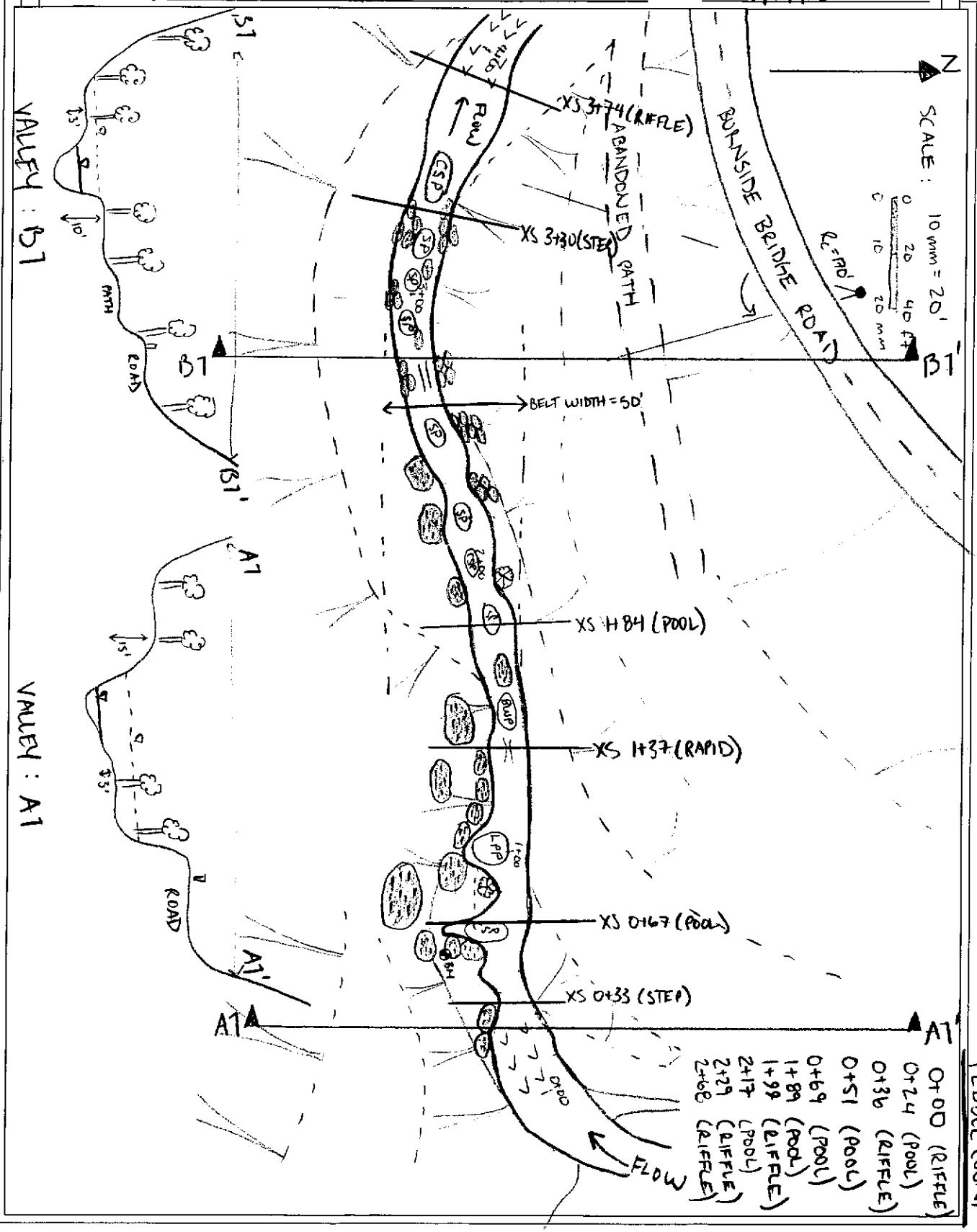
AREA-SITE LOCATION....REACH MAP

Stream/Drainage: SHARMAN'S BRANCH WASHINGTON COUNTY, MD Site/Reach: #4

