FINAL CALCULATIONS

CAMELBACK RANCH LEVEE - SOUTH
INDIAN SCHOOL ROAD TO CAMELBACK ROAD

FCD CONTRACT NO. 95-15

January 21, 1997

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO.
21029
MICHAEL S.
SHAPIRO
Date Signed 1/21/97
ARIZONA, U.S.A.

Prepared for:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, AZ 85009
(602) 506-1501

Prepared by:

DMJM ARIZONA, INC.
300 West Clarendon Avenue
Suite 400
Phoenix, AZ 85013
(602) 264-1397

[redacted]MELB[redacted]RAN[redacted]VEE [redacted]TH -[redacted]SE 1[redacted]

Vertical Control - Soil Cement Bank Data

JANUARY 21, 1997

South Bank STA	Description	Foundation Invert Slope (%)	Design Foundation Line	Offset Foundation Line (ft) LT	100yr	SPF Water surf. elev.	SPF+3	TOP OF LEVEE Elev.	Top of Levee slope (%)	Offset Toe Down (ft)	Toe Down Elev.	Toe Long. Slope (%)	Aera of Soil Cement	Vol of Soil Cement
8+50.00	Match existing top of dike	-50.0000%	1,020.00	11.00	1,011.20	1,016.60	1,019.70	1,021.00	0.0000%	11.00	1,020.00	-50.0000%	10.50	
8+72.00	Begin Foundation	1.4844%	1,009.00	22.00				1,021.00		22.00	1,009.00		109.50	1,320.00
9+00.00	existing toe down		1,009.42	21.58				1,021.00		43.21	995.00		235.50	4,830.00
9+06.00	Begin Toe		1,009.50	21.50				1,021.00		47.75	992.00	0.0000%	262.50	1,494.00
9+20.00	end removal north only		1,009.71	21.29				1,021.00		47.86	992.00		262.50	3,675.00
9+20.00	beg removal both sides		1,009.71	21.29				1,021.00		47.86	992.00		278.00	0.00
9+40.00			1,010.01	20.99				1,021.00		48.00	992.00		416.57	6,945.66
9+60.00			1,010.31	20.69				1,021.00		48.15	992.00		415.51	8,320.78
9+80.00			1,010.60	20.40				1,021.00		48.30	992.00		414.48	8,299.95
10+00.00			1,010.90	20.10				1,021.00		48.45	992.00		413.48	8,279.65
10+00.00	HEC 2 X-SEC NO 13 PI	-0.4000%	1,010.90	21.10	1,013.00	1,016.60	1,019.60	1,021.00		49.45	992.00	0.0000%	314.58	[redacted]
10+60.00	beg trns		1,010.66	21.34				1,021.00		49.33	992.00		313.23	18,834.33
11+00.00	end trns		1,010.50	10.50				1,021.00		38.25	992.00		312.34	12,511.34
12+00.00			1,010.10	10.90				1,021.00		38.05	992.00		310.14	31,123.95
13+00.00		0.9000%	1,009.70	11.30				1,021.00		37.85	992.00		307.99	30,906.75
14+00.00			1,010.60	10.40				1,021.00		38.30	992.00		312.89	31,044.38
15+00.00			1,011.50	9.50				1,021.00		38.75	992.00		318.04	31,546.58
15+52.27	PI #3		1,011.97	9.03				1,021.00		38.99	992.00		320.82	16,696.61
16+00.00		0.0900%	1,012.40	8.60				1,021.00		39.20	992.00		323.42	15,374.95
16+60.00	HEC 2 X-SEC NO 14		1,012.45	8.55	1,013.70	1,017.40	1,020.40	1,021.00		39.23	992.00		323.75	19,415.37
17+00.00			1,012.49	8.51				1,021.00		39.25	992.00		323.98	12,954.62
18+00.00			1,012.58	8.42				1,021.00		39.29	992.00		324.53	32,425.32
19+00.00			1,012.67	8.33				1,021.00		39.34	992.00		325.09	32,480.89
20+00.00			1,012.76	8.24				1,021.00		39.38	992.00		325.65	32,536.70
21+00.00			1,012.85	8.15				1,021.00		39.43	992.00		326.21	32,592.75
21+04.54	PI #4		1,012.85	8.15				1,021.00		39.43	992.00		326.23	1,481.04
22+00.00			1,012.94	8.06				1,021.00		39.47	992.00		326.77	31,168.00
22+50.00	HEC 2 X-SEC NO 15		1,012.99	8.01	1,014.10	1,017.90	1,020.90	1,021.00	0.1760%	39.49	992.00	-0.9280%	327.06	16,345.70
23+00.00			1,013.03	8.06				1,021.09		40.30	991.54		335.27	16,558.06
24+00.00			1,013.12	8.14				1,021.26		41.91	990.61		351.92	34,359.47
25+00.00			1,013.21	8.23				1,021.44		43.52	989.68		368.89	36,040.58
26+00.00		1.5000%	1,013.30	8.32				1,021.62		45.14	988.75		386.17	37,752.79
27+00.00		-1.9000%	1,014.80	6.99				1,021.79		47.46	987.82		414.87	40,0[redacted]
28+00.00		0.3000%	1,012.90	9.07				1,021.97		48.07	986.90		417.08	41,597.34
28+40.60			1,013.02	9.02				1,022.04		48.77	986.52		425.04	17,095.02
28+75.00	HEC 2 X-SEC NO 16		1,013.13	8.98	1,015.90	1,019.10	1,022.10	1,022.10	0.2241%	49.36	986.20	0.4138%	431.84	14,738.39
29+00.00			1,013.20	8.96				1,022.16		49.30	986.30		431.19	10,787.88
29+58.00			1,013.37	8.91				1,022.29		49.16	986.54		429.67	24,964.71
30+00.00			1,013.50	8.88				1,022.38		49.05	986.72		428.56	18,022.81
31+00.00			1,013.80	8.80				1,022.60		48.81	987.13		425.94	42,725.42
32+00.00		-0.7000%	1,014.10	8.73				1,022.83		48.56	987.54		423.33	42,463.69
33+00.00		1.0000%	1,013.40	9.65				1,023.05		47.81	987.96		412.94	41,813.22
34+00.00		0.1500%	1,014.40	8.88				1,023.28		47.92	988.37		415.75	41,434.47
34+55.00	HEC 2 X-SEC NO 17		1,014.48	8.92	1,017.10	1,020.40	1,023.40	1,023.40	0.2609%	47.74	988.60	-0.1087%	413.69	22,809.59
35+00.00			1,014.55	8.97				1,023.52		47.97	988.55		416.09	18,669.91
36+00.00		2.1000%	1,014.70	9.08				1,023.78		48.46	988.44		421.44	41,876.52
37+00.00		-4.7500%	1,016.80	7.24				1,024.04		49.94	988.33		442.90	43,217.03
38+00.00			1,012.05	12.25				1,024.30		47.99	988.23		409.82	42,635.90
39+00.00		0.0000%	1,007.30	17.26				1,024.56		46.04	988.12		383.20	39,651.14
39+15.00	HEC 2 X-SEC NO 18		1,007.30	17.30	1,018.00	1,021.60	1,024.60	1,024.60	0.6448%	46.10	988.10	2.6868%	383.80	5,752.49
40+00.00			1,007.30	17.85				1,025.15		43.22	990.38		355.80	31,432.95

[redacted]ELBA[redacted]ANC[redacted]VEE -[redacted]TH - [redacted]E 1 [redacted]

Vertical Control - Soil Cement Bank Data

JANUARY 21, 1997

South Bank STA	Description	Foundation Invert Slope (%)	Design Foundation Line	Offset Foundation Line (ft) LT	100yr	SPF Water surf. elev.	SPF+3	TOP OF LEVEE Elev.	Top of Levee slope (%)	Offset Toe Down (ft)	Toe Down Elev.	Toe Long. Slope (%)	Aera of Soil Cement	Vol of Soil Cement
41+00.00			1,007.30	18.49				1,025.79		39.84	993.07		324.87	34,033.79
42+00.00		6.7000%	1,007.30	19.14				1,026.44		36.45	995.76		296.11	31,049.09
43+00.00		0.0000%	1,014.00	13.08				1,027.08		36.42	998.44		294.04	29,507.64
43+80.24	HEC 2 X-SEC NO 18.5 PI		1,014.00	13.60	1,019.90	1,023.60	1,026.60	1,027.60	0.0000%	33.70	1,000.60	0.0000%	269.93	22,626.80
44+00.00			1,014.00	13.60				1,027.60		33.70	1,000.60		269.93	5,333.90
45+00.00			1,014.00	13.60				1,027.60		33.70	1,000.60		269.93	26,993.40
45+04.00	end toe		1,014.00	13.60				1,027.60		33.70	1,000.60	50.0000%	269.93	1,079.74
45+30.80	end foundation	50.0000%	1,014.00	13.60				1,027.60		13.60	1,014.00		122.40	5,257.28
45+58.00	Match highway embank.		1,027.60	0.00	1,021.40	1,024.10	1,027.10	1,027.60		0.00	1,027.60		0.00	1,664.64
	end soil cement													1,295,282.66
	HEC 2 X-SEC NO. 19													47,97[redacted]

LOCATION: Camelback Ranch Levee - South Final Design

January 21, 1997

STATION	Soil Cement AREA above exst [S.F.]	Soil Cement AREA below exst [S.F.]	DISTANCE [FT.]	AVERAGE AREA S-C above [S.F.]	AVERAGE AREA S-C below [S.F.]	VOLUME Soil Cement above [C.Y.]	VOLUME Soil Cement below [C.Y.]	STATION
8+50.00	10.50	0.00						8+50.00
			56.00	41.75	94.00	86.59	194.96	
9+06.00	73.00	188.00						9+06.00
			14.00	73.00	188.00	37.85	97.48	
9+20.00	73.00	188.00						9+20.00
			60.00	101.00	220.50	224.44	490.00	
9+80.00	129.00	253.00						9+80.00
			20.00	134.50	252.50	99.63	187.04	
10+00.00	140.00	252.00						10+00.00
			0.00	93.00	235.50	0.00	0.00	
10+00.00	46.00	219.00						10+00.00
			35.00	46.00	243.50	59.63	315.65	
10+35.00	46.00	268.00						10+35.00
			65.00	54.00	259.50	130.00	624.72	
11+00.00	62.00	251.00						11+00.00
			100.00	61.00	250.50	225.93	927.78	
12+00.00	60.00	250.00						12+00.00
			100.00	61.00	246.50	225.93	912.96	
13+00.00	62.00	243.00						13+00.00
			100.00	61.00	247.50	225.93	916.67	
14+00.00	60.00	252.00						14+00.00
			100.00	55.00	260.00	203.70	962.96	
15+00.00	50.00	268.00						15+00.00
			100.00	51.00	269.00	188.89	996.30	
16+00.00	52.00	270.00						16+00.00
			100.00	48.00	274.50	177.78	1,016.67	
17+00.00	44.00	279.00						17+00.00
			100.00	44.50	279.00	164.81	1,033.33	
18+00.00	45.00	279.00						18+00.00
			100.00	44.00	280.50	162.96	1,038.89	
19+00.00	43.00	282.00						19+00.00
			100.00	41.50	283.50	153.70	1,050.00	
20+00.00	40.00	285.00						20+00.00
			100.00	39.50	286.00	146.30	1,059.26	
21+00.00	39.00	287.00						21+00.00
			100.00	40.00	286.50	148.15	1,061.11	
22+00.00	41.00	286.00						22+00.00
			100.00	40.50	290.50	150.00	1,075.93	
23+00.00	40.00	295.00						23+00.00
			100.00	42.00	301.00	155.56	1,114.81	
24+00.00	44.00	307.00						24+00.00
			100.00	42.50	317.50	157.41	1,175.93	
25+00.00	41.00	328.00						25+00.00
			100.00	38.00	338.00	140.74	1,251.85	
26+00.00	35.00	348.00						26+00.00
			100.00	35.50	363.00	131.48	1,344.44	
27+00.00	36.00	378.00						27+00.00
			100.00	33.50	381.50	124.07	1,412.96	
28+00.00	31.00	385.00						28+00.00
			100.00	37.50	386.50	138.89	1,431.48	
29+00.00	44.00	388.00						29+00.00
			100.00	39.00	392.00	144.44	1,451.85	

LOCATION: Camelback Ranch Levee - South Final Design

January 21, 1997

STATION	Soil Cement AREA above exst [S.F.]	Soil Cement AREA below exst [S.F.]	DISTANCE [FT.]	AVERAGE AREA S-C above [S.F.]	AVERAGE AREA S-C below [S.F.]	VOLUME Soil Cement above [C.Y.]	VOLUME Soil Cement below [C.Y.]	STATION
30+00.00	34.00	396.00						30+00.00
			100.00	33.00	396.00	122.22	1,466.67	
31+00.00	32.00	396.00						31+00.00
			100.00	32.50	394.00	120.37	1,459.26	
32+00.00	33.00	392.00						32+00.00
			100.00	34.50	385.00	127.78	1,425.93	
33+00.00	36.00	378.00						33+00.00
			100.00	37.00	378.50	137.04	1,401.85	
34+00.00	38.00	379.00						34+00.00
			100.00	41.50	375.00	153.70	1,388.89	
35+00.00	45.00	371.00						35+00.00
			100.00	44.50	364.00	164.81	1,348.15	
36+00.00	44.00	357.00						36+00.00
			100.00	38.50	383.00	142.59	1,418.52	
37+00.00	33.00	409.00						37+00.00
			100.00	32.00	395.00	118.52	1,462.96	
38+00.00	31.00	381.00						38+00.00
			100.00	68.00	329.50	251.85	1,220.37	
39+00.00	105.00	278.00						39+00.00
			100.00	113.00	256.50	418.52	950.00	
40+00.00	121.00	235.00						40+00.00
			100.00	126.00	214.00	466.67	792.59	
41+00.00	131.00	193.00						41+00.00
			100.00	105.00	204.50	388.89	757.41	
42+00.00	79.00	216.00						42+00.00
			100.00	72.50	223.00	268.52	825.93	
43+00.00	66.00	230.00						43+00.00
			100.00	43.50	239.50	161.11	887.04	
44+00.00	21.00	249.00						44+00.00
			100.00	27.00	243.00	100.00	900.00	
45+00.00	33.00	237.00						45+00.00
			54.00	21.00	123.00	42.00	246.00	
45+54.00	9.00	9.00						45+54.00
					TOTALS	6,989.41	41,096.59	

TOTAL SOIL CEMENT 48,086.00

LOCATION: Camelback Ranch Levee - South Final Design
January 21, 1997

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
8+50.00	0.00	0.00						8+50.00
			56.00	402.50	0.00	834.81	0.00	
9+06.00	805.00	0.00						9+06.00
			14.00	805.00	107.50	417.41	55.74	
9+20.00	805.00	215.00						9+20.00
			60.00	805.00	215.00	1,788.89	477.78	
9+80.00	805.00	215.00						9+80.00
			20.00	836.50	228.50	619.63	169.26	
10+00.00	868.00	242.00						10+00.00
			35.00	1,015.50	246.50	1,316.39	319.54	
10+35.00	1163.00	251.00						10+35.00
			65.00	1,109.00	191.50	2,669.81	461.02	
11+00.00	1055.00	132.00						11+00.00
			100.00	1,042.50	128.00	3,861.11	474.07	
12+00.00	1030.00	124.00						12+00.00
			100.00	1,030.50	125.00	3,816.67	462.96	
13+00.00	1031.00	126.00						13+00.00
			100.00	1,036.00	123.50	3,837.04	457.41	
14+00.00	1041.00	121.00						14+00.00
			100.00	1,090.00	109.00	4,037.04	403.70	
15+00.00	1139.00	97.00						15+00.00
			100.00	1,136.50	99.00	4,209.26	366.67	
16+00.00	1134.00	101.00						16+00.00
			100.00	1,163.00	92.00	4,307.41	340.74	
17+00.00	1192.00	83.00						17+00.00
			100.00	1,194.50	82.50	4,424.07	305.56	
18+00.00	1197.00	82.00						18+00.00
			100.00	1,240.00	80.50	4,592.59	298.15	
19+00.00	1283.00	79.00						19+00.00
			100.00	1,292.00	74.50	4,785.19	275.93	
20+00.00	1301.00	70.00						20+00.00
			100.00	1,305.00	67.50	4,833.33	250.00	
21+00.00	1309.00	65.00						21+00.00
			100.00	1,297.00	68.50	4,803.70	253.70	
22+00.00	1285.00	72.00						22+00.00
			100.00	1,320.00	70.50	4,888.89	261.11	
23+00.00	1355.00	69.00						23+00.00
			100.00	1,394.50	74.00	5,164.81	274.07	
24+00.00	1434.00	79.00						24+00.00
			100.00	1,509.50	75.50	5,590.74	279.63	
25+00.00	1585.00	72.00						25+00.00
			100.00	1,658.00	70.00	6,140.74	259.26	
26+00.00	1731.00	68.00						26+00.00
			100.00	1,817.00	65.50	6,729.63	242.59	
27+00.00	1903.00	63.00						27+00.00
			100.00	1,986.50	57.00	7,357.41	211.11	
28+00.00	2070.00	51.00						28+00.00
			100.00	2,078.00	64.50	7,696.30	238.89	
29+00.00	2086.00	78.00						29+00.00
			100.00	2,122.50	67.50	7,861.11	250.00	
30+00.00	2159.00	57.00						30+00.00
			100.00	2,145.00	54.00	7,944.44	200.00	

