



COMUNE DI ACQUI TERME

VERIFICA DI COMPATIBILITA' IDRAULICA DI
PREVISIONE DEGLI STRUMENTI URBANISTICI

Torino, Ottobre 2011	Agg.	S.2011.03
il tecnico incaricato Ing. Pietro CAVALLERO	 S tudio Associato I ngegneri A rchitetti C avallero C.so Vittorio Emanuele II, 167 10139 Torino tel. 011 - 0364820 Fax. 011 - 0364822 e-mail cavallerosiacitk@virgilio.it	
collaboratore: Ing. Cosimo Vinci		
ELAB. N. 2.4	TABULATI DI CALCOLO RIO RAVANASCO	

Scenario A1)

Rio Ravanasco Tempo di ritorno $Tr = 20$ anni

Portata totale $Q = 35 \text{ mc/s}$

Portata canalizzazione sinistra $Q = 21 \text{ mc/s}$

Portata canalizzazione destra $Q = 14 \text{ mc/s}$

Fiume Bormida Tempo di ritorno $Tr = 20$ anni

$Q = 1740 \text{ mc/s}$ livello idrico 142.76 m

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A1_Tr 20

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
Acqui	20	A1_Tr 20	35.00	160.59	162.53	162.53	162.98	0.004550	2.98	11.74	13.37	1.02
Acqui	19	A1_Tr 20	35.00	159.95	162.59	161.70	162.68	0.000440	1.33	26.24	16.79	0.34
Acqui	18	A1_Tr 20	35.00	160.63	162.14	162.14	162.61	0.004328	3.05	11.48	12.34	1.01
Acqui	17	A1_Tr 20	35.00	158.37	159.28	159.86	162.25	0.075152	7.64	4.58	10.68	3.72
Acqui	16	A1_Tr 20	35.00	158.11	159.59	160.02	161.19	0.033341	5.60	6.25	11.62	2.44
Acqui	15	A1_Tr 20	35.00	158.04	159.66	159.98	160.71	0.017089	4.56	7.68	12.15	1.83
Acqui	14	A1_Tr 20	35.00	156.98	158.07	158.60	160.14	0.037734	6.37	5.50	10.07	2.75
Acqui	13	A1_Tr 20	35.00	156.45	158.07	158.38	159.04	0.015568	4.35	8.05	12.86	1.75
Acqui	12	A1_Tr 20	35.00	156.28	157.41	157.82	158.67	0.017235	4.97	7.04	10.23	1.91
Acqui	11	A1_Tr 20	35.00	155.48	157.39	157.58	158.07	0.009016	3.66	9.56	13.25	1.38
Acqui	10	A1_Tr 20	35.00	153.61	154.30	154.72	156.50	0.099136	6.56	5.33	19.44	4.00
Acqui	9	A1_Tr 20	35.00	152.84	154.01	154.41	155.28	0.014253	5.00	7.00	8.59	1.77
Acqui	8	A1_Tr 20	35.00	151.97	152.87	153.48	154.43	0.021574	5.54	6.32	9.14	2.13
Acqui	7	A1_Tr 20	35.00	151.72	152.88	153.27	153.93	0.015906	4.53	7.72	11.50	1.77
Acqui	6	A1_Tr 20	35.00	150.54	151.05	151.66	153.72	0.057634	7.23	4.84	9.77	3.28
Acqui	5	A1_Tr 20	35.00	149.33	150.10	150.56	151.71	0.023676	5.62	6.23	8.74	2.13
Acqui	4	A1_Tr 20	35.00	149.00	151.09	150.19	151.28	0.000880	1.90	18.44	9.12	0.43
Acqui	3	A1_Tr 20	35.00	148.90	150.96	150.23	151.24	0.001533	2.35	14.91	7.23	0.52
Acqui	2.2	A1_Tr 20	35.00	149.20	150.51	150.51	151.18	0.005433	3.61	9.70	7.38	1.00
Acqui	2.1	A1_Tr 20	35.00	148.10	148.82	149.41	151.02	0.033757	6.57	5.33	7.38	2.47
Acqui	2.05	A1_Tr 20	35.00	147.31	148.04	148.66	150.73	0.056488	7.26	4.82	8.95	3.16
Acqui	2	A1_Tr 20	35.00	147.31	148.14	148.77	150.65	0.052356	7.02	4.98	7.85	2.46
Acqui	1.99	A1_Tr 20	35.00	146.19	147.37	147.65	148.41	0.014339	4.53	7.73	7.85	1.33
Acqui	1.98	A1_Tr 20	35.00	144.86	146.03	146.32	147.09	0.014602	4.55	7.68	7.85	1.34
Acqui	1.97	A1_Tr 20	35.00	144.28	145.45	145.74	146.51	0.014667	4.56	7.67	7.85	1.35
Acqui	1.96	A1_Tr 20	35.00	143.89	145.06	145.35	146.12	0.014540	4.55	7.70	7.85	1.34
Acqui	1.95	A1_Tr 20	35.00	143.52	144.69	144.98	145.75	0.014540	4.55	7.70	7.85	1.34
Acqui	1.94	A1_Tr 20	35.00	143.20	144.37	144.66	145.43	0.014540	4.55	7.70	7.85	1.34
Acqui	1.93	A1_Tr 20	35.00	143.02	144.19	144.48	145.25	0.014684	4.56	7.67	7.85	1.35
Acqui	1.92	A1_Tr 20	35.00	141.98	143.15	143.44	144.21	0.014572	4.55	7.69	7.85	1.34
Acqui	1.91	A1_Tr 20	35.00	141.51	142.68	142.97	143.74	0.014709	4.57	7.66	7.85	1.35
Acqui	1.9	A1_Tr 20	35.00	141.00	142.18	142.46	143.22	0.014399	4.53	7.72	7.85	1.33
Acqui	1.8	A1_Tr 20	35.00	140.68	142.74	142.14	143.03	0.002431	2.39	14.62	7.85	0.53
Acqui	1.7	A1_Tr 20	35.00	140.45	142.75	141.91	142.98	0.001756	2.12	16.52	7.85	0.45
Acqui	1.6	A1_Tr 20	35.00	140.09	142.76	141.55	142.92	0.001150	1.80	19.42	7.85	0.35

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A1_Tr 20 (Continued)

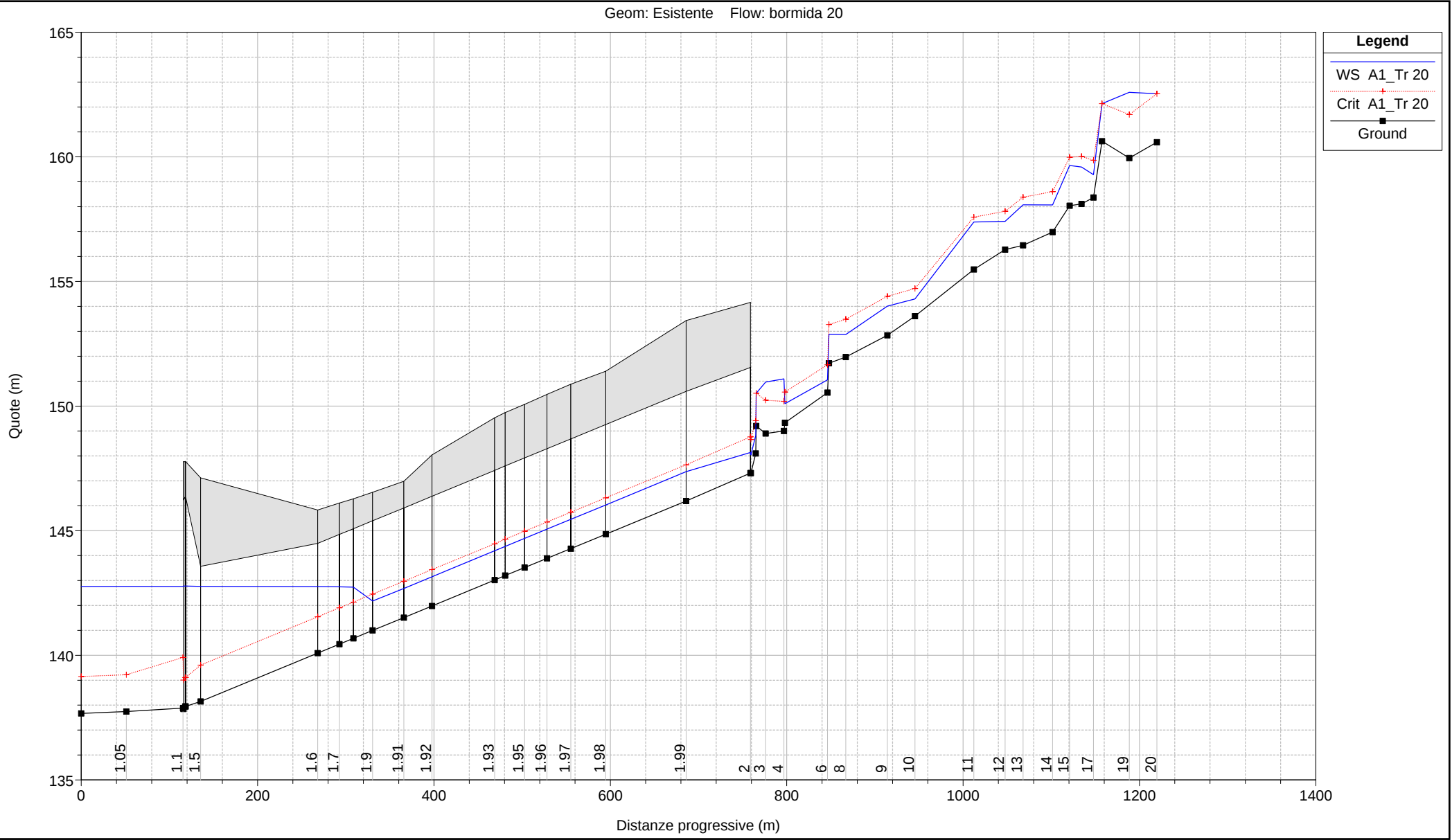
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Acqui	1.5	A1_Tr 20	35.00	138.15	142.77	139.61	142.82	0.000294	1.02	34.25	5.91	0.15
Acqui	1.4	A1_Tr 20	35.00	137.95	142.78	139.11	142.81	0.000087	0.81	43.02	8.48	0.12
Acqui	1.3	A1_Tr 20	35.00	137.95	142.78	139.11	142.81	0.000087	0.81	43.02	8.49	0.12
Acqui	1.2	A1_Tr 20	35.00	137.85	142.78	139.01	142.81	0.000083	0.80	43.90	8.43	0.11
Acqui	1.1	A1_Tr 20	35.00	137.88	142.76	139.92	142.81	0.000133	0.97	35.90	9.00	0.16
Acqui	1.05	A1_Tr 20	35.00	137.74	142.76	139.22	142.80	0.000083	0.83	41.99	9.00	0.12
Acqui	1	A1_Tr 20	35.00	137.67	142.76	139.15	142.79	0.000079	0.82	42.57	9.00	0.12

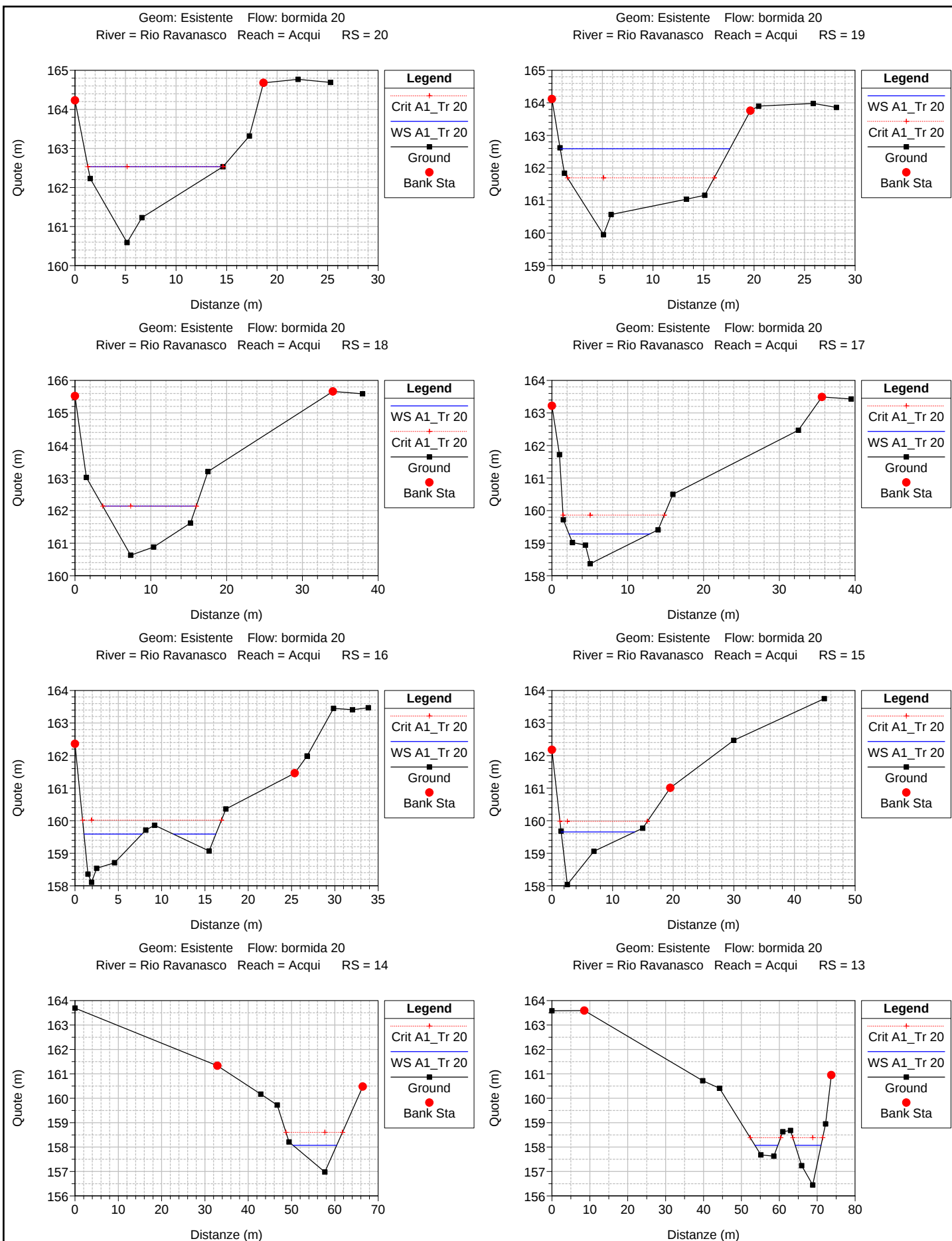
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A1_Tr 20

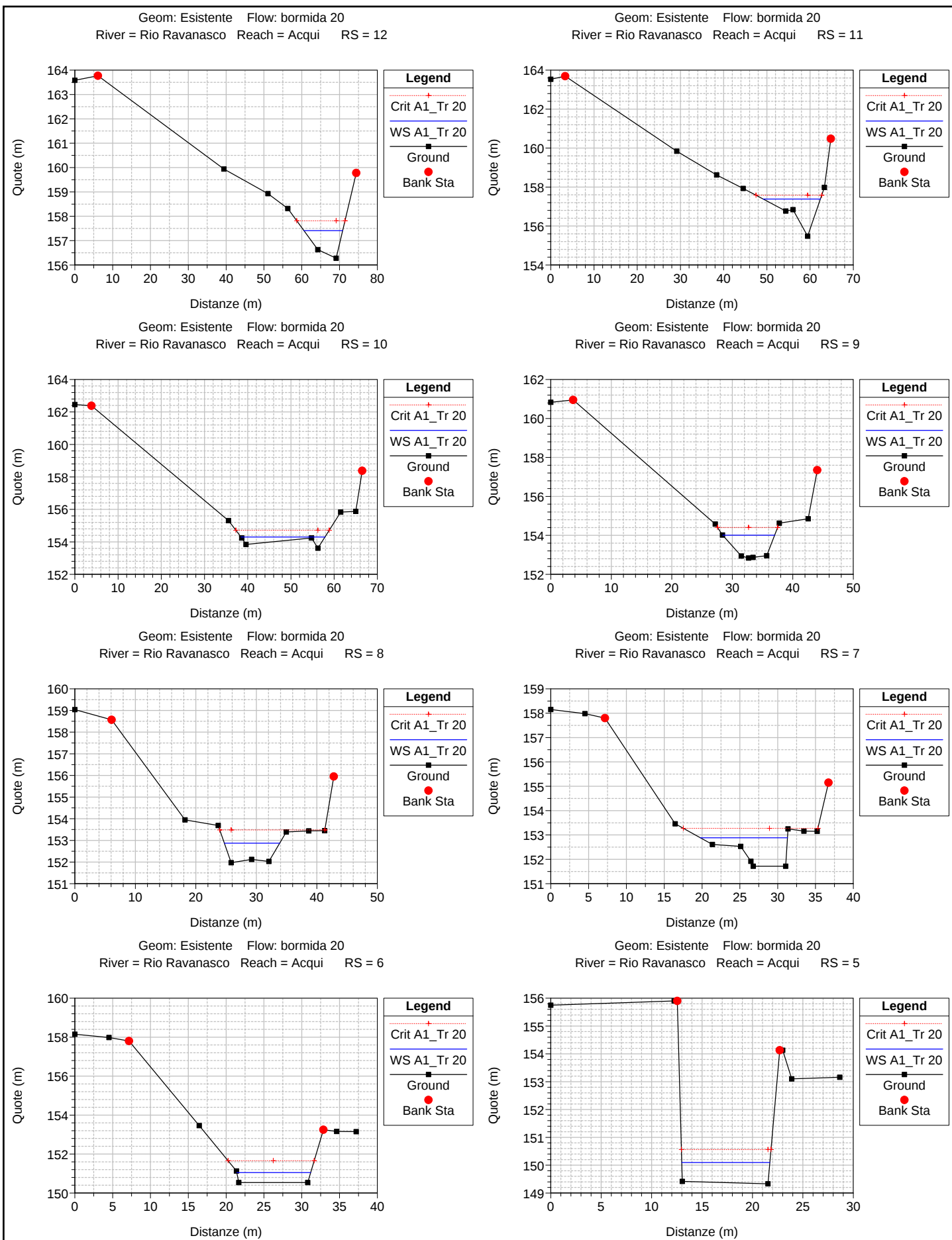
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	A1_Tr 20	162.98	162.53	0.45	0.03	0.11		35.00		13.37
Acqui	19	A1_Tr 20	162.68	162.59	0.09	0.03	0.04		35.00		16.79
Acqui	18	A1_Tr 20	162.61	162.14	0.47	0.02	0.08		35.00		12.34
Acqui	17	A1_Tr 20	162.25	159.28	2.97	0.11	0.25		35.00		10.68
Acqui	16	A1_Tr 20	161.19	159.59	1.60	0.65	0.41		35.00		11.62
Acqui	15	A1_Tr 20	160.71	159.66	1.06	0.31	0.16		35.00		12.15
Acqui	14	A1_Tr 20	160.14	158.07	2.07	0.47	0.10		35.00		10.07
Acqui	13	A1_Tr 20	159.04	158.07	0.96	0.77	0.33		35.00		12.86
Acqui	12	A1_Tr 20	158.67	157.41	1.26	0.33	0.03		35.00		10.23
Acqui	11	A1_Tr 20	158.07	157.39	0.68	0.43	0.17		35.00		13.25
Acqui	10	A1_Tr 20	156.50	154.30	2.20	1.42	0.15		35.00		19.44
Acqui	9	A1_Tr 20	155.28	154.01	1.27	0.94	0.28		35.00		8.59
Acqui	8	A1_Tr 20	154.43	152.87	1.56	0.82	0.03		35.00		9.14
Acqui	7	A1_Tr 20	153.93	152.88	1.05	0.35	0.15		35.00		11.50
Acqui	6	A1_Tr 20	153.72	151.05	2.67	0.05	0.16		35.00		9.77
Acqui	5	A1_Tr 20	151.71	150.10	1.61	1.70	0.32		35.00		8.74
Acqui	4	A1_Tr 20	151.28	151.09	0.18	0.02	0.01		35.00		9.12
Acqui	3	A1_Tr 20	151.24	150.96	0.28	0.03	0.04		35.00		7.23
Acqui	2.2	A1_Tr 20	151.18	150.51	0.66	0.00	0.00		35.00		7.38
Acqui	2.1	A1_Tr 20	151.02	148.82	2.20	0.01	0.15		35.00		7.38
Acqui	2.05	A1_Tr 20	150.73	148.04	2.69	0.24	0.05		35.00		8.95
Acqui	2	A1_Tr 20	150.65	148.14	2.51	0.03	0.05		35.00		7.85
Acqui	1.99	A1_Tr 20	148.41	147.37	1.04	1.80	0.44		35.00		7.85
Acqui	1.98	A1_Tr 20	147.09	146.03	1.06	1.32	0.00		35.00		7.85
Acqui	1.97	A1_Tr 20	146.51	145.45	1.06	0.58	0.00		35.00		7.85
Acqui	1.96	A1_Tr 20	146.12	145.06	1.05	0.39	0.00		35.00		7.85
Acqui	1.95	A1_Tr 20	145.75	144.69	1.05	0.37	0.00		35.00		7.85
Acqui	1.94	A1_Tr 20	145.43	144.37	1.05	0.32	0.00		35.00		7.85
Acqui	1.93	A1_Tr 20	145.25	144.19	1.06	0.18	0.00		35.00		7.85
Acqui	1.92	A1_Tr 20	144.21	143.15	1.06	1.04	0.00		35.00		7.85
Acqui	1.91	A1_Tr 20	143.74	142.68	1.06	0.47	0.00		35.00		7.85
Acqui	1.9	A1_Tr 20	143.22	142.18	1.05	0.52	0.00		35.00		7.85
Acqui	1.8	A1_Tr 20	143.03	142.74	0.29	0.03	0.02		35.00		7.85
Acqui	1.7	A1_Tr 20	142.98	142.75	0.23	0.03	0.02		35.00		7.85
Acqui	1.6	A1_Tr 20	142.92	142.76	0.17	0.07	0.03		35.00		7.85

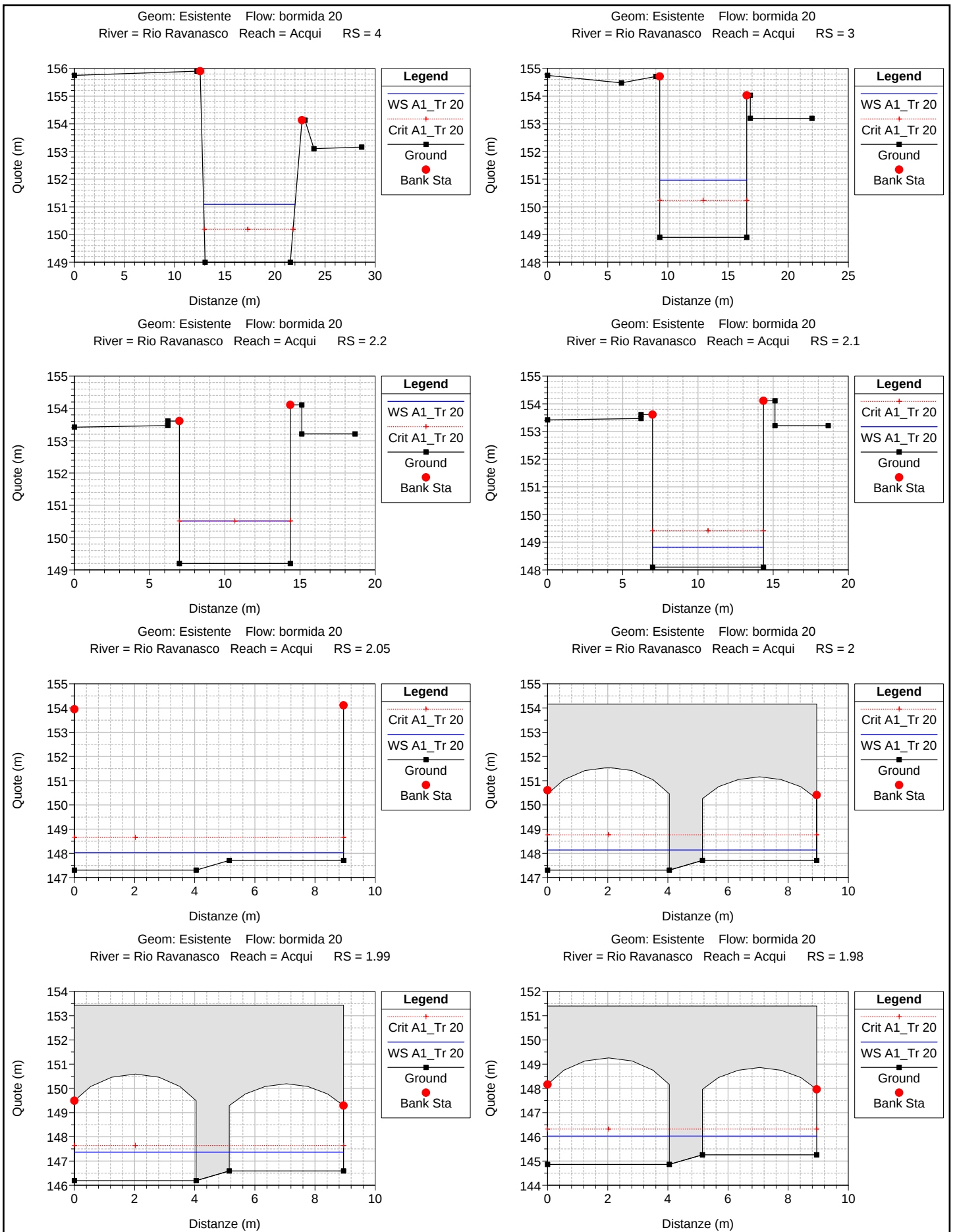
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A1_Tr 20 (Continued)

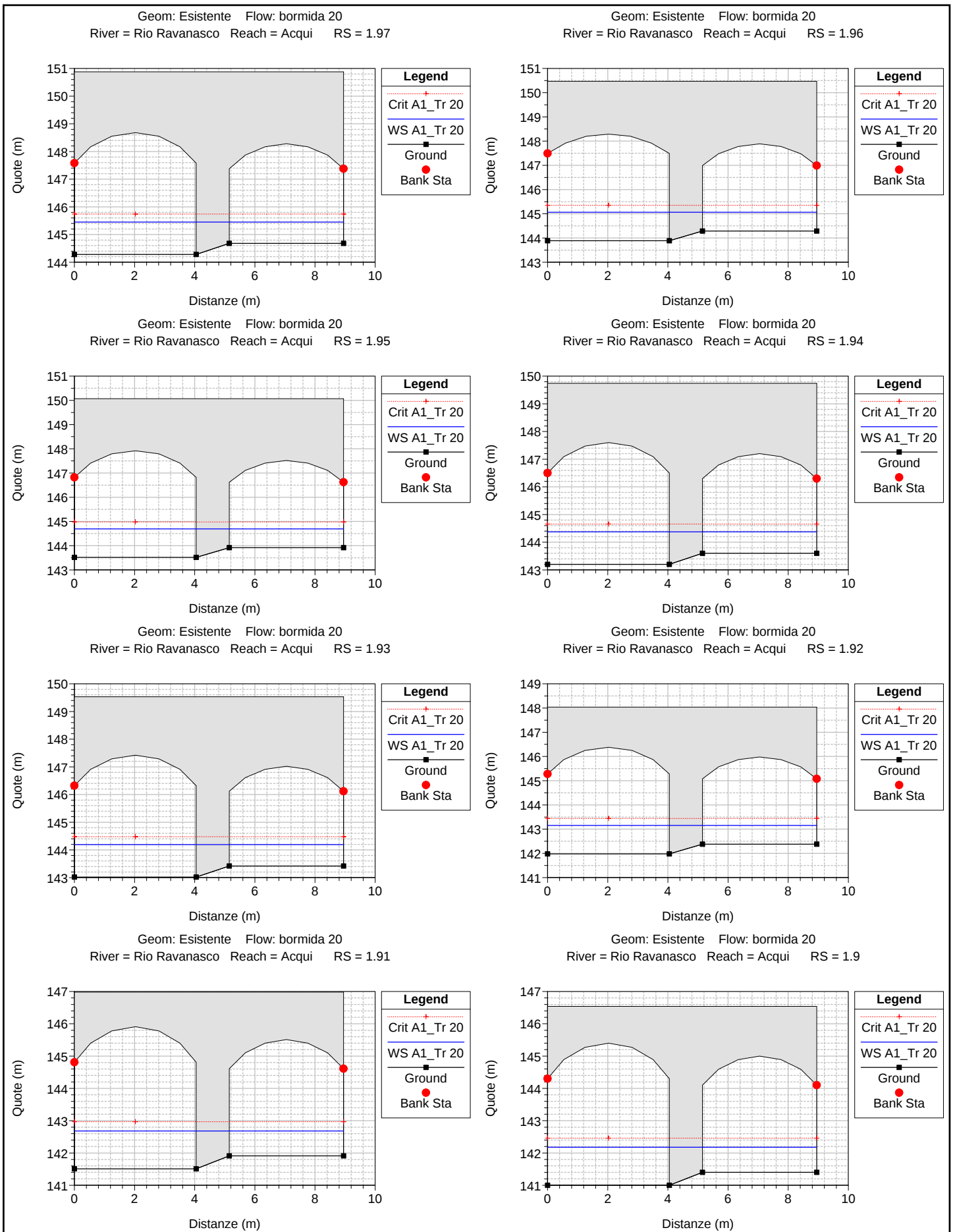
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
Acqui	1.5	A1_Tr 20	142.82	142.77	0.05	0.00	0.01		35.00		5.91
Acqui	1.4	A1_Tr 20	142.81	142.78	0.03	0.00	0.00		35.00		8.48
Acqui	1.3	A1_Tr 20	142.81	142.78	0.03	0.00	0.00		35.00		8.49
Acqui	1.2	A1_Tr 20	142.81	142.78	0.03	0.00	0.00		35.00		8.43
Acqui	1.1	A1_Tr 20	142.81	142.76	0.05	0.01	0.00		35.00		9.00
Acqui	1.05	A1_Tr 20	142.80	142.76	0.04	0.00	0.00		35.00		9.00
Acqui	1	A1_Tr 20	142.79	142.76	0.03				35.00		9.00

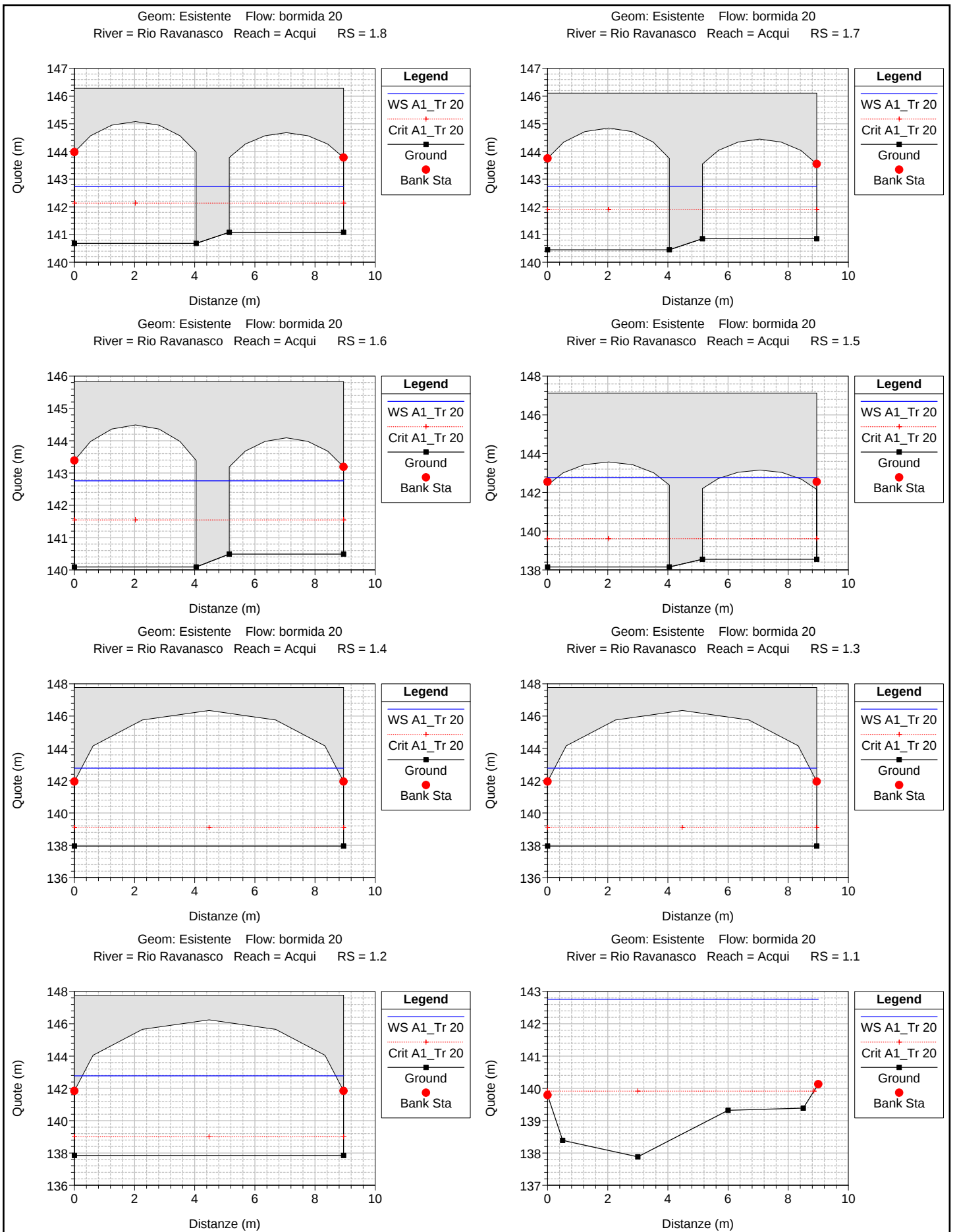




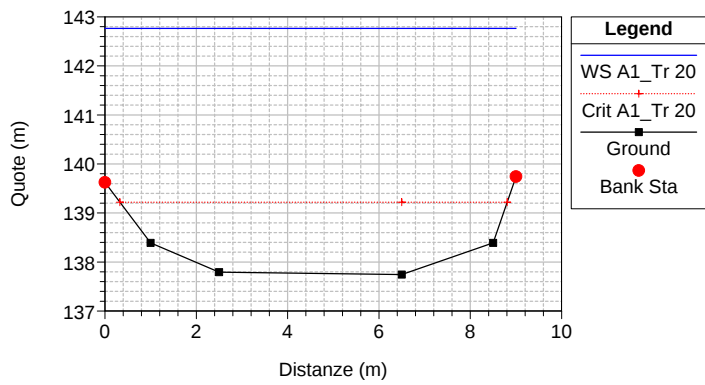




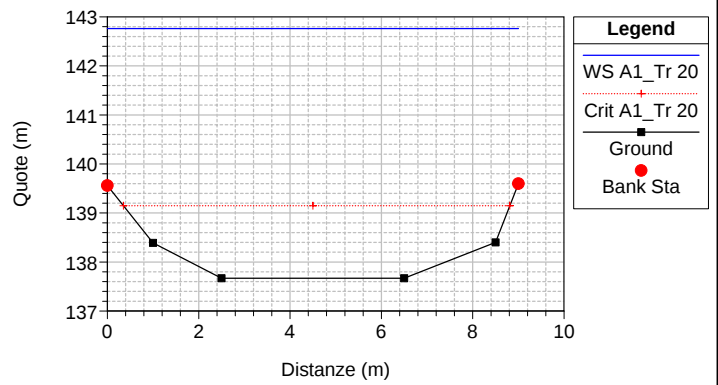




Geom: Esistente Flow: bormida 20
River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: Esistente Flow: bormida 20
River = Rio Ravanasco Reach = Acqui RS = 1



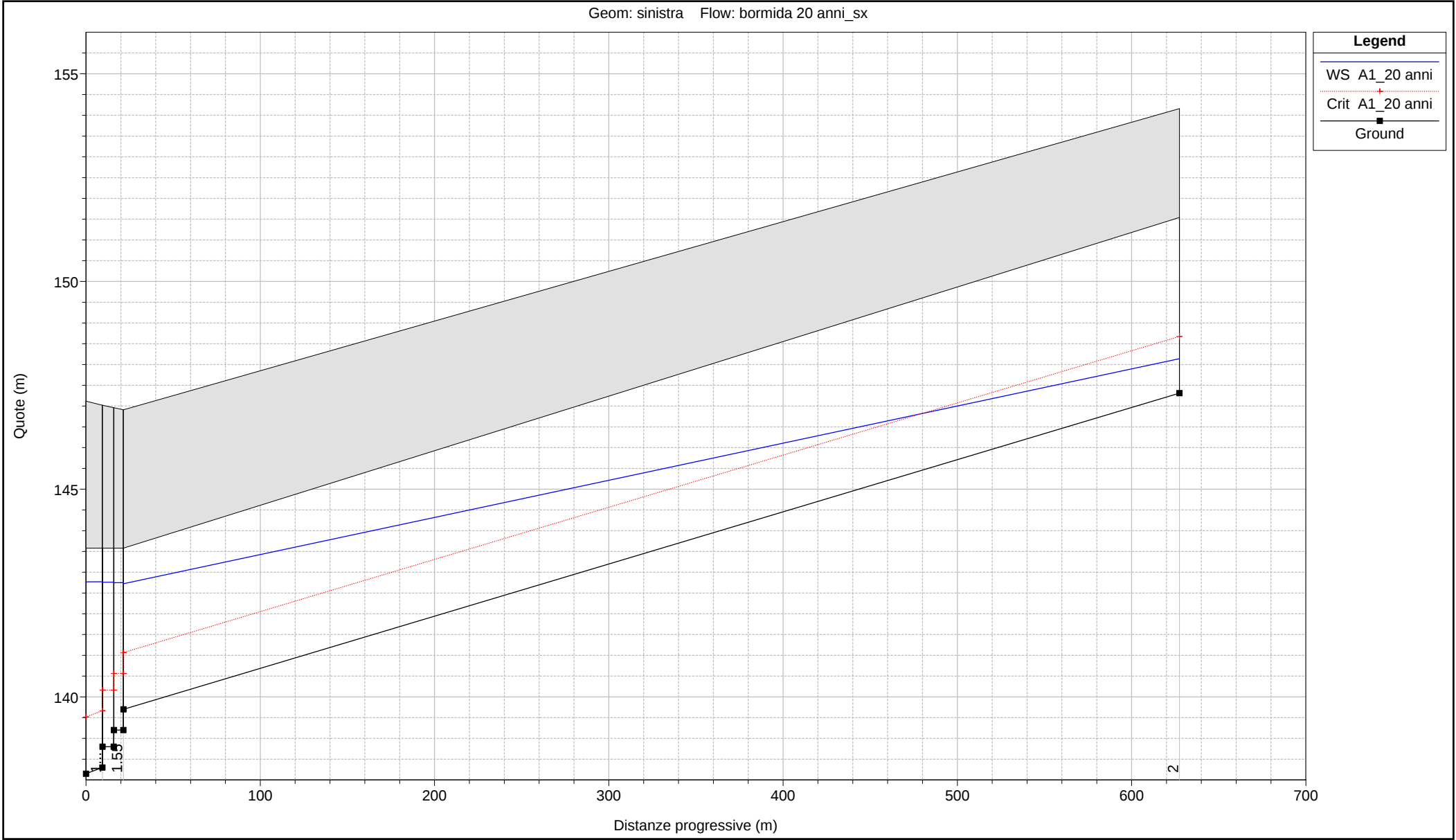
Dettaglio canalizzazione sinistra

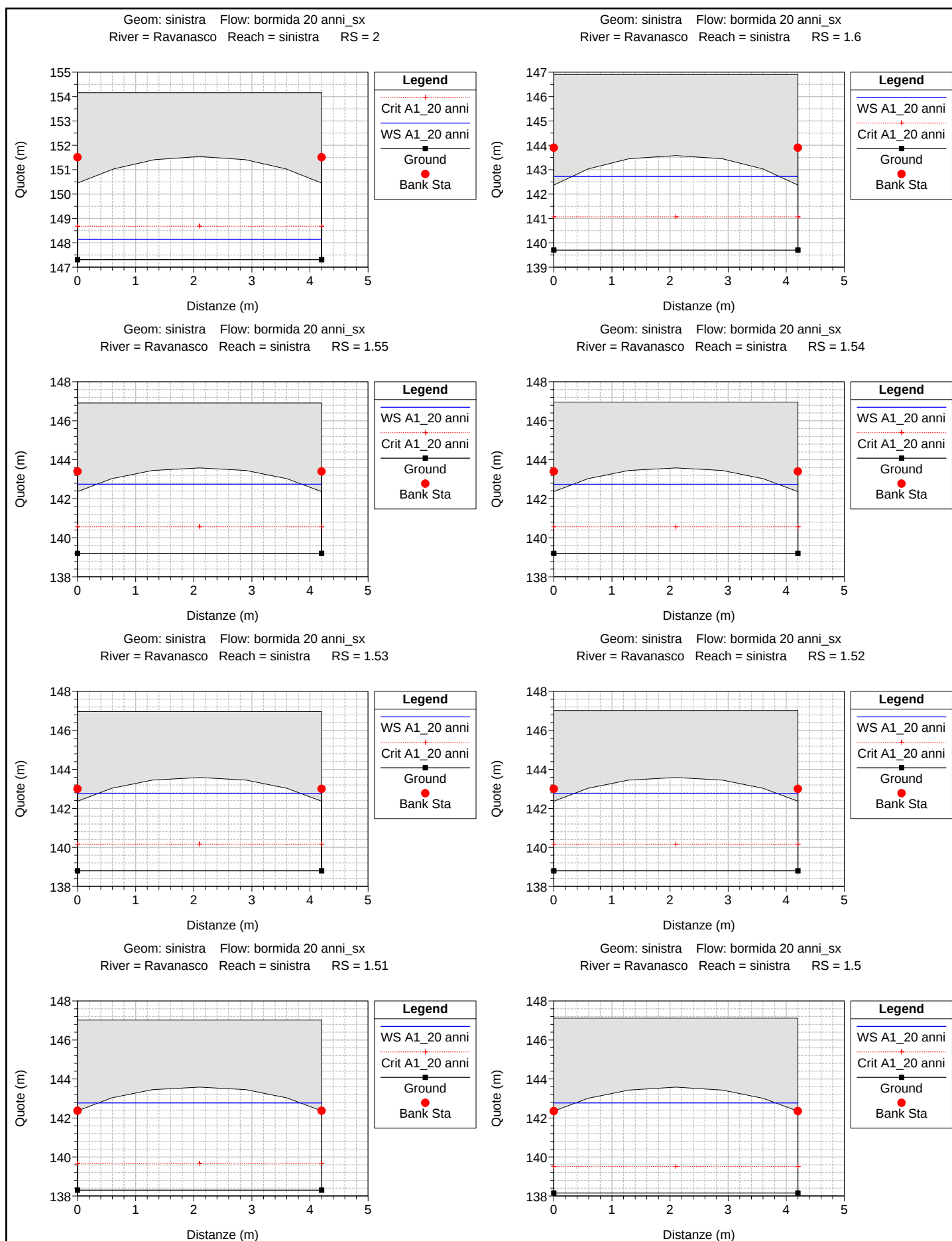
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: A1_20 anni

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
sinistra	2	A1_20 anni	21.00	147.31	148.14	148.68	149.99	0.029015	6.02	3.49	4.20	2.11
sinistra	1.6	A1_20 anni	21.00	139.70	142.72	141.07	142.86	0.000874	1.67	12.58	3.56	0.31
sinistra	1.55	A1_20 anni	21.00	139.20	142.75	140.56	142.85	0.000582	1.42	14.78	3.52	0.24
sinistra	1.54	A1_20 anni	21.00	139.20	142.75	140.56	142.85	0.000583	1.42	14.77	3.52	0.24
sinistra	1.53	A1_20 anni	21.00	138.80	142.76	140.16	142.84	0.000443	1.27	16.50	3.50	0.20
sinistra	1.52	A1_20 anni	21.00	138.80	142.76	140.16	142.84	0.000443	1.27	16.49	3.50	0.20
sinistra	1.51	A1_20 anni	21.00	138.30	142.77	139.67	142.84	0.000328	1.13	18.63	3.48	0.17
sinistra	1.5	A1_20 anni	21.00	138.15	142.77	139.51	142.83	0.000304	1.09	19.25	3.44	0.16

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: A1_20 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	A1_20 anni	149.99	148.14	1.85				21.00		4.20
sinistra	1.6	A1_20 anni	142.86	142.72	0.14	0.00	0.01		21.00		3.56
sinistra	1.55	A1_20 anni	142.85	142.75	0.10	0.00	0.00		21.00		3.52
sinistra	1.54	A1_20 anni	142.85	142.75	0.10	0.00	0.01		21.00		3.52
sinistra	1.53	A1_20 anni	142.84	142.76	0.08	0.00	0.00		21.00		3.50
sinistra	1.52	A1_20 anni	142.84	142.76	0.08	0.00	0.01		21.00		3.50
sinistra	1.51	A1_20 anni	142.84	142.77	0.06	0.00	0.00		21.00		3.48
sinistra	1.5	A1_20 anni	142.83	142.77	0.06				21.00		3.44





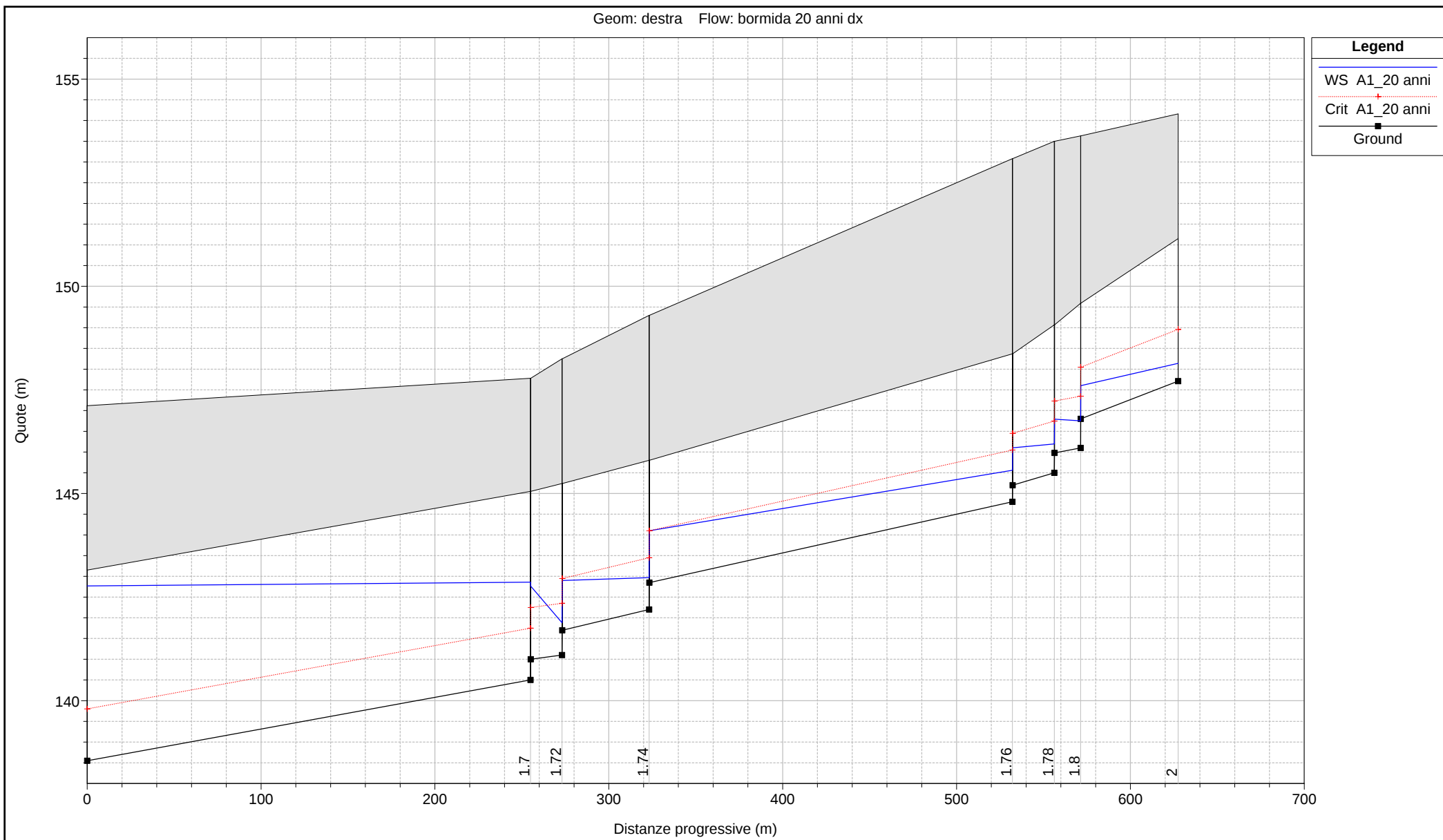
Dettaglio canalizzazione destra

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: A1_20 anni

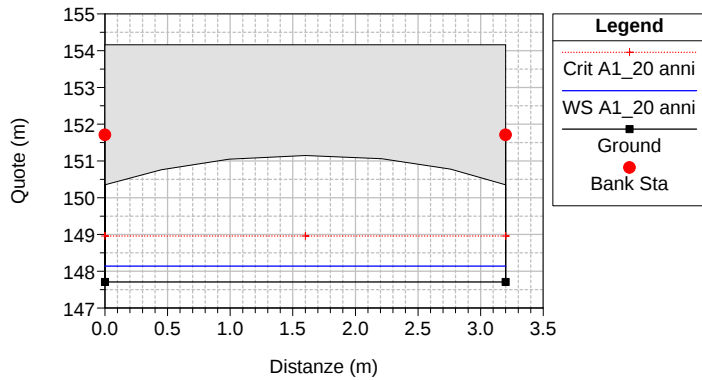
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
destra	2	A1_20 anni	14.00	147.71	148.14	148.96	153.41	0.175141	10.17	1.38	3.20	4.95
destra	1.81	A1_20 anni	14.00	146.80	147.60	148.05	149.12	0.027571	5.46	2.56	3.20	1.95
destra	1.8	A1_20 anni	14.00	146.10	146.75	147.35	149.04	0.050049	6.70	2.09	3.20	2.65
destra	1.79	A1_20 anni	14.00	145.98	146.79	147.23	148.27	0.026301	5.37	2.61	3.20	1.90
destra	1.78	A1_20 anni	14.00	145.50	146.20	146.75	148.21	0.041373	6.28	2.23	3.20	2.40
destra	1.77	A1_20 anni	14.00	145.20	146.10	146.45	147.30	0.019669	4.86	2.88	3.20	1.63
destra	1.76	A1_20 anni	14.00	144.80	145.56	146.05	147.25	0.032096	5.76	2.43	3.20	2.11
destra	1.75	A1_20 anni	14.00	142.85	144.10	144.10	144.72	0.007865	3.50	4.00	3.20	1.00
destra	1.74	A1_20 anni	14.00	142.20	142.97	143.45	144.62	0.031097	5.69	2.46	3.20	2.07
destra	1.73	A1_20 anni	14.00	141.70	142.90	142.95	143.58	0.008823	3.65	3.84	3.20	1.06
destra	1.72	A1_20 anni	14.00	141.10	141.88	142.35	143.48	0.029782	5.61	2.50	3.20	2.03
destra	1.71	A1_20 anni	14.00	141.00	142.76	142.25	143.08	0.003117	2.48	5.64	3.20	0.60
destra	1.7	A1_20 anni	14.00	140.50	142.86	141.75	143.03	0.001466	1.85	7.55	3.20	0.39
destra	1.5	A1_20 anni	14.00	138.55	142.77	139.80	142.83	0.000386	1.05	13.32	2.30	0.16

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: A1_20 anni

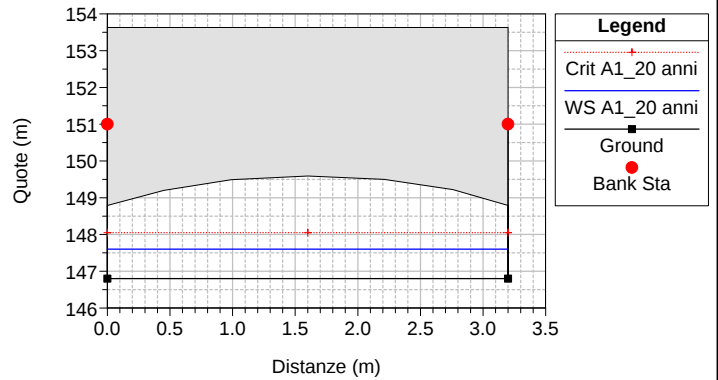
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	A1_20 anni	153.41	148.14	5.27				14.00		3.20
destra	1.81	A1_20 anni	149.12	147.60	1.52	3.17	1.13		14.00		3.20
destra	1.8	A1_20 anni	149.04	146.75	2.29	0.00	0.08		14.00		3.20
destra	1.79	A1_20 anni	148.27	146.79	1.47	0.53	0.24		14.00		3.20
destra	1.78	A1_20 anni	148.21	146.20	2.01	0.00	0.05		14.00		3.20
destra	1.77	A1_20 anni	147.30	146.10	1.20	0.66	0.24		14.00		3.20
destra	1.76	A1_20 anni	147.25	145.56	1.69	0.00	0.05		14.00		3.20
destra	1.75	A1_20 anni	144.72	144.10	0.62	0.00	0.00		14.00		3.20
destra	1.74	A1_20 anni	144.62	142.97	1.65	0.00	0.10		14.00		3.20
destra	1.73	A1_20 anni	143.58	142.90	0.68	0.75	0.29		14.00		3.20
destra	1.72	A1_20 anni	143.48	141.88	1.60	0.00	0.09		14.00		3.20
destra	1.71	A1_20 anni	143.08	142.76	0.31	0.00	0.04		14.00		3.20
destra	1.7	A1_20 anni	143.03	142.86	0.18	0.17	0.04		14.00		3.20
destra	1.5	A1_20 anni	142.83	142.77	0.06				14.00		2.30



