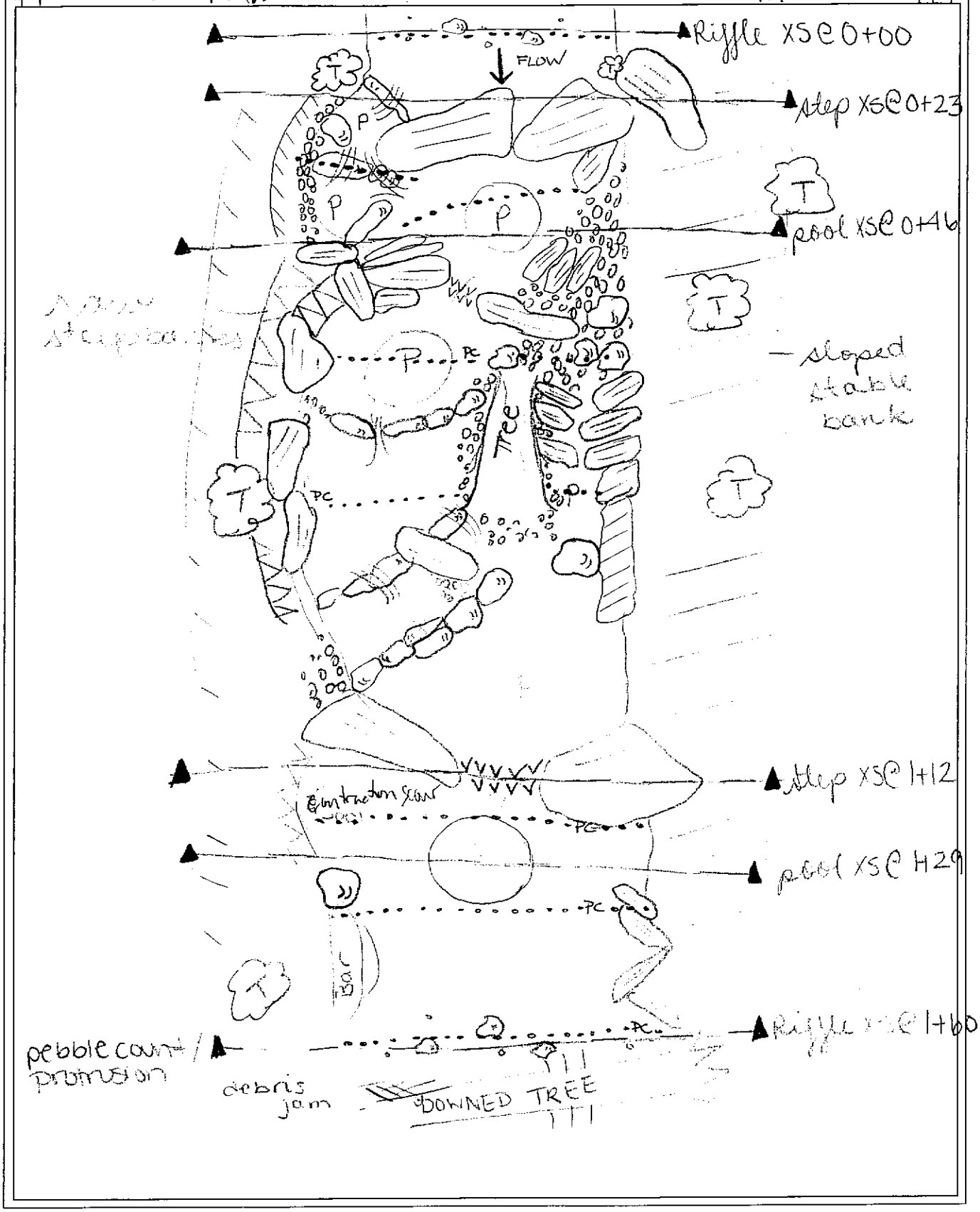
AREA-SITE LOCATION....REACH MAP

Stream/Drainage: Sharmens Branch Site/Reach: Reach 2

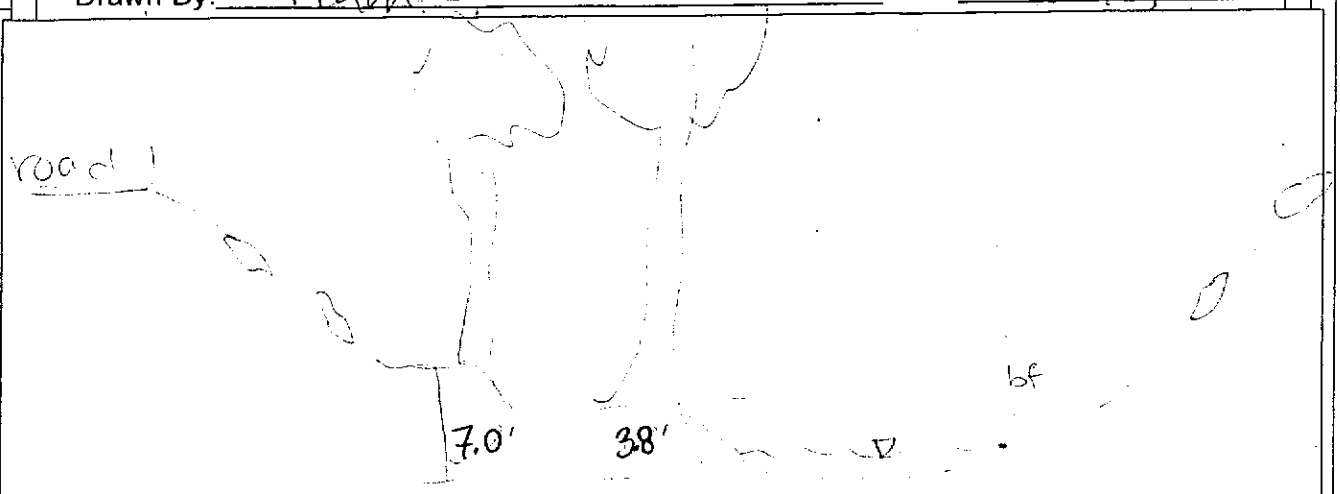
Drawn By: Team 2 Date: 04/14/15 Day 1



AREA-SITE LOCATION....REACH MAP

Stream/Drainage: Sharmans Branch Site/Reach: 2

Drawn By: Team 2 Date: 04/14/15 Day 1



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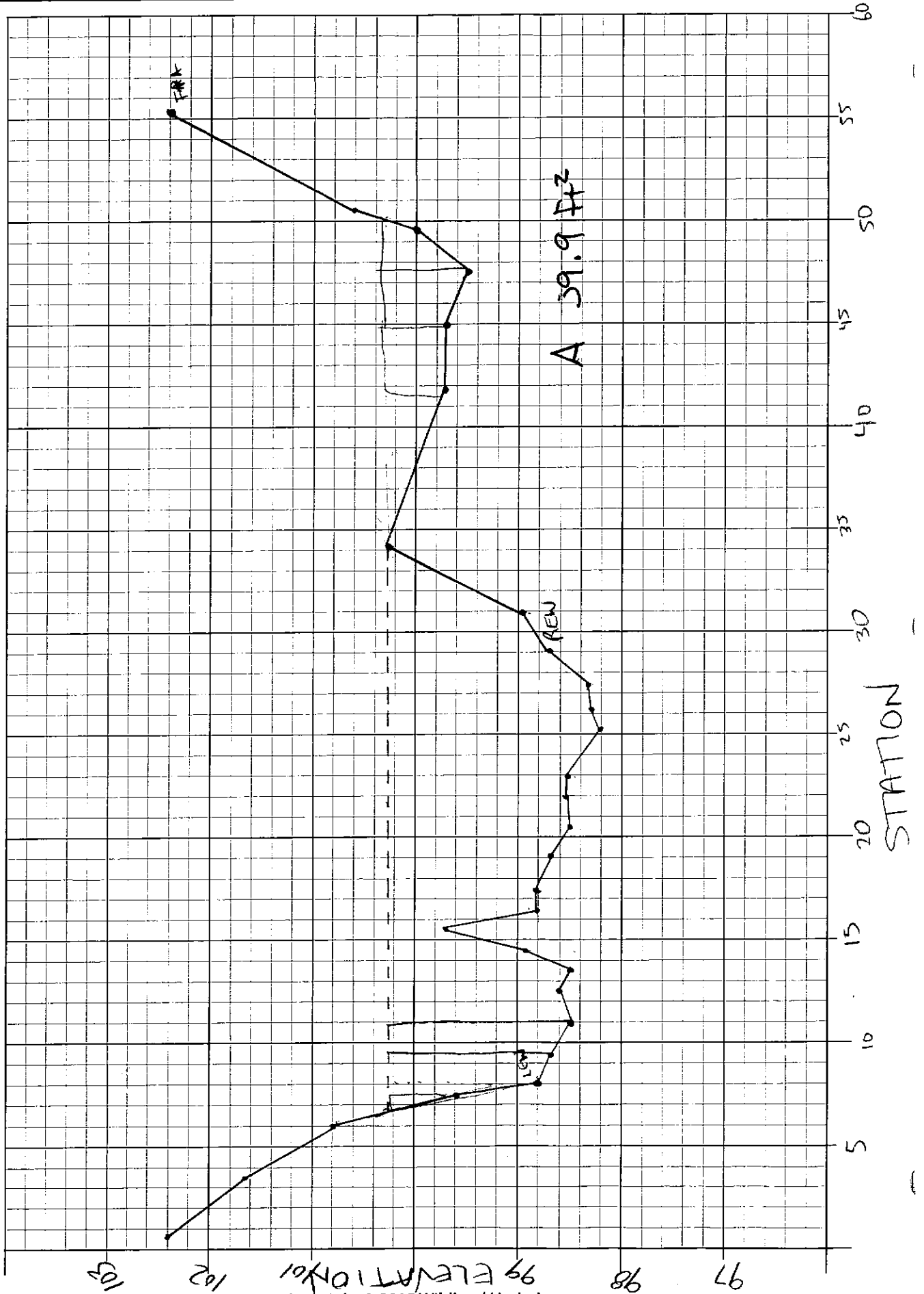
04/14/15

