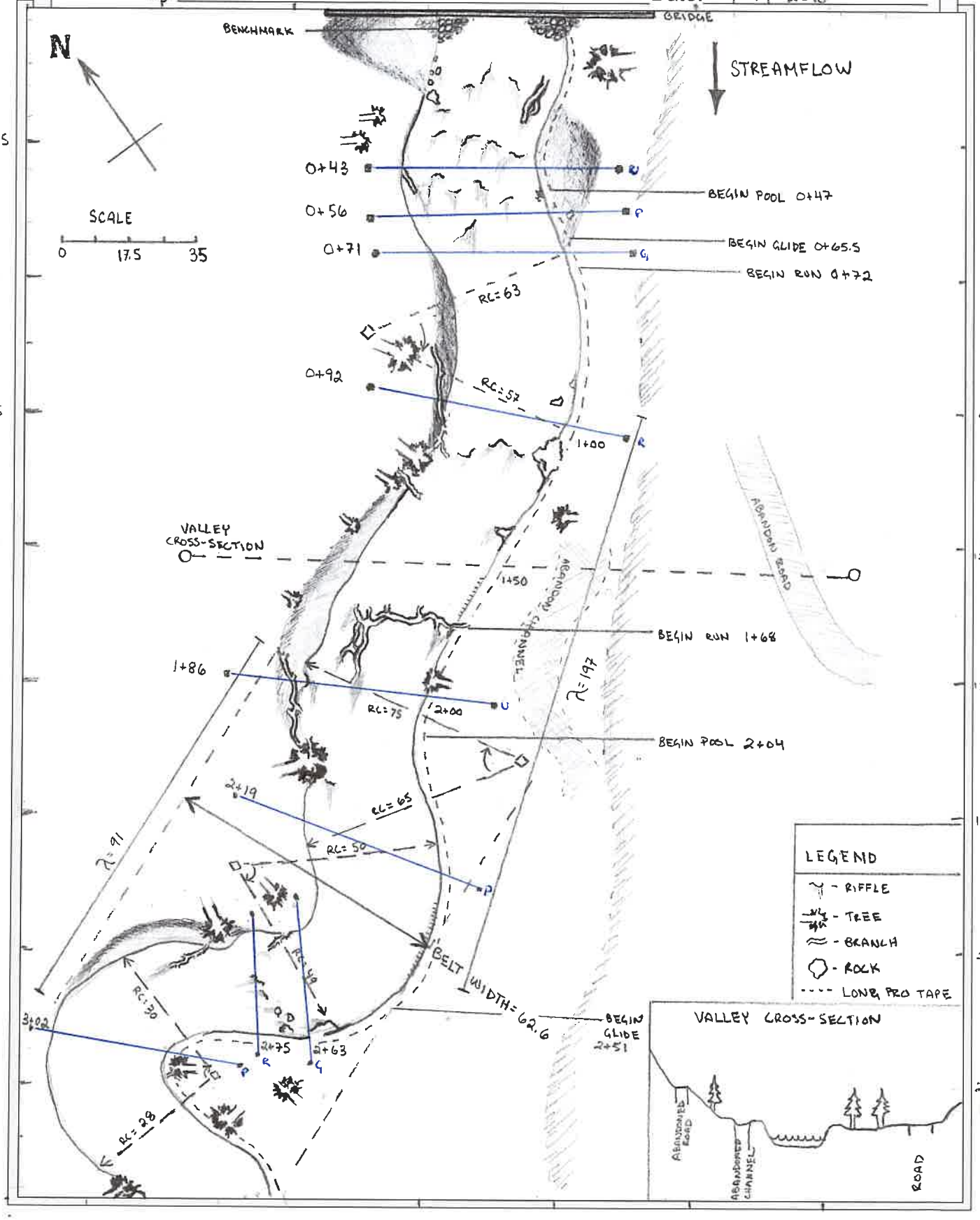
AREA-SITE LOCATION....REACH MAP

Stream/Drainage: MARSH RUN Site/Reach: 2

Drawn By: Date: 4-19-2018