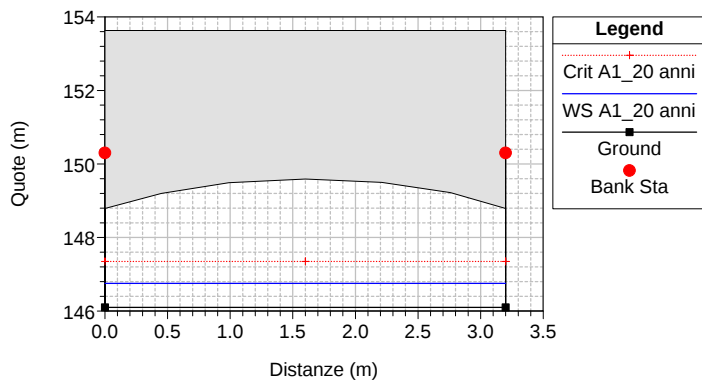
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 2



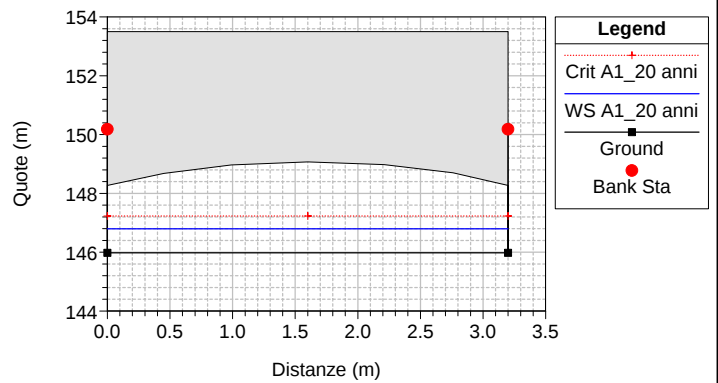
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.81



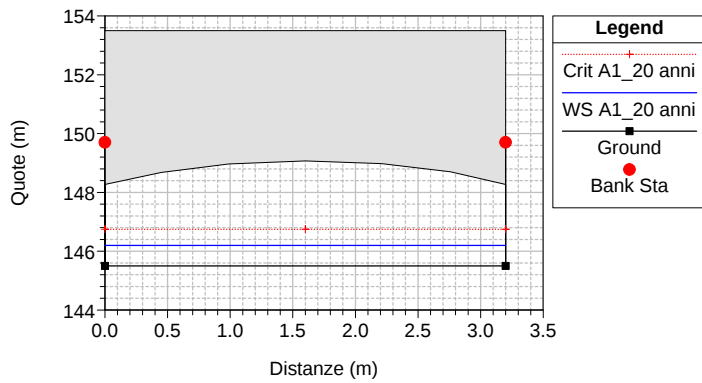
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.8



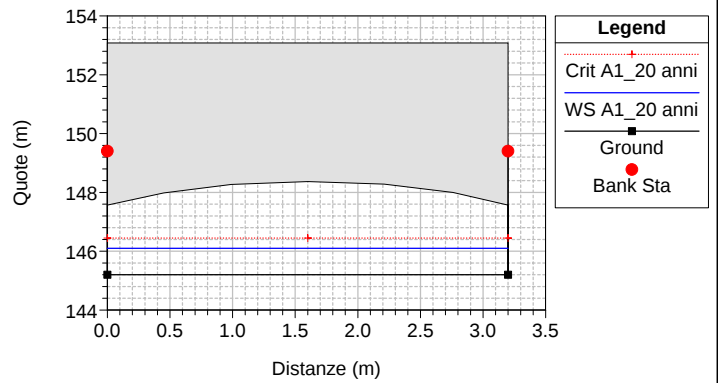
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.79



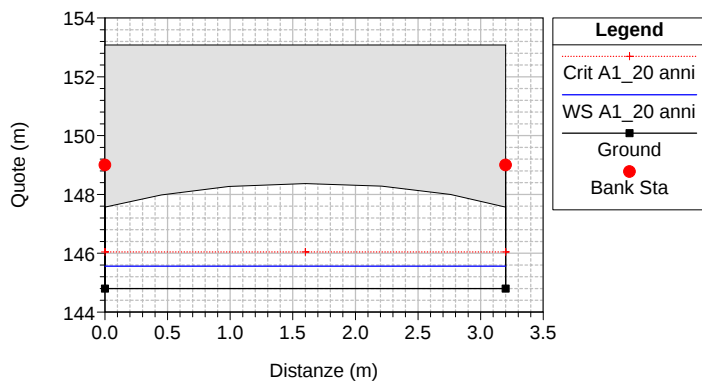
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.78



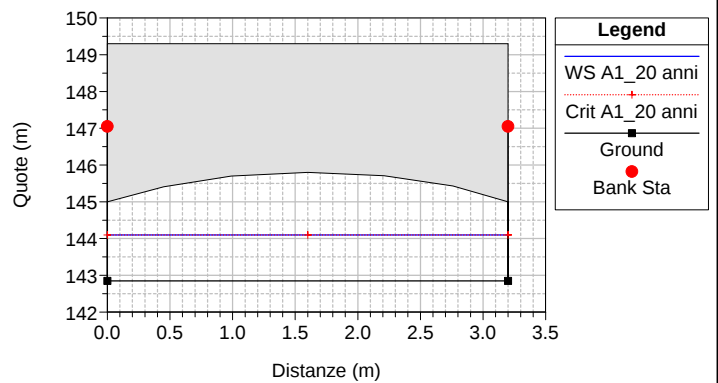
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.77



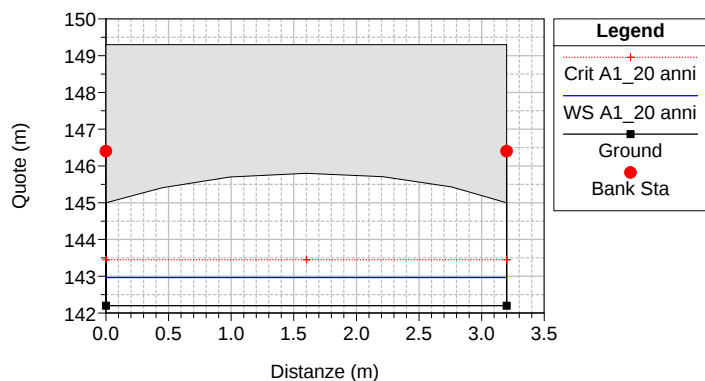
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.76



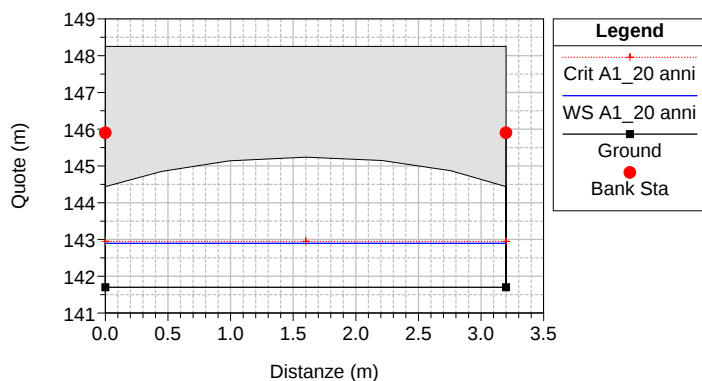
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.75



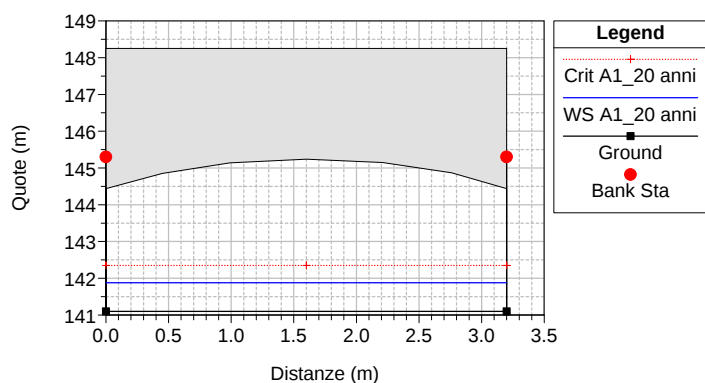
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.74



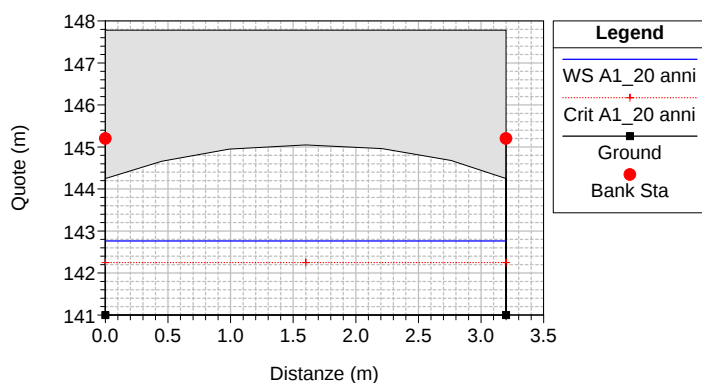
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.73



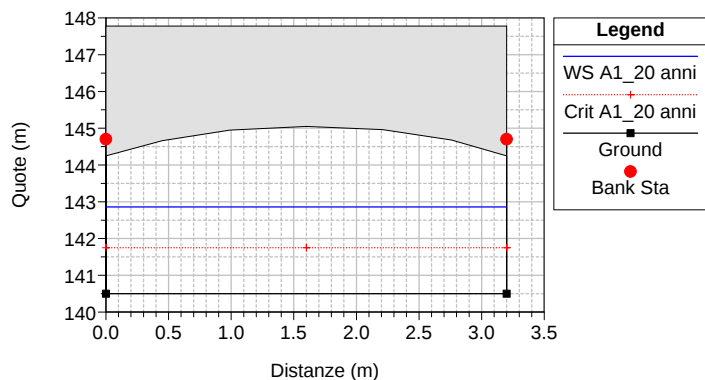
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.72



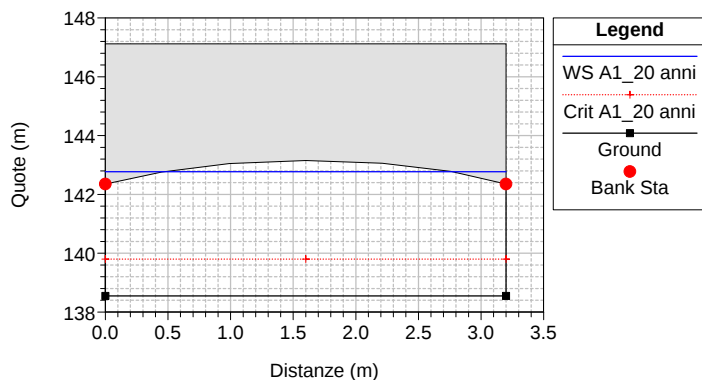
Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.71



Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.7



Geom: destra Flow: bormida 20 anni dx
River = Ravanasco Reach = destra RS = 1.5



Scenario A2)

Rio Ravanasco Tempo di ritorno $T_r = 200$ anni

Portata totale $Q = 51 \text{ mc/s}$

Portata canalizzazione sinistra $Q = 30 \text{ mc/s}$

Portata canalizzazione destra $Q = 21 \text{ mc/s}$

Fiume Bormida Tempo di ritorno $T_r = 20$ anni

$Q = 1740 \text{ mc/s}$ livello idrico 142.76 m

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A2_Tr 200

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
Acqui	20	A2_Tr 200	51.00	160.59	162.80	162.80	163.35	0.004309	3.30	15.47	14.46	1.02
Acqui	19	A2_Tr 200	51.00	159.95	162.95	161.95	163.08	0.000498	1.57	32.46	17.61	0.37
Acqui	18	A2_Tr 200	51.00	160.63	162.43	162.43	163.00	0.004040	3.34	15.26	13.48	1.00
Acqui	17	A2_Tr 200	51.00	158.37	159.45	160.12	162.64	0.060697	7.92	6.44	12.11	3.46
Acqui	16	A2_Tr 200	51.00	158.11	159.76	160.26	161.64	0.033838	6.08	8.39	14.02	2.51
Acqui	15	A2_Tr 200	51.00	158.04	159.83	160.24	161.15	0.017615	5.09	10.03	13.80	1.90
Acqui	14	A2_Tr 200	51.00	156.98	158.26	158.88	160.59	0.033593	6.76	7.54	11.55	2.67
Acqui	13	A2_Tr 200	51.00	156.45	158.24	158.66	159.49	0.017111	4.96	10.28	14.47	1.88
Acqui	12	A2_Tr 200	51.00	156.28	157.63	158.11	159.12	0.016394	5.41	9.42	11.59	1.92
Acqui	11	A2_Tr 200	51.00	155.48	157.55	157.84	158.49	0.010828	4.30	11.87	14.90	1.54
Acqui	10	A2_Tr 200	51.00	153.61	154.41	154.91	156.83	0.073733	6.90	7.39	19.98	3.62
Acqui	9	A2_Tr 200	51.00	152.84	154.29	154.87	155.75	0.012707	5.36	9.51	9.53	1.71
Acqui	8	A2_Tr 200	51.00	151.97	153.09	153.71	154.97	0.019893	6.07	8.40	9.87	2.10
Acqui	7	A2_Tr 200	51.00	151.72	153.04	153.49	154.48	0.018180	5.31	9.61	12.44	1.93
Acqui	6	A2_Tr 200	51.00	150.54	151.23	151.96	154.27	0.046394	7.72	6.61	10.16	3.06
Acqui	5	A2_Tr 200	51.00	149.33	150.28	150.90	152.42	0.024198	6.48	7.87	8.80	2.19
Acqui	4	A2_Tr 200	51.00	149.00	151.62	150.52	151.86	0.000959	2.19	23.26	9.28	0.44
Acqui	3	A2_Tr 200	51.00	148.90	151.42	150.61	151.82	0.001852	2.80	18.21	7.23	0.56
Acqui	2.2	A2_Tr 200	51.00	149.20	150.89	150.89	151.74	0.005501	4.09	12.47	7.38	1.00
Acqui	2.1	A2_Tr 200	51.00	148.10	149.09	149.79	151.57	0.027139	6.98	7.30	7.38	2.24
Acqui	2.05	A2_Tr 200	51.00	147.31	148.24	149.00	151.32	0.045197	7.78	6.56	8.95	2.90
Acqui	2	A2_Tr 200	51.00	147.31	148.37	149.13	151.23	0.044106	7.49	6.81	7.85	2.32
Acqui	1.99	A2_Tr 200	51.00	146.19	147.63	148.01	149.01	0.015454	5.20	9.81	7.85	1.38
Acqui	1.98	A2_Tr 200	51.00	144.86	146.34	146.68	147.64	0.014166	5.04	10.12	7.85	1.32
Acqui	1.97	A2_Tr 200	51.00	144.28	145.75	146.10	147.07	0.014485	5.08	10.04	7.85	1.34
Acqui	1.96	A2_Tr 200	51.00	143.89	145.37	145.71	146.67	0.014378	5.07	10.06	7.85	1.33
Acqui	1.95	A2_Tr 200	51.00	143.52	144.99	145.34	146.31	0.014426	5.07	10.05	7.85	1.33
Acqui	1.94	A2_Tr 200	51.00	143.20	144.67	145.02	145.99	0.014433	5.07	10.05	7.85	1.33
Acqui	1.93	A2_Tr 200	51.00	143.02	144.49	144.84	145.81	0.014579	5.09	10.01	7.85	1.34
Acqui	1.92	A2_Tr 200	51.00	141.98	143.45	143.80	144.77	0.014618	5.10	10.01	7.85	1.34
Acqui	1.91	A2_Tr 200	51.00	141.51	142.98	143.33	144.30	0.014695	5.11	9.99	7.85	1.35
Acqui	1.9	A2_Tr 200	51.00	141.00	142.47	142.82	143.79	0.014427	5.07	10.05	7.85	1.33
Acqui	1.8	A2_Tr 200	51.00	140.68	142.15	142.50	143.47	0.014487	5.08	10.04	7.85	1.34
Acqui	1.7	A2_Tr 200	51.00	140.45	142.73	142.27	143.22	0.003821	3.12	16.37	7.85	0.66
Acqui	1.6	A2_Tr 200	51.00	140.09	142.75	141.91	143.11	0.002452	2.63	19.39	7.85	0.51

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A2_Tr 200 (Continued)

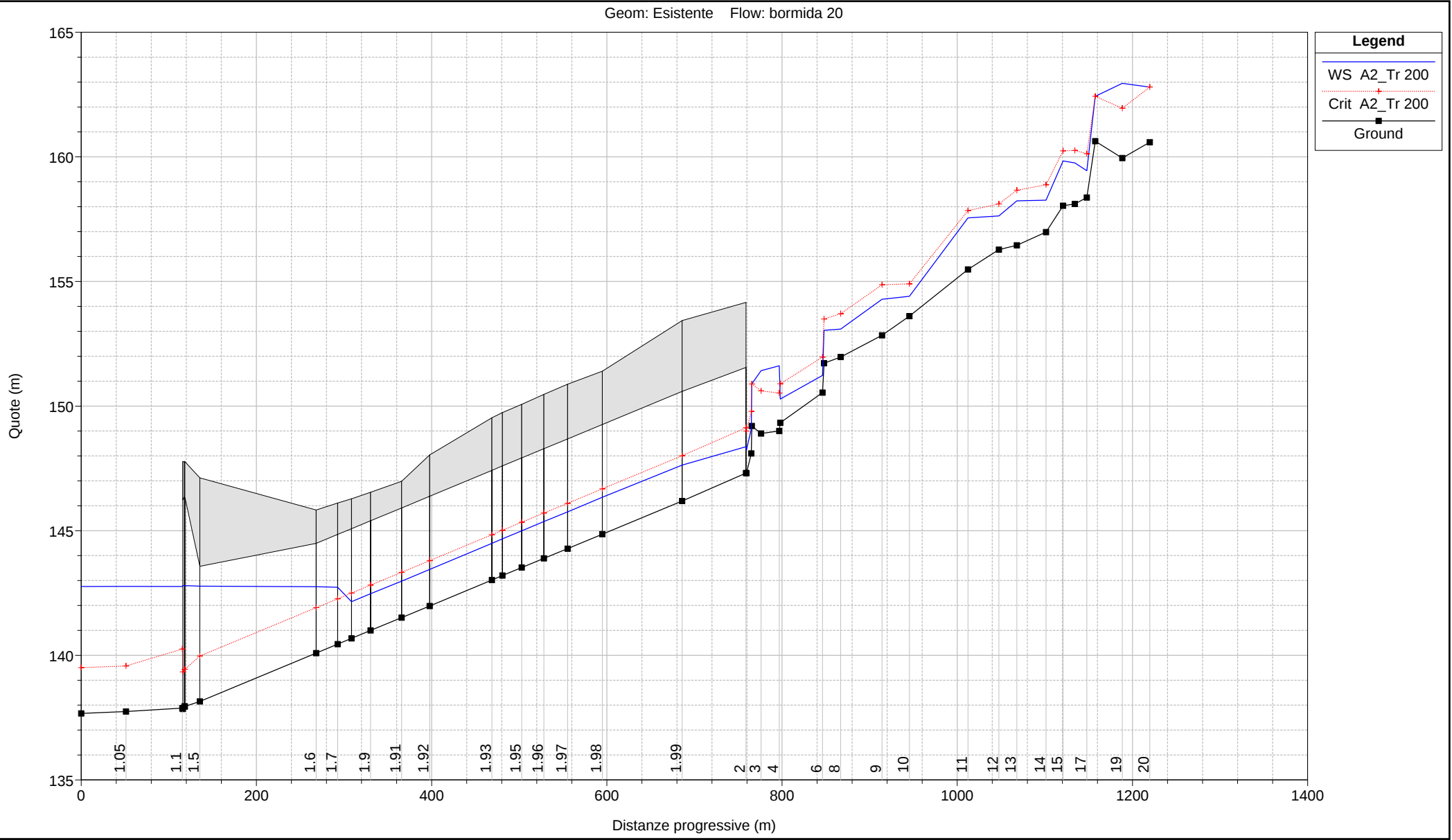
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Acqui	1.5	A2_Tr 200	51.00	138.15	142.77	139.97	142.89	0.000624	1.49	34.30	5.86	0.22
Acqui	1.4	A2_Tr 200	51.00	137.95	142.80	139.44	142.87	0.000183	1.18	43.19	8.47	0.17
Acqui	1.3	A2_Tr 200	51.00	137.95	142.80	139.44	142.87	0.000183	1.18	43.19	8.47	0.17
Acqui	1.2	A2_Tr 200	51.00	137.85	142.80	139.34	142.87	0.000173	1.16	44.09	8.41	0.17
Acqui	1.1	A2_Tr 200	51.00	137.88	142.76	140.25	142.87	0.000283	1.42	35.91	9.00	0.23
Acqui	1.05	A2_Tr 200	51.00	137.74	142.77	139.57	142.84	0.000175	1.21	42.02	9.00	0.18
Acqui	1	A2_Tr 200	51.00	137.67	142.76	139.50	142.83	0.000169	1.20	42.57	9.00	0.18

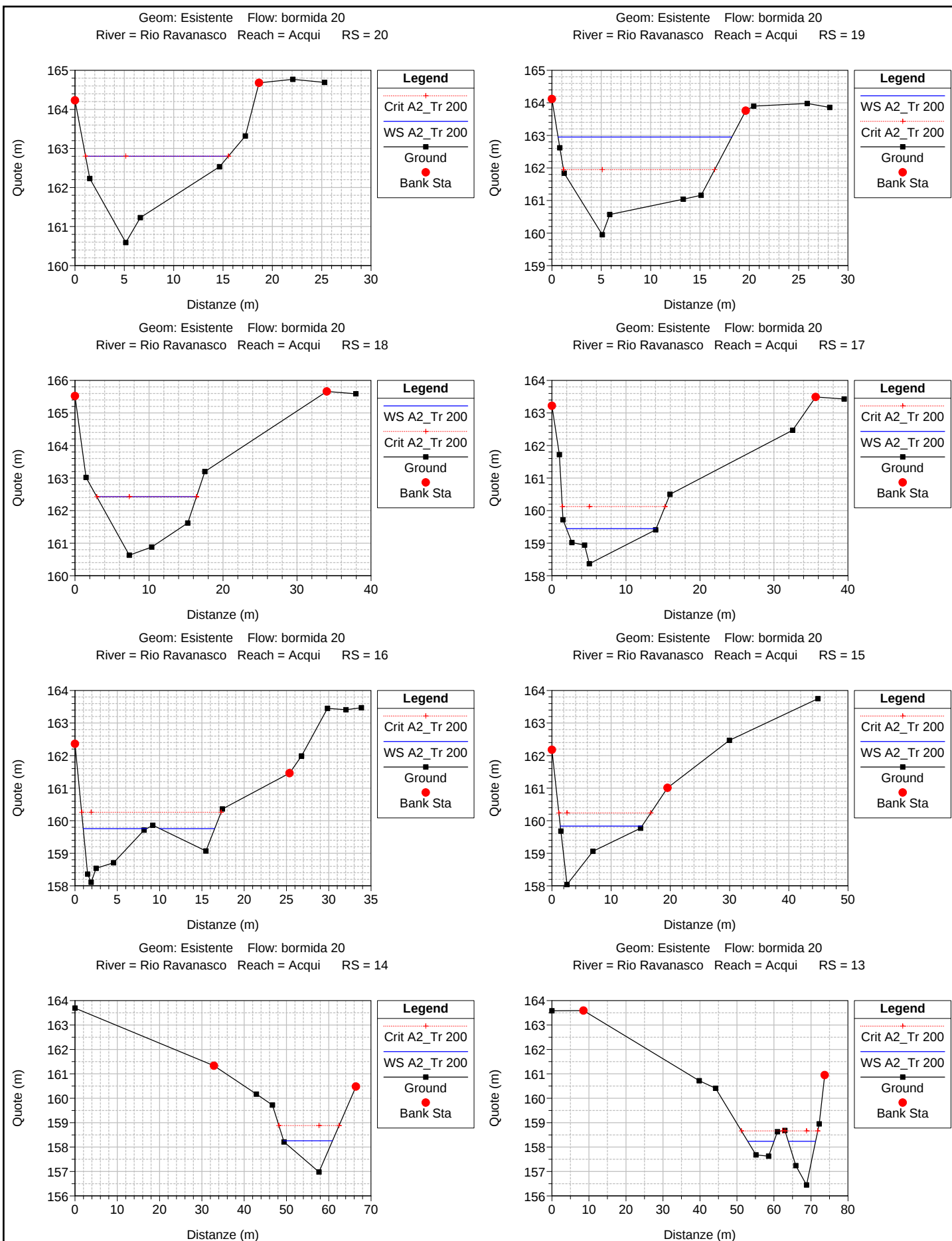
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A2_Tr 200

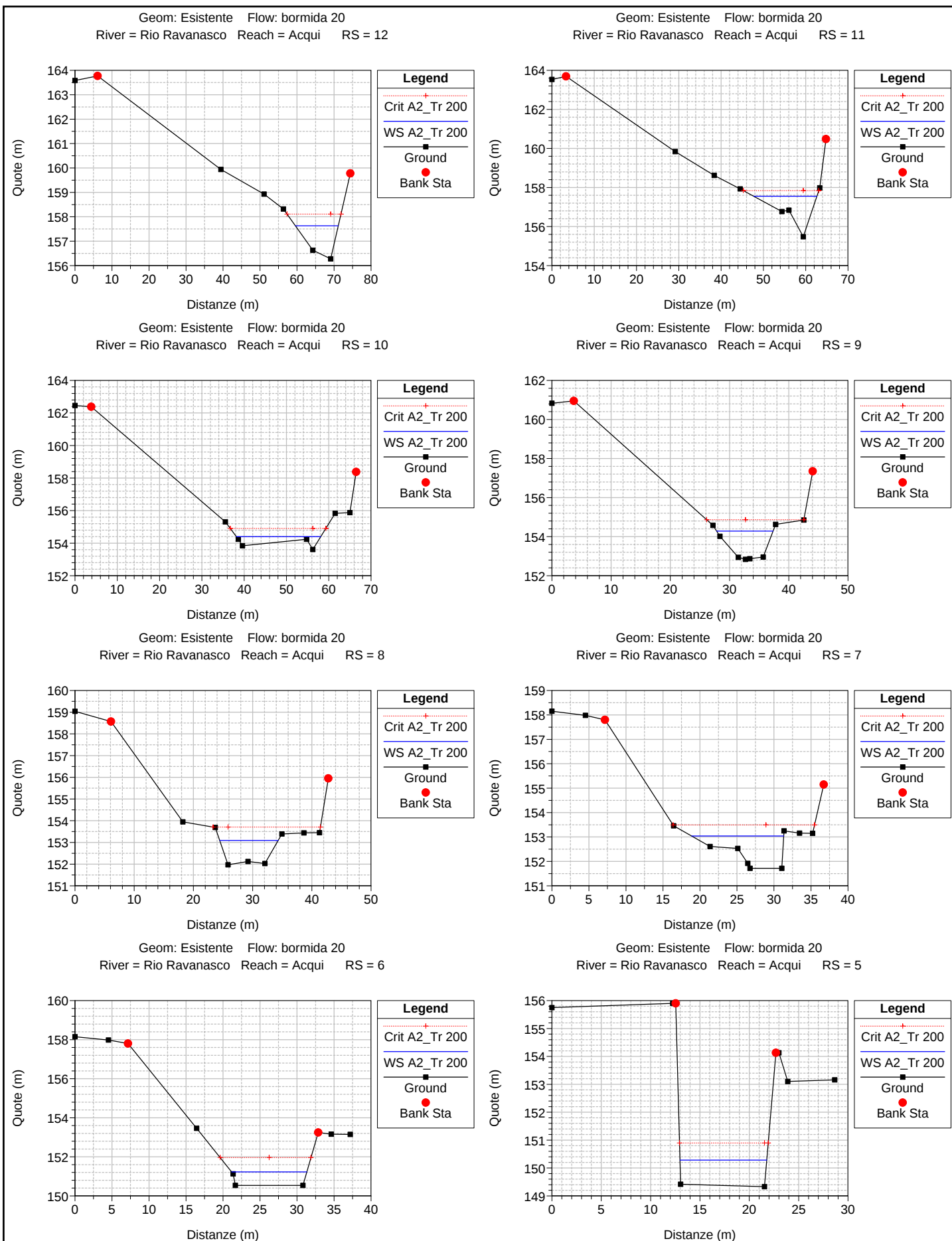
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	A2_Tr 200	163.35	162.80	0.55				51.00		14.46
Acqui	19	A2_Tr 200	163.08	162.95	0.13	0.03	0.04		51.00		17.61
Acqui	18	A2_Tr 200	163.00	162.43	0.57	0.02	0.09		51.00		13.48
Acqui	17	A2_Tr 200	162.64	159.45	3.19	0.10	0.26		51.00		12.11
Acqui	16	A2_Tr 200	161.64	159.76	1.88	0.60	0.39		51.00		14.02
Acqui	15	A2_Tr 200	161.15	159.83	1.32	0.32	0.17		51.00		13.80
Acqui	14	A2_Tr 200	160.59	158.26	2.33	0.46	0.10		51.00		11.55
Acqui	13	A2_Tr 200	159.49	158.24	1.25	0.78	0.32		51.00		14.47
Acqui	12	A2_Tr 200	159.12	157.63	1.49	0.34	0.02		51.00		11.59
Acqui	11	A2_Tr 200	158.49	157.55	0.94	0.47	0.17		51.00		14.90
Acqui	10	A2_Tr 200	156.83	154.41	2.43	1.51	0.15		51.00		19.98
Acqui	9	A2_Tr 200	155.75	154.29	1.47	0.79	0.29		51.00		9.53
Acqui	8	A2_Tr 200	154.97	153.09	1.88	0.74	0.04		51.00		9.87
Acqui	7	A2_Tr 200	154.48	153.04	1.43	0.36	0.13		51.00		12.44
Acqui	6	A2_Tr 200	154.27	151.23	3.04	0.05	0.16		51.00		10.16
Acqui	5	A2_Tr 200	152.42	150.28	2.14	1.57	0.27		51.00		8.80
Acqui	4	A2_Tr 200	151.86	151.62	0.24	0.03	0.02		51.00		9.28
Acqui	3	A2_Tr 200	151.82	151.42	0.40	0.03	0.05		51.00		7.23
Acqui	2.2	A2_Tr 200	151.74	150.89	0.85	0.00	0.00		51.00		7.38
Acqui	2.1	A2_Tr 200	151.57	149.09	2.48	0.01	0.16		51.00		7.38
Acqui	2.05	A2_Tr 200	151.32	148.24	3.08	0.19	0.06		51.00		8.95
Acqui	2	A2_Tr 200	151.23	148.37	2.86	0.02	0.07		51.00		7.85
Acqui	1.99	A2_Tr 200	149.01	147.63	1.38	1.78	0.44		51.00		7.85
Acqui	1.98	A2_Tr 200	147.64	146.34	1.29	1.35	0.02		51.00		7.85
Acqui	1.97	A2_Tr 200	147.07	145.75	1.32	0.57	0.00		51.00		7.85
Acqui	1.96	A2_Tr 200	146.67	145.37	1.31	0.39	0.00		51.00		7.85
Acqui	1.95	A2_Tr 200	146.31	144.99	1.31	0.37	0.00		51.00		7.85
Acqui	1.94	A2_Tr 200	145.99	144.67	1.31	0.32	0.00		51.00		7.85
Acqui	1.93	A2_Tr 200	145.81	144.49	1.32	0.17	0.00		51.00		7.85
Acqui	1.92	A2_Tr 200	144.77	143.45	1.32	1.04	0.00		51.00		7.85
Acqui	1.91	A2_Tr 200	144.30	142.98	1.33	0.47	0.00		51.00		7.85
Acqui	1.9	A2_Tr 200	143.79	142.47	1.31	0.52	0.01		51.00		7.85
Acqui	1.8	A2_Tr 200	143.47	142.15	1.32	0.32	0.00		51.00		7.85
Acqui	1.7	A2_Tr 200	143.22	142.73	0.49	0.07	0.04		51.00		7.85
Acqui	1.6	A2_Tr 200	143.11	142.75	0.35	0.15	0.07		51.00		7.85

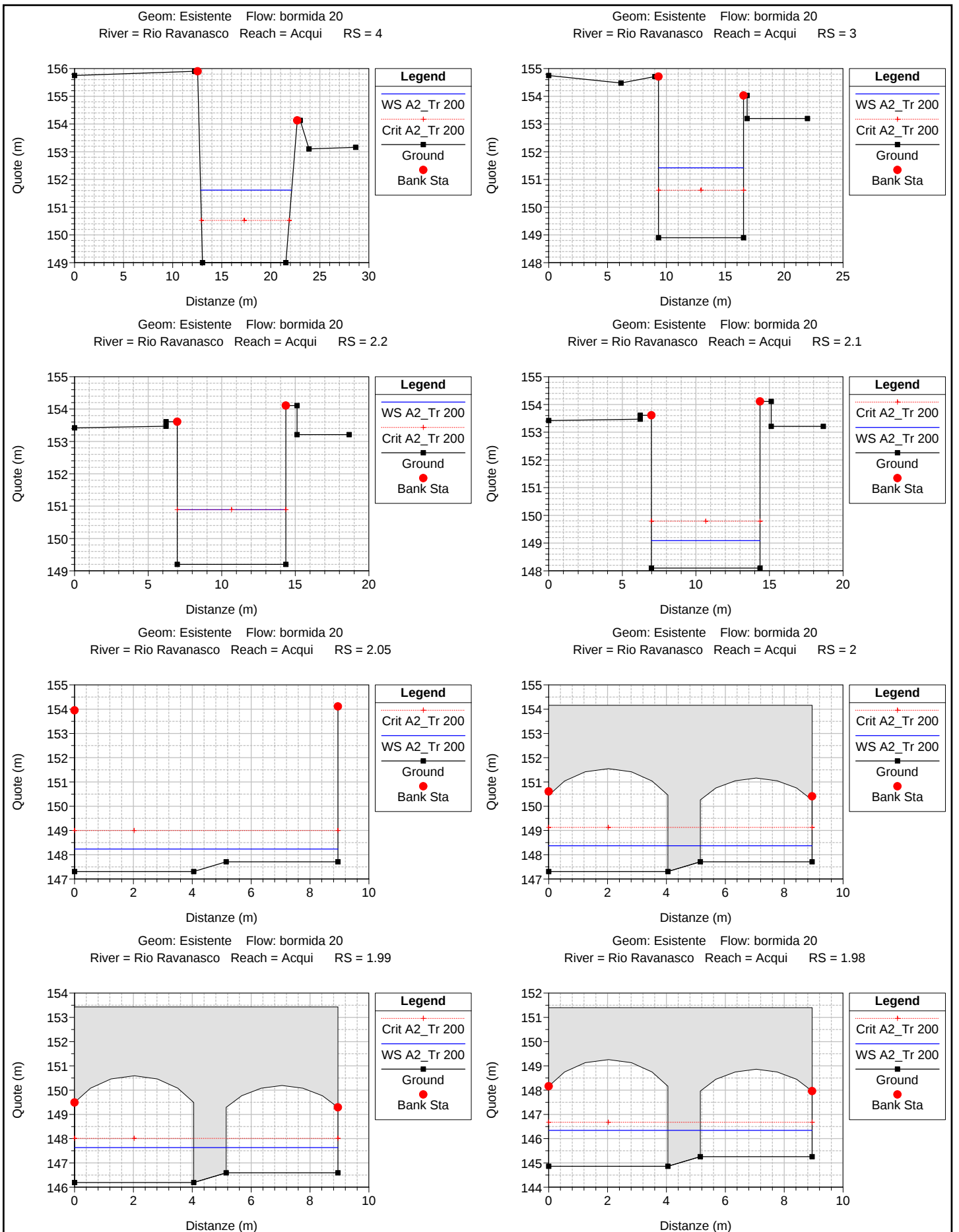
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A2_Tr 200 (Continued)

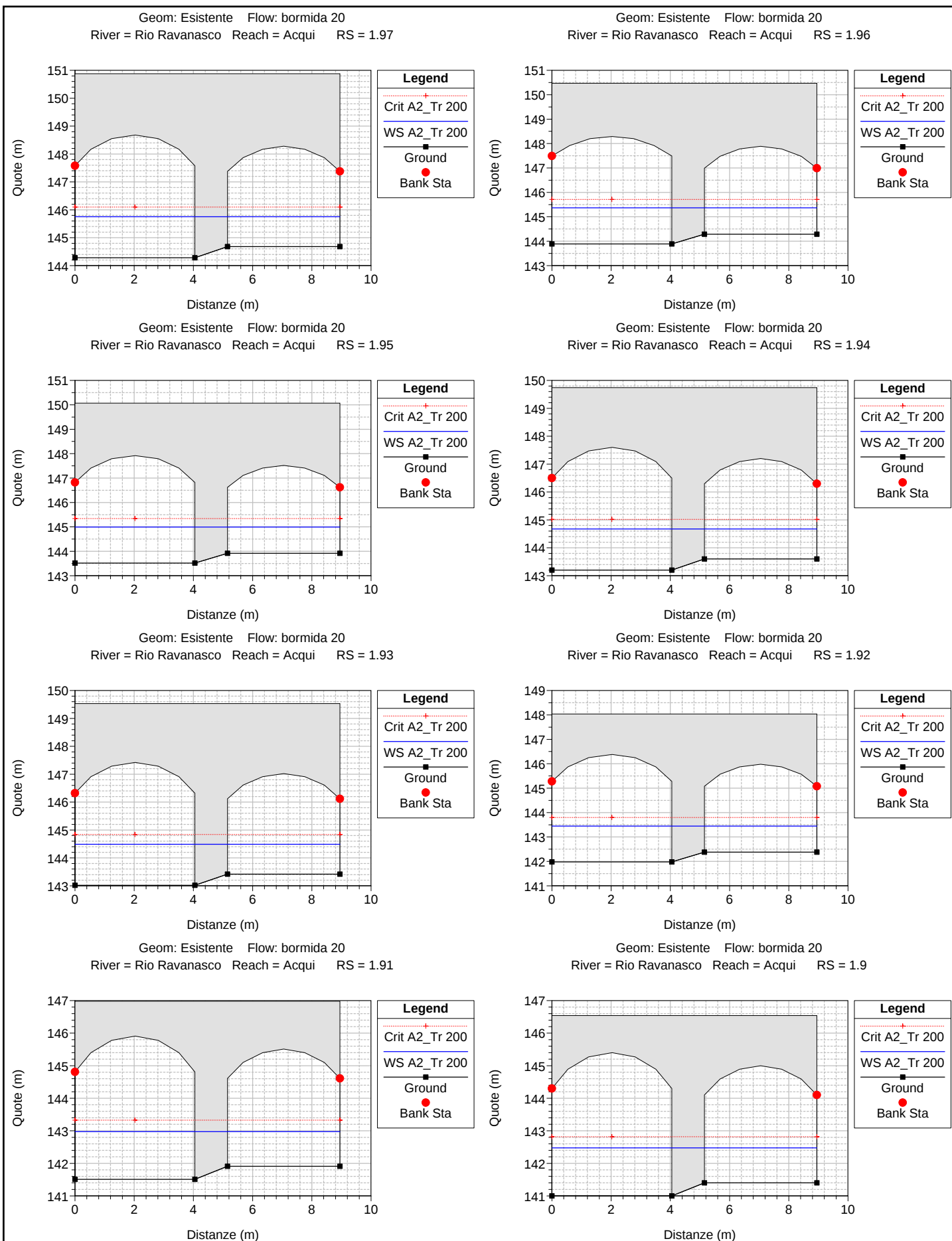
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	1.5	A2_Tr 200	142.89	142.77	0.11	0.01	0.01		51.00		5.86
Acqui	1.4	A2_Tr 200	142.87	142.80	0.07	0.00	0.00		51.00		8.47
Acqui	1.3	A2_Tr 200	142.87	142.80	0.07	0.00	0.00		51.00		8.47
Acqui	1.2	A2_Tr 200	142.87	142.80	0.07	0.00	0.00		51.00		8.41
Acqui	1.1	A2_Tr 200	142.87	142.76	0.10	0.01	0.01		51.00		9.00
Acqui	1.05	A2_Tr 200	142.84	142.77	0.08	0.01	0.00		51.00		9.00
Acqui	1	A2_Tr 200	142.83	142.76	0.07				51.00		9.00

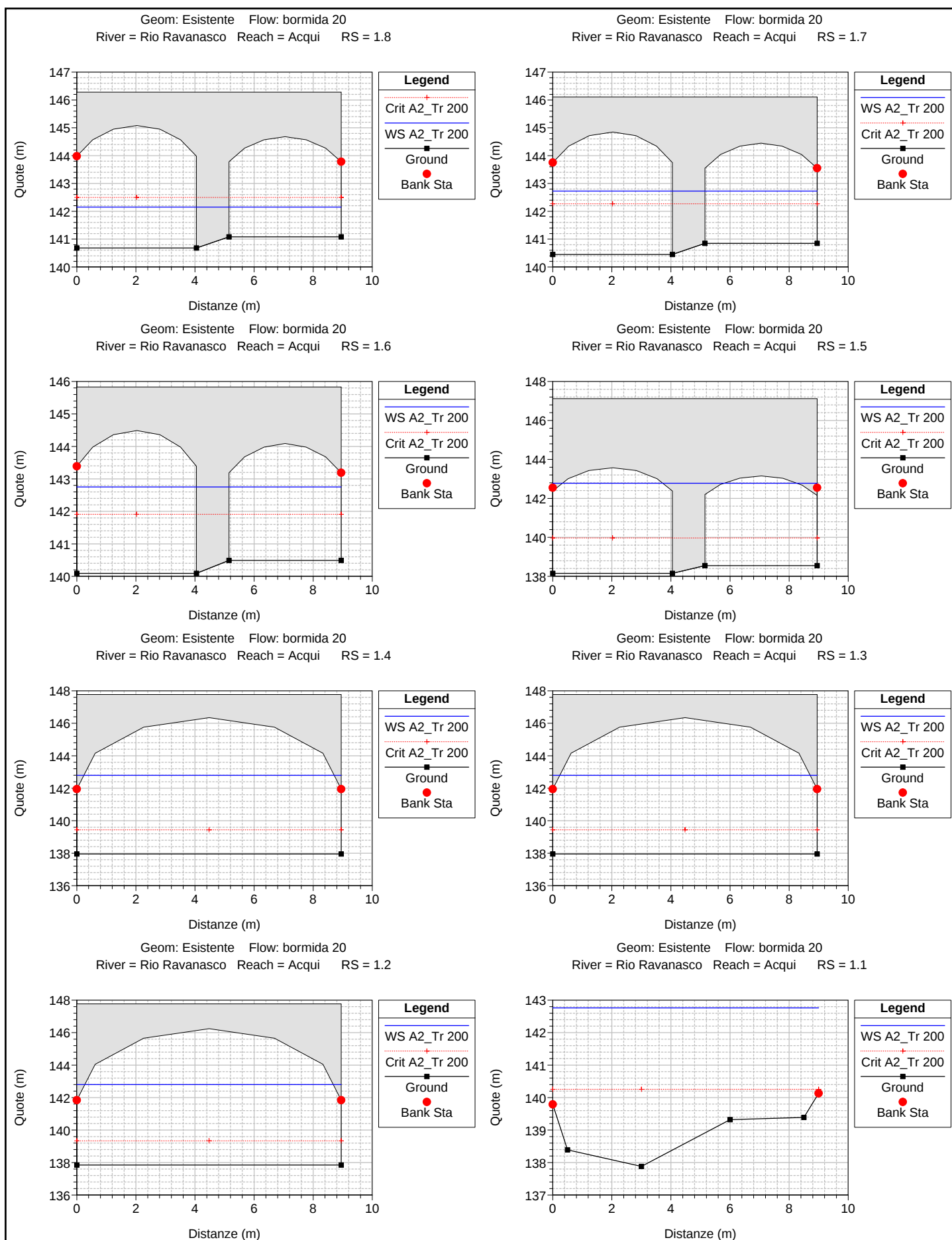




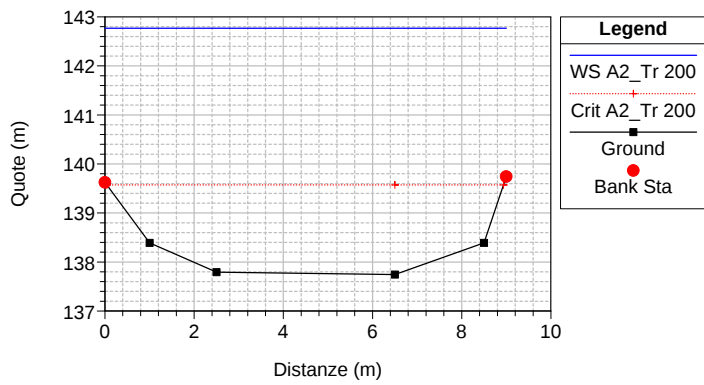




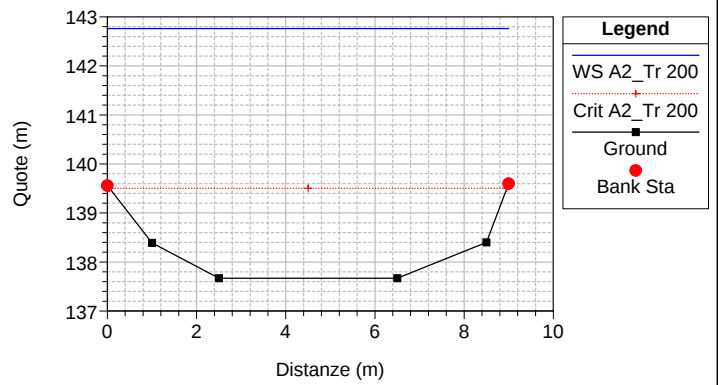




Geom: Esistente Flow: bormida 20
River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: Esistente Flow: bormida 20
River = Rio Ravanasco Reach = Acqui RS = 1



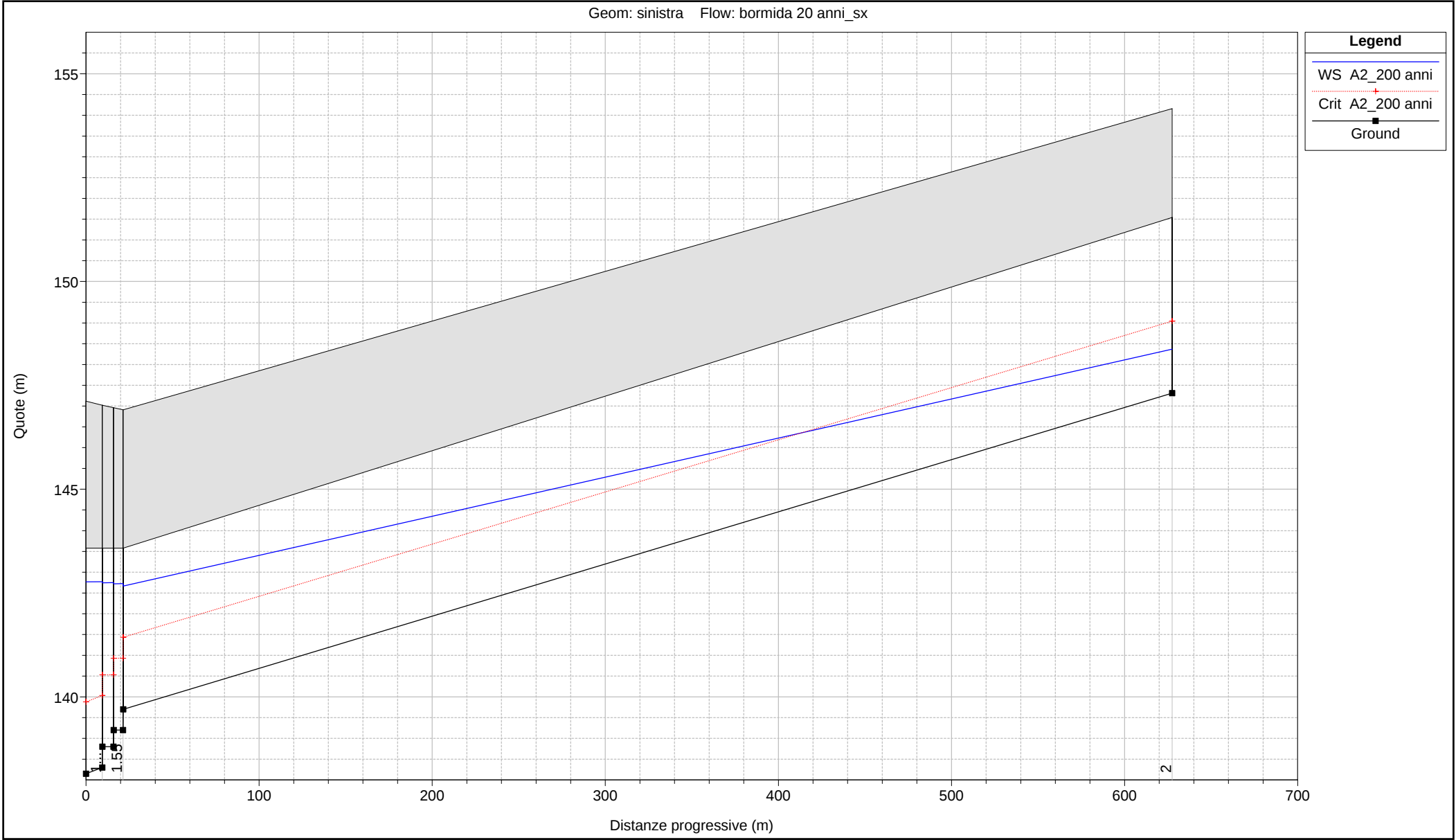
Dettaglio canalizzazione sinistra

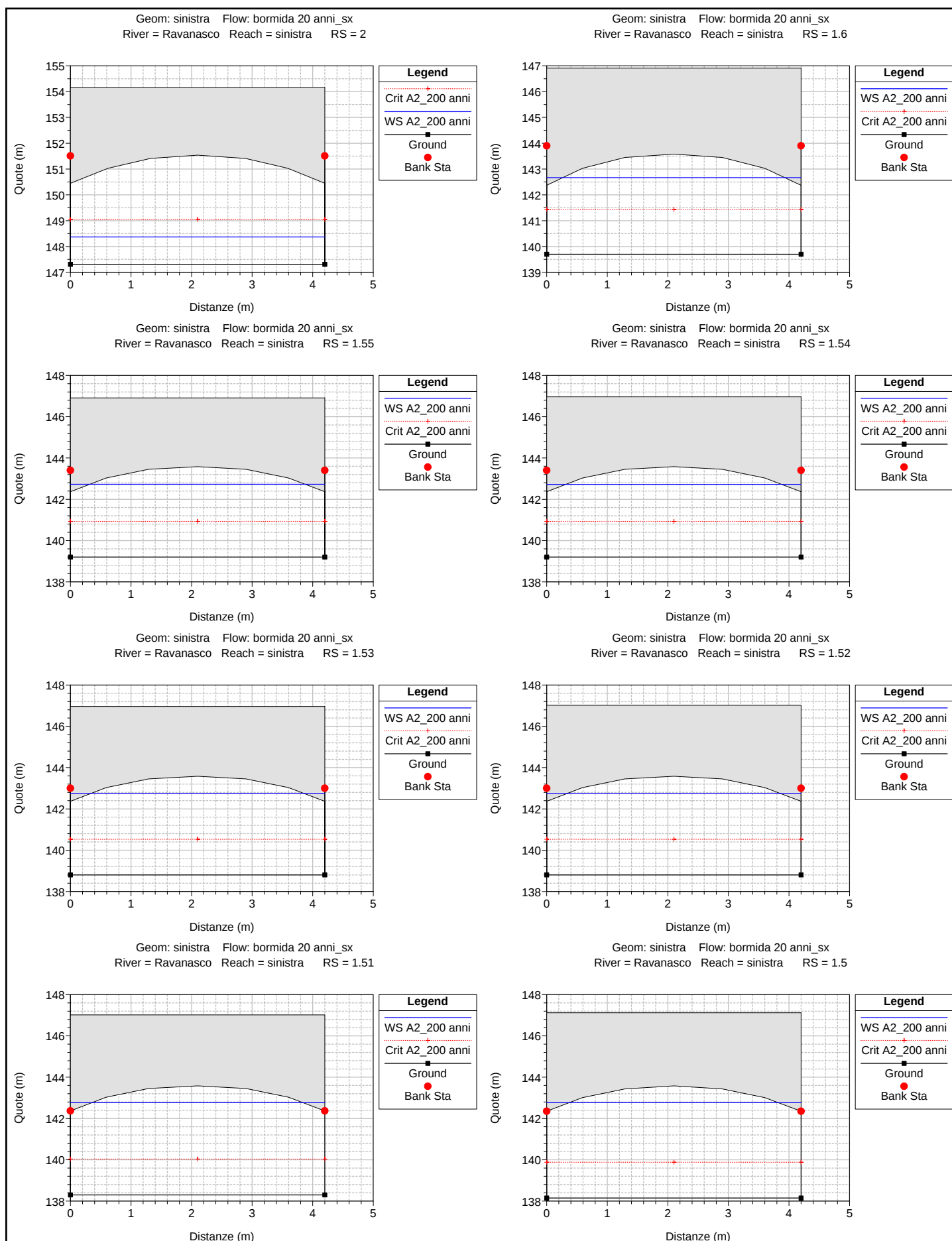
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: A2_200 anni

Reach	River Sta	Profile	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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
sinistra	2	A2_200 anni	30.00	147.31	148.37	149.04	150.68	0.028992	6.74	4.45	4.20	2.09
sinistra	1.6	A2_200 anni	30.00	139.70	142.67	141.43	142.97	0.001847	2.42	12.38	3.67	0.45
sinistra	1.55	A2_200 anni	30.00	139.20	142.73	140.93	142.94	0.001201	2.04	14.70	3.56	0.35
sinistra	1.54	A2_200 anni	30.00	139.20	142.72	140.93	142.93	0.001205	2.04	14.67	3.57	0.35
sinistra	1.53	A2_200 anni	30.00	138.80	142.75	140.53	142.92	0.000907	1.82	16.46	3.51	0.29
sinistra	1.52	A2_200 anni	30.00	138.80	142.74	140.53	142.91	0.000909	1.82	16.44	3.53	0.29
sinistra	1.51	A2_200 anni	30.00	138.30	142.77	140.03	142.90	0.000669	1.61	18.63	3.48	0.24
sinistra	1.5	A2_200 anni	30.00	138.15	142.77	139.88	142.89	0.000620	1.56	19.25	3.44	0.23

