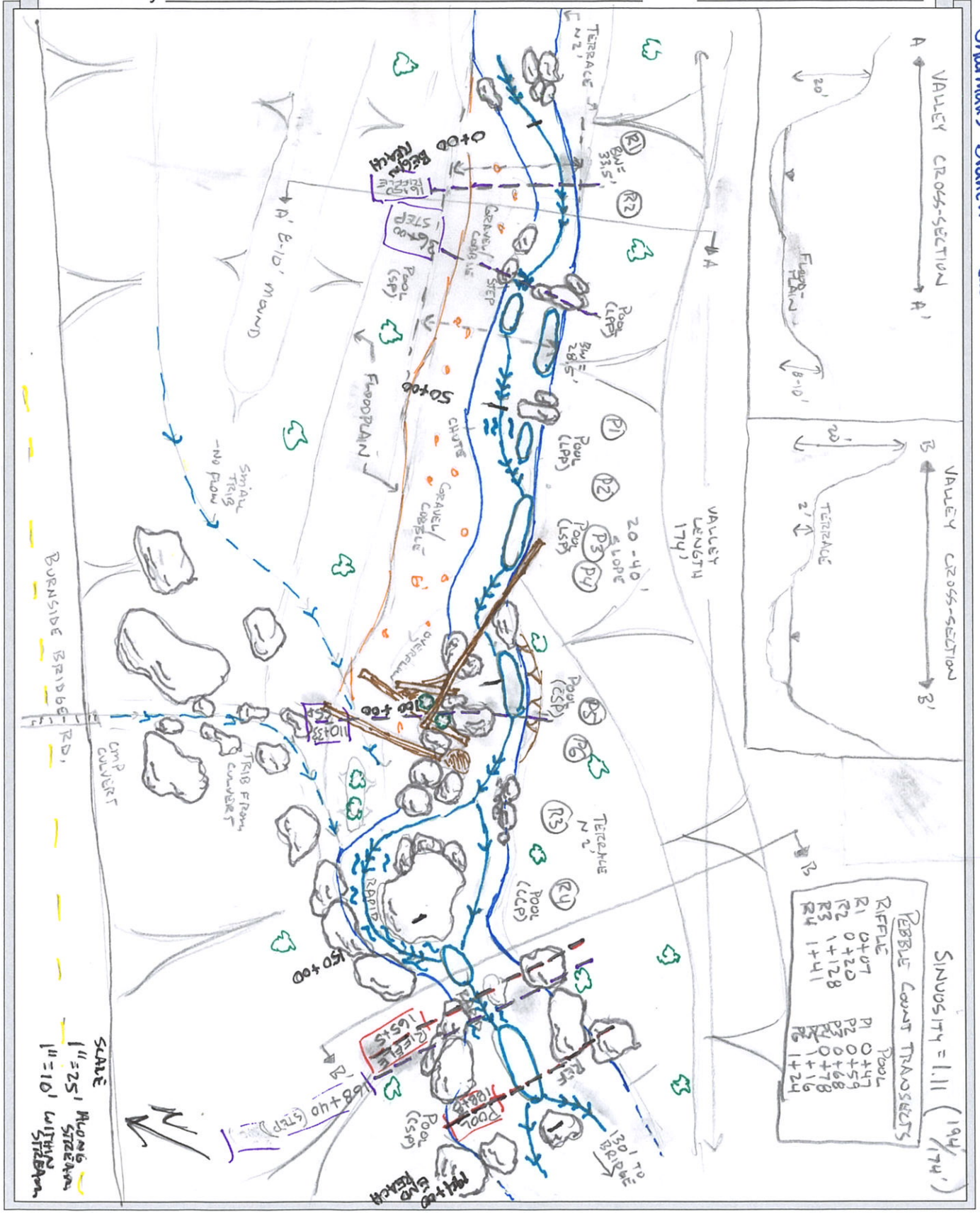
AREA-SITE LOCATION....REACH MAP

Stream/Drainage: SHARMAN'S BRANCH Site/Reach: #3

Drawn By: TEAM 3 Date: 4/25/17



Sharman's Branch Reach #3

4/25/17

11/2/18

Worksheet B-1. Field Form for Level II Stream Classification (*First Field Day*).

Stream: SHARMAN'S BRANCH			
Basin:	Drainage Area:	acres	3.6 mi^2
Location: REACH 3			
Twp.&Rge:	Sec.&Qtr.:		
Cross-Section Monuments (Lat./Long.):		Date:	
Observers:		Landscape Type:	C-CO-US

Bankfull Width (W_{bkf}) The surface width of the stream at bankfull stage elevation, in a riffle section.	29.37	ft
Bankfull Mean Depth (d_{bkf}) Mean depth of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$).	1.32	ft
Bankfull Cross-Sectional Area (A_{bkf}) Area of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	38.71	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) *Bankfull Width* divided by *Bankfull Mean Depth*, in a riffle section.	22.25	ft/ft
Bankfull Maximum Depth (d_{max}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	2.53	ft
Flood-Prone Area Width (W_{fpa}) Width of the channel at an elevation that is twice the *Bankfull Maximum Depth*, measured perpendicular to the fall line of the valley in a riffle section.	46.47	ft
Entrenchment Ratio (ER) The *Flood-Prone Area Width* divided by *Bankfull Width* (W_{fpa} / W_{bkf}), in a riffle section.	1.58	ft/ft
Channel Materials (Particle Size Index D_{50}) The D_{50} particle size index represents the median or dominant diameter of channel materials, as sampled proportionately from the channel surface between the bankfull stage and Thalweg elevations.	57.67	mm
Average Water Surface Slope (S) The elevation difference of water surface measurements over the stream length between two similar bed features (e.g., start of riffle to start of last riffle) for several riffle-pool or step-pool sequences, representing channel gradient.	0.035	ft/ft
Channel Sinuosity (k) An index of channel pattern determined from stream length divided by valley length (SL / VL), or from valley slope divided by average water surface slope (S_{val} / S).	1.11	ft/ft

Stream Type B4/1 **See Classification Key (Figure B-2)**

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Worksheet B-2. Computations of velocity and discharge using various methods (*First Field Day*).