LOCATION: Camelback Ranch Levee - South Final Design

January 21, 1997

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
31+00.00	2131.00	51.00						31+00.00
			100.00	2,116.00	52.50	7,837.04	194.44	
32+00.00	2101.00	54.00						32+00.00
			100.00	2,045.50	57.00	7,575.93	211.11	
33+00.00	1990.00	60.00						33+00.00
			100.00	1,960.50	63.00	7,261.11	233.33	
34+00.00	1931.00	66.00						34+00.00
			100.00	1,891.00	77.00	7,003.70	285.19	
35+00.00	1851.00	88.00						35+00.00
			100.00	1,816.00	86.50	6,725.93	320.37	
36+00.00	1781.00	85.00						36+00.00
			100.00	1,618.50	70.00	5,994.44	259.26	
37+00.00	1456.00	55.00						37+00.00
			100.00	1,364.00	54.50	5,051.85	201.85	
38+00.00	1272.00	54.00						38+00.00
			100.00	1,230.50	108.00	4,557.41	400.00	
39+00.00	1189.00	162.00						39+00.00
			100.00	1,099.00	206.00	4,070.37	762.96	
40+00.00	1009.00	250.00						40+00.00
			100.00	905.50	272.00	3,353.70	1,007.41	
41+00.00	802.00	294.00						41+00.00
			100.00	715.00	197.00	2,648.15	729.63	
42+00.00	628.00	100.00						42+00.00
			100.00	670.50	123.50	2,483.33	457.41	
43+00.00	713.00	147.00						43+00.00
			100.00	1,046.50	165.50	3,875.93	612.96	
44+00.00	1380.00	184.00						44+00.00
			100.00	1,402.00	121.00	5,192.59	448.15	
45+00.00	1424.00	58.00						45+00.00
			54.00	722.00	29.00	1,444.00	58.00	
45+54.00	20.00	0.00						45+54.00
					TOTALS	189,603.91	13,770.96	

LOCATION: Camelback Ranch Levee - South Final Design
January 21, 1997

STATION	FOUNDATION EXCAVATION AREA [S.F.]	[S.F.]	DISTANCE [FT.]	AVERAGE AREA Found Ex [S.F.]	[S.F.]	VOLUME Found ex [C.Y.]	[C.Y.]	STATION
10+00.00	256.00							10+00.00
			35.00	256.00		331.85		
10+35.00	256.00							10+35.00
			65.00	193.50		465.83		
11+00.00	131.00							11+00.00
			100.00	132.00		488.89		
12+00.00	133.00							12+00.00
			100.00	134.00		496.30		
13+00.00	135.00							13+00.00
			100.00	126.50		468.52		
14+00.00	118.00							14+00.00
			100.00	117.00		433.33		
15+00.00	116.00							15+00.00
			100.00	108.50		401.85		
16+00.00	101.00							16+00.00
			100.00	103.00		381.48		
17+00.00	105.00							17+00.00
			100.00	105.00		388.89		
18+00.00	105.00							18+00.00
			100.00	104.00		385.19		
19+00.00	103.00							19+00.00
			100.00	101.50		375.93		
20+00.00	100.00							20+00.00
			100.00	98.50		364.81		
21+00.00	97.00							21+00.00
			100.00	96.50		357.41		
22+00.00	96.00							22+00.00
			100.00	96.00		355.56		
23+00.00	96.00							23+00.00
			100.00	98.00		362.96		
24+00.00	100.00							24+00.00
			100.00	100.50		372.22		
25+00.00	101.00							25+00.00
			100.00	101.50		375.93		
26+00.00	102.00							26+00.00
			100.00	90.00		333.33		
27+00.00	78.00							27+00.00
			100.00	97.00		359.26		
28+00.00	116.00							28+00.00
			100.00	111.50		412.96		
29+00.00	107.00							29+00.00
			100.00	106.00		392.59		
30+00.00	105.00							30+00.00
			100.00	104.00		385.19		
31+00.00	103.00							31+00.00
			100.00	103.50		383.33		
32+00.00	104.00							32+00.00
			100.00	113.50		420.37		
33+00.00	123.00							33+00.00
			100.00	115.00		425.93		
34+00.00	107.00							34+00.00
			100.00	112.00		414.81		

LOCATION: Camelback Ranch Levee - South Final Design

January 21, 1997

STATION	FOUNDATION EXCAVATION AREA [S.F.]	[S.F.]	DISTANCE [FT.]	AVERAGE AREA Found Ex [S.F.]	[S.F.]	VOLUME Found ex [C.Y.]	[C.Y.]	STATION
35+00.00	117.00							35+00.00
			100.00	117.00		433.33		
36+00.00	117.00							36+00.00
			100.00	104.00		385.19		
37+00.00	91.00							37+00.00
			100.00	132.50		490.74		
38+00.00	174.00							38+00.00
			100.00	190.00		703.70		
39+00.00	206.00							39+00.00
			100.00	177.50		657.41		
40+00.00	149.00							40+00.00
			100.00	187.00		692.59		
41+00.00	225.00							41+00.00
			100.00	209.00		774.07		
42+00.00	193.00							42+00.00
			100.00	181.00		670.37		
43+00.00	169.00							43+00.00
			100.00	240.50		890.74		
44+00.00	312.00							44+00.00
			100.00	220.50		816.67		
45+00.00	129.00							45+00.00
			54.00	64.50		129.00		
45+54.00	0.00							45+54.00
					TOTALS	16,978.54	0.00	

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 65216.01	SHEET 1 of 6
		DESIGNED BY CBB	DATE 1-21-97
SUBJECT: QUANTITIES		CHECKED BY	DATE 1/21/97

SOIL CEMENT

FROM SPREAD SHEET 47,973 C.Y. use 48,000

@ 135 #/ft³ ⇒ 48,000 x 27 x 135/2000 TONS

= 87480 TONS

CEMENT @ 11% = 9623 TONS

SAFETY RAIL

STA 10+00 to STA 45+58

= 3558 + 10' @ STA 10+00

TOTAL RAIL = 3568

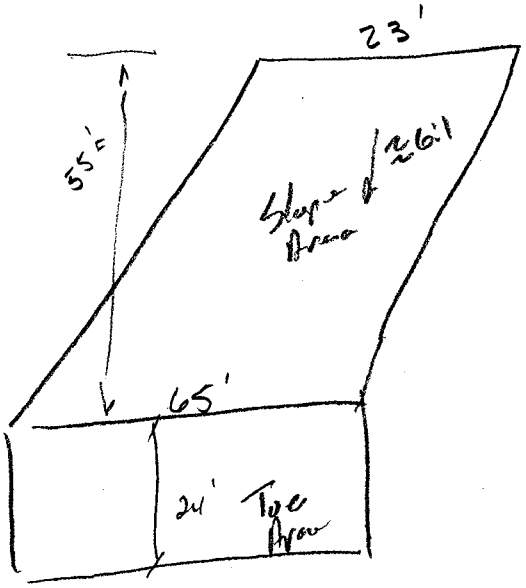
SMOOTH WIRE FENCE

FROM PLAN SHEETS 1596 LF
2527 LF

TOTAL = 4123 LF

GATES: 2 - 14' DOUBLE LEAF GATES

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 2 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY MSS	DATE 12/4/96



Riprap @ North Turnaround

Slope Section area

$\left(\frac{23+65}{2}\right) \times 55$

$= 2420$ SF

@ 6:1 slope Area increase

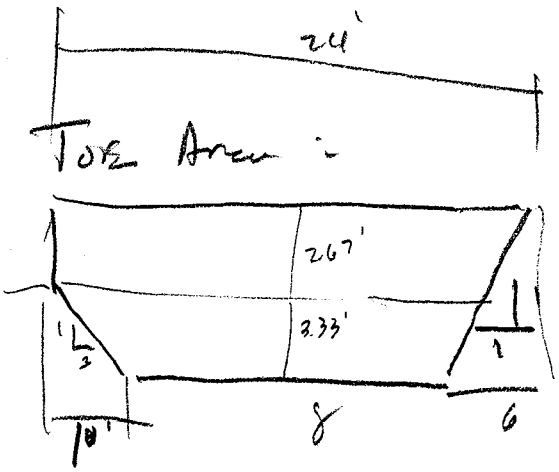
$\approx 1.38\%$

Area $= 1.0138 \times 2420$

$= 2453$ S.F.

Vol $= 2453 \times 2.5$

$= 6123.5$ C.F.



$A = \frac{24+21.33}{2} \times 2.33 +$

$\frac{21.33+8}{2} \times 3.33$

$= 109.4$ SF

Vol $= 109.4 \times 65$

$= 7106$ C.F.

Total Riprap $= 6123 + 7{,}106 / 27 = 490$ C.Y.

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 3 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY MSS	DATE 12/4/96

Pneumatically Placed Mortar

Length = 100' + 65' + 37 = 202'

width = 8' 8

1616 S.F. = 180 S.Y.

Seeding Area

avg height of Levee 7' @ 3:1 cross slope length = 22.1'

Length = STA 10+00 to STA 44+58

3458 x 22.1 = 76,421 S.F.

+ entrance

250 x 22.1 = 5,525 S.F.

81,946 S.F.

= 1.88 Acres ~~~ 2 AC.

DMJM	PROJECT: Camelback Ranch Levee - South	JOB NO. 6526.01	SHEET 4 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY MSS	DATE 12/4/96

ABC

Top of Levee

STA 10+00 to sta 44+58

7' x 3458' /9 = 2689.6 S.Y.

Turn AROUND - South end

sta 10+00 to sta 10+60

(38 - 16) x 60 /9

22' x 60 /9 = 146.7 S.Y.

North END TURNAROUND

sta 44+58 to 45+58

100' x (100 - 9) /9 = 1011.1 S.Y.

ENTRANCE AREA =

≈ 3163 SF /9 = 351.4 S.Y.

4198.8 S.Y.

TOTAL = use 4200 S.Y.

@ $1.50 S.Y.

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 5 of 6
		DESIGNED BY DBB	DATE 1-21-97
SUBJECT: QUANTITIES		CHECKED BY MJS	DATE 1/21/97

EMBANKMENT

FROM X-Sections = 13,771 CY

NORTH TURNAROUND = 3592 CY

TOTAL = 17,363 CY

~~~~ 17,400 CY

NORTH TURNAROUND + ENTRANCE EMBANKMENT

AREA of Top = 12,930.6 S.F.

Avg Depth = 7.5'

Vol = 12,930.6 x 7.5 /27 = 3592 CY
~~~~

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 6 of 6
		DESIGNED BY CBB	DATE 1-21-97
SUBJECT: QUANTITIES		CHECKED BY	DATE

EARTHWORK SUMMARY:

ASSUME: SOIL CEMENT WILL BE MADE FROM BORROW ONLY

FILL REQUIRED:

EMBANKMENT	= 17,400	C.Y.
FOUNDATION EX	= +17,000	C.Y.
TOTAL	= 34,400	C.Y.
Shrink @10%	+3440	C.Y.
	37,840	C.Y.
TOE EXCAVATION	+189,700	C.Y.
Assume no shrink	227,540	C.Y.

EXCAVATIONS MADE:

FOUNDATION	17,000	C.Y.
SOIL CEMENT (Below Grade)	= 41,000	C.Y.
TOE EXCAVATION	+ 189,700	C.Y.
TOTAL EX.	247,700	C.Y.
TOTAL Fill (Req.)	- 227,540	C.Y.
	20,160	C.Y.

SOIL CEMENT (ABOVE GRADE)	7,000	C.Y.
SOIL CEMENT (BELOW GRADE)	+ 41,000	C.Y.
TOTAL	48,000	C.Y.
10% shrink	+ 4800	
TOTAL BORROW Req.	52,800	C.Y.

FINAL CALCULATIONS

CAMELBACK RANCH LEVEE - SOUTH
INDIAN SCHOOL ROAD TO CAMELBACK ROAD

FCD CONTRACT NO. 95-15

Revised February 24, 1997

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO.
21029
MICHAEL S.
SHAPIRO
Date Signed 2/24/97
ARIZONA, U.S.A.

Prepared for:
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, AZ 85009
(602) 506-1501

Prepared by:
DMJM ARIZONA, INC.
300 West Clarendon Avenue
Suite 400
Phoenix, AZ 85013
(602) 264-1397

CAN[redacted]ACK[redacted]NCH[redacted]EE - [redacted]TH - [redacted]SE [redacted]

Vertical Control - Soil Cement Bank Data

Revised Feb. 24, 1997

Toe Down offset computed at 1.8:1 from the foundation down

South Bank STA	Description	Foundation Invert Slope (%)	Design Foundation Line	Offset Foundation Offset	100yr	SPF Water surf. elev.	SPF+3	Offset Top	TOP OF LEVEE Elev.	Top of Levee slope (%)	Offset Toe Down (ft)	Toe Down Elev.	Toe Long. Slope (%)	Aera of Soil Cemen	Vol of Soil Cement
8+50.00	MATCH EXISTING	-50.0000%	1,020.00	-11.00	1,011.20	1,016.60	1,019.70	-10.00	1,021.00	0.0000%	-11.00	1,020.00	-50.0000%	10.50	
8+72.00	Begin Foundation	1.4844%	1,009.00	-22.00				-10.00	1,021.00		-22.00	1,009.00		109.50	1,320.00
9+00.00	EXISTING TOE		1,009.42	-21.58				-10.00	1,021.00		-47.53	995.00		235.50	4,830.00
9+06.00	BEGIN TOE		1,009.50	-21.50				-10.00	1,021.00		-53.00	992.00	0.0000%	262.50	1,494.00
9+20.00	end removal north only		1,009.71	-21.29				-10.00	1,021.00		-53.17	992.00		262.50	3,675.00
9+20.00	beg removal both sides		1,009.71	-21.29				-10.00	1,021.00		-53.17	992.00		278.00	0.00
9+40.00			1,010.01	-20.99				-10.00	1,021.00		-53.41	992.00		367.92	6,459.1[illegible]
9+60.00			1,010.31	-20.69				-10.00	1,021.00		-53.65	992.00		365.24	7,331.[illegible]
9+80.00			1,010.60	-20.40				-10.00	1,021.00		-53.88	992.00		362.57	7,278.16
10+00.00	END SOIL CEMENT BACK		1,010.90	-20.10				-10.00	1,021.00		-54.12	992.00		359.90	7,224.72
10+00.00	PI #22 GB FOUNDATION	-0.4000%	1,010.90	-15.10	1,013.00	1,016.60	1,019.60	-5.00	1,021.00		-49.12	992.00	0.0000%	261.00	0.00
10+60.00	END TURNAROUND		1,010.66	-15.34				-5.00	1,021.00		-48.93	992.00		261.00	15,660.00
11+00.00	END TRANSITION		1,010.50	-10.50				0.00	1,021.00		-43.80	992.00		261.00	10,440.00
12+00.00			1,010.10	-10.90				0.00	1,021.00		-43.48	992.00		261.00	26,100.00
13+00.00	GB FOUNDATION	0.9000%	1,009.70	-11.30				0.00	1,021.00		-43.16	992.00		261.00	26,100.00
14+00.00			1,010.60	-10.40				0.00	1,021.00		-43.88	992.00		261.00	26,100.00
15+00.00			1,011.50	-9.50				0.00	1,021.00		-44.60	992.00		261.00	26,100.00
15+52.27	PI #23		1,011.97	-9.03				0.00	1,021.00		-44.98	992.00		261.00	13,642.47
16+00.00	GB FOUNDATION	0.0900%	1,012.40	-8.60				0.00	1,021.00		-45.32	992.00		261.00	12,457.53
16+60.00	HEC 2 X-SEC NO 14		1,012.45	-8.55	1,013.70	1,017.40	1,020.40	0.00	1,021.00		-45.36	992.00		261.00	15,660.00
17+00.00			1,012.49	-8.51				0.00	1,021.00		-45.39	992.00		261.00	10,440.00
18+00.00			1,012.58	-8.42				0.00	1,021.00		-45.46	992.00		261.00	26,100.00
19+00.00			1,012.67	-8.33				0.00	1,021.00		-45.54	992.00		261.00	26,100.00
20+00.00			1,012.76	-8.24				0.00	1,021.00		-45.61	992.00		261.00	26,100.00
21+00.00			1,012.85	-8.15				0.00	1,021.00		-45.68	992.00		261.00	26,100.00
21+04.54	PI #24		1,012.85	-8.15				0.00	1,021.00		-45.68	992.00		261.00	1,184.94
22+00.00			1,012.94	-8.06				0.00	1,021.00		-45.75	992.00		261.00	24,915.0[illegible]
22+50.00	HEC 2 X-SEC NO 15 GB TOP/TOE		1,012.99	-8.01	1,014.10	1,017.90	1,020.90	0.00	1,021.00	0.1760%	-45.79	992.00	-0.9280%	261.00	13,050.00
23+00.00			1,013.03	-8.06				0.00	1,021.09		-46.75	991.54		265.97	13,174.20
24+00.00			1,013.12	-8.14				0.00	1,021.26		-48.67	990.61		275.90	27,093.60
24+25.00	PI TOP		1,013.14	-8.17				0.00	1,021.31		-49.15	990.38		278.39	6,928.65
25+00.00			1,013.21	-6.73				1.50	1,021.44		-49.08	989.68		285.84	21,158.55
26+00.00	GB FOUNDATION	1.4000%	1,013.30	-4.82				3.50	1,021.62		-49.00	988.75		295.78	29,080.80
27+00.00	GB FOUNDATION	-1.8000%	1,014.70	-1.59				5.50	1,021.79		-49.97	987.82		305.71	30,074.40
28+00.00	GB FOUNDATION	0.3000%	1,012.90	-1.57				7.50	1,021.97		-48.38	986.90		315.65	31,068.00
28+75.00	HEC 2 X-SEC NO 16 GB TOP/TOE		1,013.13	0.02	1,015.90	1,019.10	1,022.10	9.00	1,022.10	0.2241%	-48.44	986.20	0.4138%	323.10	23,953.05
29+00.00			1,013.20	0.04				9.00	1,022.16		-48.37	986.30		322.67	8,072.17
29+58.00			1,013.37	0.09				9.00	1,022.29		-48.21	986.54		321.68	18,686.34
30+00.00			1,013.50	0.12				9.00	1,022.38		-48.09	986.72		320.97	13,495.64
31+00.00			1,013.80	0.20				9.00	1,022.60		-47.81	987.13		319.26	32,011.29
32+00.00	GB FOUNDATION	-0.7000%	1,014.10	0.27				9.00	1,022.83		-47.53	987.54		317.55	31,840.60
33+00.00	GB FOUNDATION	1.0000%	1,013.40	-0.65				9.00	1,023.05		-46.45	987.96		315.85	31,669.91