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: A2_200 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	A2_200 anni	150.68	148.37	2.31				30.00		4.20
sinistra	1.6	A2_200 anni	142.97	142.67	0.30	0.00	0.03		30.00		3.67
sinistra	1.55	A2_200 anni	142.94	142.73	0.21	0.01	0.00		30.00		3.56
sinistra	1.54	A2_200 anni	142.93	142.72	0.21	0.00	0.01		30.00		3.57
sinistra	1.53	A2_200 anni	142.92	142.75	0.17	0.01	0.00		30.00		3.51
sinistra	1.52	A2_200 anni	142.91	142.74	0.17	0.00	0.01		30.00		3.53
sinistra	1.51	A2_200 anni	142.90	142.77	0.13	0.01	0.00		30.00		3.48
sinistra	1.5	A2_200 anni	142.89	142.77	0.12				30.00		3.44





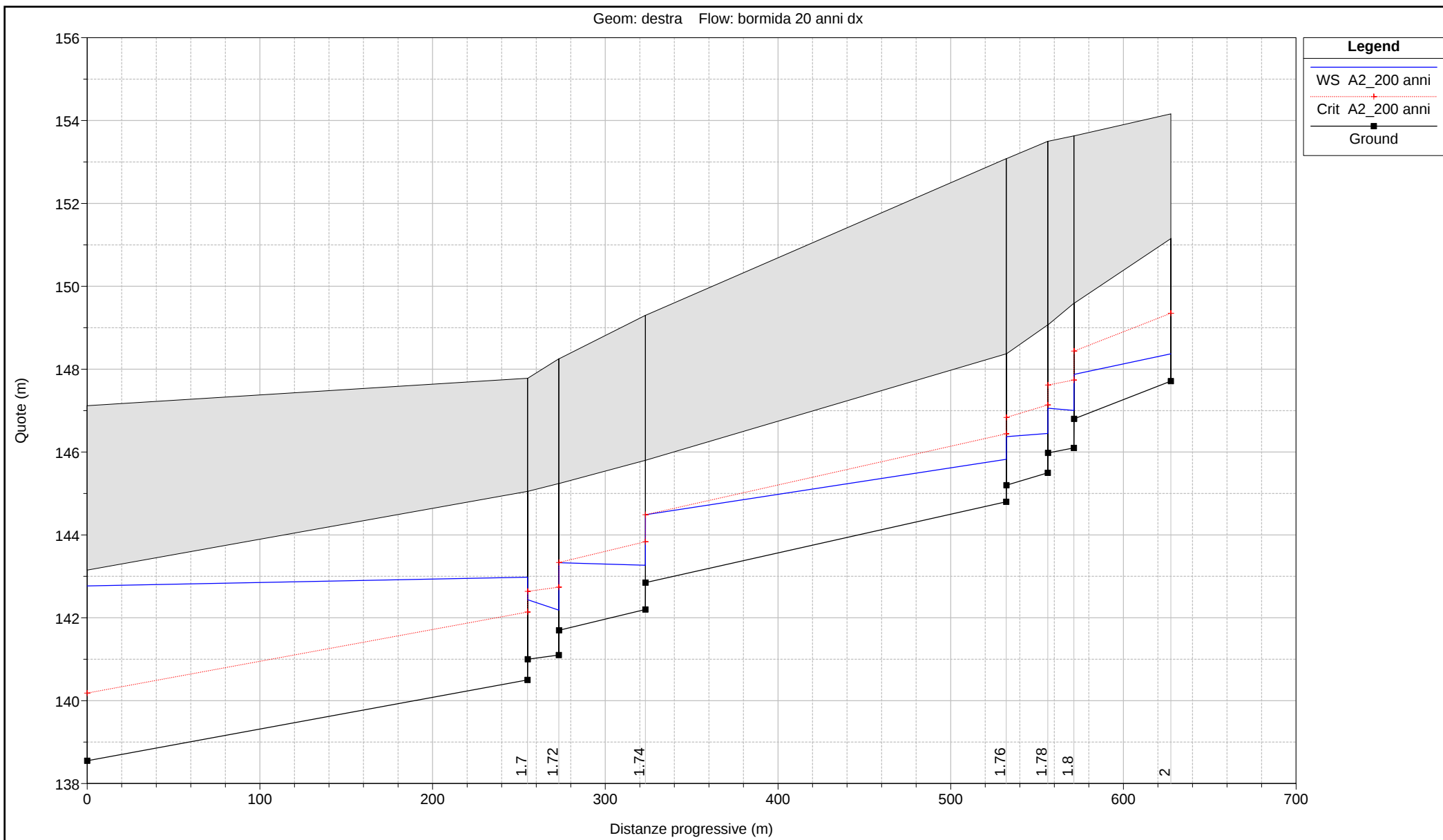
Dettaglio canalizzazione destra

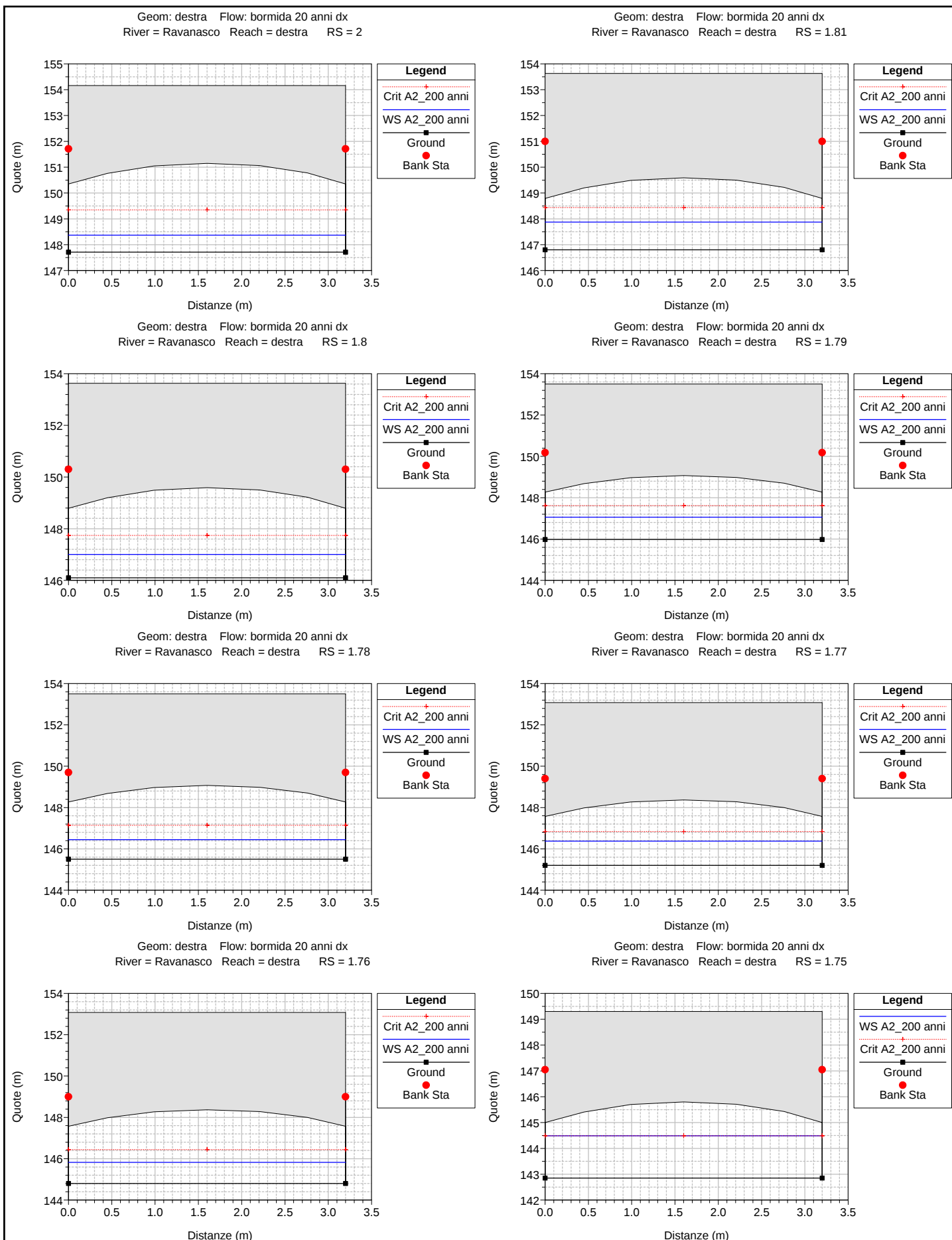
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: A2_200 anni

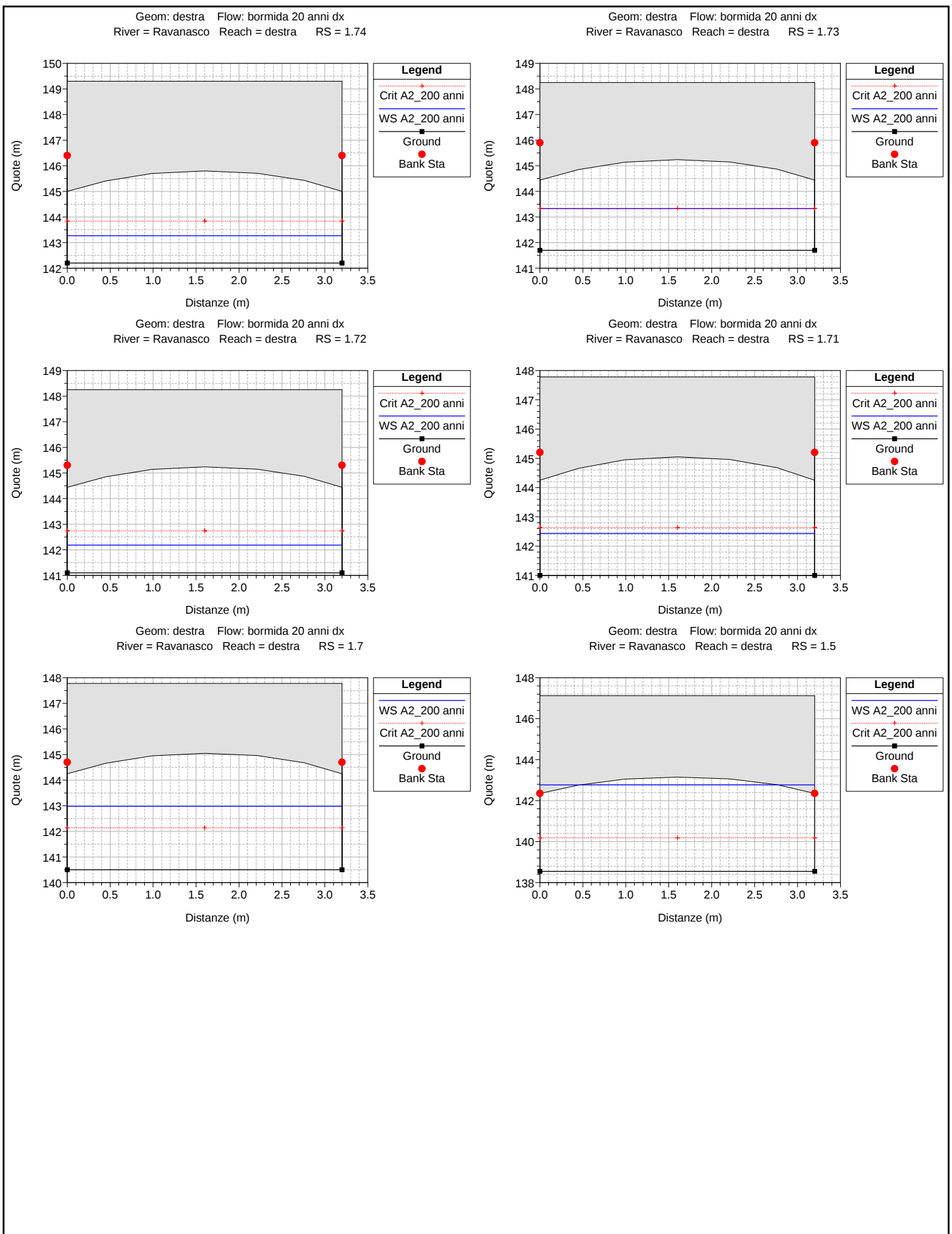
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
destra	2	A2_200 anni	21.00	147.71	148.37	149.35	153.41	0.109113	9.94	2.11	3.20	3.91
destra	1.81	A2_200 anni	21.00	146.80	147.87	148.44	149.78	0.026916	6.11	3.44	3.20	1.88
destra	1.8	A2_200 anni	21.00	146.10	147.00	147.74	149.69	0.043895	7.26	2.89	3.20	2.44
destra	1.79	A2_200 anni	21.00	145.98	147.06	147.62	148.95	0.026747	6.10	3.45	3.20	1.88
destra	1.78	A2_200 anni	21.00	145.50	146.45	147.14	148.89	0.038293	6.92	3.03	3.20	2.27
destra	1.77	A2_200 anni	21.00	145.20	146.37	146.84	147.97	0.021108	5.60	3.75	3.20	1.65
destra	1.76	A2_200 anni	21.00	144.80	145.82	146.44	147.92	0.030788	6.41	3.28	3.20	2.02
destra	1.75	A2_200 anni	21.00	142.85	144.49	144.49	145.31	0.008502	4.00	5.24	3.20	1.00
destra	1.74	A2_200 anni	21.00	142.20	143.27	143.84	145.19	0.027404	6.15	3.42	3.20	1.90
destra	1.73	A2_200 anni	21.00	141.70	143.33	143.34	144.16	0.008647	4.03	5.21	3.20	1.01
destra	1.72	A2_200 anni	21.00	141.10	142.19	142.74	144.05	0.026175	6.05	3.47	3.20	1.85
destra	1.71	A2_200 anni	21.00	141.00	142.43	142.64	143.50	0.012145	4.57	4.59	3.20	1.22
destra	1.7	A2_200 anni	21.00	140.50	142.98	142.14	143.34	0.002908	2.65	7.93	3.20	0.54
destra	1.5	A2_200 anni	21.00	138.55	142.77	140.18	142.90	0.000869	1.58	13.32	2.30	0.25

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: A2_200 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	A2_200 anni	153.41	148.37	5.04				21.00		3.20
destra	1.81	A2_200 anni	149.78	147.87	1.90	2.69	0.94		21.00		3.20
destra	1.8	A2_200 anni	149.69	147.00	2.69	0.00	0.08		21.00		3.20
destra	1.79	A2_200 anni	148.95	147.06	1.89	0.51	0.24		21.00		3.20
destra	1.78	A2_200 anni	148.89	146.45	2.44	0.00	0.05		21.00		3.20
destra	1.77	A2_200 anni	147.97	146.37	1.60	0.67	0.25		21.00		3.20
destra	1.76	A2_200 anni	147.92	145.82	2.09	0.00	0.05		21.00		3.20
destra	1.75	A2_200 anni	145.31	144.49	0.82	0.00	0.00		21.00		3.20
destra	1.74	A2_200 anni	145.19	143.27	1.93	0.00	0.11		21.00		3.20
destra	1.73	A2_200 anni	144.16	143.33	0.83	0.71	0.33		21.00		3.20
destra	1.72	A2_200 anni	144.05	142.19	1.86	0.00	0.10		21.00		3.20
destra	1.71	A2_200 anni	143.50	142.43	1.07	0.31	0.24		21.00		3.20
destra	1.7	A2_200 anni	143.34	142.98	0.36	0.37	0.07		21.00		3.20
destra	1.5	A2_200 anni	142.90	142.77	0.13				21.00		2.30







Scenario A3)

Rio Ravanasco Tempo di ritorno $T_r = 500$ anni

Portata totale $Q = 57$ mc/s

Portata canalizzazione sinistra $Q = 34$ mc/s

Portata canalizzazione destra $Q = 23$ mc/s

Fiume Bormida Tempo di ritorno $T_r = 20$ anni

$Q = 1740$ mc/s livello idrico 142.76 m

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A3_Tr 500

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
Acqui	20	A3_Tr 500	57.00	160.59	162.89	162.89	163.48	0.004251	3.39	16.79	14.83	1.02
Acqui	19	A3_Tr 500	57.00	159.95	163.07	162.03	163.21	0.000516	1.65	34.59	17.88	0.38
Acqui	18	A3_Tr 500	57.00	160.63	162.53	162.53	163.13	0.003974	3.44	16.59	13.86	1.00
Acqui	17	A3_Tr 500	57.00	158.37	159.50	160.22	162.77	0.055648	8.01	7.12	12.30	3.36
Acqui	16	A3_Tr 500	57.00	158.11	159.81	160.33	161.80	0.034451	6.25	9.12	14.86	2.55
Acqui	15	A3_Tr 500	57.00	158.04	159.89	160.33	161.30	0.017503	5.27	10.82	14.04	1.92
Acqui	14	A3_Tr 500	57.00	156.98	158.32	158.98	160.75	0.032119	6.91	8.25	11.82	2.64
Acqui	13	A3_Tr 500	57.00	156.45	158.29	158.75	159.65	0.017790	5.18	11.01	14.95	1.93
Acqui	12	A3_Tr 500	57.00	156.28	157.70	158.21	159.28	0.016345	5.57	10.23	12.02	1.93
Acqui	11	A3_Tr 500	57.00	155.48	157.60	157.93	158.64	0.011418	4.50	12.66	15.43	1.59
Acqui	10	A3_Tr 500	57.00	153.61	154.44	154.97	156.95	0.068158	7.02	8.12	20.17	3.53
Acqui	9	A3_Tr 500	57.00	152.84	154.38	154.95	155.90	0.012235	5.47	10.43	9.85	1.70
Acqui	8	A3_Tr 500	57.00	151.97	153.17	153.81	155.14	0.019359	6.23	9.15	10.13	2.09
Acqui	7	A3_Tr 500	57.00	151.72	153.10	153.56	154.66	0.018688	5.53	10.30	12.77	1.97
Acqui	6	A3_Tr 500	57.00	150.54	151.29	152.06	154.45	0.043848	7.87	7.24	10.34	3.00
Acqui	5	A3_Tr 500	57.00	149.33	150.35	151.01	152.66	0.024112	6.73	8.47	8.82	2.19
Acqui	4	A3_Tr 500	57.00	149.00	151.80	150.64	152.06	0.000983	2.28	24.95	9.34	0.45
Acqui	3	A3_Tr 500	57.00	148.90	151.58	150.74	152.02	0.001958	2.95	19.34	7.23	0.58
Acqui	2.2	A3_Tr 500	57.00	149.20	151.02	151.02	151.94	0.005537	4.24	13.43	7.38	1.00
Acqui	2.1	A3_Tr 500	57.00	148.10	149.18	149.92	151.77	0.025665	7.12	8.00	7.38	2.18
Acqui	2.05	A3_Tr 500	57.00	147.31	148.31	149.10	151.52	0.042539	7.94	7.18	8.95	2.83
Acqui	2	A3_Tr 500	57.00	147.31	148.45	149.25	151.43	0.042192	7.64	7.46	7.85	2.28
Acqui	1.99	A3_Tr 500	57.00	146.19	147.73	148.14	149.21	0.015749	5.40	10.55	7.85	1.39
Acqui	1.98	A3_Tr 500	57.00	144.86	146.45	146.80	147.82	0.014061	5.19	10.99	7.85	1.31
Acqui	1.97	A3_Tr 500	57.00	144.28	145.86	146.23	147.26	0.014435	5.24	10.88	7.85	1.33
Acqui	1.96	A3_Tr 500	57.00	143.89	145.47	145.83	146.87	0.014458	5.24	10.88	7.85	1.33
Acqui	1.95	A3_Tr 500	57.00	143.52	145.10	145.47	146.50	0.014467	5.24	10.88	7.85	1.33
Acqui	1.94	A3_Tr 500	57.00	143.20	144.78	145.14	146.18	0.014417	5.23	10.89	7.85	1.33
Acqui	1.93	A3_Tr 500	57.00	143.02	144.60	144.96	146.00	0.014561	5.25	10.85	7.85	1.34
Acqui	1.92	A3_Tr 500	57.00	141.98	143.55	143.93	144.96	0.014607	5.26	10.84	7.85	1.34
Acqui	1.91	A3_Tr 500	57.00	141.51	143.08	143.46	144.50	0.014694	5.27	10.81	7.85	1.34
Acqui	1.9	A3_Tr 500	57.00	141.00	142.58	142.94	143.98	0.014433	5.24	10.88	7.85	1.33
Acqui	1.8	A3_Tr 500	57.00	140.68	142.26	142.62	143.66	0.014488	5.24	10.87	7.85	1.33
Acqui	1.7	A3_Tr 500	57.00	140.45	142.03	142.39	143.43	0.014440	5.24	10.88	7.85	1.33
Acqui	1.6	A3_Tr 500	57.00	140.09	142.75	142.04	143.19	0.003069	2.94	19.37	7.85	0.58

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A3_Tr 500 (Continued)

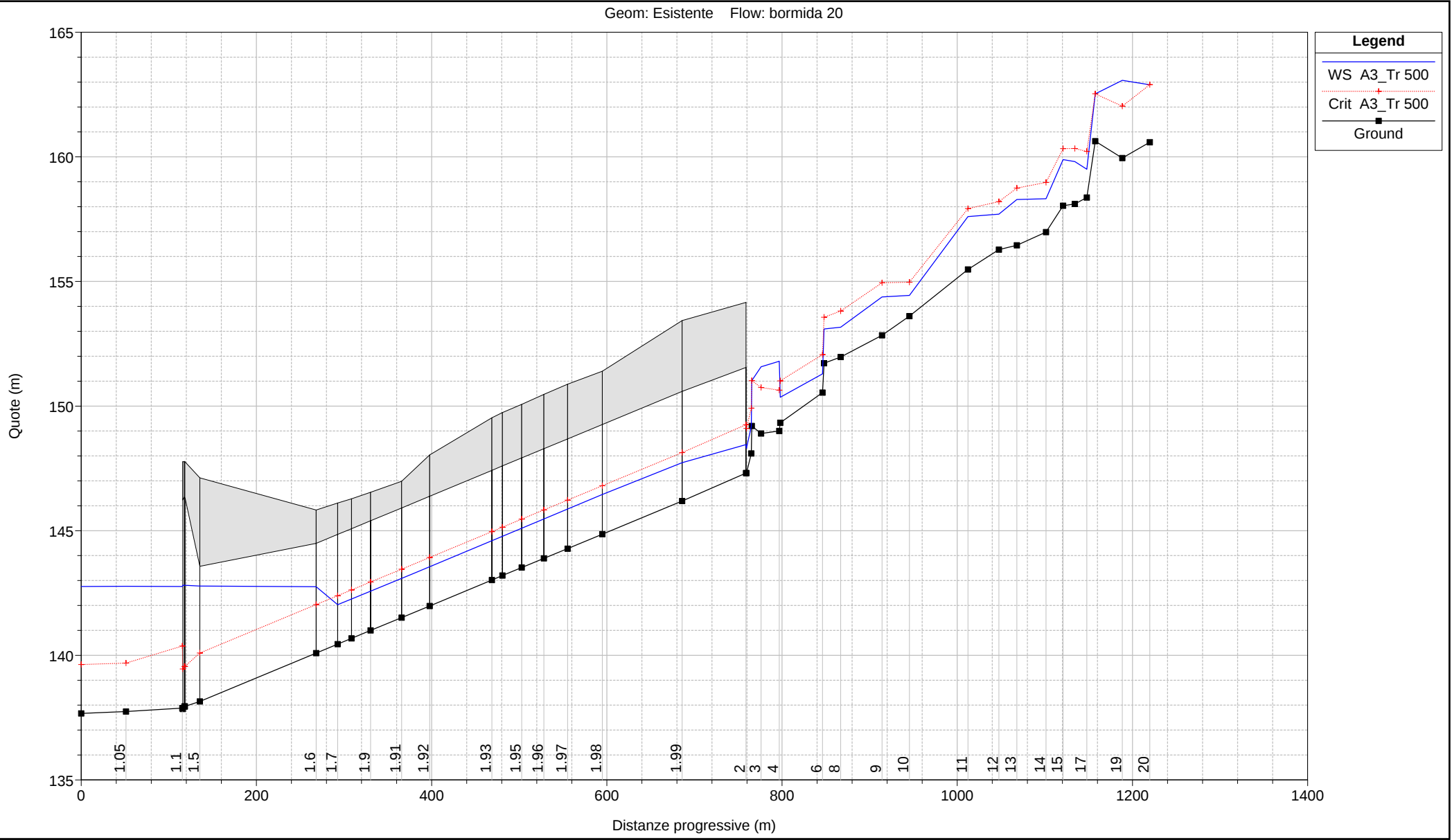
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Acqui	1.5	A3_Tr 500	57.00	138.15	142.78	140.09	142.92	0.000779	1.66	34.32	5.84	0.25
Acqui	1.4	A3_Tr 500	57.00	137.95	142.81	139.56	142.90	0.000227	1.32	43.28	8.47	0.19
Acqui	1.3	A3_Tr 500	57.00	137.95	142.81	139.56	142.90	0.000227	1.32	43.28	8.47	0.19
Acqui	1.2	A3_Tr 500	57.00	137.85	142.81	139.45	142.90	0.000216	1.29	44.17	8.41	0.18
Acqui	1.1	A3_Tr 500	57.00	137.88	142.76	140.37	142.89	0.000353	1.59	35.92	9.00	0.25
Acqui	1.05	A3_Tr 500	57.00	137.74	142.77	139.69	142.86	0.000218	1.36	42.04	9.00	0.20
Acqui	1	A3_Tr 500	57.00	137.67	142.76	139.63	142.85	0.000211	1.34	42.57	9.00	0.20

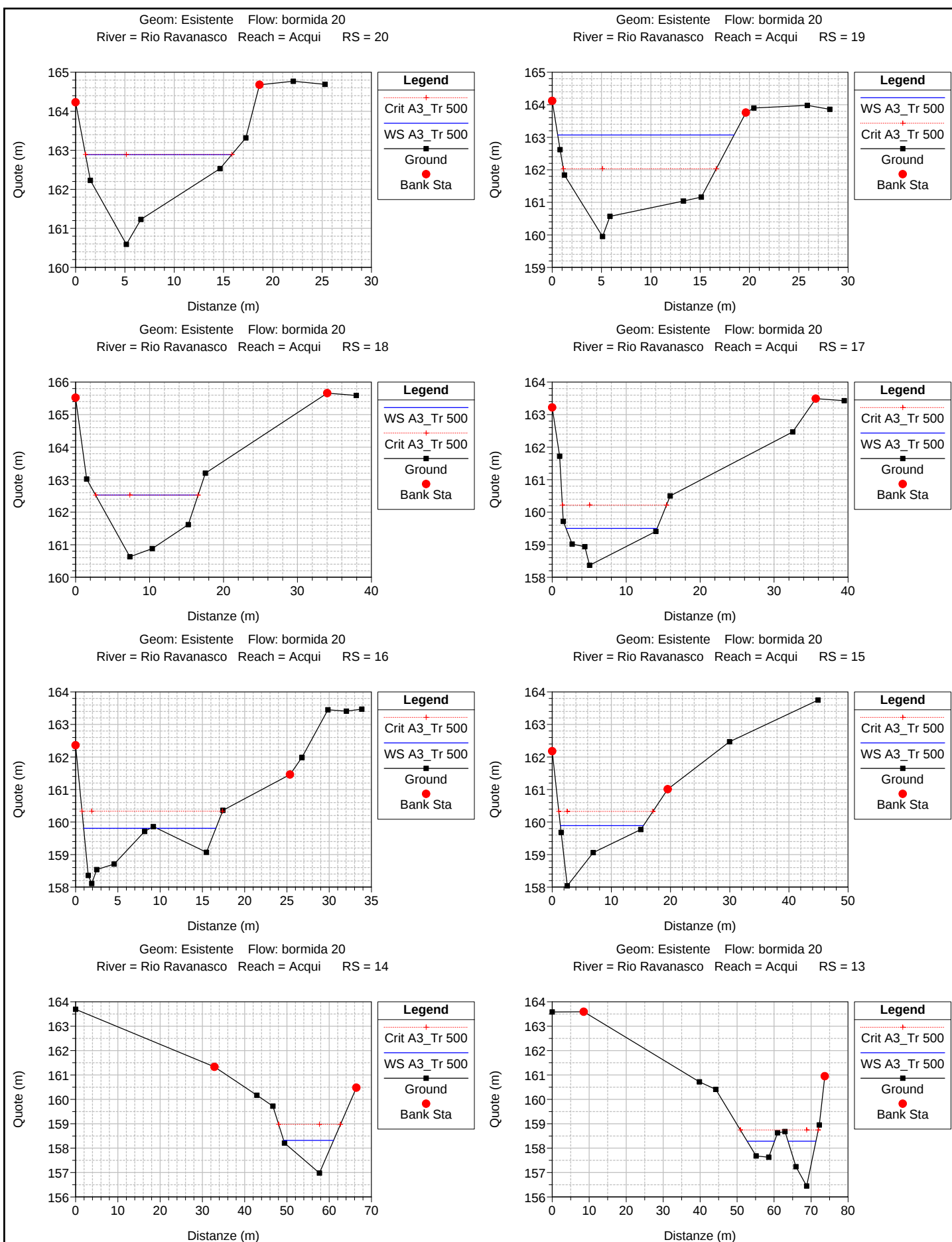
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A3_Tr 500

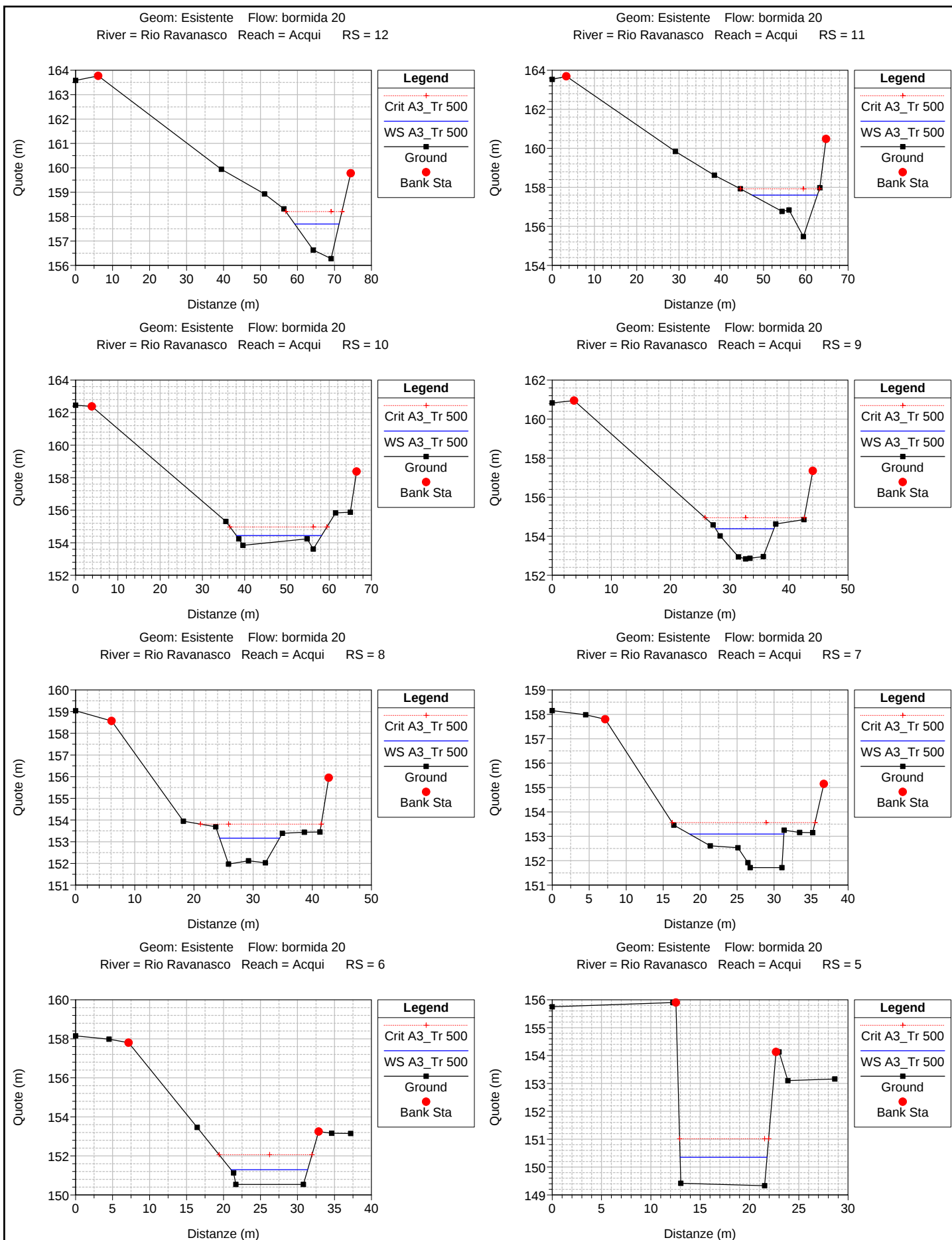
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	A3_Tr 500	163.48	162.89	0.59				57.00		14.83
Acqui	19	A3_Tr 500	163.21	163.07	0.14	0.03	0.05		57.00		17.88
Acqui	18	A3_Tr 500	163.13	162.53	0.60	0.02	0.09		57.00		13.86
Acqui	17	A3_Tr 500	162.77	159.50	3.27	0.10	0.27		57.00		12.30
Acqui	16	A3_Tr 500	161.80	159.81	1.99	0.59	0.38		57.00		14.86
Acqui	15	A3_Tr 500	161.30	159.89	1.41	0.32	0.17		57.00		14.04
Acqui	14	A3_Tr 500	160.75	158.32	2.43	0.45	0.10		57.00		11.82
Acqui	13	A3_Tr 500	159.65	158.29	1.36	0.78	0.32		57.00		14.95
Acqui	12	A3_Tr 500	159.28	157.70	1.58	0.35	0.02		57.00		12.02
Acqui	11	A3_Tr 500	158.64	157.60	1.03	0.48	0.16		57.00		15.43
Acqui	10	A3_Tr 500	156.95	154.44	2.51	1.54	0.15		57.00		20.17
Acqui	9	A3_Tr 500	155.90	154.38	1.52	0.76	0.30		57.00		9.85
Acqui	8	A3_Tr 500	155.14	153.17	1.98	0.72	0.05		57.00		10.13
Acqui	7	A3_Tr 500	154.66	153.10	1.56	0.36	0.12		57.00		12.77
Acqui	6	A3_Tr 500	154.45	151.29	3.16	0.05	0.16		57.00		10.34
Acqui	5	A3_Tr 500	152.66	150.35	2.31	1.53	0.25		57.00		8.82
Acqui	4	A3_Tr 500	152.06	151.80	0.27	0.03	0.02		57.00		9.34
Acqui	3	A3_Tr 500	152.02	151.58	0.44	0.03	0.05		57.00		7.23
Acqui	2.2	A3_Tr 500	151.94	151.02	0.92	0.00	0.00		57.00		7.38
Acqui	2.1	A3_Tr 500	151.77	149.18	2.58	0.01	0.17		57.00		7.38
Acqui	2.05	A3_Tr 500	151.52	148.31	3.21	0.18	0.06		57.00		8.95
Acqui	2	A3_Tr 500	151.43	148.45	2.97	0.02	0.07		57.00		7.85
Acqui	1.99	A3_Tr 500	149.21	147.73	1.49	1.77	0.45		57.00		7.85
Acqui	1.98	A3_Tr 500	147.82	146.45	1.37	1.36	0.03		57.00		7.85
Acqui	1.97	A3_Tr 500	147.26	145.86	1.40	0.56	0.00		57.00		7.85
Acqui	1.96	A3_Tr 500	146.87	145.47	1.40	0.39	0.00		57.00		7.85
Acqui	1.95	A3_Tr 500	146.50	145.10	1.40	0.37	0.00		57.00		7.85
Acqui	1.94	A3_Tr 500	146.18	144.78	1.40	0.32	0.00		57.00		7.85
Acqui	1.93	A3_Tr 500	146.00	144.60	1.41	0.17	0.00		57.00		7.85
Acqui	1.92	A3_Tr 500	144.96	143.55	1.41	1.04	0.00		57.00		7.85
Acqui	1.91	A3_Tr 500	144.50	143.08	1.42	0.47	0.00		57.00		7.85
Acqui	1.9	A3_Tr 500	143.98	142.58	1.40	0.52	0.01		57.00		7.85
Acqui	1.8	A3_Tr 500	143.66	142.26	1.40	0.32	0.00		57.00		7.85
Acqui	1.7	A3_Tr 500	143.43	142.03	1.40	0.23	0.00		57.00		7.85
Acqui	1.6	A3_Tr 500	143.19	142.75	0.44	0.18	0.09		57.00		7.85

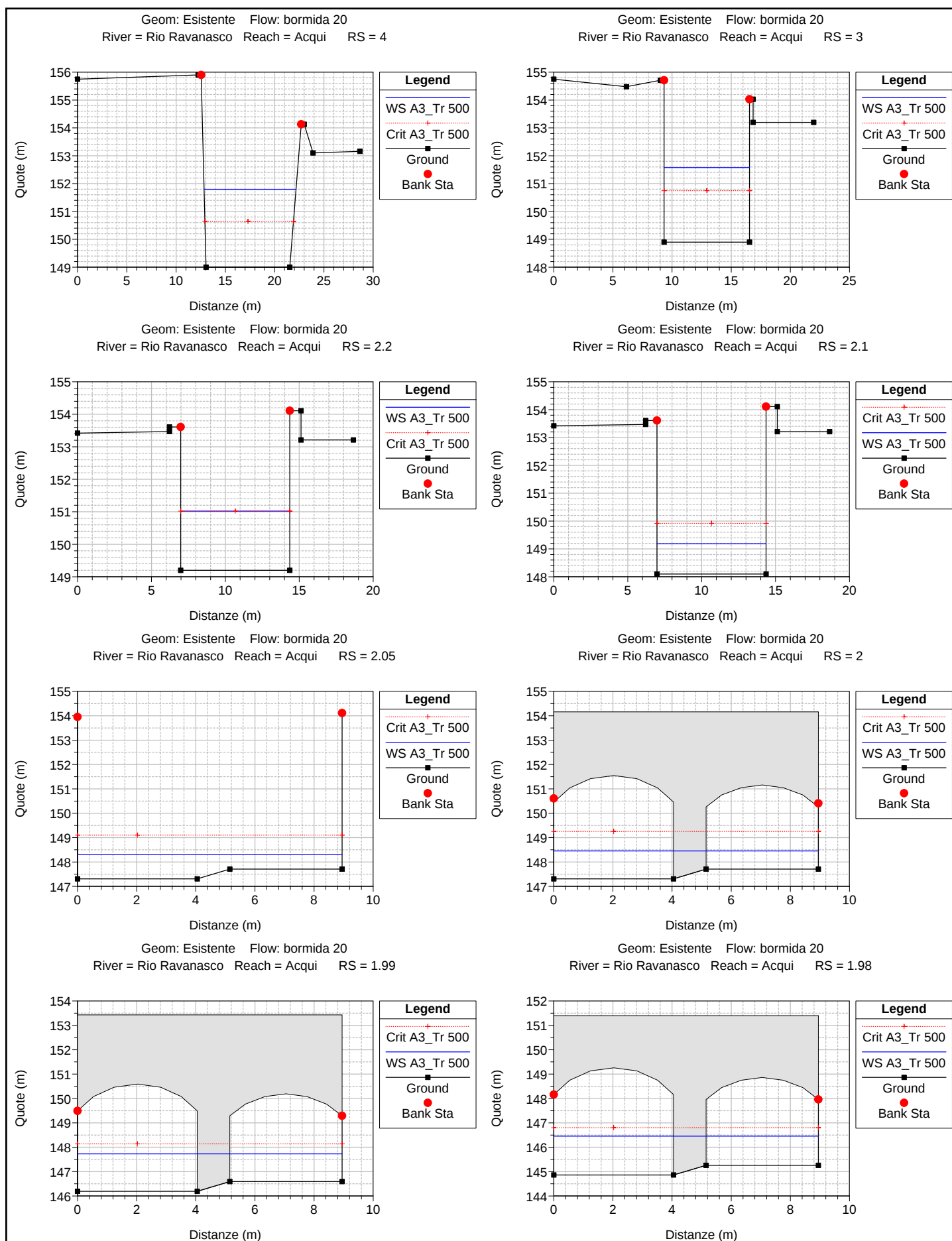
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: A3_Tr 500 (Continued)

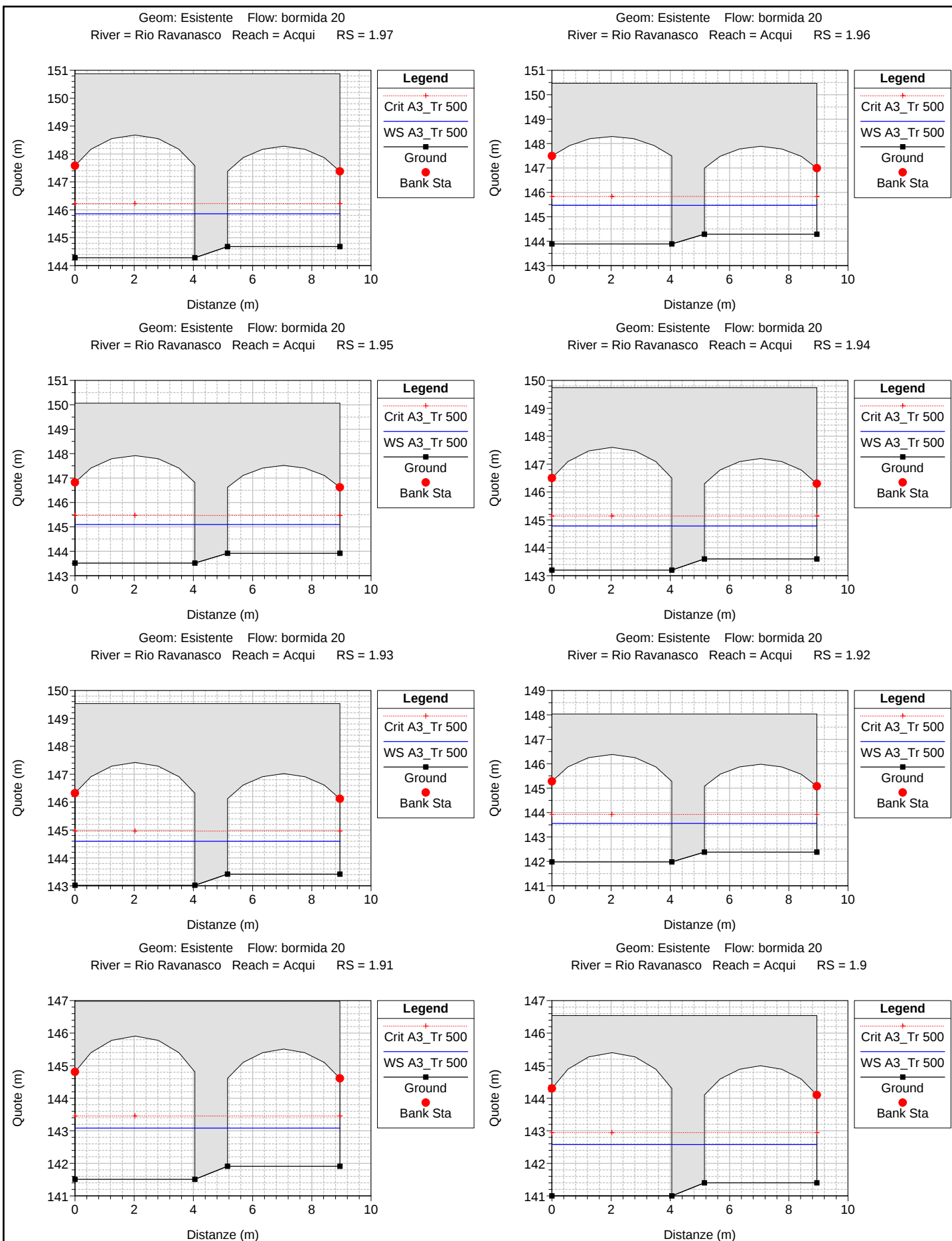
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	1.5	A3_Tr 500	142.92	142.78	0.14	0.01	0.02		57.00		5.84
Acqui	1.4	A3_Tr 500	142.90	142.81	0.09	0.00	0.00		57.00		8.47
Acqui	1.3	A3_Tr 500	142.90	142.81	0.09	0.00	0.00		57.00		8.47
Acqui	1.2	A3_Tr 500	142.90	142.81	0.08	0.00	0.00		57.00		8.41
Acqui	1.1	A3_Tr 500	142.89	142.76	0.13	0.02	0.01		57.00		9.00
Acqui	1.05	A3_Tr 500	142.86	142.77	0.09	0.01	0.00		57.00		9.00
Acqui	1	A3_Tr 500	142.85	142.76	0.09				57.00		9.00

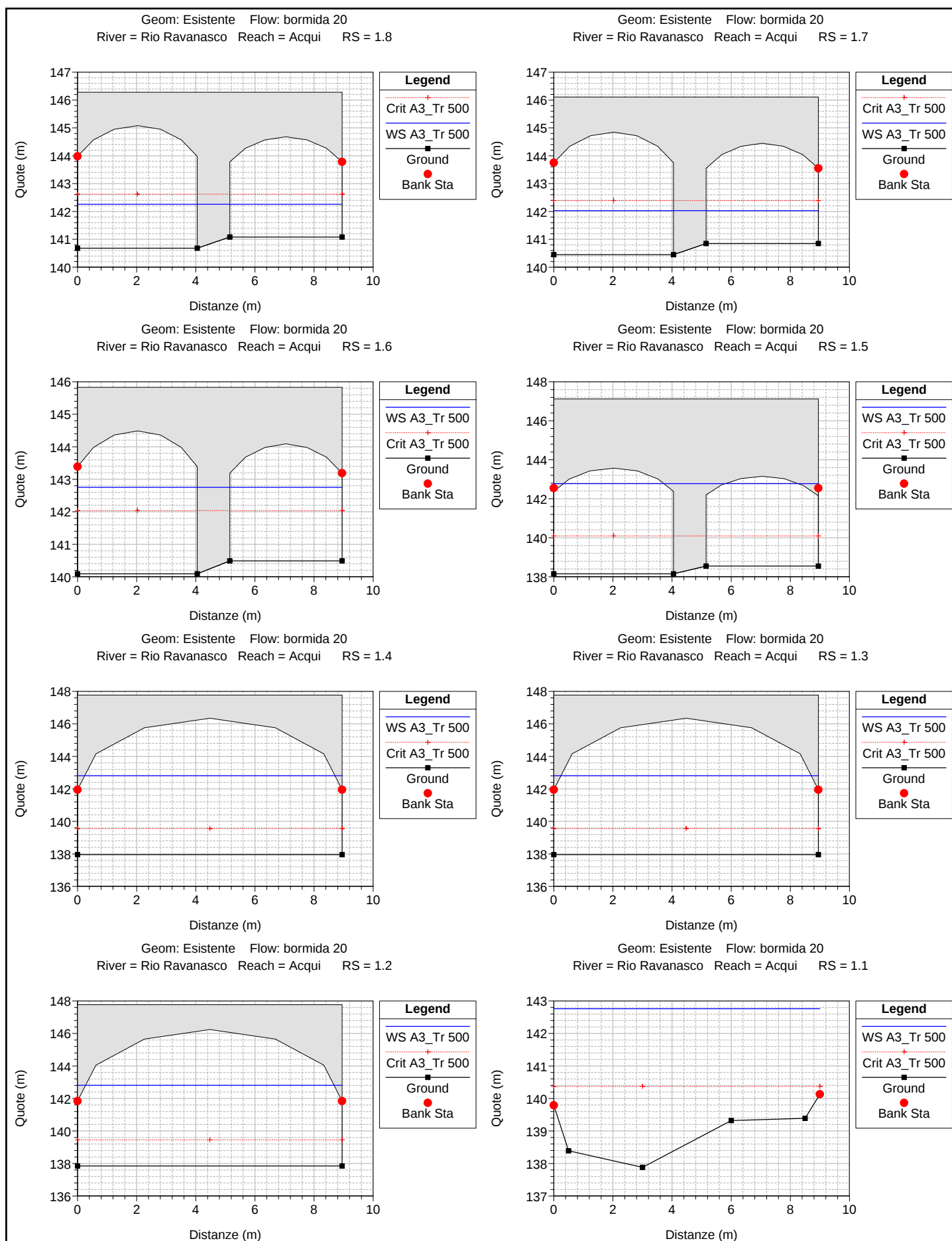




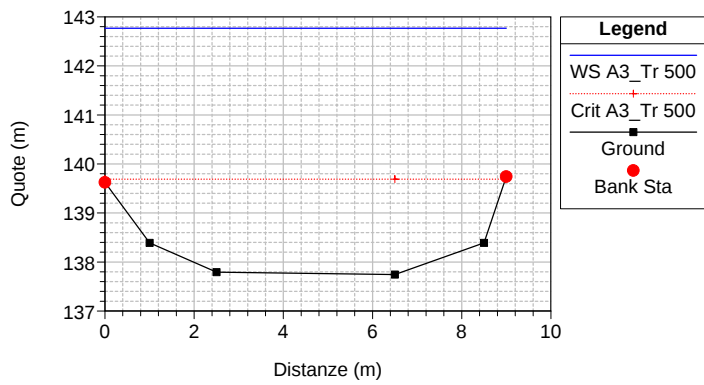




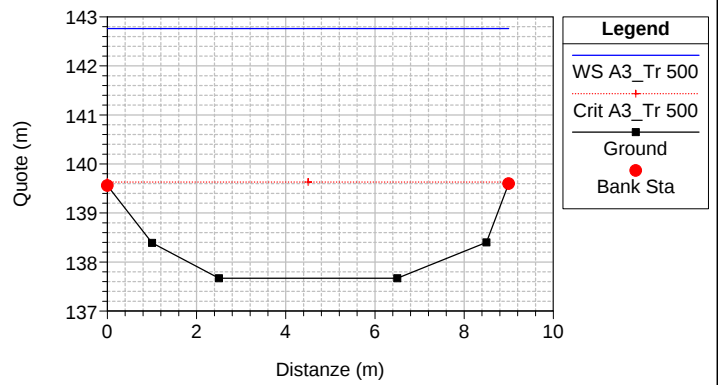




Geom: Esistente Flow: bormida 20
 River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: Esistente Flow: bormida 20
 River = Rio Ravanasco Reach = Acqui RS = 1



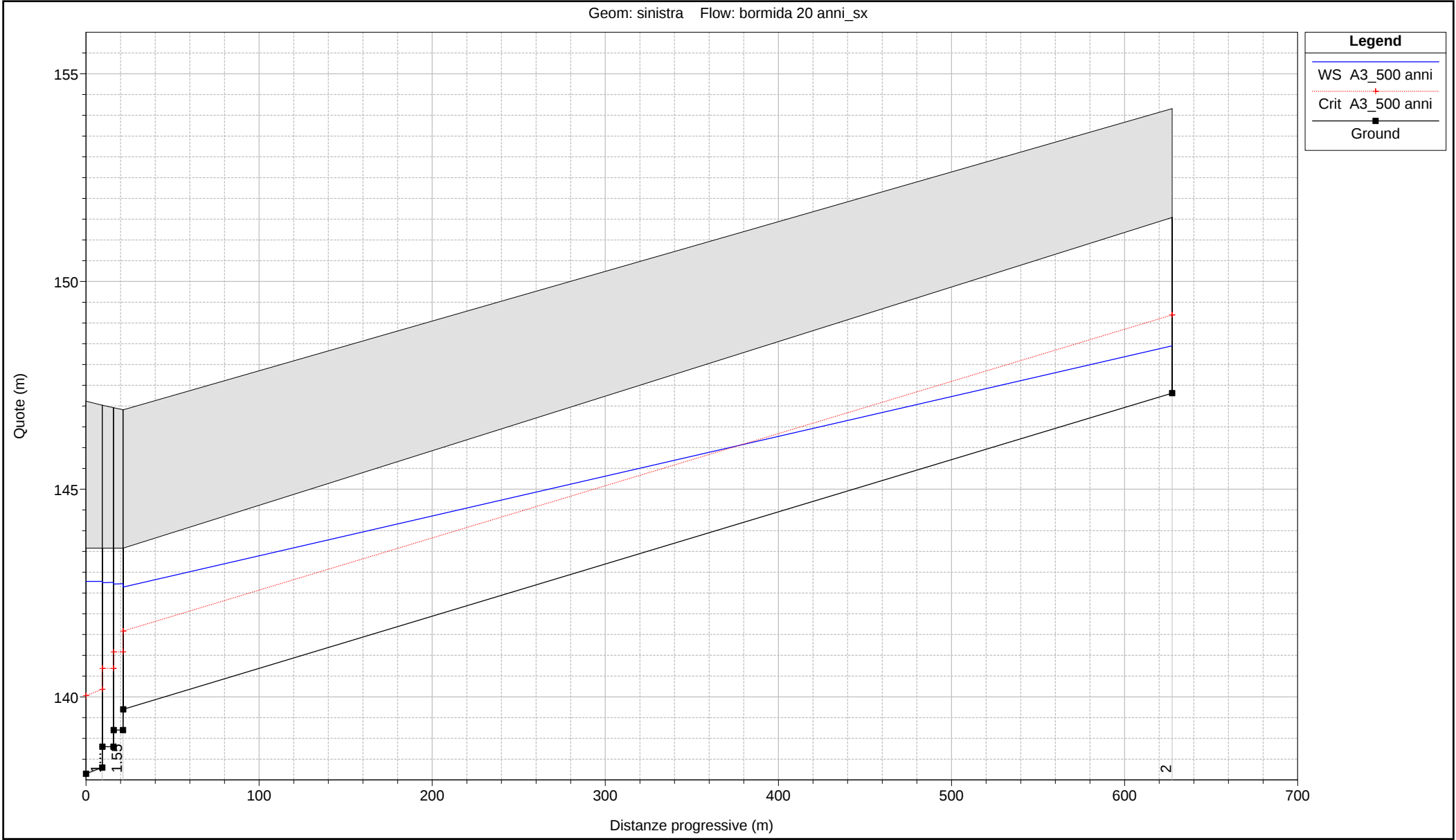
Dettaglio canalizzazione sinistra

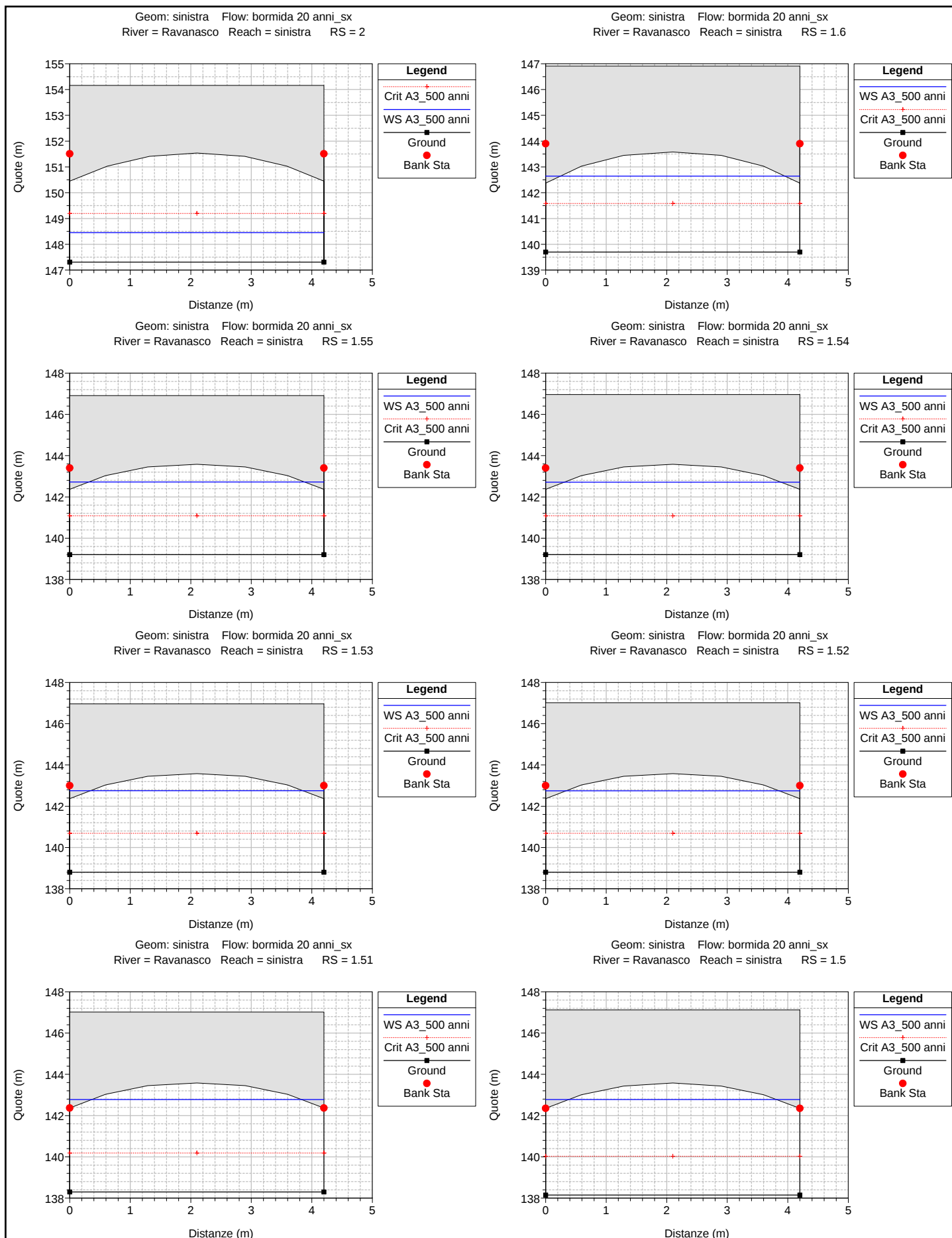
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: A3_500 anni

