

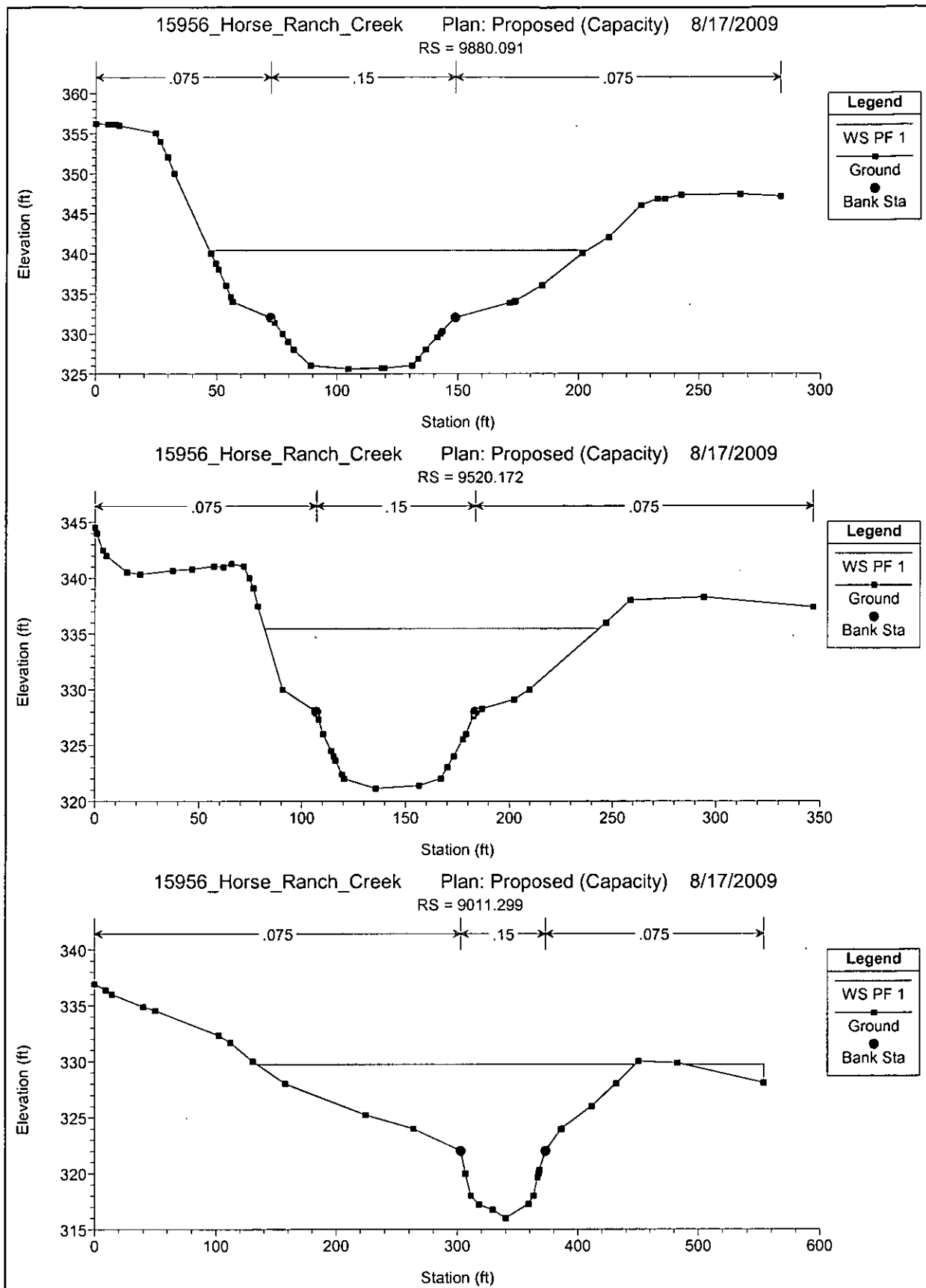
Appendix J

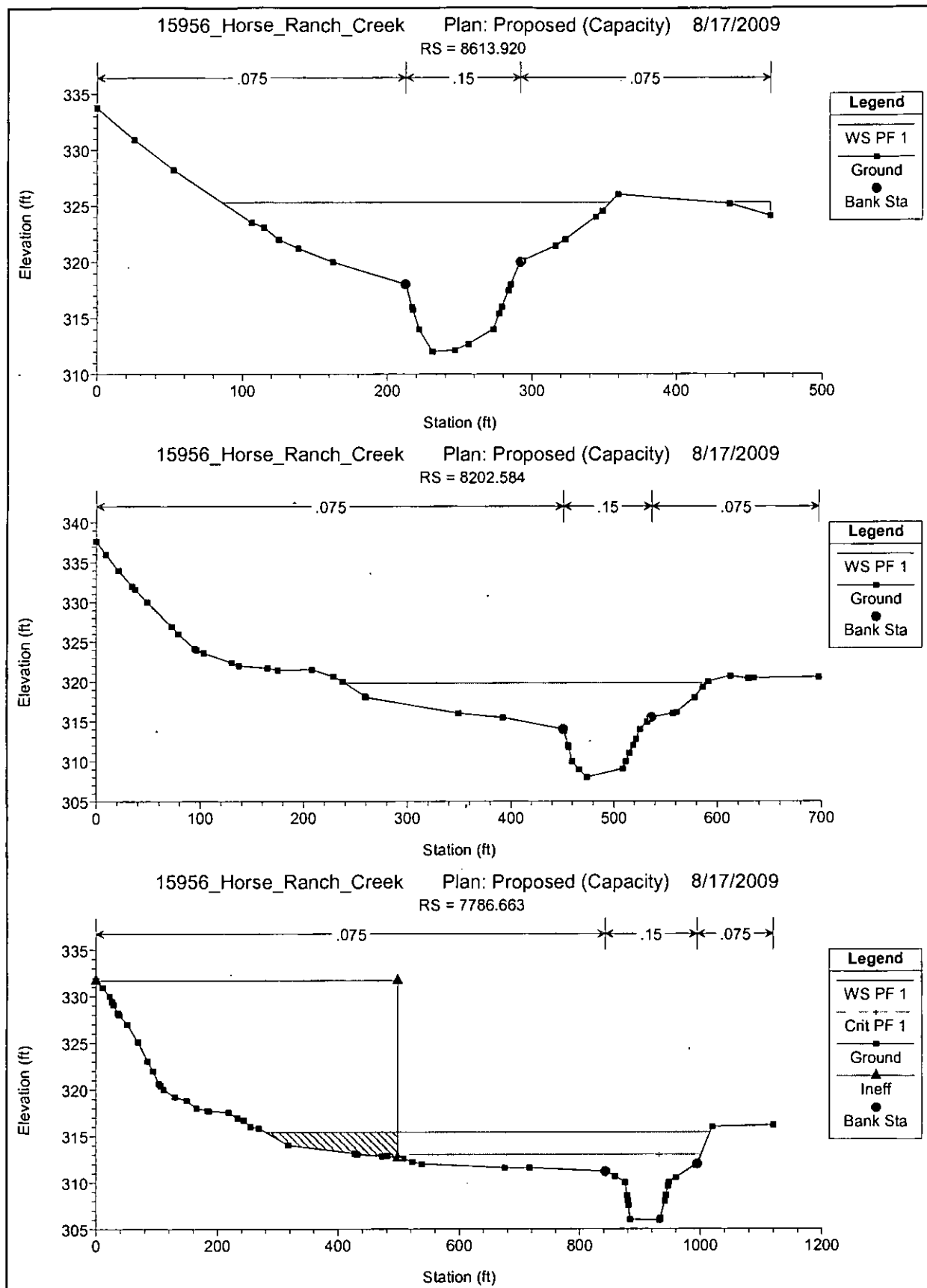
Horse Ranch Creek HEC-RAS Computer Output and HEC-RAS Workmaps (14 Sheets)

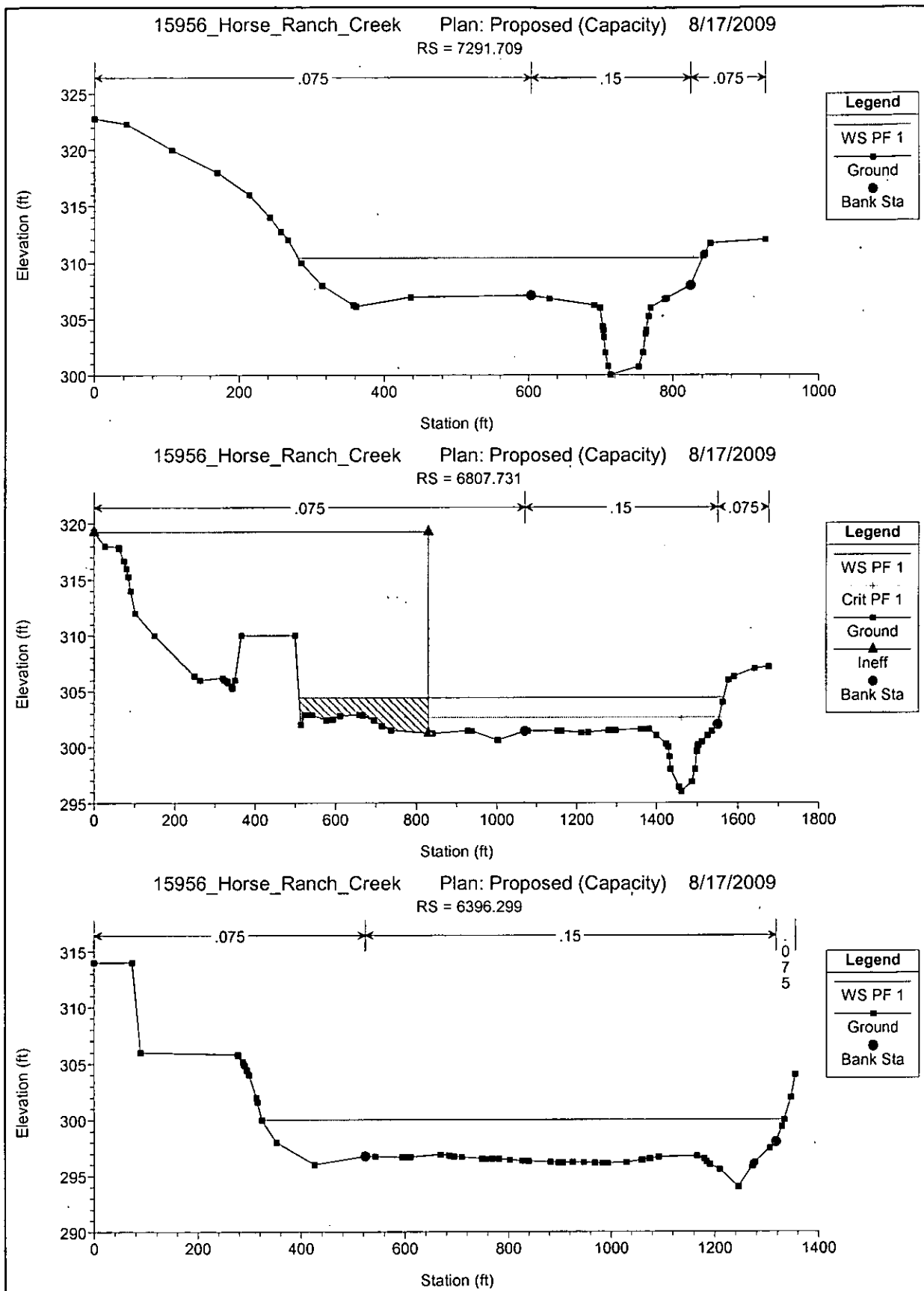
Proposed (Capacity) .p13
 .g10
 .f02

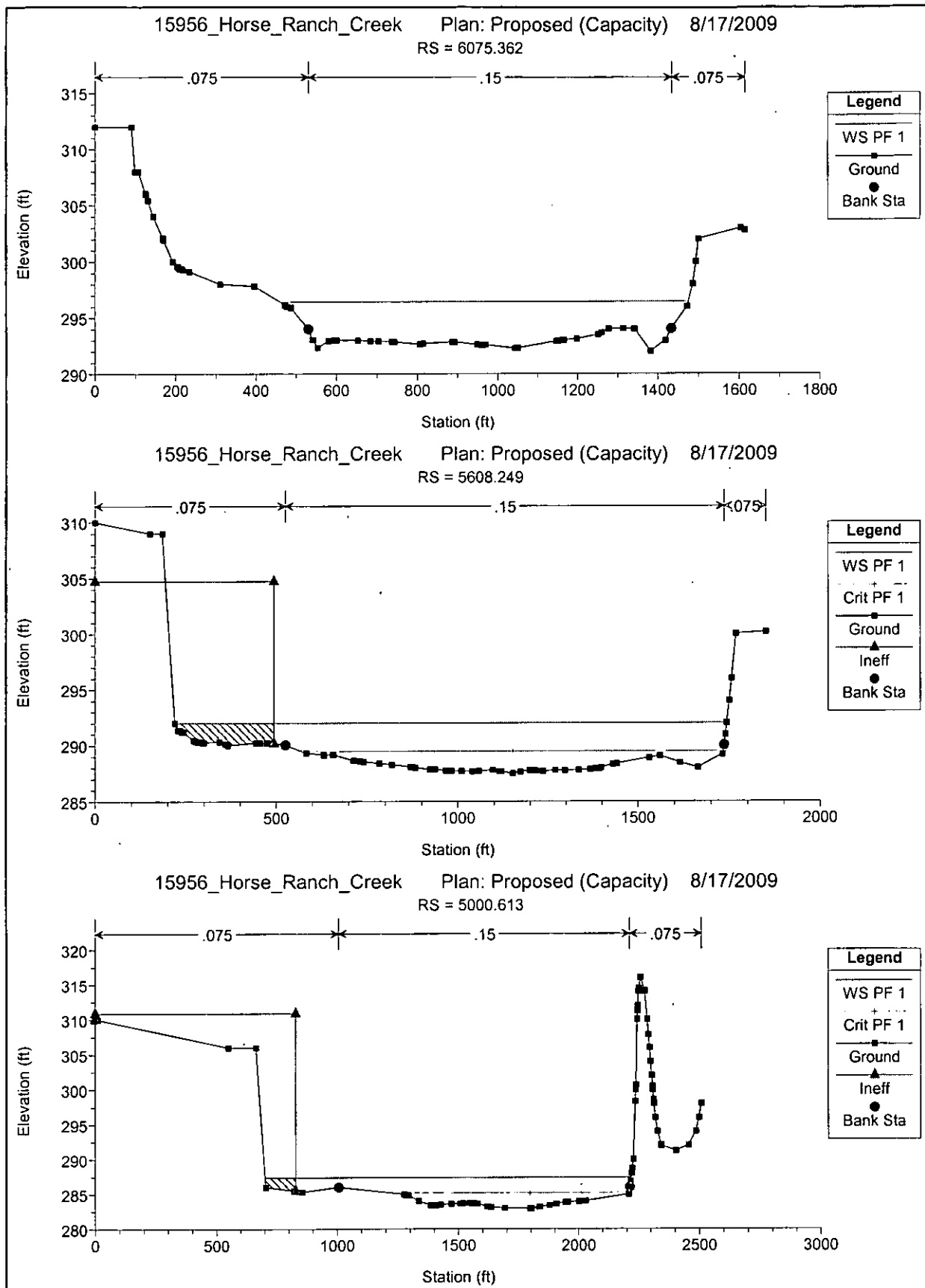
HEC-RAS Plan: Proposed (Cap.) River: HRC Reach: Main Profile: PF 1

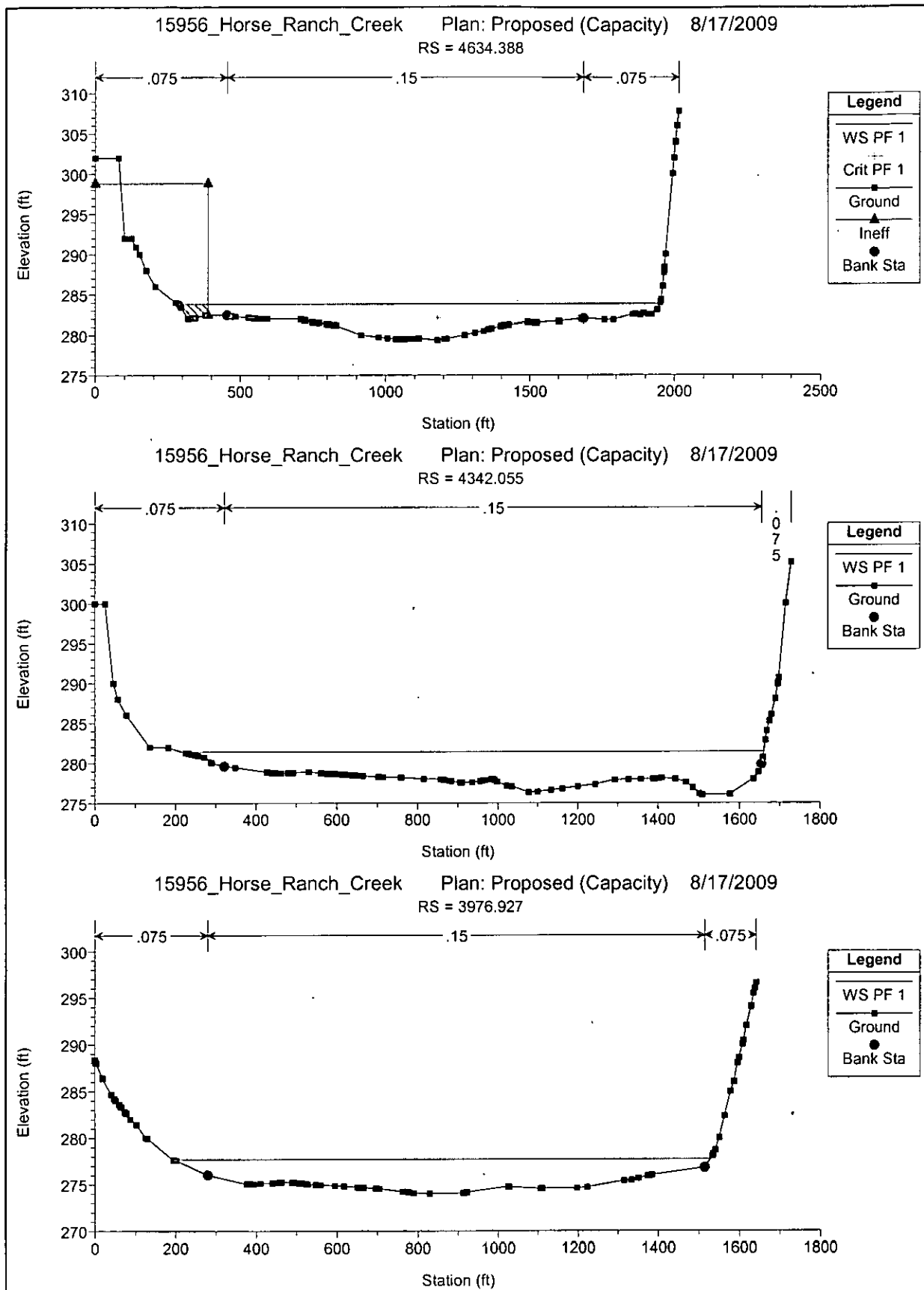
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	9880.091	PF 1	8951.00	325.59	340.41		341.01	0.012289	6.04	1444.11	158.97	0.29
Main	9920.172	PF 1	8951.00	321.13	335.47		336.13	0.015035	6.48	1370.88	162.08	0.32
Main	9911.299	PF 1	8951.00	316.00	329.73		330.09	0.009350	4.94	1871.35	379.83	0.25
Main	8613.920	PF 1	8951.00	312.00	325.30		325.77	0.012744	5.49	1634.85	307.95	0.29
Main	8202.584	PF 1	8951.00	308.00	319.81		320.24	0.014118	5.18	1704.27	348.75	0.30
Main	7786.663	PF 1	8951.00	305.94	315.40	312.98	315.55	0.008571	3.20	2320.63	735.83	0.72
Main	7291.709	PF 1	8951.00	300.00	310.43		310.70	0.011699	3.26	2265.80	558.80	0.25
Main	6807.731	PF 1	8951.00	296.00	304.42	302.81	304.67	0.013376	2.75	2594.85	1056.48	0.25
Main	6396.299	PF 1	8951.00	294.00	300.02		300.14	0.009141	2.24	3520.29	1009.80	0.21
Main	6075.362	PF 1	8951.00	292.00	296.42		296.53	0.014206	2.72	3282.29	1015.44	0.26
Main	5608.249	PF 1	8951.00	287.48	281.99	288.47	292.05	0.006912	1.97	4534.90	1523.28	0.18
Main	5000.813	PF 1	8951.00	282.91	287.39	285.14	287.46	0.008660	2.04	4289.13	1516.78	0.20
Main	4634.388	PF 1	8951.00	279.38	283.80	282.10	283.88	0.011323	2.13	4043.24	1660.55	0.22
Main	4342.055	PF 1	8951.00	278.00	281.38		281.44	0.006413	1.85	4853.59	1444.61	0.17
Main	3976.927	PF 1	8951.00	274.00	277.69		277.79	0.017744	2.59	3469.23	1336.20	0.28
Main	3642.177	PF 1	8951.00	271.44	275.52	273.15	275.57	0.003382	1.32	5749.18	2098.39	0.12
Main	3351.951	PF 1	8951.00	268.75	274.58	271.06	274.62	0.003205	1.51	5953.42	1498.77	0.13
Main	3038.374	PF 1	8951.00	266.96	273.85		273.88	0.001803	1.31	6839.49	1289.27	0.10
Main	2614.242	PF 1	8951.00	263.52	273.53		273.55	0.000422	0.98	9142.34	1190.13	0.06
Main	2033.954	PF 1	8951.00	260.00	273.34		273.35	0.000269	0.98	9375.04	1087.48	0.05
Main	1864.806	PF 1	8951.00	260.00	273.23	265.28	273.27	0.001130	1.54	5821.38	1384.81	0.09
Main	1717.589	PF 1	8951.00	258.00	272.95	265.85	273.07	0.001515	2.71	3302.86	1085.44	0.16
Main	1517.721	PF 1	8951.00	258.00	272.50	263.76	272.84	0.000723	4.76	1962.41	744.68	0.24
Main	1486.171 Pankey Road			Culvert								
Main	1394.093	PF 1	8951.00	258.00	271.80	263.77	272.18	0.000821	5.02	1893.90	710.52	0.26
Main	930.4035	PF 1	8951.00	254.00	271.52	264.80	271.59	0.001070	1.56	4409.38	938.00	0.08
Main	627.7707	PF 1	8951.00	254.00	271.02	265.55	271.12	0.002143	2.39	3849.68	807.21	0.12
Main	561.3247 SR-76			Bridge								
Main	472.6398	PF 1	8951.00	254.00	266.77	264.65	266.91	0.004789	2.90	3037.00	885.45	0.17
Main	167.5697	PF 1	8951.00	252.00	262.26	262.26	263.33	0.059477	9.05	1154.64	629.08	0.58

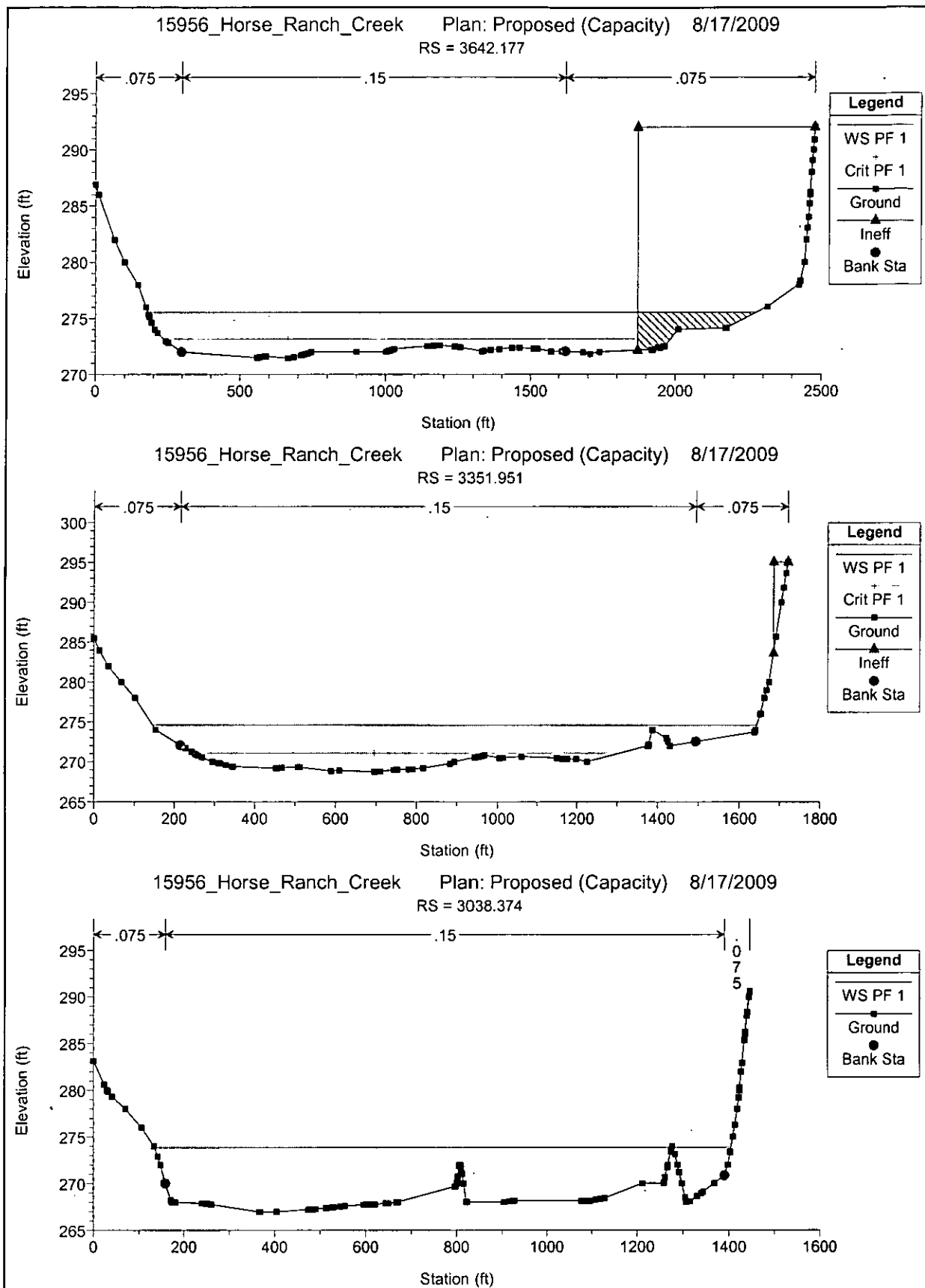


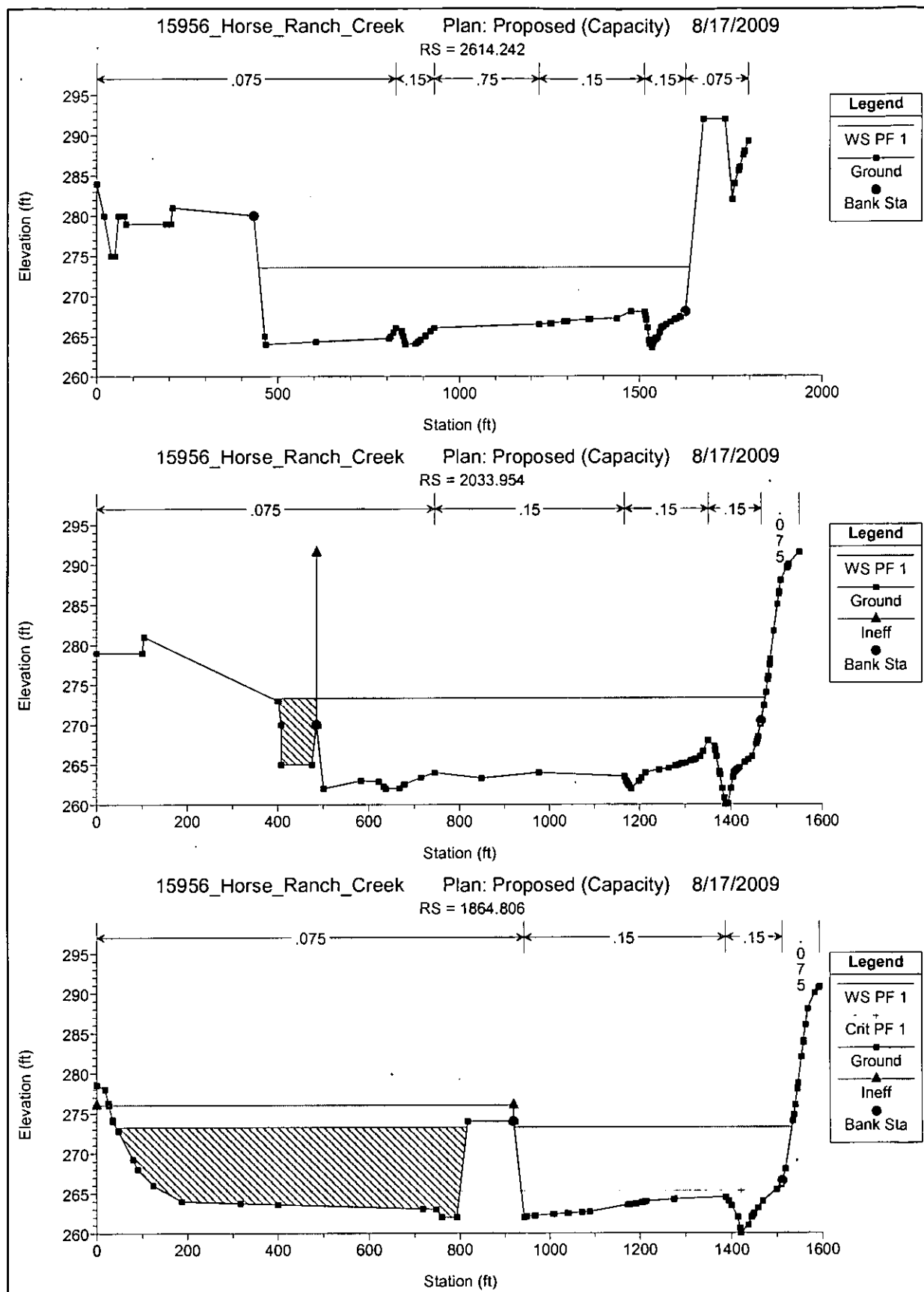


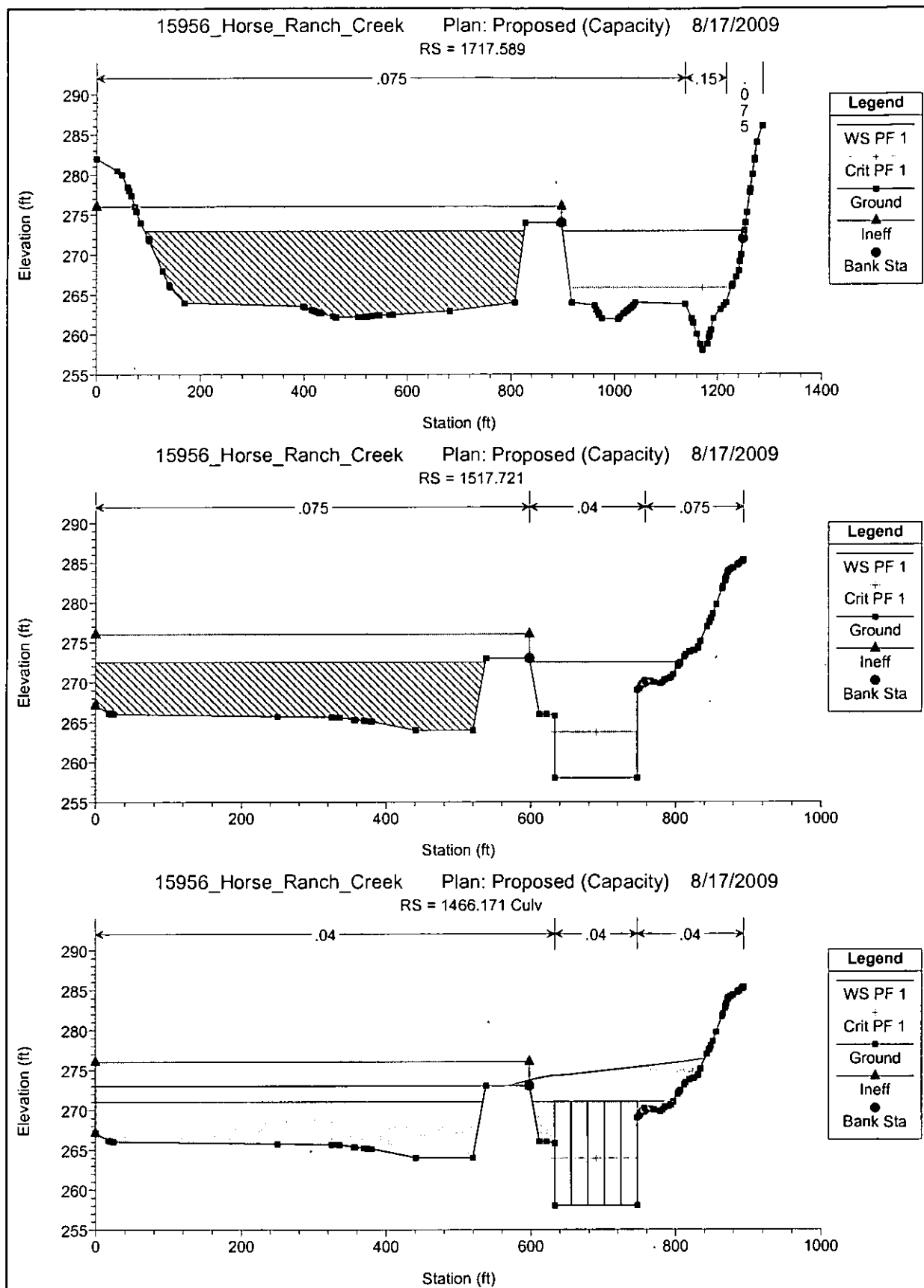


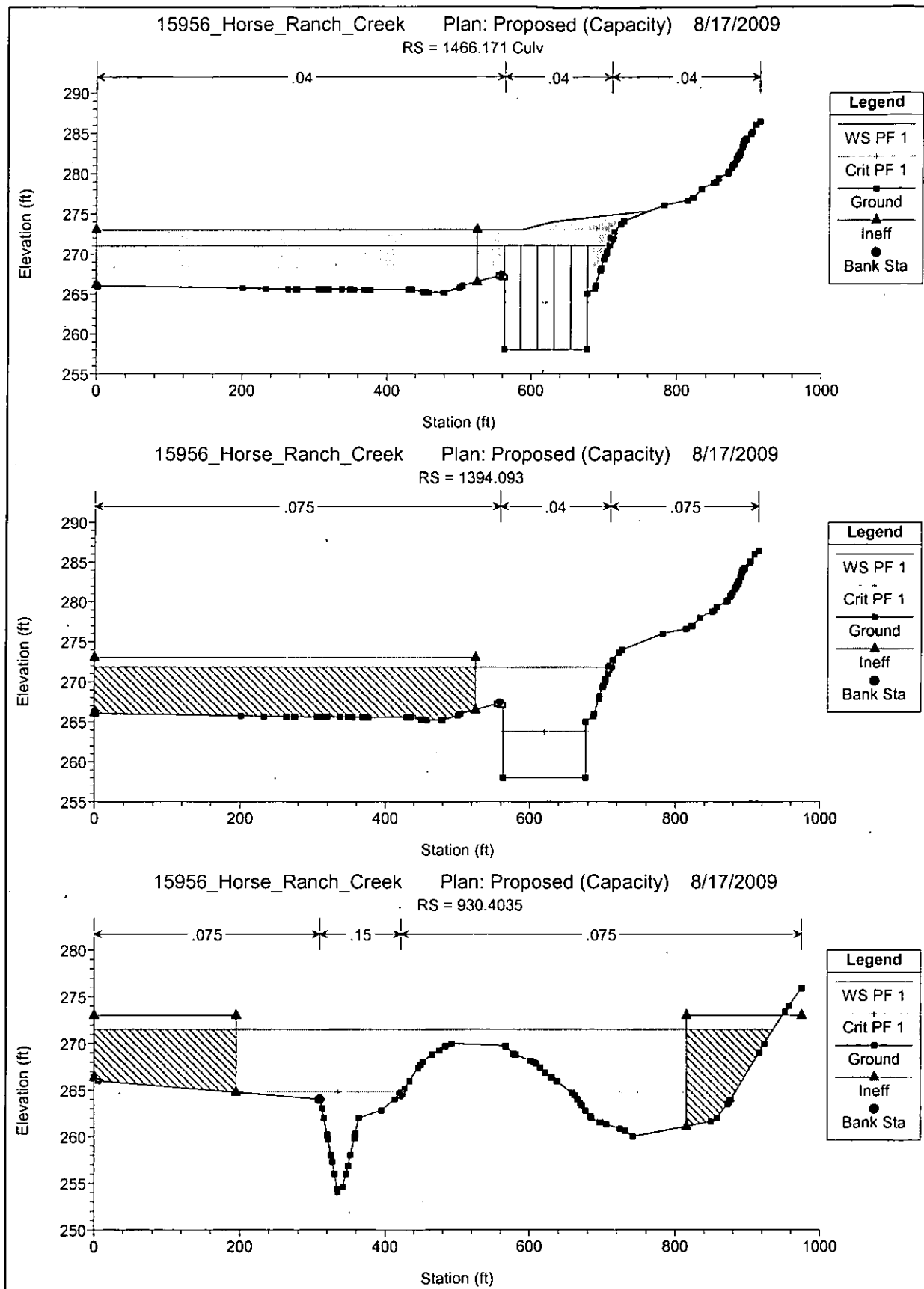


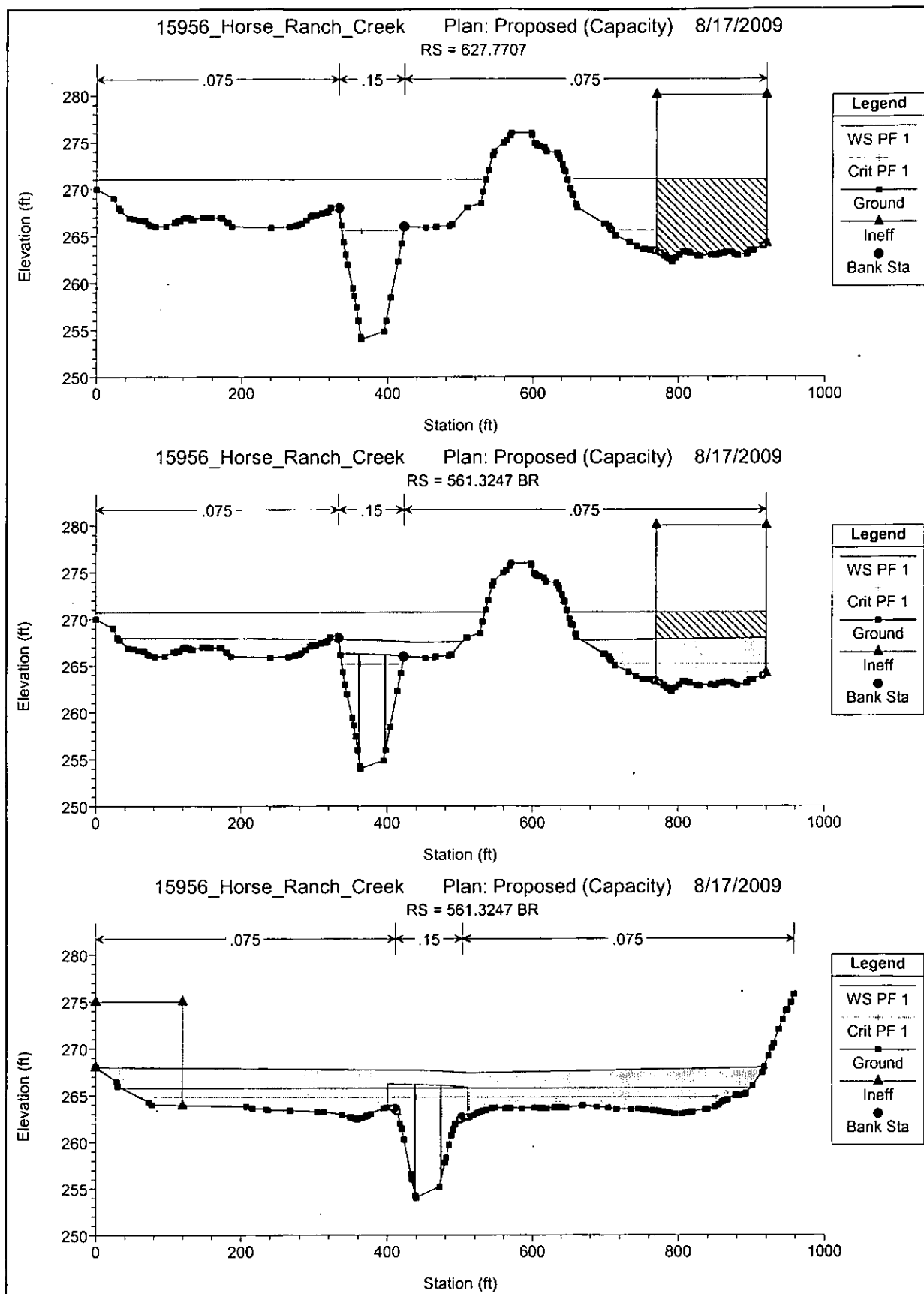




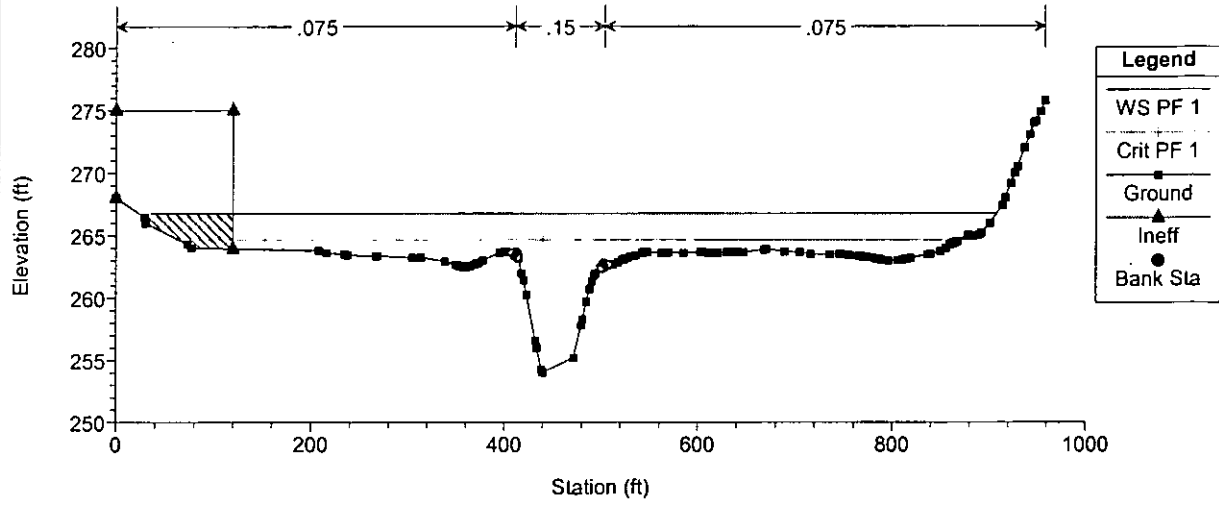




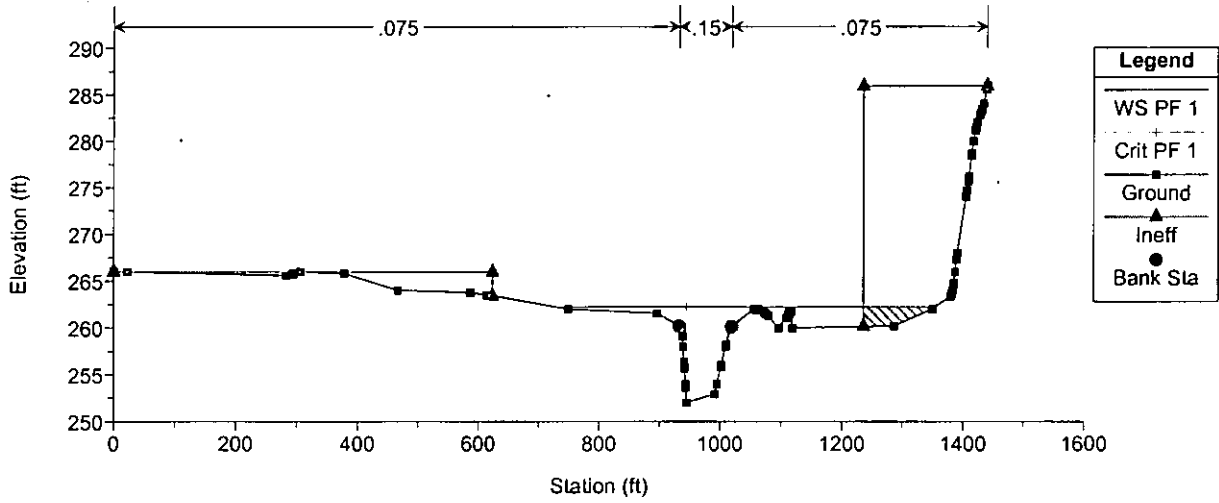




15956_Horse_Ranch_Creek Plan: Proposed (Capacity) 8/17/2009
RS = 472.6398



15956_Horse_Ranch_Creek Plan: Proposed (Capacity) 8/17/2009
RS = 167.5697



Proposed(Capacity).rep

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X   X XXXXXX XXXX XXXX XX XXXX
X   X X      X   X   X   X   X
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PROJECT DATA

Project Title: 15956_Horse_Ranch_Creek
Project File : 15956_Horse_Ranch_C.prj
Run Date and Time: 8/17/2009 11:36:33 AM

Project in English units

PLAN DATA

Plan Title: Proposed (Capacity)

Plan File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.p13

Geometry Title: Proposed (Capacity)

Geometry File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.g10

Flow Title : Existing Condition

Flow File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.f02

Plan Summary Information:

Number of:	Cross Sections = 28	Multiple Openings = 0
	Culverts = 1	Inline Structures = 0
	Bridges = 1	Lateral Structures = 0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Existing Condition

Flow File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.f02

Flow Data (cfs)

River	Reach	RS	PF 1
HRC	Main	9880.091	8951

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
HRC	Main	PF 1		Known WS = 259.19

Proposed(Capacity).rep

GEOMETRY DATA

Geometry Title: Proposed (Capacity)

Geometry File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.g10

CROSS SECTION

RIVER: HRC
REACH: Main RS: 9880.091

INPUT

Description:

Station Elevation Data				num=	45
Sta	Elev	Sta	Elev	Sta	Elev
0	356.21	4.96	356.15	7.11	356.17
24.55	355.05	26.43	354	29.57	352.07
47.48	340	49.52	338.74	50.76	338
56.63	334	72.44	332	74	331.38
82.01	328	89.13	326.01	89.15	326
119.75	325.67	130.98	326	133.59	326.84
142.71	330	143.48	330.29	148.95	332
173.83	334.08	184.94	336	201.56	340
232.93	346.83	236	346.82	242.62	347.33

Manning's n values				num=	3
Sta	n val	Sta	n val	Sta	n val
0	.075	72.44	.15	148.95	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	72.44	148.95		362.17	359.92	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Left OB	Channel	Right OB
E.G. Elev (ft)	341.01			
Vel Head (ft)	0.60	0.075	0.150	0.075
W.S. Elev (ft)	340.41	362.17	359.92	357.61
Crit W.S. (ft)		147.65	1012.43	284.03
E.G. Slope (ft/ft)	0.012289	147.65	1012.43	284.03
Q Total (cfs)	8951.00	991.16	6110.43	1849.41
Top Width (ft)	156.97	25.58	76.51	54.88
Vel Total (ft/s)	6.20	6.71	6.04	6.51
Max Chl Dpth (ft)	14.82	5.77	13.23	5.18
Conv. Total (cfs)	80744.3	8941.0	55120.3	16683.0
Length Wtd. (ft)	359.70	27.63	78.58	55.64
Min Ch El (ft)	325.59	4.10	9.88	3.92
Alpha	1.01	27.52	59.66	25.50
Frctn Loss (ft)	4.88	197.11	679.31	29.81
C & E Loss (ft)	0.01	55.42	143.14	23.81

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 9520.172

INPUT

Description:

Station Elevation Data				num=	44
Sta	Elev	Sta	Elev	Sta	Elev
0	344.54	.81	344	3.72	342.5
21.68	340.32	37.49	340.67	46.74	340.79
65.73	341.29	71.62	341.04	74.39	340
90.72	330	106.28	328.1	106.87	328.02
108.16	327.32	110.33	326	114.19	324.48
119.46	322.39	120.45	322	135.74	321.13
170.19	323.02	173.28	324	177.73	325.52
183.68	328	186.95	328.26	202.47	329.1
247.15	336	258.84	338	294.35	338.28

Manning's n values				num=	3
Sta	n val	Sta	n val	Sta	n val
0	.075	107.07	.15	183.68	.075

Proposed(Capacity).rep
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 107.07 183.68 509.29 508.87 507.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	336.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	335.47	Reach Len. (ft)	509.29	508.87	507.92
Crit W.S. (ft)		Flow Area (sq ft)	130.06	974.14	266.46
E.G. Slope (ft/ft)	0.015035	Area (sq ft)	130.06	974.14	266.46
Q Total (cfs)	8951.00	Flow (cfs)	903.09	6312.92	1734.99
Top width (ft)	162.06	Top width (ft)	25.25	76.61	60.20
Vel Total (ft/s)	6.53	Avg. Vel. (ft/s)	6.94	6.48	6.51
Max Chl Dpth (ft)	14.34	Hydr. Depth (ft)	5.15	12.72	4.43
Conv. Total (cfs)	73000.0	Conv. (cfs)	7365.2	51485.1	14149.7
Length wtd. (ft)	508.81	Wetted Per. (ft)	26.92	79.05	60.73
Min Ch El (ft)	321.13	Shear (lb/sq ft)	4.54	11.57	4.12
Alpha	1.00	Stream Power (lb/ft s)	31.49	74.96	26.82
Frctn Loss (ft)	5.95	Cum Volume (acre-ft)	195.96	671.11	27.55
C & E Loss (ft)	0.09	Cum SA (acres)	55.21	142.51	23.34

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 9011.299

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	336.94	9.18	336.39	14.2	336	40	334.87	49.9	334.54
102.26	332.33	111.98	331.67	130.58	330	157.67	328	224.45	325.23
263.55	324	302.4	322.04	302.96	322	303.1	321.92	306.6	320
306.69	319.96	311.11	318	318.04	317.21	329.24	316.74	339.93	316
358.86	317.25	363.21	318	366.57	319.66	367.27	320	368.19	320.29
373.15	322	386.2	323.95	386.47	324	411.5	326	431.87	328
432.2	328.03	450.45	330	482.96	329.85	553.75	328.1		

Manning's n	Val	Sta	n Val	Sta	n Val
0	.075	302.96	.15	373.15	.075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 302.96 373.15 397.35 397.38 397.4 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	330.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	329.73	Reach Len. (ft)	397.35	397.38	397.40
Crit W.S. (ft)		Flow Area (sq ft)	693.78	845.77	331.81
E.G. Slope (ft/ft)	0.009350	Area (sq ft)	693.78	845.77	331.81
Q Total (cfs)	8951.00	Flow (cfs)	3408.21	4182.15	1360.64
Top width (ft)	379.83	Top width (ft)	168.76	70.19	140.88
Vel Total (ft/s)	4.78	Avg. Vel. (ft/s)	4.91	4.94	4.10
Max Chl Dpth (ft)	13.73	Hydr. Depth (ft)	4.11	12.05	2.36
Conv. Total (cfs)	92569.3	Conv. (cfs)	35247.0	43250.8	14071.5
Length wtd. (ft)	397.37	Wetted Per. (ft)	168.95	72.11	142.95
Min Ch El (ft)	316.00	Shear (lb/sq ft)	2.40	6.85	1.35
Alpha	1.01	Stream Power (lb/ft s)	11.78	33.85	5.56
Frctn Loss (ft)	4.31	Cum Volume (acre-ft)	191.14	660.48	24.06
C & E Loss (ft)	0.01	Cum SA (acres)	54.07	141.65	22.17

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 8613.920

Proposed(Capacity).rep

INPUT

Description:

Station Elevation Data			num= 33								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	333.75	25.42	330.91	52.61	328.22	106.39	323.51	114.81	323.07		
125.21	322	138.89	321.2	162.54	320	212.46	318.02	212.81	318		
212.94	317.99	216.92	316	217.53	315.76	222.01	314	231.08	312.03		
231.23	312	246.79	312.15	256.03	312.67	273.22	314	277.14	315.39		
278.95	316	283.59	317.47	285.07	318	291.44	319.92	291.7	320		
293.5	320.12	316.25	321.42	323.14	322	344.11	324	348.85	324.55		
359.68	326	436.39	325.17	464.29	324.1						

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.075	212.46	.15	291.7	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	212.46	291.7		411.22	411.34	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Left OB	Channel	Right OB
E.G. Elev (ft)	325.77	0.075	0.150	0.075
Vel Head (ft)	0.47	411.22	411.34	411.42
W.S. Elev (ft)	325.30	539.22	884.30	211.33
Crit W.S. (ft)		539.22	884.30	211.33
E.G. Slope (ft/ft)	0.012744	3167.16	4853.68	930.16
Q Total (cfs)	8951.00	126.46	79.24	102.25
Top Width (ft)	307.95	5.87	5.49	4.40
Vel Total (ft/s)	5.48	4.26	11.16	2.07
Max Chl Dpth (ft)	13.30	28056.0	42995.9	8239.7
Conv. Total (cfs)	79291.6	126.70	81.32	103.71
Length Wtd. (ft)	411.30	3.39	8.65	1.62
Min Ch El (ft)	312.00	19.89	47.48	7.14
Alpha	1.02	185.52	652.59	21.58
Frctn Loss (ft)	5.51	52.73	140.97	21.06
C & E Loss (ft)	0.01			

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC

REACH: Main

RS: 8202.584

INPUT

Description:

Station Elevation Data			num= 49								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	337.64	9.17	336	21.22	333.98	34.47	332	37.4	331.61		
48.71	330	72.47	326.93	78.8	326	95.05	324.15	96.69	324		
103.57	323.6	130.55	322.37	137.26	322	164.95	321.7	175.03	321.44		
208.09	321.51	228.99	320.63	237.64	320	259.04	318.14	259.94	318.05		
260.29	318	349.37	316	392	315.49	450.96	314.01	451.29	314		
451.32	313.99	451.72	313.81	455.88	312	456.33	311.75	459.56	310		
466.29	308.95	473.81	308	508.45	309.04	511.72	310	515.27	311.01		
518.81	312	521.48	312.77	525.43	314	532.6	314.95	536.95	315.52		
557.15	316	560.91	316.12	578.25	318	585.96	319.3	590.94	320		
612.59	320.72	629.46	320.39	634.67	320.46	697.35	320.58				

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.075	450.96	.15	536.95	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	450.96	536.95		422.86	415.92	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Left OB	Channel	Right OB
E.G. Elev (ft)	320.24	0.075	0.150	0.075
Vel Head (ft)	0.43	422.86	415.92	415.91
W.S. Elev (ft)	319.81	739.99	810.86	153.42
Crit W.S. (ft)		739.99	810.86	153.42
E.G. Slope (ft/ft)	0.014118			

		Proposed(Capacity).rep			
Q Total (cfs)	8951.00	Flow (cfs)	4017.87	4198.50	734.63
Top Width (ft)	349.75	Top Width (ft)	211.12	85.99	52.63
Vel Total (ft/s)	5.25	Avg. Vel. (ft/s)	5.43	5.18	4.79
Max Chl Dpth (ft)	11.81	Hydr. Depth (ft)	3.50	9.43	2.91
Conv. Total (cfs)	75333.2	Conv. (cfs)	33815.1	35335.3	6182.8
Length wtd. (ft)	419.67	wetted Per. (ft)	211.25	87.88	52.89
Min Ch El (ft)	308.00	Shear (lb/sq ft)	3.09	8.13	2.56
Alpha	1.00	Stream Power (lb/ft s)	16.76	42.11	12.24
Frctn Loss (ft)	4.55	Cum Volume (acre-ft)	179.48	644.58	19.86
C & E Loss (ft)	0.05	Cum SA (acres)	51.13	140.19	20.33

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 7786.663

INPUT

Description:

Station Elevation Data		num=	56								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	331.69	11.02	330.91	22.23	330	26.19	329.45	26.37	329.42		
28.6	329.11	35.86	328.21	37.16	328.04	37.84	328	51.59	326.98		
69.38	325.11	84.66	323.06	93.55	322	103.27	320.63	106.28	320.42		
110.71	320	129.88	319.22	149.8	318.82	165.77	318	183.5	317.76		
186.38	317.67	218.7	317.54	233.45	316.95	243.56	316.72	254.77	316		
268.71	315.85	317.55	314	427.38	313.11	431.73	313.02	472.42	312.81		
481.42	312.86	502.06	312.58	508.03	312.57	522.58	312.23	538.07	312		
675.31	311.58	716.14	311.57	843.24	311.17	858.72	310.66	875.86	310		
878.94	308.6	880.25	308	881.12	307.55	884.05	306	932.62	305.94		
933.7	306	934.43	306.18	941.88	308	943.78	308.62	946.86	309.62		
948.07	310	959.93	310.5	992.77	311.88	995.49	312	1020.18	315.99		
1119.98	316.17										

Manning's n Values		num=	3			
Sta	n val	Sta	n val	Sta	n val	
0	.075	843.24	.15	995.49	.075	

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
843.24	995.49	499.23	494.95	494.98	.1	.3

Ineffective Flow		num=	1	
Sta L	Sta R	Elev	Permanent	
0	498.54	331.69	44	

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	315.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	wt. n-val.	0.075	0.150	0.075
W.S. Elev (ft)	315.40	Reach Len. (ft)	499.23	494.95	494.98
Crit W.S. (ft)	312.99	Flow Area (sq ft)	1283.90	1001.03	35.70
E.G. Slope (ft/ft)	0.008571	Area (sq ft)	1691.50	1001.03	35.70
Q Total (cfs)	8951.00	Flow (cfs)	5658.33	3200.27	92.40
Top Width (ft)	735.83	Top width (ft)	562.56	152.25	21.02
Vel Total (ft/s)	3.86	Avg. Vel. (ft/s)	4.41	3.20	2.59
Max Chl Dpth (ft)	9.46	Hydr. Depth (ft)	3.72	6.57	1.70
Conv. Total (cfs)	96686.7	Conv. (cfs)	61120.0	34568.6	998.1
Length wtd. (ft)	497.51	wetted Per. (ft)	344.71	153.80	21.29
Min Ch El (ft)	305.94	Shear (lb/sq ft)	1.99	3.48	0.90
Alpha	1.08	Stream Power (lb/ft s)	8.78	11.13	2.32
Frctn Loss (ft)	4.95	Cum Volume (acre-ft)	167.68	635.93	18.96
C & E Loss (ft)	0.00	Cum SA (acres)	47.38	139.05	19.98