Bankfull VELOCITY & DISCHARGE Estimates

Stream:	Sharman's Branch	Location:	Reach 3
Date: 4/25/17	Stream Type: B4/2	Landscape Type:	C-CO-US
Observers:		HUC:	

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional Area	38.7	A_{bkf} (ft^2)	Bankfull Riffle Mean Depth	1.32	d_{bkf} (ft)
Bankfull Riffle Width	29.4	W_{bkf} (ft)	Wetted Perimeter $\approx (2 * d_{bkf}) + W_{bkf}$	30.82	W_p (ft)
D_{84} Particle Size at Riffle	576	D_{84} (mm)	D_{84} Particle Size in Feet D_{84} (mm) / 304.8	1.89	D_{84} (ft)
Bankfull Slope	0.035	S_{bkf} (ft / ft)	Hydraulic Radius A_{bkf} / W_p	1.26	R (ft)
Gravitational Acceleration	32.2	g (ft / sec^2)	Relative Roughness R (ft) / D_{84} (ft)	0.66	R / D_{84} (ft / ft)
Drainage Area	3.6	DA (mi^2)	Shear Velocity $u^* = (gRS)^{1/2}$	1.19	u^* (ft / sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $\bar{u} = [\,2.83 + 5.66 * Log\{R / D_{84}\}\,]\,u^*$	2.17	ft / sec	84.01	cfs
2. Roughness Coefficient: a) Manning's *n* from Friction Factor/Relative Roughness (Figs. B-34, B-35) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.11	2.95	ft / sec	114.23	cfs
2. Roughness Coefficient: b) Manning's *n* from Stream Type (Fig. B-36) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.075	4.33	ft / sec	167.54	cfs
2. Roughness Coefficient: c) Manning's *n* from Jarrett (USGS): $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n = 0.39*S^{0.38}*R^{-0.16}$ Note: This equation is applicable to steep, step/pool, high boundary roughness, cobble- and boulder-dominated stream systems; i.e., for $n =$ 0.11	3.09	ft / sec	119.45	cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)	N/A	ft / sec	N/A	cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)	N/A	ft / sec	N/A	cfs
4. Continuity Equations: a) USGS Gage Data $\bar{u} = Q / A$ Return Period for Bankfull Q: Q = 115 year	2.97	ft / sec	115	cfs
4. Continuity Equations: b) Regional Curves $\bar{u} = Q / A$	N/A	ft / sec	N/A	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 B-3a. Morphological relations, including dimensionless ratios (*Second Field Day*).

Stream: Sharman's Branch - Reach 3 Location: Reach 3

Observers: Team 3 Date: 4/25/2017 Landscape Type: C-CO-US Stream Type: B4/1

River Reach Dimension Summary Data.....1

Riffle Dimensions*, **, ***	Mean	Min.	Max.		Riffle Dimensions & Dimensionless Ratios****	Mean	Min.	Max.
Riffle Width (W_{bkf})	29.4	29.3	29.4	ft	Riffle Cross-Sectional Area (A_{bkf}) (ft^2)	46.2	38.7	53.7
Riffle Mean Depth (d_{bkf})	1.58	1.32	1.85	ft	Riffle Width/Depth Ratio (W_{bkf} / d_{bkf})	22.2	22.2	22.3
Riffle Maximum Depth (d_{max})	2.53	2.53	2.53	ft	Riffle Max Depth to Riffle Mean Depth (d_{max} / d_{bkf})	1.92	1.92	1.92
Width of Flood-Prone Area (W_{fpa})	54.2	46.5	61.9	ft	Entrenchment Ratio (W_{fpa} / W_{bkf})	1.85	1.58	2.11
Riffle Inner Berm Width (W_{ib})	16.8	11.3	22.8	ft	Riffle Inner Berm Width to Riffle Width (W_{ib} / W_{bkf})	0.57	0.38	0.76
Riffle Inner Berm Depth (d_{ib})	0.39	0.36	0.42	ft	Riffle Inner Berm Depth to Mean Depth (d_{ib} / d_{bkf})	0.01	0.01	0.01
Riffle Inner Berm Area (A_{ib})	6.61	4.04	9.30	ft^2	Riffle Inner Berm Area to Riffle Area (A_{ib} / A_{bkf})	0.17	0.10	0.24
Riffle Inner Berm W/d Ratio (W_{ib} / d_{ib})	42.6	31.3	53.8					

Pool Dimensions*, **, ***	Mean	Min.	Max.		Pool Dimensions & Dimensionless Ratios****	Mean	Min.	Max.
Pool Width (W_{bkfp})	42.4	34.8	50.0	ft	Pool Width to Riffle Width (W_{bkfp} / W_{bkf})	1.45	1.19	1.70
Pool Mean Depth (d_{bkfp})	1.53	1.22	1.84	ft	Pool Mean Depth to Riffle Mean Depth (d_{bkfp} / d_{bkf})	1.16	0.92	1.40
Pool Cross-Sectional Area (A_{bkfp})	62.5	60.9	64.1	ft	Pool Area to Riffle Area (A_{bkfp} / A_{bkf})	1.61	1.57	1.66
Pool Maximum Depth (d_{maxp})	3.66	3.51	3.81	ft	Pool Max Depth to Riffle Mean Depth (d_{maxp} / d_{bkf})	2.77	2.66	2.89
Pool Inner Berm Width (W_{ibp})	25.9	23.3	28.6	ft	Pool Inner Berm Width to Pool Width (W_{ibp} / W_{bkfp})	0.88	0.79	0.97
Pool Inner Berm Depth (d_{ibp})	0.81	0.73	0.88	ft	Pool Inner Berm Depth to Pool Depth (d_{ibp} / d_{bkfp})	0.61	0.55	0.67
Pool Inner Berm Area (A_{ibp})	20.7	20.4	20.9	ft^2	Pool Inner Berm Area to Pool Area (A_{ibp} / A_{bkfp})	0.53	0.53	0.54
Point Bar Slope (S_{pb})	/	/	/	ft/ft	Pool Inner Berm Width/Depth Ratio (W_{ibp} / d_{ibp})	31.98	31.35	32.46

