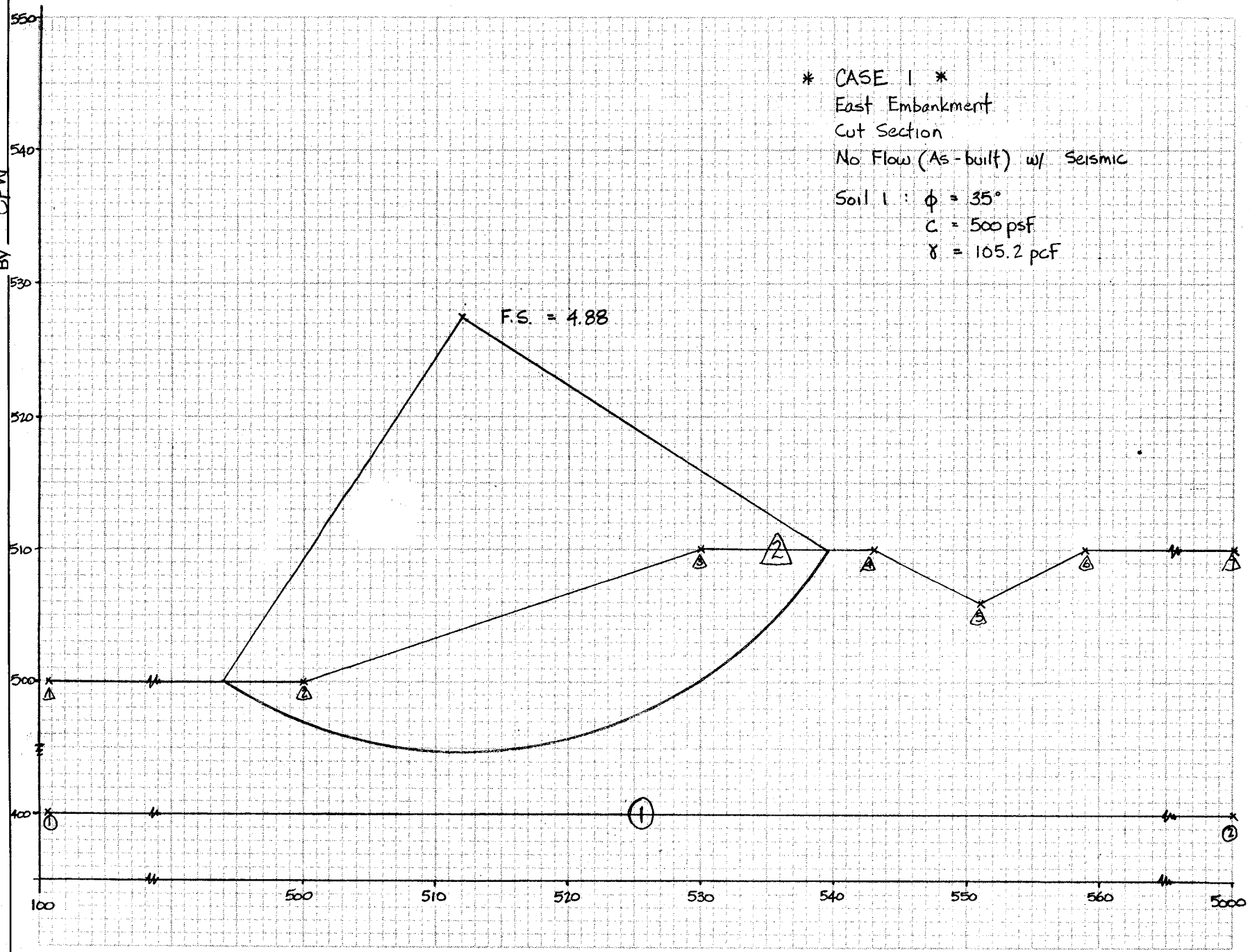
INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6
Slope Stability Analysis

Job No. 2125J108

Date 8/30/85 Sheet ____ of ____

By CPW



WESTERN TECHNOLOGIES INC.

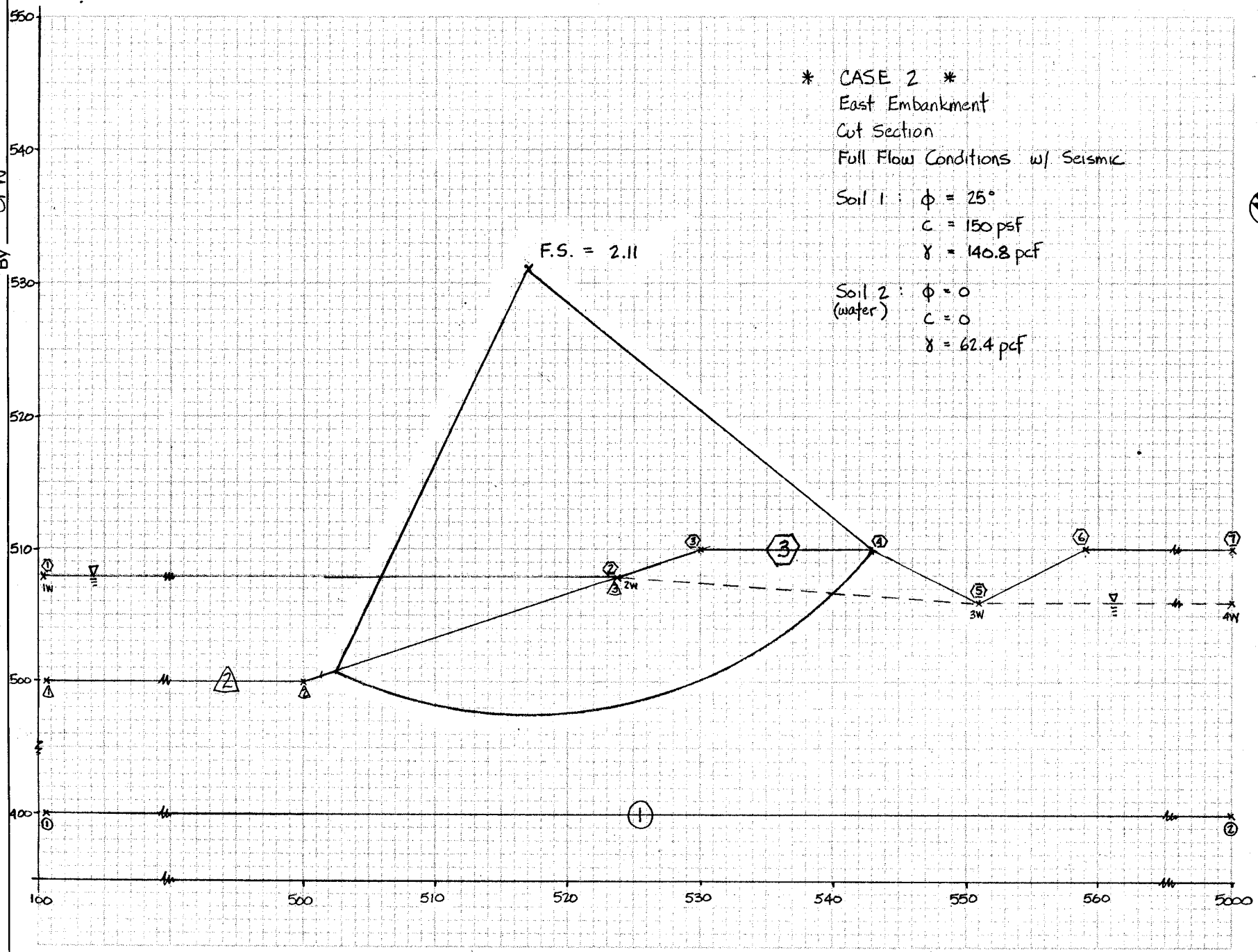
165

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 8/30/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

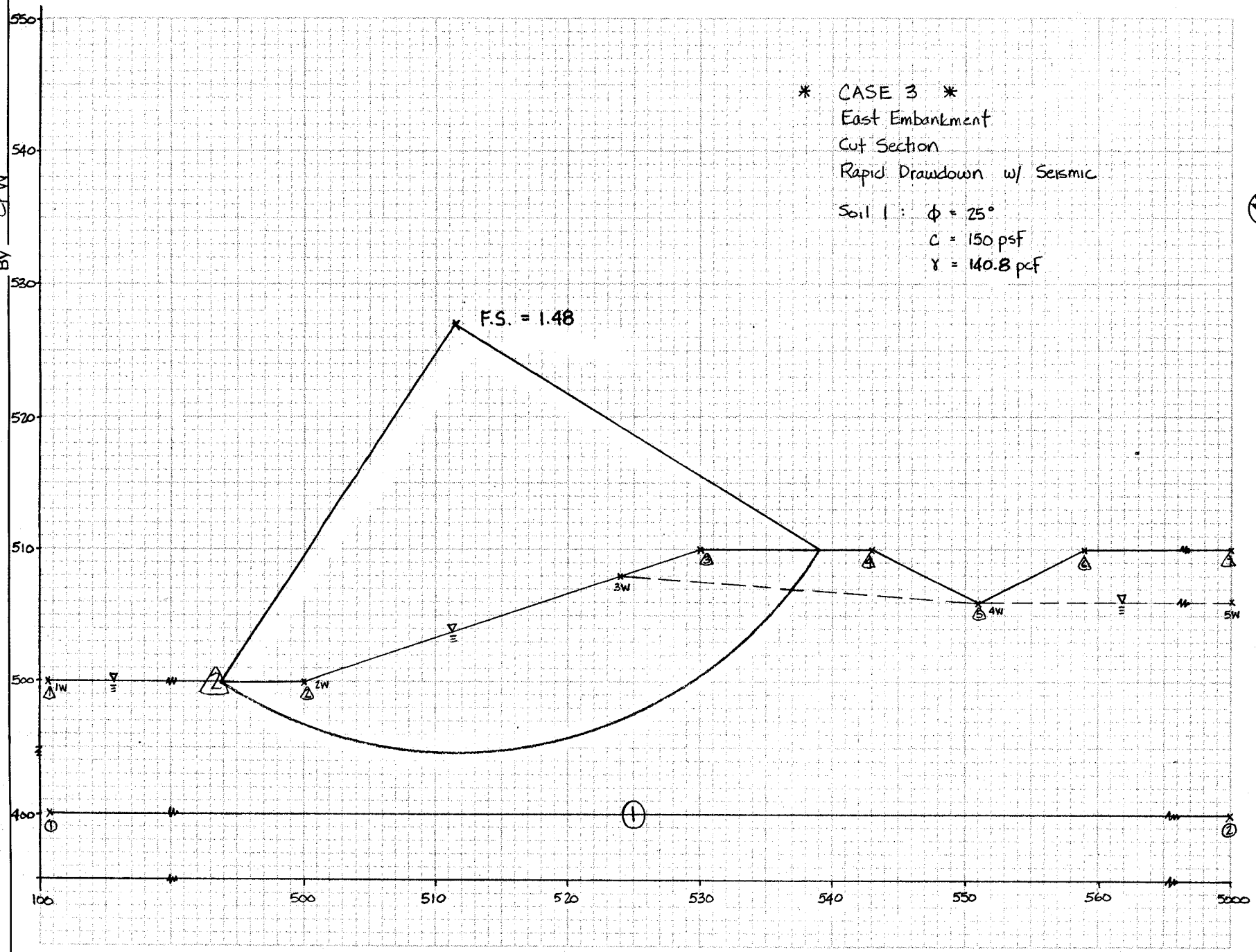
165

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 8/30/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

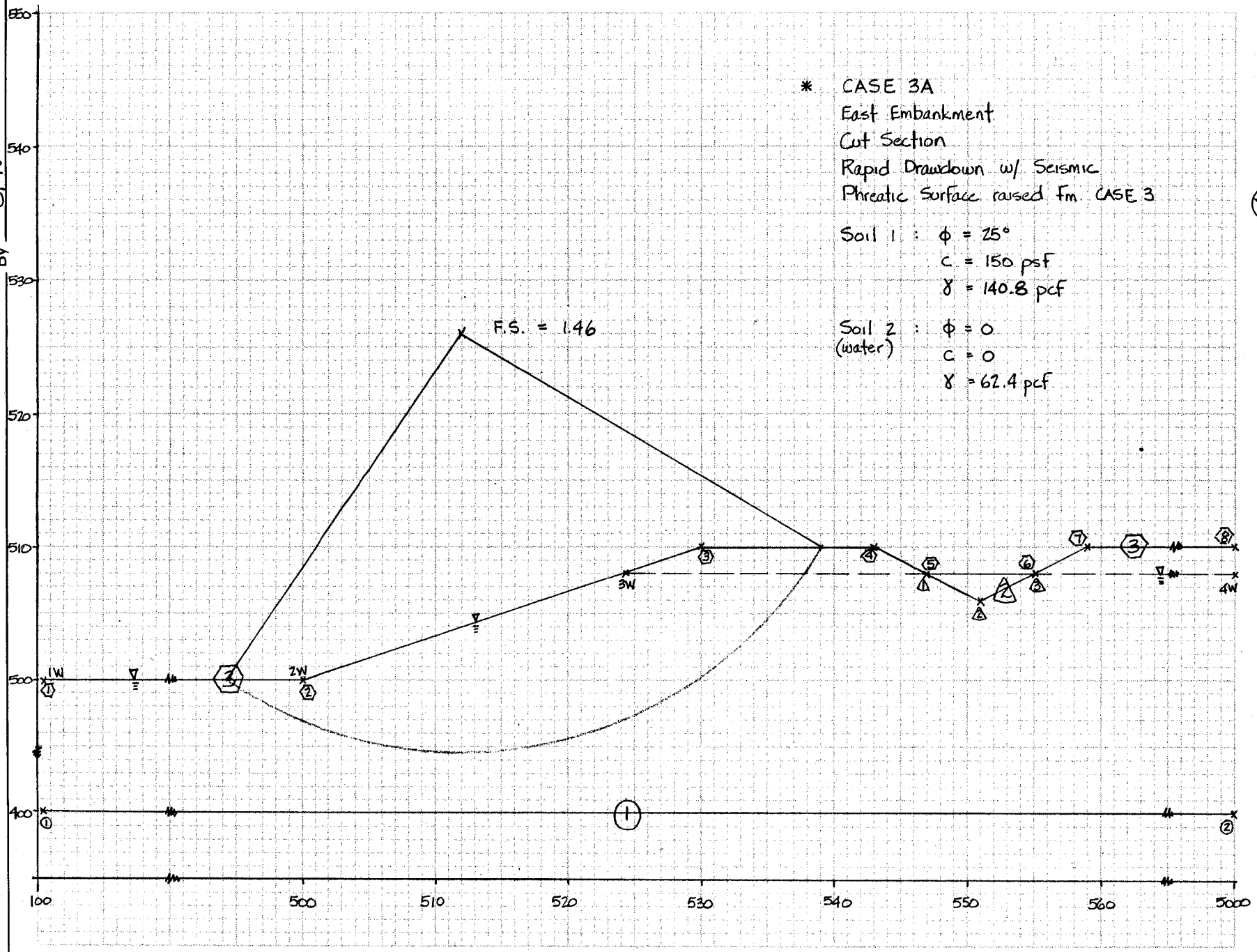
165

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 9/3/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

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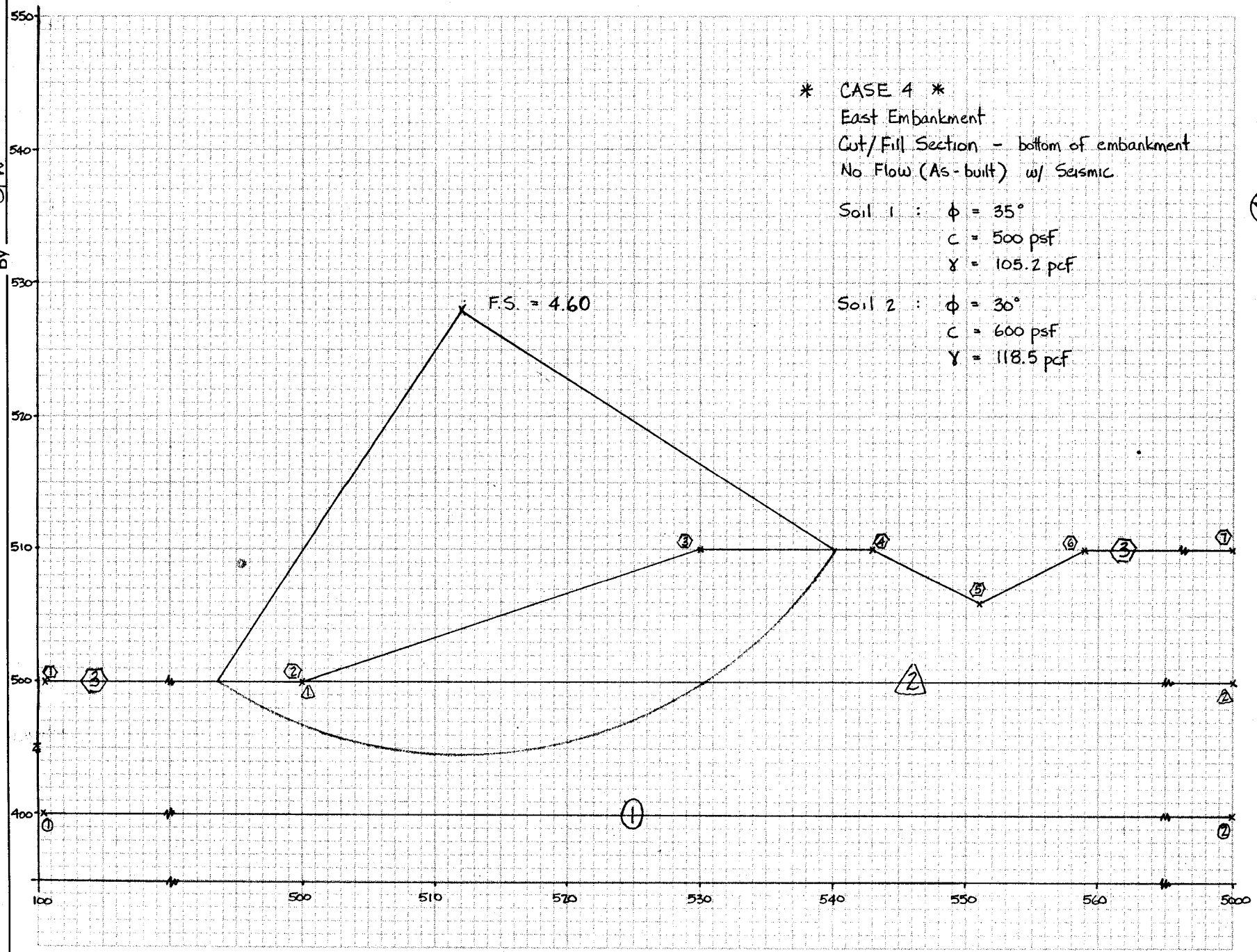
INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 9/3/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

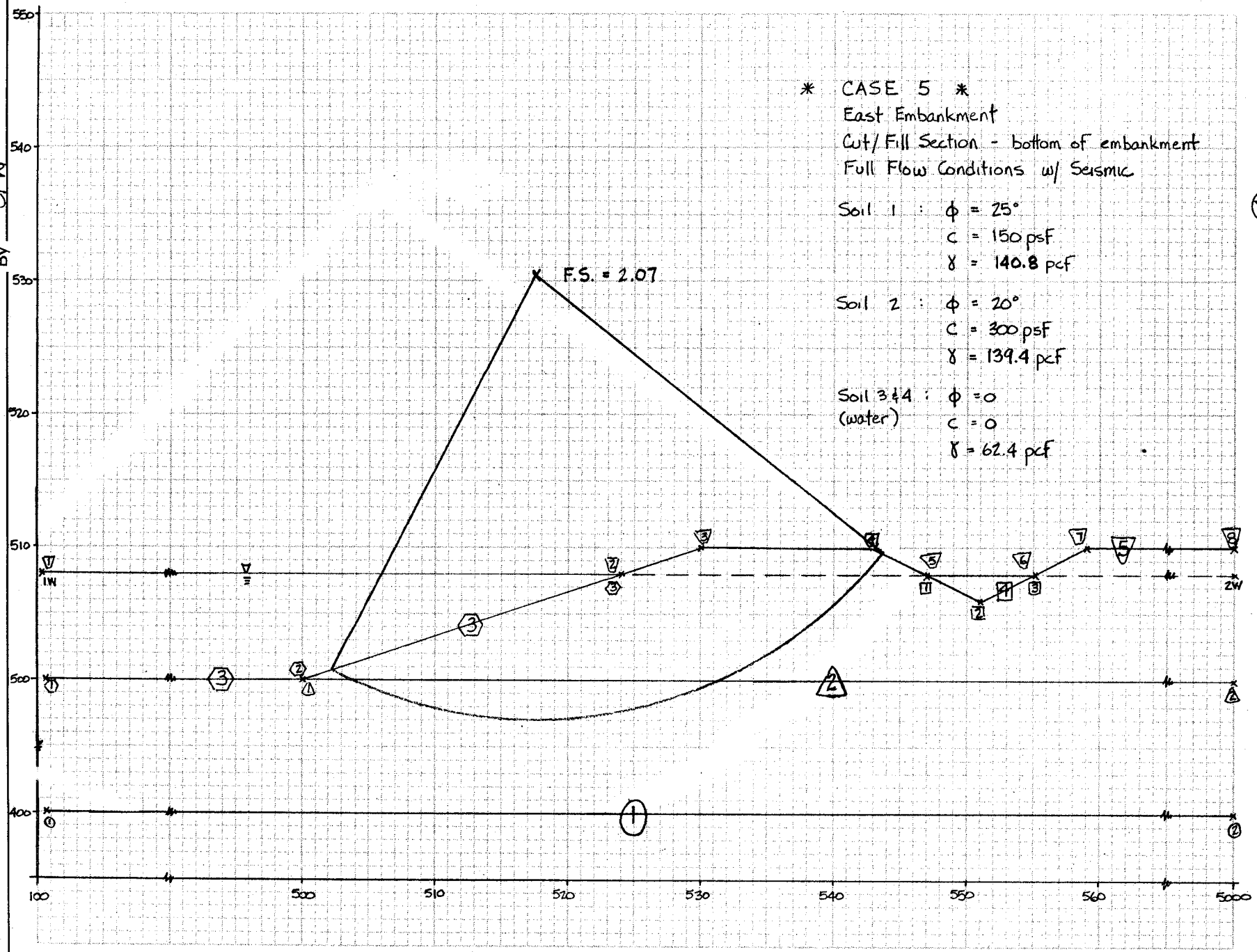
165

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 9/3/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

165

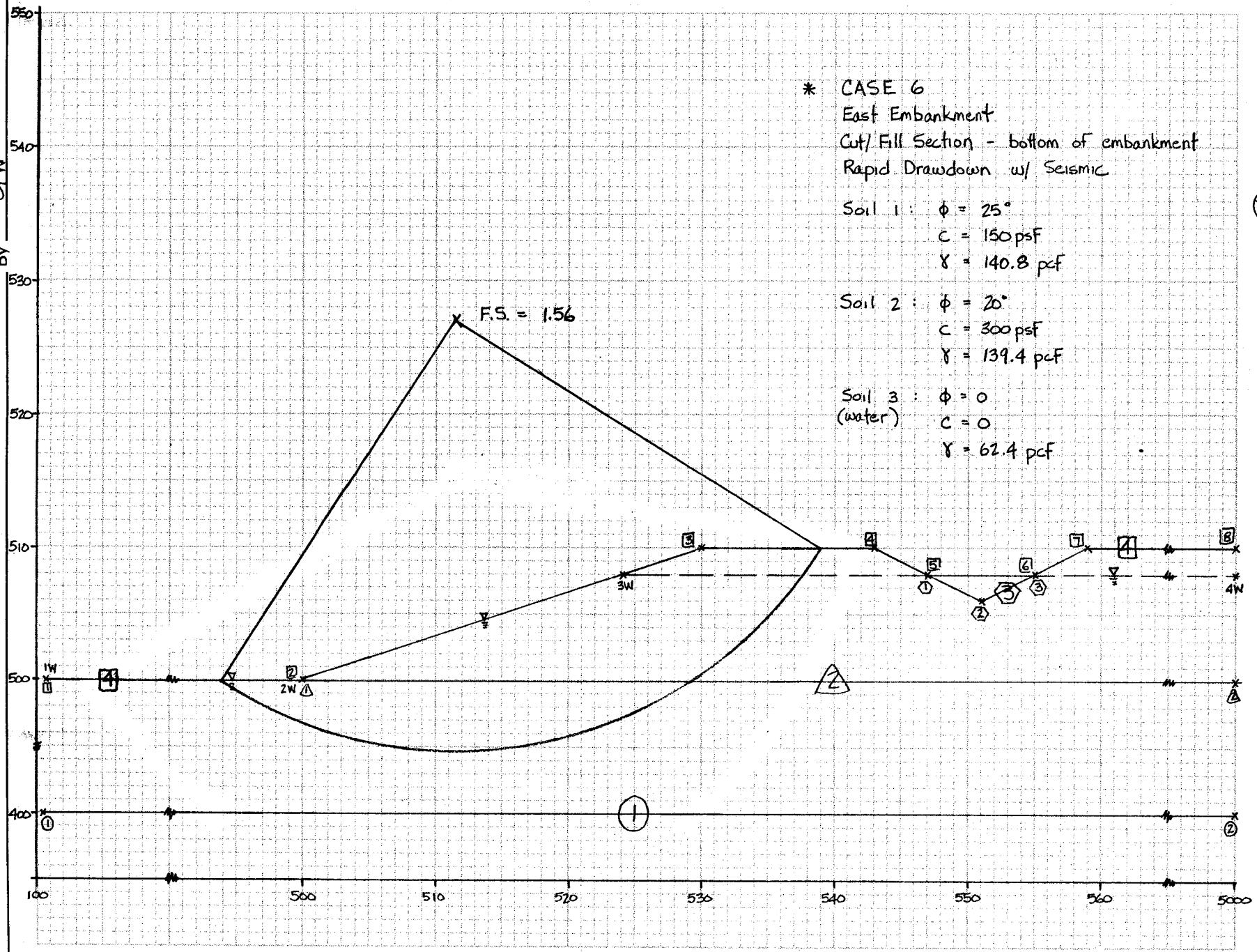
INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6
Slope Stability Analysis