CA[redacted]ACK[redacted]NCH[redacted]EE -[redacted]TH -[redacted]SE [redacted]

Vertical Control - Soil Cement Bank Data

Revised Feb. 24, 1997 Toe Down offset computed at 1.8:1 from the foundation down

South Bank STA	Description	Foundation Invert Slope (%)	Design Foundation Line	Offset Foundation Offset	100yr	SPF Water surf. elev.	SPF+3	Offset Top	TOP OF LEVEE Elev.	Top of Levee slope (%)	Offset Toe Down (ft)	Toe Down Elev.	Toe Long. Slope (%)	Aera of Soil Cemen	Vol of Soil Cement
34+00.00	GB FOUNDATION	0.1500%	1,014.40	0.12				9.00	1,023.28		-46.73	988.37		314.14	31,499.22
34+55.00	HEC 2 X-SEC NO 17 GB TOP/TOE		1,014.48	0.08	1,017.10	1,020.40	1,023.40	9.00	1,023.40	0.2609%	-46.51	988.60	-0.1087%	313.20	17,251.82
35+00.00			1,014.55	0.03				9.00	1,023.52		-46.77	988.55		314.70	14,127.68
36+00.00	GB FOUNDATION	2.1000%	1,014.70	-0.08				9.00	1,023.78		-47.34	988.44		318.02	31,635.98
37+00.00	PI TOP	-4.7500%	1,016.80	1.76				9.00	1,024.04		-49.48	988.33		321.35	31,968.59
38+00.00			1,012.05	-6.25				6.00	1,024.30		-49.13	988.23		324.67	32,301.20
39+00.00		0.0000%	1,007.30	-14.26				3.00	1,024.56		-48.79	988.12		328.00	32,633.80
39+15.00	HEC 2 X-SEC NO 18 GB TOP/TOE		1,007.30	-14.75	1,018.00	1,021.60	1,024.60	2.55	1,024.60	0.6448%	-49.31	988.10	2.6868%	328.50	4,923.76
40+00.00	PI TOP		1,007.30	-17.85				0.00	1,025.15		-48.30	990.38		312.88	27,258.[illegible]
41+00.00			1,007.30	-18.49				0.00	1,025.79		-44.11	993.07		294.50	30,369.02
42+00.00		6.7000%	1,007.30	-19.14				0.00	1,026.44		-39.91	995.76		276.12	28,531.26
43+00.00		0.0000%	1,014.00	-13.08				0.00	1,027.08		-41.08	998.44		257.75	26,693.50
43+80.24	HEC 2 X-SEC NO 18.5 PI #25 GB TOP/		1,014.00	-13.60	1,019.90	1,023.60	1,026.60	0.00	1,027.60	0.0000%	-37.72	1,000.60	0.0000%	243.00	20,089.94
44+00.00			1,014.00	-13.60				0.00	1,027.60		-37.72	1,000.60		243.00	4,801.68
45+00.00			1,014.00	-13.60				0.00	1,027.60		-37.72	1,000.60		243.00	24,300.00
45+04.00	END TOE		1,014.00	-13.60				0.00	1,027.60		-37.72	1,000.60	50.0000%	243.00	972.00
45+30.80	END FOUNDATION	50.0000%	1,014.00	-13.60				0.00	1,027.60		-13.60	1,014.00		122.40	4,896.36
45+58.00	MATCH EXISTING		1,027.60	0.00	1,021.40	1,024.10	1,027.10	0.00	1,027.60		0.00	1,027.60		0.00	1,664.64
	end soil cement														1,038,769.89
	HEC 2 X-SEC NO. 19														38,472.96

LOCATION: Camelback Ranch Levee - South Final Design

February 24, 1997 Revised soil cement slope

STATION	Soil Cement AREA above exst [S.F.]	Soil Cement AREA below exst [S.F.]	DISTANCE [FT.]	AVERAGE AREA S-C above [S.F.]	AVERAGE AREA S-C below [S.F.]	VOLUME Soil Cement above [C.Y.]	VOLUME Soil Cement below [C.Y.]	STATION
8+50.00	10.50	0.00						8+50.00
			56.00	41.75	94.00	86.59	194.96	
9+06.00	73.00	188.00						9+06.00
			14.00	73.00	188.00	37.85	97.48	
9+20.00	73.00	188.00						9+20.00
			60.00	101.00	220.50	224.44	490.00	
9+80.00	129.00	253.00						9+80.00
			20.00	134.50	252.50	99.63	187.04	
10+00.00	140.00	252.00						10+00.00
			0.00	93.00	235.50	0.00	0.00	
10+00.00	46.00	219.00						10+00.00
			35.00	46.00	217.00	59.63	281.30	
10+35.00	46.00	215.00						10+35.00
			65.00	54.00	207.50	130.00	499.54	
11+00.00	62.00	200.00						11+00.00
			100.00	61.00	202.00	225.93	748.15	
12+00.00	60.00	204.00						12+00.00
			100.00	61.00	201.50	225.93	746.30	
13+00.00	62.00	199.00						13+00.00
			100.00	61.00	199.50	225.93	738.89	
14+00.00	60.00	200.00						14+00.00
			100.00	55.00	205.00	203.70	759.26	
15+00.00	50.00	210.00						15+00.00
			100.00	51.00	209.00	188.89	774.07	
16+00.00	52.00	208.00						16+00.00
			100.00	48.00	212.00	177.78	785.19	
17+00.00	44.00	216.00						17+00.00
			100.00	44.50	216.00	164.81	800.00	
18+00.00	45.00	216.00						18+00.00
			100.00	44.00	217.50	162.96	805.56	
19+00.00	43.00	219.00						19+00.00
			100.00	41.50	219.50	153.70	812.96	
20+00.00	40.00	220.00						20+00.00
			100.00	39.50	221.00	146.30	818.52	
21+00.00	39.00	222.00						21+00.00
			100.00	40.00	221.00	148.15	818.52	
22+00.00	41.00	220.00						22+00.00
			100.00	40.50	222.50	150.00	824.07	
23+00.00	40.00	225.00						23+00.00
			100.00	42.00	229.00	155.56	848.15	
24+00.00	44.00	233.00						24+00.00
			100.00	42.50	239.00	157.41	885.19	
25+00.00	41.00	245.00						25+00.00
			100.00	38.00	250.50	140.74	927.78	
26+00.00	35.00	256.00						26+00.00
			100.00	35.50	262.50	131.48	972.22	
27+00.00	36.00	269.00						27+00.00
			100.00	33.50	276.00	124.07	1,022.22	
28+00.00	31.00	283.00						28+00.00
			100.00	37.50	275.00	138.89	1,018.52	
29+00.00	44.00	267.00						29+00.00
			100.00	39.00	277.00	144.44	1,025.93	

LOCATION: Camelback Ranch Levee - South Final Design

February 24, 1997 Revised soil cement slope

STATION	Soil Cement AREA above exst [S.F.]	Soil Cement AREA below exst [S.F.]	DISTANCE [FT.]	AVERAGE AREA S-C above [S.F.]	AVERAGE AREA S-C below [S.F.]	VOLUME Soil Cement above [C.Y.]	VOLUME Soil Cement below [C.Y.]	STATION
30+00.00	34.00	287.00						30+00.00
			100.00	33.00	287.50	122.22	1,064.81	
31+00.00	32.00	288.00						31+00.00
			100.00	32.50	286.50	120.37	1,061.11	
32+00.00	33.00	285.00						32+00.00
			100.00	34.50	281.50	127.78	1,042.59	
33+00.00	36.00	278.00						33+00.00
			100.00	37.00	277.00	137.04	1,025.93	
34+00.00	38.00	276.00						34+00.00
			100.00	41.50	273.00	153.70	1,011.11	
35+00.00	45.00	270.00						35+00.00
			100.00	44.50	271.50	164.81	1,005.56	
36+00.00	44.00	273.00						36+00.00
			100.00	38.50	280.50	142.59	1,038.89	
37+00.00	33.00	288.00						37+00.00
			100.00	32.00	290.50	118.52	1,075.93	
38+00.00	31.00	293.00						38+00.00
			100.00	68.00	260.50	251.85	964.81	
39+00.00	105.00	228.00						39+00.00
			100.00	113.00	209.50	418.52	775.93	
40+00.00	121.00	191.00						40+00.00
			100.00	126.00	176.50	466.67	653.70	
41+00.00	131.00	162.00						41+00.00
			100.00	105.00	179.50	388.89	664.81	
42+00.00	79.00	197.00						42+00.00
			100.00	72.50	195.00	268.52	722.22	
43+00.00	66.00	193.00						43+00.00
			100.00	43.50	211.50	161.11	783.33	
44+00.00	21.00	230.00						44+00.00
			100.00	27.00	222.00	100.00	822.22	
45+00.00	33.00	214.00						45+00.00
			54.00	21.00	111.50	42.00	223.00	
45+54.00	9.00	9.00						45+54.00
					TOTALS	6,989.41	31,817.76	

TOTAL SOIL CEMENT 38,807.17

LOCATION: Camelback Ranch Levee - South Final Design
February 24, 1997 Revised soil cement slope

STATION	FOUNDATION EXCAVATION AREA [S.F.]	[S.F.]	DISTANCE [FT.]	AVERAGE AREA Found Ex [S.F.]	[S.F.]	VOLUME Found ex [C.Y.]	[C.Y.]	STATION
10+00.00	256.00							10+00.00
			35.00	256.00		331.85		
10+35.00	256.00							10+35.00
			65.00	193.50		465.83		
11+00.00	131.00							11+00.00
			100.00	132.00		488.89		
12+00.00	133.00							12+00.00
			100.00	134.00		496.30		
13+00.00	135.00							13+00.00
			100.00	126.50		468.52		
14+00.00	118.00							14+00.00
			100.00	117.00		433.33		
15+00.00	116.00							15+00.00
			100.00	108.50		401.85		
16+00.00	101.00							16+00.00
			100.00	103.00		381.48		
17+00.00	105.00							17+00.00
			100.00	105.00		388.89		
18+00.00	105.00							18+00.00
			100.00	104.00		385.19		
19+00.00	103.00							19+00.00
			100.00	101.50		375.93		
20+00.00	100.00							20+00.00
			100.00	98.50		364.81		
21+00.00	97.00							21+00.00
			100.00	96.50		357.41		
22+00.00	96.00							22+00.00
			100.00	96.00		355.56		
23+00.00	96.00							23+00.00
			100.00	98.00		362.96		
24+00.00	100.00							24+00.00
			100.00	100.50		372.22		
25+00.00	101.00							25+00.00
			100.00	101.50		375.93		
26+00.00	102.00							26+00.00
			100.00	90.00		333.33		
27+00.00	78.00							27+00.00
			100.00	97.00		359.26		
28+00.00	116.00							28+00.00
			100.00	111.50		412.96		
29+00.00	107.00							29+00.00
			100.00	106.00		392.59		
30+00.00	105.00							30+00.00
			100.00	104.00		385.19		
31+00.00	103.00							31+00.00
			100.00	103.50		383.33		
32+00.00	104.00							32+00.00
			100.00	113.50		420.37		
33+00.00	123.00							33+00.00
			100.00	115.00		425.93		
34+00.00	107.00							34+00.00
			100.00	112.00		414.81		

LOCATION: Camelback Ranch Levee - South Final Design
February 24, 1997 Revised soil cement slope

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
8+50.00	0.00	0.00						8+50.00
			56.00	402.50	0.00	834.81	0.00	
9+06.00	805.00	0.00						9+06.00
			14.00	805.00	107.50	417.41	55.74	
9+20.00	805.00	215.00						9+20.00
			60.00	805.00	215.00	1,788.89	477.78	
9+80.00	805.00	215.00						9+80.00
			20.00	836.50	228.50	619.63	169.26	
10+00.00	868.00	242.00						10+00.00
			35.00	1,045.50	246.50	1,355.28	319.54	
10+35.00	1223.00	251.00						10+35.00
			65.00	1,158.00	191.50	2,787.78	461.02	
11+00.00	1093.00	132.00						11+00.00
			100.00	1,106.00	128.00	4,096.30	474.07	
12+00.00	1119.00	124.00						12+00.00
			100.00	1,091.50	125.00	4,042.59	462.96	
13+00.00	1064.00	126.00						13+00.00
			100.00	1,074.50	123.50	3,979.63	457.41	
14+00.00	1085.00	121.00						14+00.00
			100.00	1,139.00	109.00	4,218.52	403.70	
15+00.00	1193.00	97.00						15+00.00
			100.00	1,194.00	99.00	4,422.22	366.67	
16+00.00	1195.00	101.00						16+00.00
			100.00	1,226.00	92.00	4,540.74	340.74	
17+00.00	1257.00	83.00						17+00.00
			100.00	1,250.50	82.50	4,631.48	305.56	
18+00.00	1244.00	82.00						18+00.00
			100.00	1,297.50	80.50	4,805.56	298.15	
19+00.00	1351.00	79.00						19+00.00
			100.00	1,363.00	74.50	5,048.15	275.93	
20+00.00	1375.00	70.00						20+00.00
			100.00	1,381.50	67.50	5,116.67	250.00	
21+00.00	1388.00	65.00						21+00.00
			100.00	1,374.00	68.50	5,088.89	253.70	
22+00.00	1360.00	72.00						22+00.00
			100.00	1,398.50	70.50	5,179.63	261.11	
23+00.00	1437.00	69.00						23+00.00
			100.00	1,482.00	74.00	5,488.89	274.07	
24+00.00	1527.00	79.00						24+00.00
			100.00	1,607.00	75.50	5,951.85	279.63	
25+00.00	1687.00	72.00						25+00.00
			100.00	1,771.00	70.00	6,559.26	259.26	
26+00.00	1855.00	68.00						26+00.00
			100.00	1,942.00	65.50	7,192.59	242.59	
27+00.00	2029.00	63.00						27+00.00
			100.00	2,121.50	57.00	7,857.41	211.11	
28+00.00	2214.00	51.00						28+00.00
			100.00	2,157.00	64.50	7,988.89	238.89	
29+00.00	2100.00	78.00						29+00.00
			100.00	2,194.00	67.50	8,125.93	250.00	
30+00.00	2288.00	57.00						30+00.00
			100.00	2,282.50	54.00	8,453.70	200.00	