Trans 2 Sharmans Branch

pg B35

0+00 RIFFLE #1



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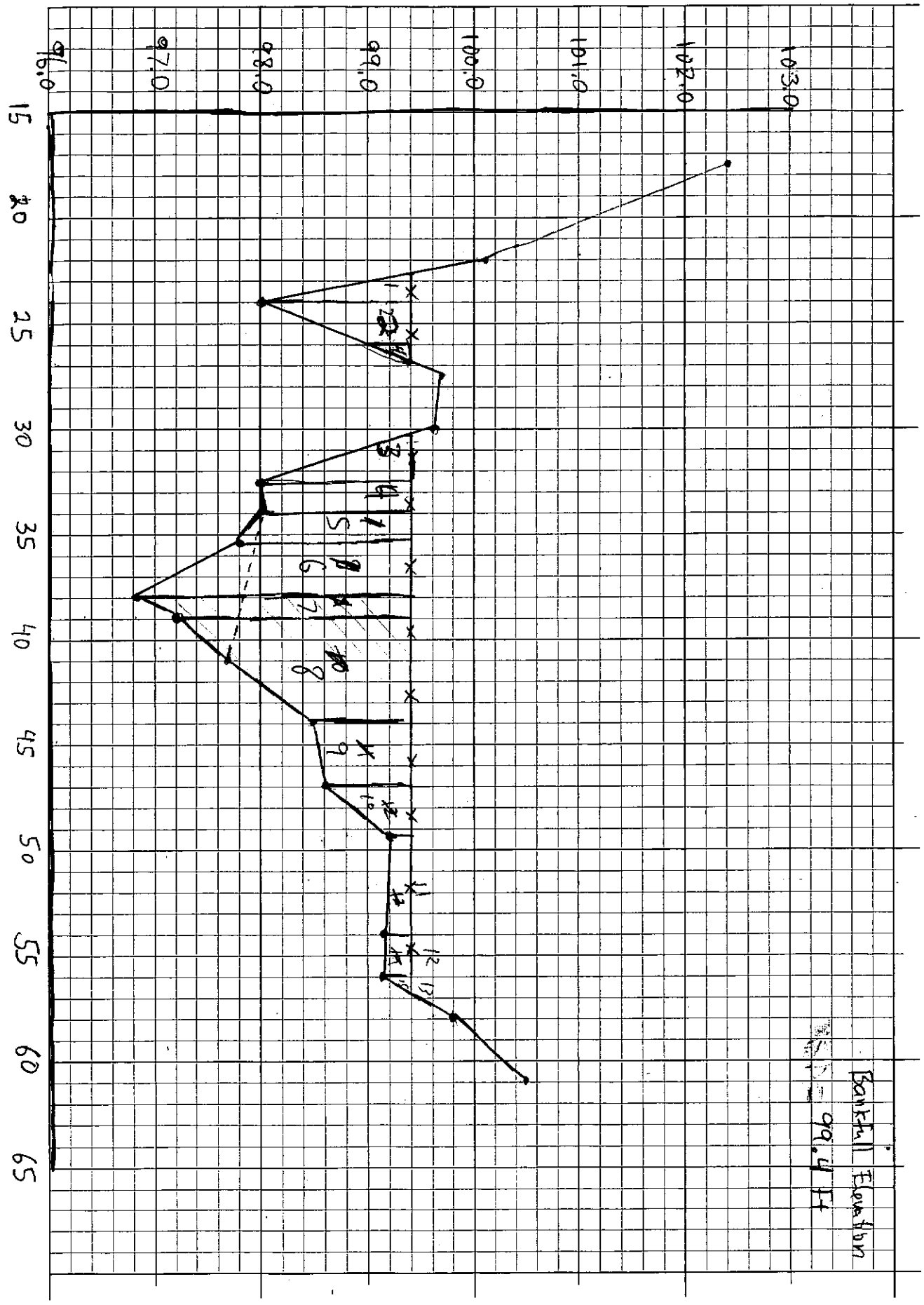

0+22 Step 1 Profile

Sharmans Branch Group 2

04/14/15

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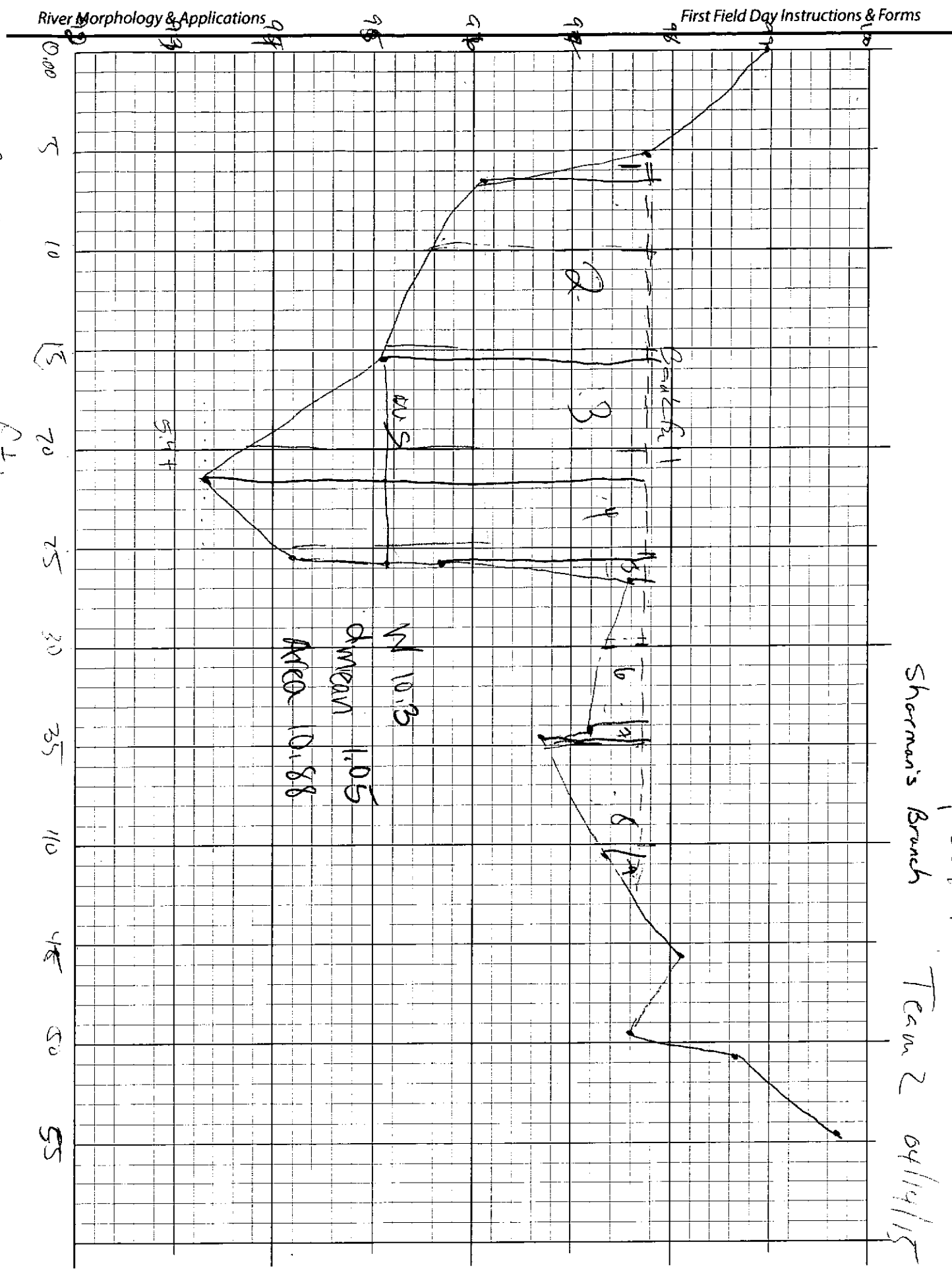