Run Dimensions*	Mean	Min.	Max.		Run Dimensionless Ratios****	Mean	Min.	Max.
Run Width (W_{bkfr})	/	/	/	ft	Run Width to Riffle Width (W_{bkfr} / W_{bkf})	/	/	/
Run Mean Depth (d_{bkfr})	/	/	/	ft	Run Mean Depth to Riffle Mean Depth (d_{bkfr} / d_{bkf})	/	/	/
Run Cross-Sectional Area (A_{bkfr})	/	/	/	ft	Run Area to Riffle Area (A_{bkfr} / A_{bkf})	/	/	/
Run Maximum Depth (d_{maxr})	/	/	/	ft	Run Max Depth to Riffle Mean Depth (d_{maxr} / d_{bkf})	/	/	/
Run Width/Depth Ratio (W_{bkfr} / d_{bkfr})	/	/	/	ft		/	/	/

Glide Dimensions*	Mean	Min.	Max.		Glide Dimensions & Dimensionless Ratios****	Mean	Min.	Max.
Glide Width (W_{bkfg})	/	/	/	ft	Glide Width to Riffle Width (W_{bkfg} / W_{bkf})	/	/	/
Glide Mean Depth (d_{bkfg})	/	/	/	ft	Glide Mean Depth to Riffle Mean Depth (d_{bkfg} / d_{bkf})	/	/	/
Glide Cross-Sectional Area (A_{bkfg})	/	/	/	ft	Glide Area to Riffle Area (A_{bkfg} / A_{bkf})	/	/	/
Glide Maximum Depth (d_{maxg})	/	/	/	ft	Glide Max Depth to Riffle Mean Depth (d_{maxg} / d_{bkf})	/	/	/
Glide Width/Depth Ratio (W_{bkfg} / d_{bkfg})	/	/	/	ft/ft	Glide Inner Berm Width/Depth Ratio (W_{ibg} / d_{ibg})	/	/	/
Glide Inner Berm Width (W_{ibg})	/	/	/	ft	Glide Inner Berm Width to Glide Width (W_{ibg}/W_{bkfg})	/	/	/
Glide Inner Berm Depth (d_{ibg})	/	/	/	ft	Glide Inner Berm Depth to Glide Depth (d_{ibg} / d_{bkfg})	/	/	/
Glide Inner Berm Area (A_{ibg})	/	/	/	ft^2	Glide Inner Berm Area to Glide Area (A_{ibg} / A_{bkfg})	/	/	/

Step Dimensions**	Mean	Min.	Max.		Step Dimensionless Ratios****	Mean	Min.	Max.
Step Width (W_{bkfs})	27.7	24.7	30.7	ft	Step Width to Riffle Width (W_{bkfs} / W_{bkf})	0.94	0.84	1.04
Step Mean Depth (d_{bkfs})	1.51	1.44	1.58	ft	Step Mean Depth to Riffle Mean Depth (d_{bkfs} / d_{bkf})	1.13	1.06	1.20
Step Cross-Sectional Area (A_{bkfs})	40.9	39.0	42.8	ft	Step Area to Riffle Area (A_{bkfs} / A_{bkf})	1.06	1.01	1.12
Step Maximum Depth (d_{maxs})	3.06	2.66	3.45	ft	Step Max Depth to Riffle Mean Depth (d_{maxs} / d_{bkf})	2.32	2.02	2.61
Step Width/Depth Ratio (W_{bkfs} / d_{bkfs})	18.8	15.6	22.9	ft/ft		/	/	/

*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.

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Worksheet B-3b. Morphological relations, including dimensionless ratios (*First Field Day*).

Stream: Sharmans Branch Location: MD

Observers: Team 3 Date: 4/25/17 Landscape Type: Confined colluvial Stream Type: B4-1

River Reach Summary Data.....2

Hydraulics

Streamflow: Estimated Mean Velocity at Bankfull Stage ($\bar{u}_{bkf}$)	3.09	ft/sec	Estimation Method	Jarrett
Streamflow: Estimated Discharge at Bankfull Stage (Q_{bkf})	119.45	cfs	Drainage Area	3.6 mi^2

Channel Pattern

Geometry	Mean	Min.	Max.		Dimensionless Geometry Ratios	Mean	Min.	Max.
Linear Wavelength (λ)				ft	Linear Wavelength to Riffle Width (λ / W_{bkf})			
Stream Meander Length (L_m)				ft	Stream Meander Length Ratio (L_m / W_{bkf})			
Radius of Curvature (R_c)				ft	Radius of Curvature to Riffle Width (R_c / W_{bkf})			
Belt Width (W_{blt})	31.0	28.5	33.5	ft	Meander Width Ratio (W_{blt} / W_{bkf})	1.055	0.97	1.141
Arc Length (L_a)				ft	Arc Length to Riffle Width (L_a / W_{bkf})			
Riffle Length (L_r)	27	20	34	ft	Riffle Length to Riffle Width (L_r / W_{bkf})	0.919	0.681	1.158
Individual Pool Length (L_p)	20.2	17.1	23.3	ft	Individual Pool Length to Riffle Width (L_p / W_{bkf})	0.688	0.582	0.793
Pool-to-Pool Spacing (P_s)	46.8	34.8	70	ft	Pool-to-Pool Spacing to Riffle Width (P_s / W_{bkf})	1.59	1.18	2.38