Drawn By: TODD MONSON & MATT WOFFORD Date: 04/14/15



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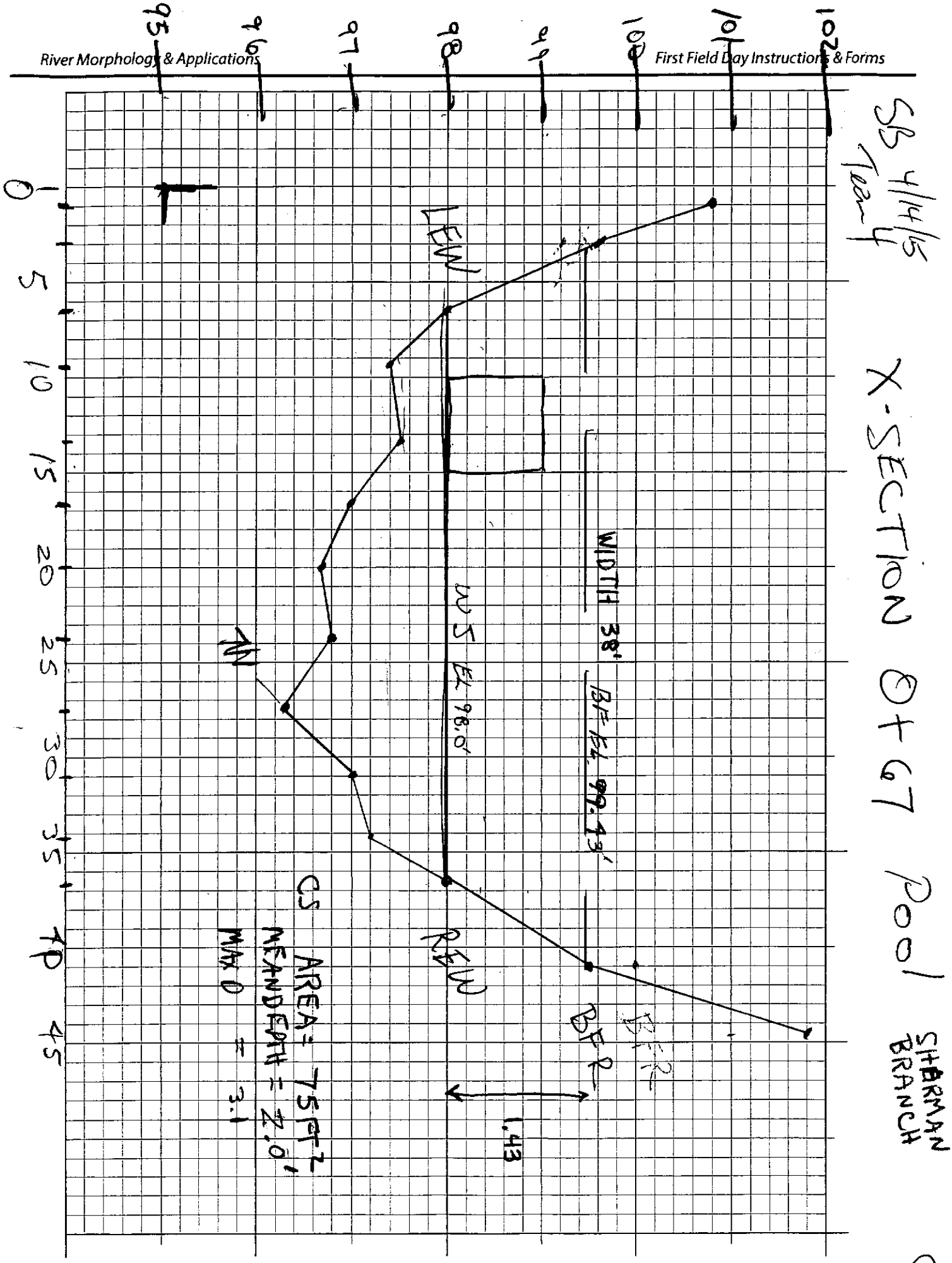