Job No. 2125J108

Date 9/4/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

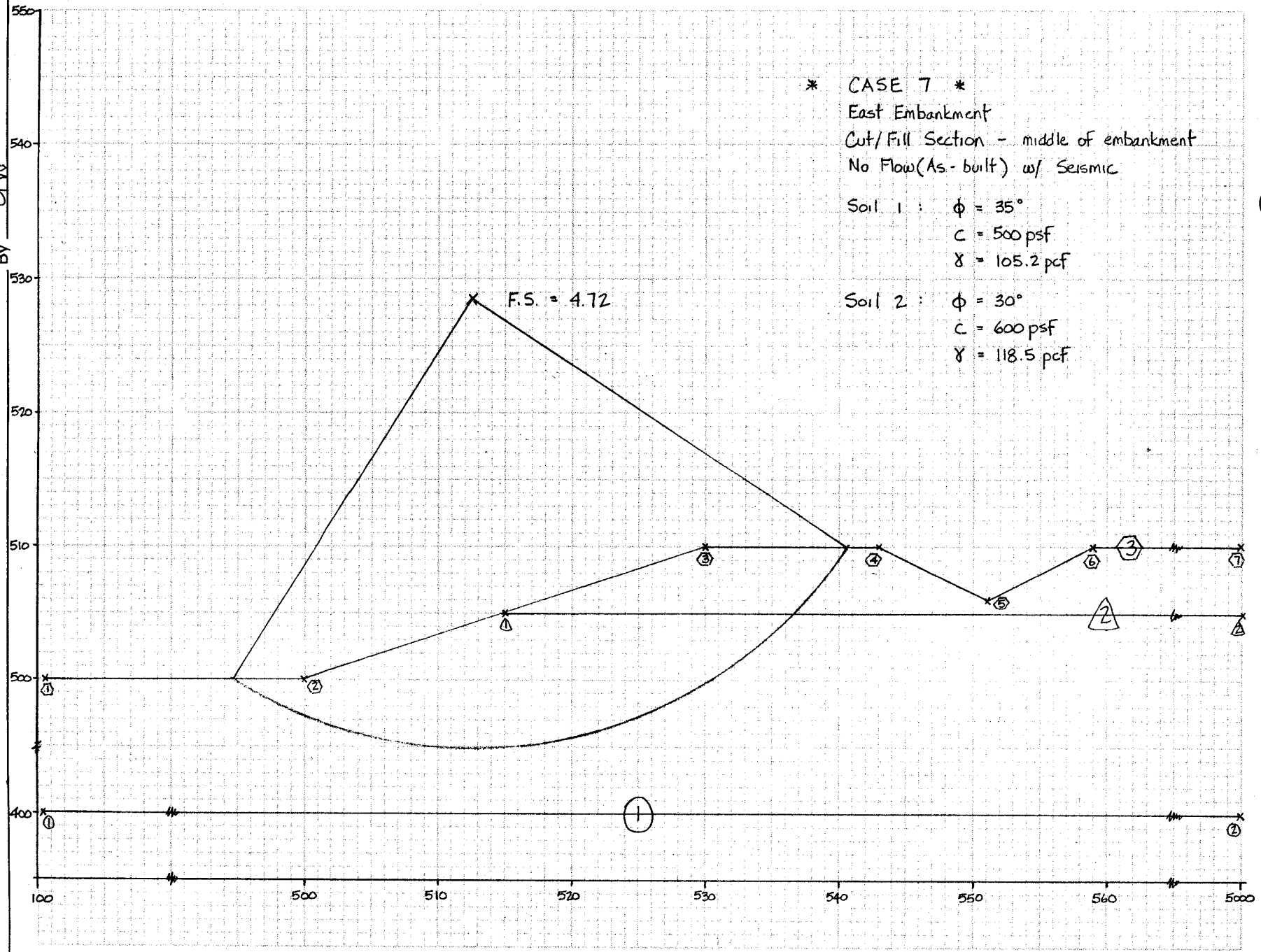
165

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 9/4/85 Sheet ___ of ___

By CPW



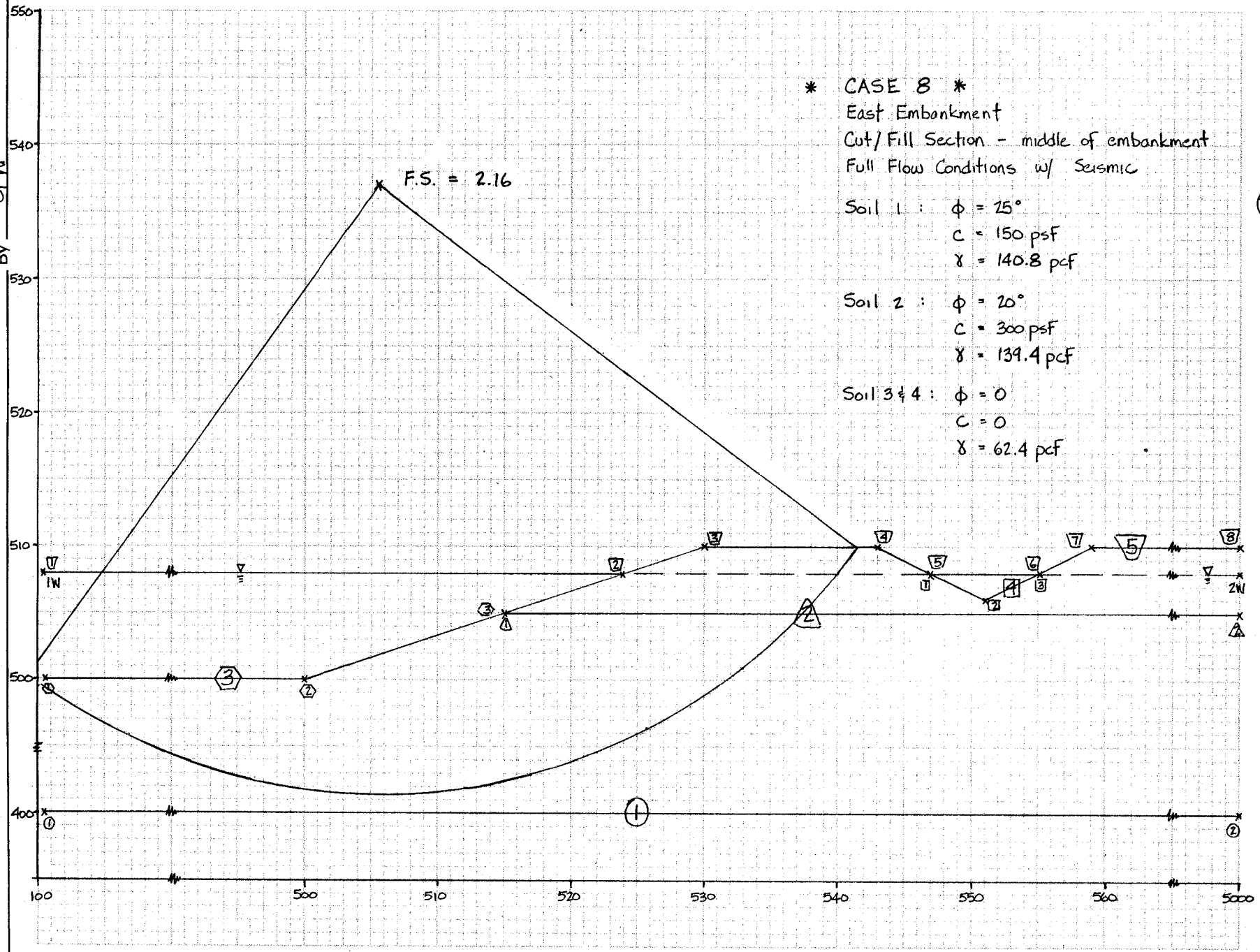
WESTERN TECHNOLOGIES INC.

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 9/4/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

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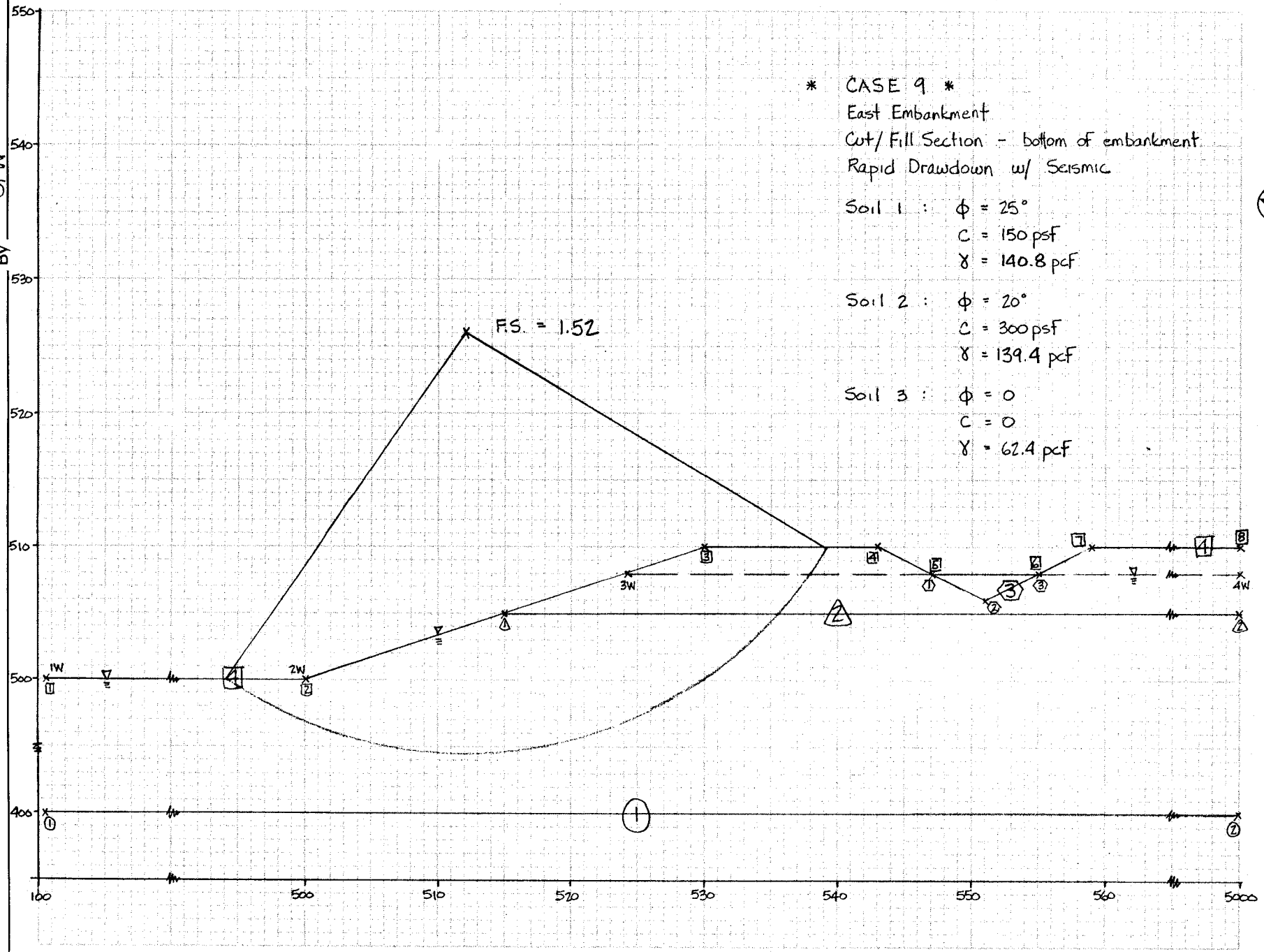
INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 9/4/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

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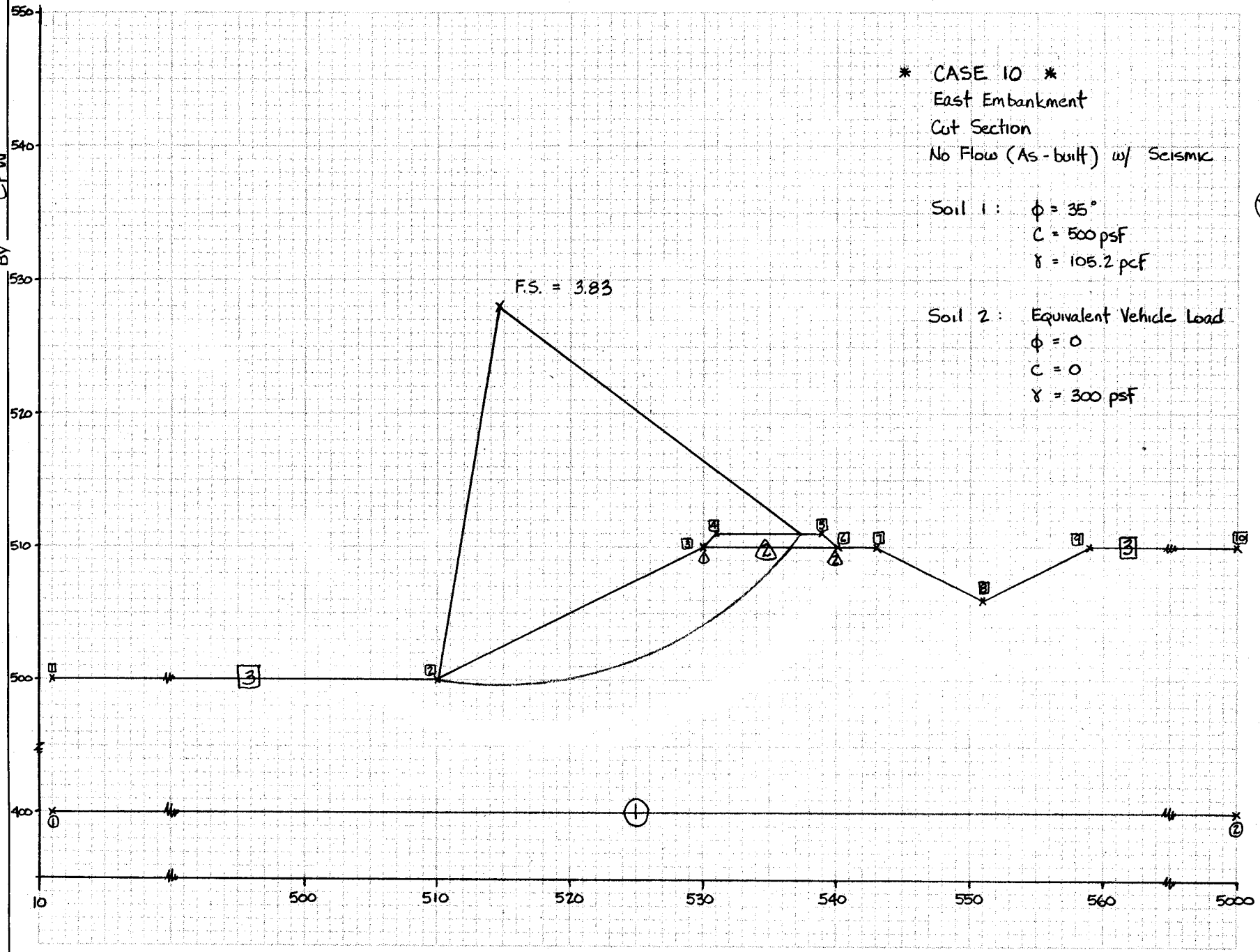
INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/11/85 Sheet ___ of ___

By CPW



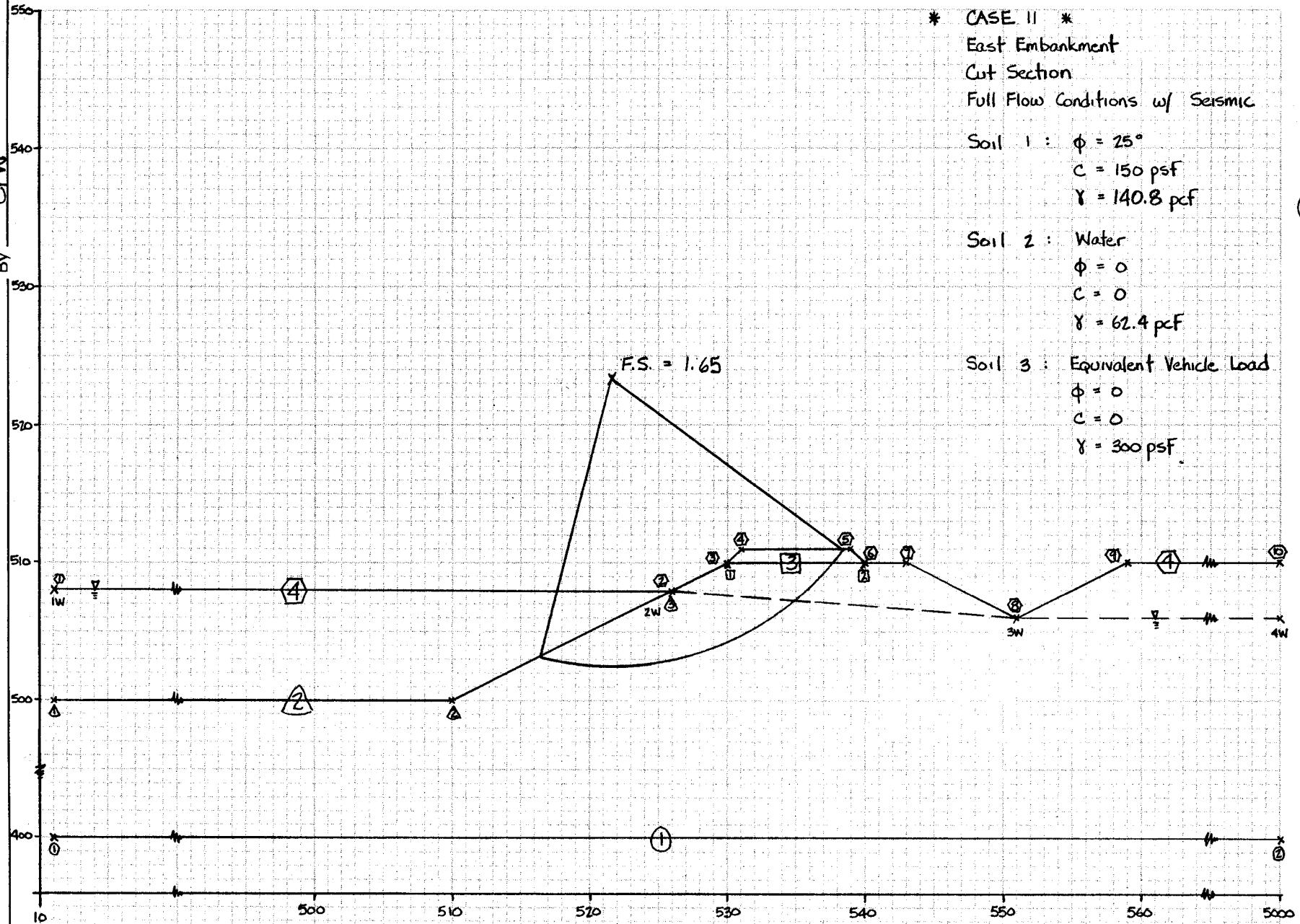
WESTERN TECHNOLOGIES INC.

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/11/85 Sheet ___ of ___

By CPW



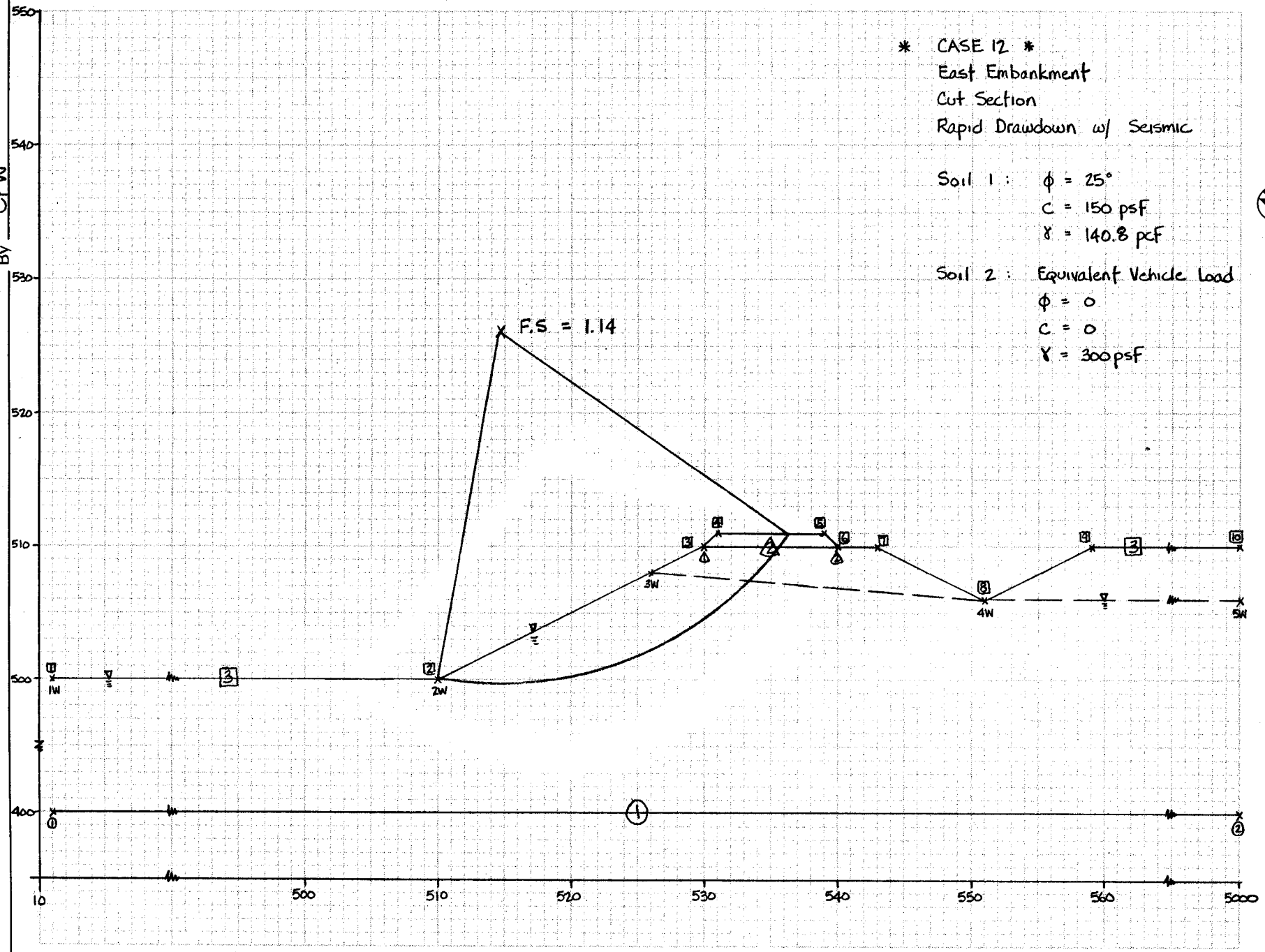
WESTERN TECHNOLOGIES INC.

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125 J108

Slope Stability Analysis Date 11/11/85 Sheet ___ of ___

By CPW



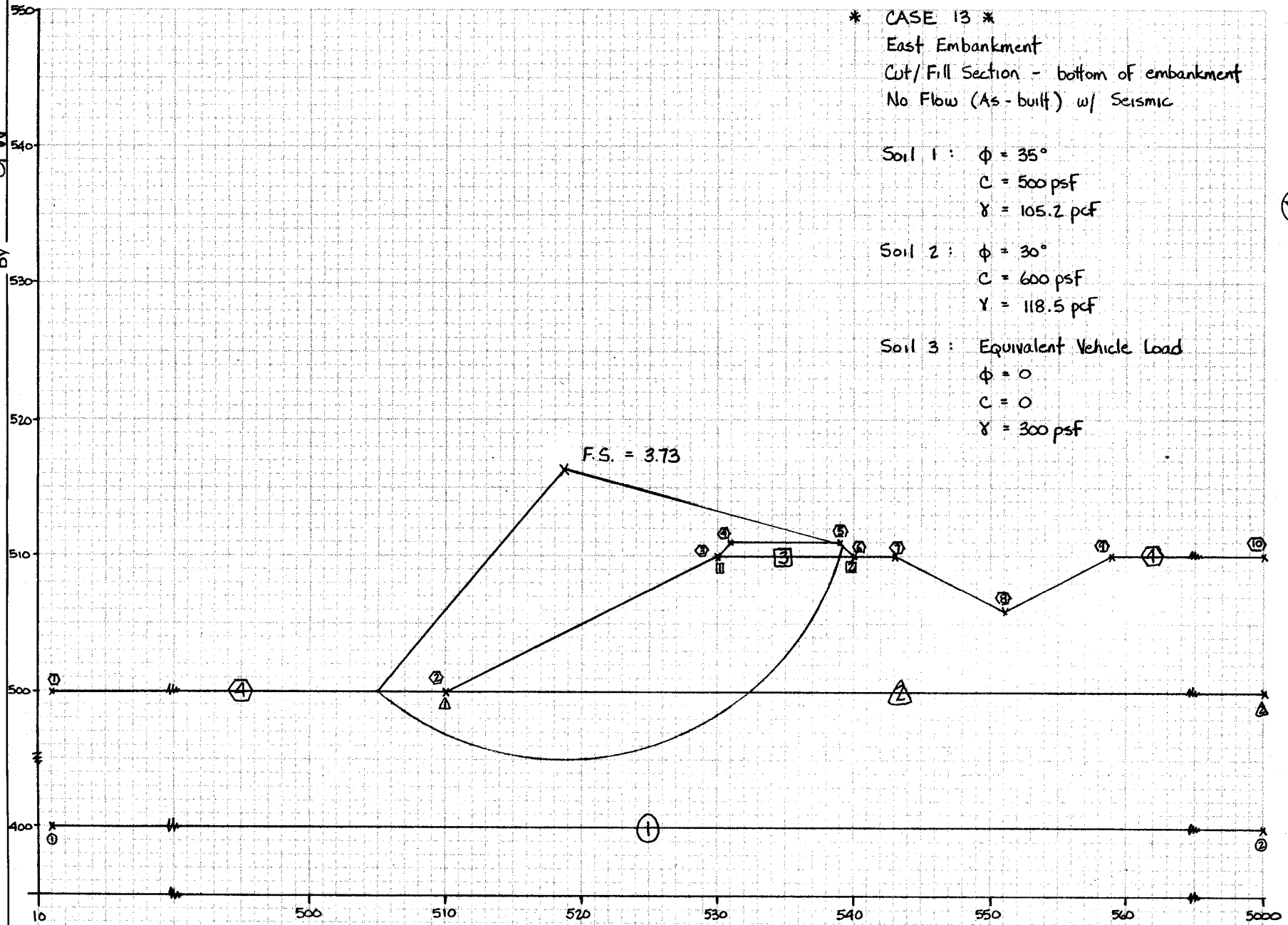
WESTERN TECHNOLOGIES INC.

