CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY

Volume 2 of 2

Prepared For

Brazoria County

With participation and support of

Texas Water Development Board

Brazoria County

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STATE OF TEXAS
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Table 2-1 Sub-Watershed Characteristics

Drainage Area ID	Area (mi^2)	Impervious %	L (mi)	Lca (mi)	S (ft/mi)	So (ft/mi)	D %	DLU %	DCI %	DCC %	TC (hr)	TC+R (hr)	R (hr)
BR-01	2.65	1.4	4.56	1.66	3.51	3.05	2.46	6.6	21.9	69	1.93	13.57	11.64
BR-02	3.8	1	5.20	2.00	2.17	2.84	2.46	11.4	85.5	36.6	2.06	17.65	15.58
BR-03	6.44	0.4	7.79	3.59	1.84	2.03	2.46	3.4	51.2	63.4	5.32	24.88	19.57
CB-01	3.76	0	4.58	2.50	1.82	2.63	2.46	0.2	0.5	32.2	4.71	17.18	12.48
CB-02	0.68	0.1	2.04	0.77	1.94	1.94	2.46	1.0	18.2	36.1	1.21	9.51	8.30
CB-03	0.42	1.2	1.86	0.81	1.85	1.85	2.46	6.5	33.5	60	1.19	9.06	7.86
CB-04	2.59	3.8	5.37	1.63	1.96	2.13	2.46	25.6	0.1	96.8	2.74	14.78	12.04
CB-05	11.86	2.3	3.00	3.35	2.15	2.75	2.46	19.6	0	33.2	5.70	32.04	26.34
CB-06	7.19	1.8	6.01	1.31	1.15	3.08	2.46	14.4	0.7	40.5	2.94	24.45	21.51
CB-07	1.9	2.4	4.87	4.87	2.03	2.61	2.46	19.1	1.6	53.8	8.66	29.33	20.67
CB-08	1.11	1.1	2.63	0.83	1.85	5.78	2.46	8.9	5.7	60.1	1.39	11.55	10.16
CB-09	3.22	1.6	3.82	2.34	2.90	4.01	2.46	8.2	65	54	2.42	12.83	10.41
CB-10	3.08	1.1	4.15	1.95	2.64	10.61	2.46	11.2	2.1	70.9	2.89	14.06	11.17
CB-11	4.05	0.3	4.50	1.71	1.56	2.93	2.46	3.3	0	85.8	3.41	17.92	14.51
CB-12	6.84	0.7	8.57	3.85	3.71	4.09	2.46	5.2	0.6	99.2	5.06	20.81	15.75
CB-13	6.03	9	5.95	2.40	1.37	2.38	2.46	17.8	0.7	93	5.07	22.84	17.77
CN-01	6.64	0.7	5.03	1.26	6.68	4.34	2.46	5.7	0.5	94.4	1.13	11.60	10.47
CW-01	4.15	0	5.55	3.00	3.32	3.92	2.46	0.2	3.9	95.1	4.09	15.91	11.82
CW-02	2.54	0.1	4.46	2.33	1.66	4.59	2.46	0.8	38.6	51.1	3.83	17.45	13.61
EF-01A	5.48	3.4	6.64	1.81	0.80	2.11	2.46	26.1	82.1	56.2	3.09	39.36	36.27
EF-01B	0.79	4.2	2.12	0.93	1.72	2.58	2.46	23.9	99.4	50.1	0.90	15.92	15.02
EF-02A	0.99	2.2	2.51	0.90	3.46	2.84	2.46	16.7	14.7	92.6	1.03	8.96	7.92
EF-02B	0.35	3.3	1.53	0.40	6.84	2.62	2.46	23.8	20.1	89.7	0.29	4.43	4.14
EF-03	5.03	2.4	5.85	2.53	2.70	3.86	2.46	20.4	13.2	55.2	3.52	28.20	24.68
EF-04A	2.86	0.8	4.36	1.45	2.87	2.67	2.46	5.1	12.3	41.9	1.95	14.12	12.17
EF-04B	4.01	4.7	5.56	2.49	4.75	5.36	2.46	27.0	75.9	54.4	1.76	18.68	16.93
EF-05	0.65	6.5	2.21	1.17	3.40	3.40	2.46	38.7	0	40	1.41	11.56	10.16
NB-01	0.55	3.3	1.55	0.74	4.42	4.79	2.46	22.1	32	60.4	0.67	8.06	7.40
NB-02	0.98	9.7	2.74	1.08	3.82	4.48	2.46	39	23.7	61.6	1.08	8.47	7.39
NB-03	4.24	5.1	5.86	2.33	2.71	3.32	2.46	27.9	23.1	61.2	3.01	20.63	17.62
NB-04	5.91	5	6.95	3.45	4.18	4.60	2.46	31.8	22.9	61.6	3.60	18.15	14.55
NB-05	2.27	12.5	3.85	1.91	5.47	4.26	2.46	54.4	23.1	61.8	1.59	7.54	5.95
NB-06	0.59	3.6	2.27	0.89	3.16	2.49	2.46	17	23.1	61.8	1.03	8.61	7.58
NB-07	1.81	2	4.24	1.43	2.86	2.32	2.46	8.6	21.7	61.1	1.83	13.88	12.05
NB-08	0.8	0	2.10	0.66	0.32	1.71	2.46	0	30.7	60.6	2.53	18.36	15.84
NB-09	4.86	0.2	7.61	3.33	1.64	2.53	2.46	1.4	21.3	64.8	6.14	25.52	19.39
NB-10	2.61	3.2	3.29	1.40	1.26	3.91	2.46	8.7	17.7	70.5	2.81	15.48	12.66
NH-01	4.2	1.1	5.40	2.09	2.72	2.56	2.46	7.9	25.5	53.6	2.76	16.75	13.98
NH-02	3.42	0.3	4.63	2.49	4.52	4.81	2.46	8.1	29.8	40.2	2.49	12.55	10.06
SH-01	7.92	1.3	7.51	3.20	3.27	2.55	2.46	6.4	2.5	95.8	4.40	19.81	15.41
SH-02	5.37	0.7	4.37	2.42	3.52	3.55	2.46	5.4	74.6	65.5	2.15	13.17	11.02
WF-01	4.66	9.4	4.89	2.80	5.57	2.78	2.46	54.1	96	37.5	1.43	14.43	13.00
WF-02	3.36	3.5	4.37	2.02	5.01	3.19	2.46	22.5	34.4	35.2	1.78	26.64	24.86
WF-03	0.33	1	1.44	0.60	1.50	6.10	2.46	7.9	0	30	1.13	8.13	7.00
WF-04A	2.63	4.9	4.15	1.63	4.18	2.41	2.46	39.8	95.2	50.7	0.99	13.08	12.09
WF-04B	0.53	2.6	1.66	0.61	3.01	1.88	2.46	11.5	4.9	31.3	0.78	7.04	6.26
WF-05	0.83	1	2.50	0.74	1.98	3.23	2.46	10.2	0	31.1	1.22	10.87	9.66
WF-06	5.02	0.4	5.47	2.30	3.10	1.50	2.46	7.5	2.4	74.1	3.19	16.13	12.94
WF-07	1.12	3.6	3.03	1.28	3.83	2.36	2.46	19	0	51.1	1.52	17.72	16.20
WF-08	1.47	5.1	4.52	1.79	3.71	2.63	2.46	31.9	28.4	50.2	1.86	17.00	15.14
WF-09	1.29	1.6	2.97	1.23	3.49	3.29	2.46	12.1	0	50.2	1.54	10.06	8.52
WF-10	4.79	1.6	5.68	2.24	4.57	3.05	2.46	11.5	1.9	49.8	2.51	14.46	11.95
WF-11	3.6	0.5	5.56	2.07	2.40	4.93	2.46	5.9	0.4	42.3	3.30	17.88	14.59

Table 5-1 Summary of Conveyance Improvements

Channel	Length (ft)	Existing Average Top Width	2-Year Target						5-Year Target						10-Year Target						100-Year Target					
			Mitigation Pond (ac-ft)	Proposed Average Top Width (ft)	Net Volume (ac-ft)	Cut Volume (ac-ft)	Fill Volume (ac-ft)	Total Volume (ac-ft)	Mitigation Pond (ac-ft)	Proposed Average Top Width (ft)	Net Volume (ac-ft)	Cut Volume (ac-ft)	Fill Volume (ac-ft)	Total Volume (ac-ft)	Mitigation Pond (ac-ft)	Average Top Width (ft)	Net Volume (ac-ft)	Cut Volume (ac-ft)	Fill Volume (ac-ft)	Total Volume (ac-ft)	Mitigation Pond (ac-ft)	Proposed Average Top Width (ft)	Net Volume (ac-ft)	Cut Volume (ac-ft)	Fill Volume (ac-ft)	Total Volume (ac-ft)
C-12 Ditch	10986	45	86	70	85	86	1	172	93	72	92	93	1	185	114	77	113	114	1	227	-	-	-	-	-	-
North Hayes Creek	27739	75	144	131	141	144	3	285	176	136	173	176	3	349	191	138	188	191	3	379	202	144	201	202	1	404
South Hayes Creek	33409	95	188	119	177	188	11	365	221	118	213	221	8	434	268	124	264	268	4	532	326	138	324	326	2	651
West Fork	52050	100	343	140	309	343	35	652	373	143	341	373	32	714	393	145	364	393	30	757	529	147	515	529	14	1045
Chocolate Bayou	134606	118	1866	162	1818	1866	49	3684	1917	170	1871	1917	46	3787	1939	172	1895	1939	44	3834	-	-	-	-	-	-

Table 5-2 Conveyance Improvement with Detention Pond Mitigation and Conveyance Improvement with In-Line Mitigation

Channel	Length (ft)	Existing BW (ft)	2-Year Target			5-Year Target			10-Year Target			100-Year Target		
			With Detention Pond Mitigation		With In-Line Mitigation	With Detention Pond Mitigation		With In-Line Mitigation	With Detention Pond Mitigation		With In-Line Mitigation	With Detention Pond Mitigation		With In-Line Mitigation
			Average TW Note 1 (ft)	Pond Size Note 2 (ac-ft)	Average TW (ft)	Average TW Note 1 (ft)	Pond Size Note 2 (ac-ft)	Average TW (ft)	Average TW Note 1 (ft)	Pond Size Note 2 (ac-ft)	Average TW (ft)	Average TW Note 1 (ft)	Pond Size Note 2 (ac-ft)	Average TW (ft)
C-12 Ditch	10986	45	70	86.3	111	72	93.1	116	77	114	126	-	-	-
North Hayes Creek	27739	75	131	144	146	136	175.7	154	138	191	158	144	202	167
South Hayes Creek	33409	95	119	188	135	118	220.8	140	124	268	152	138	326	165
West Fork Chocolate Bayou	52050	100	140	343.3	158	143	372.9	162	145	393	165	147	529	182
Chocolate Bayou	134606	118	162	1866.4	192	170	1916.7	199	172	1939	202	-	-	-

Note 1: Not including berm
Note 2: Assuming 5 ft depth pond

Table 5-3 Summary of Diversion Ponds

Channel Name	Diversion Detention Pond Name	2 Year Target										5 Year Target								10 Year Target					
		5yr Diversion		10yr Diversion		25yr Diversion		50yr Diversion		100yr Diversion		10yr Diversion		25yr Diversion		50yr Diversion		100yr Diversion		25yr Diversion		50yr Diversion		100yr Diversion	
		Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)	Volume (ac-ft)	Pond [1] (ac)
Chocolate Bayou	CH Detention 1	1668	334	3448	690	5174	1035	6946	1389	8735	1747	1181	236	2614	523	4163	833	5777	1155	960	192	2271	454	3717	743
	CH Detention 2	672	134	1288	258	1883	377	2514	503	3158	632	572	114	1091	218	1647	329	2217	443	467	93	958	192	1455	291
	CH Detention 3	426	85	911	182	1422	284	1981	396	2545	509	342	68	746	149	1227	245	1748	350	375	75	799	160	1263	253
	CH Detention 4	2129	426	4819	964	7412	1482	10054	2011	12708	2542	1570	314	3856	771	6345	1269	8903	1781	1409	282	3647	729	6103	1221
Ditch C12	Ditch C12 Detention 1	76	15	186	37	311	62	445	89	589	118	48	10	131	26	229	46	344	69	42	8	110	22	201	40
East Fork Chocolate Bayou	EF Detention 1	209	42	475	95	731	146	971	194	1199	240	122	24	318	64	546	109	771	154	104	21	276	55	481	96
	EF Detention 2	164	33	312	62	452	90	592	118	733	147	105	21	236	47	368	74	502	100	86	17	203	41	332	66
North Hayes Creek	NH Detention 1	101	20	244	49	408	82	591	118	793	159	59	12	166	33	302	60	464	93	58	12	156	31	289	58
	NH Detention 2	158	32	336	67	520	104	709	142	906	181	90	18	220	44	365	73	527	105	58	12	155	31	282	56
South Hayes Creek	SH Detention 1	200	40	498	100	841	168	1215	243	1618	324	122	24	349	70	624	125	947	189	116	23	311	62	571	114
	SH Detention 2	229	46	518	104	814	163	1118	224	1436	287	190	38	447	89	723	145	1018	204	158	32	388	78	653	131
West Fork Chocolate Bayou	WF Detention 1	600	120	1344	269	2133	427	2993	599	3904	781	318	64	818	164	1417	283	2104	421	228	46	607	121	1090	218
	WF Detention 2	107	21	253	51	405	81	565	113	728	146	175	35	377	75	590	118	800	160	140	28	338	68	559	112

Note 1: Assuming 5 ft depth

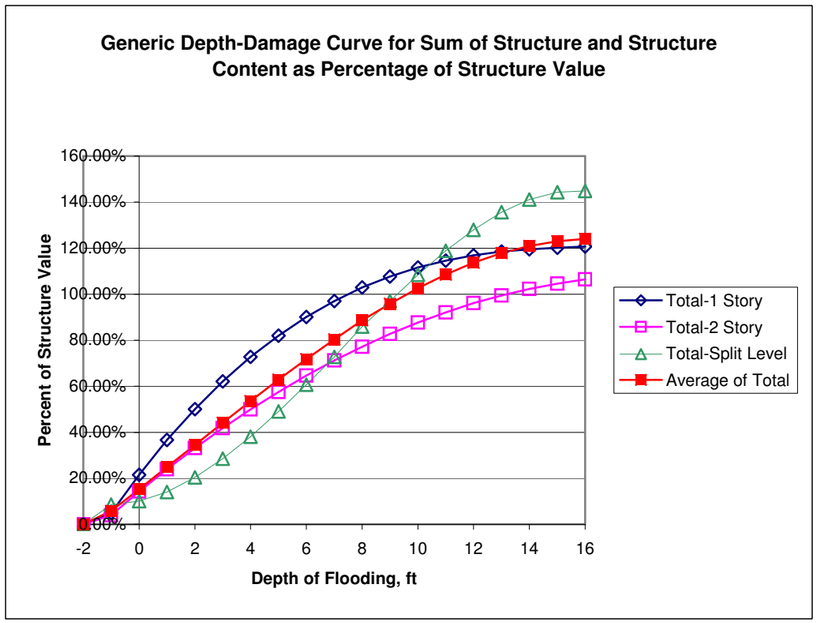
Table 5-4 Summary of Combination Options of Conveyance and Diversion Ponds

Channel	Length (ft)	Existing Average Top Width (ft)	2-Year Target						5-Year Target					10-Year Target			
			Proposed Average Top Width (ft)	5yr Diversion Volume (ac-ft)	10yr Diversion Volume (ac-ft)	25yr Diversion Volume (ac-ft)	50yr Diversion Volume (ac-ft)	100yr Diversion Volume (ac-ft)	Proposed Average Top Width (ft)	10yr Diversion Volume (ac-ft)	25yr Diversion Volume (ac-ft)	50yr Diversion Volume (ac-ft)	100yr Diversion Volume (ac-ft)	Proposed Average Top Width (ft)	25yr Diversion Volume (ac-ft)	50yr Diversion Volume (ac-ft)	100yr Diversion Volume (ac-ft)
C-12 Ditch	10986	45	70	76	186	311	445	589	72	48	131	229	344	77	42	110	201
North Hayes Creek	27739	75	131	259	581	928	1300	1699	136	149	387	666	990	138	116	311	571
South Hayes Creek	33409	95	119	429	1015	1655	2333	3053	118	313	795	1347	1965	124	274	699	1224
West Fork Chocolate Bayou	52050	100	140	707	1597	2538	3558	4633	143	493	1195	2008	2904	145	367	945	1650
Chocolate Bayou	134606	118	162	4896	10466	15891	21495	27147	170	3665	8307	13382	18644	172	3210	7675	12538

Note 1: Not including maintenance berm

Table 6-1 Generic Data for Structure and Structure Content Damage as a Percent of Structure Value[1]

Depth of Flooding ft	Structure 1-Story	Structure 2-Story	Structure Split-Level	Content 1-Story	Content 2-Story	Content Split-Level	Total-1 Story	Total-2 Story	Total-Split Level
-2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
-1	2.50%	3.00%	6.40%	2.40%	1.00%	2.20%	4.90%	4.00%	8.60%
0	13.40%	9.30%	7.20%	8.10%	5.00%	2.90%	21.50%	14.30%	10.10%
1	23.30%	15.20%	9.40%	13.30%	8.70%	4.70%	36.60%	23.90%	14.10%
2	32.10%	20.90%	12.90%	17.90%	12.20%	7.50%	50.00%	33.10%	20.40%
3	40.10%	26.30%	17.40%	22.00%	15.50%	11.10%	62.10%	41.80%	28.50%
4	47.10%	31.40%	22.80%	25.70%	18.50%	15.30%	72.80%	49.90%	38.10%
5	53.20%	36.20%	28.90%	28.80%	21.30%	20.10%	82.00%	57.50%	49.00%
6	58.60%	40.70%	35.50%	31.50%	23.90%	25.20%	90.10%	64.60%	60.70%
7	63.20%	44.90%	42.30%	33.80%	26.30%	30.50%	97.00%	71.20%	72.80%
8	67.20%	48.80%	49.20%	35.70%	28.40%	36.70%	102.90%	77.20%	85.90%
9	70.50%	52.40%	56.10%	37.20%	30.30%	40.90%	107.70%	82.70%	97.00%
10	73.20%	55.70%	62.60%	38.40%	32.00%	45.80%	111.60%	87.70%	108.40%
11	75.40%	58.70%	68.60%	39.20%	33.40%	50.20%	114.60%	92.10%	118.80%
12	77.20%	61.40%	73.90%	39.70%	34.70%	54.10%	116.90%	96.10%	128.00%
13	78.50%	63.80%	78.40%	40.00%	35.60%	57.20%	118.50%	99.40%	135.60%
14	79.50%	65.90%	81.70%	40.00%	36.40%	59.40%	119.50%	102.30%	141.10%
15	80.20%	67.70%	83.80%	40.00%	36.90%	60.50%	120.20%	104.60%	144.30%
16	80.70%	69.20%	84.40%	40.00%	37.20%	60.50%	120.70%	106.40%	144.90%
>16	80.70%	69.20%	84.40%	40.00%	37.20%	60.50%	120.70%	106.40%	144.90%



1. Source: USACE, 2000

Table 6.2. Expected Annual Avoided Damages: Example

Flood Frequency Year	Estimated Damage Avoided Million $	Comment
100	1.4	Assumed = 100 yr
100	1.4	Assumed = 100 yr
100	1.4	Computed
75	1.4	Interpolated
50	1.3	Computed
37.5	1.35	Interpolated
25	1.4	Computed
17.5	1.075	Interpolated
10	0.75	Computed
7.5	0.55	Interpolated
5	0.35	Computed
3.5	0.205	Interpolated
2	0.06	Computed
1.5	0.035	Interpolated
1	0.01	Computed
Less than 1 year	0	Assumed
Expected Annual Damage Avoided (million $)		
As computed from stepped curve		0.173
As computed from smoothed curve		0.169

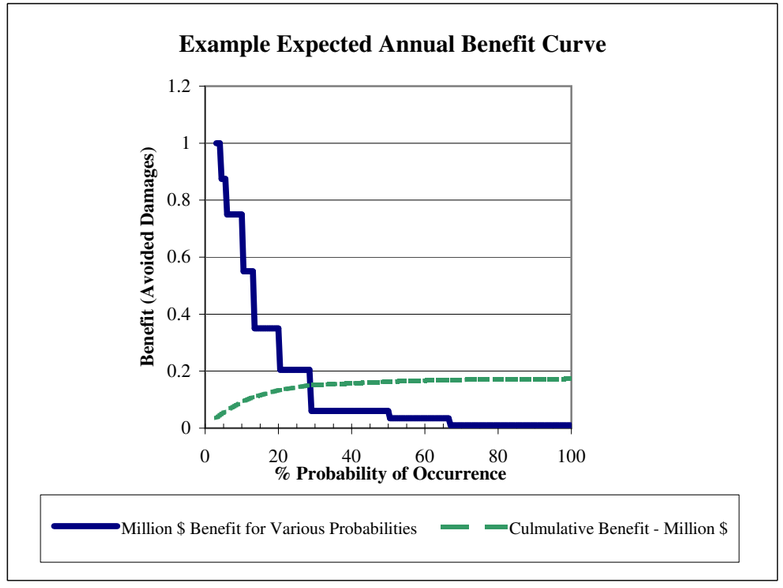


Table 6-3 Expected Annual Average Flood Reduction Benefits

Revised Diversion Pond Benefit Figures based on Watershed wide Benefits Calculated for West Fork

	Chocolate			Ditch C12			North Hayes			South Hayes			West Fork		
	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target
5yr Pond Design	$2,212,290	-	-	$405,343	-	-	$87,792	-	-	$118,769	-	-	$193,172	-	-
10yr Pond Design	$3,330,446	$434,832	-	$680,321	$64,191	-	$131,076	$26,023	-	$169,269	$22,152	-	$253,006	$49,351	-
25yr Pond Design	$4,143,280	$775,630	$165,845	$872,946	$151,173	$42,195	$155,865	$45,906	$13,374	$196,802	$40,088	$4,238	$296,479	$86,906	$30,846
50yr Pond Design	$4,442,028	$930,795	$276,607	$978,733	$238,483	$99,877	$169,389	$56,825	$19,150	$213,851	$50,281	$10,363	$312,397	$103,184	$33,172
100yr Pond Design	$4,593,965	$1,011,646	$342,767	$1,031,877	$283,305	$159,019	$176,109	$62,340	$25,701	$221,860	$55,378	$27,693	$321,680	$111,719	$44,176

Conveyance Improvement Annual Average Benefit Summary

	Chocolate	Ditch C12	North Hayes	South Hayes	West Fork
2yr Channel Design	$4,203,830	$248,490	$185,403	$408,180	$1,535,400
5yr Channel Design	$4,225,061	$251,097	$194,758	$428,610	$1,568,339
10yr Channel Design	$4,232,871	$263,549	$198,138	$452,890	$1,575,911
Average	$4,220,587	$254,379	$192,766	$429,893	$1,559,883

Expected Annual Average benefits for Combined Conveyance and Diversion Ponds

	Chocolate			Ditch C12			North Hayes			South Hayes			West Fork		
	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target
5yr Pond Design	$5,211,998	-	-	$327,701	-	-	$197,369	-	-	$438,034	-	-	$1,579,840	-	-
10yr Pond Design	$5,942,194	$4,303,133	-	$426,297	$256,908	-	$202,551	$193,202	-	$445,582	$430,210	-	$1,592,260	$1,561,405	-
25yr Pond Design	$6,509,000	$4,432,186	$4,235,699	$508,822	$267,124	$255,501	$206,250	$194,088	$192,883	$450,534	$430,909	$429,905	$1,602,686	$1,564,398	$1,560,491
50yr Pond Design	$6,722,969	$4,501,502	$4,258,487	$557,752	$283,526	$260,256	$208,475	$194,766	$193,004	$453,872	$431,471	$429,964	$1,606,772	$1,566,133	$1,560,585
100yr Pond Design	$6,832,799	$4,539,641	$4,275,645	$583,172	$293,906	$268,369	$209,633	$195,157	$193,191	$455,509	$431,795	$430,385	$1,609,218	$1,567,141	$1,561,110

Note:

1. These figures assume that all of the detention benefits within an individual sub-watershed are negated by the mitigation required by the conveyance improvements within the said sub-watershed. As such the total benefits for a combined conveyance detention project is equal to the conveyance benefits calculated for each sub-watershed plus the detention benefits calculated for each sub-watershed on a watershed wide basis minus the detention benefits calculated for each sub-watershed on an individual sub-watershed basis.

Table 6-4 Present Worth of the Expected Annual Average Flood Reduction Benefits

Revised Diversion Pond Benefit Figures based on Watershed Wide Benefits Calculated for West Fork

	Chocolate			Ditch C12			North Hayes			South Hayes			West Fork		
	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target
5yr Pond Design	$116,344,329	-	-	$21,316,976	-	-	$4,616,990	-	-	$6,246,080	-	-	$10,158,899	-	-
10yr Pond Design	$175,148,163	$22,867,798	-	$35,778,057	$3,375,825	-	$6,893,297	$1,368,552	-	$8,901,831	$1,164,988	-	$13,305,562	$2,595,393	-
25yr Pond Design	$217,895,111	$40,790,358	$8,721,808	$45,908,211	$7,950,169	$2,219,031	$8,196,932	$2,414,207	$703,349	$10,349,841	$2,108,238	$222,863	$15,591,825	$4,570,409	$1,622,212
50yr Pond Design	$233,606,249	$48,950,503	$14,546,736	$51,471,563	$12,541,810	$5,252,554	$8,908,174	$2,988,429	$1,007,117	$11,246,444	$2,644,304	$544,991	$16,428,980	$5,426,435	$1,744,512
100yr Pond Design	$241,596,640	$53,202,463	$18,026,091	$54,266,423	$14,899,007	$8,362,834	$9,261,575	$3,278,481	$1,351,591	$11,667,609	$2,912,340	$1,456,353	$16,917,141	$5,875,301	$2,323,214

Conveyance Improvement Annual Average Benefit Summary

	Chocolate	Ditch C12	North Hayes	South Hayes	West Fork
2yr Channel Design	$221,079,401	$13,068,105	$9,750,348	$21,466,170	$80,746,674
5yr Channel Design	$222,195,947	$13,205,172	$10,242,298	$22,540,596	$82,478,973
10yr Channel Design	$222,606,682	$13,860,020	$10,420,089	$23,817,480	$82,877,141
Average	$221,960,677	$13,377,765	$10,137,578	$22,608,082	$82,034,263

Expected Annual Average Benefits for Combined Conveyance and Diversion Ponds

	Chocolate			Ditch C12			North Hayes			South Hayes			West Fork		
	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target
5yr Pond Design	$274,098,998	-	-	$17,233,800	-	-	$10,379,651	-	-	$23,036,186	-	-	$83,083,768	-	-
10yr Pond Design	$312,499,995	$226,301,790	-	$22,418,969	$13,510,766	-	$10,652,178	$10,160,480	-	$23,433,135	$22,624,759	-	$83,736,956	$82,114,285	-
25yr Pond Design	$342,308,328	$233,088,676	$222,755,426	$26,758,947	$14,048,044	$13,436,775	$10,846,693	$10,207,108	$10,143,726	$23,693,592	$22,661,484	$22,608,707	$84,285,245	$82,271,714	$82,066,246
50yr Pond Design	$353,560,961	$236,733,999	$223,953,831	$29,332,199	$14,910,612	$13,686,845	$10,963,708	$10,242,722	$10,150,090	$23,869,141	$22,691,055	$22,611,788	$84,500,132	$82,362,936	$82,071,143
100yr Pond Design	$359,336,877	$238,739,719	$224,856,147	$30,669,010	$15,456,504	$14,113,505	$11,024,591	$10,263,294	$10,159,925	$23,955,202	$22,708,112	$22,633,962	$84,628,755	$82,415,961	$82,098,786

Note:

1. These figures assume that all of the detention benefits within an individual sub-watershed are negated by the mitigation required by the conveyance improvements within the said sub-watershed. As such the total benefits for a combined conveyance detention project is equal to the conveyance benefits calculated for each sub-watershed plus the detention benefits calculated for each sub-watershed on a watershed wide basis minus the detention benefits calculated for each sub-watershed on an individual sub-watershed basis.

Table 6-5 Reduction in 100-yr Storm Flooded Land

Channel 100-YR Storm Event	Existing Area (ac)	Conveyance Improvements		
		2-YR Target Area (ac)	5-YR Target Area (ac)	10-YR Target Area (ac)
Chocolate Bayou	10930	3609	3772	3815
Ditch C-12	2603	545	589	756
North Hayes	3010	1266	1794	2083
South Hayes	4872	1454	1724	2191
West Fork	7527	4135	4374	4444

Channel 100-YR Storm Event	Existing Area (ac)	Diversion Ponds											
		2-YR Target					5-YR Target				10-YR Target		
		5yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)
Chocolate Bayou	10930	791	1495	2390	3226	4020	604	1320	2130	2939	530	1272	2192
Ditch C-12	2603	5	48	105	754	1404	4	23	250	477	4	27	232
North Hayes	3010	30	104	367	939	2593	55	122	727	1331	57	157	827
South Hayes	4872	93	191	515	1167	2887	111	252	939	1627	109	263	1037
West Fork	7527	372	589	877	1517	2158	332	456	906	1356	310	188	803

Channel 100-YR Storm Event	Existing Area (ac)	Combinations Conveyance Improvements & Diversion Ponds											
		2yr Target					5yr Target				10yr Target		
		5yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)
Chocolate Bayou	10930	4475	5102	5588	5772	5866	3842	3957	4019	4053	3818	3839	3854
Ditch C-12	2603	719	935	1116	1224	1279	602	626	665	689	733	747	770
North Hayes	3010	1348	1383	1408	1423	1431	1780	1788	1794	1798	2028	2029	2031
South Hayes	4872	1560	1587	1605	1617	1623	1730	1733	1735	1736	2080	2080	2082
West Fork	7527	4255	4288	4316	4327	4334	4355	4363	4368	4371	4401	4401	4403

Table 7-1 Individual Diversion Pond Project Cost Estimates With Breakdown by Conceptual Pond

Location	Design Level	Detention Pond for Mitigation Area[1] (ac)	Description	Total Construction Costs ($) no bridge	Supplementary Construction Cost ($) no bridge	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion & Bridge Replacements	Total Cost per Mile ($/mile)
Chocolate Bayou Detention 1	2-YR	452	5-YR Pond Design CH Detention 1	$36,552,500	$16,447,500	$53,000,000	$5,230,000	$58,230,000	$8,661,029
	2-YR	935	10-YR Pond Design CH Detention 1	$75,773,000	$34,227,000	$110,000,000	$10,700,000	$120,700,000	$17,952,708
	2-YR	1,400	25-YR Pond Design CH Detention 1	$113,934,000	$51,066,000	$165,000,000	$16,000,000	$181,000,000	$26,921,625
	2-YR	1,880	50-YR Pond Design CH Detention 1	$149,792,500	$67,207,500	$217,000,000	$21,400,000	$238,400,000	$35,459,201
	2-YR	2,370	100-YR Pond Design CH Detention 1	$193,217,500	$86,782,500	$280,000,000	$27,000,000	$307,000,000	$45,662,646
	5-YR	321	10-YR Pond Design CH Detention 1	$26,269,500	$11,830,500	$38,100,000	$3,730,000	$41,830,000	$6,221,721
	5-YR	709	25-YR Pond Design CH Detention 1	$57,931,500	$26,068,500	$84,000,000	$8,150,000	$92,150,000	$13,706,231
	5-YR	1,130	50-YR Pond Design CH Detention 1	$91,717,000	$41,283,000	$133,000,000	$13,000,000	$146,000,000	$21,715,786
	5-YR	1,570	100-YR Pond Design CH Detention 1	$125,381,000	$56,619,000	$182,000,000	$17,900,000	$199,900,000	$29,732,778
	10-YR	260	25-YR Pond Design CH Detention 1	$21,575,500	$9,724,500	$31,300,000	$3,030,000	$34,330,000	$5,106,184
	10-YR	617	50-YR Pond Design CH Detention 1	$50,150,500	$22,549,500	$72,700,000	$7,110,000	$79,810,000	$11,870,801
	10-YR	1,010	100-YR Pond Design CH Detention 1	$82,194,500	$36,805,500	$119,000,000	$11,600,000	$130,600,000	$19,425,217
Chocolate Bayou Detention 2	2-YR	182	5-YR Pond Design CH Detention 2	$14,975,650	$6,724,350	$21,700,000	$2,140,000	$23,840,000	$3,545,920
	2-YR	350	10-YR Pond Design CH Detention 2	$28,539,000	$12,861,000	$41,400,000	$4,070,000	$45,470,000	$6,763,129
	2-YR	511	25-YR Pond Design CH Detention 2	$41,251,000	$18,549,000	$59,800,000	$5,900,000	$65,700,000	$9,772,104
	2-YR	682	50-YR Pond Design CH Detention 2	$55,730,500	$25,069,500	$80,800,000	$7,850,000	$88,650,000	$13,185,647
	2-YR	856	100-YR Pond Design CH Detention 2	$69,770,000	$31,230,000	$101,000,000	$9,830,000	$110,830,000	$16,484,661
	5-YR	155	10-YR Pond Design CH Detention 2	$12,691,300	$5,708,700	$18,400,000	$1,820,000	$20,220,000	$3,007,488
	5-YR	296	25-YR Pond Design CH Detention 2	$24,055,000	$10,845,000	$34,900,000	$3,450,000	$38,350,000	$5,704,112
	5-YR	447	50-YR Pond Design CH Detention 2	$36,406,500	$16,393,500	$52,800,000	$5,170,000	$57,970,000	$8,622,357
	5-YR	601	100-YR Pond Design CH Detention 2	$48,977,000	$22,023,000	$71,000,000	$6,930,000	$77,930,000	$11,591,173
	10-YR	127	25-YR Pond Design CH Detention 2	$10,415,050	$4,684,950	$15,100,000	$1,500,000	$16,600,000	$2,469,055
	10-YR	260	50-YR Pond Design CH Detention 2	$21,575,500	$9,724,500	$31,300,000	$3,030,000	$34,330,000	$5,106,184
	10-YR	395	100-YR Pond Design CH Detention 2	$31,991,000	$14,409,000	$46,400,000	$4,570,000	$50,970,000	$7,581,189
Chocolate Bayou Detention 3	2-YR	115	5-YR Pond Design CH Detention 3	$9,434,900	$4,265,100	$13,700,000	$1,360,000	$15,060,000	$2,239,998
	2-YR	246	10-YR Pond Design CH Detention 3	$20,411,000	$9,189,000	$29,600,000	$2,870,000	$32,470,000	$4,829,531
	2-YR	386	25-YR Pond Design CH Detention 3	$31,803,500	$14,296,500	$46,100,000	$4,470,000	$50,570,000	$7,521,694
	2-YR	538	50-YR Pond Design CH Detention 3	$43,447,500	$19,552,500	$63,000,000	$6,210,000	$69,210,000	$10,294,175
	2-YR	689	100-YR Pond Design CH Detention 3	$55,872,000	$25,128,000	$81,000,000	$7,930,000	$88,930,000	$13,227,293
	5-YR	93	10-YR Pond Design CH Detention 3	$7,666,950	$3,433,050	$11,100,000	$1,100,000	$12,200,000	$1,814,607
	5-YR	202	25-YR Pond Design CH Detention 3	$16,207,750	$7,292,250	$23,500,000	$2,370,000	$25,870,000	$3,847,859
	5-YR	332	50-YR Pond Design CH Detention 3	$27,319,500	$12,280,500	$39,600,000	$3,850,000	$43,450,000	$6,462,677
	5-YR	474	100-YR Pond Design CH Detention 3	$38,703,000	$17,397,000	$56,100,000	$5,480,000	$61,580,000	$9,159,302
	10-YR	102	25-YR Pond Design CH Detention 3	$8,414,150	$3,785,850	$12,200,000	$1,220,000	$13,420,000	$1,996,067
	10-YR	217	50-YR Pond Design CH Detention 3	$17,456,950	$7,843,050	$25,300,000	$2,530,000	$27,830,000	$4,139,386
	10-YR	343	100-YR Pond Design CH Detention 3	$28,424,500	$12,775,500	$41,200,000	$3,990,000	$45,190,000	$6,721,482
Chocolate Bayou Detention 4	2-YR	576	5-YR Pond Design CH Detention 4	$46,831,000	$21,069,000	$67,900,000	$6,640,000	$74,540,000	$11,086,950
	2-YR	1,310	10-YR Pond Design CH Detention 4	$105,507,000	$47,493,000	$153,000,000	$15,000,000	$168,000,000	$24,988,028
	2-YR	2,010	25-YR Pond Design CH Detention 4	$159,995,500	$72,004,500	$232,000,000	$23,000,000	$255,000,000	$37,928,256
	2-YR	2,730	50-YR Pond Design CH Detention 4	$224,939,000	$101,061,000	$326,000,000	$31,100,000	$357,100,000	$53,114,433
	2-YR	3,430	100-YR Pond Design CH Detention 4	$281,271,000	$126,729,000	$408,000,000	$39,000,000	$447,000,000	$66,486,002
	5-YR	425	10-YR Pond Design CH Detention 4	$34,347,000	$15,453,000	$49,800,000	$4,920,000	$54,720,000	$8,138,958
	5-YR	1,050	25-YR Pond Design CH Detention 4	$84,678,000	$38,322,000	$123,000,000	$12,100,000	$135,100,000	$20,094,539
	5-YR	1,720	50-YR Pond Design CH Detention 4	$137,300,500	$61,699,500	$199,000,000	$19,600,000	$218,600,000	$32,514,184
	5-YR	2,420	100-YR Pond Design CH Detention 4	$194,632,500	$87,367,500	$282,000,000	$27,600,000	$309,600,000	$46,049,365
	10-YR	382	25-YR Pond Design CH Detention 4	$30,968,000	$13,932,000	$44,900,000	$4,430,000	$49,330,000	$7,337,258
	10-YR	990	50-YR Pond Design CH Detention 4	$80,725,500	$36,274,500	$117,000,000	$11,400,000	$128,400,000	$19,097,993
	10-YR	1,650	100-YR Pond Design CH Detention 4	$135,110,500	$60,889,500	$196,000,000	$18,800,000	$214,800,000	$31,948,978
Ditch C-12 Detention 1	2-YR	21	5-YR Pond Design C12 Detention 1	$1,773,410	$796,590	$2,570,000	$261,000	$2,831,000	$1,311,200
	2-YR	50	10-YR Pond Design C12 Detention 1	$4,192,700	$1,887,300	$6,080,000	$614,000	$6,694,000	$3,100,379
	2-YR	84	25-YR Pond Design C12 Detention 1	$6,977,450	$3,122,550	$10,100,000	$1,010,000	$11,110,000	$5,145,684
	2-YR	121	50-YR Pond Design C12 Detention 1	$9,925,650	$4,474,350	$14,400,000	$1,430,000	$15,830,000	$7,331,789
	2-YR	160	100-YR Pond Design C12 Detention 1	$12,827,400	$5,772,600	$18,600,000	$1,880,000	$20,480,000	$9,485,474
	5-YR	13	10-YR Pond Design C12 Detention 1	$1,108,880	$501,120	$1,610,000	$170,000	$1,780,000	$824,421
	5-YR	36	25-YR Pond Design C12 Detention 1	$2,943,850	$1,326,150	$4,270,000	$438,000	$4,708,000	$2,180,547

Note 1: Pond depth of 5-ft assumed

Table 7-1 Individual Diversion Pond Project Cost Estimates With Breakdown by Conceptual Pond

Location	Design Level	Detention Pond for Mitigation Area[1] (ac)	Description	Total Construction Costs ($) no bridge	Supplementary Construction Cost ($) no bridge	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion & Bridge Replacements	Total Cost per Mile ($/mile)
Ditch C-12 Detention 1	5-YR	62	50-YR Pond Design C12 Detention 1	$5,125,100	$2,304,900	$7,430,000	$750,000	$8,180,000	$3,788,632
	5-YR	93	100-YR Pond Design C12 Detention 1	$7,724,650	$3,475,350	$11,200,000	$1,110,000	$12,310,000	$5,701,474
	10-YR	11	25-YR Pond Design C12 Detention 1	$971,070	$438,930	$1,410,000	$150,000	$1,560,000	$722,526
	10-YR	30	50-YR Pond Design C12 Detention 1	$2,482,200	$1,117,800	$3,600,000	$371,000	$3,971,000	$1,839,200
	10-YR	55	100-YR Pond Design C12 Detention 1	$4,529,700	$2,040,300	$6,570,000	$661,000	$7,231,000	$3,349,095
East Fork Detention 1	2-YR	57	5-YR Pond Design EF Detention 1	$4,660,750	$2,099,250	$6,760,000	$687,000	$7,447,000	$1,846,450
	2-YR	129	10-YR Pond Design EF Detention 1	$10,633,600	$4,766,400	$15,400,000	$1,530,000	$16,930,000	$4,197,718
	2-YR	198	25-YR Pond Design EF Detention 1	$16,056,350	$7,243,650	$23,300,000	$2,320,000	$25,620,000	$6,352,364
	2-YR	264	50-YR Pond Design EF Detention 1	$21,726,000	$9,774,000	$31,500,000	$3,070,000	$34,570,000	$8,571,477
	2-YR	325	100-YR Pond Design EF Detention 1	$26,420,000	$11,880,000	$38,300,000	$3,770,000	$42,070,000	$10,431,068
	5-YR	33	10-YR Pond Design EF Detention 1	$2,791,800	$1,258,200	$4,050,000	$409,000	$4,459,000	$1,105,589
	5-YR	86	25-YR Pond Design EF Detention 1	$7,182,950	$3,217,050	$10,400,000	$1,030,000	$11,430,000	$2,834,017
	5-YR	148	50-YR Pond Design EF Detention 1	$12,478,150	$5,621,850	$18,100,000	$1,750,000	$19,850,000	$4,921,719
	5-YR	209	100-YR Pond Design EF Detention 1	$17,162,250	$7,737,750	$24,900,000	$2,440,000	$27,340,000	$6,778,831
	10-YR	28	25-YR Pond Design EF Detention 1	$2,358,900	$1,061,100	$3,420,000	$353,000	$3,773,000	$935,498
	10-YR	75	50-YR Pond Design EF Detention 1	$6,151,150	$2,768,850	$8,920,000	$899,000	$9,819,000	$2,434,577
	10-YR	130	100-YR Pond Design EF Detention 1	$10,694,450	$4,805,550	$15,500,000	$1,540,000	$17,040,000	$4,224,992
East Fork Detention 2	2-YR	45	5-YR Pond Design EF Detention 2	$3,723,750	$1,676,250	$5,400,000	$544,000	$5,944,000	$1,473,788
	2-YR	85	10-YR Pond Design EF Detention 2	$6,972,500	$3,127,500	$10,100,000	$1,010,000	$11,110,000	$2,754,675
	2-YR	122	25-YR Pond Design EF Detention 2	$9,985,600	$4,514,400	$14,500,000	$1,440,000	$15,940,000	$3,952,252
	2-YR	160	50-YR Pond Design EF Detention 2	$12,826,050	$5,773,950	$18,600,000	$1,880,000	$20,480,000	$5,077,924
	2-YR	199	100-YR Pond Design EF Detention 2	$16,141,500	$7,258,500	$23,400,000	$2,330,000	$25,730,000	$6,379,638
	5-YR	29	10-YR Pond Design EF Detention 2	$2,364,850	$1,065,150	$3,430,000	$356,000	$3,786,000	$938,722
	5-YR	64	25-YR Pond Design EF Detention 2	$5,325,550	$2,394,450	$7,720,000	$771,000	$8,491,000	$2,105,305
	5-YR	100	50-YR Pond Design EF Detention 2	$8,208,200	$3,691,800	$11,900,000	$1,190,000	$13,090,000	$3,245,607
	5-YR	136	100-YR Pond Design EF Detention 2	$11,184,300	$5,015,700	$16,200,000	$1,610,000	$17,810,000	$4,415,910
	10-YR	23	25-YR Pond Design EF Detention 2	$2,000,900	$899,100	$2,900,000	$294,000	$3,194,000	$791,938
	10-YR	55	50-YR Pond Design EF Detention 2	$4,559,350	$2,050,650	$6,610,000	$669,000	$7,279,000	$1,804,795
	10-YR	90	100-YR Pond Design EF Detention 2	$7,371,800	$3,328,200	$10,700,000	$1,070,000	$11,770,000	$2,918,319
North Hayes Creek Detention 1	2-YR	27	5-YR Pond Design NH Detention 1	$2,330,150	$1,049,850	$3,380,000	$341,000	$3,721,000	$708,276
	2-YR	66	10-YR Pond Design NH Detention 1	$5,462,100	$2,457,900	$7,920,000	$798,000	$8,718,000	$1,659,434
	2-YR	111	25-YR Pond Design NH Detention 1	$9,097,800	$4,102,200	$13,200,000	$1,320,000	$14,520,000	$2,763,820
	2-YR	160	50-YR Pond Design NH Detention 1	$12,826,500	$5,773,500	$18,600,000	$1,880,000	$20,480,000	$3,898,280
	2-YR	215	100-YR Pond Design NH Detention 1	$17,382,600	$7,817,400	$25,200,000	$2,510,000	$27,710,000	$5,274,480
	5-YR	16	10-YR Pond Design NH Detention 1	$1,329,790	$600,210	$1,930,000	$206,000	$2,136,000	$406,578
	5-YR	45	25-YR Pond Design NH Detention 1	$3,738,350	$1,681,650	$5,420,000	$551,000	$5,971,000	$1,136,554
	5-YR	82	50-YR Pond Design NH Detention 1	$6,722,850	$3,027,150	$9,750,000	$980,000	$10,730,000	$2,042,410
	5-YR	126	100-YR Pond Design NH Detention 1	$10,425,400	$4,674,600	$15,100,000	$1,490,000	$16,590,000	$3,157,836
	10-YR	16	25-YR Pond Design NH Detention 1	$1,323,480	$596,520	$1,920,000	$203,000	$2,123,000	$404,104
	10-YR	42	50-YR Pond Design NH Detention 1	$3,518,700	$1,581,300	$5,100,000	$518,000	$5,618,000	$1,069,362
	10-YR	78	100-YR Pond Design NH Detention 1	$6,483,550	$2,916,450	$9,400,000	$940,000	$10,340,000	$1,968,175
North Hayes Creek Detention 2	2-YR	43	5-YR Pond Design NH Detention 2	$3,606,850	$1,623,150	$5,230,000	$526,000	$5,756,000	$1,095,630
	2-YR	91	10-YR Pond Design NH Detention 2	$7,519,600	$3,380,400	$10,900,000	$1,090,000	$11,990,000	$2,282,245
	2-YR	141	25-YR Pond Design NH Detention 2	$11,516,450	$5,183,550	$16,700,000	$1,670,000	$18,370,000	$3,496,651
	2-YR	192	50-YR Pond Design NH Detention 2	$15,931,050	$7,168,950	$23,100,000	$2,250,000	$25,350,000	$4,825,264
	2-YR	246	100-YR Pond Design NH Detention 2	$20,411,000	$9,189,000	$29,600,000	$2,870,000	$32,470,000	$6,180,526
	5-YR	24	10-YR Pond Design NH Detention 2	$2,026,500	$913,500	$2,940,000	$306,000	$3,246,000	$617,862
	5-YR	60	25-YR Pond Design NH Detention 2	$4,979,000	$2,241,000	$7,220,000	$721,000	$7,941,000	$1,511,535
	5-YR	99	50-YR Pond Design NH Detention 2	$8,219,000	$3,681,000	$11,900,000	$1,180,000	$13,080,000	$2,489,722
	5-YR	143	100-YR Pond Design NH Detention 2	$11,589,900	$5,210,100	$16,800,000	$1,690,000	$18,490,000	$3,519,492
	10-YR	16	25-YR Pond Design NH Detention 2	$1,323,480	$596,520	$1,920,000	$203,000	$2,123,000	$404,104
	10-YR	42	50-YR Pond Design NH Detention 2	$3,503,650	$1,576,350	$5,080,000	$515,000	$5,595,000	$1,064,984
	10-YR	76	100-YR Pond Design NH Detention 2	$6,352,050	$2,857,950	$9,210,000	$917,000	$10,127,000	$1,927,631
South Hayes Creek Detention 1	2-YR	54	5-YR Pond Design SH Detention 1	$4,524,650	$2,035,350	$6,560,000	$658,000	$7,218,000	$1,108,556
	2-YR	135	10-YR Pond Design SH Detention 1	$11,026,600	$4,973,400	$16,000,000	$1,600,000	$17,600,000	$2,703,045

Note 1: Pond depth of 5-ft assumed. Pond volume for costing purposes assumes listed pond area and 3:1 side slopes

Table 7-1 Individual Diversion Pond Project Cost Estimates With Breakdown by Conceptual Pond

Location	Design Level	Detention Pond for Mitigation Area[1] (ac)	Description	Total Construction Costs ($) no bridge	Supplementary Construction Cost ($) no bridge	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion & Bridge Replacements	Total Cost per Mile ($/mile)
South Hayes Creek Detention 1	2-YR	228	25-YR Pond Design SH Detention 1	$18,406,500	$8,293,500	$26,700,000	$2,670,000	$29,370,000	$4,510,707
	2-YR	330	50-YR Pond Design SH Detention 1	$27,246,500	$12,253,500	$39,500,000	$3,830,000	$43,330,000	$6,654,714
	2-YR	438	100-YR Pond Design SH Detention 1	$35,529,500	$15,970,500	$51,500,000	$5,070,000	$56,570,000	$8,688,141
	5-YR	33	10-YR Pond Design SH Detention 1	$2,791,800	$1,258,200	$4,050,000	$409,000	$4,459,000	$684,823
	5-YR	95	25-YR Pond Design SH Detention 1	$7,876,950	$3,523,050	$11,400,000	$1,130,000	$12,530,000	$1,924,384
	5-YR	169	50-YR Pond Design SH Detention 1	$13,788,650	$6,211,350	$20,000,000	$1,990,000	$21,990,000	$3,377,271
	5-YR	258	100-YR Pond Design SH Detention 1	$20,758,000	$9,342,000	$30,100,000	$3,010,000	$33,110,000	$5,085,104
	10-YR	31	25-YR Pond Design SH Detention 1	$2,600,000	$1,170,000	$3,770,000	$390,000	$4,160,000	$638,902
	10-YR	84	50-YR Pond Design SH Detention 1	$6,977,450	$3,122,550	$10,100,000	$1,010,000	$11,110,000	$1,706,297
	10-YR	155	100-YR Pond Design SH Detention 1	$12,691,750	$5,708,250	$18,400,000	$1,820,000	$20,220,000	$3,105,431
South Hayes Creek Detention 2	2-YR	62	5-YR Pond Design SH Detention 2	$5,125,100	$2,304,900	$7,430,000	$750,000	$8,180,000	$1,256,302
	2-YR	141	10-YR Pond Design SH Detention 2	$11,517,350	$5,182,650	$16,700,000	$1,670,000	$18,370,000	$2,821,304
	2-YR	221	25-YR Pond Design SH Detention 2	$18,193,350	$8,206,650	$26,400,000	$2,590,000	$28,990,000	$4,452,346
	2-YR	303	50-YR Pond Design SH Detention 2	$25,050,000	$11,250,000	$36,300,000	$3,530,000	$39,830,000	$6,117,176
	2-YR	389	100-YR Pond Design SH Detention 2	$31,867,500	$14,332,500	$46,200,000	$4,500,000	$50,700,000	$7,786,614
	5-YR	52	10-YR Pond Design SH Detention 2	$4,305,000	$1,935,000	$6,240,000	$626,000	$6,866,000	$1,054,495
	5-YR	121	25-YR Pond Design SH Detention 2	$9,924,750	$4,475,250	$14,400,000	$1,430,000	$15,830,000	$2,431,205
	5-YR	196	50-YR Pond Design SH Detention 2	$16,078,400	$7,221,600	$23,300,000	$2,300,000	$25,600,000	$3,931,702
	5-YR	276	100-YR Pond Design SH Detention 2	$22,762,500	$10,237,500	$33,000,000	$3,220,000	$36,220,000	$5,562,745
	10-YR	43	25-YR Pond Design SH Detention 2	$3,606,850	$1,623,150	$5,230,000	$526,000	$5,756,000	$884,019
	10-YR	105	50-YR Pond Design SH Detention 2	$8,607,500	$3,892,500	$12,500,000	$1,250,000	$13,750,000	$2,111,754
	10-YR	177	100-YR Pond Design SH Detention 2	$14,840,000	$6,660,000	$21,500,000	$2,080,000	$23,580,000	$3,621,467
West Fork Detention 1	2-YR	163	5-YR Pond Design WF Detention 1	$13,665,600	$6,134,400	$19,800,000	$1,910,000	$21,710,000	$2,484,423
	2-YR	364	10-YR Pond Design WF Detention 1	$29,648,500	$13,351,500	$43,000,000	$4,220,000	$47,220,000	$5,403,706
	2-YR	578	25-YR Pond Design WF Detention 1	$46,826,500	$21,073,500	$67,900,000	$6,670,000	$74,570,000	$8,533,553
	2-YR	811	50-YR Pond Design WF Detention 1	$65,945,000	$29,655,000	$95,600,000	$9,310,000	$104,910,000	$12,005,566
	2-YR	1,060	100-YR Pond Design WF Detention 1	$86,205,500	$38,794,500	$125,000,000	$12,200,000	$137,200,000	$15,700,730
	5-YR	86	10-YR Pond Design WF Detention 1	$7,182,950	$3,217,050	$10,400,000	$1,030,000	$11,430,000	$1,308,013
	5-YR	222	25-YR Pond Design WF Detention 1	$18,282,100	$8,217,900	$26,500,000	$2,600,000	$29,100,000	$3,330,111
	5-YR	384	50-YR Pond Design WF Detention 1	$31,041,000	$13,959,000	$45,000,000	$4,450,000	$49,450,000	$5,658,900
	5-YR	569	100-YR Pond Design WF Detention 1	$46,634,500	$20,965,500	$67,600,000	$6,570,000	$74,170,000	$8,487,778
	10-YR	62	25-YR Pond Design WF Detention 1	$5,110,050	$2,299,950	$7,410,000	$748,000	$8,158,000	$933,576
	10-YR	164	50-YR Pond Design WF Detention 1	$13,653,000	$6,147,000	$19,800,000	$1,930,000	$21,730,000	$2,486,712
	10-YR	296	100-YR Pond Design WF Detention 1	$24,055,000	$10,845,000	$34,900,000	$3,450,000	$38,350,000	$4,388,652
West Fork Detention 2	2-YR	29	5-YR Pond Design WF Detention 2	$2,463,450	$1,106,550	$3,570,000	$360,000	$3,930,000	$449,737
	2-YR	69	10-YR Pond Design WF Detention 2	$5,682,200	$2,557,800	$8,240,000	$828,000	$9,068,000	$1,037,713
	2-YR	110	25-YR Pond Design WF Detention 2	$9,044,600	$4,055,400	$13,100,000	$1,310,000	$14,410,000	$1,649,034
	2-YR	153	50-YR Pond Design WF Detention 2	$12,613,350	$5,686,650	$18,300,000	$1,800,000	$20,100,000	$2,300,180
	2-YR	197	100-YR Pond Design WF Detention 2	$16,066,700	$7,233,300	$23,300,000	$2,310,000	$25,610,000	$2,930,727
	5-YR	47	10-YR Pond Design WF Detention 2	$3,958,000	$1,782,000	$5,740,000	$579,000	$6,319,000	$723,126
	5-YR	102	25-YR Pond Design WF Detention 2	$8,413,250	$3,786,750	$12,200,000	$1,220,000	$13,420,000	$1,535,742
	5-YR	160	50-YR Pond Design WF Detention 2	$12,826,950	$5,773,050	$18,600,000	$1,880,000	$20,480,000	$2,343,666
	5-YR	217	100-YR Pond Design WF Detention 2	$17,456,500	$7,843,500	$25,300,000	$2,530,000	$27,830,000	$3,184,776
	10-YR	38	25-YR Pond Design WF Detention 2	$3,164,400	$1,425,600	$4,590,000	$467,000	$5,057,000	$578,707
	10-YR	92	50-YR Pond Design WF Detention 2	$7,582,250	$3,417,750	$11,000,000	$1,090,000	$12,090,000	$1,383,541
	10-YR	152	100-YR Pond Design WF Detention 2	$12,625,500	$5,674,500	$18,300,000	$1,790,000	$20,090,000	$2,299,036