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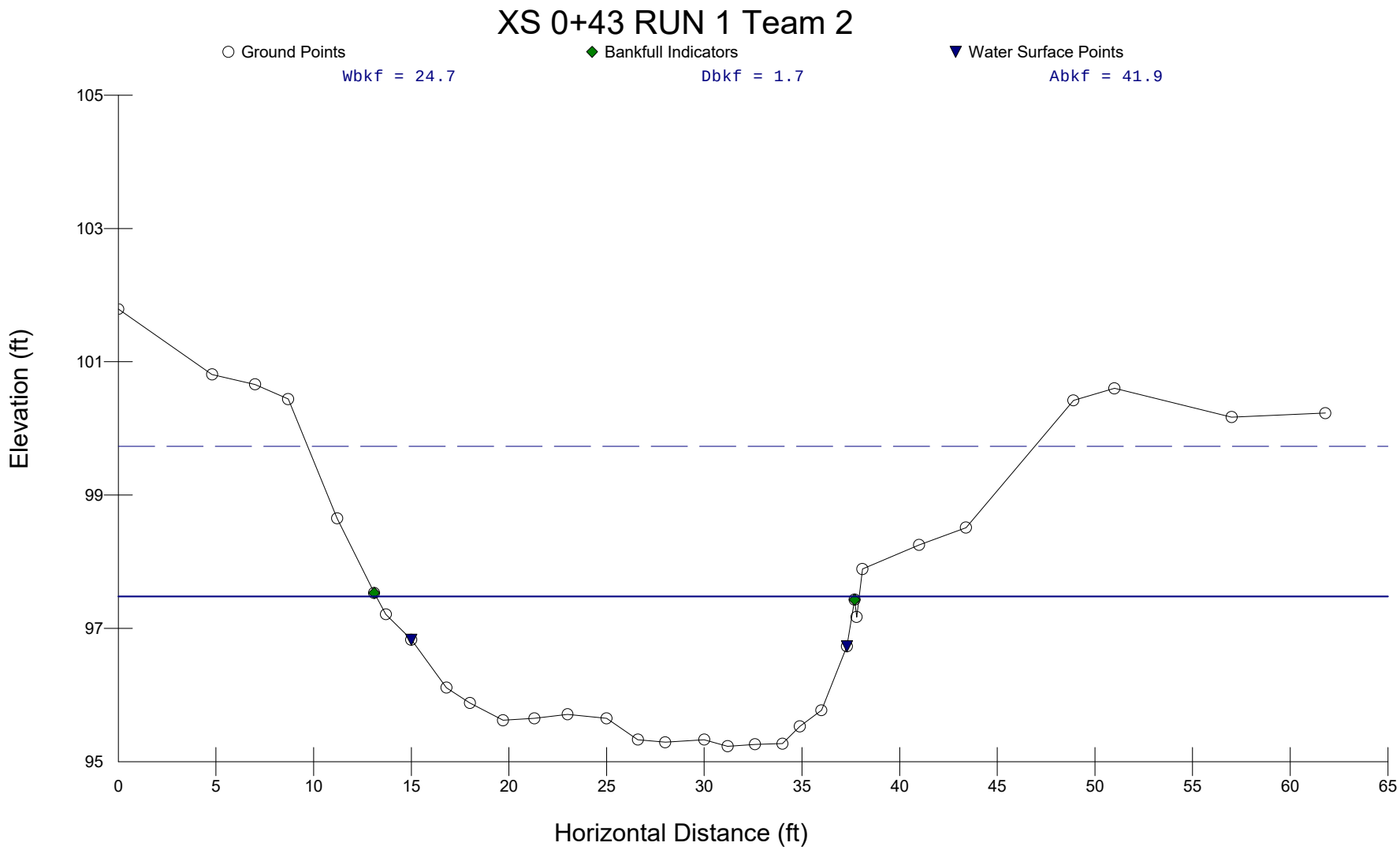
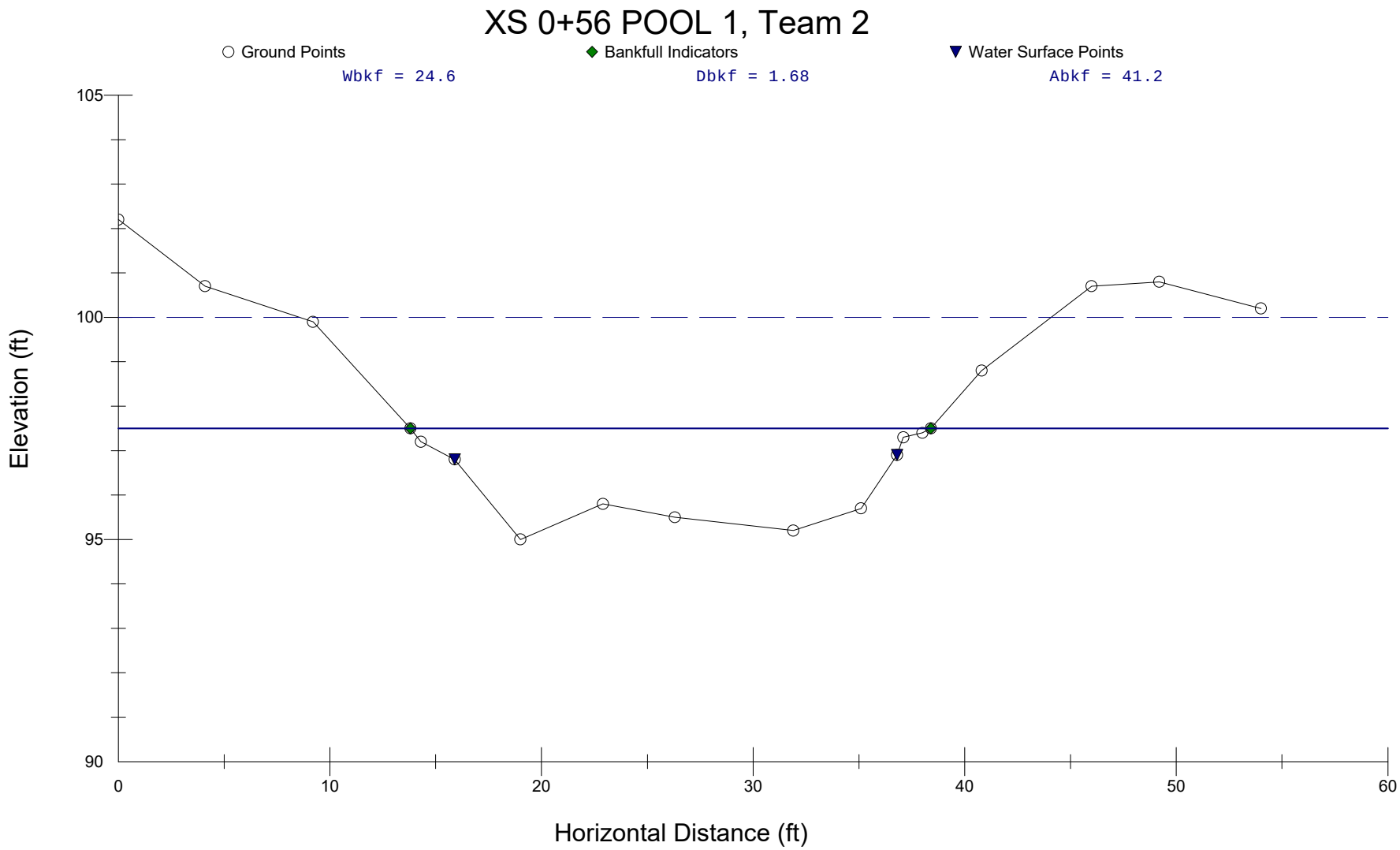