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/11/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

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INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/11/85 Sheet ___ of ___

By CPW

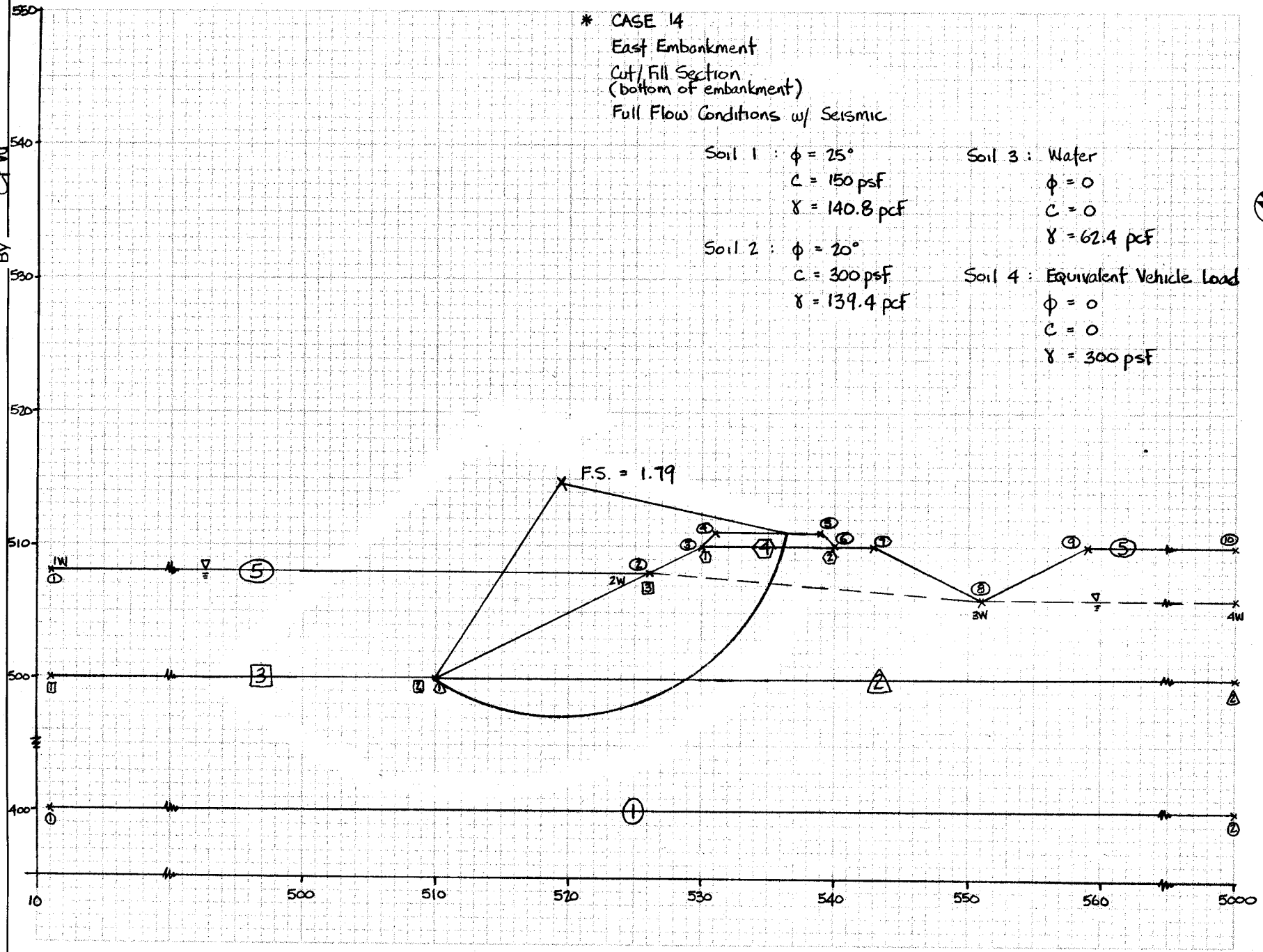
* CASE 14
East Embankment
Cut/Fill Section
(bottom of embankment)
Full Flow Conditions w/ Seismic

Soil 1 : $\phi = 25°$
$c = 150$ psf
$\gamma = 140.8$ pcf

Soil 2 : $\phi = 20°$
$c = 300$ psf
$\gamma = 139.4$ pcf

Soil 3 : Water
$\phi = 0$
$c = 0$
$\gamma = 62.4$ pcf

Soil 4 : Equivalent Vehicle Load
$\phi = 0$
$c = 0$
$\gamma = 300$ psf



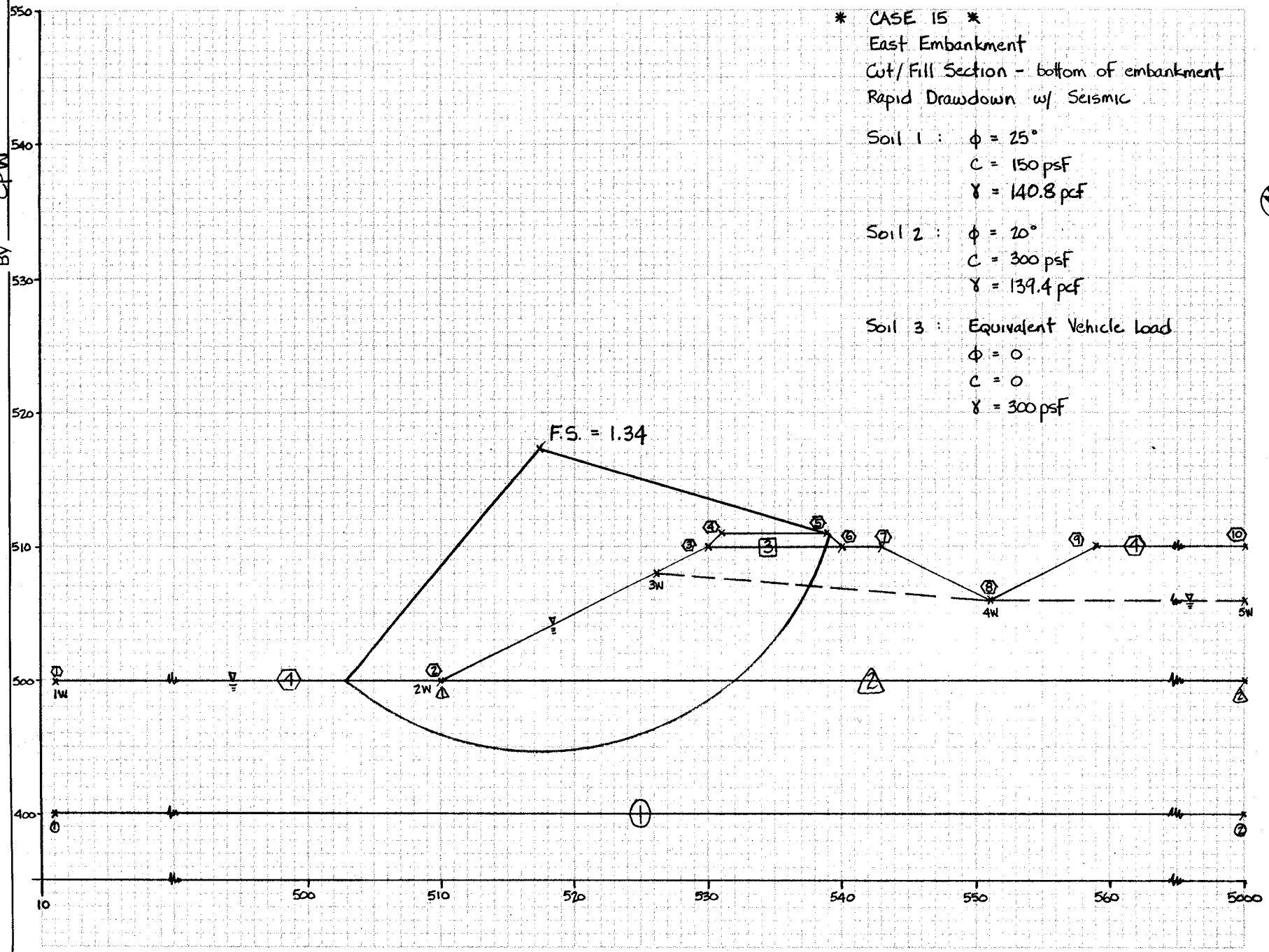
WESTERN TECHNOLOGIES INC.

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/11/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

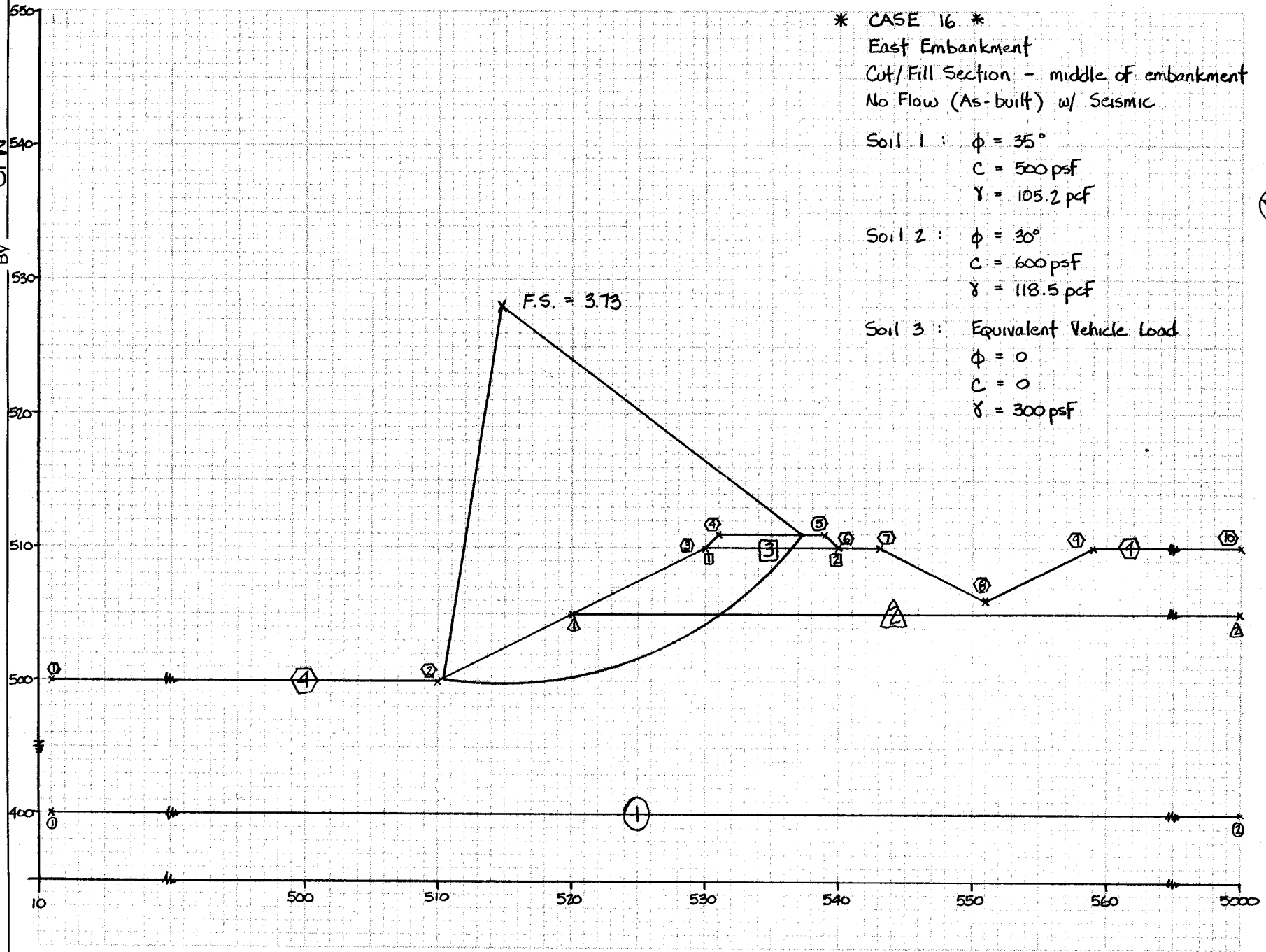
S9L

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/13/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

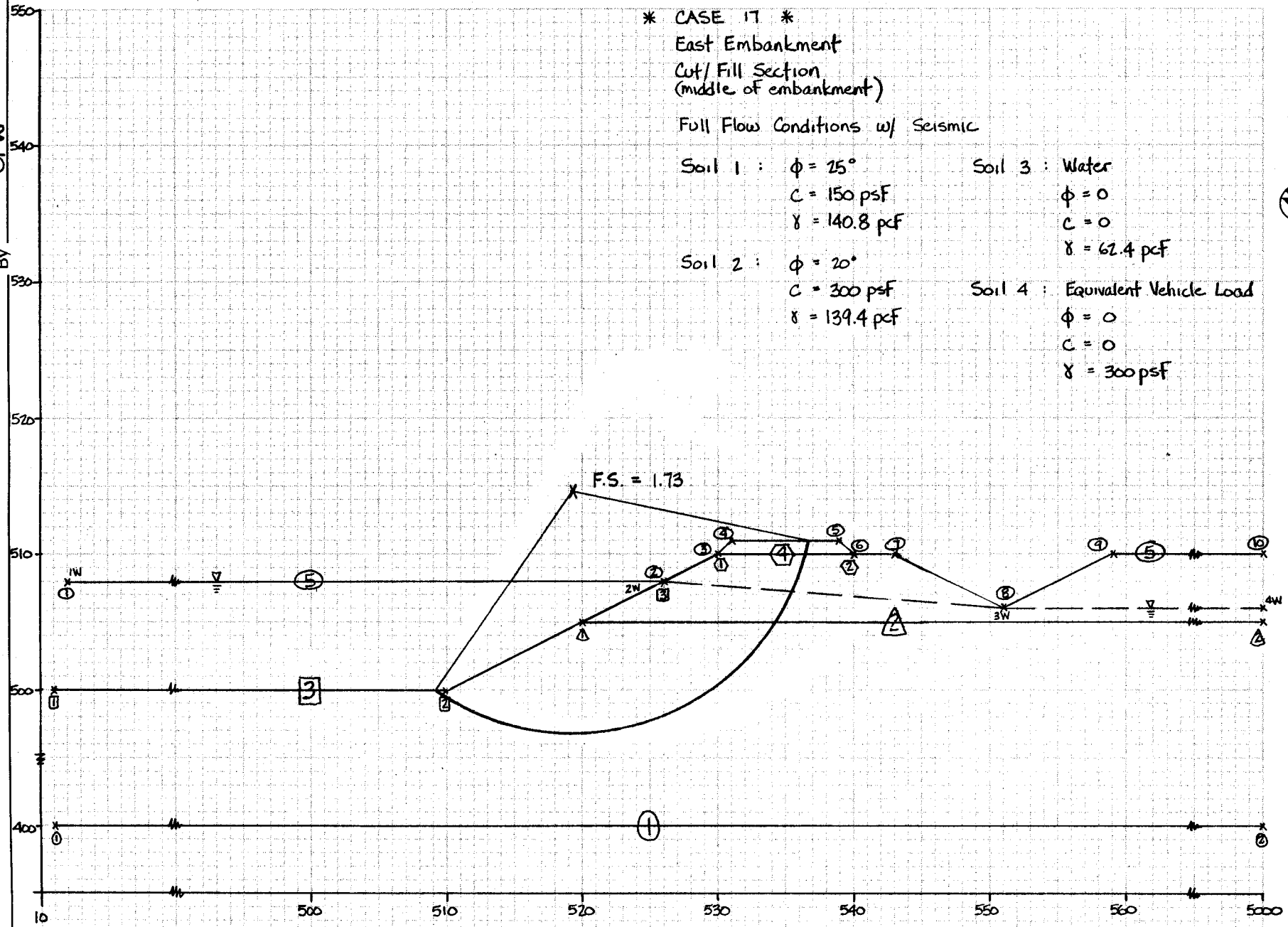
INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis

Date 11/13/85 Sheet ___ of ___

By CPW



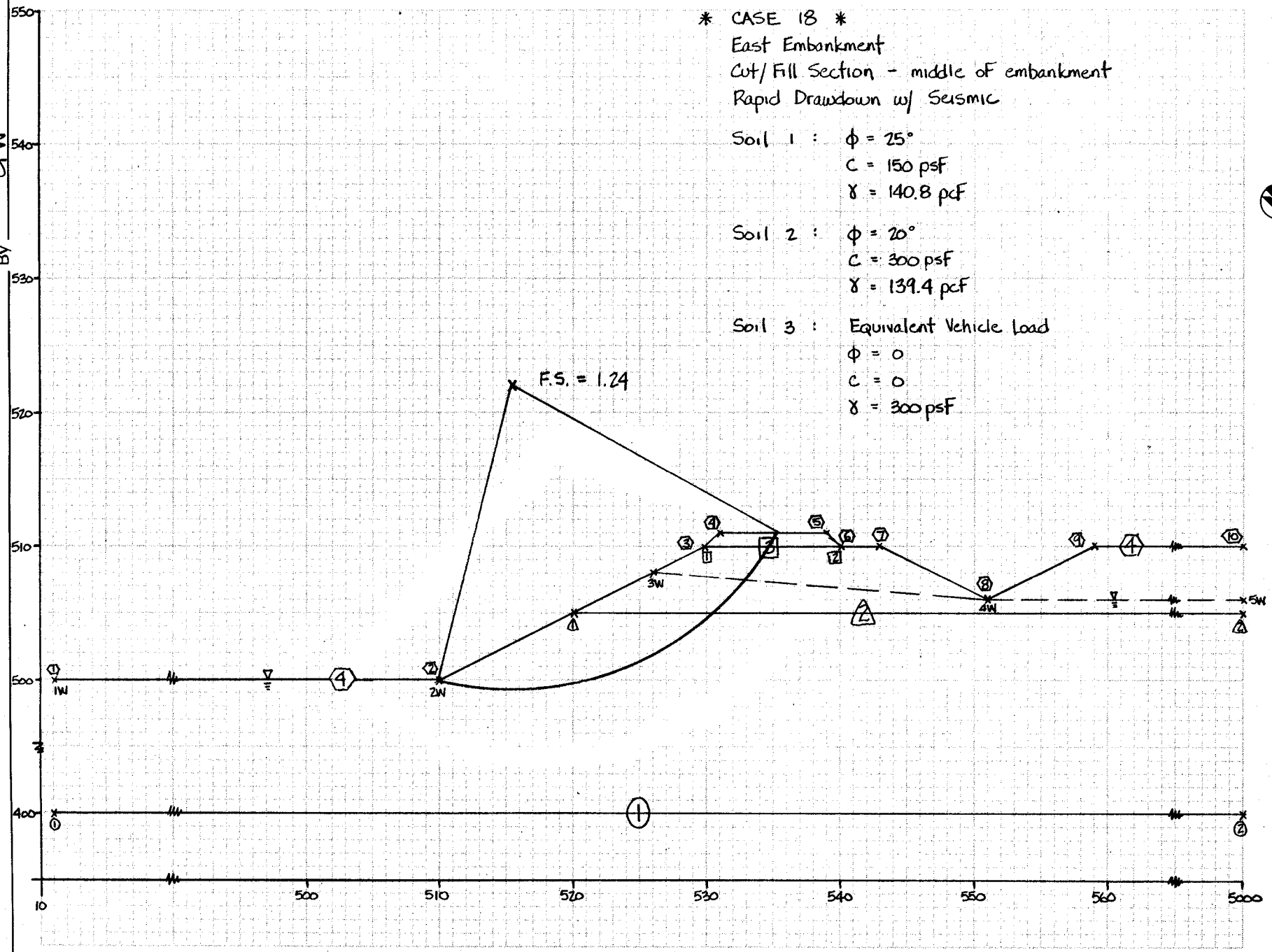
WESTERN TECHNOLOGIES INC.

INTERNAL WORK SHEETS

Project/Subject RWCD Floodway - Reach 6 Job No. 2125J108

Slope Stability Analysis Date 11/13/85 Sheet ___ of ___

By CPW



WESTERN TECHNOLOGIES INC.

WESTERN TECHNOLOGIES INC. 09-03-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 1
East Embankment - Cut Section
No Flow (As-built) w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 2

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	100.00	500.00	500.00	500.00	530.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	500.00	35.00	105.2

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

GRID SEARCH WAS SPECIFIED WITH LOCATION AT :

(____X___,	____Y___)
490.00	520.00
510.00	540.00
525.00	525.00

WESTERN TECHNOLOGIES INC. 09-03-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : NO SEEPAGE

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	12.091
	100.00	11.276
	80.00	10.521
	60.00	9.063
	40.00	8.302
LOWEST :	40.00	8.302

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	11.614
	105.00	10.700
	85.00	9.663
	65.00	8.635
	45.00	6.800
LOWEST :	45.00	6.800

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	11.206
	109.69	10.259
	89.38	9.192
	69.08	8.026
	48.77	6.107
LOWEST :	43.69	5.818

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	10.840
	114.32	9.903
	93.65	8.757
	72.97	7.495
	52.30	5.837
LOWEST :	41.96	5.209

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	10.560
	118.96	9.595
	97.91	8.477
	76.87	7.201
	55.83	5.919
LOWEST :	45.31	4.993

AT POINT(493.75, 516.25) :

	RADIUS	FS
	116.25	12.391
	96.25	11.564
	76.25	10.750
	56.25	9.224
	36.25	8.056
LOWEST :	36.25	8.056

WESTERN TECHNOLOGIES INC. 09-03-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(498.75, 521.25) :

	RADIUS	FS
	121.25	11.877
	101.11	10.919
	80.97	9.864
	60.83	8.745
	40.69	6.614
LOWEST :	35.66	6.540

AT POINT(503.75, 526.25) :

	RADIUS	FS
	126.25	11.427
	105.74	10.461
	85.24	9.332
	64.73	8.068
	44.22	5.962
LOWEST :	33.97	5.492

AT POINT(508.75, 531.25) :

	RADIUS	FS
	131.25	11.048
	110.38	10.078
	89.50	8.891
	68.63	7.556
	47.75	5.761
LOWEST :	37.32	4.976

AT POINT(513.75, 536.25) :

	RADIUS	FS
	136.25	10.753
	115.01	9.751
	93.77	8.602
	72.52	7.238
	51.28	5.914
LOWEST :	40.66	4.951

AT POINT(497.50, 512.50) :

	RADIUS	FS
	112.50	12.735
	92.50	11.908
	72.50	11.037
	52.50	9.441
	32.50	7.940
LOWEST :	32.50	7.940

AT POINT(502.50, 517.50) :

	RADIUS	FS
	117.50	12.168
	97.16	11.192
	76.82	10.103
	56.49	8.889
	36.15	6.494
LOWEST :	31.06	6.293

AT POINT(507.50, 522.50) :

	RADIUS	FS
	122.50	11.679
	101.79	10.698
	81.09	9.509
	60.38	8.192

		39.68	5.877
	LOWEST :	29.33	5.177

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	11.287
106.43	10.286
85.35	9.070
64.28	7.644
43.21	5.758
LOWEST : 32.67	4.884

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	10.974
111.06	9.952
89.62	8.754
68.18	7.329
46.74	5.971
LOWEST : 36.02	5.183

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	13.145
88.58	12.316
68.41	11.420
48.24	9.707
28.07	8.066
LOWEST : 23.03	8.021

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	12.503
93.21	11.523
72.68	10.404
52.14	9.120
31.60	6.461
LOWEST : 21.34	5.987

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	11.965
97.85	10.981
76.94	9.739
56.04	8.395
35.13	5.898
LOWEST : 24.68	5.052

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	11.562
102.48	10.533
81.21	9.293
59.94	7.792
38.66	5.900
LOWEST : 28.03	5.084

AT POINT(521.25, 528.75) :

RADIUS	FS
128.75	11.229

	107.11	10.184
	85.47	8.936
	63.83	7.491
	42.19	6.234
LOWEST :	31.37	5.763

AT POINT(505.00, 505.00) :

RADIUS	FS
105.00	13.610
84.63	12.796
64.26	11.948
43.90	10.176
23.53	8.623
LOWEST : 13.35	8.492

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	12.898
89.26	11.937
68.53	10.807
47.79	9.494
27.06	6.611
LOWEST : 16.69	6.050

AT POINT(515.00, 515.00) :

RADIUS	FS
115.00	12.319
93.90	11.331
72.79	10.050
51.69	8.690
30.59	6.081
LOWEST : 20.04	5.391

AT POINT(520.00, 520.00) :

RADIUS	FS
120.00	11.882
98.53	10.829
77.06	9.562
55.59	8.061
34.12	6.277
LOWEST : 28.75	5.636

AT POINT(525.00, 525.00) :

RADIUS	FS
125.00	11.515
103.16	10.450
81.32	9.178
59.49	7.714
37.65	6.810
LOWEST : 26.73	6.694

AT POINT(512.50, 527.50) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 32.67	4.880

AT POINT(512.50, 527.50) :

RADIUS	FS

		127.50	11.287
		106.43	10.286
		85.35	9.070
		64.28	7.644
		43.21	5.758
	LOWEST :	32.67	4.884

AT POINT(514.50, 527.50) :

RADIUS	FS
127.50	11.288
106.30	10.270
85.10	9.061
63.90	7.603
42.70	5.857
LOWEST : 32.10	4.916

AT POINT(510.50, 527.50) :

RADIUS	FS
127.50	11.289
106.55	10.302
85.61	9.085
64.66	7.698
43.71	5.748
LOWEST : 33.24	4.913

AT POINT(512.50, 529.50) :

RADIUS	FS
129.50	11.154
108.41	10.153
87.31	8.953
66.22	7.543
45.13	5.791
LOWEST : 34.58	4.886

AT POINT(512.50, 525.50) :

RADIUS	FS
125.50	11.428
104.45	10.426
83.40	9.195
62.34	7.756
41.29	5.756
LOWEST : 30.76	4.889

AT POINT(513.00, 527.50) :

RADIUS	FS
127.50	11.287
106.40	10.282
85.29	9.067
64.19	7.631
43.08	5.773
LOWEST : 32.53	4.890

AT POINT(512.00, 527.50) :

RADIUS	FS
127.50	11.287
106.46	10.290
85.42	9.073
64.38	7.657
43.34	5.753

WESTERN TECHNOLOGIES INC. 09-03-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

LOWEST : 32.81 4.881

AT POINT(511.50, 527.50) :

RADIUS	FS
127.50	11.288
106.49	10.294
85.48	9.077
64.47	7.671
43.46	5.749
LOWEST : 32.96	4.884

AT POINT(512.00, 528.00) :

RADIUS	FS
128.00	11.254
106.95	10.256
85.91	9.043
64.86	7.631
43.81	5.753
LOWEST : 33.29	4.881

AT POINT(512.00, 527.00) :

RADIUS	FS
127.00	11.322
105.96	10.324
84.93	9.103
63.89	7.684
42.86	5.753
LOWEST : 32.34	4.882

AT POINT(512.00, 527.50) : RADIUS FS

MINIMUM FACTOR OF SAFETY : 32.81 4.880

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 2
East Embankment - Cut Section
Full Flow Conditions w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 3

