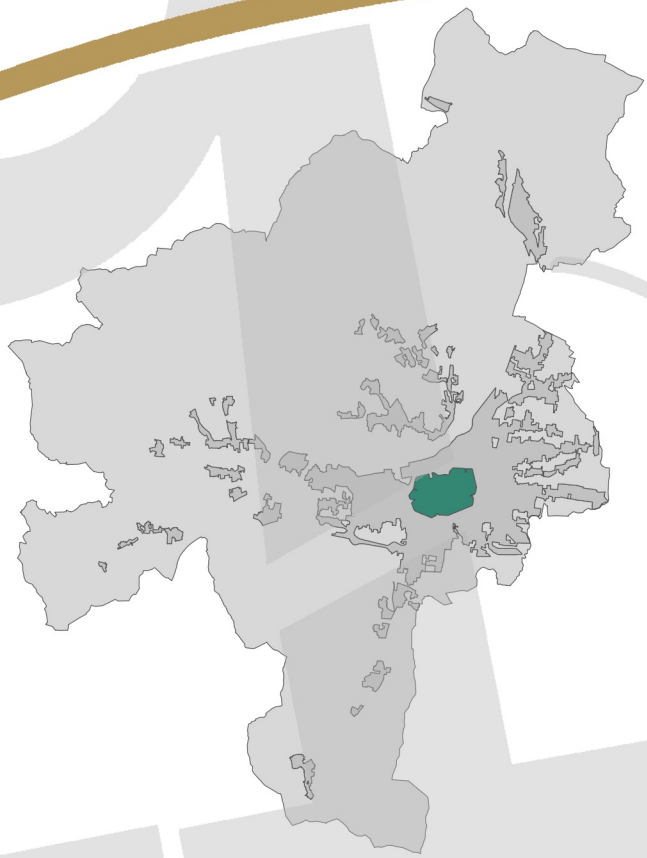
Città di Lucca

La casa della Città

il Piano Operativo



Quadro geologico - tecnico

ALL. I4 - Idraulica - Simulazioni sul sistema del Rio del Topo

Assessore all'Urbanistica
Serena Mammini

Sindaco
Alessandro Tambellini

Adozione

MODELLI DIRAULICI MONODIMENSIONALI

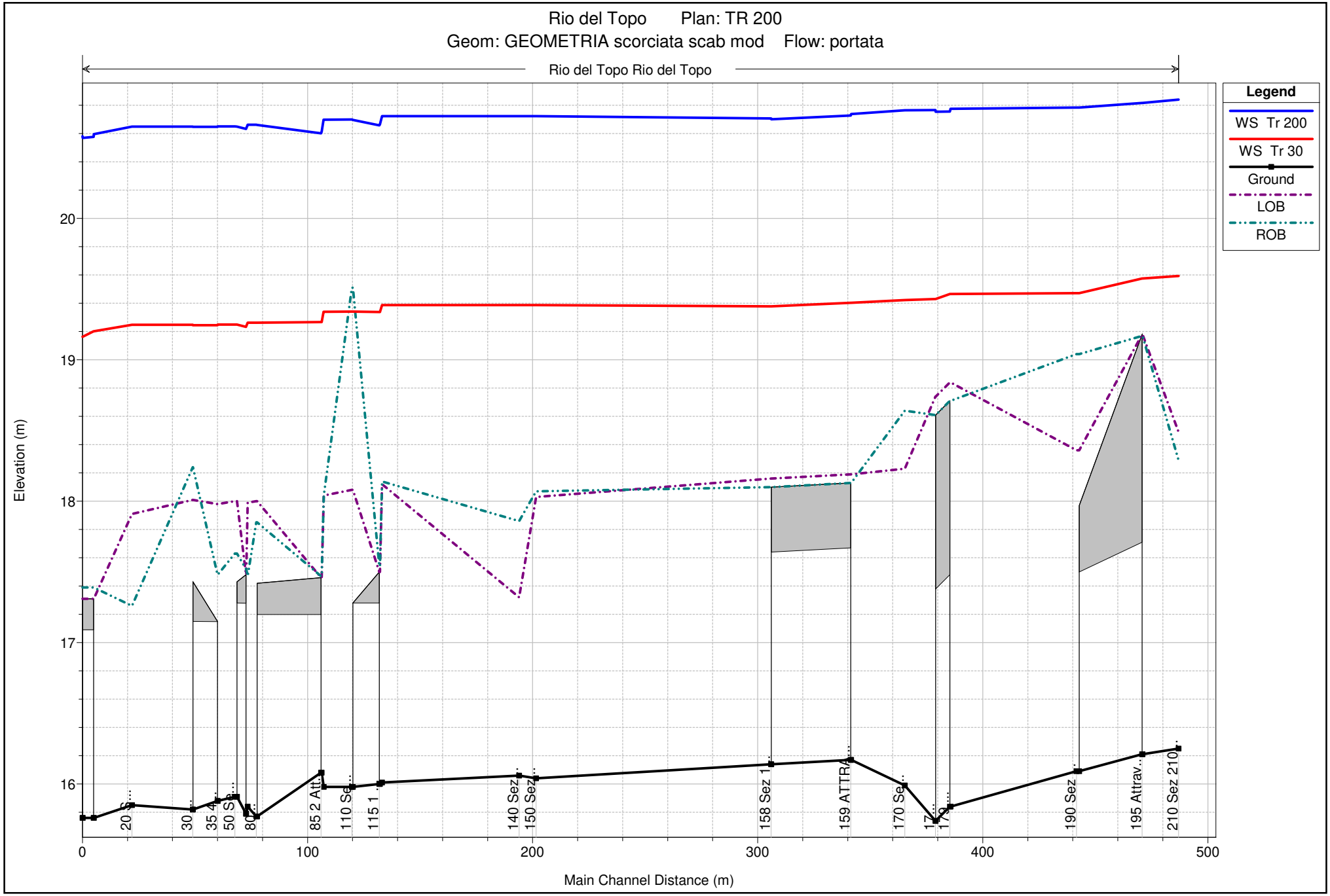
Si riportano gli output forniti dal codice di calcolo Hec-Ras 5.0.6 sul reticolo idraulico con simulazione del deflusso trentennale e duecentennale. Si allegano

- I profili;
- Le sezioni dei corsi d'acqua;
- L'output tabellare con i risultati delle simulazioni svolte.

LEGENDA DELLE TABELLE

Le grandezze riportate in tabella hanno il seguente significato:

- **River station** Sezione trasversale del corso d'acqua
- **Q Total** Portata idraulica
- **Min Ch Elev** Quota del fondo rispetto al prescelto sistema di riferimento
- **W.S. Elev** Quota del pelo libero rispetto al prescelto sistema di riferimento
- **Max Chl Dpth** Tirante idraulico massimo (differenza dei termini W.S Elev e il termine Min Ch Elev)
- **LOB Elev** Quota della sommità arginale sinistra rispetto al prescelto sistema di riferimento
- **ROB Elev** Quota della sommità arginale destra rispetto al prescelto sistema di riferimento
- **L.Freeboard** Franco sinistro: differenza fra il termine LOB Elev e il termine W.S Elev
- **R.Freeboard** Franco sinistro: differenza fra il termine LOB Elev e il termine W.S Elev
- **Vel Chnl** Velocità media della corrente
- **Froude n.** Numero di Froude: se maggiore di 1 indica la presenza di corrente veloce, se inferiore a 1 segnala la presenza di corrente lenta

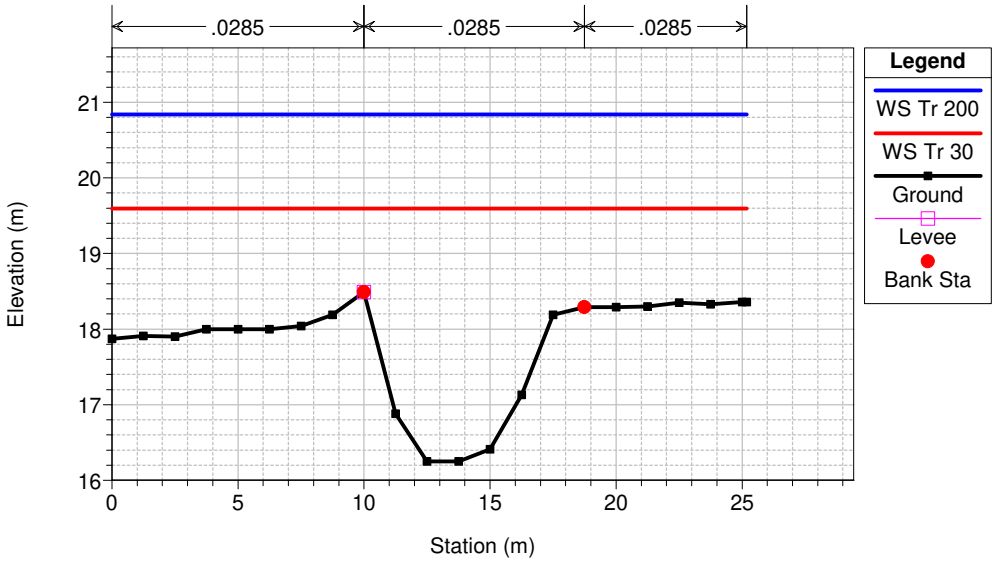


1 cm Horiz. = 22 m 1 cm Vert. = 0.35 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

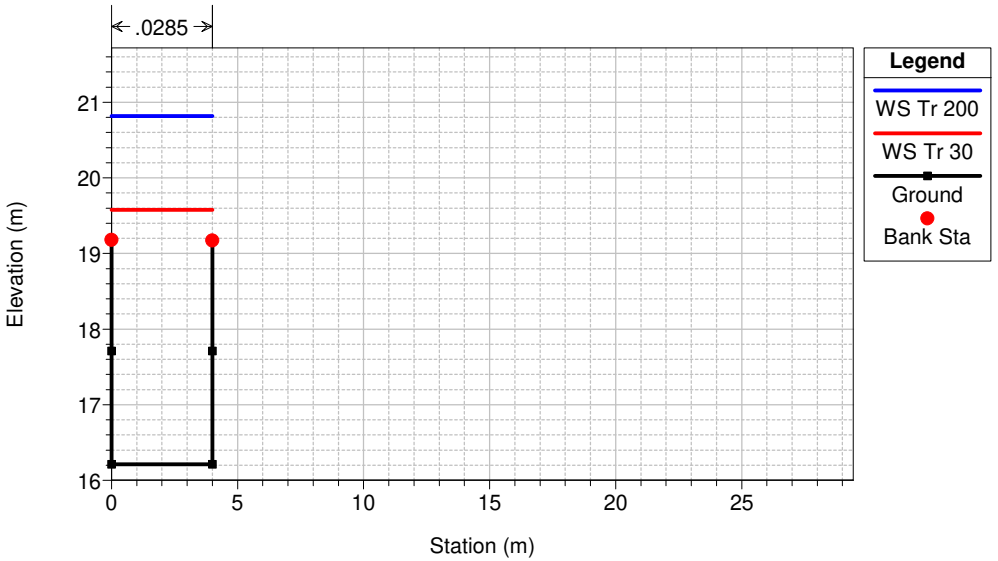
River = Rio del Topo Reach = Rio del Topo RS = 210 Sez 210 valle cassa immissione fosso sinistra



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

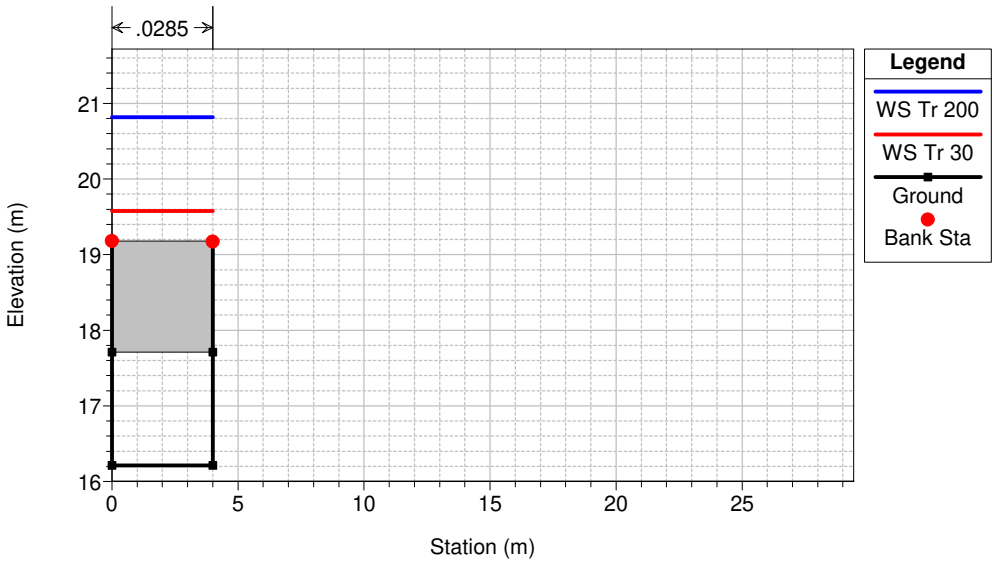
River = Rio del Topo Reach = Rio del Topo RS = 200 Sez 200 INIZIO ATTRAVERSAMENTO VIA DEI BORELLI



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

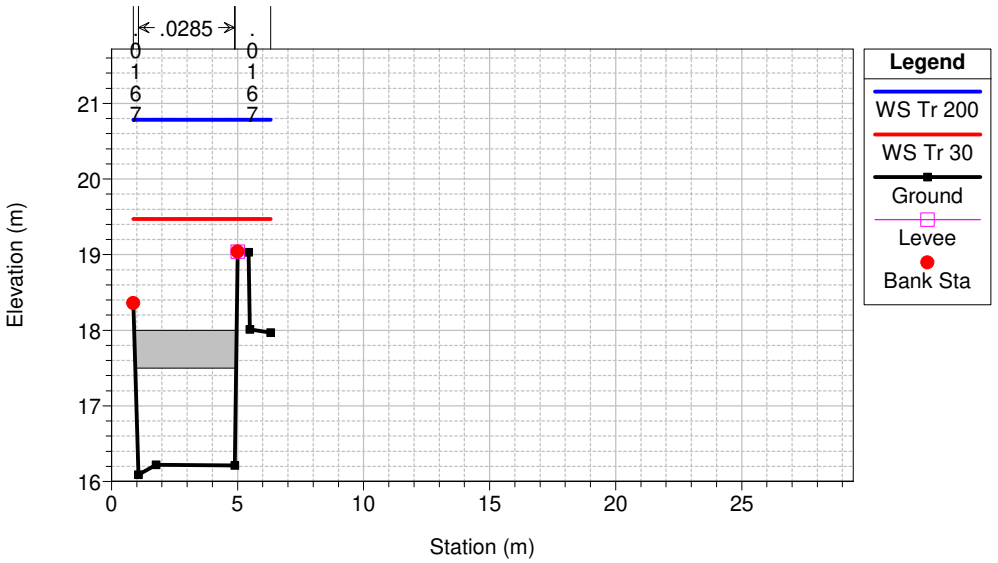
River = Rio del Topo Reach = Rio del Topo RS = 195 BR Attraversamento Via dei Borrelli