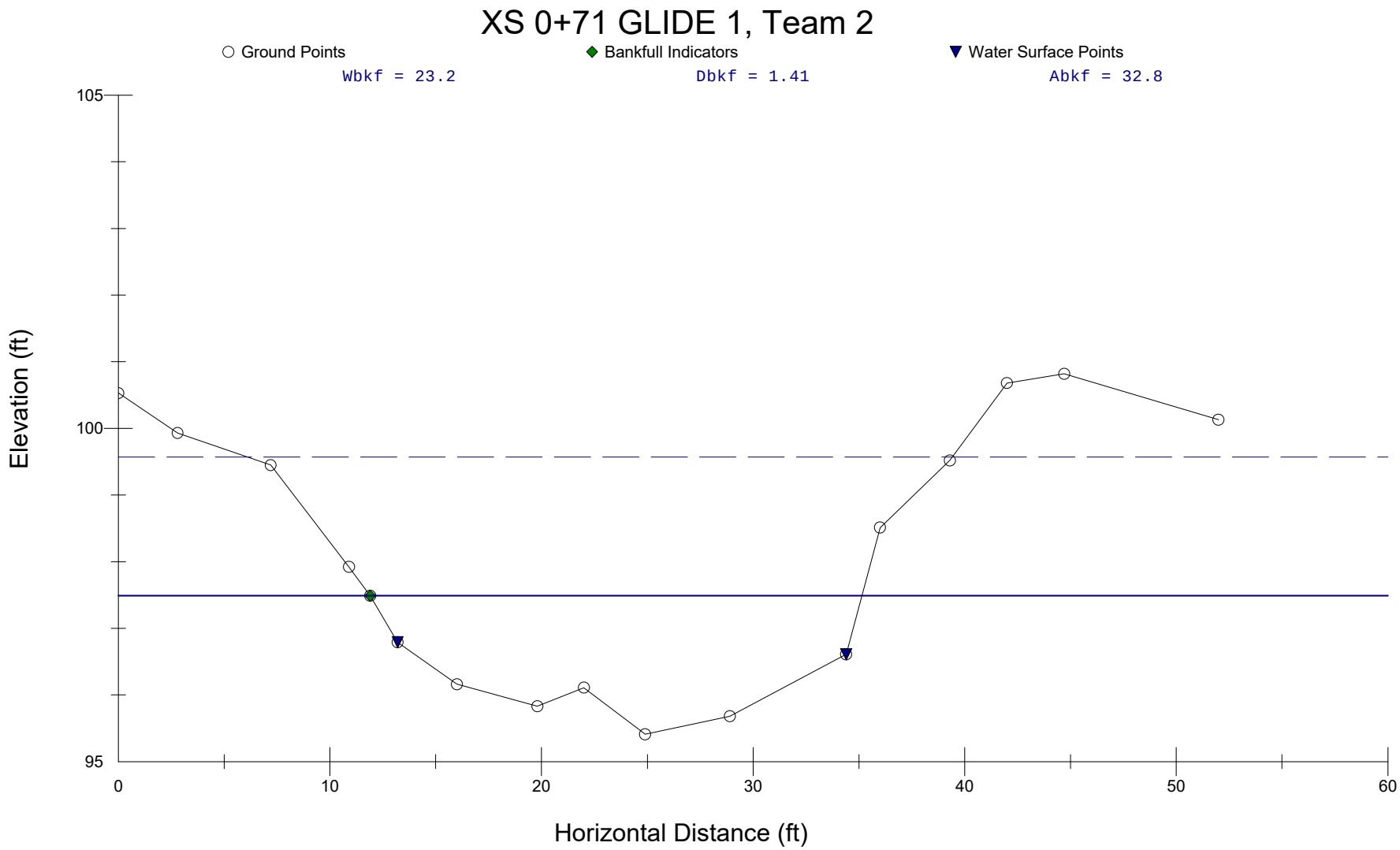
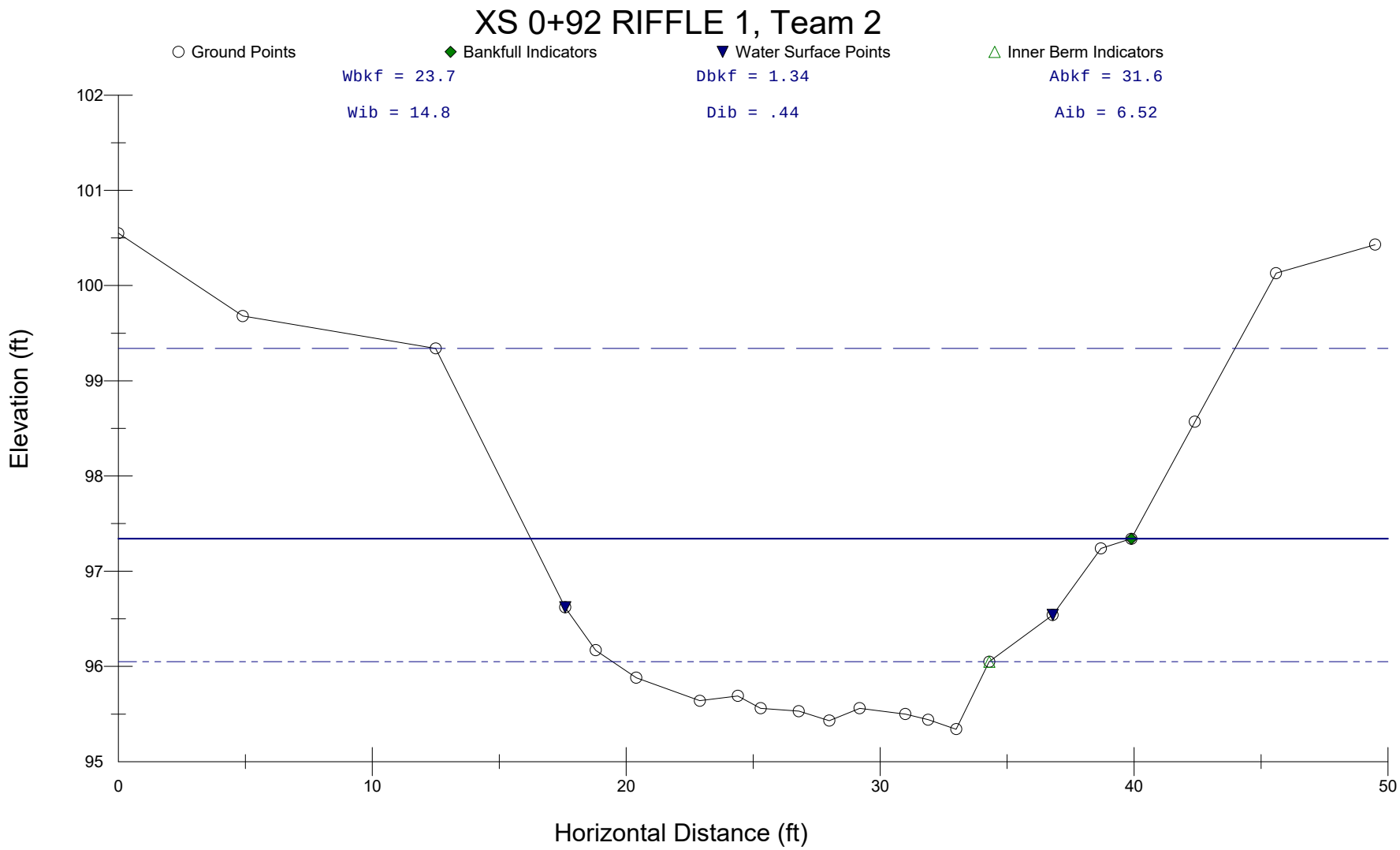
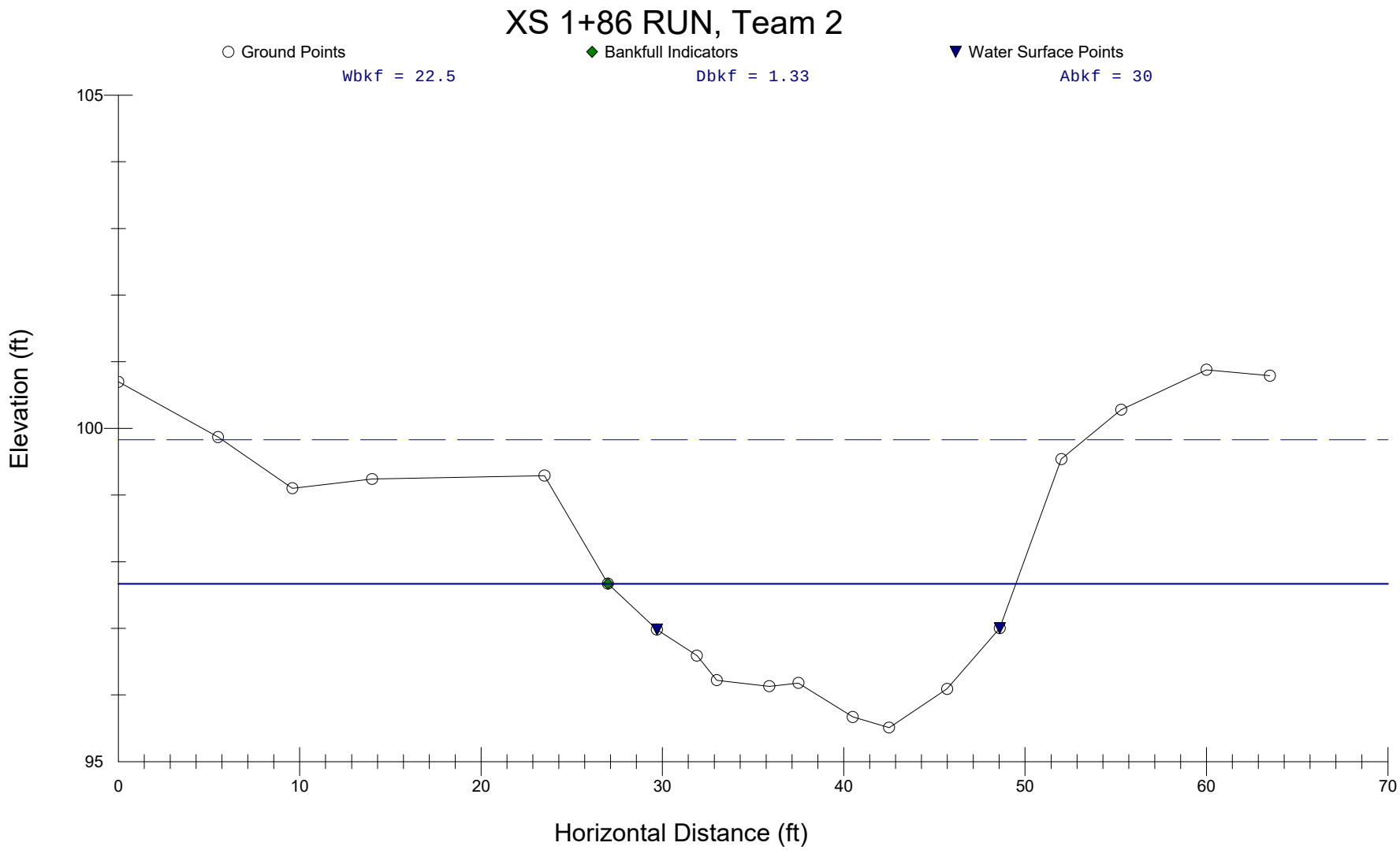
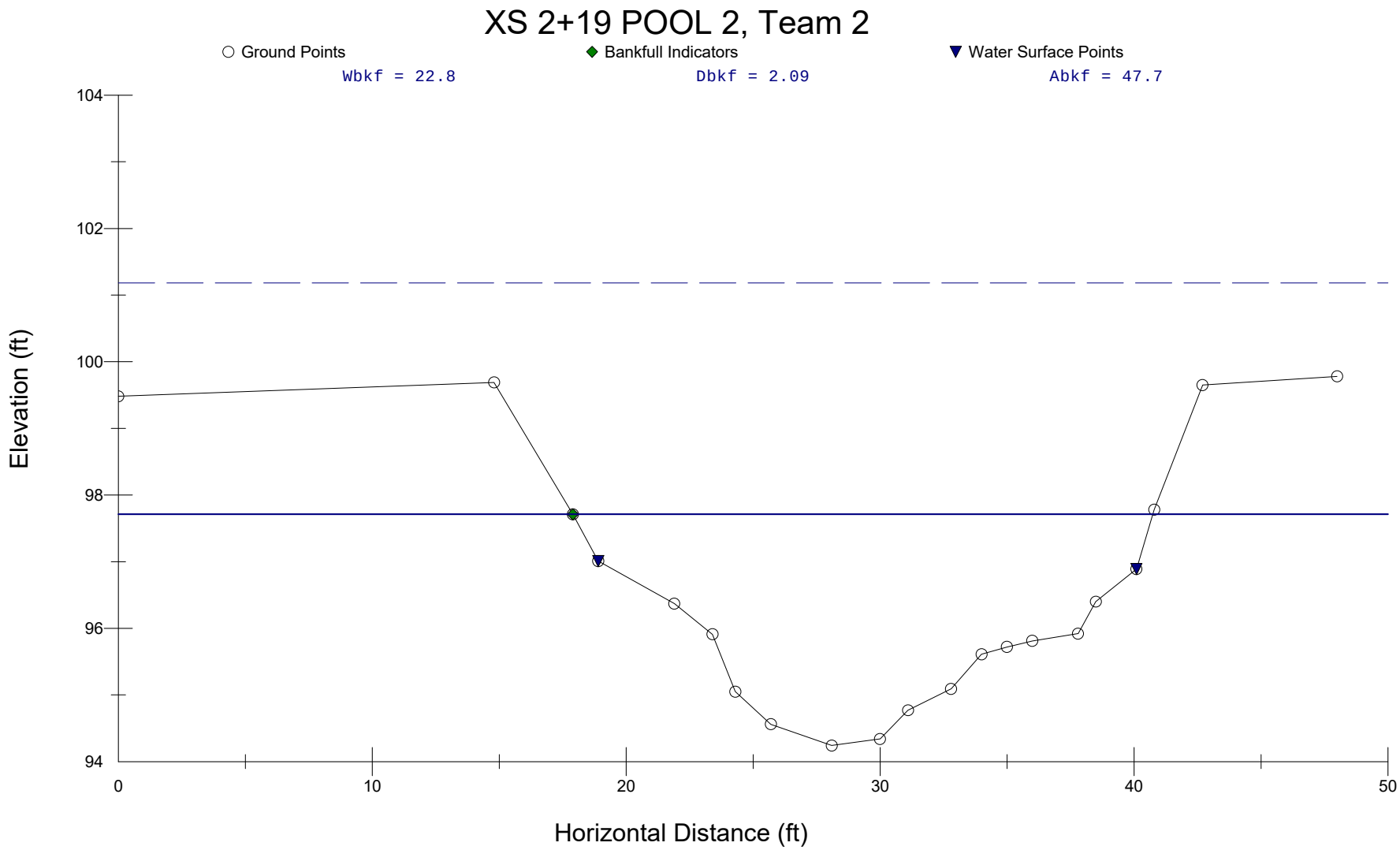

