



COMUNE DI PORTO TORRES

Regione Autonoma della Sardegna

STUDIO DI COMPATIBILITÀ IDRAULICA E GEOLOGICO - GEOTECNICO

ai sensi dell'art. 8 delle Norme di attuazione del P.A.I.
e secondo quanto previsto dagli artt. n° 24 e 25 delle Norme stesse



Studio di compatibilità idraulica

Relazione descrittiva ed elaborati quantitativi **1/3**

Fiume Santo

I tecnici incaricati	Il Responsabile del Procedimento
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Sommario

Fiume Santo.....	2
Sezioni di chiusura dei bacini oggetto di analisi idrologica e calcolo portate.....	7
Il Bacino 3.01 del Fiume Santo.....	8
Il Bacino 3.02 del Fiume Santo.....	10
Il Bacino 3.03 del Fiume Santo.....	12
Il Bacino 3.04 del Fiume Santo.....	14
Il Bacino 3.05 del Fiume Santo.....	16
Il Bacino 3.06 del Fiume Santo.....	18
Il Bacino 3.07 del Fiume Santo.....	20
Il Bacino 3.08 del Fiume Santo.....	22
Il Bacino 3.09 del Fiume Santo.....	24
Il Bacino 3.10 del Fiume Santo.....	26
Il Bacino 3.11 del Fiume Santo.....	28
Documentazione fotografica.....	30
Aste oggetto di studio del regime idraulico.....	31
Profili e sezioni del pelo libero dell'asta principale di Fiume Santo.....	32
Profili e sezioni del pelo libero dell'affluente 1 del Fiume Santo.....	33
Profili e sezioni del pelo libero dell'affluente 2 del fiume Santo.....	34

Fiume Santo

Il Fiume Santo scorre da sud verso nord nella porzione nord-occidentale del territorio comunale di Sassari e, in misura marginale, nel Comune di Porto Torres, per quanto riguarda la sponda destra.

Il bacino del Fiume Santo è posto alla sinistra del sistema idrografico di Genano e l'asta fluviale costituisce il limite ovest del territorio comunale di Porto Torres sull'isola madre.

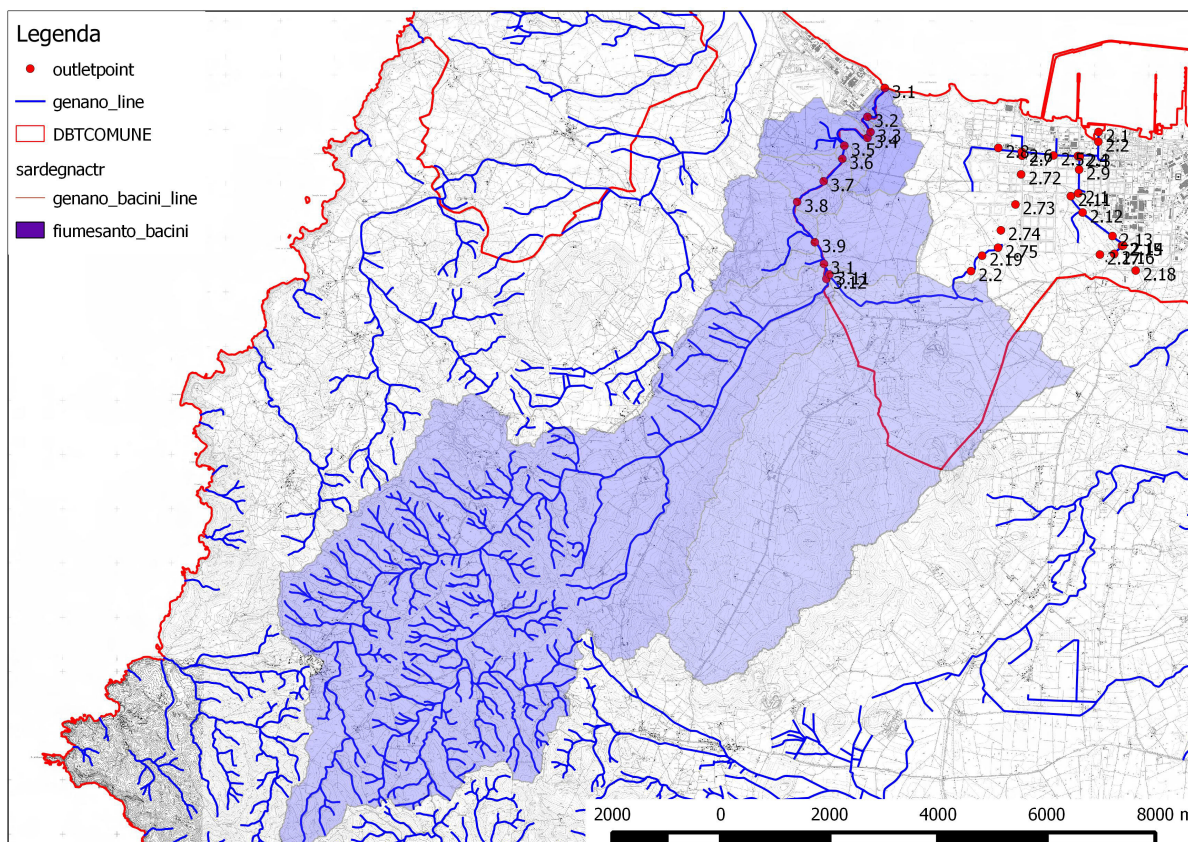
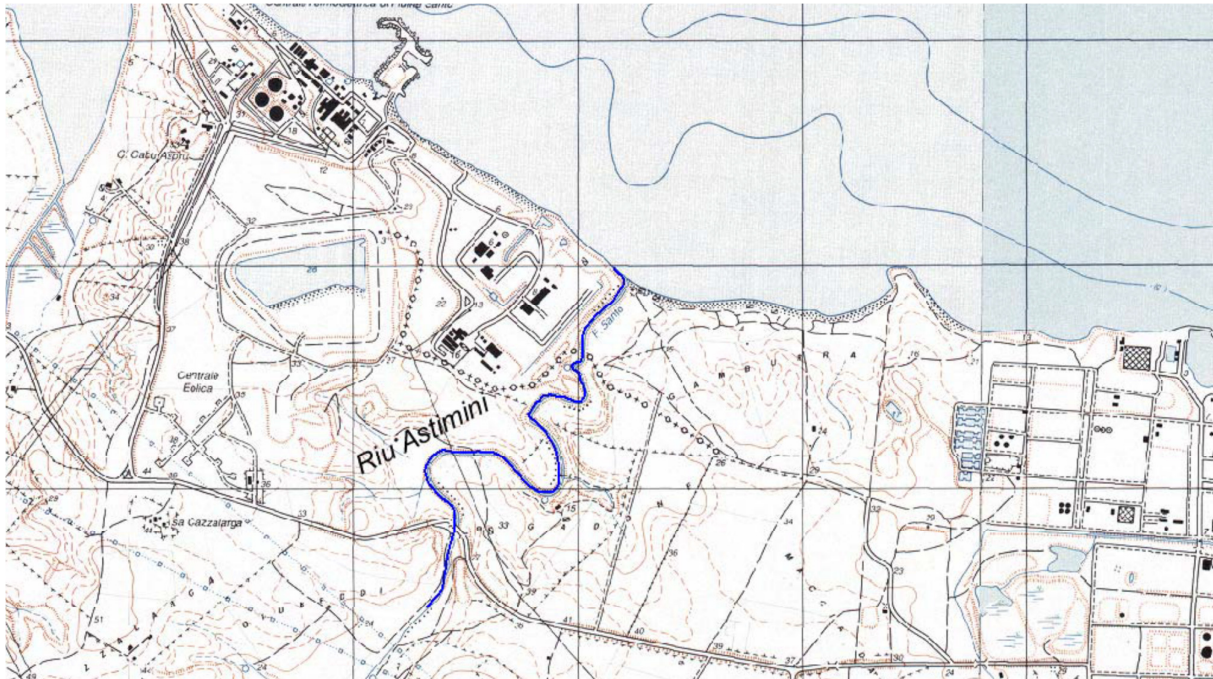


Fig. 1 - Bacino del Fiume Santo

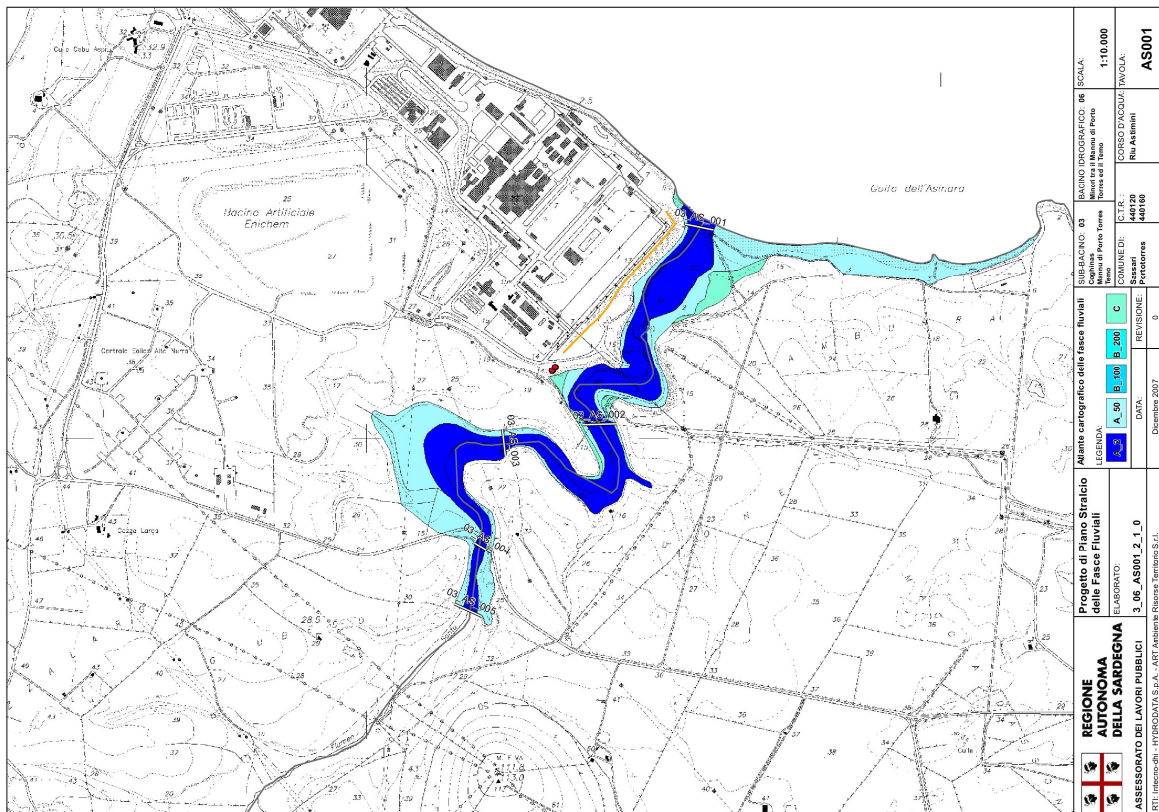
Gli interventi antropici caratterizzano la parte finale del bacino del Fiume Santo, per la presenza, alla foce del fiume in sponda sinistra, di un importante complesso industriale, Polo Elettrico (centrale E.ON.- ex Endesa e impianti Terna).

Il primo tratto del Fiume Santo è stato oggetto di studio nel PSFF (in tale studio viene citato con il toponimo Riu Astimini). Il tratto studiato ha una lunghezza di 2,6 Km partendo a monte della strada provinciale per Stintino. Lo studio è stato condotto seguendo gli indirizzi indicati per la redazione dello studio. La ricognizione sul campo eseguita per il presente studio ha sostanzialmente confermato le indicazioni ed i dati riportati nel PSFF. Pertanto, in analogia con quanto fatto per il Rio Mannu di Porto Torres, si sono assunte nel presente studio le conclusioni riportate dal PSFF per il tratto studiato provvedendo a completare lo studio nei tratti del Fiume Santo che interessano il territorio di Porto Torres, indicati e descritti successivamente nella presente relazione.



Tratto del fiume Santo studiato nel PSFF

Il Fiume Santo non è stato oggetto di indagine nella fase di definizione del PAI mentre è stato oggetto di specifica analisi di compatibilità idraulica nell'ambito del Piano Urbanistico Comunale di Sassari, così come previsto dagli artt. 8 e 26 del PAI. Dalle risultanze dello studio condotto nel PUC di Sassari viene confermato che il corso d'acqua è interessato da un'area a pericolosità idraulica molto elevata (Hi4).



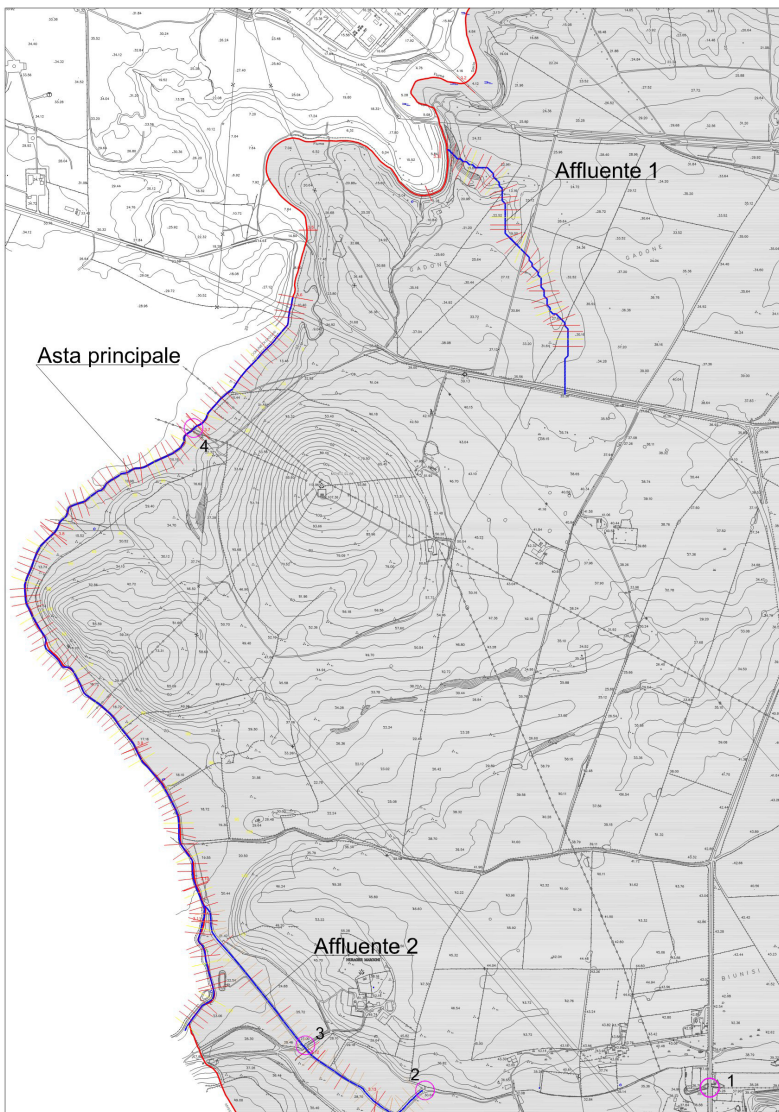
Le aree di pericolosità idraulica individuate nel PSFF. Il Fiume Santo non è stato indagato dal PAI vigente.

Da un'attenta analisi della toponomastica riportata nella Cartografia Tecnica Regionale si individua l'asta principale del bacino con le seguenti denominazioni:

- Flumen Santu (alla foce);
- Riu Sant'Osanna (in località Trobas);
- Riu d'Astimini (in corrispondenza dell'intersezione con la prov. n. 46 in località Anzu, denominazione mantenuta fino alle sorgenti).

Trattandosi di bacino sopra i 60 kmq la stima delle portate da porre a base della individuazione delle aree di pericolosità idraulica, in coerenza con quanto suggerito nel metodo VAPI, è stata svolta facendo riferimento alle piogge giornaliere.

I tratti analizzati nel presente studio sono riportati in azzurro nella immagine seguente. Si tratta dell'asta fluviale principale nel tratto che definisce il confine comunale tra Sassari e Porto Torres nonché di due affluenti in sponda destra idraulica che scorrono nel territorio di Porto Torres e che sono stati analizzati in ragione di possibili problemi connessi fondamentalmente con le intersezioni con la viabilità rurale esistente.



Tratti studiati del bacino di Fiume Santo

Oltre all'asta principale nel tratto che delimita il territorio comunale, lungo la quale l'analisi sulla cartografia disponibile ha evidenziato la presenza di una intersezione tra l'asta fluviale e la viabilità esistente, si sono individuati due intersezioni con un affluente in sponda destra, nel territorio di Porto Torres (individuate con i numeri 2 e 3 nella carta posta a lato).

Inoltre si è individuato una ulteriore intersezione (la n. 1 nella carta) che appariva necessario verificare.

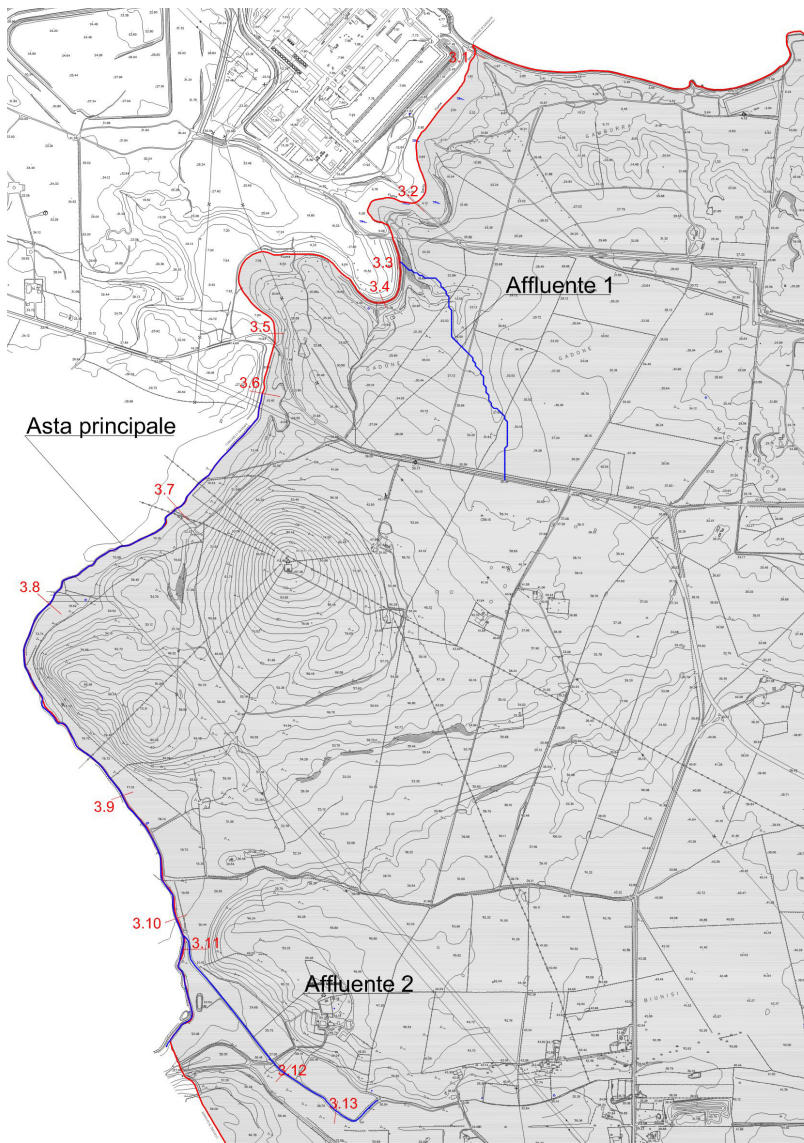
L'indagine sul posto ha evidenziato come l'intersezione 1 riguarda una depressione naturale, non collegata direttamente all'asta fluviale, che raccoglie acqua piovana nel periodo invernale la quale viene utilizzata in ambito locale a scopi agricoli.

L'intersezione n. 2 dell'affluente 2 interessa una strada di penetrazione agraria e si tratta di una intersezione a raso senza tombini o ponticelli di sorta.

L'intersezione n. 3 dell'affluente 2 interessa una strada di penetrazione agraria. La strada supera il corso d'acqua con un ponticello la cui sezione non è adeguata al deflusso delle portate poste a base della presente relazione.

Infine l'intersezione n. 4, che interessa l'asta principale, è anch'essa una sorta di passerella sommersibile oramai completamente interrata e con evidenti segni di completo abbandono. Molto probabilmente la strada non viene più utilizzata, come è evidente dalla vegetazione che ha invaso l'intero tratto stradale che adduce al ponticello.

Queste ultime due intersezioni sono documentate fotograficamente nelle pagine seguenti.



Per l'indagine idraulica sono state individuate una serie di sezioni di calcolo, riportate nella immagine a fianco.

Per ogni sezione si sono determinati i principali caratteri morfometrici e si è determinata la portata corrispondente ai periodi di ritorno previsti dalla normativa vigente, di seguito riassunti. Le prime sezioni di calcolo sono state elaborate per confrontare i risultati determinati con quelli riportati nel PSFF e posti a base di quello studio.

I dati sono risultati assolutamente confrontabili.

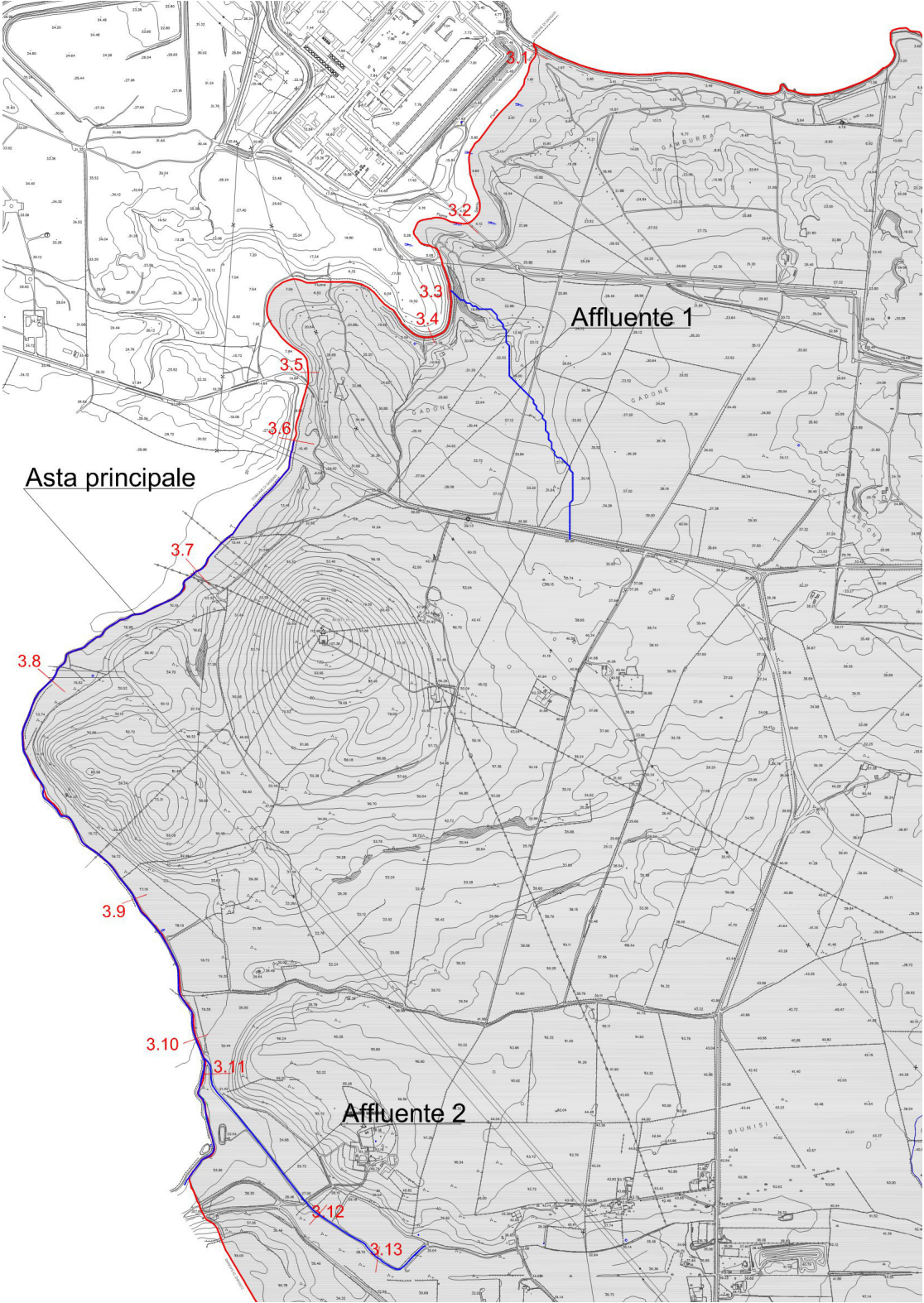
Sezione di calcolo	Area del bacino (kmq)	Q50	Q100	Q200	Q500
3.01	83.17	168.28	204.15	240.03	286.96
3.02	82.81	168.09	203.92	239.75	286.63
3.03	1.06	0.17	0.47	0.88	1.61
3.04	81.59	167.61	203.34	239.06	285.81
3.05	80.14	167.02	202.62	238.22	284.80
3.06	79.93	166.86	202.42	237.99	284.53
3.07	79.55	166.61	202.12	237.63	284.10
3.08	78.60	166.15	201.56	236.98	283.32
3.09	75.97	164.66	199.76	234.85	280.78
3.10	72.93	163.54	198.40	233.26	278.88
3.11	72.80	163.48	198.33	233.18	278.78
3.12	25.87	29.17	44.51	62.07	87.34
3.13	25.54	28.67	43.76	61.03	85.87

Le sezioni 3.03 e 3.11 definiscono rispettivamente i bacini degli affluenti Af1 e Af2.

Si riportano nel seguito i risultati delle analisi idrologiche e dei calcoli delle portate massime per i vari tempi di ritorno in corrispondenza delle sezioni di chiusura dei bacini.

Seguiranno i risultati delle analisi svolte con il software hec-ras riguardo le aste oggetto di studio del regime idraulico.

Sezioni di chiusura dei bacini oggetto di analisi idrologica e calcolo portate.

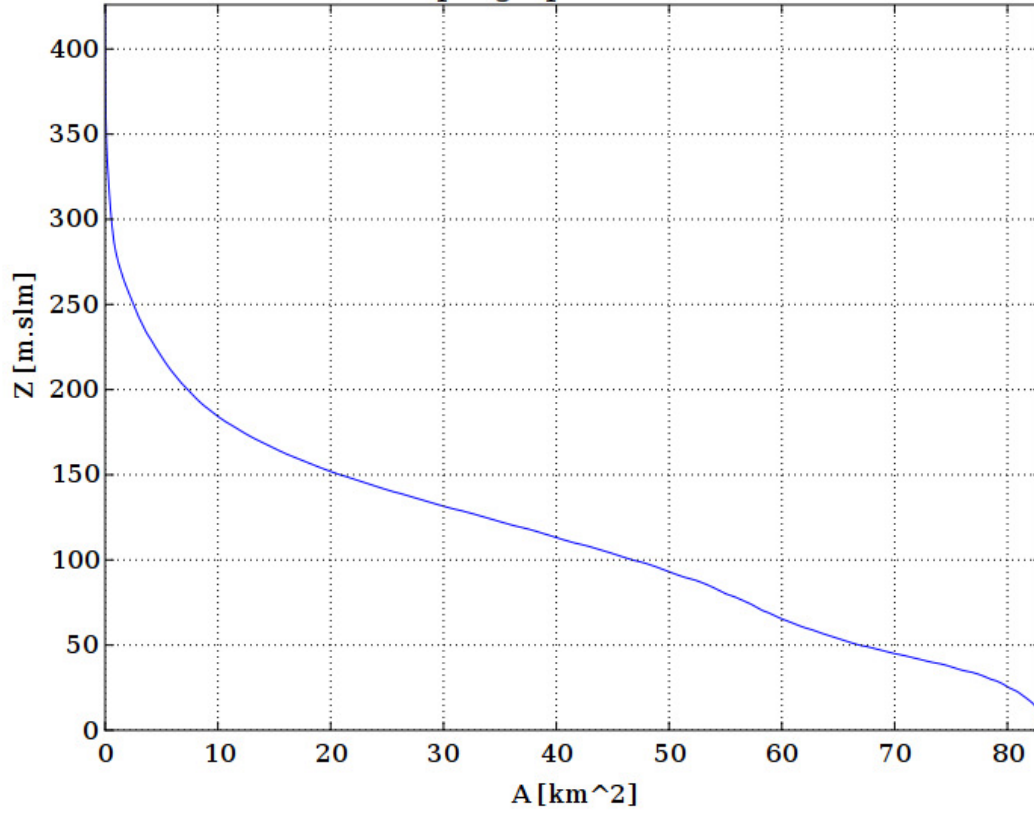


Il Bacino 3.01 del Fiume Santo

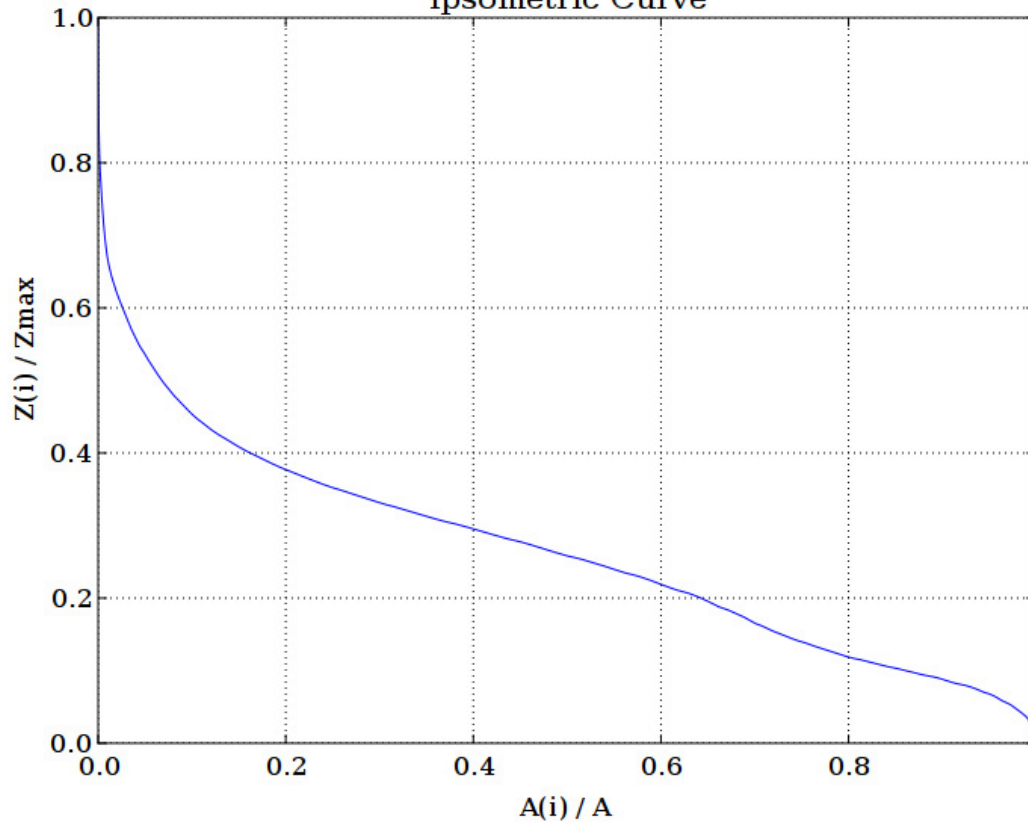
Parametri morfometrici del Bacino 3.01

Morphometric parameters of basin :	3.01	
Easting Centroid of basin		1437985
Northing Centroid of basin		4514415
Rectangle containing basin N-W	('1430950', '4521760')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		83.170675
Perimeter of basin [km]		65.3240692221
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		0.006719053
Elevation Difference [m]		425.782180947
Mean Elevation		113.4756
Mean Slope		8.24
Length of Directing Vector [km]		8.4442260403
Prevalent Orientation [degree from north, counterclockwise]		1.0488303177
Compactness Coefficient		6.3479435774
Circularity Ratio		0.2449252892
Topological Diameter		188
Elongation Ratio		0.4091357332
Shape Factor		3.3067203295
Concentration Time (Giandotti, 1934) [hr]		4.4953378631
Length of Mainchannel [km]		25.152013691
Mean slope of mainchannel [percent]		2.1260329923
Mean hillslope length [m]		2708795
Magnitudo		1018
Max order (Strahler)	6	
Number of streams	1483	
Total Stream Length [km]		428.659
First order stream frequency		12.2398910433
Drainage Density [km/km ²]		5.1539680302
Bifurcation Ratio (Horton)		4.1641
Length Ratio (Horton)		2.6209
Area ratio (Horton)		3.5828
Slope ratio (Horton)		1.6099
Calcolo del tempo di corrivazione		
Pasini [ore]		9.47
Giandotti (1934) [ore]		8.71
Pezzoli [ore]		9.49
Puglisi [ore]		6.85
Ventura [ore]		7.94
Viparelli [ore]		6.99
Tournon [ore]		9.73
Kirpich (1940) [ore]		2.08
Formula VAPI-Sardegna [ore]		4.75
	CN	82.20
SCS [ore]		5.87

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.01

Sottobacino

3.01

Pioggia indice	$\mu g =$	45
Superficie del bacino [kmq]		83.17
CN III		82.20
Tc (ventura)(ore)		7.94
Tc SCS [ore]		5.87
Tc VAPI Sardegna		4.75
Tc Puglisi		6.85

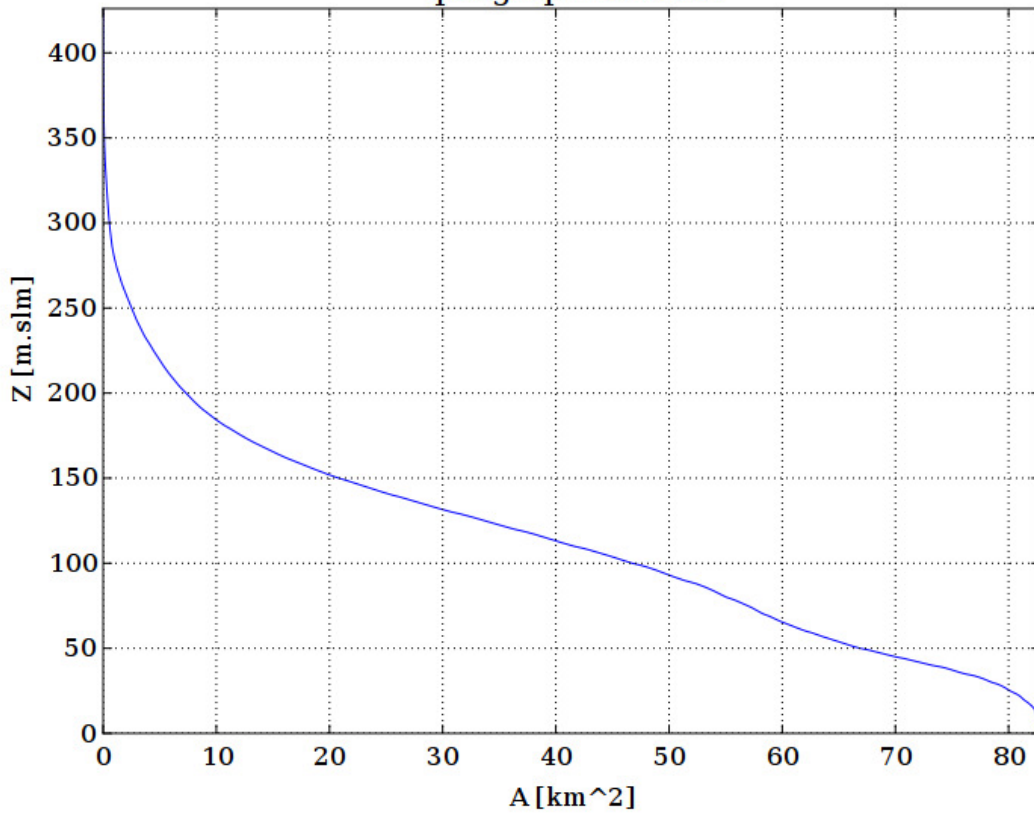
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso
2	0.889030096	40.01	55.01	10.01	48.67	0.25
50	2.282572185	102.72	55.01	57.33	278.63	0.56
100	2.603078000	117.14	55.01	69.90	339.75	0.60
200	2.930821015	131.89	55.01	83.08	403.78	0.63
500	3.375180726	151.88	55.01	101.32	492.43	0.67

Il Bacino 3.02 del Fiume Santo

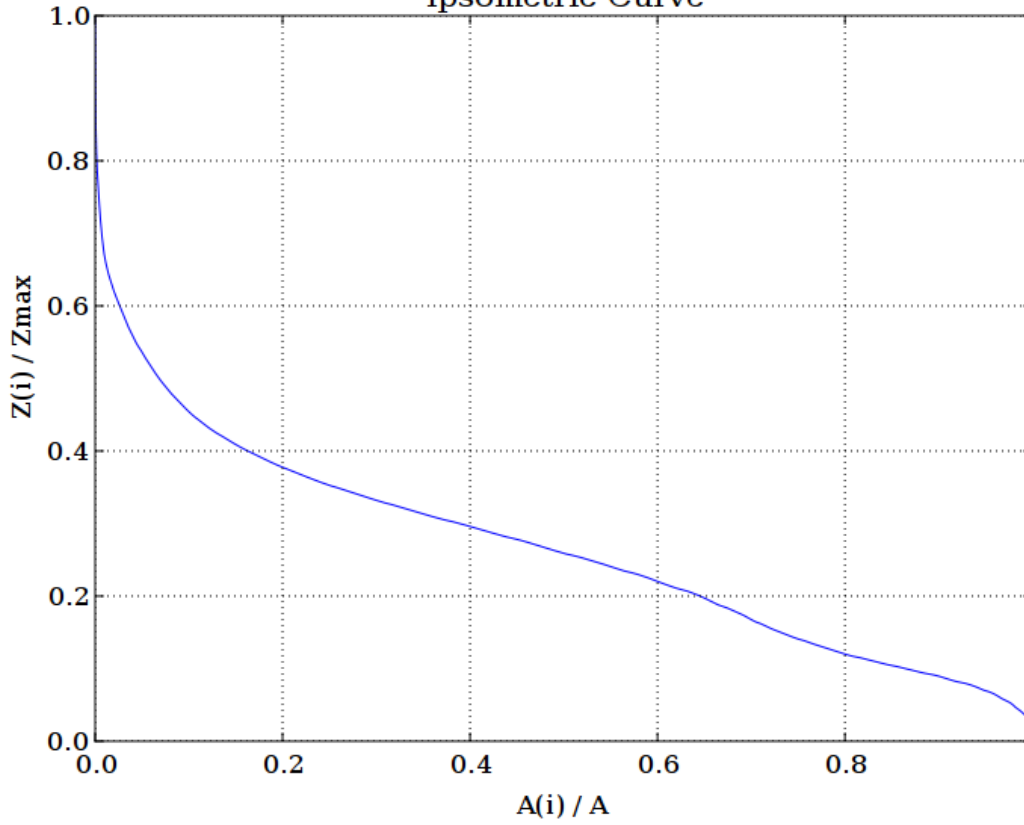
Parametri morfometrici del Bacino 3.02

Morphometric parameters of basin :	3.02	
Easting Centroid of basin		1437975
Northing Centroid of basin		4514385
Rectangle containing basin N-W	('1430950', '4521580')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		82.809475
Perimeter of basin [km]		64.7818152547
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		0.01
Elevation Difference [m]		425.7789
Mean Elevation		113.9135
Mean Slope		8.26
Length of Directing Vector [km]		7.9439041498
Prevalent Orientation [degree from north, counterclockwise]		1.0600913508
Compactness Coefficient		6.3089638404
Circularity Ratio		0.2479611654
Topological Diameter		187
Elongation Ratio		0.417955166
Shape Factor		3.370657723
Concentration Time (Giandotti, 1934) [hr]		4.4374607142
Length of Mainchannel [km]		24.567749622
Mean slope of mainchannel [percent]		2.1453443413
Mean hillslope length [m]		2695235
Magnitudo		1014
Max order (Strahler)	6	
Number of streams	1478	
Total Stream Length [km]		427.1025
First order stream frequency		12.2449755901
Drainage Density [km/km ²]		5.1576525512
Bifurcation Ratio (Horton)		4.1607
Length Ratio (Horton)		2.5831
Area ratio (Horton)		3.5819
Slope ratio (Horton)		1.5993
Calcolo del tempo di corrivazione		
Pasini [ore]		9.34
Giandotti (1934) [ore]		8.58
Pezzoli [ore]		9.23
Puglisi [ore]		6.74
Ventura [ore]		7.89
Viparelli [ore]		6.82
Tournon [ore]		9.78
Kirpich (1940) [ore]		2.04
Formula VAPI-Sardegna [ore]		4.75
	CN	82.20
SCS [ore]		5.75

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.02

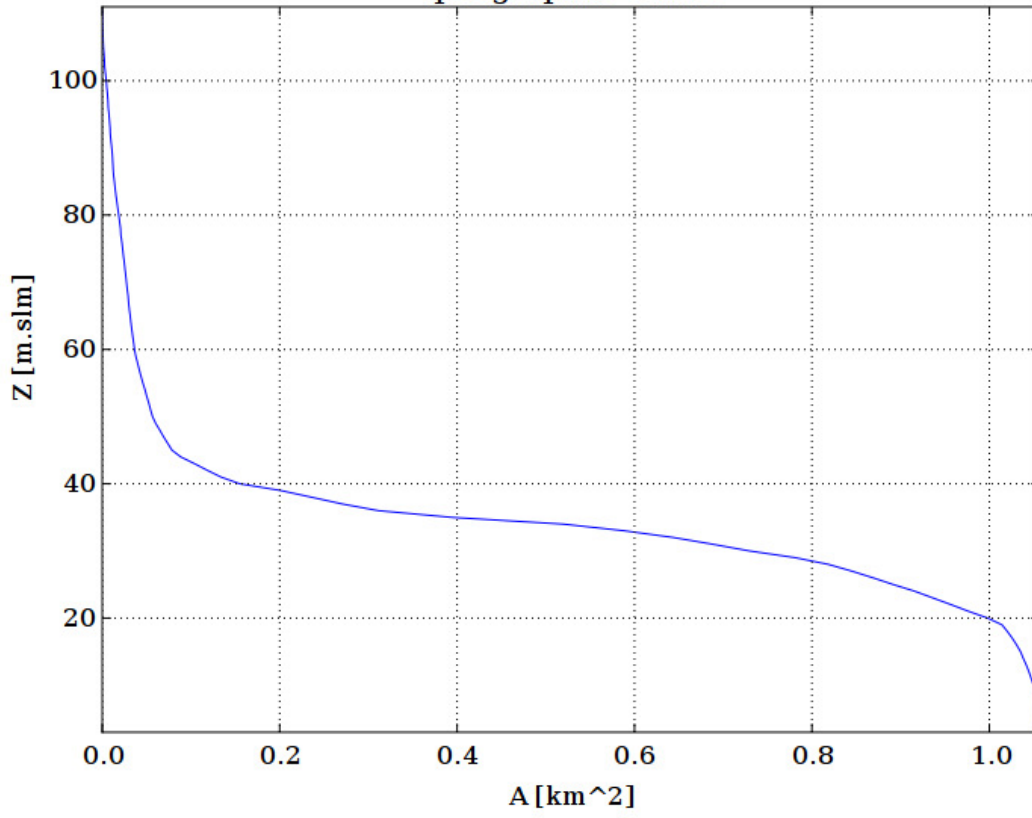
Sottobacin		3.02					
Pioggia indice	$\mu g =$	45					
Superficie del bacino [kmq]		82.81					
CN III		82.20					
Tc (ventura)(sec)		7.89					
Tc SCS [ore]		5.75					
Tc VAPI Sardegna		4.75					
Tc Puglisi		6.74					
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	55.01	10.01	48.48	0.25	
50	2.282572185	102.72	55.01	57.33	277.58	0.56	
100	2.603078000	117.14	55.01	69.90	338.48	0.60	
200	2.930821015	131.89	55.01	83.08	402.26	0.63	
500	3.375180726	151.88	55.01	101.32	490.58	0.67	

Il Bacino 3.03 del Fiume Santo

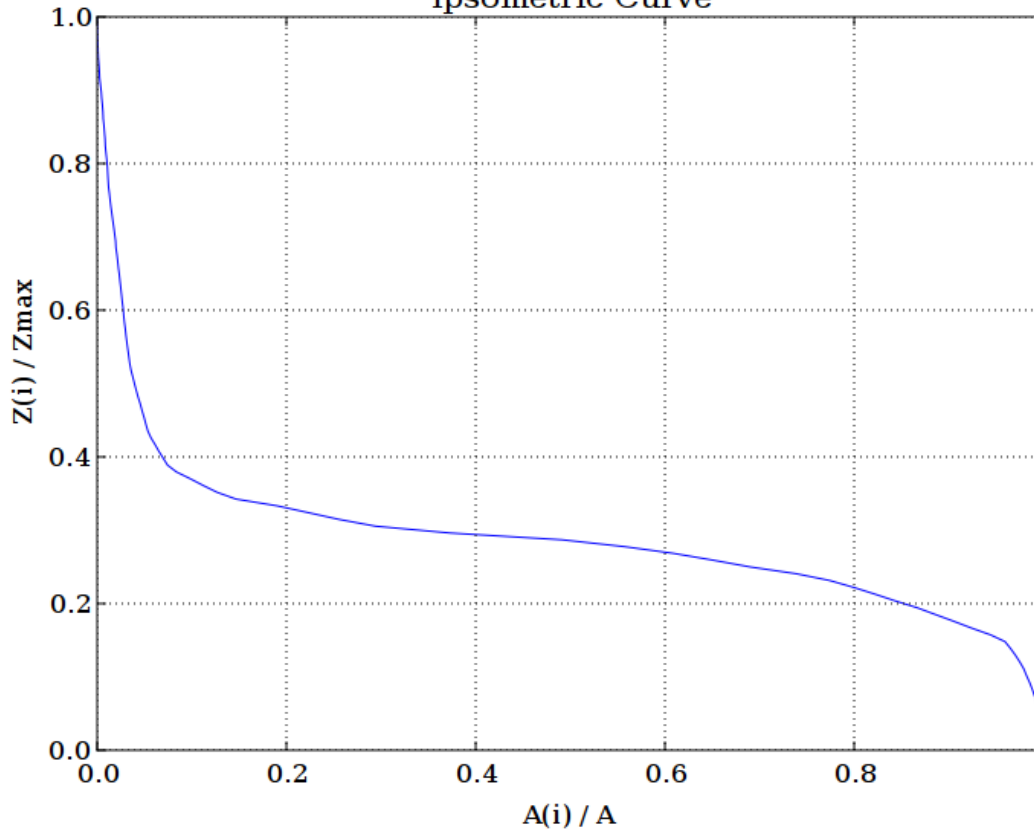
Parametri morfometrici del Bacino 3.03

Morphometric parameters of basin :	3.03	
Easting Centroid of basin		1442205
Northing Centroid of basin		4520415
Rectangle containing basin N-W	('1441430', '4521090')	
Rectangle containing basin S-E	('1442860', '4519750')	
Area of basin [km ²]		1.0571625
Perimeter of basin [km]		5.3347875144
Max Elevation [m s.l.m.]		111.0488
Min Elevation [m s.l.m.]		2.842837
Elevation Difference [m]		108.205963
Mean Elevation		34.71222
Mean Slope		1.85
Length of Directing Vector [km]		0.6404754216
Prevalent Orientation [degree from north, counterclockwise]		1.0107525132
Compactness Coefficient		4.5982353103
Circularity Ratio		0.4667855046
Topological Diameter		10
Elongation Ratio		0.7676971553
Shape Factor		0.6995290373
Concentration Time (Giandotti, 1934) [hr]		0.7666171398
Length of Mainchannel [km]		1.511248917
Mean slope of mainchannel [percent]		2.7505666037
Mean hillslope length [m]		5838416
Magnitudo		10
Max order (Strahler)	3	
Number of streams	16	
Total Stream Length [km]		4.7807
First order stream frequency		9.4592836957
Drainage Density [km/km ²]		4.5221997564
Bifurcation Ratio (Horton)		3.5
Length Ratio (Horton)		1.7768
Area ratio (Horton)		1.5019
Slope ratio (Horton)		0.8472
Calcolo del tempo di corrivazione		
Pasini [ore]		0.76
Giandotti (1934) [ore]		1.41
Pezzoli [ore]		0.50
Puglisi [ore]		1.66
Ventura [ore]		0.79
Viparelli [ore]		0.42
Tournon [ore]		2.39
Kirpich (1940) [ore]		0.42
Formula VAPI-Sardegna [ore]		1.90
	CN	78.15
SCS [ore]		1.48

Ipsographic Curve



Ipsometric Curve



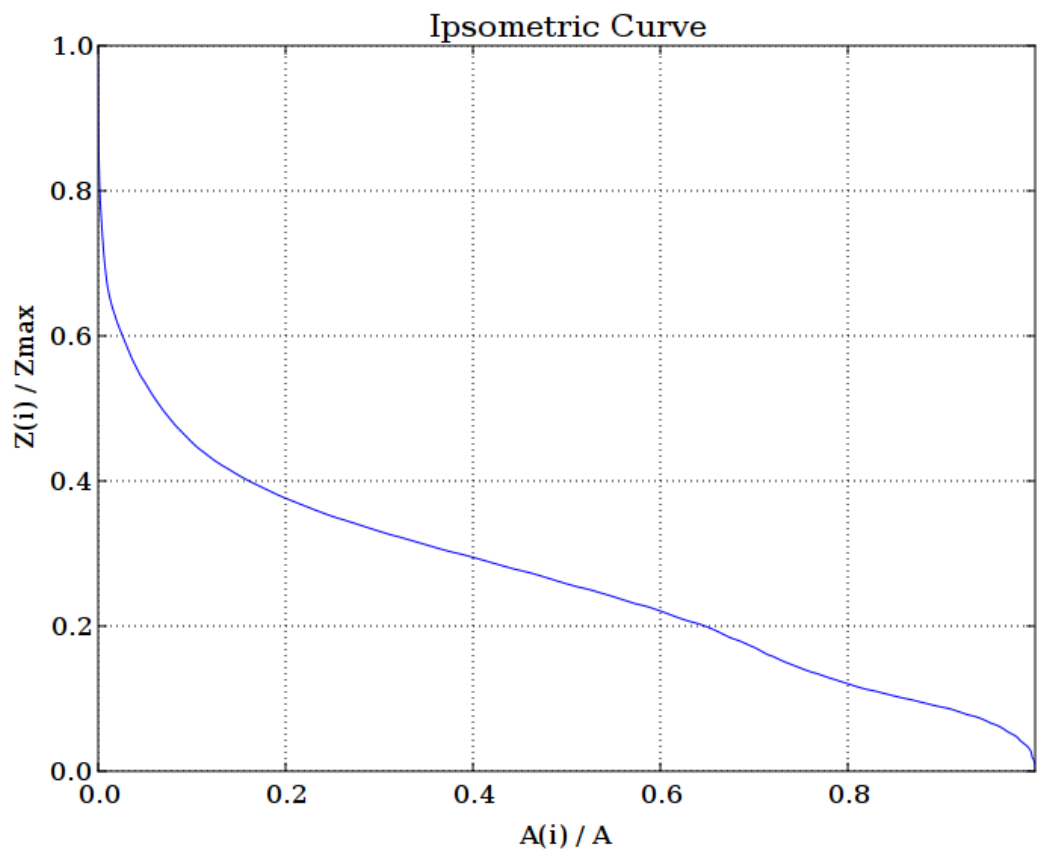
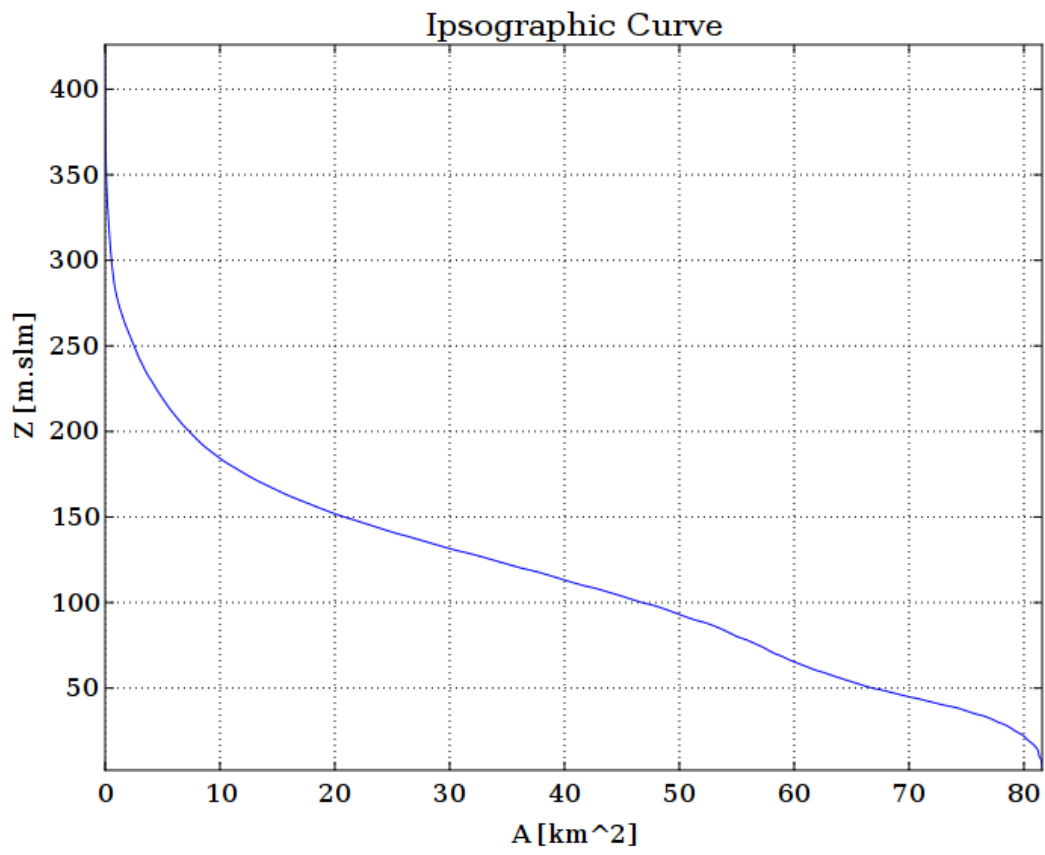
Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.03

Sottobacin		3.03				
Pioggia indice	$\mu g =$	45				
Superficie del bacino [kmq]		1.06				
CN III		82.20				
Tc (ventura)(sec)		0.79				
Tc SCS [ore]		1.48				
Tc VAPI Sardegna		1.90				
Tc Puglisi		1.66				
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso
2	0.889030096	40.01	71.02	6.88	1.06	0.17
50	2.282572185	102.72	71.02	49.11	7.60	0.48
100	2.603078000	117.14	71.02	60.91	9.43	0.52
200	2.930821015	131.89	71.02	73.39	11.37	0.56
500	3.375180726	151.88	71.02	90.83	14.07	0.60

Il Bacino 3.04 del Fiume Santo

Parametri morfometrici del Bacino 3.04

Morphometric parameters of basin :	3.04	
Easting Centroid of basin		1437905
Northing Centroid of basin		4514295
Rectangle containing basin N-W	('1430950', '4521580')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		81.587275
Perimeter of basin [km]		64.5100995259
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		2.364457
Elevation Difference [m]		423.424443
Mean Elevation		115.1491
Mean Slope		8.34
Length of Directing Vector [km]		7.6379245916
Prevalent Orientation [degree from north, counterclockwise]		1.0414229842
Compactness Coefficient		6.3293839087
Circularity Ratio		0.2463637853
Topological Diameter		185
Elongation Ratio		0.4181465833
Shape Factor		3.3472234636
Concentration Time (Giandotti, 1934) [hr]		4.4158040721
Length of Mainchannel [km]		24.374612537
Mean slope of mainchannel [percent]		1.6959078422
Mean hillslope length [m]		2650152
Magnitudo		1002
Max order (Strahler)	6	
Number of streams	1460	
Total Stream Length [km]		421.3743
First order stream frequency		12.2813269594
Drainage Density [km/km ²]		5.1647061383
Bifurcation Ratio (Horton)		4.1489
Length Ratio (Horton)		2.5491
Area ratio (Horton)		3.5878
Slope ratio (Horton)		1.6016
Calcolo del tempo di corrivazione		
Pasini [ore]		10.43
Giandotti (1934) [ore]		8.56
Pezzoli [ore]		10.29
Puglisi [ore]		6.72
Ventura [ore]		8.81
Viparelli [ore]		6.77
Tournon [ore]		10.00
Kirpich (1940) [ore]		2.02
Formula VAPI-Sardegna [ore]		4.74
	CN	82.24
SCS [ore]		5.68



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.04

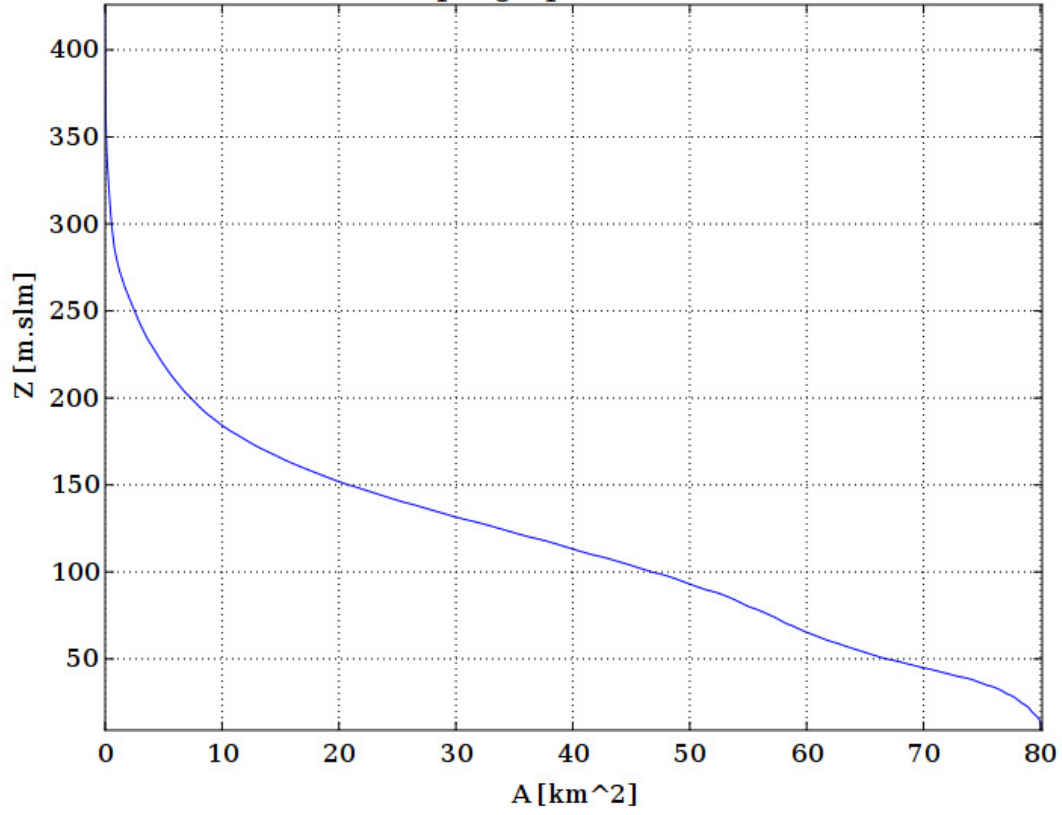
Sottobacino		3.04					
Pioggia indice	$\mu g =$						45
Superficie del bacino [kmq]							81.59
CN III							82.20
Tc (ventura)(sec)							8.81
Tc SCS [ore]							5.68
Tc VAPI Sardegna							4.74
Tc Puglisi							6.72
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	54.84	10.05	48.11	0.25	
50	2.282572185	102.72	54.84	57.43	274.80	0.56	
100	2.603078000	117.14	54.84	70.01	335.02	0.60	
200	2.930821015	131.89	54.84	83.19	398.10	0.63	
500	3.375180726	151.88	54.84	101.44	485.43	0.67	

Il Bacino 3.05 del Fiume Santo

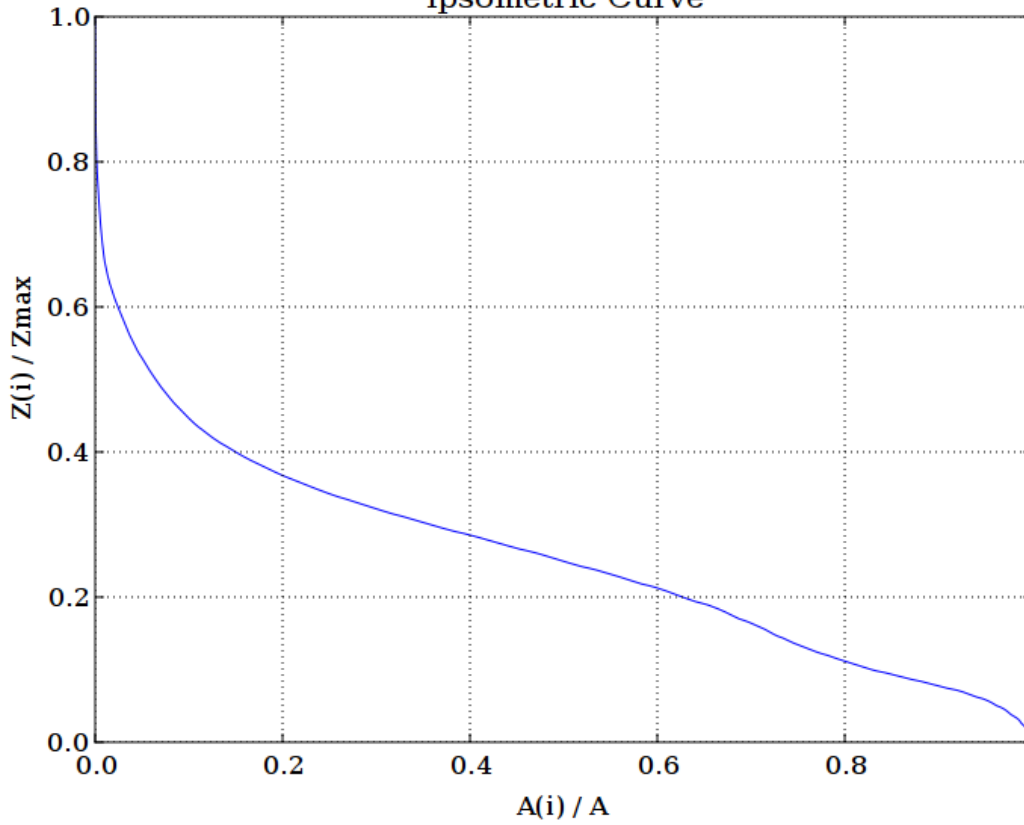
Parametri morfometrici del Bacino 3.05

Morphometric parameters of basin :	3.05	
Easting Centroid of basin		1437855
Northing Centroid of basin		4514175
Rectangle containing basin N-W	('1430950', '4520690')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		80.142675
Perimeter of basin [km]		63.1015713885
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		8.819305
Elevation Difference [m]		416.969595
Mean Elevation		116.7324
Mean Slope		8.44
Length of Directing Vector [km]		7.3667162027
Prevalent Orientation [degree from north, counterclockwise]		1.0759960722
Compactness Coefficient		6.2467366593
Circularity Ratio		0.2529259264
Topological Diameter		179
Elongation Ratio		0.441882138
Shape Factor		3.5057690648
Concentration Time (Giandotti, 1934) [hr]		4.291129306
Length of Mainchannel [km]		22.860226535
Mean slope of mainchannel [percent]		1.8239959012
Mean hillslope length [m]		2587781
Magnitudo		987
Max order (Strahler)	6	
Number of streams	1433	
Total Stream Length [km]		414.0695
First order stream frequency		12.3155360112
Drainage Density [km/km ²]		5.1666543449
Bifurcation Ratio (Horton)		4.1313
Length Ratio (Horton)		2.473
Area ratio (Horton)		3.5847
Slope ratio (Horton)		1.608
Calcolo del tempo di corrivazione		
Pasini [ore]		9.78
Giandotti (1934) [ore]		8.44
Pezzoli [ore]		9.31
Puglisi [ore]		6.47
Ventura [ore]		8.42
Viparelli [ore]		6.35
Tournon [ore]		10.01
Kirpich (1940) [ore]		1.91
Formula VAPI-Sardegna [ore]		4.72
	CN	82.28
SCS [ore]		5.36

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.05

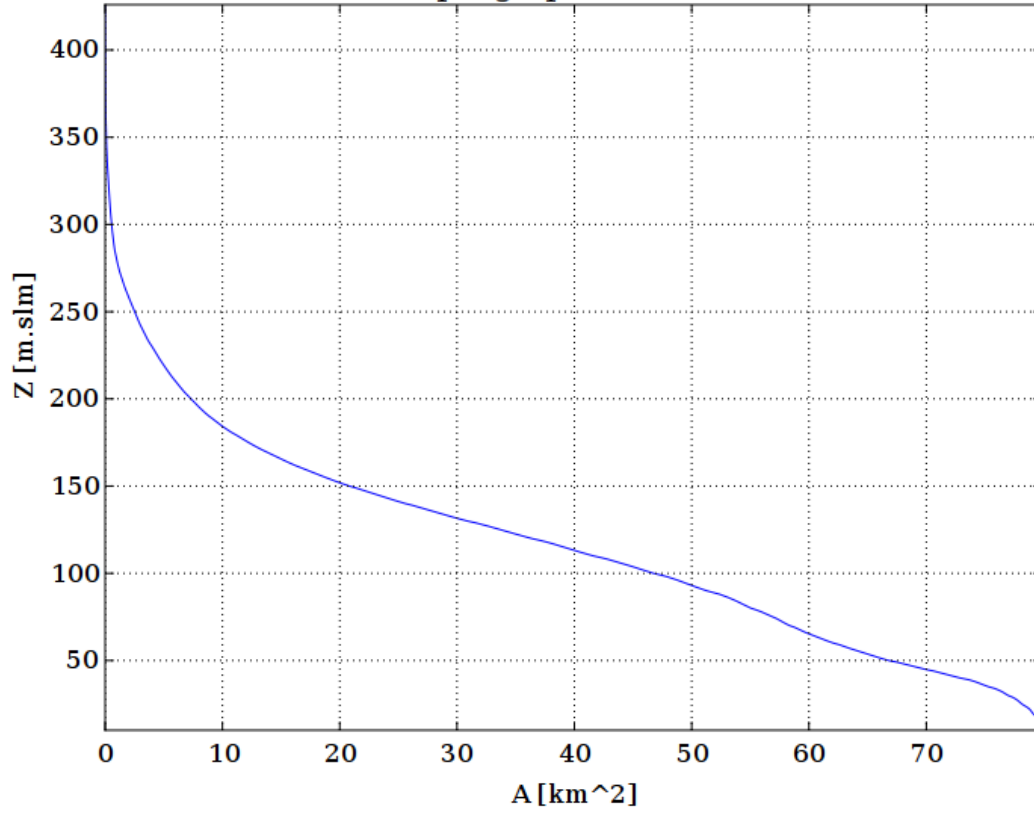
Sottobacino		3.05				
Pioggia indice	$\mu g =$	45				
Superficie del bacino [kmq]		80.14				
CN III		82.20				
Tc (ventura)(sec)		8.42				
Tc SCS [ore]		5.36				
Tc VAPI Sardegna		4.72				
Tc Puglisi		6.47				
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso
2	0.889030096	40.01	54.69	10.09	47.59	0.25
50	2.282572185	102.72	54.69	57.51	271.31	0.56
100	2.603078000	117.14	54.69	70.10	330.72	0.60
200	2.930821015	131.89	54.69	83.29	392.93	0.63
500	3.375180726	151.88	54.69	101.54	479.05	0.67

Il Bacino 3.06 del Fiume Santo

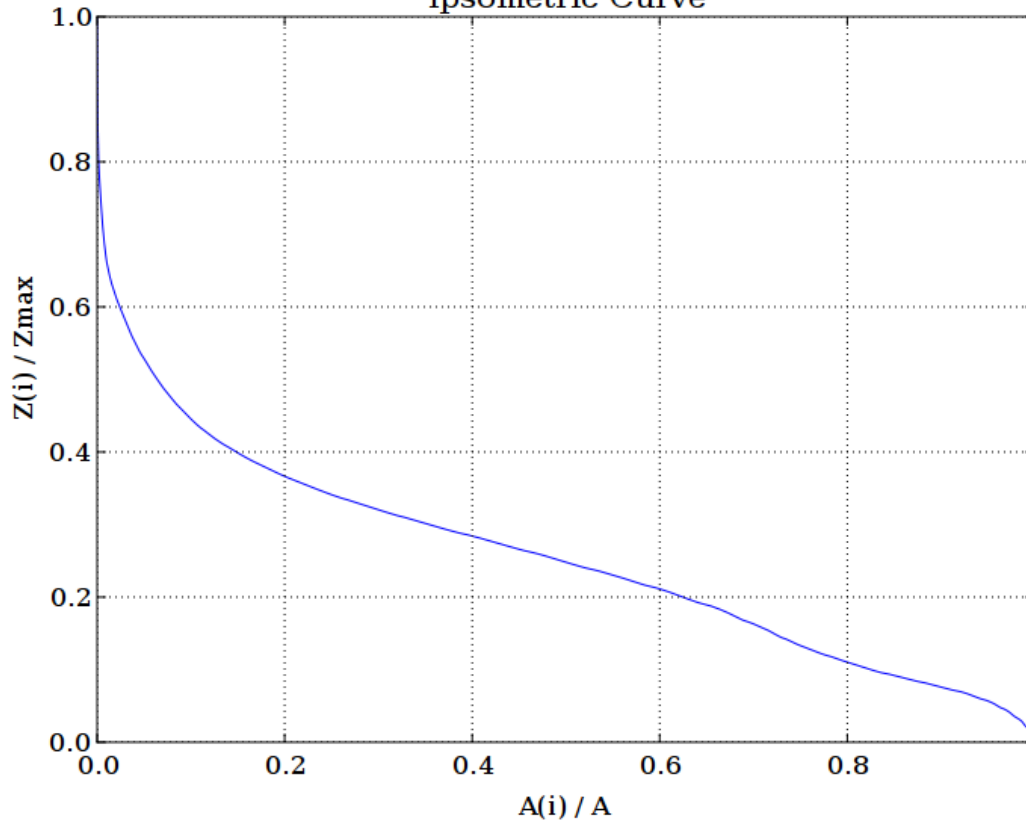
Parametri morfometrici del Bacino 3.06

Morphometric parameters of basin :	3.06	
Easting Centroid of basin		1437845
Northing Centroid of basin		4514155
Rectangle containing basin N-W	('1430950', '4520550')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		79.932175
Perimeter of basin [km]		62.4090230485
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		9.643307
Elevation Difference [m]		416.145593
Mean Elevation		116.9404
Mean Slope		8.44
Length of Directing Vector [km]		7.1691679395
Prevalent Orientation [degree from north, counterclockwise]		1.0676606138
Compactness Coefficient		6.1863075871
Circularity Ratio		0.2578913207
Topological Diameter		177
Elongation Ratio		0.445997649
Shape Factor		3.5337703736
Concentration Time (Giandotti, 1934) [hr]		4.2703675506
Length of Mainchannel [km]		22.619515857
Mean slope of mainchannel [percent]		1.839763484
Mean hillslope length [m]		2577158
Magnitudo		982
Max order (Strahler)	6	
Number of streams	1428	
Total Stream Length [km]		412.7866
First order stream frequency		12.285415729
Drainage Density [km/km ²]		5.1642107825
Bifurcation Ratio (Horton)		4.1278
Length Ratio (Horton)		2.4578
Area ratio (Horton)		3.584
Slope ratio (Horton)		1.6059
Calcolo del tempo di corrivazione		
Pasini [ore]		9.70
Giandotti (1934) [ore]		8.41
Pezzoli [ore]		9.17
Puglisi [ore]		6.43
Ventura [ore]		8.37
Viparelli [ore]		6.28
Tournon [ore]		10.03
Kirpich (1940) [ore]		1.90
Formula VAPI-Sardegna [ore]		4.72
	CN	82.28
SCS [ore]		5.31

