



Provincia di Macerata

Settore X
Genio Civile

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VERIFICA IDRAULICA PROGETTO PRELIMINARE VIADOTTO ATTRAVERSAMENTO FIUME POTENZA IN LOCALITA' PIANE DI POTENZA

IL DIRIGENTE
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Verifiche idrauliche sul progetto preliminare

La calcolazione che si propone ha lo scopo di verificare il comportamento idraulico in caso di realizzazione di un eventuale manufatto di attraversamento del Fiume Potenza in località Piane di Potenza previsto nel progetto nuovo asse stradale della Val Potenza. Non essendo disponibili osservazioni di valori massimi annuali di portate al colmo si è, proceduto con metodi di stima regionale. Tali metodi basati su di un modello con una funzione di probabilità a due parametri (M.G.), tarata sui valori massimi delle serie storiche dei massimi annuali delle portate di colmo di piena registrate nelle stazioni idrometriche distribuite sull'intero territorio nazionale con una successiva stima regionale dei parametri tarati per diversi raggruppamenti di bacini. Tale verifica è stata sviluppata a suo tempo dal Prof. Ugo Maione per conto del Genio Civile, in detta valutazione viene determinata la portata al colmo di piena del fiume Potenza in località Villa Potenza calcolata per più periodi di ritorno. I valori proposti sono i seguenti:

Tempo di ritorno anni 50	mc/sec	597
Tempo di ritorno anni 100	mc/sec	654
Tempo di ritorno anni 200	mc/sec	709
Tempo di ritorno anni 500	mc/sec	780

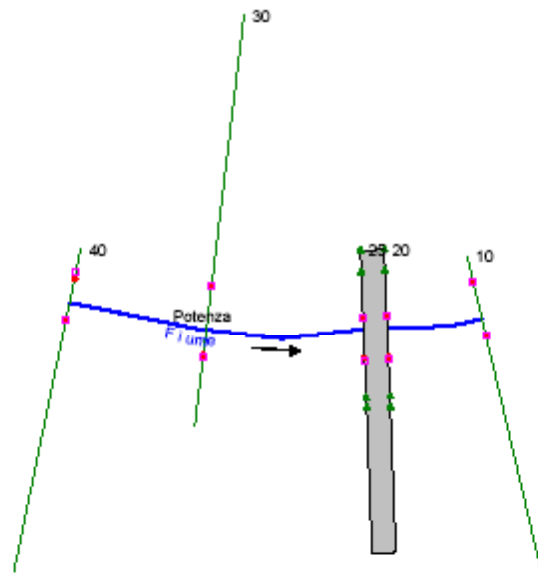
Le verifiche effettuate tramite l'utilizzo del software HEC- RAS hanno portato alla definizione dell'altezza massima d'acqua presumibile per i vari tempi di ritorno. Bisogna comunque evidenziare che la particolare postura del manufatto crea notevoli problemi idraulici, in effetti ogni eventuale piena, si dovesse verificare, incanalerebbe parte delle acque lungo il rilevato stradale senza alcuna possibilità di rientro della stessa in alveo con conseguente erosione del rilevato stradale e possibile pericolo per la pubblica incolumità. Il problema potrebbe essere attenuato

tramite la realizzazione dell'infrastruttura in modo tale che il suo asse sia il più possibile prossimo all'ortogonale al corso d'acqua, ovvero allungando l'ampiezza dell'attraversamento.

Come risulta dagli elaborati, per piene eccezionali, le acque potrebbero arrivare ad una quota massima di 5.17 m. dal fondo alveo e, quindi l'attraversamento dovrebbe avere una imposta ad un'altezza minima di 7,00-8,00 m. dal fondo alveo.

Tenuto conto della particolare situazione progettuale, si ritiene, non si possano porre in opera pilastri in alveo.

VERIFICA CON HEC-RAS 3.1.3 (Tempo di ritorno: 50 anni)



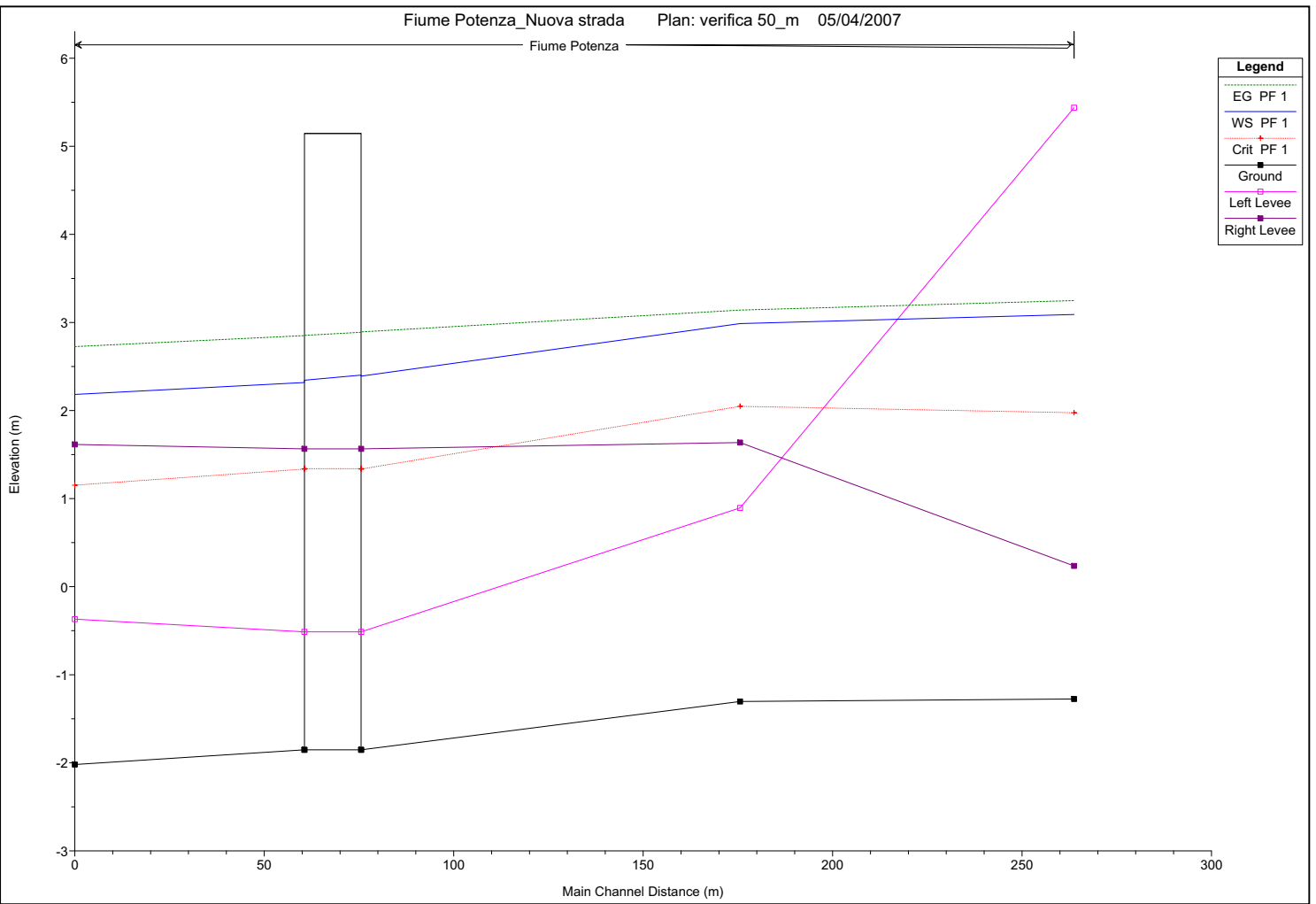
H max del livello idrico (m)	4,36
Portata max utilizzata (mc/sec)	597,00

HEC-RAS Plan: 50_m River: Fiume Reach: Potenza Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Potenza	40	PF 1	597.00	-1.27	3.09	1.97	3.25	0.001211	2.08	348.96	186.10	0.33
Potenza	30	PF 1	597.00	-1.30	2.99	2.05	3.14	0.001126	1.95	358.76	216.01	0.33
Potenza	25	PF 1	597.00	-1.85	2.39	1.34	2.89	0.002043	2.75	209.98	124.44	0.44
Potenza	23	Bridge										
Potenza	20	PF 1	597.00	-1.85	2.32	1.34	2.85	0.002231	2.83	202.46	120.77	0.46
Potenza	10	PF 1	597.00	-2.02	2.18	1.15	2.73	0.002801	3.21	195.48	106.71	0.52

Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007

Fiume Potenza



Legend

- EG PF 1
- WS PF 1
- Crit PF 1
- Ground
- Left Levee
- Right Levee

Plan: 50_m Fiume Potenza RS: 40 Profile: PF 1

E.G. Elev (m)	3.25	Element	Left OB	Channel	Right OB
Vel Head (m)	0.16	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.09	Reach Len. (m)	92.68	88.13	95.38
Crit W.S. (m)	1.97	Flow Area (m2)	1.34	104.78	242.84
E.G. Slope (m/m)	0.001211	Area (m2)	1.34	104.78	242.84
Q Total (m3/s)	597.00	Flow (m3/s)	0.97	218.09	377.94
Top Width (m)	186.10	Top Width (m)	3.54	26.35	156.22
Vel Total (m/s)	1.71	Avg. Vel. (m/s)	0.72	2.08	1.56
Max Chl Dpth (m)	4.37	Hydr. Depth (m)	0.38	3.98	1.55
Conv. Total (m3/s)	17156.2	Conv. (m3/s)	27.8	6267.3	10861.1
Length Wtd. (m)	91.65	Wetted Per. (m)	3.61	28.31	156.24
Min Ch EI (m)	-1.27	Shear (N/m2)	4.42	43.95	18.46
Alpha	1.06	Stream Power (N/m s)	3.18	91.47	28.72
Frctn Loss (m)	0.11	Cum Volume (1000 m3)	38.30	33.05	19.22
C & E Loss (m)	0.00	Cum SA (1000 m2)	24.85	8.84	21.77

Plan: 50_m Fiume Potenza RS: 30 Profile: PF 1

E.G. Elev (m)	3.14	Element	Left OB	Channel	Right OB
Vel Head (m)	0.15	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.99	Reach Len. (m)	211.32	100.00	0.01
Crit W.S. (m)	2.05	Flow Area (m2)	156.22	156.74	45.80
E.G. Slope (m/m)	0.001126	Area (m2)	156.22	156.74	45.80
Q Total (m3/s)	597.00	Flow (m3/s)	240.73	305.11	51.16
Top Width (m)	216.01	Top Width (m)	126.97	43.91	45.13
Vel Total (m/s)	1.66	Avg. Vel. (m/s)	1.54	1.95	1.12
Max Chl Dpth (m)	4.29	Hydr. Depth (m)	1.23	3.57	1.01
Conv. Total (m3/s)	17792.3	Conv. (m3/s)	7174.5	9093.1	1524.7
Length Wtd. (m)	142.80	Wetted Per. (m)	126.99	44.34	45.89
Min Ch EI (m)	-1.30	Shear (N/m2)	13.58	39.03	11.02
Alpha	1.08	Stream Power (N/m s)	20.93	75.97	12.31
Frctn Loss (m)	0.21	Cum Volume (1000 m3)	31.00	21.53	5.45
C & E Loss (m)	0.03	Cum SA (1000 m2)	18.80	5.74	12.16

Plan: 50_m Fiume Potenza RS: 25 Profile: PF 1

E.G. Elev (m)	2.89	Element	Left OB	Channel	Right OB
Vel Head (m)	0.50	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.39	Reach Len. (m)	0.04	0.04	0.04
Crit W.S. (m)	1.34	Flow Area (m2)	80.39	101.80	27.78
E.G. Slope (m/m)	0.002043	Area (m2)	113.84	101.80	31.30
Q Total (m3/s)	597.00	Flow (m3/s)	289.49	279.49	28.02
Top Width (m)	124.44	Top Width (m)	42.30	26.11	56.03
Vel Total (m/s)	2.84	Avg. Vel. (m/s)	3.60	2.75	1.01
Max Chl Dpth (m)	4.24	Hydr. Depth (m)	2.81	3.90	0.56
Conv. Total (m3/s)	13207.6	Conv. (m3/s)	6404.6	6183.1	619.9
Length Wtd. (m)	0.04	Wetted Per. (m)	28.60	26.88	50.74
Min Ch EI (m)	-1.85	Shear (N/m2)	56.31	75.87	10.97
Alpha	1.22	Stream Power (N/m s)	202.79	208.29	11.07
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	2.47	8.60	5.45
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.92	2.24	12.16

Plan: 50_m Fiume Potenza RS: 23 BR U Profile: PF 1

E.G. Elev (m)	2.89	Element	Left OB	Channel	Right OB
Vel Head (m)	0.49	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.40	Reach Len. (m)	14.95	14.95	14.95
Crit W.S. (m)	1.34	Flow Area (m2)	80.70	102.08	22.08
E.G. Slope (m/m)	0.002128	Area (m2)	80.70	102.08	22.08
Q Total (m3/s)	597.00	Flow (m3/s)	280.67	286.57	29.76
Top Width (m)	79.94	Top Width (m)	28.60	26.11	25.24
Vel Total (m/s)	2.91	Avg. Vel. (m/s)	3.48	2.81	1.35
Max Chl Dpth (m)	4.25	Hydr. Depth (m)	2.82	3.91	0.87
Conv. Total (m3/s)	12940.3	Conv. (m3/s)	6083.7	6211.6	645.0
Length Wtd. (m)	14.95	Wetted Per. (m)	31.19	26.88	26.92
Min Ch EI (m)	-1.85	Shear (N/m2)	54.00	79.25	17.12
Alpha	1.13	Stream Power (N/m s)	187.82	222.48	23.07

Plan: 50_m Fiume Potenza RS: 23 BR U Profile: PF 1 (Continued)

Frctn Loss (m)	0.03	Cum Volume (1000 m3)	2.46	8.60	5.45
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.92	2.24	12.16

Plan: 50_m Fiume Potenza RS: 23 BR D Profile: PF 1

E.G. Elev (m)	2.85	Element	Left OB	Channel	Right OB
Vel Head (m)	0.51	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.34	Reach Len. (m)	0.01	0.01	0.01
Crit W.S. (m)	1.34	Flow Area (m2)	79.07	100.59	20.64
E.G. Slope (m/m)	0.002272	Area (m2)	79.07	100.59	20.64
Q Total (m3/s)	597.00	Flow (m3/s)	280.60	288.89	27.51
Top Width (m)	79.94	Top Width (m)	28.60	26.11	25.24
Vel Total (m/s)	2.98	Avg. Vel. (m/s)	3.55	2.87	1.33
Max Chl Dpth (m)	4.20	Hydr. Depth (m)	2.76	3.85	0.82
Conv. Total (m3/s)	12525.2	Conv. (m3/s)	5887.0	6061.0	577.2
Length Wtd. (m)	0.01	Wetted Per. (m)	31.13	26.88	26.86
Min Ch El (m)	-1.85	Shear (N/m2)	56.58	83.36	17.12
Alpha	1.12	Stream Power (N/m s)	200.78	239.40	22.82
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	1.27	7.08	5.13
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.49	1.85	11.79

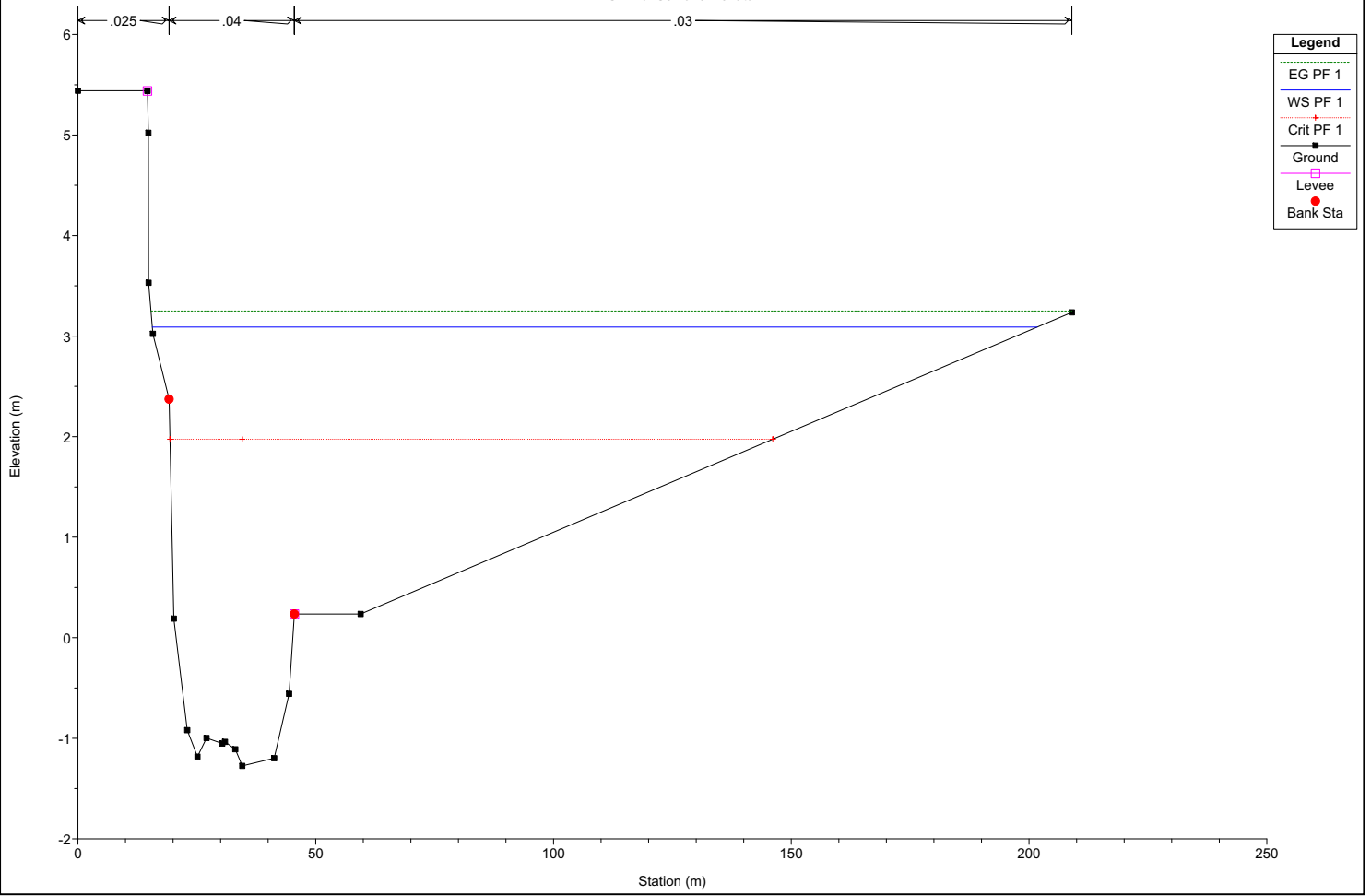
Plan: 50_m Fiume Potenza RS: 20 Profile: PF 1

E.G. Elev (m)	2.85	Element	Left OB	Channel	Right OB
Vel Head (m)	0.53	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.32	Reach Len. (m)	16.61	60.59	218.74
Crit W.S. (m)	1.34	Flow Area (m2)	78.30	99.89	24.27
E.G. Slope (m/m)	0.002231	Area (m2)	110.73	99.89	27.32
Q Total (m3/s)	597.00	Flow (m3/s)	289.47	282.95	24.58
Top Width (m)	120.77	Top Width (m)	42.30	26.11	52.37
Vel Total (m/s)	2.95	Avg. Vel. (m/s)	3.70	2.83	1.01
Max Chl Dpth (m)	4.17	Hydr. Depth (m)	2.74	3.83	0.53
Conv. Total (m3/s)	12639.2	Conv. (m3/s)	6128.4	5990.4	520.3
Length Wtd. (m)	49.90	Wetted Per. (m)	28.60	26.88	47.07
Min Ch El (m)	-1.85	Shear (N/m2)	59.89	81.29	11.28
Alpha	1.20	Stream Power (N/m s)	221.42	230.27	11.42
Frctn Loss (m)	0.12	Cum Volume (1000 m3)	1.27	7.08	5.13
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.49	1.85	11.78

Plan: 50_m Fiume Potenza RS: 10 Profile: PF 1

E.G. Elev (m)	2.73	Element	Left OB	Channel	Right OB
Vel Head (m)	0.54	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.18	Reach Len. (m)			
Crit W.S. (m)	1.15	Flow Area (m2)	41.94	133.92	19.61
E.G. Slope (m/m)	0.002801	Area (m2)	41.94	133.92	19.61
Q Total (m3/s)	597.00	Flow (m3/s)	150.59	429.35	17.06
Top Width (m)	106.71	Top Width (m)	16.44	34.89	55.39
Vel Total (m/s)	3.05	Avg. Vel. (m/s)	3.59	3.21	0.87
Max Chl Dpth (m)	4.20	Hydr. Depth (m)	2.55	3.84	0.35
Conv. Total (m3/s)	11281.0	Conv. (m3/s)	2845.5	8113.0	322.5
Length Wtd. (m)		Wetted Per. (m)	18.99	35.50	56.62
Min Ch El (m)	-2.02	Shear (N/m2)	60.66	103.60	9.51
Alpha	1.14	Stream Power (N/m s)	217.78	332.14	8.28
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

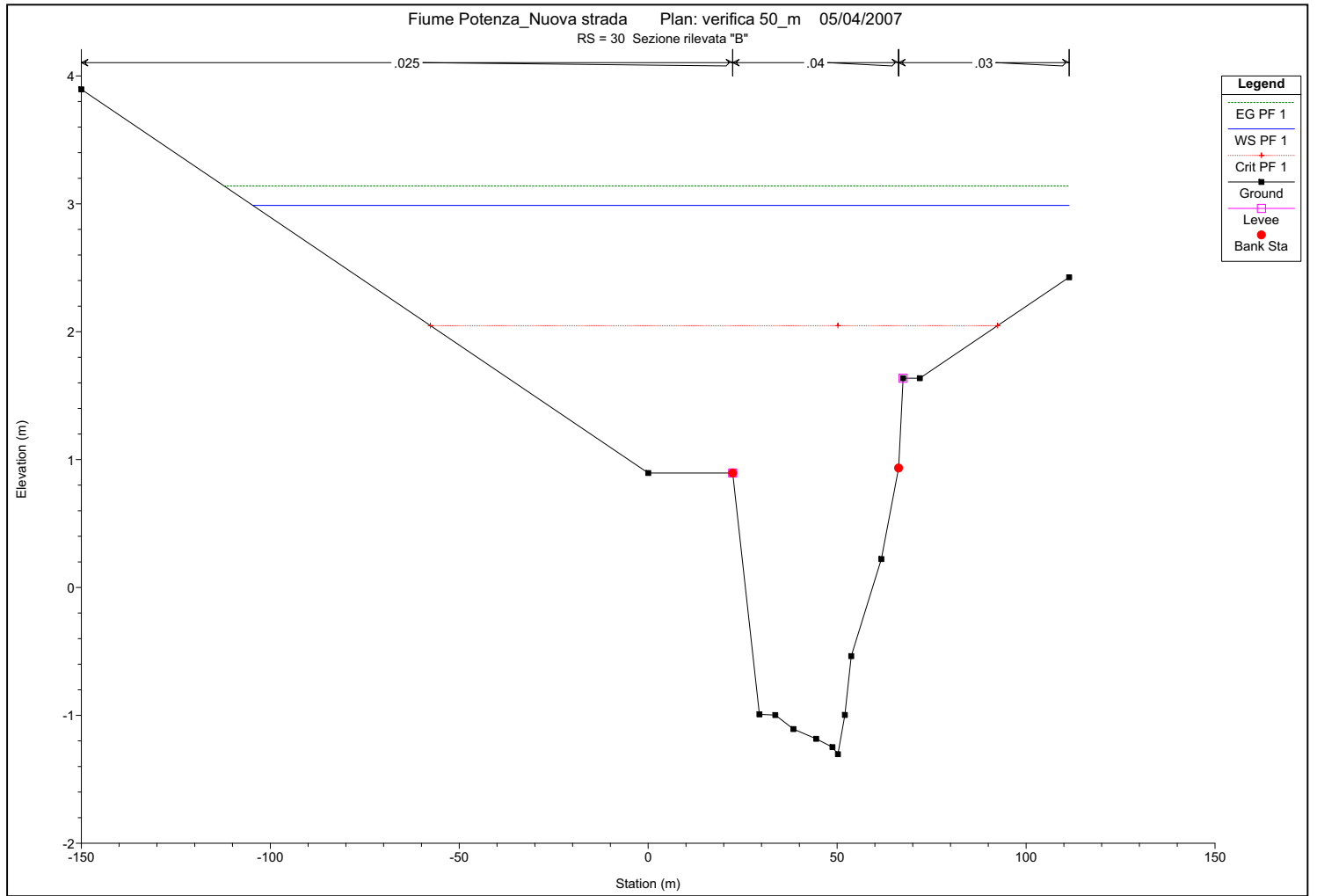
Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007
RS = 40 Sezione rilevata "A"