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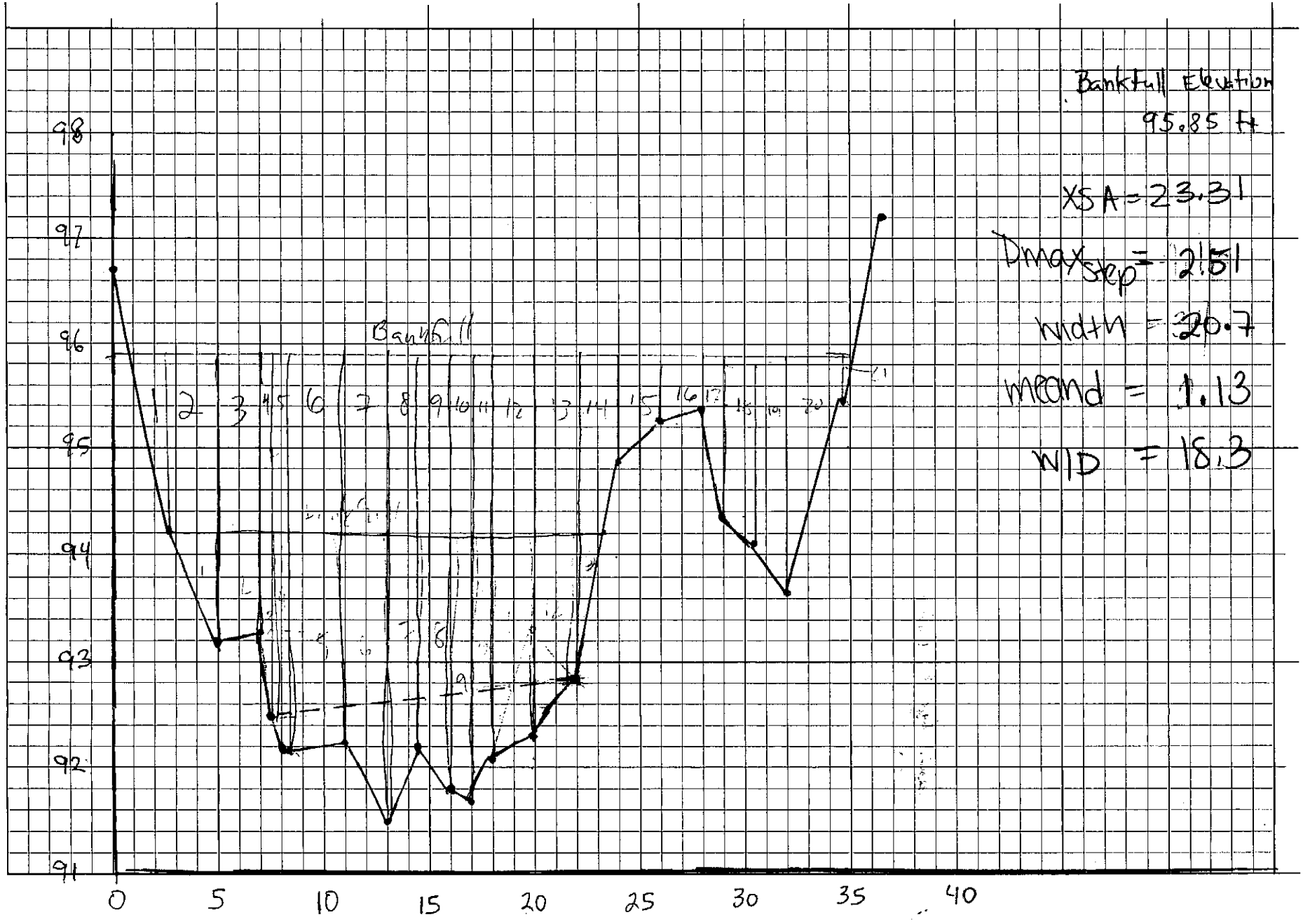
1 of 20 Step 2 Profile Sharman's Branch Group 2 04/14/15



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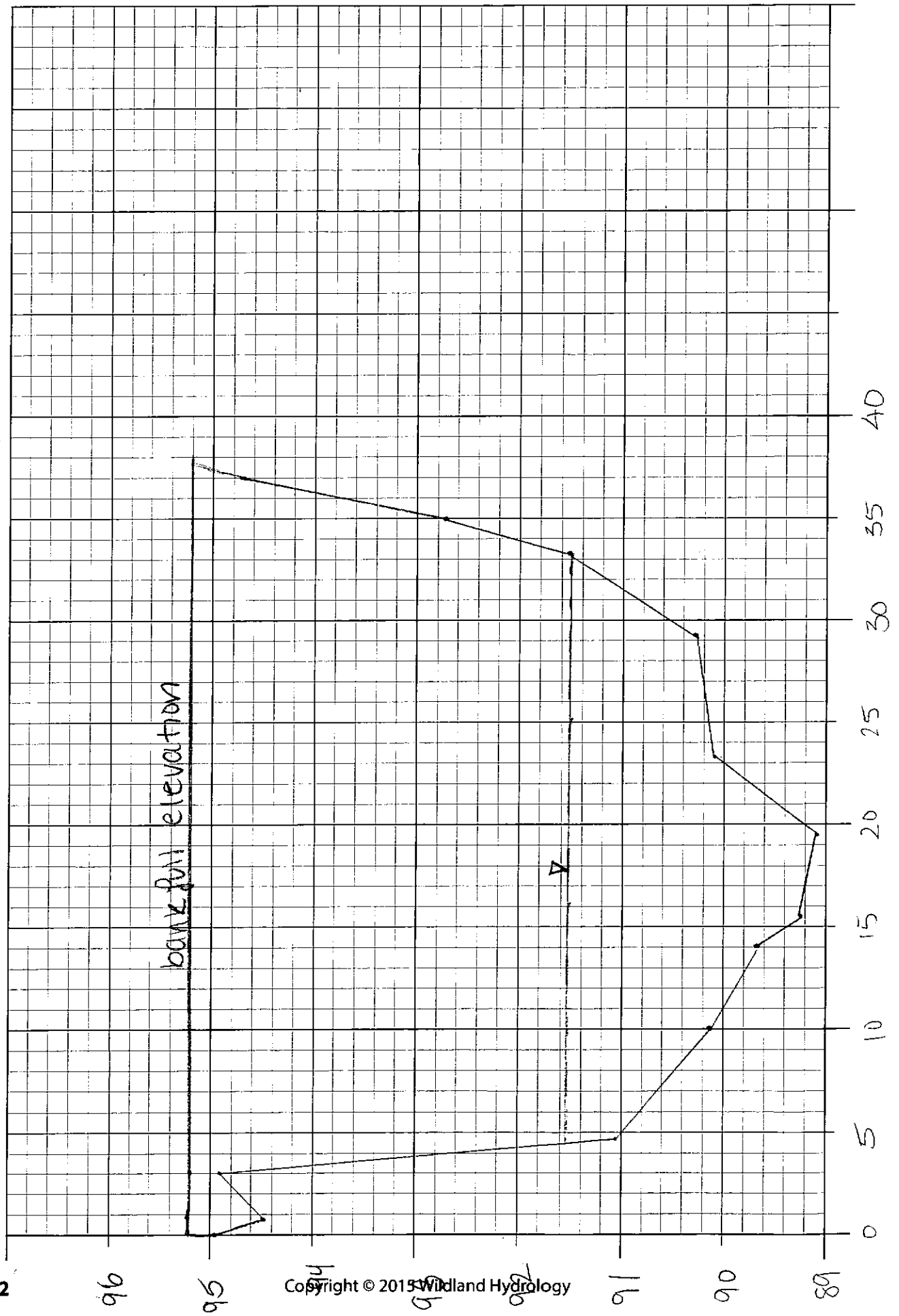
Trm 2 04/15/15
Sherman's Branch 95.2

POOL XS @ STA 1+29



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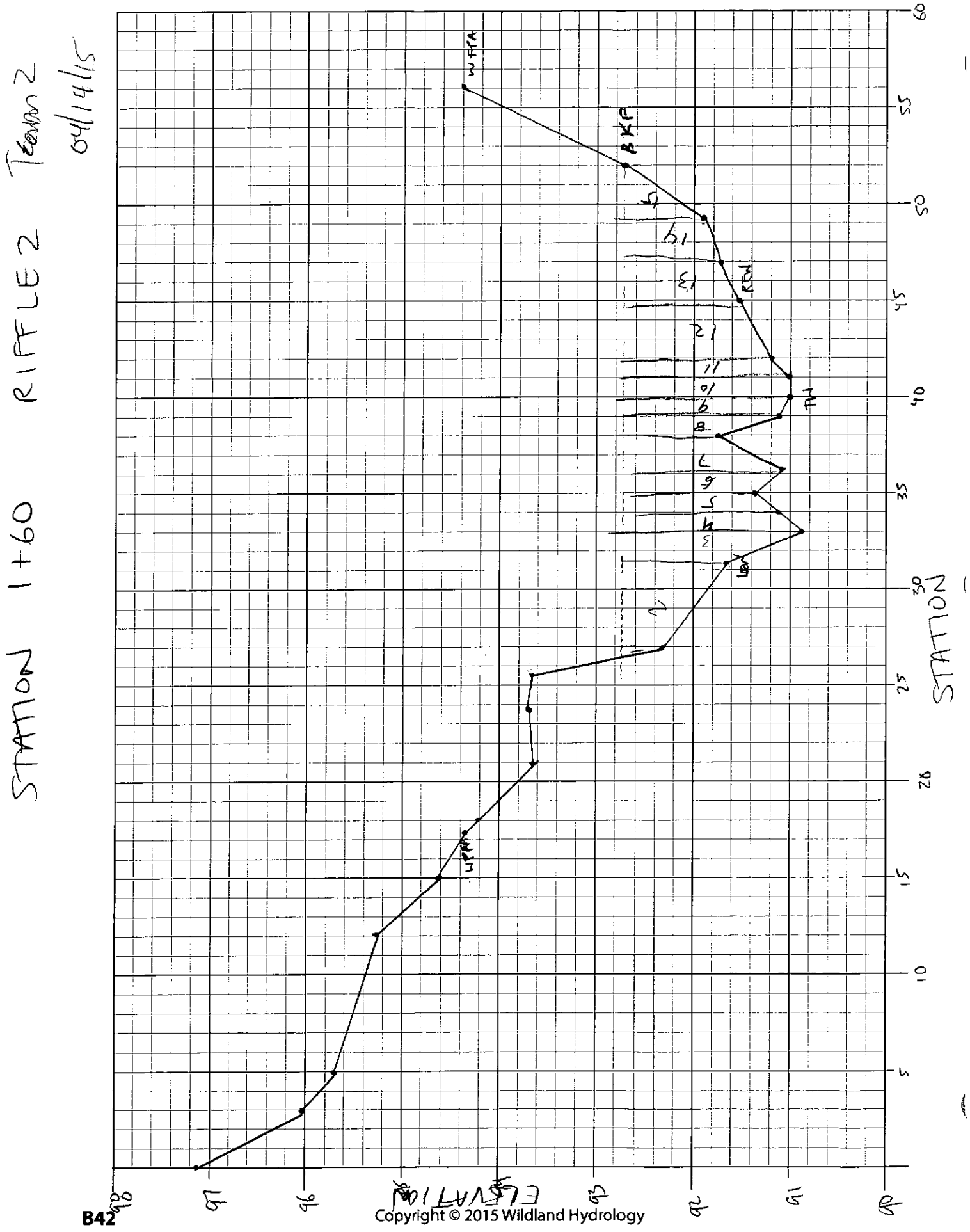

