APPENDIX C

HEC-RAS MODELING RESULTS

Assume:

rwater (slug/ft^3)=	2
g=gravity (ft/s^2)=	32.2
s=rs/r (quartz particles)=	2.65
d=particle dia. (ft)=	0.005
rwater (slug/ft^3)=	5.3
u=viscositywater (ft^2/s)	1.00E-05

Big Chico Creek

1-year, 6-month, and 3-month flows over 24 year period, 1/16-inch gravels

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Reach	River Sta	Q Total (cfs)	E.G. Slope (ft/ft)	Mannings Coefficient	Flow Area (sq ft)	Hydaulic Radius (R_h)* (ft)	Shear Stress (lb/ft^2)	Shield's Parameter Y	Reynolds Number (R_e)	Erosion Y > 0.06, Y If Y < 0.06,	Critical Depth (y_c) (ft)	Bed Load Transport (q_s) (ft^2/s)	Bed Load Transport Vol. (cu. yards)
Reach-1	5490	266	0.029535	0.045	44.2	1.1	2.069	3.74	530	Yes	0.02	0.15	36,486
Reach-1	5480	266	0.000434	0.045	196.98	2.7	0.077	0.14	102	Yes	1.19	0.00	113
Reach-1	5470	266	0.001846	0.045	101.68	2.5	0.296	0.54	201	Yes	0.28	0.01	1,697
Reach-1	5460	Culvert											0
Reach-1	5450	266	0.005193	0.045	77.74	1.7	0.574	1.04	279	Yes	0.10	0.02	5,001
Reach-1	5440	266	0.004598	0.045	89.16	1.5	0.454	0.82	248	Yes	0.11	0.01	3,424
Reach-1	5430	266	0.000254	0.07	405.07	2.7	0.044	0.08	77	Yes	2.03	0.00	14
Reach-1	5420	266	0.000375	0.07	301.47	3.1	0.076	0.14	101	Yes	1.38	0.00	110
Reach-1	5355	266	0.002026	0.07	145.29	2.6	0.345	0.62	216	Yes	0.25	0.01	2,184
Reach-1	5350	266	0.005455	0.09	136.94	2.0	0.703	1.27	309	Yes	0.09	0.03	6,893
Reach-1	5330	Bridge											0
Reach-1	5310	266	0.115144	0.09	42.88	1.2	8.604	15.55	1080	Yes	0.00	1.34	315,268
Reach-1	4500	266	0.00072	0.09	276.49	3.2	0.148	0.27	142	Yes	0.72	0.00	487
Reach-1	4491	266	0.01654	0.09	78.15	2.0	2.153	3.89	540	Yes	0.03	0.16	38,774
Reach-1	4490	266	0.005631	0.09	135.7	2.0	0.719	1.30	312	Yes	0.09	0.03	7,131
Reach-1	4480	266	0.002059	0.09	193.25	2.5	0.329	0.59	211	Yes	0.25	0.01	2,020
Reach-1	4470	266	0.010952	0.09	117.28	1.5	1.056	1.91	379	Yes	0.05	0.06	13,003
Reach-1	4460	266	0.000919	0.09	482.82	1.2	0.068	0.12	96	Yes	0.56	0.00	82
Reach-1	4455	266	0.123508	0.09	48.42	0.9	7.298	13.19	995	Yes	0.00	1.04	245,989
Reach-1	4450	266	0.001877	0.09	307.99	1.3	0.160	0.29	147	Yes	0.27	0.00	565
Reach-1	4440	266	0.004648	0.09	122.87	2.7	0.795	1.44	328	Yes	0.11	0.04	8,356
Reach-1	4430	Bridge											0
Reach-1	4420	266	0.004915	0.09	119.28	2.7	0.843	1.52	338	Yes	0.10	0.04	9,155
Reach-1	4410	266	0.003138	0.09	148.23	2.7	0.544	0.98	272	Yes	0.16	0.02	4,586
Reach-1	4401	266	0.025798	0.09	77.1	1.5	2.455	4.44	577	Yes	0.02	0.20	47,360
Reach-1	4400	266	0.122492	0.09	47.45	1.0	7.507	13.56	1009	Yes	0.00	1.09	256,701
Reach-1	4390	266	0.000841	0.09	241.94	3.5	0.188	0.34	160	Yes	0.61	0.00	763
Reach-1	4386	266	0.005004	0.09	113.07	2.8	0.917	1.66	353	Yes	0.10	0.04	10,447