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 195 BR Attraversamento Via dei Borrelli

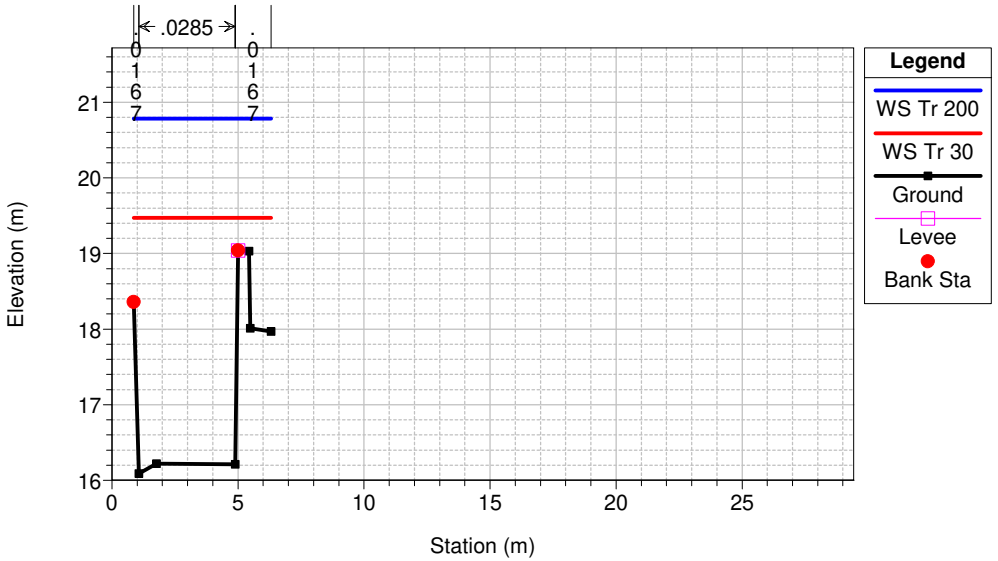


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

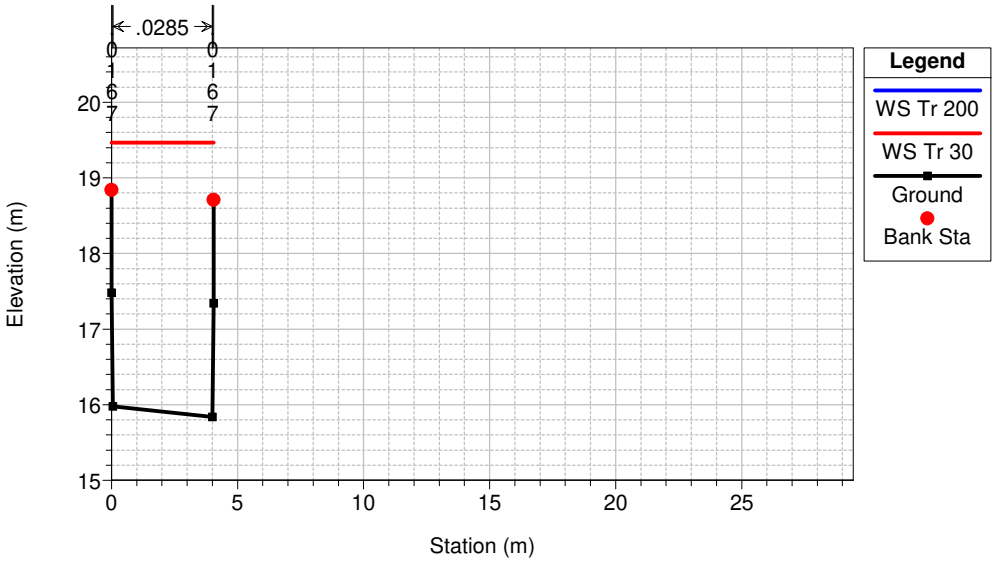
River = Rio del Topo Reach = Rio del Topo RS = 190 Sez 190 A VALLE ATTRAVERSAMENTO VIA DEI BORELLI



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

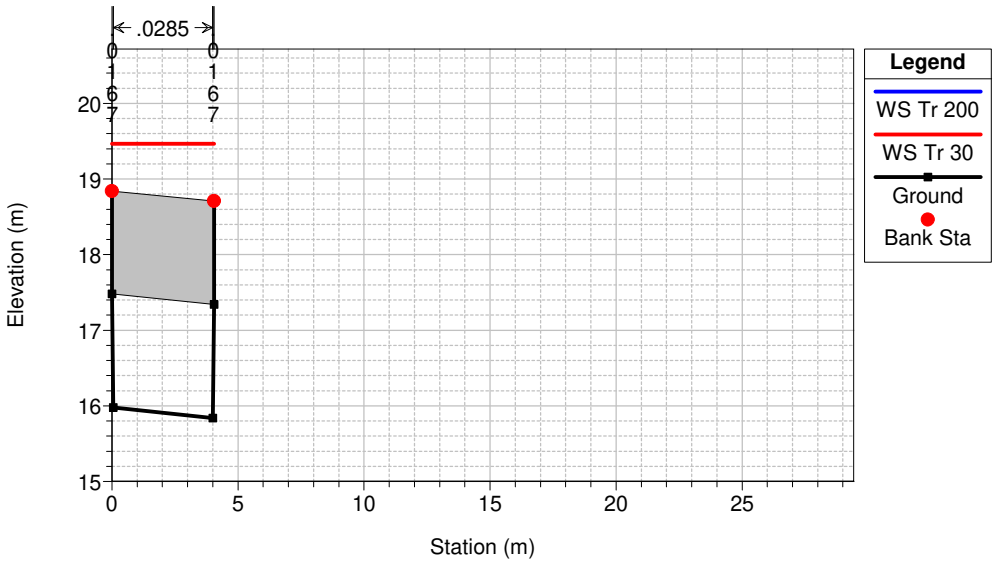
River = Rio del Topo Reach = Rio del Topo RS = 180 Sez 180 MONTE ATTRAVERSAVENTO PRIVATO



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

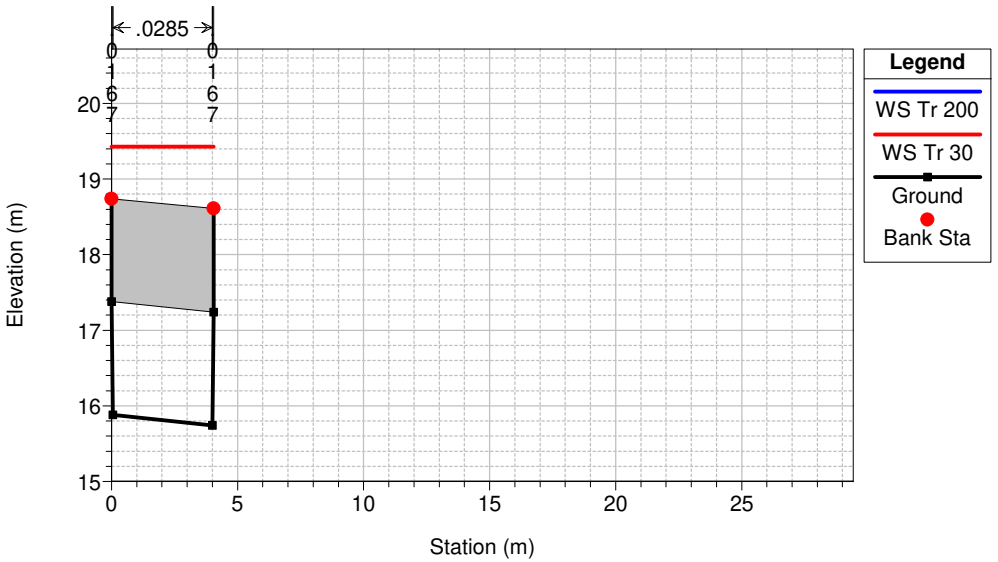
River = Rio del Topo Reach = Rio del Topo RS = 179 BR Attraversamento Privato



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 179 BR Attraversamento Privato

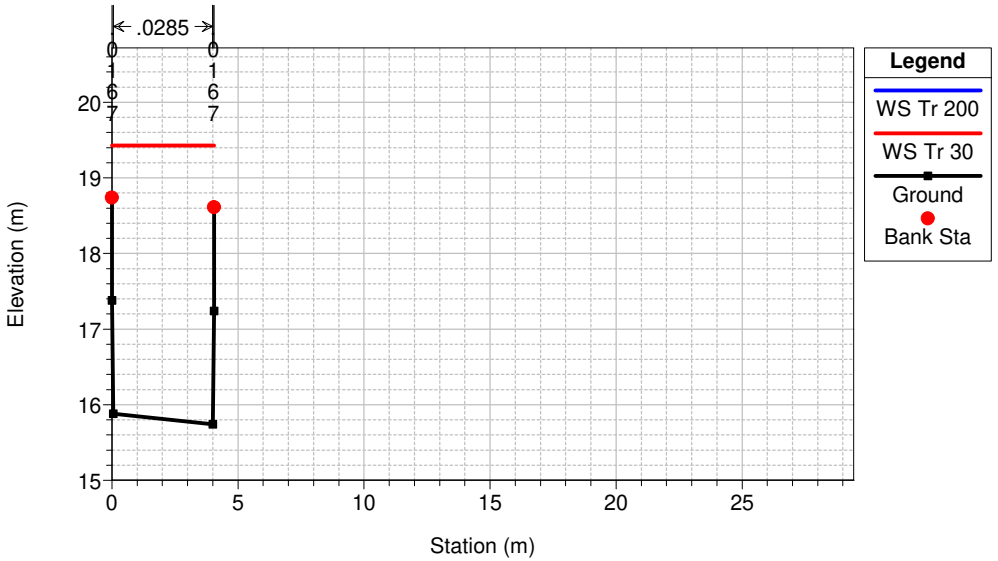


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

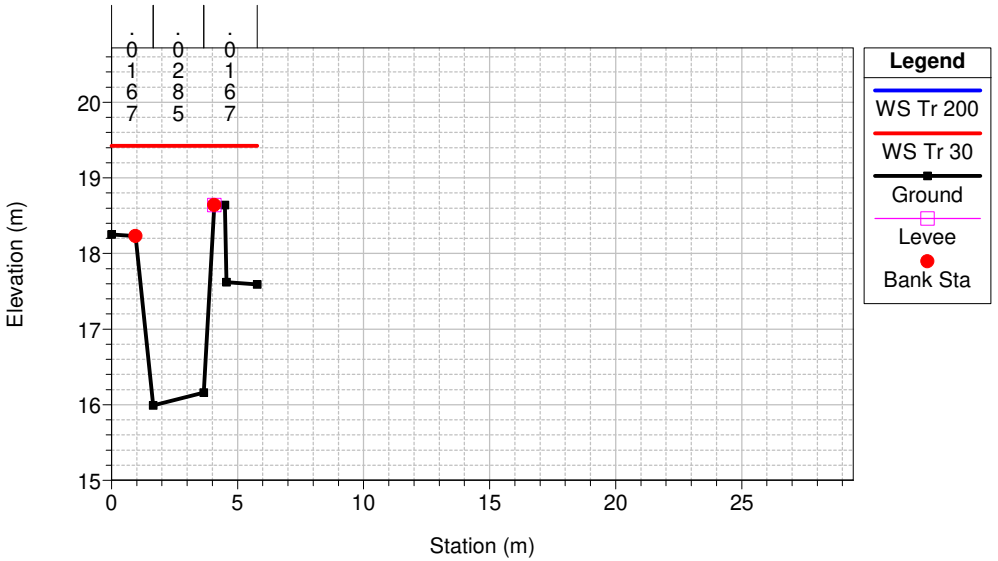
River = Rio del Topo Reach = Rio del Topo RS = 178 Sez 178 VALLE ATTRAVERSAVENTO PRIVATO



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

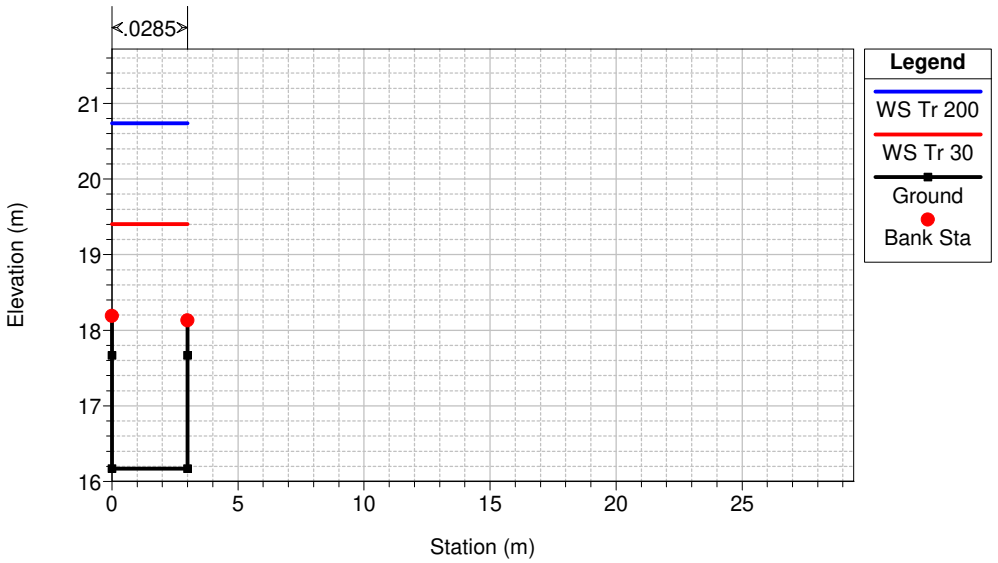
River = Rio del Topo Reach = Rio del Topo RS = 170 Sez 170



