

**PIANO DI BACINO STRALCIO**  
per la difesa idraulica ed idrogeologica



**TORRENTE ARMEA E RIO FONTI**  
(Ambito di Bacino n° 4 – Argentina)



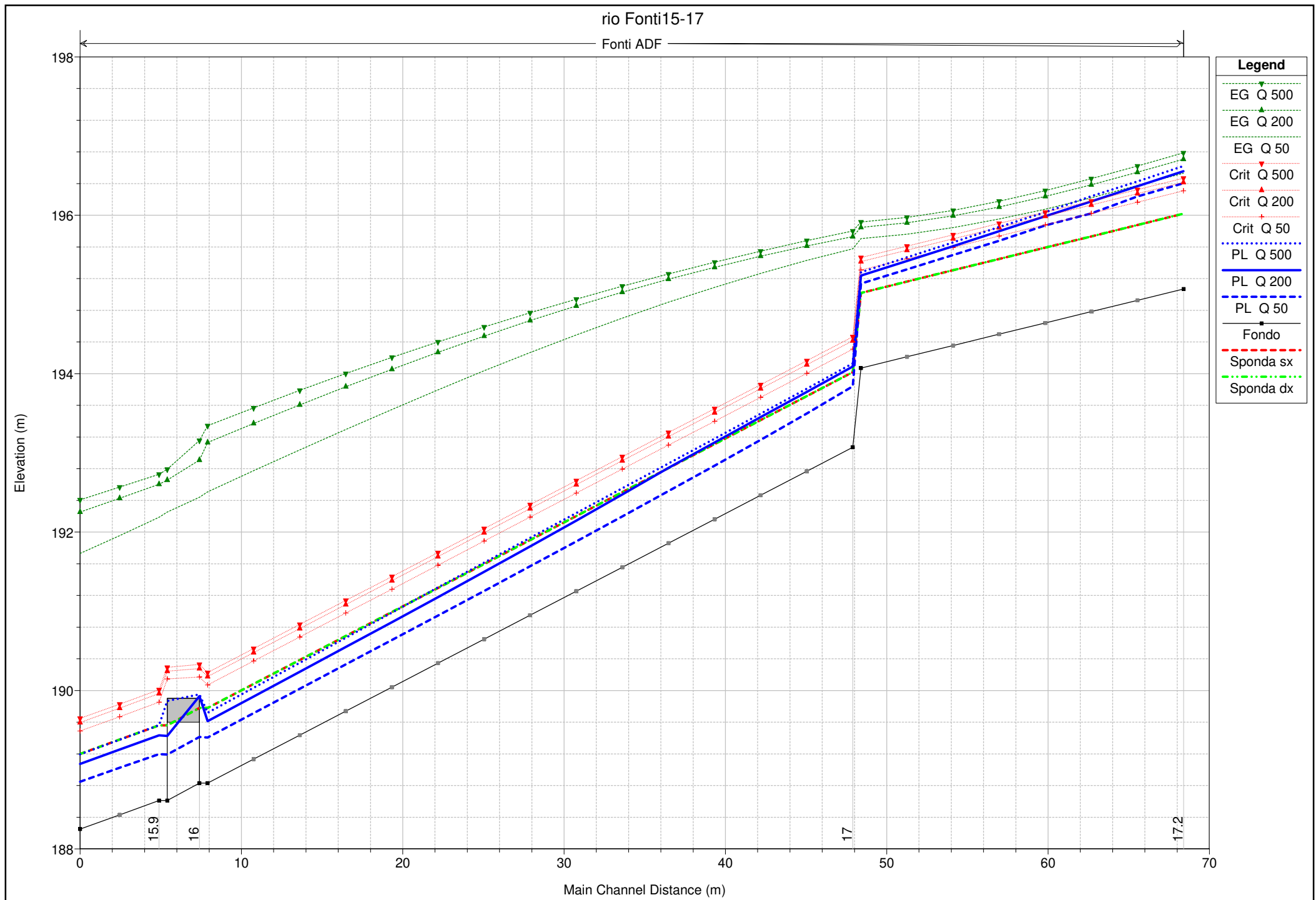
**PROVINCIA DI  
IMPERIA**

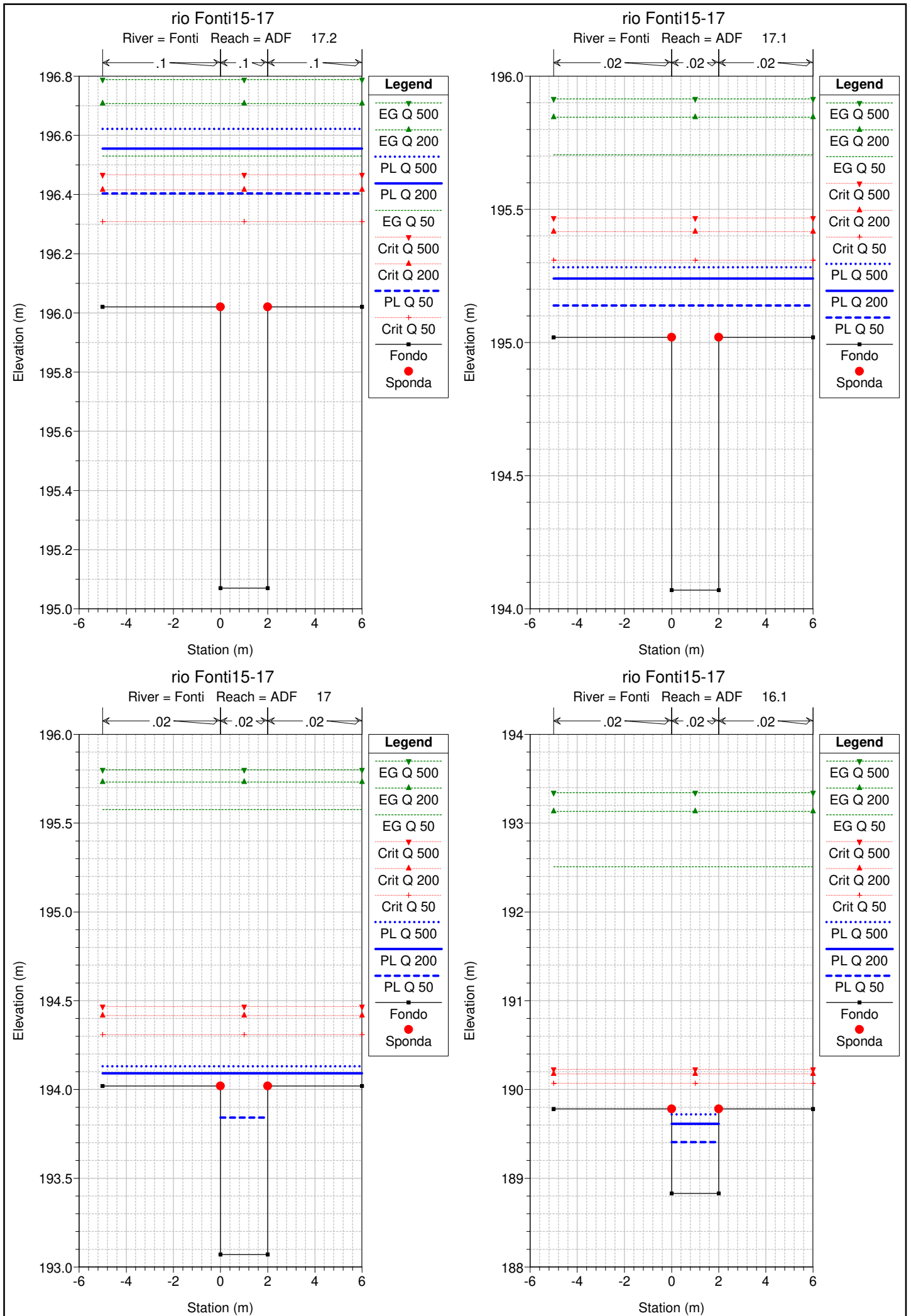
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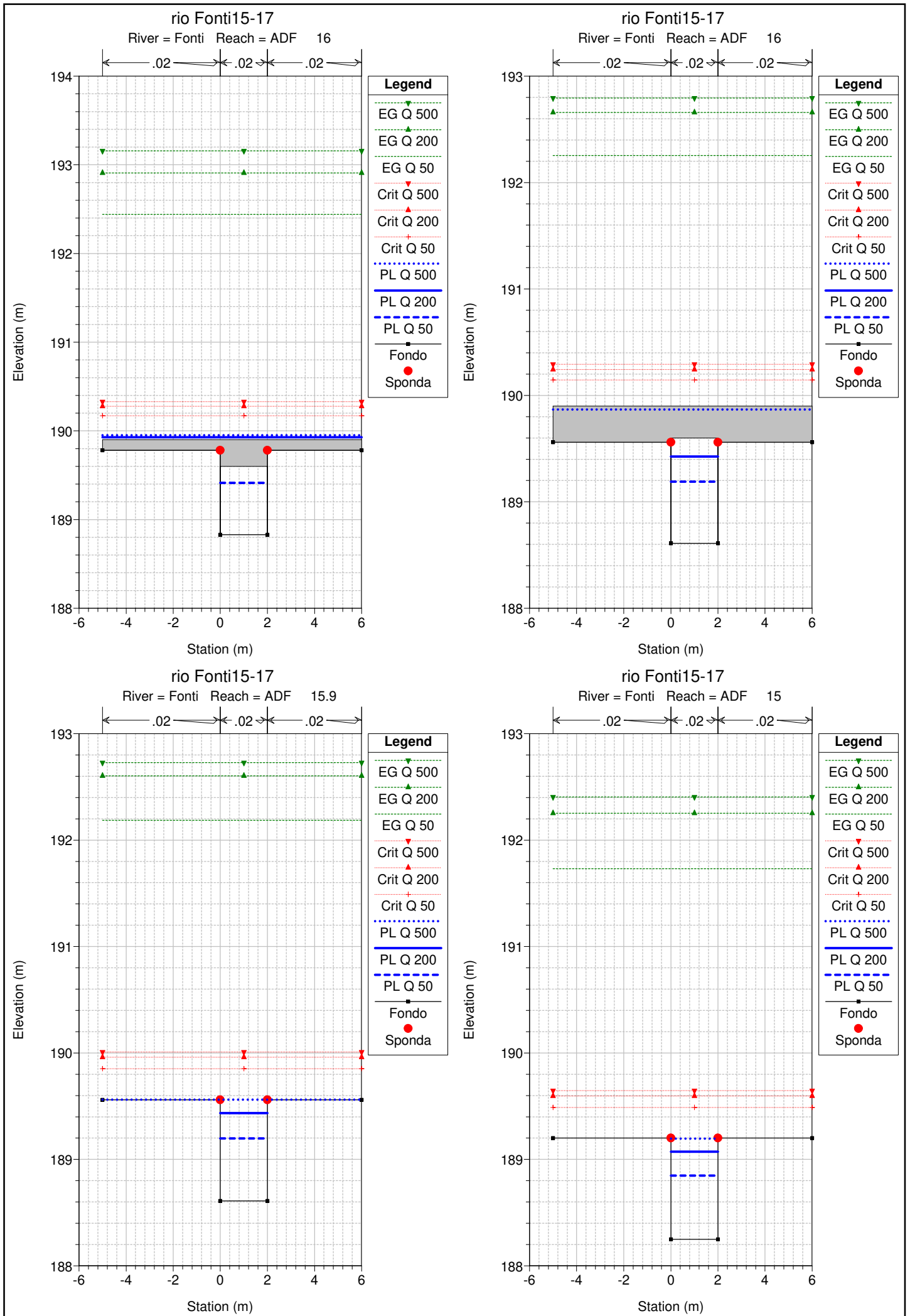