Assume:

rwater (slug/ft^3)=	2
g=gravity (ft/s^2)=	32.2
s=rs/r (quartz particles)=	2.65
d=particle dia. (ft)=	0.005
rwater (slug/ft^3)=	5.3
u=viscositywater (ft^2/s)	1.00E-05

Big Chico Creek

1-year, 6-month, and 3-month flows over 24 year period, 1/16-inch gravels

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Reach	River Sta	Q Total (cfs)	E.G. Slope (ft/ft)	Mannings Coefficient	Flow Area (sq ft)	Hydaulic Radius (R_h)* (ft)	Shear Stress (lb/ft^2)	Shield's Parameter Y	Reynolds Number (R_e)	Erosion Y > 0.06, Y If Y < 0.06,	Critical Depth (y_c) (ft)	Bed Load Transport (q_s) (ft^2/s)	Bed Load Transport Vol. (cu. yards)
Reach-1	4264	266	0.001031	0.07	173.87	3.3	0.222	0.40	174	Yes	0.50	0.00	1,034
Reach-1	4260	266	0.000264	0.07	317.97	3.8	0.064	0.12	93	Yes	1.95	0.00	68
Reach-1	4250	266	0.000012	0.065	1255.1	4.4	0.003	0.01	21	No	0.00	0.00	0
Reach-1	4241	266	0.000062	0.065	437.13	6.2	0.025	0.04	58	No	0.00	0.00	0
Reach-1	4230	Bridge											0
Reach-1	4219	266	0.000062	0.065	436.95	6.2	0.025	0.04	58	No	0.00	0.00	0
Reach-1	4210	266	0.000009	0.065	1400.69	4.6	0.003	0.00	19	No	0.00	0.00	0
Reach-1	4200	266	0.000003	0.065	2247.57	5.1	0.001	0.00	12	No	0.00	0.00	0
Reach-1	4190	266	0.000006	0.07	1308.97	7.7	0.003	0.01	20	No	0.00	0.00	0
Reach-1	4184	266	0.003699	0.07	219.96	0.9	0.215	0.39	171	Yes	0.14	0.00	974
Reach-1	4183	266	0.084917	0.07	60.2	0.6	3.288	5.94	668	Yes	0.01	0.31	73,773
Reach-1	4182	266	0.000481	0.07	313.17	2.5	0.076	0.14	102	Yes	1.07	0.00	111
Reach-1	4181	266	0.002182	0.07	136.81	2.7	0.384	0.69	228	Yes	0.24	0.01	2,613
Reach-1	4180	266	0.001989	0.07	149.77	2.6	0.328	0.59	211	Yes	0.26	0.01	2,009
Reach-1	4179	266	0.009052	0.07	85.33	1.9	1.113	2.01	389	Yes	0.06	0.06	14,103
Reach-1	4170	Bridge											0
Reach-1	4161	266	0.067663	0.07	40.1	1.3	5.714	10.32	880	Yes	0.01	0.72	170,114
Reach-1	4160	266	0.004986	0.07	123.63	1.7	0.550	0.99	273	Yes	0.10	0.02	4,667
Reach-1	4150	266	0.013446	0.07	86.54	1.4	1.203	2.17	404	Yes	0.04	0.07	15,903
Reach-1	4140	266	0.001356	0.07	183.61	2.5	0.219	0.40	173	Yes	0.38	0.00	1,010
Reach-1	4130	266	0.015218	0.07	76.75	1.5	1.486	2.69	449	Yes	0.03	0.09	22,002
Reach-1	4120	266	0.00278	0.07	126.25	2.6	0.461	0.83	250	Yes	0.19	0.01	3,509
Reach-1	4117.5	Bridge											0
Reach-1	4115	266	0.002874	0.07	124.83	2.6	0.472	0.85	253	Yes	0.18	0.02	3,656
Reach-1	4105	266	0.002442	0.07	135.98	2.5	0.399	0.72	233	Yes	0.21	0.01	2,778
Reach-1	4102.5	Bridge											0
Reach-1	4100	266	0.002881	0.07	129.08	2.4	0.449	0.81	247	Yes	0.18	0.01	3,374
Reach-1	4090	266	0.00185	0.07	147.8	2.8	0.328	0.59	211	Yes	0.28	0.01	2,015