Note 1: Pond depth of 5-ft assumed. Pond volume for costing purposes assumes listed pond area and 3:1 side slopes

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
Chocolate Bayou	2-YR	Diversion Pond	452	5-YR Floodplain CH Detention 1	$36,552,500	$16,447,500	$53,000,000	$5,230,000	$58,230,000	$8,661,029
Chocolate Bayou	2-YR	Diversion Pond	935	10-YR Floodplain CH Detention 1	$75,773,000	$34,227,000	$110,000,000	$10,700,000	$120,700,000	$17,952,708
Chocolate Bayou	2-YR	Diversion Pond	1,400	25-YR Floodplain CH Detention 1	$113,934,000	$51,066,000	$165,000,000	$16,000,000	$181,000,000	$26,921,625
Chocolate Bayou	2-YR	Diversion Pond	1,880	50-YR Floodplain CH Detention 1	$149,792,500	$67,207,500	$217,000,000	$21,400,000	$238,400,000	$35,459,201
Chocolate Bayou	2-YR	Diversion Pond	2,370	100-YR Floodplain CH Detention 1	$193,217,500	$86,782,500	$280,000,000	$27,000,000	$307,000,000	$45,662,646
Chocolate Bayou	5-YR	Diversion Pond	321	10-YR Floodplain CH Detention 1	$26,269,500	$11,830,500	$38,100,000	$3,730,000	$41,830,000	$6,221,721
Chocolate Bayou	5-YR	Diversion Pond	709	25-YR Floodplain CH Detention 1	$57,931,500	$26,068,500	$84,000,000	$8,150,000	$92,150,000	$13,706,231
Chocolate Bayou	5-YR	Diversion Pond	1,130	50-YR Floodplain CH Detention 1	$91,717,000	$41,283,000	$133,000,000	$13,000,000	$146,000,000	$21,715,786
Chocolate Bayou	5-YR	Diversion Pond	1,570	100-YR Floodplain CH Detention 1	$125,381,000	$56,619,000	$182,000,000	$17,900,000	$199,900,000	$29,732,778
Chocolate Bayou	10-YR	Diversion Pond	260	25-YR Floodplain CH Detention 1	$21,575,500	$9,724,500	$31,300,000	$3,030,000	$34,330,000	$5,106,184
Chocolate Bayou	10-YR	Diversion Pond	617	50-YR Floodplain CH Detention 1	$50,150,500	$22,549,500	$72,700,000	$7,110,000	$79,810,000	$11,870,801
Chocolate Bayou	10-YR	Diversion Pond	1,010	100-YR Floodplain CH Detention 1	$82,194,500	$36,805,500	$119,000,000	$11,600,000	$130,600,000	$19,425,217
Chocolate Bayou	2-YR	Diversion Pond	182	5-YR Floodplain CH Detention 2	$14,975,650	$6,724,350	$21,700,000	$2,140,000	$23,840,000	$3,545,920
Chocolate Bayou	2-YR	Diversion Pond	350	10-YR Floodplain CH Detention 2	$28,539,000	$12,861,000	$41,400,000	$4,070,000	$45,470,000	$6,763,129
Chocolate Bayou	2-YR	Diversion Pond	511	25-YR Floodplain CH Detention 2	$41,251,000	$18,549,000	$59,800,000	$5,900,000	$65,700,000	$9,772,104
Chocolate Bayou	2-YR	Diversion Pond	682	50-YR Floodplain CH Detention 2	$55,730,500	$25,069,500	$80,800,000	$7,850,000	$88,650,000	$13,185,647
Chocolate Bayou	2-YR	Diversion Pond	856	100-YR Floodplain CH Detention 2	$69,770,000	$31,230,000	$101,000,000	$9,830,000	$110,830,000	$16,484,661
Chocolate Bayou	5-YR	Diversion Pond	155	10-YR Floodplain CH Detention 2	$12,691,300	$5,708,700	$18,400,000	$1,820,000	$20,220,000	$3,007,488
Chocolate Bayou	5-YR	Diversion Pond	296	25-YR Floodplain CH Detention 2	$24,055,000	$10,845,000	$34,900,000	$3,450,000	$38,350,000	$5,704,112
Chocolate Bayou	5-YR	Diversion Pond	447	50-YR Floodplain CH Detention 2	$36,406,500	$16,393,500	$52,800,000	$5,170,000	$57,970,000	$8,622,357
Chocolate Bayou	5-YR	Diversion Pond	601	100-YR Floodplain CH Detention 2	$48,977,000	$22,023,000	$71,000,000	$6,930,000	$77,930,000	$11,591,173

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
Chocolate Bayou	10-YR	Diversion Pond	127	25-YR Floodplain CH Detention 2	$10,415,050	$4,684,950	$15,100,000	$1,500,000	$16,600,000	$2,469,055
Chocolate Bayou	10-YR	Diversion Pond	260	50-YR Floodplain CH Detention 2	$21,575,500	$9,724,500	$31,300,000	$3,030,000	$34,330,000	$5,106,184
Chocolate Bayou	10-YR	Diversion Pond	395	100-YR Floodplain CH Detention 2	$31,991,000	$14,409,000	$46,400,000	$4,570,000	$50,970,000	$7,581,189
Chocolate Bayou	2-YR	Diversion Pond	115	5-YR Floodplain CH Detention 3	$9,434,900	$4,265,100	$13,700,000	$1,360,000	$15,060,000	$2,239,998
Chocolate Bayou	2-YR	Diversion Pond	246	10-YR Floodplain CH Detention 3	$20,411,000	$9,189,000	$29,600,000	$2,870,000	$32,470,000	$4,829,531
Chocolate Bayou	2-YR	Diversion Pond	386	25-YR Floodplain CH Detention 3	$31,803,500	$14,296,500	$46,100,000	$4,470,000	$50,570,000	$7,521,694
Chocolate Bayou	2-YR	Diversion Pond	538	50-YR Floodplain CH Detention 3	$43,447,500	$19,552,500	$63,000,000	$6,210,000	$69,210,000	$10,294,175
Chocolate Bayou	2-YR	Diversion Pond	689	100-YR Floodplain CH Detention 3	$55,872,000	$25,128,000	$81,000,000	$7,930,000	$88,930,000	$13,227,293
Chocolate Bayou	5-YR	Diversion Pond	93	10-YR Floodplain CH Detention 3	$7,666,950	$3,433,050	$11,100,000	$1,100,000	$12,200,000	$1,814,607
Chocolate Bayou	5-YR	Diversion Pond	202	25-YR Floodplain CH Detention 3	$16,207,750	$7,292,250	$23,500,000	$2,370,000	$25,870,000	$3,847,859
Chocolate Bayou	5-YR	Diversion Pond	332	50-YR Floodplain CH Detention 3	$27,319,500	$12,280,500	$39,600,000	$3,850,000	$43,450,000	$6,462,677
Chocolate Bayou	5-YR	Diversion Pond	474	100-YR Floodplain CH Detention 3	$38,703,000	$17,397,000	$56,100,000	$5,480,000	$61,580,000	$9,159,302
Chocolate Bayou	10-YR	Diversion Pond	102	25-YR Floodplain CH Detention 3	$8,414,150	$3,785,850	$12,200,000	$1,220,000	$13,420,000	$1,996,067
Chocolate Bayou	10-YR	Diversion Pond	217	50-YR Floodplain CH Detention 3	$17,456,950	$7,843,050	$25,300,000	$2,530,000	$27,830,000	$4,139,386
Chocolate Bayou	10-YR	Diversion Pond	343	100-YR Floodplain CH Detention 3	$28,424,500	$12,775,500	$41,200,000	$3,990,000	$45,190,000	$6,721,482
Chocolate Bayou	2-YR	Diversion Pond	576	5-YR Floodplain CH Detention 4	$46,831,000	$21,069,000	$67,900,000	$6,640,000	$74,540,000	$11,086,950
Chocolate Bayou	2-YR	Diversion Pond	1,310	10-YR Floodplain CH Detention 4	$105,507,000	$47,493,000	$153,000,000	$15,000,000	$168,000,000	$24,988,028
Chocolate Bayou	2-YR	Diversion Pond	2,010	25-YR Floodplain CH Detention 4	$159,995,500	$72,004,500	$232,000,000	$23,000,000	$255,000,000	$37,928,256
Chocolate Bayou	2-YR	Diversion Pond	2,730	50-YR Floodplain CH Detention 4	$224,939,000	$101,061,000	$326,000,000	$31,100,000	$357,100,000	$53,114,433
Chocolate Bayou	2-YR	Diversion Pond	3,430	100-YR Floodplain CH Detention 4	$281,271,000	$126,729,000	$408,000,000	$39,000,000	$447,000,000	$66,486,002
Chocolate Bayou	5-YR	Diversion Pond	425	10-YR Floodplain CH Detention 4	$34,347,000	$15,453,000	$49,800,000	$4,920,000	$54,720,000	$8,138,958

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
Chocolate Bayou	5-YR	Diversion Pond	1,050	25-YR Floodplain CH Detention 4	$84,678,000	$38,322,000	$123,000,000	$12,100,000	$135,100,000	$20,094,539
Chocolate Bayou	5-YR	Diversion Pond	1,720	50-YR Floodplain CH Detention 4	$137,300,500	$61,699,500	$199,000,000	$19,600,000	$218,600,000	$32,514,184
Chocolate Bayou	5-YR	Diversion Pond	2,420	100-YR Floodplain CH Detention 4	$194,632,500	$87,367,500	$282,000,000	$27,600,000	$309,600,000	$46,049,365
Chocolate Bayou	10-YR	Diversion Pond	382	25-YR Floodplain CH Detention 4	$30,968,000	$13,932,000	$44,900,000	$4,430,000	$49,330,000	$7,337,258
Chocolate Bayou	10-YR	Diversion Pond	990	50-YR Floodplain CH Detention 4	$80,725,500	$36,274,500	$117,000,000	$11,400,000	$128,400,000	$19,097,993
Chocolate Bayou	10-YR	Diversion Pond	1,650	100-YR Floodplain CH Detention 4	$135,110,500	$60,889,500	$196,000,000	$18,800,000	$214,800,000	$31,948,978
Ditch C-12	2-YR	Diversion Pond	21	5-YR Floodplain C12 Detention 1	$1,773,410	$796,590	$2,570,000	$261,000	$2,831,000	$1,311,200
Ditch C-12	2-YR	Diversion Pond	50	10-YR Floodplain C12 Detention 1	$4,192,700	$1,887,300	$6,080,000	$614,000	$6,694,000	$3,100,379
Ditch C-12	2-YR	Diversion Pond	84	25-YR Floodplain C12 Detention 1	$6,977,450	$3,122,550	$10,100,000	$1,010,000	$11,110,000	$5,145,684
Ditch C-12	2-YR	Diversion Pond	121	50-YR Floodplain C12 Detention 1	$9,925,650	$4,474,350	$14,400,000	$1,430,000	$15,830,000	$7,331,789
Ditch C-12	2-YR	Diversion Pond	160	100-YR Floodplain C12 Detention 1	$12,827,400	$5,772,600	$18,600,000	$1,880,000	$20,480,000	$9,485,474
Ditch C-12	5-YR	Diversion Pond	13	10-YR Floodplain C12 Detention 1	$1,108,880	$501,120	$1,610,000	$170,000	$1,780,000	$824,421
Ditch C-12	5-YR	Diversion Pond	36	25-YR Floodplain C12 Detention 1	$2,943,850	$1,326,150	$4,270,000	$438,000	$4,708,000	$2,180,547
Ditch C-12	5-YR	Diversion Pond	62	50-YR Floodplain C12 Detention 1	$5,125,100	$2,304,900	$7,430,000	$750,000	$8,180,000	$3,788,632
Ditch C-12	5-YR	Diversion Pond	93	100-YR Floodplain C12 Detention 1	$7,724,650	$3,475,350	$11,200,000	$1,110,000	$12,310,000	$5,701,474
Ditch C-12	10-YR	Diversion Pond	11	25-YR Floodplain C12 Detention 1	$971,070	$438,930	$1,410,000	$150,000	$1,560,000	$722,526
Ditch C-12	10-YR	Diversion Pond	30	50-YR Floodplain C12 Detention 1	$2,482,200	$1,117,800	$3,600,000	$371,000	$3,971,000	$1,839,200
Ditch C-12	10-YR	Diversion Pond	55	100-YR Floodplain C12 Detention 1	$4,529,700	$2,040,300	$6,570,000	$661,000	$7,231,000	$3,349,095
East Fork	2-YR	Diversion Pond	57	5-YR Floodplain EF Detention 1	$4,660,750	$2,099,250	$6,760,000	$687,000	$7,447,000	$1,846,450
East Fork	2-YR	Diversion Pond	129	10-YR Floodplain EF Detention 1	$10,633,600	$4,766,400	$15,400,000	$1,530,000	$16,930,000	$4,197,718
East Fork	2-YR	Diversion Pond	198	25-YR Floodplain EF Detention 1	$16,056,350	$7,243,650	$23,300,000	$2,320,000	$25,620,000	$6,352,364

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
East Fork	2-YR	Diversion Pond	264	50-YR Floodplain EF Detention 1	$21,726,000	$9,774,000	$31,500,000	$3,070,000	$34,570,000	$8,571,477
East Fork	2-YR	Diversion Pond	325	100-YR Floodplain EF Detention 1	$26,420,000	$11,880,000	$38,300,000	$3,770,000	$42,070,000	$10,431,068
East Fork	5-YR	Diversion Pond	33	10-YR Floodplain EF Detention 1	$2,791,800	$1,258,200	$4,050,000	$409,000	$4,459,000	$1,105,589
East Fork	5-YR	Diversion Pond	86	25-YR Floodplain EF Detention 1	$7,182,950	$3,217,050	$10,400,000	$1,030,000	$11,430,000	$2,834,017
East Fork	5-YR	Diversion Pond	148	50-YR Floodplain EF Detention 1	$12,478,150	$5,621,850	$18,100,000	$1,750,000	$19,850,000	$4,921,719
East Fork	5-YR	Diversion Pond	209	100-YR Floodplain EF Detention 1	$17,162,250	$7,737,750	$24,900,000	$2,440,000	$27,340,000	$6,778,831
East Fork	10-YR	Diversion Pond	28	25-YR Floodplain EF Detention 1	$2,358,900	$1,061,100	$3,420,000	$353,000	$3,773,000	$935,498
East Fork	10-YR	Diversion Pond	75	50-YR Floodplain EF Detention 1	$6,151,150	$2,768,850	$8,920,000	$899,000	$9,819,000	$2,434,577
East Fork	10-YR	Diversion Pond	130	100-YR Floodplain EF Detention 1	$10,694,450	$4,805,550	$15,500,000	$1,540,000	$17,040,000	$4,224,992
East Fork	2-YR	Diversion Pond	45	5-YR Floodplain EF Detention 2	$3,723,750	$1,676,250	$5,400,000	$544,000	$5,944,000	$1,473,788
East Fork	2-YR	Diversion Pond	85	10-YR Floodplain EF Detention 2	$6,972,500	$3,127,500	$10,100,000	$1,010,000	$11,110,000	$2,754,675
East Fork	2-YR	Diversion Pond	122	25-YR Floodplain EF Detention 2	$9,985,600	$4,514,400	$14,500,000	$1,440,000	$15,940,000	$3,952,252
East Fork	2-YR	Diversion Pond	160	50-YR Floodplain EF Detention 2	$12,826,050	$5,773,950	$18,600,000	$1,880,000	$20,480,000	$5,077,924
East Fork	2-YR	Diversion Pond	199	100-YR Floodplain EF Detention 2	$16,141,500	$7,258,500	$23,400,000	$2,330,000	$25,730,000	$6,379,638
East Fork	5-YR	Diversion Pond	29	10-YR Floodplain EF Detention 2	$2,364,850	$1,065,150	$3,430,000	$356,000	$3,786,000	$938,722
East Fork	5-YR	Diversion Pond	64	25-YR Floodplain EF Detention 2	$5,325,550	$2,394,450	$7,720,000	$771,000	$8,491,000	$2,105,305
East Fork	5-YR	Diversion Pond	100	50-YR Floodplain EF Detention 2	$8,208,200	$3,691,800	$11,900,000	$1,190,000	$13,090,000	$3,245,607
East Fork	5-YR	Diversion Pond	136	100-YR Floodplain EF Detention 2	$11,184,300	$5,015,700	$16,200,000	$1,610,000	$17,810,000	$4,415,910
East Fork	10-YR	Diversion Pond	23	25-YR Floodplain EF Detention 2	$2,000,900	$899,100	$2,900,000	$294,000	$3,194,000	$791,938
East Fork	10-YR	Diversion Pond	55	50-YR Floodplain EF Detention 2	$4,559,350	$2,050,650	$6,610,000	$669,000	$7,279,000	$1,804,795
East Fork	10-YR	Diversion Pond	90	100-YR Floodplain EF Detention 2	$7,371,800	$3,328,200	$10,700,000	$1,070,000	$11,770,000	$2,918,319

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
North Hayes	2-YR	Diversion Pond	27	5-YR Floodplain NH Detention 1	$2,330,150	$1,049,850	$3,380,000	$341,000	$3,721,000	$708,276
North Hayes	2-YR	Diversion Pond	66	10-YR Floodplain NH Detention 1	$5,462,100	$2,457,900	$7,920,000	$798,000	$8,718,000	$1,659,434
North Hayes	2-YR	Diversion Pond	111	25-YR Floodplain NH Detention 1	$9,097,800	$4,102,200	$13,200,000	$1,320,000	$14,520,000	$2,763,820
North Hayes	2-YR	Diversion Pond	160	50-YR Floodplain NH Detention 1	$12,826,500	$5,773,500	$18,600,000	$1,880,000	$20,480,000	$3,898,280
North Hayes	2-YR	Diversion Pond	215	100-YR Floodplain NH Detention 1	$17,382,600	$7,817,400	$25,200,000	$2,510,000	$27,710,000	$5,274,480
North Hayes	5-YR	Diversion Pond	16	10-YR Floodplain NH Detention 1	$1,329,790	$600,210	$1,930,000	$206,000	$2,136,000	$406,578
North Hayes	5-YR	Diversion Pond	45	25-YR Floodplain NH Detention 1	$3,738,350	$1,681,650	$5,420,000	$551,000	$5,971,000	$1,136,554
North Hayes	5-YR	Diversion Pond	82	50-YR Floodplain NH Detention 1	$6,722,850	$3,027,150	$9,750,000	$980,000	$10,730,000	$2,042,410
North Hayes	5-YR	Diversion Pond	126	100-YR Floodplain NH Detention 1	$10,425,400	$4,674,600	$15,100,000	$1,490,000	$16,590,000	$3,157,836
North Hayes	10-YR	Diversion Pond	16	25-YR Floodplain NH Detention 1	$1,323,480	$596,520	$1,920,000	$203,000	$2,123,000	$404,104
North Hayes	10-YR	Diversion Pond	42	50-YR Floodplain NH Detention 1	$3,518,700	$1,581,300	$5,100,000	$518,000	$5,618,000	$1,069,362
North Hayes	10-YR	Diversion Pond	78	100-YR Floodplain NH Detention 1	$6,483,550	$2,916,450	$9,400,000	$940,000	$10,340,000	$1,968,175
North Hayes	2-YR	Diversion Pond	43	5-YR Floodplain NH Detention 2	$3,606,850	$1,623,150	$5,230,000	$526,000	$5,756,000	$1,095,630
North Hayes	2-YR	Diversion Pond	91	10-YR Floodplain NH Detention 2	$7,519,600	$3,380,400	$10,900,000	$1,090,000	$11,990,000	$2,282,245
North Hayes	2-YR	Diversion Pond	141	25-YR Floodplain NH Detention 2	$11,516,450	$5,183,550	$16,700,000	$1,670,000	$18,370,000	$3,496,651
North Hayes	2-YR	Diversion Pond	192	50-YR Floodplain NH Detention 2	$15,931,050	$7,168,950	$23,100,000	$2,250,000	$25,350,000	$4,825,264
North Hayes	2-YR	Diversion Pond	246	100-YR Floodplain NH Detention 2	$20,411,000	$9,189,000	$29,600,000	$2,870,000	$32,470,000	$6,180,526
North Hayes	5-YR	Diversion Pond	24	10-YR Floodplain NH Detention 2	$2,026,500	$913,500	$2,940,000	$306,000	$3,246,000	$617,862
North Hayes	5-YR	Diversion Pond	60	25-YR Floodplain NH Detention 2	$4,979,000	$2,241,000	$7,220,000	$721,000	$7,941,000	$1,511,535
North Hayes	5-YR	Diversion Pond	99	50-YR Floodplain NH Detention 2	$8,219,000	$3,681,000	$11,900,000	$1,180,000	$13,080,000	$2,489,722
North Hayes	5-YR	Diversion Pond	143	100-YR Floodplain NH Detention 2	$11,589,900	$5,210,100	$16,800,000	$1,690,000	$18,490,000	$3,519,492

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
North Hayes	10-YR	Diversion Pond	16	25-YR Floodplain NH Detention 2	$1,323,480	$596,520	$1,920,000	$203,000	$2,123,000	$404,104
North Hayes	10-YR	Diversion Pond	42	50-YR Floodplain NH Detention 2	$3,503,650	$1,576,350	$5,080,000	$515,000	$5,595,000	$1,064,984
North Hayes	10-YR	Diversion Pond	76	100-YR Floodplain NH Detention 2	$6,352,050	$2,857,950	$9,210,000	$917,000	$10,127,000	$1,927,631
South Hayes	2-YR	Diversion Pond	54	5-YR Floodplain SH Detention 1	$4,524,650	$2,035,350	$6,560,000	$658,000	$7,218,000	$1,108,556
South Hayes	2-YR	Diversion Pond	135	10-YR Floodplain SH Detention 1	$11,026,600	$4,973,400	$16,000,000	$1,600,000	$17,600,000	$2,703,045
South Hayes	2-YR	Diversion Pond	228	25-YR Floodplain SH Detention 1	$18,406,500	$8,293,500	$26,700,000	$2,670,000	$29,370,000	$4,510,707
South Hayes	2-YR	Diversion Pond	330	50-YR Floodplain SH Detention 1	$27,246,500	$12,253,500	$39,500,000	$3,830,000	$43,330,000	$6,654,714
South Hayes	2-YR	Diversion Pond	438	100-YR Floodplain SH Detention 1	$35,529,500	$15,970,500	$51,500,000	$5,070,000	$56,570,000	$8,688,141
South Hayes	5-YR	Diversion Pond	33	10-YR Floodplain SH Detention 1	$2,791,800	$1,258,200	$4,050,000	$409,000	$4,459,000	$684,823
South Hayes	5-YR	Diversion Pond	95	25-YR Floodplain SH Detention 1	$7,876,950	$3,523,050	$11,400,000	$1,130,000	$12,530,000	$1,924,384
South Hayes	5-YR	Diversion Pond	169	50-YR Floodplain SH Detention 1	$13,788,650	$6,211,350	$20,000,000	$1,990,000	$21,990,000	$3,377,271
South Hayes	5-YR	Diversion Pond	258	100-YR Floodplain SH Detention 1	$20,758,000	$9,342,000	$30,100,000	$3,010,000	$33,110,000	$5,085,104
South Hayes	10-YR	Diversion Pond	31	25-YR Floodplain SH Detention 1	$2,600,000	$1,170,000	$3,770,000	$390,000	$4,160,000	$638,902
South Hayes	10-YR	Diversion Pond	84	50-YR Floodplain SH Detention 1	$6,977,450	$3,122,550	$10,100,000	$1,010,000	$11,110,000	$1,706,297
South Hayes	10-YR	Diversion Pond	155	100-YR Floodplain SH Detention 1	$12,691,750	$5,708,250	$18,400,000	$1,820,000	$20,220,000	$3,105,431
South Hayes	2-YR	Diversion Pond	62	5-YR Floodplain SH Detention 2	$5,125,100	$2,304,900	$7,430,000	$750,000	$8,180,000	$1,256,302
South Hayes	2-YR	Diversion Pond	141	10-YR Floodplain SH Detention 2	$11,517,350	$5,182,650	$16,700,000	$1,670,000	$18,370,000	$2,821,304
South Hayes	2-YR	Diversion Pond	221	25-YR Floodplain SH Detention 2	$18,193,350	$8,206,650	$26,400,000	$2,590,000	$28,990,000	$4,452,346
South Hayes	2-YR	Diversion Pond	303	50-YR Floodplain SH Detention 2	$25,050,000	$11,250,000	$36,300,000	$3,530,000	$39,830,000	$6,117,176
South Hayes	2-YR	Diversion Pond	389	100-YR Floodplain SH Detention 2	$31,867,500	$14,332,500	$46,200,000	$4,500,000	$50,700,000	$7,786,614
South Hayes	5-YR	Diversion Pond	52	10-YR Floodplain SH Detention 2	$4,305,000	$1,935,000	$6,240,000	$626,000	$6,866,000	$1,054,495

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
South Hayes	5-YR	Diversion Pond	121	25-YR Floodplain SH Detention 2	$9,924,750	$4,475,250	$14,400,000	$1,430,000	$15,830,000	$2,431,205
South Hayes	5-YR	Diversion Pond	196	50-YR Floodplain SH Detention 2	$16,078,400	$7,221,600	$23,300,000	$2,300,000	$25,600,000	$3,931,702
South Hayes	5-YR	Diversion Pond	276	100-YR Floodplain SH Detention 2	$22,762,500	$10,237,500	$33,000,000	$3,220,000	$36,220,000	$5,562,745
South Hayes	10-YR	Diversion Pond	43	25-YR Floodplain SH Detention 2	$3,606,850	$1,623,150	$5,230,000	$526,000	$5,756,000	$884,019
South Hayes	10-YR	Diversion Pond	105	50-YR Floodplain SH Detention 2	$8,607,500	$3,892,500	$12,500,000	$1,250,000	$13,750,000	$2,111,754
South Hayes	10-YR	Diversion Pond	177	100-YR Floodplain SH Detention 2	$14,840,000	$6,660,000	$21,500,000	$2,080,000	$23,580,000	$3,621,467
West Fork	2-YR	Diversion Pond	163	5-YR Floodplain WF Detention 1	$13,665,600	$6,134,400	$19,800,000	$1,910,000	$21,710,000	$2,484,423
West Fork	2-YR	Diversion Pond	364	10-YR Floodplain WF Detention 1	$29,648,500	$13,351,500	$43,000,000	$4,220,000	$47,220,000	$5,403,706
West Fork	2-YR	Diversion Pond	578	25-YR Floodplain WF Detention 1	$46,826,500	$21,073,500	$67,900,000	$6,670,000	$74,570,000	$8,533,553
West Fork	2-YR	Diversion Pond	811	50-YR Floodplain WF Detention 1	$65,945,000	$29,655,000	$95,600,000	$9,310,000	$104,910,000	$12,005,566
West Fork	2-YR	Diversion Pond	1,060	100-YR Floodplain WF Detention 1	$86,205,500	$38,794,500	$125,000,000	$12,200,000	$137,200,000	$15,700,730
West Fork	5-YR	Diversion Pond	86	10-YR Floodplain WF Detention 1	$7,182,950	$3,217,050	$10,400,000	$1,030,000	$11,430,000	$1,308,013
West Fork	5-YR	Diversion Pond	222	25-YR Floodplain WF Detention 1	$18,282,100	$8,217,900	$26,500,000	$2,600,000	$29,100,000	$3,330,111
West Fork	5-YR	Diversion Pond	384	50-YR Floodplain WF Detention 1	$31,041,000	$13,959,000	$45,000,000	$4,450,000	$49,450,000	$5,658,900
West Fork	5-YR	Diversion Pond	569	100-YR Floodplain WF Detention 1	$46,634,500	$20,965,500	$67,600,000	$6,570,000	$74,170,000	$8,487,778
West Fork	10-YR	Diversion Pond	62	25-YR Floodplain WF Detention 1	$5,110,050	$2,299,950	$7,410,000	$748,000	$8,158,000	$933,576
West Fork	10-YR	Diversion Pond	164	50-YR Floodplain WF Detention 1	$13,653,000	$6,147,000	$19,800,000	$1,930,000	$21,730,000	$2,486,712
West Fork	10-YR	Diversion Pond	296	100-YR Floodplain WF Detention 1	$24,055,000	$10,845,000	$34,900,000	$3,450,000	$38,350,000	$4,388,652
West Fork	2-YR	Diversion Pond	29	5-YR Floodplain WF Detention 2	$2,463,450	$1,106,550	$3,570,000	$360,000	$3,930,000	$449,737
West Fork	2-YR	Diversion Pond	69	10-YR Floodplain WF Detention 2	$5,682,200	$2,557,800	$8,240,000	$828,000	$9,068,000	$1,037,713
West Fork	2-YR	Diversion Pond	110	25-YR Floodplain WF Detention 2	$9,044,600	$4,055,400	$13,100,000	$1,310,000	$14,410,000	$1,649,034

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
West Fork	2-YR	Diversion Pond	153	50-YR Floodplain WF Detention 2	$12,613,350	$5,686,650	$18,300,000	$1,800,000	$20,100,000	$2,300,180
West Fork	2-YR	Diversion Pond	197	100-YR Floodplain WF Detention 2	$16,066,700	$7,233,300	$23,300,000	$2,310,000	$25,610,000	$2,930,727
West Fork	5-YR	Diversion Pond	47	10-YR Floodplain WF Detention 2	$3,958,000	$1,782,000	$5,740,000	$579,000	$6,319,000	$723,126
West Fork	5-YR	Diversion Pond	102	25-YR Floodplain WF Detention 2	$8,413,250	$3,786,750	$12,200,000	$1,220,000	$13,420,000	$1,535,742
West Fork	5-YR	Diversion Pond	160	50-YR Floodplain WF Detention 2	$12,826,950	$5,773,050	$18,600,000	$1,880,000	$20,480,000	$2,343,666
West Fork	5-YR	Diversion Pond	217	100-YR Floodplain WF Detention 2	$17,456,500	$7,843,500	$25,300,000	$2,530,000	$27,830,000	$3,184,776
West Fork	10-YR	Diversion Pond	38	25-YR Floodplain WF Detention 2	$3,164,400	$1,425,600	$4,590,000	$467,000	$5,057,000	$578,707
West Fork	10-YR	Diversion Pond	92	50-YR Floodplain WF Detention 2	$7,582,250	$3,417,750	$11,000,000	$1,090,000	$12,090,000	$1,383,541
West Fork	10-YR	Diversion Pond	152	100-YR Floodplain WF Detention 2	$12,625,500	$5,674,500	$18,300,000	$1,790,000	$20,090,000	$2,299,036
Chocolate, including East Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	1426	All the diversion ponds along the channel	$116,178,550	$52,281,450	$168,460,000	$16,601,000	$185,061,000	$28,854,136
Chocolate, including East Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	3055	All the diversion ponds along the channel	$247,836,100	$111,663,900	$359,500,000	$35,180,000	$394,680,000	$61,485,788
Chocolate, including East Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	4627	All the diversion ponds along the channel	$373,025,950	$167,674,050	$540,700,000	$53,130,000	$593,830,000	$92,448,295
Chocolate, including East Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	6254	All the diversion ponds along the channel	$508,461,550	$228,438,450	$736,900,000	$71,510,000	$808,410,000	$125,702,857
Chocolate, including East Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	7869	All the diversion ponds along the channel	$642,692,000	$289,008,000	$931,700,000	$89,860,000	$1,021,560,000	$158,671,310
Chocolate, including East Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	1055	All the diversion ponds along the channel	$86,131,400	$38,748,600	$124,880,000	$12,335,000	$137,215,000	$21,227,084
Chocolate, including East Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	2407	All the diversion ponds along the channel	$195,380,750	$88,139,250	$283,520,000	$27,871,000	$311,391,000	$48,292,064
Chocolate, including East Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	3877	All the diversion ponds along the channel	$313,429,850	$140,970,150	$454,400,000	$44,560,000	$498,960,000	$77,482,330

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
Chocolate, including East Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	5410	All the diversion ponds along the channel	$436,040,050	$196,159,950	$632,200,000	$61,960,000	$694,160,000	$107,727,359
Chocolate, including East Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	923	All the diversion ponds along the channel	$75,732,500	$34,087,500	$109,820,000	$10,827,000	$120,647,000	$18,636,002
Chocolate, including East Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	2214	All the diversion ponds along the channel	$180,618,950	$81,211,050	$261,830,000	$25,638,000	$287,468,000	$44,453,736
Chocolate, including East Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	3618	All the diversion ponds along the channel	$295,786,750	$133,013,250	$428,800,000	$41,570,000	$470,370,000	$72,820,177
Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	21	All the diversion ponds along the channel	$1,773,410	$796,590	$2,570,000	$261,000	$2,831,000	$1,311,200
Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	50	All the diversion ponds along the channel	$4,192,700	$1,887,300	$6,080,000	$614,000	$6,694,000	$3,100,379
Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	84	All the diversion ponds along the channel	$6,977,450	$3,122,550	$10,100,000	$1,010,000	$11,110,000	$5,145,684
Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	121	All the diversion ponds along the channel	$9,925,650	$4,474,350	$14,400,000	$1,430,000	$15,830,000	$7,331,789
Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	160	All the diversion ponds along the channel	$12,827,400	$5,772,600	$18,600,000	$1,880,000	$20,480,000	$9,485,474
Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	13	All the diversion ponds along the channel	$1,108,880	$501,120	$1,610,000	$170,000	$1,780,000	$824,421
Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	36	All the diversion ponds along the channel	$2,943,850	$1,326,150	$4,270,000	$438,000	$4,708,000	$2,180,547
Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	62	All the diversion ponds along the channel	$5,125,100	$2,304,900	$7,430,000	$750,000	$8,180,000	$3,788,632
Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	93	All the diversion ponds along the channel	$7,724,650	$3,475,350	$11,200,000	$1,110,000	$12,310,000	$5,701,474
Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	11	All the diversion ponds along the channel	$971,070	$438,930	$1,410,000	$150,000	$1,560,000	$722,526

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	30	All the diversion ponds along the channel	$2,482,200	$1,117,800	$3,600,000	$371,000	$3,971,000	$1,839,200
Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	55	All the diversion ponds along the channel	$4,529,700	$2,040,300	$6,570,000	$661,000	$7,231,000	$3,349,095
North Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	70	All the diversion ponds along the channel	$5,937,000	$2,673,000	$8,610,000	$867,000	$9,477,000	$1,803,906
North Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	157	All the diversion ponds along the channel	$12,981,700	$5,838,300	$18,820,000	$1,888,000	$20,708,000	$3,941,679
North Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	252	All the diversion ponds along the channel	$20,614,250	$9,285,750	$29,900,000	$2,990,000	$32,890,000	$6,260,471
North Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	352	All the diversion ponds along the channel	$28,757,550	$12,942,450	$41,700,000	$4,130,000	$45,830,000	$8,723,544
North Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	461	All the diversion ponds along the channel	$37,793,600	$17,006,400	$54,800,000	$5,380,000	$60,180,000	$11,455,006
North Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	40	All the diversion ponds along the channel	$3,356,290	$1,513,710	$4,870,000	$512,000	$5,382,000	$1,024,441
North Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	105	All the diversion ponds along the channel	$8,717,350	$3,922,650	$12,640,000	$1,272,000	$13,912,000	$2,648,090
North Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	181	All the diversion ponds along the channel	$14,941,850	$6,708,150	$21,650,000	$2,160,000	$23,810,000	$4,532,132
North Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	269	All the diversion ponds along the channel	$22,015,300	$9,884,700	$31,900,000	$3,180,000	$35,080,000	$6,677,328
North Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	31	All the diversion ponds along the channel	$2,646,960	$1,193,040	$3,840,000	$406,000	$4,246,000	$808,208
North Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	84	All the diversion ponds along the channel	$7,022,350	$3,157,650	$10,180,000	$1,033,000	$11,213,000	$2,134,347
North Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	155	All the diversion ponds along the channel	$12,835,600	$5,774,400	$18,610,000	$1,857,000	$20,467,000	$3,895,806

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
South Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	116	All the diversion ponds along the channel	$9,649,750	$4,340,250	$13,990,000	$1,408,000	$15,398,000	$2,364,858
South Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	276	All the diversion ponds along the channel	$22,543,950	$10,156,050	$32,700,000	$3,270,000	$35,970,000	$5,524,349
South Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	449	All the diversion ponds along the channel	$36,599,850	$16,500,150	$53,100,000	$5,260,000	$58,360,000	$8,963,053
South Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	633	All the diversion ponds along the channel	$52,296,500	$23,503,500	$75,800,000	$7,360,000	$83,160,000	$12,771,890
South Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	827	All the diversion ponds along the channel	$67,397,000	$30,303,000	$97,700,000	$9,570,000	$107,270,000	$16,474,755
South Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	85	All the diversion ponds along the channel	$7,096,800	$3,193,200	$10,290,000	$1,035,000	$11,325,000	$1,739,318
South Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	216	All the diversion ponds along the channel	$17,801,700	$7,998,300	$25,800,000	$2,560,000	$28,360,000	$4,355,589
South Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	365	All the diversion ponds along the channel	$29,867,050	$13,432,950	$43,300,000	$4,290,000	$47,590,000	$7,308,974
South Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	534	All the diversion ponds along the channel	$43,520,500	$19,579,500	$63,100,000	$6,230,000	$69,330,000	$10,647,849
South Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	74	All the diversion ponds along the channel	$6,206,850	$2,793,150	$9,000,000	$916,000	$9,916,000	$1,522,920
South Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	189	All the diversion ponds along the channel	$15,584,950	$7,015,050	$22,600,000	$2,260,000	$24,860,000	$3,818,052
South Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	332	All the diversion ponds along the channel	$27,531,750	$12,368,250	$39,900,000	$3,900,000	$43,800,000	$6,726,897
West Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	192	All the diversion ponds along the channel	$16,129,050	$7,240,950	$23,370,000	$2,270,000	$25,640,000	$2,934,160
West Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	433	All the diversion ponds along the channel	$35,330,700	$15,909,300	$51,240,000	$5,048,000	$56,288,000	$6,441,419

Table 7-2 Total Diversion Pond Project Cost Estimates With All Ponds Lumped Together

Location	Bypass Design Level	Type of Pond Improvement	Total Diversion Pond for Surface Area[1] (ac)	Description	Total Construction Costs ($) (no bridges)	Supplementary Cost ($)	Total Construction & Supplementary Cost ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquistion ($)	Construction Cost per Mile ($/mile)
West Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	688	All the diversion ponds along the channel	$55,871,100	$25,128,900	$81,000,000	$7,980,000	$88,980,000	$10,182,587
West Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	964	All the diversion ponds along the channel	$78,558,350	$35,341,650	$113,900,000	$11,110,000	$125,010,000	$14,305,746
West Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	1257	All the diversion ponds along the channel	$102,272,200	$46,027,800	$148,300,000	$14,510,000	$162,810,000	$18,631,457
West Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	134	All the diversion ponds along the channel	$11,140,950	$4,999,050	$16,140,000	$1,609,000	$17,749,000	$2,031,139
West Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	324	All the diversion ponds along the channel	$26,695,350	$12,004,650	$38,700,000	$3,820,000	$42,520,000	$4,865,853
West Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	544	All the diversion ponds along the channel	$43,867,950	$19,732,050	$63,600,000	$6,330,000	$69,930,000	$8,002,566
West Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	786	All the diversion ponds along the channel	$64,091,000	$28,809,000	$92,900,000	$9,100,000	$102,000,000	$11,672,555
West Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	100	All the diversion ponds along the channel	$8,274,450	$3,725,550	$12,000,000	$1,215,000	$13,215,000	$1,512,282
West Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	256	All the diversion ponds along the channel	$21,235,250	$9,564,750	$30,800,000	$3,020,000	$33,820,000	$3,870,253
West Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	448	All the diversion ponds along the channel	$36,680,500	$16,519,500	$53,200,000	$5,240,000	$58,440,000	$6,687,687

Note 1: Pond depth of 5-ft assumed

Table 7-3 Conveyance Improvement Cost Estimates

Location	Channel Design Level	Type of Improvement	Land Acquisition for Widening			Mitigation Pond Surface Area[1] (ac)	Description	Total Construction Costs ($) no bridge	Supplementary Cost ($) no bridge	Total Construction & Supplementary Cost ($) no bridge	Total Bridge/ Culvert Cost ($)	Total Construction & Supplementary Cost with Bridge Replacements ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquisition & Bridge Replacements ($)	Total Cost per Foot ($/ft)	Total Cost per Mile ($/mile)
			Additional Acres Needed (ac)	Widned Channel Top Width (ft)	Existing Channel Top Width (ft)											
Conveyance Improvement with Detention Pond Mitigation																
Chocolate Bayou including East Fork	2-YR	Channel Improvement with Mitigation Pond	15	140	135	506	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$70,130,000	$28,040,000	$98,170,000	5,430,000	$103,600,000	$12,790,000	$116,390,000	$865	$4,565,467
Chocolate Bayou including East Fork	5-YR	Channel Improvement with Mitigation Pond	18	141	135	520	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$72,266,000	$28,904,000	$101,170,000	5,430,000	$106,600,000	$12,990,000	$119,590,000	$888	$4,690,989
Chocolate Bayou including East Fork	10-YR	Channel Improvement with Mitigation Pond	21	142	135	526	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$73,634,000	$29,436,000	$103,070,000	5,430,000	$108,500,000	$13,090,000	$121,590,000	$903	$4,769,440
Ditch C-12	2-YR	Channel Improvement with Mitigation Pond	6	70	49	23	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$3,918,800	$1,565,200	$5,484,000	3,456,000	$8,940,000	$718,000	$9,658,000	$765	$4,037,549
Ditch C-12	5-YR	Channel Improvement with Mitigation Pond	7	72	49	25	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$4,127,000	$1,647,000	$5,774,000	3,456,000	$9,230,000	$749,000	$9,979,000	$790	$4,171,743
Ditch C-12	10-YR	Channel Improvement with Mitigation Pond	8	77	49	31	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$4,788,400	$1,915,600	$6,704,000	3,456,000	$10,160,000	$832,000	$10,992,000	$870	$4,595,230
North Hayes	2-YR	Channel Improvement with Mitigation Pond	23	131	96	39	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$10,872,000	$4,338,000	$15,210,000	9,070,000	$24,280,000	$1,851,000	$26,131,000	$942	$4,973,924
North Hayes	5-YR	Channel Improvement with Mitigation Pond	26	136	96	48	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$12,275,600	$4,904,400	$17,180,000	9,070,000	$26,250,000	$1,992,000	$28,242,000	$1,018	$5,375,744
North Hayes	10-YR	Channel Improvement with Mitigation Pond	27	139	96	52	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$12,905,600	$5,164,400	$18,070,000	9,070,000	$27,140,000	$2,048,000	$29,188,000	$1,052	$5,555,811
South Hayes	2-YR	Channel Improvement with Mitigation Pond	20	96	71	51	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$10,847,200	$4,322,800	$15,170,000	6,020,000	$21,190,000	$2,012,000	$23,202,000	$675	$3,563,413
South Hayes	5-YR	Channel Improvement with Mitigation Pond	23	100	71	60	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$12,203,600	$4,866,400	$17,070,000	6,020,000	$23,090,000	$2,154,000	$25,244,000	$734	$3,877,027
South Hayes	10-YR	Channel Improvement with Mitigation Pond	28	107	71	73	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$14,010,800	$5,599,200	$19,610,000	6,020,000	$25,630,000	$2,355,000	$27,985,000	$814	$4,297,996
West Fork	2-YR	Channel Improvement with Mitigation Pond	37	144	109	93	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$20,793,200	$8,296,800	$29,090,000	9,710,000	$38,800,000	$3,540,000	$42,340,000	$918	$4,845,255
West Fork	5-YR	Channel Improvement with Mitigation Pond	40	146	109	101	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$21,986,000	$8,804,000	$30,790,000	9,710,000	$40,500,000	$3,670,000	$44,170,000	$957	$5,054,674
West Fork	10-YR	Channel Improvement with Mitigation Pond	41	148	109	107	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$22,939,200	$9,150,800	$32,090,000	9,710,000	$41,800,000	$3,750,000	$45,550,000	$987	$5,212,597

Note 1: Pond depth of 5-ft assumed. Pond volume for costing purposes assumes listed pond area and 3:1 side slopes

Table 7-3 Conveyance Improvement Cost Estimates

Location	Channel Design Level	Type of Improvement	Land Acquisition for Widening			Mitigation Pond Surface Area[1] (ac)	Description	Total Construction Costs ($) no bridge	Supplementary Cost ($) no bridge	Total Construction & Supplementary Cost ($) no bridge	Total Bridge/ Culvert Cost ($)	Total Construction & Supplementary Cost with Bridge Replacements ($)	Estimated Land Acquisition Cost ($)	Total Cost With Land Acquisition & Bridge Replacements ($)	Total Cost per Foot ($/ft)	Total Cost per Mile ($/mile)
			Additional Acres Needed (ac)	Widned Channel Top Width (ft)	Existing Channel Top Width (ft)											
Conveyance Improvement with Inline Mitigation																
Chocolate Bayou including East Fork	2-YR	Channel Improvement with Mitigation Pond	106	169	135	0	Widening Channel to convey the 2-YR Storm Event, with In-line Detention	$49,870,000	$20,000,000	$69,870,000	5,430,000	$75,300,000	$7,980,000	$83,280,000	$619	$3,266,707
Chocolate Bayou including East Fork	5-YR	Channel Improvement with Mitigation Pond	109	170	135	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$50,670,000	$20,300,000	$70,970,000	5,430,000	$76,400,000	$8,020,000	$84,420,000	$627	$3,311,424
Chocolate Bayou including East Fork	10-YR	Channel Improvement with Mitigation Pond	112	171	135	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$51,370,000	$20,500,000	$71,870,000	5,430,000	$77,300,000	$8,050,000	$85,350,000	$634	$3,347,904
Ditch C-12	2-YR	Channel Improvement with Mitigation Pond	18	111	49	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$3,604,000	$1,440,000	$5,044,000	3,456,000	$8,500,000	$558,000	$9,058,000	$717	$3,786,717
Ditch C-12	5-YR	Channel Improvement with Mitigation Pond	19	116	49	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$3,794,000	$1,520,000	$5,314,000	3,456,000	$8,770,000	$573,000	$9,343,000	$740	$3,905,862
Ditch C-12	10-YR	Channel Improvement with Mitigation Pond	22	126	49	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$4,204,000	$1,680,000	$5,884,000	3,456,000	$9,340,000	$606,000	$9,946,000	$787	$4,157,948
North Hayes	2-YR	Channel Improvement with Mitigation Pond	32	146	96	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$9,750,000	$3,880,000	$13,630,000	9,070,000	$22,700,000	$1,480,000	$24,180,000	$872	$4,602,560
North Hayes	5-YR	Channel Improvement with Mitigation Pond	37	155	96	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$10,960,000	$4,370,000	$15,330,000	9,070,000	$24,400,000	$1,540,000	$25,940,000	$935	$4,937,568
North Hayes	10-YR	Channel Improvement with Mitigation Pond	40	158	96	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$11,460,000	$4,570,000	$16,030,000	9,070,000	$25,100,000	$1,560,000	$26,660,000	$961	$5,074,617
South Hayes	2-YR	Channel Improvement with Mitigation Pond	33	113	71	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$8,840,000	$3,540,000	$12,380,000	6,020,000	$18,400,000	$1,540,000	$19,940,000	$580	$3,062,428
South Hayes	5-YR	Channel Improvement with Mitigation Pond	40	122	71		Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$10,070,000	$4,010,000	$14,080,000	6,020,000	$20,100,000	$1,620,000	$21,720,000	$632	$3,335,804
South Hayes	10-YR	Channel Improvement with Mitigation Pond	49	134	71	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$11,560,000	$4,620,000	$16,180,000	6,020,000	$22,200,000	$1,720,000	$23,920,000	$696	$3,673,685
West Fork	2-YR	Channel Improvement with Mitigation Pond	55	161	109	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$17,270,000	$6,920,000	$24,190,000	9,710,000	$33,900,000	$2,640,000	$36,540,000	$792	$4,181,521
West Fork	5-YR	Channel Improvement with Mitigation Pond	60	166	109	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$18,270,000	$7,320,000	$25,590,000	9,710,000	$35,300,000	$2,690,000	$37,990,000	$823	$4,347,454
West Fork	10-YR	Channel Improvement with Mitigation Pond	63	169	109	0	Widening Channel to convey the 5-YR Storm Event, with In-line Detention	$19,060,000	$7,630,000	$26,690,000	9,710,000	$36,400,000	$2,730,000	$39,130,000	$848	$4,477,912

Note 1: Pond depth of 5-ft assumed. Pond volume for costing purposes assumes listed pond area and 3:1 side slopes

Table 7-4 Combination Channel Conveyance Improvement and Diversion Pond Cost Estimates