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SURVEY DATA ⟶ **CROSS - SECTION** 1

SITE: Sharman's Branch Reach 2 Date: 4/14/15

Location: 0+00 RIFFLE 1

Party / Notes: RA, JBF 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	Depth
1	0.7		103.11	0.72	102.39	Elev of WPA (LB)	
2	3.4			1.49	101.62		
3	6.05			2.32	100.79	~~LBKF~~	
4	7.2			3.51	99.6	mid bank	
5	8.0			4.31	98.8	LEW	0.8
6	9.5			4.41	98.7		1.5
7	11			4.62	98.49		1.5
8	12.7			4.5	98.61		1.7
9	13.6			4.65	98.46		0.9
10	14.6			4.2	98.91		1.0
11	15.3			3.42	99.69	ROCKS	0.7
12	16.3			4.3	98.81		1.0
13	17.3			4.3	98.81		1.0
14	19.2			4.39	98.72		1.9
15	20.5			4.58	98.53		1.3
16	22.0			4.55	98.56		1.5
17	23.2			4.6	98.51		1.2
18	25.2			4.9	98.21	TW	2.0
19	26.2			4.78	98.33		1.0
20	27.5			4.75	98.36		1.3
21	29.3			4.39	98.72		1.8
22	31.0			4.22	98.89	REW	1.7
23	34.2			2.88	100.23	RBKF	3.2
24	41.9			3.39	99.72		
25	45.0			3.36	99.75		
26	47.7			3.59	99.52		
27	49.3			3.12	99.99		
28	50.5			2.49	100.62		
29	55.1			0.72	102.39	Elev of RB WPA	

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SURVEY DATA ⟹ **CROSS - SECTION 2**

SITE: 1+60 RA JF RIFFLE 2 Date: 4/14/15

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS REMARKS	CELL WIDTH
29	0.00		103.11	5.95	97.16	DSL PIN	
30	3.00			7.08	96.03		3
31	5.0			7.37	95.74		2
32	12.2			7.85	95.26		7.2
33	15.0			8.48	94.63		2.8
34	17.5			8.73	94.38	Elev of WFPA	2.5
35	18.0			8.89	94.22		0.5
36	21.0			9.47	93.64		3.0
37	23.8			9.42	93.69	Boulder	2.8
38	25.5			9.47	93.64		1.7
39	27.0			10.81	92.30		1.5
40	31.3			11.47	91.64	LEW	4.3
41	33.0			12.24	90.87		1.7
42	34.0			11.97	91.14		1.0
43	35.0			11.74	91.37		1.0
44	36.3			12.04	91.07		1.3
45	38.0			11.36	91.75		1.7
46	39.0			12.02	91.09		1.0
47	40.0			12.11	91.00	TW	1.0
48	41.0			12.10	91.01		1.0
49	42.0			11.92	91.19		1.0
50	45.0			11.54	91.57	REW	3.0
51	47.0			11.41	91.7		2.0
52	49.4			11.21	91.9		2.4
53	52.0			10.42	92.69	BKF DSR	2.6
54	56.0			8.73	94.38	Elev of WFPA	4.0
55							
56							
57							
58							
59							

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SURVEY DATA ⟶ **CROSS - SECTION** 3

SITE: Sharman's Branch Reach 2 Date: 04/14/15

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS	REMARKS
29	cell	station	Elevation	Depth	Cell width	Ave cell depth	incremental area ft²
30			96.72				
31	1	2.99	94.26	2.46	2.99	1.23	3.68
32	2	5.0	93.2	1.06	2.01	1.76	3.54
33	3	7.0	93.32	0.12	2.0	0.59	1.18
34	4	7.3	92.54	0.78	0.3	0.45	0.14
35	5	8.0	92.25	0.29	0.7	0.54	0.38
36	6	8.2	92.25	0.00	0.2	0.15	0.03
37	7	11.5	92.27	0.02	3.3	0.01	0.03
38	8	13.1	91.52	0.75	1.6	0.39	0.62
39	9	14.6	92.19	0.67	1.5	0.71	1.10
40	10	16.0	91.81	0.38	1.4	0.53	0.74
41	11	17.2	91.69	0.12	1.2	0.25	0.30
42	12	18.2	92.6	0.91	1.0	0.52	0.52
43	13	20.0	92.32	0.28	1.8	0.60	1.08
44	14	22.2	92.84	0.52	2.2	0.40	0.88
45	15	24.0	94.87	2.03	1.8	1.28	2.30
46	16	26.0	95.24	0.37	2.0	1.20	2.40
47	17	28.0	95.38	0.14	2.0	0.26	0.52
48	18	29.3	94.30	1.02	1.3	0.58	0.75
49	19	30.5	94.11	0.25	1.2	0.64	0.77
50	20	32.3	93.65	0.46	1.8	0.36	0.65
51	21	34.8	95.45	1.80	1.5	1.13	1.70
52							
53						Total	23.31
54							
55							
56							
57							
58							
59							

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SURVEY DATA ⟹ **CROSS - SECTION** 3

SITE: 1 + 12 STEP

Date: 04/14/15

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS REMARKS
29	0.00		103.11	6.39	96.72	DSL Pin
30	2.90			8.85	94.26	mid bank
31	5.0			9.91	93.2	
32	7.0			9.79	93.32	
33	7.3			10.57	92.54	LEW
34	8.0			10.86	92.25	
35	8.2			10.86	92.25	
36	11.5			10.84	92.27	
37	13.1			11.59	91.52	
38	14.6			10.92	92.19	
39	16.0			11.30	91.81	deepest point of step
40	17.2			11.15	91.69	
41	18.2			10.51	92.6	
42	20.0			10.79	92.32	
43	22.2			10.27	92.84	REW
44	24.0			8.24	94.87	
45	26.0			7.87	95.24	large rock
46	28.0			7.73	95.38	
47	29.3			8.75	94.36	back in active channel
48	30.5			9.00	94.11	beside large rock
49	32.3			9.46	93.65	
50	34.8			7.66	95.45	mid bank
51	36.6			5.90	97.21	DSR Pin
52						
53						get BKF elev from
54						BKF slope long pro
55						
56						
57						
58						
59						

97.21
91.81

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SURVEY DATA → CROSS - SECTION 8

SITE: 04222 group2 STEP 1 Date: 04/14/15

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS REMARKS
29	17.5		103.11	0.70	102.41	
30	22.0			2.99	100.12	
31	24.3			5.09	98.02	
32	27.4			3.37	99.74	Large Boulder (massive)
33	30.0			3.50	99.61	
34	32.7			5.11	98.0	LEW
35	34.2			5.06	98.05	
36	35.3			5.31	97.80	
37	38.0			6.27	96.84	TW
38	39.1			5.91	97.2	
39	41.2			5.42	97.69	REW
40	44.0			4.58	98.53	
41	47.0			4.49	98.62	
42	49.4			3.89	99.22	BKF
43	54.0			3.94	99.17	
44	56.4			3.96	99.15	
45	58.2			3.32	99.79	
46	61.0			2.62	100.49	
47						
48						
49						
50						
51						
52						
53						102.41
54						96.84
55						
56						
57						
58						
59						

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SURVEY DATA ⟶ **CROSS - SECTION** 1

SITE: Sharmans Branch Date: 4/14/15

Location: POOL XS @ Sta 1+29 Team 2

Party / Notes: 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	0			3.30	94.94	
2	0.8			3.8	94.44	
3	3.0			3.34	94.90	
4	4.7			7.20	91.04	
5	10.0			8.09	90.15	
6	14.0			8.59	89.65	
7	15.5			8.99	89.25	
8	19.5			9.14	89.10	TW
9	23.3			8.10	90.14	
10	29.2			7.95	90.29	
11	33.3			6.68	91.56	EOW
12	35.0			5.48	92.76	
13	37.0			3.52	94.72	
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

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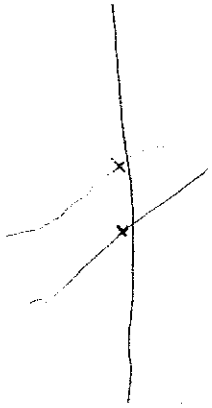
~~POO~~ STEP.

	mean	min	max
XSA	27.65	23.3	32
meand	1.08	1.02	1.13
width	26.1	20.7	31.5
maxd	2.66	2.51	2.8
w/D	24.5	18.3	30.8



SURVEY DATA ⟹ **CROSS - SECTION 2**

SITE: Cross sectional area pool 1 Date: 04/14/15

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES / COMMENTS / REMARKS	
29	cell	station	Elevation	Depth ft	Cell width ft	Avg cell depth ft	incremental area ft²
30			97.72				
31	1	6.8	96.15	1.57	1.7	1.045	1.77
32	2	15.6	95.63	0.52	8.8	1.38	12.14
33	3	21.8	93.39	2.24	6.2	1.6	9.92
34	4	25.4	94.35	0.96	3.6	1.18	4.25
35	5	28.7	95.75	1.40	0.3	1.625	0.49
36	6	26.7	97.60	1.85	1.0	1.125	1.125
37	7	34.1	97.20	0.40	7.4	0.83	3.07
38	8	34.3	96.77	0.43	0.2	1.03	0.10
39	9	41.6	97.37	0.60	7.2	0.60	4.18
40							
41					36.4	total area	33.06 ft²
42							
43							
44			max depth				
45			4.33				
46							
47				$\bar{d}$ = 0.91			
48				W = 36.4'			
49				A = 33.06 ft²			
50				W/D = 40			
51							
52							
53							
54							
55							
56							
57							
58							
59							