XS 0+43 RUN 1 Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 24.7
Dbkf = 1.7
Abkf = 41.9
Elevation (ft)
105
103
101
99
97
95
0
5
10
15
20
25
30
35
40
45
50
55
60
65
Horizontal Distance (ft)

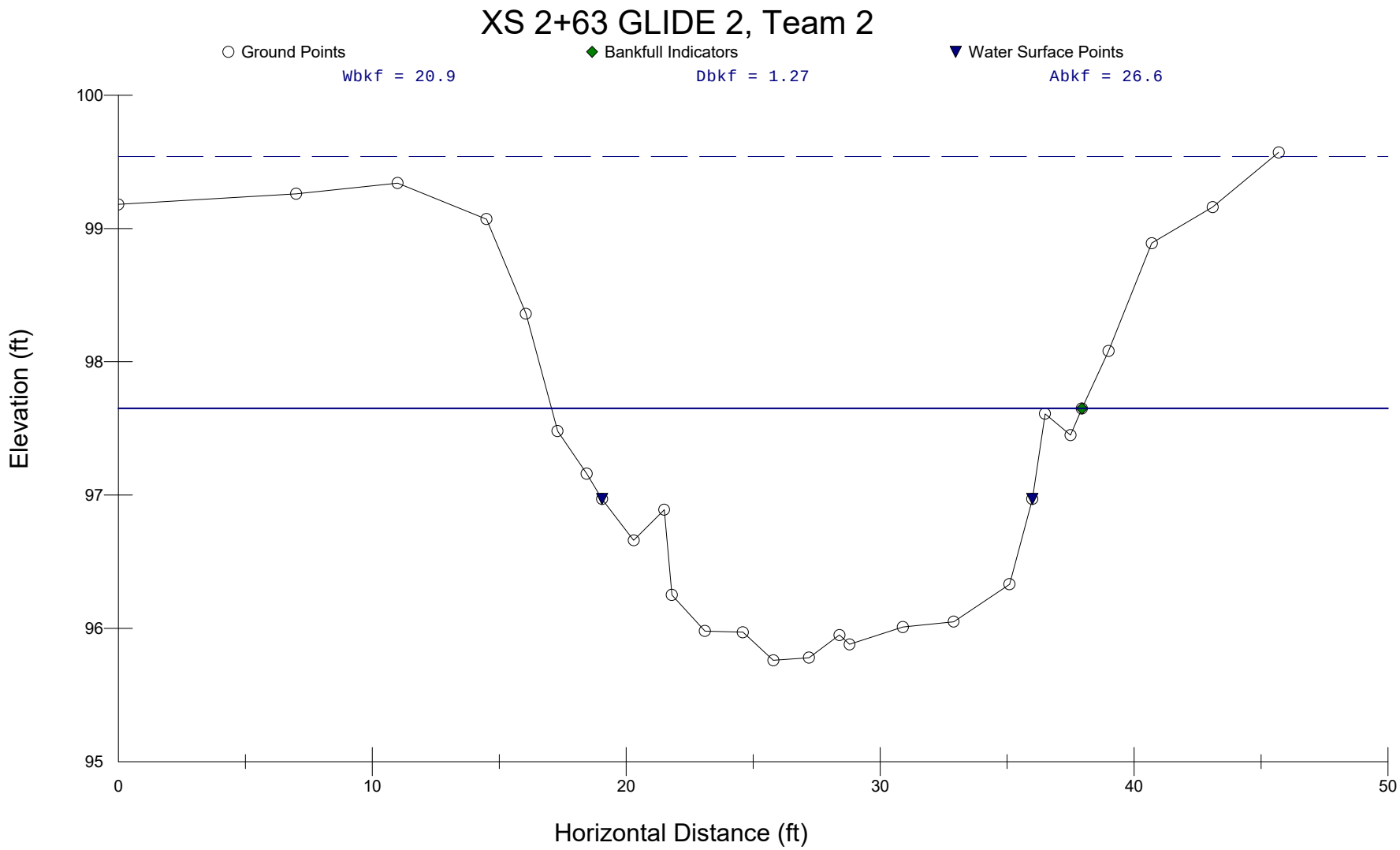

XS 0+56 POOL 1, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 24.6
Dbkf = 1.68
Abkf = 41.2
105
100
95
90
Elevation (ft)
0
10
20
30
40
50
60
Horizontal Distance (ft)

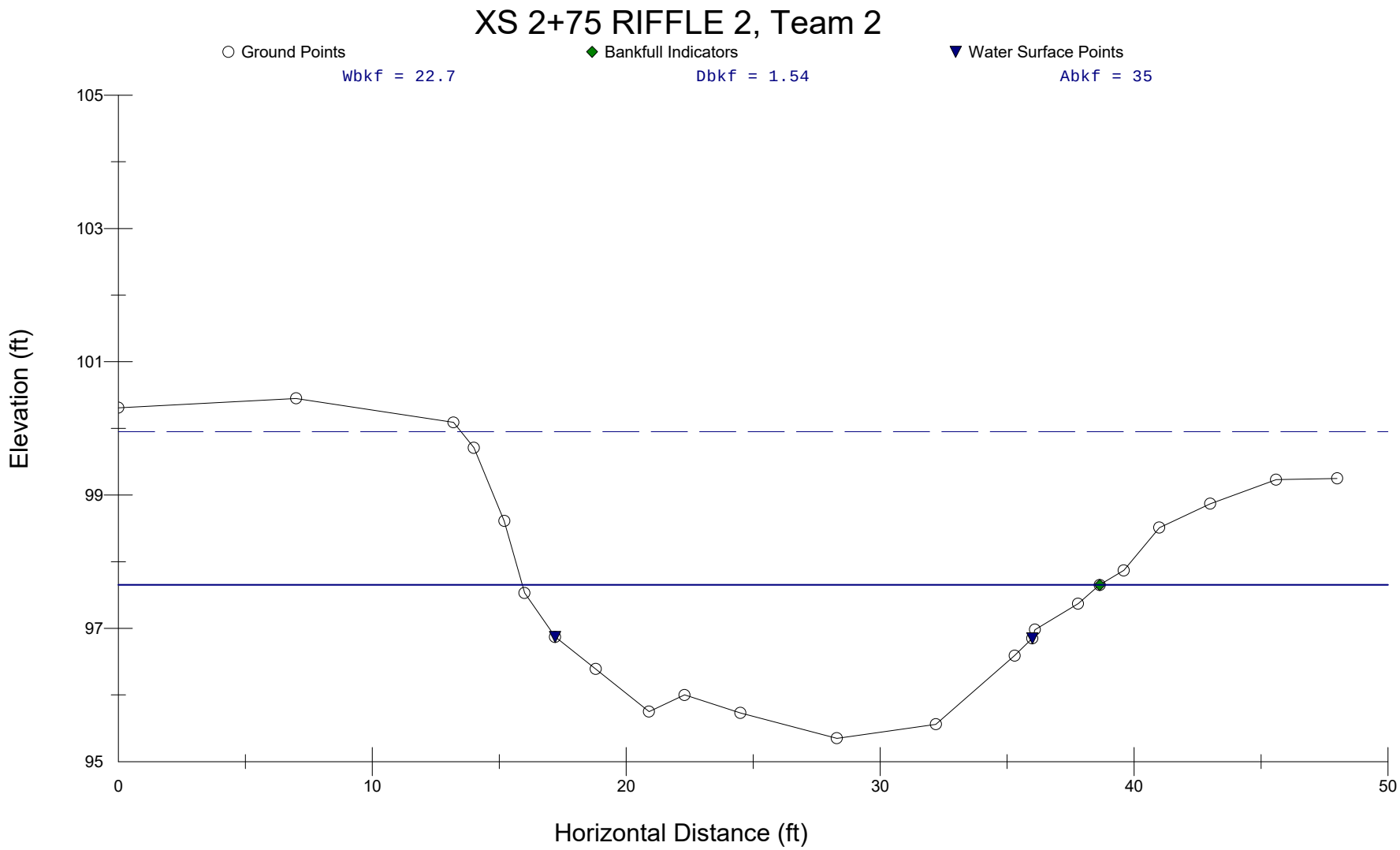

XS 0+71 GLIDE 1, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 23.2
Dbkf = 1.41
Abkf = 32.8
105
100
95
Elevation (ft)
0
10
20
30
40
50
60
Horizontal Distance (ft)

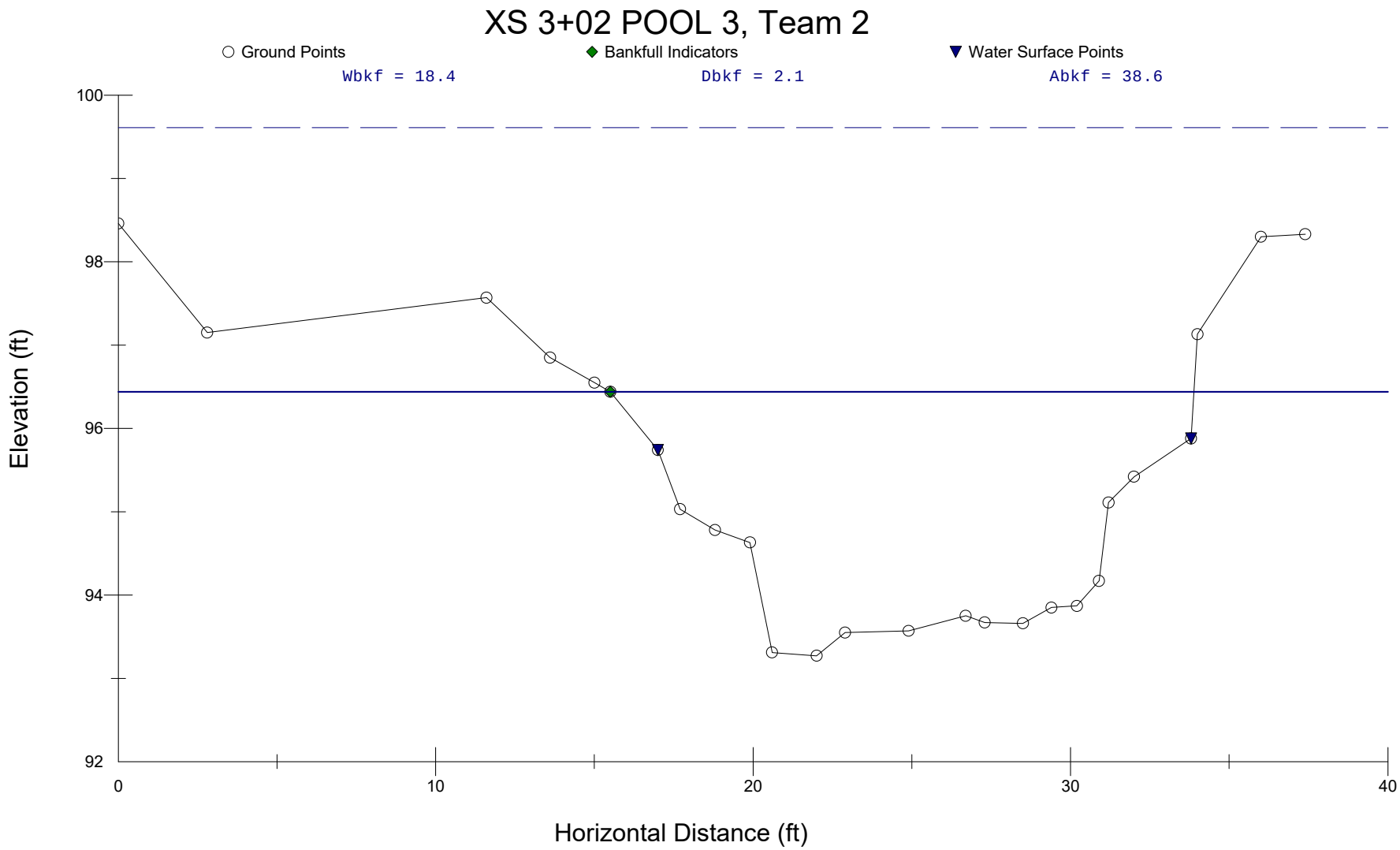

XS 0+92 RIFFLE 1, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Inner Berm Indicators
Wbkf = 23.7
Wib = 14.8
Dbkf = 1.34
Dib = .44
Abkf = 31.6
Aib = 6.52
Elevation (ft)
102
101
100
99
98
97
96
95
0
10
20
30
40
50
Horizontal Distance (ft)