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

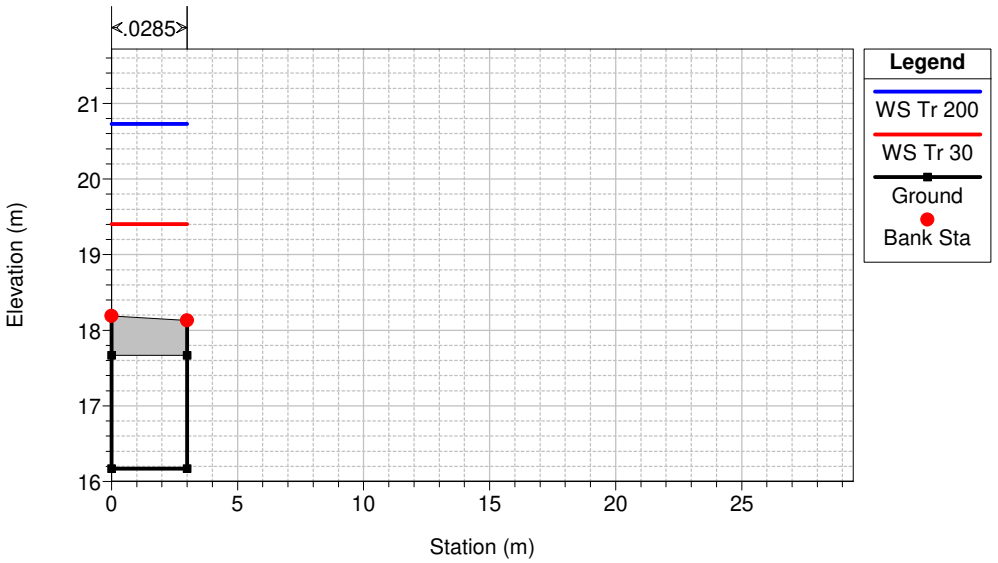
River = Rio del Topo Reach = Rio del Topo RS = 160 Sez 160 MONTE ATTRAVERSAMENTO VIA DELLA PIEVE DI SANTO STFANO



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 159 BR ATTRAVERSAMENTO VIA DELLA PIEVE DI SANTO STFANO

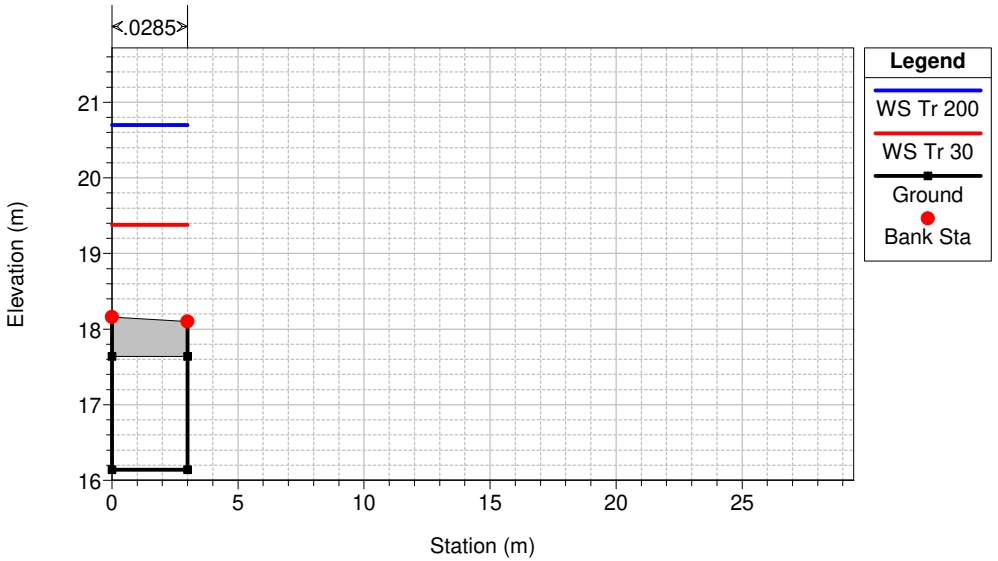


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

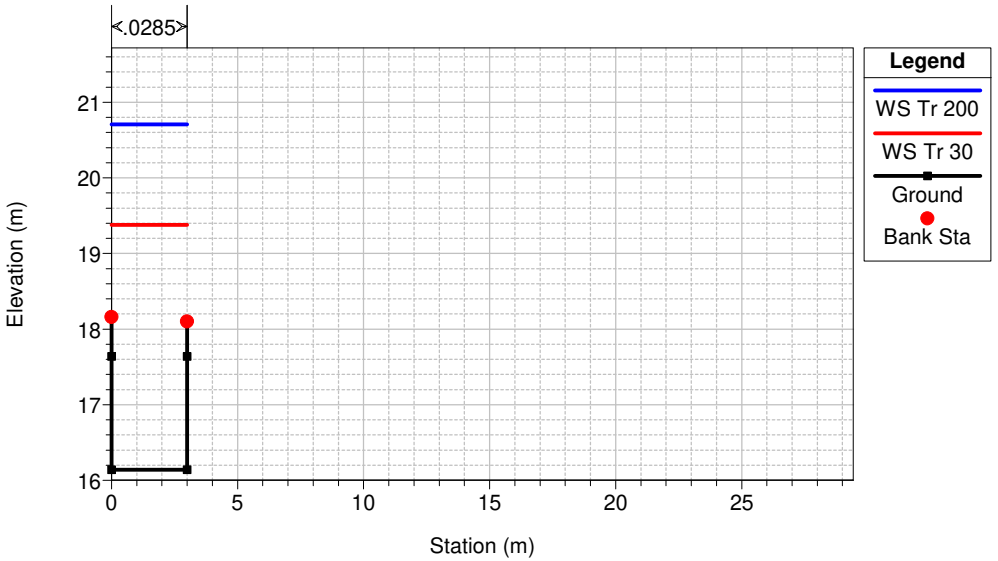
River = Rio del Topo Reach = Rio del Topo RS = 159 BR ATTRAVERSAMENTO VIA DELLA PIEVE DI SANTO STFANO



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

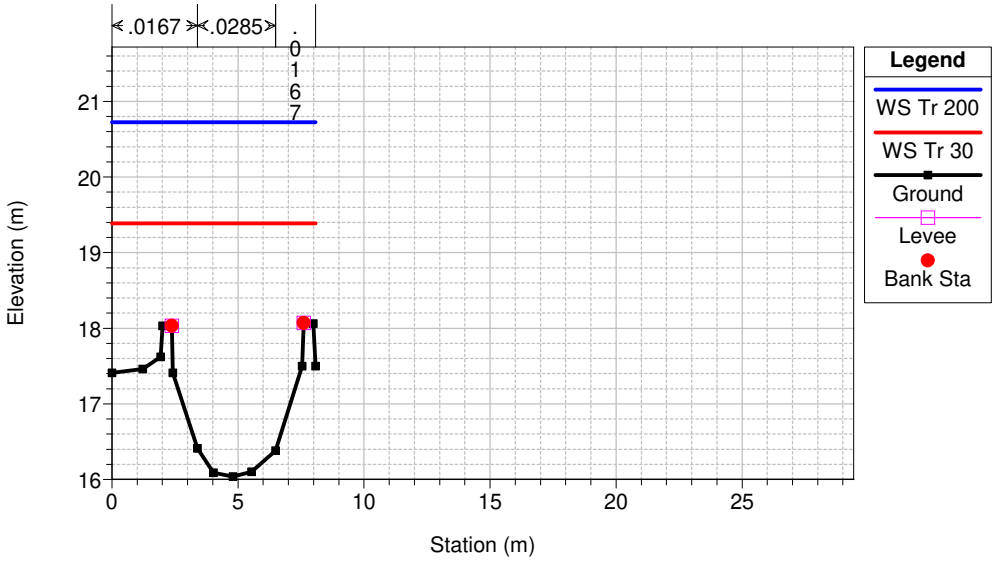
River = Rio del Topo Reach = Rio del Topo RS = 158 Sez 158 VALLE ATTRAVERSAVENTO VIA DELLA PIEVE DI



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

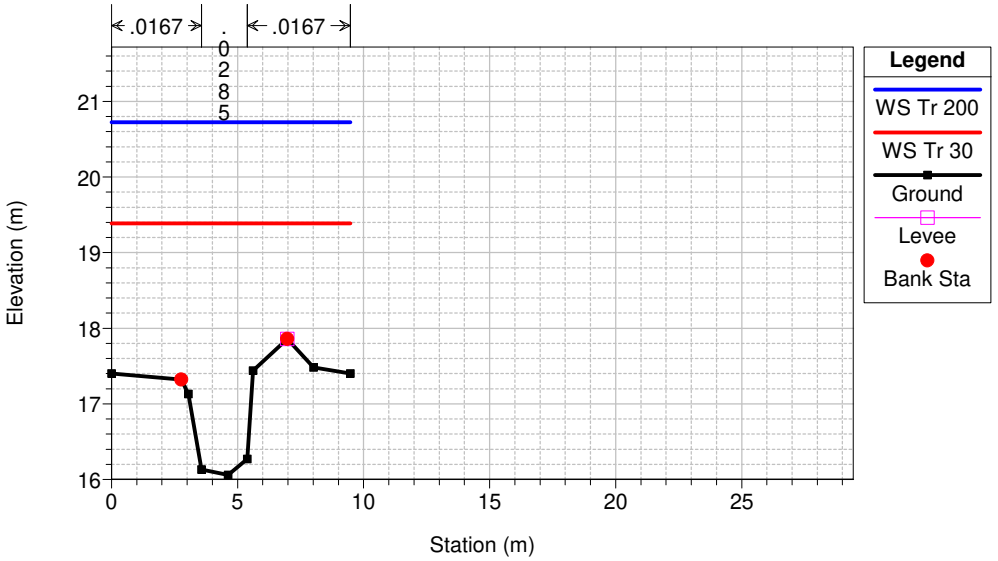
River = Rio del Topo Reach = Rio del Topo RS = 150 Sez 150



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 140 Sez 140

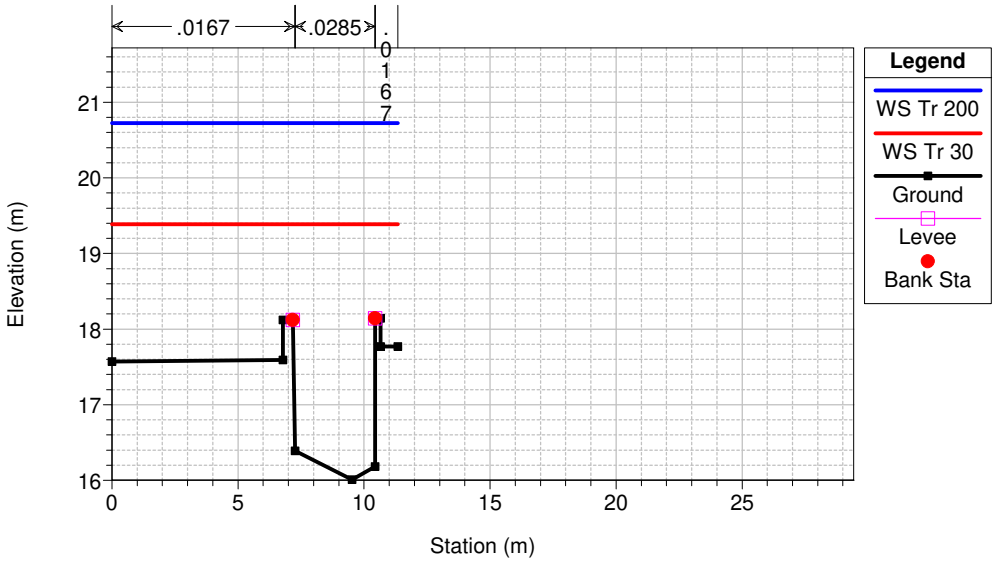


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

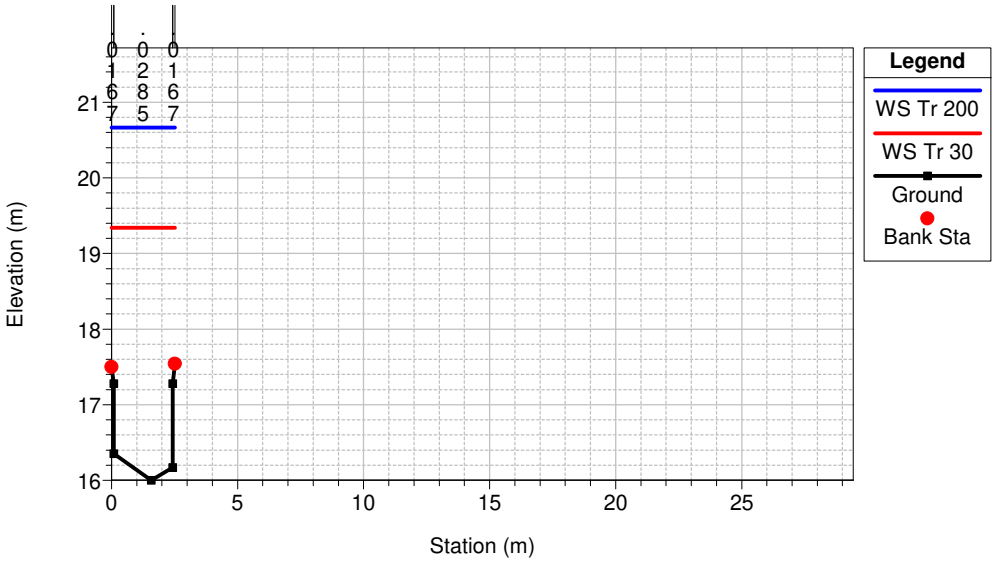
River = Rio del Topo Reach = Rio del Topo RS = 130 Sez 130 PRIMA DEL 1 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

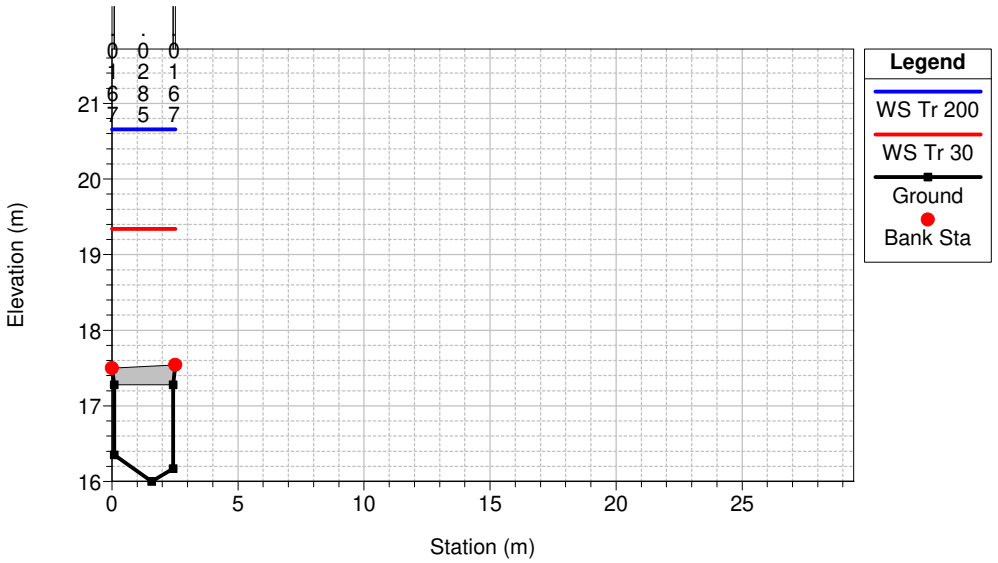
River = Rio del Topo Reach = Rio del Topo RS = 120 Sez 120 MONTE 1 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