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.06

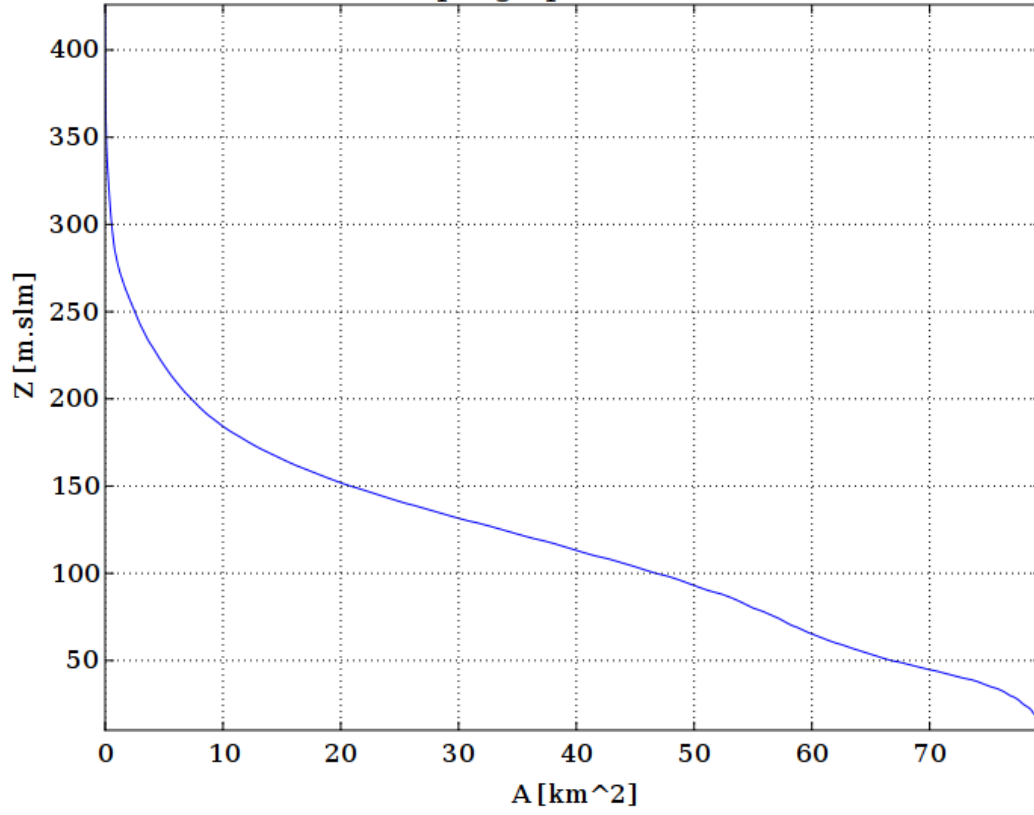
Sottobacino		3.06					
Pioggia indice	$\mu g =$						45
Superficie del bacino [kmq]							79.93
CN III							82.20
Tc (ventura)(sec)							8.37
Tc SCS [ore]							5.31
Tc VAPI Sardegna							4.72
Tc Puglisi							6.43
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	54.69	10.09	47.47	0.25	
50	2.282572185	102.72	54.69	57.51	270.62	0.56	
100	2.603078000	117.14	54.69	70.10	329.88	0.60	
200	2.930821015	131.89	54.69	83.29	391.93	0.63	
500	3.375180726	151.88	54.69	101.54	477.84	0.67	

Il Bacino 3.07 del Fiume Santo

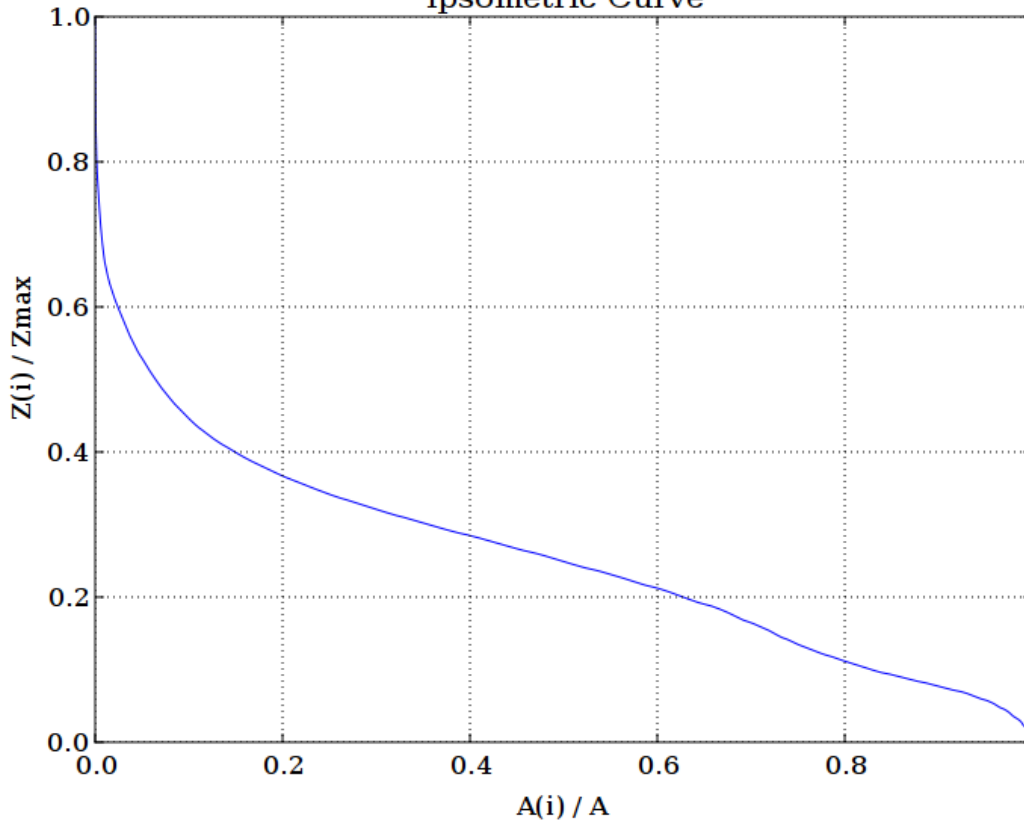
Parametri morfometrici del Bacino 3.07

Morphometric parameters of basin :	3.07	
Easting Centroid of basin		1437835
Northing Centroid of basin		4514125
Rectangle containing basin N-W	('1430950', '4520550')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		79.545075
Perimeter of basin [km]		61.919317421
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		9.99937
Elevation Difference [m]		415.78953
Mean Elevation		117.3555
Mean Slope		8.45
Length of Directing Vector [km]		6.7470869078
Prevalent Orientation [degree from north, counterclockwise]		1.0867318787
Compactness Coefficient		6.1526817702
Circularity Ratio		0.260717894
Topological Diameter		174
Elongation Ratio		0.4549759957
Shape Factor		3.5961688314
Concentration Time (Giandotti, 1934) [hr]		4.2208932026
Length of Mainchannel [km]		22.119393924
Mean slope of mainchannel [percent]		1.8797510069
Mean hillslope length [m]		2565624
Magnitudo		980
Max order (Strahler)	6	
Number of streams	1424	
Total Stream Length [km]		411.4422
First order stream frequency		12.3200587843
Drainage Density [km/km ²]		5.1724409085
Bifurcation Ratio (Horton)		4.125
Length Ratio (Horton)		2.4262
Area ratio (Horton)		3.5844
Slope ratio (Horton)		1.597
Calcolo del tempo di corrivazione		
Pasini [ore]		9.51
Giandotti (1934) [ore]		8.31
Pezzoli [ore]		8.87
Puglisi [ore]		6.33
Ventura [ore]		8.26
Viparelli [ore]		6.14
Tournon [ore]		10.06
Kirpich (1940) [ore]		1.86
Formula VAPI-Sardegna [ore]		4.72
	CN	82.29
SCS [ore]		5.21

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.07

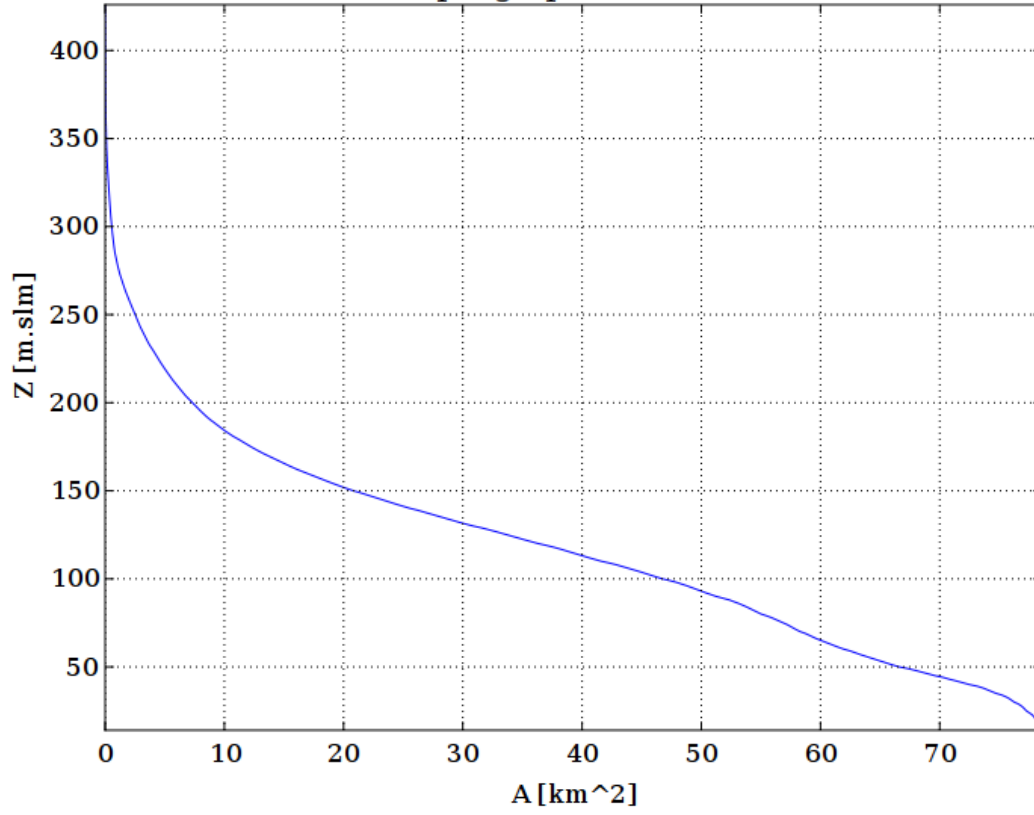
Sottobacino		3.07					
Pioggia indice	$\mu g =$						45
Superficie del bacino [kmq]						79.55	
CN III						82.20	
Tc (ventura)(sec)						8.26	
Tc SCS [ore]						5.21	
Tc VAPI Sardegna						4.72	
Tc Puglisi						6.33	
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	125.73	1.57	7.36	0.04	
50	2.282572185	102.72	125.73	29.60	138.66	0.29	
100	2.603078000	117.14	125.73	38.87	182.10	0.33	
200	2.930821015	131.89	125.73	49.01	229.62	0.37	
500	3.375180726	151.88	125.73	63.62	298.07	0.42	

Il Bacino 3.08 del Fiume Santo

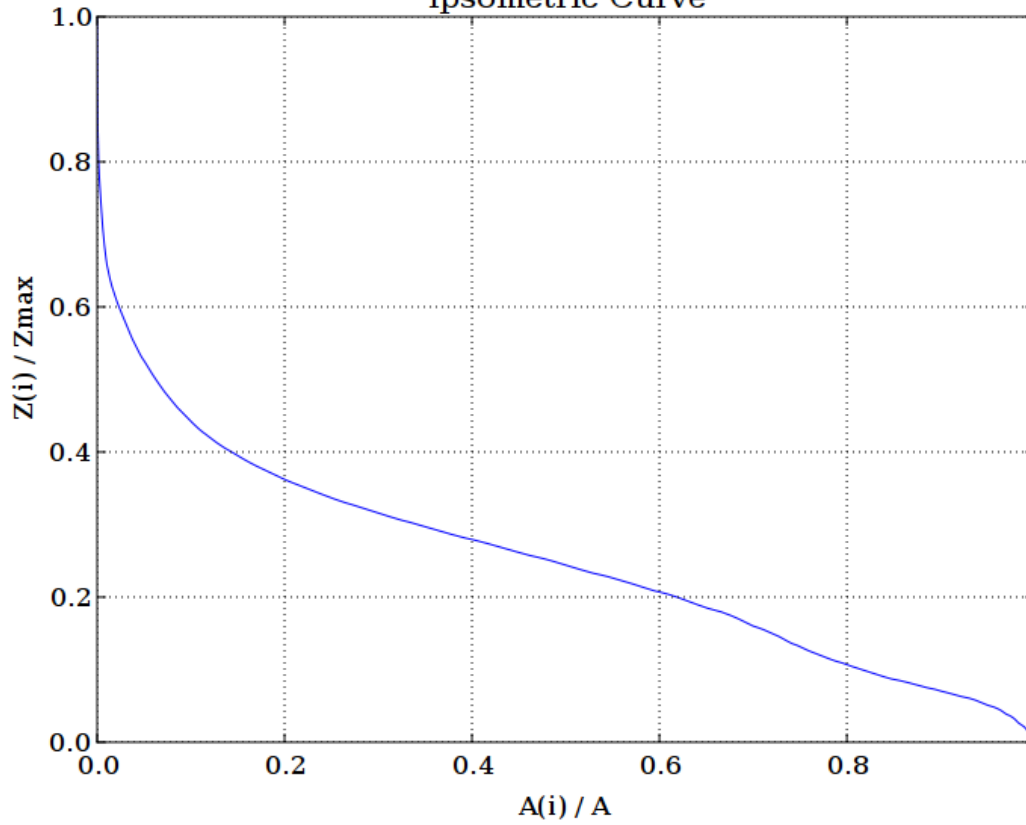
Parametri morfometrici del Bacino 3.08

Morphometric parameters of basin :	3.08	
Easting Centroid of basin		1437795
Northing Centroid of basin		4514055
Rectangle containing basin N-W	('1430950', '4520240')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		78.5975625
Perimeter of basin [km]		62.2196475069
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		13.53964
Elevation Difference [m]		412.24926
Mean Elevation		118.3466
Mean Slope		8.5
Length of Directing Vector [km]		6.324569265
Prevalent Orientation [degree from north, counterclockwise]		1.1468651384
Compactness Coefficient		6.2196786709
Circularity Ratio		0.2551313629
Topological Diameter		169
Elongation Ratio		0.4689361376
Shape Factor		3.6843695264
Concentration Time (Giandotti, 1934) [hr]		4.1532099546
Length of Mainchannel [km]		21.332703448
Mean slope of mainchannel [percent]		1.6155575328
Mean hillslope length [m]		2534442
Magnitudo		970
Max order (Strahler)	6	
Number of streams	1413	
Total Stream Length [km]		407.5984
First order stream frequency		12.3413496443
Drainage Density [km/km ²]		5.1858911019
Bifurcation Ratio (Horton)		4.1167
Length Ratio (Horton)		2.3771
Area ratio (Horton)		3.5892
Slope ratio (Horton)		1.6009
Calcolo del tempo di corrivazione		
Pasini [ore]		10.09
Giandotti (1934) [ore]		8.24
Pezzoli [ore]		9.23
Puglisi [ore]		6.20
Ventura [ore]		8.86
Viparelli [ore]		5.93
Tournon [ore]		10.32
Kirpich (1940) [ore]		1.81
Formula VAPI-Sardegna [ore]		4.71
	CN	82.32
SCS [ore]		5.05

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.08

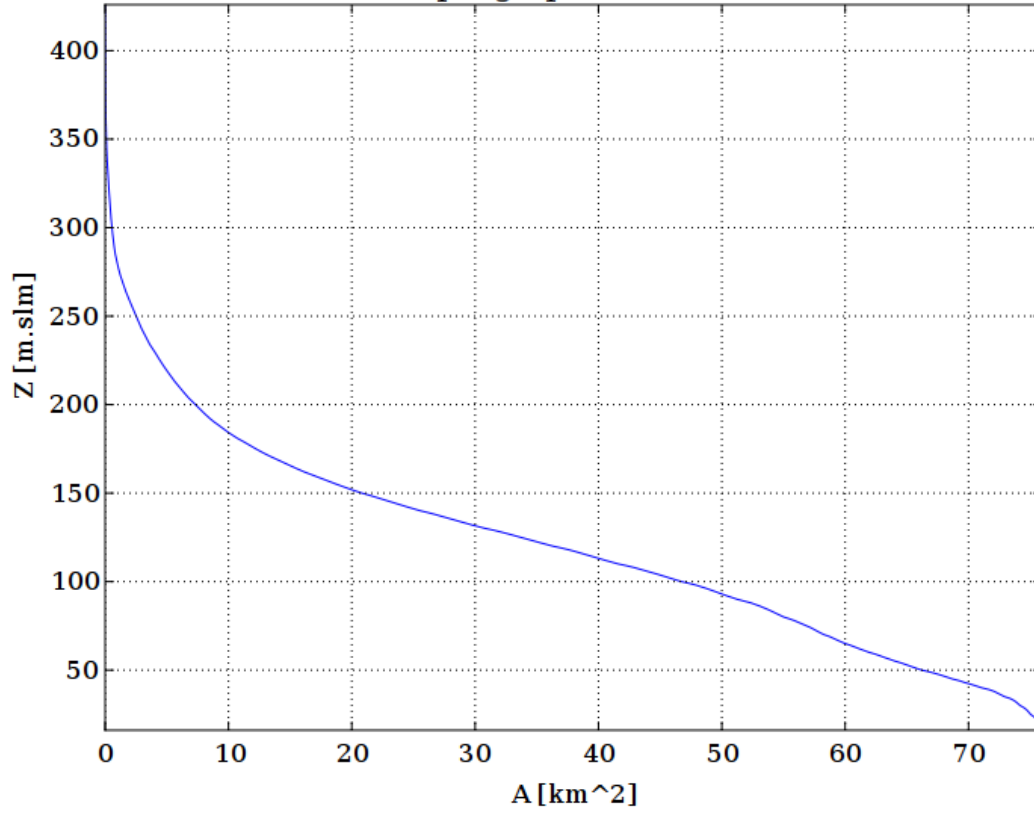
Sottobacino		3.08					
Pioggia indice	$\mu g =$	45					
Superficie del bacino [kmq]		78.60					
CN III		82.20					
Tc (ventura)(sec)		8.86					
Tc SCS [ore]		5.05					
Tc VAPI Sardegna		4.71					
Tc Puglisi		6.20					
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	54.57	10.12	46.93	0.25	
50	2.282572185	102.72	54.57	57.58	267.09	0.56	
100	2.603078000	117.14	54.57	70.18	325.53	0.60	
200	2.930821015	131.89	54.57	83.37	386.72	0.63	
500	3.375180726	151.88	54.57	101.63	471.43	0.67	

Il Bacino 3.09 del Fiume Santo

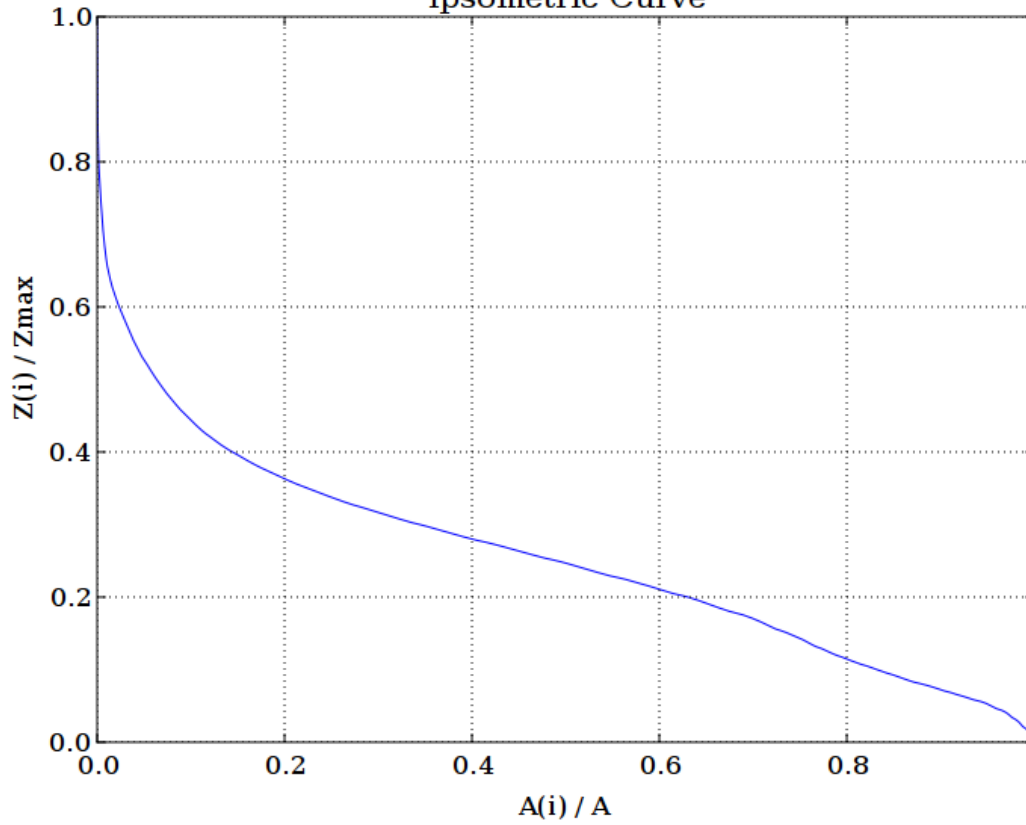
Parametri morfometrici del Bacino 3.09

Morphometric parameters of basin :	3.09	
Easting Centroid of basin		1437725
Northing Centroid of basin		4513885
Rectangle containing basin N-W	('1430950', '4519900')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		75.9686625
Perimeter of basin [km]		60.3141345214
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		16.04335
Elevation Difference [m]		409.74555
Mean Elevation		121.077
Mean Slope		8.6
Length of Directing Vector [km]		5.9292591308
Prevalent Orientation [degree from north, counterclockwise]		1.0231182572
Compactness Coefficient		6.1326305314
Circularity Ratio		0.2624255667
Topological Diameter		159
Elongation Ratio		0.4876093507
Shape Factor		3.7664673421
Concentration Time (Giandotti, 1934) [hr]		4.0212216289
Length of Mainchannel [km]		20.169738803
Mean slope of mainchannel [percent]		1.6646888527
Mean hillslope length [m]		2421034
Magnitudo		935
Max order (Strahler)	6	
Number of streams	1363	
Total Stream Length [km]		393.107
First order stream frequency		12.3077064836
Drainage Density [km/km ²]		5.1745941953
Bifurcation Ratio (Horton)		4.0852
Length Ratio (Horton)		2.3011
Area ratio (Horton)		3.5822
Slope ratio (Horton)		1.5871
Calcolo del tempo di corrivazione		
Pasini [ore]		9.65
Giandotti (1934) [ore]		7.94
Pezzoli [ore]		8.60
Puglisi [ore]		5.99
Ventura [ore]		8.58
Viparelli [ore]		5.60
Tournon [ore]		10.24
Kirpich (1940) [ore]		1.72
Formula VAPI-Sardegna [ore]		4.68
	CN	82.34
SCS [ore]		4.79

Ipsographic Curve



Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.09

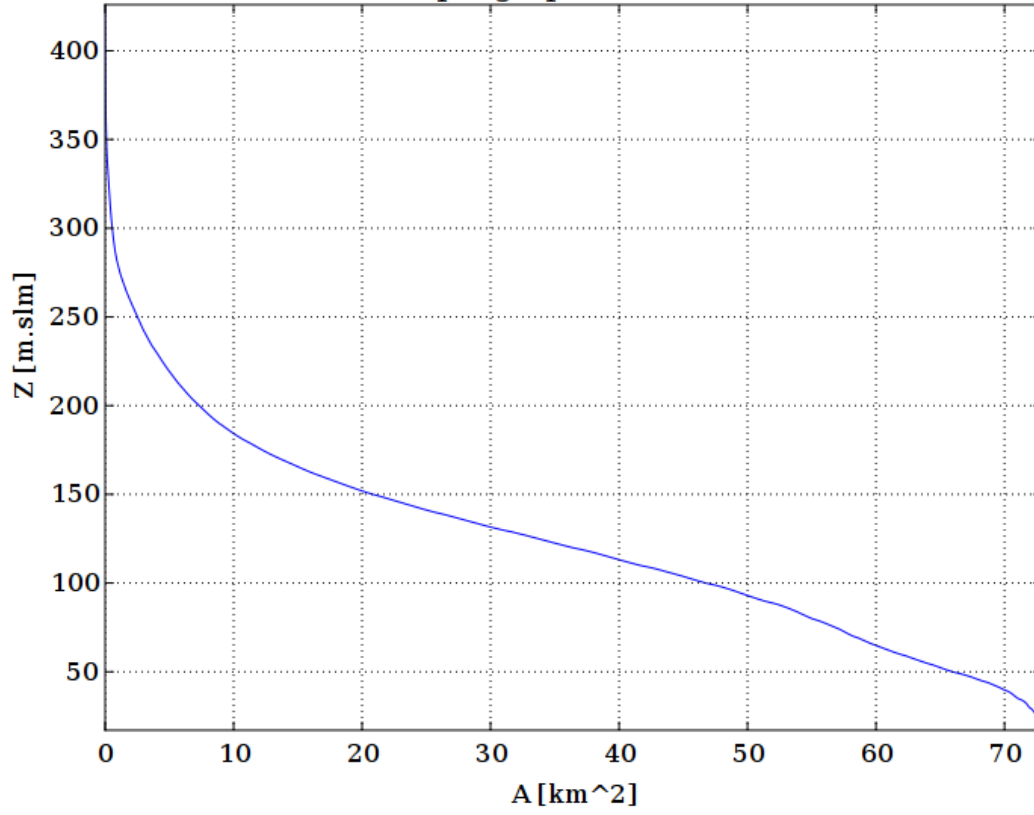
Sottobacino		3.09					
Pioggia indice	$\mu g =$	45					
Superficie del bacino [kmq]		75.97					
CN III		82.20					
Tc (ventura)(sec)		8.58					
Tc SCS [ore]		4.79					
Tc VAPI Sardegna		4.68					
Tc Puglisi		5.99					
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	54.49	10.13	45.65	0.25	
50	2.282572185	102.72	54.49	57.62	259.55	0.56	
100	2.603078000	117.14	54.49	70.22	316.31	0.60	
200	2.930821015	131.89	54.49	83.42	375.75	0.63	
500	3.375180726	151.88	54.49	101.68	458.02	0.67	

Il Bacino 3.10 del Fiume Santo

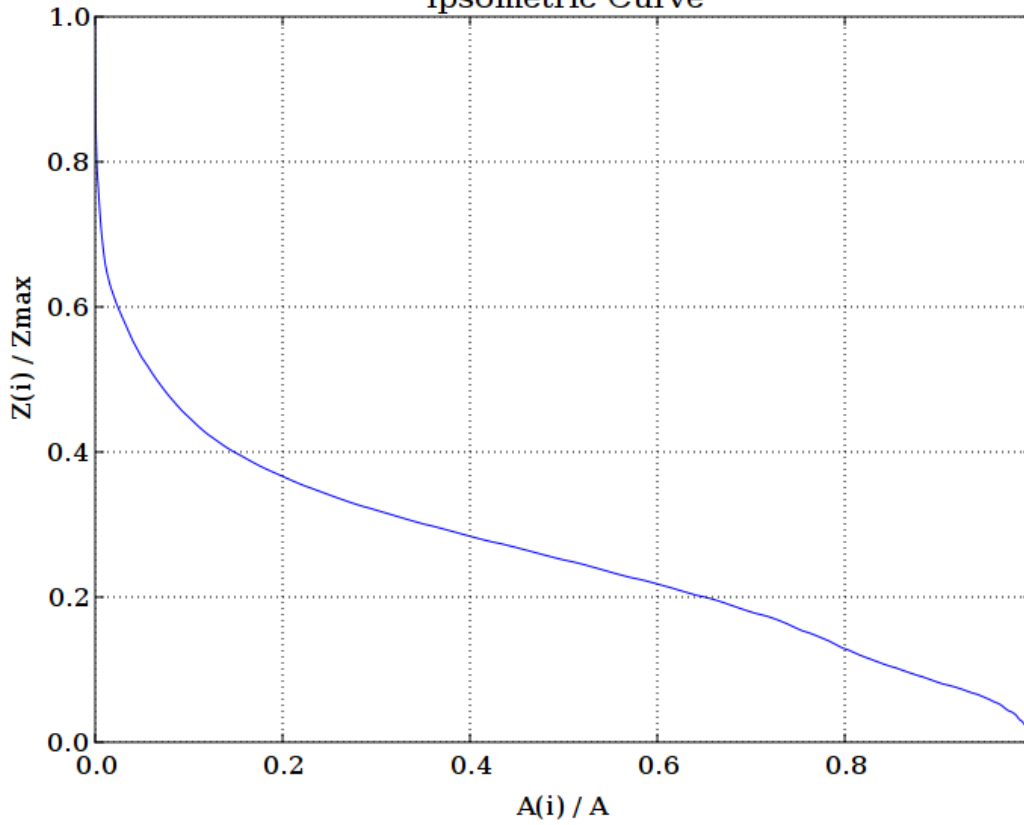
Parametri morfometrici del Bacino 3.10

Morphometric parameters of basin :	3.10	
Easting Centroid of basin		1437555
Northing Centroid of basin		4513665
Rectangle containing basin N-W	('1430950', '4518510')	
Rectangle containing basin S-E	('1445640', '4507760')	
Area of basin [km ²]		72.927075
Perimeter of basin [km]		57.6846875531
Max Elevation [m s.l.m.]		425.7889
Min Elevation [m s.l.m.]		16.53883
Elevation Difference [m]		409.25007
Mean Elevation		124.5316
Mean Slope		8.85
Length of Directing Vector [km]		5.9352779641
Prevalent Orientation [degree from north, counterclockwise]		0.9507037585
Compactness Coefficient		5.9863359811
Circularity Ratio		0.2754086458
Topological Diameter		155
Elongation Ratio		0.4907548066
Shape Factor		3.7141026288
Concentration Time (Giandotti, 1934) [hr]		3.930544411
Length of Mainchannel [km]		19.635180362
Mean slope of mainchannel [percent]		1.7252988587
Mean hillslope length [m]		2291732
Magnitudo		899
Max order (Strahler)	6	
Number of streams	1303	
Total Stream Length [km]		378.3636
First order stream frequency		12.3273832112
Drainage Density [km/km ²]		5.1882459292
Bifurcation Ratio (Horton)		4.065
Length Ratio (Horton)		2.2676
Area ratio (Horton)		3.5952
Slope ratio (Horton)		1.5801
Calcolo del tempo di corrivazione		
Pasini [ore]		9.27
Giandotti (1934) [ore]		7.65
Pezzoli [ore]		8.22
Puglisi [ore]		5.88
Ventura [ore]		8.26
Viparelli [ore]		5.45
Tournon [ore]		9.91
Kirpich (1940) [ore]		1.67
Formula VAPI-Sardegna [ore]		4.64
	CN	82.38
SCS [ore]		4.62

Ipsographic Curve



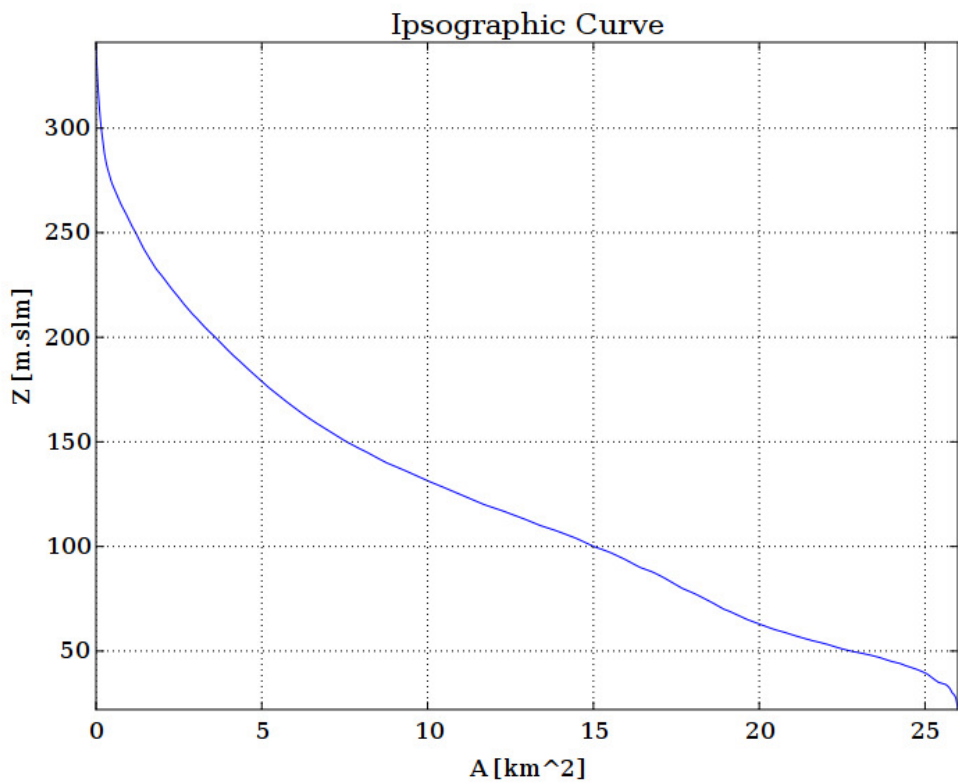
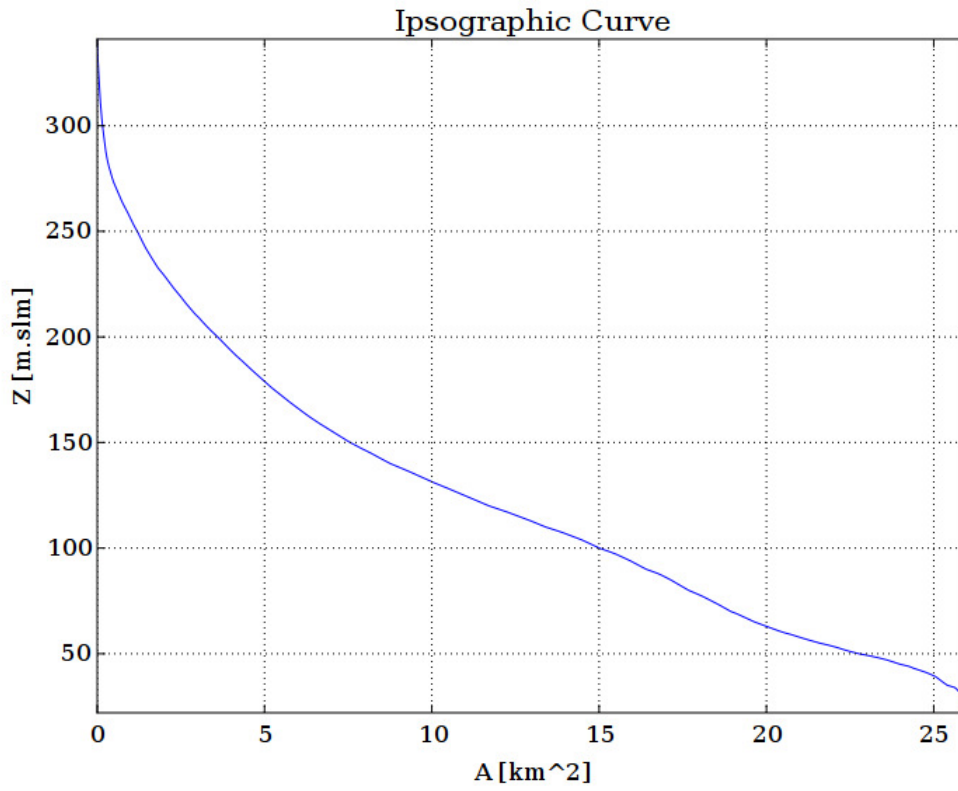
Ipsometric Curve



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.10

Sottobacino		3.10					
Pioggia indice	$\mu g =$	45					
Superficie del bacino [kmq]		72.93					
CN III		82.20					
Tc (ventura)(sec)		8.26					
Tc SCS [ore]		4.62					
Tc VAPI Sardegna		4.64					
Tc Puglisi		5.88					
T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso	
2	0.889030096	40.01	54.34	10.17	44.40	0.25	
50	2.282572185	102.72	54.34	57.70	251.92	0.56	
100	2.603078000	117.14	54.34	70.31	306.97	0.60	
200	2.930821015	131.89	54.34	83.52	364.60	0.63	
500	3.375180726	151.88	54.34	101.79	444.37	0.67	

Il Bacino 3.11 del Fiume Santo



Calcolo portate di massima piena nella sezione di chiusura del Bacino 3.11

Sottobacino**3.11**Pioggia indice $\mu g =$ 45

Superficie del bacino [kmq] 26.05

CN III 82.20

Tc (ventura)(sec) 5.55

Tc SCS [ore] 2.88

Tc VAPI Sardegna 3.76

Tc Puglisi 4.11

T (anni)	KT	h(T)	S	h netta	Q con Tc VAPI	coeff deflusso
2	0.889030096	40.01	54.34	10.17	19.57	0.25
50	2.282572185	102.72	54.34	57.70	111.04	0.56
100	2.603078000	117.14	54.34	70.31	135.30	0.60
200	2.930821015	131.89	54.34	83.52	160.70	0.63
500	3.375180726	151.88	54.34	101.79	195.86	0.67

Documentazione fotografica



L'intersezione 4 dell'asta principale con la viabilità rurale consistente in un guado



Il tratto a monte del guado in corrispondente dell'intersezione n. 4



Il ponticello in corrispondenza dell'intersezione 3, vista del tratto a monte



Il ponticello in corrispondenza dell'intersezione 3 visto da monte

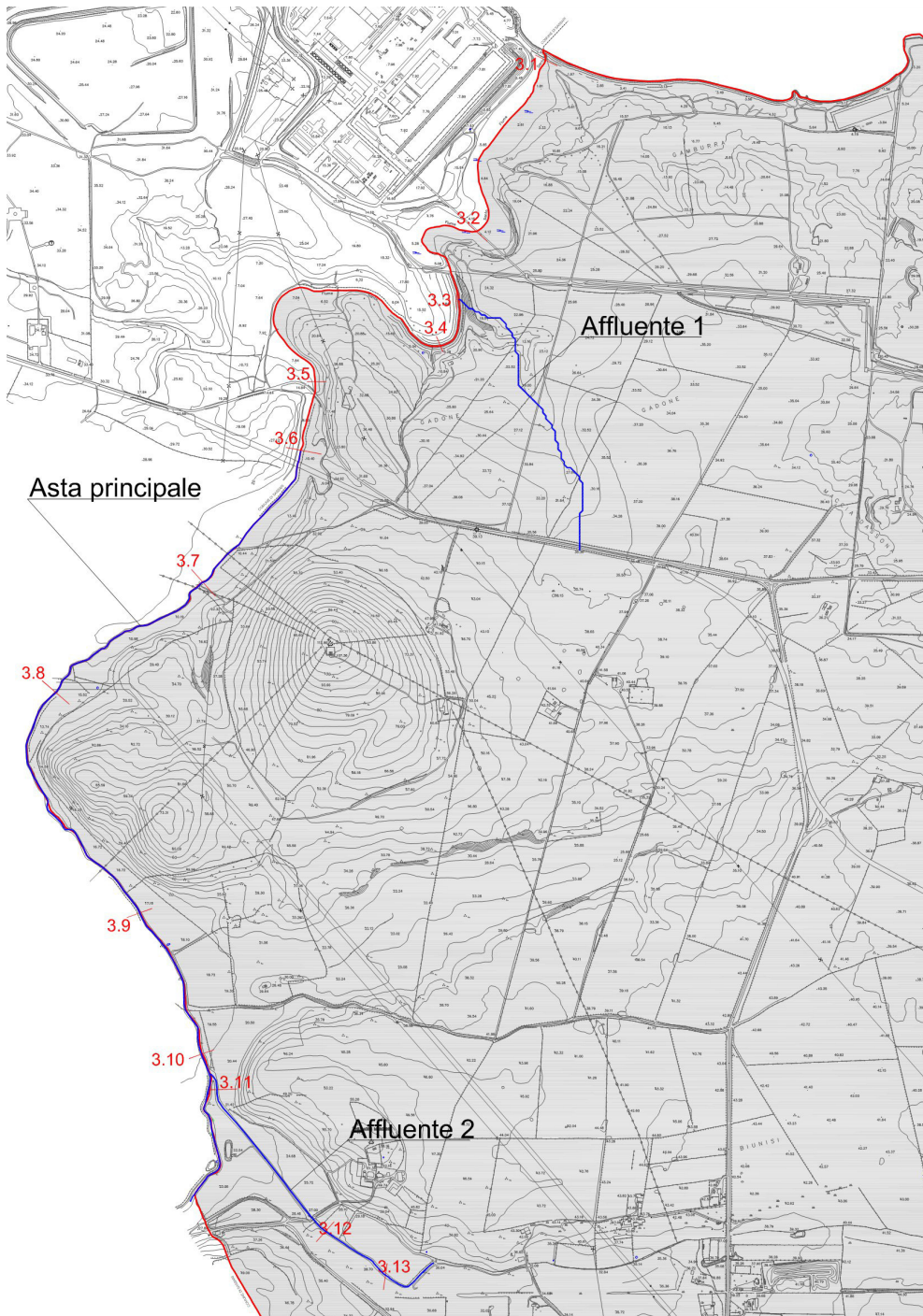


L'alveo del fiume santo a monte della Strada provinciale per Stintino.



Particolare della vegetazione che soffoca l'alveo sotto la strada provinciale per Stintino.

Aste oggetto di studio del regime idraulico.

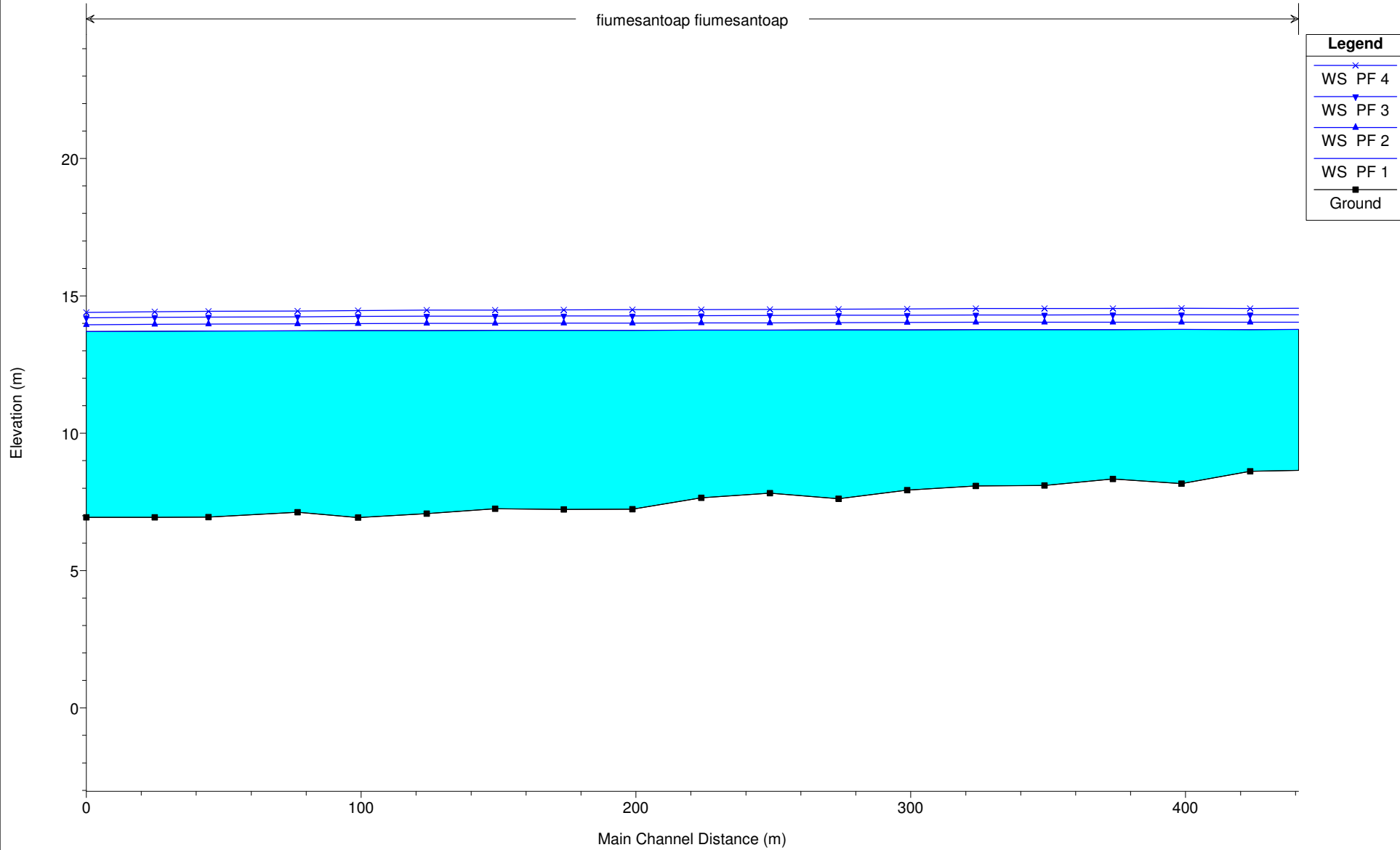


Profili e sezioni del pelo libero dell'asta principale di Fiume Santo.

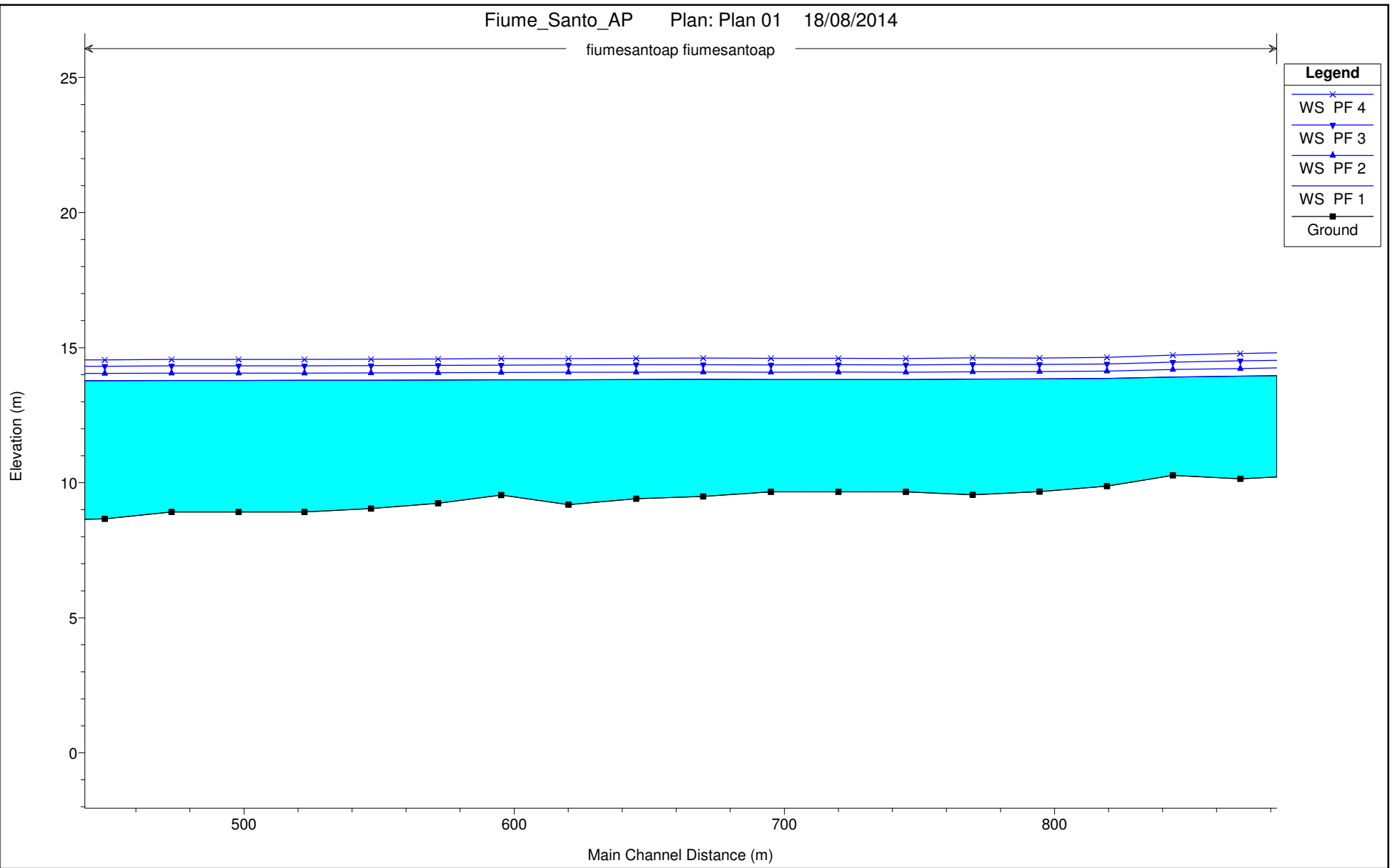
Profili e sezioni del pelo libero dell'affluente 1 del Fiume Santo

Profili e sezioni del pelo libero dell'affluente 2 del fiume Santo

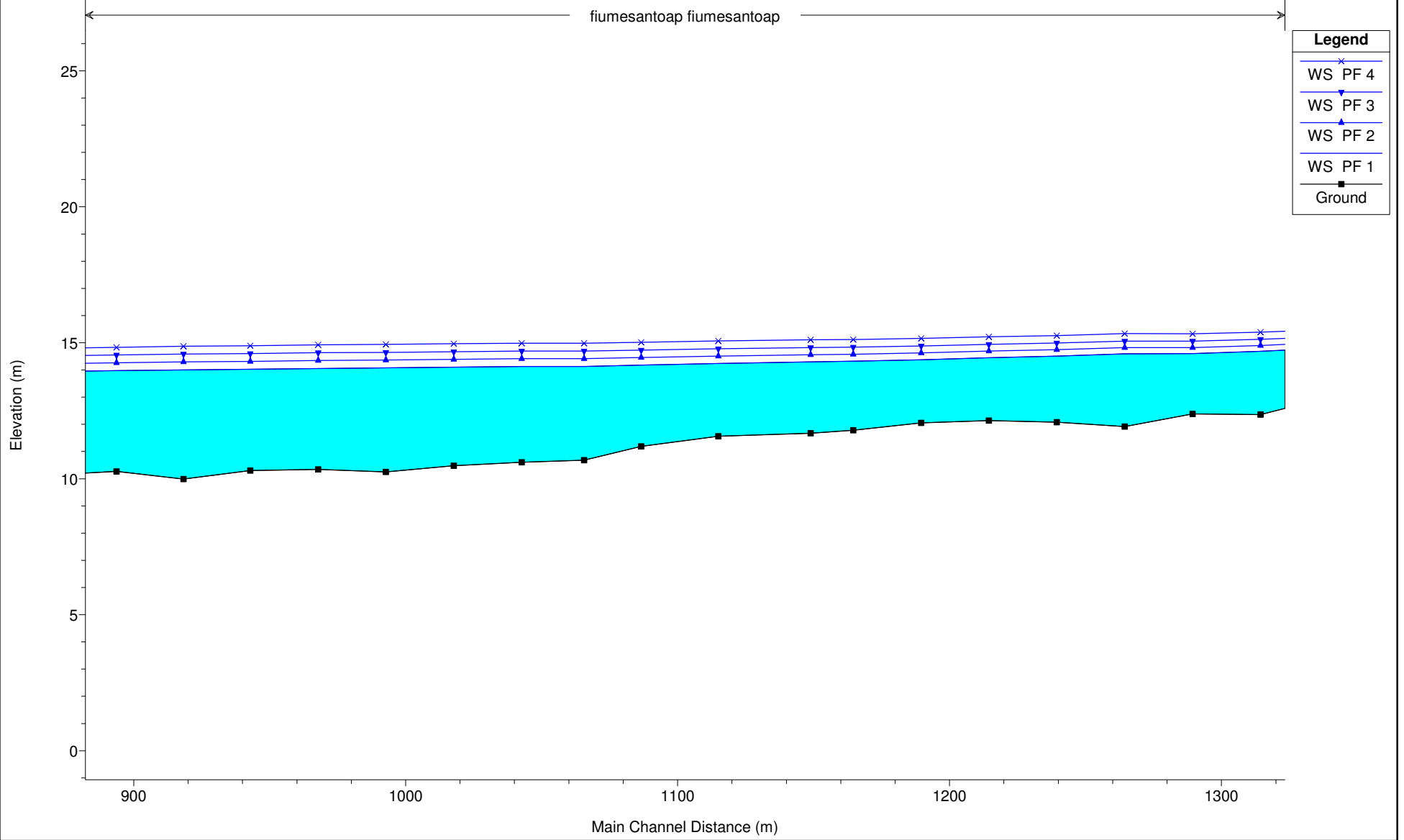
Profili e sezioni del pelo libero dell'asta principale di Fiume Santo.



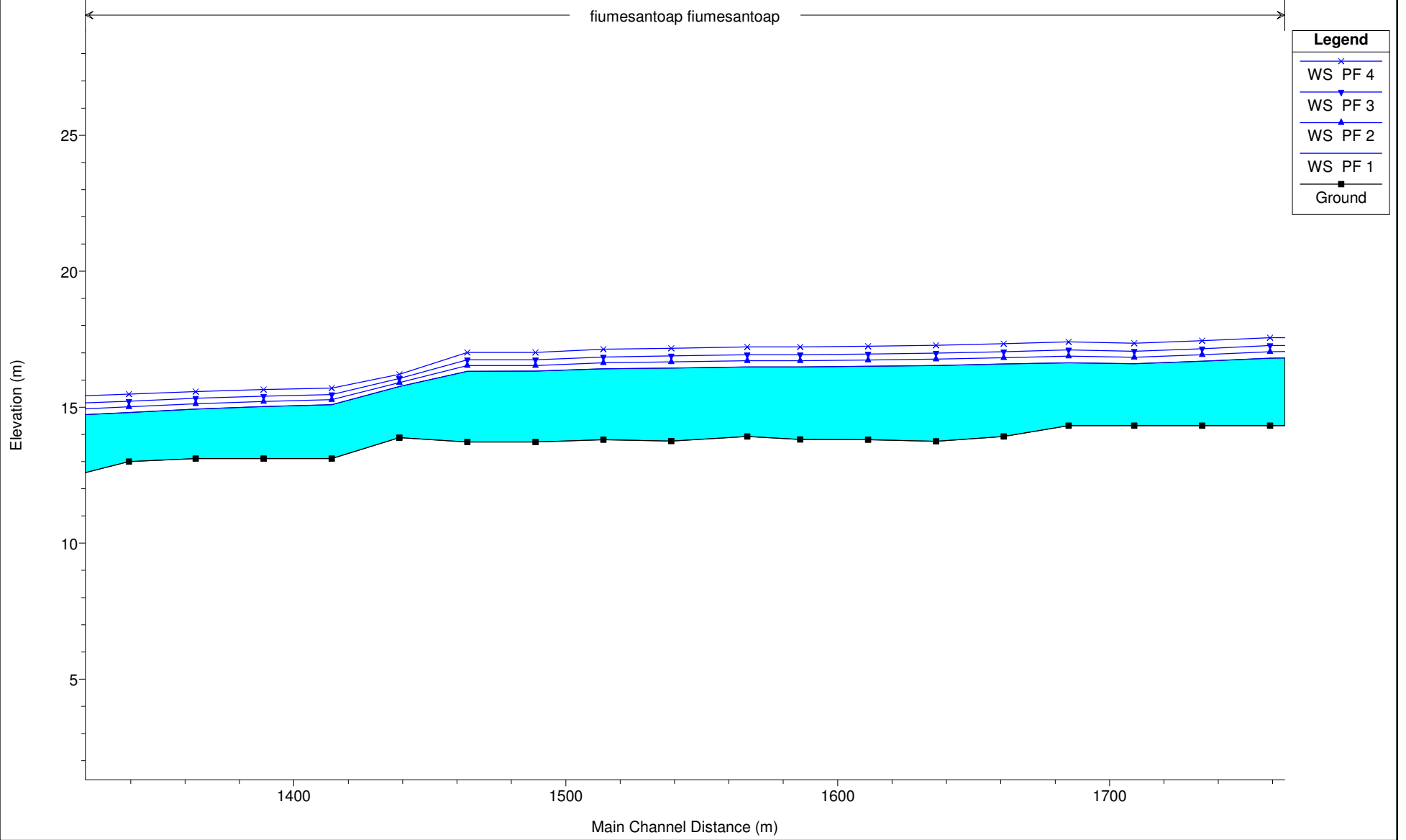
1 cm Horiz. = 20 m 1 cm Vert. = 2 m



1 cm Horiz. = 20 m 1 cm Vert. = 2 m



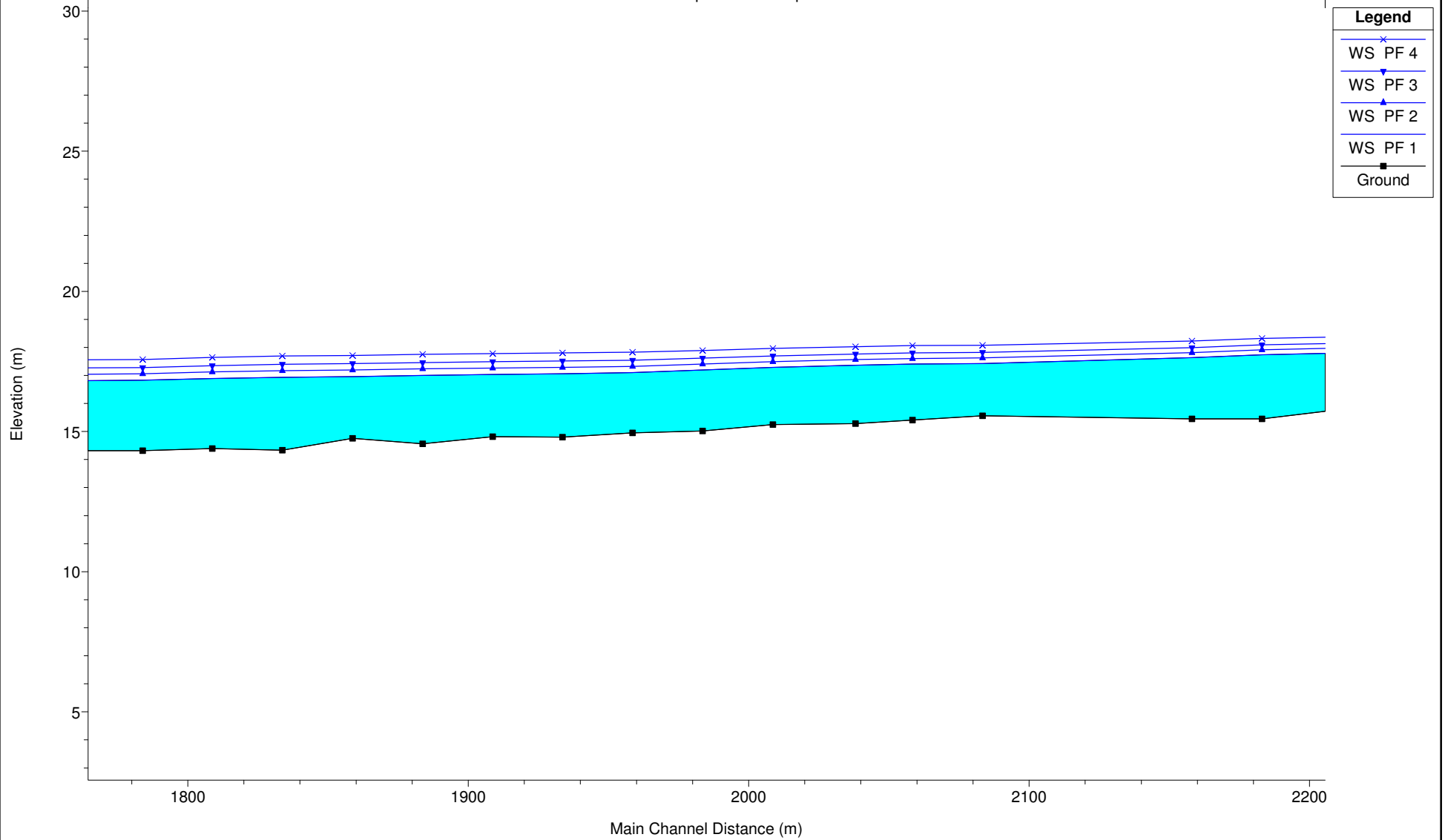
1 cm Horiz. = 20 m 1 cm Vert. = 2 m



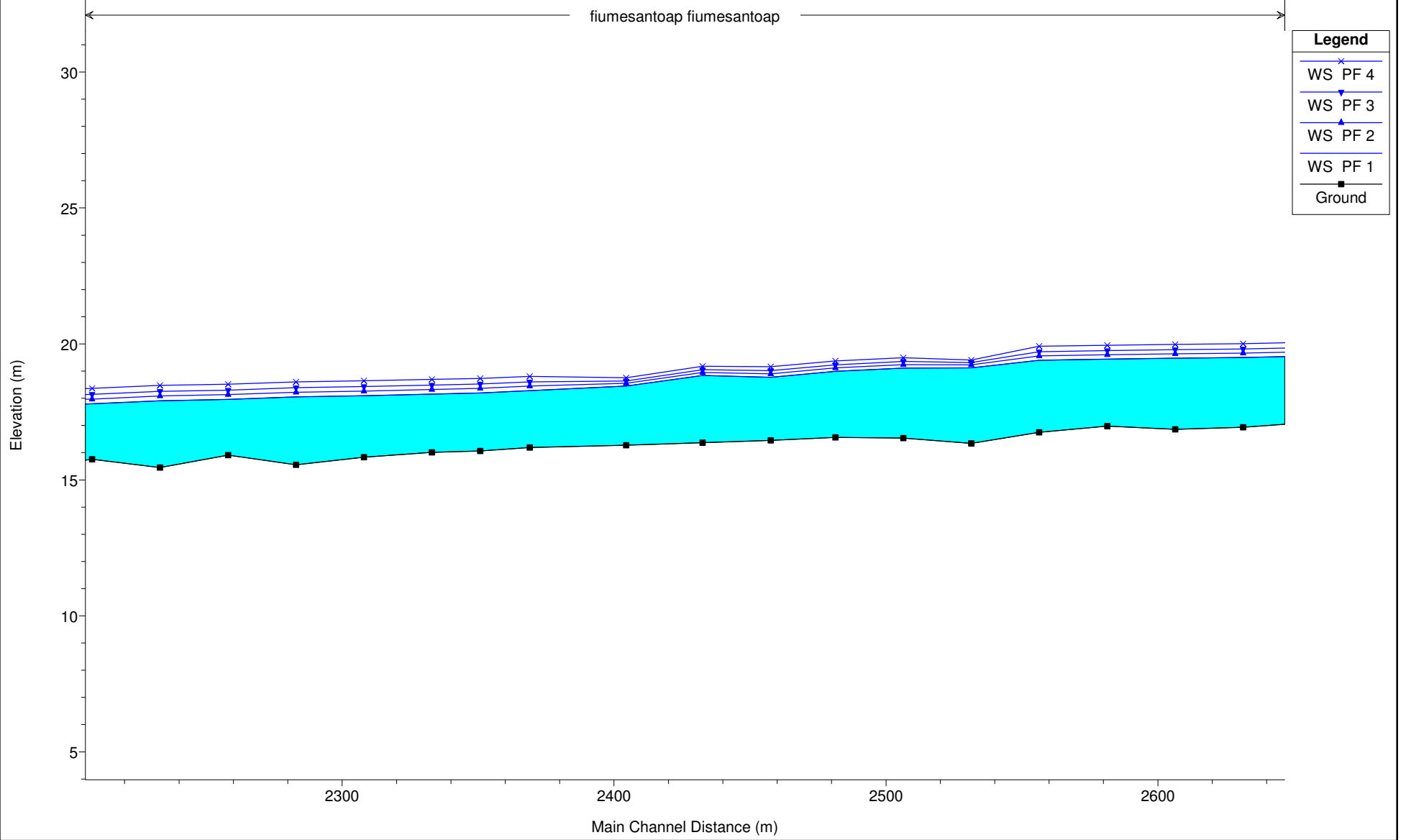
1 cm Horiz. = 20 m 1 cm Vert. = 2 m

Fiume_Santo_AP Plan: Plan 01 18/08/2014

fiumesantoap fiumesantoap

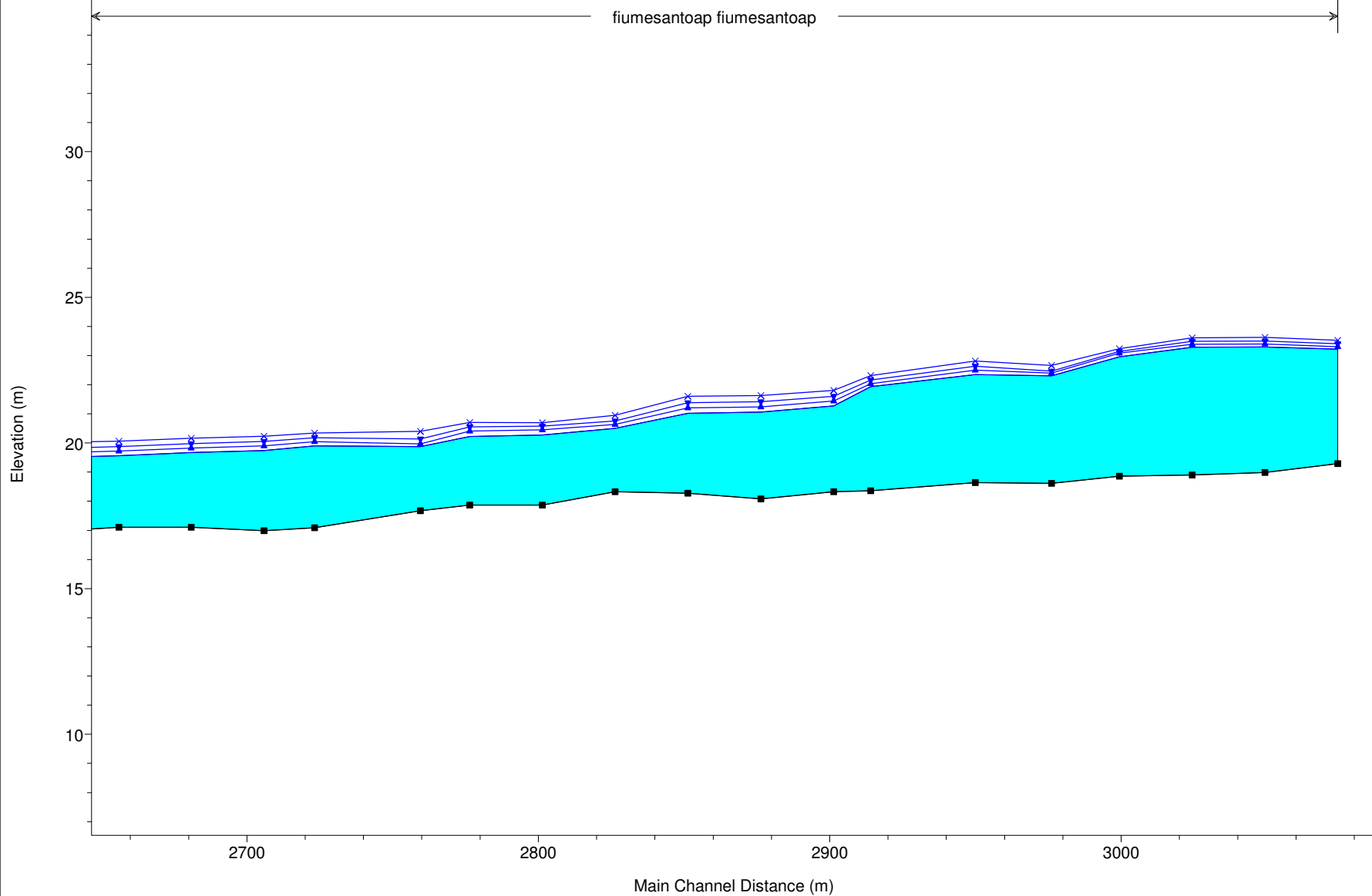


1 cm Horiz. = 20 m 1 cm Vert. = 2 m



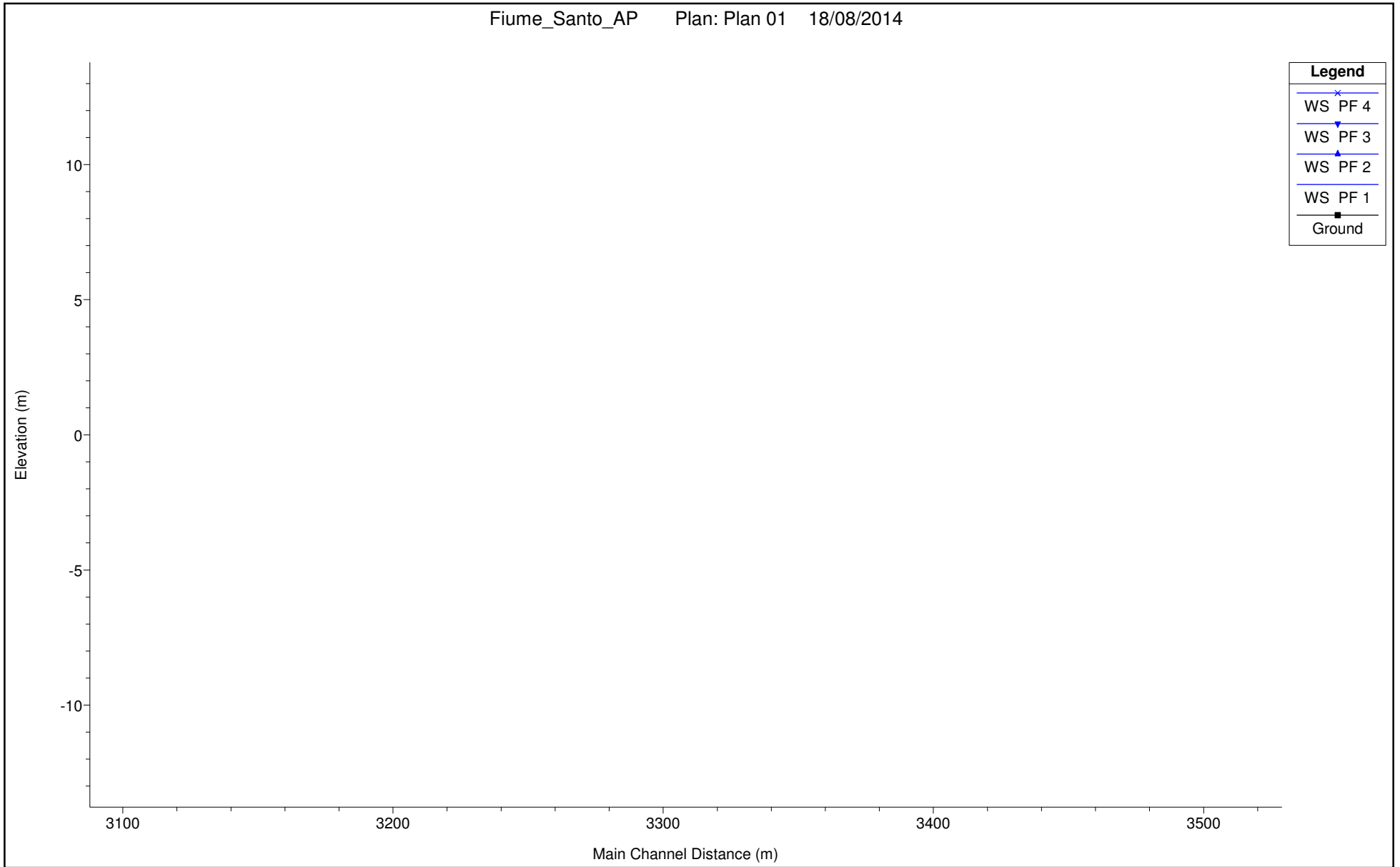
1 cm Horiz. = 20 m 1 cm Vert. = 2 m

fiumesantoap fiumesantoap

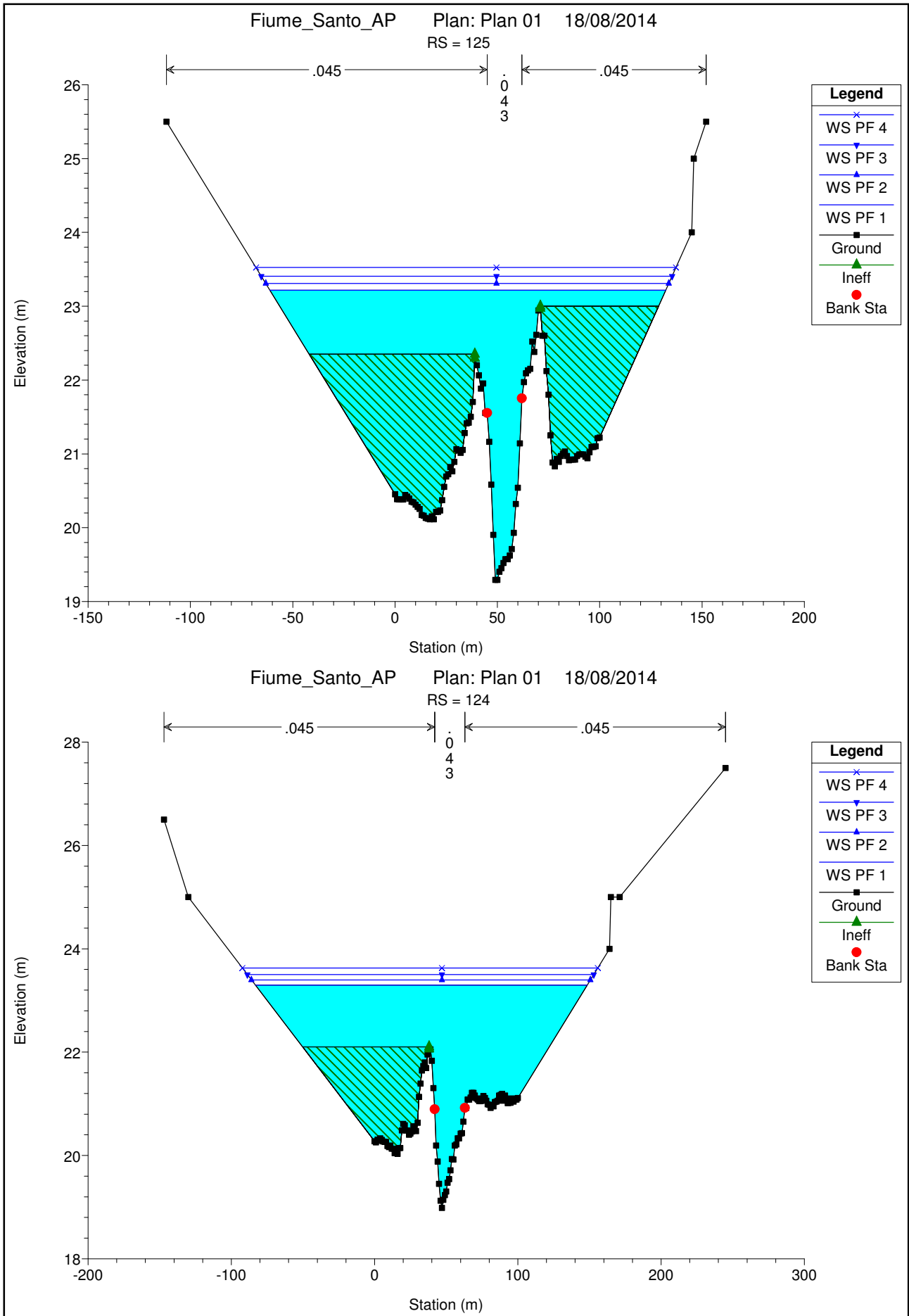


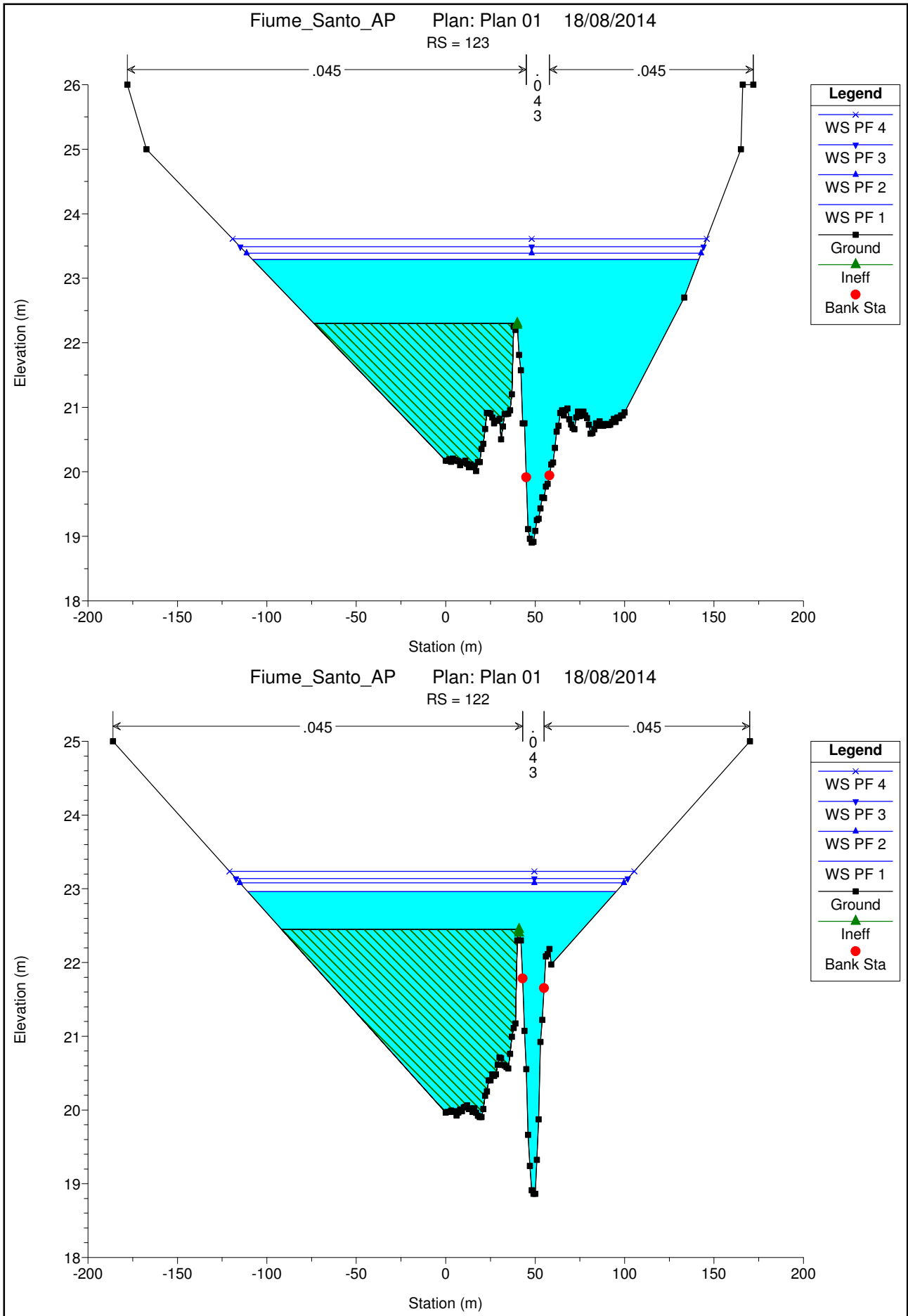
Legend	
WS PF 4	✕
WS PF 3	▼
WS PF 2	▲
WS PF 1	▲
Ground	■