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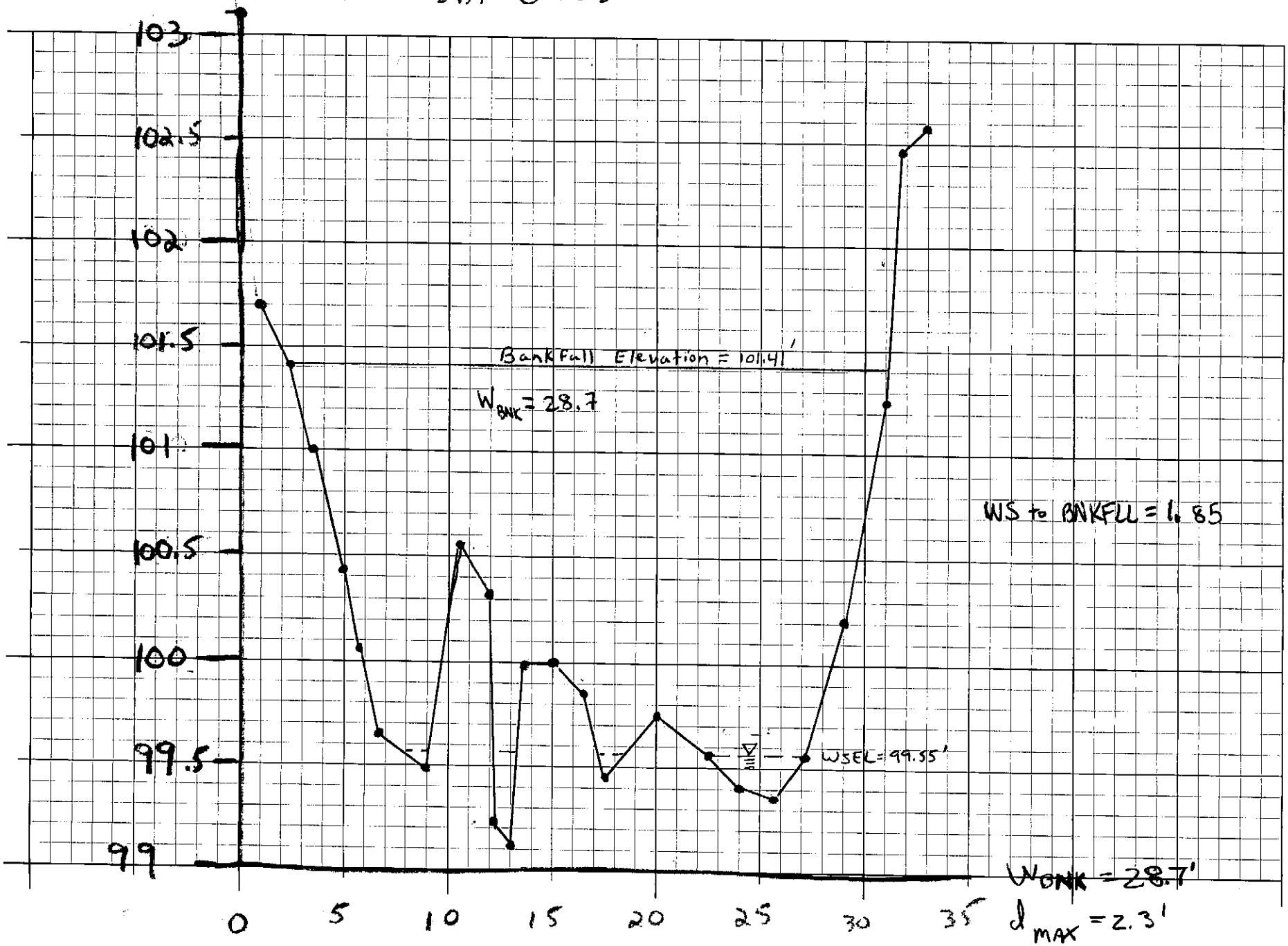
Cross Section 33' Step Team 4 Shaman's Branch ①

STA 0+33



W_{BNK} = 28.7'

d_{MAX} = 2.3'

A_c = 43.3 ft²

d_{mean} = 1.5 ft

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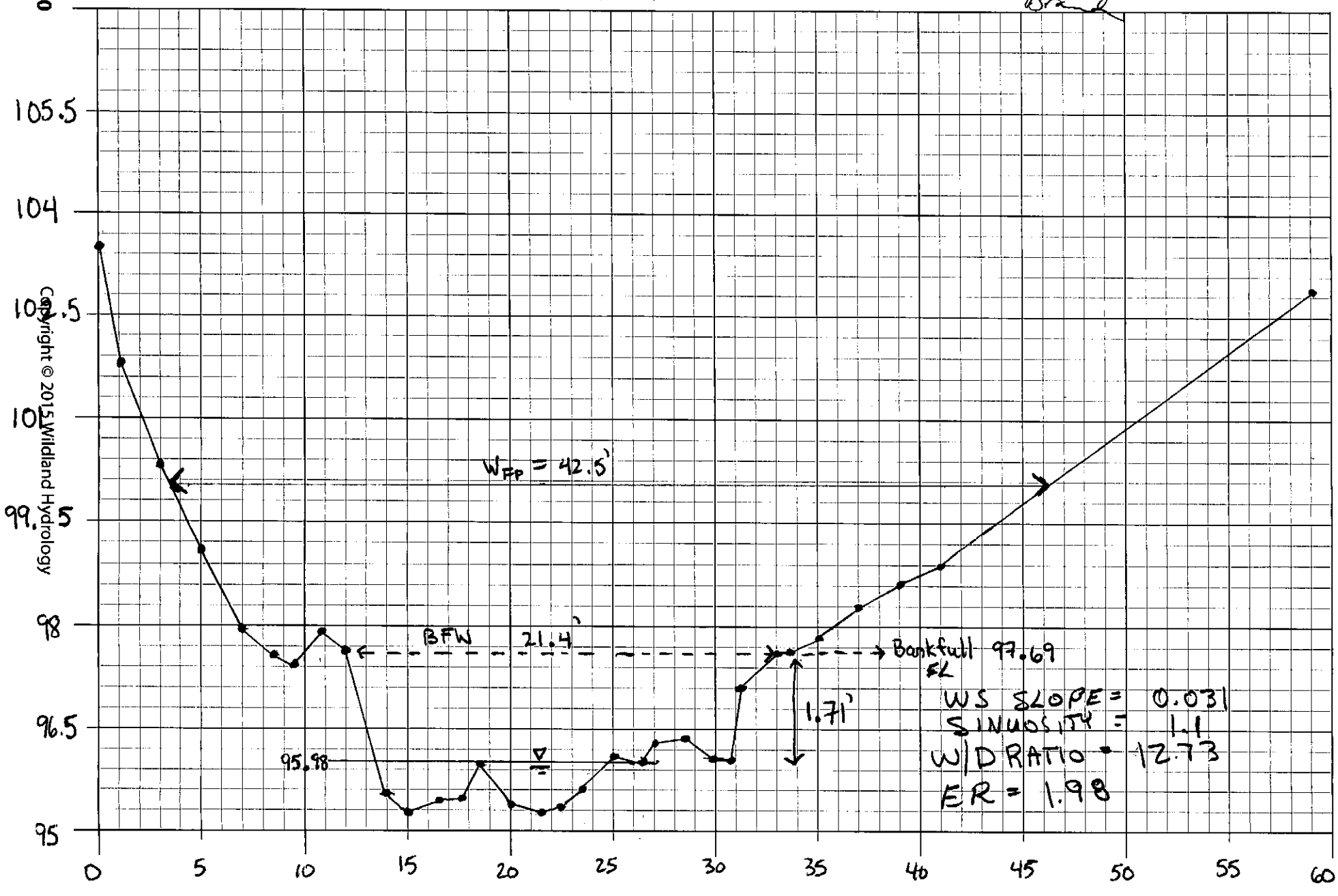
DA = 3.6 sq mi

