PED Hydraulic Design of Tres Rios North Levee

Maricopa County

Volume II

Pre-Final Project Analysis Final Report

Contract Number: DACW09-00-D-0021

Prepared for:

U.S. Army Corps of Engineers
Los Angeles District

Prepared by:

WEST CONSULTANTS, INC.

WEST Consultants, Inc.
960 W Elliot Road, Suite 201
Tempe, AZ 85284-1137

April 2004

APPENDIX M

Toe-Down Calculations

Tres Rios PED
Existing Condition With Levee

Incised channel formed by 5-yr flow

Reach ID	XS Id	Reach Length (ft)	Distance (ft)	Incised / Bankfull Q cfs	Regime Width Incised / Bankfull Width	Incised / Bankfull q cfs/ft	Hydr. Depth Depth in Incised Reach	Competent Veloc.(p. 38 USBR)	Design Q 100-yr	Actual Top Width Design Channel Width	Design Flow / Width	Hydr. Depth Average Depth	Average Velocity	D50 - mm	D85 - mm	D90 - mm	USBR - Lacey Z (p 36 USBR)	Neill Z (p. 36 USBR)	Blench Z (p. 36 USBR)	Blench "zero bed factor" (p35)
				Qi	Wi	qi	di	Vc	Q100		qf	dm	Vm				Zl	Zn	Zb	Fbo
	Along Levee																			
Lower Gila	196.81	333.79	333.79	23500	900	26.11	5.81	3.9	227000	4111.18	55.22	19.06	7.6	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	196.87	282.74	616.53	23500	900	26.11	5.21	3.9	227000	4000.51	56.74	19.21	8.71	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	196.94	313.2	929.73	23500	900	26.11	5.21	3.9	227000	4033.34	56.28	19.61	8.29	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	196.99	373.53	1303.26	23500	900	26.11	4.84	3.9	227000	4171.1	54.42	20.06	8.01	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.05	300.35	1603.61	23500	900	26.11	4.98	3.9	227000	4184.98	54.24	18.85	7.6	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.09	272.85	1876.46	23500	900	26.11	5.11	3.9	227000	4358.15	52.09	19.34	6.34	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.14	234.45	2110.91	23500	900	26.11	5.09	3.9	227000	4438.24	51.15	18.33	6.05	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.16	234.63	2345.54	23500	900	26.11	5.21	3.9	227000	4590.88	49.45	17.91	7.23	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.18	132.21	2477.75	23500	900	26.11	5.18	3.9	227000	4783.52	47.45	17.87	7.68	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.23	118.22	2595.97	23500	900	26.11	4.37	3.9	227000	4868.23	46.63	17.79	8.42	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.28	243.22	2839.19	23500	900	26.11	6.25	3.9	227000	4871.51	46.60	18.37	8.69	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.33	245.84	3085.03	23500	900	26.11	4.72	3.9	227000	4973.21	45.64	16.55	10	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.38	268.41	3353.44	23500	900	26.11	3.97	3.9	227000	4848.38	46.82	16.97	9.31	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.42	268.46	3621.9	23500	900	26.11	3.98	3.9	227000	4724.59	48.05	17.31	10.42	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.48	242.18	3864.08	23500	900	26.11	3.83	3.9	227000	4760.64	47.68	17.86	10.38	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.53	308.12	4172.2	23500	900	26.11	4.89	3.9	227000	4523.09	50.19	18.61	9.61	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.58	269.79	2146.25	23500	900	26.11	5.35	3.9	227000	4578.88	49.58	19.02	9.73	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.64	263.35	263.35	23500	900	26.11	6.38	3.9	227000	4824.39	47.05	19.56	8.28	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.7	306.9	570.25	23500	900	26.11	5.88	3.9	227000	4824.11	47.06	19.91	8.04	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.75	306.99	877.24	23500	900	26.11	6.07	3.9	227000	4772.08	47.57	20.3	6.97	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.81	278.31	1155.55	23500	900	26.11	5.27	3.9	227000	4744.25	47.85	20.15	8.19	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.87	292.55	1448.1	23500	900	26.11	5.39	3.9	227000	4707.49	48.22	20.46	7.68	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.92	328.15	1776.25	23500	900	26.11	5.81	3.9	227000	4514.41	50.28	20.8	7.22	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.95	262.82	2039.07	23500	900	26.11	5.5	3.9	227000	4434.16	51.19	21.02	6.8	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.98	155.35	2194.42	23500	900	26.11	3.52	3.9	227000	4488.02	50.58	20.61	7.92	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.03	170.43	2364.85	23500	900	26.11	4.15	3.9	227000	4155.46	54.63	18.88	8.73	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.08	259.16	2624.01	23500	900	26.11	4.45	3.9	227000	3852.65	58.92	16.77	9.23	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.15	243.97	2867.98	23500	900	26.11	3.65	3.9	227000	3623.15	62.65	17.13	9.08	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.2	369.76	3237.74	23500	900	26.11	4.17	3.9	227000	3474.86	65.33	17.05	9.62	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.26	301.61	3539.35	23500	900	26.11	4.54	3.9	227000	3332.35	68.12	17.41	10	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.33	294.09	3833.44	23500	900	26.11	4.89	3.9	227000	3488.39	65.07	17.99	8.79	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.4	382.26	4215.7	23500	900	26.11	4.97	3.9	227000	3320.07	68.37	17.34	9.7	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.45	346.16	4561.86	23500	900	26.11	5.36	3.9	227000	3315.19	68.47	18.27	8.57	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.49	257.14	4819	23500	900	26.11	5.5	3.9	227000	3299.36	68.80	18.59	8.17	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.54	242.06	5061.06	23500	900	26.11	5.14	3.9	227000	3257.75	69.68	18.85	7.96	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.6	270.71	5331.77	23500	900	26.11	4.55	3.9	227000	3247.84	69.89	19.07	8.03	8.5	28	33	0.25	0.5	0.6	3

Tres Rios PED
Existing Condition With Levee

Incised channel formed by 5-yr flow

Reach ID	XS Id	Reach Length (ft)	Distance (ft)	Incised / Bankfull Q cfs	Regime Width Incised / Bankfull Width	Incised / Bankfull q cfs/ft	Hydr. Depth Depth in Incised Reach	Competent Veloc.(p. 38 USBR)	Design Q 100-yr	Actual Top Width Design Channel Width	Design Flow / Width	Hydr. Depth Average Depth	Average Velocity	D50 - mm	D85 - mm	D90 - mm	USBR - Lacey Z (p 36 USBR)	Neill Z (p. 36 USBR)	Blench Z (p. 36 USBR)	Blench "zero bed factor" (p35)
				Qi	Wi	qi	di	Vc	Q100		qf	dm	Vm				Zl	Zn	Zb	Fbo
	Along Levee																			ft/s^2
Lower Gila	198.65	329.78	5661.55	23500	900	26.11	4.5	3.9	227000	3261.33	69.60	19.31	7.73	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.7	262.59	5924.14	23500	900	26.11	4.89	3.9	227000	3191.34	71.13	18.95	7.7	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.76	255.86	6180	23500	900	26.11	4.78	3.9	227000	3141.17	72.27	16.46	7.87	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.8	292.67	6472.67	23500	900	26.11	5.01	3.9	227000	3059.23	74.20	15.34	7.57	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.83	223.34	6696.01	23500	900	26.11	5.14	3.9	227000	3174.38	71.51	15.34	8.6	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.88	175.6	6871.61	23500	900	26.11	5	3.9	227000	2941.35	77.18	15.33	8.49	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.93	255.7	7127.31	23500	900	26.11	5.51	3.9	227000	2991.96	75.87	15.73	8.03	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	198.97	225.74	7353.05	23500	900	26.11	5.54	3.9	227000	2623.76	86.52	15.29	9.61	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	198.99	237.08	7590.13	23500	900	26.11	5.94	3.9	227000	2518.83	90.12	15.78	9.14	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.02	110.62	7700.75	23500	900	26.11	5.74	3.9	227000	2484.48	91.37	14.91	9.14	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.06	147.43	7848.18	23500	900	26.11	5.82	3.9	227000	2430.66	93.39	15.99	8.59	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.11	204.6	8052.78	23500	900	26.11	6.16	3.9	227000	2499.03	90.84	16.38	7.38	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.18	277	8329.78	23500	900	26.11	4.82	3.9	227000	2565.54	88.48	16.78	9.69	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.21	191.43	8521.21	23500	900	26.11	6.44	3.9	227000	2473.54	91.77	15.51	7.87	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.31	515.65	9036.86	23500	900	26.11	5.93	3.9	227000	2656.82	85.44	15.37	8.56	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.38	390.67	9427.53	23500	900	26.11	3.2	3.9	227000	2883.17	78.73	13.37	9.92	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.47	439.22	7566.53	23500	900	26.11	4.4	3.9	227000	3029.68	74.93	14.69	9.68	15	30	40	0.25	0.5	0.6	3.6

Tres Rios PED
Existing Condition With Levee

Incised channel formed by 5-yr flow

Reach ID	XS Id	Reach Length (ft)	Distance (ft)	Incised / Bankfull Q cfs	Regime Width Incised / Bankfull Width	Incised / Bankfull q cfs/ft	Hydr. Depth Depth in Incised Reach	Competent Veloc.(p. 38 USBR)	Design Q 100-yr	Actual Top Width Design Channel Width	Design Flow / Width	Hydr. Depth Average Depth	Average Velocity	D50 - mm	D85 - mm	D90 - mm	USBR - Lacey Z (p 36	Neill Z (p. 36 USBR)	Blench Z (p. 36 USBR)	Blench "zero bed factor"
				Qi	Wi	qi	di	Vc	Q100		qf	dm	Vm				Zl	Zn	Zb	Fbo
	Along Levee																			ft/s^2
Salt	199.55	440	440	19500	800	24.38	5.49	3.9	162000	2166.74	74.77	12.08	11.49	15	30	40	0.25	0.5	0.6	3.6
Salt	199.69	760.48	1200.48	19500	800	24.38	6.31	3.9	162000	2481	65.30	11.42	9.43	15	30	40	0.25	0.5	0.6	3.6
Salt	199.86	887.92	2088.4	19500	800	24.38	6.56	3.9	162000	2719	59.58	11.58	6.57	15	30	40	0.25	0.5	0.6	3.6
Salt	199.98	615.42	2703.82	19500	800	24.38	5.99	3.9	162000	2582.64	62.73	11.34	8.29	15	30	40	0.25	0.5	0.6	3.6
Salt	200.02	223.32	2927.14	19500	800	24.38	6.55	3.9	162000	2660	60.90	11.8	7.11	15	30	40	0.25	0.5	0.6	3.6
Salt	200.11	464.16	3391.3	19500	800	24.38	6.74	3.9	162000	2782	58.23	10.55	7.38	15	30	40	0.25	0.5	0.6	3.6
Salt	200.22	577.45	3968.75	19500	800	24.38	7.47	3.9	162000	3223	50.26	10.29	6.94	15	30	40	0.25	0.5	0.6	3.6
Salt	200.31	464.68	4433.43	19500	800	24.38	6.6	3.9	162000	3610	44.88	9.57	7.25	15	30	40	0.25	0.5	0.6	3.6
Salt	200.4	474.12	4907.55	19500	800	24.38	6.92	3.9	162000	4025	40.25	9.1	6.65	15	30	40	0.25	0.5	0.6	3.6
Salt	200.47	401.47	5309.02	19500	800	24.38	6.42	3.9	162000	3975.8	40.75	8.76	6.62	15	30	40	0.25	0.5	0.6	3.6
Salt	200.52	233.78	5542.8	19500	800	24.38	6.13	3.9	162000	4063.68	39.87	8.35	6.51	15	30	40	0.25	0.5	0.6	3.6
Salt	200.6	417.72	5960.52	19500	800	24.38	5.41	3.9	162000	3994.43	40.56	8.41	6.54	15	30	40	0.25	0.5	0.6	3.6
Salt	200.68	430.96	6391.48	19500	800	24.38	3.41	3.9	162000	4183.45	38.72	7.75	8.16	15	30	40	0.25	0.5	0.6	3.6
Salt	200.75	386.75	6778.23	19500	800	24.38	3.47	3.9	162000	4192.02	38.64	7.58	9.65	15	30	40	0.25	0.5	0.6	3.6
Salt	200.83	399.16	7177.39	19500	800	24.38	5.05	3.9	162000	3841.77	42.17	8.86	7.27	15	30	40	0.25	0.5	0.6	3.6
Salt	200.88	292.47	7469.86	19500	800	24.38	4.52	3.9	162000	3884.98	41.70	8.3	7.35	15	30	40	0.25	0.5	0.6	3.6
Salt	200.95	362.23	7832.09	19500	800	24.38	4.07	3.9	162000	3904.59	41.49	7.86	8.94	15	30	40	0.25	0.5	0.6	3.6
Salt	201.01	329.07	8161.16	19500	800	24.38	3.93	3.9	162000	3910.55	41.43	7.73	8.65	15	30	40	0.25	0.5	0.6	3.6
Salt	201.1	468.21	8629.37	19500	800	24.38	3.22	3.9	162000	3880.41	41.75	7.87	9.55	15	30	40	0.25	0.5	0.6	3.6
Salt	201.16	294.85	8924.22	19500	800	24.38	4.3	3.9	162000	3685.58	43.96	8.88	6.89	15	30	40	0.25	0.5	0.6	3.6
Salt	201.2	229.67	9153.89	19500	800	24.38	3.99	3.9	162000	3657.01	44.30	8.22	8.26	15	30	40	0.25	0.5	0.6	3.6
Salt	201.26	337.88	9491.77	19500	800	24.38	3.79	3.9	162000	3462.7	46.78	7.28	9.14	15	30	40	0.25	0.5	0.6	3.6
Salt	201.33	348.28	9840.05	19500	800	24.38	3.73	3.9	162000	3344.08	48.44	7.45	10.62	15	30	40	0.25	0.5	0.6	3.6
Salt	201.41	419.68	10259.73	19500	800	24.38	4.92	3.9	162000	3351.13	48.34	8.45	7.44	15	30	40	0.25	0.5	0.6	3.6
Salt	201.48	358.13	10617.86	19500	800	24.38	5.58	3.9	162000	3302.37	49.06	8.59	7.42	15	30	40	0.25	0.5	0.6	3.6
Salt	201.54	350.25	10968.11	19500	800	24.38	5.9	3.9	162000	3210.05	50.47	8.51	8.87	15	50	60	0.25	0.5	0.6	3.6
Salt	201.62	390.05	11358.16	19500	800	24.38	6.28	3.9	162000	3252.47	49.81	8.98	8.6	15	50	60	0.25	0.5	0.6	3.6
Salt	201.7	434.66	11792.82	19500	800	24.38	5.84	3.9	162000	3387.1	47.83	8.42	9.26	15	50	60	0.25	0.5	0.6	3.6
Salt	201.81	574.27	12367.09	19500	800	24.38	7.01	3.9	162000	3040.7	53.28	9.77	7.97	15	50	60	0.25	0.5	0.6	3.6
Salt	201.89	397.68	12764.77	19500	800	24.38	6.22	3.9	162000	2984.18	54.29	8.27	8.16	15	50	60	0.25	0.5	0.6	3.6
Salt	201.96	376.25	13141.02	19500	800	24.38	5.94	3.9	162000	3075.24	52.68	7.69	7.75	15	50	60	0.25	0.5	0.6	3.6
Salt	202.01	238.04	13379.06	19500	800	24.38	6.3	3.9	162000	2838.97	57.06	7.96	8.89	15	50	60	0.25	0.5	0.6	3.6
Salt	202.06	274.55	13653.61	19500	800	24.38	5.59	3.9	162000	3024.49	53.56	8.1	9.45	15	50	60	0.25	0.5	0.6	3.6
Salt	202.11	252.79	13906.4	19500	800	24.38	5.9	3.9	162000	4099.99	39.51	6.85	9.46	15	50	60	0.25	0.5	0.6	3.6
Salt	202.18	357.97	14264.37	19500	800	24.38	6.39	3.9	162000	4127.2	39.25	6.62	9.4	15	50	60	0.25	0.5	0.6	3.6
Salt	202.24	343.68	14608.05	19500	800	24.38	4.88	3.9	162000	4041.61	40.08	6.23	8.69	15	50	60	0.25	0.5	0.6	3.6
Salt	202.32	401.28	0	19500	800	24.38	4.33	3.9	162000	4289.72	37.76	6.99	7.73	15	50	60	0.25	0.5	0.6	3.6

Tres Rios PED
Existing Condition With Levee

If Value > 0 Use this Formula in Calculating Average

Reach ID	XS Id	Neill - Incised	Neill - Competent Velocity	USBR - D90 Method	Lacey	Blench - Zero Bed Factor	Abbot - SW Streams	Blodgett	Average	Like Value Average (LVA)	130% of Average (LVA)	RAS Thalweg Elevation	HEC-6T 105-yr Thalweg	Maximum Recommended Toe Elevation
		1		1	1	1	1							
												ft	ft	ft
	Along Levee													
Lower Gila	196.81	5.3	18.1	4.8	4.2	5.9	6.4	9.7	7.8	5.3	6.9	906.4	905.86	898.3
Lower Gila	196.87	4.8	23.7	4.8	4.2	6.0	6.5	9.7	8.5	5.3	6.8	906.4	906.16	898.7
Lower Gila	196.94	4.8	22.1	4.9	4.2	6.0	6.4	9.7	8.3	5.3	6.8	906.4	906.51	899.1
Lower Gila	196.99	4.4	21.1	5.0	4.2	5.8	6.4	9.7	8.1	5.2	6.7	906.4	906.23	898.7
Lower Gila	197.05	4.5	17.9	4.7	4.2	5.8	6.4	9.7	7.6	5.1	6.7	908.12	907.68	900.1
Lower Gila	197.09	4.4	12.1	4.8	4.2	5.7	6.3	9.7	6.8	5.1	6.6	908.08	907.66	900.1
Lower Gila	197.14	4.4	10.1	4.6	4.2	5.6	6.3	9.7	6.4	5.0	6.5	909.26	908.05	900.8
Lower Gila	197.16	4.3	15.3	4.5	4.2	5.5	6.2	9.7	7.1	5.0	6.4	909.8	908	901.0
Lower Gila	197.18	4.2	17.3	4.5	4.2	5.3	6.2	9.7	7.3	4.9	6.3	910.95	909.17	902.3
Lower Gila	197.23	3.5	20.6	4.4	4.2	5.3	6.2	9.7	7.7	4.7	6.1	910.88	909.46	903.0
Lower Gila	197.28	5.0	22.6	4.6	4.2	5.3	6.2	9.7	8.2	5.0	6.5	910.5	909.68	903.1
Lower Gila	197.33	3.7	25.9	4.1	4.2	5.3	6.1	9.6	8.4	4.7	6.1	911.65	910.04	903.9
Lower Gila	197.38	3.2	23.5	4.2	4.2	5.4	6.2	9.6	8.0	4.6	6.0	911.9	910.32	904.3
Lower Gila	197.42	3.2	28.9	4.3	4.2	5.5	6.2	9.6	8.9	4.7	6.1	911.9	910.55	904.4
Lower Gila	197.48	3.1	29.7	4.5	4.2	5.5	6.2	9.6	9.0	4.7	6.1	911.9	910.66	904.3
Lower Gila	197.53	4.1	27.2	4.7	4.2	5.7	6.3	9.6	8.8	5.0	6.5	911.9	910.99	904.2
Lower Gila	197.58	4.5	28.4	4.8	4.2	5.6	6.3	9.6	9.0	5.0	6.6	911.9	911.24	904.4
Lower Gila	197.64	5.1	22.0	4.9	4.2	5.4	6.2	9.6	8.2	5.2	6.7	911.9	911.53	904.5
Lower Gila	197.7	4.7	21.1	5.0	4.2	5.4	6.2	9.6	8.0	5.1	6.6	911.9	911.39	904.5
Lower Gila	197.75	4.9	16.0	5.1	4.2	5.5	6.2	9.6	7.3	5.2	6.7	911.9	911.79	904.9
Lower Gila	197.81	4.3	22.2	5.0	4.2	5.5	6.2	9.6	8.1	5.0	6.5	912.13	911.95	905.3
Lower Gila	197.87	4.4	19.8	5.1	4.2	5.5	6.2	9.6	7.8	5.1	6.6	912.14	912.3	905.4
Lower Gila	197.92	4.9	17.7	5.2	4.2	5.7	6.3	9.6	7.6	5.2	6.8	912.14	912.71	905.3
Lower Gila	197.95	4.7	15.6	5.3	4.2	5.7	6.3	9.6	7.3	5.2	6.8	912.14	912.94	905.3
Lower Gila	197.98	3.0	21.2	5.2	4.2	5.7	6.3	9.6	7.9	4.9	6.3	915.6	912.45	905.9
Lower Gila	198.03	3.7	23.4	4.7	4.2	6.0	6.4	9.6	8.3	5.0	6.5	917.47	913.89	907.1
Lower Gila	198.08	4.3	22.9	4.2	4.2	6.3	6.5	9.6	8.3	5.1	6.6	917.9	914.15	907.4
Lower Gila	198.15	3.7	22.8	4.3	4.2	6.6	6.6	9.6	8.2	5.1	6.6	918.06	914.16	907.6
Lower Gila	198.2	4.3	25.0	4.3	4.2	6.7	6.7	9.6	8.7	5.2	6.8	917.83	914.33	907.5
Lower Gila	198.26	4.9	27.2	4.4	4.2	6.9	6.7	9.6	9.1	5.4	7.0	919.07	914.89	907.8
Lower Gila	198.33	5.1	22.6	4.5	4.2	6.7	6.7	9.6	8.5	5.4	7.1	920.97	916.08	909.0
Lower Gila	198.4	5.4	25.8	4.3	4.2	7.0	6.8	9.6	9.0	5.5	7.2	922.23	917.59	910.4
Lower Gila	198.45	5.8	21.9	4.6	4.2	7.0	6.8	9.6	8.5	5.6	7.3	922.19	918.41	911.1
Lower Gila	198.49	6.0	20.4	4.6	4.2	7.0	6.8	9.6	8.4	5.7	7.4	922.46	918.92	911.5
Lower Gila	198.54	5.6	19.6	4.7	4.2	7.0	6.8	9.6	8.2	5.7	7.4	922.67	919.24	911.7
Lower Gila	198.6	5.0	20.2	4.8	4.2	7.1	6.8	9.6	8.2	5.6	7.2	923.3	919.98	912.6

Tres Rios PED
Existing Condition With Levee

If Value > 0 Use this Formula in Calculating Average

Reach ID	XS Id	Neill - Incised	Neill - Competent Velocity	USBR - D90 Method	Lacey	Blench - Zero Bed Factor	Abbot - SW Streams	Blodgett	Average	Like Value Average (LVA)	130% of Average (LVA)	RAS Thalweg Elevation	HEC-6T 105-yr Thalweg	Maximum Recommended Toe Elevation
		1		1	1	1	1							
												ft	ft	ft
	Along Levee													
Lower Gila	198.65	4.9	19.0	4.8	4.2	7.0	6.8	9.6	8.0	5.5	7.2	923.88	920.92	913.5
Lower Gila	198.7	5.5	18.5	4.7	4.2	7.1	6.8	9.6	8.1	5.7	7.4	923.9	921.31	913.5
Lower Gila	198.76	5.4	16.8	4.1	4.2	7.2	6.8	9.6	7.7	5.5	7.2	923.9	921.35	913.7
Lower Gila	198.8	5.8	14.4	3.8	4.2	7.3	6.9	9.6	7.4	5.6	7.3	923.9	921.54	913.9
Lower Gila	198.83	5.8	18.5	3.8	4.2	7.2	6.8	9.6	8.0	5.5	7.2	923.9	921.82	914.3
Lower Gila	198.88	5.9	18.0	3.8	4.2	7.5	7.0	9.6	8.0	5.7	7.4	923.9	921.98	914.3
Lower Gila	198.93	6.5	16.7	3.9	3.8	7.0	6.9	9.1	7.7	5.6	7.3	923.9	922.16	914.5
Lower Gila	198.97	7.2	22.4	3.8	3.8	7.7	7.1	9.1	8.7	5.9	7.7	925.1	923.53	915.7
Lower Gila	198.99	8.0	21.2	3.9	3.8	7.9	7.2	9.1	8.7	6.2	8.0	925.1	923.75	915.6
Lower Gila	199.02	7.8	20.0	3.7	3.8	7.9	7.2	9.1	8.5	6.1	7.9	925.4	923.78	915.8
Lower Gila	199.06	8.1	19.2	4.0	3.8	8.1	7.3	9.1	8.5	6.2	8.1	925.4	923.91	915.8
Lower Gila	199.11	8.4	14.6	4.1	3.8	7.9	7.2	9.1	7.9	6.3	8.2	925.4	924.66	916.4
Lower Gila	199.18	6.4	24.9	4.2	3.8	7.8	7.2	9.1	9.0	5.9	7.6	925.4	923.54	915.7
Lower Gila	199.21	8.8	15.8	3.9	3.8	8.0	7.2	9.1	8.1	6.3	8.2	927.64	925.85	917.4
Lower Gila	199.31	7.7	18.4	3.8	3.8	7.6	7.1	9.1	8.2	6.0	7.8	928.11	926.88	919.1
Lower Gila	199.38	3.9	20.6	3.3	3.8	7.2	7.0	9.1	7.8	5.0	6.5	931.1	927.32	920.1
Lower Gila	199.47	5.1	21.8	3.7	3.8	7.0	6.9	9.1	8.2	5.3	6.9	931.64	928.01	919.7