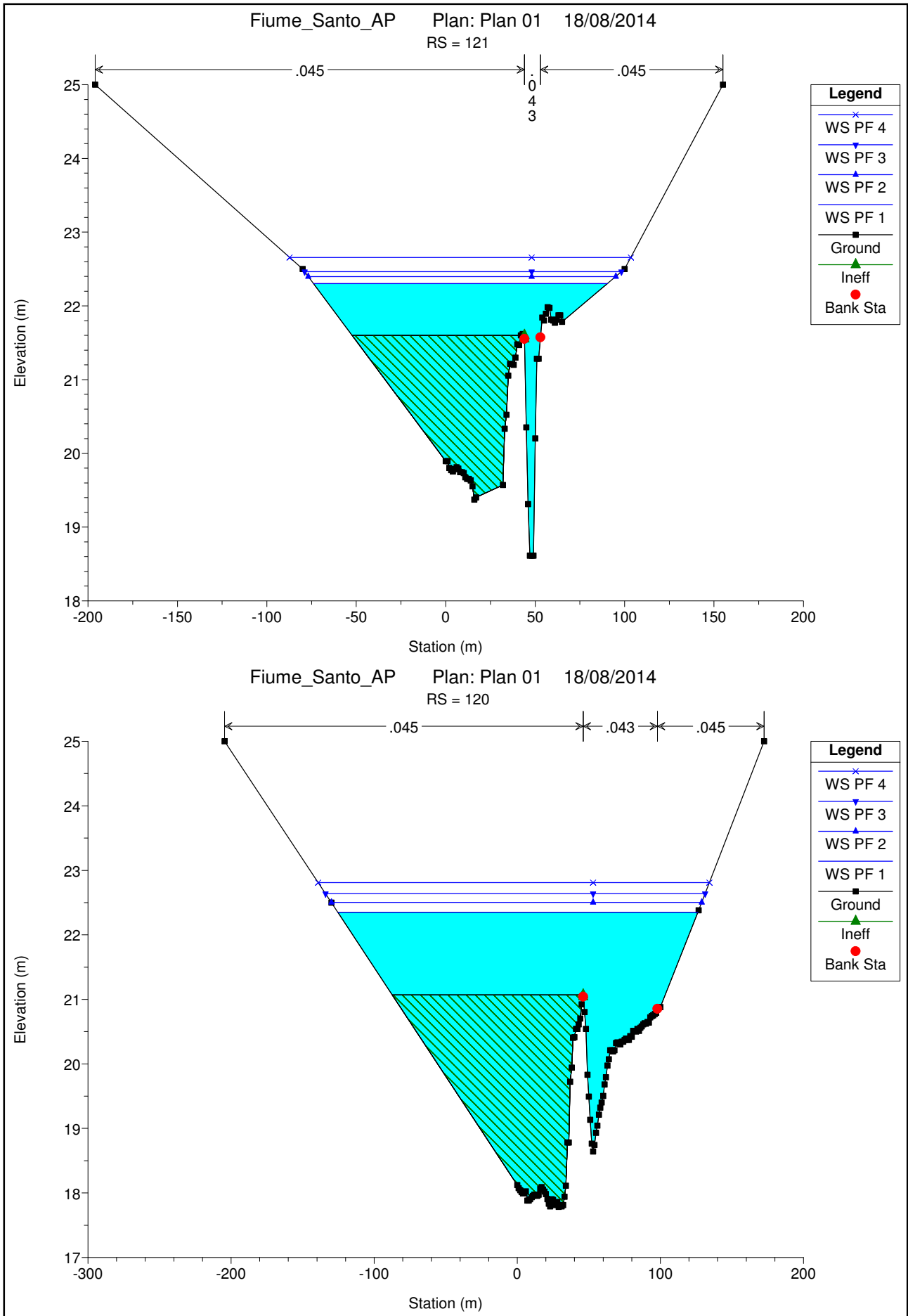
1 cm Horiz. = 20 m 1 cm Vert. = 2 m

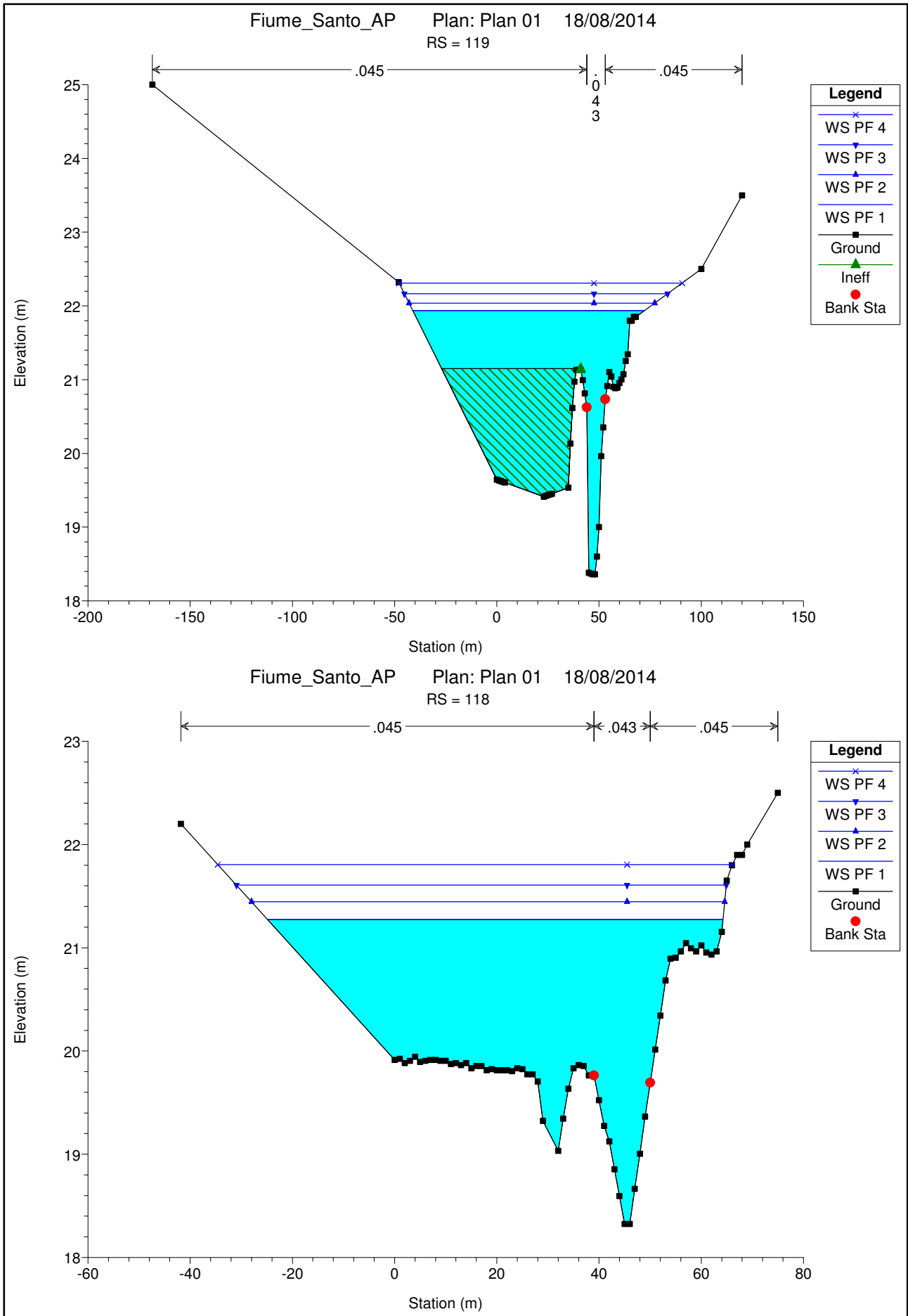


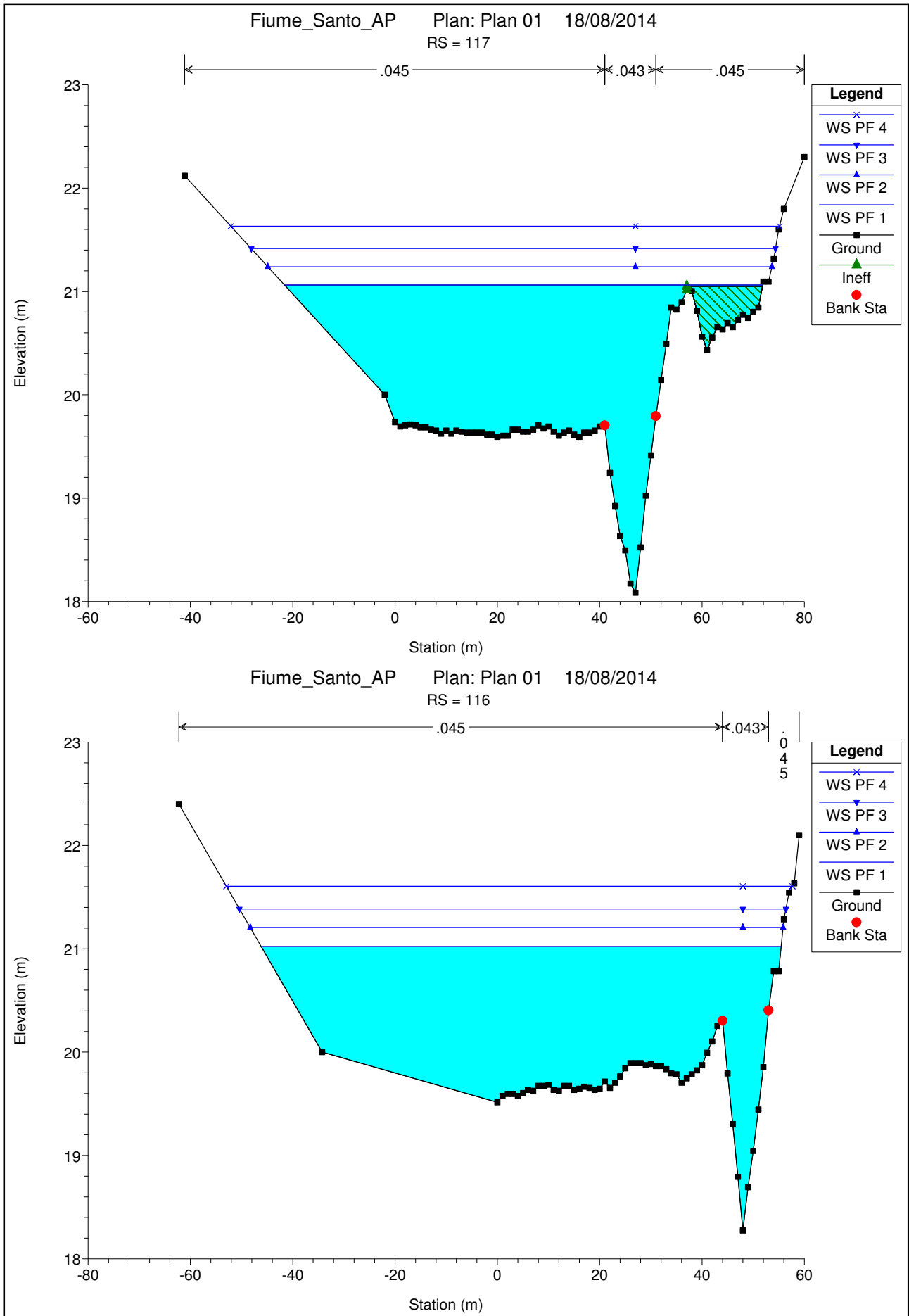
1 cm Horiz. = 20 m 1 cm Vert. = 2 m

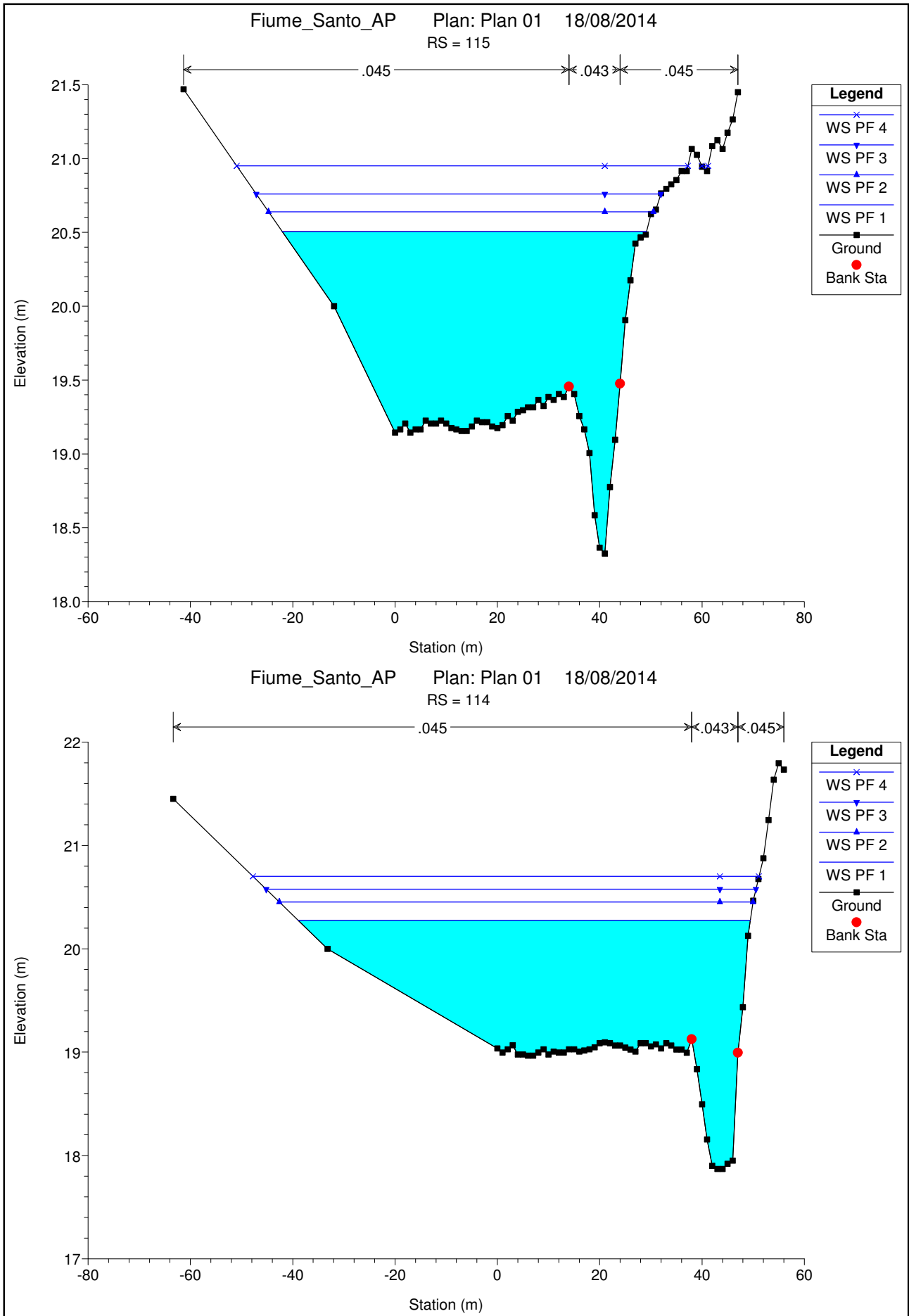


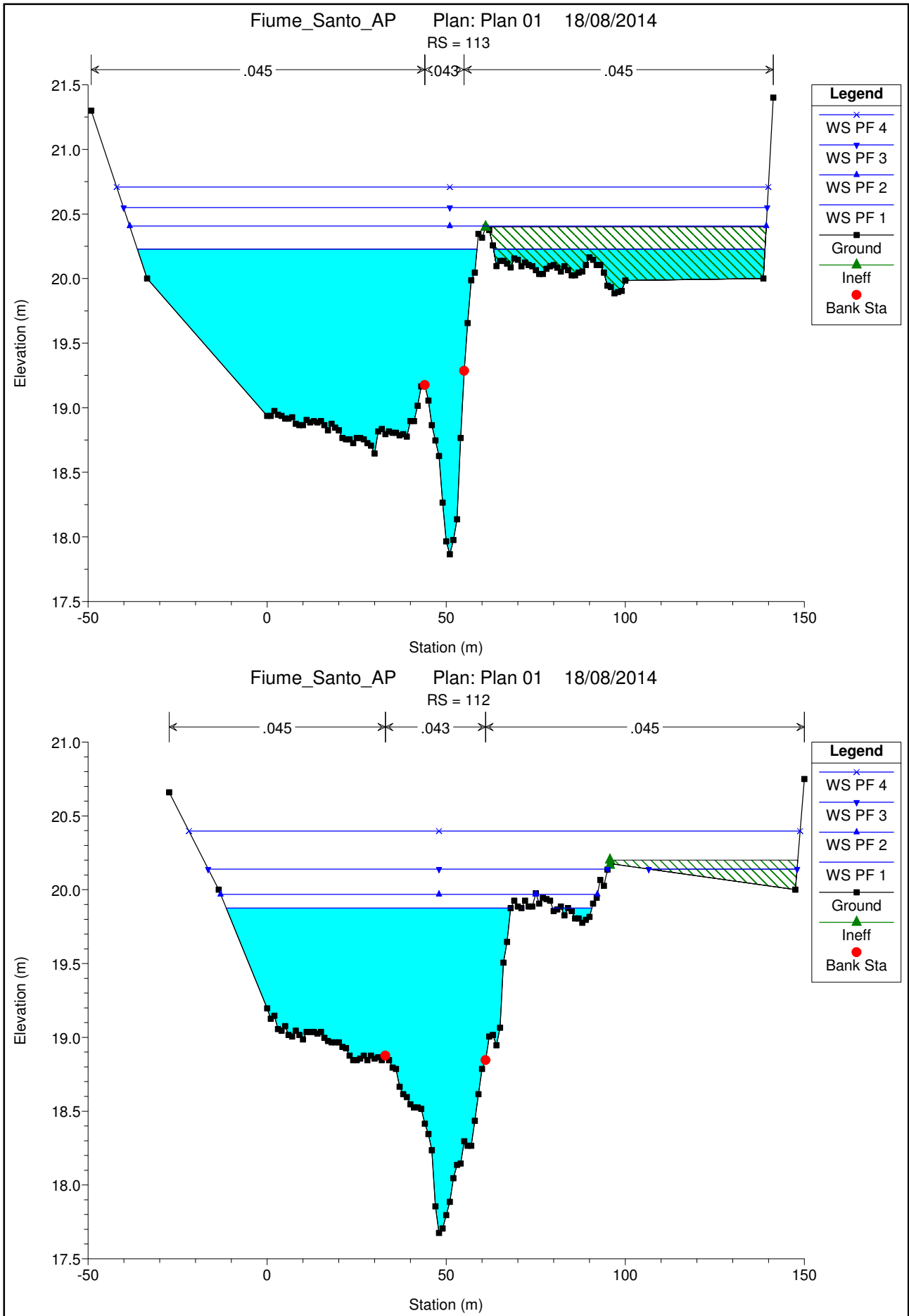


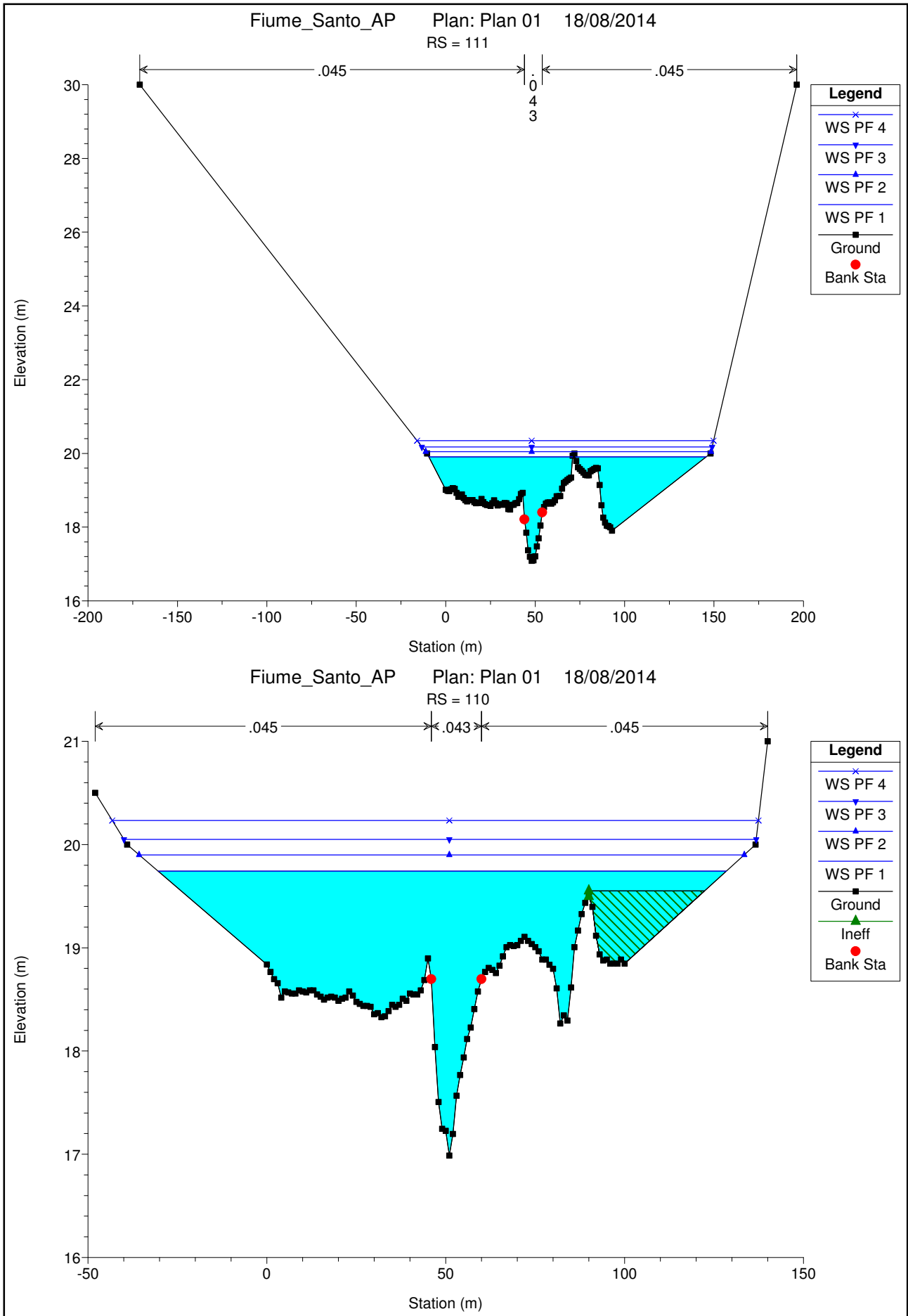


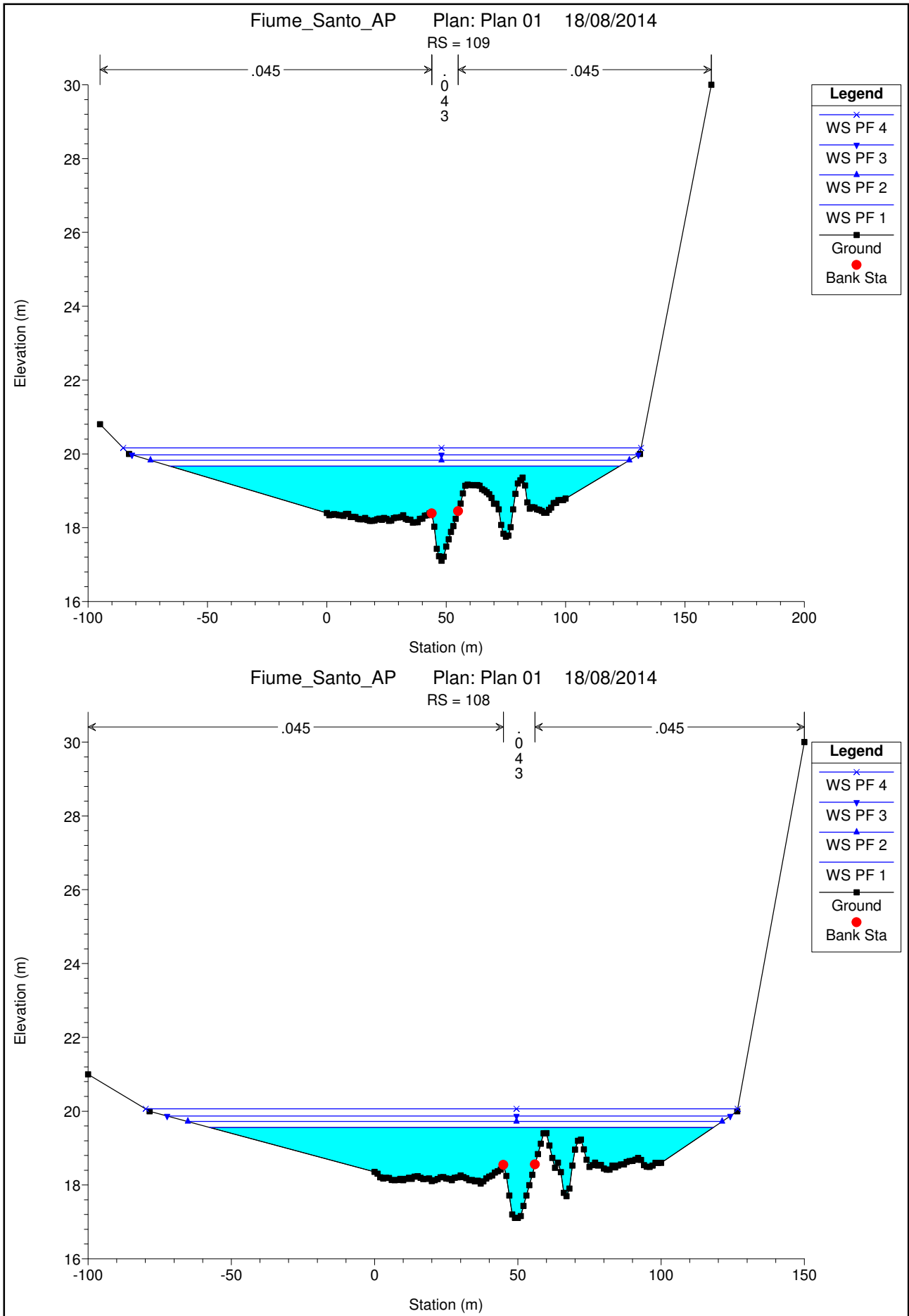


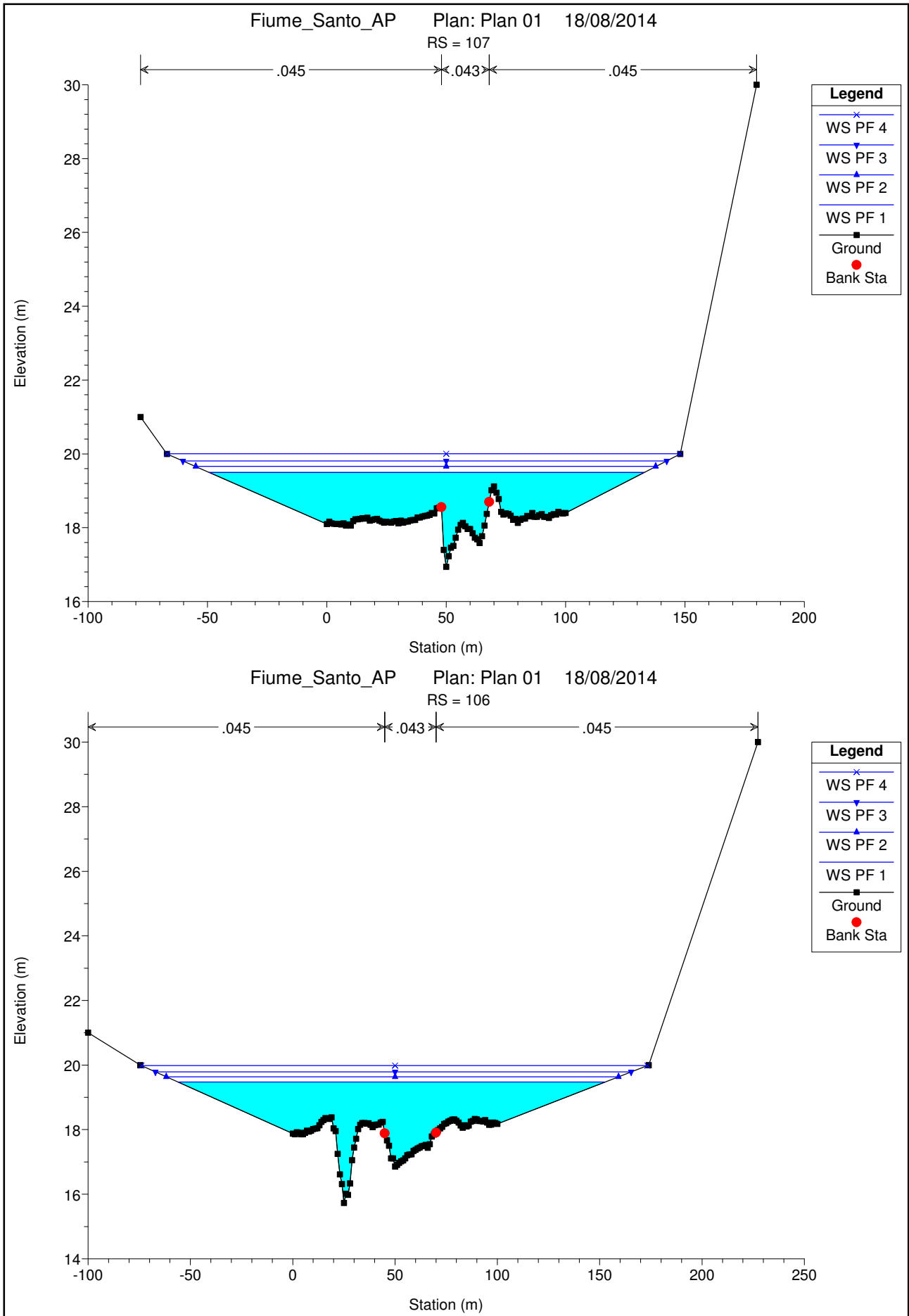


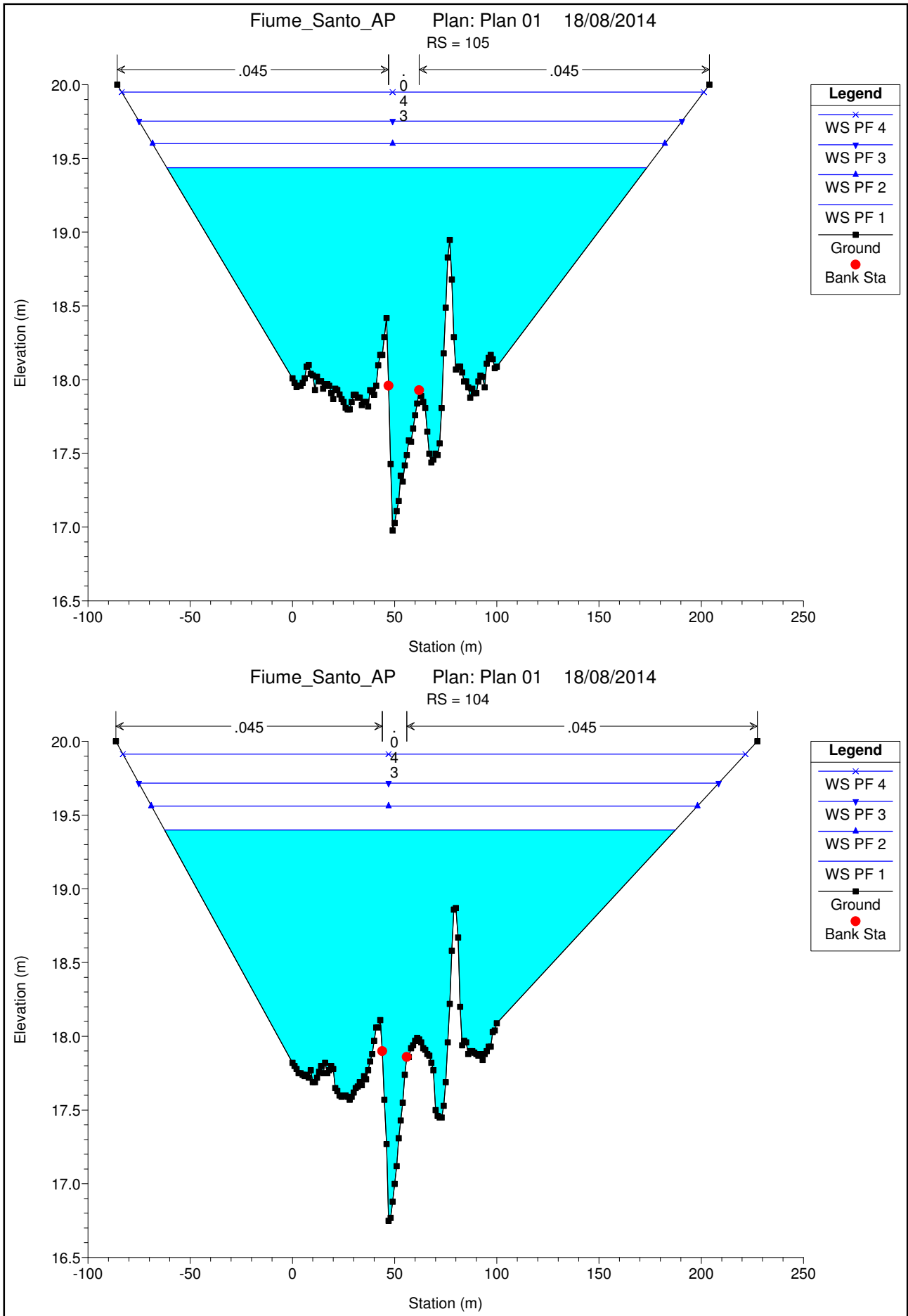


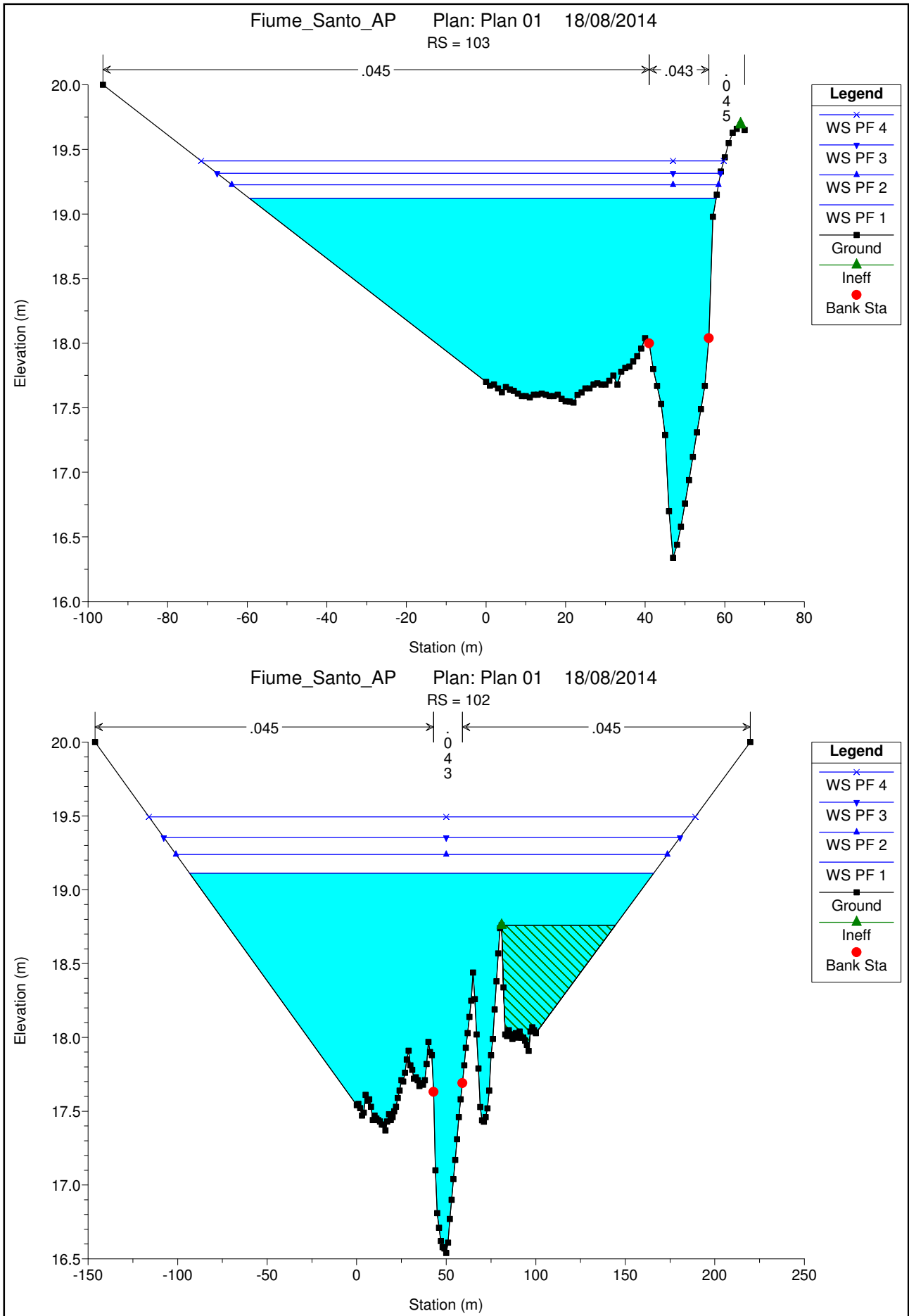


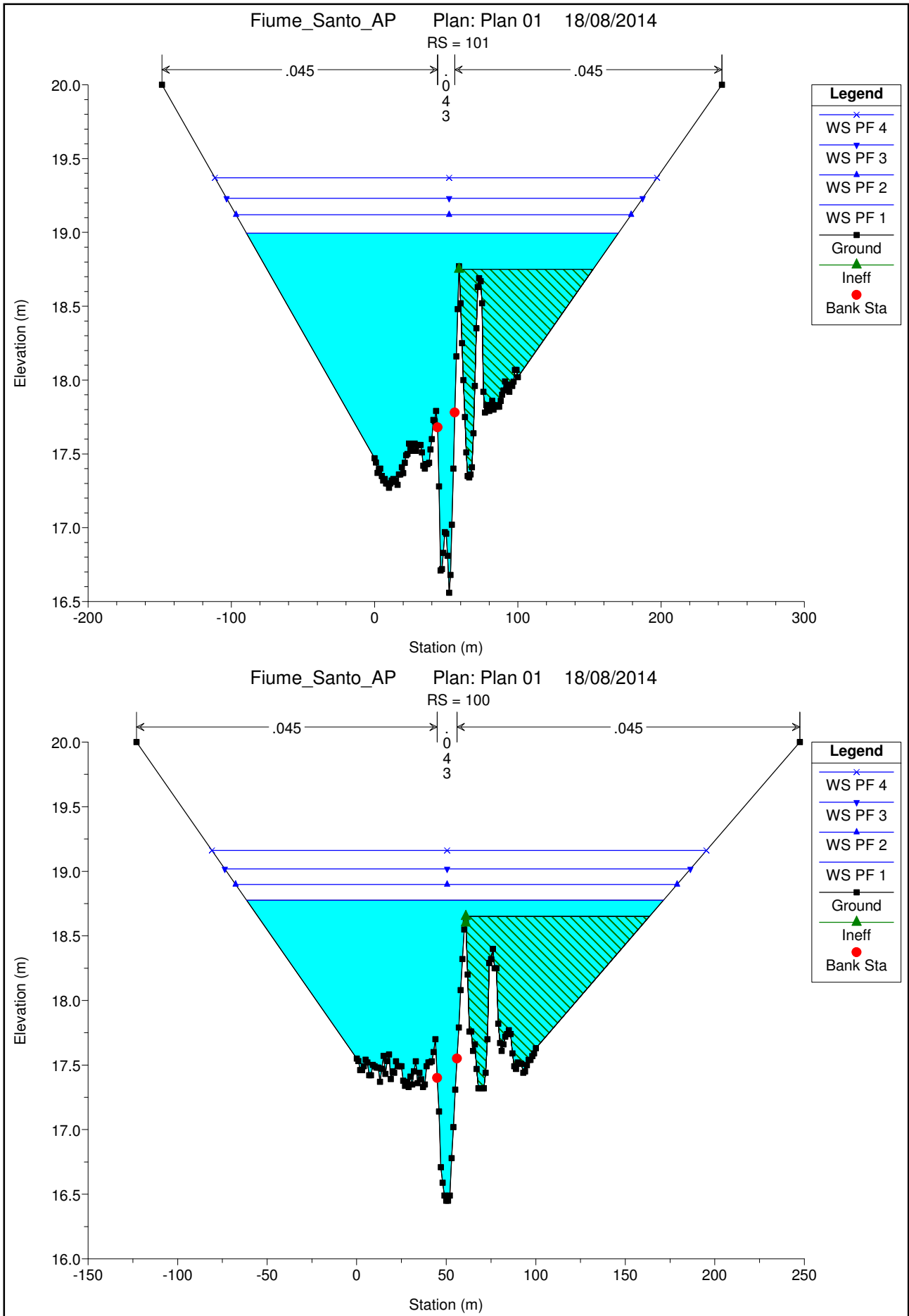


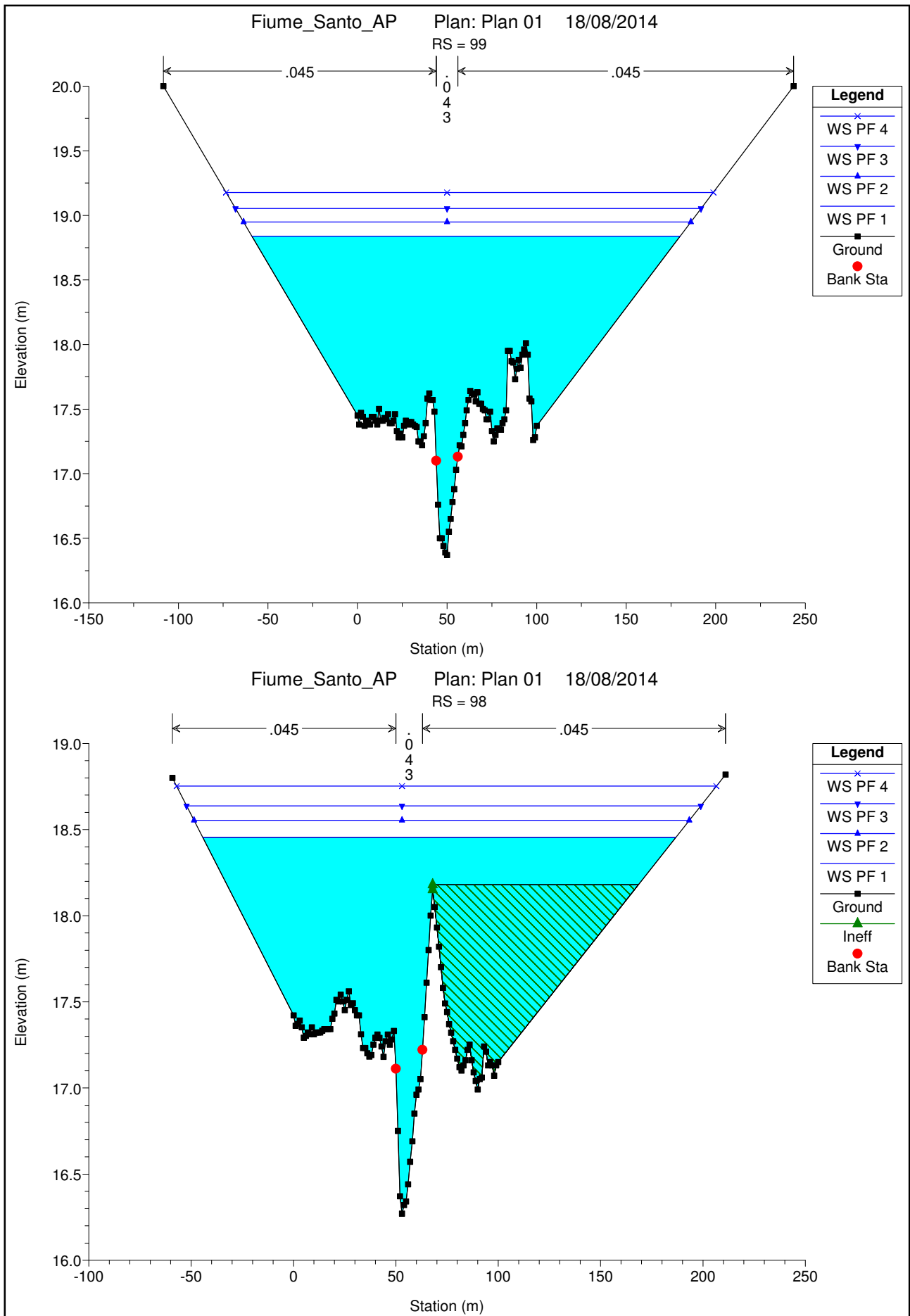


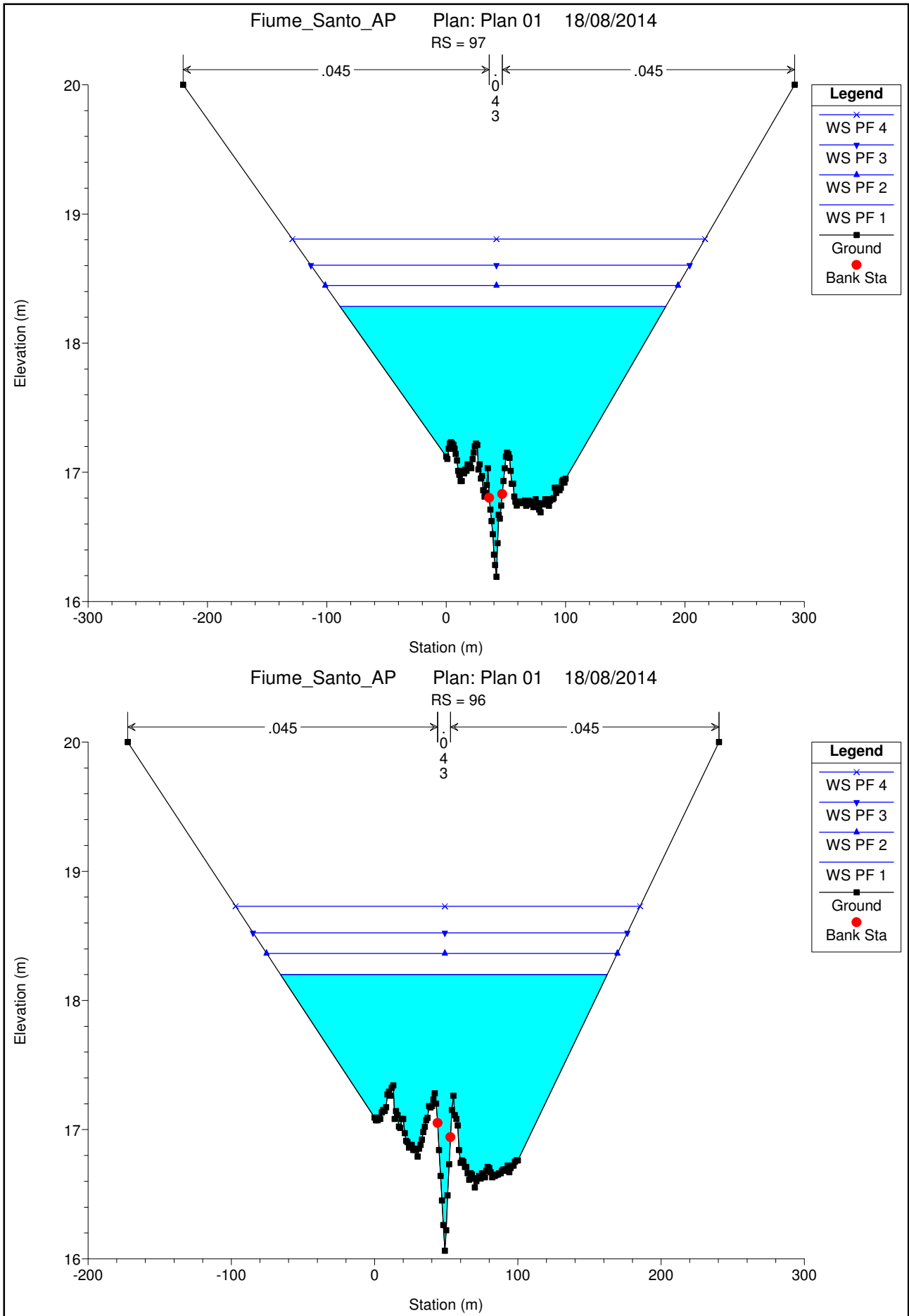


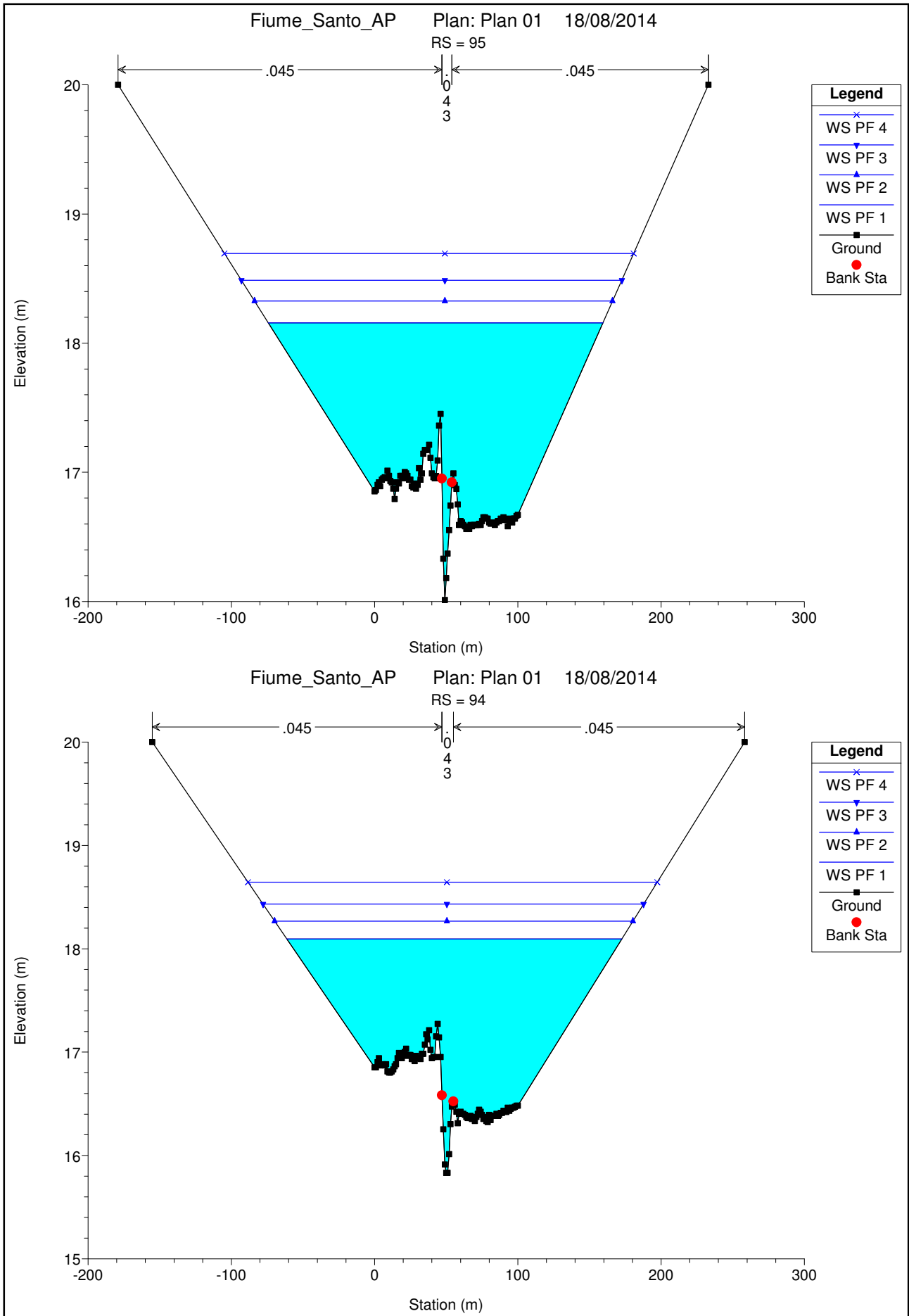


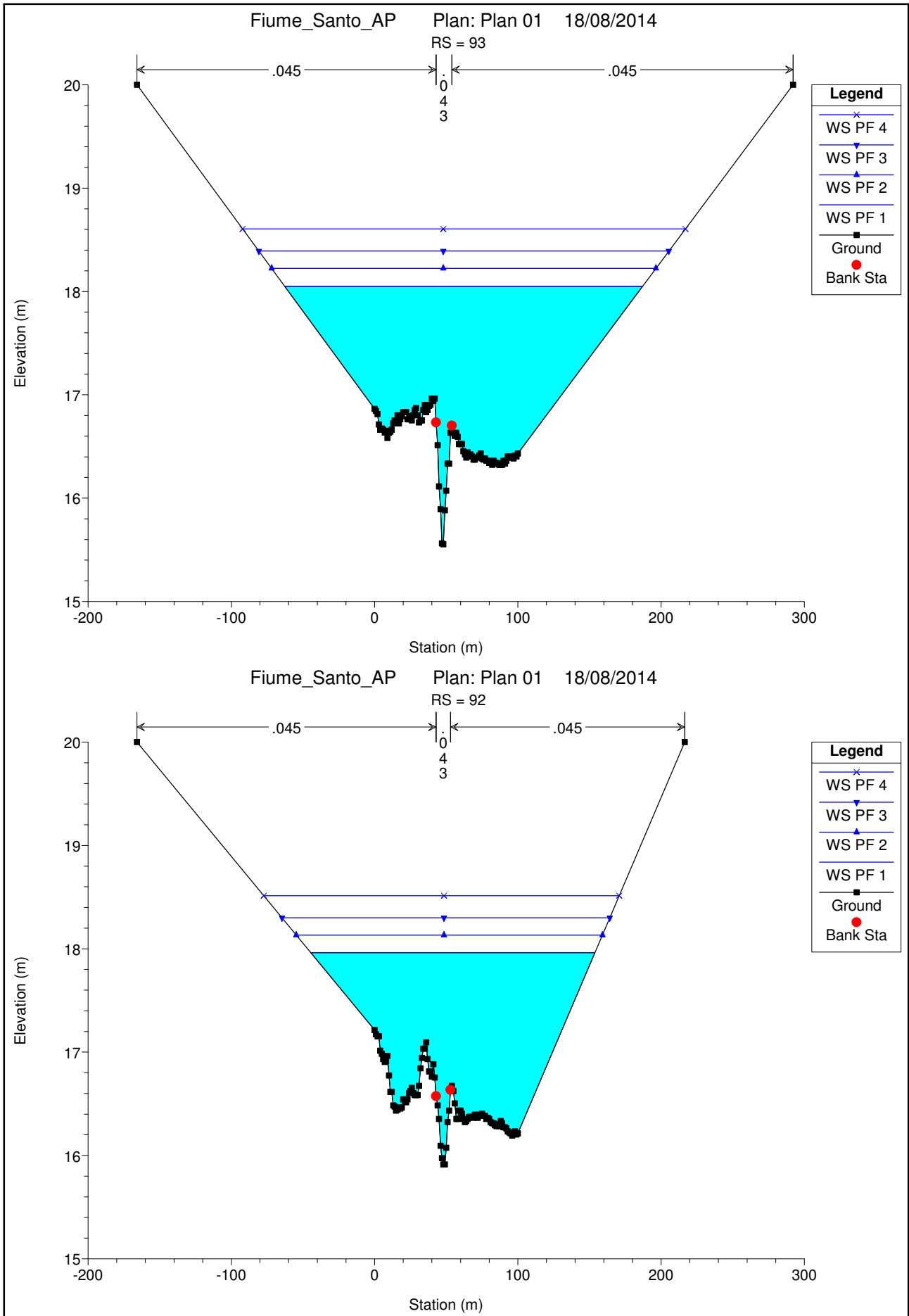


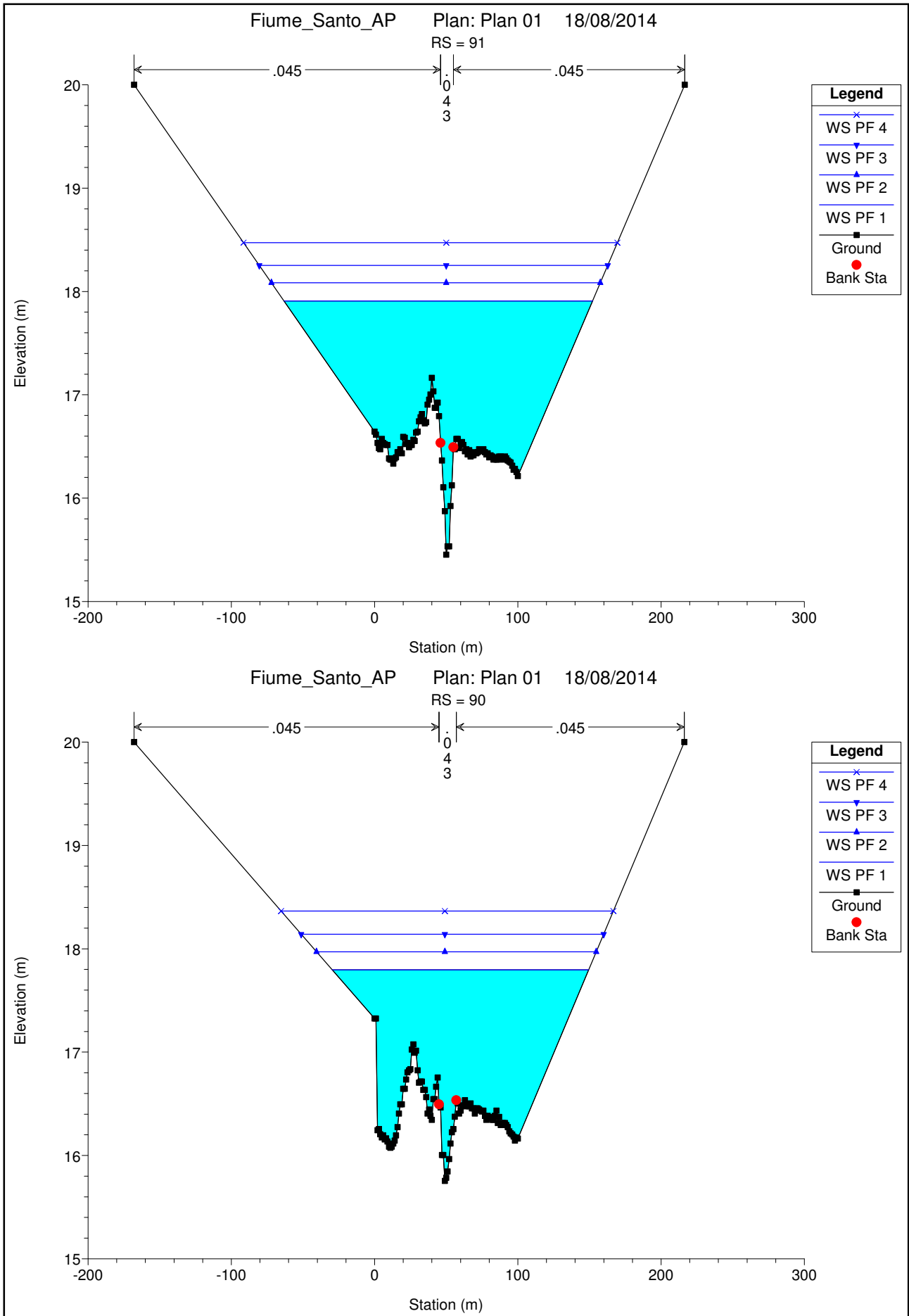


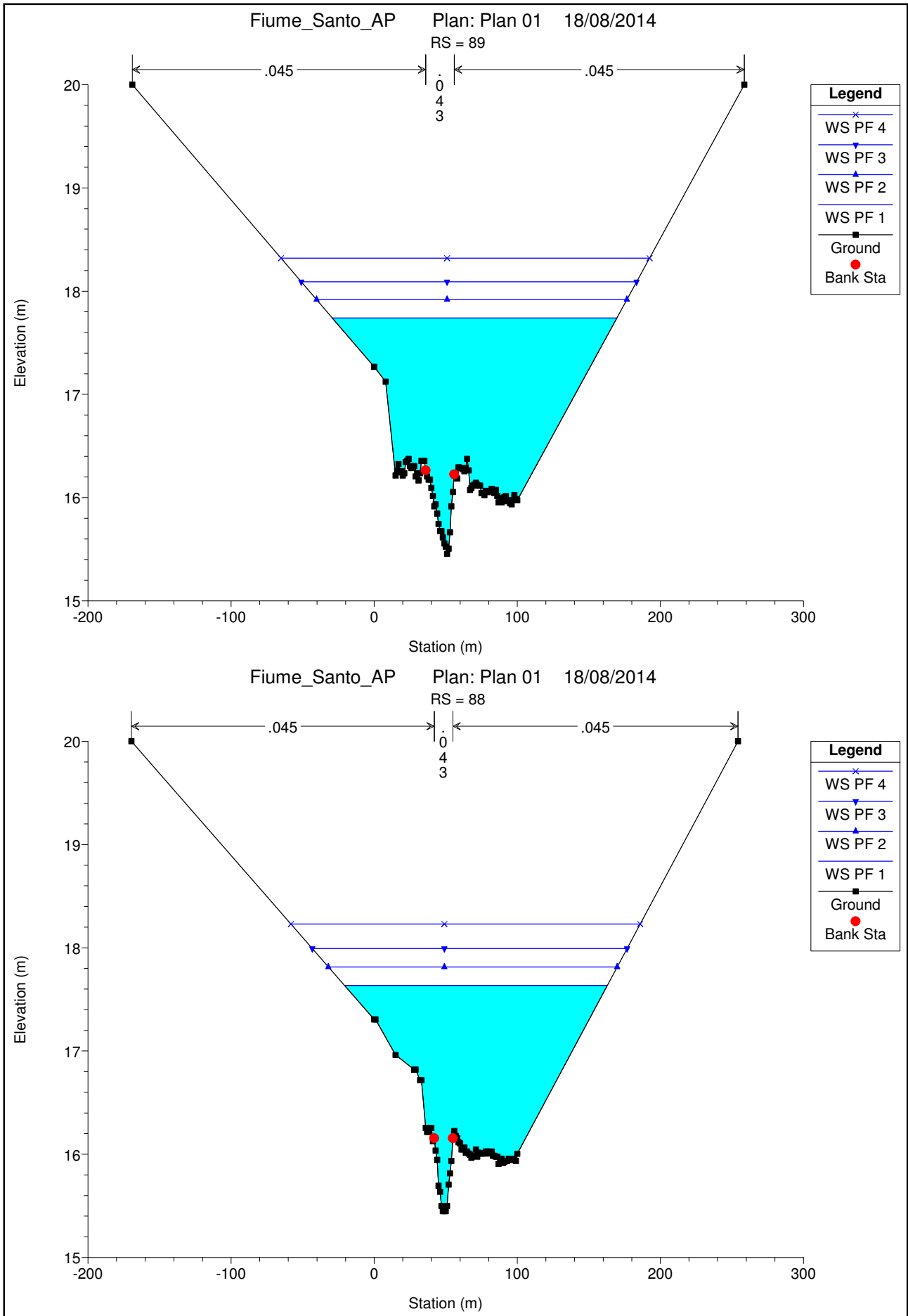


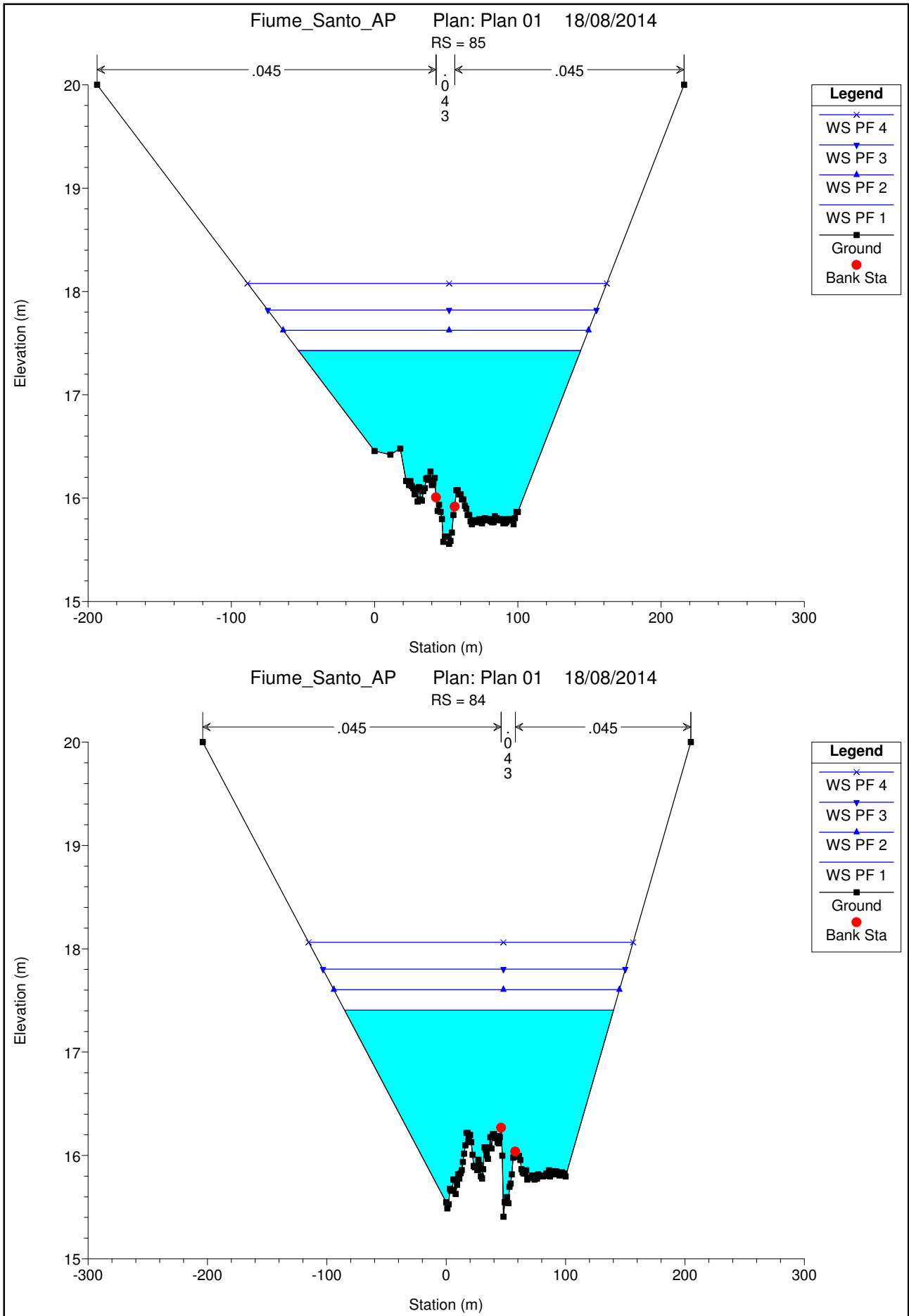


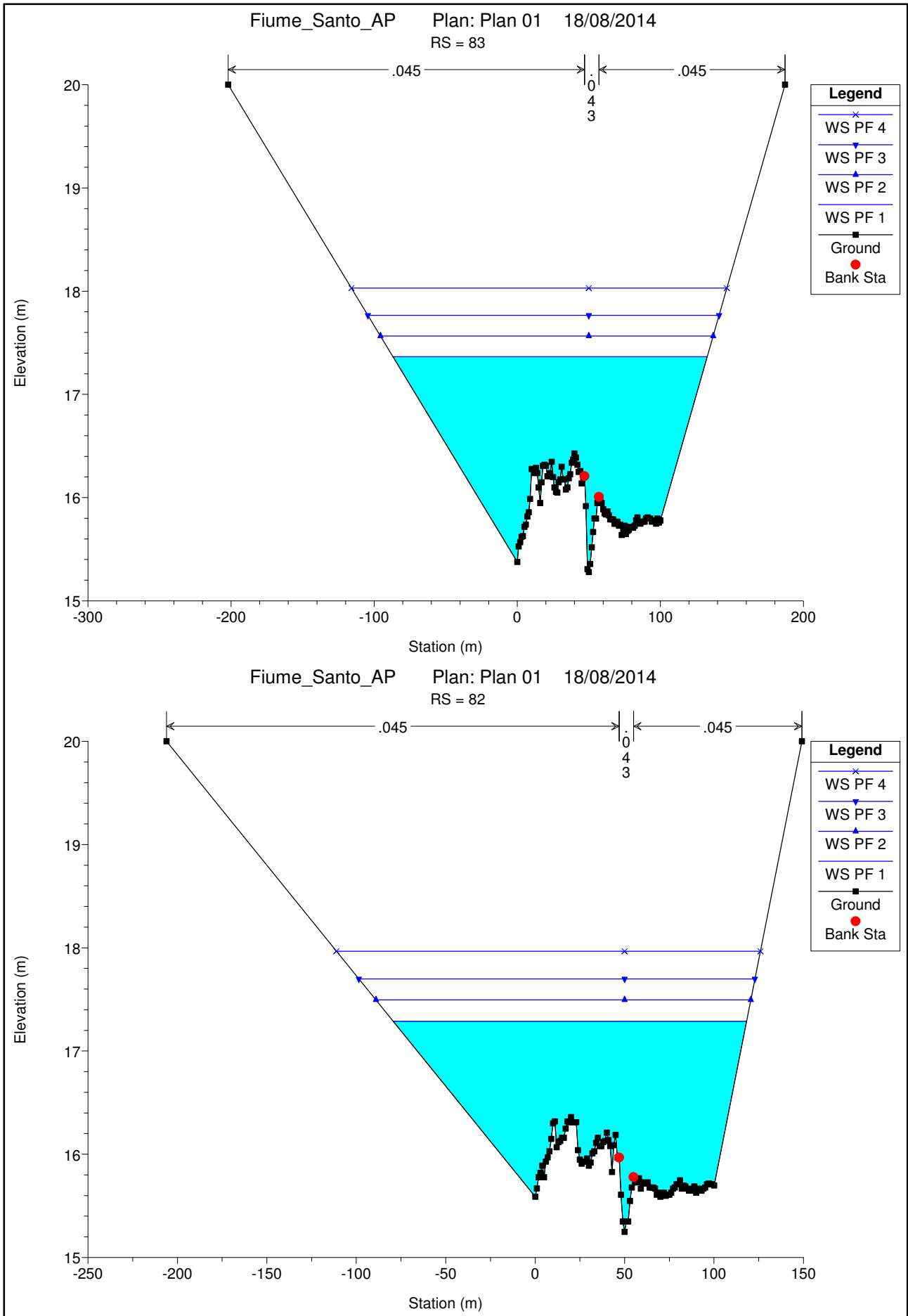


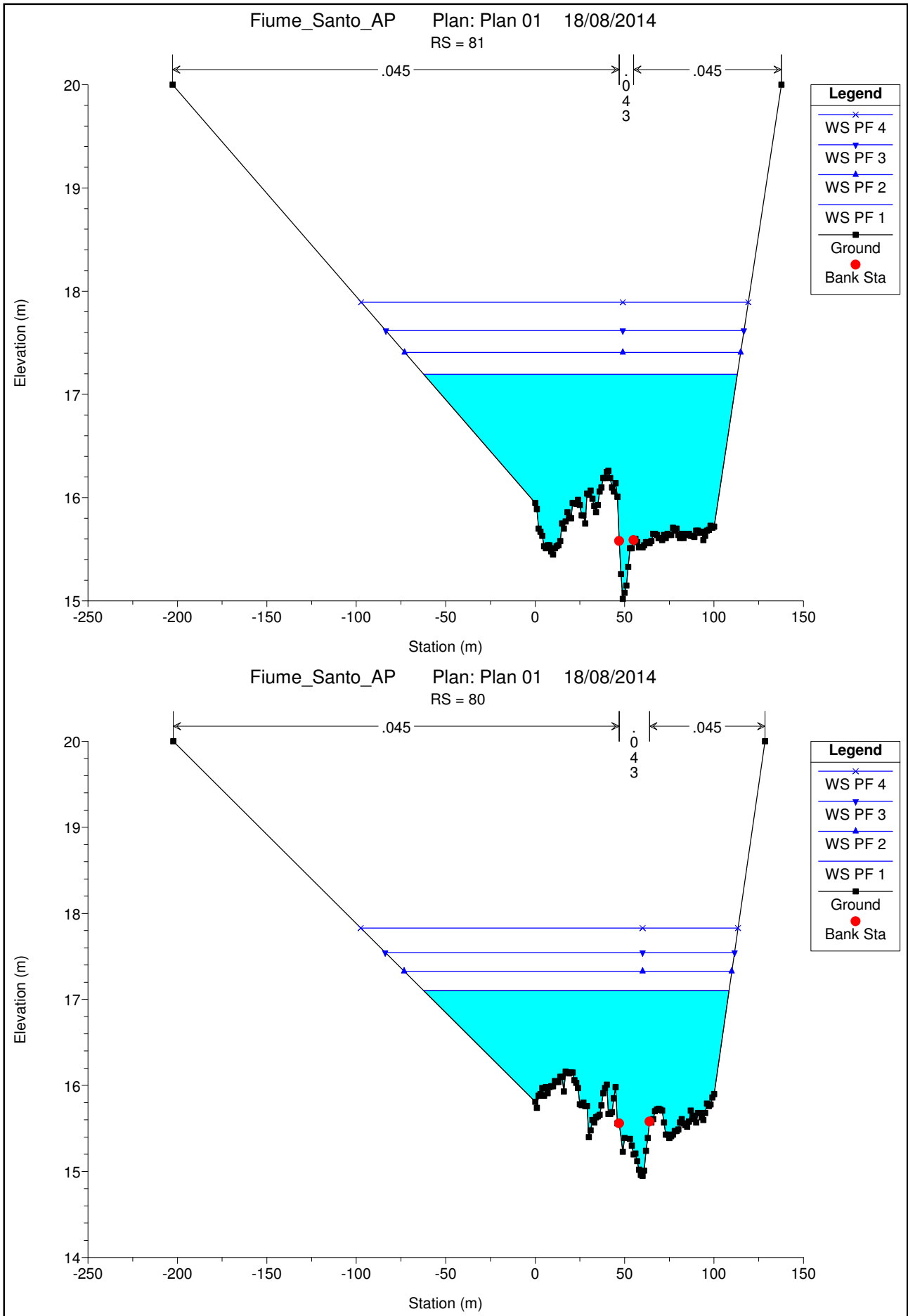


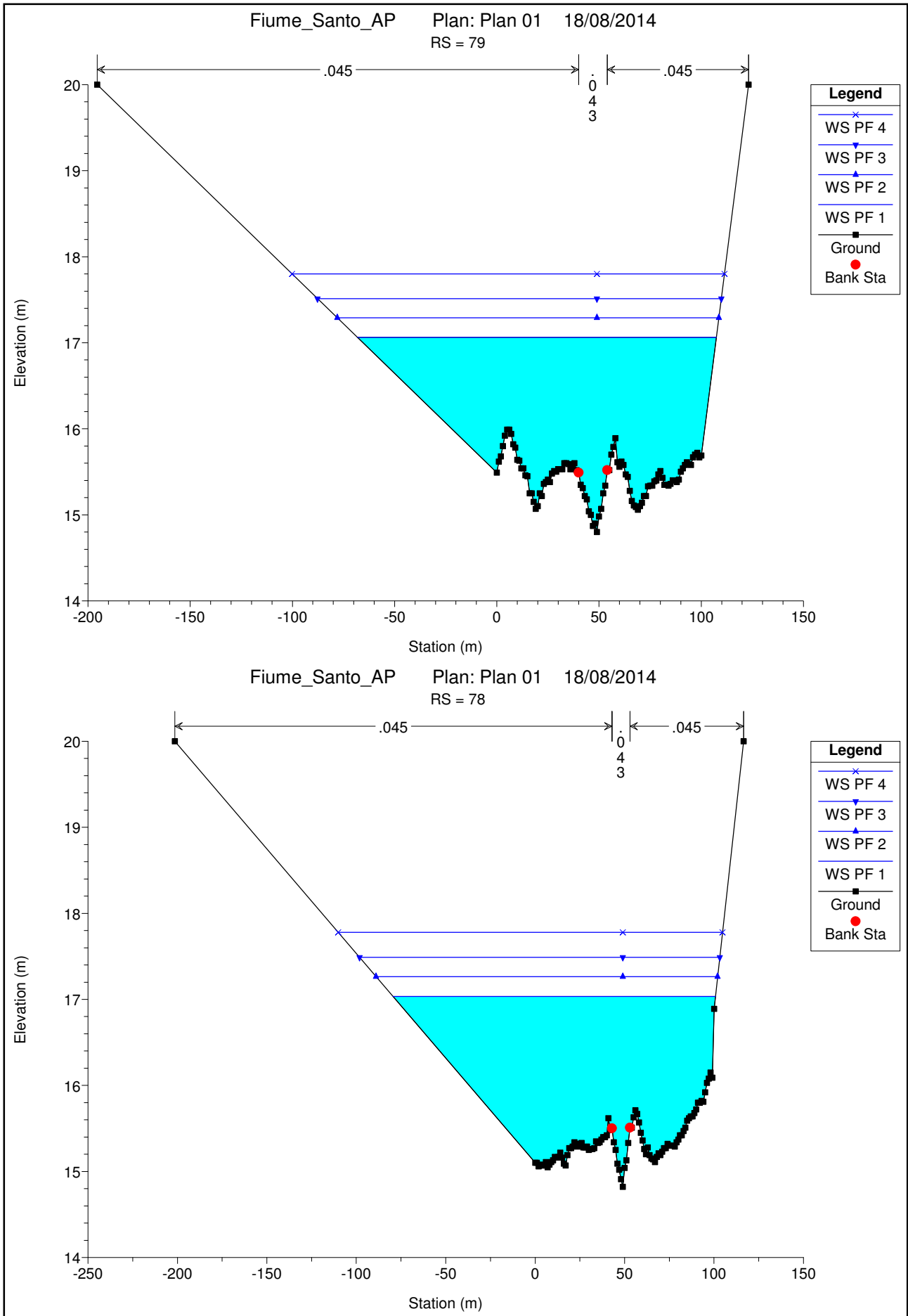




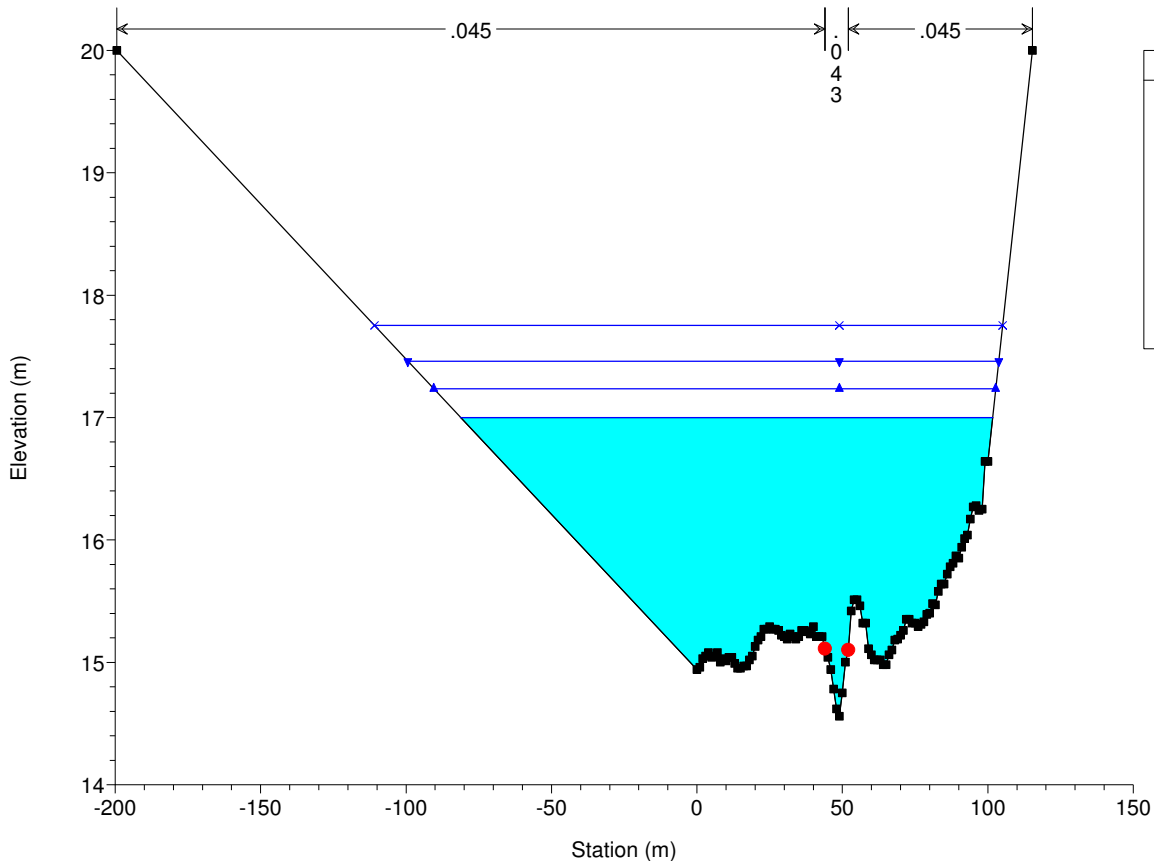






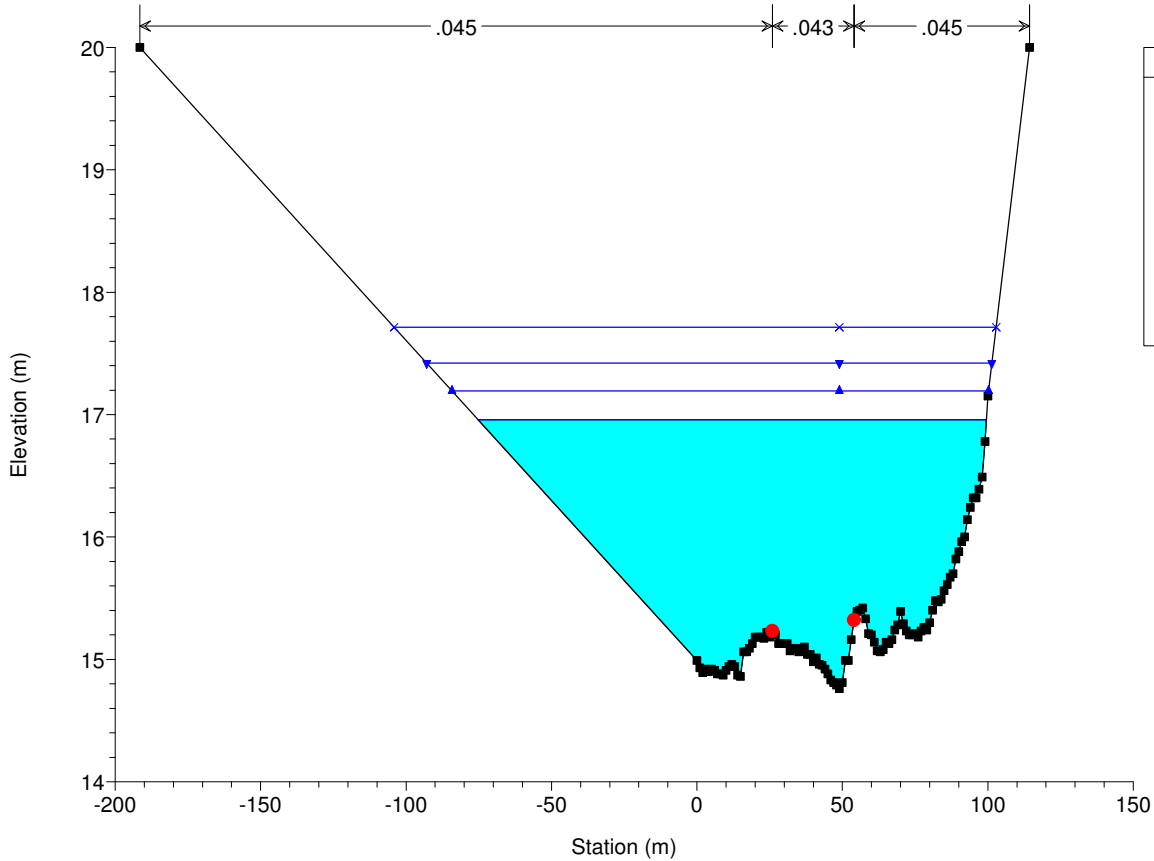


Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 77