**VERIFICHE IDRAULICHE**  
*Rio Fonti*

**AUTORITA' DI  
BACINO  
REGIONALE**  
Regione Liguria

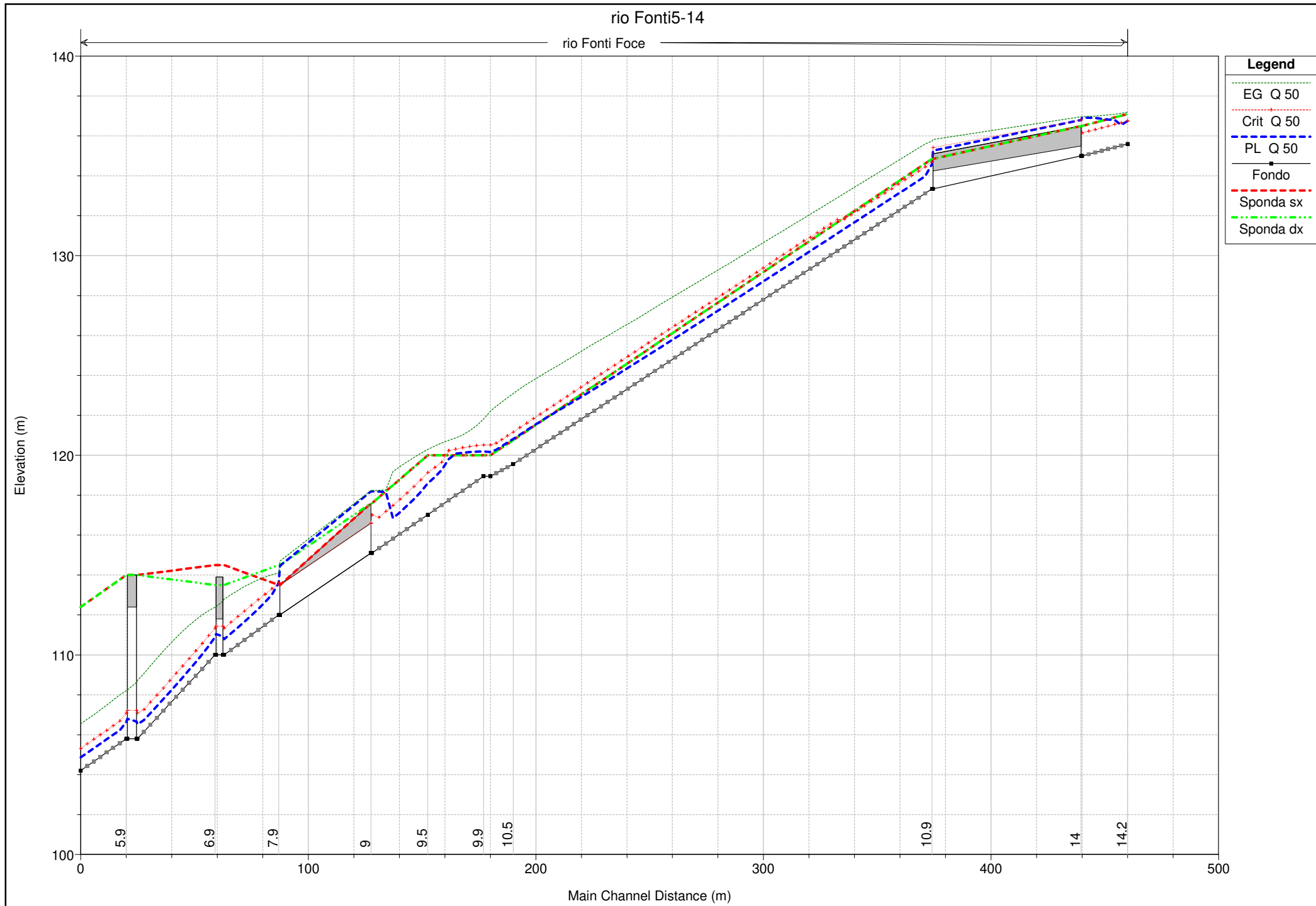


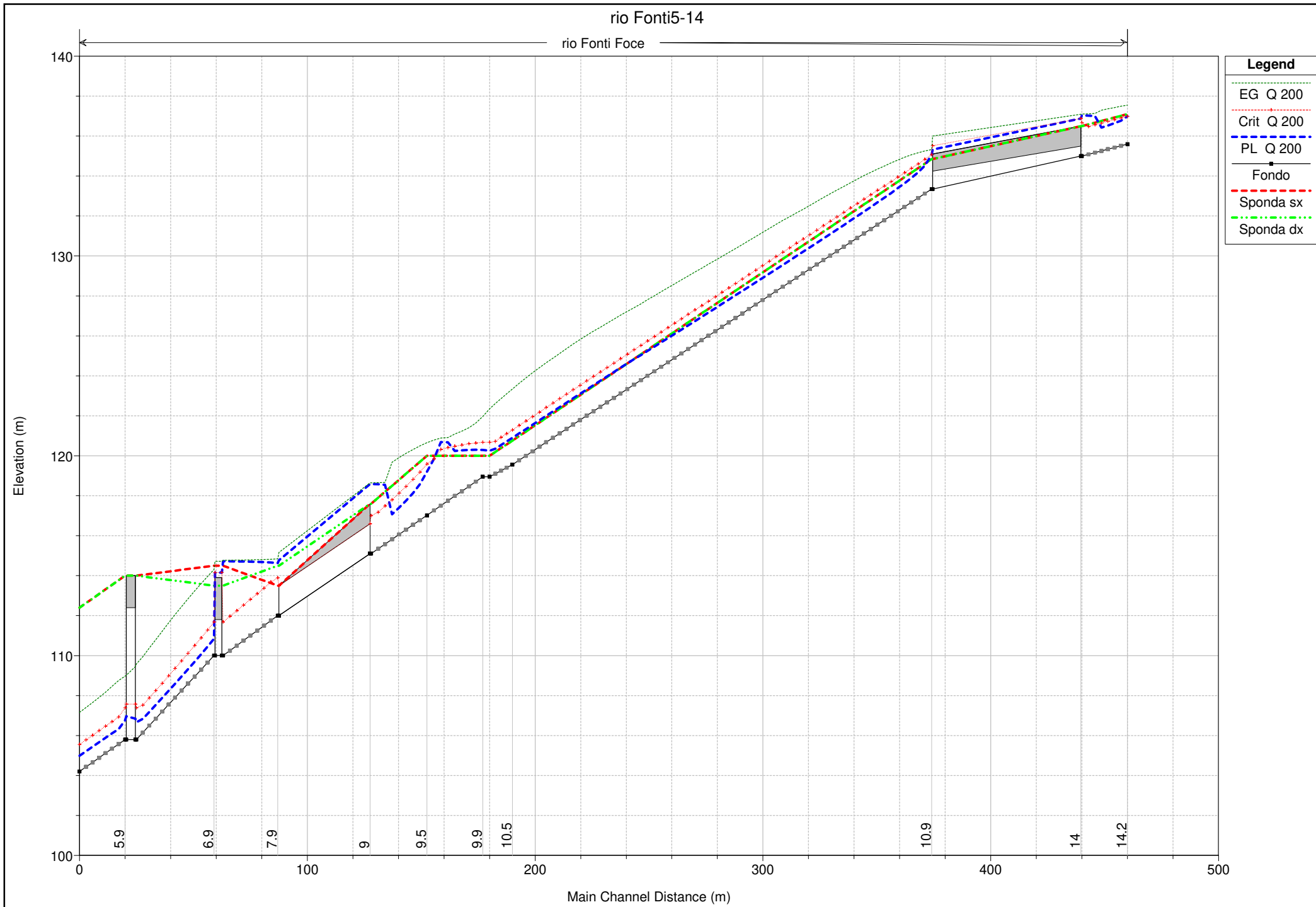


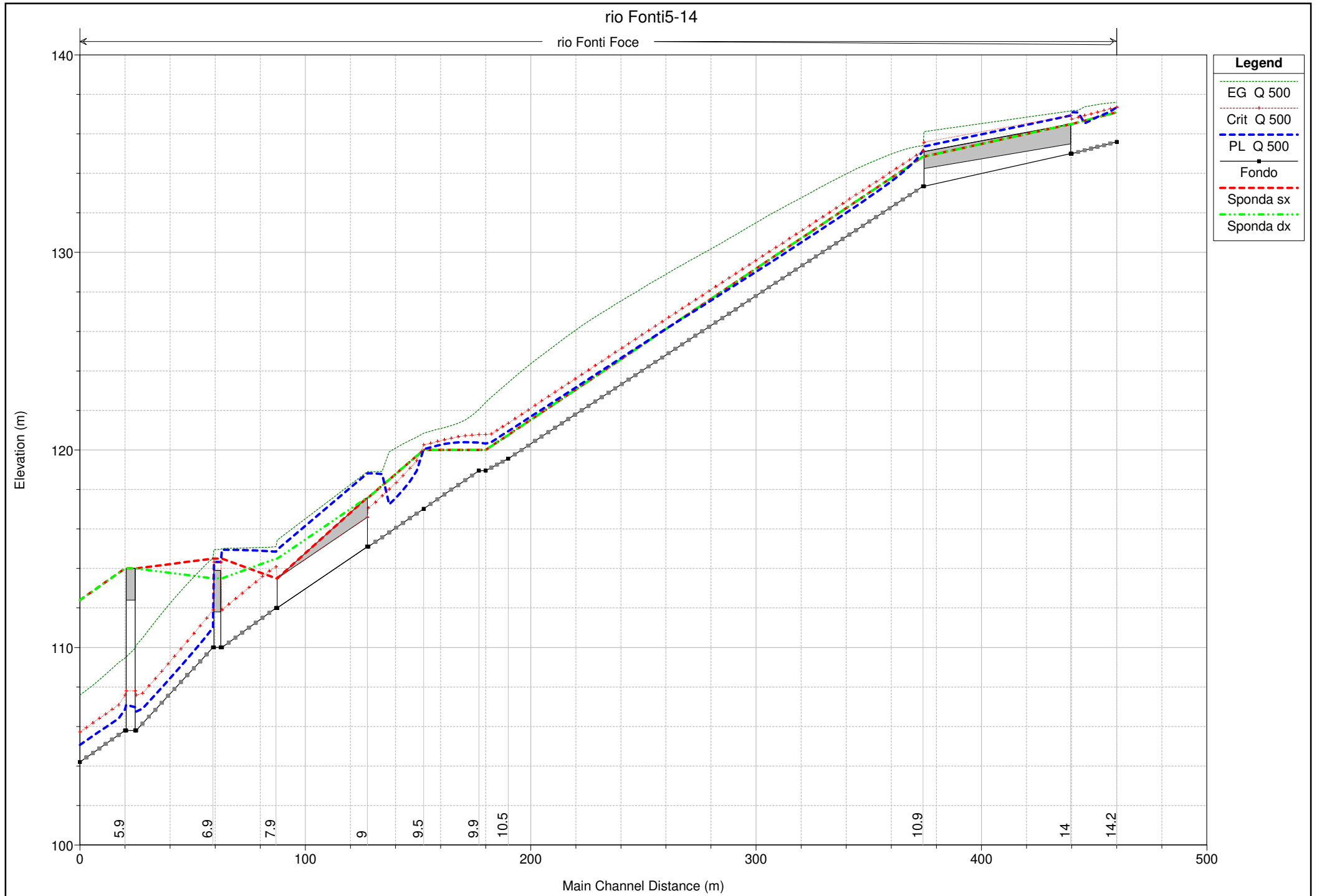


HEC-RAS Plan: Plan 01 River: Fonti Reach: ADF

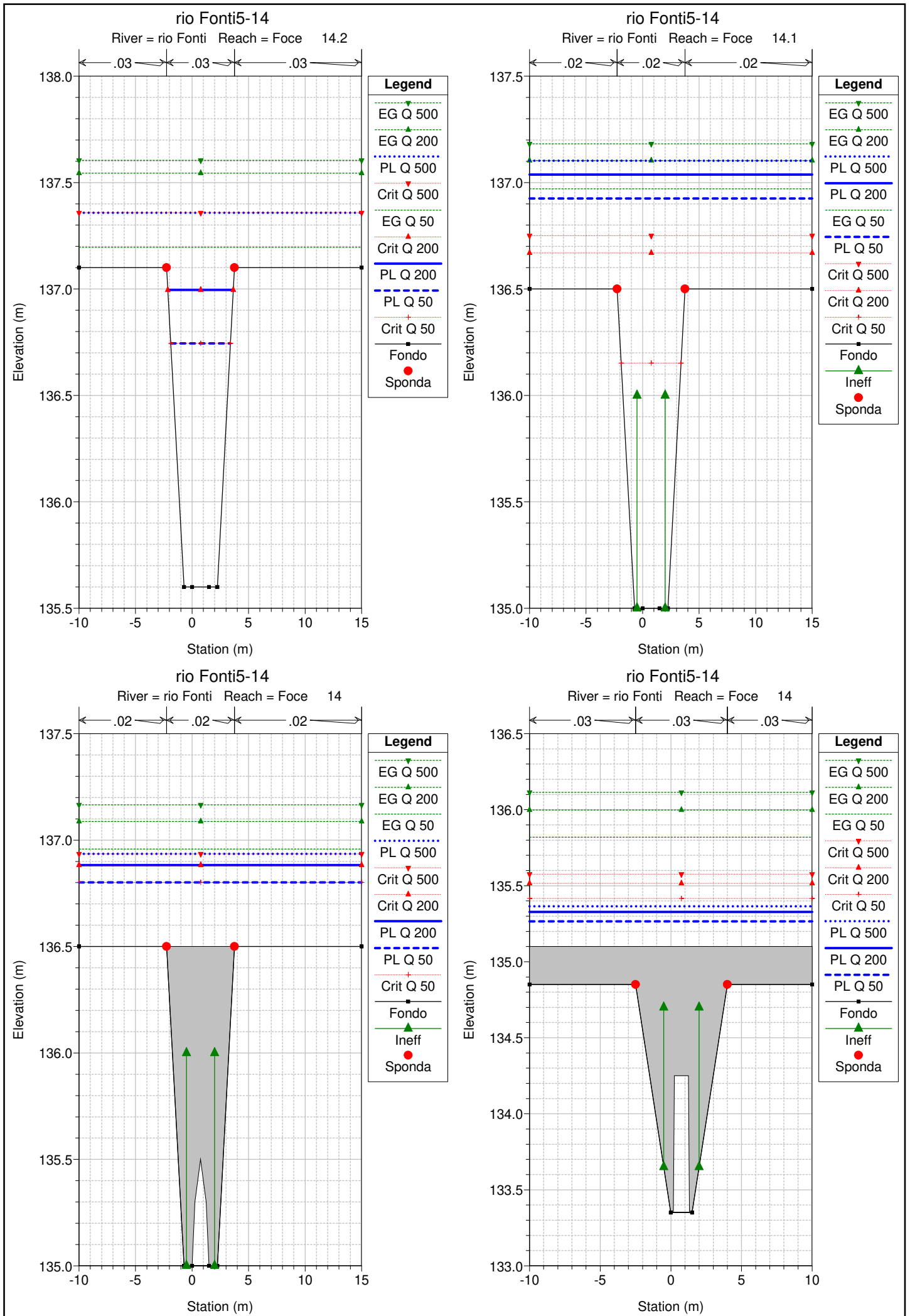
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	LOB Elev (m)	L. Freeboard (m)	ROB Elev (m)	R. Freeboard (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
ADF	17.2	Q 50	9.00	195.07	196.40	196.02	-0.38	196.02	-0.38	196.31	196.53	0.056101	1.84	6.12	11.00	0.51
ADF	17.2	Q 200	13.00	195.07	196.56	196.02	-0.54	196.02	-0.54	196.42	196.71	0.057466	2.00	7.79	11.00	0.52
ADF	17.2	Q 500	15.00	195.07	196.62	196.02	-0.60	196.02	-0.60	196.47	196.79	0.058259	2.07	8.52	11.00	0.53
ADF	17.1	Q 50	9.00	194.07	195.14	195.02	-0.12	195.02	-0.12	195.31	195.70	0.011407	3.58	3.21	11.00	1.10
ADF	17.1	Q 200	13.00	194.07	195.24	195.02	-0.22	195.02	-0.22	195.42	195.85	0.012096	3.91	4.32	11.00	1.15
ADF	17.1	Q 500	15.00	194.07	195.28	195.02	-0.26	195.02	-0.26	195.47	195.91	0.012362	4.05	4.79	11.00	1.17
ADF	17	Q 50	9.00	193.07	193.84	194.02	0.18	194.02	0.18	194.31	195.58	0.041215	5.83	1.54	2.00	2.12
ADF	17	Q 200	13.00	193.07	194.09	194.02	-0.07	194.02	-0.07	194.42	195.73	0.032795	5.88	2.68	11.00	1.86
ADF	17	Q 500	15.00	193.07	194.13	194.02	-0.11	194.02	-0.11	194.47	195.80	0.033600	6.11	3.11	11.00	1.89
ADF	16.1	Q 50	9.00	188.83	189.41	189.78	0.37	189.78	0.37	190.07	192.51	0.092998	7.80	1.15	2.00	3.28
ADF	16.1	Q 200	13.00	188.83	189.61	189.78	0.17	189.78	0.17	190.18	193.13	0.082770	8.31	1.56	2.00	3.00
ADF	16.1	Q 500	15.00	188.83	189.72	189.78	0.06	189.78	0.06	190.23	193.34	0.077606	8.43	1.78	2.00	2.85
ADF	16		Bridge													
ADF	15.9	Q 50	9.00	188.61	189.20	189.56	0.36	189.56	0.36	189.85	192.19	0.088242	7.66	1.18	2.00	3.19
ADF	15.9	Q 200	13.00	188.61	189.43	189.56	0.13	189.56	0.13	189.96	192.60	0.071668	7.88	1.65	2.00	2.77
ADF	15.9	Q 500	15.00	188.61	189.56	189.56	0.00	189.56	0.00	190.01	192.73	0.064713	7.88	1.91	11.00	2.58
ADF	15	Q 50	9.00	188.25	188.85	189.20	0.35	189.20	0.35	189.49	191.73	0.083780	7.52	1.20	2.00	3.10
ADF	15	Q 200	13.00	188.25	189.07	189.20	0.13	189.20	0.13	189.60	192.25	0.072013	7.90	1.65	2.00	2.78
ADF	15	Q 500	15.00	188.25	189.20	189.20	0.01	189.20	0.01	189.65	192.41	0.065944	7.94	1.89	2.00	2.61