XS 1+86 RUN, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 22.5
Dbkf = 1.33
Abkf = 30
105
100
95
Elevation (ft)
0
10
20
30
40
50
60
70
Horizontal Distance (ft)

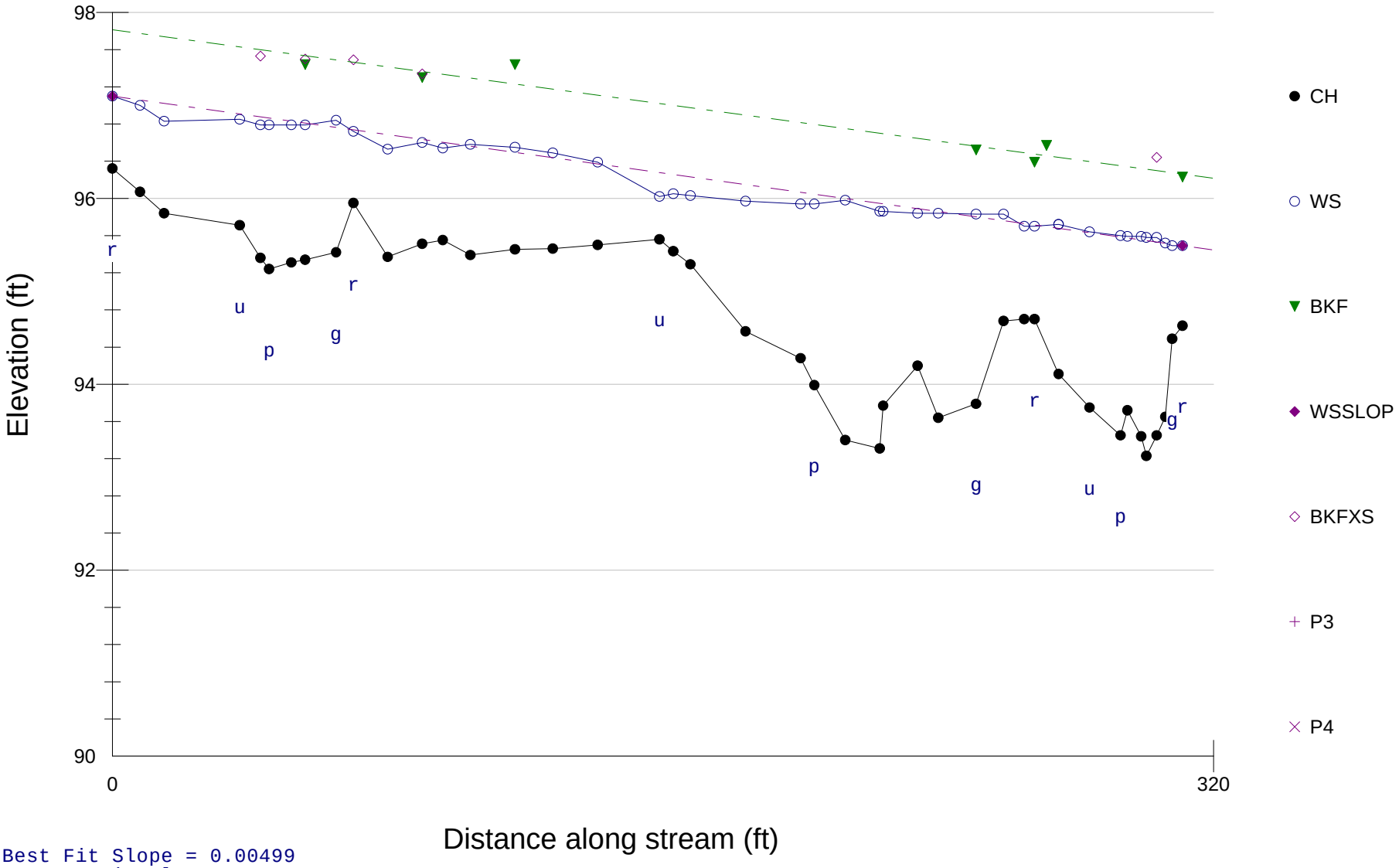

XS 2+19 POOL 2, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 22.8
Dbkf = 2.09
Abkf = 47.7
Elevation (ft)
104
102
100
98
96
94
0
10
20
30
40
50
Horizontal Distance (ft)


XS 2+63 GLIDE 2, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 20.9
Dbkf = 1.27
Abkf = 26.6
Elevation (ft)
100
99
98
97
96
95
0
10
20
30
40
50
Horizontal Distance (ft)


XS 2+75 RIFFLE 2, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 22.7
Dbkf = 1.54
Abkf = 35
Elevation (ft)
105
103
101
99
97
95
0
10
20
30
40
50
Horizontal Distance (ft)

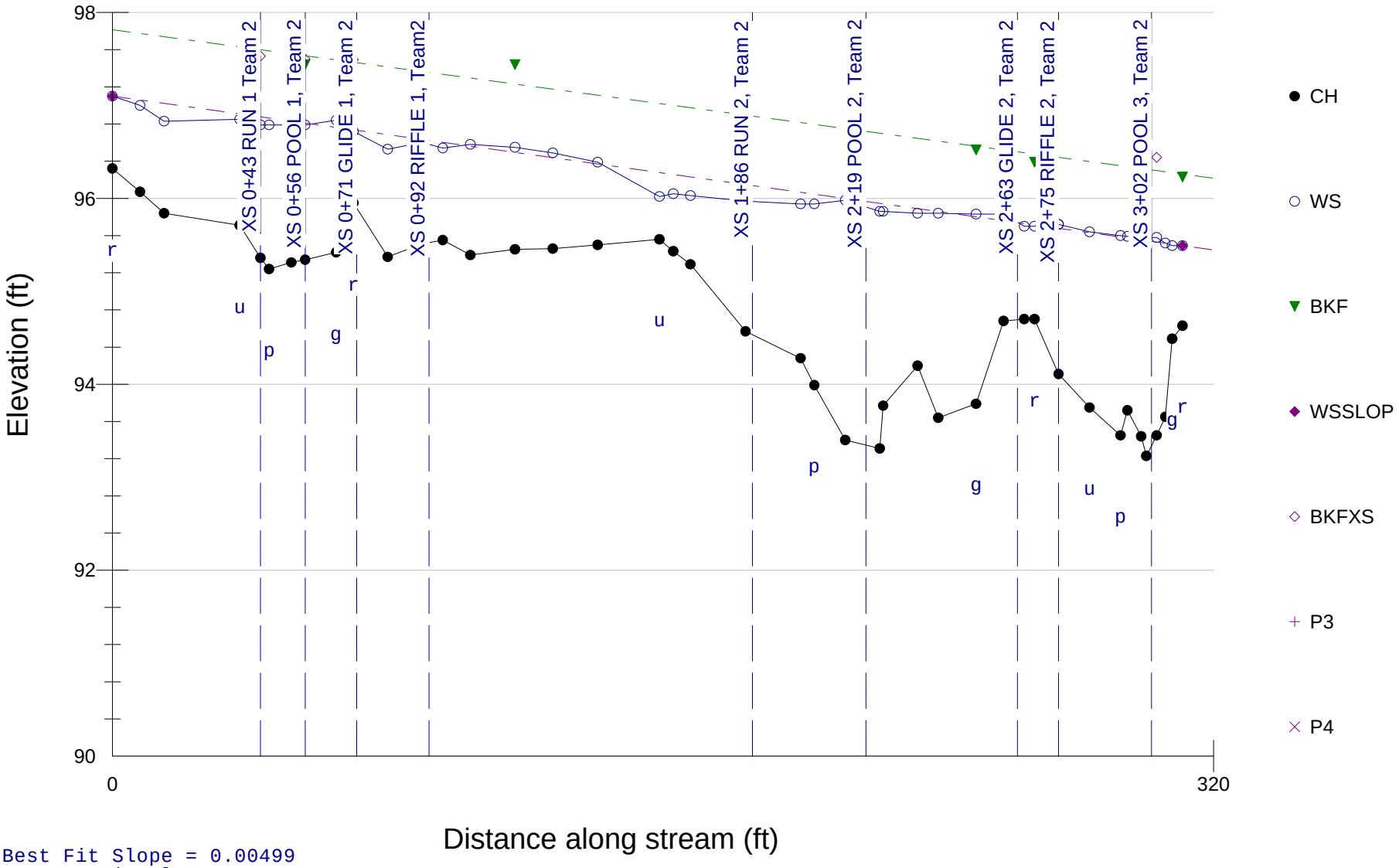

XS 3+02 POOL 3, Team 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 18.4
Dbkf = 2.1
Abkf = 38.6
100
98
96
94
92
Elevation (ft)
0
10
20
30
40
Horizontal Distance (ft)