Location	Channel Design Level for Diversion & Conveyance	Type of Improvement	Diversion Pond Area[1]	Description	Total Construction Costs	Supplementary Construction Cost	Total Construction & Supplementary Construction Cost	Total Bridge/Culvert Replacement Cost	Total Cost of all Land Acquistions	Total Cost With Land Acquisition and Bridge Replacements	Total Cost per Length	Construction Cost per Mile
			(ac)		($)	($)	($)		($)		($/ft)	($/mile)
Chocolate, Includes East Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	1426	All the diversion ponds along the channel	$116,178,550	$52,281,450	$168,460,000	$5,430,000	$23,551,000	$249,711,000	1855	$9,795,062
Chocolate, Includes East Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	3055	All the diversion ponds along the channel	$247,836,100	$111,663,900	$359,500,000	$5,430,000	$42,130,000	$459,330,000	3412	$18,017,491
Chocolate, Includes East Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	4627	All the diversion ponds along the channel	$373,025,950	$167,674,050	$540,700,000	$5,430,000	$60,080,000	$658,480,000	4892	$25,829,268
Chocolate, Includes East Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	6254	All the diversion ponds along the channel	$508,461,550	$228,438,450	$736,900,000	$5,430,000	$78,460,000	$873,060,000	6486	$34,246,295
Chocolate, Includes East Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	7869	All the diversion ponds along the channel	$642,692,000	$289,008,000	$931,700,000	$5,430,000	$96,810,000	$1,086,210,000	8070	$42,607,230
Chocolate, Includes East Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	1055	All the diversion ponds along the channel	$86,131,400	$38,748,600	$124,880,000	$5,430,000	$19,325,000	$203,605,000	3412	$18,017,491
Chocolate, Includes East Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	2407	All the diversion ponds along the channel	$195,380,750	$88,139,250	$283,520,000	$5,430,000	$34,861,000	$377,781,000	4892	$25,829,268
Chocolate, Includes East Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	3877	All the diversion ponds along the channel	$313,429,850	$140,970,150	$454,400,000	$5,430,000	$51,550,000	$565,350,000	6486	$34,246,295
Chocolate, Includes East Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	5410	All the diversion ponds along the channel	$436,040,050	$196,159,950	$632,200,000	$5,430,000	$68,950,000	$760,550,000	8070	$42,607,230
Chocolate, Includes East Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	923	All the diversion ponds along the channel	$75,732,500	$34,087,500	$109,820,000	$5,430,000	$17,847,000	$188,067,000	4892	$25,829,268
Chocolate, Includes East Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	2214	All the diversion ponds along the channel	$180,618,950	$81,211,050	$261,830,000	$5,430,000	$32,658,000	$354,888,000	6486	$34,246,295
Chocolate, Includes East Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	3618	All the diversion ponds along the channel	$295,786,750	$133,013,250	$428,800,000	$5,430,000	$48,590,000	$537,790,000	8070	$42,607,230
Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	21	All the diversion ponds along the channel	$1,773,410	$796,590	$2,570,000	$3,456,000	$685,000	$10,161,000	69126	$364,984,703
Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	50	All the diversion ponds along the channel	$4,192,700	$1,887,300	$6,080,000	$3,456,000	$1,038,000	$14,024,000	86002	$454,092,542
Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	84	All the diversion ponds along the channel	$6,977,450	$3,122,550	$10,100,000	$3,456,000	$1,434,000	$18,440,000	16121	$85,117,530
Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	121	All the diversion ponds along the channel	$9,925,650	$4,474,350	$14,400,000	$3,456,000	$1,854,000	$23,160,000	29911	$157,932,200
Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	160	All the diversion ponds along the channel	$12,827,400	$5,772,600	$18,600,000	$3,456,000	$2,304,000	$27,810,000	44762	$236,345,843
Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	13	All the diversion ponds along the channel	$1,108,880	$501,120	$1,610,000	$3,456,000	$601,000	$9,258,000	86002	$454,092,542
Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	36	All the diversion ponds along the channel	$2,943,850	$1,326,150	$4,270,000	$3,456,000	$869,000	$12,186,000	16121	$85,117,530
Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	62	All the diversion ponds along the channel	$5,125,100	$2,304,900	$7,430,000	$3,456,000	$1,181,000	$15,658,000	29911	$157,932,200
Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	93	All the diversion ponds along the channel	$7,724,650	$3,475,350	$11,200,000	$3,456,000	$1,541,000	$19,788,000	44762	$236,345,843
Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	11	All the diversion ponds along the channel	$971,070	$438,930	$1,410,000	$3,456,000	$597,000	$9,427,000	16121	$85,117,530
Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	30	All the diversion ponds along the channel	$2,482,200	$1,117,800	$3,600,000	$3,456,000	$818,000	$11,838,000	29911	$157,932,200
Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	55	All the diversion ponds along the channel	$4,529,700	$2,040,300	$6,570,000	$3,456,000	$1,108,000	$15,098,000	44762	$236,345,843
North Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	70	All the diversion ponds along the channel	$5,937,000	$2,673,000	$8,610,000	$9,070,000	$2,237,000	$33,577,000	13619	$71,908,997
North Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	157	All the diversion ponds along the channel	$12,981,700	$5,838,300	$18,820,000	$9,070,000	$3,258,000	$44,808,000	20381	$107,611,954
North Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	252	All the diversion ponds along the channel	$20,614,250	$9,285,750	$29,900,000	$9,070,000	$4,360,000	$56,990,000	27418	$144,767,439
North Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	352	All the diversion ponds along the channel	$28,757,550	$12,942,450	$41,700,000	$9,070,000	$5,500,000	$69,930,000	6780	$35,797,749
North Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	461	All the diversion ponds along the channel	$37,793,600	$17,006,400	$54,800,000	$9,070,000	$6,750,000	$84,280,000	12794	$67,551,413
North Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	40	All the diversion ponds along the channel	$3,356,290	$1,513,710	$4,870,000	$9,070,000	$1,922,000	$30,812,000	20381	$107,611,954
North Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	105	All the diversion ponds along the channel	$8,717,350	$3,922,650	$12,640,000	$9,070,000	$2,682,000	$39,342,000	27418	$144,767,439
North Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	181	All the diversion ponds along the channel	$14,941,850	$6,708,150	$21,650,000	$9,070,000	$3,570,000	$49,240,000	6780	$35,797,749

Table 7-4 Combination Channel Conveyance Improvement and Diversion Pond Cost Estimates

Location	Channel Design Level for Diversion & Conveyance	Type of Improvement	Diversion Pond Area[1]	Description	Total Construction Costs	Supplementary Construction Cost	Total Construction & Supplementary Construction Cost	Total Bridge/Culvert Replacement Cost	Total Cost of all Land Acquistions	Total Cost With Land Acquisition and Bridge Replacements	Total Cost per Length	Construction Cost per Mile
			(ac)		($)	($)	($)		($)		($/ft)	($/mile)

Note 1: Pond depth of 5-ft assumed. Pond volume for costing purposes assumes listed pond area and 3:1 side slopes

Table 7-4 Combination Channel Conveyance Improvement and Diversion Pond Cost Estimates

Location	Channel Design Level for Diversion & Conveyance	Type of Improvement	Diversion Pond Area[1]	Description	Total Construction Costs	Supplementary Construction Cost	Total Construction & Supplementary Construction Cost	Total Bridge/Culvert Replacement Cost	Total Cost of all Land Acquistions	Total Cost With Land Acquisition and Bridge Replacements	Total Cost per Length	Construction Cost per Mile
			(ac)		($)	($)	($)		($)		($/ft)	($/mile)
North Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	269	All the diversion ponds along the channel	$22,015,300	$9,884,700	$31,900,000	$9,070,000	$4,590,000	$60,510,000	12794	$67,551,413
North Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	31	All the diversion ponds along the channel	$2,646,960	$1,193,040	$3,840,000	$6,020,000	$1,826,000	$30,206,000	27418	$144,767,439
North Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	84	All the diversion ponds along the channel	$7,022,350	$3,157,650	$10,180,000	$6,020,000	$2,453,000	$37,173,000	6780	$35,797,749
North Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	155	All the diversion ponds along the channel	$12,835,600	$5,774,400	$18,610,000	$6,020,000	$3,277,000	$46,427,000	12794	$67,551,413
South Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	116	All the diversion ponds along the channel	$9,649,750	$4,340,250	$13,990,000	$6,020,000	$2,798,000	$34,728,000	10323	$54,504,454
South Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	276	All the diversion ponds along the channel	$22,543,950	$10,156,050	$32,700,000	$6,020,000	$4,660,000	$55,300,000	15643	$82,594,933
South Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	449	All the diversion ponds along the channel	$36,599,850	$16,500,150	$53,100,000	$6,020,000	$6,650,000	$77,690,000	296	$1,560,548
South Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	633	All the diversion ponds along the channel	$52,296,500	$23,503,500	$75,800,000	$6,020,000	$8,750,000	$102,490,000	408	$2,153,836
South Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	827	All the diversion ponds along the channel	$67,397,000	$30,303,000	$97,700,000	$6,020,000	$10,960,000	$126,600,000	536	$2,832,054
South Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	85	All the diversion ponds along the channel	$7,096,800	$3,193,200	$10,290,000	$6,020,000	$2,465,000	$31,725,000	15643	$82,594,933
South Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	216	All the diversion ponds along the channel	$17,801,700	$7,998,300	$25,800,000	$6,020,000	$3,990,000	$48,760,000	296	$1,560,548
South Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	365	All the diversion ponds along the channel	$29,867,050	$13,432,950	$43,300,000	$6,020,000	$5,720,000	$67,990,000	408	$2,153,836
South Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	534	All the diversion ponds along the channel	$43,520,500	$19,579,500	$63,100,000	$6,020,000	$7,660,000	$89,730,000	536	$2,832,054
South Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	74	All the diversion ponds along the channel	$6,206,850	$2,793,150	$9,000,000	$6,020,000	$2,396,000	$31,786,000	296	$1,560,548
South Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	189	All the diversion ponds along the channel	$15,584,950	$7,015,050	$22,600,000	$6,020,000	$3,740,000	$46,730,000	408	$2,153,836
South Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	332	All the diversion ponds along the channel	$27,531,750	$12,368,250	$39,900,000	$6,020,000	$5,380,000	$65,670,000	536	$2,832,054
West Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	192	All the diversion ponds along the channel	$16,129,050	$7,240,950	$23,370,000	$9,710,000	$4,700,000	$61,410,000	400	$2,110,215
West Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	433	All the diversion ponds along the channel	$35,330,700	$15,909,300	$51,240,000	$9,710,000	$7,478,000	$92,058,000	502	$2,650,357
West Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	688	All the diversion ponds along the channel	$55,871,100	$25,128,900	$81,000,000	$9,710,000	$10,410,000	$124,750,000	603	$3,182,488
West Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	964	All the diversion ponds along the channel	$78,558,350	$35,341,650	$113,900,000	$9,710,000	$13,540,000	$160,780,000	201	$1,059,456
West Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	1257	All the diversion ponds along the channel	$102,272,200	$46,027,800	$148,300,000	$9,710,000	$16,940,000	$198,580,000	264	$1,394,527
West Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	134	All the diversion ponds along the channel	$11,140,950	$4,999,050	$16,140,000	$9,710,000	$4,069,000	$54,589,000	502	$2,650,357
West Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	324	All the diversion ponds along the channel	$26,695,350	$12,004,650	$38,700,000	$9,710,000	$6,280,000	$79,360,000	603	$3,182,488
West Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	544	All the diversion ponds along the channel	$43,867,950	$19,732,050	$63,600,000	$9,710,000	$8,790,000	$106,770,000	201	$1,059,456
West Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	786	All the diversion ponds along the channel	$64,091,000	$28,809,000	$92,900,000	$9,710,000	$11,560,000	$138,840,000	264	$1,394,527
West Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	100	All the diversion ponds along the channel	$8,274,450	$3,725,550	$12,000,000	$9,710,000	$3,695,000	$50,835,000	603	$3,182,488
West Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	256	All the diversion ponds along the channel	$21,235,250	$9,564,750	$30,800,000	$9,710,000	$5,500,000	$71,440,000	201	$1,059,456
West Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	448	All the diversion ponds along the channel	$36,680,500	$16,519,500	$53,200,000	$9,710,000	$7,720,000	$96,060,000	264	$1,394,527

Note 1: Pond depth of 5-ft assumed. Pond volume for costing purposes assumes listed pond area and 3:1 side slopes

Table 7-5 Siphon Improvements Cost Estimates

Location	Design Level for Siphons and Channel Conveyance Improvement	Type of Improvement	Description	Construction Cost for Siphons ($)	Supplementary Construction Cost for Siphons ($)	Total Construction & Supplementary Cost for Siphons ($)	Construction Costs for Mitigation Pond ($)	Supplementary Cost for Mitigation Pond ($)	Total Construction & Supplementary Cost for Mitigation Pond ($)	Bridge/ Culvert Cost ($)	Bridge/Culvert Supplementary Cost ($)	Total Siphon Improvement Cost ($)	Estimated Land Acquisition for Conveyence Improvement ($)	Estimated Land Acquisition for Mitigation Pond ($)	Total Cost of Land Acquistion ($)	Total Cost With Land Acquistion, Bridge Replacement and Siphon Improvement ($)	Construction Cost per Mile ($/mile)
Siphon Improvements				**Conveyance**			**Mitigation Pond**			**Siphons**			**Land**				
West Fork Tributary A	100-YR	Siphon Improvement	Siphon Improvement, Widening of Channel, and Mitigation Pond	$2,007,000	$573,000	$2,580,000	$20,432,000	$8,168,000	$28,600,000	$2,350,000	$823,000	$3,173,000	$375,000	$2,870,000	$3,245,000	$37,598,000	$29,852,247
West Fork Tributary B	100-YR	Siphon Improvement	Siphon Improvement, Widening of Channel, and Mitigation Pond	$2,395,000	$685,000	$3,080,000	$9,367,600	$3,732,400	$13,100,000	$2,270,000	$795,000	$3,065,000	$444,000	$1,350,000	$1,794,000	$21,039,000	$16,629,629
East Fork Tributary A	100-YR	Siphon Improvement	Siphon Improvement, Widening of Channel, and Mitigation Pond	$3,020,000	$864,000	$3,884,000	$9,988,000	$4,012,000	$14,000,000	$3,550,000	$1,240,000	$4,790,000	$563,000	$1,440,000	$2,003,000	$24,677,000	$13,572,350
East Fork Tributary B	100-YR	Siphon Improvement	Siphon Improvement, Widening of Channel, and Mitigation Pond	$1,547,000	$443,000	$1,990,000	$1,799,200	$720,800	$2,520,000	$2,350,000	$823,000	$3,173,000	$302,000	$275,000	$577,000	$8,260,000	$5,071,256
Ditch C-12	100-YR	Siphon Improvement	Siphon Improvement, Widening of Channel, and Mitigation Pond	$2,317,000	$663,000	$2,980,000	$30,792,000	$12,308,000	$43,100,000	$1,580,000	$553,000	$2,133,000	$228,000	$4,350,000	$4,578,000	$52,791,000	$48,058,014

Table 7-6 Brunner Options Cost Estimates

Location	Design Level	Type of Improvement	Mitigation Pond Area (ac)	Construction Costs ($)	Supplementary Construction Cost ($)	Construction & Supplementary Cost without Bridge ($)	Total Bridge/Culvert Cost ($)	Estimated Land Acquisition ($)	Total Cost With Land and Bridge ($)	Toal Cost per Mile ($/mile)
Brunner Option 1A				**Without Bridge/Culvert Replacements**						
North Hayes	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	27	$4,986,800	$2,013,200	$7,000,000	9,070,000	$761,000	$16,831,000	$11,151,673
South Hayes	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	44	$7,994,400	$3,185,600	$11,180,000	6,020,000	$1,289,000	$18,489,000	$5,828,174
West Fork	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	72	$12,928,400	$5,161,600	$18,090,000	9,710,000	$2,055,000	$29,855,000	$7,204,497
Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	1,530	$195,702,000	$78,192,000	$273,894,000	2,106,000	$23,550,000	$299,550,000	$17,632,375
		Component for Widening of Common Portion of Existing Brunner Ditch Only (Note 1)	---	---	---	---	---	---	*$99,850,000*	
Total				**$221,611,600**	**$88,552,400**	**$310,164,000**	**$26,906,000**	**$27,655,000**	**$464,575,000**	**$41,816,719**
Brunner Option 1B				**Without Bridge/Culvert Replacements**						
North Hayes	100-YR	Channel Improvement with In-line Mitigation	0	$3,660,000	$1,470,000	$5,130,000	9,070,000	$469,000	$14,669,000	$9,719,202
South Hayes	100-YR	Channel Improvement with In-line Mitigation	0	$6,330,000	$2,550,000	$8,880,000	6,020,000	$889,000	$15,789,000	$4,977,070
West Fork	100-YR	Channel Improvement with In-line Mitigation	0	$10,550,000	$4,240,000	$14,790,000	9,710,000	$1,370,000	$25,870,000	$6,242,852
Brunner Ditch	100-YR	Channel Improvement with In-line Mitigation	0	$194,794,000	$77,100,000	$271,894,000	2,106,000	$11,200,000	$285,200,000	$16,787,692
		Component for Widening of Common Portion of Existing Brunner Ditch Only (Note 1)	---	---	---	---	---	---	*$95,066,667*	
Total				**$215,334,000**	**$85,360,000**	**$300,694,000**	**$26,906,000**	**$13,928,000**	**$341,528,000**	**$37,726,816**
Brunner Option 2A				**Without Bridge/Culvert Replacements**						
North Hayes	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	55	$13,922,000	$5,568,000	$19,490,000	9,070,000	$2,123,000	$30,683,000	$5,840,378
South Hayes	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	88	$16,064,400	$6,415,600	$22,480,000	6,020,000	$2,590,000	$31,090,000	$4,774,868
West Fork	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	143	$26,277,600	$10,512,400	$36,790,000	9,710,000	$4,200,000	$50,700,000	$5,801,946
Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond for Brunner Ditch	1,050	$132,826,000	$53,276,000	$186,102,000	2,498,000	$16,280,000	$204,880,000	$17,447,845
		Component for Widening of Common Portion of Existing Brunner Ditch Only (Note 1)	---	---	---	---	---	---	*$102,440,000*	
Total				**$189,090,000**	**$75,772,000**	**$264,862,000**	**$27,298,000**	**$25,193,000**	**$317,353,000**	**$33,865,038**
Brunner Option 2B				**Without Bridge/Culvert Replacements**						
North Hayes	100-YR	Channel Improvement with In-line Mitigation	0	$12,820,000	$5,110,000	$17,930,000	9,070,000	$1,630,000	$28,630,000	$5,449,598
South Hayes	100-YR	Channel Improvement with In-line Mitigation	0	$13,140,000	$5,240,000	$18,380,000	6,020,000	$1,820,000	$26,220,000	$4,026,923
West Fork	100-YR	Channel Improvement with In-line Mitigation	0	$22,360,000	$8,930,000	$31,290,000	9,710,000	$2,890,000	$43,890,000	$5,022,632
Brunner Ditch	100-YR	Channel Improvement with In-line Mitigation	0	$106,102,000	$42,400,000	$148,502,000	2,498,000	$6,660,000	$157,660,000	$13,426,529
		Component for Widening of Common Portion of Existing Brunner Ditch Only (Note 1 & 2)	---	---	---	---	---	---	*$78,830,000*	
Total				**$154,422,000**	**$61,680,000**	**$216,102,000**	**$27,298,000**	**$13,000,000**	**$256,400,000**	**$27,925,682**
Brunner Option 3A				**Without Bridge/Culvert Replacements**						
Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	649	**$84,886,000**	**$33,980,000**	**$118,866,000**	**1,134,000**	**$10,510,000**	**$130,510,000**	**$15,313,173**
		Component for Widening of Common Portion of Existing Brunner Ditch Only (Note 1)	---	---	---	---	---	---	*$102,440,000*	
Brunner Option 3B				**Without Bridge/Culvert Replacements**						
Brunner Ditch	100-YR	Component for Widening of Existing Brunner Ditch Only (Note 1)	0	**$63,066,000**	**$25,200,000**	**$88,266,000**	**1,134,000**	**$4,340,000**	**$93,740,000**	**$10,998,827**
		Component for Widening of Common Portion of Existing Brunner Ditch Only (Note 1)	---	---	---	---	---	---	*$78,830,000*	

Note 1: Cost for "Component of Widening of Exisitng Brunner Ditch" is the cost for the length of channel common to all Brunner Ditch options and is computed from the total project cost and the relative length of the common length compared to the total length of widened channel; this data used in marginal analysis of Section 9.
Note 2: Component cost is included in the Brunner Ditch cost for summation of total cost

Table 8-1 Computed Benefit/Cost

Project ID	Location	Design Level	Type of Improvement	Description	Construction Cost	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Con. Cost	Benefit / Total Cost	Structures Removed From Flooding
CV-1	Chocolate Bayou	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$98.17M	$116.39M	$4.20M	$221.08M	2.25	1.90	221
CV-2	Chocolate Bayou	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$101.17M	$119.59M	$4.23M	$222.20M	2.20	1.86	222
CV-3	Chocolate Bayou	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$103.07M	$121.59M	$4.23M	$222.61M	2.16	1.83	222
CV-4	Ditch C-12	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$5.48M	$9.66M	$0.25M	$13.07M	2.38	1.35	14
CV-5	Ditch C-12	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$5.77M	$9.98M	$0.25M	$13.21M	2.29	1.32	14
CV-6	Ditch C-12	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$6.70M	$10.99M	$0.26M	$13.86M	2.07	1.26	14
CV-7	North Hayes	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$15.21M	$26.13M	$0.19M	$9.75M	0.64	0.37	10
CV-8	North Hayes	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$17.18M	$28.24M	$0.19M	$10.24M	0.60	0.36	11
CV-9	North Hayes	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$18.07M	$29.19M	$0.20M	$10.42M	0.58	0.36	11
CV-10	South Hayes	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$15.17M	$23.20M	$0.41M	$21.47M	1.42	0.93	22
CV-11	South Hayes	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$17.07M	$25.24M	$0.43M	$22.54M	1.32	0.89	23
CV-12	South Hayes	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$19.61M	$27.99M	$0.45M	$23.82M	1.21	0.85	24
CV-13	West Fork	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$29.09M	$42.34M	$1.54M	$80.75M	2.78	1.91	81
CV-14	West Fork	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$30.79M	$44.17M	$1.57M	$82.48M	2.68	1.87	83
CV-15	West Fork	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$32.09M	$45.55M	$1.58M	$82.88M	2.58	1.82	83
CV-16	Chocolate Bayou	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$69.87M	$83.28M	$4.20M	$221.08M	3.16	2.65	221
CV-17	Chocolate Bayou	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$70.97M	$84.42M	$4.23M	$222.20M	3.13	2.63	222
CV-18	Chocolate Bayou	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$71.87M	$85.35M	$4.23M	$222.61M	3.10	2.61	222
CV-19	Ditch C-12	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$5.04M	$9.06M	$0.25M	$13.07M	2.59	1.44	14
CV-20	Ditch C-12	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$5.31M	$9.34M	$0.25M	$13.21M	2.48	1.41	14
CV-21	Ditch C-12	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$5.88M	$9.95M	$0.26M	$13.86M	2.36	1.39	14
CV-22	North Hayes	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$13.63M	$24.18M	$0.19M	$9.75M	0.72	0.40	10
CV-23	North Hayes	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$15.33M	$25.94M	$0.19M	$10.24M	0.67	0.39	11
CV-24	North Hayes	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$16.03M	$26.66M	$0.20M	$10.42M	0.65	0.39	11

Table 8-1 Computed Benefit/Cost

Project ID	Location	Design Level	Type of Improvement	Description	Construction Cost	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Con. Cost	Benefit / Total Cost	Structures Removed From Flooding
CV-25	South Hayes	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$12.38M	$19.94M	$0.41M	$21.47M	1.73	1.08	22
CV-26	South Hayes	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$14.08M	$21.72M	$0.43M	$22.54M	1.60	1.04	23
CV-27	South Hayes	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$16.18M	$23.92M	$0.45M	$23.82M	1.47	1.00	24
CV-28	West Fork	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$24.19M	$36.54M	$1.54M	$80.75M	3.34	2.21	81
CV-29	West Fork	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$25.59M	$37.99M	$1.57M	$82.48M	3.22	2.17	83
CV-30	West Fork	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$26.69M	$39.13M	$1.58M	$82.88M	3.11	2.12	83
CO-1	Chocolate, Includes East Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$168.46M	$249.71M	$5.21M	$274.10M	1.63	1.10	273
CO-2	Chocolate, Includes East Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$359.50M	$459.33M	$5.94M	$312.50M	0.87	0.68	312
CO-3	Chocolate, Includes East Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$540.70M	$658.48M	$6.51M	$342.31M	0.63	0.52	341
CO-4	Chocolate, Includes East Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$736.90M	$873.06M	$6.72M	$353.56M	0.48	0.40	352
CO-5	Chocolate, Includes East Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$931.70M	$1086.21M	$6.83M	$359.34M	0.39	0.33	358
CO-6	Chocolate, Includes East Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$124.88M	$203.61M	$4.30M	$226.30M	1.81	1.11	226
CO-7	Chocolate, Includes East Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$283.52M	$377.78M	$4.43M	$233.09M	0.82	0.62	233
CO-8	Chocolate, Includes East Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$454.40M	$565.35M	$4.50M	$236.73M	0.52	0.42	236
CO-9	Chocolate, Includes East Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$632.20M	$760.55M	$4.54M	$238.74M	0.38	0.31	238
CO-10	Chocolate, Includes East Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$109.82M	$188.07M	$4.24M	$222.76M	2.03	1.18	222
CO-11	Chocolate, Includes East Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$261.83M	$354.89M	$4.26M	$223.95M	0.86	0.63	223
CO-12	Chocolate, Includes East Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$428.80M	$537.79M	$4.28M	$224.86M	0.52	0.42	224
CO-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$2.57M	$10.16M	$0.33M	$17.23M	6.71	1.70	18
CO-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$6.08M	$14.02M	$0.43M	$22.42M	3.69	1.60	23
CO-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$10.10M	$18.44M	$0.51M	$26.76M	2.65	1.45	27
CO-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$14.40M	$23.16M	$0.56M	$29.33M	2.04	1.27	30
CO-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$18.60M	$27.81M	$0.58M	$30.67M	1.65	1.10	31
CO-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$1.61M	$9.26M	$0.26M	$13.51M	8.39	1.46	14

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CO-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$4.27M	$12.19M	$0.27M	$14.05M	3.29	1.15	14
CO-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$7.43M	$15.66M	$0.28M	$14.91M	2.01	0.95	15
CO-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$11.20M	$19.79M	$0.29M	$15.46M	1.38	0.78	16
CO-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$1.41M	$9.43M	$0.26M	$13.44M	9.53	1.43	14
CO-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$3.60M	$11.84M	$0.26M	$13.69M	3.80	1.16	14
CO-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$6.57M	$15.10M	$0.27M	$14.11M	2.15	0.93	15
CO-25	North Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$8.61M	$33.58M	$0.20M	$10.38M	1.21	0.31	11
CO-26	North Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$18.82M	$44.81M	$0.20M	$10.65M	0.57	0.24	11
CO-27	North Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$29.90M	$56.99M	$0.21M	$10.85M	0.36	0.19	11
CO-28	North Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$41.70M	$69.93M	$0.21M	$10.96M	0.26	0.16	11
CO-29	North Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$54.80M	$84.28M	$0.21M	$11.02M	0.20	0.13	11
CO-30	North Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$4.87M	$30.81M	$0.19M	$10.16M	2.09	0.33	11
CO-31	North Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$12.64M	$39.34M	$0.19M	$10.21M	0.81	0.26	11
CO-32	North Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$21.65M	$49.24M	$0.19M	$10.24M	0.47	0.21	11
CO-33	North Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$31.90M	$60.51M	$0.20M	$10.26M	0.32	0.17	11
CO-34	North Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$3.84M	$30.21M	$0.19M	$10.14M	2.64	0.34	11
CO-35	North Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$10.18M	$37.17M	$0.19M	$10.15M	1.00	0.27	11
CO-36	North Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$18.61M	$46.43M	$0.19M	$10.16M	0.55	0.22	11
CO-37	South Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$13.99M	$34.73M	$0.44M	$23.04M	1.65	0.66	23
CO-38	South Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$32.70M	$55.30M	$0.45M	$23.43M	0.72	0.42	24
CO-39	South Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$53.10M	$77.69M	$0.45M	$23.69M	0.45	0.30	24
CO-40	South Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$75.80M	$102.49M	$0.45M	$23.87M	0.31	0.23	24
CO-41	South Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$97.70M	$126.60M	$0.46M	$23.96M	0.25	0.19	24
CO-42	South Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$10.29M	$31.73M	$0.43M	$22.62M	2.20	0.71	23

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CO-43	South Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$25.80M	$48.76M	$0.43M	$22.66M	0.88	0.46	23
CO-44	South Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$43.30M	$67.99M	$0.43M	$22.69M	0.52	0.33	23
CO-45	South Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$63.10M	$89.73M	$0.43M	$22.71M	0.36	0.25	23
CO-46	South Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$9.00M	$31.79M	$0.43M	$22.61M	2.51	0.71	23
CO-47	South Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$22.60M	$46.73M	$0.43M	$22.61M	1.00	0.48	23
CO-48	South Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$39.90M	$65.67M	$0.43M	$22.63M	0.57	0.34	23
CO-49	West Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$23.37M	$61.41M	$1.58M	$83.08M	3.56	1.35	83
CO-50	West Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$51.24M	$92.06M	$1.59M	$83.74M	1.63	0.91	84
CO-51	West Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$81.00M	$124.75M	$1.60M	$84.29M	1.04	0.68	84
CO-52	West Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$113.90M	$160.78M	$1.61M	$84.50M	0.74	0.53	85
CO-53	West Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$148.30M	$198.58M	$1.61M	$84.63M	0.57	0.43	85
CO-54	West Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$16.14M	$54.59M	$1.56M	$82.11M	5.09	1.50	82
CO-55	West Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$38.70M	$79.36M	$1.56M	$82.27M	2.13	1.04	82
CO-56	West Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$63.60M	$106.77M	$1.57M	$82.36M	1.30	0.77	82
CO-57	West Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$92.90M	$138.84M	$1.57M	$82.42M	0.89	0.59	83
CO-58	West Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$12.00M	$50.84M	$1.56M	$82.07M	6.84	1.61	82
CO-59	West Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$30.80M	$71.44M	$1.56M	$82.07M	2.66	1.15	82
CO-60	West Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$53.20M	$96.06M	$1.56M	$82.10M	1.54	0.85	82
DP-1	Chocolate, Includes East Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$168.46M	$185.06M	$1.22M	$64.21M	0.38	0.35	64
DP-2	Chocolate, Includes East Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$359.50M	$394.68M	$1.61M	$84.61M	0.24	0.21	85
DP-3	Chocolate, Includes East Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$540.70M	$593.83M	$1.85M	$97.55M	0.18	0.16	98
DP-4	Chocolate, Includes East Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$736.90M	$808.41M	$1.94M	$102.01M	0.14	0.13	102
DP-5	Chocolate, Includes East Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$931.70M	$1021.56M	$1.98M	$104.22M	0.11	0.10	104
DP-6	Chocolate, Includes East Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$124.88M	$137.22M	$0.35M	$18.53M	0.15	0.14	19

Table 8-1 Computed Benefit/Cost

Project ID	Location	Design Level	Type of Improvement	Description	Construction Cost	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Con. Cost	Benefit / Total Cost	Structures Removed From Flooding
DP-7	Chocolate, Includes East Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$283.52M	$311.39M	$0.56M	$29.66M	0.10	0.10	30
DP-8	Chocolate, Includes East Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$454.40M	$498.96M	$0.65M	$34.18M	0.08	0.07	35
DP-9	Chocolate, Includes East Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$632.20M	$694.16M	$0.69M	$36.42M	0.06	0.05	37
DP-10	Chocolate, Includes East Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$109.82M	$120.65M	$0.15M	$7.93M	0.07	0.07	8
DP-11	Chocolate, Includes East Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$261.83M	$287.47M	$0.24M	$12.55M	0.05	0.04	13
DP-12	Chocolate, Includes East Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$428.80M	$470.37M	$0.29M	$15.13M	0.04	0.03	16
DP-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$2.57M	$2.83M	$0.33M	$17.46M	6.79	6.17	18
DP-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$6.08M	$6.69M	$0.51M	$26.74M	4.40	3.99	27
DP-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$10.10M	$11.11M	$0.62M	$32.53M	3.22	2.93	33
DP-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$14.40M	$15.83M	$0.68M	$35.52M	2.47	2.24	36
DP-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$18.60M	$20.48M	$0.70M	$36.98M	1.99	1.81	37
DP-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$1.61M	$1.78M	$0.06M	$3.24M	2.01	1.82	4
DP-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$4.27M	$4.71M	$0.14M	$7.28M	1.70	1.55	8
DP-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$7.43M	$8.18M	$0.21M	$11.01M	1.48	1.35	11
DP-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$11.20M	$12.31M	$0.24M	$12.82M	1.14	1.04	13
DP-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$1.41M	$1.56M	$0.04M	$2.16M	1.53	1.38	3
DP-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$3.60M	$3.97M	$0.09M	$4.94M	1.37	1.24	5
DP-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$6.57M	$7.23M	$0.15M	$7.63M	1.16	1.05	8
DP-25	North Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$8.61M	$9.48M	$0.08M	$4.37M	0.51	0.46	5
DP-26	North Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$18.82M	$20.71M	$0.12M	$6.38M	0.34	0.31	7
DP-27	North Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$29.90M	$32.89M	$0.14M	$7.49M	0.25	0.23	8
DP-28	North Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$41.70M	$45.83M	$0.15M	$8.08M	0.19	0.18	9
DP-29	North Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$54.80M	$60.18M	$0.16M	$8.37M	0.15	0.14	9
DP-30	North Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$4.87M	$5.38M	$0.03M	$1.35M	0.28	0.25	2

Table 8-1 Computed Benefit/Cost

Project ID	Location	Design Level	Type of Improvement	Description	Construction Cost	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Con. Cost	Benefit / Total Cost	Structures Removed From Flooding
DP-31	North Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$12.64M	$13.91M	$0.04M	$2.34M	0.19	0.17	3
DP-32	North Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$21.65M	$23.81M	$0.05M	$2.88M	0.13	0.12	3
DP-33	North Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$31.90M	$35.08M	$0.06M	$3.15M	0.10	0.09	4
DP-34	North Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$3.84M	$4.25M	$0.01M	$0.70M	0.18	0.16	1
DP-35	North Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$10.18M	$11.21M	$0.02M	$0.99M	0.10	0.09	1
DP-36	North Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$18.61M	$20.47M	$0.03M	$1.33M	0.07	0.06	2
DP-37	South Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$13.99M	$15.40M	$0.11M	$5.82M	0.42	0.38	6
DP-38	South Hayes	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$32.70M	$35.97M	$0.15M	$8.08M	0.25	0.22	9
DP-39	South Hayes	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$53.10M	$58.36M	$0.18M	$9.26M	0.17	0.16	10
DP-40	South Hayes	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$75.80M	$83.16M	$0.19M	$9.99M	0.13	0.12	10
DP-41	South Hayes	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$97.70M	$107.27M	$0.20M	$10.32M	0.11	0.10	11
DP-42	South Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$10.29M	$11.33M	$0.02M	$1.15M	0.11	0.10	2
DP-43	South Hayes	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$25.80M	$28.36M	$0.04M	$2.05M	0.08	0.07	3
DP-44	South Hayes	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$43.30M	$47.59M	$0.05M	$2.56M	0.06	0.05	3
DP-45	South Hayes	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$63.10M	$69.33M	$0.05M	$2.81M	0.04	0.04	3
DP-46	South Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$9.00M	$9.92M	$0.00M	$0.22M	0.02	0.02	1
DP-47	South Hayes	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$22.60M	$24.86M	$0.01M	$0.54M	0.02	0.02	1
DP-48	South Hayes	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$39.90M	$43.80M	$0.03M	$1.43M	0.04	0.03	2
DP-49	West Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$23.37M	$25.64M	$0.17M	$9.11M	0.39	0.36	10
DP-50	West Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$51.24M	$56.29M	$0.22M	$11.60M	0.23	0.21	12
DP-51	West Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$81.00M	$88.98M	$0.25M	$13.34M	0.16	0.15	14
DP-52	West Fork	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$113.90M	$125.01M	$0.27M	$13.96M	0.12	0.11	14
DP-53	West Fork	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$148.30M	$162.81M	$0.27M	$14.32M	0.10	0.09	15
DP-54	West Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$16.14M	$17.75M	$0.05M	$2.52M	0.16	0.14	3

Table 8-1 Computed Benefit/Cost

Project ID	Location	Design Level	Type of Improvement	Description	Construction Cost	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Con. Cost	Benefit / Total Cost	Structures Removed From Flooding
DP-55	West Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$38.70M	$42.52M	$0.08M	$4.33M	0.11	0.10	5
DP-56	West Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$63.60M	$69.93M	$0.10M	$5.10M	0.08	0.07	6
DP-57	West Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$92.90M	$102.00M	$0.10M	$5.49M	0.06	0.05	6
DP-58	West Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$12.00M	$13.22M	$0.03M	$1.59M	0.13	0.12	2
DP-59	West Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$30.80M	$33.82M	$0.03M	$1.71M	0.06	0.05	2
DP-60	West Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$53.20M	$58.44M	$0.04M	$2.26M	0.04	0.04	3
BR-1A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Intercept North Hayes, South Hayes & West Fork at Mid-Tributary Length	$310.16M	$364.73M	$6.32M	$332.20M	1.07	0.91	331
BR-1B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Intercept North Hayes, South Hayes & West Fork at Mid-Tributary Length	$300.69M	$341.53M	$6.32M	$332.20M	1.10	0.97	331
BR-2A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Intercept North Hayes, South Hayes & West Fork at Chocolate Bayou Confluence	$264.86M	$317.35M	$8.97M	$471.64M	1.78	1.49	470
BR-2B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Intercept North Hayes, South Hayes & West Fork at Chocolate Bayou Confluence	$216.10M	$256.40M	$8.97M	$471.64M	2.18	1.84	470
BR-3A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Diversion from Chocolate Bayou	$118.87M	$130.51M	$3.31M	$174.14M	1.46	1.33	174
BR-3B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Diversion from Chocolate Bayou	$88.27M	$93.74M	$3.31M	$174.14M	1.97	1.86	174
SI-1	West Fork Trib A	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$28.60M	$37.60M	$1.17M	$61.56M	2.15	1.64	62
SI-2	West Fork Trib B	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$13.10M	$21.04M	$0.48M	$25.13M	1.92	1.19	26
SI-3	East Fork Trib A	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$14.00M	$24.68M	$0.26M	$13.82M	0.99	0.56	14
SI-4	East Fork Trib B	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$2.52M	$8.26M	$0.17M	$8.79M	3.49	1.06	9
SI-5	Ditch C12	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$43.10M	$52.79M	$0.88M	$46.48M	1.08	0.88	47
SI-5/D13 (Note 1)	Ditch C-12	100-YR	Siphon Improvement & Diversion ponds	Siphon Improvement, widening of Channel, and Diversion Ponds	---	$54.69M	$1.11M	$58.19M	---	1.06	58

Note 1: Joint constuction of SI-5 and D13. Benefits and costs estimated from SI-5 siphon improvements and length prorating of diversion pond DP-17 Project benefits and costs

Table 8-2 Ordered Benefit/Cost from Highest to Lowest Greater than 0.6

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding
DP-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$2.83M	$0.33M	$17.46M	6.17	18
DP-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$6.69M	$0.51M	$26.74M	3.99	27
DP-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$11.11M	$0.62M	$32.53M	2.93	33
CV-16	Chocolate Bayou	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$83.28M	$4.20M	$221.08M	2.65	221
CV-17	Chocolate Bayou	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$84.42M	$4.23M	$222.20M	2.63	222
CV-18	Chocolate Bayou	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$85.35M	$4.23M	$222.61M	2.61	222
DP-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$15.83M	$0.68M	$35.52M	2.24	36
CV-28	West Fork	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$36.54M	$1.54M	$80.75M	2.21	81
CV-29	West Fork	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$37.99M	$1.57M	$82.48M	2.17	83
CV-30	West Fork	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$39.13M	$1.58M	$82.88M	2.12	83
CV-13	West Fork	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$42.34M	$1.54M	$80.75M	1.91	81
CV-1	Chocolate Bayou	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$116.39M	$4.20M	$221.08M	1.90	221
CV-14	West Fork	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$44.17M	$1.57M	$82.48M	1.87	83
CV-2	Chocolate Bayou	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$119.59M	$4.23M	$222.20M	1.86	222
BR-3B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Diversion from Chocolate Bayou	$93.74M	$3.31M	$174.14M	1.86	174
BR-2B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Intercept North Hayes, South Hayes & West Fork at Chocolate Bayou Confluence	$256.40M	$8.97M	$471.64M	1.84	470
CV-3	Chocolate Bayou	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$121.59M	$4.23M	$222.61M	1.83	222
DP-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$1.78M	$0.06M	$3.24M	1.82	4
CV-15	West Fork	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$45.55M	$1.58M	$82.88M	1.82	83
DP-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$20.48M	$0.70M	$36.98M	1.81	37
CO-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$10.16M	$0.33M	$17.23M	1.70	18
SI-1	West Fork Trib A	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$37.60M	$1.17M	$61.56M	1.64	62
CO-58	West Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$50.84M	$1.56M	$82.07M	1.61	82

Table 8-2 Ordered Benefit/Cost from Highest to Lowest Greater than 0.6

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding
CO-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$14.02M	$0.43M	$22.42M	1.60	23
DP-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$4.71M	$0.14M	$7.28M	1.55	8
CO-54	West Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$54.59M	$1.56M	$82.11M	1.50	82
BR-2A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Intercept North Hayes, South Hayes & West Fork at Chocolate Bayou Confluence	$317.35M	$8.97M	$471.64M	1.49	470
CO-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$9.26M	$0.26M	$13.51M	1.46	14
CO-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$18.44M	$0.51M	$26.76M	1.45	27
CV-19	Ditch C-12	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$9.06M	$0.25M	$13.07M	1.44	14
CO-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$9.43M	$0.26M	$13.44M	1.43	14
CV-20	Ditch C-12	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$9.34M	$0.25M	$13.21M	1.41	14
CV-21	Ditch C-12	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$9.95M	$0.26M	$13.86M	1.39	14
DP-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$1.56M	$0.04M	$2.16M	1.38	3
CV-4	Ditch C-12	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$9.66M	$0.25M	$13.07M	1.35	14
CO-49	West Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$61.41M	$1.58M	$83.08M	1.35	83
DP-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$8.18M	$0.21M	$11.01M	1.35	11
BR-3A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Diversion from Chocolate Bayou	$130.51M	$3.31M	$174.14M	1.33	174
CV-5	Ditch C-12	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$9.98M	$0.25M	$13.21M	1.32	14
CO-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$23.16M	$0.56M	$29.33M	1.27	30
CV-6	Ditch C-12	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$10.99M	$0.26M	$13.86M	1.26	14
DP-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$3.97M	$0.09M	$4.94M	1.24	5
SI-2	West Fork Trib B	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$21.04M	$0.48M	$25.13M	1.19	26
CO-10	Chocolate, Includes East Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$188.07M	$4.24M	$222.76M	1.18	222
CO-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$11.84M	$0.26M	$13.69M	1.16	14
CO-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$12.19M	$0.27M	$14.05M	1.15	14

Table 8-2 Ordered Benefit/Cost from Highest to Lowest Greater than 0.6

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding
CO-59	West Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$71.44M	$1.56M	$82.07M	1.15	82
CO-6	Chocolate, Includes East Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$203.61M	$4.30M	$226.30M	1.11	226
CO-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$27.81M	$0.58M	$30.67M	1.10	31
CO-1	Chocolate, Includes East Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$249.71M	$5.21M	$274.10M	1.10	273
CV-25	South Hayes	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$19.94M	$0.41M	$21.47M	1.08	22
SI-5/DP-13	Ditch C-12	100-YR	Siphon Improvement & Diversion ponds	Siphon Improvement, widening of Channel, and Diversion Ponds	$54.69M	$1.11M	$58.19M	1.06	58
SI-4	East Fork Trib B	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$8.26M	$0.17M	$8.79M	1.06	9
DP-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$7.23M	$0.15M	$7.63M	1.05	8
DP-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$12.31M	$0.24M	$12.82M	1.04	13
CV-26	South Hayes	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$21.72M	$0.43M	$22.54M	1.04	23
CO-55	West Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$79.36M	$1.56M	$82.27M	1.04	82
CV-27	South Hayes	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$23.92M	$0.45M	$23.82M	1.00	24
BR-1B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Intercept North Hayes, South Hayes & West Fork at Mid-Tributary Length	$341.53M	$6.32M	$332.20M	0.97	331
CO-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$15.66M	$0.28M	$14.91M	0.95	15
CO-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$15.10M	$0.27M	$14.11M	0.93	15
CV-10	South Hayes	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$23.20M	$0.41M	$21.47M	0.93	22
BR-1A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Intercept North Hayes, South Hayes & West Fork at Mid-Tributary Length	$364.73M	$6.32M	$332.20M	0.91	331
CO-50	West Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$92.06M	$1.59M	$83.74M	0.91	84
CV-11	South Hayes	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$25.24M	$0.43M	$22.54M	0.89	23
SI-5	Ditch C12	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$52.79M	$0.88M	$46.48M	0.88	47
CO-60	West Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$96.06M	$1.56M	$82.10M	0.85	82
CV-12	South Hayes	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$27.99M	$0.45M	$23.82M	0.85	24
CO-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$19.79M	$0.29M	$15.46M	0.78	16

Table 8-2 Ordered Benefit/Cost from Highest to Lowest Greater than 0.6

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Average Annual Benefit	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding
CO-56	West Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$106.77M	$1.57M	$82.36M	0.77	82
CO-42	South Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$31.73M	$0.43M	$22.62M	0.71	23
CO-46	South Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$31.79M	$0.43M	$22.61M	0.71	23
CO-2	Chocolate, Includes East Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$459.33M	$5.94M	$312.50M	0.68	312
CO-51	West Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$124.75M	$1.60M	$84.29M	0.68	84
CO-37	South Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$34.73M	$0.44M	$23.04M	0.66	23
CO-11	Chocolate, Includes East Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$354.89M	$4.26M	$223.95M	0.63	223
CO-7	Chocolate, Includes East Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$377.78M	$4.43M	$233.09M	0.62	233
CO-57	West Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$138.84M	$1.57M	$82.42M	0.59	83
SI-3	East Fork Trib A	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$24.68M	$0.26M	$13.82M	0.56	14

Table 9-1 Example of Finding Preferred Projects

Project ID	Location	Design Level	Type of Improvement	Description	Total Diversion Pond Volume (ac-ft)	Total Cost	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding	Inferior/Superior Evaluation Based Upon B/C and Cost	Constructibility Considerations	Marginal Benefit	Marginal Cost	Marginal B/C
DP-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	76	$2.83M	$17.46M	6.17	18	-	-	$14.22M	$1.05M	Marginal B/C of DP-13 over DP-18: 13.53
DP-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	186	$6.69M	$26.74M	3.99	27	Inferior to DP-13	-	-	-	-
DP-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	311	$11.11M	$32.53M	2.93	33	Inferior to DP-13	-	-	-	-
DP-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	445	$15.83M	$35.52M	2.24	36	Inferior to DP-13	-	-	-	-
DP-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	589	$20.48M	$36.98M	1.81	37	Inferior to DP-13	-	-	-	-
DP-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	48	$1.78M	$3.24M	1.82	4	-	Must construct first before DP-13 if phased construct used	$1.08M	$0.22M	Marginal B/C of DP-18 over DP-22: 4.92
DP-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	131	$4.71M	$7.28M	1.55	8	Inferior to DP-13	-	-	-	-
DP-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	229	$8.18M	$11.01M	1.35	11	Inferior to DP-13	-	-	-	-
DP-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	344	$12.31M	$12.82M	1.04	13	Inferior to DP-13	-	-	-	-
DP-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	42	$1.56M	$2.16M	1.38	3	-	Must construct first before DP-18 if phased construct used	-	-	-
DP-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	121	$3.97M	$4.94M	1.24	5	Inferior to DP-13	-	-	-	-
DP-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	160	$7.23M	$7.63M	1.05	8	Inferior to DP-13	-	-	-	-

Table 9-2 Superior-Inferior Analysis of Economically Efficient Projects Within a Single Watershed and One Type of Project Based Upon B/C and Total Cost

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding	Reason for Retention as Economically Efficient Proejct	Reason for Exclusion (Excluded Projects Indicated By Shading)	$/mi
SI-3	East Fork Trib A	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$24.68M	$13.82M	0.56	14	Retained; B/C > 1	Addressed in subsequent tables	$13.57M
SI-4	East Fork Trib B	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$8.26M	$8.79M	1.06	9	Retained; B/C > 1	Addressed in subsequent tables	$5.07M
SI-2	West Fork Trib B	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$21.04M	$25.13M	1.19	26	Retained; B/C > 1	Addressed in subsequent tables	$29.85M
SI-1	West Fork Trib A	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$37.60M	$61.56M	1.64	62	Retained; B/C > 1	Addressed in subsequent tables	$16.63M
SI-5	Ditch C12	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$52.79M	$46.48M	0.88	47	Part of overall siphon improvement program for	Addressed in subsequent tables	$48.06M
SI-5/DP-13	Ditch C-12	100-YR	Siphon Improvement & Diversion ponds	Siphon Improvement, widening of Channel, and Diversion Ponds	$54.69M	$58.19M	1.06	58	Retained; B/C > 1	Retain because special combination project	
CV-13	West Fork	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$42.34M	$80.75M	1.91	81	Retained; B/C > 1	Inferior to CV-28	
CV-14	West Fork	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$44.17M	$82.48M	1.87	83	Retained; B/C > 1	Inferior to CV-13	
CV-15	West Fork	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$45.55M	$82.88M	1.82	83	Retained; B/C > 1	Inferior to CV-13	
CV-28	West Fork	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$36.54M	$80.75M	2.21	81	Retained; B/C > 1	Superior for West Fork for Conveyance Improvement Projects	$4.18M
CV-29	West Fork	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$37.99M	$82.48M	2.17	83	Retained; B/C > 1	Inferior to CV-28	
CV-30	West Fork	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$39.13M	$82.88M	2.12	83	Retained; B/C > 1	Inferior to CV-28	
CO-49	West Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$61.41M	$83.08M	1.35	83	Retained; B/C > 1	Inferior to CO-54	
CO-50	West Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$92.06M	$83.74M	0.91	84	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-49	
CO-51	West Fork	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$124.75M	$84.29M	0.68	84	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-49	
CO-54	West Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$54.59M	$82.11M	1.50	82	Retained; B/C > 1	Inferior to CO-58	
CO-55	West Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$79.36M	$82.27M	1.04	82	Retained; B/C > 1	Inferior to CO-49	
CO-56	West Fork	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$106.77M	$82.36M	0.77	82	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-49	
CO-57	West Fork	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$138.84M	$82.42M	0.59	83	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-49	
CO-58	West Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$50.84M	$82.07M	1.61	82	Retained; B/C > 1	Superior for West Fork Combined Conveyance Improvement and Diversion Pond Projects	$3.18M
CO-59	West Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$71.44M	$82.07M	1.15	82	Retained; B/C > 1	Inferior to CO-49	
CO-60	West Fork	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$96.06M	$82.10M	0.85	82	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-49	

Table 9-2 Superior-Inferior Analysis of Economically Efficient Projects Within a Single Watershed and One Type of Project Based Upon B/C and Total Cost

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding	Reason for Retention as Economically Efficient Proejct	Reason for Exclusion (Excluded Projects Indicated By Shading)	$/mi
CO-37	South Hayes	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$34.73M	$23.04M	0.66	23	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-46	
CO-42	South Hayes	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$31.73M	$22.62M	0.71	23	Possibly utilized as part of Brunner Ditch Project	Inferior to CO-46	
CO-46	South Hayes	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$31.79M	$22.61M	0.71	23	Possibly utilized as part of Brunner Ditch Project	Superior for South Hayes Combined Conveyance Improvement and Diversion Pond Projects	$1.56M
CV-10	South Hayes	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$23.20M	$21.47M	0.93	22	Possibly utilized as part of Brunner Ditch Project	Inferior to CV-25	
CV-11	South Hayes	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$25.24M	$22.54M	0.89	23	Possibly utilized as part of Brunner Ditch Project	Inferior to CV-10	
CV-12	South Hayes	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$27.99M	$23.82M	0.85	24	B/C ratio too small to retain for consideration	Inferior to CV-25	
CV-25	South Hayes	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$19.94M	$21.47M	1.08	22	Retained; B/C > 1	Superior for South Hayes Conveyance Improvement Projects	$3.06M
CV-26	South Hayes	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$21.72M	$22.54M	1.04	23	Retained; B/C > 1	Inferior to CV-25	
CV-27	South Hayes	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$23.92M	$23.82M	1.00	24	Retained; B/C > 1	Inferior to CV-25	
CO-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$10.16M	$17.23M	1.70	18	Retained; B/C > 1	Not Superior/Inferior for Ditch C-12 Combined Conveyance and Diversion Pond Projects	$364.98M
CO-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$14.02M	$22.42M	1.60	23	Retained; B/C > 1	Inferior to CO-13	
CO-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$9.26M	$13.51M	1.46	14	Retained; B/C > 1	Not Superior/Inferior for Ditch C-12 Combined Conveyance and Diversion Pond Projects	$454.09M
CO-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$18.44M	$26.76M	1.45	27	Retained; B/C > 1	Inferior to CO-13	
CO-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$9.43M	$13.44M	1.43	14	Retained; B/C > 1	Not Superior/Inferior for Ditch C-12 Combined Conveyance and Diversion Pond Projects	$85.12M
CO-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$23.16M	$29.33M	1.27	30	Retained; B/C > 1	Inferior to CO-13	
CO-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$11.84M	$13.69M	1.16	14	Retained; B/C > 1	Inferior to CO-13	
CO-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$12.19M	$14.05M	1.15	14	Retained; B/C > 1	Inferior to CO-13	
CO-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$27.81M	$30.67M	1.10	31	Retained; B/C > 1	Inferior to CO-13	

Table 9-2 Superior-Inferior Analysis of Economically Efficient Projects Within a Single Watershed and One Type of Project Based Upon B/C and Total Cost