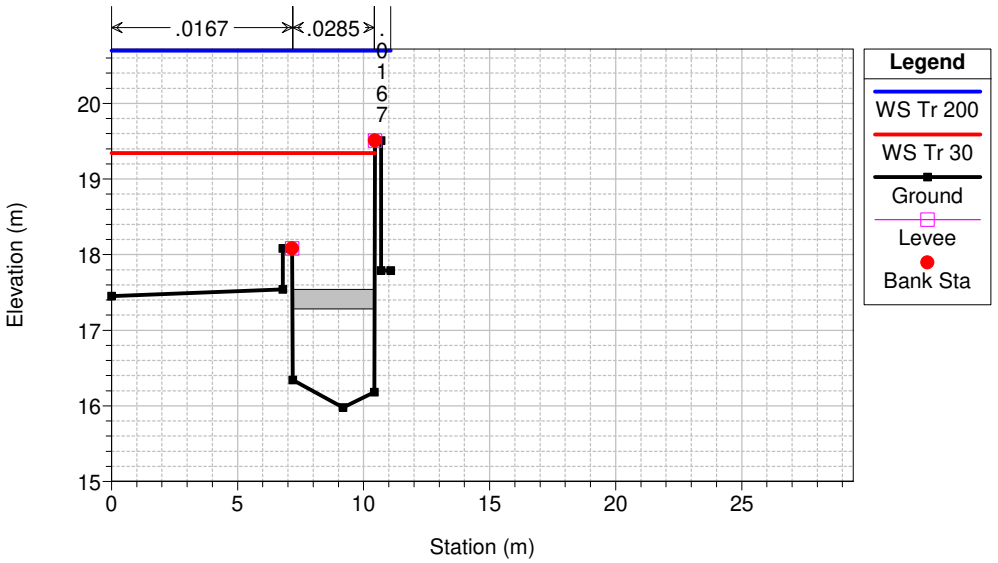
River = Rio del Topo Reach = Rio del Topo RS = 115 BR 1 Attrversamento privato lungo SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 115 BR 1 Attrversamento privato lungo SP 24

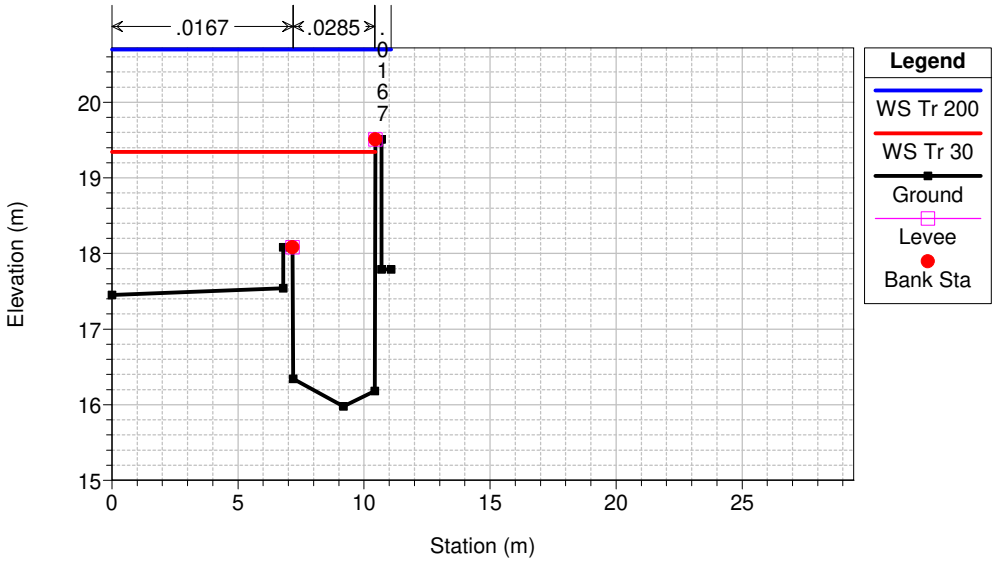


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

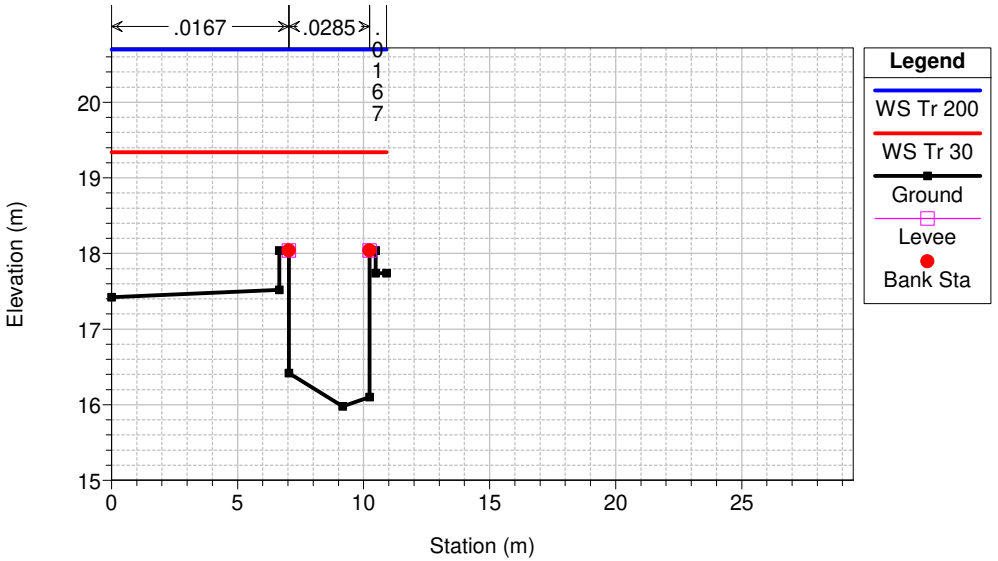
River = Rio del Topo Reach = Rio del Topo RS = 110 Sez 110 VALLE 1 ATTRAVERSAMENTO PRIVATO LUUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

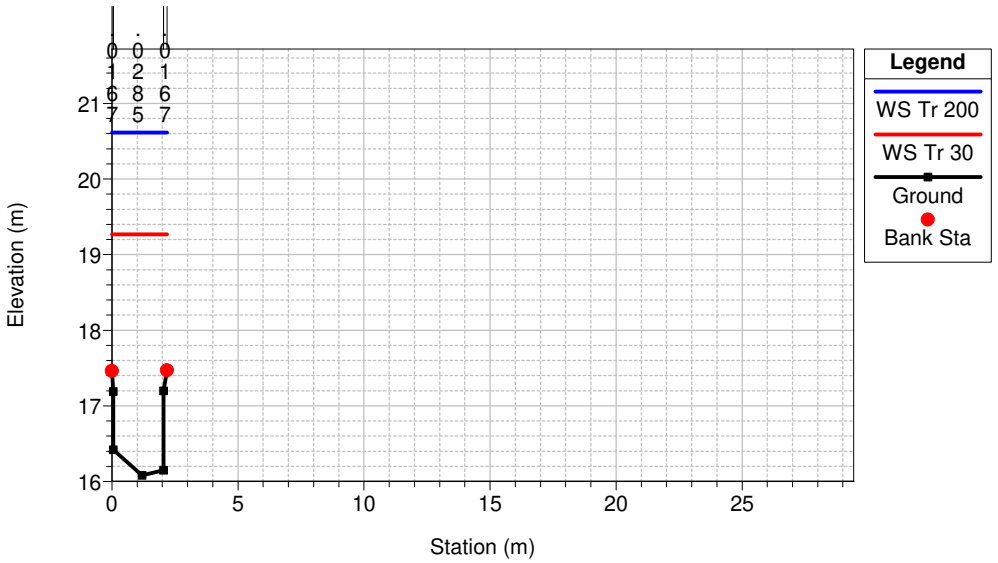
River = Rio del Topo Reach = Rio del Topo RS = 100 Sez 100 PRIMA 2 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

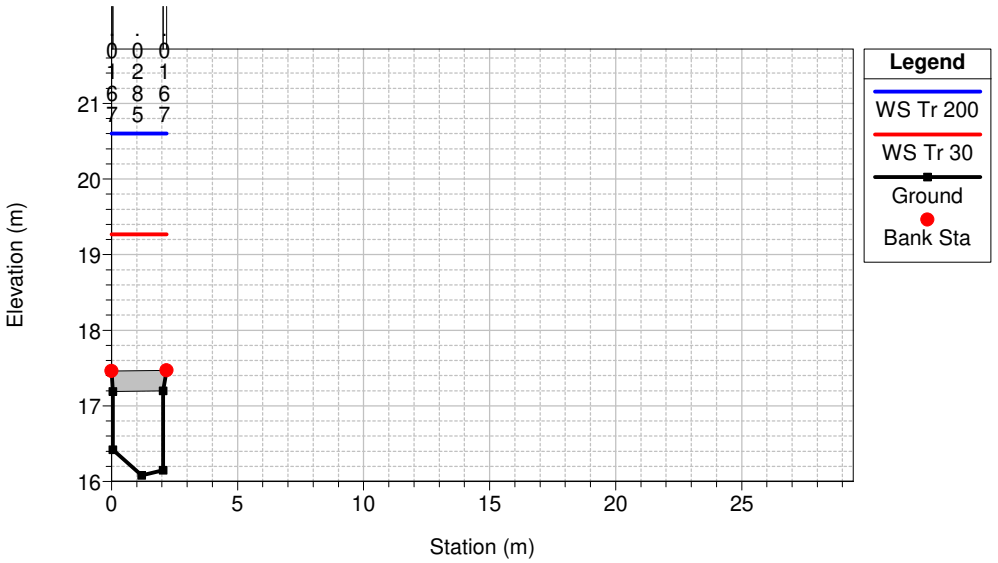
River = Rio del Topo Reach = Rio del Topo RS = 90 Sez 90 MONTE 2 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 85 BR 2 Attrversamento privato lungo SP 24

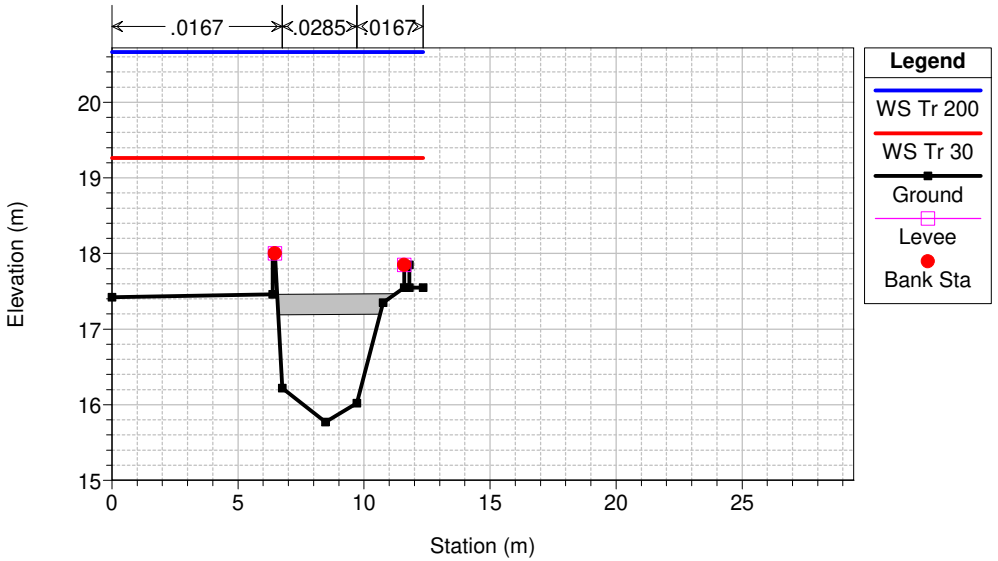


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

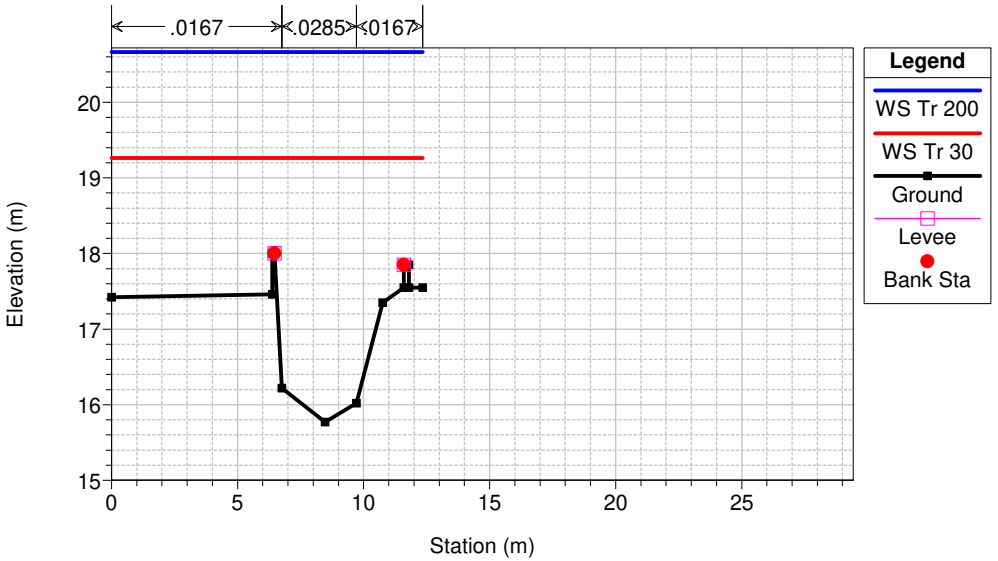
River = Rio del Topo Reach = Rio del Topo RS = 85 BR 2 Attrversamento privato lungo SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