Legend	
EG PF 1	—
WS PF 1	—
Crit PF 1	—
Ground	—■—
Levee	—□—
Bank Sta	●

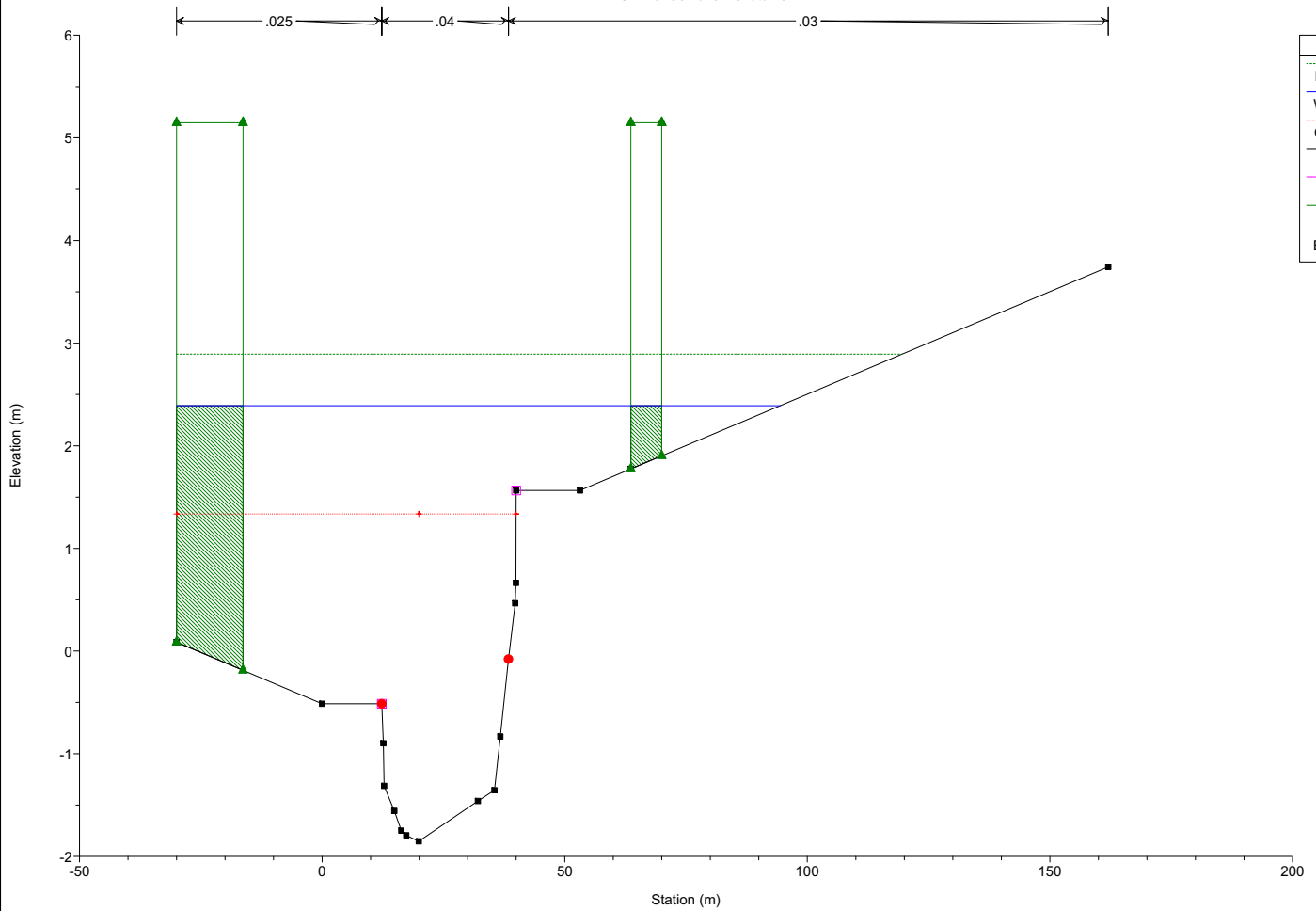
Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007

RS = 30 Sezione rilevata "B"



- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007
 RS = 25 Sezione rilevata "C"



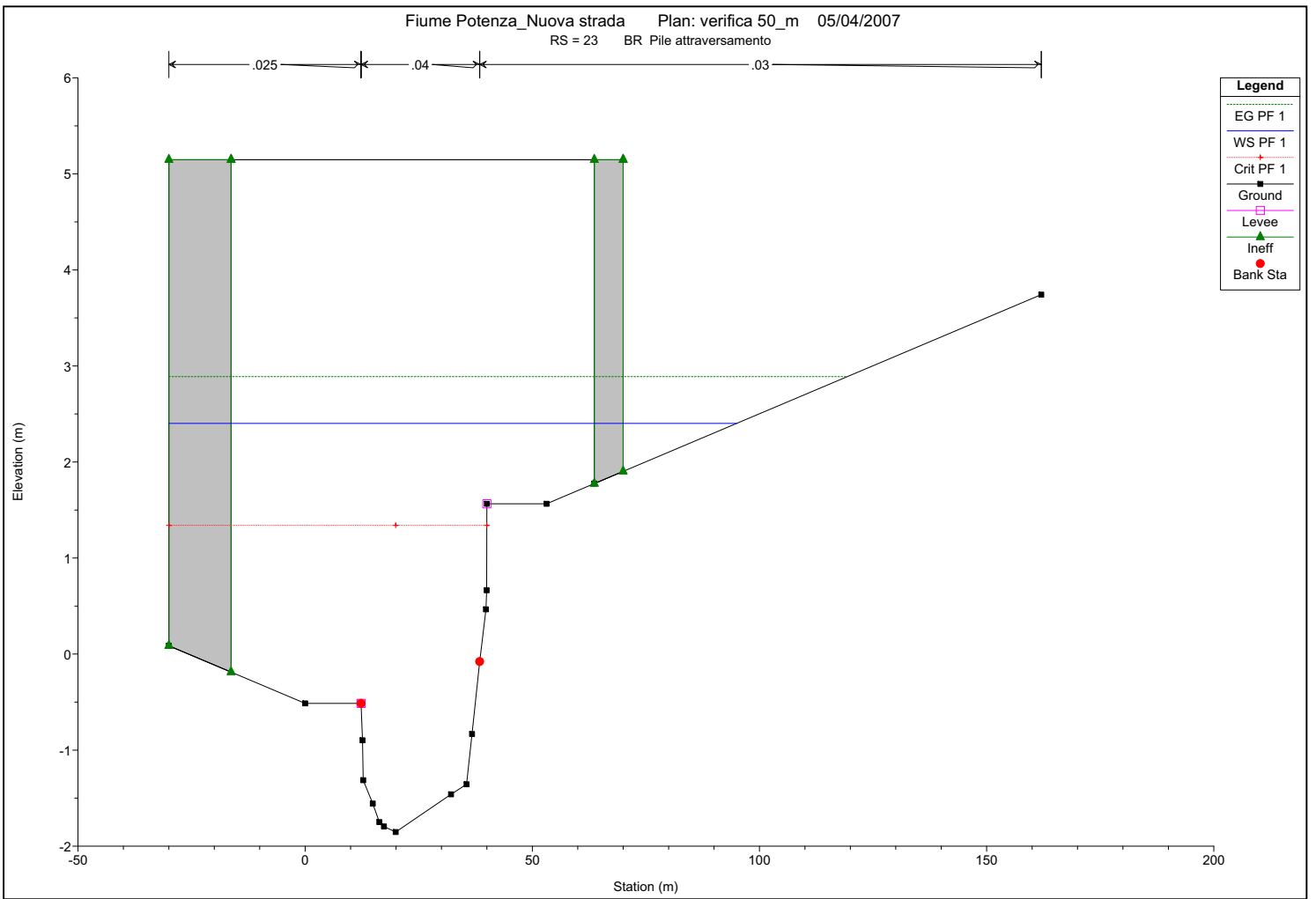
0.25 0.04 0.03

Elevation (m)

Station (m)

Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007

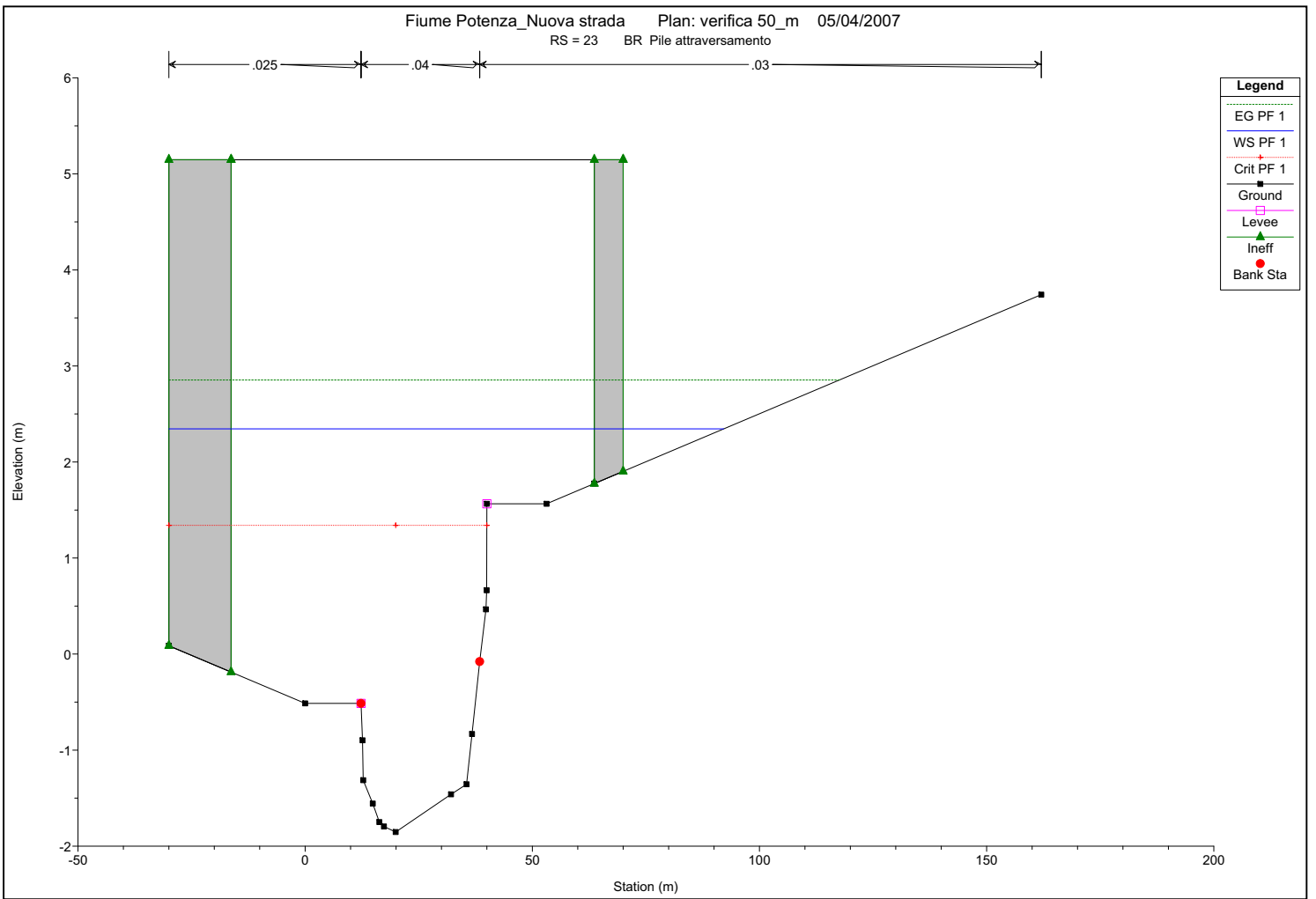
RS = 23 BR Pile attraversamento



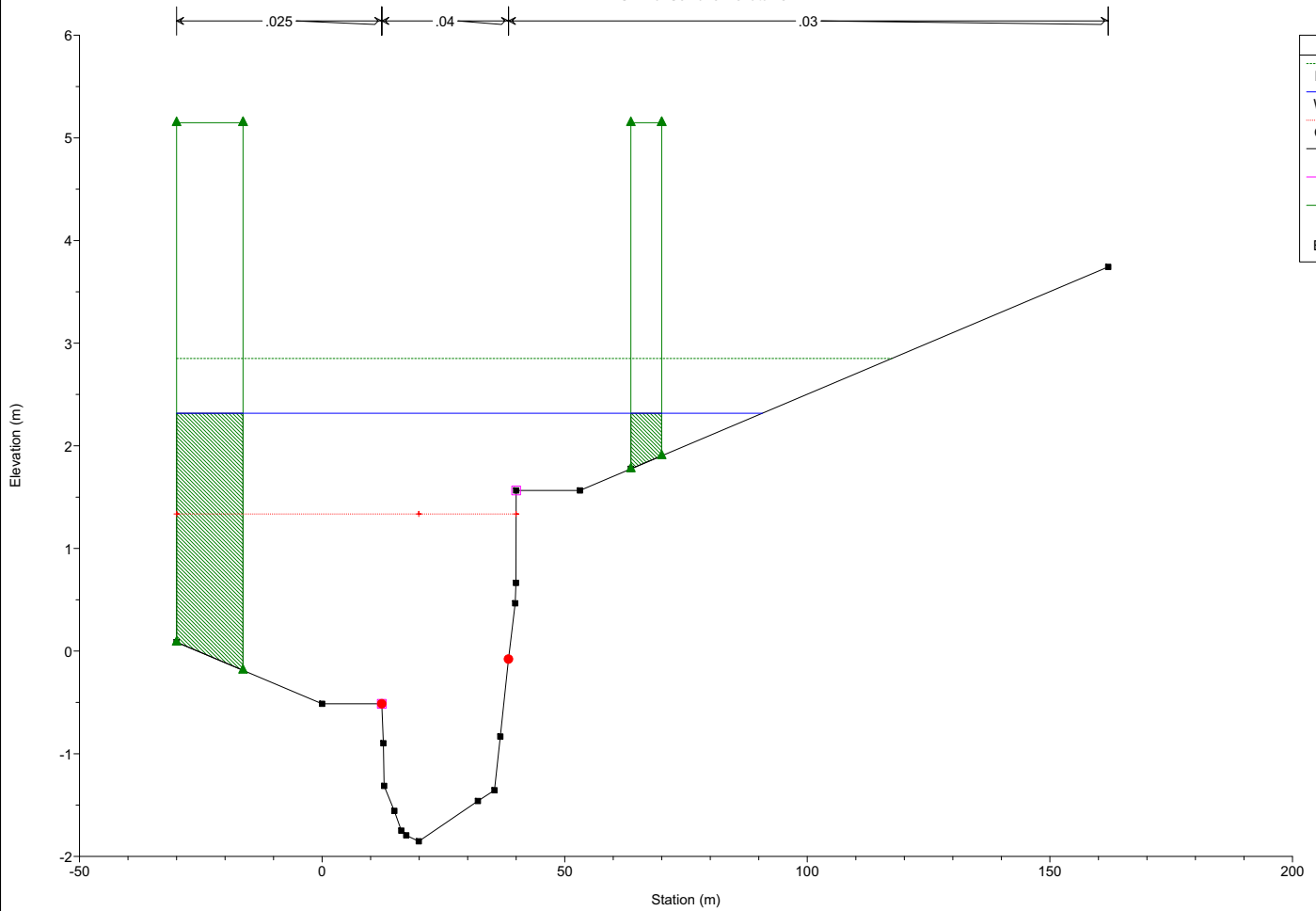
- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Ineff
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007

RS = 23 BR Pile attraversamento

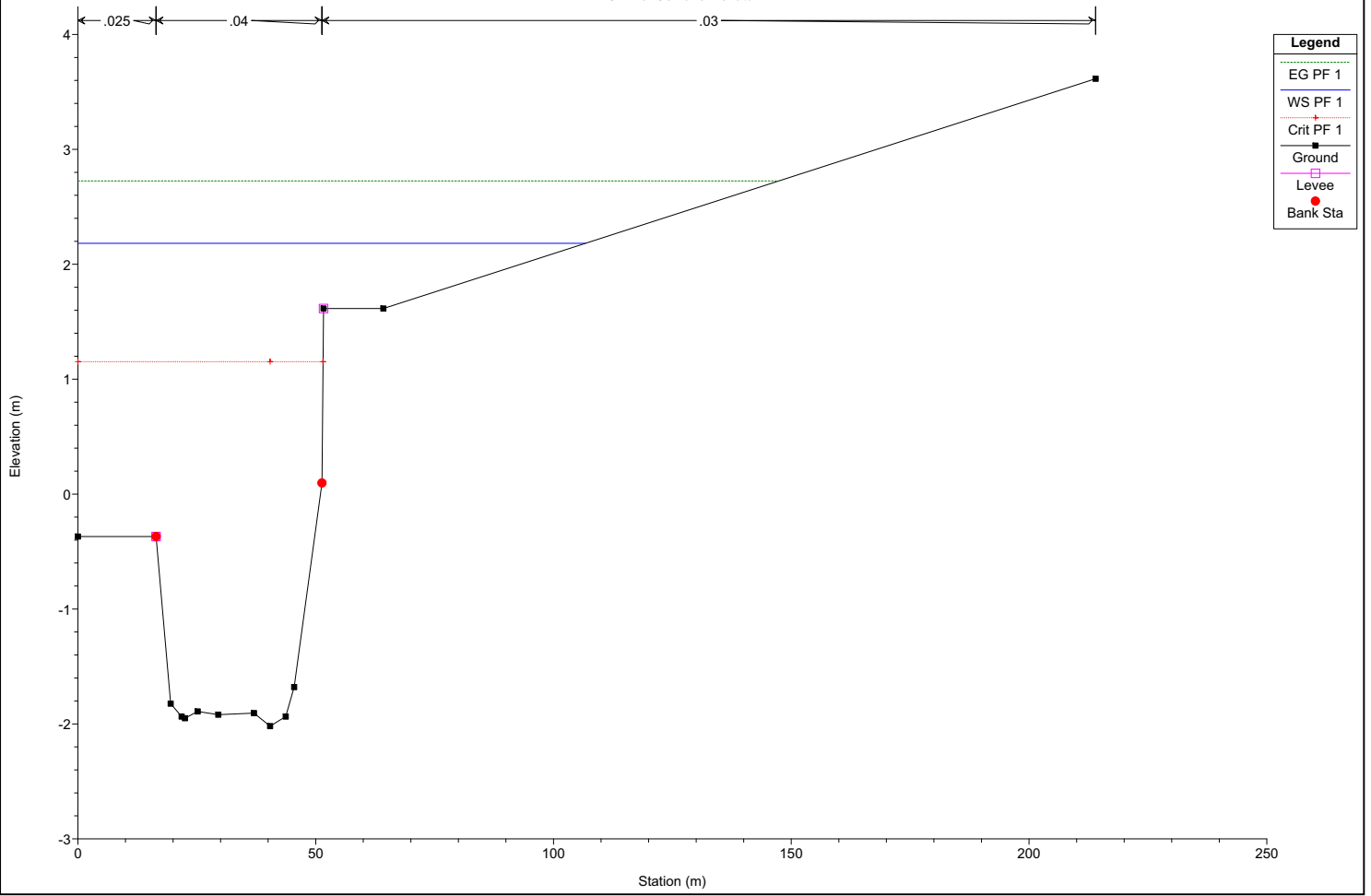


Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007
 RS = 20 Sezione rilevata "C"

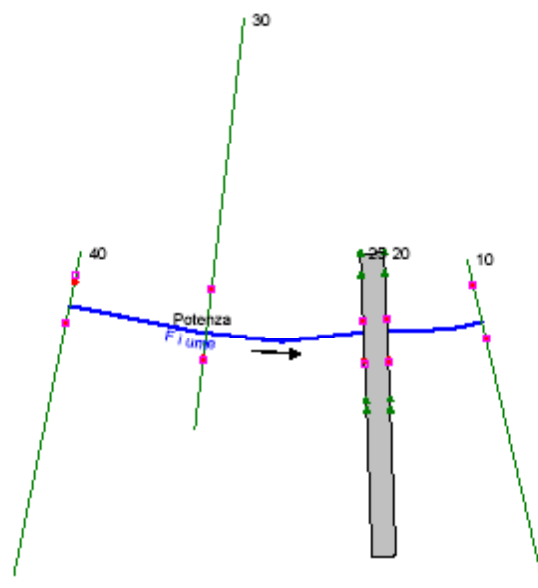


- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Ineff
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 50_m 05/04/2007
RS = 10 Sezione rilevata "D"



VERIFICA CON HEC-RAS 3.1.3 (Tempo di ritorno: 200 anni)



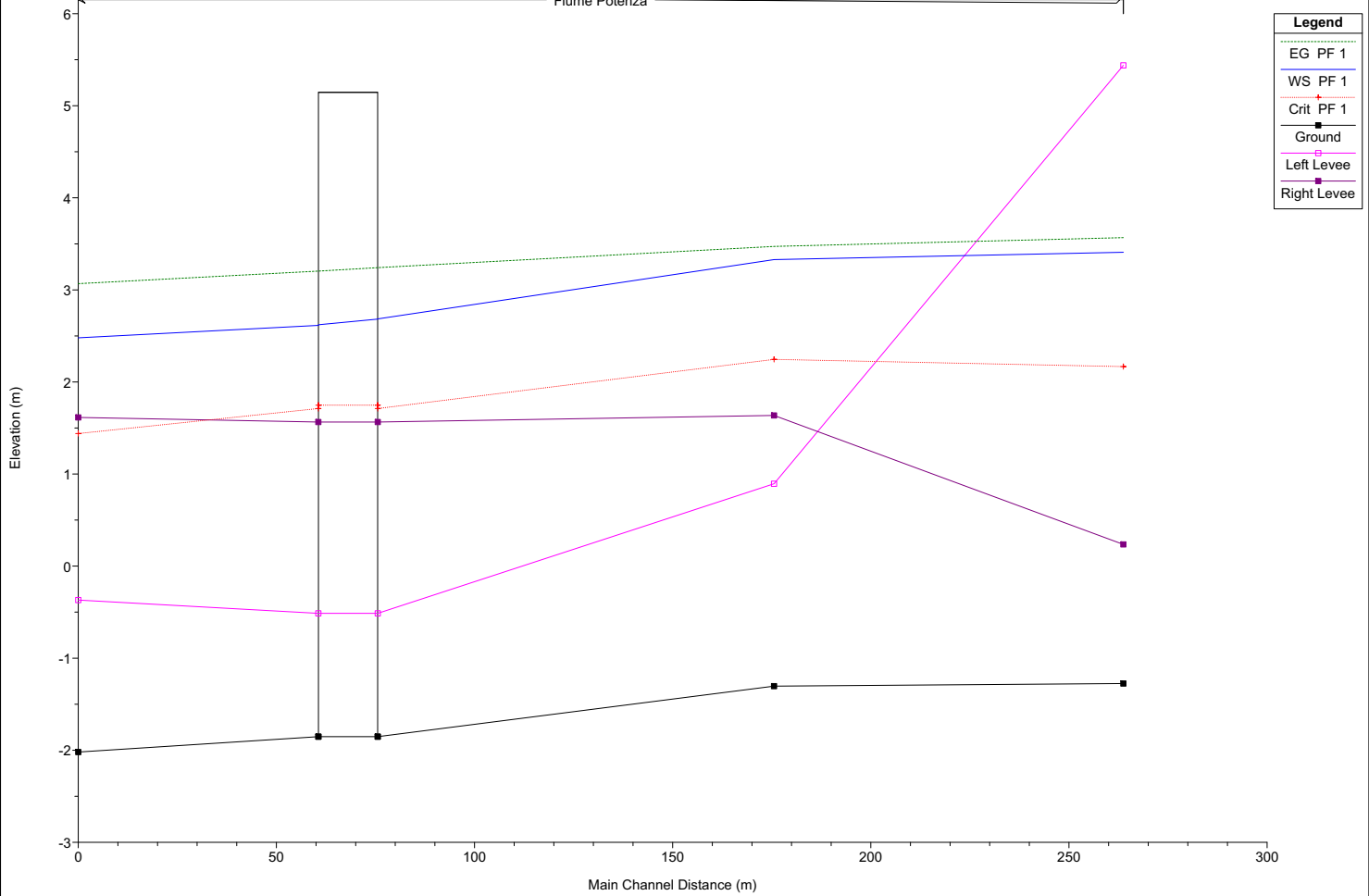
H max del livello idrico (m)	4,68
Portata max utilizzata (mc/sec)	709,00

HEC-RAS Plan: 200_m River: Fiume Reach: Potenza Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Potenza	40	PF 1	709.00	-1.27	3.41	2.17	3.57	0.001066	2.06	410.18	193.93	0.32
Potenza	30	PF 1	709.00	-1.30	3.33	2.25	3.47	0.000933	1.88	435.42	233.08	0.30
Potenza	25	PF 1	709.00	-1.85	2.68	1.71	3.24	0.002043	2.88	242.81	139.13	0.45
Potenza	23	Bridge										
Potenza	20	PF 1	709.00	-1.85	2.61	1.71	3.20	0.002217	2.97	234.52	135.60	0.47
Potenza	10	PF 1	709.00	-2.02	2.48	1.44	3.07	0.002801	3.37	230.51	128.98	0.53

Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007

Fiume Potenza



Plan: 200_m Fiume Potenza RS: 40 Profile: PF 1

E.G. Elev (m)	3.57	Element	Left OB	Channel	Right OB
Vel Head (m)	0.16	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.41	Reach Len. (m)	92.68	88.13	95.38
Crit W.S. (m)	2.17	Flow Area (m2)	2.56	113.18	294.44
E.G. Slope (m/m)	0.001066	Area (m2)	2.56	113.18	294.44
Q Total (m3/s)	709.00	Flow (m3/s)	2.38	232.68	473.93
Top Width (m)	193.93	Top Width (m)	4.09	26.35	163.49
Vel Total (m/s)	1.73	Avg. Vel. (m/s)	0.93	2.06	1.61
Max Chl Dpth (m)	4.68	Hydr. Depth (m)	0.63	4.30	1.80
Conv. Total (m3/s)	21716.8	Conv. (m3/s)	73.0	7127.1	14516.7
Length Wtd. (m)	91.94	Wetted Per. (m)	4.26	28.31	163.69
Min Ch El (m)	-1.27	Shear (N/m2)	6.29	41.78	18.80
Alpha	1.04	Stream Power (N/m s)	5.85	85.90	30.26
Frctn Loss (m)	0.09	Cum Volume (1000 m3)	46.97	35.88	26.62
C & E Loss (m)	0.00	Cum SA (1000 m2)	27.47	8.84	26.17