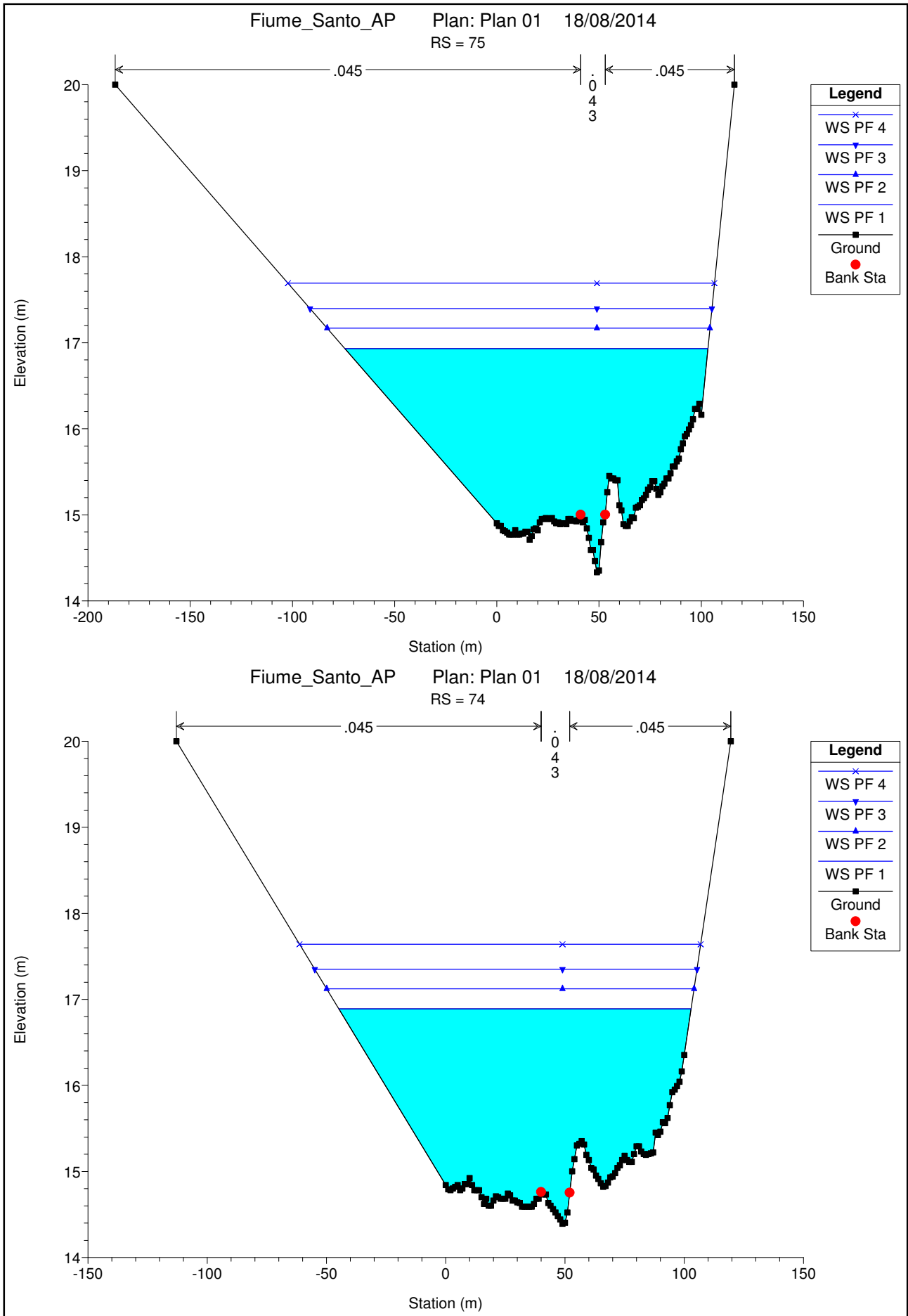


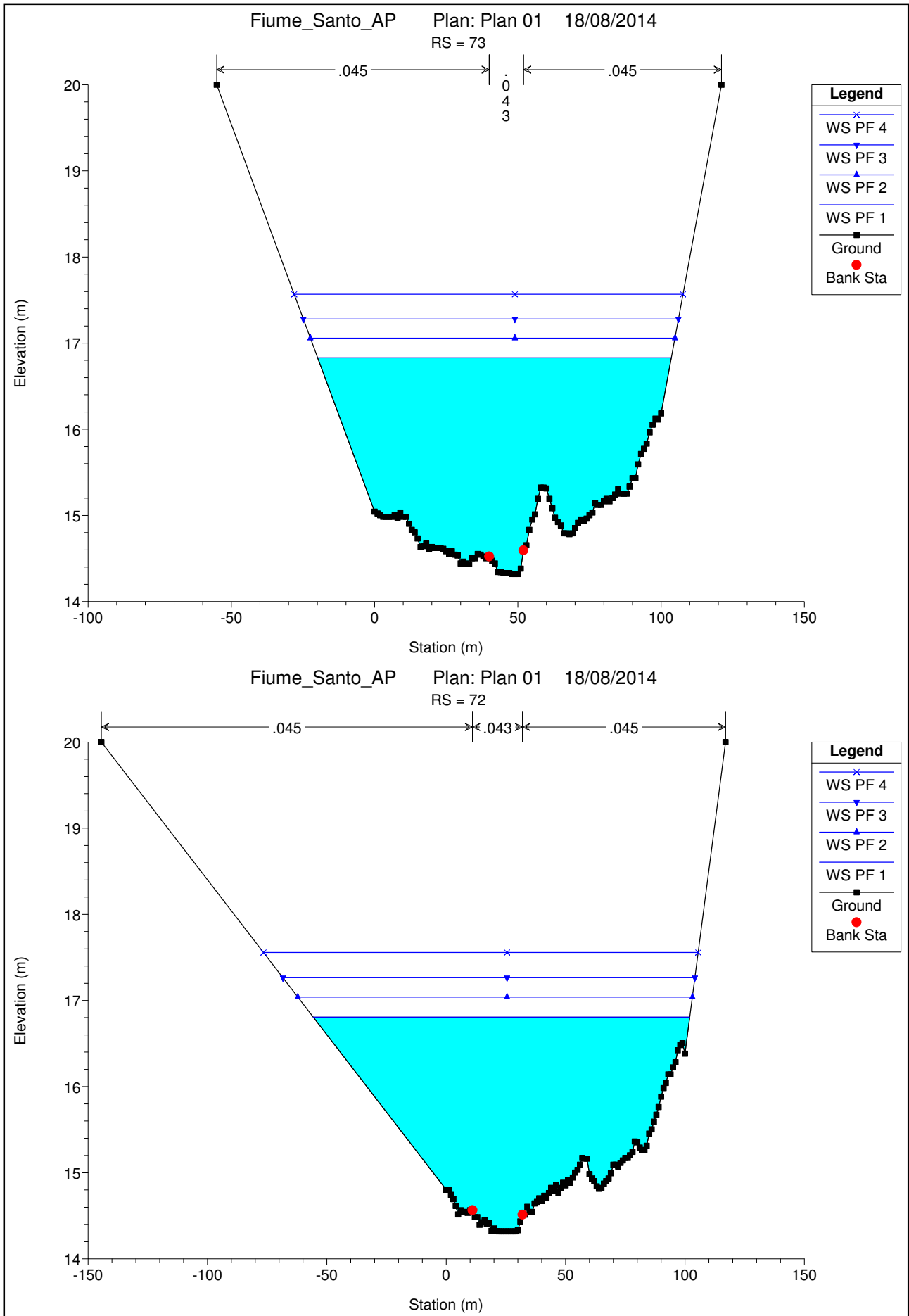
Legend	
—x—	WS PF 4
—v—	WS PF 3
—▲—	WS PF 2
—■—	WS PF 1
—■—	Ground
●	Bank Sta

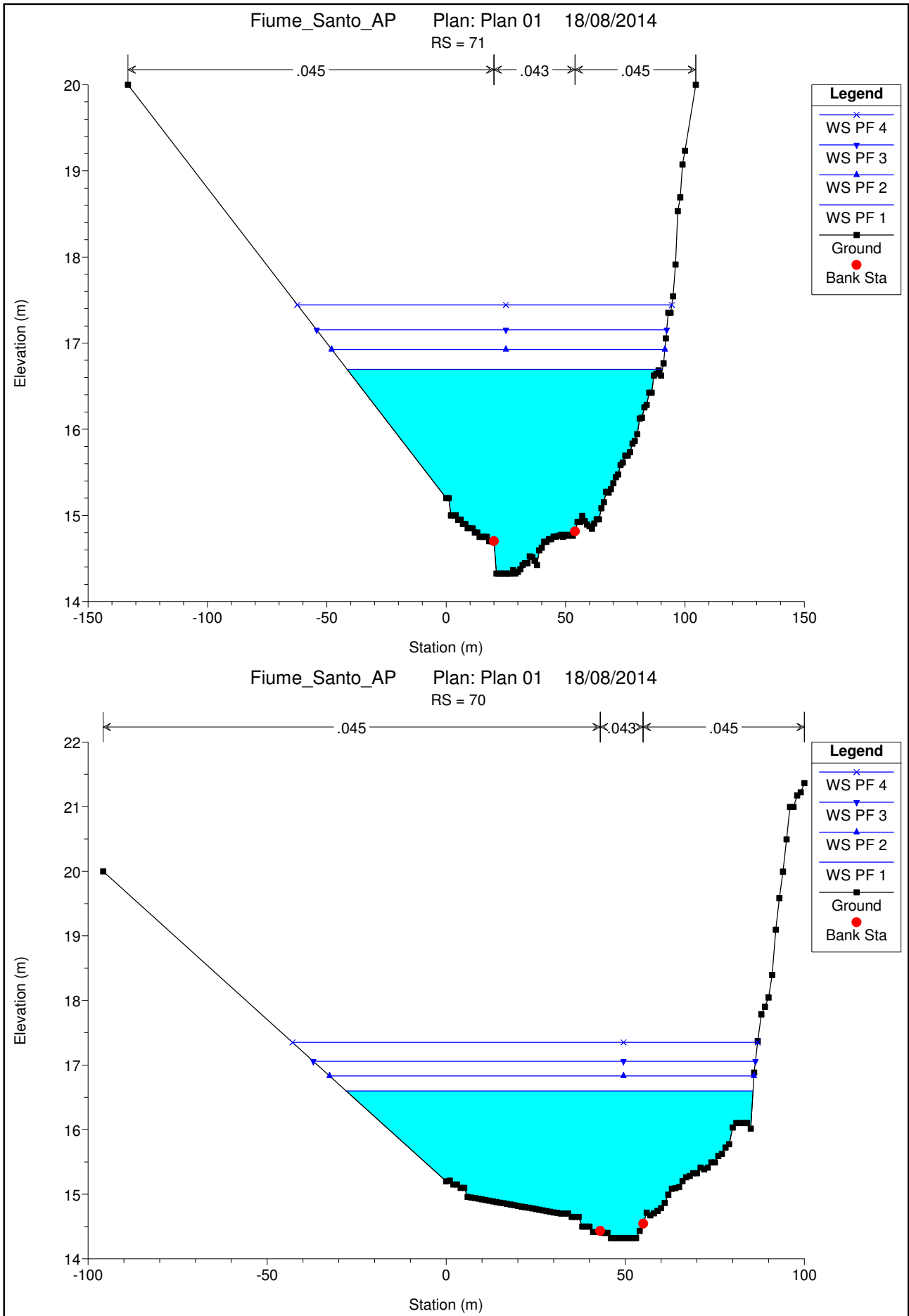
Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 76



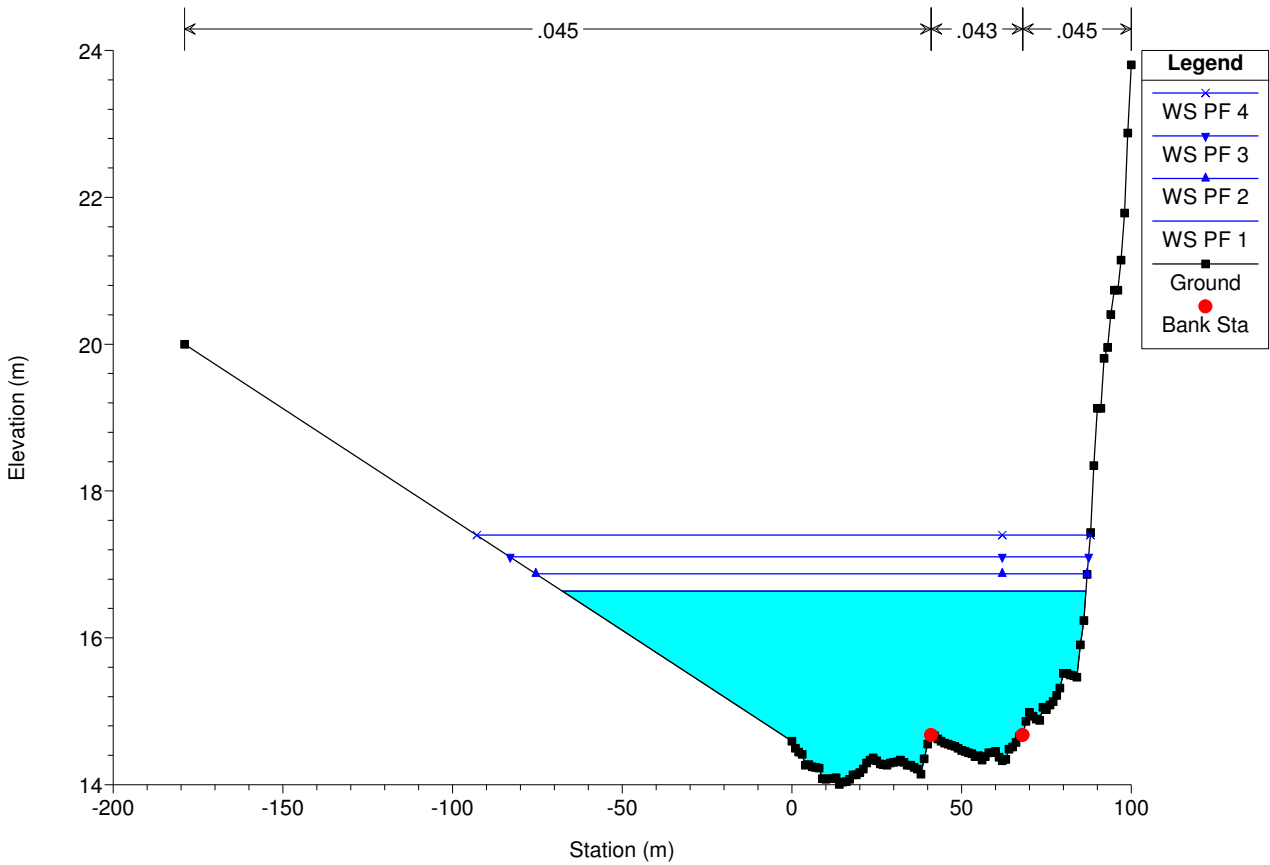
Legend	
—x—	WS PF 4
—v—	WS PF 3
—▲—	WS PF 2
—■—	WS PF 1
—■—	Ground
●	Bank Sta



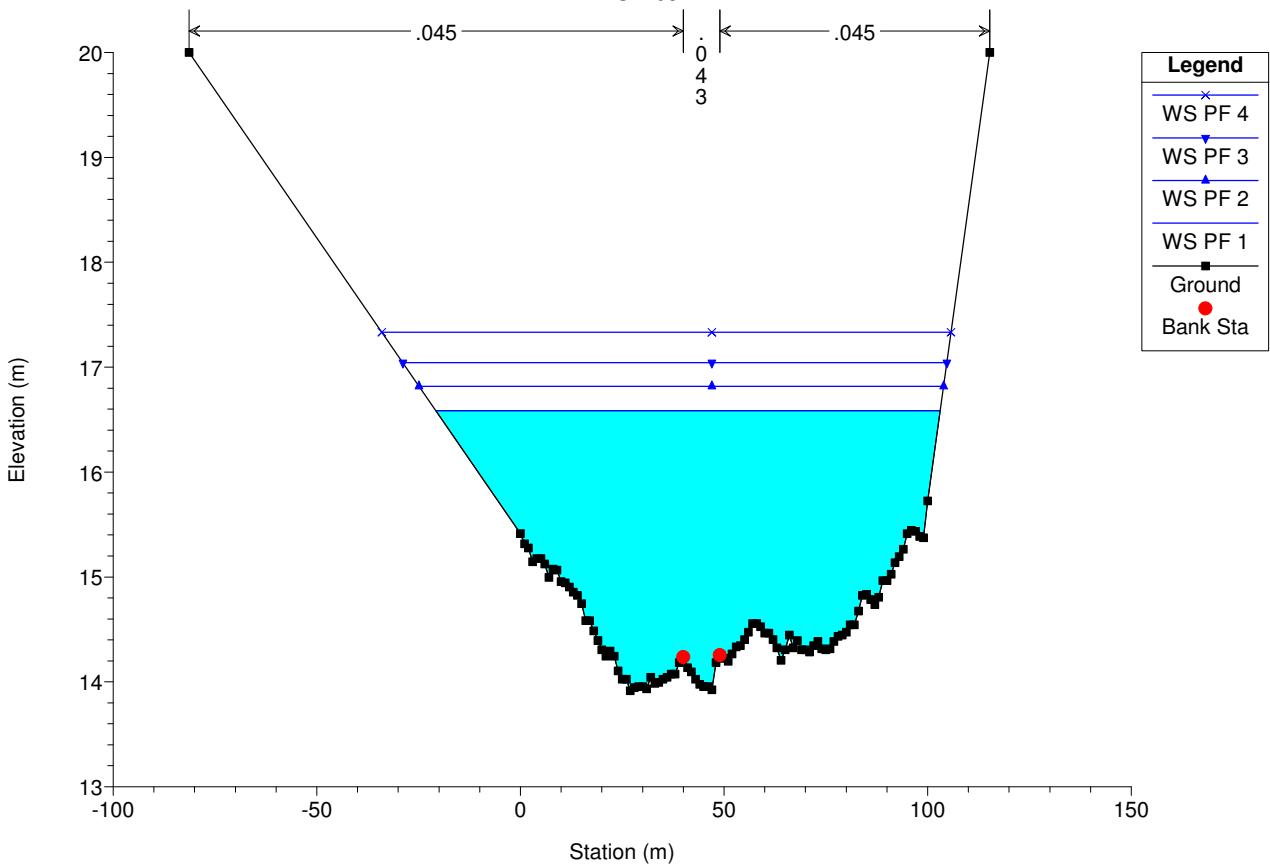


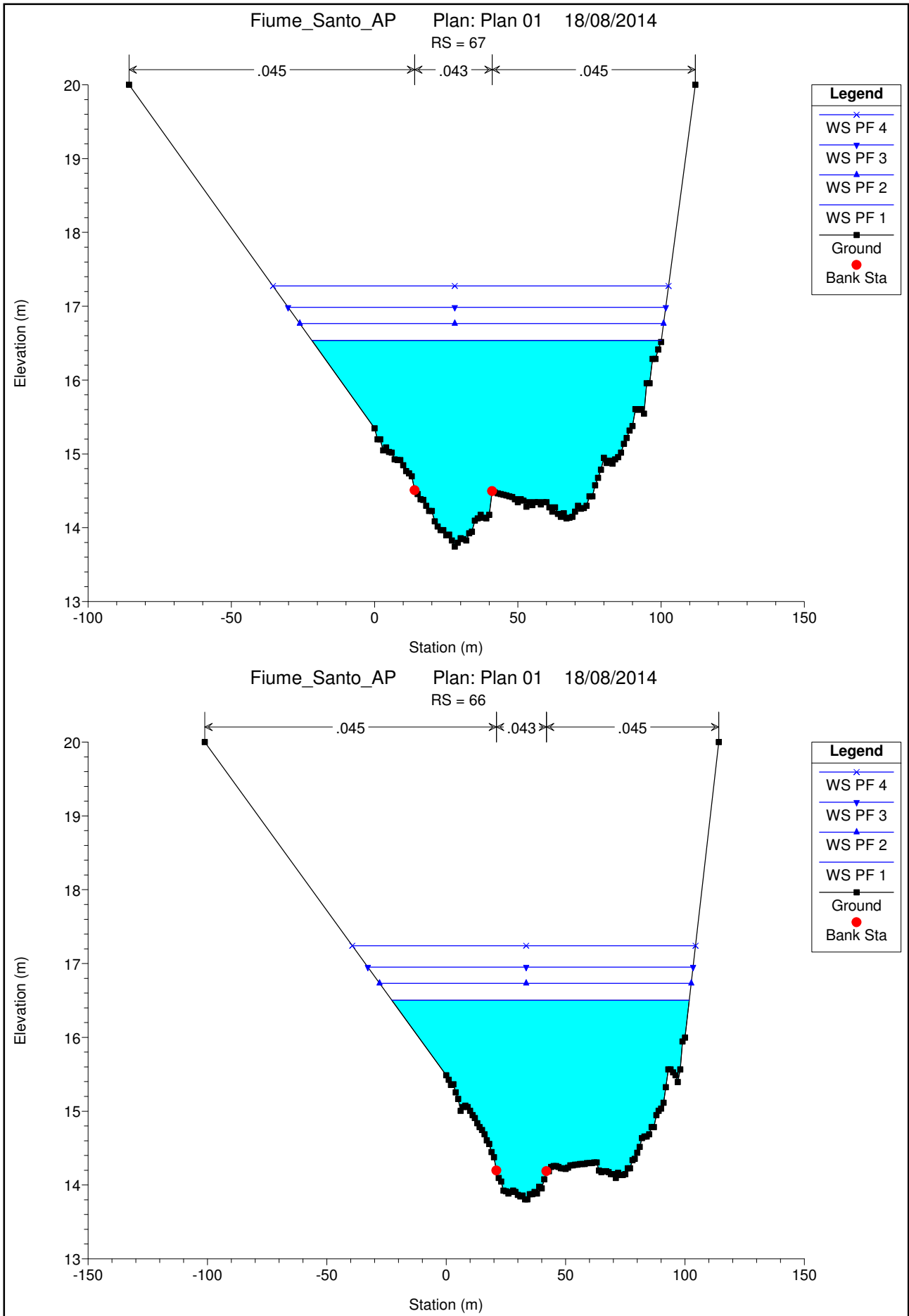


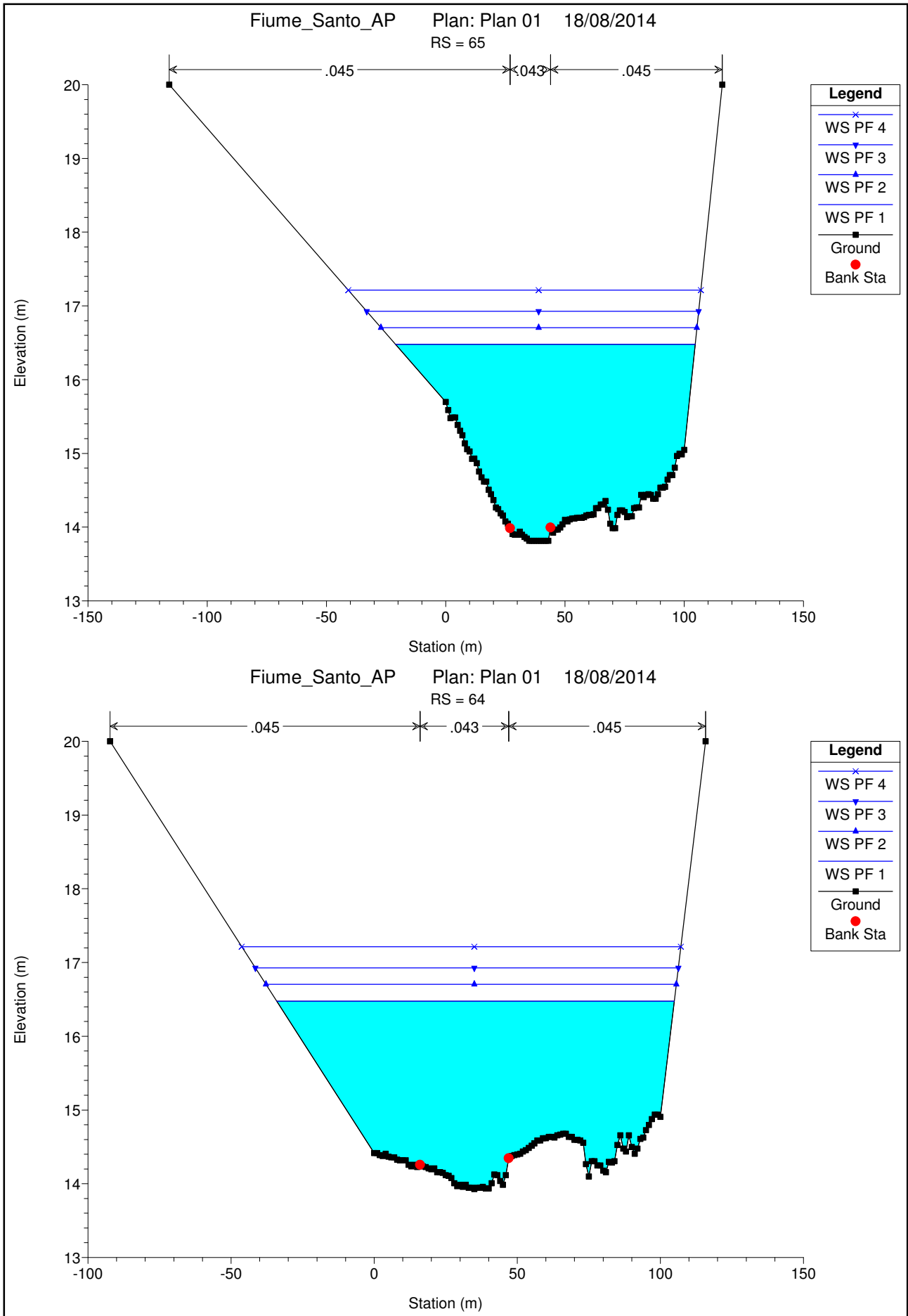
Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 69

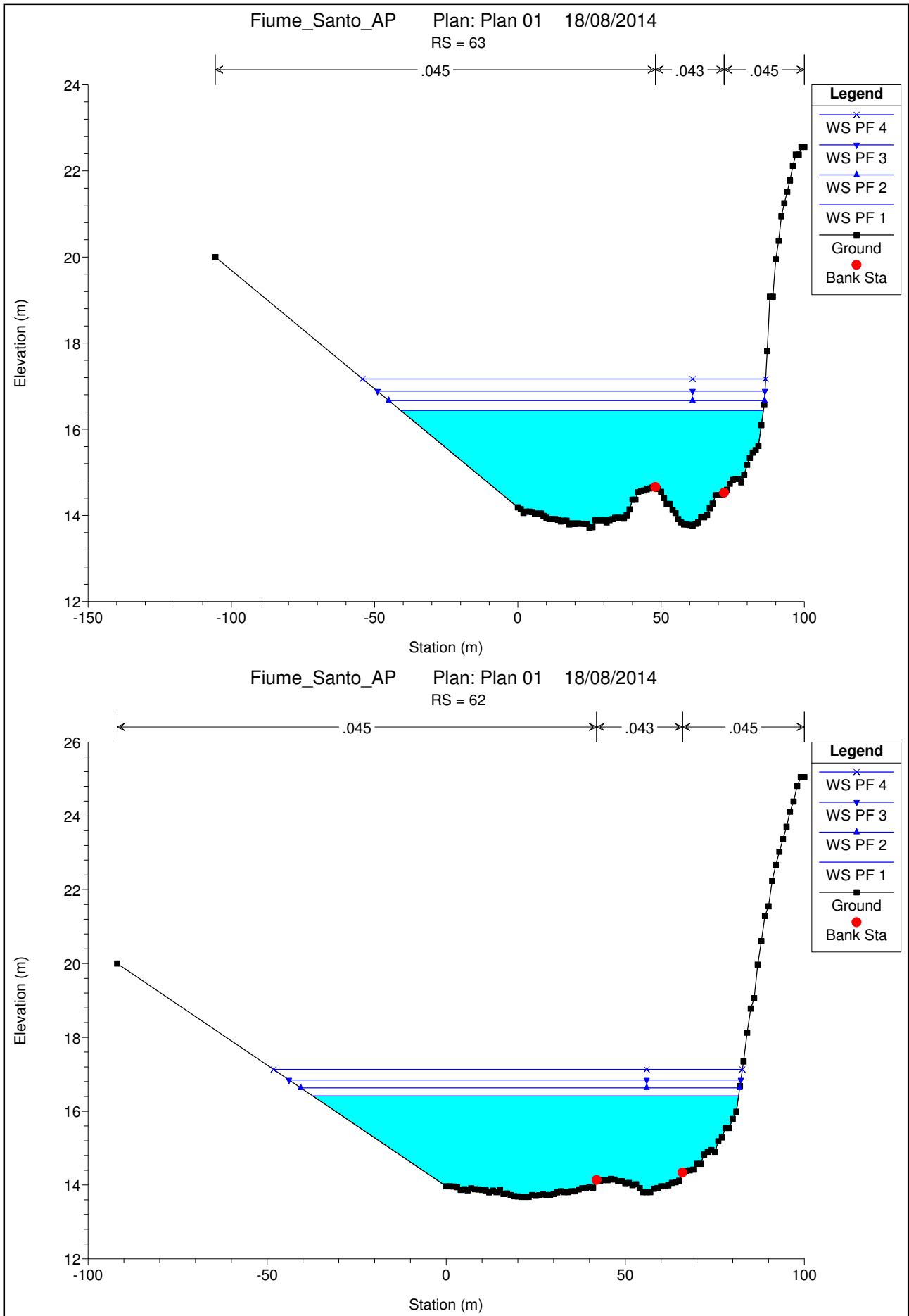


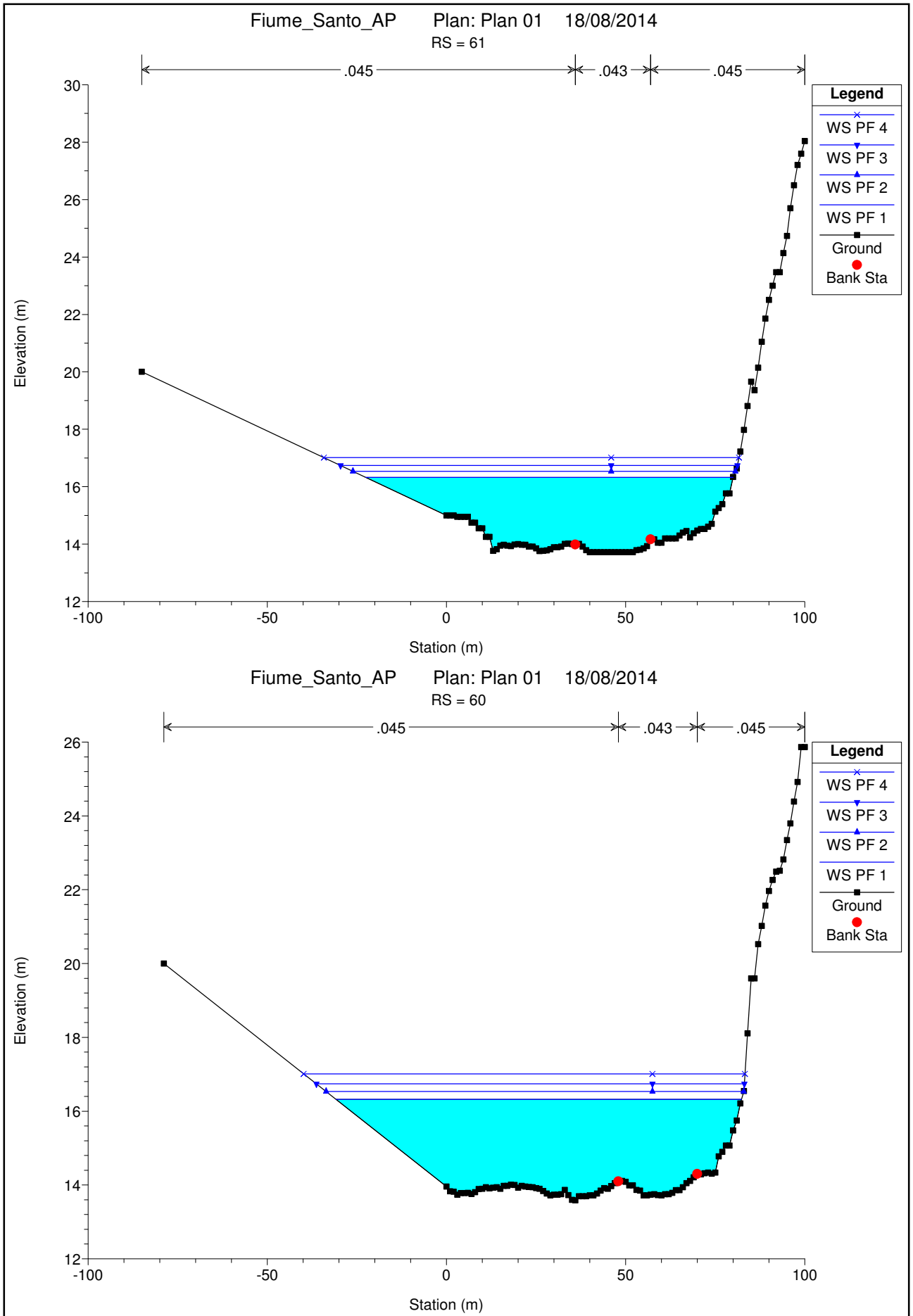
Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 68



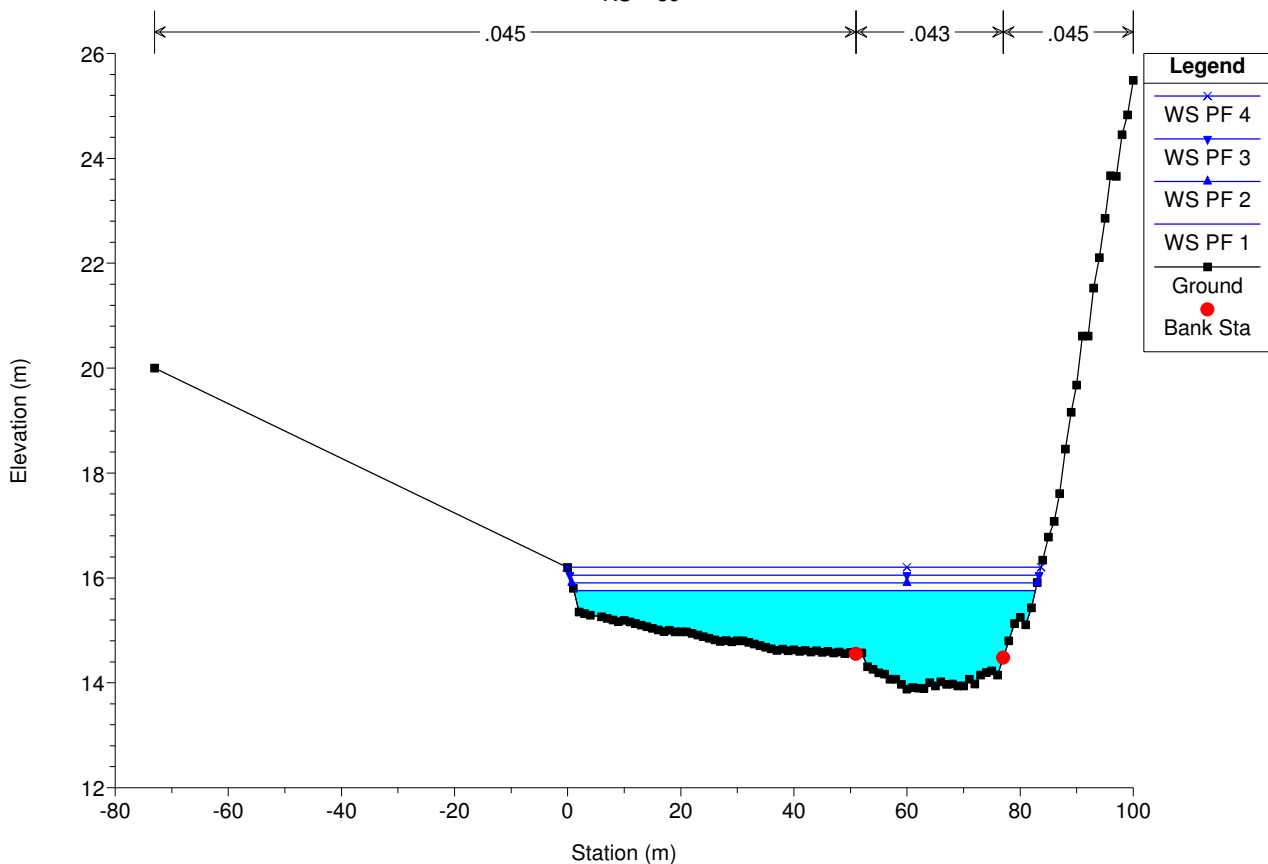




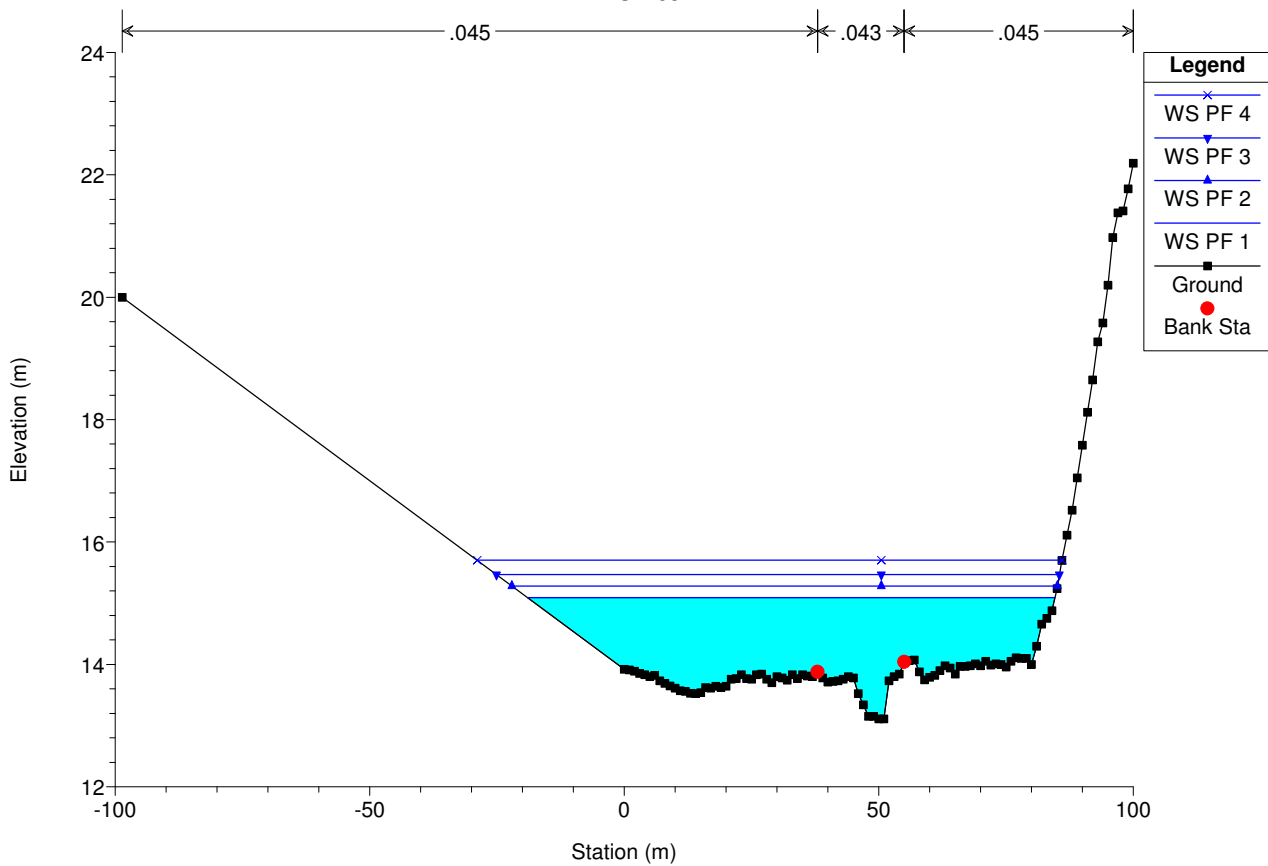


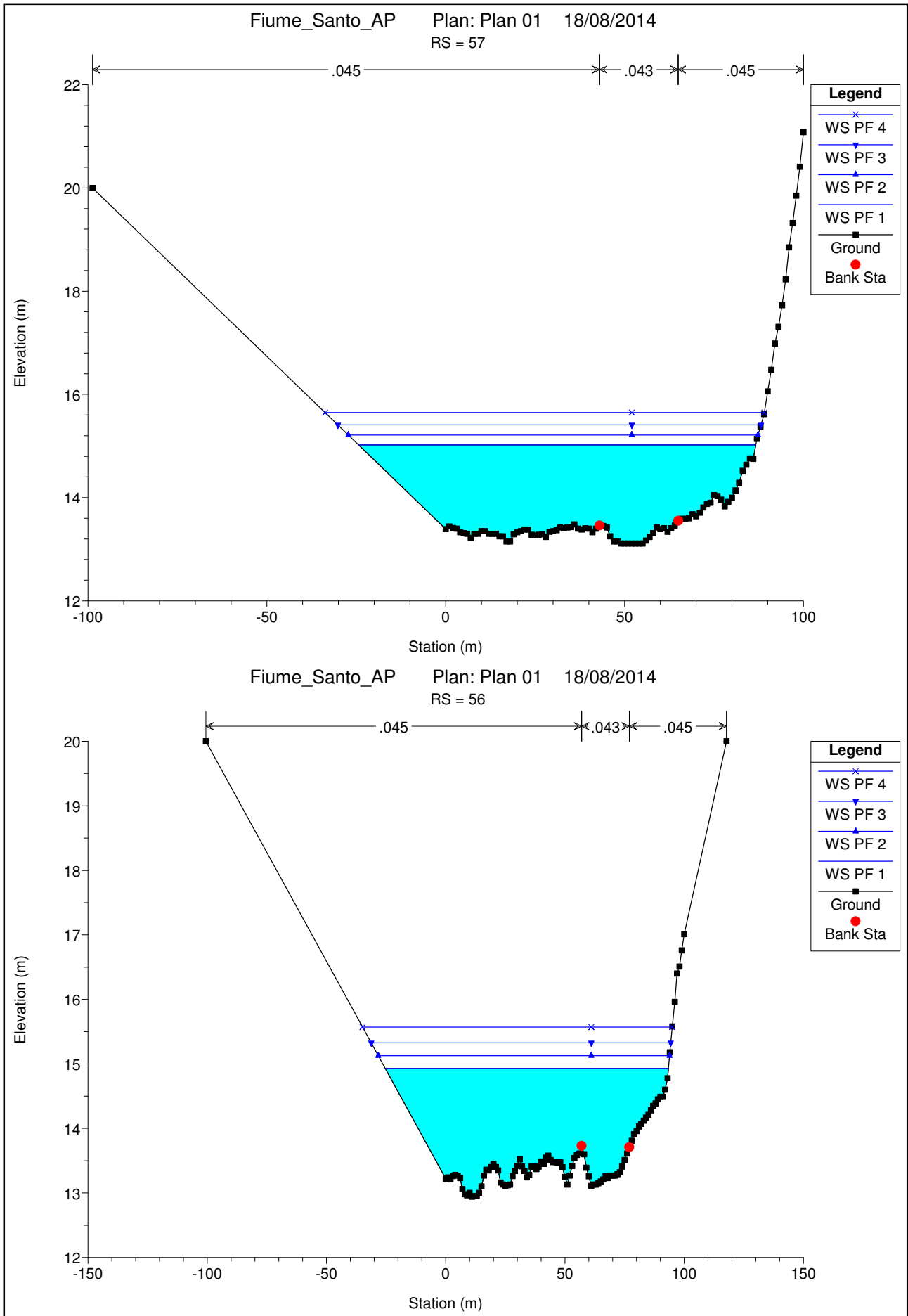


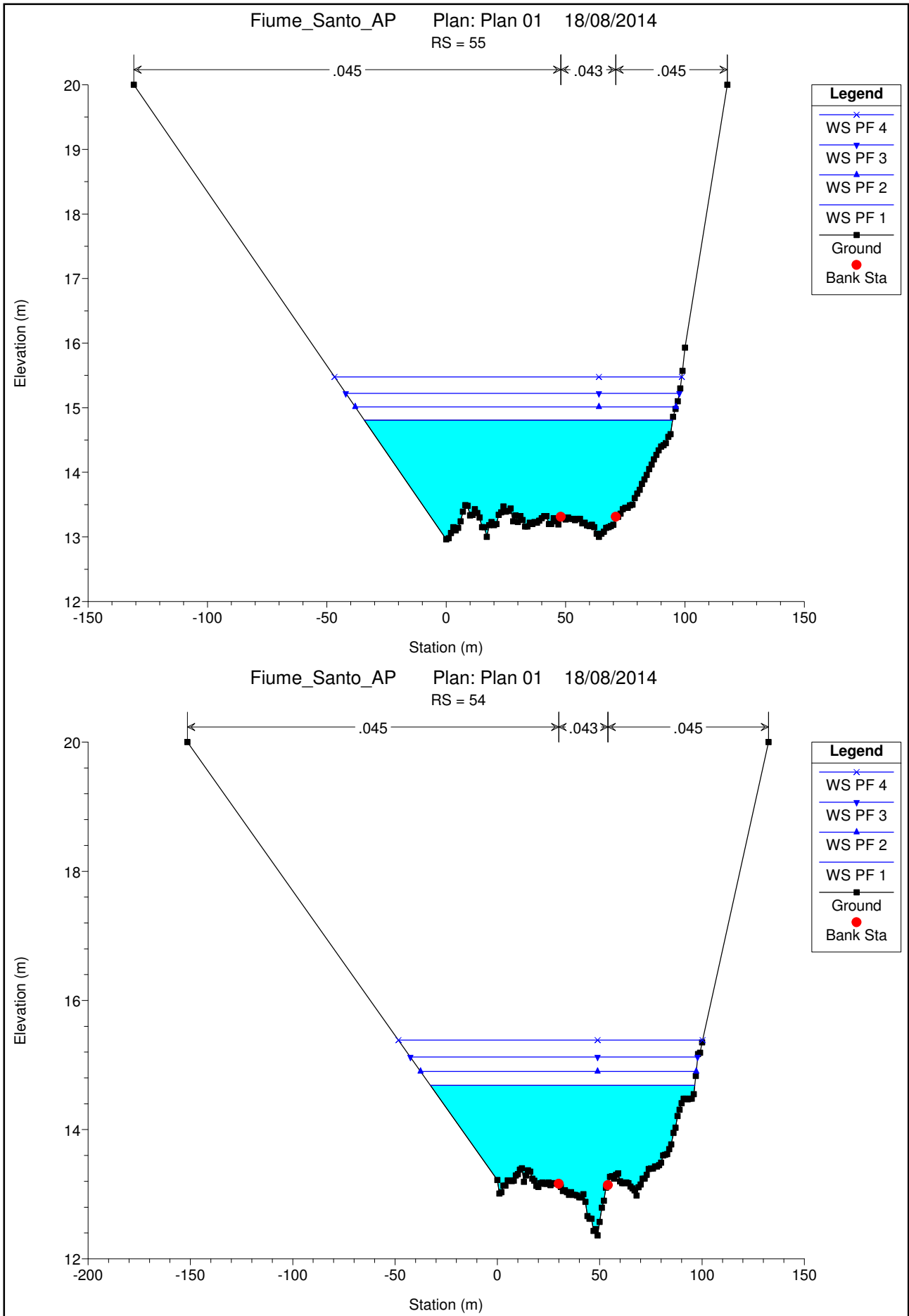
Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 59

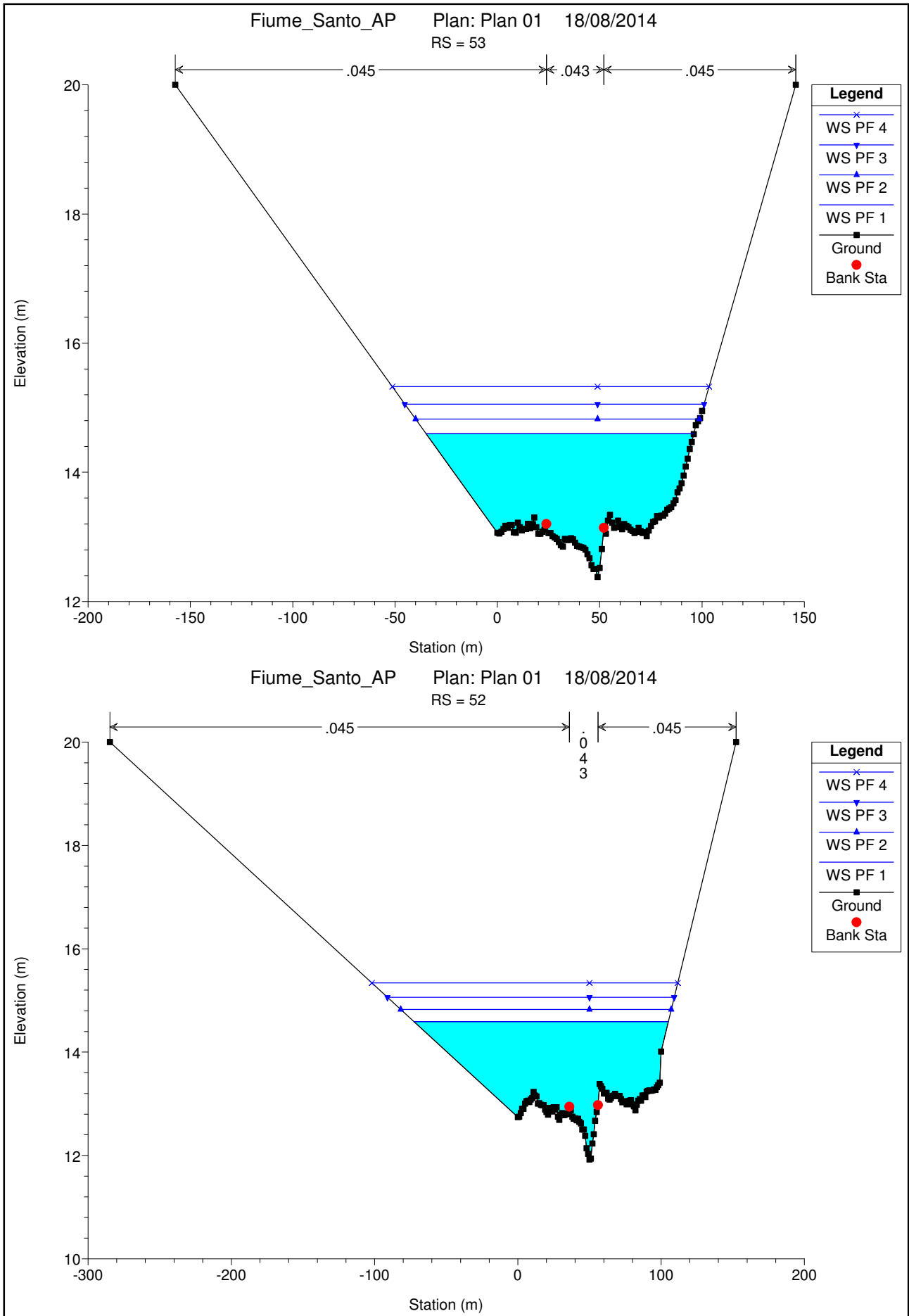


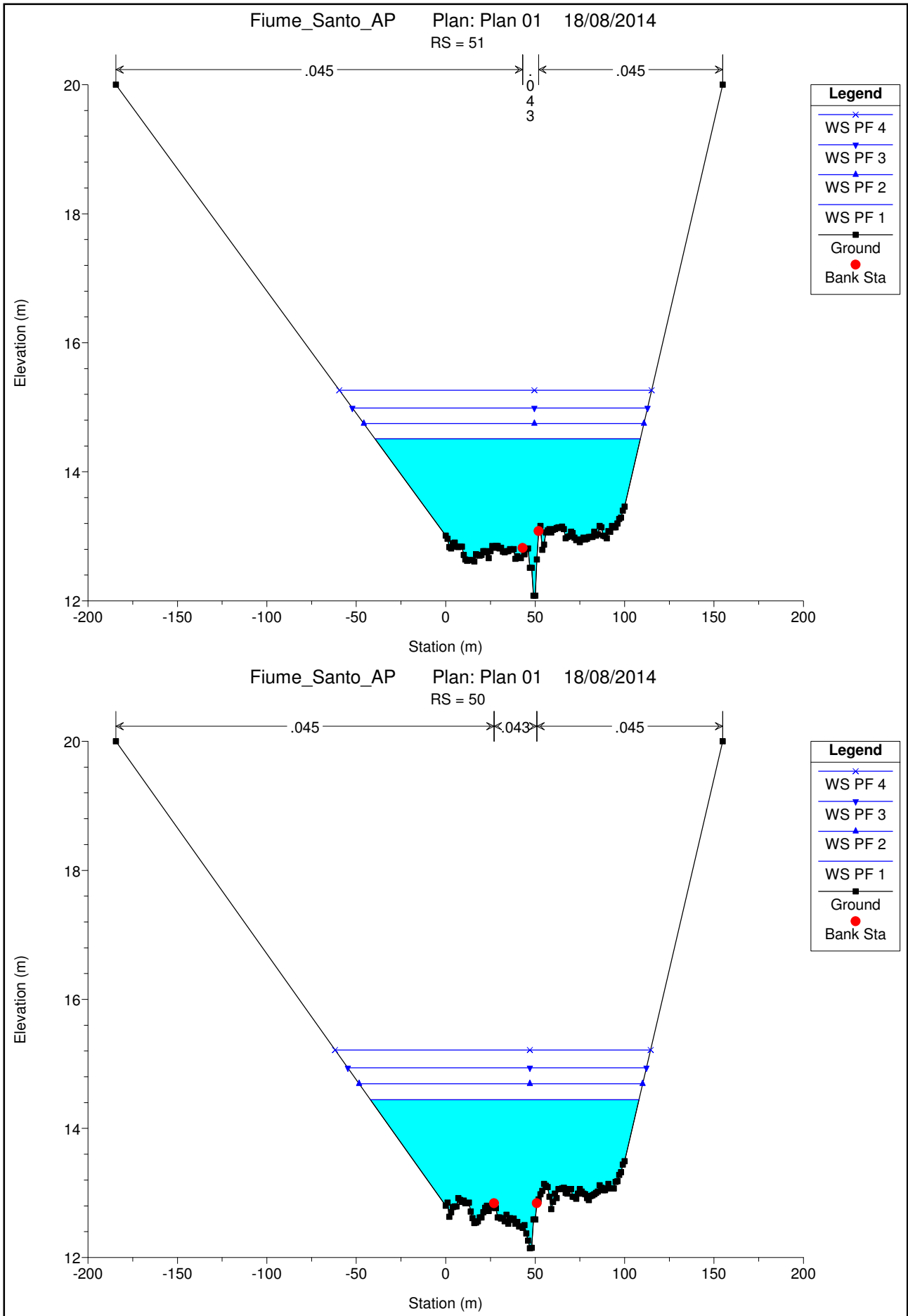
Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 58

