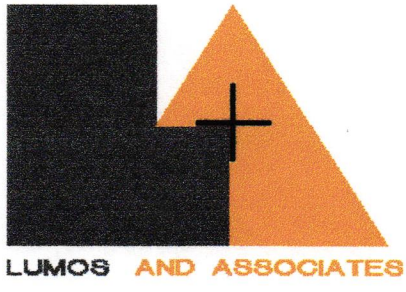
ADDENDUM TO
DRAINAGE ANALYSIS
of
ROSEWOOD WASH
RENO, NEVADA

Prepared for:

CITY OF RENO

Prepared by:



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Job Number: 4616

June 24, 1999

ROSEWOOD WASH – ADDENDUM TO MAY 27, 1999 REPORT June 24, 1999

The City of Reno has requested that we refine our May 27, 1999 Rosewood Wash study between the Plumb Lane # 1 crossing and the Plumb Lane # 2 crossing to determine what the ramifications of upgrading the existing culvert upstream of the proposed Ribeiro – Plumas Quail Park Development would have on existing property owners along Plumas Street north of Rosewood Wash and adjacent to Rosewood Wash between Plumas Street and Plumb Lane # 2 crossing.

From the May 27, 1999 report the capacity of the existing Rosewood Wash facilities are:

- 205 cfs at Plumb # 1 crossing controlled by entrance control on the existing 68-inch x 43-inch and 48-inch RCP's.
- 330 cfs at the 10-foot x 3.4-foot RCB controlled by entrance control at elevation of 4506.5 upstream bank elevation. Water surfaces higher than 4506.5 will cause overbank flooding to the north of Rosewood Wash.
- 250 cfs at Section No. 72 in the channel between Plumas Street and Plumb Lane. This capacity is obtained by assuming mixed flow in the study region, that is allowing either subcritical or supercritical flow to occur.

Flow above the 205 cfs capacity of the culverts at Plumb Lane # 1, (640 cfs in a 100-year storm), overflows Plumb Lane at the low point in the street. Sheet flow occurs through the existing homes to Games Lane. Elevation at the end of Games Lane is 4509. $\pm$. Existing ground elevation to the north of Games Lane along the west side of the Plumas Quail Project is 4510.8 $\pm$ at the building corner approximately 80 feet north of the street. Elevation of the north bank of the existing channel at the outlet of the 48-inch and 54-inch pipes is 4512. $\pm$. Residents have reported seeing 3-feet of standing water at the end of Games Lane.

Without better topography to the north and east it is not possible to accurately calculate an existing flow pattern, but it does appear possible that some of the flow from Games Lane could re-enter the channel at this point during periods of high runoff. If we assume a 75% split to the north and 25% re-entering the channel the flow downstream from the pipes would be 25%*640 + 205 = 365cfs. This is higher than the capacity of the Plumas Street crossing. Approximately 35 cfs would overflow the north bank and continue north through the existing homes on the west side of Plumas Street until it reaches the street or its overbank area.

Total overland flow to the north of Games Lane would be 840 cfs – 365 cfs or 475 cfs. This overland flow continues northeasterly through existing development until it reaches Plumas Street and its overbank area. The 35 cfs from the Rosewood Wash overflow west of Plumas would add to this 475 cfs for a total flow of 510 cfs in Plumas Street and its overbank area.

The channel below Plumas Street would have a flow of 330 cfs based on the above analysis, which is greater than the 250 cfs capacity as stated in our May 27, 1999 report. Backwater from the 10-foot x 3-foot RCB at the Plumb Lane # 2 crossing, with a capacity of 150 cfs, causes overbank flooding for approximately 300 feet upstream of the culvert. The channel was analyzed for flows of 250, 330, 420, and 840 cfs using a mixed flow analysis which allows both supercritical and subcritical flow to occur. Copies of the analysis, cross sections, and profiles for these flows are included at the end of this addendum.

Only two sections have minor overtopping on the southerly side, sections 70 and 72 using a flow of 330 cfs. Minor channel modifications in a 150-foot reach would eliminate the overtopping.

Overtopping with a flow of 420 cfs occurs in two 200-foot reaches of the channel. The channel could be improved within these reaches to accommodate the 420 cfs.

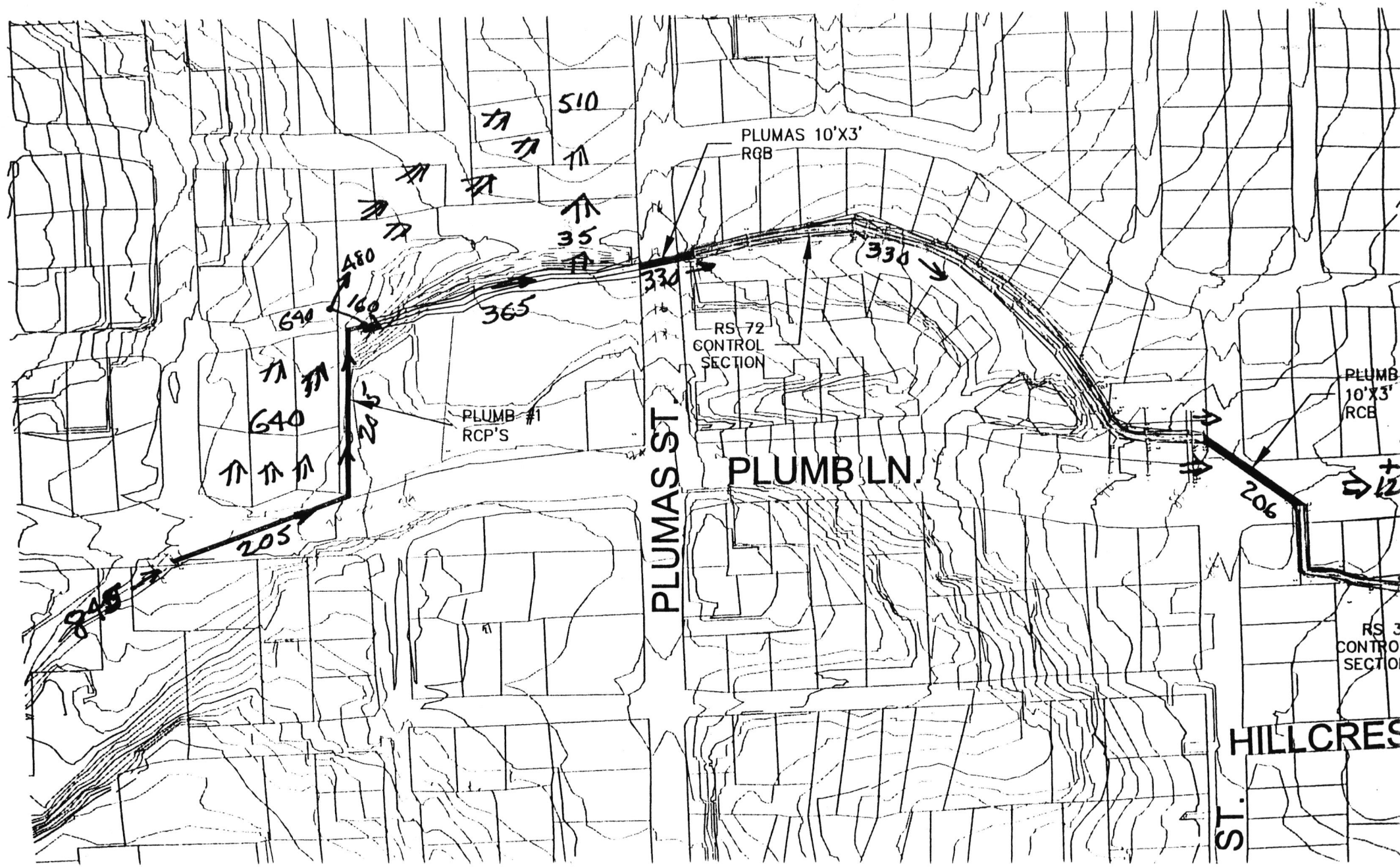
From our May 27, 1999 report the capacity of Plumb # 2 RCB is 150 cfs with no overtopping. Table 1 is the culvert and overtopping for the calculated flows in this addendum.

Table 1

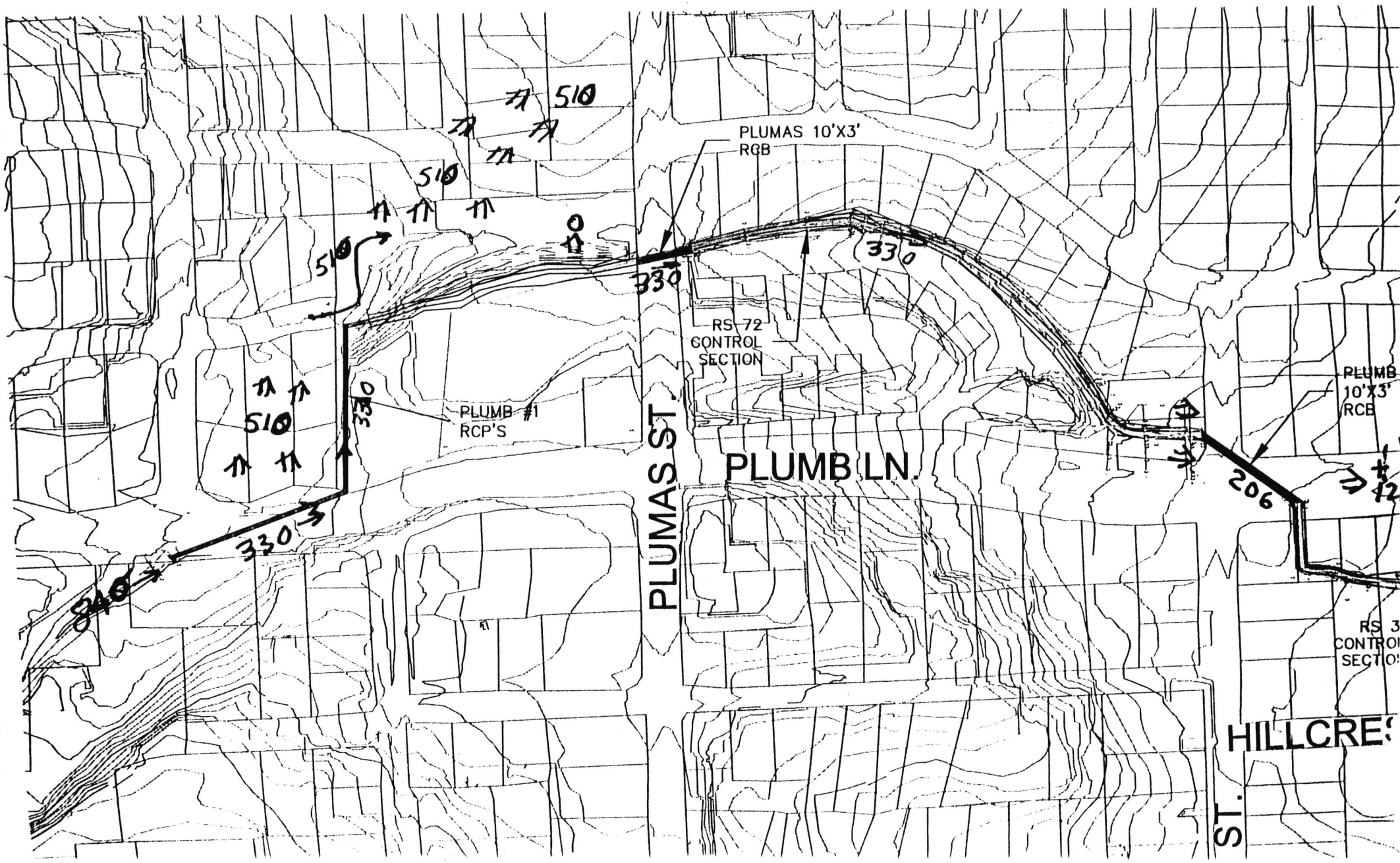
W.S. Elev (ft)	Total Flow (cfs)	Culvert (cfs)	Overtopping (cfs)
4484.58	250	192	58
4489.93	330	206	124
4485.21	420	222	198
4486.17	840	244	596

Based on previously stated assumptions the flow in Rosewood Creek upstream of Plumb lane # 2 is 330 cfs. 206 cfs flows through the culvert continuing downstream and 124 cfs overtops the channel and combines with other surface flow and continues easterly down Plumb Lane and its overbank area. Increasing the upstream flow to 420 cfs would raise the culvert flow to 222 cfs and the overtopping flow to 198 cfs, an increase of 16 cfs and 74 cfs respectively. The 16 cfs increase in the facility downstream is minor. However, the 74 cfs is a 60% increase to the flow added to the existing surface flow on Plumb lane. The effect this has on Plumb Lane easterly of crossing # 2 is beyond the scope of this addendum.