Plan: 200_m Fiume Potenza RS: 30 Profile: PF 1

E.G. Elev (m)	3.47	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.33	Reach Len. (m)	211.32	100.00	0.01
Crit W.S. (m)	2.25	Flow Area (m2)	202.48	171.73	61.21
E.G. Slope (m/m)	0.000933	Area (m2)	202.48	171.73	61.21
Q Total (m3/s)	709.00	Flow (m3/s)	310.43	323.43	75.14
Top Width (m)	233.08	Top Width (m)	144.04	43.91	45.13
Vel Total (m/s)	1.63	Avg. Vel. (m/s)	1.53	1.88	1.23
Max Chl Dpth (m)	4.63	Hydr. Depth (m)	1.41	3.91	1.36
Conv. Total (m3/s)	23210.8	Conv. (m3/s)	10162.6	10588.3	2459.9
Length Wtd. (m)	142.23	Wetted Per. (m)	144.06	44.34	46.23
Min Ch El (m)	-1.30	Shear (N/m2)	12.86	35.44	12.11
Alpha	1.06	Stream Power (N/m s)	19.72	66.74	14.87
Frctn Loss (m)	0.19	Cum Volume (1000 m3)	37.47	23.32	9.66
C & E Loss (m)	0.04	Cum SA (1000 m2)	20.61	5.74	16.22

Plan: 200_m Fiume Potenza RS: 25 Profile: PF 1

E.G. Elev (m)	3.24	Element	Left OB	Channel	Right OB
Vel Head (m)	0.56	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.68	Reach Len. (m)	0.04	0.04	0.04
Crit W.S. (m)	1.71	Flow Area (m2)	88.80	109.47	44.54
E.G. Slope (m/m)	0.002043	Area (m2)	126.26	109.47	49.92
Q Total (m3/s)	709.00	Flow (m3/s)	341.64	315.44	51.92
Top Width (m)	139.13	Top Width (m)	42.30	26.11	70.72
Vel Total (m/s)	2.92	Avg. Vel. (m/s)	3.85	2.88	1.17
Max Chl Dpth (m)	4.54	Hydr. Depth (m)	3.10	4.19	0.69
Conv. Total (m3/s)	15686.6	Conv. (m3/s)	7558.7	6979.0	1148.8
Length Wtd. (m)	0.04	Wetted Per. (m)	28.60	26.88	65.43
Min Ch El (m)	-1.85	Shear (N/m2)	62.19	81.57	13.64
Alpha	1.28	Stream Power (N/m s)	239.28	235.05	15.90
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	2.73	9.26	9.66
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.92	2.24	16.22

Plan: 200_m Fiume Potenza RS: 23 BR U Profile: PF 1

E.G. Elev (m)	3.24	Element	Left OB	Channel	Right OB
Vel Head (m)	0.56	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.68	Reach Len. (m)	14.95	14.95	14.95
Crit W.S. (m)	1.75	Flow Area (m2)	88.75	109.43	29.18
E.G. Slope (m/m)	0.002211	Area (m2)	88.75	109.43	29.18
Q Total (m3/s)	709.00	Flow (m3/s)	333.15	327.92	47.93
Top Width (m)	79.94	Top Width (m)	28.60	26.11	25.24
Vel Total (m/s)	3.12	Avg. Vel. (m/s)	3.75	3.00	1.64
Max Chl Dpth (m)	4.54	Hydr. Depth (m)	3.10	4.19	1.16
Conv. Total (m3/s)	15078.7	Conv. (m3/s)	7085.3	6974.1	1019.3
Length Wtd. (m)	14.95	Wetted Per. (m)	31.47	26.88	27.20
Min Ch El (m)	-1.85	Shear (N/m2)	61.13	88.25	23.26
Alpha	1.13	Stream Power (N/m s)	229.49	264.45	38.20

Plan: 200_m Fiume Potenza RS: 23 BR U Profile: PF 1 (Continued)

Frctn Loss (m)	0.03	Cum Volume (1000 m3)	2.73	9.26	9.66
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.92	2.24	16.22

Plan: 200_m Fiume Potenza RS: 23 BR D Profile: PF 1

E.G. Elev (m)	3.20	Element	Left OB	Channel	Right OB
Vel Head (m)	0.58	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.62	Reach Len. (m)	0.01	0.01	0.01
Crit W.S. (m)	1.75	Flow Area (m2)	86.98	107.81	27.62
E.G. Slope (m/m)	0.002360	Area (m2)	86.98	107.81	27.62
Q Total (m3/s)	709.00	Flow (m3/s)	333.26	330.49	45.25
Top Width (m)	79.94	Top Width (m)	28.60	26.11	25.24
Vel Total (m/s)	3.19	Avg. Vel. (m/s)	3.83	3.07	1.64
Max Chl Dpth (m)	4.47	Hydr. Depth (m)	3.04	4.13	1.09
Conv. Total (m3/s)	14594.7	Conv. (m3/s)	6860.1	6803.2	931.4
Length Wtd. (m)	0.01	Wetted Per. (m)	31.41	26.88	27.14
Min Ch El (m)	-1.85	Shear (N/m2)	64.08	92.81	23.55
Alpha	1.13	Stream Power (N/m s)	245.53	284.49	38.58
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	1.41	7.63	9.23
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.49	1.85	15.84

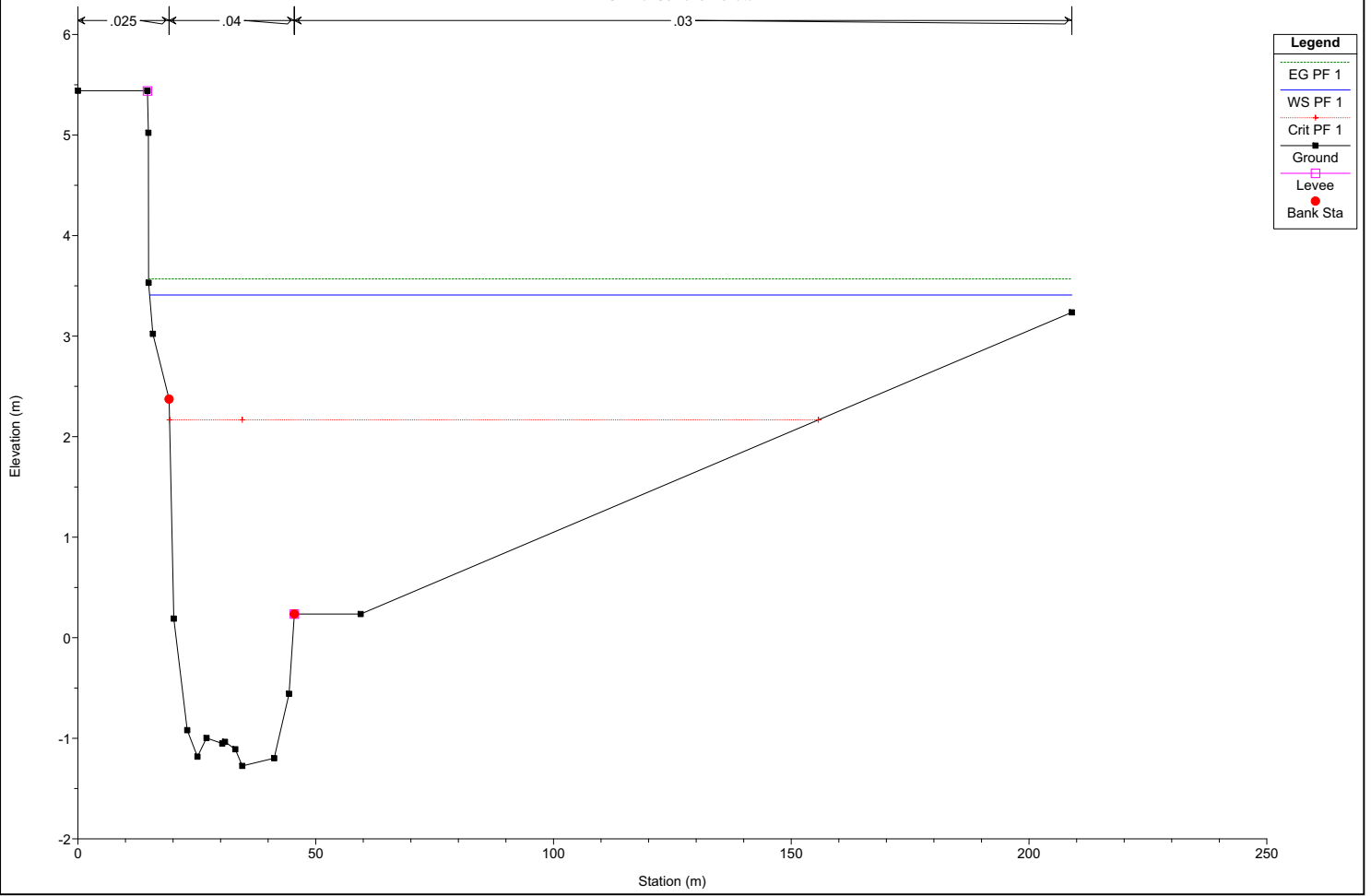
Plan: 200_m Fiume Potenza RS: 20 Profile: PF 1

E.G. Elev (m)	3.20	Element	Left OB	Channel	Right OB
Vel Head (m)	0.59	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.61	Reach Len. (m)	16.61	60.59	218.74
Crit W.S. (m)	1.71	Flow Area (m2)	86.78	107.63	40.11
E.G. Slope (m/m)	0.002217	Area (m2)	123.27	107.63	45.04
Q Total (m3/s)	709.00	Flow (m3/s)	342.47	319.39	47.14
Top Width (m)	135.60	Top Width (m)	42.30	26.11	67.19
Vel Total (m/s)	3.02	Avg. Vel. (m/s)	3.95	2.97	1.18
Max Chl Dpth (m)	4.47	Hydr. Depth (m)	3.03	4.12	0.66
Conv. Total (m3/s)	15059.4	Conv. (m3/s)	7274.1	6784.0	1001.4
Length Wtd. (m)	54.55	Wetted Per. (m)	28.60	26.88	61.90
Min Ch El (m)	-1.85	Shear (N/m2)	65.94	87.02	14.09
Alpha	1.27	Stream Power (N/m s)	260.25	258.23	16.56
Frctn Loss (m)	0.14	Cum Volume (1000 m3)	1.41	7.63	9.23
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.49	1.85	15.84

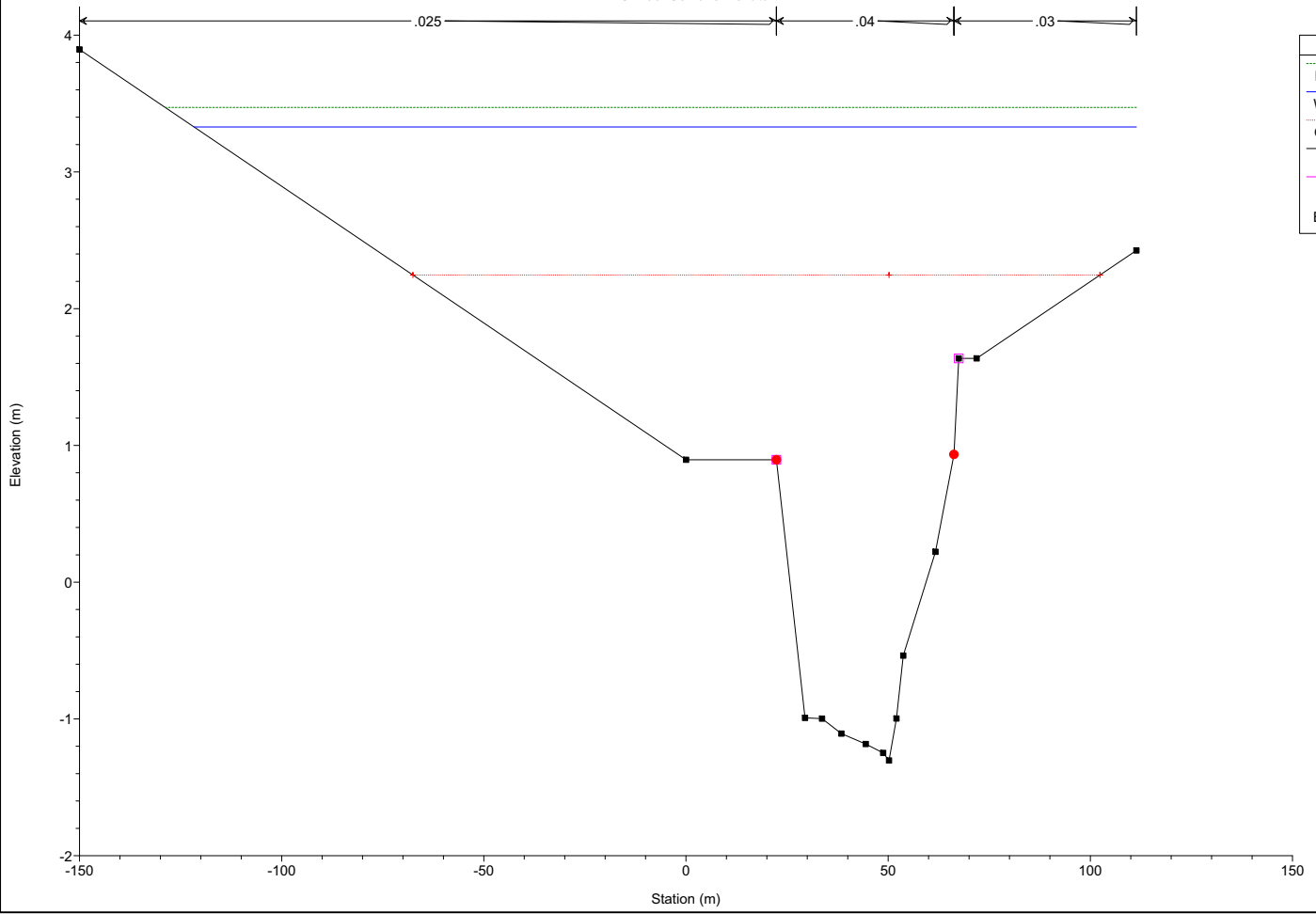
Plan: 200_m Fiume Potenza RS: 10 Profile: PF 1

E.G. Elev (m)	3.07	Element	Left OB	Channel	Right OB
Vel Head (m)	0.59	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.48	Reach Len. (m)			
Crit W.S. (m)	1.44	Flow Area (m2)	46.83	144.29	39.39
E.G. Slope (m/m)	0.002801	Area (m2)	46.83	144.29	39.39
Q Total (m3/s)	709.00	Flow (m3/s)	179.09	486.18	43.73
Top Width (m)	128.98	Top Width (m)	16.44	34.89	77.65
Vel Total (m/s)	3.08	Avg. Vel. (m/s)	3.82	3.37	1.11
Max Chl Dpth (m)	4.50	Hydr. Depth (m)	2.85	4.14	0.51
Conv. Total (m3/s)	13397.2	Conv. (m3/s)	3384.0	9186.9	826.3
Length Wtd. (m)		Wetted Per. (m)	19.29	35.50	78.89
Min Ch El (m)	-2.02	Shear (N/m2)	66.69	111.63	13.71
Alpha	1.22	Stream Power (N/m s)	255.01	376.12	15.22
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007
 RS = 40 Sezione rilevata "A"

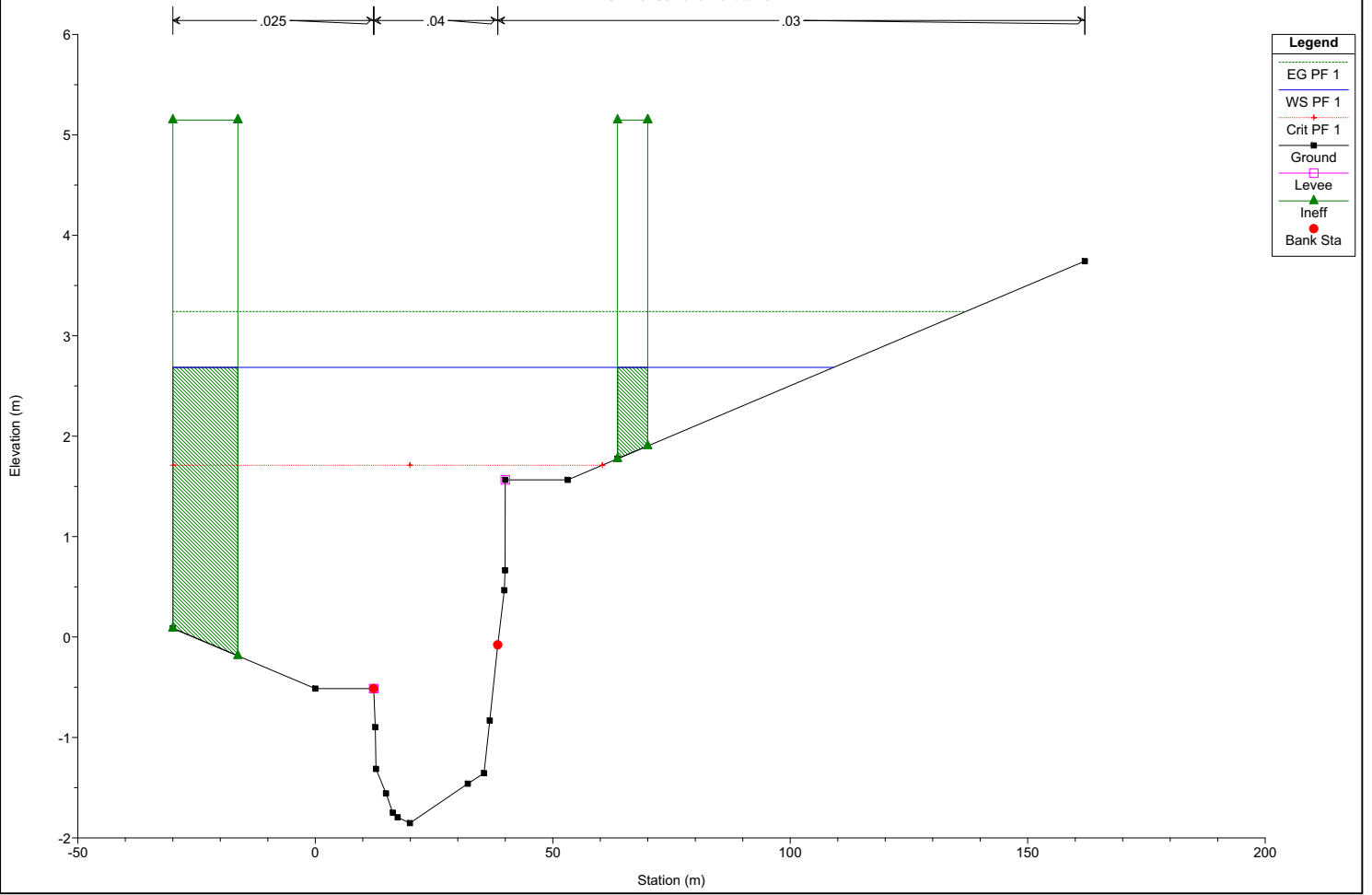


Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007
RS = 30 Sezione rilevata "B"



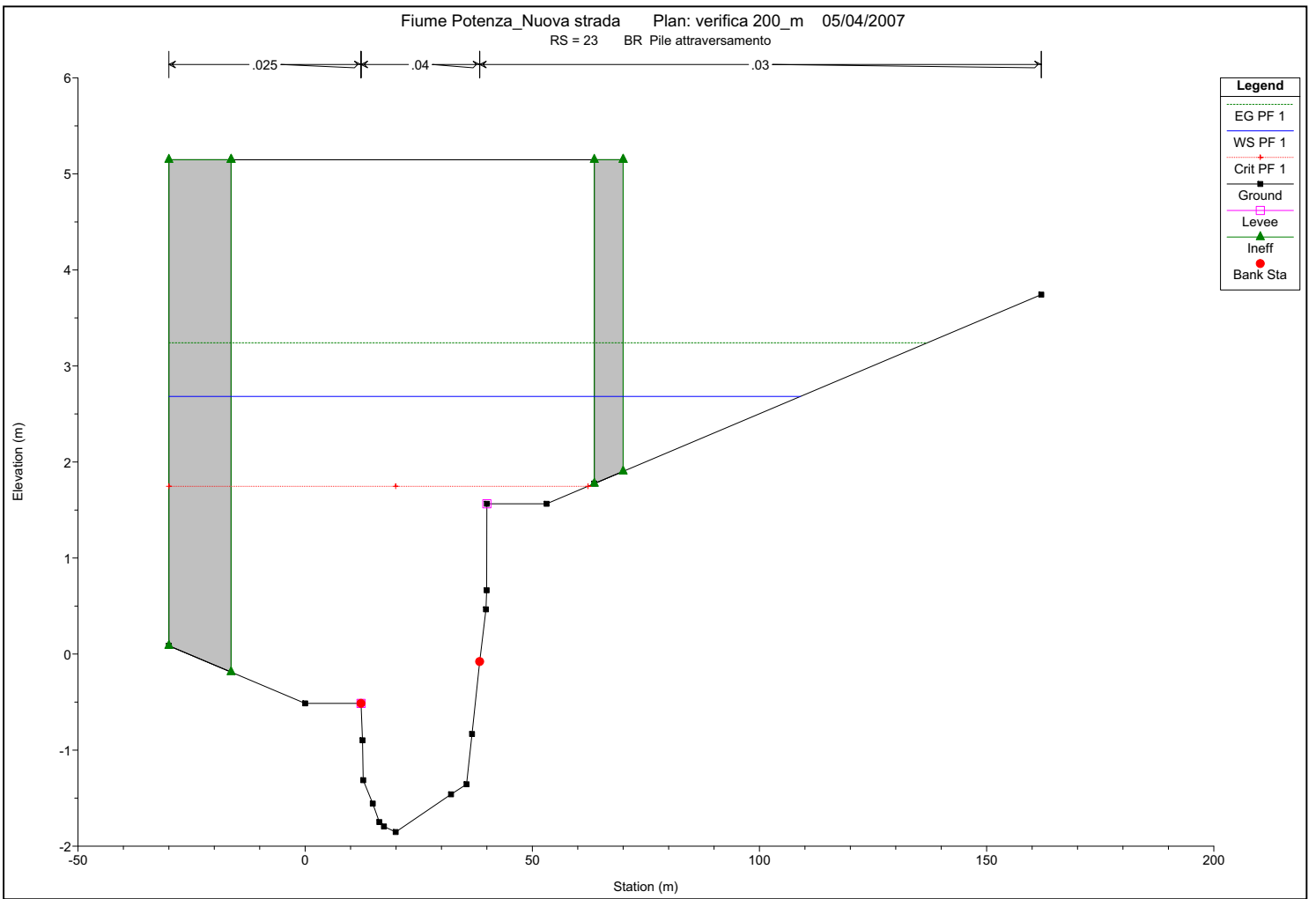
- EG PF 1
- WS PF 1
- Crit PF 1
- Ground
- Levee
- Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007
RS = 25 Sezione rilevata "C"



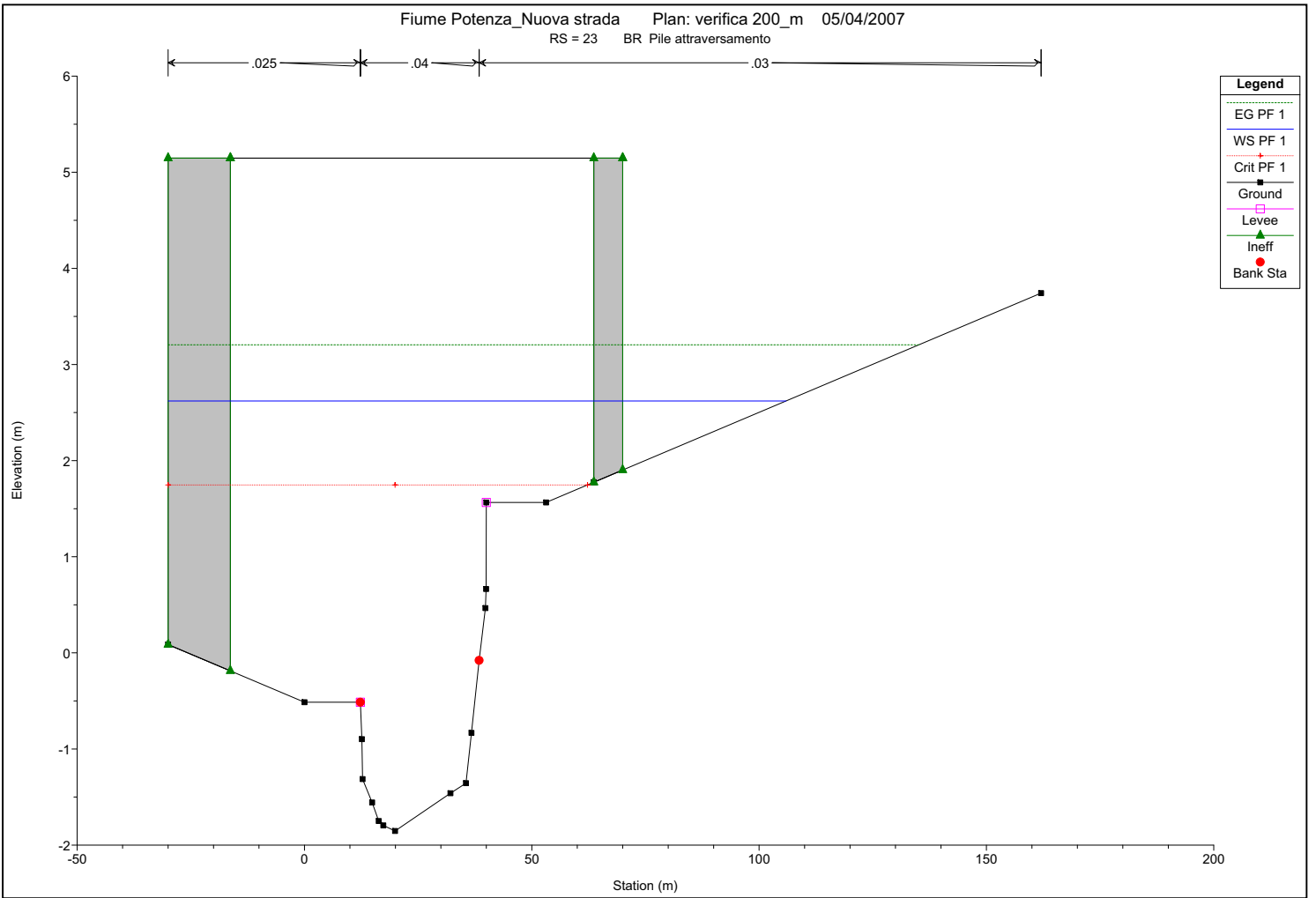
Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007