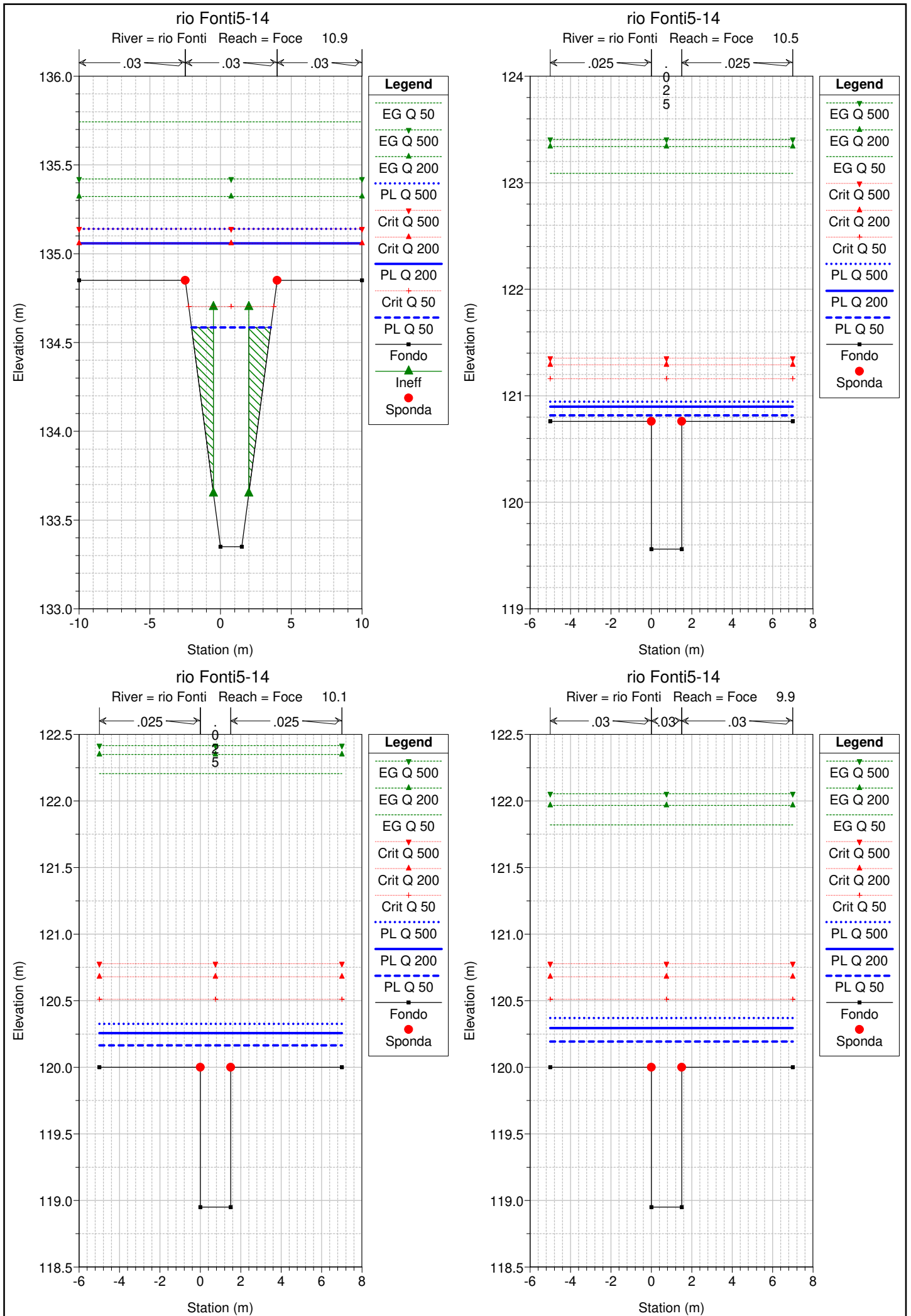


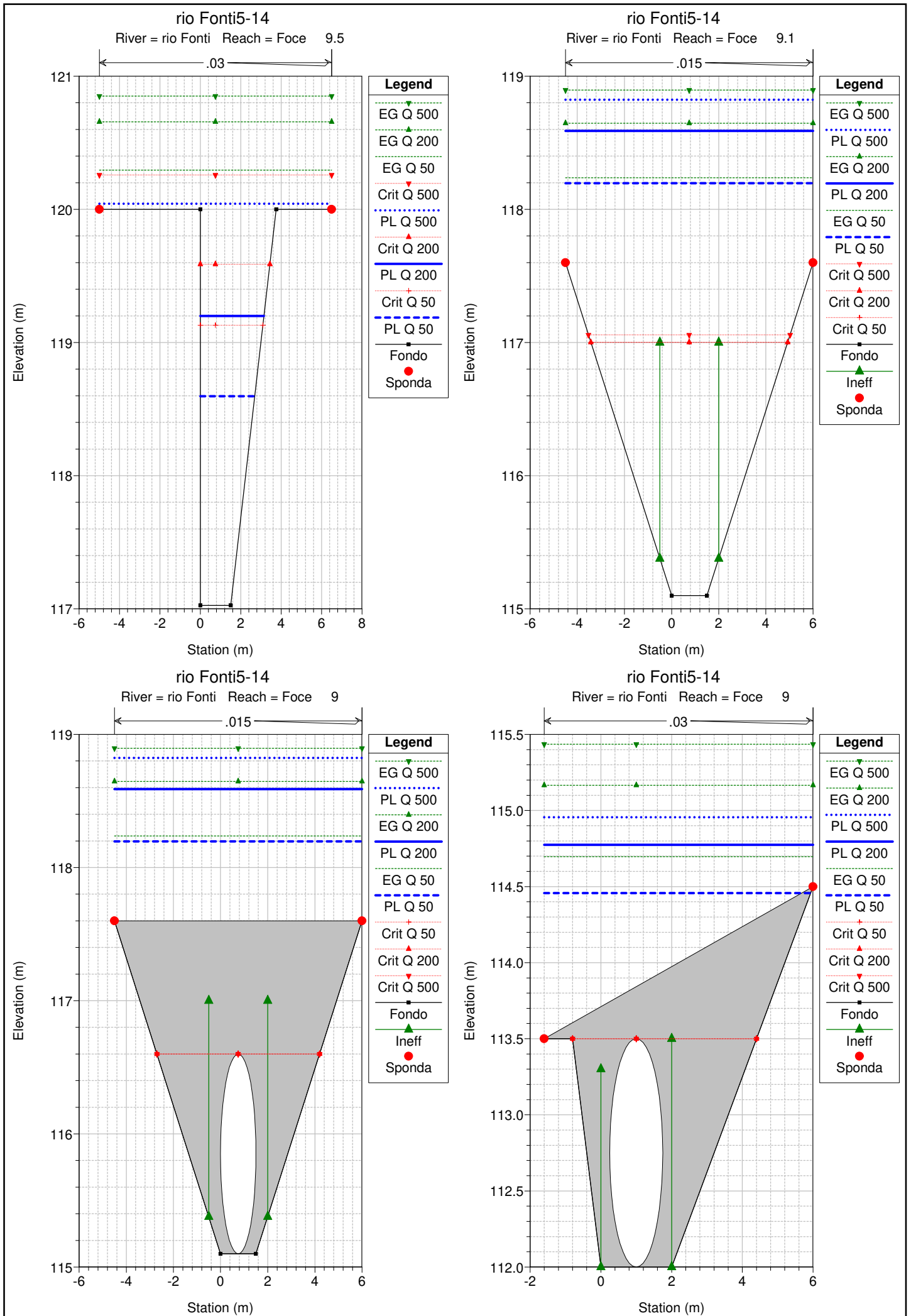


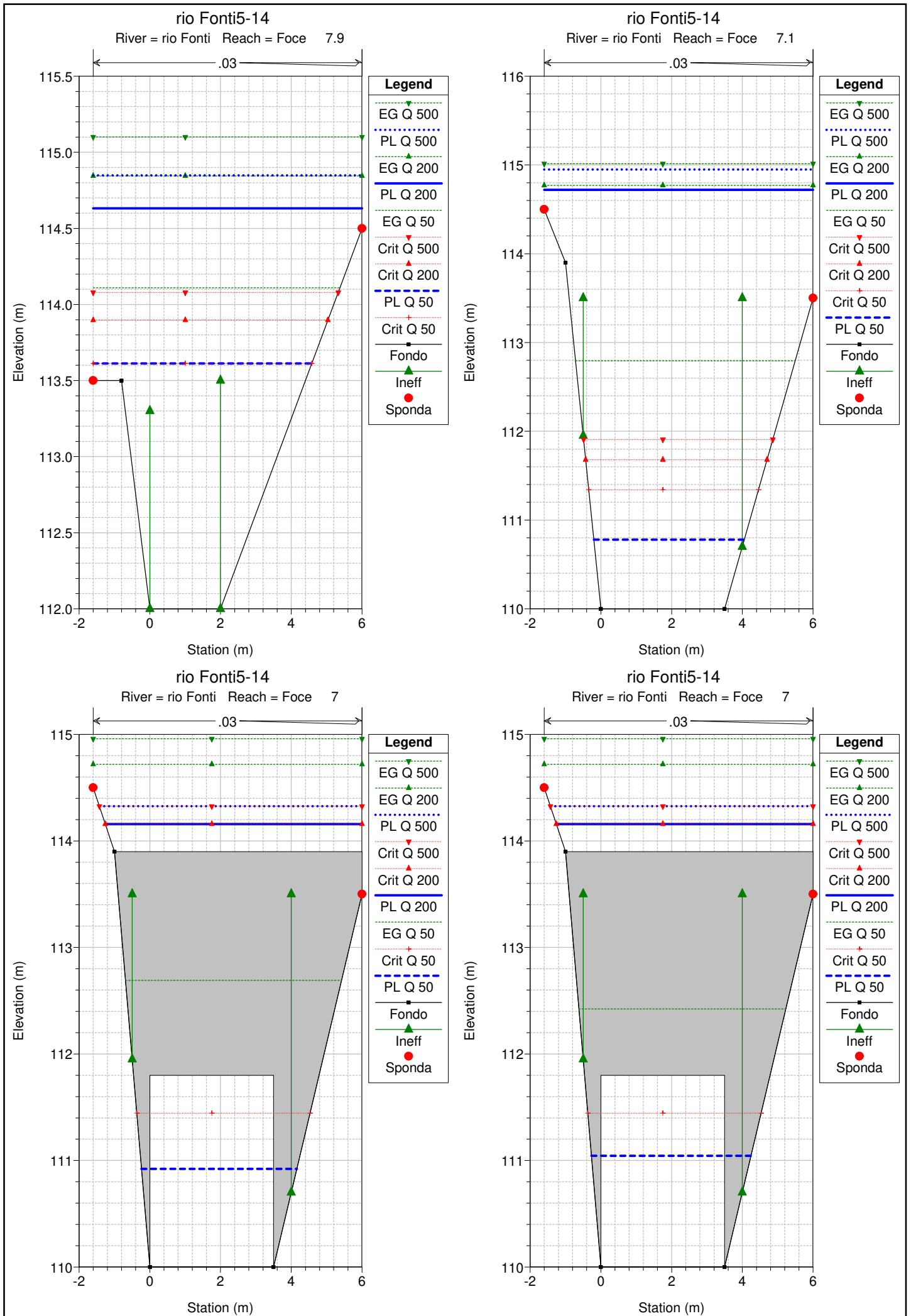


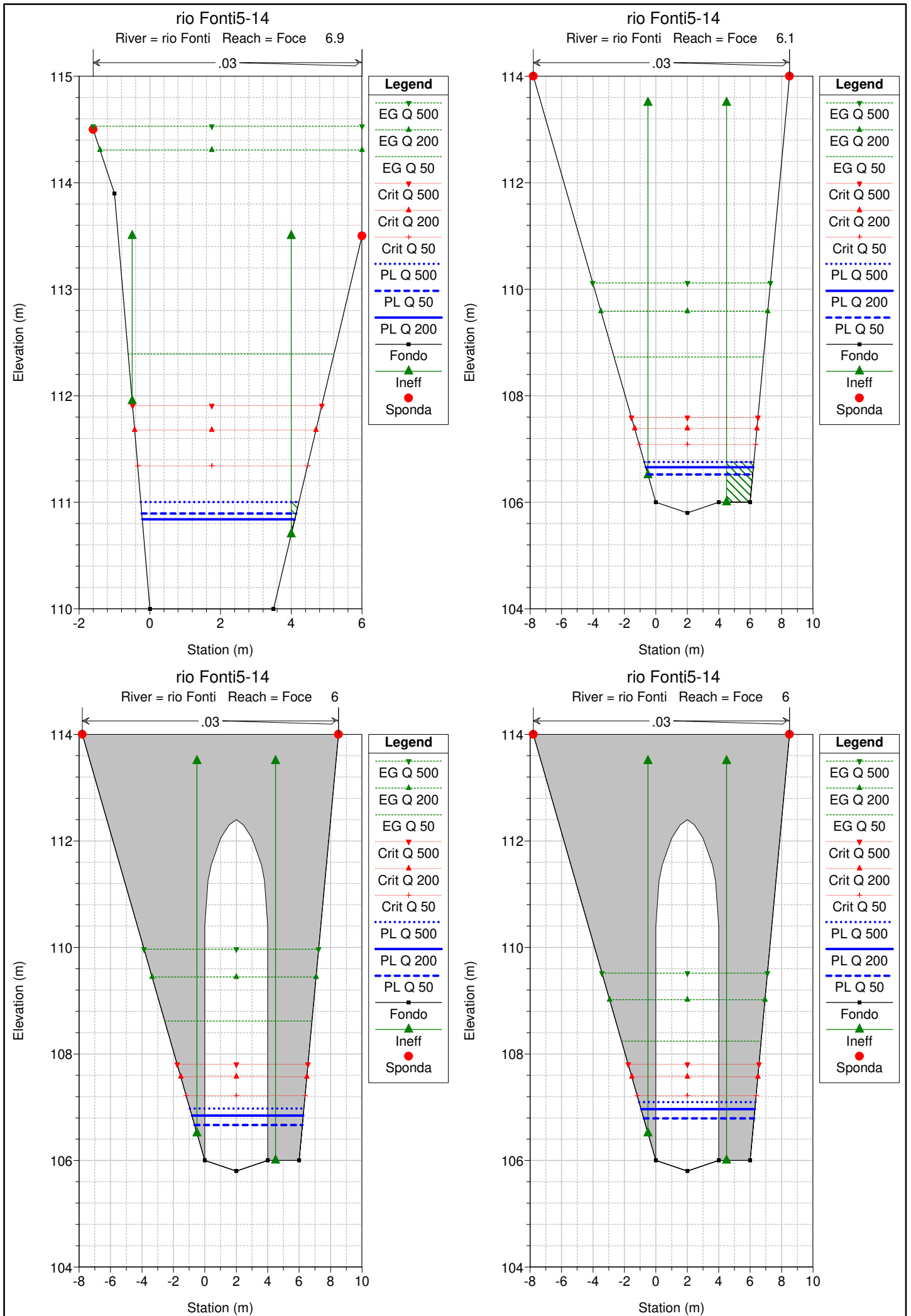


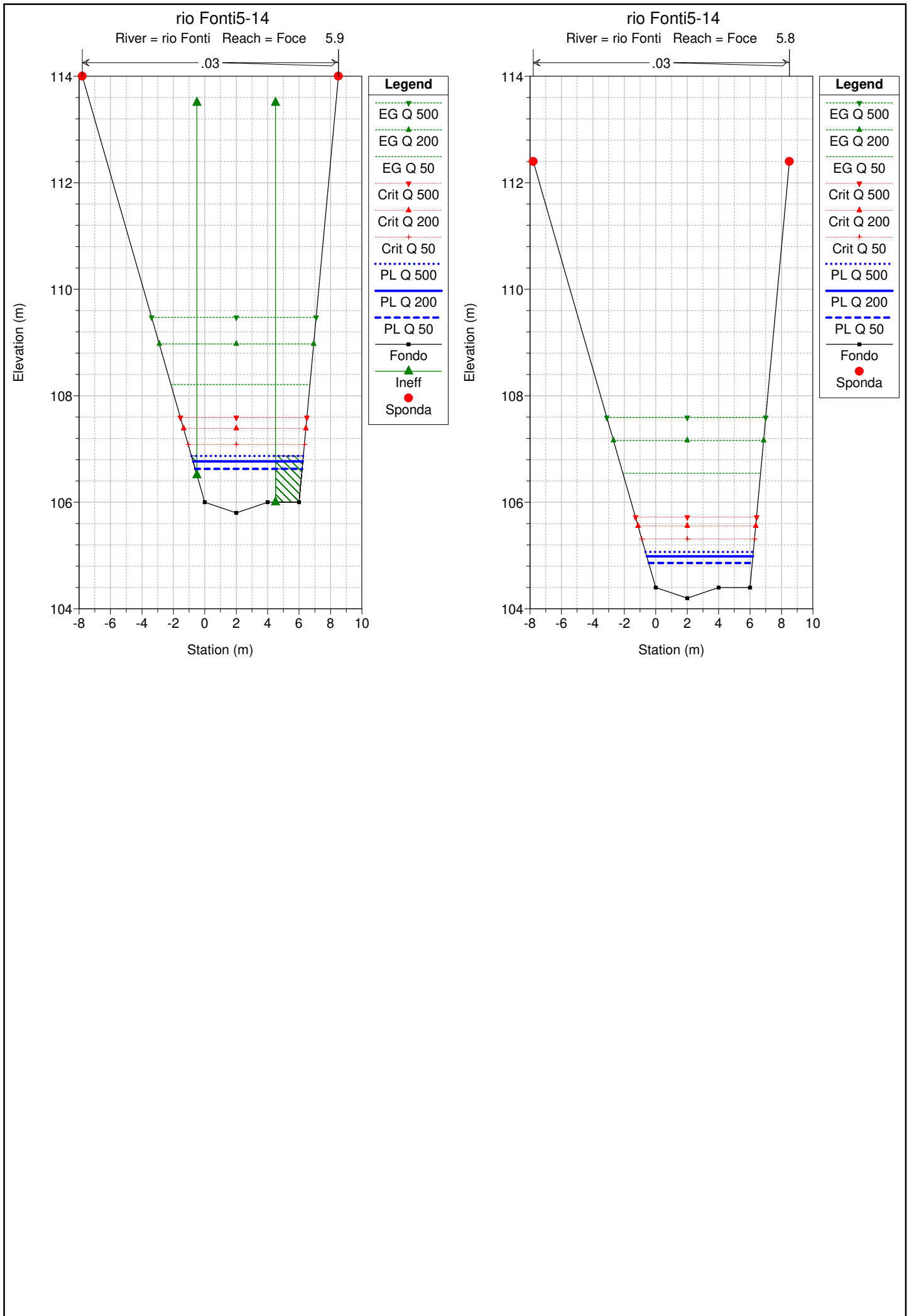












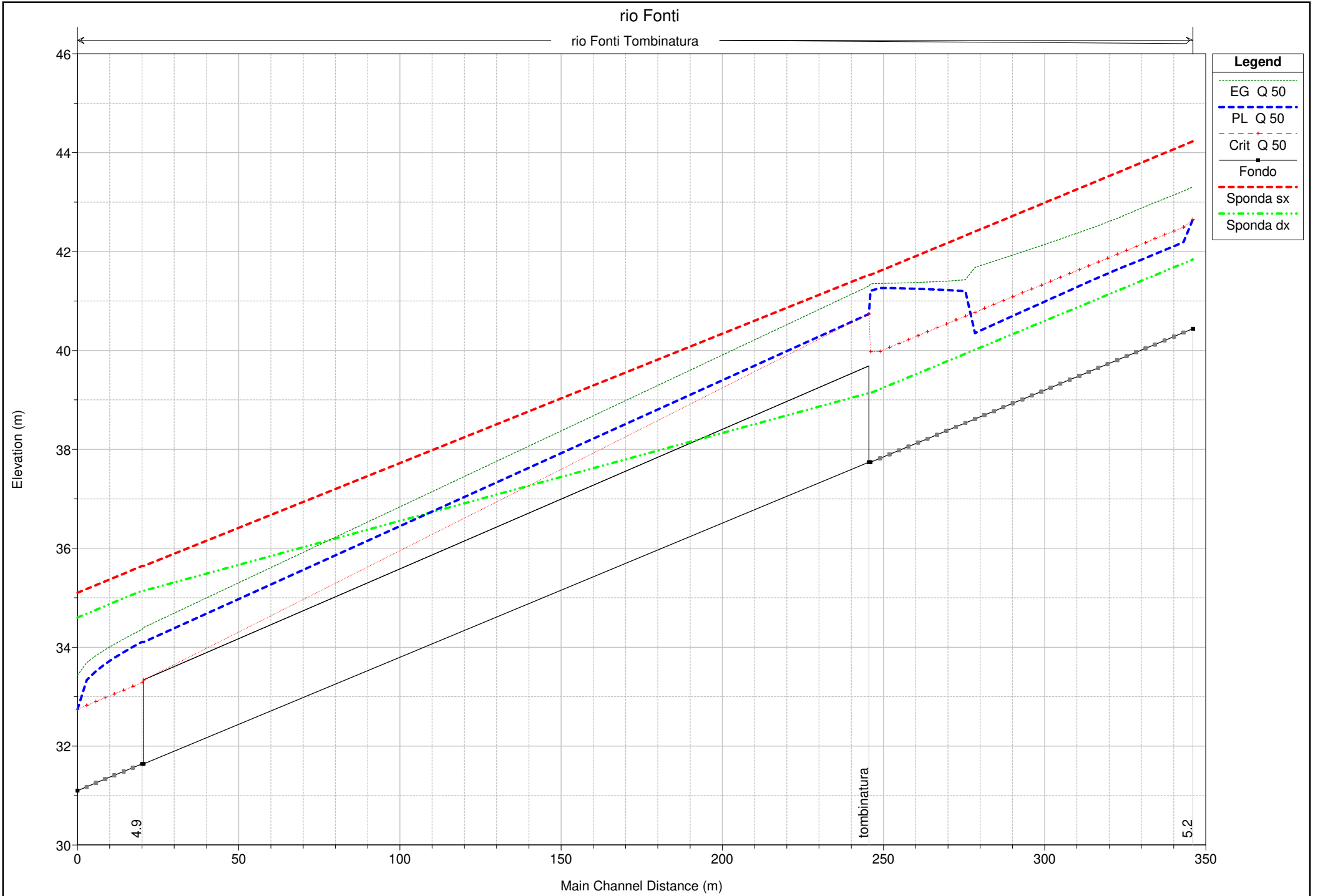
HEC-RAS Plan: Plan 01nat River: rio Fonti Reach: Foce

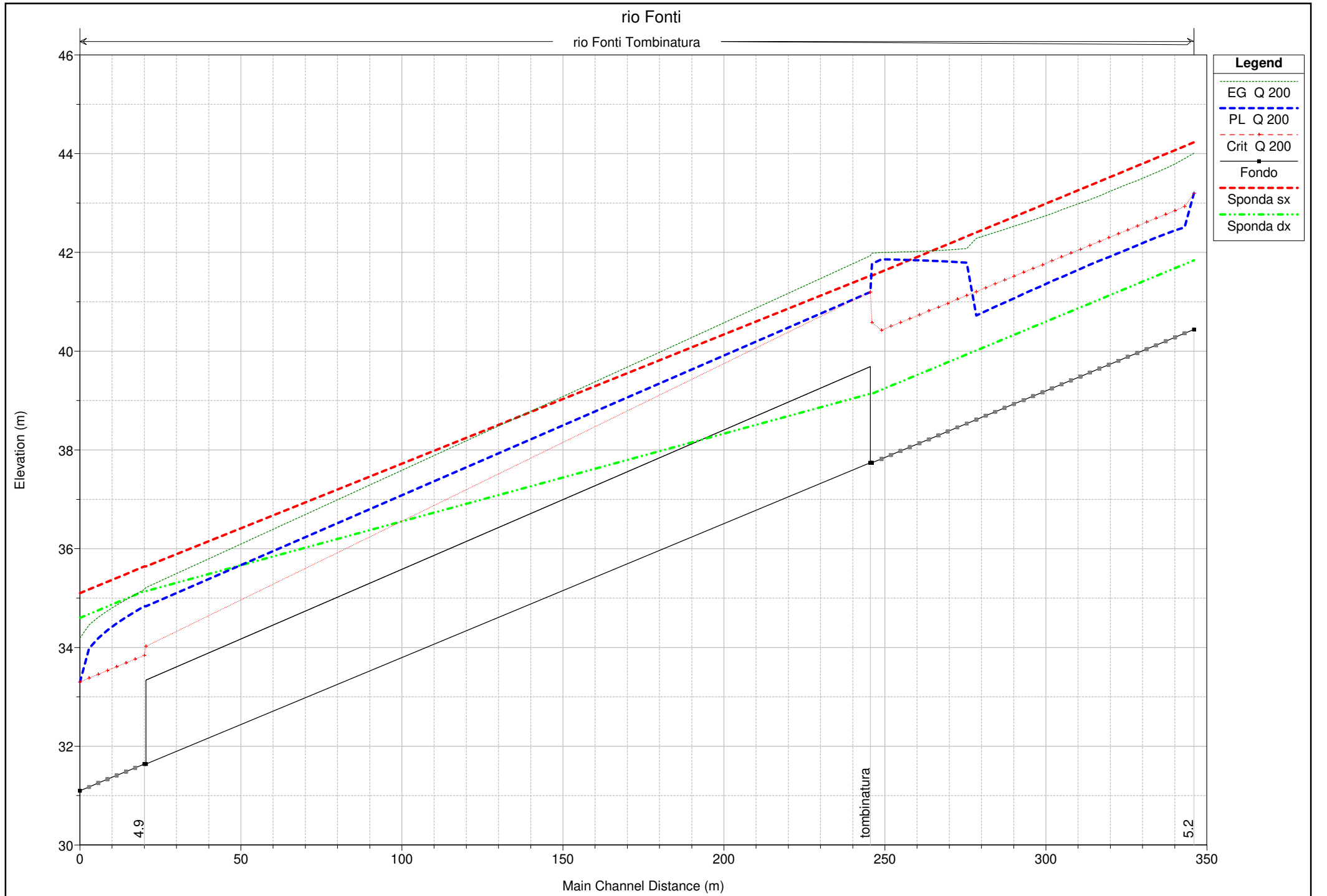
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	LOB Elev (m)	L. Freeboard (m)	ROB Elev (m)	R. Freeboard (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Foce	14.2	Q 50	14.00	135.60	136.74	137.10	0.36	137.10	0.36	136.74	137.20	0.011538	2.97	4.71	5.28	1.01
Foce	14.2	Q 200	20.00	135.60	137.00	137.10	0.10	137.10	0.10	137.00	137.54	0.011500	3.28	6.09	5.79	1.02
Foce	14.2	Q 500	24.00	135.60	137.36	137.10	-0.26	137.10	-0.26	137.36	137.60	0.004306	2.39	13.15	25.00	0.65
Foce	14.1	Q 50	14.00	135.00	136.93	136.50	-0.43	136.50	-0.43	136.15	136.97	0.000332	1.08	17.34	25.00	0.28
Foce	14.1	Q 200	20.00	135.00	137.04	136.50	-0.54	136.50	-0.54	136.67	137.10	0.000453	1.32	20.16	25.00	0.33
Foce	14.1	Q 500	24.00	135.00	137.10	136.50	-0.60	136.50	-0.60	136.75	137.18	0.000526	1.45	21.77	25.00	0.35
Foce	14	Bridge														
Foce	10.9	Q 50	14.00	133.35	134.59	134.85	0.26	134.85	0.26	134.70	135.74	0.017954	4.77	2.94	5.62	1.40
Foce	10.9	Q 200	20.00	133.35	135.06	134.85	-0.21	134.85	-0.21	135.06	135.32	0.005176	2.40	10.17	20.00	0.72
Foce	10.9	Q 500	24.00	133.35	135.14	134.85	-0.29	134.85	-0.29	135.14	135.42	0.005236	2.53	11.80	20.00	0.73
Foce	10.5	Q 50	14.00	119.56	120.82	120.76	-0.06	120.76	-0.06	121.16	123.09	0.078583	6.91	2.48	12.00	1.97
Foce	10.5	Q 200	20.00	119.56	120.90	120.76	-0.14	120.76	-0.14	121.29	123.34	0.089556	7.69	3.46	12.00	2.12
Foce	10.5	Q 500	24.00	119.56	120.94	120.76	-0.18	120.76	-0.18	121.35	123.41	0.091821	7.96	4.02	12.00	2.16
Foce	10.1	Q 50	19.00	118.95	120.16	120.00	-0.16	120.00	-0.16	120.51	122.21	0.081630	7.26	3.54	12.00	2.10
Foce	10.1	Q 200	27.00	118.95	120.26	120.00	-0.26	120.00	-0.26	120.68	122.35	0.081512	7.62	4.66	12.00	2.13