Channel Profile

Valley Slope (S_{val})		ft/ft	Average Water Surface Slope (S)	0.0353	ft/ft	Sinuosity (S_{val} / S)		N/A
Stream Length (SL)	200	ft	Valley Length (VL)	174	ft	Sinuosity (SL / VL)		1.11
Low Bank Height (LBH)	start 2.25	ft	Bankfull Max Depth (d_{max})	start 2.25	ft	Bank-Height Ratio (BHR) (LBH / d_{max})	start	1
	end 2.45	ft		end 2.45	ft		end	1

contraction

Facet Slopes	Mean	Min.	Max.		Dimensionless Facet Slope Ratios	Mean	Min.	Max.
Riffle Slope (S_{rf})	0.055	0.047	0.064	ft/ft	Riffle Slope to Average Water Surface Slope (S_{rf} / S)	1.556	1.330	1.81
Run Slope (S_{run})				ft/ft	Run Slope to Average Water Surface Slope (S_{run} / S)			
Pool Slope (S_p)	0.003	0.002	0.003	ft/ft	Pool Slope to Average Water Surface Slope (S_p / S)	0.085	0.057	0.085
Glide Slope (S_g)				ft/ft	Glide Slope to Average Water Surface Slope (S_g / S)			
Step Slope (S_s)	0.22	0.15	0.27	ft/ft	Step Slope to Average Water Surface Slope (S_s / S)	6.29	4.29	7.71

Max Depths[a]	Mean	Min.	Max.		Dimensionless Depth Ratios	Mean	Min.	Max.
Max Riffle Depth (d_{max})	2.32	2.21	2.45	ft	Max Riffle Depth to Mean Riffle Depth (d_{max} / d_{bkf})	1.758	1.674	1.841
Max Run Depth (d_{maxr})				ft	Max Run Depth to Mean Riffle Depth (d_{maxr} / d_{bkf})			
Max Pool Depth (d_{maxp})	3.515	3.51	3.52	ft	Max Pool Depth to Mean Riffle Depth (d_{maxp} / d_{bkf})	2.663	2.659	2.67
Max Glide Depth (d_{maxg})				ft	Max Glide Depth to Mean Riffle Depth (d_{maxg} / d_{bkf})			
Max Step Depth (d_{maxs})	2.12	1.65	2.46	ft	Max Step Depth to Mean Riffle Depth (d_{maxs} / d_{bkf})	1.06	1.25	1.864

Channel Materials

	Reach[b]	Riffle[c]	~~Bar~~		Reach[b]	Riffle[c]	~~Bar~~	Protrusion Height[d]	
% Silt/Clay	20%	0	0	D_{16}	5.6	32		110.73	mm
% Sand	30%	2%	0	D_{35}	24.17	90.5		195.2	mm
% Gravel	42%	31%	5%	D_{50}	57.67	105.55		252.2	mm
% Cobble	29%	47%	46%	D_{84}	362	512		576.0	mm
% Boulder	16%	14%	49%	D_{95}	945.23	BEDROCK		928.0	mm
% Bedrock	3%	6%	0	D_{100}	BEDROCK	BEDROCK		2047.95	mm

[a] *Mean*, *Min*., and *Max*. depths are measured from Thalweg to bankfull at mid-point of feature for riffles, runs, and steps, the deepest part of pools, and 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.

Lateral Pool	STEP Pool
0.003 slope	0.008 slope
2.5 Depth	3.01 Depth

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Worksheet B-4. Dimensionless ratios of the ten pool types (*First Field Day*).

Stream: Location:

Observers: Stream Type: Landscape Type: Date:

Pool Type		Dimensional Values: Pool Length (L_p)	Dimensional Values: Pool Max Depth (d_{maxp})	Dimensional Values: Pool Slope (S_p)		Dimensionless Ratios: Pool Length to Riffle Width (L_p / W_{bkf})	Dimensionless Ratios: Pool Max Depth to Riffle Mean Depth (d_{maxp} / d_{bkf})	Dimensionless Ratios: Pool Slope to Average Slope (S_p / S)
1. Lateral Scour Pool (LSP)	Mean	23.0	2.5	0.003	Mean	0.78	1.89	0.086
	Min.	23.0	2.5	0.003	Min.	0.78	1.89	0.086
	Max.	23.0	2.5	0.003	Max.	0.78	1.89	0.086
2. Contraction Scour Pool (CSP)	Mean	20.2	3.515	0.003	Mean	0.69	2.66	0.085
	Min.	17.1	3.51	0.002	Min.	0.58	2.66	0.057
	Max.	23.3	3.52	0.003	Max.	0.79	2.67	0.085
3. Step/Pool (SP)	Mean	9.0	3.01	0.008	Mean	0.31	2.28	0.23
	Min.	9.0	3.01	0.008	Min.	0.31	2.28	0.23
	Max.	9.0	3.01	0.008	Max.	0.31	2.28	0.23
4. Backwater Pool (BWP)	Mean	—	—	—	Mean	—	—	—
	Min.	—	—	—	Min.	—	—	—
	Max.	—	—	—	Max.	—	—	—
5. Plunge Pool (PP)	Mean	—	—	—	Mean	—	—	—
	Min.	—	—	—	Min.	—	—	—
	Max.	—	—	—	Max.	—	—	—
6. Pocket Water Pool (PWP)	Mean	—	—	—	Mean	—	—	—
	Min.	—	—	—	Min.	—	—	—
	Max.	—	—	—	Max.	—	—	—
7. Lateral Protrusion Pool (LPP)	Mean	6.0	2.9	0.005	Mean	0.2	2.2	0.14
	Min.	6.0	2.7	0.002	Min.	0.2	2.0	0.06
	Max.	6.0	3.0	0.007	Max.	0.2	2.3	0.2
8. Straight Dissipator Pool (SDP)	Mean	—	—	—	Mean	—	—	—
	Min.	—	—	—	Min.	—	—	—
	Max.	—	—	—	Max.	—	—	—
9. Converging Confluence Pool (CCP)	Mean	—	—	—	Mean	—	—	—
	Min.	—	—	—	Min.	—	—	—
	Max.	—	—	—	Max.	—	—	—
10. Compound Pool (CP)	Mean	—	—	—	Mean	—	—	—
	Min.	—	—	—	Min.	—	—	—
	Max.	—	—	—	Max.	—	—	—