RS = 23 BR Pile attraversamento



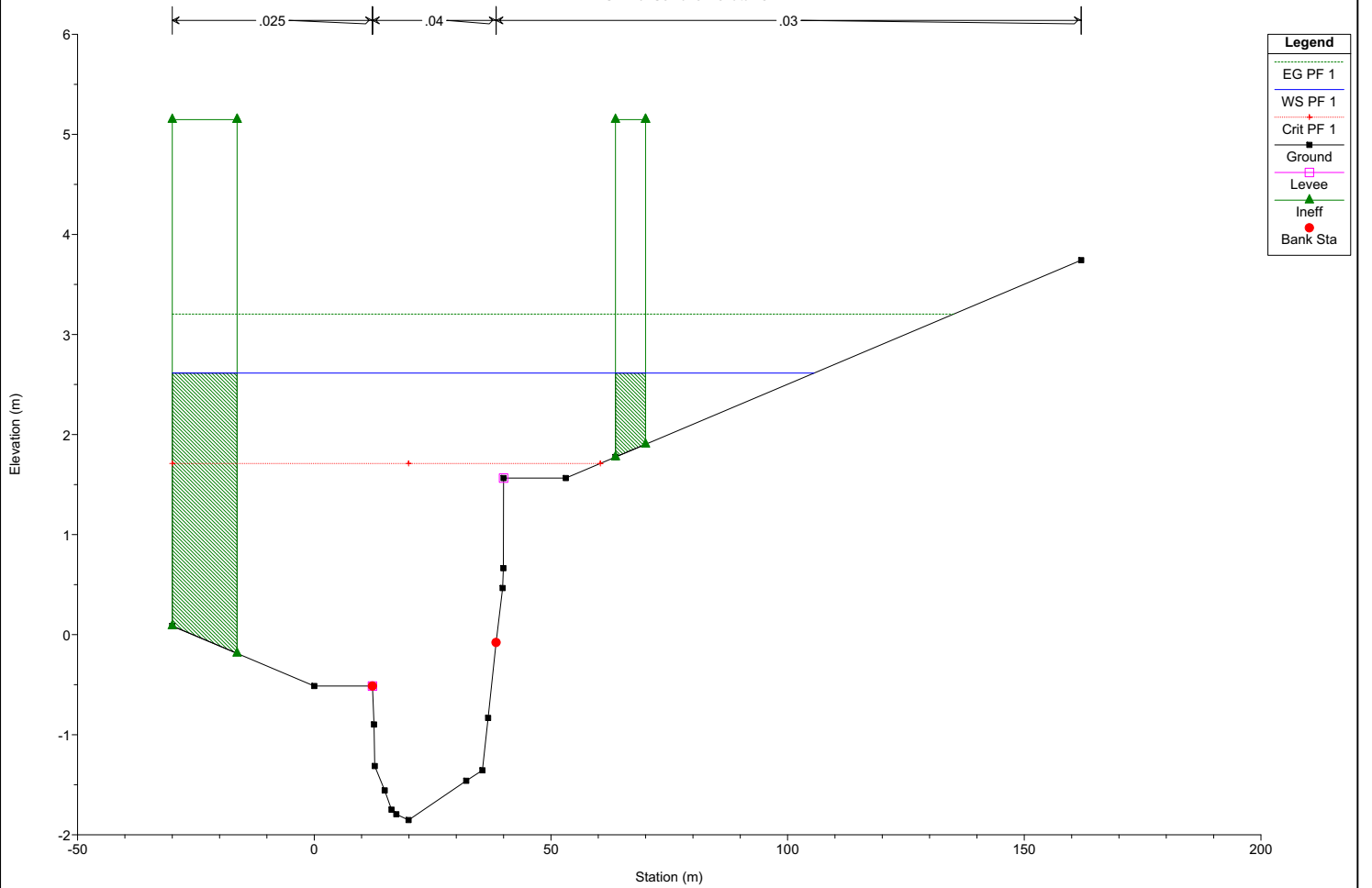
Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007

RS = 23 BR Pile attraversamento



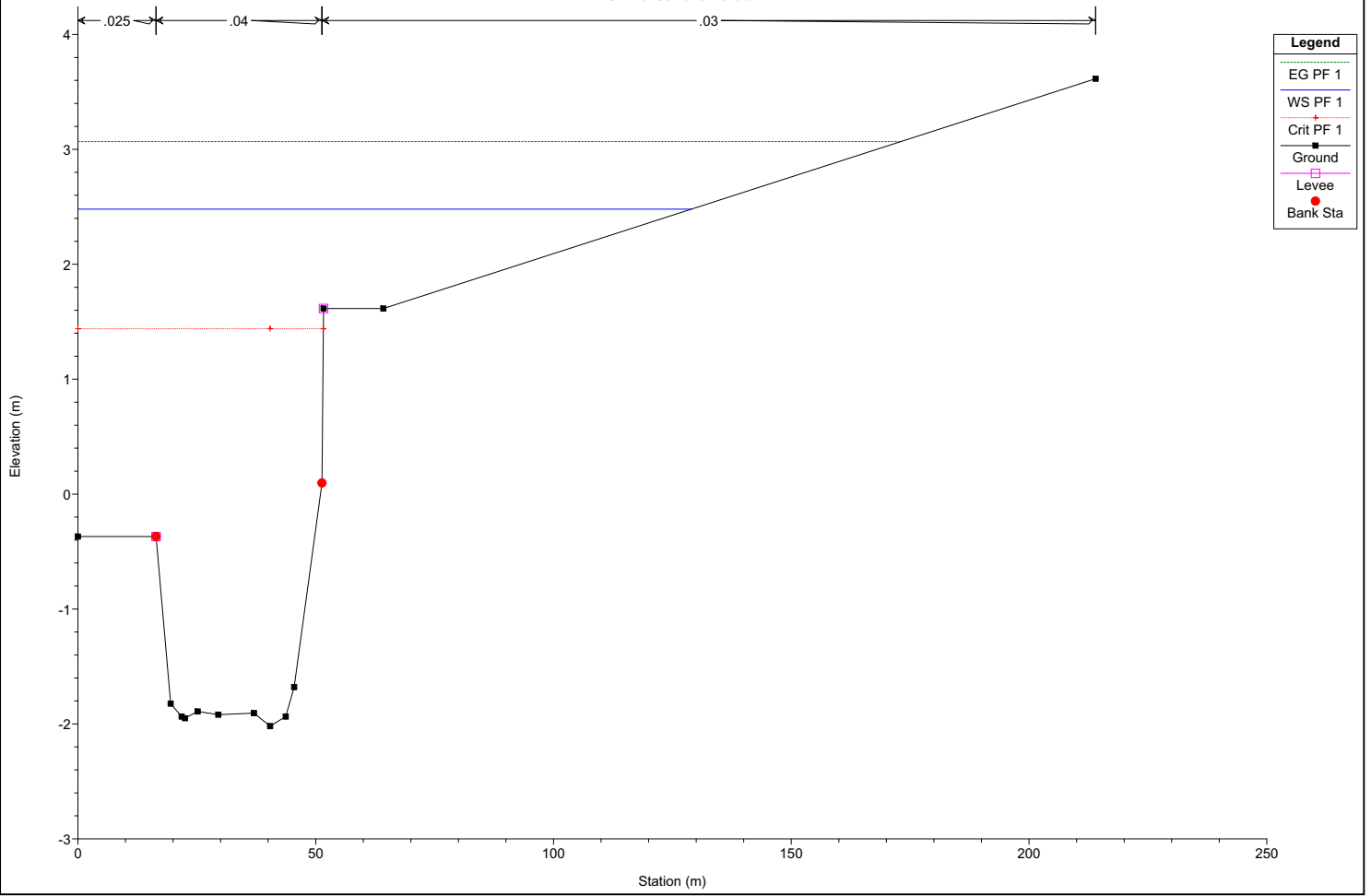
- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Ineff
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007
 RS = 20 Sezione rilevata "C"

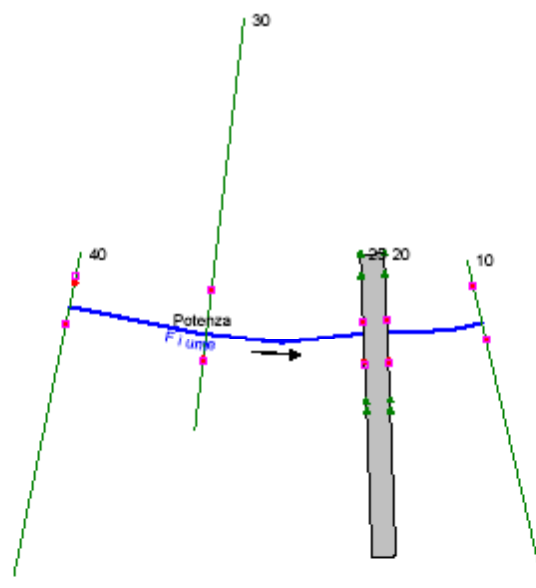


- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Ineff
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 200_m 05/04/2007
RS = 10 Sezione rilevata "D"



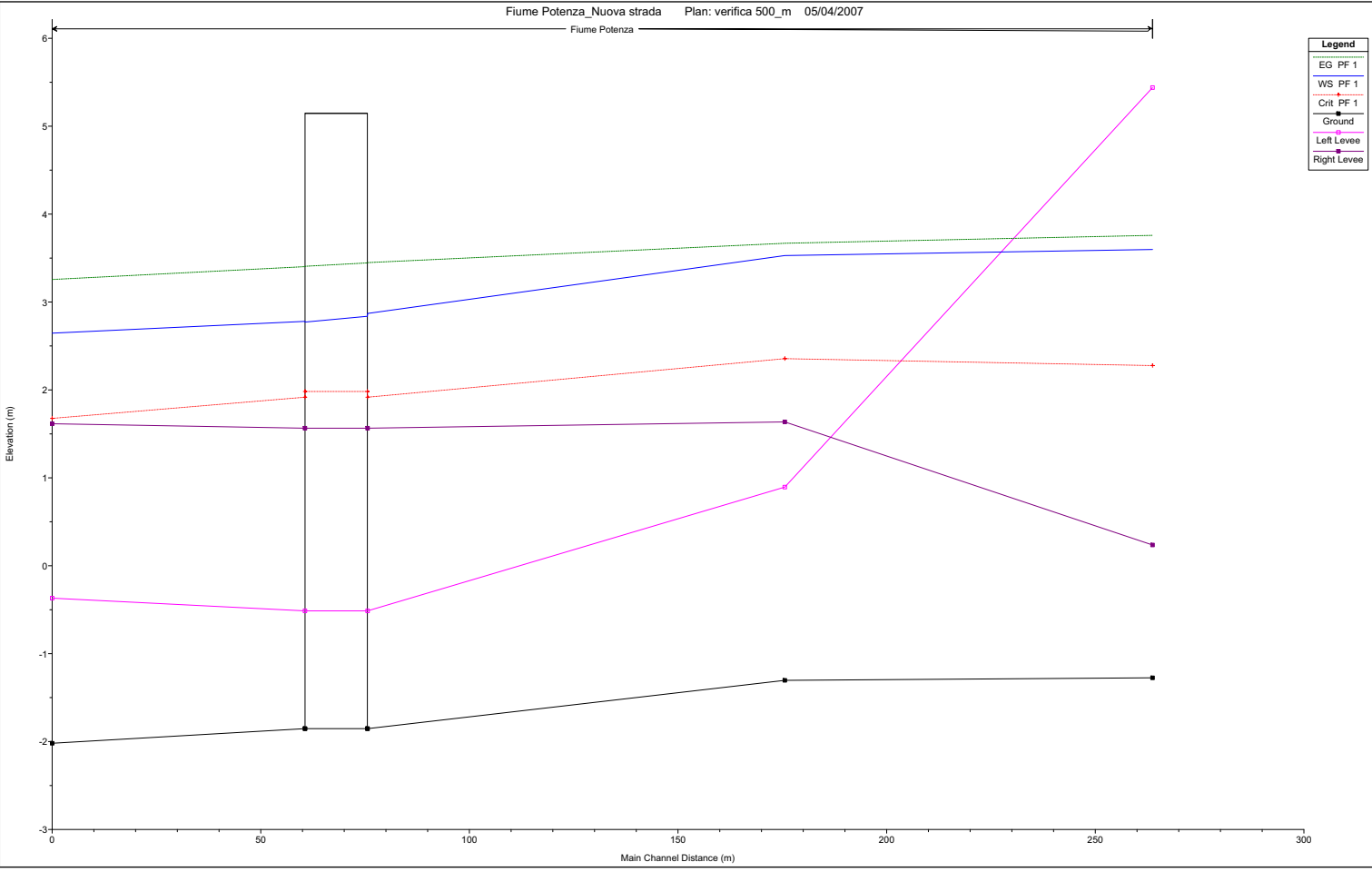
VERIFICA CON HEC-RAS 3.1.3 (Tempo di ritorno: 500 anni)



H max del livello idrico (m)	4,87
Portata max utilizzata (mc/sec)	780,00

HEC-RAS Plan: 500_m River: Fiume Reach: Potenza Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Potenza	40	PF 1	780.00	-1.27	3.60	2.28	3.76	0.000982	2.03	446.82	194.15	0.31
Potenza	30	PF 1	780.00	-1.30	3.53	2.36	3.67	0.000846	1.85	483.05	243.08	0.29
Potenza	25	PF 1	780.00	-1.85	2.87	1.92	3.45	0.002004	2.94	265.69	148.38	0.45
Potenza	23	Bridge										
Potenza	20	PF 1	780.00	-1.85	2.78	1.92	3.40	0.002218	3.05	254.34	143.88	0.47
Potenza	10	PF 1	780.00	-2.02	2.65	1.68	3.26	0.002797	3.46	252.97	141.42	0.53



Plan: 500_m Fiume Potenza RS: 40 Profile: PF 1

E.G. Elev (m)	3.76	Element	Left OB	Channel	Right OB
Vel Head (m)	0.16	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.60	Reach Len. (m)	92.68	88.13	95.38
Crit W.S. (m)	2.28	Flow Area (m2)	3.36	118.15	325.31
E.G. Slope (m/m)	0.000982	Area (m2)	3.36	118.15	325.31
Q Total (m3/s)	780.00	Flow (m3/s)	3.43	239.91	536.65
Top Width (m)	194.15	Top Width (m)	4.31	26.35	163.49
Vel Total (m/s)	1.75	Avg. Vel. (m/s)	1.02	2.03	1.65
Max Chl Dpth (m)	4.87	Hydr. Depth (m)	0.78	4.48	1.99
Conv. Total (m3/s)	24893.5	Conv. (m3/s)	109.5	7656.8	17127.2
Length Wtd. (m)	92.09	Wetted Per. (m)	4.57	28.31	163.88
Min Ch EI (m)	-1.27	Shear (N/m2)	7.08	40.18	19.11
Alpha	1.03	Stream Power (N/m s)	7.23	81.59	31.53
Frctn Loss (m)	0.08	Cum Volume (1000 m3)	52.51	37.53	31.40
C & E Loss (m)	0.01	Cum SA (1000 m2)	29.00	8.84	28.44

Plan: 500_m Fiume Potenza RS: 30 Profile: PF 1

E.G. Elev (m)	3.67	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.53	Reach Len. (m)	211.32	100.00	0.01
Crit W.S. (m)	2.36	Flow Area (m2)	232.30	180.52	70.24
E.G. Slope (m/m)	0.000846	Area (m2)	232.30	180.52	70.24
Q Total (m3/s)	780.00	Flow (m3/s)	355.47	334.77	89.76
Top Width (m)	243.08	Top Width (m)	154.04	43.91	45.13
Vel Total (m/s)	1.61	Avg. Vel. (m/s)	1.53	1.85	1.28
Max Chl Dpth (m)	4.83	Hydr. Depth (m)	1.51	4.11	1.56
Conv. Total (m3/s)	26809.6	Conv. (m3/s)	12218.1	11506.4	3085.1
Length Wtd. (m)	141.61	Wetted Per. (m)	154.07	44.34	46.43
Min Ch EI (m)	-1.30	Shear (N/m2)	12.52	33.79	12.56
Alpha	1.05	Stream Power (N/m s)	19.15	62.67	16.05
Frctn Loss (m)	0.18	Cum Volume (1000 m3)	41.59	24.37	12.54
C & E Loss (m)	0.04	Cum SA (1000 m2)	21.66	5.74	18.49

Plan: 500_m Fiume Potenza RS: 25 Profile: PF 1

E.G. Elev (m)	3.45	Element	Left OB	Channel	Right OB
Vel Head (m)	0.58	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.87	Reach Len. (m)	0.04	0.04	0.04
Crit W.S. (m)	1.92	Flow Area (m2)	94.09	114.30	57.30
E.G. Slope (m/m)	0.002004	Area (m2)	134.09	114.30	63.86
Q Total (m3/s)	780.00	Flow (m3/s)	372.62	335.72	71.66
Top Width (m)	148.38	Top Width (m)	42.30	26.11	79.97
Vel Total (m/s)	2.94	Avg. Vel. (m/s)	3.96	2.94	1.25
Max Chl Dpth (m)	4.72	Hydr. Depth (m)	3.29	4.38	0.78
Conv. Total (m3/s)	17424.7	Conv. (m3/s)	8324.2	7499.7	1600.9
Length Wtd. (m)	0.04	Wetted Per. (m)	28.60	26.88	74.68
Min Ch EI (m)	-1.85	Shear (N/m2)	64.64	83.55	15.08
Alpha	1.32	Stream Power (N/m s)	255.99	245.38	18.86
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	2.88	9.63	12.53
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.92	2.24	18.49

Plan: 500_m Fiume Potenza RS: 23 BR U Profile: PF 1

E.G. Elev (m)	3.44	Element	Left OB	Channel	Right OB
Vel Head (m)	0.61	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.84	Reach Len. (m)	14.95	14.95	14.95
Crit W.S. (m)	1.98	Flow Area (m2)	93.18	113.47	33.09
E.G. Slope (m/m)	0.002284	Area (m2)	93.18	113.47	33.09
Q Total (m3/s)	780.00	Flow (m3/s)	366.06	354.09	59.84
Top Width (m)	79.94	Top Width (m)	28.60	26.11	25.24
Vel Total (m/s)	3.25	Avg. Vel. (m/s)	3.93	3.12	1.81
Max Chl Dpth (m)	4.69	Hydr. Depth (m)	3.26	4.35	1.31
Conv. Total (m3/s)	16320.3	Conv. (m3/s)	7659.3	7408.9	1252.2
Length Wtd. (m)	14.95	Wetted Per. (m)	31.63	26.88	27.36
Min Ch EI (m)	-1.85	Shear (N/m2)	65.99	94.54	27.09
Alpha	1.13	Stream Power (N/m s)	259.25	295.02	49.00

Plan: 500 m Fiume Potenza RS: 23 BR U Profile: PF 1 (Continued)

Frctn Loss (m)	0.04	Cum Volume (1000 m3)	2.87	9.62	12.53
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.92	2.24	18.48

Plan: 500_m Fiume Potenza RS: 23 BR D Profile: PF 1

E.G. Elev (m)	3.41	Element	Left OB	Channel	Right OB
Vel Head (m)	0.64	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.77	Reach Len. (m)	0.01	0.01	0.01
Crit W.S. (m)	1.98	Flow Area (m2)	91.28	111.74	31.42
E.G. Slope (m/m)	0.002442	Area (m2)	91.28	111.74	31.42
Q Total (m3/s)	780.00	Flow (m3/s)	366.28	356.87	56.85
Top Width (m)	79.94	Top Width (m)	28.60	26.11	25.24
Vel Total (m/s)	3.33	Avg. Vel. (m/s)	4.01	3.19	1.81
Max Chl Dpth (m)	4.62	Hydr. Depth (m)	3.19	4.28	1.24
Conv. Total (m3/s)	15784.1	Conv. (m3/s)	7411.9	7221.7	1150.4
Length Wtd. (m)	0.01	Wetted Per. (m)	31.56	26.88	27.29
Min Ch El (m)	-1.85	Shear (N/m2)	69.26	99.54	27.57
Alpha	1.13	Stream Power (N/m s)	277.91	317.89	49.89
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	1.49	7.94	12.05
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.49	1.85	18.11

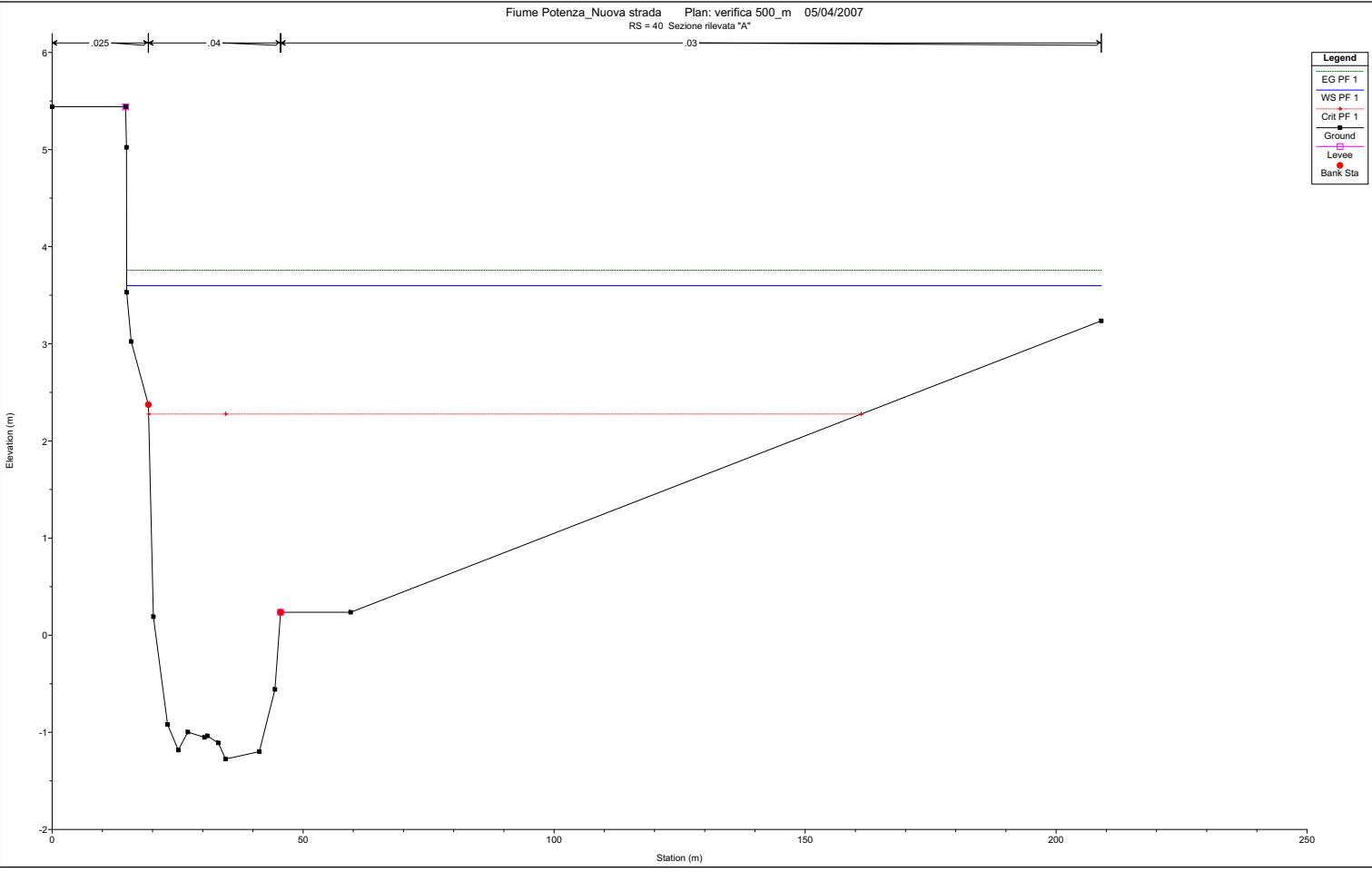
Plan: 500_m Fiume Potenza RS: 20 Profile: PF 1

E.G. Elev (m)	3.40	Element	Left OB	Channel	Right OB
Vel Head (m)	0.62	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.78	Reach Len. (m)	16.61	60.59	218.74
Crit W.S. (m)	1.92	Flow Area (m2)	91.51	111.95	50.87
E.G. Slope (m/m)	0.002218	Area (m2)	130.28	111.95	56.86
Q Total (m3/s)	780.00	Flow (m3/s)	374.34	341.20	64.46
Top Width (m)	143.88	Top Width (m)	42.30	26.11	75.47
Vel Total (m/s)	3.07	Avg. Vel. (m/s)	4.09	3.05	1.27
Max Chl Dpth (m)	4.63	Hydr. Depth (m)	3.20	4.29	0.74
Conv. Total (m3/s)	16560.6	Conv. (m3/s)	7947.8	7244.3	1368.5
Length Wtd. (m)	57.71	Wetted Per. (m)	28.60	26.88	70.18
Min Ch El (m)	-1.85	Shear (N/m2)	69.60	90.59	15.77
Alpha	1.30	Stream Power (N/m s)	284.71	276.10	19.98
Frctn Loss (m)	0.14	Cum Volume (1000 m3)	1.49	7.94	12.05
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.49	1.85	18.11