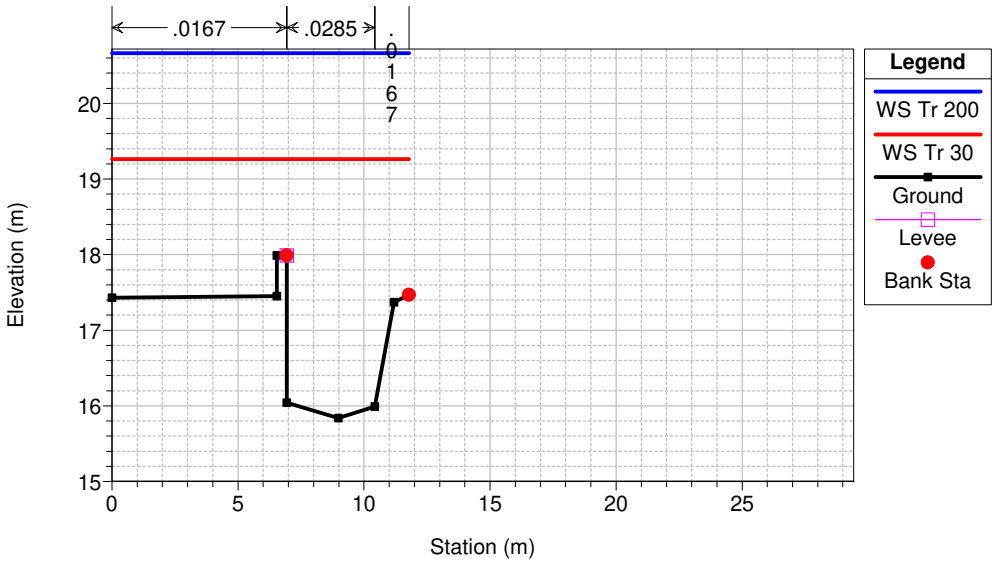
River = Rio del Topo Reach = Rio del Topo RS = 80 Sez 80 VALLE 2 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

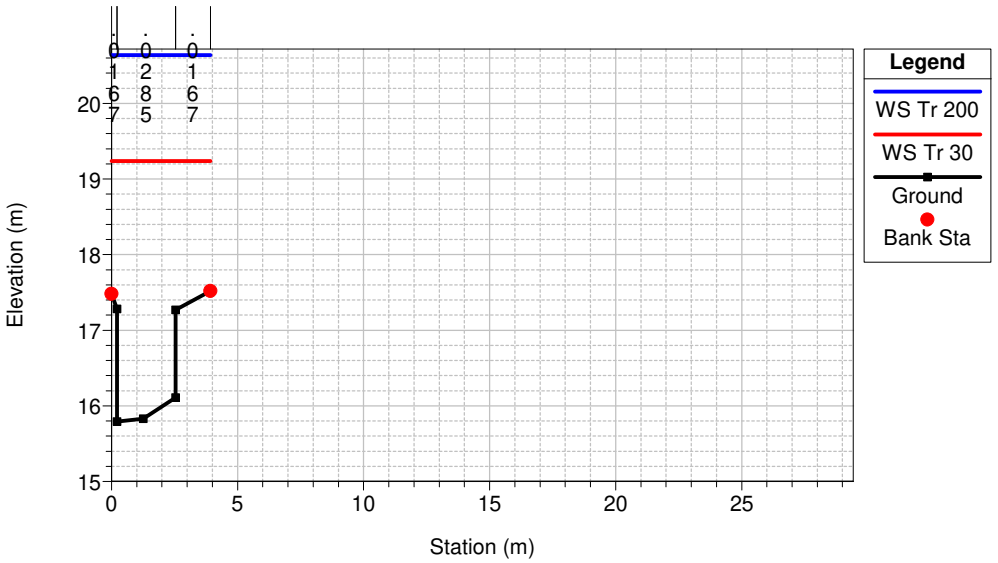
River = Rio del Topo Reach = Rio del Topo RS = 70 Sez 70 PRIMA 3 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 60 Sez 60 MONTE 3 ATTRAVERSAMENTO PRIVATO LUNGO SP 24

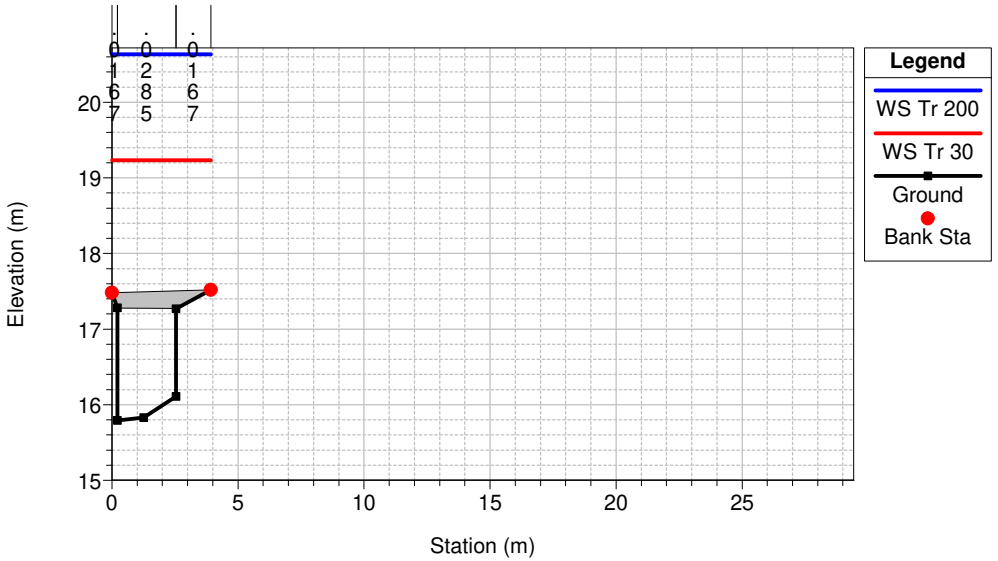


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

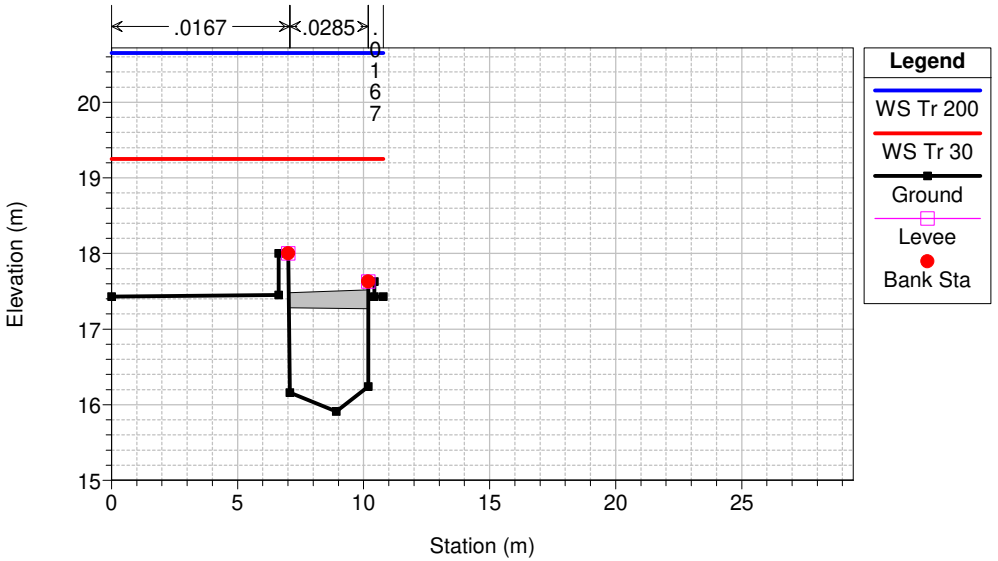
River = Rio del Topo Reach = Rio del Topo RS = 55 BR 3 Attrversamento privato lungo SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

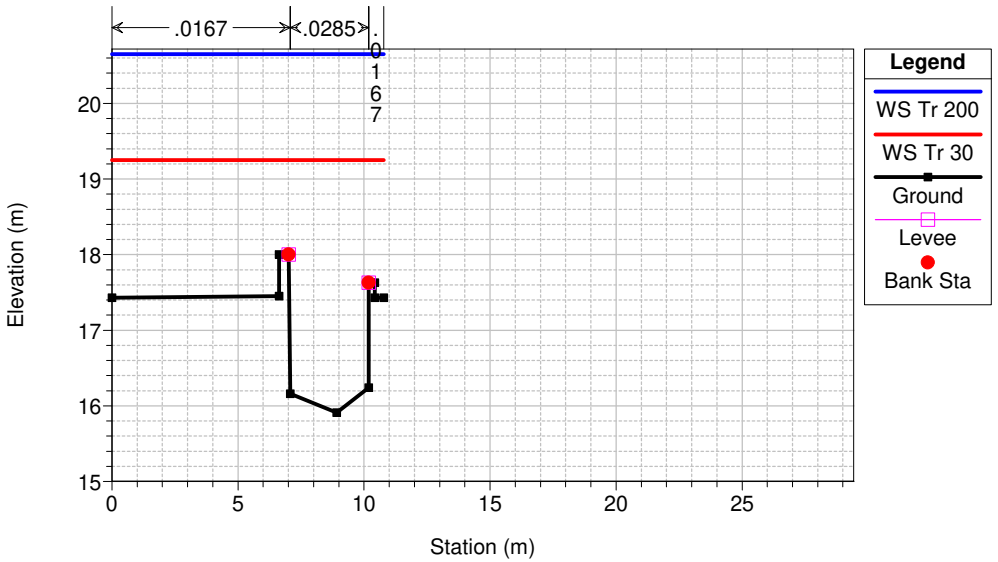
River = Rio del Topo Reach = Rio del Topo RS = 55 BR 3 Attrversamento privato lungo SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

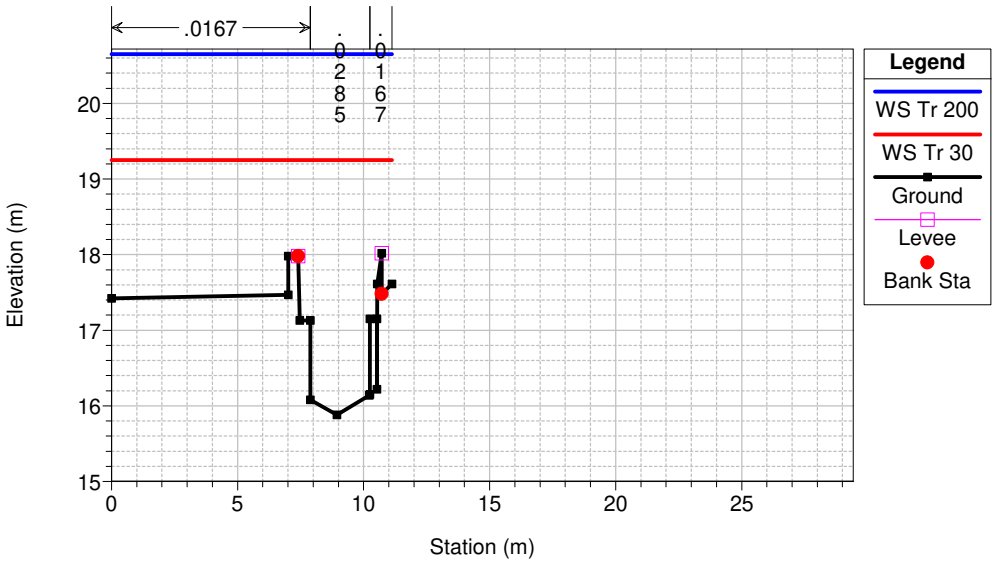
River = Rio del Topo Reach = Rio del Topo RS = 50 Sez 50 VALLE 3 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 40 Sez 40 MONTE 4 ATTRAVERSAMENTO PRIVATO LUNGO SP 24

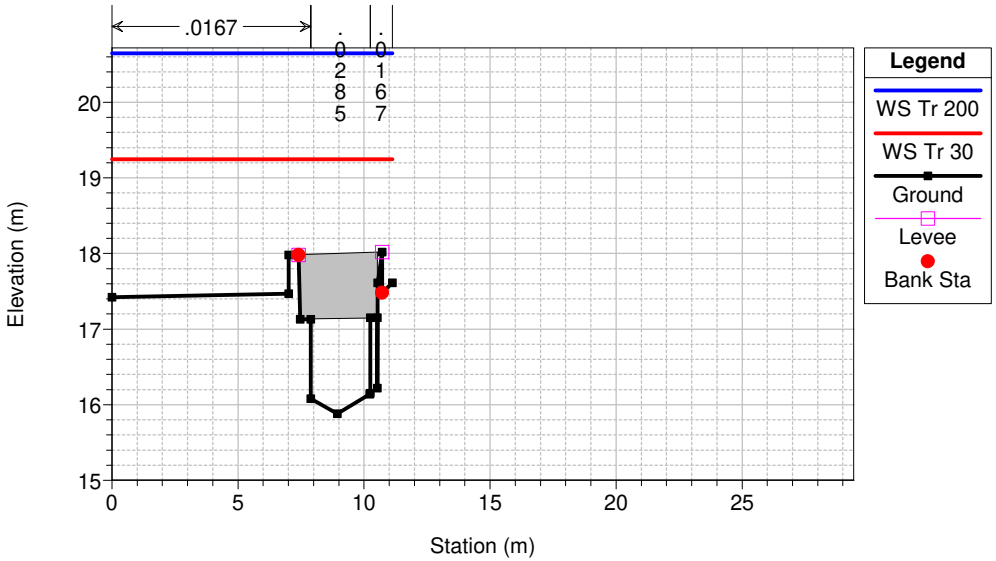


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

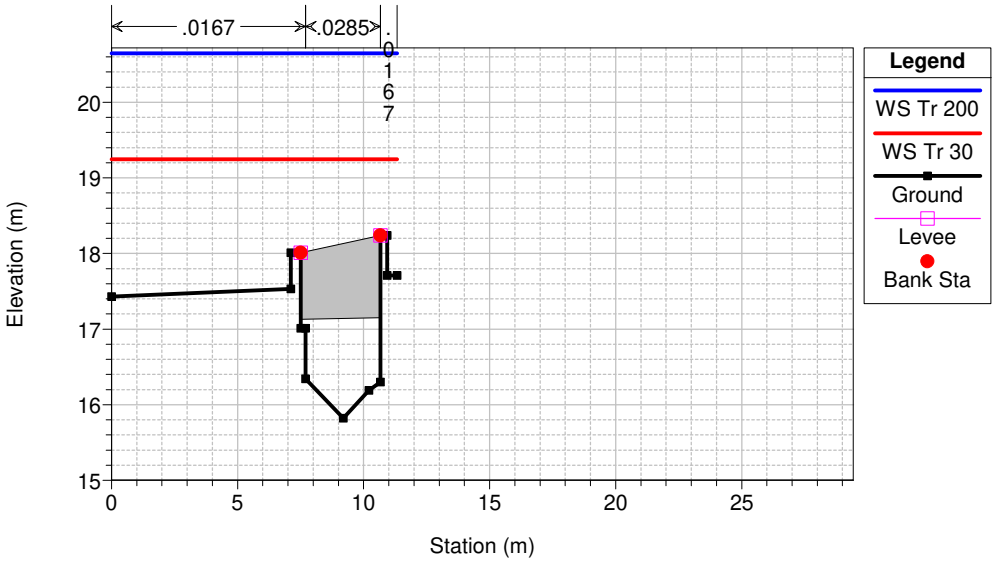
River = Rio del Topo Reach = Rio del Topo RS = 35 BR 4 Attrversamento privato lungo SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