LOCATION: Camelback Ranch Levee - South Final Design

February 24, 1997 Revised soil cement slope

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
31+00.00	2277.00	51.00						31+00.00
			100.00	2,258.50	52.50	8,364.81	194.44	
32+00.00	2240.00	54.00						32+00.00
			100.00	2,184.50	57.00	8,090.74	211.11	
33+00.00	2129.00	60.00						33+00.00
			100.00	2,099.00	63.00	7,774.07	233.33	
34+00.00	2069.00	66.00						34+00.00
			100.00	2,033.00	77.00	7,529.63	285.19	
35+00.00	1997.00	88.00						35+00.00
			100.00	1,958.00	86.50	7,251.85	320.37	
36+00.00	1919.00	85.00						36+00.00
			100.00	1,767.00	70.00	6,544.44	259.26	
37+00.00	1615.00	55.00						37+00.00
			100.00	1,511.50	54.50	5,598.15	201.85	
38+00.00	1408.00	54.00						38+00.00
			100.00	1,304.00	108.00	4,829.63	400.00	
39+00.00	1200.00	162.00						39+00.00
			100.00	1,131.50	206.00	4,190.74	762.96	
40+00.00	1063.00	250.00						40+00.00
			100.00	936.00	272.00	3,466.67	1,007.41	
41+00.00	809.00	294.00						41+00.00
			100.00	735.00	197.00	2,722.22	729.63	
42+00.00	661.00	100.00						42+00.00
			100.00	687.00	123.50	2,544.44	457.41	
43+00.00	713.00	147.00						43+00.00
			100.00	1,046.50	165.50	3,875.93	612.96	
44+00.00	1380.00	184.00						44+00.00
			100.00	1,402.00	121.00	5,192.59	448.15	
45+00.00	1424.00	58.00						45+00.00
			54.00	722.00	29.00	1,444.00	58.00	
45+54.00	20.00	0.00						45+54.00
					TOTALS	200,012.61	13,770.96	

LOCATION: Camelback Ranch Levee - South Final Design
February 24, 1997 Revised soil cement slope

STATION	FOUNDATION EXCAVATION AREA [S.F.]	[S.F.]	DISTANCE [FT.]	AVERAGE AREA Found Ex [S.F.]	[S.F.]	VOLUME Found ex [C.Y.]	[C.Y.]	STATION
35+00.00	117.00							35+00.00
			100.00	117.00		433.33		
36+00.00	117.00							36+00.00
			100.00	104.00		385.19		
37+00.00	91.00							37+00.00
			100.00	132.50		490.74		
38+00.00	174.00							38+00.00
			100.00	190.00		703.70		
39+00.00	206.00							39+00.00
			100.00	177.50		657.41		
40+00.00	149.00							40+00.00
			100.00	187.00		692.59		
41+00.00	225.00							41+00.00
			100.00	209.00		774.07		
42+00.00	193.00							42+00.00
			100.00	181.00		670.37		
43+00.00	169.00							43+00.00
			100.00	240.50		890.74		
44+00.00	312.00							44+00.00
			100.00	220.50		816.67		
45+00.00	129.00							45+00.00
			54.00	64.50		129.00		
45+54.00	0.00							45+54.00
					TOTALS	16,978.54	0.00	

DMJM	PROJECT: CAMELBACK RANCH LEVEL SOUTH -	JOB NO. 4526.01	SHEET 1 of 2
		DESIGNED BY CBB	DATE 2/24/97
SUBJECT: Revised Quantities		CHECKED BY	DATE 2/24/97

EARTHWORK SUMMARY

ASSUME: SOIL CEMENT WILL BE MADE FROM BORROW ONLY

FILL REQUIRED:

EMBANKMENT	17,400	C.Y.
FOUNDATION	17,000	C.Y.
TOTAL	34,400	CY
shrink @ 10%	3440	CY.
	37,840	C.Y.
TOE EXCAVATION	200,100	C.Y.
(ASSUME NO shrink)	237,940	C.Y.

EXCAVATION REQUIRED:

FOUNDATION:	17,000	CY
SOIL CEMENT (Below Grade)	31,800	C.Y.
TOE EXCAVATIONS	200,100	C.Y
TOTAL EX:	248,900	C
(Less Total fill)	237,940	C
	10,960	CY

EXCESS EX

Borrow

SOIL CEMENT (ABOVE GRADE)	7,000	CY.
SOIL CEMENT (BELOW GRADE)	31,800	C.Y.
TOTAL	38,800	CY.
+10% shrink	3880	
	42,680	CY.

Borrow.

DMJM	PROJECT: CAMELBACK RANCH LEVEE SOUTH	JOB NO. 6526.01	SHEET 2 of 2
		DESIGNED BY CBB	DATE 2/24/97
SUBJECT: Revised Quantities		CHECKED BY [illegible]	DATE 2/24/97

SOIL CEMENT:

TOTAL 38,800 C.Y.

Assume: unit weight ≈ 125 #/ft³

Cement @ 11%

Soil Cement = 38,800 x 27 x 125/2000 = 65,475 TONS

CEMENT @ 11% = 65,475 x .11 = 7,202 TONS

use 7,210

FINAL CALCULATIONS

CAMELBACK RANCH LEVEE - SOUTH
INDIAN SCHOOL ROAD TO CAMELBACK ROAD

FCD CONTRACT NO. 95-15

December 4, 1996

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO.
21029
MICHAEL S.
SHAPIRO
Date Signed 12-4-96
ARIZONA, U.S.A.

Prepared for:
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, AZ 85009
(602) 506-1501

Prepared by:
DMJM ARIZONA, INC.
300 West Clarendon Avenue
Suite 400
Phoenix, AZ 85013
(602) 264-1397

Vertical Control - Soil Cement Bank Data

DECEMBER 4, 1996

South Bank STA	Description	Foundation Invert Slope (%)	Design Foundation Line	Offset Foundation Line (ft) LT	SPF Water surf. elev.	SPF+3	TOP OF LEVEE Elev.	Top of Levee slope (%)	Offset Toe Down (ft)	Toe Down Elev.	Toe Long. Slope (%)	Aera of Soil Cement	Vol of Soil Cement
9+20.00	Match existing top of dike	-50.0000%	1,020.00	11.00	1,016.60	1,019.70	1,021.00	0.0000%	11.00	1,020.00	-50.0000%	26.00	
9+38.20	Begin Foundation Line	0.0000%	1,010.90	20.10			1,021.00		20.10	1,010.90		189.80	1,963.78
9+40.00			1,010.90	20.10			1,021.00		21.45	1,010.00		198.02	349.04
9+60.00			1,010.90	20.10			1,021.00		36.45	1,000.00		305.72	5,037.43
9+76.00	Begin Toe Down		1,010.90	20.10			1,021.00		48.45	992.00	0.0000%	413.48	5,753.62
9+80.00			1,010.90	20.10			1,021.00		48.45	992.00		413.48	1,653.93
10+00.00			1,010.90	20.10			1,021.00		48.45	992.00		413.48	8,269.63
10+00.00	HEC 2 X-SEC NO 13 PI	-0.4000%	1,010.90	21.10	1,016.60	1,019.60	1,021.00		49.45	992.00		314.58	0.00
10+60.00			1,010.66	21.34			1,021.00		49.33	992.00		313.23	18,834.33
11+00.00	end trns		1,010.50	10.50			1,021.00		38.25	992.00		312.34	12,511.34
12+00.00			1,010.10	10.90			1,021.00		38.05	992.00		310.14	31,123.95
13+00.00		0.9000%	1,009.70	11.30			1,021.00		37.85	992.00		307.99	30,906.75
14+00.00			1,010.60	10.40			1,021.00		38.30	992.00		312.89	31,044.38
15+00.00			1,011.50	9.50			1,021.00		38.75	992.00		318.04	31,546.58
15+02.27	PI #3		1,011.52	9.48			1,021.00		38.76	992.00		318.16	722.08
16+00.00		0.0900%	1,012.40	8.60			1,021.00		39.20	992.00		323.42	31,350.86
16+60.00	HEC 2 X-SEC NO 14		1,012.45	8.55	1,017.40	1,020.40	1,021.00		39.23	992.00		323.75	19,415.37
17+00.00			1,012.49	8.51			1,021.00		39.25	992.00		323.98	12,954.62
18+00.00			1,012.58	8.42			1,021.00		39.29	992.00		324.53	32,425.32
19+00.00			1,012.67	8.33			1,021.00		39.34	992.00		325.09	32,480.89
20+00.00			1,012.76	8.24			1,021.00		39.38	992.00		325.65	32,536.70
21+00.00			1,012.85	8.15			1,021.00		39.43	992.00		326.21	32,592.75
21+04.54	PI #4		1,012.85	8.15			1,021.00		39.43	992.00		326.23	1,481.04
22+00.00			1,012.94	8.06			1,021.00		39.47	992.00		326.77	31,168.00
22+50.00	HEC 2 X-SEC NO 15		1,012.99	8.01	1,017.90	1,020.90	1,021.00	0.1760%	39.49	992.00	-0.9280%	327.06	16,345.70
23+00.00			1,013.03	8.06			1,021.09		40.30	991.54		335.27	16,558.06
24+00.00			1,013.12	8.14			1,021.26		41.91	990.61		351.92	34,359.47
25+00.00			1,013.21	8.23			1,021.44		43.52	989.68		368.89	36,040.58
26+00.00		1.5000%	1,013.30	8.32			1,021.62		45.14	988.75		386.17	37,752.79
27+00.00		-1.9000%	1,014.80	6.99			1,021.79		47.46	987.82		414.87	40,051.72
28+00.00		0.3000%	1,012.90	9.07			1,021.97		48.07	986.90		417.08	41,597.34
28+40.60			1,013.02	9.02			1,022.04		48.77	986.52		425.04	17,095.02
28+75.00	HEC 2 X-SEC NO 16		1,013.13	8.98	1,019.10	1,022.10	1,022.10	0.2241%	49.36	986.20	0.4138%	431.84	14,738.39
29+00.00			1,013.20	8.96			1,022.16		49.30	986.30		431.19	10,787.88
29+58.00			1,013.37	8.91			1,022.29		49.16	986.54		429.67	24,964.71
30+00.00			1,013.50	8.88			1,022.38		49.05	986.72		428.56	18,022.81
31+00.00			1,013.80	8.80			1,022.60		48.81	987.13		425.94	42,725.42
32+00.00		-0.7000%	1,014.10	8.73			1,022.83		48.56	987.54		423.33	42,463.69
33+00.00		1.0000%	1,013.40	9.65			1,023.05		47.81	987.96		412.94	41,813.22
34+00.00		0.1500%	1,014.40	8.88			1,023.28		47.92	988.37		415.75	41,434.47
34+55.00	HEC 2 X-SEC NO 17		1,014.48	8.92	1,020.40	1,023.40	1,023.40	0.2609%	47.74	988.60	-0.1087%	413.69	22,809.59
35+00.00			1,014.55	8.97			1,023.52		47.97	988.55		416.09	18,669.91

Vertical Control - Soil Cement Bank Data

DECEMBER 4, 1996

South Bank STA	Description	Foundation Invert Slope (%)	Design Foundation Line	Offset Foundation Line (ft) LT	SPF Water surf. elev.	SPF+3	TOP OF LEVEE Elev.	Top of Levee slope (%)	Offset Toe Down (ft)	Toe Down Elev.	Toe Long. Slope (%)	Aera of Soil Cement	Vol of Soil Cement
36+00.00		2.1000%	1,014.70	9.08			1,023.78		48.46	988.44		421.44	41,876.52
37+00.00		-4.7500%	1,016.80	7.24			1,024.04		49.94	988.33		442.90	43,217.03
38+00.00			1,012.05	12.25			1,024.30		47.99	988.23		409.82	42,635.90
39+00.00		0.0000%	1,007.30	17.26			1,024.56		46.04	988.12		383.20	39,651.14
39+15.00	HEC 2 X-SEC NO 18		1,007.30	17.30	1,021.60	1,024.60	1,024.60	0.6448%	46.10	988.10	2.6868%	383.80	5,752.49
40+00.00			1,007.30	17.85			1,025.15		43.22	990.38		355.80	31,432.95
41+00.00			1,007.30	18.49			1,025.79		39.84	993.07		324.87	34,033.79
42+00.00		6.7000%	1,007.30	19.14			1,026.44		36.45	995.76		296.11	31,049.09
43+00.00		0.0000%	1,014.00	13.08			1,027.08		36.42	998.44		294.04	29,507.64
43+80.24	HEC 2 X-SEC NO 18.5 PI		1,014.00	13.60	1,023.60	1,026.60	1,027.60	0.0000%	33.70	1,000.60	0.0000%	269.93	22,626.80
44+00.00			1,014.00	13.60			1,027.60		33.70	1,000.60		269.93	5,333.90
45+00.00			1,014.00	13.60			1,027.60		33.70	1,000.60		269.93	26,993.40
45+04.00	end toe		1,014.00	13.60			1,027.60		33.70	1,000.60	50.0000%	269.93	1,079.74
45+30.80	end foundation	50.0000%	1,014.00	13.60			1,027.60		13.60	1,014.00		122.40	5,257.28
45+58.00	Match highway embank.		1,027.60	0.00	1,024.10	1,027.10	1,027.60		0.00	1,027.60		0.00	1,664.64
	end soil cement												1,286,465.43
	HEC 2 X-SEC NO. 19												47,646.87

LOCATION: Camelback Ranch Levee - South Final Design

December 4, 1996

STATION	Soil Cement AREA above exst [S.F.]	Soil Cement AREA below exst [S.F.]	DISTANCE [FT.]	AVERAGE AREA S-C above [S.F.]	AVERAGE AREA S-C below [S.F.]	VOLUME Soil Cement above [C.Y.]	VOLUME Soil Cement below [C.Y.]	STATION
9+20.00	26.00	0.00						9+20.00
			20.00	85.50	27.00	63.33	20.00	
9+40.00	145.00	54.00						9+40.00
			20.00	136.00	139.50	100.74	103.33	
9+60.00	127.00	225.00						9+60.00
			20.00	128.00	241.00	94.81	178.52	
9+80.00	129.00	257.00						9+80.00
			20.00	186.50	256.50	138.15	190.00	
10+00.00	244.00	256.00						10+00.00
			0.00	145.00	237.50	0.00	0.00	
10+00.00	46.00	219.00						10+00.00
			35.00	46.00	243.50	59.63	315.65	
10+35.00	46.00	268.00						10+35.00
			65.00	54.00	259.50	130.00	624.72	
11+00.00	62.00	251.00						11+00.00
			100.00	61.00	250.50	225.93	927.78	
12+00.00	60.00	250.00						12+00.00
			100.00	61.00	246.50	225.93	912.96	
13+00.00	62.00	243.00						13+00.00
			100.00	61.00	247.50	225.93	916.67	
14+00.00	60.00	252.00						14+00.00
			100.00	55.00	260.00	203.70	962.96	
15+00.00	50.00	268.00						15+00.00
			100.00	51.00	269.00	188.89	996.30	
16+00.00	52.00	270.00						16+00.00
			100.00	48.00	274.50	177.78	1,016.67	
17+00.00	44.00	279.00						17+00.00
			100.00	44.50	279.00	164.81	1,033.33	
18+00.00	45.00	279.00						18+00.00
			100.00	44.00	280.50	162.96	1,038.89	
19+00.00	43.00	282.00						19+00.00
			100.00	41.50	283.50	153.70	1,050.00	
20+00.00	40.00	285.00						20+00.00
			100.00	39.50	286.00	146.30	1,059.26	
21+00.00	39.00	287.00						21+00.00
			100.00	40.00	286.50	148.15	1,061.11	
22+00.00	41.00	286.00						22+00.00
			100.00	40.50	290.50	150.00	1,075.93	
23+00.00	40.00	295.00						23+00.00
			100.00	42.00	301.00	155.56	1,114.81	
24+00.00	44.00	307.00						24+00.00
			100.00	42.50	317.50	157.41	1,175.93	
25+00.00	41.00	328.00						25+00.00
			100.00	38.00	338.00	140.74	1,251.85	
26+00.00	35.00	348.00						26+00.00
			100.00	35.50	363.00	131.48	1,344.44	
27+00.00	36.00	378.00						27+00.00
			100.00	33.50	381.50	124.07	1,412.96	
28+00.00	31.00	385.00						28+00.00
			100.00	37.50	386.50	138.89	1,431.48	
29+00.00	44.00	388.00						29+00.00
			100.00	39.00	392.00	144.44	1,451.85	

LOCATION: Camelback Ranch Levee - South Final Design

December 4, 1996

STATION	Soil Cement AREA above exst [S.F.]	Soil Cement AREA below exst [S.F.]	DISTANCE [FT.]	AVERAGE AREA S-C above [S.F.]	AVERAGE AREA S-C below [S.F.]	VOLUME Soil Cement above [C.Y.]	VOLUME Soil Cement below [C.Y.]	STATION
30+00.00	34.00	396.00						30+00.00
			100.00	33.00	396.00	122.22	1,466.67	
31+00.00	32.00	396.00						31+00.00
			100.00	32.50	394.00	120.37	1,459.26	
32+00.00	33.00	392.00						32+00.00
			100.00	34.50	385.00	127.78	1,425.93	
33+00.00	36.00	378.00						33+00.00
			100.00	37.00	378.50	137.04	1,401.85	
34+00.00	38.00	379.00						34+00.00
			100.00	41.50	375.00	153.70	1,388.89	
35+00.00	45.00	371.00						35+00.00
			100.00	44.50	364.00	164.81	1,348.15	
36+00.00	44.00	357.00						36+00.00
			100.00	38.50	383.00	142.59	1,418.52	
37+00.00	33.00	409.00						37+00.00
			100.00	32.00	395.00	118.52	1,462.96	
38+00.00	31.00	381.00						38+00.00
			100.00	68.00	329.50	251.85	1,220.37	
39+00.00	105.00	278.00						39+00.00
			100.00	113.00	256.50	418.52	950.00	
40+00.00	121.00	235.00						40+00.00
			100.00	126.00	214.00	466.67	792.59	
41+00.00	131.00	193.00						41+00.00
			100.00	105.00	204.50	388.89	757.41	
42+00.00	79.00	216.00						42+00.00
			100.00	72.50	223.00	268.52	825.93	
43+00.00	66.00	230.00						43+00.00
			100.00	43.50	239.50	161.11	887.04	
44+00.00	21.00	249.00						44+00.00
			100.00	27.00	243.00	100.00	900.00	
45+00.00	33.00	237.00						45+00.00
			54.00	21.00	123.00	42.00	246.00	
45+54.00	9.00	9.00						45+54.00
					TOTALS	6,937.93	40,618.96	