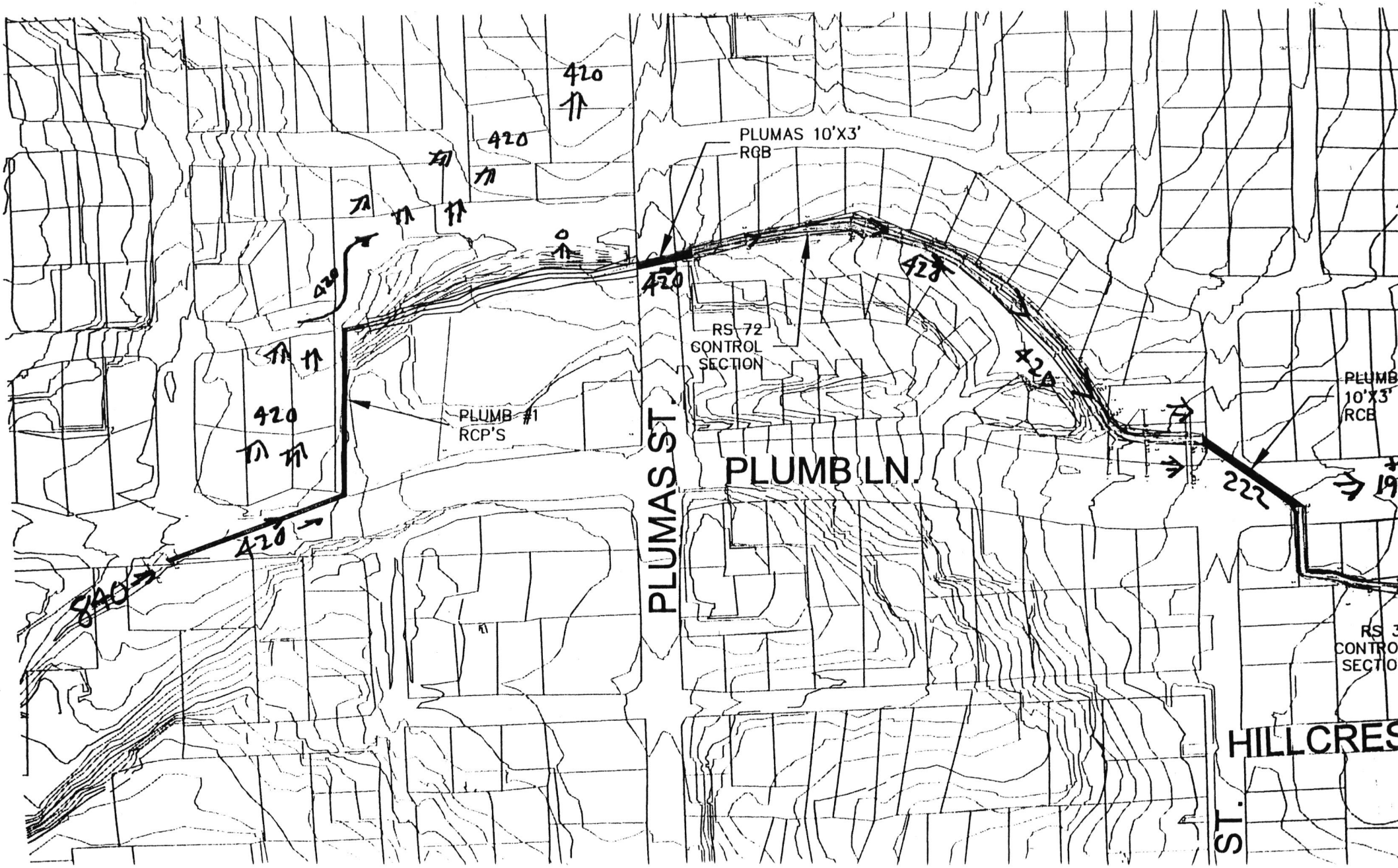
EXISTING

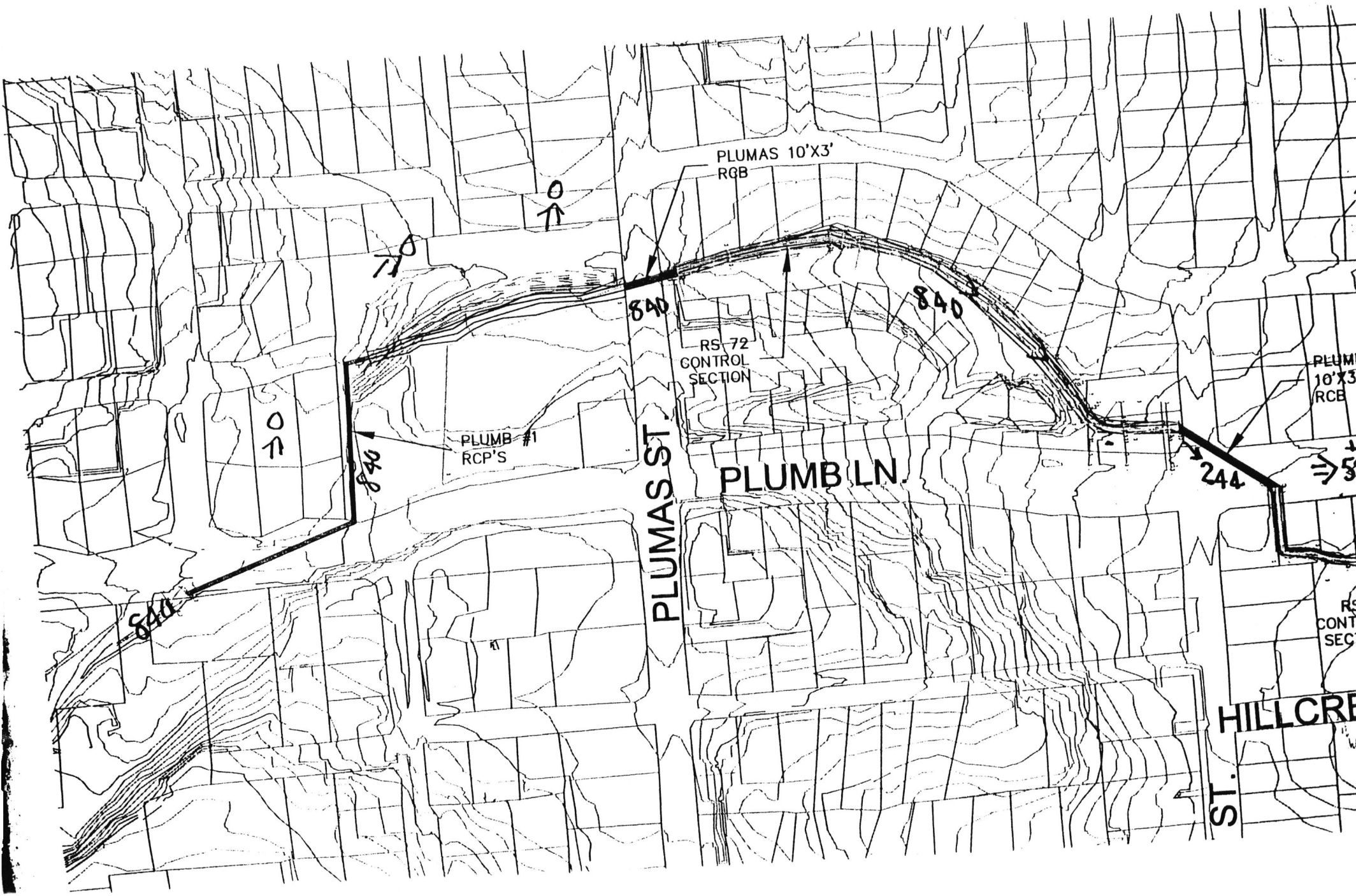

510
35
480
160
640
365
330
330
PLUMAS 10'X3'
RCB
RS 72
CONTROL
SECTION
640
PLUMB #1
RCP'S
205
PLUMAS ST.
PLUMB LN.
206
PLUMB
10'X3'
RCB
HILLCRES
ST.