Plan: 500_m Fiume Potenza RS: 10 Profile: PF 1

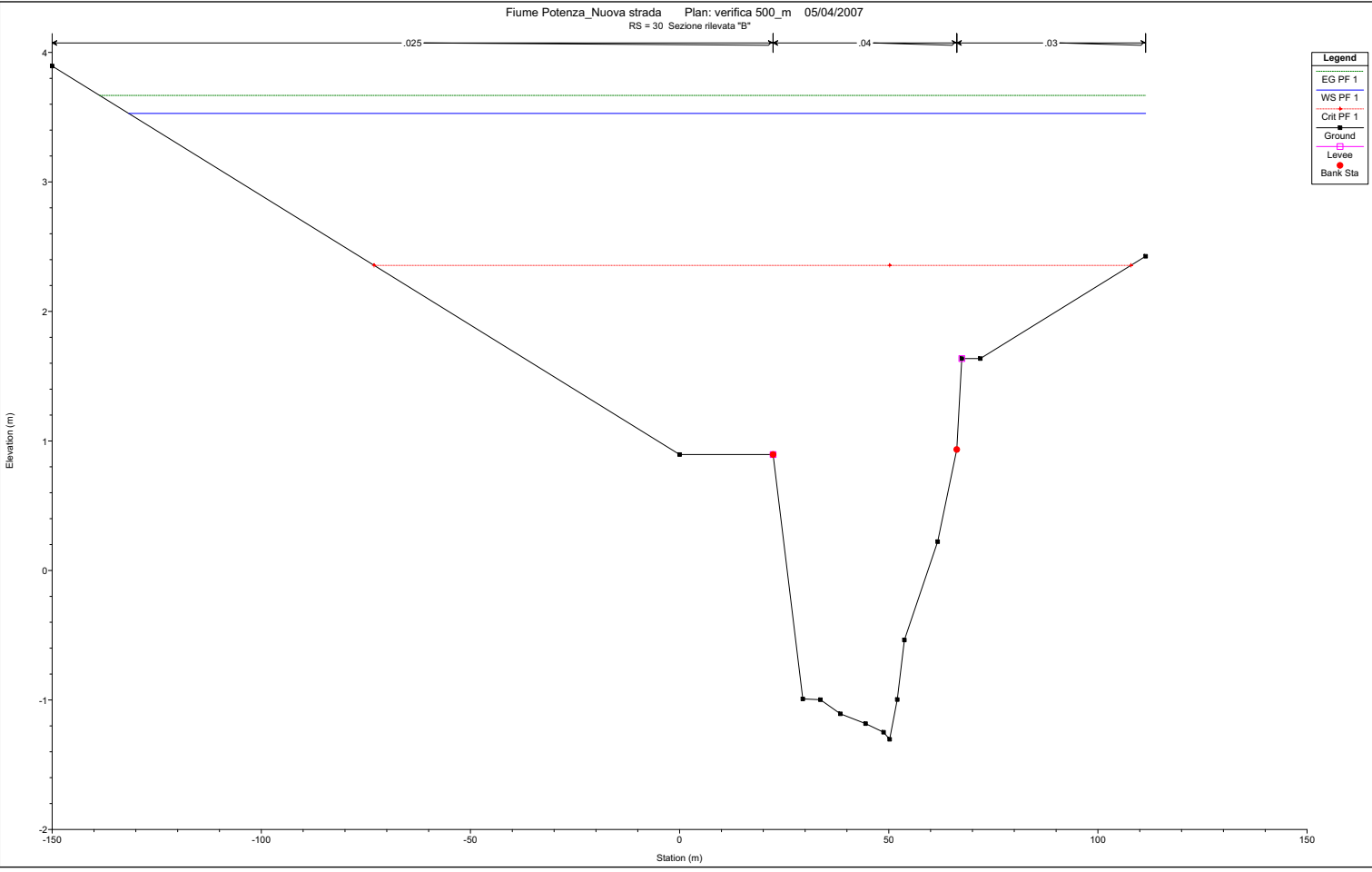
E.G. Elev (m)	3.26	Element	Left OB	Channel	Right OB
Vel Head (m)	0.61	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.65	Reach Len. (m)			
Crit W.S. (m)	1.68	Flow Area (m2)	49.56	150.09	53.32
E.G. Slope (m/m)	0.002797	Area (m2)	49.56	150.09	53.32
Q Total (m3/s)	780.00	Flow (m3/s)	195.56	518.78	65.66
Top Width (m)	141.42	Top Width (m)	16.44	34.89	90.09
Vel Total (m/s)	3.08	Avg. Vel. (m/s)	3.95	3.46	1.23
Max Chl Dpth (m)	4.66	Hydr. Depth (m)	3.01	4.30	0.59
Conv. Total (m3/s)	14749.7	Conv. (m3/s)	3698.1	9810.1	1241.6
Length Wtd. (m)		Wetted Per. (m)	19.45	35.50	91.33
Min Ch El (m)	-2.02	Shear (N/m2)	69.87	115.94	16.01
Alpha	1.26	Stream Power (N/m s)	275.68	400.74	19.71
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
RS = 40 Sezione rilevata "A"



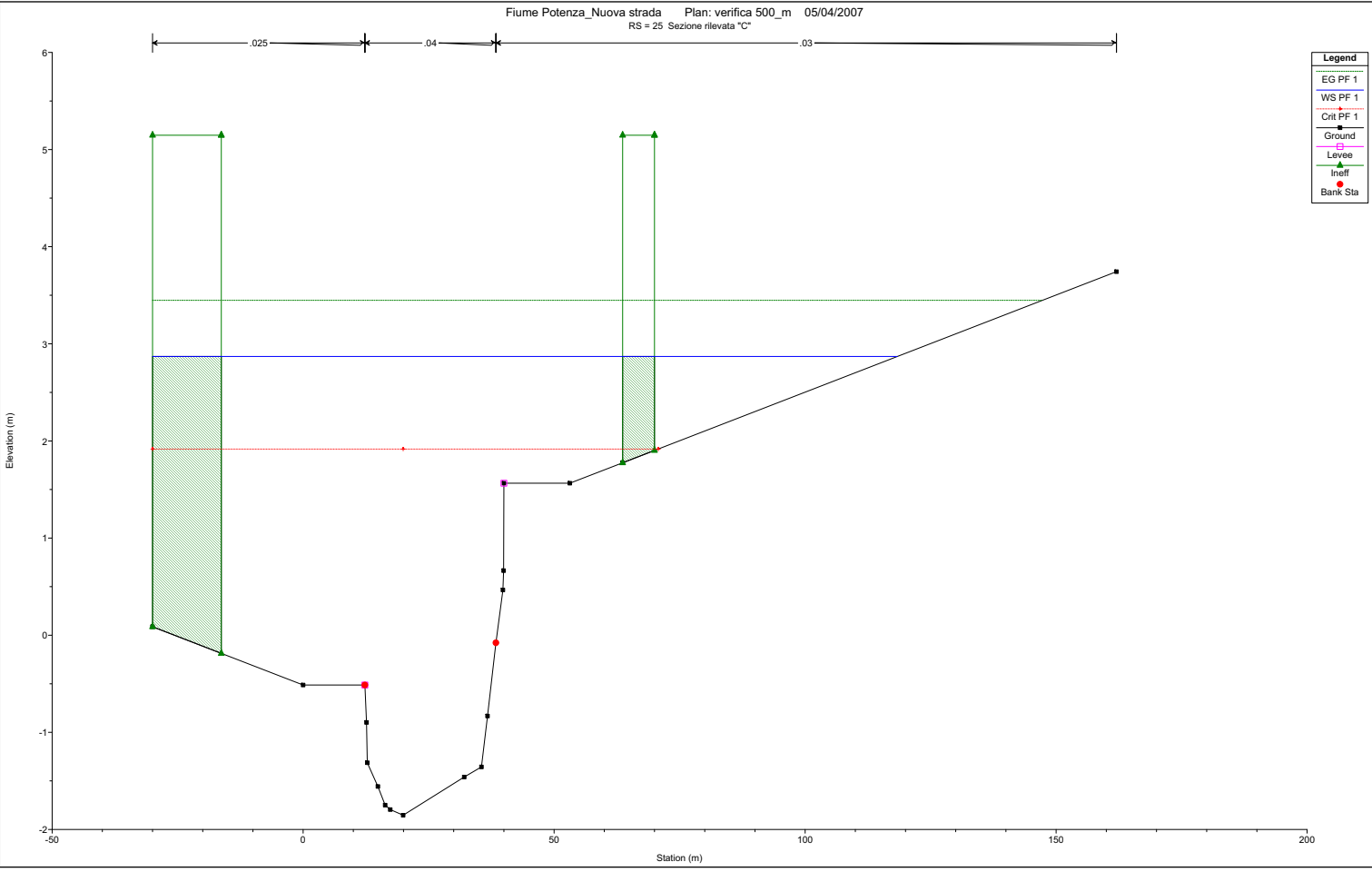
Legend	
EG PF 1	—
WS PF 1	—
Crit PF 1	—
Ground	—
Levee	■
Bank Sta	●

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
RS = 30 Sezione rilevata "B"



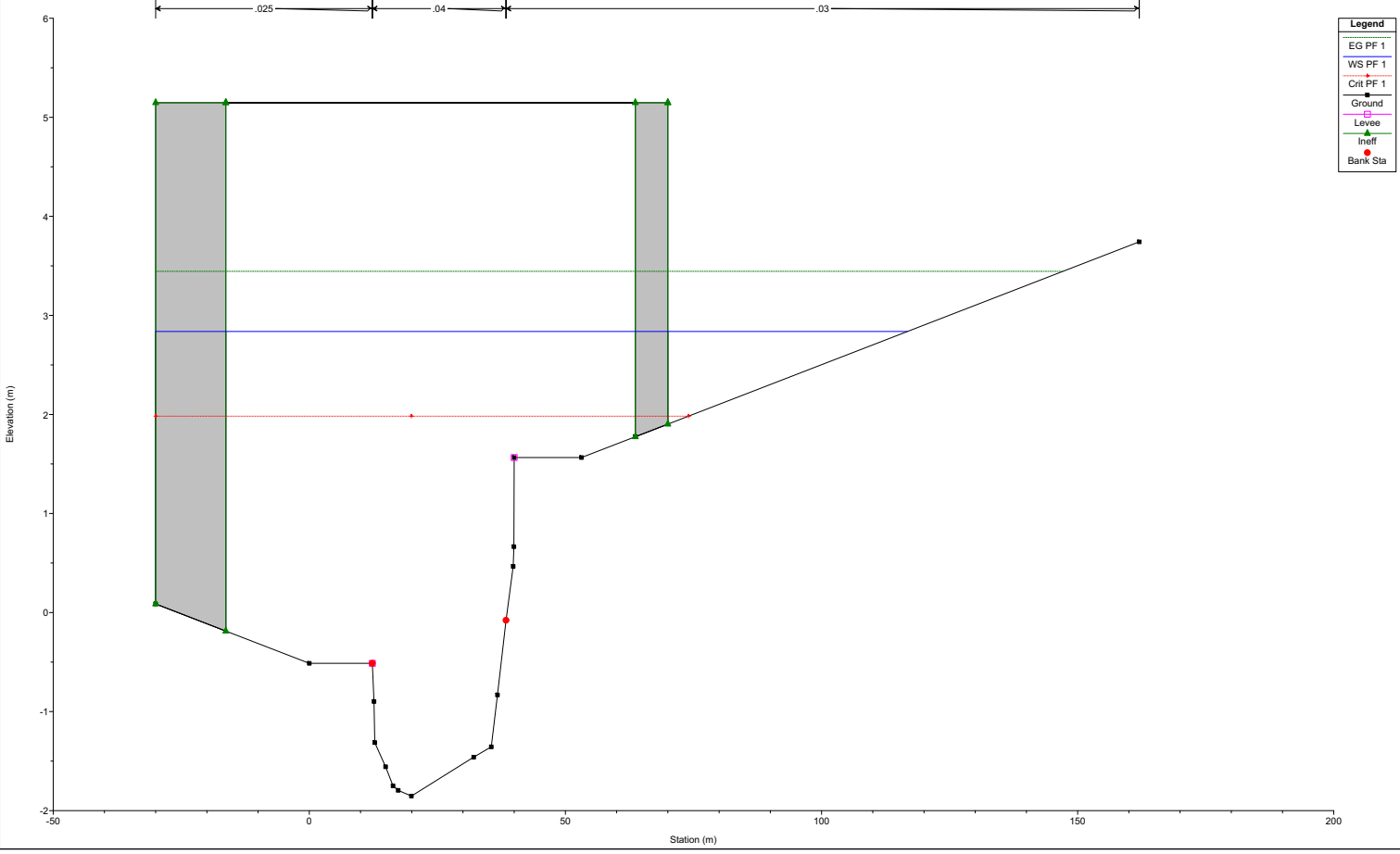
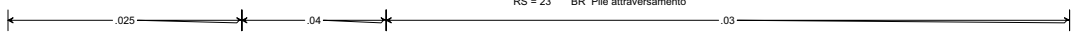
- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
RS = 25 Sezione rilevata "C"



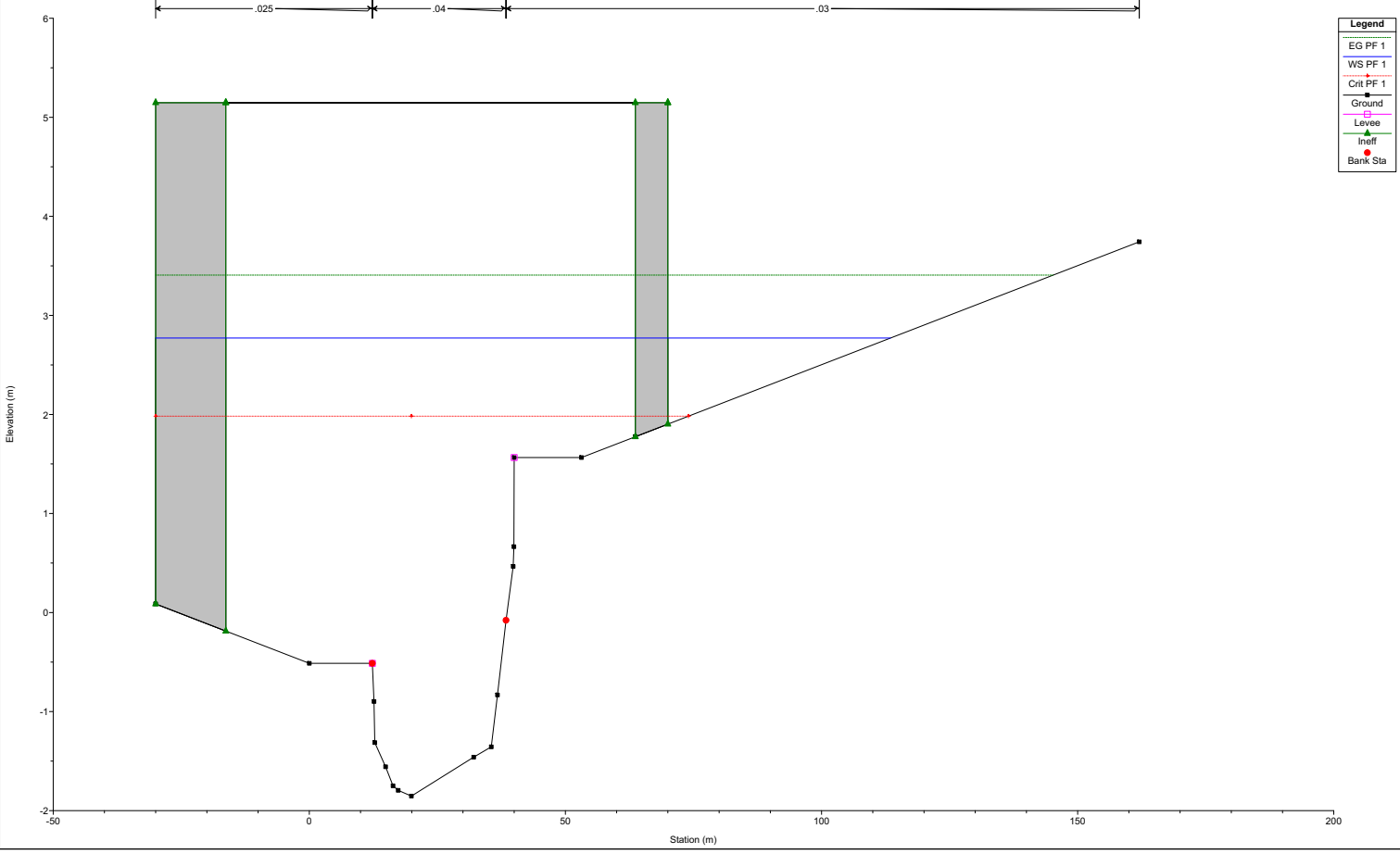
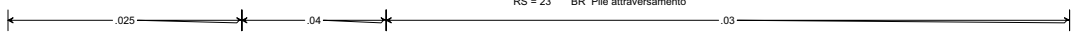
Legend	
EG PF 1	(dotted line)
WS PF 1	(blue line)
Crit PF 1	(red line)
Ground	(black line with square markers)
Levee	(green line with triangle markers)
Inlet	(green triangle)
Bank Sta	(red dot)

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
RS = 23 BR Pile attraversamento



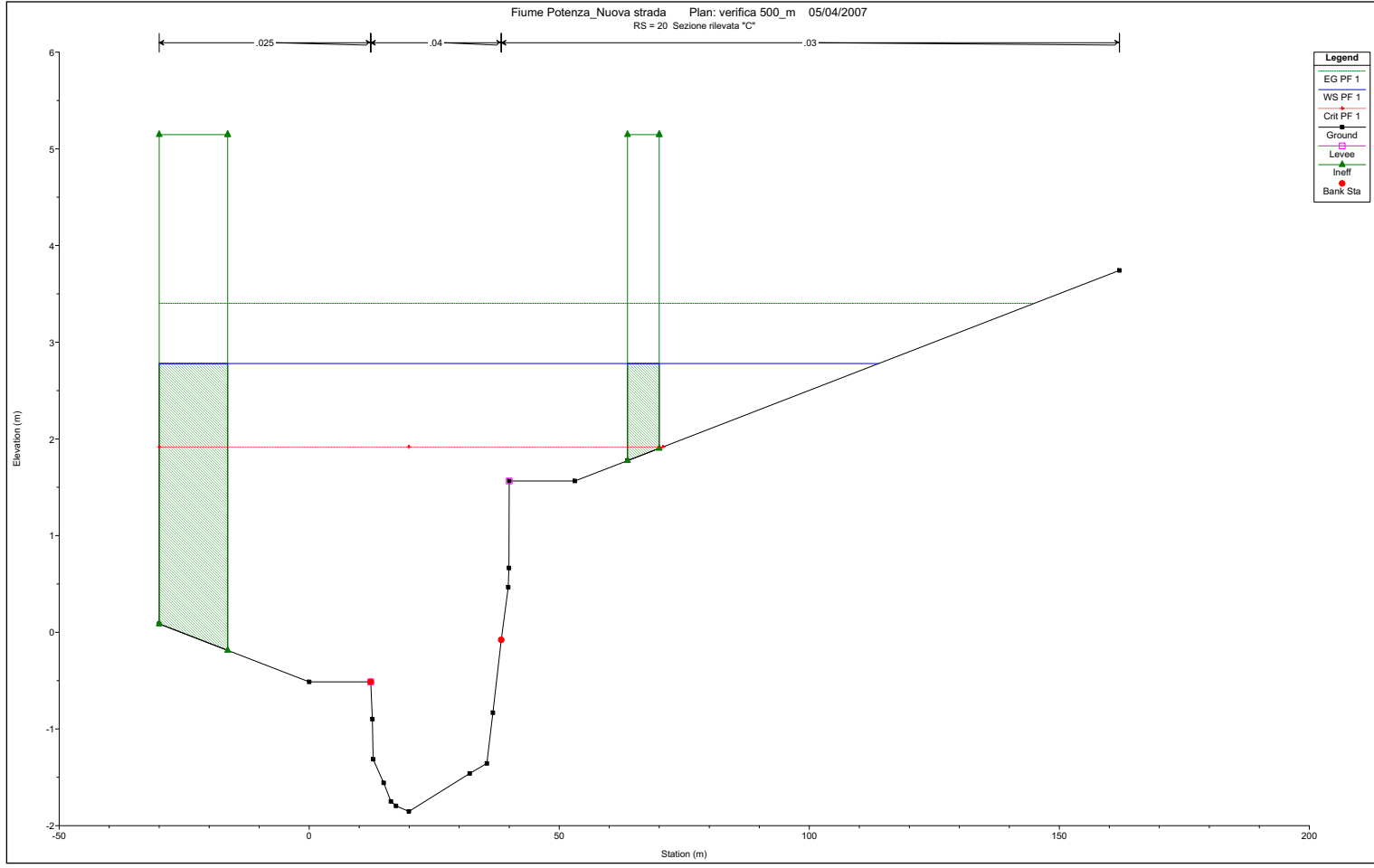
Legend	
EG PF 1	(Dotted line)
WS PF 1	(Blue line)
Crit PF 1	(Red line with dots)
Ground	(Black line with square markers)
Levee	(Purple line with square markers)
Inlet	(Green line with triangle markers)
Bank Sta	(Red line with circle markers)

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
 RS = 23 BR Pile attraversamento



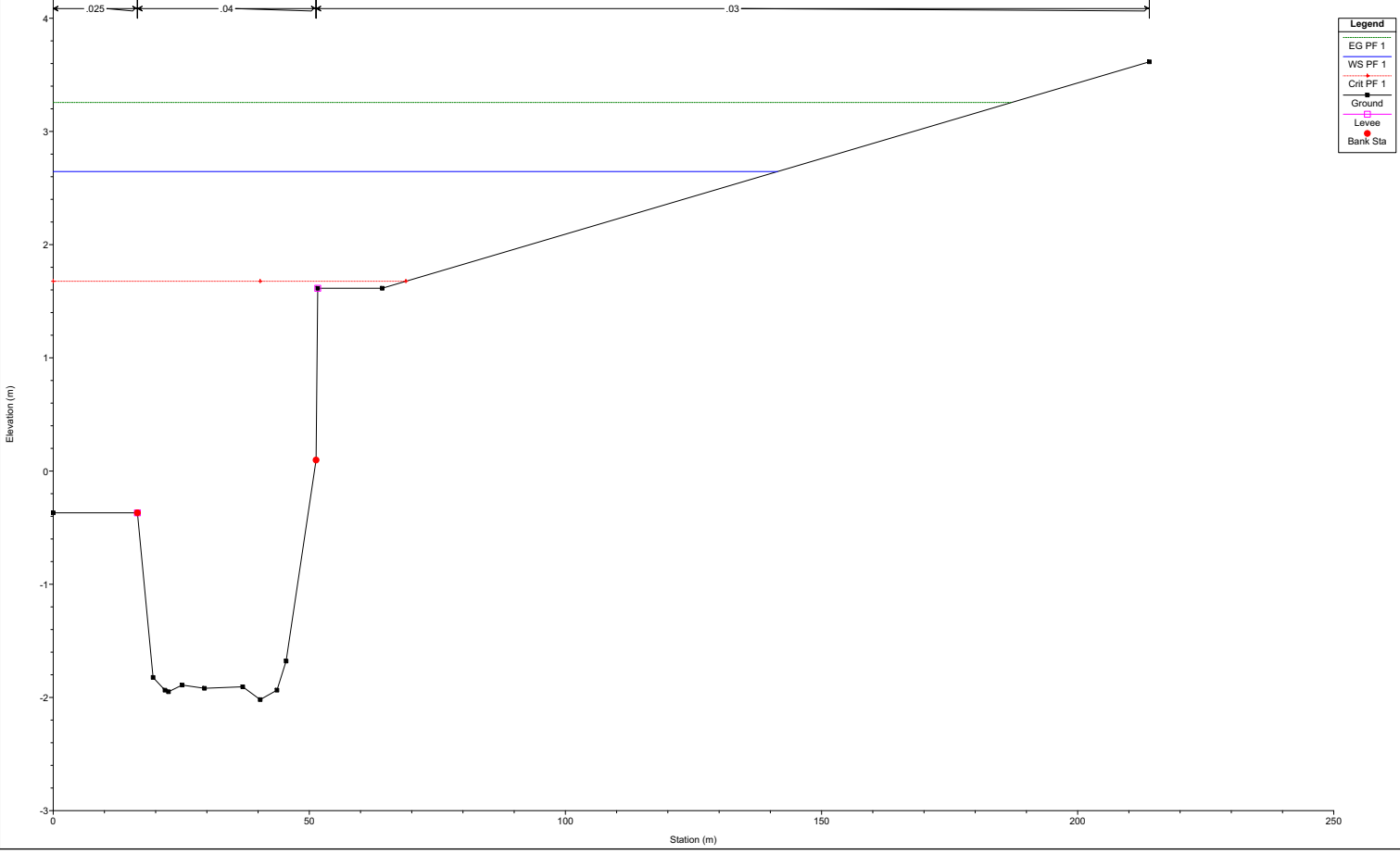
Legend	
EG PF 1	Blue line
WS PF 1	Red line with circle markers
Crit PF 1	Purple line with square markers
Ground	Black line with square markers
Levee	Green line with triangle markers
Inlet	Green line with triangle markers
Bank Sta	Red line with circle markers

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
RS = 20 Sezione rilevata "C"



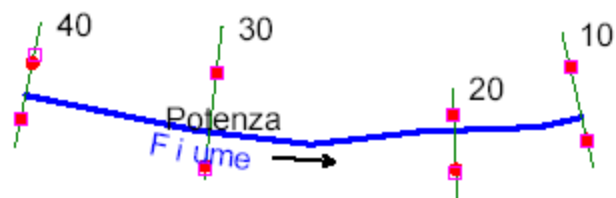
- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Inlet
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica 500_m 05/04/2007
RS = 10 Sezione rilevata "D"



- Legend
- EG PF 1
- WS PF 1
- Crit PF 1
- Ground
- Levee
- Bank Sta

VERIFICA CON HEC-RAS 3.1.3 (Tempo di ritorno: 50 anni)