Marsh Run Reach 2 Profile

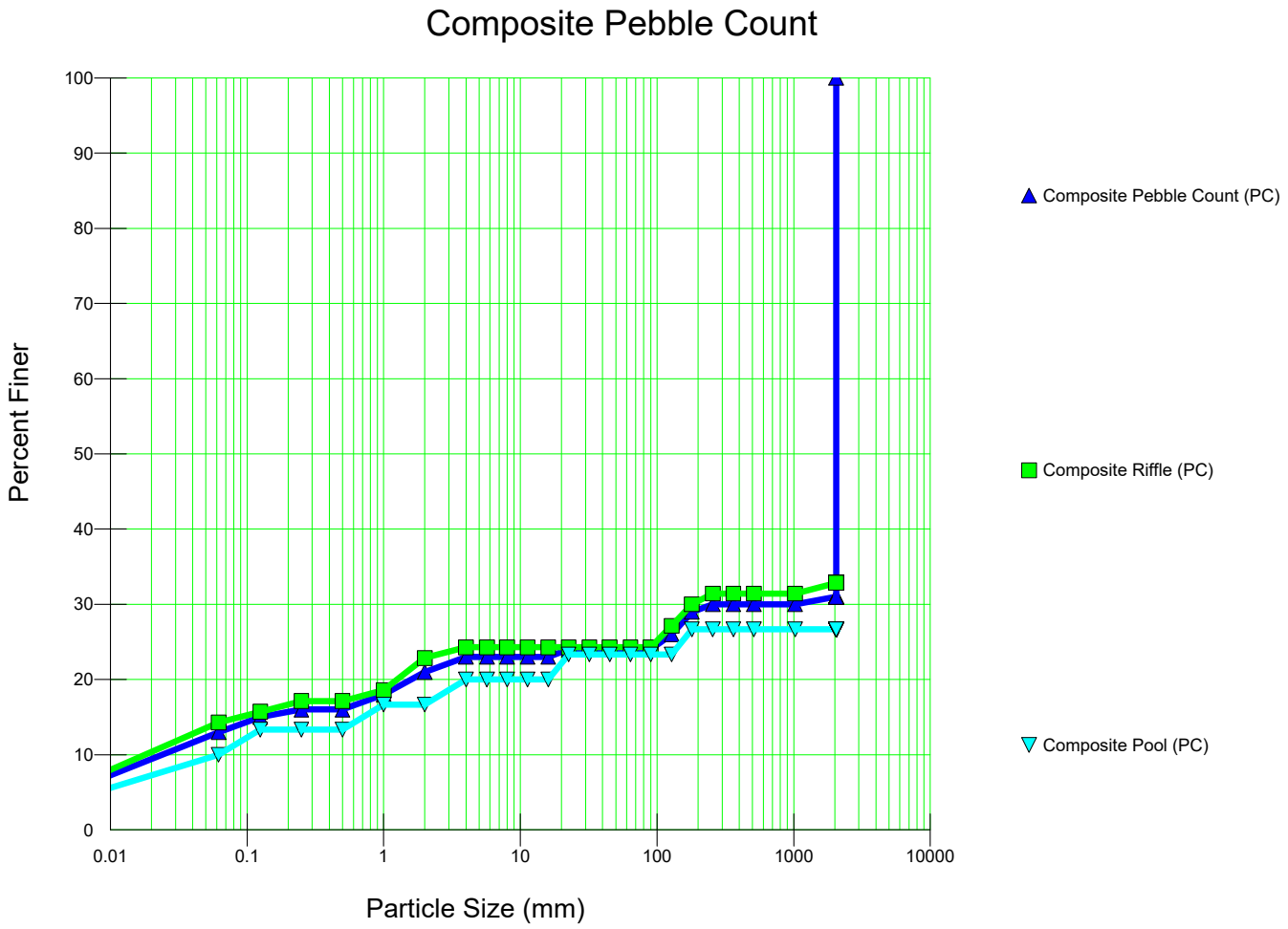


BKF Best Fit Slope = 0.00499
WSSLOP Best Fit Slope = 0.00518

Marsh Run Reach 2 Profile



BKF Best Fit Slope = 0.00499
WSSLOP Best Fit Slope = 0.00518


Composite Pebble Count
Percent Finer
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)
Composite Pebble Count (PC)
Composite Riffle (PC)
Composite Pool (PC)

Composite Pebble Count Data
RIVERMORPH PARTICLE SUMMARY

River Name: Marsh Run - Reach 2 - Pebble Count
Reach Name: Reach 2 Pebble count
Sample Name: Composite Pebble Count
Survey Date: 04/19/2018

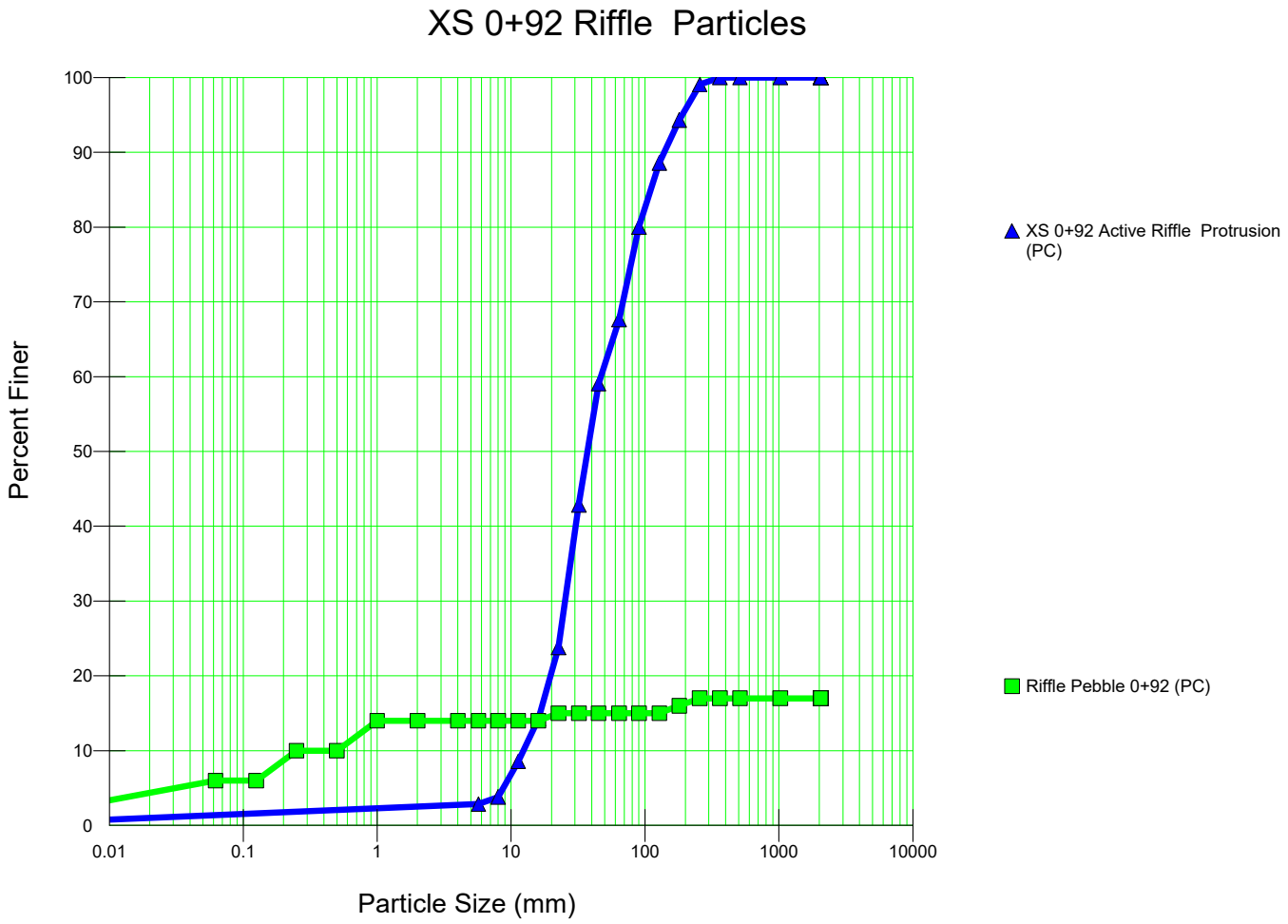
Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	13	13.00	13.00
0.062 - 0.125	2	2.00	15.00
0.125 - 0.25	1	1.00	16.00
0.25 - 0.50	0	0.00	16.00
0.50 - 1.0	2	2.00	18.00
1.0 - 2.0	3	3.00	21.00
2.0 - 4.0	2	2.00	23.00
4.0 - 5.7	0	0.00	23.00
5.7 - 8.0	0	0.00	23.00
8.0 - 11.3	0	0.00	23.00
11.3 - 16.0	0	0.00	23.00
16.0 - 22.6	1	1.00	24.00
22.6 - 32.0	0	0.00	24.00
32 - 45	0	0.00	24.00
45 - 64	0	0.00	24.00
64 - 90	0	0.00	24.00
90 - 128	2	2.00	26.00
128 - 180	3	3.00	29.00
180 - 256	1	1.00	30.00
256 - 362	0	0.00	30.00
362 - 512	0	0.00	30.00
512 - 1024	0	0.00	30.00
1024 - 2048	1	1.00	31.00
Bedrock	69	69.00	100.00

D16 (mm)	0.25
D35 (mm)	Bedrock
D50 (mm)	Bedrock
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	13
Sand (%)	8
Gravel (%)	3
Cobble (%)	6

Composite Pebble Count Data

Boulder (%)	1
Bedrock (%)	69

Total Particles = 100.


XS 0+92 Riffle Particles
Percent Finer
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)
XS 0+92 Active Riffle Protrusion (PC)
Riffle Pebble 0+92 (PC)

CS 0+92 Protusion Count Data
RIVERMORPH PARTICLE SUMMARY

River Name: Marsh Run - Reach 2 - Pebble Count
Reach Name: Reach 2 Pebble count
Sample Name: XS 0+92 Active Riffle Protrusion
Survey Date: 04/19/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	0	0.00	0.00
1.0 - 2.0	0	0.00	0.00
2.0 - 4.0	0	0.00	0.00
4.0 - 5.7	3	2.86	2.86
5.7 - 8.0	1	0.95	3.81
8.0 - 11.3	5	4.76	8.57
11.3 - 16.0	6	5.71	14.29
16.0 - 22.6	10	9.52	23.81
22.6 - 32.0	20	19.05	42.86
32 - 45	17	16.19	59.05
45 - 64	9	8.57	67.62
64 - 90	13	12.38	80.00
90 - 128	9	8.57	88.57
128 - 180	6	5.71	94.29
180 - 256	5	4.76	99.05
256 - 362	1	0.95	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	17.19
D35 (mm)	28.12
D50 (mm)	37.73
D84 (mm)	107.74
D95 (mm)	191.34
D100 (mm)	361.99
Silt/Clay (%)	0
Sand (%)	0
Gravel (%)	67.62
Cobble (%)	31.43

CS 0+92 Protusion Count Data

Boulder (%)	0.95
Bedrock (%)	0

Total Particles = 105.