Reach	River Sta	Profile	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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
sinistra	2	A3_500 anni	34.00	147.31	148.45	149.20	151.02	0.030196	7.10	4.79	4.20	2.12
sinistra	1.6	A3_500 anni	34.00	139.70	142.64	141.58	143.03	0.002409	2.77	12.29	3.71	0.51
sinistra	1.55	A3_500 anni	34.00	139.20	142.72	141.08	143.00	0.001545	2.31	14.69	3.56	0.39
sinistra	1.54	A3_500 anni	34.00	139.20	142.71	141.08	142.99	0.001553	2.32	14.65	3.58	0.40
sinistra	1.53	A3_500 anni	34.00	138.80	142.75	140.69	142.97	0.001163	2.06	16.48	3.51	0.33
sinistra	1.52	A3_500 anni	34.00	138.80	142.75	140.69	142.96	0.001167	2.07	16.45	3.52	0.33
sinistra	1.51	A3_500 anni	34.00	138.30	142.78	140.18	142.95	0.000857	1.82	18.67	3.46	0.27
sinistra	1.5	A3_500 anni	34.00	138.15	142.78	140.03	142.94	0.000793	1.76	19.28	3.42	0.26

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: A3_500 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	A3_500 anni	151.02	148.45	2.57				34.00		4.20
sinistra	1.6	A3_500 anni	143.03	142.64	0.39	0.00	0.04		34.00		3.71
sinistra	1.55	A3_500 anni	143.00	142.72	0.27	0.01	0.00		34.00		3.56
sinistra	1.54	A3_500 anni	142.99	142.71	0.27	0.00	0.02		34.00		3.58
sinistra	1.53	A3_500 anni	142.97	142.75	0.22	0.01	0.00		34.00		3.51
sinistra	1.52	A3_500 anni	142.96	142.75	0.22	0.00	0.01		34.00		3.52
sinistra	1.51	A3_500 anni	142.95	142.78	0.17	0.01	0.00		34.00		3.46
sinistra	1.5	A3_500 anni	142.94	142.78	0.16				34.00		3.42





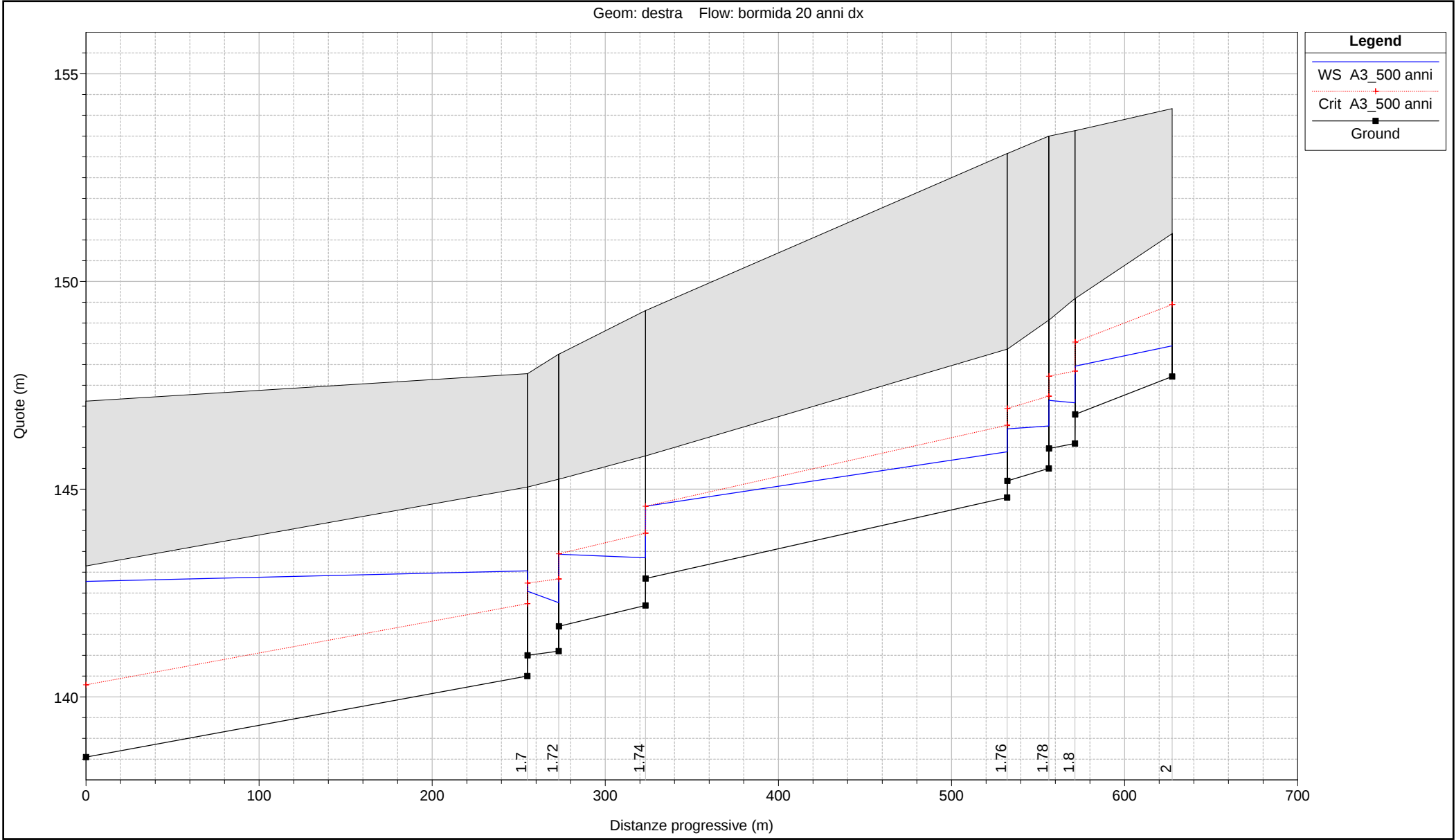
Dettaglio canalizzazione destra

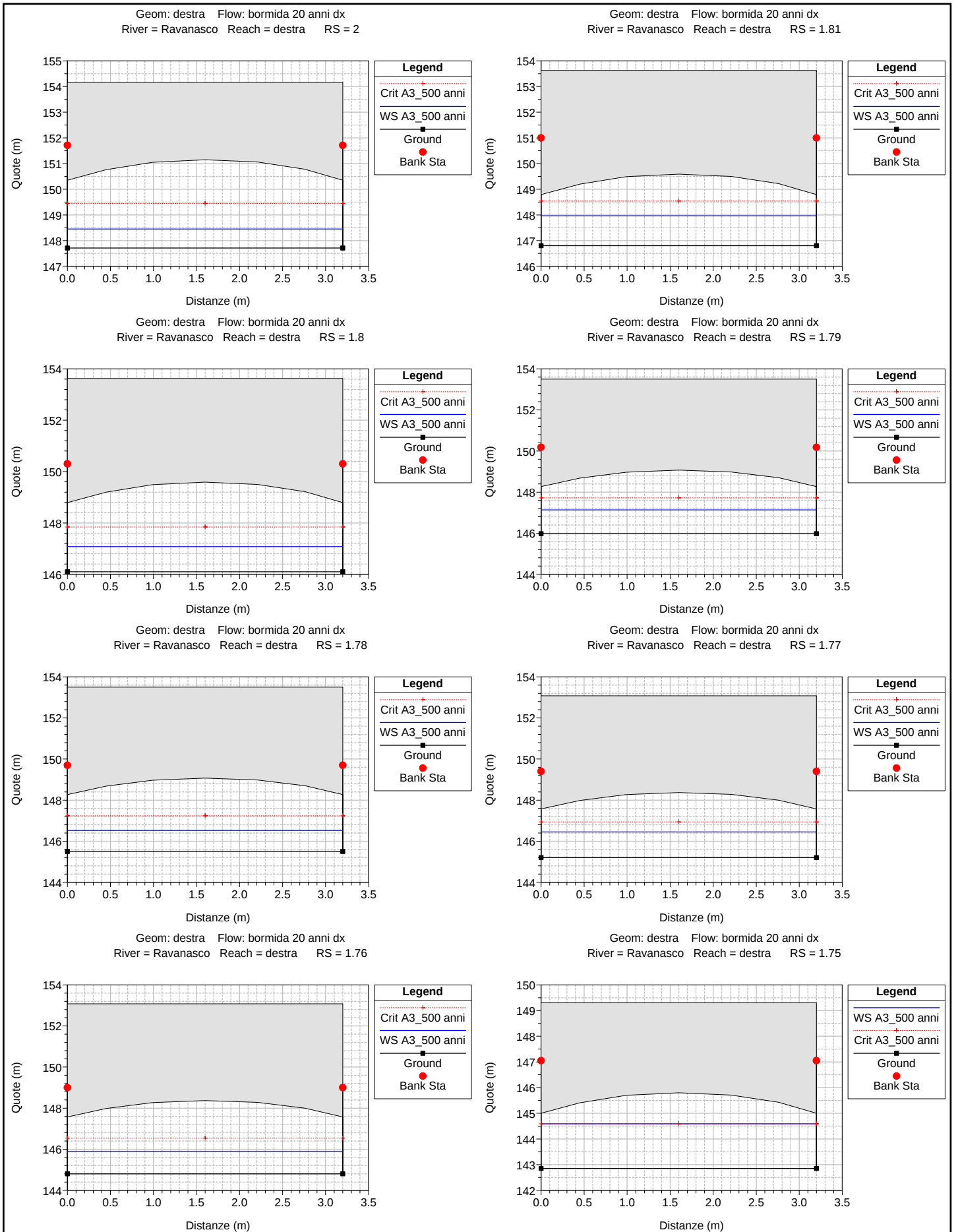
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: A3_500 anni

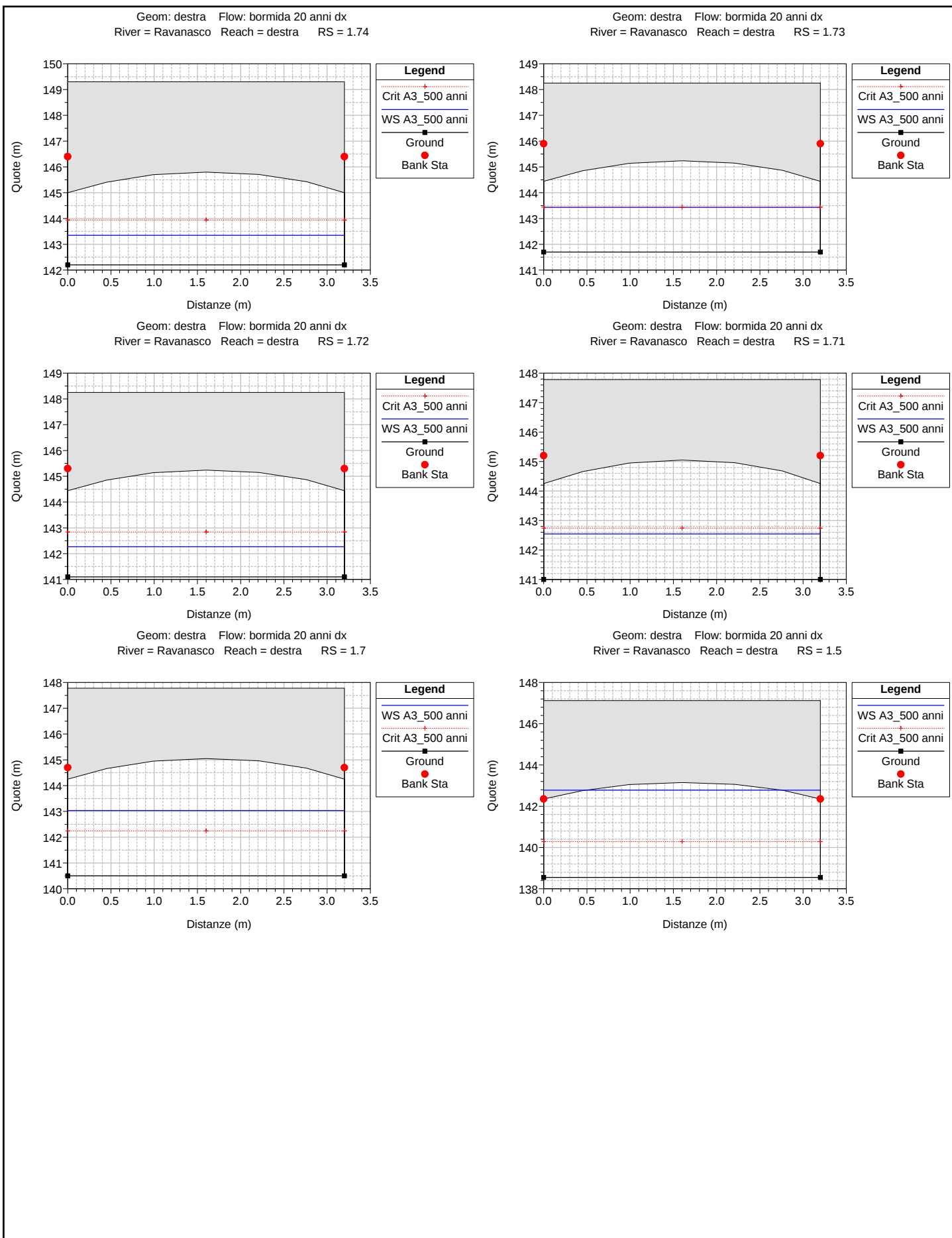
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
destra	2	A3_500 anni	23.00	147.71	148.45	149.45	153.26	0.093567	9.71	2.37	3.20	3.60
destra	1.81	A3_500 anni	23.00	146.80	147.96	148.54	149.91	0.025869	6.18	3.72	3.20	1.83
destra	1.8	A3_500 anni	23.00	146.10	147.08	147.84	149.82	0.041913	7.34	3.13	3.20	2.37
destra	1.79	A3_500 anni	23.00	145.98	147.14	147.72	149.10	0.026242	6.21	3.70	3.20	1.84
destra	1.78	A3_500 anni	23.00	145.50	146.52	147.24	149.04	0.037127	7.03	3.27	3.20	2.22
destra	1.77	A3_500 anni	23.00	145.20	146.45	146.94	148.13	0.021107	5.74	4.01	3.20	1.64
destra	1.76	A3_500 anni	23.00	144.80	145.90	146.54	148.08	0.030290	6.54	3.52	3.20	1.99
destra	1.75	A3_500 anni	23.00	142.85	144.59	144.59	145.46	0.008704	4.13	5.57	3.20	1.00
destra	1.74	A3_500 anni	23.00	142.20	143.35	143.94	145.34	0.026779	6.26	3.68	3.20	1.86
destra	1.73	A3_500 anni	23.00	141.70	143.43	143.44	144.31	0.008780	4.14	5.55	3.20	1.00
destra	1.72	A3_500 anni	23.00	141.10	142.27	142.84	144.20	0.025689	6.16	3.73	3.20	1.82
destra	1.71	A3_500 anni	23.00	141.00	142.54	142.74	143.65	0.012002	4.66	4.93	3.20	1.20
destra	1.7	A3_500 anni	23.00	140.50	143.03	142.24	143.44	0.003301	2.84	8.11	3.20	0.57
destra	1.5	A3_500 anni	23.00	138.55	142.78	140.29	142.93	0.001040	1.72	13.34	2.27	0.27

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: A3_500 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	A3_500 anni	153.26	148.45	4.81				23.00		3.20
destra	1.81	A3_500 anni	149.91	147.96	1.95	2.49	0.86		23.00		3.20
destra	1.8	A3_500 anni	149.82	147.08	2.75	0.00	0.08		23.00		3.20
destra	1.79	A3_500 anni	149.10	147.14	1.97	0.49	0.23		23.00		3.20
destra	1.78	A3_500 anni	149.04	146.52	2.52	0.00	0.06		23.00		3.20
destra	1.77	A3_500 anni	148.13	146.45	1.68	0.66	0.25		23.00		3.20
destra	1.76	A3_500 anni	148.08	145.90	2.18	0.00	0.05		23.00		3.20
destra	1.75	A3_500 anni	145.46	144.59	0.87	0.00	0.00		23.00		3.20
destra	1.74	A3_500 anni	145.34	143.35	1.99	0.00	0.11		23.00		3.20
destra	1.73	A3_500 anni	144.31	143.43	0.88	0.70	0.34		23.00		3.20
destra	1.72	A3_500 anni	144.20	142.27	1.94	0.00	0.11		23.00		3.20
destra	1.71	A3_500 anni	143.65	142.54	1.11	0.30	0.25		23.00		3.20
destra	1.7	A3_500 anni	143.44	143.03	0.41	0.44	0.08		23.00		3.20
destra	1.5	A3_500 anni	142.93	142.78	0.15				23.00		2.27







Scenario B1)

Rio Ravanasco Tempo di ritorno $T_r = 20$ anni

Portata totale $Q = 35 \text{ mc/s}$

Portata canalizzazione sinistra $Q = 21 \text{ mc/s}$

Portata canalizzazione destra $Q = 14 \text{ mc/s}$

Fiume Bormida Tempo di ritorno $T_r = 200$ anni

$Q = 2980 \text{ mc/s}$ livello idrico 144.40 m

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B1_Tr 20

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
Acqui	20	B1_Tr 20	35.00	160.59	162.53	162.53	162.98	0.004550	2.98	11.74	13.37	1.02
Acqui	19	B1_Tr 20	35.00	159.95	162.59	161.70	162.68	0.000440	1.33	26.24	16.79	0.34
Acqui	18	B1_Tr 20	35.00	160.63	162.14	162.14	162.61	0.004328	3.05	11.48	12.34	1.01
Acqui	17	B1_Tr 20	35.00	158.37	159.28	159.86	162.25	0.075152	7.64	4.58	10.68	3.72
Acqui	16	B1_Tr 20	35.00	158.11	159.59	160.02	161.19	0.033341	5.60	6.25	11.62	2.44
Acqui	15	B1_Tr 20	35.00	158.04	159.66	159.98	160.71	0.017089	4.56	7.68	12.15	1.83
Acqui	14	B1_Tr 20	35.00	156.98	158.07	158.60	160.14	0.037734	6.37	5.50	10.07	2.75
Acqui	13	B1_Tr 20	35.00	156.45	158.07	158.38	159.04	0.015568	4.35	8.05	12.86	1.75
Acqui	12	B1_Tr 20	35.00	156.28	157.41	157.82	158.67	0.017235	4.97	7.04	10.23	1.91
Acqui	11	B1_Tr 20	35.00	155.48	157.39	157.58	158.07	0.009016	3.66	9.56	13.25	1.38
Acqui	10	B1_Tr 20	35.00	153.61	154.30	154.72	156.50	0.099136	6.56	5.33	19.44	4.00
Acqui	9	B1_Tr 20	35.00	152.84	154.01	154.41	155.28	0.014253	5.00	7.00	8.59	1.77
Acqui	8	B1_Tr 20	35.00	151.97	152.87	153.48	154.43	0.021574	5.54	6.32	9.14	2.13
Acqui	7	B1_Tr 20	35.00	151.72	152.88	153.27	153.93	0.015906	4.53	7.72	11.50	1.77
Acqui	6	B1_Tr 20	35.00	150.54	151.05	151.66	153.72	0.057634	7.23	4.84	9.77	3.28
Acqui	5	B1_Tr 20	35.00	149.33	150.10	150.56	151.71	0.023676	5.62	6.23	8.74	2.13
Acqui	4	B1_Tr 20	35.00	149.00	151.09	150.19	151.28	0.000880	1.90	18.44	9.12	0.43
Acqui	3	B1_Tr 20	35.00	148.90	150.96	150.23	151.24	0.001533	2.35	14.91	7.23	0.52
Acqui	2.2	B1_Tr 20	35.00	149.20	150.51	150.51	151.18	0.005433	3.61	9.70	7.38	1.00
Acqui	2.1	B1_Tr 20	35.00	148.10	148.82	149.41	151.02	0.033757	6.57	5.33	7.38	2.47
Acqui	2.05	B1_Tr 20	35.00	147.31	148.04	148.66	150.73	0.056488	7.26	4.82	8.95	3.16
Acqui	2	B1_Tr 20	35.00	147.31	148.14	148.77	150.65	0.052356	7.02	4.98	7.85	2.46
Acqui	1.99	B1_Tr 20	35.00	146.19	147.37	147.65	148.41	0.014339	4.53	7.73	7.85	1.33
Acqui	1.98	B1_Tr 20	35.00	144.86	146.03	146.32	147.09	0.014602	4.55	7.68	7.85	1.34
Acqui	1.97	B1_Tr 20	35.00	144.28	145.45	145.74	146.51	0.014667	4.56	7.67	7.85	1.35
Acqui	1.96	B1_Tr 20	35.00	143.89	145.06	145.35	146.12	0.014540	4.55	7.70	7.85	1.34
Acqui	1.95	B1_Tr 20	35.00	143.52	144.69	144.98	145.75	0.014540	4.55	7.70	7.85	1.34
Acqui	1.94	B1_Tr 20	35.00	143.20	144.37	144.66	145.43	0.014540	4.55	7.70	7.85	1.34
Acqui	1.93	B1_Tr 20	35.00	143.02	144.19	144.48	145.25	0.014684	4.56	7.67	7.85	1.35
Acqui	1.92	B1_Tr 20	35.00	141.98	144.43	143.44	144.63	0.001455	1.97	17.74	7.85	0.40
Acqui	1.91	B1_Tr 20	35.00	141.51	144.44	142.97	144.58	0.000885	1.63	21.50	7.85	0.30
Acqui	1.9	B1_Tr 20	35.00	141.00	144.44	142.46	144.54	0.000602	1.38	25.36	6.85	0.24
Acqui	1.8	B1_Tr 20	35.00	140.68	144.44	142.14	144.52	0.000534	1.28	27.30	5.20	0.21
Acqui	1.7	B1_Tr 20	35.00	140.45	144.44	141.91	144.51	0.000548	1.24	28.27	2.80	0.20
Acqui	1.6	B1_Tr 20	35.00	140.09	144.42	141.55	144.50	0.000564	1.21	28.94	0.79	0.19

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B1_Tr 20 (Continued)

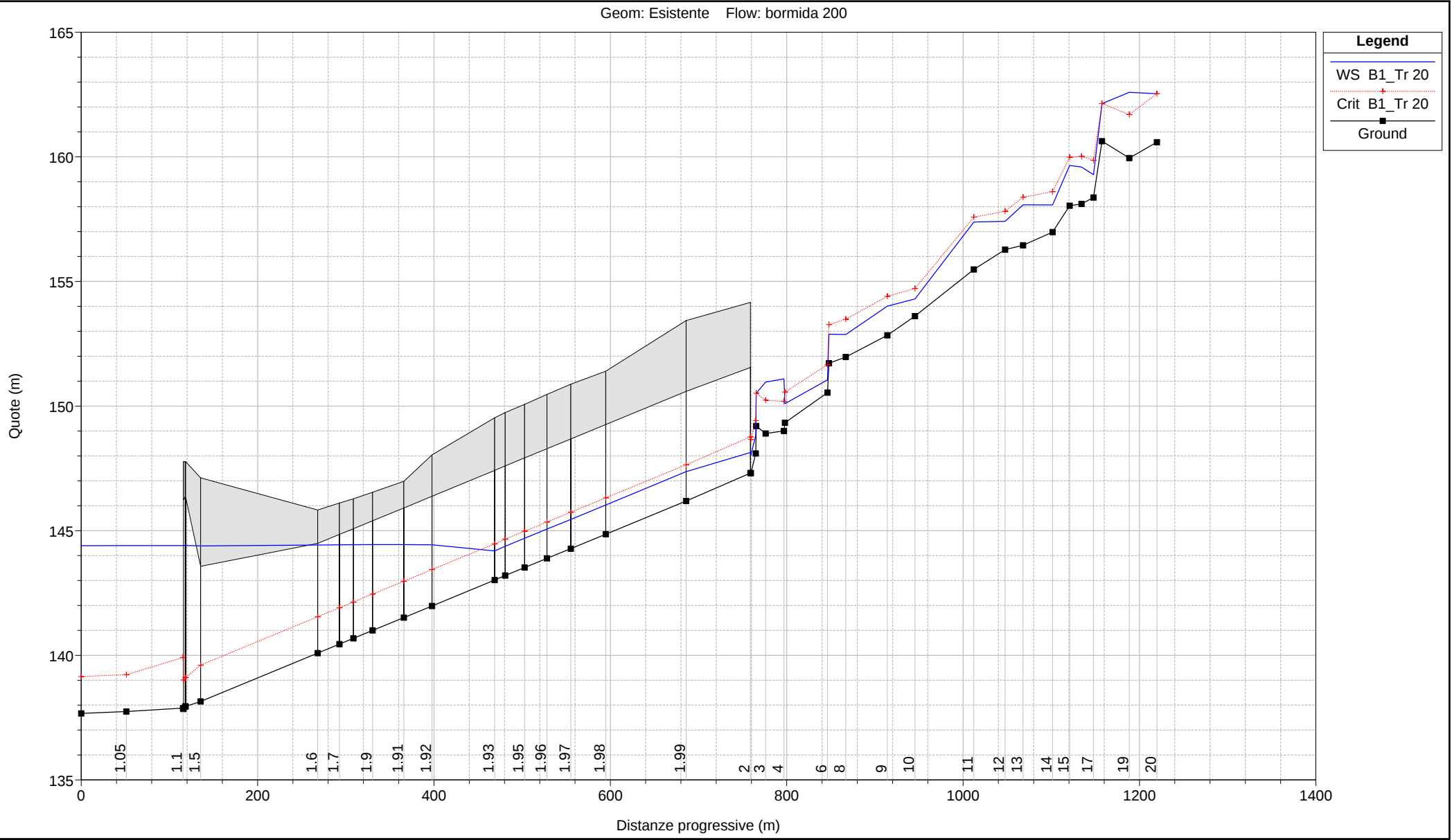
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Acqui	1.5	B1_Tr 20	35.00	138.15	144.39	139.61	144.44	0.000313	0.95	36.73		0.12
Acqui	1.4	B1_Tr 20	35.00	137.95	144.41	139.11	144.43	0.000046	0.62	56.04	7.20	0.08
Acqui	1.3	B1_Tr 20	35.00	137.95	144.41	139.11	144.43	0.000046	0.62	56.05	7.21	0.08
Acqui	1.2	B1_Tr 20	35.00	137.85	144.41	139.01	144.43	0.000044	0.62	56.78	6.99	0.08
Acqui	1.1	B1_Tr 20	35.00	137.88	144.40	139.92	144.43	0.000054	0.69	50.66	9.00	0.09
Acqui	1.05	B1_Tr 20	35.00	137.74	144.40	139.22	144.42	0.000038	0.62	56.73	9.00	0.08
Acqui	1	B1_Tr 20	35.00	137.67	144.40	139.15	144.42	0.000037	0.61	57.33	9.00	0.08

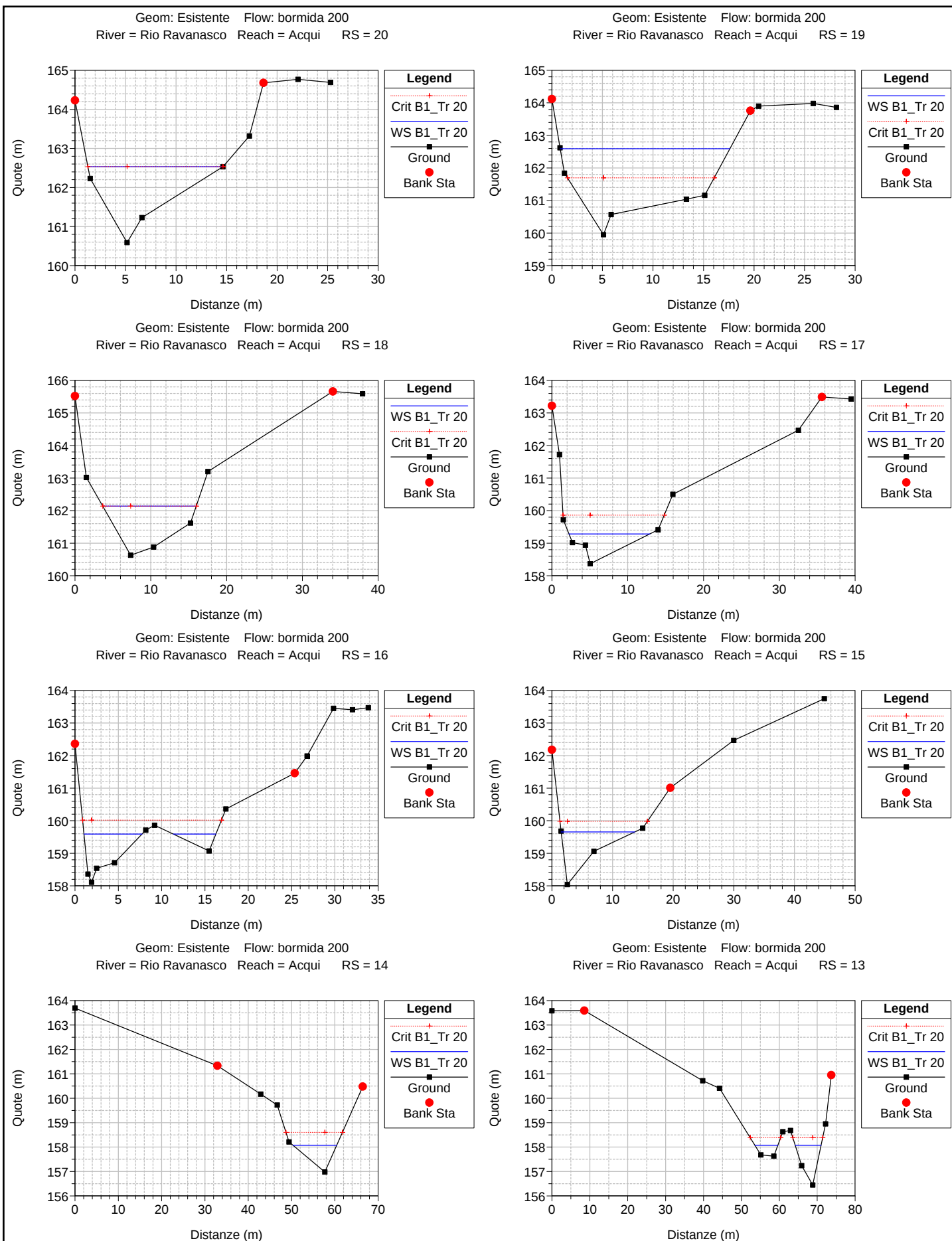
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B1_Tr 20

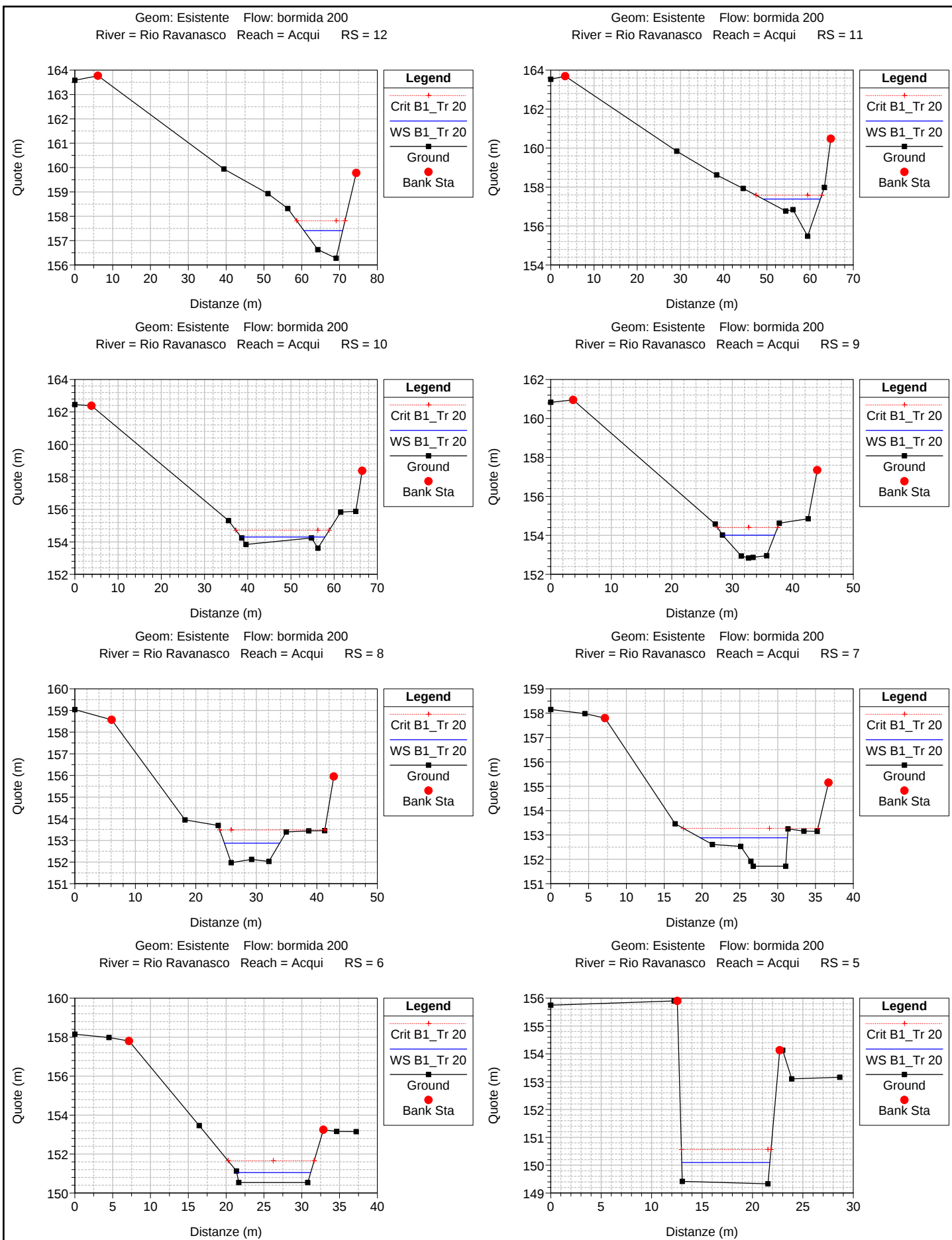
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	B1_Tr 20	162.98	162.53	0.45	0.03	0.11		35.00		13.37
Acqui	19	B1_Tr 20	162.68	162.59	0.09	0.03	0.04		35.00		16.79
Acqui	18	B1_Tr 20	162.61	162.14	0.47	0.02	0.08		35.00		12.34
Acqui	17	B1_Tr 20	162.25	159.28	2.97	0.11	0.25		35.00		10.68
Acqui	16	B1_Tr 20	161.19	159.59	1.60	0.65	0.41		35.00		11.62
Acqui	15	B1_Tr 20	160.71	159.66	1.06	0.31	0.16		35.00		12.15
Acqui	14	B1_Tr 20	160.14	158.07	2.07	0.47	0.10		35.00		10.07
Acqui	13	B1_Tr 20	159.04	158.07	0.96	0.77	0.33		35.00		12.86
Acqui	12	B1_Tr 20	158.67	157.41	1.26	0.33	0.03		35.00		10.23
Acqui	11	B1_Tr 20	158.07	157.39	0.68	0.43	0.17		35.00		13.25
Acqui	10	B1_Tr 20	156.50	154.30	2.20	1.42	0.15		35.00		19.44
Acqui	9	B1_Tr 20	155.28	154.01	1.27	0.94	0.28		35.00		8.59
Acqui	8	B1_Tr 20	154.43	152.87	1.56	0.82	0.03		35.00		9.14
Acqui	7	B1_Tr 20	153.93	152.88	1.05	0.35	0.15		35.00		11.50
Acqui	6	B1_Tr 20	153.72	151.05	2.67	0.05	0.16		35.00		9.77
Acqui	5	B1_Tr 20	151.71	150.10	1.61	1.70	0.32		35.00		8.74
Acqui	4	B1_Tr 20	151.28	151.09	0.18	0.02	0.01		35.00		9.12
Acqui	3	B1_Tr 20	151.24	150.96	0.28	0.03	0.04		35.00		7.23
Acqui	2.2	B1_Tr 20	151.18	150.51	0.66	0.00	0.00		35.00		7.38
Acqui	2.1	B1_Tr 20	151.02	148.82	2.20	0.01	0.15		35.00		7.38
Acqui	2.05	B1_Tr 20	150.73	148.04	2.69	0.24	0.05		35.00		8.95
Acqui	2	B1_Tr 20	150.65	148.14	2.51	0.03	0.05		35.00		7.85
Acqui	1.99	B1_Tr 20	148.41	147.37	1.04	1.80	0.44		35.00		7.85
Acqui	1.98	B1_Tr 20	147.09	146.03	1.06	1.32	0.00		35.00		7.85
Acqui	1.97	B1_Tr 20	146.51	145.45	1.06	0.58	0.00		35.00		7.85
Acqui	1.96	B1_Tr 20	146.12	145.06	1.05	0.39	0.00		35.00		7.85
Acqui	1.95	B1_Tr 20	145.75	144.69	1.05	0.37	0.00		35.00		7.85
Acqui	1.94	B1_Tr 20	145.43	144.37	1.05	0.32	0.00		35.00		7.85
Acqui	1.93	B1_Tr 20	145.25	144.19	1.06	0.18	0.00		35.00		7.85
Acqui	1.92	B1_Tr 20	144.63	144.43	0.20	0.04	0.02		35.00		7.85
Acqui	1.91	B1_Tr 20	144.58	144.44	0.14	0.03	0.01		35.00		7.85
Acqui	1.9	B1_Tr 20	144.54	144.44	0.10	0.01	0.00		35.00		6.85
Acqui	1.8	B1_Tr 20	144.52	144.44	0.08	0.01	0.00		35.00		5.20
Acqui	1.7	B1_Tr 20	144.51	144.44	0.08	0.01	0.00		35.00		2.80
Acqui	1.6	B1_Tr 20	144.50	144.42	0.07	0.05	0.01		35.00		0.79

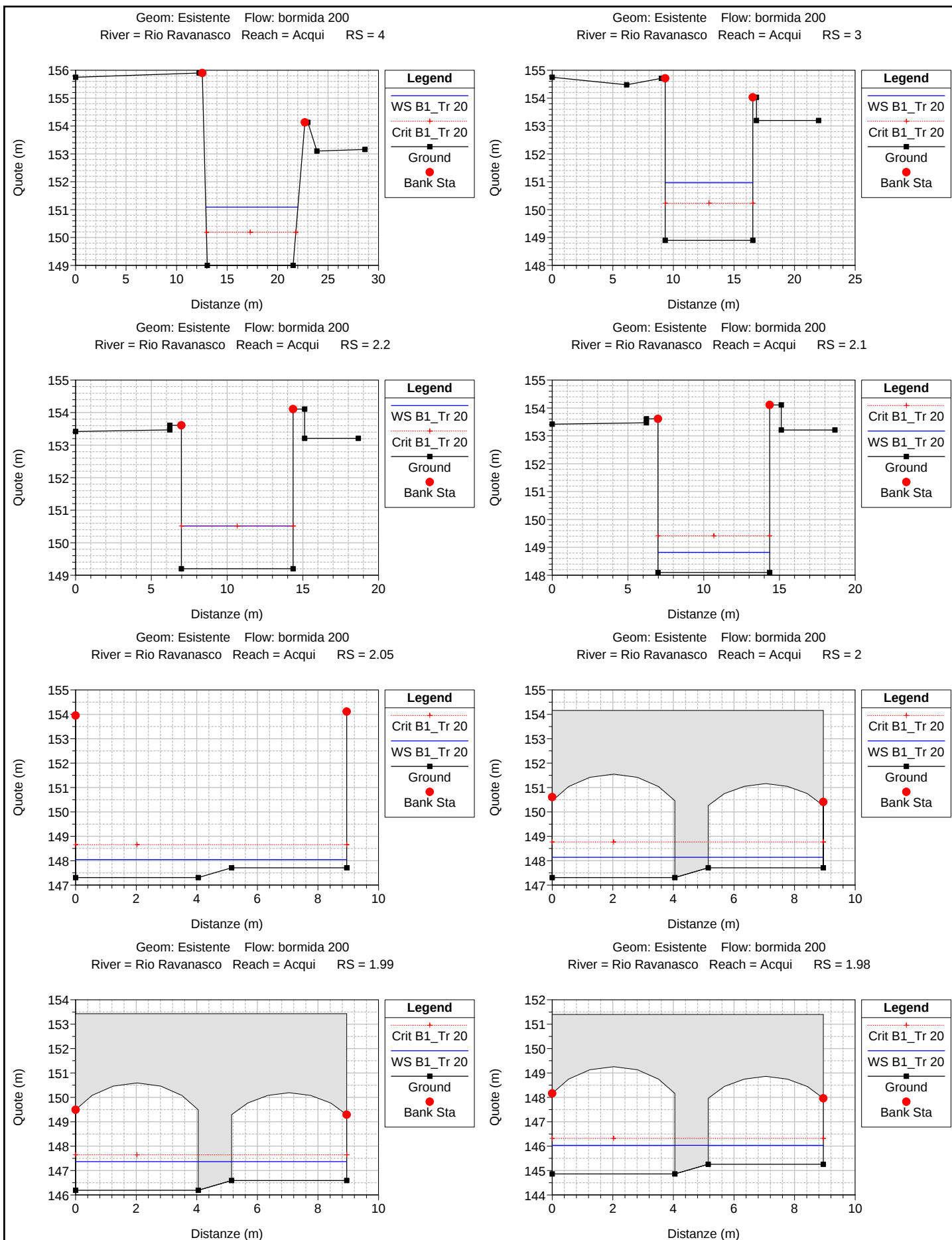
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B1_Tr 20 (Continued)

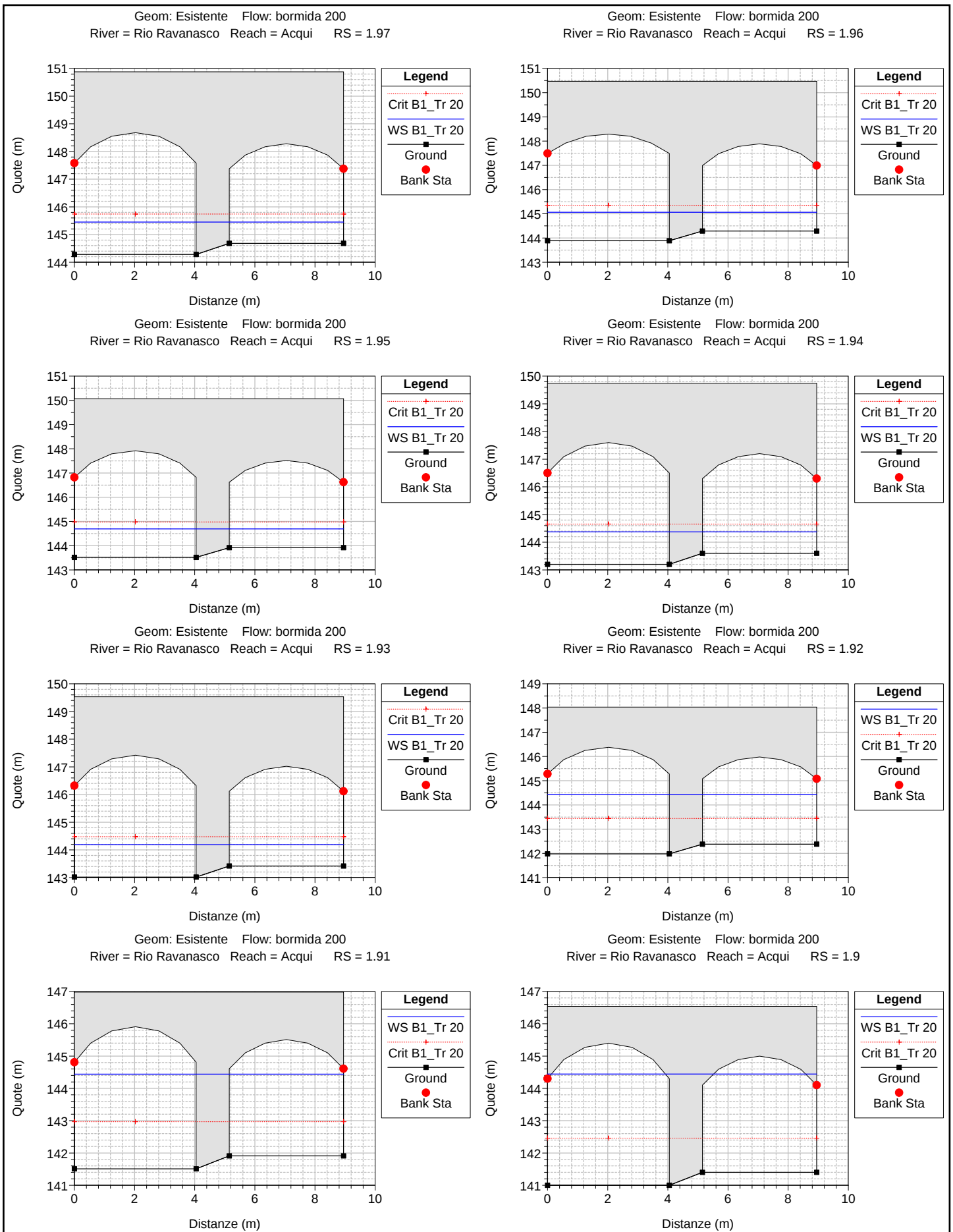
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
Acqui	1.5	B1_Tr 20	144.44	144.39	0.05	0.00	0.01		35.00		
Acqui	1.4	B1_Tr 20	144.43	144.41	0.02	0.00	0.00		35.00		7.20
Acqui	1.3	B1_Tr 20	144.43	144.41	0.02	0.00	0.00		35.00		7.21
Acqui	1.2	B1_Tr 20	144.43	144.41	0.02	0.00	0.00		35.00		6.99
Acqui	1.1	B1_Tr 20	144.43	144.40	0.02	0.00	0.00		35.00		9.00
Acqui	1.05	B1_Tr 20	144.42	144.40	0.02	0.00	0.00		35.00		9.00
Acqui	1	B1_Tr 20	144.42	144.40	0.02				35.00		9.00

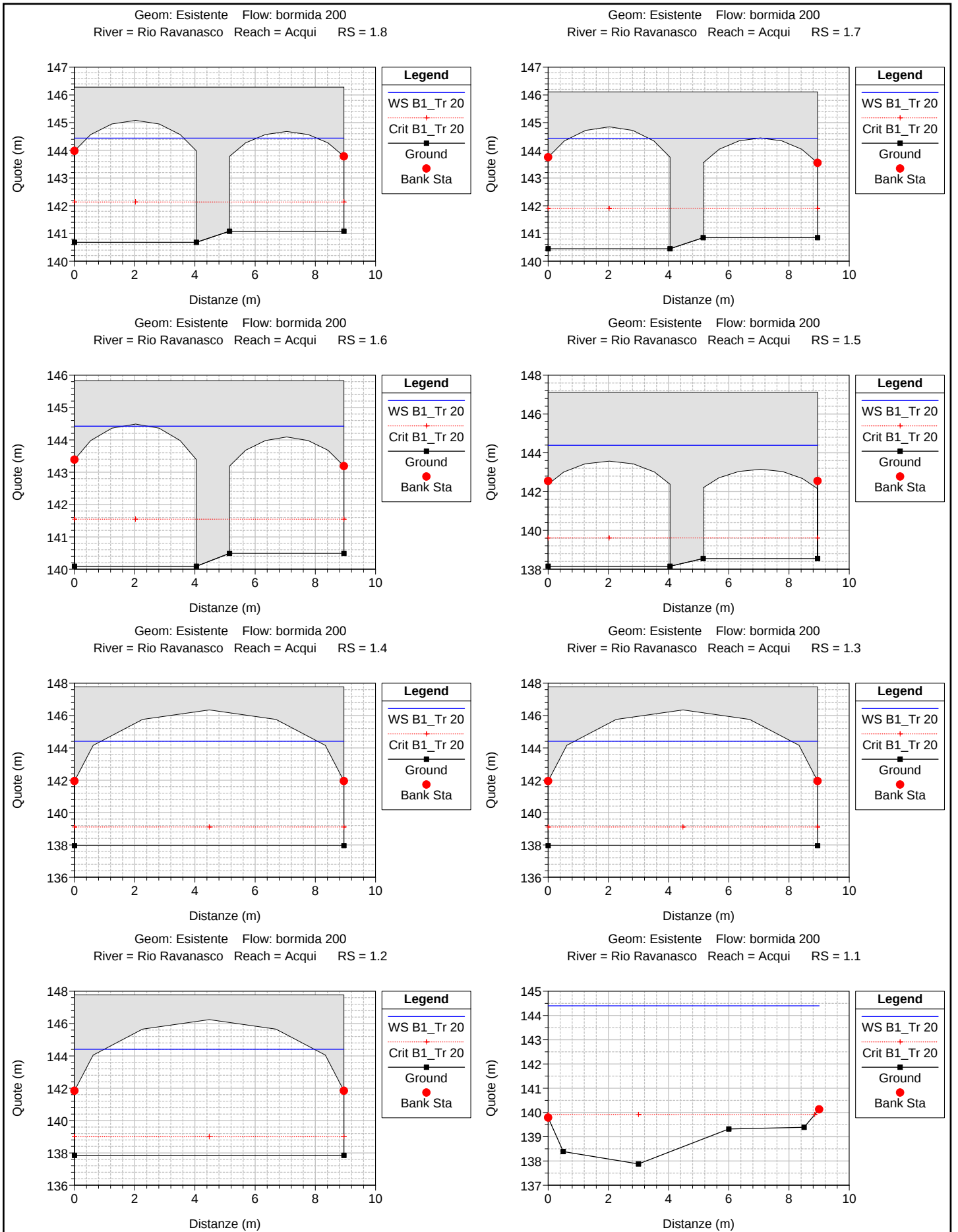




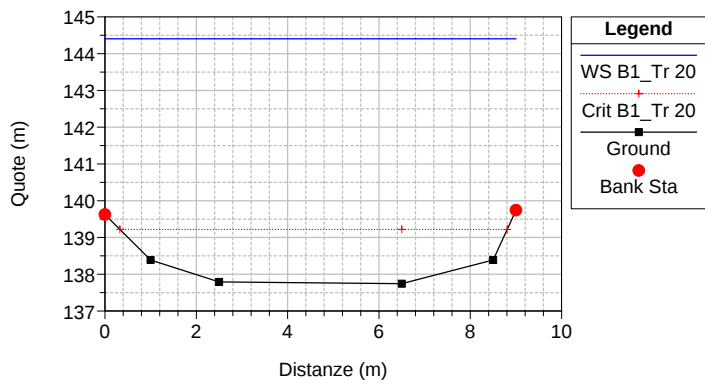




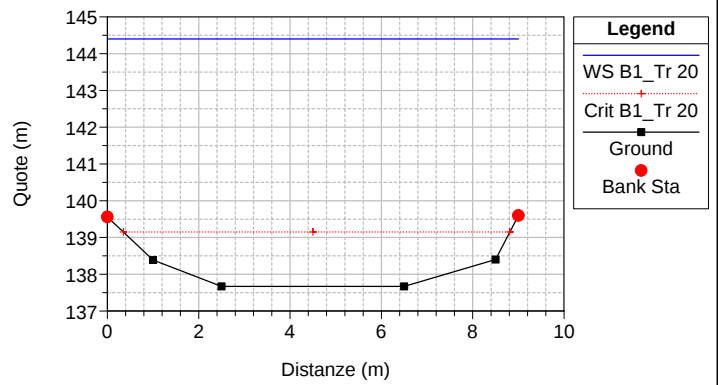




Geom: Esistente Flow: bormida 200
River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: Esistente Flow: bormida 200
River = Rio Ravanasco Reach = Acqui RS = 1