Proposed 330

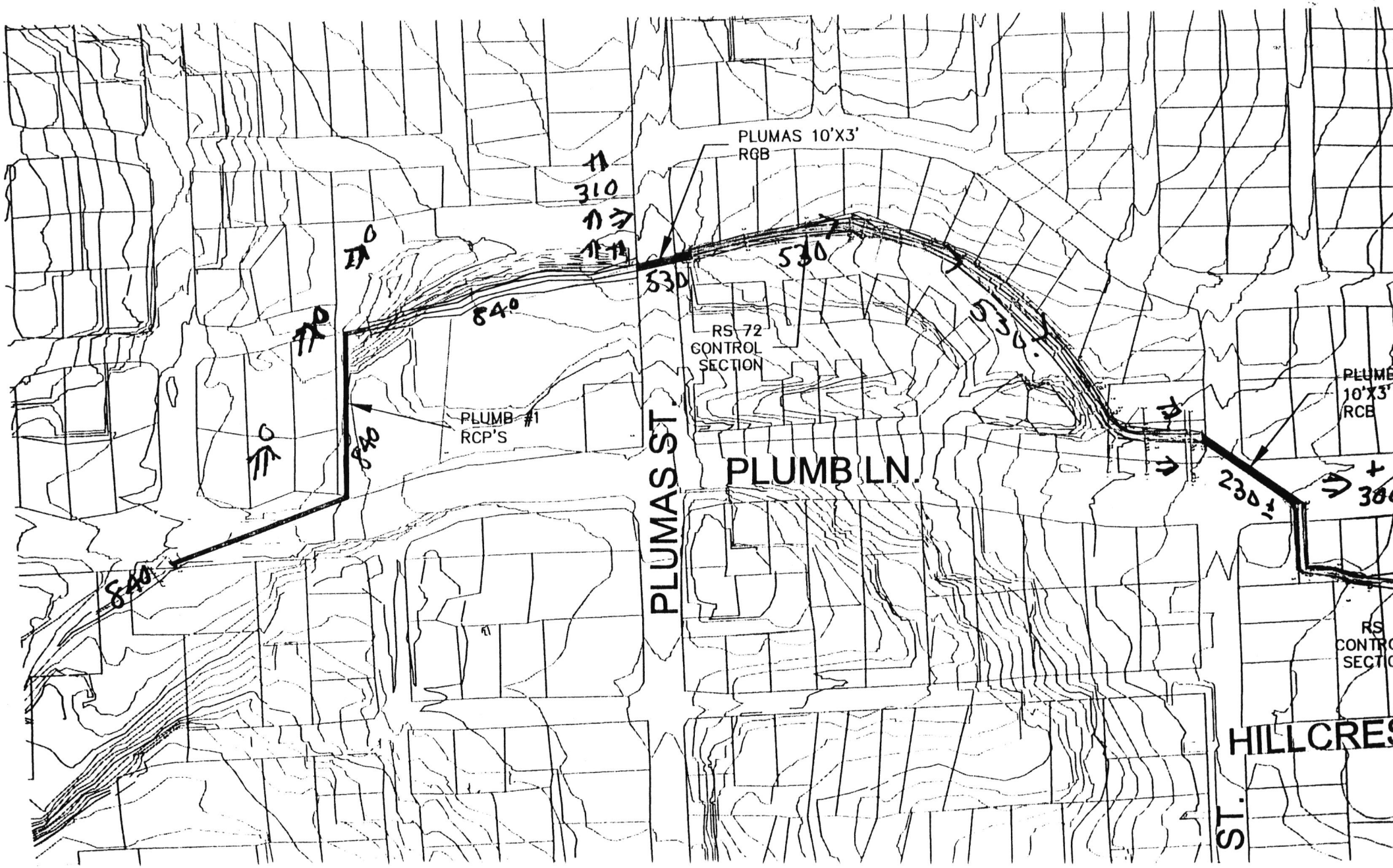


Proposed 420




PLUMAS 10'X3'
RCB
840
840
RS-72
CONTROL
SECTION
PLUMB #1
RCP'S
840
PLUMAS ST.
PLUMB LN.
244
840
HILLCRE
ST.

Ribeiro
+100YR UPSTREAM



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

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	74	250.00	4499.18	4502.08	4502.22	4503.19	0.020024	8.45	29.58	16.45	1.11
Reach-1	74	330.00	4499.18	4502.47	4502.66	4503.75	0.020031	9.06	36.44	18.25	1.13
Reach-1	74	420.00	4499.18	4502.85	4503.08	4504.29	0.020032	9.61	43.69	19.99	1.15
Reach-1	74	840.00	4499.18	4504.14	4504.54	4506.19	0.020000	11.51	72.97	25.01	1.19
Reach-1	73	250.00	4497.37	4500.26	4500.44	4501.43	0.021112	8.70	28.73	15.78	1.14
Reach-1	73	330.00	4497.37	4500.66	4500.90	4502.01	0.020855	9.32	35.40	17.33	1.15
Reach-1	73	420.00	4497.37	4501.08	4501.39	4502.55	0.021122	9.70	43.28	20.24	1.17
Reach-1	73	840.00	4497.37	4502.27	4502.77	4504.33	0.024264	11.52	72.91	29.68	1.30
Reach-1	72	250.00	4495.74	4498.37	4498.51	4499.22	0.023883	7.37	33.94	27.51	1.17
Reach-1	72	330.00	4495.74	4498.52	4498.80	4499.69	0.029538	8.70	37.92	27.92	1.32
Reach-1	72	420.00	4495.74	4498.70	4499.08	4500.17	0.032197	9.73	43.16	28.51	1.39
Reach-1	72	840.00	4495.74	4501.26	4500.20	4501.95	0.005434	6.64	126.45	36.53	0.63
Reach-1	71	250.00	4494.21	4496.88	4496.93	4497.83	0.017459	7.84	31.90	18.17	1.04
Reach-1	71	330.00	4494.21	4497.23	4497.39	4498.37	0.018289	8.57	38.50	19.82	1.08
Reach-1	71	420.00	4494.21	4498.17	4497.77	4498.91	0.009141	6.89	60.95	25.56	0.79
Reach-1	71	840.00	4494.21	4501.13		4501.63	0.002895	5.67	148.26	31.90	0.46
Reach-1	70	250.00	4492.82	4496.73	4495.46	4496.98	0.003029	3.94	63.40	27.47	0.46
Reach-1	70	330.00	4492.82	4497.65	4495.85	4497.85	0.002176	3.61	91.36	34.40	0.39
Reach-1	70	420.00	4492.82	4498.47		4498.67	0.001511	3.50	119.88	34.40	0.33
Reach-1	70	840.00	4492.82	4501.28		4501.51	0.001013	3.88	216.23	34.40	0.27
Reach-1	69	250.00	4491.46	4495.22	4495.22	4496.76	0.005005	9.94	25.15	8.28	1.00
Reach-1	69	330.00	4491.46	4496.00	4496.00	4497.63	0.004727	10.27	32.15	9.84	1.00
Reach-1	69	420.00	4491.46	4496.68	4496.68	4498.45	0.004588	10.69	39.30	11.19	1.00
Reach-1	69	840.00	4491.46	4498.85	4498.85	4501.25	0.004302	12.44	67.54	13.80	0.99
Reach-1	68	250.00	4490.95	4493.76	4494.79	4496.43	0.009770	13.10	19.08	6.87	1.39
Reach-1	68	330.00	4490.95	4494.43	4495.48	4497.28	0.010502	13.54	24.37	9.52	1.49
Reach-1	68	420.00	4490.95	4494.90	4496.02	4498.07	0.011835	14.29	29.39	12.16	1.62
Reach-1	68	840.00	4490.95	4496.11	4497.50	4500.75	0.015335	17.30	48.54	19.35	1.93
Reach-1	66	250.00	4490.17	4492.75	4493.85	4495.87	0.012187	14.18	17.63	6.94	1.57
Reach-1	66	330.00	4490.17	4493.44	4494.59	4496.75	0.011522	14.60	22.60	7.96	1.53
Reach-1	66	420.00	4490.17	4494.06	4495.12	4497.52	0.011289	14.92	28.15	9.90	1.56
Reach-1	66	840.00	4490.17	4496.51	4497.12	4499.96	0.006780	14.89	56.40	11.88	1.20

MIXED FLOW

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	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
Reach-1	65	250.00	4489.18	4491.59	4492.81	4495.12	0.014367	15.06	16.60	6.98	1.72
Reach-1	65	330.00	4489.18	4492.22	4493.56	4496.06	0.013345	15.72	20.99	7.26	1.63
Reach-1	65	420.00	4489.18	4492.87	4494.25	4496.83	0.012884	15.97	26.30	9.01	1.65
Reach-1	65	840.00	4489.18	4494.79	4496.30	4499.38	0.011171	17.19	48.88	14.55	1.65
Reach-1	63	250.00	4488.23	4489.86	4490.87	4493.35	0.072035	14.99	16.67	11.85	2.23
Reach-1	63	330.00	4488.23	4490.14	4491.47	4494.34	0.071801	16.44	20.07	12.06	2.25
Reach-1	63	420.00	4488.23	4490.46	4491.95	4495.23	0.068600	17.52	23.97	12.29	2.21
Reach-1	63	840.00	4488.23	4491.79	4493.63	4497.81	0.063614	19.70	42.64	16.85	2.18
Reach-1	62	250.00	4488.21	4490.67	4490.94	4491.93	0.018882	9.01	27.75	16.42	1.22
Reach-1	62	330.00	4488.21	4491.36	4491.37	4492.40	0.012906	8.21	40.22	19.89	1.02
Reach-1	62	420.00	4488.21	4491.44	4491.79	4493.01	0.019057	10.06	41.75	20.30	1.24
Reach-1	62	840.00	4488.21	4492.27	4493.17	4495.26	0.029969	13.87	60.56	24.74	1.56
Reach-1	60	250.00	4486.68	4489.17	4489.37	4490.28	0.022431	8.43	29.65	18.48	1.17
Reach-1	60	330.00	4486.68	4489.58	4489.75	4490.78	0.020381	8.76	37.68	20.60	1.14
Reach-1	60	420.00	4486.68	4490.02	4490.13	4491.26	0.017656	8.95	46.94	21.92	1.08
Reach-1	60	840.00	4486.68	4491.22	4491.52	4493.15	0.018806	11.15	75.32	25.43	1.14
Reach-1	59	250.00	4485.10	4487.95	4488.01	4488.94	0.017631	7.99	31.29	17.30	1.05
Reach-1	59	330.00	4485.10	4488.38	4488.53	4489.48	0.016685	8.42	39.20	19.17	1.04
Reach-1	59	420.00	4485.10	4489.06	4489.08	4489.89	0.017542	7.33	57.31	36.00	1.02
Reach-1	59	840.00	4485.10	4489.56	4490.04	4491.45	0.030787	11.04	76.12	38.79	1.39
Reach-1	58	250.00	4484.28	4487.18	4487.26	4488.23	0.021108	8.24	30.35	16.23	1.06
Reach-1	58	330.00	4484.28	4487.61	4487.73	4488.79	0.020955	8.73	37.81	18.48	1.08
Reach-1	58	420.00	4484.28	4488.30	4488.36	4489.18	0.021384	7.49	56.08	36.25	1.06
Reach-1	58	840.00	4484.28	4489.70	4489.33	4490.63	0.010905	7.72	108.87	39.23	0.82
Reach-1	57	250.00	4484.06	4486.28	4486.58	4487.64	0.029459	9.37	26.67	15.52	1.26
Reach-1	57	330.00	4484.06	4486.69	4487.01	4488.21	0.027399	9.90	33.34	16.81	1.24
Reach-1	57	420.00	4484.06	4487.41	4487.44	4488.69	0.017852	9.09	46.19	18.97	1.03
Reach-1	57	840.00	4484.06	4489.14	4489.14	4490.29	0.017552	8.60	97.66	43.21	1.01
Reach-1	55	250.00	4482.77	4485.13	4485.56	4486.77	0.035878	10.28	24.32	13.92	1.37
Reach-1	55	330.00	4482.77	4485.54	4486.54	4487.39	0.033646	10.91	30.25	14.92	1.35
Reach-1	55	420.00	4482.77	4485.90	4486.69	4487.99	0.034094	11.61	36.18	22.30	1.61