TOTAL SOIL CEMENT 47,556.89

LOCATION: Camelback Ranch Levee - South Final Design
December 4, 1996

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
9+20.00	0.00	0.00						9+20.00
			20.00	8.00	71.00	5.93	52.59	
9+40.00	16.00	142.00						9+40.00
			20.00	356.50	166.50	264.07	123.33	
9+60.00	697.00	191.00						9+60.00
			20.00	751.00	203.00	556.30	150.37	
9+80.00	805.00	215.00						9+80.00
			20.00	836.50	228.50	619.63	169.26	
10+00.00	868.00	242.00						10+00.00
			35.00	1,015.50	246.50	1,316.39	319.54	
10+35.00	1163.00	251.00						10+35.00
			65.00	1,109.00	191.50	2,669.81	461.02	
11+00.00	1055.00	132.00						11+00.00
			100.00	1,042.50	128.00	3,861.11	474.07	
12+00.00	1030.00	124.00						12+00.00
			100.00	1,030.50	125.00	3,816.67	462.96	
13+00.00	1031.00	126.00						13+00.00
			100.00	1,036.00	123.50	3,837.04	457.41	
14+00.00	1041.00	121.00						14+00.00
			100.00	1,090.00	109.00	4,037.04	403.70	
15+00.00	1139.00	97.00						15+00.00
			100.00	1,136.50	99.00	4,209.26	366.67	
16+00.00	1134.00	101.00						16+00.00
			100.00	1,163.00	92.00	4,307.41	340.74	
17+00.00	1192.00	83.00						17+00.00
			100.00	1,194.50	82.50	4,424.07	305.56	
18+00.00	1197.00	82.00						18+00.00
			100.00	1,240.00	80.50	4,592.59	298.15	
19+00.00	1283.00	79.00						19+00.00
			100.00	1,292.00	74.50	4,785.19	275.93	
20+00.00	1301.00	70.00						20+00.00
			100.00	1,305.00	67.50	4,833.33	250.00	
21+00.00	1309.00	65.00						21+00.00
			100.00	1,297.00	68.50	4,803.70	253.70	
22+00.00	1285.00	72.00						22+00.00
			100.00	1,320.00	70.50	4,888.89	261.11	
23+00.00	1355.00	69.00						23+00.00
			100.00	1,394.50	74.00	5,164.81	274.07	
24+00.00	1434.00	79.00						24+00.00
			100.00	1,509.50	75.50	5,590.74	279.63	
25+00.00	1585.00	72.00						25+00.00
			100.00	1,658.00	70.00	6,140.74	259.26	
26+00.00	1731.00	68.00						26+00.00
			100.00	1,817.00	65.50	6,729.63	242.59	
27+00.00	1903.00	63.00						27+00.00
			100.00	1,986.50	57.00	7,357.41	211.11	
28+00.00	2070.00	51.00						28+00.00
			100.00	2,078.00	64.50	7,696.30	238.89	
29+00.00	2086.00	78.00						29+00.00
			100.00	2,122.50	67.50	7,861.11	250.00	
30+00.00	2159.00	57.00						30+00.00
			100.00	2,145.00	54.00	7,944.44	200.00	

LOCATION: Camelback Ranch Levee - South Final Design

December 4, 1996

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
31+00.00	2131.00	51.00						31+00.00
			100.00	2,116.00	52.50	7,837.04	194.44	
32+00.00	2101.00	54.00						32+00.00
			100.00	2,045.50	57.00	7,575.93	211.11	
33+00.00	1990.00	60.00						33+00.00
			100.00	1,960.50	63.00	7,261.11	233.33	
34+00.00	1931.00	66.00						34+00.00
			100.00	1,891.00	77.00	7,003.70	285.19	
35+00.00	1851.00	88.00						35+00.00
			100.00	1,816.00	86.50	6,725.93	320.37	
36+00.00	1781.00	85.00						36+00.00
			100.00	1,618.50	70.00	5,994.44	259.26	
37+00.00	1456.00	55.00						37+00.00
			100.00	1,364.00	54.50	5,051.85	201.85	
38+00.00	1272.00	54.00						38+00.00
			100.00	1,230.50	108.00	4,557.41	400.00	
39+00.00	1189.00	162.00						39+00.00
			100.00	1,099.00	206.00	4,070.37	762.96	
40+00.00	1009.00	250.00						40+00.00
			100.00	905.50	272.00	3,353.70	1,007.41	
41+00.00	802.00	294.00						41+00.00
			100.00	715.00	197.00	2,648.15	729.63	
42+00.00	628.00	100.00						42+00.00
			100.00	670.50	123.50	2,483.33	457.41	
43+00.00	713.00	147.00						43+00.00
			100.00	1,046.50	165.50	3,875.93	612.96	
44+00.00	1380.00	184.00						44+00.00
			100.00	1,402.00	121.00	5,192.59	448.15	
45+00.00	1424.00	58.00						45+00.00
			54.00	722.00	29.00	1,444.00	58.00	
45+54.00	20.00	0.00						45+54.00
					TOTALS	187,389.09	13,563.74	

LOCATION: Camelback Ranch Levee - South Final Design

December 4, 1996

STATION	FOUNDATION EXCAVATION AREA [S.F.]	[S.F.]	DISTANCE [FT.]	AVERAGE AREA Found Ex [S.F.]	[S.F.]	VOLUME Found ex [C.Y.]	[C.Y.]	STATION
10+00.00	256.00							10+00.00
			35.00	256.00		331.85		
10+35.00	256.00							10+35.00
			65.00	193.50		465.83		
11+00.00	131.00							11+00.00
			100.00	132.00		488.89		
12+00.00	133.00							12+00.00
			100.00	134.00		496.30		
13+00.00	135.00							13+00.00
			100.00	126.50		468.52		
14+00.00	118.00							14+00.00
			100.00	117.00		433.33		
15+00.00	116.00							15+00.00
			100.00	108.50		401.85		
16+00.00	101.00							16+00.00
			100.00	103.00		381.48		
17+00.00	105.00							17+00.00
			100.00	105.00		388.89		
18+00.00	105.00							18+00.00
			100.00	104.00		385.19		
19+00.00	103.00							19+00.00
			100.00	101.50		375.93		
20+00.00	100.00							20+00.00
			100.00	98.50		364.81		
21+00.00	97.00							21+00.00
			100.00	96.50		357.41		
22+00.00	96.00							22+00.00
			100.00	96.00		355.56		
23+00.00	96.00							23+00.00
			100.00	98.00		362.96		
24+00.00	100.00							24+00.00
			100.00	100.50		372.22		
25+00.00	101.00							25+00.00
			100.00	101.50		375.93		
26+00.00	102.00							26+00.00
			100.00	90.00		333.33		
27+00.00	78.00							27+00.00
			100.00	97.00		359.26		
28+00.00	116.00							28+00.00
			100.00	111.50		412.96		
29+00.00	107.00							29+00.00
			100.00	106.00		392.59		
30+00.00	105.00							30+00.00
			100.00	104.00		385.19		
31+00.00	103.00							31+00.00
			100.00	103.50		383.33		
32+00.00	104.00							32+00.00
			100.00	113.50		420.37		
33+00.00	123.00							33+00.00
			100.00	115.00		425.93		
34+00.00	107.00							34+00.00
			100.00	112.00		414.81		

LOCATION: Camelback Ranch Levee - South Final Design

December 4, 1996

STATION	FOUNDATION EXCAVATION AREA [S.F.]	[S.F.]	DISTANCE [FT.]	AVERAGE AREA Found Ex [S.F.]	[S.F.]	VOLUME Found ex [C.Y.]	[C.Y.]	STATION
35+00.00	117.00							35+00.00
			100.00	117.00		433.33		
36+00.00	117.00							36+00.00
			100.00	104.00		385.19		
37+00.00	91.00							37+00.00
			100.00	132.50		490.74		
38+00.00	174.00							38+00.00
			100.00	190.00		703.70		
39+00.00	206.00							39+00.00
			100.00	177.50		657.41		
40+00.00	149.00							40+00.00
			100.00	187.00		692.59		
41+00.00	225.00							41+00.00
			100.00	209.00		774.07		
42+00.00	193.00							42+00.00
			100.00	181.00		670.37		
43+00.00	169.00							43+00.00
			100.00	240.50		890.74		
44+00.00	312.00							44+00.00
			100.00	220.50		816.67		
45+00.00	129.00							45+00.00
			54.00	64.50		129.00		
45+54.00	0.00							45+54.00
					TOTALS	16,978.54	0.00	

DMJM	PROJECT: Camelback Ranch LEUFER - SOUTH	JOB NO. 6526.01	SHEET 1 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY [illegible]	DATE 12/4/96

SOIL CEMENT

FROM SPREAD SHEET TOTAL SOIL Cement

= 47,647 C.Y.

@ 135 #/ft3 = 47,~~647~~ 700 x 27 x 135/2000 TONS

= 86,~~836~~ 933.7 TONS

cement @ 11% : 86,~~836~~ 933.7 x 0.11

= 9,~~5~~ 63 TONS

SAFETY RAIL

STA 10+00 to STA 45+58

3558 LF + 10' @ sta 10+00

TOTAL RAIL = 3568 L.F.

Smooth wire Fence

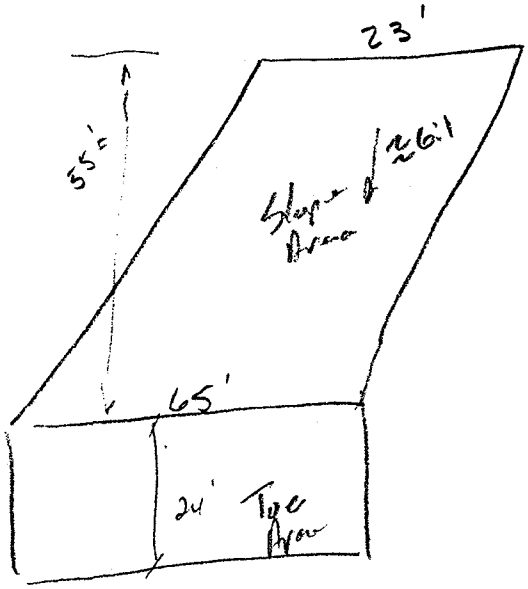
from Plan sheets 1596

2527

TOTAL 4123

GATES: 2 - 14' Double Leaf GATES

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 2 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY MSS	DATE 12/4/96



Riprap @ North Turnaround

Slope Section area

$\left(\frac{23+65}{2}\right) \times 55$

$= 2420$ SF

@ 6:1 slope Area increase

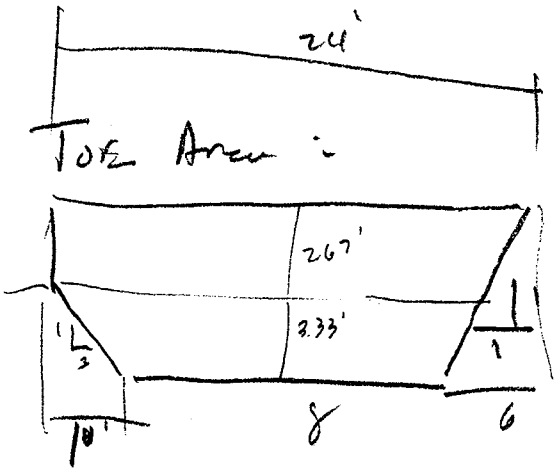
$\approx 1.38\%$

Area $= 1.0138 \times 2420$

$= 2453$ S.F.

Vol $= 2453 \times 2.5$

$= 6123.5$ C.F.



$A = \frac{24+21.33}{2} \times 2.33 +$

$\frac{21.33+8}{2} \times 3.33$

$= 109.4$ SF

Vol $= 109.4 \times 65$

$= 7106$ C.F.

Total Riprap $= 6123 + 7{,}106 / 27 = 490$ C.Y.

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 3 of 6
		DESIGNED BY UBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY MSS	DATE 12/4/96

Pneumatically Placed Mortar

Length = 100' + 65' + 37 = 202'

width = 8' 8

1616 S.F. = 180 S.Y.

Seeding Area

avg height of Levee 7' @ 3:1 cross slope length = 22.1'

Length = STA 10+00 to STA 44+58

3458 x 22.1 = 76,421 S.F.

+ entrance

250 x 22.1 = 5,525 S.F.

81,946 S.F.

= 1.88 Acres ~~~ 2 AC.

DMJM	PROJECT: Camelback Ranch Levee - South	JOB NO. 6526.01	SHEET 4 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY [illegible]	DATE 12/4/96

ABC

Top of Levee

STA 10+00 to sta 44+58

7' x 3458' /9 = 2689.6 SY.

Turn Around - South end

sta 10+00 to sta 10+60

(38 - 16) x 60 / 9 146.7 SY.

22' x 60 / 9 =

North END TURNAROUND

sta 44+58 to 45+58

100' x (90 - 9) / 9 = 1011.1 SY.

ENTRANCE AREA =

≈ 3163 SF /9 = 351.4 SY.

4198.8 SY.

TOTAL = use 4200 SY.

@ $1.50 SY.

DMJM	PROJECT: CAMELBACK RANCH LEVEE - SOUTH	JOB NO. 6526.01	SHEET 5 of 6
		DESIGNED BY CBB	DATE 12-2-96
SUBJECT: Quantities		CHECKED BY MJS	DATE 12/4/96

EMBANKMENT

From X-Sections = 13,564 C.Y.

North Turn Around = 3592 C.Y.

Total Embankment 17,156 C.Y.
use 17,200 C.Y.

NORTH TURNAROUND + ENTRANCE

Area of Top = 12,930.6 SF
Avg Depth = 7.5'

Vol = 12,930.6 x 7.5 / 27 = 3592 C.Y.

DMJM	PROJECT: Camelback Ranch Levee - South	JOB NO. 65266.01	SHEET 6 of 6
		DESIGNED BY CBB	DATE 12-4-96
SUBJECT: Quantities		CHECKED BY WKS	DATE 12/4/96

EARTHWORK Summary:

Assume: SOIL CEMENT WILL BE FROM Borrow.

FILL REQUIRED

EMBANKMENT	13,600
FOUNDATION Ex	17,000
TOTAL	30,600
shrink @ 10%	3060
	33,660
TOE Ex	187,400
TOTAL	221,060

EXCAVATIONS MADE

FOUNDATION Ex	17,000
Soil Cement (Below Grade)	40 700
TOE EXCAVATION	187,400
TOTAL Ex	245,100 C.Y.
TOTAL Fill	221,060 C.Y.
EXCESS	24,040 C.Y.

SOIL CEMENT (ABOVE GRADE)	40,700
SOIL CEMENT (BELOW Grade)	7,000
	47,700
Shrink @ 10%	4770
REQUIRED from BORROW	52,470 C.Y.

sla Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

December 4, 1996

Michael Shapiro, P.E.
Project Manager
Daniel, Mann, Johnson & Mendenhall
300 West Clarendon Avenue - Suite #400
Phoenix, AZ 85013

RE: CAMELBACK RANCH LEVEE DESIGN, PHASE 1 DESIGN SUBMITTAL

Dear Michael:

Enclosed for the above submittal to the Flood Control District of Maricopa County is the following support information for the top-of-bank and toe-down elevations recommended by Simons, Li & Associates, Inc.:

- Table 1 - Sediment transport and scour analysis for existing conditions
- Table 2 - Sediment transport and scour analysis for proposed conditions
- Table 3 - Sediment transport and scour analysis for proposed conditions with mining
- Table 4 - Comparison of HEC-2 and QUASED water-surface elevations
- Table 5 - Recommended design elevations
- Table 6 - Calculated average equilibrium slope and armoring sediment size
- Table 7 - Cross-section stations
- Figure 1 - Cross-section locations
- Example hand calculations for long-term scour, bed-form scour, and factor of safety
- Disk (3.5") containing eight (8) HEC-2 input and output files, and six (6) QUASED output files.

The Standard Project Flood (SPF) of 142,000 cfs was used to determine all levee design elevations and scour components, except for long-term scour. The 10-year discharge of 23,000 cfs was used to estimate long-term scour.