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding	Reason for Retention as Economically Efficient Proejct	Reason for Exclusion (Excluded Projects Indicated By Shading)	$/mi
CO-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$15.66M	$14.91M	0.95	15	Possible marginal improvement project	Inferior to CO-13	
CO-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$15.10M	$14.11M	0.93	15	Possible marginal improvement project	Inferior to CO-13	
CO-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$19.79M	$15.46M	0.78	16	Possible marginal improvement project	Inferior to CO-13	
CV-19	Ditch C-12	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$9.06M	$13.07M	1.44	14	Retained; B/C > 1	Superior for Ditch C-12 Conveyance Improvement Projects	$3.79M
CV-20	Ditch C-12	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$9.34M	$13.21M	1.41	14	Retained; B/C > 1	Inferior to CV-19	
CV-21	Ditch C-12	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$9.95M	$13.86M	1.39	14	Retained; B/C > 1	Inferior to CV-19	
CV-4	Ditch C-12	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$9.66M	$13.07M	1.35	14	Retained; B/C > 1	Inferior to CV-19	
CV-5	Ditch C-12	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$9.98M	$13.21M	1.32	14	Retained; B/C > 1	Inferior to CV-19	
CV-6	Ditch C-12	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$10.99M	$13.86M	1.26	14	Retained; B/C > 1	Inferior to CV-19	
DP-13	Ditch C-12	2 Yr	Series of 5-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$2.83M	$17.46M	6.17	18	Retained; B/C > 1	Not Superior/Inferior for Ditch C-12 Diversion Pond Projects	$1.31M
DP-14	Ditch C-12	2 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$6.69M	$26.74M	3.99	27	Retained; B/C > 1	Inferior to DP-13	
DP-15	Ditch C-12	2 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$11.11M	$32.53M	2.93	33	Retained; B/C > 1	Inferior to DP-13	
DP-16	Ditch C-12	2 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$15.83M	$35.52M	2.24	36	Retained; B/C > 1	Inferior to DP-13	
DP-17	Ditch C-12	2 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$20.48M	$36.98M	1.81	37	Retained; B/C > 1	Inferior to DP-13	
DP-18	Ditch C-12	5 Yr	Series of 10-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$1.78M	$3.24M	1.82	4	Retained; B/C > 1	Not Superior/Inferior for Ditch C-12 Diversion Pond Projects	$0.82M
DP-19	Ditch C-12	5 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$4.71M	$7.28M	1.55	8	Retained; B/C > 1	Inferior to DP-18	
DP-20	Ditch C-12	5 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$8.18M	$11.01M	1.35	11	Retained; B/C > 1	Inferior to DP-18	
DP-21	Ditch C-12	5 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$12.31M	$12.82M	1.04	13	Retained; B/C > 1	Inferior to DP-18	
DP-22	Ditch C-12	10 Yr	Series of 25-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$1.56M	$2.16M	1.38	3	Retained; B/C > 1	Not Superior/Inferior for Ditch C-12 Diversion Pond Projects	$0.72M
DP-23	Ditch C-12	10 Yr	Series of 50-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$3.97M	$4.94M	1.24	5	Retained; B/C > 1	Inferior to DP-22	
DP-24	Ditch C-12	10 Yr	Series of 100-yr Pond Design Diversion Ponds	All the diversion ponds on the channel	$7.23M	$7.63M	1.05	8	Retained; B/C > 1	Inferior to DP-22	

Table 9-2 Superior-Inferior Analysis of Economically Efficient Projects Within a Single Watershed and One Type of Project Based Upon B/C and Total Cost

Project ID	Location	Design Level	Type of Improvement	Description	Total Cost	Total Benefit at Present Worth	Benefit / Total Cost	Structures Removed From Flooding	Reason for Retention as Economically Efficient Proejct	Reason for Exclusion (Excluded Projects Indicated By Shading)	$/mi
CO-1	Chocolate, Includes East Fork	2 Yr	Series of 5-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$249.71M	$274.10M	1.10	273	Retained; B/C > 1	Inferior to CO-10	
CO-10	Chocolate, Includes East Fork	10 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$188.07M	$222.76M	1.18	222	Retained; B/C > 1	Supreior for Chocolate Bayou for Combined Conveyance Improvement and Diversion Pond Projects	$18.64M
CO-11	Chocolate, Includes East Fork	10 Yr	Series of 50-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$354.89M	$223.95M	0.63	223	Possible marginal improvement project	Inferior to CO-1	
CO-2	Chocolate, Includes East Fork	2 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$459.33M	$312.50M	0.68	312	Possible marginal improvement project	Inferior to CO-1	
CO-6	Chocolate, Includes East Fork	5 Yr	Series of 10-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$203.61M	$226.30M	1.11	226	Retained; B/C > 1	Inferior to CO-10	
CO-7	Chocolate, Includes East Fork	5 Yr	Series of 25-yr Pond Design Diversion Ponds	Diversion ponds on the conveyance improved channel	$377.78M	$233.09M	0.62	233	Possible marginal improvement project	Inferior to CO-1	
CV-1	Chocolate Bayou	2-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 2-YR Storm Event, with a Mitigation Pond	$116.39M	$221.08M	1.90	221	Retained; B/C > 1	Inferior to CV-16	
CV-16	Chocolate Bayou	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$83.28M	$221.08M	2.65	221	Retained; B/C > 1	Supreior for Chocolate Bayou Conveyance Improvement Projects	$4.57M
CV-17	Chocolate Bayou	5-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 5-YR Storm Event, with with Inline Detention	$84.42M	$222.20M	2.63	222	Retained; B/C > 1	Inferior to CV-16	
CV-18	Chocolate Bayou	10-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 10-YR Storm Event, with with Inline Detention	$85.35M	$222.61M	2.61	222	Retained; B/C > 1	Inferior to CV-16	
CV-2	Chocolate Bayou	5-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 5-YR Storm Event, with a Mitigation Pond	$119.59M	$222.20M	1.86	222	Retained; B/C > 1	Inferior to CV-16	
CV-3	Chocolate Bayou	10-YR	Channel Improvement with Mitigation Pond	Widening Channel to convey the 10-YR Storm Event, with a Mitigation Pond	$121.59M	$222.61M	1.83	222	Retained; B/C > 1	Inferior to CV-16	
BR-1A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Extend Brunner Ditch upstream	$364.73M	$332.20M	0.91	331	Mitigation Alternative for Brunner Ditch Project	Inferior to BR-1B	
BR-1B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Extend Brunner Ditch upstream	$341.53M	$332.20M	0.97	331	Mitigation Alternative for Brunner Ditch Project	Superior to BR-1A & Inferior to BR-2B & BR-3B	$16.8M for Brunner Ditch segment only and $27.9M/mile for all channels in project
BR-2A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Realign and extend Brunner Ditch	$317.35M	$471.64M	1.49	470	Retained; B/C > 1	Inferior to BR-2B	
BR-2B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Realign and extend Brunner Ditch	$256.40M	$471.64M	1.84	470	Retained; B/C > 1	Superior to BR-2B & Inferior to BR-3B	$13.4M for Existing Brunner Ditch Segment Only, and $27.9M for all channels in project
BR-3A	Brunner Ditch	100-YR	Channel Improvement with Mitigation Pond	Divert Chocolate Bayou flow to improved Brunner Ditch	$130.51M	$174.14M	1.33	174	Retained; B/C > 1	Inferiort to BR-3B	
BR-3B	Brunner Ditch	100-YR	Channel Improvement with Inline Mitigation	Divert Chocolate Bayou flow to improved Brunner Ditch	$93.74M	$174.14M	1.86	174	Retained; B/C > 1	Superior to BR-3A, BR-2B and BR-1B	$11M for both existing ditch and diversion ditch from Chocolate Bayou

Table 9-3 Recommended Watershed Wide Project Options With Considerations of Constructibility and Marginal B/C

Project ID	Location	Project Status	Design Level	Type of Improvement	Description	Total Cost (without marginal costs or benefits)	Total Benefit at Present Worth	Total Benefit / Total Cost	Structures Removed From Flooding Each Year	Total Cost per Mile of Project ($/mi)	Constructibility Comment	Marginal Cost or Total Cost as Appropriate to Construction Order	Marginal or Total Benefit as Appropriate to Construction Order	Marginal B/C (B/C with SH 6 Benefits included)	Construction Order if Original Full UNMODIFIED Project Constructed	Construction Order if MODIFIED Project Constructed (no joint project SI-5/DP-13 constructed)	Construction Order if MODIFIED Project Constructed AND Joint Project SI-5/DP-13 Constructed as Joint Project
SI-3	East Fork Trib A	Unmodified from Originally Proposed	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$24.68M	$13.82M	0.56	14	$13.57M	SH 6 benefit not obtained until 4 siphons built	$24.68M	$13.82M	0.56 (0.75)	10	Prority 11 if Project SI-5 constructed as a single, stand-alone project	11
SI-4	East Fork Trib B	Unmodified from Originally Proposed	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$8.26M	$8.79M	1.06	9	$5.07M	SH 6 benefit not obtained until 4 siphons built	$8.26M	$8.79M	1.06(1.62)	9	10	10
SI-2	West Fork Trib B	Unmodified from Originally Proposed	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$21.04M	$25.13M	1.19	26	$29.85M	SH 6 benefit not obtained until 4 siphons built	$21.04M	$25.13M	1.19(1.41)	6	7	7
SI-1	West Fork Trib A	Unmodified from Originally Proposed	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$37.60M	$61.56M	1.64	62	$16.63M	SH 6 benefit not obtained until 4 siphons built	$37.60M	$61.56M	1.64(1.76)	5	6	6
All 4 Siphon projects without inclusion of SH 6 Flood Prevention Benefit						$91.57M	$109.30M	1.19	155								
All 4 siphon projects with inclusion of SH 6 Flood Prevention Benefit						$91.57M	$127.80M	1.40	155								
SI-5	Ditch C12	Unmodified from Originally Proposed	100-YR	Siphon Improvement	Siphon Improvement, widen of Channel, and Mitigation Pond	$52.79M	$46.48M	0.88	47	$48.06M	Expected to have little impact on SH 6 flooding	$52.79M	$46.48M	0.88	11	Prority 12 if constructed as separate stand-alonse project	n/a
Modified SI-5: Project SI-5/DP-13	Ditch C-12	Modified	100-YR	Siphon Improvement & Diversion ponds with 589 ac-ft of storage; marginal cost assumes proirt constuction of DP-18	Siphon Improvement, widening of Channel, and Diversion Ponds	$54.69M	$58.19M	1.06	58	---	For marginal cost, assumed to be constructed after DP-18 if phased construction used	$52.91M	$58.19M	1.10	n/a - see modified project construction list	n/a	Priority 9 if constructed in conjunction with DP-13
CV-28	West Fork (within Brazoria County)	Unmodified from Originally Proposed	2-YR	Channel Improvement with Inline Mitigation Along Entire West Fork in Brazoria County	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$36.54M	$80.75M	2.21	58	$4.18M	No prior project phasing for this project	$36.54M	$80.75M	2.21	3	1	1
CV-28-Mod	West Fork	Modified	2-YR	Channel Improvement with Inline Mitigation Along Entire West Fork in Brazoria County	Extend Widening into Fort Bend County and Arcola Area a Distance of Approximately 2 miles	$8.36M	$18.48M	2.21	13	$4.18M	No prior project phasing for this project	$8.36M	$18.48M	2.21	n/a	8	8
DP-13	Ditch C-12	Unmodified from Originally Proposed	2 Yr	Series of 5-yr Pond Design Diversion Ponds with Total 76 ac-ft of Storage	All the diversion ponds on the channel	$2.83M	$17.46M	6.17	18	$1.31M	For marginal cost, assumed to be constructed after DP-18 if phased construction used	$1.05M	$14.22M	13.53	8	5	Not constructed as Stand-Alone Project
DP-18	Ditch C-12	Unmodified from Originally Proposed	5 Yr	Series of 10-yr Pond Design Diversion Ponds with 48 ac-ft of storage. Assumes Diversion Pond DP-22 is not built	All the diversion ponds on the channel	$1.78M	$3.24M	1.82	4	$0.82M	For marginal cost, assumed to be constructed Before DP-13 if phased construction used	$1.78M	$3.24M	1.82	1	2	2
CV-16	Chocolate Bayou	Unmodified from Originally Proposed	2-YR	Channel Improvement with Inline Mitigation	Widening Channel to convey the 2-YR Storm Event, with with Inline Detention	$83.28M	$221.08M	2.65	221	$3.27M	No prior project phasing for this project	$83.28M	$221.08M	2.65	2	n/a	n/a
CV-16-Mod	East Fork of Chocolate Bayou	Modified	2-YR	Channel Improvement with Inline Mitigation	Restrict improvement reach to East Fork above confluence of East Work with West Fork (Distance of 8.1 mi)	$26.46M	$70.24M	2.65	70	$3.27M	No prior project phasing for this project	$26.46M	$70.24M	2.65	n/a	4	4

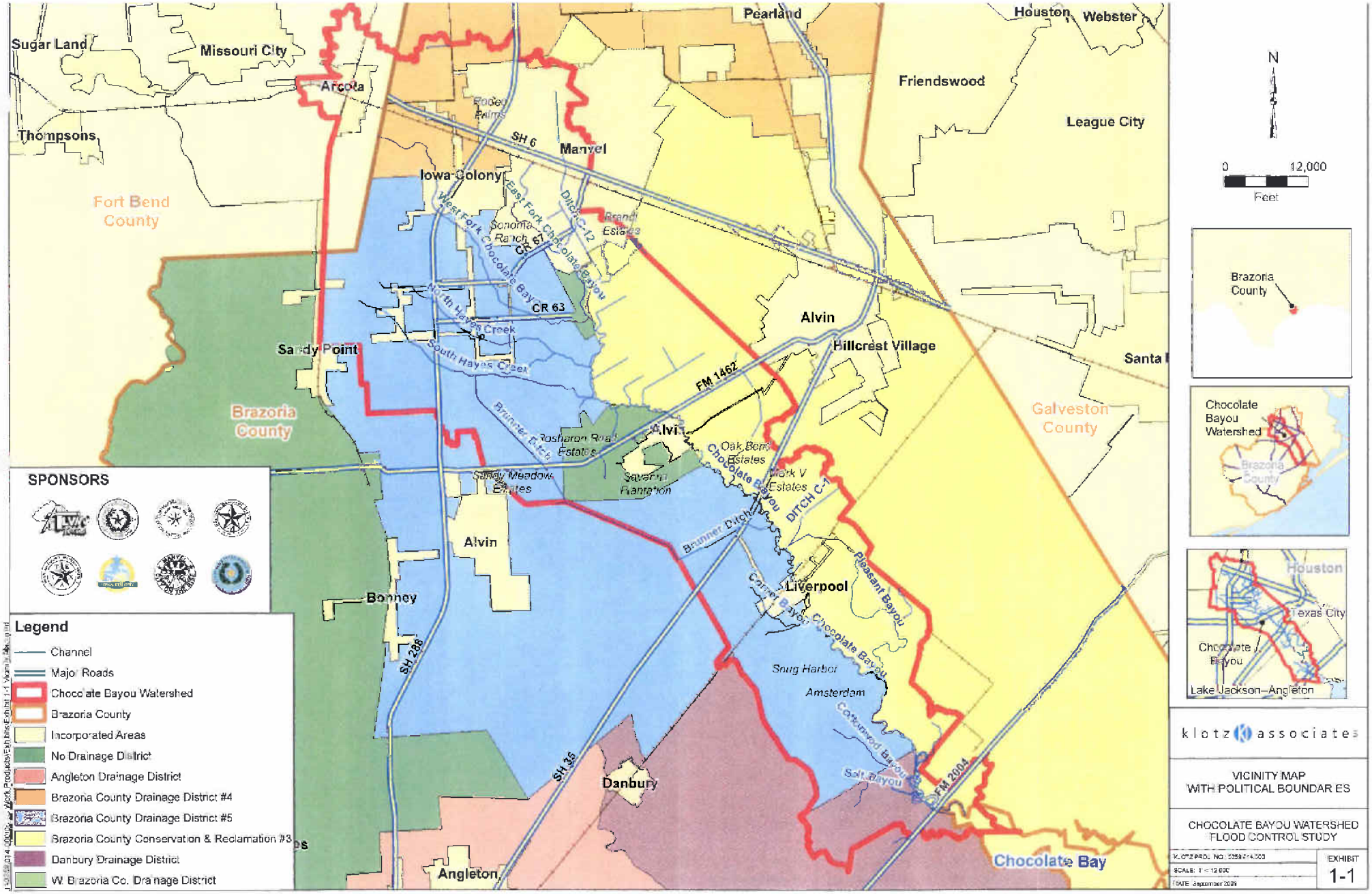
Table 9-3 Recommended Watershed Wide Project Options With Considerations of Constructibility and Marginal B/C

Project ID	Location	Project Status	Design Level	Type of Improvement	Description	Total Cost (without marginal costs or benefits)	Total Benefit at Present Worth	Total Benefit / Total Cost	Structures Removed From Flooding Each Year	Total Cost per Mile of Project ($/mi)	Constructibility Comment	Marginal Cost or Total Cost as Appropriate to Construction Order	Marginal or Total Benefit as Appropriate to Construction Order	Marginal B/C (B/C with SH 6 Benefits included)	Construction Order if Original Full UNMODIFIED Project Constructed	Construction Order if MODIFIED Project Constructed (no joint project SI-5/DP-13 constructed)	Construction Order if MODIFIED Project Constructed AND Joint Project SI-5/DP-13 Constructed as Joint Project
BR-2B	Brunner Ditch	Unmodified from Originally Proposed	100-YR	Channel Improvement with Inline Mitigation	Widening and extend Brunner Ditch to intercept West Fork and North and South Hayes near their confluence with Chocolate Bayou; DOES assume BR-3B-Mod is built first so that existing Brunner Ditch widening is already done	$256.40M	$471.64M	1.84	470	---	Has common element of BR-3B; for marginal cost and benefits, this project assumes BR-3B is built prior to this project	$177.57M	$297.50M	1.68	7	---	---
BR-2B-Mod 1	Brunner Ditch	Modified	100-YR	Channel Improvement with Inline Mitigation	Same as BR-2B except that North and South Hayes Creek Channel Improvements NOT made	$256.40M	$471.64M	1.84	58	---	Has common element of BR-3B; for marginal cost and benefits, this project assumes BR-3B is built prior to this project	$124.77M	$245.60M	1.97	n/a	9, if Project BR-3B-Mod CANNOT be done	5, if Project BR-3B-Mod CANNOT be done
BR-2B-Mod 2	Brunner Ditch	Modified	100-YR	Channel Improvement with Inline Mitigation	Same as BR-2B-Mod 1 except that IN-KIND services worth $29M for Excavation to Widen Existing Brunner Ditch	$227.40M	$471.64M	2.07	58	---	Has common element of BR-3B; for marginal cost and benefits, this project assumes BR-3B is built prior to this project	$95.77M	$245.60M	2.56	n/a	9, if Project BR-3B-Mod CAN be done	5, if Project BR-3B-Mod CAN be done
BR-3B	Brunner Ditch	Unmodified from Originally Proposed	100-YR	Channel Improvement with Inline Mitigation	Divert Chocolate Bayou flow to improved Brunner Ditch by widening existing Brunner Ditch, reversing grade of unnamed Chocolate Bayou tributary, and connecting unnamed tributary to existing Brunner Ditch	$93.74M	$174.14M	1.86	174	---	Has common element of BR-2B. For marginal cost, this project assumed to be constructed before BR-3B	$93.74M	$174.14M	1.86	4	3, if Project BR-3B-Mod CANNOT be done	3, if Project BR-3B-Mod CANNOT be done
BR-3B-Mod	Brunner Ditch	Modified	100-YR	Channel Improvement with Inline Mitigation	Assumes Local Agency IN-KIND SERVICES Worth $29M for Excavation to Widen Existing Brunner Ditch	$64.74M	$174.14M	2.69	174	---	Has common element of BR-2B. This modification is a modification of BR-3B to accoount for In-Kind services	$64.74M	$174.14M	2.69	n/a	3, if Project BR-3B-Mod CAN be done	3, if Project BR-3B-Mod CAN be done

Table 9-4 Summary of Characteristics of Recommended Projects

Project ID	Location	Description	Design Level for Conveyance Improvement Projects or Design Capacity of Siphons	Design Level of Channel Bypass Flow for Diversion Projects	Diversion Pond Design Frequency	Average Channel Top Width After Widening for Conveyance Improvement including in-line detention mitigation if used but without maintenance berms (ft)	Recommended Average Top Width of Channels for Land Acquisition including 30-ft Maintenance Berms	Total Pond Volume for Diversion Ponds, Mitigation Ponds, or Extra Channel Volume for Inline Mitigation (ac-ft) (note 1)	Total Length of Improved, Modified, Extended and New Channel as appropriate to Project (miles)(note 1)	Land Acquisition Requirements without maintenance berms (ac) (note 1)
BR-2B	Brunner Ditch Segment	Widening of Existing Brunner Ditch; Northward Extension and Realignment of Ditch to Intercept Flow From West Fork, North and South Hayes Creeeks near Confluence with Chocolate Bayou; Improve Conveyance of West Fork, North Hayes, and South Hayes to 100-Yr	100-YR	N/A	N/A	356	420	3886	11.7	592
	West Fork Segment		100-YR	N/A	N/A	182	250	529	8.7	257
	North Hayes Segment		100-YR	N/A	N/A	167	230	202	5.3	145
	South Hayes Segement		100-YR	N/A	N/A	145	210	326	6.5	162
						Total		**4943**	**32.2**	**1155**
BR-2B Mod	Brunner Ditch Segment	Same as BR-2B except no conveyance improvements made for North and South Hayes Creeks	100-YR	N/A	N/A	356	420	3055	11.7	592
	West Fork Segment		100-YR	N/A	N/A	182	250	529	8.7	257
						Total		**3584**	**20**	**848**
BR-3B	Brunner Ditch Segment	Widening of Existing Brunner Ditch; Extension to Northeast to Capture Flow from Chocolate Bayou via Existing Ditch with Reversed Grade; Use Inline Detention to Mitigate	100-YR	N/A	N/A	313	380	1730	5.4	237
	Extension Segment		100-YR	N/A	N/A	313	380	1090	3.4	149
						Total		**2820**	**8.8**	**237**
CV-16	Chocolate Bayou including East Fork	Conveyance Improvement by Widening and Depending using Inline Detention from Upstream End of East Fork of Chocolate Bayou to Vicinity of Saltwater Barrier in Chocolate Bayou	2-YR	N/A	N/A	169	230	1866	25.5	709
CV-16-Mod	East Fork	Conveyance Improvement by Widening and Depending using Inline Detention from Upstream End of East Fork of Chocolate Bayou to Vicinity of confluence of Chocolate Bayou and South Hayes Creek	100-YR	N/A	N/A	169	230	722	8.1	225
CV-28	West Fork	Conveyance Improvement by Widening and Depending with Inline Detention from Brazoria County line along West Fork to Confluence with Chocolate Bayou	2-YR	N/A	N/A	161	230	343	8.7	234
CV-28-Mod	West Fork in Fort Bend County	Approximate 2-mi Extension of CV-28 into Fort Bend County and Arcola Area	2 Yr	N/A	N/A	161	230	79	2.0	54
DP-13	Ditch C-12	Diversion Ponds	N/A	2 Yr	5-YR	N/A	N/A	76	N/A	23
DP-18	Ditch C-12	Diversion Ponds	N/A	5-YR	10-YR	N/A	N/A	48	N/A	15
SI-1	West Fork Trib A	Siphon, Mitigation Pond and Upstream Channel Conveyance Improvement	100-YR	N/A	N/A	150	210	1517	1.3	288
SI-2	West Fork Trib B	Siphon, Mitigation Pond and Upstream Channel Conveyance Improvement	100-YR	N/A	N/A	185	250	737	1.3	159
SI-3	East Fork Trib A	Siphon, Mitigation Pond and Upstream Channel Conveyance Improvement	100-YR	N/A	N/A	160	220	808	1.8	178
SI-4	East Fork Trib B	Siphon, Mitigation Pond and Upstream Channel Conveyance Improvement	100-YR	N/A	N/A	65	130	183	1.6	51
SI-5	Ditch C12	Siphon, Mitigation Pond and Upstream Channel Conveyance Improvement	100-YR	N/A	N/A	85	150	2179	1.1	406

Note 1: For modified projects, pond volume and land acquisition requirements estimated by prorationing of channel length in modified project to length in full project



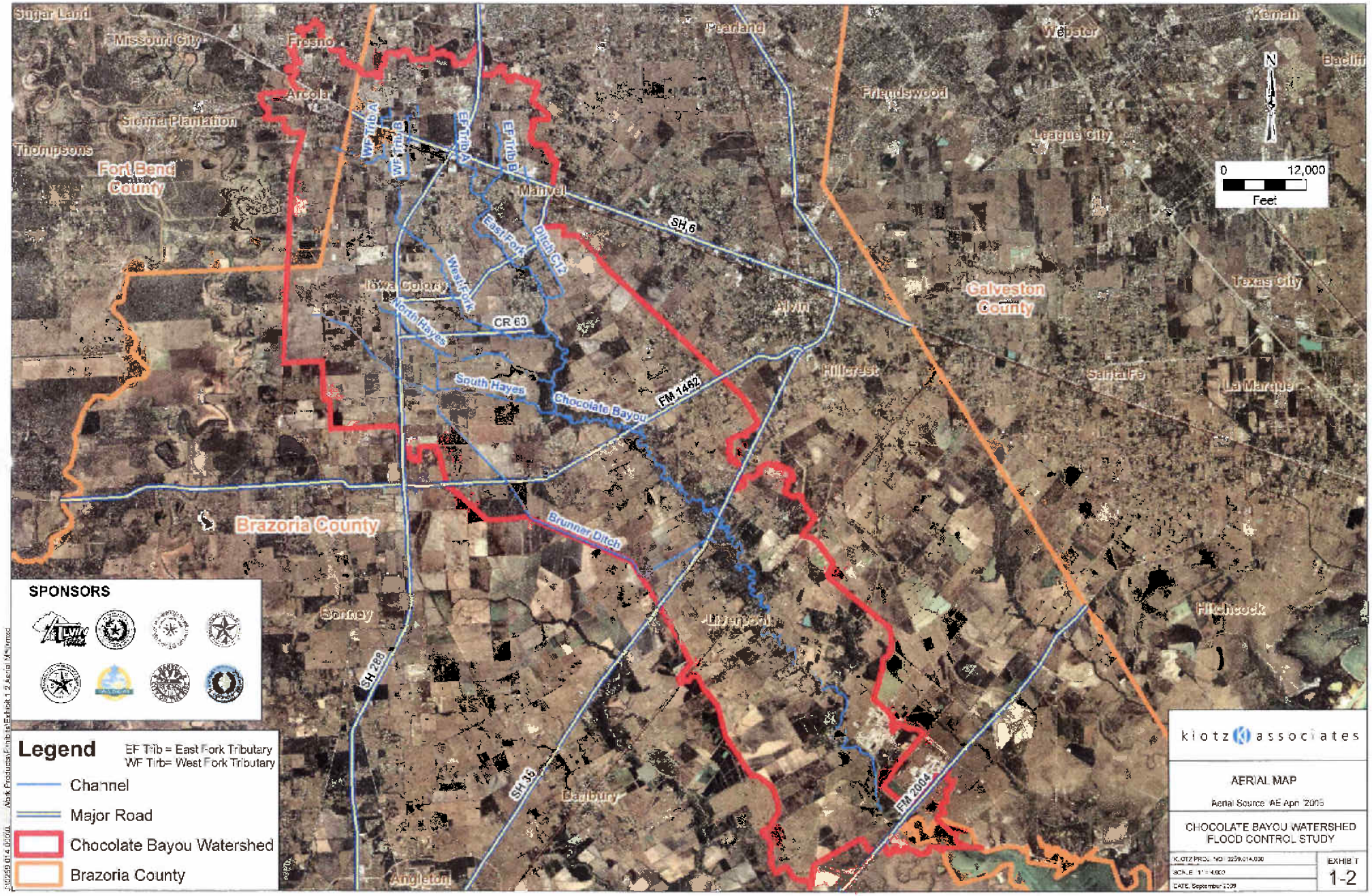
klotz associates

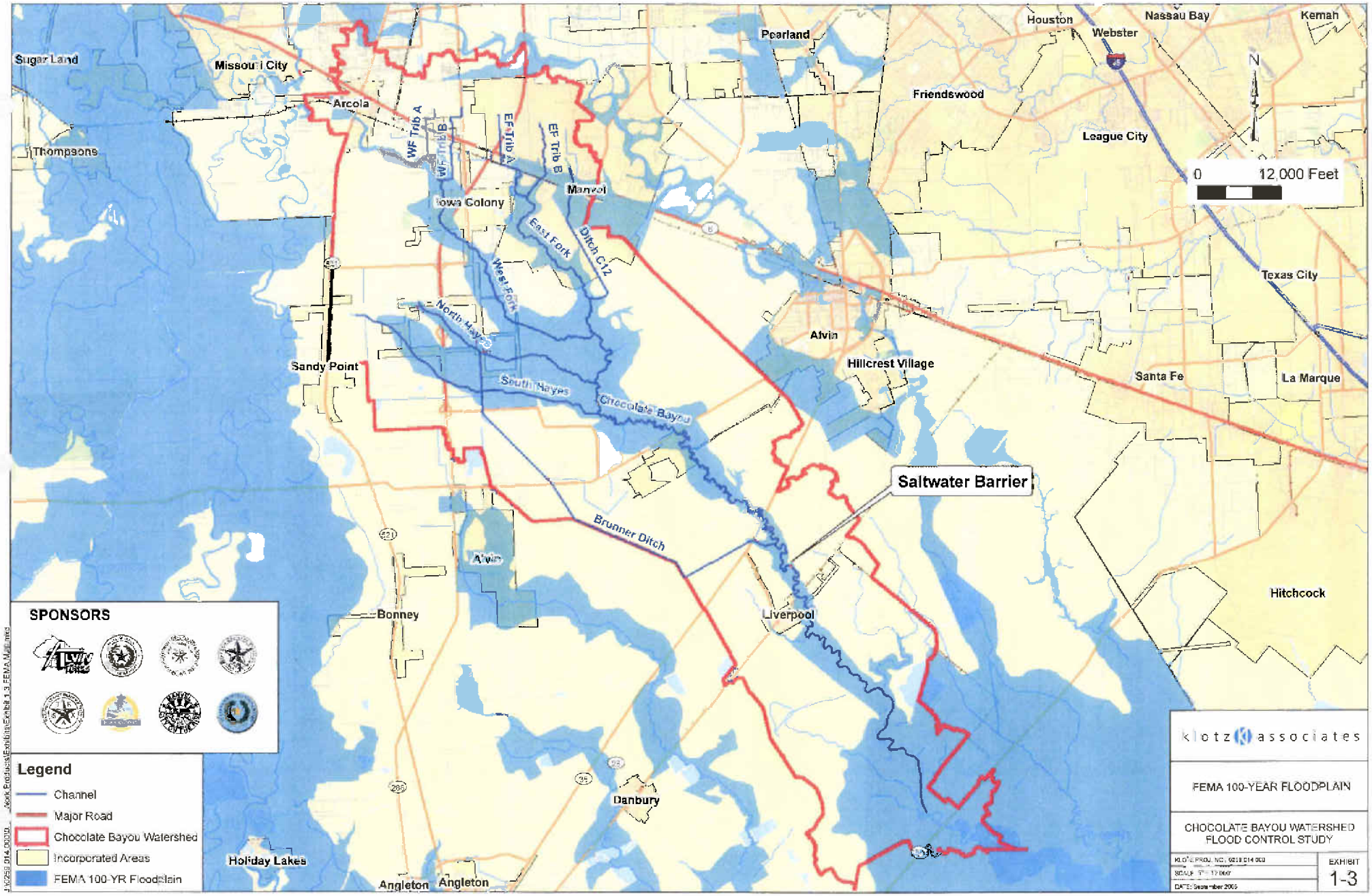
VICINITY MAP
WITH POLITICAL BOUNDAR ES

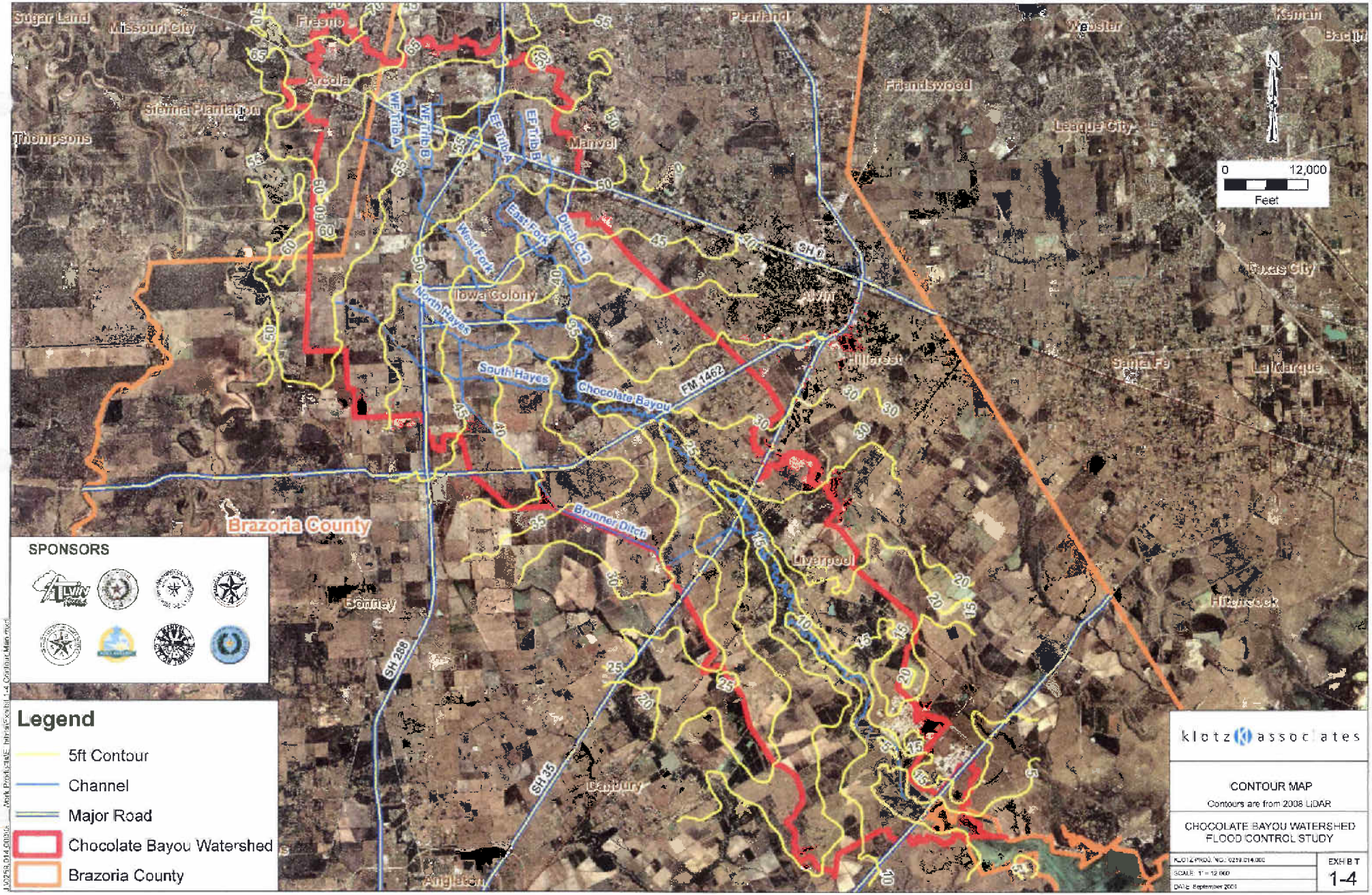
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY

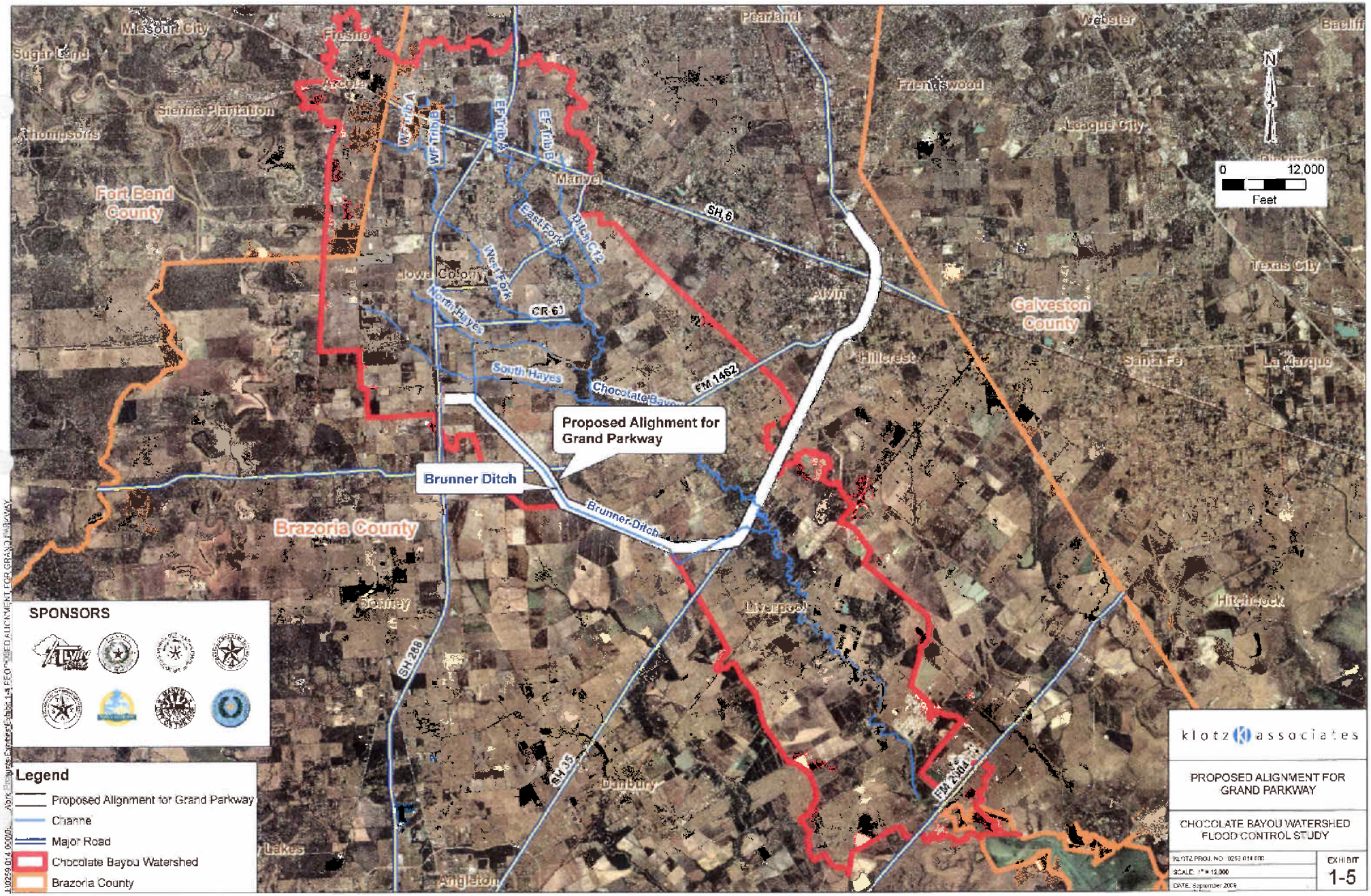
KLOTZ PROJ. NO.: 0259-14-003
SCALE: 1" = 12,000'
DATE: September 2009

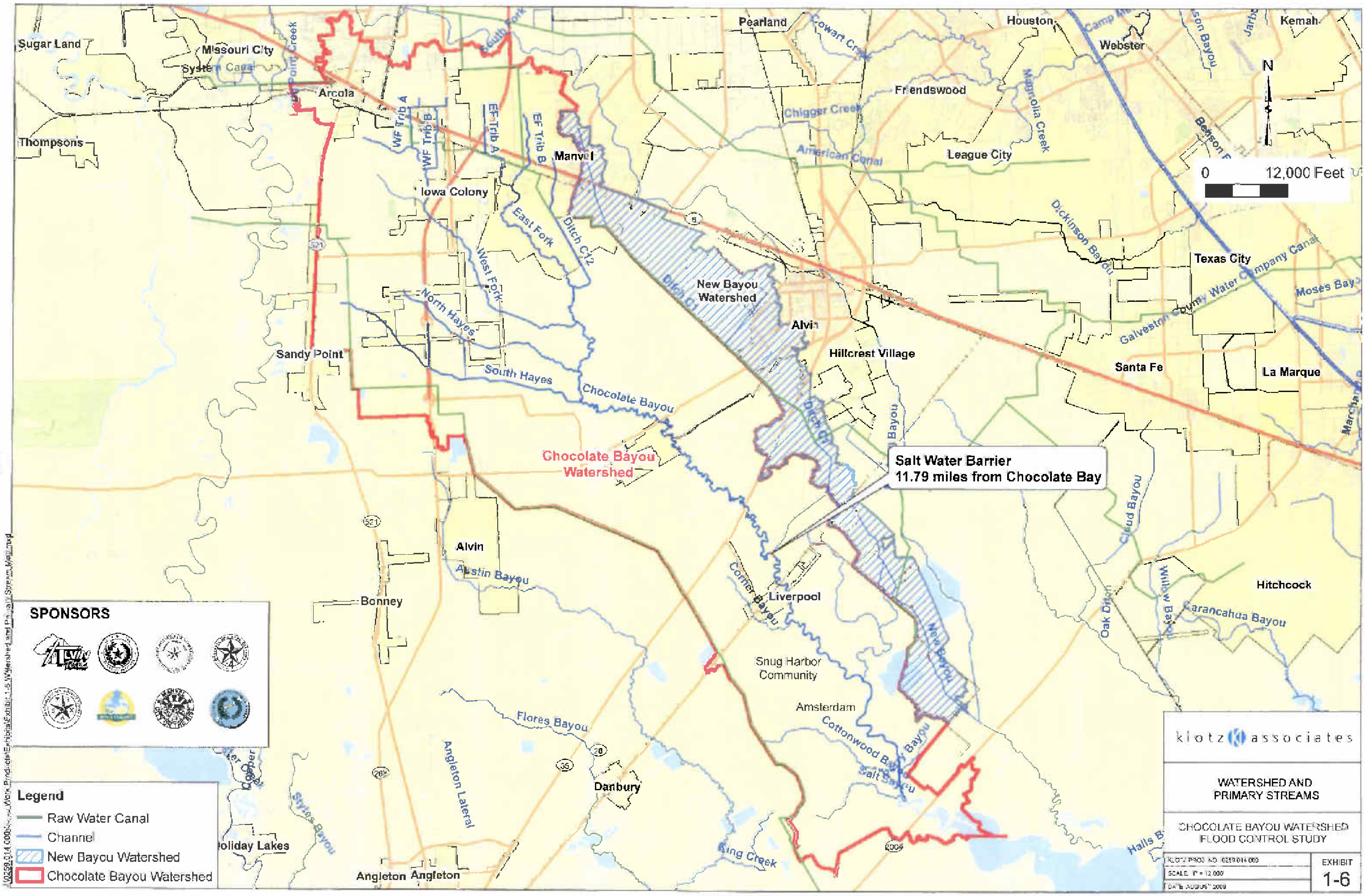
EXHIBIT
1-1


Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Fort Bend County
Pearland
Webster
Friendswood
League City
Galveston County
Texas City
Alvin
Manvel
Iowa Colony
Hillcrest
Santa Fe
La Marque
Hitchcock
Brazoria County
Sweeny
Liverpool
Danbury
Angleton
WF Trib A
WF Trib B
EF Trib A
EF Trib B
East Fork
West Fork
North Hayes
South Hayes
Ditch C12
CR 63
SH 6
FM 1462
Chocolate Bayou
Brunner Ditch
SH 288
SH 35
FM 2004
N
0
12,000
Feet
SPONSORS
Legend
EF Trib = East Fork Tributary
WF Trib= West Fork Tributary
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
AERIAL MAP
Aerial Source: AE Apr '2005
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 2259.014.000
SCALE: 1" = 4000
DATE: September 2009
EXHIBIT
1-2


Sugar Land
Missouri City
Arcola
Thompsons
Pearland
Houston
Webster
Nassau Bay
Kemah
Friendswood
League City
Texas City
La Marque
Santa Fe
Hitchcock
Alvin
Hillcrest Village
Sandy Point
Iowa Colony
Manvel
Bonney
Liverpool
Danbury
Holiday Lakes
Angleton
WF Trib A
WF Trib B
EF Trib A
EF Trib B
East Fork
West Fork
North Mayes
South Mayes
Ditch C12
Chocolate Bayou
Brunner Ditch
Saltwater Barrier
0
12,000 Feet
N
SPONSORS
Legend
Channel
Major Road
Chocolate Bayou Watershed
Incorporated Areas
FEMA 100-YR Floodplain
klotz associates
FEMA 100-YEAR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
1-3


Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Pearland
Webster
Friendswood
League City
Manvel
Alvin
Iowa Colony
Hillcrest
Santa Fe
La Marque
Texas City
Hitchcock
Liverpool
Bonney
Danbury
Angleton
Brazoria County
WF Trib A
WF Trib B
EF Trib A
EF Trib B
East Fork
West Fork
Ditch Ch 2
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
FM 1462
SH 288
SH 35
SH 6
N
0
12,000
Feet
SPONSORS
Legend
5ft Contour
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
CONTOUR MAP
Contours are from 2008 LIDAR
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO.: 0219.014.000
SCALE: 1" = 12,000
DATE: September 2009
EXHIBIT
1-4


Missouri City
Sugar Land
Fresno
Arcola
Sienna Plantation
Thompsons
Pearland
Webster
Friendswood
League City
Fort Bend County
Manvel
SH 6
Iowa Colony
CR 61
Alvin
Texas City
Galveston County
Hillcrest
Santa Fe
La Marque
FM 1462
South Hayes
Chocolate Bayou
Proposed Alignment for Grand Parkway
Brunner Ditch
Brunner Ditch
Brazoria County
Alvin
Liverpool
Hitchcock
SH 288
Danbury
Lakes
Angleton
FM 2004
N
0
12,000
Feet
SPONSORS
Legend
Proposed Alignment for Grand Parkway
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
PROPOSED ALIGNMENT FOR GRAND PARKWAY
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0253.014.000
SCALE: 1" = 12,000'
DATE: September 2005
EXHIBIT
1-5


SPONSORS
Legend
Raw Water Canal
Channel
New Bayou Watershed
Chocolate Bayou Watershed
Salt Water Barrier
11.79 miles from Chocolate Bay
Chocolate Bayou Watershed
New Bayou Watershed
0 12,000 Feet
N
Sugar Land
Missouri City
Arcola
Thompsons
Iowa Colony
Manvel
Sandy Point
Pearland
Houston
Webster
Kemah
Friendswood
League City
Texas City
Santa Fe
La Marque
Alvin
Hillcrest Village
Liverpool
Snug Harbor Community
Amsterdam
Bonney
Danbury
Angleton Angleton
Hitchcock
WF Trib A
WF Trib B
EF Trib A
EF Trib B
East Fork
West Fork
North Hayes
South Hayes
Ditch C12
Chocolate Bayou
Austin Bayou
Flores Bayou
Angleton Lateral
Cottonwood Bayou
Corner Bayou
Chigger Creek
American Canal
Dickinson Bayou
Magnolia Creek
Galveston County Water Company Canal
Moses Bay
Oak Ditch
Cloud Bayou
Carancahua Bayou
klotz associates
WATERSHED AND
PRIMARY STREAMS
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
1-6

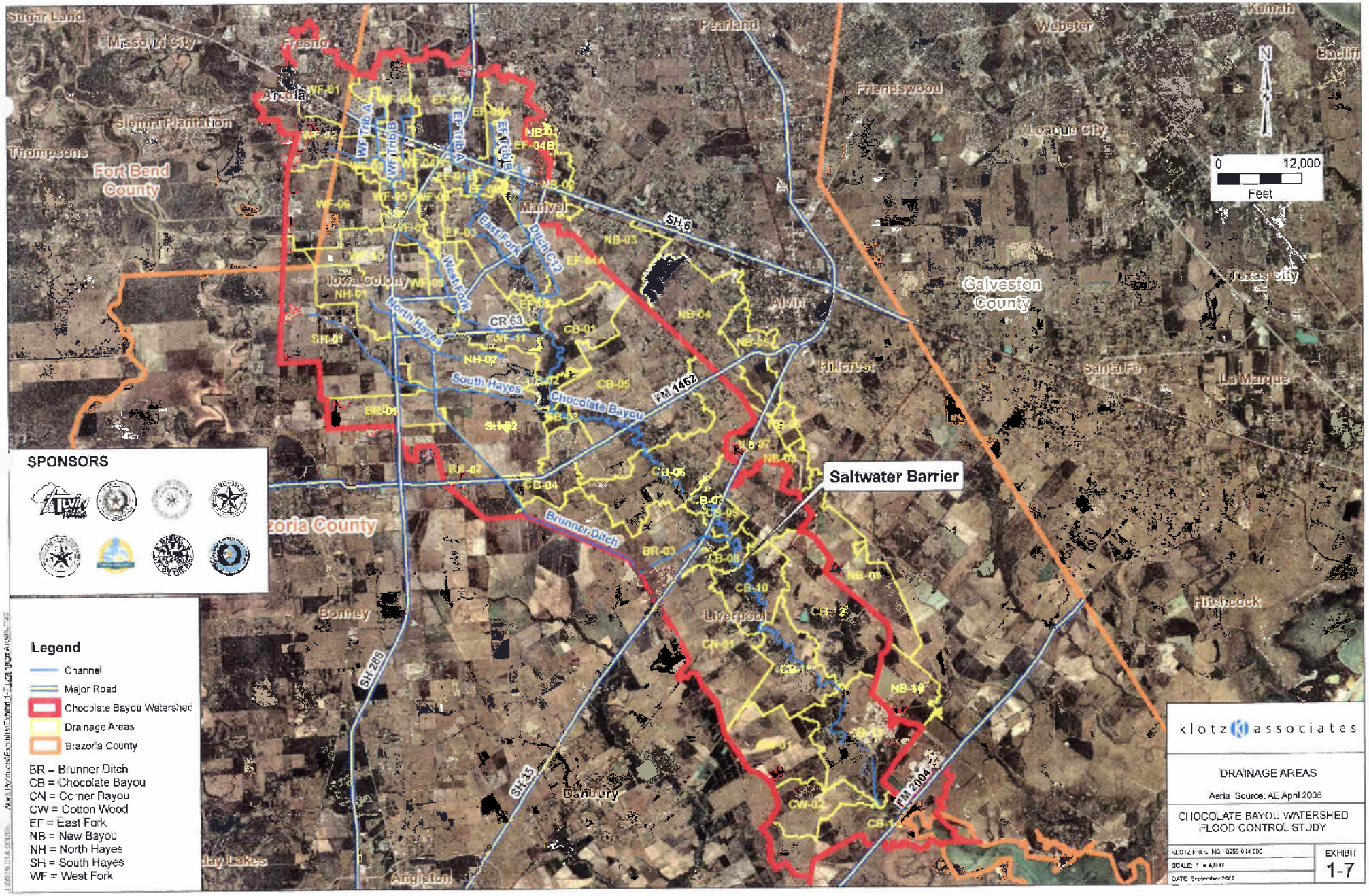

Sugar Land
Missouri City
Fresno
Arcola
Pearland
Webster
Kemah
Bacliff
Friendswood
League City
Sienna Plantation
Thompsons
Fort Bend County
Manvel
Iowa Colony
Alvin
Galveston County
Texas City
Santa Fe
La Marque
Hitchcock
Liverpool
Bonney
Danbury
Angleton
Brazoria County
SH 6
CR 63
FM 1462
FM 2004
SH 288
SH 35
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
Ditch CH2
Saltwater Barrier
N
0
12,000
Feet
SPONSORS
Legend
Channel
Major Road
Chocolate Bayou Watershed
Drainage Areas
Brazoria County
BR = Brunner Ditch
CB = Chocolate Bayou
CN = Corner Bayou
CW = Cotton Wood
EF = East Fork
NB = New Bayou
NH = North Hayes
SH = South Hayes
WF = West Fork
klotz associates
DRAINAGE AREAS
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
1-7

TABLE 2-1

POINT RAINFALL AMOUNT (INCHES) FOR
VARYING DURATIONS AND FREQUENCIES
IN BRAZORIA COUNTY, TEXAS

	Rainfall Frequency					
Duration	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
5-minute	0.57	0.64	0.69	0.78	0.84	0.91
15-minute	1.21	1.38	1.51	1.71	1.86	2.02
60-minute	2.35	2.87	3.24	3.78	4.20	4.62
2-hour	2.85	3.75	4.35	5.00	5.60	6.20
3-hour	3.30	4.10	4.90	5.60	6.30	7.15
6-hour	3.70	5.00	5.85	6.85	7.80	8.75
12-hour	4.40	6.00	7.25	8.50	9.60	10.75
24-hour	5.10	7.00	8.55	9.95	11.50	13.00

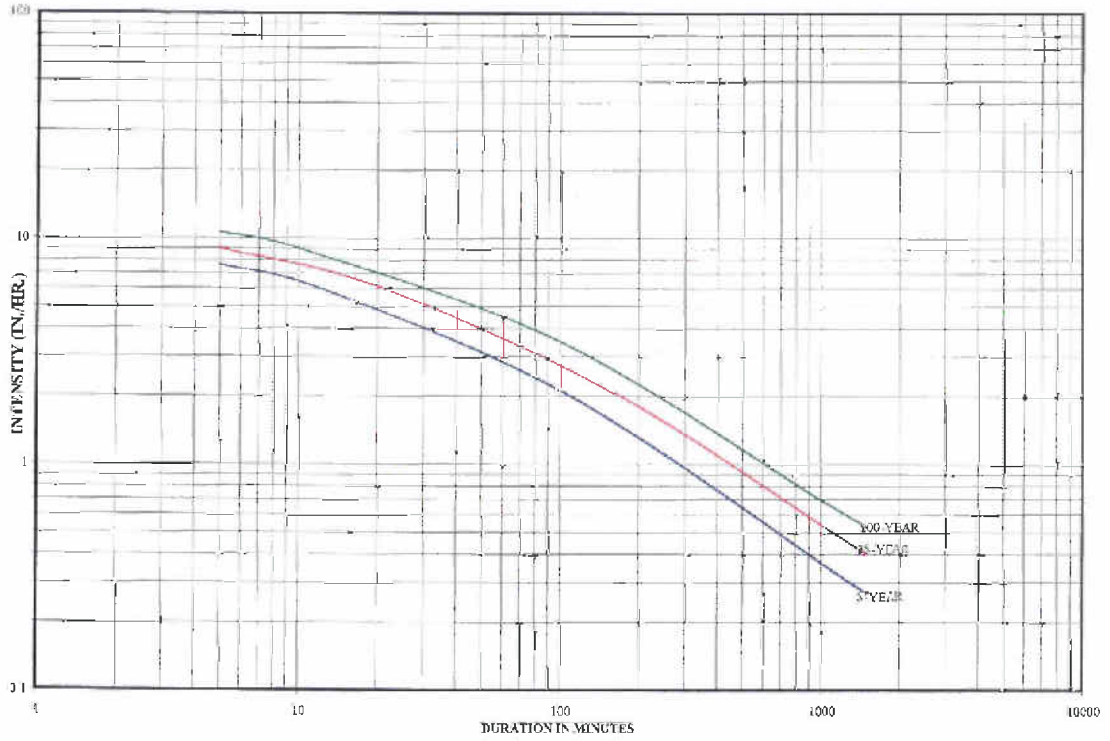
P = Total precipitation (inches)
I = Intensity (inches/hr.)