Cross Section 137' Rapid/Riffle

STA 1+37'

Team 4

Shaymas Brand



DSL

d_{max} = 2.39' A_c = 36 ft²

d_{mean} = 1.682'

DSR

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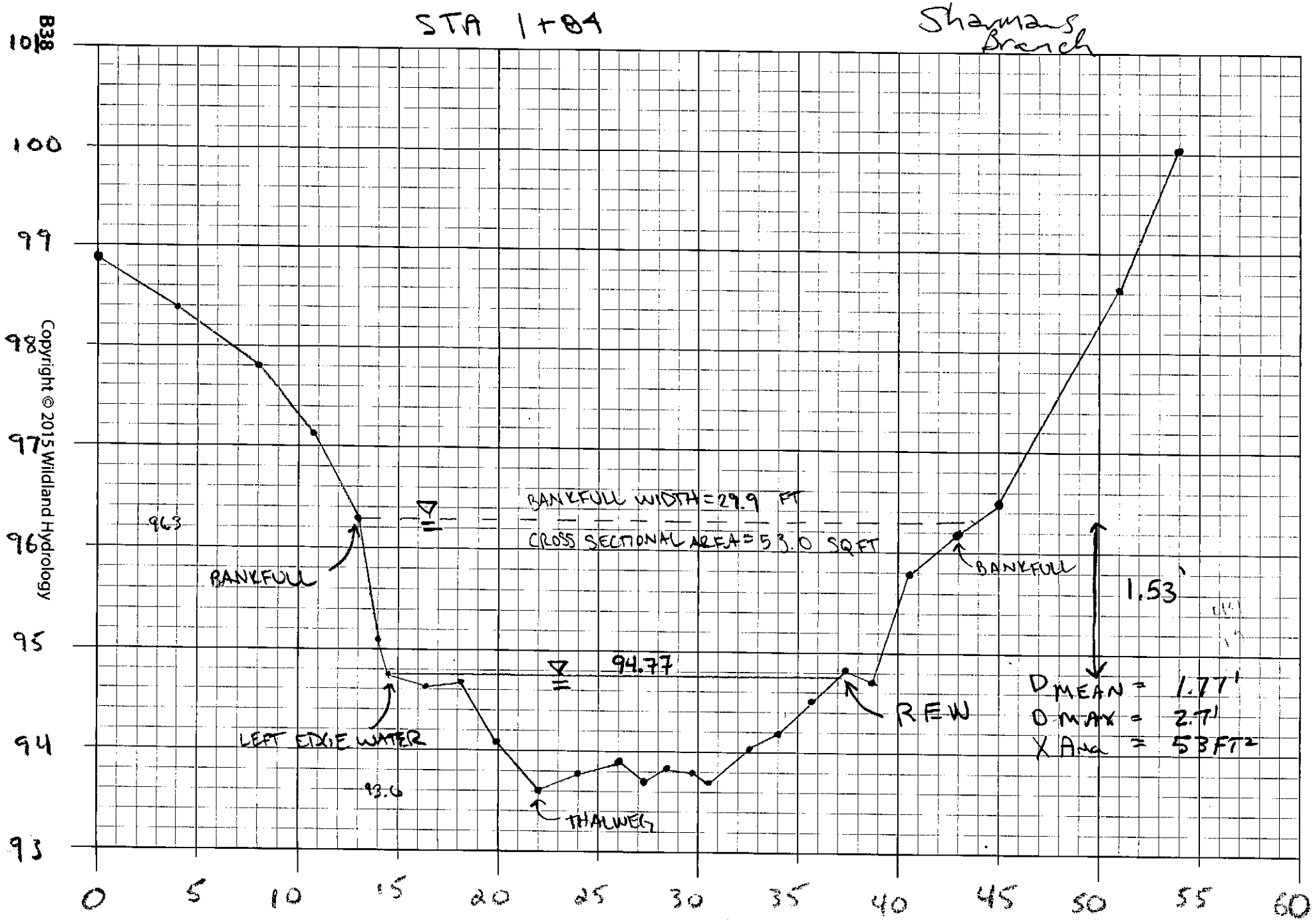
Cross Section 184' Pool