MIXED FLOW

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

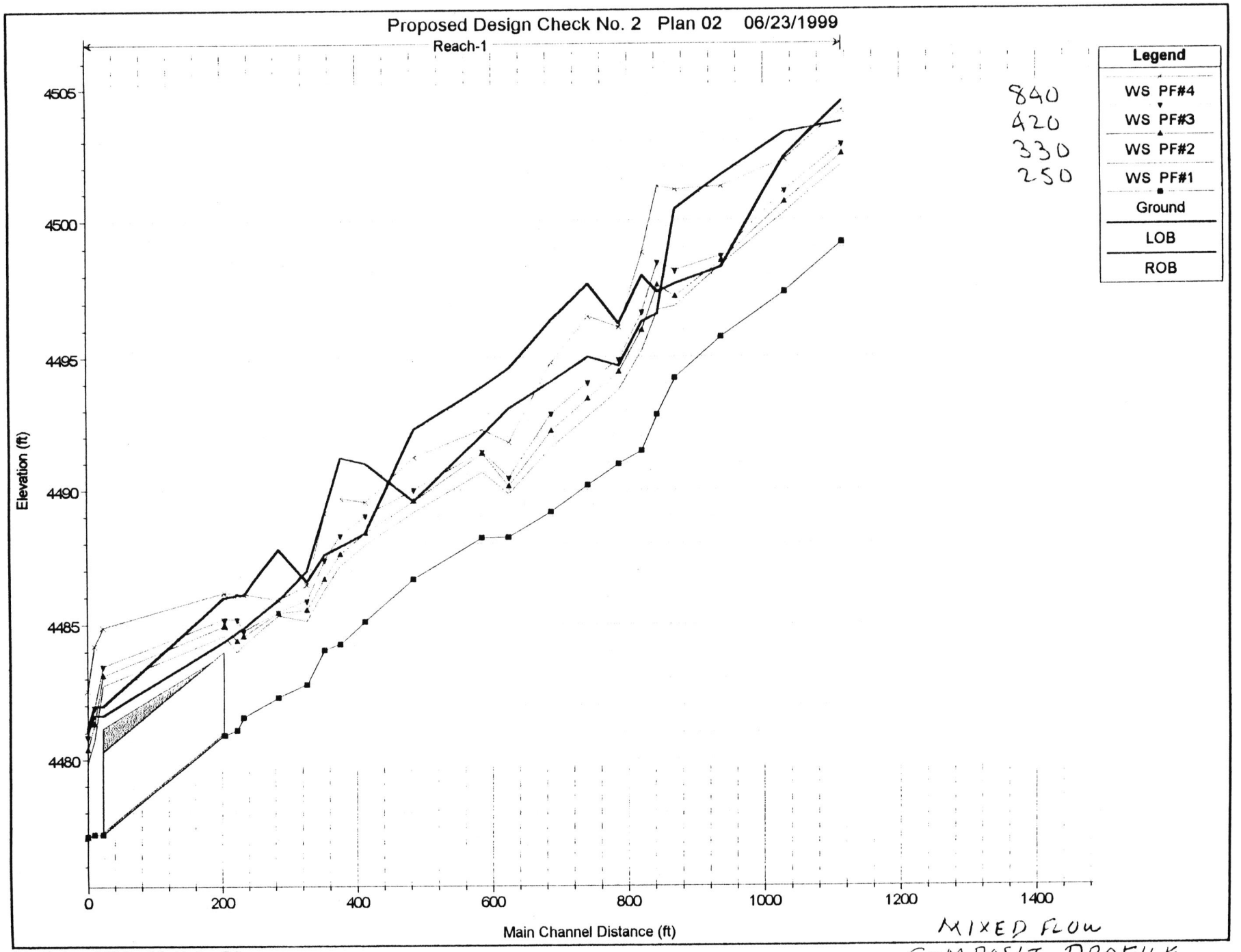
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	55	840.00	4482.77	4486.47	4487.16	4489.40	0.049922	13.72	61.22	83.38	2.82
Reach-1	54	250.00	4482.29	4485.35	4485.43	4485.87	0.010283	5.80	43.07	47.90	1.08
Reach-1	54	330.00	4482.29	4485.44	4485.62	4486.17	0.014427	6.87	48.05	57.98	1.33
Reach-1	54	420.00	4482.29	4485.47	4485.78	4486.56	0.021172	8.38	50.14	61.44	1.63
Reach-1	54	840.00	4482.29	4485.93	4486.43	4487.66	0.023152	10.56	79.56	64.81	1.68
Reach-1	53	250.00	4481.56	4484.26	4484.64	4485.15	0.016712	7.57	33.04	24.92	1.16
Reach-1	53	330.00	4481.56	4484.58	4484.79	4485.39	0.015782	7.23	45.62	62.26	1.49
Reach-1	53	420.00	4481.56	4484.77	4484.96	4485.58	0.014639	7.22	58.16	66.38	1.36
Reach-1	53	840.00	4481.56	4486.14	4485.66	4486.55	0.002746	5.15	163.01	95.50	0.70
Reach-1	52	250.00	4481.09	4483.99	4484.44	4484.99	0.018097	8.00	31.26	19.70	1.12
Reach-1	52	330.00	4481.09	4484.40	4484.65	4485.24	0.015629	7.35	44.91	53.55	1.41
Reach-1	52	420.00	4481.09	4485.20	4484.79	4485.50	0.003153	4.35	96.58	67.22	0.64
Reach-1	52	840.00	4481.09	4486.15		4486.52	0.002194	4.85	173.37	95.50	0.63
Reach-1	50	250.00	4480.90	4484.58	4484.13	4484.77	0.002670	3.55	70.49	62.45	0.59
Reach-1	50	330.00	4480.90	4484.93	4484.31	4485.13	0.002058	3.54	93.23	64.44	0.52
Reach-1	50	420.00	4480.90	4485.21	4484.55	4485.43	0.001919	3.75	112.03	72.16	0.53
Reach-1	50	840.00	4480.90	4486.17	4485.28	4486.46	0.001603	4.32	194.55	95.50	0.53
Reach-1	49.5	Culvert									
Reach-1	49	250.00	4477.21	4480.76		4481.08	0.000630	4.54	55.07	16.58	0.44
Reach-1	49	330.00	4477.21	4481.34		4481.74	0.000803	5.07	65.14	19.96	0.49
Reach-1	49	420.00	4477.21	4481.94		4482.39	0.000901	5.38	78.06	22.86	0.51
Reach-1	49	840.00	4477.21	4484.23		4484.86	0.000809	6.36	132.13	23.70	0.47
Reach-1	48	250.00	4477.13	4479.89	4479.89	4480.99	0.003118	8.41	29.74	13.66	1.00
Reach-1	48	330.00	4477.13	4480.39	4480.39	4481.64	0.003010	8.98	36.76	14.70	1.00
Reach-1	48	420.00	4477.13	4480.86	4480.86	4482.28	0.002966	9.55	43.99	15.69	1.00
Reach-1	48	840.00	4477.13	4482.56	4482.56	4484.69	0.002981	11.72	71.65	16.40	0.99

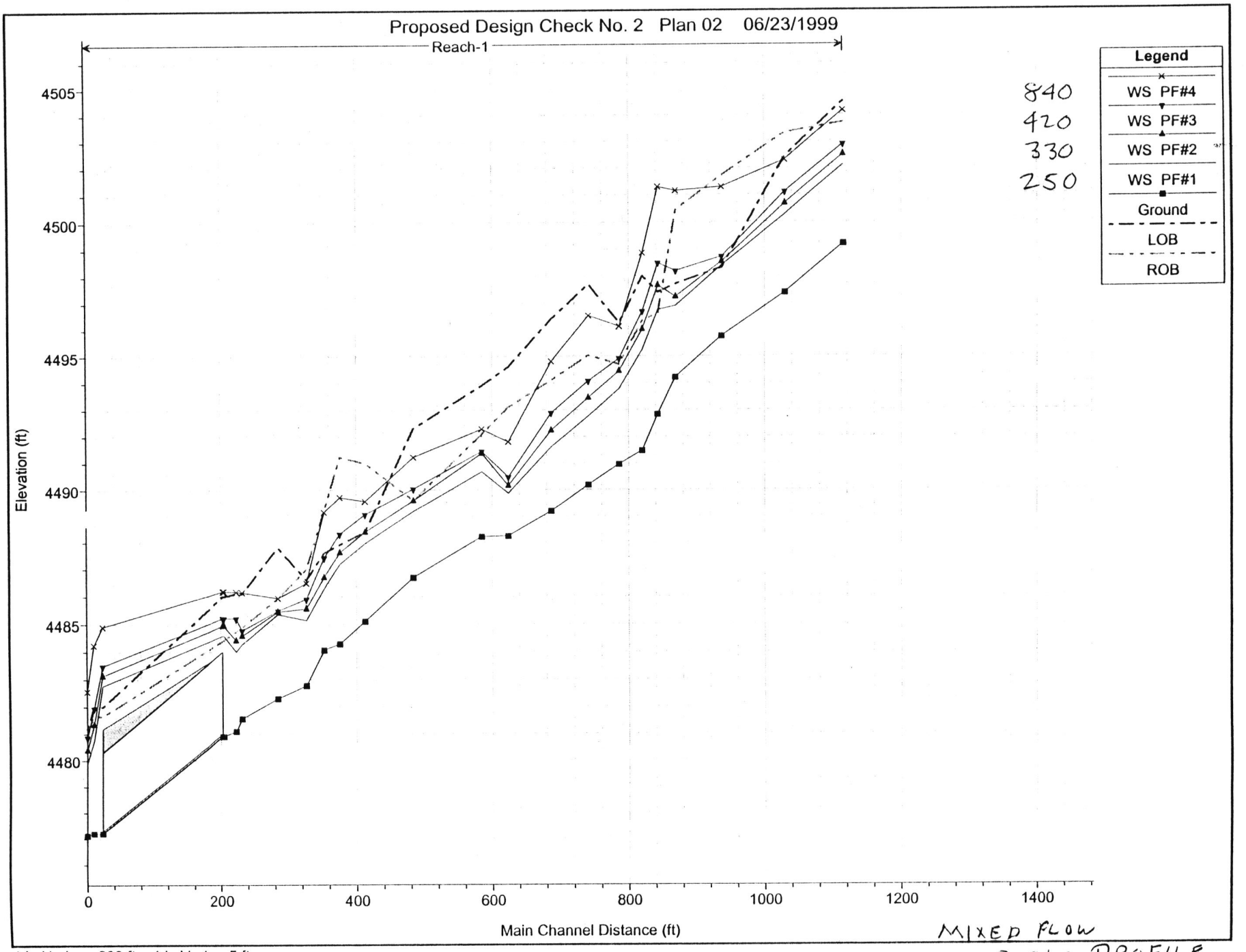
MIXED FLOW

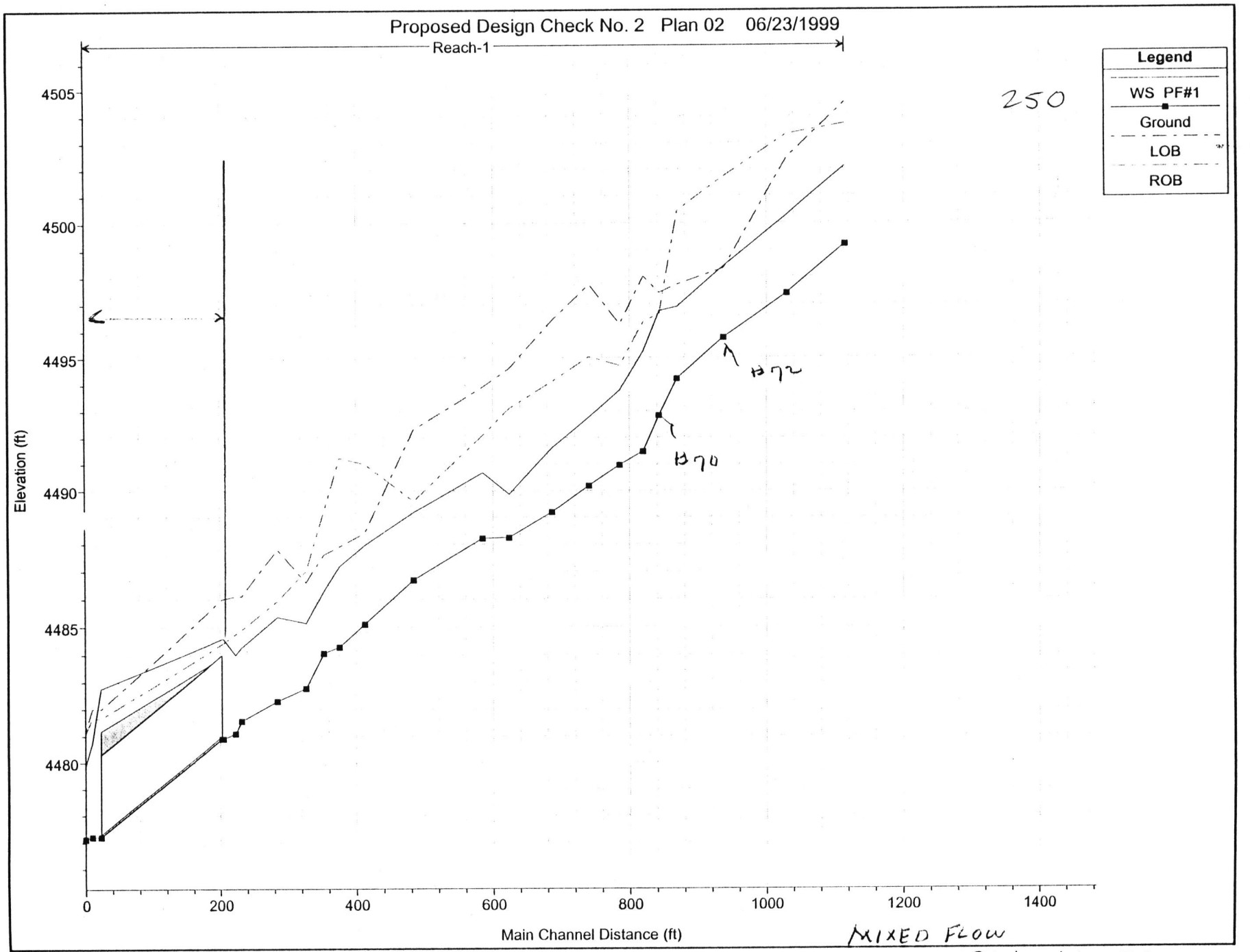
HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