Source: TP-40 (24 hour) and Hydro-35 (5-60 minutes)

Equations for Brazoria County Intensity-Duration Curves (valid between 5 and 1440 minutes)

Return Period (Years)	Equation
2	I = 75.5 / (t + 14.7) ^ 0.807
5	I = 82.8 / (t + 16.9) ^ 0.775
10	I = 88.1 / (t + 18.4) ^ 0.756
25	I = 100.8 / (t + 19.5) ^ 0.753
50	I = 107.3 / (t + 19.8) ^ 0.742
100	I = 120.2 / (t + 21.3) ^ 0.741

I = Rainfall Intensity, inches/hour
t = Rainfall Duration, minutes



RAINFALL INTENSITY/DURATION CURVES FOR BRAZORIA COUNTY, TEXAS

DEVELOPED FROM TP-40 AND HYDRO-35

FIGURE 2-7

klotz associates

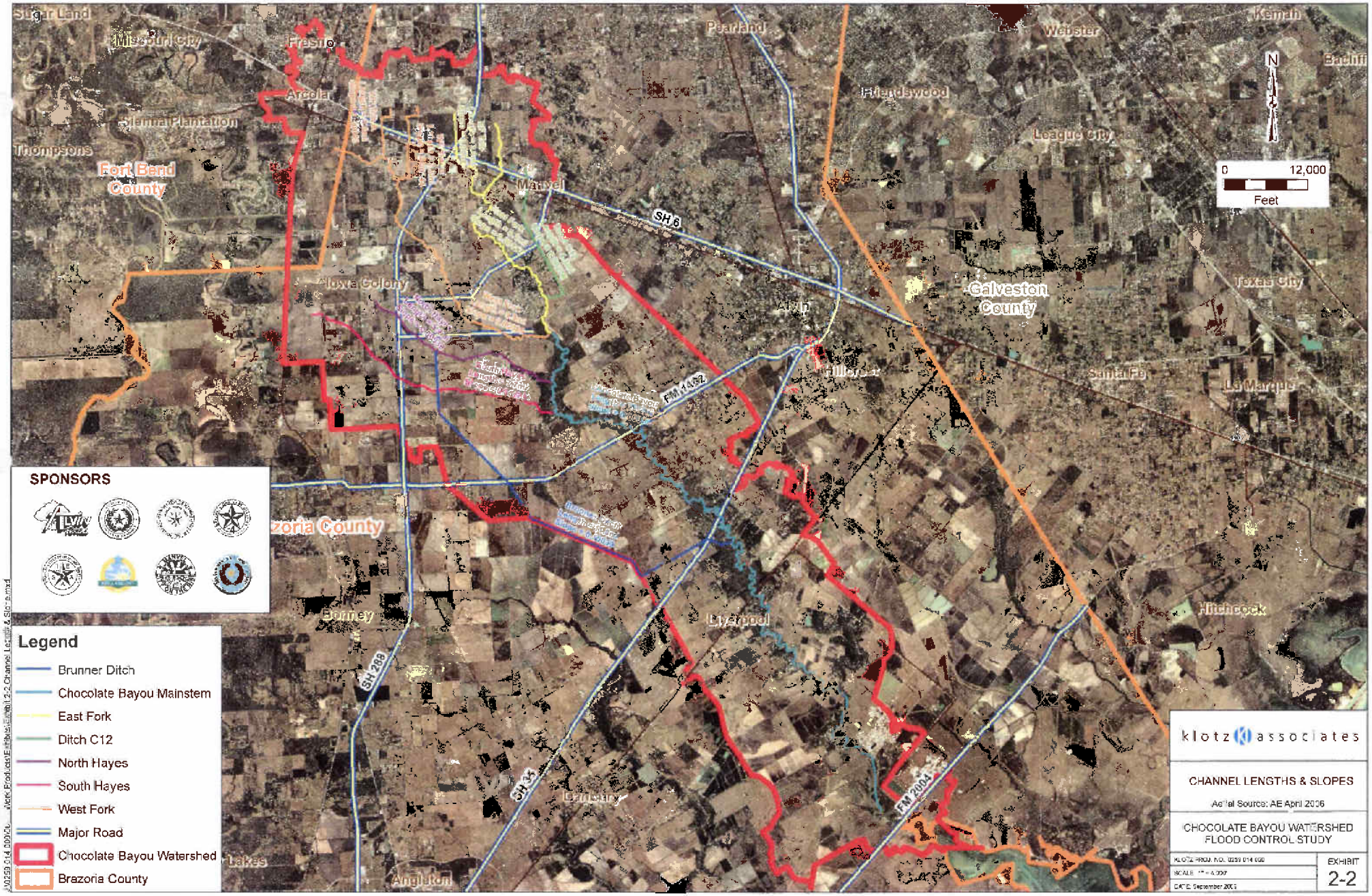
INTENSITY-DURATION-FREQUENCY CURVES FOR BRAZORIA COUNTY

Source: Brazoria County Drainage Criteria Manual

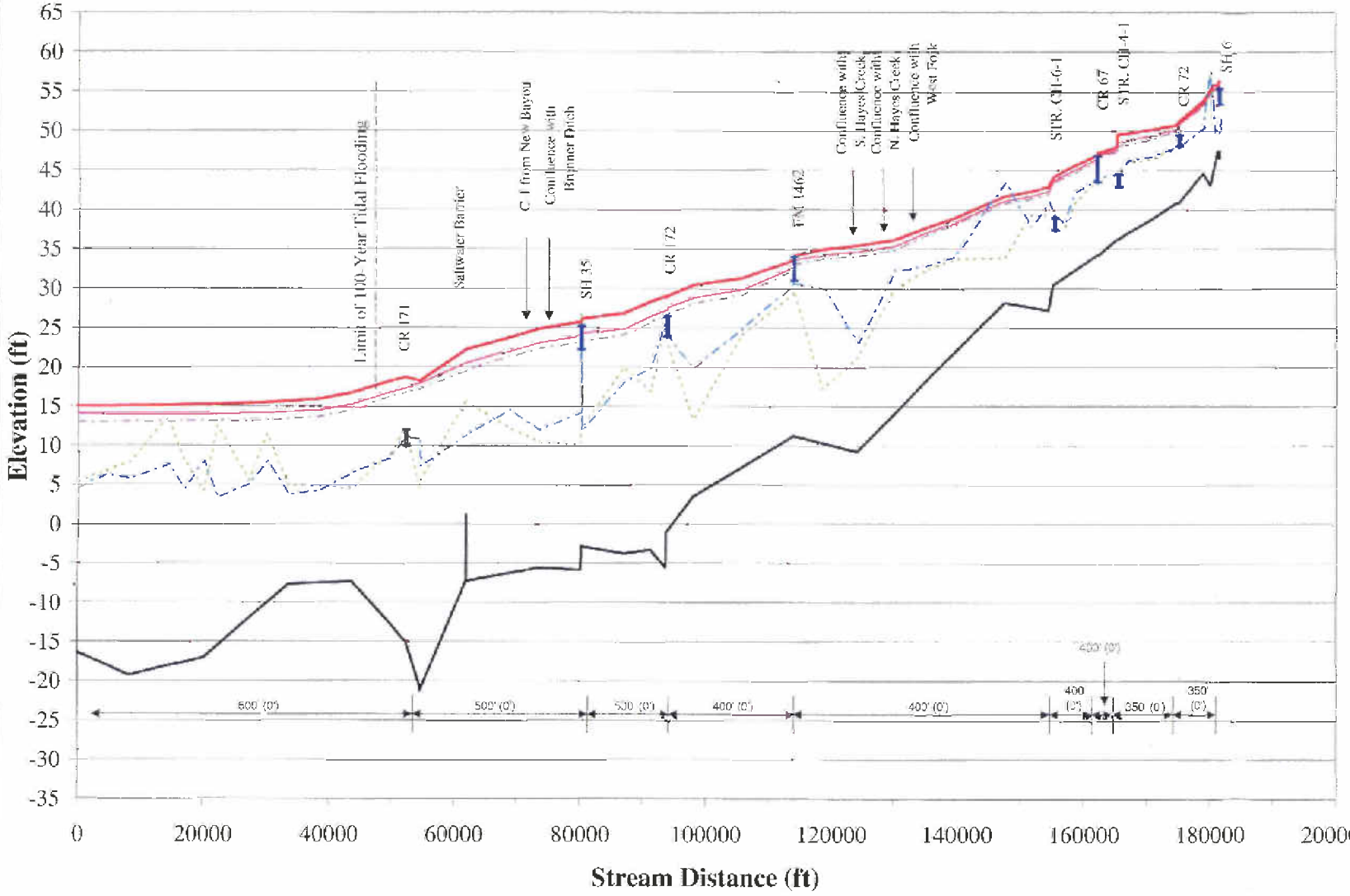
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY

H-GTZ PROJ. NO. 0255-014-000
SCALE: N.T.S.
DATE: September 2008

EXHIBIT 2-1


Sugar Land
Missouri City
Fresno
Arcola
Pearland
Webster
Kemah
Bacliff
Friendswood
League City
Thompsons
Fort Bend County
Manvel
SH 6
Alvin
Galveston County
Texas City
Santa Fe
La Marque
Hitchcock
Liverpool
Brazoria County
Angleton
Lakes
SH 288
SH 35
FM 1462
FM 2004
N
0
12,000
Feet
SPONSORS
Legend
Brunner Ditch
Chocolate Bayou Mainstem
East Fork
Ditch C12
North Hayes
South Hayes
West Fork
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
CHANNEL LENGTHS & SLOPES
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
2-2

CHOCOLATE BAYOU 100-YR, 25-YR, AND 10-YR WATER SURFACE PROFILES



Legend

- 100-YR
- 25-YR
- 10-YR
- Left Bank
- Right Bank
- Existing Flowline

Right-Of-Way Required (Existing)

150 (0')

Bridge/Culvert

Exhibit 30 from Brazoria County Master Drainage Plan Dated 2002

SPONSORS

klotz associates

PROFILE OF CHOCOLATE BAYOU FROM BRAZORIA COUNTY MASTER DRAINAGE PLAN

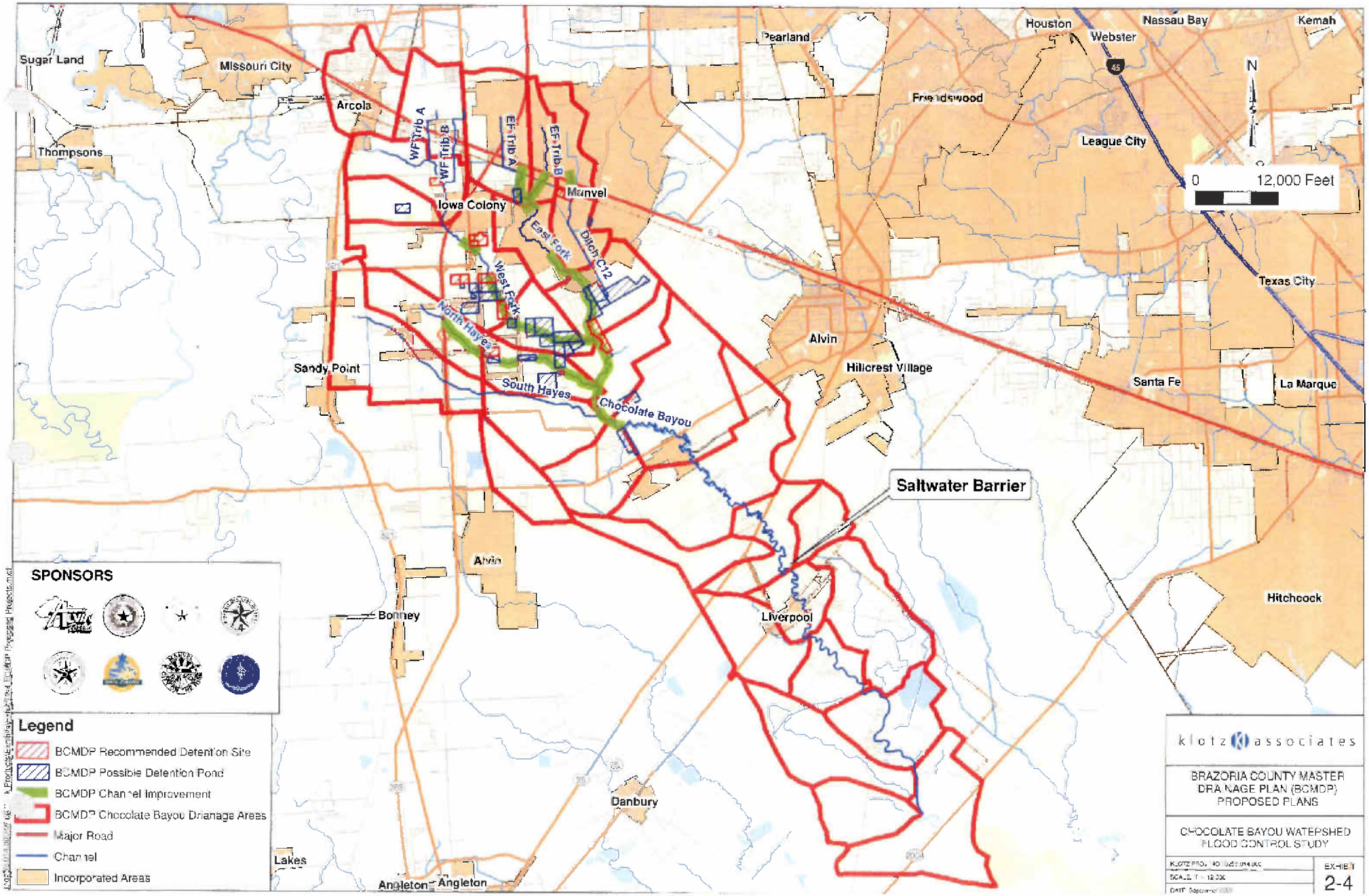
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY

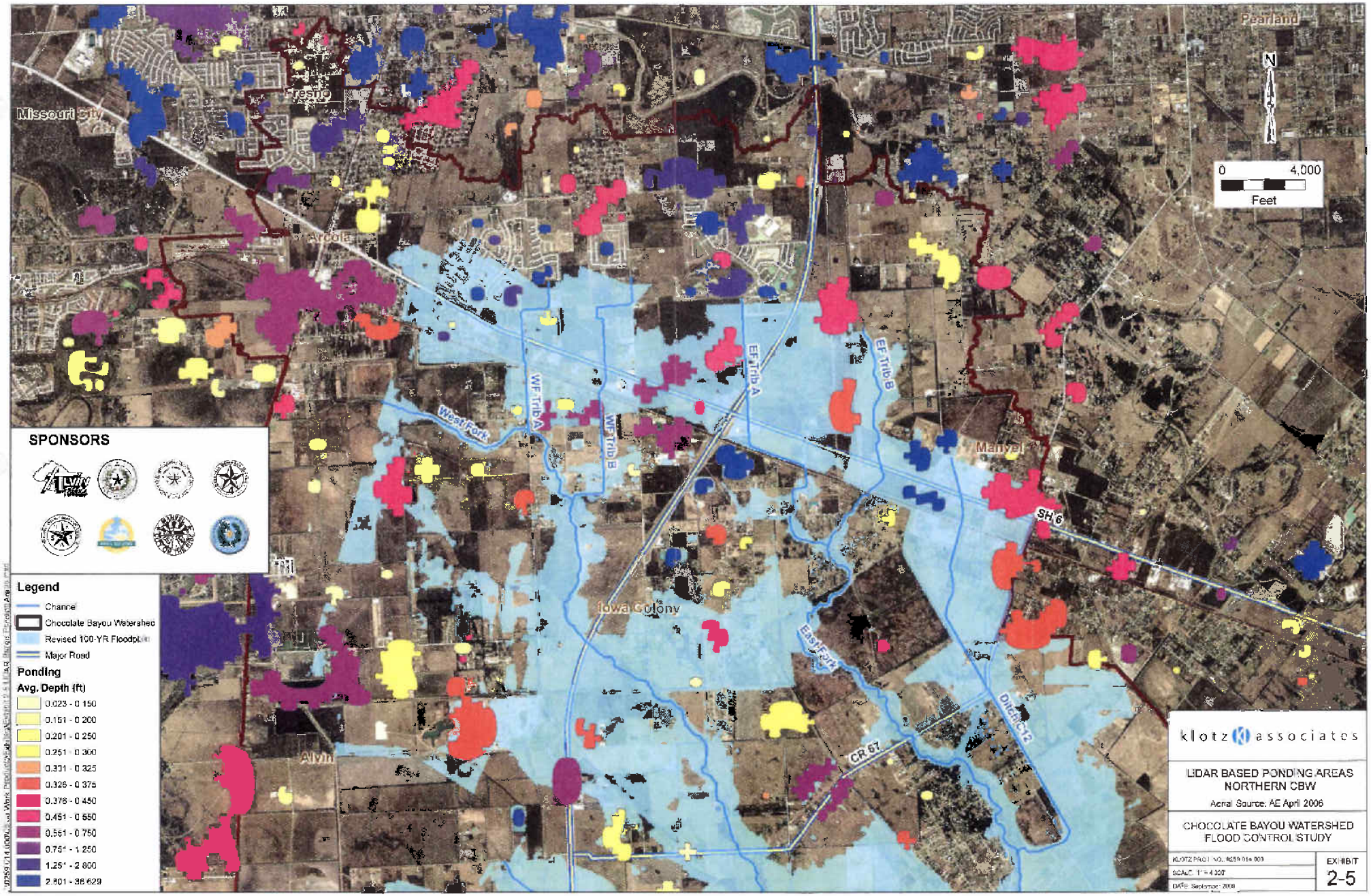
KLOTZ PROJ NO. 025-01-101

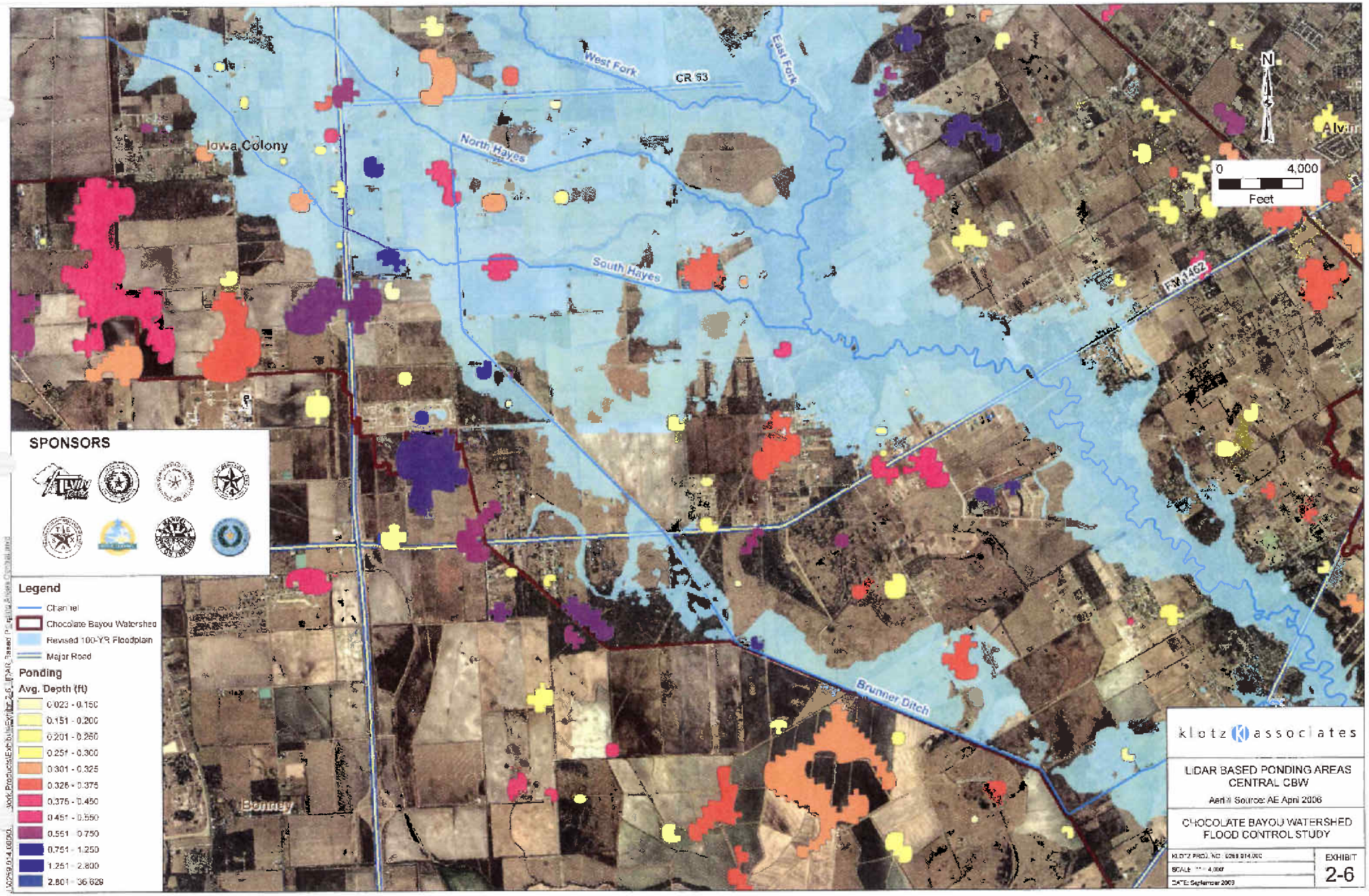
SCALE: N/S

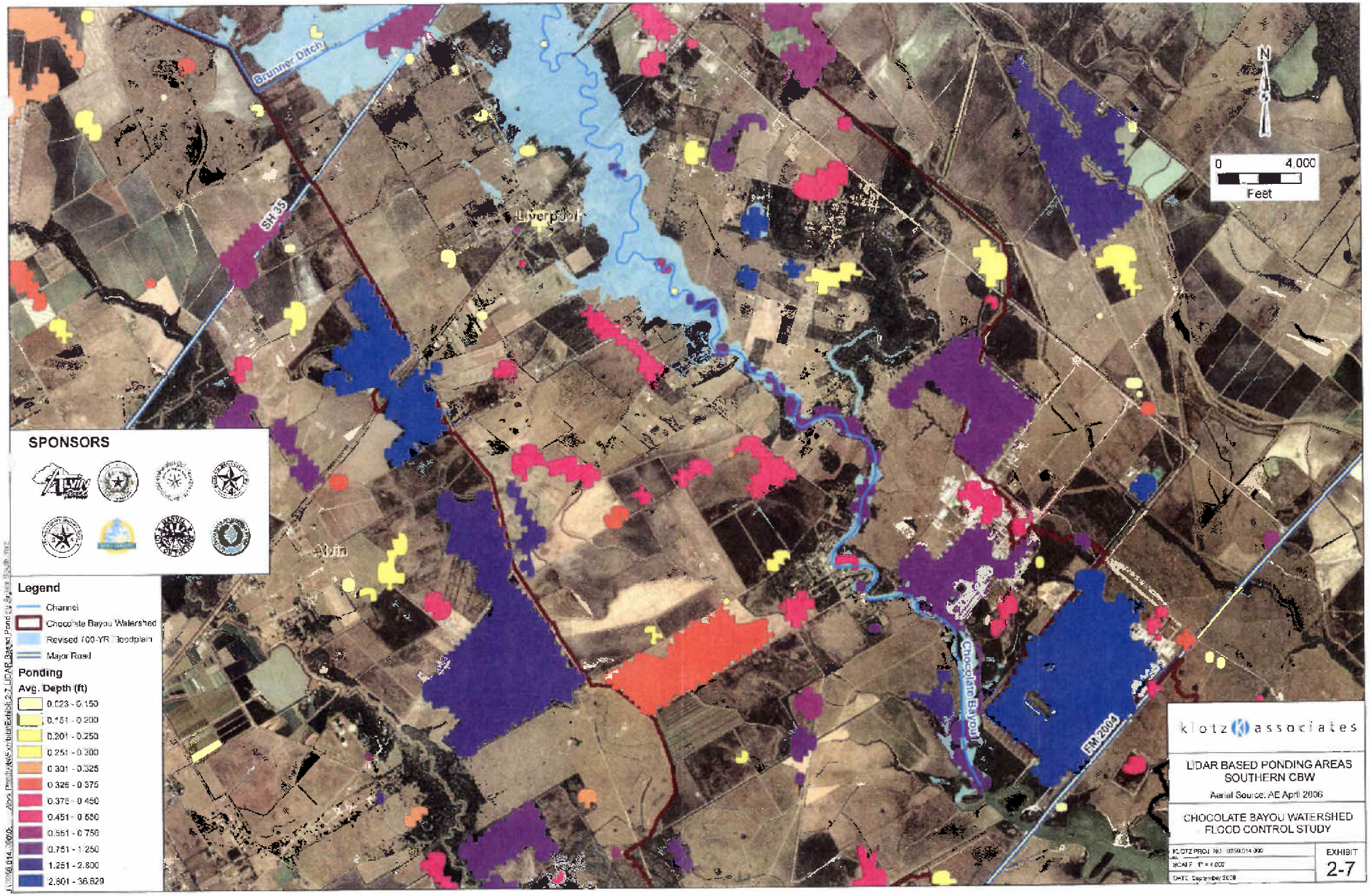
DATE: September 2004

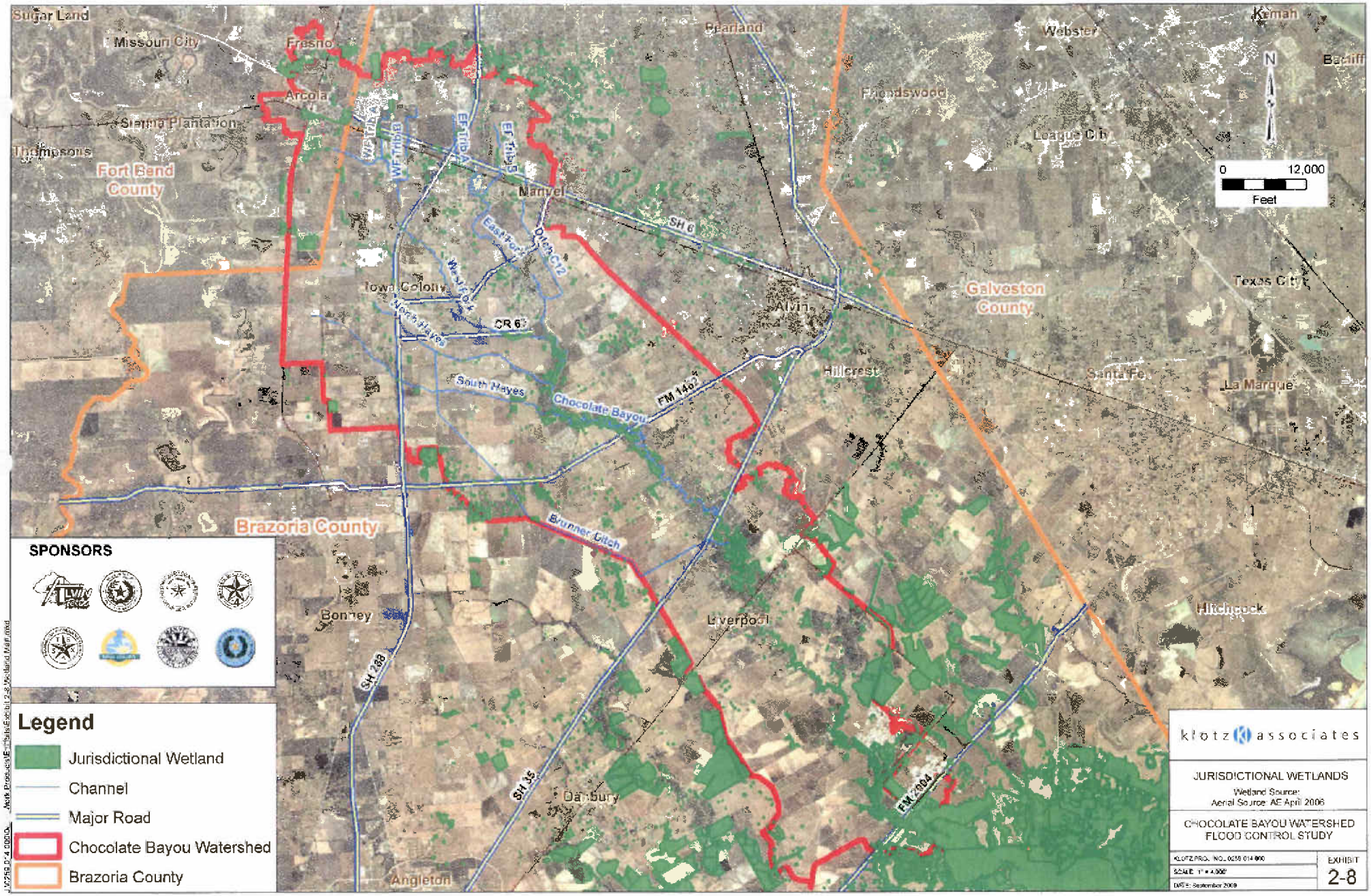
EXHIBIT 2-3

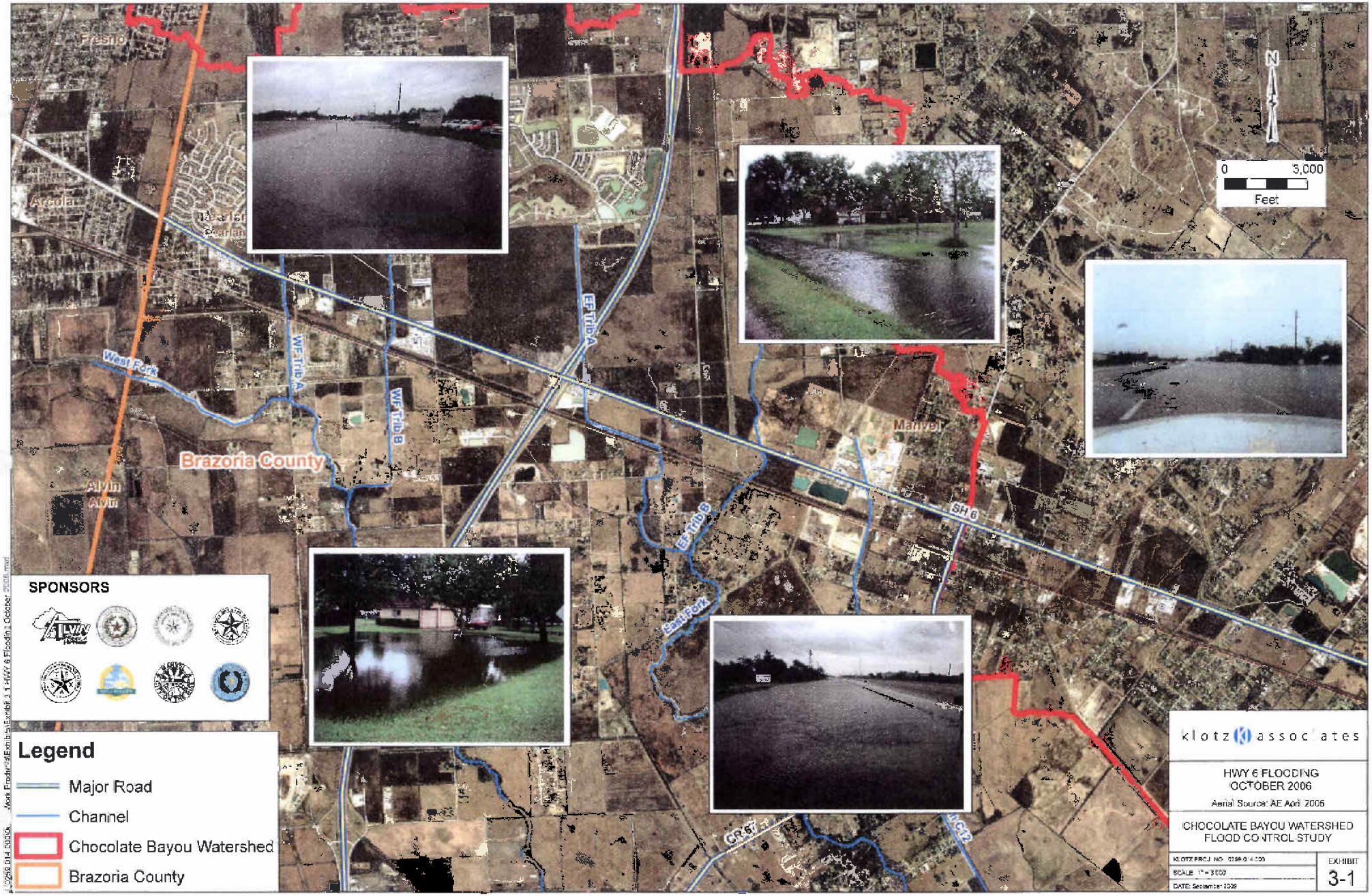

Sugar Land
Missouri City
Arcola
Thompsons
Iowa Colony
Manvel
Pearland
Houston
Webster
Nassau Bay
Kemah
Friendswood
League City
Texas City
Alvin
Hillcrest Village
Santa Fe
La Marque
Sandy Point
Bonney
Liverpool
Hitchcock
Danbury
Lakes
Angleton
WF Trib A
WF Trib B
EF Trib A
EF Trib B
East Fork
Ditch C12
West Fork
North Hayes
South Hayes
Chocolate Bayou
Saltwater Barrier
N
0
12,000 Feet
SPONSORS
Legend
BCMDP Recommended Detention Site
BCMDP Possible Detention Pond
BCMDP Channel Improvement
BCMDP Chocolate Bayou Drainage Areas
Major Road
Channel
Incorporated Areas
klotz associates
BRAZORIA COUNTY MASTER DRAINAGE PLAN (BCMDP) PROPOSED PLANS
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT
2-4

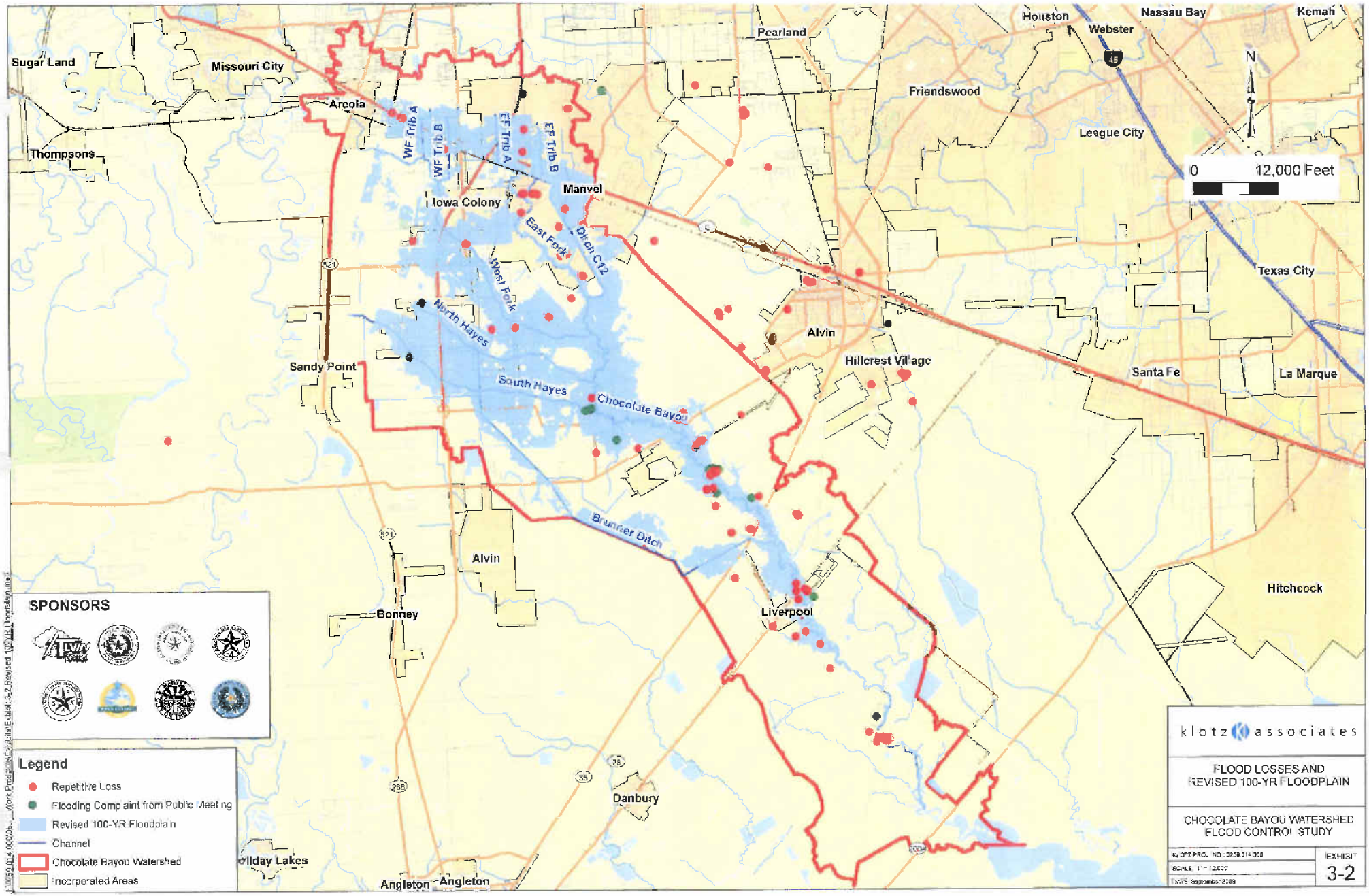

Pearland
Missouri City
Fresno
Arcola
Manvel
Iowa Colony
Alvin
West Fork
WF Trib A
WF Trib B
EF Trib A
EF Trib B
East Fork
Ditch C12
SH 6
CR 67
N
0
4,000
Feet
SPONSORS
Legend
Channel
Chocolate Bayou Watershed
Revised 100-YR Floodplain
Major Road
Ponding
Avg. Depth (ft)
0.023 - 0.150
0.151 - 0.200
0.201 - 0.250
0.251 - 0.300
0.301 - 0.325
0.326 - 0.375
0.376 - 0.450
0.451 - 0.550
0.551 - 0.750
0.751 - 1.250
1.25' - 2.800
2.801 - 36.629
klotz associates
LIDAR BASED PONDING AREAS
NORTHERN CBW
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 9659.014.000
SCALE: 1" = 4,000'
DATE: September 2008
EXHIBIT
2-5

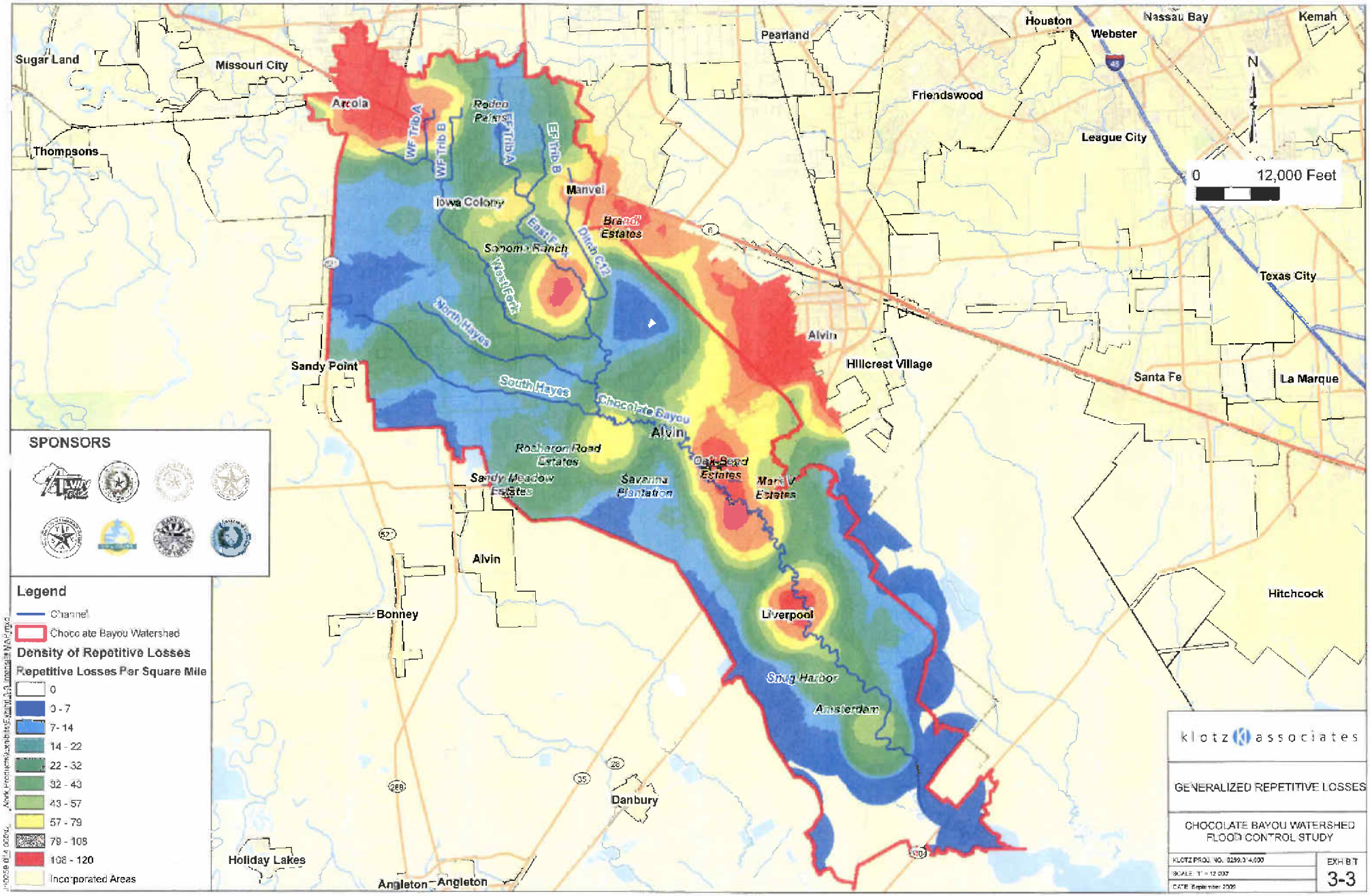

West Fork
CR 53
East Fork
Iowa Colony
North Hayes
South Hayes
FM 1462
Alvin
Brunner Ditch
Bonney
N
0
4,000
Feet
SPONSORS
Legend
Channel
Chocolate Bayou Watershed
Revised 100-YR Floodplain
Major Road
Ponding
Avg. Depth (ft)
0.023 - 0.150
0.151 - 0.200
0.201 - 0.250
0.251 - 0.300
0.301 - 0.325
0.326 - 0.375
0.376 - 0.450
0.451 - 0.550
0.551 - 0.750
0.751 - 1.250
1.251 - 2.800
2.801 - 36.629
klotz associates
LIDAR BASED PONDING AREAS
CENTRAL CBW
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO.: 0259.014.000
SCALE: 1" = 4,000'
DATE: September 2009
EXHIBIT
2-6

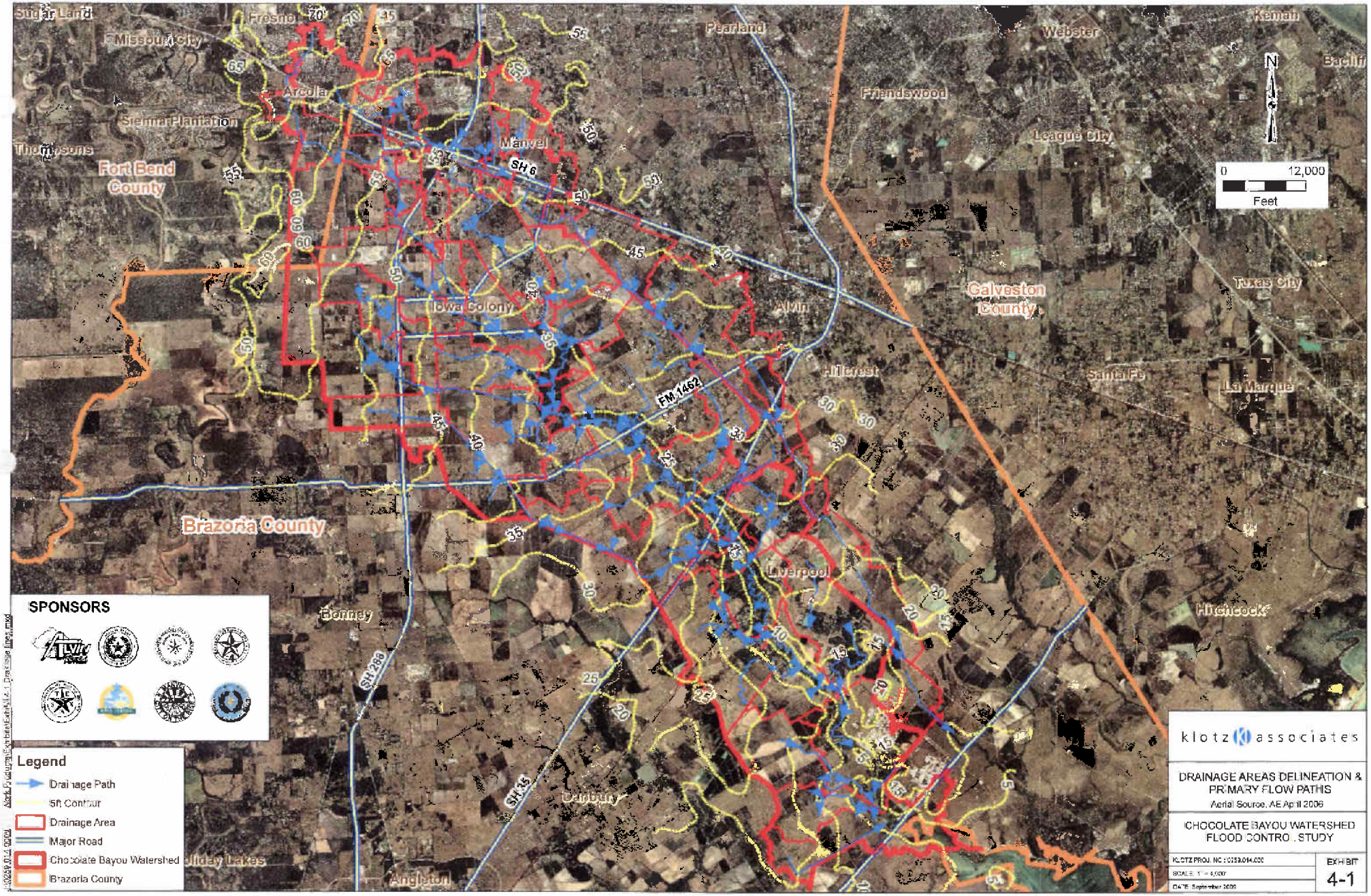

Brunner Ditch
SR 35
Liverpool
Alvin
Chocolate Bayou
FM 2004
N
0
4,000
Feet
SPONSORS
Legend
Channel
Chocolate Bayou Watershed
Revised 100-YR Floodplain
Major Road
Ponding
Avg. Depth (ft)
0.023 - 0.150
0.151 - 0.200
0.201 - 0.250
0.251 - 0.300
0.301 - 0.325
0.326 - 0.375
0.376 - 0.450
0.451 - 0.550
0.551 - 0.750
0.751 - 1.250
1.251 - 2.800
2.801 - 36.629
klotz associates
LIDAR BASED PONDING AREAS
SOUTHERN CBW
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0059.014.000
SCALE: 1" = 4,000'
DATE: September 2009
EXHIBIT
2-7

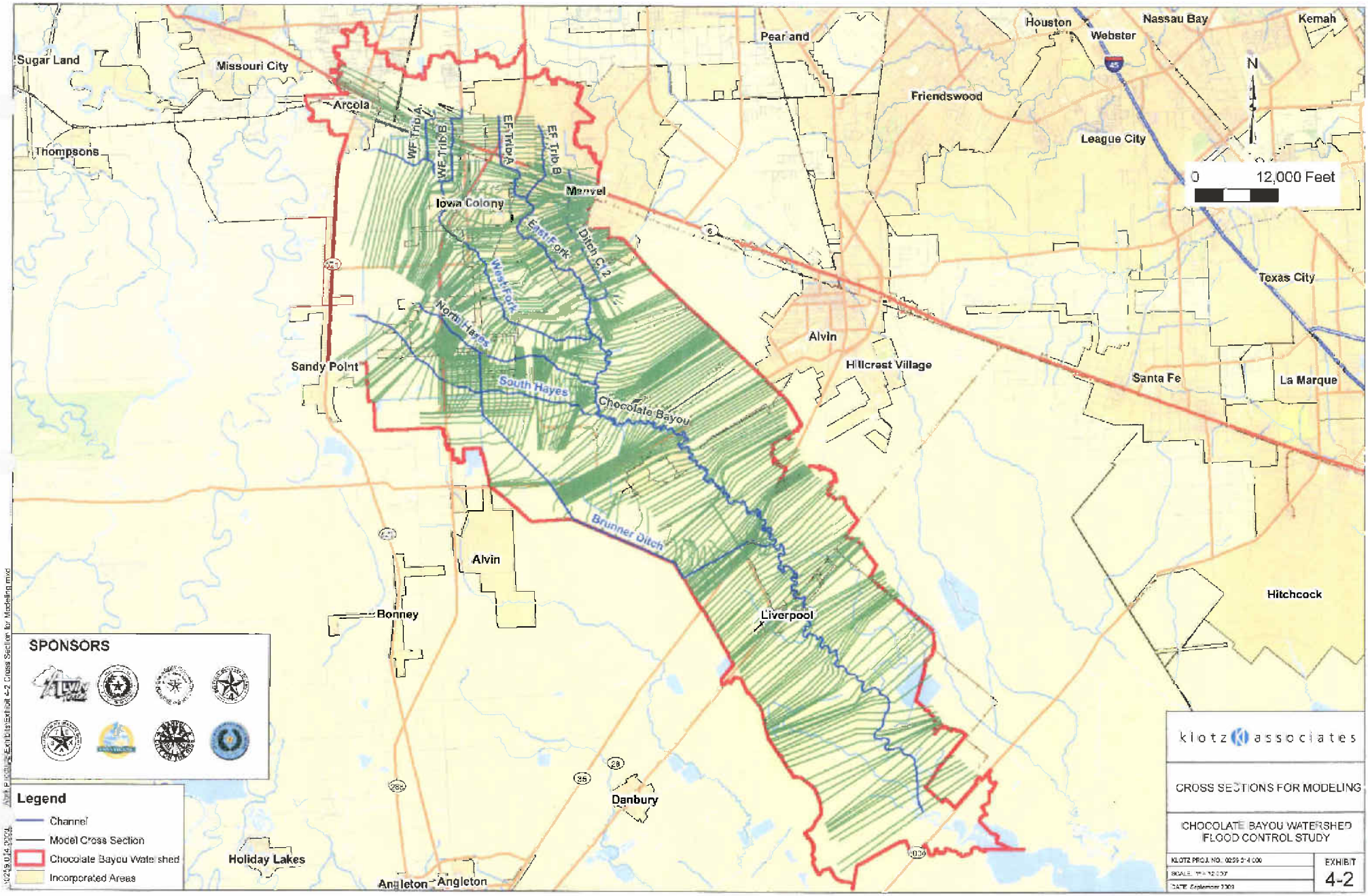

Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Fort Bend County
Pearland
Manvel
Iowa Colony
Alvin
Hillcrest
Friendswood
Webster
Kemah
Bacliff
League City
Galveston County
Texas City
Santa Fe
La Marque
Hitchcock
Brazoria County
Bonney
Liverpool
Dambury
Angleton
SH 6
CR 6
FM 1462
SH 288
SH 35
FM 2004
Chocolate Bayou
Brunner Ditch
South Hayes
North Hayes
West Fork
East Fork
Clear Creek
WF Trib B
EF Trib A
EF Trib B
N
0
12,000
Feet
SPONSORS
Legend
Jurisdictional Wetland
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
JURISDICTIONAL WETLANDS
Wetland Source:
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0258.014.000
SCALE: 1" = 4,000'
DATE: September 2009
EXHIBIT
2-8