Foce	10.1	Q 500	33.00	118.95	120.33	120.00	-0.33	120.00	-0.33	120.78	122.42	0.076240	7.62	5.49	12.00	2.08
Foce	9.9	Q 50	19.00	118.95	120.19	120.00	-0.19	120.00	-0.19	120.51	121.82	0.093883	6.59	3.89	12.00	1.89
Foce	9.9	Q 200	27.00	118.95	120.29	120.00	-0.29	120.00	-0.29	120.68	121.97	0.091054	6.83	5.10	12.00	1.88
Foce	9.9	Q 500	33.00	118.95	120.37	120.00	-0.37	120.00	-0.37	120.78	122.05	0.083824	6.80	6.02	12.00	1.82
Foce	9.5	Q 50	19.00	117.02	118.60	120.00	1.40	120.00	1.40	119.13	120.30	0.052922	5.77	3.29	2.69	1.67
Foce	9.5	Q 200	27.00	117.02	119.20	120.00	0.80	120.00	0.80	119.59	120.66	0.035341	5.35	5.05	3.14	1.35
Foce	9.5	Q 500	33.00	117.02	120.04	120.00	-0.04	120.00	-0.04	120.26	120.85	0.034426	3.98	8.29	11.50	1.50
Foce	9.1	Q 50	19.00	115.10	118.20	117.60	-0.60	117.60	-0.60	117.00	118.24	0.000093	0.89	21.26	10.50	0.20
Foce	9.1	Q 200	27.00	115.10	118.59	117.60	-0.99	117.60	-0.99	117.00	118.65	0.000113	1.06	25.39	10.50	0.22
Foce	9.1	Q 500	33.00	115.10	118.82	117.60	-1.22	117.60	-1.22	117.06	118.90	0.000129	1.19	27.85	10.50	0.23
Foce	9	Culvert														
Foce	7.9	Q 50	19.00	112.00	113.61	113.50	-0.11	114.50	0.89	113.61	114.11	0.011904	3.12	6.09	6.18	1.00
Foce	7.9	Q 200	27.00	112.00	114.63	113.50	-1.13	114.50	-0.13	113.90	114.85	0.002768	2.05	13.20	7.60	0.50
Foce	7.9	Q 500	33.00	112.00	114.85	113.50	-1.35	114.50	-0.35	114.08	115.10	0.002949	2.22	14.85	7.60	0.51
Foce	7.1	Q 50	19.00	110.00	110.78	114.50	3.72	113.50	2.72	111.34	112.79	0.072568	6.28	3.02	4.26	2.36
Foce	7.1	Q 200	27.00	110.00	114.72	114.50	-0.22	113.50	-1.22	111.68	114.77	0.000378	1.00	27.03	7.60	0.17
Foce	7.1	Q 500	33.00	110.00	114.95	114.50	-0.45	113.50	-1.45	111.91	115.02	0.000478	1.15	28.76	7.60	0.19
Foce	7	Bridge														
Foce	6.9	Q 50	19.00	110.00	110.89	114.50	3.61	113.50	2.61	111.34	112.39	0.045663	5.42	3.51	4.37	1.90
Foce	6.9	Q 200	27.00	110.00	110.84	114.50	3.66	113.50	2.66	111.68	114.31	0.114235	8.25	3.27	4.31	2.99
Foce	6.9	Q 500	33.00	110.00	111.00	114.50	3.50	113.50	2.50	111.91	114.53	0.093783	8.32	3.97	4.47	2.75