Tres Rios PED
Existing Condition With Levee

If Value > 0 Use this Formula in Calculating Average

Reach ID	XS Id	Neill - Incised	Neill - Competent Velocity	USBR - D90 Method	Lacey	Blench - Zero Bed Factor	Abbot - SW Streams	Blodgett	Average	Like Value Average (LVA)	130% of Average (LVA)	RAS Thalweg Elevation	HEC-6T 105-yr Thalweg	Maximum Recommended Toe Elevation
		1		1	1	1	1							
												ft	ft	ft
	Along Levee													
Salt	199.55	6.7	23.5	3.0	3.4	6.9	6.9	9.1	8.5	5.4	7.0	931.65	928.39	921.4
Salt	199.69	6.9	16.2	2.9	3.4	6.3	6.7	9.1	7.3	5.2	6.8	931.79	928.93	922.1
Salt	199.86	6.7	7.9	2.9	3.4	6.0	6.5	9.1	6.1	5.1	6.6	931.12	929.06	922.4
Salt	199.98	6.4	12.8	2.8	3.4	6.2	6.6	9.1	6.7	5.1	6.6	932.56	930.07	923.5
Salt	200.02	6.8	9.7	3.0	3.4	6.1	6.6	9.1	6.4	5.2	6.7	931.98	930.17	923.5
Salt	200.11	6.8	9.4	2.6	3.4	5.9	6.5	9.1	6.2	5.0	6.5	931.98	931.27	924.7
Salt	200.22	6.7	8.0	2.6	3.4	5.3	6.3	9.1	5.9	4.8	6.3	931.78	932.55	925.5
Salt	200.31	5.4	8.2	2.4	3.4	4.9	6.1	9.1	5.6	4.4	5.8	931.67	933.02	925.9
Salt	200.4	5.2	6.4	2.3	3.4	4.6	5.9	9.1	5.3	4.3	5.6	931.55	933.42	926.0
Salt	200.47	4.8	6.1	2.2	3.4	4.6	6.0	9.1	5.2	4.2	5.5	931.67	933.16	926.2
Salt	200.52	4.5	5.6	2.1	3.4	4.6	5.9	9.1	5.0	4.1	5.3	932.45	934.02	927.1
Salt	200.6	4.1	5.7	2.1	3.4	4.6	6.0	9.1	5.0	4.0	5.2	932.82	934.31	927.6
Salt	200.68	2.5	8.5	1.9	3.4	4.5	5.9	9.1	5.1	3.6	4.7	937.28	935.81	931.1
Salt	200.75	2.5	11.2	1.9	3.4	4.5	5.9	9.1	5.5	3.6	4.7	937.28	935.93	931.2
Salt	200.83	3.9	7.7	2.2	3.4	4.7	6.0	9.1	5.3	4.1	5.3	937.28	935.83	930.6
Salt	200.88	3.5	7.3	2.1	3.4	4.7	6.0	9.1	5.1	3.9	5.1	938.71	936.46	931.4
Salt	200.95	3.1	10.2	2.0	3.4	4.7	6.0	9.1	5.5	3.8	5.0	938.69	936.74	931.8
Salt	201.01	3.0	9.4	1.9	3.4	4.7	6.0	9.1	5.4	3.8	4.9	938.69	936.27	931.3
Salt	201.1	2.5	11.4	2.0	3.4	4.7	6.0	9.1	5.6	3.7	4.8	942.17	936.48	931.7
Salt	201.16	3.4	6.8	2.2	3.4	4.9	6.1	9.1	5.1	4.0	5.2	943.39	938.14	932.9
Salt	201.2	3.2	9.2	2.1	3.4	4.9	6.1	9.1	5.4	3.9	5.1	942.38	938.76	933.7
Salt	201.26	3.2	9.8	1.8	3.4	5.1	6.2	9.1	5.5	3.9	5.1	942.38	939.32	934.2
Salt	201.33	3.2	12.8	1.9	3.4	5.2	6.2	9.1	6.0	4.0	5.2	942.38	939.15	934.0
Salt	201.41	4.3	7.7	2.1	3.4	5.2	6.2	9.1	5.4	4.2	5.5	942.38	939.42	933.9
Salt	201.48	4.9	7.8	2.1	3.4	5.2	6.2	9.1	5.5	4.4	5.7	943.46	939.53	933.8
Salt	201.54	5.3	10.8	2.1	3.4	5.3	6.3	9.1	6.0	4.5	5.8	944.01	940.13	934.3
Salt	201.62	5.6	10.8	2.2	3.4	5.3	6.3	9.1	6.1	4.5	5.9	944.97	940.67	934.8
Salt	201.7	5.0	11.6	2.1	3.4	5.2	6.2	9.1	6.1	4.4	5.7	945.11	941.17	935.5
Salt	201.81	6.6	10.2	2.4	3.4	5.5	6.4	9.1	6.2	4.9	6.3	945.11	942.07	935.8
Salt	201.89	5.9	9.0	2.1	3.4	5.6	6.4	9.1	5.9	4.7	6.1	946.82	943.02	936.9
Salt	201.96	5.5	7.6	1.9	3.4	5.5	6.3	9.1	5.6	4.5	5.9	946.2	944.02	938.1
Salt	202.01	6.2	10.2	2.0	3.4	5.8	6.5	9.1	6.2	4.8	6.2	946.85	944.39	938.2
Salt	202.06	5.2	11.5	2.0	3.4	5.6	6.4	9.1	6.2	4.5	5.9	947.33	945.19	939.3
Salt	202.11	4.3	9.8	1.7	3.4	4.5	5.9	9.1	5.5	4.0	5.2	948.26	946.46	941.3
Salt	202.18	4.7	9.3	1.7	3.4	4.5	5.9	9.1	5.5	4.0	5.2	946.86	947.24	941.6
Salt	202.24	3.6	7.7	1.6	3.4	4.6	5.9	9.1	5.1	3.8	5.0	948.09	947.66	942.7
Salt	202.32	3.1	6.9	1.7	3.4	4.4	5.9	9.1	4.9	3.7	4.8	950.65	948.51	943.7

Tres Rios PED
Future Levee + Pond

Incised channel formed by 5-yr flow

Reach ID	XS Id	Reach Length (ft)	Distance (ft)	Incised / Bankfull Q cfs	Regime Width Incised / Bankfull Width	Incised / Bankfull q cfs/ft	Hydr. Depth Depth in Incised Reach	Competent Veloc.(p. 38 USBR)	Design Q 100-yr	Actual Top Width Design Channel Width	Design Flow / Width	Hydr. Depth Average Depth	Average Velocity	D50 - mm	D85 - mm	D90 - mm	USBR - Lacey Z (p 36 USBR)	Neill Z (p. 36 USBR)	Blench Z (p. 36 USBR)	Blench "zero bed factor" (p35)
				Qi	Wi	qi	di	Vc	Q100		qf	dm	Vm				Zl	Zn	Zb	Fbo
	Along Levee																			ft/s^2
Lower Gila	196.81	333.79	333.79	23500	900	26.11	5.81	3.9	227000	4040.01	56.19	11.01	5.96	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	196.87	282.74	616.53	23500	900	26.11	5.21	3.9	227000	3995.63	56.81	10.38	6.69	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	196.94	313.2	929.73	23500	900	26.11	5.21	3.9	227000	4030.69	56.32	10.29	6.03	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	196.99	373.53	1303.26	23500	900	26.11	4.84	3.9	227000	4156.09	54.62	9.98	5.25	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.05	300.35	1603.61	23500	900	26.11	4.98	3.9	227000	4060.92	55.90	10.88	5.84	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.09	272.85	1876.46	23500	900	26.11	5.11	3.9	227000	4249.12	53.42	10.83	6.23	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.14	234.45	2110.91	23500	900	26.11	5.09	3.9	227000	4287.51	52.94	9.11	6.43	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.16	234.63	2345.54	23500	900	26.11	5.21	3.9	227000	4394.06	51.66	9.05	7.68	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.18	132.21	2477.75	23500	900	26.11	5.18	3.9	227000	4548.49	49.91	9.33	7.07	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.23	118.22	2595.97	23500	900	26.11	4.37	3.9	227000	4810.63	47.19	8.81	6.77	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.28	243.22	2839.19	23500	900	26.11	6.25	3.9	227000	4587.65	49.48	9.36	6.62	8	30	35	0.25	0.5	0.6	3.2
Lower Gila	197.33	245.84	3085.03	23500	900	26.11	4.72	3.9	227000	4519.77	50.22	9.17	6.7	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.38	268.41	3353.44	23500	900	26.11	3.97	3.9	227000	4505.1	50.39	8.75	5.51	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.42	268.46	3621.9	23500	900	26.11	3.98	3.9	227000	4388.03	51.73	9.07	5.79	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.48	242.18	3864.08	23500	900	26.11	3.83	3.9	227000	4273.54	53.12	9.49	6.15	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.53	308.12	4172.2	23500	900	26.11	4.89	3.9	227000	4320.97	52.53	9.08	7.2	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.58	269.79	2146.25	23500	900	26.11	5.35	3.9	227000	4420.61	51.35	7.56	9.33	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.64	263.35	263.35	23500	900	26.11	6.38	3.9	227000	4478.06	50.69	7.96	7.94	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.7	306.9	570.25	23500	900	26.11	5.87	3.9	227000	4612.29	49.22	7.63	8.26	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.75	306.99	877.24	23500	900	26.11	6.05	3.9	227000	4541.76	49.98	8.18	7.13	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.81	278.31	1155.55	23500	900	26.11	5.25	3.9	227000	4276.04	53.09	7.87	7.75	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.87	292.55	1448.1	23500	900	26.11	5.37	3.9	227000	4056.98	55.95	8.17	8.89	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.92	328.15	1776.25	23500	900	26.11	5.8	3.9	227000	3968.09	57.21	9.03	8.78	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.95	262.82	2039.07	23500	900	26.11	5.5	3.9	227000	4012.85	56.57	8.28	8.8	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	197.98	155.35	2194.42	23500	900	26.11	3.51	3.9	227000	3968.89	57.19	8.3	10.28	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.03	170.43	2364.85	23500	900	26.11	4.15	3.9	227000	3881.04	58.49	9.44	9.12	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.08	259.16	2624.01	23500	900	26.11	4.45	3.9	227000	3768.21	60.24	8.84	8.63	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.15	243.97	2867.98	23500	900	26.11	3.65	3.9	227000	3614.95	62.79	10.04	5.97	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.2	369.76	3237.74	23500	900	26.11	4.18	3.9	227000	3466.67	65.48	9.4	6.64	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.26	301.61	3539.35	23500	900	26.11	4.56	3.9	227000	3300.63	68.77	9.14	8.27	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.33	294.09	3833.44	23500	900	26.11	4.9	3.9	227000	3221.21	70.47	7.93	9.7	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.4	382.26	4215.7	23500	900	26.11	4.92	3.9	227000	3042.7	74.60	7.35	10.05	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.45	346.16	4561.86	23500	900	26.11	5.27	3.9	227000	3286.08	69.08	8.3	8.71	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.49	257.14	4819	23500	900	26.11	5.43	3.9	227000	3270.31	69.41	9.32	8.31	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.54	242.06	5061.06	23500	900	26.11	5.08	3.9	227000	3242.93	70.00	9.12	8.48	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.6	270.71	5331.77	23500	900	26.11	4.51	3.9	227000	3211.66	70.68	9.24	8.48	8.5	28	33	0.25	0.5	0.6	3

Tres Rios PED
Future Levee + Pond

Incised channel formed by 5-yr flow

Reach ID	XS Id	Reach Length (ft)	Distance (ft)	Incised / Bankfull Q cfs	Regime Width Incised / Bankfull Width	Incised / Bankfull q cfs/ft	Hydr. Depth Depth in Incised Reach	Competent Veloc.(p. 38 USBR)	Design Q 100-yr	Actual Top Width Design Channel Width	Design Flow / Width	Hydr. Depth Average Depth	Average Velocity	D50 - mm	D85 - mm	D90 - mm	USBR - Lacey Z (p 36 USBR)	Neill Z (p. 36 USBR)	Blench Z (p. 36 USBR)	Blench "zero bed factor" (p35)
				Qi	Wi	qi	di	Vc	Q100		qf	dm	Vm				Zl	Zn	Zb	Fbo
	Along Levee																			ft/s^2
Lower Gila	198.65	329.78	5661.55	23500	900	26.11	4.48	3.9	227000	3159.87	71.84	9.88	8	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.7	262.59	5924.14	23500	900	26.11	4.86	3.9	227000	3098.71	73.26	10.81	7.56	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.76	255.86	6180	23500	900	26.11	4.76	3.9	227000	3066.51	74.03	10.74	7.7	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.8	292.67	6472.67	23500	900	26.11	4.96	3.9	227000	2812.15	80.72	10.28	7.36	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.83	223.34	6696.01	23500	900	26.11	5.07	3.9	227000	3076.99	73.77	11.01	7.56	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.88	175.6	6871.61	23500	900	26.11	4.96	3.9	227000	2937.85	77.27	11.67	6.59	8.5	28	33	0.25	0.5	0.6	3
Lower Gila	198.93	255.7	7127.31	23500	900	26.11	5.47	3.9	227000	2963.11	76.61	11.71	6.39	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	198.97	225.74	7353.05	23500	900	26.11	5.5	3.9	227000	2619.38	86.66	12.03	6.6	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	198.99	237.08	7590.13	23500	900	26.11	5.91	3.9	227000	2513.96	90.30	12.37	6.31	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.02	110.62	7700.75	23500	900	26.11	5.72	3.9	227000	2479.71	91.54	12.3	7.9	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.06	147.43	7848.18	23500	900	26.11	7.39	3.9	227000	2184.3	103.92	12.65	9.36	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.11	204.6	8052.78	23500	900	26.11	5.96	3.9	227000	2493.46	91.04	11.41	8.59	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.18	277	8329.78	23500	900	26.11	4.63	3.9	227000	2435.62	93.20	11.06	11.09	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.21	191.43	8521.21	23500	900	26.11	6.31	3.9	227000	2415	94.00	13.06	8.6	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.31	515.65	9036.86	23500	900	26.11	5.83	3.9	227000	2652.44	85.58	12.06	8.4	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.38	390.67	9427.53	23500	900	26.11	5.2	3.9	227000	2855.76	79.49	11.62	8.06	15	30	40	0.25	0.5	0.6	3.6
Lower Gila	199.47	439.22	7566.53	23500	900	26.11	5.24	3.9	227000	3042.92	74.60	12.72	6.6	15	30	40	0.25	0.5	0.6	3.6

Tres Rios PED
Future Levee + Pond

Incised channel formed by 5-yr flow

Reach ID	XS Id	Reach Length (ft)	Distance (ft)	Incised / Bankfull Q cfs	Regime Width Incised / Bankfull Width	Incised / Bankfull q cfs/ft	Hydr. Depth Depth in Incised Reach	Competent Veloc.(p. 38 USBR)	Design Q 100-yr	Actual Top Width Design Channel Width	Design Flow / Width	Hydr. Depth Average Depth	Average Velocity	D50 - mm	D85 - mm	D90 - mm	USBR - Lacey Z (p 36	Neill Z (p. 36 USBR)	Blench Z (p. 36 USBR)	Blench "zero bed factor"
				Qi	Wi	qi	di	Vc	Q100		qf	dm	Vm				Zl	Zn	Zb	Fbo
	Along Levee																			ft/s^2
Salt	199.55	440	440	19500	800	24.38	4.6	3.9	162000	2160.41	74.99	11.79	7.6	15	30	40	0.25	0.5	0.6	3.6
Salt	199.69	760.48	1200.48	19500	800	24.38	5.77	3.9	162000	2479.67	65.33	10.88	6.73	15	30	40	0.25	0.5	0.6	3.6
Salt	199.86	887.92	2088.4	19500	800	24.38	6.22	3.9	162000	2712.06	59.73	10.72	4.81	15	30	40	0.25	0.5	0.6	3.6
Salt	199.98	615.42	2703.82	19500	800	24.38	5.7	3.9	162000	2368.99	68.38	10.5	11.51	15	30	40	0.25	0.5	0.6	3.6
Salt	200.02	223.32	2927.14	19500	800	24.38	6.28	3.9	162000	2491.94	65.01	8.03	11.53	15	30	40	0.25	0.5	0.6	3.6
Salt	200.11	464.16	3391.3	19500	800	24.38	6.5	3.9	162000	2782	58.23	8.91	7.98	15	30	40	0.25	0.5	0.6	3.6
Salt	200.22	577.45	3968.75	19500	800	24.38	7.26	3.9	162000	3223	50.26	9.27	6.1	15	30	40	0.25	0.5	0.6	3.6
Salt	200.31	464.68	4433.43	19500	800	24.38	6.42	3.9	162000	3417.55	47.40	9.16	6.28	15	30	40	0.25	0.5	0.6	3.6
Salt	200.4	474.12	4907.55	19500	800	24.38	6.77	3.9	162000	3616.96	44.79	8.79	6.1	15	30	40	0.25	0.5	0.6	3.6
Salt	200.47	401.47	5309.02	19500	800	24.38	6.27	3.9	162000	3077.51	52.64	9.13	7.04	15	30	40	0.25	0.5	0.6	3.6
Salt	200.52	233.78	5542.8	19500	800	24.38	5.99	3.9	162000	3081.92	52.56	8.52	7.64	15	30	40	0.25	0.5	0.6	3.6
Salt	200.6	417.72	5960.52	19500	800	24.38	5.37	3.9	162000	3439.6	47.10	8.59	7.01	15	30	40	0.25	0.5	0.6	3.6
Salt	200.68	430.96	6391.48	19500	800	24.38	3.67	3.9	162000	3437.83	47.12	8.79	6.98	15	30	40	0.25	0.5	0.6	3.6
Salt	200.75	386.75	6778.23	19500	800	24.38	3.49	3.9	162000	3587.7	45.15	8.31	7.45	15	30	40	0.25	0.5	0.6	3.6
Salt	200.83	399.16	7177.39	19500	800	24.38	5.04	3.9	162000	3832.4	42.27	8.16	6.51	15	30	40	0.25	0.5	0.6	3.6
Salt	200.88	292.47	7469.86	19500	800	24.38	4.52	3.9	162000	3772.66	42.94	8.08	6.18	15	30	40	0.25	0.5	0.6	3.6
Salt	200.95	362.23	7832.09	19500	800	24.38	4.07	3.9	162000	3660.9	44.25	8.08	6.5	15	30	40	0.25	0.5	0.6	3.6
Salt	201.01	329.07	8161.16	19500	800	24.38	3.93	3.9	162000	3664.81	44.20	7.5	10.72	15	30	40	0.25	0.5	0.6	3.6
Salt	201.1	468.21	8629.37	19500	800	24.38	3.16	3.9	162000	3850.27	42.07	7.64	12.49	15	30	40	0.25	0.5	0.6	3.6
Salt	201.16	294.85	8924.22	19500	800	24.38	4.27	3.9	162000	3682.17	44.00	8.01	9.34	15	30	40	0.25	0.5	0.6	3.6
Salt	201.2	229.67	9153.89	19500	800	24.38	4.1	3.9	162000	3654.83	44.32	7.8	8.26	15	30	40	0.25	0.5	0.6	3.6
Salt	201.26	337.88	9491.77	19500	800	24.38	3.79	3.9	162000	3461.28	46.80	8.27	11.12	15	30	40	0.25	0.5	0.6	3.6
Salt	201.33	348.28	9840.05	19500	800	24.38	3.72	3.9	162000	3347.45	48.40	9.52	8.43	15	30	40	0.25	0.5	0.6	3.6
Salt	201.41	419.68	10259.73	19500	800	24.38	4.76	3.9	162000	3342.6	48.47	10.37	7.34	15	30	40	0.25	0.5	0.6	3.6
Salt	201.48	358.13	10617.86	19500	800	24.38	5.36	3.9	162000	3289.38	49.25	10.77	6.95	15	30	40	0.25	0.5	0.6	3.6
Salt	201.54	350.25	10968.11	19500	800	24.38	5.58	3.9	162000	3132.16	51.72	10.53	7.12	15	50	60	0.25	0.5	0.6	3.6
Salt	201.62	390.05	11358.16	19500	800	24.38	6.01	3.9	162000	3218.9	50.33	10.29	8.4	15	50	60	0.25	0.5	0.6	3.6
Salt	201.7	434.66	11792.82	19500	800	24.38	5.63	3.9	162000	3329.37	48.66	8.78	8.55	15	50	60	0.25	0.5	0.6	3.6
Salt	201.81	574.27	12367.09	19500	800	24.38	6.83	3.9	162000	2949.16	54.93	9.74	7.81	15	50	60	0.25	0.5	0.6	3.6
Salt	201.89	397.68	12764.77	19500	800	24.38	6.06	3.9	162000	2739.5	59.13	8.96	7.55	15	50	60	0.25	0.5	0.6	3.6
Salt	201.96	376.25	13141.02	19500	800	24.38	5.77	3.9	162000	2989.85	54.18	7.65	8.14	15	50	60	0.25	0.5	0.6	3.6
Salt	202.01	238.04	13379.06	19500	800	24.38	6.07	3.9	162000	2749.19	58.93	8.02	8.68	15	50	60	0.25	0.5	0.6	3.6
Salt	202.06	274.55	13653.61	19500	800	24.38	5.47	3.9	162000	2888.67	56.08	8.38	8.95	15	50	60	0.25	0.5	0.6	3.6
Salt	202.11	252.79	13906.4	19500	800	24.38	5.72	3.9	162000	3762.29	43.06	6.4	10.05	15	50	60	0.25	0.5	0.6	3.6
Salt	202.18	357.97	14264.37	19500	800	24.38	6.25	3.9	162000	3790.02	42.74	5.81	11.3	15	50	60	0.25	0.5	0.6	3.6
Salt	202.24	343.68	14608.05	19500	800	24.38	4.81	3.9	162000	3966.28	40.84	5.5	10	15	50	60	0.25	0.5	0.6	3.6
Salt	202.32	401.28	0	19500	800	24.38	4.27	3.9	162000	4254.39	38.08	6.64	8.19	15	50	60	0.25	0.5	0.6	3.6

Tres Rios PED
Future Levee + Pond

If Value > 0 Use this Formula in Calculating Average

Reach ID	XS Id	Neill - Incised	Neill - Competent Velocity	USBR - D90 Method	Lacey	Blench - Zero Bed Factor	Abbot - SW Streams	Blodgett	Average	Like Value Average (LVA)	130% of Average (LVA)	RAS Thalweg Elevation	HEC-6T 105-year Thalweg
		1		1	1	1	1						
												ft	ft
	Along Levee												
Lower Gila	196.81	5.4	5.8	2.8	4.2	6.0	6.4	9.7	5.7	4.9	6.4	906.4	905.21
Lower Gila	196.87	4.9	7.4	2.6	4.2	6.0	6.5	9.7	5.9	4.8	6.3	906.4	905.56
Lower Gila	196.94	4.8	5.6	2.6	4.2	6.0	6.4	9.7	5.6	4.8	6.2	906.4	905.92
Lower Gila	196.99	4.4	3.5	2.5	4.2	5.9	6.4	9.7	5.2	4.7	6.1	906.4	905.4
Lower Gila	197.05	4.6	5.4	2.7	4.2	6.0	6.4	9.7	5.6	4.8	6.2	908.12	906.78
Lower Gila	197.09	4.5	6.5	2.7	4.2	5.8	6.4	9.7	5.7	4.7	6.1	908.08	906.76
Lower Gila	197.14	4.5	5.9	2.3	4.2	5.7	6.4	9.7	5.5	4.6	6.0	909.26	907.31
Lower Gila	197.16	4.5	8.8	2.3	4.2	5.6	6.3	9.7	5.9	4.6	6.0	909.8	907.39
Lower Gila	197.18	4.3	7.6	2.3	4.2	5.5	6.3	9.7	5.7	4.5	5.9	910.95	908.63
Lower Gila	197.23	3.5	6.5	2.2	4.2	5.3	6.2	9.7	5.4	4.3	5.6	910.88	909.14
Lower Gila	197.28	5.2	6.5	2.3	4.2	5.5	6.2	9.7	5.7	4.7	6.1	910.5	909.82
Lower Gila	197.33	4.0	6.6	2.3	4.2	5.7	6.3	9.6	5.5	4.5	5.8	911.65	910.23
Lower Gila	197.38	3.4	3.6	2.2	4.2	5.7	6.3	9.6	5.0	4.3	5.6	911.9	910.53
Lower Gila	197.42	3.4	4.4	2.3	4.2	5.8	6.3	9.6	5.1	4.4	5.7	911.9	910.51
Lower Gila	197.48	3.4	5.5	2.4	4.2	5.9	6.4	9.6	5.3	4.4	5.8	911.9	910.36
Lower Gila	197.53	4.3	7.7	2.3	4.2	5.8	6.3	9.6	5.7	4.6	5.9	911.9	910.68
Lower Gila	197.58	4.6	10.5	1.9	4.2	5.7	6.3	9.6	6.1	4.5	5.9	911.9	910.97
Lower Gila	197.64	5.4	8.2	2.0	4.2	5.7	6.3	9.6	5.9	4.7	6.1	911.9	911.23
Lower Gila	197.7	4.9	8.5	1.9	4.2	5.6	6.2	9.6	5.8	4.6	5.9	911.9	911.15
Lower Gila	197.75	5.1	6.8	2.0	4.2	5.6	6.3	9.6	5.7	4.6	6.0	911.9	911.61
Lower Gila	197.81	4.6	7.8	2.0	4.2	5.9	6.4	9.6	5.8	4.6	6.0	912.13	911.8
Lower Gila	197.87	4.9	10.5	2.0	4.2	6.1	6.4	9.6	6.3	4.7	6.2	912.14	912.04
Lower Gila	197.92	5.4	11.3	2.3	4.2	6.2	6.5	9.6	6.5	4.9	6.4	912.14	912.39
Lower Gila	197.95	5.1	10.4	2.1	4.2	6.1	6.5	9.6	6.3	4.8	6.2	912.14	912.7
Lower Gila	197.98	3.3	13.6	2.1	4.2	6.2	6.5	9.6	6.5	4.4	5.8	915.6	912.18
Lower Gila	198.03	4.0	12.6	2.4	4.2	6.3	6.5	9.6	6.5	4.6	6.0	917.47	913.6
Lower Gila	198.08	4.3	10.7	2.2	4.2	6.4	6.6	9.6	6.3	4.7	6.1	917.9	913.97
Lower Gila	198.15	3.7	5.3	2.5	4.2	6.6	6.6	9.6	5.5	4.7	6.1	918.06	914.23
Lower Gila	198.2	4.4	6.6	2.4	4.2	6.8	6.7	9.6	5.8	4.9	6.3	917.83	914.32
Lower Gila	198.26	4.9	10.2	2.3	4.2	7.0	6.8	9.6	6.4	5.0	6.5	919.07	914.93
Lower Gila	198.33	5.4	11.8	2.0	4.2	7.1	6.8	9.6	6.7	5.1	6.6	920.97	916.27
Lower Gila	198.4	5.7	11.6	1.8	4.2	7.4	6.9	9.6	6.7	5.2	6.7	922.23	917.97
Lower Gila	198.45	5.7	10.2	2.1	4.2	7.0	6.8	9.6	6.5	5.1	6.7	922.19	918.7
Lower Gila	198.49	5.9	10.5	2.3	4.2	7.0	6.8	9.6	6.6	5.2	6.8	922.46	919.19
Lower Gila	198.54	5.6	10.7	2.3	4.2	7.1	6.8	9.6	6.6	5.2	6.7	922.67	919.1
Lower Gila	198.6	5.0	10.9	2.3	4.2	7.1	6.8	9.6	6.6	5.1	6.6	923.3	919.79