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SURVEY DATA ⟹ **LONGITUDINAL PROFILE 1**

SITE: Reach 3 - Sharman's Branch Date: 4/25/17

Location: Reach 3 BM - top of rock @ flag

Observers: Team 3 - Paige, Diane, Kim HUC:

	Distance, Point, or STATION (ft)	Back-Sight BS (ft)	Height of Instrument HI (ft)	Thalweg Fore-Sight FS (ft)	Thalweg Elevation Elev. (ft)	Water Surface Fore-Sight FS (ft)	Water Surface Elevation Elev. (ft)	Bankfull Fore-Sight FS (ft)	Bankfull Elevation Elev. (ft)	Low Bank HI Fore-Sight FS (ft)	Low Bank HI Elevation Elev. (ft)	NOTES e.g. Riffle Run Pool Glide
1		9.36	109.36									
2	0+0			8.42		7.50		6.05				head of rapid
3	0+0							5.82		5.82		2nd BKF - like [illegible]
4	0+09			8.49								[illegible]
5	0+13			8.17		7.84		6.45				mid-rapid
6	0+46.5			8.55		8.14		6.27				XS1
7	0+22					8.33		6.32				BKF [illegible]
8	0+27			9.46		8.54						end of riffle
9	0+33			9.28		8.78						mid run
10	0+36			9.65		9.04		6.86				XS2 end run
11	0+40			10.06		9.05		6.99				head of pool
12	0+46			10.11		9.13						mid pool step pool
13	0+49			9.64		9.12		7.07				end of pool
14	0+52.3			9.57		9.16						step top
15	0+56			9.74		9.40						end of step
16	0+61			10.31		9.48		7.39				start pool - lateral
17	0+73			10.61		9.48						mid pool
18	0+84			10.90		9.55						end of pool
19	0+91.2			10.06		9.60						top of step
20	0+96.3			10.55		10.00						mid step
21	1+00.7			12.11		10.94						start of pool
22	1+08.2			12.70		11.03						mid pool
23	1+13.4					11.04		8.99				MID-BM Location
24	1+24			12.08		11.02		8.84				END POOL 2.16
25	1+31.5			11.52		11.04						RAPID Begin
26	1+38			12.57		12.01						MID RIFFLE
27	1+59			13.76		13.29						Bottom RAPID

BKF-WS
~~1.45~~
~~1.68~~
~~1.37~~
2.01
2.18
2.06
4.09
~~4.13~~
2.18

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SURVEY DATA ⟹ **LONGITUDINAL PROFILE 2**

SITE: Reach 3 Shumans Branch Date: 4/25/17

Location: Reach 3

Observers: Team 3 Paige Dianne Kim HUC:

	Distance, Point, or STATION (ft)	Back-Sight BS (ft)	Height of Instrument HI (ft)	Thalweg Fore-Sight FS (ft)	Thalweg Elevation Elev. (ft)	Water Surface Fore-Sight FS (ft)	Water Surface Elevation Elev. (ft)	Bankfull Fore-Sight FS (ft)	Bankfull Elevation Elev. (ft)	Low Bank HI Fore-Sight FS (ft)	Low Bank HI Elevation Elev. (ft)	NOTES e.g. Riffle Run Pool Glide
28	1+62.3			13.71		13.23						Step
29	1+65.5			13.89		13.23		11.44			Bg in	STEP convergence Rapid
30	1+67.5			14.62		13.63						Rapid MID
31	1+71.7			15.56		14.05		12.02				RAPID END
32	1+79.3			15.75		14.01					top	Convergence pool
33	1+88.8			15.55		14.02		12.2				end pool
34	1+95			15.04		14.03						top rapid
35	2+00			14.78		14.09						mid rapid
36												
37	Went back to get data @ 1+10.3 XS											
38	1+10.3			12.40		11.02		9.00				
39							11.02 - 4 = 2.02					
40												
41	1+68.4 XS					13.27		11.44				
42												
43												
44	STATION			TWG		WS		BKF	XS BKF			Field WS-BKF
45	0+16.5			8.55		8.14		6.27	6.12			XS1 1.87
46	0+36			9.65	99.81	9.04	100.46	6.86	6.89			XS2 2.18
47	1+10.3			12.4	96.48	11.02	98.41	9.00	9.07			XS3 2.02
48	1+65.5			13.89		13.23		11.44	11.25			XS4 1.79
49	1+68.4			14.66		13.27		11.44	11.21			XS5 1.83
50	1+88.8			15.71	93.65	14.02	95.32	12.2	12.2			XS6 1.82
51												
52	* Know each pool type									XS TEAM		XS1
53												XS2
54												XS3

XS4 Pool

BKF-WS Run XS team = 2.17 = 1.85

XS Stations
1+65.5
0+16.5
1+10.3
0+36
1+88.8

XS4
XS5
XS6

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SURVEY DATA ⟹ **CROSS - SECTION 3**

STA 1-88?