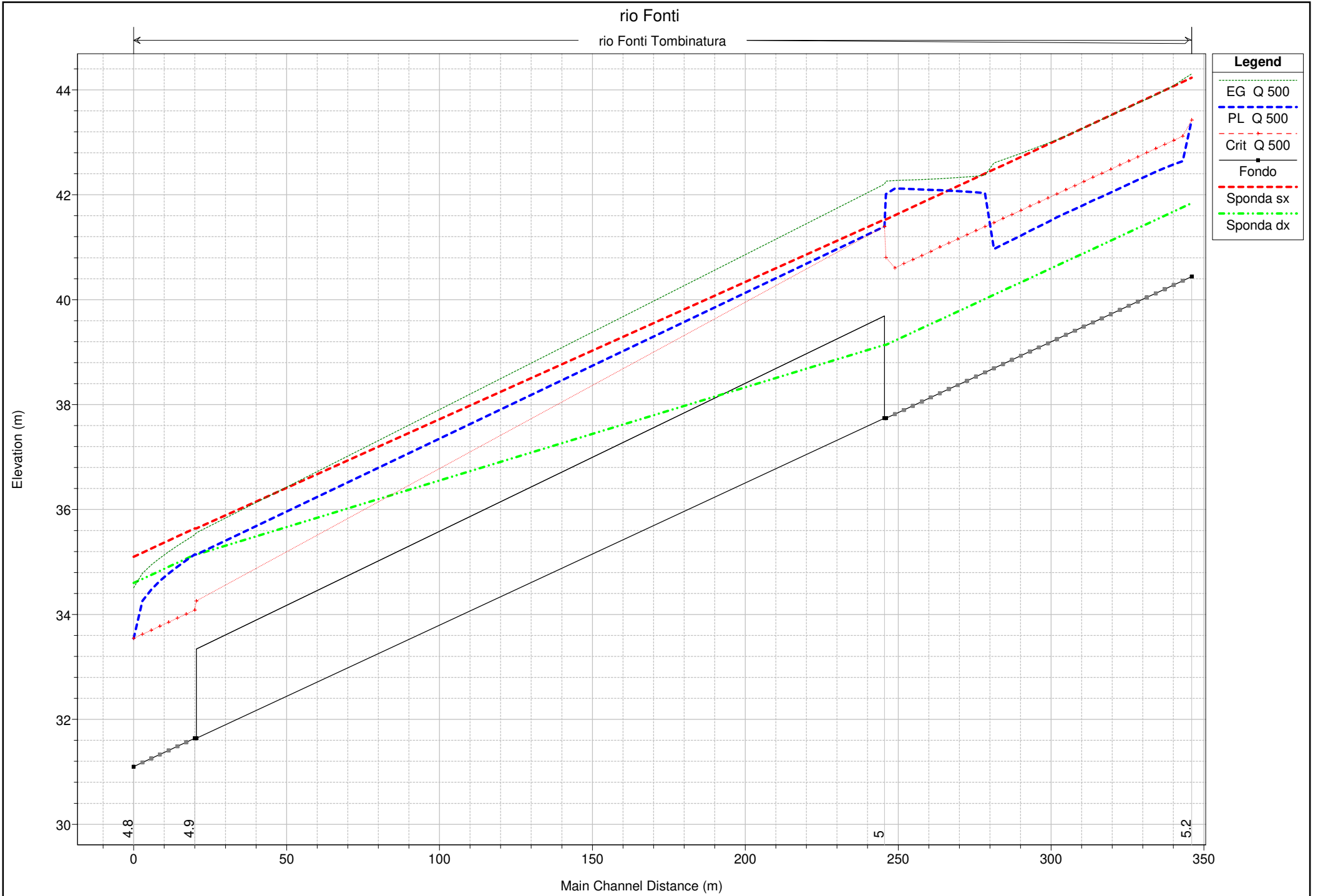
HEC-RAS Plan: Plan 01nat River: rio Fonti Reach: Foce (Continued)

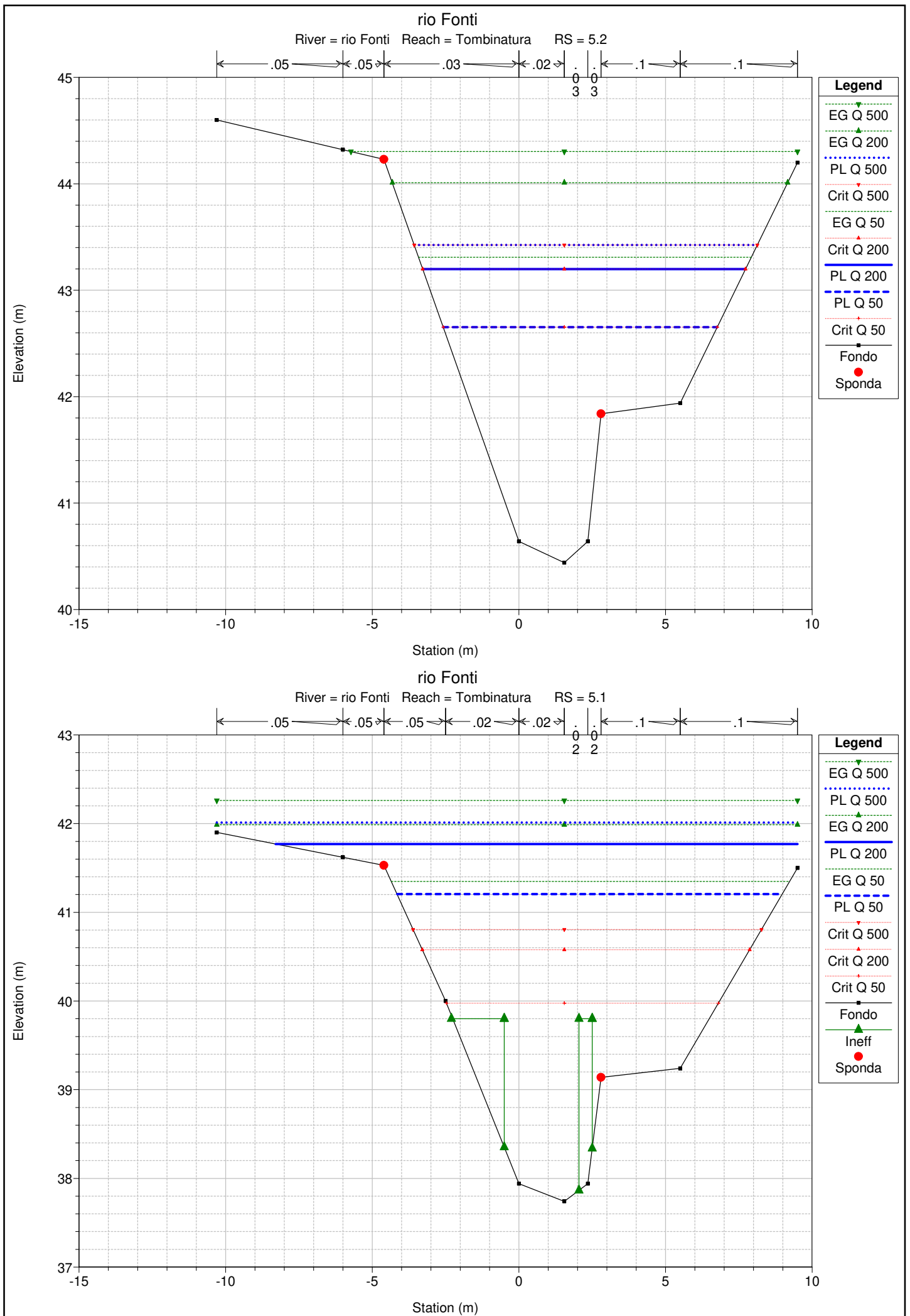
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	LOB Elev (m)	L. Freeboard (m)	ROB Elev (m)	R. Freeboard (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Foce	6.1	Q 50	19.00	105.80	106.52	114.00	7.48	114.00	7.48	107.08	108.73	0.085895	6.57	2.89	6.67	2.76
Foce	6.1	Q 200	27.00	105.80	106.66	114.00	7.34	114.00	7.34	107.39	109.59	0.086296	7.58	3.56	6.85	2.87
Foce	6.1	Q 500	33.00	105.80	106.76	114.00	7.24	114.00	7.24	107.59	110.12	0.083135	8.12	4.06	6.98	2.88
Foce	6	Bridge														
Foce	5.9	Q 50	19.00	105.80	106.63	114.00	7.37	114.00	7.37	107.08	108.21	0.049385	5.57	3.41	6.81	2.15
Foce	5.9	Q 200	27.00	105.80	106.77	114.00	7.23	114.00	7.23	107.39	108.97	0.053833	6.58	4.11	6.99	2.32
Foce	5.9	Q 500	33.00	105.80	106.87	114.00	7.13	114.00	7.13	107.59	109.47	0.054261	7.14	4.62	7.12	2.37
Foce	5.8	Q 50	19.00	104.20	104.86	112.40	7.54	112.40	7.54	105.31	106.55	0.083115	5.75	3.31	6.59	2.59
Foce	5.8	Q 200	27.00	104.20	104.99	112.40	7.41	112.40	7.41	105.55	107.16	0.084270	6.53	4.13	6.75	2.67
Foce	5.8	Q 500	33.00	104.20	105.07	112.40	7.33	112.40	7.33	105.72	107.59	0.085550	7.04	4.69	6.86	2.72