Assume:

rwater (slug/ft^3)=	2
g=gravity (ft/s^2)=	32.2
s=rs/r (quartz particles)=	2.65
d=particle dia. (ft)=	0.005
rwater (slug/ft^3)=	5.3
u=viscositywater (ft^2/s)	1.00E-05

Big Chico Creek

1-year, 6-month, and 3-month flows over 24 year period, 1/16-inch gravels

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Reach	River Sta	Q Total (cfs)	E.G. Slope (ft/ft)	Mannings Coefficient	Flow Area (sq ft)	Hydaulic Radius (R_h)* (ft)	Shear Stress (lb/ft^2)	Shield's Parameter Y	Reynolds Number (R_e)	Erosion Y > 0.06, Y If Y < 0.06,	Critical Depth (y_c) (ft)	Bed Load Transport (q_t) (ft^2/s)	Bed Load Transport Vol. (cu. yards)
Reach-1	4385.5	Bridge											0
Reach-1	4385	266	0.005272	0.09	111.03	2.8	0.955	1.73	360	Yes	0.10	0.05	11,124
Reach-1	4380	266	0.004442	0.09	126.66	2.6	0.751	1.36	319	Yes	0.12	0.03	7,643
Reach-1	4370	266	0.002455	0.09	185.26	2.3	0.366	0.66	223	Yes	0.21	0.01	2,413
Reach-1	4360	266	0.002103	0.09	186.04	2.6	0.350	0.63	218	Yes	0.25	0.01	2,240
Reach-1	4350	266	0.000513	0.09	356.82	2.8	0.093	0.17	112	Yes	1.01	0.00	182
Reach-1	4349	266	0.127574	0.09	49.94	0.9	7.024	12.69	976	Yes	0.00	0.98	232,204
Reach-1	4340	266	0.002264	0.09	205.71	2.1	0.307	0.55	204	Yes	0.23	0.01	1,796
Reach-1	4330	266	0.002317	0.09	192.61	2.3	0.340	0.62	215	Yes	0.22	0.01	2,139
Reach-1	4329	266	0.002324	0.09	192.42	2.3	0.341	0.62	215	Yes	0.22	0.01	2,147
Reach-1	4327	Bridge											0
Reach-1	4325	266	0.002658	0.09	183.87	2.2	0.378	0.68	226	Yes	0.19	0.01	2,540
Reach-1	4320	266	0.002464	0.09	218.95	1.8	0.285	0.52	197	Yes	0.21	0.01	1,590
Reach-1	4315	266	0.002324	0.09	225.75	1.8	0.268	0.49	191	Yes	0.22	0.01	1,434
Reach-1	4313	Bridge											0
Reach-1	4311	266	0.002584	0.09	213.46	1.8	0.300	0.54	202	Yes	0.20	0.01	1,730
Reach-1	4310	266	0.00259	0.09	213.15	1.8	0.301	0.54	202	Yes	0.20	0.01	1,738
Reach-1	4297	266	0.019737	0.09	72.67	2.0	2.509	4.53	583	Yes	0.03	0.21	48,956
Reach-1	4295.5	Bridge											0
Reach-1	4294	266	0.112195	0.09	40.62	1.3	9.272	16.75	1121	Yes	0.00	1.49	352,813
Reach-1	4290	266	0.000562	0.09	423.95	2.0	0.073	0.13	100	Yes	0.92	0.00	100
Reach-1	4280	266	0.002244	0.07	159.58	2.1	0.307	0.56	204	Yes	0.23	0.01	1,801
Reach-1	4271	266	0.010106	0.07	109.79	1.2	0.784	1.42	326	Yes	0.05	0.03	8,175
Reach-1	4270	266	0.001543	0.07	248.19	1.5	0.144	0.26	140	Yes	0.33	0.00	465
Reach-1	4269	266	0.000241	0.07	407.2	2.8	0.043	0.08	76	Yes	2.14	0.00	12
Reach-1	4268	266	0.00032	0.07	329.14	3.1	0.064	0.12	93	Yes	1.61	0.00	67
Reach-1	4267	266	0.001031	0.07	173.92	3.3	0.222	0.40	174	Yes	0.50	0.00	1,033
Reach-1	4265.5	Bridge											0