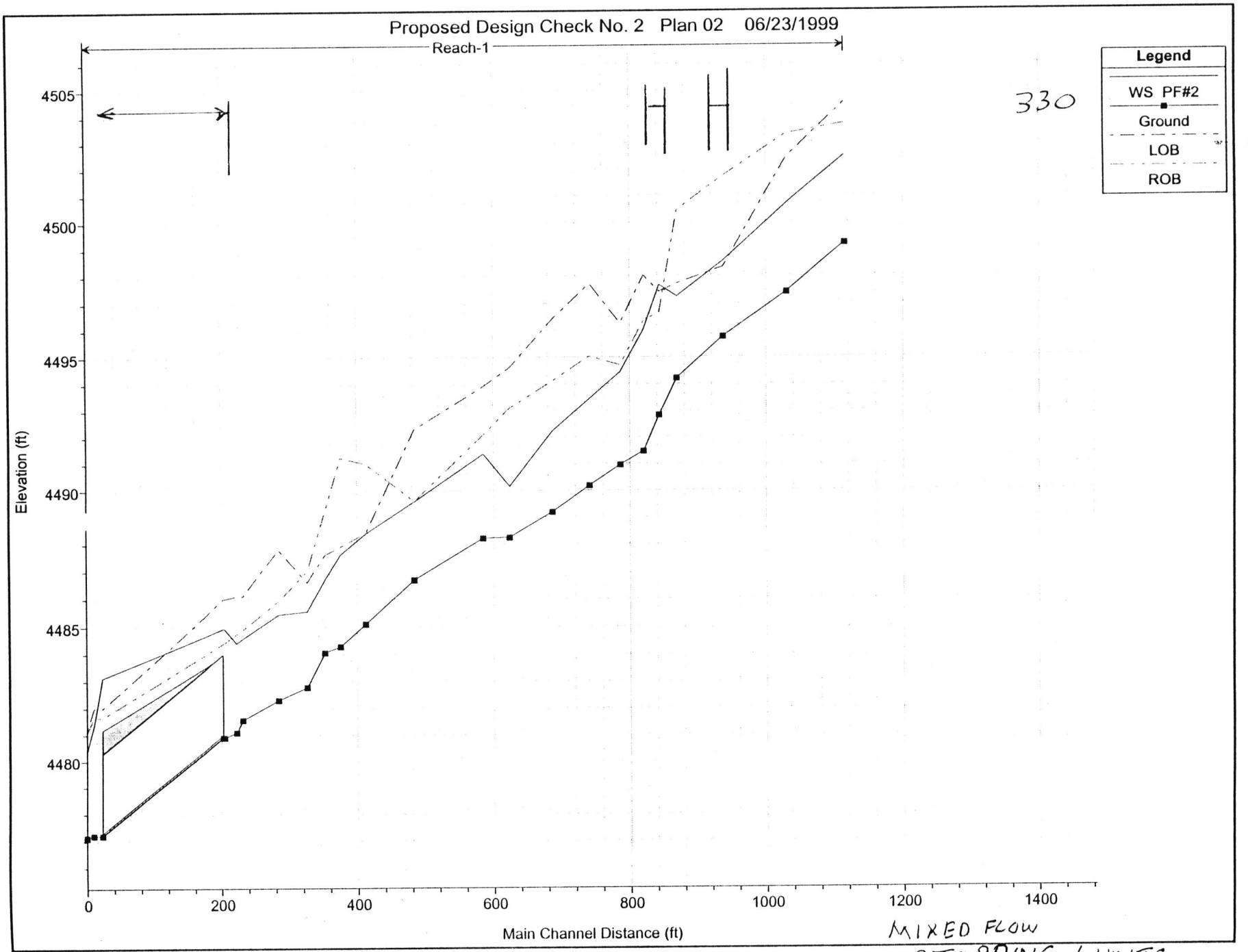
Reach	River Sta	E.G. US. (ft)	W.S. US. (ft)	E.G. IC (ft)	E.G. OC (ft)	Min Top Rd (ft)	Culv Q (cfs)	Q Weir (cfs)	Delta WS (ft)	Culv Vel In (ft/s)	Culv Vel Out (ft/s)
Reach-1	49.5 Culvert #1	4484.77	4484.58	4484.77	4484.60	4483.92	191.77	58.23	3.82	8.52	6.39
Reach-1	49.5 Culvert #1	4485.13	4484.93	4485.13	4484.78	4483.92	206.34	123.66	3.59	8.73	6.88
Reach-1	49.5 Culvert #1	4485.43	4485.21	4485.43	4484.98	4483.92	222.30	197.70	3.27	8.95	7.41
Reach-1	49.5 Culvert #1	4486.46	4486.17	4485.85	4486.46	4483.92	243.83	596.17	1.94	8.13	8.13