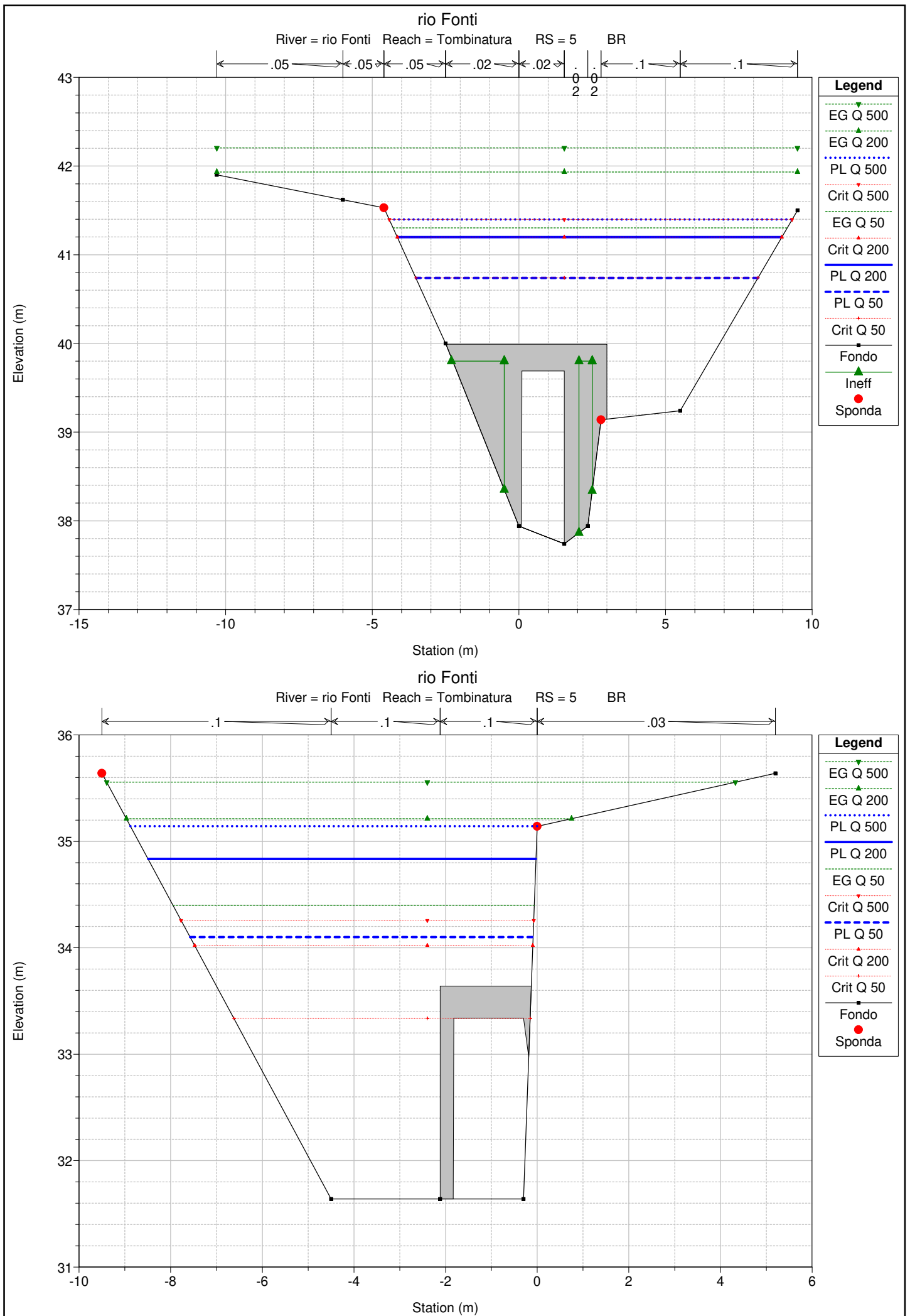


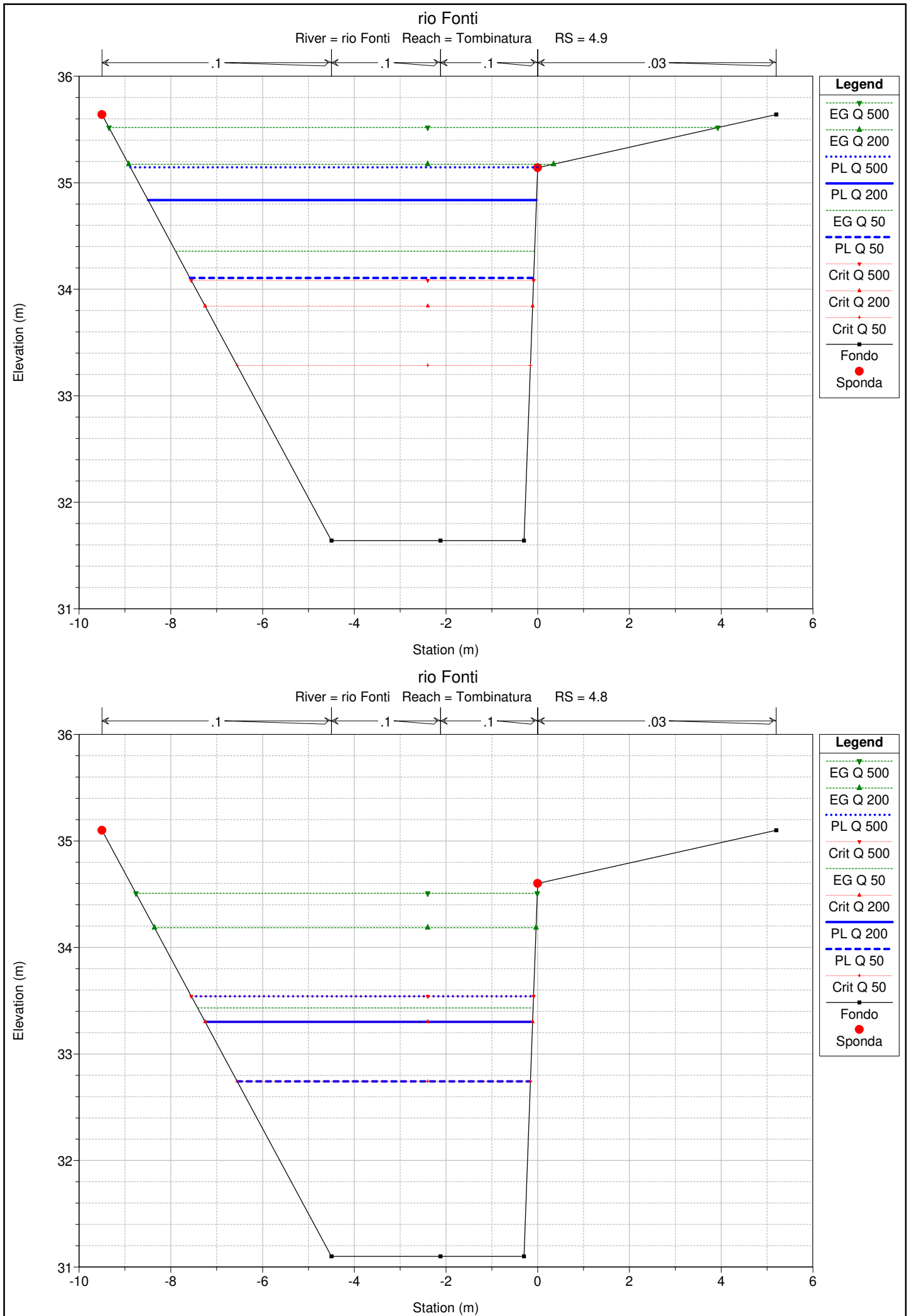






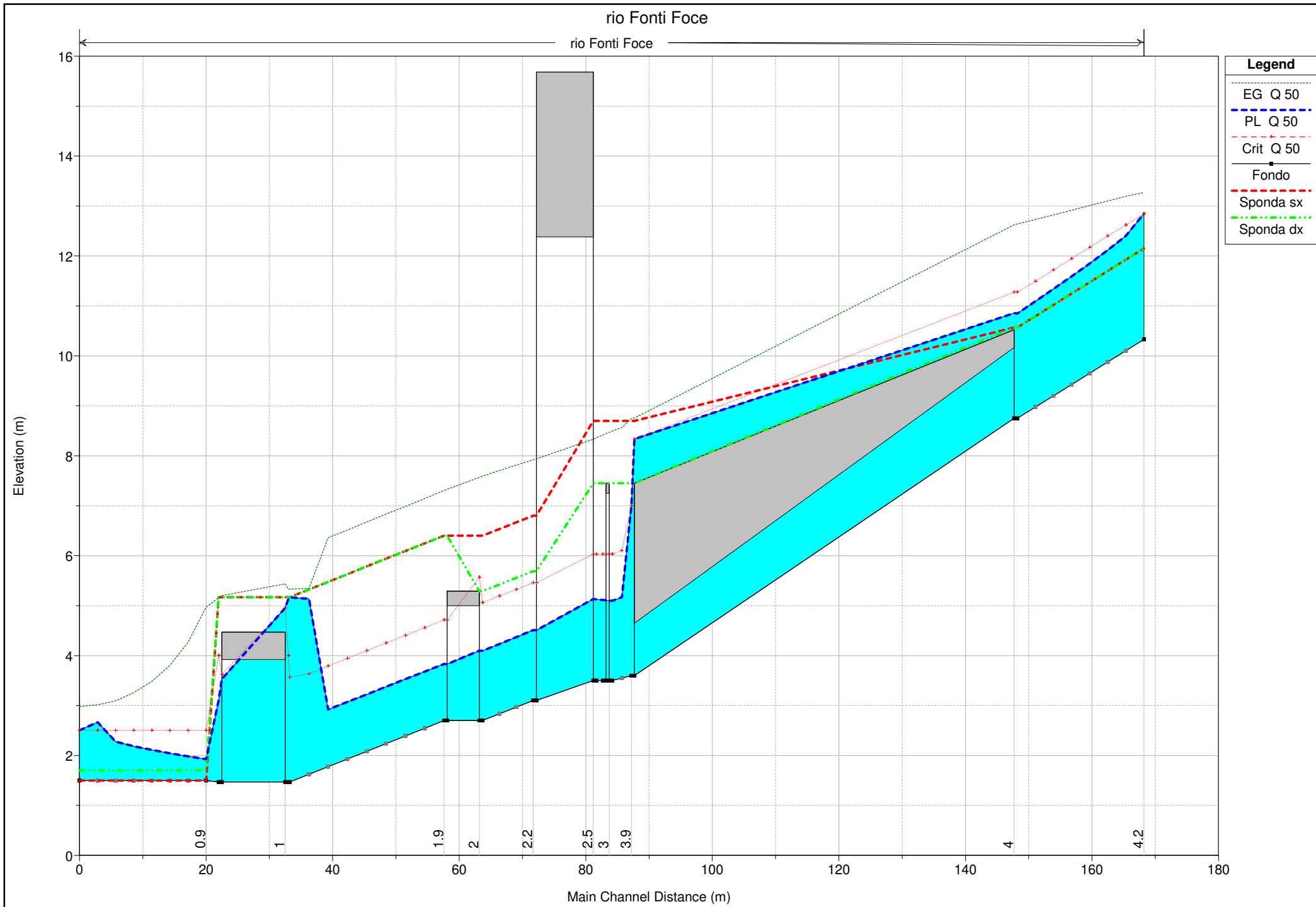




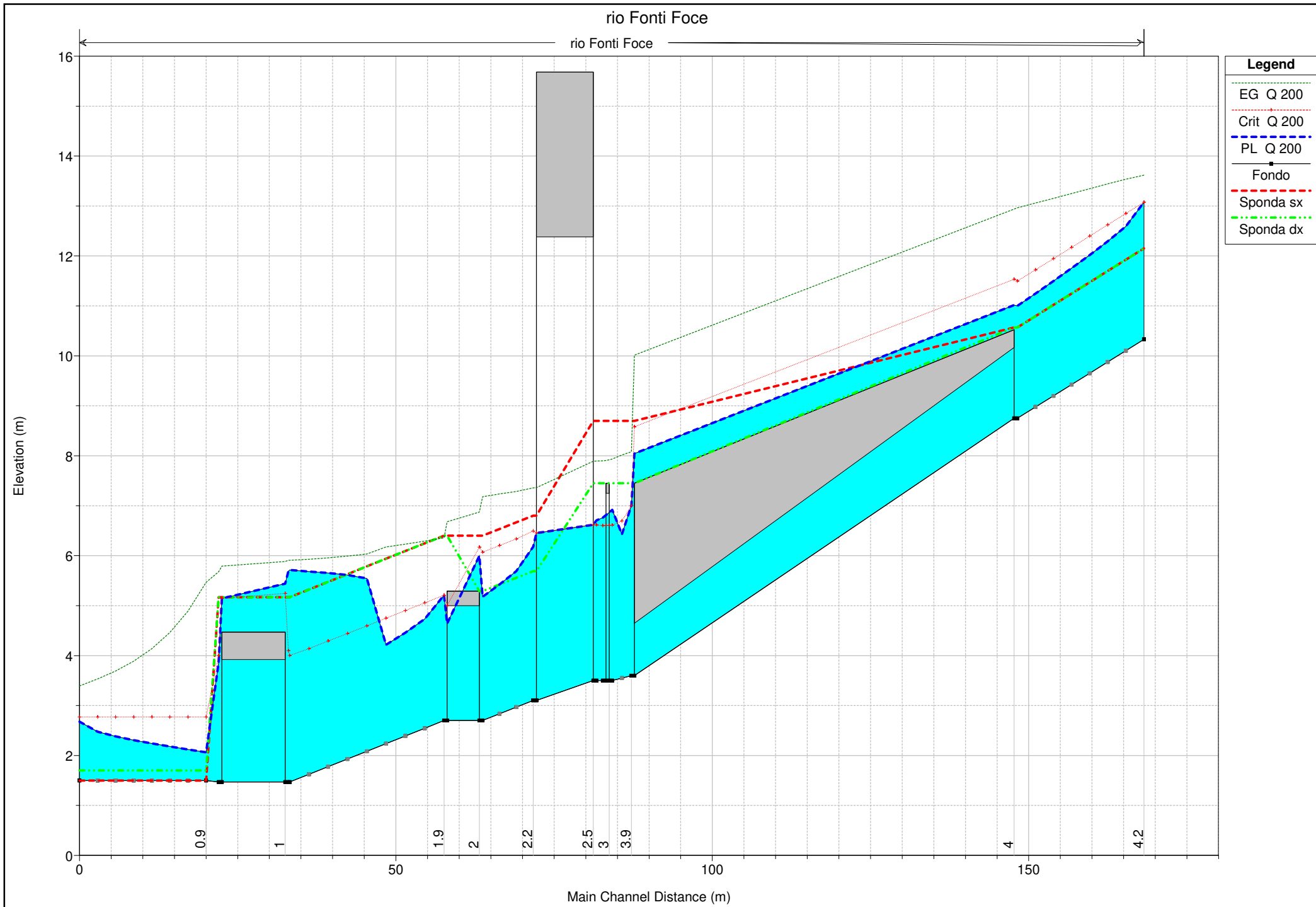


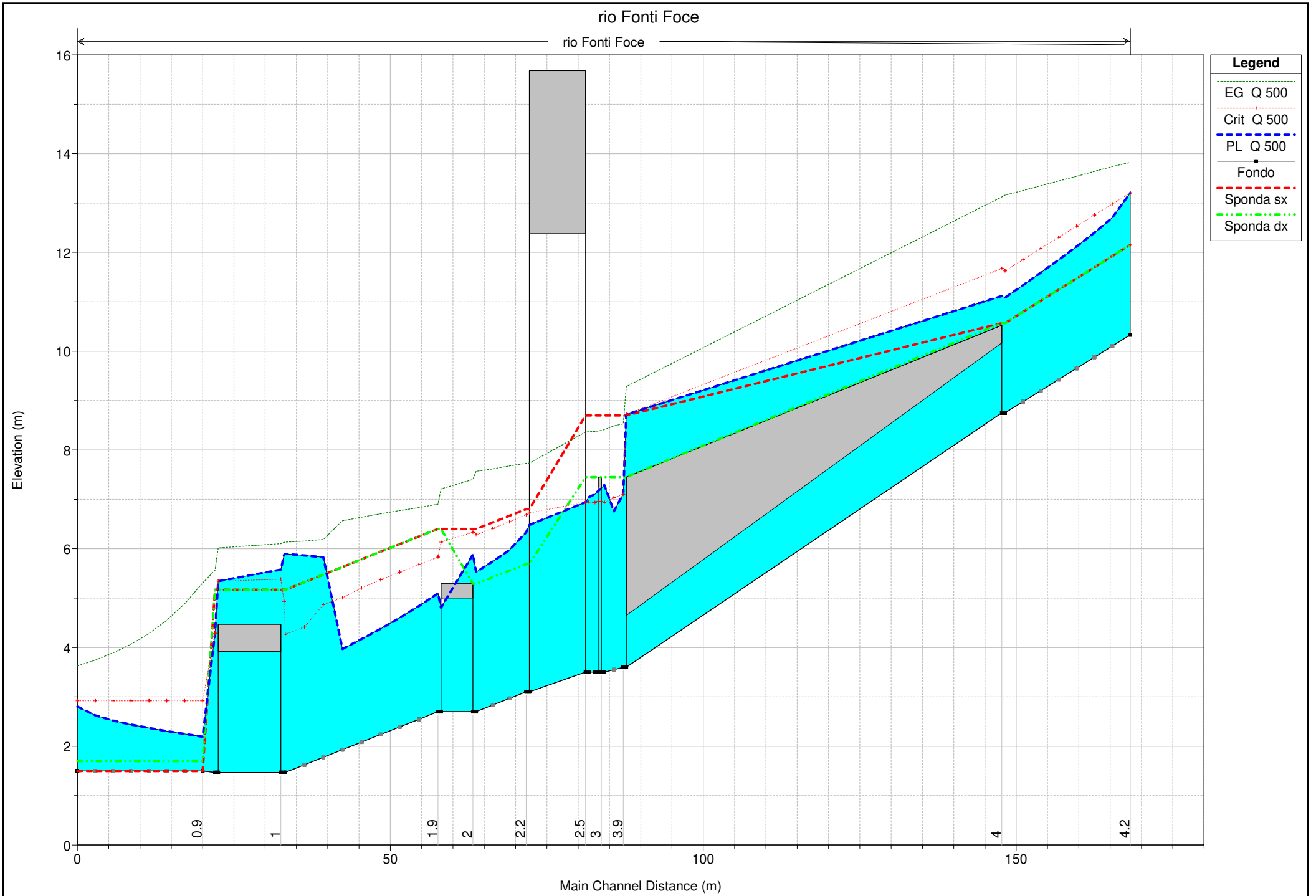
HEC-RAS Plan: Plan 01 River: rio Fonti Reach: Tombinatura