Assume:

rwater (slug/ft^3)=	2
g=gravity (ft/s^2)=	32.2
s=rs/r (quartz particles)=	2.65
d=particle dia. (ft)=	0.005
rwater (slug/ft^3)=	5.3
u=viscositywater (ft^2/s)	1.00E-05

Big Chico Creek

1-year, 6-month, and 3-month flows over 24 year period, 1/16-inch gravels

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Reach	River Sta	Q Total (cfs)	E.G. Slope (ft/ft)	Mannings Coefficient	Flow Area (sq ft)	Hydaulic Radius (R_h)* (ft)	Shear Stress (lb/ft^2)	Shield's Parameter Y	Reynolds Number (R_e)	Erosion Y > 0.06, Y If Y < 0.06,	Critical Depth (y_c) (ft)	Bed Load Transport (q_t) (ft^2/s)	Bed Load Transport Vol. (cu. yards)
Reach-1	4080	266	0.001674	0.07	160.68	2.6	0.283	0.51	196	Yes	0.31	0.01	1,564
Reach-1	4076	266	0.002887	0.07	118.12	2.8	0.514	0.93	264	Yes	0.18	0.02	4,184
Reach-1	4075.5	Bridge											0
Reach-1	4075	266	0.002931	0.07	117.49	2.8	0.520	0.94	266	Yes	0.18	0.02	4,264
Reach-1	4070	266	0.000351	0.07	308.93	3.2	0.072	0.13	99	Yes	1.47	0.00	95
Reach-1	4067	266	0.00088	0.07	217.45	2.7	0.153	0.28	144	Yes	0.59	0.00	520
Reach-1	4066	266	0.000883	0.07	216.88	2.7	0.154	0.28	144	Yes	0.58	0.00	524
Reach-1	4065.5	Bridge											0
Reach-1	4065	266	0.000888	0.07	216.46	2.7	0.154	0.28	145	Yes	0.58	0.00	529
Reach-1	4064	266	0.000886	0.07	216.88	2.7	0.154	0.28	144	Yes	0.58	0.00	525
Reach-1	4060	266	0.00009	0.07	519.45	4.0	0.023	0.04	56	No	0.00	0.00	0
Reach-1	4059	266	0.003798	0.07	103.64	2.7	0.669	1.21	301	Yes	0.14	0.03	6,375
Reach-1	4058	266	0.003836	0.07	102.99	2.7	0.677	1.22	303	Yes	0.13	0.03	6,496
Reach-1	4057.5	Bridge											0
Reach-1	4057	266	0.003926	0.07	102.11	2.7	0.690	1.25	306	Yes	0.13	0.03	6,690
Reach-1	4056	266	0.003918	0.07	102.45	2.7	0.686	1.24	305	Yes	0.13	0.03	6,632
Reach-1	4054	266	0.020145	0.07	56.3	2.0	2.537	4.58	587	Yes	0.03	0.21	49,781
Reach-1	4053	266	0.021123	0.07	55.33	1.9	2.635	4.76	598	Yes	0.02	0.22	52,734
Reach-1	4052.5	Bridge											0
Reach-1	4052	266	0.031832	0.07	48.3	1.7	3.580	6.47	697	Yes	0.02	0.36	83,918
Reach-1	4051	266	0.056973	0.07	39.93	1.5	5.509	9.95	864	Yes	0.01	0.68	160,970
Reach-1	4050	266	0.001477	0.07	177.25	2.5	0.236	0.43	179	Yes	0.35	0.00	1,150
Reach-1	4040	266	0.005502	0.07	93.75	2.4	0.854	1.54	340	Yes	0.09	0.04	9,336
Reach-1	4030	Bridge											0
Reach-1	4020	266	0.007019	0.07	86.44	2.3	1.025	1.85	373	Yes	0.07	0.05	12,403
Reach-1	4010	266	0.003356	0.07	124.96	2.3	0.490	0.89	258	Yes	0.15	0.02	3,881
Reach-1	4000	266	0.001213	0.07	208	2.3	0.177	0.32	155	Yes	0.43	0.00	685
Reach-1	3066	266	0.000556	0.07	202.93	4.2	0.151	0.27	143	Yes	0.93	0.00	509