Tres Rios PED
Future Levee + Pond

If Value > 0 Use this Formula in Calculating Average

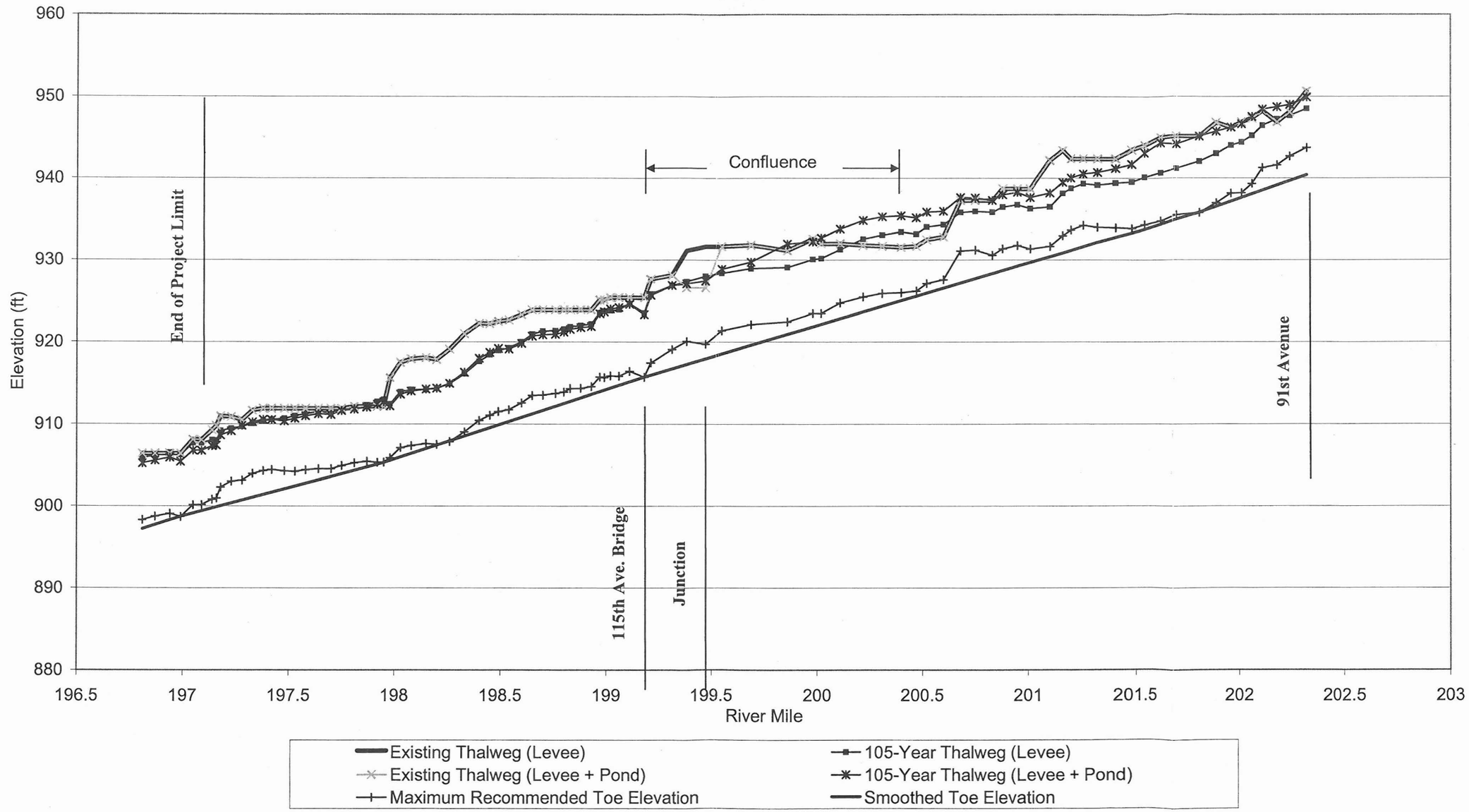
Reach ID	XS Id	Neill - Incised	Neill - Competent Velocity	USBR - D90 Method	Lacey	Blench - Zero Bed Factor	Abbot - SW Streams	Blodgett	Average	Like Value Average (LVA)	130% of Average (LVA)	RAS Thalweg Elevation	HEC-6T 105-year Thalweg
		1		1	1	1	1						
												ft	ft
	Along Levee												
Lower Gila	198.65	5.0	10.4	2.5	4.2	7.2	6.8	9.6	6.5	5.1	6.7	923.88	920.68
Lower Gila	198.7	5.5	10.1	2.7	4.2	7.3	6.9	9.6	6.6	5.3	6.9	923.9	920.86
Lower Gila	198.76	5.5	10.5	2.7	4.2	7.3	6.9	9.6	6.7	5.3	6.9	923.9	920.93
Lower Gila	198.8	6.1	9.1	2.6	4.2	7.8	7.0	9.6	6.6	5.5	7.2	923.9	921.17
Lower Gila	198.83	5.8	10.3	2.8	4.2	7.3	6.9	9.6	6.7	5.4	7.0	923.9	921.51
Lower Gila	198.88	5.9	8.0	2.9	4.2	7.5	7.0	9.6	6.5	5.5	7.1	923.9	921.72
Lower Gila	198.93	6.5	7.5	2.9	3.8	7.1	6.9	9.1	6.2	5.4	7.1	923.9	921.85
Lower Gila	198.97	7.2	8.3	3.0	3.8	7.7	7.1	9.1	6.6	5.8	7.5	925.1	923.42
Lower Gila	198.99	8.0	7.6	3.1	3.8	7.9	7.2	9.1	6.7	6.0	7.8	925.1	923.65
Lower Gila	199.02	7.8	12.6	3.1	3.8	8.0	7.2	9.1	7.4	6.0	7.8	925.4	924
Lower Gila	199.06	11.2	17.7	3.2	3.8	8.7	7.5	9.1	8.7	6.8	8.9	925.4	924.18
Lower Gila	199.11	8.1	13.7	2.9	3.8	7.9	7.2	9.1	7.5	6.0	7.8	925.4	924.56
Lower Gila	199.18	6.4	20.4	2.8	3.8	8.0	7.3	9.1	8.2	5.7	7.4	925.4	923.31
Lower Gila	199.21	8.8	15.7	3.3	3.8	8.1	7.3	9.1	8.0	6.2	8.1	927.64	925.67
Lower Gila	199.31	7.5	13.9	3.0	3.8	7.6	7.1	9.1	7.4	5.8	7.6	928.11	926.88
Lower Gila	199.38	6.3	12.4	2.9	3.8	7.2	7.0	9.1	7.0	5.5	7.1	926.6	927.08
Lower Gila	199.47	6.1	8.8	3.2	3.8	6.9	6.9	9.1	6.4	5.4	7.0	926.6	927.43

Tres Rios PED
Future Levee + Pond

If Value > 0 Use this Formula in Calculating Average

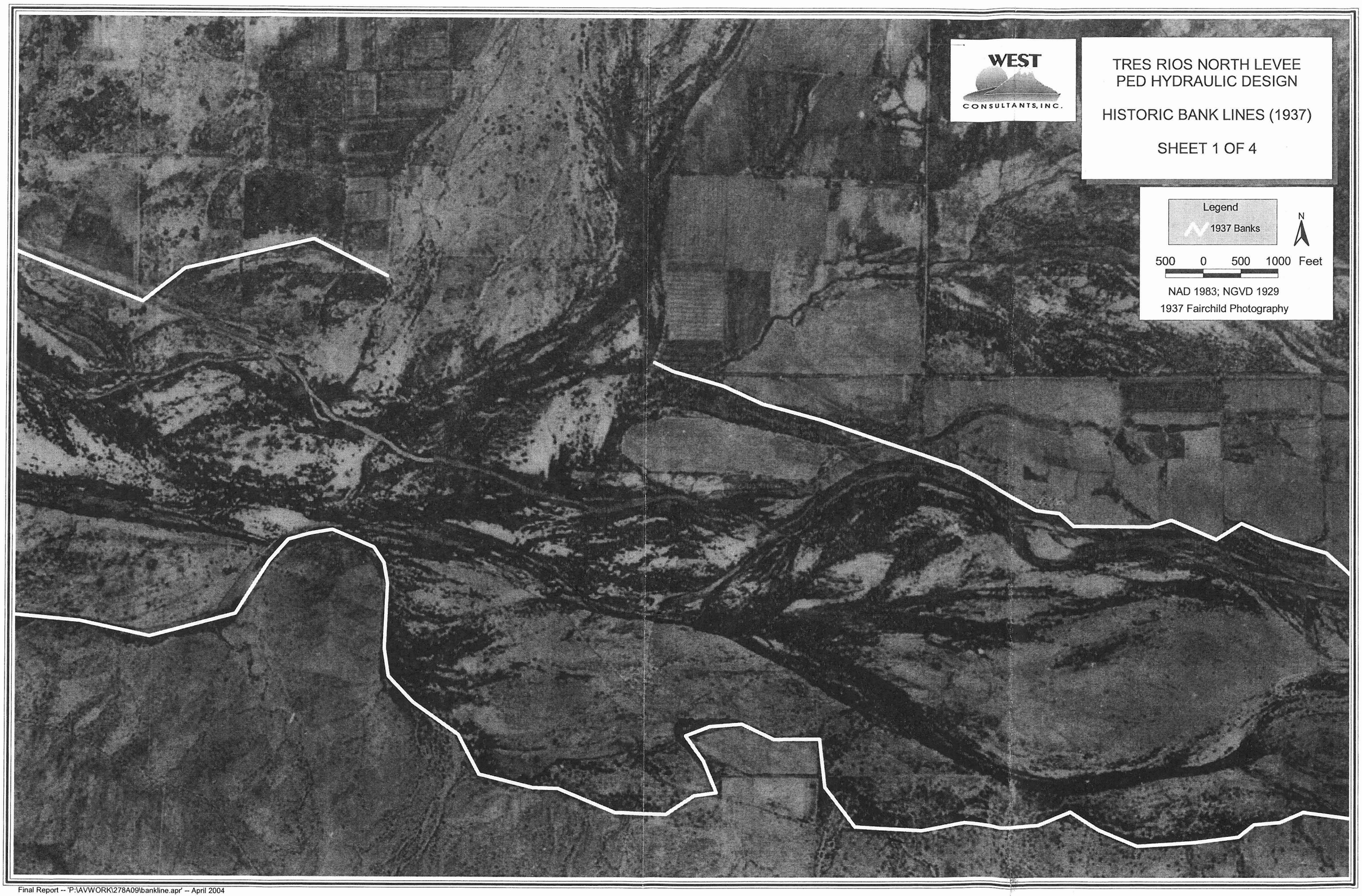
Reach ID	XS Id	Neill - Incised	Neill - Competent Velocity	USBR - D90 Method	Lacey	Blench - Zero Bed Factor	Abbot - SW Streams	Blodgett	Average	Like Value Average (LVA)	130% of Average (LVA)	RAS Thalweg Elevation	HEC-6T 105-year Thalweg
		1		1	1	1	1						
												ft	ft
	Along Levee												
Salt	199.55	5.7	11.2	2.9	3.4	7.0	6.9	9.1	6.6	5.2	6.7	931.65	928.88
Salt	199.69	6.3	7.9	2.7	3.4	6.4	6.7	9.1	6.1	5.1	6.6	931.79	929.72
Salt	199.86	6.4	2.5	2.7	3.4	6.0	6.5	9.1	5.2	5.0	6.5	931.12	931.93
Salt	199.98	6.5	20.5	2.6	3.4	6.5	6.8	9.1	7.9	5.2	6.7	932.56	932.2
Salt	200.02	6.9	15.7	2.0	3.4	6.3	6.7	9.1	7.1	5.1	6.6	931.98	932.66
Salt	200.11	6.5	9.3	2.2	3.4	5.9	6.5	9.1	6.1	4.9	6.4	931.98	933.77
Salt	200.22	6.5	5.2	2.3	3.4	5.3	6.3	9.1	5.4	4.8	6.2	931.78	934.84
Salt	200.31	5.5	5.6	2.3	3.4	5.1	6.2	9.1	5.3	4.5	5.8	931.67	935.27
Salt	200.4	5.5	5.0	2.2	3.4	4.9	6.1	9.1	5.2	4.4	5.8	931.55	935.4
Salt	200.47	5.8	7.4	2.3	3.4	5.5	6.3	9.1	5.7	4.7	6.1	931.67	935.15
Salt	200.52	5.5	8.2	2.1	3.4	5.5	6.3	9.1	5.7	4.6	5.9	932.45	935.86
Salt	200.6	4.5	6.8	2.1	3.4	5.1	6.2	9.1	5.3	4.3	5.6	932.82	935.95
Salt	200.68	3.1	6.9	2.2	3.4	5.1	6.2	9.1	5.1	4.0	5.2	937.28	937.64
Salt	200.75	2.9	7.6	2.1	3.4	5.0	6.1	9.1	5.1	3.9	5.0	937.28	937.58
Salt	200.83	3.9	5.5	2.0	3.4	4.8	6.0	9.1	4.9	4.0	5.2	937.28	937.28
Salt	200.88	3.6	4.7	2.0	3.4	4.8	6.0	9.1	4.8	4.0	5.1	938.71	937.96
Salt	200.95	3.3	5.4	2.0	3.4	4.9	6.1	9.1	4.9	3.9	5.1	938.69	938.27
Salt	201.01	3.2	13.1	1.9	3.4	4.9	6.1	9.1	5.9	3.9	5.0	938.69	937.63
Salt	201.1	2.4	16.8	1.9	3.4	4.7	6.0	9.1	6.3	3.7	4.8	942.17	938.19
Salt	201.16	3.4	11.2	2.0	3.4	4.9	6.1	9.1	5.7	4.0	5.1	943.39	939.5
Salt	201.2	3.3	8.7	2.0	3.4	4.9	6.1	9.1	5.3	3.9	5.1	942.38	940.03
Salt	201.26	3.2	15.3	2.1	3.4	5.1	6.2	9.1	6.3	4.0	5.2	942.38	940.51
Salt	201.33	3.2	11.1	2.4	3.4	5.2	6.2	9.1	5.8	4.1	5.3	942.38	940.7
Salt	201.41	4.1	9.1	2.6	3.4	5.2	6.2	9.1	5.7	4.3	5.6	942.38	941.2
Salt	201.48	4.7	8.4	2.7	3.4	5.3	6.2	9.1	5.7	4.5	5.8	943.46	941.7
Salt	201.54	5.1	8.7	2.6	3.4	5.4	6.3	9.1	5.8	4.6	5.9	944.01	943.1
Salt	201.62	5.4	11.9	2.6	3.4	5.3	6.3	9.1	6.3	4.6	6.0	944.97	944.31
Salt	201.7	4.9	10.5	2.2	3.4	5.2	6.2	9.1	5.9	4.4	5.7	945.11	944.15
Salt	201.81	6.5	9.8	2.4	3.4	5.7	6.4	9.1	6.2	4.9	6.3	945.11	945.11
Salt	201.89	6.2	8.4	2.2	3.4	5.9	6.5	9.1	6.0	4.8	6.3	946.82	945.73
Salt	201.96	5.5	8.3	1.9	3.4	5.6	6.4	9.1	5.7	4.5	5.9	946.2	946.22
Salt	202.01	6.1	9.8	2.0	3.4	5.9	6.5	9.1	6.1	4.8	6.2	946.85	946.62
Salt	202.06	5.3	10.9	2.1	3.4	5.7	6.4	9.1	6.1	4.6	6.0	947.33	947.51
Salt	202.11	4.5	10.1	1.6	3.4	4.8	6.0	9.1	5.6	4.1	5.3	948.26	948.45
Salt	202.18	4.9	11.0	1.5	3.4	4.8	6.0	9.1	5.8	4.1	5.3	946.86	948.72
Salt	202.24	3.6	8.6	1.4	3.4	4.6	6.0	9.1	5.2	3.8	4.9	948.09	949
Salt	202.32	3.1	7.3	1.7	3.4	4.4	5.9	9.1	5.0	3.7	4.8	950.65	949.91

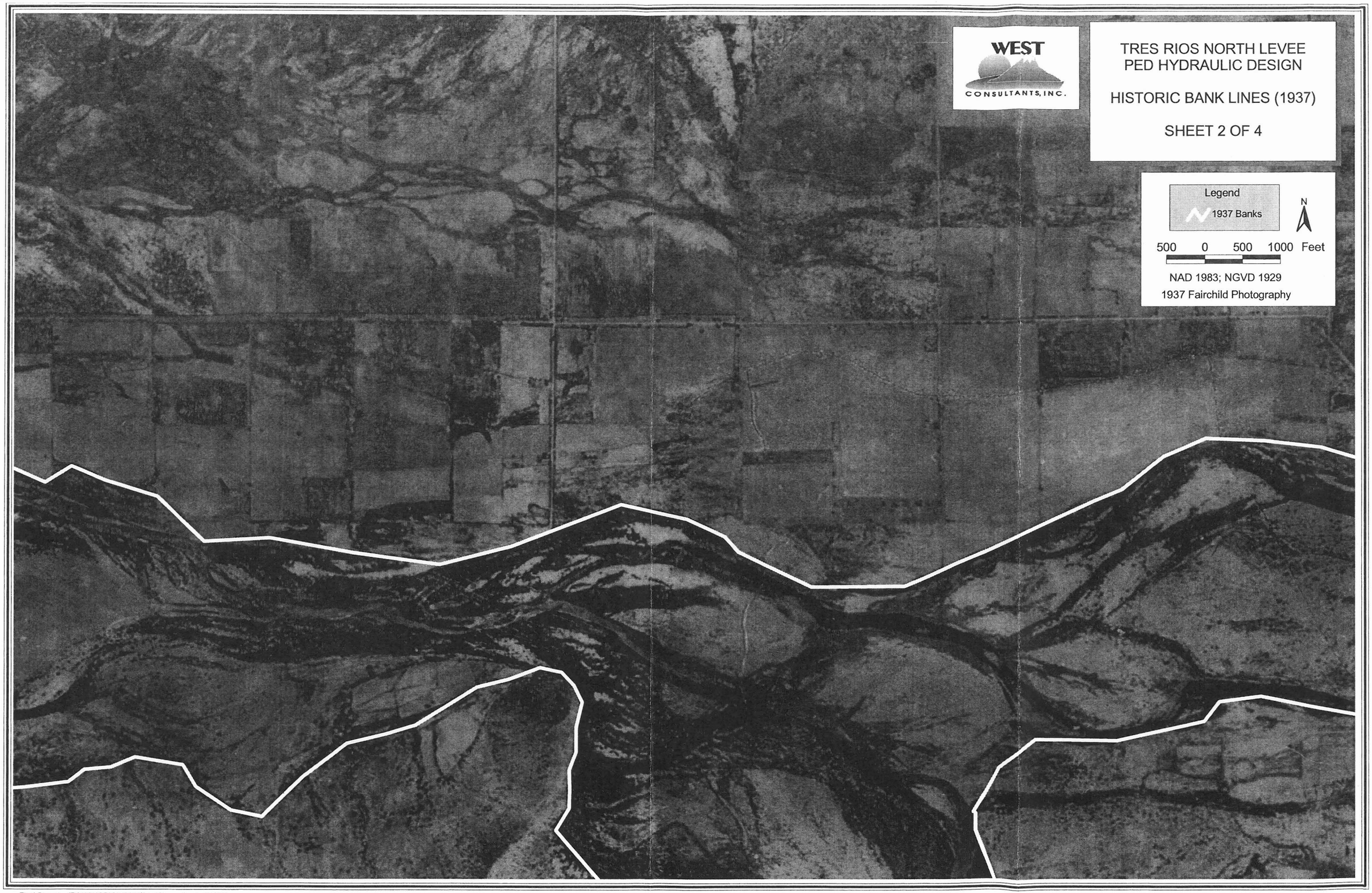
Maximum Recommended Toe & Thalweg Elevations Along Proposed Levee

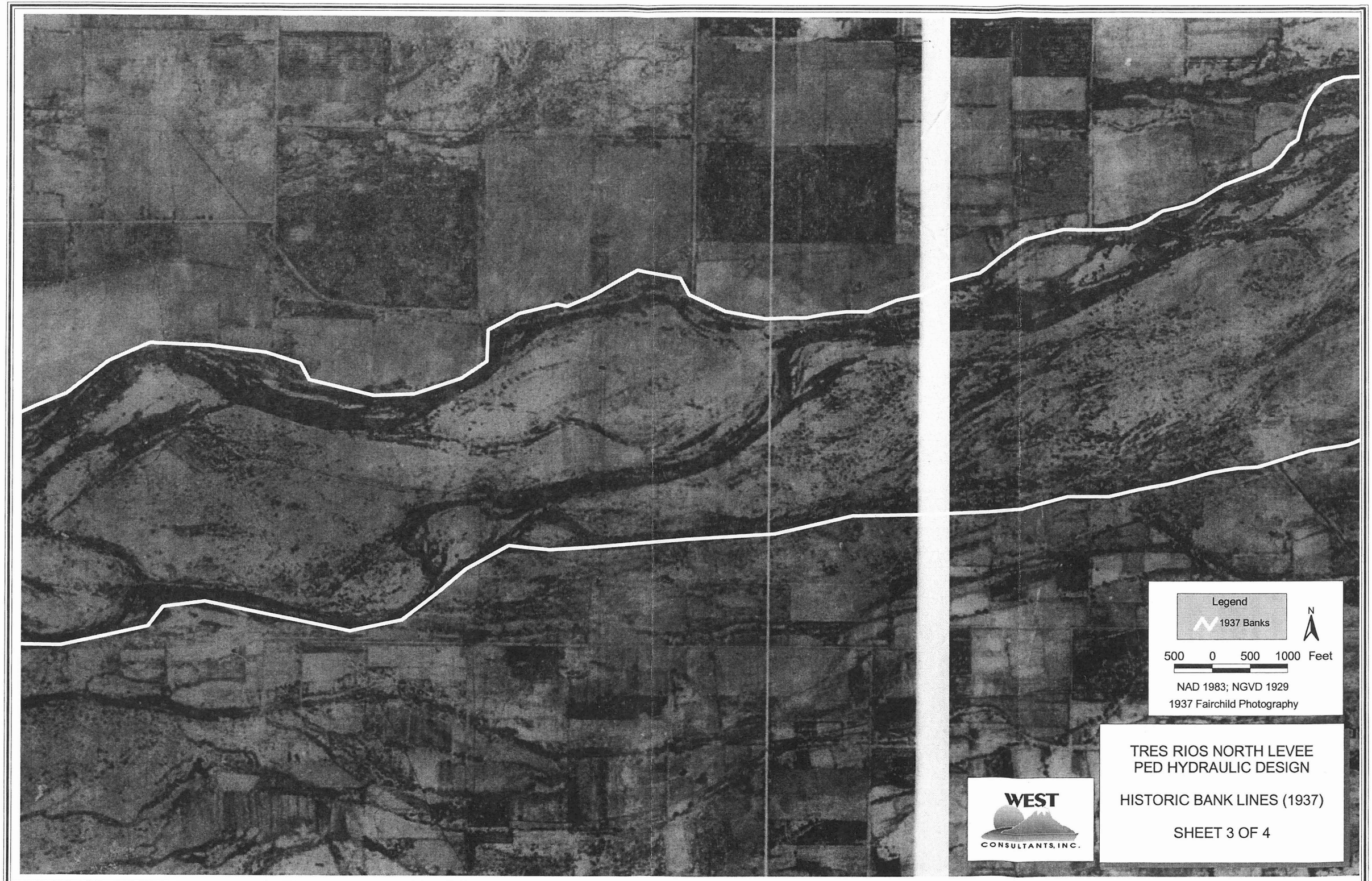


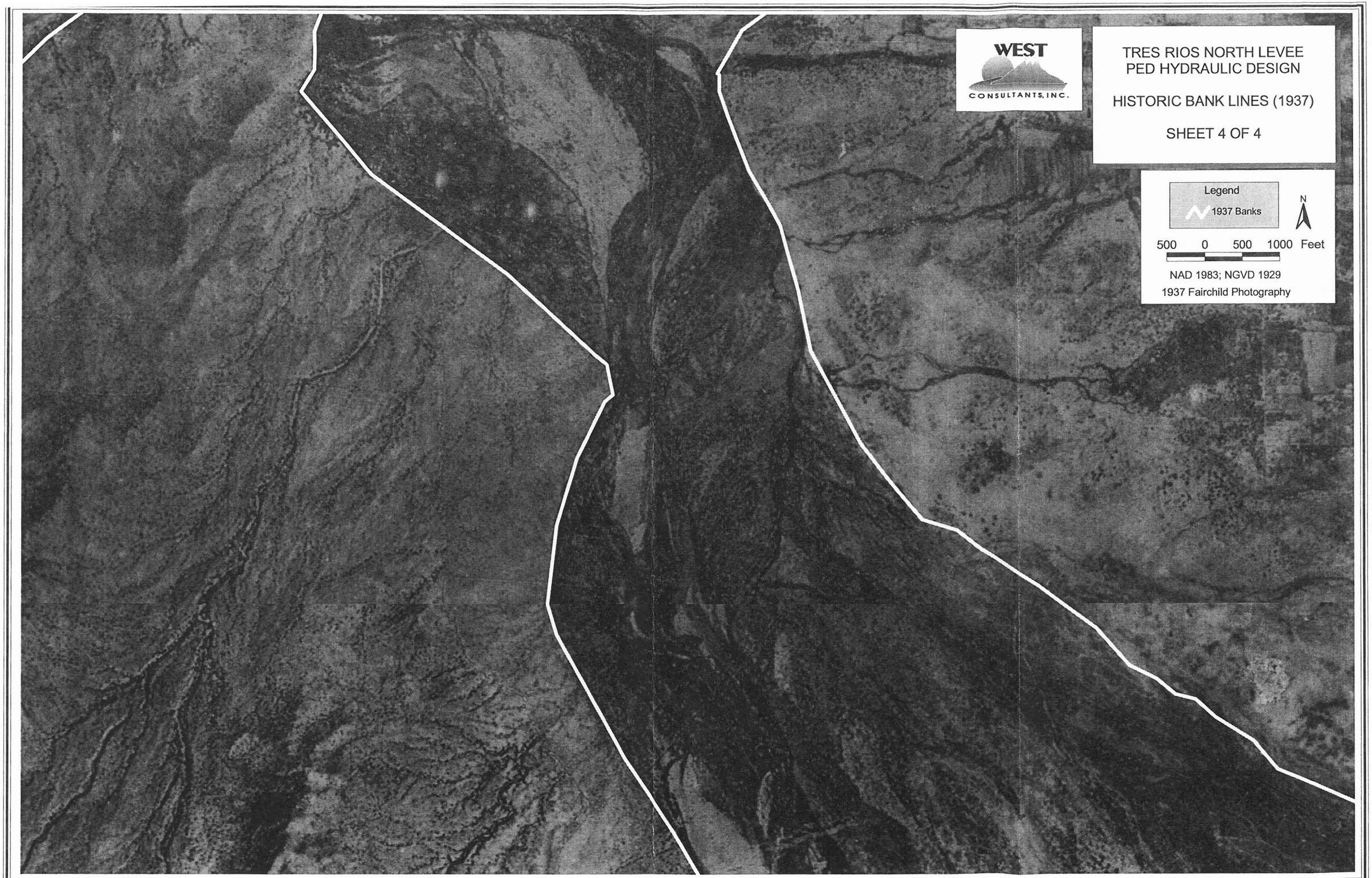
APPENDIX N

Historic Aerial Photos and Bank Lines


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1937)
SHEET 1 OF 4
Legend
1937 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1937 Fairchild Photography