4600 South Mill Avenue, Suite 200 • Tempe, AZ 85282 • Phone: (602) 491-1393 • Fax: (602) 491-1396
An Equal Opportunity Employer

This information is being provided with the understanding that it will be modified, as necessary, during the Phase 2 design analysis. If you have any questions or need additional information, please do not hesitate to call me.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Bart S. Bergendahl, P.E.
Project Manager

Registered Professional Engineer (Civil)
CERTIFICATE NO.
28660
BART S.
BERGENDAHL
Date Signed 12-4-96
ARIZONA, U.S.A.

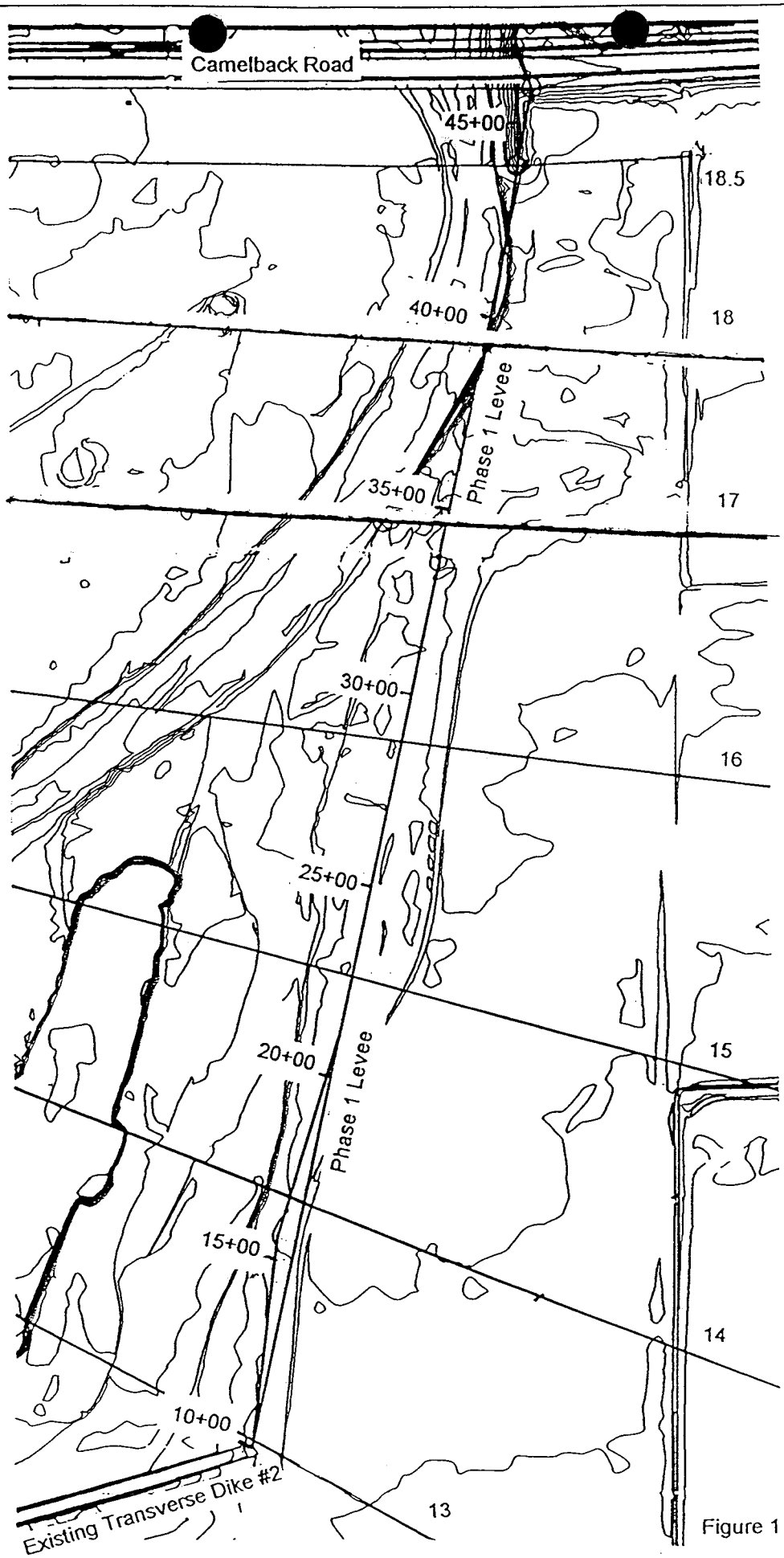
Enclosures

BSB/DLR/ad

[PAZ-DMJM-11]
rwpdos6:let001

TABLE 7 - Cross-section stations

Cross-Section No.	Section No.
13	10+10
14	16+50
15	22+60
16	28+80
17	34+50
18	39+25
18.5	43+90



SCALE: 1" = 400'

Figure 1 - Cross-section locations

TABLE 1

CAMELBACK RANCH LEVEE DESIGN

Sediment Transport and Scour Analysis

Existing Conditions (QUASED)

Section Number	Distance upstream from g.c.s (Feet)	Channel Invert (Feet)	Computed W.S. Elevation (Feet)	Maximum Depth (Feet)	Channel Velocity (Feet/sec.)	Energy Slope (Ft/Ft)	General Scour (Feet)	LONG-TERM		Low Flow Scour (Feet)	BEDFORM SCOUR		Factor of Safety (30%) (Feet)	Total calc. toe down (Feet)	Total calc. toe down elev. (Feet)
								Stable Slope (Feet)	Armoring (Feet)		Dune (Feet)	Antidune (Feet)			
			[1]	[1]	[1]	[1]		[2]	[2]						
13.00	2959	1002.0	1016.54	14.54	7.04	0.00135	0.00	0.88	2.50	1.5	0.83	0.67	0.51	3.72	998.28
14.00	3468	1002.0	1017.26	15.26	6.63	0.00112	0.00	0.68	2.50	1.5	0.88	0.59	0.47	3.54	998.46
15.00	3959	1002.0	1017.90	15.90	6.99	0.00180	0.00	0.50	2.50	1.5	0.93	0.66	0.43	3.35	998.65
16.00	4463	1004.0	1018.88	14.88	8.07	0.00295	2.20	2.30	2.50	1.5	0.86	0.88	1.61	8.50	995.50
17.00	5013	1004.0	1020.29	16.29	9.26	0.00255	3.00	2.10	2.50	1.5	0.96	1.16	1.88	9.63	994.37
18.00	5444	1004.0	1021.54	17.54	6.15	0.00128	1.60	1.93	2.50	1.5	1.05	0.51	1.37	7.45	996.55
18.50	5914	1012.0	1022.60	10.60	13.99	0.00661	2.50	9.75	2.50	1.5	0.57	2.64	2.29	11.43	1000.57

[1] SPF Hydraulics
[2] 10-year Hydraulics

TABLE 2

CAMELBACK RANCH LEVEE DESIGN

Sediment Transport and Scour Analysis

Proposed Conditions w/o Mining (QUASED)

Section Number	Distance upstream from g.c.s (Feet)	Channel Invert (Feet)	Computed W.S. Elevation (Feet)	Maximum Depth (Feet)	Channel Velocity (Feet/sec.)	Energy Slope (Ft/Ft)	General Scour (Feet)	LONG-TERM		Low Flow Scour (Feet)	BEDFORM SCOUR		Factor of Safety (30%) (Feet)	Total calc. toe down (Feet)	Total calc. toe down elev. (Feet)
								Stable Slope (Feet)	Armoring (Feet)		Dune (Feet)	Antidune (Feet)			
			[1]	[1]	[1]	[1]		[2]	[2]						
----	2959	1002.0	1016.64	14.64	6.93	0.00132	0.00	0.88	2.50	1.5	0.84	0.65	0.51	3.73	998.27
14.00	3468	1002.0	1017.42	15.42	4.10	0.00114	0.00	0.68	2.50	1.5	0.89	0.23	0.47	3.55	998.45
15.00	3959	1002.0	1017.34	15.34	7.39	0.00161	0.00	0.50	2.50	1.5	0.89	0.74	0.42	3.30	998.70
16.00	4463	1004.0	1019.06	15.06	8.33	0.00302	2.10	2.30	2.50	1.5	0.87	0.94	1.60	8.44	995.56
17.00	5013	1004.0	1020.38	16.38	9.02	0.00235	2.50	2.10	2.50	1.5	0.96	1.10	1.71	8.90	995.10
18.00	5444	1004.0	1021.56	17.56	6.23	0.00147	0.00	1.93	2.50	1.5	1.05	0.52	0.89	5.37	998.63
18.50	5914	1012.0	1023.58	11.58	11.99	0.00636	2.00	9.75	2.50	1.5	0.63	1.94	1.93	9.87	1002.13

[1] SPF Hydraulics
[2] 10-year Hydraulics

TABLE 3

CAMELBACK RANCH LEVEE DESIGN

Sediment Transport and Scour Analysis

Proposed Conditions With Mining (QUASED)

Section Number	Distance upstream from g.c.s (Feet)	Mining Invert (Feet)	Computed W.S. Elevation (Feet)	Maximum Depth (Feet)	Channel Velocity (Feet/sec.)	Energy Slope (Ft/Ft)	General Scour (Feet)	LONG-TERM		Low Flow Scour (Feet)	BEDFORM SCOUR		Factor of Safety (30%) (Feet)	Total calc. toe down (Feet)	Total calc. toe down elev. (Feet)
								Stable Slope (Feet)	Armoring (Feet)		Dune (Feet)	Antidune (Feet)			
			[1]	[1]	[1]	[1]		[2]	[2]						
13.00	2959	992.0	1016.62	24.62	4.04	0.00022	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	992.00
14.00	3468	992.0	1016.72	24.72	4.37	0.00029	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	992.00
15.00	3959	994.0	1016.83	22.83	4.72	0.00032	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	994.00
16.00	4463	996.0	1016.66	20.66	8.33	0.00211	3.80	0.00	2.50	0.0	1.27	0.94	2.27	9.85	986.15
--		1000.0	1017.71	17.71	7.26	0.00094	3.30	0.00	2.50	0.0	1.06	0.71	2.06	8.91	991.09
18.00	5444	1004.0	1019.01	15.01	11.60	0.00816	7.30	1.93	2.50	1.5	0.87	1.82	3.31	15.86	988.14
18.50	5914	1012.0	1022.66	10.66	13.85	0.00639	0.00	9.75	2.50	1.5	0.57	2.59	1.53	8.12	1003.88

1] SPF Hydraulics
2] 10-year Hydraulics

TABLE 4

CAMELBACK RANCH LEVEE DESIGN

COMPARISON OF HEC-2 AND QUASED WATER-SURFACE ELEVATIONS

	EXISTING		PROPOSED W/O MINING		PROPOSED WITH MINING	
	QUASED	HEC-2	QUASED	HEC-2	QUASED	HEC-2
Section Number	Computed W.S. Elevation (Feet)	Computed W.S. Elevation (Feet)	Computed W.S. Elevation (Feet)	Computed W.S. Elevation (Feet)	Computed W.S. Elevation (Feet)	Computed W.S. Elevation (Feet)
13.00	1015.96	1016.54	1015.97	1016.64	1015.52	1016.62
14.00	1016.68	1017.26	1016.70	1017.42	1015.77	1016.72
15.00	1017.31	1017.90	1017.23	1017.34	1015.99	1016.83
16.00	1018.32	1018.88	1018.07	1019.06	1016.21	1016.66
17.00	1019.43	1020.29	1019.26	1020.38	1016.84	1017.71
18.00	1020.68	1021.54	1020.47	1021.56	1017.77	1019.01
18.50	1021.20	1022.60	1021.33	1023.58	1023.64	1022.66

TABLE 5

CAMELBACK RANCH LEVEE DESIGN

Phase 1

Recommended Design Elevations

Section Number	Channel Invert (Feet)	Rec. Toedown Elevation (Feet)	Water Surf. Elevation (Feet)	Rec. Top of Bank Elevation (Feet)	Bank Height (Feet)	Remarks
13.0	1002.0	992.0	1016.6	1019.6	27.6	Begin Phase 1 Levee (Mining section)
14.0	1002.0	992.0	1017.4	1020.4	28.4	Mining section
15.0	1002.0	994.0	1017.9	1020.9	26.9	Mining section
16.0	1004.0	986.2	1019.1	1022.1	36.0	Mining section
17.0	1004.0	991.1	1020.4	1023.4	32.3	Mining section
18.0	1004.0	988.1	1021.6	1024.6	36.5	
18.5	1012.0	1000.6	1023.6	1026.6	26.1	End Phase 1 Levee

11/23/96

TABLE 6
Average Equilibrium and Armorizing Sediment Size

				10-YR HYDRAULICS				ARMORING SIZE							EQUILIBRIUM SLOPE		
Section Number	Manning's n	D50 (mm.)	D90 (mm.)	Hydraulic Depth (Feet)	Channel Velocity (Feet/sec.)	Energy Slope (Ft/Ft)	Top Width (Feet)		Meyer-Peter Muller Dc (mm)	Competent Bottom Dc (mm)	Shields Diagram Dc (Feet)	(mm)	Yang incip. motion Dc (Feet)	(mm)	Schoklitsch Method	Meyer-Peter Muler	Shield's Diagram
1.00	0.025	3.00	35.00	4.44	5.21	0.001054	994.4		15.18	51.03	0.05	15.77	0.18	54.52	0.00038	0.00021	0.00020
2.00	0.025	3.00	35.00	3.79	6.00	0.001725	1011.4		21.21	67.68	0.07	20.19	0.24	72.31	0.00038	0.00024	0.00026
	0.025	3.00	35.00	3.01	6.92	0.003124	1102.5		30.51	90.03	0.10	29.04	0.32	96.19	0.00041	0.00031	0.00032
4.00	0.025	3.00	35.00	3.32	5.36	0.001642	1291.5		17.69	54.01	0.06	17.42	0.19	57.71	0.00046	0.00028	0.00028
5.00	0.025	3.00	35.00	4.22	3.98	0.000659	1369.2		9.02	29.78	0.03	9.91	0.10	31.82	0.00048	0.00022	0.00020
6.00	0.022	3.00	35.00	3.50	4.77	0.000860	1378.8		11.83	42.78	0.03	10.52	0.15	45.70	0.00048	0.00022	0.00024
7.00	0.025	3.00	35.00	3.13	5.20	0.001176	1410.6		11.94	50.84	0.04	12.63	0.18	54.31	0.00049	0.00030	0.00028
8.00	0.025	3.00	35.00	3.57	4.52	0.001060	1424.1		12.28	38.41	0.04	12.99	0.13	41.04	0.00049	0.00026	0.00024
9.00	0.025	3.00	35.00	3.34	4.55	0.001176	1511.9		12.74	38.92	0.04	13.48	0.14	41.58	0.00051	0.00028	0.00026
10.00	0.025	3.00	35.00	2.87	5.35	0.001986	1498.1		18.49	53.81	0.06	18.21	0.19	57.49	0.00051	0.00032	0.00033
11.00	0.028	3.00	35.00	2.68	5.32	0.002704	1611.5		19.84	53.21	0.07	22.38	0.19	56.85	0.00054	0.00041	0.00036
12.00	0.028	3.00	35.00	2.06	6.26	0.005315	1782.0		29.97	73.67	0.11	33.82	0.26	78.71	0.00058	0.00053	0.00047
13.00	0.028	3.00	35.00	3.11	4.00	0.001253	1849.8		10.67	30.08	0.04	13.13	0.11	32.14	0.00060	0.00035	0.00029
14.00	0.028	3.00	35.00	4.01	3.51	0.000689	1633.6		7.56	23.16	0.03	9.85	0.08	24.75	0.00055	0.00027	0.00021
15.00	0.028	3.00	35.00	4.17	3.98	0.000840	1385.7		9.59	29.78	0.04	12.02	0.10	31.82	0.00048	0.00026	0.00021
16.00	0.028	3.00	35.00	2.48	7.55	0.006040	1226.0		41.00	107.16	0.15	46.27	0.38	114.50	0.00044	0.00044	0.00039
17.00	0.028	3.00	35.00	4.45	6.28	0.001916	823.1		23.34	74.14	0.09	26.33	0.26	79.22	0.00033	0.00025	0.00022
18.00	0.028	3.00	35.00	1.87	8.17	0.010335	1508.2		52.90	125.49	0.20	59.69	0.44	134.07	0.00051	0.00059	0.00052
18.50	0.028	3.00	35.00	3.02	4.45	0.001617	1713.0		13.37	37.23	0.05	15.88	0.13	39.78	0.00057	0.00036	0.00031
19.00	0.022	3.00	35.00	2.97	4.64	0.001116	1667.6		13.03	40.48	0.04	11.37	0.14	43.25	0.00055	0.00026	0.00029
20.00	0.022	3.00	35.00	3.08	4.47	0.000985	1665.6		11.92	37.56	0.03	10.61	0.13	40.13	0.00055	0.00025	0.00028
20.50	0.022	3.00	35.00	3.33	4.14	0.001225	1667.0		16.03	32.22	0.05	14.00	0.11	34.43	0.00055	0.00023	0.00026
21.00	0.028	3.00	35.00	3.14	4.38	0.001479	1671.5		12.71	36.07	0.05	15.65	0.13	38.53	0.00056	0.00035	0.00028
22.00	0.028	3.00	35.00	2.87	4.19	0.001533	1964.7		12.04	33.01	0.05	15.10	0.12	35.26	0.00063	0.00038	0.00030
23.00	0.028	3.00	35.00	2.61	5.53	0.003028	1592.7		21.63	57.49	0.08	24.82	0.20	61.43	0.00054	0.00042	0.00037
24.00	0.028	3.00	35.00	3.20	3.35	0.000846	2142.9		7.41	21.10	0.03	9.84	0.07	22.54	0.00067	0.00034	0.00026
25.00	0.028	3.00	35.00	2.86	3.70	0.001198	2170.9		9.38	25.74	0.04	11.76	0.09	27.50	0.00068	0.00038	0.00031
26.00	0.028	3.00	35.00	3.53	3.19	0.000679	2043.0		6.56	19.13	0.03	8.88	0.07	20.44	0.00065	0.00031	0.00023
27.00	0.030	3.00	35.00	2.17	8.36	0.010162	1268.1		54.42	131.39	0.22	68.11	0.46	140.38	0.00045	0.00056	0.00045
28.00	0.030	3.00	35.00	3.37	4.64	0.001741	1472.8		14.48	40.48	0.06	18.75	0.14	43.25	0.00050	0.00036	0.00028
29.00	0.035	3.00	35.00	2.14	8.38	0.008198	7240.1		34.36	132.02	0.18	54.19	0.46	141.05	0.00263	0.00072	0.00045
30.00	0.035	3.00	35.00	2.08	6.40	0.001918	7267.3		7.81	77.00	0.04	13.69	0.27	82.27	0.00264	0.00074	0.00042
31.00	0.035	3.00	35.00	2.32	5.21	0.002327	7122.2		10.57	51.03	0.06	17.25	0.18	54.52	0.00260	0.00066	0.00040
32.00	0.035	3.00	35.00	1.69	4.97	0.002795	7032.9		9.25	46.44	0.05	15.92	0.16	49.62	0.00258	0.00091	0.00053
33.00	0.035	3.00	35.00	1.78	4.32	0.001896	7165.2		6.61	35.09	0.04	11.58	0.12	37.49	0.00261	0.00086	0.00049
34.00	0.035	3.00	35.00	1.75	5.34	0.001470	6935.9		5.04	28.00	0.03	9.35	0.10	30.08	0.00255	0.00088	0.00047
35.00	0.035	3.00	35.00	2.27	4.49	0.001975	7656.3		8.78	37.90	0.05	15.39	0.13	40.49	0.00275	0.00068	0.00038
36.00	0.035	3.00	35.00	2.71	5.91	0.002163	7442.6		11.48	65.66	0.06	18.73	0.23	70.16	0.00269	0.00057	0.00035
37.00	0.035	3.00	35.00	3.16	7.05	0.005409	7825.3		33.48	93.44	0.17	52.79	0.33	99.83	0.00263	0.00049	0.00031
38.00	0.035	3.00	35.00	3.53	5.85	0.003210	8189.3		22.19	64.34	0.11	35.00	0.23	68.74	0.00273	0.00043	0.00027
39.00	0.035	3.00	35.00	4.13	3.88	0.004061	8678.0		32.85	28.30	0.17	51.80	0.10	30.24	0.00285	0.00037	0.00023
40.00	0.035	3.00	35.00	4.11	2.93	0.002670	8557.9		21.49	16.14	0.11	33.89	0.06	17.24	0.00282	0.00037	0.00024
								AF aver.	18.29	51.53	0.07	20.28	0.18	55.05	0.00052	0.00033	0.00030