CS 0+92 Pebble Count Data
RIVERMORPH PARTICLE SUMMARY

River Name: Marsh Run - Reach 2 - Pebble Count
Reach Name: Reach 2 Pebble count
Sample Name: Riffle_Pebble_0+92
Survey Date: 04/19/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	6	6.00	6.00
0.062 - 0.125	0	0.00	6.00
0.125 - 0.25	4	4.00	10.00
0.25 - 0.50	0	0.00	10.00
0.50 - 1.0	4	4.00	14.00
1.0 - 2.0	0	0.00	14.00
2.0 - 4.0	0	0.00	14.00
4.0 - 5.7	0	0.00	14.00
5.7 - 8.0	0	0.00	14.00
8.0 - 11.3	0	0.00	14.00
11.3 - 16.0	0	0.00	14.00
16.0 - 22.6	1	1.00	15.00
22.6 - 32.0	0	0.00	15.00
32 - 45	0	0.00	15.00
45 - 64	0	0.00	15.00
64 - 90	0	0.00	15.00
90 - 128	0	0.00	15.00
128 - 180	1	1.00	16.00
180 - 256	1	1.00	17.00
256 - 362	0	0.00	17.00
362 - 512	0	0.00	17.00
512 - 1024	0	0.00	17.00
1024 - 2048	0	0.00	17.00
Bedrock	83	83.00	100.00

D16 (mm)	180
D35 (mm)	Bedrock
D50 (mm)	Bedrock
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	6
Sand (%)	8
Gravel (%)	1
Cobble (%)	2

CS 0+92 Pebble Count Data

Boulder (%)	0
Bedrock (%)	83

Total Particles = 100.

Worksheet 2-2. Computations of velocity and bankfull discharge using various methods (Rosgen, 2006b; Rosgen and Silvey, 2007).

Bankfull VELOCITY & DISCHARGE Estimates

Stream:	**Marsh Run**			Location:	**Reach - Reach 2**
Date:	**4/19/2018**	Stream Type:	**F1/6**	Valley Type:	**U-AL-AD**
Observers:	**Team 2**			HUC:	**2070004**

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional AREA	**31.62**	**A_{bkf}** (ft^2)	Bankfull Riffle Mean DEPTH	**1.34**	**d_{bkf}** (ft)
Bankfull Riffle WIDTH	**23.65**	**W_{bkf}** (ft)	Wetted PERMIMETER ~ $(2 * d_{bkf}) + W_{bkf}$	**24.34**	**W_p** (ft)
D_{84} at Riffle	**107.74**	**Dia.** (mm)	D_{84} (mm) / 304.8	**0.35**	**D_{84}** (ft)
Bankfull SLOPE	**0.0050**	**S_{bkf}** (ft / ft)	Hydraulic RADIUS A_{bkf} / W_p	**1.30**	**R** (ft)
Gravitational Acceleration	**32.2**	g (ft / sec^2)	Relative Roughness R(ft) / D_{84} (ft)	**3.68**	**R / D_{84}**
Drainage Area	**19.0**	**DA** (mi^2)	Shear Velocity $u^* = (gRS)^{½}$	**0.457**	**u*** (ft/sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $u = [\,2.83 + 5.66 * Log\{R / D_{84}\}\,]\,u^*$	**2.76**	ft / sec	**87.19**	cfs
2. Roughness Coefficient: a) Manning's *n* from Friction Factor / Relative Roughness (Figs. 2-18, 2-19) $u = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ **0.037**	**3.38**	ft / sec	**106.94**	cfs
2. Roughness Coefficient: b) Manning's *n* from Stream Type (Fig. 2-20) $u = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ **0.034**	**3.68**	ft / sec	**116.39**	cfs
2. Roughness Coefficient: c) Manning's *n* from Jarrett (USGS): $u = 1.49*R^{2/3}*S^{1/2}/n$ $n = 0.39*S^{0.38}*R^{-0.16}$ **Note:** This equation is applicable to **steep, step/pool, high boundary roughness, cobble- and boulder-dominated stream systems**; i.e., for Stream Types A1, A2, A3, B1, B2, B3, C2 & E3 $n =$ **0.050**	**2.51**	ft / sec	**79.30**	cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.) **Darcy-Weisbach (Leopold, Wolman and Miller)**	**2.86**	ft / sec	**90.36**	cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.) **Chezy C**	**0.00**	ft / sec	**0.00**	cfs
4. Continuity Equations: a) Regional Curves $u = Q / A$ **Return Period for Bankfull Discharge** $Q =$ **2.0** **year**	**3.29**	ft / sec	**103.97**	cfs
4. Continuity Equations: b) USGS Gage Data $u = Q / A$	**3.62**	ft / sec	**114.50**	cfs

Protrusion Height Options for the D_{84} Term in the Relative Roughness Relation (R/D_{84}) – Estimation Method 1

Option 1.	For **sand-bed** channels: Measure 100 **"protrusion heights"** of sand dunes from the downstream side of feature to the top of feature. Substitute the D_{84} sand dune protrusion height in ft for the D_{84} term in method 1.
Option 2.	For **boulder-dominated** channels: Measure 100 **"protrusion heights"** of boulders on the sides from the bed elevation to the top of the rock on that side. Substitute the D_{84} boulder protrusion height in ft for the D_{84} term in method 1.
Option 3.	For **bedrock-dominated** channels: Measure 100 **"protrusion heights"** of rock separations, steps, joints or uplifted surfaces above channel bed elevation. Substitute the D_{84} bedrock protrusion height in ft for the D_{84} term in method 1.
Option 4.	For **log-influenced** channels: Measure "**protrustion heights**" proportionate to channel width of log diameters or the height of the log on upstream side if embedded. Substitute the D_{84} protrusion height in ft for the D_{84} term in method 1.

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Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Marsh Run, Reach - Reach 2**				
Basin:		Drainage Area:	**12173** acres	**19.02**	mi^2
Location:					
Twp.&Rge: **;**		Sec.&Qtr.: **;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**04/19/18**
Observers:	**Team 2**			Valley Type:	U-AL-AD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**23.65**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A / W_{bkf}$).	**1.34**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**31.62**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**17.65**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**2**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**31.48**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**1.33**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**2048**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.005**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.21**	

Stream Type **F1/6** (See **Figure 2-14**)

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Worksheet 2-4a. Morphological relations, including dimensionless ratios of river reach sites (Rosgen and Silvey, 2007; Rosgen, 2008).

Stream: **Marsh Run** Location: **Reach - Reach 2**

Observers: **Team 2** Date: **04/19/18** Valley Type: **U-AL-AD** Stream Type: **F1/6**

River Reach Dimension Summary Data…..1

Riffle Dimensions*, **, *

Riffle Dimensions*, **, ***	Mean	Min	Max		Riffle Dimensions & Dimensionless Ratios****	Mean	Min	Max
Riffle Width (W_{bkf})	23.2	22.7	23.7	ft	Riffle Cross-Sectional Area (A_{bkf}) (ft^2)	33.3	31.6	35.0
Mean Riffle Depth (d_{bkf})	1.44	1.34	1.54	ft	Riffle Width/Depth Ratio (W_{bkf} / d_{bkf})	16.2	14.8	17.7
Maximum Riffle Depth (d_{max})	2.15	2.0	2.3	ft	Max Riffle Depth to Mean Riffle Depth (d_{max} / d_{bkf})	1.49	1.49	1.49
Width of Flood-Prone Area (W_{fpa})	31.8	31.5	32.1	ft	Entrenchment Ratio (W_{fpa} / W_{bkf})	1.37	1.33	1.41
Riffle Inner Berm Width (W_{ib})	14.1	13.4	14.8	ft	Riffle Inner Berm Width to Riffle Width (W_{ib} / W_{bkf})	0.61	0.59	0.63
Riffle Inner Berm Depth (d_{ib})	0.4	0.35	0.44	ft	Riffle Inner Berm Depth to Mean Depth (d_{ib} / d_{bkf})	0.28	0.23	0.33
Riffle Inner Berm Area (A_{ib})	5.63	4.74	6.52	ft^2	Riffle Inner Berm Area to Riffle Area (A_{ib} / A_{bkf})	0.17	0.14	0.21
Riffle Inner Berm W/D Ratio (W_{ib} / d_{ib})	36	33.8	38.1					

Pool Dimensions*, **, *

Pool Dimensions*, **, ***	Mean	Min	Max		Pool Dimensions & Dimensionless Ratios****	Mean	Min	Max
Pool Width (W_{bkfp})	21.9	18.4	24.6	ft	Pool Width to Riffle Width (W_{bkfp} / W_{bkf})	0.95	0.79	1.06
Mean Pool Depth (d_{bkfp})	1.96	1.68	2.1	ft	Mean Pool Depth to Mean Riffle Depth (d_{bkfp} / d_{bkf})	1.36	1.17	1.46
Pool Cross-Sectional Area (A_{bkfp})	42.5	38.6	47.7	ft	Pool Area to Riffle Area (A_{bkfp} / A_{bkf})	1.28	1.16	1.43
Maximum Pool Depth (d_{maxp})	3.05	2.5	3.47	ft	Max Pool Depth to Mean Riffle Depth (d_{maxp} / d_{bkf})	2.12	1.74	2.41
Pool Inner Berm Width (W_{ibp})	0	0	0	ft	Pool Inner Berm Width to Pool Width (W_{ibp} / W_{bkfp})	0	0	0
Pool Inner Berm Depth (d_{ibp})	0	0	0	ft	Pool Inner Berm Depth to Pool Depth (d_{ibp} / d_{bkfp})	0	0	0
Pool Inner Berm Area (A_{ibp})	0	0	0	ft^2	Pool Inner Berm Area to Pool Area (A_{ibp} / A_{bkfp})	0	0	0
Point Bar Slope (S_{pb})	0.29	0.29	0.29	ft/ft	Pool Inner Berm Width/Depth Ratio (W_{ibp} / d_{ibp})	0	0	0