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 7291.709

Proposed(Capacity).rep

INPUT

Description:

Station Elevation Data			num= 37								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	322.78	43.82	322.32	106.82	320	169.28	318	213.37	316		
242.23	314	257.51	312.71	267.74	312	285.6	310	314.77	308		
357.38	306.24	358.01	306.21	361.56	306.13	436.69	306.95	603.43	307.09		
629.13	306.82	691.4	306.22	699.32	306	703.12	304.33	703.98	304		
704.72	303.39	706.61	302	710.55	300.78	713.85	300	753.05	300.72		
759.22	302	762.58	303.68	763.23	304	766.88	305.23	769.47	306		
789.25	306.73	791.66	306.82	824.52	308	841.79	310.62	843.72	310.75		
851.19	311.67	926.57	311.98								

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.075	603.43	.15	824.52	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	603.43	824.52		480.67	483.98	485.99	.1
							.3

CROSS SECTION OUTPUT Profile #PF 1

		Left OB	Channel	Right OB
E.G. Elev (ft)	310.70	0.075	0.150	0.075
Vel Head (ft)	0.27			
W.S. Elev (ft)	310.43	480.67	483.98	485.99
Crit W.S. (ft)		1062.63	1183.69	19.48
E.G. Slope (ft/ft)	0.011699	1062.63	1183.69	19.48
Q Total (cfs)	8951.00	5049.38	3854.42	47.20
Top width (ft)	558.80	321.68	221.09	16.03
Vel Total (ft/s)	3.95	4.75	3.26	2.42
Max Chl Dpth (ft)	10.43	3.30	5.35	1.22
Conv. Total (cfs)	82755.4	46683.4	35635.6	436.4
Length wtd. (ft)	482.32	321.82	223.42	16.21
Min Ch El (ft)	300.00	2.41	3.87	0.88
Alpha	1.11	11.46	12.60	2.13
Frctn Loss (ft)	6.03	151.89	623.52	18.64
C & E Loss (ft)	0.01	42.31	136.93	19.77

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main

RS: 6807.731

INPUT

Description:

Station Elevation Data			num= 76								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	319.25	27.12	318	60.91	317.89	61.89	317.79	73.41	316.69		
79.96	316	84.77	315.27	90.52	314	101.51	312	148.64	310		
248.87	306.38	263.31	306	318.83	306.2	319.45	306.19	323.87	306		
330.08	305.92	330.66	305.89	332.54	305.77	341.39	305.44	343.79	305.27		
350	306	366	310	500	310	514	302	524.29	302.87		
525.73	302.88	541.42	302.87	577.25	302.4	592.63	302.46	611.19	302.79		
658.39	302.89	666.97	302.85	694.75	302.4	714.87	301.86	738.03	301.49		
840.87	301.19	928.04	301.44	938.93	301.41	1001.51	300.62	1003.45	300.61		
1070.96	301.4	1076.9	301.42	1152.88	301.45	1160.52	301.44	1162.72	301.43		
1212.27	301.28	1229.38	301.29	1279.44	301.47	1282.73	301.48	1287.13	301.47		
1297.55	301.48	1361.17	301.59	1374.41	301.58	1381.5	301.6	1400	301.029		
1424.57	300.27	1429.66	300	1431.96	299.13	1434.99	298	1456.03	296.4		
1461.39	296	1487.48	296.88	1494.85	298	1499.39	299.57	1500.54	300		
1502.06	300.17	1503.54	300.18	1511.77	300.44	1526.07	301.01	1536.03	301.4		
1551.01	302	1563.3	304	1577.18	306	1590.67	306.28	1641.78	307.02		
1676.45	307.17										

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.075	1070.96	.15	1551.01	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	1070.96	1551.01		406.99	411.43	413.61	.1
							.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	830.34	19.2468	F

Proposed(Capacity).rep

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	304.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	304.42	Reach Len. (ft)	406.99	411.43	413.61
Crit W.S. (ft)	302.61	Flow Area (sq ft)	789.08	1787.65	18.12
E.G. Slope (ft/ft)	0.013376	Area (sq ft)	1500.51	1787.65	18.12
Q Total (cfs)	8951.00	Flow (cfs)	3990.78	4913.98	46.24
Top width (ft)	1056.48	Top width (ft)	561.20	480.05	15.23
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)	5.06	2.75	2.55
Max Chl Dpth (ft)	8.42	Hydr. Depth (ft)	3.28	3.72	1.19
Conv. Total (cfs)	77395.2	Conv. (cfs)	34506.5	42488.9	399.8
Length wtd. (ft)	409.85	Wetted Per. (ft)	240.63	481.00	15.42
Min Ch El (ft)	296.00	Shear (lb/sq ft)	2.74	3.10	0.98
Alpha	1.31	Stream Power (lb/ft s)	13.85	8.53	2.50
Frctn Loss (ft)	4.49	Cum Volume (acre-ft)	137.75	607.01	18.43
C & E Loss (ft)	0.04	Cum SA (acres)	37.44	133.04	19.59

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 6396.299

INPUT

Description:

Station Elevation Data		num=	66												
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	314	73	314	89	306	277.24	305.81	278.19	305.73						
286.73	305.17	289.24	304.94	291.25	304.81	295.06	304.43	295.69	304.38						
299.28	304	313.26	302	315.42	301.59	324.16	300	352.16	298						
425.63	296	524.04	296.73	542.75	296.71	594.32	296.65	606.29	296.66						
610.77	296.67	668.64	296.88	684.92	296.82	688.41	296.77	695.08	296.71						
709.83	296.68	748.61	296.53	755.97	296.48	768.55	296.53	781.56	296.51						
802.55	296.41	826.96	296.33	839.54	296.32	882.23	296.22	897.7	296.18						
906.6	296.17	924.71	296.21	925.42	296.2	947.19	296.19	968.88	296.14						
983.13	296.13	993.38	296.12	1030.11	296.19	1059.02	296.38	1061.06	296.41						
1074.77	296.52	1076.31	296.51	1093.06	296.67	1166.17	296.77	1179.92	296.53						
1184.29	296.25	1190.65	296.01	1190.88	296	1209.25	295.58	1245.57	294						
1272.1	295.85	1272.98	295.95	1273.22	296	1274.04	296.05	1277.3	296.19						
1305.44	297.45	1317.7	298	1329.37	299.38	1333.76	300	1347.21	302						
1355.3	304														

Manning's n values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	524.04	.15	1317.7	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	524.04	1317.7		314.29	320.94	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	300.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	300.02	Reach Len. (ft)	314.29	320.94	323.63
Crit W.S. (ft)		Flow Area (sq ft)	609.47	2893.90	16.92
E.G. Slope (ft/ft)	0.009141	Area (sq ft)	609.47	2893.90	16.92
Q Total (cfs)	8951.00	Flow (cfs)	2426.00	6492.15	32.85
Top width (ft)	1009.80	Top width (ft)	199.97	793.66	16.17
Vel Total (ft/s)	2.54	Avg. Vel. (ft/s)	3.98	2.24	1.94
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)	3.05	3.65	1.05
Conv. Total (cfs)	93620.5	Conv. (cfs)	25374.1	67902.8	343.6
Length wtd. (ft)	320.00	Wetted Per. (ft)	200.07	793.84	16.30
Min Ch El (ft)	294.00	Shear (lb/sq ft)	1.74	2.08	0.59
Alpha	1.23	Stream Power (lb/ft s)	6.92	4.67	1.15
Frctn Loss (ft)	3.60	Cum Volume (acre-ft)	127.90	584.90	18.27
C & E Loss (ft)	0.00	Cum SA (acres)	33.88	127.02	19.44

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 6075.362

INPUT

Description:

Station Elevation Data			num= 75			Station Elevation Data			num= 75		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	312	90	312	98	308	106.29	308	123.42	306.1		
123.9	306.05	124.33	306	129.31	305.46	129.67	305.43	143.05	304		
167.44	302.1	168.61	302	169.45	301.92	192.55	300	204.13	299.57		
205.95	299.48	210	299.37	213.35	299.38	217.37	299.26	233.63	299.13		
310.77	298	395.4	297.83	471.38	296.16	471.59	296.15	476.16	296		
485.7	295.94	487.81	295.86	530.36	294	540.64	293.03	542.15	293.05		
553.28	292.32	580.29	292.94	594.44	293.01	600.52	293	652.42	292.97		
684.09	292.92	703.87	292.91	736.68	292.86	739.05	292.85	741.84	292.84		
743.88	292.83	805.83	292.64	814.96	292.7	886.8	292.83	887.65	292.84		
892.02	292.83	892.79	292.82	948.52	292.61	958.56	292.58	968.79	292.59		
1042.22	292.27	1045.04	292.28	1047.81	292.29	1049.52	292.3	1147	292.89		
1149.82	292.83	1156.42	292.95	1162.27	292.98	1166.02	292.99	1198.25	293.1		
1251.39	293.49	1259.79	293.65	1277.47	294	1313.68	294.02	1341.08	294		
1342.55	293.97	1382.04	292	1418.66	292.95	1433.31	294	1472.16	296		
1485.82	298	1493.44	300	1499.39	302	1603.68	302.96	1613.71	302.79		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	530.36	.15	1433.31	.075

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
530.36	1433.31	433.42	467.11	451.66	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	296.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	296.42	Reach Len. (ft)	433.42	467.11	451.66
Crit W.S. (ft)		Flow Area (sq ft)	71.90	3164.65	55.74
E.G. Slope (ft/ft)	0.014206	Area (sq ft)	71.90	3164.65	55.74
Q Total (cfs)	8951.00	Flow (cfs)	171.52	8620.03	159.45
Top Width (ft)	1015.44	Top Width (ft)	70.77	902.95	41.71
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)	2.39	2.72	2.86
Max Chl Dpth (ft)	4.42	Hydr. Depth (ft)	1.02	3.50	1.34
Conv. Total (cfs)	75100.1	Conv. (cfs)	1439.0	72323.2	1337.8
Length wtd. (ft)	466.35	Wetted Per. (ft)	70.82	903.14	41.79
Min Ch El (ft)	292.00	Shear (lb/sq ft)	0.90	3.11	1.18
Alpha	1.00	Stream Power (lb/ft s)	2.15	8.46	3.38
Frcn Loss (ft)	4.47	Cum volume (acre-ft)	125.44	562.58	18.00
C & E Loss (ft)	0.02	Cum SA (acres)	32.91	120.77	19.23

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 5608.249

INPUT

Description:

Station Elevation Data			num= 87			Station Elevation Data			num= 87		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	310	150	309	185	309	219	292	228.53	291.35		
230.1	291.32	234.28	291.34	238.95	291.21	243.58	291.16	270.57	290.47		
272.31	290.45	273.92	290.41	275.83	290.39	277.5	290.35	278.51	290.34		
284.8	290.32	286.12	290.29	292.43	290.28	292.85	290.27	294.5	290.28		
296.25	290.25	297.85	290.28	298.73	290.26	342.65	290.32	359.58	290.13		
365.9	290	444.19	290.2	445.04	290.19	454.2	290.21	454.79	290.2		
473.92	290.2	474.49	290.19	489.86	290.17	491.48	290.18	525.71	290.03		
526.97	290	582.95	289.32	630.38	289.15	631.7	289.13	655.87	289.18		
657.9	289.14	713	288.63	729.88	288.6	740.29	288.53	783.7	288.37		
817.65	288.28	868.94	288.08	873.71	288.06	882.22	288	922.44	287.85		
936.64	287.84	965.86	287.75	982.45	287.72	1009.77	287.71	1039.27	287.68		
1057.13	287.7	1095.93	287.81	1114.77	287.68	1119.12	287.67	1151.17	287.48		

Proposed(Capacity).rep									
1173.21	287.63	1198.58	287.76	1205.59	287.79	1210.81	287.77	1217.18	287.73
1236.51	287.68	1269.95	287.79	1296.84	287.77	1336.42	287.8	1368.19	287.88
1381.79	287.93	1392.34	287.94	1397.83	288	1430.1	288.31	1440.6	288.36
1531.54	288.88	1561.02	289.05	1615.53	288.45	1664.74	288	1731.48	289.18
1736	290	1739.23	290.97	1742.52	292	1749.96	294	1756.3	296
1768.31	300	1849.97	300.17						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .075 525.71 .15 1736 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 525.71 1736 386.8 607.64 624.67 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 493.25304.7255 F

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	292.05	Wt. n-Val.	0.075	0.150	0.075
Vel Head (ft)	0.06	Reach Len. (ft)	386.80	607.64	624.67
W.S. Elev (ft)	291.99	Flow Area (sq ft)	61.20	4467.19	6.50
Crit W.S. (ft)	289.47	Area (sq ft)	505.57	4467.19	6.50
E.G. Slope (ft/ft)	0.006912	Flow (cfs)	153.86	8786.72	10.42
Q Total (cfs)	8951.00	Top width (ft)	306.51	1210.29	6.48
Top width (ft)	1523.28	Avg. Vel. (ft/s)	2.51	1.97	1.60
Vel Total (ft/s)	1.97	Hydr. Depth (ft)	1.89	3.69	1.00
Max Chl Dpth (ft)	4.51	Conv. (cfs)	1850.6	105684.2	125.3
Conv. Total (cfs)	107660.1	Wetted Per. (ft)	32.46	1210.40	6.78
Length Wtd. (ft)	595.22	Shear (lb/sq ft)	0.81	1.59	0.41
Min Ch El (ft)	287.48	Stream Power (lb/ft s)	2.05	3.13	0.66
Alpha	1.00	Cum Volume (acre-ft)	122.56	521.67	17.67
Frctn Loss (ft)	4.59	Cum SA (acres)	31.03	109.44	18.98
C & E Loss (ft)	0.00				

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 5000.613

INPUT

Description:

Station Elevation Data num= 77									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	310	9.72	310	550	306	665	306	705	286
821.72	285.46	855.28	285.31	1006.28	286	1276.91	284.96	1283.72	284.88
1289.31	284.85	1294.53	284.78	1335.39	284	1385.05	283.4	1396.08	283.36
1408.04	283.37	1425.23	283.46	1426.93	283.48	1470.24	283.59	1471.38	283.58
1508.02	283.63	1518.24	283.66	1546.32	283.71	1547.37	283.7	1562.72	283.69
1578.16	283.65	1618.18	283.24	1634.68	283.11	1635.54	283.14	1691.46	282.99
1797	282.91	1802.21	282.93	1834.71	283.18	1837.35	283.17	1877.56	283.39
1906.65	283.6	1908.64	283.61	1946.58	283.85	1955.94	283.89	2002.62	283.94
2027.86	284	2029.92	284	2208.42	284.95	2213.82	286	2216.83	286.83
2221.31	288	2223.85	288.72	2228.21	290	2237.55	298.3	2239.43	300
2239.79	300.64	2245.19	310	2246.77	311.21	2248.02	312	2250.66	314
2252.73	314.43	2258.9	316	2276	314.1	2276.39	314	2286.73	310
2291.99	307.83	2296.85	306	2301.06	304	2305.57	302	2309.35	300.47
2310.46	300	2313.17	298.59	2314.37	298	2320.67	296	2329.35	294
2343.93	292.11	2345.26	291.96	2404.33	291.22	2457	292	2487.35	294
2499.21	296	2509.14	298						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .075 1006.28 .15 2213.82 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1006.28 2213.82 325.18 366.23 367.72 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 829.2310.8611 F

Proposed(Capacity).rep

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	287.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	287.39	Reach Len. (ft)	325.18	366.23	367.72
Crit W.S. (ft)	285.14	Flow Area (sq ft)	315.37	3970.20	3.55
E.G. slope (ft/ft)	0.008660	Area (sq ft)	526.09	3970.20	3.55
Q Total (cfs)	8951.00	Flow (cfs)	854.27	8091.74	4.99
Top width (ft)	1516.78	Top width (ft)	304.07	1207.54	5.17
Vel Total (ft/s)	2.09	Avg. Vel. (ft/s)	2.71	2.04	1.40
Max Chl Dpth (ft)	4.48	Hydr. Depth (ft)	1.78	3.29	0.69
Conv. Total (cfs)	96188.6	Conv. (cfs)	9180.1	86955.0	53.6
Length wtd. (ft)	363.83	Wetted Per. (ft)	177.08	1207.67	5.35
Min Ch El (ft)	282.91	Shear (lb/sq ft)	0.96	1.78	0.36
Alpha	1.02	Stream Power (lb/ft s)	2.61	3.62	0.50
Frctn Loss (ft)	3.59	Cum Volume (acre-ft)	117.98	462.82	17.60
C & E Loss (ft)	0.00	Cum SA (acres)	28.32	92.58	18.90

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main

RS: 4634.388

INPUT

Description:

Station Elevation Data

num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	302	80	302	100	292	123.14	292	139	290.91		
150.76	290	173.63	288	204.83	286	276.91	284	288.03	283.88		
290.75	283.7	293.62	283.54	294.67	283.46	320.14	282	335.46	282.01		
341.8	282.11	344.17	282.09	379.67	282.43	455.34	282.45	459.32	282.42		
462.17	282.39	464.82	282.37	467.55	282.34	474.11	282.29	477.49	282.26		
482.44	282.27	483.21	282.26	527.58	282.13	535.09	282.09	539.19	282.08		
546.48	282.05	549.3	282.04	552.15	282.02	557.84	282	576.6	281.99		
593.35	282	708.31	281.93	714.42	281.9	719.56	281.87	723.75	281.84		
747.55	281.6	752.62	281.56	770.74	281.52	796.45	281.35	804.65	281.32		
821.95	281.2	824.98	281.17	829.02	281.15	915.12	280	975.7	279.72		
1006.16	279.61	1035.43	279.51	1039.6	279.5	1053.65	279.49	1063.35	279.5		
1076.7	279.51	1094.92	279.54	1096.98	279.55	1114.79	279.59	1178.72	279.38		
1203.23	279.52	1210.59	279.55	1272.45	280	1308.62	280.29	1338.37	280.52		
1354.61	280.7	1365.95	280.8	1396.74	281.06	1406.46	281.12	1420.16	281.19		
1425.11	281.21	1490.66	281.57	1498.43	281.56	1500.42	281.55	1513.62	281.53		
1520.79	281.52	1524.52	281.5	1599.21	281.67	1602.89	281.68	1678.38	281.97		
1684.86	281.98	1686.4	282	1758.78	281.86	1790.13	281.86	1857.15	282.49		
1866.94	282.52	1881.83	282.44	1892.63	282.68	1909.95	282.5	1920.61	282.49		
1941.32	283.09	1952.07	284	1954.13	284.32	1959.59	286	1964.18	287.72		
1964.98	288	1965.81	288.36	1969.82	290	1993.72	300.04	1998.67	302		
2003.35	303.94	2003.61	304.04	2009.75	306	2014.94	307.82				

Manning's n values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	455.34	.15	1686.4	.075

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff Contr.	Expan.
	455.34	1686.4		279.84	292.33	293.02	.1	.3

Ineffective Flow	num=	1
Sta L	Sta R	Elev
0	388.56	298.8025

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	283.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	283.80	Reach Len. (ft)	279.84	292.33	293.02
Crit W.S. (ft)	282.10	Flow Area (sq ft)	90.95	3541.89	410.40
E.G. slope (ft/ft)	0.011323	Area (sq ft)	228.83	3541.89	410.40
Q Total (cfs)	8951.00	Flow (cfs)	235.61	7552.52	1162.88
Top width (ft)	1660.55	Top width (ft)	166.15	1231.06	263.34
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)	2.59	2.13	2.83
Max Chl Dpth (ft)	4.42	Hydr. Depth (ft)	1.36	2.88	1.56
Conv. Total (cfs)	84117.0	Conv. (cfs)	2214.1	70974.7	10928.1

Length wtd. (ft)	292.12	Proposed(Capacity).rep			
Min Ch El (ft)	279.38	wetted Per. (ft)	66.78	1231.08	263.39
Alpha	1.03	Shear (lb/sq ft)	0.96	2.03	1.10
Frctn Loss (ft)	2.44	Stream Power (lb/ft s)	2.49	4.34	3.12
C & E Loss (ft)	0.01	Cum Volume (acre-ft)	115.17	431.24	15.85
		Cum SA (acres)	26.56	82.33	17.76

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 4342.055

INPUT

Description:

Station	Elevation	Data	num=	109
Sta	Elev	Sta	Elev	Sta
0	300	25	300	45
135.35	282	181.38	281.94	225.4
249	281.03	255.26	280.9	271.2
321.6	279.57	348.22	279.44	426.5
444.84	278.75	450.31	278.74	451.67
490.95	278.75	492.25	278.77	530.64
568.8	278.7	577.56	278.67	580.38
599.77	278.61	604.41	278.6	606.66
620.56	278.54	625.8	278.52	631.18
645.28	278.44	648.86	278.43	665.19
713.91	278.23	757.62	278.2	760.16
864.2	277.92	865.28	277.91	878.33
910.46	277.55	935.37	277.58	955.97
984.25	277.99	986.09	278	986.24
997.76	277.69	1021.37	277.15	1024.58
1100.03	276.4	1133.92	276.62	1162.11
1293.03	277.9	1327.14	277.94	1357.82
1409.16	278.12	1442.61	278	1468.73
1509.48	276	1577.47	276.06	1578.21
1647.13	278.83	1655.14	279.78	1656.99
1668.61	284	1675.12	285.21	1679.75
1696.89	290	1698.1	290.63	1715.25

Manning's n	Values	num=	3
Sta	n Val	Sta	n Val
0	.075	321.6	.15
		1655.14	.075

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	321.6	1655.14		344.09	365.13	365.45	.1	.3	

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	281.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	wt. n-val.	0.075	0.150	0.075
W.S. Elev (ft)	281.38	Reach Len. (ft)	344.09	365.13	365.45
Crit W.S. (ft)		Flow Area (sq ft)	87.96	4760.05	5.57
E.G. Slope (ft/ft)	0.006413	Area (sq ft)	87.96	4760.05	5.57
Q Total (cfs)	8951.00	Flow (cfs)	123.78	8818.83	8.39
Top width (ft)	1444.61	Top width (ft)	105.29	1333.54	5.78
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	1.41	1.85	1.51
Max chl Dpth (ft)	5.38	Hydr. Depth (ft)	0.84	3.57	0.96
Conv. Total (cfs)	111773.5	Conv. (cfs)	1545.7	110123.1	104.7
Length wtd. (ft)	364.80	wetted Per. (ft)	105.31	1333.73	6.03
Min Ch El (ft)	276.00	Shear (lb/sq ft)	0.33	1.43	0.37
Alpha	1.00	Stream Power (lb/ft s)	0.47	2.65	0.56
Frctn Loss (ft)	3.65	Cum volume (acre-ft)	114.15	403.38	14.46
C & E Loss (ft)	0.01	Cum SA (acres)	25.69	73.72	16.86

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

Proposed(Capacity).rep

RIVER: HRC
 REACH: Main

RS: 3976.927

INPUT

Description:

Station	Elevation	Data	num=	94	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	288.37	1.9	288.11	2.68	288.02	2.81	288	17.99	286.47			
18.79	286.37	40.6	284.68	47.44	284.21	47.89	284.17	50.96	284			
59.39	283.62	59.83	283.59	63.16	283.39	64.69	283.31	72.8	282.8			
76.19	282.69	77.57	282.63	86.87	282	102.18	281.42	125.1	280			
128.5	279.95	194.15	277.64	201.67	277.58	279.35	276	376.46	275.03			
377.4	275.04	382.07	275.03	383.54	275.04	392.79	275.03	409.89	275.11			
439.78	275.14	442.5	275.15	457.58	275.2	463.13	275.21	489.47	275.18			
494.43	275.17	496.85	275.16	507.74	275.11	510.34	275.1	512.66	275.09			
518.73	275.06	520.89	275.05	527.35	275.01	548.31	274.92	550.26	274.91			
559.21	274.89	594.52	274.82	616.98	274.76	650.08	274.66	652.1	274.65			
656.52	274.63	665.31	274.61	695.8	274.53	704.5	274.52	762.31	274.2			
768.34	274.22	776.7	274.15	789.71	274.05	829.23	274	913.08	274.05			
916.5	274.09	919.82	274.12	922.17	274.16	1024.5	274.74	1027.38	274.73			
1106.84	274.52	1110.37	274.53	1197.53	274.57	1222.91	274.66	1315.6	275.37			
1333.82	275.43	1350.44	275.64	1374.32	275.9	1376.51	275.91	1378.38	275.92			
1384.91	276	1514.42	276.77	1534.12	278	1535.82	278.25	1540.34	278.66			
1550.6	280	1563.3	282.32	1578.6	284.94	1586.47	286	1594.92	288			
1599.02	288.54	1607.87	290	1609.43	290.38	1617.34	292	1628.41	294			
1628.82	294.07	1634.97	295.45	1637.57	296	1641.15	296.59					

Manning's n values

num= 3

Sta	n val	Sta	n val
0	.075	279.35	.15
		1514.42	.075

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff Contr.	Expan.
	279.35	1514.42		334.84	334.75	343.16	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	277.79				
Vel Head (ft)	0.10	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	277.69	Reach Len. (ft)	334.84	334.75	343.16
Crit W.S. (ft)		Flow Area (sq ft)	70.12	3392.41	6.70
E.G. Slope (ft/ft)	0.017744	Area (sq ft)	70.12	3392.41	6.70
Q Total (cfs)	8951.00	Flow (cfs)	160.88	8779.63	10.49
Top Width (ft)	1336.20	Top Width (ft)	86.48	1235.07	14.65
Vel Total (ft/s)	2.58	Avg. vel. (ft/s)	2.29	2.59	1.56
Max Chl Dpth (ft)	3.68	Hydr. Depth (ft)	0.81	2.75	0.46
Conv. Total (cfs)	67196.5	Conv. (cfs)	1207.7	65910.0	78.8
Length wtd. (ft)	335.85	Wetted Per. (ft)	86.50	1235.09	14.68
Min Ch El (ft)	274.00	Shear (lb/sq ft)	0.90	3.04	0.51
Alpha	1.00	Stream Power (lb/ft s)	2.06	7.87	0.79
Frctn Loss (ft)	2.20	Cum Volume (acre-ft)	113.52	369.21	14.40
C & E Loss (ft)	0.02	Cum SA (acres)	24.93	62.96	16.77

warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main

RS: 3642.177

INPUT

Description:

Station	Elevation	Data	num=	98	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	286.93	10.44	286	65.44	282	99.45	280	146.37	278			
174.1	276	182.3	275.34	185.36	275.15	192.4	274.62	202.82	274			
213.37	273.69	242.26	272.96	250.5	272.85	251.89	272.82	298.66	272			
558.78	271.48	562.24	271.51	567.92	271.55	578.79	271.59	580.97	271.6			
586.73	271.61	588.07	271.59	590.12	271.61	664.72	271.44	665.35	271.45			
684.38	271.55	709.6	271.7	714.82	271.75	720.76	271.78	733.39	271.87			
744.96	272	900	272.018	1001.77	272.03	1008.53	272.08	1012.19	272.11			
1015.73	272.14	1023.46	272.21	1030.67	272.27	1143.5	272.54	1145.55	272.53			
1146.64	272.54	1148.16	272.53	1149.44	272.54	1156.13	272.55	1166.79	272.58			
1170.77	272.59	1174.72	272.6	1175.97	272.59	1185.52	272.61	1187.32	272.6			

Proposed(Capacity).rep									
1237.84	272.51	1241.49	272.49	1243.23	272.48	1247.62	272.46	1258.1	272.42
1330.73	272.07	1336.79	272.1	1360.06	272.19	1361.24	272.2	1391.38	272.26
1434.16	272.38	1435.76	272.37	1460.58	272.41	1462.04	272.39	1510.46	272.3
1511.66	272.29	1526.14	272.3	1572.56	272.03	1610.9	272.04	1623.24	272.05
1683.71	271.96	1708.43	271.81	1740.08	272	1919.38	272.18	1924.18	272.16
1940.88	272.4	1948.93	272.35	1960.33	272.51	1964.9	272.48	2010.76	274
2171.31	274.11	2174.05	274.13	2314.91	276.01	2315.23	276.02	2424.07	278
2428.14	278.34	2443.28	280	2448.25	282	2452.53	283.06	2456.05	284
2458.94	285.22	2460.86	286	2461.33	286.21	2465.45	288	2468.69	289.07
2471.9	290	2474.83	290.89	2477.39	292				

Manning's n Values num= 3
Sta n Val Sta n Val
0 .075 298.66 .15 1623.24 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
298.66 1623.24 258.14 290.23 300.27 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
1871.42 2477.39 291.9999 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	275.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	275.52	Reach Len. (ft)	258.14	290.23	300.27
Crit W.S. (ft)	273.15	Flow Area (sq ft)	270.29	4607.67	871.22
E.G. Slope (ft/ft)	0.003382	Area (sq ft)	270.29	4607.67	1594.30
Q Total (cfs)	8951.00	Flow (cfs)	538.96	6093.64	2318.40
Top Width (ft)	2098.39	Top Width (ft)	118.63	1324.58	655.18
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)	1.99	1.32	2.66
Max Chl Dpth (ft)	4.08	Hydr. Depth (ft)	2.28	3.48	3.51
Conv. Total (cfs)	153926.7	Conv. (cfs)	9268.3	104789.8	39868.6
Length Wtd. (ft)	290.48	Wetted Per. (ft)	118.71	1324.59	248.18
Min Ch El (ft)	271.44	Shear (lb/sq ft)	0.48	0.73	0.74
Alpha	1.35	Stream Power (lb/ft s)	0.96	0.97	1.97
Frctn Loss (ft)	0.96	Cum Volume (acre-ft)	112.22	338.47	8.10
C & E Loss (ft)	0.00	Cum SA (acres)	24.15	53.12	14.13

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 3351.951

INPUT

Description:

Station Elevation Data num= 84									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	285.5	13.31	284	36.12	282	67.29	280	101.62	278
152.47	274	215.42	272.06	217.49	272	228.37	271.69	243.04	271.25
244.01	271.23	252.46	270.96	253.9	270.92	258.75	270.76	269.35	270.57
294.08	270	309.39	269.83	311.81	269.81	312.8	269.8	313.69	269.79
328.44	269.61	344.46	269.41	346.63	269.4	452.88	269.2	454.68	269.19
457.11	269.22	459.78	269.23	464.05	269.24	465.06	269.25	466.19	269.27
506.87	269.35	511.02	269.31	588.81	268.85	608.98	268.89	695.67	268.75
710.2	268.77	744.32	269	745.35	268.99	749.51	269	753	269.02
781.12	269.05	782.52	269.06	790.96	269.09	816.16	269.23	817.27	269.24
883.64	269.76	894.13	270	943	270.54	943.18	270.53	948.39	270.59
954.83	270.65	960.21	270.72	967.81	270.83	1005.28	270.47	1013.24	270.51
1060.38	270.65	1149.48	270.47	1159.35	270.42	1162.8	270.4	1166.46	270.39
1176.11	270.35	1198.61	270.37	1225.58	270	1375.87	271.98	1377.46	272
1378.28	272.16	1387.72	274	1421.83	272.97	1425.19	272.57	1430.32	272
1494	272.531	1637.91	273.73	1640.11	274	1652.81	275.98	1652.95	276
1653.1	276.03	1661.94	278	1667.37	278.98	1673.97	280	1690.83	285.7
1704.02	290	1710.4	291.86	1716	293.65	1720.61	295.06		

Manning's n Values num= 3
Sta n Val Sta n Val
0 .075 215.42 .15 1494 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
215.42 1494 278.96 313.58 317.16 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1684.75	1720.61	295.06	04 F

E.G. Elev (ft)	274.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-val.	0.075	0.150	0.075
W.S. Elev (ft)	274.58	Reach Len. (ft)	278.96	313.58	317.16
Crit W.S. (ft)	271.06	Flow Area (sq ft)	99.86	5642.00	211.56
E.G. Slope (ft/ft)	0.003205	Area (sq ft)	99.86	5642.00	211.56
Q Total (cfs)	8951.00	Flow (cfs)	141.39	8511.05	298.56
Top width (ft)	1498.77	Top width (ft)	70.35	1278.58	149.84
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	1.42	1.51	1.41
Max Chl Dpth (ft)	5.83	Hydr. Depth (ft)	1.42	4.41	1.41
Conv. Total (cfs)	158107.9	Conv. (cfs)	2497.5	150336.8	5273.6
Length wtd. (ft)	313.27	Wetted Per. (ft)	70.40	1278.91	149.91
Min Ch El (ft)	268.75	Shear (lb/sq ft)	0.28	0.88	0.28
Alpha	1.00	Stream Power (lb/ft s)	0.40	1.33	0.40
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	111.12	304.33	1.87
C & E Loss (ft)	0.00	Cum SA (acres)	23.59	44.45	11.36

CROSS SECTION

INPUT

Station	Elevation	Data	num=	124					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	283.15	23.75	280.6	28.99	280	30.64	279.9	31.47	279.86
40.77	279.32	69.71	278	105.45	276	132.43	274	141.27	272.9
147.74	272	158.93	270	170.9	268.22	172.22	268	181.13	267.9841
239.5	267.88	241.18	267.89	244.82	267.88	248.69	267.87	250.31	267.86
252.2	267.84	256.99	267.8	260.34	267.75	366.4	266.96	368.26	266.97
404.25	266.99	474.06	267.2	476.12	267.21	479.22	267.22	484.16	267.24
489.28	267.27	512.67	267.38	520.12	267.42	528.01	267.46	529.72	267.47
544.85	267.55	554.29	267.59	595.12	267.72	599.09	267.74	603.25	267.75
611.08	267.74	612.41	267.73	620.29	267.76	643.95	267.87	649.93	267.89
667.11	267.98	671.21	268	795.95	269.67	797.76	269.72	800.86	270
801.18	270.1	801.2	270.11	801.22	270.12	801.26	270.13	801.3	270.15
801.36	270.18	801.44	270.21	801.56	270.26	801.74	270.33	802.07	270.46
802.82	270.77	805.53	271.86	805.87	272	809.04	271.97	809.45	271.88
809.82	271.8	810.16	271.72	812.56	271.03	815.49	270	821.53	268.04
821.64	268	903.39	268.01	915.93	268.09	921.77	268.12	927.41	268.16
1076.9	268.11	1078.49	268.1	1082.49	268.09	1087.93	268.1	1092.79	268.12
1093.81	268.13	1098	268.15	1109.77	268.29	1120.04	268.36	1128.65	268.43
1211.64	270	1257.99	270.03	1258.11	270.06	1260.8	270.66	1265.58	271.73
1266.79	272	1273.52	273.42	1276.11	274	1282.41	273.14	1287.51	272
1291.29	271.2	1297.03	270	1304.52	268.46	1306.74	268	1315.15	268.06
1330.8	268.61	1339.49	268.92	1343.5	269.07	1368.34	270	1390.09	270.81
1390.38	270.85	1398.16	272	1402.95	273.35	1403.08	273.39	1408.84	275.02
1413.11	276.29	1418.64	278	1421.41	279.22	1422.97	280	1423.56	280.29
1426.82	282	1428.65	282.94	1433.52	285.36	1434.87	286	1435.47	286.28
1439.05	288	1439.93	288.39	1443.94	290	1445.57	290.63		

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	158.93	.15	1390.38	.075

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	273.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-val.	0.075	0.150	0.075
W.S. Elev (ft)	273.85	Reach Len. (ft)	564.80	424.13	403.85
Crit W.S. (ft)		Flow Area (sq ft)	44.54	6770.04	24.91
E.G. Slope (ft/ft)	0.001803	Area (sq ft)	44.54	6770.04	24.91
Q Total (cfs)	8951.00	Flow (cfs)	54.23	8866.94	29.84
Top width (ft)	1269.27	Top width (ft)	25.28	1229.67	14.32
Vel Total (ft/s)	1.31	Avg. vel. (ft/s)	1.22	1.31	1.20

		Proposed(Capacity).rep			
Max Chl Dpth (ft)	6.89	Hydr. Depth (ft)	1.76	5.51	1.74
Conv. Total (cfs)	210829.8	Conv. (cfs)	1277.2	208849.7	702.8
Length wtd. (ft)	424.50	Wetted Per. (ft)	25.58	1231.92	14.66
Min Ch El (ft)	266.96	Shear (lb/sq ft)	0.20	0.62	0.19
Alpha	1.00	Stream Power (lb/ft s)	0.24	0.81	0.23
Frcn Loss (ft)	0.33	Cum Volume (acre-ft)	110.66	259.65	1.01
C & E Loss (ft)	0.00	Cum SA (acres)	23.28	35.42	10.76

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 2614.242

INPUT

Description:

Station	Elevation	Data	num=	81						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	284	20	280	40	275	50	275	60	280	
75	280	80	279	190	279	205	279	209	281	
434	280	464	265	466.75	264	604.17	264.28	805.55	264.7	
810.36	264.98	817.1	265.47	824.36	266	840.46	265.66	841.2	265.54	
841.52	265.48	844.52	264.99	848.09	264.41	850.62	264	878.3	264.06	
884.81	264.27	887.07	264.34	893.2	264.54	904.81	264.99	906.98	265.07	
919.83	265.59	930.39	266	1221.37	266.45	1252.77	266.55	1255.58	266.56	
1291.4	266.8	1296.66	266.82	1300.32	266.84	1358.35	267.05	1363.83	267.08	
1437.45	267.14	1476.36	268	1513.81	267.97	1515.66	267.58	1515.69	267.57	
1517.8	267.11	1518.45	266.96	1522.24	266	1525.79	264.43	1526.72	264	
1534.45	263.52	1536.74	264	1537.23	264.1	1539.45	264.41	1539.74	264.39	
1541.6	264.52	1543.19	264.64	1543.7	264.59	1544.9	264.73	1545.99	264.6	
1550.98	264.79	1555.8	265.46	1559.37	266	1564.27	266.15	1565.13	266.16	
1573.36	266.41	1584.82	266.74	1596.82	267.06	1601.45	267.12	1609.78	267.32	
1612.16	267.38	1626	268	1674	292	1734	292	1754	282	
1759.72	284	1770.23	285.58	1773.52	286	1783.38	287.53	1786.71	288	
1797.04	289.28									

Manning's n	Values	num=	6							
Sta	n val	Sta	n val	Sta	n val	Sta	n val	Sta	n val	
0	.075	824.36	.15	930.39	.75	1221.37	.15	1513.81	.15	
1626	.075									

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.	
	434	1626		566.01	580.29	596.27	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	273.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	wt. n-val.		0.123	0.075
W.S. Elev (ft)	273.53	Reach Len. (ft)	566.01	580.29	596.27
Crit W.S. (ft)		Flow Area (sq ft)		9111.74	30.60
E.G. Slope (ft/ft)	0.000422	Area (sq ft)		9111.74	30.60
Q Total (cfs)	8951.00	Flow (cfs)		8928.22	22.78
Top width (ft)	1190.13	Top width (ft)		1179.06	11.06
Vel Total (ft/s)	0.98	Avg. Vel. (ft/s)		0.98	0.74
Max Chl Dpth (ft)	10.01	Hydr. Depth (ft)		7.73	2.77
Conv. Total (cfs)	435636.4	Conv. (cfs)		434527.7	1108.7
Length wtd. (ft)	580.32	Wetted Per. (ft)		1182.39	12.37
Min Ch El (ft)	263.52	Shear (lb/sq ft)		0.20	0.07
Alpha	1.00	Stream Power (lb/ft s)		0.20	0.05
Frcn Loss (ft)	0.19	Cum Volume (acre-ft)	110.37	182.33	0.76
C & E Loss (ft)	0.00	Cum SA (acres)	23.12	23.69	10.64

CROSS SECTION

RIVER: HRC
REACH: Main RS: 2033.954

INPUT

Description:

Station	Elevation	Data	num=	93						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	279	100	279	104	281	400	273	402	273	

Proposed(Capacity).rep									
408	270	408	265	475	265	485	270	501	262
583	262.987	621.76	262.89	632.77	262.26	637.19	262	667.3	262.05
677.53	262.49	678.87	262.57	715.02	263.35	745.29	264	848.74	263.31
976.36	264	1166.66	263.5	1167.98	263.37	1170.01	262.93	1172.3	262.78
1173.66	262.58	1174.34	262.52	1177.25	262.37	1177.7	262.33	1181.67	262
1198.55	262.92	1204.15	263.34	1213.03	264	1242.62	264.36	1264.45	264.51
1278.97	264.85	1284.69	264.92	1291.21	265.08	1298.05	265.16	1300.1	265.19
1312.36	265.49	1320.28	265.6	1322.69	265.67	1323.15	265.68	1332.87	266
1338.99	266.61	1339.21	266.64	1339.45	266.67	1349.62	268	1364.42	267.24
1365.99	266.75	1368.33	266	1374.53	264.1	1374.8	264	1375.74	263.71
1381.41	262	1385.36	260.8	1388.05	260	1393.64	260.1	1399.81	262
1404.21	263.38	1406.39	264	1409.3	264.15	1412.15	264.3	1413.94	264.4
1417.55	264.59	1430.01	265.27	1437.46	265.61	1445.96	266	1455.18	267.57
1456.54	267.82	1457.47	268	1458.91	268.44	1464.34	270	1465.62	270.41
1472.2	272.35	1476.79	274	1480.29	275.59	1481.32	276	1484.62	277.46
1485.81	278	1486.18	278.16	1494.18	281.71	1501.88	285.02	1505.02	286.33
1505.61	286.57	1509.19	288	1509.29	288.01	1522.96	289.59	1523.99	289.7
1524.56	289.77	1526.58	290	1549.68	291.52				

Manning's n Values		num=	5	Sta		n Val	Sta	n Val	Sta	n Val
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta
0	.075	745.29	.15	1166.66	.15	1349.62	.15	1465.62	.075	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	485	1465.62		314.82	169.15	136.16	
Ineffective Flow			num=	1			
Sta L	Sta R	Elev	Permanent				
0	485		F				

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	273.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	wt. n-Val.		0.115	0.075
W.S. Elev (ft)	273.34	Reach Len. (ft)	314.82	169.15	136.16
Crit W.S. (ft)		Flow Area (sq ft)		9360.79	14.25
E.G. Slope (ft/ft)	0.000269	Area (sq ft)	630.90	9360.79	14.25
Q Total (cfs)	8951.00	Flow (cfs)		8945.05	5.95
Top Width (ft)	1087.48	Top width (ft)	97.53	980.62	9.33
Vel Total (ft/s)	0.95	Avg. Vel. (ft/s)		0.96	0.42
Max Chl Dpth (ft)	13.34	Hydr. Depth (ft)		9.55	1.53
Conv. Total (cfs)	545306.6	Conv. (cfs)		544943.9	362.7
Length wtd. (ft)	168.92	Wetted Per. (ft)		985.14	9.78
Min Ch El (ft)	260.00	Shear (lb/sq ft)		0.16	0.02
Alpha	1.00	Stream Power (lb/ft s)		0.15	0.01
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	106.27	59.29	0.45
C & E Loss (ft)	0.00	Cum SA (acres)	22.48	9.31	10.50

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 1864.806

INPUT

Description:

Station Elevation Data		num=	72	Sta		Elev	Sta	Elev	Sta	Elev
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
0	278.55	18.5	278	25.34	276.3	26.21	276.09	26.57	276	
34.55	274.2	35.41	274	47.77	272.79	79.36	269.27	90.07	268	
123.56	266	187.57	264	317	263.762	400	263.61	718	263.025	
747.96	262.97	760.39	262	793	262	817	274	919	274	
943	262	948.99	262.12	966.42	262.2	967.47	262.21	1006.74	262.37	
1008.23	262.38	1009.82	262.39	1039.11	262.49	1041.52	262.5	1071.66	262.63	
1088.53	262.69	1172.73	263.53	1177.2	263.59	1179.09	263.6	1189.69	263.65	
1190.96	263.66	1203.97	263.85	1206.73	263.88	1210.93	263.95	1214.28	264	
1274.27	264.24	1275.13	264.25	1387.59	264.48	1388.15	264.45	1394.36	264	
1400.15	263.44	1413.68	262	1418.11	260.6	1420.37	260	1436.62	260.98	
1443.65	262	1446.72	262.24	1449.29	262.45	1457.9	263.13	1468.23	264	
1499.91	265.46	1510.1	266	1512.42	266.52	1519.16	268	1535.2	274	
1537.19	274.76	1540.35	276	1545.19	278	1546.86	278.76	1554.23	282	
1557.98	283.79	1558.47	284	1562.92	286	1567.55	288	1583.12	290	
1591.89	290.63	1593.87	290.76							

Manning's n Values		num=	4	Sta		n Val	Sta	n Val
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	

0 .075 943 .15 1387.59 Proposed(Capacity).rep
 .15 1512.42 .075
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 919 1512.42 303.13 147.22 135.57 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 919 276 F

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	273.27				
Vel Head (ft)	0.04	Wt. n-Val.		0.147	0.075
W.S. Elev (ft)	273.23	Reach Len. (ft)	303.13	147.22	135.57
Crit W.S. (ft)	265.28	Flow Area (sq ft)		5744.55	76.83
E.G. Slope (ft/ft)	0.001130	Area (sq ft)	6943.20	5744.55	76.83
Q Total (cfs)	8951.00	Flow (cfs)		8832.61	118.39
Top width (ft)	1384.81	Top width (ft)	772.20	591.88	20.73
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)		1.54	1.54
Max Chl Dpth (ft)	13.23	Hydr. Depth (ft)		9.71	3.71
Conv. Total (cfs)	266268.8	Conv. (cfs)		262746.9	3521.8
Length wtd. (ft)	147.14	Wetted Per. (ft)		595.25	21.83
Min ch E (ft)	260.00	Shear (lb/sq ft)		0.68	0.25
Alpha	1.00	Stream Power (lb/ft s)		1.05	0.38
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	78.90	29.96	0.31
C & E Loss (ft)	0.01	Cum SA (acres)	19.34	6.25	10.46

Warning: Divided flow computed for this cross-section.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 1717.589

INPUT

Description:

Station Elevation Data		num=	109								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	282	39.1	280.47	48.2	280	58.74	278.47	62.16	278		
66.25	277.37	72.96	276	76.12	275.39	83.95	274	99.04	272		
100.64	271.8	126.4	268	126.54	267.98	126.86	267.94	139.39	266.26		
141.25	266	169.72	264	398.11	263.53	398.4	263.52	401.73	263.43		
415.03	263.1	417.04	263.04	419.02	262.99	421.54	262.94	424.24	262.86		
426.45	262.82	428.27	262.77	429.47	262.72	431.24	262.71	432.04	262.68		
433.29	262.69	455.77	262.29	462.03	262.17	462.51	262.18	504.36	262.23		
516.21	262.21	519.14	262.23	522.92	262.26	527.66	262.3	530.2	262.32		
537.65	262.38	540.66	262.4	543.65	262.43	546.36	262.45	565.04	262.46		
568.37	262.47	571.99	262.49	681.92	262.95	808	264	828	274		
898	274	918	264	961.9	263.62	964.9	263.08	964.92	263.07		
968.46	262.73	969.92	262.51	970.71	262.4	975.96	262	1007.16	261.87		
1008.46	262	1011.4	262.19	1011.55	262.2	1017	262.56	1018.97	262.64		
1023.1	262.89	1026.26	263.02	1029.25	263.2	1032.45	263.35	1035.62	263.57		
1037.02	263.65	1041.04	264	1137.41	263.79	1149.87	262	1152.88	261.42		
1160.24	260	1166.78	258.76	1170.73	258	1180.4	258.77	1183.54	259.63		
1184.45	259.89	1184.88	260	1185.15	260.07	1186.88	260.56	1192.01	262		
1205.92	263.15	1211.59	263.6	1216.85	264	1227.42	266	1227.95	266.08		
1228.24	266.11	1229.52	266.3	1236.01	267.21	1240.98	268	1243.23	269.17		
1245.05	270	1249.29	272	1251.53	272.99	1253.74	274	1256.43	275.28		
1261.92	277.77	1262.42	278	1262.92	278.22	1266.83	280	1270.53	281.76		
1271.01	282	1275.33	284	1285.9	286	1286.76	286.08				

Manning's n Values num= 3
 Sta n Val Sta n Val
 0 .075 1137.41 .15 1216.85 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 898 1249.29 260.39 199.87 163.52 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 898 276 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	273.07	Element	Left OB	Channel	Right OB
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Proposed(Capacity).rep			
Vel Head (ft)	0.11	wt. n-Val.	0.095
W.S. Elev (ft)	272.95	Reach Len. (ft)	260.39
Crit W.S. (ft)	265.85	Flow Area (sq ft)	3301.83
E.G. Slope (ft/ft)	0.001515	Area (sq ft)	6719.44
Q Total (cfs)	8951.00	Flow (cfs)	8950.54
Top Width (ft)	1085.44	Top Width (ft)	734.07
Vel Total (ft/s)	2.71	Avg. Vel. (ft/s)	2.71
Max Chl Dpth (ft)	14.95	Hydr. Depth (ft)	9.46
Conv. Total (cfs)	229964.4	Conv. (cfs)	229952.6
Length Wtd. (ft)	199.70	Wetted Per. (ft)	353.80
Min Ch El (ft)	258.00	Shear (lb/sq ft)	0.88
Alpha	1.00	Stream Power (lb/ft s)	2.39
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	31.36
C & E Loss (ft)	0.02	Cum SA (acres)	14.10
			4.66
			10.42

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 1517.721

INPUT

Description:

Station Elevation Data		num= 85							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	267.1	18.05	266.19	19.05	266.15	19.96	266.13	21.511	266.07
24.56	266	249.952	265.7223	324.86	265.63	328.36	265.62	336.15	265.6
355.62	265.34	357.73	265.31	369.75	265.22	374.52	265.15	380.39	265.1
441.021	264	520	264	538	273	598.001	273	612	266
621.889	266	633	265.8	633	258	747	258	747	269.03
749.849	269.24	751.33	269.48	753.33	269.69	754.531	269.83	758.16	269.96
759.35	270	760.9	270.09	761.14	270.08	765.33	270.14	770.38	270
779.17	269.83	782.248	270	784.76	270.29	785.06	270.34	785.389	270.36
790.38	270.45	793.24	270.59	794.18	270.6	797.141	270.97	803.241	272
804.62	272.26	804.939	272.24	805.469	272.27	806.331	272.45	812.01	273.15
814.03	273.41	818.9	273.77	819.469	273.83	824.46	273.94	824.73	273.96
826.01	274	830.8	274.27	831.071	274.3	831.56	274.42	834.54	275.13
843.4	276.95	846.26	277.51	846.94	277.62	848.801	278	851.478	278.57
856.38	279.74	864.42	281.69	865.67	282	868.42	282.75	868.7	282.83
869.05	282.94	870.11	283.24	872.109	283.78	872.801	283.96	872.94	284
875.59	284.13	876.06	284.17	879.229	284.34	879.51	284.36	885.499	284.71
887.54	284.89	888.049	284.93	891.76	285.16	892.97	285.28	893.948	285.37

Manning's n values

num= 3					
Sta	n val	Sta	n val	Sta	n val
0	.075	598.001	.04	758.16	.075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
598.001 758.16 125.59 123.63 106.49 .3 .5

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 598.001 276 F

CROSS SECTION OUTPUT Profile #PF 1

		Left OB		Channel		Right OB	
E.G. Elev (ft)	272.84	wt. n-Val.	0.040				0.075
Vel Head (ft)	0.35	Reach Len. (ft)	125.59				106.49
W.S. Elev (ft)	272.50	Flow Area (sq ft)	1864.97				97.44
Crit W.S. (ft)	263.76	Area (sq ft)	3773.05				97.44
E.G. Slope (ft/ft)	0.000723	Flow (cfs)	536.99				82.39
Q Total (cfs)	8951.00	Top width (ft)	159.15				48.54
Top Width (ft)	744.68	Avg. Vel. (ft/s)	4.76				0.85
Vel Total (ft/s)	4.56	Hydr. Depth (ft)	11.72				2.01
Max Chl Dpth (ft)	14.50	Conv. (cfs)	329792.2				3063.9
Conv. Total (cfs)	332856.2	Wetted Per. (ft)	179.56				48.74
Length Wtd. (ft)	123.63	Shear (lb/sq ft)	0.47				0.09
Min Ch El (ft)	258.00	Stream Power (lb/ft s)	2.23				0.08
Alpha	1.08	Cum Volume (acre-ft)	2.82				
Frctn Loss (ft)		Cum SA (acres)	10.30				
C & E Loss (ft)			3.50				

Proposed(Capacity).rep

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CULVERT

RIVER: HRC
REACH: Main RS: 1466.171

INPUT

Description:

Distance from Upstream XS = 17
Deck/Roadway width = 72
Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num=	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0	273					538	273				568	273			
610	274					628	274.28				650	274.4			
650	274.4					710.001	275				720	275.1			
720	275.1					810	276				950	278			

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	267.1	18.05	266.19	19.05	266.15	19.96	266.13	21.511	266.07				
24.56	266	249.95	265.722	324.86	265.63	328.36	265.62	336.15	265.6				
355.62	265.34	357.73	265.31	369.75	265.22	374.52	265.15	380.39	265.1				
441.02	264	520	264	538	273	598.001	273	612	266				
621.889	266	633	265.8	633	258	747	258	747	269.03				
749.849	269.24	751.33	269.48	753.33	269.69	754.531	269.83	758.16	269.96				
759.35	270	760.9	270.09	761.14	270.08	765.33	270.14	770.38	270				
779.17	269.83	782.248	270	784.76	270.29	785.06	270.34	785.389	270.36				
790.38	270.45	793.24	270.59	794.18	270.6	797.14	270.97	803.241	272				
804.62	272.26	804.94	272.24	805.47	272.27	806.331	272.45	812.01	273.15				
814.03	273.41	818.9	273.77	819.469	273.83	824.46	273.94	824.73	273.96				
826.01	274	830.8	274.27	831.071	274.3	831.56	274.42	834.54	275.13				
843.4	276.95	846.26	277.51	846.94	277.62	848.801	278	851.479	278.57				
856.38	279.74	864.42	281.69	865.67	282	868.42	282.75	868.7	282.83				
869.05	282.94	870.11	283.24	872.11	283.78	872.801	283.96	872.94	284				
875.599	284.13	876.06	284.17	879.23	284.34	879.51	284.36	885.5	284.71				
887.54	284.89	888.049	284.93	891.76	285.16	892.97	285.28	893.949	285.37				

Manning's n values

Sta	n Val	Sta	n Val
0	.04	633	.04
		747	.04

Bank Sta: Left Right Coeff Contr. Expan.
598.001 758.16 .3 .5

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 598.001 276 F

Downstream Deck/Roadway Coordinates

num=	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0	273					538	273				587	272.99			
588	273					588	273				630	274			
658	274.28					658	274.28				679	274.49			
679	274.49					729.999	275				830	276			
970	278														

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	266.16	1.74	266	201.161	265.73	232.54	265.64	263.28	265.639				
273.68	265.63	275.4	265.62	275.93	265.61	305.25	265.62	313.33	265.63				
318	265.64	319.521	265.63	337.36	265.62	348.58	265.59	353.09	265.58				
354.301	265.57	368	265.56	370.529	265.54	373.93	265.53	376.82	265.51				
429.399	265.58	431.931	265.6	433.951	265.59	435.12	265.58	449.839	265.27				
450.06	265.26	451.929	265.27	453.13	265.26	454.68	265.25	457.99	265.21				
478.051	265.17	479.75	265.19	501.04	265.78	504.911	266	554.7	267.22				
558.629	267.27	563	267.08	563	258	677	258	677	265				
687.7	265.68	688.591	266	695.15	267.9	695.53	268	696.17	268.2				
700.15	269.34	701.24	269.51	703.19	270	703.979	270.18	704.38	270.3				
707.48	271.02	709.63	271.57	710.739	271.86	711.269	272	714.01	272.7				

Proposed(Capacity).rep									
722.811	273.62	727.19	274	782.17	276	814.37	276.62	814.91	276.64
821.23	276.94	822.99	276.95	833.63	278	850.099	278.78	853.58	278.89
857.09	279.34	870	280	870.99	280.1	871.12	280.11	871.509	280.17
871.729	280.21	875.36	280.69	876.041	280.8	876.99	280.97	879.09	281.18
881.75	281.69	882.22	281.76	882.729	281.84	883.849	282	884.95	282.17
885.46	282.25	885.95	282.33	886.42	282.41	886.59	282.45	887.089	282.62
887.24	282.66	889.74	283.17	890.179	283.34	890.55	283.47	890.76	283.55
891.26	283.72	891.56	283.81	891.889	283.92	892.151	284	892.26	284.01
893.82	284.13	894.17	284.15	894.509	284.18	894.85	284.2	895.07	284.22
895.31	284.25	895.451	284.26	895.68	284.3	895.82	284.31	901.86	284.89
903.51	285.13	908.58	286	914.489	286.43				

Manning's n values num= 3
Sta n Val Sta n Val Sta n Val
0 .04 563 .04 710.739 .04

Bank Sta: Left Right Coeff Contr. Expan.
558.629 710.739 .3 .5

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 525 273 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span
Culvert #1 Box 13 22
FHWA Chart # 58- Rectangular concrete
FHWA Scale # 1 - Side tapered; Less favorable edges
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
17	72	.014	.045	0	.5	1

Number of Barrels = 5

Upstream Elevation = 258

Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.
644	667	690	713	736

Downstream Elevation = 258

Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.
574	597	620	643	666

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 1394.093

INPUT

Description:

Station Elevation Data num= 108									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	266.16	1.74	266	201.161	265.73	232.54	265.64	263.282	265.6388
273.68	265.63	275.4	265.62	275.93	265.61	305.25	265.62	313.33	265.63
318	265.64	319.521	265.63	337.36	265.62	348.58	265.59	353.09	265.58
354.301	265.57	368	265.56	370.529	265.54	373.93	265.53	376.82	265.51
429.399	265.58	431.931	265.6	433.951	265.59	435.12	265.58	449.839	265.27
450.06	265.26	451.929	265.27	453.13	265.26	454.68	265.25	457.99	265.21
478.051	265.17	479.75	265.19	501.04	265.78	504.911	266	554.7	267.22
558.629	267.27	563	267.08	563	258	677	258	677	265
687.37	265.68	688.591	266	695.15	267.9	695.53	268	696.17	268.2
700.15	269.34	701.24	269.51	703.19	270	703.979	270.18	704.38	270.3
707.48	271.02	709.63	271.57	710.739	271.86	711.269	272	714.01	272.7
722.811	273.62	727.19	274	782.17	276	814.37	276.62	814.91	276.64
821.23	276.94	822.99	276.95	833.63	278	850.099	278.78	853.58	278.89
857.09	279.34	870	280	870.99	280.1	871.12	280.11	871.509	280.17
871.729	280.21	875.36	280.69	876.041	280.8	876.99	280.97	879.09	281.18
881.75	281.69	882.22	281.76	882.729	281.84	883.849	282	884.95	282.17
885.46	282.25	885.95	282.33	886.42	282.41	886.59	282.45	887.089	282.62
887.24	282.66	889.74	283.17	890.179	283.34	890.55	283.47	890.76	283.55
891.26	283.72	891.56	283.81	891.889	283.92	892.151	284	892.26	284.01
893.82	284.13	894.17	284.15	894.509	284.18	894.85	284.2	895.07	284.22

Proposed(Capacity).rep
 895.31 284.25 895.451 284.26 895.68 284.3 895.82 284.31 901.86 284.89
 903.51 285.13 908.58 286 914.489 286.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .075 558.629 .04 710.739 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 558.629 710.739 420.88 463.69 516.28 .3 .5
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 525 273 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	272.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.075	0.040	
W.S. Elev (ft)	271.80	Reach Len. (ft)	420.88	463.69	516.28
Crit W.S. (ft)	263.77	Flow Area (sq ft)	164.82	1729.08	
E.G. Slope (ft/ft)	0.000821	Area (sq ft)	3368.77	1729.08	
Q Total (cfs)	8951.00	Flow (cfs)	269.95	8681.05	
Top width (ft)	710.52	Top width (ft)	558.63	151.89	
Vel Total (ft/s)	4.73	Avg. Vel. (ft/s)	1.64	5.02	
Max Chl Dpth (ft)	13.80	Hydr. Depth (ft)	4.90	11.38	
Conv. Total (cfs)	312368.7	Conv. (cfs)	9420.5	302948.2	
Length Wtd. (ft)	473.30	wetted Per. (ft)	33.64	168.81	
Min Ch El (ft)	258.00	Shear (lb/sq ft)	0.25	0.53	
Alpha	1.10	Stream Power (lb/ft s)	0.41	2.64	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	42.15	32.10	51.24
C & E Loss (ft)	0.16	Cum SA (acres)	8.72	3.06	10.27

Warning: The cross-section end points had to be extended vertically for the computed water surface.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 930.4035

INPUT

Description:

Station	Elevation	Data	num= 78
Sta	Elev	Sta	Elev
0	266.38	5.9	266
315.74	262	319.99	260.22
326.89	257.29	329.92	256
346.05	256	348.75	256.85
358.72	260.19	359.14	260.32
422.16	264.54	427.25	265.16
451.91	268	464.89	268.79
484.05	269.74	492.55	270
579.31	268.83	581.21	268.79
614.77	267.47	614.88	267.46
637.39	266	638.22	265.95
666.46	264	669.66	263.6
684.11	262.11	685.31	262
724.98	260.85	731.72	260.65
872.74	263.53	874.79	263.73
952.05	273.41	957.63	274

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .075 309.85 .15 422.16 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 309.85 422.16 245.97 302.63 371.27 .1 .3
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 195 273 F
 815.61 975.13 273 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	271.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.075	0.150	0.075

Proposed(Capacity).rep			
W.S. Elev (ft)	271.52	Reach Len. (ft)	245.97
Crit W.S. (ft)	264.80	Flow Area (sq ft)	818.69
E.G. Slope (ft/ft)	0.001070	Area (sq ft)	2010.27
Q Total (cfs)	8951.00	Flow (cfs)	1964.87
Top Width (ft)	936.00	Top Width (ft)	309.85
Vel Total (ft/s)	2.03	Avg. Vel. (ft/s)	2.40
Max Chl Dpth (ft)	17.52	Hydr. Depth (ft)	7.13
Conv. Total (cfs)	273683.0	Conv. (cfs)	60077.1
Length Wtd. (ft)	316.41	Wetted Per. (ft)	114.85
Min Ch El (ft)	254.00	Shear (lb/sq ft)	0.48
Alpha	1.07	Stream Power (lb/ft s)	1.14
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	16.16
C & E Loss (ft)	0.00	Cum SA (acres)	4.52

Warning: The cross-section end points had to be extended vertically for the computed water surface.
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 627.7707

INPUT

Description:

Station Elevation Data		num= 145
Sta	Elev	Sta Elev
0	270	23.311
51.7	266.81	58.258
74.023	266.11	81.155
112.654	266.62	115.535
129.324	266.87	131.285
158.226	266.93	170.966
186.677	266	240.293
278.84	266.21	282.303
302.182	267.19	309.306
321.831	268	333.229
345.08	261.94	352.311
362.998	254.26	363.687
414.193	262.29	418.934
466.598	266	484.768
527.399	268.46	530.386
545.653	274	558.898
597.737	275.98	598.342
608.898	274.55	615.854
636.951	273.34	637.127
647.737	270.91	651.406
661.234	268	698.242
709.035	265.54	713.708
753.244	263.56	760.927
779.58	262.91	781.618
791.592	262.28	796.234
810.789	263.26	813.692
844.296	262.96	850.692
871.659	263.26	876.01
897.092	263.47	901.481

Manning's n values		num= 3
Sta	n Val	Sta n Val
0	.075	333.229
		.15 423.079
		.075

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
333.229	423.079	152.69	155.13	152.21	.1	.3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent F
 770 919.598 , 280
 Skew Angle = 40

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	271.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	271.02	Reach Len. (ft)	32.00	32.00	32.00
Crit W.S. (ft)	265.55	Flow Area (sq ft)	1404.18	1132.95	1112.55

		Proposed(Capacity).rep			
E.G. Slope (ft/ft)	0.002143	Area (sq ft)	1404.18	1132.95	2297.92
Q Total (cfs)	8951.00	Flow (cfs)	3351.22	2708.92	2890.86
Top Width (ft)	807.21	Top width (ft)	333.23	89.85	384.13
Vel Total (ft/s)	2.45	Avg. Vel. (ft/s)	2.39	2.39	2.60
Max Chl Dpth (ft)	17.02	Hydr. Depth (ft)	4.21	12.61	4.74
Conv. Total (cfs)	193341.2	Conv. (cfs)	72386.1	58512.6	62442.5
Length wtd. (ft)	32.00	Wetted Per. (ft)	334.56	95.17	235.55
Min Ch El (ft)	254.00	Shear (lb/sq ft)	0.56	1.59	0.63
Alpha	1.00	Stream Power (lb/ft s)	1.34	3.81	1.64
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	6.52	8.25	9.02
C & E Loss (ft)	0.01	Cum SA (acres)	2.71	0.95	3.39

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: HRC
REACH: Main RS: 561.3247

INPUT

Description:
Distance from Upstream XS = 32
Deck/Roadway width = 88
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

num=	8																			
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	
0	268		250		324.4	267.85		250		324.4	267.85		250		434.4	267.52		265.98		
361.4	267.81		266.27		397.4	267.71		266.17												
434.4	267.52		250		965.9	268		250												

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	145																
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	270	23.311	269.04	29.661	268	32.702	267.72	44.691	266.88											
51.7	266.81	58.258	266.66	64.271	266.66	66.585	266.61	70.813	266.28											
74.023	266.11	81.155	266	95.648	266.04	107.805	266.47	109.759	266.46											
112.654	266.62	115.535	266.6	119.947	266.89	123.571	267	127.24	266.89											
129.324	266.87	131.285	266.74	133.568	266.72	146.82	266.98	153.569	266.99											
158.226	266.93	170.966	266.95	173.701	266.92	179.829	266.49	181.905	266.43											
186.677	266	240.293	265.87	265.166	265.97	266.017	266	273.792	266.09											
278.84	266.21	282.303	266.35	288.63	266.68	294.437	267.06	297.034	267.19											
302.182	267.19	309.306	267.41	315.955	267.49	317.74	267.62	318.422	267.56											
321.831	268	333.229	267.98	336.071	266.16	339.457	264.33	342.223	263.01											
345.08	261.94	352.311	259.43	354.089	258.63	356.923	257.46	359.543	256											
362.998	254.26	363.687	254	395.225	254.84	398.159	256	404.219	258.48											
414.193	262.29	418.934	264.2	423.079	266	452.357	265.87	465.862	265.95											
466.598	266	484.768	266.06	487.924	266.22	488.851	266.2	509.197	268											
527.399	268.46	530.386	269.69	534.799	270.96	538.131	272	543.7	273.54											
545.653	274	558.898	274.98	562.951	275.21	567.892	275.68	569.753	276											
597.737	275.98	598.342	275.75	602.302	274.86	604.309	274.78	605.681	274.65											
608.898	274.55	615.854	274.39	618.489	274	632.998	273.82	635.549	273.58											
636.951	273.34	637.127	273.19	640.995	272.58	643.025	272	644.963	271.83											
647.737	270.91	651.406	270	654.072	269.45	655.604	269.32	659.97	268.38											
661.234	268	698.242	266.27	699.927	266.28	705.343	266	706.944	265.7											
709.035	265.54	713.708	265.02	732.553	264.3	742.519	263.84	751.244	263.53											
753.244	263.56	760.927	263.49	763.233	263.5	769.63	263.36	775.091	263.17											
779.58	262.91	781.618	262.83	784.667	262.61	787.524	262.54	790.573	262.25											
791.592	262.28	796.234	262.64	801.183	262.97	806.614	263.28	808.951	263.33											
810.789	263.26	813.692	263.25	815.799	263.15	825.206	262.89	829.151	262.83											
844.296	262.96	850.692	262.91	855.457	263.08	860.919	263.14	864.703	263.27											
871.659	263.26	876.01	263.03	880.43	262.91	893.024	263.09	894.05	263.14											
897.092	263.47	901.481	263.48	914.611	263.9	915.798	264	919.598	264.19											

Manning's n values num= 3
Sta n Val Sta n Val
0 .075 333.229 .15 423.079 .075

Bank Sta: Left Right Coeff Contr. Expan.
333.229 423.079 .1 .3
Ineffective Flow num= 1

Proposed(Capacity).rep

Sta L Sta R Elev Permanent
770 919.598 280 F
Skew Angle = 40

Downstream Deck/Roadway Coordinates

num=	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
8	0	268	250	401.1	267.74	250	401.1	267.74	266.2						
	438.1	267.7	266.16	474.1	267.6	266.06	511.1	267.41	265.87						
	511.1	267.41	250	922	268	250									

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	132	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	268	28.956	266.45	30.305	266	72.82	264.3	77.133	264					
207.889	263.81	216.193	263.63	234.172	263.52	237.313	263.44	266.898	263.38					
267.932	263.39	304.258	263.24	313.19	263.26	338.109	262.93	349.232	262.69					
350.71	262.68	352.802	262.56	355.199	262.57	356.862	262.49	359.666	262.46					
364.07	262.55	365.426	262.62	370.153	262.72	371.8	262.81	373.148	262.83					
377.675	263.02	394.865	263.62	399.462	263.71	401.032	263.7	408.386	263.71					
409.16	263.63	411.695	263.53	414.706	263.19	417.747	262	420.252	261.42					
423.048	260.26	432.279	256.58	433.803	256	438.79	254.27	440.016	254					
471.937	255.19	479.605	257.8	480.946	258.28	485.09	259.7	488.269	260.71					
490.552	261.33	492.957	261.83	494.014	262	499.193	262.34	502.318	262.59					
503.751	262.62	508.041	262.72	510.147	262.66	512.553	262.69	517.685	262.86					
521.891	263.07	523.155	263.09	523.974	263.16	526.885	263.21	530.018	263.34					
535.871	263.43	542.62	263.68	544.183	263.66	546.833	263.71	547.53	263.69					
562.414	263.6	564.958	263.65	567.739	263.62	569.393	263.67	585.021	263.59					
602.701	263.68	604.057	263.71	611.748	263.63	612.767	263.68	620.35	263.63					
630.37	263.67	631.742	263.69	639.333	263.68	640.551	263.69	647.292	263.68					
668.328	263.88	670.411	263.95	689.34	263.72	704.5	263.67	716.029	263.52					
735.556	263.49	745.806	263.55	753.42	263.5	755.733	263.45	765.378	263.36					
768.266	263.37	770.02	263.32	772.832	263.34	776.478	263.27	779.443	263.26					
783.104	263.17	785.854	263.16	788.252	263.09	796.135	263.01	805.703	263.03					
810.781	263.08	812.888	263.14	815.623	263.16	816.282	263.2	819.177	263.22					
836.819	263.5	839.761	263.51	849.957	263.75	855.518	263.98	859.655	264.29					
862.39	264.42	863.279	264.4	864.198	264.5	865.998	264.49	867.362	264.54					
877.787	265	879.113	265.04	883.226	264.95	889.684	265.08	892.082	265.2					
901.259	266	914.136	267.39	917.047	268	922.846	269.15	927.358	270					
930.131	270.5	937.202	272	942.97	273.07	947.222	274	949.221	274.14					
954.361	274.9	958.429	275.77											

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .075 411.695 .15 503.751 .075

Bank Sta: Left Right Coeff Contr. Expan.
411.695 503.751 .1 .3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 120 275 F
Skew Angle = 40

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 361.4 Downstream= 438.1
Upstream num= 2
width Elev width Elev
1.5 250 1.5 267
Downstream num= 2
width Elev width Elev
1.5 250 1.5 267

Pier Data
Pier Station Upstream= 397.4 Downstream= 474.1
Upstream num= 2
width Elev width Elev
1.5 250 1.5 267
Downstream num= 2
width Elev width Elev

1.5 250 1.5 267

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Energy Only

Additional Bridge Parameters

Add Friction component to Momentum

Do not add weight component to Momentum

Class 8 flow critical depth computations use critical depth

inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (ft)	271.12	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	271.02	E.G. Elev (ft)	270.96	268.04
Q Total (cfs)	8951.00	W.S. Elev (ft)	270.72	265.76
Q Bridge (cfs)	1579.10	Crit W.S. (ft)	265.17	264.81
Q Weir (cfs)		Max Chl Dpth (ft)	16.72	11.76
Weir Sta Lft (ft)		Vel Total (ft/s)	3.59	12.01
Weir Sta Rgt (ft)		Flow Area (sq ft)	2491.94	745.13
Weir Submerg		Froude # Chl	0.15	0.62
Weir Max Depth (ft)		Specif Force (cu ft)	9993.79	6630.72
Min El Weir Flow (ft)	267.53	Hydr Depth (ft)	3.80	6.96
Min El Prs (ft)	266.30	W.P. Total (ft)	896.10	151.77
Delta EG (ft)	4.21	Conv. Total (cfs)	79131.6	22579.7
Delta WS (ft)	4.25	Top width (ft)	805.09	107.00
BR Open Area (sq ft)	670.27	Frctn Loss (ft)	2.73	0.49
BR Open Vel (ft/s)	2.36	C & E Loss (ft)	0.20	0.64
Coef of Q		Shear Total (lb/sq ft)	2.22	48.17
Br Sel Method	Energy only	Power Total (lb/ft s)	7.98	578.60

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 472.6398

INPUT

Description:

Station	Elevation	Data	num=	132						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	268	28.956	266.45	30.305	266	72.82	264.3	77.133	264	
207.889	263.81	216.193	263.63	234.172	263.52	237.313	263.44	266.898	263.38	
267.932	263.39	304.258	263.24	313.19	263.26	338.109	262.93	349.232	262.69	
350.71	262.68	352.802	262.56	355.199	262.57	356.862	262.49	359.666	262.46	
364.07	262.55	365.426	262.62	370.153	262.72	371.8	262.81	373.148	262.83	
377.675	263.02	394.865	263.62	399.462	263.71	401.032	263.7	408.386	263.71	
409.16	263.63	411.695	263.53	414.706	263.19	417.747	262	420.252	261.42	
423.048	260.26	432.279	256.58	433.803	256	438.79	254.27	440.016	254	
471.937	255.19	479.605	257.8	480.946	258.28	485.09	259.7	488.269	260.71	
490.552	261.33	492.957	261.83	494.014	262	499.193	262.34	502.318	262.59	
503.751	262.62	508.041	262.72	510.147	262.66	512.553	262.69	517.685	262.86	

				Proposed(Capacity).rep					
521.891	263.07	523.155	263.09	523.974	263.16	526.885	263.21	530.018	263.34
535.871	263.43	542.62	263.68	544.183	263.66	546.833	263.71	547.53	263.69
562.414	263.6	564.958	263.65	567.739	263.62	569.393	263.67	585.021	263.59
602.701	263.68	604.057	263.71	611.748	263.63	612.767	263.68	620.35	263.63
630.37	263.67	631.742	263.69	639.333	263.68	640.551	263.69	647.292	263.68
668.328	263.88	670.411	263.95	689.34	263.72	704.5	263.67	716.029	263.52
735.556	263.49	745.806	263.55	753.42	263.5	755.733	263.45	765.378	263.36
768.266	263.37	770.02	263.32	772.832	263.34	776.478	263.27	779.443	263.26
783.104	263.17	785.854	263.16	788.252	263.09	796.135	263.01	805.703	263.03
810.781	263.08	812.888	263.14	815.623	263.16	816.282	263.2	819.177	263.22
836.819	263.5	839.761	263.51	849.957	263.75	855.518	263.98	859.655	264.29
862.39	264.42	863.279	264.4	864.198	264.5	865.998	264.49	867.362	264.54
877.787	265	879.113	265.04	883.226	264.95	889.684	265.08	892.082	265.2
901.259	266	914.136	267.39	917.047	268	922.846	269.15	927.358	270
930.131	270.5	937.202	272	942.97	273.07	947.222	274	949.221	274.14
954.361	274.9	958.429	275.77						

Manning's n values num= 3
Sta n Val Sta n Val
0 .075 411.695 .15 503.751 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
411.695 503.751 286.58 305.07 300.37 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 120 275 F
Skew Angle = 40

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	266.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	266.77	Reach Len. (ft)	286.58	305.07	300.37
Crit W.S. (ft)	264.65	Flow Area (sq ft)	971.92	825.12	1239.96
E.G. Slope (ft/ft)	0.004789	Area (sq ft)	1173.97	825.12	1239.96
Q Total (cfs)	8951.00	Flow (cfs)	2972.48	2392.89	3585.63
Top width (ft)	885.45	Top width (ft)	388.74	92.06	404.65
Vel Total (ft/s)	2.95	Avg. vel. (ft/s)	3.06	2.90	2.89
Max Chl Dpth (ft)	12.77	Hydr. Depth (ft)	3.33	8.96	3.06
Conv. Total (cfs)	129343.8	Conv. (cfs)	42952.9	34577.8	51813.2
Length wtd. (ft)	299.96	wetted Per. (ft)	291.74	94.83	404.81
Min Ch El (ft)	254.00	Shear (lb/sq ft)	1.00	2.60	0.92
Alpha	1.00	Stream Power (lb/ft s)	3.05	7.54	2.65
Frctn Loss (ft)	3.49	Cum Volume (acre-ft)	4.27	5.22	6.15
C & E Loss (ft)	0.09	Cum SA (acres)	1.96	0.63	2.55

warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 167.5697

INPUT Description:

Station Elevation Data				num= 84			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	266	21.77	265.99	22.99	266	283.14	265.59
295.13	265.74	306.24	266	378.2	265.83	466.94	264
587.93	263.78	588.1	263.77	614.34	263.5	619.26	263.49
895.97	261.56	932.96	260.19	937.78	260	938.66	259.08
941.11	256.39	941.45	256	941.75	255.69	943.46	254
945.31	252	991.55	252.92	995.4	254	1002.1	255.85
1002.79	256.04	1009.83	258	1010.82	258.26	1017.52	260
1056.16	261.99	1056.42	262	1060.72	261.91	1063.94	262
1073.99	261.59	1074.24	261.55	1077.34	261.47	1080.23	261.29
1110.05	261.13	1112.06	261.47	1114.35	261.5	1114.86	261.72
1117.28	261.76	1119.77	260	1285.99	260.22	1286.45	260.21
1380.02	263.33	1382.13	263.68	1383.75	264	1385.2	264.71

Proposed(Capacity).rep									
1387.3	266	1389.93	267.32	1391.26	268	1405.59	274	1405.89	274.13
1407.42	274.71	1409.66	275.67	1409.98	275.8	1410.45	276	1410.82	276.18
1415.17	278.47	1415.63	278.67	1418.04	280	1421.54	281.15	1422.51	281.45
1424.24	282	1428.28	282.75	1429.59	283.02	1431.96	283.37	1432.13	283.39
1432.48	283.44	1434.29	284	1439.62	285.56	1440.86	285.91		

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
0	.075	932.96	.15
		1020.42	.075

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
932.96	1020.42	164.95	167.57	157.53	.1	.3	
Ineffective Flow	num=	2					
Sta L	Sta R	Elev	Permanent				
0	624.28	265.9999	F				
1235.99	1440.86	285.9134	F				

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	263.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.07	Wt. n-Val.	0.075	0.150	0.075
W.S. Elev (ft)	262.26	Reach Len. (ft)			
Crit W.S. (ft)	262.26	Flow Area (sq ft)	123.75	666.25	364.65
E.G. Slope (ft/ft)	0.059477	Area (sq ft)	123.75	666.25	543.76
Q Total (cfs)	8951.00	Flow (cfs)	426.05	6029.88	2495.07
Top Width (ft)	629.08	Top Width (ft)	205.72	87.46	335.90
Vel Total (ft/s)	7.75	Avg. Vel. (ft/s)	3.44	9.05	6.84
Max Chl Dpth (ft)	10.26	Hydr. Depth (ft)	0.60	7.62	1.69
Conv. Total (cfs)	36702.5	Conv. (cfs)	1747.0	24724.8	10230.8
Length wtd. (ft)		wetted Per. (ft)	205.75	91.88	216.39
Min Ch El (ft)	252.00	Shear (lb/sq ft)	2.23	26.92	6.26
Alpha	1.14	Stream Power (lb/ft s)	7.69	243.68	42.82
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

SUMMARY OF MANNING'S N VALUES

River:HRC

Reach	River Sta.	n1	n2	n3	n4	n5	n6
Main	9880.091	.075	.15	.075			
Main	9520.172	.075	.15	.075			
Main	9011.299	.075	.15	.075			
Main	8613.920	.075	.15	.075			
Main	8202.584	.075	.15	.075			
Main	7786.663	.075	.15	.075			
Main	7291.709	.075	.15	.075			
Main	6807.731	.075	.15	.075			
Main	6396.299	.075	.15	.075			
Main	6075.362	.075	.15	.075			
Main	5608.249	.075	.15	.075			
Main	5000.613	.075	.15	.075			
Main	4634.388	.075	.15	.075			
Main	4342.055	.075	.15	.075			
Main	3976.927	.075	.15	.075			
Main	3642.177	.075	.15	.075			
Main	3351.951	.075	.15	.075			
Main	3038.374	.075	.15	.075			
Main	2614.242	.075	.15	.75	.15	.15	.075
Main	2033.954	.075	.15	.15	.15	.075	
Main	1864.806	.075	.15	.15	.075		
Main	1717.589	.075	.15	.075			
Main	1517.721	.075	.04	.075			
Main	1466.171	Culvert					
Main	1394.093	.075	.04	.075			
Main	930.4035	.075	.15	.075			
Main	627.7707	.075	.15	.075			
Main	561.3247	Bridge					
Main	472.6398	.075	.15	.075			

Main	167.5697	Proposed(Capacity).rep .075 .15 .075
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SUMMARY OF REACH LENGTHS

River: HRC

Reach	River Sta.	Left	Channel	Right
Main	9880.091	362.17	359.92	357.61
Main	9520.172	509.29	508.87	507.92
Main	9011.299	397.35	397.38	397.4
Main	8613.920	411.22	411.34	411.42
Main	8202.584	422.86	415.92	415.91
Main	7786.663	499.23	494.95	494.98
Main	7291.709	480.67	483.98	485.99
Main	6807.731	406.99	411.43	413.61
Main	6396.299	314.29	320.94	323.63
Main	6075.362	433.42	467.11	451.66
Main	5608.249	386.8	607.64	624.67
Main	5000.613	325.18	366.23	367.72
Main	4634.388	279.84	292.33	293.02
Main	4342.055	344.09	365.13	365.45
Main	3976.927	334.84	334.75	343.16
Main	3642.177	258.14	290.23	300.27
Main	3351.951	278.96	313.58	317.16
Main	3038.374	564.8	424.13	403.85
Main	2614.242	566.01	580.29	596.27
Main	2033.954	314.82	169.15	136.16
Main	1864.806	303.13	147.22	135.57
Main	1717.589	260.39	199.87	163.52
Main	1517.721	125.59	123.63	106.49
Main	1466.171	Culvert		
Main	1394.093	420.88	463.69	516.28
Main	930.4035	245.97	302.63	371.27
Main	627.7707	152.69	155.13	152.21
Main	561.3247	Bridge		
Main	472.6398	286.58	305.07	300.37
Main	167.5697	164.95	167.57	157.53

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: HRC

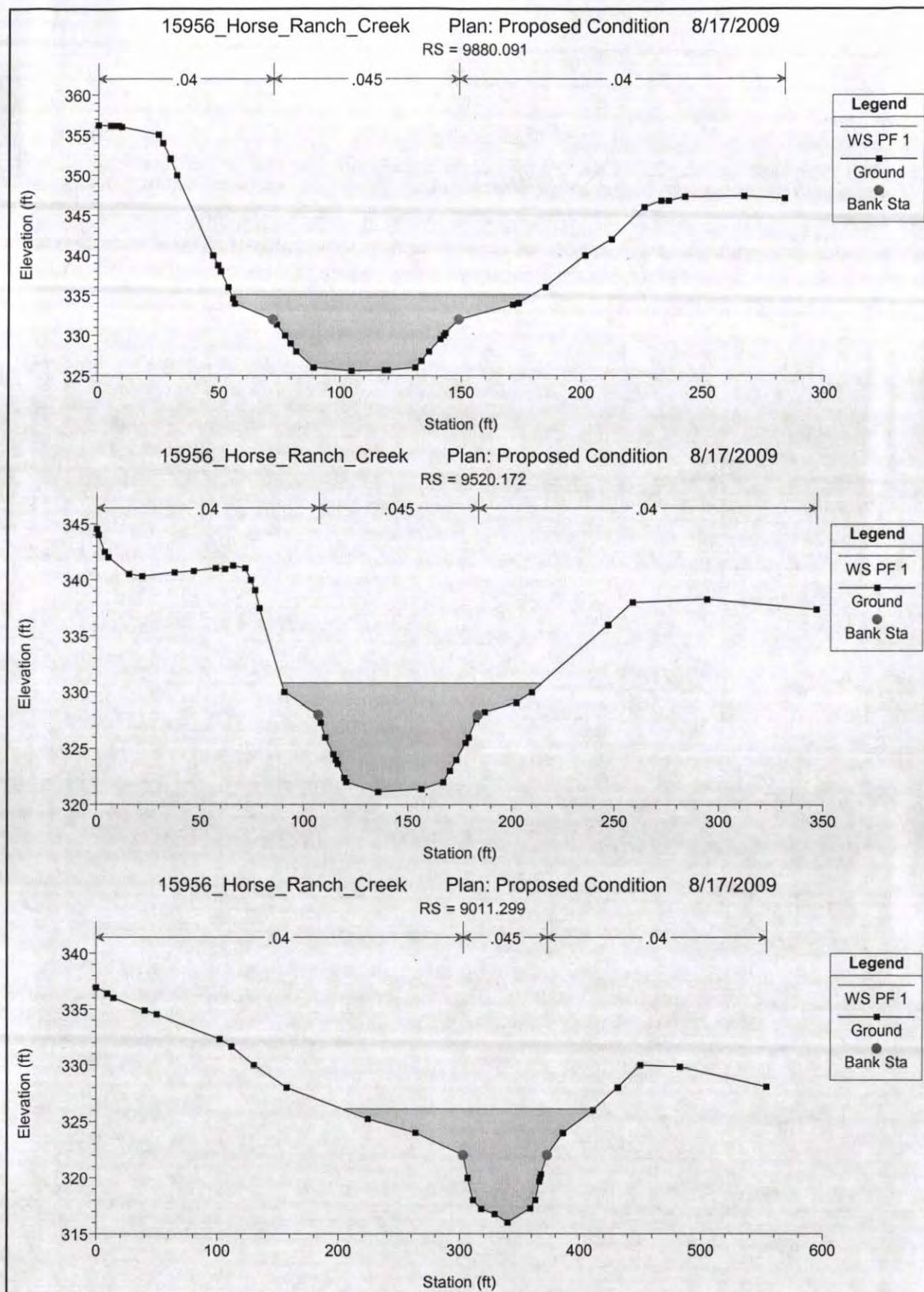
Reach	River Sta.	Contr.	Expan.
Main	9880.091	.1	.3
Main	9520.172	.1	.3
Main	9011.299	.1	.3
Main	8613.920	.1	.3
Main	8202.584	.1	.3
Main	7786.663	.1	.3
Main	7291.709	.1	.3
Main	6807.731	.1	.3
Main	6396.299	.1	.3
Main	6075.362	.1	.3
Main	5608.249	.1	.3
Main	5000.613	.1	.3
Main	4634.388	.1	.3
Main	4342.055	.1	.3
Main	3976.927	.1	.3
Main	3642.177	.1	.3
Main	3351.951	.1	.3
Main	3038.374	.1	.3
Main	2614.242	.1	.3
Main	2033.954	.1	.3
Main	1864.806	.1	.3
Main	1717.589	.1	.3
Main	1517.721	.3	.5
Main	1466.171	Culvert	
Main	1394.093	.3	.5
Main	930.4035	.1	.3
Main	627.7707	.1	.3
Main	561.3247	Bridge	

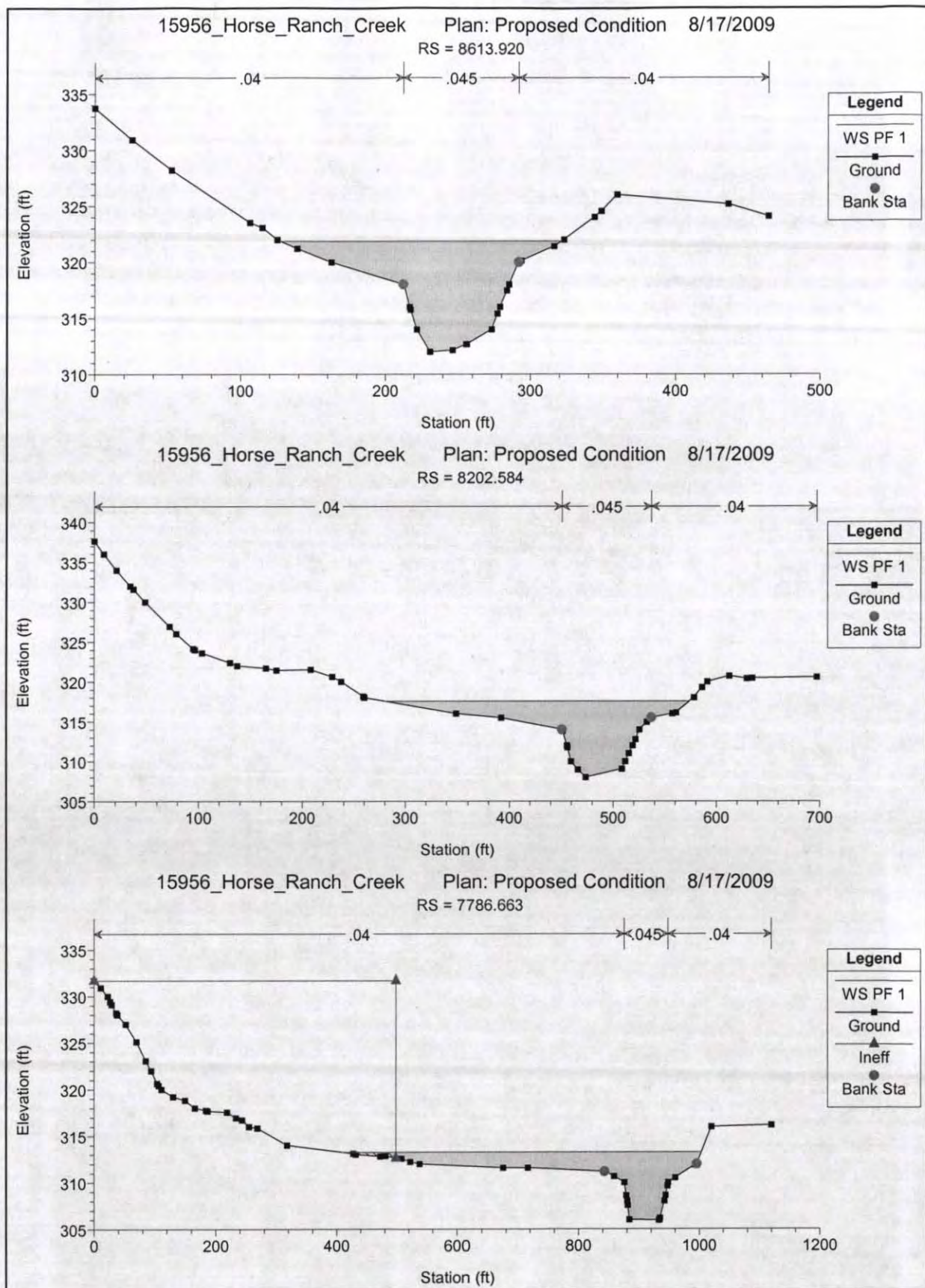
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Main	472.6398	.1	.3	
Main	167.5697	.1	.3	

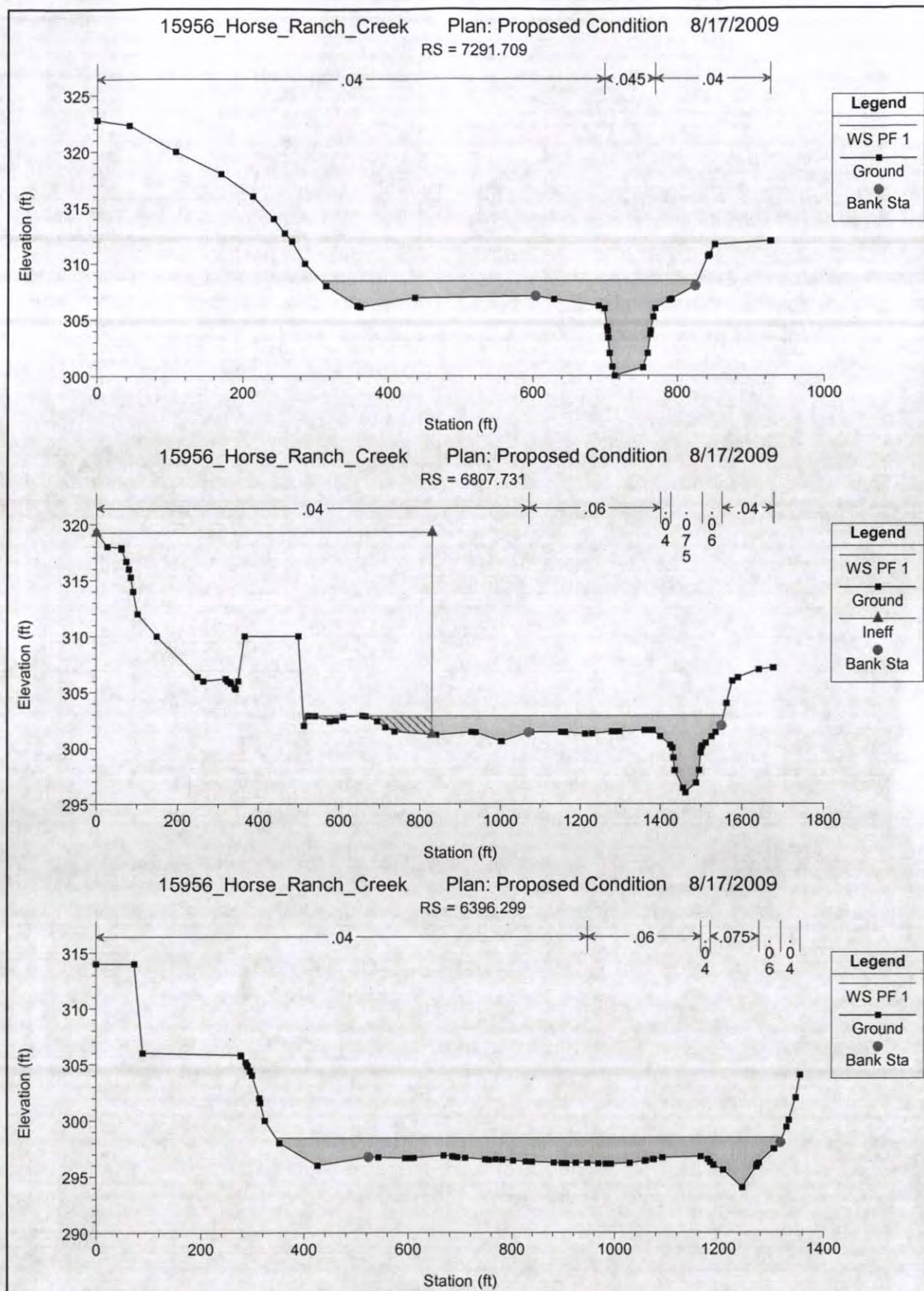
Proposed .p12
.g09
.f02

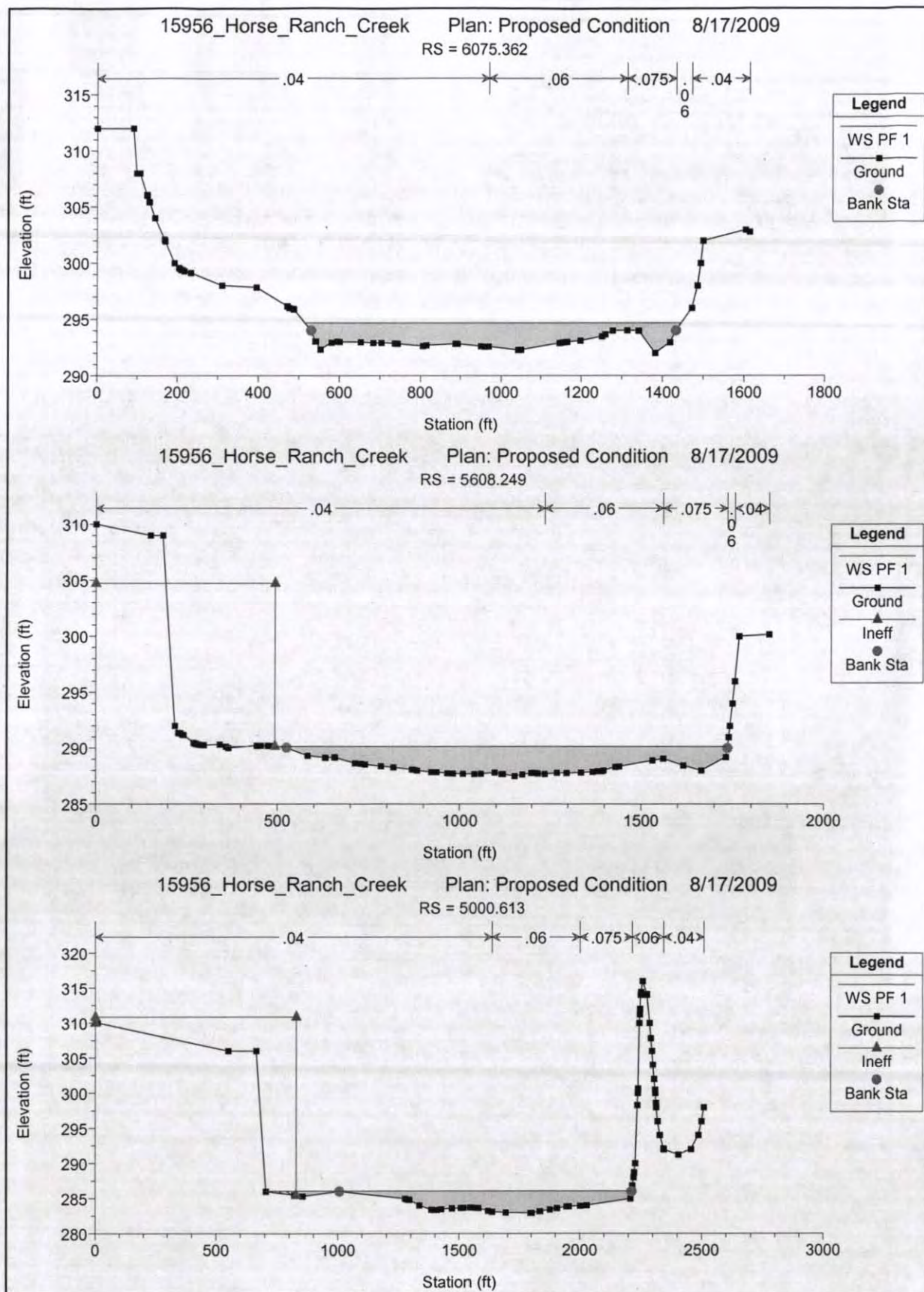
HEC-RAS Plan: Proposed Cond. River: HRC Reach: Main Profile: PF 1

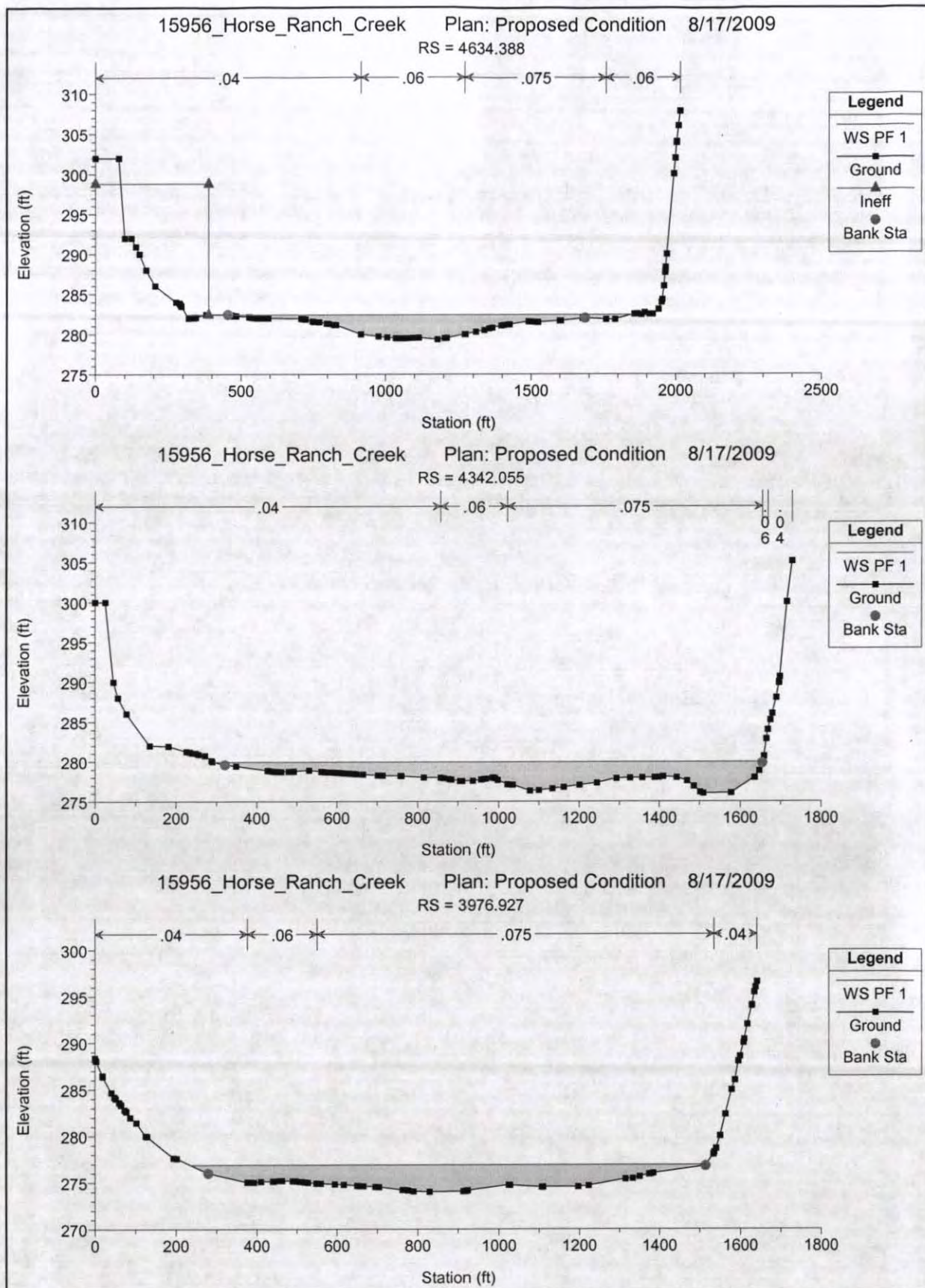
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	8880.091	PF 1	8951.00	325.59	335.08	335.08	337.96	0.011772	13.95	691.49	124.48	0.88
Main	9520.172	PF 1	8951.00	321.13	330.80	330.71	333.62	0.011251	13.77	699.29	125.51	0.86
Main	9011.299	PF 1	8951.00	316.00	326.12	326.12	328.32	0.009018	12.76	852.81	208.69	0.77
Main	8613.920	PF 1	8951.00	312.00	321.87	321.87	324.11	0.010002	12.69	818.64	194.11	0.80
Main	8202.584	PF 1	8951.00	308.00	317.57	317.57	319.33	0.009177	11.61	969.11	294.82	0.76
Main	7786.683	PF 1	8951.00	305.94	313.28	313.28	314.34	0.008459	9.36	1236.15	596.50	0.78
Main	7281.709	PF 1	8951.00	300.00	308.46	308.46	309.53	0.009033	9.11	1203.14	519.58	0.87
Main	6807.731	PF 1	8951.00	296.00	302.89	302.52	303.48	0.015832	5.78	1477.31	1044.08	0.69
Main	6396.299	PF 1	8951.00	294.00	298.44		298.77	0.008458	4.51	1954.81	975.42	0.55
Main	6075.362	PF 1	8951.00	292.00	294.68		295.17	0.015441	5.60	1604.62	831.74	0.74
Main	5608.249	PF 1	8951.00	287.48	290.14	289.47	290.39	0.007098	4.01	2232.64	1297.27	0.52
Main	5000.613	PF 1	8951.00	282.91	286.06	285.14	286.28	0.006435	3.73	2442.24	1509.17	0.47
Main	4634.388	PF 1	8951.00	279.38	282.42	282.08	282.78	0.015481	4.80	1911.29	1456.82	0.69
Main	4342.055	PF 1	8951.00	276.00	279.95		280.11	0.005813	3.14	2857.35	1363.48	0.38
Main	3976.927	PF 1	8951.00	274.00	276.88		277.09	0.012598	3.72	2415.75	1280.02	0.47
Main	3642.177	PF 1	8951.00	271.44	274.13	273.04	274.23	0.008026	2.68	3402.07	1972.97	0.33
Main	3351.951	PF 1	8951.00	268.75	272.74	271.06	272.85	0.003852	2.70	3327.33	1283.32	0.29
Main	3038.374	PF 1	8951.00	266.96	272.15		272.21	0.001235	1.90	4714.46	1232.67	0.17
Main	2814.242	PF 1	8951.00	263.52	271.99		272.01	0.000214	1.22	7313.70	1183.96	0.09
Main	2033.954	PF 1	8951.00	260.00	271.91		271.93	0.000105	1.12	7963.02	1066.52	0.07
Main	1864.806	PF 1	8951.00	260.00	271.85	265.28	271.90	0.000335	1.80	4977.34	1362.59	0.11
Main	1717.589	PF 1	8951.00	258.00	271.66	265.85	271.81	0.000905	3.14	2850.46	1067.58	0.19
Main	1517.721	PF 1	8951.00	258.00	271.13	263.78	271.58	0.001072	5.40	1687.51	730.64	0.29
Main	1466.171 Pankkey Road			Culvert								
Main	1394.093	PF 1	8951.00	258.00	270.47	263.77	270.95	0.001156	5.62	1650.86	705.13	0.31
Main	930.4035	PF 1	8951.00	254.00	270.31	264.29	270.41	0.000524	2.86	3661.21	925.77	0.15
Main	627.7707	PF 1	8951.00	254.00	270.03	265.54	270.17	0.001092	3.23	3001.51	799.90	0.17
Main	561.3247 SR-76			Bridge								
Main	472.6398	PF 1	8951.00	254.00	265.55	264.73	265.87	0.005042	5.40	2081.79	854.56	0.34
Main	167.5697	PF 1	8951.00	252.00	262.28	262.28	263.35	0.015088	9.14	1167.54	631.85	0.58