STA 1+84

Team 4

Shamans Branch



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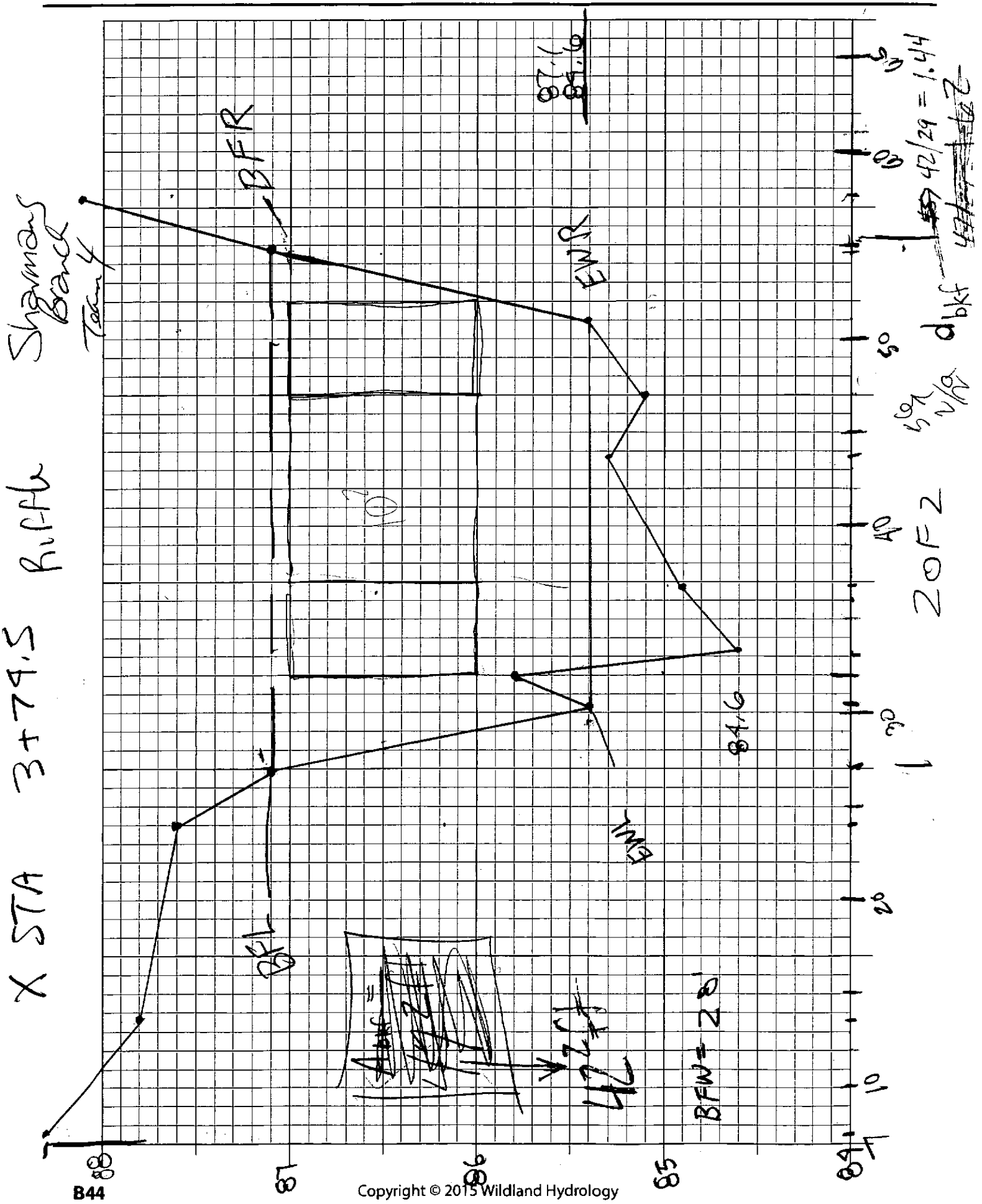