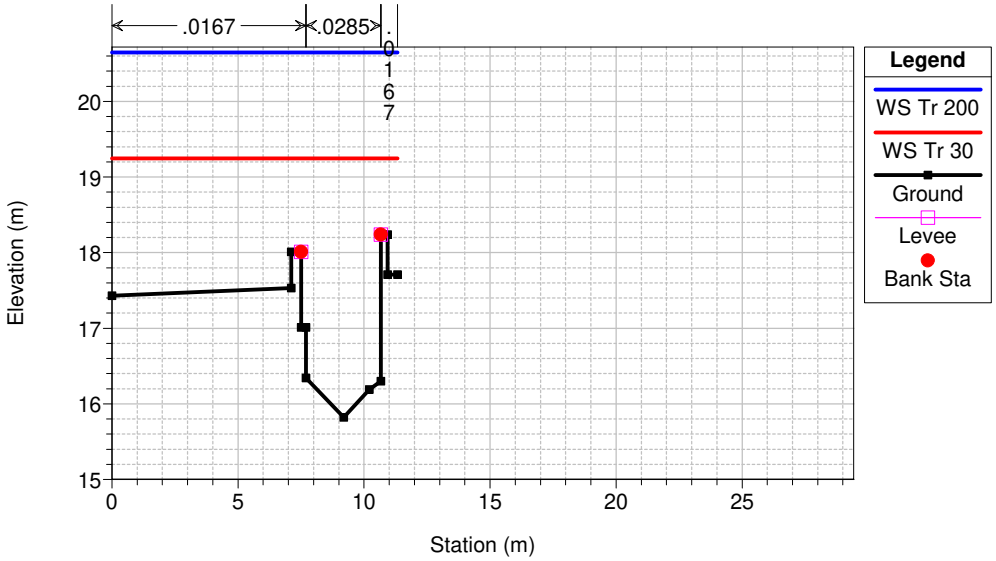
River = Rio del Topo Reach = Rio del Topo RS = 35 BR 4 Attrversamento privato lungo SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

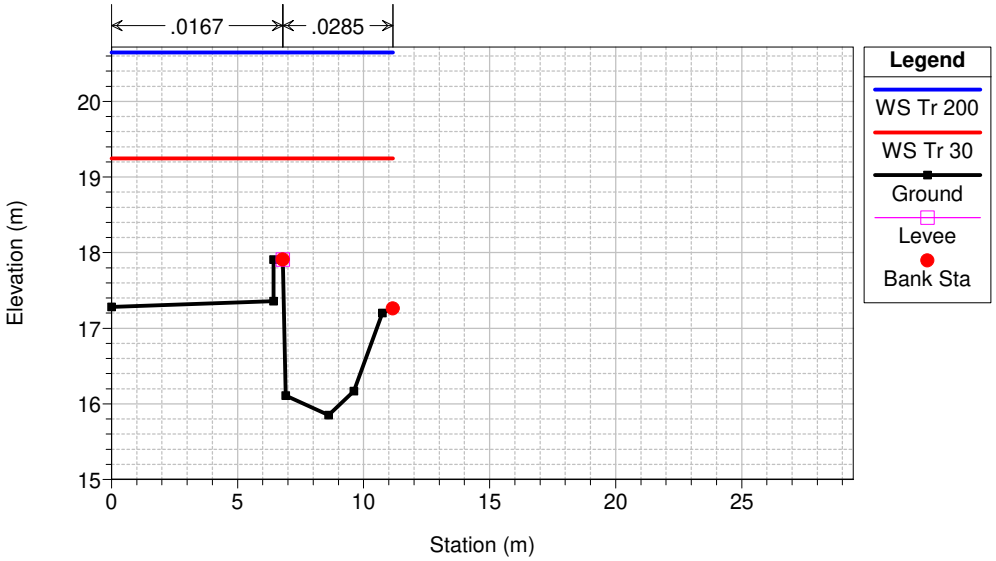
River = Rio del Topo Reach = Rio del Topo RS = 30 Sez 30 VALLE 4 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 20 Sez 20

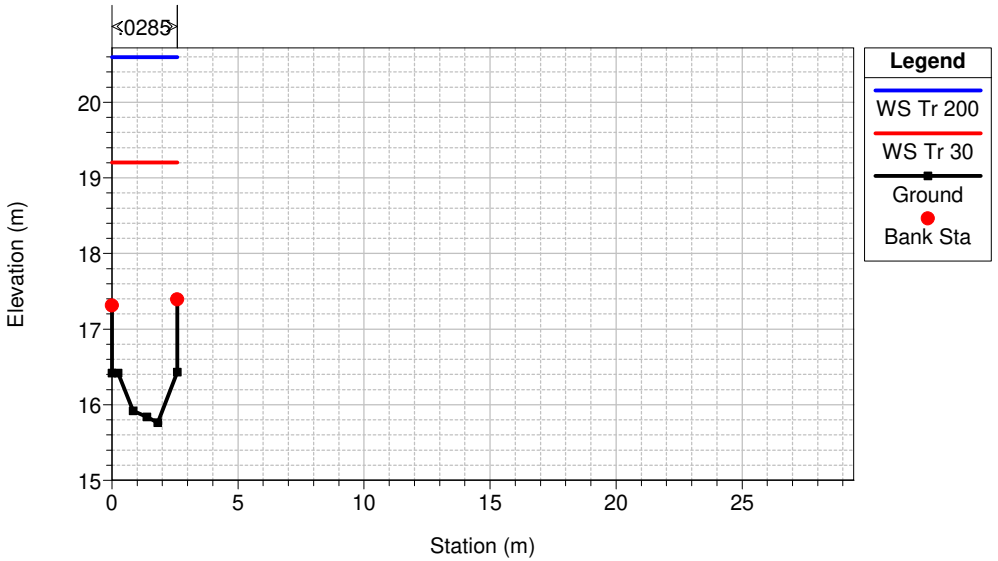


1 cm Horiz. = 3 m 1 cm Vert. = 1 m

Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

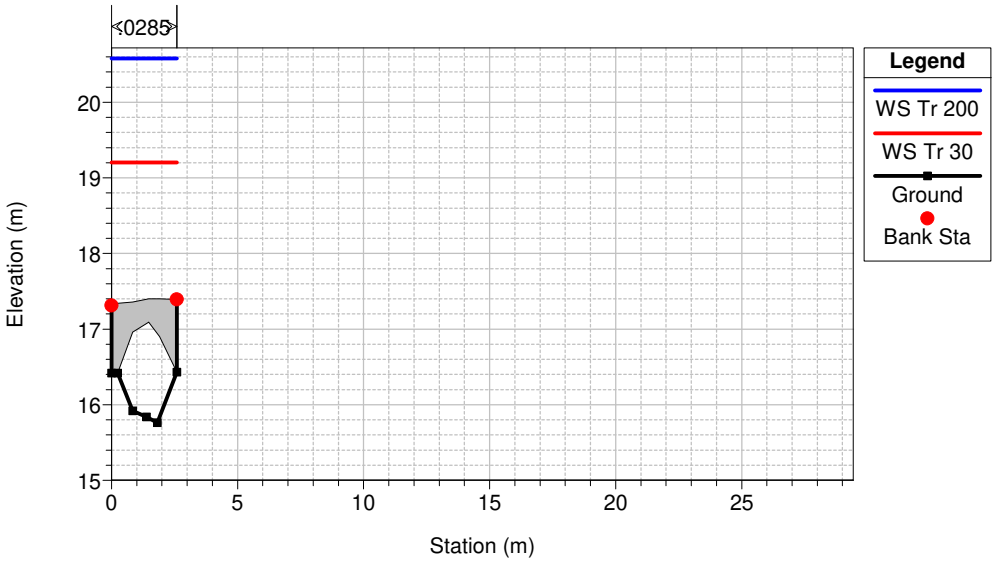
River = Rio del Topo Reach = Rio del Topo RS = 10 Sez10 MONTE 5 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

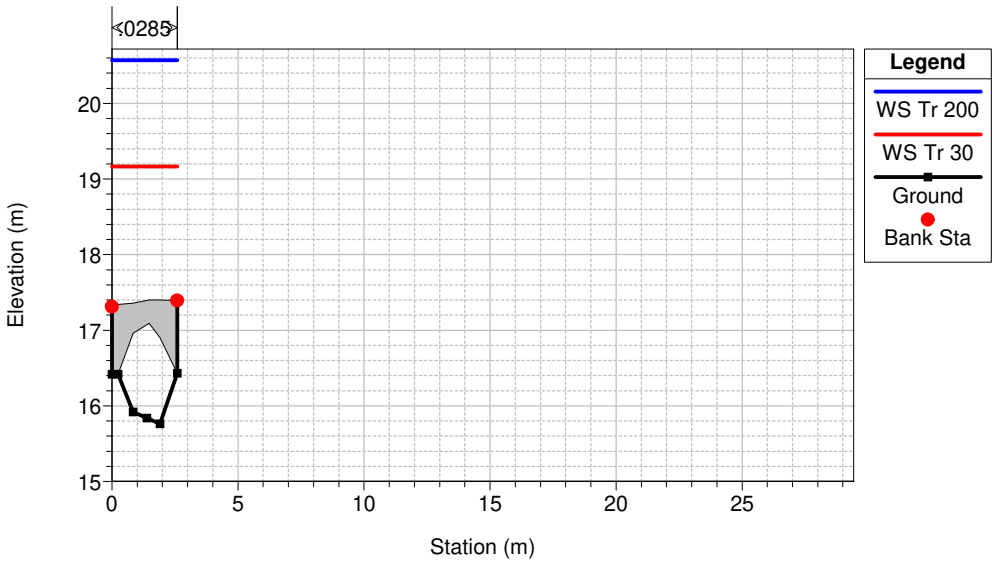
River = Rio del Topo Reach = Rio del Topo RS = 5 BR



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

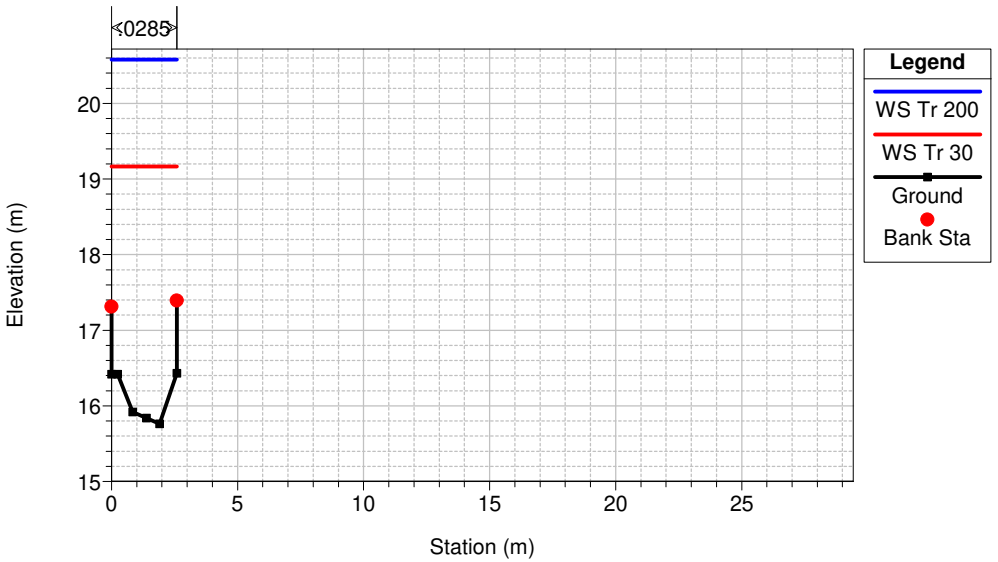
River = Rio del Topo Reach = Rio del Topo RS = 5 BR



Rio del Topo Plan: TR 200

Geom: GEOMETRIA scorciata scab mod Flow: portata

River = Rio del Topo Reach = Rio del Topo RS = 4 Sez 4 VALLEE 5 ATTRAVERSAMENTO PRIVATO LUNGO SP 24