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	100.00	500.00	500.00	500.00	524.00	508.00
3	100.00	508.00	524.00	508.00	530.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	0.00	0.00	62.4

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	490.00, 520.00
	510.00, 540.00
	525.00, 525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------]	
(X,	Y)	(X,	Y)	(X,	Y)
100.00	508.00	524.00	508.00	551.00	506.00
5000.00	506.00				

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	5.066
	98.40	4.754
	76.80	4.491
	55.20	3.650
	33.60	21.163
LOWEST :	44.40	3.472

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	4.852
	103.40	4.496
	81.80	4.050
	60.20	13.703
	38.60	2.844
LOWEST :	38.60	2.844

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	4.668
	108.40	4.292
	86.80	3.861
	65.20	3.387
	43.60	2.438
LOWEST :	38.20	2.431

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	4.504
	113.40	4.141
	91.80	3.682
	70.20	3.168
	48.60	2.333
LOWEST :	43.20	2.159

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	4.375
	118.40	4.006
	96.80	3.565
	75.20	3.054
	53.60	33.237
LOWEST :	59.00	2.648

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(493.75, 516.25) :

	RADIUS	FS
	116.25	5.217
	94.65	4.907
	73.05	4.644
	51.45	3.778
	29.85	79.877
LOWEST :	35.25	3.468

AT POINT(498.75, 521.25) :

	RADIUS	FS
	121.25	4.981
	99.65	4.611
	78.05	4.169
	56.45	16.303
	34.85	2.772
LOWEST :	34.85	2.772

AT POINT(503.75, 526.25) :

	RADIUS	FS
	126.25	4.778
	104.65	4.401
	83.05	3.954
	61.45	3.447
	39.85	2.399
LOWEST :	34.45	2.289

AT POINT(508.75, 531.25) :

	RADIUS	FS
	131.25	4.603
	109.65	4.231
	88.05	3.755
	66.45	3.212
	44.85	1000000.000
LOWEST :	55.65	2.929

AT POINT(513.75, 536.25) :

	RADIUS	FS
	136.25	4.465
	114.65	4.088
	93.05	3.643
	71.45	3.104
	49.85	31.607
LOWEST :	55.25	2.680

AT POINT(497.50, 512.50) :

	RADIUS	FS
	112.50	5.390
	90.90	5.090
	69.30	4.833
	47.70	3.950
	26.10	1000000.000
LOWEST :	31.50	3.469

AT POINT(502.50, 517.50) :

	RADIUS	FS
	117.50	5.127
	95.90	4.752
	74.30	4.319
	52.70	19.616

		31.10	2.730
	LOWEST :	25.70	2.697

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	4.900
100.90	4.526
79.30	4.061
57.70	3.541
36.10	2.386
LOWEST : 30.70	2.179

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.715
105.90	4.341
84.30	3.862
62.70	3.293
41.10	1000000.000
LOWEST : 51.90	2.988

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	4.572
110.90	4.189
89.30	3.732
67.70	3.161
46.10	2.628
LOWEST : 35.30	2.124

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	5.594
87.15	5.311
65.55	5.075
43.95	4.170
22.35	1000000.000
LOWEST : 27.75	3.586

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	5.293
92.15	4.925
70.55	4.500
48.95	24.695
27.35	2.729
LOWEST : 21.95	2.579

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	5.037
97.15	4.674
75.55	4.200
53.95	3.680
32.35	2.408
LOWEST : 21.55	2.172

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	4.849

		102.15	4.468
		80.55	3.989
		58.95	3.385
		37.35	1000000.000
	LOWEST :	42.75	2.931

AT POINT(521.25, 528.75) :

RADIUS	FS
128.75	4.691
107.11	4.303
85.47	3.831
63.83	3.259
42.19	2.742
LOWEST : 31.37	2.315

AT POINT(505.00, 505.00) :

RADIUS	FS
105.00	1000000.000
LOWEST : 105.00	1000000.000

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	5.485
88.40	5.144
66.80	4.739
45.20	4.265
23.60	2.828
LOWEST : 18.20	2.655

AT POINT(515.00, 515.00) :

RADIUS	FS
115.00	5.211
93.40	4.856
71.80	4.369
50.20	3.873
28.60	2.538
LOWEST : 23.20	2.301

AT POINT(520.00, 520.00) :

RADIUS	FS
120.00	5.000
98.40	4.613
76.80	4.135
55.20	3.541
33.60	1000000.000
LOWEST : 39.00	3.075

AT POINT(525.00, 525.00) :

RADIUS	FS
125.00	4.820
103.16	4.429
81.32	3.942
59.49	3.367
37.65	2.990
LOWEST : 26.73	2.631

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(	517.50,	532.50) :	RADIUS	FS
MINIMUM FACTOR OF SAFETY :			35.30	2.120

AT POINT(	517.50,	532.50) :	RADIUS	FS
			132.50	4.572
			110.90	4.189
			89.30	3.732
			67.70	3.161
			46.10	2.628
		LOWEST :	35.30	2.124
AT POINT(	519.50,	532.50) :	RADIUS	FS
			132.50	4.576
			110.90	4.193
			89.30	3.732
			67.70	3.164
			46.10	2.638
		LOWEST :	35.30	2.223
AT POINT(	515.50,	532.50) :	RADIUS	FS
			132.50	4.569
			110.90	4.185
			89.30	3.731
			67.70	3.169
			46.10	40.774
		LOWEST :	51.50	2.743
AT POINT(	517.50,	534.50) :	RADIUS	FS
			134.50	4.517
			112.90	4.137
			91.30	3.684
			69.70	3.123
			48.10	2.590
		LOWEST :	37.30	2.132
AT POINT(	517.50,	530.50) :	RADIUS	FS
			130.50	4.630
			108.90	4.245
			87.30	3.783
			65.70	3.204
			44.10	2.650
		LOWEST :	33.30	2.123
AT POINT(	517.50,	528.50) :	RADIUS	FS
			128.50	4.691
			106.90	4.304
			85.30	3.838
			63.70	3.251
			42.10	61.699
		LOWEST :	47.50	2.828
AT POINT(	519.50,	530.50) :	RADIUS	FS
			130.50	4.634
			108.90	4.248

	87.30	3.784
	65.70	3.210
	44.10	2.660
LOWEST :	33.30	2.209

AT POINT(515.50, 530.50) :

RADIUS	FS
130.50	4.627
108.90	4.243
87.30	3.782
65.70	3.212
44.10	69.992
LOWEST : 49.50	2.760

AT POINT(518.00, 530.50) :

RADIUS	FS
130.50	4.631
108.90	4.246
87.30	3.783
65.70	3.203
44.10	2.658
LOWEST : 33.30	2.140

AT POINT(517.00, 530.50) :

RADIUS	FS
130.50	4.629
108.90	4.244
87.30	3.783
65.70	3.206
44.10	44.954
LOWEST : 49.50	2.794

AT POINT(517.50, 531.00) :

RADIUS	FS
131.00	4.615
109.40	4.231
87.80	3.770
66.20	3.192
44.60	2.647
LOWEST : 33.80	2.122

AT POINT(517.50, 531.50) :

RADIUS	FS
131.50	4.601
109.90	4.216
88.30	3.757
66.70	3.181
45.10	2.641
LOWEST : 34.30	2.122

AT POINT(518.00, 531.00) :

RADIUS	FS
131.00	4.616
109.40	4.231
87.80	3.770
66.20	3.192
44.60	2.651
LOWEST : 33.80	2.140

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(517.00, 531.00) :

	RADIUS	FS
	131.00	4.614
	109.40	4.230
	87.80	3.769
	66.20	3.194
	44.60	2.636
LOWEST :	33.80	2.106

AT POINT(516.50, 531.00) :

	RADIUS	FS
	131.00	4.613
	109.40	4.229
	87.80	3.769
	66.20	3.197
	44.60	44.361
LOWEST :	50.00	2.778

AT POINT(517.00, 531.50) :

	RADIUS	FS
	131.50	4.600
	109.90	4.216
	88.30	3.756
	66.70	3.183
	45.10	2.634
LOWEST :	34.30	2.106

AT POINT(517.00, 530.50) :

	RADIUS	FS
	130.50	4.629
	108.90	4.244
	87.30	3.783
	65.70	3.206
	44.10	44.954
LOWEST :	49.50	2.794

AT POINT(517.00, 531.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	33.80	2.110

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------]	
(___X____,	___Y____)	(___X____,	___Y____)	(___X____,	___Y____)
100.00	500.00	500.00	500.00	524.00	508.00
551.00	506.00	5000.00	506.00		

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

RADIUS	FS
120.00	4.402
100.00	4.076
80.00	3.752
60.00	3.155
40.00	2.677
LOWEST : 40.00	2.677

AT POINT(495.00, 525.00) :

RADIUS	FS
125.00	4.232
105.00	3.872
85.00	3.455
65.00	3.005
45.00	2.229
LOWEST : 40.00	2.162

AT POINT(500.00, 530.00) :

RADIUS	FS
130.00	4.086
109.69	3.717
89.38	3.291
69.08	2.805
48.77	2.012
LOWEST : 38.61	1.761

AT POINT(505.00, 535.00) :

RADIUS	FS
135.00	3.954
114.32	3.590
93.65	3.141
72.97	2.627
52.30	1.929
LOWEST : 41.96	1.573

AT POINT(510.00, 540.00) :

RADIUS	FS
140.00	3.854
118.96	3.481
97.91	3.043
76.87	2.531
55.83	1.948
LOWEST : 45.31	1.529

AT POINT(493.75, 516.25) :

RADIUS	FS
116.25	4.514

		96.25	4.184
		76.25	3.839
		56.25	3.216
		36.25	2.611
	LOWEST :	36.25	2.611

AT POINT(498.75, 521.25) :

RADIUS	FS
121.25	4.331
101.11	3.955
80.97	3.530
60.83	3.047
40.69	2.172
LOWEST : 30.62	2.003

AT POINT(503.75, 526.25) :

RADIUS	FS
126.25	4.168
105.74	3.793
85.24	3.346
64.73	2.821
44.22	1.967
LOWEST : 33.97	1.639

AT POINT(508.75, 531.25) :

RADIUS	FS
131.25	4.032
110.38	3.656
89.50	3.192
68.63	2.652
47.75	1.905
LOWEST : 37.32	1.509

AT POINT(513.75, 536.25) :

RADIUS	FS
136.25	3.926
115.01	3.540
93.77	3.091
72.52	2.545
51.28	1.950
LOWEST : 40.66	1.531

AT POINT(497.50, 512.50) :

RADIUS	FS
112.50	4.643
92.50	4.312
72.50	3.948
52.50	3.297
32.50	2.589
LOWEST : 27.50	2.541

AT POINT(502.50, 517.50) :

RADIUS	FS
117.50	4.440
97.16	4.059
76.82	3.620
56.49	3.101
36.15	2.135
LOWEST : 25.98	1.853

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(507.50, 522.50) :

	RADIUS	FS
	122.50	4.263
	101.79	3.881
	81.09	3.414
	60.38	2.869
	39.68	1.944
LOWEST :	29.33	1.544

AT POINT(512.50, 527.50) :

	RADIUS	FS
	127.50	4.122
	106.43	3.734
	85.35	3.258
	64.28	2.687
	43.21	1.907
LOWEST :	32.67	1.490

AT POINT(517.50, 532.50) :

	RADIUS	FS
	132.50	4.009
	111.06	3.616
	89.62	3.149
	68.18	2.582
	46.74	1.973
LOWEST :	36.02	1.627

AT POINT(501.25, 508.75) :

	RADIUS	FS
	108.75	4.796
	88.58	4.464
	68.41	4.088
	48.24	3.399
	28.07	2.635
LOWEST :	17.99	2.446

AT POINT(506.25, 513.75) :

	RADIUS	FS
	113.75	4.564
	93.21	4.182
	72.68	3.734
	52.14	3.184
	31.60	2.127
LOWEST :	21.34	1.751

AT POINT(511.25, 518.75) :

	RADIUS	FS
	118.75	4.370
	97.85	3.987
	76.94	3.500
	56.04	2.946
	35.13	1.955
LOWEST :	24.68	1.511

AT POINT(516.25, 523.75) :

	RADIUS	FS
	123.75	4.225
	102.48	3.827
	81.21	3.342
	59.94	2.741

		38.66	1.959
	LOWEST :	28.03	1.576

AT POINT(521.25, 528.75) :

RADIUS	FS
128.75	4.106
107.11	3.704
85.47	3.219
63.83	2.645
42.19	2.072
LOWEST : 31.37	1.835

AT POINT(505.00, 505.00) :

RADIUS	FS
105.00	4.966
84.63	4.640
64.26	4.277
43.90	3.570
23.53	2.813
LOWEST : 8.25	2.434

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	4.711
89.26	4.336
68.53	3.885
47.79	3.321
27.06	2.184
LOWEST : 16.69	1.772

AT POINT(515.00, 515.00) :

RADIUS	FS
115.00	4.502
93.90	4.118
72.79	3.615
51.69	3.055
30.59	2.022
LOWEST : 20.04	1.634

AT POINT(520.00, 520.00) :

RADIUS	FS
120.00	4.345
98.53	3.939
77.06	3.445
55.59	2.843
34.12	2.091
LOWEST : 23.38	1.793

AT POINT(525.00, 525.00) :

RADIUS	FS
125.00	4.213
103.16	3.803
81.32	3.310
59.49	2.728
37.65	2.274
LOWEST : 26.73	2.171

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 527.50) :	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	32.67	1.490

AT POINT(512.50, 527.50) :	RADIUS	FS
	127.50	4.122
	106.43	3.734
	85.35	3.258
	64.28	2.687
	43.21	1.907
LOWEST :	32.67	1.490

AT POINT(514.50, 527.50) :	RADIUS	FS
	127.50	4.123
	106.30	3.730
	85.10	3.257
	63.90	2.674
	42.70	1.939
LOWEST :	32.10	1.515

AT POINT(510.50, 527.50) :	RADIUS	FS
	127.50	4.121
	106.55	3.739
	85.61	3.263
	64.66	2.703
	43.71	1.902
LOWEST :	33.24	1.489

AT POINT(508.50, 527.50) :	RADIUS	FS
	127.50	4.122
	106.68	3.743
	85.86	3.269
	65.04	2.715
	44.22	1.910
LOWEST :	33.81	1.510

AT POINT(510.50, 529.50) :	RADIUS	FS
	129.50	4.073
	108.53	3.691
	87.57	3.221
	66.60	2.668
	45.63	1.900
LOWEST :	35.15	1.491

AT POINT(510.50, 525.50) :	RADIUS	FS
	125.50	4.173
	104.57	3.790
	83.65	3.308
	62.72	2.741
	41.80	1.907
LOWEST :	31.33	1.490

AT POINT(511.00, 527.50) :	RADIUS	FS
	127.50	4.121
	106.52	3.737

		85.54	3.261
		64.57	2.699
		43.59	1.901
	LOWEST :	33.10	1.486

AT POINT(511.50, 527.50) :

RADIUS	FS
127.50	4.121
106.49	3.736
85.48	3.260
64.47	2.695
43.46	1.903
LOWEST : 32.96	1.485

AT POINT(512.00, 527.50) :

RADIUS	FS
127.50	4.122
106.46	3.735
85.42	3.259
64.38	2.691
43.34	1.904
LOWEST : 32.81	1.486

AT POINT(511.50, 528.00) :

RADIUS	FS
128.00	4.109
106.99	3.724
85.97	3.249
64.96	2.686
43.94	1.902
LOWEST : 33.43	1.486

AT POINT(511.50, 527.00) :

RADIUS	FS
127.00	4.134
106.00	3.749
84.99	3.271
63.99	2.704
42.98	1.903
LOWEST : 32.48	1.484

AT POINT(511.50, 526.50) :

RADIUS	FS
126.50	4.147
105.50	3.761
84.50	3.283
63.50	2.714
42.50	1.904
LOWEST : 32.00	1.484

AT POINT(512.00, 527.00) :

RADIUS	FS
127.00	4.134
105.96	3.748
84.93	3.270
63.89	2.700
42.86	1.905
LOWEST : 32.34	1.486

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(511.00, 527.00) :	RADIUS	FS
	127.00	4.134
	106.03	3.750
	85.05	3.272
	64.08	2.708
	43.11	1.902
LOWEST :	32.62	1.486

AT POINT(511.50, 527.00) :	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	32.48	1.480

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 3A
East Embankment - Cut Section
Rapid Drawdown w/ Seismic
Water in ditch at top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 3

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	547.00	508.00	551.00	506.00	555.00	508.00
3	100.00	500.00	500.00	500.00	530.00	510.00
	543.00	510.00	547.00	508.00	555.00	508.00
	559.00	510.00	5000.00	510.00		

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	0.00	0.00	62.4

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)	
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	490.00	520.00
	510.00	540.00
	525.00	525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------]	
(X,	Y)	(X,	Y)	(X,	Y)
100.00	500.00	500.00	500.00	524.00	508.00
5000.00	508.00				

RESULTS OF REITERATIONS -

	RADIUS	FS
AT POINT(490.00, 520.00) :	120.00	4.377
	100.00	4.044
	80.00	3.723
	60.00	3.148
	40.00	2.676
LOWEST :	40.00	2.676
AT POINT(495.00, 525.00) :	RADIUS	FS
	125.00	4.204
	105.00	3.845
	85.00	3.428
	65.00	2.988
	45.00	2.221
LOWEST :	40.00	2.158
AT POINT(500.00, 530.00) :	RADIUS	FS
	130.00	4.055
	109.69	3.687
	89.38	3.257
	69.08	2.772
	48.77	1.998
LOWEST :	38.61	1.756
AT POINT(505.00, 535.00) :	RADIUS	FS
	135.00	3.925
	114.32	3.556
	93.65	3.110
	72.97	2.594
	52.30	1.909
LOWEST :	41.96	1.557
AT POINT(510.00, 540.00) :	RADIUS	FS
	140.00	3.824
	118.96	3.449
	97.91	3.007
	76.87	2.491
	55.83	1.905
LOWEST :	45.31	1.503

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(493.75, 516.25) :

	RADIUS	FS
	116.25	4.487
	96.25	4.151
	76.25	3.811
	56.25	3.216
	36.25	2.609
LOWEST :	36.25	2.609

AT POINT(498.75, 521.25) :

	RADIUS	FS
	121.25	4.301
	101.11	3.927
	80.97	3.500
	60.83	3.033
	40.69	2.163
LOWEST :	30.62	2.002

AT POINT(503.75, 526.25) :

	RADIUS	FS
	126.25	4.138
	105.74	3.762
	85.24	3.313
	64.73	2.788
	44.22	1.951
LOWEST :	33.97	1.631

AT POINT(508.75, 531.25) :

	RADIUS	FS
	131.25	4.002
	110.38	3.621
	89.50	3.158
	68.63	2.613
	47.75	1.882
LOWEST :	37.32	1.490

AT POINT(513.75, 536.25) :

	RADIUS	FS
	136.25	3.895
	115.01	3.507
	93.77	3.052
	72.52	2.507
	51.28	1.902
LOWEST :	40.66	1.502

AT POINT(497.50, 512.50) :

	RADIUS	FS
	112.50	4.615
	92.50	4.279
	72.50	3.920
	52.50	3.307
	32.50	2.586
LOWEST :	27.50	2.541

AT POINT(502.50, 517.50) :

	RADIUS	FS
	117.50	4.407
	97.16	4.029
	76.82	3.585
	56.49	3.088

	36.15	2.124
LOWEST :	25.98	1.852

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	4.232
101.79	3.846
81.09	3.381
60.38	2.835
39.68	1.924
LOWEST : 29.33	1.534

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.091
106.43	3.701
85.35	3.222
64.28	2.645
43.21	1.886
LOWEST : 32.67	1.468

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	3.977
111.06	3.581
89.62	3.109
68.18	2.540
46.74	1.929
LOWEST : 36.02	1.593

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	4.765
88.58	4.432
68.41	4.060
48.24	3.418
28.07	2.632
LOWEST : 17.99	2.446

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	4.530
93.21	4.151
72.68	3.696
52.14	3.175
31.60	2.115
LOWEST : 21.34	1.750

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	4.338
97.85	3.950
76.94	3.466
56.04	2.907
35.13	1.932
LOWEST : 24.68	1.500

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	4.192

		102.48	3.792
		81.21	3.301
		59.94	2.698
		38.66	1.930
	LOWEST :	28.03	1.548

AT POINT(521.25, 528.75) :

RADIUS	FS
128.75	4.071
107.11	3.667
85.47	3.179
63.83	2.599
42.19	2.012
LOWEST : 31.37	1.790

AT POINT(505.00, 505.00) :

RADIUS	FS
105.00	4.933
84.63	4.608
64.26	4.247
43.90	3.593
23.53	2.811
LOWEST : 8.25	2.434

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	4.677
89.26	4.301
68.53	3.845
47.79	3.312
27.06	2.172
LOWEST : 16.69	1.771

AT POINT(515.00, 515.00) :

RADIUS	FS
115.00	4.469
93.90	4.079
72.79	3.579
51.69	3.010
30.59	1.996
LOWEST : 20.04	1.619

AT POINT(520.00, 520.00) :

RADIUS	FS
120.00	4.310
98.53	3.902
77.06	3.401
55.59	2.796
34.12	2.044
LOWEST : 23.38	1.755

AT POINT(525.00, 525.00) :

RADIUS	FS
125.00	4.176
103.16	3.764
81.32	3.268
59.49	2.676
37.65	2.192
LOWEST : 26.73	2.103

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 527.50) : RADIUS FS
MINIMUM FACTOR OF SAFETY : 32.67 1.470

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.091
106.43	3.701
85.35	3.222
64.28	2.645
43.21	1.886
LOWEST : 32.67	1.468

AT POINT(514.50, 527.50) :

RADIUS	FS
127.50	4.091
106.30	3.696
85.10	3.217
63.90	2.631
42.70	1.901
LOWEST : 32.10	1.489

AT POINT(510.50, 527.50) :

RADIUS	FS
127.50	4.091
106.55	3.704
85.61	3.228
64.66	2.664
43.71	1.880
LOWEST : 33.24	1.471

AT POINT(512.50, 529.50) :

RADIUS	FS
129.50	4.042
108.41	3.652
87.31	3.179
66.22	2.610
45.13	1.887
LOWEST : 34.58	1.471

AT POINT(512.50, 525.50) :

RADIUS	FS
125.50	4.142
104.45	3.751
83.40	3.268
62.34	2.684
41.29	1.885
LOWEST : 30.76	1.467

AT POINT(512.50, 523.50) :

RADIUS	FS
123.50	4.196
102.47	3.804
81.44	3.317
60.40	2.728
39.37	1.892
LOWEST : 28.86	1.472

AT POINT(514.50, 525.50) :

RADIUS	FS
125.50	4.143
104.32	3.747

	83.14	3.264
	61.96	2.669
	40.78	1.901
LOWEST :	30.20	1.489

AT POINT(510.50, 525.50) :

RADIUS	FS
125.50	4.142
104.57	3.754
83.65	3.274
62.72	2.704
41.80	1.886
LOWEST : 31.33	1.473

AT POINT(513.00, 525.50) :

RADIUS	FS
125.50	4.142
104.42	3.750
83.33	3.267
62.25	2.680
41.16	1.888
LOWEST : 30.62	1.470

AT POINT(512.00, 525.50) :

RADIUS	FS
125.50	4.142
104.48	3.751
83.46	3.269
62.44	2.689
41.42	1.885
LOWEST : 30.91	1.465

AT POINT(511.50, 525.50) :

RADIUS	FS
125.50	4.142
104.51	3.752
83.52	3.271
62.53	2.693
41.54	1.886
LOWEST : 31.05	1.466

AT POINT(512.00, 526.00) :

RADIUS	FS
126.00	4.129
104.97	3.739
83.95	3.257
62.92	2.678
41.90	1.884
LOWEST : 31.38	1.464

AT POINT(512.00, 526.50) :

RADIUS	FS
126.50	4.116
105.47	3.726
84.44	3.246
63.41	2.669
42.38	1.883
LOWEST : 31.86	1.464

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 526.00) :

	RADIUS	FS
	126.00	4.129
	104.94	3.738
	83.89	3.256
	62.83	2.674
	41.77	1.885
LOWEST :	31.24	1.467

AT POINT(511.50, 526.00) :

	RADIUS	FS
	126.00	4.129
	105.01	3.739
	84.01	3.259
	63.02	2.683
	42.02	1.884
LOWEST :	31.53	1.465

AT POINT(512.00, 526.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	31.38	1.460

WESTERN TECHNOLOGIES INC. 09-04-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 4
East Embankment
Cut/Fill Section - bottom of embankment
No Flow (As-built) w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 3

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	500.00	500.00	5000.00	500.00		
3	100.00	500.00	500.00	500.00	530.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	500.00	35.00	105.2
2	600.00	30.00	118.5

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 09-04-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)	
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	490.00	520.00
	510.00	540.00
	525.00	525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : NO SEEPAGE

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	11.765
	100.00	10.961
	80.00	10.134
	60.00	8.627
	40.00	8.009
LOWEST :	40.00	8.009

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	11.312
	105.00	10.404
	85.00	9.377
	65.00	8.242
	45.00	6.465
LOWEST :	45.00	6.465

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	10.921
	109.69	9.975
	89.38	8.908
	69.08	7.642
	48.77	5.773
LOWEST :	43.69	5.462

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	10.568
	114.32	9.628
	93.65	8.481
	72.97	7.211
	52.30	5.504
LOWEST :	41.96	4.890

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	10.296
	118.96	9.328
	97.91	8.206
	76.87	6.921
	55.83	5.601
LOWEST :	45.31	4.702

AT POINT(493.75, 516.25) :

	RADIUS	FS
	116.25	12.033
	96.25	11.218
	76.25	10.357
	56.25	8.788

		36.25	7.772
	LOWEST :	36.25	7.772

AT POINT(498.75, 521.25) :

RADIUS	FS
121.25	11.555
101.11	10.608
80.97	9.565
60.83	8.358
40.69	6.302
LOWEST : 35.66	6.154

AT POINT(503.75, 526.25) :

RADIUS	FS
126.25	11.129
105.74	10.167
85.24	9.042
64.73	7.690
44.22	5.627
LOWEST : 33.97	5.168

AT POINT(508.75, 531.25) :

RADIUS	FS
131.25	10.767
110.38	9.796
89.50	8.611
68.63	7.271
47.75	5.447
LOWEST : 37.32	4.679

AT POINT(513.75, 536.25) :

RADIUS	FS
136.25	10.483
115.01	9.480
93.77	8.328
72.52	6.958
51.28	5.598
LOWEST : 40.66	4.679

AT POINT(497.50, 512.50) :

RADIUS	FS
112.50	12.331
92.50	11.513
72.50	10.622
52.50	9.002
32.50	7.668
LOWEST : 32.50	7.668

AT POINT(502.50, 517.50) :