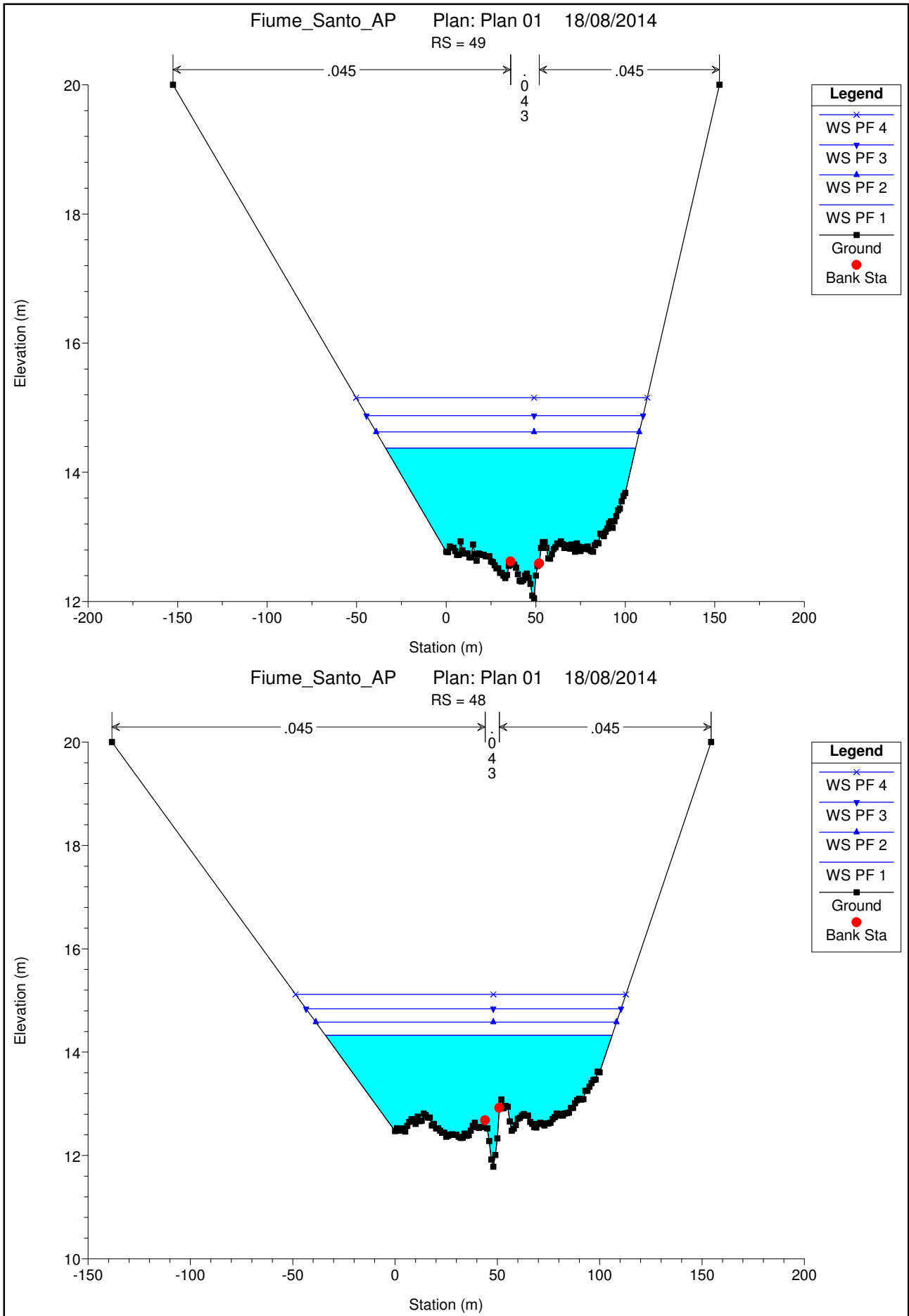


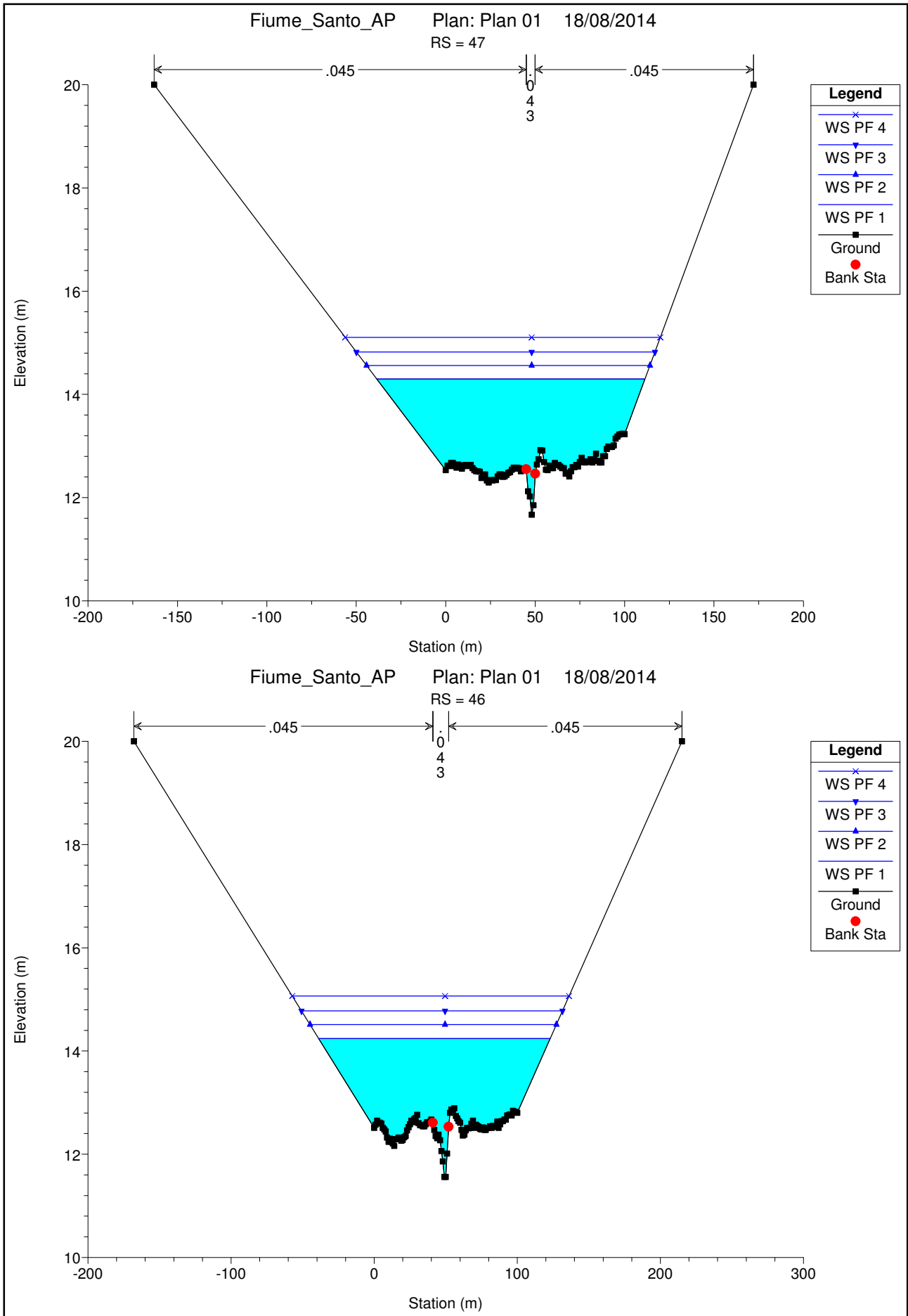


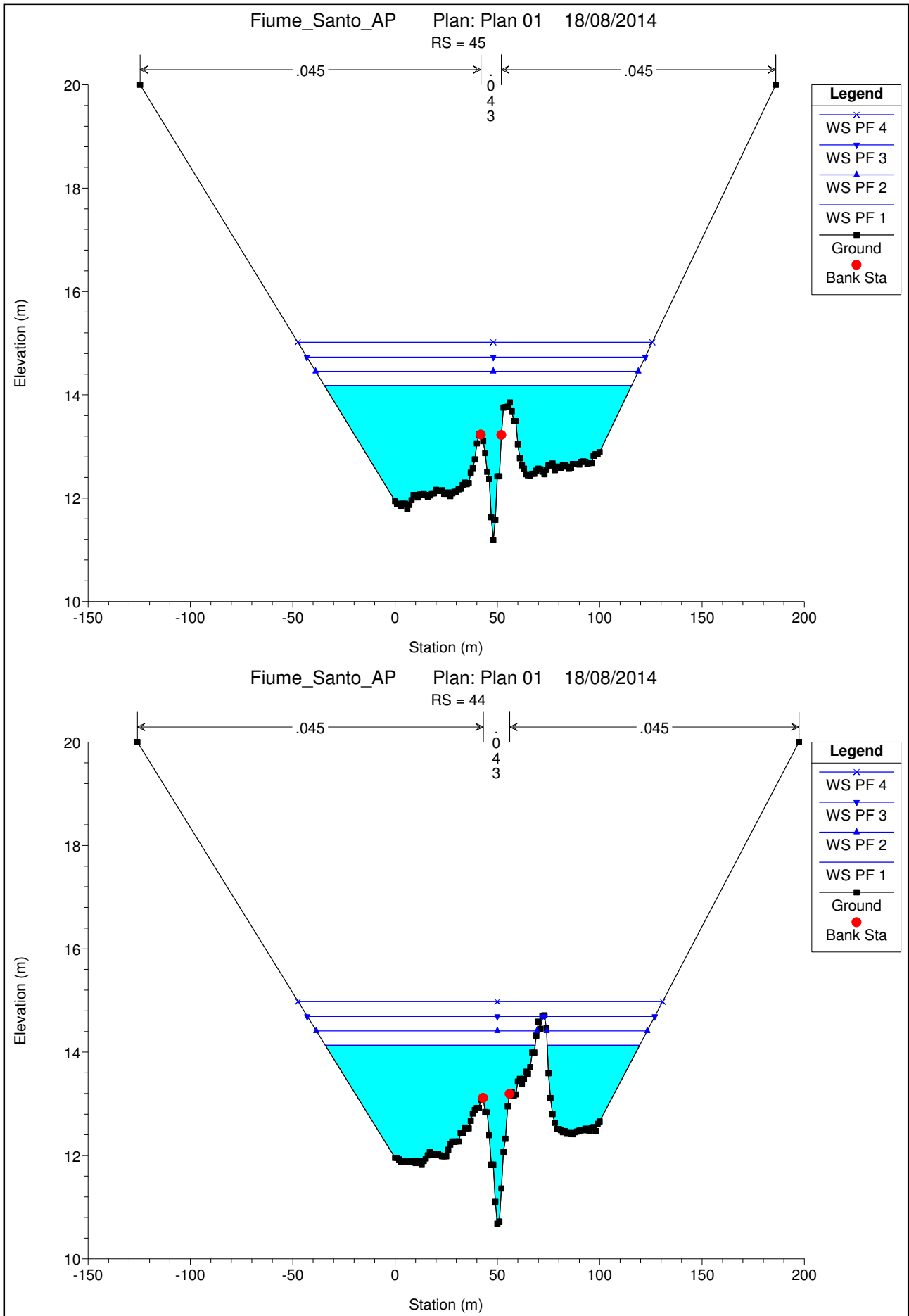


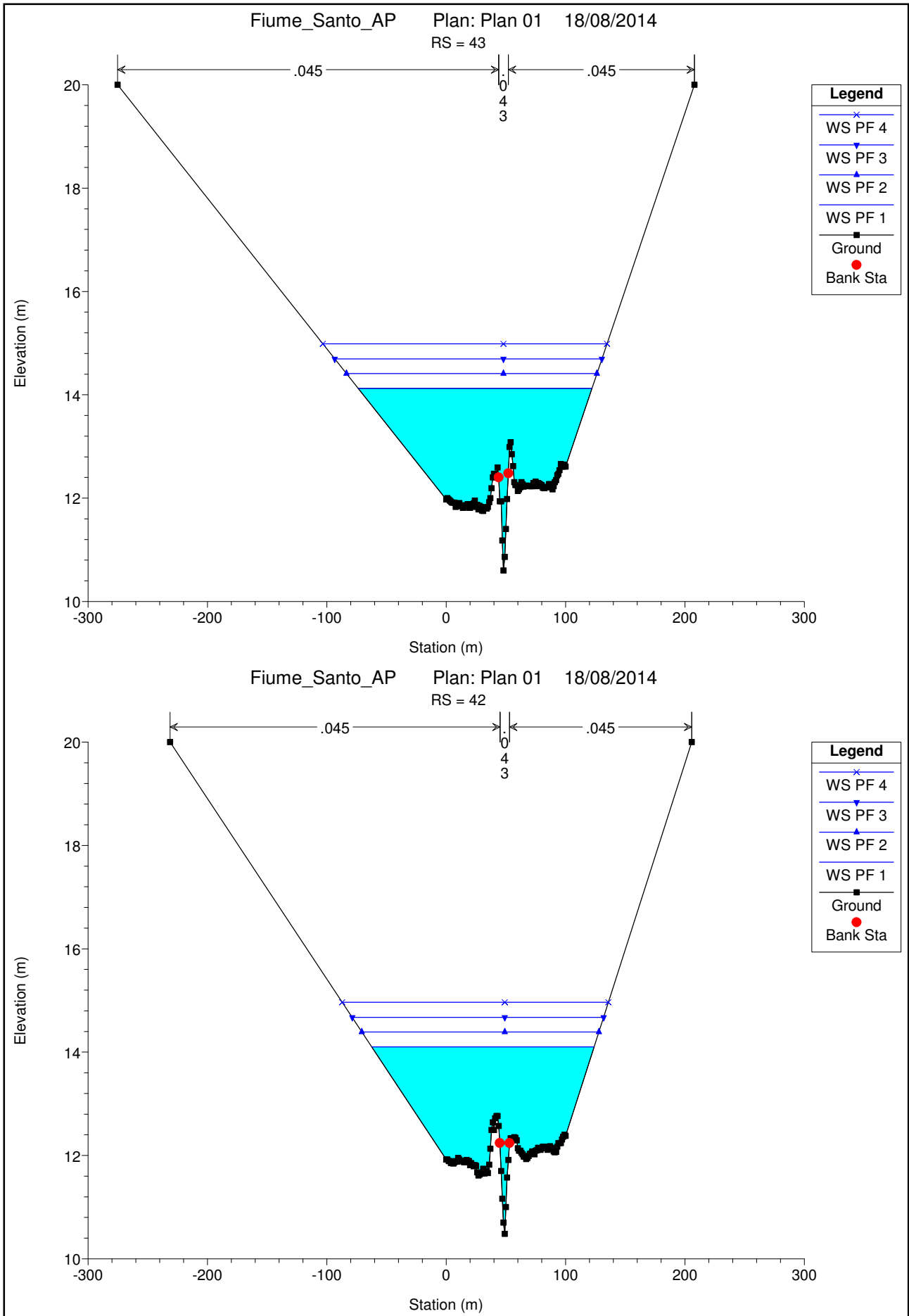


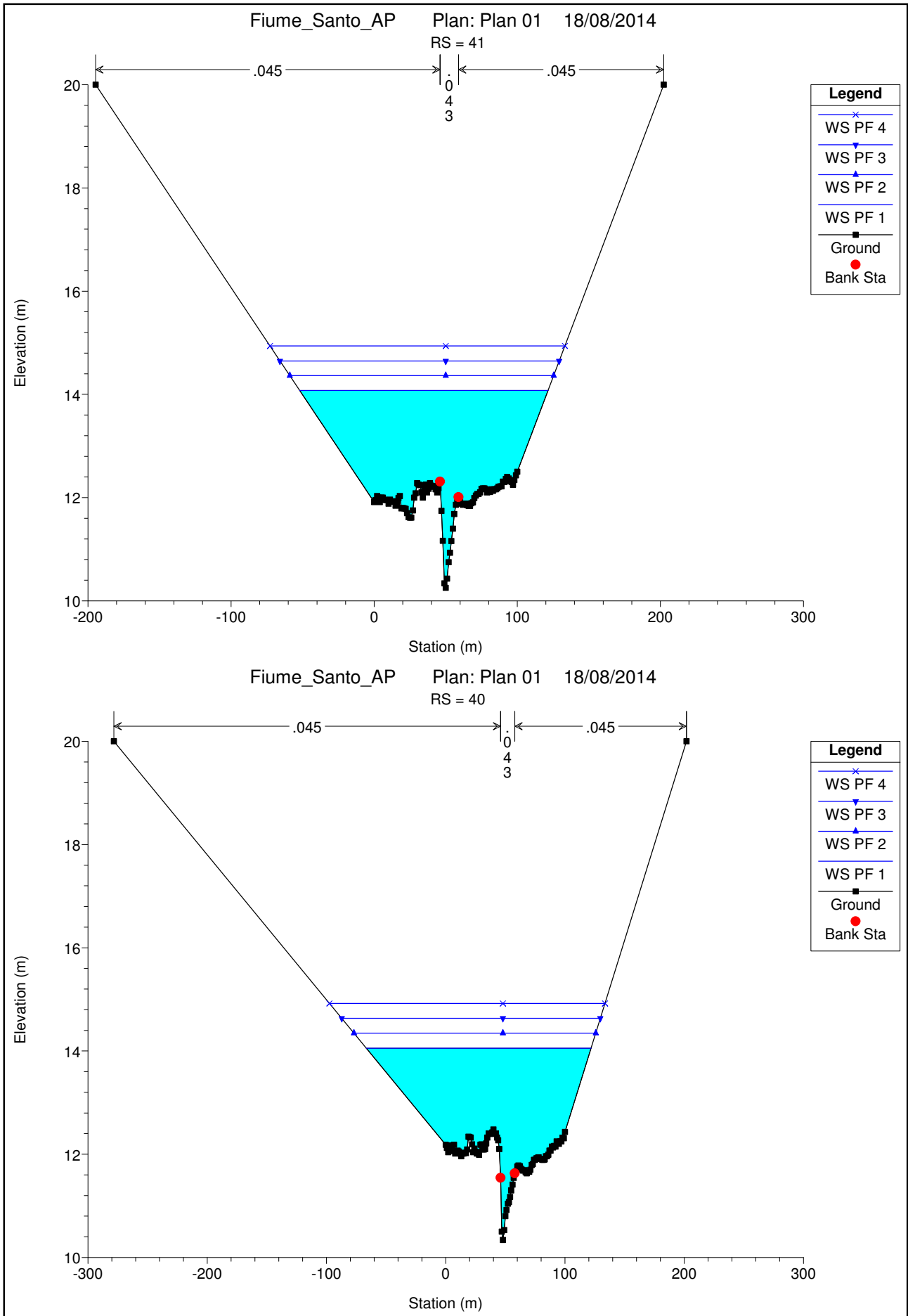




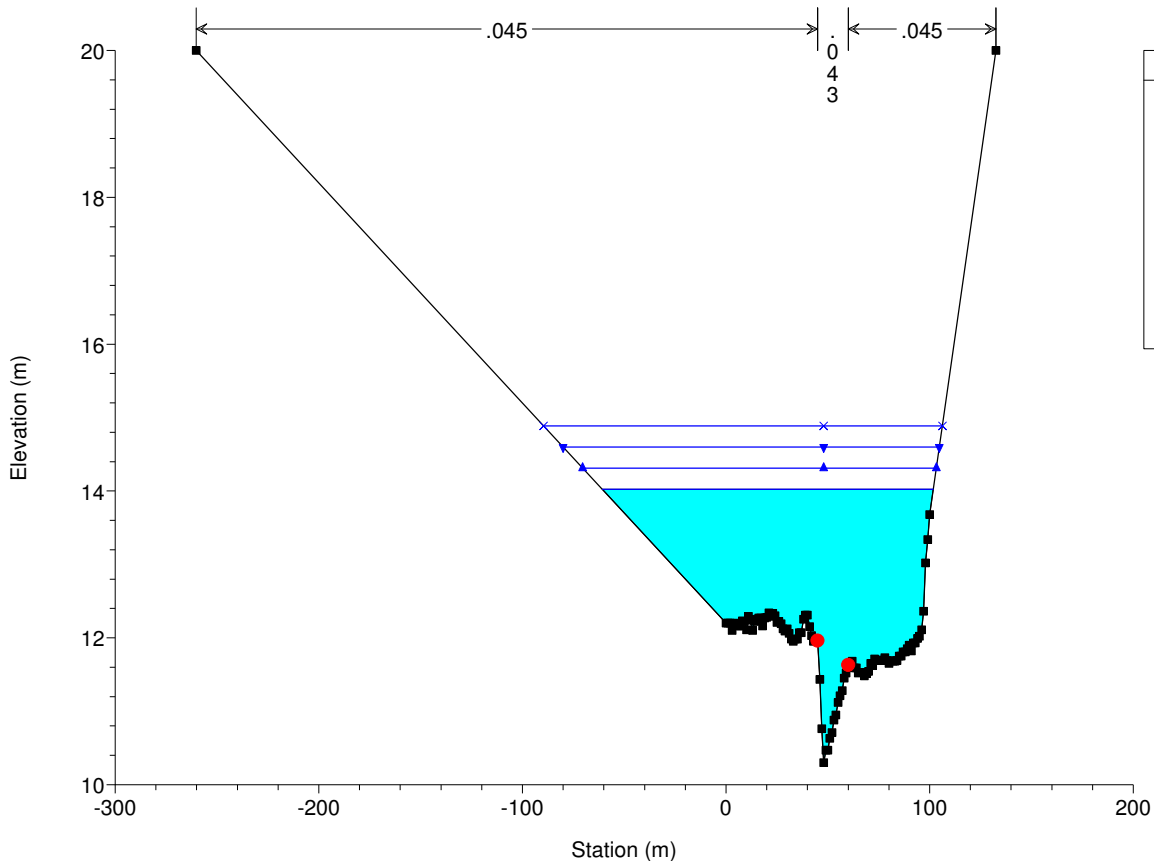






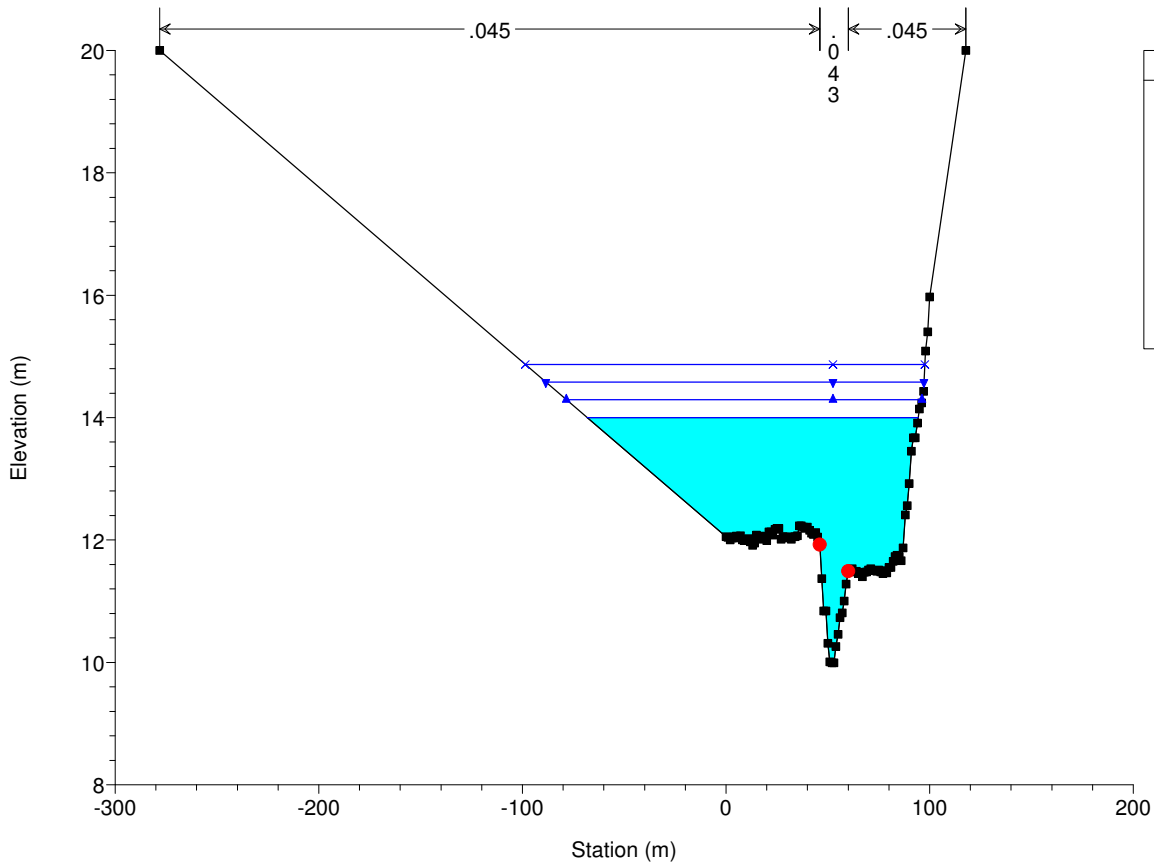


Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 39

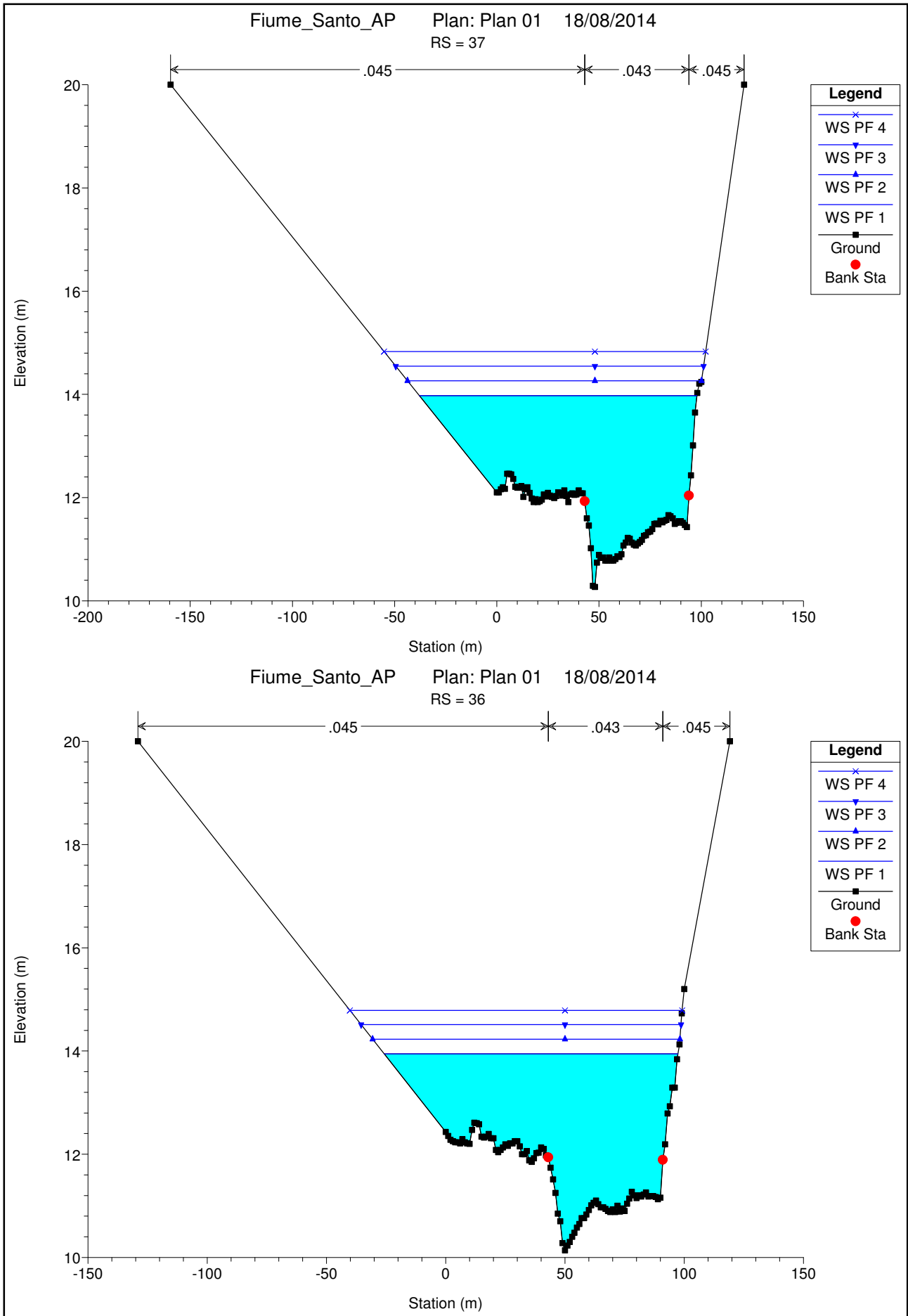


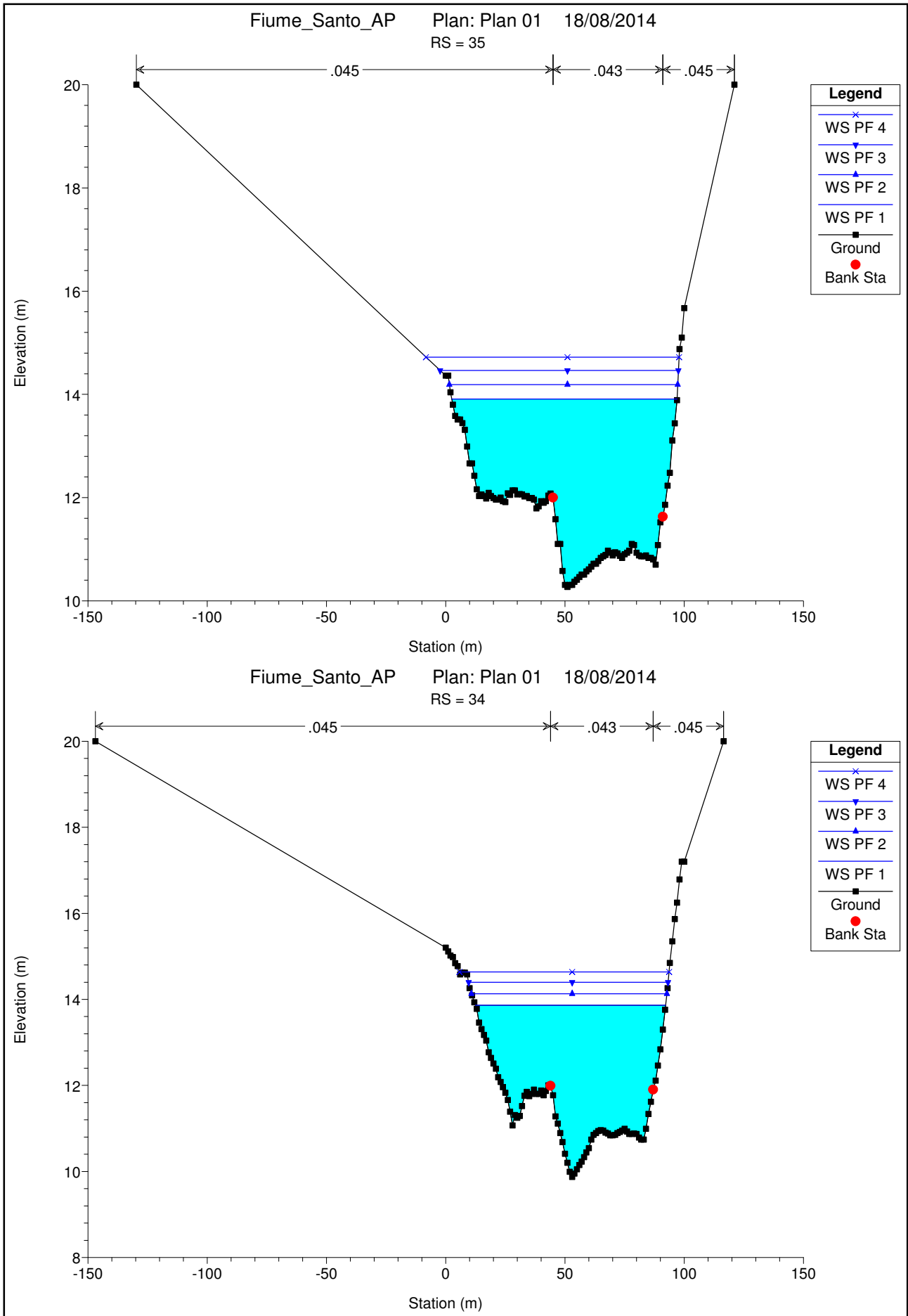
Legend	
—x—	WS PF 4
—▼—	WS PF 3
—▲—	WS PF 2
—■—	WS PF 1
—■—	Ground
●	Bank Sta

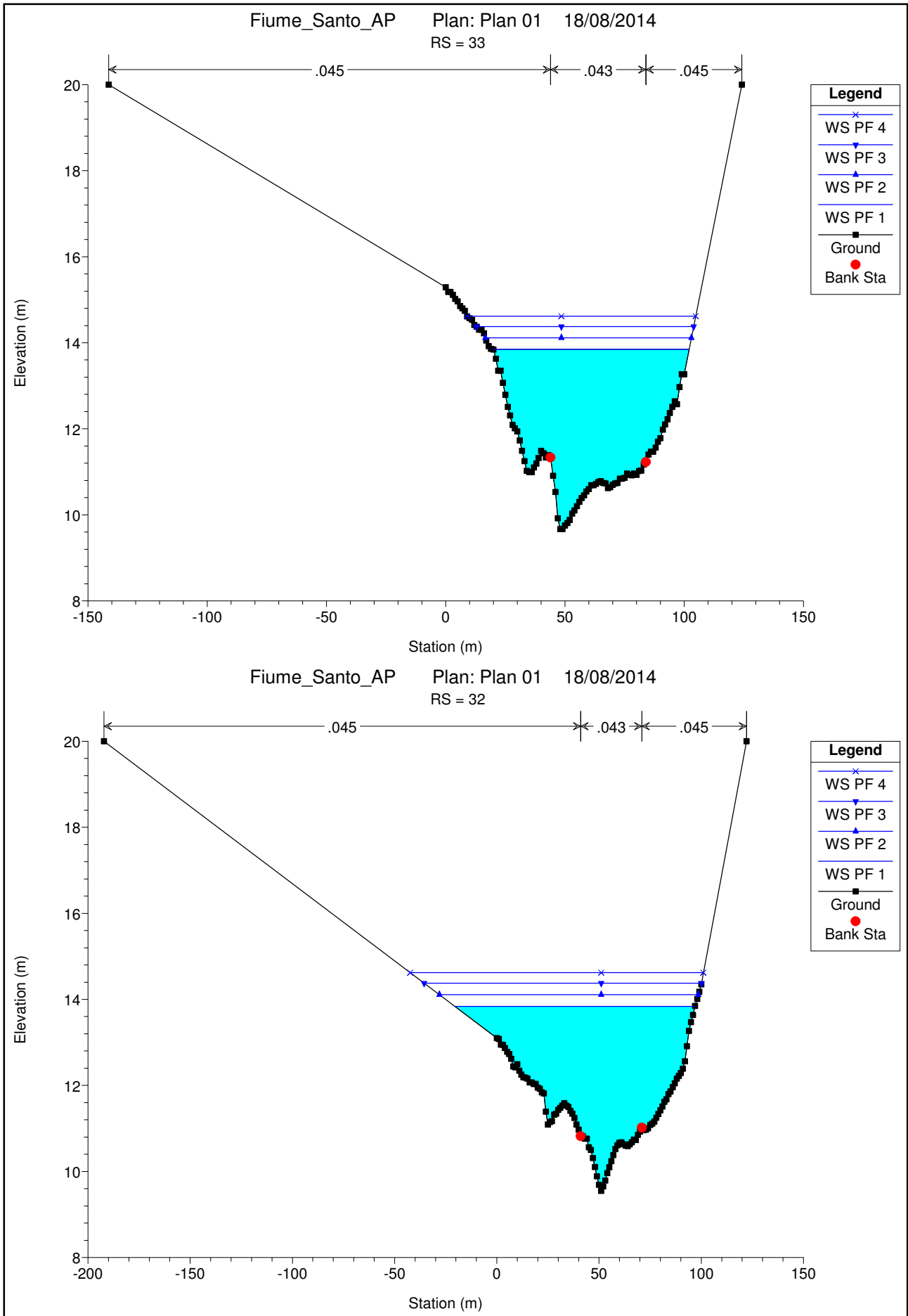
Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 38

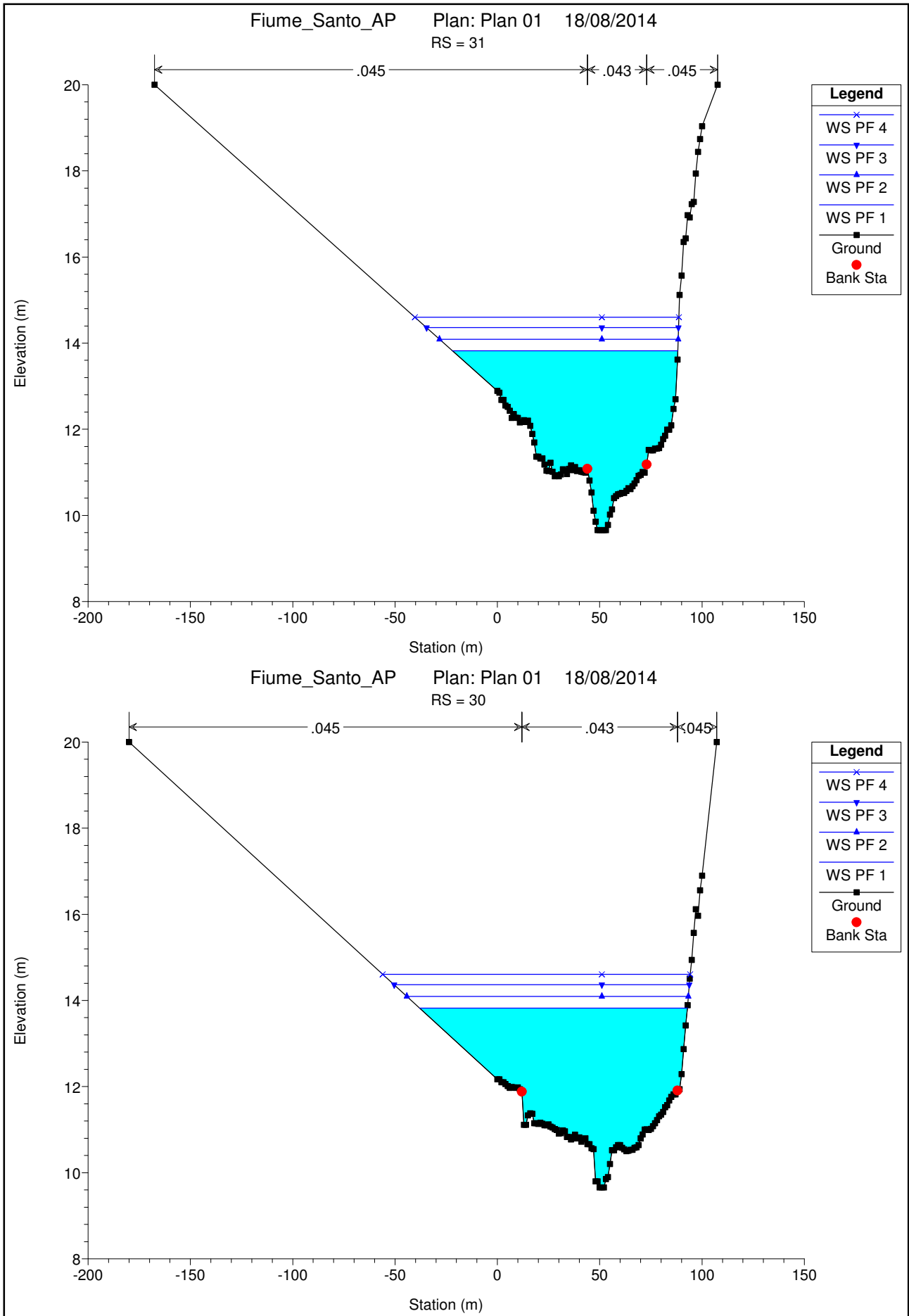


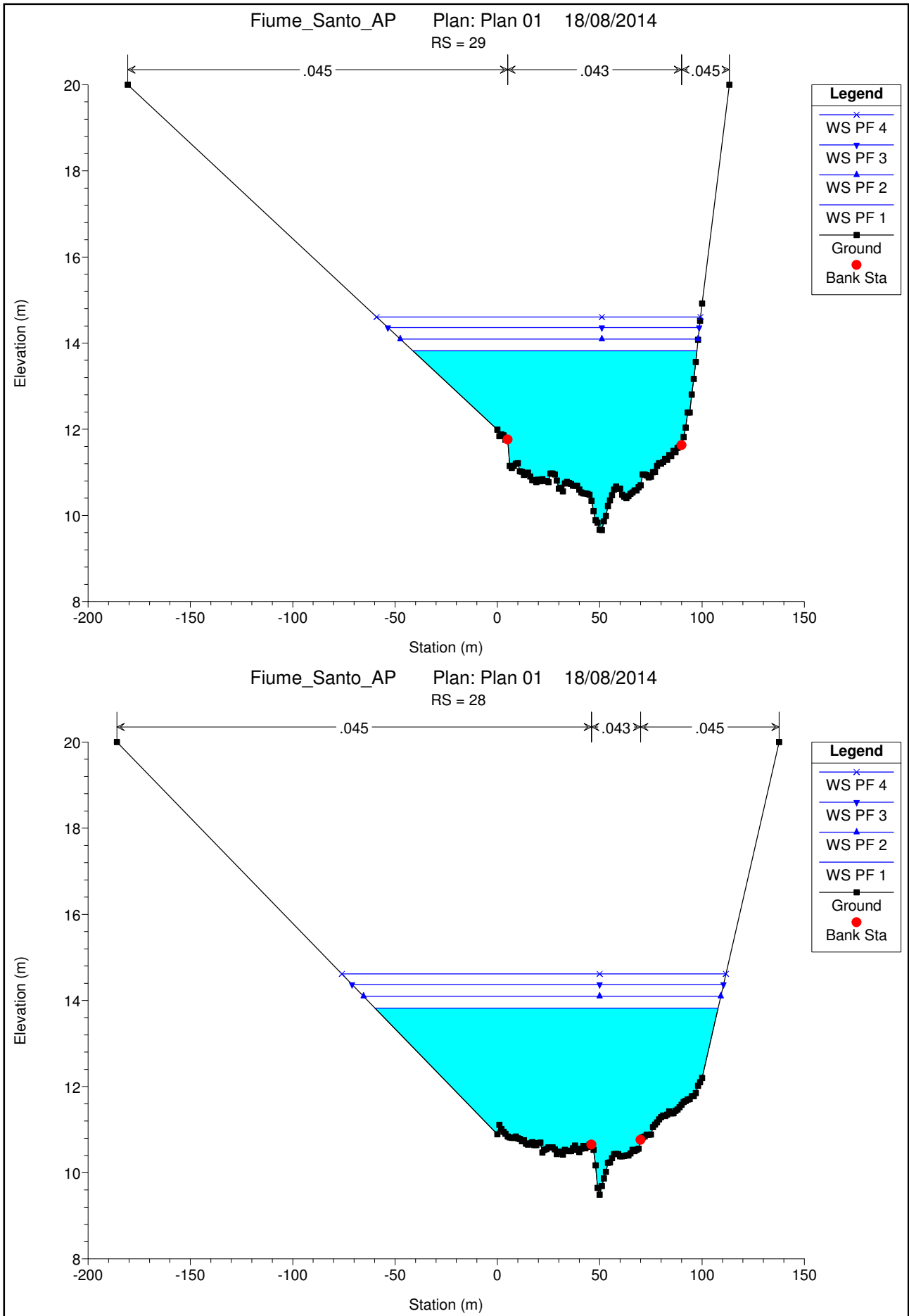
Legend	
—x—	WS PF 4
—▼—	WS PF 3
—▲—	WS PF 2
—■—	WS PF 1
—■—	Ground
●	Bank Sta

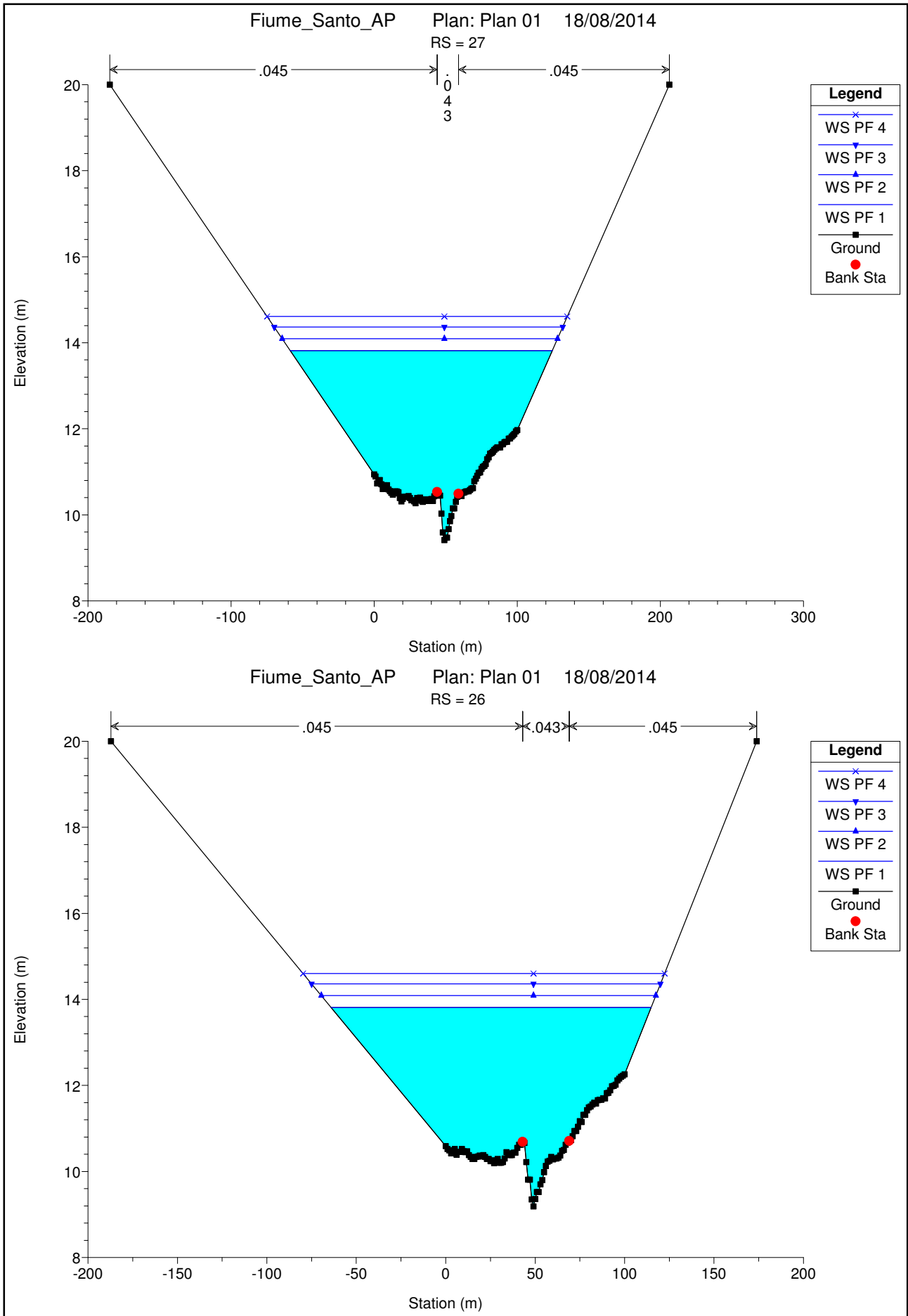


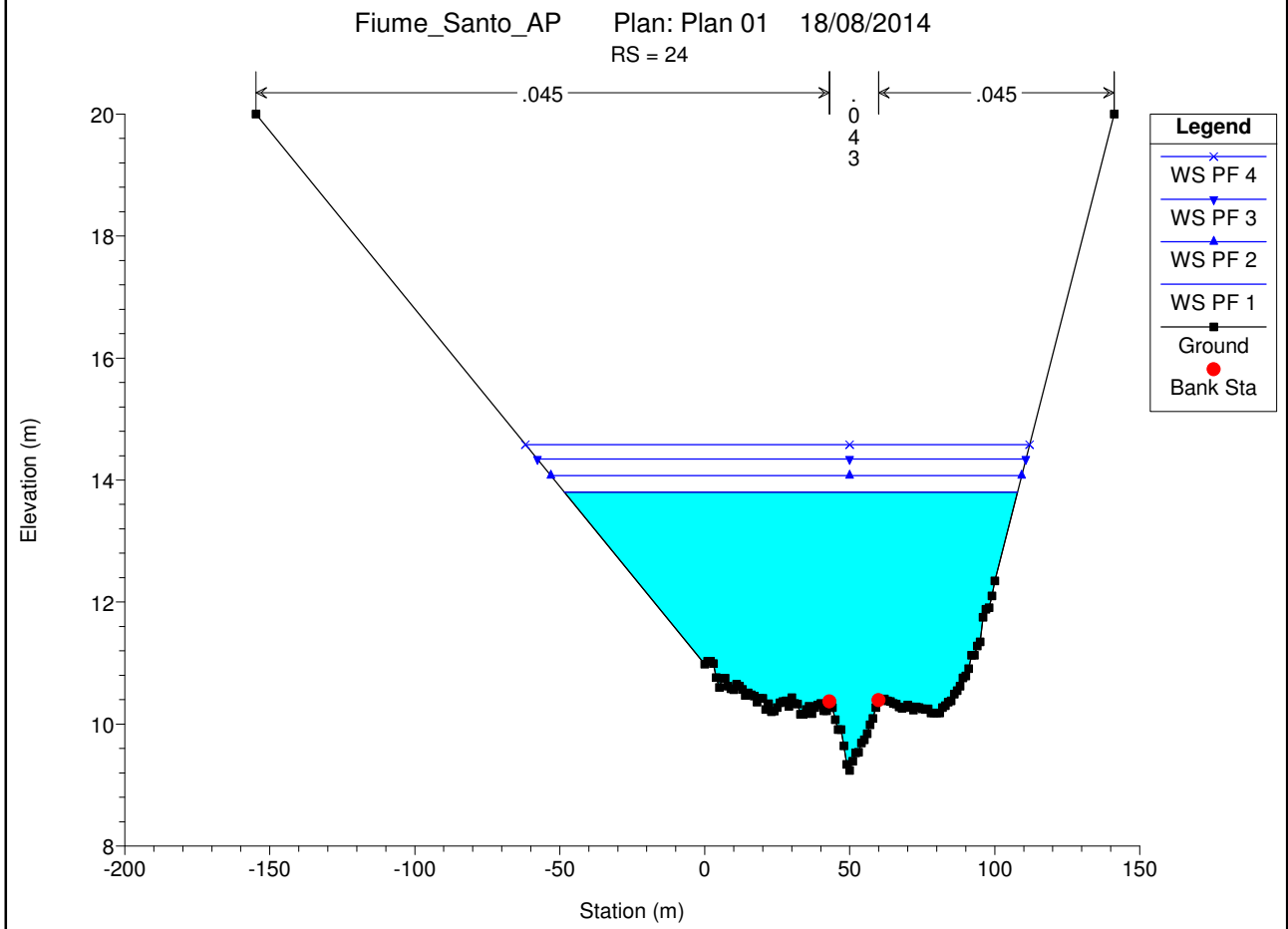
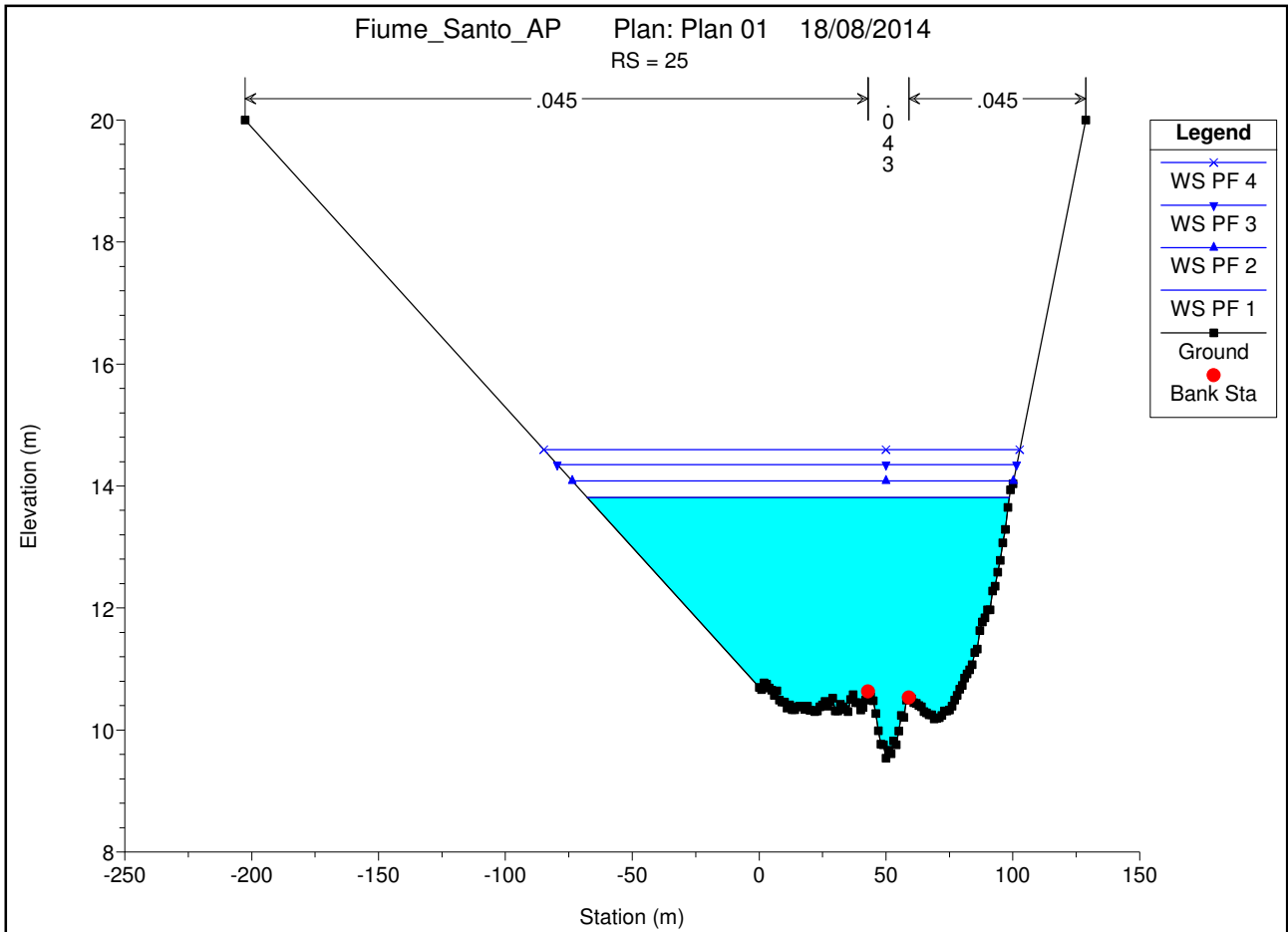