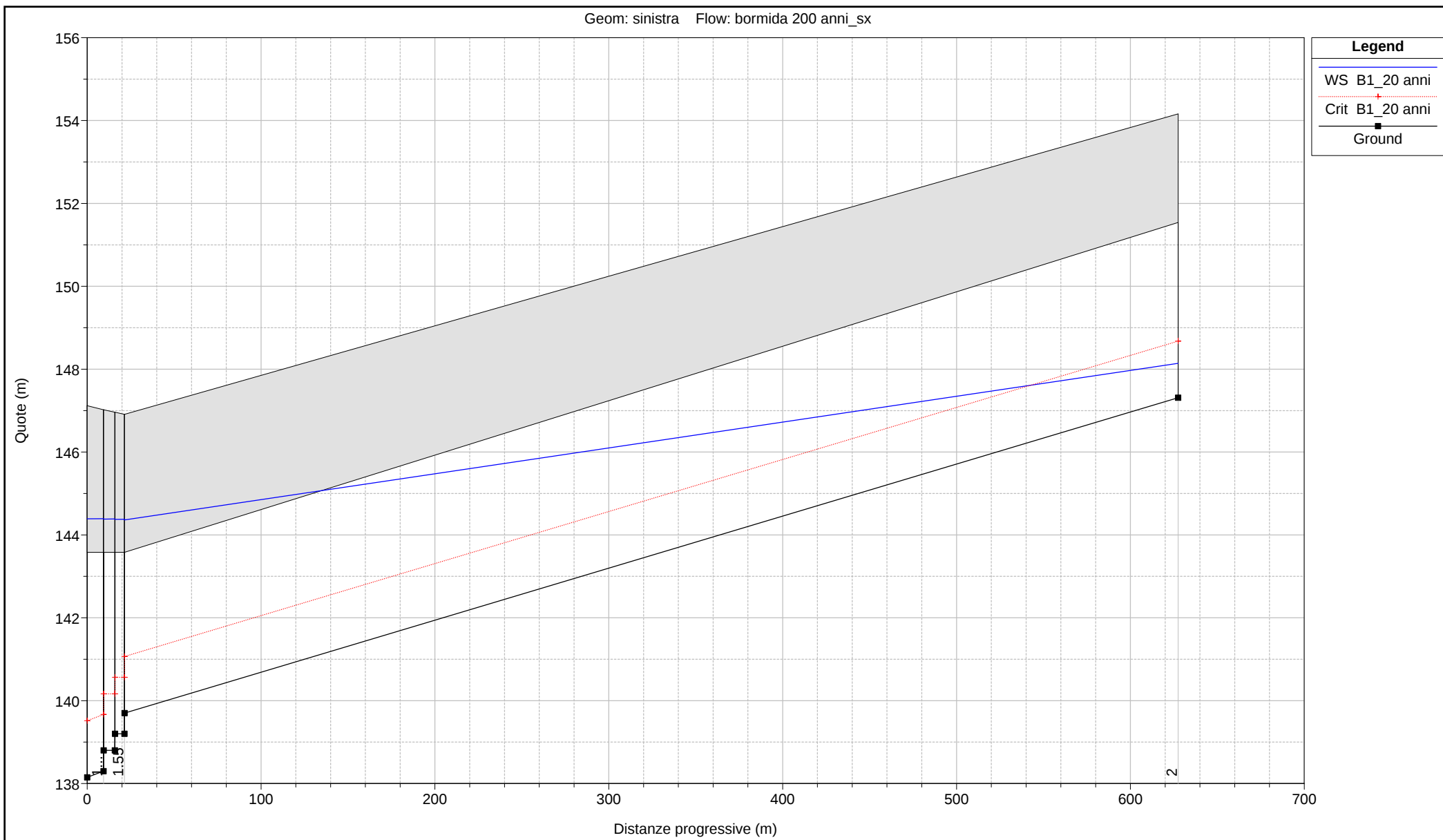
Dettaglio canalizzazione sinistra

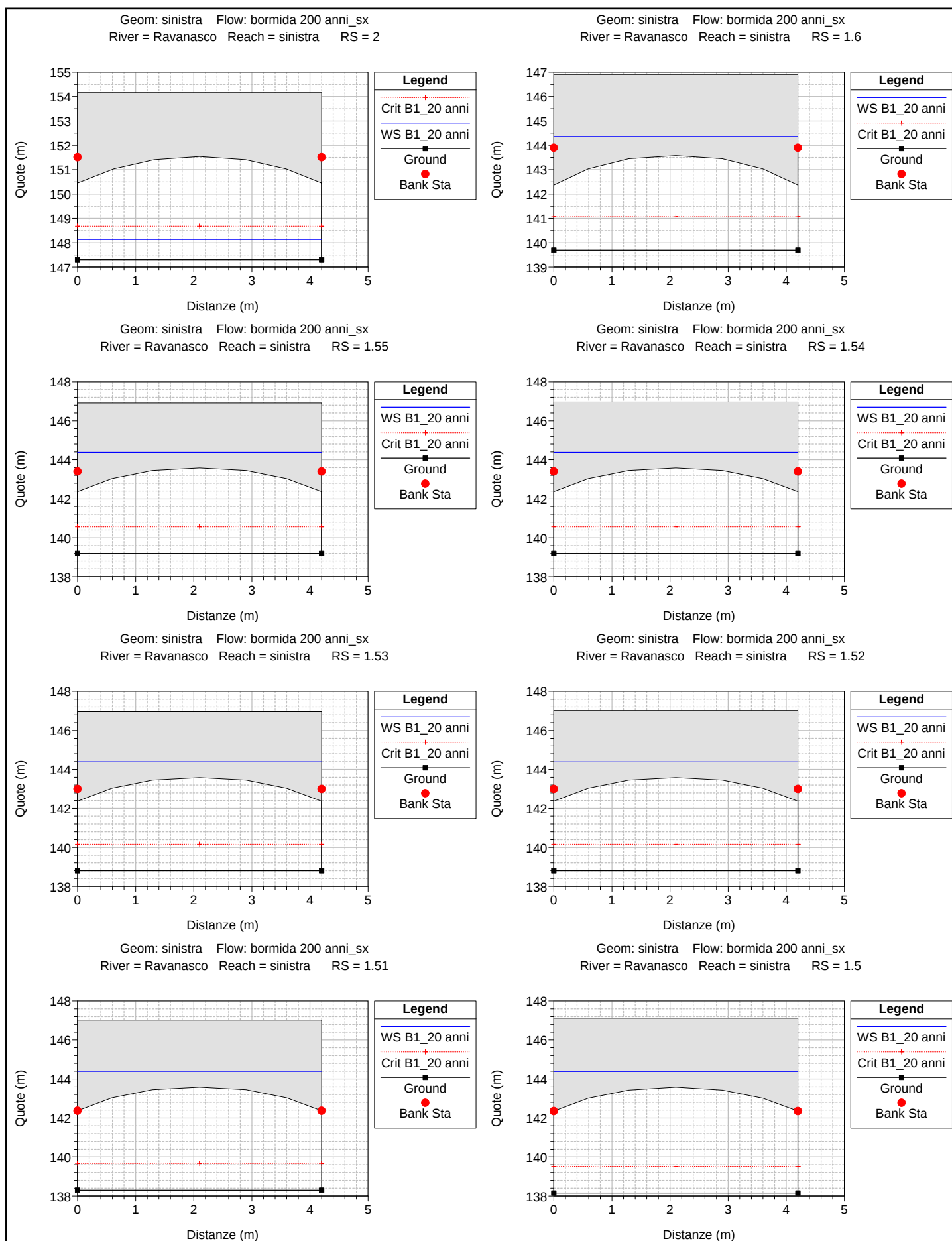
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: B1_20 anni

Reach	River Sta	Profile	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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
sinistra	2	B1_20 anni	21.00	147.31	148.14	148.68	149.99	0.029015	6.02	3.49	4.20	2.11
sinistra	1.6	B1_20 anni	21.00	139.70	144.36	141.07	144.47	0.000813	1.43	14.67		0.21
sinistra	1.55	B1_20 anni	21.00	139.20	144.38	140.56	144.46	0.000569	1.25	16.77		0.18
sinistra	1.54	B1_20 anni	21.00	139.20	144.38	140.56	144.46	0.000569	1.25	16.77		0.18
sinistra	1.53	B1_20 anni	21.00	138.80	144.38	140.16	144.45	0.000442	1.14	18.45		0.15
sinistra	1.52	B1_20 anni	21.00	138.80	144.38	140.16	144.45	0.000442	1.14	18.45		0.15
sinistra	1.51	B1_20 anni	21.00	138.30	144.39	139.67	144.44	0.000334	1.02	20.55		0.13
sinistra	1.5	B1_20 anni	21.00	138.15	144.39	139.51	144.44	0.000312	0.99	21.11		0.13

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: B1_20 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	B1_20 anni	149.99	148.14	1.85				21.00		4.20
sinistra	1.6	B1_20 anni	144.47	144.36	0.10	0.00	0.01		21.00		
sinistra	1.55	B1_20 anni	144.46	144.38	0.08	0.00	0.00		21.00		
sinistra	1.54	B1_20 anni	144.46	144.38	0.08	0.00	0.00		21.00		
sinistra	1.53	B1_20 anni	144.45	144.38	0.07	0.00	0.00		21.00		
sinistra	1.52	B1_20 anni	144.45	144.38	0.07	0.00	0.00		21.00		
sinistra	1.51	B1_20 anni	144.44	144.39	0.05	0.00	0.00		21.00		
sinistra	1.5	B1_20 anni	144.44	144.39	0.05				21.00		





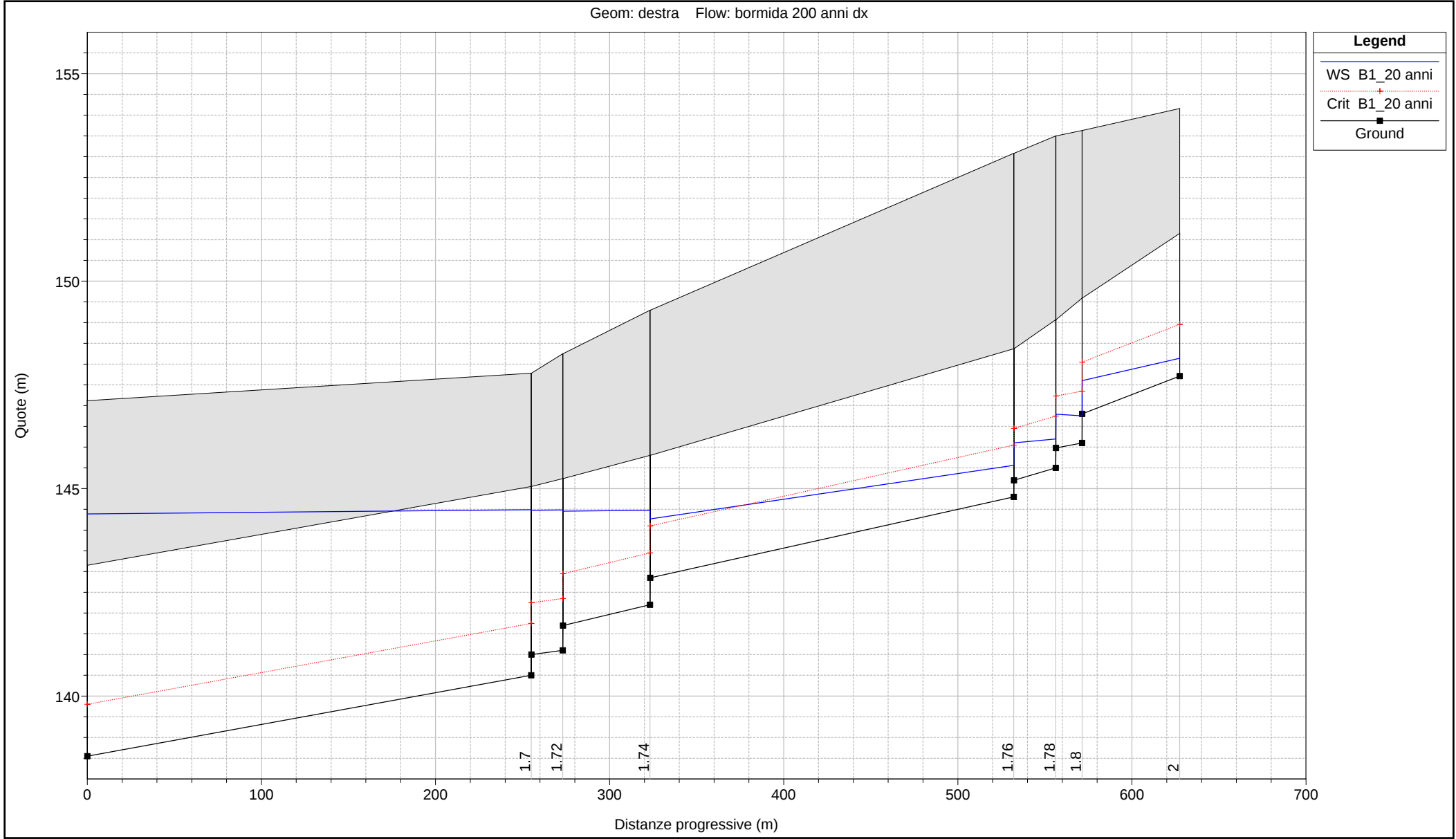
Dettaglio canalizzazione destra

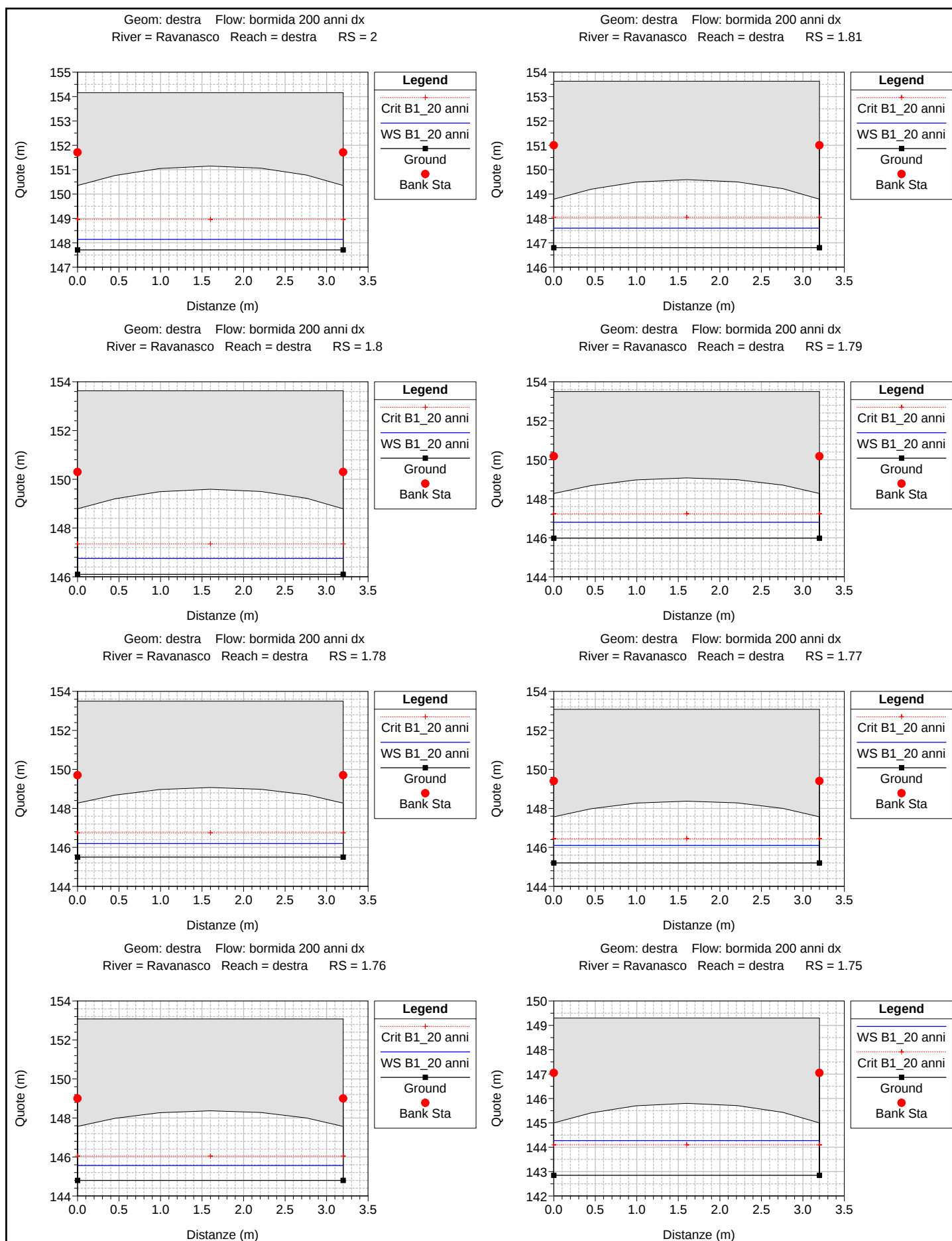
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: B1_20 anni

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
destra	2	B1_20 anni	14.00	147.71	148.14	148.96	153.41	0.175141	10.17	1.38	3.20	4.95
destra	1.81	B1_20 anni	14.00	146.80	147.60	148.05	149.12	0.027571	5.46	2.56	3.20	1.95
destra	1.8	B1_20 anni	14.00	146.10	146.75	147.35	149.04	0.050049	6.70	2.09	3.20	2.65
destra	1.79	B1_20 anni	14.00	145.98	146.79	147.23	148.27	0.026301	5.37	2.61	3.20	1.90
destra	1.78	B1_20 anni	14.00	145.50	146.20	146.75	148.21	0.041373	6.28	2.23	3.20	2.40
destra	1.77	B1_20 anni	14.00	145.20	146.10	146.45	147.30	0.019669	4.86	2.88	3.20	1.63
destra	1.76	B1_20 anni	14.00	144.80	145.56	146.05	147.25	0.032096	5.76	2.43	3.20	2.11
destra	1.75	B1_20 anni	14.00	142.85	144.27	144.10	144.75	0.005550	3.08	4.54	3.20	0.83
destra	1.74	B1_20 anni	14.00	142.20	144.48	143.45	144.66	0.001606	1.92	7.28	3.20	0.41
destra	1.73	B1_20 anni	14.00	141.70	144.46	142.95	144.58	0.000994	1.59	8.82	3.17	0.31
destra	1.72	B1_20 anni	14.00	141.10	144.49	142.35	144.57	0.000602	1.29	10.83	3.10	0.22
destra	1.71	B1_20 anni	14.00	141.00	144.48	142.25	144.56	0.000585	1.26	11.07	2.72	0.22
destra	1.7	B1_20 anni	14.00	140.50	144.49	141.75	144.55	0.000420	1.10	12.71	2.69	0.18
destra	1.5	B1_20 anni	14.00	138.55	144.39	139.80	144.44	0.000431	1.01	13.88		0.13

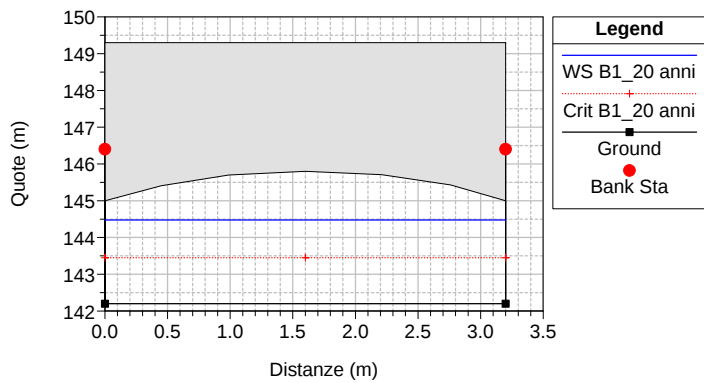
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: B1_20 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	B1_20 anni	153.41	148.14	5.27				14.00		3.20
destra	1.81	B1_20 anni	149.12	147.60	1.52	3.17	1.13		14.00		3.20
destra	1.8	B1_20 anni	149.04	146.75	2.29	0.00	0.08		14.00		3.20
destra	1.79	B1_20 anni	148.27	146.79	1.47	0.53	0.24		14.00		3.20
destra	1.78	B1_20 anni	148.21	146.20	2.01	0.00	0.05		14.00		3.20
destra	1.77	B1_20 anni	147.30	146.10	1.20	0.66	0.24		14.00		3.20
destra	1.76	B1_20 anni	147.25	145.56	1.69	0.00	0.05		14.00		3.20
destra	1.75	B1_20 anni	144.75	144.27	0.48	0.00	0.09		14.00		3.20
destra	1.74	B1_20 anni	144.66	144.48	0.19	0.06	0.02		14.00		3.20
destra	1.73	B1_20 anni	144.58	144.46	0.13	0.00	0.01		14.00		3.17
destra	1.72	B1_20 anni	144.57	144.49	0.09	0.01	0.00		14.00		3.10
destra	1.71	B1_20 anni	144.56	144.48	0.08	0.00	0.01		14.00		2.72
destra	1.7	B1_20 anni	144.55	144.49	0.06	0.11	0.00		14.00		2.69
destra	1.5	B1_20 anni	144.44	144.39	0.05				14.00		

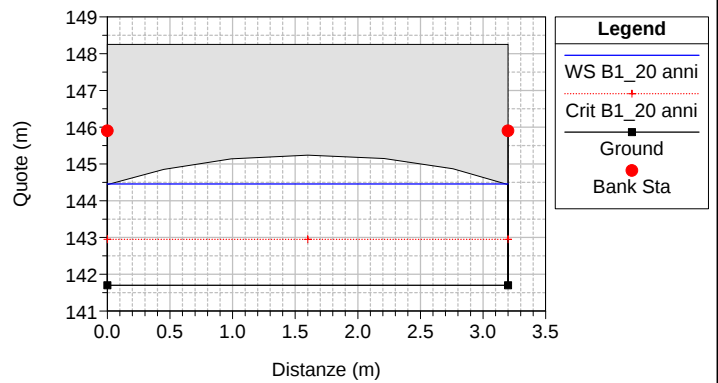




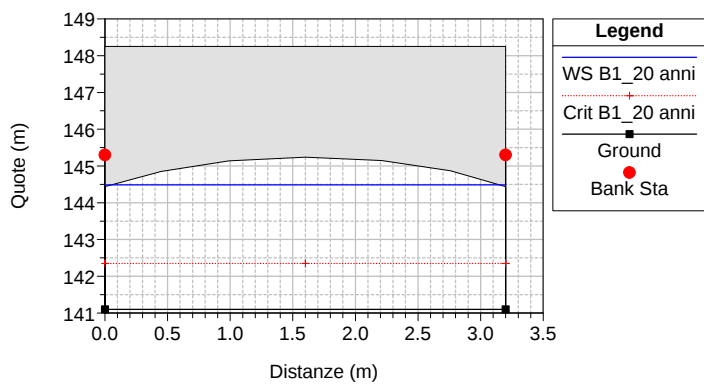
Geom: destra Flow: bormida 200 anni dx
River = Ravanasco Reach = destra RS = 1.74



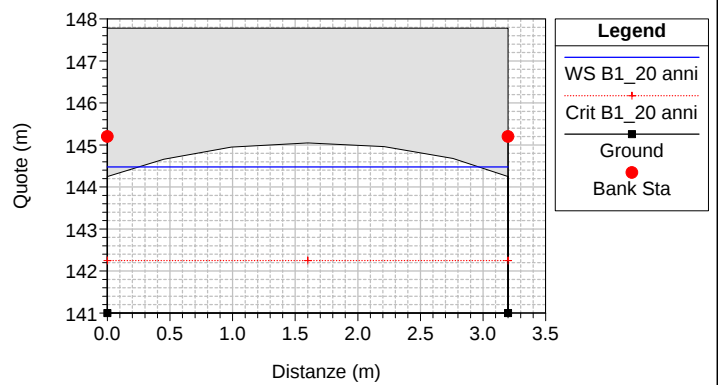
Geom: destra Flow: bormida 200 anni dx
River = Ravanasco Reach = destra RS = 1.73



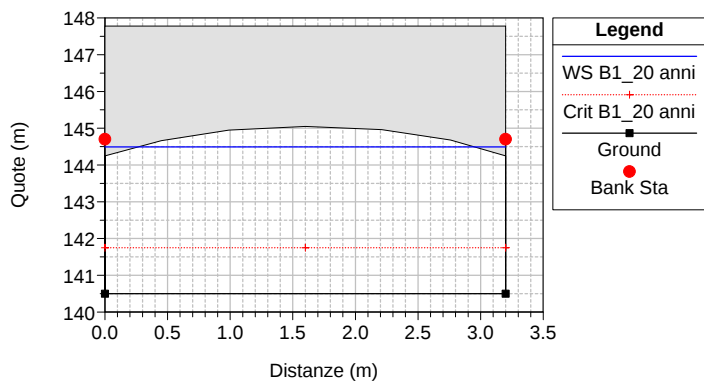
Geom: destra Flow: bormida 200 anni dx
River = Ravanasco Reach = destra RS = 1.72



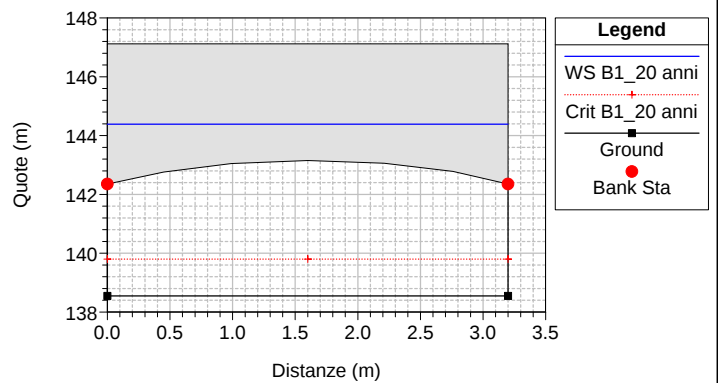
Geom: destra Flow: bormida 200 anni dx
River = Ravanasco Reach = destra RS = 1.71



Geom: destra Flow: bormida 200 anni dx
River = Ravanasco Reach = destra RS = 1.7



Geom: destra Flow: bormida 200 anni dx
River = Ravanasco Reach = destra RS = 1.5



Scenario B2)

Rio Ravanasco Tempo di ritorno $Tr = 200$ anni

Portata totale $Q = 51 \text{ mc/s}$

Portata canalizzazione sinistra $Q = 30 \text{ mc/s}$

Portata canalizzazione destra $Q = 21 \text{ mc/s}$

Fiume Bormida Tempo di ritorno $Tr = 200$ anni

$Q = 2980 \text{ mc/s}$ livello idrico 144.40 m

HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: B2_Tr 200

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
Acqui	20	B2_Tr 200	51.00	160.59	162.80	162.80	163.35	0.004309	3.30	15.47	14.46	1.02
Acqui	19	B2_Tr 200	51.00	159.95	162.95	161.95	163.08	0.000498	1.57	32.46	17.61	0.37
Acqui	18	B2_Tr 200	51.00	160.63	162.43	162.43	163.00	0.004040	3.34	15.26	13.48	1.00
Acqui	17	B2_Tr 200	51.00	158.37	159.45	160.12	162.64	0.060697	7.92	6.44	12.11	3.46
Acqui	16	B2_Tr 200	51.00	158.11	159.76	160.26	161.64	0.033838	6.08	8.39	14.02	2.51
Acqui	15	B2_Tr 200	51.00	158.04	159.83	160.24	161.15	0.017615	5.09	10.03	13.80	1.90
Acqui	14	B2_Tr 200	51.00	156.98	158.26	158.88	160.59	0.033593	6.76	7.54	11.55	2.67
Acqui	13	B2_Tr 200	51.00	156.45	158.24	158.66	159.49	0.017111	4.96	10.28	14.47	1.88
Acqui	12	B2_Tr 200	51.00	156.28	157.63	158.11	159.12	0.016394	5.41	9.42	11.59	1.92
Acqui	11	B2_Tr 200	51.00	155.48	157.55	157.84	158.49	0.010828	4.30	11.87	14.90	1.54
Acqui	10	B2_Tr 200	51.00	153.61	154.41	154.91	156.83	0.073733	6.90	7.39	19.98	3.62
Acqui	9	B2_Tr 200	51.00	152.84	154.29	154.87	155.75	0.012707	5.36	9.51	9.53	1.71
Acqui	8	B2_Tr 200	51.00	151.97	153.09	153.71	154.97	0.019893	6.07	8.40	9.87	2.10
Acqui	7	B2_Tr 200	51.00	151.72	153.04	153.49	154.48	0.018180	5.31	9.61	12.44	1.93
Acqui	6	B2_Tr 200	51.00	150.54	151.23	151.96	154.27	0.046394	7.72	6.61	10.16	3.06
Acqui	5	B2_Tr 200	51.00	149.33	150.28	150.90	152.42	0.024198	6.48	7.87	8.80	2.19
Acqui	4	B2_Tr 200	51.00	149.00	151.62	150.52	151.86	0.000959	2.19	23.26	9.28	0.44
Acqui	3	B2_Tr 200	51.00	148.90	151.42	150.61	151.82	0.001852	2.80	18.21	7.23	0.56
Acqui	2.2	B2_Tr 200	51.00	149.20	150.89	150.89	151.74	0.005501	4.09	12.47	7.38	1.00
Acqui	2.1	B2_Tr 200	51.00	148.10	149.09	149.79	151.57	0.027139	6.98	7.30	7.38	2.24
Acqui	2.05	B2_Tr 200	51.00	147.31	148.24	149.00	151.32	0.045197	7.78	6.56	8.95	2.90
Acqui	2	B2_Tr 200	51.00	147.31	148.37	149.13	151.23	0.044106	7.49	6.81	7.85	2.32
Acqui	1.99	B2_Tr 200	51.00	146.19	147.63	148.01	149.01	0.015454	5.20	9.81	7.85	1.38
Acqui	1.98	B2_Tr 200	51.00	144.86	146.34	146.68	147.64	0.014166	5.04	10.12	7.85	1.32
Acqui	1.97	B2_Tr 200	51.00	144.28	145.75	146.10	147.07	0.014485	5.08	10.04	7.85	1.34
Acqui	1.96	B2_Tr 200	51.00	143.89	145.37	145.71	146.67	0.014378	5.07	10.06	7.85	1.33
Acqui	1.95	B2_Tr 200	51.00	143.52	144.99	145.34	146.31	0.014426	5.07	10.05	7.85	1.33
Acqui	1.94	B2_Tr 200	51.00	143.20	144.67	145.02	145.99	0.014433	5.07	10.05	7.85	1.33
Acqui	1.93	B2_Tr 200	51.00	143.02	144.49	144.84	145.81	0.014579	5.09	10.01	7.85	1.34
Acqui	1.92	B2_Tr 200	51.00	141.98	144.48	143.80	144.88	0.002938	2.82	18.09	7.85	0.57
Acqui	1.91	B2_Tr 200	51.00	141.51	144.50	143.33	144.77	0.001789	2.33	21.92	7.85	0.43
Acqui	1.9	B2_Tr 200	51.00	141.00	144.50	142.82	144.70	0.001242	1.98	25.72	6.63	0.34
Acqui	1.8	B2_Tr 200	51.00	140.68	144.49	142.50	144.66	0.001124	1.85	27.54	4.90	0.30
Acqui	1.7	B2_Tr 200	51.00	140.45	144.48	142.27	144.64	0.001171	1.80	28.37	2.46	0.29
Acqui	1.6	B2_Tr 200	51.00	140.09	144.45	141.91	144.61	0.001215	1.76	28.96	0.45	0.27

HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: B2_Tr 200 (Continued)

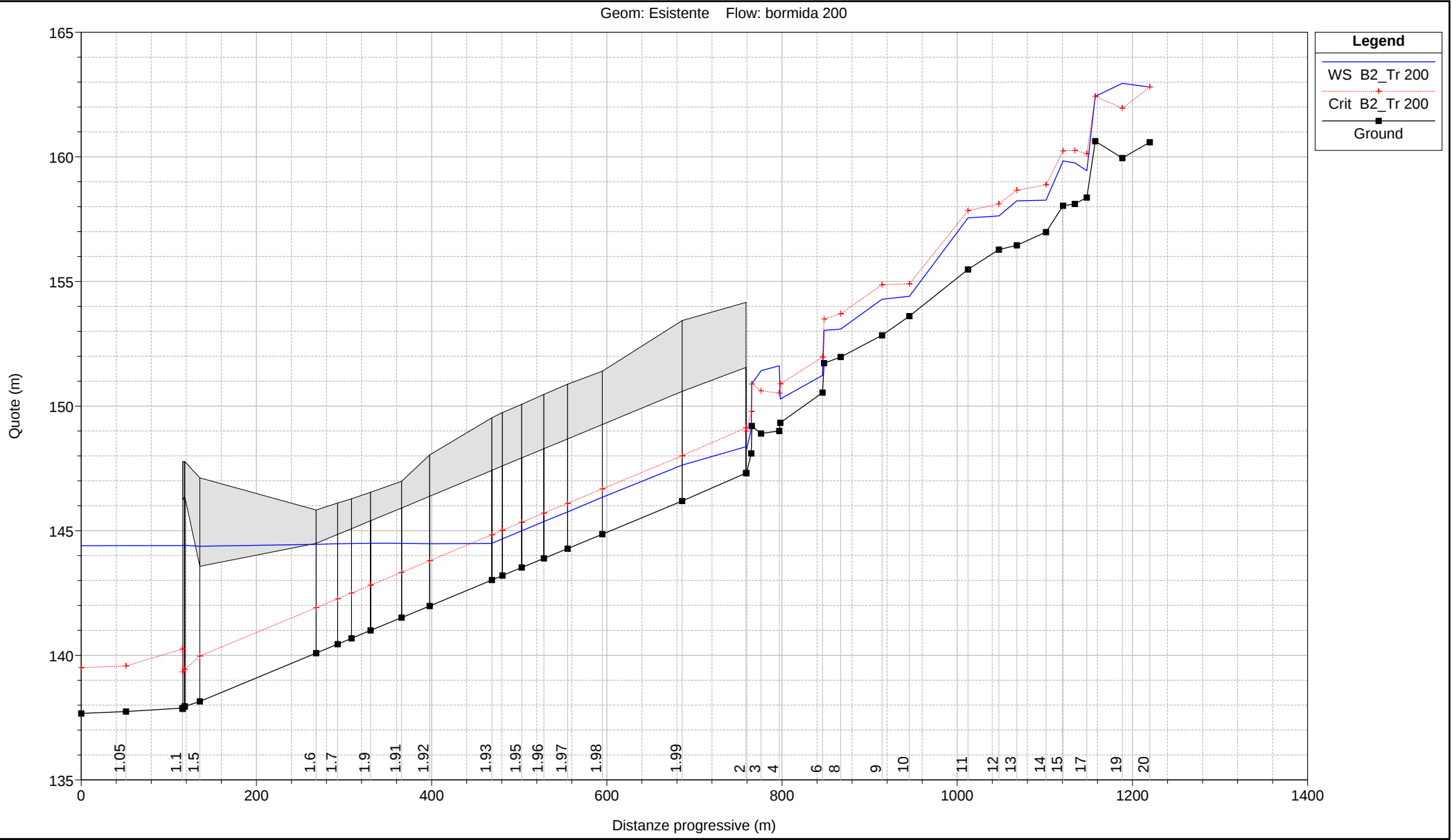
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Acqui	1.5	B2_Tr 200	51.00	138.15	144.38	139.97	144.48	0.000666	1.39	36.73		0.18
Acqui	1.4	B2_Tr 200	51.00	137.95	144.41	139.44	144.46	0.000096	0.91	56.09	7.18	0.11
Acqui	1.3	B2_Tr 200	51.00	137.95	144.41	139.44	144.46	0.000096	0.91	56.10	7.19	0.11
Acqui	1.2	B2_Tr 200	51.00	137.85	144.41	139.34	144.46	0.000094	0.90	56.83	6.97	0.11
Acqui	1.1	B2_Tr 200	51.00	137.88	144.40	140.25	144.45	0.000115	1.01	50.67	9.00	0.14
Acqui	1.05	B2_Tr 200	51.00	137.74	144.40	139.57	144.44	0.000081	0.90	56.75	9.00	0.11
Acqui	1	B2_Tr 200	51.00	137.67	144.40	139.50	144.44	0.000079	0.89	57.33	9.00	0.11

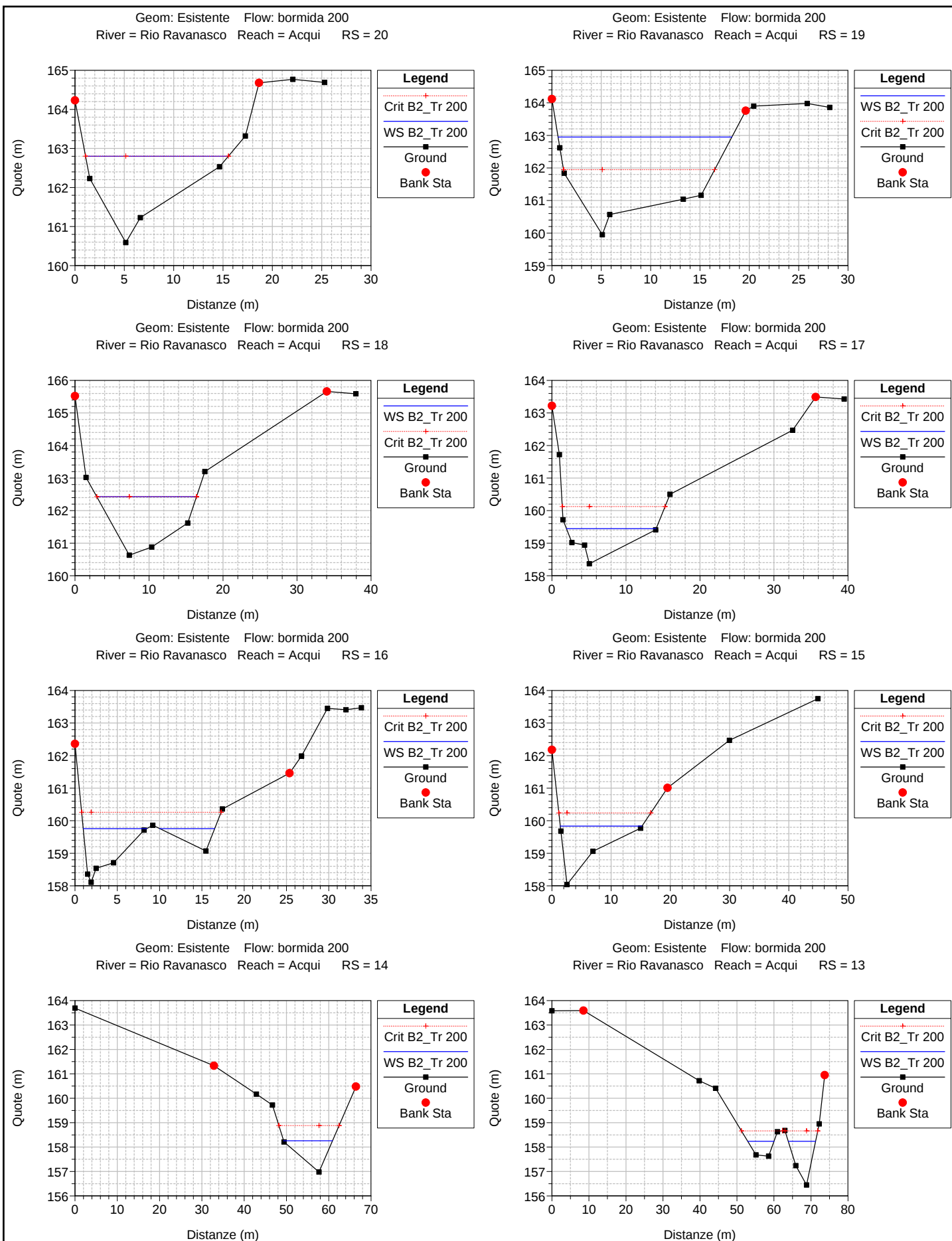
HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: B2_Tr 200

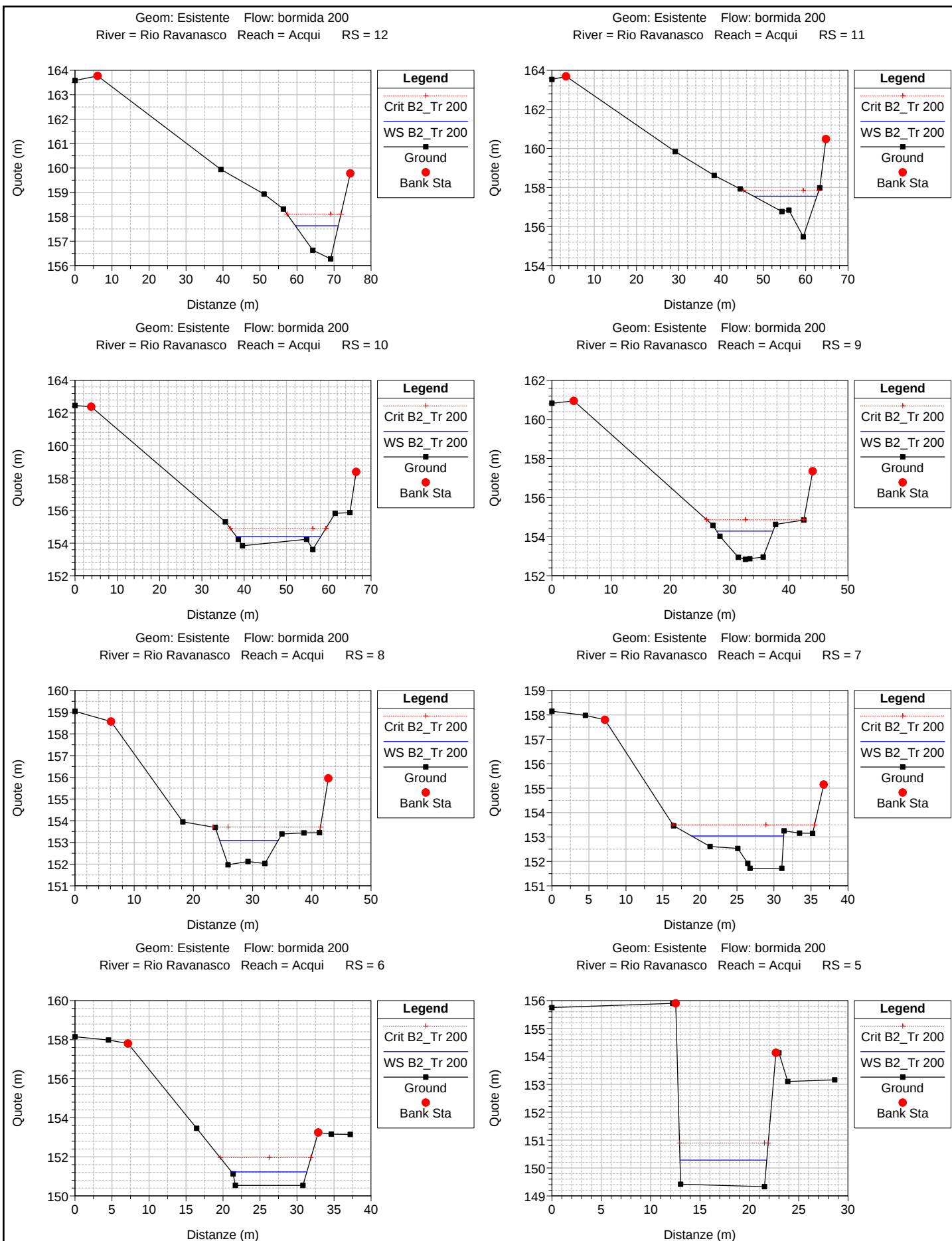
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	B2_Tr 200	163.35	162.80	0.55				51.00		14.46
Acqui	19	B2_Tr 200	163.08	162.95	0.13	0.03	0.04		51.00		17.61
Acqui	18	B2_Tr 200	163.00	162.43	0.57	0.02	0.09		51.00		13.48
Acqui	17	B2_Tr 200	162.64	159.45	3.19	0.10	0.26		51.00		12.11
Acqui	16	B2_Tr 200	161.64	159.76	1.88	0.60	0.39		51.00		14.02
Acqui	15	B2_Tr 200	161.15	159.83	1.32	0.32	0.17		51.00		13.80
Acqui	14	B2_Tr 200	160.59	158.26	2.33	0.46	0.10		51.00		11.55
Acqui	13	B2_Tr 200	159.49	158.24	1.25	0.78	0.32		51.00		14.47
Acqui	12	B2_Tr 200	159.12	157.63	1.49	0.34	0.02		51.00		11.59
Acqui	11	B2_Tr 200	158.49	157.55	0.94	0.47	0.17		51.00		14.90
Acqui	10	B2_Tr 200	156.83	154.41	2.43	1.51	0.15		51.00		19.98
Acqui	9	B2_Tr 200	155.75	154.29	1.47	0.79	0.29		51.00		9.53
Acqui	8	B2_Tr 200	154.97	153.09	1.88	0.74	0.04		51.00		9.87
Acqui	7	B2_Tr 200	154.48	153.04	1.43	0.36	0.13		51.00		12.44
Acqui	6	B2_Tr 200	154.27	151.23	3.04	0.05	0.16		51.00		10.16
Acqui	5	B2_Tr 200	152.42	150.28	2.14	1.57	0.27		51.00		8.80
Acqui	4	B2_Tr 200	151.86	151.62	0.24	0.03	0.02		51.00		9.28
Acqui	3	B2_Tr 200	151.82	151.42	0.40	0.03	0.05		51.00		7.23
Acqui	2.2	B2_Tr 200	151.74	150.89	0.85	0.00	0.00		51.00		7.38
Acqui	2.1	B2_Tr 200	151.57	149.09	2.48	0.01	0.16		51.00		7.38
Acqui	2.05	B2_Tr 200	151.32	148.24	3.08	0.19	0.06		51.00		8.95
Acqui	2	B2_Tr 200	151.23	148.37	2.86	0.02	0.07		51.00		7.85
Acqui	1.99	B2_Tr 200	149.01	147.63	1.38	1.78	0.44		51.00		7.85
Acqui	1.98	B2_Tr 200	147.64	146.34	1.29	1.35	0.02		51.00		7.85
Acqui	1.97	B2_Tr 200	147.07	145.75	1.32	0.57	0.00		51.00		7.85
Acqui	1.96	B2_Tr 200	146.67	145.37	1.31	0.39	0.00		51.00		7.85
Acqui	1.95	B2_Tr 200	146.31	144.99	1.31	0.37	0.00		51.00		7.85
Acqui	1.94	B2_Tr 200	145.99	144.67	1.31	0.32	0.00		51.00		7.85
Acqui	1.93	B2_Tr 200	145.81	144.49	1.32	0.17	0.00		51.00		7.85
Acqui	1.92	B2_Tr 200	144.88	144.48	0.41	0.07	0.04		51.00		7.85
Acqui	1.91	B2_Tr 200	144.77	144.50	0.28	0.05	0.02		51.00		7.85
Acqui	1.9	B2_Tr 200	144.70	144.50	0.20	0.03	0.01		51.00		6.63
Acqui	1.8	B2_Tr 200	144.66	144.49	0.17	0.02	0.00		51.00		4.90
Acqui	1.7	B2_Tr 200	144.64	144.48	0.16	0.03	0.00		51.00		2.46
Acqui	1.6	B2_Tr 200	144.61	144.45	0.16	0.12	0.02		51.00		0.45

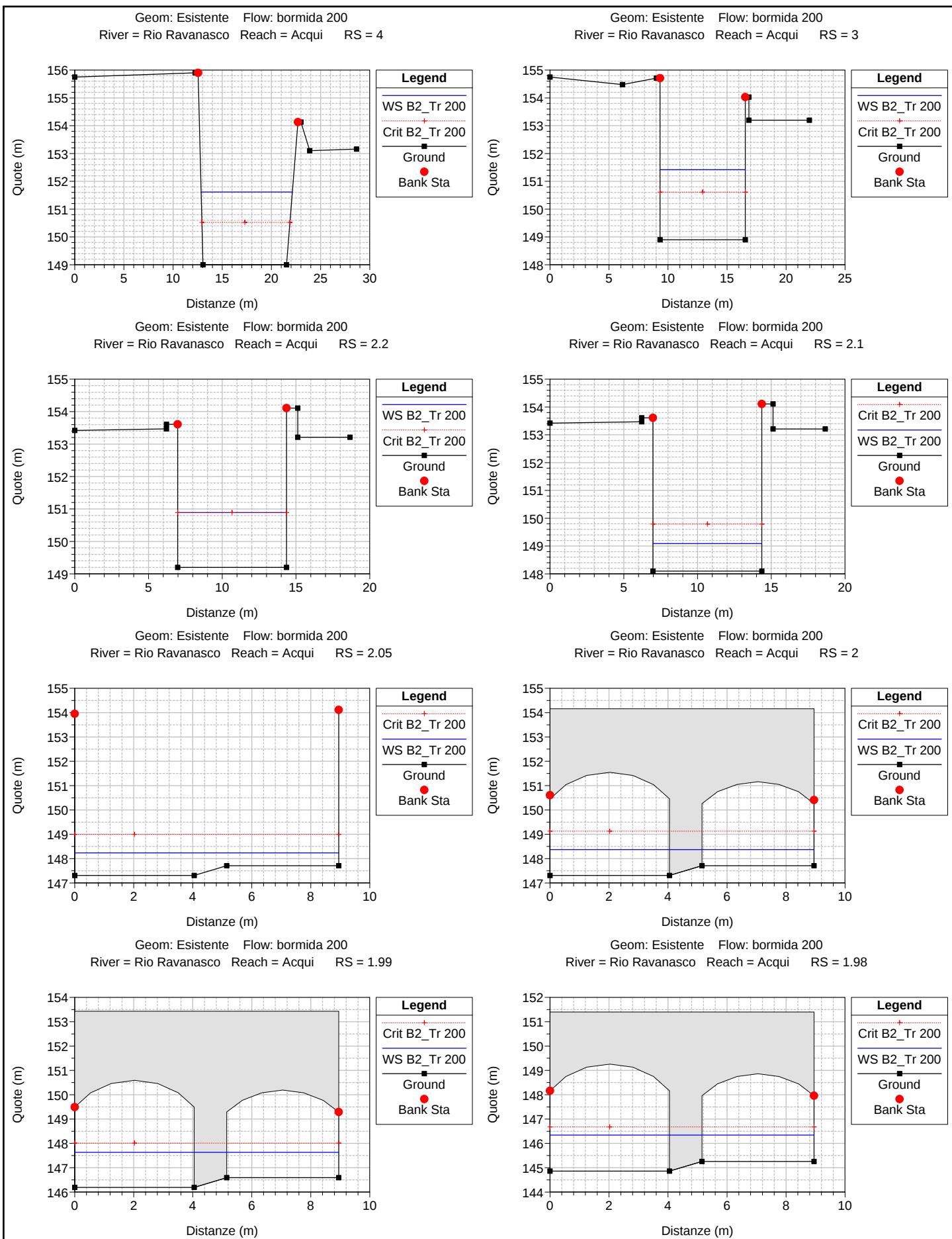
HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: B2_Tr 200 (Continued)

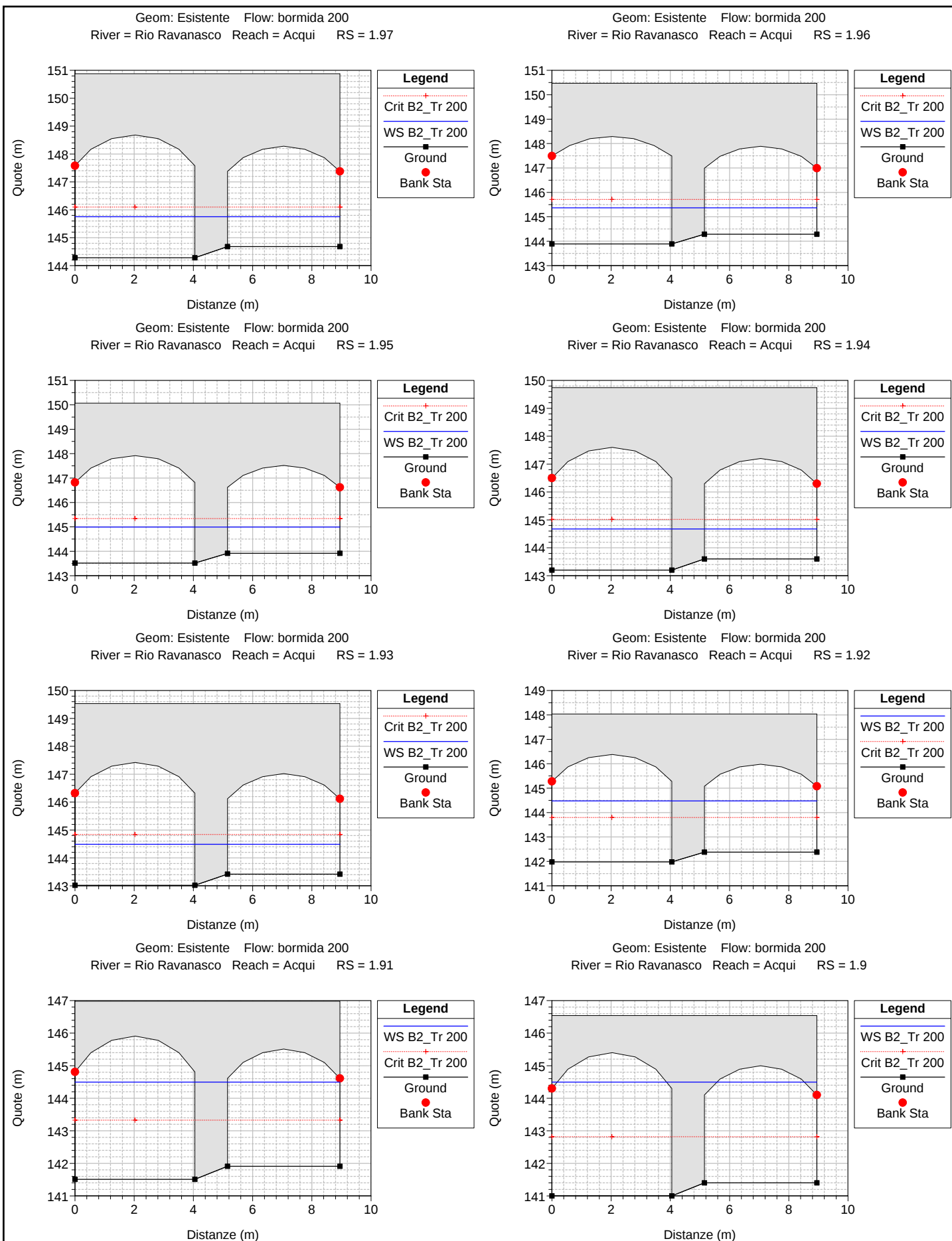
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
Acqui	1.5	B2_Tr 200	144.48	144.38	0.10	0.00	0.02		51.00		
Acqui	1.4	B2_Tr 200	144.46	144.41	0.04	0.00	0.00		51.00		7.18
Acqui	1.3	B2_Tr 200	144.46	144.41	0.04	0.00	0.00		51.00		7.19
Acqui	1.2	B2_Tr 200	144.46	144.41	0.04	0.00	0.00		51.00		6.97
Acqui	1.1	B2_Tr 200	144.45	144.40	0.05	0.01	0.00		51.00		9.00
Acqui	1.05	B2_Tr 200	144.44	144.40	0.04	0.00	0.00		51.00		9.00
Acqui	1	B2_Tr 200	144.44	144.40	0.04				51.00		9.00