111.78 ft²

59.715

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SURVEY DATA ⟹ **CROSS - SECTION 1**

SITE: Group 2 Pool 1 Date: 04/14/15

Location: Sherman's Branch XS station 46.5

Party / Notes: HUC:

Item	Distance, Point, or STATION ft	Back-Sight B S ft	Height of Instrument H I ft	Fore-Sight F S ft	Elevation ft	REMARKS / COMMENTS / NOTES
1		3.70	103.75			
2	0			4.77	98.98	
3	5.1			6.03	97.72	Bankfull
4	6.8			7.60	96.15	
5	15.6			8.12	95.63	Edge of water
6	21.8			10.36	93.39	Thalweg
7	25.4			9.40	94.35	
8	25.7			8.00	95.75	on edge of bedrock
9	26.7			6.15	97.60	bedrock
10	34.1			6.55	97.20	bed rock
11	34.3			6.98	96.77	next piece of bedrock
12	41.6			6.38	97.37	bedrock + gravel deposit
13	46.2			5.56	98.19	
14	49.7			6.15	97.60	bedrock
15	51.4			5.10	98.65	bedrock needs bank
16	54.6			4.08	99.67	pin
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

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4/14/15 Sharman's Br
Team 2

	Cell #	Station	Elevation	Depth	Cell width	Average Cell Depth	Incremental Area
	1	22.5	99.4	0			
1	2	24.3	98.02	1.38	1.8	(0+1.38)/2 = 0.69	1.24
2	3	27	99.4	0.8	2.7	(1.38+0.8)/2 = 1.09	2.94
3	4	30	99.4	0	3	(0.8+0)/2 = 0.4	1.2
3 4	5	32.7	98.0	1.4	2.7	(0+1.4)/2 = 0.7	1.89
4 5	6	34.2	98.05	1.35	1.5	(1.4+1.35)/2 = 1.38	2.07
5 6	7	35.3	97.80	1.6	1.1	(1.35+1.6)/2 = 1.47	1.62
6 7	8	38	96.84	2.56	2.7	(1.6+2.56)/2 = 2.08	5.62
7 8	9	39.1	97.2	2.2	1.1	(2.56+2.2)/2 = 2.38	2.62
8 9	10	44	98.53	0.87	4.9	(2.2+0.87)/2 = 1.53	7.49
9 10	11	47	98.62	0.78	3	(0.87+0.78)/2 = 0.83	2.49
10 11	12	49.4	99.22	0.18	2.4	(0.78+0.18)/2 = 0.48	1.15
11 12	13	54.0	99.17	0.23	4.6	(0.18+0.23)/2 = 0.25	1.15
12 13	14	56.4	99.15	0.25	2.0	(0.23+0.25)/2 = 0.25	0.5
13 14	15	57	99.4	0	0.4	(0+.25+0)/2 = 0.13	0.05

= 32.03

32.03 Area of Cross Section

w×d = area

$\frac{\text{area}}{\text{width}}$ = depth

$\frac{32.03\ Ft^2}{31.5\ Ft} = 1.02\ Ft$ $\bar{d}_{step}$

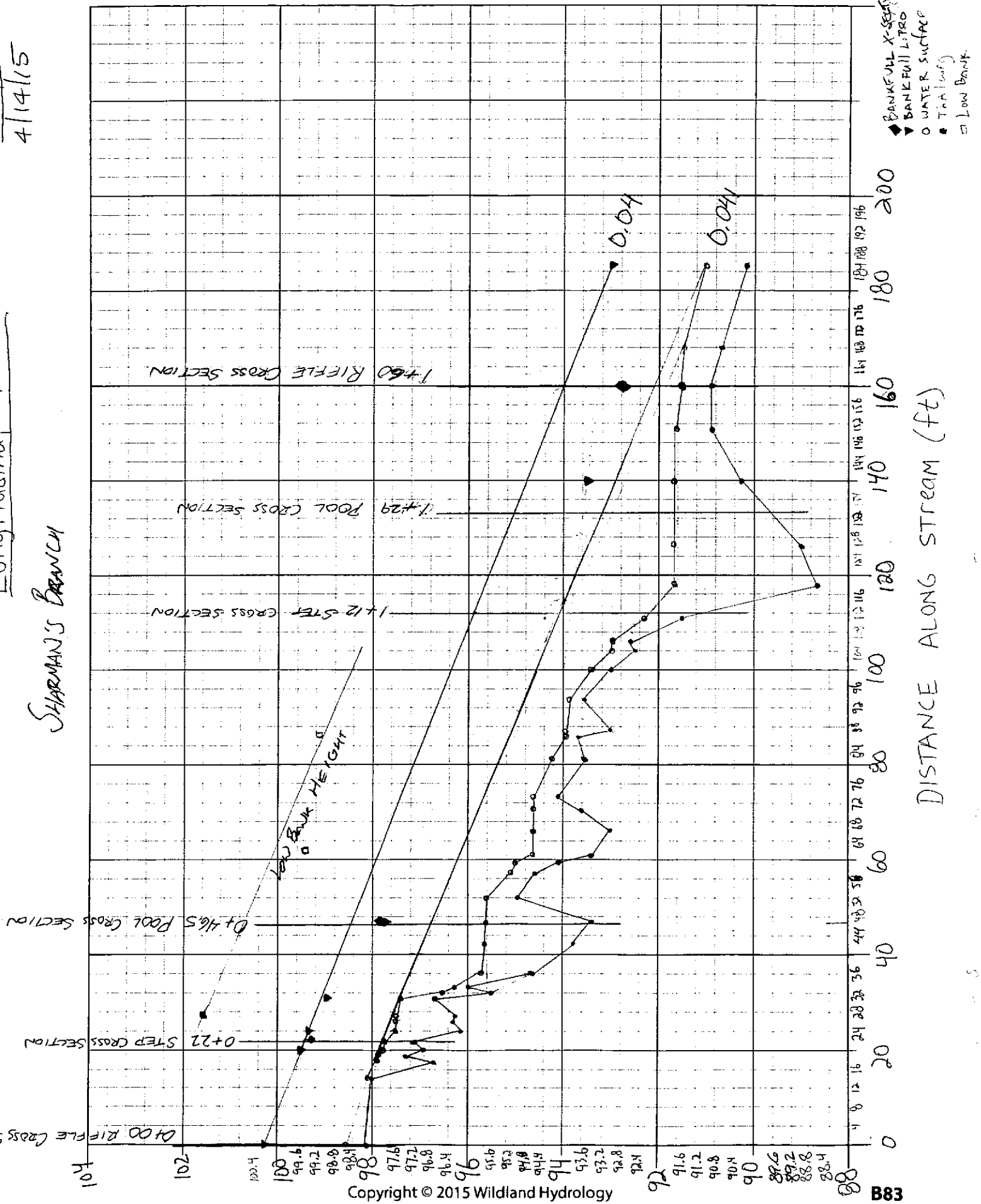
27 22.5 + ~~22.5~~ = 4.5 + (57 − 30

4.5 + 27 = 31.5 Ft bank Full width

Group 2
4/14/15

Longitudinal Profile

SHARMAN'S BRANCH



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SURVEY DATA → LONGITUDINAL PROFILE 2

SITE: Sharman Branch Date: 4/15/15

Location: Team 2

Party / Notes: 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	0+18		3.11'	S								
29	0+20		2.8	S								
30	0+24		3.32	C								
31	0+32		2.89	S								
32	0+47		4.14	C								
33	0+66		3.57	S								
34	0+87		2.82	S								
35	1+40		4.78	C								
36												
37	0+19		2.45									
38	0+22		2.53									
39	0+51		2.59									
40	0+33		2.17									
41	0+59		2.86									
42	0+94		2.21									
43	1+85		2.77		AVG:	2.51						
44												
45												
46	0+00		2.39									
47	0+57		2.51									
48	0+81		2.57									
49	1+11		2.69									
50	1+168		2.72		AVG:	2.58						
51												
52												
53												
54												

Pool Depths

Step Depths

Riffle Depths

Pool length

Steps: 4, 2.5, 2, 5, 12, 5, 2

13

Cont.: 16, 8, 5, 38, 8, 16, 3

4, 6, 22, 18, 14, 10, 14

28

145

0+00 Step 1, 0+22, 0+46.5, 0+112, 0+129, 0+160

DA = 3.6 mi²

Scores: 0.09

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SURVEY DATA ⟶ **LONGITUDINAL PROFILE 3**

SITE: Sharman's Branch Date: 4/15/15

Location: Team 2

Party / Notes: 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
55												
56												
57												
58		WATER										
59		SURFACE:		97.86 − 91.01		= 6.85		= 0.041				
60				185 − 19		166				1/1000 TH		
61												
62		BKF:		99.56 − 93.02		= 6.54		= 0.040				
63				185 − 20		165						
64												
65												
66		~~1 REACH NOTES~~										
67		~~1 ROCKY REACH~~										
68		1 WATER SLOPE = 0.041, EVEN w/ BKF Slope										
69		2 RIFFLE, STEP-POOL, CONT. POOL, STEP-POOL, BIG CONT. POOL/Scour										~3.5' deep
70		3 FACET SLOPES										
71		POOL TO POOL SPACING ~14 ft CLOSE AS IT WAS STEP-POOL + STEEP										
72		BANKFULL CALLS ~~MATCH~~ ~1.9' ; MATCHED WELL W/ X-SECTION										
73												
74		LOW BANK HT										
75		~~STEEP SECTION~~										
76												
77												
78		TRANSITION TO GROUP 15 ~~REACH~~										
79												
80												
81												