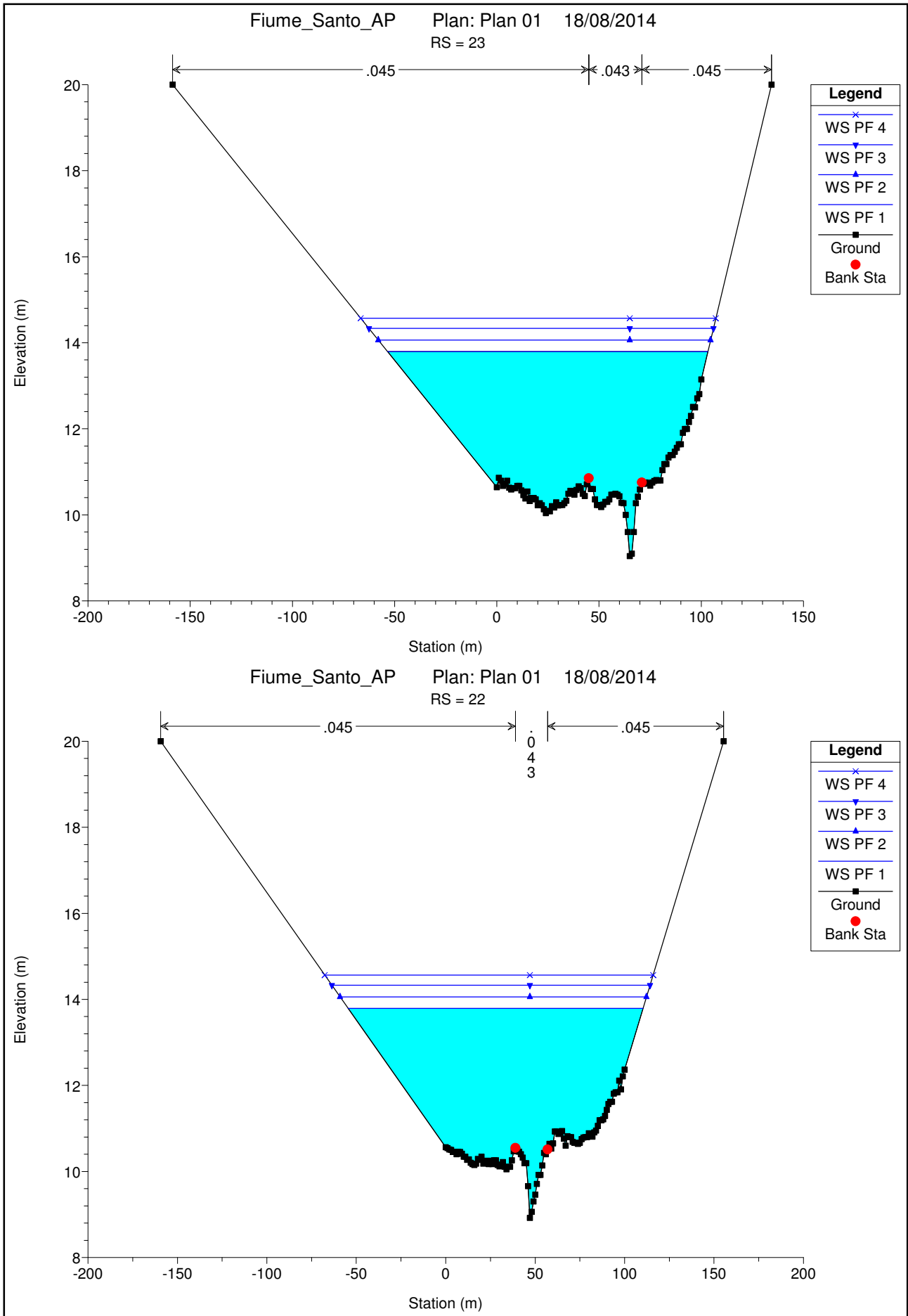


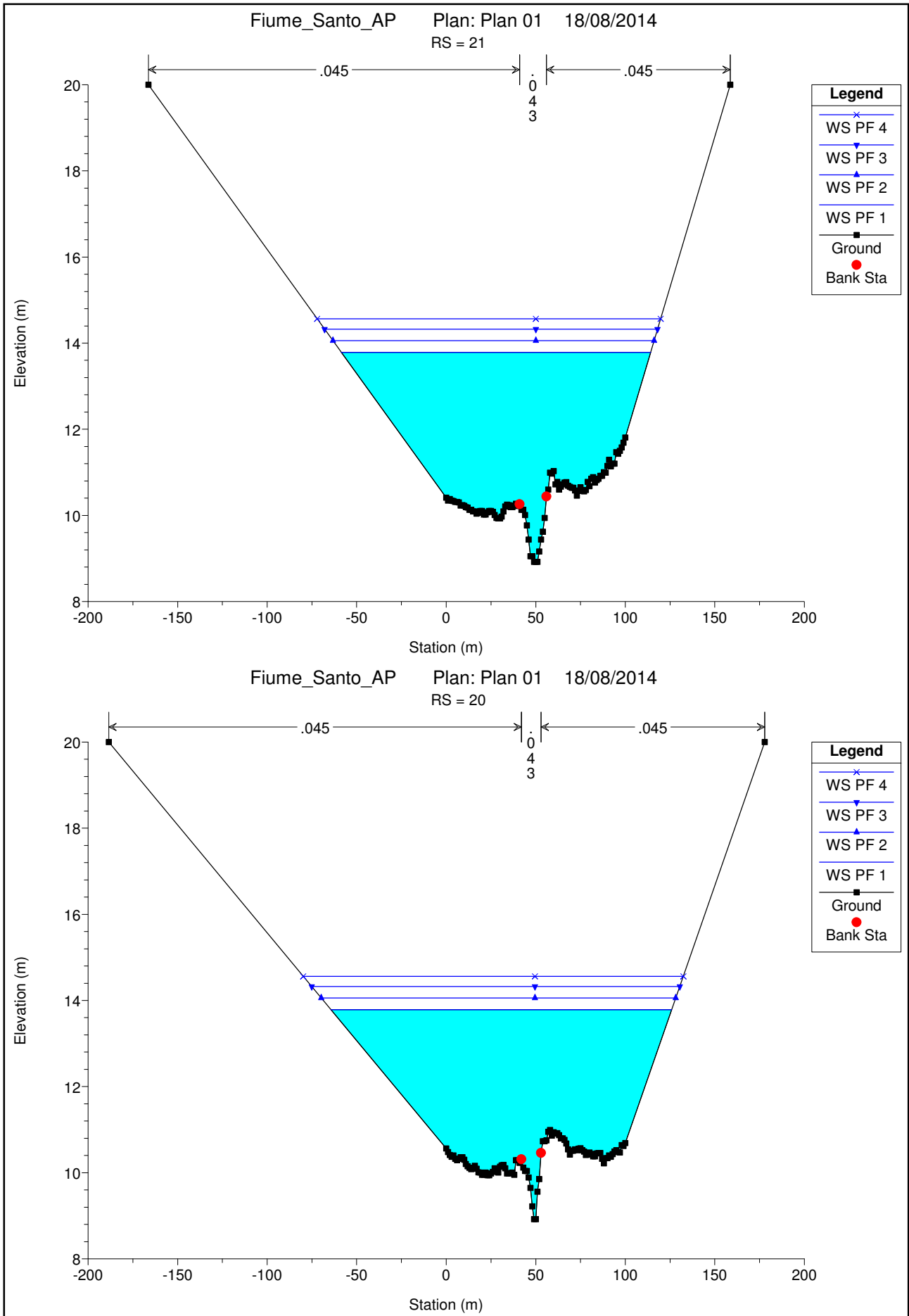


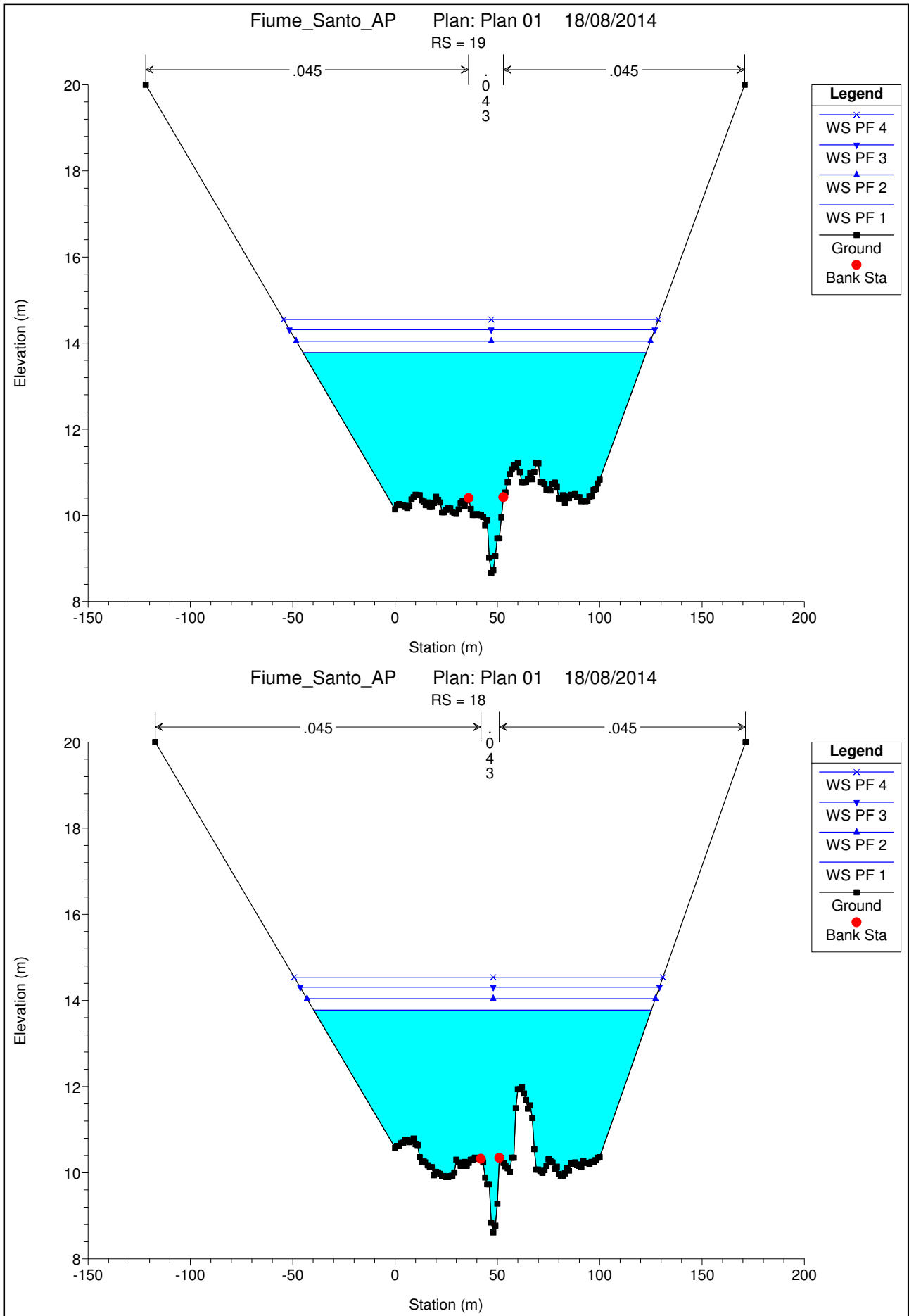


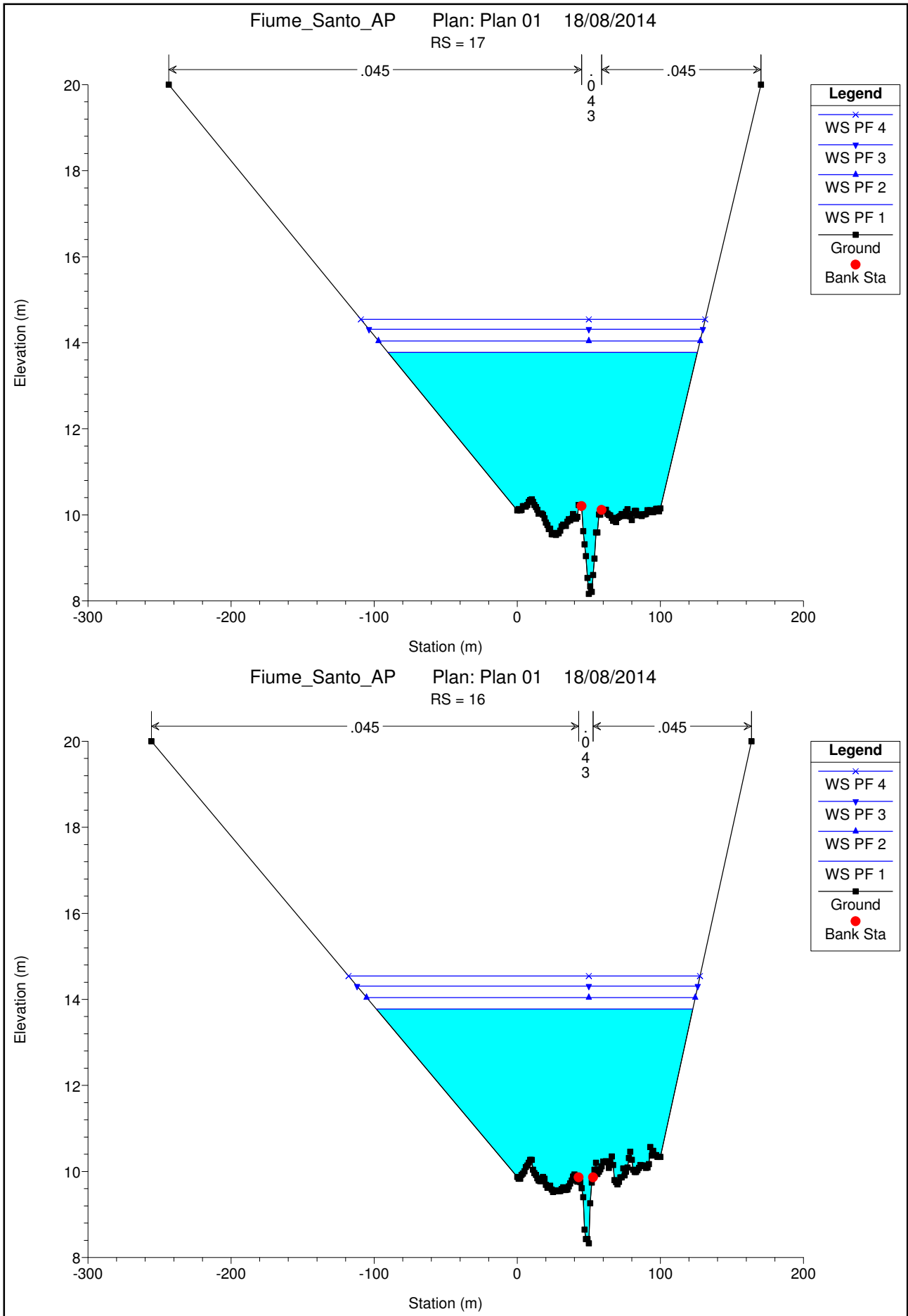


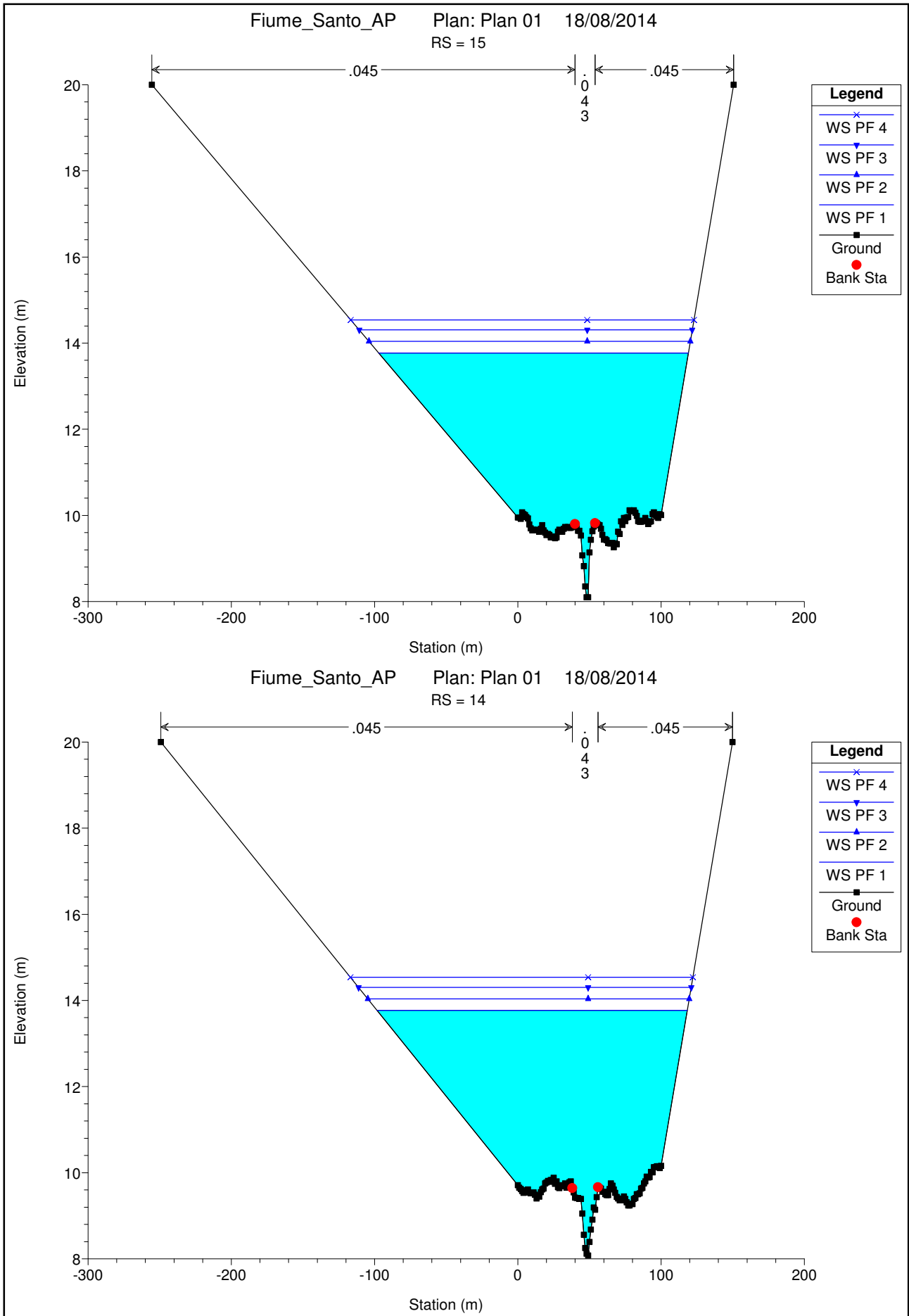


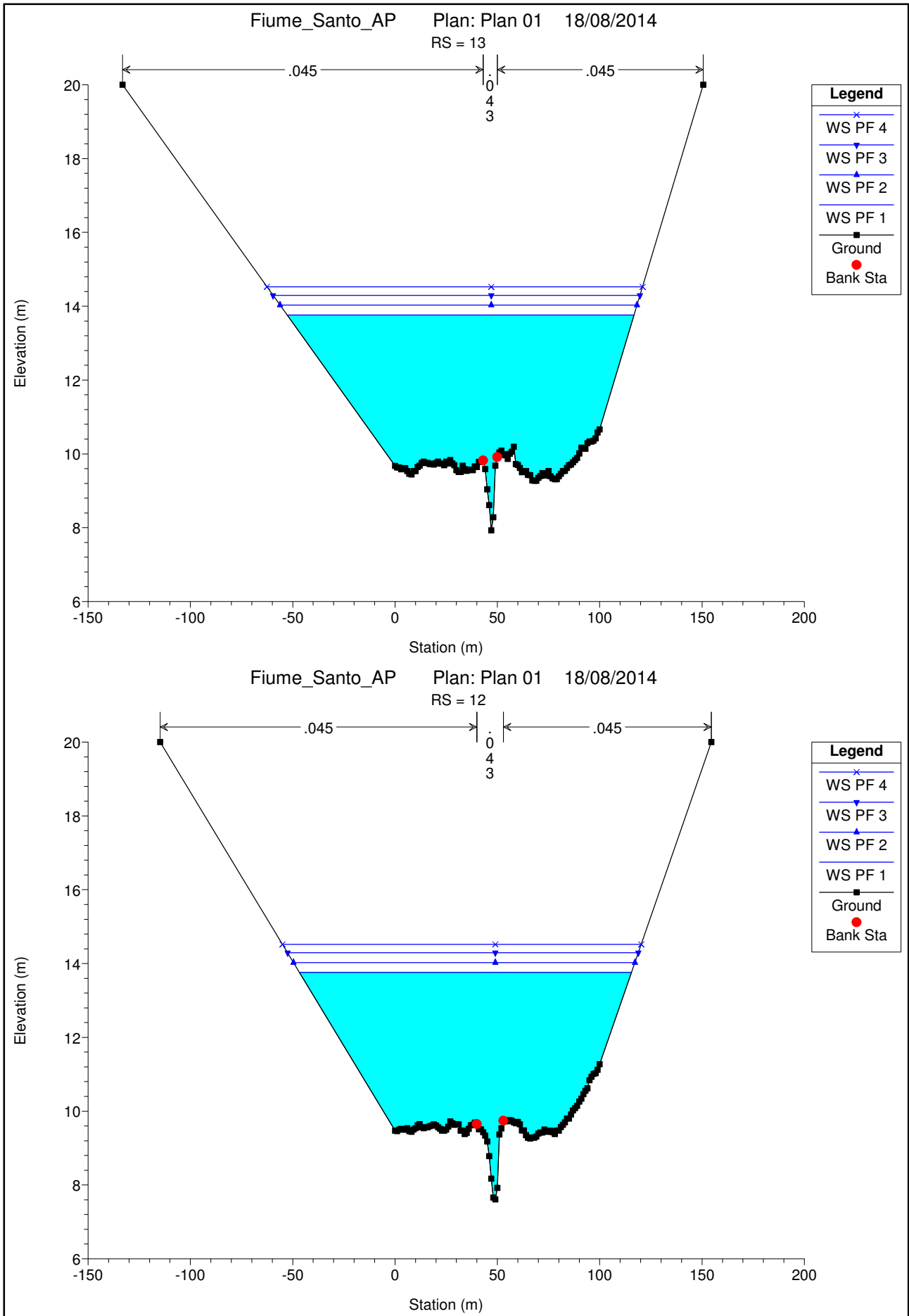


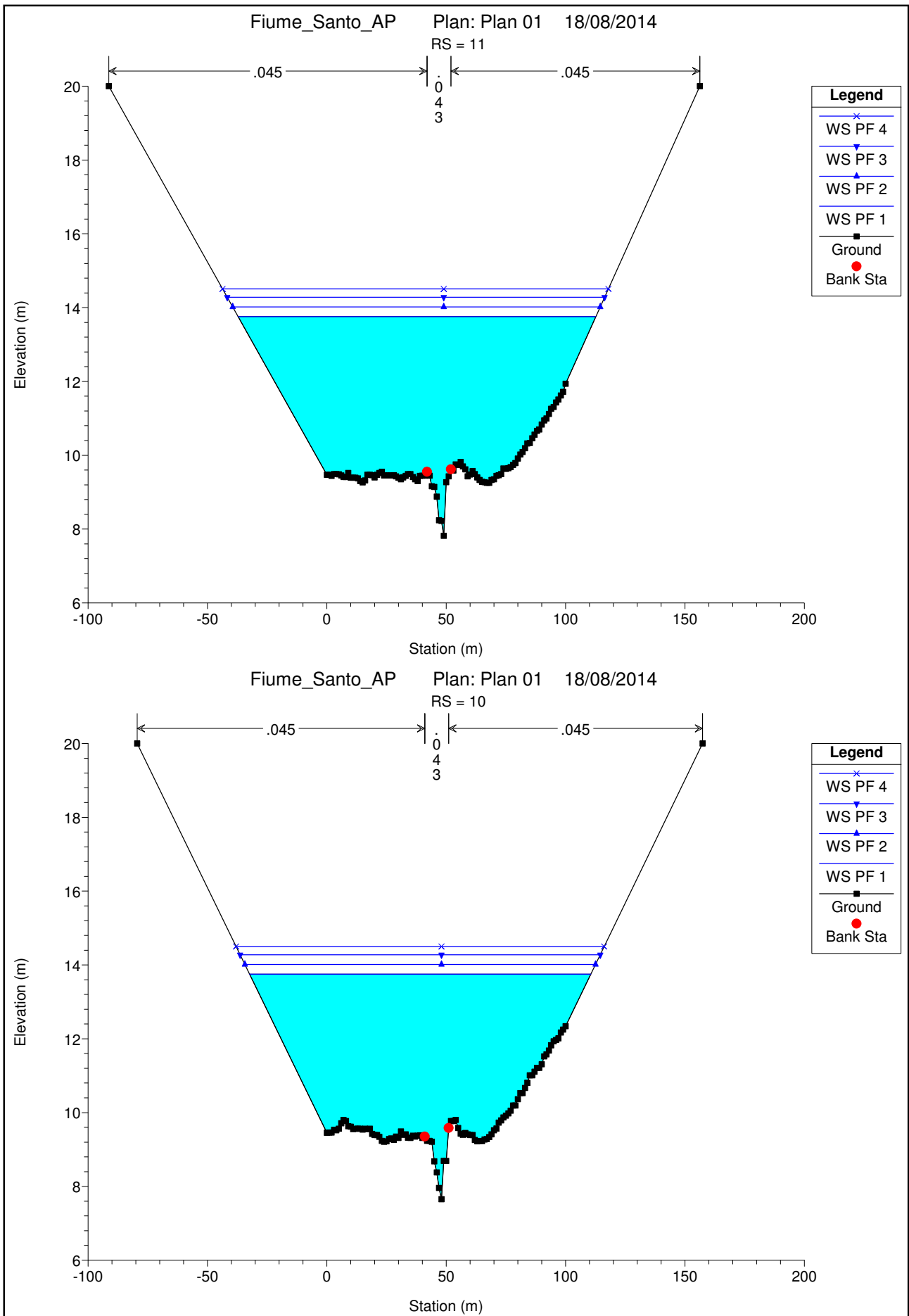


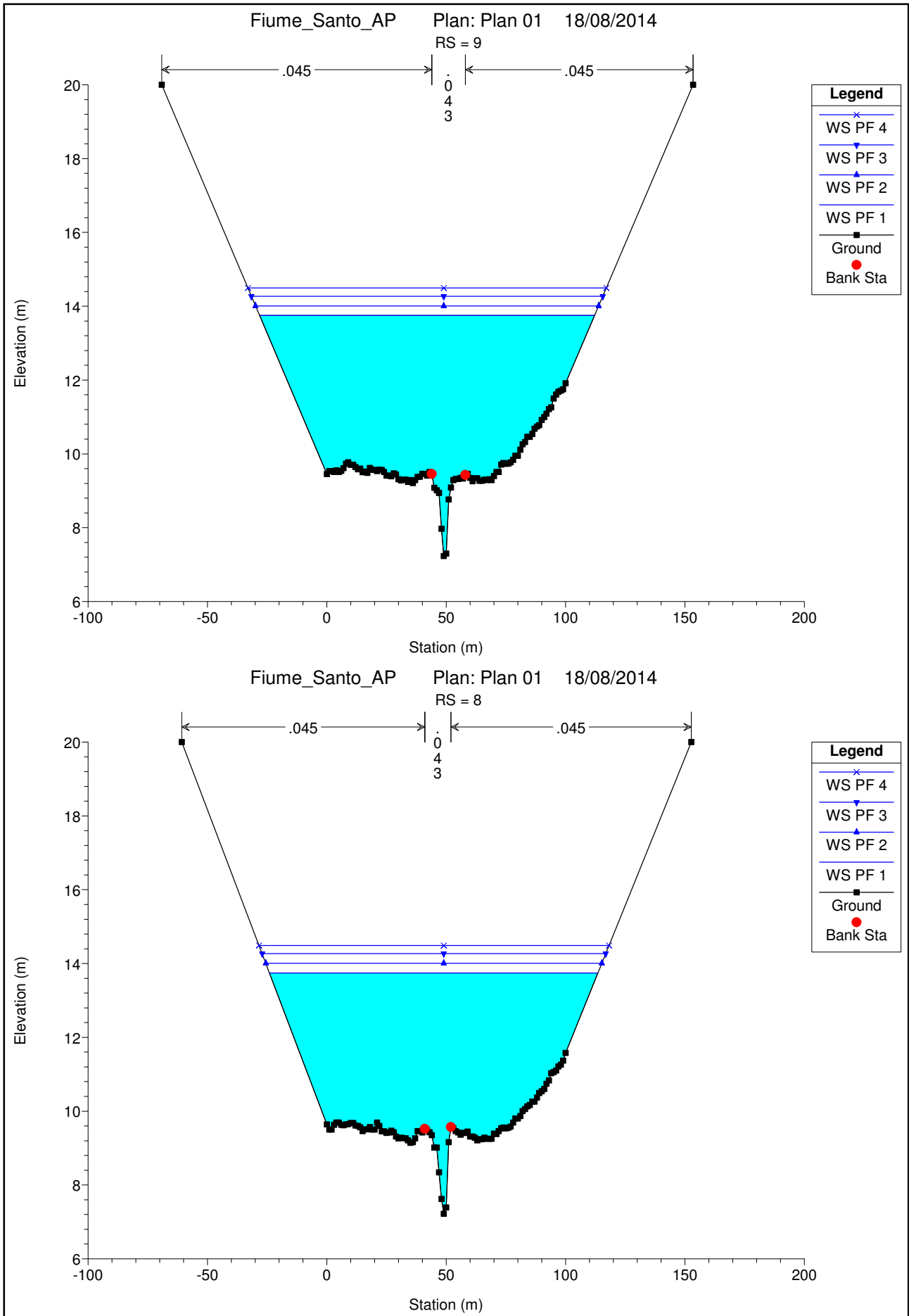


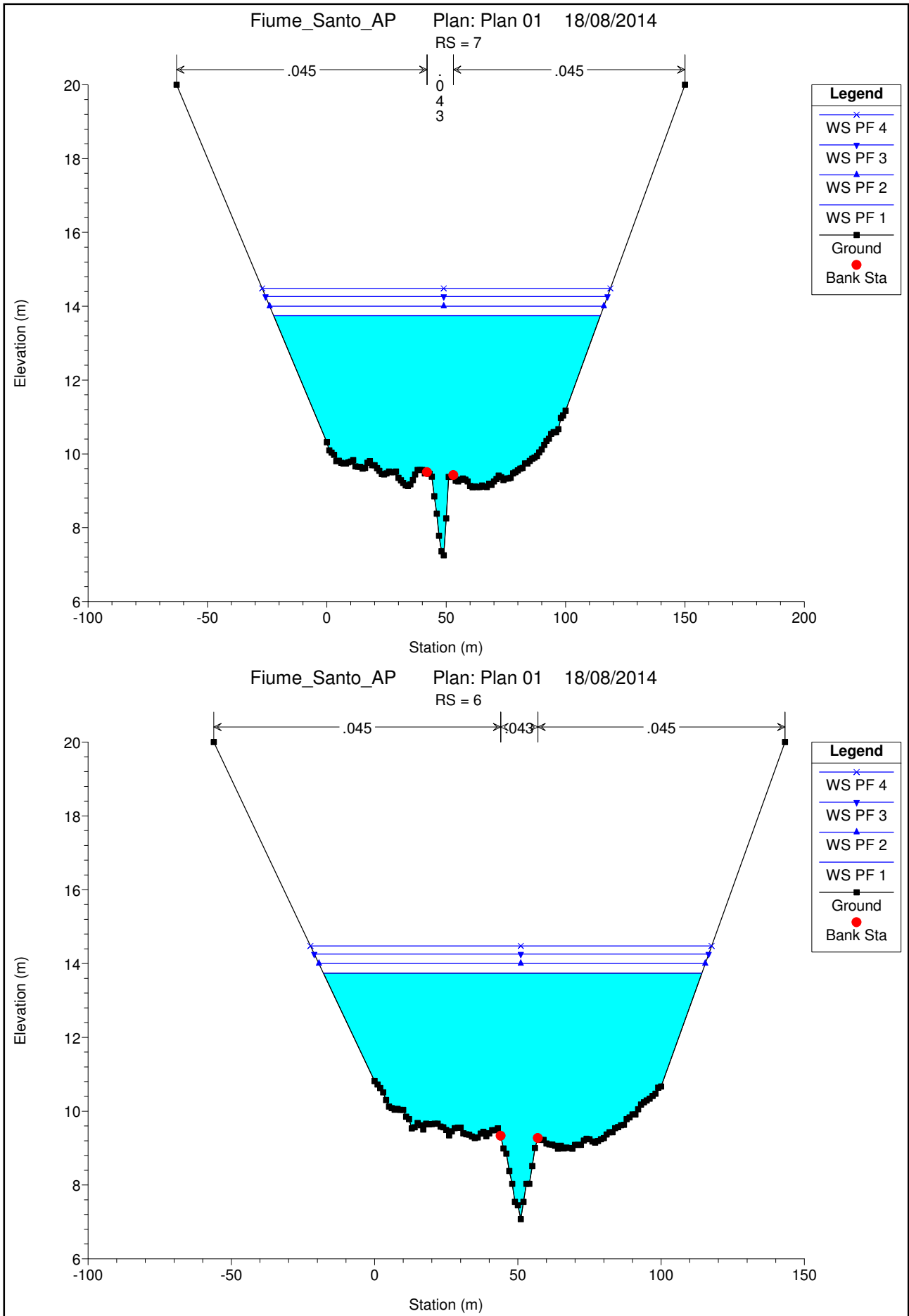


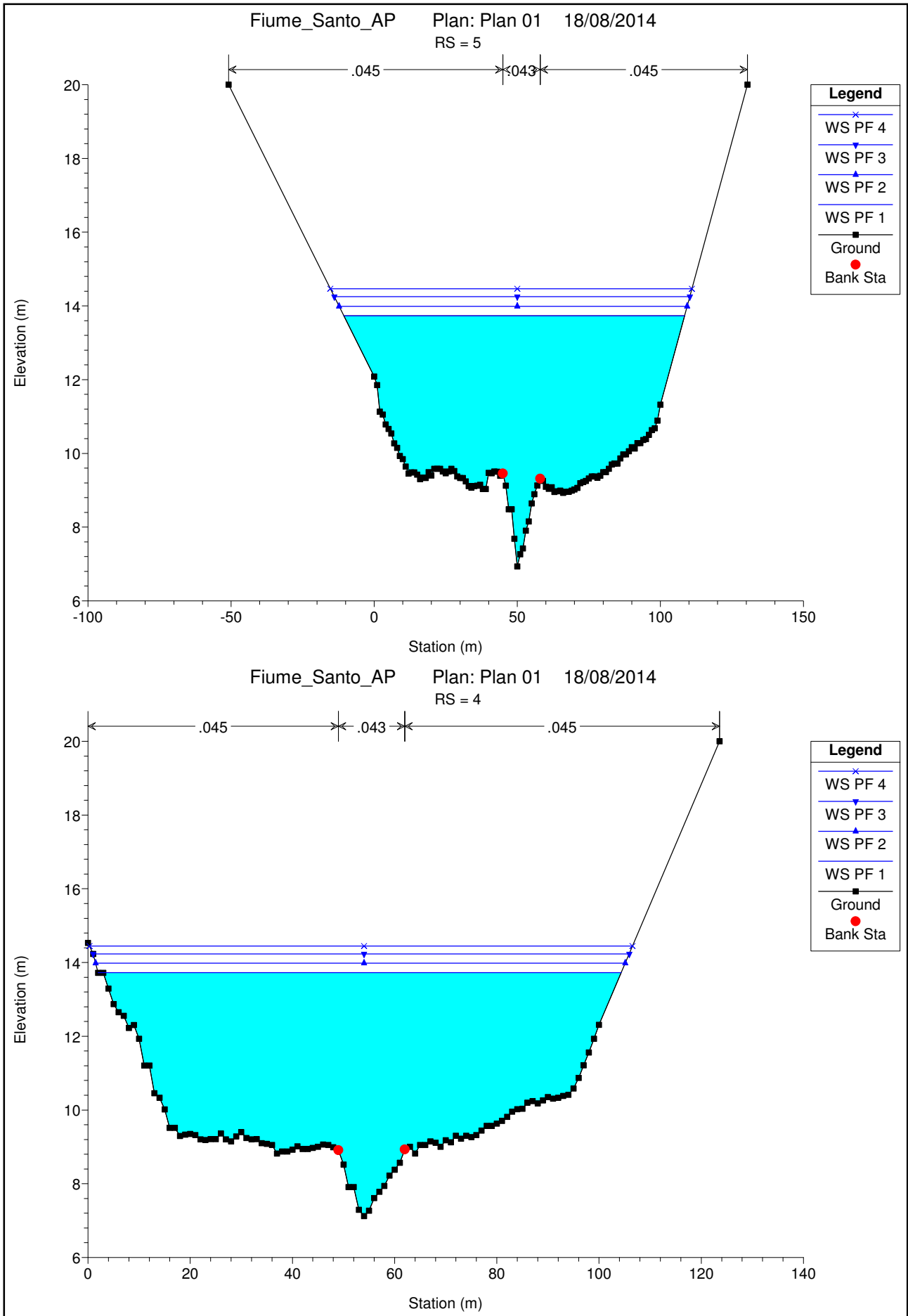


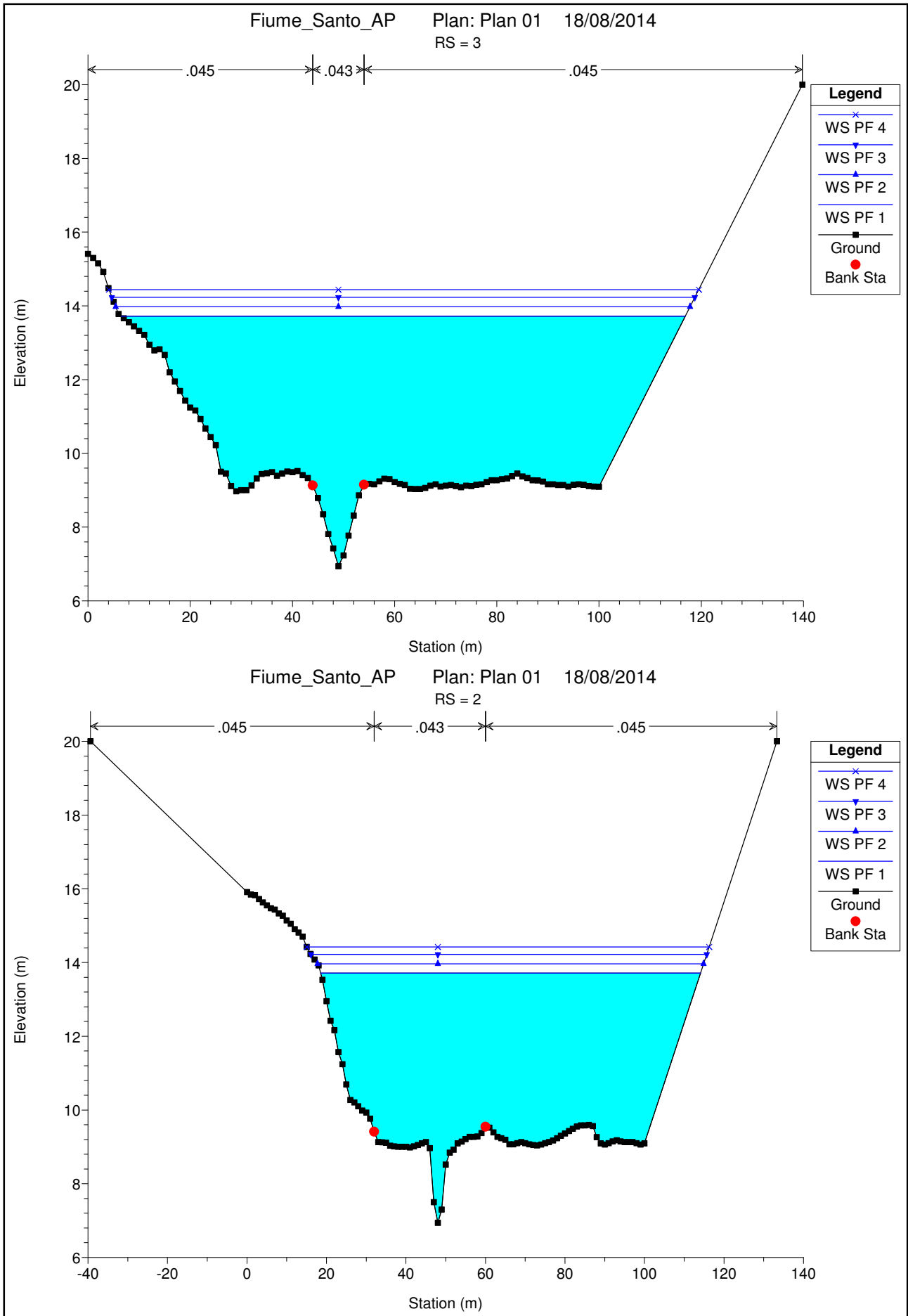




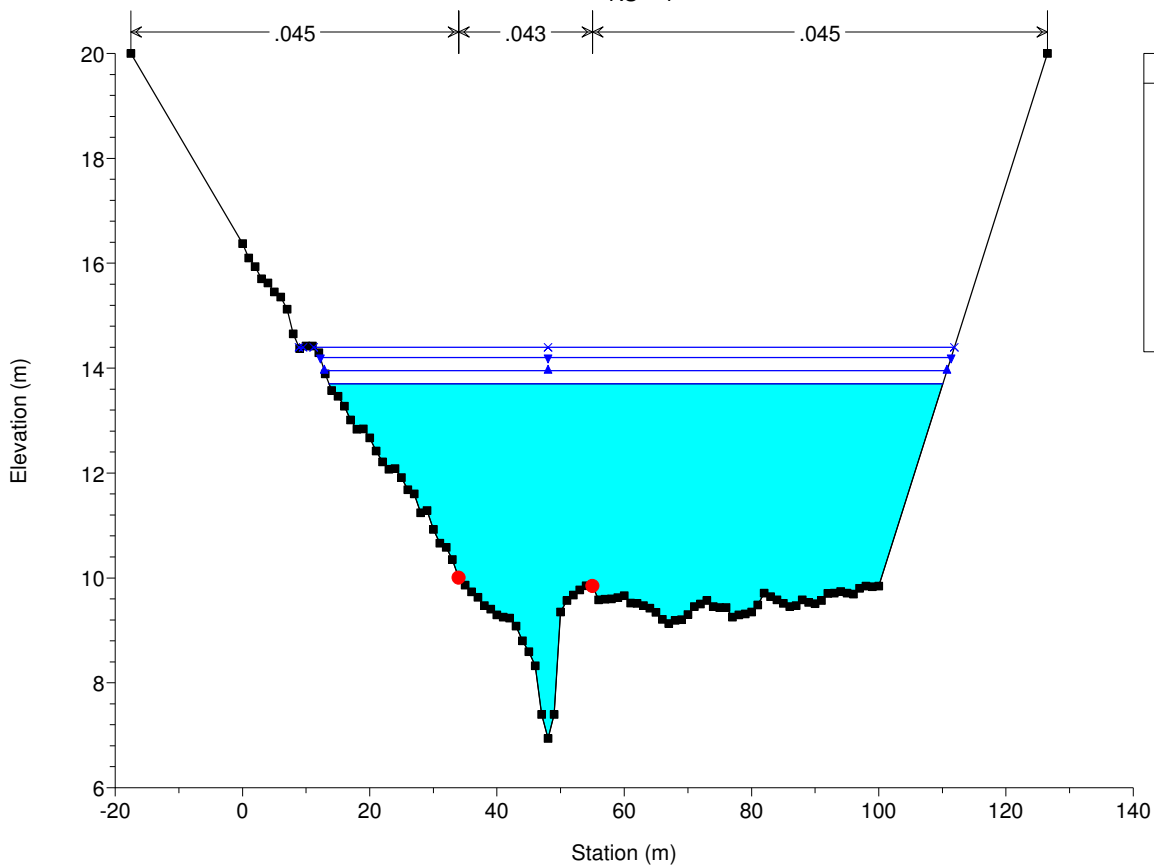








Fiume_Santo_AP Plan: Plan 01 18/08/2014
RS = 1

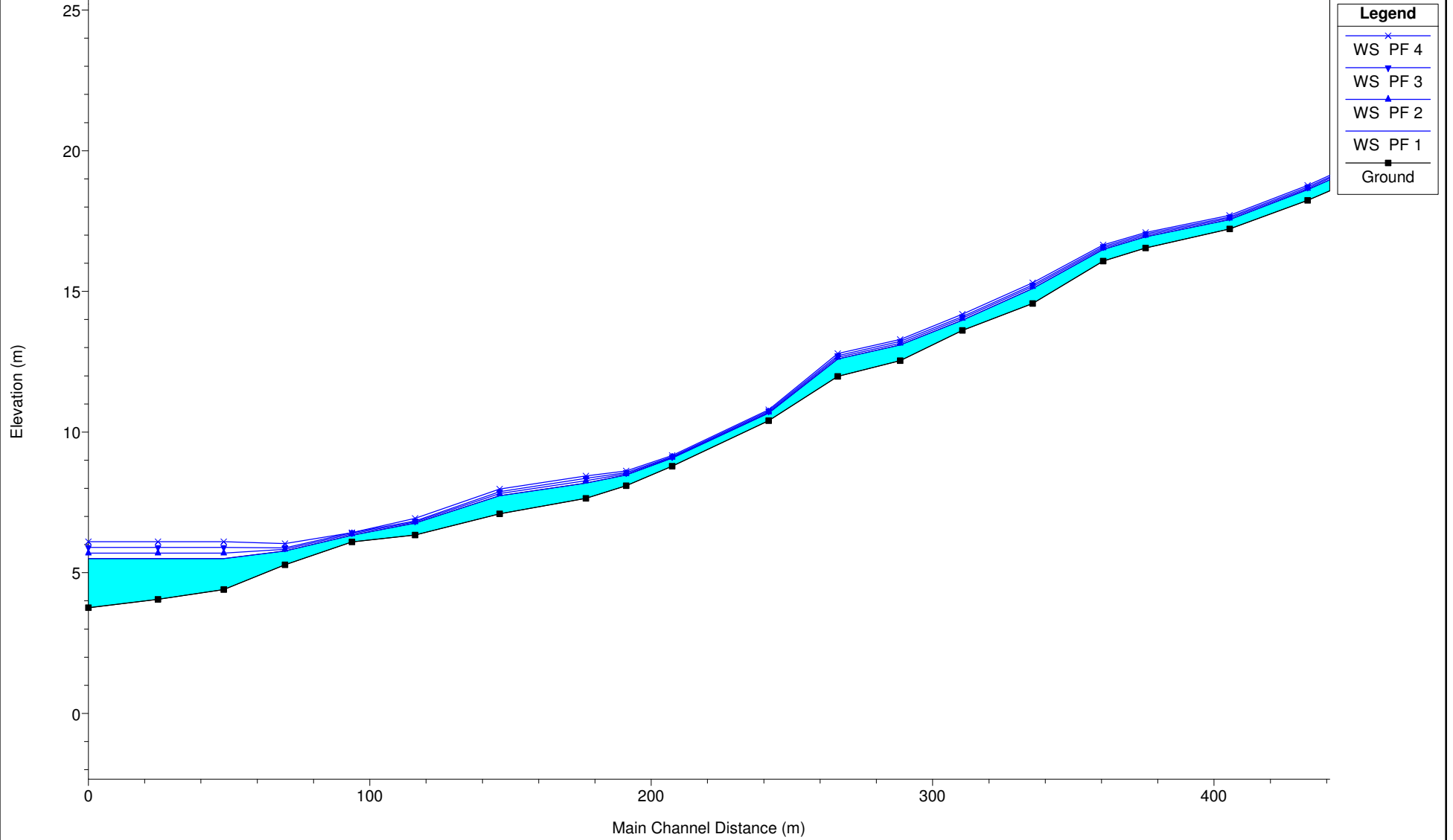


Legend	
WS PF 4	—x—
WS PF 3	—v—
WS PF 2	—▲—
WS PF 1	—
Ground	—■—
Bank Sta	●

Profili e sezioni del pelo libero dell'affluente 1 del Fiume Santo

Fiume_Santo_Af1 Plan: Plan 01 18/08/2014

fiumesanto_af1 fiumesanto_af1



1 cm Horiz. = 20 m 1 cm Vert. = 2 m

Fiume_Santo_Af1 Plan: Plan 01 18/08/2014

fiumesanto_af1 fiumesanto_af1

Legend

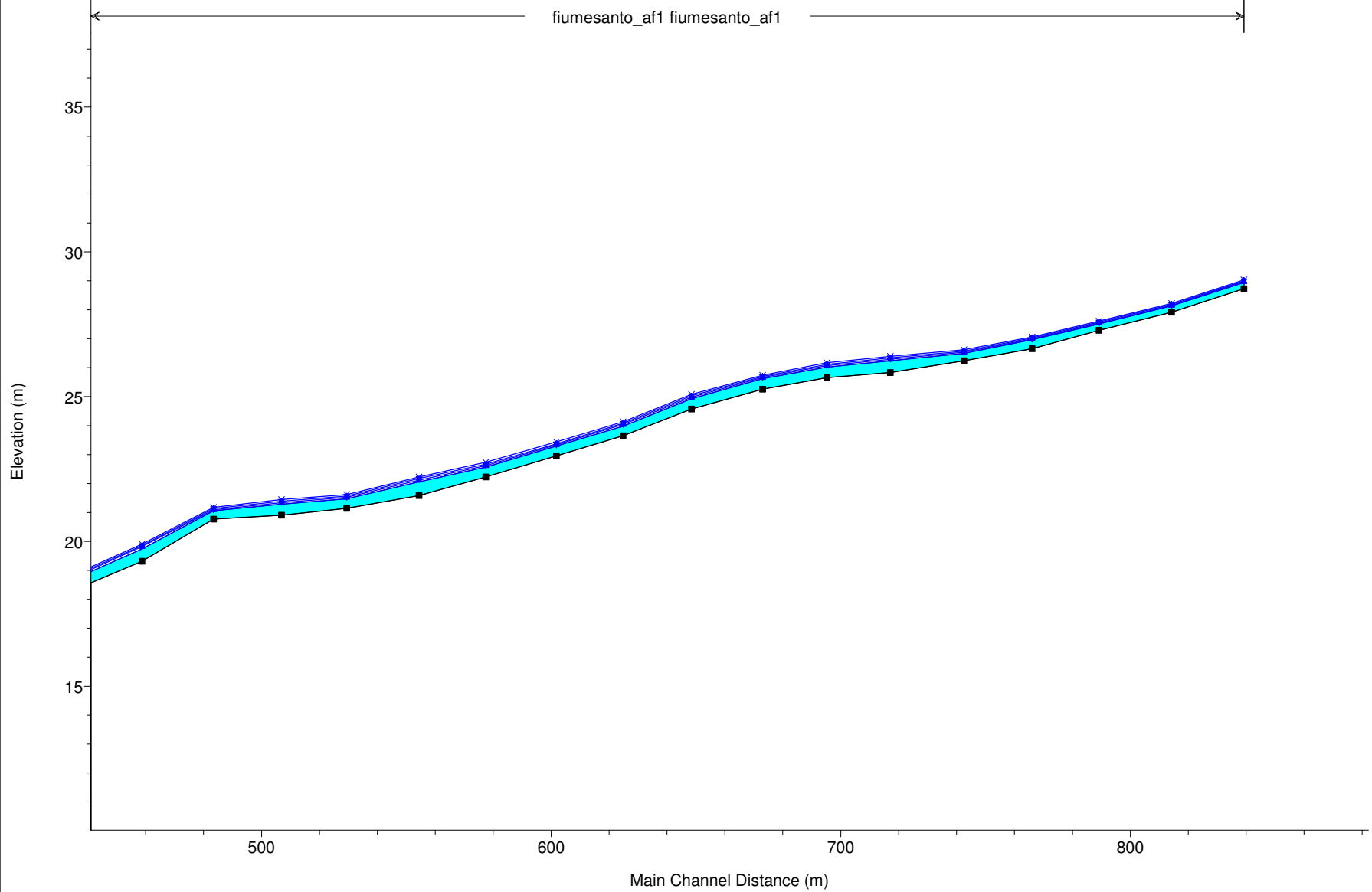
WS PF 4

WS PF 3

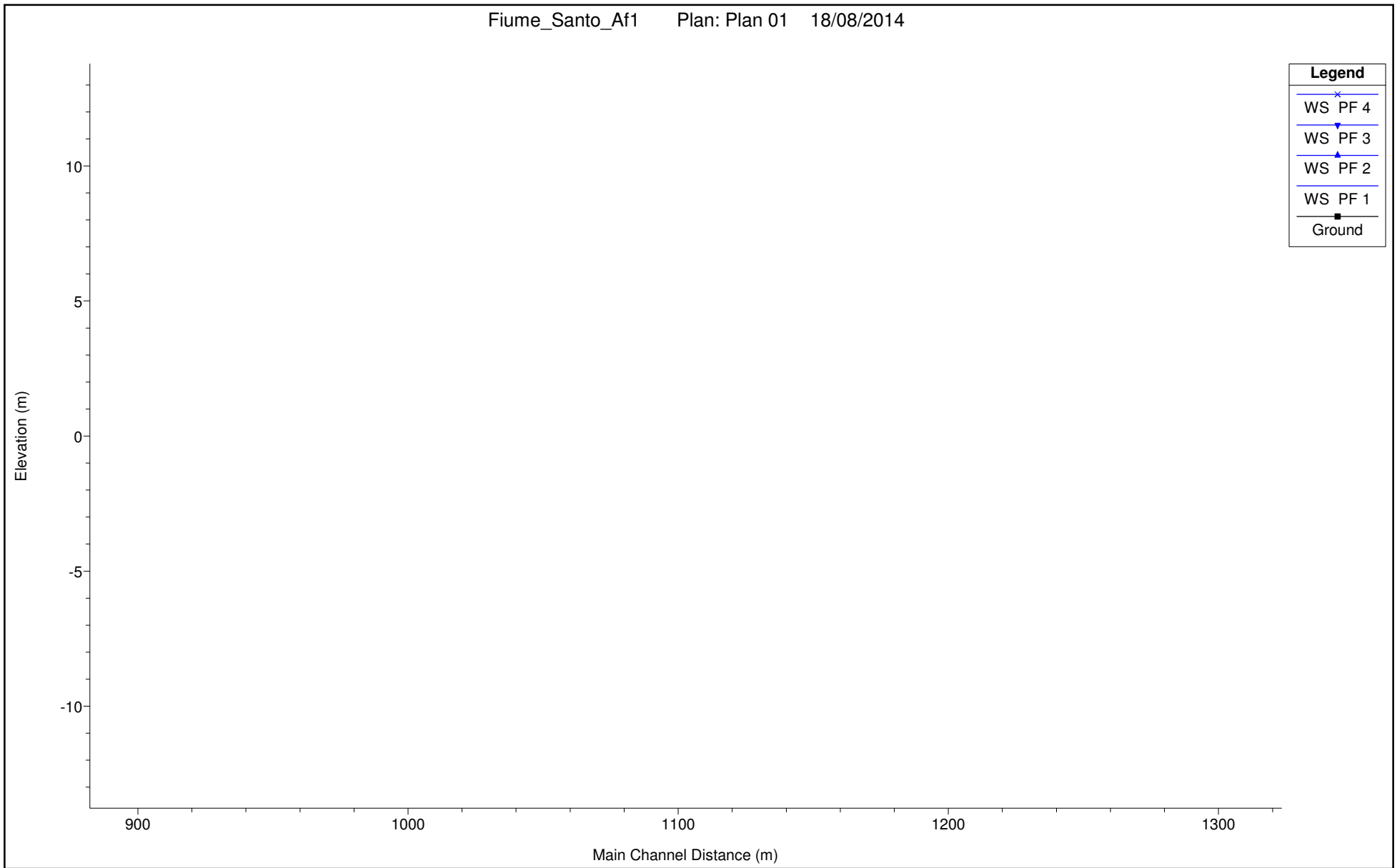
WS PF 2

WS PF 1

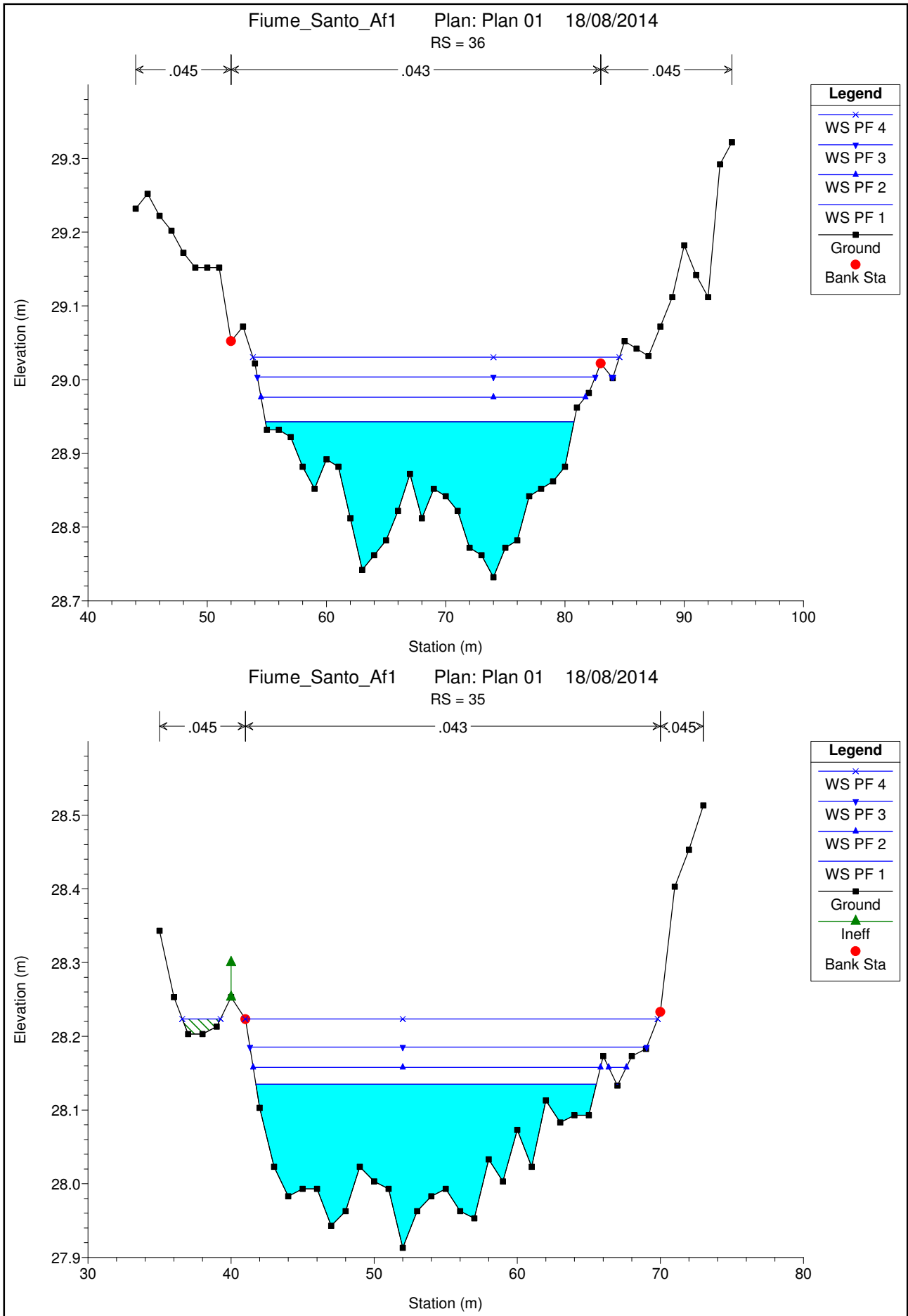
Ground

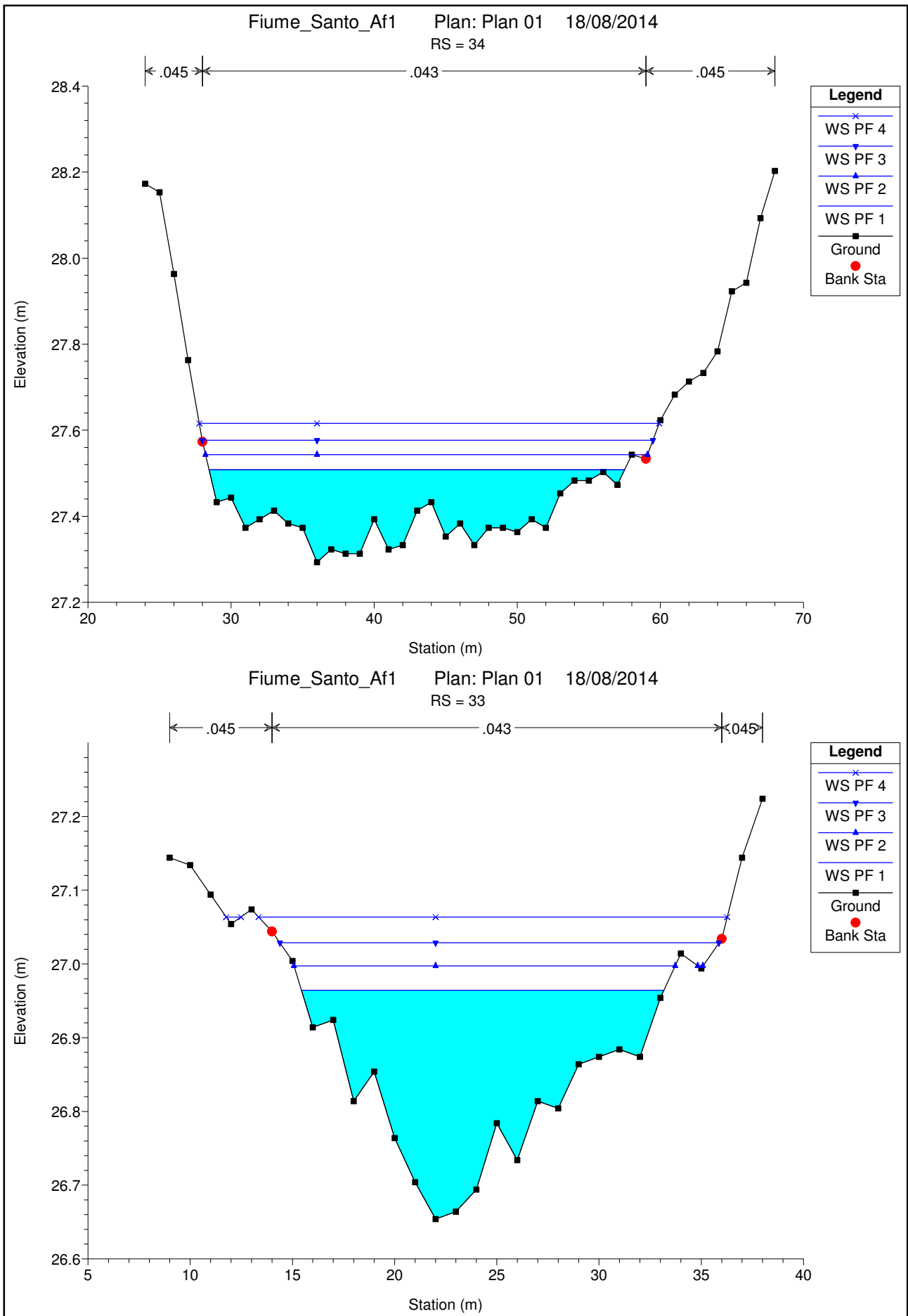


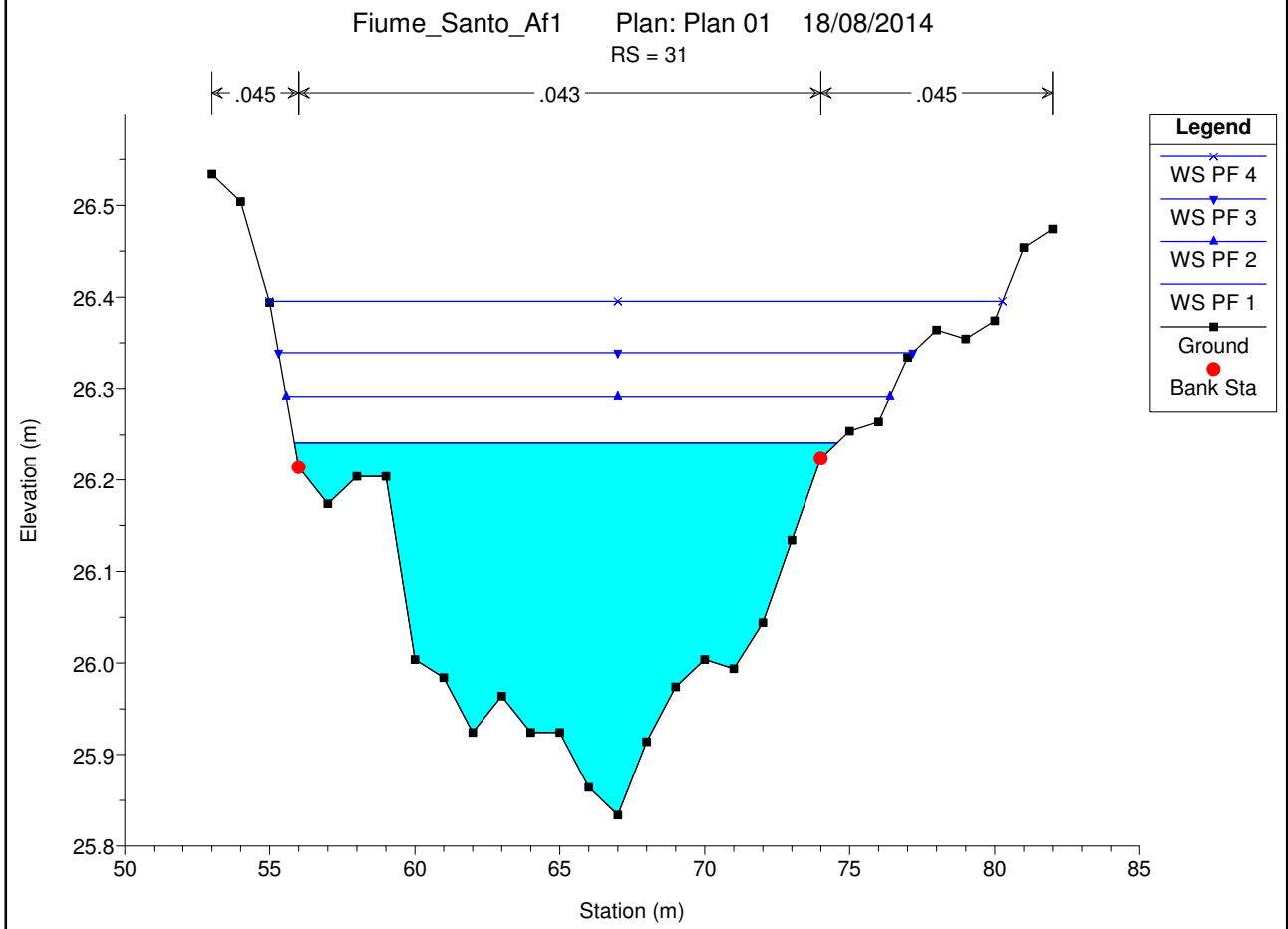
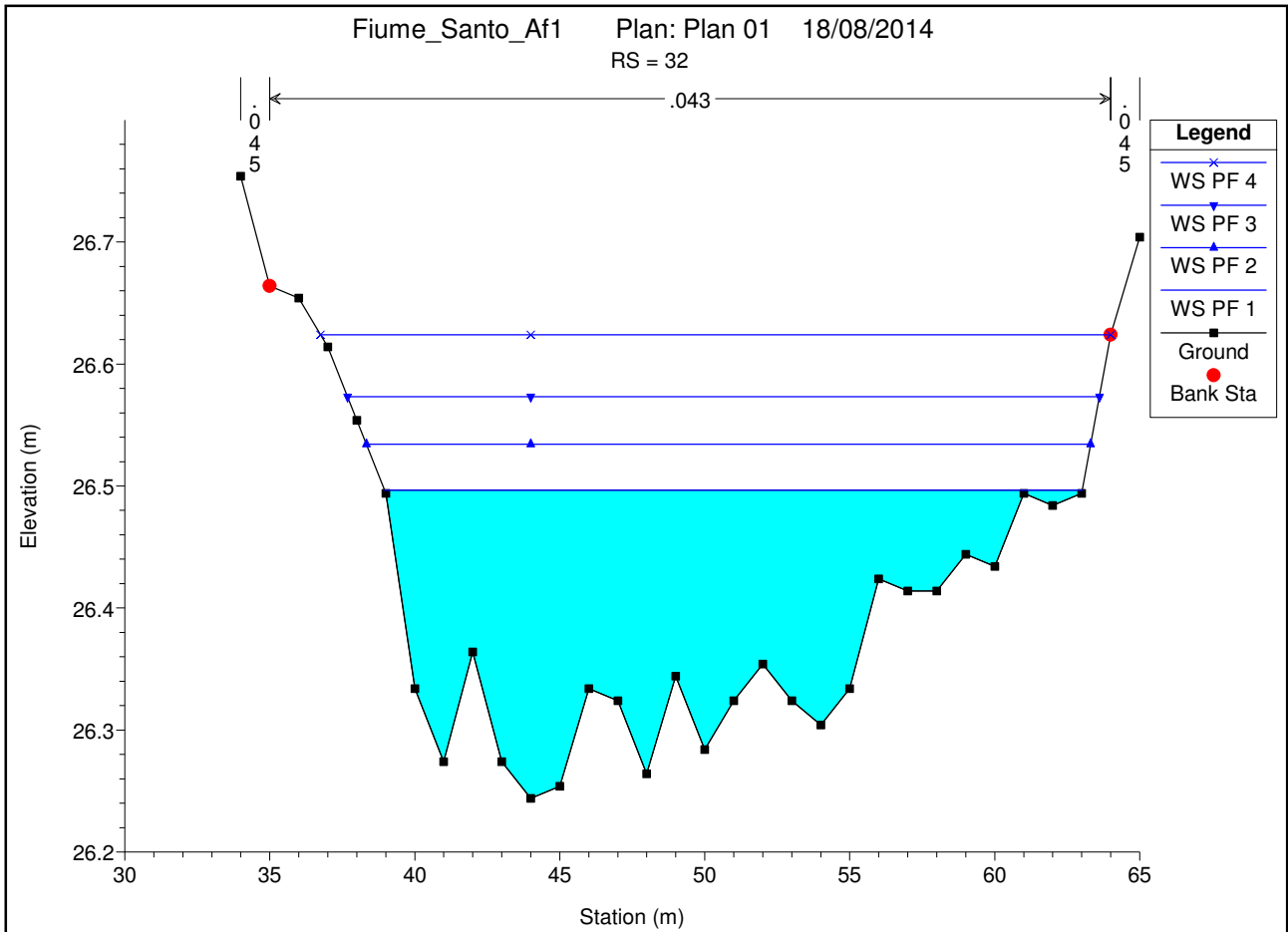
1 cm Horiz. = 20 m 1 cm Vert. = 2 m

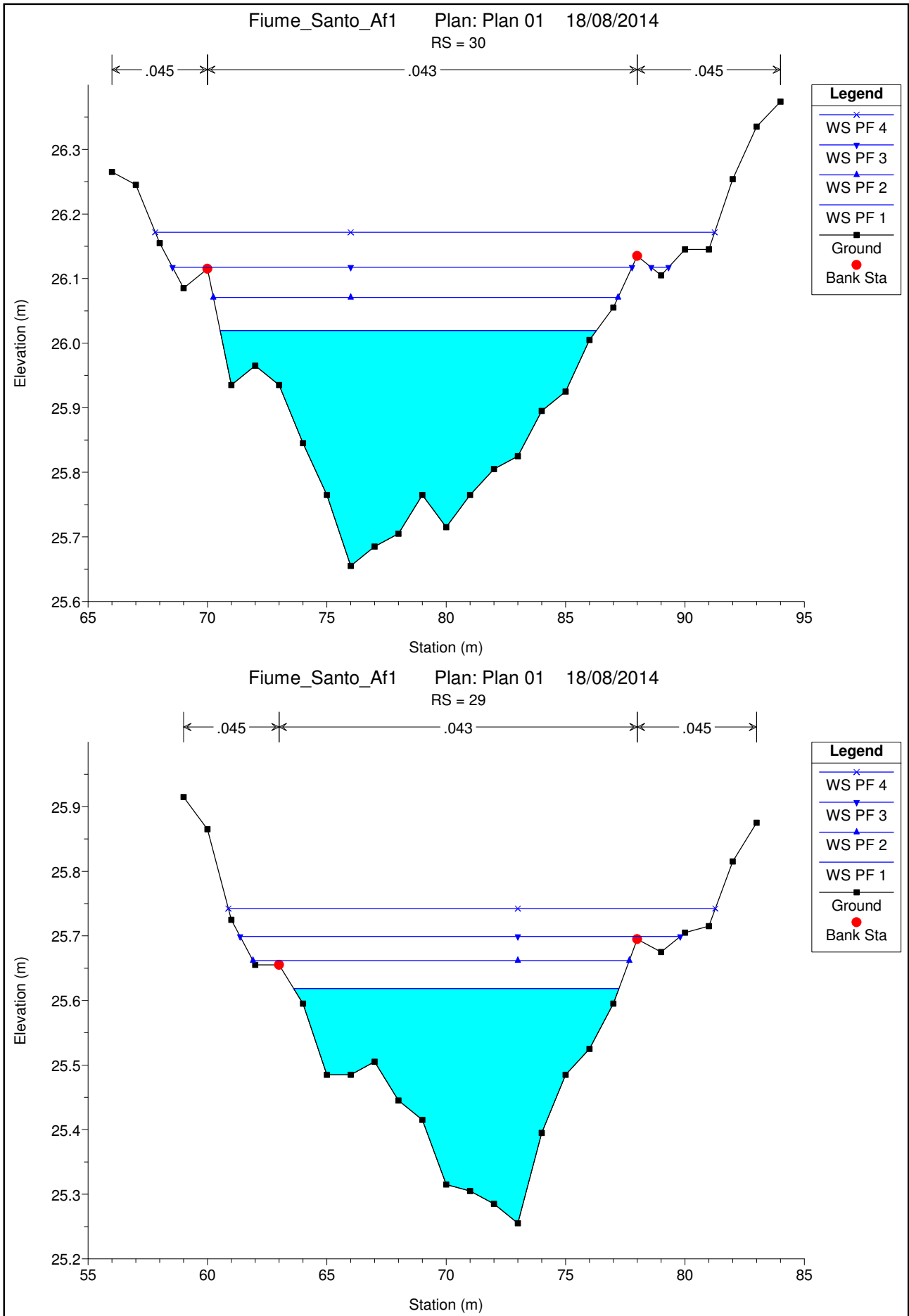


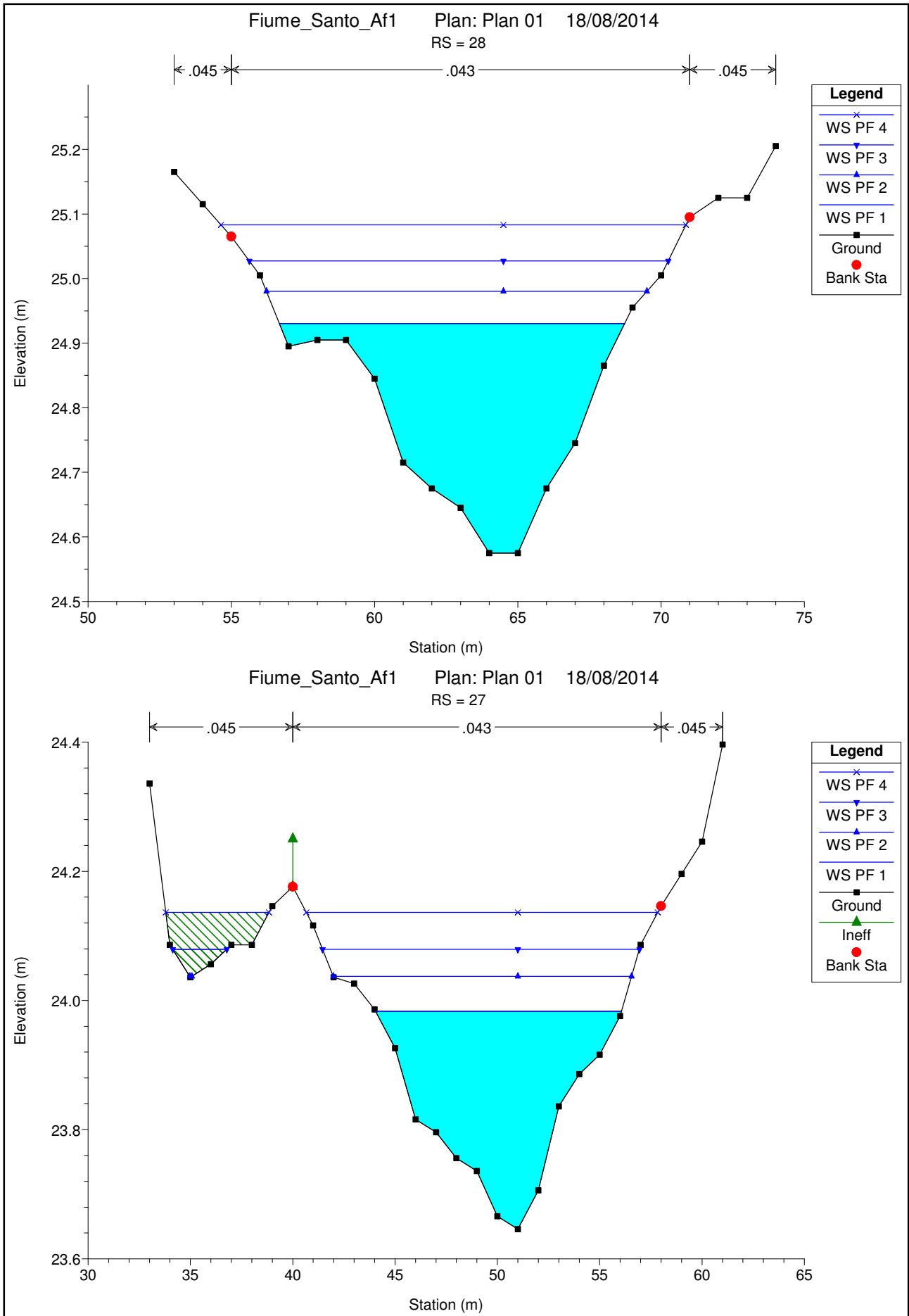
1 cm Horiz. = 20 m 1 cm Vert. = 2 m



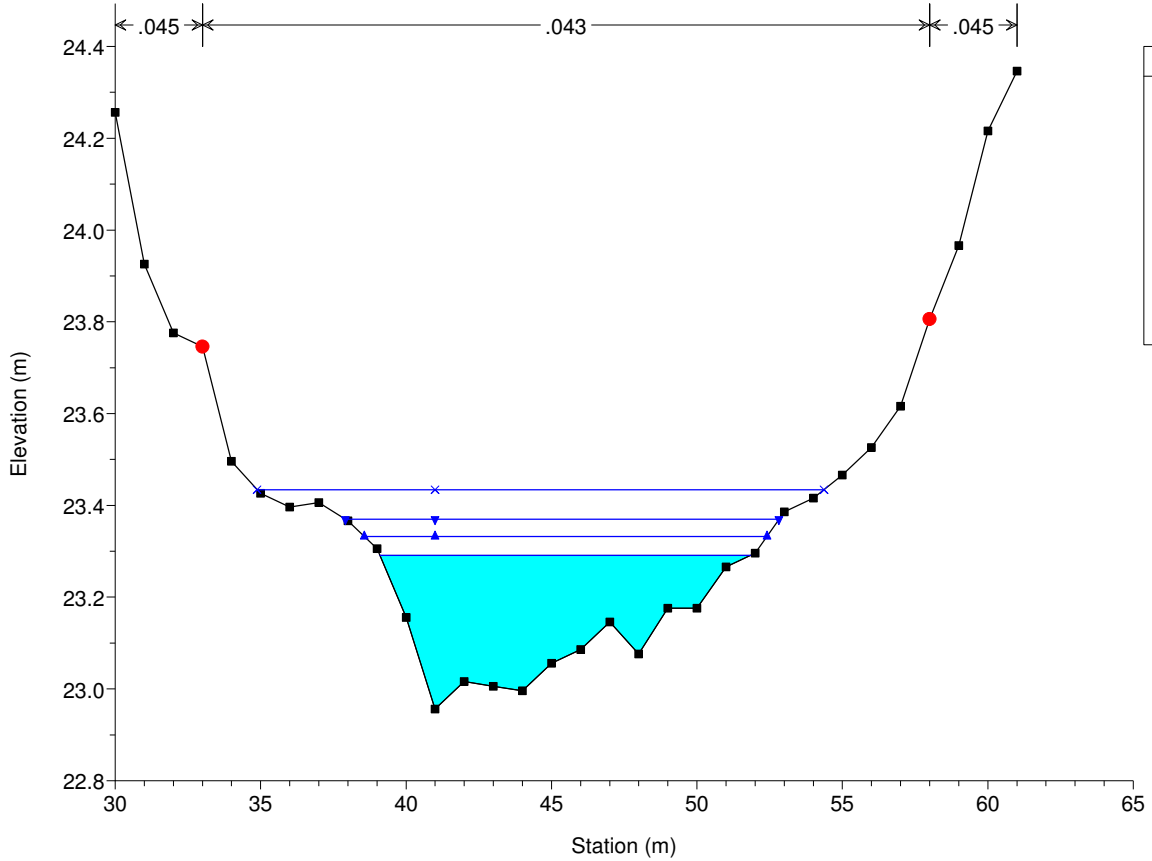






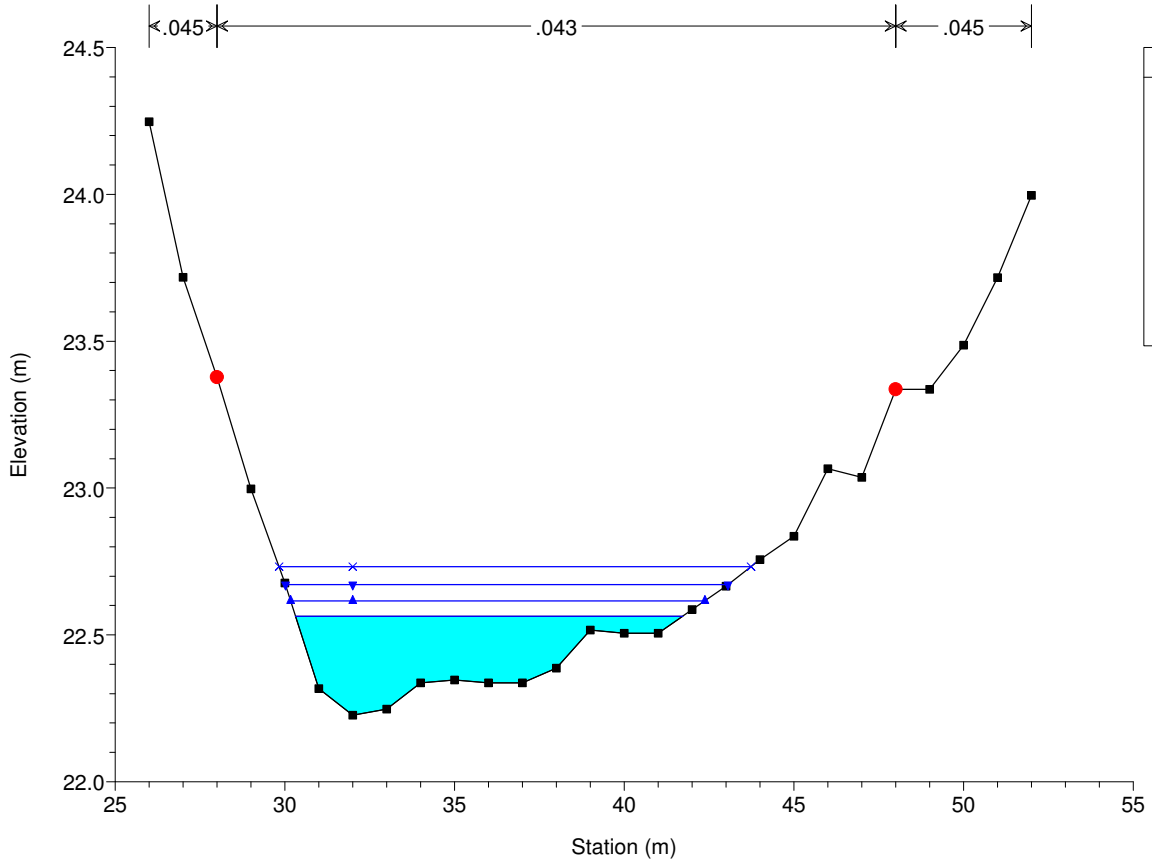


Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 26

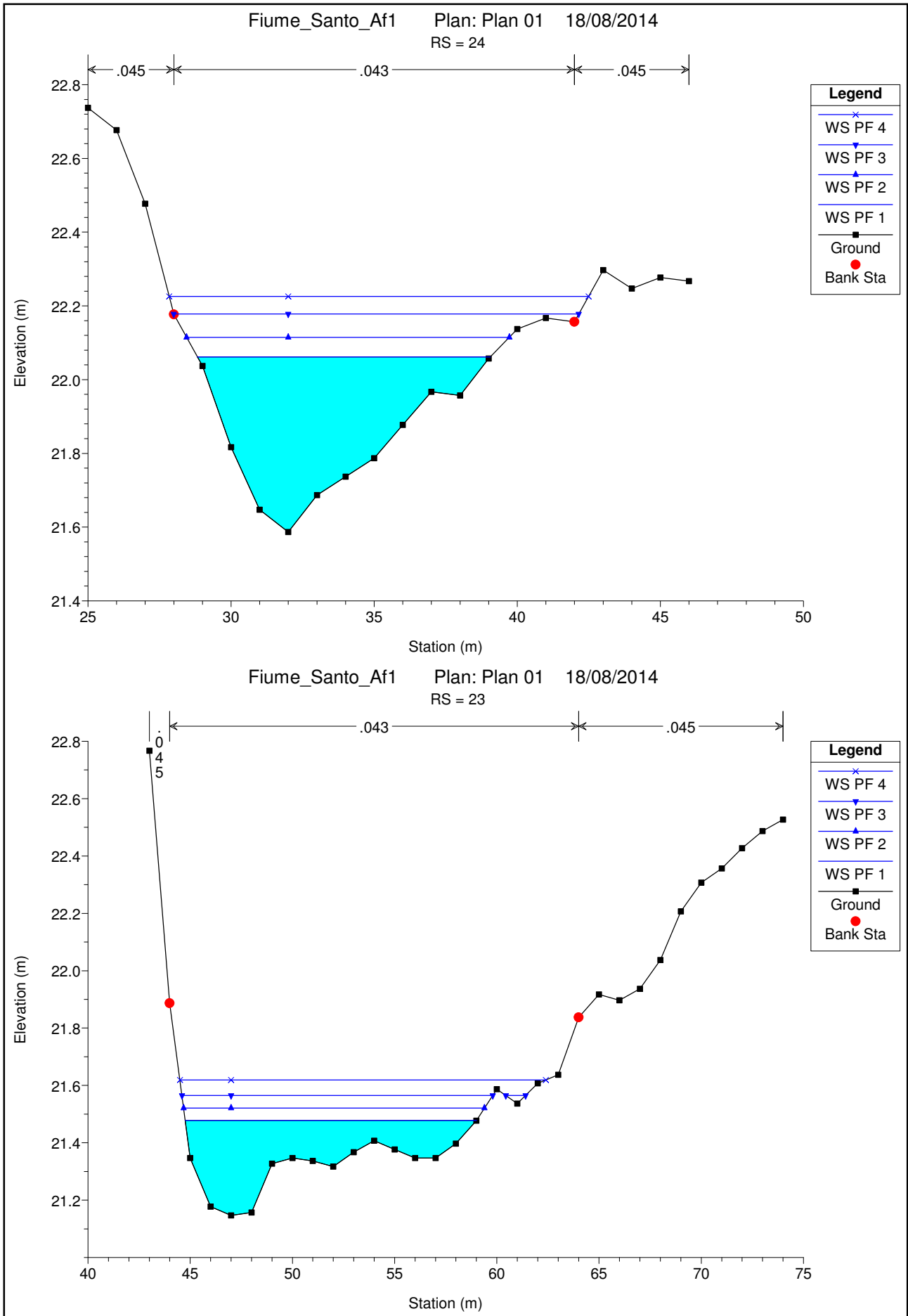


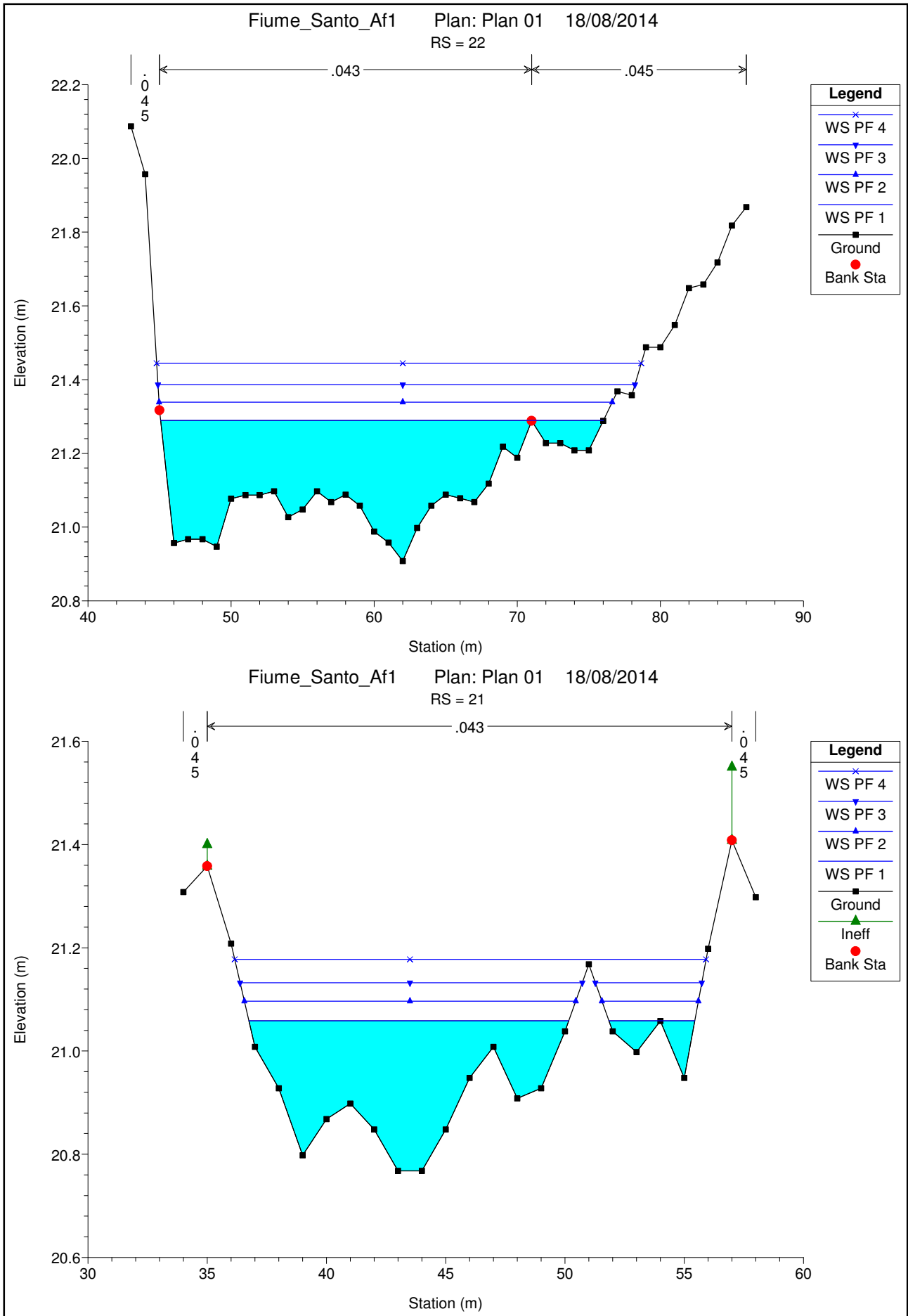
Legend	
—x—	WS PF 4
—v—	WS PF 3
—▲—	WS PF 2
—■—	WS PF 1
—■—	Ground
●	Bank Sta