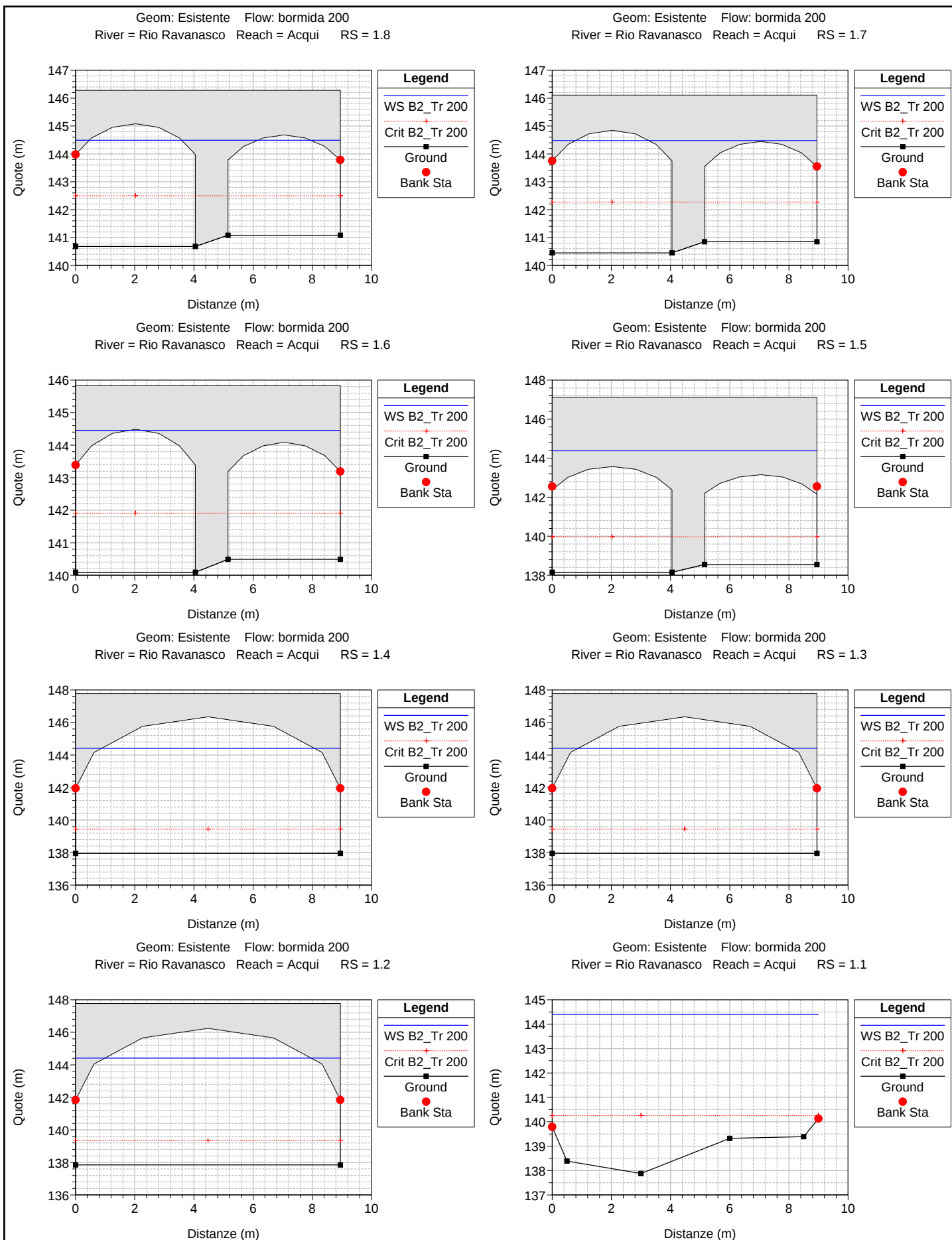




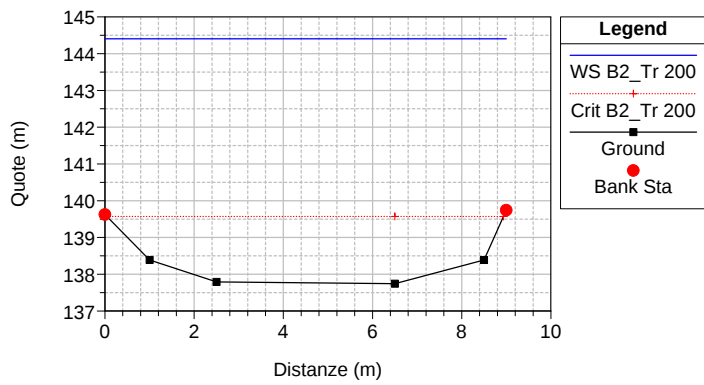




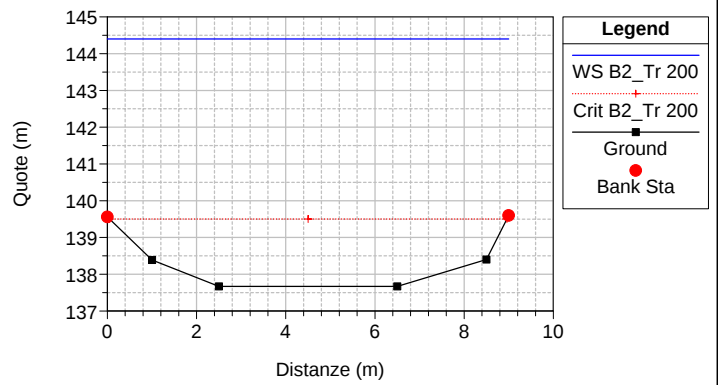




Geom: Esistente Flow: bormida 200
River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: Esistente Flow: bormida 200
River = Rio Ravanasco Reach = Acqui RS = 1



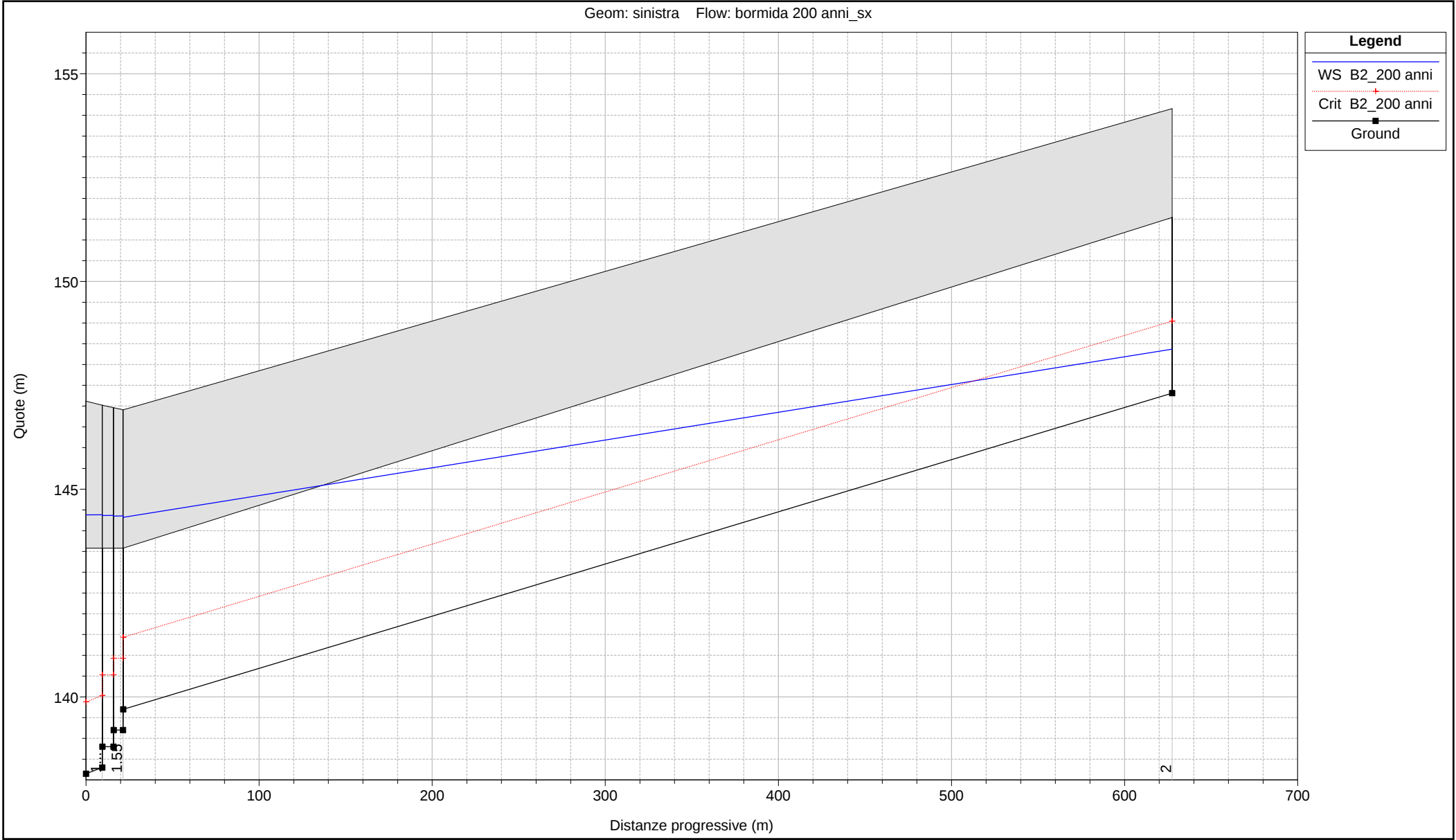
Dettaglio canalizzazione sinistra

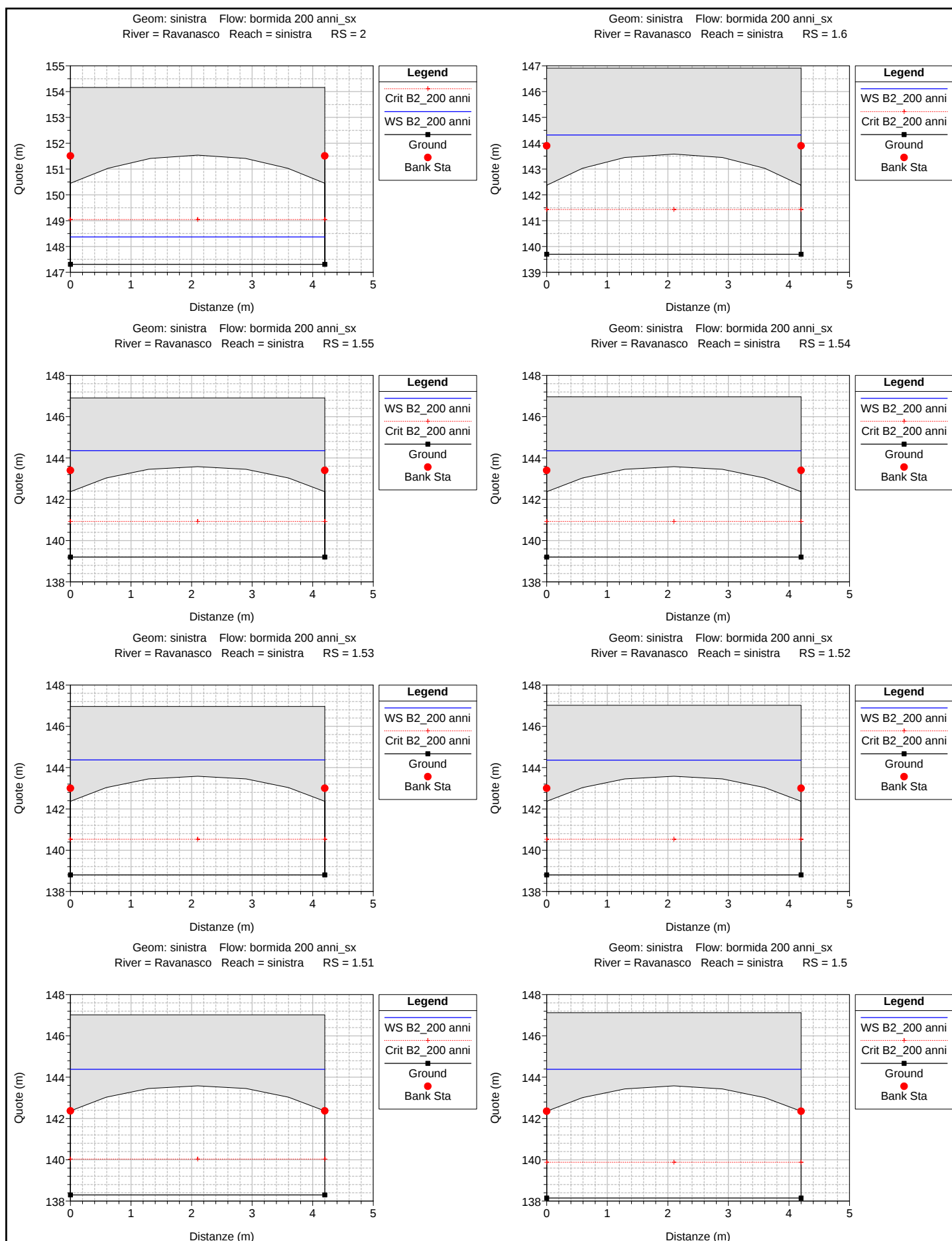
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: B2_200 anni

Reach	River Sta	Profile	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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
sinistra	2	B2_200 anni	30.00	147.31	148.37	149.04	150.68	0.028992	6.74	4.45	4.20	2.09
sinistra	1.6	B2_200 anni	30.00	139.70	144.32	141.43	144.53	0.001660	2.05	14.67		0.30
sinistra	1.55	B2_200 anni	30.00	139.20	144.36	140.93	144.52	0.001161	1.79	16.77		0.25
sinistra	1.54	B2_200 anni	30.00	139.20	144.35	140.93	144.51	0.001161	1.79	16.77		0.25
sinistra	1.53	B2_200 anni	30.00	138.80	144.37	140.53	144.50	0.000903	1.63	18.45		0.22
sinistra	1.52	B2_200 anni	30.00	138.80	144.36	140.53	144.50	0.000903	1.63	18.45		0.22
sinistra	1.51	B2_200 anni	30.00	138.30	144.38	140.03	144.49	0.000682	1.46	20.55		0.19
sinistra	1.5	B2_200 anni	30.00	138.15	144.38	139.88	144.48	0.000636	1.42	21.11		0.18

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: B2_200 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	B2_200 anni	150.68	148.37	2.31				30.00		4.20
sinistra	1.6	B2_200 anni	144.53	144.32	0.21	0.00	0.02		30.00		
sinistra	1.55	B2_200 anni	144.52	144.36	0.16	0.01	0.00		30.00		
sinistra	1.54	B2_200 anni	144.51	144.35	0.16	0.00	0.01		30.00		
sinistra	1.53	B2_200 anni	144.50	144.37	0.13	0.01	0.00		30.00		
sinistra	1.52	B2_200 anni	144.50	144.36	0.13	0.00	0.01		30.00		
sinistra	1.51	B2_200 anni	144.49	144.38	0.11	0.01	0.00		30.00		
sinistra	1.5	B2_200 anni	144.48	144.38	0.10				30.00		





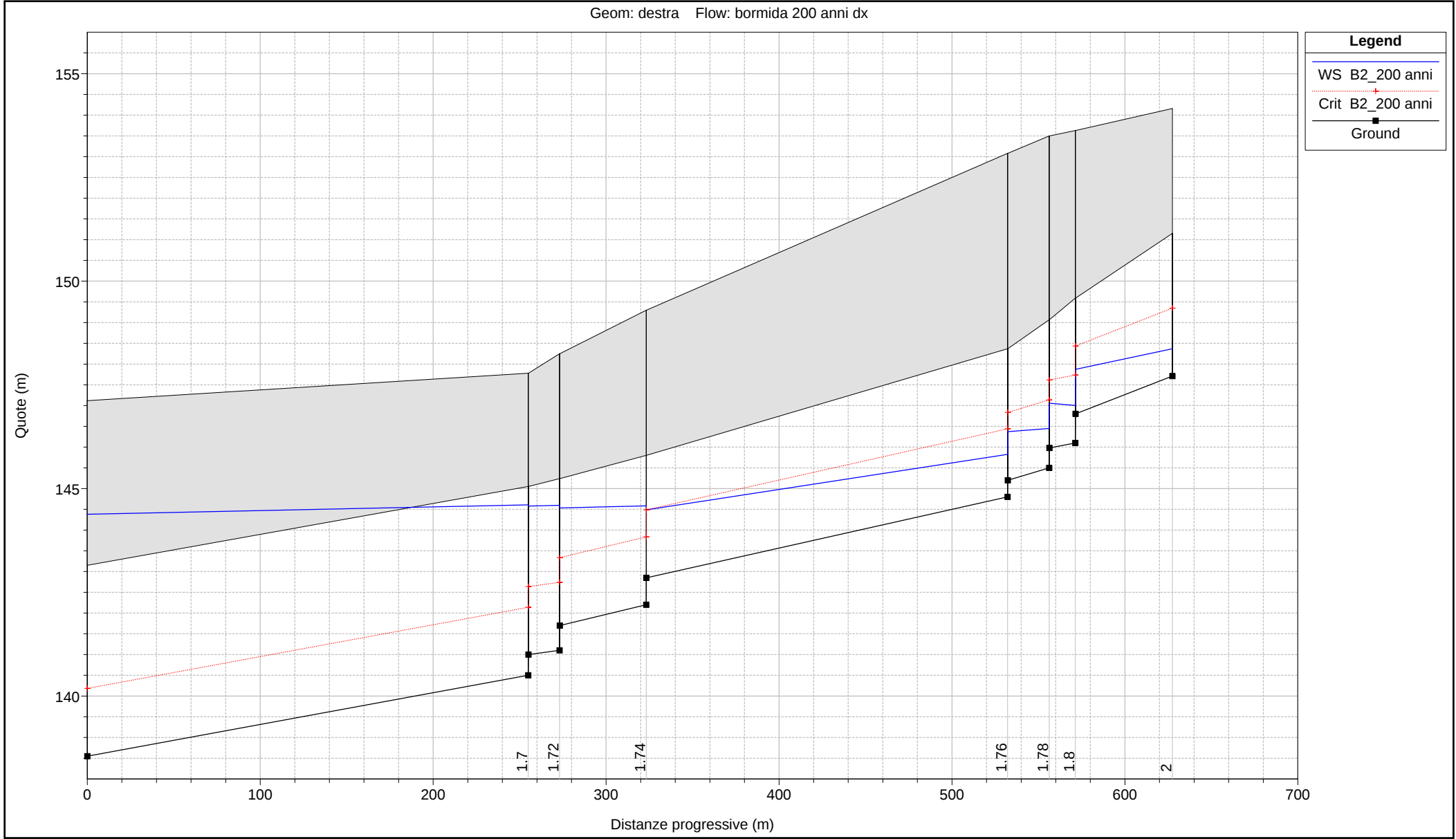
Dettaglio canalizzazione destra

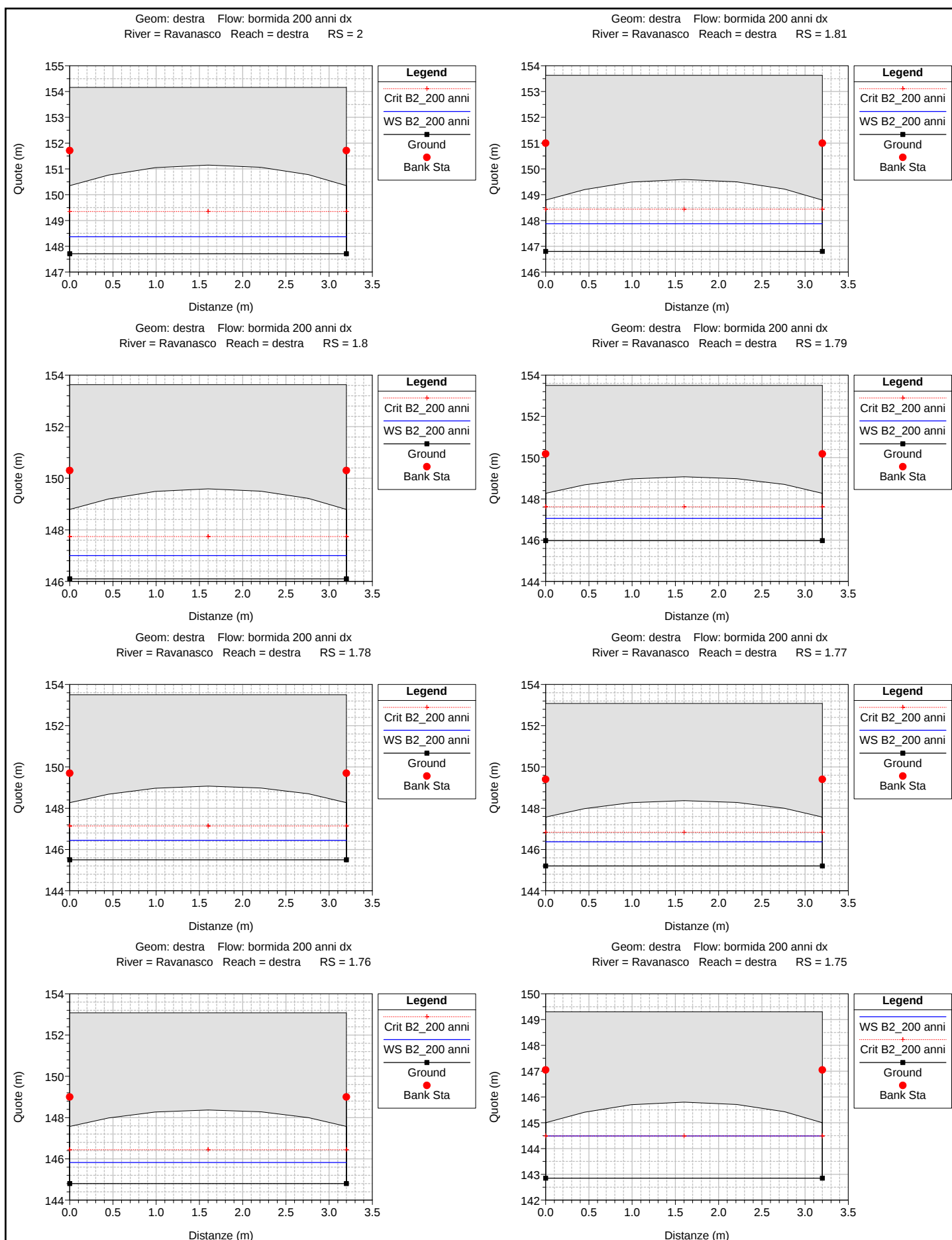
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: B2_200 anni

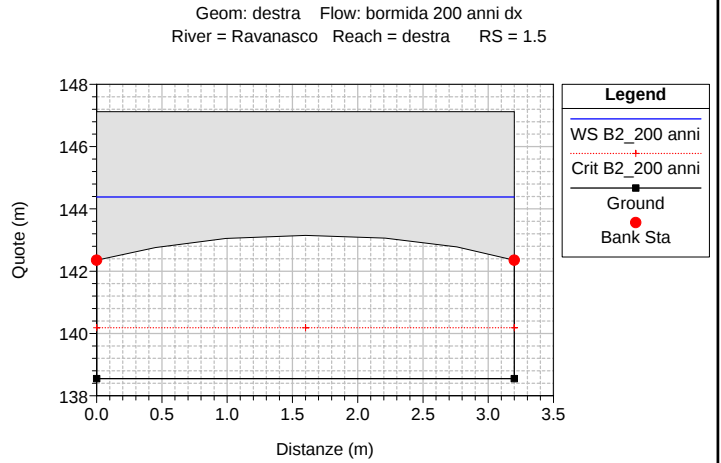
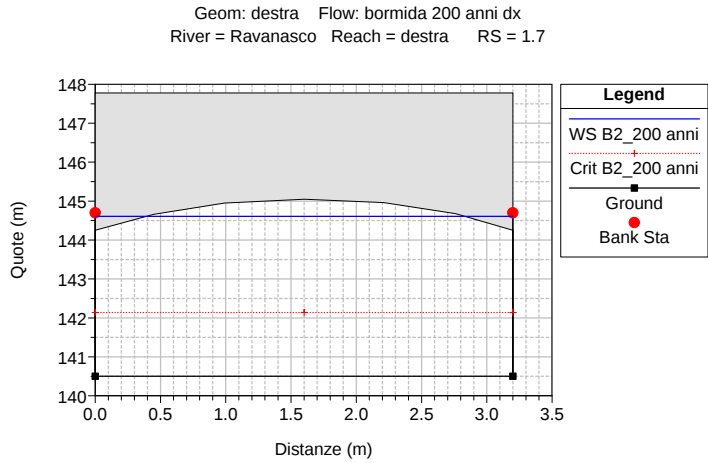
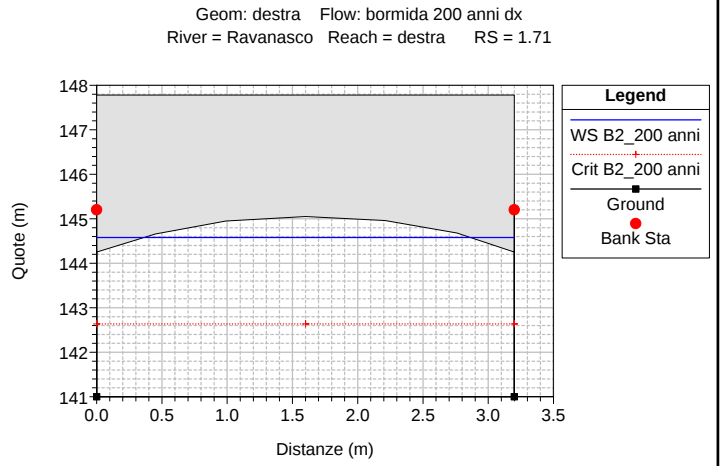
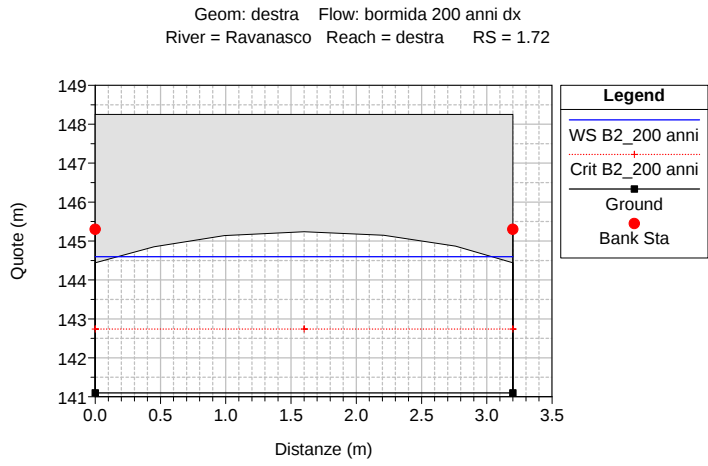
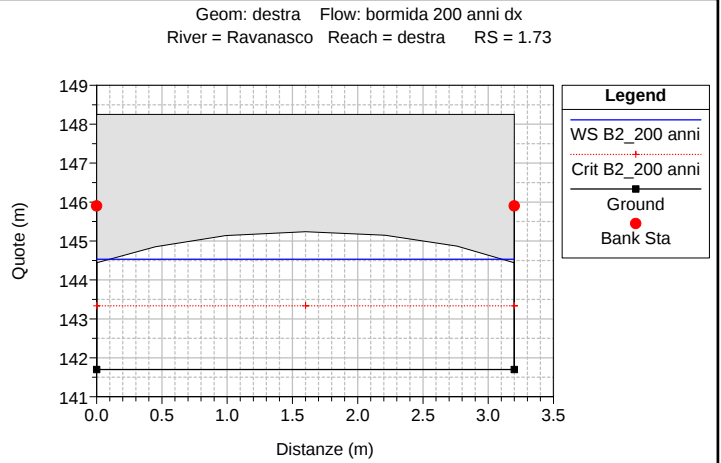
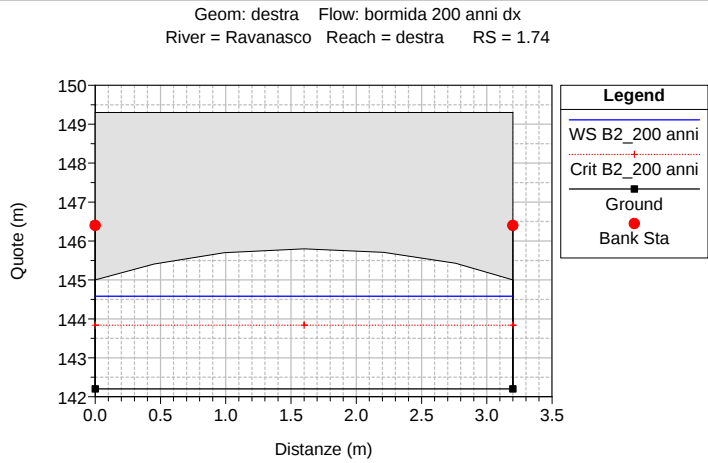
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
destra	2	B2_200 anni	21.00	147.71	148.37	149.35	153.41	0.109113	9.94	2.11	3.20	3.91
destra	1.81	B2_200 anni	21.00	146.80	147.87	148.44	149.78	0.026916	6.11	3.44	3.20	1.88
destra	1.8	B2_200 anni	21.00	146.10	147.00	147.74	149.69	0.043895	7.26	2.89	3.20	2.44
destra	1.79	B2_200 anni	21.00	145.98	147.06	147.62	148.95	0.026747	6.10	3.45	3.20	1.88
destra	1.78	B2_200 anni	21.00	145.50	146.45	147.14	148.89	0.038293	6.92	3.03	3.20	2.27
destra	1.77	B2_200 anni	21.00	145.20	146.37	146.84	147.97	0.021108	5.60	3.75	3.20	1.65
destra	1.76	B2_200 anni	21.00	144.80	145.82	146.44	147.92	0.030788	6.41	3.28	3.20	2.02
destra	1.75	B2_200 anni	21.00	142.85	144.49	144.49	145.31	0.008502	4.00	5.24	3.20	1.00
destra	1.74	B2_200 anni	21.00	142.20	144.58	143.84	144.97	0.003215	2.75	7.63	3.20	0.57
destra	1.73	B2_200 anni	21.00	141.70	144.53	143.34	144.81	0.002118	2.32	9.06	3.00	0.44
destra	1.72	B2_200 anni	21.00	141.10	144.60	142.74	144.78	0.001277	1.88	11.17	2.87	0.32
destra	1.71	B2_200 anni	21.00	141.00	144.58	142.64	144.75	0.001264	1.85	11.34	2.50	0.31
destra	1.7	B2_200 anni	21.00	140.50	144.61	142.14	144.74	0.000909	1.61	13.01	2.44	0.25
destra	1.5	B2_200 anni	21.00	138.55	144.38	140.18	144.50	0.000970	1.51	13.88		0.20

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: B2_200 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	B2_200 anni	153.41	148.37	5.04				21.00		3.20
destra	1.81	B2_200 anni	149.78	147.87	1.90	2.69	0.94		21.00		3.20
destra	1.8	B2_200 anni	149.69	147.00	2.69	0.00	0.08		21.00		3.20
destra	1.79	B2_200 anni	148.95	147.06	1.89	0.51	0.24		21.00		3.20
destra	1.78	B2_200 anni	148.89	146.45	2.44	0.00	0.05		21.00		3.20
destra	1.77	B2_200 anni	147.97	146.37	1.60	0.67	0.25		21.00		3.20
destra	1.76	B2_200 anni	147.92	145.82	2.09	0.00	0.05		21.00		3.20
destra	1.75	B2_200 anni	145.31	144.49	0.82	0.00	0.13		21.00		3.20
destra	1.74	B2_200 anni	144.97	144.58	0.39	0.13	0.03		21.00		3.20
destra	1.73	B2_200 anni	144.81	144.53	0.27	0.00	0.03		21.00		3.00
destra	1.72	B2_200 anni	144.78	144.60	0.18	0.02	0.00		21.00		2.87
destra	1.71	B2_200 anni	144.75	144.58	0.17	0.00	0.01		21.00		2.50
destra	1.7	B2_200 anni	144.74	144.61	0.13	0.24	0.00		21.00		2.44
destra	1.5	B2_200 anni	144.50	144.38	0.12				21.00		







Scenario B3)

Rio Ravanasco Tempo di ritorno $T_r = 500$ anni

Portata totale $Q = 57 \text{ mc/s}$

Portata canalizzazione sinistra $Q = 34 \text{ mc/s}$

Portata canalizzazione destra $Q = 23 \text{ mc/s}$

Fiume Bormida Tempo di ritorno $T_r = 200$ anni

$Q = 2980 \text{ mc/s}$ livello idrico 144.40 m

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B3_Tr 500

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
Acqui	20	B3_Tr 500	57.00	160.59	162.89	162.89	163.48	0.004251	3.39	16.79	14.83	1.02
Acqui	19	B3_Tr 500	57.00	159.95	163.07	162.03	163.21	0.000516	1.65	34.59	17.88	0.38
Acqui	18	B3_Tr 500	57.00	160.63	162.53	162.53	163.13	0.003974	3.44	16.59	13.86	1.00
Acqui	17	B3_Tr 500	57.00	158.37	159.50	160.22	162.77	0.055648	8.01	7.12	12.30	3.36
Acqui	16	B3_Tr 500	57.00	158.11	159.81	160.33	161.80	0.034451	6.25	9.12	14.86	2.55
Acqui	15	B3_Tr 500	57.00	158.04	159.89	160.33	161.30	0.017503	5.27	10.82	14.04	1.92
Acqui	14	B3_Tr 500	57.00	156.98	158.32	158.98	160.75	0.032119	6.91	8.25	11.82	2.64
Acqui	13	B3_Tr 500	57.00	156.45	158.29	158.75	159.65	0.017790	5.18	11.01	14.95	1.93
Acqui	12	B3_Tr 500	57.00	156.28	157.70	158.21	159.28	0.016345	5.57	10.23	12.02	1.93
Acqui	11	B3_Tr 500	57.00	155.48	157.60	157.93	158.64	0.011418	4.50	12.66	15.43	1.59
Acqui	10	B3_Tr 500	57.00	153.61	154.44	154.97	156.95	0.068158	7.02	8.12	20.17	3.53
Acqui	9	B3_Tr 500	57.00	152.84	154.38	154.95	155.90	0.012235	5.47	10.43	9.85	1.70
Acqui	8	B3_Tr 500	57.00	151.97	153.17	153.81	155.14	0.019359	6.23	9.15	10.13	2.09
Acqui	7	B3_Tr 500	57.00	151.72	153.10	153.56	154.66	0.018688	5.53	10.30	12.77	1.97
Acqui	6	B3_Tr 500	57.00	150.54	151.29	152.06	154.45	0.043848	7.87	7.24	10.34	3.00
Acqui	5	B3_Tr 500	57.00	149.33	150.35	151.01	152.66	0.024112	6.73	8.47	8.82	2.19
Acqui	4	B3_Tr 500	57.00	149.00	151.80	150.64	152.06	0.000983	2.28	24.95	9.34	0.45
Acqui	3	B3_Tr 500	57.00	148.90	151.58	150.74	152.02	0.001958	2.95	19.34	7.23	0.58
Acqui	2.2	B3_Tr 500	57.00	149.20	151.02	151.02	151.94	0.005537	4.24	13.43	7.38	1.00
Acqui	2.1	B3_Tr 500	57.00	148.10	149.18	149.92	151.77	0.025665	7.12	8.00	7.38	2.18
Acqui	2.05	B3_Tr 500	57.00	147.31	148.31	149.10	151.52	0.042539	7.94	7.18	8.95	2.83
Acqui	2	B3_Tr 500	57.00	147.31	148.45	149.25	151.43	0.042192	7.64	7.46	7.85	2.28
Acqui	1.99	B3_Tr 500	57.00	146.19	147.73	148.14	149.21	0.015749	5.40	10.55	7.85	1.39
Acqui	1.98	B3_Tr 500	57.00	144.86	146.45	146.80	147.82	0.014061	5.19	10.99	7.85	1.31
Acqui	1.97	B3_Tr 500	57.00	144.28	145.86	146.23	147.26	0.014435	5.24	10.88	7.85	1.33
Acqui	1.96	B3_Tr 500	57.00	143.89	145.47	145.83	146.87	0.014458	5.24	10.88	7.85	1.33
Acqui	1.95	B3_Tr 500	57.00	143.52	145.10	145.47	146.50	0.014467	5.24	10.88	7.85	1.33
Acqui	1.94	B3_Tr 500	57.00	143.20	144.78	145.14	146.18	0.014417	5.23	10.89	7.85	1.33
Acqui	1.93	B3_Tr 500	57.00	143.02	144.60	144.96	146.00	0.014561	5.25	10.85	7.85	1.34
Acqui	1.92	B3_Tr 500	57.00	141.98	144.50	143.93	145.00	0.003576	3.12	18.27	7.85	0.63
Acqui	1.91	B3_Tr 500	57.00	141.51	144.52	143.46	144.86	0.002180	2.58	22.13	7.85	0.47
Acqui	1.9	B3_Tr 500	57.00	141.00	144.52	142.94	144.77	0.001531	2.20	25.90	6.53	0.37
Acqui	1.8	B3_Tr 500	57.00	140.68	144.51	142.62	144.73	0.001399	2.06	27.66	4.75	0.34
Acqui	1.7	B3_Tr 500	57.00	140.45	144.50	142.39	144.70	0.001461	2.01	28.42	2.39	0.32
Acqui	1.6	B3_Tr 500	57.00	140.09	144.47	142.04	144.66	0.001529	1.97	28.96	0.29	0.30

HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B3_Tr 500 (Continued)

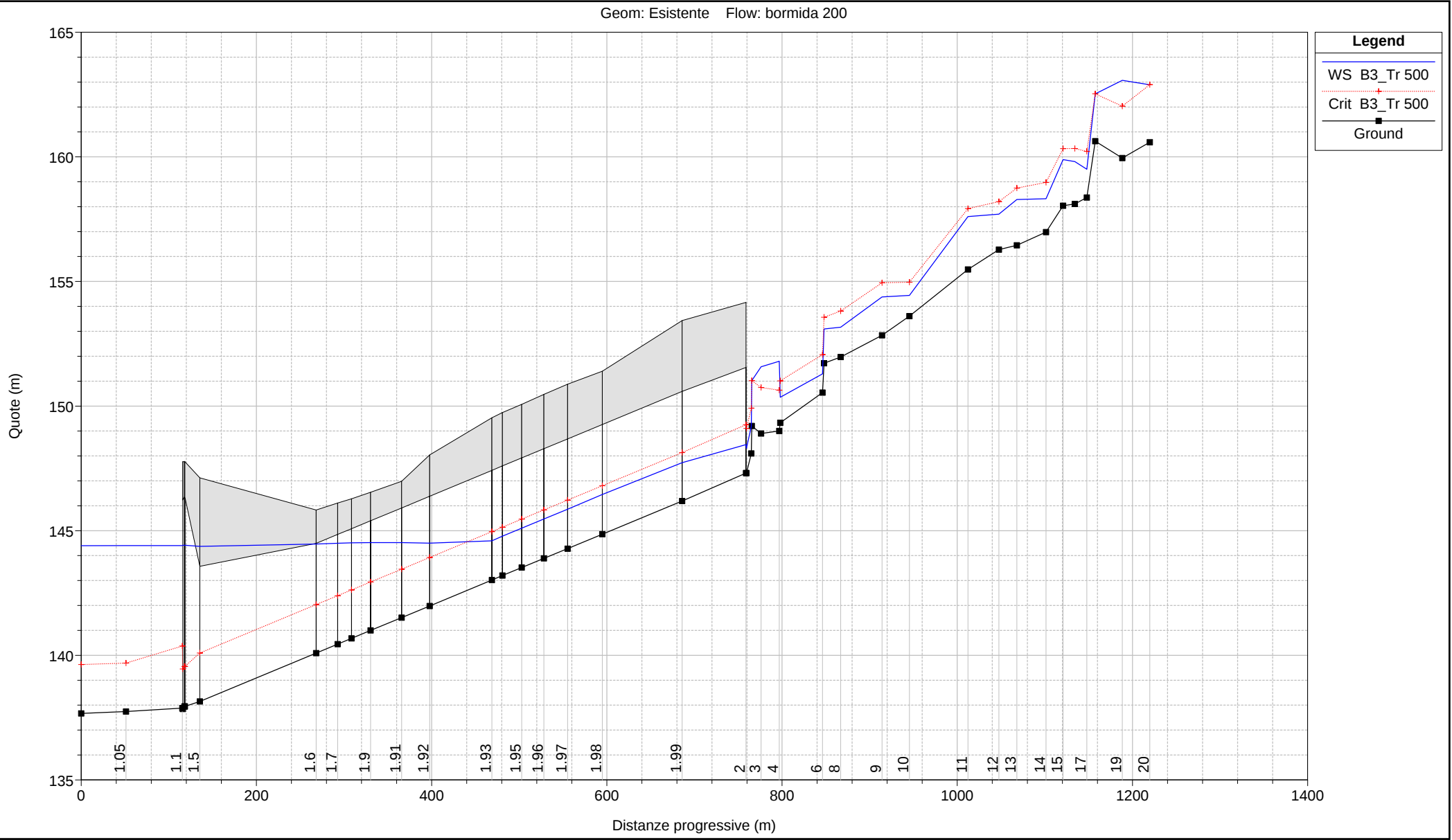
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Acqui	1.5	B3_Tr 500	57.00	138.15	144.37	140.09	144.49	0.000831	1.55	36.73		0.20
Acqui	1.4	B3_Tr 500	57.00	137.95	144.42	139.56	144.47	0.000120	1.02	56.12	7.18	0.13
Acqui	1.3	B3_Tr 500	57.00	137.95	144.42	139.56	144.47	0.000120	1.02	56.12	7.18	0.13
Acqui	1.2	B3_Tr 500	57.00	137.85	144.42	139.45	144.47	0.000117	1.00	56.86	6.96	0.12
Acqui	1.1	B3_Tr 500	57.00	137.88	144.40	140.37	144.47	0.000143	1.12	50.68	9.00	0.15
Acqui	1.05	B3_Tr 500	57.00	137.74	144.40	139.69	144.46	0.000102	1.00	56.75	9.00	0.13
Acqui	1	B3_Tr 500	57.00	137.67	144.40	139.63	144.45	0.000099	0.99	57.33	9.00	0.13

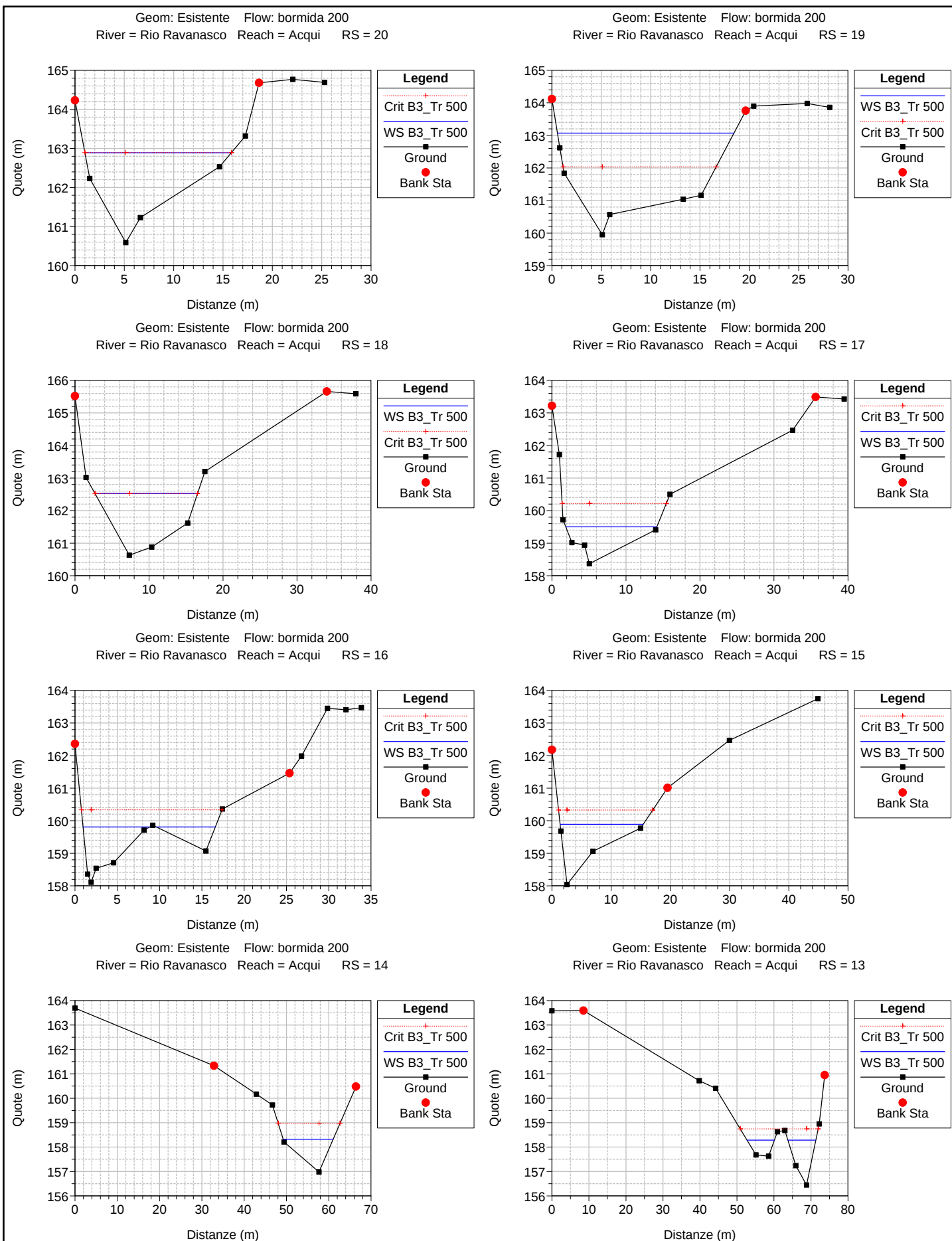
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B3_Tr 500

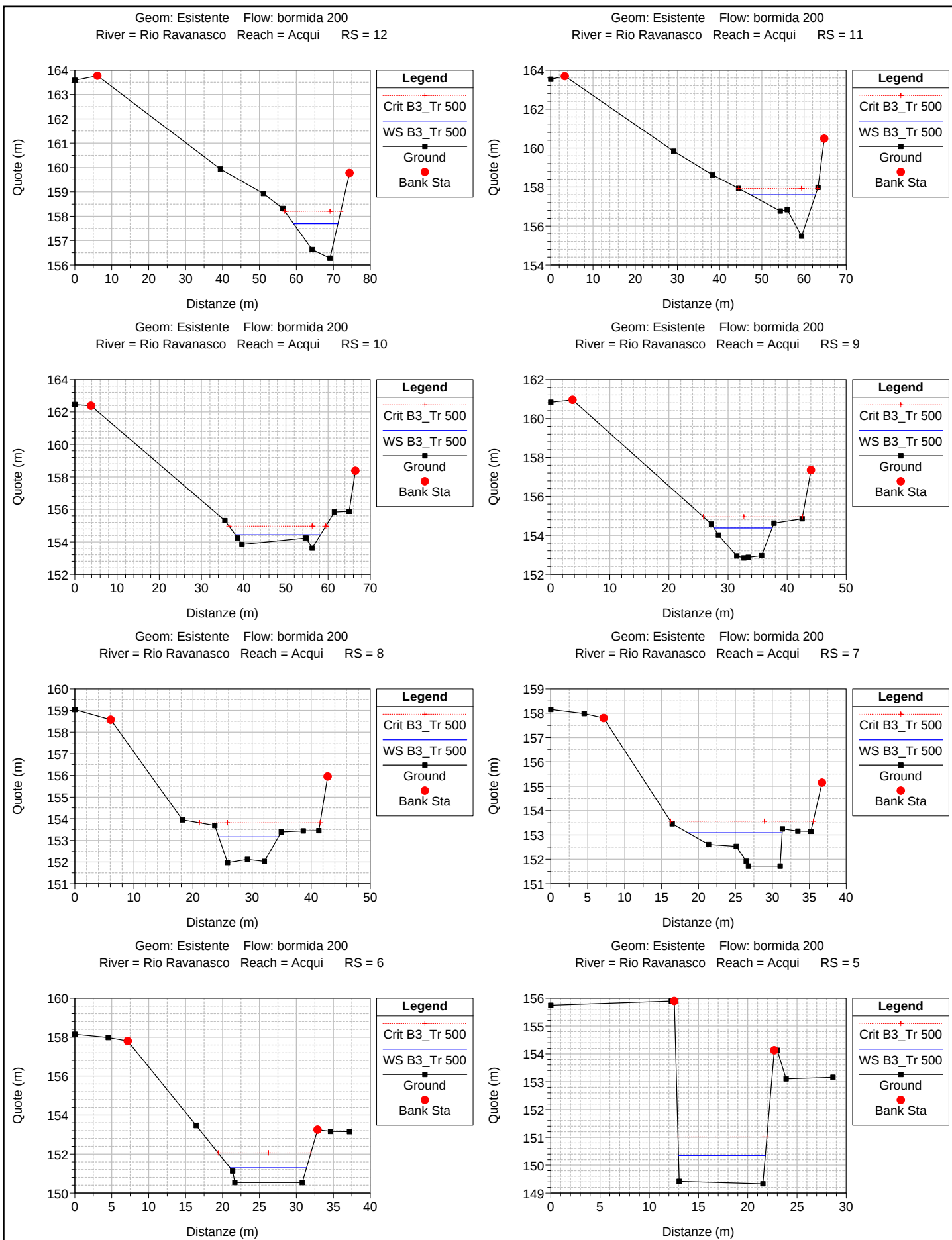
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	B3_Tr 500	163.48	162.89	0.59				57.00		14.83
Acqui	19	B3_Tr 500	163.21	163.07	0.14	0.03	0.05		57.00		17.88
Acqui	18	B3_Tr 500	163.13	162.53	0.60	0.02	0.09		57.00		13.86
Acqui	17	B3_Tr 500	162.77	159.50	3.27	0.10	0.27		57.00		12.30
Acqui	16	B3_Tr 500	161.80	159.81	1.99	0.59	0.38		57.00		14.86
Acqui	15	B3_Tr 500	161.30	159.89	1.41	0.32	0.17		57.00		14.04
Acqui	14	B3_Tr 500	160.75	158.32	2.43	0.45	0.10		57.00		11.82
Acqui	13	B3_Tr 500	159.65	158.29	1.36	0.78	0.32		57.00		14.95
Acqui	12	B3_Tr 500	159.28	157.70	1.58	0.35	0.02		57.00		12.02
Acqui	11	B3_Tr 500	158.64	157.60	1.03	0.48	0.16		57.00		15.43
Acqui	10	B3_Tr 500	156.95	154.44	2.51	1.54	0.15		57.00		20.17
Acqui	9	B3_Tr 500	155.90	154.38	1.52	0.76	0.30		57.00		9.85
Acqui	8	B3_Tr 500	155.14	153.17	1.98	0.72	0.05		57.00		10.13
Acqui	7	B3_Tr 500	154.66	153.10	1.56	0.36	0.12		57.00		12.77
Acqui	6	B3_Tr 500	154.45	151.29	3.16	0.05	0.16		57.00		10.34
Acqui	5	B3_Tr 500	152.66	150.35	2.31	1.53	0.25		57.00		8.82
Acqui	4	B3_Tr 500	152.06	151.80	0.27	0.03	0.02		57.00		9.34
Acqui	3	B3_Tr 500	152.02	151.58	0.44	0.03	0.05		57.00		7.23
Acqui	2.2	B3_Tr 500	151.94	151.02	0.92	0.00	0.00		57.00		7.38
Acqui	2.1	B3_Tr 500	151.77	149.18	2.58	0.01	0.17		57.00		7.38
Acqui	2.05	B3_Tr 500	151.52	148.31	3.21	0.18	0.06		57.00		8.95
Acqui	2	B3_Tr 500	151.43	148.45	2.97	0.02	0.07		57.00		7.85
Acqui	1.99	B3_Tr 500	149.21	147.73	1.49	1.77	0.45		57.00		7.85
Acqui	1.98	B3_Tr 500	147.82	146.45	1.37	1.36	0.03		57.00		7.85
Acqui	1.97	B3_Tr 500	147.26	145.86	1.40	0.56	0.00		57.00		7.85
Acqui	1.96	B3_Tr 500	146.87	145.47	1.40	0.39	0.00		57.00		7.85
Acqui	1.95	B3_Tr 500	146.50	145.10	1.40	0.37	0.00		57.00		7.85
Acqui	1.94	B3_Tr 500	146.18	144.78	1.40	0.32	0.00		57.00		7.85
Acqui	1.93	B3_Tr 500	146.00	144.60	1.41	0.17	0.00		57.00		7.85
Acqui	1.92	B3_Tr 500	145.00	144.50	0.50	0.09	0.05		57.00		7.85
Acqui	1.91	B3_Tr 500	144.86	144.52	0.34	0.06	0.03		57.00		7.85
Acqui	1.9	B3_Tr 500	144.77	144.52	0.25	0.03	0.01		57.00		6.53
Acqui	1.8	B3_Tr 500	144.73	144.51	0.22	0.02	0.00		57.00		4.75
Acqui	1.7	B3_Tr 500	144.70	144.50	0.20	0.04	0.00		57.00		2.39
Acqui	1.6	B3_Tr 500	144.66	144.47	0.20	0.15	0.02		57.00		0.29