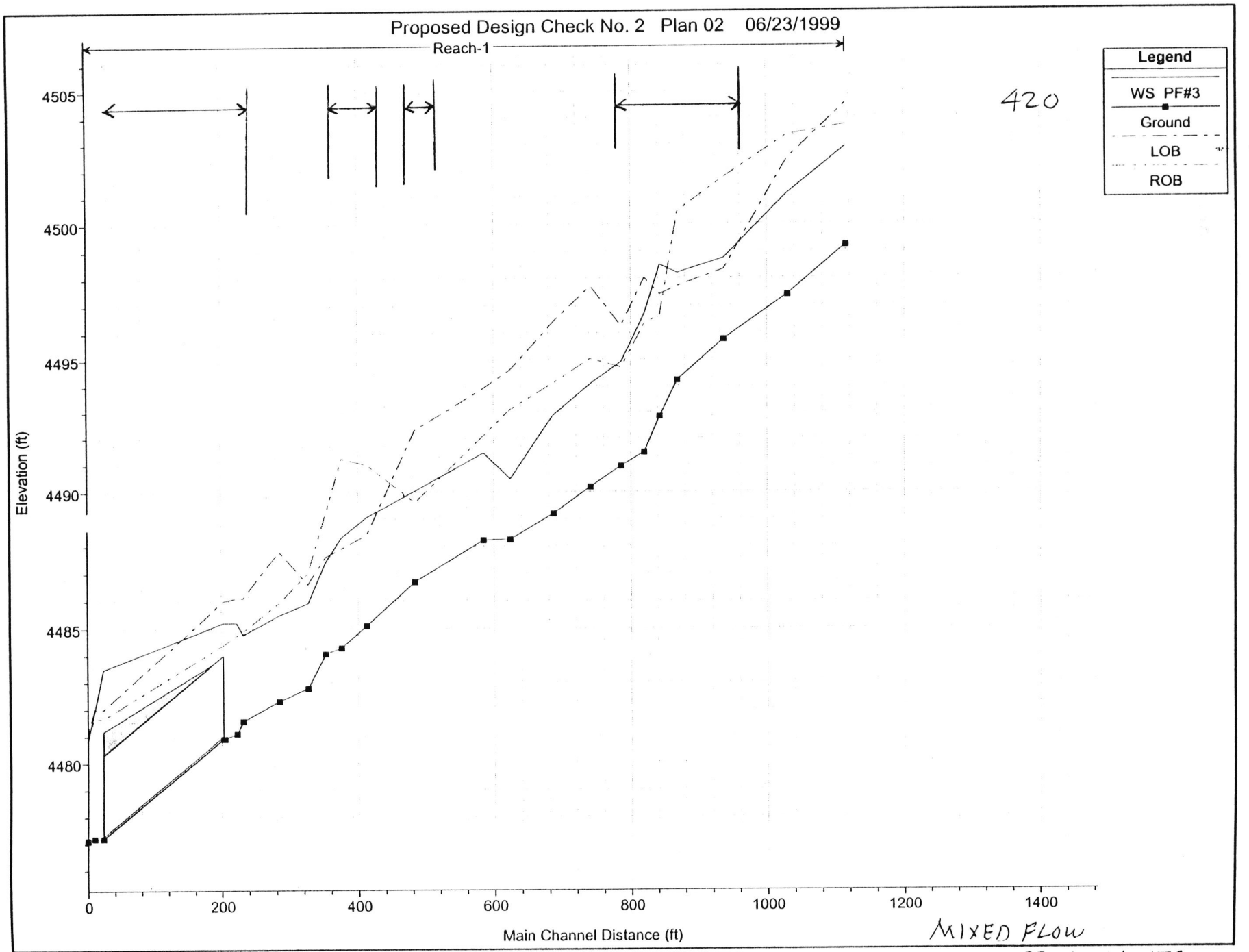
MIXED FLOW

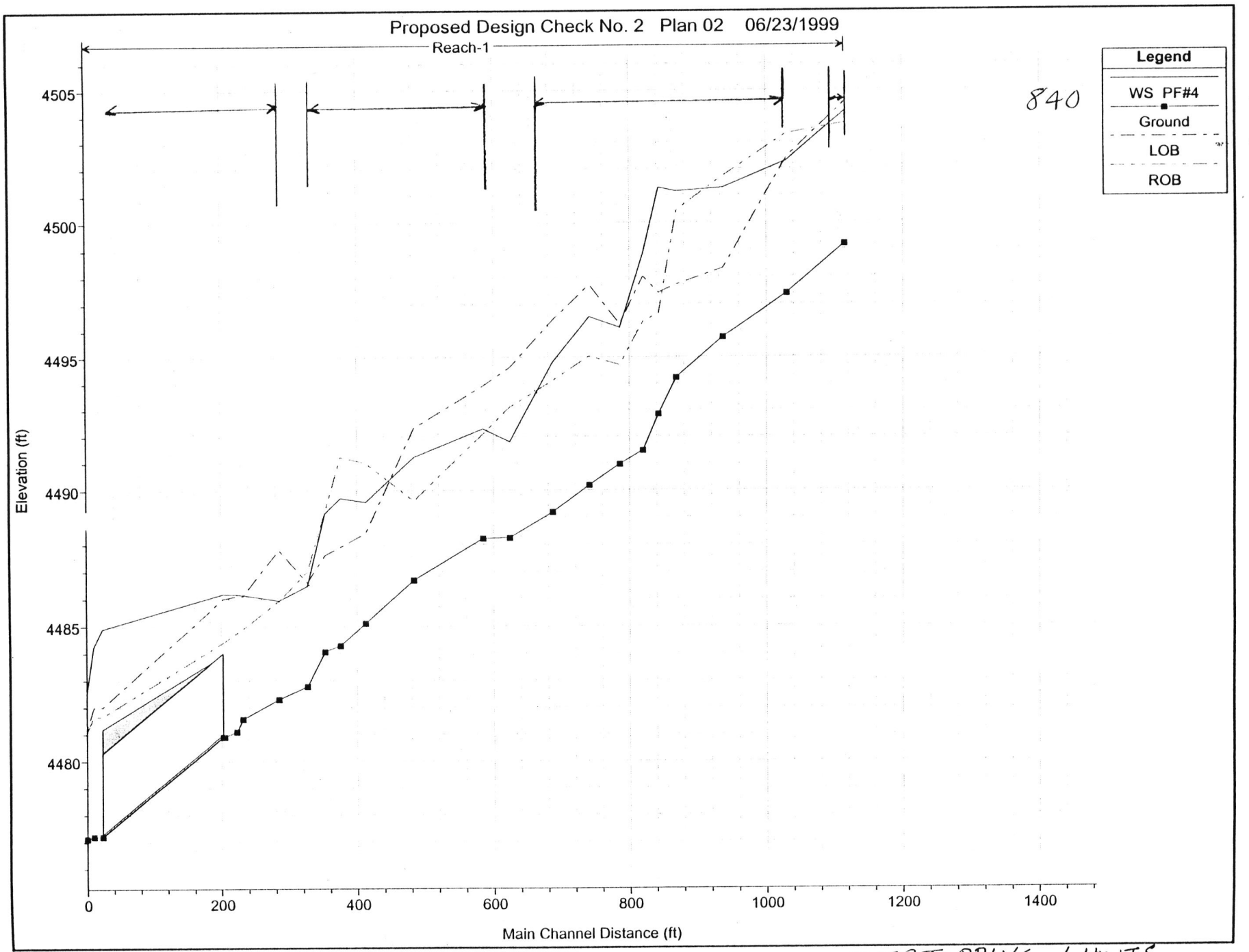

Proposed Design Check No. 2 Plan 02 06/23/1999
Reach-1
Legend
WS PF#4
WS PF#3
WS PF#2
WS PF#1
Ground
LOB
ROB
840
420
330
250
Elevation (ft)
4505
4500
4495
4490
4485
4480
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)
1 in Horiz. = 200 ft 1 in Vert. = 5 ft
MIXED FLOW
COMPOSIT PROFILE

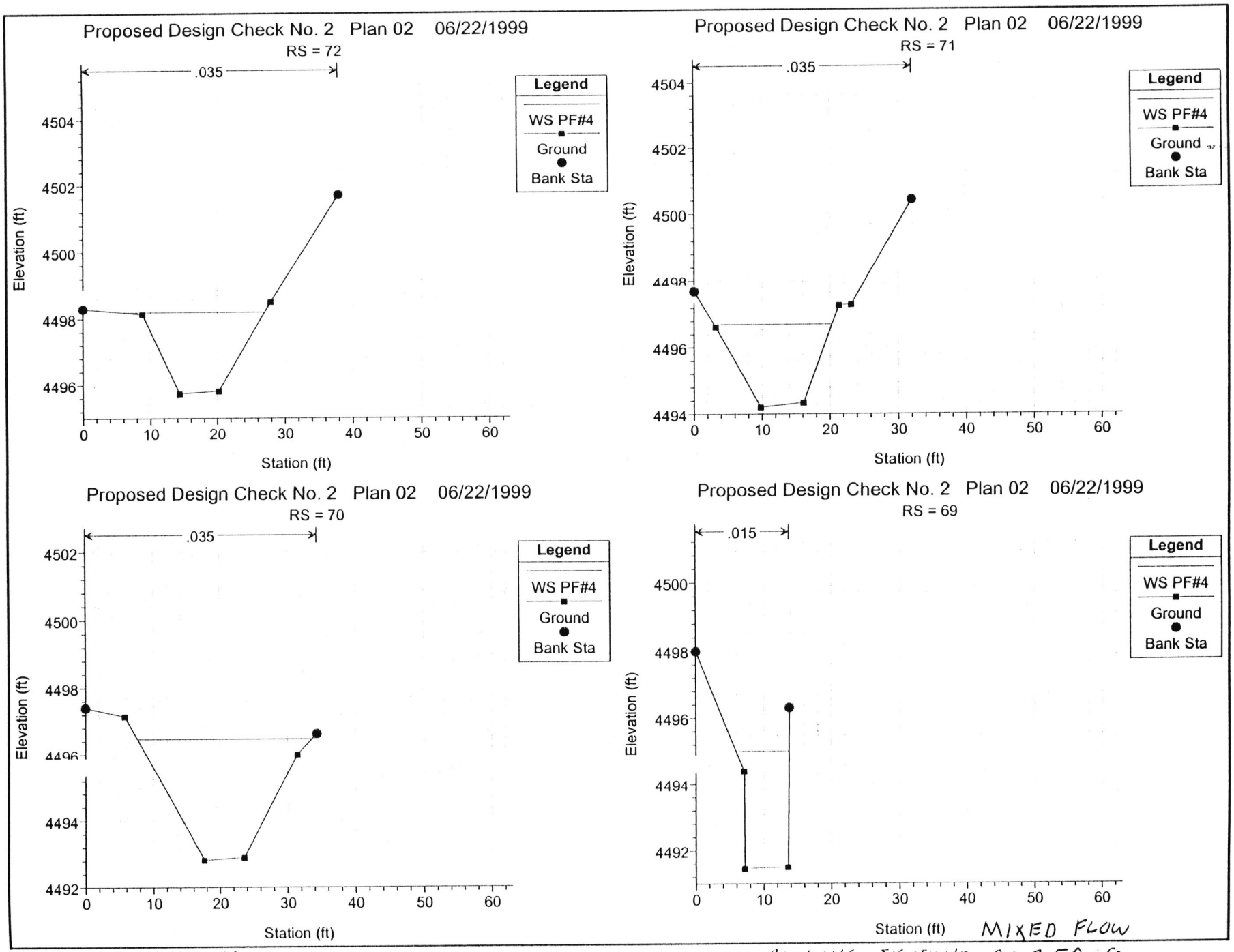

Proposed Design Check No. 2 Plan 02 06/23/1999
Reach-1
Legend
WS PF#4
WS PF#3
WS PF#2
WS PF#1
Ground
LOB
ROB
840
420
330
250
Elevation (ft)
4505
4500
4495
4490
4485
4480
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)
1 in Horiz. = 200 ft 1 in Vert. = 5 ft
MIXED FLOW
COMPOSIT PROFILE

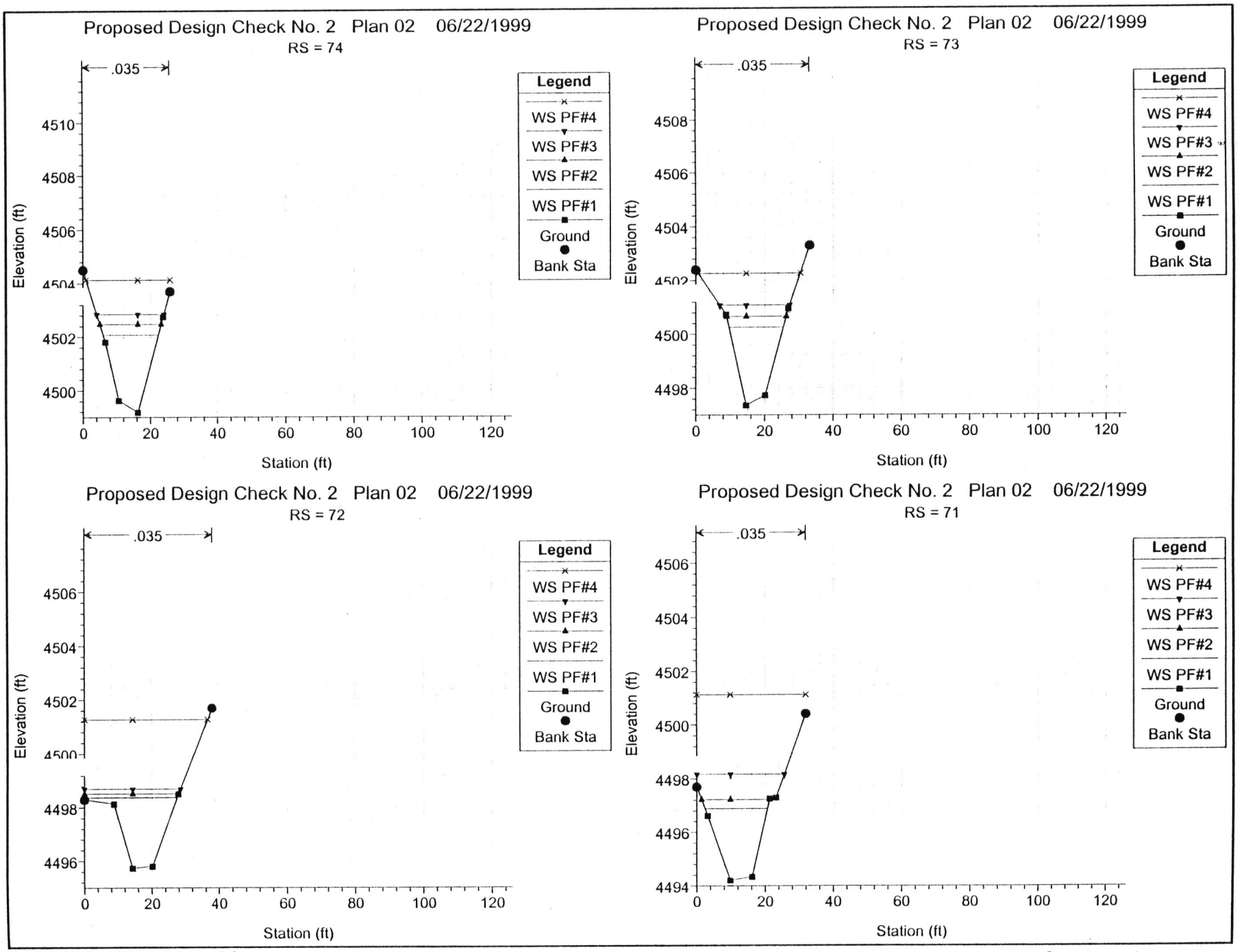

Proposed Design Check No. 2 Plan 02 06/23/1999
Reach-1
Legend
WS PF#1
Ground
LOB
ROB
250
#72
#70
4505
4500
4495
4490
4485
4480
Elevation (ft)
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)
MIXED FLOW
OVERTOPPING LIMITS
1 in Horiz. = 200 ft 1 in Vert. = 5 ft


Proposed Design Check No. 2 Plan 02 06/23/1999
Reach-1
330
Legend
WS PF#2
Ground
LOB
ROB
4505
4500
4495
4490
4485
4480
Elevation (ft)
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)
1 in Horiz. = 200 ft 1 in Vert. = 5 ft
MIXED FLOW
OVERTOPPING LIMITS