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1937)
SHEET 2 OF 4
Legend
1937 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1937 Fairchild Photography


Legend
1937 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1937 Fairchild Photography
WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1937)
SHEET 3 OF 4


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1937)
SHEET 4 OF 4
Legend
1937 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1937 Fairchild Photography

WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1958)

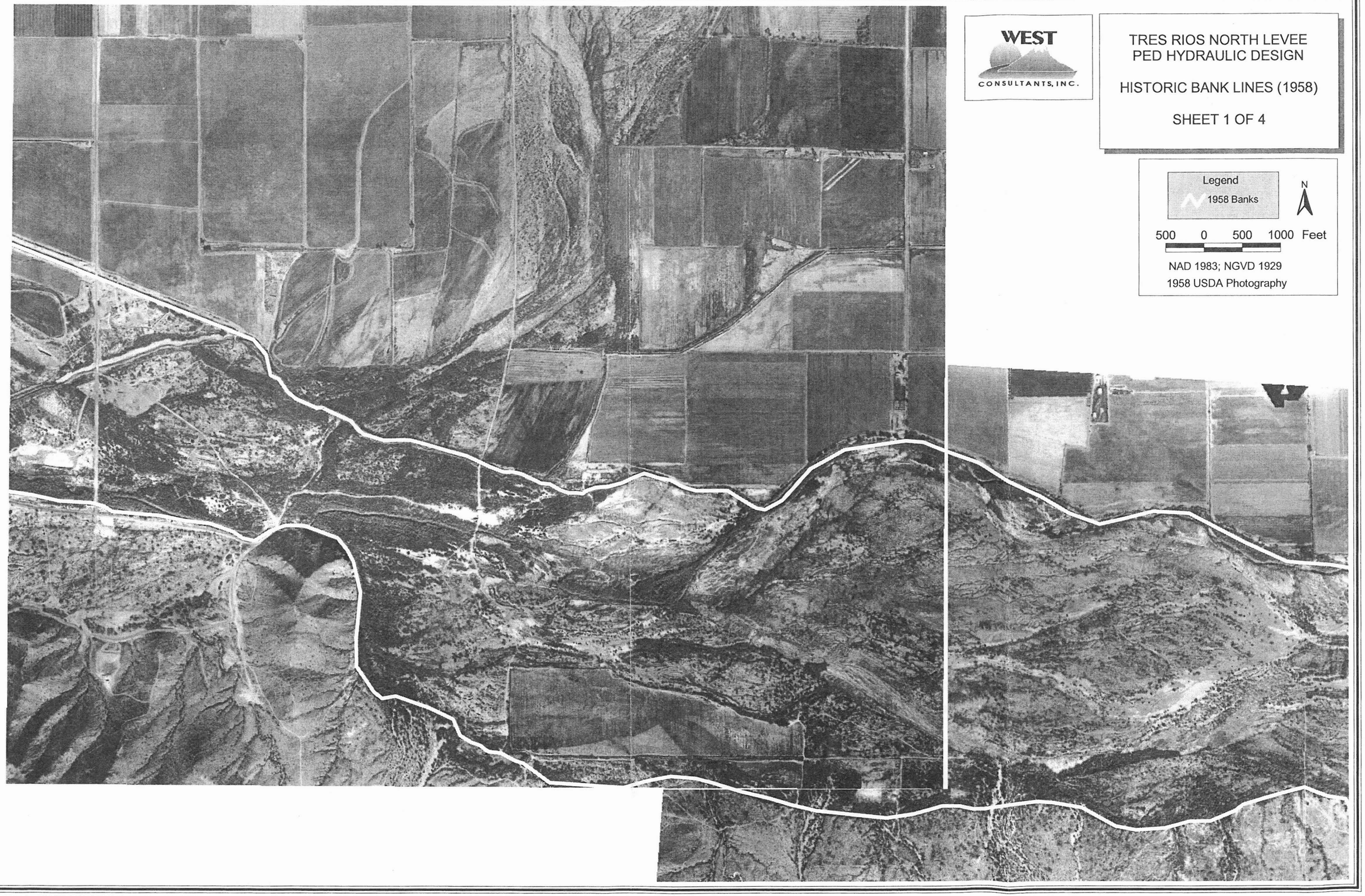
SHEET 1 OF 4

Legend
1958 Banks

N

500 0 500 1000 Feet

NAD 1983; NGVD 1929
1958 USDA Photography

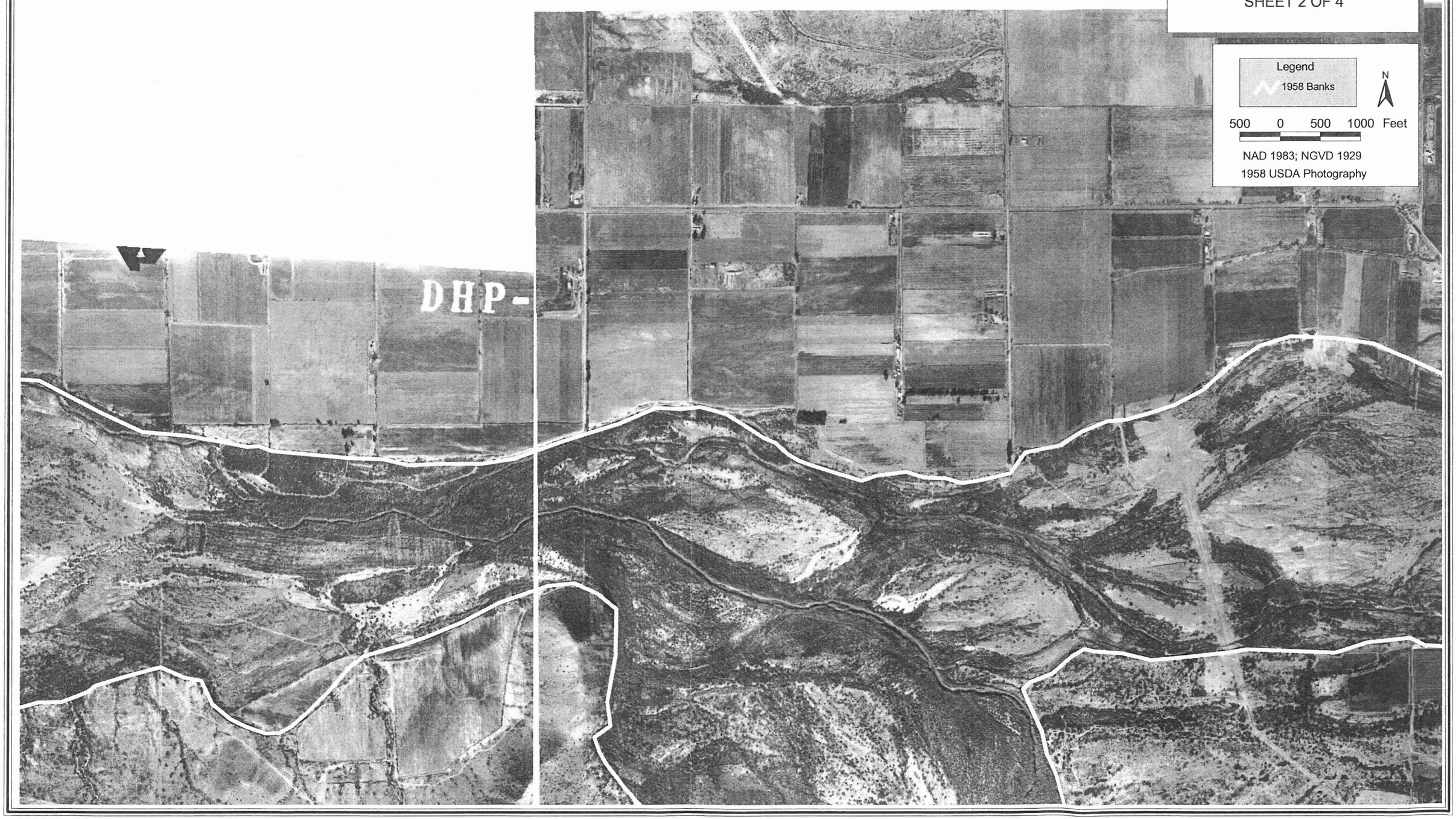


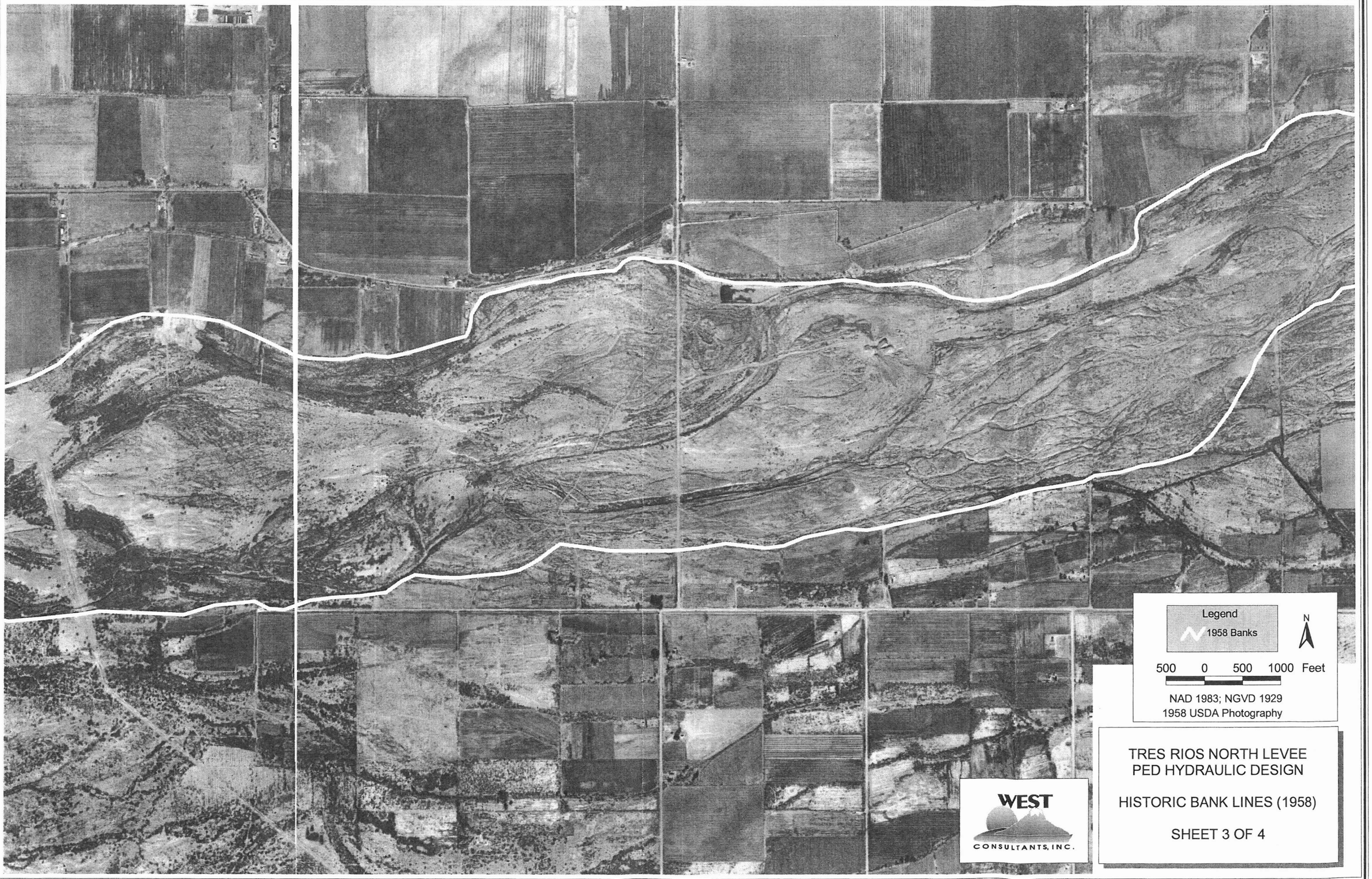
WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1958)

SHEET 2 OF 4





TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1958)

SHEET 3 OF 4

WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1958)

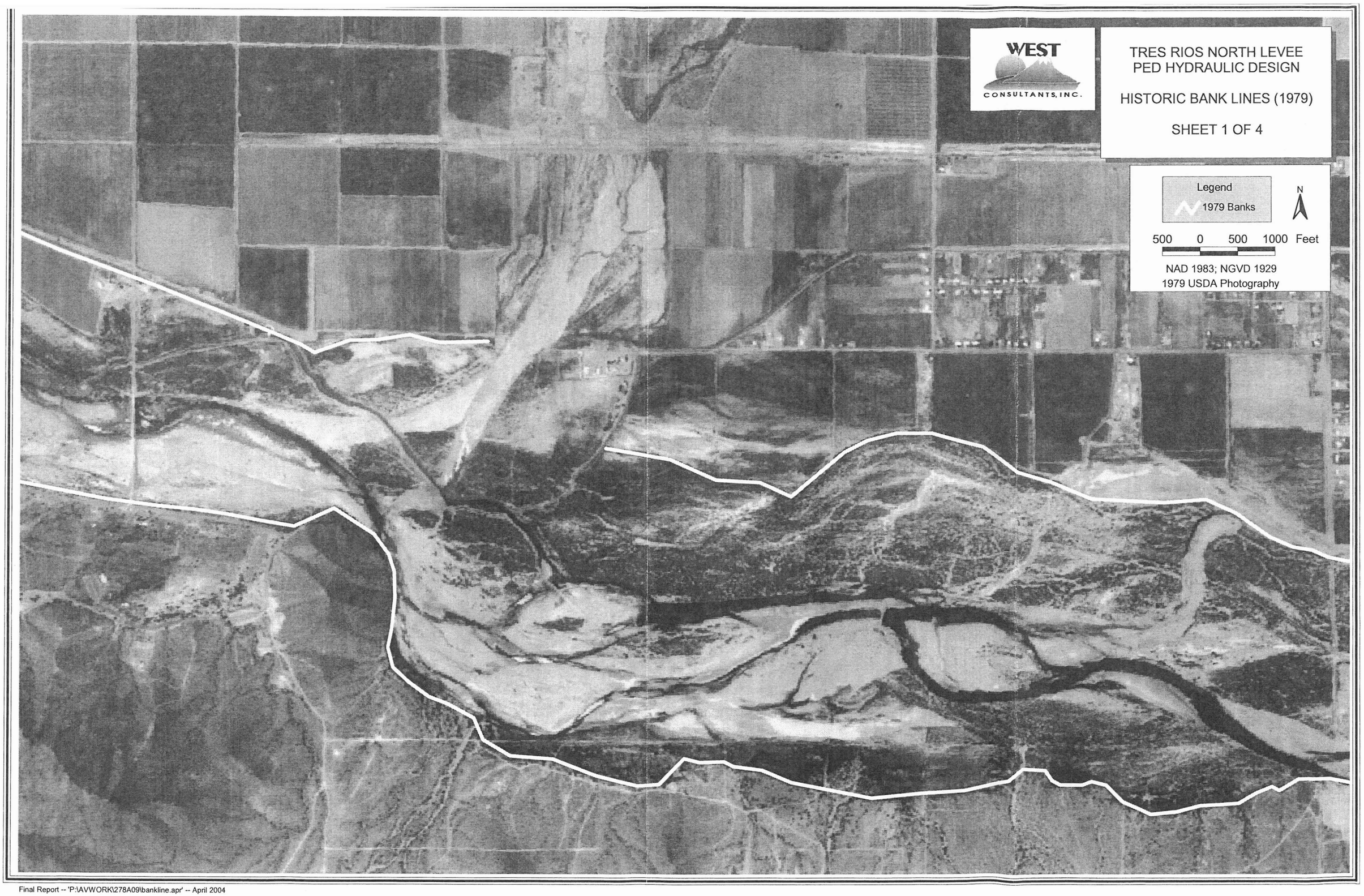
SHEET 4 OF 4

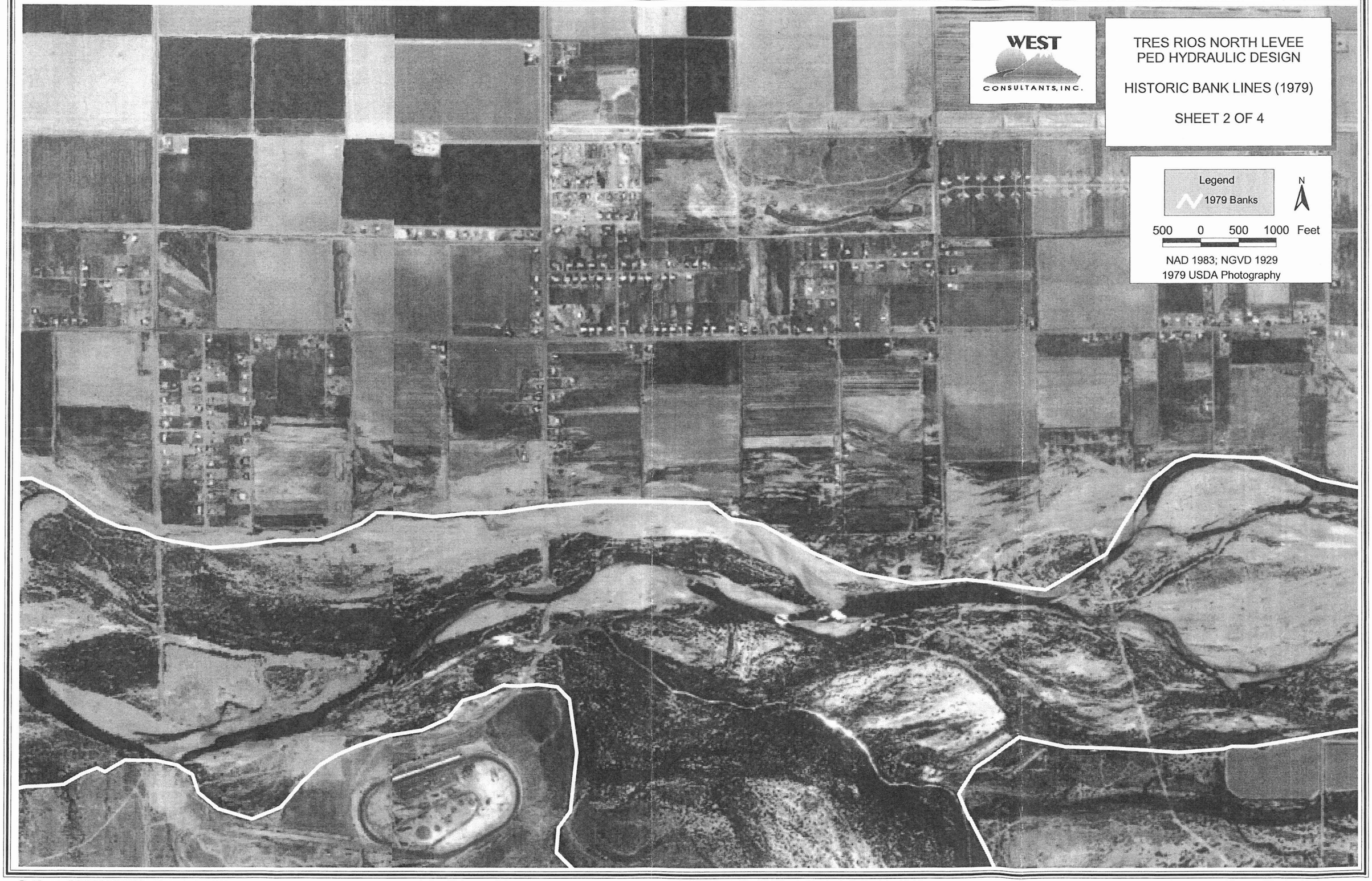
Legend
1958 Banks

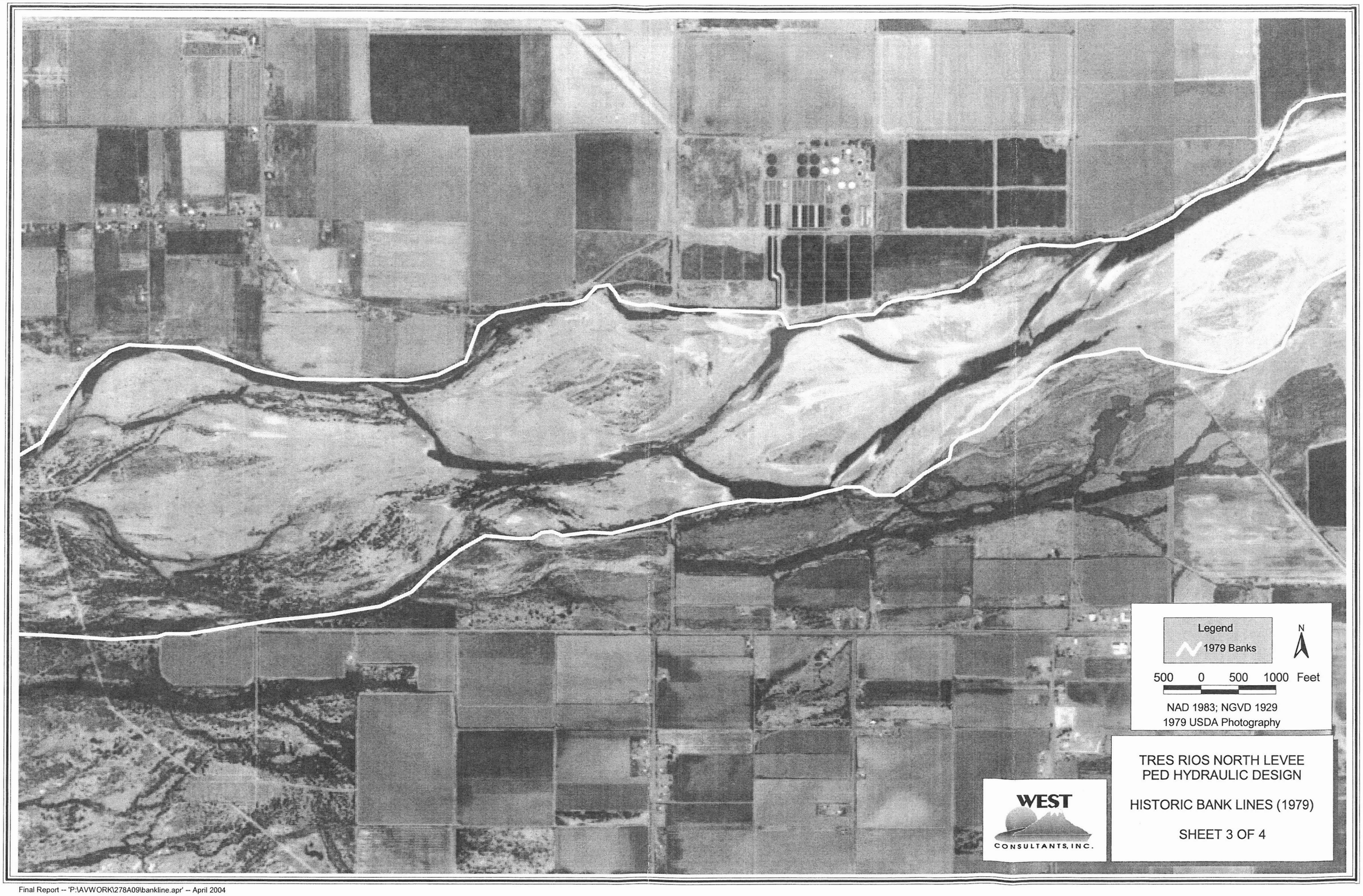
N

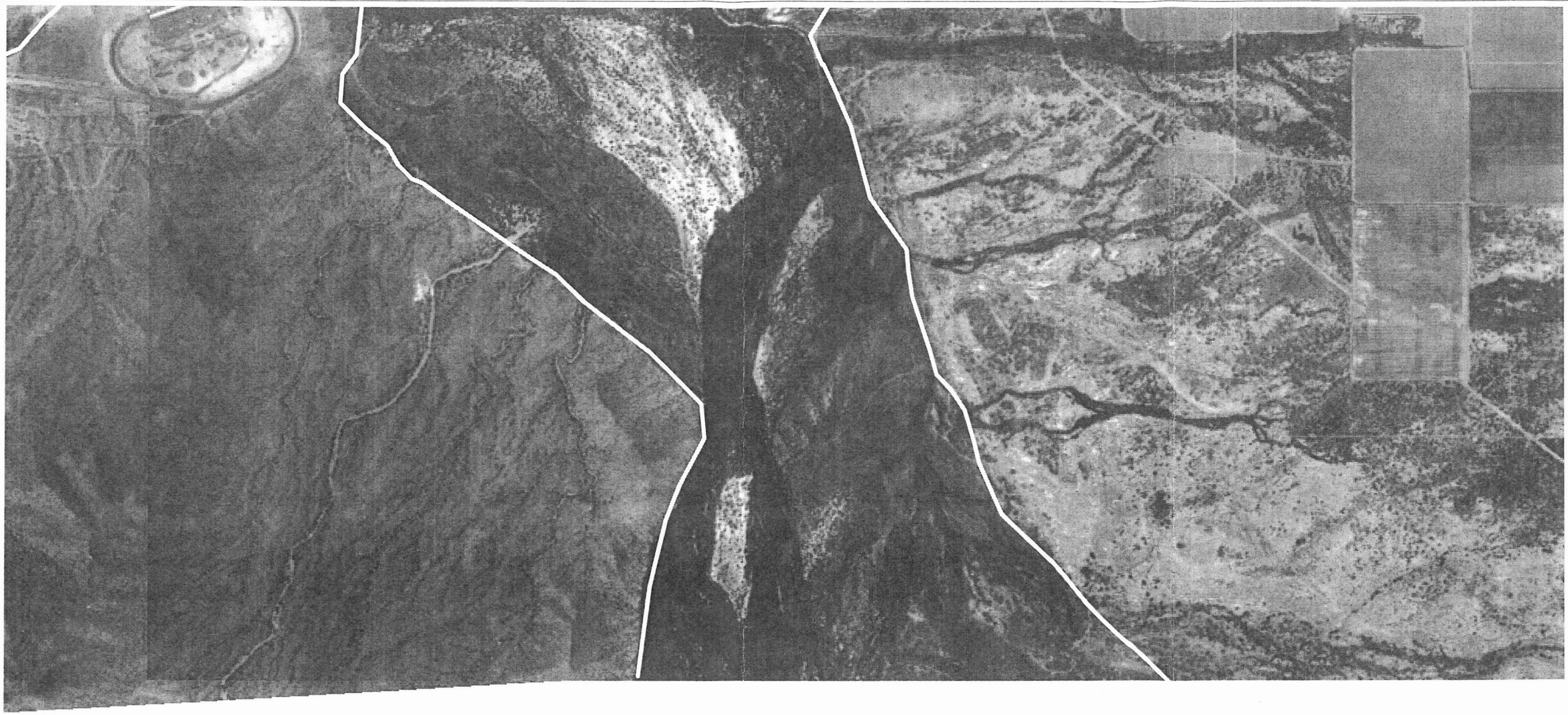
500 0 500 1000 Feet

NAD 1983; NGVD 1929
1958 USDA Photography


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1979)
SHEET 1 OF 4
Legend
1979 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1979 USDA Photography