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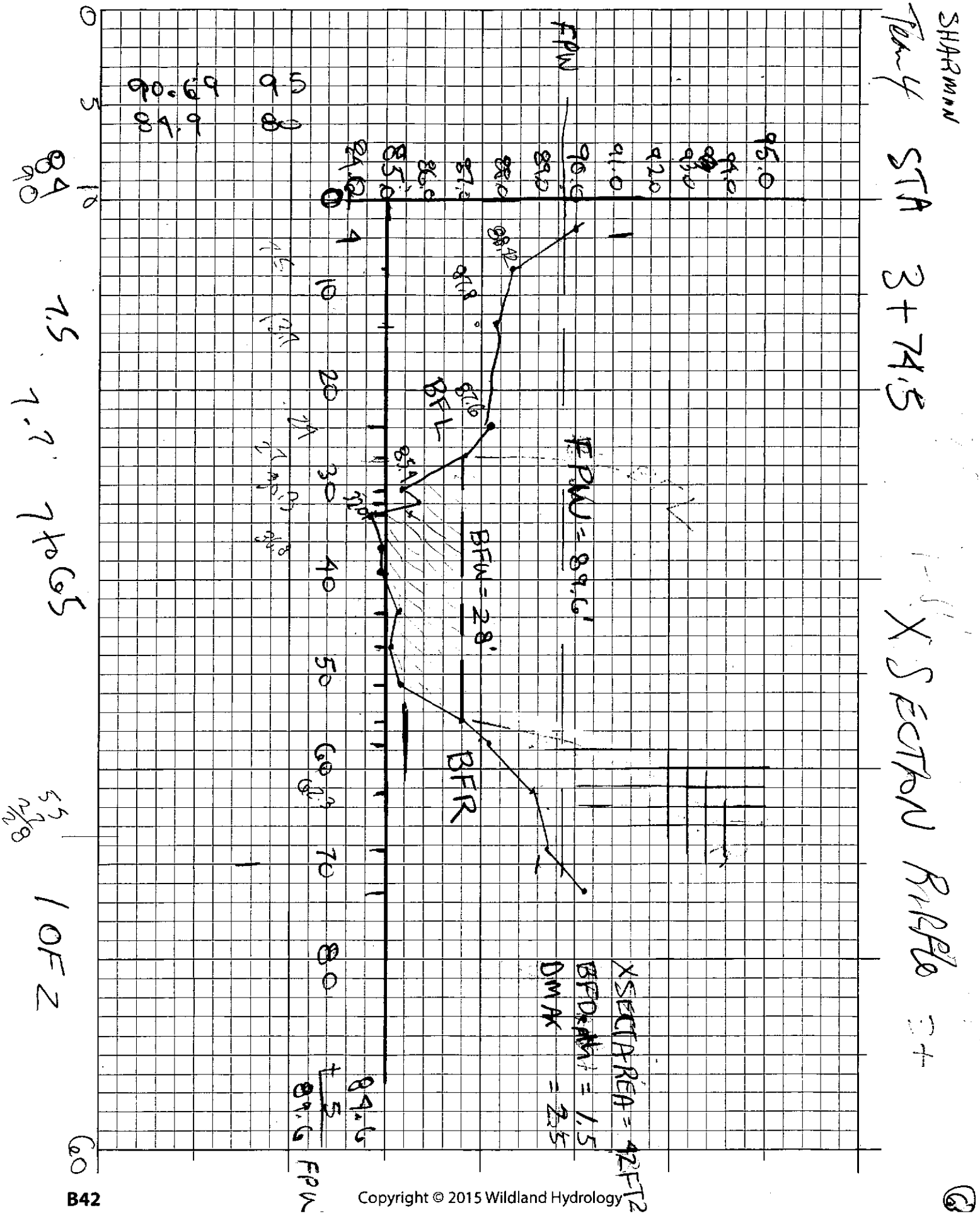