RADIUS	FS
117.50	11.819
97.16	10.856
76.82	9.785
56.49	8.505
36.15	6.190
LOWEST : 31.06	5.911

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	11.364

			101.79	10.390
			81.09	9.212
			60.38	7.818
			39.68	5.541
		LOWEST :	29.33	4.873

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	10.994
106.43	9.996
85.35	8.786
64.28	7.360
43.21	5.464
LOWEST : 32.67	4.606

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	10.696
111.06	9.676
89.62	8.478
68.18	7.051
46.74	5.660
LOWEST : 36.02	4.918

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	12.674
88.58	11.846
68.41	10.943
48.24	9.245
28.07	7.770
LOWEST : 23.03	7.723

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	12.115
93.21	11.150
72.68	10.054
52.14	8.733
31.60	6.171
LOWEST : 21.34	5.632

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	11.628
97.85	10.654
76.94	9.431
56.04	8.028
35.13	5.559
LOWEST : 24.68	4.762

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	11.254
102.48	10.233
81.21	9.003
59.94	7.511
38.66	5.607
LOWEST : 28.03	4.819

WESTERN TECHNOLOGIES INC. 09-04-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(521.25, 528.75) :

	RADIUS	FS
	128.75	10.943
	107.11	9.902
	85.47	8.658
	63.83	7.216
	42.19	5.919
LOWEST :	31.37	5.502

AT POINT(505.00, 505.00) :

	RADIUS	FS
	105.00	13.067
	84.63	12.242
	64.26	11.384
	43.90	9.637
	23.53	8.255
LOWEST :	13.35	8.157

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	12.451
	89.26	11.501
	68.53	10.395
	47.79	9.081
	27.06	6.328
LOWEST :	16.69	5.689

AT POINT(515.00, 515.00) :

	RADIUS	FS
	115.00	11.948
	93.90	10.972
	72.79	9.722
	51.69	8.329
	30.59	5.735
LOWEST :	20.04	5.100

AT POINT(520.00, 520.00) :

	RADIUS	FS
	120.00	11.556
	98.53	10.515
	77.06	9.265
	55.59	7.784
	34.12	5.983
LOWEST :	28.75	5.350

AT POINT(525.00, 525.00) :

	RADIUS	FS
	125.00	11.217
	103.16	10.161
	81.32	8.901
	59.49	7.448
	37.65	6.488
LOWEST :	26.73	6.410

AT POINT(512.50, 527.50) : RADIUS FS

MINIMUM FACTOR OF SAFETY : 32.67 4.610

WESTERN TECHNOLOGIES INC. 09-04-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 527.50) :

	RADIUS	FS
	127.50	10.994
	106.43	9.996
	85.35	8.786
	64.28	7.360
	43.21	5.464
LOWEST :	32.67	4.606

AT POINT(514.50, 527.50) :

	RADIUS	FS
	127.50	10.995
	106.30	9.981
	85.10	8.777
	63.90	7.321
	42.70	5.557
LOWEST :	32.10	4.650

AT POINT(510.50, 527.50) :

	RADIUS	FS
	127.50	10.996
	106.55	10.011
	85.61	8.800
	64.66	7.412
	43.71	5.430
LOWEST :	33.24	4.626

AT POINT(512.50, 529.50) :

	RADIUS	FS
	129.50	10.868
	108.41	9.868
	87.31	8.672
	66.22	7.259
	45.13	5.496
LOWEST :	34.58	4.609

AT POINT(512.50, 525.50) :

	RADIUS	FS
	125.50	11.127
	104.45	10.130
	83.40	8.908
	62.34	7.472
	41.29	5.449
LOWEST :	30.76	4.612

AT POINT(513.00, 527.50) :

	RADIUS	FS
	127.50	10.994
	106.40	9.992
	85.29	8.783
	64.19	7.347
	43.08	5.479
LOWEST :	32.53	4.615

AT POINT(512.00, 527.50) :

	RADIUS	FS
	127.50	10.994
	106.46	9.999
	85.42	8.789
	64.38	7.373

		43.34	5.454
	LOWEST :	32.81	4.602

AT POINT(511.50, 527.50) :

RADIUS	FS
127.50	10.995
106.49	10.003
85.48	8.792
64.47	7.386
43.46	5.443
LOWEST : 32.96	4.603

AT POINT(512.00, 528.00) :

RADIUS	FS
128.00	10.962
106.95	9.967
85.91	8.759
64.86	7.347
43.81	5.458
LOWEST : 33.29	4.602

AT POINT(512.00, 528.50) :

RADIUS	FS
128.50	10.930
107.45	9.935
86.40	8.731
65.35	7.321
44.29	5.464
LOWEST : 33.77	4.603

AT POINT(512.50, 528.00) :

RADIUS	FS
128.00	10.962
106.92	9.963
85.84	8.757
64.77	7.334
43.69	5.471
LOWEST : 33.15	4.606

AT POINT(511.50, 528.00) :

RADIUS	FS
128.00	10.962
106.99	9.971
85.97	8.763
64.96	7.360
43.94	5.447
LOWEST : 33.43	4.603

AT POINT(512.00, 528.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	33.29	4.600

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 5
East Embankment
Cut/Fill Section - bottom of embankment
Full Flow Conditions w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 5

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	500.00	500.00	500.00	500.00		
3	100.00	500.00	500.00	500.00	524.00	508.00
4	547.00	508.00	551.00	506.00	555.00	508.00
5	100.00	508.00	524.00	508.00	530.00	510.00
	543.00	510.00	547.00	508.00	555.00	508.00
	559.00	510.00	5000.00	510.00		

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	62.4
4	0.00	0.00	62.4

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

NO. OF ADDED RADII : 3

GRID SEARCH WAS SPECIFIED WITH LOCATION AT :

(X,	Y)
490.00	520.00
510.00	540.00
525.00	525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

POINTS ON WATER TABLE

(X,	Y)	(X,	Y)
100.00	508.00	5000.00	508.00

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	5.036
	98.40	4.716
	76.80	4.458
	55.20	3.633
	33.60	21.163
LOWEST :	44.40	3.464

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	4.820
	103.40	4.463
	81.80	4.021
	60.20	15.659
	38.60	2.840
LOWEST :	38.60	2.840

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	4.632
	108.40	4.258
	86.80	3.817
	65.20	3.348
	43.60	2.422
LOWEST :	43.60	2.422

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	4.471
	113.40	4.100
	91.80	3.644
	70.20	3.128
	48.60	2.304
LOWEST :	43.20	2.134

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	4.341
	118.40	3.969
	96.80	3.523
	75.20	3.001

	53.60	1000000.000
LOWEST :	59.00	2.600

AT POINT(493.75, 516.25) :

RADIUS	FS
116.25	5.186
94.65	4.865
73.05	4.605
51.45	3.757
29.85	79.877
LOWEST : 35.25	3.466

AT POINT(498.75, 521.25) :

RADIUS	FS
121.25	4.947
99.65	4.577
78.05	4.135
56.45	19.156
34.85	2.766
LOWEST : 34.85	2.766

AT POINT(503.75, 526.25) :

RADIUS	FS
126.25	4.741
104.65	4.364
83.05	3.908
61.45	3.409
39.85	2.379
LOWEST : 34.45	2.276

AT POINT(508.75, 531.25) :

RADIUS	FS
131.25	4.568
109.65	4.189
88.05	3.715
66.45	3.168
44.85	1000000.000
LOWEST : 55.65	2.889

AT POINT(513.75, 536.25) :

RADIUS	FS
136.25	4.429
114.65	4.049
93.05	3.595
71.45	3.051
49.85	1000000.000
LOWEST : 55.25	2.623

AT POINT(497.50, 512.50) :

RADIUS	FS
112.50	5.357
90.90	5.046
69.30	4.790
47.70	3.926
26.10	1000000.000
LOWEST : 31.50	3.465

AT POINT(502.50, 517.50) :

RADIUS	FS
117.50	5.088

		95.90	4.716
		74.30	4.281
		52.70	24.146
		31.10	2.720
	LOWEST :	25.70	2.696

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	4.864
100.90	4.485
79.30	4.018
57.70	3.494
36.10	2.362
LOWEST : 30.70	2.162

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.678
105.90	4.300
84.30	3.818
62.70	3.238
41.10	1000000.000
LOWEST : 51.90	2.946

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	4.534
110.90	4.148
89.30	3.681
67.70	3.109
46.10	2.549
LOWEST : 35.30	2.076

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	5.558
87.15	5.268
65.55	5.030
43.95	4.144
22.35	1000000.000
LOWEST : 27.75	3.583

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	5.252
92.15	4.888
70.55	4.452
48.95	32.639
27.35	2.718
LOWEST : 21.95	2.576

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	5.000
97.15	4.628
75.55	4.157
53.95	3.627
32.35	2.380
LOWEST : 21.55	2.162

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(516.25, 523.75) :

	RADIUS	FS
	123.75	4.811
	102.15	4.426
	80.55	3.938
	58.95	3.328
	37.35	1000000.000
LOWEST :	42.75	2.851

AT POINT(521.25, 528.75) :

	RADIUS	FS
	128.75	4.651
	107.11	4.260
	85.47	3.781
	63.83	3.201
	42.19	2.671
LOWEST :	31.37	2.257

AT POINT(505.00, 505.00) :

	RADIUS	FS
	105.00	1000000.000
LOWEST :	105.00	1000000.000

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	5.445
	88.40	5.103
	66.80	4.685
	45.20	4.141
	23.60	2.815
LOWEST :	18.20	2.651

AT POINT(515.00, 515.00) :

	RADIUS	FS
	115.00	5.171
	93.40	4.808
	71.80	4.324
	50.20	3.810
	28.60	2.506
LOWEST :	23.20	2.275

AT POINT(520.00, 520.00) :

	RADIUS	FS
	120.00	4.960
	98.40	4.569
	76.80	4.080
	55.20	3.477
	33.60	1000000.000
LOWEST :	39.00	3.027

AT POINT(525.00, 525.00) :

	RADIUS	FS
	125.00	4.777
	103.16	4.383
	81.32	3.890
	59.49	3.299
	37.65	2.882
LOWEST :	26.73	2.548

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

			RADIUS	FS
AT POINT(	517.50,	532.50) :		
MINIMUM FACTOR OF SAFETY :			35.30	2.080

			RADIUS	FS
AT POINT(	517.50,	532.50) :		
			132.50	4.534
			110.90	4.148
			89.30	3.681
			67.70	3.109
			46.10	2.549
		LOWEST :	35.30	2.076
AT POINT(	519.50,	532.50) :	RADIUS	FS
			132.50	4.537
			110.90	4.151
			89.30	3.683
			67.70	3.109
			46.10	2.567
		LOWEST :	35.30	2.169
AT POINT(	515.50,	532.50) :	RADIUS	FS
			132.50	4.532
			110.90	4.145
			89.30	3.681
			67.70	3.115
			46.10	1000000.000
		LOWEST :	51.50	2.684
AT POINT(	517.50,	534.50) :	RADIUS	FS
			134.50	4.480
			112.90	4.096
			91.30	3.634
			69.70	3.071
			48.10	2.528
		LOWEST :	37.30	2.086
AT POINT(	517.50,	530.50) :	RADIUS	FS
			130.50	4.592
			108.90	4.204
			87.30	3.732
			65.70	3.152
			44.10	2.561
		LOWEST :	33.30	2.073
AT POINT(	517.50,	528.50) :	RADIUS	FS
			128.50	4.653
			106.90	4.263
			85.30	3.787
			63.70	3.196
			42.10	1000000.000
		LOWEST :	47.50	2.766
AT POINT(	519.50,	530.50) :	RADIUS	FS
			130.50	4.595
			108.90	4.206

	87.30	3.734
	65.70	3.155
	44.10	2.598
LOWEST :	33.30	2.160

AT POINT(515.50, 530.50) :

RADIUS	FS
130.50	4.590
108.90	4.203
87.30	3.732
65.70	3.155
44.10	1000000.000
LOWEST : 49.50	2.712

AT POINT(518.00, 530.50) :

RADIUS	FS
130.50	4.593
108.90	4.204
87.30	3.732
65.70	3.151
44.10	2.571
LOWEST : 33.30	2.090

AT POINT(517.00, 530.50) :

RADIUS	FS
130.50	4.591
108.90	4.203
87.30	3.732
65.70	3.153
44.10	1000000.000
LOWEST : 49.50	2.727

AT POINT(517.50, 531.00) :

RADIUS	FS
131.00	4.577
109.40	4.189
87.80	3.719
66.20	3.141
44.60	2.559
LOWEST : 33.80	2.073

AT POINT(517.50, 530.00) :

RADIUS	FS
130.00	4.607
108.40	4.218
86.80	3.745
65.20	3.163
43.60	2.562
LOWEST : 32.80	2.073

AT POINT(517.50, 530.50) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 33.30	2.070

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Grieiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 6
East Embankment
Cut/Fill Section - bottom of embankment
Rapid Drawdown w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	500.00	500.00	5000.00	500.00		
3	547.00	508.00	551.00	506.00	555.00	508.00
4	100.00	500.00	500.00	500.00	530.00	510.00
	543.00	510.00	547.00	508.00	555.00	508.00
	559.00	510.00	5000.00	510.00		

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	62.4

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(____X___,	____Y___)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	490.00	520.00
	510.00	540.00
	525.00	525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------]	
(___X____,	___Y____)	(___X____,	___Y____)	(___X____,	___Y____)
100.00	500.00	500.00	500.00	524.00	508.00
5000.00	508.00				

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	4.449
	100.00	4.125
	80.00	3.785
	60.00	3.175
	40.00	2.783
LOWEST :	40.00	2.783

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	4.277
	105.00	3.922
	85.00	3.509
	65.00	3.014
	45.00	2.283
LOWEST :	40.00	2.225

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	4.125
	109.69	3.760
	89.38	3.330
	69.08	2.808
	48.77	2.046
LOWEST :	38.61	1.862

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	3.992
	114.32	3.624
	93.65	3.175
	72.97	2.654
	52.30	1.943
LOWEST :	41.96	1.651

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	3.888
	118.96	3.512
	97.91	3.067
	76.87	2.545
	55.83	1.946
LOWEST :	45.31	1.605

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(493.75, 516.25) :

RADIUS	FS
116.25	4.555
96.25	4.228
76.25	3.880
56.25	3.242
36.25	2.716
LOWEST : 36.25	2.716

AT POINT(498.75, 521.25) :

RADIUS	FS
121.25	4.372
101.11	4.004
80.97	3.583
60.83	3.062
40.69	2.233
LOWEST : 30.62	2.113

AT POINT(503.75, 526.25) :

RADIUS	FS
126.25	4.209
105.74	3.836
85.24	3.389
64.73	2.829
44.22	1.997
LOWEST : 33.97	1.732

AT POINT(508.75, 531.25) :

RADIUS	FS
131.25	4.071
110.38	3.692
89.50	3.227
68.63	2.676
47.75	1.917
LOWEST : 37.32	1.586

AT POINT(513.75, 536.25) :

RADIUS	FS
136.25	3.961
115.01	3.572
93.77	3.115
72.52	2.563
51.28	1.951
LOWEST : 40.66	1.611

AT POINT(497.50, 512.50) :

RADIUS	FS
112.50	4.674
92.50	4.348
72.50	3.988
52.50	3.337
32.50	2.696
LOWEST : 27.50	2.658

AT POINT(502.50, 517.50) :

RADIUS	FS
117.50	4.475
97.16	4.104
76.82	3.669
56.49	3.121

	36.15	2.197
LOWEST :	25.98	1.960

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	4.302
101.79	3.922
81.09	3.460
60.38	2.884
39.68	1.969
LOWEST : 29.33	1.634

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.160
106.43	3.773
85.35	3.294
64.28	2.712
43.21	1.921
LOWEST : 32.67	1.570

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	4.044
111.06	3.649
89.62	3.175
68.18	2.599
46.74	1.982
LOWEST : 36.02	1.723

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	4.809
88.58	4.484
68.41	4.117
48.24	3.450
28.07	2.739
LOWEST : 17.99	2.582

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	4.591
93.21	4.220
72.68	3.777
52.14	3.211
31.60	2.192
LOWEST : 21.34	1.853

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	4.406
97.85	4.025
76.94	3.547
56.04	2.964
35.13	1.977
LOWEST : 24.68	1.600

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	4.262

			102.48	3.866
			81.21	3.377
			59.94	2.769
			38.66	1.965
		LOWEST :	28.03	1.668
AT POINT(	521.25,	528.75) :	RADIUS	FS
			128.75	4.140
			107.11	3.738
			85.47	3.249
			63.83	2.662
			42.19	2.068
		LOWEST :	36.78	1.898
AT POINT(	505.00,	505.00) :	RADIUS	FS
			105.00	4.965
			84.63	4.646
			64.26	4.292
			43.90	3.626
			23.53	2.925
		LOWEST :	8.25	2.664
AT POINT(	510.00,	510.00) :	RADIUS	FS
			110.00	4.725
			89.26	4.357
			68.53	3.913
			47.79	3.348
			27.06	2.249
		LOWEST :	16.69	1.865
AT POINT(	515.00,	515.00) :	RADIUS	FS
			115.00	4.532
			93.90	4.151
			72.79	3.658
			51.69	3.076
			30.59	2.042
		LOWEST :	20.04	1.734
AT POINT(	520.00,	520.00) :	RADIUS	FS
			120.00	4.379
			98.53	3.977
			77.06	3.480
			55.59	2.874
			34.12	2.084
		LOWEST :	28.75	1.870
AT POINT(	525.00,	525.00) :	RADIUS	FS
			125.00	4.246
			103.16	3.838
			81.32	3.342
			59.49	2.744
			37.65	2.253
		LOWEST :	32.19	2.247

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 527.50) : RADIUS FS
MINIMUM FACTOR OF SAFETY : 32.67 1.570

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.160
106.43	3.773
85.35	3.294
64.28	2.712
43.21	1.921
LOWEST : 32.67	1.570

AT POINT(514.50, 527.50) :

RADIUS	FS
127.50	4.161
106.30	3.768
85.10	3.289
63.90	2.697
42.70	1.936
LOWEST : 32.10	1.598

AT POINT(510.50, 527.50) :

RADIUS	FS
127.50	4.160
106.55	3.776
85.61	3.301
64.66	2.731
43.71	1.917
LOWEST : 33.24	1.569

AT POINT(508.50, 527.50) :

RADIUS	FS
127.50	4.161
106.68	3.781
85.86	3.309
65.04	2.750
44.22	1.925
LOWEST : 33.81	1.590

AT POINT(510.50, 529.50) :

RADIUS	FS
129.50	4.111
108.53	3.728
87.57	3.256
66.60	2.692
45.63	1.914
LOWEST : 35.15	1.570

AT POINT(510.50, 525.50) :

RADIUS	FS
125.50	4.212
104.57	3.828
83.65	3.349
62.72	2.774
41.80	1.923
LOWEST : 31.33	1.570

AT POINT(511.00, 527.50) :

RADIUS	FS
127.50	4.160
106.52	3.775

	85.54	3.299
	64.57	2.726
	43.59	1.917
LOWEST :	33.10	1.565

AT POINT(511.50, 527.50) :

RADIUS	FS
127.50	4.160
106.49	3.775
85.48	3.297
64.47	2.721
43.46	1.918
LOWEST : 32.96	1.564

AT POINT(512.00, 527.50) :

RADIUS	FS
127.50	4.160
106.46	3.774
85.42	3.296
64.38	2.716
43.34	1.920
LOWEST : 32.81	1.566

AT POINT(511.50, 528.00) :

RADIUS	FS
128.00	4.147
106.99	3.762
85.97	3.286
64.96	2.711
43.94	1.918
LOWEST : 33.43	1.565

AT POINT(511.50, 527.00) :

RADIUS	FS
127.00	4.173
106.00	3.787
84.99	3.309
63.99	2.731
42.98	1.919
LOWEST : 32.48	1.564

AT POINT(511.50, 526.50) :

RADIUS	FS
126.50	4.186
105.50	3.800
84.50	3.321
63.50	2.742
42.50	1.920
LOWEST : 32.00	1.564

AT POINT(512.00, 527.00) :

RADIUS	FS
127.00	4.173
105.96	3.786
84.93	3.307
63.89	2.726
42.86	1.920
LOWEST : 32.34	1.565

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(511.00, 527.00) :	RADIUS	FS
	127.00	4.173
	106.03	3.788
	85.05	3.311
	64.08	2.736
	43.11	1.918
LOWEST :	32.62	1.566

AT POINT(511.50, 527.00) :	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	32.48	1.560

WESTERN TECHNOLOGIES INC. 09-05-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 7
East Embankment
Cut /Fill Section - middle of embankment
No Flow (As-built) w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 3

LINE NO.	(____X___,____Y___)		(____X___,____Y___)		(____X___,____Y___)	
1	100.00	400.00	5000.00	400.00		
2	515.00	505.00	5000.00	505.00		
3	100.00	500.00	500.00	500.00	530.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	500.00	35.00	105.2
2	600.00	30.00	118.5

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 09-05-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	490.00 520.00
	510.00 540.00
	525.00 525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : NO SEEPAGE

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	11.934
	100.00	11.135
	80.00	10.370
	60.00	8.875
	40.00	8.324
LOWEST :	40.00	8.324

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	11.468
	105.00	10.563
	85.00	9.546
	65.00	8.493
	45.00	6.712
LOWEST :	45.00	6.712

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	11.068
	109.69	10.127
	89.38	9.068
	69.08	7.869
	48.77	5.960
LOWEST :	43.69	5.712

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	10.708
	114.32	9.773
	93.65	8.633
	72.97	7.382
	52.30	5.683
LOWEST :	41.96	5.069

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	10.431
	118.96	9.467
	97.91	8.352
	76.87	7.080
	55.83	5.776
LOWEST :	45.31	4.829

AT POINT(493.75, 516.25) :

	RADIUS	FS
	116.25	12.213
	96.25	11.401
	76.25	10.590
	56.25	9.029

		36.25	8.074
	LOWEST :	36.25	8.074

AT POINT(498.75, 521.25) :

RADIUS	FS
121.25	11.718
101.11	10.772
80.97	9.737
60.83	8.605
40.69	6.534
LOWEST : 35.66	6.404

AT POINT(503.75, 526.25) :

RADIUS	FS
126.25	11.282
105.74	10.322
85.24	9.204
64.73	7.914
44.22	5.799
LOWEST : 33.97	5.356

AT POINT(508.75, 531.25) :

RADIUS	FS
131.25	10.909
110.38	9.943
89.50	8.764
68.63	7.440
47.75	5.609
LOWEST : 37.32	4.830

AT POINT(513.75, 536.25) :

RADIUS	FS
136.25	10.618
115.01	9.618
93.77	8.473
72.52	7.115
51.28	5.778
LOWEST : 40.66	4.774

AT POINT(497.50, 512.50) :

RADIUS	FS
112.50	12.528
92.50	11.712
72.50	10.854
52.50	9.237
32.50	7.949
LOWEST : 32.50	7.949

AT POINT(502.50, 517.50) :

RADIUS	FS
117.50	11.993
97.16	11.029
76.82	9.961
56.49	8.749
36.15	6.415
LOWEST : 31.06	6.162

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	11.521

		101.79	10.549
		81.09	9.375
		60.38	8.040
		39.68	5.700
	LOWEST :	29.33	5.051

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	11.140
106.43	10.143
85.35	8.938
64.28	7.525
43.21	5.605
LOWEST : 32.67	4.725

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	10.834
111.06	9.814
89.62	8.620
68.18	7.203
46.74	5.848
LOWEST : 36.02	4.976

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	12.895
88.58	12.069
68.41	11.187
48.24	9.484
28.07	8.007
LOWEST : 28.07	8.007

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	12.303
93.21	11.334
72.68	10.239
52.14	8.973
31.60	6.381
LOWEST : 21.34	5.969

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	11.792
97.85	10.817
76.94	9.594
56.04	8.244
35.13	5.715
LOWEST : 24.68	4.927

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	11.404
102.48	10.382
81.21	9.153
59.94	7.671
38.66	5.734
LOWEST : 28.03	4.894

WESTERN TECHNOLOGIES INC. 09-05-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(521.25, 528.75) :

	RADIUS	FS
	128.75	11.081
	107.11	10.040
	85.47	8.798
	63.83	7.364
	42.19	6.106
LOWEST :	31.37	5.501

AT POINT(505.00, 505.00) :

	RADIUS	FS
	105.00	13.330
	84.63	12.511
	64.26	11.671
	43.90	9.905
	23.53	8.476
LOWEST :	18.44	8.462

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	12.658
	89.26	11.704
	68.53	10.591
	47.79	9.315
	27.06	6.499
LOWEST :	16.69	6.037

AT POINT(515.00, 515.00) :

	RADIUS	FS
	115.00	12.123
	93.90	11.144
	72.79	9.886
	51.69	8.536
	30.59	5.886
LOWEST :	20.04	5.238

AT POINT(520.00, 520.00) :

	RADIUS	FS
	120.00	11.710
	98.53	10.665
	77.06	9.412
	55.59	7.935
	34.12	6.088
LOWEST :	28.75	5.432

AT POINT(525.00, 525.00) :

	RADIUS	FS
	125.00	11.357
	103.16	10.299
	81.32	9.038
	59.49	7.586
	37.65	6.654
LOWEST :	26.73	6.355

AT POINT(512.50, 527.50) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	32.67	4.730

WESTERN TECHNOLOGIES INC. 09-05-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 527.50) :

	RADIUS	FS
	127.50	11.140
	106.43	10.143
	85.35	8.938
	64.28	7.525
	43.21	5.605
LOWEST :	32.67	4.725

AT POINT(514.50, 527.50) :

	RADIUS	FS
	127.50	11.140
	106.30	10.127
	85.10	8.926
	63.90	7.482
	42.70	5.689
LOWEST :	32.10	4.743

AT POINT(510.50, 527.50) :

	RADIUS	FS
	127.50	11.142
	106.55	10.161
	85.61	8.954
	64.66	7.582
	43.71	5.593
LOWEST :	33.24	4.766

AT POINT(512.50, 529.50) :

	RADIUS	FS
	129.50	11.011
	108.41	10.014
	87.31	8.822
	66.22	7.423
	45.13	5.634
LOWEST :	34.58	4.725

AT POINT(512.50, 531.50) :

	RADIUS	FS
	131.50	10.888
	110.39	9.892
	89.27	8.714
	68.16	7.334
	47.04	5.700
LOWEST :	36.49	4.731

AT POINT(514.50, 529.50) :

	RADIUS	FS
	129.50	11.011
	108.28	9.997
	87.06	8.809
	65.84	7.382
	44.62	5.753
LOWEST :	34.01	4.742

AT POINT(510.50, 529.50) :

	RADIUS	FS
	129.50	11.013
	108.53	10.032
	87.57	8.839
	66.60	7.480

		45.63	5.596
	LOWEST :	35.15	4.755

AT POINT(513.00, 529.50) :