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1979)
SHEET 2 OF 4
Legend
1979 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1979 USDA Photography


Legend
1979 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1979 USDA Photography
WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1979)
SHEET 3 OF 4



WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1979)

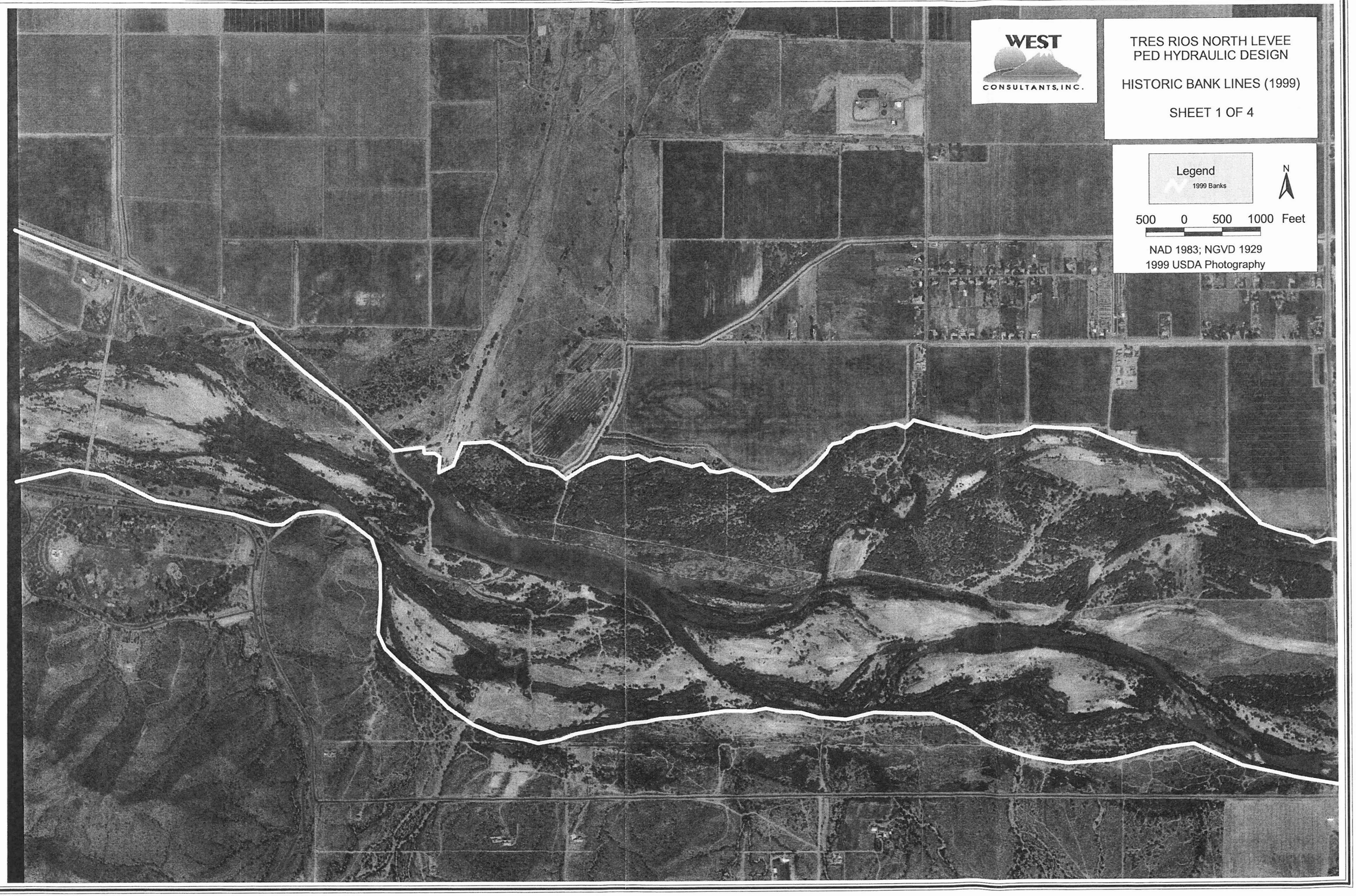
SHEET 4 OF 4

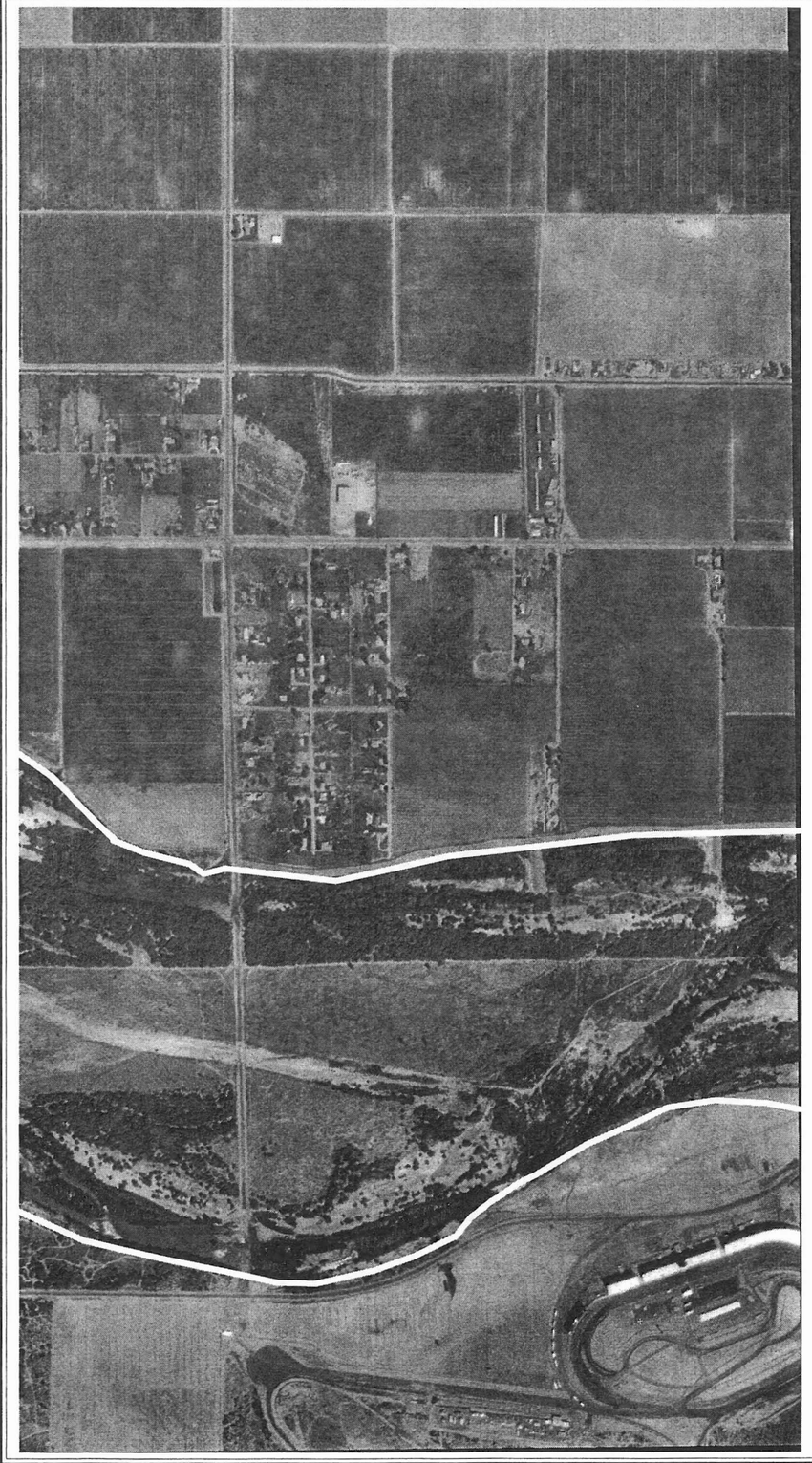
Legend
1979 Banks

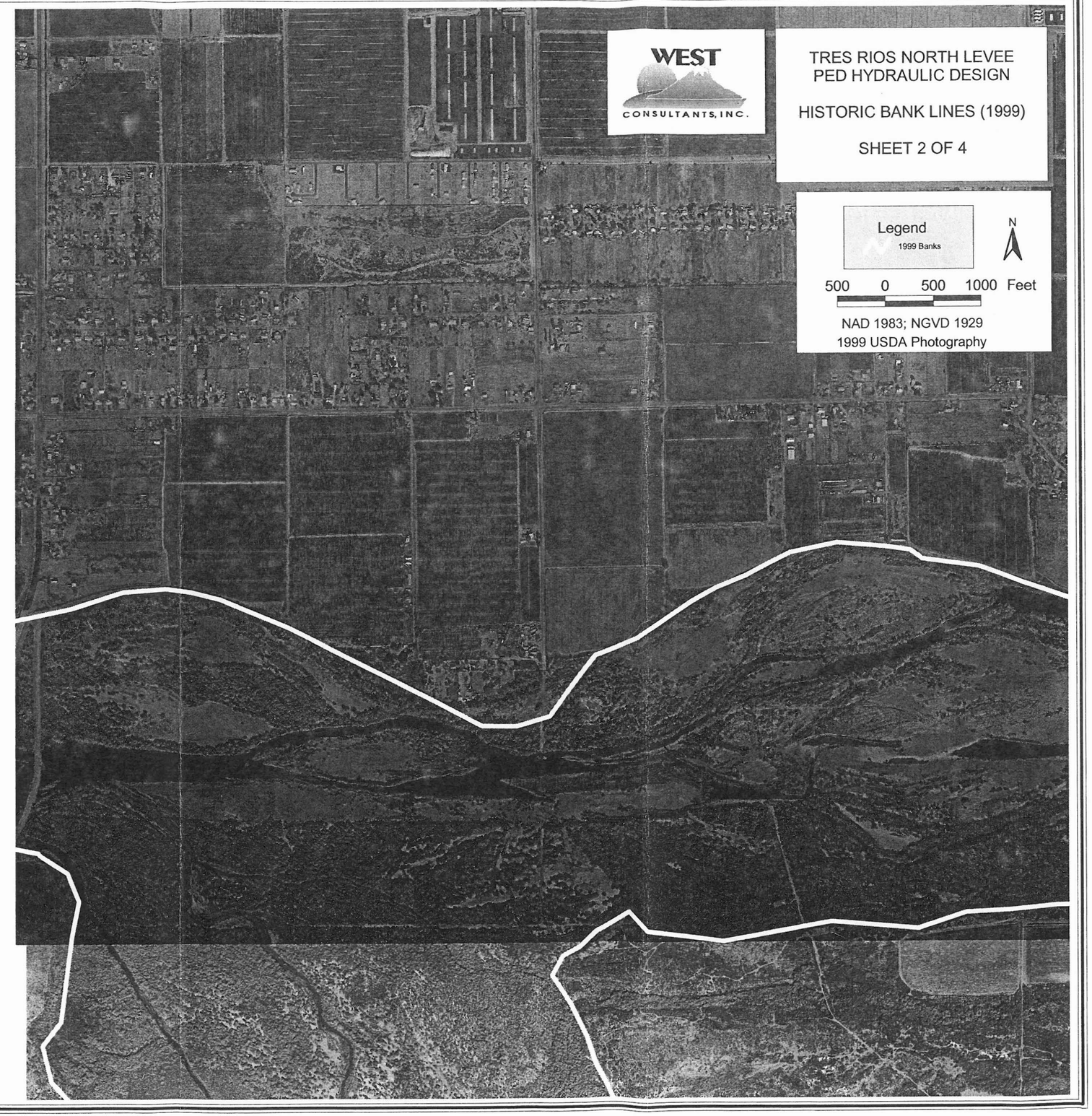
N

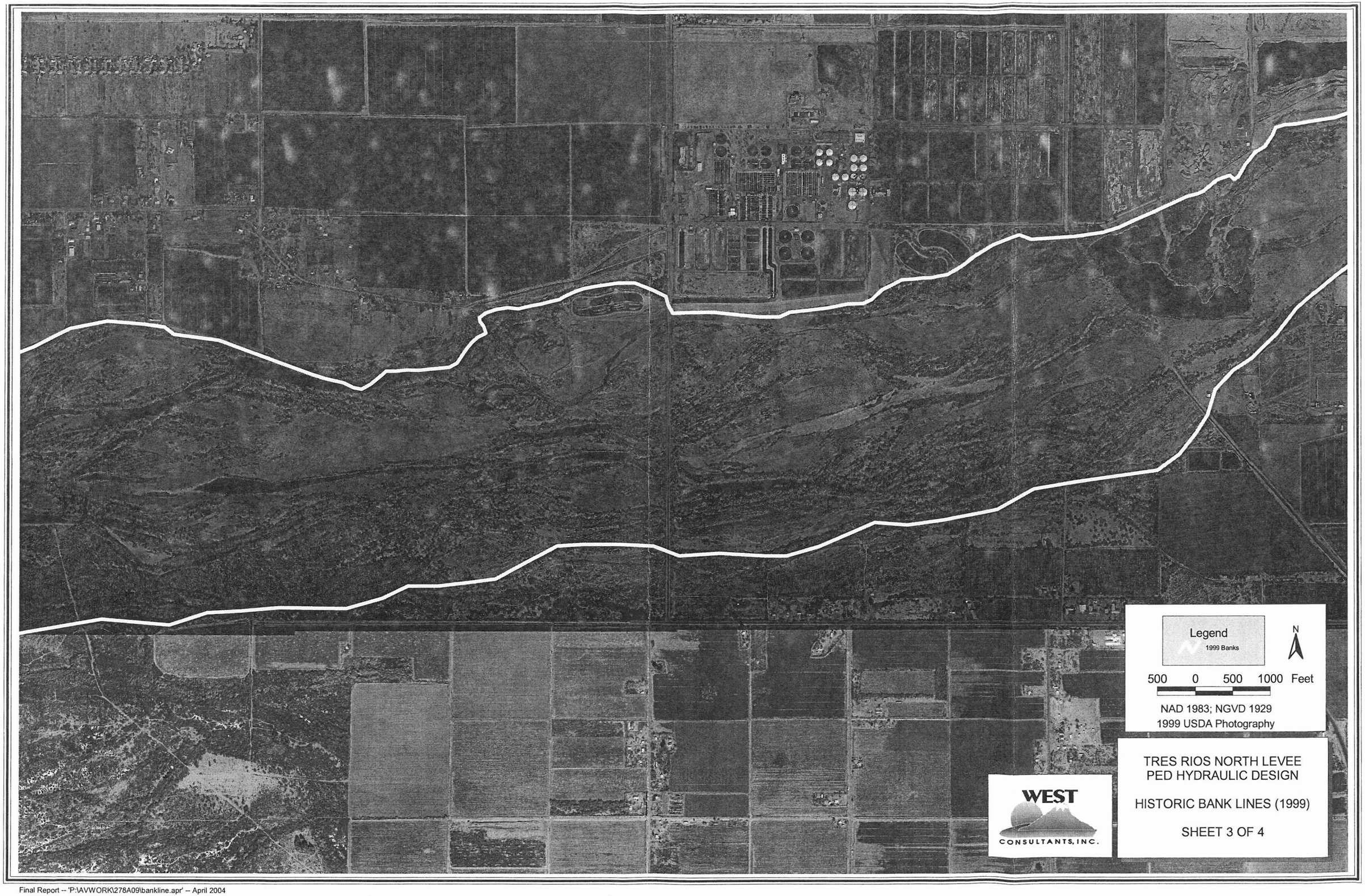
500 0 500 1000 Feet

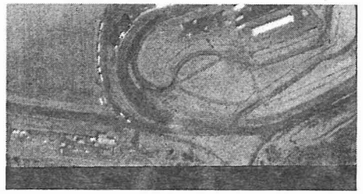
NAD 1983; NGVD 1929
1979 USDA Photography

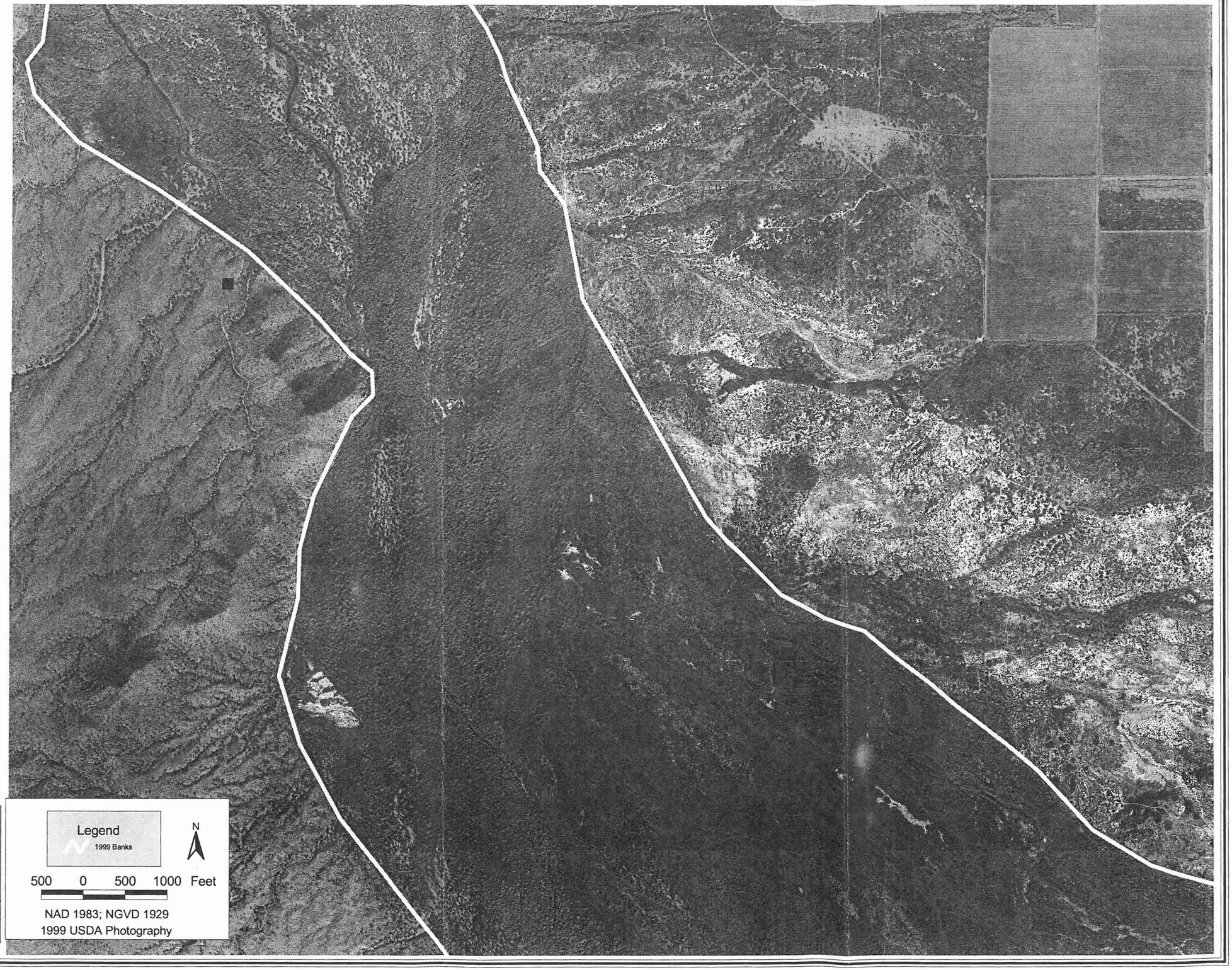

WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1999)
SHEET 1 OF 4
Legend
1999 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1999 USDA Photography




WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1999)
SHEET 2 OF 4
Legend
1999 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1999 USDA Photography


Legend
1999 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
1999 USDA Photography
WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES (1999)
SHEET 3 OF 4





WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1999)

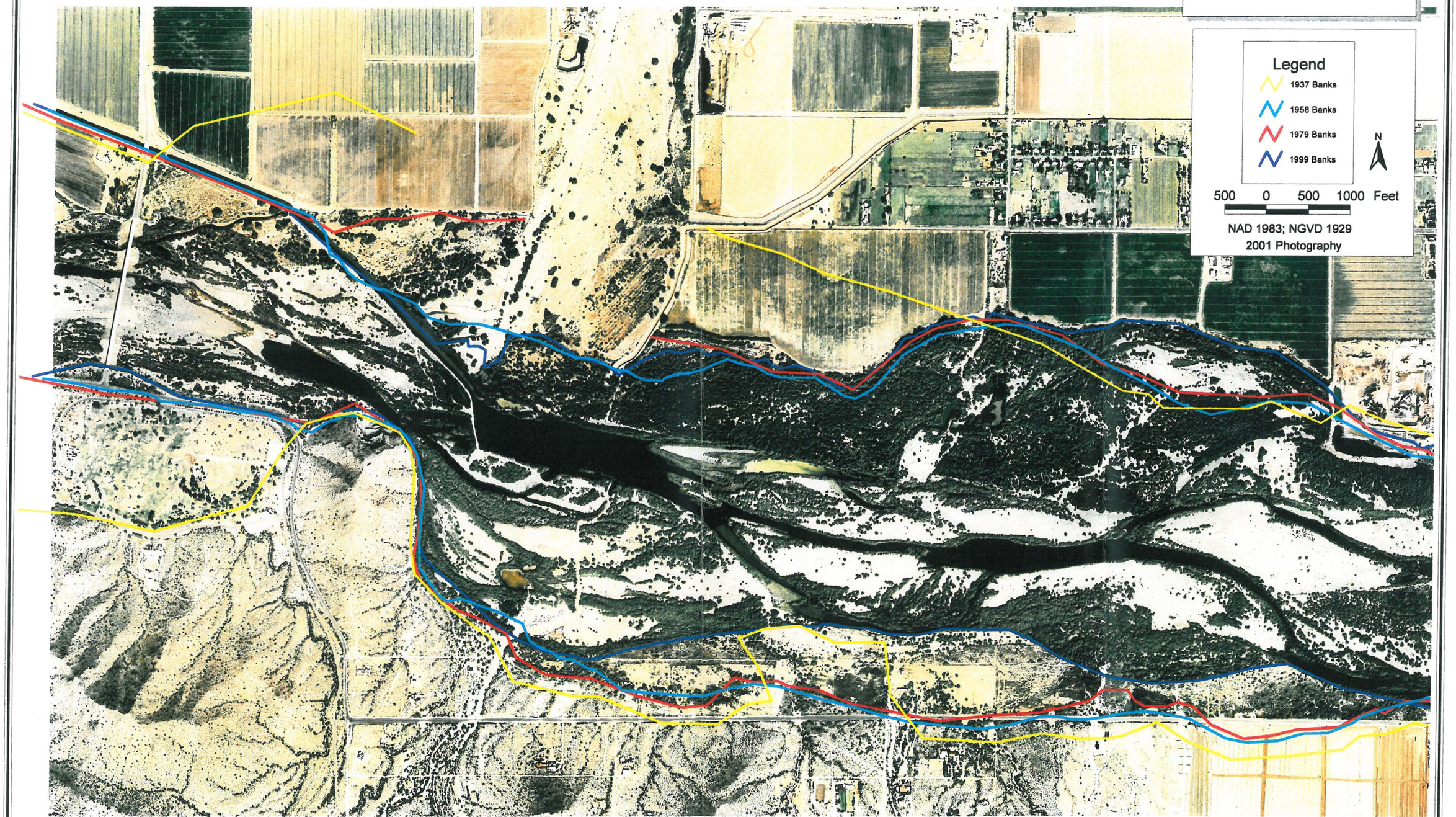
SHEET 4 OF 4

WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES
(1937, 1958, 1978, 1999)