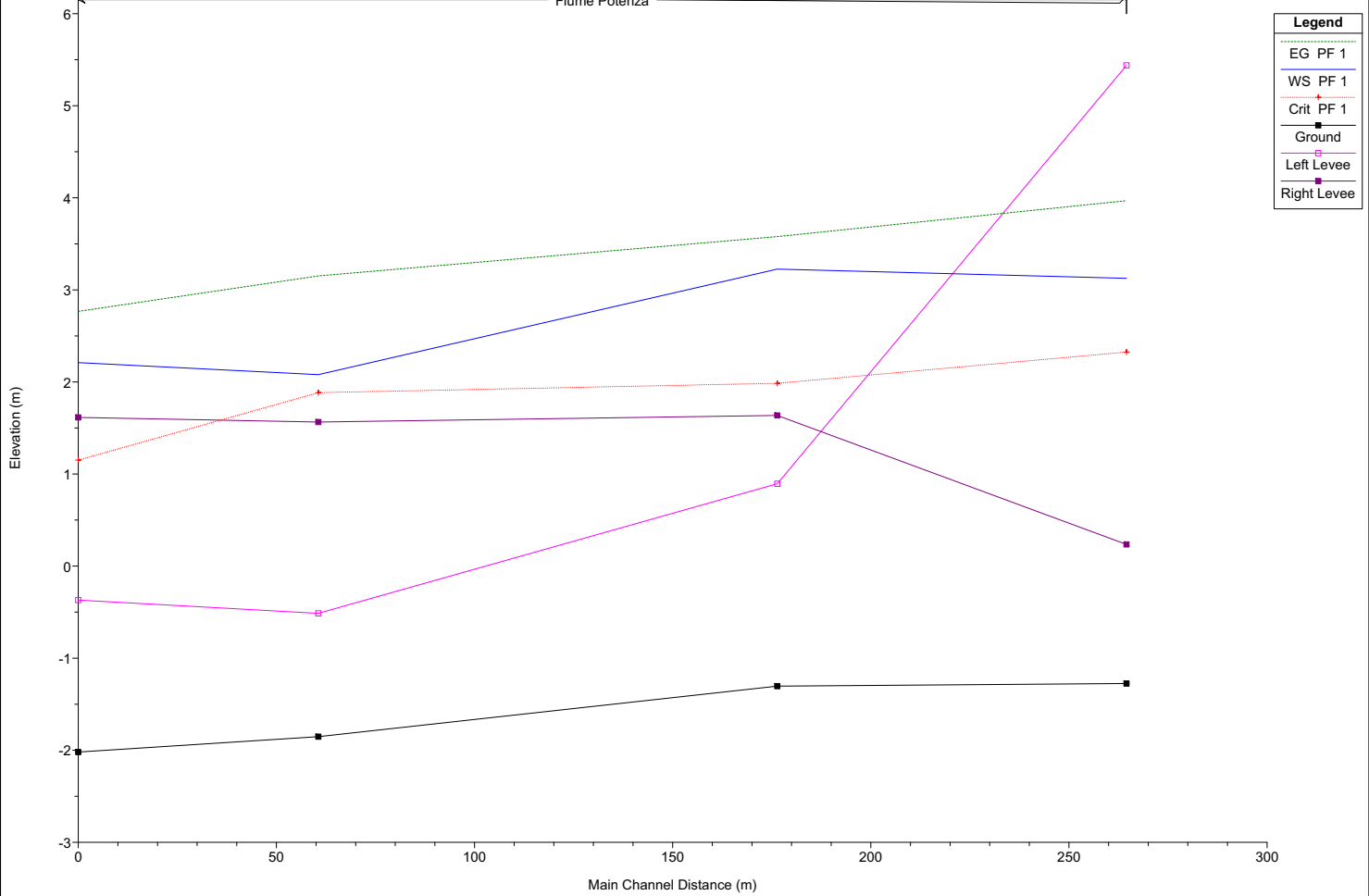
H max del livello idrico (m)	4,53
Portata max utilizzata (mc/sec)	597,00

HEC-RAS Plan: 50_Set1 River: Fiume Reach: Potenza Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Potenza	40	PF 1	597.00	-1.27	3.13	2.33	3.97	0.004604	4.08	147.51	43.89	0.65
Potenza	30	PF 1	597.00	-1.30	3.23	1.99	3.58	0.001839	2.60	228.65	71.87	0.42
Potenza	20	PF 1	597.00	-1.85	2.08	1.88	3.15	0.005969	4.44	135.20	53.13	0.75
Potenza	10	PF 1	597.00	-2.02	2.21	1.15	2.77	0.002801	3.22	185.22	64.23	0.52

Fiume Potenza_Nuova strada Plan: verifica_50_Set 11/04/2007

Fiume Potenza



Plan: 50_Set Fiume Potenza RS: 40 Profile: PF 1

E.G. Elev (m)	3.97	Element	Left OB	Channel	Right OB
Vel Head (m)	0.84	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.13	Reach Len. (m)	92.68	88.13	82.67
Crit W.S. (m)	2.33	Flow Area (m2)	1.47	105.73	40.30
E.G. Slope (m/m)	0.004604	Area (m2)	1.47	105.73	40.30
Q Total (m3/s)	597.00	Flow (m3/s)	2.17	431.70	163.13
Top Width (m)	43.89	Top Width (m)	3.60	26.35	13.94
Vel Total (m/s)	4.05	Avg. Vel. (m/s)	1.47	4.08	4.05
Max Chl Dpth (m)	4.40	Hydr. Depth (m)	0.41	4.01	2.89
Conv. Total (m3/s)	8798.6	Conv. (m3/s)	32.0	6362.4	2404.3
Length Wtd. (m)	87.88	Wetted Per. (m)	3.69	28.31	16.83
Min Ch El (m)	-1.27	Shear (N/m2)	18.04	168.60	108.09
Alpha	1.01	Stream Power (N/m s)	26.55	688.41	437.50
Frctn Loss (m)	0.24	Cum Volume (1000 m3)	9.45	34.06	3.74
C & E Loss (m)	0.15	Cum SA (1000 m2)	4.03	9.00	2.91

Plan: 50_Set Fiume Potenza RS: 30 Profile: PF 1

E.G. Elev (m)	3.58	Element	Left OB	Channel	Right OB
Vel Head (m)	0.35	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.23	Reach Len. (m)	120.72	115.81	114.85
Crit W.S. (m)	1.99	Flow Area (m2)	52.10	167.21	9.34
E.G. Slope (m/m)	0.001839	Area (m2)	52.10	167.21	9.34
Q Total (m3/s)	597.00	Flow (m3/s)	147.06	434.33	15.61
Top Width (m)	71.87	Top Width (m)	22.35	43.91	5.61
Vel Total (m/s)	2.61	Avg. Vel. (m/s)	2.82	2.60	1.67
Max Chl Dpth (m)	4.53	Hydr. Depth (m)	2.33	3.81	1.66
Conv. Total (m3/s)	13920.7	Conv. (m3/s)	3429.2	10127.6	363.9
Length Wtd. (m)	117.06	Wetted Per. (m)	24.68	44.34	7.39
Min Ch El (m)	-1.30	Shear (N/m2)	38.07	68.01	22.79
Alpha	1.02	Stream Power (N/m s)	107.46	176.67	38.09
Frctn Loss (m)	0.36	Cum Volume (1000 m3)	6.96	22.03	1.68
C & E Loss (m)	0.07	Cum SA (1000 m2)	2.82	5.90	2.10

Plan: 50_Set Fiume Potenza RS: 20 Profile: PF 1

E.G. Elev (m)	3.15	Element	Left OB	Channel	Right OB
Vel Head (m)	1.07	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.08	Reach Len. (m)	50.98	60.59	67.52
Crit W.S. (m)	1.88	Flow Area (m2)	31.88	93.67	9.65
E.G. Slope (m/m)	0.005969	Area (m2)	31.88	93.67	9.65
Q Total (m3/s)	597.00	Flow (m3/s)	163.69	415.80	17.51
Top Width (m)	53.13	Top Width (m)	12.30	26.11	14.73
Vel Total (m/s)	4.42	Avg. Vel. (m/s)	5.13	4.44	1.82
Max Chl Dpth (m)	3.93	Hydr. Depth (m)	2.59	3.59	0.65
Conv. Total (m3/s)	7727.1	Conv. (m3/s)	2118.6	5381.8	226.7
Length Wtd. (m)	58.19	Wetted Per. (m)	14.89	26.88	16.30
Min Ch El (m)	-1.85	Shear (N/m2)	125.33	203.95	34.65
Alpha	1.08	Stream Power (N/m s)	643.41	905.34	62.91
Frctn Loss (m)	0.23	Cum Volume (1000 m3)	1.89	6.92	0.59
C & E Loss (m)	0.15	Cum SA (1000 m2)	0.73	1.85	0.93

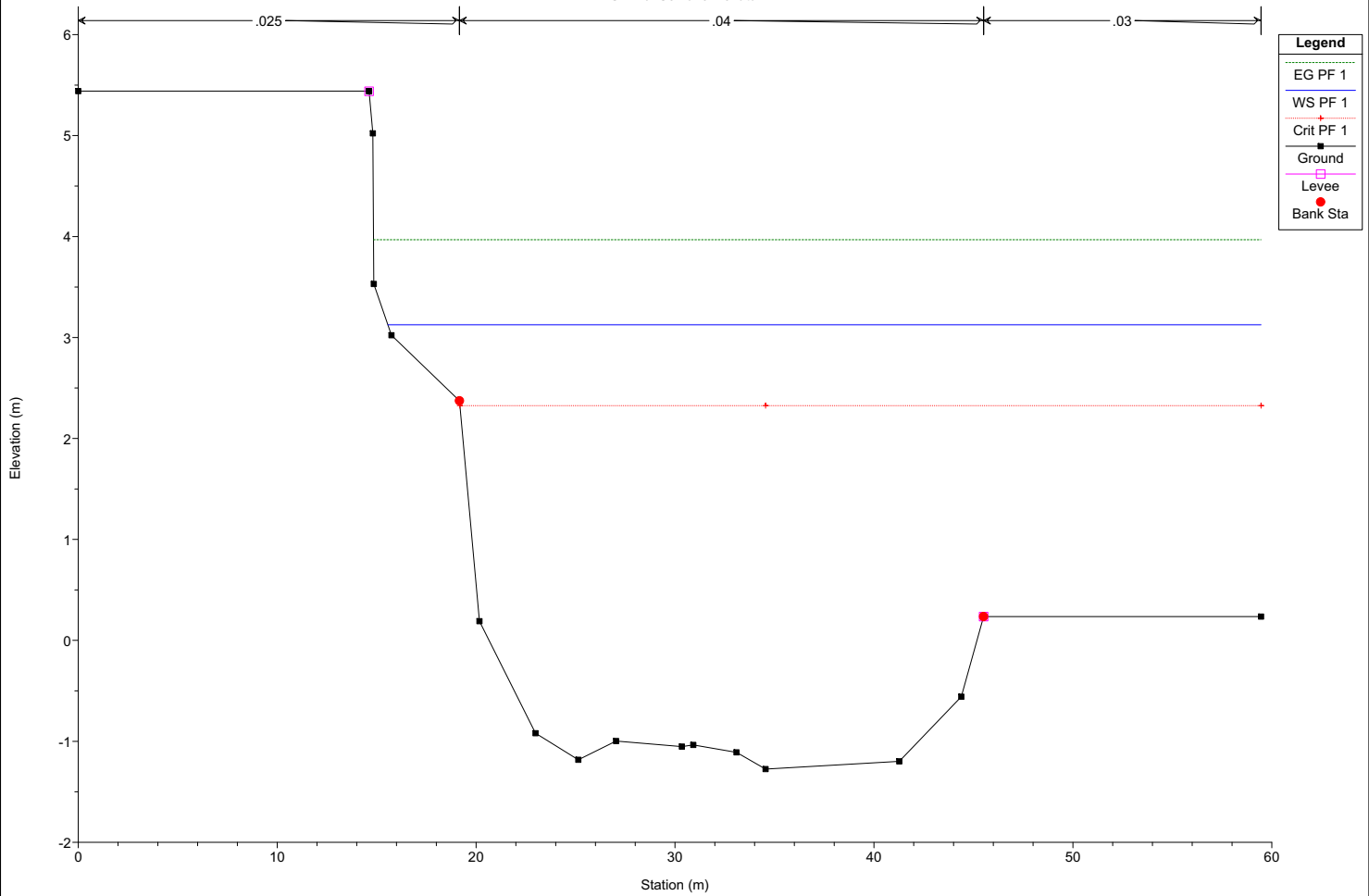
Plan: 50_Set Fiume Potenza RS: 10 Profile: PF 1

E.G. Elev (m)	2.77	Element	Left OB	Channel	Right OB
Vel Head (m)	0.56	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.21	Reach Len. (m)			
Crit W.S. (m)	1.15	Flow Area (m2)	42.40	134.89	7.92
E.G. Slope (m/m)	0.002801	Area (m2)	42.40	134.89	7.92
Q Total (m3/s)	597.00	Flow (m3/s)	153.19	434.56	9.25
Top Width (m)	64.23	Top Width (m)	16.44	34.89	12.90
Vel Total (m/s)	3.22	Avg. Vel. (m/s)	3.61	3.22	1.17
Max Chl Dpth (m)	4.23	Hydr. Depth (m)	2.58	3.87	0.61
Conv. Total (m3/s)	11281.0	Conv. (m3/s)	2894.7	8211.6	174.7
Length Wtd. (m)		Wetted Per. (m)	19.02	35.50	14.73
Min Ch El (m)	-2.02	Shear (N/m2)	61.23	104.35	14.77
Alpha	1.05	Stream Power (N/m s)	221.22	336.17	17.24

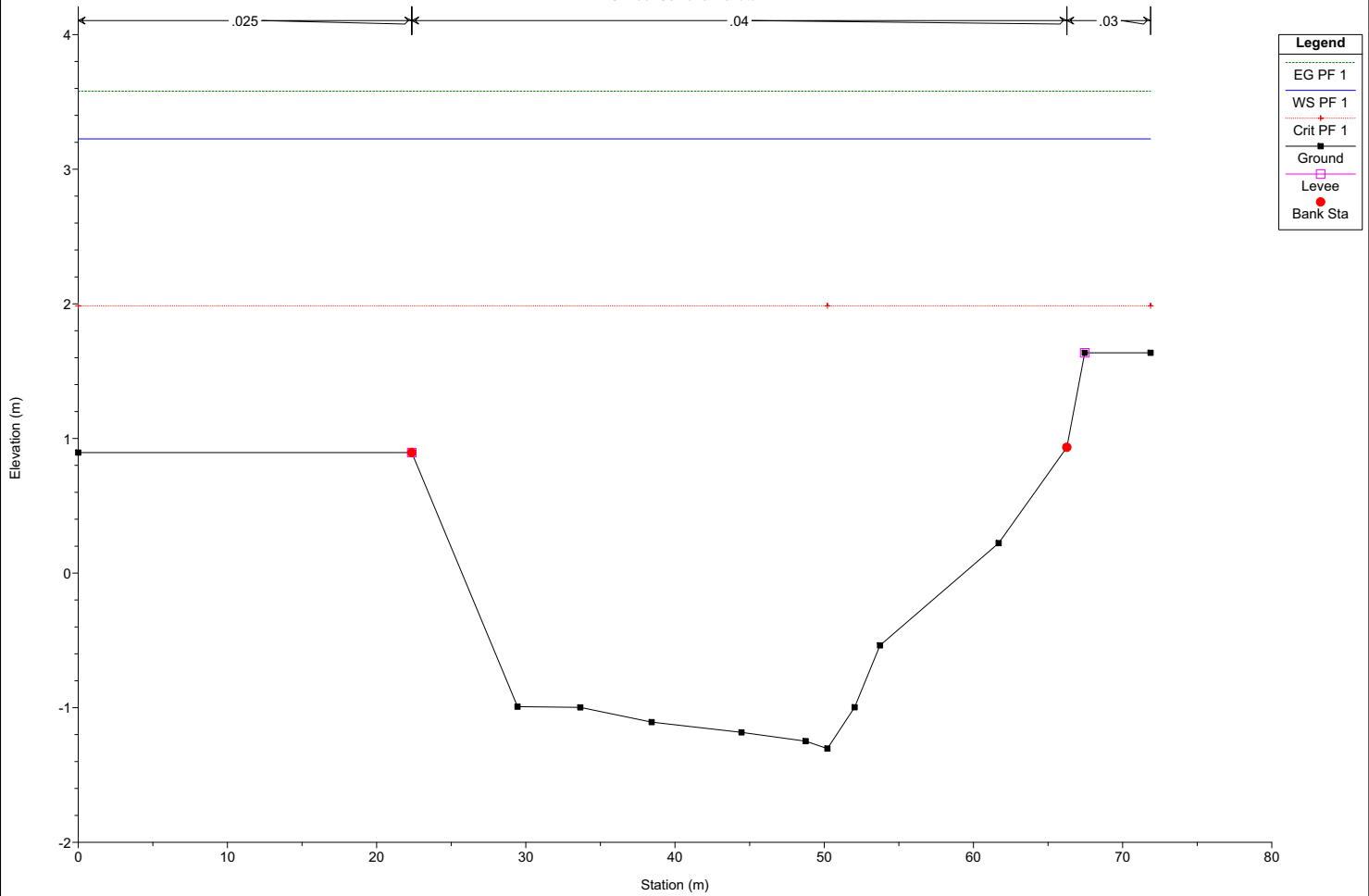
Plan: 50_Set1 Fiume Potenza RS: 10 Profile: PF 1 (Continued)

Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Fiume Potenza_Nuova strada Plan: verifica_50_Set 11/04/2007
 RS = 40 Sezione rilevata "A"

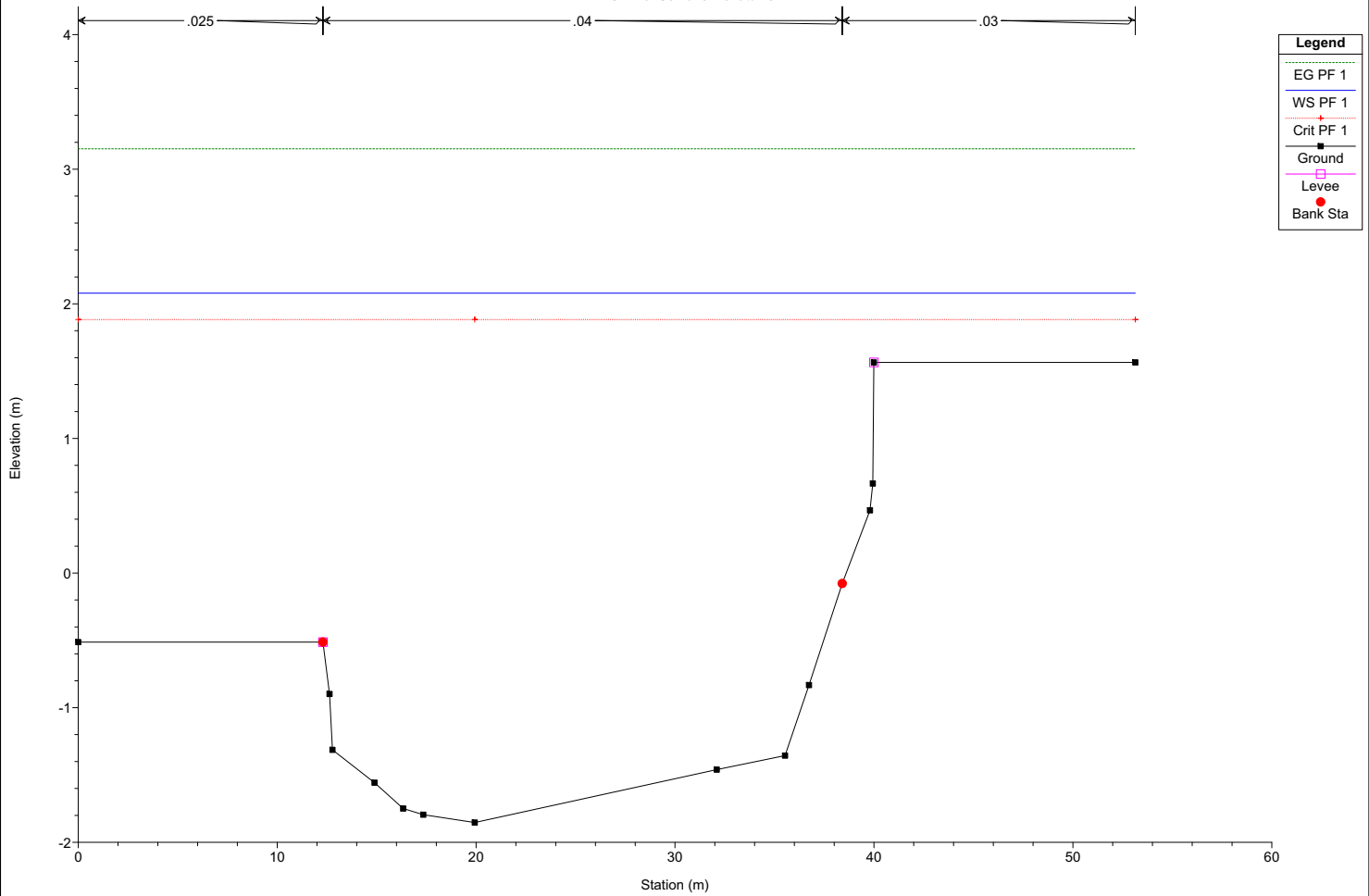


Fiume Potenza_Nuova strada Plan: verifica_50_Set 11/04/2007
 RS = 30 Sezione rilevata "B"

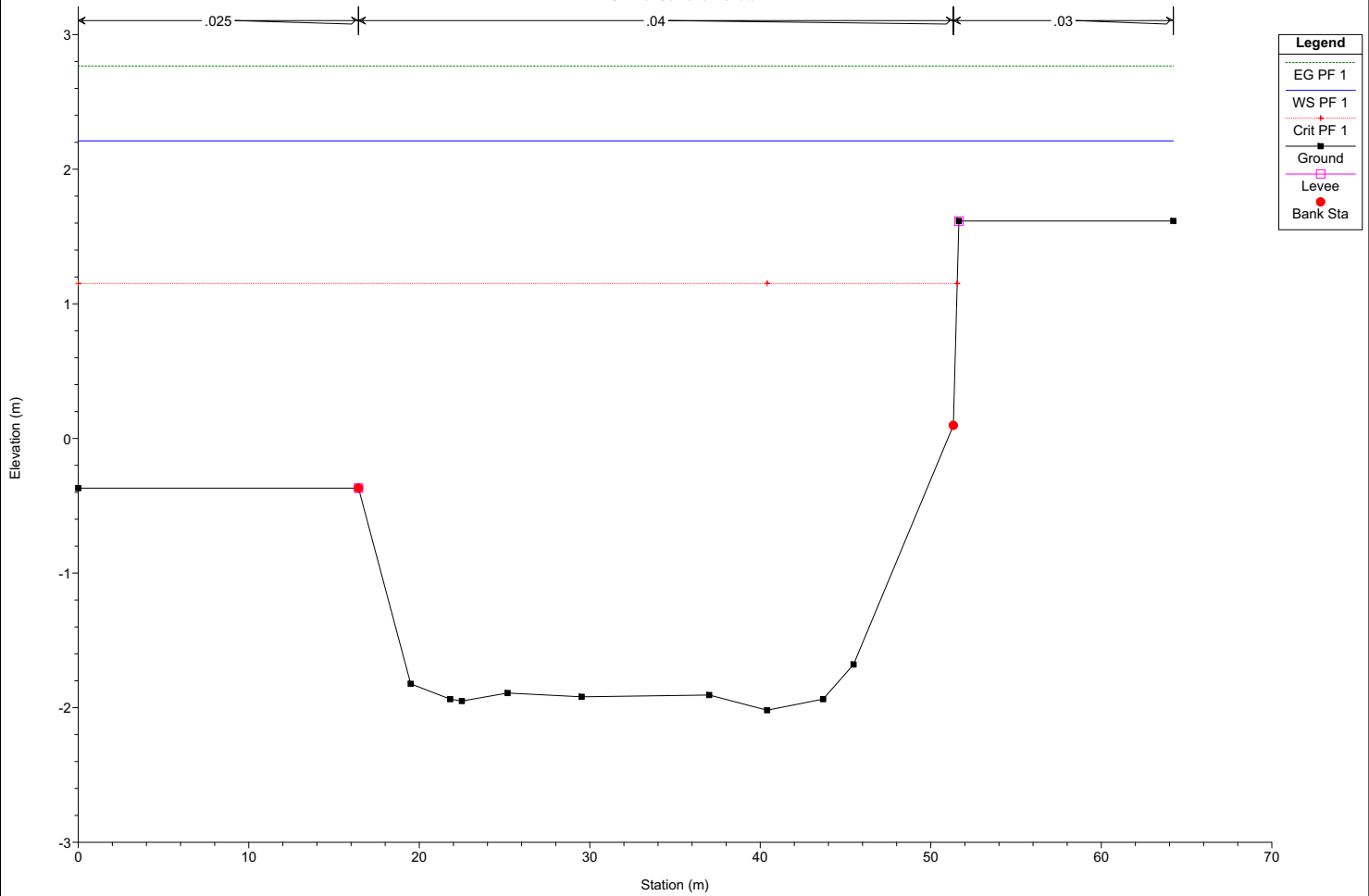


- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica_50_Set 11/04/2007
 RS = 20 Sezione rilevata "C"

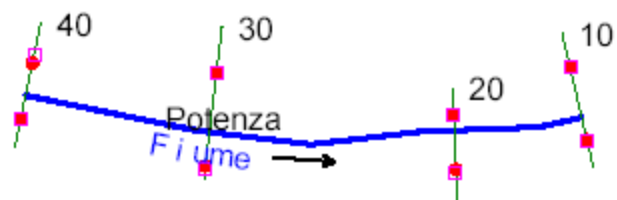


Fiume Potenza_Nuova strada Plan: verifica_50_Set 11/04/2007
 RS = 10 Sezione rilevata "D"



- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

VERIFICA CON HEC-RAS 3.1.3 (Tempo di ritorno: 200 anni)