Assume:

rwater (slug/ft^3)=	2
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s=rs/r (quartz particles)=	2.65
d=particle dia. (ft)=	0.005
rwater (slug/ft^3)=	5.3
u=viscositywater (ft^2/s)	1.00E-05

Big Chico Creek

1-year, 6-month, and 3-month flows over 24 year period, 1/16-inch gravels

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Reach	River Sta	Q Total (cfs)	E.G. Slope (ft/ft)	Mannings Coefficient	Flow Area (sq ft)	Hydaulic Radius (R_h)* (ft)	Shear Stress (lb/ft^2)	Shield's Parameter Y	Reynolds Number (R_e)	Erosion Y > 0.06, Y If Y < 0.06,	Critical Depth (y_c) (ft)	Bed Load Transport (q_t) (ft^2/s)	Bed Load Transport Vol. (cu. yards)
Reach-1	3065	266	0.000569	0.07	201.22	4.2	0.154	0.28	144	Yes	0.91	0.00	527
Reach-1	3064	266	0.001397	0.07	156.38	3.1	0.281	0.51	195	Yes	0.37	0.01	1,552
Reach-1	3050	266	0.000585	0.07	197.96	4.2	0.159	0.29	147	Yes	0.88	0.00	560
Reach-1	3049	266	0.000578	0.07	199.08	4.2	0.157	0.28	146	Yes	0.89	0.00	548
Reach-1	3030	266	0.001103	0.07	152.5	3.9	0.275	0.50	193	Yes	0.47	0.01	1,497
Reach-1	3023	Bridge											0
Reach-1	3016	266	0.001115	0.07	151.89	3.9	0.278	0.50	194	Yes	0.46	0.01	1,519
Reach-1	2991	266	0.002021	0.07	153.51	2.4	0.317	0.57	207	Yes	0.26	0.01	1,901
Reach-1	2990	266	0.003379	0.07	138.43	1.9	0.421	0.76	239	Yes	0.15	0.01	3,036
Reach-1	2982.5	Bridge											0
Reach-1	2975	266	0.003595	0.07	135.37	1.9	0.442	0.80	245	Yes	0.14	0.01	3,287
Reach-1	2974	266	0.00221	0.07	149.25	2.4	0.338	0.61	214	Yes	0.23	0.01	2,117
Reach-1	2950	266	0.00465	0.1	133.12	2.8	0.826	1.49	335	Yes	0.11	0.04	8,867
Reach-1	2942.5	Bridge											0
Reach-1	2935	266	0.004673	0.1	132.89	2.8	0.829	1.50	335	Yes	0.11	0.04	8,920
Reach-1	2925	266	0.004401	0.1	132.64	2.9	0.819	1.48	333	Yes	0.12	0.04	8,752
Reach-1	2910	266	0.00193	0.1	177.54	3.5	0.430	0.78	242	Yes	0.27	0.01	3,145
Reach-1	2905	266	0.00289	0.1	160.53	3.0	0.554	1.00	274	Yes	0.18	0.02	4,719
Reach-1	2900	266	0.003995	0.1	137.98	2.9	0.754	1.36	320	Yes	0.13	0.03	7,680
Reach-1	2890	266	0.001923	0.08	142.67	3.4	0.427	0.77	241	Yes	0.27	0.01	3,106
Reach-1	2880	266	0.003051	0.08	114.42	3.4	0.667	1.21	301	Yes	0.17	0.03	6,346
Reach-1	2870	266	0.002351	0.08	122.47	3.7	0.565	1.02	277	Yes	0.22	0.02	4,868
Reach-1	2845	266	0.002515	0.08	121.85	3.6	0.579	1.05	280	Yes	0.21	0.02	5,062
Reach-1	2844	266	0.009074	0.08	84.95	2.3	1.370	2.48	431	Yes	0.06	0.08	19,422
Reach-1	2837.5	Bridge											0
Reach-1	2831	266	0.034808	0.08	53.99	1.7	3.785	6.84	716	Yes	0.01	0.39	91,284
Reach-1	2830	266	0.008817	0.08	79.04	2.7	1.516	2.74	453	Yes	0.06	0.10	22,679
Reach-1	2820	266	0.001595	0.08	124.46	4.9	0.500	0.90	260	Yes	0.32	0.02	4,010