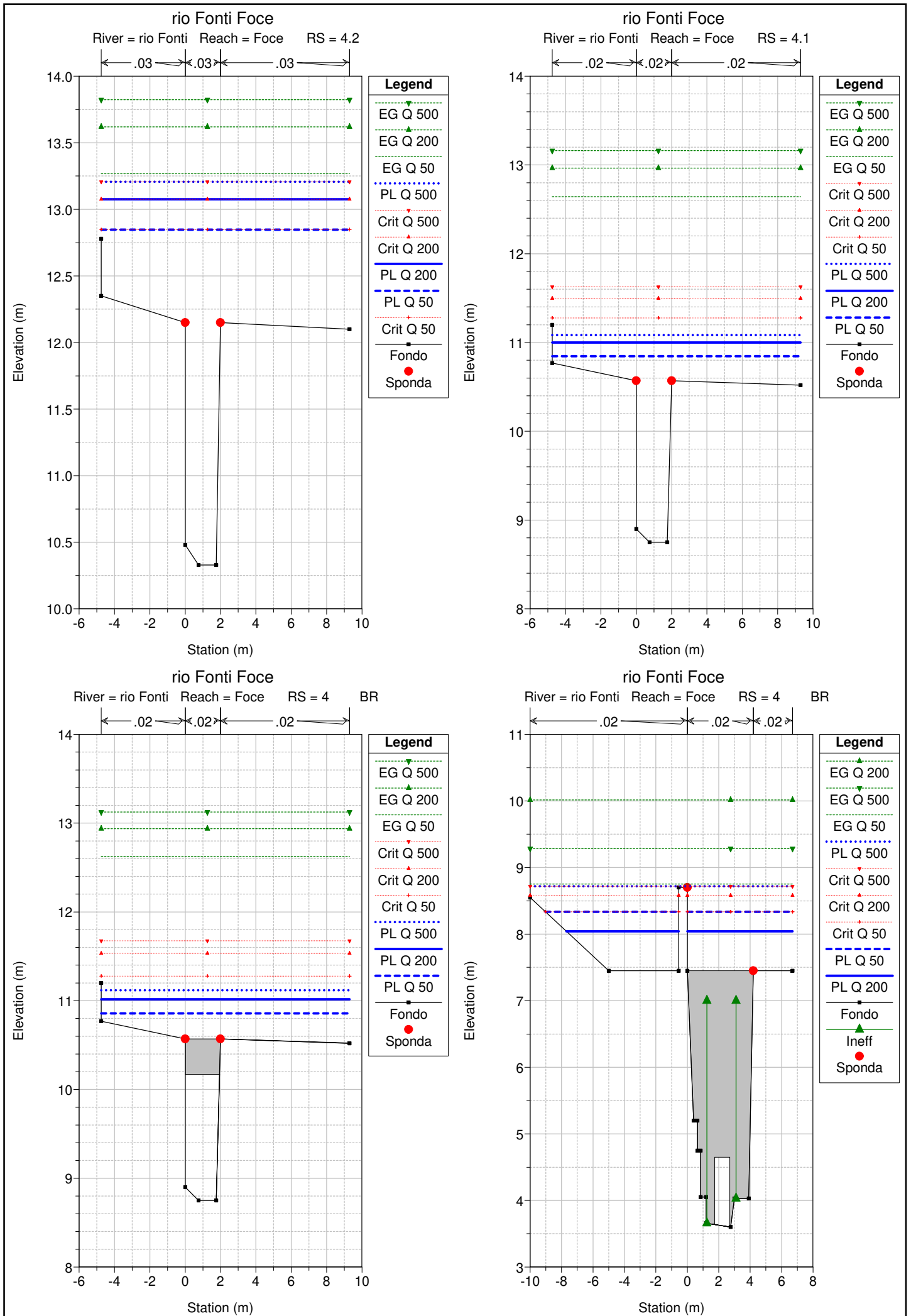
Reach	River Sta		Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	LOB Elev (m)	L. Freeboard (m)	ROB Elev (m)	R. Freeboard (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Tombinatura	5.2	5.2	Q 50	32.00	40.44	42.65	44.23	1.58	41.84	-0.81	42.65	43.31	0.008481	3.69	10.71	9.34	0.95
Tombinatura	5.2	5.2	Q 200	52.00	40.44	43.20	44.23	1.03	41.84	-1.36	43.20	44.01	0.008443	4.17	16.25	11.00	0.98
Tombinatura	5.2	5.2	Q 500	62.00	40.44	43.43	44.23	0.80	41.84	-1.59	43.43	44.30	0.008435	4.36	18.84	11.70	0.99
Tombinatura	5.1	5.1	Q 50	32.00	37.74	41.20	41.53	0.33	39.14	-2.06	39.98	41.35	0.001195	1.78	24.54	13.13	0.38
Tombinatura	5.1	5.1	Q 200	52.00	37.74	41.77	41.53	-0.24	39.14	-2.63	40.58	41.99	0.001644	2.23	32.80	17.79	0.44
Tombinatura	5.1	5.1	Q 500	62.00	37.74	42.01	41.53	-0.48	39.14	-2.87	40.81	42.26	0.001705	2.40	37.45	19.80	0.45
Tombinatura	5	tombinatura		Bridge													
Tombinatura	4.9	4.9	Q 50	32.00	31.64	34.11	35.64	1.53	35.14	1.03	33.28	34.36	0.032736	2.22	14.42	7.50	0.51
Tombinatura	4.9	4.9	Q 200	52.00	31.64	34.84	35.64	0.80	35.14	0.30	33.84	35.17	0.034732	2.57	20.25	8.47	0.53
Tombinatura	4.9	4.9	Q 500	62.00	31.64	35.14	35.64	0.50	35.14	0.00	34.08	35.52	0.035482	2.70	22.92	8.93	0.54
Tombinatura	4.8	4.8	Q 50	32.00	31.10	32.74	35.10	2.36	34.60	1.86	32.74	33.43	0.130432	3.68	8.71	6.40	1.01
Tombinatura	4.8	4.8	Q 200	52.00	31.10	33.30	35.10	1.80	34.60	1.30	33.30	34.19	0.127988	4.17	12.48	7.14	1.01
Tombinatura	4.8	4.8	Q 500	62.00	31.10	33.54	35.10	1.56	34.60	1.06	33.54	34.51	0.127269	4.35	14.24	7.46	1.01