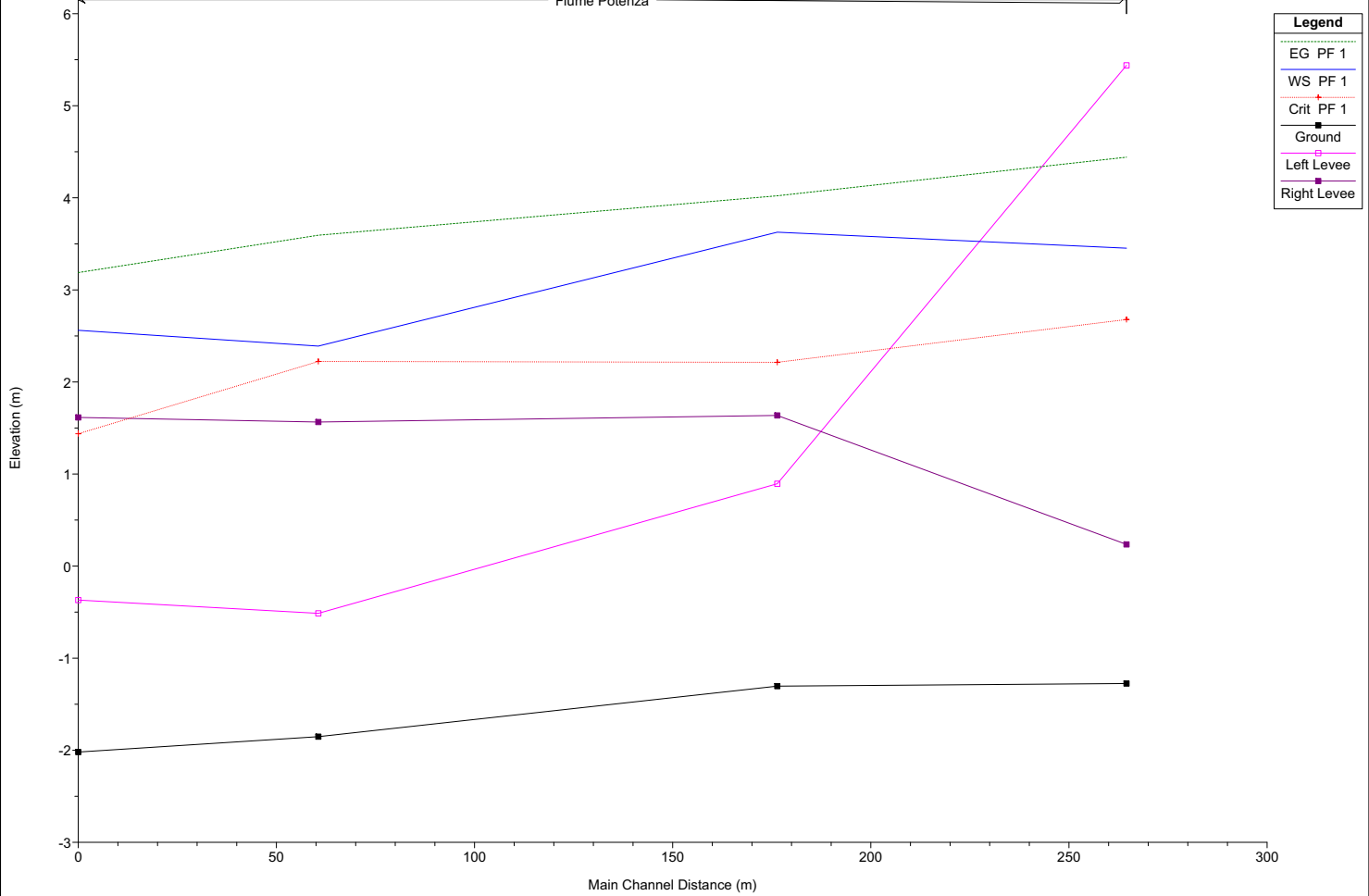
H max del livello idrico (m)	4,93
Portata max utilizzata (mc/sec)	709,00

HEC-RAS Plan: 200_Sett River: Fiume Reach: Potenza Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Potenza	40	PF 1	709.00	-1.27	3.45	2.68	4.44	0.004862	4.42	161.95	44.47	0.68
Potenza	30	PF 1	709.00	-1.30	3.63	2.21	4.02	0.001761	2.72	257.51	71.87	0.42
Potenza	20	PF 1	709.00	-1.85	2.39	2.22	3.59	0.006034	4.72	151.66	53.13	0.76
Potenza	10	PF 1	709.00	-2.02	2.56	1.44	3.19	0.002802	3.41	207.76	64.23	0.53

Fiume Potenza_Nuova strada Plan: verifica_200_Set 11/04/2007

Fiume Potenza



Plan: 200_Set1 Fiume Potenza RS: 40 Profile: PF 1

E.G. Elev (m)	4.44	Element	Left OB	Channel	Right OB
Vel Head (m)	0.99	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.45	Reach Len. (m)	92.68	88.13	82.67
Crit W.S. (m)	2.68	Flow Area (m2)	2.74	114.34	44.86
E.G. Slope (m/m)	0.004862	Area (m2)	2.74	114.34	44.86
Q Total (m3/s)	709.00	Flow (m3/s)	5.63	505.50	197.87
Top Width (m)	44.47	Top Width (m)	4.17	26.35	13.94
Vel Total (m/s)	4.38	Avg. Vel. (m/s)	2.05	4.42	4.41
Max Chl Dpth (m)	4.73	Hydr. Depth (m)	0.66	4.34	3.22
Conv. Total (m3/s)	10168.0	Conv. (m3/s)	80.7	7249.6	2837.7
Length Wtd. (m)	87.90	Wetted Per. (m)	4.35	28.31	17.16
Min Ch El (m)	-1.27	Shear (N/m2)	30.08	192.56	124.64
Alpha	1.01	Stream Power (N/m s)	61.73	851.31	549.75
Frctn Loss (m)	0.24	Cum Volume (1000 m3)	10.94	37.32	4.71
C & E Loss (m)	0.18	Cum SA (1000 m2)	4.05	9.00	2.91

Plan: 200_Set1 Fiume Potenza RS: 30 Profile: PF 1

E.G. Elev (m)	4.02	Element	Left OB	Channel	Right OB
Vel Head (m)	0.39	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.63	Reach Len. (m)	120.72	115.81	114.85
Crit W.S. (m)	2.21	Flow Area (m2)	61.08	184.84	11.59
E.G. Slope (m/m)	0.001761	Area (m2)	61.08	184.84	11.59
Q Total (m3/s)	709.00	Flow (m3/s)	185.56	502.31	21.13
Top Width (m)	71.87	Top Width (m)	22.35	43.91	5.61
Vel Total (m/s)	2.75	Avg. Vel. (m/s)	3.04	2.72	1.82
Max Chl Dpth (m)	4.93	Hydr. Depth (m)	2.73	4.21	2.07
Conv. Total (m3/s)	16894.5	Conv. (m3/s)	4421.5	11969.5	503.6
Length Wtd. (m)	117.09	Wetted Per. (m)	25.09	44.34	7.79
Min Ch El (m)	-1.30	Shear (N/m2)	42.05	72.00	25.69
Alpha	1.02	Stream Power (N/m s)	127.75	195.66	46.84
Frctn Loss (m)	0.35	Cum Volume (1000 m3)	7.98	24.14	2.38
C & E Loss (m)	0.08	Cum SA (1000 m2)	2.82	5.90	2.10

Plan: 200_Set1 Fiume Potenza RS: 20 Profile: PF 1

E.G. Elev (m)	3.59	Element	Left OB	Channel	Right OB
Vel Head (m)	1.20	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.39	Reach Len. (m)	50.98	60.59	67.52
Crit W.S. (m)	2.22	Flow Area (m2)	35.69	101.76	14.21
E.G. Slope (m/m)	0.006034	Area (m2)	35.69	101.76	14.21
Q Total (m3/s)	709.00	Flow (m3/s)	195.93	479.92	33.15
Top Width (m)	53.13	Top Width (m)	12.30	26.11	14.73
Vel Total (m/s)	4.68	Avg. Vel. (m/s)	5.49	4.72	2.33
Max Chl Dpth (m)	4.24	Hydr. Depth (m)	2.90	3.90	0.96
Conv. Total (m3/s)	9127.3	Conv. (m3/s)	2522.3	6178.2	426.8
Length Wtd. (m)	58.25	Wetted Per. (m)	15.20	26.88	16.60
Min Ch El (m)	-1.85	Shear (N/m2)	138.94	223.96	50.63
Alpha	1.08	Stream Power (N/m s)	762.65	1056.29	118.14
Frctn Loss (m)	0.23	Cum Volume (1000 m3)	2.14	7.54	0.90
C & E Loss (m)	0.17	Cum SA (1000 m2)	0.73	1.85	0.93

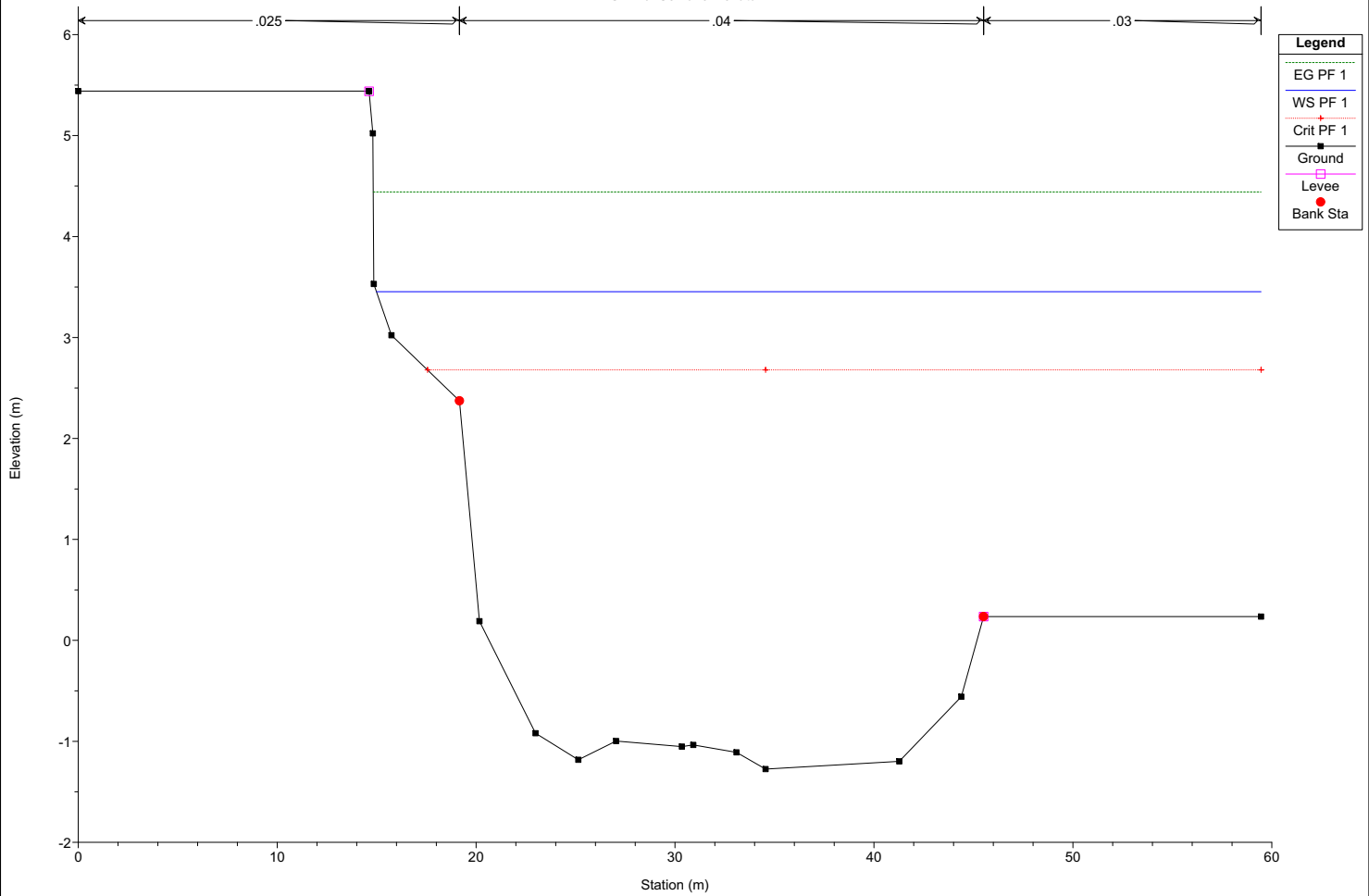
Plan: 200_Set1 Fiume Potenza RS: 10 Profile: PF 1

E.G. Elev (m)	3.19	Element	Left OB	Channel	Right OB
Vel Head (m)	0.63	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.56	Reach Len. (m)			
Crit W.S. (m)	1.44	Flow Area (m2)	48.17	147.14	12.45
E.G. Slope (m/m)	0.002802	Area (m2)	48.17	147.14	12.45
Q Total (m3/s)	709.00	Flow (m3/s)	187.24	502.42	19.34
Top Width (m)	64.23	Top Width (m)	16.44	34.89	12.90
Vel Total (m/s)	3.41	Avg. Vel. (m/s)	3.89	3.41	1.55
Max Chl Dpth (m)	4.58	Hydr. Depth (m)	2.93	4.22	0.96
Conv. Total (m3/s)	13393.1	Conv. (m3/s)	3537.0	9490.8	365.3
Length Wtd. (m)		Wetted Per. (m)	19.37	35.50	15.08
Min Ch El (m)	-2.02	Shear (N/m2)	68.35	113.90	22.69
Alpha	1.06	Stream Power (N/m s)	265.66	388.92	35.24

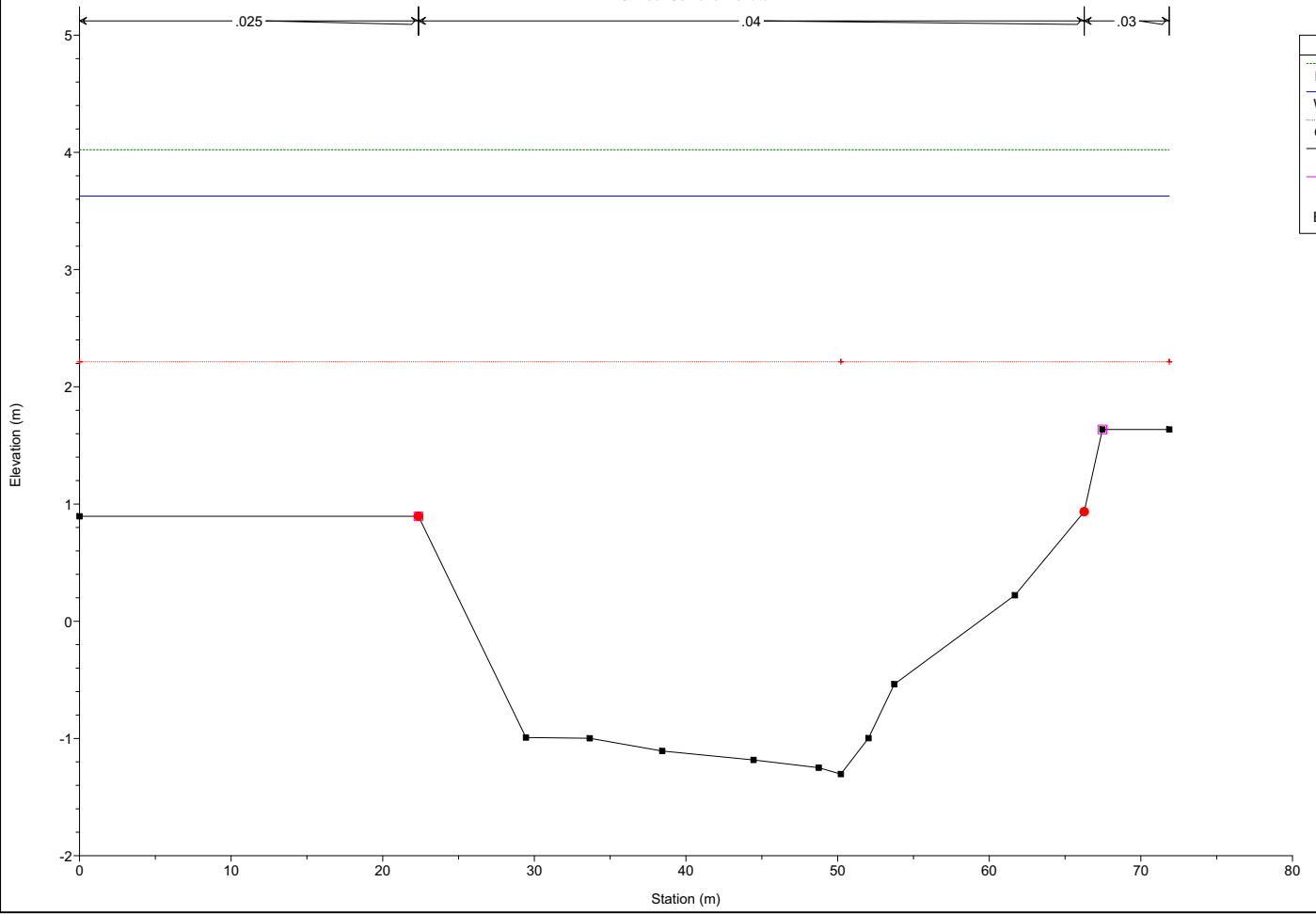
Plan: 200_Set1 Fiume Potenza RS: 10 Profile: PF 1 (Continued)

Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

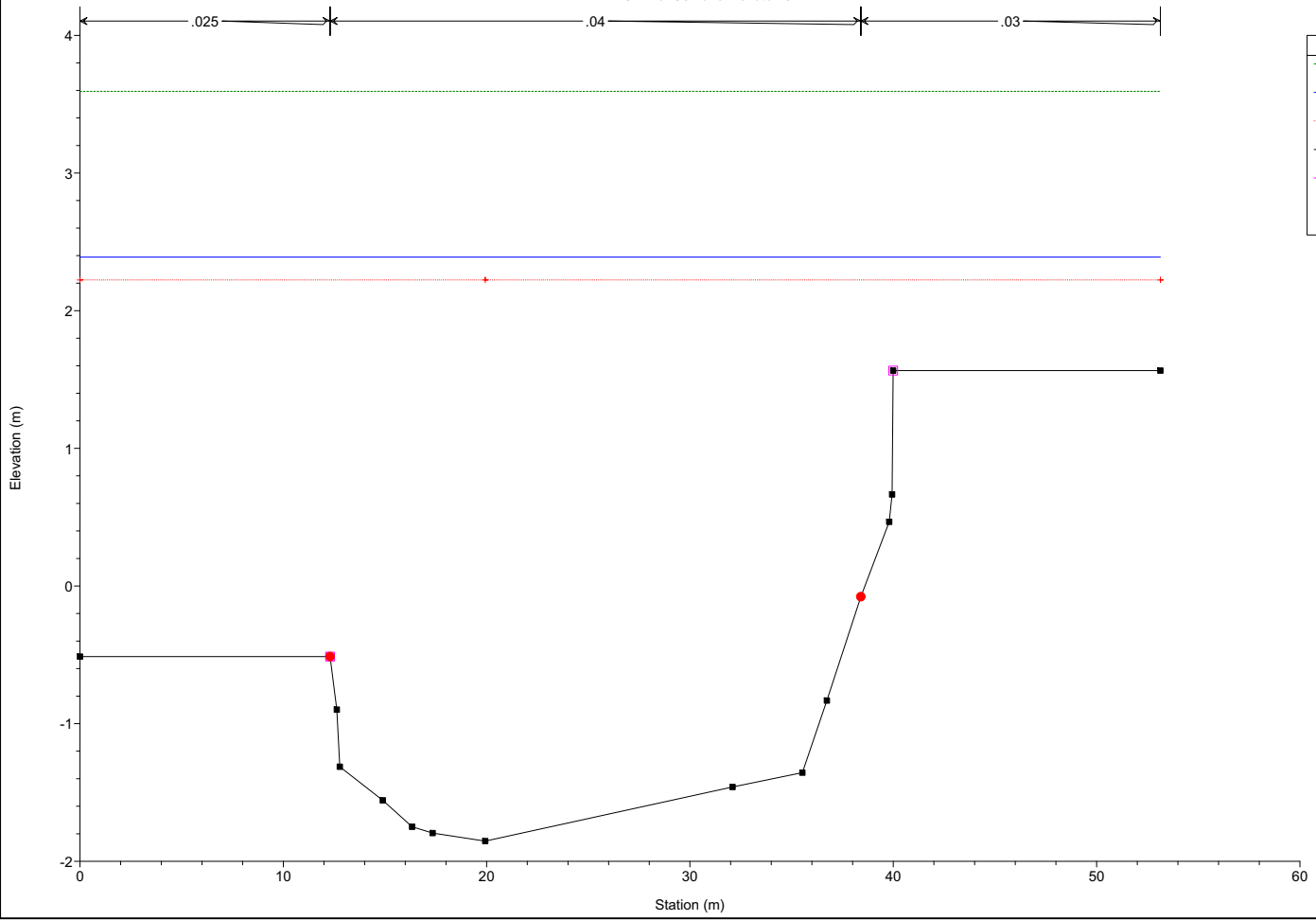
Fiume Potenza_Nuova strada Plan: verifica_200_Set 11/04/2007
 RS = 40 Sezione rilevata "A"



Fiume Potenza_Nuova strada Plan: verifica_200_Set 11/04/2007
RS = 30 Sezione rilevata "B"

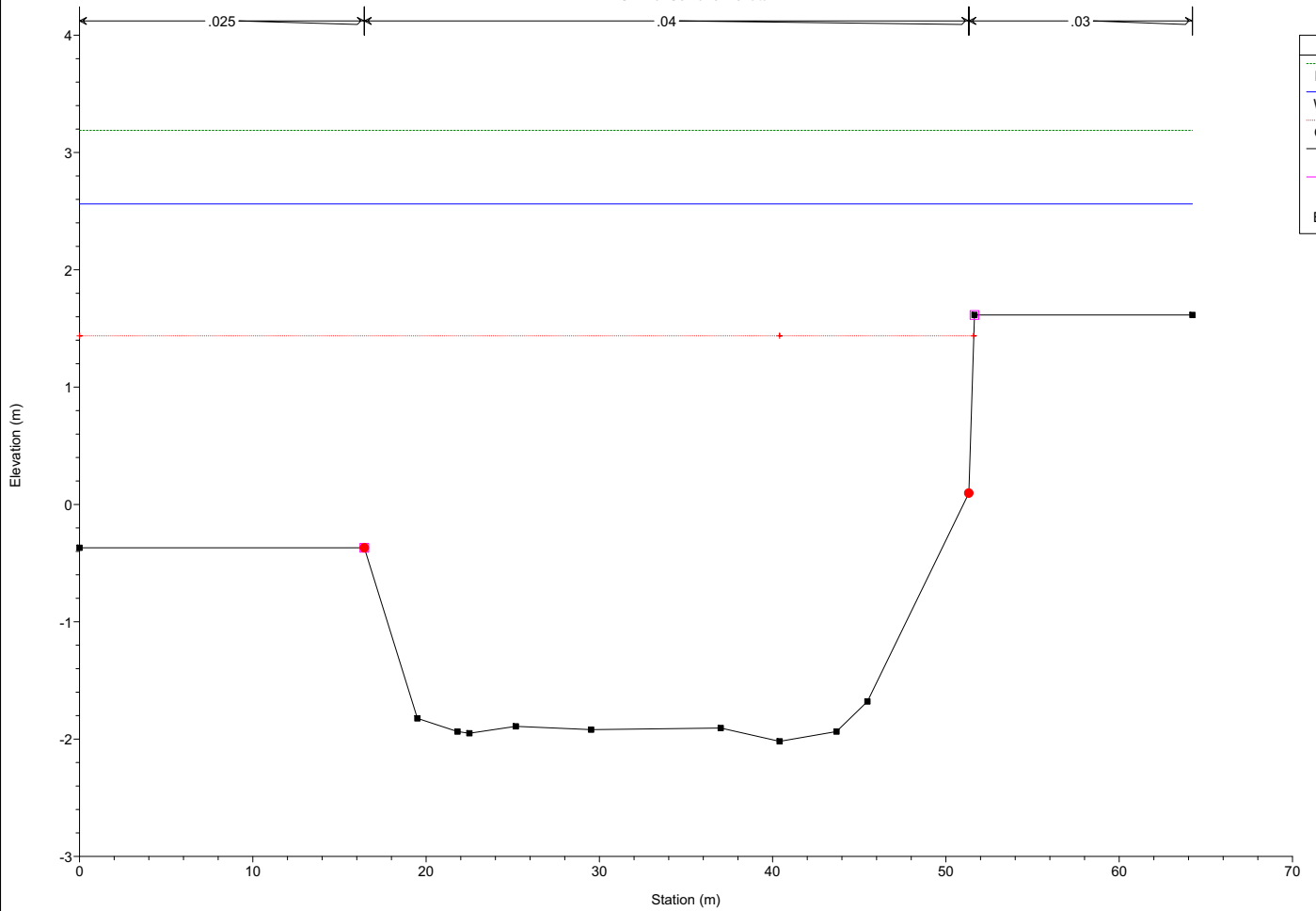


Fiume Potenza_Nuova strada Plan: verifica_200_Set 11/04/2007
 RS = 20 Sezione rilevata "C"



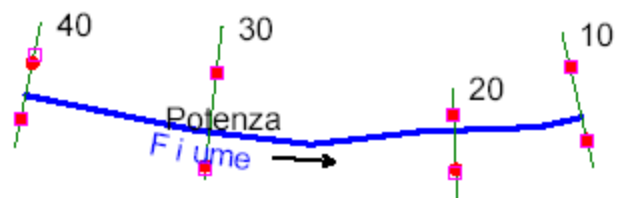
Legend	
EG PF 1	—
WS PF 1	—
Crit PF 1	—
Ground	—
Levee	■
Bank Sta	●

Fiume Potenza_Nuova strada Plan: verifica_200_Set 11/04/2007
RS = 10 Sezione rilevata "D"