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SURVEY DATA ⟹ **LONGITUDINAL PROFILE 1**

SITE: Sharmans Branch **Date:** 4/15/15

Location:

Party / Notes: Reach 2 **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		3.10	103.11									BM
2	0+00			5.04	98.07	4.55	98.56					RIFF
3	0+14			5.06	98.05	5.04	98.07					R
4	0+18			6.40	96.71	5.19	97.92					POOL (Step)
5	0+19			5.30	97.31	5.25	97.86					STEP
6	0+20			6.24	96.87	5.34	97.77	3.55	99.56			POOL
7	0+25			5.97	97.14	5.34	97.77					S
8	0+31			6.96	96.15	5.54	97.57	3.75	99.33			P
9	0+36			6.77	96.34	5.54	97.57					P
10	0+37			6.84	96.27	5.54	97.57			1.55	101.56	P
11	0+41			6.38	96.73	5.69	97.42	4.16	93.95			S
12	0+52			7.61	95.50	[illegible]	96.49					P (Step)
13	0+55			7.11	96.00	6.34	96.27					S
14	0+56			8.46	94.65	7.18	95.66					P CONVERG.
15	0+42			9.39	93.73	7.47	95.64					P
16	0+47			9.72	93.39	7.45	95.63	5.46	97.68			P
17	0+52			8.[illegible]	95.00	7.50	95.61					R
18	0+57			8.47	94.64	7.45	95.16					R
19	0+59			9.33	94.08	8.07	95.04					S
20	0+64			9.80	93.31	8.46	94.65			3.69	99.42	P
21	0+66			10.13	92.98	8.46	94.65					P MAX (Step)
22	0+71			9.51	93.60	8.46	94.65					P
23	0+75			8.95	94.13	8.46	94.65					R
24	0+81			9.55	93.58	8.86	94.25					R
25	0+86			9.45	93.66	9.17	93.94			3.92	99.19	R (Step)
26	0+87			10.09	93.02	9.17	93.94					P
27	0+94			9.55	93.56	9.24	93.87					S

Convergence

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BM - Highest Point on Survey of Study Reach.

SURVEY DATA ⟹ **LONGITUDINAL PROFILE 2**

SITE: Sharmans Branch **Date:** 4/14/15

Location: Reach 2

Party / Notes: **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+00		103.11	10.06	93.05	9.72	93.39						
29	1+04			10.67	92.44	10.13	92.98					R	
30	1+06			10.56	92.55	10.19	92.92					R	
31	1+11			11.59	91.52	10.8	92.31					R	
32	1+18			14.37	88.74	11.49	91.62					P	
33	1+27			14.15	88.96	11.44	91.67					P	
34	1+40			12.76	90.35	11.47	91.64	9.58	93.53			P	1.89
35	1+51			12.21	90.9	11.50	91.61					Gl/R	
36	1+60			12.23	90.88	11.55	91.56			9.05	94.02	R	
37	1+68			12.45	90.66	11.63	91.48					R	
38	1+85			12.97	90.14	12.1	91.01	0.09 ~~[illegible]~~	93.02			S	2.01
39													
40													
41													
42													
43													
44													
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48													
49													
50													
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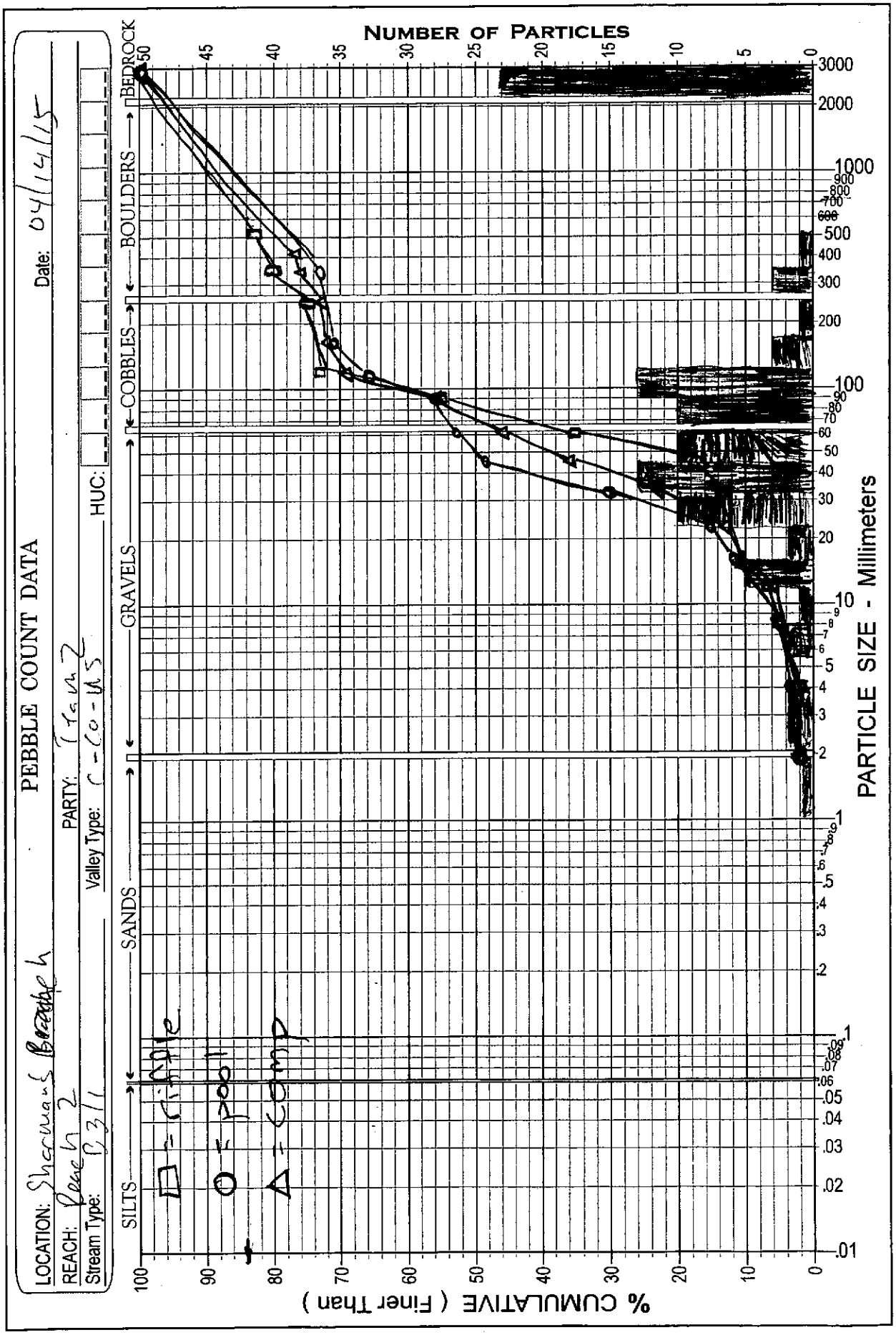

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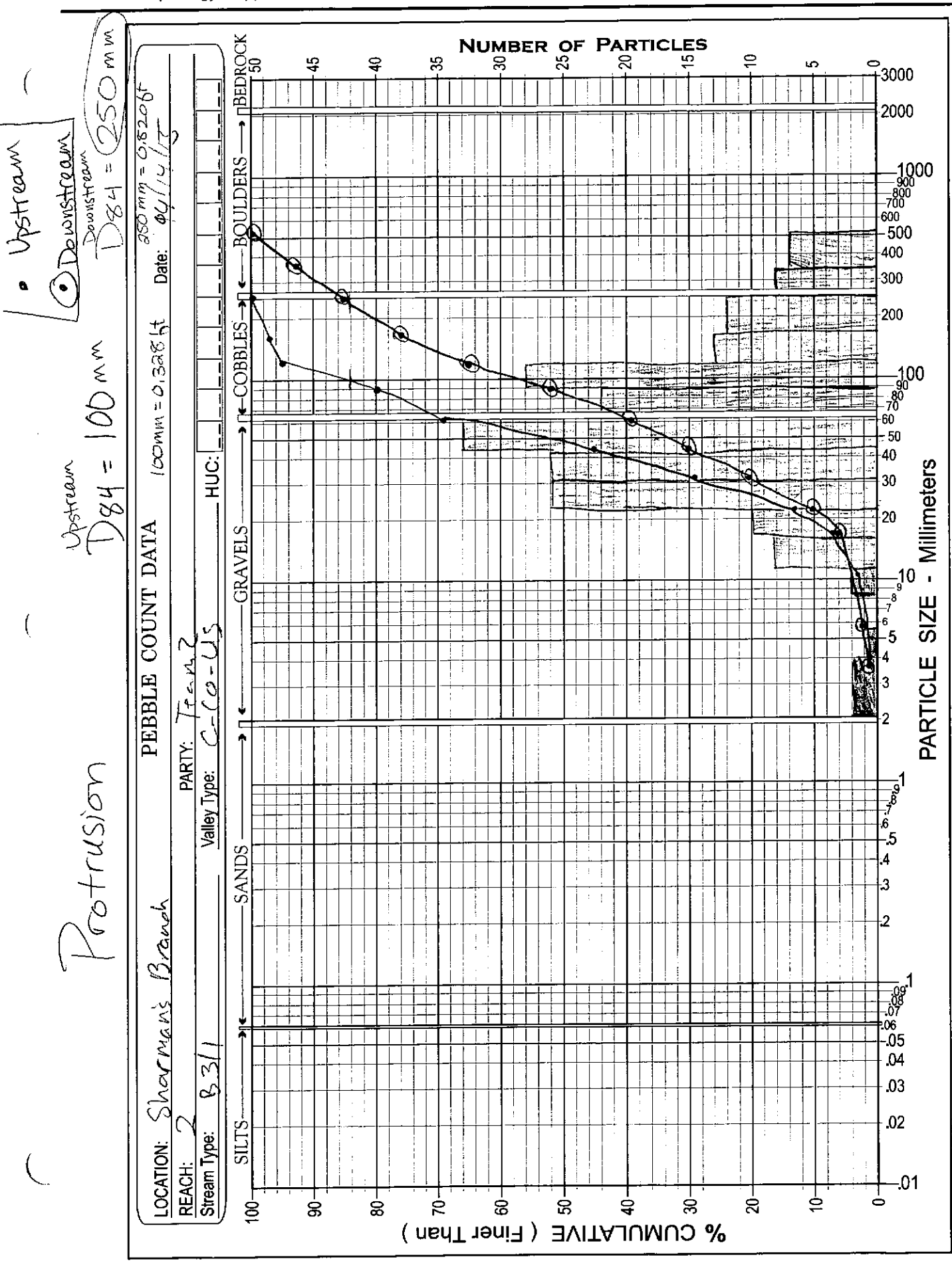