RADIUS	FS
129.50	11.011
108.38	10.010
87.25	8.819
66.13	7.413
45.00	5.660
LOWEST : 34.44	4.728

AT POINT(512.00, 529.50) :

RADIUS	FS
129.50	11.011
108.44	10.019
87.38	8.826
66.31	7.435
45.25	5.618
LOWEST : 34.72	4.726

AT POINT(512.50, 530.00) :

RADIUS	FS
130.00	10.980
108.90	9.983
87.80	8.794
66.70	7.400
45.61	5.651
LOWEST : 35.06	4.726

AT POINT(512.50, 529.00) :

RADIUS	FS
129.00	11.043
107.91	10.046
86.82	8.850
65.74	7.447
44.65	5.625
LOWEST : 34.10	4.724

AT POINT(512.50, 528.50) :

RADIUS	FS
128.50	11.075
107.42	10.078
86.33	8.879
65.25	7.472
44.17	5.618
LOWEST : 33.63	4.724

AT POINT(512.50, 528.00) :

RADIUS	FS
128.00	11.107
106.92	10.110
85.84	8.908
64.77	7.498
43.69	5.611
LOWEST : 33.15	4.724

AT POINT(513.00, 528.50) :

RADIUS	FS
128.50	11.075

	107.39	10.074
	86.27	8.876
	65.16	7.460
	44.04	5.631
LOWEST :	33.48	4.728

AT POINT(512.00, 528.50) :

RADIUS	FS
128.50	11.075
107.45	10.082
86.40	8.882
65.35	7.486
44.29	5.605
LOWEST : 33.77	4.725

AT POINT(512.50, 528.50) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	33.63	4.720

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 8
East Embankment
Cut/Fill Section - middle of embankment
Full Flow Coditions w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 5

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	100.00	400.00	5000.00	400.00		
2	515.00	505.00	5000.00	505.00		
3	100.00	500.00	500.00	500.00	515.00	505.00
4	547.00	508.00	551.00	506.00	555.00	508.00
5	100.00	508.00	524.00	508.00	530.00	510.00
	543.00	510.00	547.00	508.00	555.00	508.00
	559.00	510.00	5000.00	510.00		

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	62.4
4	0.00	0.00	62.4

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

NO. OF ADDED RADII : 3

GRID SEARCH WAS SPECIFIED WITH LOCATION AT :

(X, Y)	
490.00	520.00
510.00	540.00
525.00	525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

POINTS ON WATER TABLE

(X, Y)		(X, Y)		(X, Y)	
100.00	508.00	5000.00	508.00		

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	5.075
	98.40	4.751
	76.80	4.493
	55.20	3.585
	33.60	35.282
LOWEST :	39.00	3.356

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	4.867
	103.40	4.512
	81.80	4.063
	60.20	15.727
	38.60	2.841
LOWEST :	38.60	2.841

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	4.678
	108.40	4.309
	86.80	3.871
	65.20	3.346
	43.60	2.456
LOWEST :	38.20	2.380

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	4.516
	113.40	4.149
	91.80	3.696
	70.20	3.173
	48.60	2.308
LOWEST :	43.20	2.165

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	4.385
	118.40	4.015
	96.80	3.570
	75.20	3.049

	53.60	1000000.000
LOWEST :	59.00	2.625

AT POINT(493.75, 516.25) :

RADIUS	FS
116.25	5.224
94.65	4.904
73.05	4.602
51.45	3.732
29.85	544.683
LOWEST : 35.25	3.396

AT POINT(498.75, 521.25) :

RADIUS	FS
121.25	4.993
99.65	4.628
78.05	4.188
56.45	20.681
34.85	2.679
LOWEST : 34.85	2.679

AT POINT(503.75, 526.25) :

RADIUS	FS
126.25	4.788
104.65	4.416
83.05	3.966
61.45	3.424
39.85	2.397
LOWEST : 34.45	2.292

AT POINT(508.75, 531.25) :

RADIUS	FS
131.25	4.614
109.65	4.239
88.05	3.767
66.45	3.223
44.85	1000000.000
LOWEST : 55.65	2.913

AT POINT(513.75, 536.25) :

RADIUS	FS
136.25	4.474
114.65	4.097
93.05	3.646
71.45	3.104
49.85	1000000.000
LOWEST : 55.25	2.650

AT POINT(497.50, 512.50) :

RADIUS	FS
112.50	5.389
90.90	5.081
69.30	4.800
47.70	3.924
26.10	1000000.000
LOWEST : 31.50	3.461

AT POINT(502.50, 517.50) :

RADIUS	FS
117.50	5.130

	95.90	4.766
	74.30	4.339
	52.70	25.086
	31.10	2.690
LOWEST :	25.70	2.658

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	4.910
100.90	4.536
79.30	4.075
57.70	3.523
36.10	2.410
LOWEST : 30.70	2.196

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.725
105.90	4.352
84.30	3.875
62.70	3.299
41.10	1000000.000
LOWEST : 51.90	2.968

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	4.580
110.90	4.198
89.30	3.735
67.70	3.166
46.10	2.589
LOWEST : 35.30	2.209

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	5.578
87.15	5.289
65.55	5.040
43.95	4.154
22.35	1000000.000
LOWEST : 27.75	3.473

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	5.287
92.15	4.929
70.55	4.507
48.95	32.240
27.35	2.744
LOWEST : 21.95	2.543

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	5.044
97.15	4.680
75.55	4.218
53.95	3.667
32.35	2.447
LOWEST : 21.55	2.213

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANAIYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(516.25, 523.75) :

	RADIUS	FS
	123.75	4.858
	102.15	4.479
	80.55	3.998
	58.95	3.395
	37.35	1000000.000
LOWEST :	42.75	2.883

AT POINT(521.25, 528.75) :

	RADIUS	FS
	128.75	4.697
	107.11	4.311
	85.47	3.837
	63.83	3.290
	42.19	2.745
LOWEST :	31.37	2.367

AT POINT(505.00, 505.00) :

	RADIUS	FS
	105.00	1000000.000
LOWEST :	105.00	1000000.000

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	5.469
	88.40	5.132
	66.80	4.721
	45.20	4.158
	23.60	2.836
LOWEST :	18.20	2.639

AT POINT(515.00, 515.00) :

	RADIUS	FS
	115.00	5.211
	93.40	4.855
	71.80	4.382
	50.20	3.863
	28.60	2.586
LOWEST :	23.20	2.373

AT POINT(520.00, 520.00) :

	RADIUS	FS
	120.00	5.005
	98.40	4.621
	76.80	4.141
	55.20	3.550
	33.60	1000000.000
LOWEST :	39.00	3.100

AT POINT(525.00, 525.00) :

	RADIUS	FS
	125.00	4.824
	103.16	4.435
	81.32	3.970
	59.49	3.382
	37.65	3.049
LOWEST :	26.73	2.715

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(	505.00,	535.00) :	RADIUS	FS
MINIMUM FACTOR OF SAFETY :			43.20	2.170

AT POINT(	505.00,	535.00) :	RADIUS	FS
			135.00	4.516
			113.40	4.149
			91.80	3.696
			70.20	3.173
			48.60	2.308
		LOWEST :	43.20	2.165

AT POINT(	507.00,	535.00) :	RADIUS	FS
			135.00	4.511
			113.40	4.141
			91.80	3.679
			70.20	3.155
			48.60	1000000.000
		LOWEST :	59.40	2.858

AT POINT(	503.00,	535.00) :	RADIUS	FS
			135.00	4.524
			113.40	4.158
			91.80	3.716
			70.20	3.195
			48.60	2.323
		LOWEST :	43.20	2.233

AT POINT(	505.00,	537.00) :	RADIUS	FS
			137.00	4.462
			115.40	4.098
			93.80	3.645
			72.20	3.129
			50.60	2.309
		LOWEST :	45.20	2.161

AT POINT(	505.00,	539.00) :	RADIUS	FS
			139.00	4.412
			117.40	4.050
			95.80	3.603
			74.20	3.093
			52.60	1000000.000
		LOWEST :	63.40	2.811

AT POINT(	507.00,	537.00) :	RADIUS	FS
			137.00	4.460
			115.40	4.091
			93.80	3.634
			72.20	3.117
			50.60	1000000.000
		LOWEST :	61.40	2.823

AT POINT(	503.00,	537.00) :	RADIUS	FS
			137.00	4.470
			115.40	4.106

		93.80	3.666
		72.20	3.149
		50.60	2.314
	LOWEST :	45.20	2.230

AT POINT(505.50, 537.00) :

RADIUS	FS
137.00	4.461
115.40	4.096
93.80	3.643
72.20	3.123
50.60	2.314
LOWEST : 45.20	2.155

AT POINT(506.00, 537.00) :

RADIUS	FS
137.00	4.460
115.40	4.093
93.80	3.637
72.20	3.121
50.60	1000000.000
LOWEST : 61.40	2.833

AT POINT(505.50, 537.50) :

RADIUS	FS
137.50	4.448
115.90	4.084
94.30	3.632
72.70	3.115
51.10	1000000.000
LOWEST : 61.90	2.830

AT POINT(505.50, 536.50) :

RADIUS	FS
136.50	4.473
114.90	4.109
93.30	3.654
71.70	3.133
50.10	2.313
LOWEST : 44.70	2.156

AT POINT(505.50, 537.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	45.20	2.160

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 9
East Embankment
Cut/Fill Section - middle of embankment
Rapid Drawdown w/ Seismic

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,____Y___)		(____X___,____Y___)		(____X___,____Y___)	
1	100.00	400.00	5000.00	400.00		
2	515.00	505.00	5000.00	505.00		
3	547.00	508.00	551.00	506.00	555.00	508.00
4	100.00	500.00	500.00	500.00	530.00	510.00
	543.00	510.00	547.00	508.00	555.00	508.00
	559.00	510.00	5000.00	510.00		

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	62.4

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	490.00, 520.00
	510.00, 540.00
	525.00, 525.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 4.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 4.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------	POINTS ON WATER TABLE	----------]
(X, Y)	(X, Y)	(X, Y)
100.00, 500.00	500.00, 500.00	524.00, 508.00
5000.00, 508.00		

RESULTS OF REITERATIONS -

AT POINT(490.00, 520.00) :

	RADIUS	FS
	120.00	4.410
	100.00	4.082
	80.00	3.755
	60.00	3.158
	40.00	2.742
LOWEST :	40.00	2.742

AT POINT(495.00, 525.00) :

	RADIUS	FS
	125.00	4.239
	105.00	3.883
	85.00	3.469
	65.00	3.002
	45.00	2.265
LOWEST :	40.00	2.191

AT POINT(500.00, 530.00) :

	RADIUS	FS
	130.00	4.090
	109.69	3.724
	89.38	3.296
	69.08	2.794
	48.77	2.024
LOWEST :	38.61	1.804

AT POINT(505.00, 535.00) :

	RADIUS	FS
	135.00	3.959
	114.32	3.591
	93.65	3.145
	72.97	2.629
	52.30	1.921
LOWEST :	41.96	1.611

AT POINT(510.00, 540.00) :

	RADIUS	FS
	140.00	3.857
	118.96	3.482
	97.91	3.039
	76.87	2.524
	55.83	1.923
LOWEST :	45.31	1.556

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(493.75, 516.25) :

	RADIUS	FS
	116.25	4.517
	96.25	4.186
	76.25	3.844
	56.25	3.226
	36.25	2.677
LOWEST :	36.25	2.677

AT POINT(498.75, 521.25) :

	RADIUS	FS
	121.25	4.334
	101.11	3.964
	80.97	3.542
	60.83	3.050
	40.69	2.211
LOWEST :	30.62	2.070

AT POINT(503.75, 526.25) :

	RADIUS	FS
	126.25	4.173
	105.74	3.799
	85.24	3.353
	64.73	2.813
	44.22	1.973
LOWEST :	33.97	1.679

AT POINT(508.75, 531.25) :

	RADIUS	FS
	131.25	4.036
	110.38	3.657
	89.50	3.195
	68.63	2.650
	47.75	1.893
LOWEST :	37.32	1.544

AT POINT(513.75, 536.25) :

	RADIUS	FS
	136.25	3.929
	115.01	3.541
	93.77	3.086
	72.52	2.541
	51.28	1.926
LOWEST :	40.66	1.556

AT POINT(497.50, 512.50) :

	RADIUS	FS
	112.50	4.639
	92.50	4.307
	72.50	3.949
	52.50	3.318
	32.50	2.649
LOWEST :	27.50	2.600

AT POINT(502.50, 517.50) :

	RADIUS	FS
	117.50	4.437
	97.16	4.064
	76.82	3.625
	56.49	3.107

		36.15	2.173
	LOWEST :	25.98	1.917

AT POINT(507.50, 522.50) :

RADIUS	FS
122.50	4.266
101.79	3.883
81.09	3.421
60.38	2.864
39.68	1.943
LOWEST : 29.33	1.588

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.125
106.43	3.737
85.35	3.260
64.28	2.684
43.21	1.897
LOWEST : 32.67	1.524

AT POINT(517.50, 532.50) :

RADIUS	FS
132.50	4.011
111.06	3.616
89.62	3.145
68.18	2.575
46.74	1.955
LOWEST : 36.02	1.650

AT POINT(501.25, 508.75) :

RADIUS	FS
108.75	4.779
88.58	4.448
68.41	4.078
48.24	3.429
28.07	2.675
LOWEST : 17.99	2.484

AT POINT(506.25, 513.75) :

RADIUS	FS
113.75	4.556
93.21	4.180
72.68	3.732
52.14	3.195
31.60	2.165
LOWEST : 21.34	1.815

AT POINT(511.25, 518.75) :

RADIUS	FS
118.75	4.370
97.85	3.985
76.94	3.506
56.04	2.940
35.13	1.952
LOWEST : 24.68	1.559

AT POINT(516.25, 523.75) :

RADIUS	FS
123.75	4.226

		102.48	3.829
		81.21	3.340
		59.94	2.739
		38.66	1.941
	LOWEST :	28.03	1.609

AT POINT(521.25, 528.75) :

RADIUS	FS
128.75	4.106
107.11	3.704
85.47	3.217
63.83	2.637
42.19	2.043
LOWEST : 31.37	1.853

AT POINT(505.00, 505.00) :

RADIUS	FS
105.00	4.945
84.63	4.621
64.26	4.263
43.90	3.607
23.53	2.856
LOWEST : 8.25	2.434

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	4.694
89.26	4.321
68.53	3.869
47.79	3.329
27.06	2.211
LOWEST : 16.69	1.834

AT POINT(515.00, 515.00) :

RADIUS	FS
115.00	4.496
93.90	4.111
72.79	3.616
51.69	3.046
30.59	2.019
LOWEST : 20.04	1.688

AT POINT(520.00, 520.00) :

RADIUS	FS
120.00	4.343
98.53	3.938
77.06	3.441
55.59	2.840
34.12	2.057
LOWEST : 23.38	1.828

AT POINT(525.00, 525.00) :

RADIUS	FS
125.00	4.211
103.16	3.801
81.32	3.307
59.49	2.717
37.65	2.229
LOWEST : 26.73	2.178

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 527.50) : RADIUS FS
MINIMUM FACTOR OF SAFETY : 32.67 1.520

AT POINT(512.50, 527.50) :

RADIUS	FS
127.50	4.125
106.43	3.737
85.35	3.260
64.28	2.684
43.21	1.897
LOWEST : 32.67	1.524

AT POINT(514.50, 527.50) :

RADIUS	FS
127.50	4.126
106.30	3.732
85.10	3.255
63.90	2.670
42.70	1.913
LOWEST : 32.10	1.547

AT POINT(510.50, 527.50) :

RADIUS	FS
127.50	4.125
106.55	3.740
85.61	3.266
64.66	2.703
43.71	1.893
LOWEST : 33.24	1.525

AT POINT(512.50, 529.50) :

RADIUS	FS
129.50	4.076
108.41	3.689
87.31	3.217
66.22	2.648
45.13	1.897
LOWEST : 34.58	1.528

AT POINT(512.50, 525.50) :

RADIUS	FS
125.50	4.176
104.45	3.788
83.40	3.307
62.34	2.724
41.29	1.898
LOWEST : 30.76	1.523

AT POINT(512.50, 523.50) :

RADIUS	FS
123.50	4.230
102.47	3.841
81.44	3.357
60.40	2.769
39.37	1.906
LOWEST : 28.86	1.529

AT POINT(514.50, 525.50) :

RADIUS	FS
125.50	4.177
104.32	3.784

		83.14	3.303
		61.96	2.709
		40.78	1.912
	LOWEST :	30.20	1.547

AT POINT(510.50, 525.50) :

RADIUS	FS
125.50	4.176
104.57	3.791
83.65	3.313
62.72	2.744
41.80	1.900
LOWEST : 31.33	1.528

AT POINT(513.00, 525.50) :

RADIUS	FS
125.50	4.176
104.42	3.787
83.33	3.306
62.25	2.720
41.16	1.900
LOWEST : 30.62	1.527

AT POINT(512.00, 525.50) :

RADIUS	FS
125.50	4.176
104.48	3.788
83.46	3.308
62.44	2.729
41.42	1.898
LOWEST : 30.91	1.521

AT POINT(511.50, 525.50) :

RADIUS	FS
125.50	4.176
104.51	3.789
83.52	3.309
62.53	2.734
41.54	1.899
LOWEST : 31.05	1.522

AT POINT(512.00, 526.00) :

RADIUS	FS
126.00	4.163
104.97	3.775
83.95	3.296
62.92	2.718
41.90	1.897
LOWEST : 31.38	1.520

AT POINT(512.00, 526.50) :

RADIUS	FS
126.50	4.150
105.47	3.763
84.44	3.284
63.41	2.708
42.38	1.895
LOWEST : 31.86	1.520

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(512.50, 526.00) :

	RADIUS	FS
	126.00	4.163
	104.94	3.775
	83.89	3.295
	62.83	2.714
	41.77	1.897
LOWEST :	31.24	1.523

AT POINT(511.50, 526.00) :

	RADIUS	FS
	126.00	4.163
	105.01	3.776
	84.01	3.298
	63.02	2.723
	42.02	1.897
LOWEST :	31.53	1.521

AT POINT(512.00, 526.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	31.38	1.520

WESTERN TECHNOLOGIES INC. 11-12-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : BWCD Floodway - Reach 6

REMARKS : CASE 10
East Embankment - Cut Section
No Flow (As-built) w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 3

LINE NO.	(____X___,____Y___)		(____X___,____Y___)		(____X___,____Y___)	
1	10.00	400.00	5000.00	400.00		
2	530.00	510.00	540.00	510.00		
3	10.00	500.00	510.00	500.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	500.00	35.00	105.2
2	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-12-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00, 510.00
	495.00, 530.00
	520.00, 540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : NO SEEPAGE

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	12.862
	89.79	11.909
	69.58	10.751
	49.37	9.357
	29.16	6.329
LOWEST :	24.10	6.175

AT POINT(505.00, 516.67) :

	RADIUS	FS
	116.67	12.195
	96.67	11.226
	76.67	10.103
	56.67	8.857
	36.67	6.333
LOWEST :	31.67	6.028

AT POINT(500.00, 523.33) :

	RADIUS	FS
	123.33	11.670
	103.33	10.711
	83.33	9.649
	63.33	9.499
	43.33	6.366
LOWEST :	38.33	6.284

AT POINT(495.00, 530.00) :

	RADIUS	FS
	130.00	11.247
	110.00	10.316
	90.00	9.319
	70.00	8.284
	50.00	6.524
LOWEST :	50.00	6.524

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	12.434
	92.31	11.410
	71.28	10.112
	50.25	8.487
	29.23	5.642
LOWEST :	18.71	4.110

AT POINT(513.33, 526.00) :

	RADIUS	FS
	120.00	11.817
	99.28	10.814
	78.56	9.543
	57.84	8.000

	37.12	5.594
LOWEST :	26.76	4.217

AT POINT(508.33, 526.67) :

RADIUS	FS
126.67	11.329
106.25	10.370
85.84	9.159
65.42	7.763
45.01	5.738
LOWEST : 34.80	4.608

AT POINT(503.33, 533.33) :

RADIUS	FS
133.33	10.941
113.23	10.017
93.12	8.899
73.01	7.640
52.90	5.942
LOWEST : 42.85	5.102

AT POINT(526.67, 516.67) :

RADIUS	FS
116.67	12.151
94.76	11.082
72.85	9.728
50.95	8.089
29.04	6.380
LOWEST : 12.61	4.786

AT POINT(521.67, 523.33) :

RADIUS	FS
123.33	11.557
101.76	10.479
80.19	9.184
58.61	7.586
37.04	5.717
LOWEST : 26.25	4.122

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	11.086
108.76	10.041
87.52	8.816
66.28	7.329
45.04	5.633
LOWEST : 29.11	3.928

AT POINT(511.67, 536.67) :

RADIUS	FS
136.67	10.768
115.74	9.720
94.82	8.570
73.90	7.207
52.97	5.718
LOWEST : 37.28	4.163

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	11.911

	97.80	10.848
	75.60	9.577
	53.40	8.133
	31.20	8.259
LOWEST :	36.75	7.547

AT POINT(530.00, 526.67) :

	RADIUS	FS
	126.67	11.357
	104.47	10.295
	82.28	8.971
	60.09	7.447
	37.89	6.261
LOWEST :	37.89	6.261

AT POINT(525.00, 533.33) :

	RADIUS	FS
	133.33	10.898
	111.29	9.848
	89.25	8.579
	67.21	7.070
	45.17	5.645
LOWEST :	34.15	5.159

AT POINT(520.00, 540.00) :

	RADIUS	FS
	140.00	10.528
	118.20	9.506
	96.41	8.297
	74.61	6.903
	52.81	5.503
LOWEST :	41.91	4.477

AT POINT(516.67, 530.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	29.11	3.930

AT POINT(516.67, 530.00) :

	RADIUS	FS
	130.00	11.086
	108.76	10.041
	87.52	8.816
	66.28	7.329
	45.04	5.633
LOWEST :	29.11	3.928

AT POINT(516.67, 530.00) :

	RADIUS	FS
	130.00	11.088
	108.53	10.032
	87.06	8.785
	65.59	7.277
	44.12	5.577
LOWEST :	28.02	4.107

AT POINT(514.67, 530.00) :

RADIUS	FS

	130.00	11.088
	108.95	10.059
	87.90	8.849
	66.85	7.383
	45.80	5.666
LOWEST :	35.27	4.193

AT POINT(516.67, 532.00) :

RADIUS	FS
132.00	10.963
110.69	9.923
89.37	8.705
68.06	7.236
46.74	5.594
LOWEST : 30.75	4.001

AT POINT(516.67, 528.00) :

RADIUS	FS
128.00	11.216
106.81	10.166
85.63	8.932
64.44	7.426
43.25	5.650
LOWEST : 27.36	3.893

AT POINT(516.67, 526.00) :

RADIUS	FS
126.00	11.353
104.85	10.301
83.71	9.056
62.56	7.530
41.42	5.638
LOWEST : 25.56	3.884

AT POINT(516.67, 524.00) :

RADIUS	FS
124.00	11.497
102.90	10.448
81.79	9.191
60.69	7.641
39.59	5.599
LOWEST : 23.76	3.895

AT POINT(516.67, 526.00) :

RADIUS	FS
126.00	11.354
104.68	10.291
83.35	9.031
62.03	7.491
40.70	5.660
LOWEST : 24.71	3.971

AT POINT(516.67, 526.00) :

RADIUS	FS
126.00	11.355
105.03	10.327
84.07	9.088
63.10	7.577
42.13	5.605

LOWEST : 26.41 3.837

AT POINT(512.67, 526.00) :

RADIUS	FS
126.00	11.359
105.21	10.354
84.43	9.123
63.64	7.638
42.85	5.585
LOWEST : 32.46	4.238

AT POINT(514.67, 528.00) :

RADIUS	FS
128.00	11.216
106.99	10.189
85.98	8.964
64.97	7.477
43.97	5.645
LOWEST : 28.21	3.828

AT POINT(514.67, 530.00) :

RADIUS	FS
130.00	11.388
108.95	10.059
87.90	8.849
66.85	7.383
45.80	5.666
LOWEST : 35.27	4.193

AT POINT(516.67, 528.00) :

RADIUS	FS
128.00	11.216
106.81	10.166
85.63	8.932
64.44	7.426
43.25	5.650
LOWEST : 27.36	3.893

AT POINT(513.67, 528.00) :

RADIUS	FS
128.00	11.222
107.17	10.217
86.34	8.999
65.51	7.531
44.68	5.620
LOWEST : 29.06	4.167

AT POINT(515.17, 528.00) :

RADIUS	FS
128.00	11.217
106.95	10.182
85.89	8.956
64.84	7.464
43.79	5.649
LOWEST : 33.26	4.144

AT POINT(514.17, 528.00) :

RADIUS	FS
128.00	11.219
107.04	10.196

	86.07	8.973
	65.11	7.490
	44.14	5.641
LOWEST :	28.42	3.866

AT POINT(514.67, 528.50) :

RADIUS	FS
128.50	11.185
107.48	10.156
86.46	8.934
65.44	7.453
44.42	5.652
LOWEST : 28.66	3.828

AT POINT(514.67, 527.50) :

RADIUS	FS
127.50	11.251
106.50	10.223
85.50	8.994
64.51	7.501
43.51	5.637
LOWEST : 27.76	3.828

AT POINT(514.67, 528.00) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	28.21	3.830

WESTERN TECHNOLOGIES INC.
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

11-26-85

JOB NO. : 2125J108

CLIENT : Grieiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 11
East Embankment - Cut Section
Full Flow Conditions w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	10.00	500.00	510.00	500.00	526.00	508.00
3	530.00	510.00	540.00	510.00		
4	10.00	508.00	526.00	508.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	0.00	0.00	62.4
3	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC.
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

11-26-85

GRID SEARCH WAS SPECIFIED WITH LOCATION AT :

(X,	Y)
510.00	510.00
495.00	530.00
520.00	540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------]	
(X,	Y)	(X,	Y)	(X,	Y)
10.00	508.00	526.00	508.00	551.00	506.00
5000.00	506.00				

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	5.474
88.40	5.123
66.80	4.684
45.20	4.129
23.60	2.773
LOWEST : 23.60	2.773

AT POINT(505.00, 516.67) :

RADIUS	FS
116.67	5.147
95.07	4.767
73.47	4.317
51.87	3.773
30.27	2.634
LOWEST : 30.27	2.634

AT POINT(500.00, 523.33) :

RADIUS	FS
123.33	4.890
101.73	4.505
80.13	4.065
58.53	3.559
36.93	2.695
LOWEST : 36.93	2.695

AT POINT(495.00, 530.00) :

RADIUS	FS
130.00	4.681
108.40	4.300
86.80	3.882
65.20	3.424
43.60	2.831
LOWEST : 43.60	2.831

AT POINT(518.33, 513.33) :