Proposed Design Check No. 2 Plan 02 06/23/1999
Reach-1
Legend
WS PF#3
Ground
LOB
ROB
420
4505
4500
4495
4490
4485
4480
Elevation (ft)
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)
1 in Horiz. = 200 ft 1 in Vert. = 5 ft
MIXED FLOW
OVERTOPPING LIMITS

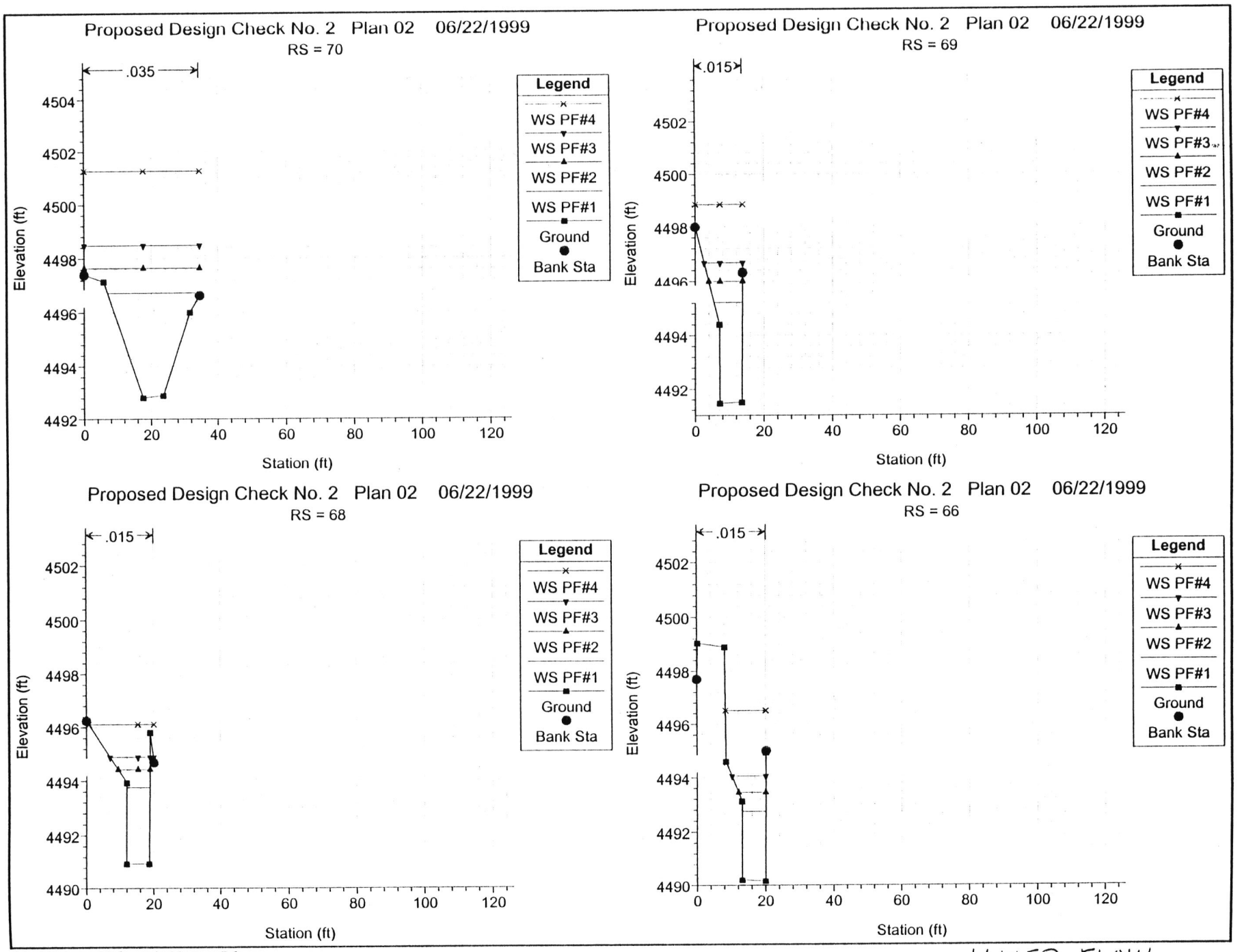

Proposed Design Check No. 2 Plan 02 06/23/1999
Reach-1
840
Legend
WS PF#4
Ground
LOB
ROB
4505
4500
4495
4490
4485
4480
Elevation (ft)
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)
1 in Horiz. = 200 ft 1 in Vert. = 5 ft
OVERTOPPING LIMITS


Proposed Design Check No. 2 Plan 02 06/22/1999
RS = 72
.035
Legend
WS PF#4
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Design Check No. 2 Plan 02 06/22/1999
RS = 71
.035
Legend
WS PF#4
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Design Check No. 2 Plan 02 06/22/1999
RS = 70
.035
Legend
WS PF#4
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Design Check No. 2 Plan 02 06/22/1999
RS = 69
.015
Legend
WS PF#4
Ground
Bank Sta
Elevation (ft)
Station (ft)
MIXED FLOW
CONTROLLING SECTIONS Q = 250 cfs
1 in Horiz. = 20 ft 1 in Vert. = 4 ft