SITE: XS-4 Contraction Pool Date: 4/25/17

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
1	BM	4.75			1.00	Benchmark
2	0	5.19				flat on Bench (not terrace
3	3.2	6.99				1/2 way down slope
4	5.4	7.59				Bkfl? from VS indicators
5	7.04	7.81				Boulder @ Possible BKFL
6	8.10	8.33				BKFL?
7	9.70	9.09				Top of inner berm/deposition gravel & cobble
8	13.1	9.16				On Deposition bar cobble
9	14.7	9.20				" " " "
10	15.4	8.66				TOP On Boulder
11	18.20	9.43				~~Dry~~ LEON WS
12	18.9	9.56				Gravel Deposit on Boulder
13	20.6	9.95				gravel dep
14	22.10	10.46				Dmax Twg
15	25.1	11.10				OG
16	25.9	11.0				OG
17	28.6	10.60				bed
18	30.6	10.36				bed
19	33.8	9.45				REON
20	36.2	8.77				halfway up bank
21	37.8	8.17				TOB BKFL?
22	39.4	7.77				On Boulder BKFL
23	41.7	7.28				BKFL? on boulder 2.17
24	44.0	6.26				
25	45.0	5.72				mid bank
26	46.0	4.31				
27	BM					Benchmark
28						
29						
30						
31						

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SURVEY DATA ⟹ **CROSS - SECTION 2**

SITE: XS-3 Lateral Contraction POOL 1 Date: 4/25/17

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
1	BM	~~8.01~~ 4.60	100			Benchmark
2	~~0.0~~ 0.044			3.82		~~LEP OG~~ Top of upper bank
3	~~0.0~~ 1.0			4.68		BKFL? scour mark
4	0.60			~~[illegible]~~		LEP OG [illegible]
5	1.30			6.73		LEOW in [illegible] (W DEV 0.50)
6	2.0			6.83		~~[illegible]~~ on Boulder
7	3.0			7.11		Dmax Twg
8	3.80			7.90		on Bed
9	3.40			8.12		Dmax Thalweg
10	5.8			7.59		on Boulder
11	6.6			7.56		on "
12	7.40			6.71		OG
13	8.50			6.19		edge of water / REOW on boulder
14	9.50			5.78		on boulder | same boulder
15	11.0			5.05		on boulder
16	12.0			4.47		on boulder
17	13.4			4.34		edge of boulder
18	13.60			5.19		OG
19	14.3			5.70		on root
20	15.0			~~[illegible]~~ 5.58		on boulder
21	16.0			5.53		"
22	17.5			5.43		"
23	19.6			5.20		boulder
24	21.4			5.17		BKFL
25	21.8			5.10		BKFL?
26	22.6			5.13		BKFL TOB
27	23.1			5.11		OG side channel
28	26.10			5.26		
29	26.4			5.55		
30	27.7			5.68		
31	29.6			5.71		

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STA	FS	NOTE
32.2	5.52	[illegible] side [illegible]
32.6	5.49	[illegible]
33.40	5.77	[illegible]
35.2	5.03	
	4.60	Benchmark
		WS [illegible]
0.6	4.31	BEFL? [illegible] Top of moss
0.9	4.55	[illegible]
1.3	6.28	WS LEDW
2.3	6.23	WS REDW
52.1	3.50	
51.4	4.02	Bottom of bank
48.2	5.23	

SURVEY DATA → CROSS - SECTION 1

SITE: Date:

Location: Step Group 3 Image 36

Observers: HUC:

Item	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Fore-Sight FS ft	Elevation ft	REMARKS / COMMENTS / NOTES
1	BM	7.22	107.22		100	Benchmark
2	-4.3	1.92				mid left bank (waste line)
3	0	4.5				left end pin (top)
4	0	5.13				left end pin (ground)
5	0.7	5.37				on large rock maybe TOB
6	2.6	6.56				left top of water
7	3.0	7.24				water depth 0.67
8	4.2	6.82				on boulder
9	7.6	6.80				on boulder
10	8.4	6.58				Edge of water BWA@WS
11	8.8	6.32				On boulder (rounded edge of step)
12	9.5	6.82				left edge of active channel @WS on rock
13	10.4	7.41				Thalweg?
14	11.2	7.03				On boulder mid step
15	11.6	7.10				in channel on gravel
16	12.6	7.09				in channel on gravel
17	13.2	6.76				@WS and Right edge of water
18	13.9	6.72				Bottom of Bank (Dry)
19	14.6	6.41				Gravel top of Bar
20	16.9	6.31				on Bar
21	19.6	5.93				on Bar
22	21.6	5.89				Edge of bar / bottom of wet bank
23	22.2	5.16				Front BF (bank slumping)
24	22.8	4.73				BF
25	23.3	4.84				BF ? 1.1
26	24.1	4.75				BF
27	25	4.50				
28	26.1	4.20				
	27.7	4.05				
	28.8	4.33				

Bankwater Area

Possible BF

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Stn	Rod Rdg	Note
30.7	4.10	
32.7	3.65	
35.8	3.41	@ pin
~~7.22~~	7.27	Verify BM

R 7
R 20
R 128
R 141

Pools: 47 78
59 68
116
129

Representative Reach
67 ft riffles/non pools
148 total

Riffles: 49% → 10
Pools: 51% → 60

Site:

Location: HUC:

Observers: Jessie, Emily

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) TOT # ITEM % % CUM	POOL (2) TOT # ITEM % % CUM	COMPOSITE (3) TOT # ITEM % % CUM
							Reach:	Reach:	Reach:
							Date:	Date:	Date:
	Silt / Clay	< .062	S/C						
	Very Fine	.062 - .125	SAND						
	Fine	.125 - .25							
	Medium	.25 - .50							
	Coarse	.50 - 1.0							
.04 - .08	Very Coarse	1.0 - 2							
.08 - .16	Very Fine	2 - 4	GRAVEL						
.16 - .22	Fine	4 - 5.7							
.22 - .31	Fine	5.7 - 8							
.31 - .44	Medium	8 - 11.3							
.44 - .63	Medium	11.3 - 16							
.63 - .89	Coarse	16 - 22.6							
.89 - 1.3	Coarse	22.6 - 32							
1.3 - 1.8	Very Coarse	32 - 45							
1.8 - 2.5	Very Coarse	45 - 64							
2.5 - 3.5	Small	64 - 90	COBBLE						
3.5 - 5.0	Small	90 - 128							
5.0 - 7.1	Large	128 - 180							
7.1 - 10.1	Large	180 - 256							
10.1 - 14.3	Small	256 - 362	BOULDER						
14.3 - 20	Small	362 - 512							
20 - 40	Medium	512 - 1024							
40 - 80	Large-Vry Large	1024 - 2048							
	Bedrock		BDRK						
						TOTAL→			

Stream Type:

Landscape Type:

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X Section 16.5 (Previous Rep. Riffle STA 0+16.5 Q-35)

Pebble

Site:

Location: HUC:

Observers:

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) TOT # ITEM % % CUM	POOL (2) TOT # ITEM % % CUM	COMPOSITE (3) TOT # ITEM % % CUM
				Reach:	Reach:	Reach:			
				Date:	Date:	Date:			
	Silt / Clay	< .062	S/C						
	Very Fine	.062 - .125	SAND						
	Fine	.125 - .25	SAND						
	Medium	.25 - .50	SAND						
	Coarse	.50 - 1.0	SAND			‖			
.04 - .08	Very Coarse	1.0 - 2	SAND			|			
.08 - .16	Very Fine	2 - 4	GRAVEL			|			
.16 - .22	Fine	4 - 5.7	GRAVEL			|			
.22 - .31	Fine	5.7 - 8	GRAVEL						
.31 - .44	Medium	8 - 11.3	GRAVEL			‖‖			
.44 - .63	Medium	11.3 - 16	GRAVEL			‖			
.63 - .89	Coarse	16 - 22.6	GRAVEL	|		‖‖			
.89 - 1.3	Coarse	22.6 - 32	GRAVEL	|		‖			
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL	|		~~‖‖~~ ‖‖			
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL	~~‖‖~~ ~~‖‖~~ ‖‖		~~‖‖~~ |		
2.5 - 3.5	Small	64 - 90	COBBLE	~~‖‖~~ ~~‖‖~~ ‖‖	‖	~~‖‖~~ ~~‖‖~~ ~~‖‖~~ ‖‖			
3.5 - 5.0	Small	90 - 128	COBBLE	~~‖‖~~ ~~‖‖~~ ~~‖‖~~ |		~~‖‖~~ ~~‖‖~~ ‖‖			
5.0 - 7.1	Large	128 - 180	COBBLE	~~‖‖~~ ~~‖‖~~ ‖‖		~~‖‖~~ |		
7.1 - 10.1	Large	180 - 256	COBBLE	~~‖‖~~ ~~‖‖~~ ~~‖‖~~ ‖		~~‖‖~~ ‖‖			
10.1 - 14.3	Small	256 - 362	BOULDER	~~‖‖~~ ~~‖‖~~		‖			
14.3 - 20	Small	362 - 512	BOULDER	~~‖‖~~ ~~‖‖~~		~~‖‖~~ ‖‖‖‖			
20 - 40	Medium	512 - 1024	BOULDER	‖‖‖‖		~~‖‖~~ |		
40 - 80	Large-Vry Large	1024 - 2048	BOULDER						
	Bedrock		BDRK			‖‖‖‖			
Stream Type:				Landscape Type:		TOTAL→»			

Mountainous

~~‖‖~~ ~~‖‖~~ ~~‖‖~~

148 - 179 STA 1+65

Protrusions

Pebble - 161 - 172

Site:

Location: HUC:

Observers:

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) Reach: Date: TOT # ITEM % % CUM	POOL (2) Reach: Date: TOT # ITEM % % CUM	COMPOSITE (3) Reach: Date: TOT # ITEM % % CUM
	Silt / Clay	< .062	S/C						
	Very Fine	.062 - .125	SAND			I			
	Fine	.125 - .25	SAND						
	Medium	.25 - .50	SAND						
	Coarse	.50 - 1.0	SAND						
.04 - .08	Very Coarse	1.0 - 2				I			
.08 - .16	Very Fine	2 - 4	GRAVEL						
.16 - .22	Fine	4 - 5.7	GRAVEL						
.22 - .31	Fine	5.7 - 8	GRAVEL						
.31 - .44	Medium	8 - 11.3	GRAVEL			II			
.44 - .63	Medium	11.3 - 16	GRAVEL						
.63 - .89	Coarse	16 - 22.6	GRAVEL			卌			
.89 - 1.3	Coarse	22.6 - 32	GRAVEL	I		卌 II			
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL			卌 II			
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL	IIII		卌 卌			
2.5 - 3.5	Small	64 - 90	COBBLE	卌		卌 III			
3.5 - 5.0	Small	90 - 128	COBBLE	卌 卌 I		卌 卌 卌	卌 II		
5.0 - 7.1	Large	128 - 180	COBBLE	卌 卌		卌 卌 I			
7.1 - 10.1	Large	180 - 256	COBBLE	卌 卌 卌 卌		卌 I			
10.1 - 14.3	Small	256 - 362	BOULDER	卌 卌 卌 卌 卌		I			
14.3 - 20	Small	362 - 512	BOULDER	卌 I		III			
20 - 40	Medium	512 - 1024	BOULDER	卌 卌 卌 I		卌 卌			
40 - 80	Large-Vry Large	1024 - 2048	BOULDER	II					
	Bedrock		BDRK			卌 I			