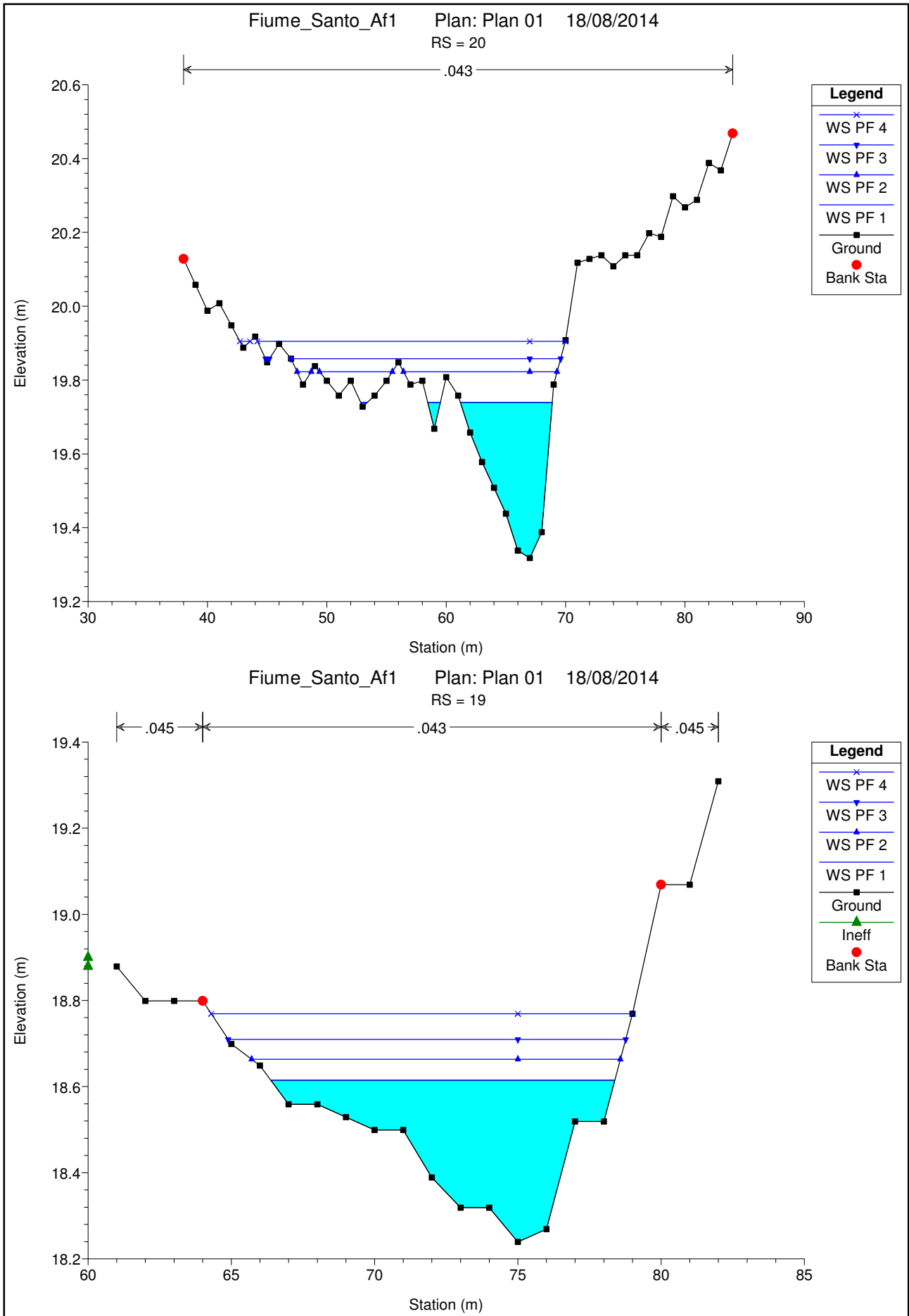
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 25

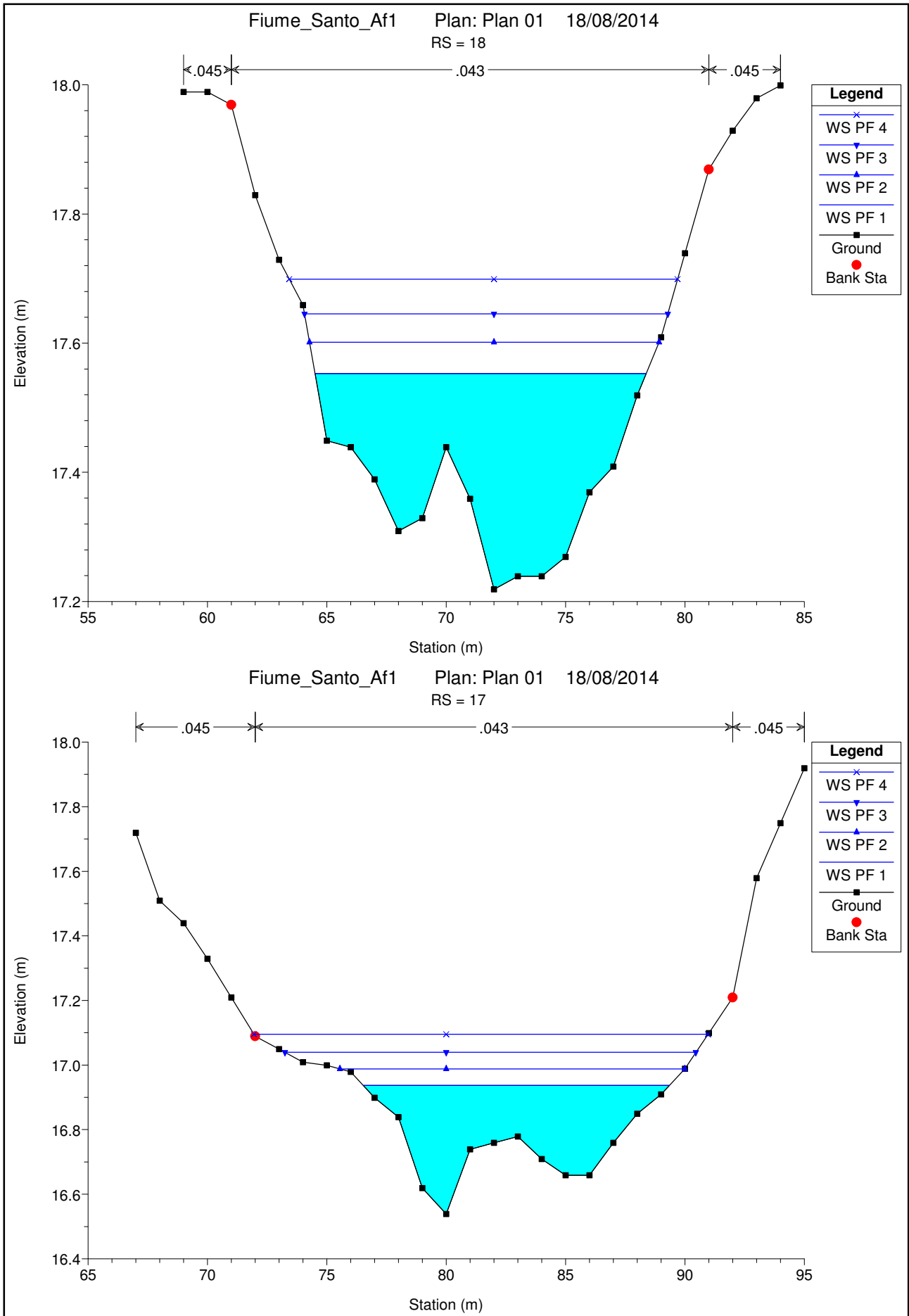


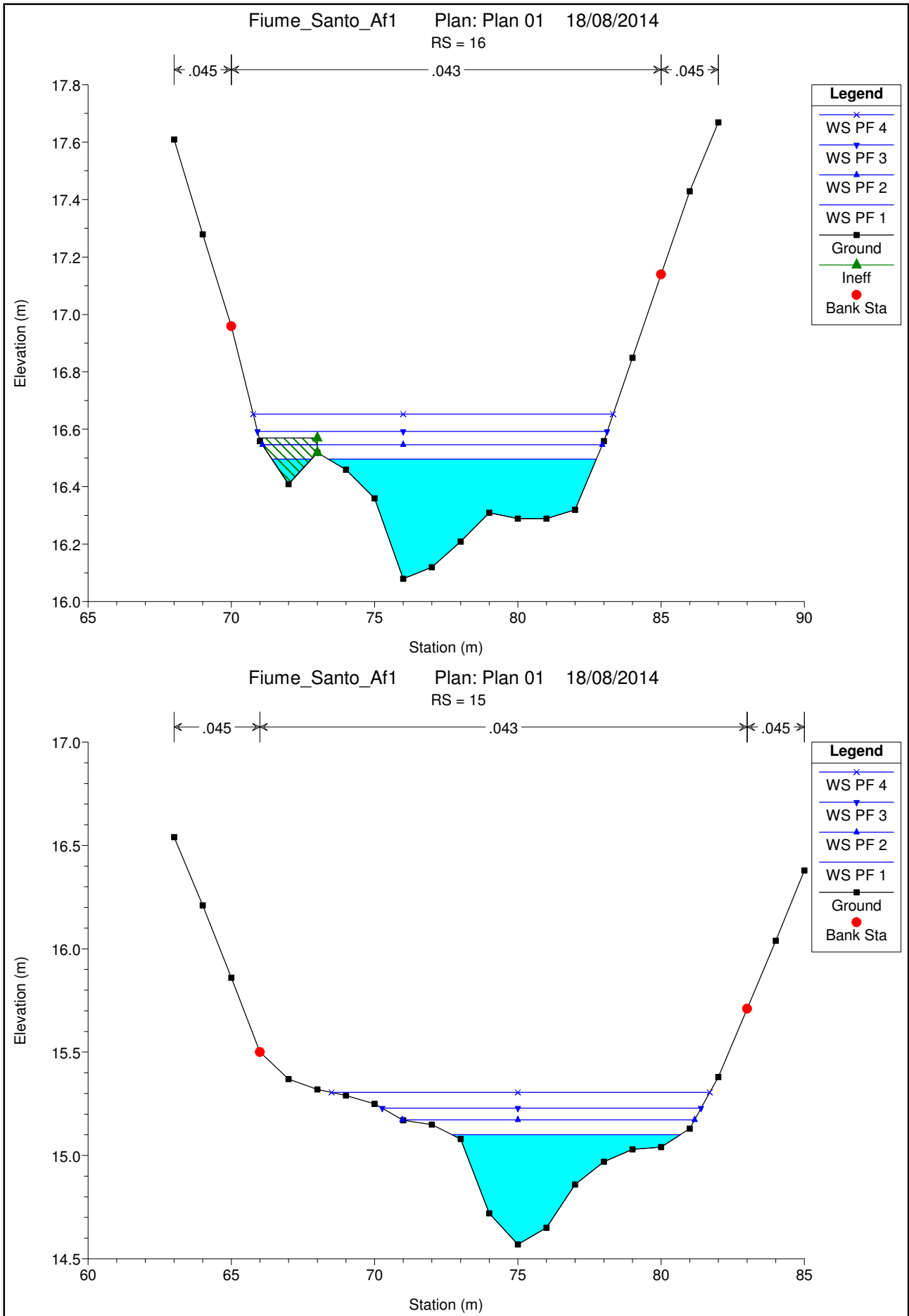
Legend	
—x—	WS PF 4
—v—	WS PF 3
—▲—	WS PF 2
—■—	WS PF 1
—■—	Ground
●	Bank Sta

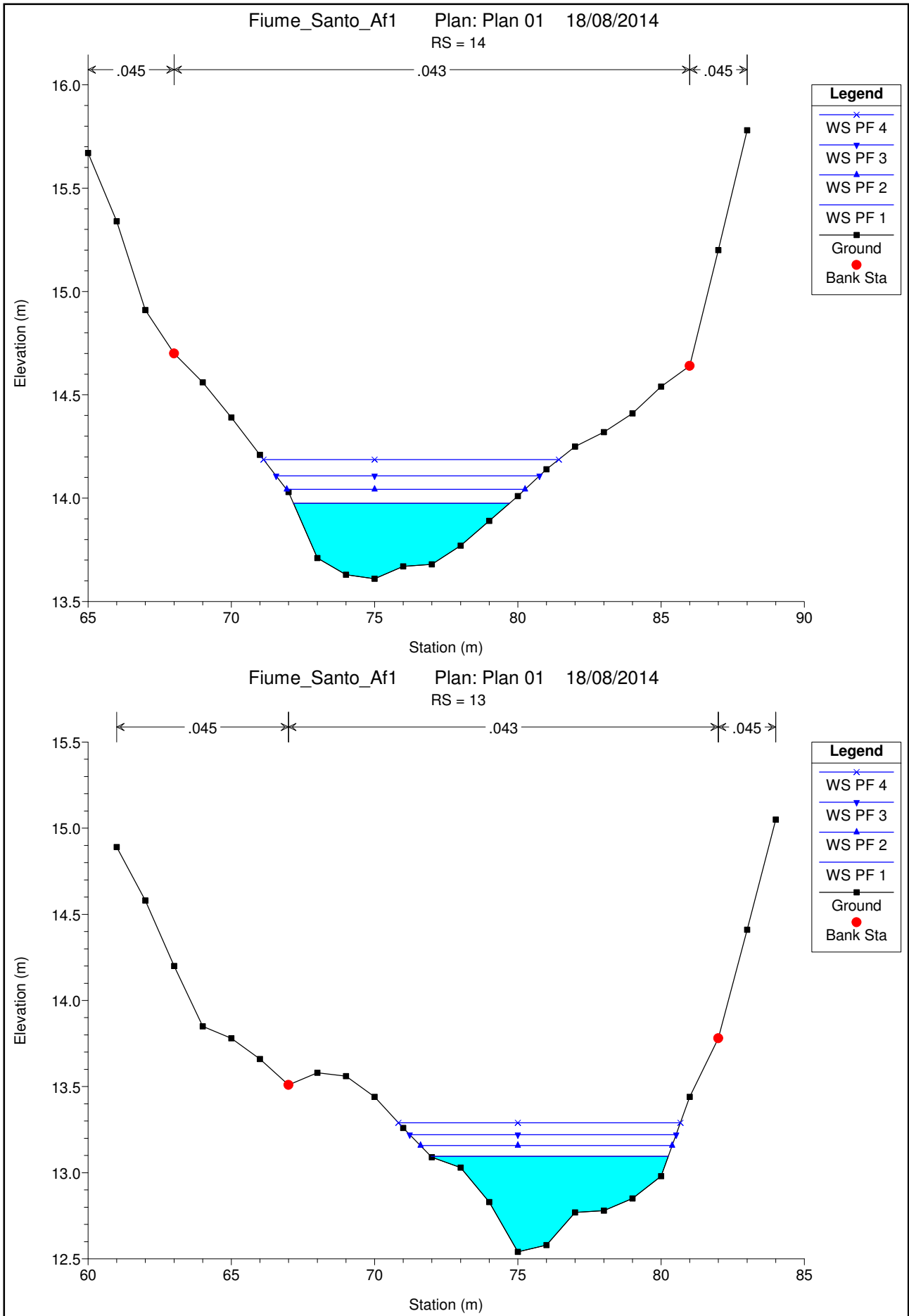




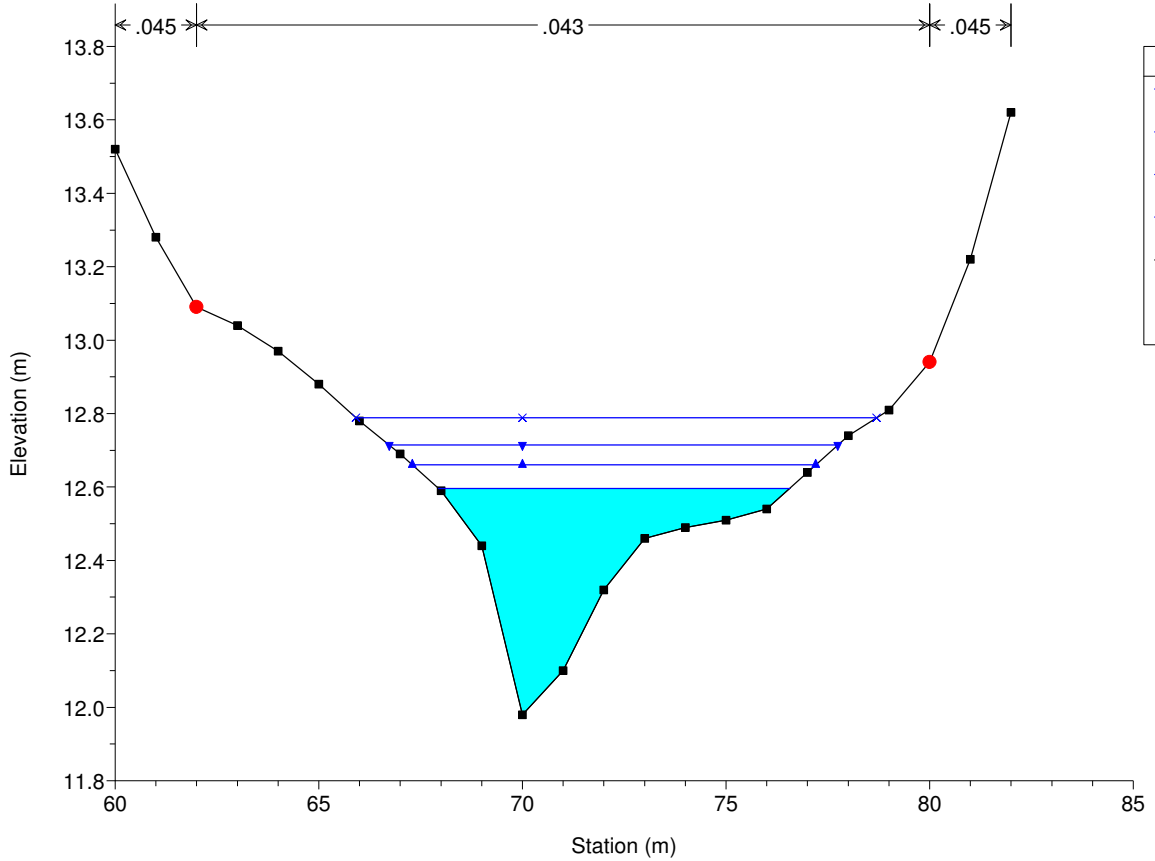




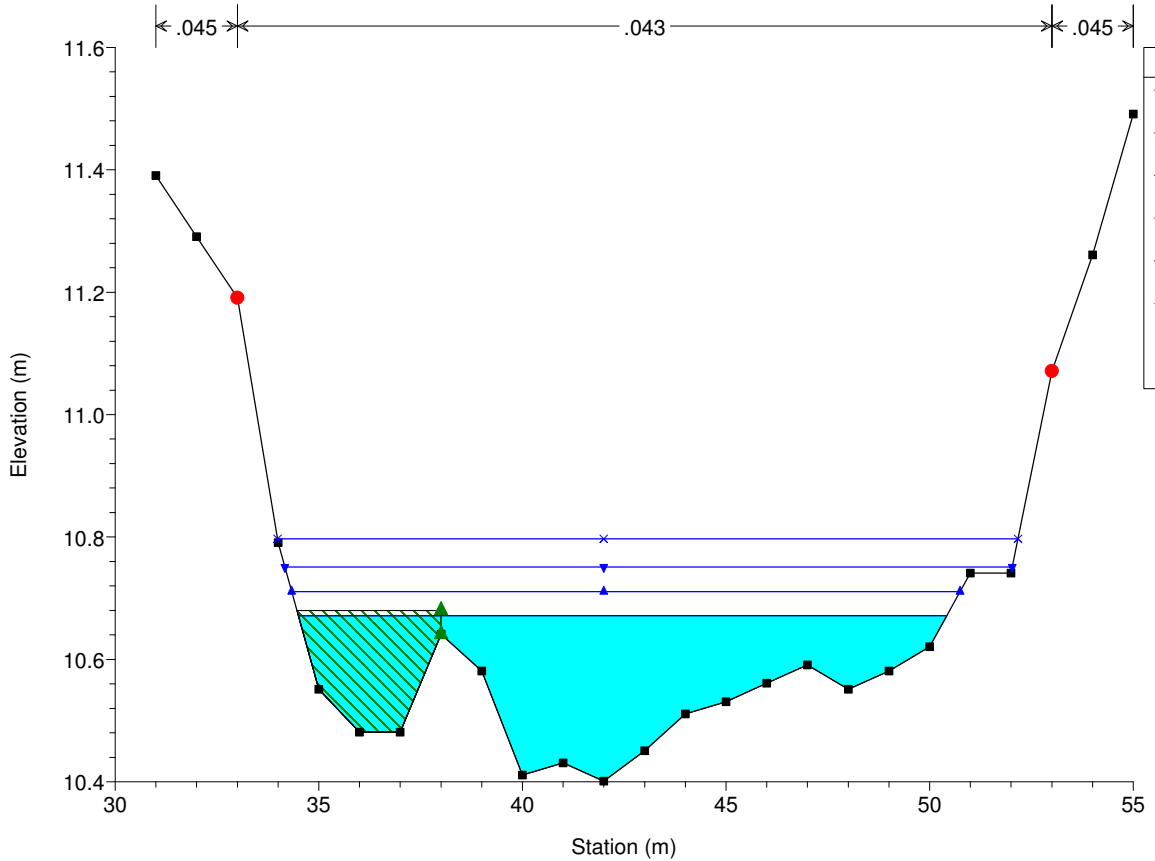




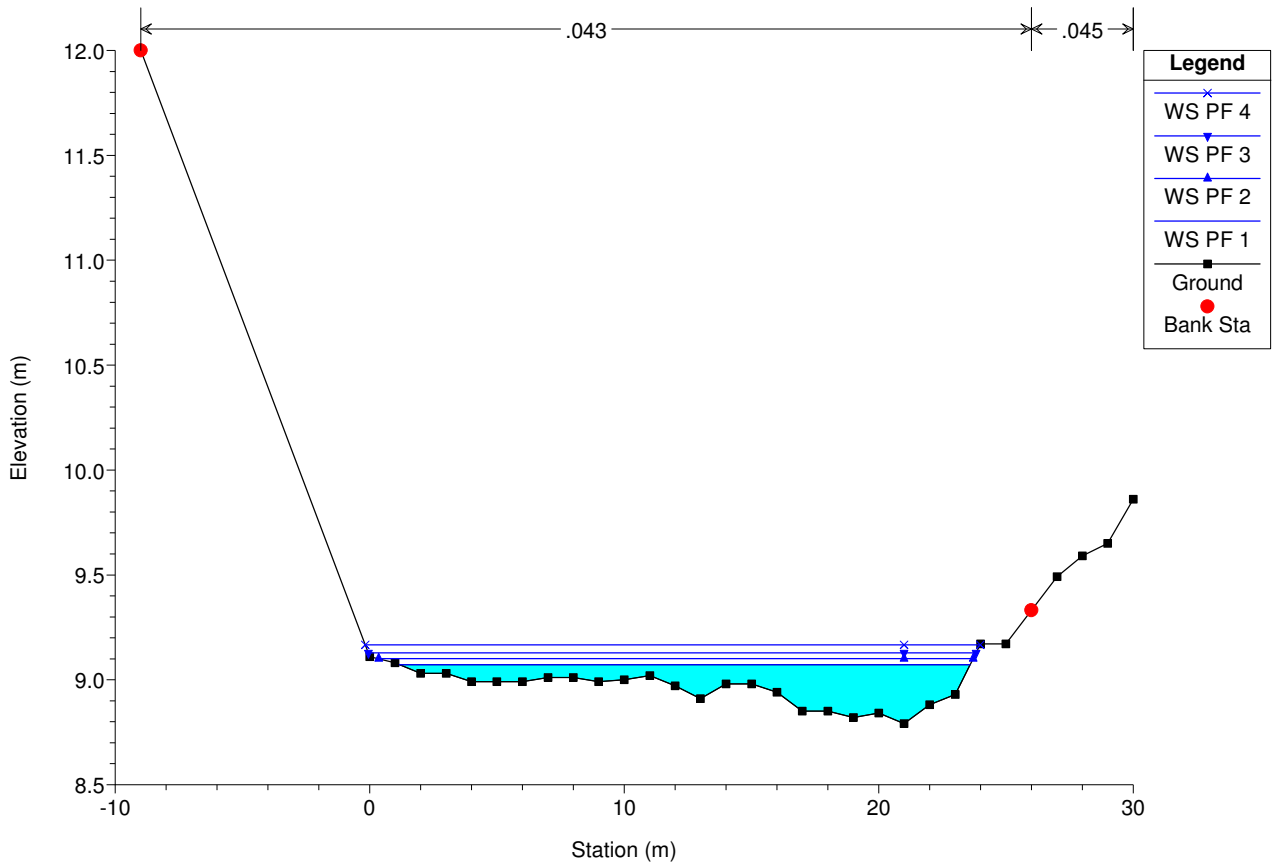
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 12



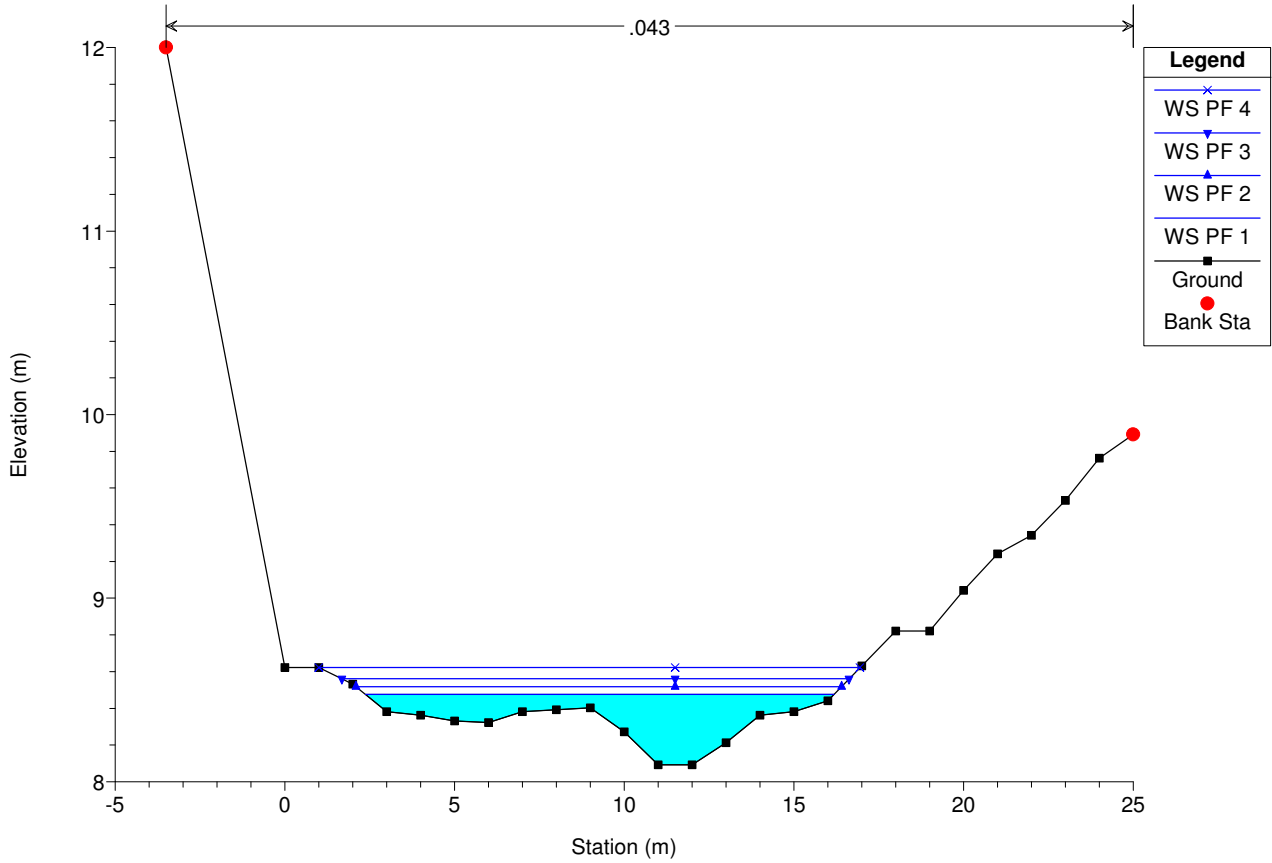
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 11



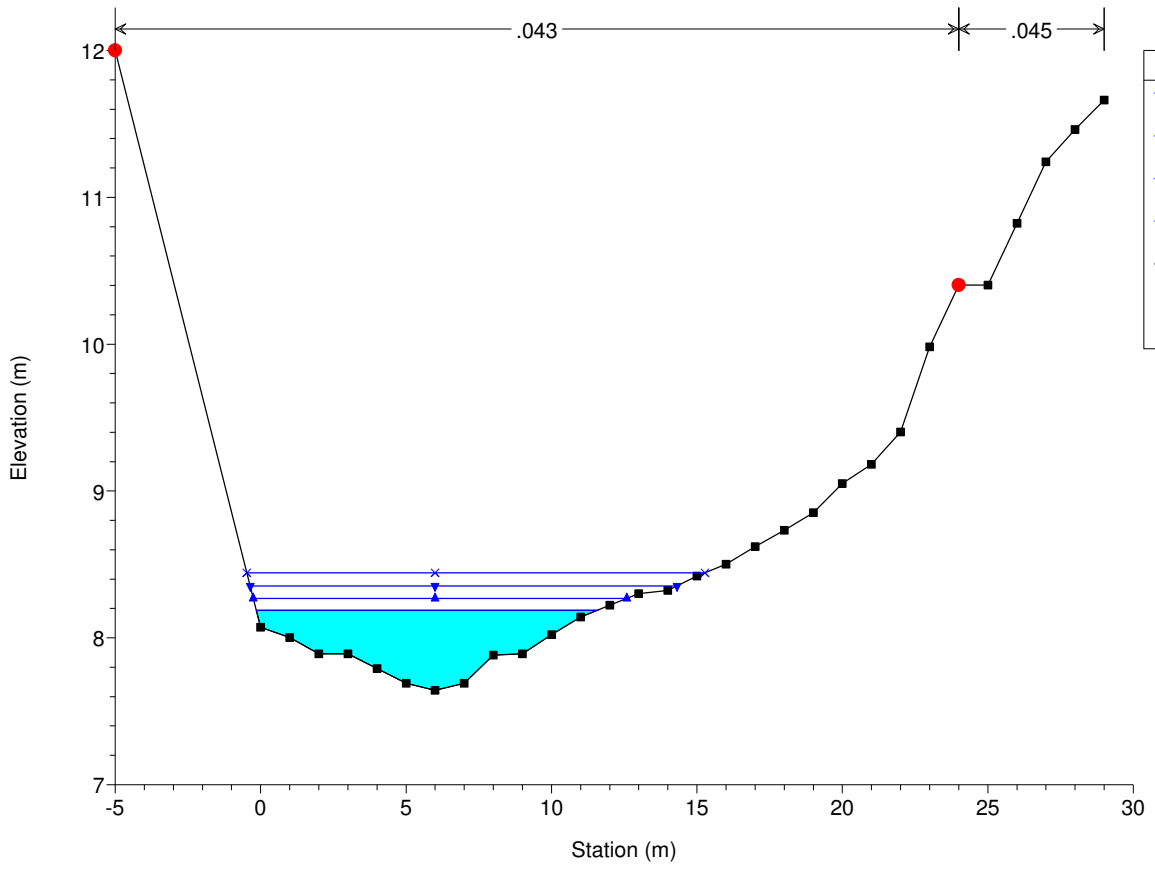
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 10



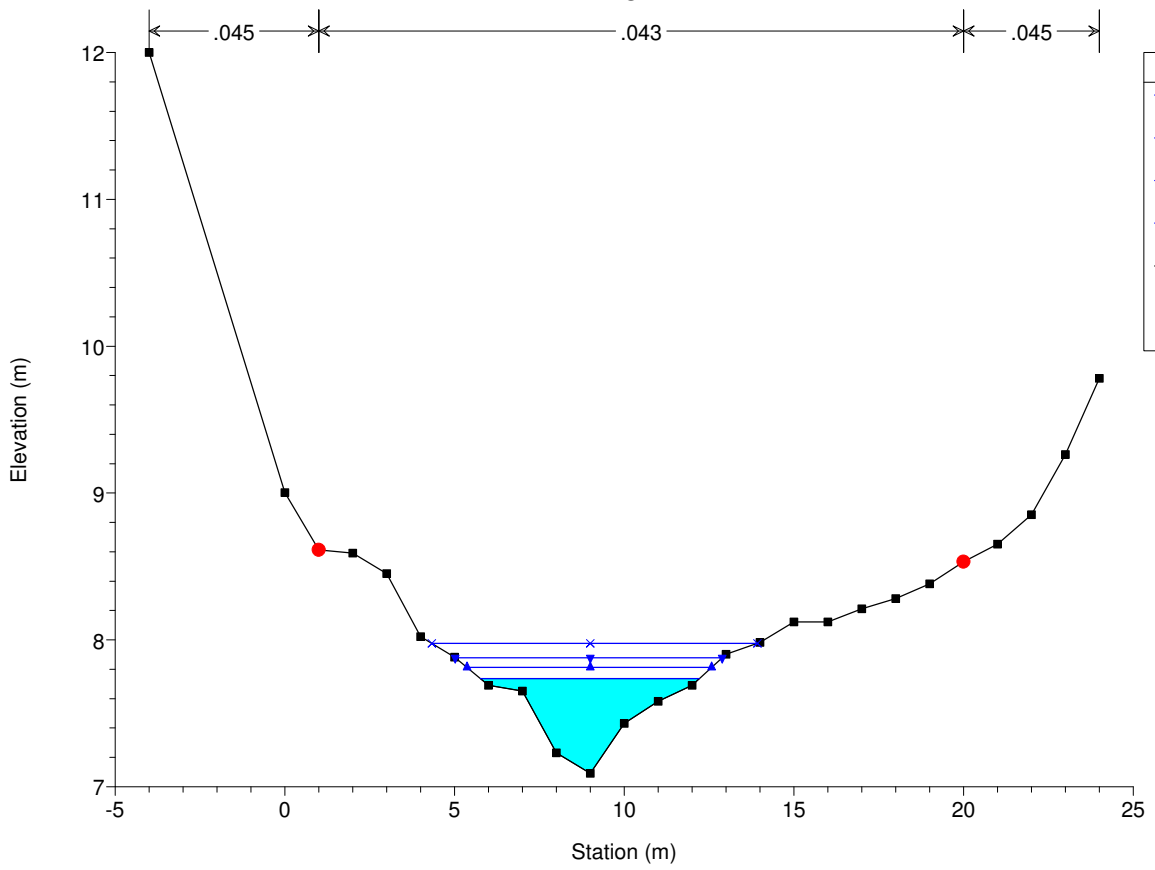
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 9



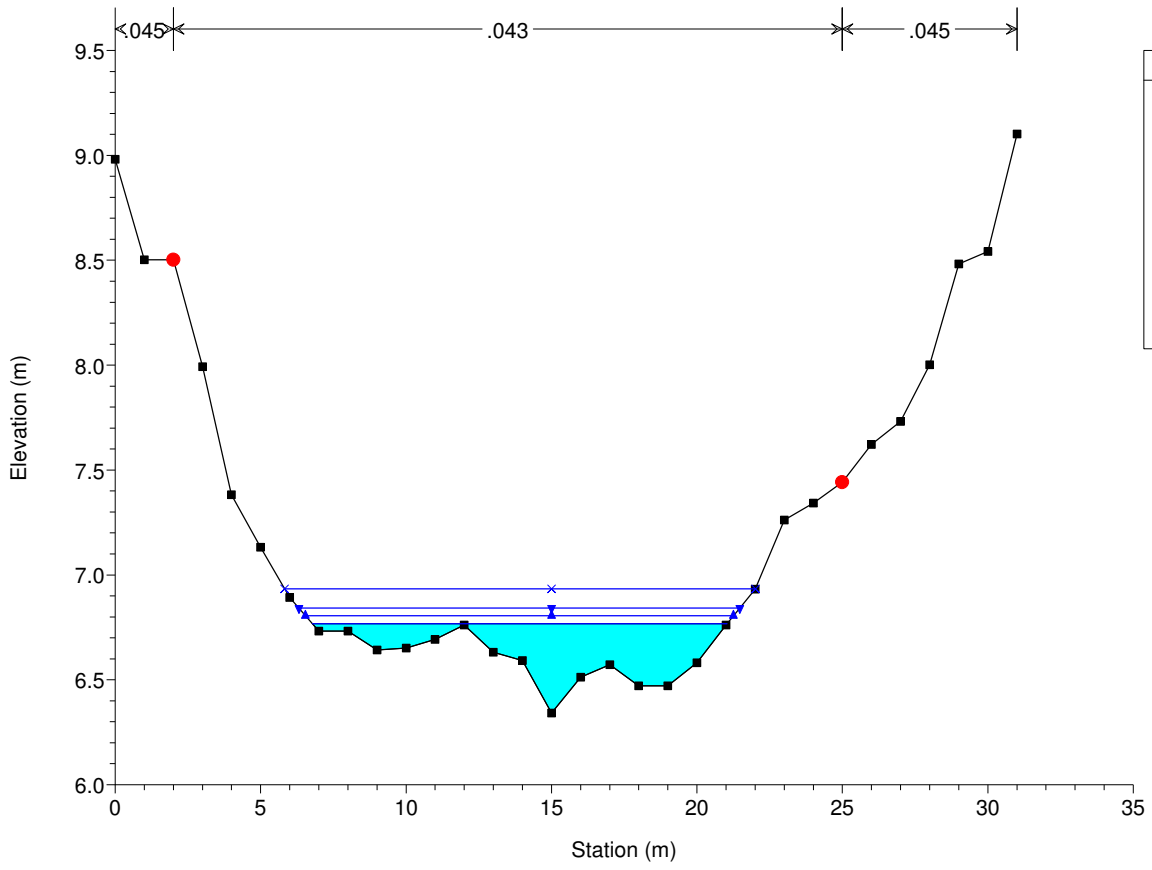
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 8



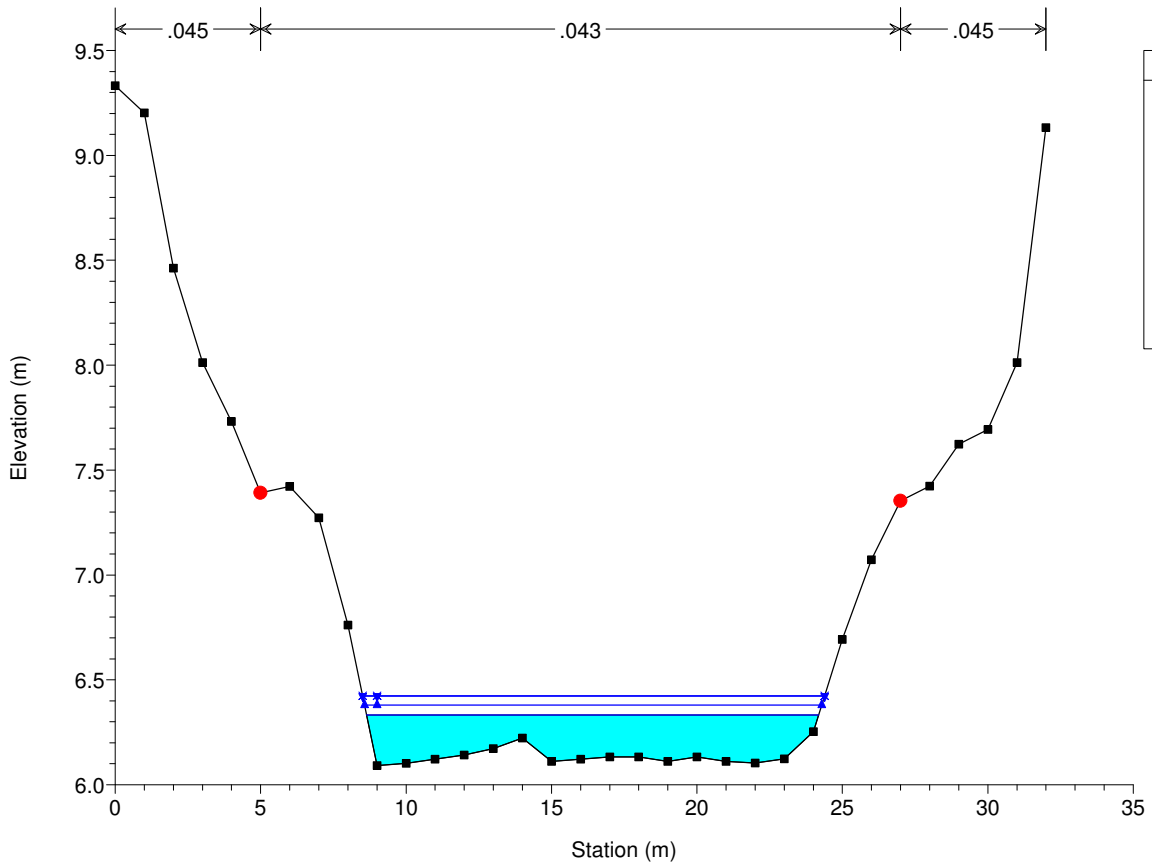
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 7

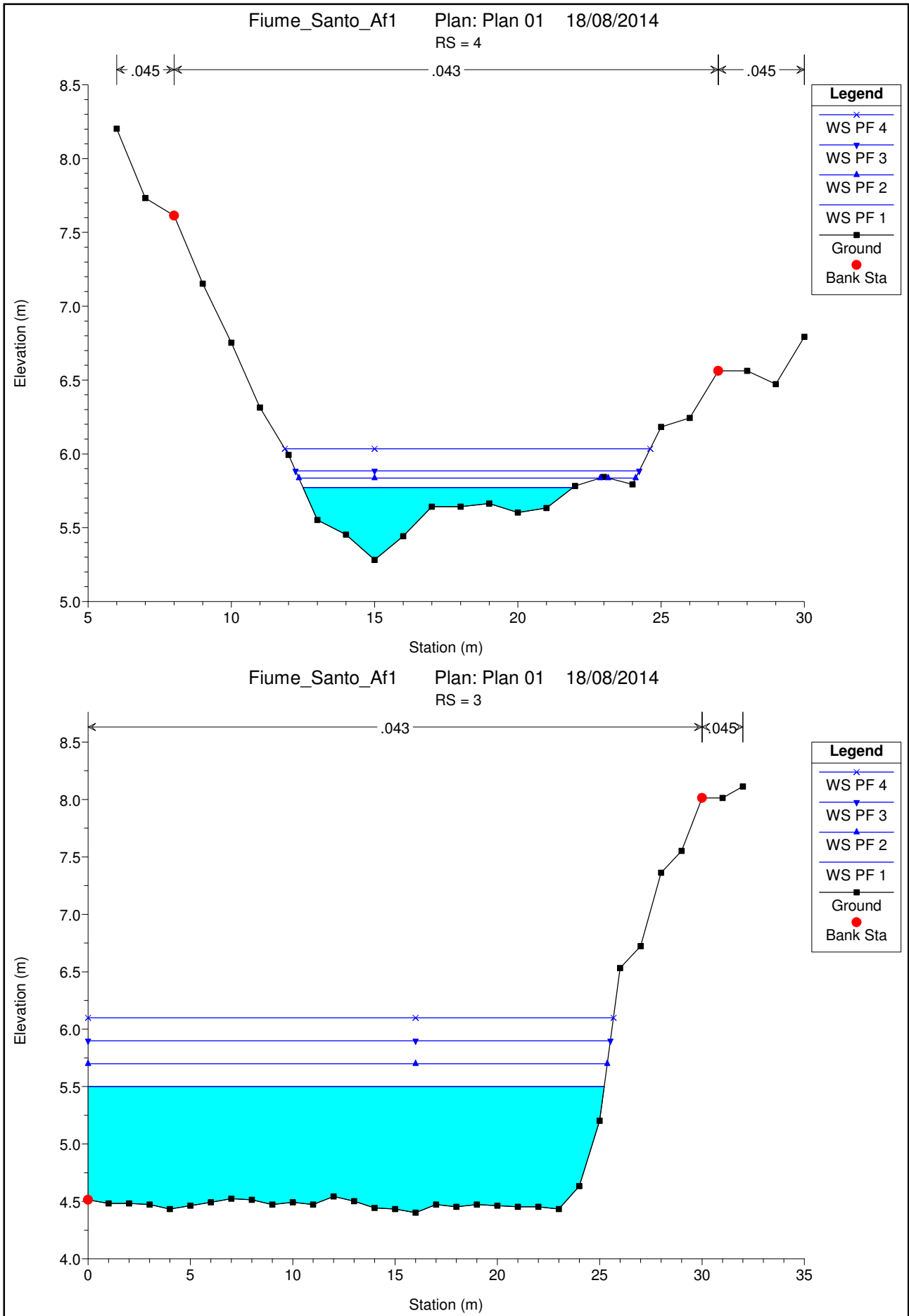


Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 6

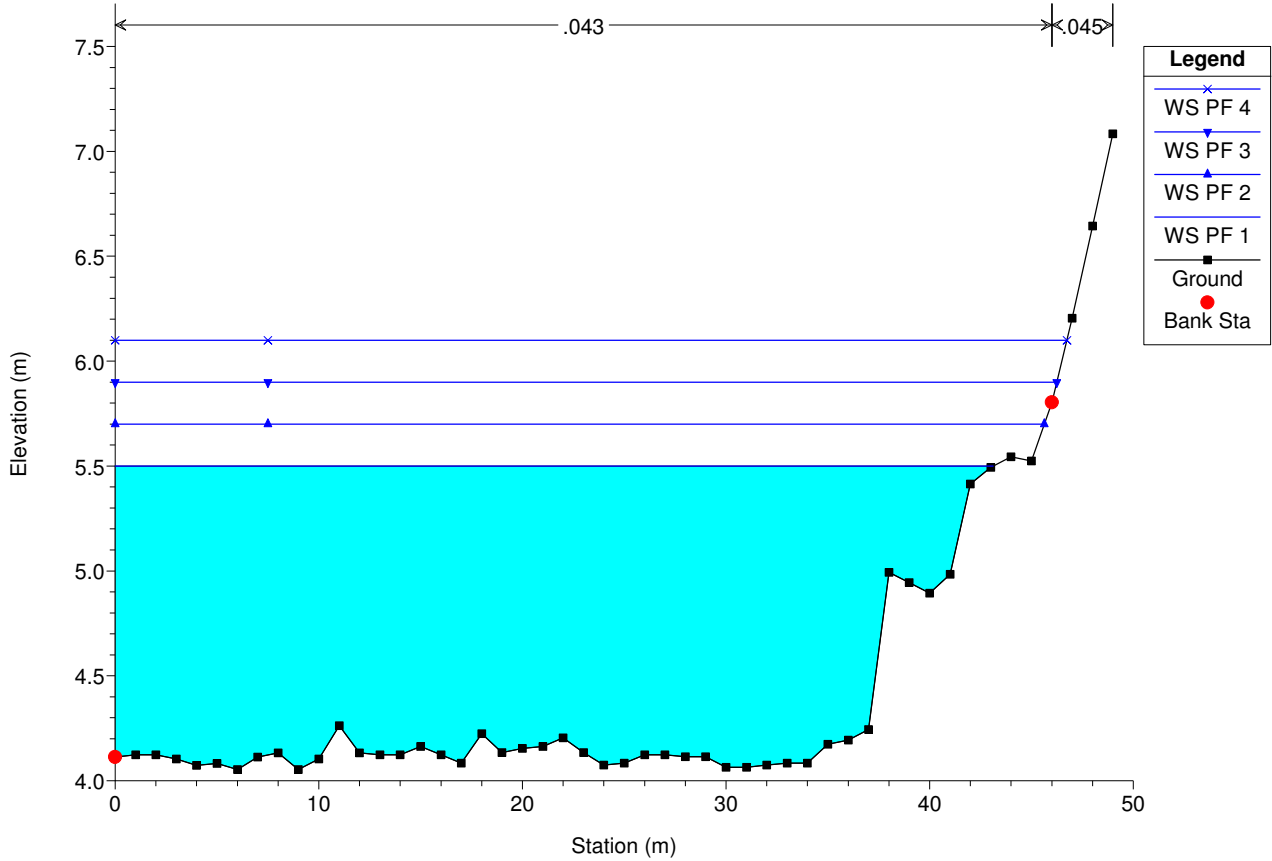


Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 5

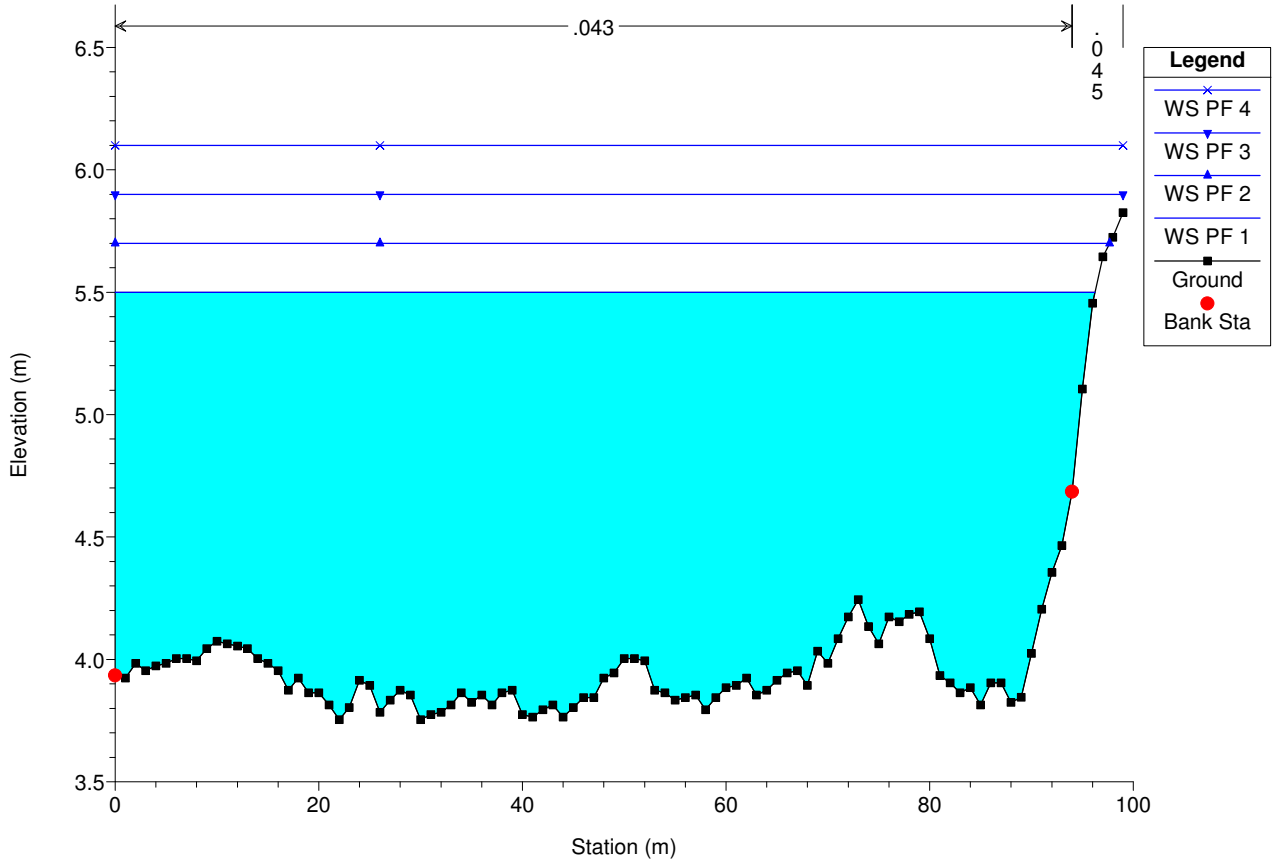




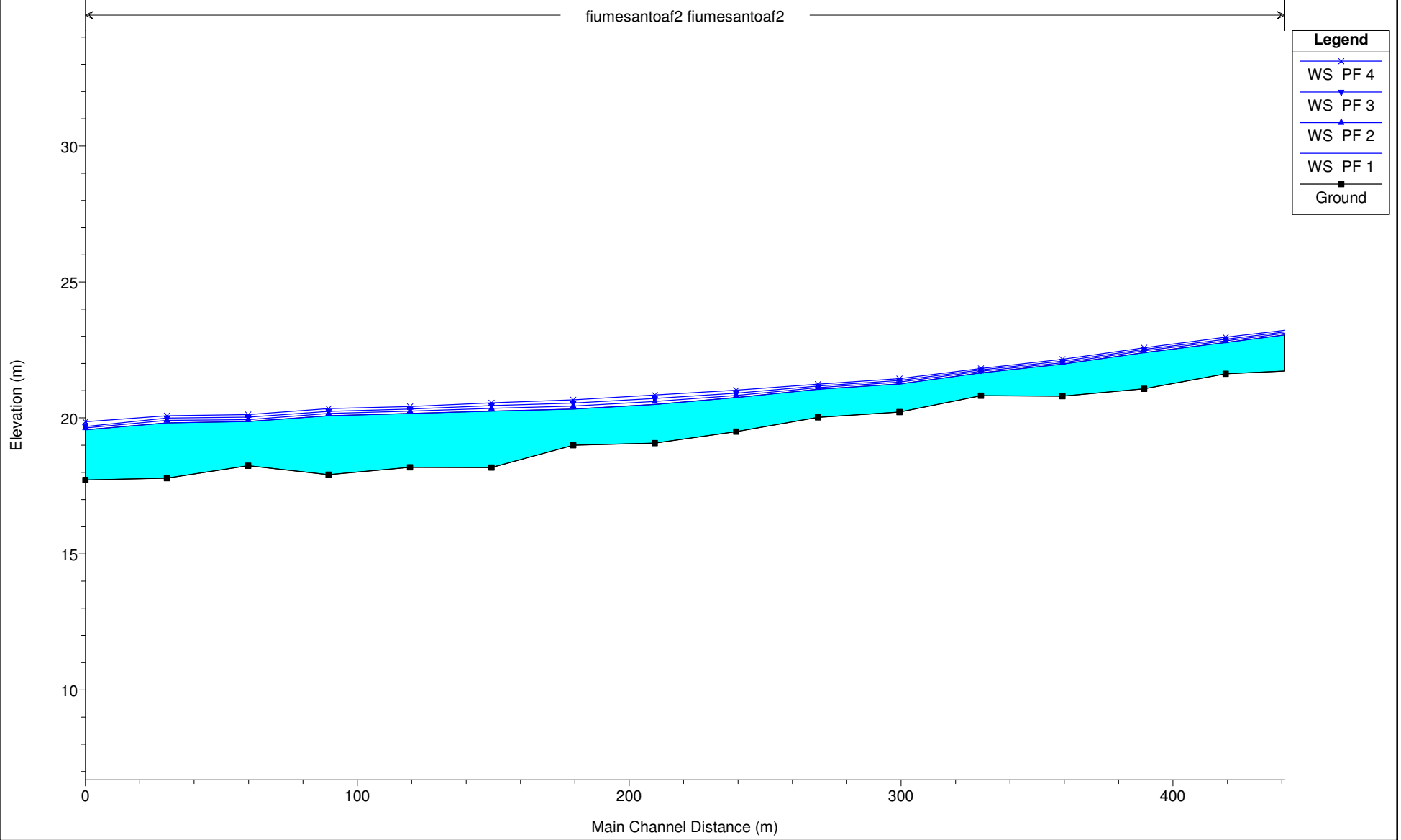
Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 2



Fiume_Santo_Af1 Plan: Plan 01 18/08/2014
RS = 1



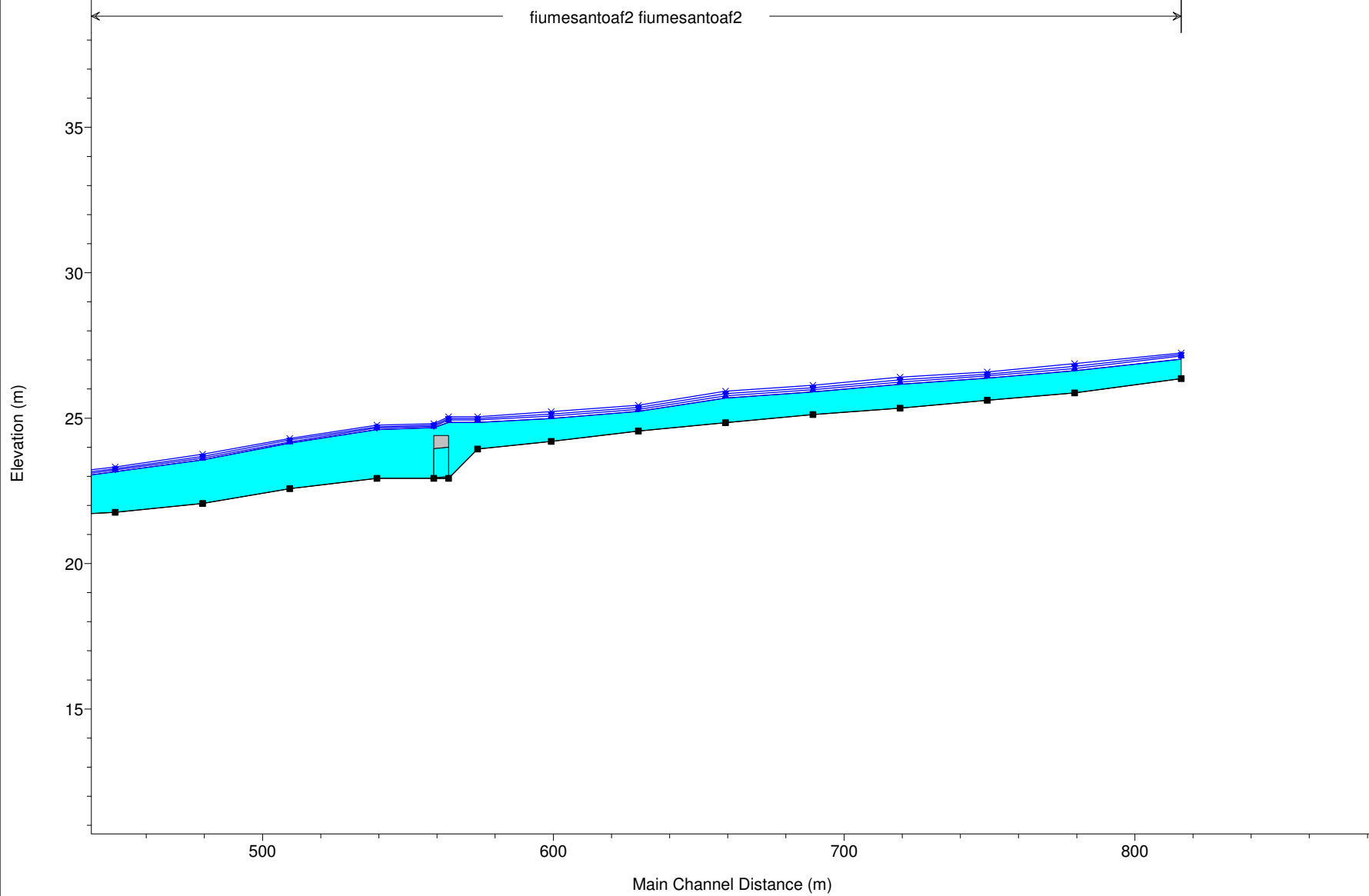
Profili e sezioni del pelo libero dell'affluente 2 del fiume Santo



1 cm Horiz. = 20 m 1 cm Vert. = 2 m

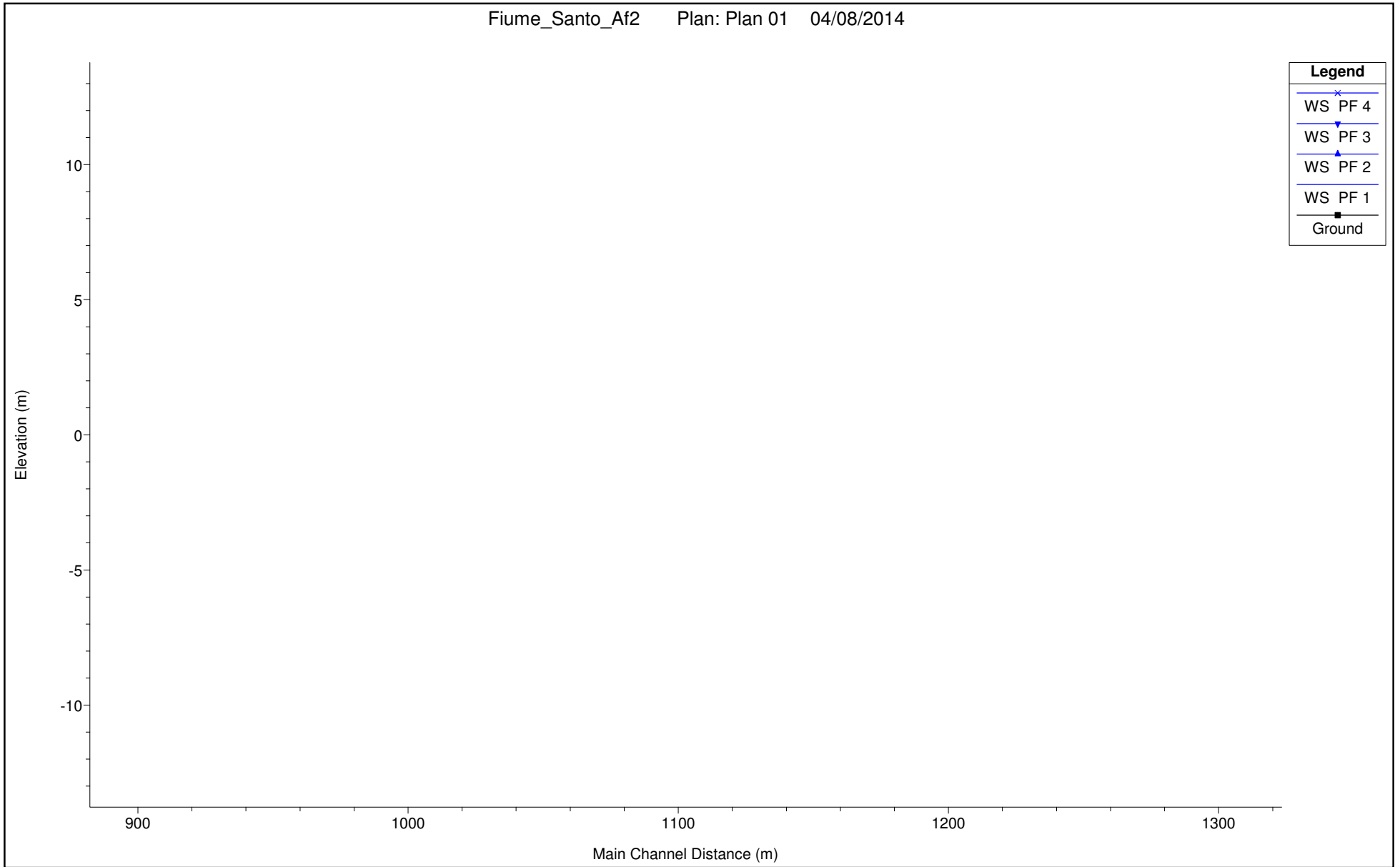
Fiume_Santo_Af2 Plan: Plan 01 04/08/2014

fiumesantoaf2 fiumesantoaf2

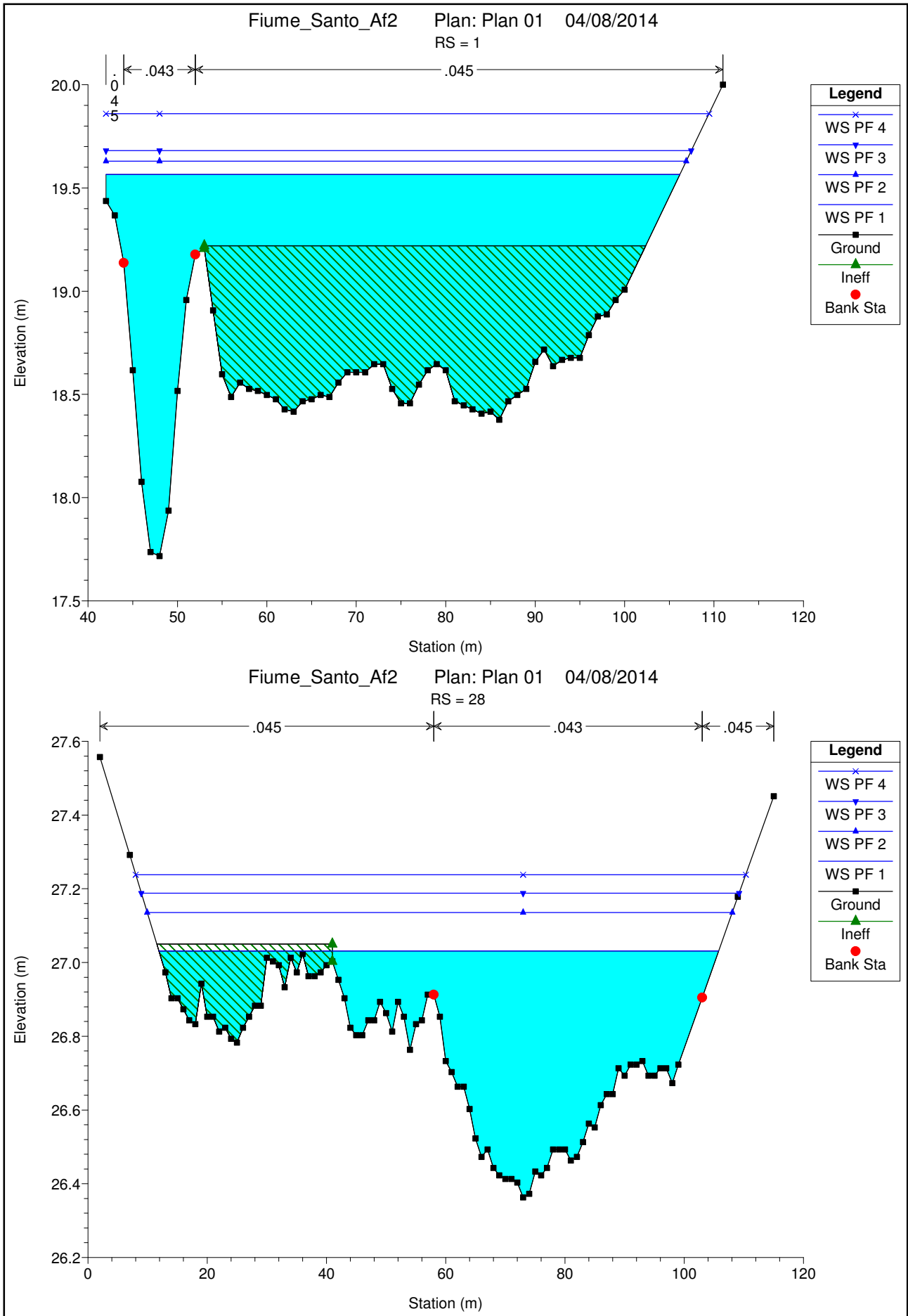


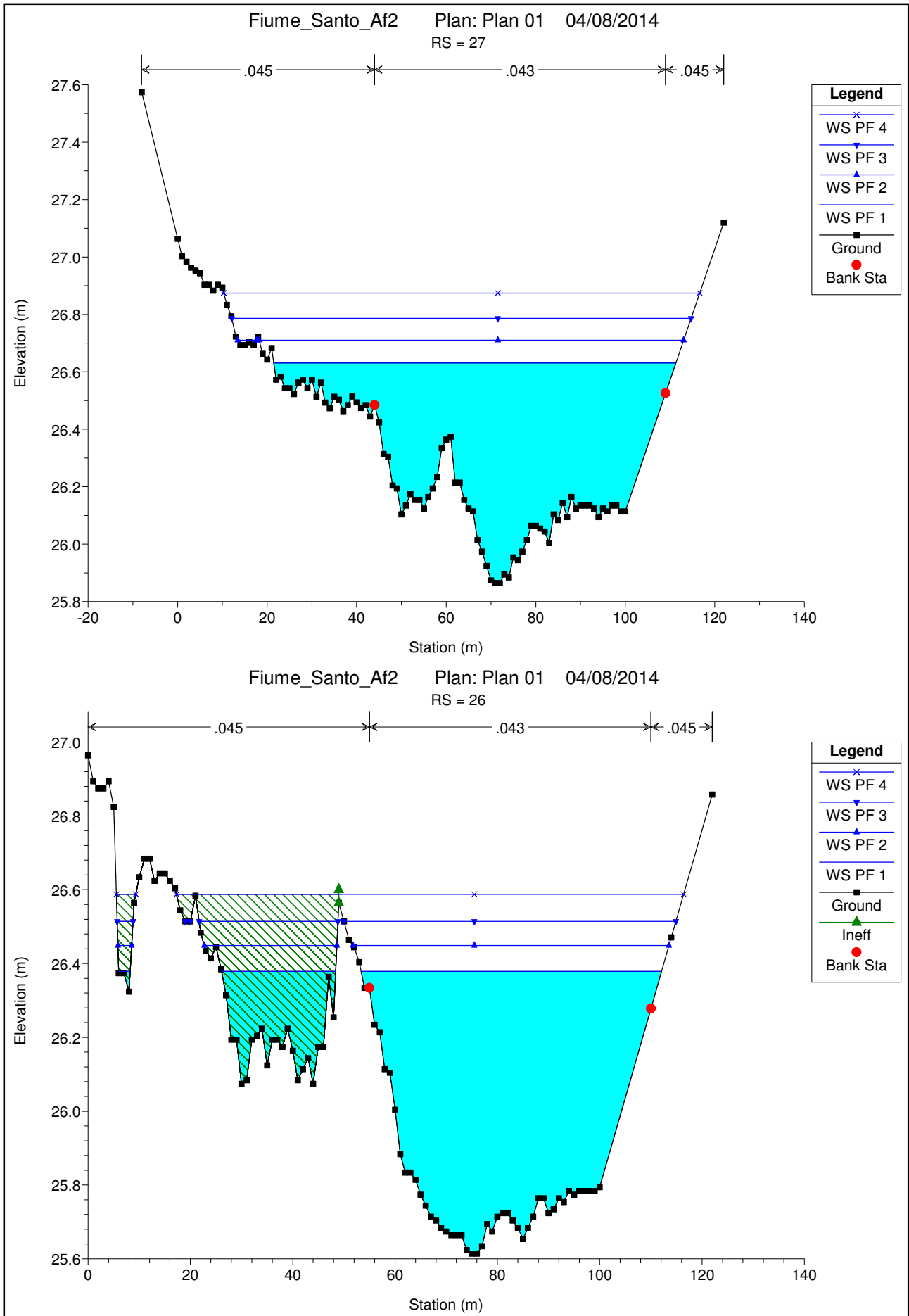
Legend	
WS PF 4	✕
WS PF 3	▼
WS PF 2	▲
WS PF 1	■
Ground	■