- EG PF 1
- WS PF 1
- Crit PF 1
- Ground
- Levee
- Bank Sta

VERIFICA CON HEC-RAS 3.1.3 (Tempo di ritorno: 500 anni)



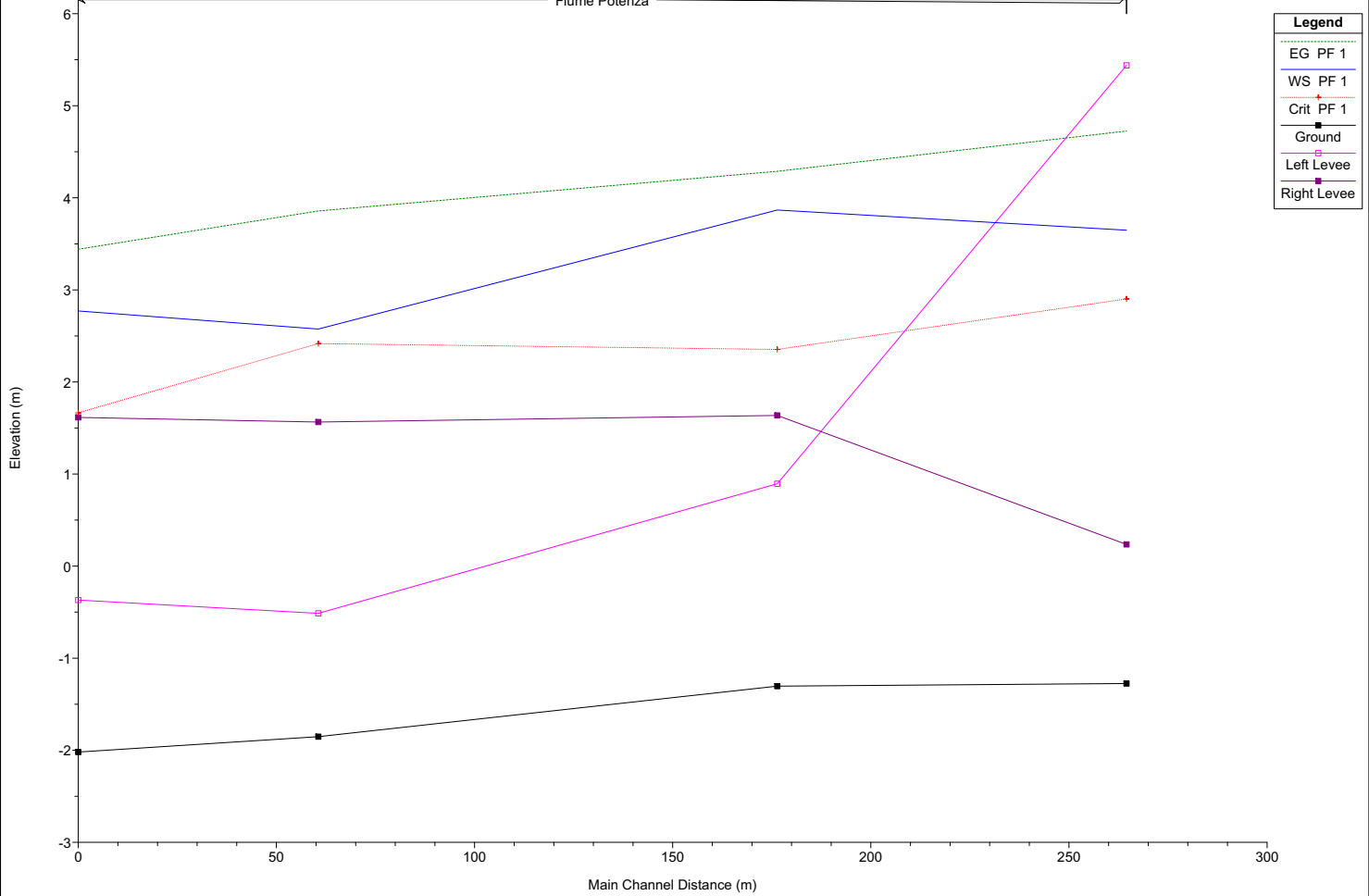
H max del livello idrico (m)	5,17
Portata max utilizzata (mc/sec)	780,00

HEC-RAS Plan: 500_Set1 River: Fiume Reach: Potenza Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Potenza	40	PF 1	780.00	-1.27	3.65	2.90	4.73	0.005002	4.62	170.64	44.60	0.69
Potenza	30	PF 1	780.00	-1.30	3.87	2.35	4.29	0.001726	2.79	274.77	71.87	0.42
Potenza	20	PF 1	780.00	-1.85	2.57	2.42	3.86	0.006061	4.88	161.52	53.13	0.77
Potenza	10	PF 1	780.00	-2.02	2.77	1.66	3.44	0.002801	3.53	221.27	64.23	0.53

Fiume Potenza_Nuova strada Plan: verifica_500_Set 11/04/2007

Fiume Potenza



Plan: 500_Set1 Fiume Potenza RS: 40 Profile: PF 1

E.G. Elev (m)	4.73	Element	Left OB	Channel	Right OB
Vel Head (m)	1.08	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.65	Reach Len. (m)	92.68	88.13	82.67
Crit W.S. (m)	2.90	Flow Area (m2)	3.58	119.48	47.58
E.G. Slope (m/m)	0.005002	Area (m2)	3.58	119.48	47.58
Q Total (m3/s)	780.00	Flow (m3/s)	8.54	551.73	219.73
Top Width (m)	44.60	Top Width (m)	4.31	26.35	13.94
Vel Total (m/s)	4.57	Avg. Vel. (m/s)	2.39	4.62	4.62
Max Chl Dpth (m)	4.92	Hydr. Depth (m)	0.83	4.53	3.41
Conv. Total (m3/s)	11028.4	Conv. (m3/s)	120.7	7800.9	3106.8
Length Wtd. (m)	87.91	Wetted Per. (m)	4.62	28.31	17.36
Min Ch El (m)	-1.27	Shear (N/m2)	37.99	207.03	134.48
Alpha	1.01	Stream Power (N/m s)	90.63	955.96	621.04
Frctn Loss (m)	0.24	Cum Volume (1000 m3)	11.83	39.27	5.30
C & E Loss (m)	0.20	Cum SA (1000 m2)	4.06	9.00	2.91

Plan: 500_Set1 Fiume Potenza RS: 30 Profile: PF 1

E.G. Elev (m)	4.29	Element	Left OB	Channel	Right OB
Vel Head (m)	0.42	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	3.87	Reach Len. (m)	120.72	115.81	114.85
Crit W.S. (m)	2.35	Flow Area (m2)	66.44	195.38	12.94
E.G. Slope (m/m)	0.001726	Area (m2)	66.44	195.38	12.94
Q Total (m3/s)	780.00	Flow (m3/s)	210.01	545.37	24.62
Top Width (m)	71.87	Top Width (m)	22.35	43.91	5.61
Vel Total (m/s)	2.84	Avg. Vel. (m/s)	3.16	2.79	1.90
Max Chl Dpth (m)	5.17	Hydr. Depth (m)	2.97	4.45	2.31
Conv. Total (m3/s)	18777.3	Conv. (m3/s)	5055.7	13128.9	592.7
Length Wtd. (m)	117.11	Wetted Per. (m)	25.33	44.34	8.03
Min Ch El (m)	-1.30	Shear (N/m2)	44.40	74.56	27.26
Alpha	1.02	Stream Power (N/m s)	140.32	208.13	51.87
Frctn Loss (m)	0.34	Cum Volume (1000 m3)	8.59	25.40	2.80
C & E Loss (m)	0.09	Cum SA (1000 m2)	2.82	5.90	2.10

Plan: 500_Set1 Fiume Potenza RS: 20 Profile: PF 1

E.G. Elev (m)	3.86	Element	Left OB	Channel	Right OB
Vel Head (m)	1.28	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.57	Reach Len. (m)	50.98	60.59	67.52
Crit W.S. (m)	2.42	Flow Area (m2)	37.98	106.60	16.94
E.G. Slope (m/m)	0.006061	Area (m2)	37.98	106.60	16.94
Q Total (m3/s)	780.00	Flow (m3/s)	215.99	519.78	44.23
Top Width (m)	53.13	Top Width (m)	12.30	26.11	14.73
Vel Total (m/s)	4.83	Avg. Vel. (m/s)	5.69	4.88	2.61
Max Chl Dpth (m)	4.43	Hydr. Depth (m)	3.09	4.08	1.15
Conv. Total (m3/s)	10019.2	Conv. (m3/s)	2774.5	6676.6	568.1
Length Wtd. (m)	58.29	Wetted Per. (m)	15.39	26.88	16.79
Min Ch El (m)	-1.85	Shear (N/m2)	146.69	235.67	59.97
Alpha	1.08	Stream Power (N/m s)	834.26	1149.06	156.55
Frctn Loss (m)	0.23	Cum Volume (1000 m3)	2.28	7.91	1.08
C & E Loss (m)	0.18	Cum SA (1000 m2)	0.73	1.85	0.93

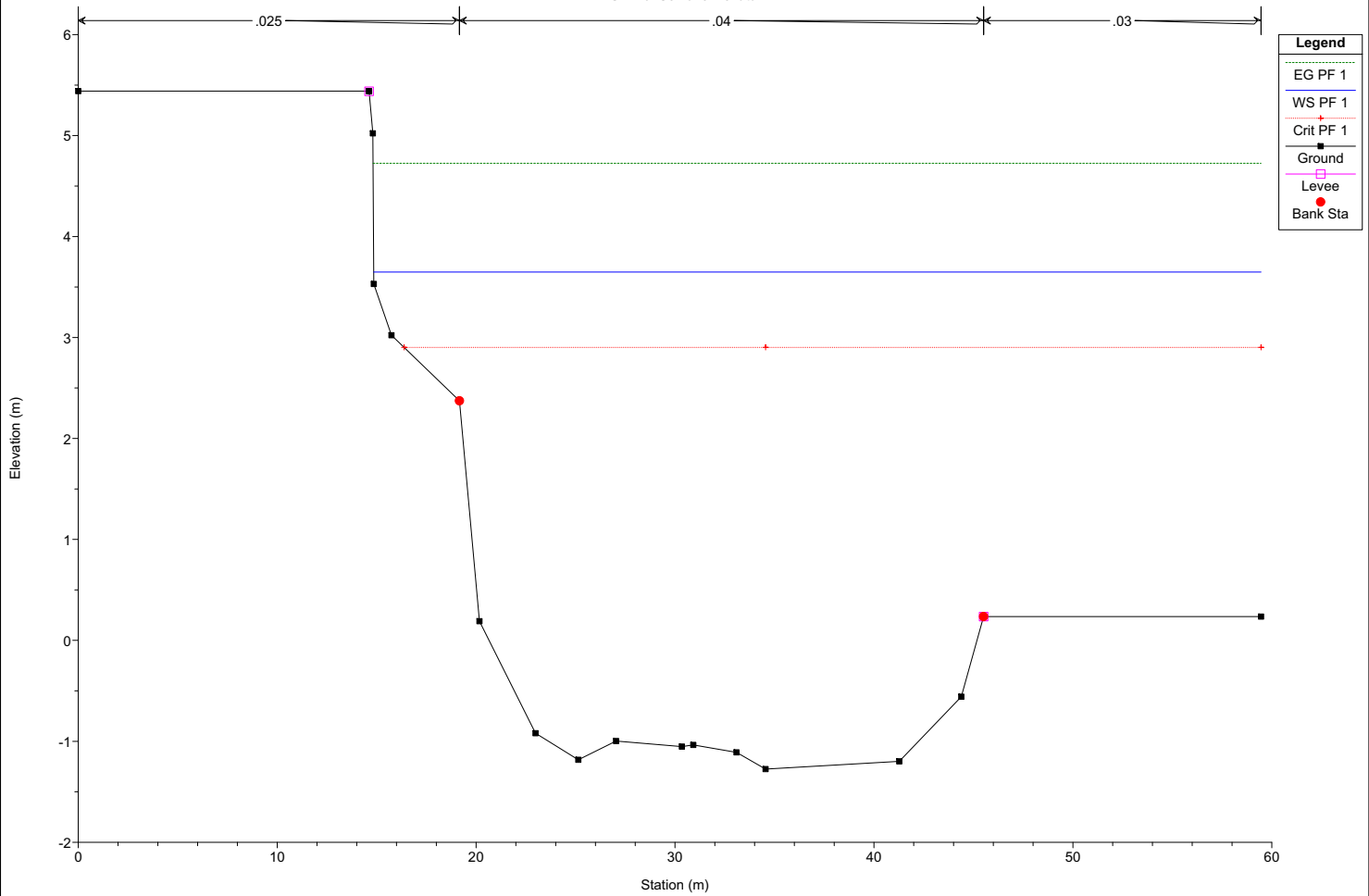
Plan: 500_Set1 Fiume Potenza RS: 10 Profile: PF 1

E.G. Elev (m)	3.44	Element	Left OB	Channel	Right OB
Vel Head (m)	0.67	Wt. n-Val.	0.025	0.040	0.030
W.S. Elev (m)	2.77	Reach Len. (m)			
Crit W.S. (m)	1.66	Flow Area (m2)	51.63	154.47	15.17
E.G. Slope (m/m)	0.002801	Area (m2)	51.63	154.47	15.17
Q Total (m3/s)	780.00	Flow (m3/s)	208.63	544.77	26.61
Top Width (m)	64.23	Top Width (m)	16.44	34.89	12.90
Vel Total (m/s)	3.53	Avg. Vel. (m/s)	4.04	3.53	1.75
Max Chl Dpth (m)	4.79	Hydr. Depth (m)	3.14	4.43	1.18
Conv. Total (m3/s)	14736.9	Conv. (m3/s)	3941.7	10292.5	502.7
Length Wtd. (m)		Wetted Per. (m)	19.58	35.50	15.29
Min Ch El (m)	-2.02	Shear (N/m2)	72.44	119.53	27.25
Alpha	1.06	Stream Power (N/m s)	292.72	421.54	47.81

Plan: 500_Set1 Fiume Potenza RS: 10 Profile: PF 1 (Continued)

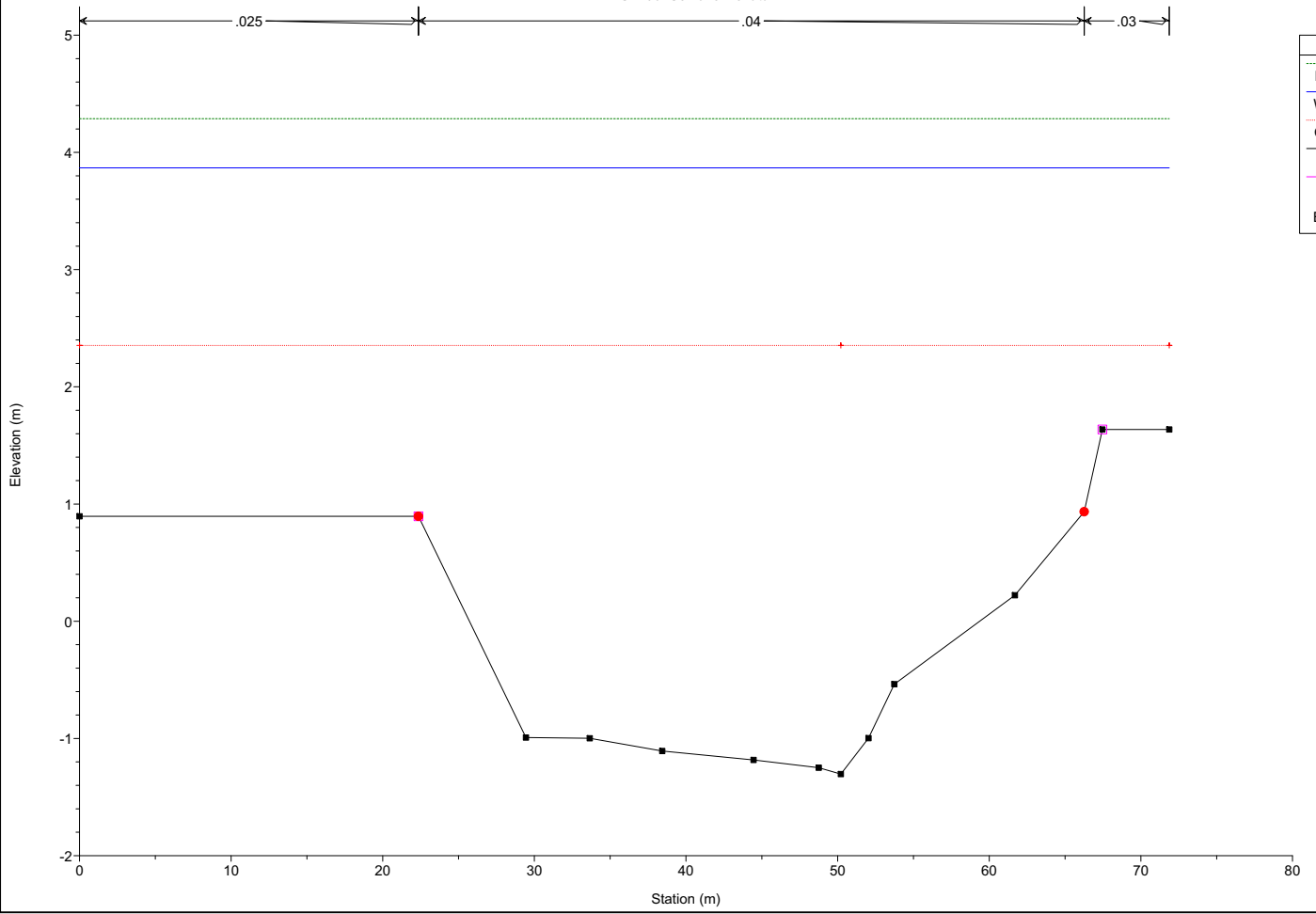
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Fiume Potenza_Nuova strada Plan: verifica_500_Set 11/04/2007
 RS = 40 Sezione rilevata "A"



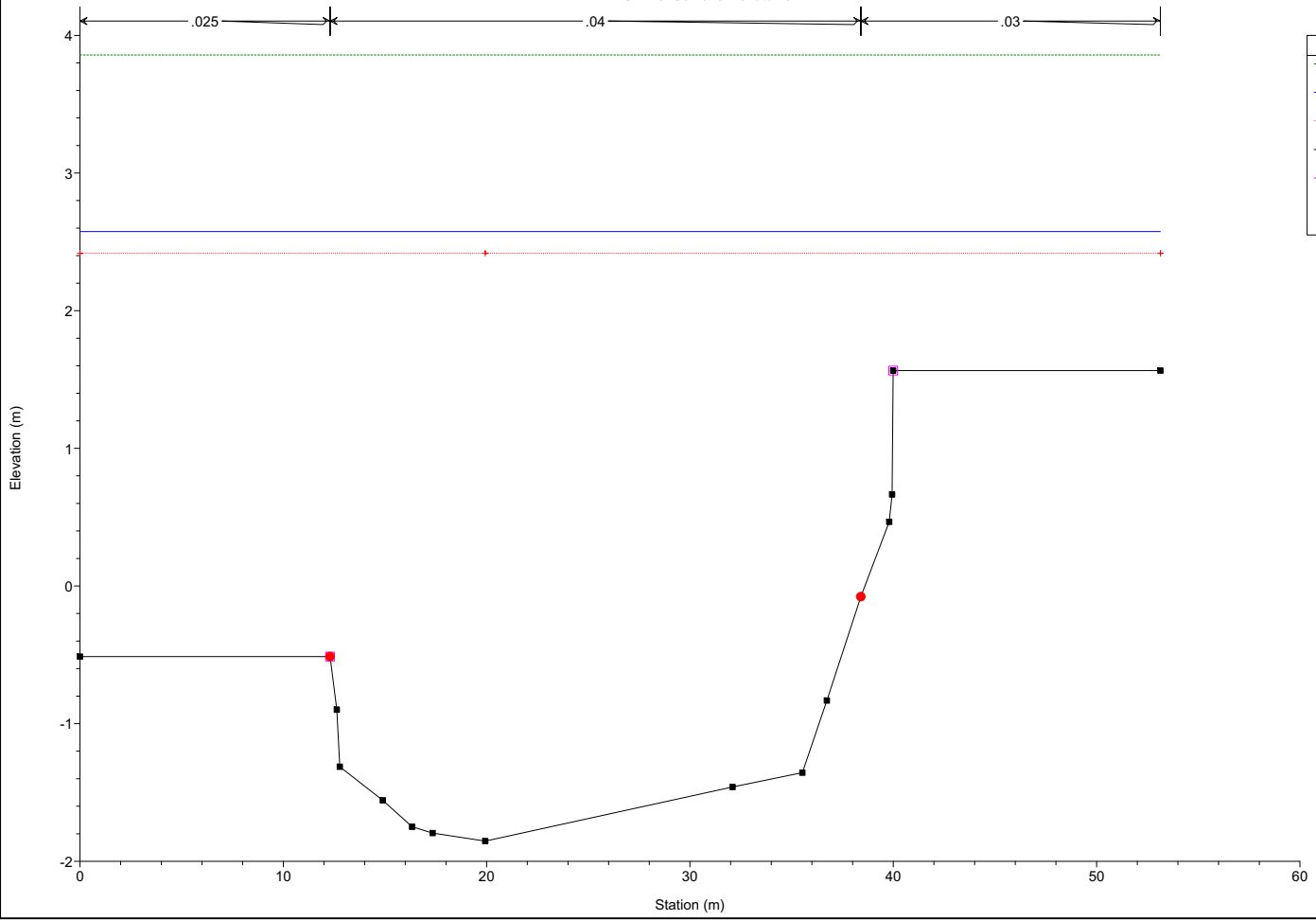
- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica_500_Set 11/04/2007
RS = 30 Sezione rilevata "B"



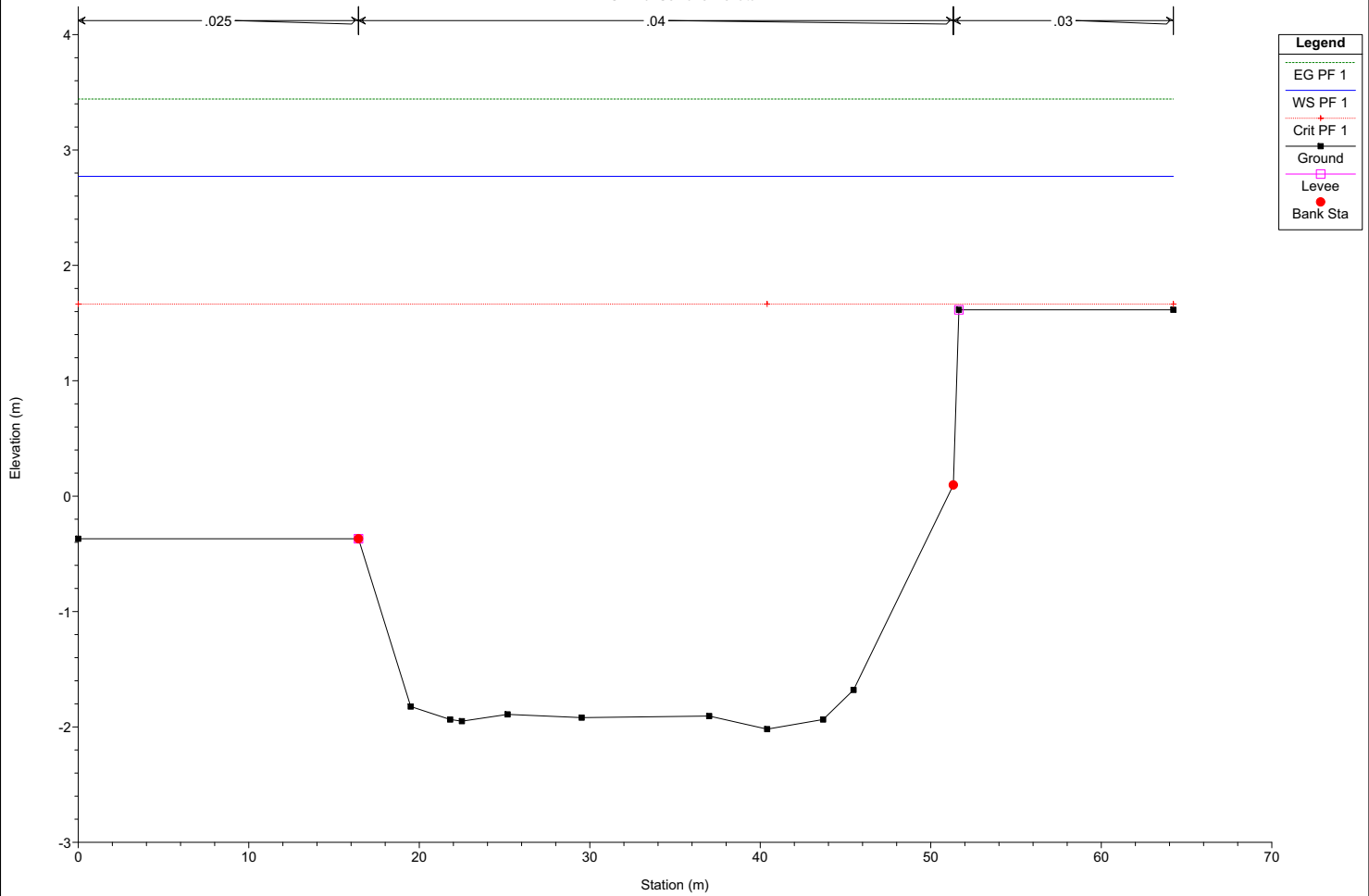
- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica_500_Set 11/04/2007
 RS = 20 Sezione rilevata "C"



- Legend**
- EG PF 1
 - WS PF 1
 - Crit PF 1
 - Ground
 - Levee
 - Bank Sta

Fiume Potenza_Nuova strada Plan: verifica_500_Set 11/04/2007
 RS = 10 Sezione rilevata "D"



Legend

- EG PF 1
- WS PF 1
- Crit PF 1
- Ground
- Levee
- Bank Sta