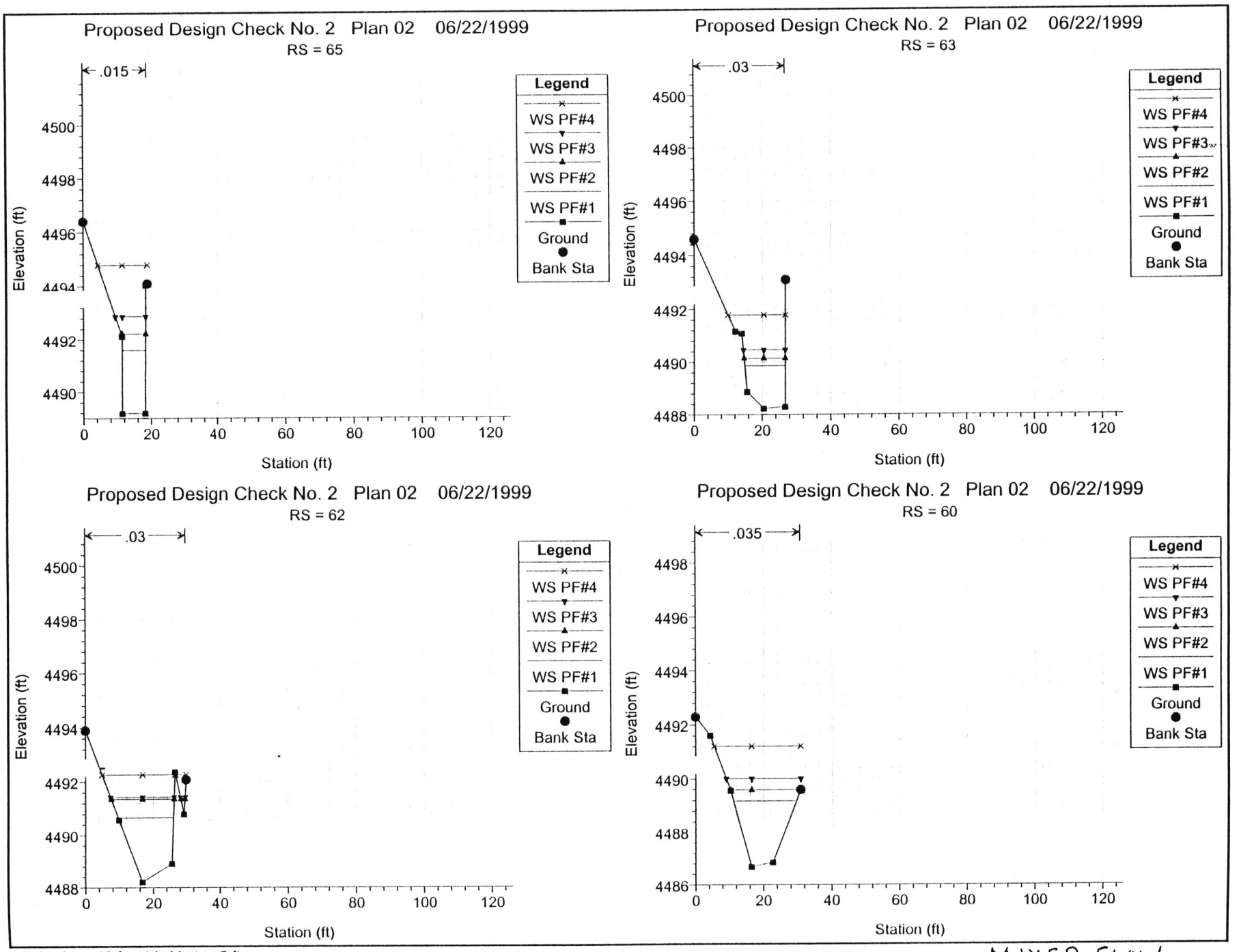
1 in Horiz. = 40 ft 1 in Vert. = 5 ft

MIXED FLOW



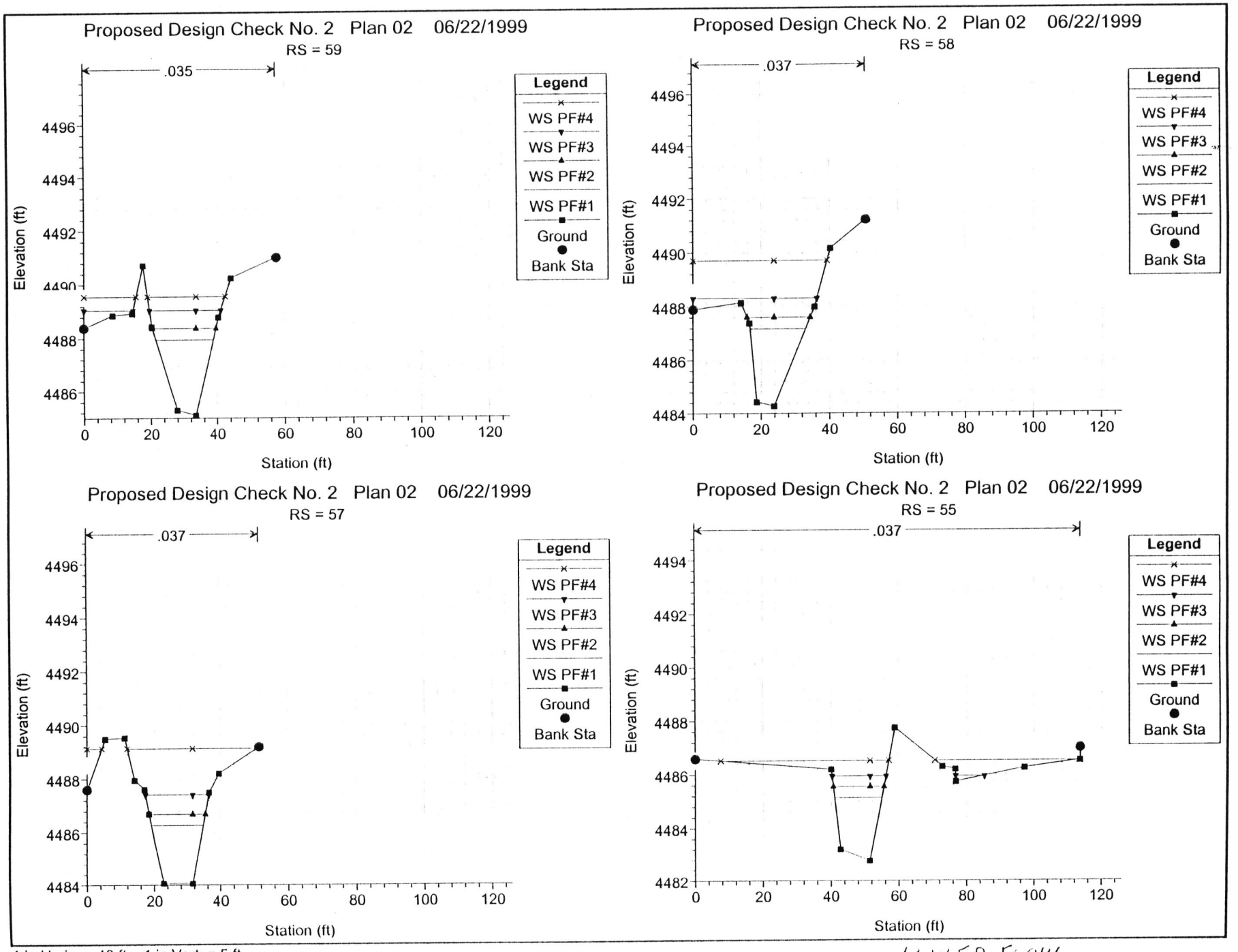
1 in Horiz. = 40 ft 1 in Vert. = 5 ft

MIXED FLOW



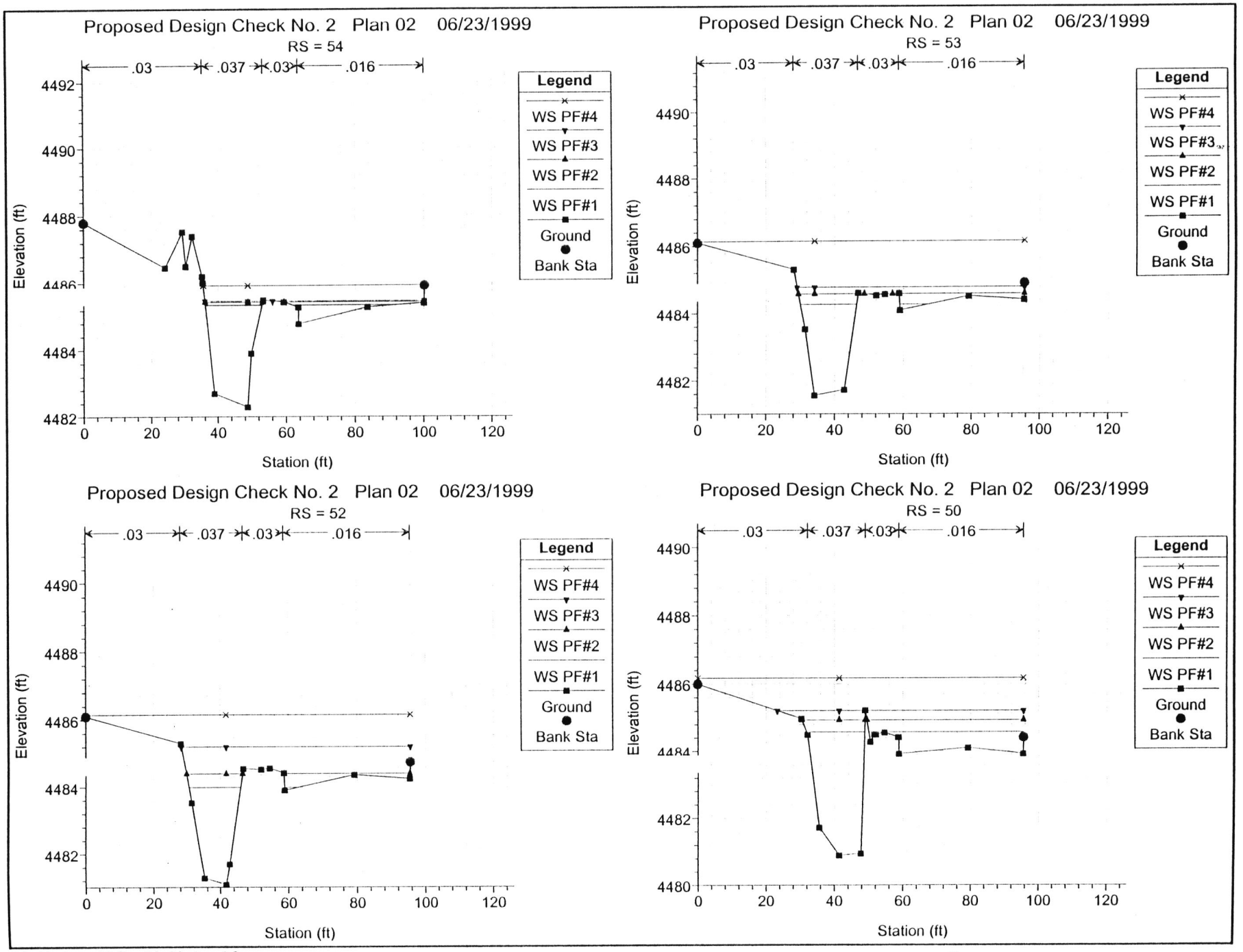
1 in Horiz. = 40 ft 1 in Vert. = 5 ft

MIXED FLOW



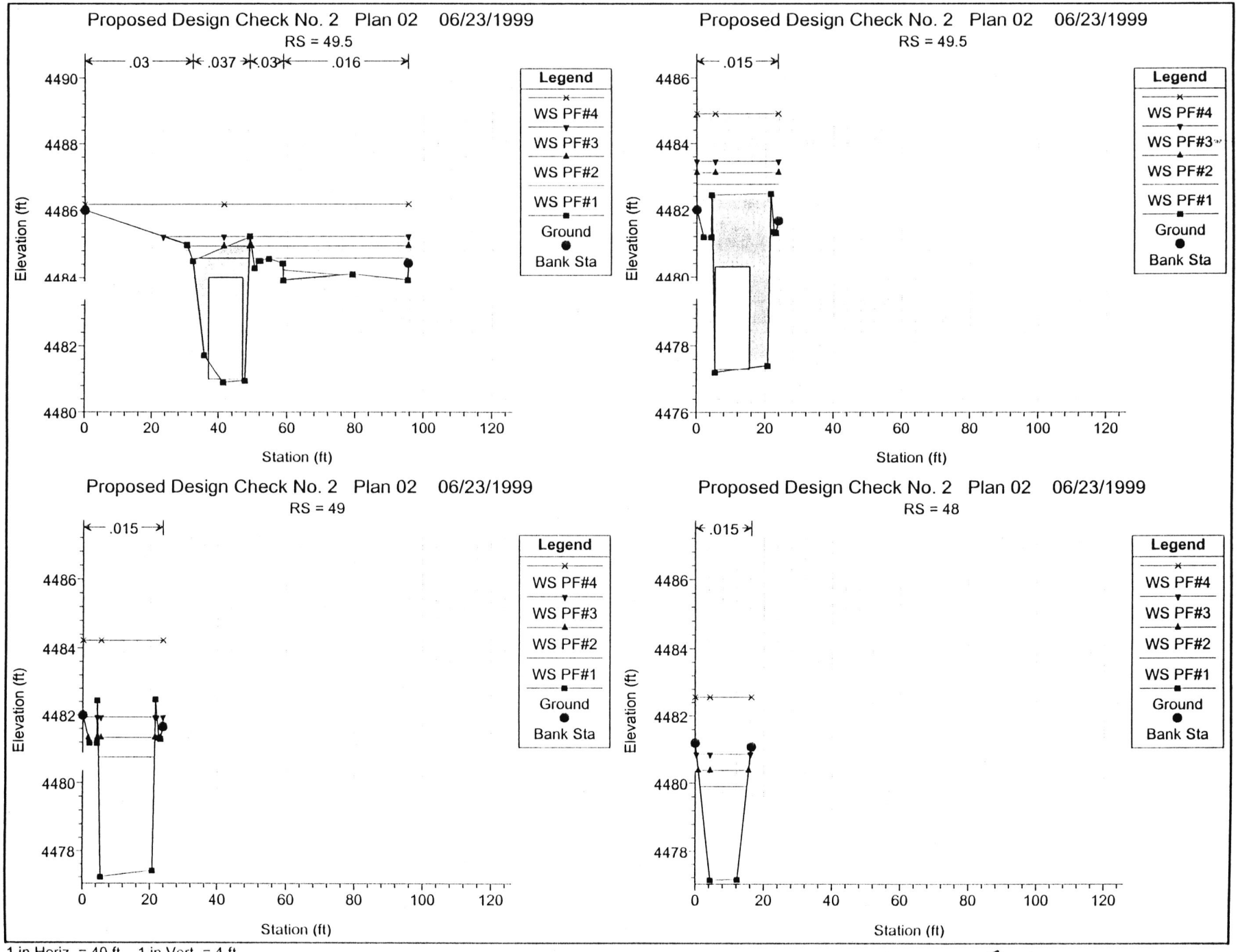
1 in Horiz. = 40 ft 1 in Vert. = 5 ft

MIXED FLOW



1 in Horiz. = 40 ft 1 in Vert. = 4 ft

MIXED FLOW



1 in Horiz. = 40 ft 1 in Vert. = 4 ft

MIXED FLOW

EXISTING PLUMB NO 1

CURRENT DATE: 06-23-1999
CURRENT TIME: 11:01:16

FILE DATE: 06-23-1999
FILE NAME: ROSEWOOD

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 4.1 **********
****

CULV #	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	9.96	7.64	570.00	1 RCP	4.00	4.00	.012	CONVENTIONAL
2	10.94	7.29	570.01	1 RCPE	5.67	3.58	.012	CONVENTIONAL
3								
4								
5								
6								

****

FILE: ROSEWOOD CULVERT HEADWATER ELEVATION (FT) DATE: 06-23-1999

DISCHARGE	1	2	3	4	5	6	ROADWAY
0	9.96	10.94	0.00	0.00	0.00	0.00	20.00
50	12.99	13.27	0.00	0.00	0.00	0.00	20.30
100	14.79	14.56	0.00	0.00	0.00	0.00	20.48
150	19.56	15.97	0.00	0.00	0.00	0.00	20.63
200	25.72	18.43	0.00	0.00	0.00	0.00	20.76
250	33.64	22.68	0.00	0.00	0.00	0.00	20.88
300	43.33	28.07	0.00	0.00	0.00	0.00	21.00
350	54.77	34.48	0.00	0.00	0.00	0.00	21.10
400	67.97	41.82	0.00	0.00	0.00	0.00	21.20
450	97.32	50.08	0.00	0.00	0.00	0.00	21.31
500	170.32	59.27	0.00	0.00	0.00	0.00	21.40
500	170.32	59.27	0.00	0.00	0.00	0.00	0.00

The above Q and HW are for a point above the roadway.

****

EXISTING PLUMB #1

DISCHARGE	48-INCH	54-INCH	ROADWAY	3	4	5	6
0	10.0	10.9	20.0	0	0	0	0
50	13.0	13.3	20.3	0	0	0	0
100	14.8	14.6	20.5	0	0	0	0
150	19.6	16.0	20.6	0	0	0	0
200	25.7	18.4	20.8	0	0	0	0
250	33.6	22.7	20.9	0	0	0	0
300	43.3	28.1	21.0	0	0	0	0
350	54.8	34.5	21.1	0	0	0	0
400	68.0	41.8	21.2	0	0	0	0
450	97.3	50.1	21.3	0	0	0	0
500	170.3	59.3	21.4	0	0	0	0
500	170.3	59.3	0.0	0	0	0	0