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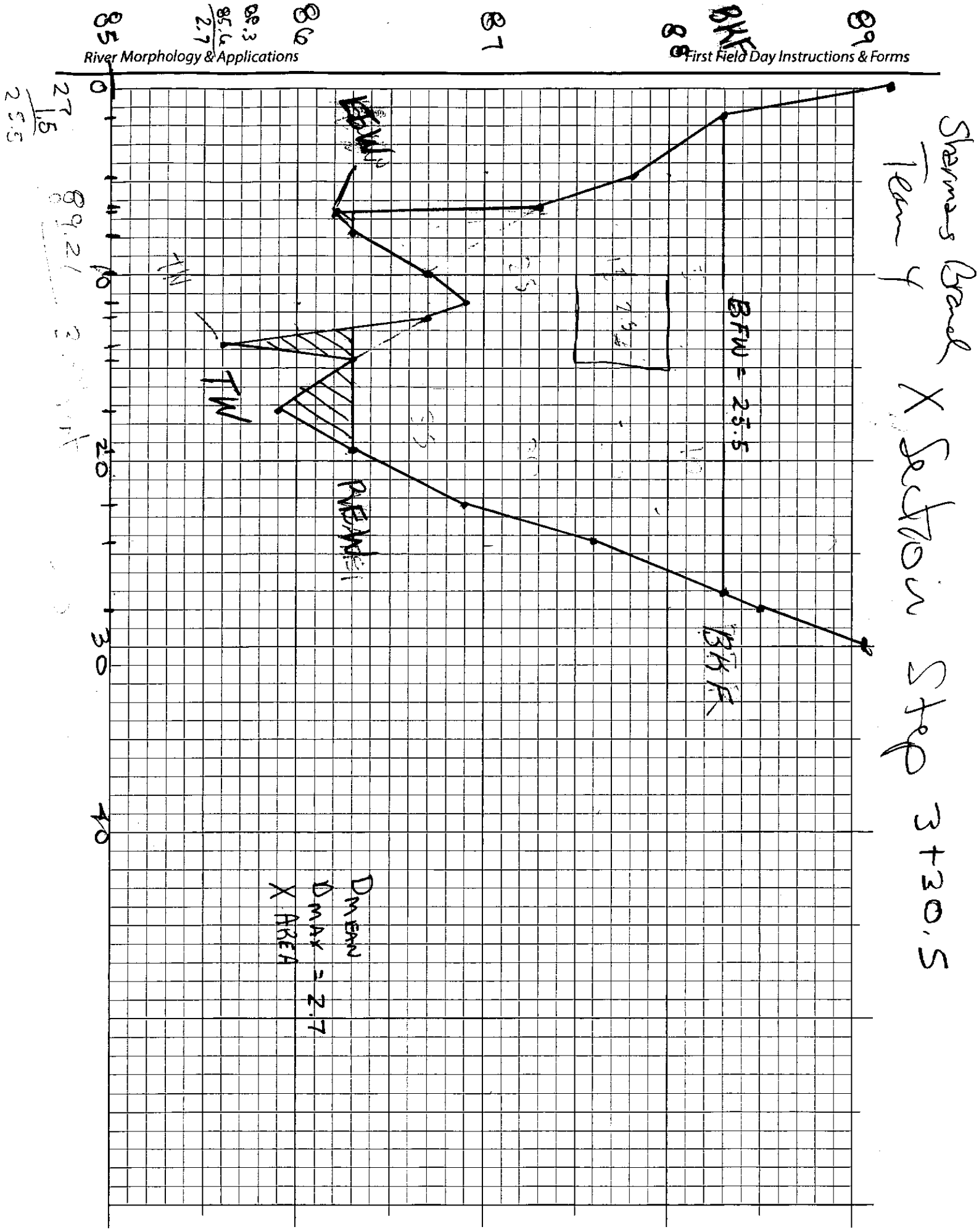

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SURVEY DATA ⟹ CROSS - SECTION 1

SITE: Sharman's Branch Date: 4/14/2015

Location: Cross Section 137' ~ Riffle / Rapid

Party / Notes: Team 4 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		103.5	0.44	103.06	BM = 100 DSL Bank
2	1		103.5	1.64	101.86	
3	3		103.5	3.12	100.38	
4	5		103.5	4.36	99.14	
5	7		103.5	5.54	97.96	
6	8.5		103.5	5.93	97.57	
7	9.5		103.5	6.08	97.42	
8	10.7		103.5	5.58	97.92	Boulder
9	12		103.5	5.82	97.68	Boulder
10	13.9		103.5	7.92	95.58	EOW
11	15		103.5	8.2	95.3	
12	16.5		103.5	8.06	95.44	
13	17.7		103.5	7.94	95.56	
14	18.5		103.5	7.52	95.98	Boulder
15	20		103.5	8.12	95.38	
16	21.5		103.5	8.20	95.30	thalweg
17	22.4		103.5	8.12	95.38	
18	23.5		103.5	7.89	95.61	
19	25		103.5	7.4	96.1	
20	26.4		103.5	7.52	95.98	EOW
21	27.1		103.5	7.23	96.27	
22	28.5		103.5	7.06	96.44	
23	29.9		103.5	7.40	96.1	
24	30.8		103.5	7.43	96.07	
25	31.2		103.5	6.38	97.12	
26	33		103.5	5.83	97.67	
27	33.4		103.5	5.81	97.69	Bankfull
28	35		103.5	5.62	97.88	