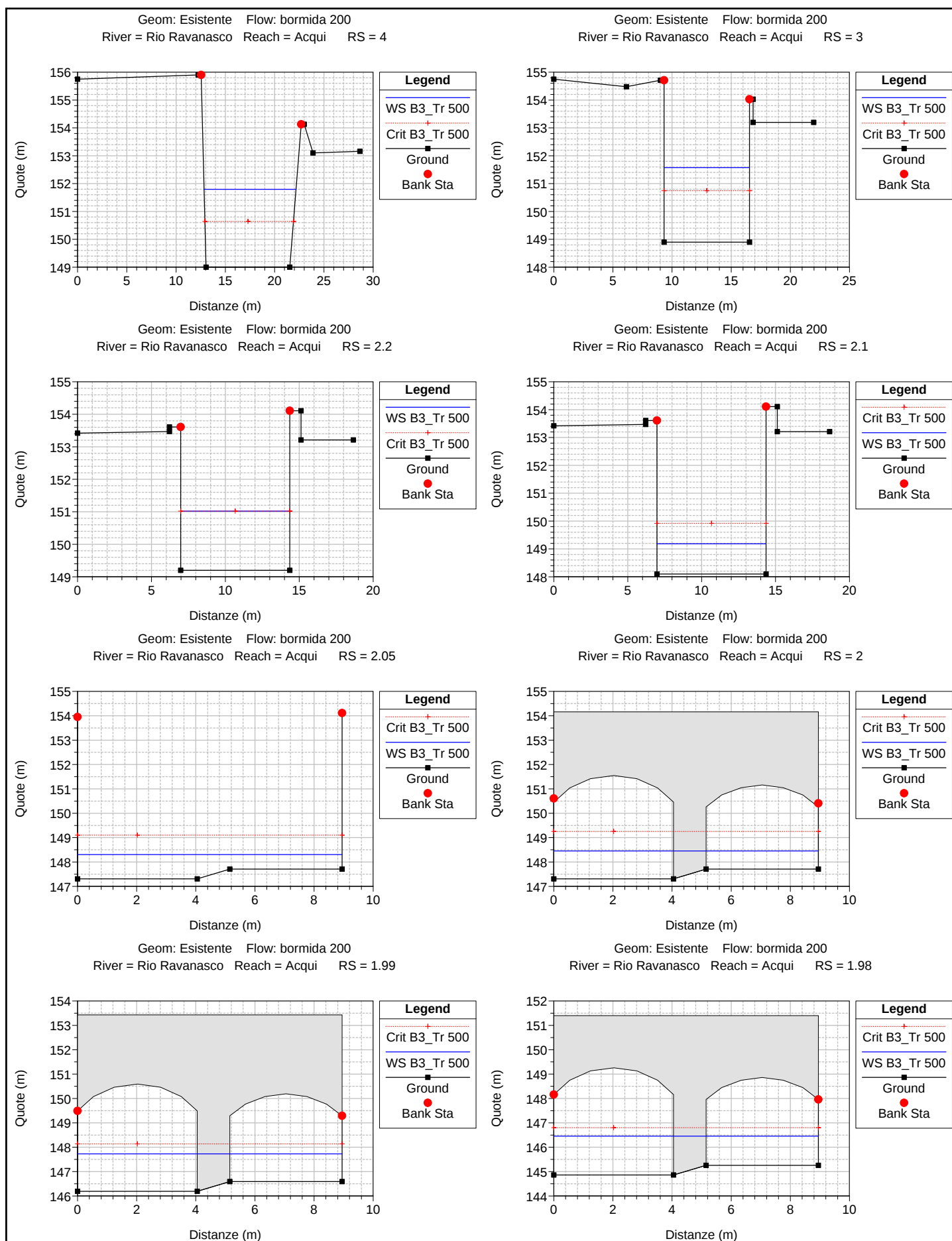
HEC-RAS Plan: Plan 10 River: Rio Ravanasco Reach: Acqui Profile: B3_Tr 500 (Continued)

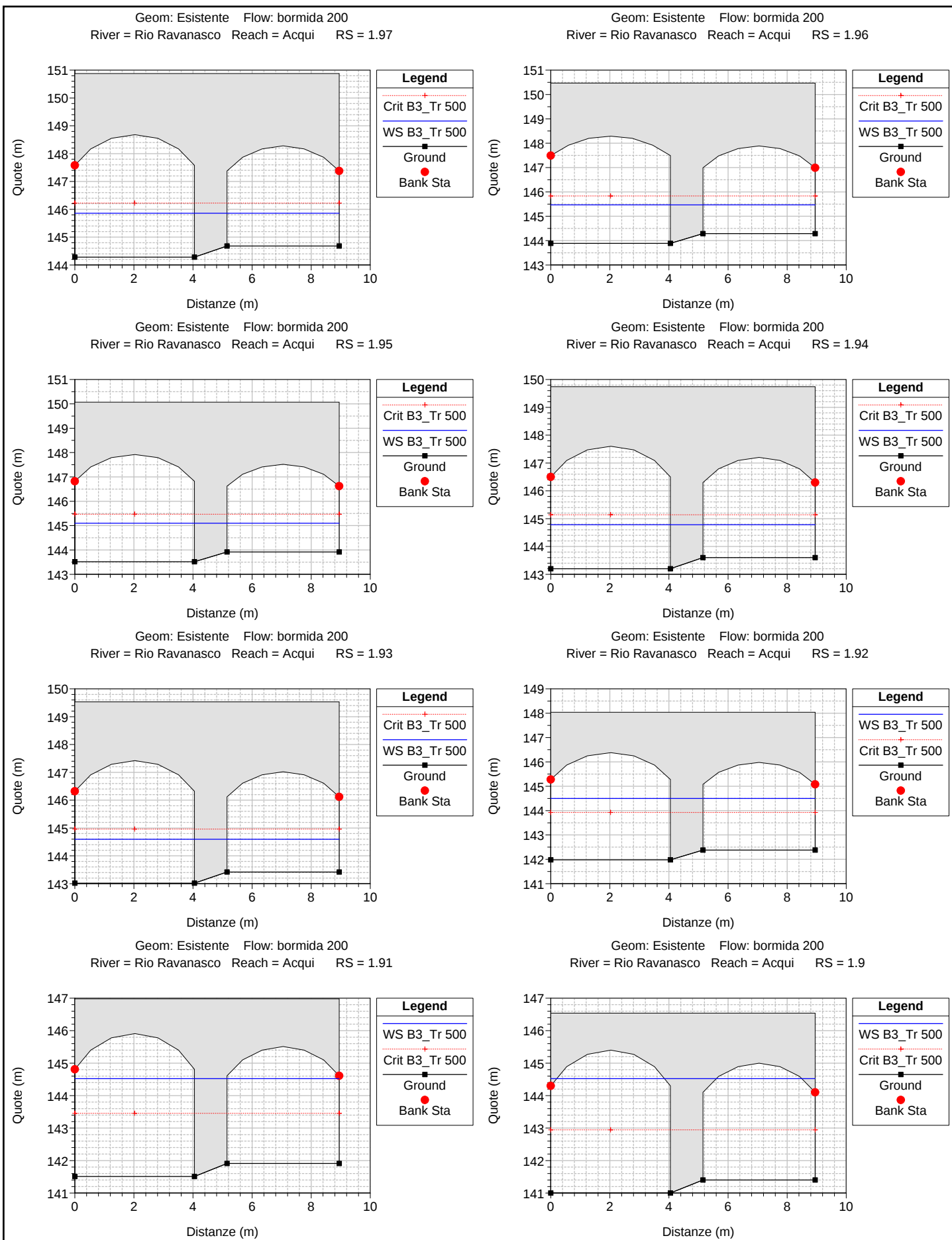
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	1.5	B3_Tr 500	144.49	144.37	0.12	0.00	0.02		57.00		
Acqui	1.4	B3_Tr 500	144.47	144.42	0.05	0.00	0.00		57.00		7.18
Acqui	1.3	B3_Tr 500	144.47	144.42	0.05	0.00	0.00		57.00		7.18
Acqui	1.2	B3_Tr 500	144.47	144.42	0.05	0.00	0.00		57.00		6.96
Acqui	1.1	B3_Tr 500	144.47	144.40	0.06	0.01	0.00		57.00		9.00
Acqui	1.05	B3_Tr 500	144.46	144.40	0.05	0.01	0.00		57.00		9.00
Acqui	1	B3_Tr 500	144.45	144.40	0.05				57.00		9.00

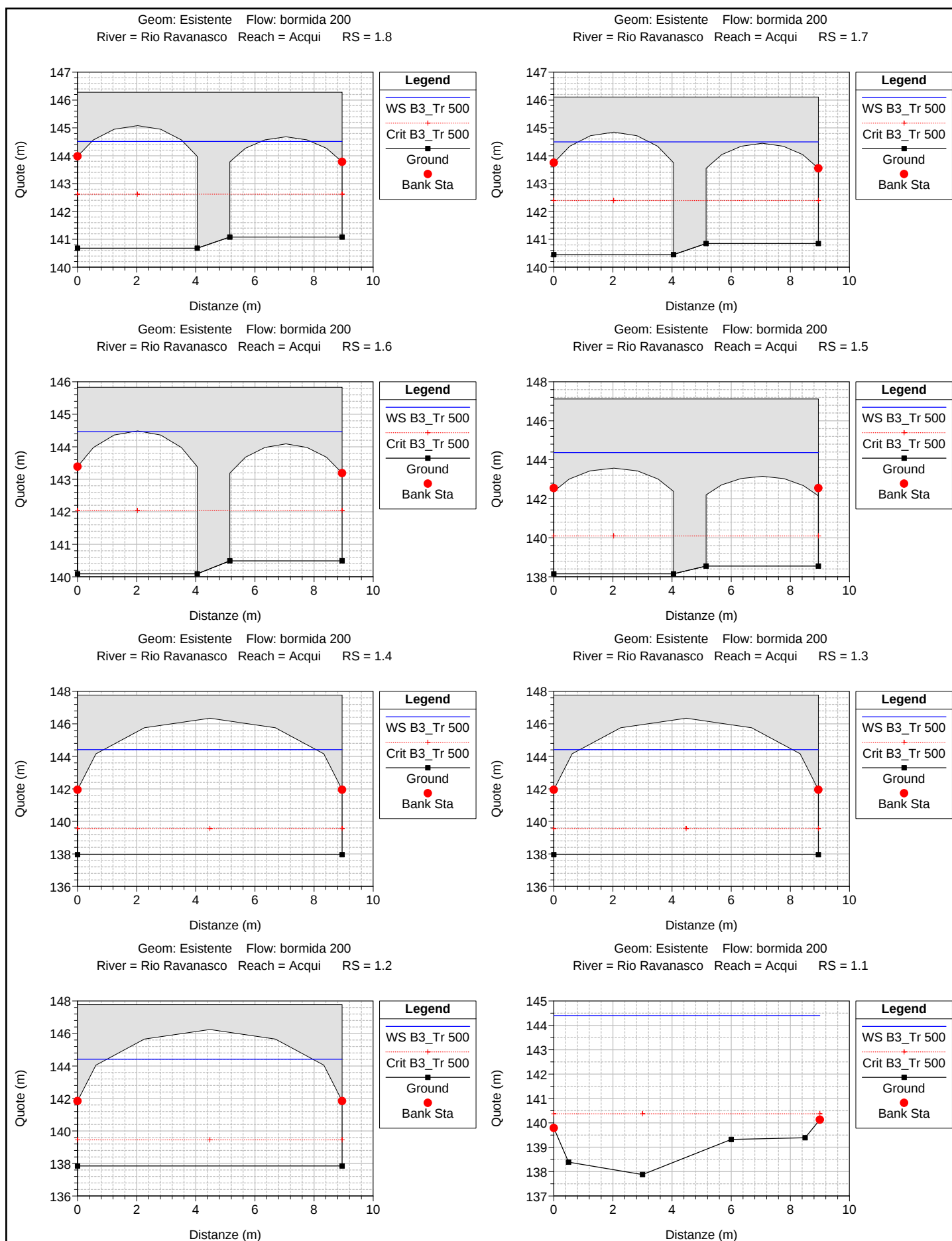




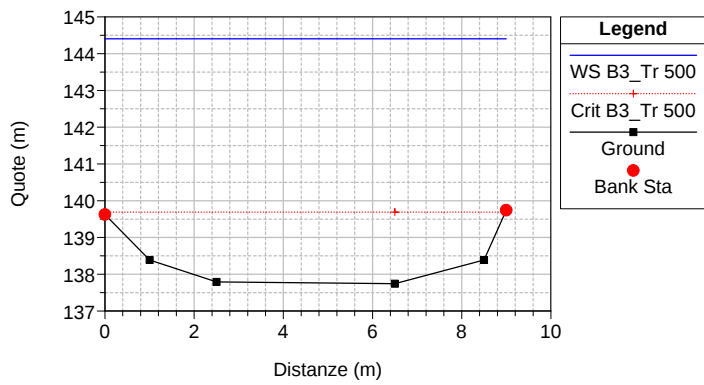




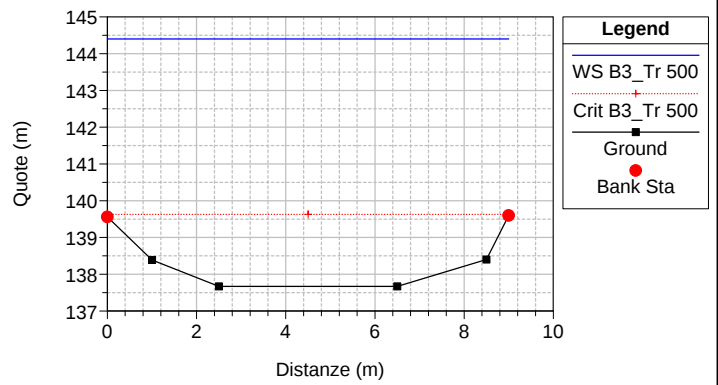




Geom: Esistente Flow: bormida 200
River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: Esistente Flow: bormida 200
River = Rio Ravanasco Reach = Acqui RS = 1



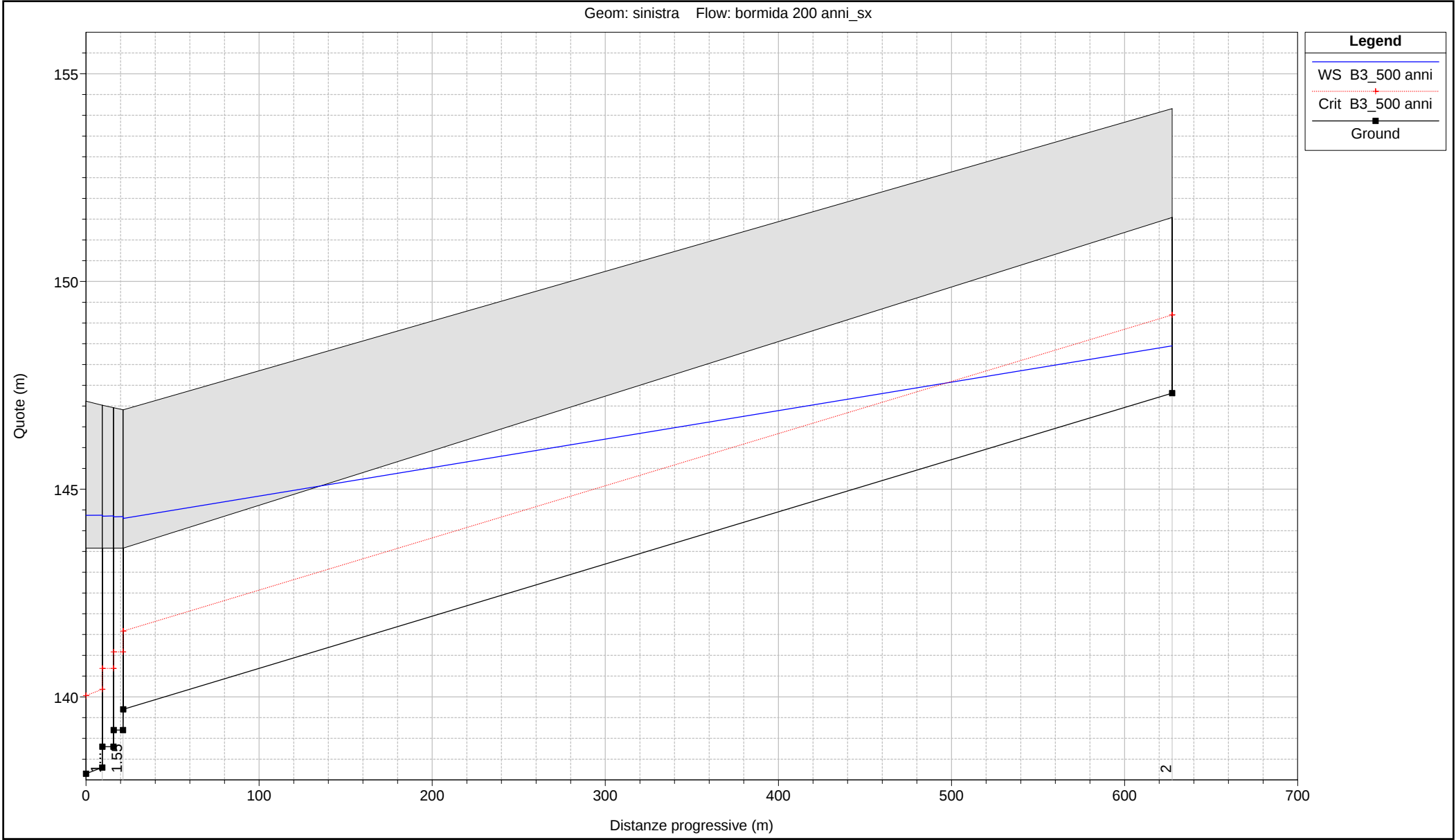
Dettaglio canalizzazione sinistra

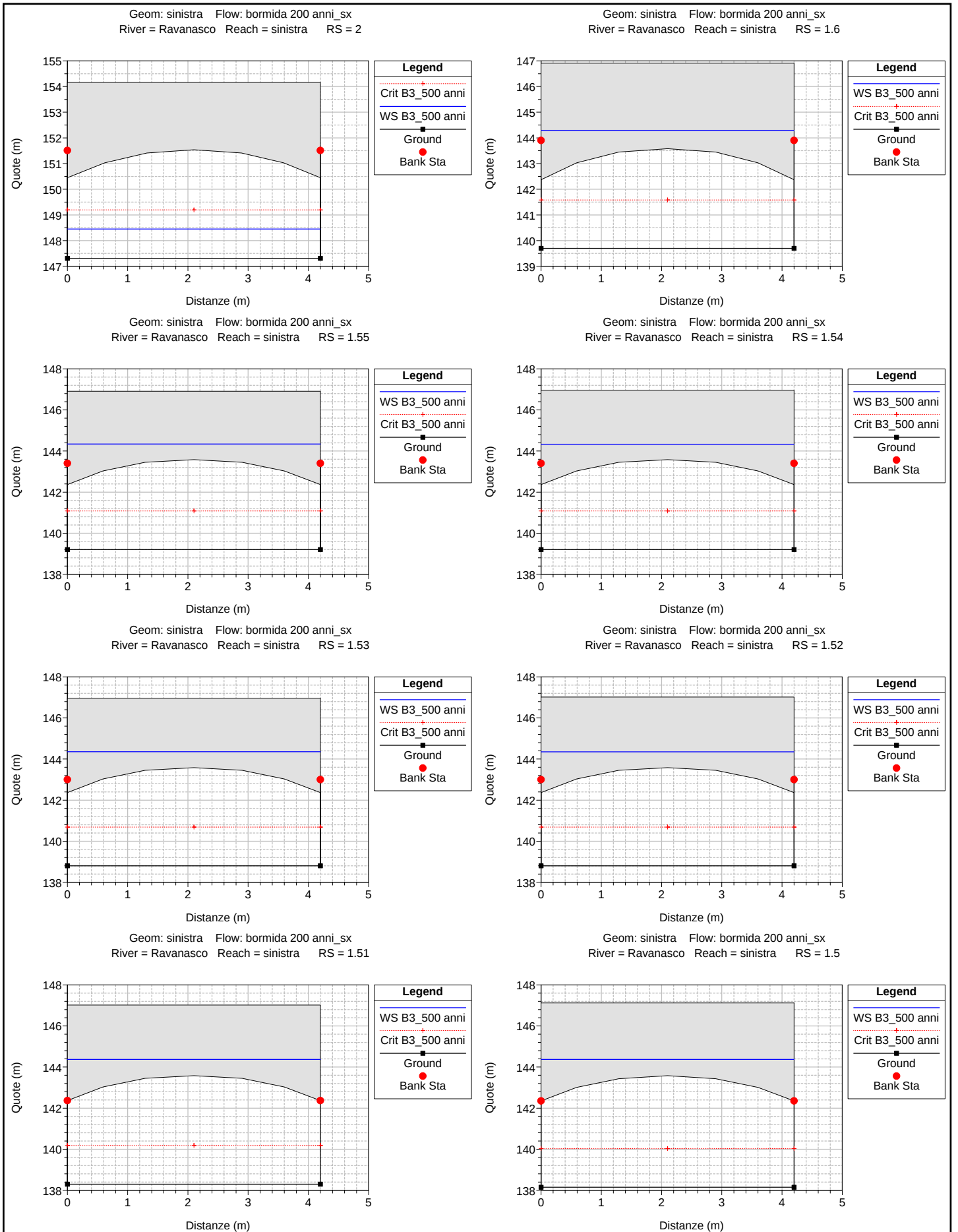
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: B3_500 anni

Reach	River Sta	Profile	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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
sinistra	2	B3_500 anni	34.00	147.31	148.45	149.20	151.02	0.030196	7.10	4.79	4.20	2.12
sinistra	1.6	B3_500 anni	34.00	139.70	144.29	141.58	144.57	0.002132	2.32	14.67		0.35
sinistra	1.55	B3_500 anni	34.00	139.20	144.34	141.08	144.55	0.001491	2.03	16.77		0.29
sinistra	1.54	B3_500 anni	34.00	139.20	144.33	141.08	144.54	0.001491	2.03	16.77		0.29
sinistra	1.53	B3_500 anni	34.00	138.80	144.36	140.69	144.53	0.001160	1.84	18.45		0.25
sinistra	1.52	B3_500 anni	34.00	138.80	144.35	140.69	144.52	0.001160	1.84	18.45		0.25
sinistra	1.51	B3_500 anni	34.00	138.30	144.37	140.18	144.51	0.000876	1.65	20.55		0.21
sinistra	1.5	B3_500 anni	34.00	138.15	144.37	140.03	144.50	0.000817	1.61	21.11		0.21

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: B3_500 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	B3_500 anni	151.02	148.45	2.57				34.00		4.20
sinistra	1.6	B3_500 anni	144.57	144.29	0.27	0.00	0.02		34.00		
sinistra	1.55	B3_500 anni	144.55	144.34	0.21	0.01	0.00		34.00		
sinistra	1.54	B3_500 anni	144.54	144.33	0.21	0.00	0.01		34.00		
sinistra	1.53	B3_500 anni	144.53	144.36	0.17	0.01	0.00		34.00		
sinistra	1.52	B3_500 anni	144.52	144.35	0.17	0.00	0.01		34.00		
sinistra	1.51	B3_500 anni	144.51	144.37	0.14	0.01	0.00		34.00		
sinistra	1.5	B3_500 anni	144.50	144.37	0.13				34.00		





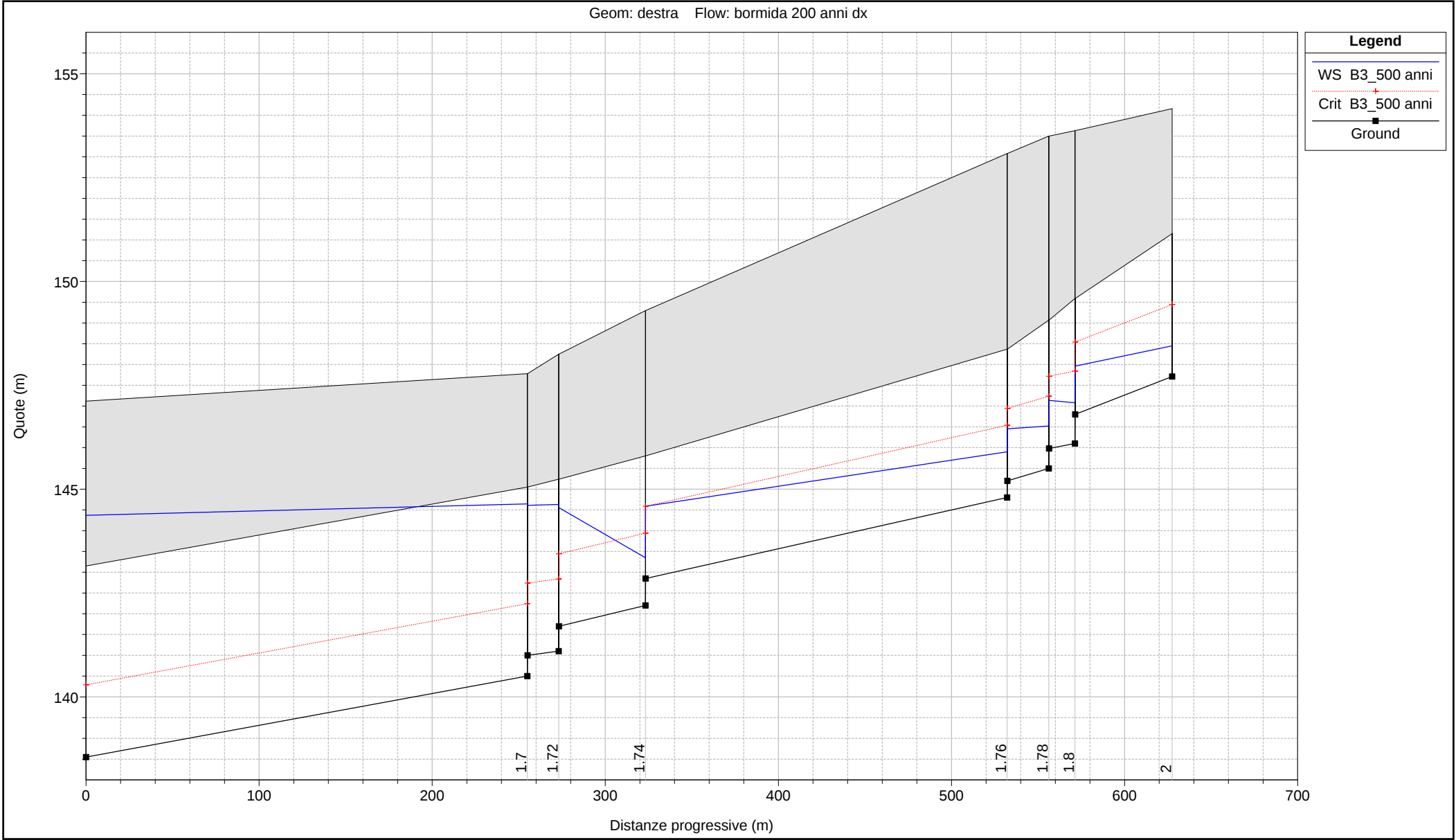
Dettaglio canalizzazione destra

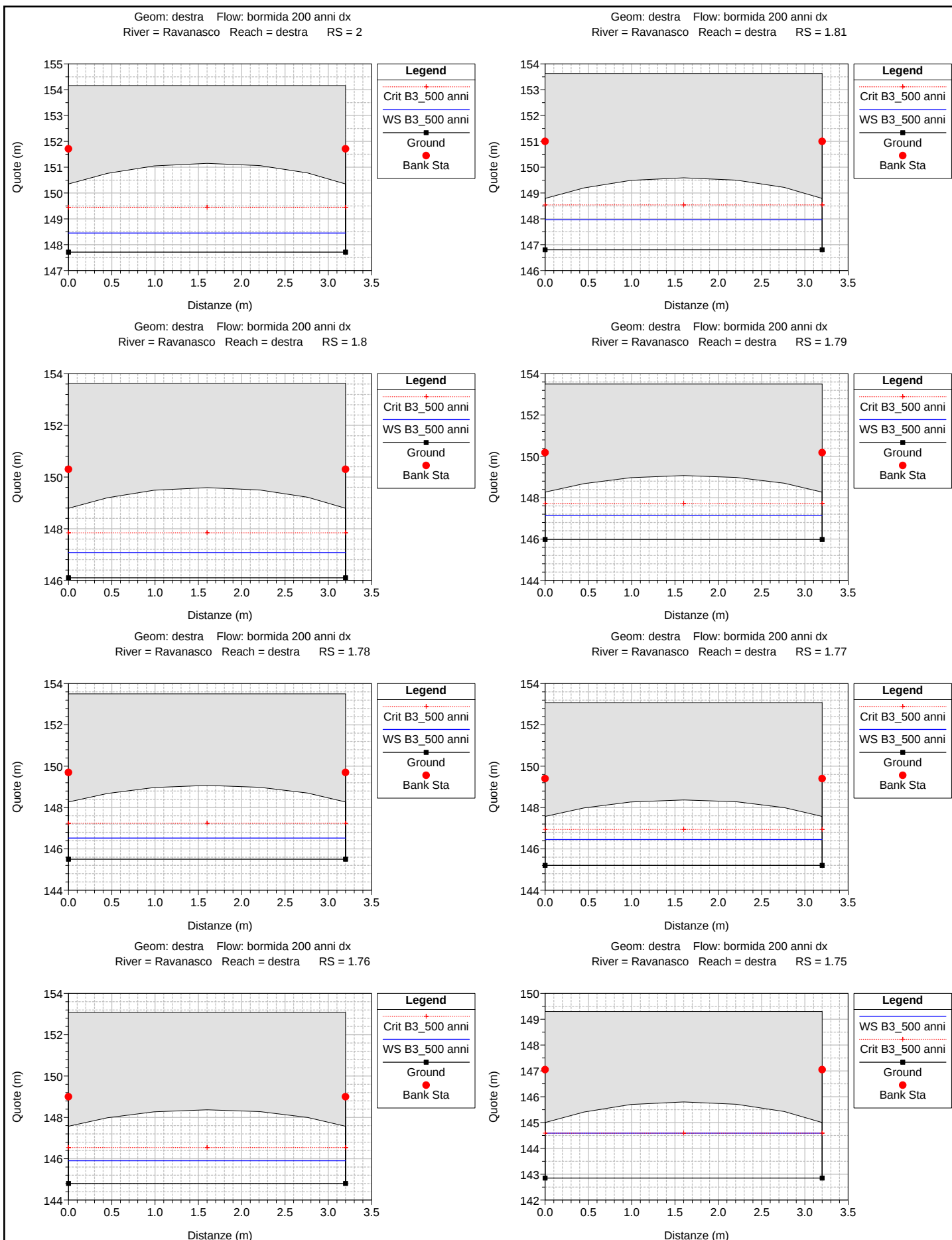
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: B3_500 anni

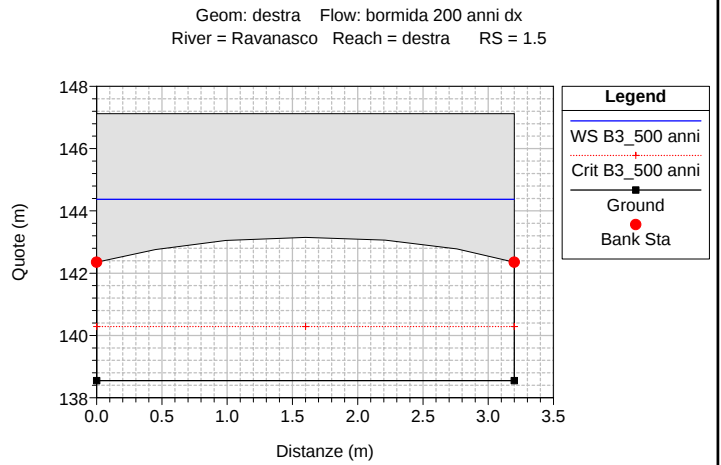
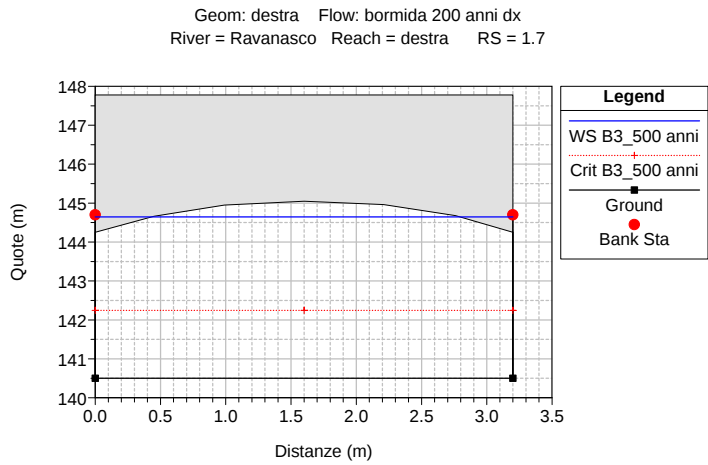
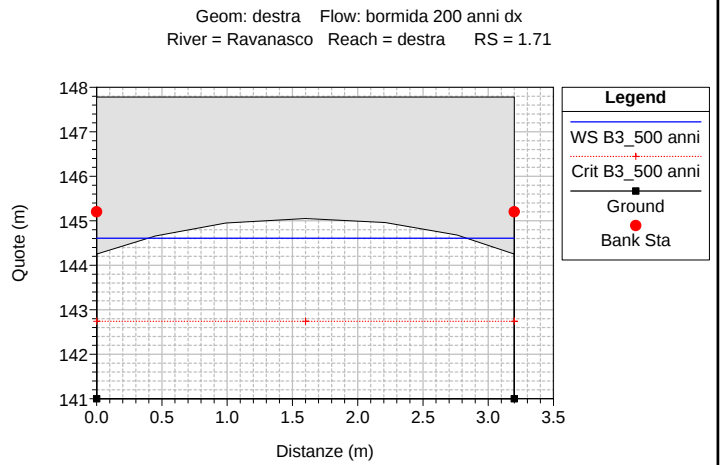
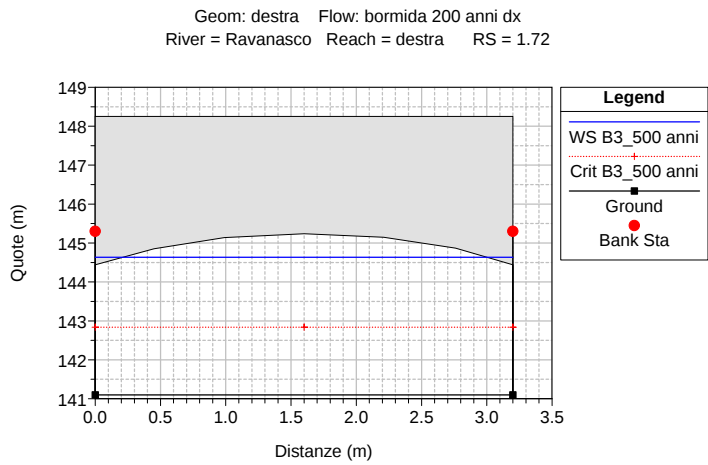
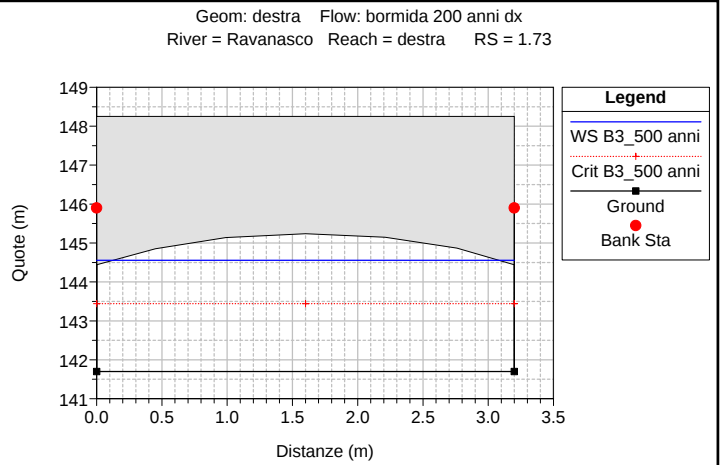
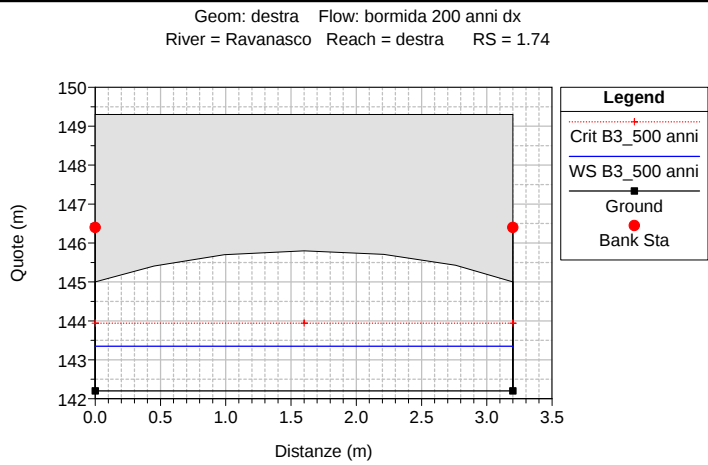
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
destra	2	B3_500 anni	23.00	147.71	148.45	149.45	153.26	0.093567	9.71	2.37	3.20	3.60
destra	1.81	B3_500 anni	23.00	146.80	147.96	148.54	149.91	0.025869	6.18	3.72	3.20	1.83
destra	1.8	B3_500 anni	23.00	146.10	147.08	147.84	149.82	0.041913	7.34	3.13	3.20	2.37
destra	1.79	B3_500 anni	23.00	145.98	147.14	147.72	149.10	0.026242	6.21	3.70	3.20	1.84
destra	1.78	B3_500 anni	23.00	145.50	146.52	147.24	149.04	0.037127	7.03	3.27	3.20	2.22
destra	1.77	B3_500 anni	23.00	145.20	146.45	146.94	148.13	0.021107	5.74	4.01	3.20	1.64
destra	1.76	B3_500 anni	23.00	144.80	145.90	146.54	148.08	0.030290	6.54	3.52	3.20	1.99
destra	1.75	B3_500 anni	23.00	142.85	144.59	144.59	145.46	0.008704	4.13	5.57	3.20	1.00
destra	1.74	B3_500 anni	23.00	142.20	143.35	143.94	145.34	0.026779	6.26	3.68	3.20	1.86
destra	1.73	B3_500 anni	23.00	141.70	144.55	143.44	144.88	0.002504	2.52	9.12	2.96	0.48
destra	1.72	B3_500 anni	23.00	141.10	144.63	142.84	144.84	0.001507	2.04	11.26	2.79	0.35
destra	1.71	B3_500 anni	23.00	141.00	144.61	142.74	144.82	0.001499	2.02	11.41	2.44	0.34
destra	1.7	B3_500 anni	23.00	140.50	144.64	142.24	144.80	0.001080	1.76	13.10	2.37	0.28
destra	1.5	B3_500 anni	23.00	138.55	144.37	140.29	144.51	0.001163	1.66	13.88		0.22

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: B3_500 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	B3_500 anni	153.26	148.45	4.81				23.00		3.20
destra	1.81	B3_500 anni	149.91	147.96	1.95	2.49	0.86		23.00		3.20
destra	1.8	B3_500 anni	149.82	147.08	2.75	0.00	0.08		23.00		3.20
destra	1.79	B3_500 anni	149.10	147.14	1.97	0.49	0.23		23.00		3.20
destra	1.78	B3_500 anni	149.04	146.52	2.52	0.00	0.06		23.00		3.20
destra	1.77	B3_500 anni	148.13	146.45	1.68	0.66	0.25		23.00		3.20
destra	1.76	B3_500 anni	148.08	145.90	2.18	0.00	0.05		23.00		3.20
destra	1.75	B3_500 anni	145.46	144.59	0.87	0.00	0.13		23.00		3.20
destra	1.74	B3_500 anni	145.34	143.35	1.99	0.00	0.11		23.00		3.20
destra	1.73	B3_500 anni	144.88	144.55	0.32	0.00	0.03		23.00		2.96
destra	1.72	B3_500 anni	144.84	144.63	0.21	0.03	0.00		23.00		2.79
destra	1.71	B3_500 anni	144.82	144.61	0.21	0.00	0.01		23.00		2.44
destra	1.7	B3_500 anni	144.80	144.64	0.16	0.29	0.01		23.00		2.37
destra	1.5	B3_500 anni	144.51	144.37	0.14				23.00		







Scenario C)

Progetto intervento R1

Rio Ravanasco Tempo di ritorno $T_r = 200$ anni

Portata totale $Q = 51 \text{ mc/s}$

Portata canalizzazione sinistra $Q = 30 \text{ mc/s}$

Portata canalizzazione destra $Q = 21 \text{ mc/s}$

Fiume Bormida Tempo di ritorno $T_r = 20$ anni

$Q = 1740 \text{ mc/s}$ livello idrico 142.76 m

HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: C_Tr 200

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
Acqui	20	C_Tr 200	51.00	160.59	162.80	162.80	163.35	0.004309	3.30	15.47	14.46	1.02
Acqui	19	C_Tr 200	51.00	159.95	162.95	161.95	163.08	0.000498	1.57	32.46	17.61	0.37
Acqui	18	C_Tr 200	51.00	160.63	162.43	162.43	163.00	0.004040	3.34	15.26	13.48	1.00
Acqui	17	C_Tr 200	51.00	158.37	159.45	160.12	162.64	0.060697	7.92	6.44	12.11	3.46
Acqui	16	C_Tr 200	51.00	158.11	159.76	160.26	161.64	0.033838	6.08	8.39	14.02	2.51
Acqui	15	C_Tr 200	51.00	158.04	159.83	160.24	161.15	0.017615	5.09	10.03	13.80	1.90
Acqui	14	C_Tr 200	51.00	156.98	158.26	158.88	160.59	0.033593	6.76	7.54	11.55	2.67
Acqui	13	C_Tr 200	51.00	156.45	158.24	158.66	159.49	0.017111	4.96	10.28	14.47	1.88
Acqui	12	C_Tr 200	51.00	156.28	157.63	158.11	159.12	0.016394	5.41	9.42	11.59	1.92
Acqui	11	C_Tr 200	51.00	155.48	157.55	157.84	158.49	0.010828	4.30	11.87	14.90	1.54
Acqui	10	C_Tr 200	51.00	153.61	154.41	154.91	156.83	0.073733	6.90	7.39	19.98	3.62
Acqui	9	C_Tr 200	51.00	152.68	154.42	154.92	155.72	0.010559	5.05	10.09	9.46	1.56
Acqui	8	C_Tr 200	51.00	151.81	152.79	153.35	154.86	0.031156	6.36	8.01	12.62	2.55
Acqui	7.1	C_Tr 200	51.00	150.96	151.85	152.50	154.70	0.051527	7.48	6.82	12.35	3.21
Acqui	7	C_Tr 200	51.00	150.80	151.96	152.54	153.91	0.020498	6.19	8.23	9.33	2.11
Acqui	6	C_Tr 200	51.00	149.95	150.95	151.68	153.77	0.035825	7.44	6.86	9.24	2.75
Acqui	5.1	C_Tr 200	51.00	149.80	152.62	151.53	152.79	0.000656	1.85	27.60	13.42	0.41
Acqui	5.05	C_Tr 200	51.00	149.30	152.61	151.14	152.77	0.000528	1.76	29.05	10.66	0.34
Acqui	5		Inl Struct									
Acqui	4	C_Tr 200	51.00	148.70	150.53	150.53	151.27	0.004302	3.79	13.45	8.94	0.99
Acqui	3	C_Tr 200	51.00	148.50	150.12	150.35	151.13	0.006830	4.45	11.47	8.65	1.23
Acqui	2.2	C_Tr 200	51.00	148.30	149.57	149.97	150.91	0.012281	5.14	9.92	10.03	1.65
Acqui	2.1	C_Tr 200	51.00	147.84	149.05	149.56	150.75	0.016698	5.78	8.82	9.39	1.91
Acqui	2.05	C_Tr 200	51.00	147.31	148.37	148.99	150.59	0.027132	6.61	7.72	8.95	2.27
Acqui	2	C_Tr 200	51.00	147.31	148.56	149.13	150.49	0.025042	6.16	8.28	7.85	1.76
Acqui	1.99	C_Tr 200	51.00	146.19	147.68	148.01	148.96	0.014045	5.02	10.15	7.85	1.32
Acqui	1.98	C_Tr 200	51.00	144.86	146.33	146.68	147.65	0.014625	5.10	10.00	7.85	1.34
Acqui	1.97	C_Tr 200	51.00	144.28	145.75	146.10	147.07	0.014666	5.10	9.99	7.85	1.35
Acqui	1.96	C_Tr 200	51.00	143.89	145.36	145.71	146.68	0.014558	5.09	10.02	7.85	1.34
Acqui	1.95	C_Tr 200	51.00	143.52	144.99	145.34	146.31	0.014558	5.09	10.02	7.85	1.34
Acqui	1.94	C_Tr 200	51.00	143.20	144.67	145.02	145.99	0.014563	5.09	10.02	7.85	1.34
Acqui	1.93	C_Tr 200	51.00	143.02	144.49	144.84	145.81	0.014676	5.10	9.99	7.85	1.35
Acqui	1.92	C_Tr 200	51.00	141.98	143.45	143.80	144.77	0.014611	5.10	10.01	7.85	1.34
Acqui	1.91	C_Tr 200	51.00	141.51	142.98	143.33	144.30	0.014698	5.11	9.99	7.85	1.35
Acqui	1.9	C_Tr 200	51.00	141.00	142.47	142.82	143.79	0.014427	5.07	10.05	7.85	1.33

HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: C_Tr 200 (Continued)

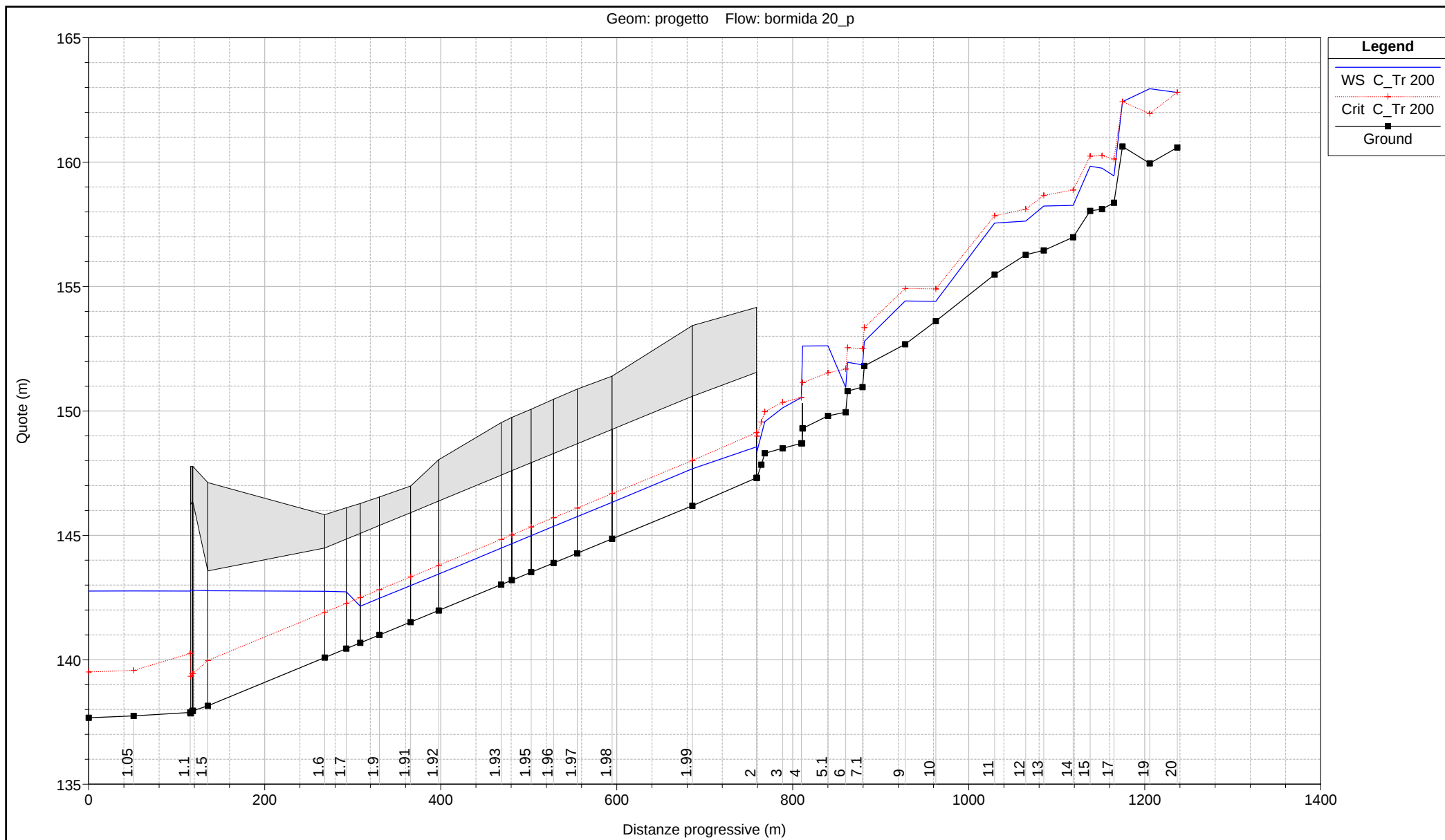
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Acqui	1.8	C_Tr 200	51.00	140.68	142.15	142.50	143.47	0.014487	5.08	10.04	7.85	1.34
Acqui	1.7	C_Tr 200	51.00	140.45	142.73	142.27	143.22	0.003821	3.12	16.37	7.85	0.66
Acqui	1.6	C_Tr 200	51.00	140.09	142.75	141.91	143.11	0.002452	2.63	19.39	7.85	0.51
Acqui	1.5	C_Tr 200	51.00	138.15	142.77	139.97	142.89	0.000624	1.49	34.30	5.86	0.22
Acqui	1.4	C_Tr 200	51.00	137.95	142.80	139.44	142.87	0.000183	1.18	43.19	8.47	0.17
Acqui	1.3	C_Tr 200	51.00	137.95	142.80	139.44	142.87	0.000183	1.18	43.19	8.47	0.17
Acqui	1.2	C_Tr 200	51.00	137.85	142.80	139.34	142.87	0.000173	1.16	44.09	8.41	0.17
Acqui	1.1	C_Tr 200	51.00	137.88	142.76	140.25	142.87	0.000283	1.42	35.91	9.00	0.23
Acqui	1.05	C_Tr 200	51.00	137.74	142.77	139.57	142.84	0.000175	1.21	42.02	9.00	0.18
Acqui	1	C_Tr 200	51.00	137.67	142.76	139.51	142.83	0.000169	1.20	42.57	9.00	0.18

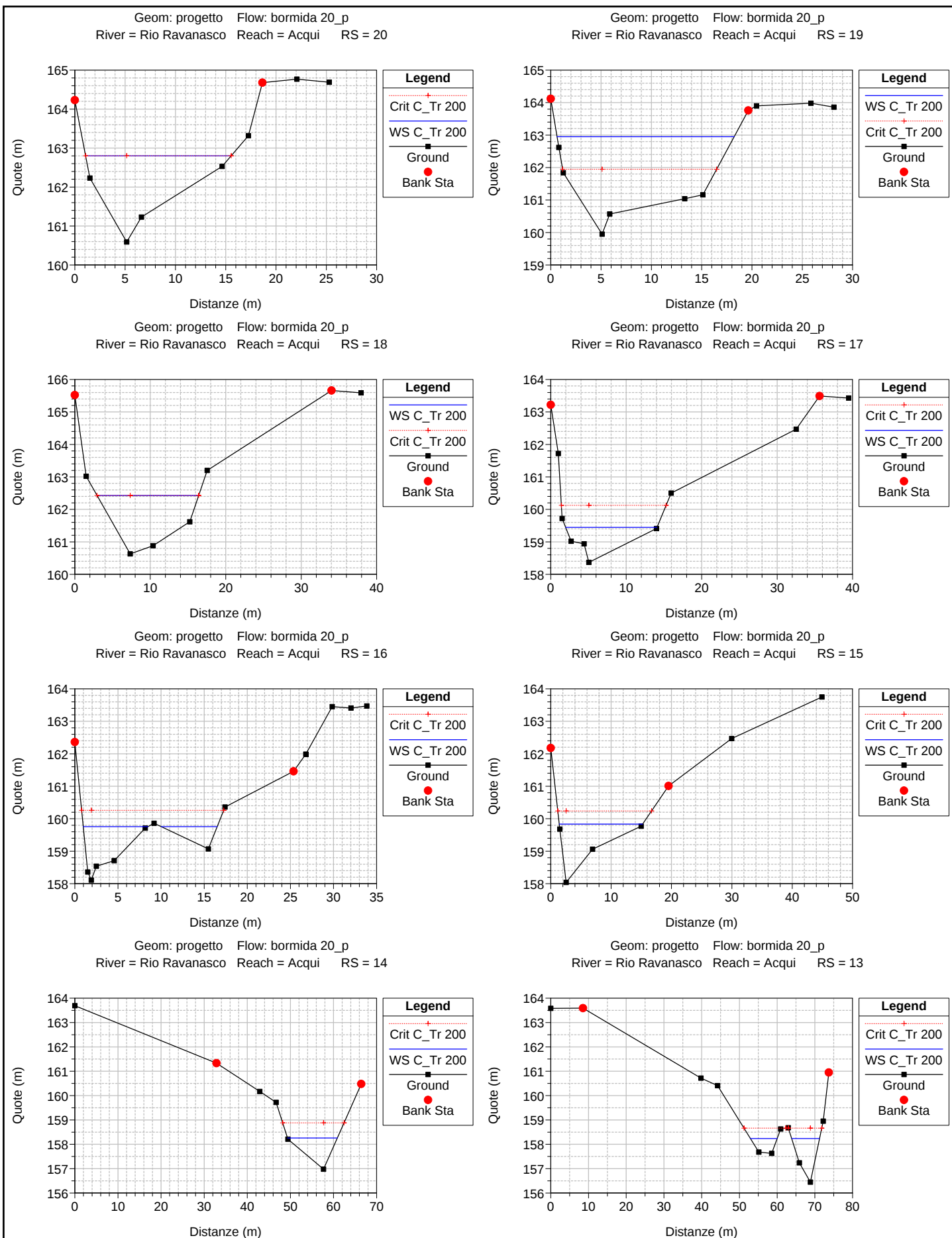
HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: C_Tr 200