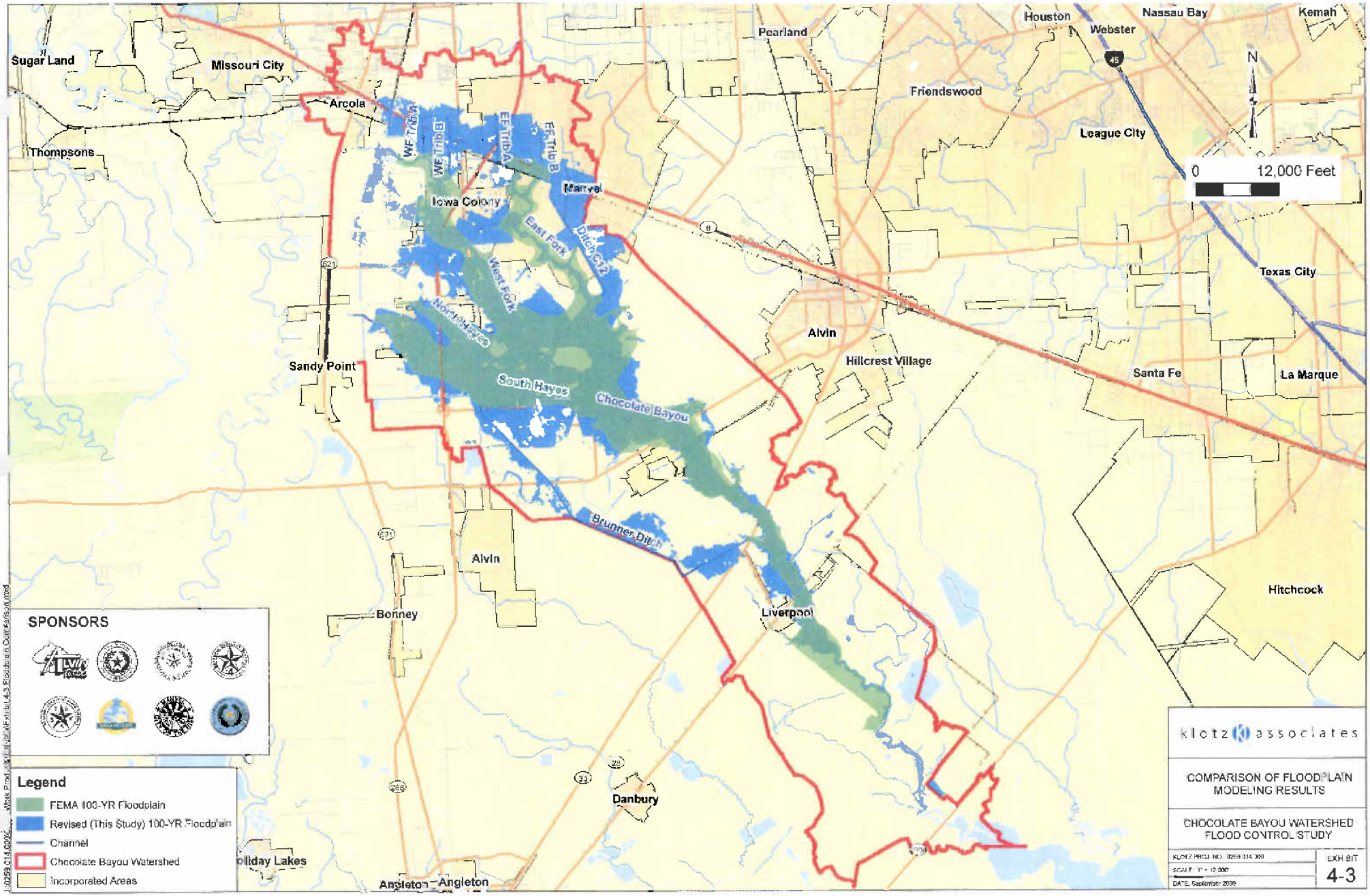

Fresno
Arcola
West Fork
WF Trib A
WF Trib B
EF Trib A
Brazoria County
Alvin
Manvel
SH 6
EF Trib B
East Fork
CR 61
N
0
3,000
Feet
SPONSORS
Legend
Major Road
Channel
Chocolate Bayou Watershed
Brazoria County
klotz associates
HWY 6 FLOODING
OCTOBER 2006
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
3-1

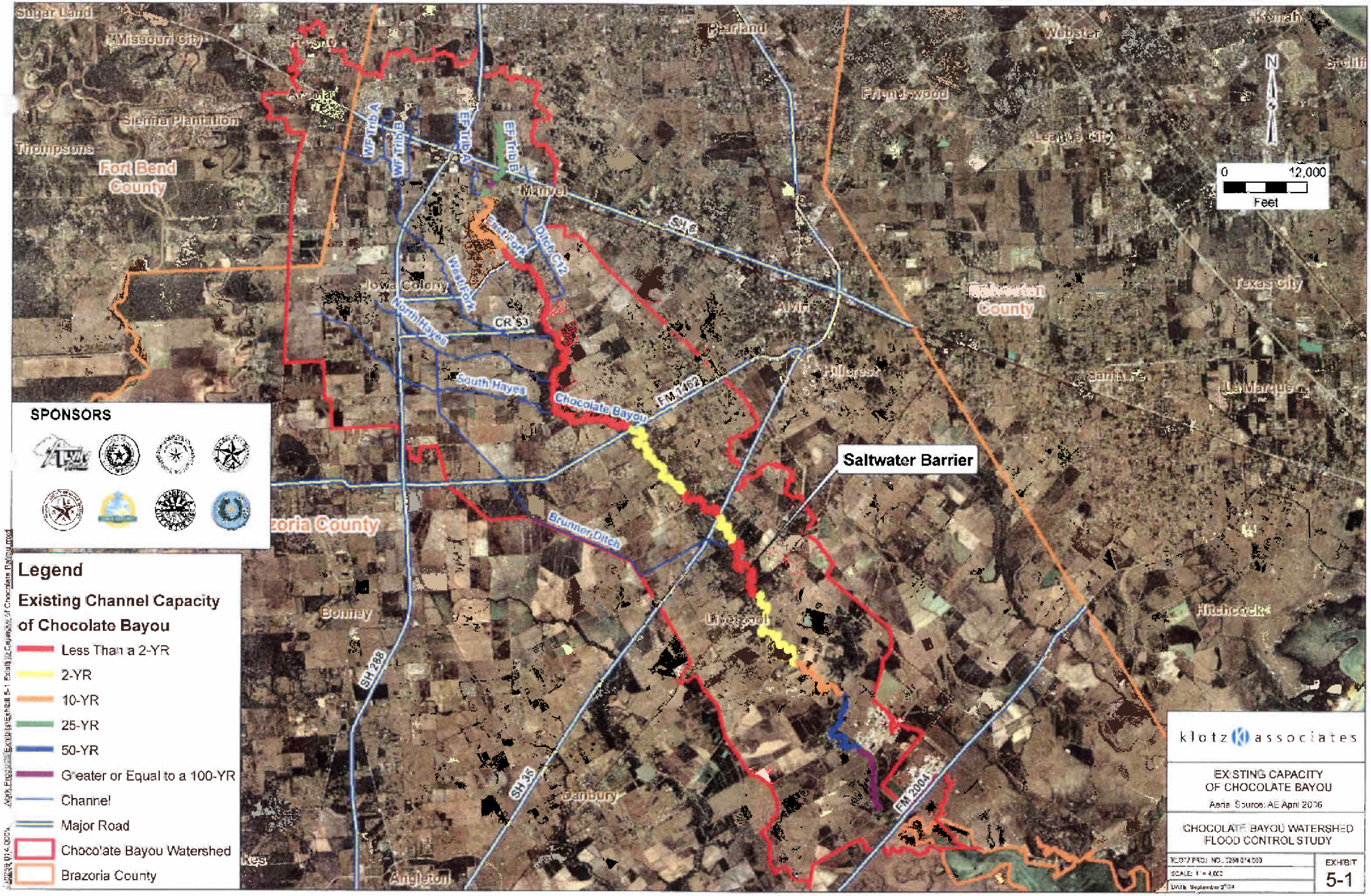

Sugar Land
Missouri City
Arcola
Thompsons
Houston
Pearland
Webster
Nassau Bay
Kemah
Friendswood
League City
N
0 12,000 Feet
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Manvel
Iowa Colony
East Fork
Ditch C42
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
Sandy Point
Alvin
Hillcrest Village
Texas City
Santa Fe
La Marque
Hitchcock
Liverpool
Bonney
Danbury
Angleton
Angleton
SPONSORS
Legend
Repetitive Loss
Flooding Complaint from Public Meeting
Revised 100-YR Floodplain
Channel
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
FLOOD LOSSES AND REVISED 100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT 3-2

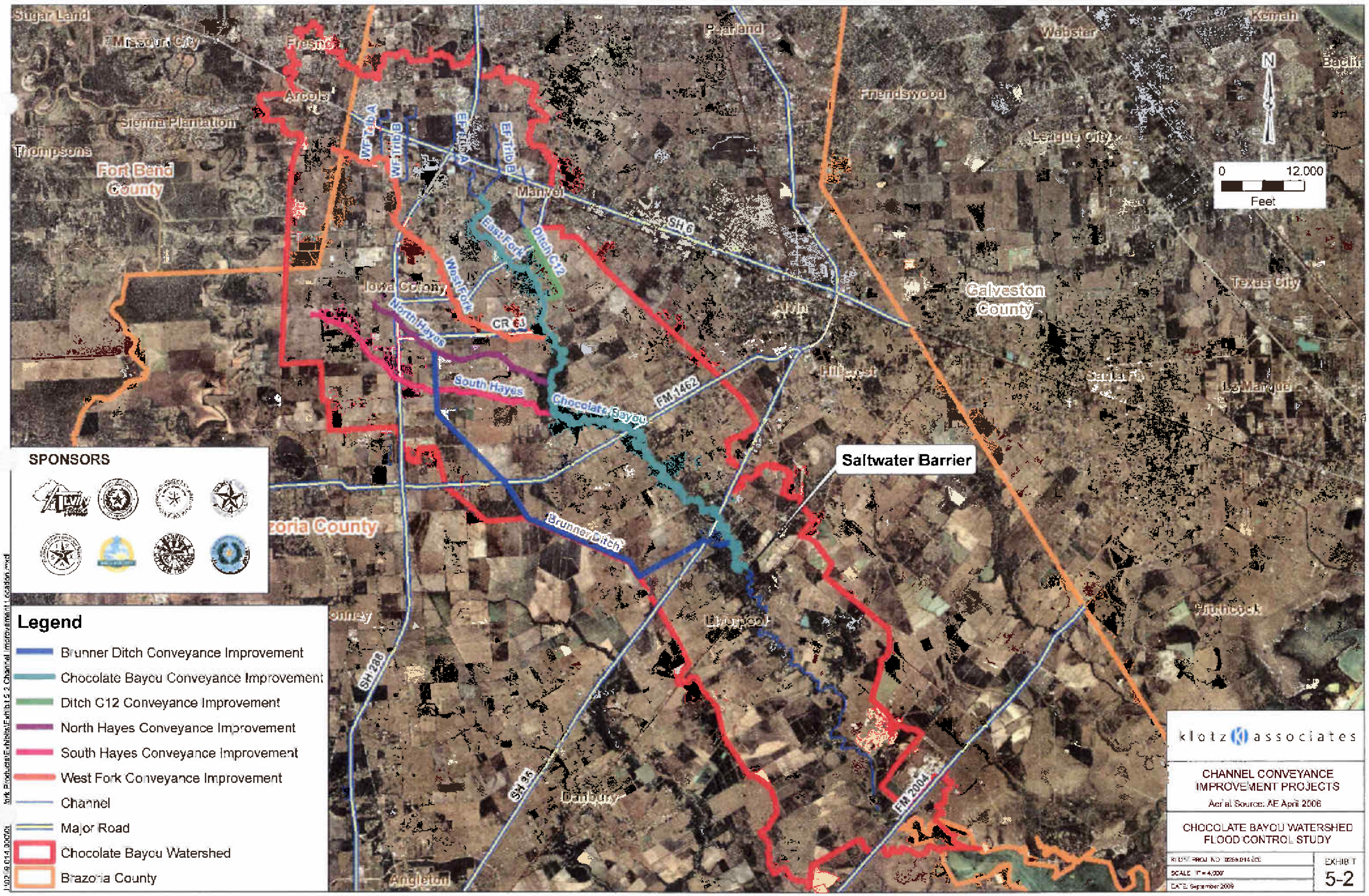

Sugar Land
Missouri City
Arcola
Thompsons
Pearland
Houston
Webster
Nassau Bay
Kemah
Friendswood
League City
N
0 12,000 Feet
WF Trib A
WF Trib B
Rodeo Palms
EF Trib A
EF Trib B
Manvel
Iowa Colony
Brand Estates
Sonoma Ranch
East Fork
Ditch C12
West Fork
North Hayes
South Hayes
Sandy Point
Alvin
Hillcrest Village
Texas City
Santa Fe
La Marque
Chocolate Bayou
Rosharon Road Estates
Sandy Meadow Estates
Savanna Plantation
Oak Bend Estates
Mark V Estates
Liverpool
Snug Harbor
Amsterdam
Hitchcock
Bonney
Danbury
Holiday Lakes
Angleton
SPONSORS
Legend
Channel
Chocolate Bayou Watershed
Density of Repetitive Losses
Repetitive Losses Per Square Mile
0
0 - 7
7 - 14
14 - 22
22 - 32
32 - 43
43 - 57
57 - 79
79 - 108
108 - 120
Incorporated Areas
klotz associates
GENERALIZED REPETITIVE LOSSES
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
3-3

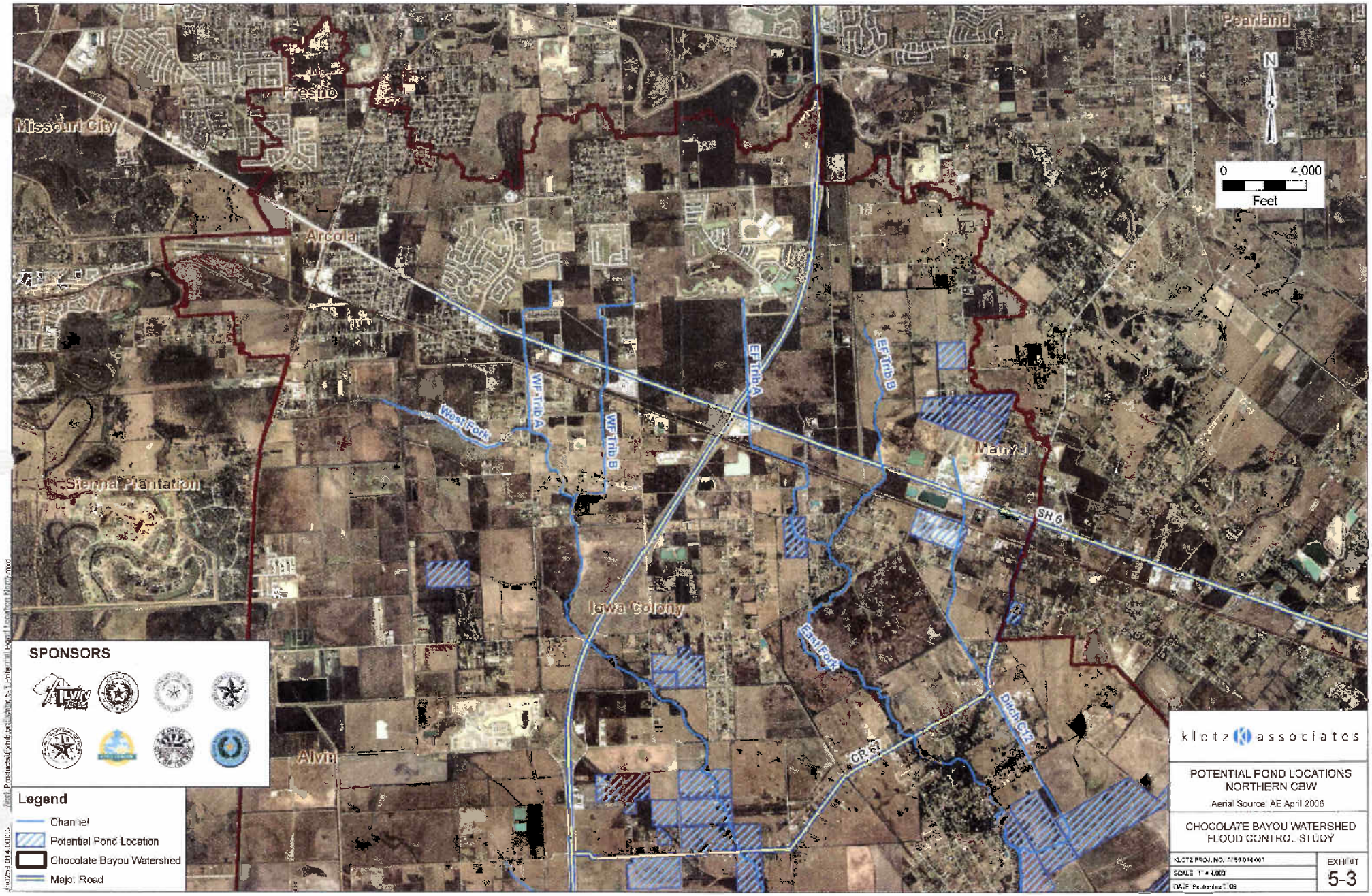

Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Fort Bend County
Manvel
SH 6
Pearland
Webster
Kemah
Bacliff
Friendswood
League City
N
0
12,000
Feet
Iowa Colony
Alvin
Galveston County
Texas City
Hillcrest
Santa Fe
La Marque
FM 1462
Brazoria County
Liverpool
Hitchcock
Bonney
SH 256
Danbury
Holiday Lakes
Angleton
SPONSORS
Legend
Drainage Path
5ft Contour
Drainage Area
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
DRAINAGE AREAS DELINEATION & PRIMARY FLOW PATHS
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0159.014.000
SCALE: 1" = 4,000'
DATE: September 2006
EXHIBIT
4-1

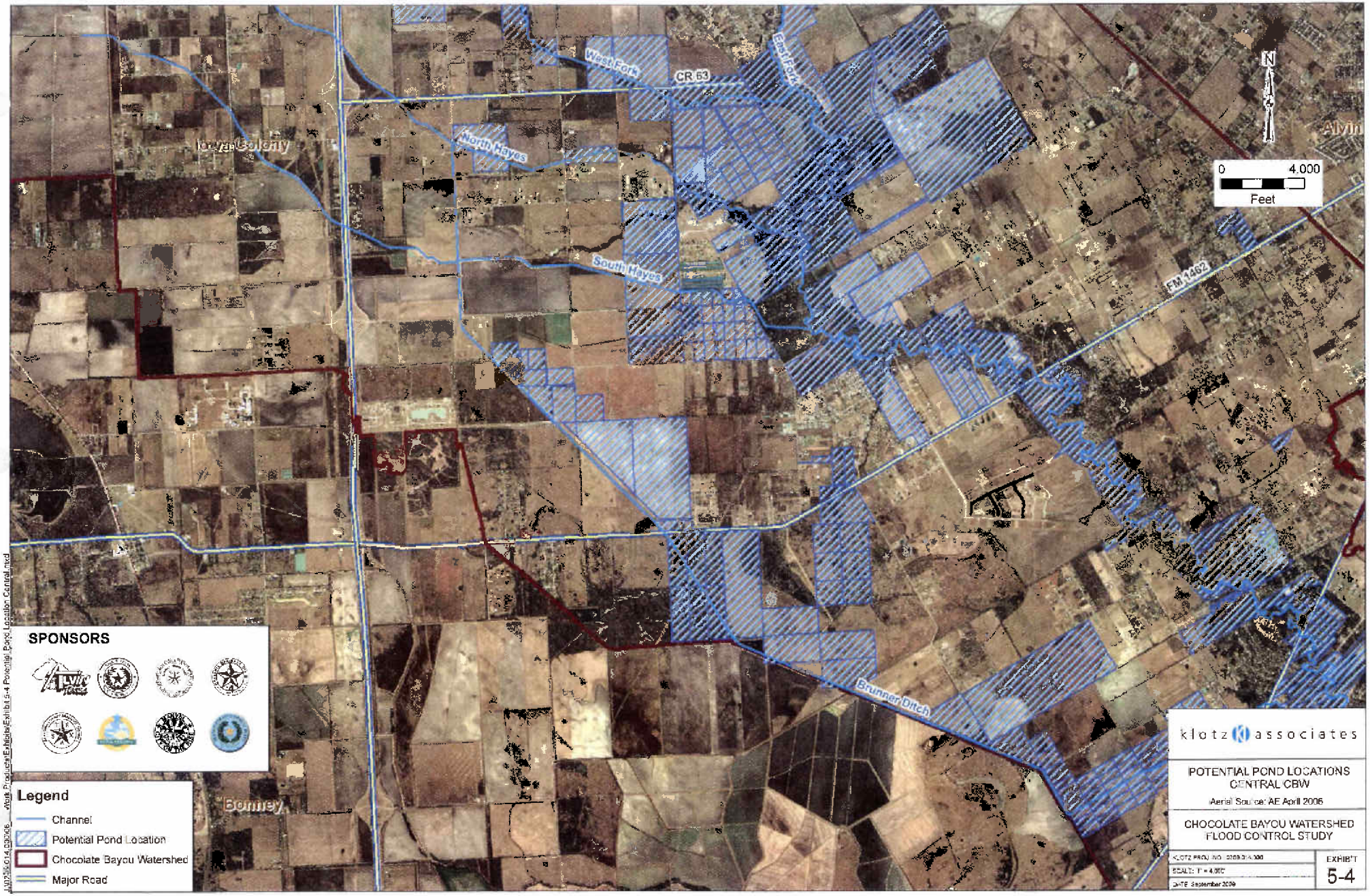

Sugar Land
Missouri City
Arcola
Thompsons
Pearland
Houston
Webster
Nassau Bay
Kemah
Friendswood
League City
N
0 12,000 Feet
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Manvel
Iowa Colony
East Fork
Ditch C-2
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
Sandy Point
Alvin
Hillcrest Village
Texas City
Santa Fe
La Marque
Hitchcock
Liverpool
Bonney
Danbury
Holiday Lakes
Angleton
SPONSORS
Legend
Channel
Model Cross Section
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
CROSS SECTIONS FOR MODELING
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
4-2


Sugar Land
Missouri City
Arcola
Thompsons
Pearland
Houston
Webster
Nassau Bay
Kemah
Friendswood
League City
N
0 12,000 Feet
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Iowa Colony
Manvel
East Fork
Ditch C12
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
Sandy Point
Alvin
Hillcrest Village
Texas City
Santa Fe
La Marque
Hitchcock
Bonney
Liverpool
Danbury
Angleton
SPONSORS
Legend
FEMA 100-YR Floodplain
Revised (This Study) 100-YR Floodplain
Channel
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
COMPARISON OF FLOODPLAIN MODELING RESULTS
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0259.014.000
SCALE: 1" = 12,000'
DATE: September 2009
EXHIBIT
4-3

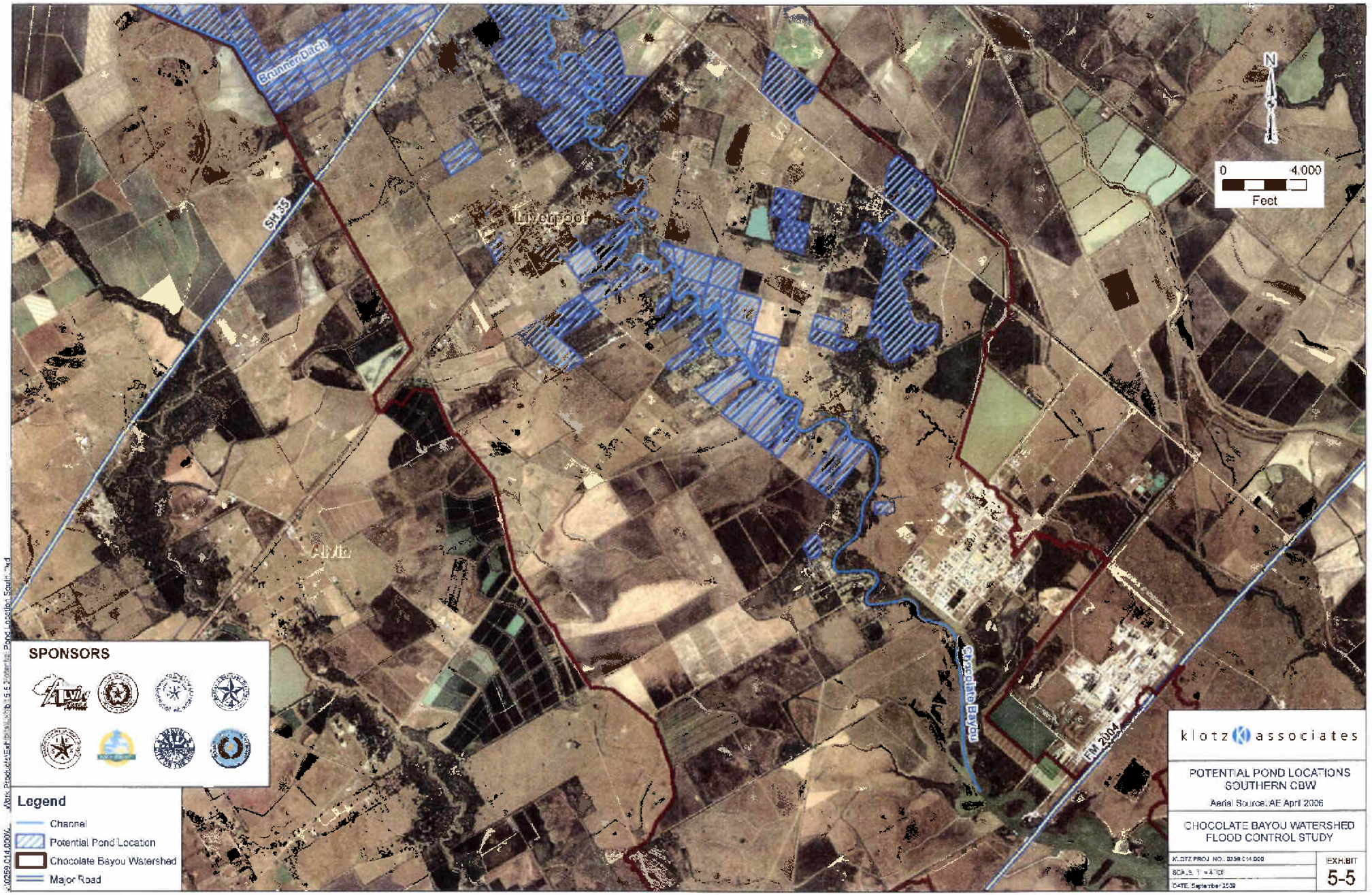

Sugar Land
Missouri City
Pearland
Webster
Friendswood
Sienna Plantation
Thompsons
Fort Bend County
Iowa Colony
Alvin
Texas City
La Marque
Hitchcock
Santa Fe
Hillcrest
Liverpool
Bonney
Danbury
Angleton
Saltwater Barrier
Chocolate Bayou
Brunner Ditch
North Hayes
South Hayes
West Fork
East Fork
Ditch C12
WF Trib A
WF Trib B
EF Trib A
EF Trib B
CR 53
FM 1462
SH 6
SH 288
SH 35
FM 2004
N
0
12,000
Feet
SPONSORS
Legend
Existing Channel Capacity of Chocolate Bayou
Less Than a 2-YR
2-YR
10-YR
25-YR
50-YR
Greater or Equal to a 100-YR
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
EXISTING CAPACITY OF CHOCOLATE BAYOU
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT 5-1

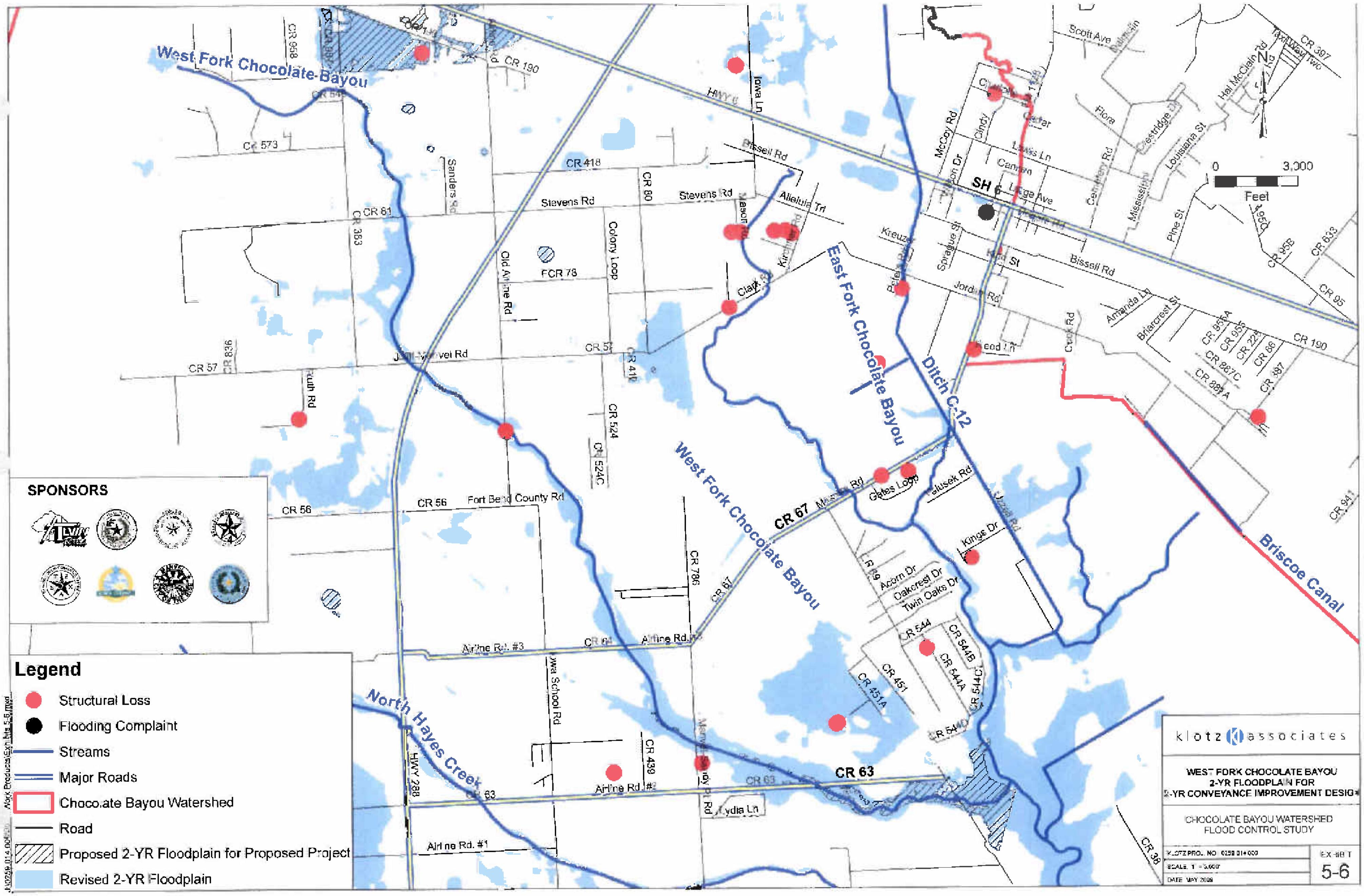

Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Fort Bend County
Pearland
Webster
Kemah
Bacliff
Friendswood
League City
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Manvel
SH 6
East Fork
Ditch C12
West Fork
Iowa Colony
North Hayes
CR 63
South Hayes
Chocolate Bayou
FM 1462
Alvin
Hillcrest
Galveston County
Texas City
Santa Fe
La Marque
Saltwater Barrier
Brazoria County
Brunner Ditch
Liverpool
SH 288
SH 35
Danbury
FM 2004
Angleton
Hitchcock
N
0
12,000
Feet
SPONSORS
Legend
Brunner Ditch Conveyance Improvement
Chocolate Bayou Conveyance Improvement
Ditch C12 Conveyance Improvement
North Hayes Conveyance Improvement
South Hayes Conveyance Improvement
West Fork Conveyance Improvement
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
CHANNEL CONVEYANCE IMPROVEMENT PROJECTS
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT
5-2
DATE: September 2009

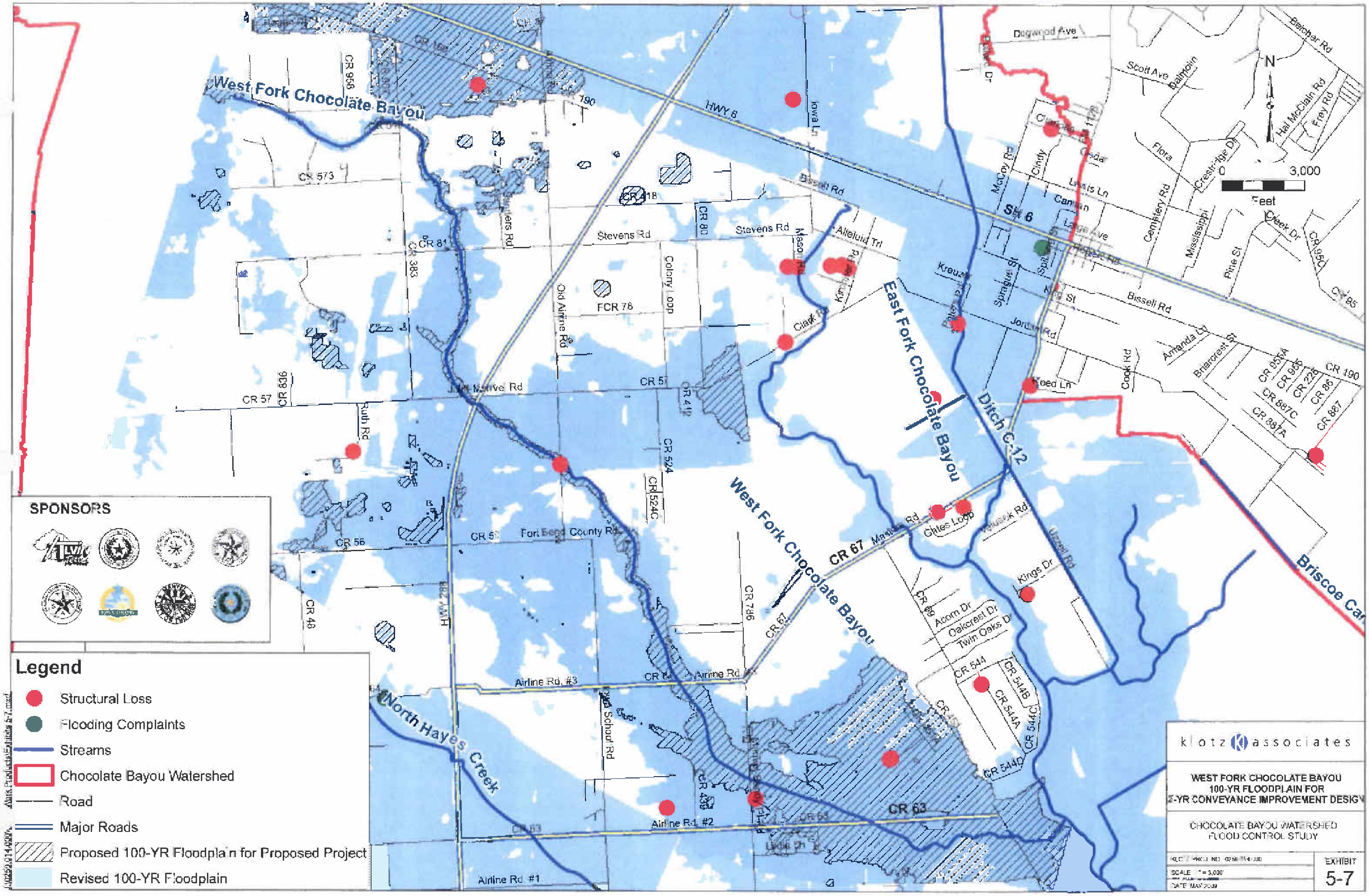

Pearland
Missouri City
Fresno
Arcola
Sienna Plantation
Manvel
Iowa Colony
Alvin
West Fork
East Fork
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Ditch G12
SH 6
CR 6
N
0
4,000
Feet
SPONSORS
Legend
Channel
Potential Pond Location
Chocolate Bayou Watershed
Major Road
klotz associates
POTENTIAL POND LOCATIONS
NORTHERN CBW
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
5-3

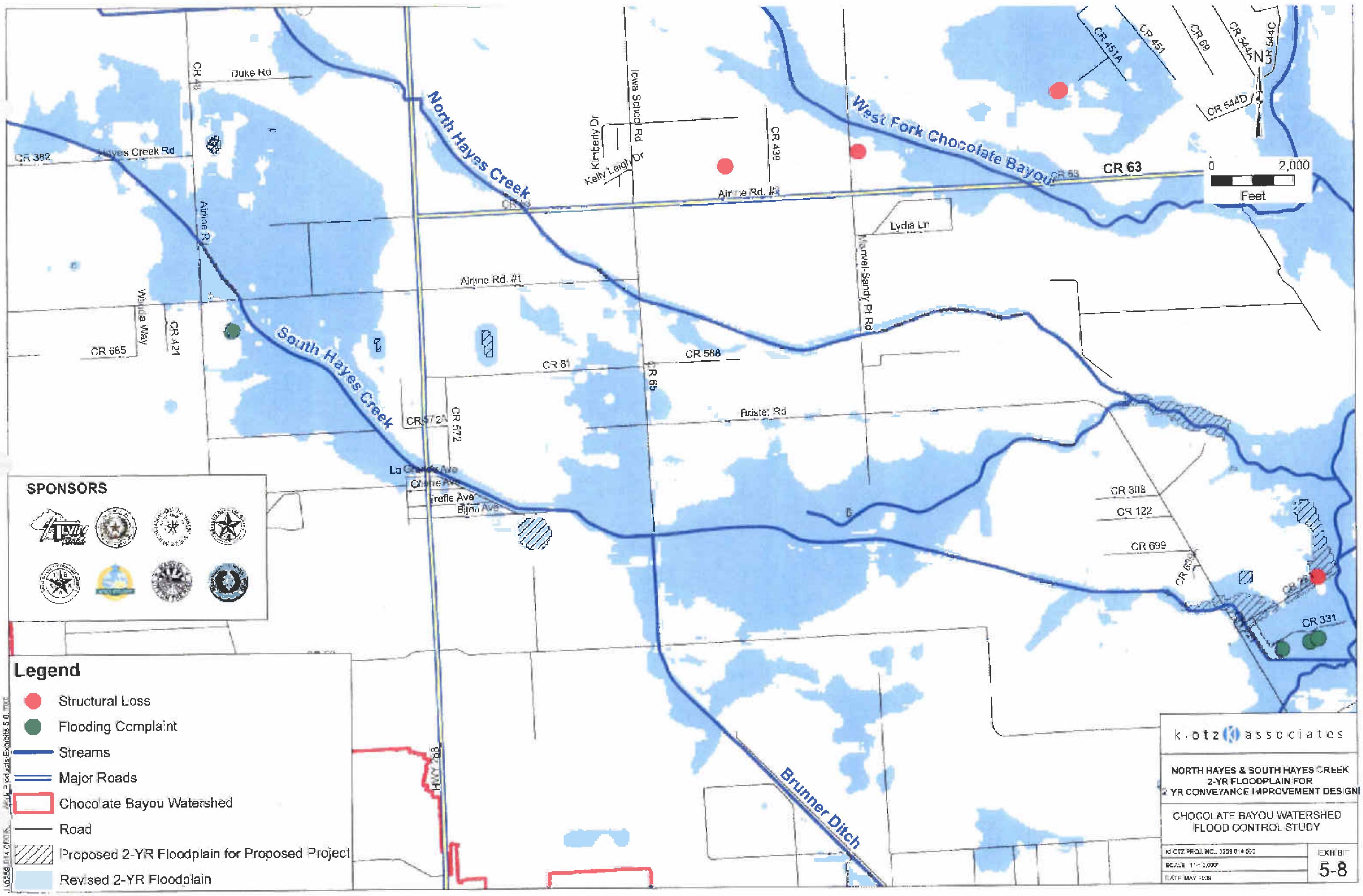


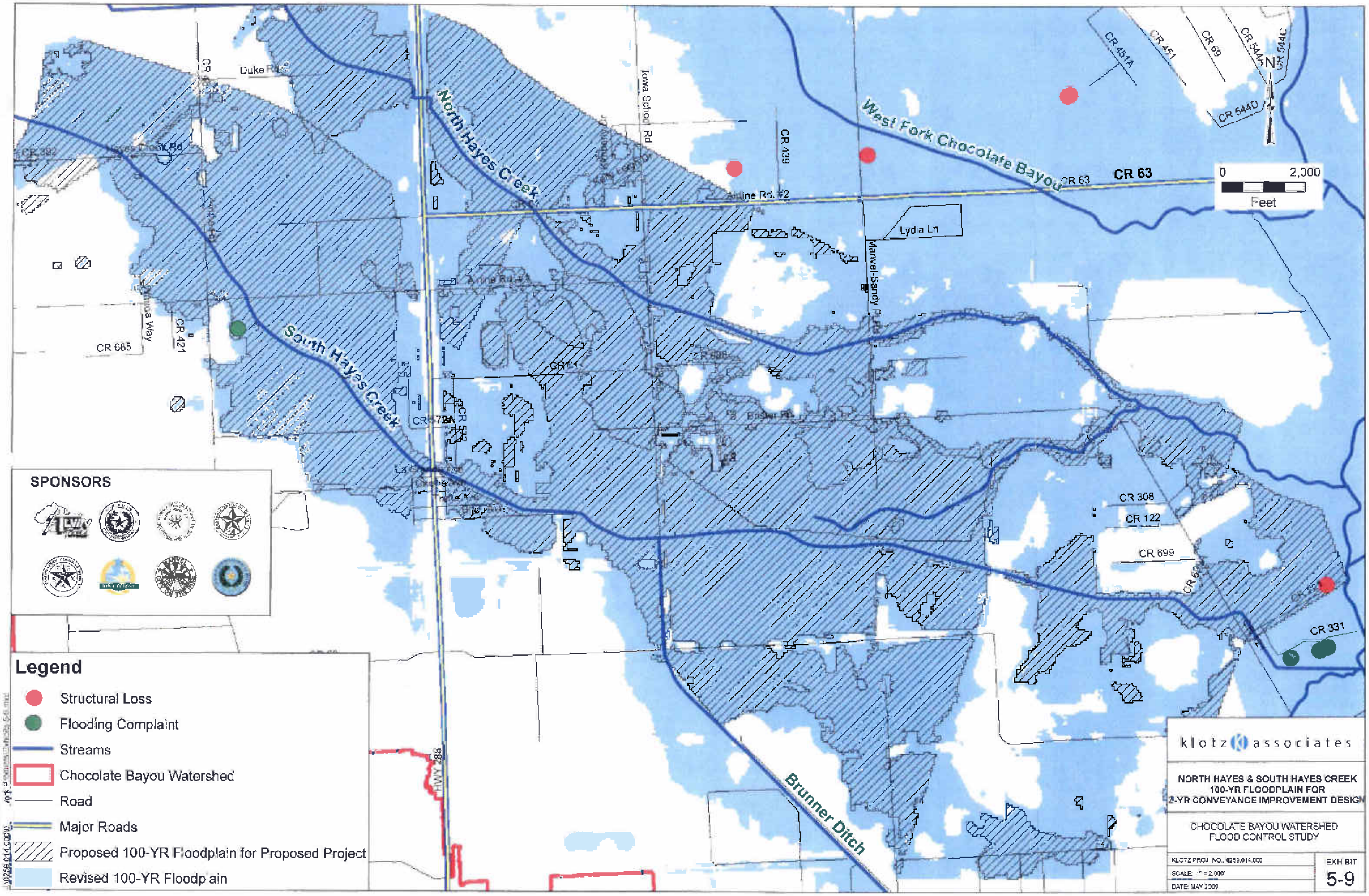
J:\0309\014.000\06_Work Products\Exhibits\Exhibit 5-4 Potential Pond Location Central.mxd

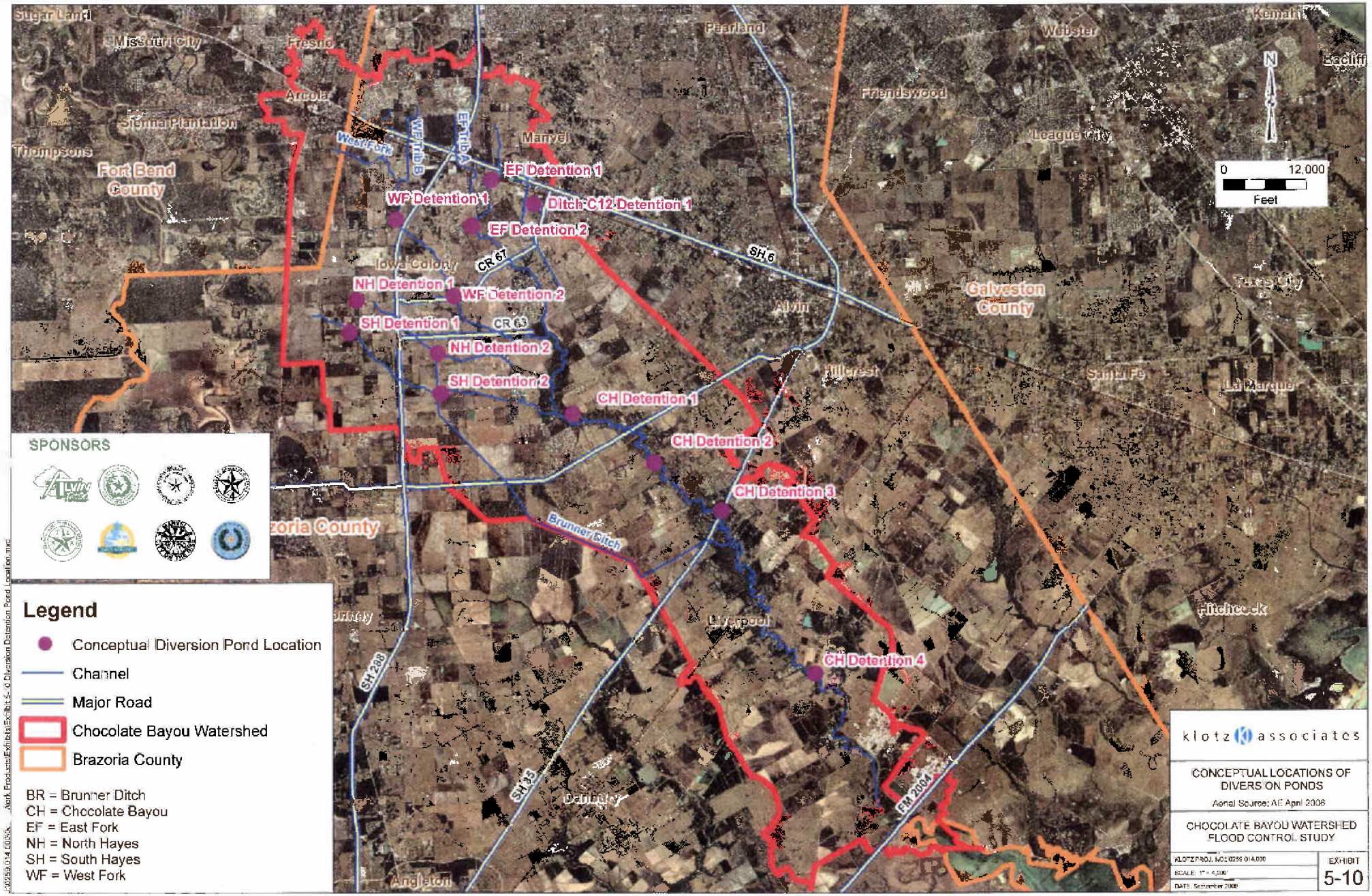

Brannon Ditch
SH 35
Liverpool
Alvin
Chocolate Bayou
FM 2004
N
0
4,000
Feet
SPONSORS
Legend
Channel
Potential Pond Location
Chocolate Bayou Watershed
Major Road
klotz associates
POTENTIAL POND LOCATIONS
SOUTHERN CBW
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO.: 0259.014.000
SCALE: 1" = 4,000'
DATE: September 2006
EXHIBIT
5-5

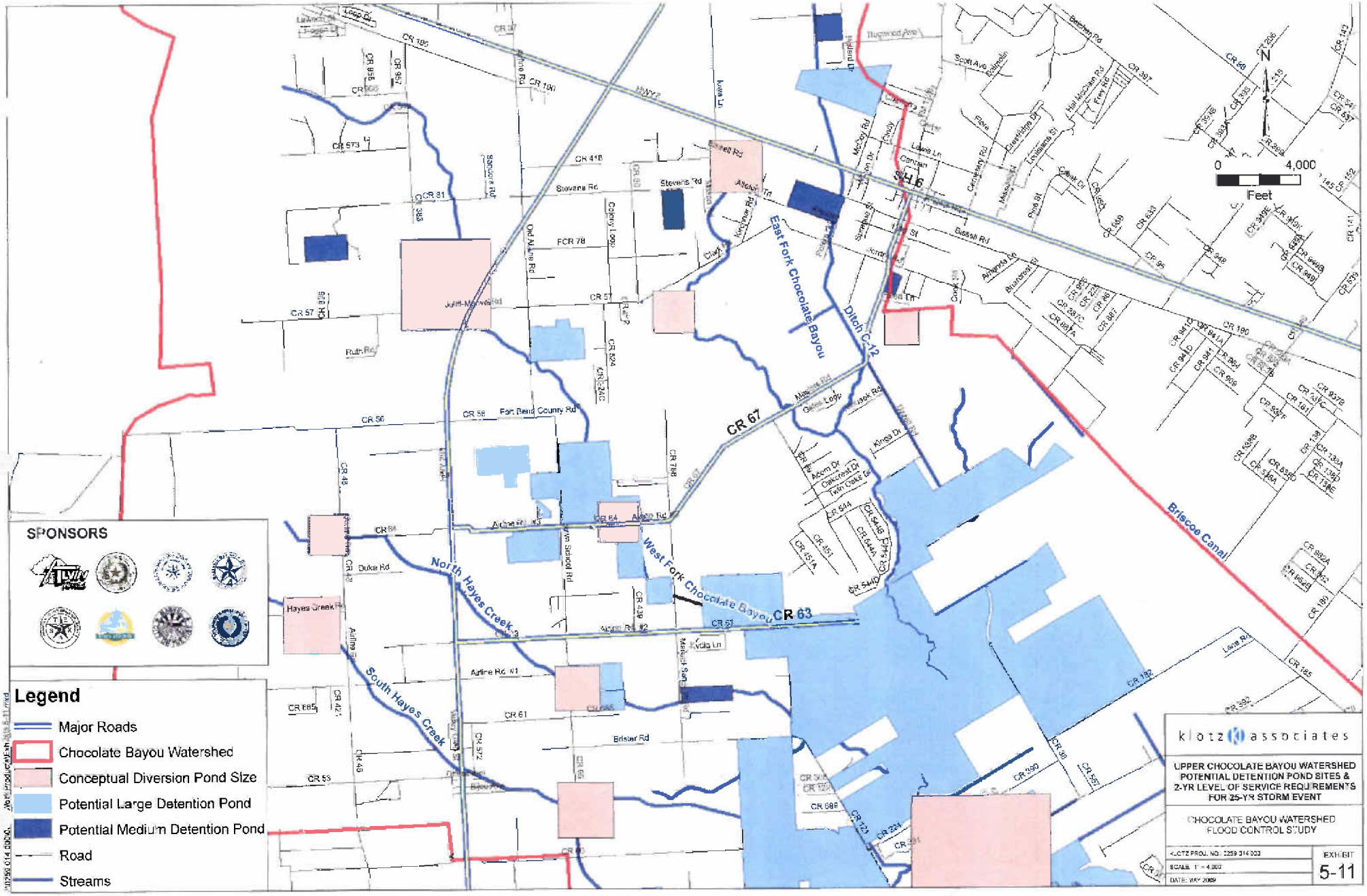

West Fork Chocolate Bayou
East Fork Chocolate Bayou
North Hayes Creek
Ditch C-12
Briscoe Canal
SH 6
HWY 6
HWY 288
CR 67
CR 63
SPONSORS
Legend
Structural Loss
Flooding Complaint
Streams
Major Roads
Chocolate Bayou Watershed
Road
Proposed 2-YR Floodplain for Proposed Project
Revised 2-YR Floodplain
0
3,000
Feet
klotz associates
WEST FORK CHOCOLATE BAYOU
2-YR FLOODPLAIN FOR
2-YR CONVEYANCE IMPROVEMENT DESIGN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EX-8B T
5-6