RADIUS	FS
113.33	5.273
91.73	4.903
70.13	4.410
48.53	3.823
26.93	2.376
LOWEST : 16.13	1.718

WESTERN TECHNOLOGIES INC.
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

11-26-85

AT POINT(513.33, 520.00) :

	RADIUS	FS
	120.00	4.975
	98.40	4.598
	76.80	4.088
	55.20	3.507
	33.60	2.238
LOWEST :	22.80	1.748

AT POINT(508.33, 526.67) :

	RADIUS	FS
	126.67	4.739
	105.07	4.365
	83.47	3.879
	61.87	3.328
	40.27	2.225
LOWEST :	34.87	1.943

AT POINT(503.33, 533.33) :

	RADIUS	FS
	133.33	4.552
	111.73	4.182
	90.13	3.727
	68.53	3.217
	46.93	2.272
LOWEST :	41.53	2.105

AT POINT(526.67, 516.67) :

	RADIUS	FS
	116.67	5.136
	94.76	4.752
	72.85	4.250
	50.95	3.612
	29.04	1000000.000
LOWEST :	34.52	3.153

AT POINT(521.67, 523.33) :

	RADIUS	FS
	123.33	4.849
	101.73	4.457
	80.13	3.973
	58.53	3.352
	36.93	2.610
LOWEST :	20.73	1.646

AT POINT(516.67, 530.00) :

	RADIUS	FS
	130.00	4.630
	108.40	4.235
	86.80	3.762
	65.20	3.169
	43.60	1000000.000
LOWEST :	49.00	2.675

AT POINT(511.67, 536.67) :

	RADIUS	FS
	136.67	4.450
	115.07	4.072
	93.47	3.615
	71.87	3.062

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	50.27	1000000.000
LOWEST :	55.67	2.595

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	5.008
97.80	4.622
75.60	4.142
53.40	3.566
31.20	3.594
LOWEST : 36.75	3.314

AT POINT(530.00, 526.67) :

RADIUS	FS
126.67	4.752
104.47	4.360
82.28	3.857
60.09	3.256
37.89	2.801
LOWEST : 37.89	2.801

AT POINT(525.00, 533.33) :

RADIUS	FS
133.33	4.540
111.29	4.154
89.25	3.668
67.21	3.082
45.17	2.535
LOWEST : 28.64	2.227

AT POINT(520.00, 540.00) :

RADIUS	FS
140.00	4.368
118.20	3.985
96.41	3.529
74.61	2.986
52.81	2.434
LOWEST : 36.47	1.952

AT POINT(521.67, 523.33) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 20.73	1.650

AT POINT(521.67, 523.33) :

RADIUS	FS
123.33	4.849
101.73	4.457
80.13	3.973
58.53	3.352
36.93	2.610
LOWEST : 20.73	1.646

AT POINT(523.67, 523.33) :

RADIUS	FS
123.33	4.854
101.54	4.462
79.74	3.969

	57.94	3.335
	36.15	2.636
LOWEST :	19.80	1.732

AT POINT(519.67, 523.33) :

RADIUS	FS
123.33	4.849
101.73	4.449
80.13	3.967
58.53	3.343
36.93	1000000.000
LOWEST : 42.33	2.786

AT POINT(521.67, 525.33) :

RADIUS	FS
125.33	4.779
103.69	4.386
82.04	3.903
60.40	3.288
38.75	2.573
LOWEST : 22.52	1.668

AT POINT(521.67, 521.33) :

RADIUS	FS
121.33	4.923
99.73	4.532
78.13	4.047
56.53	3.417
34.93	1000000.000
LOWEST : 40.33	2.871

AT POINT(522.17, 523.33) :

RADIUS	FS
123.33	4.849
101.70	4.458
80.07	3.973
58.44	3.350
36.80	2.620
LOWEST : 20.58	1.662

AT POINT(521.17, 523.33) :

RADIUS	FS
123.33	4.849
101.73	4.455
80.13	3.972
58.53	3.350
36.93	1000000.000
LOWEST : 42.33	2.826

AT POINT(521.67, 523.83) :

RADIUS	FS
123.83	4.831
102.23	4.439
80.63	3.956
59.03	3.336
37.43	2.604
LOWEST : 21.23	1.649

AT POINT(521.67, 522.83) :

RADIUS	FS

WESTERN TECHNOLOGIES INC.
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

11-26-85

	122.83	4.867
	101.23	4.475
	79.63	3.991
	58.03	3.368
	36.43	1000000.000
LOWEST :	41.83	2.846

AT POINT(521.67, 523.33) : RADIUS FS
MINIMUM FACTOR OF SAFETY : 20.73 1.650

WESTERN TECHNOLOGIES INC.
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

11-26-85

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 12
East Embankment - Cut Section
Rapid Drawdown w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 3

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	530.00	510.00	540.00	510.00		
3	10.00	500.00	510.00	500.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC.
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

11-26-85

GRID SEARCH WAS SPECIFIED WITH LOCATION AT :

(____X___,	____Y___)
510.00	510.00
495.00	530.00
520.00	540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------	]
(___X____,	___Y____)	(___X____,	___Y____)	(___X____,	___Y____)
10.00	500.00	510.00	500.00	526.00	508.00
551.00	506.00	5000.00	506.00		

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	4.704
	89.79	4.336
	69.58	3.884
	49.37	3.315
	29.16	2.182
LOWEST :	19.05	1.909

AT POINT(505.00, 516.67) :

	RADIUS	FS
	116.67	4.457
	96.67	4.083
	76.67	3.641
	56.67	3.131
	36.67	2.165
LOWEST :	31.67	1.985

AT POINT(500.00, 523.33) :

	RADIUS	FS
	123.33	4.262
	103.33	3.890
	83.33	3.470
	63.33	2.997
	43.33	2.160
LOWEST :	38.33	2.050

AT POINT(495.00, 530.00) :

	RADIUS	FS
	130.00	4.103
	110.00	3.742
	90.00	3.346
	70.00	2.913
	50.00	2.200
LOWEST :	45.00	2.192

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	4.551
	92.31	4.157
	71.28	3.654
	50.25	3.014
	29.23	1.936

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SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

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AT POINT(513.33, 520.00) :

	RADIUS	FS
	120.00	4.322
	99.28	3.935
	78.56	3.443
	57.84	2.835
	37.12	1.904
LOWEST :	21.58	1.244

AT POINT(508.33, 526.67) :

	RADIUS	FS
	126.67	4.140
	106.25	3.769
	85.84	3.300
	65.42	2.747
	45.01	1.948
LOWEST :	34.80	1.474

AT POINT(503.33, 533.33) :

	RADIUS	FS
	133.33	3.995
	113.23	3.638
	93.12	3.202
	73.01	2.697
	52.90	2.012
LOWEST :	42.85	1.639

AT POINT(526.67, 516.67) :

	RADIUS	FS
	116.67	4.451
	94.76	4.040
	72.85	3.519
	50.95	2.875
	29.04	2.165
LOWEST :	12.61	1.703

AT POINT(521.67, 523.33) :

	RADIUS	FS
	123.33	4.229
	101.76	3.816
	80.19	3.316
	58.61	2.690
	37.04	1.926
LOWEST :	26.25	1.368

AT POINT(516.67, 530.00) :

	RADIUS	FS
	130.00	4.054
	108.76	3.653
	87.52	3.178
	66.28	2.594
	45.04	1.892
LOWEST :	29.11	1.244

AT POINT(511.67, 536.67) :

	RADIUS	FS
	136.67	3.912
	115.74	3.533
	94.82	3.086
	73.90	2.549

		52.97	1.917
	LOWEST :	37.28	1.260

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	4.364
97.80	3.958
75.60	3.467
53.40	2.902
31.20	2.864
LOWEST : 31.20	2.864

AT POINT(530.00, 526.67) :

RADIUS	FS
126.67	4.159
104.47	3.752
82.28	3.242
60.09	2.646
37.89	2.142
LOWEST : 37.89	2.142

AT POINT(525.00, 533.33) :

RADIUS	FS
133.33	3.988
111.29	3.586
89.25	3.097
67.21	2.508
45.17	1.905
LOWEST : 34.15	1.759

AT POINT(520.00, 540.00) :

RADIUS	FS
140.00	3.849
118.20	3.458
96.41	2.991
74.61	2.443
52.81	1.845
LOWEST : 41.91	1.481

AT POINT(516.67, 530.00) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 29.11	1.240

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	4.054
108.76	3.653
87.52	3.178
66.28	2.594
45.04	1.892
LOWEST : 29.11	1.244

AT POINT(518.67, 530.00) :

RADIUS	FS
130.00	4.055
108.53	3.650
87.06	3.168

	65.59	2.576
	44.12	1.869
LOWEST :	28.02	1.337

AT POINT(514.67, 530.00) :

RADIUS	FS
130.00	4.054
108.95	3.659
87.90	3.189
66.85	2.613
45.80	1.905
LOWEST : 35.27	1.344

AT POINT(516.67, 532.00) :

RADIUS	FS
132.00	4.009
110.69	3.609
89.37	3.138
68.06	2.560
46.74	1.876
LOWEST : 30.75	1.279

AT POINT(516.67, 528.00) :

RADIUS	FS
128.00	4.102
106.81	3.699
85.63	3.221
64.44	2.629
43.25	1.901
LOWEST : 27.36	1.216

AT POINT(516.67, 526.00) :

RADIUS	FS
126.00	4.152
104.85	3.748
83.71	3.266
62.56	2.666
41.42	1.901
LOWEST : 25.56	1.195

AT POINT(516.67, 524.00) :

RADIUS	FS
124.00	4.205
102.90	3.802
81.79	3.316
60.69	2.706
39.59	1.893
LOWEST : 23.76	1.181

AT POINT(516.67, 522.00) :

RADIUS	FS
122.00	4.262
100.94	3.860
79.88	3.369
58.82	2.750
37.76	1.879
LOWEST : 21.96	1.172

AT POINT(516.67, 520.00) :

RADIUS	FS

			120.00	4.321
			98.98	3.921
			77.96	3.426
			56.94	2.798
			35.93	1.878
		LOWEST :	20.16	1.173

AT POINT(518.67, 522.00) :

RADIUS	FS
122.00	4.263
100.76	3.853
79.52	3.360
58.28	2.739
37.04	1.906
LOWEST : 21.11	1.229

AT POINT(514.67, 522.00) :

RADIUS	FS
122.00	4.261
101.12	3.868
80.24	3.378
59.35	2.768
38.47	1.879
LOWEST : 22.81	1.159

AT POINT(512.67, 522.00) :

RADIUS	FS
122.00	4.262
101.30	3.877
80.59	3.390
59.89	2.793
39.19	1.900
LOWEST : 23.66	1.254

AT POINT(514.67, 524.00) :

RADIUS	FS
124.00	4.205
103.08	3.811
82.15	3.326
61.23	2.722
40.30	1.880
LOWEST : 24.61	1.148

AT POINT(514.67, 526.00) :

RADIUS	FS
126.00	4.152
105.03	3.757
84.07	3.277
63.10	2.683
42.13	1.892
LOWEST : 26.41	1.143

AT POINT(514.67, 528.00) :

RADIUS	FS
128.00	4.101
106.99	3.706
85.98	3.232
64.97	2.647
43.97	1.901

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SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	LOWEST :	28.21	1.157

AT POINT(516.67, 526.00) :	RADIUS	FS
	126.00	4.152
	104.85	3.748
	83.71	3.266
	62.56	2.666
	41.42	1.901
LOWEST :	25.56	1.195

AT POINT(512.67, 526.00) :	RADIUS	FS
	126.00	4.153
	105.21	3.766
	84.43	3.289
	63.64	2.704
	42.85	1.889
LOWEST :	27.26	1.224

AT POINT(515.17, 526.00) :	RADIUS	FS
	126.00	4.152
	104.99	3.755
	83.98	3.274
	62.97	2.679
	41.96	1.895
LOWEST :	26.20	1.155

AT POINT(514.17, 526.00) :	RADIUS	FS
	126.00	4.152
	105.08	3.759
	84.16	3.280
	63.24	2.687
	42.31	1.890
LOWEST :	26.62	1.161

AT POINT(514.67, 526.50) :	RADIUS	FS
	126.50	4.139
	105.52	3.744
	84.55	3.265
	63.57	2.674
	42.59	1.895
LOWEST :	26.86	1.146

AT POINT(514.67, 525.50) :	RADIUS	FS
	125.50	4.165
	104.54	3.770
	83.59	3.289
	62.63	2.693
	41.68	1.889
LOWEST :	25.96	1.144

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	RADIUS	FS
AT POINT(514.67, 526.00) :		
MINIMUM FACTOR OF SAFETY :	26.41	1.140

WESTERN TECHNOLOGIES INC. 11-12-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : BWCD Floodway - Reach 6

REMARKS : CASE 13
East Embankment - Cut/Fill Section (bottom)
No Flow (As-built) w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,____Y___)		(____X___,____Y___)		(____X___,____Y___)	
1	10.00	400.00	5000.00	400.00		
2	510.00	500.00	5000.00	500.00		
3	530.00	510.00	540.00	510.00		
4	10.00	500.00	510.00	500.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	500.00	35.00	105.2
2	600.00	30.00	118.5
3	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-12-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(____X___,	____Y___)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00	510.00
	495.00	530.00
	520.00	540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : NO SEEPAGE

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	12.417
	89.79	11.475
	69.58	10.345
	49.37	8.930
	29.16	6.081
LOWEST :	24.10	5.835

AT POINT(508.00, 516.67) :

	RADIUS	FS
	116.67	11.840
	96.67	10.885
	76.67	9.785
	56.67	8.397
	36.67	6.006
LOWEST :	31.67	5.707

AT POINT(500.00, 523.33) :

	RADIUS	FS
	123.33	11.362
	103.33	10.413
	83.33	9.362
	63.33	8.073
	43.33	6.048
LOWEST :	38.33	5.929

AT POINT(498.00, 530.00) :

	RADIUS	FS
	130.00	10.965
	110.00	10.040
	90.00	9.049
	70.00	7.894
	50.00	6.215
LOWEST :	50.00	6.215

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	12.043
	92.31	11.033
	71.28	9.767
	50.25	8.187
	29.23	5.357
LOWEST :	18.71	3.906

AT POINT(518.33, 520.00) :

	RADIUS	FS
	120.00	11.488
	99.28	10.494
	78.56	9.243
	57.84	7.722

	37.12	5.302
LOWEST :	26.76	3.987

AT POINT(508.33, 526.67) :

RADIUS	FS
126.67	11.034
106.25	10.079
85.84	8.876
65.42	7.492
45.01	5.435
LOWEST : 34.80	4.347

AT POINT(503.33, 533.33) :

RADIUS	FS
133.33	10.666
113.23	9.741
93.12	8.625
73.01	7.367
52.90	5.632
LOWEST : 42.85	4.813

AT POINT(526.67, 516.67) :

RADIUS	FS
116.67	11.799
94.76	10.745
72.85	9.419
50.95	7.817
29.04	6.080
LOWEST : 12.61	4.864

AT POINT(521.67, 523.33) :

RADIUS	FS
123.33	11.247
101.76	10.178
80.19	8.894
58.61	7.309
37.04	5.426
LOWEST : 26.25	3.947

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	10.801
108.76	9.758
87.52	8.535
66.28	7.051
45.04	5.339
LOWEST : 34.42	3.931

AT POINT(511.67, 536.67) :

RADIUS	FS
136.67	10.438
115.74	9.449
94.82	8.297
73.90	6.931
52.97	5.420
LOWEST : 37.28	4.037

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	11.590

	97.80	10.541
	75.60	9.293
	53.40	7.977
	31.20	7.897
LOWEST :	36.75	7.272

AT POINT(530.00, 526.67) :

RADIUS	FS
126.67	11.066
104.47	10.009
82.28	8.695
60.09	7.176
37.89	5.972
LOWEST : 37.89	5.972

AT POINT(525.00, 533.33) :

RADIUS	FS
133.33	10.623
111.29	9.574
89.25	8.306
67.21	6.797
45.17	5.365
LOWEST : 34.15	4.956

AT POINT(520.00, 540.00) :

RADIUS	FS
140.00	10.264
118.20	9.240
96.41	8.028
74.61	6.631
52.81	5.219
LOWEST : 41.91	4.256

AT POINT(518.33, 513.33) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 18.71	3.910

AT POINT(518.33, 513.33) :

RADIUS	FS
113.33	12.043
92.31	11.033
71.28	9.767
50.25	8.187
29.23	5.357
LOWEST : 18.71	3.906

AT POINT(520.33, 513.33) :

RADIUS	FS
113.33	12.049
92.13	11.019
70.92	9.756
49.72	8.134
28.51	5.404
LOWEST : 17.91	3.866

AT POINT(522.33, 513.33) :

RADIUS	FS

	113.33	12.061
	91.95	11.013
	70.56	9.752
	49.18	8.128
	27.79	5.537
LOWEST :	17.10	4.033

AT POINT(52[illegible].33, 515.33) :

RADIUS	FS
115.33	11.872
94.09	10.826
72.84	9.558
51.59	7.939
30.34	5.373
LOWEST : 19.72	3.772

AT POINT(52[illegible].33, 517.33) :

RADIUS	FS
117.33	11.703
96.04	10.644
74.75	9.375
53.46	7.768
32.17	5.368
LOWEST : 21.53	3.786

AT POINT(522.33, 515.33) :

RADIUS	FS
115.33	11.882
93.91	10.826
72.48	9.554
51.05	7.932
29.63	5.513
LOWEST : 18.91	4.004

AT POINT(518.33, 515.33) :

RADIUS	FS
115.33	11.866
94.26	10.841
73.20	9.573
52.13	7.972
31.06	5.307
LOWEST : 20.52	3.783

AT POINT(52[illegible].33, 515.33) :

RADIUS	FS
115.33	11.874
94.04	10.823
72.75	9.556
51.46	7.936
30.16	5.398
LOWEST : 19.52	3.803

AT POINT(519.33, 515.33) :

RADIUS	FS
115.33	11.870
94.13	10.829
72.93	9.561
51.72	7.943
30.52	5.353

LOWEST : 19.92 3.753

AT POINT(519.33, 515.33) :

RADIUS	FS
115.33	11.868
94.17	10.833
73.02	9.565
51.86	7.953
30.70	5.333
LOWEST : 20.12	3.754

AT POINT(519.83, 515.83) :

RADIUS	FS
115.83	11.827
94.62	10.783
73.41	9.514
52.19	7.899
30.98	5.349
LOWEST : 20.37	3.752

AT POINT(519.83, 516.33) :

RADIUS	FS
116.33	11.784
95.11	10.737
73.88	9.468
52.66	7.857
31.44	5.347
LOWEST : 20.82	3.753

AT POINT(52[illegible].33, 515.83) :

RADIUS	FS
115.83	11.829
94.57	10.779
73.32	9.511
52.06	7.895
30.80	5.370
LOWEST : 20.17	3.771

AT POINT(519.33, 515.83) :

RADIUS	FS
115.83	11.825
94.66	10.787
73.50	9.518
52.33	7.906
31.16	5.328
LOWEST : 20.57	3.737

AT POINT(519.83, 515.83) :

RADIUS	FS
115.83	11.824
94.71	10.791
73.58	9.522
52.46	7.916
31.34	5.311
LOWEST : 20.77	3.740

AT POINT(519.33, 516.33) :

RADIUS	FS
116.33	11.782
95.15	10.741

	73.97	9.472
	52.79	7.863
	31.61	5.324
LOWEST :	21.02	3.737

AT POINT(519.33, 516.83) :

RADIUS	FS
116.83	11.740
95.64	10.696
74.45	9.427
53.26	7.821
32.07	5.322
LOWEST : 21.48	3.738

AT POINT(519.83, 516.33) :

RADIUS	FS
116.33	11.784
95.11	10.737
73.88	9.468
52.66	7.857
31.44	5.347
LOWEST : 20.82	3.753

AT POINT(518.83, 516.33) :

RADIUS	FS
116.33	11.781
95.20	10.745
74.06	9.476
52.93	7.870
31.79	5.306
LOWEST : 21.23	3.728

AT POINT(518.33, 516.33) :

RADIUS	FS
116.33	11.780
95.24	10.750
74.15	9.481
53.06	7.879
31.97	5.293
LOWEST : 21.43	3.737

AT POINT(519.83, 516.83) :

RADIUS	FS
116.83	11.739
95.69	10.700
74.54	9.431
53.40	7.826
32.25	5.303
LOWEST : 21.68	3.728

AT POINT(518.83, 515.83) :

RADIUS	FS
115.83	11.824
94.71	10.791
73.58	9.522
52.46	7.916
31.34	5.311
LOWEST : 20.77	3.740

WESTERN TECHNOLOGIES INC. 11-12-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	RADIUS	FS
AT POINT(518.83, 516.33) :		
MINIMUM FACTOR OF SAFETY :	21.23	3.730

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 14
East Embankment - Cut/Fill Section (bottom)
Full Flow Conditions w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 5

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	510.00	500.00	5000.00	500.00		
3	10.00	500.00	510.00	500.00	526.00	508.00
4	530.00	510.00	540.00	510.00		
5	10.00	508.00	526.00	508.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	62.4
4	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

NO. OF SLICES : 10
NO. OF ADDED RADII : 3

	(X,	Y)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00	510.00
	495.00	530.00
	520.00	540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

POINTS ON WATER TABLE

(X,	Y)	(X,	Y)	(X,	Y)
10.00	508.00	526.00	508.00	551.00	506.00
5000.00	506.00				

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	5.542
88.40	5.207
66.80	4.792
45.20	4.208
23.60	2.844
LOWEST : 23.60	2.844

AT POINT(505.00, 516.67) :

RADIUS	FS
116.67	5.239
95.07	4.876
73.47	4.447
51.87	3.845
30.27	2.703
LOWEST : 30.27	2.703

AT POINT(500.00, 523.33) :

RADIUS	FS
123.33	4.989
101.73	4.615
80.13	4.189
58.53	3.617
36.93	2.773
LOWEST : 36.93	2.773

AT POINT(495.00, 530.00) :

RADIUS	FS
130.00	4.777
108.40	4.404
86.80	3.993
65.20	3.470
43.60	2.920
LOWEST : 43.60	2.920

AT POINT(518.33, 513.33) :

RADIUS	FS
113.33	5.356
91.73	5.003

	70.13	4.531
	48.53	3.944
	26.93	2.440
LOWEST :	16.13	1.880

AT POINT(513.33, 520.00) :

RADIUS	FS
120.00	5.071
98.40	4.707
76.80	4.208
55.20	3.608
33.60	2.297
LOWEST : 28.20	1.957

AT POINT(508.33, 526.67) :

RADIUS	FS
126.67	4.834
105.07	4.470
83.47	3.990
61.87	3.407
40.27	2.285
LOWEST : 34.87	2.021

AT POINT(503.33, 533.33) :

RADIUS	FS
133.33	4.644
111.73	4.280
90.13	3.828
68.53	3.277
46.93	2.334
LOWEST : 41.53	2.202

AT POINT(526.67, 516.67) :

RADIUS	FS
116.67	5.227
94.76	4.858
72.85	4.373
50.95	3.749
29.04	1000000.000
LOWEST : 34.52	3.244

AT POINT(521.67, 523.33) :

RADIUS	FS
123.33	4.945
101.73	4.563
80.13	4.088
58.53	3.467
36.93	2.683
LOWEST : 26.13	1.889

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	4.724
108.40	4.334
86.80	3.864
65.20	3.267
43.60	1000000.000
LOWEST : 49.00	2.741

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(511.67, 536.67) :

RADIUS	FS
136.67	4.538
115.07	4.164
93.47	3.708
71.87	3.149
50.27	200.235
LOWEST : 55.67	2.664

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	5.102
97.80	4.730
75.60	4.264
53.40	3.695
31.20	3.683
LOWEST : 31.20	3.683

AT POINT(530.00, 526.67) :

RADIUS	FS
126.67	4.847
104.47	4.463
82.28	3.965
60.09	3.360
37.89	2.881
LOWEST : 37.89	2.881

AT POINT(525.00, 533.33) :

RADIUS	FS
133.33	4.630
111.29	4.249
89.25	3.764
67.21	3.171
45.17	2.610
LOWEST : 39.66	2.599

AT POINT(520.00, 540.00) :

RADIUS	FS
140.00	4.453
118.20	4.073
96.41	3.615
74.61	3.065
52.81	2.505
LOWEST : 52.81	2.505

AT POINT(518.33, 513.33) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 16.13	1.880

AT POINT(518.33, 513.33) :

RADIUS	FS
113.33	5.356
91.73	5.003
70.13	4.531
48.53	3.944
26.93	2.440
LOWEST : 16.13	1.880

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(520.33, 513.33) :

	RADIUS	FS
	113.33	5.356
	91.73	5.001
	70.13	4.542
	48.53	3.899
	26.93	2.519
LOWEST :	16.13	1.867

AT POINT(522.33, 513.33) :

	RADIUS	FS
	113.33	5.362
	91.73	5.003
	70.13	4.549
	48.53	3.911
	26.93	1000000.000
LOWEST :	37.73	3.545

AT POINT(520.33, 515.33) :

	RADIUS	FS
	115.33	5.265
	93.73	4.899
	72.13	4.434
	50.53	3.786
	28.93	1000000.000
LOWEST :	39.73	3.388

AT POINT(520.33, 511.33) :

	RADIUS	FS
	111.33	5.452
	89.73	5.110
	68.13	4.658
	46.53	4.072
	24.93	2.547
LOWEST :	14.13	2.002

AT POINT(520.83, 513.33) :

	RADIUS	FS
	113.33	5.356
	91.73	5.002
	70.13	4.544
	48.53	3.901
	26.93	1000000.000
LOWEST :	37.73	3.480

AT POINT(519.83, 513.33) :

	RADIUS	FS
	113.33	5.356
	91.73	5.001
	70.13	4.539
	48.53	3.909
	26.93	2.492
LOWEST :	16.13	1.860

AT POINT(519.33, 513.33) :

	RADIUS	FS
	113.33	5.356
	91.73	5.000
	70.13	4.537
	48.53	3.922

		26.93	2.471
	LOWEST :	16.13	1.855

AT POINT(518.83, 513.33) :

RADIUS	FS
113.33	5.356
91.73	5.001
70.13	4.534
48.53	3.933
26.93	2.455
LOWEST : 16.13	1.863

AT POINT(519.33, 513.83) :

RADIUS	FS
113.83	5.333
92.23	4.974
70.63	4.509
49.03	3.881
27.43	2.463
LOWEST : 16.63	1.828

AT POINT(519.33, 514.33) :

RADIUS	FS
114.33	5.310
92.73	4.948
71.13	4.482
49.53	3.843
27.93	2.461
LOWEST : 17.13	1.805

AT POINT(519.33, 514.83) :

RADIUS	FS
114.83	5.287
93.23	4.923
71.63	4.456
50.03	3.811
28.43	2.459
LOWEST : 17.63	1.787

AT POINT(519.33, 515.33) :