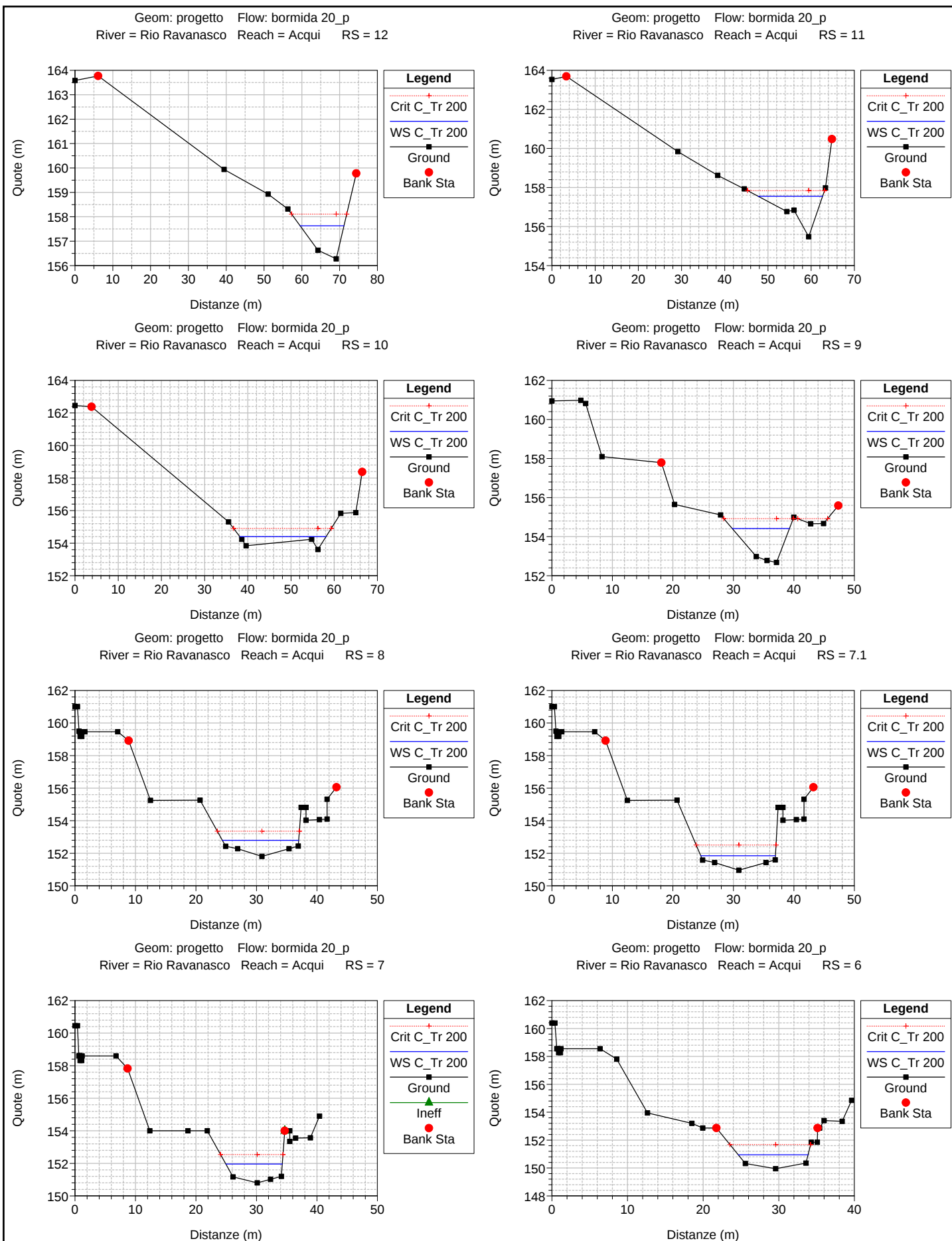
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	20	C_Tr 200	163.35	162.80	0.55				51.00		14.46
Acqui	19	C_Tr 200	163.08	162.95	0.13	0.03	0.04		51.00		17.61
Acqui	18	C_Tr 200	163.00	162.43	0.57	0.02	0.09		51.00		13.48
Acqui	17	C_Tr 200	162.64	159.45	3.19	0.10	0.26		51.00		12.11
Acqui	16	C_Tr 200	161.64	159.76	1.88	0.60	0.39		51.00		14.02
Acqui	15	C_Tr 200	161.15	159.83	1.32	0.32	0.17		51.00		13.80
Acqui	14	C_Tr 200	160.59	158.26	2.33	0.46	0.10		51.00		11.55
Acqui	13	C_Tr 200	159.49	158.24	1.25	0.78	0.32		51.00		14.47
Acqui	12	C_Tr 200	159.12	157.63	1.49	0.34	0.02		51.00		11.59
Acqui	11	C_Tr 200	158.49	157.55	0.94	0.47	0.17		51.00		14.90
Acqui	10	C_Tr 200	156.83	154.41	2.43	1.51	0.15		51.00		19.98
Acqui	9	C_Tr 200	155.72	154.42	1.30	0.78	0.34		51.00		9.46
Acqui	8	C_Tr 200	154.86	152.79	2.06	0.78	0.08		51.00		12.62
Acqui	7.1	C_Tr 200	154.70	151.85	2.85	0.08	0.08		51.00		12.35
Acqui	7	C_Tr 200	153.91	151.96	1.95	0.52	0.27		51.00		9.33
Acqui	6	C_Tr 200	153.77	150.95	2.82	0.06	0.09		51.00		9.24
Acqui	5.1	C_Tr 200	152.79	152.62	0.17	0.02	0.01		51.00		13.42
Acqui	5.05	C_Tr 200	152.77	152.61	0.16				51.00		10.66
Acqui	5		Inl Struct								
Acqui	4	C_Tr 200	151.27	150.53	0.73	0.09	0.00		51.00		8.94
Acqui	3	C_Tr 200	151.13	150.12	1.01	0.11	0.03		51.00		8.65
Acqui	2.2	C_Tr 200	150.91	149.57	1.35	0.18	0.03		51.00		10.03
Acqui	2.1	C_Tr 200	150.75	149.05	1.70	0.06	0.11		51.00		9.39
Acqui	2.05	C_Tr 200	150.59	148.37	2.23	0.10	0.05		51.00		8.95
Acqui	2	C_Tr 200	150.49	148.56	1.93	0.01	0.09		51.00		7.85
Acqui	1.99	C_Tr 200	148.96	147.68	1.29	1.34	0.19		51.00		7.85
Acqui	1.98	C_Tr 200	147.65	146.33	1.32	1.31	0.00		51.00		7.85
Acqui	1.97	C_Tr 200	147.07	145.75	1.33	0.58	0.00		51.00		7.85
Acqui	1.96	C_Tr 200	146.68	145.36	1.32	0.39	0.00		51.00		7.85
Acqui	1.95	C_Tr 200	146.31	144.99	1.32	0.37	0.00		51.00		7.85
Acqui	1.94	C_Tr 200	145.99	144.67	1.32	0.32	0.00		51.00		7.85
Acqui	1.93	C_Tr 200	145.81	144.49	1.33	0.18	0.00		51.00		7.85
Acqui	1.92	C_Tr 200	144.77	143.45	1.32	1.04	0.00		51.00		7.85
Acqui	1.91	C_Tr 200	144.30	142.98	1.33	0.47	0.00		51.00		7.85
Acqui	1.9	C_Tr 200	143.79	142.47	1.31	0.52	0.01		51.00		7.85

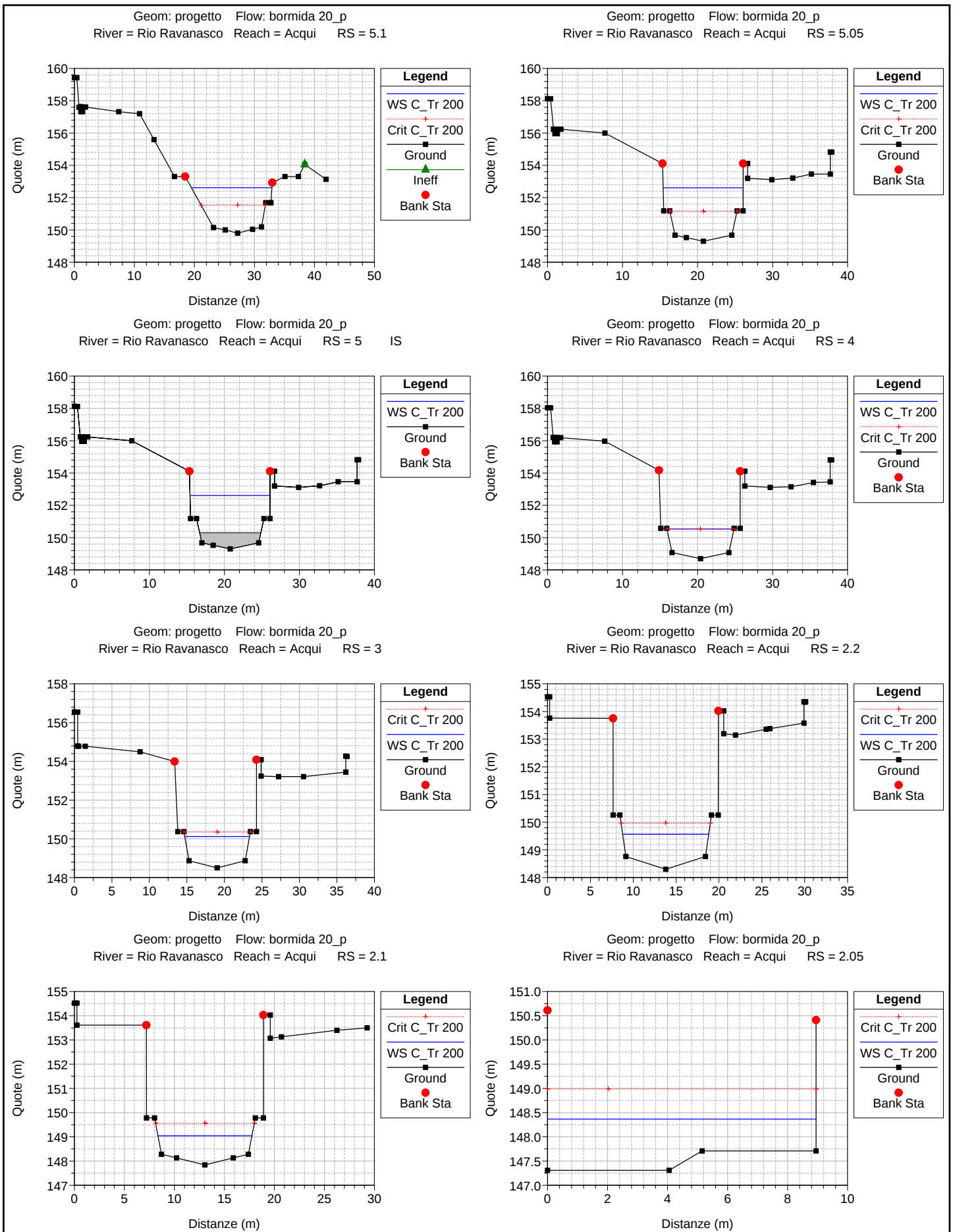
HEC-RAS Plan: Plan 11 River: Rio Ravanasco Reach: Acqui Profile: C_Tr 200 (Continued)

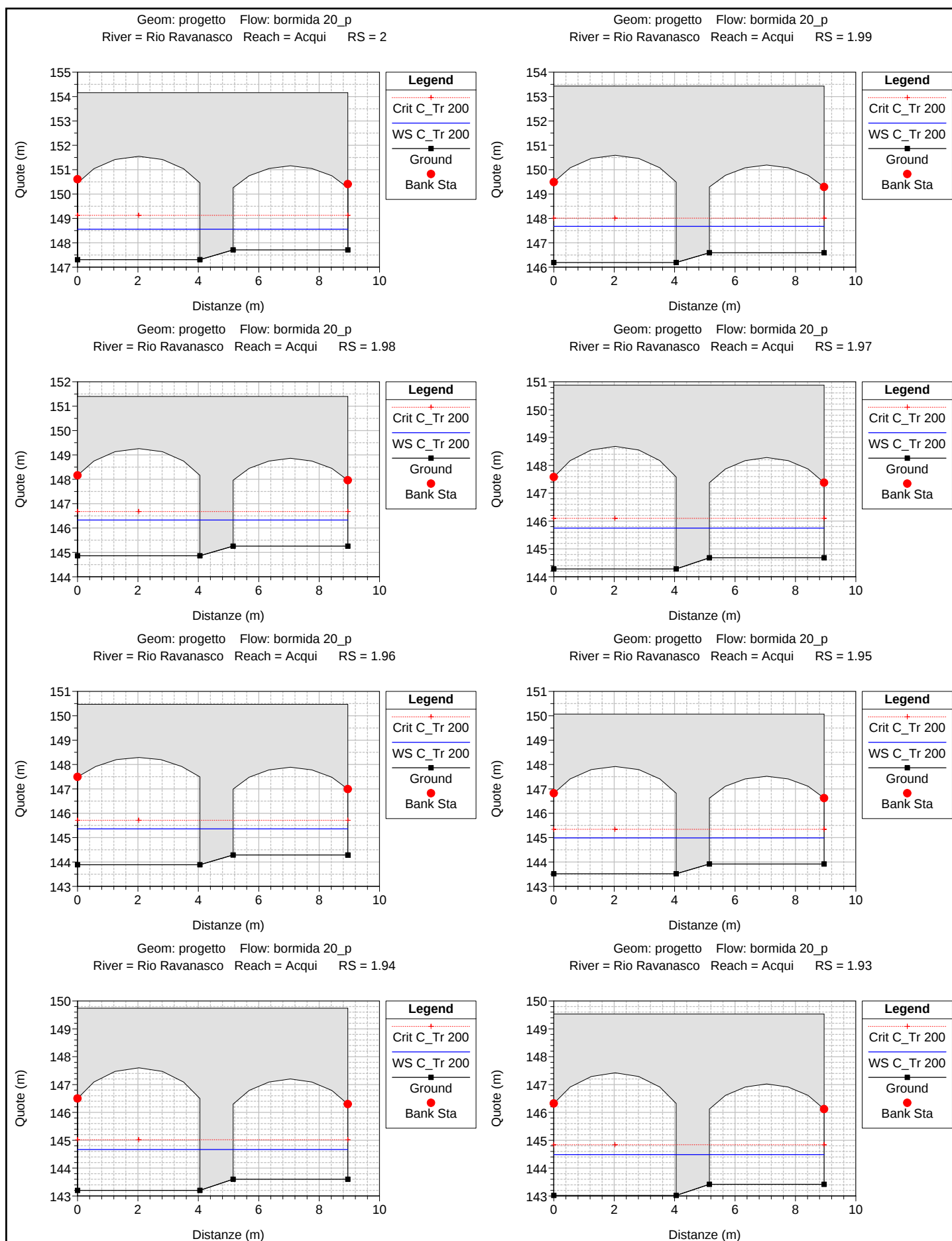
Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)
Acqui	1.8	C_Tr 200	143.47	142.15	1.32	0.32	0.00		51.00		7.85
Acqui	1.7	C_Tr 200	143.22	142.73	0.49	0.07	0.04		51.00		7.85
Acqui	1.6	C_Tr 200	143.11	142.75	0.35	0.15	0.07		51.00		7.85
Acqui	1.5	C_Tr 200	142.89	142.77	0.11	0.01	0.01		51.00		5.86
Acqui	1.4	C_Tr 200	142.87	142.80	0.07	0.00	0.00		51.00		8.47
Acqui	1.3	C_Tr 200	142.87	142.80	0.07	0.00	0.00		51.00		8.47
Acqui	1.2	C_Tr 200	142.87	142.80	0.07	0.00	0.00		51.00		8.41
Acqui	1.1	C_Tr 200	142.87	142.76	0.10	0.01	0.01		51.00		9.00
Acqui	1.05	C_Tr 200	142.84	142.77	0.08	0.01	0.00		51.00		9.00
Acqui	1	C_Tr 200	142.83	142.76	0.07				51.00		9.00

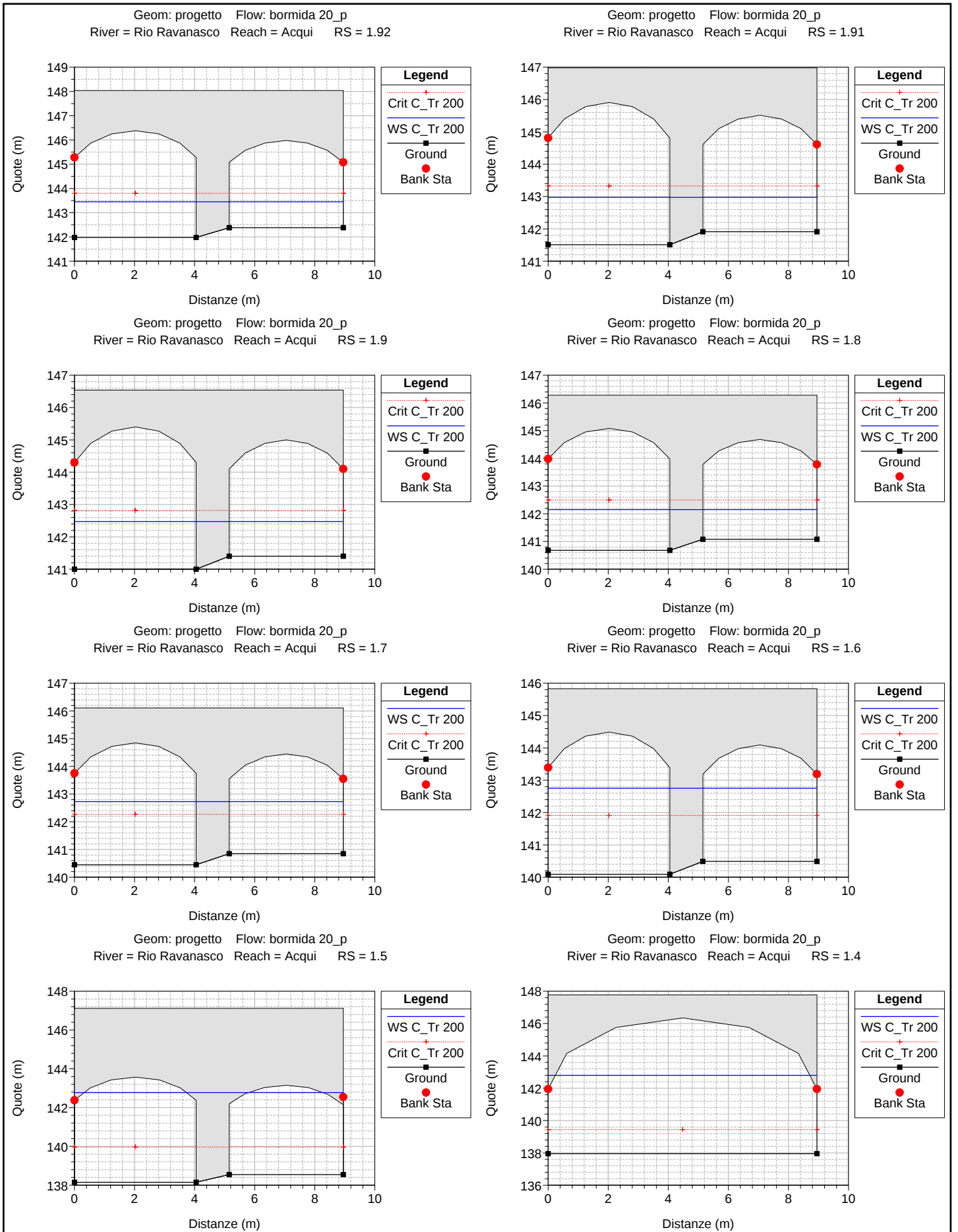




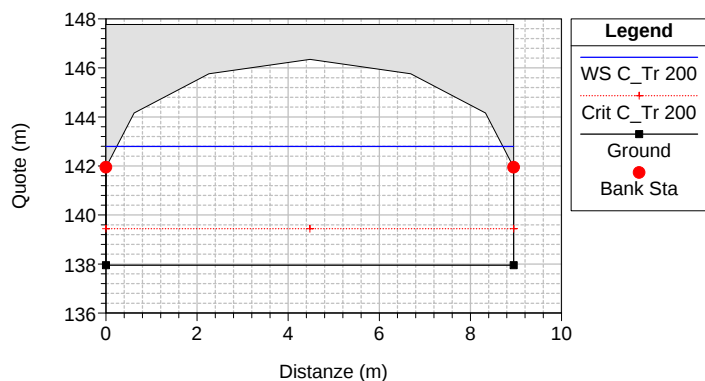




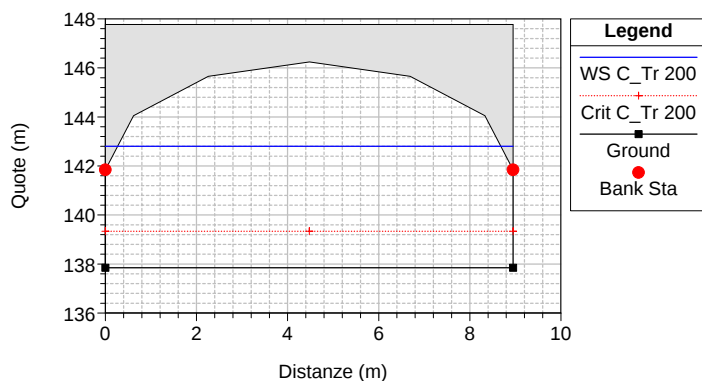




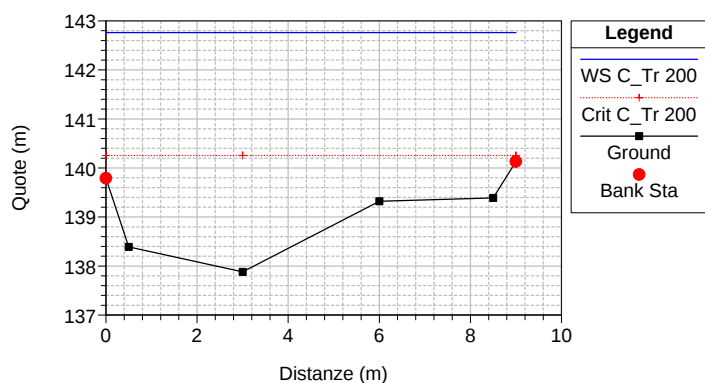
Geom: progetto Flow: bormida 20_p
River = Rio Ravanasco Reach = Acqui RS = 1.3



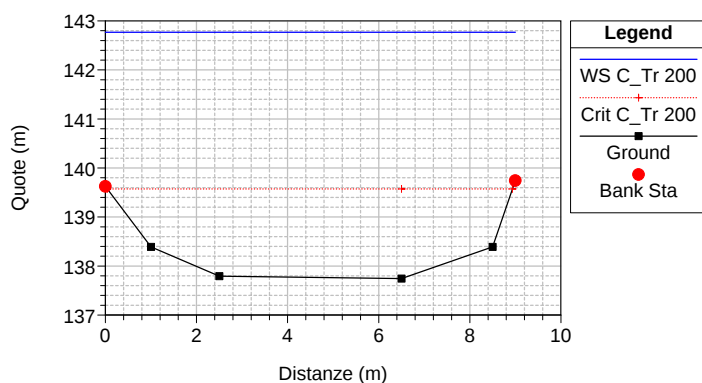
Geom: progetto Flow: bormida 20_p
River = Rio Ravanasco Reach = Acqui RS = 1.2



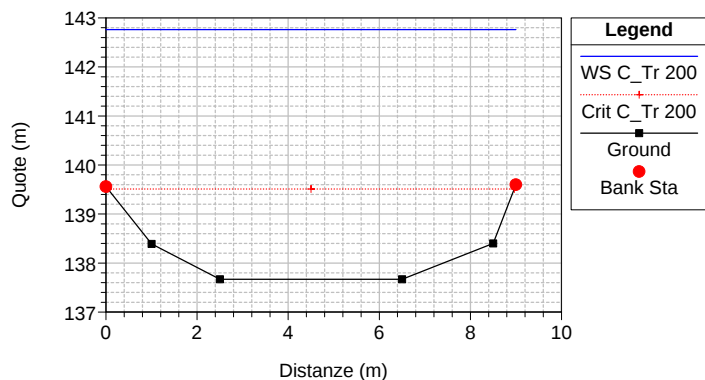
Geom: progetto Flow: bormida 20_p
River = Rio Ravanasco Reach = Acqui RS = 1.1



Geom: progetto Flow: bormida 20_p
River = Rio Ravanasco Reach = Acqui RS = 1.05



Geom: progetto Flow: bormida 20_p
River = Rio Ravanasco Reach = Acqui RS = 1



Dettaglio canalizzazione sinistra

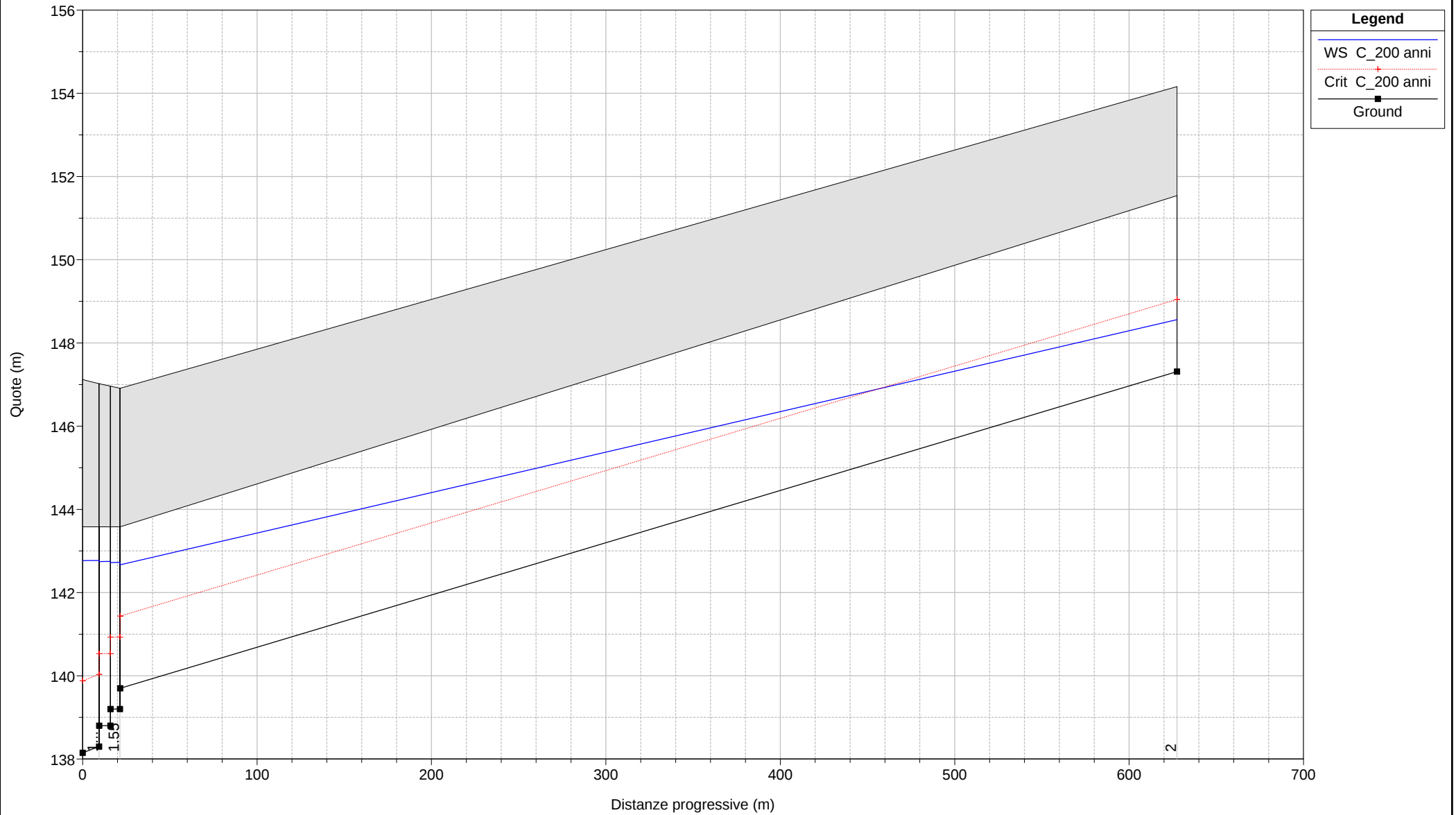
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: C_200 anni

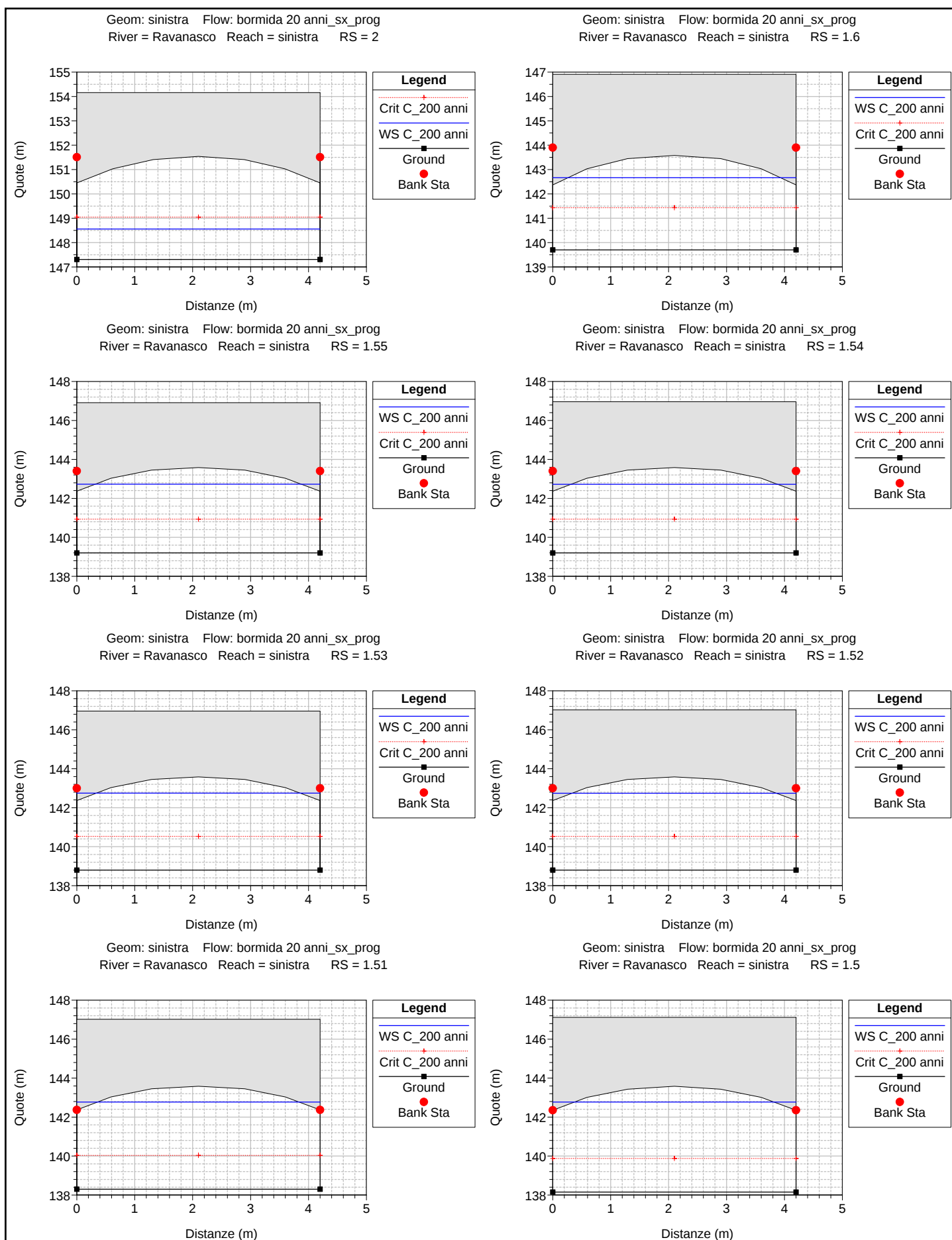
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
sinistra	2	C_200 anni	30.00	147.31	148.56	149.04	150.22	0.018079	5.71	5.25	4.20	1.63
sinistra	1.6	C_200 anni	30.00	139.70	142.67	141.43	142.97	0.001847	2.42	12.38	3.67	0.45
sinistra	1.55	C_200 anni	30.00	139.20	142.73	140.93	142.94	0.001201	2.04	14.70	3.56	0.35
sinistra	1.54	C_200 anni	30.00	139.20	142.72	140.93	142.93	0.001205	2.04	14.67	3.57	0.35
sinistra	1.53	C_200 anni	30.00	138.80	142.75	140.53	142.92	0.000907	1.82	16.46	3.51	0.29
sinistra	1.52	C_200 anni	30.00	138.80	142.74	140.53	142.91	0.000909	1.82	16.44	3.53	0.29
sinistra	1.51	C_200 anni	30.00	138.30	142.77	140.03	142.90	0.000669	1.61	18.63	3.48	0.24
sinistra	1.5	C_200 anni	30.00	138.15	142.77	139.88	142.89	0.000620	1.56	19.25	3.44	0.23

HEC-RAS Plan: Plan 15 River: Ravanasco Reach: sinistra Profile: C_200 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
sinistra	2	C_200 anni	150.22	148.56	1.66				30.00		4.20
sinistra	1.6	C_200 anni	142.97	142.67	0.30	0.00	0.03		30.00		3.67
sinistra	1.55	C_200 anni	142.94	142.73	0.21	0.01	0.00		30.00		3.56
sinistra	1.54	C_200 anni	142.93	142.72	0.21	0.00	0.01		30.00		3.57
sinistra	1.53	C_200 anni	142.92	142.75	0.17	0.01	0.00		30.00		3.51
sinistra	1.52	C_200 anni	142.91	142.74	0.17	0.00	0.01		30.00		3.53
sinistra	1.51	C_200 anni	142.90	142.77	0.13	0.01	0.00		30.00		3.48
sinistra	1.5	C_200 anni	142.89	142.77	0.12				30.00		3.44

Geom: sinistra Flow: bormida 20 anni_sx_prog





Dettaglio canalizzazione destra

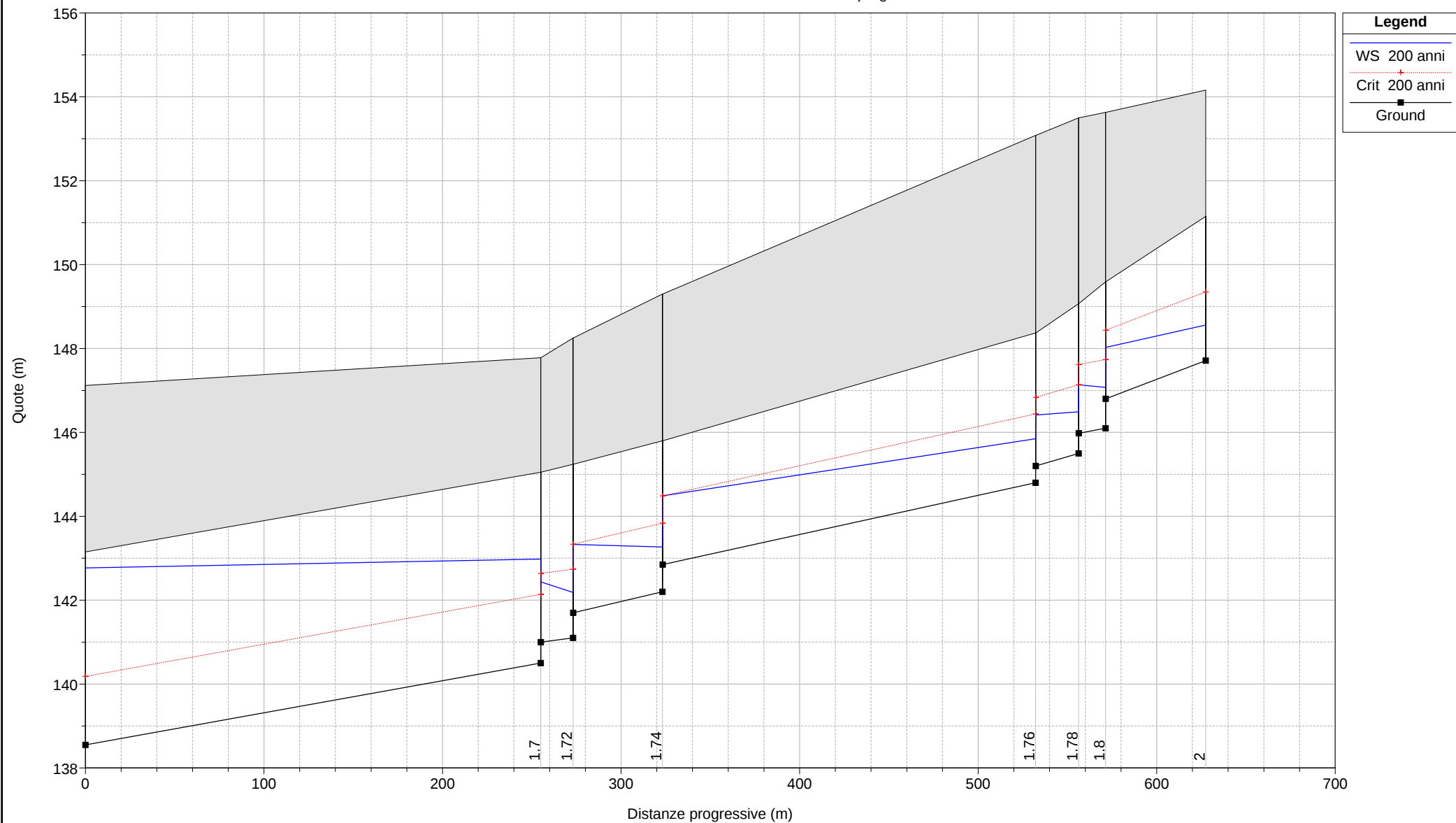
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: 200 anni

Reach	River Sta	Profile	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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
destra	2	200 anni	21.00	147.71	148.56	149.35	151.60	0.052244	7.72	2.72	3.20	2.67
destra	1.81	200 anni	21.00	146.80	148.03	148.44	149.49	0.018654	5.35	3.92	3.20	1.54
destra	1.8	200 anni	21.00	146.10	147.07	147.74	149.39	0.035658	6.75	3.11	3.20	2.19
destra	1.79	200 anni	21.00	145.98	147.13	147.62	148.78	0.022000	5.68	3.70	3.20	1.69
destra	1.78	200 anni	21.00	145.50	146.49	147.14	148.72	0.033598	6.61	3.18	3.20	2.12
destra	1.77	200 anni	21.00	145.20	146.42	146.84	147.90	0.019104	5.40	3.89	3.20	1.56
destra	1.76	200 anni	21.00	144.80	145.85	146.44	147.85	0.028830	6.26	3.35	3.20	1.95
destra	1.75	200 anni	21.00	142.85	144.49	144.49	145.31	0.008502	4.00	5.24	3.20	1.00
destra	1.74	200 anni	21.00	142.20	143.27	143.84	145.19	0.027404	6.15	3.42	3.20	1.90
destra	1.73	200 anni	21.00	141.70	143.33	143.34	144.16	0.008647	4.03	5.21	3.20	1.01
destra	1.72	200 anni	21.00	141.10	142.19	142.74	144.05	0.026175	6.05	3.47	3.20	1.85
destra	1.71	200 anni	21.00	141.00	142.43	142.64	143.50	0.012145	4.57	4.59	3.20	1.22
destra	1.7	200 anni	21.00	140.50	142.98	142.14	143.34	0.002908	2.65	7.93	3.20	0.54
destra	1.5	200 anni	21.00	138.55	142.77	140.18	142.90	0.000869	1.58	13.32	2.30	0.25

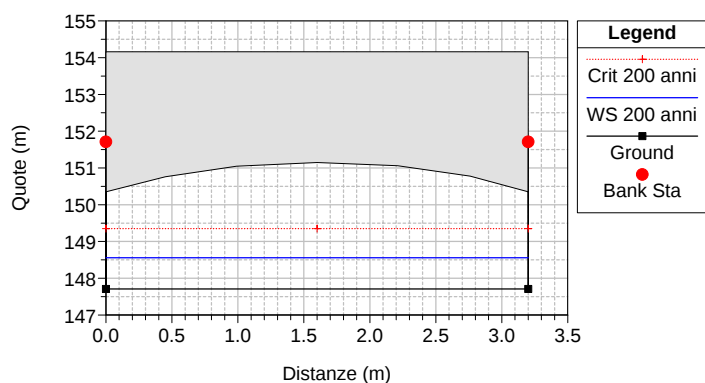
HEC-RAS Plan: Plan 15 River: Ravanasco Reach: destra Profile: 200 anni

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
destra	2	200 anni	151.60	148.56	3.04				21.00		3.20
destra	1.81	200 anni	149.49	148.03	1.46	1.64	0.47		21.00		3.20
destra	1.8	200 anni	149.39	147.07	2.32	0.00	0.09		21.00		3.20
destra	1.79	200 anni	148.78	147.13	1.65	0.41	0.20		21.00		3.20
destra	1.78	200 anni	148.72	146.49	2.23	0.00	0.06		21.00		3.20
destra	1.77	200 anni	147.90	146.42	1.49	0.60	0.22		21.00		3.20
destra	1.76	200 anni	147.85	145.85	2.00	0.00	0.05		21.00		3.20
destra	1.75	200 anni	145.31	144.49	0.82	0.00	0.00		21.00		3.20
destra	1.74	200 anni	145.19	143.27	1.93	0.00	0.11		21.00		3.20
destra	1.73	200 anni	144.16	143.33	0.83	0.71	0.33		21.00		3.20
destra	1.72	200 anni	144.05	142.19	1.86	0.00	0.10		21.00		3.20
destra	1.71	200 anni	143.50	142.43	1.07	0.31	0.24		21.00		3.20
destra	1.7	200 anni	143.34	142.98	0.36	0.37	0.07		21.00		3.20
destra	1.5	200 anni	142.90	142.77	0.13				21.00		2.30

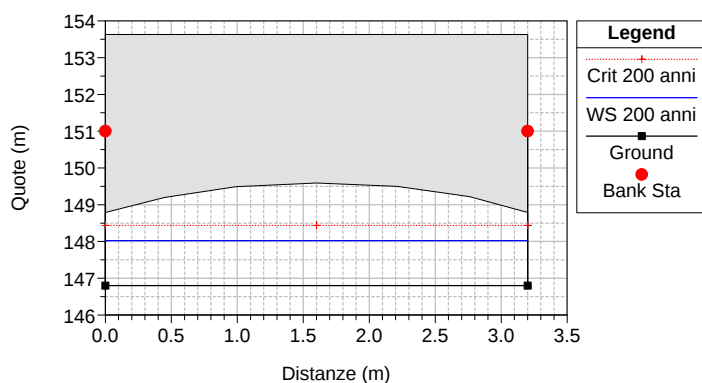
Geom: destra Flow: bormida 20 anni dx prog



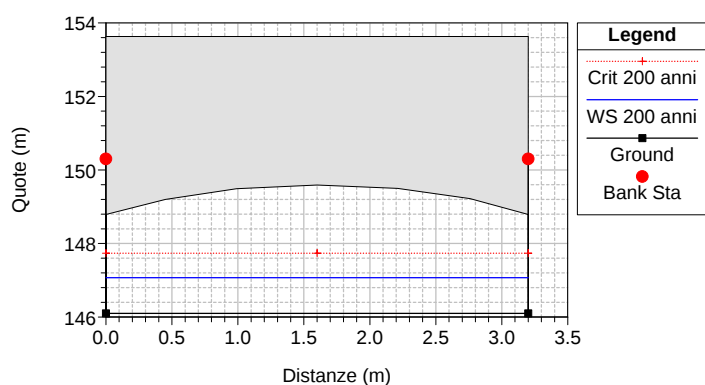
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 2



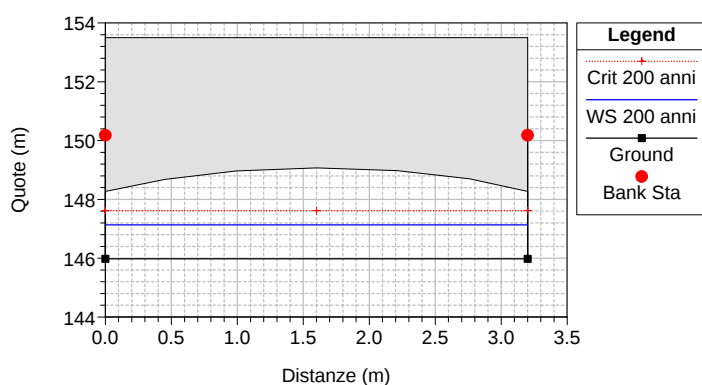
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.81



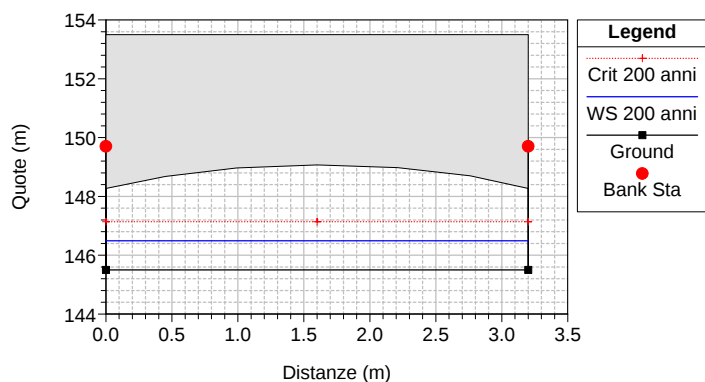
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.8



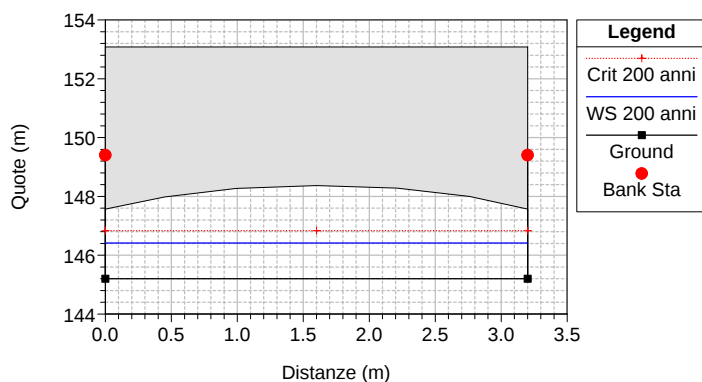
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.79



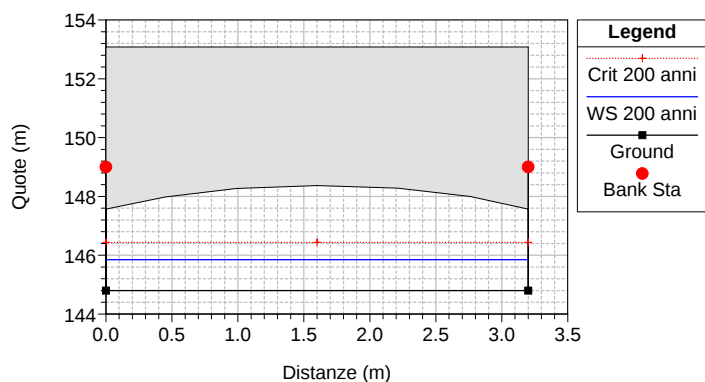
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.78



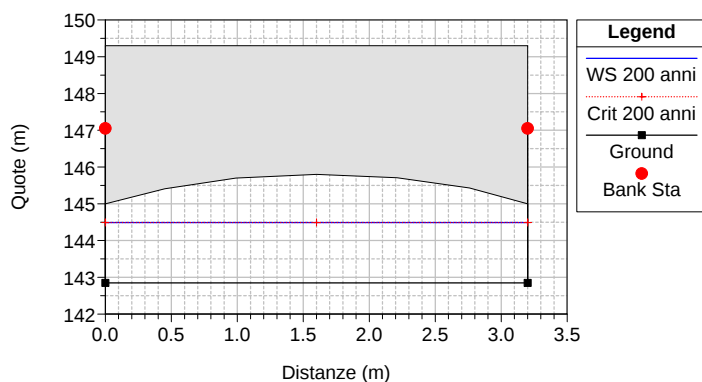
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.77



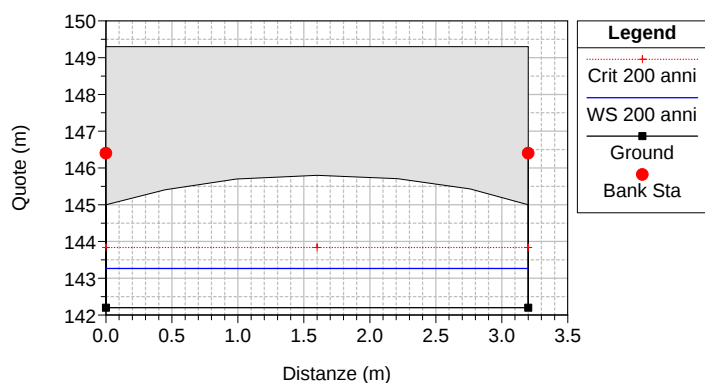
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.76



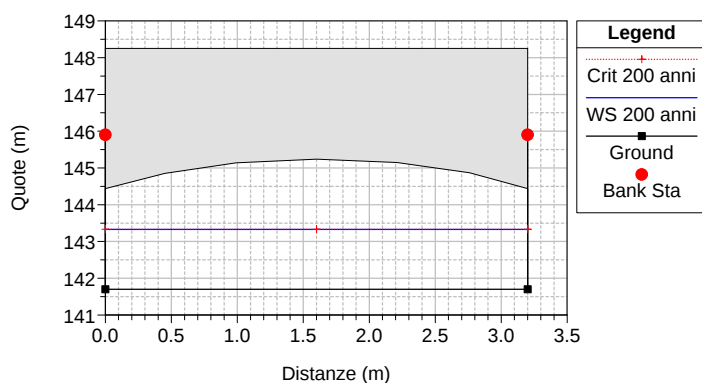
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.75



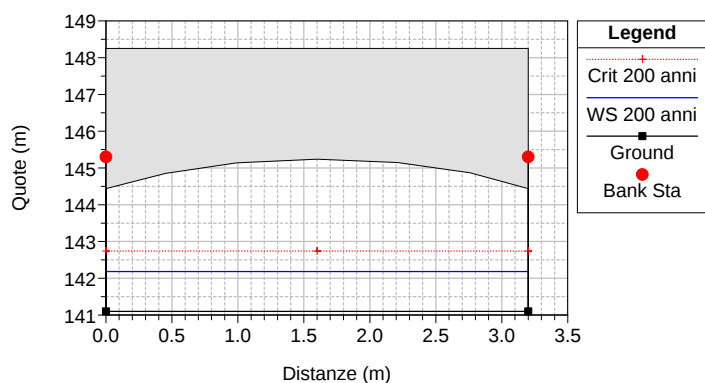
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.74



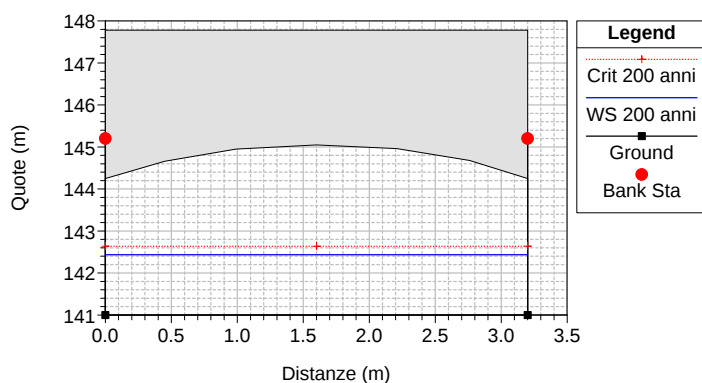
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.73



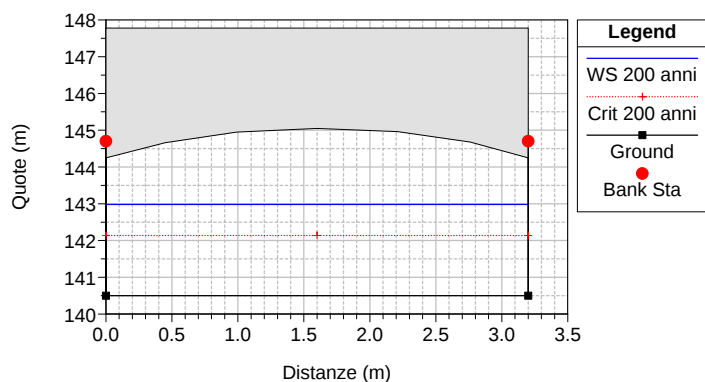
Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.72



Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.71



Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.7



Geom: destra Flow: bormida 20 anni dx prog
River = Ravanasco Reach = destra RS = 1.5