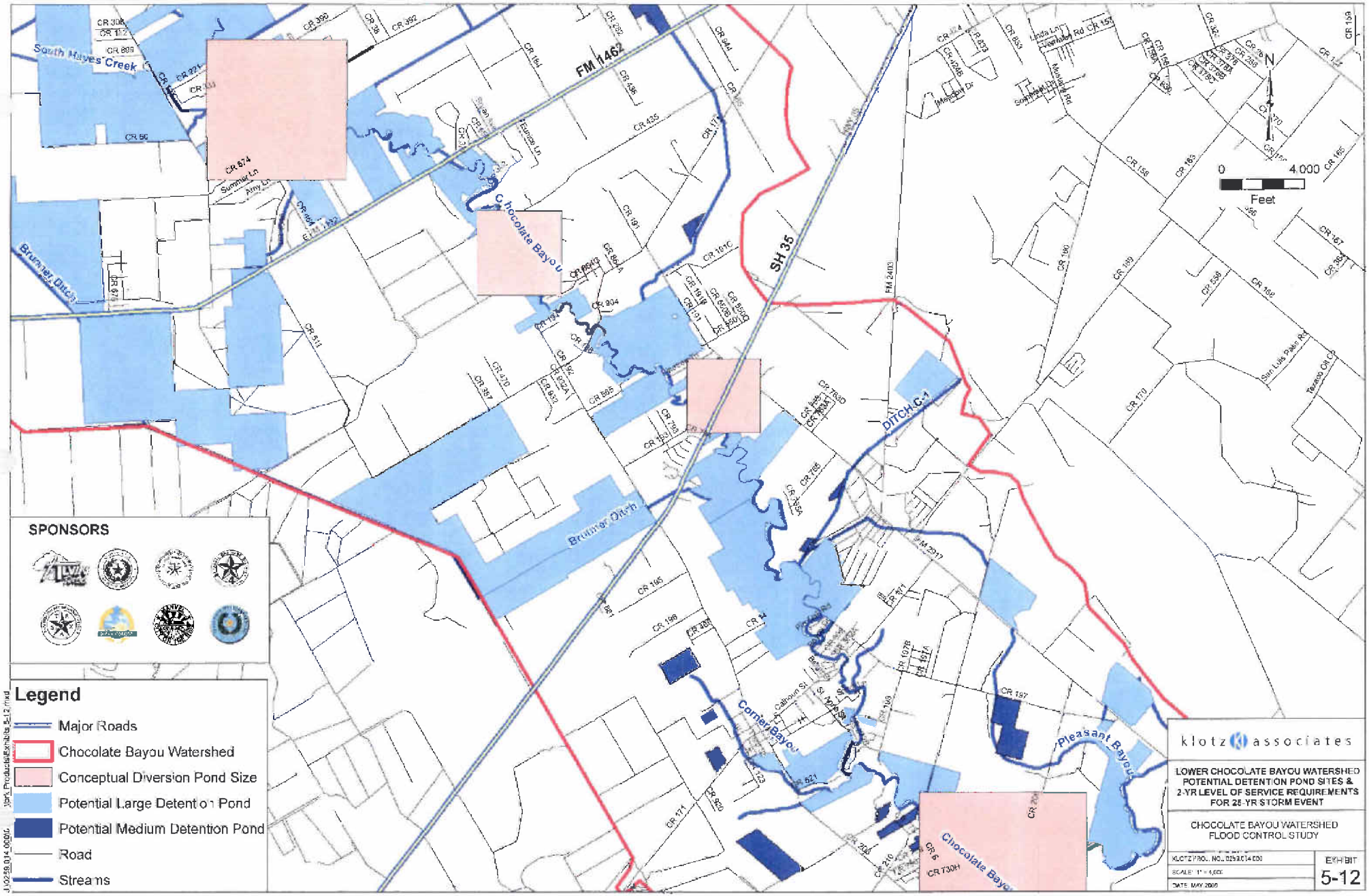

West Fork Chocolate Bayou
East Fork Chocolate Bayou
North Hayes Creek
Ditch C-12
HWY 6
HWY 288
CR 67
CR 63
SPONSORS
Legend
Structural Loss
Flooding Complaints
Streams
Chocolate Bayou Watershed
Road
Major Roads
Proposed 100-YR Floodplain for Proposed Project
Revised 100-YR Floodplain
0
3,000
Feet
N
klotz associates
WEST FORK CHOCOLATE BAYOU
100-YR FLOODPLAIN FOR
2-YR CONVEYANCE IMPROVEMENT DESIGN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
5-7

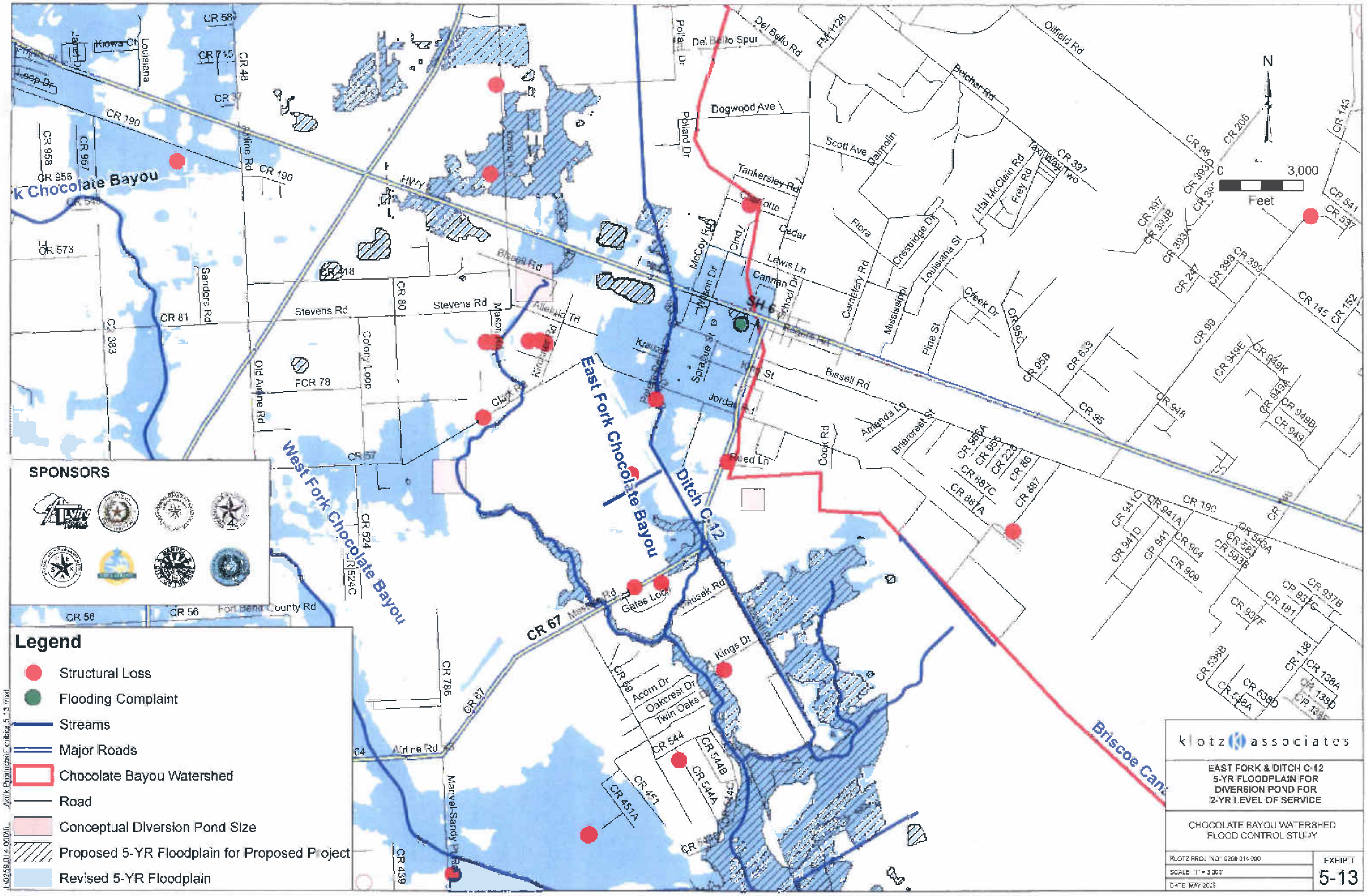

SPONSORS
Legend
Structural Loss
Flooding Complaint
Streams
Major Roads
Chocolate Bayou Watershed
Road
Proposed 2-YR Floodplain for Proposed Project
Revised 2-YR Floodplain
North Hayes Creek
South Hayes Creek
West Fork Chocolate Bayou
Brunner Ditch
HWY 288
CR 63
CR 382
Hayes Creek Rd
Duke Rd
CR 48
Airline Rd
Airline Rd. #1
Airline Rd. #3
Wanda Way
CR 685
CR 421
CR 61
CR 65
CR 588
CR 572
Brister Rd
Kimberly Dr
Kelly Leigh Dr
Iowa School Rd
CR 439
Manvel-Sandy Pt Rd
Lydia Ln
CR 451A
CR 451
CR 69
CR 544D
CR 544C
CR 308
CR 122
CR 699
CR 331
Chene Ave
Trefle Ave
Bijou Ave
0
2,000
Feet
N
klotz associates
NORTH HAYES & SOUTH HAYES CREEK
2-YR FLOODPLAIN FOR
2-YR CONVEYANCE IMPROVEMENT DESIGN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
5-8

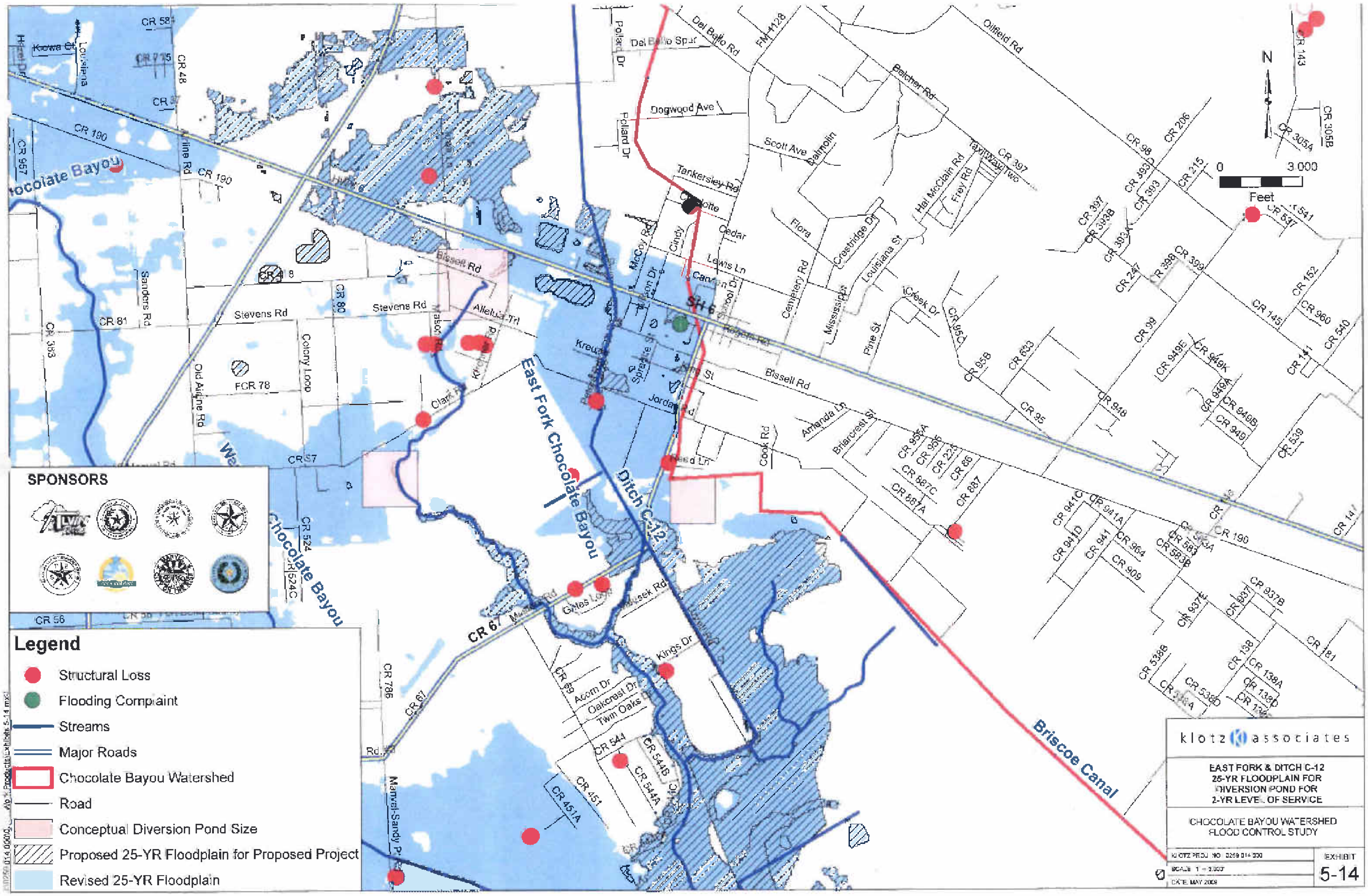

SPONSORS
Legend
Structural Loss
Flooding Complaint
Streams
Chocolate Bayou Watershed
Road
Major Roads
Proposed 100-YR Floodplain for Proposed Project
Revised 100-YR Floodplain
North Hayes Creek
South Hayes Creek
West Fork Chocolate Bayou
Brunner Ditch
CR 63
HWY 288
Duke Rd
Iowa School Rd
CR 439
Lydia Ln
Manvel-Sandy Pt Rd
CR 685
CR 421
CR 382
CR 451A
CR 451
CR 69
CR 544D
CR 544C
CR 308
CR 122
CR 699
CR 331
0
2,000
Feet
N
klotz associates
NORTH HAYES & SOUTH HAYES CREEK
100-YR FLOODPLAIN FOR
2-YR CONVEYANCE IMPROVEMENT DESIGN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
5-9

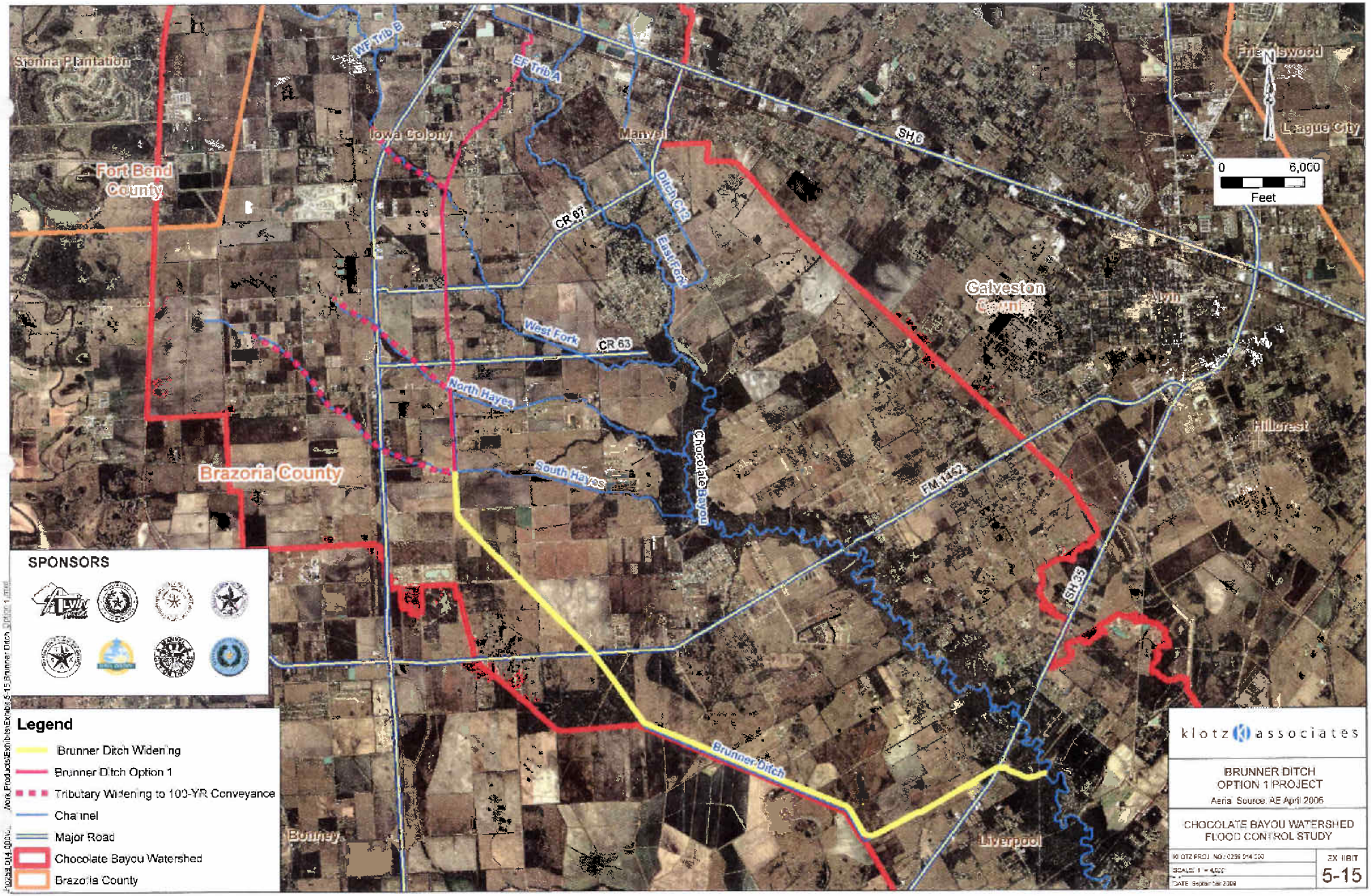

Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Fort Bend County
Pearland
Manvel
Iowa Colony
Alvin
Friendswood
Webster
Kemah
Seabrook
League City
Galveston County
Texas City
Hillcrest
Santa Fe
La Marque
Hitchcock
Liverpool
Danbury
Angleton
Brazoria County
West Fork
WF Trib B
EF Trib A
EF Detention 1
WF Detention 1
Ditch C12 Detention 1
EF Detention 2
NH Detention 1
WF Detention 2
SH Detention 1
NH Detention 2
SH Detention 2
CH Detention 1
CH Detention 2
CH Detention 3
CH Detention 4
Brunner Ditch
CR 67
CR 65
SH 6
SH 288
SH 35
FM 2004
N
0
12,000
Feet
SPONSORS
Legend
Conceptual Diversion Pond Location
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
BR = Brunner Ditch
CH = Chocolate Bayou
EF = East Fork
NH = North Hayes
SH = South Hayes
WF = West Fork
klotz associates
CONCEPTUAL LOCATIONS OF DIVERS ON PONDS
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0255.014.000
SCALE: 1" = 4,000'
DATE: September 2008
EXHIBIT
5-10

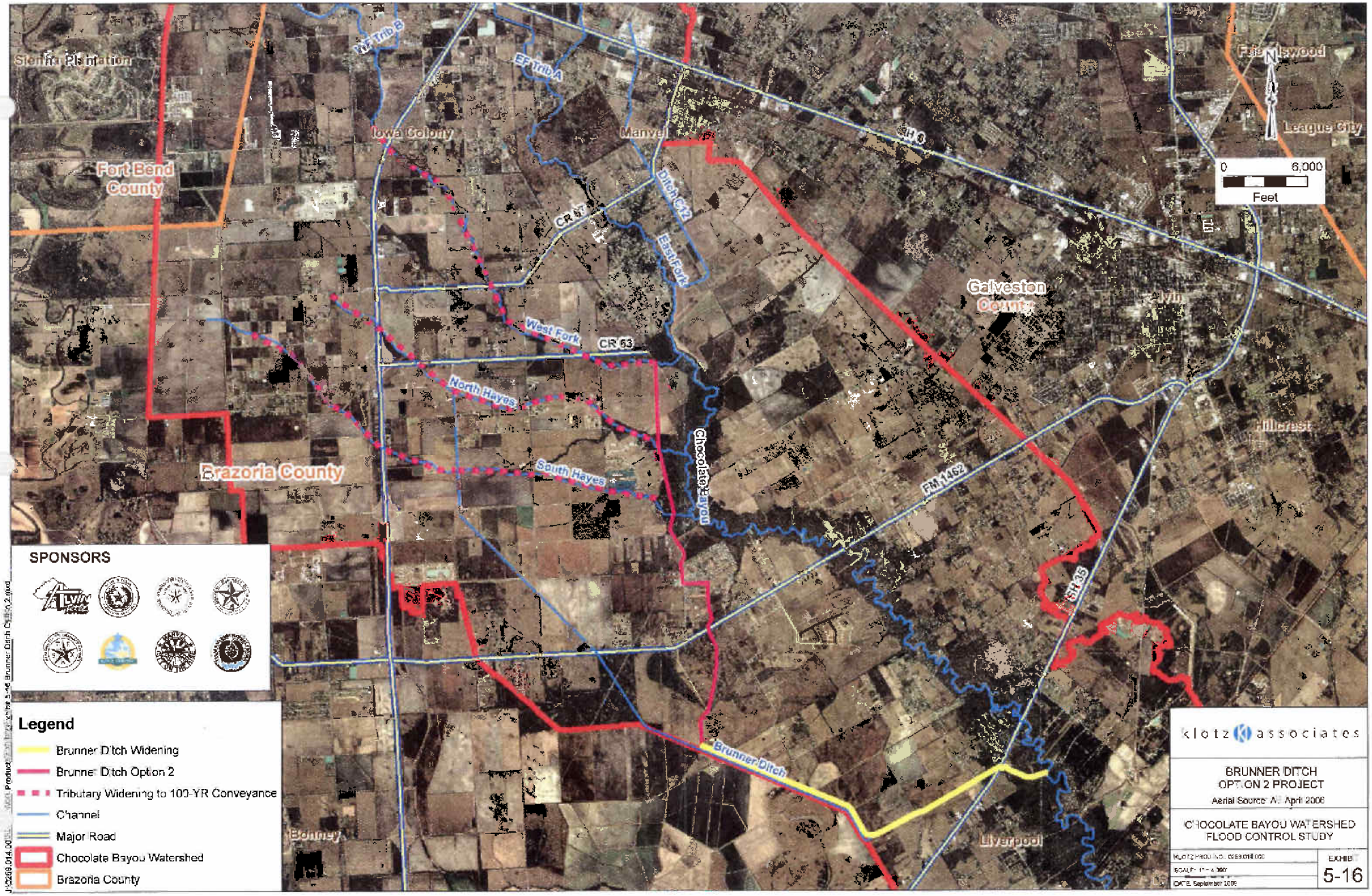

SPONSORS
Legend
Major Roads
Chocolate Bayou Watershed
Conceptual Diversion Pond Size
Potential Large Detention Pond
Potential Medium Detention Pond
Road
Streams
East Fork Chocolate Bayou
West Fork Chocolate Bayou
North Hayes Creek
South Hayes Creek
Ditch C-12
Briscoe Canal
CR 67
CR 63
CR 61
CR 56
Fort Bend County Rd
Juliff-Manvel Rd
Stevens Rd
Stevana Rd
Bissell Rd
Brister Rd
Duke Rd
Hayes Creek Pl
Airline Rd
SH 6
N
0
4,000
Feet
klotz associates
UPPER CHOCOLATE BAYOU WATERSHED
POTENTIAL DETENTION POND SITES &
2-YR LEVEL OF SERVICE REQUIREMENTS
FOR 25-YR STORM EVENT
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0259.014.000
SCALE: 1" = 4,000'
DATE: MAY 2009
EXHIBIT
5-11

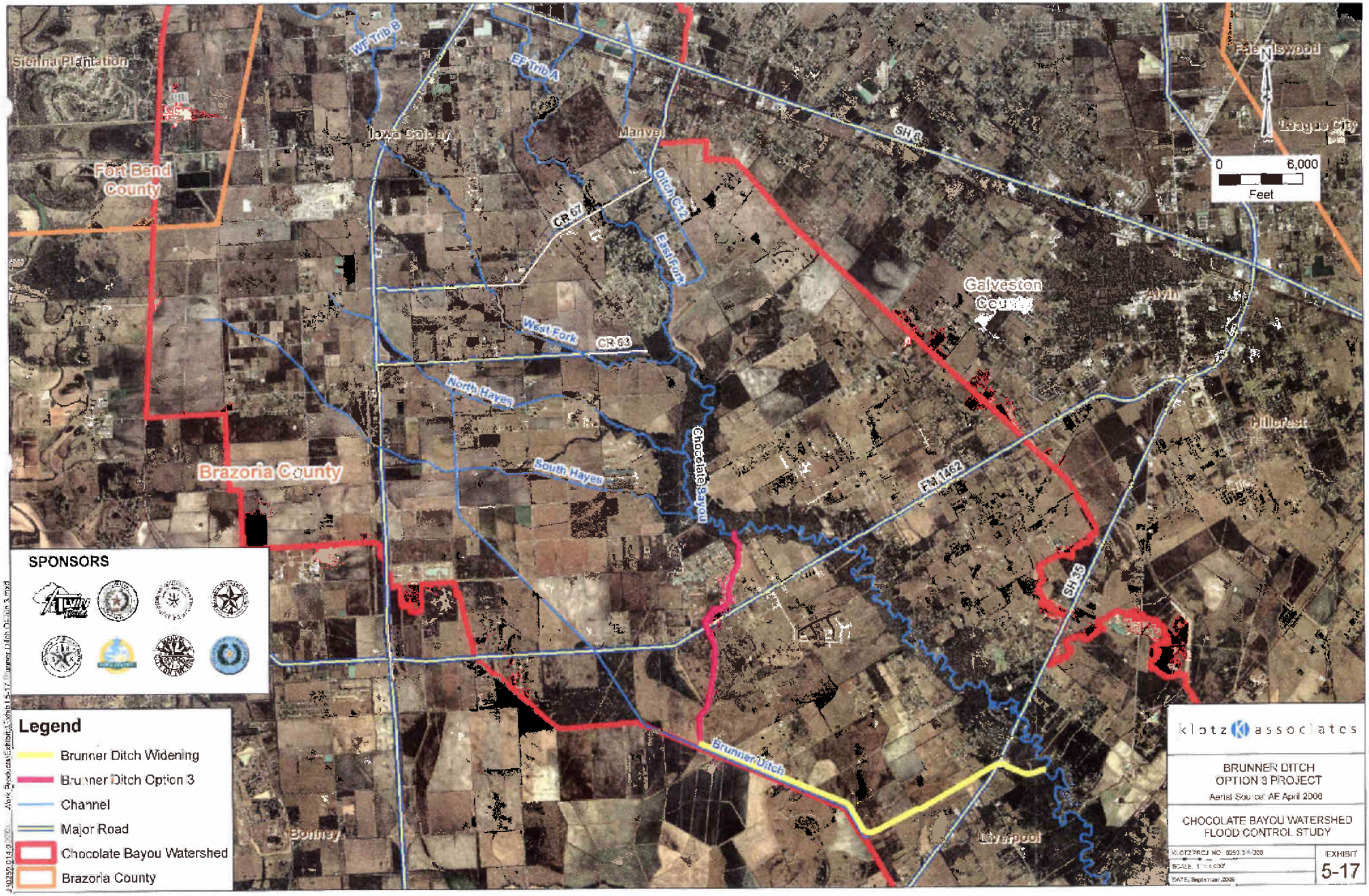

SPONSORS
Legend
Major Roads
Chocolate Bayou Watershed
Conceptual Diversion Pond Size
Potential Large Detention Pond
Potential Medium Detention Pond
Road
Streams
FM 1462
SH 35
South Hayes Creek
Brunner Ditch
Chocolate Bayou
DITCH C-1
Corner Bayou
Pleasant Bayou
0
4,000
Feet
N
klotz associates
LOWER CHOCOLATE BAYOU WATERSHED POTENTIAL DETENTION POND SITES & 2-YR LEVEL OF SERVICE REQUIREMENTS FOR 25-YR STORM EVENT
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT 5-12

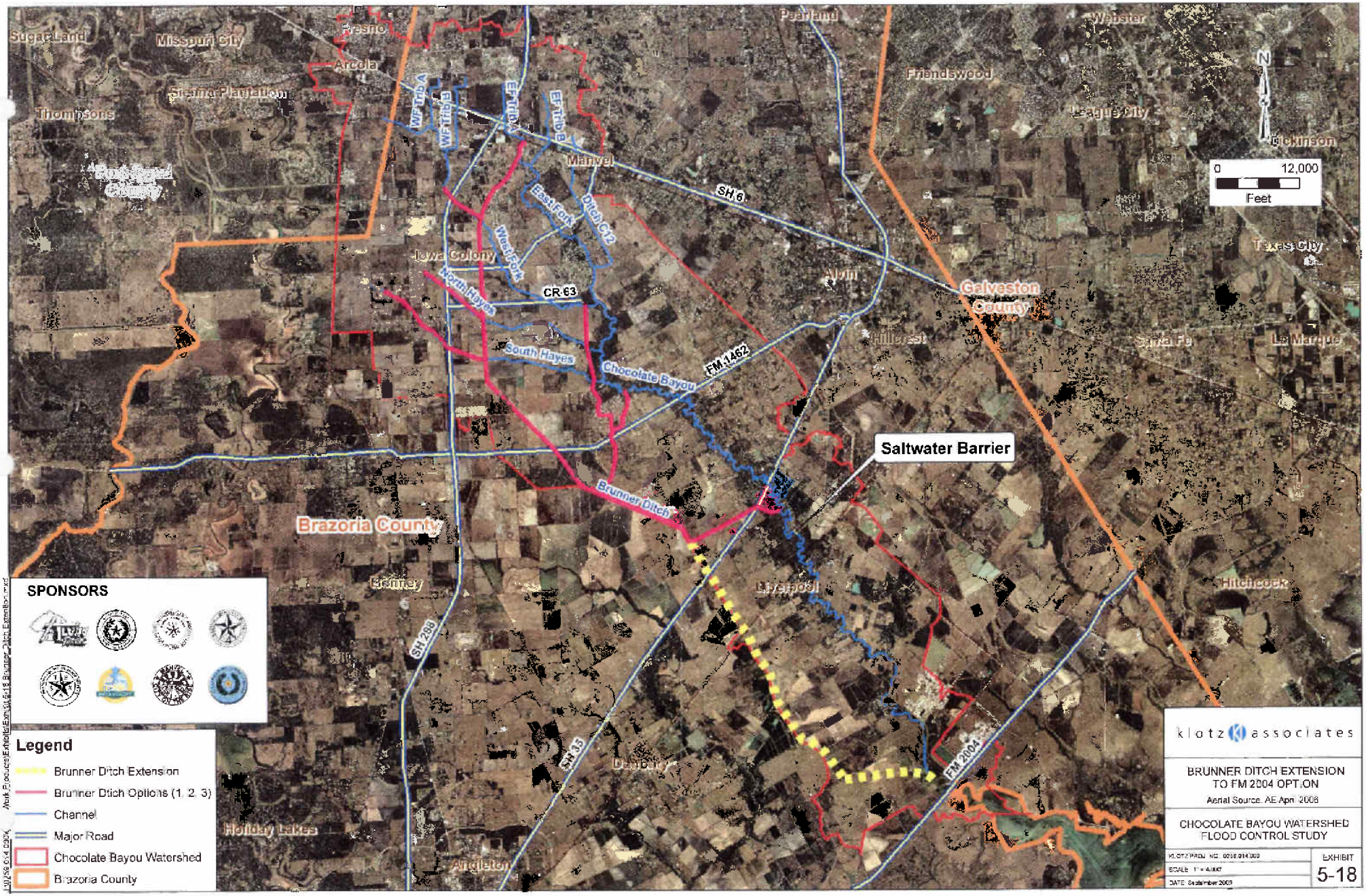

SPONSORS
Legend
Structural Loss
Flooding Complaint
Streams
Major Roads
Chocolate Bayou Watershed
Road
Conceptual Diversion Pond Size
Proposed 5-YR Floodplain for Proposed Project
Revised 5-YR Floodplain
East Fork Chocolate Bayou
West Fork Chocolate Bayou
Ditch C-12
CR 67
CR 190
SH 6
Feet
N
0
3,000
klotz associates
EAST FORK & DITCH C-12
5-YR FLOODPLAIN FOR
DIVERSION POND FOR
2-YR LEVEL OF SERVICE
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
5-13
DATE MAY 2009


SPONSORS
Legend
Structural Loss
Flooding Complaint
Streams
Major Roads
Chocolate Bayou Watershed
Road
Conceptual Diversion Pond Size
Proposed 25-YR Floodplain for Proposed Project
Revised 25-YR Floodplain
East Fork Chocolate Bayou
Ditch C-12
Chocolate Bayou
Briscoe Canal
CR 67
SH 6
0 3,000
Feet
N
klotz associates
EAST FORK & DITCH C-12
25-YR FLOODPLAIN FOR
DIVERSION POND FOR
2-YR LEVEL OF SERVICE
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
5-14

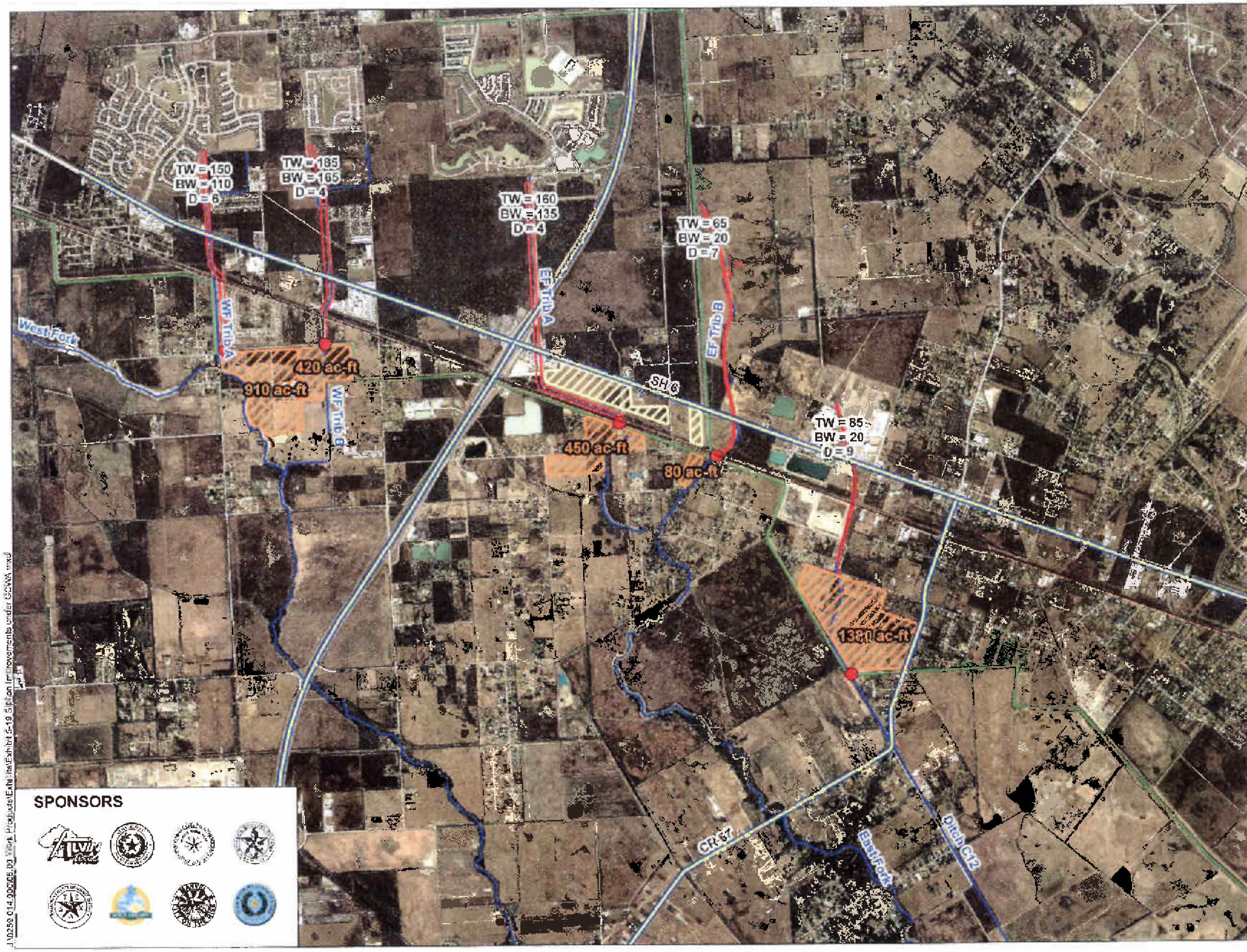

Sienna Plantation
WF Trib B
EF Trib A
Iowa Colony
Manvel
SH 6
Friendswood
League City
N
0
6,000
Feet
Fort Bend County
CR 67
Ditch C13
East Fork
Galveston County
Lyn
West Fork
CR 63
North Hayes
Chocolate Bayou
Hillcrest
Brazoria County
South Hayes
FM 1462
SH 35
SPONSORS
Legend
Brunner Ditch Widening
Brunner Ditch Option 1
Tributary Widening to 100-YR Conveyance
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
Brunner Ditch
Bonney
Liverpool
klotz associates
BRUNNER DITCH
OPTION 1 PROJECT
Aerial Source: AE April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO.: 0258.014.000
SCALE: 1" = 4,000'
DATE: September 2009
EXHIBIT
5-15


Sienna Plantation
Fort Bend County
Iowa Colony
Manvel
Pearland
League City
Galveston County
Hillcrest
Brazoria County
Bonney
Liverpool
EF Trib B
EF Trib A
Ditch C-12
East Fork
CR 87
West Fork
CR 63
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
FM 1462
SH 35
IH 45
0
6,000
Feet
SPONSORS
Legend
Brunner Ditch Widening
Brunner Ditch Option 2
Tributary Widening to 100-YR Conveyance
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
BRUNNER DITCH
OPTION 2 PROJECT
Aerial Source: A.I. April 2006
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0269.014.000
SCALE: 1" = 4,000'
DATE: September 2006
EXHIBIT
5-16


Sienna Plantation
Fort Bend County
Brazoria County
Galveston County
Iowa Colony
Manvel
Alvin
Pearland
League City
Hillcrest
Bonney
Liverpool
WF Trib B
EF Trib A
Ditch C12
East Fork
CR 67
West Fork
CR 63
North Hayes
South Hayes
Chocolate Bayou
FM 1462
SH 35
SH 6
Brunner Ditch
N
0
6,000
Feet
SPONSORS
Legend
Brunner Ditch Widening
Brunner Ditch Option 3
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
BRUNNER DITCH
OPTION 3 PROJECT
Aerial Source: AE April 2008
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0250.01.000
SCALE: 1" = 4,000'
DATE: September 2009
EXHIBIT
5-17


Sugar Land
Missouri City
Fresno
Arcola
Sienna Plantation
Thompsons
Pearland
Webster
Friendswood
League City
Dickinson
N
0
12,000
Feet
WF Trib A
WF Trib B
E Trib A
E Trib B
Manvel
SH 6
East Fork
Ditch C12
West Fork
Iowa Colony
North Hayes
CR 63
South Hayes
Chocolate Bayou
FM 1462
Alvin
Galveston County
Hillcrest
Santa Fe
La Marque
Texas City
Saltwater Barrier
Brunner Ditch
Brazoria County
Brookside Village
Liverpool
Hitchcock
SH 288
SH 35
Dixie Farm
FM 2004
Holiday Lakes
Angleton
SPONSORS
Legend
Brunner Ditch Extension
Brunner Ditch Options (1, 2, 3)
Channel
Major Road
Chocolate Bayou Watershed
Brazoria County
klotz associates
BRUNNER DITCH EXTENSION TO FM 2004 OPTION
Aerial Source: AE April 2008
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
KLOTZ PROJ. NO. 0258.014.000
SCALE: 1" = 4,000'
DATE: September 2009
EXHIBIT
5-18

J:\0259 014.000\05.00 Work Products\Exhibits\Exhibit 5-19 Siphon Improvements under GCWA.mxd



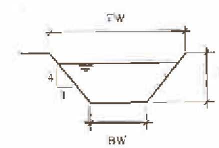
N

0 3,000

Feet

Legend

- Major Road
- Railroads (Local)
- Siphon Improvements
- Channel Improvements
- Proposed Pond Location
- Alternate Pond Location
- Elevated Canal System
- Channel



TW = Channel Top Width
BW = Channel bottom Width
D= Channel Depth

klotz associates

SIPHON IMPROVEMENT PROJECTS

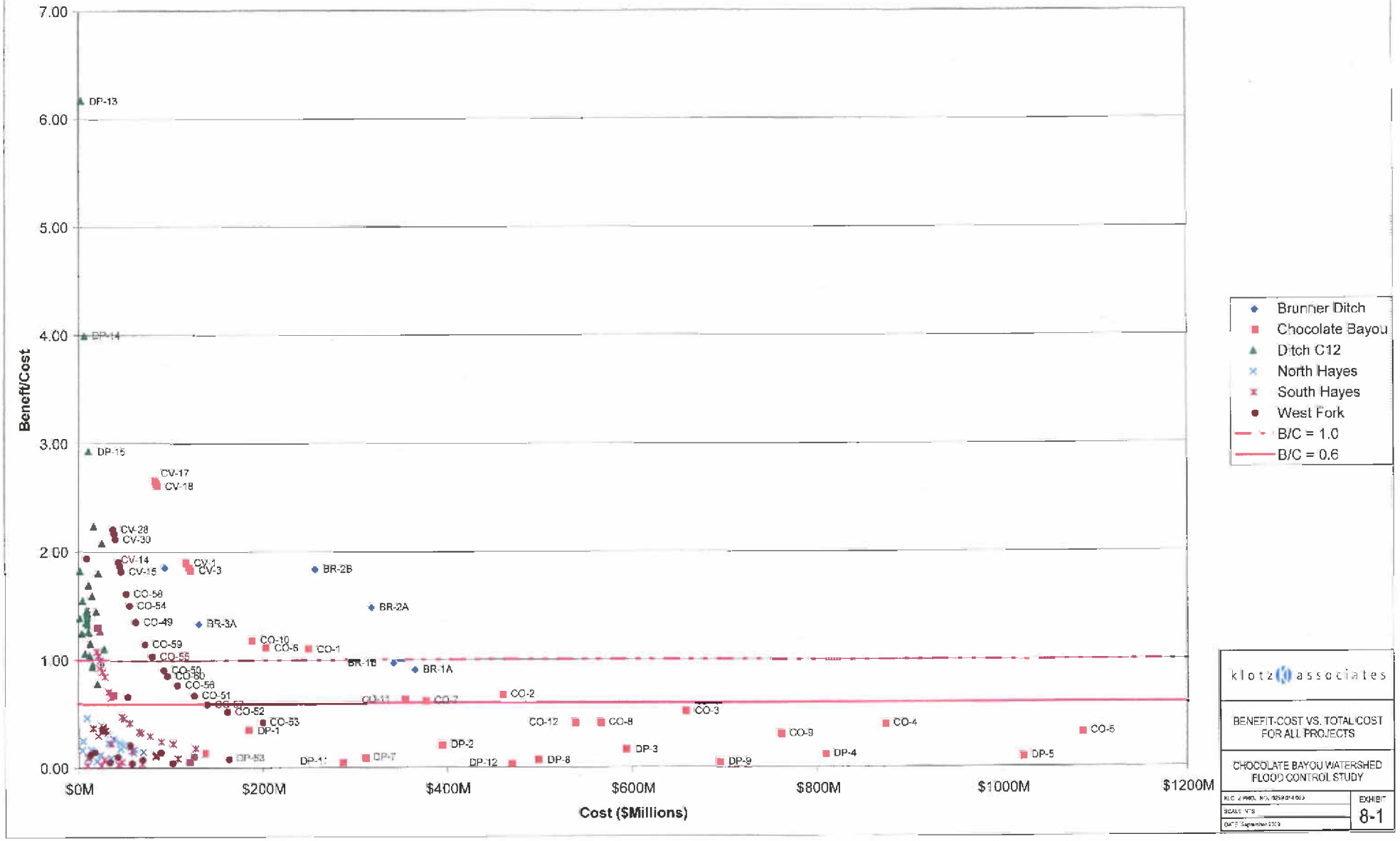
Aerial Source: AE April 2006

CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY

KLOTZ PROJ. NO. 0259.014.000
SCALE: 1" = 3,000
DATE: September 2009

EXHIBIT
5-19

EXHIBIT 8-1
BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS



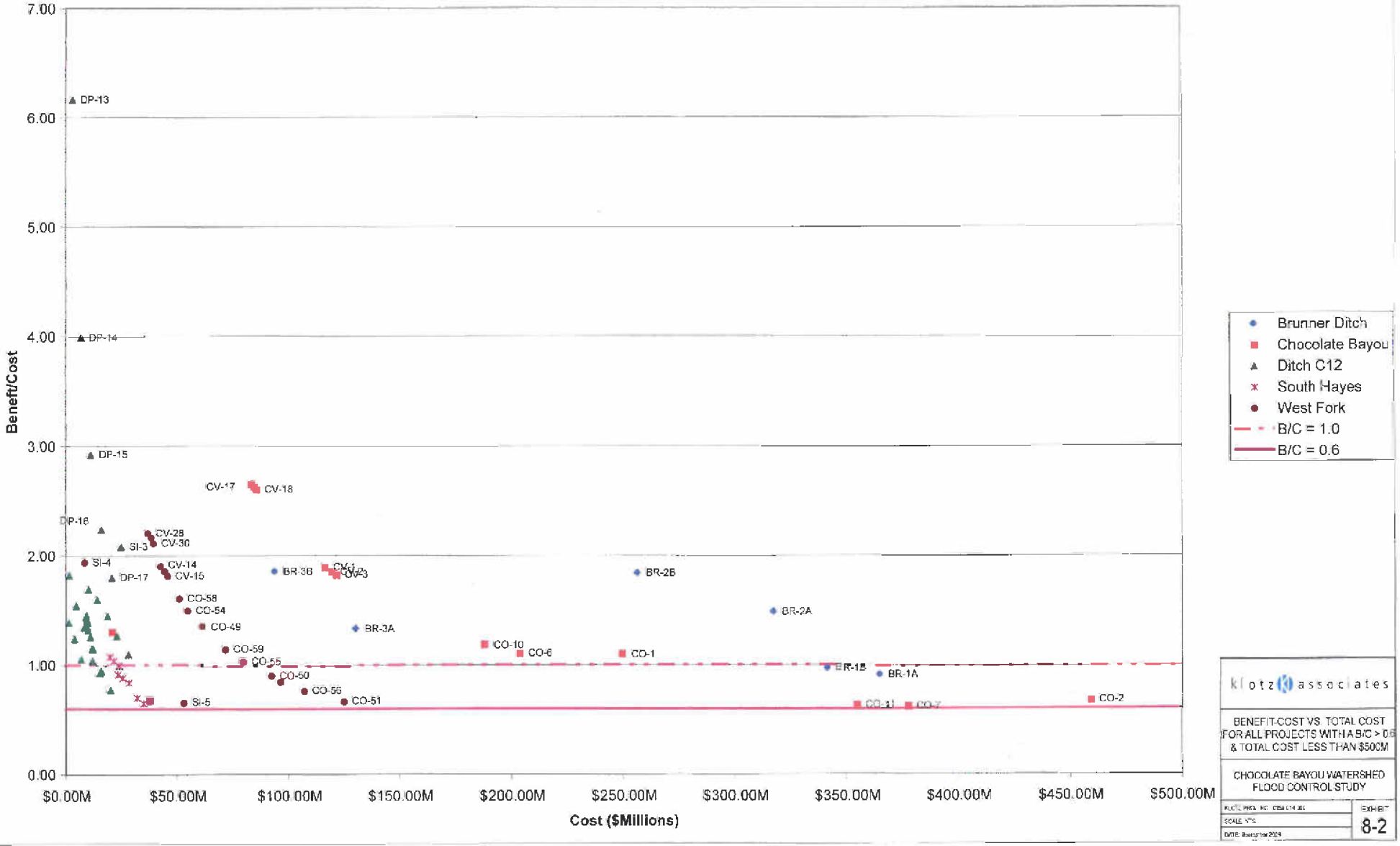
klotz associates

BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS

CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY

EXHIBIT 8-1

EXHIBIT 8-2
BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS WITH A B/C > 0.6 AND TOTAL COST LESS THAN $500.00 M



klotz associates

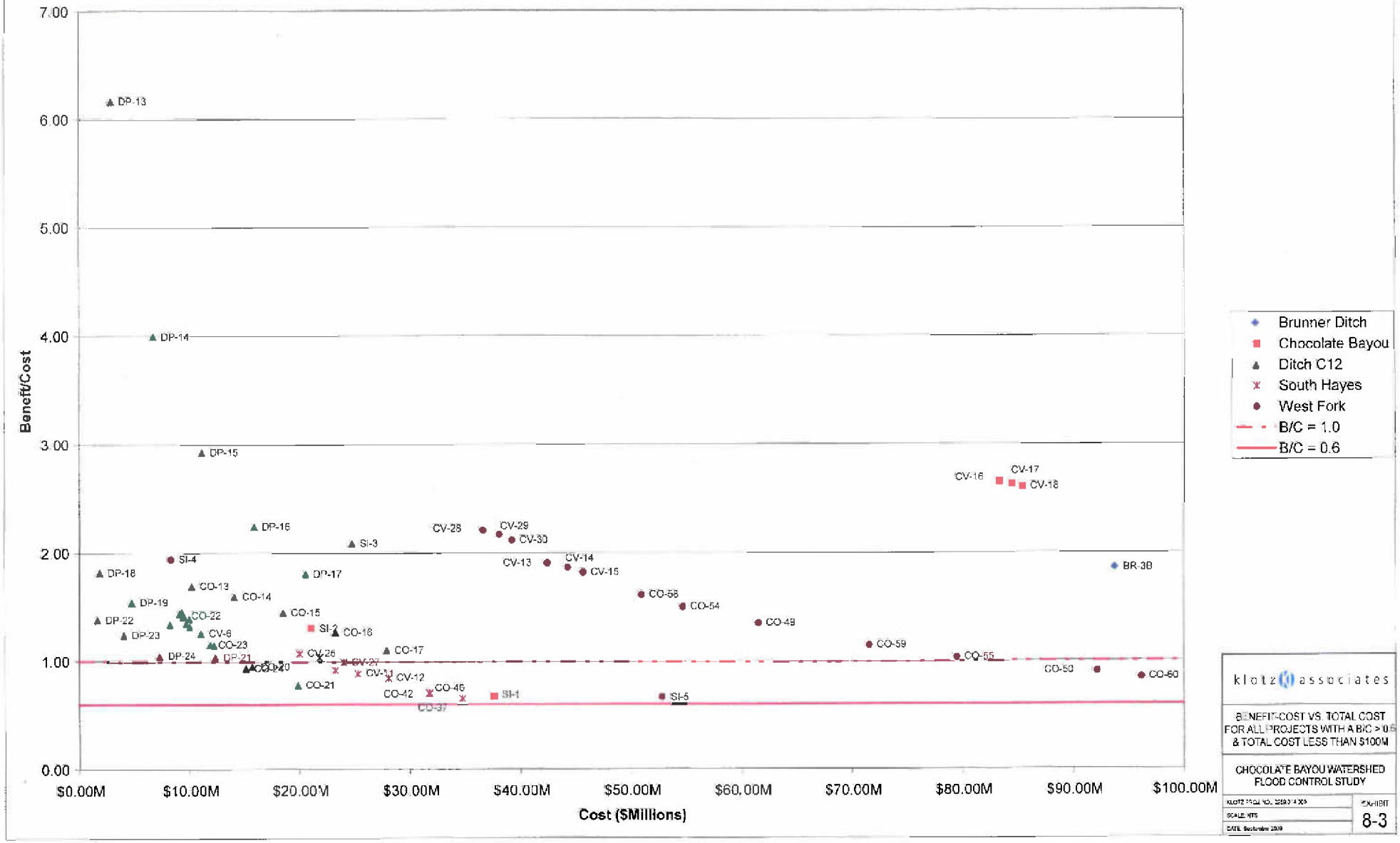
BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS WITH A B/C > 0.6 & TOTAL COST LESS THAN $500M

CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY

EXHIBIT 8-2

EXHIBIT 8-3

BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS WITH A B/C > 0.6 AND TOTAL COST LESS THAN $100.00 M



klotz associates

BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS WITH A B/C > 0.6 & TOTAL COST LESS THAN $100M

CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY

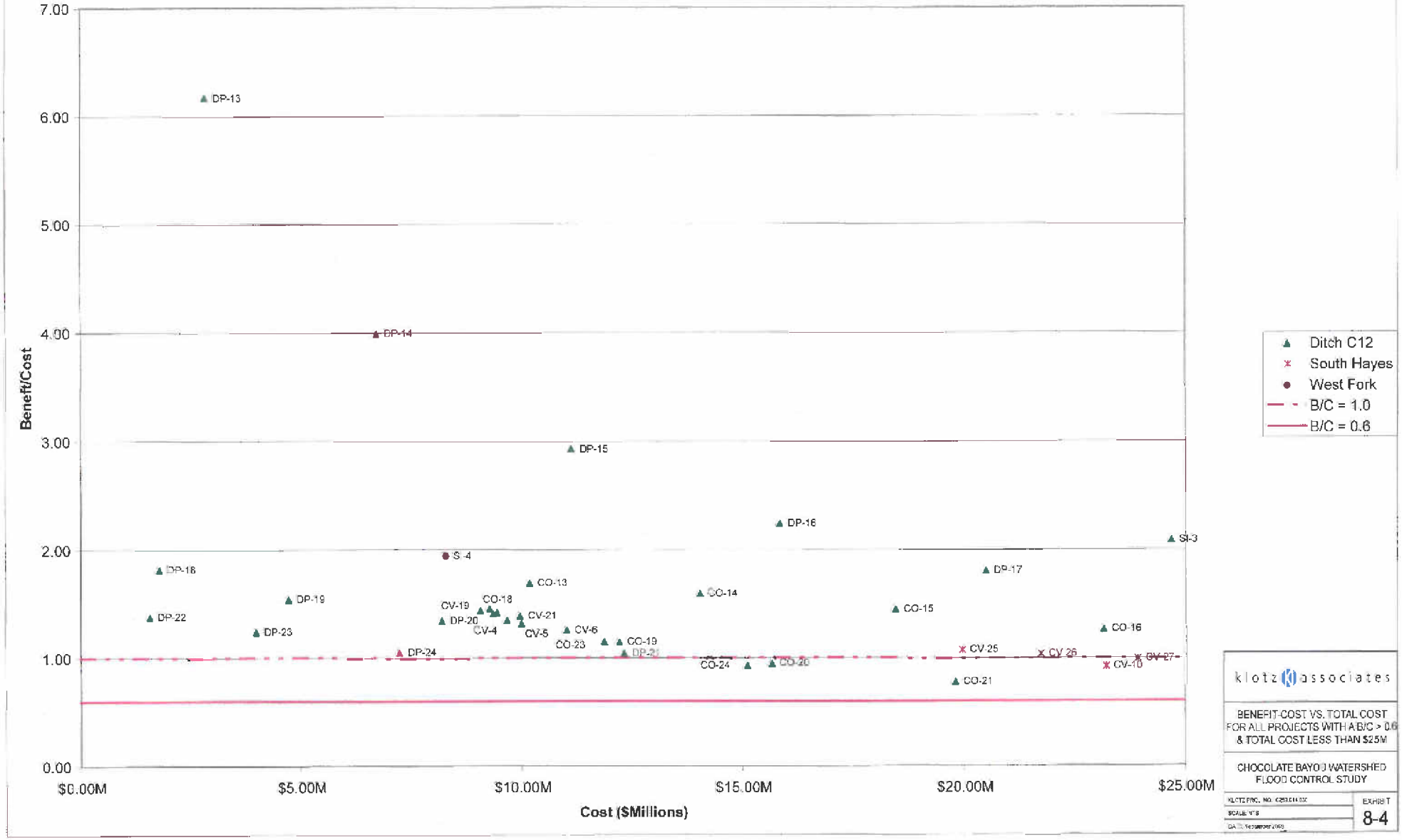
KLOTZ PROJ NO. 2009.014.309

SCALE: NTS

DATE: September 2009

EXHIBIT 8-3

EXHIBIT 8-4
BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS WITH A B/C > 0.6 AND A TOTAL COST LESS THAN $25.00 M



klotz associates

BENEFIT-COST VS. TOTAL COST FOR ALL PROJECTS WITH A B/C > 0.6 & TOTAL COST LESS THAN $25M

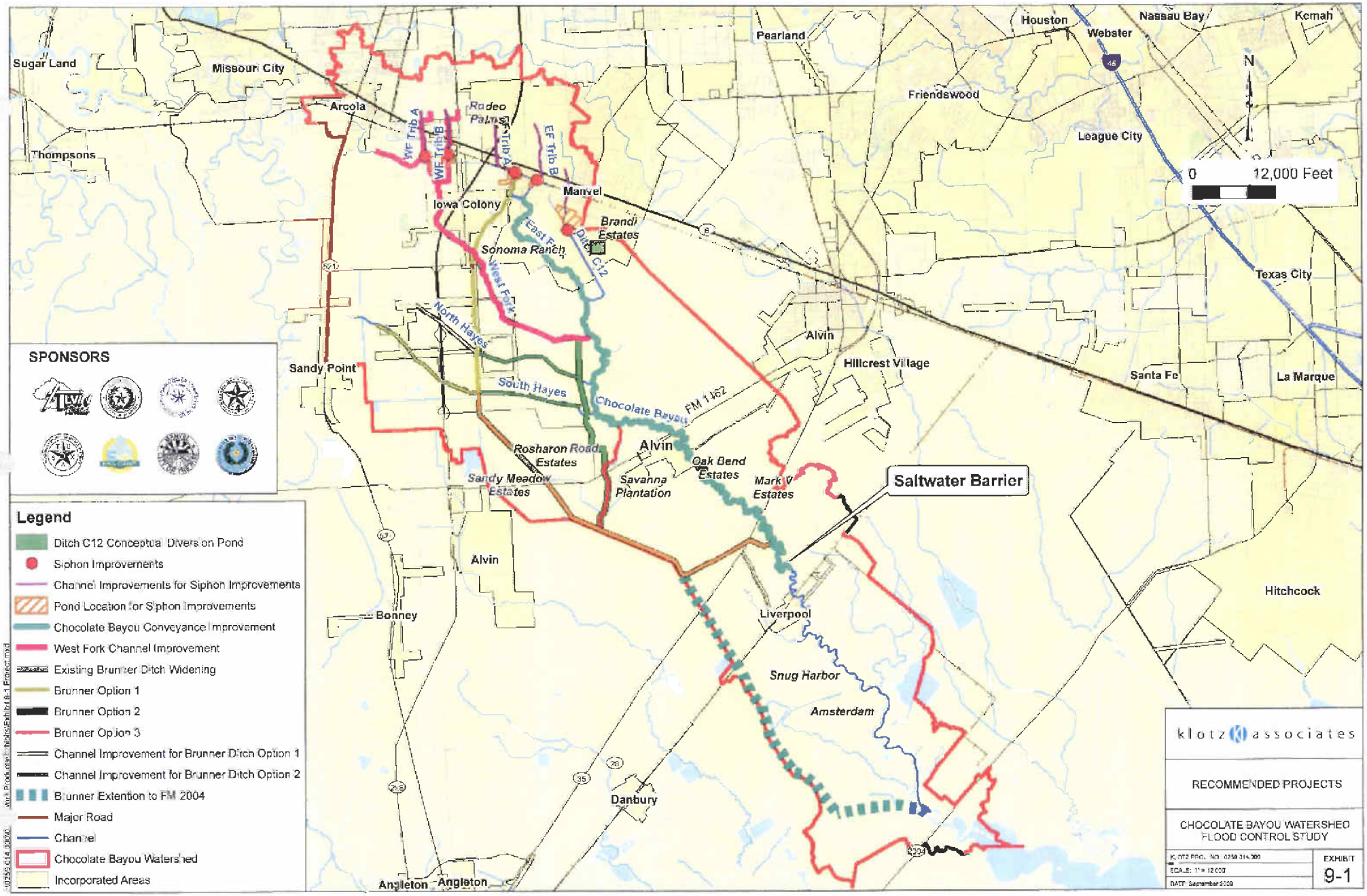
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY

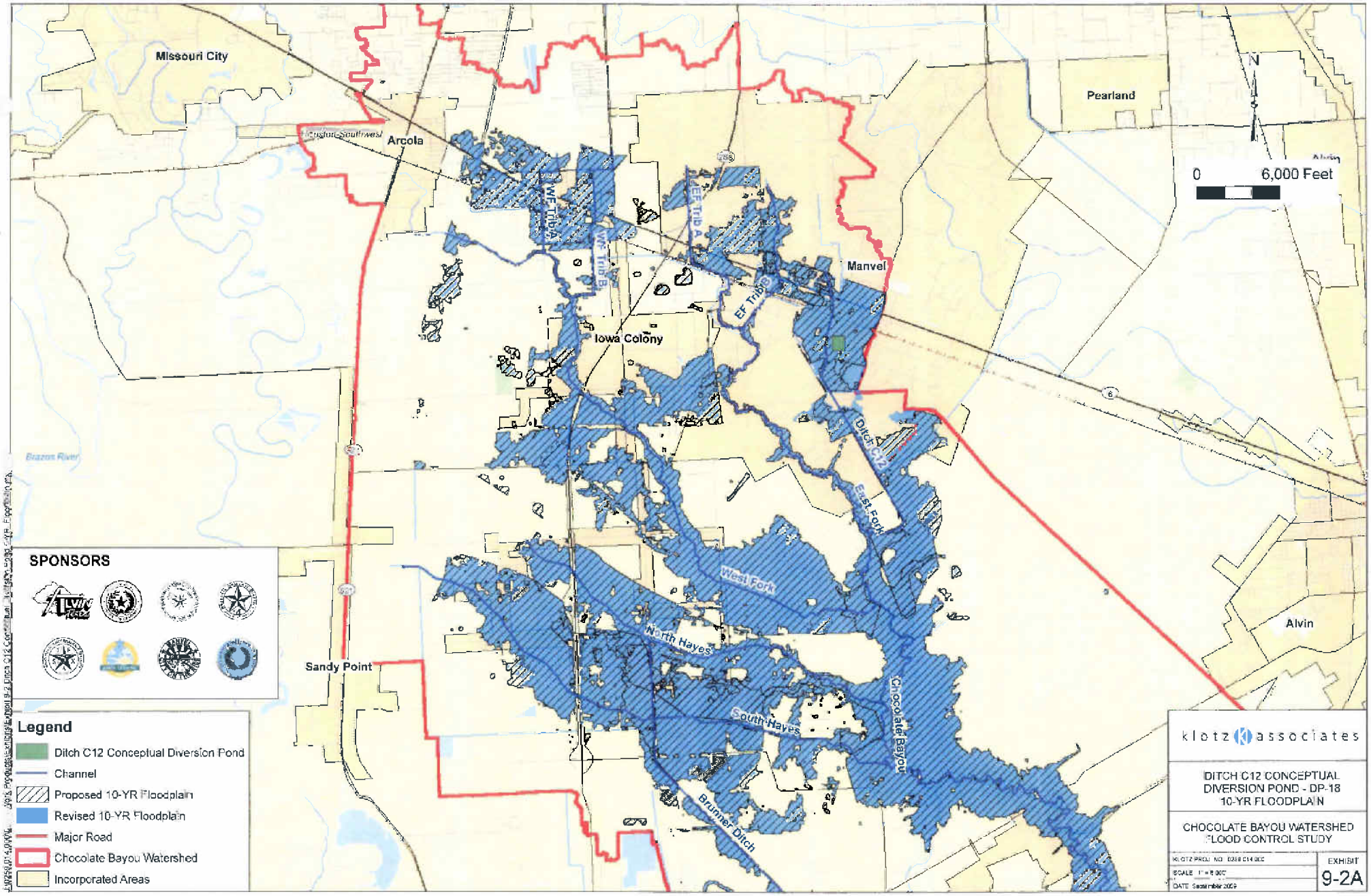
KLOTZ PROJ. NO. 4253.014.002

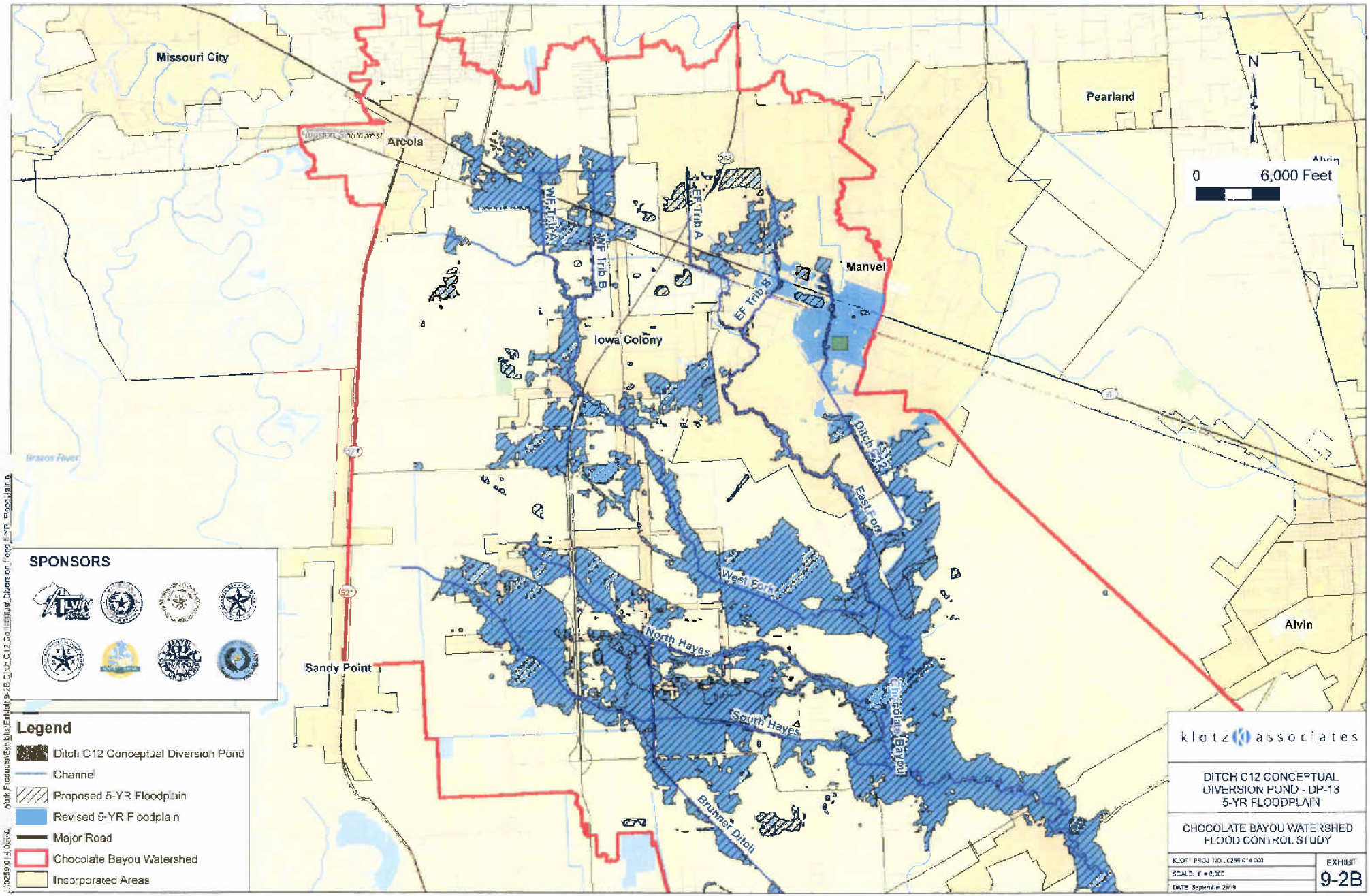
SCALE: N.T.S.

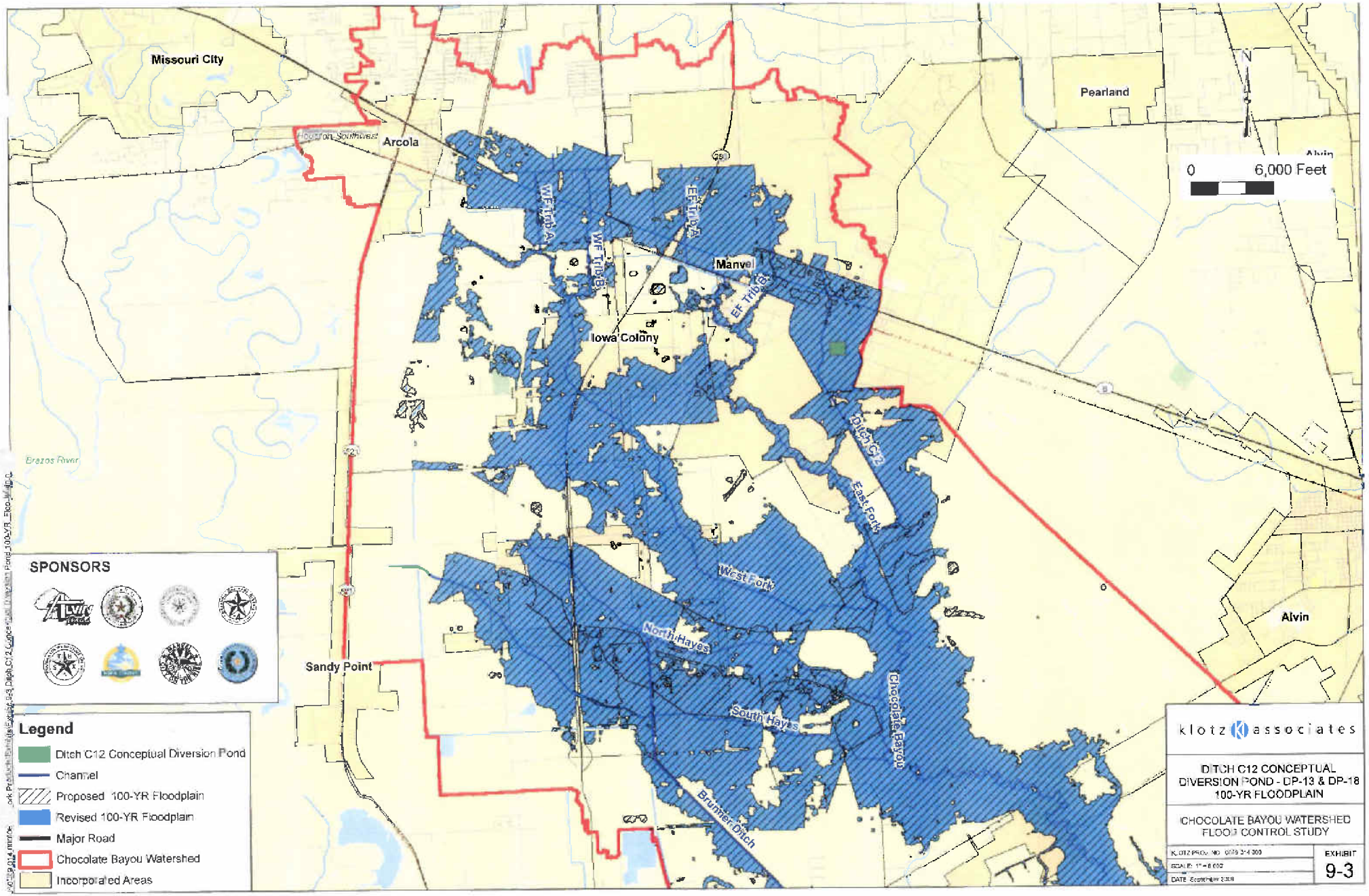
DATE: NOVEMBER 2003

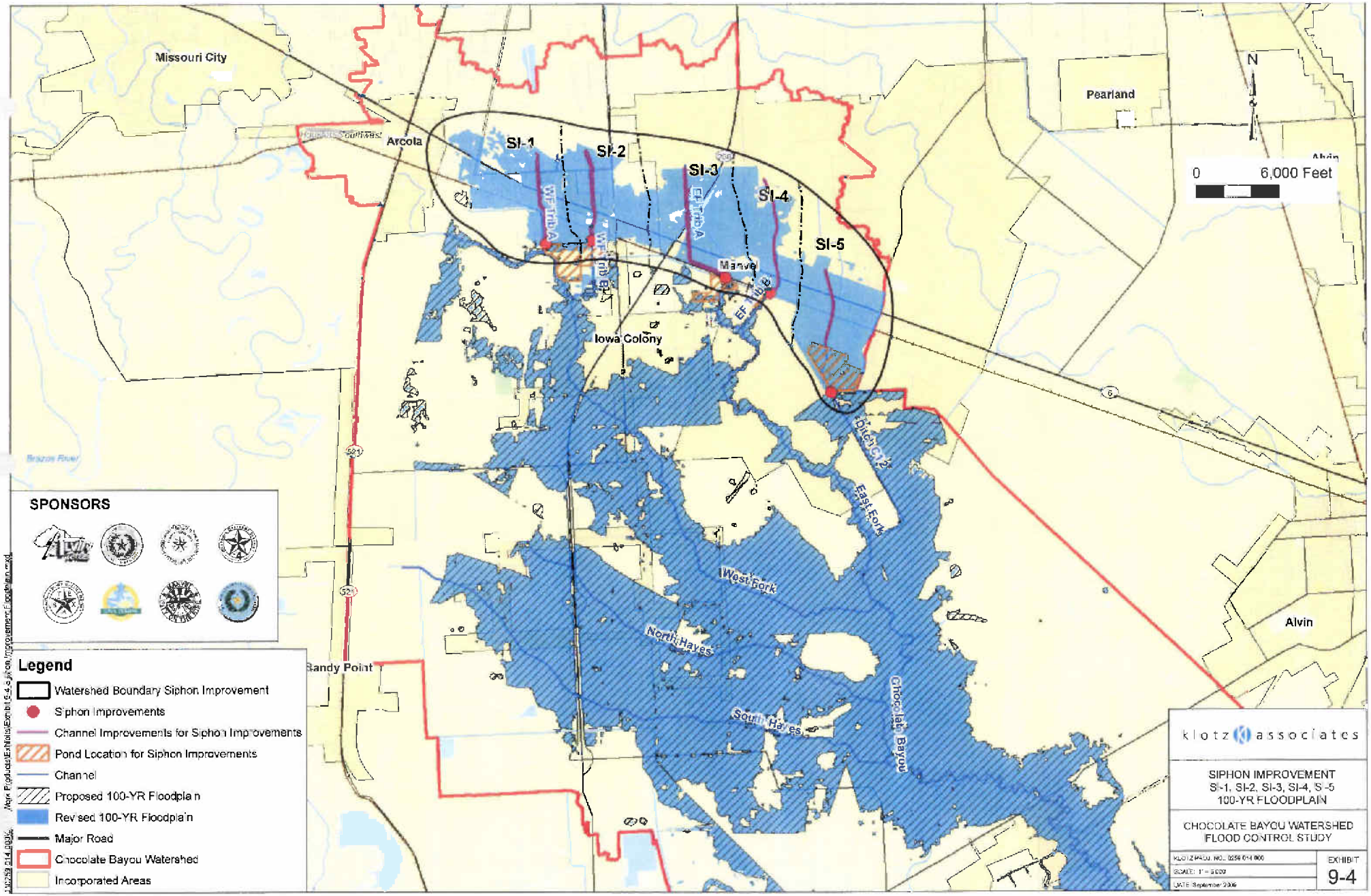
EXHIBIT 8-4

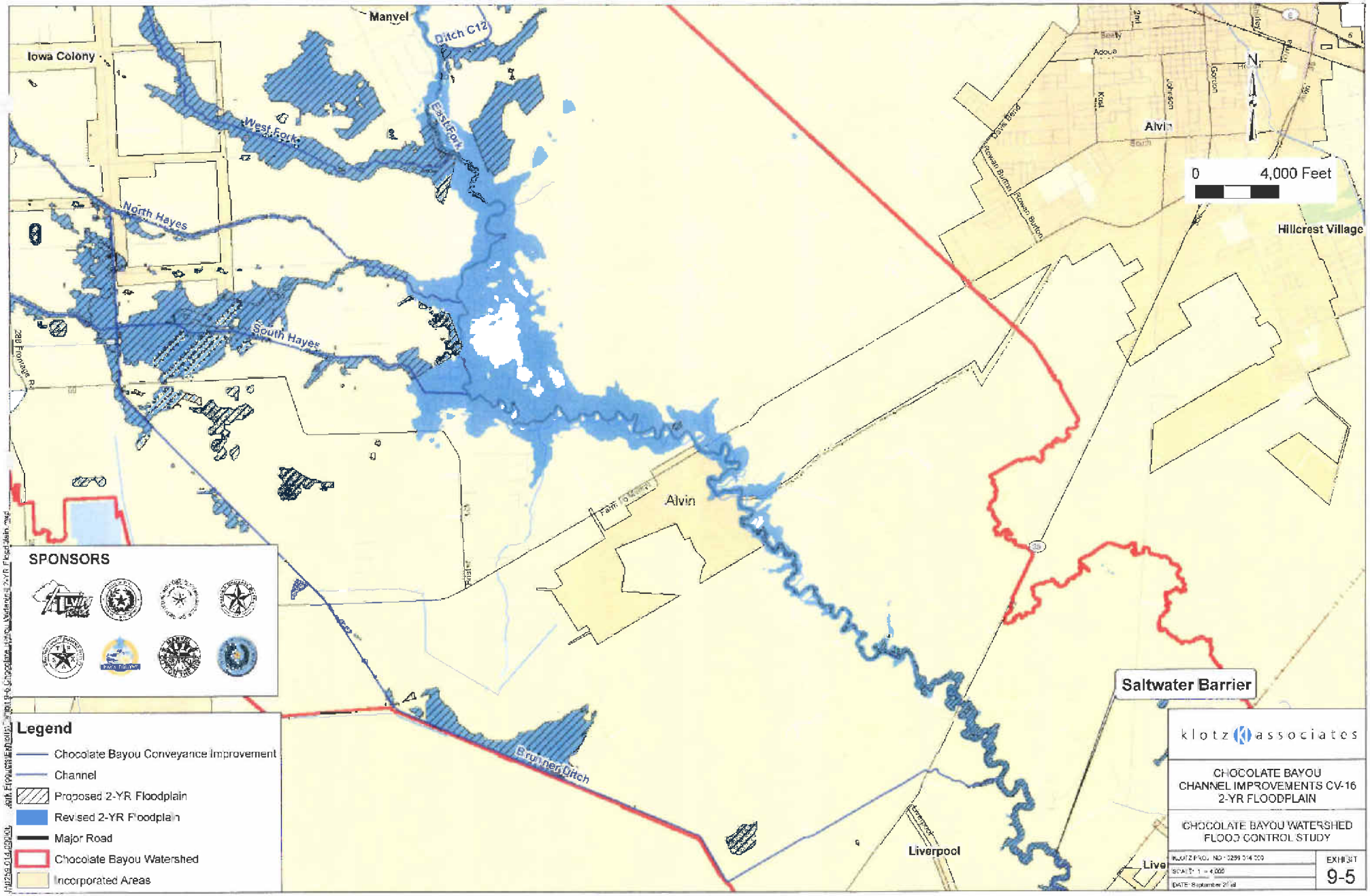

Sugar Land
Missouri City
Arcola
Thompsons
Rodeo Palms
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Iowa Colony
Manvel
Brandi Estates
Sonoma Ranch
East Fork
West Fork
Ditch C12
North Hayes
South Hayes
Sandy Point
Pearland
Houston
Webster
Nassau Bay
Kemah
Friendswood
League City
N
0 12,000 Feet
Texas City
Alvin
Hillcrest Village
Santa Fe
La Marque
Chocolate Bayou
FM 1462
Rosharon Road Estates
Sandy Meadow Estates
Savanna Plantation
Oak Bend Estates
Mark V Estates
Saltwater Barrier
Bonney
Liverpool
Hitchcock
Snug Harbor
Amsterdam
Danbury
Angleton
SPONSORS
Legend
Ditch C12 Conceptual Diversion Pond
Siphon Improvements
Channel Improvements for Siphon Improvements
Pond Location for Siphon Improvements
Chocolate Bayou Conveyance Improvement
West Fork Channel Improvement
Existing Brunner Ditch Widening
Brunner Option 1
Brunner Option 2
Brunner Option 3
Channel Improvement for Brunner Ditch Option 1
Channel Improvement for Brunner Ditch Option 2
Brunner Extention to FM 2004
Major Road
Channel
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
RECOMMENDED PROJECTS
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-1

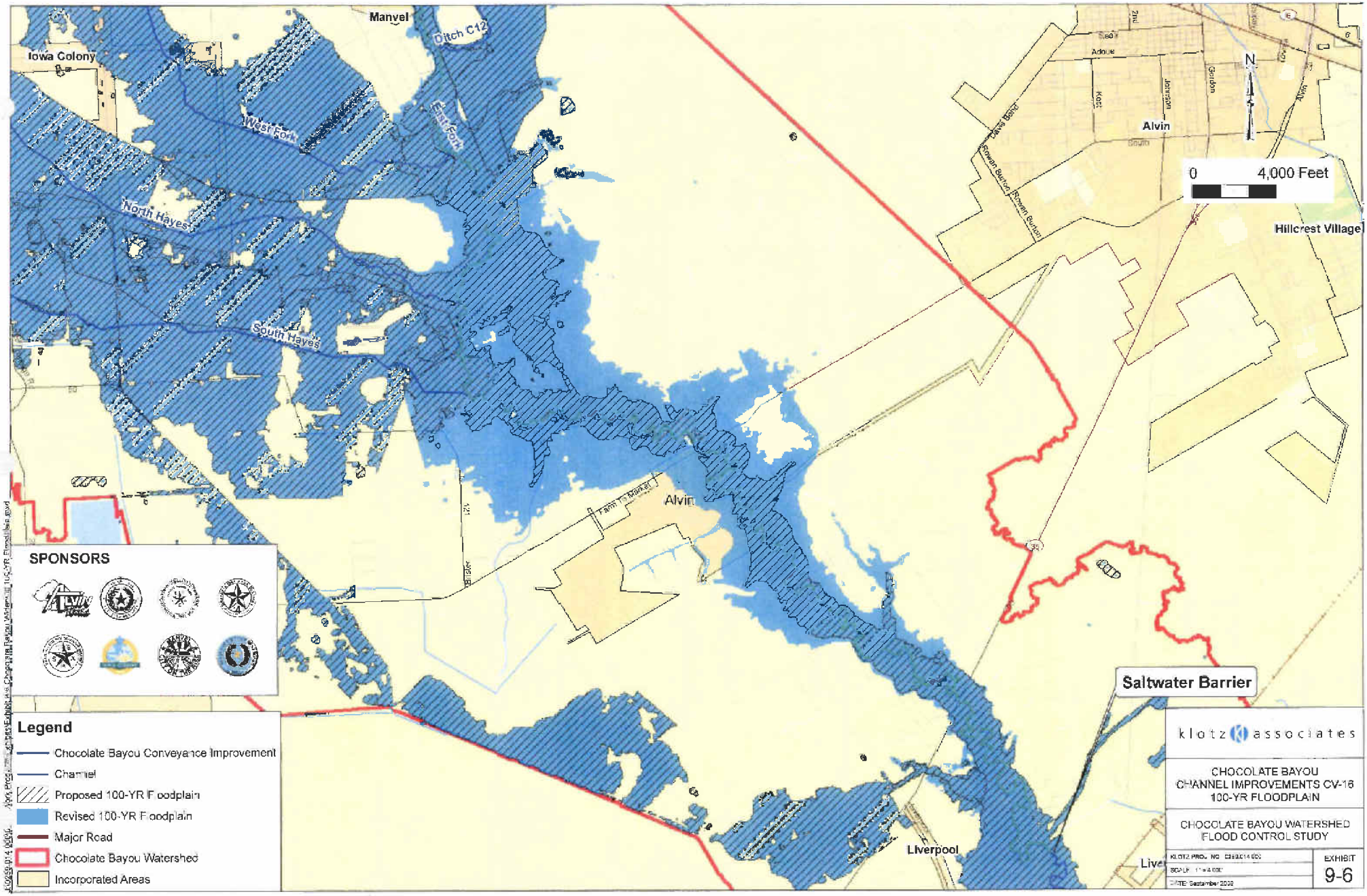

Missouri City
Arcola
Pearland
Manvel
Iowa Colony
Alvin
Sandy Point
Brazos River
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Ditch C12
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
N
0
6,000 Feet
SPONSORS
Legend
Ditch C12 Conceptual Diversion Pond
Channel
Proposed 10-YR Floodplain
Revised 10-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
DITCH C12 CONCEPTUAL DIVERSION POND - DP-18 10-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT
9-2A

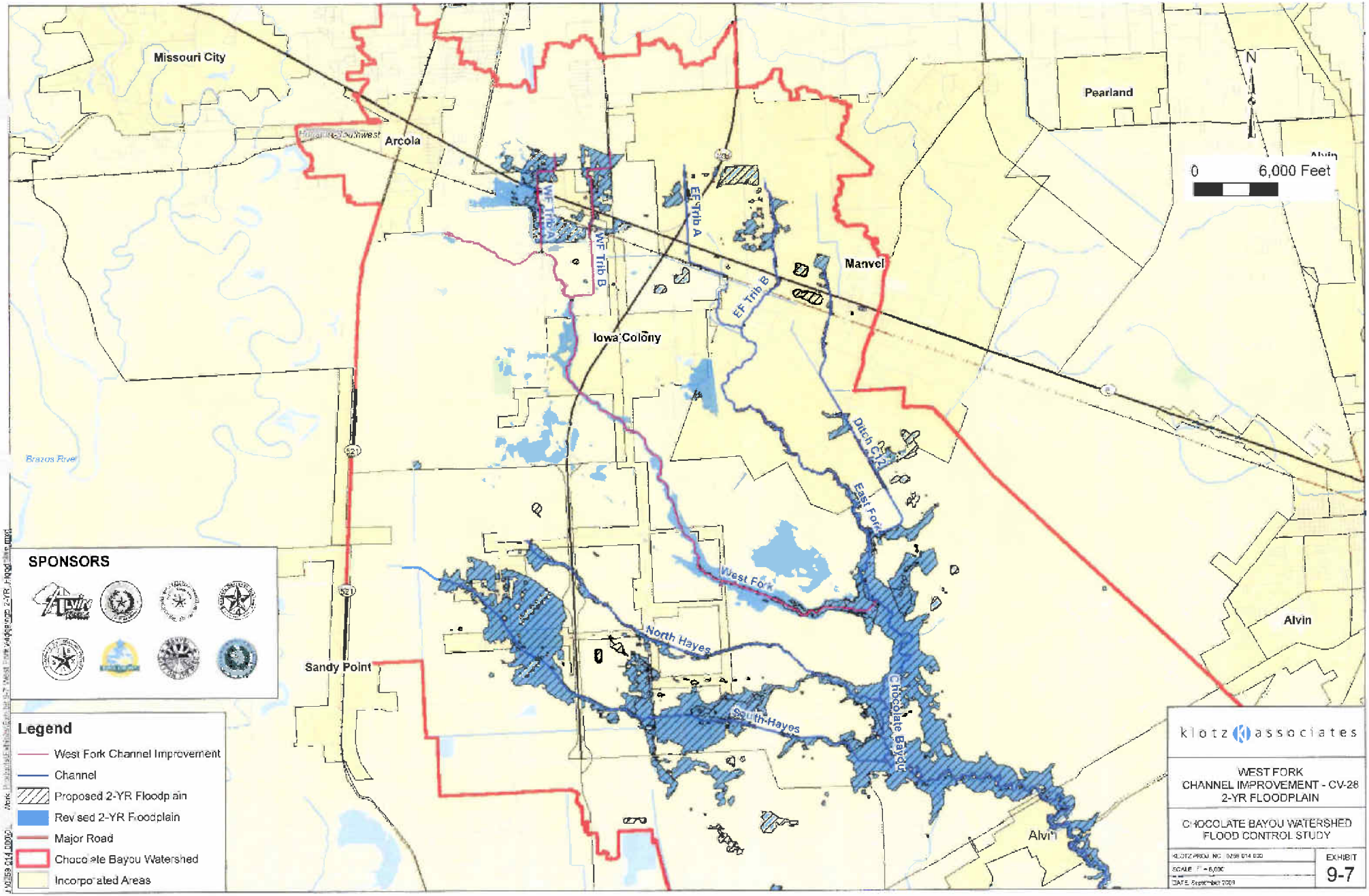

Missouri City
Arcola
Pearland
Manvel
Iowa Colony
Alvin
Sandy Point
N
0
6,000 Feet
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Ditch C12
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
SPONSORS
Legend
Ditch C12 Conceptual Diversion Pond
Channel
Proposed 5-YR Floodplain
Revised 5-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
DITCH C12 CONCEPTUAL DIVERSION POND - DP-13 5-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT
9-2B

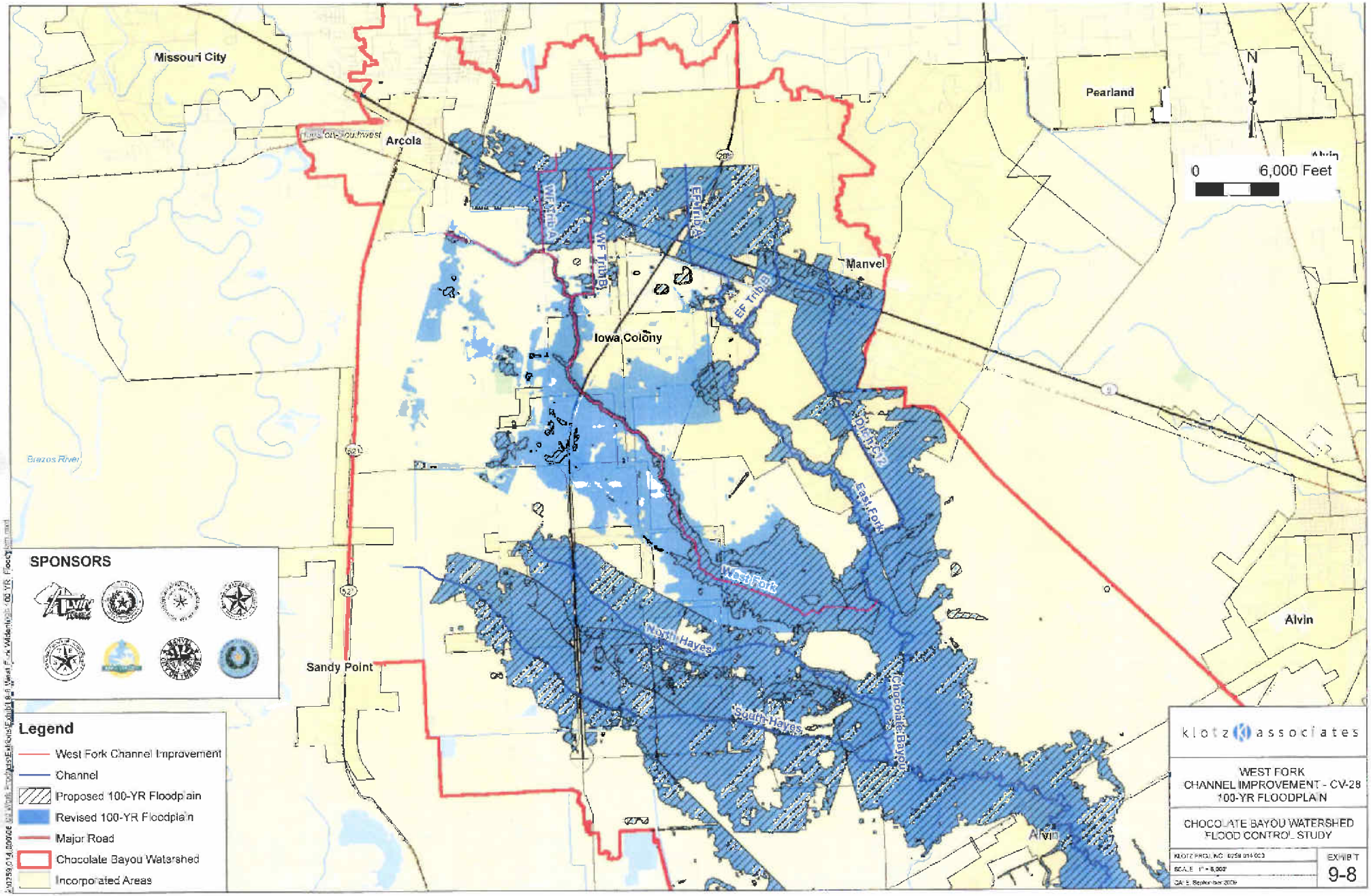

Missouri City
Arcola
Houston Southwest
Pearland
Alvin
Manvel
Iowa Colony
Sandy Point
Brazos River
WF Trib A
WF Trib B
EF Trib A
EF Trib B
DITCH C12
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
Brunner Ditch
0
6,000 Feet
N
SPONSORS
Legend
Ditch C12 Conceptual Diversion Pond
Channel
Proposed 100-YR Floodplain
Revised 100-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
DITCH C12 CONCEPTUAL DIVERSION POND - DP-13 & DP-18 100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED FLOOD CONTROL STUDY
EXHIBIT
9-3

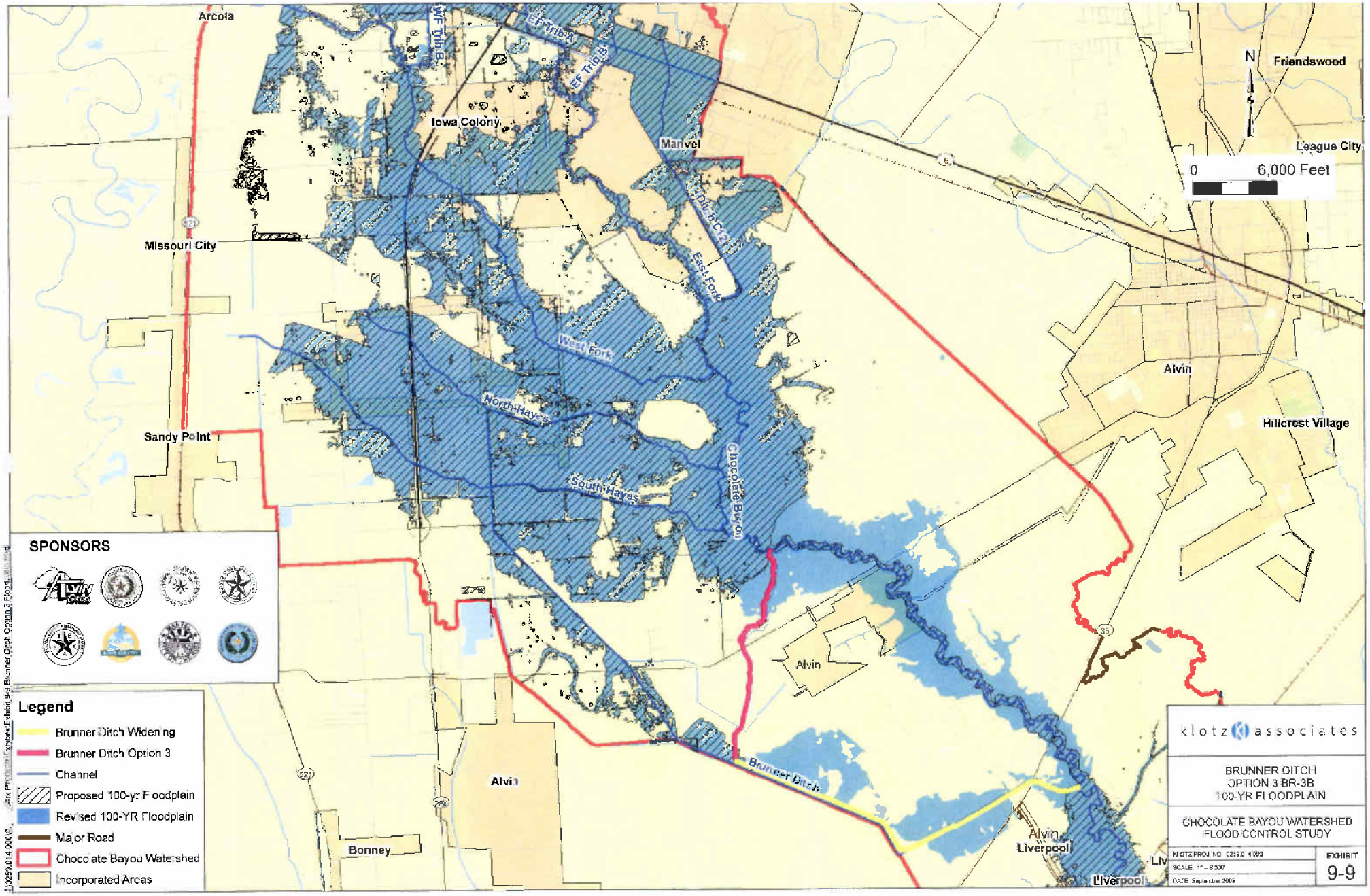

Missouri City
Arcola
Pearland
Alvin
Iowa Colony
Manvel
Brazos River
Sandy Point
SI-1
SI-2
SI-3
SI-4
SI-5
WFTDA
EFTDA
N
0
6,000 Feet
SPONSORS
Legend
Watershed Boundary Siphon Improvement
Siphon Improvements
Channel Improvements for Siphon Improvements
Pond Location for Siphon Improvements
Channel
Proposed 100-YR Floodplain
Revised 100-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
West Fork
East Fork
North Hayes
South Hayes
Chocolate Bayou
klotz associates
SIPHON IMPROVEMENT
SI-1, SI-2, SI-3, SI-4, SI-5
100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-4

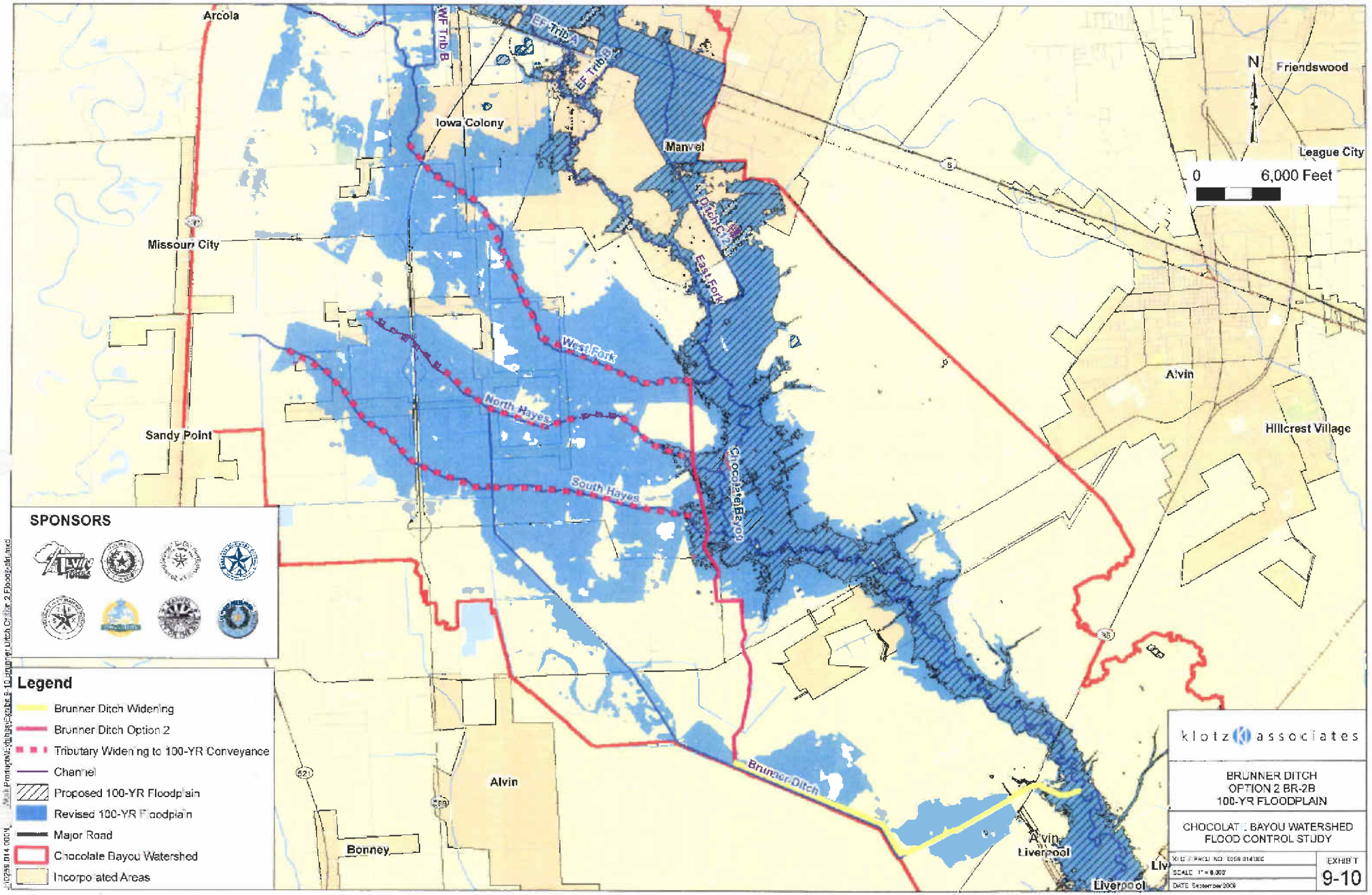

Manvel
Ditch C12
Iowa Colony
West Fork
East Fork
North Hayes
South Hayes
Alvin
Hillcrest Village
Saltwater Barrier
Liverpool
Brunner Ditch
0
4,000 Feet
N
SPONSORS
Legend
Chocolate Bayou Conveyance Improvement
Channel
Proposed 2-YR Floodplain
Revised 2-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
CHOCOLATE BAYOU
CHANNEL IMPROVEMENTS CV-16
2-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-5


Manvel
Ditch C12
Iowa Colony
West Fork
East Fork
North Hayes
South Hayes
Adoue
Alvin
Johnson
Gordon
Parks Bend
Rowan Burton
Hillcrest Village
0
4,000 Feet
N
Farm To Market
Alvin
Saltwater Barrier
Liverpool
SPONSORS
Legend
Chocolate Bayou Conveyance Improvement
Channel
Proposed 100-YR Floodplain
Revised 100-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
CHOCOLATE BAYOU
CHANNEL IMPROVEMENTS CV-16
100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-6


Missouri City
Arcola
Pearland
Manvel
Iowa Colony
Alvin
Sandy Point
Brazos River
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Ditch C-2
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
N
0
6,000 Feet
SPONSORS
Legend
West Fork Channel Improvement
Channel
Proposed 2-YR Floodplain
Revised 2-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
WEST FORK
CHANNEL IMPROVEMENT - CV-28
2-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-7


Missouri City
Arcola
Pearland
Manvel
Iowa Colony
Alvin
Sandy Point
Brazos River
N
0 6,000 Feet
WF Trib A
WF Trib B
EF Trib A
EF Trib B
Mud Gully
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
SPONSORS
Legend
West Fork Channel Improvement
Channel
Proposed 100-YR Floodplain
Revised 100-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
WEST FORK
CHANNEL IMPROVEMENT - CV-28
100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-8


Arcola
WF Trib B
EF Trib A
EF Trib B
Iowa Colony
Manvel
Friendswood
League City
N
0
6,000 Feet
Missouri City
Dixie Ditch
East Fork
West Fork
North Hays
South Hays
Chocolate Bayou
Alvin
Hillcrest Village
Sandy Point
Alvin
Brunner Ditch
Alvin
Liverpool
Bonney
Liv
Liverpool
SPONSORS
Legend
Brunner Ditch Widening
Brunner Ditch Option 3
Channel
Proposed 100-yr Floodplain
Revised 100-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
BRUNNER DITCH
OPTION 3 BR-3B
100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
KLOTZ PROJ NO. 0259.0 4.000
SCALE: 1" = 6,000'
DATE: September 2009
EXHIBIT
9-9


Arcola
WF Trib B
EF Trib A
EF Trib C
Iowa Colony
Manvel
Friendswood
League City
N
0
6,000 Feet
Missouri City
Dawes Ditch
East Fork
West Fork
North Hayes
South Hayes
Chocolate Bayou
Alvin
Hillcrest Village
Sandy Point
Brunner Ditch
Bonney
Liverpool
SPONSORS
Legend
Brunner Ditch Widening
Brunner Ditch Option 2
Tributary Widening to 100-YR Conveyance
Channel
Proposed 100-YR Floodplain
Revised 100-YR Floodplain
Major Road
Chocolate Bayou Watershed
Incorporated Areas
klotz associates
BRUNNER DITCH
OPTION 2 BR-2B
100-YR FLOODPLAIN
CHOCOLATE BAYOU WATERSHED
FLOOD CONTROL STUDY
EXHIBIT
9-10