AF Average Size (mm) 36.29

Percent Coarser 0.09

AF Average Slope 0.00038

HYDRAULICS @ 13

Source : Computing Degradation and Local Scour
USBR, 1984

A) ARMORING (Based on 10-yr hydraulics, Q_{10}, dominant discharge)

1) Meyer-Peter, Muller

$$D_c = \frac{d\,S}{K\left(\frac{n_s}{D_{90}^{1/6}}\right)^{3/2}}$$

where

D_c : Individual particle size (mm.)

K : 0.19 inch-lb units

d : Mean water depth at dominant discharge (ft.)

S : Slope of energy gradient (ft/ft.)

n_s : Manning's n for bed of stream

D_{90} : Particle size in mm. at which 90% of bed material by weight is finer.

$$D_c = \frac{(3.11)\ (0.001253)}{0.19 \left(\frac{0.028}{35^{1/6}} \right)^{3/2}} = 10.67 \text{ mm.}$$

2) Competent Bottom Velocity

$$D_c = 1.88\ V_m^2$$

where

V_m : mean channel velocity (ft/sec.)

D_c : armor size (mm.)

$$D_c = 1.88\ (4.0)^2 = 30.08 \text{ mm.}$$

3) Shield's Diagram

$$R_* = \frac{V_* D_{50}}{\nu}$$

V_* = shear velocity (ft/sec.)
$= \sqrt{SRg}$

D_{50} = particle size (ft.)

ν = Kinematic viscosity (ft^2/sec.)

$$V_* = \sqrt{0.001253 * 3.11 * 32.2} = 0.354 \text{ ft/sec.}$$

$$R_* = \frac{0.354 * (3/1000/0.305)}{1*10^{-5}} = 348 < 500$$

$$\therefore \quad D_c = \frac{\gamma_w \; d \; S}{(\gamma_s - \gamma_w)\, 0.059}$$

$$D_c = \frac{62.4 * 3.11 * 0.001253}{(165 - 62.4)\, 0.059} = 0.04 \text{ ft.} \equiv 12.19 \text{ mm}$$

4) Yang's Incipient Motion

$$D_c = 0.00659 \, (V_{cr})^2$$

$$D_c = 0.00659 \, (4.0)^2$$

$$= 0.105 \text{ ft} \equiv 32.14 \text{ mm.}$$

B) STABLE SLOPE (Based on 10-yr hydraulics)

1) Schoklitsch Method

$$S_L = K \left(\frac{D_{50}\ B}{Q} \right)^{3/4}$$

where B: channel width (ft.)

Q: dominant discharge (ft^3/sec.)

K: 0.00174 in-lb units

D_{50}: in mm.

$$S_L = 0.00174 \left(\frac{3\ (1849.8)}{23{,}000} \right)^{3/4} = 0.00060$$

2) Meyer-Peter Muller Method

$$S_L = \frac{K \left(\frac{Q}{Q_B} \right) \left(\frac{n_s}{D_{90}^{1/6}} \right)^{3/2} D_{50}}{d}$$

where K = 0.19 in-lb units

$\frac{Q}{Q_B}$ = Ratio of total flow to channel flow

D_{50} & D_{90}: in mm.

$$S_L = \frac{0.19\ (1) \left(\frac{0.028}{35^{1/6}} \right)^{3/2} (3)}{(3.11)} = 0.00035$$

3) Shield's Diagram Method

As computed on page 3, $R_* = 332 < 500$

$\therefore \quad T_* = 0.052$

$$S_L = \frac{0.052\ (\gamma_s - \gamma_w)\ D_{50}}{\gamma_w\ d}$$

$$= \frac{0.052\ (165 - 62.4)\ (3/1000/0.305)}{(62.4)\ (3.11)} = 0.0003$$

LONG TERM SCOUR

ARMORING Source : USBR, 1984

$$y_d = y_a \left(\frac{1}{\Delta p} - 1 \right)$$

where

y_a : thickness of armoring layer (ft.) $(2\ D_c)$

y_d : depth to armor (ft.)

Δp : decimal percentage of original bed material larger than the armor size, D_c

D_c = 36.29 mm (Average of the 4 methods)

Δp = 9%

$$y_d = 2\left(\frac{36.29}{304.8}\right)\left(\frac{1}{0.09} - 1\right) = 2.41 \text{ ft} \approx 2.5 \text{ ft.}$$

Equilibrium Slope

Use G.C.S. constructed 150 ft. downstream of the Indian School Road Bridge as the pivot point

G.C.S. Elevation = 1000 ft.

Distance of x-section 13 from GCS = 2959 ft.

Equilibrium Slope = 0.00038 (Average of the 3 methods)

Stable Invert = 1000 + 0.00038(2959) = 1001.12 ft.

y_d = 1002 − 1001.12 = 0.88 ft.

BED-FORM SCOUR (SPF HYDRAULICS)

Antidune Scour

$$\Delta z_{as} = \frac{1}{2} h_a = 0.0135 V^2$$

$$= 0.0135 (7.04)^2 = 0.67 \text{ ft.}$$

Dune Scour

$$\Delta z_{ds} = \frac{1}{2} (0.0655 d^{1.209})$$

$$= \frac{1}{2} (0.0655 (14.54)^{1.209})$$

$$= 0.83 \text{ ft.}$$

FACTOR OF SAFETY

$$F.S. = 0.3 * \left[\text{General} + \underbrace{\text{Min (Stable, Armoring)}^{*}}_{\text{Long-Term}} + \underbrace{\text{Max (Dune, Antidune)}}_{\text{Bed form}} \right]$$

$$= 0.3 * (0 + 0.88 + 0.83)$$

$$= 0.51'$$

* For the proposed conditions with mining at sections 16 and 17; Max (Stable, Armoring) is used.

ATL, INC.
CONSTRUCTION QUALITY CONTROL
GEOTECHNICAL CONSULTANTS

September 20, 1996

Mr. Michael Shapiro, P.E.
DMJM
300 W. Clarendon Avenue
Phoenix, Arizona 85013-0217

Re: Calculations and Analysis
Geotechnical Investigation
Camelback Ranch Levee
FCD Project No. 95-15
ATL Job No. 195034

Dear Mr. Shapiro:

Attached are copies of calculations used in part to develop ATL's Geotechnical Report for the subject project. The calculations address the following issues:

1.	Bearing Capactiy	-	Levee Foundation Toe-Down Foundation
2.	Settlement	-	Levee Foundation Toe-Down Foundation
3.	Equivalent Fluid Pressures	-	Levee Embankment
4.	Stability Analysis	-	Levee Embankment
5.	Shrinkage	-	Structural Fill and Native Material

Please do not hesitate to contact me if you have any questions.

Very truly yours,

David P. Hayes, P.E.
Executive Vice President

DPH/rg

2912 W. CLARENDON
PHOENIX, AZ 85017
TELEPHONE (602) 241-1097
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820 E. 47TH STREET, SUITE B-1
TUCSON, AZ 85713
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FAX (520) 425-9597

AMOUSBALLOUCH LOUGE 195034

I) BEARING CAPACITY ANALYSIS

(A) PHASE I

1. Soil Type – Phase I

Based on an overexcavated and replacement material used as the "Founding soils", we have assumed 1 soil type – a poorly graded SAND

2. Footing Type

I have assumed a "Strip" footing condition, 12" deep and 15' wide

3. Soil Properties

Based on the testing of existing material, a Friction Angle of 41° was used

The in-place unit weight, assumed to be 95% of the maximum proctor density, was chosen @ 120 pcf

If the depth of footing is 1 foot, we assumed the worse condition that surface water could saturate it, since the SPF (Standard Project Flood) ends up 0.4 feet above grade.

No eccentricity or vertical inclination was assumed.

Registered Professional Engineer (Civil) CERTIFICATE NO. 22719 David Preston Jones Date Signed 9/20/96 ARIZONA, U.S.A.

Therefore, the following Qu were calculated as a function of depth:

Depth	Qu (psf)
0	10018.61
1.50	4587
3.00	4258
4.50	3909
6.00	3540
7.50	3152

Use 3000 psf for Design at Depth 0.
Factor of Safety = 3+.

(B) Phase II

1. Soil Type

The top 3 feet of material in this phase will be over-excavated and replaced with material from the Agua Fria Borrow Site (or) blended to meet a grading and PI specification.

We will assume 12" of somewhat disturbed material and will use a friction angle of 41°

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David Preston Hayes
Date Signed 9/20/96
ARIZONA, U.S.A.

2. ~~Footing Type~~

We will use a "Strip Footing" configuration

3. Soil Properties

A friction angle of 41° was used for this silty SAND w/gravel.

In-place unit weight at 95% of the maximum proctor dry density was calculated at 120pcf.

We have assumed 1 foot of saturation based on a SPF of 0.4 feet above grade.

No eccentricity or vertical inclination was assumed.

Therefore, the following Qu were calculated as a function of depth.

Depth	Qu (psf)
0	10019
1.50	4587
3.00	4258
4.50	3909
7.50	3152

Use 3000 psf at surface (Depth = 0)

Factor of Safety is 3+.

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CERTIFICATE NO. 22719
David Western Hayes
Date Signed 9/20/96
ARIZONA, U.S.A.

(2) Discussion

Equations used and procedures are from: Tomlinson (1987) Bowles (1988) Das (1985).

Ultimate Bearing Capacity – Homogeneous

$$Q_u = (C)(N_c)F_1 + (q)(F_2)N_q + \tfrac{1}{2}BN_g$$

Where:

$$N_q = e^{\pi \tan(\phi)}(\tan(45 + \phi/2))$$

$$N_g = (2)(N_q + 1)\tan\phi$$

$$N_c = (N_q - 1)(\cot\phi)$$

$$F_1 = S_c(D_c)(I_c)$$
$$F_2 = S_q(D_q)(I_q)$$
$$F_3 = S_g(D_g)(I_g)$$

S(), D() and I() = Shape, depth and inclination factors.

C = Cohesion.

B = Footing Width

q = Overburden pressure at Foundation level

Registered Professional Engineer
CERTIFICATE NO. 22719
David Preston Hayes
Date Signed 9/21/90
ARIZONA, U.S.A.

II) Equivalent Fluid Pressures

We have chosen to use the "Rankine states" to express geostatic stress. In this approach, there are two (2) conjugat stresses, one representing the Active State and the other representing the Passive State. The difference is as follows:

1) In the Active State, the shear stress, as represented by slip line orientation, opposes the effect of gravity.

2) In the Passive condition, the ~~stress~~ shear stress acts with gravity to oppose horizontal stresses.

K_a = Active Coefficient

$$= \frac{1}{K_p}$$

K_p = Passive Coefficient

$$= \frac{1 + \sin\phi}{1 - \sin\phi}$$

γ = Unit Wt of Soil

ϕ = Friction Angle.

EQUIVALENT FLUID PRESSURES $= K_p \gamma$

$= K_a \gamma$

Registered Professional Engineer (Civil)
CERTIFICATE NO. 22719
David Preston Davis
Date Signed 6/20/06
ARIZONA, U.S.A.

Using a Friction Angle of 41°
and a Dry Unit Wt of 104pcf;

$K_p = 4.815 \times 104 = 501$ pcf
$K_a = 0.208 \times 104 = 22$ pcf

If the "At Rest" Condition is needed, then

$K_r = 0.344 \times 104 = 36$ pcf.

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David Preston Hayes
Date Signed 9/20/10
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III) Settlement Analysis

Analytical procedures are dictated by the material type and by actual testing. ATL conducted consolidation tests on material that will be used as recompacted founding soil for the levee embankment. The densities that this split-spoon samples exhibited were less than those anticipated during construction. Consolidation data is based on tests of a 1-inch thick sample and consolidation percentages are based on the top 1 inch.

Time Rate of Settlement was not computed since the founding soil is cohesionless, where $C_c = 0$. However, for a one-dimensional settlement analysis, the following formula is used:

$$\text{Total Settlement } (S) = \frac{C_c (H)}{1+e^o} \times \log\left[\frac{P_o + P}{P}\right]$$

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H = Thickness of Layer
C_c = Compression Index (Coefficient of Cohesion)
P_o = Effective Overburden Pressure
P = Pressure Due to Structure.
e^o = Initial void ratio.

For Phase I

(a) $\boxed{H = 15 \text{ feet}}$ This layer is actually thicker, but this is sufficient

(b) I used $\boxed{4}$ sublayers in that 15 feet.

(c) I assumed a constant unit weight of $\boxed{115 \text{ pcf}}$

(d) I assumed a $\boxed{C_c = 0.01}$ - minimal value.

(e) I used laboratory proctor data to determine an initial void ratio and used a value of $\boxed{e_0 = 0.40}$

(f) Total Calculated Settlement of 0.0346 ft. $\boxed{= 0.41 \text{ inches}}$

This is settlement due to an overburden pressure of $\boxed{420 \text{ psf}}$ and a constant pressure of $\boxed{720 \text{ psf}}$ for a 60 foot high structure.

FOR PHASE II

We have 2 layers; the first consists of a 4 ft thick borrow and the second the existing silty SAND layer — we will use 11.0 feet for that layer

Registered Professional Engineer (Civil) CERTIFICATE NO. 22716 David Preston Hayes Date Signed 9/20/96 ARIZONA, U.S.A.