SHEET 1 OF 4

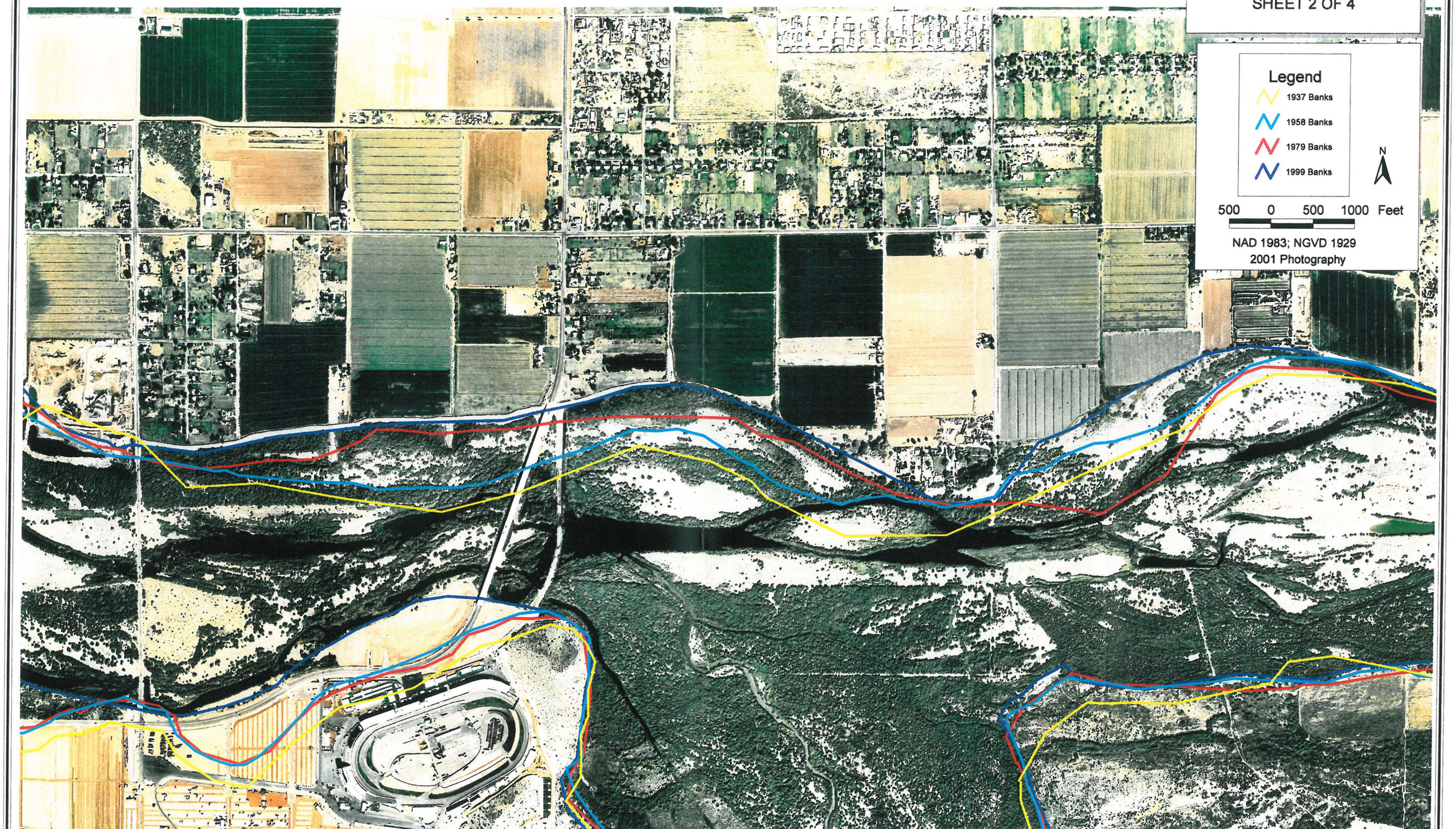


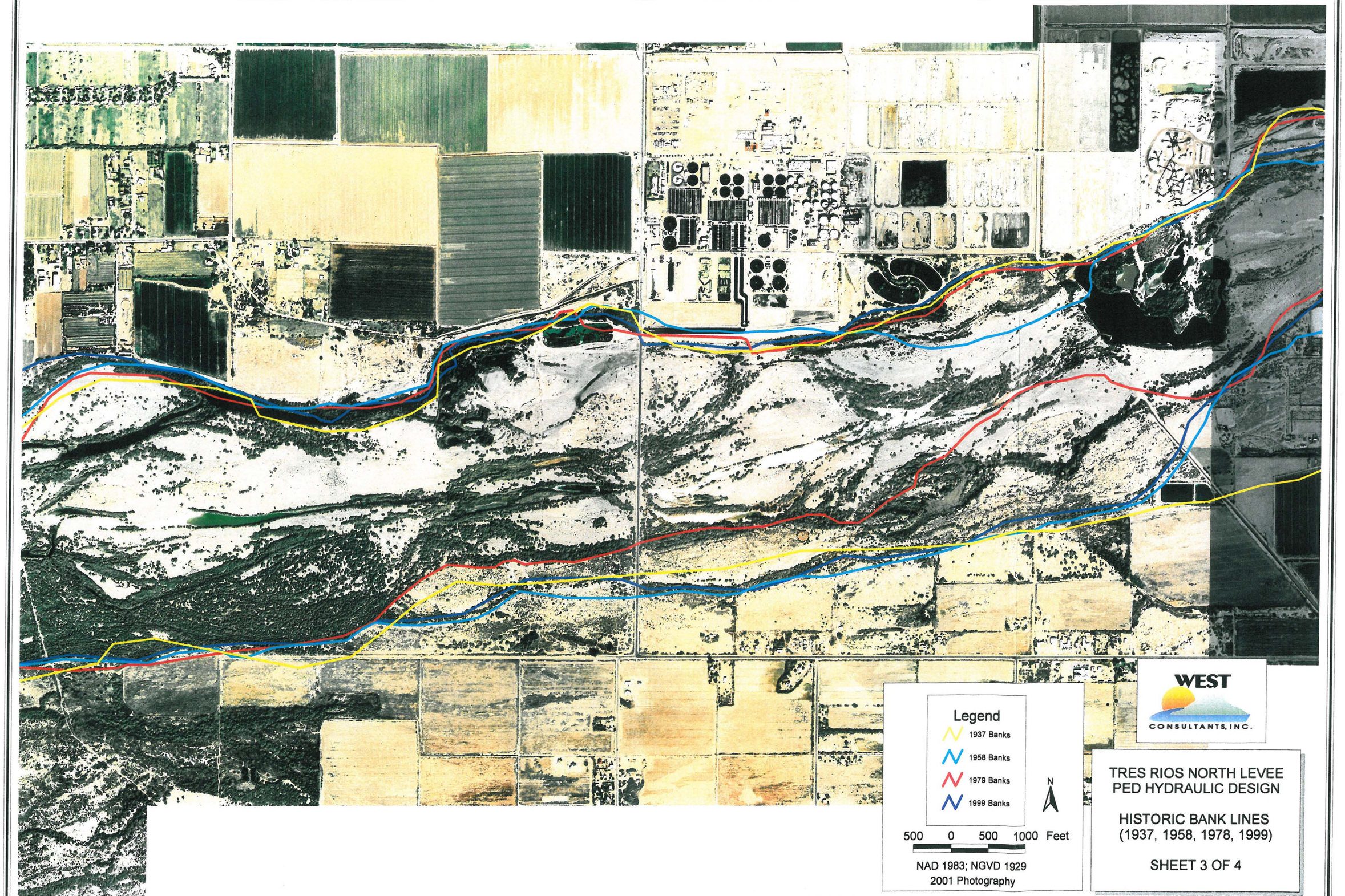
WEST CONSULTANTS, INC.

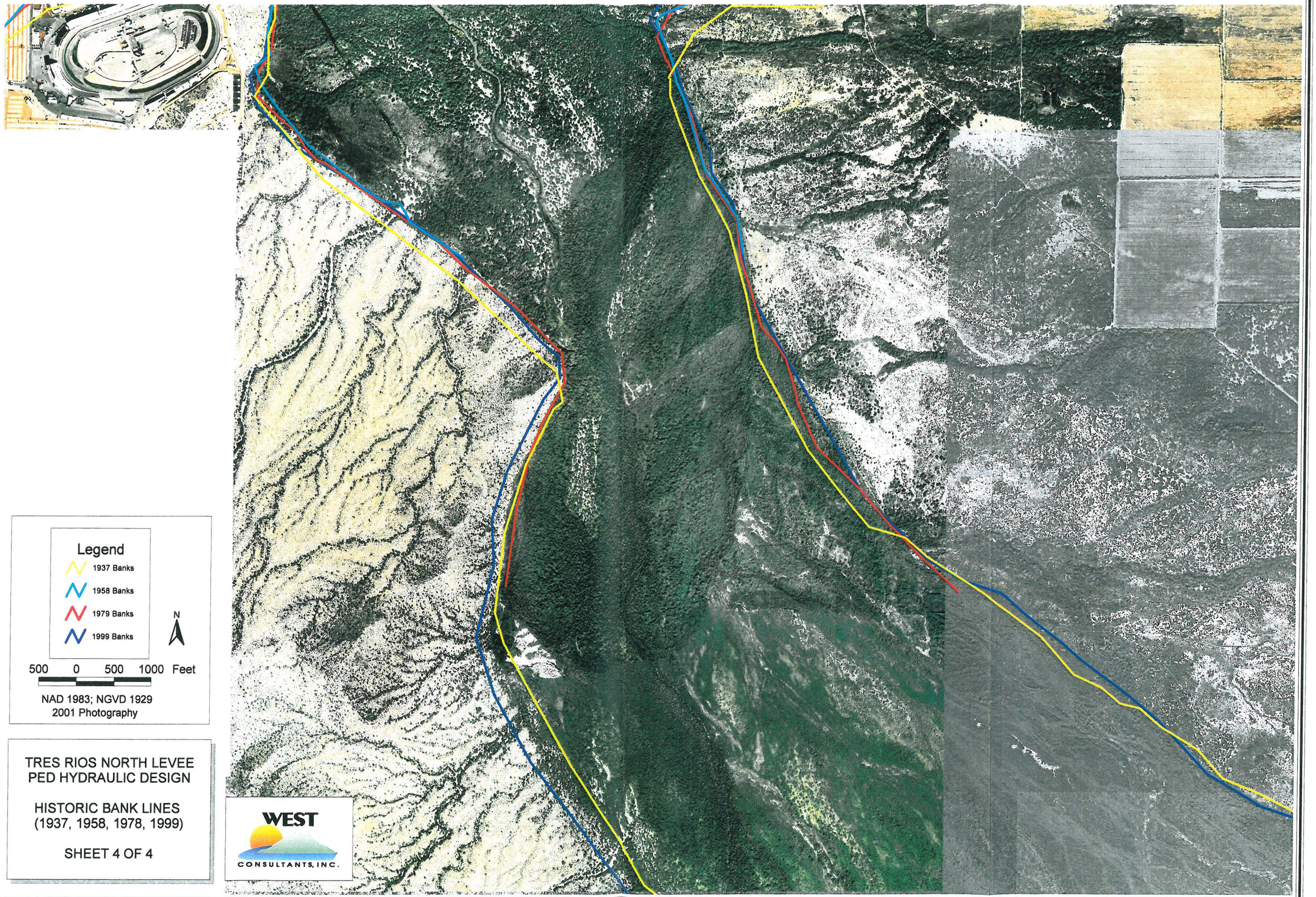
TRES RIOS NORTH LEVEE PED HYDRAULIC DESIGN

HISTORIC BANK LINES (1937, 1958, 1978, 1999)

SHEET 2 OF 4




Legend
1937 Banks
1958 Banks
1979 Banks
1999 Banks
N
500 0 500 1000 Feet
NAD 1983; NGVD 1929
2001 Photography
WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
HISTORIC BANK LINES
(1937, 1958, 1978, 1999)
SHEET 3 OF 4



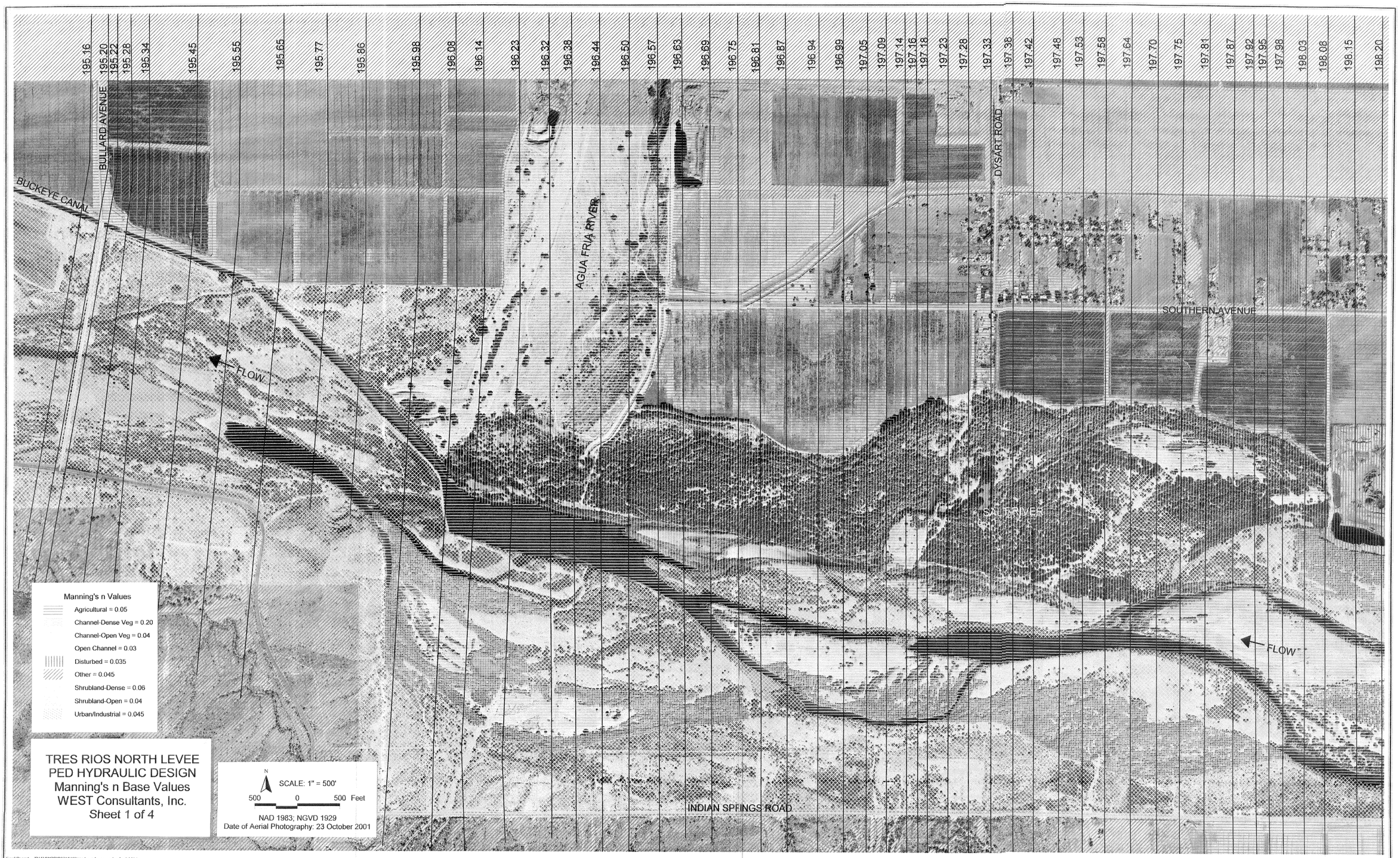
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

HISTORIC BANK LINES
(1937, 1958, 1978, 1999)

SHEET 4 OF 4

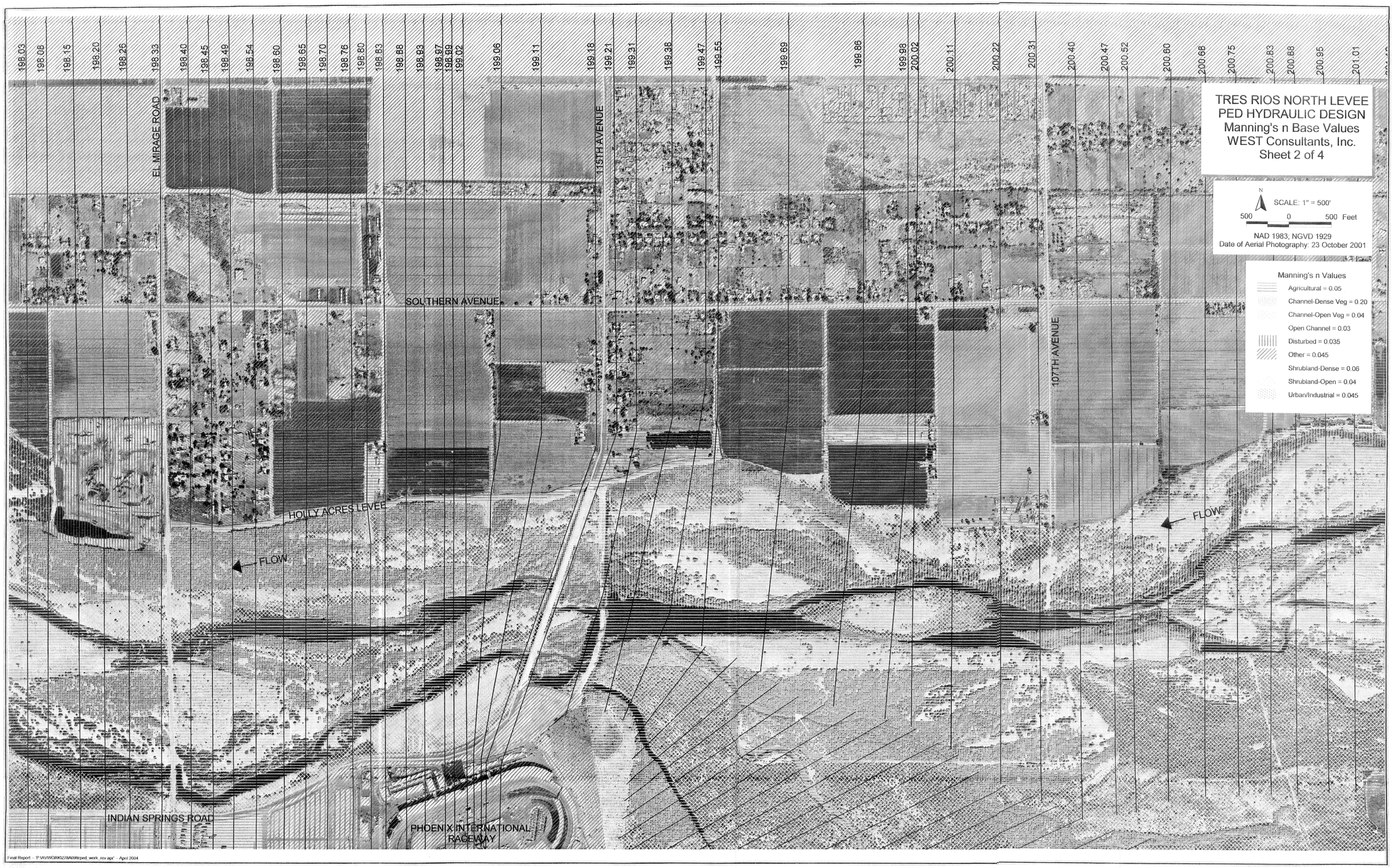
APPENDIX O

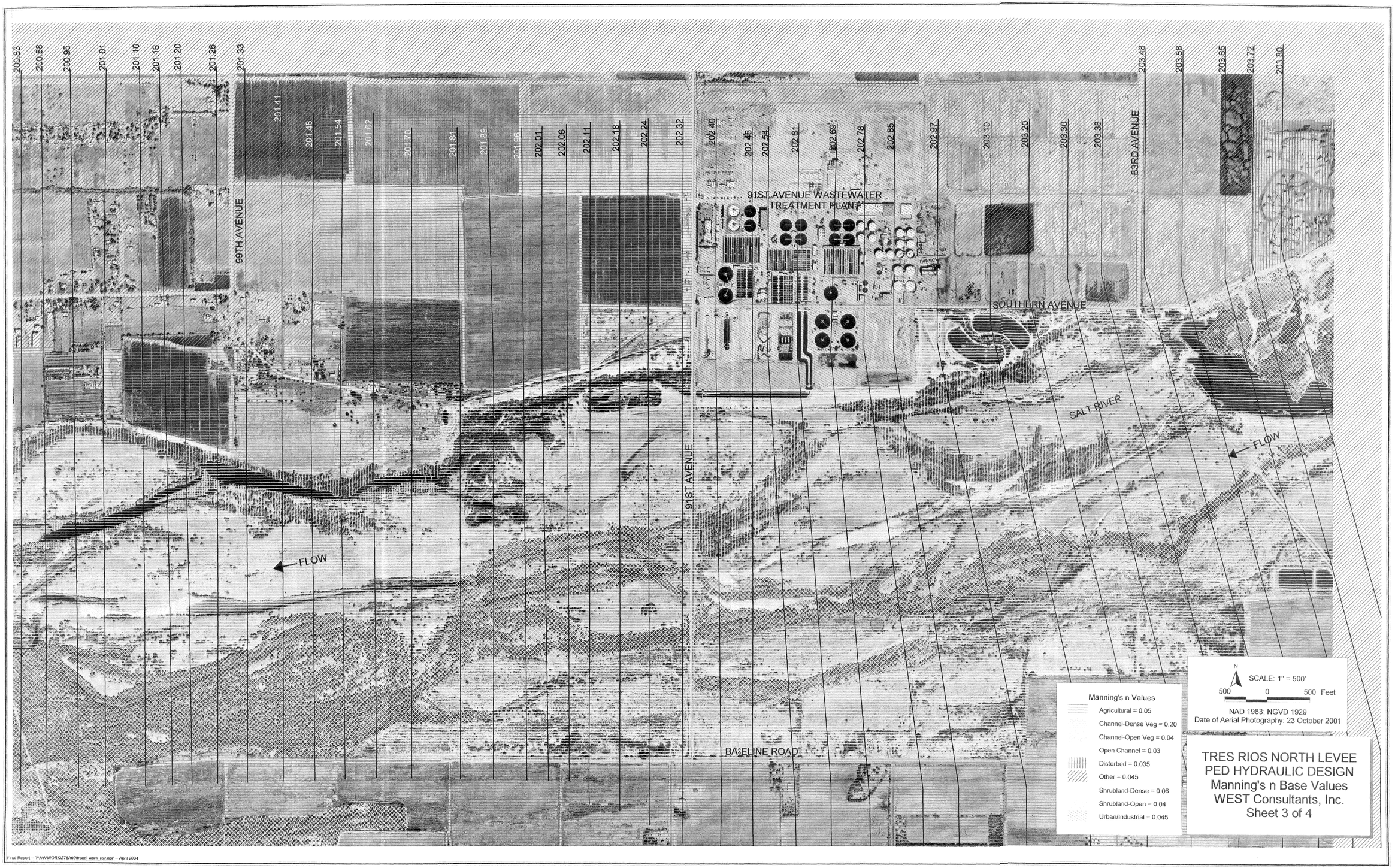
Manning's *n* Values

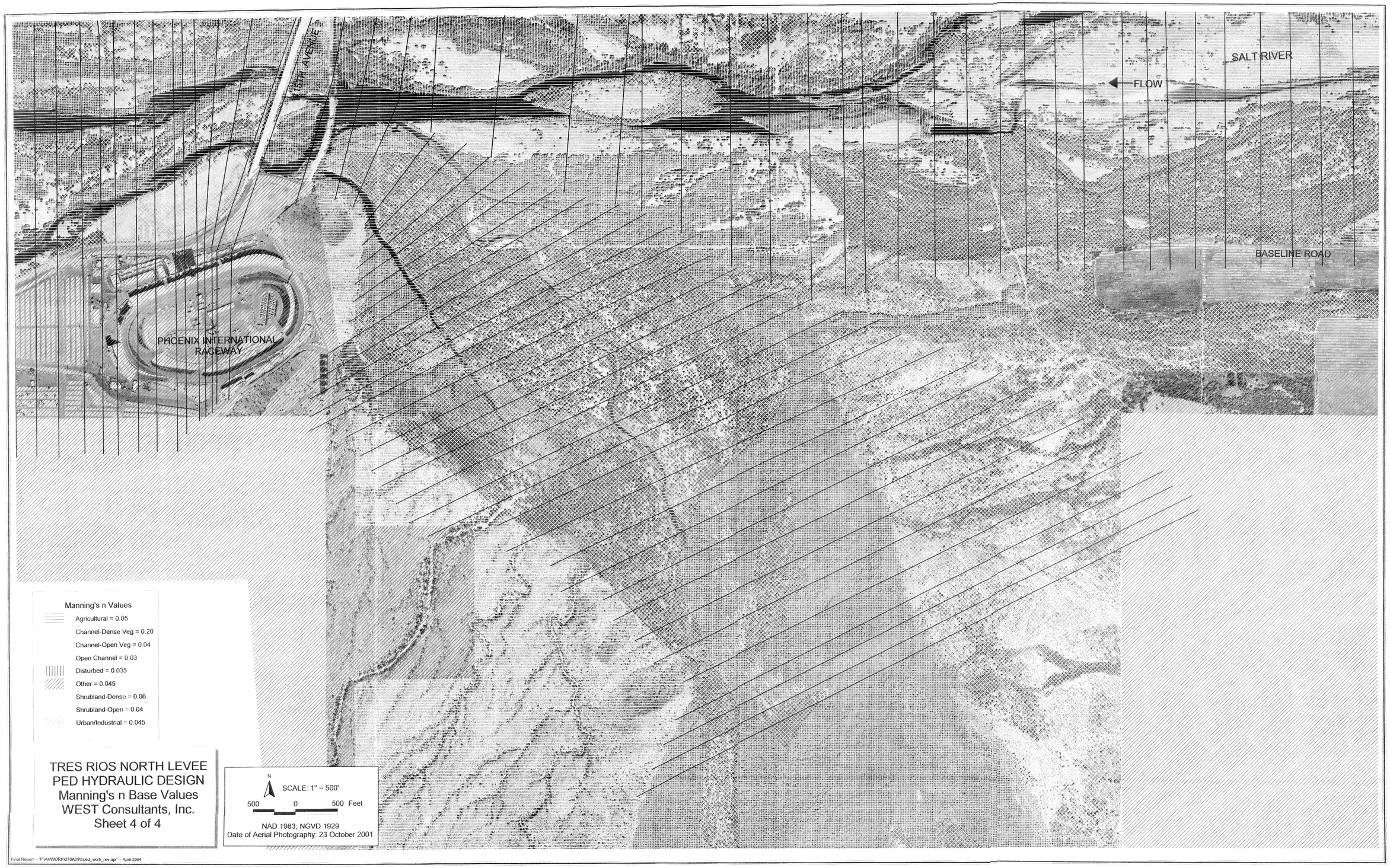


TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
Manning's n Base Values
WEST Consultants, Inc.
Sheet 1 of 4