1 cm Horiz. = 3 m 1 cm Vert. = 1 m

HEC-RAS Plan: TR 200 River: Rio del Topo Reach: Rio del Topo

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Max Chl Dpth	LOB Elev	ROB Elev	L. Freeboard	R. Freeboard	Vel Chnl	Froude # Chl	Length Chnl
			(m3/s)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m/s)		(m)
Rio del Topo	210	Tr 200	11.95	16.25	20.84	4.59	18.49	18.29	-2.35	-2.55	0.18	0.03	16.00
Rio del Topo	210	Tr 30	7.76	16.25	19.59	3.34	18.49	18.29	-1.10	-1.30	0.20	0.04	16.00
Rio del Topo	200	Tr 200	11.95	16.21	20.82	4.61	19.18	19.17	-1.64	-1.65	0.65	0.10	0.20
Rio del Topo	200	Tr 30	7.76	16.21	19.58	3.37	19.18	19.17	-0.40	-0.41	0.58	0.10	0.20
Rio del Topo	195		Bridge										
Rio del Topo	190	Tr 200	11.95	16.09	20.78	4.69	18.36	19.04	-2.42	-1.74	0.58	0.09	56.00
Rio del Topo	190	Tr 30	7.76	16.09	19.47	3.38	18.36	19.04	-1.11	-0.43	0.55	0.10	56.00
Rio del Topo	180	Tr 200	11.95	15.84	20.78	4.94	18.84	18.71	-1.94	-2.07	0.61	0.09	0.20
Rio del Topo	180	Tr 30	7.76	15.84	19.47	3.63	18.84	18.71	-0.63	-0.76	0.54	0.09	0.20
Rio del Topo	179		Bridge										
Rio del Topo	178	Tr 200	11.95	15.74	20.77	5.03	18.74	18.61	-2.03	-2.16	0.60	0.09	13.58
Rio del Topo	178	Tr 30	7.76	15.74	19.43	3.69	18.74	18.61	-0.69	-0.82	0.53	0.09	13.58
Rio del Topo	170	Tr 200	11.95	15.99	20.76	4.77	18.23	18.64	-2.53	-2.12	0.65	0.10	23.85
Rio del Topo	170	Tr 30	7.76	15.99	19.42	3.43	18.23	18.64	-1.19	-0.78	0.66	0.12	23.85
Rio del Topo	160	Tr 200	11.95	16.17	20.74	4.57	18.19	18.13	-2.55	-2.61	0.87	0.13	0.20
Rio del Topo	160	Tr 30	7.76	16.17	19.40	3.23	18.19	18.13	-1.21	-1.27	0.80	0.14	0.20
Rio del Topo	159		Bridge										
Rio del Topo	158	Tr 200	11.95	16.14	20.71	4.57	18.16	18.10	-2.55	-2.61	0.87	0.13	104.40
Rio del Topo	158	Tr 30	7.76	16.14	19.38	3.24	18.16	18.10	-1.22	-1.28	0.80	0.14	104.40
Rio del Topo	150	Tr 200	11.95	16.04	20.72	4.68	18.03	18.07	-2.69	-2.65	0.43	0.07	7.50
Rio del Topo	150	Tr 30	7.76	16.04	19.39	3.35	18.03	18.07	-1.36	-1.32	0.41	0.08	7.50
Rio del Topo	140	Tr 200	11.95	16.06	20.72	4.66	17.32	17.86	-3.40	-2.86	0.39	0.06	60.90
Rio del Topo	140	Tr 30	7.76	16.06	19.39	3.33	17.32	17.86	-2.07	-1.53	0.39	0.08	60.90
Rio del Topo	130	Tr 200	11.95	16.01	20.72	4.71	18.12	18.14	-2.60	-2.58	0.21	0.03	0.95
Rio del Topo	130	Tr 30	7.76	16.01	19.39	3.38	18.12	18.14	-1.27	-1.25	0.23	0.04	0.95
Rio del Topo	120	Tr 200	11.95	16.00	20.67	4.67	17.50	17.54	-3.17	-3.13	1.07	0.16	0.30
Rio del Topo	120	Tr 30	7.76	16.00	19.34	3.34	17.50	17.54	-1.84	-1.80	0.99	0.18	0.30
Rio del Topo	115		Bridge										
Rio del Topo	110	Tr 200	11.95	15.98	20.70	4.72	18.08	19.51	-2.62	-1.19	0.25	0.04	12.50
Rio del Topo	110	Tr 30	7.76	15.98	19.34	3.36	18.08	19.51	-1.26	0.17	0.28	0.05	12.50
Rio del Topo	100	Tr 200	11.95	15.98	20.70	4.72	18.04	18.04	-2.66	-2.66	0.20	0.03	0.90
Rio del Topo	100	Tr 30	7.76	15.98	19.34	3.36	18.04	18.04	-1.30	-1.30	0.22	0.04	0.90
Rio del Topo	90	Tr 200	11.95	16.08	20.61	4.53	17.46	17.47	-3.15	-3.14	1.27	0.19	0.30
Rio del Topo	90	Tr 30	7.76	16.08	19.27	3.19	17.46	17.47	-1.81	-1.80	1.20	0.22	0.30
Rio del Topo	85		Bridge										
Rio del Topo	80	Tr 200	11.95	15.77	20.66	4.89	18.00	17.85	-2.66	-2.81	0.27	0.04	3.90
Rio del Topo	80	Tr 30	7.76	15.77	19.26	3.49	18.00	17.85	-1.26	-1.41	0.28	0.05	3.90
Rio del Topo	70	Tr 200	11.95	15.84	20.66	4.82	17.99	17.47	-2.67	-3.19	0.23	0.03	0.60
Rio del Topo	70	Tr 30	7.76	15.84	19.26	3.42	17.99	17.47	-1.27	-1.79	0.25	0.05	0.60
Rio del Topo	60	Tr 200	11.95	15.79	20.64	4.85	17.48	17.52	-3.16	-3.12	0.74	0.12	0.10
Rio del Topo	60	Tr 30	7.76	15.79	19.24	3.45	17.48	17.52	-1.76	-1.72	0.72	0.14	0.10
Rio del Topo	55		Bridge										
Rio del Topo	50	Tr 200	11.95	15.91	20.65	4.74	18.00	17.63	-2.65	-3.02	0.23	0.03	7.60
Rio del Topo	50	Tr 30	7.76	15.91	19.25	3.34	18.00	17.63	-1.25	-1.62	0.26	0.05	7.60
Rio del Topo	40	Tr 200	11.95	15.88	20.65	4.77	17.98	17.48	-2.67	-3.17	0.24	0.04	0.10
Rio del Topo	40	Tr 30	7.76	15.88	19.25	3.37	17.98	17.48	-1.27	-1.77	0.27	0.05	0.10
Rio del Topo	35		Bridge										
Rio del Topo	30	Tr 200	11.95	15.82	20.65	4.83	18.01	18.24	-2.64	-2.41	0.20	0.03	27.00
Rio del Topo	30	Tr 30	7.76	15.82	19.25	3.43	18.01	18.24	-1.24	-1.01	0.23	0.04	27.00
Rio del Topo	20	Tr 200	11.95	15.85	20.65	4.80	17.91	17.26	-2.74	-3.39	0.20	0.03	17.00
Rio del Topo	20	Tr 30	7.76	15.85	19.25	3.40	17.91	17.26	-1.34	-1.99	0.23	0.04	17.00
Rio del Topo	10	Tr 200	11.95	15.76	20.60	4.84	17.31	17.39	-3.29	-3.21	1.01	0.15	0.05
Rio del Topo	10	Tr 30	7.76	15.76	19.20	3.44	17.31	17.39	-1.89	-1.81	0.95	0.17	0.05
Rio del Topo	5		Bridge										
Rio del Topo	4	Tr 200	11.95	15.76	20.58	4.82	17.31	17.39	-3.27	-3.19	1.02	0.15	
Rio del Topo	4	Tr 30	7.76	15.76	19.16	3.40	17.31	17.39	-1.85	-1.77	0.96	0.17	

MODELLI DIRAULICI BIDIMENSIONALI

Si riportano gli output forniti dal codice di calcolo Hec-Ras 5.0.6 relativi alle esondazioni. Si allegano:

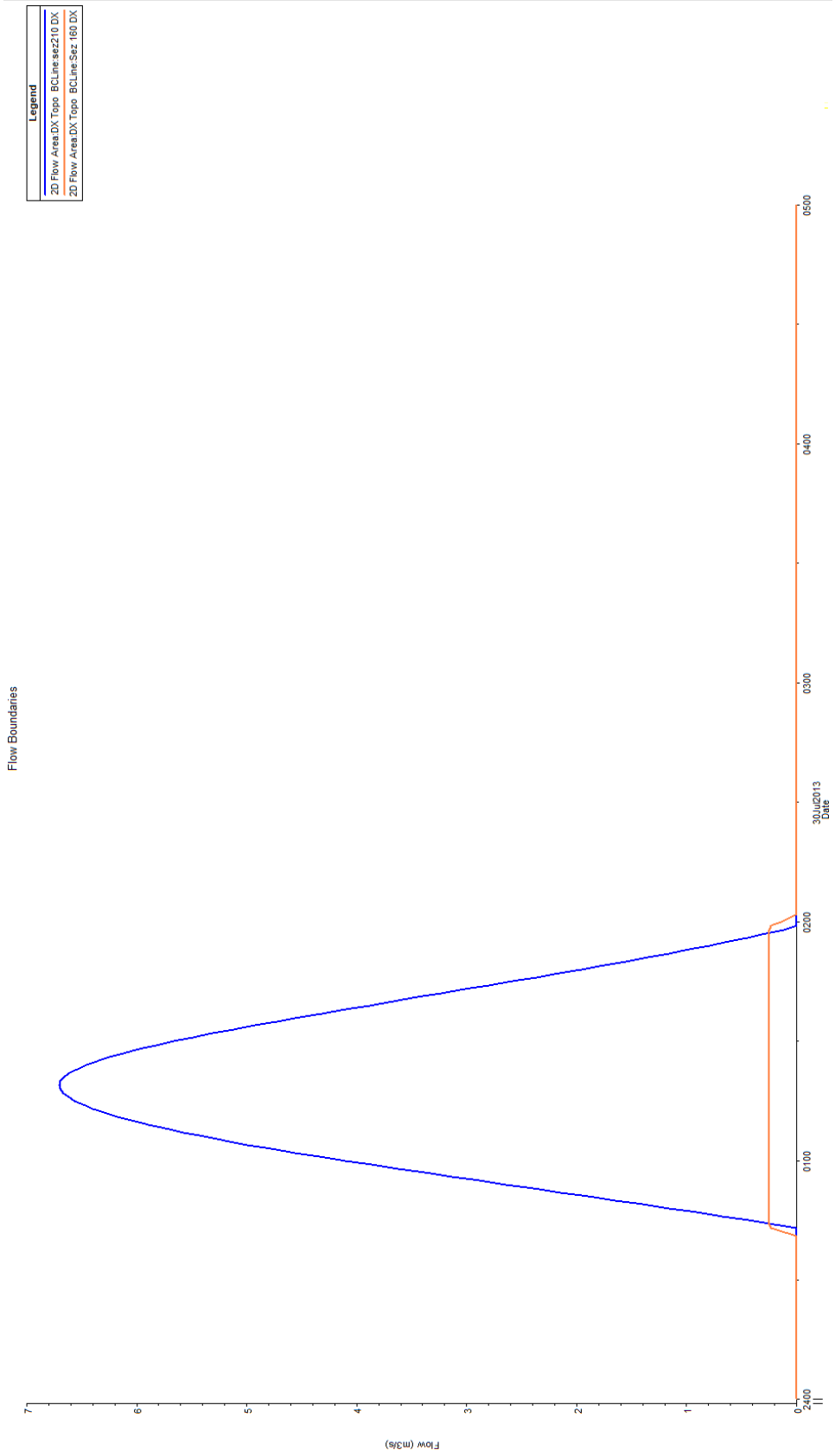
- Gli idrogrammi di ingresso nel modello;
- La planimetria dello schema di modello;
- Alcune sezioni indicative per la dinamica di esondazione;

Si fa presente che i risultati in termini di massimo battente idraulico e di massima velocità del flusso di corrente sono riportati negli appositi elaborati grafici (QG 12, QG 12a, QG 13 e QG 13a).

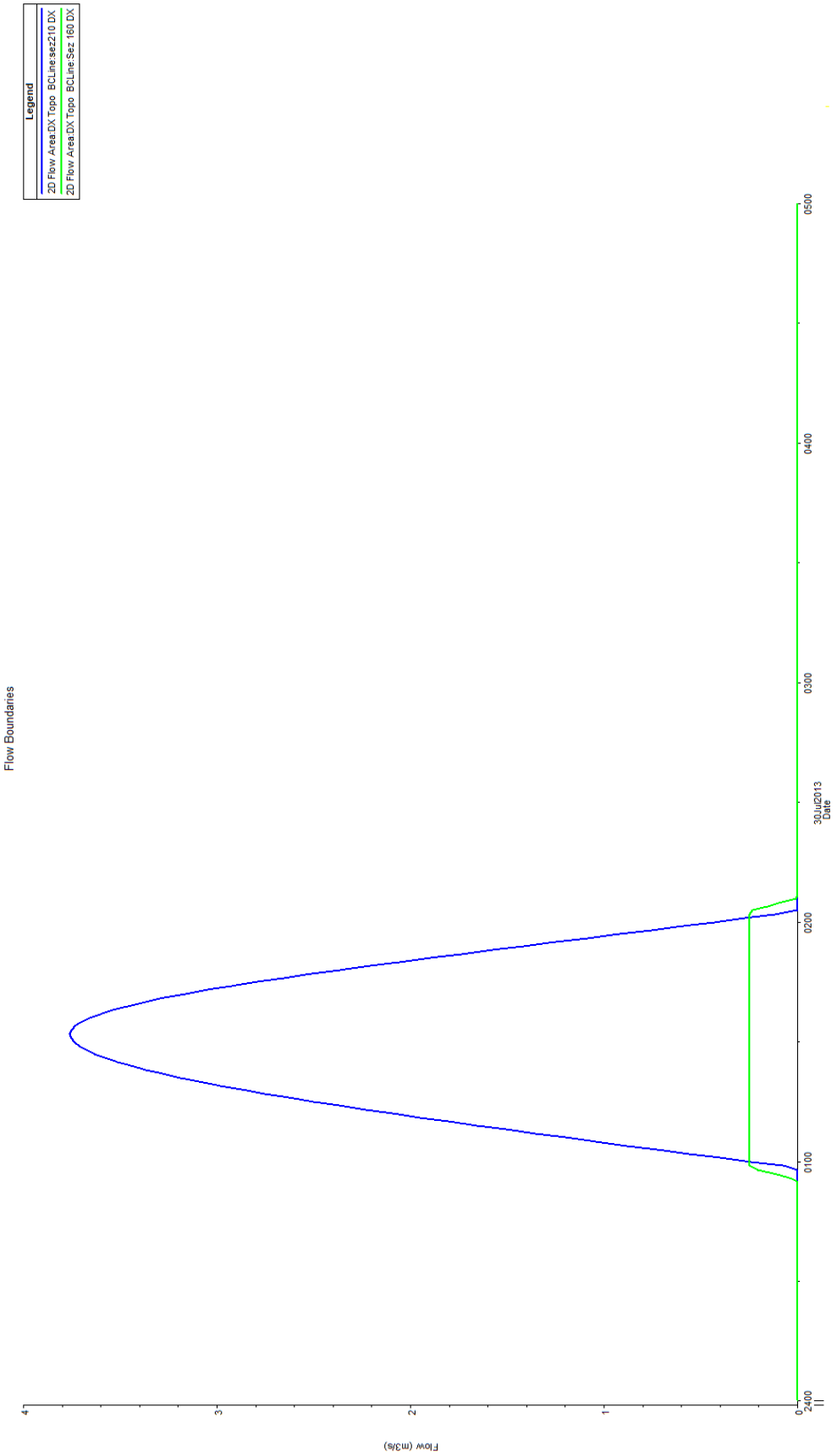
I fenomeni del presente allegato sono quelli indicati come quelli di massima portata all'interno della relazione idraulica (quelli maggiormente critici). Gli output dei fenomeni di massimo volume sono comunque inclusi all'interno della copia digitale consegnata unitamente al presente elaborato.