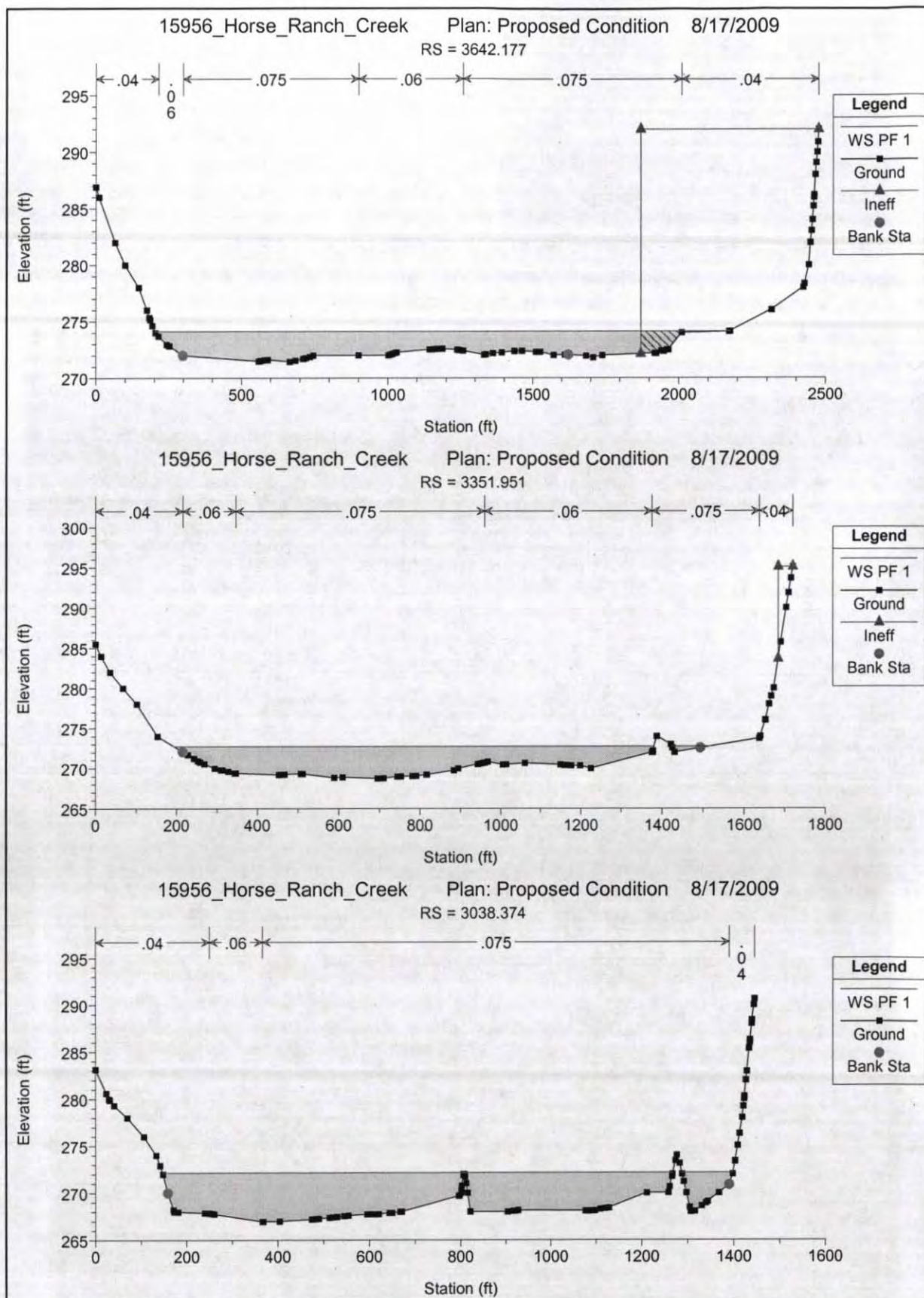


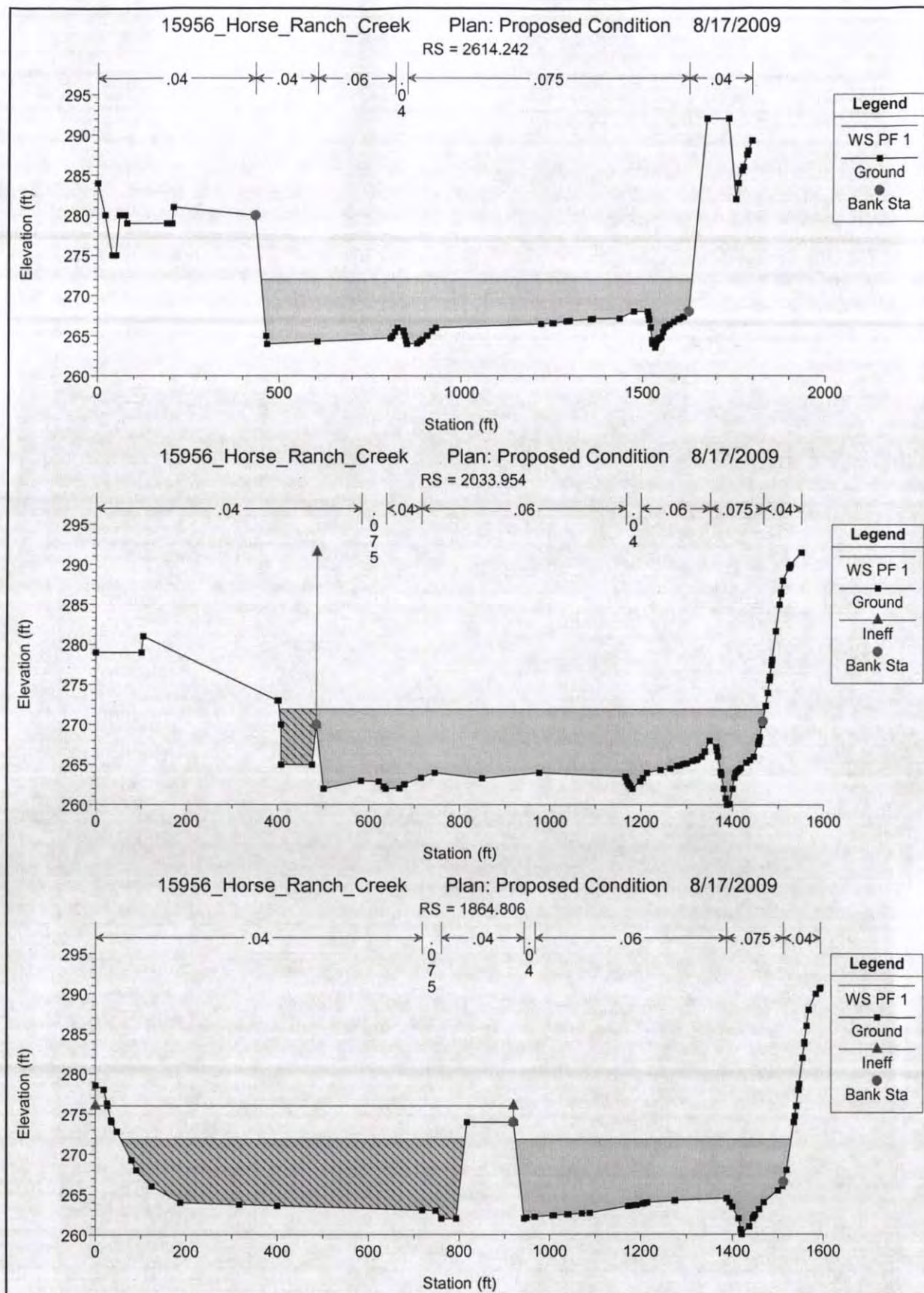


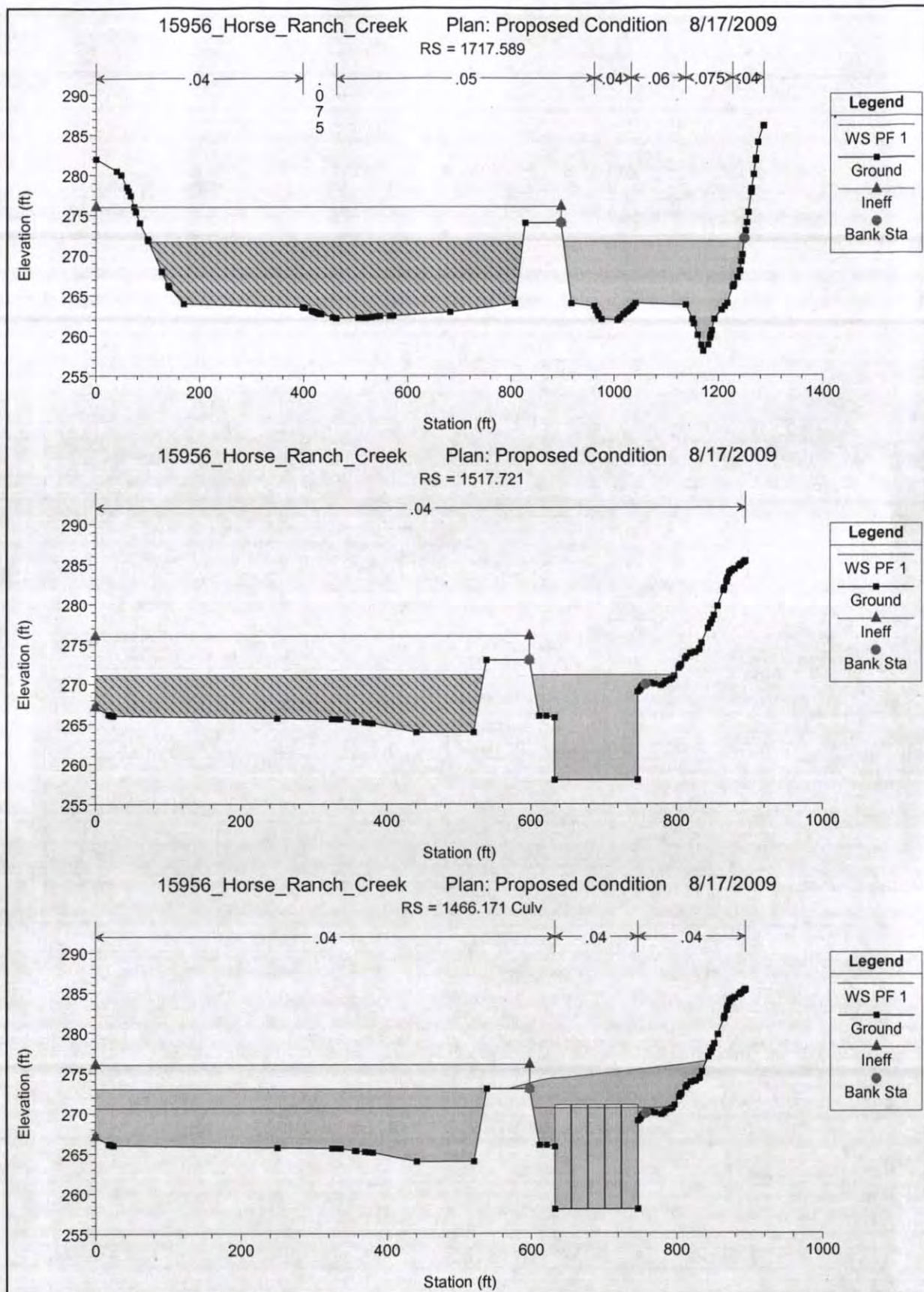


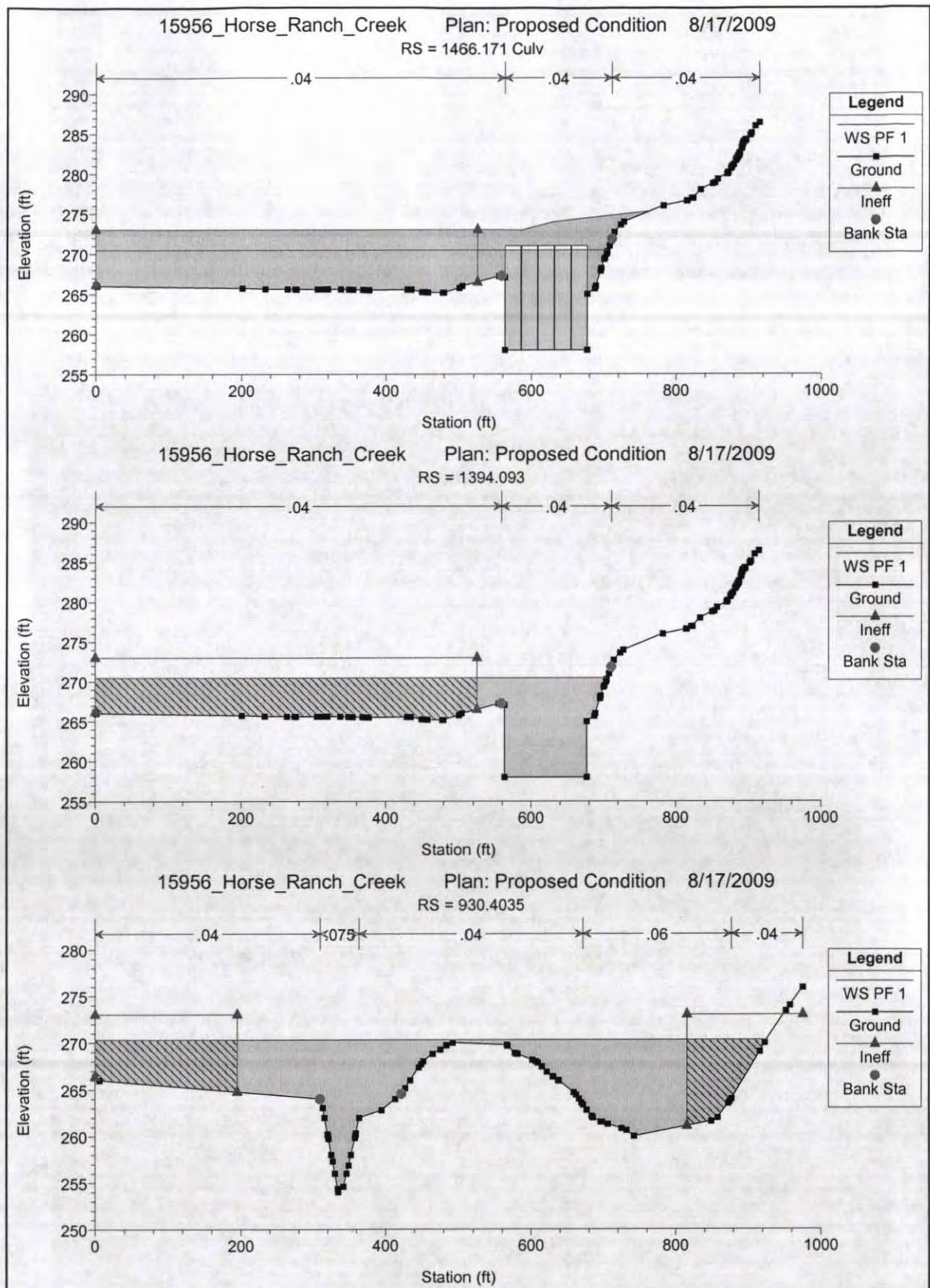


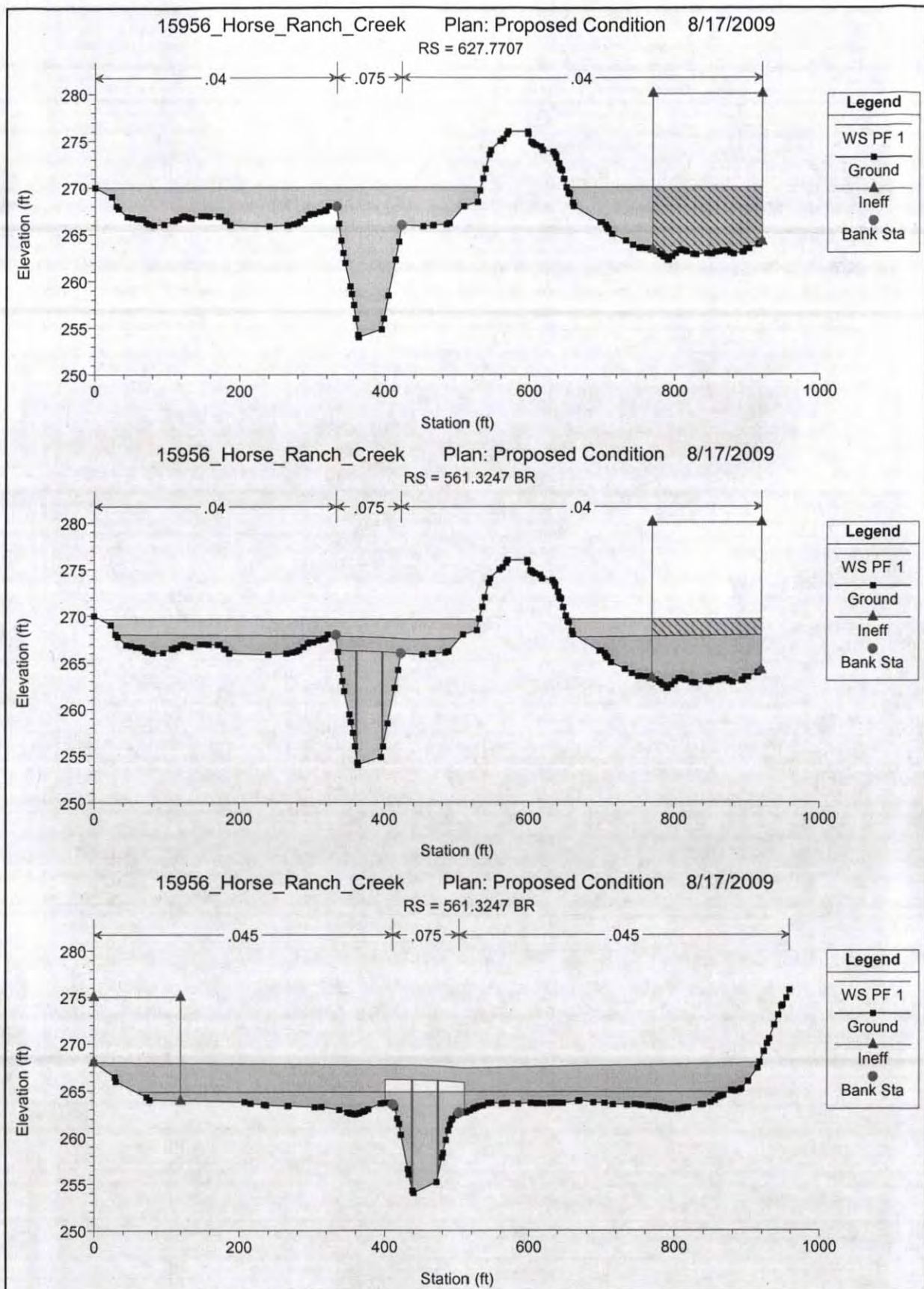


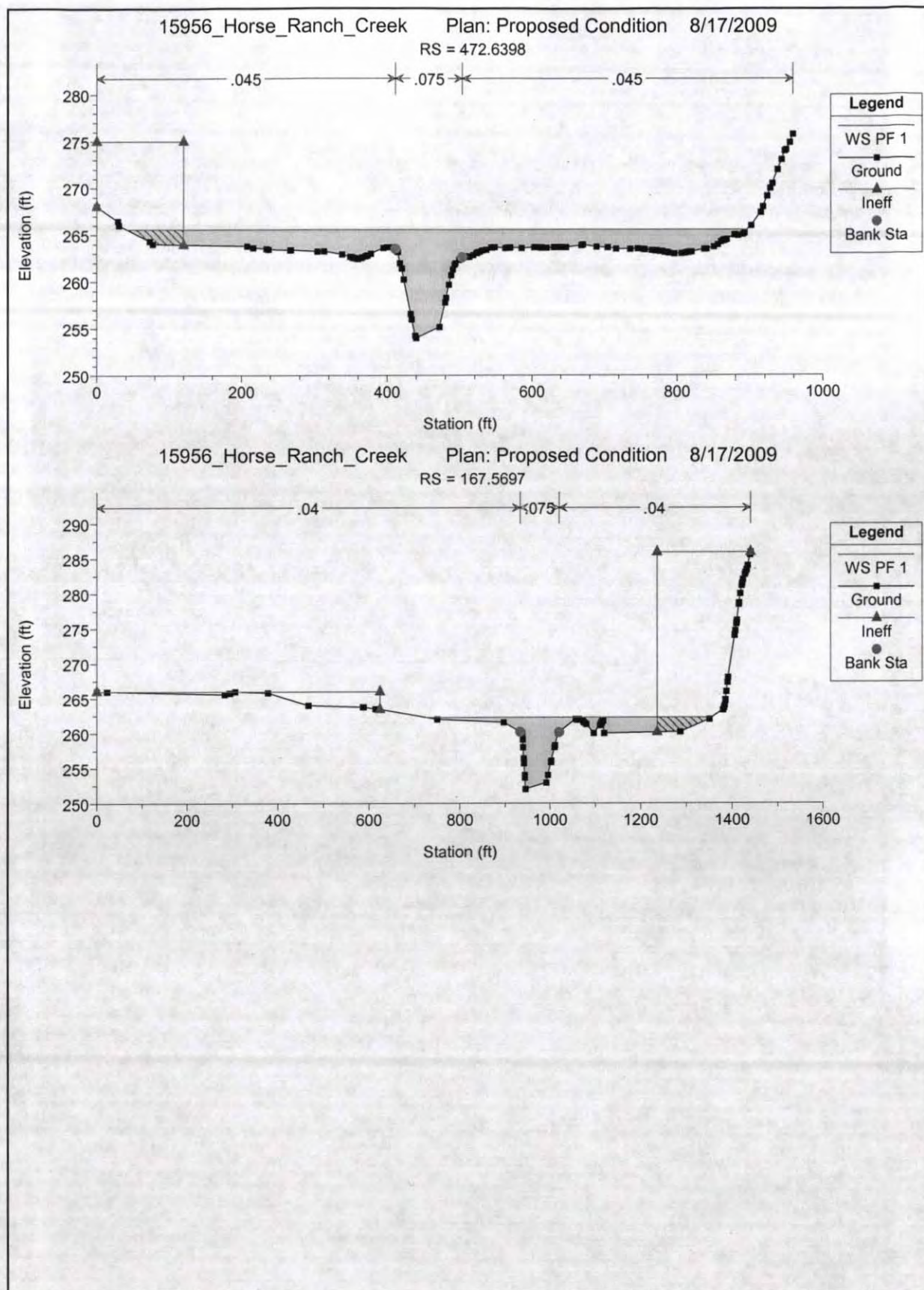












Proposed.rep

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X   X  XXXXXX  XXXX  XXXX  XX  XXXX
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PROJECT DATA

Project Title: 15956_Horse_Ranch_Creek
Project File : 15956_Horse_Ranch_C.prj
Run Date and Time: 8/17/2009 11:44:09 AM

Project in English units

PLAN DATA

Plan Title: Proposed Condition

Plan File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.p12

Geometry Title: Proposed Condition

Geometry File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.g09

Flow Title : Existing Condition

Flow File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.f02

Plan Summary Information:

Number of:	Cross Sections = 28	Multiple Openings = 0
	Culverts = 1	Inline Structures = 0
	Bridges = 1	Lateral Structures = 0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Existing Condition

Flow File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.f02

Flow Data (cfs)

River	Reach	RS	PF 1
HRC	Main	9880.091	8951

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
HRC	Main	PF 1		Known WS = 259.19

GEOMETRY DATA

Geometry Title: Proposed Condition

Geometry File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.g09

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 9880.091

INPUT

Description:

Station Elevation Data				num=	45			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	356.21	4.96	356.15	7.11	356.17	8.21	356.15	
24.55	355.05	26.43	354	29.57	352.07	29.68	352	
47.48	340	49.52	338.74	50.76	338	53.83	336	
56.63	334	72.44	332	74	331.38	77.42	330	
82.01	328	89.13	326.01	89.15	326	104.78	325.59	
119.75	325.67	130.98	326	133.59	326.84	136.72	328	
142.71	330	143.48	330.29	148.95	332	171.34	333.85	
173.83	334.08	184.94	336	201.56	340	212.53	342	
232.93	346.83	236	346.82	242.62	347.33	266.82	347.4	

Manning's n Values				num=	3			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	
0	.04	72.44	.045	148.95	.04			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	72.44	148.95		362.17	359.92	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	337.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.88	Wt. n-val.	0.040	0.045	0.040
W.S. Elev (ft)	335.08	Reach Len. (ft)	362.17	359.92	357.61
Crit W.S. (ft)	335.08	Flow Area (sq ft)	33.64	604.03	53.82
E.G. Slope (ft/ft)	0.011772	Area (sq ft)	33.64	604.03	53.82
Q Total (cfs)	8951.00	Flow (cfs)	207.22	8429.15	314.63
Top width (ft)	124.48	Top width (ft)	17.33	76.51	30.64
Vel Total (ft/s)	12.94	Avg. Vel. (ft/s)	6.16	13.95	5.85
Max chl Dpth (ft)	9.49	Hydr. Depth (ft)	1.94	7.89	1.76
Conv. Total (cfs)	82497.0	Conv. (cfs)	1909.9	77687.3	2899.8
Length wtd. (ft)	359.89	Wetted Per. (ft)	17.80	78.58	30.81
Min Ch El (ft)	325.59	Shear (lb/sq ft)	1.39	5.65	1.28
Alpha	1.11	Stream Power (lb/ft s)	8.56	78.84	7.50
Frctn Loss (ft)	4.14	Cum Volume (acre-ft)	123.09	460.15	8.97
C & E Loss (ft)	0.02	Cum SA (acres)	46.83	142.57	17.77

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 9520.172

INPUT

Description:

Station Elevation Data				num=	44			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	344.54	.81	344	3.72	342.5	5.48	342	
21.68	340.32	37.49	340.67	46.74	340.79	57.25	341.05	
65.73	341.29	71.62	341.04	74.39	340	76.38	339.08	
90.72	330	106.28	328.1	106.87	328.02	107.07	328	
108.16	327.32	110.33	326	114.19	324.48	115.4	324	
119.46	322.39	120.45	322	135.74	321.13	156.48	321.38	
170.19	323.02	173.28	324	177.73	325.52	179.17	326	
183.68	328	186.95	328.26	202.47	329.1	209.97	330	
247.15	336	258.84	338	294.35	338.28	346.88	337.4	

Proposed.rep

Manning's n values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .04 107.07 .045 183.68 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 107.07 183.68 509.29 508.87 507.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	333.62	wt. n-Val.	0.040	0.045	0.040
Vel Head (ft)	2.82	Reach Len. (ft)	509.29	508.87	507.92
W.S. Elev (ft)	330.80	Flow Area (sq ft)	29.91	616.41	52.96
Crit W.S. (ft)	330.71	Area (sq ft)	29.91	616.41	52.96
E.G. Slope (ft/ft)	0.011251	Flow (cfs)	165.34	8489.93	295.74
Q Total (cfs)	8951.00	Top width (ft)	17.65	76.61	31.25
Top width (ft)	125.51	Avg. Vel. (ft/s)	5.53	13.77	5.58
Vel Total (ft/s)	12.80	Hydr. Depth (ft)	1.69	8.05	1.70
Max Chl Dpth (ft)	9.67	Conv. (cfs)	1558.8	80041.1	2788.1
Conv. Total (cfs)	84388.0	Wetted Per. (ft)	18.00	79.05	31.40
Length Wtd. (ft)	508.86	Shear (lb/sq ft)	1.17	5.48	1.18
Min Ch El (ft)	321.13	Stream Power (lb/ft s)	6.45	75.44	6.62
Alpha	1.11	Cum Volume (acre-ft)	122.83	455.11	8.53
Frctn Loss (ft)	5.11	Cum SA (acres)	46.68	141.93	17.52
C & E Loss (ft)	0.18				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 9011.299

INPUT

Description:

Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	336.94	9.18	336.39	14.2	336	40	334.87	49.9	334.54
102.26	332.33	111.98	331.67	130.58	330	157.67	328	224.45	325.23
263.55	324	302.4	322.04	302.96	322	303.1	321.92	306.6	320
306.69	319.96	311.11	318	318.04	317.21	329.24	316.74	339.93	316
358.86	317.25	363.21	318	366.57	319.66	367.27	320	368.19	320.29
373.15	322	386.2	323.95	386.47	324	411.5	326	431.87	328
432.2	328.03	450.45	330	482.96	329.85	553.75	328.1		

Manning's n values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .04 302.96 .045 373.15 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 302.96 373.15 397.35 397.38 397.4 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	328.32	wt. n-Val.	0.040	0.045	0.040
Vel Head (ft)	2.20	Reach Len. (ft)	397.35	397.38	397.40
W.S. Elev (ft)	326.12	Flow Area (sq ft)	191.02	592.10	69.69
Crit W.S. (ft)	326.12	Area (sq ft)	191.02	592.10	69.69
E.G. Slope (ft/ft)	0.009018	Flow (cfs)	1037.18	7556.69	357.13
Q Total (cfs)	8951.00	Top width (ft)	99.94	70.19	39.56
Top width (ft)	209.69	Avg. Vel. (ft/s)	5.43	12.76	5.12
Vel Total (ft/s)	10.50	Hydr. Depth (ft)	1.91	8.44	1.76
Max Chl Dpth (ft)	10.12	Conv. (cfs)	10922.0	79576.1	3760.8
Conv. Total (cfs)	94259.0	Wetted Per. (ft)	100.03	72.11	39.80
Length Wtd. (ft)	397.38	Shear (lb/sq ft)	1.08	4.62	0.99
Min Ch El (ft)	316.00	Stream Power (lb/ft s)	5.84	59.00	5.05
Alpha	1.29	Cum Volume (acre-ft)	121.53	448.05	7.82
Frctn Loss (ft)	3.77	Cum SA (acres)	46.00	141.08	17.10
C & E Loss (ft)	0.00				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

Proposed.rep

section. This may indicate the need for additional cross sections.
 warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 8613.920

INPUT

Description:

Station	Elevation	Data	num=	33
Sta	Elev	Sta	Elev	Sta
0	333.75	25.42	330.91	52.61
125.21	322	138.89	321.2	162.54
212.94	317.99	216.92	316	217.53
231.23	312	246.79	312.15	256.03
278.95	316	283.59	317.47	285.07
293.5	320.12	316.25	321.42	323.14
359.68	326	436.39	325.17	464.29

Sta	n Val	Sta	n Val
0	.04	212.46	.045
		291.7	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	212.46	291.7		411.22	411.34	411.42	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	324.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.24	Wt. n-Val.	0.040	0.045	0.040
W.S. Elev (ft)	321.87	Reach Len. (ft)	411.22	411.34	411.42
Crit W.S. (ft)	321.87	Flow Area (sq ft)	176.50	612.71	29.44
E.G. Slope (ft/ft)	0.010002	Area (sq ft)	176.50	612.71	29.44
Q Total (cfs)	8951.00	Flow (cfs)	1066.57	7776.29	108.14
Top width (ft)	194.11	Top width (ft)	85.00	79.24	29.88
Vel Total (ft/s)	10.93	Avg. Vel. (ft/s)	6.04	12.69	3.67
Max chl Dpth (ft)	9.87	Hydr. Depth (ft)	2.08	7.73	0.99
Conv. Total (cfs)	89499.6	Conv. (cfs)	10664.5	77753.8	1081.2
Length wtd. (ft)	411.32	wetted Per. (ft)	85.09	81.32	29.94
Min Ch El (ft)	312.00	Shear (lb/sq ft)	1.30	4.70	0.61
Alpha	1.21	Stream Power (lb/ft s)	7.83	59.71	2.26
Frctn Loss (ft)	3.94	Cum Volume (acre-ft)	119.86	442.55	7.37
C & E Loss (ft)	0.15	Cum SA (acres)	45.15	140.39	16.79

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
 warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
 warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 8202.584

INPUT

Description:

Station	Elevation	Data	num=	49
Sta	Elev	Sta	Elev	Sta
0	337.64	9.17	336	21.22
48.71	330	72.47	326.93	78.8
103.57	323.6	130.55	322.37	137.26
208.09	321.51	228.99	320.63	237.64
260.29	318	349.37	316	392
451.32	313.99	451.72	313.81	455.88
466.29	308.95	473.81	308	508.45
518.81	312	521.48	312.77	525.43
557.15	316	560.91	316.12	578.25
612.59	320.72	629.46	320.39	634.67

Sta	n Val	Sta	n Val

Proposed.rep

Sta	n Val	Sta	n Val	Sta	n Val				
0	.04	450.96	.045	536.95	.04				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	450.96	536.95		422.86 415.92	415.91	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	319.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.76	Wt. n-Val.	0.040	0.045	0.040
W.S. Elev (ft)	317.57	Reach Len. (ft)	422.86	415.92	415.91
Crit W.S. (ft)	317.57	Flow Area (sq ft)	298.90	618.28	51.92
E.G. Slope (ft/ft)	0.009177	Area (sq ft)	298.90	618.28	51.92
Q Total (cfs)	8951.00	Flow (cfs)	1540.26	7180.85	229.89
Top Width (ft)	294.82	Top width (ft)	171.50	85.99	37.33
Vel Total (ft/s)	9.24	Avg. vel. (ft/s)	5.15	11.61	4.43
Max Chl Dpth (ft)	9.57	Hydr. Depth (ft)	1.74	7.19	1.39
Conv. Total (cfs)	93436.9	Conv. (cfs)	16078.3	74958.8	2399.7
Length Wtd. (ft)	417.52	Wetted Per. (ft)	171.54	87.88	37.42
Min Ch El (ft)	308.00	Shear (lb/sq ft)	1.00	4.03	0.80
Alpha	1.33	Stream Power (lb/ft s)	5.14	46.81	3.52
Frctn Loss (ft)	3.68	Cum Volume (acre-ft)	117.61	436.74	6.98
C & E Loss (ft)	0.21	Cum SA (acres)	43.94	139.61	16.47

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 7786.663

INPUT

Description:

Station	Elevation	Data	num=	56						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	331.69	11.02	330.91	22.23	330	26.19	329.45	26.37	329.42	
28.6	329.11	35.86	328.21	37.16	328.04	37.84	328	51.59	326.98	
69.38	325.11	84.66	323.06	93.55	322	103.27	320.63	106.28	320.42	
110.71	320	129.88	319.22	149.8	318.82	165.77	318	183.5	317.76	
186.38	317.67	218.7	317.54	233.45	316.95	243.56	316.72	254.77	316	
268.71	315.85	317.55	314	427.38	313.11	431.73	313.02	472.42	312.81	
481.42	312.86	502.06	312.58	508.03	312.57	522.58	312.23	538.07	312	
675.31	311.58	716.14	311.57	843.24	311.17	858.72	310.66	875.86	310	
878.94	308.6	880.25	308	881.12	307.55	884.05	306	932.62	305.94	
933.7	306	934.43	306.18	941.88	308	943.78	308.62	946.86	309.62	
948.07	310	959.93	310.5	992.77	311.88	995.49	312	1020.18	315.99	
1119.98	316.17									

Manning's n values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.04	875.86	.045	948.07	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	843.24	995.49		499.23 494.95	494.98	.1	.3

Ineffective Flow	num=	1			
Sta L	Sta R	Elev	Permanent		
0	498.54	331.69	44		

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	314.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.040	0.044	0.040
W.S. Elev (ft)	313.28	Reach Len. (ft)	499.23	494.95	494.98
Crit W.S. (ft)	313.28	Flow Area (sq ft)	552.93	678.18	5.04
E.G. Slope (ft/ft)	0.008459	Area (sq ft)	583.32	678.18	5.04
Q Total (cfs)	8951.00	Flow (cfs)	2588.73	6349.62	12.65
Top Width (ft)	596.50	Top width (ft)	436.35	152.25	7.90
Vel Total (ft/s)	7.24	Avg. vel. (ft/s)	4.68	9.36	2.51
Max Chl Dpth (ft)	7.34	Hydr. Depth (ft)	1.60	4.45	0.64

Proposed.rep

Description:

Station Elevation Data			num=	76							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	319.25	27.12	318	60.91	317.89	61.89	317.79	73.41	316.69		
79.96	316	84.77	315.27	90.52	314	101.51	312	148.64	310		
248.87	306.38	263.31	306	318.83	306.2	319.45	306.19	323.87	306		
330.08	305.92	330.66	305.89	332.54	305.77	341.39	305.44	343.79	305.27		
350	306	366	310	500	310	514	302	524.29	302.87		
525.73	302.88	541.42	302.87	577.25	302.4	592.63	302.46	611.19	302.79		
658.39	302.89	666.97	302.85	694.75	302.4	714.87	301.86	738.03	301.49		
840.87	301.19	928.04	301.44	938.93	301.41	1001.51	300.62	1003.45	300.61		
1070.96	301.4	1076.9	301.42	1152.88	301.45	1160.52	301.44	1162.72	301.43		
1212.27	301.28	1229.38	301.29	1279.44	301.47	1282.73	301.48	1287.13	301.47		
1297.55	301.48	1361.17	301.59	1374.41	301.58	1381.5	301.6	1400	301.029		
1424.57	300.27	1429.66	300	1431.96	299.13	1434.99	298	1456.03	296.4		
1461.39	296	1487.48	296.88	1494.85	298	1499.39	299.57	1500.54	300		
1502.06	300.17	1503.54	300.18	1511.77	300.44	1526.07	301.01	1536.03	301.4		
1551.01	302	1563.3	304	1577.18	306	1590.67	306.28	1641.78	307.02		
1676.45	307.17										

Manning's n values		num=		6							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1070.96	.06	1400	.04	1424.57	.075	1502.06	.06		
1551.01	.04										

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1070.96	1551.01		406.99	411.43	413.61	.1	.3
Ineffective Flow	num=		1					
Sta L	Sta R	Elev	Permanent					
0	830.34	319.2468	F					

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	303.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	wt. n-val.	0.040	0.067	0.040
W.S. Elev (ft)	302.89	Reach Len. (ft)	406.99	411.43	413.61
Crit W.S. (ft)	302.52	Flow Area (sq ft)	421.18	1053.67	2.46
E.G. Slope (ft/ft)	0.015832	Area (sq ft)	644.49	1053.67	2.46
Q Total (cfs)	8951.00	Flow (cfs)	2859.25	6085.08	6.67
Top width (ft)	1044.08	Top width (ft)	558.53	480.05	5.50
Vel Total (ft/s)	6.06	Avg. Vel. (ft/s)	6.79	5.78	2.71
Max Chl Dpth (ft)	6.89	Hydr. Depth (ft)	1.75	2.19	0.45
Conv. Total (cfs)	71137.7	Conv. (cfs)	22723.8	48361.0	53.0
Length wtd. (ft)	410.34	Wetted Per. (ft)	240.63	481.00	5.57
Min Ch El (ft)	296.00	Shear (lb/sq ft)	1.73	2.17	0.44
Alpha	1.02	Stream Power (lb/ft s)	11.74	12.50	1.18
Frctn Loss (ft)	4.63	Cum Volume (acre-ft)	101.33	412.43	6.66
C & E Loss (ft)	0.08	Cum SA (acres)	32.09	132.46	16.14

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 6396.299

INPUT

Description:

Station Elevation Data			num= 66								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	314	73	314	89	306	277.24	305.81	278.19	305.73		
286.73	305.17	289.24	304.94	291.25	304.81	295.06	304.43	295.69	304.38		
299.28	304	313.26	302	315.42	301.59	324.16	300	352.16	298		
425.63	296	524.04	296.73	542.75	296.71	594.32	296.65	606.29	296.66		
610.77	296.67	668.64	296.88	684.92	296.82	688.41	296.77	695.08	296.71		
709.83	296.68	748.61	296.53	755.97	296.48	768.55	296.53	781.56	296.51		
802.55	296.41	826.96	296.33	839.54	296.32	882.23	296.22	897.7	296.18		
906.6	296.17	924.71	296.21	925.42	296.2	947.19	296.19	968.88	296.14		
983.13	296.13	993.38	296.12	1030.11	296.19	1059.02	296.38	1061.06	296.41		
1074.77	296.52	1076.31	296.51	1093.06	296.67	1166.17	296.77	1179.92	296.53		
1184.29	296.25	1190.65	296.01	1190.88	296	1209.25	295.58	1245.57	294		
1272.1	295.85	1272.98	295.95	1273.22	296	1274.04	296.05	1277.3	296.19		
1305.44	297.45	1317.7	298	1329.37	299.38	1333.76	300	1347.21	302		

Proposed.rep

1355.3 304

Manning's n Values num= 6
 Sta n Val Sta n Val Sta n Val Sta n Val
 0 .04 947.19 .06 1166.17 .04 1184.29 .075 1277.3 .06
 1317.7 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 524.04 1317.7 314.29 320.94 323.63 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	298.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.040	0.050	0.040
W.S. Elev (ft)	298.44	Reach Len. (ft)	314.29	320.94	323.63
Crit W.S. (ft)		Flow Area (sq ft)	311.37	1642.62	0.82
E.G. Slope (ft/ft)	0.008458	Area (sq ft)	311.37	1642.62	0.82
Q Total (cfs)	8951.00	Flow (cfs)	1543.87	7406.12	1.02
Top width (ft)	975.42	Top width (ft)	178.04	793.66	3.72
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	4.96	4.51	1.24
Max Chl Dpth (ft)	4.44	Hydr. Depth (ft)	1.75	2.07	0.22
Conv. Total (cfs)	97327.3	Conv. (cfs)	16787.0	80529.3	11.0
Length Wtd. (ft)	320.36	wetted Per. (ft)	178.09	793.84	3.75
Min Ch El (ft)	294.00	Shear (lb/sq ft)	0.92	1.09	0.12
Alpha	1.00	Stream Power (lb/ft s)	4.58	4.93	0.14
Frctn Loss (ft)	3.58	Cum Volume (acre-ft)	96.86	399.70	6.64
C & E Loss (ft)	0.02	Cum SA (acres)	28.64	126.44	16.10

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 6075.362

INPUT

Description:

Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	312	90	312	98	308	106.29	308
123.9	306.05	124.33	306	129.31	305.46	129.67	305.43
167.44	302.1	168.61	302	169.45	301.92	192.55	300
205.95	299.48	210	299.37	213.35	299.38	217.37	299.26
310.77	298	395.4	297.83	471.38	296.16	471.59	296.15
485.7	295.94	487.81	295.86	530.36	294	540.64	293.03
553.28	292.32	580.29	292.94	594.44	293.01	600.52	293
684.09	292.92	703.87	292.91	736.68	292.86	739.05	292.85
743.88	292.83	805.83	292.64	814.96	292.7	886.8	292.83
892.02	292.83	892.79	292.82	948.52	292.61	958.56	292.58
1042.22	292.27	1045.04	292.28	1047.81	292.29	1049.52	292.3
1149.82	292.91	1156.42	292.95	1162.27	292.98	1166.02	292.99
1251.39	293.49	1259.79	293.65	1277.47	294	1313.68	294.02
1342.55	293.97	1382.04	292	1418.66	292.95	1433.31	294
1485.82	298	1493.44	300	1499.39	302	1603.68	302.96

Manning's n Values num= 5
 Sta n Val Sta n Val Sta n Val Sta n Val
 0 .04 968.79 .06 1313.68 .075 1433.31 .06 1472.16 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 530.36 1433.31 433.42 467.11 451.66 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	295.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.	0.040	0.048	0.060
W.S. Elev (ft)	294.68	Reach Len. (ft)	433.42	467.11	451.66
Crit W.S. (ft)		Flow Area (sq ft)	5.30	1594.82	4.50
E.G. Slope (ft/ft)	0.015441	Area (sq ft)	5.30	1594.82	4.50
Q Total (cfs)	8951.00	Flow (cfs)	11.92	8932.34	6.74
Top width (ft)	931.74	Top width (ft)	15.57	902.95	13.22
Vel Total (ft/s)	5.58	Avg. Vel. (ft/s)	2.25	5.60	1.50
Max Chl Dpth (ft)	2.68	Hydr. Depth (ft)	0.34	1.77	0.34
Conv. Total (cfs)	72034.2	Conv. (cfs)	95.9	71884.0	54.3
Length Wtd. (ft)	467.08	wetted Per. (ft)	15.59	903.14	13.24
Min Ch El (ft)	292.00	Shear (lb/sq ft)	0.33	1.70	0.33

Alpha	1.01	Proposed.rep			
Frctn Loss (ft)	4.71	Stream Power (lb/ft s)	0.74	9.53	0.49
C & E Loss (ft)	0.07	Cum Volume (acre-ft)	95.72	387.77	6.62
		Cum SA (acres)	27.95	120.19	16.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 5608.249

INPUT

Description:

Station Elevation Data		num=	87								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	310	150	309	185	309	219	292	228.53	291.35		
230.1	291.32	234.28	291.34	238.95	291.21	243.58	291.16	270.57	290.47		
272.31	290.45	273.92	290.41	275.83	290.39	277.5	290.35	278.51	290.34		
284.8	290.32	286.12	290.29	292.43	290.28	292.85	290.27	294.5	290.28		
296.25	290.25	297.85	290.28	298.73	290.26	342.65	290.32	359.58	290.13		
365.9	290	444.19	290.2	445.04	290.19	454.2	290.21	454.79	290.2		
473.92	290.2	474.49	290.19	489.86	290.17	491.48	290.18	525.71	290.03		
526.97	290	582.95	289.32	630.38	289.15	631.7	289.13	655.87	289.18		
657.9	289.14	713	288.63	729.88	288.6	740.29	288.53	783.7	288.37		
817.65	288.28	868.94	288.08	873.71	288.06	882.22	288	922.44	287.85		
936.64	287.84	965.86	287.75	982.45	287.72	1009.77	287.71	1039.27	287.68		
1057.13	287.7	1095.93	287.81	1114.77	287.68	1119.12	287.67	1151.17	287.48		
1173.21	287.63	1198.58	287.76	1205.59	287.79	1210.81	287.77	1217.18	287.73		
1236.51	287.68	1269.95	287.79	1296.84	287.77	1336.42	287.8	1368.19	287.88		
1381.79	287.93	1392.34	287.94	1397.83	288	1430.1	288.31	1440.6	288.36		
1531.54	288.88	1561.02	289.05	1615.53	288.45	1664.74	288	1731.48	289.18		
1736	290	1739.23	290.97	1742.52	292	1749.96	294	1756.3	296		
1768.31	300	1849.97	300.17								

Manning's n Values		num=	5								
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1236.51	.06	1561.02	.075	1736	.06	1756.3	.04		

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
525.71	1736	386.8	607.64	624.67	.1	.3	

Ineffective Flow		num=	1		
Sta L	Sta R	Elev	Permanent		
0	493.25	304.7255	F		

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	290.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	wt. n-Val.	0.040	0.047	0.060
W.S. Elev (ft)	290.14	Reach Len. (ft)	386.80	607.64	624.67
Crit w.s. (ft)	289.47	Flow Area (sq ft)	1.36	2231.25	0.03
E.G. Slope (ft/ft)	0.007098	Area (sq ft)	5.62	2231.25	0.03
Q Total (cfs)	8951.00	Flow (cfs)	0.61	8950.38	0.01
Top width (ft)	1297.27	Top width (ft)	86.52	1210.29	0.46
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	0.45	4.01	0.34
Max Chl Dpth (ft)	2.66	Hydr. Depth (ft)	0.05	1.84	0.07
Conv. Total (cfs)	106240.8	Conv. (cfs)	7.3	106233.4	0.1
Length wtd. (ft)	605.91	Wetted Per. (ft)	24.91	1210.40	0.48
Min Ch El (ft)	287.48	Shear (lb/sq ft)	0.02	0.82	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.01	3.28	0.01
Frctn Loss (ft)	4.09	Cum Volume (acre-ft)	95.67	367.26	6.60
C & E Loss (ft)	0.01	Cum SA (acres)	27.44	108.86	15.97

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC

Proposed.rep

REACH: Main

RS: 5000.613

INPUT

Description:

Station Elevation Data			num= 77			Elev Sta			Elev Sta			Elev Sta		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	310	9.72	310	550	306	665	306	705	286					
821.72	285.46	855.28	285.31	1006.28	286	1276.91	284.96	1283.72	284.88					
1289.31	284.85	1294.53	284.78	1335.39	284	1385.05	283.4	1396.08	283.36					
1408.04	283.37	1425.23	283.46	1426.93	283.48	1470.24	283.59	1471.38	283.58					
1508.02	283.63	1518.24	283.66	1546.32	283.71	1547.37	283.7	1562.72	283.69					
1578.16	283.65	1618.18	283.24	1634.68	283.11	1635.54	283.14	1691.46	282.99					
1797	282.91	1802.21	282.93	1834.71	283.18	1837.35	283.17	1877.56	283.39					
1906.65	283.6	1908.64	283.61	1946.58	283.85	1955.94	283.89	2002.62	283.94					
2027.86	284	2029.92	284	2208.42	284.95	2213.82	286	2216.83	286.83					
2221.31	288	2223.85	288.72	2228.21	290	2237.55	298.3	2239.43	300					
2239.79	300.64	2245.19	310	2246.77	311.21	2248.02	312	2250.66	314					
2252.73	314.43	2258.9	316	2276	314.1	2276.39	314	2286.73	310					
2291.99	307.83	2296.85	306	2301.06	304	2305.57	302	2309.35	300.47					
2310.46	300	2313.17	298.59	2314.37	298	2320.67	296	2329.35	294					
2343.93	292.11	2345.26	291.96	2404.33	291.22	2457	292	2487.35	294					
2499.21	296	2509.14	298											

Manning's n Values			num= 5			n Val Sta			n Val Sta			n Val Sta		
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	
0	.04	1635.54	.06	2002.62	.075	2216.83	.06	2345.26	.04					

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1006.28 2213.82 325.18 366.23 367.72 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 829.2310.8611 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	286.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	wt. n-Val.	0.040	0.052	0.075
w.s. Elev (ft)	286.06	Reach Len. (ft)	325.18	366.23	367.72
Crit w.s. (ft)	285.14	Flow Area (sq ft)	79.62	2362.61	0.01
E.G. Slope (ft/ft)	0.006435	Area (sq ft)	123.06	2362.61	0.01
Q Total (cfs)	8951.00	Flow (cfs)	139.25	8811.75	0.00
Top width (ft)	1509.17	Top width (ft)	301.40	1207.54	0.23
Vel Total (ft/s)	3.67	Avg. Vel. (ft/s)	1.75	3.73	0.15
Max chl Dpth (ft)	3.15	Hydr. Depth (ft)	0.45	1.96	0.03
Conv. Total (cfs)	111584.5	Conv. (cfs)	1736.0	109848.5	0.0
Length Wtd. (ft)	365.92	Wetted Per. (ft)	177.08	1207.67	0.23
Min Ch El (ft)	282.91	Shear (lb/sq ft)	0.18	0.79	0.01
Alpha	1.02	Stream Power (lb/ft s)	0.32	2.93	0.00
Frctn Loss (ft)	3.48	Cum Volume (acre-ft)	95.10	335.22	6.60
C & E Loss (ft)	0.01	Cum SA (acres)	25.72	92.00	15.96

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main

RS: 4634.388

INPUT

Description:

Station Elevation Data			num= 104			Elev Sta			Elev Sta			Elev Sta		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	302	80	302	100	292	123.14	292	139	290.91					
150.76	290	173.63	288	204.83	286	276.91	284	288.03	283.88					
290.75	283.7	293.62	283.54	294.67	283.46	320.14	282	335.46	282.01					
341.8	282.11	344.17	282.09	379.67	282.43	455.34	282.45	459.32	282.42					
462.17	282.39	464.82	282.37	467.55	282.34	474.11	282.29	477.49	282.26					
482.44	282.27	483.21	282.26	527.58	282.13	535.09	282.09	539.19	282.08					
546.48	282.05	549.3	282.04	552.15	282.02	557.84	282	576.6	281.99					
593.35	282	708.31	281.93	714.42	281.9	719.56	281.87	723.75	281.84					
747.55	281.6	752.62	281.56	770.74	281.52	796.45	281.35	804.65	281.32					

Proposed.rep									
821.95	281.2	824.98	281.17	829.02	281.15	915.12	280	975.7	279.72
1006.16	279.61	1035.43	279.51	1039.6	279.5	1053.65	279.49	1063.35	279.5
1076.7	279.51	1094.92	279.54	1096.98	279.55	1114.79	279.59	1178.72	279.38
1203.23	279.52	1210.59	279.55	1272.45	280	1308.62	280.29	1338.37	280.52
1354.61	280.7	1365.95	280.8	1396.74	281.06	1406.46	281.12	1420.16	281.19
1425.11	281.21	1490.66	281.57	1498.43	281.56	1500.42	281.55	1513.62	281.53
1520.79	281.52	1524.52	281.5	1599.21	281.67	1602.89	281.68	1678.38	281.97
1684.86	281.98	1686.4	282	1758.78	281.86	1790.13	281.86	1857.15	282.49
1866.94	282.52	1881.83	282.44	1892.63	282.68	1909.95	282.5	1920.61	282.49
1941.32	283.09	1952.07	284	1954.13	284.32	1959.59	286	1964.18	287.72
1964.98	288	1965.81	288.36	1969.82	290	1993.72	300.04	1998.67	302
2003.35	303.94	2003.61	304.04	2009.75	306	2014.94	307.82		

Manning's n values		num= 4		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	915.12	.06	1272.45	.075	1758.78	.06				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	455.34	1686.4		279.84	292.33		.1	.3

Ineffective Flow		num= 1		Sta		Elev		Permanent	
Sta L	Sta R	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	388.56	298.80	25						

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)		282.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35		Wt. n-val.		0.059	0.067
W.S. Elev (ft)	282.42		Reach Len. (ft)	279.84	292.33	293.02
Crit W.S. (ft)	282.08		Flow Area (sq ft)		1841.31	69.99
E.G. Slope (ft/ft)	0.015481		Area (sq ft)	16.74	1841.31	69.99
Q Total (cfs)	8951.00		Flow (cfs)		8840.98	110.02
Top width (ft)	1456.82		Top width (ft)	66.02	1227.31	163.49
Vel Total (ft/s)	4.68		Avg. Vel. (ft/s)		4.80	1.57
Max chl Dpth (ft)	3.04		Hydr. Depth (ft)		1.50	0.43
Conv. Total (cfs)	71941.1		Conv. (cfs)		71056.9	884.2
Length wtd. (ft)	292.33		Wetted Per. (ft)		1227.33	163.49
Min Ch El (ft)	279.38		Shear (lb/sq ft)		1.45	0.41
Alpha	1.04		Stream Power (lb/ft s)		6.96	0.65
Frctn Loss (ft)	2.61		Cum Volume (acre-ft)	94.57	317.55	6.31
C & E Loss (ft)	0.06		Cum SA (acres)	24.34	81.76	15.27

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 4342.055

INPUT

Description:

Station Elevation Data		num= 109		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	300	25	300	45	290	56.31	288	77.72	286		
135.35	282	181.38	281.94	225.4	281.24	233.94	281.2	239.64	281.06		
249	281.03	255.26	280.9	271.2	280.73	287.29	280.13	289.66	280		
321.6	279.57	348.22	279.44	426.5	278.88	430.24	278.84	439.04	278.77		
444.84	278.75	450.31	278.74	451.67	278.73	461.32	278.71	479.45	278.74		
490.95	278.75	492.25	278.77	530.64	278.9	560.84	278.74	561.62	278.73		
568.8	278.7	577.56	278.67	580.38	278.66	587.14	278.65	595.25	278.63		
599.77	278.61	604.41	278.6	606.66	278.59	611.58	278.57	616.62	278.55		
620.56	278.54	625.8	278.52	631.18	278.5	635.99	278.48	640.91	278.47		
645.28	278.44	648.86	278.43	665.19	278.38	702.12	278.27	704.62	278.26		
713.91	278.23	757.62	278.2	760.16	278.19	815.39	278	857.05	277.98		
864.2	277.92	865.28	277.91	878.33	277.8	884.4	277.74	905.47	277.57		
910.46	277.55	935.37	277.58	955.97	277.75	961.21	277.8	968.35	277.87		
984.25	277.99	986.09	278	986.24	277.99	988.37	277.96	991.28	277.9		
997.76	277.69	1021.37	277.15	1024.58	277.11	1034.82	277.09	1077.23	276.33		
1100.03	276.4	1133.92	276.62	1162.11	276.78	1200.67	277.04	1244.07	277.31		
1293.03	277.9	1327.14	277.94	1357.82	277.97	1388.18	278	1398.51	278.05		
1409.16	278.12	1442.61	278	1468.73	277.6	1485.94	276.9	1501.49	276.17		

Proposed.rep									
1509.48	276	1577.47	276.06	1578.21	276.07	1635.17	277.97	1636.27	278
1647.13	278.83	1655.14	279.78	1656.99	280	1658.99	280.66	1664.8	282.84
1668.61	284	1675.12	285.21	1679.75	286	1689.53	288	1696.28	289.86
1696.89	290	1698.1	290.63	1715.25	300	1728.6	305.12		

Manning's n Values									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	857.05	.06	1021.37	.075	1655.14	.06	1668.61	.04

Bank Sta: Left Right		Lengths: Left Channel Right		Coeff	Contr.	Expan.
321.6	1655.14	344.09	365.13	365.45	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	280.11	wt. n-val.	0.040	0.063	0.060
Vel Head (ft)	0.15	Reach Len. (ft)	344.09	365.13	365.45
w.s. Elev (ft)	279.95	Flow Area (sq ft)	5.46	2851.76	0.13
Crit w.s. (ft)		Area (sq ft)	5.46	2851.76	0.13
E.G. Slope (ft/ft)	0.005813	Flow (cfs)	5.14	8945.81	0.05
Q Total (cfs)	8951.00	Top width (ft)	28.48	1333.54	1.46
Top width (ft)	1363.48	Avg. Vel. (ft/s)	0.94	3.14	0.37
Vel Total (ft/s)	3.13	Hydr. Depth (ft)	0.19	2.14	0.09
Max Chl Dpth (ft)	3.95	Conv. (cfs)	67.4	117331.9	0.6
Conv. Total (cfs)	117399.9	Wetted Per. (ft)	28.49	1333.73	1.47
Length wtd. (ft)	365.07	Shear (lb/sq ft)	0.07	0.78	0.03
Min Ch El (ft)	276.00	Stream Power (lb/ft s)	0.07	2.43	0.01
Alpha	1.00	Cum Volume (acre-ft)	94.50	301.80	6.07
Frctn Loss (ft)	3.01	Cum SA (acres)	24.04	73.17	14.71
C & E Loss (ft)	0.01				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 3976.927

INPUT

Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	288.37	1.9	288.11	2.68	288.02	2.81	288	17.99	286.47
18.79	286.37	40.6	284.68	47.44	284.21	47.89	284.17	50.96	284
59.39	283.62	59.83	283.59	63.16	283.39	64.69	283.31	72.8	282.8
76.19	282.69	77.57	282.63	86.87	282	102.18	281.42	125.1	280
128.5	279.95	194.15	277.64	201.67	277.58	279.35	276	376.46	275.03
377.4	275.04	382.07	275.03	383.54	275.04	392.79	275.03	409.89	275.11
439.78	275.14	442.5	275.15	457.58	275.2	463.13	275.21	489.47	275.18
494.43	275.17	496.85	275.16	507.74	275.11	510.34	275.1	512.66	275.09
518.73	275.06	520.89	275.05	527.35	275.01	548.31	274.92	550.26	274.91
559.21	274.89	594.52	274.82	616.98	274.76	650.08	274.66	652.1	274.65
656.52	274.63	665.31	274.61	695.8	274.53	704.5	274.52	762.31	274.2
768.34	274.22	776.7	274.15	789.71	274.05	829.23	274	913.08	274.05
916.5	274.09	919.82	274.12	922.17	274.16	1024.5	274.74	1027.38	274.73
1106.84	274.52	1110.37	274.53	1197.53	274.57	1222.91	274.66	1315.6	275.37
1333.82	275.43	1350.44	275.64	1374.32	275.9	1376.51	275.91	1378.38	275.92
1384.91	276	1514.42	276.77	1534.12	278	1535.82	278.25	1540.34	278.66
1550.6	280	1563.3	282.32	1578.6	284.94	1586.47	286	1594.92	288
1599.02	288.54	1607.87	290	1609.43	290.38	1617.34	292	1628.41	294
1628.82	294.07	1634.97	295.45	1637.57	296	1641.15	296.59		

Manning's n Values									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	376.46	.06	550.26	.075	1535.82	.04		

Bank Sta: Left Right		Lengths: Left Channel Right		Coeff	Contr.	Expan.
279.35	1514.42	334.84	334.75	343.16	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	277.09	wt. n-val.	0.040	0.070	0.075
Vel Head (ft)	0.21	Reach Len. (ft)	334.84	334.75	343.16
w.s. Elev (ft)	276.88	Flow Area (sq ft)	18.98	2396.67	0.09
Crit w.s. (ft)					

Proposed.rep					
E.G. slope (ft/ft)	0.012598	Area (sq ft)	18.98	2396.67	0.09
Q Total (cfs)	8951.00	Flow (cfs)	45.74	8905.23	0.03
Top width (ft)	1280.02	Top width (ft)	43.21	1235.07	1.74
Vel Total (ft/s)	3.71	Avg. vel. (ft/s)	2.41	3.72	0.32
Max Chl Dpth (ft)	2.88	Hydr. Depth (ft)	0.44	1.94	0.05
Conv. Total (cfs)	79748.2	Conv. (cfs)	407.5	79340.4	0.3
Length wtd. (ft)	335.38	wetted Per. (ft)	43.21	1235.09	1.75
Min Ch El (ft)	274.00	Shear (lb/sq ft)	0.35	1.53	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.83	5.67	0.01
Frctn Loss (ft)	2.83	Cum Volume (acre-ft)	94.41	279.80	6.07
C & E Loss (ft)	0.03	Cum SA (acres)	23.76	62.41	14.70

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 3642.177

INPUT

Description:

Station Elevation Data		num= 98									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	286.93	10.44	286	65.44	282	99.45	280	146.37	278		
174.1	276	182.3	275.34	185.36	275.15	192.4	274.62	202.82	274		
213.37	273.69	242.26	272.96	250.5	272.85	251.89	272.82	298.66	272		
558.78	271.48	562.24	271.51	567.92	271.55	578.79	271.59	580.97	271.6		
586.73	271.61	588.07	271.59	590.12	271.61	664.72	271.44	665.35	271.45		
684.38	271.55	709.6	271.7	714.82	271.75	720.76	271.78	733.39	271.87		
744.96	272	900	272.018	1001.77	272.03	1008.53	272.08	1012.19	272.11		
1015.73	272.14	1023.46	272.21	1030.62	272.27	1143.5	272.54	1145.55	272.53		
1146.64	272.54	1148.16	272.53	1149.44	272.54	1156.13	272.55	1166.79	272.58		
1170.77	272.59	1174.72	272.6	1175.97	272.59	1185.52	272.61	1187.32	272.6		
1237.84	272.51	1241.49	272.49	1243.23	272.48	1247.62	272.46	1258.1	272.42		
1330.73	272.07	1336.79	272.1	1360.06	272.19	1361.24	272.2	1391.38	272.26		
1434.16	272.38	1435.76	272.37	1460.58	272.41	1462.04	272.39	1510.46	272.3		
1511.66	272.29	1526.14	272.3	1572.56	272.03	1610.9	272.04	1623.24	272.05		
1683.71	271.96	1708.43	271.81	1740.08	272	1919.38	272.18	1924.18	272.16		
1940.88	272.4	1948.93	272.35	1960.33	272.51	1964.9	272.48	2010.76	274		
2171.31	274.11	2174.05	274.13	2314.91	276.01	2315.23	276.02	2424.07	278		
2428.14	278.34	2443.28	280	2448.25	282	2452.53	283.06	2456.05	284		
2458.94	285.22	2460.86	286	2461.33	286.21	2465.45	288	2468.69	289.07		
2471.9	290	2474.83	290.89	2477.39	292						

Manning's n values		num= 6									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	213.37	.06	298.66	.075	900	.06	1258.1	.075		
2010.76	.04										

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
298.66 1623.24 258.14 290.23 300.27 .1 .3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
1871.42 2477.39291.9999 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)		Element		Left OB		Channel		Right OB	
Vel Head (ft)	0.11	wt. n-val.	0.060	0.071	0.075				
w.s. Elev (ft)	274.13	Reach Len. (ft)	258.14	290.23	300.27				
Crit w.s. (ft)	273.04	Flow Area (sq ft)	118.46	2758.80	524.80				
E.G. slope (ft/ft)	0.006026	Area (sq ft)	118.46	2758.80	752.78				
Q Total (cfs)	8951.00	Flow (cfs)	274.68	7346.58	1329.74				
Top width (ft)	1972.97	Top width (ft)	97.98	1324.58	550.42				
Vel Total (ft/s)	2.63	Avg. vel. (ft/s)	2.32	2.66	2.53				
Max Chl Dpth (ft)	2.69	Hydr. Depth (ft)	1.21	2.08	2.11				
Conv. Total (cfs)	115306.4	Conv. (cfs)	3538.5	94638.2	17129.7				
Length wtd. (ft)	290.47	wetted Per. (ft)	98.00	1324.59	248.18				
Min Ch El (ft)	271.44	Shear (lb/sq ft)	0.45	0.78	0.80				
Alpha	1.00	Stream Power (lb/ft s)	1.05	2.09	2.02				
Frctn Loss (ft)	1.38	Cum Volume (acre-ft)	93.88	259.99	3.10				
C & E Loss (ft)	0.00	Cum SA (acres)	23.22	52.57	12.53				

Proposed.rep

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 3351.951

INPUT

Description:

Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	285.5	13.31	284	36.12	282	67.29	280	101.62	278
152.47	274	215.42	272.06	217.49	272	228.37	271.69	243.04	271.25
244.01	271.23	252.46	270.96	253.9	270.92	258.75	270.76	269.35	270.57
294.08	270	309.39	269.83	311.81	269.81	312.8	269.8	313.69	269.79
328.44	269.61	344.46	269.41	346.63	269.4	452.88	269.2	454.68	269.19
457.11	269.22	459.78	269.23	464.05	269.24	465.06	269.25	466.19	269.27
506.87	269.35	511.02	269.31	588.81	268.85	608.98	268.89	695.67	268.75
710.2	268.77	744.32	269	745.35	268.99	749.51	269	753	269.02
781.12	269.05	782.52	269.06	790.96	269.09	816.16	269.23	817.27	269.24
883.64	269.76	894.13	270	943	270.54	943.18	270.53	948.39	270.59
954.83	270.65	960.21	270.72	967.81	270.83	1005.28	270.47	1013.24	270.51
1060.38	270.65	1149.48	270.47	1159.35	270.42	1162.8	270.4	1166.46	270.39
1176.11	270.35	1198.61	270.37	1225.58	270	1375.87	271.98	1377.46	272
1378.28	272.16	1387.72	274	1421.83	272.97	1425.19	272.57	1430.32	272
1494	272.531	1637.91	273.73	1640.11	274	1652.81	275.98	1652.95	276
1653.1	276.03	1661.94	278	1667.37	278.98	1673.97	280	1690.83	285.7
1704.02	290	1710.4	291.86	1716	293.65	1720.61	295.06		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	215.42	.06	346.63	.075	960.21	.06
1637.91	.04					1375.87	.075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 215.42 1494 278.96 313.58 317.16 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1684.75 1720.61295.0604 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	272.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-val.	0.040	0.070	0.075
W.S. Elev (ft)	272.74	Reach Len. (ft)	278.96	313.58	317.16
Crit W.S. (ft)	271.06	Flow Area (sq ft)	7.52	3317.18	2.64
E.G. Slope (ft/ft)	0.003852	Area (sq ft)	7.52	3317.18	2.64
Q Total (cfs)	8951.00	Flow (cfs)	8.44	8941.84	0.72
Top width (ft)	1283.32	Top width (ft)	22.08	1236.08	25.16
Vel Total (ft/s)	2.69	Avg. Vel. (ft/s)	1.12	2.70	0.27
Max chl Dpth (ft)	3.99	Hydr. Depth (ft)	0.34	2.68	0.10
Conv. Total (cfs)	144220.7	Conv. (cfs)	136.0	144073.0	11.6
Length wtd. (ft)	313.53	Wetted Per. (ft)	22.09	1236.26	25.16
Min Ch El (ft)	268.75	Shear (lb/sq ft)	0.08	0.65	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.09	1.74	0.01
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	93.51	239.75	0.50
C & E Loss (ft)	0.02	Cum SA (acres)	22.86	44.04	10.54

Warning: Divided flow computed for this cross-section.
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 3038.374

INPUT

Description:

Proposed.rep

Station Elevation Data			num=	124					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	283.15	23.75	280.6	28.99	280	30.64	279.9	31.47	279.86
40.77	279.32	69.71	278	105.45	276	132.43	274	141.27	272.9
147.74	272	158.93	270	170.9	268.22	172.22	268	181.13	267.9841
239.5	267.88	241.18	267.89	244.82	267.88	248.69	267.87	250.31	267.86
252.2	267.84	256.99	267.8	260.34	267.75	366.4	266.96	368.26	266.97
404.25	266.99	474.06	267.2	476.12	267.21	479.22	267.22	484.16	267.24
489.28	267.27	512.67	267.38	520.12	267.42	528.01	267.46	529.72	267.47
544.85	267.55	554.29	267.59	595.12	267.72	599.09	267.74	603.25	267.75
611.08	267.74	612.41	267.73	620.29	267.76	643.95	267.87	649.93	267.89
667.11	267.98	671.21	268	795.95	269.67	797.76	269.72	800.86	270
801.18	270.1	801.2	270.11	801.22	270.12	801.26	270.13	801.3	270.15
801.36	270.18	801.44	270.21	801.56	270.26	801.74	270.33	802.07	270.46
802.82	270.77	805.53	271.86	805.87	272	809.04	271.97	809.45	271.88
809.82	271.8	810.16	271.72	812.56	271.03	815.49	270	821.53	268.04
821.64	268	903.39	268.01	915.93	268.09	921.77	268.12	927.41	268.16
1076.9	268.11	1078.49	268.1	1082.49	268.09	1087.93	268.1	1092.79	268.12
1093.81	268.13	1098	268.15	1109.77	268.29	1120.04	268.36	1128.65	268.43
1211.64	270	1257.99	270.03	1258.11	270.06	1260.8	270.66	1265.58	271.73
1266.79	272	1273.52	273.42	1276.11	274	1282.41	273.14	1287.51	272
1291.29	271.2	1297.03	270	1304.52	268.46	1306.74	268	1315.15	268.06
1330.8	268.61	1339.49	268.92	1343.5	269.07	1368.34	270	1390.09	270.81
1390.38	270.85	1398.16	272	1402.95	273.35	1403.08	273.39	1408.84	275.02
1413.11	276.29	1418.64	278	1421.41	279.22	1422.97	280	1423.56	280.29
1426.82	282	1428.65	282.94	1433.52	285.36	1434.87	286	1435.47	286.28
1439.05	288	1439.93	288.39	1443.94	290	1445.57	290.63		

Manning's n Values			num=	4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	250.31	.06	366.4	.075	1390.38	.04

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	158.93	1390.38		564.8	424.13	403.85		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	272.21	Element	Left OB	Channel	Right OB
vel Head (ft)	0.06	wt. n-val.	0.040	0.068	0.040
w.s. Elev (ft)	272.15	Reach Len. (ft)	564.80	424.13	403.85
Crit w.s. (ft)		Flow Area (sq ft)	12.94	4695.86	5.67
E.G. slope (ft/ft)	0.001235	Area (sq ft)	12.94	4695.86	5.67
Q Total (cfs)	8951.00	Flow (cfs)	17.33	8927.98	5.69
Top width (ft)	1232.67	Top width (ft)	12.26	1212.10	8.31
vel Total (ft/s)	1.90	Avg. vel. (ft/s)	1.34	1.90	1.00
Max chl Dpth (ft)	5.19	Hydr. depth (ft)	1.06	3.87	0.68
Conv. Total (cfs)	254736.0	Conv. (cfs)	493.1	254080.9	162.0
Length wtd. (ft)	424.25	wetted Per. (ft)	12.45	1214.02	8.41
Min Ch El (ft)	266.96	Shear (lb/sq ft)	0.08	0.30	0.05
Alpha	1.00	Stream Power (lb/ft s)	0.11	0.57	0.05
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	93.44	210.91	0.47
C & E Loss (ft)	0.01	Cum SA (acres)	22.75	35.23	10.42

warning: Divided flow computed for this cross-section.

warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 2614.242

INPUT

Description:

Station Elevation Data			num=	81					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	284	20	280	40	275	50	275	60	280
75	280	80	279	190	279	205	279	209	281
434	280	464	265	466.75	264	604.17	264.2839	805.55	264.7
810.36	264.98	817.1	265.47	824.36	266	840.46	265.66	841.2	265.54
841.52	265.48	844.52	264.99	848.09	264.41	850.62	264	878.3	264.06
884.81	264.27	887.07	264.34	893.2	264.54	904.81	264.99	906.98	265.07
919.83	265.59	930.39	266	1221.37	266.45	1252.77	266.55	1255.58	266.56
1291.4	266.8	1296.66	266.82	1300.32	266.84	1358.35	267.05	1363.83	267.08
1437.45	267.14	1476.36	268	1513.81	267.97	1515.66	267.58	1515.69	267.57
1517.8	267.11	1518.45	266.96	1522.24	266	1525.79	264.43	1526.72	264
1534.45	263.52	1536.74	264	1537.23	264.1	1539.45	264.41	1539.74	264.39

Proposed.rep									
1541.6	264.52	1543.19	264.64	1543.7	264.59	1544.9	264.73	1545.99	264.6
1550.98	264.79	1555.8	265.46	1559.37	266	1564.27	266.15	1565.13	266.16
1573.36	266.41	1584.82	266.74	1596.82	267.06	1601.45	267.12	1609.78	267.32
1612.16	267.38	1626	268	1674	292	1734	292	1754	282
1759.72	284	1770.23	285.58	1773.52	286	1783.38	287.53	1786.71	288
1797.04	289.28								

Manning's n Values		num= 6		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	434	.04	604.17	.06	817.1	.04	850.62	.075		
1626	.04										

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.	
	434	1626		566.01	580.29	596.27	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	272.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.060	0.040
W.S. Elev (ft)	271.99	Reach Len. (ft)	566.01	580.29	596.27
Crit W.S. (ft)		Flow Area (sq ft)		7297.77	15.93
E.G. Slope (ft/ft)	0.000214	Area (sq ft)		7297.77	15.93
Q Total (cfs)	8951.00	Flow (cfs)		8938.26	12.74
Top Width (ft)	1183.96	Top width (ft)		1175.98	7.98
Vel Total (ft/s)	1.22	Avg. vel. (ft/s)		1.22	0.80
Max Chl Dpth (ft)	8.47	Hydr. Depth (ft)		6.21	2.00
Conv. Total (cfs)	611758.6	Conv. (cfs)		610888.1	870.6
Length Wtd. (ft)	580.30	wetted Per. (ft)		1178.94	8.92
Min Ch El (ft)	263.52	Shear (lb/sq ft)		0.08	0.02
Alpha	1.00	Stream Power (lb/ft s)		0.10	0.02
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	93.36	152.52	0.37
C & E Loss (ft)	0.00	Cum SA (acres)	22.67	23.60	10.35

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 2033.954

INPUT

Description:

Station Elevation Data		num= 93		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	279	100	279	104	281	400	273	402	273		
408	270	408	265	475	265	485	270	501	262		
583	262.987	621.76	262.89	632.77	262.26	637.19	262	667.3	262.05		
677.53	262.49	678.87	262.57	715.02	263.35	745.29	264	848.74	263.31		
976.36	264	1166.66	263.5	1167.98	263.37	1170.01	262.93	1172.3	262.78		
1173.66	262.58	1174.34	262.52	1177.25	262.37	1177.7	262.33	1181.67	262		
1198.55	262.92	1204.15	263.34	1213.03	264	1242.62	264.36	1264.45	264.51		
1278.97	264.85	1284.69	264.92	1291.21	265.08	1298.05	265.16	1300.1	265.19		
1312.36	265.49	1320.28	265.6	1322.69	265.67	1323.15	265.68	1332.87	266		
1338.99	266.61	1339.21	266.64	1339.45	266.67	1349.62	268	1364.42	267.24		
1365.99	266.75	1368.33	266	1374.53	264.1	1374.8	264	1375.74	263.71		
1381.41	262	1385.36	260.8	1388.05	260	1393.64	260.1	1399.81	262		
1404.21	263.38	1406.39	264	1409.3	264.15	1412.15	264.3	1413.94	264.4		
1417.55	264.59	1430.01	265.27	1437.46	265.61	1445.96	266	1455.18	267.57		
1456.54	267.82	1457.47	268	1458.91	268.44	1464.34	270	1465.62	270.41		
1472.2	272.35	1476.79	274	1480.29	275.59	1481.32	276	1484.62	277.46		
1485.81	278	1486.18	278.16	1494.18	281.71	1501.88	285.02	1505.02	286.33		
1505.61	286.57	1509.19	288	1509.29	288.01	1522.96	289.59	1523.99	289.7		
1524.56	289.77	1526.58	290	1549.68	291.52						

Manning's n Values		num= 8		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	583	.075	637.19	.04	715.02	.06	1166.66	.04		
1198.55	.06	1349.62	.075	1465.62	.04						

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.	
	485	1465.62		314.82	169.15	136.16	.1	.3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent F
0 485

CROSS SECTION OUTPUT Profile #PF 1

Proposed.rep

E.G. Elev (ft)	271.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.055	0.040
W.S. Elev (ft)	271.91	Reach Len. (ft)	314.82	169.15	136.16
Crit W.S. (ft)		Flow Area (sq ft)		7959.20	3.81
E.G. Slope (ft/ft)	0.000105	Area (sq ft)	510.66	7959.20	3.81
Q Total (cfs)	8951.00	Flow (cfs)		8949.84	1.16
Top width (ft)	1066.52	Top width (ft)	80.82	980.62	5.09
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)		1.12	0.30
Max Chl Dpth (ft)	11.91	Hydr. Depth (ft)		8.12	0.75
Conv. Total (cfs)	875545.6	Conv. (cfs)		875431.9	113.7
Length Wtd. (ft)	169.02	Wetted Per. (ft)		985.14	5.30
Min Ch El (ft)	260.00	Shear (lb/sq ft)		0.05	0.00
Alpha	1.00	Stream Power (lb/ft s)		0.06	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	90.04	50.90	0.23
C & E Loss (ft)	0.00	Cum SA (acres)	22.15	9.24	10.26

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 1864.806

INPUT

Description:

Station		Elevation Data		num=	72	Sta		Elev		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev			Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	278.55	18.5	278	25.34	276.3	26.21	276.09	26.57	276								
34.55	274.2	35.41	274	47.77	272.79	79.36	269.27	90.07	268								
123.56	266	187.57	264	317	263.762	400	263.61	718	263.025								
747.96	262.97	760.39	262	793	262	817	274	919	274								
943	262	948.99	262.12	966.42	262.2	967.47	262.21	1006.74	262.37								
1008.23	262.38	1009.82	262.39	1039.11	262.49	1041.52	262.5	1071.66	262.63								
1088.53	262.69	1172.73	263.53	1177.2	263.59	1179.09	263.6	1189.69	263.65								
1190.96	263.66	1203.97	263.85	1206.73	263.88	1210.93	263.95	1214.28	264								
1274.27	264.24	1275.13	264.25	1387.59	264.48	1388.15	264.45	1394.36	264								
1400.15	263.44	1413.68	262	1418.11	260.6	1420.37	260	1436.62	260.98								
1443.65	262	1446.72	262.24	1449.29	262.45	1457.9	263.13	1468.23	264								
1499.91	265.46	1510.1	266	1512.42	266.52	1519.16	268	1535.2	274								
1537.19	274.76	1540.35	276	1545.19	278	1546.86	278.76	1554.23	282								
1557.98	283.79	1558.47	284	1562.92	286	1567.55	288	1583.12	290								
1591.89	290.63	1593.87	290.76														

Manning's n values		num=	7	Sta		n Val		Sta		n Val	
Sta	n Val			Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04			718	.075	760.39	.04	943	.04	967.47	.06
1387.59	.075	1512.42	.04								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
919	1512.42	303.13	147.22	135.57	.1	.3	
Ineffective Flow	num=	1					
Sta L	Sta R	Elev	Permanent				
0	919	276	F				

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	271.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.062	0.040
W.S. Elev (ft)	271.85	Reach Len. (ft)	303.13	147.22	135.57
Crit W.S. (ft)	265.28	Flow Area (sq ft)		4926.65	50.69
E.G. Slope (ft/ft)	0.000335	Area (sq ft)	5884.78	4926.65	50.69
Q Total (cfs)	8951.00	Flow (cfs)		8881.98	69.02
Top width (ft)	1362.59	Top width (ft)	756.46	589.11	17.02
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	1.36
Max Chl Dpth (ft)	11.85	Hydr. Depth (ft)		8.36	2.98
Conv. Total (cfs)	489166.0	Conv. (cfs)		485394.0	3771.9
Length Wtd. (ft)	147.18	Wetted Per. (ft)		592.15	17.88
Min Ch El (ft)	260.00	Shear (lb/sq ft)		0.17	0.06
Alpha	1.00	Stream Power (lb/ft s)		0.31	0.08
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	66.93	25.88	0.15
C & E Loss (ft)	0.01	Cum SA (acres)	19.12	6.19	10.22

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than

Proposed.rep

0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 1717.589

INPUT

Description:

Station Elevation Data			num= 109								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	282	39.1	280.47	48.2	280	58.74	278.47	62.16	278		
66.25	277.37	72.96	276	76.12	275.39	83.95	274	99.04	272		
100.64	271.8	126.4	268	126.54	267.98	126.86	267.94	139.39	266.26		
141.25	266	169.72	264	398.11	263.53	398.4	263.52	401.73	263.43		
415.03	263.1	417.04	263.04	419.02	262.99	421.54	262.94	424.24	262.86		
426.45	262.82	428.27	262.77	429.47	262.72	431.24	262.71	432.04	262.68		
433.29	262.69	455.77	262.29	462.03	262.17	462.51	262.18	504.36	262.23		
516.21	262.21	519.14	262.23	522.92	262.26	527.66	262.3	530.2	262.32		
537.65	262.38	540.66	262.4	543.65	262.43	546.36	262.45	565.04	262.46		
568.37	262.47	571.99	262.49	681.92	262.95	808	264	828	274		
898	274	918	264	961.9	263.62	964.9	263.08	964.92	263.07		
968.46	262.73	969.92	262.51	970.71	262.4	975.96	262	1007.16	261.87		
1008.46	262	1011.4	262.19	1011.55	262.2	1017	262.56	1018.97	262.64		
1023.1	262.89	1026.26	263.02	1029.25	263.2	1032.45	263.35	1035.62	263.57		
1037.02	263.65	1041.04	264	1137.41	263.79	1149.87	262	1152.88	261.42		
1160.24	260	1166.78	258.76	1170.73	258	1180.4	258.77	1183.54	259.63		
1184.45	259.89	1184.88	260	1185.15	260.07	1186.88	260.56	1192.01	262		
1205.92	263.15	1211.59	263.6	1216.85	264	1227.42	266	1227.95	266.08		
1228.24	266.11	1229.52	266.3	1236.01	267.21	1240.98	268	1243.23	269.17		
1245.05	270	1249.29	272	1251.53	272.99	1253.74	274	1256.43	275.28		
1261.92	277.77	1262.42	278	1262.92	278.22	1266.83	280	1270.53	281.76		
1271.01	282	1275.33	284	1285.9	286	1286.76	286.08				

Manning's n Values			num= 7								
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	398.11	.075	462.51	.05	961.9	.04	1032.45	.06		
1137.41	.075	1227.42	.04								

Bank Sta: Left Right		Lengths: Left Channel Right		Coeff Contr.		Expan.	
898	1249.29	260.4	199.86	163.52	.1	.3	
Ineffective Flow		num= 1					
Sta L	Sta R	Elev	Permanent				
0	898	276	F				

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	271.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.058	
W.S. Elev (ft)	271.66	Reach Len. (ft)	260.40	199.86	163.52
Crit W.S. (ft)	265.85	Flow Area (sq ft)		2850.46	
E.G. Slope (ft/ft)	0.000905	Area (sq ft)	5774.84	2850.46	
Q Total (cfs)	8951.00	Flow (cfs)		8951.00	
Top width (ft)	1067.58	Top width (ft)	721.71	345.88	
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)		3.14	
Max Chl Dpth (ft)	13.66	Hydr. Depth (ft)		8.24	
Conv. Total (cfs)	297500.6	Conv. (cfs)		297500.6	
Length wtd. (ft)	199.77	Wetted Per. (ft)		350.10	
Min Ch El (ft)	258.00	Shear (lb/sq ft)		0.46	
Alpha	1.00	Stream Power (lb/ft s)		1.44	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	26.36	12.74	0.07
C & E Loss (ft)	0.03	Cum SA (acres)	13.98	4.61	10.19

Warning: Divided flow computed for this cross-section.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC

num= 85

num= 1

RS: 1466-171

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Proposed.rep									
0	267.1	18.05	266.19	19.05	266.15	19.96	266.13	21.511	266.07
24.56	266	249.95	265.722	324.86	265.63	328.36	265.62	336.15	265.6
355.62	265.34	357.73	265.31	369.75	265.22	374.52	265.15	380.39	265.1
441.02	264	520	264	538	273	598.001	273	612	266
621.889	266	633	265.8	633	258	747	258	747	269.03
749.849	269.24	751.33	269.48	753.33	269.69	754.531	269.83	758.16	269.96
759.35	270	760.9	270.09	761.14	270.08	765.33	270.14	770.38	270
779.17	269.83	782.248	270	784.76	270.29	785.06	270.34	785.389	270.36
790.38	270.45	793.24	270.59	794.18	270.6	797.14	270.97	803.241	272
804.62	272.26	804.94	272.24	805.47	272.27	806.331	272.45	812.01	273.15
814.03	273.41	818.9	273.77	819.469	273.83	824.46	273.94	824.73	273.96
826.01	274	830.8	274.27	831.071	274.3	831.56	274.42	834.54	275.13
843.4	276.95	846.26	277.51	846.94	277.62	848.801	278	851.479	278.57
856.38	279.74	864.42	281.69	865.67	282	868.42	282.75	868.7	282.83
869.05	282.94	870.11	283.24	872.11	283.78	872.801	283.96	872.94	284
875.599	284.13	876.06	284.17	879.23	284.34	879.51	284.36	885.5	284.71
887.54	284.89	888.049	284.93	891.76	285.16	892.97	285.28	893.949	285.37

Manning's n values num= 3
Sta n Val Sta n Val Sta n Val
0 .04 633 .04 747 .04

Bank Sta: Left Right Coeff Contr. Expan.
598.001 758.16 .3 .5
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 598.001 276 F

Downstream Deck/Roadway Coordinates
num= 13
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
0 273 538 273 587 272.99
588 273 588 273 630 274
658 274.28 658 274.28 679 274.49
679 274.49 729.999 275 830 276
970 278

Downstream Bridge Cross Section Data
Station Elevation Data num= 108
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 266.16 1.74 266 201.161 265.73 232.54 265.64 263.28 265.639
273.68 265.63 275.4 265.62 275.93 265.61 305.25 265.62 313.33 265.63
318 265.64 319.521 265.63 337.36 265.62 348.58 265.59 353.09 265.58
354.301 265.57 368 265.56 370.529 265.54 373.93 265.53 376.82 265.51
429.399 265.58 431.931 265.6 433.951 265.59 435.12 265.58 449.839 265.27
450.06 265.26 451.929 265.27 453.13 265.26 454.68 265.25 457.99 265.21
478.051 265.17 479.75 265.19 501.04 265.78 504.911 266 554.7 267.22
558.629 267.27 563 267.08 563 258 677 258 677 265
687.37 265.68 688.591 266 695.15 267.9 695.53 268 696.17 268.2
700.15 269.34 701.24 269.51 703.19 270 703.979 270.18 704.38 270.3
707.48 271.02 709.63 271.57 710.739 271.86 711.269 272 714.01 272.7
722.811 273.62 727.19 274 782.17 276 814.37 276.62 814.91 276.64
821.23 276.94 822.99 276.95 833.63 278 850.099 278.78 853.58 278.89
857.09 279.34 870 280 870.99 280.1 871.12 280.11 871.509 280.17
871.729 280.21 875.36 280.69 876.041 280.8 876.99 280.97 879.09 281.18
881.75 281.69 882.22 281.76 882.729 281.84 883.849 282 884.95 282.17
885.46 282.25 885.95 282.33 886.42 282.41 886.59 282.45 887.089 282.62
887.24 282.66 889.74 283.17 890.179 283.34 890.55 283.47 890.76 283.55
891.26 283.72 891.56 283.81 891.889 283.92 892.151 284 892.26 284.01
893.82 284.13 894.17 284.15 894.509 284.18 894.85 284.2 895.07 284.22
895.31 284.25 895.451 284.26 895.68 284.3 895.82 284.31 901.86 284.89
903.51 285.13 908.58 286 914.489 286.43

Manning's n values num= 3
Sta n Val Sta n Val Sta n Val
0 .04 563 .04 710.739 .04

Bank Sta: Left Right Coeff Contr. Expan.
558.629 710.739 .3 .5
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 525 273 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

Proposed.rep
= Broad Crested

Culvert Name	Shape	Rise	Span
Culvert #1	Box	13	22

Solution Criteria = Highest U.S. EG

$$\text{Number of Barrels} = 5$$

upstream elevation = 250
centerline Stations

Sta. 644	Sta. 667	Sta. 690	Sta. 713	Sta. 736
-------------	-------------	-------------	-------------	-------------

Sta. 574 Sta. 597 Sta. 620 Sta. 643 Sta. 666

RIVER: HRC
REACH: Main RS: 1394.093

Description:

Manning's	n	Values		num=	3	
Sta	n	Val	Sta	n	Val	Sta
0	.04	558.629		.04	710.739	.04

CROSS SECTION OUTPUT Profile #PF 1

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Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	32.44	28.83	40.83
C & E Loss (ft)	0.19	Cum SA (acres)	8.65	3.03	10.07

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 930.4035

INPUT

Description:

Station	Elevation	Data	num=	78	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	266.38	5.9	266	307.36	264.03	309.85	264	313.27	263.05			
315.74	262	319.99	260.22	320.5	260	321.14	259.73	325.2	258			
326.89	257.29	329.92	256	333.82	254.35	334.64	254	341.83	254.6			
346.05	256	348.75	256.85	352.02	258	357.54	259.81	358.14	260			
358.72	260.19	359.14	260.32	363.67	262	394.45	262.8	413.67	264			
422.16	264.54	427.25	265.16	433.93	266	445.66	267.38	448.93	267.7			
451.91	268	464.89	268.79	465.04	268.8	475.55	269.27	483.27	269.7			
484.05	269.74	492.55	270	566.17	269.76	567.31	269.68	577.36	268.9			
579.31	268.83	581.21	268.79	601.93	268.17	606.39	268	609.31	267.86			
614.77	267.47	614.88	267.46	621.82	266.9	630.05	266.41	630.91	266.35			
637.39	266	638.22	265.95	638.42	265.94	658.89	264.69	662.07	264.43			
666.46	264	669.66	263.6	671.98	263.37	676.79	262.81	683.65	262.16			
684.11	262.11	685.31	262	696.09	261.52	698.08	261.53	705.85	261.29			
724.98	260.85	731.72	260.65	742.13	260	849.13	261.6	858.06	262			
872.74	263.53	874.79	263.73	877.31	264	916.28	269.06	923.13	270			
952.05	273.41	957.63	274	975.13	275.92							

Manning's n	Values	num=	5	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	309.85	.075	363.67	.04	671.98	.06	877.31	.04		

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
309.85	422.16	245.97	302.63	371.27	.1	.3	

Ineffective Flow	num=	2	Sta L	Sta R	Elev	Permanent
0	195	273	F			
815.61	975.13	273	F			

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	270.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.040	0.058	0.056
W.S. Elev (ft)	270.31	Reach Len. (ft)	245.97	302.63	371.27
Crit W.S. (ft)	264.29	Flow Area (sq ft)	680.24	1081.58	1899.39
E.G. Slope (ft/ft)	0.000524	Area (sq ft)	1636.74	1081.58	2569.68
Q Total (cfs)	8951.00	Flow (cfs)	1892.85	2875.79	4182.36
Top width (ft)	925.77	Top width (ft)	309.85	112.31	503.61
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)	2.78	2.66	2.20
Max Chl Dpth (ft)	16.31	Hydr. Depth (ft)	5.92	9.63	4.83
Conv. Total (cfs)	391173.1	Conv. (cfs)	82720.5	125676.7	182776.0
Length wtd. (ft)	313.94	wetted Per. (ft)	114.85	115.59	394.05
Min Ch El (ft)	254.00	Shear (lb/sq ft)	0.19	0.31	0.16
Alpha	1.03	Stream Power (lb/ft s)	0.54	0.81	0.35
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	11.85	14.93	25.61
C & E Loss (ft)	0.00	Cum SA (acres)	4.45	1.65	7.09

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC

REACH: Main

RS: 627.7707

INPUT

Description:

Station Elevation Data

num= 145

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	270	23.311	269.04	29.661	268	32.702	267.72	44.691	266.88
51.7	266.81	58.258	266.66	64.271	266.66	66.585	266.61	70.813	266.28
74.023	266.11	81.155	266	95.648	266.04	107.805	266.47	109.759	266.46
112.654	266.62	115.535	266.6	119.947	266.89	123.571	267	127.24	266.89
129.324	266.87	131.285	266.74	133.568	266.72	146.82	266.98	153.569	266.99
158.226	266.93	170.966	266.95	173.701	266.92	179.829	266.49	181.905	266.43
186.677	266	240.293	265.87	265.166	265.97	266.017	266	273.792	266.09
278.84	266.21	282.303	266.35	288.63	266.68	294.437	267.06	297.034	267.19
302.182	267.19	309.306	267.41	315.955	267.49	317.74	267.62	318.422	267.56
321.831	268	333.229	267.98	336.071	266.16	339.457	264.33	342.223	263.01
345.08	261.94	352.311	259.43	354.089	258.63	356.923	257.46	359.543	256
362.998	254.26	363.687	254	395.225	254.84	398.159	256	404.219	258.48
414.193	262.29	418.934	264.2	423.079	266	452.357	265.87	465.862	265.95
466.598	266	484.768	266.06	487.924	266.22	488.851	266.2	509.197	268
527.399	268.46	530.386	269.69	534.799	270.96	538.131	272	543.7	273.54
545.653	274	558.898	274.98	562.951	275.21	567.892	275.68	569.753	276
597.737	275.98	598.342	275.75	602.302	274.86	604.309	274.78	605.681	274.65
608.898	274.55	615.854	274.39	618.489	274	632.998	273.82	635.549	273.58
636.951	273.34	637.127	273.19	640.995	272.58	643.025	272	644.963	271.83
647.737	270.91	651.406	270	654.072	269.45	655.604	269.32	659.97	268.38
661.234	268	698.242	266.27	699.927	266.28	705.343	266	706.944	265.7
709.035	265.54	713.708	265.02	732.553	264.3	742.519	263.84	751.244	263.53
753.244	263.56	760.927	263.49	763.233	263.5	769.63	263.36	775.091	263.17
779.58	262.91	781.618	262.83	784.667	262.61	787.524	262.54	790.573	262.25
791.592	262.28	796.234	262.64	801.183	262.97	806.614	263.28	808.951	263.33
810.789	263.26	813.692	263.25	815.799	263.15	825.206	262.89	829.151	262.83
844.296	262.96	850.692	262.91	855.457	263.08	860.919	263.14	864.703	263.27
871.659	263.26	876.01	263.03	880.43	262.91	893.024	263.09	894.05	263.14
897.092	263.47	901.481	263.48	914.611	263.9	915.798	264	919.598	264.19

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	333.229	.075	423.079	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
333.229	423.079	152.69	155.13	152.21	.1	.3
Ineffective Flow	num= 1					
Sta L	Sta R	Elev	Permanent			
770	919.598	280	F			
Skew Angle = 40						

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	270.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	wt. n-Val.	0.040	0.075	0.040
W.S. Elev (ft)	270.03	Reach Len. (ft)	32.00	32.00	32.00
Crit W.S. (ft)	265.54	Flow Area (sq ft)	1073.93	1043.91	883.68
E.G. Slope (ft/ft)	0.001092	Area (sq ft)	1073.93	1043.91	1920.78
Q Total (cfs)	8951.00	Flow (cfs)	2874.07	3373.56	2703.38
Top Width (ft)	799.90	Top width (ft)	333.23	89.85	376.82
Vel Total (ft/s)	2.98	Avg. Vel. (ft/s)	2.68	3.23	3.06
Max Chl Dpth (ft)	16.03	Hydr. Depth (ft)	3.22	11.62	3.89
Conv. Total (cfs)	270901.8	Conv. (cfs)	86983.5	102100.6	81817.7
Length Wtd. (ft)	32.00	Wetted Per. (ft)	333.57	95.17	227.97
Min Ch El (ft)	254.00	Shear (lb/sq ft)	0.22	0.75	0.26
Alpha	1.02	Stream Power (lb/ft s)	0.59	2.42	0.81
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	4.19	7.54	6.47
C & E Loss (ft)	0.03	Cum SA (acres)	2.64	0.95	3.33

warning: Divided flow computed for this cross-section.

warning: The cross-section end points had to be extended vertically for the computed water surface.

warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: HRC
REACH: Main

RS: 561.3247

Proposed.rep

INPUT

Description:

Distance from Upstream XS = 32

Deck/Roadway Width = 88

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 8											
Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord	
0	268	250		324.4	267.85	250		324.4	267.85	266.31	
361.4	267.81	266.27		397.4	267.71	266.17		434.4	267.52	265.98	
434.4	267.52	250		965.9	268	250					

Upstream Bridge Cross Section Data

Station Elevation Data num= 145											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	270	23.311	269.04	29.661	268	32.702	267.72	44.691	266.88		
51.7	266.81	58.258	266.66	64.271	266.66	66.585	266.61	70.813	266.28		
74.023	266.11	81.155	266	95.648	266.04	107.805	266.47	109.759	266.46		
112.654	266.62	115.535	266.6	119.947	266.89	123.571	267	127.24	266.89		
129.324	266.87	131.285	266.74	133.568	266.72	146.82	266.98	153.569	266.99		
158.226	266.93	170.966	266.95	173.701	266.92	179.829	266.49	181.905	266.43		
186.677	266	240.293	265.87	265.166	265.97	266.017	266	273.792	266.09		
278.84	266.21	282.303	266.35	288.63	266.68	294.437	267.06	297.034	267.19		
302.182	267.19	309.306	267.41	315.955	267.49	317.74	267.62	318.422	267.56		
321.831	268	333.229	267.98	336.071	266.16	339.457	264.33	342.223	263.01		
345.08	261.94	352.311	259.43	354.089	258.63	356.923	257.46	359.543	256		
362.998	254.26	363.687	254	395.225	254.84	398.159	256	404.219	258.48		
414.193	262.29	418.934	264.2	423.079	266	452.357	265.87	465.862	265.95		
466.598	266	484.768	266.06	487.924	266.22	488.851	266.2	509.197	268		
527.399	268.46	530.386	269.69	534.799	270.96	538.131	272	543.7	273.54		
545.653	274	558.898	274.98	562.951	275.21	567.892	275.68	569.753	276		
597.737	275.98	598.342	275.75	602.302	274.86	604.309	274.78	605.681	274.65		
608.898	274.55	615.854	274.39	618.489	274	632.998	273.82	635.549	273.58		
636.951	273.34	637.127	273.19	640.995	272.58	643.025	272	644.963	271.83		
647.737	270.91	651.406	270	654.072	269.45	655.604	269.32	659.97	268.38		
661.234	268	698.242	266.27	699.927	266.28	705.343	266	706.944	265.7		
709.035	265.54	713.708	265.02	732.553	264.3	742.519	263.84	751.244	263.53		
753.244	263.56	760.927	263.49	763.233	263.5	769.63	263.36	775.091	263.17		
779.58	262.91	781.618	262.83	784.667	262.61	787.524	262.54	790.573	262.25		
791.592	262.28	796.234	262.64	801.183	262.97	806.614	263.28	808.951	263.33		
810.789	263.26	813.692	263.25	815.799	263.15	825.206	262.89	829.151	262.83		
844.296	262.96	850.692	262.91	855.457	263.08	860.919	263.14	864.703	263.27		
871.659	263.26	876.01	263.03	880.43	262.91	893.024	263.09	894.05	263.14		
897.092	263.47	901.481	263.48	914.611	263.9	915.798	264	919.598	264.19		

Manning's n Values

Sta	n val	Sta	n val	Sta	n val
0	.04	333.229	.075	423.079	.04

Bank Sta: Left Right Coeff Contr. Expan.
333.229 423.079 .1 .3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
770 919.598 280 F

Skew Angle = 40

Downstream Deck/Roadway Coordinates

num= 8											
Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord	
0	268	250		401.1	267.74	250		401.1	267.74	266.2	
438.1	267.7	266.16		474.1	267.6	266.06		511.1	267.41	265.87	
511.1	267.41	250		922	268	250					

Downstream Bridge Cross Section Data

Station Elevation Data num= 132											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	268	28.956	266.45	30.305	266	72.82	264.3	77.133	264		
207.889	263.81	216.193	263.63	234.172	263.52	237.313	263.44	266.898	263.38		
267.932	263.39	304.258	263.24	313.19	263.26	338.109	262.93	349.232	262.69		
350.71	262.68	352.802	262.56	355.199	262.57	356.862	262.49	359.666	262.46		
364.07	262.55	365.426	262.62	370.153	262.72	371.8	262.81	373.148	262.83		
377.675	263.02	394.865	263.62	399.462	263.71	401.032	263.7	408.386	263.71		
409.16	263.63	411.695	263.53	414.706	263.19	417.747	262	420.252	261.42		
423.048	260.26	432.279	256.58	433.803	256	438.79	254.27	440.016	254		
471.937	255.19	479.605	257.8	480.946	258.28	485.09	259.7	488.269	260.71		
490.552	261.33	492.957	261.83	494.014	262	499.193	262.34	502.318	262.59		
503.751	262.62	508.041	262.72	510.147	262.66	512.553	262.69	517.685	262.86		
521.891	263.07	523.155	263.09	523.974	263.16	526.885	263.21	530.018	263.34		

Proposed.rep									
535.871	263.43	542.62	263.68	544.183	263.66	546.833	263.71	547.53	263.69
562.414	263.6	564.958	263.65	567.739	263.62	569.393	263.67	585.021	263.59
602.701	263.68	604.057	263.71	611.748	263.63	612.767	263.68	620.35	263.63
630.37	263.67	631.742	263.69	639.333	263.68	640.551	263.69	647.292	263.68
668.328	263.88	670.411	263.95	689.34	263.72	704.5	263.67	716.029	263.52
735.556	263.49	745.806	263.55	753.42	263.5	755.733	263.45	765.378	263.36
768.266	263.37	770.02	263.32	772.832	263.34	776.478	263.27	779.443	263.26
783.104	263.17	785.854	263.16	788.252	263.09	796.135	263.01	805.703	263.03
810.781	263.08	812.888	263.14	815.623	263.16	816.282	263.2	819.177	263.22
836.819	263.5	839.761	263.51	849.957	263.75	855.518	263.98	859.655	264.29
862.39	264.42	863.279	264.4	864.198	264.5	865.998	264.49	867.362	264.54
877.787	265	879.113	265.04	883.226	264.95	889.684	265.08	892.082	265.2
901.259	266	914.136	267.39	917.047	268	922.846	269.15	927.358	270
930.131	270.5	937.202	272	942.97	273.07	947.222	274	949.221	274.14
954.361	274.9	958.429	275.77						

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .045 411.695 .075 503.751 .045

Bank Sta: Left Right Coeff Contr. Expan.
411.695 503.751 .1 .3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 120 275 F

Skew Angle = 40

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 361.4 Downstream= 438.1
Upstream num= 2
width Elev width Elev
1.5 250 1.5 267
Downstream num= 2
width Elev width Elev
1.5 250 1.5 267

Pier Data
Pier Station Upstream= 397.4 Downstream= 474.1
Upstream num= 2
width Elev width Elev
1.5 250 1.5 267
Downstream num= 2
width Elev width Elev
1.5 250 1.5 267

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
Do not add weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (ft)	270.17	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	270.03	E.G. Elev (ft)	270.06	267.83
Q Total (cfs)	8951.00	W.S. Elev (ft)	269.65	264.86
Q Bridge (cfs)	2981.93	Crit W.S. (ft)	265.17	264.86
Q Weir (cfs)		Max Chl Dpth (ft)	15.65	10.86
Weir Sta Lft (ft)		Vel Total (ft/s)	4.99	13.80

Proposed.rep			
Weir Sta Rgt (ft)		Flow Area (sq ft)	1794.52
Weir Submerg		Froude # Chl	0.22
Weir Max Depth (ft)		Specif Force (cu ft)	8045.77
Min El Weir Flow (ft)	267.53	Hydr Depth (ft)	2.81
Min El Prs (ft)	266.30	w.P. Total (ft)	878.32
Delta EG (ft)	4.31	Conv. Total (cfs)	83181.8
Delta WS (ft)	4.48	Top Width (ft)	788.32
BR Open Area (sq ft)	670.27	Frctn Loss (ft)	1.98
BR Open Vel (ft/s)	4.60	C & E Loss (ft)	0.26
Coef of Q		Shear Total (lb/sq ft)	1.48
Br Sel Method	Energy only	Power Total (lb/ft s)	7.37
			231.62

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 472.6398

INPUT

Description:

Station Elevation Data		num= 132									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	268	28.956	266.45	30.305	266	72.82	264.3	77.133	264		
207.889	263.81	216.193	263.63	234.172	263.52	237.313	263.44	266.898	263.38		
267.932	263.39	304.258	263.24	313.19	263.26	338.109	262.93	349.232	262.69		
350.71	262.68	352.802	262.56	355.199	262.57	356.862	262.49	359.666	262.46		
364.07	262.55	365.426	262.62	370.153	262.72	371.8	262.81	373.148	262.83		
377.675	263.02	394.865	263.62	399.462	263.71	401.032	263.7	408.386	263.71		
409.16	263.63	411.695	263.53	414.706	263.19	417.747	262	420.252	261.42		
423.048	260.26	432.279	256.58	433.803	256	438.79	254.27	440.016	254		
471.937	255.19	479.605	257.8	480.946	258.28	485.09	259.7	488.269	260.71		
490.552	261.33	492.957	261.83	494.014	262	499.193	262.34	502.318	262.59		
503.751	262.62	508.041	262.72	510.147	262.66	512.553	262.69	517.685	262.86		
521.891	263.07	523.155	263.09	523.974	263.16	526.885	263.21	530.018	263.34		
535.871	263.43	542.62	263.68	544.183	263.66	546.833	263.71	547.53	263.69		
562.414	263.6	564.958	263.65	567.739	263.62	569.393	263.67	585.021	263.59		
602.701	263.68	604.057	263.71	611.748	263.63	612.767	263.68	620.35	263.63		
630.37	263.67	631.742	263.69	639.333	263.68	640.551	263.69	647.292	263.68		
668.328	263.88	670.411	263.95	689.34	263.72	704.5	263.67	716.029	263.52		
735.556	263.49	745.806	263.55	753.42	263.5	755.733	263.45	765.378	263.36		
768.266	263.37	770.02	263.32	772.832	263.34	776.478	263.27	779.443	263.26		
783.104	263.17	785.854	263.16	788.252	263.09	796.135	263.01	805.703	263.03		
810.781	263.08	812.888	263.14	815.623	263.16	816.282	263.2	819.177	263.22		
836.819	263.5	839.761	263.51	849.957	263.75	855.518	263.98	859.655	264.29		
862.39	264.42	863.279	264.4	864.198	264.5	865.998	264.49	867.362	264.54		
877.787	265	879.113	265.04	883.226	264.95	889.684	265.08	892.082	265.2		
901.259	266	914.136	267.39	917.047	268	922.846	269.15	927.358	270		
930.131	270.5	937.202	272	942.97	273.07	947.222	274	949.221	274.14		
954.361	274.9	958.429	275.77								

Proposed.rep

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .045 411.695 .075 503.751 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 411.695 503.751 286.58 305.07 300.37 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 120 275 F

Skew Angle = 40

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	265.87	Wt. n-Val.	0.045	0.075	0.045
Vel Head (ft)	0.32	Reach Len. (ft)	286.58	305.07	300.37
W.S. Elev (ft)	265.55	Flow Area (sq ft)	615.88	712.75	753.16
Crit W.S. (ft)	264.73	Area (sq ft)	709.27	712.75	753.16
E.G. Slope (ft/ft)	0.005042	Flow (cfs)	2376.40	3847.46	2727.15
Q Total (cfs)	8951.00	Top width (ft)	370.15	92.06	392.35
Top width (ft)	854.56	Avg. Vel. (ft/s)	3.86	5.40	3.62
Vel Total (ft/s)	4.30	Hydr. Depth (ft)	2.11	7.74	1.92
Max Chl Dpth (ft)	11.55	Conv. (cfs)	33466.5	54183.3	38406.1
Conv. Total (cfs)	126055.9	Wetted Per. (ft)	291.74	94.83	392.45
Length wtd. (ft)	300.82	Shear (lb/sq ft)	0.66	2.37	0.60
Min. Chl El (ft)	254.00	Stream Power (lb/ft s)	2.56	12.77	2.19
Alpha	1.11	Cum Volume (acre-ft)	2.76	4.84	4.50
Frctn Loss (ft)	2.44	Cum SA (acres)	1.90	0.63	2.51
C & E Loss (ft)	0.08				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 167.5697

INPUT

Description:

Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	266	21.77	265.99	22.99	266	283.14	265.59	293.31	265.78
295.13	265.74	306.24	266	378.2	265.83	466.94	264	586.59	263.79
587.93	263.78	588.1	263.77	614.34	263.5	619.26	263.49	749.74	262
895.97	261.56	932.96	260.19	937.78	260	938.66	259.08	939.66	258
941.11	256.39	941.45	256	941.75	255.69	943.46	254	943.78	253.65
945.31	252	991.55	252.92	995.4	254	1002.1	255.85	1002.64	256
1002.79	256.04	1009.83	258	1010.82	258.26	1017.52	260	1020.42	260.1494
1056.16	261.99	1056.42	262	1060.72	261.91	1063.94	262	1072.58	261.84
1073.99	261.59	1074.24	261.55	1077.34	261.47	1080.23	261.29	1096.57	260
1110.05	261.13	1112.06	261.47	1114.35	261.5	1114.86	261.72	1115.37	261.75
1117.28	261.76	1119.77	260	1285.99	260.22	1286.45	260.21	1350.64	262
1380.02	263.33	1382.13	263.68	1383.75	264	1385.2	264.71	1385.33	264.8
1387.3	266	1389.93	267.32	1391.26	268	1405.59	274	1405.89	274.13
1407.42	274.71	1409.66	275.67	1409.98	275.8	1410.45	276	1410.82	276.18
1415.17	278.47	1415.63	278.67	1418.04	280	1421.54	281.15	1422.51	281.45
1424.24	282	1428.28	282.75	1429.59	283.02	1431.96	283.37	1432.13	283.39
1432.48	283.44	1434.29	284	1439.62	285.56	1440.86	285.91		

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .04 932.96 .075 1020.42 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 932.96 1020.42 164.95 167.57 157.53 .1 .3

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 624.28 265.9999 F
 1235.99 1440.86 285.9134 F

Proposed.rep

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	263.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.07	wt. n-val.	0.040	0.075	0.040
W.S. Elev (ft)	262.28	Reach Len. (ft)			
Crit W.S. (ft)	262.28	Flow Area (sq ft)	128.98	668.46	370.10
E.G. Slope (ft/ft)	0.015088	Area (sq ft)	128.98	668.46	552.27
Q Total (cfs)	8951.00	Flow (cfs)	428.03	6107.69	2415.29
Top Width (ft)	631.85	Top width (ft)	207.93	87.46	336.45
Vel Total (ft/s)	7.67	Avg. Vel. (ft/s)	3.32	9.14	6.53
Max chl dpth (ft)	10.28	Hydr. Depth (ft)	0.62	7.64	1.72
Conv. Total (cfs)	72871.5	Conv. (cfs)	3484.6	49723.6	19663.2
Length wtd. (ft)		wetted Per. (ft)	207.96	91.88	216.39
Min Ch El (ft)	252.00	Shear (lb/sq ft)	0.58	6.85	1.61
Alpha	1.17	Stream Power (lb/ft s)	1.94	62.61	10.51
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

SUMMARY OF MANNING'S N VALUES

River:HRC

n8	Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7
Main		9880.091	.04	.045	.04				
Main		9520.172	.04	.045	.04				
Main		9011.299	.04	.045	.04				
Main		8613.920	.04	.045	.04				
Main		8202.584	.04	.045	.04				
Main		7786.663	.04	.045	.04				
Main		7291.709	.04	.045	.04				
Main		6807.731	.04	.06	.04	.075	.06	.04	
Main		6396.299	.04	.06	.04	.075	.06	.04	
Main		6075.362	.04	.06	.075	.06	.04		
Main		5608.249	.04	.06	.075	.06	.04		
Main		5000.613	.04	.06	.075	.06	.04		
Main		4634.388	.04	.06	.075	.06			
Main		4342.055	.04	.06	.075	.06	.04		
Main		3976.927	.04	.06	.075	.04			
Main		3642.177	.04	.06	.075	.06	.075	.04	
Main		3351.951	.04	.06	.075	.06	.075	.04	
Main		3038.374	.04	.06	.075	.04			
Main		2614.242	.04	.04	.06	.04	.075	.04	
Main		2033.954	.04	.075	.04	.06	.04	.06	.075
Main	.04	1864.806	.04	.075	.04	.04	.06	.075	.04

Main	1717.589	.04	Proposed.rep .075	.05	.04	.06	.075	.04
Main	1517.721	.04						
Main	1466.171	Culvert						
Main	1394.093	.04	.04	.04				
Main	930.4035	.04	.075	.04	.06	.04		
Main	627.7707	.04	.075	.04				
Main	561.3247	Bridge						
Main	472.6398	.045	.075	.045				
Main	167.5697	.04	.075	.04				

SUMMARY OF REACH LENGTHS

River: HRC

Reach	River Sta.	Left	Channel	Right
Main	9880.091	362.17	359.92	357.61
Main	9520.172	509.29	508.87	507.92
Main	9011.299	397.35	397.38	397.4
Main	8613.920	411.22	411.34	411.42
Main	8202.584	422.86	415.92	415.91
Main	7786.663	499.23	494.95	494.98
Main	7291.709	480.67	483.98	485.99
Main	6807.731	406.99	411.43	413.61
Main	6396.299	314.29	320.94	323.63
Main	6075.362	433.42	467.11	451.66
Main	5608.249	386.8	607.64	624.67
Main	5000.613	325.18	366.23	367.72
Main	4634.388	279.84	292.33	293.02
Main	4342.055	344.09	365.13	365.45
Main	3976.927	334.84	334.75	343.16
Main	3642.177	258.14	290.23	300.27
Main	3351.951	278.96	313.58	317.16
Main	3038.374	564.8	424.13	403.85
Main	2614.242	566.01	580.29	596.27
Main	2033.954	314.82	169.15	136.16
Main	1864.806	303.13	147.22	135.57
Main	1717.589	260.4	199.86	163.52
Main	1517.721	125.59	123.63	106.49
Main	1466.171	Culvert		
Main	1394.093	420.88	463.69	516.28
Main	930.4035	245.97	302.63	371.27
Main	627.7707	152.69	155.13	152.21
Main	561.3247	Bridge		
Main	472.6398	286.58	305.07	300.37
Main	167.5697	164.95	167.57	157.53

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: HRC

Reach	River Sta.	Contr.	Expan.
Main	9880.091	.1	.3
Main	9520.172	.1	.3
Main	9011.299	.1	.3
Main	8613.920	.1	.3
Main	8202.584	.1	.3
Main	7786.663	.1	.3
Main	7291.709	.1	.3
Main	6807.731	.1	.3
Main	6396.299	.1	.3
Main	6075.362	.1	.3

			Proposed.rep
Main	5608.249	.1	.3
Main	5000.613	.1	.3
Main	4634.388	.1	.3
Main	4342.055	.1	.3
Main	3976.927	.1	.3
Main	3642.177	.1	.3
Main	3351.951	.1	.3
Main	3038.374	.1	.3
Main	2614.242	.1	.3
Main	2033.954	.1	.3
Main	1864.806	.1	.3
Main	1717.589	.1	.3
Main	1517.721	.3	.5
Main	1466.171 culvert		
Main	1394.093	.3	.5
Main	930.4035	.1	.3
Main	627.7707	.1	.3
Main	561.3247 Bridge		
Main	472.6398	.1	.3
Main	167.5697	.1	.3

Existing

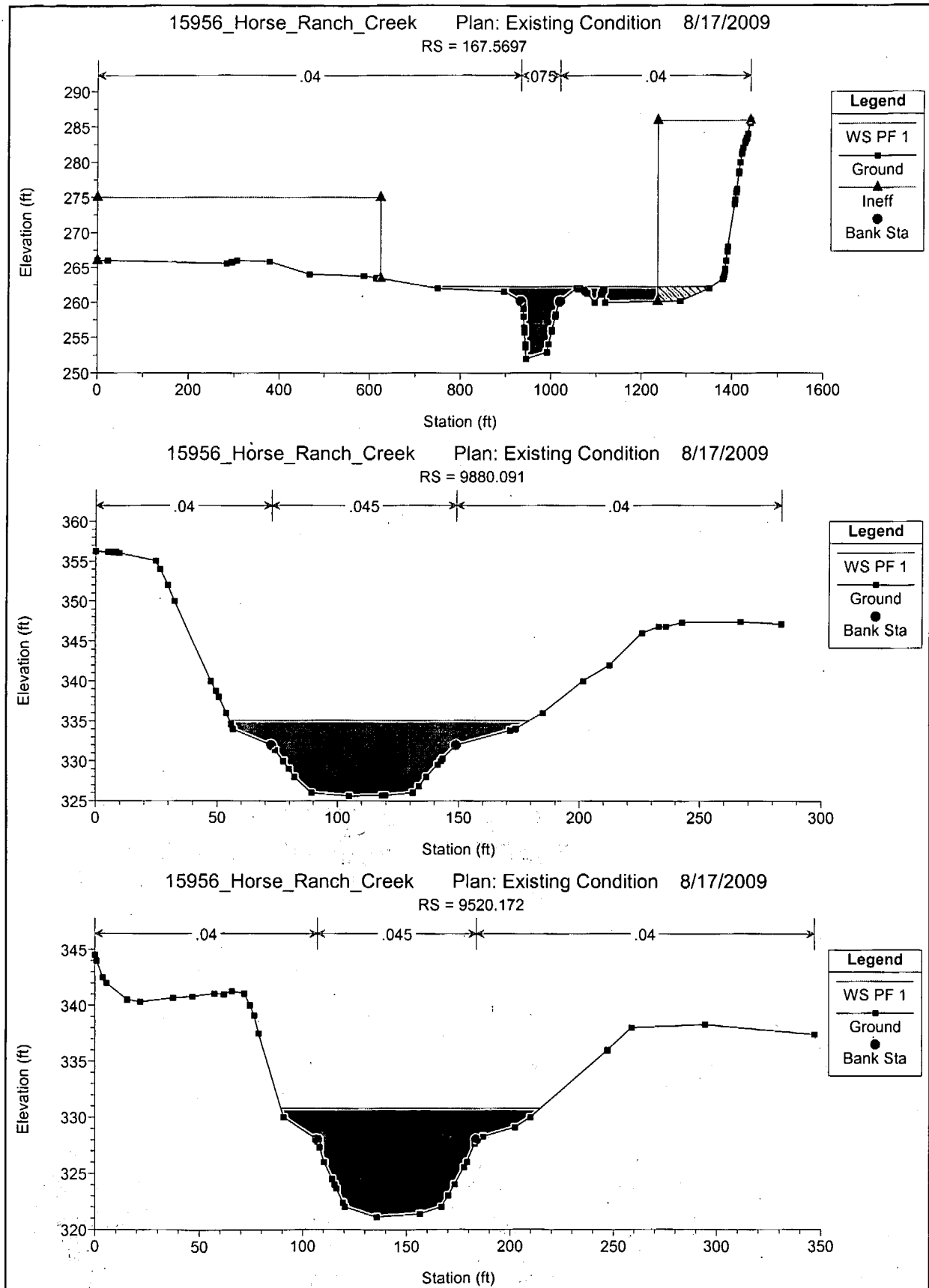
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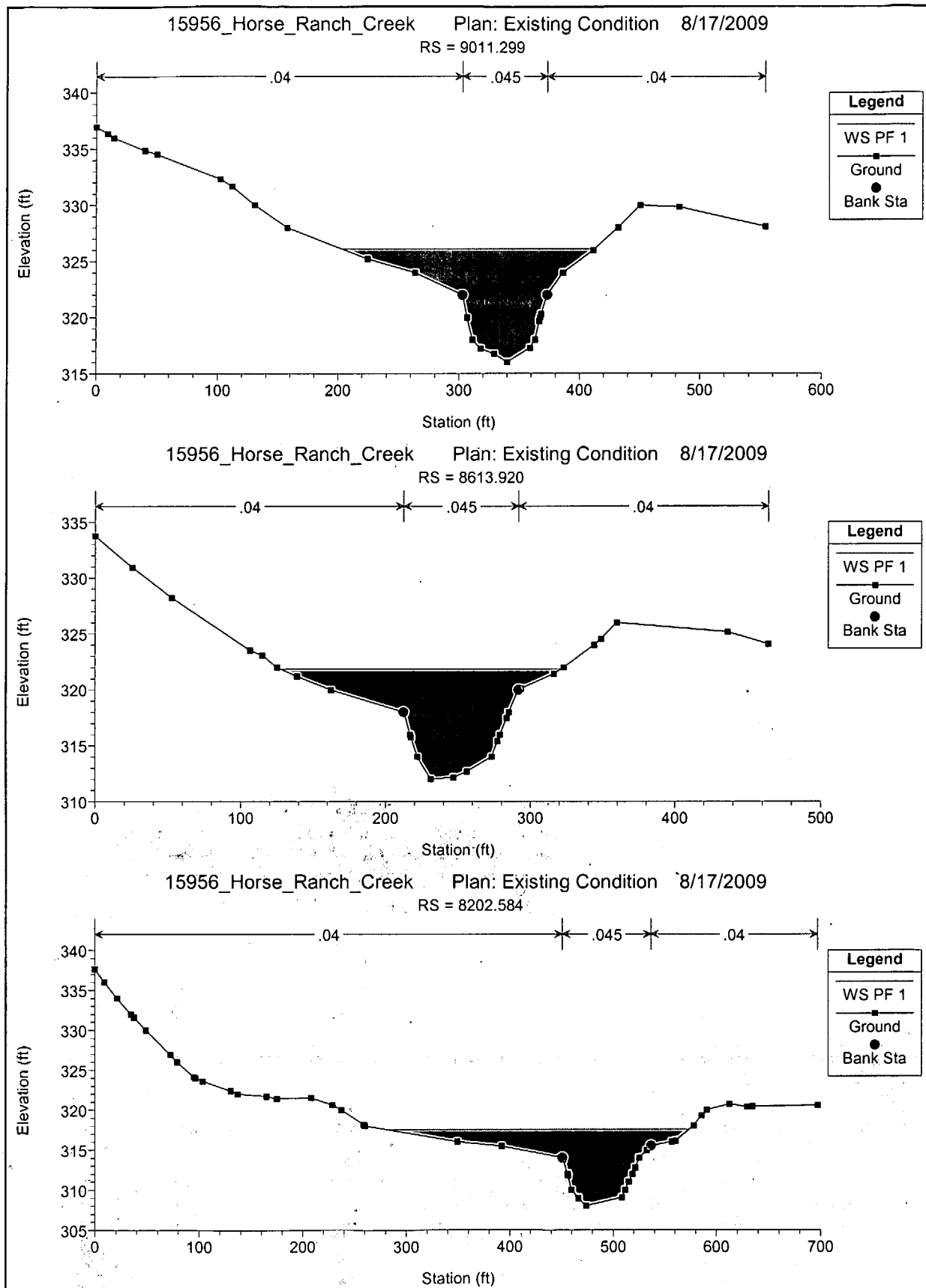
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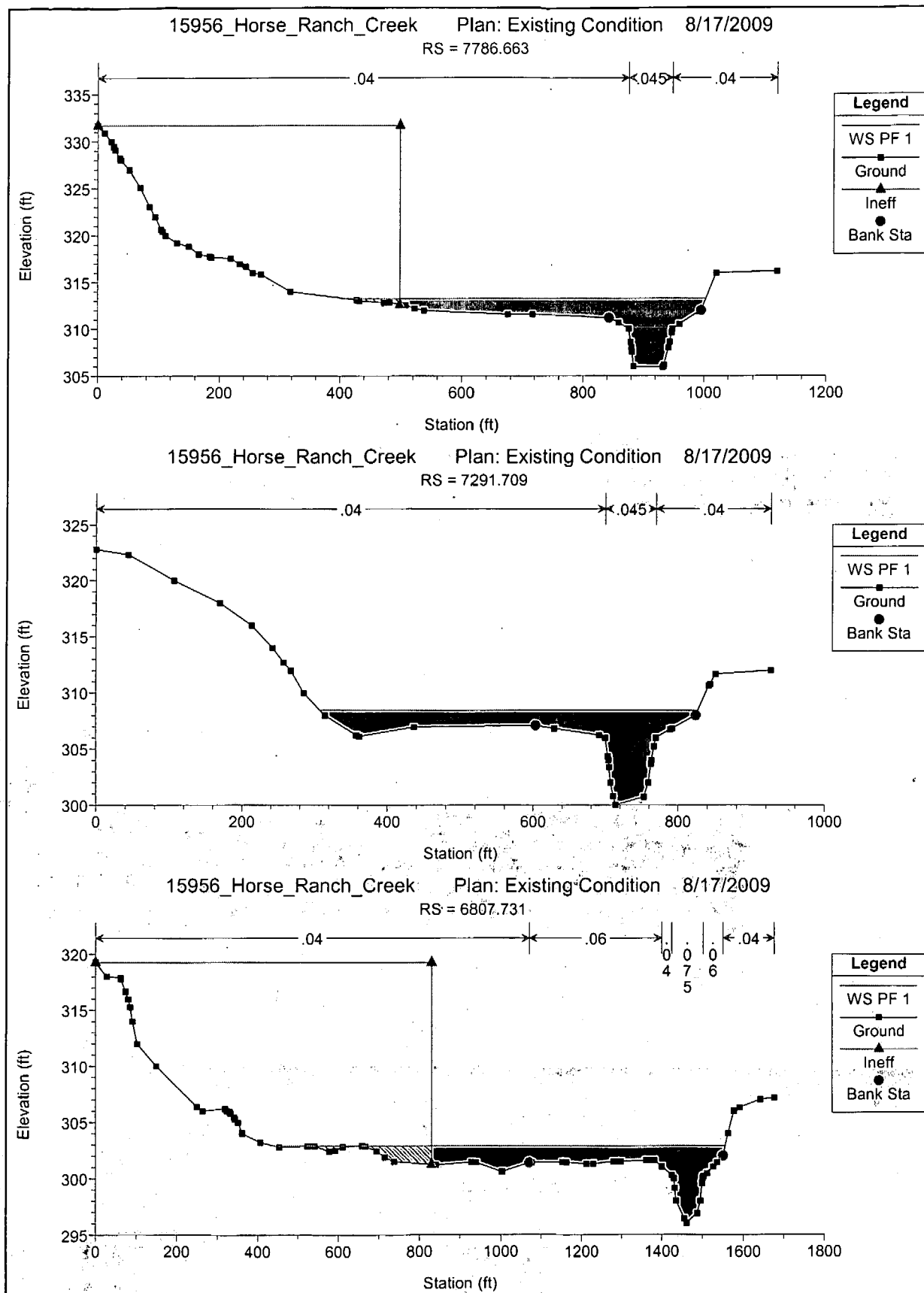
.f02