Final Report -- 'P:\AVWORK\278A09\trped_work_rev.apr' -- April 2004


TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
Manning's n Base Values
WEST Consultants, Inc.
Sheet 2 of 4
N
SCALE: 1" = 500'
500 0 500 Feet
NAD 1983; NGVD 1929
Date of Aerial Photography: 23 October 2001
Manning's n Values
Agricultural = 0.05
Channel-Dense Veg = 0.20
Channel-Open Veg = 0.04
Open Channel = 0.03
Disturbed = 0.035
Other = 0.045
Shrubland-Dense = 0.06
Shrubland-Open = 0.04
Urban/Industrial = 0.045
198.03
198.08
198.15
198.20
198.26
198.33
198.40
198.45
198.49
198.54
198.60
198.65
198.70
198.76
198.80
198.83
198.86
198.93
198.97
198.99
199.02
199.06
199.11
199.18
199.21
199.31
199.38
199.47
199.55
199.69
199.86
199.98
200.02
200.11
200.22
200.31
200.40
200.47
200.52
200.60
200.68
200.75
200.83
200.88
200.95
201.01
EL MIRAGE ROAD
115TH AVENUE
SOUTHERN AVENUE
107TH AVENUE
HOLLY ACRES LEVEE
FLOW
FLOW
INDIAN SPRINGS ROAD
PHOENIX INTERNATIONAL
RACEWAY


200.83
200.88
200.95
201.01
201.10
201.16
201.20
201.26
201.33
201.41
201.46
201.54
201.62
201.70
201.81
201.89
201.96
202.01
202.06
202.11
202.18
202.24
202.32
202.40
202.46
202.54
202.61
202.69
202.78
202.85
202.97
203.10
203.20
203.30
203.38
203.48
203.56
203.65
203.72
203.80
99TH AVENUE
91ST AVENUE WASTEWATER TREATMENT PLANT
91ST AVENUE
83RD AVENUE
SOUTHERN AVENUE
SALT RIVER
FLOW
FLOW
BASELINE ROAD
Manning's n Values
Agricultural = 0.05
Channel-Dense Veg = 0.20
Channel-Open Veg = 0.04
Open Channel = 0.03
Disturbed = 0.035
Other = 0.045
Shrubland-Dense = 0.06
Shrubland-Open = 0.04
Urban/Industrial = 0.045
N
SCALE: 1" = 500'
500 0 500 Feet
NAD 1983; NGVD 1929
Date of Aerial Photography: 23 October 2001
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
Manning's n Base Values
WEST Consultants, Inc.
Sheet 3 of 4



TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
Manning's n Base Values
WEST Consultants, Inc.
Sheet 4 of 4

APPENDIX P

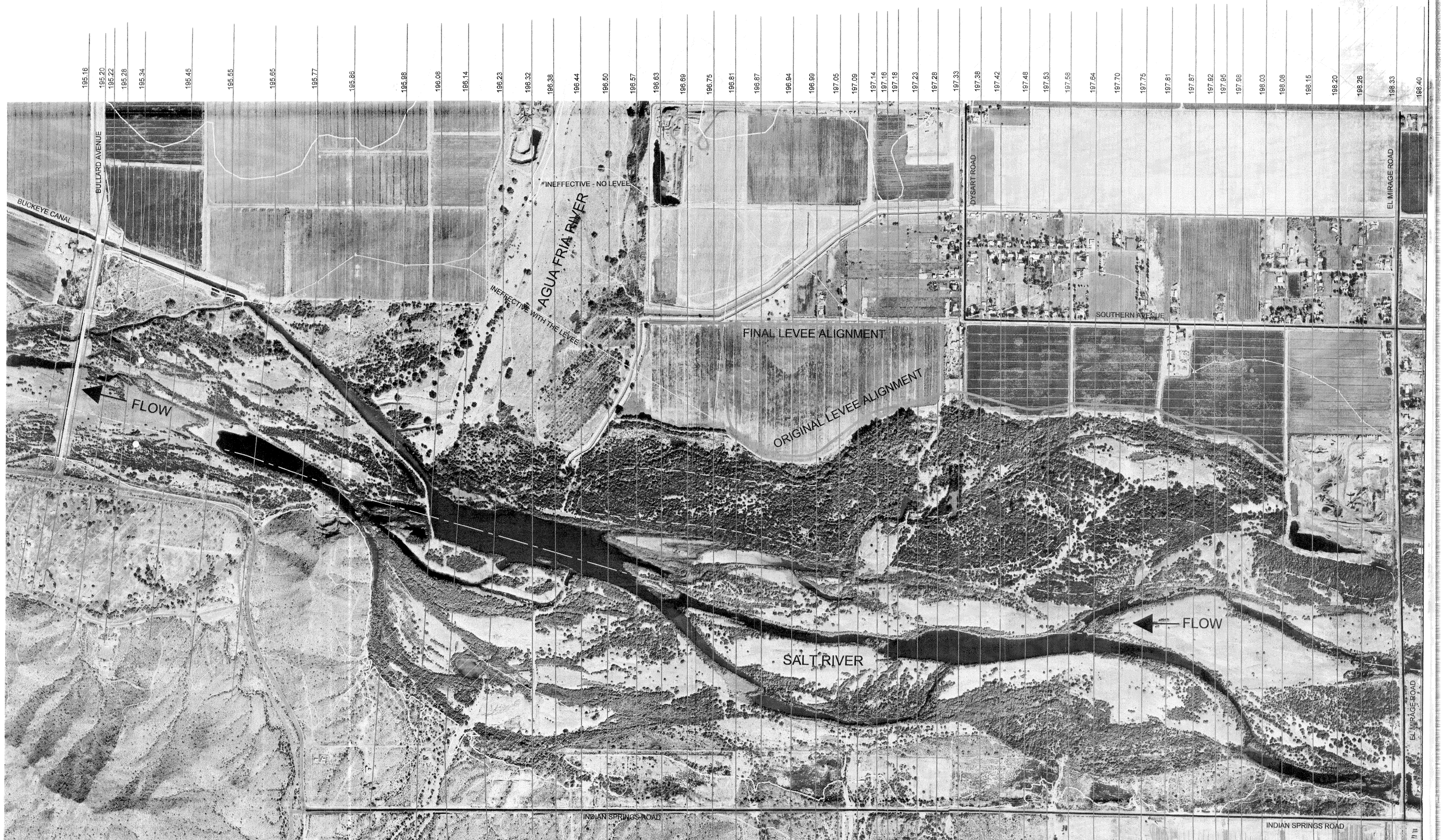
Inundation Limits

i. Existing Conditions with Ineffective Flow Areas and Inundation Limits

ii. Inundation Maps for Pre- and Post HEC-6T Runs

P-i

Existing Conditions with Ineffective Flow Areas and Inundation Limits



SCALE: 1" = 500'

500 0 500 feet

HYDR. CENTERLINE
PONDS
PROPOSED LEVEE
INEFF. FLOW AREAS
FLOW SEP. LINE

100-YR INUNDATION LIMITS
EXISTING
SOIL SAMPLE LOCATION

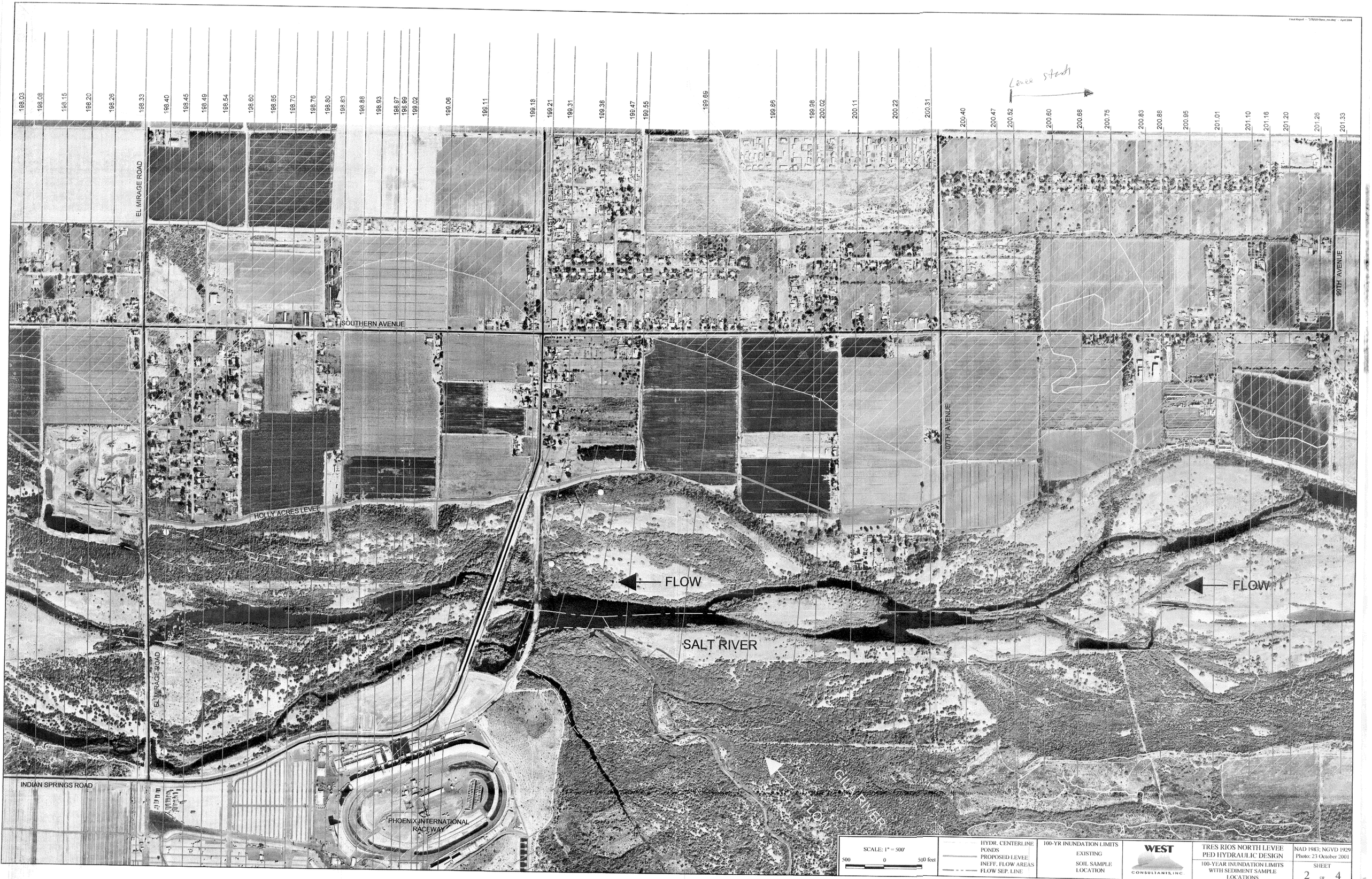
WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

100-YEAR INUNDATION LIMITS WITH SEDIMENT SAMPLE LOCATIONS

NAD 1983; NGVD 1929
Photo: 23 October 2001

SHEET 1 OF 4


198.03
198.08
198.15
198.20
198.26
198.33
198.40
198.45
198.49
198.54
198.60
198.65
198.70
198.76
198.80
198.83
198.88
198.93
198.97
198.99
199.02
199.06
199.11
199.18
199.21
199.31
199.38
199.47
199.55
199.69
199.86
199.98
200.02
200.11
200.22
200.31
200.40
200.47
200.52
200.60
200.68
200.75
200.83
200.88
200.95
201.01
201.10
201.16
201.20
201.26
201.33
Check stech
EL MIRAGE ROAD
SOUTHERN AVENUE
115TH AVENUE
107TH AVENUE
99TH AVENUE
HOLLY ACRES LEVEE
FLOW
FLOW
SALT RIVER
FLOW
GILA RIVER
INDIAN SPRINGS ROAD
PHOENIX INTERNATIONAL RACEWAY
SCALE: 1" = 500'
500 0 500 feet
HYDR. CENTERLINE
PONDS
PROPOSED LEVEE
INEFF. FLOW AREAS
FLOW SEP. LINE
100-YR INUNDATION LIMITS
EXISTING
SOIL SAMPLE LOCATION
WEST CONSULTANTS, INC
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
100-YEAR INUNDATION LIMITS WITH SEDIMENT SAMPLE LOCATIONS
NAD 1983; NGVD 1929
Photo: 23 October 2001
SHEET 2 OF 4

SCALE: 1" = 500'

500 0 500 feet

HYDR. CENTERLINE
PONDS
PROPOSED LEVEE
INEFF. FLOW AREAS
FLOW SEP. LINE

100-YR INUNDATION LIMITS
EXISTING
SOIL SAMPLE LOCATION

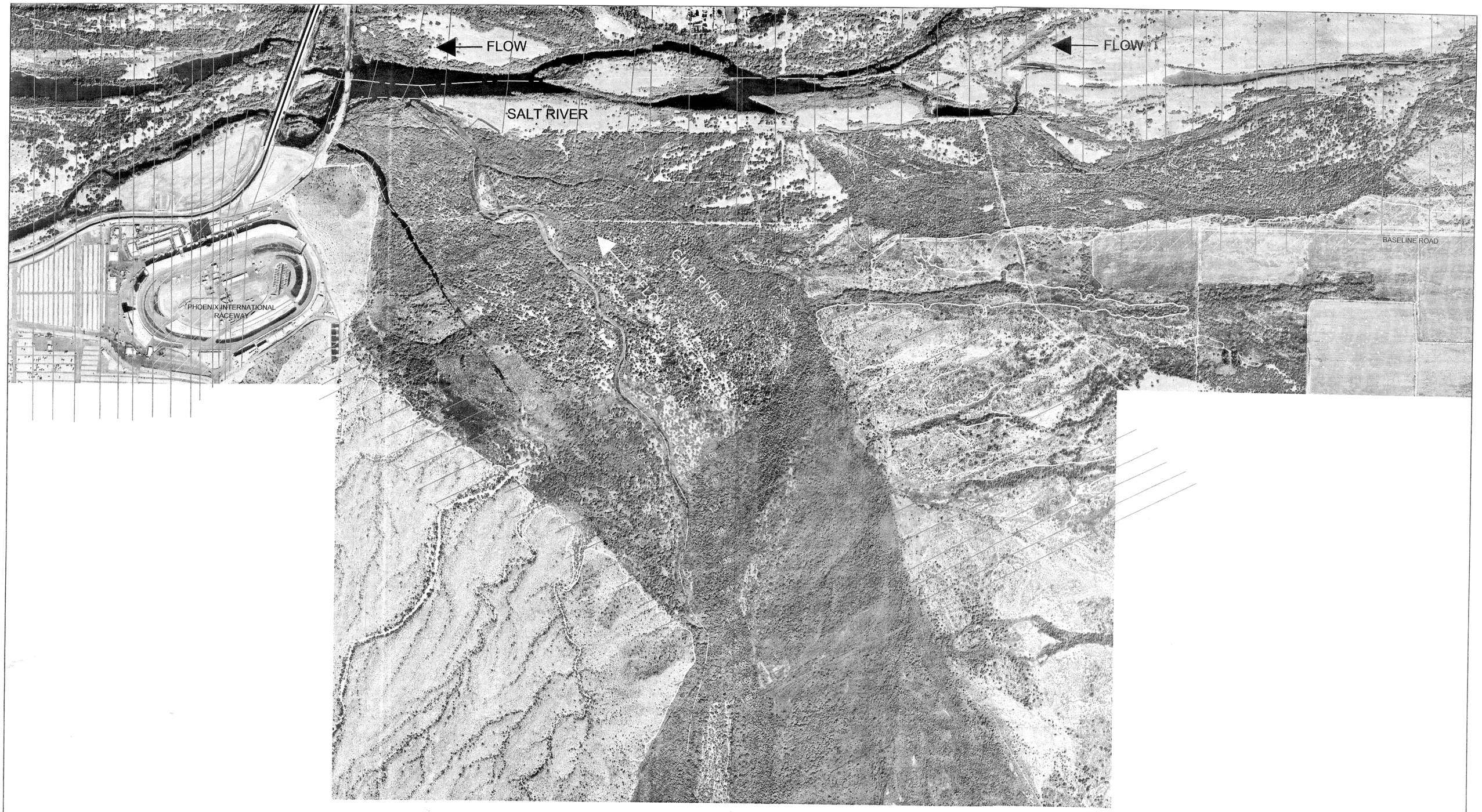
WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

100-YEAR INUNDATION LIMITS WITH SEDIMENT SAMPLE LOCATIONS

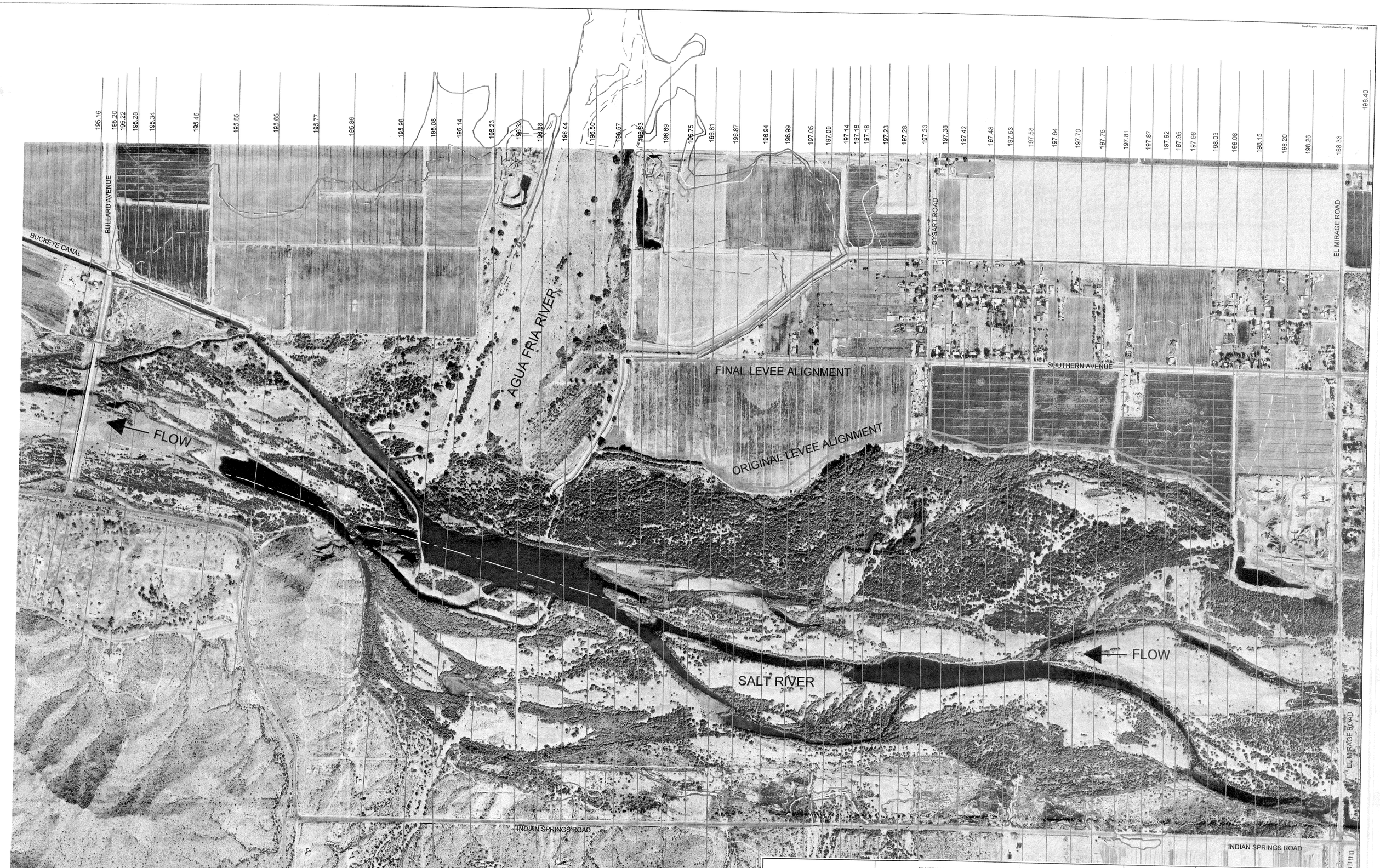
NAD 1983; NGVD 1929
Photo: 23 October 2001

SHEET 3 OF 4



SCALE: 1" = 500' 500 0 500 feet	HYDR. CENTERLINE PONDS PROPOSED LEVEE INEFF. FLOW AREAS FLOW SEP. LINE	100-YR INUNDATION LIMITS EXISTING SOIL SAMPLE LOCATION	WEST CONSULTANTS, INC.	TRES RIOS NORTH LEVEE PED HYDRAULIC DESIGN 100-YEAR INUNDATION LIMITS WITH SEDIMENT SAMPLE LOCATIONS	NAD 1983; NGVD 1929 Photo: 23 October 2001 SHEET 4 OF 4

Final Report — 'FIBAGO Base rev.dwg' April 2004



SCALE: 1" = 500'

500 0 500 Feet

EXISTING PRE-HEC-6T
LEVEE ONLY PRE-HEC-6T
LEVEE + PONDS PRE-HEC-6T
EXISTING POST-HEC-6T
LEVEE ONLY POST HEC-6T
LEVEE + PONDS POST HEC-6T
HYDR. CENTERLINE
LEVEE ALIGNMENT

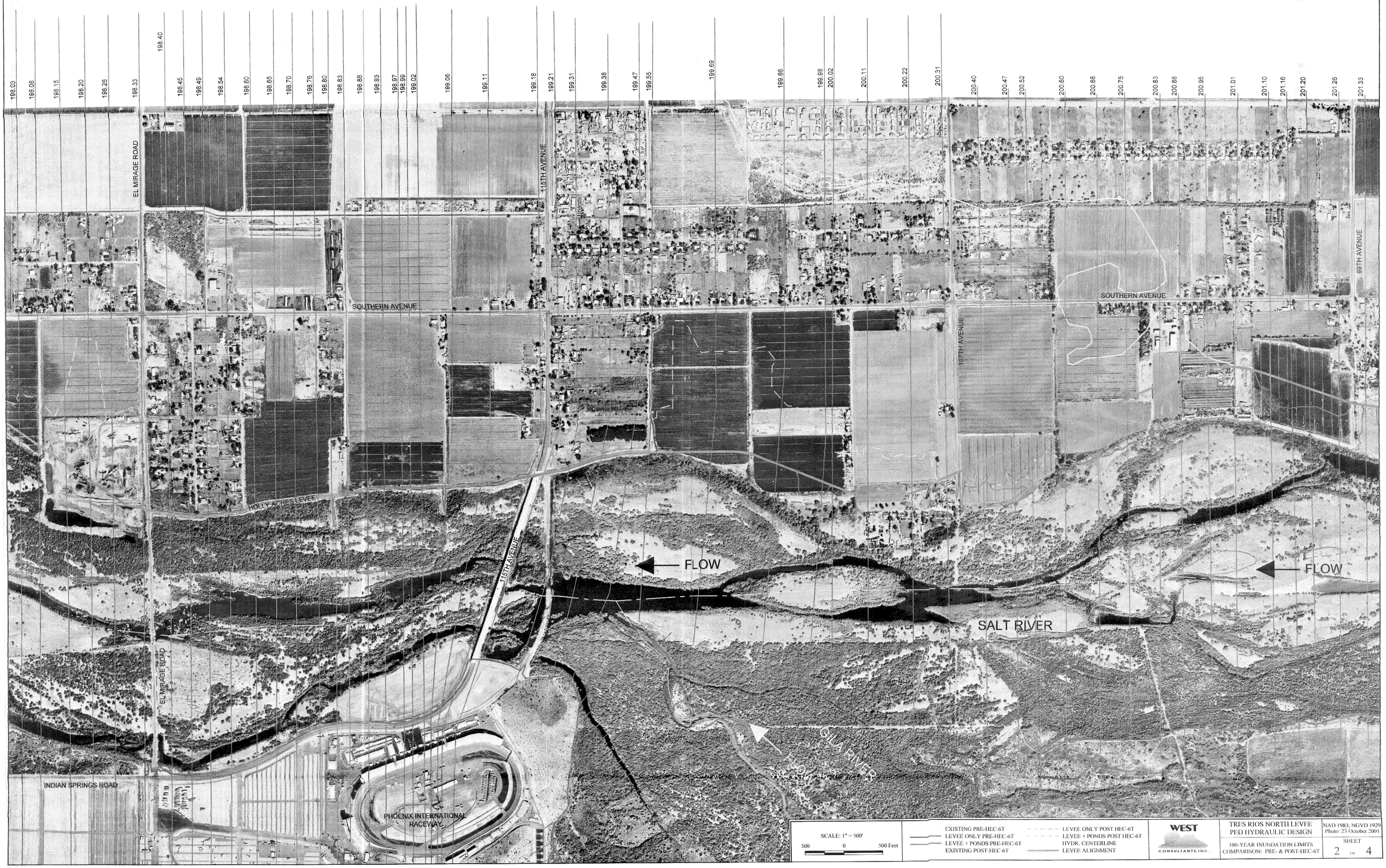
WEST CONSULTANTS, INC.