RADIUS	FS
115.33	5.265
93.73	4.898
72.13	4.430
50.53	3.784
28.93	1000000.000
LOWEST : 39.73	3.360

AT POINT(519.83, 514.83) :

RADIUS	FS
114.83	5.287
93.23	4.923
71.63	4.458
50.03	3.812
28.43	1000000.000
LOWEST : 39.23	3.387

AT POINT(518.83, 514.83) :

RADIUS	FS
114.83	5.287

	93.23	4.925
	71.63	4.453
	50.03	3.818
	28.43	2.434
LOWEST :	17.63	1.794

AT POINT(519.33, 514.83) : RADIUS FS
MINIMUM FACTOR OF SAFETY : 17.63 1.790

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Grieiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 15
East Embankment - Cut/Fill Section (bottom)
Rapid Drawdown w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	510.00	500.00	5000.00	500.00		
3	530.00	510.00	540.00	510.00		
4	10.00	500.00	510.00	500.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00, 510.00
	495.00, 530.00
	520.00, 540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[----------		POINTS ON WATER TABLE		----------]	
(X,	Y)	(X,	Y)	(X,	Y)
10.00	500.00	510.00	500.00	526.00	508.00
551.00	506.00	5000.00	506.00		

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	4.753
	89.79	4.393
	69.58	3.951
	49.37	3.366
	29.16	2.250
LOWEST :	19.05	2.003

AT POINT(505.00, 516.67) :

	RADIUS	FS
	116.67	4.525
	96.67	4.158
	76.67	3.725
	56.67	3.156
	36.67	2.209
LOWEST :	31.67	2.037

AT POINT(500.00, 523.33) :

	RADIUS	FS
	123.33	4.335
	103.33	3.968
	83.33	3.553
	63.33	3.022
	43.33	2.205
LOWEST :	38.33	2.095

AT POINT(495.00, 530.00) :

	RADIUS	FS
	130.00	4.175
	110.00	3.816
	90.00	3.423
	70.00	2.941
	50.00	2.247
LOWEST :	45.00	2.245

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	4.611
	92.31	4.226
	71.28	3.732
	50.25	3.097
	29.23	1.979
LOWEST :	18.71	1.379

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(513.33, 520.00) :

	RADIUS	FS
	120.00	4.392
	99.28	4.011
	78.56	3.523
	57.84	2.914
	37.12	1.945
LOWEST :	26.76	1.408

AT POINT(508.33, 526.67) :

	RADIUS	FS
	126.67	4.211
	106.25	3.844
	85.84	3.375
	65.42	2.817
	45.01	1.985
LOWEST :	34.80	1.532

AT POINT(503.33, 533.33) :

	RADIUS	FS
	133.33	4.064
	113.23	3.708
	93.12	3.271
	73.01	2.761
	52.90	2.047
LOWEST :	42.85	1.696

AT POINT(526.67, 516.67) :

	RADIUS	FS
	116.67	4.517
	94.76	4.115
	72.85	3.600
	50.95	2.959
	29.04	2.217
LOWEST :	23.56	1.949

AT POINT(521.67, 523.33) :

	RADIUS	FS
	123.33	4.300
	101.76	3.891
	80.19	3.393
	58.61	2.761
	37.04	1.972
LOWEST :	26.25	1.464

AT POINT(516.67, 530.00) :

	RADIUS	FS
	130.00	4.123
	108.76	3.724
	87.52	3.248
	66.28	2.655
	45.04	1.937
LOWEST :	34.42	1.416

AT POINT(511.67, 536.67) :

	RADIUS	FS
	136.67	3.979
	115.74	3.599
	94.82	3.150
	73.90	2.605

	52.97	1.961
LOWEST :	42.51	1.486

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	4.434
97.80	4.034
75.60	3.549
53.40	2.983
31.20	2.925
LOWEST : 31.20	2.925

AT POINT(530.00, 526.67) :

RADIUS	FS
126.67	4.229
104.47	3.826
82.28	3.315
60.09	2.712
37.89	2.200
LOWEST : 37.89	2.200

AT POINT(525.00, 533.33) :

RADIUS	FS
133.33	4.056
111.29	3.655
89.25	3.163
67.21	2.564
45.17	1.958
LOWEST : 39.66	1.930

AT POINT(520.00, 540.00) :

RADIUS	FS
140.00	3.913
118.20	3.521
96.41	3.050
74.61	2.494
52.81	1.895
LOWEST : 41.91	1.594

AT POINT(518.33, 513.33) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 18.71	1.380

AT POINT(518.33, 513.33) :

RADIUS	FS
113.33	4.611
92.31	4.226
71.28	3.732
50.25	3.097
29.23	1.979
LOWEST : 18.71	1.379

AT POINT(520.33, 513.33) :

RADIUS	FS
113.33	4.614
92.13	4.221
70.92	3.729

	49.72	3.076
	28.51	1.994
LOWEST :	17.91	1.390

AT POINT(516.33, 513.33) :

RADIUS	FS
113.33	4.610
92.49	4.232
71.64	3.738
50.79	3.136
29.94	1.981
LOWEST : 19.52	1.415

AT POINT(518.33, 515.33) :

RADIUS	FS
115.33	4.542
94.26	4.151
73.20	3.656
52.13	3.013
31.06	1.955
LOWEST : 20.52	1.349

AT POINT(518.33, 517.33) :

RADIUS	FS
117.33	4.475
96.22	4.079
75.11	3.586
54.00	2.943
32.89	1.941
LOWEST : 22.33	1.338

AT POINT(518.33, 519.33) :

RADIUS	FS
119.33	4.412
98.18	4.012
77.03	3.520
55.87	2.885
34.72	1.935
LOWEST : 24.14	1.349

AT POINT(520.33, 517.33) :

RADIUS	FS
117.33	4.478
96.04	4.074
74.75	3.580
53.46	2.936
32.17	1.966
LOWFST : 21.53	1.374

AT POINT(516.33, 517.33) :

RADIUS	FS
117.33	4.474
96.40	4.087
75.47	3.593
54.54	2.961
33.60	1.939
LOWEST : 23.14	1.354

AT POINT(518.83, 517.33) :

RADIUS	FS

	117.33	4.476
	96.18	4.078
	75.02	3.584
	53.87	2.942
	32.71	1.946
LOWEST :	22.13	1.342

AT POINT(517.83, 517.33) :

RADIUS	FS
117.33	4.475
96.27	4.081
75.20	3.587
54.13	2.947
33.07	1.938
LOWEST : 22.53	1.337

AT POINT(517.33, 517.33) :

RADIUS	FS
117.33	4.475
96.31	4.083
75.29	3.589
54.27	2.951
33.25	1.936
LOWEST : 22.73	1.340

AT POINT(517.83, 517.83) :

RADIUS	FS
117.83	4.459
96.76	4.064
75.68	3.571
54.60	2.931
33.52	1.936
LOWEST : 22.99	1.338

AT POINT(517.83, 516.83) :

RADIUS	FS
116.83	4.491
95.78	4.099
74.72	3.605
53.67	2.964
32.61	1.940
LOWEST : 22.08	1.338

AT POINT(517.83, 517.33) : RADIUS FS

MINIMUM FACTOR OF SAFETY : 22.53 1.340

WESTERN TECHNOLOGIES INC. 11-13-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 16
East Embankment - Cut/Fill Section (middle)
No Flow (As-built) w/ Seismic
Equivalent Vehicle load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	520.00	505.00	5000.00	505.00		
3	530.00	510.00	540.00	510.00		
4	10.00	500.00	510.00	500.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	500.00	35.00	105.2
2	600.00	30.00	118.5
3	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-13-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(X, Y)	
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00	510.00
	495.00	530.00
	520.00	540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : NO SEEPAGE

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	12.625
	89.79	11.679
	69.58	10.541
	49.37	9.144
	29.16	6.215
LOWEST :	24.10	6.093

AT POINT(505.00, 516.67) :

	RADIUS	FS
	116.67	12.016
	96.67	11.058
	76.67	9.958
	56.67	8.672
	36.67	6.180
LOWEST :	31.67	5.957

AT POINT(500.00, 523.33) :

	RADIUS	FS
	123.33	11.519
	103.33	10.570
	83.33	9.527
	63.33	8.327
	43.33	6.219
LOWEST :	38.33	6.185

AT POINT(495.00, 530.00) :

	RADIUS	FS
	130.00	11.112
	110.00	10.190
	90.00	9.210
	70.00	8.117
	50.00	6.396
LOWEST :	50.00	6.396

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	12.227
	92.31	11.212
	71.28	9.937
	50.25	8.358
	29.23	5.507
LOWEST :	18.71	4.031

AT POINT(513.33, 520.00) :

	RADIUS	FS
	120.00	11.650
	99.28	10.655
	78.56	9.404
	57.84	7.891

		37.12	5.458
	LOWEST :	26.76	4.123

AT POINT(508.33, 526.67) :

RADIUS	FS
126.67	11.184
106.25	10.231
85.84	9.032
65.42	7.661
45.01	5.600
LOWEST : 34.80	4.507

AT POINT(503.33, 533.33) :

RADIUS	FS
133.33	10.809
113.23	9.888
93.12	8.777
73.01	7.534
52.90	5.803
LOWEST : 42.85	4.992

AT POINT(526.67, 516.67) :

RADIUS	FS
116.67	11.963
94.76	10.902
72.85	9.567
50.95	7.965
29.04	6.232
LOWEST : 12.61	4.731

AT POINT(521.67, 523.33) :

RADIUS	FS
123.33	11.398
101.76	10.327
80.19	9.043
58.61	7.465
37.04	5.591
LOWEST : 26.25	4.001

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	10.944
108.76	9.903
87.52	8.685
66.28	7.210
45.04	5.512
LOWEST : 29.11	3.826

AT POINT(511.67, 536.67) :

RADIUS	FS
136.67	10.575
115.74	9.590
94.82	8.445
73.90	7.091
52.97	5.596
LOWEST : 37.28	4.052

AT POINT(535.00, 520.00) :

RADIUS	FS
120.00	11.738

	97.80	10.685
	75.60	9.428
	53.40	8.002
	31.20	8.111
LOWEST :	36.75	7.422

AT POINT(530.00, 526.67) :

RADIUS	FS
126.67	11.204
104.47	10.146
82.28	8.833
60.09	7.319
37.89	6.115
LOWEST : 37.89	6.115

AT POINT(525.00, 533.33) :

RADIUS	FS
133.33	10.758
111.29	9.711
89.25	8.445
67.21	6.944
45.17	5.503
LOWEST : 34.15	4.981

AT POINT(520.00, 540.00) :

RADIUS	FS
140.00	10.397
118.20	9.376
96.41	8.169
74.61	6.780
52.81	5.363
LOWEST : 41.91	4.339

AT POINT(516.67, 530.00) : RADIUS FS

MINIMUM FACTOR OF SAFETY : 29.11 3.830

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	10.944
108.76	9.903
87.52	8.685
66.28	7.210
45.04	5.512
LOWEST : 29.11	3.826

AT POINT(518.67, 530.00) :

RADIUS	FS
130.00	10.944
108.53	9.893
87.06	8.652
65.59	7.157
44.12	5.470
LOWEST : 28.02	4.000

AT POINT(514.67, 530.00) : RADIUS FS

		130.00	10.946
		108.95	9.922
		87.90	8.719
		66.85	7.267
		45.80	5.533
	LOWEST :	35.27	4.079

AT POINT(516.67, 532.00) :

RADIUS	FS
132.00	10.824
110.69	9.787
89.37	8.575
68.06	7.116
46.74	5.482
LOWEST : 30.75	3.897

AT POINT(516.67, 528.00) :

RADIUS	FS
128.00	11.070
106.81	10.025
85.63	8.799
64.44	7.308
43.25	5.518
LOWEST : 27.36	3.791

AT POINT(516.67, 526.00) :

RADIUS	FS
126.00	11.202
104.85	10.157
83.71	8.922
62.56	7.413
41.42	5.498
LOWEST : 25.56	3.780

AT POINT(516.67, 524.00) :

RADIUS	FS
124.00	11.342
102.90	10.299
81.79	9.055
60.69	7.526
39.59	5.452
LOWEST : 23.76	3.787

AT POINT(518.67, 526.00) :

RADIUS	FS
126.00	11.203
104.68	10.146
83.35	8.896
62.03	7.372
40.70	5.530
LOWEST : 24.71	3.865

AT POINT(514.67, 526.00) :

RADIUS	FS
126.00	11.205
105.03	10.183
84.07	8.956
63.10	7.463
42.13	5.459

WESTERN TECHNOLOGIES INC. 11-13-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	LOWEST :	26.41	3.737

AT POINT(512.67, 526.00) :	RADIUS	FS
	126.00	11.210
	105.21	10.211
	84.43	8.993
	63.64	7.526
	42.85	5.450
LOWEST :	32.46	4.129

AT POINT(514.67, 528.00) :	RADIUS	FS
	128.00	11.072
	106.99	10.049
	85.98	8.833
	64.97	7.361
	43.97	5.504
LOWEST :	28.21	3.728

AT POINT(514.67, 530.00) :	RADIUS	FS
	130.00	10.946
	108.95	9.922
	87.90	8.719
	66.85	7.267
	45.80	5.533
LOWEST :	35.27	4.079

AT POINT(516.67, 528.00) :	RADIUS	FS
	128.00	11.070
	106.81	10.025
	85.63	8.799
	64.44	7.308
	43.25	5.518
LOWEST :	27.36	3.791

AT POINT(512.67, 528.00) :	RADIUS	FS
	128.00	11.077
	107.17	10.077
	86.34	8.870
	65.51	7.418
	44.68	5.484
LOWEST :	29.06	4.054

AT POINT(515.17, 528.00) :	RADIUS	FS
	128.00	11.071
	106.95	10.042
	85.89	8.825
	64.84	7.348
	43.79	5.510
LOWEST :	33.26	4.032

AT POINT(514.17, 528.00) :	RADIUS	FS
	128.00	11.073
	107.04	10.056

	86.07	8.842
	65.11	7.375
	44.14	5.499
LOWEST :	28.42	3.765

AT POINT(514.67, 528.50) :

RADIUS	FS
128.50	11.040
107.48	10.016
86.46	8.804
65.44	7.337
44.42	5.513
LOWEST : 28.66	3.729

AT POINT(514.67, 527.50) :

RADIUS	FS
127.50	11.105
106.50	10.082
85.50	8.863
64.51	7.386
43.51	5.495
LOWEST : 27.76	3.729

AT POINT(514.67, 528.00) :

RADIUS	FS
MINIMUM FACTOR OF SAFETY : 28.21	3.730

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Greiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 17
East Embankment - Cut/Fill Section (middle)
Full Flow Conditions w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 5

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	520.00	505.00	5000.00	505.00		
3	10.00	500.00	510.00	500.00	526.00	508.00
4	530.00	510.00	540.00	510.00		
5	10.00	508.00	526.00	508.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	62.4
4	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

NO. OF SLICES : 10
NO. OF ADDED RADII : 3

	(X, Y)	
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00	510.00
	495.00	530.00
	520.00	540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

POINTS ON WATER TABLE

(X, Y)	(X, Y)	(X, Y)
10.00 508.00	526.00 508.00	551.00 506.00
5000.00 506.00		

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

RADIUS	FS
110.00	5.497
88.40	5.152
66.80	4.721
45.20	4.161
23.60	2.835
LOWEST : 23.60	2.835

AT POINT(505.00, 516.67) :

RADIUS	FS
116.67	5.188
95.07	4.817
73.47	4.378
51.87	3.808
30.27	2.695
LOWEST : 30.27	2.695

AT POINT(500.00, 523.33) :

RADIUS	FS
123.33	4.937
101.73	4.559
80.13	4.127
58.53	3.589
36.93	2.742
LOWEST : 36.93	2.742

AT POINT(495.00, 530.00) :

RADIUS	FS
130.00	4.728
108.40	4.352
86.80	3.939
65.20	3.449
43.60	2.872
LOWEST : 43.60	2.872

AT POINT(518.33, 513.33) :

RADIUS	FS
113.33	5.307
91.73	4.945

		70.13	4.463
		48.53	3.884
		26.93	2.409
	LOWEST :	16.13	1.816

AT POINT(513.33, 520.00) :

RADIUS	FS
120.00	5.020
98.40	4.649
76.80	4.147
55.20	3.564
33.60	2.266
LOWEST : 22.80	1.838

AT POINT(508.33, 526.67) :

RADIUS	FS
126.67	4.785
105.07	4.417
83.47	3.936
61.87	3.374
40.27	2.258
LOWEST : 34.87	2.004

AT POINT(503.33, 533.33) :

RADIUS	FS
133.33	4.597
111.73	4.232
90.13	3.780
68.53	3.253
46.93	2.308
LOWEST : 41.53	2.169

AT POINT(526.67, 516.67) :

RADIUS	FS
116.67	5.177
94.76	4.801
72.85	4.309
50.95	3.685
29.04	1000000.000
LOWEST : 34.52	3.186

AT POINT(521.67, 523.33) :

RADIUS	FS
123.33	4.895
101.73	4.508
80.13	4.032
58.53	3.416
36.93	2.648
LOWEST : 20.73	1.819

AT POINT(516.67, 530.00) :

RADIUS	FS
130.00	4.676
108.40	4.285
86.80	3.815
65.20	3.225
43.60	1000000.000
LOWEST : 49.00	2.704

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(511.67, 536.67) :

	RADIUS	FS
	136.67	4.494
	115.07	4.119
	93.47	3.664
	71.87	3.113
	50.27	1085.955
LOWEST :	55.67	2.634

AT POINT(535.00, 520.00) :

	RADIUS	FS
	120.00	5.052
	97.80	4.674
	75.60	4.203
	53.40	3.639
	31.20	3.706
LOWEST :	42.30	3.407

AT POINT(530.00, 526.67) :

	RADIUS	FS
	126.67	4.798
	104.47	4.412
	82.28	3.914
	60.09	3.317
	37.89	2.854
LOWEST :	37.89	2.854

AT POINT(525.00, 533.33) :

	RADIUS	FS
	133.33	4.585
	111.29	4.203
	89.25	3.719
	67.21	3.134
	45.17	2.576
LOWEST :	39.66	2.506

AT POINT(520.00, 540.00) :

	RADIUS	FS
	140.00	4.411
	118.20	4.030
	96.41	3.575
	74.61	3.033
	52.81	2.472
LOWEST :	36.47	2.232

AT POINT(518.33, 513.33) :

	RADIUS	FS
MINIMUM FACTOR OF SAFETY :	16.13	1.820

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	5.307
	91.73	4.945
	70.13	4.463
	48.53	3.884
	26.93	2.409
LOWEST :	16.13	1.816

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(520.33, 513.33) :

	RADIUS	FS
	113.33	5.308
	91.73	4.944
	70.13	4.474
	48.53	3.825
	26.93	2.496
LOWEST :	16.13	1.808

AT POINT(522.33, 513.33) :

	RADIUS	FS
	113.33	5.313
	91.73	4.946
	70.13	4.482
	48.53	3.837
	26.93	1000000.000
LOWEST :	37.73	3.470

AT POINT(520.33, 515.33) :

	RADIUS	FS
	115.33	5.215
	93.73	4.841
	72.13	4.368
	50.53	3.718
	28.93	1000000.000
LOWEST :	39.73	3.319

AT POINT(520.33, 511.33) :

	RADIUS	FS
	111.33	5.406
	89.73	5.055
	68.13	4.590
	46.53	4.003
	24.93	2.527
LOWEST :	14.13	1.945

AT POINT(520.83, 513.33) :

	RADIUS	FS
	113.33	5.308
	91.73	4.944
	70.13	4.476
	48.53	3.827
	26.93	1000000.000
LOWEST :	37.73	3.413

AT POINT(519.83, 513.33) :

	RADIUS	FS
	113.33	5.308
	91.73	4.943
	70.13	4.472
	48.53	3.839
	26.93	2.475
LOWEST :	16.13	1.802

AT POINT(519.33, 513.33) :

	RADIUS	FS
	113.33	5.308
	91.73	4.943
	70.13	4.469
	48.53	3.855

	26.93	2.453
LOWEST :	16.13	1.799

AT POINT(518.83, 513.33) :

RADIUS	FS
113.33	5.308
91.73	4.944
70.13	4.466
48.53	3.870
26.93	2.430
LOWEST : 16.13	1.805

AT POINT(519.33, 513.83) :

RADIUS	FS
113.83	5.284
92.23	4.916
70.63	4.442
49.03	3.813
27.43	2.447
LOWEST : 16.63	1.773

AT POINT(519.33, 514.33) :

RADIUS	FS
114.33	5.261
92.73	4.891
71.13	4.415
49.53	3.773
27.93	2.442
LOWEST : 17.13	1.750

AT POINT(519.33, 514.83) :

RADIUS	FS
114.83	5.238
93.23	4.865
71.63	4.389
50.03	3.741
28.43	2.437
LOWEST : 17.63	1.731

AT POINT(519.33, 515.33) :

RADIUS	FS
115.33	5.215
93.73	4.840
72.13	4.364
50.53	3.716
28.93	1000000.000
LOWEST : 39.73	3.302

AT POINT(519.83, 514.83) :

RADIUS	FS
114.83	5.238
93.23	4.866
71.63	4.392
50.03	3.743
28.43	1000000.000
LOWEST : 39.23	3.326

AT POINT(518.83, 514.83) :

RADIUS	FS
114.83	5.238

WESTERN TECHNOLOGIES INC. 11-26-85

SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	93.23	4.867
	71.63	4.387
	50.03	3.750
	28.43	2.417
LOWEST :	17.63	1.734

AT POINT(519.33, 514.83) : RADIUS FS

MINIMUM FACTOR OF SAFETY : 17.63 1.730

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

JOB NO. : 2125J108

CLIENT : Grieiner Engineering Sciences

PROJECT : RWCD Floodway - Reach 6

REMARKS : CASE 18
East Embankment - Cut/Fill Section (middle)
Rapid Drawdown w/ Seismic
Equivalent Vehicle Load @ top of slope

BOUNDARY LINE INFORMATION -

NO. OF BOUNDARY LINES : 4

LINE NO.	(____X___,	____Y___)	(____X___,	____Y___)	(____X___,	____Y___)
1	10.00	400.00	5000.00	400.00		
2	520.00	505.00	5000.00	505.00		
3	530.00	510.00	540.00	510.00		
4	10.00	500.00	510.00	500.00	530.00	510.00
	531.00	511.00	539.00	511.00	540.00	510.00
	543.00	510.00	551.00	506.00	559.00	510.00
	5000.00	510.00				

SOIL PROPERTIES -

SOIL LAYER	COHESION	ANGLE OF FRICTION	UNIT WEIGHT
1	150.00	25.00	140.8
2	300.00	20.00	139.4
3	0.00	0.00	300.0

RADIUS CONTROL ZONES -

NO. OF CONTROL ZONES SPECIFIED : 1

ZONE 1 DATA - RADIUS DECREMENT : 0.0
NO. OF CIRCLES : 5
ID. OF 1ST CIRCLE : 1
NO. OF BOTTOM LINES: 1

BOTTOM LINE	BEGINNING POINT	ENDING POINT
1	1	2

RUN SPECIFICATIONS -

SEISMIC COEFFICIENT : .10
MIN. DEPTH OF TALLEST SLICE : 2.00
NO. OF SLICES : 10
NO. OF ADDED RADII : 3

WESTERN TECHNOLOGIES INC. 11-26-85
SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

	(____X___,____Y___)
GRID SEARCH WAS SPECIFIED WITH LOCATION AT :	510.00 510.00
	495.00 530.00
	520.00 540.00

NO. OF DIVISIONS BETWEEN POINTS 1 & 2 : 3.00
NO. OF DIVISIONS BETWEEN POINTS 2 & 3 : 3.00

X-INCREMENT FOR SEARCH : 2.00
Y-INCREMENT FOR SEARCH : 2.00

SEEPAGE CONDITION : PHREATIC SURFACE SPECIFIED

UNIT WEIGHT OF WATER : 62.4

[---------- POINTS ON WATER TABLE ----------]

(___X____,___Y____)	(___X____,___Y____)	(___X____,___Y____)
10.00 500.00	510.00 500.00	526.00 508.00
551.00 506.00	5000.00 506.00	

RESULTS OF REITERATIONS -

AT POINT(510.00, 510.00) :

	RADIUS	FS
	110.00	4.721
	89.79	4.356
	69.58	3.907
	49.37	3.324
	29.16	2.208
LOWEST :	19.05	1.973

AT POINT(505.00, 516.67) :

	RADIUS	FS
	116.67	4.487
	96.67	4.117
	76.67	3.680
	56.67	3.146
	36.67	2.184
LOWEST :	31.67	2.030

AT POINT(500.00, 523.33) :

	RADIUS	FS
	123.33	4.296
	103.33	3.927
	83.33	3.511
	63.33	3.010
	43.33	2.180
LOWEST :	38.33	2.088

AT POINT(495.00, 530.00) :

	RADIUS	FS
	130.00	4.139
	110.00	3.779
	90.00	3.385
	70.00	2.925
	50.00	2.225
LOWEST :	45.00	2.224

AT POINT(518.33, 513.33) :

	RADIUS	FS
	113.33	4.576
	92.31	4.186
	71.28	3.689
	50.25	3.054
	29.23	1.960
LOWEST :	18.71	1.358

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SLOPE STABILITY ANALYSIS - SIMPLIFIED BISHOP METHOD

AT POINT(513.33, 520.00) :

	RADIUS	FS
	120.00	4.354
	99.28	3.971
	78.56	3.482
	57.84	2.877
	37.12	1.924
LOWEST :	21.58	1.346

AT POINT(508.33, 526.67) :

	RADIUS	FS
	126.67	4.174
	106.25	3.806
	85.84	3.339
	65.42	2.785
	45.01	1.965
LOWEST :	34.80	1.511

AT POINT(503.33, 533.33) :

	RADIUS	FS
	133.33	4.029
	113.23	3.674
	93.12	3.238
	73.01	2.732
	52.90	2.027
LOWEST :	42.85	1.677

AT POINT(526.67, 516.67) :

	RADIUS	FS
	116.67	4.481
	94.76	4.075
	72.85	3.558
	50.95	2.920
	29.04	2.190
LOWEST :	18.09	1.856

AT POINT(521.67, 523.33) :

	RADIUS	FS
	123.33	4.263
	101.76	3.853
	80.19	3.355
	58.61	2.730
	37.04	1.950
LOWEST :	26.25	1.421

AT POINT(516.67, 530.00) :

	RADIUS	FS
	130.00	4.088
	108.76	3.689
	87.52	3.215
	66.28	2.629
	45.04	1.915
LOWEST :	29.11	1.361

AT POINT(511.67, 536.67) :

	RADIUS	FS
	136.67	3.946
	115.74	3.566
	94.82	3.120
	73.90	2.581