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Pools 60% ~~||||~~ |
Riffles 40% ||||

04/14/15

Site: Sharman's Branch Date: 4-14-15
Location: MD HUC:
Party: Team 2

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					40			60				
	Very Fine	.062 - .125	SAND												
	Fine	.125 - .25													
	Medium	.25 - .50													
	Coarse	.50 - 1.0													
.04 - .08	Very Coarse	1.0 - 2			1					1	1.7	1.7	1	1	1
.08 - .16	Very Fine	2 - 4	GRAVEL	1	1		1	2.5	2.5	1	1.7	3.4	2	2	3
.16 - .22	Fine	4 - 5.7													
.22 - .31	Fine	5.7 - 8		1	1		1	2.5	5.0	1	1.7	5.1	2	2	5
.31 - .44	Medium	8 - 11.3			1					1	1.7	6.8	1	1	6
.44 - .63	Medium	11.3 - 16		11	111		2	5.0	10.0	3	5.0	11.8	5	5	11
.63 - .89	Coarse	16 - 22.6			11					2	3.3	15.1	2	2	13
.89 - 1.3	Coarse	22.6 - 32		1	~~||||~~ ~~||||~~		1	2.5	12.5	9	15.0	30.1	10	10	23
1.3 - 1.8	Very Coarse	32 - 45		11	~~||||~~ ~~||||~~		2	5.0	17.5	11	18.3	48.4	13	13	36
1.8 - 2.5	Very Coarse	45 - 64		~~||||~~	111		7	17.5	35.0	3	5.0	53.4	10	10	46
2.5 - 3.5	Small	64 - 90	COBBLE	~~||||~~ 111	11		8	20.0	55.0	2	3.3	56.7	10	10	56
3.5 - 5.0	Small	90 - 128		~~||||~~ 1	~~||||~~ 1		7	17.5	72.5	6	10.0	66.7	13	13	69
5.0 - 7.1	Large	128 - 180			111					3	5.0	71.7	3	3	72
7.1 - 10.1	Large	180 - 256		1			1	2.5	75.0				1	1	73
10.1 - 14.3	Small	256 - 362	BOULDER	11	1		2	5.0	80.0	1	1.7	73.4	3	3	76
14.3 - 20	Small	362 - 512		1			1	2.5	82.5				1	1	77
20 - 40	Medium	512 - 1024													
40 - 80	Large-Vry Large	1024 - 2048													
	Bedrock		BDRK	~~||||~~ 1	~~||||~~ ~~||||~~ ~~||||~~		7	17.5	100	16	26.7	100	23	23	100
Stream Type:			**Valley Type:**			TOTAL→	40	100	100	60	100	100	100	100	100

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protrusion height x-section #1 Upstream

Site: Sharman's Branch Date: 4/14/15

Location: Reach 2 HUC:

Party:

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	Upstream ~~RIFFLE~~ (1) TOT #	ITEM %	% CUM	Downstream ~~POOL~~ (2) TOT #	ITEM %	% CUM	COMPOSITE (3) TOT #	ITEM %	% CUM
	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	I			1	10	1	1	1	1	2		
.16 - .22	Fine	4 - 5.7								1	1	2	1		
.22 - .31	Fine	5.7 - 8													
.31 - .44	Medium	8 - 11.3		II			2	2	3				2		
.44 - .63	Medium	11.3 - 16		IIII			4	4	7	4	4	6	8		
.63 - .89	Coarse	16 - 22.6		~~IIII~~ I			6	6	13	4		10	10		
.89 - 1.3	Coarse	22.6 - 32		~~IIII~~ ~~IIII~~ ~~IIII~~ I			16	16	29	10		20	26		
1.3 - 1.8	Very Coarse	32 - 45		~~IIII~~ ~~IIII~~ ~~IIII~~ I			16	16	45	10		30	26		
1.8 - 2.5	Very Coarse	45 - 64		~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ IIII			24	24	69	9		39	33		
2.5 - 3.5	Small	64 - 90	COBBLE	~~IIII~~ ~~IIII~~ I			11	11	80	13		52	24		
3.5 - 5.0	Small	90 - 128		~~IIII~~ ~~IIII~~ ~~IIII~~ I			15	15	95	13		65	28		
5.0 - 7.1	Large	128 - 180		II			2	2	97	11		76	13		
7.1 - 10.1	Large	180 - 256		III			3	3	100	9		85	12		
10.1 - 14.3	Small	256 - 362	BOULDER							8		93	8		
14.3 - 20	Small	362 - 512								7		100	7		
20 - 40	Medium	512 - 1024													
40 - 80	Large-Vry Large	1024 - 2048													
	Bedrock		BDRK												
Stream Type:			**Valley Type:**			TOTAL→	100								

D84 = 100

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

Bankfull VELOCITY & DISCHARGE Estimates 04/14/15

Stream:	Sherman's Branch	Location:	Reach 2
Date: 04/14/15	Stream Type:	Valley Type:	C-C0-US
Observers:	Team 2	HUC:	

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional AREA	39.9	A_{bkf} (ft^2)	Bankfull Riffle Mean DEPTH	1.5	d_{bkf} (ft)
Bankfull Riffle WIDTH	27.0	W_{bkf} (ft)	Wetted PERIMETER ~ $(2 * d_{bkf}) + W_{bkf}$	30	W_p (ft)
D_{84} at Riffle	100	Dia. (mm)	D_{84} (mm) / 304.8	0.33	D_{84} (ft)
Bankfull SLOPE	0.041	S_{bkf} (ft / ft)	Hydraulic RADIUS A_{bkf} / W_p	1.33	R (ft)
Gravitational Acceleration	32.2	g (ft / sec^2)	Relative Roughness R(ft) / D_{84} (ft)	4.03	R / D_{84}
Drainage Area	3.6	DA (mi^2)	Shear Velocity $u^* = (gRS)^{½}$	1.3	u^* (ft/sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $\bar{u} = [\,2.83 + 5.66 * Log\{R / D_{84}\}\,]\,u^*$	8.3	ft / sec	331.17	cfs
2. Roughness Coefficient: a) Manning's *n* from Friction Factor / Relative Roughness (Figs. B-34, B-35) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.04	9.1	ft / sec	363.09	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	4.86	ft / sec	194.00	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 Stream Types A1, A2, A3, B1, B2, B3, C2 & E3 $n =$	3.29	ft / sec	131.27	cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)		ft / sec		cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)		ft / sec		cfs
4. Continuity Equations: a) USGS Gage Data $\bar{u} = Q / A$ Return Period for Bankfull Discharge Q = year		ft / sec		cfs
4. Continuity Equations: b) Regional Curves $\bar{u} = Q / A$	3.00	ft / sec	119.6	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 **"protrusion 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-1. Field Form for Level II Stream Classification (*First Field Day*). 04/14/15

Stream: Shermans Branch			
Basin: Potomac	Drainage Area:	acres 3.6	mi²
Location: Reach 2			
Twp.&Rge:	Sec.&Qtr.:		
Cross-Section Monuments (Lat./Long.):		Date: 04/14/15	
Observers: Team 2		Valley Type: C-CO-US	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	27.0	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$).	1.5	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	39.9	ft²
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	18.0	ft/ft
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.	2.02	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or ($2 \times d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	54.4	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	2.01	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.	70	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.	0.04	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 (S_{val} / S).	1	