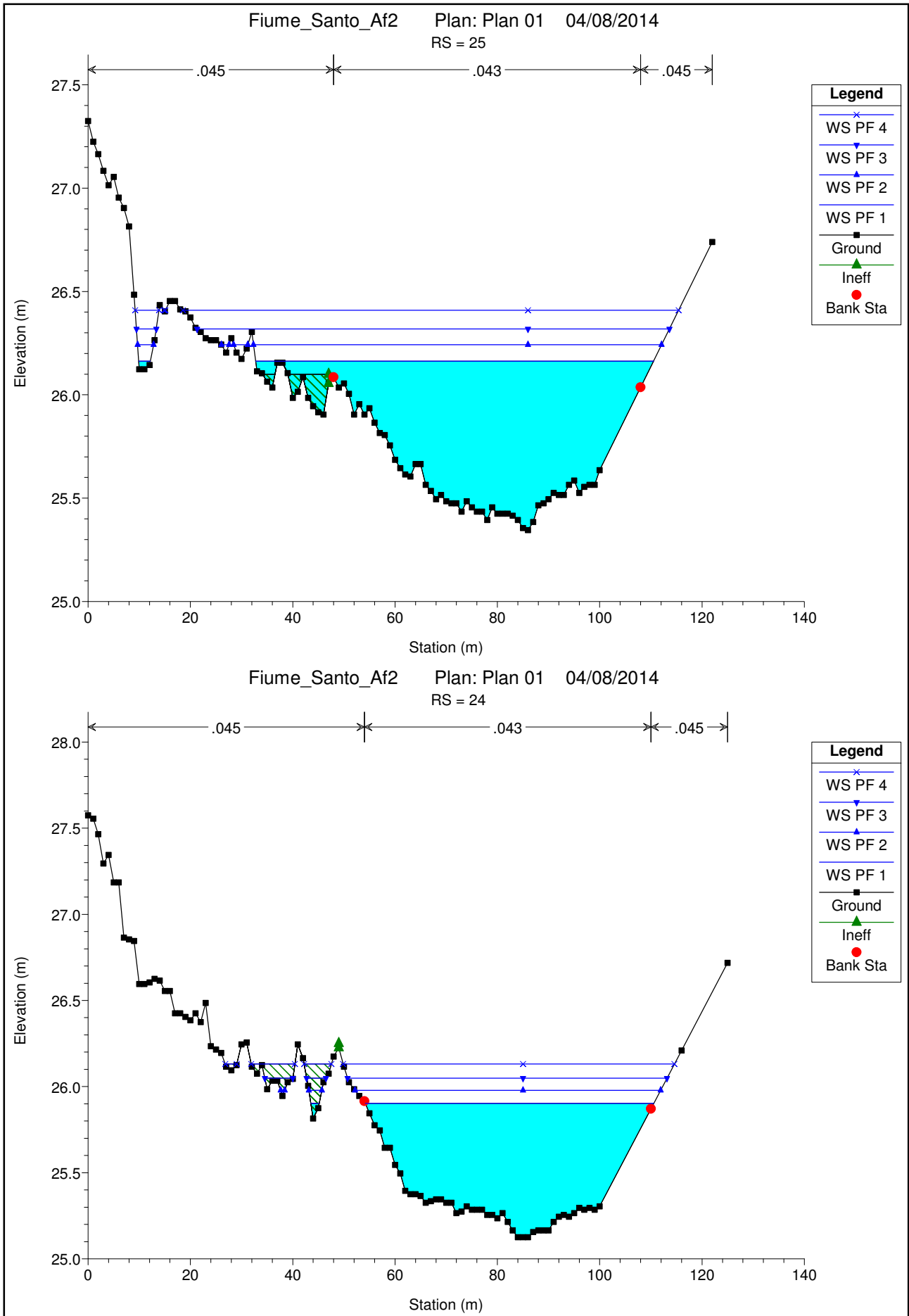
1 cm Horiz. = 20 m 1 cm Vert. = 2 m



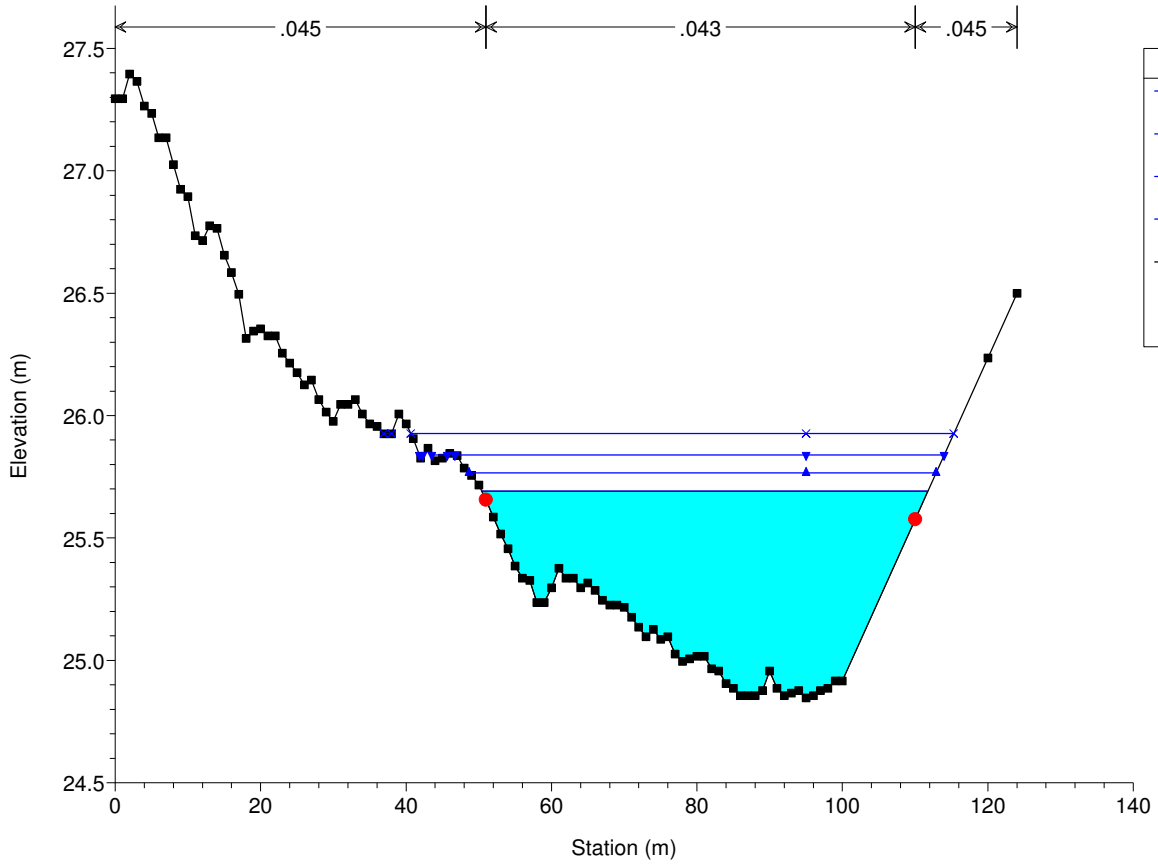
1 cm Horiz. = 20 m 1 cm Vert. = 2 m





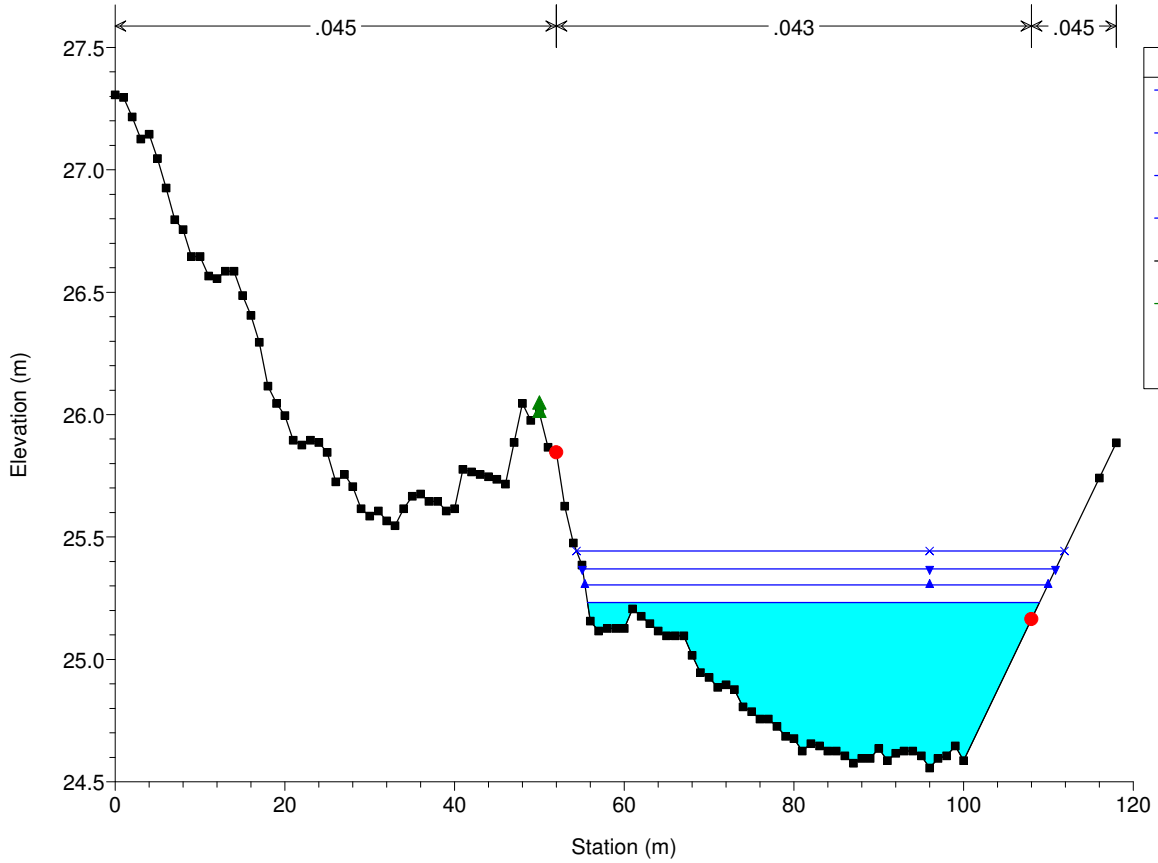


Fiume_Santo_Af2 Plan: Plan 01 04/08/2014
RS = 23

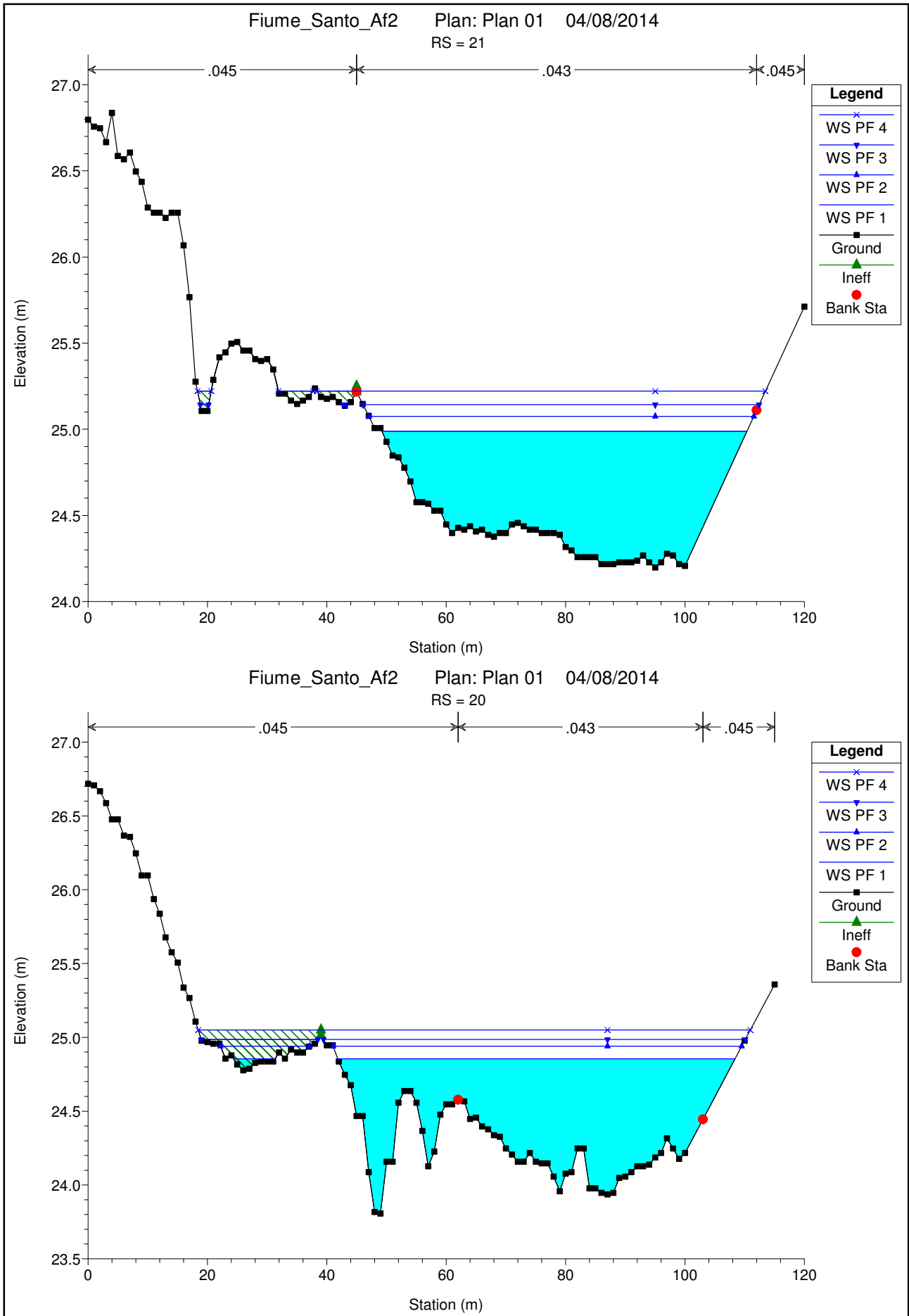


Legend	
WS PF 4	✕
WS PF 3	▼
WS PF 2	▲
WS PF 1	—
Ground	■
Bank Sta	●

Fiume_Santo_Af2 Plan: Plan 01 04/08/2014
RS = 22

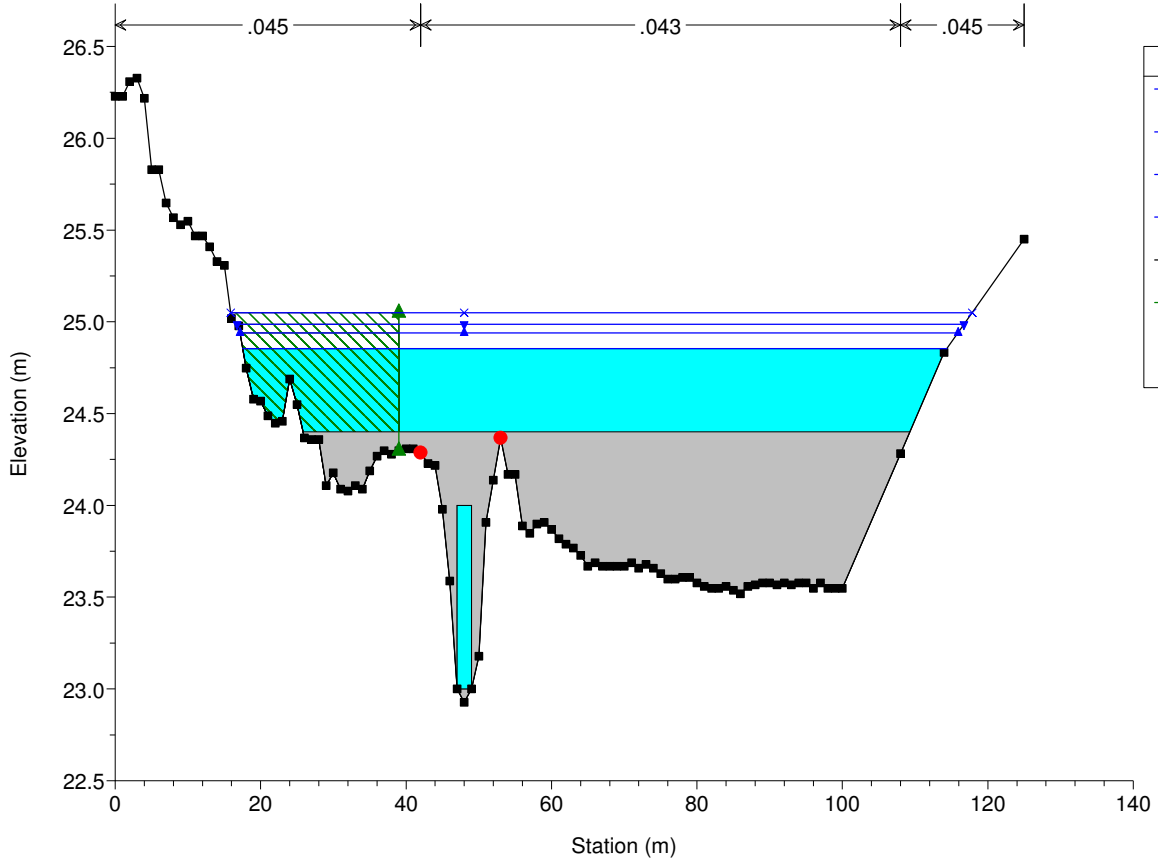


Legend	
WS PF 4	✕
WS PF 3	▼
WS PF 2	▲
WS PF 1	—
Ground	■
Ineff	▲
Bank Sta	●



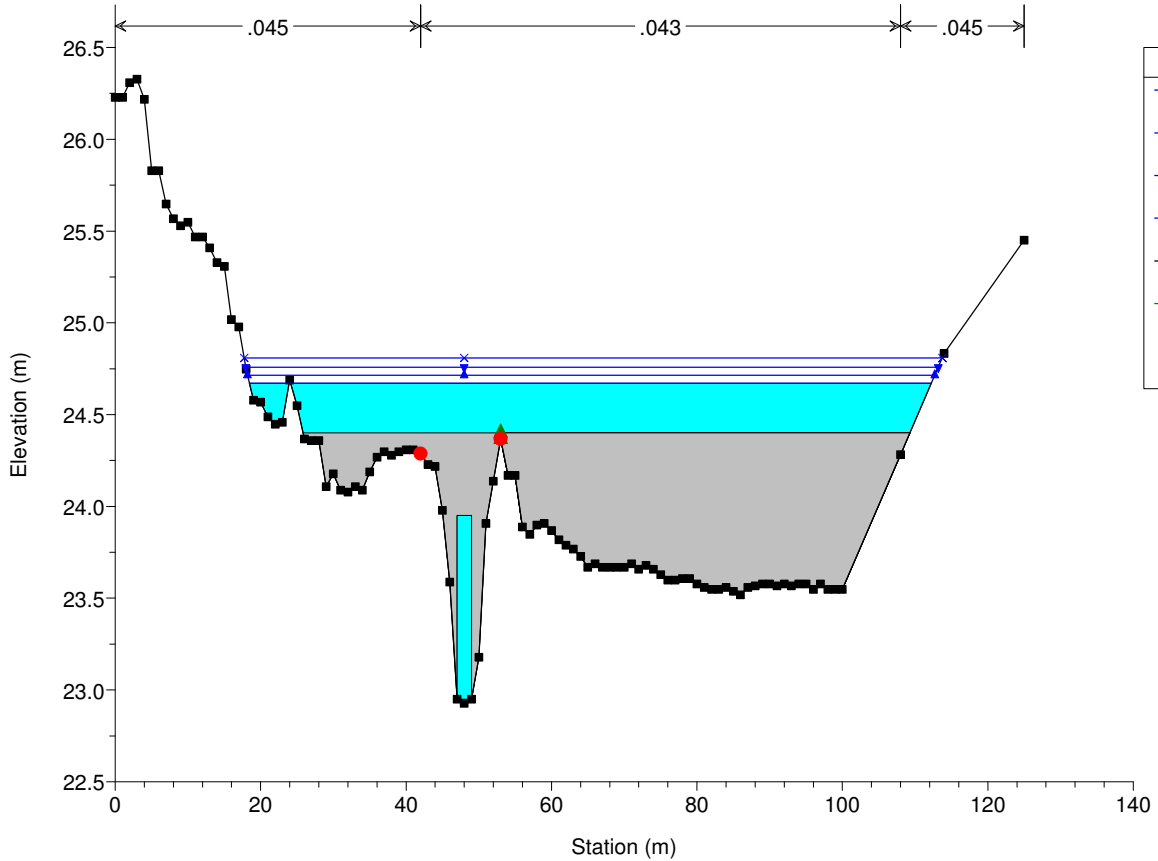
Fiume_Santo_Af2 Plan: Plan 01 04/08/2014

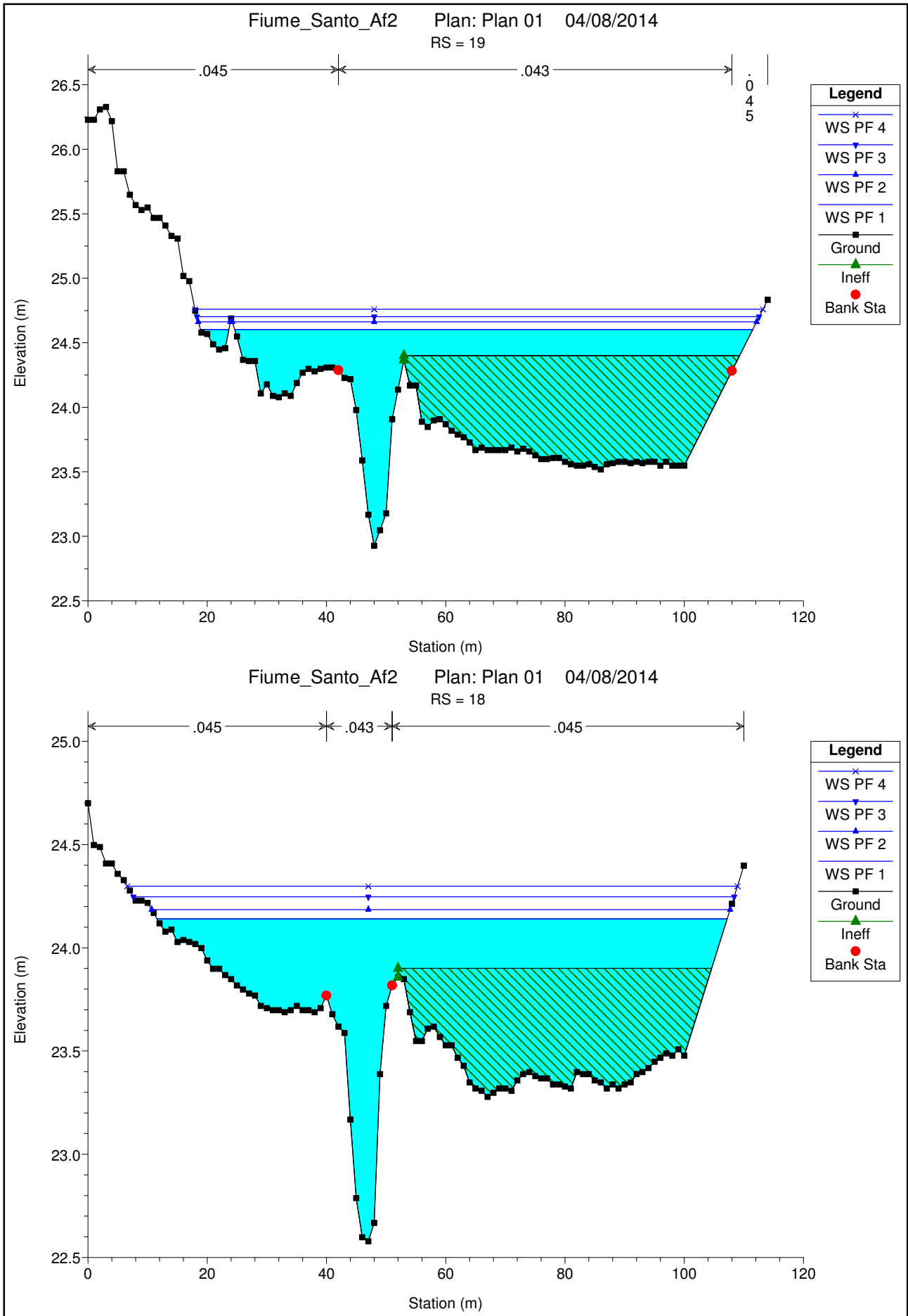
RS = 19.5 Culv ponticello

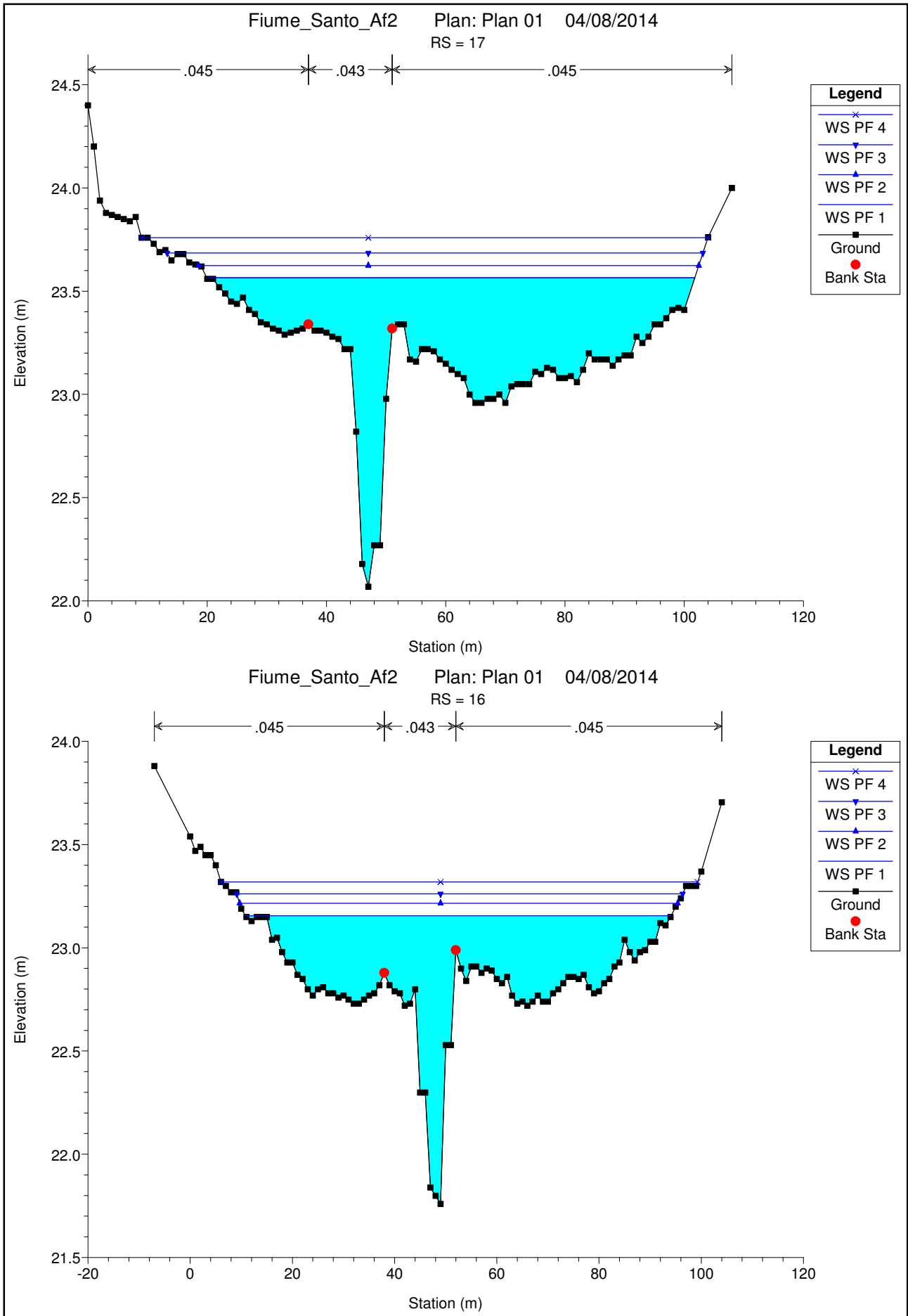


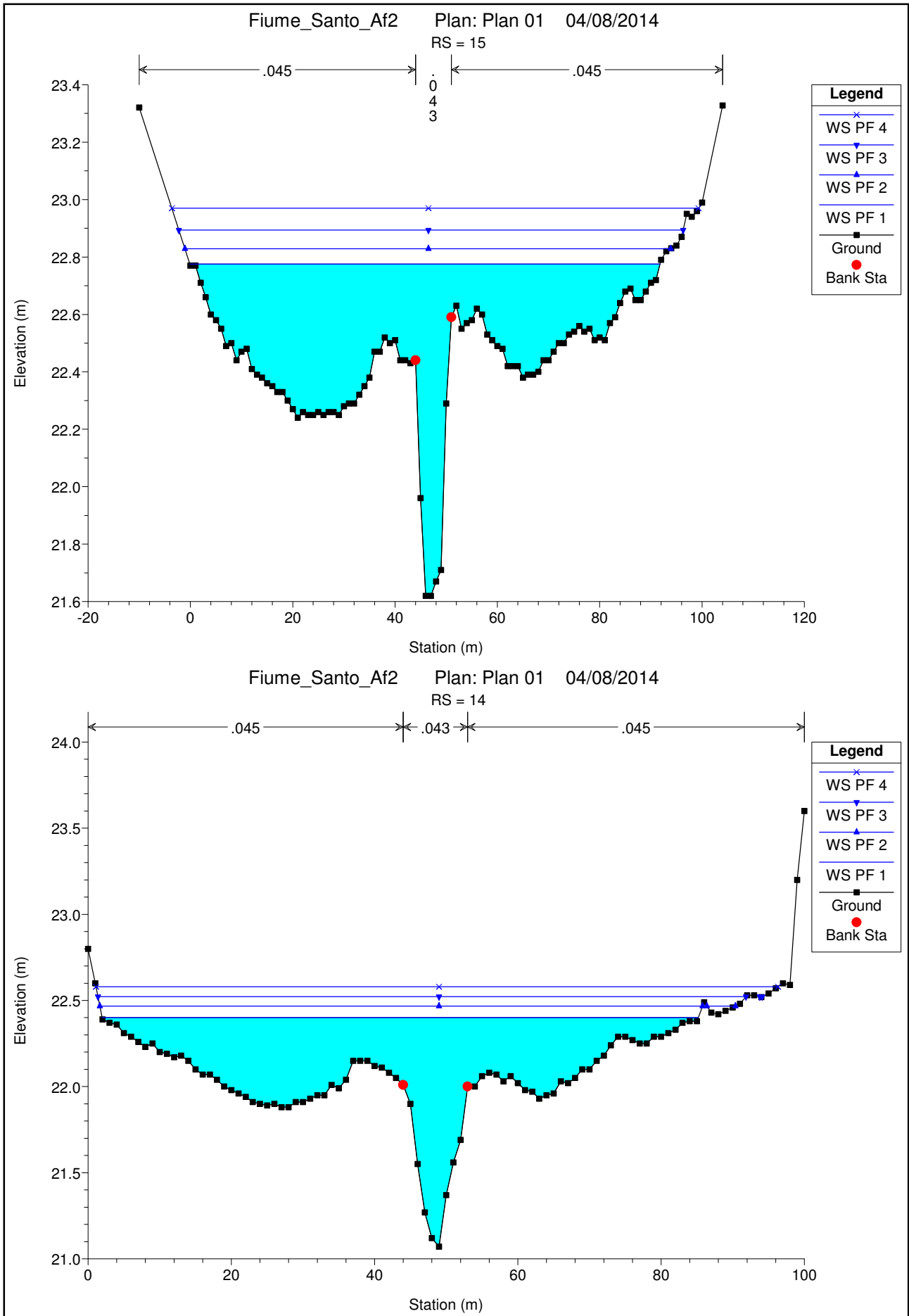
Fiume_Santo_Af2 Plan: Plan 01 04/08/2014

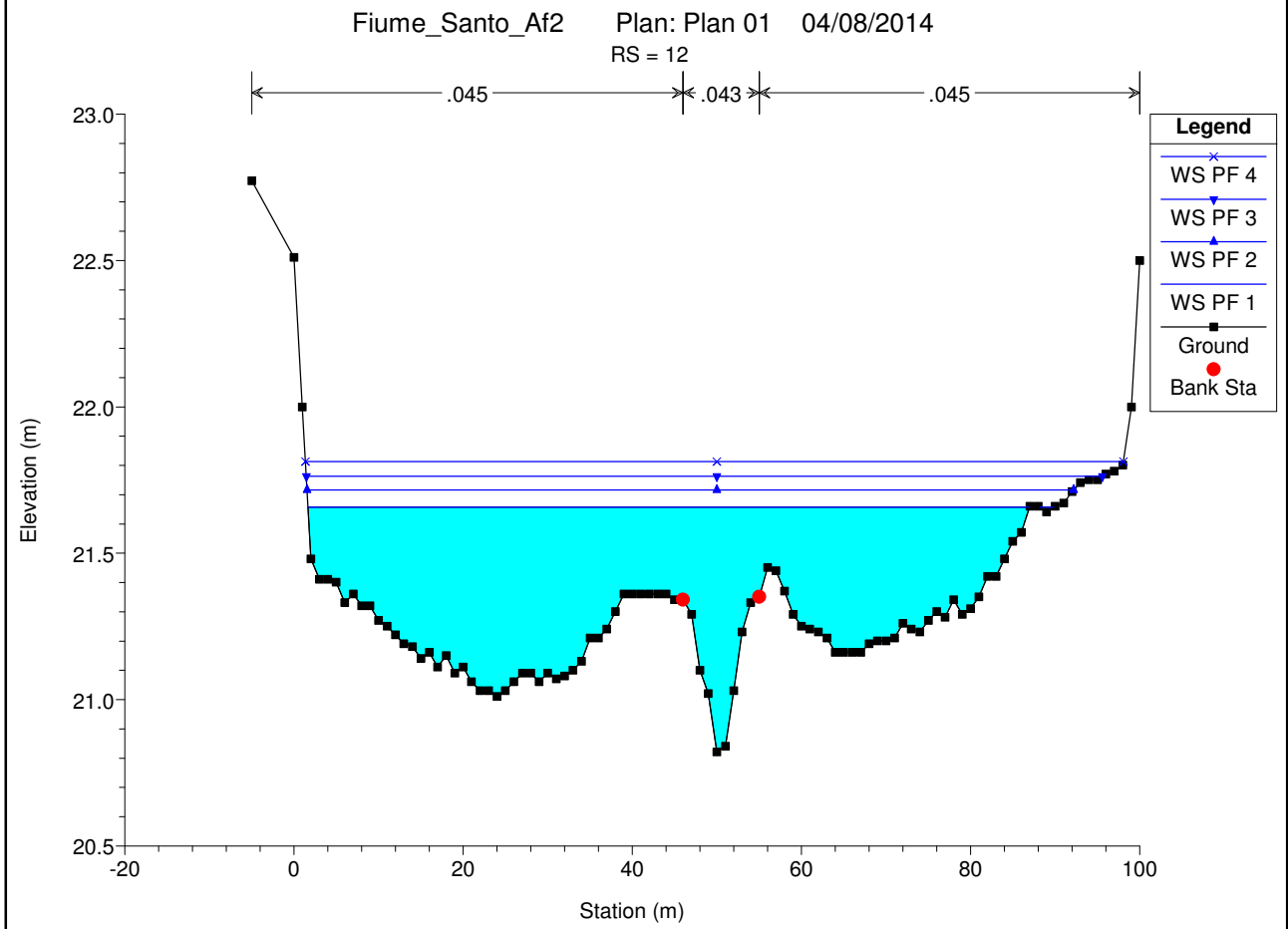
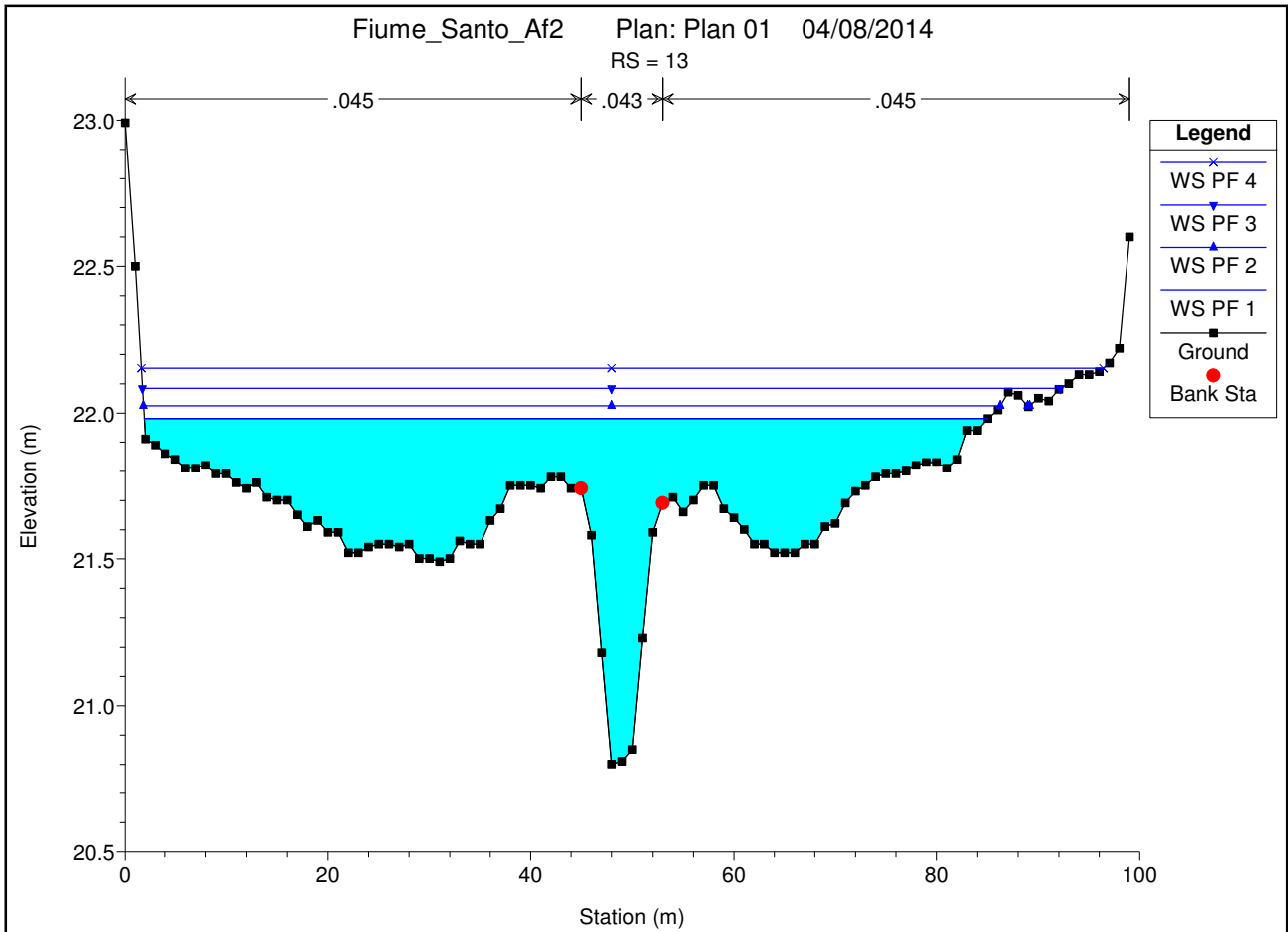
RS = 19.5 Culv ponticello

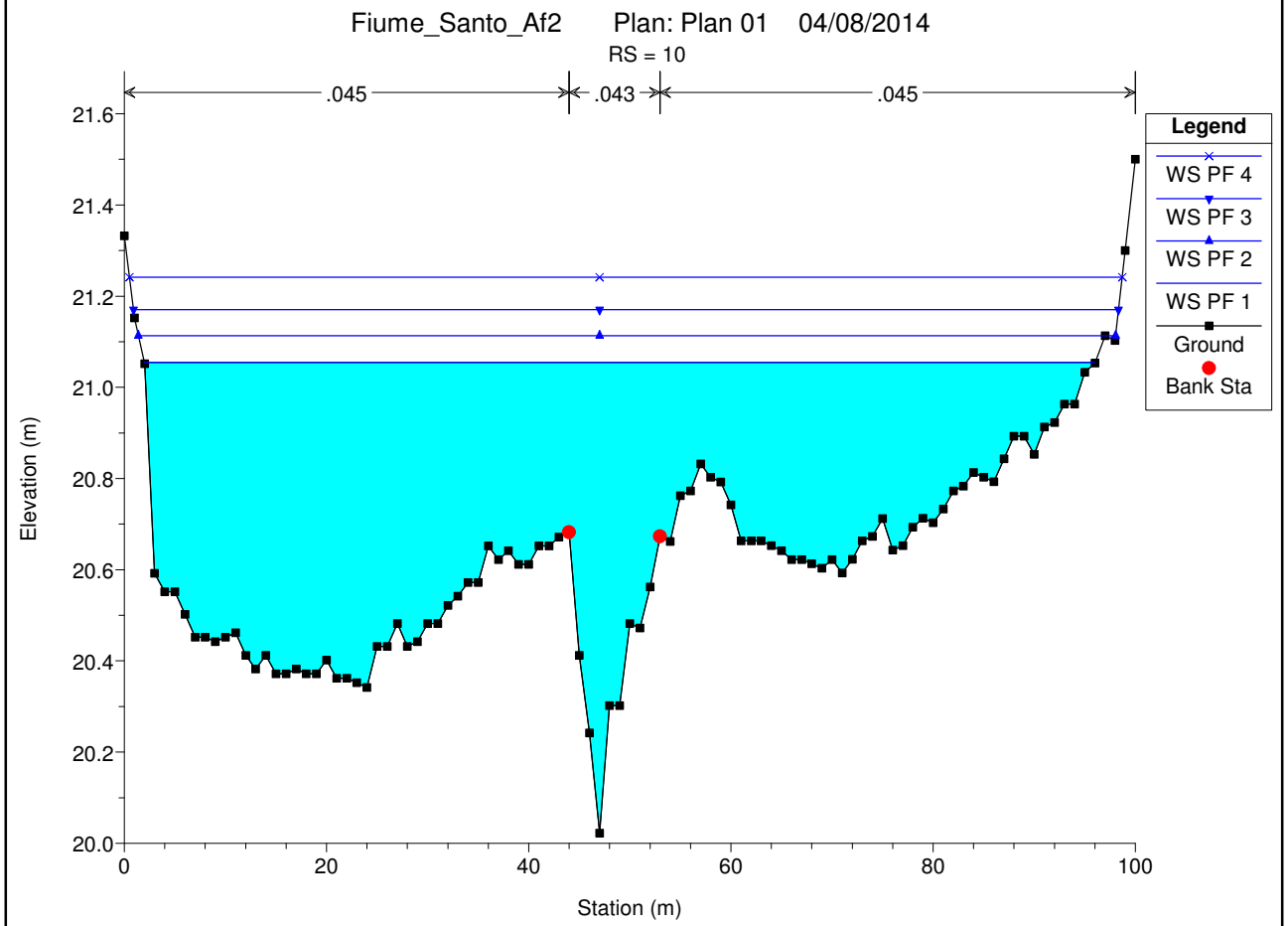
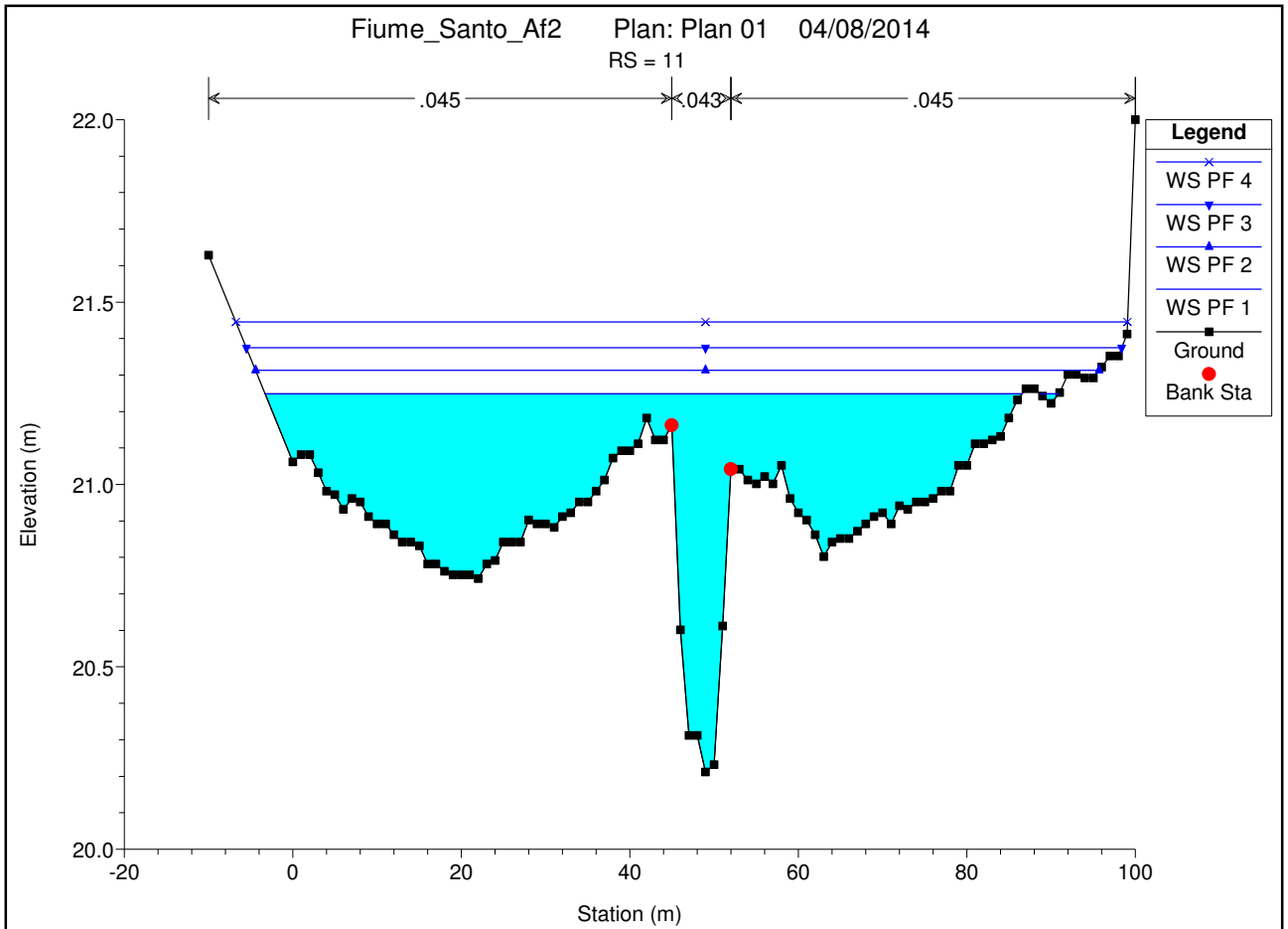


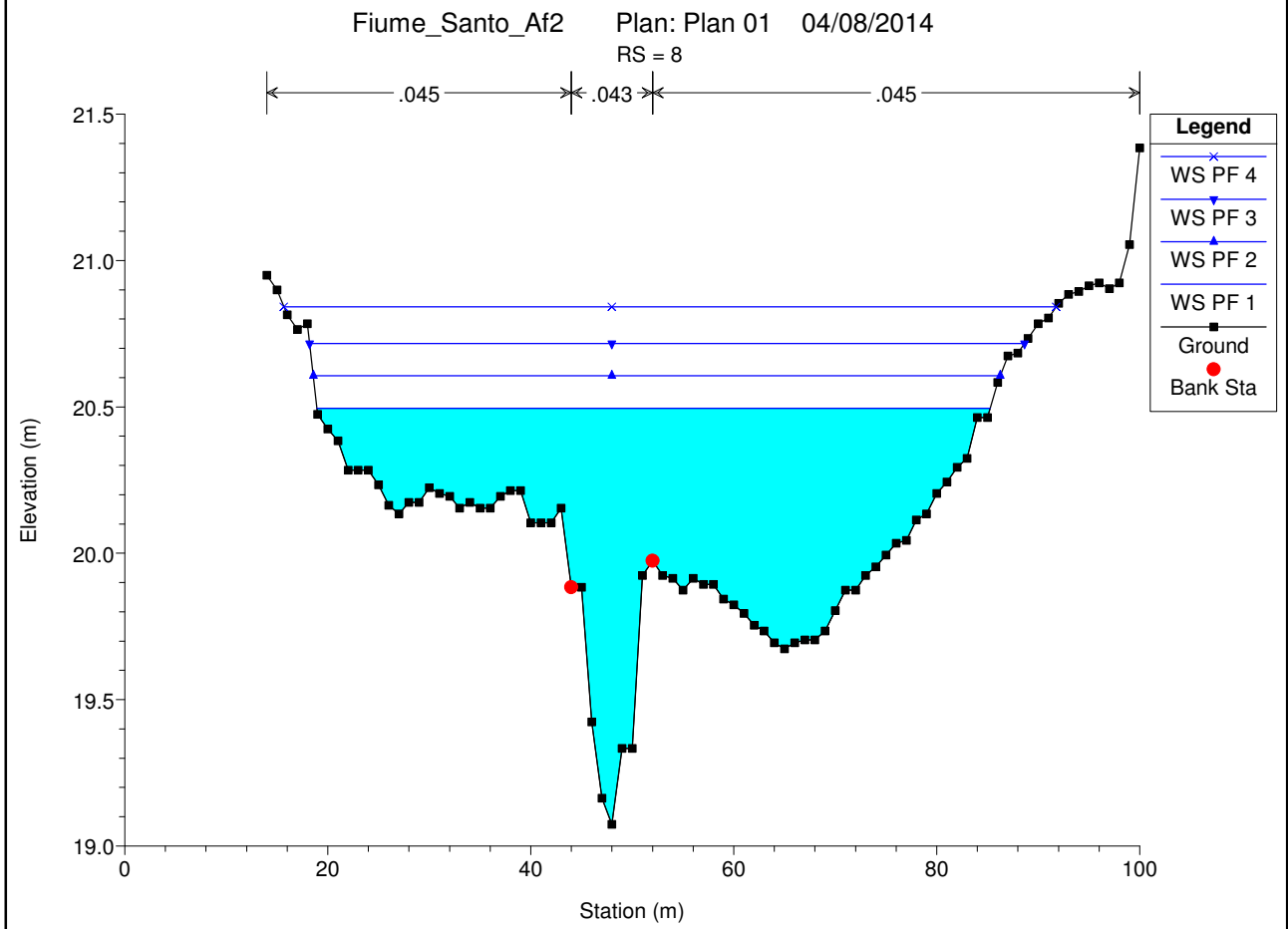
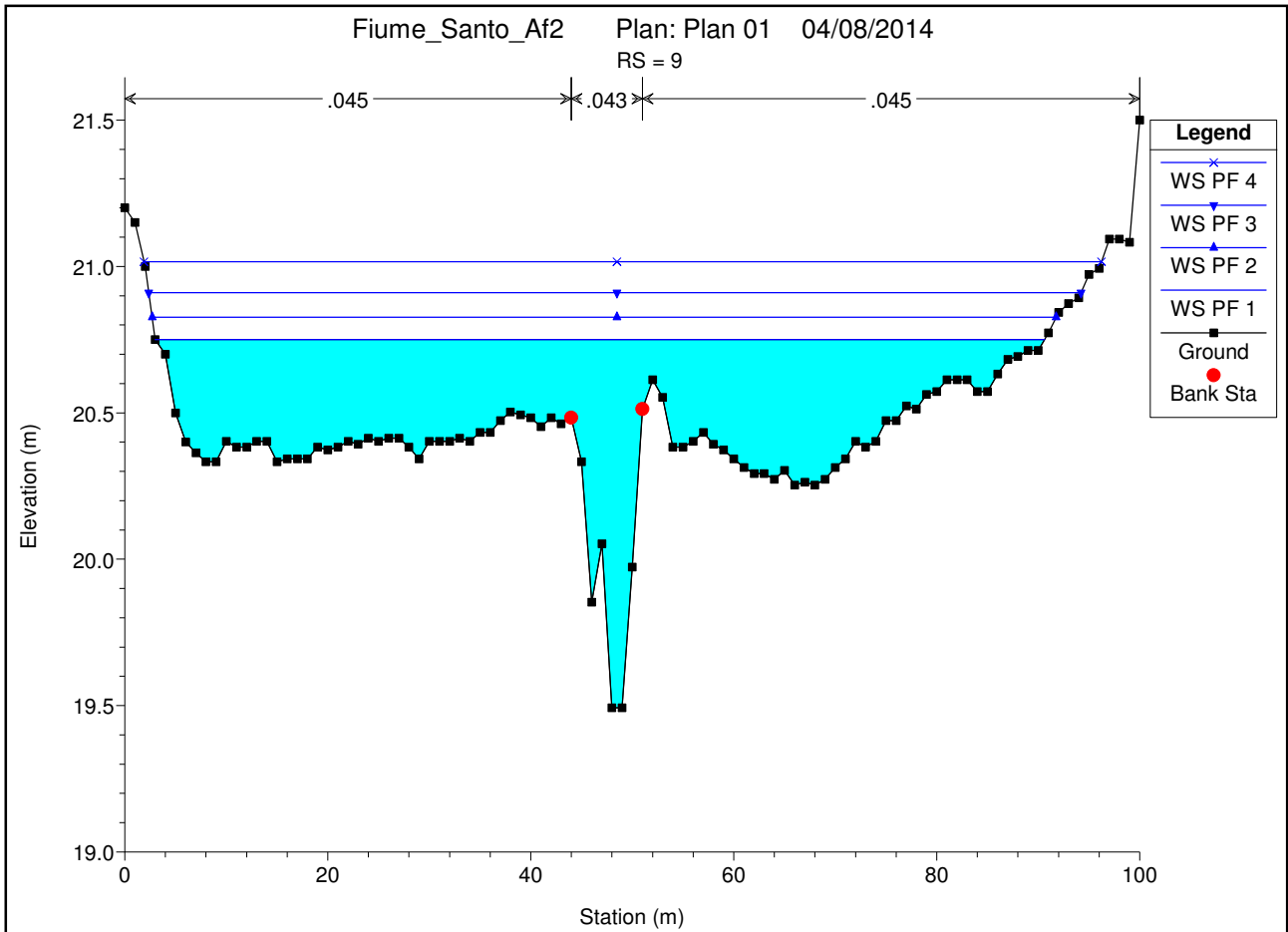


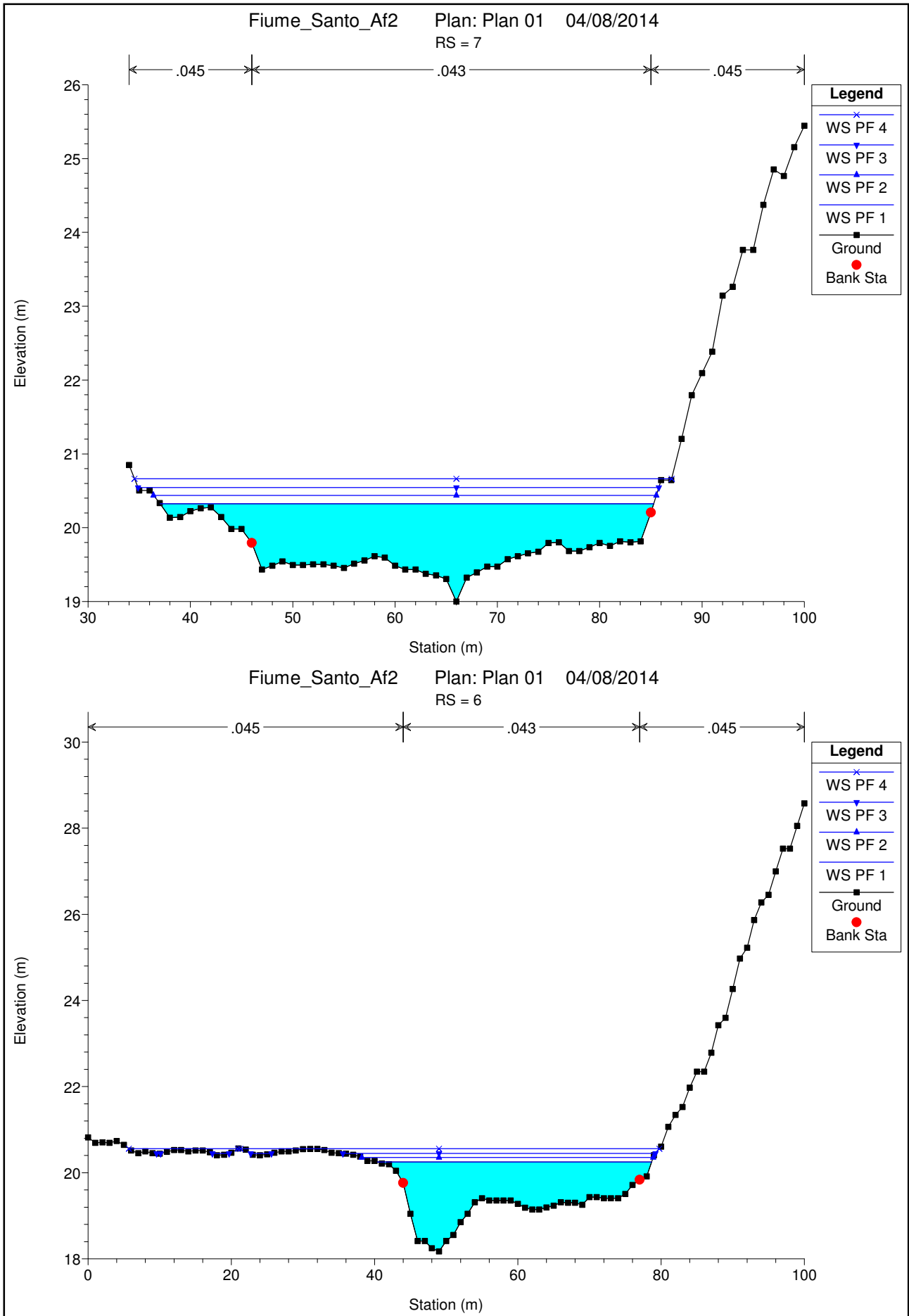


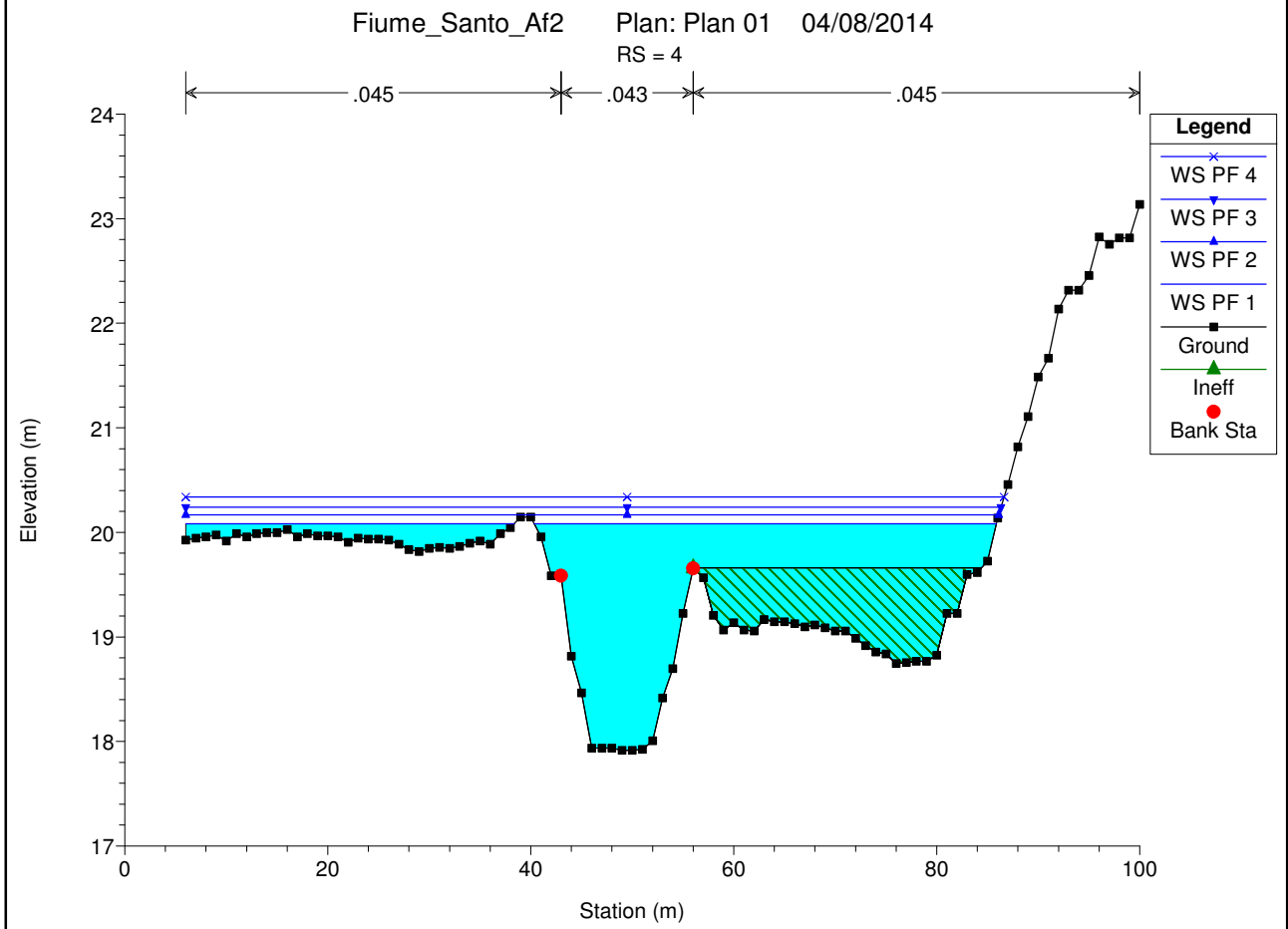
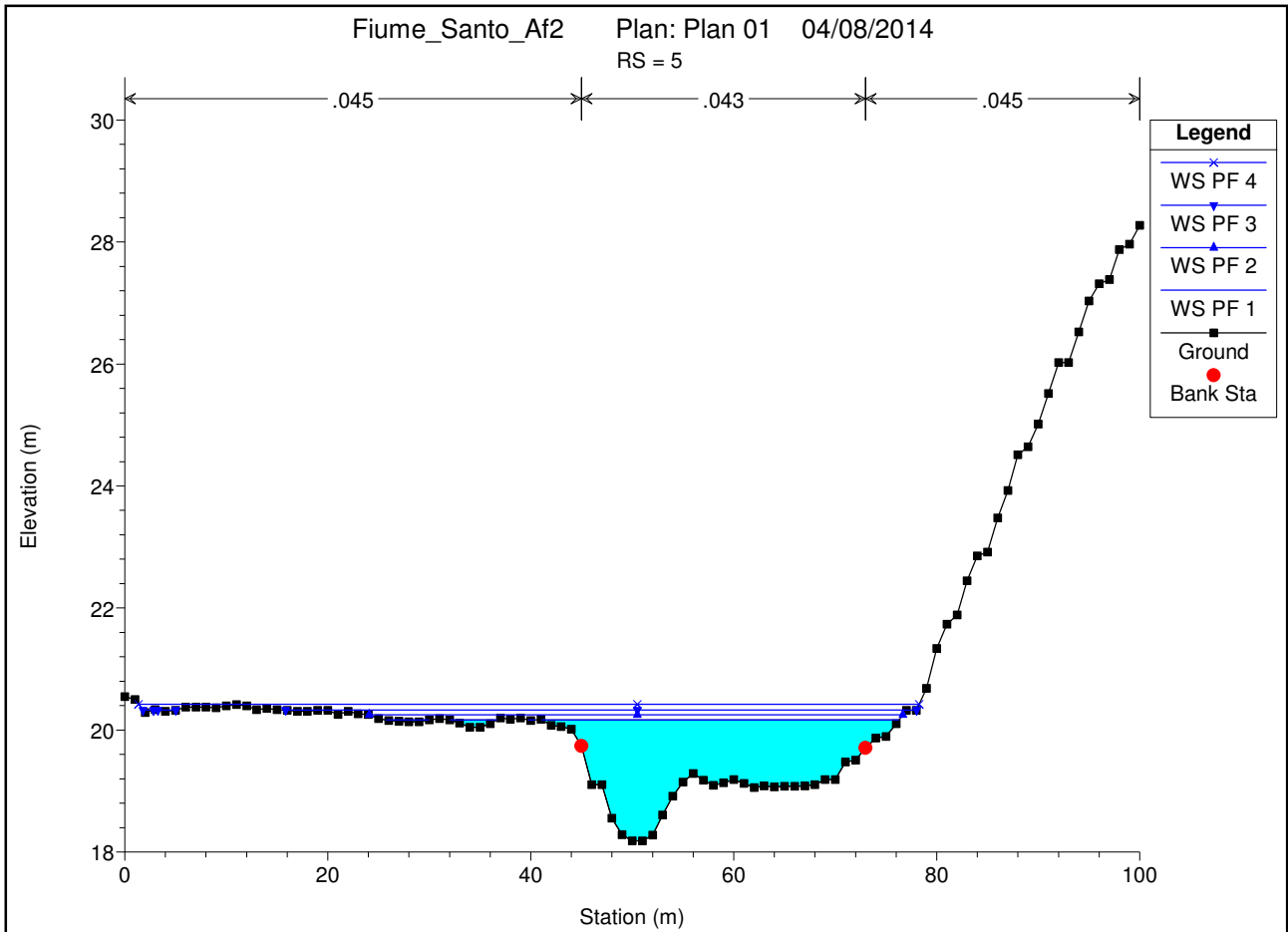




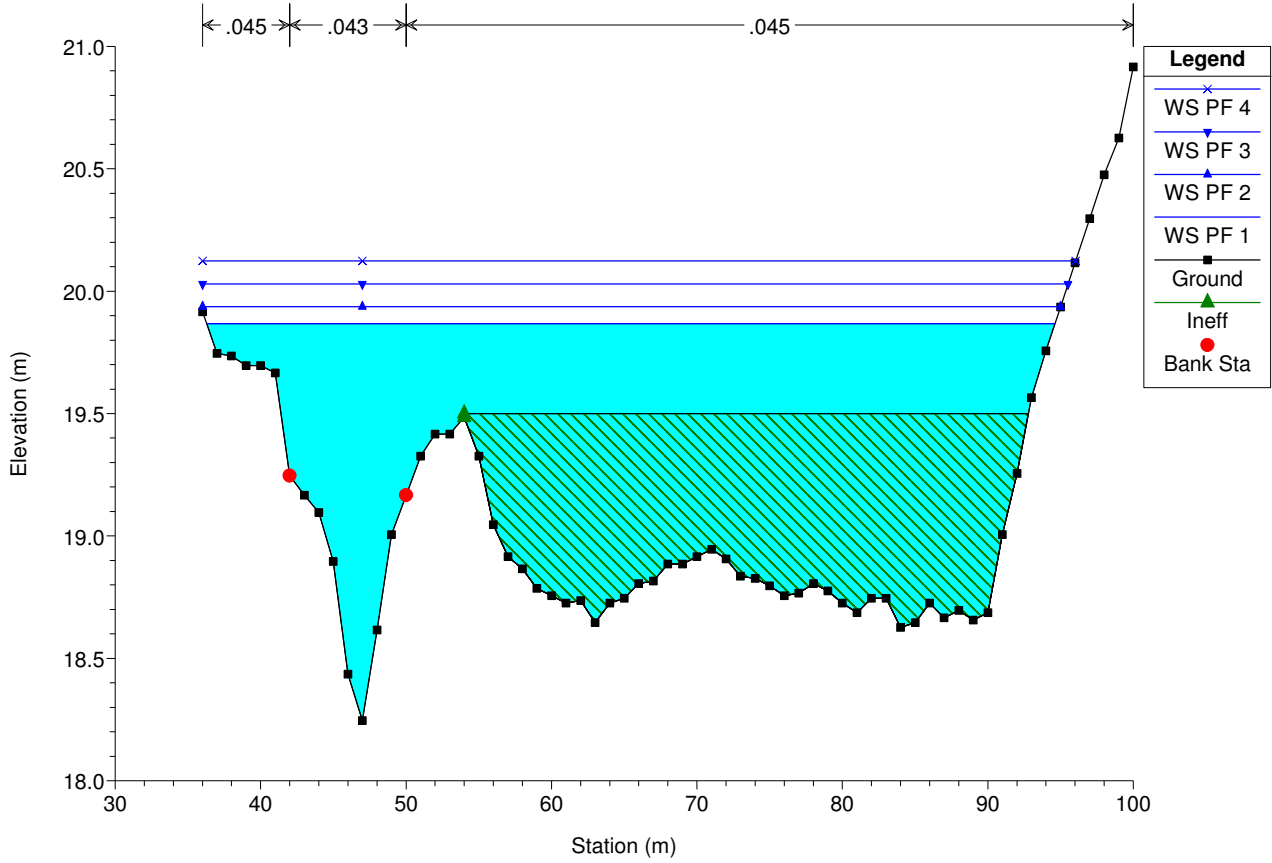








Fiume_Santo_Af2 Plan: Plan 01 04/08/2014
RS = 3



Fiume_Santo_Af2 Plan: Plan 01 04/08/2014
RS = 2