Stream Type: *Landscape Type:* TOTAL→

5, 10, 15, 20, 25, 30

35, 40, 45, 50

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SURVEY DATA → CROSS - SECTION 1

SITE: ~~Representative~~ Upstream Rapid Riffle/Pool/c sta. 0+16.5 Date: 4-26-17

Location: Sharman's Branch

Observers: Kanuckel, Martinez HUC:

Item	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Fore-Sight FS ft	Elevation ft	NOTES / COMMENTS / REMARKS
1	-2.4		10.36	4.11		left Bank
2	-0.5			5.95		
3	0			6.45		Begin station
4	0.5			7.01		
5	0.8			7.28		
6	1.4			7.47		
7	1.9			7.96		Debris
8	2.7			7.98		"
9	3.6			8.0		Water surface
10	4.0			8.12		Debris
11	4.6			8.47		Channel bottom
12	6.6			8.32'		
13	8.0			8.65'		Trailing
14	9.9			8.45		
15	10.3			8.45		
16	12.1			8.32		
17	14.6			8.20		
18	17.2			8.18		
19	18.2			8.12		
20	18.2			7.95		Water Surface
21	21.8			7.95		Right edge water
22	22.2			7.70		Inner Berm
23	23.9			7.69		"
24	24.8			7.86		"
25	25.7			7.86		"
26	26.6'			7.75		Right edge Inner Berm
27	27.1			6.96		Up Bank
28	28.1			6.43		"

7.8
8.2

2.53 drop

WS to BKF 1.83'

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WS to BKF = 1.83'

STA	FS	BS	NOTE
28.5	6.27		~~Bkf~~
29.0	6.12		Bankfull
29.7	6.02		Floodplain
32.0	5.66		"
35.0	5.57		END TAPE
-3.2	3.59		Left ~~Ø~~ FPA
31.0	5.79		Floodplain
58.7	3.59		Right FPA (Boulder)
57.5	4.30		Floodplain
62.3	2.40		"
64.9	1.95		"
4.25	3.00		Left Bm
		9.36	BM

.83
BKF to
inter

.53 dmax

stepped
contract [illegible]

BKF TWG = 2.53

~~[illegible]~~
BKF

TWG - 2x Dmax = Dfpm

8.65 - 5.06 = 3.59

→ Rod Reading

SURVEY DATA → **CROSS - SECTION** 3

SITE: Sharman's Branch Downstream Rapid Staton 165.5 Representative **Date:** 4-26-17

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS REMARKS
1	0+00	4.40	10.49	5.85		
2	2.5			6.09		top bank 2.06
3	3.1			6.01		pos BKf 2.17
4	4.3			6.29		poss BKf * 2.53
5	4.9			6.48		pos BKf 1.67
6	5.9			6.84		pos BKf
7	6.4			6.94		top boulder
8	7.5			7.15		Boulder (same)
9	9.0			8.15		LWS
10	9.10 / 10.0			8.22 / 8.16		Channel / top inner berm
11	10.5			8.17		inner berm
12	11.5			8.14		inner berm
13	13.0			8.24		inner berm
14	14.5			8.54		
15	15.5			8.81		
16	16.5			8.82		thalweg
17	17.0			8.62		
18	17.4			8.15		Boulder
19	18.2			8.63		thalweg?
20	19.4			8.60		
21	19.5			8.20		RWS
22	20.2			8.01		inner berm
23	21.2			7.84		inner berm
24	22.8			7.69		inner berm
25	23.8			7.5		
26	25			7.05		
27	26.5			7.03		
28	29			7.09		
29	30.3			6.96		
30	31.6			6.67		
31	33.0			6.41		bkf? 1.79

WS + BKf 1.86

to wdr 51, fora

2.53 bkf / 5.06 flood 2 = dmax

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2.06 BKF - water surface

Sta	FS	
34.5	6.14	
36.0	5.99	ground
37.0	5.82	ground
37.2	3.05	Boulder
38	2.25	Boulder
39	1.64	Boulder
40	1.31	Boulder
41	0.98	Boulder
41.5	0.81	top boulder
42.3	1.65	ground
43	1.62	ground
44	1.38	ground
45	0.7	ground

LBK	
-2.0	5.49
-4.0	4.52
-6.0	4.14
-9	3.80
-12	3.43
-15	3.44
-19	3.02
-35	2.93
-43	0.82

SURVEY DATA → CROSS - SECTION 6

SITE: Sharman's Branch Downstream Step @ Sta 168.4 Date: 4-26-17

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
1	1.0	4.40	1.89			
2	6.0		3.39			
3	22.0		3.44			
4	35.0		4.61			
5	38.4		6.10			
6	42.8		6.25			bkf
7	44.5		6.40			gravel deposition
8	45.5		6.86			" "
9	46.4		7.20			" "
10	47.5		7.70			
11	48.7		8.03			
12	49.2		8.13			LWS
13	49.4		8.25			inner berm
14	51.4		8.14			inner berm
15	52.5		8.22			
16	53.0		8.64			Bottom channel
17	53.8		8.76			
18	54.0		8.62			water surface
19	55.0		8.93			
20	55.3		8.72			Boulder
21	55.5		7.90			
22	57.0		9.51			
23	57.8		9.50			
24	58.5		9.70			thalweg
25	60.0		8.80			
26	60.8		8.20			RWS
27	61.8		7.77			Boulder
28	62.5		7.85			inner
29	63.0		6.37			Top Boulder
30	64.7		6.42			Boulder
31	66.4		6.90			ground

2.03

1.88 bkf to WS-BKF

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(over)

68.5	7.10	
70.3	6.97	
73.5	6.24	
75.6	5.87	
78.2	5.85	ground
78.4	3.27	Boulder
81.0	1.29 1.00	Boulder top boulder
82.7	1.24	ground
84.0	1.39	ground
85.0	0.65	ground
87.0	0.01	gund