Stream Type B3/C4/1 **See Classification Key (Figure B-2)**

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

Stream: Sharman's Branch Location: Reach 2

Observers: Team 2 Date: 04/14/15 Valley Type: C-(O-US Stream Type: B3/1

River Reach Dimension Summary Data.....1

Riffle Dimensions*, **, ***	Mean	Min	Max		Riffle Dimensions & Dimensionless Ratios****	Mean	Min	Max
Riffle Width (W_{bkf})	26.25	25.5	27	ft	Riffle Cross-Sectional Area (A_{bkf}) (ft^2)	34.1	26.3	39.9
Riffle Mean Depth (d_{bkf})	1.305	1.11	1.5	ft	Riffle Width/Depth Ratio (W_{bkf} / d_{bkf})	20	16	23
Riffle Maximum Depth (d_{max})	1.86	1.69	2.02	ft	Riffle Max Depth to Riffle Mean Depth (d_{max} / d_{bkf})	1.42	1.34	1.5
Width of Flood-Prone Area (W_{fpa})	46.45	38.5	54.4	ft	Entrenchment Ratio (W_{fpa} / W_{bkf})	1.75	1.5	2.0
Riffle Inner Berm Width (W_{ib})	18.4	13.7	23	ft	Riffle Inner Berm Width to Riffle Width (W_{ib} / W_{bkf})	0.68	0.5	0.85
Riffle Inner Berm Depth (d_{ib})	0.96	[illegible]	[illegible]	ft	Riffle Inner Berm Depth to Mean Depth (d_{ib} / d_{bkf})	[illegible]	0.70	0.77
Riffle Inner Berm Area (A_{ib})	18.5	13.5	21.5	ft^2	Riffle Inner Berm Area to Riffle Area (A_{ib} / A_{bkf})	0.4	0.3	0.46
Riffle Inner Berm W/D Ratio (W_{ib} / d_{ib})		8.7	100					

Pool Dimensions*, **, ***	Mean	Min	Max		Pool Dimensions & Dimensionless Ratios****	Mean	Min	Max
Pool Width (W_{bkfp})	37.2	36.4	38	ft	Pool Width to Riffle Width (W_{bkfp} / W_{bkf})	1.38	1.35	1.41
Pool Mean Depth (d_{bkfp})	2.23	0.91	4.26	ft	Pool Mean Depth to Riffle Mean Depth (d_{bkfp} / d_{bkf})	1.49	0.61	2.81
Pool Cross-Sectional Area (A_{bkfp})	99.3	33.06	163.6	ft	Pool Area to Riffle Area (A_{bkfp} / A_{bkf})	2.49	0.83	4.10
Pool Maximum Depth (d_{maxp})	3.22	4.33	6.1	ft	Pool Max Depth to Riffle Mean Depth (d_{maxp} / d_{bkf})	3.48	2.89	4.07
Pool Inner Berm Width (W_{ibp}) N/A	10.3	—	—	ft	Pool Inner Berm Width to Pool Width (W_{ibp} / W_{bkfp})	0.38		
Pool Inner Berm Depth (d_{ibp}) N/A	1.05	—	—	ft	Pool Inner Berm Depth to Pool Depth (d_{ibp} / d_{bkfp})	0.7		
Pool Inner Berm Area (A_{ibp}) N/A	10.88		—	ft^2	Pool Inner Berm Area to Pool Area (A_{ibp} / A_{bkfp})	0.27		
Point Bar Slope (S_{pb}) NA	—	—	—	ft/ft	Pool Inner Berm Width/Depth Ratio (W_{ibp} / d_{ibp}) NA	—	—	—

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})	N/A		
Run Cross-Sectional Area (A_{bkfr})	N/A			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})	N/A			ft	Glide Max Depth to Riffle Mean Depth (d_{maxg} / d_{bkf})	N/A		
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**	Mean	Min	Max		Step Dimensionless Ratios****	Mean	Min	Max
Step Width (W_{bkfs})	26.1	20.7	31.5	ft	Step Width to Riffle Width (W_{bkfs} / W_{bkf})	0.97	0.77	1.67
Step Mean Depth (d_{bkfs})	1.08	1.02	1.13	ft	Step Mean Depth to Riffle Mean Depth (d_{bkfs} / d_{bkf})	0.72	0.68	1.07
Step Cross-Sectional Area (A_{bkfs})	27.6	23.3	32	ft	Step Area to Riffle Area (A_{bkfs} / A_{bkf})	0.68	0.58	0.80
Step Maximum Depth (d_{maxs})	2.66	2.51	2.8	ft	Step Max Depth to Riffle Mean Depth (d_{maxs} / d_{bkf})	1.77	1.67	1.87
Step Width/Depth Ratio (W_{bkfs} / d_{bkfs})	24.5	18.3	30.8					

*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: Sharman's Branch Location: Reach 2

Observers: Team 2 Date: 04/14/15 Valley Type: C-(0-4) Stream Type: B3/1

River Reach Summary Data.....2

Hydraulics					
Streamflow: Estimated Mean Velocity at Bankfull Stage ($\bar{u}_{bkf}$)	4.8	ft/sec	Estimation Method	Mannings n from Stream Type	
Streamflow: Estimated Discharge at Bankfull Stage (Q_{bkf})	190	cfs	Drainage Area	3.6	mi²

Channel Pattern: Geometry	Mean	Min	Max		Dimensionless Geometry Ratios	Mean	Min	Max
Linear Wavelength (λ)	N/A			ft	Linear Wavelength to Riffle Width (λ / W_{bkf})	N/A		
Stream Meander Length (L_m)	N/A			ft	Stream Meander Length Ratio (L_m / W_{bkf})	N/A		
Radius of Curvature (R_c)	N/A			ft	Radius of Curvature to Riffle Width (R_c / W_{bkf})	N/A		
Belt Width (W_{blt})	46.8			ft	Meander Width Ratio (W_{blt} / W_{bkf})	1.73		
Arc Length (L_a)	N/A			ft	Arc Length to Riffle Width (L_a / W_{bkf})	N/A		
Riffle Length (L_r)	10.5	5	15	ft	Riffle Length to Riffle Width (L_r / W_{bkf})	0.39	0.19	0.56
Individual Pool Length (L_p)	12.6	2.0	38.0	ft	Individual Pool Length to Riffle Width (L_p / W_{bkf})	0.47	0.07	1.41
Pool to Pool Spacing (P_s)	14.5	4.0	28.0	ft	Pool to Pool Spacing to Riffle Width (P_s / W_{bkf})	0.53	0.15	1.04

Channel Profile

Valley Slope (S_{val})	0.04	ft/ft	Average Water Surface Slope (S)	0.04	ft/ft	Sinuosity (S_{val} / S)	1
Stream Length (SL)	185	ft	Valley Length (VL)	185	ft	Sinuosity (SL / VL)	1
Low Bank Height (LBH)	start 5.29 ft		Max Depth (d_{max})	start 2.69 ft		Bank-Height Ratio (BHR) (LBH / d_{max})	start 1.97
	end 3.14 ft			end 2.88 ft			end 1.09

Facet Slopes	Mean	Min	Max		Dimensionless Facet Slope Ratios	Mean	Min	Max
Riffle Slope (S_{rif})	0.056	0.01	0.1	ft/ft	Riffle Slope to Average Water Surface Slope (S_{rif} / S)	1.37	0.25	2.43
Run Slope (S_{run}) N/A				ft/ft	Run Slope to Average Water Surface Slope (S_{run} / S) N/A			
Pool Slope (S_p)	0.0013	0	0.003	ft/ft	Pool Slope to Average Water Surface Slope (S_p / S)	0.032	0	0.075
Glide Slope (S_g) N/A				ft/ft	Glide Slope to Average Water Surface Slope (S_g / S) N/A			
Step Slope (S_s) N/A				ft/ft	Step Slope to Average Water Surface Slope (S_s / S) N/A			

Max Depths[a]	Mean	Min	Max		Dimensionless Depth Ratios	Mean	Min	Max
Max Riffle Depth (d_{maxrif})	2.58	2.39	2.72	ft	Max Riffle Depth to Mean Riffle Depth (d_{maxrif} / d_{bkf})	1.72	1.60	1.81
Max Run Depth (d_{maxrun}) N/A				ft	Max Run Depth to Mean Riffle Depth (d_{maxrun} / d_{bkf}) N/A			
Max Pool Depth (d_{maxp})	3.43	2.8	4.78	ft	Max Pool Depth to Mean Riffle Depth (d_{maxp} / d_{bkf})	2.30	1.9	3.19
Max Glide Depth (d_{maxg}) N/A				ft	Max Glide Depth to Mean Riffle Depth (d_{maxg} / d_{bkf}) N/A			
Max Step Depth (d_{maxs})	2.51	2.17	2.86	ft	Max Step Depth to Mean Riffle Depth (d_{maxs} / d_{bkf})	1.67	1.45	1.91

Channel Materials

	Reach[b]	Riffle[c]	Bar		Reach[b]	Riffle[c]	Bar	Protrusion Height[d]	
% Silt/Clay	0%	0%	N/A	D_{16}	25	40	N/A	22	mm
% Sand	1%	0%		D_{35}	45	60		35	mm
% Gravel	45%	35%		D_{50}	70	80		50	mm
% Cobble	27%	40%		D_{84}	700	600		100	mm
% Boulder	4%	7.5%		D_{95}	1800	1800		125	mm
% Bedrock	23%	17.5%		D_{100}	3000	3000		250	mm

[a] Min, max & mean depths are measured from Thalweg to bankfull at mid-point of feature for riffles, runs & steps, 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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Worksheet B-4. Dimensionless ratios of the ten pool types (*First Field Day*).

Stream: Sharman's Branch Location: Reach 2

Observers: Team 2 Stream Type: B3/1 Valley Type: C-CO-US Date: 04/19/15

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				Mean			
	Min.				Min.			
	Max.				Max.			
2. Contraction Scour Pool (CSP)	Mean	20.6	4.71	0.0017	Mean	0.76	1.58	0.04
	Min.	8.0	3.32	0	Min.	0.30	2.10	0
	Max.	38.0	6.1	0.003	Max.	1.41	1.85	0.07
3. Step/Pool (SP)	Mean	3.0	3.6	0	Mean	0.11	1.50	0
	Min.	2.0	2.8	0	Min.	0.07	1.09	0
	Max.	4.0	4.3	0	Max.	0.15	1.38	0
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				Mean			
	Min.				Min.			
	Max.				Max.			
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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