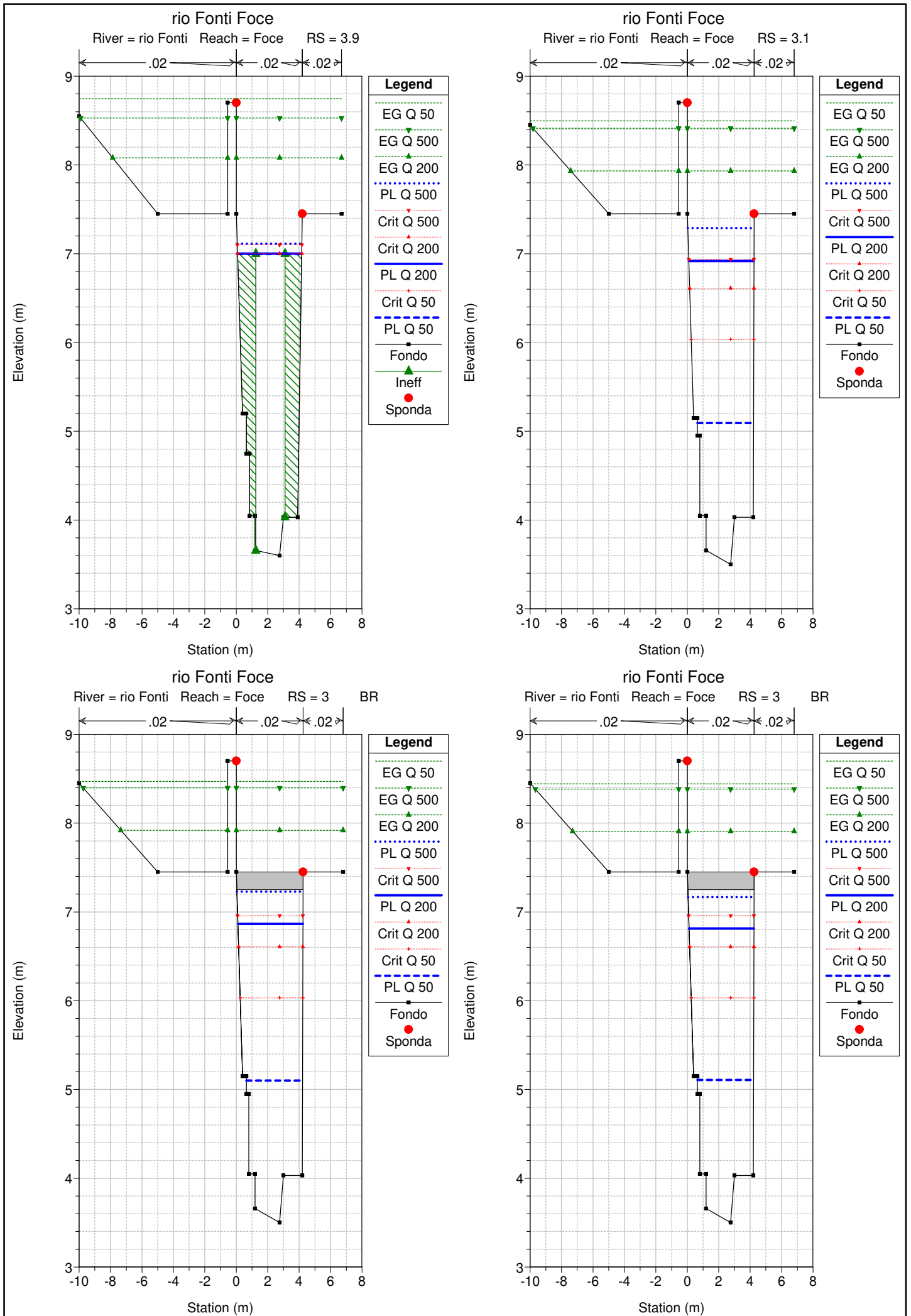


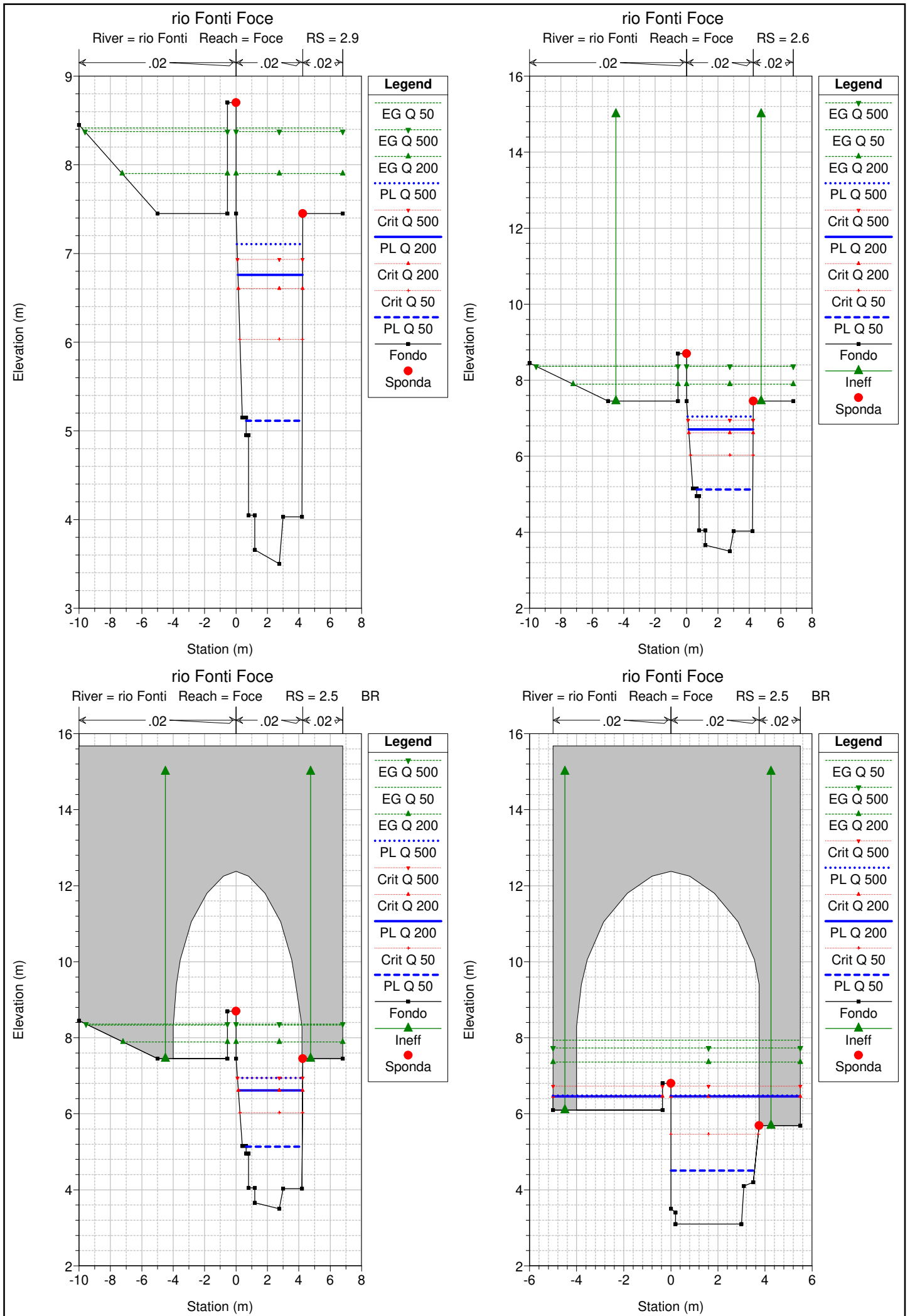


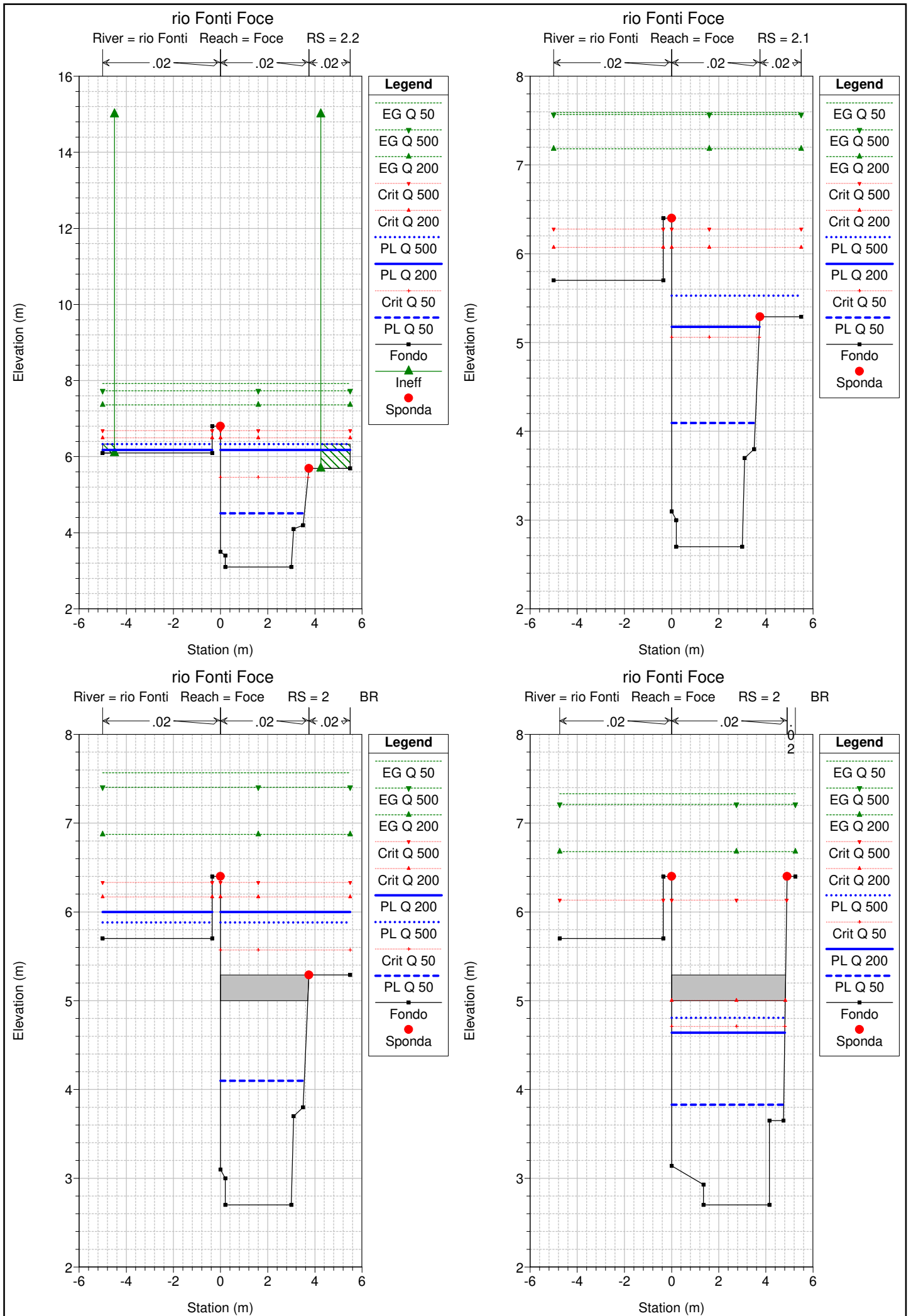


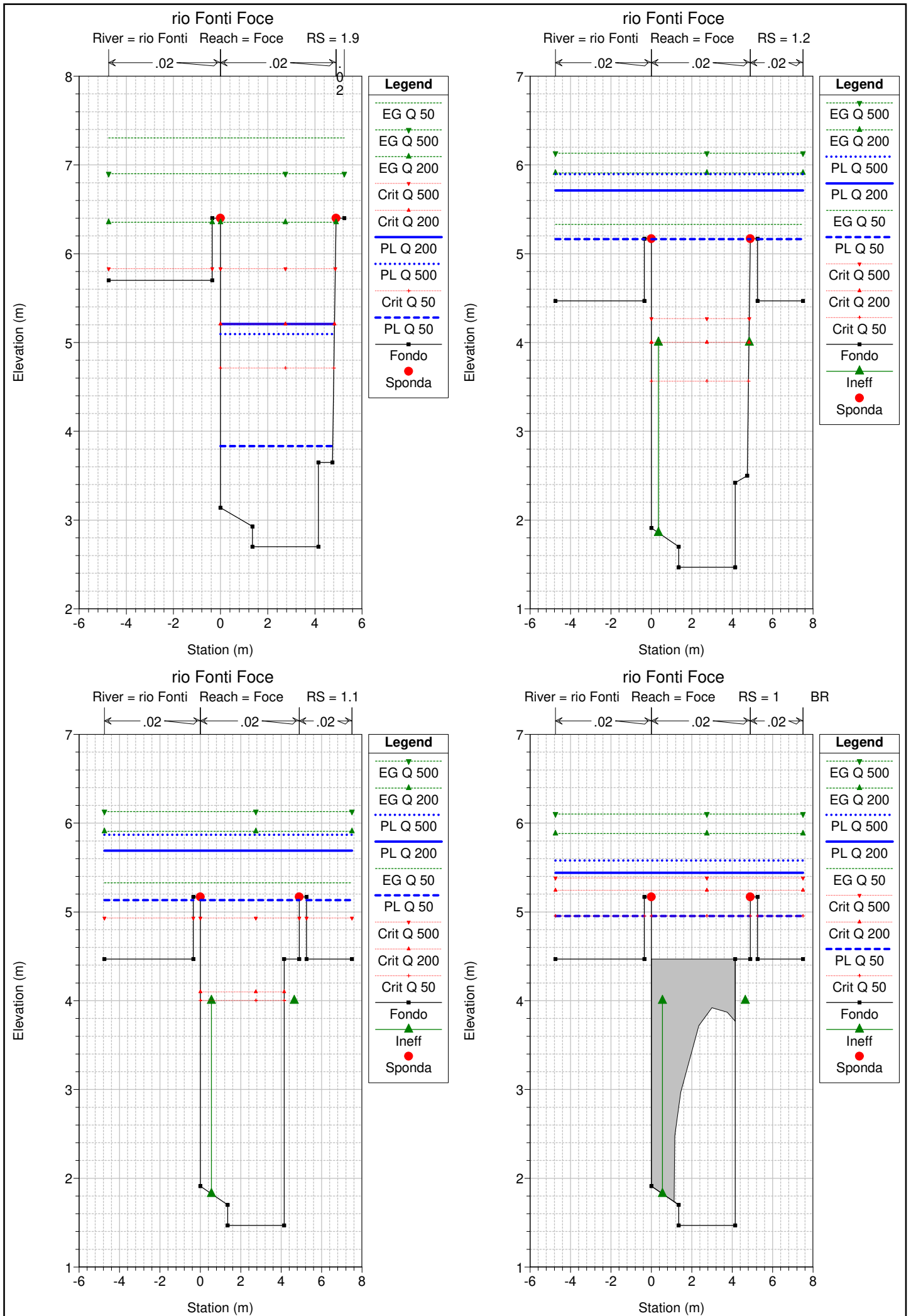


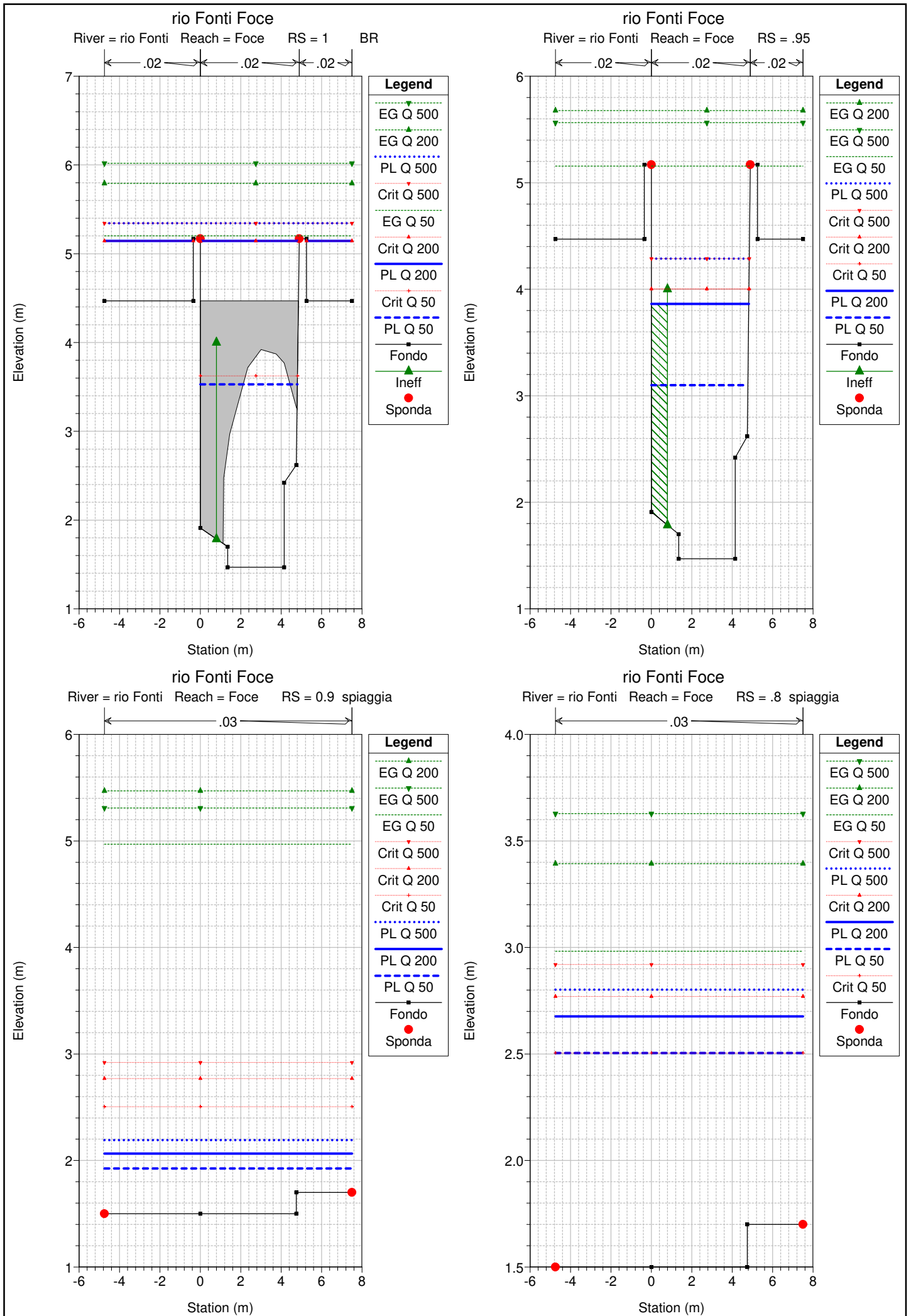














HEC-RAS Plan: Plan 01 nat River: rio Fonti Reach: Foce

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	LOB Elev (m)	L. Freeboard (m)	ROB Elev (m)	R. Freeboard (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
Foce	4.2	Q 50	36.00	10.33	12.85	12.15	-0.70	12.15	-0.70	12.85	13.27	0.011001	3.26	12.86	14.05	0.68
Foce	4.2	Q 200	52.00	10.33	13.08	12.15	-0.93	12.15	-0.93	13.08	13.62	0.011618	3.56	16.07	14.05	0.70
Foce	4.2	Q 500	62.00	10.33	13.21	12.15	-1.06	12.15	-1.06	13.21	13.82	0.011791	3.71	17.91	14.05	0.72
Foce	4.1	Q 50	36.00	8.75	10.85	10.57	-0.28	10.57	-0.28	11.28	12.64	0.026450	6.66	6.95	14.05	1.52
Foce	4.1	Q 200	52.00	8.75	11.00	10.57	-0.43	10.57	-0.43	11.50	12.96	0.027852	7.19	9.10	14.05	1.58
Foce	4.1	Q 500	62.00	8.75	11.08	10.57	-0.51	10.57	-0.51	11.63	13.16	0.027956	7.40	10.30	14.05	1.59
Foce	4	Bridge														
Foce	3.9	Q 50	36.00	3.60	7.00	8.70	1.70	7.45	0.45	7.00	8.75	0.003278	5.86	6.14	4.08	1.03
Foce	3.9	Q 200	52.00	3.60	7.00	8.70	1.70	7.45	0.45	7.00	8.08	0.007275	4.60	11.31	4.08	0.88
Foce	3.9	Q 500	62.00	3.60	7.11	8.70	1.59	7.45	0.34	7.10	8.53	0.009351	5.27	11.76	4.11	1.00
Foce	3.1	Q 50	36.00	3.50	5.09	8.70	3.61	7.45	2.36	6.03	8.50	0.043894	8.17	4.41	3.57	2.35
Foce	3.1	Q 200	52.00	3.50	6.92	8.70	1.78	7.45	0.53	6.61	7.93	0.006787	4.47	11.64	4.15	0.85
Foce	3.1	Q 500	62.00	3.50	7.29	8.70	1.41	7.45	0.16	6.94	8.41	0.006975	4.70	13.20	4.22	0.85
Foce	3	Bridge														
Foce	2.9	Q 50	36.00	3.50	5.11	8.70	3.59	7.45	2.34	6.03	8.42	0.042104	8.05	4.47	3.57	2.30
Foce	2.9	Q 200	52.00	3.50	6.76	8.70	1.94	7.45	0.69	6.60	7.90	0.007893	4.73	10.99	4.12	0.92
Foce	2.9	Q 500	62.00	3.50	7.11	8.70	1.59	7.45	0.34	6.93	8.37	0.008153	4.99	12.43	4.19	0.92
Foce	2.6	Q 50	36.00	3.50	5.13	8.70	3.57	7.45	2.32	6.03	8.36	0.040968	7.97	4.51	3.57	2.26
Foce	2.6	Q 200	52.00	3.50	6.71	8.70	1.99	7.45	0.74	6.62	7.89	0.008316	4.83	10.77	4.11	0.95
Foce	2.6	Q 500	62.00	3.50	7.04	8.70	1.66	7.45	0.41	6.95	8.37	0.008606	5.10	12.17	4.17	0.95
Foce	2.5	Bridge														
Foce	2.2	Q 50	36.00	3.10	4.51	6.80	2.29	5.69	1.18	5.46	7.92	0.041088	8.18	4.40	3.55	2.35
Foce	2.2	Q 200	52.00	3.10	6.18	6.80	0.62	5.69	-0.49	6.49	7.36	0.007527	4.85	11.11	10.15	0.92
Foce	2.2	Q 500	62.00	3.10	6.33	6.80	0.47	5.69	-0.64	6.69	7.73	0.008689	5.33	12.39	10.15	0.99
Foce	2.1	Q 50	36.00	2.70	4.09	6.40	2.31	5.29	1.20	5.06	7.59	0.042522	8.28	4.35	3.55	2.39
Foce	2.1	Q 200	52.00	2.70	5.18	6.40	1.22	5.29	0.11	6.07	7.18	0.015557	6.27	8.29	3.73	1.34
Foce	2.1	Q 500	62.00	2.70	5.53	6.40	0.87	5.29	-0.24	6.28	7.57	0.014174	6.37	10.02	5.50	1.27
Foce	2	Bridge														
Foce	1.9	Q 50	36.00	2.70	3.83	6.40	2.57	6.40	2.57	4.71	7.30	0.049509	8.26	4.36	4.76	2.75
Foce	1.9	Q 200	52.00	2.70	5.21	6.40	1.19	6.40	1.19	5.21	6.36	0.007527	4.75	10.96	4.83	1.01
Foce	1.9	Q 500	62.00	2.70	5.10	6.40	1.30	6.40	1.30	5.83	6.90	0.012283	5.95	10.41	4.83	1.29
Foce	1.2	Q 50	36.00	1.47	5.16	5.17	0.01	5.17	0.01	3.56	5.33	0.000912	1.90	21.31	11.55	0.33
Foce	1.2	Q 200	52.00	1.47	5.71	5.17	-0.54	5.17	-0.54	4.00	5.91	0.000925	2.11	28.03	12.25	0.34
Foce	1.2	Q 500	62.00	1.47	5.90	5.17	-0.73	5.17	-0.73	4.27	6.13	0.001059	2.32	30.28	12.25	0.36
Foce	1.1	Q 50	36.00	1.47	5.13	5.17	0.04	5.17	0.04	4.00	5.33	0.001227	2.05	19.66	11.55	0.37

HEC-RAS Plan: Plan 01 nat River: rio Fonti Reach: Foce (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	LOB Elev (m)	L. Freeboard (m)	ROB Elev (m)	R. Freeboard (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
Foce	1.1	Q 200	52.00	1.47	5.69	5.17	-0.52	5.17	-0.52	4.10	5.91	0.001163	2.22	26.45	12.25	0.37
Foce	1.1	Q 500	62.00	1.47	5.87	5.17	-0.70	5.17	-0.70	4.93	6.13	0.001314	2.44	28.66	12.25	0.40
Foce	1	Bridge														
Foce	.95	Q 50	36.00	1.47	3.10	5.17	2.07	5.17	2.07	4.00	5.16	0.016081	6.35	5.67	4.78	1.70
Foce	.95	Q 200	52.00	1.47	3.86	5.17	1.31	5.17	1.31	4.00	5.68	0.009469	5.97	8.71	4.82	1.29
Foce	.95	Q 500	62.00	1.47	4.29	5.17	0.88	5.17	0.88	4.29	5.56	0.007562	5.01	12.39	4.85	1.00
Foce	0.9	Q 50	36.00	1.50	1.92	1.50	-0.43	1.70	-0.23	2.50	4.97	0.213587	7.73	4.66	12.25	4.00
Foce	0.9	Q 200	52.00	1.50	2.06	1.50	-0.56	1.70	-0.36	2.77	5.47	0.162129	8.18	6.36	12.25	3.62
Foce	0.9	Q 500	62.00	1.50	2.19	1.50	-0.69	1.70	-0.49	2.92	5.31	0.113455	7.82	7.93	12.25	3.10
Foce	.8	Q 50	36.00	1.50	2.50	1.50	-1.00	1.70	-0.80	2.50	2.98	0.010910	3.06	11.76	12.25	1.00
Foce	.8	Q 200	52.00	1.50	2.68	1.50	-1.18	1.70	-0.98	2.77	3.39	0.013569	3.75	13.86	12.25	1.13
Foce	.8	Q 500	62.00	1.50	2.80	1.50	-1.30	1.70	-1.10	2.92	3.63	0.013901	4.03	15.40	12.25	1.15