For the analysis, two layers were evaluated. The overburden pressure remained at 1400 psf and the constant pressure remained at 780 psf for a 6 foot high structure.

For the 2nd layer, a $C_c = 0.10$ was used and a void ratio $e_0 = 1.0$. The unit weight was reduced to 103 pcf for the 2nd layer.

Total Settlement = 0.187 feet
= 2.24 inches

Note:

Settlement for these Phases is not time dependent and most settlement will occur during construction.

Procedures developed by: DAS (1985)
Lee & Evett (1985)
Winterkorn & Fang (1975)

were used in the analysis

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David Preston
HWest
Date Signed 9/24/90
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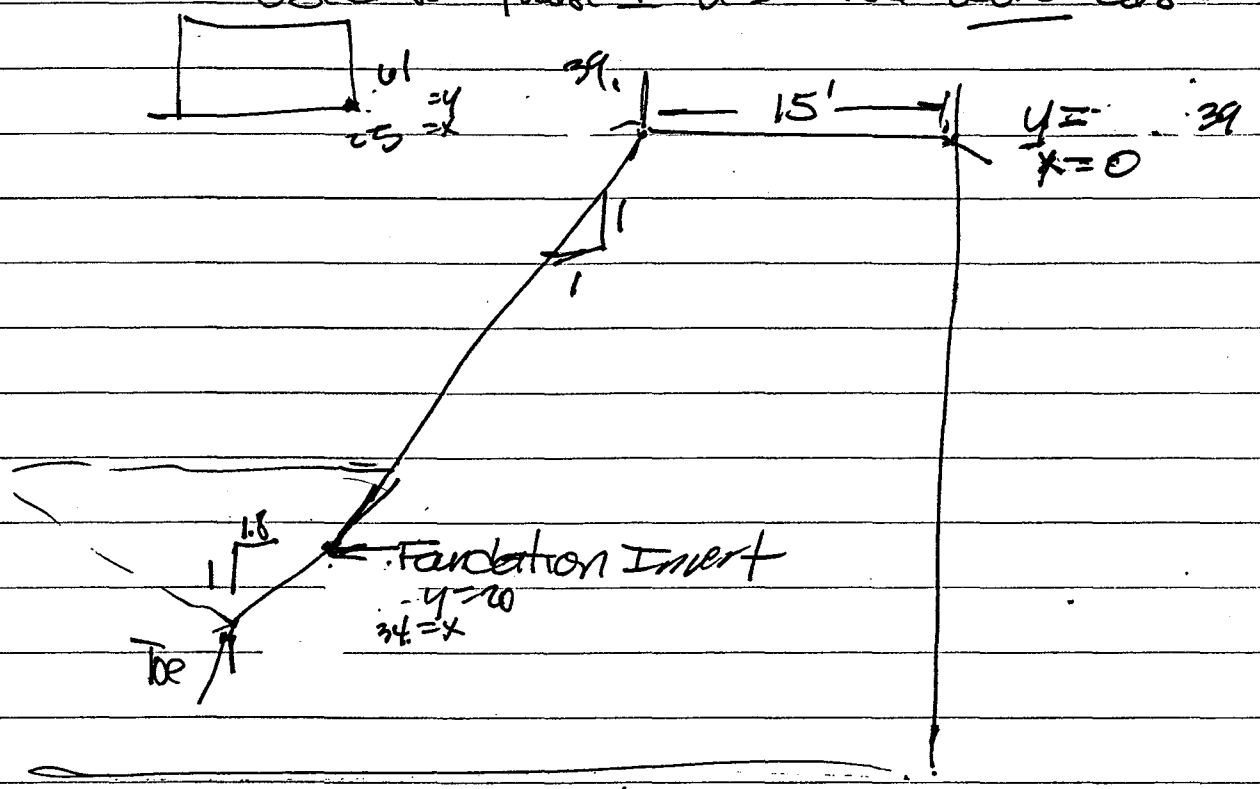
IV Slope Stability Analysis

ATL used a computer program Developed by GEOPRO, to determine the "most probable failure circle"

The following typical section was used for Phase I and the worst case. Sta 41+40.0



The resulting analysis produced the most probable failure circle of:

x = 34
y = 54
Radius = 30.00

Resulting in a **1.4428 Factor of Safety**

Registered Professional Engineer (Civil)
CERTIFICATE NO. 22709
David Preston Hayes
Date Signed 9/20/00
ARIZONA, U.S.A.

Preliminary 30% Submittal Package

- 10 full size plan sets
  2 ½ size plan sets

- 6 copies of the Hydrology report have been submitted and is under review

- Hydraulic report is currently being prepared and will be submitted shortly. Sediment transport analysis has been started and will be completed shortly after acceptance of the Hydraulic report.

- Geotechnical report is currently being prepared and will be submitted shortly.

- Cost estimate - 2 copies and 3½" diskette in Excel are included

- Correspondence and meeting minutes have been transmitted as received. Included are 3 letters from utility companies which you have not been copied.

- Quantity Calculations for 30% Earthwork

30% Plan Development Assumptions

- Toe down depth has been assumed at 10 feet for this submittal. Will be revised after sediment transport analysis is completed.

- Cement content has been assumed at 9% for this submittal will be revised when mix design is completed.

- Right-of-Way and alignment is from description of property acquired from Johnson-Stewart. Need to adjust levee location or irrigation facilities at south end. Discuss at 30% review meeting.

- Top of levee elevation has been set at 3' above the SPF water surface elevation from the preliminary Hydraulic analysis. Elevation at north end set 4' above SPF at bridge opening. Elevation at south end was set to match existing top of transverse dike elevation and run level until 3" above SPF water surface elevation

CAMELBACK RANCH LEEVE - SOUTH

Preliminary 30% Submittal

FCD Project No. 95-15

May 31, 1996

Construction Cost Estimate

Line No.	Item No.	Item Description	Unit	Quantity	Price	Amount
1	201	Removal of Trees > 12" Diameter	EA	12	$750.00	$9,000.00
2	202	Mobilization	L.Sum	1	$150,000.00	$150,000.00
3	211	Embankment Fill	CY	19,000	$3.50	$66,500.00
4	221	Soil-Cement Bank Protection	CY	17,200	$30.00	$516,000.00
5	310	Aggregate Base Course	SY	4,400	$4.00	$17,600.00
6	350	Removal of Existing Improvements	L.Sum	1	$50,000.00	$50,000.00
7	520	Steel and Aluminum Handrails	LF	3,400	$16.00	$54,400.00
8	520-1	Fence Gate	EA	3	$500.00	$1,500.00
9		Subtotal				$865,000.00
10		Contingency @ 15%				$129,750.00
11						
12		Estimated Construction Cost				$994,750.00
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LOCATION: Camelback Ranch Levee - South 30% Submittal

May 31, 1996

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
9+00.00	0.00	0.00						9+00.00
			100.00	63.98	42.88	236.94	158.81	
10+00.00	127.95	85.76						10+00.00
			100.00	134.45	102.49	497.94	379.57	
11+00.00	140.94	119.21						11+00.00
			100.00	140.88	109.68	521.76	406.22	
12+00.00	140.81	100.15						12+00.00
			100.00	127.79	94.17	473.30	348.76	
13+00.00	114.77	88.18						13+00.00
			100.00	122.21	83.46	452.61	309.09	
14+00.00	129.64	78.73						14+00.00
			100.00	137.24	73.68	508.30	272.87	
15+00.00	144.84	68.62						15+00.00
			100.00	151.84	67.37	562.35	249.52	
16+00.00	158.83	66.12						16+00.00
			100.00	169.93	66.92	629.35	247.85	
17+00.00	181.02	67.72						17+00.00
			100.00	172.98	65.60	640.65	242.96	
18+00.00	164.93	63.48						18+00.00
			100.00	153.72	61.38	569.33	227.31	
19+00.00	142.51	59.27						19+00.00
			100.00	141.10	53.93	522.59	199.72	
20+00.00	139.69	48.58						20+00.00
			100.00	143.56	54.62	531.69	202.28	
21+00.00	147.42	60.65						21+00.00
			100.00	151.19	66.59	559.94	246.63	
22+00.00	154.95	72.53						22+00.00
			100.00	156.11	72.53	578.17	268.61	
23+00.00	157.26	72.52						23+00.00
			100.00	148.44	59.29	549.76	219.59	
24+00.00	139.61	46.06						24+00.00
			100.00	139.99	58.28	518.48	215.85	
25+00.00	140.37	70.50						25+00.00
			100.00	144.37	73.63	534.69	272.70	
26+00.00	148.36	76.76						26+00.00
			100.00	148.82	54.65	551.17	202.39	
27+00.00	149.27	32.53						27+00.00
			100.00	148.47	51.27	549.89	189.87	
28+00.00	147.67	70.00						28+00.00
			100.00	150.70	68.86	558.13	255.02	
29+00.00	153.72	67.71						29+00.00
			100.00	154.39	70.06	571.81	259.46	
30+00.00	155.06	72.40						30+00.00
			100.00	154.39	67.37	571.81	249.50	
31+00.00	153.72	62.33						31+00.00
			100.00	157.12	67.18	581.91	248.81	
32+00.00	160.51	72.03						32+00.00
			100.00	147.08	81.90	544.72	303.33	
33+00.00	133.64	91.77						33+00.00
			100.00	149.94	87.89	555.31	325.52	
34+00.00	166.23	84.01						34+00.00
			100.00	167.87	88.46	621.74	327.63	

TOE EX DOES NOT INCLUDE CSA AREA/VOL

LOCATION: Camelback Ranch Levee - South 30% Submittal

May 31, 1996

STATION	Toe EX AREA [S.F.]	Embank AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA Toe Ex [S.F.]	AVERAGE AREA Embank [S.F.]	VOLUME Toe Ex [C.Y.]	VOLUME Embank [C.Y.]	STATION
35+00.00	169.51	92.91						35+00.00
			100.00	160.62	88.71	594.89	328.54	
36+00.00	151.73	84.50						36+00.00
			100.00	93.67	58.61	346.93	217.07	
37+00.00	35.61	32.72						37+00.00
			100.00	89.66	70.95	332.06	262.76	
38+00.00	143.70	109.17						38+00.00
			100.00	141.83	211.07	525.28	781.72	
39+00.00	139.95	312.96						39+00.00
			100.00	143.35	365.91	530.93	1,355.22	
40+00.00	146.75	418.86						40+00.00
			100.00	143.47	420.05	531.35	1,555.72	
41+00.00	140.18	421.23						41+00.00
			100.00	144.85	340.41	536.48	1,260.76	
42+00.00	149.52	259.58						42+00.00
			100.00	97.17	206.96	359.89	766.52	
43+00.00	44.82	154.34						43+00.00
			100.00	22.41	77.17	83.00	285.81	
44+00.00	0.00	0.00						44+00.00
					TOTALS	17,835.15	13,644.04	

TOE EX DOES NOT INCLUDE CSA AREA/VOL

LOCATION: Camelback Ranch Levee - South 30% Submittal

May 31, 1996

STATION	CSA Above AREA [S.F.]	CSA Below AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA CSA Above [S.F.]	AVERAGE AREA CSA Below [S.F.]	VOLUME CSA Above [C.Y.]	VOLUME CSA Below [C.Y.]	STATION
9+00.00	0.00	0.00						9+00.00
			100.00	18.66	45.00	69.09	166.67	
10+00.00	37.31	90.00						10+00.00
			100.00	44.57	90.00	165.06	333.33	
11+00.00	51.82	90.00						11+00.00
			100.00	48.94	90.00	181.24	333.33	
12+00.00	46.05	90.00						12+00.00
			100.00	42.51	90.00	157.44	333.33	
13+00.00	38.97	90.00						13+00.00
			100.00	39.33	90.00	145.65	333.33	
14+00.00	39.68	90.00						14+00.00
			100.00	36.70	90.00	135.91	333.33	
15+00.00	33.71	90.00						15+00.00
			100.00	33.04	90.00	122.37	333.33	
16+00.00	32.37	90.00						16+00.00
			100.00	35.13	90.00	130.11	333.33	
17+00.00	37.89	90.00						17+00.00
			100.00	35.99	90.00	133.28	333.33	
18+00.00	34.08	90.00						18+00.00
			100.00	31.66	90.00	117.26	333.33	
19+00.00	29.24	90.00						19+00.00
			100.00	28.42	90.00	105.26	333.33	
20+00.00	27.60	90.00						20+00.00
			100.00	30.17	90.00	111.72	333.33	
21+00.00	32.73	90.00						21+00.00
			100.00	33.33	90.00	123.43	333.33	
22+00.00	33.92	90.00						22+00.00
			100.00	33.07	90.00	122.46	333.33	
23+00.00	32.21	90.00						23+00.00
			100.00	29.24	90.00	108.30	333.33	
24+00.00	26.27	90.00						24+00.00
			100.00	29.19	90.00	108.09	333.33	
25+00.00	32.10	90.00						25+00.00
			100.00	32.48	90.00	120.28	333.33	
26+00.00	32.85	90.00						26+00.00
			100.00	26.23	90.00	97.15	333.33	
27+00.00	19.61	90.00						27+00.00
			100.00	27.72	90.00	102.65	333.33	
28+00.00	35.82	90.00						28+00.00
			100.00	34.48	90.00	127.69	333.33	
29+00.00	33.13	90.00						29+00.00
			100.00	33.10	90.00	122.57	333.33	
30+00.00	33.06	90.00						30+00.00
			100.00	32.24	90.00	119.39	333.33	
31+00.00	31.41	90.00						31+00.00
			100.00	32.72	90.00	121.19	333.33	
32+00.00	34.03	90.00						32+00.00
			100.00	39.13	90.00	144.93	333.33	
33+00.00	44.23	90.00						33+00.00
			100.00	40.84	90.00	151.26	333.33	
34+00.00	37.45	90.00						34+00.00
			100.00	38.47	90.00	142.48	333.33	

LOCATION: Camelback Ranch Levee - South 30% Submittal

May 31, 1996

STATION	CSA Above AREA [S.F.]	CSA Below AREA [S.F.]	DISTANCE [FT.]	AVERAGE AREA CSA Above [S.F.]	AVERAGE AREA CSA Below [S.F.]	VOLUME CSA Above [C.Y.]	VOLUME CSA Below [C.Y.]	STATION
35+00.00	39.49	90.00						35+00.00
			100.00	39.33	90.00	145.65	333.33	
36+00.00	39.16	90.00						36+00.00
			100.00	31.37	90.00	116.19	333.33	
37+00.00	23.58	90.00						37+00.00
			100.00	63.02	90.00	233.41	333.33	
38+00.00	102.46	90.00						38+00.00
			100.00	102.80	90.00	380.74	333.33	
39+00.00	103.14	90.00						39+00.00
			100.00	106.29	90.00	393.65	333.33	
40+00.00	109.43	90.00						40+00.00
			100.00	106.69	90.00	395.13	333.33	
41+00.00	103.94	90.00						41+00.00
			100.00	109.32	90.00	404.87	333.33	
42+00.00	114.69	90.00						42+00.00
			100.00	85.12	90.00	315.26	333.33	
43+00.00	55.55	90.00						43+00.00
			100.00	27.78	45.00	102.87	166.67	
44+00.00	0.00	0.00						44+00.00
					TOTALS	5,774.00	11,333.33	
					TOTAL CSA		17,107.33	

DMJM	PROJECT: Camelback Ranch Levee	JOB NO. 6526.01	SHEET 1 of
		DESIGNED BY CBB	DATE 5-30-96
SUBJECT: Quantities - 302 Phase 1		CHECKED BY DBL	DATE 5-31-96

ABC

Levee Length = 3376' x 7' = 23,632 SF

Ramp = 150' x 15' = 2250 SF

Turn Around = 13,300 SF

Total = 39,182 SF

4,354 SY

$39,182 \times 4/12 \times 135/2000 = 881.6$ Tons

$\times 18.00$ Ton

4354) 15,868.71

= 3.65 SY

use 4.00 /S.Y.

DMJM	PROJECT: Camelback Ranch Levee	JOB NO. 6526.01	SHEET 2 of
		DESIGNED BY CBB	DATE 5-31-96
SUBJECT: Quantities - 30% Phase 1		CHECKED BY DBL	DATE 5-31-96

CSA

Above : 5774 C.Y.

Below = 11,333 CY

Total = 17,107 C.Y.

use 17,200 C.Y.

cement @ 9%

17,200 x 27 x 150/2000 x 0.09 = 3135 Tons.

cost 3135 @ 120 — Ton = 376,200

17,200 @ 7.5 CY = 129,000

Total = 505,200

cost/CY = 29.37

use 30.00 C.Y.

DMJM	PROJECT: Camelback Ranch-Levee	JOB NO. 6526.01	SHEET 3 of
		DESIGNED BY CBB	DATE 5-31-96
SUBJECT: Quantities - 30% Phase 1		CHECKED BY DBC	DATE 5-31-96

Embankment —

Levee = 13,644 C.Y.

Turn Around = 5,200 C.Y.

TOTAL 18,844

use 19,000 C.Y.