Run Dimensions*

Run Dimensions*	Mean	Min	Max		Run Dimensionless Ratios****	Mean	Min	Max
Run Width (W_{bkfr})	23.6	22.5	24.7	ft	Run Width to Riffle Width (W_{bkfr} / W_{bkf})	1.02	0.97	1.07
Mean Run Depth (d_{bkfr})	1.52	1.33	1.7	ft	Mean Run Depth to Mean Riffle Depth (d_{bkfr} / d_{bkf})	1.06	0.92	1.18
Run Cross-Sectional Area (A_{bkfr})	36	30	41.9	ft	Run Area to Riffle Area (A_{bkfr} / A_{bkf})	1.08	0.90	1.26
Maximum Run Depth (d_{maxr})	2.21	2.16	2.25	ft	Max Run Depth to Mean Riffle Depth (d_{maxr} / d_{bkf})	1.53	1.50	1.56
Run Width/Depth Ratio (W_{bkfr} / d_{bkfr})	15.7	14.6	16.9	ft				

Glide Dimensions*

Glide Dimensions*	Mean	Min	Max		Glide Dimensions & Dimensionless Ratios****	Mean	Min	Max
Glide Width (W_{bkfg})	22.1	20.9	23.2	ft	Glide Width to Riffle Width (W_{bkfg} / W_{bkf})	0.95	0.90	1.00
Mean Glide Depth (d_{bkfg})	1.34	1.27	1.41	ft	Mean Glide Depth to Mean Riffle Depth (d_{bkfg} / d_{bkf})	0.93	0.88	0.98
Glide Cross-Sectional Area (A_{bkfg})	29.7	26.6	32.8	ft	Glide Area to Riffle Area (A_{bkfg} / A_{bkf})	0.89	0.80	0.99
Maximum Glide Depth (d_{maxg})	1.99	1.89	2.08	ft	Max Glide Depth to Mean Riffle Depth (d_{maxg} / d_{bkf})	1.38	1.31	1.44
Glide Width/Depth Ratio (W_{bkfg} / d_{bkfg})	16.5	16.5	16.5	ft/ft	Glide Inner Berm Width/Depth Ratio (W_{ibg} / d_{ibg})	0	0	0
Glide Inner Berm Width (W_{ibg})	0	0	0	ft	Glide Inner Berm Width to Glide Width (W_{ibg}/W_{bkfg})	0	0	0
Glide Inner Berm Depth (d_{ibg})	0	0	0	ft	Glide Inner Berm Depth to Glide Depth (d_{ibg} / d_{bkfg})	0	0	0
Glide Inner Berm Area (A_{ibg})	0	0	0	ft^2	Glide Inner Berm Area to Glide Area (A_{ibg} / A_{bkfg})	0	0	0

Step**

Step**	Mean	Min	Max		Step Dimensionless Ratios****	Mean	Min	Max
Step Width (W_{bkfs})	0	0	0	ft	Step Width to Riffle Width (W_{bkfs} / W_{bkf})	0	0	0
Mean Step Depth (d_{bkfs})	0	0	0	ft	Mean Step Depth to Riffle Depth (d_{bkfs} / d_{bkf})	0	0	0
Step Cross-Sectional Area (A_{bkfs})	0	0	0	ft	Step Area to Riffle Area (A_{bkfs} / A_{bkf})	0	0	0
Maximum Step Depth (d_{maxs})	0	0	0	ft	Max Step Depth to Mean Riffle Depth (d_{maxs} / d_{bkf})	0	0	0
Step Width/Depth Ratio (W_{bkfs} / d_{bkfs})	0	0	0					

*Riffle–Pool system (i.e., C, E, F stream types) bed features include riffles, runs, pools and glides.

**Step–Pool system (i.e., A, B, G stream types) bed features include riffles, rapids, chutes, pools and steps (note: include rapids and chutes in riffle category).

***Convergence-Divergence system (i.e., D stream types) bed features include riffles and pools; cross-sections taken at riffles for classification purposes.

****Mean values are used as the normalization parameter for all dimensionless ratios; e.g., minimum pool width to riffle width ratio uses the *mean* riffle width value.

Worksheet 2-4b. Morphological relations, including dimensionless ratios of river reach sites (Rosgen and Silvey, 2007; Rosgen, 2008).

Stream: **Marsh Run**		Location: **Reach - Reach 2**	
Observers: **Team 2**	Date: **04/19/18**	Valley Type: **U-AL-AD**	Stream Type: **F1/6**

River Reach Summary Data…..2

Hydraulics

Streamflow: Estimated Mean Velocity at Bankfull Stage (u_{bkf})	3.68	ft/sec	Estimation Method		
Streamflow: Estimated Discharge at Bankfull Stage (Q_{bkf})	116.39	cfs	Drainage Area	19.02	mi^2

Channel Pattern

Geometry	Mean	Min	Max		Dimensionless Geometry Ratios	Mean	Min	Max
Linear Wavelength (λ)	118	65	197	ft	Linear Wavelength to Riffle Width (λ / W_{bkf})	5.09	2.80	8.49
Stream Meander Length (L_m)	146	85	218	ft	Stream Meander Length Ratio (L_m / W_{bkf})	6.29	3.66	9.40
Radius of Curvature (R_c)	52	28	75	ft	Radius of Curvature to Riffle Width (R_c / W_{bkf})	2.24	1.21	3.23
Belt Width (W_{blt})	63	45	85	ft	Meander Width Ratio (W_{blt} / W_{bkf})	2.72	1.94	3.66
Arc Length (L_a)	59	52	71	ft	Arc Length to Riffle Width (L_a / W_{bkf})	2.54	2.24	3.06
Riffle Length (L_r)	42	15.8	89	ft	Riffle Length to Riffle Width (L_r / W_{bkf})	1.81	0.68	3.83
Individual Pool Length (L_p)	26.4	12.6	47.4	ft	Individual Pool Length to Riffle Width (L_p / W_{bkf})	1.14	0.54	2.04
Pool to Pool Spacing (P_s)	119	61.3	177	ft	Pool to Pool Spacing to Riffle Width (P_s / W_{bkf})	5.13	2.64	7.62

Channel Profile

Valley Slope (S_{val})	0.00606	ft/ft	Average Water Surface Slope (S)	0.005	ft/ft	Sinuosity (S_{val} / S)	1.21	
Stream Length (SL)	311	ft	Valley Length (VL)	264	ft	Sinuosity (SL / VL)	1.18	
Low Bank Height (LBH)	start 0	ft	Max Depth (d_{max})	start 0	ft	Bank-Height Ratio (BHR) (LBH / d_{max})	start	
	end 0	ft		end 0	ft		end	

Facet Slopes	Mean	Min	Max		Dimensionless Facet Slope Ratios	Mean	Min	Max
Riffle Slope (S_{rif})	0.004	0.002	0.008	ft/ft	Riffle Slope to Average Water Surface Slope (S_{rif} / S)	0.86	0.34	1.67
Run Slope (S_{run})	0.005	0.002	0.007	ft/ft	Run Slope to Average Water Surface Slope (S_{run} / S)	0.91	0.39	1.41
Pool Slope (S_p)	0.002	0.001	0.003	ft/ft	Pool Slope to Average Water Surface Slope (S_p / S)	0.41	0.23	0.56
Glide Slope (S_g)	0.004	0.001	0.008	ft/ft	Glide Slope to Average Water Surface Slope (S_g / S)	0.89	0.17	1.53
Step Slope (S_s)	0.000	0.000	0.000	ft/ft	Step Slope to Average Water Surface Slope (S_s / S)	0.00	0.00	0.00

Max Depths[a]	Mean	Min	Max		Dimensionless Depth Ratios	Mean	Min	Max
Max Riffle Depth (d_{maxrif})	1.99	1.78	2.28	ft	Max Riffle Depth to Mean Riffle Depth (d_{maxrif} / d_{bkf})	1.38	1.24	1.58
Max Run Depth (d_{maxrun})	2.42	2.15	2.79	ft	Max Run Depth to Mean Riffle Depth (d_{maxrun} / d_{bkf})	1.68	1.49	1.94
Max Pool Depth (d_{maxp})	2.92	2.33	3.38	ft	Max Pool Depth to Mean Riffle Depth (d_{maxp} / d_{bkf})	2.03	1.62	2.35
Max Glide Depth (d_{maxg})	1.62	1.48	1.73	ft	Max Glide Depth to Mean Riffle Depth (d_{maxg} / d_{bkf})	1.13	1.03	1.20
Max Step Depth (d_{maxs})	0	0	0	ft	Max Step Depth to Mean Riffle Depth (d_{maxs} / d_{bkf})	0	0	0

Channel Materials

	Reach[b]	Riffle[c]	Bar		Reach[b]	Riffle[c]	Bar	Protrusion Height[d]	
% Silt/Clay	14.29	6		D_{16}	0.15	180		17.19	mm
% Sand	8.57	8		D_{35}	Bedrock	Bedrock		28.12	mm
% Gravel	1.43	1		D_{50}	Bedrock	Bedrock		37.73	mm
% Cobble	7.14	2		D_{84}	Bedrock	Bedrock		107.74	mm
% Boulder	1.43	0		D_{95}	Bedrock	Bedrock		191.34	mm
% Bedrock	67.14	83		D_{100}	Bedrock	Bedrock		361.99	mm

[a] Min, max & mean depths are measured from Thalweg to bankfull at mid-point of feature for riffles and runs, the deepest part of pools, & at the tail-out of glides.
[b] Composite sample of riffles and pools within the designated reach. [c] Active bed of a riffle. [d] Height of roughness feature above bed.

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