HEC-RAS Plan: Existing River: HRC Reach: Main Profile: PF 1

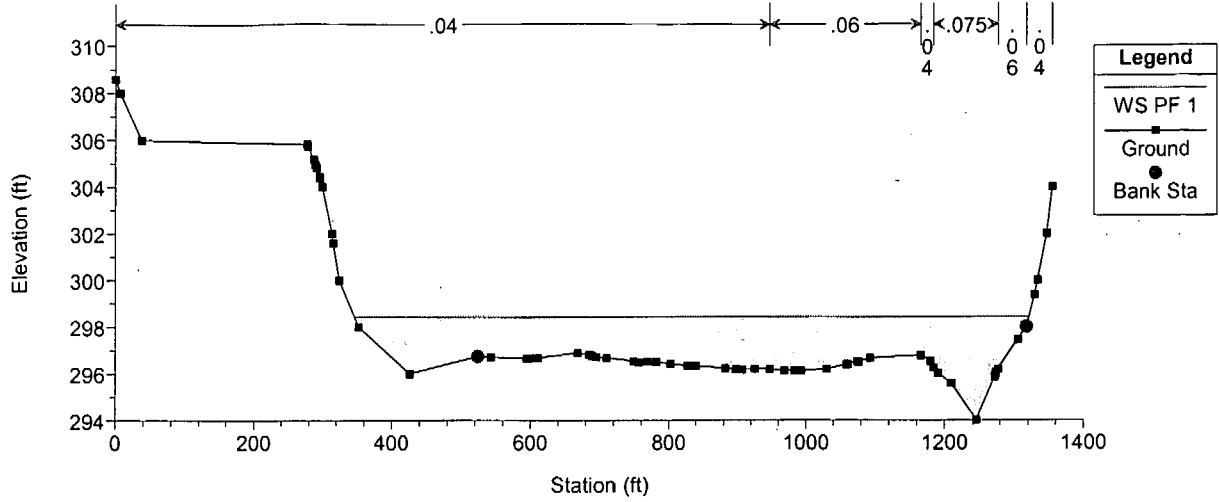
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	9880.091	PF 1	8951.00	325.59	335.08	335.08	337.96	0.011772	13.95	691.49	124.48	0.88
Main	9520.172	PF 1	8951.00	321.13	330.80	330.71	333.62	0.011251	13.77	699.29	125.51	0.86
Main	9011.299	PF 1	8951.00	316.00	326.12	326.12	328.32	0.009018	12.76	852.81	209.69	0.77
Main	8613.920	PF 1	8951.00	312.00	321.87	321.87	324.11	0.010002	12.69	818.64	194.11	0.80
Main	8202.584	PF 1	8951.00	308.00	317.57	317.57	319.33	0.009177	11.81	969.11	294.82	0.78
Main	7786.663	PF 1	8951.00	305.94	313.28	313.28	314.34	0.008459	9.36	1236.15	596.50	0.78
Main	7291.709	PF 1	8951.00	300.00	308.46	308.46	309.53	0.009033	9.11	1203.14	519.58	0.87
Main	6807.731	PF 1	8951.00	296.00	302.90	302.52	303.48	0.015818	5.77	1477.71	1115.80	0.69
Main	6396.299	PF 1	8951.00	294.00	298.44		298.77	0.008465	4.51	1954.33	975.41	0.55
Main	6075.362	PF 1	8951.00	292.00	294.68		295.17	0.015420	5.60	1605.30	931.77	0.74
Main	5608.249	PF 1	8951.00	287.48	290.14	289.47	290.39	0.007110	4.01	2231.55	1296.64	0.52
Main	5000.613	PF 1	8951.00	282.91	286.06	285.14	286.28	0.006421	3.73	2443.97	1633.89	0.47
Main	4634.388	PF 1	8951.00	279.38	282.42	282.08	282.77	0.015551	4.81	1908.02	1455.99	0.69
Main	4342.055	PF 1	8951.00	276.00	279.96		280.11	0.005781	3.13	2862.05	1363.77	0.38
Main	3976.927	PF 1	8951.00	274.00	276.87		277.08	0.012824	3.74	2402.87	1279.36	0.47
Main	3642.177	PF 1	8951.00	271.44	274.15	273.04	274.25	0.005848	2.64	3433.12	1974.86	0.32
Main	3351.951	PF 1	8951.00	268.75	272.43	271.06	272.57	0.005701	3.05	2932.19	1231.07	0.35
Main	3038.374	PF 1	8951.00	266.96	271.08		271.19	0.003486	2.82	3413.61	1201.05	0.27
Main	2614.242	PF 1	8951.00	263.52	270.89		270.91	0.000233	1.20	7502.29	1557.74	0.09
Main	2033.954	PF 1	8951.00	260.00	270.82		270.84	0.000075	0.95	9402.91	1409.14	0.06
Main	1884.806	PF 1	8951.00	260.00	270.81	264.29	270.82	0.000088	1.06	8440.18	1461.08	0.07
Main	1717.589	PF 1	8951.00	258.00	270.78	264.52	270.81	0.000155	1.38	6523.56	1139.11	0.09
Main	1535.785	PF 1	8951.00	258.00	270.66	266.37	270.75	0.000544	2.39	3746.57	839.64	0.17
Main	1463.580 Pankey Road		Bridge									
Main	1434.036	PF 1	8951.00	258.00	270.49	266.60	270.60	0.000686	2.66	3369.46	885.85	0.20
Main	988.7041	PF 1	8951.00	256.00	270.37	263.25	270.41	0.000232	1.84	5436.50	1060.14	0.12
Main	627.7707	PF 1	8951.00	254.00	270.09	265.54	270.24	0.001104	3.26	2898.54	800.31	0.17
Main	561.3247 SR-76		Bridge									
Main	472.6398	PF 1	8951.00	254.00	265.55	264.73	265.87	0.005046	5.40	2081.31	854.53	0.34
Main	167.5697	PF 1	8951.00	252.00	262.28	262.28	263.35	0.015066	9.13	1168.25	632.00	0.58



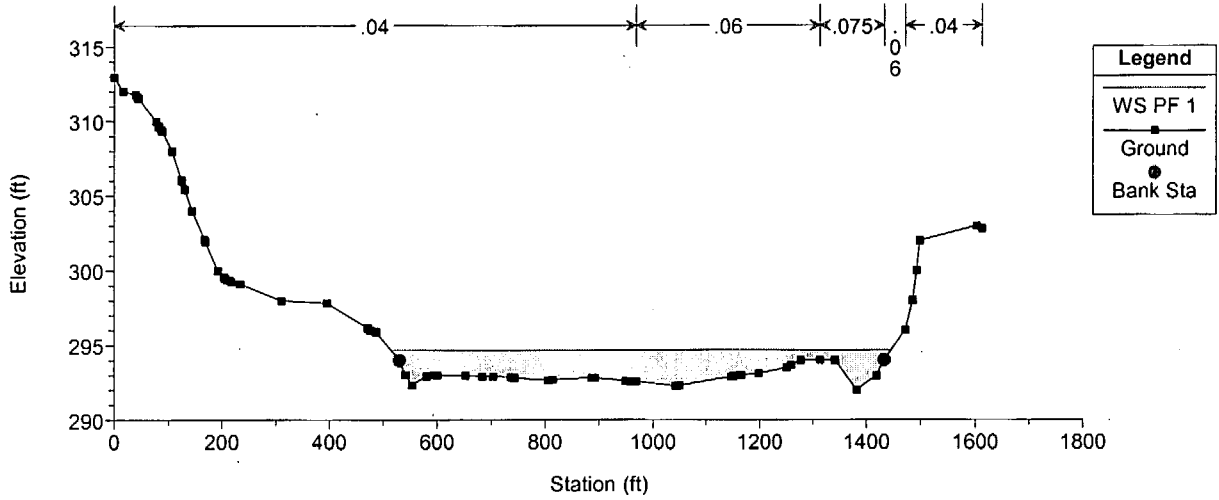




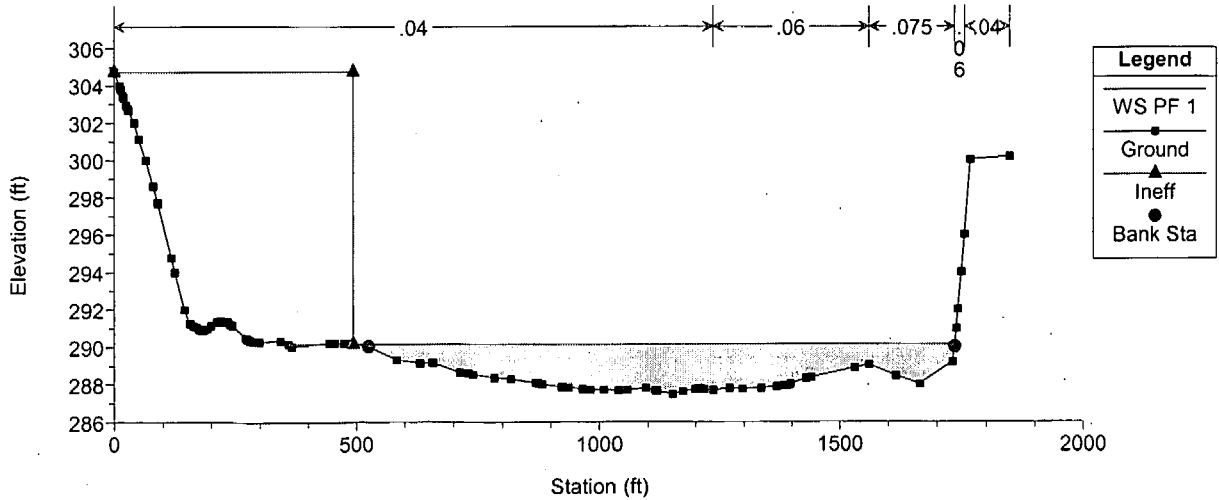
15956_Horse_Ranch_Creek Plan: Existing Condition 8/17/2009
RS = 6396.299

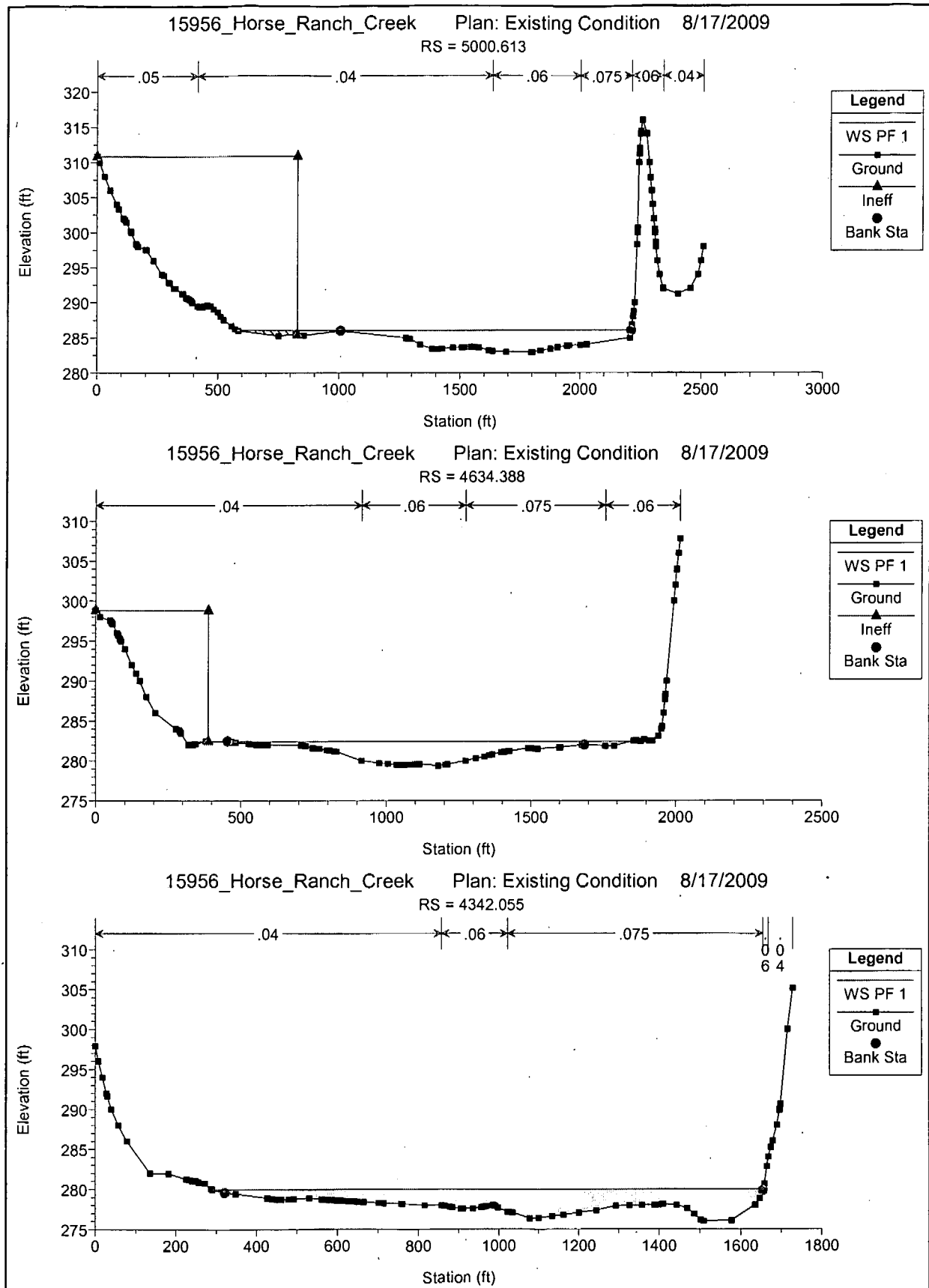


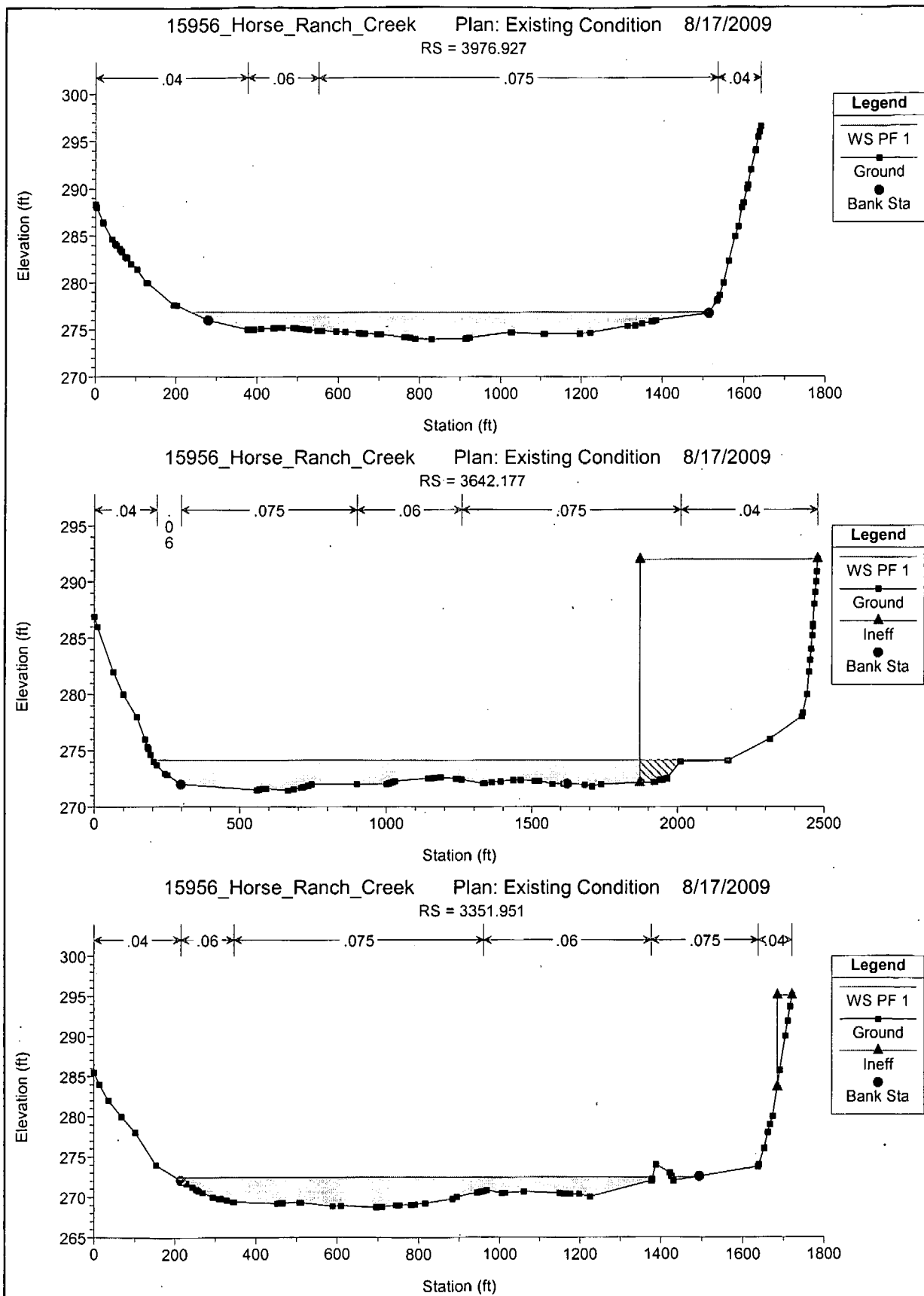
15956_Horse_Ranch_Creek Plan: Existing Condition 8/17/2009
RS = 6075.362

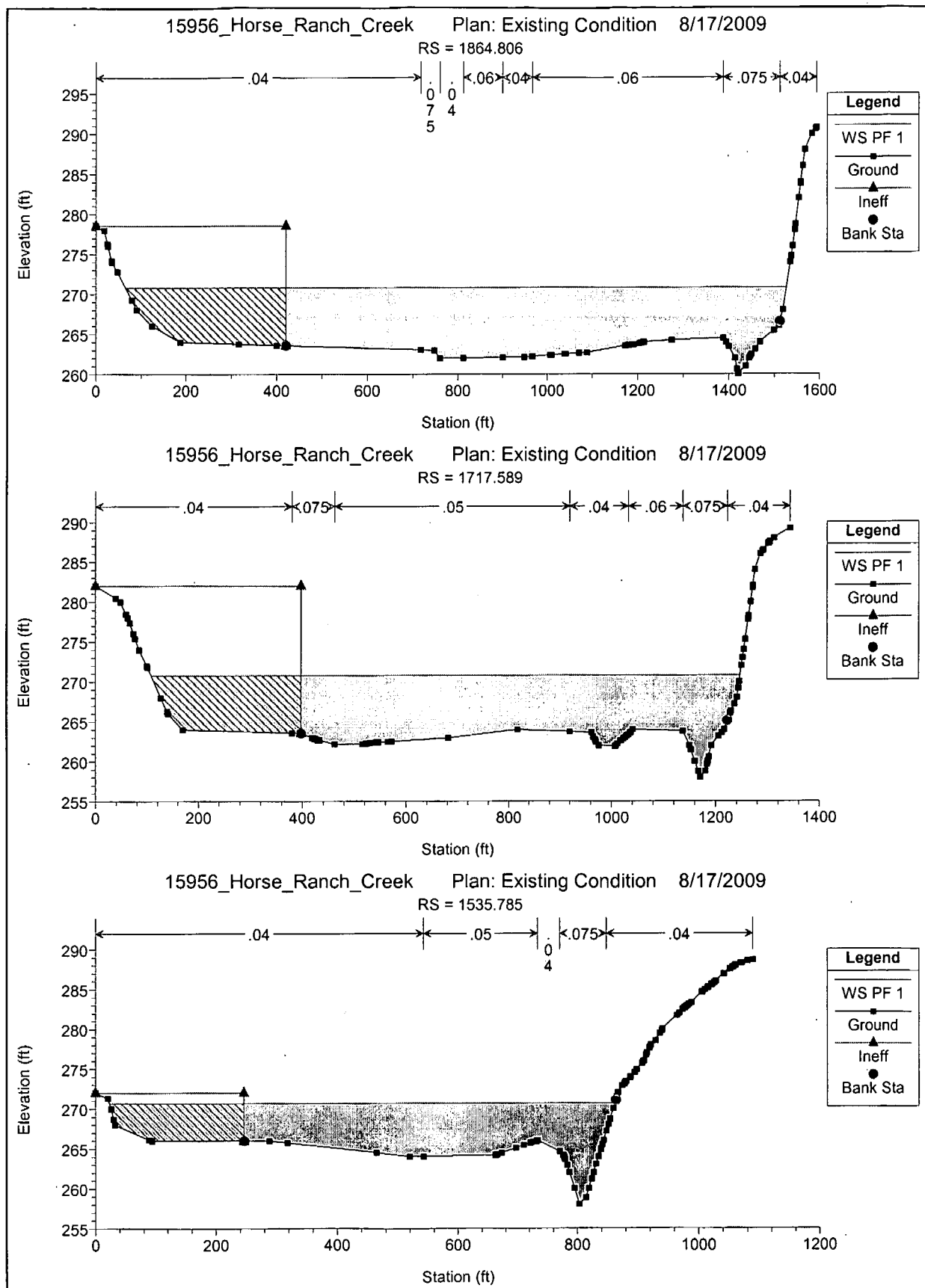


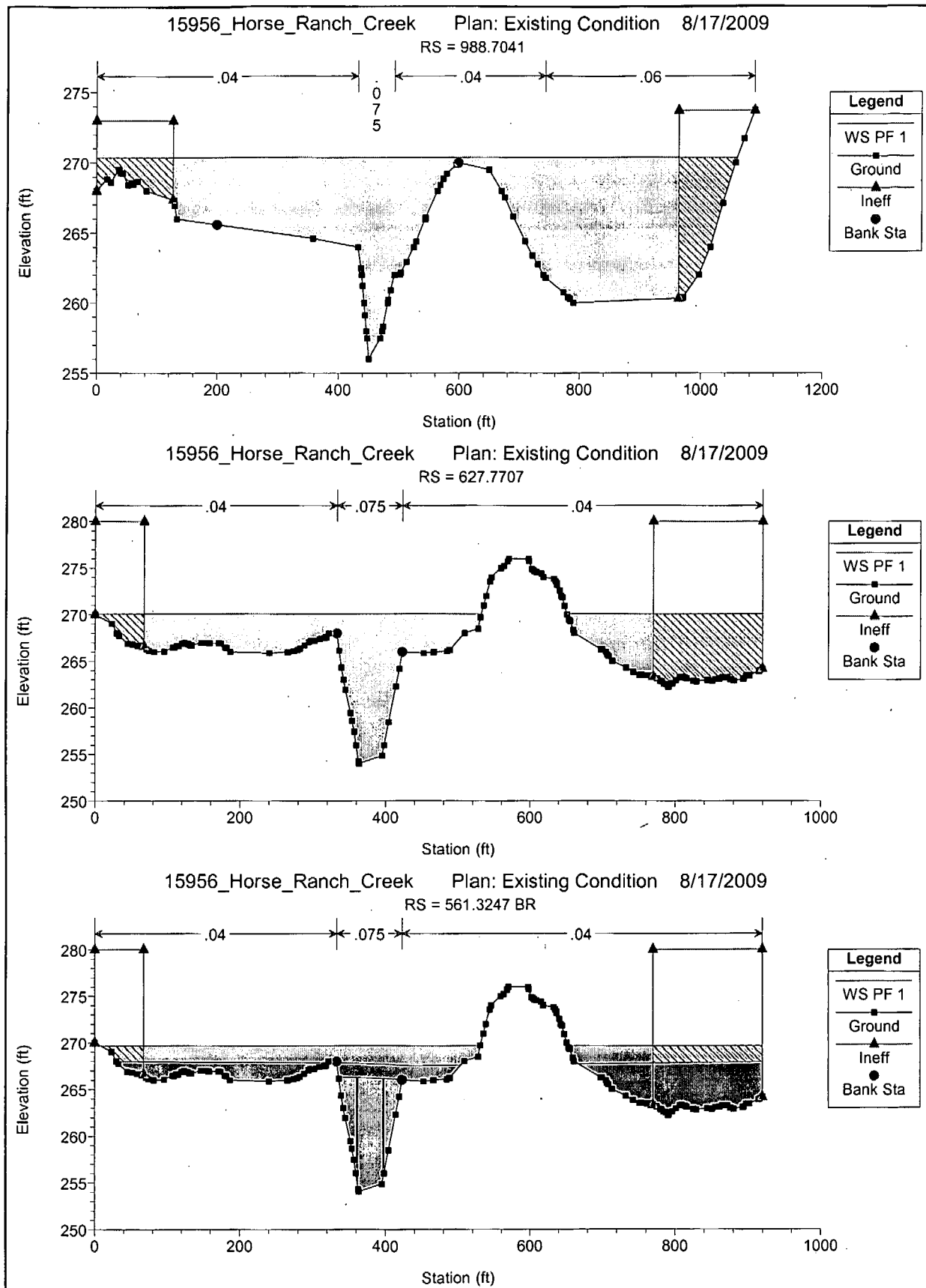
15956_Horse_Ranch_Creek Plan: Existing Condition 8/17/2009
RS = 5608.249





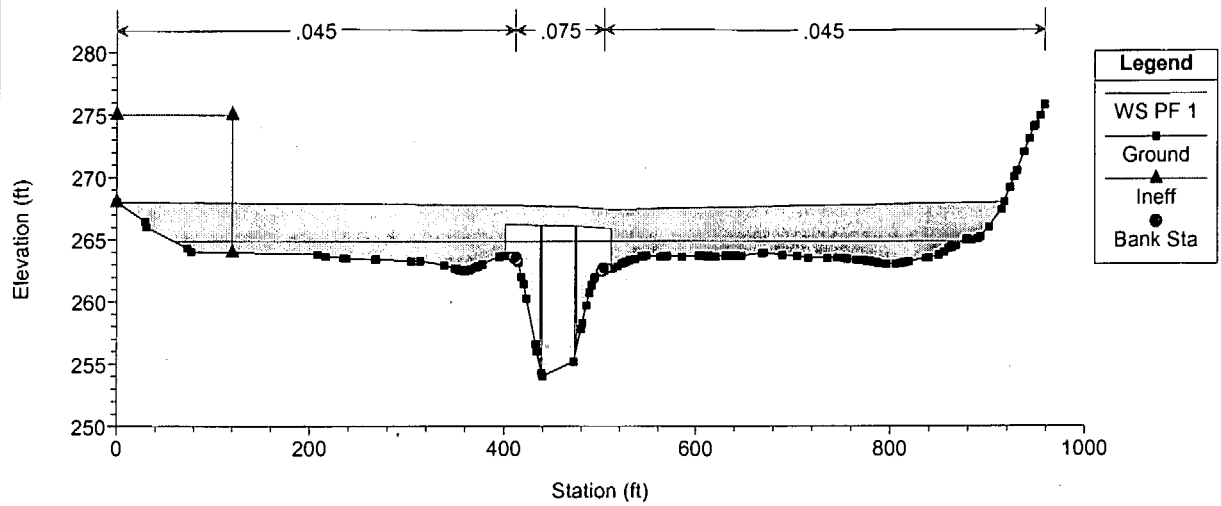






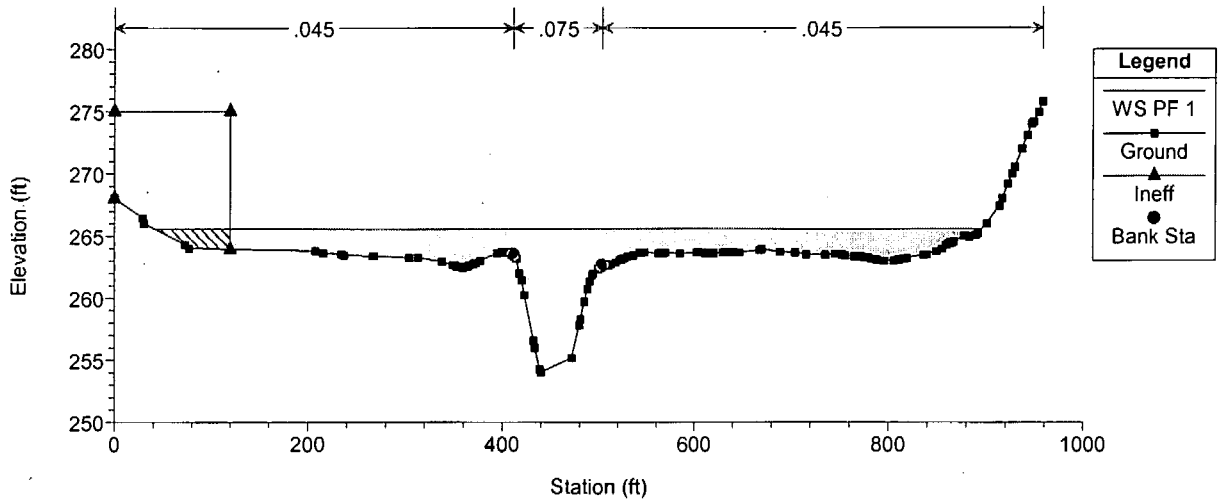
15956_Horse_Ranch_Creek Plan: Existing Condition 8/17/2009

RS = 561.3247 BR



15956_Horse_Ranch_Creek Plan: Existing Condition 8/17/2009

RS = 472.6398



Existing.rep

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X   X XXXXXX   XXXX   XXXX   XX   XXXX
X   X X       X X X   X X X   X
X   X X       X   X   X X X   X
XXXXXXXX XXXX   X   XXX XXXXXX XXXX
X   X X       X   X   X X X   X
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X   X XXXXXX   XXXX   X   X   XXXXX

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PROJECT DATA

Project Title: 15956_Horse_Ranch_Creek
Project File : 15956_Horse_Ranch_C.prj
Run Date and Time: 8/17/2009 11:49:30 AM

Project in English units

PLAN DATA

Plan Title: Existing Condition
Plan File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.p05

Geometry Title: Existing Condition
Geometry File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.g04

Flow Title : Existing Condition
Flow File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.f02

Plan Summary Information:

Number of:	Cross Sections = 28	Multiple Openings = 0
	Culverts = 0	Inline Structures = 0
	Bridges = 2	Lateral Structures = 0

Computational Information

water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Existing Condition
Flow File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.f02

Flow Data (cfs)

River	Reach	RS	PF 1
HRC	Main	9880.091	8951

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
HRC	Main	PF 1		Known WS = 259.19

Existing.rep

GEOMETRY DATA

Geometry Title: Existing Condition

Geometry File : j:\15956\Hydro\Hydraulics\HecRas\Horse_Ranch_Creek\15956_Horse_Ranch_C.g04

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 9880.091

INPUT

Description:

Station Elevation Data			num= 45		
Sta	Elev	Sta	Elev	Sta	Elev
0	356.21	4.96	356.15	7.11	356.17
24.55	355.05	26.43	354	29.57	352.07
47.48	340	49.52	338.74	50.76	338
56.63	334	72.44	332	74	331.38
82.01	328	89.13	326.01	89.15	326
119.75	325.67	130.98	326	133.59	326.84
142.71	330	143.48	330.29	148.95	332
173.83	334.08	184.94	336	201.56	340
232.93	346.83	236	346.82	242.62	347.33

Manning's n values			num= 3		
Sta	n val	Sta	n val	Sta	n val
0	.04	72.44	.045	148.95	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	72.44	148.95		362.17	359.92	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	337.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.88	wt. n-val.	0.040	0.045	0.040
W.S. Elev (ft)	335.08	Reach Len. (ft)	362.17	359.92	357.61
Crit W.S. (ft)	335.08	Flow Area (sq ft)	33.64	604.03	53.82
E.G. Slope (ft/ft)	0.011772	Area (sq ft)	33.64	604.03	53.82
Q Total (cfs)	8951.00	Flow (cfs)	207.22	8429.15	314.63
Top width (ft)	124.48	Top width (ft)	17.33	76.51	30.64
Vel Total (ft/s)	12.94	Avg. Vel. (ft/s)	6.16	13.95	5.85
Max chl dpth (ft)	9.49	Hydr. Depth (ft)	1.94	7.89	1.76
Conv. Total (cfs)	82497.0	Conv. (cfs)	1909.9	77687.3	2899.8
Length wtd. (ft)	359.89	wetted Per. (ft)	17.80	78.58	30.81
Min Ch El (ft)	325.59	Shear (lb/sq ft)	1.39	5.65	1.28
Alpha	1.11	Stream Power (lb/ft s)	8.56	78.84	7.50
Frctn Loss (ft)	4.14	Cum Volume (acre-ft)	86.67	545.24	60.00
C & E Loss (ft)	0.02	Cum SA (acres)	39.99	158.94	17.94

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 9520.172

INPUT

Description:

Station Elevation Data			num= 44		
Sta	Elev	Sta	Elev	Sta	Elev
0	344.54	.81	344	3.72	342.5
21.68	340.32	37.49	340.67	46.74	340.79
65.73	341.29	71.62	341.04	74.39	340
90.72	330	106.28	328.1	106.87	328.02
108.16	327.32	110.33	326	114.19	324.48
119.46	322.39	120.45	322	135.74	321.13
170.19	323.02	173.28	324	177.73	325.52
183.68	328	186.95	328.26	202.47	329.1
247.15	336	258.84	338	294.35	338.28

Existing.rep

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .04 107.07 .045 183.68 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 107.07 183.68 509.29 508.87 507.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	333.62	wt. n-Val.	0.040	0.045	0.040
Vel Head (ft)	2.82	Reach Len. (ft)	509.29	508.87	507.92
W.S. Elev (ft)	330.80	Flow Area (sq ft)	29.91	616.41	52.96
Crit W.S. (ft)	330.71	Area (sq ft)	29.91	616.41	52.96
E.G. Slope (ft/ft)	0.011251	Flow (cfs)	165.34	8489.93	295.74
Q Total (cfs)	8951.00	Top Width (ft)	17.65	76.61	31.25
Top Width (ft)	125.51	Avg. Vel. (ft/s)	5.53	13.77	5.58
Vel Total (ft/s)	12.80	Hydr. Depth (ft)	1.69	8.05	1.70
Max Chl Dpth (ft)	9.67	Conv. (cfs)	1558.8	80041.1	2788.1
Conv. Total (cfs)	84388.0	Wetted Per. (ft)	18.00	79.05	31.40
Length Wtd. (ft)	508.86	Shear (lb/sq ft)	1.17	5.48	1.18
Min Ch El (ft)	321.13	Stream Power (lb/ft s)	6.45	75.44	6.62
Alpha	1.11	Cum Volume (acre-ft)	86.41	540.20	59.57
Frctn Loss (ft)	5.11	Cum SA (acres)	39.85	158.31	17.68
C & E Loss (ft)	0.18				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 9011.299

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	336.94	9.18	336.39	14.2	336	40	334.87	49.9	334.54
102.26	332.33	111.98	331.67	130.58	330	157.67	328	224.45	325.23
263.55	324	302.4	322.04	302.96	322	303.1	321.92	306.6	320
306.69	319.96	311.11	318	318.04	317.21	329.24	316.74	339.93	316
358.86	317.25	363.21	318	366.57	319.66	367.27	320	368.19	320.29
373.15	322	386.2	323.95	386.47	324	411.5	326	431.87	328
432.2	328.03	450.45	330	482.96	329.85	553.75	328.1		

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .04 302.96 .045 373.15 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 302.96 373.15 397.35 397.38 397.4 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	328.32	wt. n-Val.	0.040	0.045	0.040
Vel Head (ft)	2.20	Reach Len. (ft)	397.35	397.38	397.40
W.S. Elev (ft)	326.12	Flow Area (sq ft)	191.02	592.10	69.69
Crit W.S. (ft)	326.12	Area (sq ft)	191.02	592.10	69.69
E.G. Slope (ft/ft)	0.009018	Flow (cfs)	1037.18	7556.69	357.13
Q Total (cfs)	8951.00	Top Width (ft)	99.94	70.19	39.56
Top Width (ft)	209.69	Avg. Vel. (ft/s)	5.43	12.76	5.12
Vel Total (ft/s)	10.50	Hydr. Depth (ft)	1.91	8.44	1.76
Max Chl Dpth (ft)	10.12	Conv. (cfs)	10922.0	79576.1	3760.8
Conv. Total (cfs)	94259.0	Wetted Per. (ft)	100.03	72.11	39.80
Length Wtd. (ft)	397.38	Shear (lb/sq ft)	1.08	4.62	0.99
Min Ch El (ft)	316.00	Stream Power (lb/ft s)	5.84	59.00	5.05
Alpha	1.29	Cum Volume (acre-ft)	85.12	533.14	58.85
Frctn Loss (ft)	3.77	Cum SA (acres)	39.16	157.45	17.27
C & E Loss (ft)	0.00				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

Existing.rep
 section. This may indicate the need for additional cross sections.
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 8613.920

INPUT

Description:

Station	Elevation	Data	num=	33
Sta	Elev	Sta	Elev	Sta
0	333.75	25.42	330.91	52.61
125.21	322	138.89	321.2	162.54
212.94	317.99	216.92	316	217.53
231.23	312	246.79	312.15	256.03
278.95	316	283.59	317.47	285.07
293.5	320.12	316.25	321.42	323.14
359.68	326	436.39	325.17	464.29

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	212.46	.045	291.7	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
212.46	291.7	411.22	411.34	411.42	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	324.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.24	wt. n-Val.	0.040	0.045	0.040
W.S. Elev (ft)	321.87	Reach Len. (ft)	411.22	411.34	411.42
Crit W.S. (ft)	321.87	Flow Area (sq ft)	176.50	612.71	29.44
E.G. Slope (ft/ft)	0.010002	Area (sq ft)	176.50	612.71	29.44
Q Total (cfs)	8951.00	Flow (cfs)	1066.57	7776.29	108.14
Top width (ft)	194.11	Top width (ft)	85.00	79.24	29.88
Vel Total (ft/s)	10.93	Avg. Vel. (ft/s)	6.04	12.69	3.67
Max chl depth (ft)	9.87	Hydr. Depth (ft)	2.08	7.73	0.99
Conv. Total (cfs)	89499.6	Conv. (cfs)	10664.5	77753.8	1081.2
Length wtd. (ft)	411.32	wetted Per. (ft)	85.09	81.32	29.94
Min Ch El (ft)	312.00	Shear (lb/sq ft)	1.30	4.70	0.61
Alpha	1.21	Stream Power (lb/ft s)	7.83	59.71	2.26
Frctn Loss (ft)	3.94	Cum Volume (acre-ft)	83.44	527.64	58.40
C & E Loss (ft)	0.15	Cum SA (acres)	38.32	156.77	16.95

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 8202.584

INPUT

Description:

Station	Elevation	Data	num=	49
Sta	Elev	Sta	Elev	Sta
0	337.64	9.17	336	21.22
48.71	330	72.47	326.93	78.8
103.57	323.6	130.55	322.37	137.26
208.09	321.51	228.99	320.63	237.64
260.29	318	349.37	316	392
451.32	313.99	451.72	313.81	455.88
466.29	308.95	473.81	308	508.45
518.81	312	521.48	312.77	525.43
557.15	316	560.91	316.12	578.25
612.59	320.72	629.46	320.39	634.67

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	212.46	.045	291.7	.04

Existing.rep

Sta	n Val	Sta	n Val	Sta	n Val				
0	.04	450.96	.045	536.95	.04				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	450.96	536.95		422.86 415.92	415.91	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	319.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.76	wt. n-Val.	0.040	0.045	0.040
W.S. Elev (ft)	317.57	Reach Len. (ft)	422.86	415.92	415.91
Crit W.S. (ft)	317.57	Flow Area (sq ft)	298.90	618.28	51.92
E.G. Slope (ft/ft)	0.009177	Area (sq ft)	298.90	618.28	51.92
Q Total (cfs)	8951.00	Flow (cfs)	1540.26	7180.85	229.89
Top width (ft)	294.82	Top width (ft)	171.50	85.99	37.33
Vel Total (ft/s)	9.24	Avg. Vel. (ft/s)	5.15	11.61	4.43
Max Chl Dpth (ft)	9.57	Hydr. Depth (ft)	1.74	7.19	1.39
Conv. Total (cfs)	93436.9	Conv. (cfs)	16078.3	74958.8	2399.7
Length wtd. (ft)	417.52	wetted Per. (ft)	171.54	87.88	37.42
Min Ch El (ft)	308.00	Shear (lb/sq ft)	1.00	4.03	0.80
Alpha	1.33	Stream Power (lb/ft s)	5.14	46.81	3.52
Frctn Loss (ft)	3.68	Cum Volume (acre-ft)	81.20	521.83	58.01
C & E Loss (ft)	0.21	Cum SA (acres)	37.11	155.99	16.64

warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 7786.663

INPUT

Description:

Station Elevation Data		num=	56
Sta	Elev	Sta	Elev
0	331.69	11.02	330.91
28.6	329.11	35.86	328.21
69.38	325.11	84.66	323.06
110.71	320	129.88	319.22
186.38	317.67	218.7	317.54
268.71	315.85	317.55	314
481.42	312.86	502.06	312.58
675.31	311.58	716.14	311.57
878.94	308.6	880.25	308
933.7	306	934.43	306.18
948.07	310	959.93	310.5
1119.98	316.17		

Manning's n values	num=	3
Sta	n Val	Sta
0	.04	875.86
	.045	948.07
		.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	843.24	995.49		499.23 494.95	494.98	.1	.3

Ineffective Flow	num=	1
Sta L	Sta R	Elev
0	498.54	331.6944
		F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	314.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	wt. n-Val.	0.040	0.044	0.040
W.S. Elev (ft)	313.28	Reach Len. (ft)	499.23	494.95	494.98
Crit W.S. (ft)	313.28	Flow Area (sq ft)	552.93	678.18	5.04
E.G. slope (ft/ft)	0.008459	Area (sq ft)	583.32	678.18	5.04
Q Total (cfs)	8951.00	Flow (cfs)	2588.73	6349.62	12.65
Top width (ft)	596.50	Top width (ft)	436.35	152.25	7.90
Vel Total (ft/s)	7.24	Avg. Vel. (ft/s)	4.68	9.36	2.51
Max Chl Dpth (ft)	7.34	Hydr. Depth (ft)	1.60	4.45	0.64

		Existing.rep			
Conv. Total (cfs)	97321.4	Conv. (cfs)	28146.5	69037.4	137.5
Length wtd. (ft)	496.08	wetted Per. (ft)	344.71	153.80	8.00
Min Ch El (ft)	305.94	Shear (lb/sq ft)	0.85	2.33	0.33
Alpha	1.31	Stream Power (lb/ft s)	3.97	21.80	0.84
Frctn Loss (ft)	4.34	Cum Volume (acre-ft)	76.91	515.64	57.74
C & E Loss (ft)	0.00	Cum SA (acres)	34.16	154.85	16.42

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 7291.709

INPUT

Description:

Station Elevation Data	num=	37
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 322.78 43.82 322.32 106.82 320 169.28 318 213.37 316		
242.23 314 257.51 312.71 267.74 312 285.6 310 314.77 308		
357.38 306.24 358.01 306.21 361.56 306.13 436.69 306.95 603.43 307.09		
629.13 306.82 691.4 306.22 699.32 306 703.12 304.33 703.98 304		
704.72 303.39 706.61 302 710.55 300.78 713.85 300 753.05 300.72		
759.22 302 762.58 303.68 763.23 304 766.88 305.23 769.47 306		
789.25 306.73 791.66 306.82 824.52 308 841.79 310.62 843.72 310.75		
851.19 311.67 926.57 311.98		

Manning's n values	num=	3
Sta n Val Sta n Val Sta n Val		
0 .04 699.32 .045 769.47 .04		

Bank Sta: Left Right	Lengths: Left Channel Right	Coeff Contr.	Expan.
603.43 824.52	480.67 483.98 485.99	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	309.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	wt. n-Val.	0.040	0.044	0.040
W.S. Elev (ft)	308.46	Reach Len. (ft)	480.67	483.98	485.99
Crit W.S. (ft)	308.46	Flow Area (sq ft)	453.71	748.72	0.71
E.G. Slope (ft/ft)	0.009033	Area (sq ft)	453.71	748.72	0.71
Q Total (cfs)	8951.00	Flow (cfs)	2132.02	6818.04	0.94
Top width (ft)	519.58	Top width (ft)	295.43	221.09	3.06
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)	4.70	9.11	1.32
Max Chl Dpth (ft)	8.46	Hydr. Depth (ft)	1.54	3.39	0.23
Conv. Total (cfs)	94179.4	Conv. (cfs)	22432.4	71737.1	9.9
Length wtd. (ft)	483.06	wetted Per. (ft)	295.49	223.42	3.09
Min Ch El (ft)	300.00	Shear (lb/sq ft)	0.87	1.89	0.13
Alpha	1.24	Stream Power (lb/ft s)	4.07	17.21	0.17
Frctn Loss (ft)	5.66	Cum Volume (acre-ft)	70.97	507.53	57.71
C & E Loss (ft)	0.14	Cum SA (acres)	29.96	152.73	16.36

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 6807.731

INPUT

Existing.rep

Description:

Station Elevation Data		num= 80									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	319.25	27.12	318	60.91	317.89	61.89	317.79	73.41	316.69		
79.96	316	84.77	315.27	90.52	314	101.51	312	148.64	310		
248.87	306.38	263.31	306	318.83	306.2	319.45	306.19	323.87	306		
330.08	305.92	330.66	305.89	332.54	305.77	341.39	305.44	343.79	305.27		
351.21	304.96	360.82	304.07	361.06	304.06	361.22	304.05	361.34	304.04		
361.63	304	406.35	303.21	453.33	302.78	524.29	302.87	525.73	302.88		
541.42	302.87	577.25	302.4	592.63	302.46	611.19	302.79	658.39	302.89		
666.97	302.85	694.75	302.4	714.87	301.86	738.03	301.49	840.87	301.19		
928.04	301.44	938.93	301.41	1001.51	300.62	1003.45	300.61	1070.96	301.4		
1076.9	301.42	1152.88	301.45	1160.52	301.44	1162.72	301.43	1212.27	301.28		
1229.38	301.29	1279.44	301.47	1282.73	301.48	1287.13	301.47	1297.55	301.48		
1361.17	301.59	1374.41	301.58	1381.5	301.6	1400	301.029	1424.57	300.27		
1429.66	300	1431.96	299.13	1434.99	298	1456.03	296.4	1461.39	296		
1487.48	296.88	1494.85	298	1499.39	299.57	1500.54	300	1502.06	300.17		
1503.54	300.18	1511.77	300.44	1526.07	301.01	1536.03	301.4	1551.01	302		
1563.3	304	1577.18	306	1590.67	306.28	1641.78	307.02	1676.45	307.17		

Manning's n Values

num= 6											
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1070.96	.06	1400	.04	1424.57	.075	1502.06	.06		
1551.01	.04										

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1070.96 1551.01 406.99 411.43 413.61 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 830.34319.2468 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	303.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	wt. n-val.	0.040	0.067	0.040
W.S. Elev (ft)	302.90	Reach Len. (ft)	406.99	411.43	413.61
Crit W.S. (ft)	302.52	Flow Area (sq ft)	421.31	1053.93	2.46
E.G. Slope (ft/ft)	0.015819	Area (sq ft)	645.09	1053.93	2.46
Q Total (cfs)	8951.00	Flow (cfs)	2859.58	6084.75	6.68
Top width (ft)	1115.80	Top Width (ft)	630.25	480.05	5.50
Vel Total (ft/s)	6.06	Avg. Vel. (ft/s)	6.79	5.77	2.71
Max Chl Dpth (ft)	6.90	Hydr. Depth (ft)	1.75	2.20	0.45
Conv. Total (cfs)	71166.8	Conv. (cfs)	22735.7	48378.0	53.1
Length Wtd. (ft)	410.34	wetted Per. (ft)	240.63	481.00	5.58
Min Ch El (ft)	296.00	Shear (lb/sq ft)	1.73	2.16	0.44
Alpha	1.02	Stream Power (lb/ft s)	11.74	12.49	1.18
Frctn Loss (ft)	4.63	Cum volume (acre-ft)	64.91	497.52	57.69
C & E Loss (ft)	0.08	Cum SA (acres)	24.86	148.83	16.31

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main

RS: 6396.299

INPUT

Description:

Station Elevation Data		num= 66									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	308.59	6.68	308	37.55	306	277.24	305.81	278.19	305.73		
286.73	305.17	289.24	304.94	291.25	304.81	295.06	304.43	295.69	304.38		
299.28	304	313.26	302	315.42	301.59	324.16	300	352.16	298		
425.63	296	524.04	296.73	542.75	296.71	594.32	296.65	606.29	296.66		
610.77	296.67	668.64	296.88	684.92	296.82	688.41	296.77	695.08	296.71		
709.83	296.68	748.61	296.53	755.97	296.48	768.55	296.53	781.56	296.51		
802.55	296.41	826.96	296.33	839.54	296.32	882.23	296.22	897.7	296.18		
906.6	296.17	924.71	296.21	925.42	296.2	947.19	296.19	968.88	296.14		
983.13	296.13	993.38	296.12	1030.11	296.19	1059.02	296.38	1061.06	296.41		
1074.77	296.52	1076.31	296.51	1093.06	296.67	1166.17	296.77	1179.92	296.53		
1184.29	296.25	1190.65	296.01	1190.88	296	1209.25	295.58	1245.57	294		
1272.1	295.85	1272.98	295.95	1273.22	296	1274.04	296.05	1277.3	296.19		
1305.44	297.45	1317.7	298	1329.37	299.38	1333.76	300	1347.21	302		

Existing.rep

1355.3 304

Manning's n values		num=	6
Sta	n Val	Sta	n Val
0	.04	947.19	.06
1317.7	.04	1166.17	.04
		1184.29	.075
		1277.3	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
524.04	1317.7	314.29	320.94	323.63	.1	.3	

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	298.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-val.	0.040	0.050	0.040
W.S. Elev (ft)	298.44	Reach Len. (ft)	314.29	320.94	323.63
Crit W.S. (ft)		Flow Area (sq ft)	311.28	1642.23	0.82
E.G. Slope (ft/ft)	0.008465	Area (sq ft)	311.28	1642.23	0.82
Q Total (cfs)	8951.00	Flow (cfs)	1543.81	7406.18	1.01
Top Width (ft)	975.41	Top Width (ft)	178.03	793.66	3.72
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	4.96	4.51	1.24
Max Chl Dpth (ft)	4.44	Hydr. Depth (ft)	1.75	2.07	0.22
Conv. Total (cfs)	97288.0	Conv. (cfs)	16779.6	80497.4	11.0
Length Wtd. (ft)	320.36	Wetted Per. (ft)	178.08	793.84	3.74
Min Ch El (ft)	294.00	Shear (lb/sq ft)	0.92	1.09	0.12
Alpha	1.00	Stream Power (lb/ft s)	4.58	4.93	0.14
Frctn Loss (ft)	3.58	Cum Volume (acre-ft)	60.44	484.79	57.68
C & E Loss (ft)	0.02	Cum SA (acres)	21.08	142.82	16.27

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 6075.362

INPUT

Description:

Station Elevation Data		num=	84
Sta	Elev	Sta	Elev
0	312.95	312	39.45
76.73	310	309.68	81.31
86.5	309.42	309.33	106.29
124.33	306	305.46	129.67
168.61	302	301.92	192.55
210	299.37	299.38	217.37
395.4	297.83	296.16	471.59
487.81	295.86	294	540.64
580.29	292.94	293.01	600.52
703.87	292.91	292.86	739.05
805.83	292.64	292.7	886.8
892.79	292.82	292.61	958.56
1045.04	292.28	292.29	1049.52
1156.42	292.95	292.98	1166.02
1259.79	293.65	294	1313.68
1382.04	292	292.95	1433.31
1493.44	300	302	1603.68

Manning's n values		num=	5
Sta	n Val	Sta	n Val
0	.04	968.79	.06
		1313.68	.075
		1433.31	.06
		1472.16	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
530.36	1433.31	433.42	467.11	451.66	.1	.3	

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	295.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-val.	0.040	0.048	0.060
W.S. Elev (ft)	294.68	Reach Len. (ft)	433.42	467.11	451.66
Crit W.S. (ft)		Flow Area (sq ft)	5.31	1595.48	4.51
E.G. Slope (ft/ft)	0.015420	Area (sq ft)	5.31	1595.48	4.51
Q Total (cfs)	8951.00	Flow (cfs)	11.94	8932.30	6.76
Top Width (ft)	931.77	Top Width (ft)	15.59	902.95	13.24
Vel Total (ft/s)	5.58	Avg. Vel. (ft/s)	2.25	5.60	1.50
Max Chl Dpth (ft)	2.68	Hydr. Depth (ft)	0.34	1.77	0.34
Conv. Total (cfs)	72083.5	Conv. (cfs)	96.2	71932.9	54.4

warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

RIVER: HRC
REACH: Main RS: 5608.249

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	304.73	11.04	304	13.3	303.8	13.81	303.77	17.74	303.45
19.52	303.34	24.98	302.93	27.99	302.76	29.64	302.65	41	302
50.22	301.12	64.61	300	64.79	299.98	79.78	298.61	88.62	297.73
89.38	297.66	116.94	294.78	124.03	294	143.32	292	154.29	291.25
156.33	291.23	161.85	291.12	168.29	291.06	173.37	290.95	175.94	290.92
177.15	290.93	180	290.87	183.03	290.95	184.6	290.92	191.78	290.97
198.83	291.14	211.18	291.34	219.17	291.4	228.53	291.35	230.1	291.32
234.28	291.34	238.95	291.21	243.58	291.16	270.57	290.47	272.31	290.45
273.92	290.41	275.83	290.39	277.5	290.35	278.51	290.34	284.8	290.32
286.12	290.29	292.43	290.28	292.85	290.27	294.5	290.28	296.25	290.25
297.85	290.28	298.73	290.26	342.65	290.32	359.58	290.13	365.9	290
444.19	290.2	445.04	290.19	454.2	290.21	454.79	290.2	473.92	290.2
474.49	290.19	489.86	290.17	491.48	290.18	525.71	290.03	526.97	290
582.95	289.32	630.38	289.15	631.7	289.13	655.87	289.18	657.9	289.14
713	288.63	729.88	288.6	740.29	288.53	783.7	288.37	817.65	288.28
868.94	288.08	873.71	288.06	882.22	288	922.44	287.85	936.64	287.84
965.86	287.75	982.45	287.72	1009.77	287.71	1039.27	287.68	1057.13	287.7
1095.93	287.81	1114.77	287.68	1119.12	287.67	1151.17	287.48	1173.21	287.63
1198.58	287.76	1205.59	287.79	1210.81	287.77	1217.18	287.73	1236.51	287.68
1269.95	287.79	1296.84	287.77	1336.42	287.8	1368.19	287.88	1381.79	287.93
1392.34	287.94	1397.83	288	1430.1	288.31	1440.6	288.36	1531.54	288.88
1561.02	289.05	1615.53	288.45	1664.74	288	1731.48	289.18	1736	290
1739.23	290.97	1742.52	292	1749.96	294	1756.3	296	1768.31	300
1849.97	300.17								

Manning's	n	values		num=	5								
Sta	n	val	Sta	n	val	Sta	n	val	Sta	n	val	Sta	n
0	.04	1236.51		.06	1561.02		.075	1736		.06	1756.3		.04

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	525.71	1736		386.8	607.64	624.67		.1	.3
Ineffective Flow	num=		1						
Sta L	Sta R	Elev	Permanent						
0	493.25	304.7255	F						

E.G. Elev (ft)	290.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.	0.040	0.047	0.060
W.S. Elev (ft)	290.14	Reach Len. (ft)	386.80	607.64	624.67
Crit w.S. (ft)	289.47	Flow Area (sq ft)	1.34	2230.18	0.03
E.G. Slope (ft/ft)	0.007110	Area (sq ft)	5.55	2230.18	0.03
Q Total (cfs)	8951.00	Flow (cfs)	0.60	8950.39	0.01
Top width (ft)	1296.64	Top width (ft)	85.89	1210.29	0.46
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	0.45	4.01	0.34
Max chl Dpth (ft)	2.66	Hydr. Depth (ft)	0.05	1.84	0.07
Conv. Total (cfs)	106156.3	Conv. (cfs)	7.1	106149.0	0.1
Length Wtd. (ft)	605.91	Wetted Per. (ft)	24.71	1210.40	0.48
Min ch El (ft)	287.48	Shear (lb/sq ft)	0.02	0.82	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.01	3.28	0.01
Frctn Loss (ft)	4.09	Cum Volume (acre-ft)	59.25	452.35	57.63
C & E Loss (ft)	0.01	Cum SA (acres)	19.88	125.24	16.13

Page 9

Existing.rep

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 5000.613

INPUT

Description:

Station Elevation Data			num= 121								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	310.86	9.72	310	30.27	308	53.4	306.05	53.94	306		
79.95	304	89.41	303.37	107.3	302	113.15	301.83	119.32	301.46		
137.63	300.21	140.43	300	159.37	298.41	162.89	298.29	167.21	298		
199.68	297.59	202.58	297.48	232.53	296	267.6	294	276.28	293.84		
297.08	292.87	300.3	292.75	316.97	292	324.98	291.99	352.47	291.23		
356.75	291.21	368.46	290.67	369.1	290.63	373.36	290.59	376.74	290.51		
383.32	290.42	389.54	290.23	393.89	290	415.99	289.44	425.12	289.34		
425.89	289.32	435.45	289.34	443.41	289.49	452.68	289.52	456.6	289.58		
470.09	289.5	482.97	289.02	499.84	288.59	510.92	288	524.17	287.52		
556.51	286.68	571.04	286.21	584.13	286	750.67	285.23	821.72	285.46		
855.28	285.31	1006.28	286	1276.91	284.96	1283.72	284.88	1289.31	284.85		
1294.53	284.78	1335.39	284	1385.05	283.4	1396.08	283.36	1408.04	283.37		
1425.23	283.46	1426.93	283.48	1470.24	283.59	1471.38	283.58	1508.02	283.63		
1518.24	283.66	1546.32	283.71	1547.37	283.7	1562.72	283.69	1578.16	283.65		
1618.18	283.24	1634.68	283.11	1635.54	283.14	1691.46	282.99	1797	282.91		
1802.21	282.93	1834.71	283.18	1837.35	283.17	1877.56	283.39	1906.65	283.6		
1908.64	283.61	1946.58	283.85	1955.94	283.89	2002.62	283.94	2027.86	284		
2029.92	284	2208.42	284.95	2213.82	286	2216.83	286.83	2221.31	288		
2223.85	288.72	2228.21	290	2237.55	298.3	2239.43	300	2239.79	300.64		
2245.19	310	2246.77	311.21	2248.02	312	2250.66	314	2252.73	314.43		
2258.9	316	2276	314.1	2276.39	314	2286.73	310	2291.99	307.83		
2296.85	306	2301.06	304	2305.57	302	2309.35	300.47	2310.46	300		
2313.17	298.59	2314.37	298	2320.67	296	2329.35	294	2343.93	292.11		
2345.26	291.96	2404.33	291.22	2457	292	2487.35	294	2499.21	296		
2509.14	298										