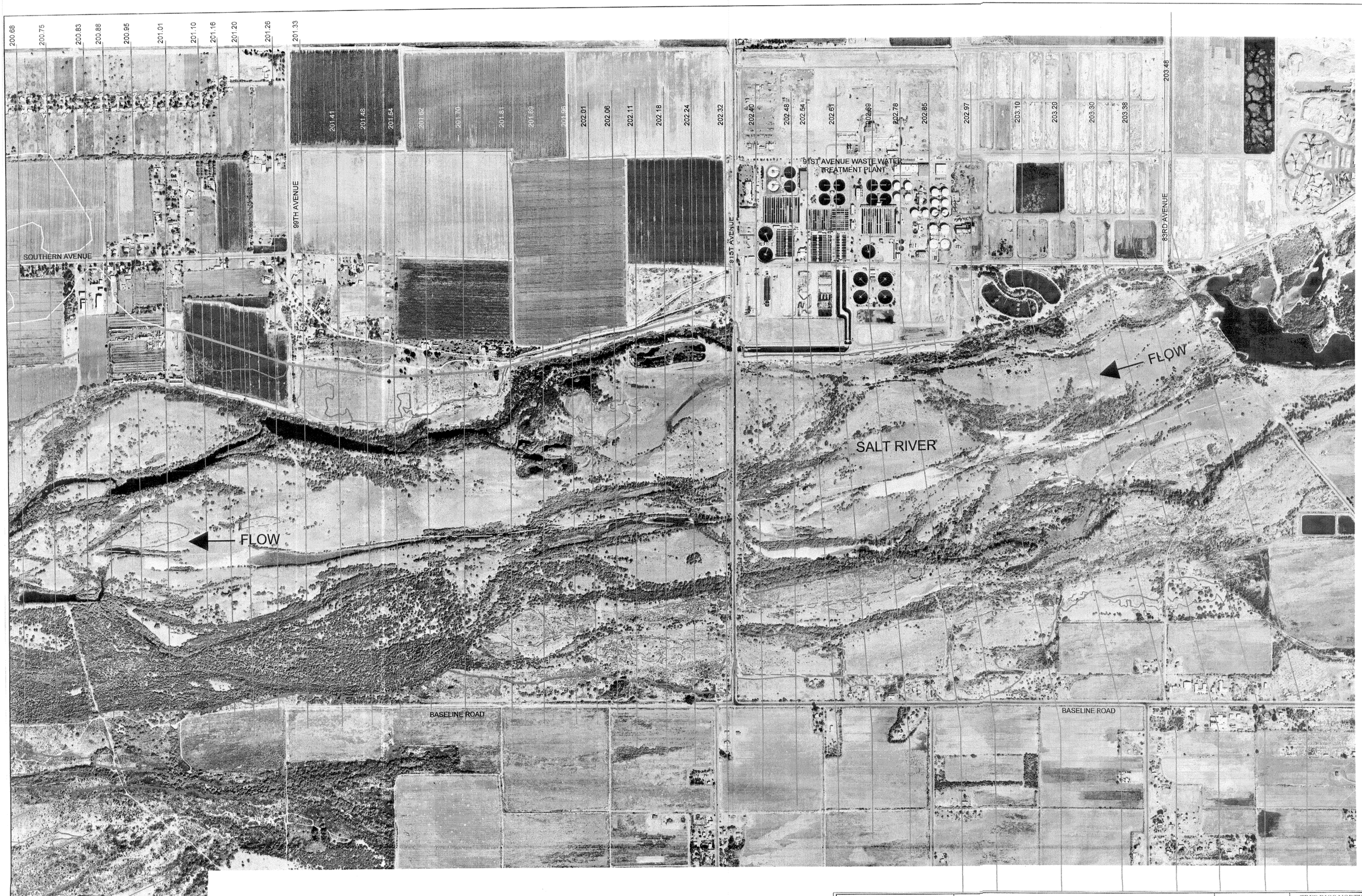
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

100-YEAR INUNDATION LIMITS
COMPARISON: PRE- & POST-HEC-6T

NAD 1983; NGVD 1929
Photo: 23 October 2001

SHEET 1 OF 4


198.03
198.08
198.15
198.20
198.26
198.33
198.40
198.45
198.49
198.54
198.60
198.65
198.70
198.76
198.80
198.83
198.88
198.93
198.97
198.99
199.02
199.06
199.11
199.18
199.21
199.31
199.38
199.47
199.55
199.69
199.86
199.98
200.02
200.11
200.22
200.31
200.40
200.47
200.52
200.60
200.68
200.75
200.83
200.88
200.95
201.01
201.10
201.16
201.20
201.26
201.33
EL MIRAGE ROAD
115TH AVENUE
SOUTHERN AVENUE
107TH AVENUE
99TH AVENUE
HOLLY ACRES LEVEE
FLOW
FLOW
SALT RIVER
GILA RIVER
INDIAN SPRINGS ROAD
PHOENIX INTERNATIONAL RACEWAY
SCALE: 1" = 500'
500 0 500 Feet
EXISTING PRE-HEC-6T
LEVEE ONLY PRE-HEC-6T
LEVEE + PONDS PRE-HEC-6T
EXISTING POST-HEC-6T
LEVEE ONLY POST HEC-6T
LEVEE + PONDS POST HEC-6T
HYDR. CENTERLINE
LEVEE ALIGNMENT
WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
100-YEAR INUNDATION LIMITS
COMPARISON: PRE- & POST-HEC-6T
NAD 1983; NGVD 1929
Photo: 23 October 2001
SHEET
2 OF 4



SCALE: 1" = 500'

500 0 500 Feet

EXISTING PRE-HEC-6T
LEVEE ONLY PRE-HEC-6T
LEVEE + PONDS PRE-HEC-6T
EXISTING POST-HEC-6T
LEVEE ONLY POST HEC-6T
LEVEE + PONDS POST HEC-6T
HYDR. CENTERLINE
LEVEE ALIGNMENT

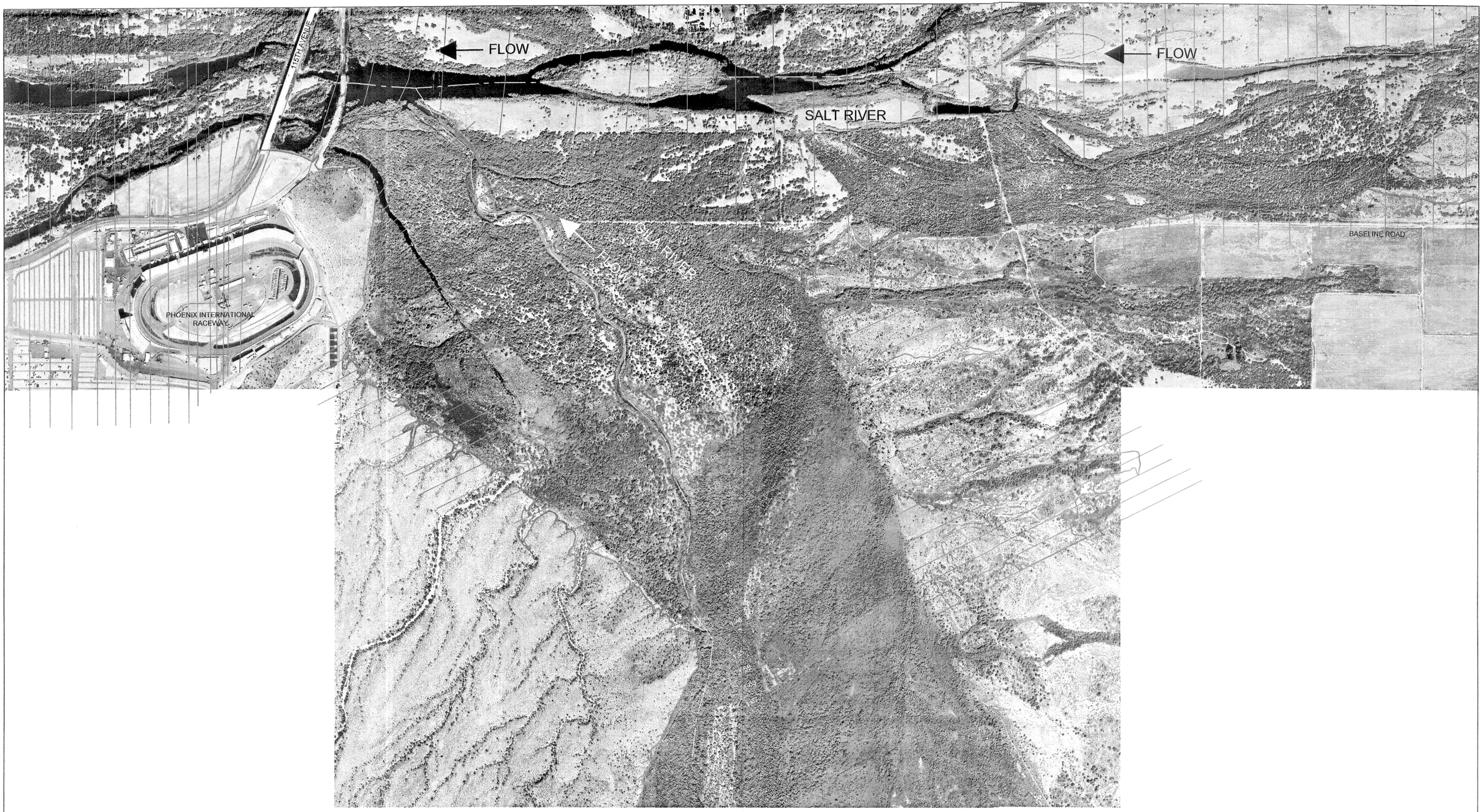
WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

100-YEAR INUNDATION LIMITS
COMPARISON: PRE- & POST-HEC-6T

NAD 1983; NGVD 1929
Photo: 23 October 2001

SHEET 3 OF 4



SCALE: 1" = 500'

500 0 500 Feet

EXISTING PRE-HEC-6T
LEVEE ONLY PRE-HEC-6T
LEVEE + PONDS PRE-HEC-6T
EXISTING POST-HEC-6T
LEVEE ONLY POST HEC-6T
LEVEE + PONDS POST HEC-6T
HYDR. CENTERLINE
LEVEE ALIGNMENT

WEST CONSULTANTS, INC.

TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN

100-YEAR INUNDATION LIMITS
COMPARISON: PRE- & POST-HEC-6T

NAD 1983; NGVD 1929
Photo: 23 October 2001

SHEET 4 OF 4

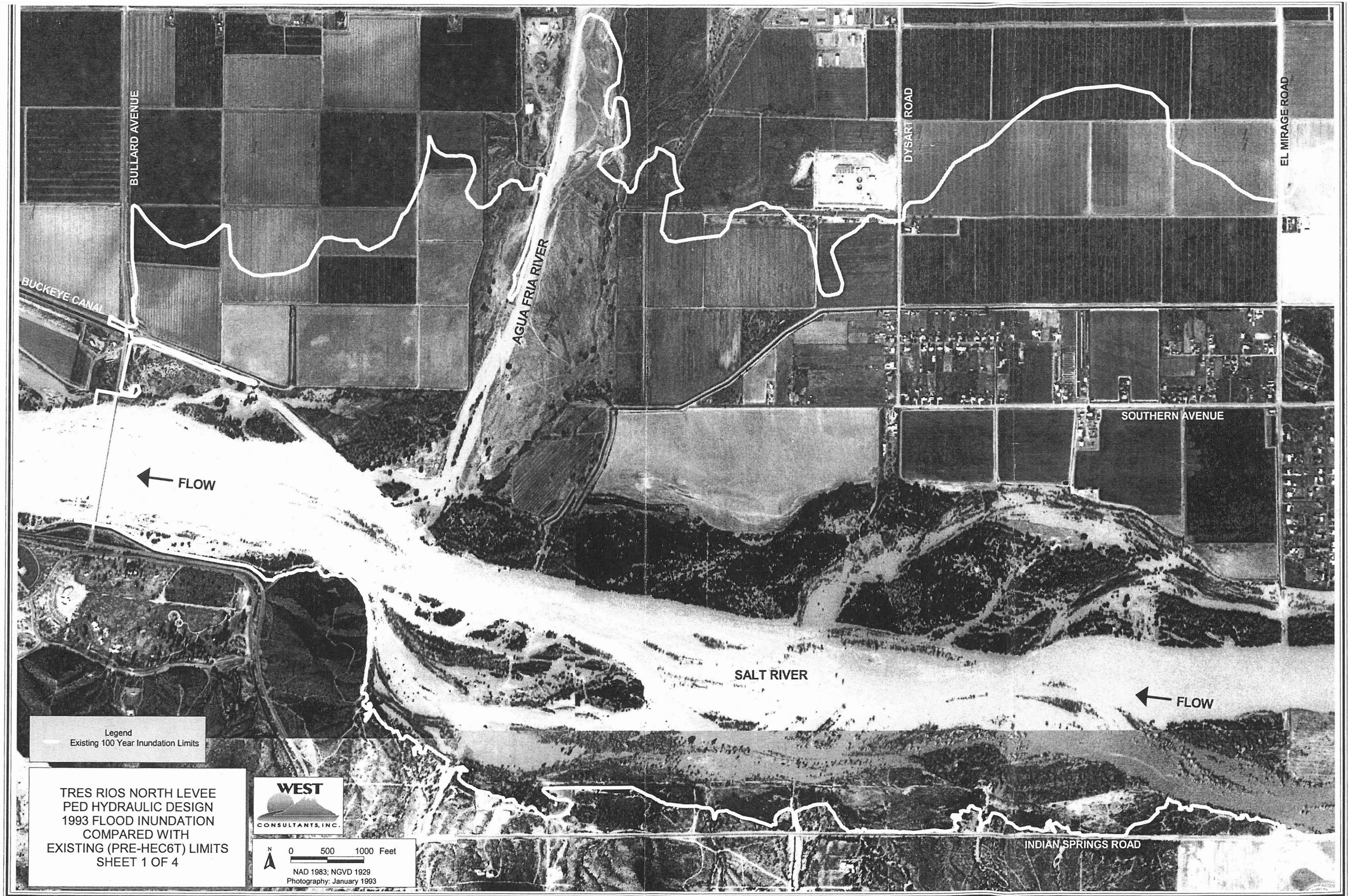
Final Report 27A4ZB Rios N. Ave.dwg April 2004

P-ii

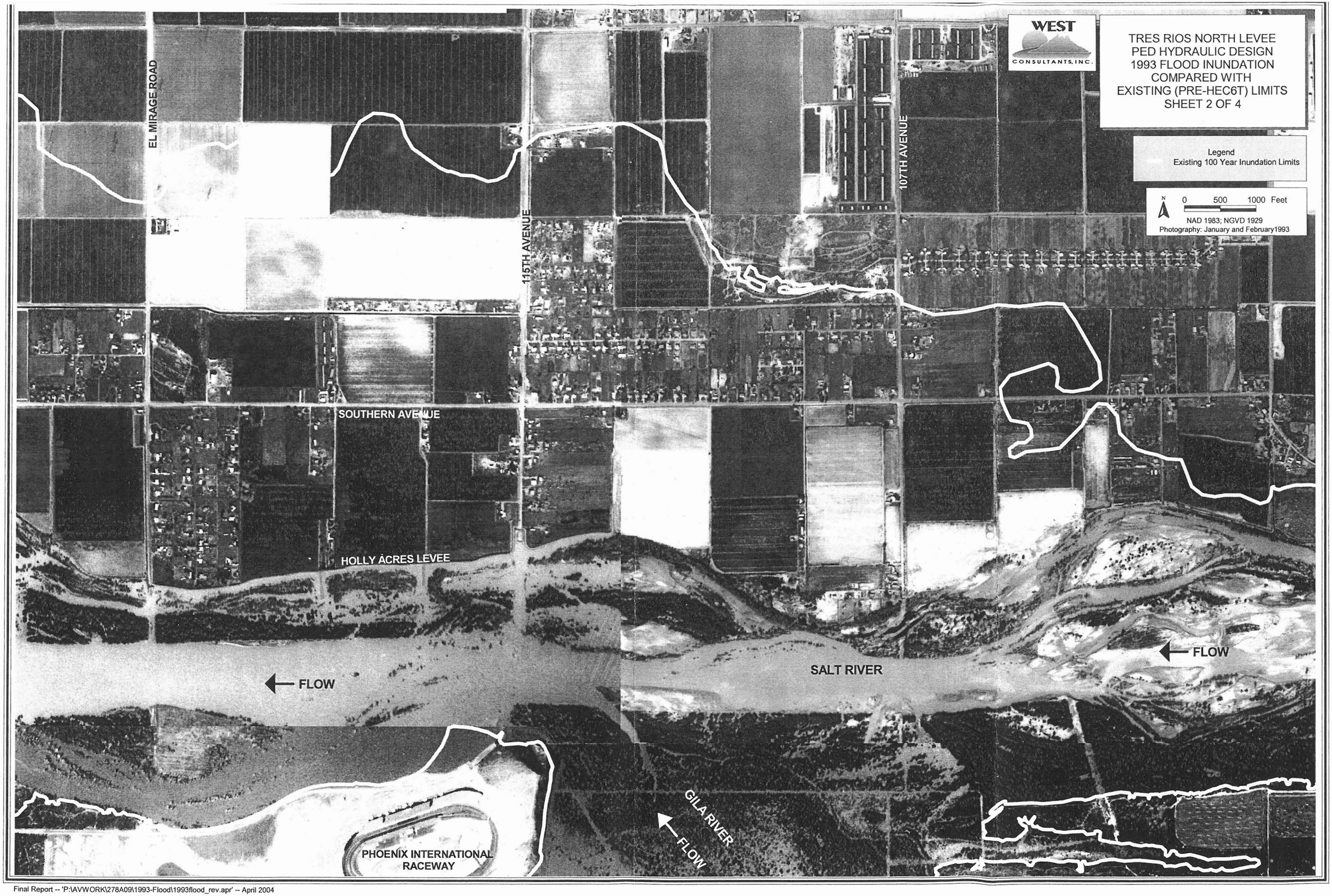
Inundation Maps for Pre- and Post HEC-6T Runs

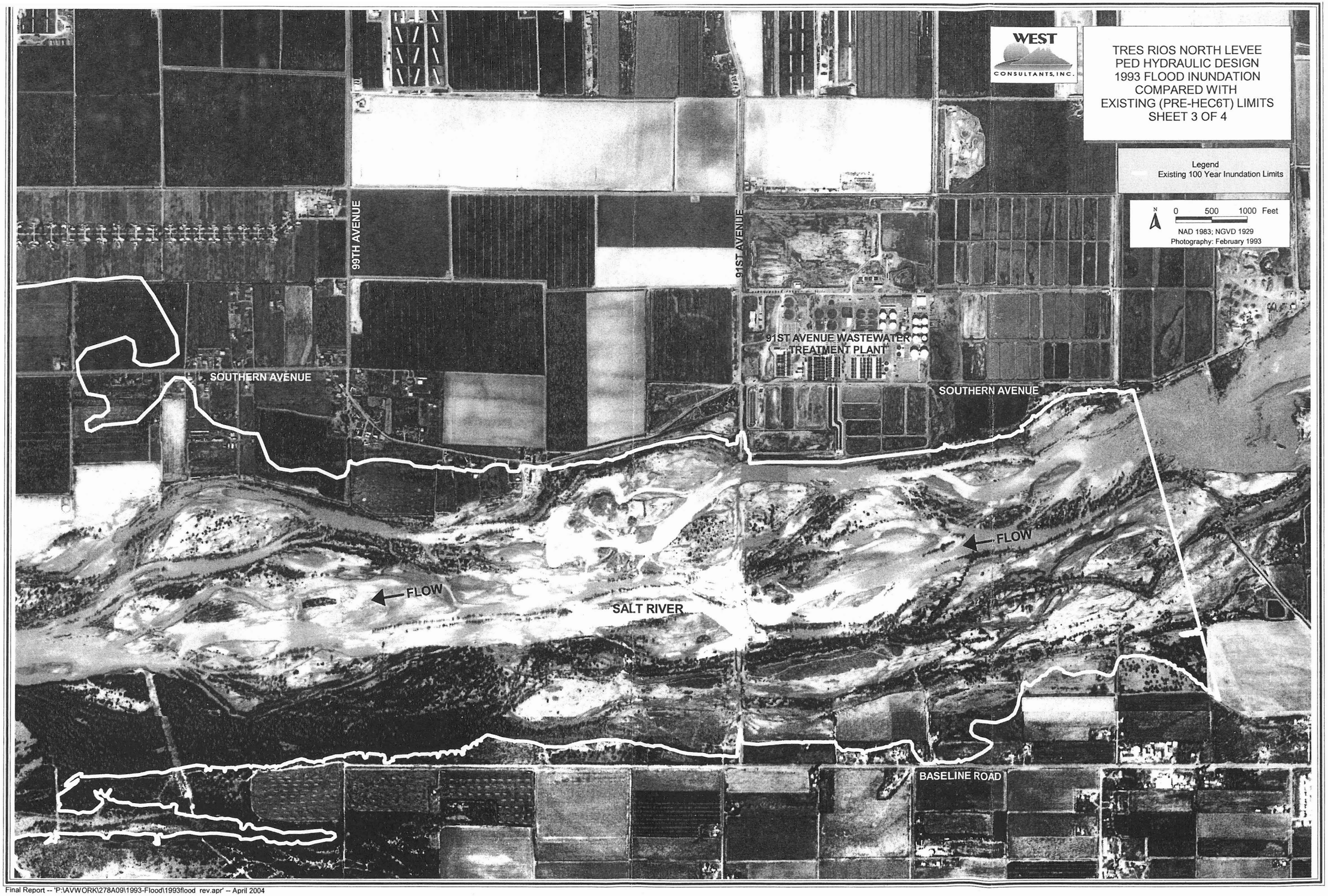
APPENDIX Q

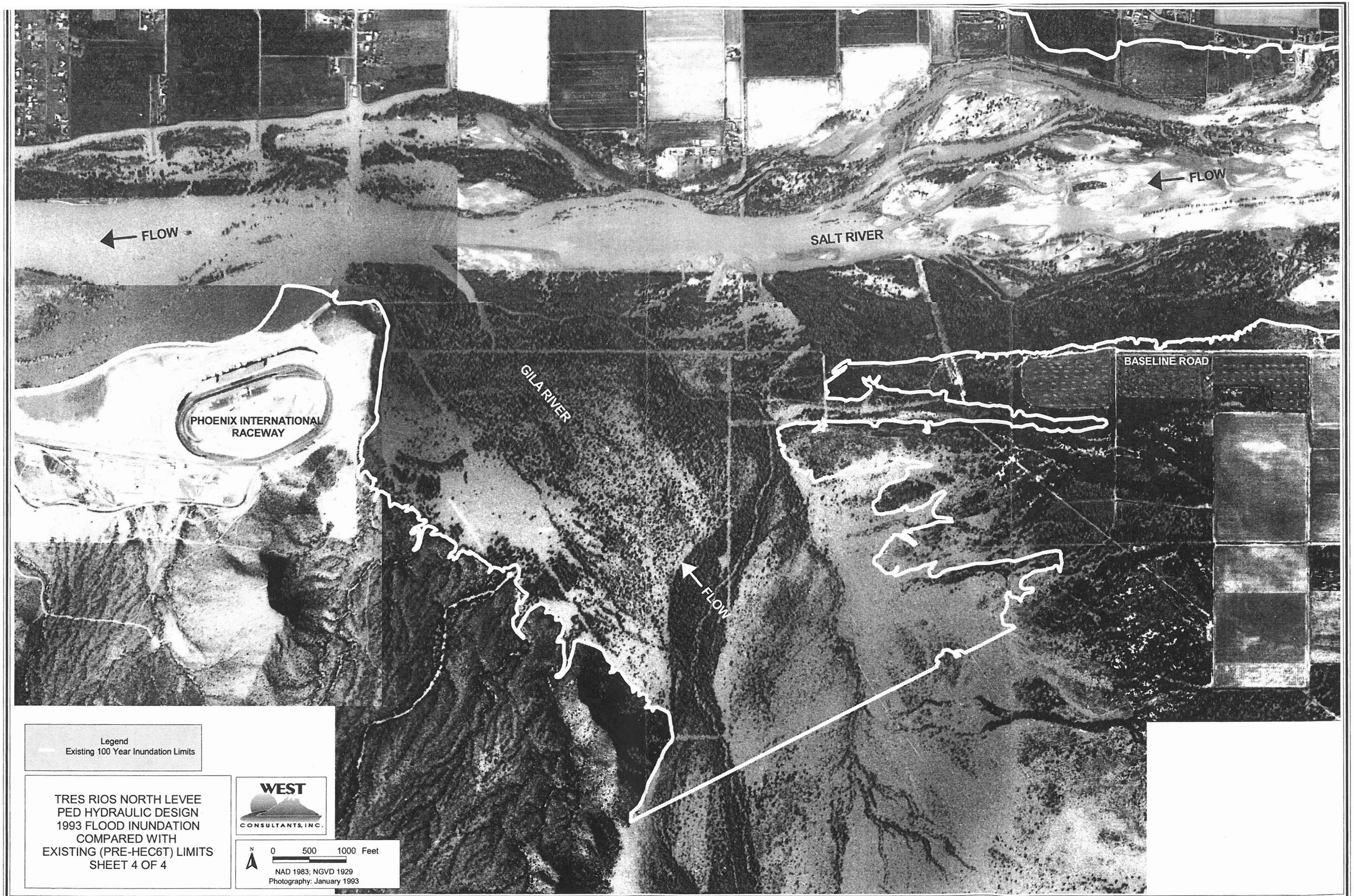
1993 Flood Photos with 100 Year Inundation Limits



TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
1993 FLOOD INUNDATION
COMPARED WITH
EXISTING (PRE-HEC6T) LIMITS
SHEET 1 OF 4


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
1993 FLOOD INUNDATION
COMPARED WITH
EXISTING (PRE-HEC6T) LIMITS
SHEET 2 OF 4
Legend
Existing 100 Year Inundation Limits
N
0 500 1000 Feet
NAD 1983; NGVD 1929
Photography: January and February1993
EL MIRAGE ROAD
115TH AVENUE
107TH AVENUE
SOUTHERN AVENUE
HOLLY ACRES LEVEE
FLOW
SALT RIVER
FLOW
GILA RIVER
FLOW
PHOENIX INTERNATIONAL
RACEWAY


WEST
CONSULTANTS, INC.
TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
1993 FLOOD INUNDATION
COMPARED WITH
EXISTING (PRE-HEC6T) LIMITS
SHEET 3 OF 4
Legend
Existing 100 Year Inundation Limits
N
0 500 1000 Feet
NAD 1983; NGVD 1929
Photography: February 1993
99TH AVENUE
91ST AVENUE
91ST AVENUE WASTEWATER TREATMENT PLANT
SOUTHERN AVENUE
SOUTHERN AVENUE
FLOW
FLOW
SALT RIVER
BASELINE ROAD



TRES RIOS NORTH LEVEE
PED HYDRAULIC DESIGN
1993 FLOOD INUNDATION
COMPARED WITH
EXISTING (PRE-HEC6T) LIMITS
SHEET 4 OF 4