IDROGRAMMI IN ENTRATA NEL MODELLO BIDIMENSIONALE

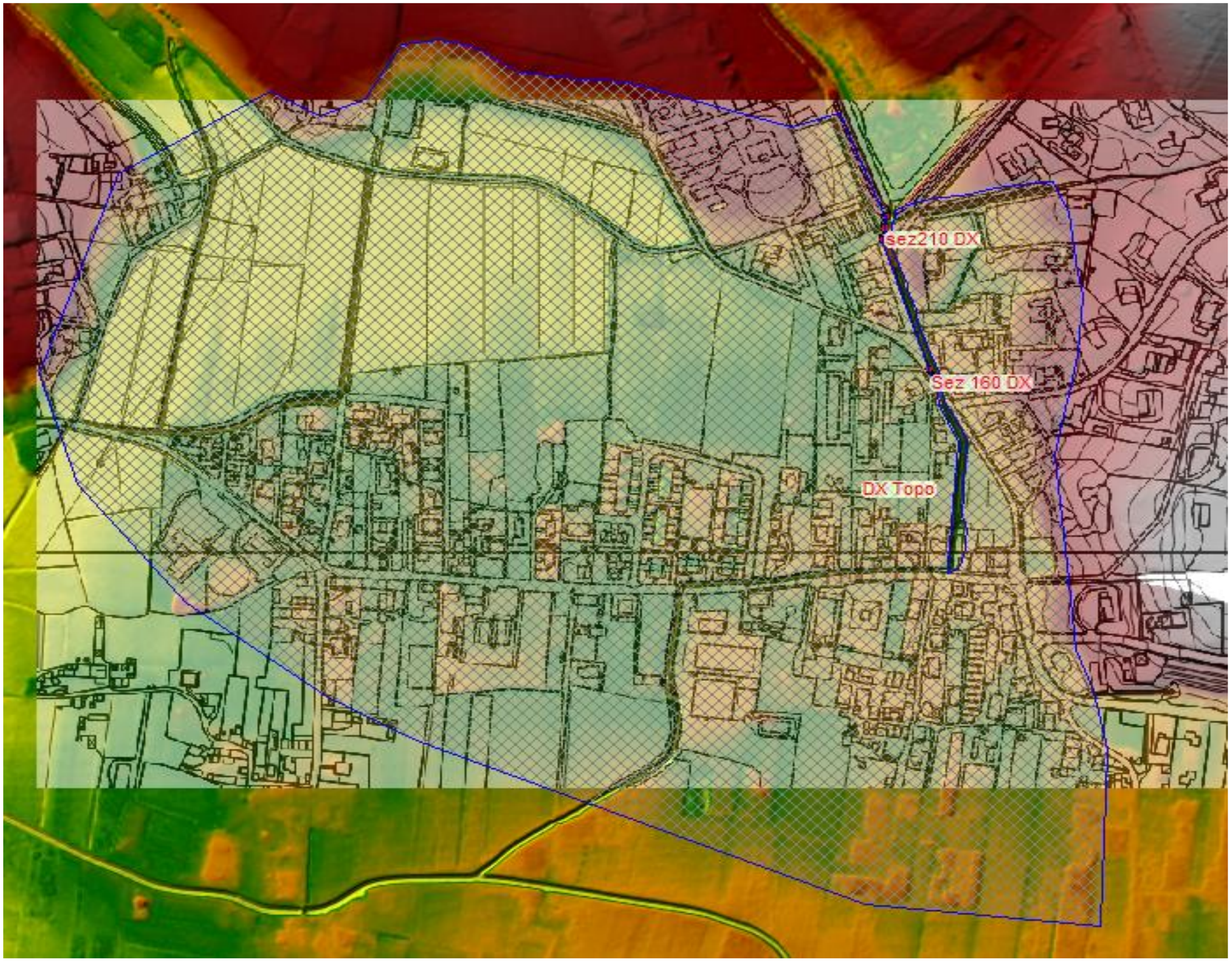
Tempi di ritorno 200 anni



Tempo di ritorno 30 anni

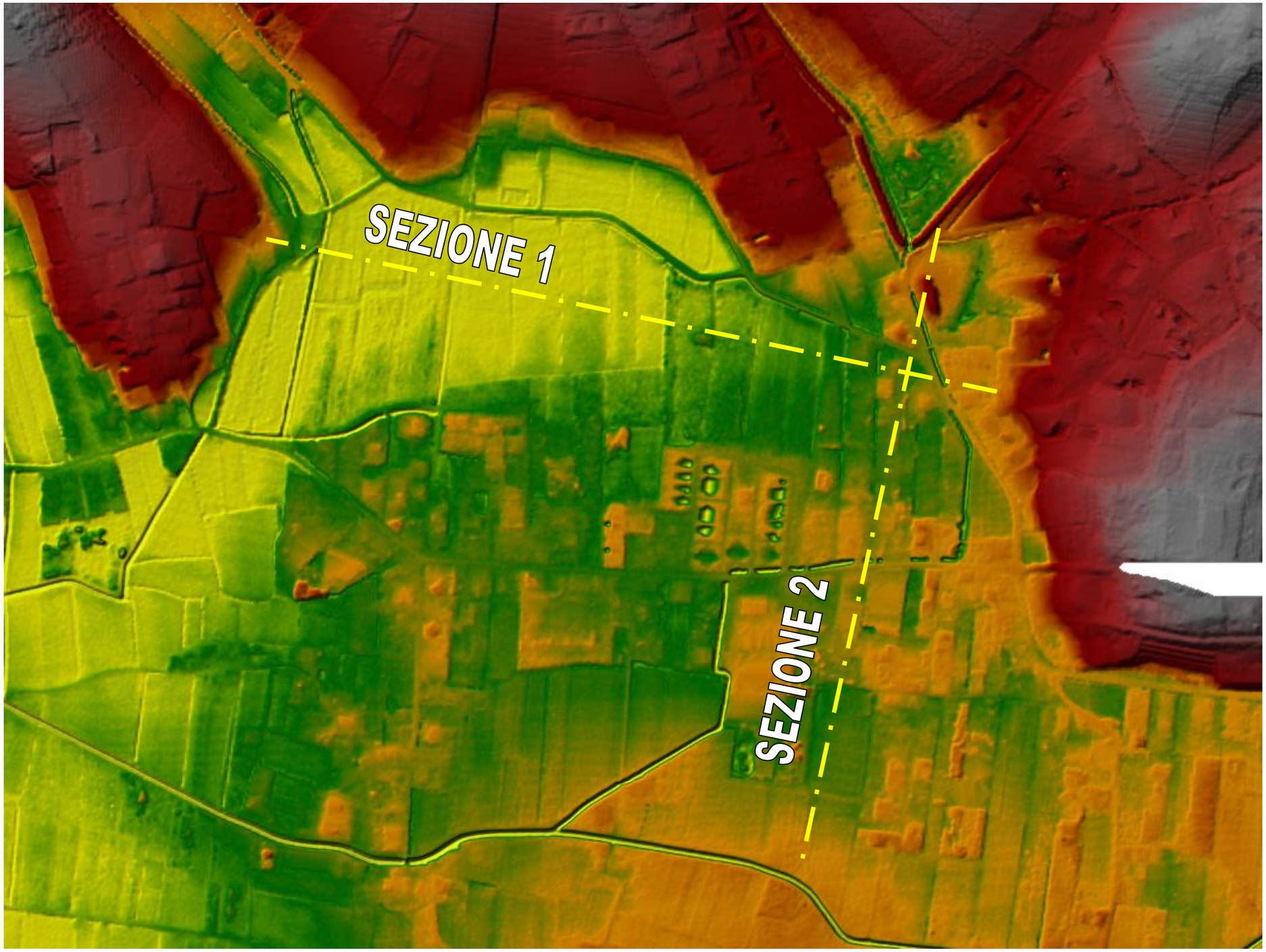


SCHEMA DEL MODELLO DI CALCOLO

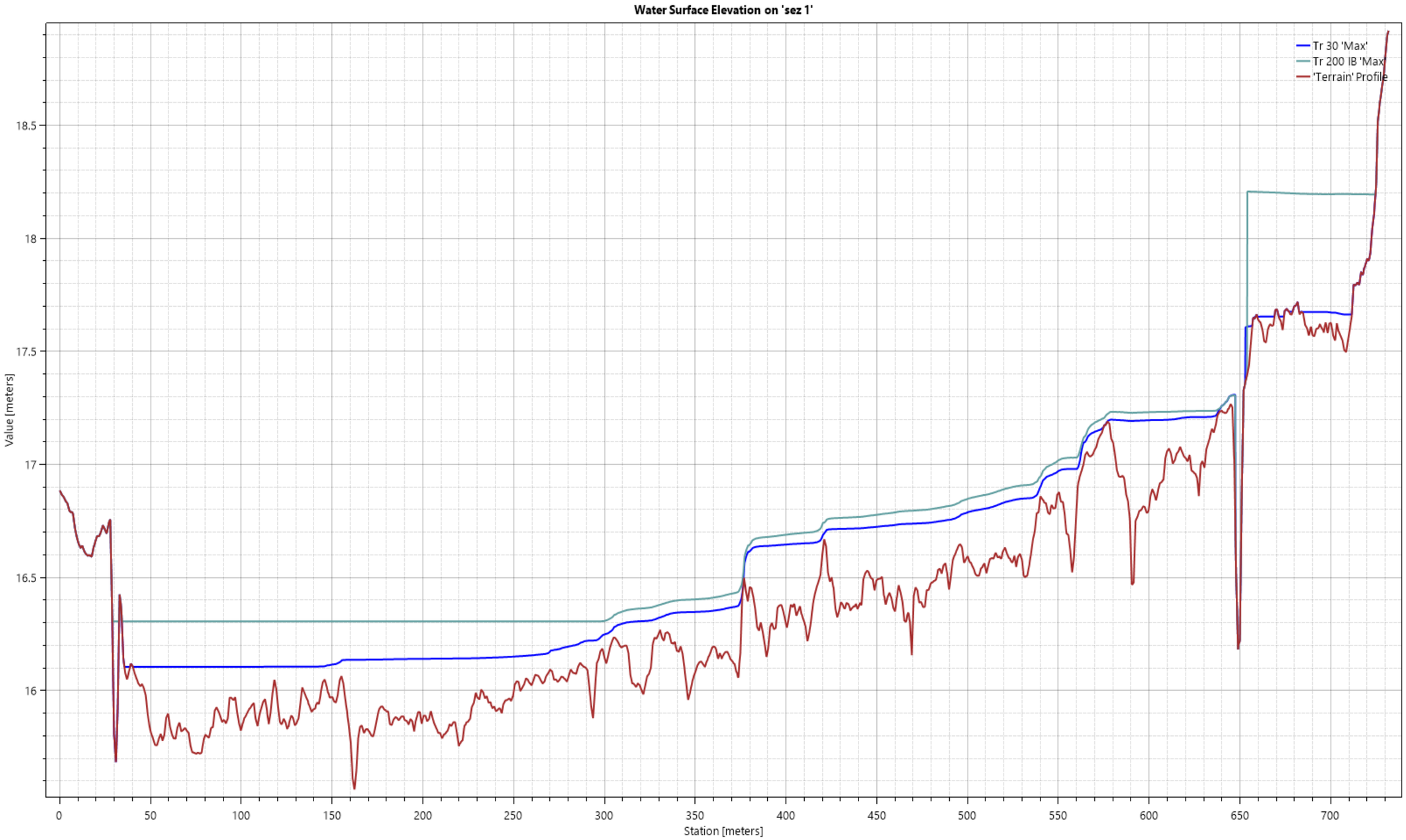


ALL. I4 – idraulica – Simulazioni sul sistema del Rio del Topo

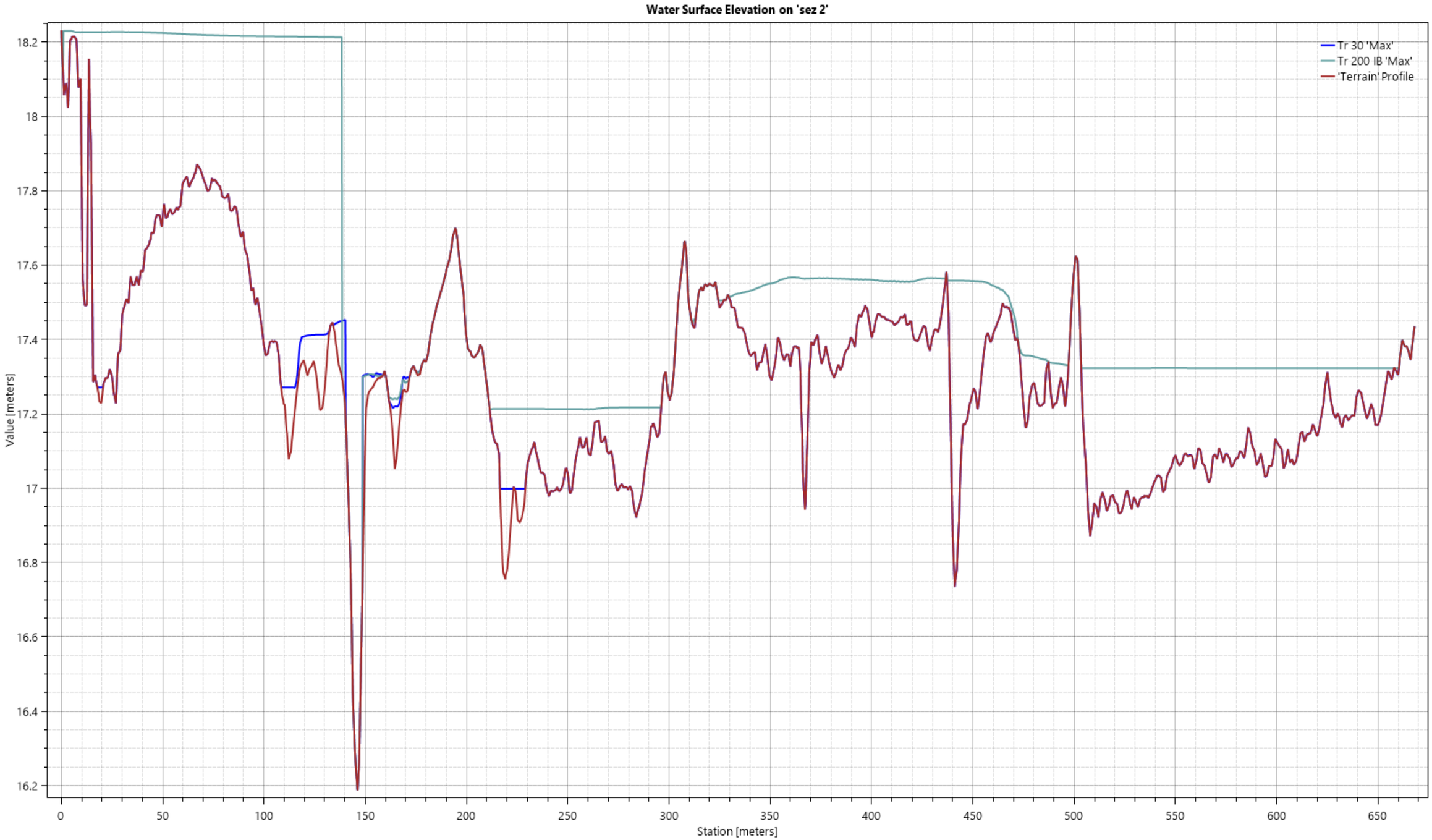
PLANIMETRIA CON INDICAZIONE DELLE SEZIONI DI CONTROLLO



SEZIONE 1


Water Surface Elevation on 'sez 1'
Tr 30 'Max'
Tr 200 IB 'Max'
'Terrain' Profile
Value [meters]
18.5
18
17.5
17
16.5
16
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
Station [meters]

SEZIONE 2


Water Surface Elevation on 'sez 2'
Tr 30 'Max'
Tr 200 IB 'Max'
'Terrain' Profile
Value [meters]
18.2
18
17.8
17.6
17.4
17.2
17
16.8
16.6
16.4
16.2
0
50
100
150
200
250
300
350
400
450
500
550
600
650
Station [meters]