Manning's n Values

num= 6											
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.05	415.99	.04	1635.54	.06	2002.62	.075	2216.83	.06		
2345.26	.04										

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1006.28 2213.82 325.18 366.23 367.72 .1 .3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 829.2310.8611 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	286.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	wt. n-Val.	0.040	0.052	0.075
W.S. Elev (ft)	286.06	Reach Len. (ft)	325.18	366.23	367.72
Crit W.S. (ft)	285.14	Flow Area (sq ft)	79.84	2364.12	0.01
E.G. Slope (ft/ft)	0.006421	Area (sq ft)	210.39	2364.12	0.01
Q Total (cfs)	8951.00	Flow (cfs)	139.74	8811.26	0.00
Top width (ft)	1633.89	Top width (ft)	426.12	1207.54	0.23
Vel Total (ft/s)	3.66	Avg. Vel. (ft/s)	1.75	3.73	0.16
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)	0.45	1.96	0.03
Conv. Total (cfs)	111708.5	Conv. (cfs)	1744.0	109964.4	0.0
Length wtd. (ft)	365.92	wetted Per. (ft)	177.08	1207.67	0.24
Min Ch El (ft)	282.91	Shear (lb/sq ft)	0.18	0.78	0.01
Alpha	1.02	Stream Power (lb/ft s)	0.32	2.92	0.00
Frctn Loss (ft)	3.48	Cum Volume (acre-ft)	58.29	420.30	57.63
C & E Loss (ft)	0.01	Cum SA (acres)	17.60	108.38	16.13

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

Existing.rep

RIVER: HRC
REACH: Main

RS: 4634.388

INPUT

Description:

Station Elevation Data				num=	115
Sta	Elev	Sta	Elev	Sta	Elev
0	298.8	14.92	298	48.95	297.57
55.1	297.23	56.72	297.14	73	296
81.33	295.34	83.22	295.21	86.33	294.96
139	290.91	150.76	290	173.63	288
288.03	283.88	290.75	283.7	293.62	283.54
335.46	282.01	341.8	282.11	344.17	282.09
459.32	282.42	462.17	282.39	464.82	282.37
477.49	282.26	482.44	282.27	483.21	282.26
539.19	282.08	546.48	282.05	549.3	282.04
576.6	281.99	593.35	282	708.31	281.93
723.75	281.84	747.55	281.6	752.62	281.56
804.65	281.32	821.95	281.2	824.98	281.17
975.7	279.72	1006.16	279.61	1035.43	279.51
1063.35	279.5	1076.7	279.51	1094.92	279.54
1178.72	279.38	1203.23	279.52	1210.59	279.55
1338.37	280.52	1354.61	280.7	1365.95	280.8
1420.16	281.19	1425.11	281.21	1490.66	281.57
1513.62	281.53	1520.79	281.52	1524.52	281.5
1678.38	281.97	1684.86	281.98	1686.4	282
1857.15	282.49	1866.94	282.52	1881.83	282.44
1920.61	282.49	1941.32	283.09	1952.07	284
1964.18	287.72	1964.98	288	1965.81	288.36
1998.67	302	2003.35	303.94	2003.61	304.04

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	915.12	.06	1272.45	.075
				1758.78	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	455.34	1686.4		279.84	292.33		.1	.3
Ineffective Flow			num=	1				
Sta L	Sta R	Elev	Permanent					
0	388.56	298.80	25					

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	282.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	wt. n-val.		0.059	0.067
W.S. Elev (ft)	282.42	Reach Len. (ft)	279.84	292.33	293.02
Crit W.S. (ft)	282.08	Flow Area (sq ft)		1838.42	69.60
E.G. Slope (ft/ft)	0.015551	Area (sq ft)	16.58	1838.42	69.60
Q Total (cfs)	8951.00	Flow (cfs)		8841.64	109.36
Top width (ft)	1455.99	Top width (ft)	65.74	1227.02	163.24
Vel Total (ft/s)	4.69	Avg. vel. (ft/s)		4.81	1.57
Max Chl Dpth (ft)	3.04	Hydr. Depth (ft)		1.50	0.43
Conv. Total (cfs)	71777.8	Conv. (cfs)		70900.8	876.9
Length wtd. (ft)	292.33	Wetted Per. (ft)		1227.04	163.24
Min Ch El (ft)	279.38	Shear (lb/sq ft)		1.45	0.41
Alpha	1.04	Stream Power (lb/ft s)		7.00	0.65
Frctn Loss (ft)	2.61	Cum Volume (acre-ft)	57.44	402.64	57.34
C & E Loss (ft)	0.06	Cum SA (acres)	15.77	98.14	15.44

warning: Divided flow computed for this cross-section.

warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 4342.055

INPUT

Description:

Existing.rep

Station Elevation Data				num= 112			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	297.91	7.93	296	17.6	294	27.85	292
39.09	290	56.31	288	77.72	286	135.35	282
225.4	281.24	233.94	281.2	239.64	281.06	249	281.03
271.2	280.73	287.29	280.13	289.66	280	321.6	279.57
426.5	278.88	430.24	278.84	439.04	278.77	444.84	278.75
451.67	278.73	461.32	278.71	479.45	278.74	490.95	278.75
530.64	278.9	560.84	278.74	561.62	278.73	568.8	278.7
580.38	278.66	587.14	278.65	595.25	278.63	599.77	278.61
606.66	278.59	611.58	278.57	616.62	278.55	620.56	278.54
631.18	278.5	635.99	278.48	640.91	278.47	645.28	278.44
665.19	278.38	702.12	278.27	704.62	278.26	713.91	278.23
760.16	278.19	815.39	278	857.05	277.98	864.2	277.92
878.33	277.8	884.4	277.74	905.47	277.57	910.46	277.55
955.97	277.75	961.21	277.8	968.35	277.87	984.25	277.99
986.24	277.99	988.37	277.96	991.28	277.9	997.76	277.69
1024.58	277.11	1034.82	277.09	1077.23	276.33	1100.03	276.4
1162.11	276.78	1200.67	277.04	1244.07	277.31	1293.03	277.9
1357.82	277.97	1388.18	278	1398.51	278.05	1409.16	278.12
1468.73	277.6	1485.94	276.9	1501.49	276.17	1509.48	276
1578.21	276.07	1635.17	277.97	1636.27	278	1647.13	278.83
1656.99	280	1658.99	280.66	1664.8	282.84	1668.61	284
1679.75	286	1689.53	288	1696.28	289.86	1696.89	290
1715.25	300	1728.6	305.12				

Manning's n values				num= 5			
Sta	n val	Sta	n val	Sta	n val	Sta	n val
0	.04	857.05	.06	1021.37	.075	1655.14	.06
						1668.61	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	321.6	1655.14		344.09	365.13	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	280.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	wt. n-val.	0.040	0.063	0.060
W.S. Elev (ft)	279.96	Reach Len. (ft)	344.09	365.13	365.45
Crit w.s. (ft)		Flow Area (sq ft)	5.56	2856.36	0.13
E.G. Slope (ft/ft)	0.005781	Area (sq ft)	5.56	2856.36	0.13
Q Total (cfs)	8951.00	Flow (cfs)	5.25	8945.70	0.05
Top width (ft)	1363.77	Top width (ft)	28.74	1333.54	1.49
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)	0.94	3.13	0.37
Max chl Dpth (ft)	3.96	Hydr. Depth (ft)	0.19	2.14	0.09
Conv. Total (cfs)	117723.9	Conv. (cfs)	69.1	117654.2	0.6
Length wtd. (ft)	365.07	wetted Per. (ft)	28.74	1333.73	1.50
Min Ch El (ft)	276.00	Shear (lb/sq ft)	0.07	0.77	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.07	2.42	0.01
Frctn Loss (ft)	3.02	Cum volume (acre-ft)	57.37	386.88	57.10
C & E Loss (ft)	0.01	Cum SA (acres)	15.46	89.55	14.88

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 3976.927

INPUT

Description:

Station Elevation Data				num= 94			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	288.37	1.9	288.11	2.68	288.02	2.81	288
18.79	286.37	40.6	284.68	47.44	284.21	47.89	284.17
59.39	283.62	59.83	283.59	63.16	283.39	64.69	283.31
76.19	282.69	77.57	282.63	86.87	282	102.18	281.42
128.5	279.95	194.15	277.64	201.67	277.58	279.35	276
377.4	275.04	382.07	275.03	383.54	275.04	392.79	275.03
439.78	275.14	442.5	275.15	457.58	275.2	463.13	275.21
494.43	275.17	496.85	275.16	507.74	275.11	510.34	275.1
518.73	275.06	520.89	275.05	527.35	275.01	548.31	274.92
559.21	274.89	594.52	274.82	616.98	274.76	650.08	274.66
656.52	274.63	665.31	274.61	695.8	274.53	704.5	274.52
768.34	274.22	776.7	274.15	789.71	274.05	829.23	274

Existing.rep									
916.5	274.09	919.82	274.12	922.17	274.16	1024.5	274.74	1027.38	274.73
1106.84	274.52	1110.37	274.53	1197.53	274.57	1222.91	274.66	1315.6	275.37
1333.82	275.43	1350.44	275.64	1374.32	275.9	1376.51	275.91	1378.38	275.92
1384.91	276	1514.42	276.77	1534.12	278	1535.82	278.25	1540.34	278.66
1550.6	280	1563.3	282.32	1578.6	284.94	1586.47	286	1594.92	288
1599.02	288.54	1607.87	290	1609.43	290.38	1617.34	292	1628.41	294
1628.82	294.07	1634.97	295.45	1637.57	296	1641.15	296.59		

Manning's n Values		num=	4
Sta	n Val	Sta	n Val
0	.04	376.46	.06
		550.26	.075
		1535.82	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	279.35	1514.42		334.84	334.75	343.16	.1
							.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	277.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.040	0.070	0.075
W.S. Elev (ft)	276.87	Reach Len. (ft)	334.84	334.75	343.16
Crit W.S. (ft)		Flow Area (sq ft)	18.55	2384.24	0.08
E.G. Slope (ft/ft)	0.012824	Area (sq ft)	18.55	2384.24	0.08
Q Total (cfs)	8951.00	Flow (cfs)	44.75	8906.22	0.02
Top width (ft)	1279.36	Top width (ft)	42.71	1235.07	1.58
Vel Total (ft/s)	3.73	Avg. Vel. (ft/s)	2.41	3.74	0.30
Max Chl Dpth (ft)	2.87	Hydr. Depth (ft)	0.43	1.93	0.05
Conv. Total (cfs)	79042.9	Conv. (cfs)	395.2	78647.5	0.2
Length wtd. (ft)	335.38	Wetted Per. (ft)	42.72	1235.09	1.58
Min Ch El (ft)	274.00	Shear (lb/sq ft)	0.35	1.55	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.84	5.77	0.01
Frctn Loss (ft)	2.80	Cum Volume (acre-ft)	57.27	364.92	57.10
C & E Loss (ft)	0.03	Cum SA (acres)	15.18	78.78	14.87

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 3642.177

INPUT Description:

Station Elevation Data		num=	98
Sta	Elev	Sta	Elev
0	286.93	10.44	286
174.1	276	182.3	275.34
213.37	273.69	242.26	272.96
558.78	271.48	562.24	271.51
586.73	271.61	588.07	271.59
684.38	271.55	709.6	271.7
744.96	272	900	272.018
1015.73	272.14	1023.46	272.21
1146.64	272.54	1148.16	272.53
1170.77	272.59	1174.72	272.6
1237.84	272.51	1241.49	272.49
1330.73	272.07	1336.79	272.1
1434.16	272.38	1435.76	272.37
1511.66	272.29	1526.14	272.3
1683.71	271.96	1708.43	271.81
1940.88	272.4	1948.93	272.35
2171.31	274.11	2174.05	274.13
2428.14	278.34	2443.28	280
2458.94	285.22	2460.86	286
2471.9	290	2474.83	290.89

Manning's n Values		num=	6
Sta	n Val	Sta	n Val
0	.04	213.37	.06
2010.76	.04		.075
		900	.06
		1258.1	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	298.66	1623.24		258.14	290.23	300.27	.1
							.3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent

1871.42 2477.39291.9999 F

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	274.25	wt. n-Val.	0.060	0.071	0.075
Vel Head (ft)	0.11	Reach Len. (ft)	258.14	290.23	300.27
W.S. Elev (ft)	274.15	Flow Area (sq ft)	120.29	2783.42	529.42
Crit W.S. (ft)	273.04	Area (sq ft)	120.29	2783.42	763.03
E.G. Slope (ft/ft)	0.005848	Flow (cfs)	277.12	7344.73	1329.15
Q Total (cfs)	8951.00	Top width (ft)	98.29	1324.58	551.99
Top width (ft)	1974.86	Avg. Vel. (ft/s)	2.30	2.64	2.51
Vel Total (ft/s)	2.61	Hydr. Depth (ft)	1.22	2.10	2.13
Max Chl Dpth (ft)	2.71	Conv. (cfs)	3623.9	96047.5	17381.3
Conv. Total (cfs)	117052.7	Wetted Per. (ft)	98.32	1324.59	248.18
Length wtd. (ft)	290.48	Shear (lb/sq ft)	0.45	0.77	0.78
Min ch El (ft)	271.44	Stream Power (lb/ft s)	1.03	2.02	1.96
Alpha	1.00	Cum Volume (acre-ft)	56.74	345.06	54.10
Frctn Loss (ft)	1.68	Cum SA (acres)	14.64	68.95	12.69
C & E Loss (ft)	0.00				

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest valid, water surface was used.

CROSS SECTION

RIVER: HRC
 REACH: Main RS: 3351.951

INPUT

Description:

Station Elevation Data		num=	84	Station Elevation Data		num=	84
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	285.5	13.31	284	36.12	282	67.29	280
152.47	274	215.42	272.06	217.49	272	228.37	271.69
244.01	271.23	252.46	270.96	253.9	270.92	258.75	270.76
294.08	270	309.39	269.83	311.81	269.81	312.8	269.8
328.44	269.61	344.46	269.41	346.63	269.4	452.88	269.2
457.11	269.22	459.78	269.23	464.05	269.24	465.06	269.25
506.87	269.35	511.02	269.31	588.81	268.85	608.98	268.89
710.2	268.77	744.32	269	745.35	268.99	749.51	269
781.12	269.05	782.52	269.06	790.96	269.09	816.16	269.23
883.64	269.76	894.13	270	943	270.54	943.18	270.53
954.83	270.65	960.21	270.72	967.81	270.83	1005.28	270.47
1060.38	270.65	1149.48	270.47	1159.35	270.42	1162.8	270.4
1176.11	270.35	1198.61	270.37	1225.58	270	1375.87	271.98
1378.28	272.16	1387.72	274	1421.83	272.97	1425.19	272.57
1494	272.531	1637.91	273.73	1640.11	274	1652.81	275.98
1653.1	276.03	1661.94	278	1667.37	278.98	1673.97	280
1704.02	290	1710.4	291.86	1716	293.65	1720.61	295.06

Manning's n Values		num=	6	Manning's n Values		num=	6
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	215.42	.06	346.63	.075	960.21	.06
1637.91	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
215.42	1494	278.96	313.58	317.16	.1
Ineffective Flow	num=	1			.3
Sta L	Sta R	Elev	Permanent		
1684.75	1720.61	295.0604	F		

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	272.57	wt. n-Val.	0.040	0.070	
Vel Head (ft)	0.14	Reach Len. (ft)	278.96	313.58	317.16
W.S. Elev (ft)	272.43	Flow Area (sq ft)	2.18	2930.01	
Crit W.S. (ft)	271.06	Area (sq ft)	2.18	2930.01	
E.G. Slope (ft/ft)	0.005701	Flow (cfs)	1.97	8949.03	
Q Total (cfs)	8951.00	Top width (ft)	11.89	1219.19	
Top width (ft)	1231.07	Avg. Vel. (ft/s)	0.90	3.05	
Vel Total (ft/s)	3.05	Hydr. Depth (ft)	0.18	2.40	
Max Chl Dpth (ft)	3.68	Conv. (cfs)	26.1	118521.0	
Conv. Total (cfs)	118547.1	Wetted Per. (ft)	11.89	1219.32	
Length wtd. (ft)	313.57				

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warning: Divided flow computed for this cross-section.
warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest,
valid,
      water surface was used.
```

RIVER: HRC
REACH: Main RS: 3038.374

Station Elevation Data		num= 124																			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	283.15	23.75	280.6	28.99	280	30.64	279.9	31.47	279.86												
40.77	279.32	69.71	278	105.45	276	132.43	274	141.27	272.9												
147.74	272	158.93	270	170.9	268.22	172.22	268	181.13	267.884												
239.5	267.88	241.18	267.89	244.82	267.88	248.69	267.87	250.31	267.86												
252.2	267.84	256.99	267.8	260.34	267.75	366.4	266.96	368.26	266.97												
404.25	266.99	474.06	267.2	476.12	267.21	479.22	267.22	484.16	267.24												
489.28	267.27	512.67	267.38	520.12	267.42	528.01	267.46	529.72	267.47												
544.85	267.55	554.29	267.59	595.12	267.72	599.09	267.74	603.25	267.75												
611.08	267.74	612.41	267.73	620.29	267.76	643.95	267.87	649.93	267.89												
667.11	267.98	671.21	268	795.95	269.67	797.76	269.72	800.86	270												
801.18	270.1	801.2	270.11	801.22	270.12	801.26	270.13	801.3	270.15												
801.36	270.18	801.44	270.21	801.56	270.26	801.74	270.33	802.07	270.46												
802.82	270.77	805.53	271.86	805.87	272	809.04	271.97	809.45	271.88												
809.82	271.8	810.16	271.72	812.56	271.03	815.49	270	821.53	268.04												
821.64	268	903.39	268.01	915.93	268.09	921.77	268.12	927.41	268.16												
1076.9	268.11	1078.49	268.1	1082.49	268.09	1087.93	268.1	1092.79	268.12												
1093.81	268.13	1098	268.15	1109.77	268.29	1120.04	268.36	1128.65	268.43												
1211.64	270	1257.99	270.03	1258.11	270.06	1260.8	270.66	1265.58	271.73												
1266.79	272	1273.52	273.42	1276.11	274	1282.41	273.14	1287.51	272												
1291.29	271.2	1297.03	270	1304.52	268.46	1306.74	268	1315.15	268.06												
1330.8	268.61	1339.49	268.92	1343.5	269.07	1368.34	270	1390.09	270.81												

Manning's	n Values		num=	4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	250.31	.06	366.4	.075	1390.38	.04

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	158.93	1390.38		564.8	424.13	403.85		.1	.3

E.G. Elev (ft)	271.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	wt. n-val.	0.040	0.068	0.040
W.S. Elev (ft)	271.08	Reach Len. (ft)	564.80	424.13	403.85
Crit W.S. (ft)		Flow Area (sq ft)	3.26	3410.17	0.18
E.G. Slope (ft/ft)	0.003486	Area (sq ft)	3.26	3410.17	0.18
Q Total (cfs)	8951.00	Flow (cfs)	4.69	8946.22	0.09
Top width (ft)	1201.05	Top width (ft)	6.04	1193.46	1.55
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)	1.44	2.62	0.51
Max chl Dpth (ft)	4.12	Hydr. Depth (ft)	0.54	2.86	0.11
Conv. Total (cfs)	151611.8	Conv. (cfs)	79.4	151530.8	1.6
Length Wtd. (ft)	426.07	Wetted Per. (ft)	6.14	1194.85	1.57
Min ch El (ft)	266.96	Shear (lb/sq ft)	0.12	0.62	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.17	1.63	0.01
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	56.36	303.21	51.47
C & E Loss (ft)	0.03	Cum SA (acres)	14.26	51.79	10.78

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Existing.rep

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 2614.242

INPUT

Description:

Station Elevation Data			num= 114								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	284.09	23.85	284.05	24	284	32.71	281.46	37.12	280.14		
37.62	280	47.64	279.46	51	279.16	54.09	278.96	55.26	278.87		
63.3	278.16	65.42	278	79.89	276.77	86.43	276	98.52	274		
107.89	272.54	111.74	272	129.37	270	142.22	269.25	155.14	268.63		
171.43	268	178.3	267.79	199.43	267.37	205.28	267.35	208.26	267.32		
210.28	267.27	215.43	267.23	221.97	267.08	293.19	266.43	314.34	266.11		
315.02	266.09	334.04	266	447.35	265.97	451.64	265.76	456.73	265.16		
461.02	264.77	462.93	264.56	466.75	264	604.17	264.2839	805.55	264.7		
810.36	264.98	817.1	265.47	824.36	266	840.46	265.66	841.2	265.54		
841.52	265.48	844.52	264.99	848.09	264.41	850.62	264	878.3	264.06		
884.81	264.27	887.07	264.34	893.2	264.54	904.81	264.99	906.98	265.07		
919.83	265.59	930.39	266	1221.37	266.45	1252.77	266.55	1255.58	266.56		
1291.4	266.8	1296.66	266.82	1300.32	266.84	1358.35	267.05	1363.83	267.08		
1437.45	267.14	1476.36	268	1513.81	267.97	1515.66	267.58	1515.69	267.57		
1517.8	267.11	1518.45	266.96	1522.24	266	1525.79	264.43	1526.72	264		
1534.45	263.52	1536.74	264	1537.23	264.1	1539.45	264.41	1539.74	264.39		
1541.6	264.52	1543.19	264.64	1543.7	264.59	1544.9	264.73	1545.99	264.6		
1550.98	264.79	1555.8	265.46	1559.37	266	1564.27	266.15	1565.13	266.16		
1573.36	266.41	1584.82	266.74	1596.82	267.06	1601.45	267.12	1609.78	267.32		
1612.16	267.38	1655.9	268	1661.55	268.01	1672	269.6	1674.38	269.99		
1685.18	271.97	1685.89	272.08	1686.48	272.18	1697.66	274	1700.19	274.39		
1711.5	276	1747.89	282	1752.11	282.64	1759.72	284	1770.23	285.58		
1773.52	286	1783.38	287.53	1786.71	288	1797.04	289.28				

Manning's n values

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	604.17	.06	817.1	.04	850.62	.075
							1661.55
							.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215.43	1661.55	566.01	580.29	596.27	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	270.91				
Vel Head (ft)	0.02	wt. n-val.	0.040	0.056	0.040
W.S. Elev (ft)	270.89	Reach Len. (ft)	566.01	580.29	596.27
Crit W.S. (ft)		Flow Area (sq ft)	234.50	7241.22	26.57
E.G. Slope (ft/ft)	0.000233	Area (sq ft)	234.50	7241.22	26.57
Q Total (cfs)	8951.00	Flow (cfs)	244.39	8687.06	19.55
Top Width (ft)	1557.74	Top width (ft)	93.89	1446.12	17.73
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	1.04	1.20	0.74
Max Chl Dpth (ft)	7.37	Hydr. Depth (ft)	2.50	5.01	1.50
Conv. Total (cfs)	586857.4	Conv. (cfs)	16023.2	569552.6	1281.6
Length wtd. (ft)	580.11	Wetted Per. (ft)	94.00	1447.36	17.96
Min Ch El (ft)	263.52	Shear (lb/sq ft)	0.04	0.07	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.04	0.09	0.02
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	54.82	251.36	51.34
C & E Loss (ft)	0.00	Cum SA (acres)	13.61	38.94	10.69

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 2033.954

INPUT

Description:

Station Elevation Data			num= 103								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	275.6	4.15	275.02	13.53	274.18	13.67	274.17	14.6	274.06		
15.46	274	35.67	272.86	43.13	272.28	45.9	272.27	46.88	272		
48.91	271.74	53.93	271.19	60	270.627	66.77	270	67.21	269.97		
89.55	268	114.16	266	128	265.583	180.49	264	500	263.196		
583	262.987	621.76	262.89	632.77	262.26	637.19	262	667.3	262.05		
677.53	262.49	678.87	262.57	715.02	263.35	745.29	264	848.74	263.31		

Existing.rep									
976.36	264	1166.66	263.5	1167.98	263.37	1170.01	262.93	1172.3	262.78
1173.66	262.58	1174.34	262.52	1177.25	262.37	1177.7	262.33	1181.67	262
1198.55	262.92	1204.15	263.34	1213.03	264	1242.62	264.36	1264.45	264.51
1278.97	264.85	1284.69	264.92	1291.21	265.08	1298.05	265.16	1300.1	265.19
1312.36	265.49	1320.28	265.6	1322.69	265.67	1323.15	265.68	1332.87	266
1338.99	266.61	1339.21	266.64	1339.45	266.67	1349.62	268	1364.42	267.24
1365.99	266.75	1368.33	266	1374.53	264.1	1374.8	264	1375.74	263.71
1381.41	262	1385.36	260.8	1388.05	260	1393.64	260.1	1399.81	262
1404.21	263.38	1406.39	264	1409.3	264.15	1412.15	264.3	1413.94	264.4
1417.55	264.59	1430.01	265.27	1437.46	265.61	1445.96	266	1455.18	267.57
1456.54	267.82	1457.47	268	1458.91	268.44	1464.34	270	1465.62	270.41
1472.2	272.35	1476.79	274	1480.29	275.59	1481.32	276	1484.62	277.46
1485.81	278	1486.18	278.16	1494.18	281.71	1501.88	285.02	1505.02	286.33
1505.61	286.57	1509.19	288	1509.29	288.01	1522.96	289.59	1523.99	289.7
1524.56	289.77	1526.58	290	1549.68	291.52				

Manning's n Values									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	583	.075	637.19	.04	715.02	.06	1166.66	.04
1198.55	.06	1349.62	.075	1465.62	.04				

Bank Sta:		Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
		128	1465.62		314.82	169.15	136.16	.1	.3
Ineffective Flow		num=		1					
Sta L	Sta R	Elev	Permanent						
0	127.67		F						

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	270.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	wt. n-Val.	0.040	0.050	0.040
W.S. Elev (ft)	270.82	Reach Len. (ft)	314.82	169.15	136.16
Crit W.S. (ft)		Flow Area (sq ft)	1.73	9400.90	0.29
E.G. Slope (ft/ft)	0.000075	Area (sq ft)	208.83	9400.90	0.29
Q Total (cfs)	8951.00	Flow (cfs)	1.67	8949.30	0.03
Top Width (ft)	1409.14	Top Width (ft)	70.12	1337.62	1.40
Vel Total (ft/s)	0.95	Avg. Vel. (ft/s)	0.97	0.95	0.11
Max chl Dpth (ft)	10.82	Hydr. Depth (ft)	5.24	7.03	0.21
Conv. Total (cfs)	1035405.0	Conv. (cfs)	193.4	1035208.0	3.7
Length Wtd. (ft)	169.17	wetted Per. (ft)	0.33	1340.27	1.46
Min Ch El (ft)	260.00	Shear (lb/sq ft)	0.02	0.03	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.02	0.03	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	51.94	140.50	51.16
C & E Loss (ft)	0.00	Cum SA (acres)	12.54	20.40	10.56

CROSS SECTION

RIVER: HRC
REACH: Main RS: 1864.806

INPUT

Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	278.55	18.5	278	25.34	276.3	26.21	276.09	26.57	276
34.55	274.2	35.41	274	47.77	272.79	79.36	269.27	90.07	268
123.56	266	187.57	264	317	263.762	400	263.61	421	263.571
718	263.025	747.96	262.97	760.39	262	812.55	262.033	900	262.089
948.99	262.12	966.42	262.2	967.47	262.21	1006.74	262.37	1008.23	262.38
1009.82	262.39	1039.11	262.49	1041.52	262.5	1071.66	262.63	1088.53	262.69
1172.73	263.53	1177.2	263.59	1179.09	263.6	1189.69	263.65	1190.96	263.66
1203.97	263.85	1206.73	263.88	1210.93	263.95	1214.28	264	1274.27	264.24
1275.13	264.25	1387.59	264.48	1388.15	264.45	1394.36	264	1400.15	263.44
1413.68	262	1418.11	260.6	1420.37	260	1436.62	260.98	1443.65	262
1446.72	262.24	1449.29	262.45	1457.9	263.13	1468.23	264	1499.91	265.46
1510.1	266	1512.42	266.52	1519.16	268	1535.2	274	1537.19	274.76
1540.35	276	1545.19	278	1546.86	278.76	1554.23	282	1557.98	283.79
1558.47	284	1562.92	286	1567.55	288	1583.12	290	1591.89	290.63
1593.87	290.76								

Manning's n Values									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	718	.075	760.39	.04	812.55	.06	900	.04
967.47	.06	1387.59	.075	1512.42	.04				

Bank Sta:		Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
		421	1512.42		303.13	147.22	135.57	.1	.3

Existing.rep

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 420.39 278.548 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	270.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	wt. n-val.	0.040	0.051	0.040
W.S. Elev (ft)	270.81	Reach Len. (ft)	303.13	147.22	135.57
Crit W.S. (ft)	264.29	Flow Area (sq ft)	4.41	8401.34	34.42
E.G. Slope (ft/ft)	0.000088	Area (sq ft)	2171.66	8401.34	34.42
Q Total (cfs)	8951.00	Flow (cfs)	5.77	8924.23	21.00
Top width (ft)	1461.08	Top width (ft)	355.42	1091.42	14.24
Vel Total (ft/s)	1.06	Avg. vel. (ft/s)	1.31	1.06	0.61
Max Chl Dpth (ft)	10.81	Hydr. Depth (ft)	7.23	7.70	2.42
Conv. Total (cfs)	951859.3	Conv. (cfs)	613.2	949012.5	2233.7
Length wtd. (ft)	147.22	wetted Per. (ft)	0.61	1092.17	14.91
Min Ch El (ft)	260.00	Shear (lb/sq ft)	0.04	0.04	0.01
Alpha	1.00	Stream Power (lb/ft s)	0.05	0.05	0.01
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	43.34	105.94	51.10
C & E Loss (ft)	0.00	Cum SA (acres)	11.00	15.68	10.54

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 1717.589

INPUT

Description:

Station Elevation Data			num= 108								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	282	39.1	280.47	48.2	280	58.74	278.47	62.16	278		
66.25	277.37	72.96	276	76.12	275.39	83.95	274	99.04	272		
100.64	271.8	126.54	267.98	139.39	266.26	141.25	266	169.72	264		
380	263.567	398	263.53	398.11	263.53	398.4	263.52	419.02	262.99		
421.54	262.94	424.24	262.86	426.45	262.82	428.27	262.77	429.47	262.72		
431.24	262.71	432.04	262.68	433.29	262.69	462.03	262.17	462.51	262.18		
516.21	262.21	522.92	262.26	527.66	262.3	530.2	262.32	537.65	262.38		
540.66	262.4	543.65	262.43	546.36	262.45	565.04	262.46	568.37	262.47		
571.99	262.49	681.92	262.95	817.37	264	920	263.73	961.9	263.62		
964.9	263.08	964.92	263.07	968.46	262.73	969.92	262.51	970.71	262.4		
975.96	262	1007.16	261.87	1008.46	262	1011.4	262.19	1011.55	262.2		
1017	262.56	1018.97	262.64	1023.1	262.89	1026.26	263.02	1029.25	263.2		
1032.45	263.35	1035.62	263.57	1037.02	263.65	1041.04	264	1137.41	263.79		
1149.87	262	1152.88	261.42	1160.24	260	1166.78	258.76	1170.73	258		
1180.4	258.77	1183.54	259.63	1184.45	259.89	1184.88	260	1185.15	260.07		
1186.88	260.56	1192.01	262	1205.92	263.15	1211.59	263.6	1216.85	264		
1222.63	265.1	1227.42	266	1227.95	266.08	1228.24	266.11	1229.52	266.3		
1236.01	267.21	1240.98	268	1243.23	269.17	1245.05	270	1249.29	272		
1251.53	272.99	1253.74	274	1256.43	275.28	1261.92	277.77	1262.42	278		
1262.92	278.22	1266.83	280	1270.53	281.76	1271.01	282	1275.33	284		
1285.9	286	1290.03	286.36	1291.7	286.49	1301.02	287.29	1302.21	287.38		
1303.83	287.52	1312.08	288	1342.96	289.19						

Manning's n Values			num= 7								
Sta	n val	Sta	n val	Sta	n val	Sta	n val	Sta	n val	Sta	n val
0	.04	380	.075	462.51	.05	920	.04	1032.45	.06		
1137.41	.075	1222.63	.04								

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	398	1222.63		370.67	181.8	159.36	
						.1	.3

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 397.63 282 F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	270.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	wt. n-val.	0.075	0.053	0.040
W.S. Elev (ft)	270.78	Reach Len. (ft)	370.67	181.80	159.36
Crit W.S. (ft)	264.52	Flow Area (sq ft)	2.68	6436.54	84.34
E.G. Slope (ft/ft)	0.000155	Area (sq ft)	1847.02	6436.54	84.34
Q Total (cfs)	8951.00	Flow (cfs)	2.47	8860.74	87.79

C & E Loss (ft)	0.00	Cum SA (acres)	Existing.rep 6.57	9.44	10.43
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Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
 Note: Manning's n values were composited to a single value in the main channel.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: HRC
 REACH: Main RS: 1463.580

INPUT

Description:

Distance from Upstream XS = 41
 Deck/Roadway width = 45
 Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num=	9								
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	
706.6	265.6	250	756.6	271.19	250	756.6	271.19	269.57	
788.1	272.3	270.68	809.1	273.04	271.42	830.1	273.8	272.18	
861.599	274.89	273.27	861.599	274.89	250	955.6	275.6	250	

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	121					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	272	20.27	271.32	26.08	270	30.17	268.72	32.17	268
88.6	266.13	89.17	266.12	93.65	266	247	265.992	288.4	265.99
318	265.751	464.99	264.48	519.59	264	543	264.028	662.59	264.17
662.89	264.18	663.23	264.19	663.62	264.2	664.07	264.21	664.32	264.22
664.88	264.23	665.2	264.24	665.54	264.25	665.91	264.26	672.68	264.44
697.69	265.07	710.6	265.41	721.73	265.7	726.34	265.82	732.25	265.93
733.21	265.97	733.86	266	771.29	264.6	776.78	264.16	776.87	264.15
776.99	264.14	778.26	264	778.91	263.87	779.5	263.74	780	263.63
783.64	262.9	787.28	262	795.65	260	803.81	258	814.41	258.8
819.33	260	823.83	261.16	827.23	262	831.24	263.03	835.4	264
838.74	264.85	839.12	264.94	841.14	265.48	843.46	266	848.36	267.21
851.64	268	854.45	268.7	860.14	270	864.27	271.03	864.65	271.13
865.73	271.47	867.37	272	874.33	272.86	877.83	273.06	878.92	273.26
880.9	273.39	886.99	273.88	887.79	274	894.96	274.53	898.15	274.87
907.09	275.68	909.18	275.91	909.31	275.92	910.22	276	913.68	276.75
915.05	276.96	918.96	277.6	919.53	277.68	921.47	278	929.3	278.54
936.58	279.47	939.93	279.82	940.89	280	964.67	281.74	968.52	282
974.14	282.49	976.68	282.65	976.91	282.67	977.59	282.7	978.02	282.71
978.42	282.73	980.25	282.88	982.13	282.97	984.25	283.12	988.42	283.33
1005.23	284.6	1007.07	284.71	1010.72	284.97	1015.13	285.22	1015.74	285.26
1021.18	285.56	1021.6	285.58	1021.98	285.61	1022.34	285.63	1022.64	285.64
1022.92	285.66	1025.9	285.82	1026.12	285.83	1028.34	286	1041.63	286.92
1051.69	287.53	1051.83	287.54	1055.61	287.74	1055.86	287.76	1056.66	287.81
1059.75	287.96	1060.45	288	1069.29	288.27	1070.66	288.3	1080.2	288.57
1089.27	288.68								

Manning's n values

Sta	n val	Sta	n val	Sta	n val	Sta	n val
0	.04	543	.05	733.86	.04	771.29	.075
							848.36
							.04

Bank Sta: Left Right Coeff Contr. Expan.
 247 864.27 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 246.28 272 F

Downstream Deck/Roadway Coordinates

num=	10								
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	
652.3	266.7	250	702.3	271.15	250	702.3	271.15	269.53	
733.8	272.19	270.57	754.8	272.88	271.26	775.8	273.69	272.07	
807.299	274.77	273.15	807.299	274.77	250	902.3	276	250	
975	276.5	250							

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	126					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	272	18.49	270.92	24.16	270	31.29	268	45.34	267.74

Existing.rep										
46.6	267.73	125.25	266	215	265.733	308.18	265.455	443.97	265.05	
445.37	265.06	446.93	265.04	450.98	265.05	482.15	264.7	484.89	264.66	
489.12	264.65	494.63	264.58	529.95	264	586.88	264.02	586.95	264.03	
590.23	264.16	596.2	264.37	598.44	264.53	602.94	264.68	609.31	264.87	
611.37	265.05	613.72	265.12	619.67	266	642.38	266.47	647.06	266.55	
655.6	266.82	660.35	266.93	661.32	266.97	665.2	267.06	666.33	267.09	
672.24	267.24	674.64	267.27	690.65	268	714.49	265.46	728.04	260.86	
729.95	260	735.99	258.04	736.12	258.01	736.41	258	749.1	258.51	
752.61	259.1	754.85	259.46	758.16	260	769.33	261.81	770.45	262	
774.99	262.76	776.28	262.84	783.92	264	789.52	264.08	790.15	264.33	
797.26	266	801.51	267.07	805.56	268	811.88	269.61	813.28	270	
814.47	270.41	816.56	270.54	817.3	270.65	819.76	270.74	820.87	270.81	
822.55	270.92	823.2	270.94	826.59	271.08	834.39	270.34	839.7	269.41	
840.97	269.26	843.98	268.7	845.76	268.45	856.71	268.38	860.39	268.16	
860.72	268.12	863.19	268	870.8	267.83	872.01	267.89	880.52	267.66	
882.19	267.64	886.51	267.49	904.85	267.94	905.53	268	913.44	268.95	
919.91	269.85	920.51	269.93	921.15	270	927.18	271.03	928.33	270.99	
934.79	270.86	936.99	270.74	940.89	270.71	942.96	270.98	944.02	271	
950.56	272	952.55	272.46	960.67	274.99	963.79	276	982.39	277.98	
982.62	278	982.91	278.09	989.43	280	993.21	280.34	1009	282	
1026	283.23	1028.41	283.38	1028.69	283.39	1028.96	283.41	1029.22	283.42	
1029.46	283.44	1029.84	283.46	1032.9	283.58	1034.56	283.6	1036.99	283.66	
1040.07	283.62	1040.59	283.64	1045.9	283.66	1046.15	283.67	1046.98	283.68	
1047.37	283.67	1047.93	283.68	1049.52	283.69	1059.45	283.65	1060.6	283.63	
1061.23	283.6									

Manning's n values
Sta n Val Sta num= 3 n Val Sta n Val
0 .04 690.65 .075 823.2 .04

Bank Sta: Left Right Coeff Contr. Expan.
215 823.2 .1 .3
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 214.05 272 F
824 1000 280 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 788.1 Downstream= 733.8
Upstream num= 2
width Elev width Elev
1.25 250 1.25 272
Downstream num= 2
width Elev width Elev
1.25 250 1.25 272

Pier Data
Pier Station Upstream= 830.1 Downstream= 775.8
Upstream num= 2
width Elev width Elev
1.25 250 1.25 273
Downstream num= 2
width Elev width Elev
1.25 250 1.25 273

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end

Existing.rep
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (ft)	270.75	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	270.66	E.G. Elev (ft)	270.71	270.62
Q Total (cfs)	8951.00	W.S. Elev (ft)	270.61	270.50
Q Bridge (cfs)	1051.38	Crit W.S. (ft)	266.40	266.62
Q Weir (cfs)		Max Chl Dpth (ft)	12.61	12.50
Weir Sta Lft (ft)		Vel Total (ft/s)	2.53	2.75
Weir Sta Rgt (ft)		Flow Area (sq ft)	3542.66	3250.85
Weir Submerg		Froude # Chl	0.13	0.14
Weir Max Depth (ft)		Specif Force (cu ft)	12209.83	11047.80
Min El Weir Flow (ft)	264.01	Hydr Depth (ft)	6.13	5.87
Min El Prs (ft)	273.27	W.P. Total (ft)	677.79	657.11
Delta EG (ft)	0.15	Conv. Total (cfs)	211551.9	187219.8
Delta WS (ft)	0.17	Top width (ft)	800.94	747.00
BR Open Area (sq ft)	845.27	Frctn Loss (ft)	0.09	0.02
BR Open Vel (ft/s)	1.41	C & E Loss (ft)	0.00	0.00
Coef of Q		Shear Total (lb/sq ft)	0.58	0.71
Br Sel Method	Energy only	Power Total (lb/ft s)	1.48	1.94

Warning: The composite Mannings n value for the channel was larger than the largest entered n value or smaller than the smallest entered n value.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 1434.036

INPUT

Description:

Station		Elevation Data		num=	126	Station		Elevation Data		num=	3
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	272	18.49	270.92	24.16	270	31.29	268	45.34	267.74		
46.6	267.73	125.25	266	215	265.733	308.18	265.455	443.97	265.05		
445.37	265.06	446.93	265.04	450.98	265.05	482.15	264.7	484.89	264.66		
489.12	264.65	494.63	264.58	529.95	264	586.88	264.02	586.95	264.03		
590.23	264.16	596.2	264.37	598.44	264.53	602.94	264.68	609.31	264.87		
611.37	265.05	613.72	265.12	619.67	266	642.38	266.47	647.06	266.55		
655.6	266.82	660.35	266.93	661.32	266.97	665.2	267.06	666.33	267.09		
672.24	267.24	674.64	267.27	690.65	268	714.49	265.46	728.04	260.86		
729.95	260	735.99	258.04	736.12	258.01	736.41	258	749.1	258.51		
752.61	259.1	754.85	259.46	758.16	260	769.33	261.81	770.45	262		
774.99	262.76	776.28	262.84	783.92	264	789.52	264.08	790.15	264.33		
797.26	266	801.51	267.07	805.56	268	811.88	269.61	813.28	270		
814.47	270.41	816.56	270.54	817.3	270.65	819.76	270.74	820.87	270.81		
822.55	270.92	823.2	270.94	826.59	271.08	834.39	270.34	839.7	269.41		
840.97	269.26	843.98	268.7	845.76	268.45	856.71	268.38	860.39	268.16		
860.72	268.12	863.19	268	870.8	267.83	872.01	267.89	880.52	267.66		
882.19	267.64	886.51	267.49	904.85	267.94	905.53	268	913.44	268.95		
919.91	269.85	920.51	269.93	921.15	270	927.18	271.03	928.33	270.99		
934.79	270.86	936.99	270.74	940.89	270.71	942.96	270.98	944.02	271		
950.56	272	952.55	272.46	960.67	274.99	963.79	276	982.39	277.98		
982.62	278	982.91	278.09	989.43	280	993.21	280.34	1009	282		
1026	283.23	1028.41	283.38	1028.69	283.39	1028.96	283.41	1029.22	283.42		
1029.46	283.44	1029.84	283.46	1032.9	283.58	1034.56	283.6	1036.99	283.66		
1040.07	283.62	1040.59	283.64	1045.9	283.66	1046.15	283.67	1046.98	283.68		
1047.37	283.67	1047.93	283.68	1049.52	283.69	1059.45	283.65	1060.6	283.63		
1061.23	283.6										

Manning's n values		num=	3
Sta	n Val	Sta	n Val
0	.04	690.65	.075
		823.2	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215	823.2	325.9	445.33	470.35	.1	.3
Ineffective Flow	num=	2				

Sta L	Sta R	Elev	Permanent
0	214.05	272	F
824	1000	280	F

E.G. Elev (ft)	270.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.040	0.046	
W.S. Elev (ft)	270.49	Reach Len. (ft)	325.90	445.33	470.35
Crit W.S. (ft)	266.60	Flow Area (sq ft)	4.52	3364.94	
E.G. Slope (ft/ft)	0.000686	Area (sq ft)	751.84	3364.94	190.79
Q Total (cfs)	8951.00	Flow (cfs)	12.43	8938.57	
Top width (ft)	885.85	Top width (ft)	193.86	600.77	91.22
Vel Total (ft/s)	2.66	Avg. Vel. (ft/s)	2.75	2.66	
Max chl Dpth (ft)	12.49	Hydr. Depth (ft)	4.76	5.60	
Conv. Total (cfs)	341743.5	Conv. (cfs)	474.7	341268.8	
Length wtd. (ft)	448.17	Wetted Per. (ft)	0.95	603.54	
Min ch El (ft)	258.00	Shear (lb/sq ft)	0.20	0.24	
Alpha	1.00	Stream Power (lb/ft s)	0.56	0.63	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	15.40	51.50	50.73
C & E Loss (ft)	0.02	Cum SA (acres)	6.07	8.08	10.42

energy was used.

E.G. Elev (ft)	270.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-val.	0.040	0.049	0.057
W.S. Elev (ft)	270.37	Reach Len. (ft)	320.67	360.93	426.06
Crit W.S. (ft)	263.25	Flow Area (sq ft)	325.80	2420.81	2689.89
E.G. Slope (ft/ft)	0.000232	Area (sq ft)	586.88	2420.81	3276.79
Q Total (cfs)	8951.00	Flow (cfs)	501.30	3964.35	4485.35
Top width (ft)	1060.14	Top width (ft)	200.00	398.98	461.16
Vel Total (ft/s)	1.65	Avg. vel. (ft/s)	1.54	1.64	1.67
Max chl Dpth (ft)	14.37	Hydr. Depth (ft)	4.49	6.07	7.37
Conv. Total (cfs)	587184.6	Conv. (cfs)	32885.3	260060.9	294238.3

```

warning: The cross-section end points had to be extended vertically for the computed water surface.
warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest,
valid,
      water surface was used.

```

RIVER: HRC
REACH: Main RS: 627.7707

Station	Elevation Data	num=	145						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	270	23.311	269.04	29.661	268	32.702	267.72	44.691	266.88
51.7	266.81	58.258	266.66	64.271	266.66	66.585	266.61	70.813	266.28
74.023	266.11	81.155	266	95.648	266.04	107.805	266.47	109.759	266.46
112.654	266.62	115.535	266.6	119.947	266.89	123.571	267	127.24	266.89
129.324	266.87	131.285	266.74	133.568	266.72	146.82	266.98	153.569	266.99
158.226	266.93	170.966	266.95	173.701	266.92	179.829	266.49	181.905	266.43
186.677	266	240.293	265.87	265.166	265.97	266.017	266	273.792	266.09
278.84	266.21	282.303	266.35	288.63	266.68	294.437	267.06	297.034	267.19
302.182	267.19	309.306	267.41	315.955	267.49	317.74	267.62	318.422	267.56
321.831	268	333.229	267.98	336.071	266.16	339.457	264.33	342.223	263.01
345.08	261.94	352.311	259.43	354.089	258.63	356.923	257.46	359.543	256
362.998	254.26	363.687	254	395.225	254.84	398.159	256	404.219	258.48
414.193	262.29	418.934	264.2	423.079	266	452.357	265.87	465.862	265.95
466.598	266	484.768	266.06	487.924	266.22	488.851	266.2	509.197	268
527.399	268.46	530.386	269.69	534.799	270.96	538.131	272	543.7	273.54
545.653	274	558.898	274.98	562.951	275.21	567.892	275.68	569.753	276
597.737	275.98	598.342	275.75	602.302	274.86	604.309	274.78	605.681	274.65
608.898	274.55	615.854	274.39	618.489	274	632.998	273.82	635.549	273.58
636.951	273.34	637.127	273.19	640.995	272.58	643.025	272	644.963	271.83
647.737	270.91	651.406	270	654.072	269.45	655.604	269.32	659.97	268.38
661.234	268	698.242	266.27	699.927	266.28	705.343	266	706.944	265.7
709.035	265.54	713.708	265.02	732.553	264.3	742.519	263.84	751.244	263.53
753.244	263.56	760.927	263.49	763.233	263.5	769.63	263.36	775.091	263.17
779.58	262.91	781.618	262.83	784.667	262.61	787.524	262.54	790.573	262.25
791.592	262.28	796.234	262.64	801.183	262.97	806.614	263.28	808.951	263.33
810.789	263.26	813.692	263.25	815.799	263.15	825.206	262.89	829.151	262.83
844.296	262.96	850.692	262.91	855.457	263.08	860.919	263.14	864.703	263.27
871.659	263.26	876.01	263.03	880.43	262.91	893.024	263.09	894.05	263.14
897.092	263.47	901.481	263.48	914.611	263.9	915.798	264	919.598	264.19

Manning's	n	Values		num=	3	
Sta	n	val	Sta	n	val	Sta
0	.04	333.229	.075	423.079	.04	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	333.229	423.079		152.69	155.13	152.21		.1	.3
Ineffective Flow	num=		2						
Sta L	Sta R	Elev	Permanent						
770	919.598	280	F						
0	67.11	280	F						
Skew Angle = 40									

E.G. Elev (ft)	270.24	Element	Left OB	Channel	Right OB
vel Head (ft)	0.15	Wt. n-val.	0.040	0.075	0.040
W.S. Elev (ft)	270.09	Reach Len. (ft)	32.00	32.00	32.00
Crit W.S. (ft)	265.54	Flow Area (sq ft)	953.62	1048.82	896.11
E.G. Slope (ft/ft)	0.001104	Area (sq ft)	1092.14	1048.82	1941.39
Q Total (cfs)	8951.00	Flow (cfs)	2754.73	3418.46	2777.81
Top width (ft)	800.31	Top width (ft)	333.23	89.85	377.23
vel Total (ft/s)	3.09	Avg. Vel. (ft/s)	2.89	3.26	3.10
Max Chl Dpth (ft)	16.09	Hydr. Depth (ft)	3.58	11.67	3.94
Conv. Total (cfs)	269442.6	Conv. (cfs)	82922.6	102902.4	83617.5
Length wtd. (ft)	32.00	Wetted Per. (ft)	266.27	95.17	228.40

Min Ch El (ft)	254.00	Existing.rep	0.25	0.76	0.27
Alpha	1.01	Shear (lb/sq ft)	0.71	2.47	0.84
Frctn Loss (ft)	0.08	Stream Power (lb/ft s)	4.21	7.55	6.49
C & E Loss (ft)	0.03	Cum Volume (acre-ft)	2.64	0.95	3.34
		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: HRC
REACH: Main RS: 561.3247

INPUT

Description:

Distance from Upstream XS = 32
Deck/Roadway width = 88
Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num=	8																			
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta
0	268		250		324.4	267.85		250		324.4	267.85		266.31		434.4	267.52		265.98		
361.4	267.81		266.27		397.4	267.71		266.17												
434.4	267.52		250		965.9	268		250												

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	145																
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
0	270	23.311	269.04	29.661	268	32.702	267.72	44.691	266.88											
51.7	266.81	58.258	266.66	64.271	266.66	66.585	266.61	70.813	266.28											
74.023	266.11	81.155	266	95.648	266.04	107.805	266.47	109.759	266.46											
112.654	266.62	115.535	266.6	119.947	266.89	123.571	267	127.24	266.89											
129.324	266.87	131.285	266.74	133.568	266.72	146.82	266.98	153.569	266.99											
158.226	266.93	170.966	266.95	173.701	266.92	179.829	266.49	181.905	266.43											
186.677	266	240.293	265.87	265.166	265.97	266.017	266	273.792	266.09											
278.84	266.21	282.303	266.35	288.63	266.68	294.437	267.06	297.034	267.19											
302.182	267.19	309.306	267.41	315.955	267.49	317.74	267.62	318.422	267.56											
321.831	268	333.229	267.98	336.071	266.16	339.457	264.33	342.223	263.01											
345.08	261.94	352.311	259.43	354.089	258.63	356.923	257.46	359.543	256											
362.998	254.26	363.687	254	395.225	254.84	398.159	256	404.219	258.48											
414.193	262.29	418.934	264.2	423.079	266	452.357	265.87	465.862	265.95											
466.598	266	484.768	266.06	487.924	266.22	488.851	266.2	509.197	268											
527.399	268.46	530.386	269.69	534.799	270.96	538.131	272	543.7	273.54											
545.653	274	558.898	274.98	562.951	275.21	567.892	275.68	569.753	276											
597.737	275.98	598.342	275.75	602.302	274.86	604.309	274.78	605.681	274.65											
608.898	274.55	615.854	274.39	618.489	274	632.998	273.82	635.549	273.58											
636.951	273.34	637.127	273.19	640.995	272.58	643.025	272	644.963	271.83											
647.737	270.91	651.406	270	654.072	269.45	655.604	269.32	659.97	268.38											
661.234	268	698.242	266.27	699.927	266.28	705.343	266	706.944	265.7											
709.035	265.54	713.708	265.02	732.553	264.3	742.519	263.84	751.244	263.53											
753.244	263.56	760.927	263.49	763.233	263.5	769.63	263.36	775.091	263.17											
779.58	262.91	781.618	262.83	784.667	262.61	787.524	262.54	790.573	262.25											
791.592	262.28	796.234	262.64	801.183	262.97	806.614	263.28	808.951	263.33											
810.789	263.26	813.692	263.25	815.799	263.15	825.206	262.89	829.151	262.83											
844.296	262.96	850.692	262.91	855.457	263.08	860.919	263.14	864.703	263.27											
871.659	263.26	876.01	263.03	880.43	262.91	893.024	263.09	894.05	263.14											
897.092	263.47	901.481	263.48	914.611	263.9	915.798	264	919.598	264.19											

Manning's n values num= 3
Sta n Val Sta n Val Sta n Val
0 .04 333.229 .075 423.079 .04

Bank Sta: Left Right Coeff Contr. Expan.
333.229 423.079 .1 .3

Ineffective Flow num= 2
Sta L Sta R Elev Permanent
770 919.598 280 F
0 67.11 280 F

Skew Angle = 40.

Downstream Deck/Roadway Coordinates
num= 8

				Existing.rep			
Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord	
0	268	250		401.1	267.74	250	
438.1	267.7	266.16		474.1	267.6	266.06	
511.1	267.41	250		922	268	250	

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	132	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	268	28.956		266.45	30.305	266	72.82	264.3	77.133	264	264
207.889	263.81	216.193		263.63	234.172	263.52	237.313	263.44	266.898	263.38	263.38
267.932	263.39	304.258		263.24	313.19	263.26	338.109	262.93	349.232	262.69	262.69
350.71	262.68	352.802		262.56	355.199	262.57	356.862	262.49	359.666	262.46	262.46
364.07	262.55	365.426		262.62	370.153	262.72	371.8	262.81	373.148	262.83	262.83
377.675	263.02	394.865		263.62	399.462	263.71	401.032	263.7	408.386	263.71	263.71
409.16	263.63	411.695		263.53	414.706	263.19	417.747	262	420.252	261.42	261.42
423.048	260.26	432.279		256.58	433.803	256	438.79	254.27	440.016	254	254
471.937	255.19	479.605		257.8	480.946	258.28	485.09	259.7	488.269	260.71	260.71
490.552	261.33	492.957		261.83	494.014	262	499.193	262.34	502.318	262.59	262.59
503.751	262.62	508.041		262.72	510.147	262.66	512.553	262.69	517.685	262.86	262.86
521.891	263.07	523.155		263.09	523.974	263.16	526.885	263.21	530.018	263.34	263.34
535.871	263.43	542.62		263.68	544.183	263.66	546.833	263.71	547.53	263.69	263.69
562.414	263.6	564.958		263.65	567.739	263.62	569.393	263.67	585.021	263.59	263.59
602.701	263.68	604.057		263.71	611.748	263.63	612.767	263.68	620.35	263.63	263.63
630.37	263.67	631.742		263.69	639.333	263.68	640.551	263.69	647.292	263.68	263.68
668.328	263.88	670.411		263.95	689.34	263.72	704.5	263.67	716.029	263.52	263.52
735.556	263.49	745.806		263.55	753.42	263.5	755.733	263.45	765.378	263.36	263.36
768.266	263.37	770.02		263.32	772.832	263.34	776.478	263.27	779.443	263.26	263.26
783.104	263.17	785.854		263.16	788.252	263.09	796.135	263.01	805.703	263.03	263.03
810.781	263.08	812.888		263.14	815.623	263.16	816.282	263.2	819.177	263.22	263.22
836.819	263.5	839.761		263.51	849.957	263.75	855.518	263.98	859.655	264.29	264.29
862.39	264.42	863.279		264.4	864.198	264.5	865.998	264.49	867.362	264.54	264.54
877.787	265	879.113		265.04	883.226	264.95	889.684	265.08	892.082	265.2	265.2
901.259	266	914.136		267.39	917.047	268	922.846	269.15	927.358	270	270
930.131	270.5	937.202		272	942.97	273.07	947.222	274	949.221	274.14	274.14
954.361	274.9	958.429		275.77							

Manning's n values num= 3

Sta	n val	Sta	n val	Sta	n val
0	.045	411.695	.075	503.751	.045

Bank Sta: Left Right Coeff Contr. Expan.

Left	Right	Coeff	Contr.	Expan.
411.695	503.751	.1	.3	

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	120	275	F

Skew Angle = 40

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98

Elevation at which weir flow begins =

Energy head used in spillway design =

Spillway height used in design =

Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data

Pier Station	Upstream=	361.4	Downstream=	438.1
Upstream	num= 2			
width	Elev	width	Elev	
1.5	250	1.5	267	
Downstream	num= 2			
width	Elev	width	Elev	
1.5	250	1.5	267	

Pier Data

Pier Station	Upstream=	397.4	Downstream=	474.1
Upstream	num= 2			
width	Elev	width	Elev	
1.5	250	1.5	267	
Downstream	num= 2			
width	Elev	width	Elev	
1.5	250	1.5	267	

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (ft)	270.24	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	270.09	E.G. Elev (ft)	270.12	267.83
Q Total (cfs)	8951.00	W.S. Elev (ft)	269.68	264.86
Q Bridge (cfs)	3047.48	Crit W.S. (ft)	265.17	264.86
Q Weir (cfs)		Max Chl Dpth (ft)	15.68	10.86
Weir Sta Lft (ft)		Vel Total (ft/s)	5.16	13.80
Weir Sta Rgt (ft)		Flow Area (sq ft)	1734.62	648.58
Weir Submerg		Froude # Chl	0.23	0.74
Weir Max Depth (ft)		Specif Force (cu ft)	8085.96	6491.42
Min El Weir Flow (ft)	267.53	Hydr Depth (ft)	2.99	6.06
Min El Prs (ft)	266.30	W.P. Total (ft)	819.78	148.16
Delta EG (ft)	4.37	Conv. Total (cfs)	81377.5	36120.3
Delta WS (ft)	4.54	Top width (ft)	789.11	107.00
BR Open Area (sq ft)	670.27	Frctn Loss (ft)	2.04	0.43
BR Open Vel (ft/s)	4.70	C & E Loss (ft)	0.25	0.80
Coef of Q		Shear Total (lb/sq ft)	1.60	16.78
Br Sel Method	Energy only	Power Total (lb/ft s)	8.25	231.62

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main

RS: 472.6398

INPUT

Description:

Station	Elevation	Data	num=	132	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	268	28.956	266.45	30.305	266	72.82	264.3	77.133	264		
207.889	263.81	216.193	263.63	234.172	263.52	237.313	263.44	266.898	263.38		
267.932	263.39	304.258	263.24	313.19	263.26	338.109	262.93	349.232	262.69		
350.71	262.68	352.802	262.56	355.199	262.57	356.862	262.49	359.666	262.46		
364.07	262.55	365.426	262.62	370.153	262.72	371.8	262.81	373.148	262.83		
377.675	263.02	394.865	263.62	399.462	263.71	401.032	263.7	408.386	263.71		
409.16	263.63	411.695	263.53	414.706	263.19	417.747	262	420.252	261.42		
423.048	260.26	432.279	256.58	433.803	256	438.79	254.27	440.016	254		
471.937	255.19	479.605	257.8	480.946	258.28	485.09	259.7	488.269	260.71		

Existing.rep									
490.552	261.33	492.957	261.83	494.014	262.499.193	262.34	502.318	262.59	
503.751	262.62	508.041	262.72	510.147	262.66	512.553	262.69	517.685	262.86
521.891	263.07	523.155	263.09	523.974	263.16	526.885	263.21	530.018	263.34
535.871	263.43	542.62	263.68	544.183	263.66	546.833	263.71	547.53	263.69
562.414	263.6	564.958	263.65	567.739	263.62	569.393	263.67	585.021	263.59
602.701	263.68	604.057	263.71	611.748	263.63	612.767	263.68	620.35	263.63
630.37	263.67	631.742	263.69	639.333	263.68	640.551	263.69	647.292	263.68
668.328	263.88	670.411	263.95	689.34	263.72	704.5	263.67	716.029	263.52
735.556	263.49	745.806	263.55	753.42	263.5	755.733	263.45	765.378	263.36
768.266	263.37	770.02	263.32	772.832	263.34	776.478	263.27	779.443	263.26
783.104	263.17	785.854	263.16	788.252	263.09	796.135	263.01	805.703	263.03
810.781	263.08	812.888	263.14	815.623	263.16	816.282	263.2	819.177	263.22
836.819	263.5	839.761	263.51	849.957	263.75	855.518	263.98	859.655	264.29
862.39	264.42	863.279	264.4	864.198	264.5	865.998	264.49	867.362	264.54
877.787	265	879.113	265.04	883.226	264.95	889.684	265.08	892.082	265.2
901.259	266	914.136	267.39	917.047	268	922.846	269.15	927.358	270
930.131	270.5	937.202	272	942.97	273.07	947.222	274	949.221	274.14
954.361	274.9	958.429	275.77						

Manning's n values num= 3
Sta n Val Sta n Val
0 .045 411.695 .075 503.751 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
411.695 503.751 286.58 305.07 300.37 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 120 275 F
Skew Angle = 40

CROSS SECTION OUTPUT Profile #PF 1

	E.G. Elev (ft)	265.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32		wt. n-val.	0.045	0.075	0.045
w.s. Elev (ft)	265.55		Reach Len. (ft)	286.58	305.07	300.37
Crit w.s. (ft)	264.73		Flow Area (sq ft)	615.70	712.70	752.92
E.G. slope (ft/ft)	0.005046		Area (sq ft)	709.05	712.70	752.92
Q Total (cfs)	8951.00		Flow (cfs)	2376.07	3848.27	2726.67
Top width (ft)	854.53		Top width (ft)	370.13	92.06	392.34
Vel Total (ft/s)	4.30		Avg. vel. (ft/s)	3.86	5.40	3.62
Max Chl Dpth (ft)	11.55		Hydr. Depth (ft)	2.11	7.74	1.92
Conv. Total (cfs)	126012.8		conv. (cfs)	33450.4	54176.2	38386.2
Length wtd. (ft)	300.82		wetted Per. (ft)	291.74	94.83	392.45
Min Ch El (ft)	254.00		Shear (lb/sq ft)	0.66	2.37	0.60
Alpha	1.11		Stream Power (lb/ft s)	2.57	12.78	2.19
Frctn Loss (ft)	2.44		Cum Volume (acre-ft)	2.76	4.84	4.50
C & E Loss (ft)	0.08		Cum SA (acres)	1.90	0.63	2.51

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: HRC
REACH: Main RS: 167.5697

INPUT

Description:

Station Elevation Data		num= 84	Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	266	21.77	265.99	22.99	266	283.14	265.59	293.31	265.78	
295.13	265.74	306.24	266	378.2	265.83	466.94	264	586.59	263.79	
587.93	263.78	588.1	263.77	614.34	263.5	619.26	263.49	749.74	262	
895.97	261.56	932.96	260.19	937.78	260	938.66	259.08	939.66	258	
941.11	256.39	941.45	256	941.75	255.69	943.46	254	943.78	253.65	
945.31	252	991.55	252.92	995.4	254	1002.1	255.85	1002.64	256	
1002.79	256.04	1009.83	258	1010.82	258.26	1017.52	260	1020.42	260.1494	
1056.16	261.99	1056.42	262	1060.72	261.91	1063.94	262	1072.58	261.84	
1073.99	261.59	1074.24	261.55	1077.34	261.47	1080.23	261.29	1096.57	260	
1110.05	261.13	1112.06	261.47	1114.35	261.5	1114.86	261.72	1115.37	261.75	

Existing.rep									
1117.28	261.76	1119.77	260	1285.99	260.22	1286.45	260.21	1350.64	262
1380.02	263.33	1382.13	263.68	1383.75	264	1385.2	264.71	1385.33	264.8
1387.3	266	1389.93	267.32	1391.26	268	1405.59	274	1405.89	274.13
1407.42	274.71	1409.66	275.67	1409.98	275.8	1410.45	276	1410.82	276.18
1415.17	278.47	1415.63	278.67	1418.04	280	1421.54	281.15	1422.51	281.45
1424.24	282	1428.28	282.75	1429.59	283.02	1431.96	283.37	1432.13	283.39
1432.48	283.44	1434.29	284	1439.62	285.56	1440.86	285.91		

Manning's n values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	932.96	.075	1020.42	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
932.96	1020.42	164.95	167.57	157.53	.1	.3	

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	624.28	275	F
1235.99	1440.86	285.913	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	263.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.07	Wt. n-val.	0.040	0.075	0.040
W.S. Elev (ft)	262.28	Reach Len. (ft)			
Crit W.S. (ft)	262.28	Flow Area (sq ft)	129.27	668.58	370.40
E.G. Slope (ft/ft)	0.015066	Area (sq ft)	129.27	668.58	552.73
Q Total (cfs)	8951.00	Flow (cfs)	429.13	6105.11	2416.76
Top width (ft)	632.00	Top width (ft)	208.06	87.46	336.48
Vel Total (ft/s)	7.66	Avg. Vel. (ft/s)	3.32	9.13	6.52
Max chl Dpth (ft)	10.28	Hydr. Depth (ft)	0.62	7.64	1.72
Conv. Total (cfs)	72924.1	Conv. (cfs)	3496.2	49738.5	19689.4
Length Wtd. (ft)		Wetted Per. (ft)	208.08	91.88	216.39
Min Ch El (ft)	252.00	Shear (lb/sq ft)	0.58	6.84	1.61
Alpha	1.17	Stream Power (lb/ft s)	1.94	62.50	10.51
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

SUMMARY OF MANNING'S N VALUES

River:HRC

n8	Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7
Main		9880.091	.04	.045	.04				
Main		9520.172	.04	.045	.04				
Main		9011.299	.04	.045	.04				
Main		8613.920	.04	.045	.04				
Main		8202.584	.04	.045	.04				
Main		7786.663	.04	.045	.04				
Main		7291.709	.04	.045	.04				
Main		6807.731	.04	.06	.04	.075	.06	.04	
Main		6396.299	.04	.06	.04	.075	.06	.04	
Main		6075.362	.04	.06	.075	.06	.04		
Main		5608.249	.04	.06	.075	.06	.04		
Main		5000.613	.05	.04	.06	.075	.06	.04	

Main	4634.388	.04	Existing.rep .06	.075	.06		
Main	4342.055	.04	.06	.075	.06	.04	
Main	3976.927	.04	.06	.075	.04		
Main	3642.177	.04	.06	.075	.06	.075	.04
Main	3351.951	.04	.06	.075	.06	.075	.04
Main	3038.374	.04	.06	.075	.04		
Main	2614.242	.04	.06	.04	.075	.04	
Main	2033.954	.04	.075	.04	.06	.04	.06 .075
.04 Main	1864.806	.04	.075	.04	.06	.04	.06 .075
.04 Main	1717.589	.04	.075	.05	.04	.06	.075 .04
Main	1535.785	.04	.05	.04	.075	.04	
Main	1463.580	Bridge					
Main	1434.036	.04	.075	.04			
Main	988.7041	.04	.075	.04	.06		
Main	627.7707	.04	.075	.04			
Main	561.3247	Bridge					
Main	472.6398	.045	.075	.045			
Main	167.5697	.04	.075	.04			

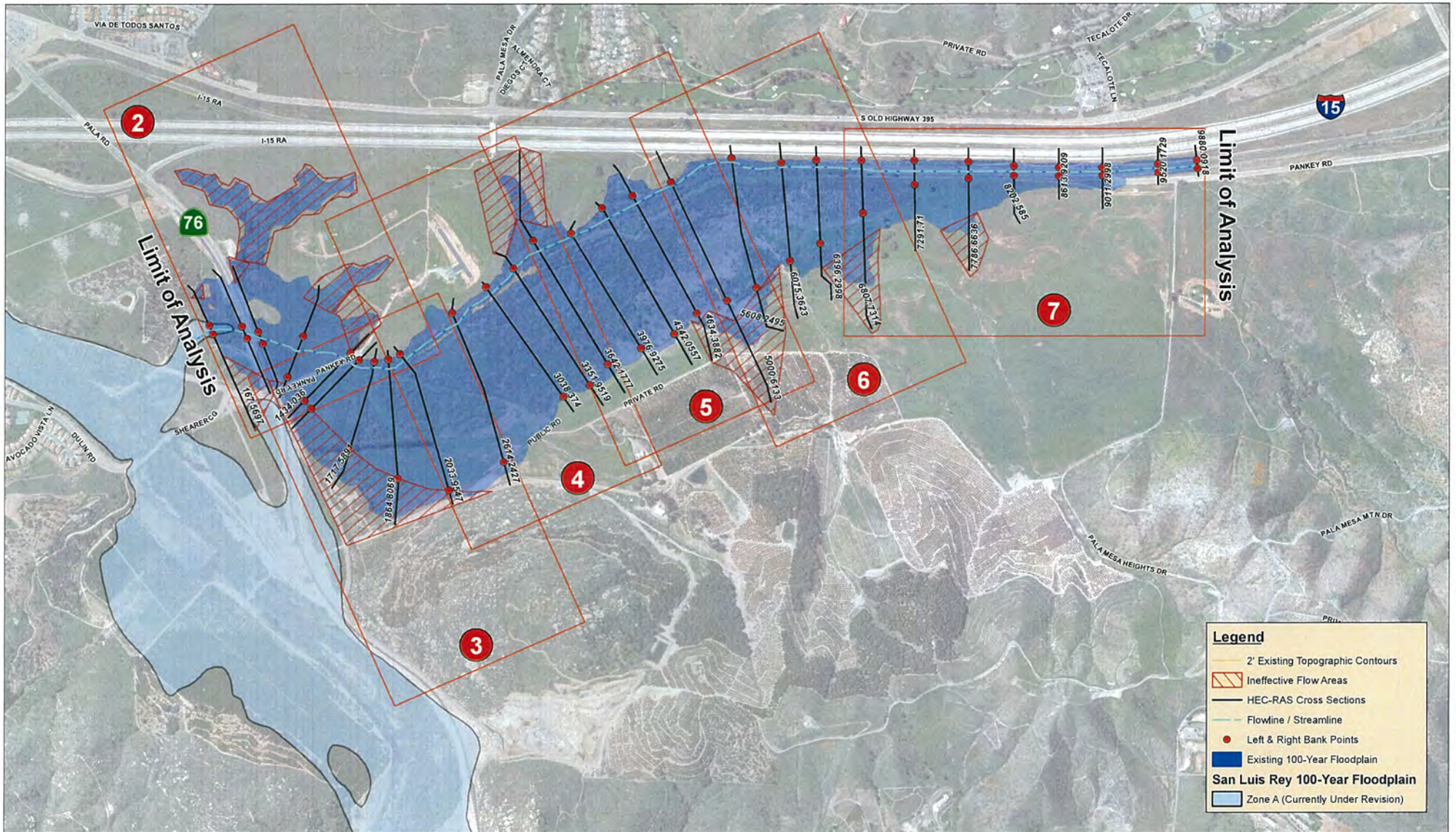
SUMMARY OF REACH LENGTHS

River: HRC

Reach	River Sta.	Left	Channel	Right
Main	9880.091	362.17	359.92	357.61
Main	9520.172	509.29	508.87	507.92
Main	9011.299	397.35	397.38	397.4
Main	8613.920	411.22	411.34	411.42
Main	8202.584	422.86	415.92	415.91
Main	7786.663	499.23	494.95	494.98
Main	7291.709	480.67	483.98	485.99
Main	6807.731	406.99	411.43	413.61
Main	6396.299	314.29	320.94	323.63
Main	6075.362	433.42	467.11	451.66
Main	5608.249	386.8	607.64	624.67
Main	5000.613	325.18	366.23	367.72
Main	4634.388	279.84	292.33	293.02
Main	4342.055	344.09	365.13	365.45
Main	3976.927	334.84	334.75	343.16
Main	3642.177	258.14	290.23	300.27
Main	3351.951	278.96	313.58	317.16
Main	3038.374	564.8	424.13	403.85
Main	2614.242	566.01	580.29	596.27
Main	2033.954	314.82	169.15	136.16
Main	1864.806	303.13	147.22	135.57
Main	1717.589	370.67	181.8	159.36
Main	1535.785	96.86	101.75	101.8
Main	1463.580	Bridge		
Main	1434.036	325.9	445.33	470.35
Main	988.7041	320.67	360.93	426.06
Main	627.7707	152.69	155.13	152.21
Main	561.3247	Bridge		
Main	472.6398	286.58	305.07	300.37
Main	167.5697	164.95	167.57	157.53

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 River: HRC

Reach	River Sta.	Contr.	Expan.
Main	9880.091	.1	.3
Main	9520.172	.1	.3
Main	9011.299	.1	.3
Main	8613.920	.1	.3
Main	8202.584	.1	.3
Main	7786.663	.1	.3
Main	7291.709	.1	.3
Main	6807.731	.1	.3
Main	6396.299	.1	.3
Main	6075.362	.1	.3
Main	5608.249	.1	.3
Main	5000.613	.1	.3
Main	4634.388	.1	.3
Main	4342.055	.1	.3
Main	3976.927	.1	.3
Main	3642.177	.1	.3
Main	3351.951	.1	.3
Main	3038.374	.1	.3
Main	2614.242	.1	.3
Main	2033.954	.1	.3
Main	1864.806	.1	.3
Main	1717.589	.1	.3
Main	1535.785	.1	.3
Main	1463.580 Bridge	.1	.3
Main	1434.036	.1	.3
Main	988.7041	.1	.3
Main	627.7707	.1	.3
Main	561.3247 Bridge	.1	.3
Main	472.6398	.1	.3
Main	167.5697	.1	.3



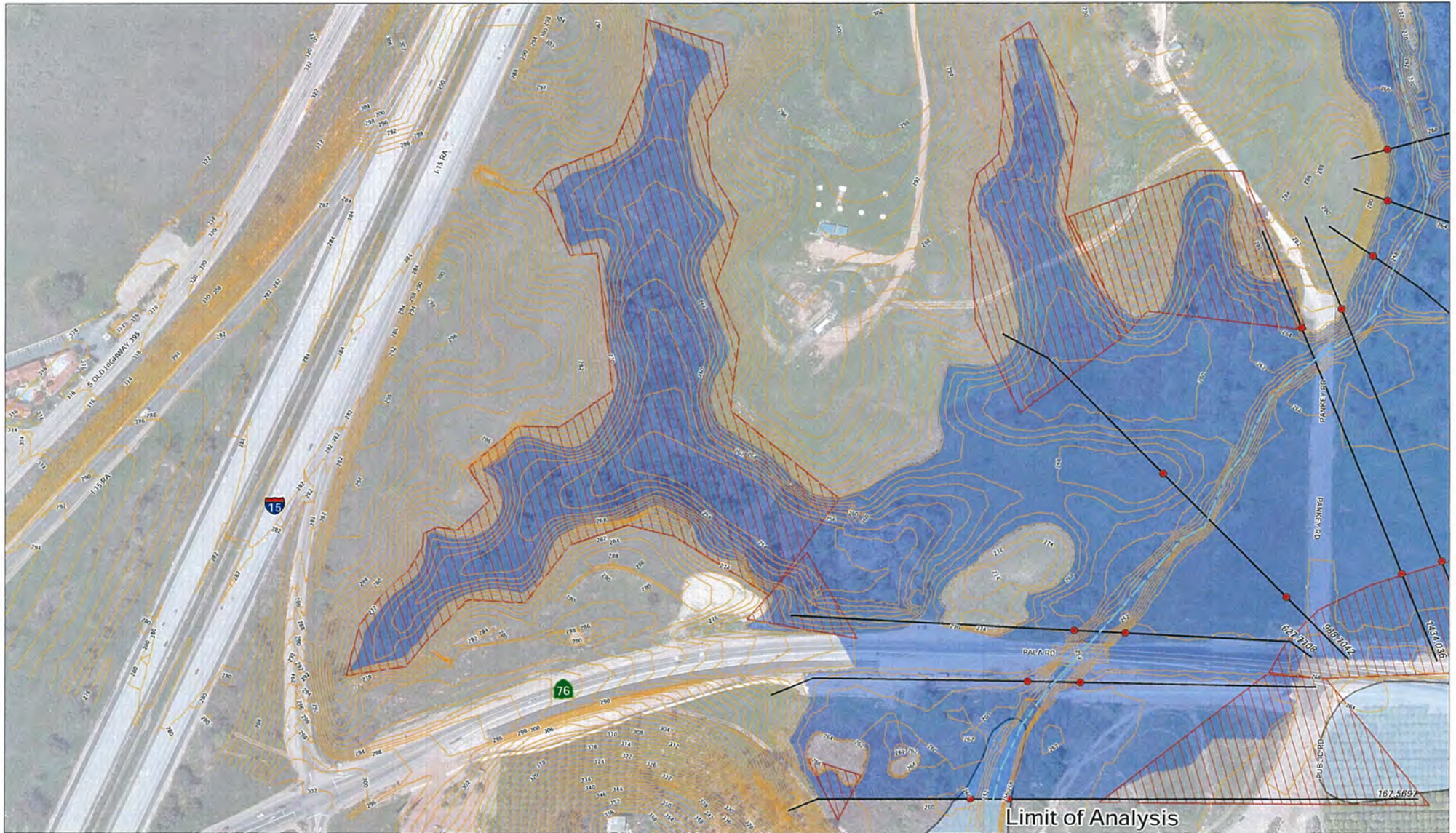
Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

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 Exhibit Date: 07/16/2009
 REC JN: 15956



Data Sources:
 FEMA-NHFL San Luis Rey 100-Year Floodplain
 SanGIS Roads - October 2008
 Eagle Aerial Photo: March 2009

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Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 2 of 7

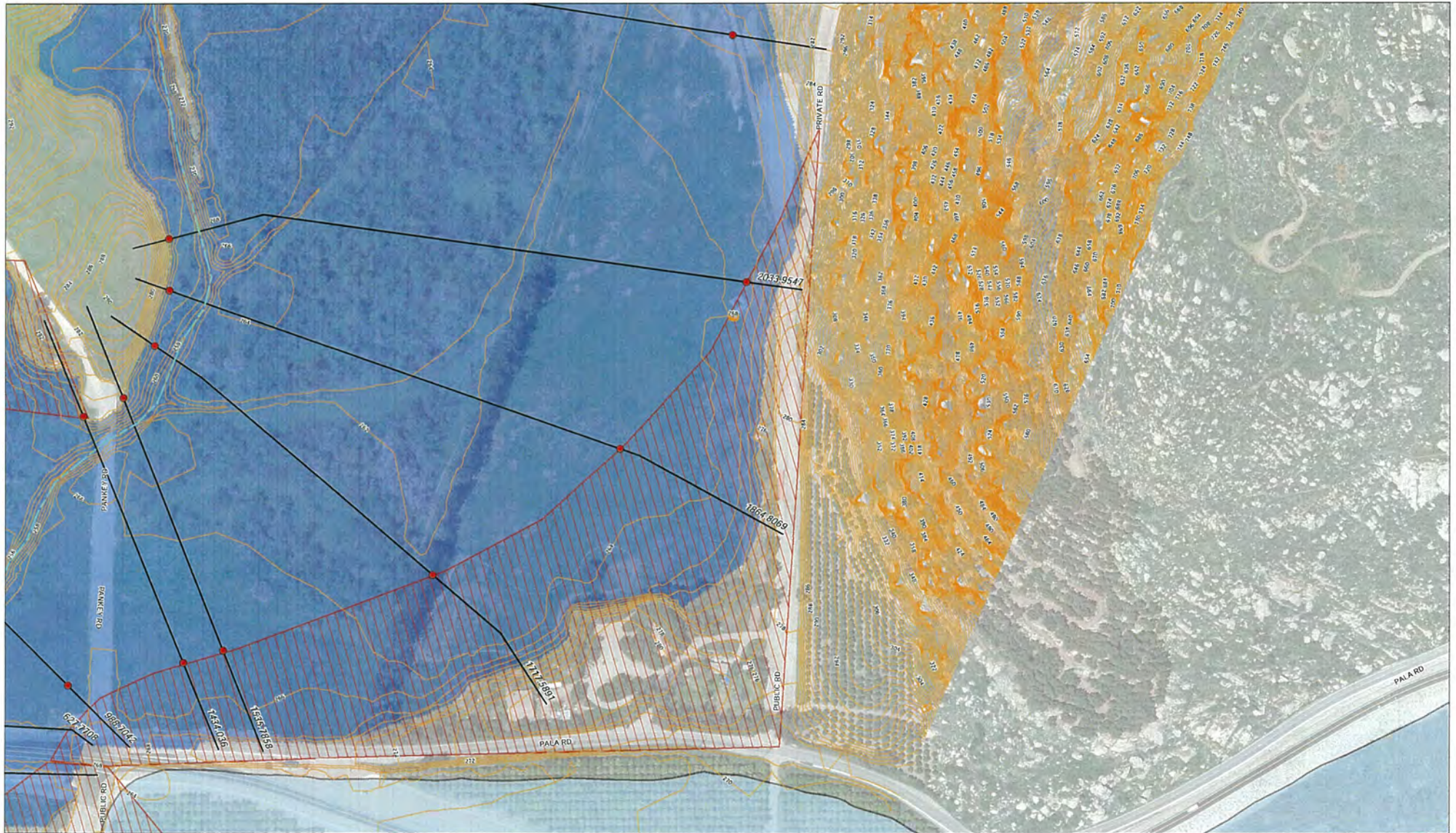
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 SanGIS Roads - October 2008
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Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 3 of 7

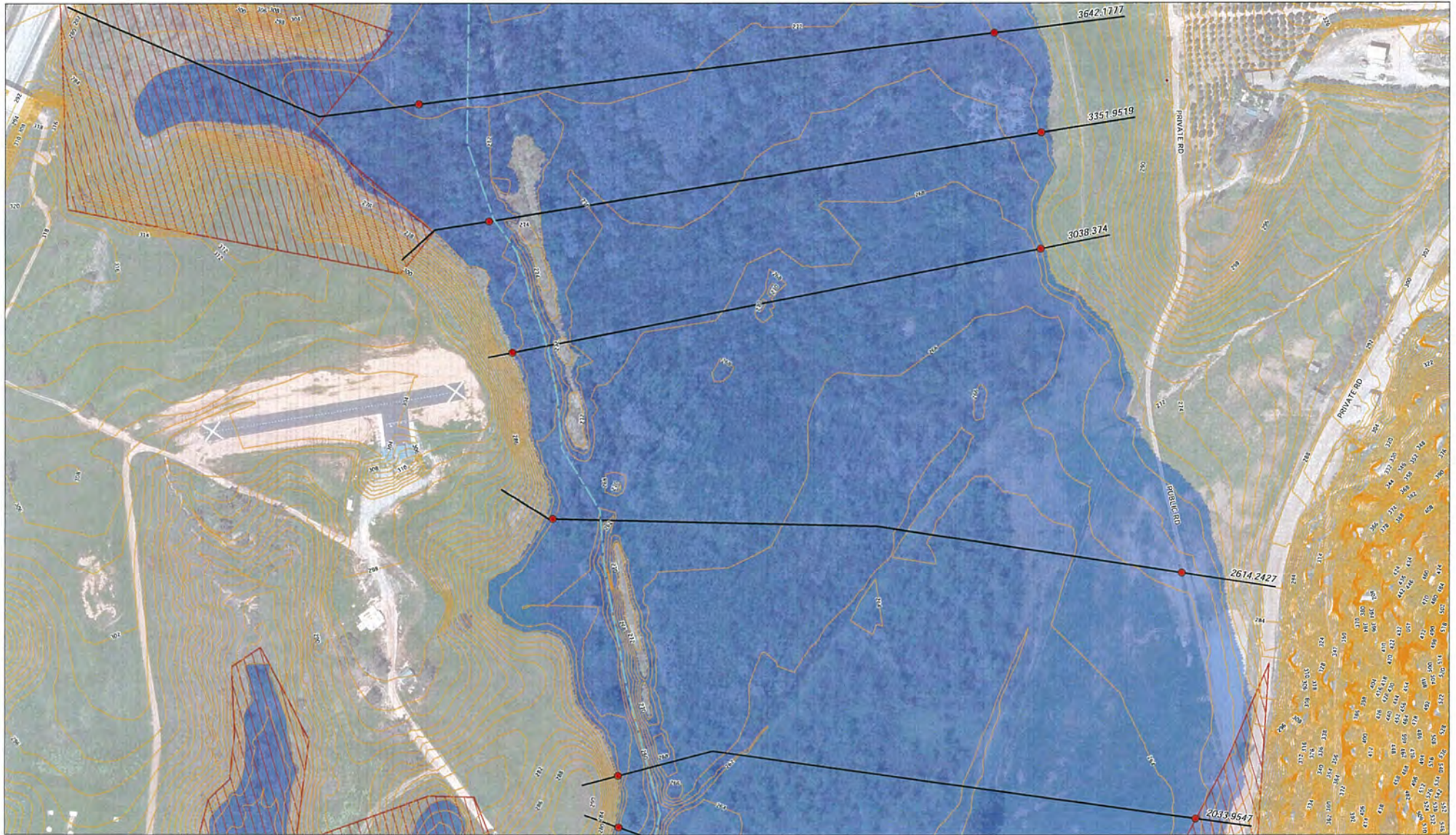
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Eagle Aerial Photo: March 2009

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Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 4 of 7

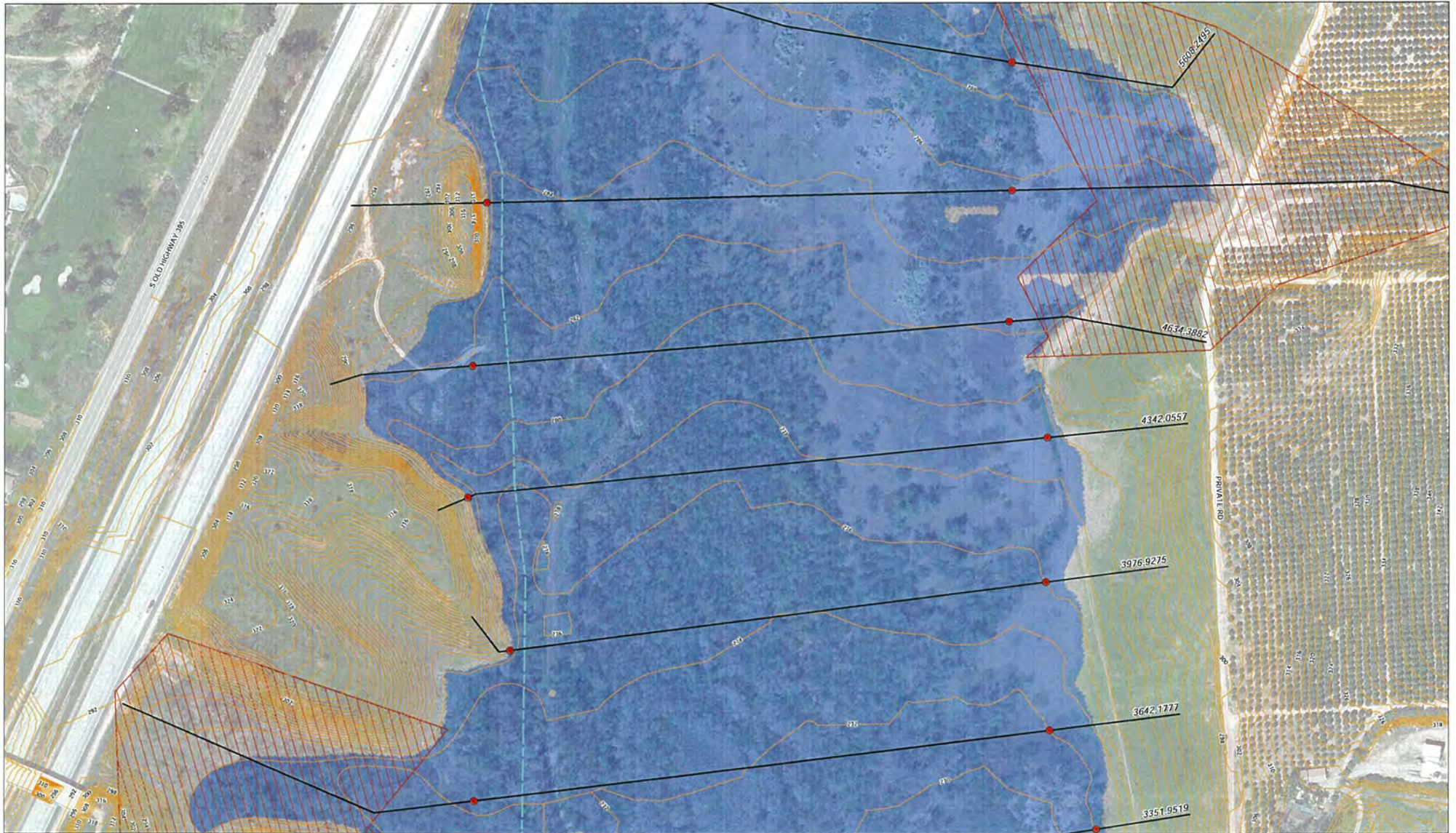
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Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 5 of 7

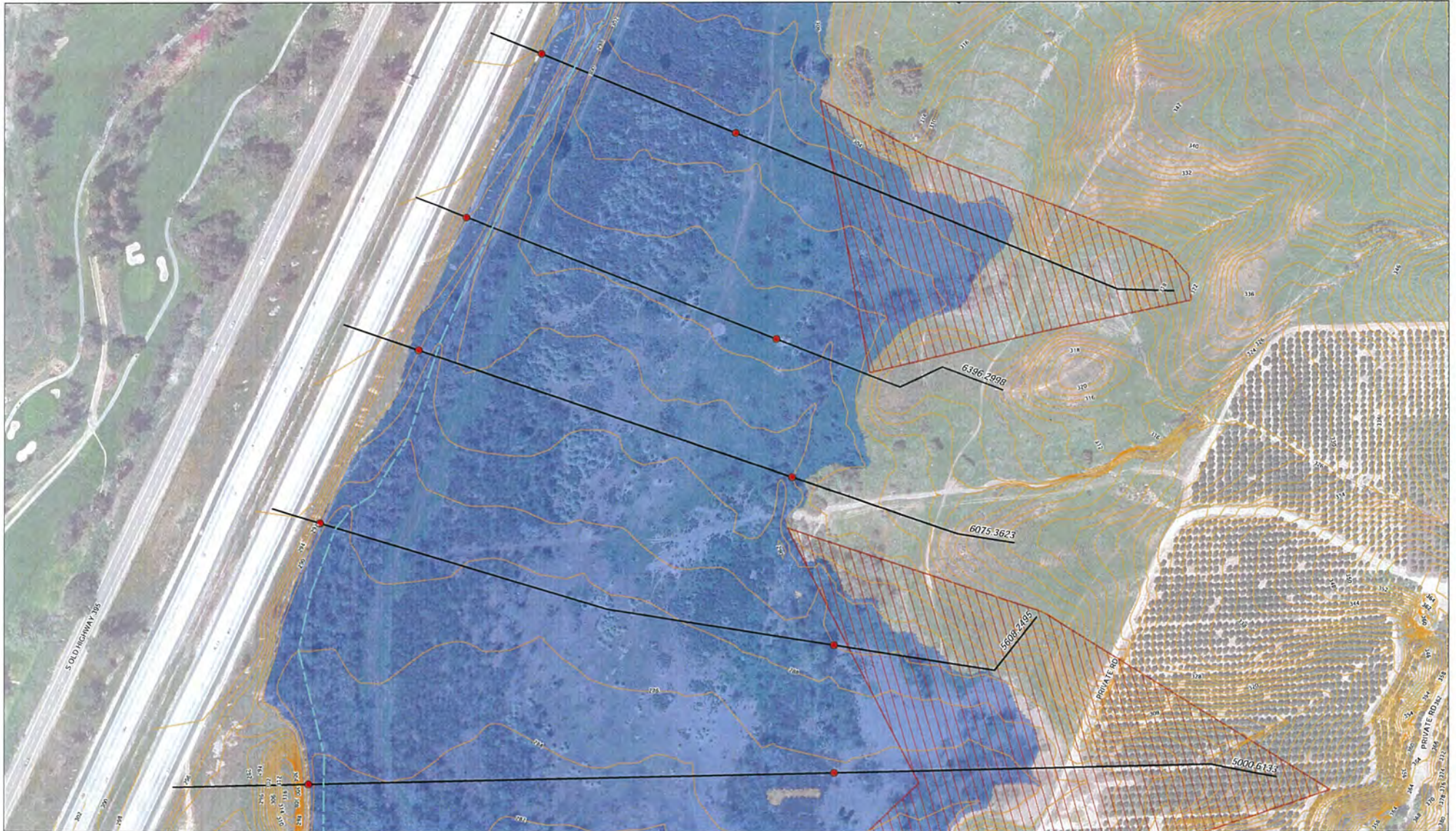
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Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 6 of 7

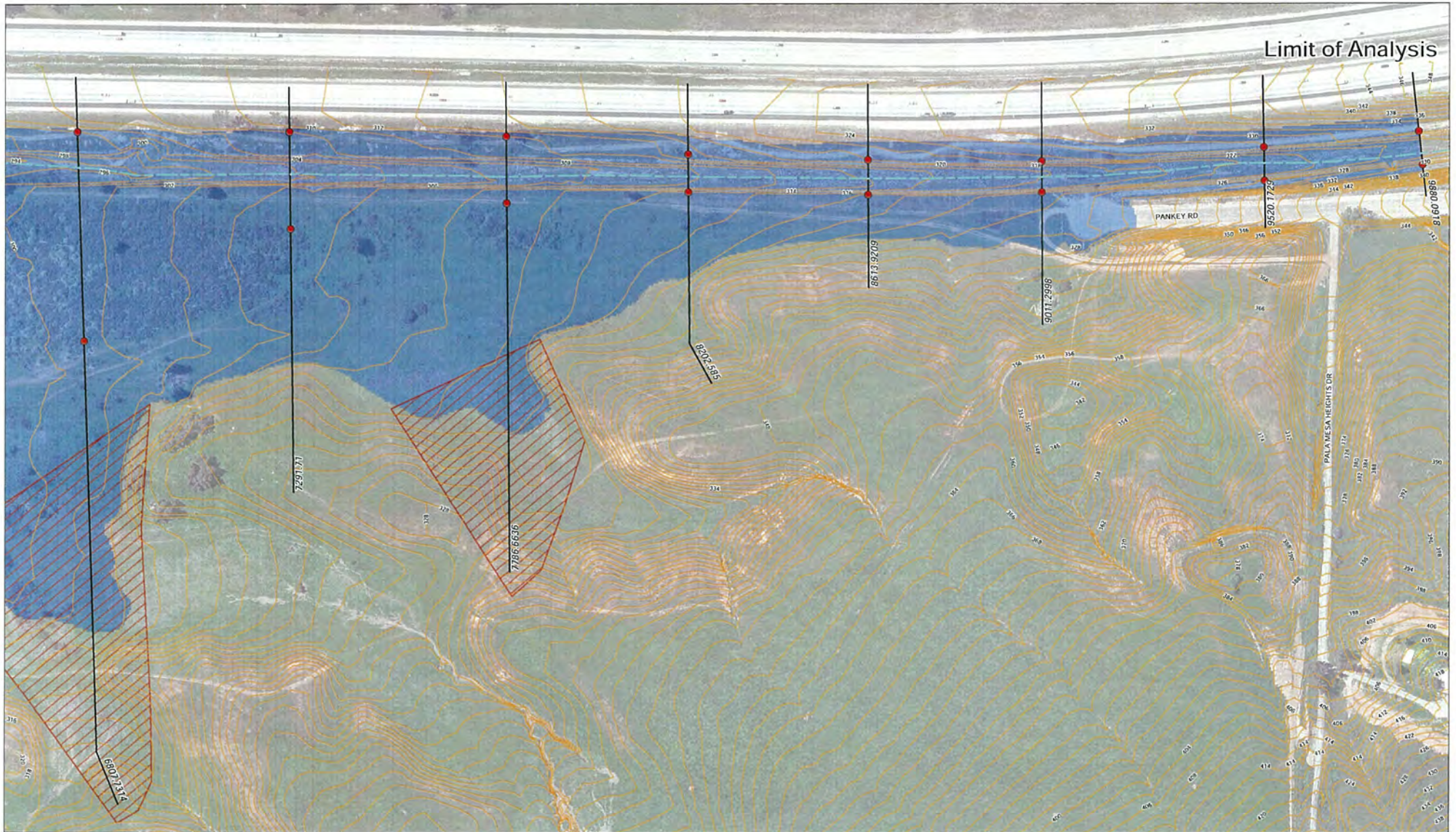
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Meadowood Vesting Tentative Map
Pre-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 7 of 7

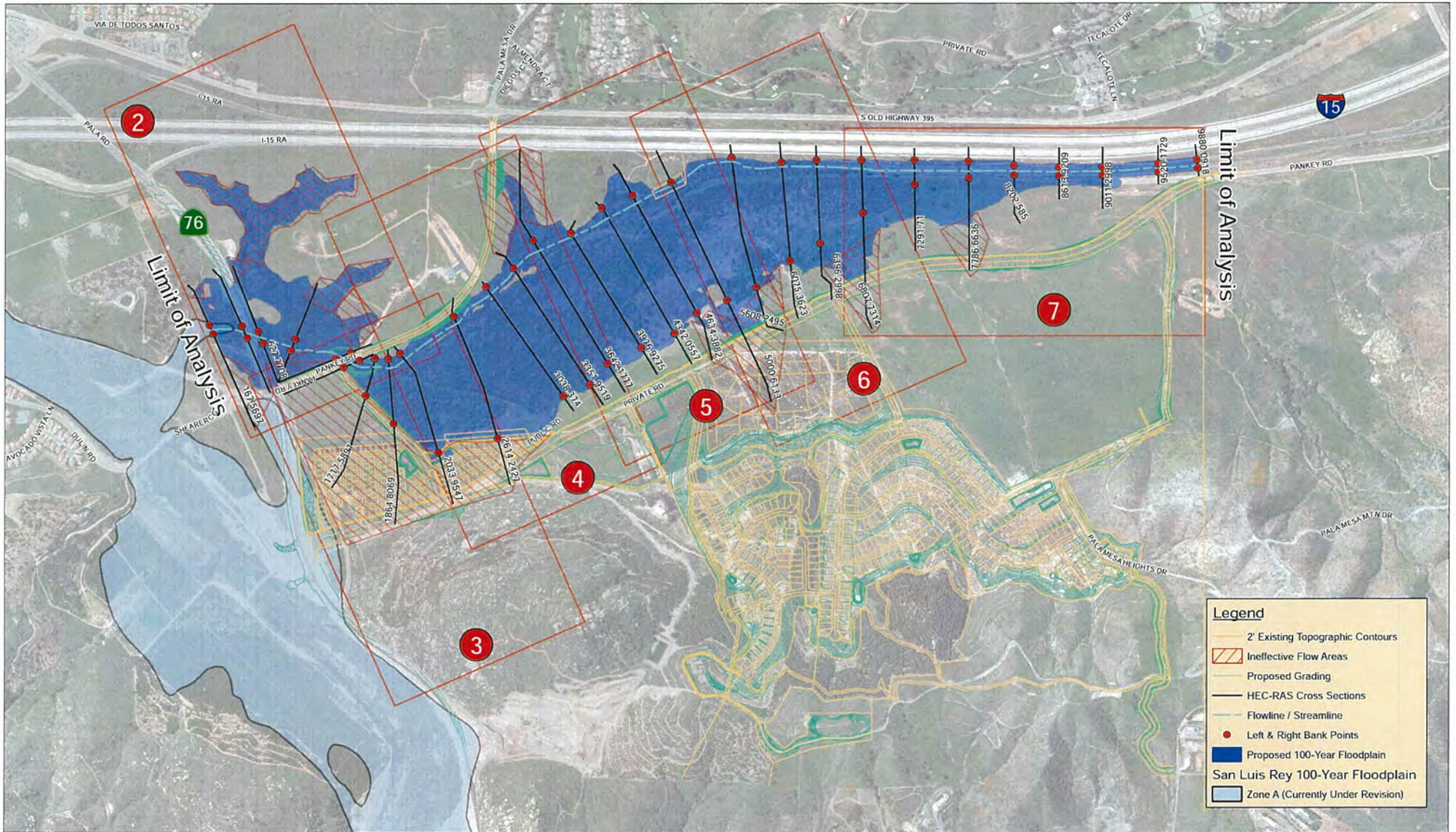
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Meadowood Vesting Tentative Map
Post-Project 100-Year Floodplain For Horse Ranch Creek



Meadowood Vesting Tentative Map
Post-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 2 of 7

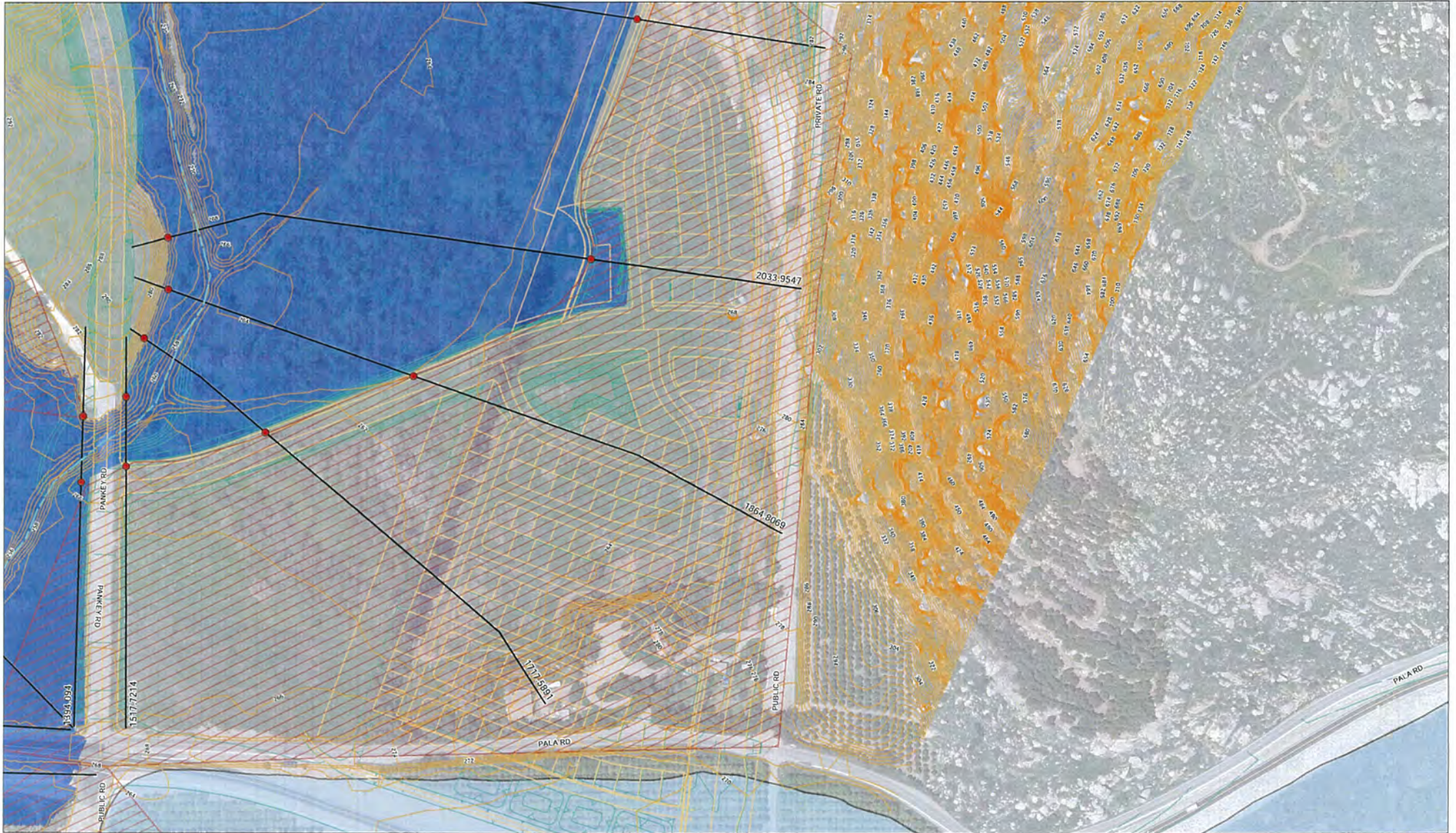
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Meadowood Vesting Tentative Map
Post-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 3 of 7

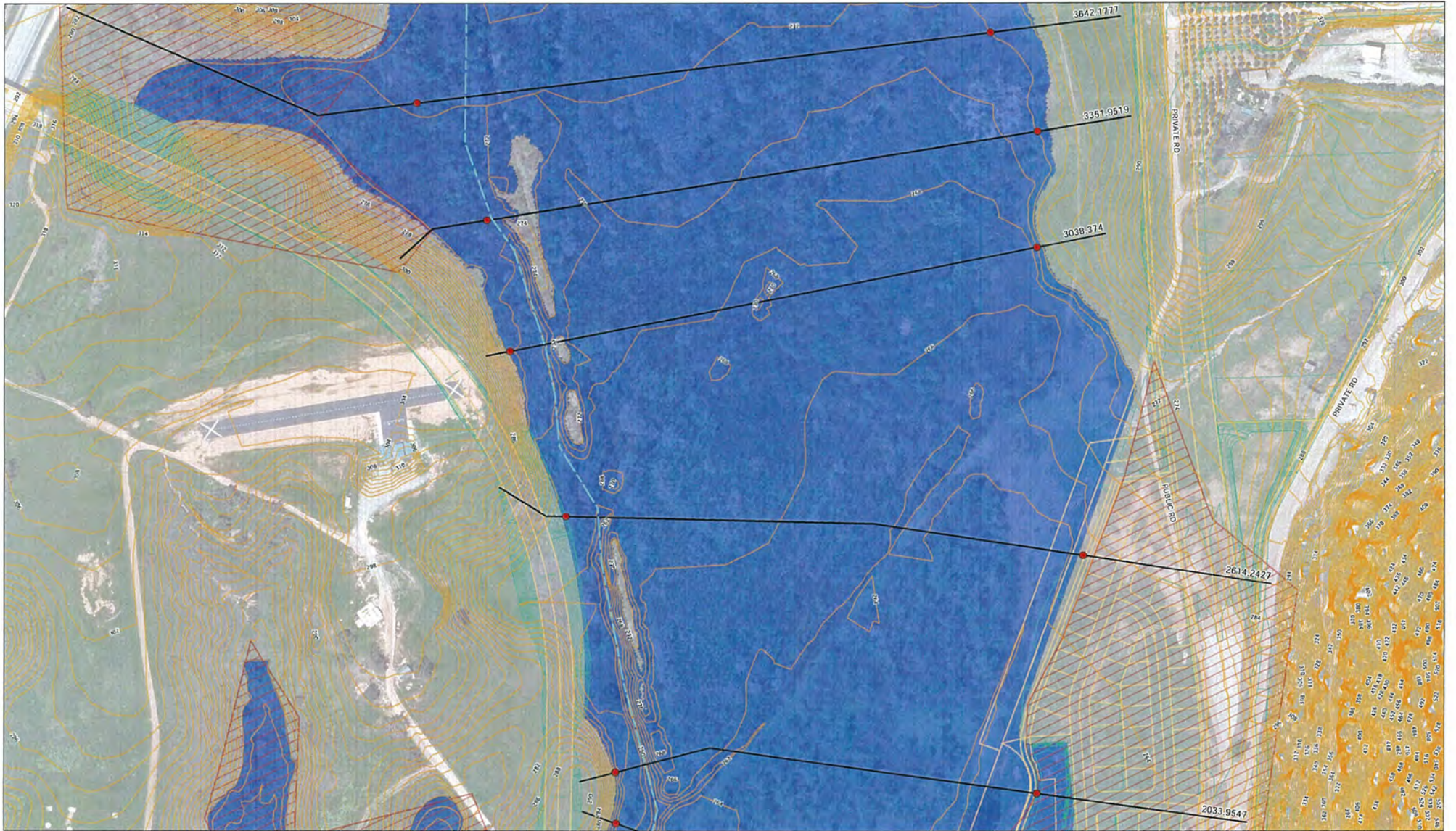
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Meadowood Vesting Tentative Map
Post-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 4 of 7

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Meadowood Vesting Tentative Map
Post-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 5 of 7

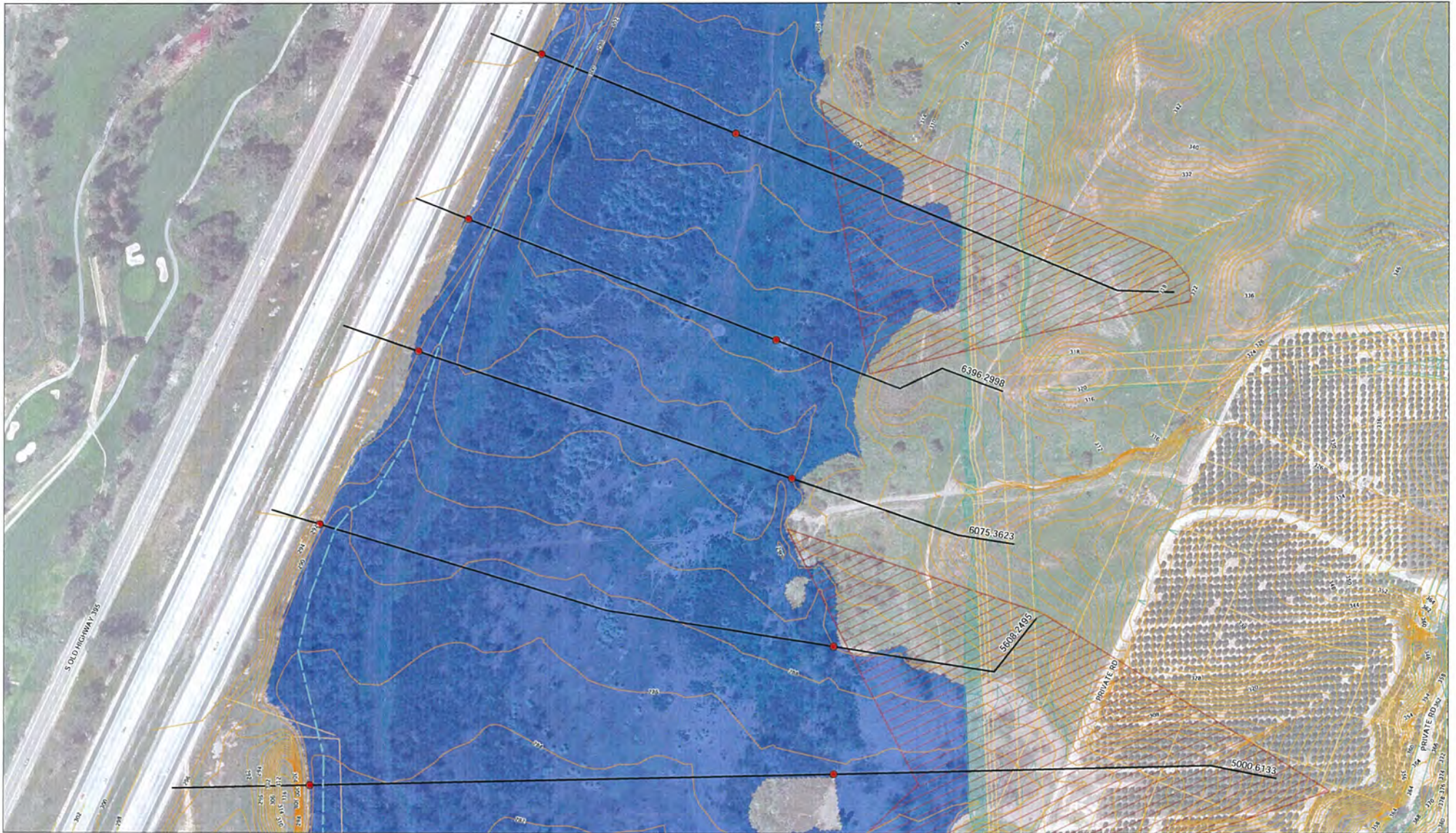
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Meadowood Vesting Tentative Map
Post-Project 100-Year Floodplain For Horse Ranch Creek

Sheet 6 of 7

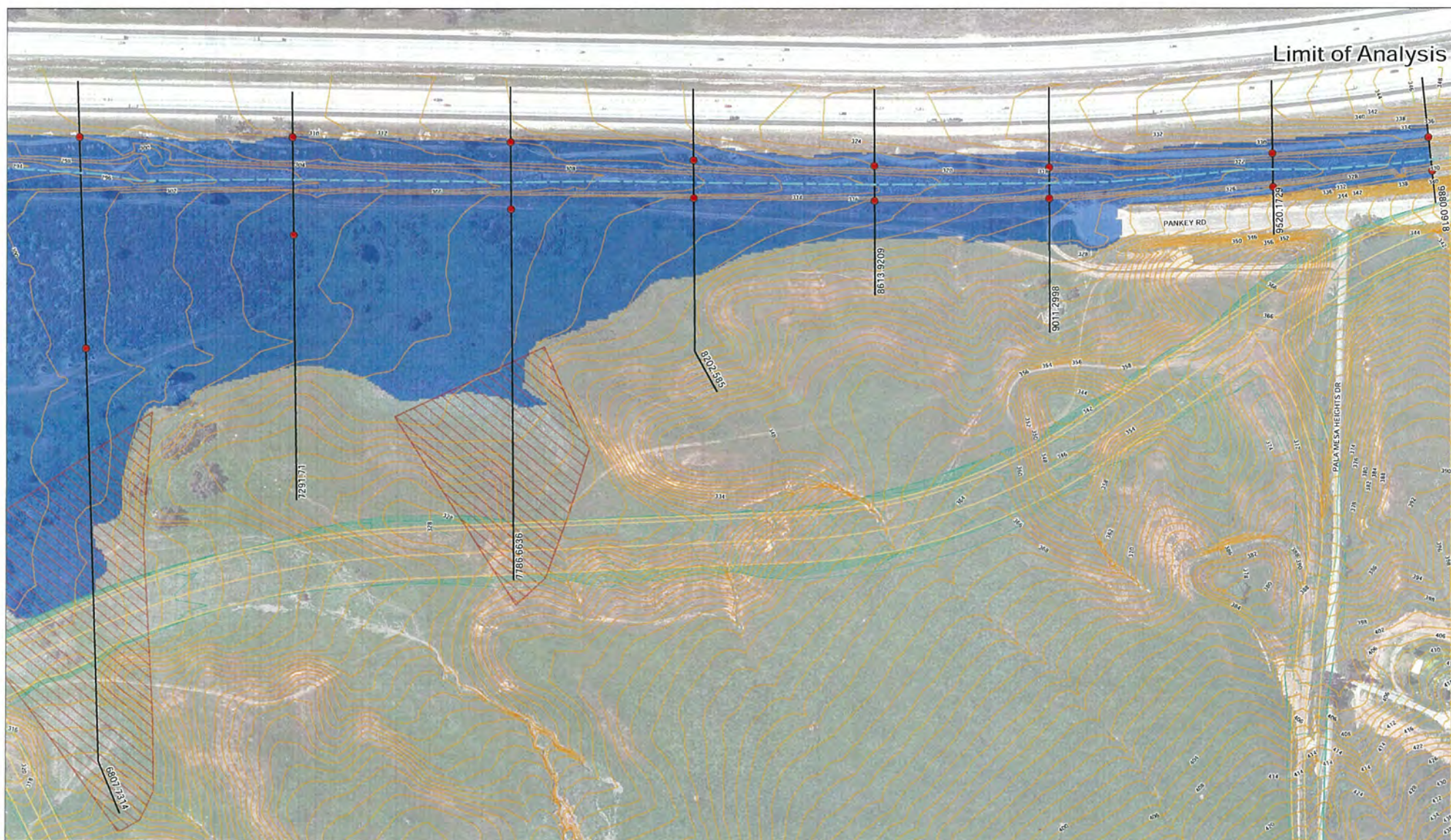
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Post-Project 100-Year Floodplain For Horse Ranch Creek

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