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95.30 → 103.60

SURVEY DATA → **CROSS - SECTION 2**

SITE: Sharman's Branch Cross Section 137' Date:

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
29	37		103.5	5.2	98.3	
30	39		103.5	4.86	98.64	
31	41		103.5	4.61	98.89	
32	58.9		103.5	0.57	102.93	
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
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58						
59						

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SURVEY DATA → **CROSS - SECTION 1**

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

Location: Cross Section 184' - Step Pool Section

Party / Notes: Team 4 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		103.5	4.6	98.9	BM = 100, DS Left Bank
2	4		103.5	5.12	98.38	
3	8		103.5	5.69	97.81	
4	10.8		103.5	6.38	97.12	
5	13		103.5	7.18	96.32	
6	14		103.5	8.42	95.08	
7	14.5		103.5	8.73	94.77	DS Left EOW
8	16.2		103.5	8.86	94.64	
9	18.2		103.5	8.83	94.67	
10	19.9		103.5	9.37	94.13	
11	22.1		103.5	9.88	93.62	Thalweg
12	24		103.5	9.72	93.78	
13	26		103.5	9.58	93.92	
14	27.3		103.5	9.83	93.67	
15	28.5		103.5	9.67	93.83	
16	29.7		103.5	9.70	93.8	
17	30.5		103.5	9.82	93.68	
18	32.6		103.5	9.44	94.06	
19	34		103.5	9.32	94.18	
20	35.8		103.5	8.98	94.52	
21	37.3		103.5	8.67	94.83	DS Right EOW
22	38.7		103.5	8.8	94.7	Slope Break
23	40.6		103.5	7.71	95.79	Slope Break
24	43		103.5	7.3	96.2	Bank full
25	45		103.5	7.02	96.48	
26	51		103.5	4.86	98.64	
27	54		103.5	3.45	100.05	
28						

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SURVEY DATA ⟶ **CROSS - SECTION 1**

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

Location: Cross Section 33' - Step Section

Party / Notes: Team 4 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		106.3	3.22	103.08	BM=100, DS Left Bank*
2	1		106.3	4.6	101.7	
3	2.3		106.3	4.89	101.41	Bankfull
4	3.5		106.3	5.32	100.98	
5	5		106.3	5.88	100.42	
6	5.8		106.3	6.24	100.06	DS Left EOW
7	6.6		106.3	6.66	99.64	
8	9		106.3	6.82	99.48	
9	10.6		106.3	5.76	100.57	Boulder Top
10	11.9		106.3	5.98	100.32	Boulder Top
11	12.2		106.3	7.08	99.22	Bottom of Step
12	12.9		106.3	7.2	99.1	Bottom of Step*
13	13.6		106.3	6.35	99.95	Boulder Top
14	15		106.3	6.33	99.97	Boulder Top
15	16.4		106.3	6.46	99.84	
16	17.4		106.3	6.85	99.45	
17	20.2		106.3	6.56	99.74	
18	22.6		106.3	6.74	99.56	
19	24		106.3	6.9	99.40	
20	25.6		106.3	6.94	99.36	
21	27.2		106.3	6.75	99.55	DS Right EOW
22	29		106.3	6.1	100.20	Slope Break
23	31		106.3	5.06	101.24	
24	31.6		106.3	3.85	102.45	
25	33		106.3	3.73	102.57	
26						
27						
28						

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SURVEY DATA ⟹ CROSS - SECTION 3 "A"

SITE: X section Pool STA 0+~~75~~ 67 Date:

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES / COMMENTS / REMARKS
29	0+01	2.66	102.66	1.80	100.86	GS
30	0+03	~~3.02~~	"	3.02	99.64	BF
31	0+09.4		"	5.31	97.35	GS
32	0+06.4		"	4.62	98.04	EW WS
33	0+13.4		"	5.14	97.52	GS
34	0+16.6		"	5.76	96.9	GS
35	0+20.0		"	6.01	96.65	GS
36	0+23.8		"	5.86	96.80	GS
37	0+27.5		"	6.41	96.25	TW
38	0+31.0		"	5.63	97.03	GS
39	0+34.2		"	5.49	97.17	GS
40	0+36.7		"	4.64	98.02	EW RB
41	0+41.0		"	3.16	99.50	BF
42	0+44.7		"	0.88	101.78	GS
43						
44	sta	2+76		13.98		NewTP
45						9.37
46						102.66
47						13.98
48	1+30.5	TW	14			88.68
49						+9.37
50						98.05
51						
52						
53						
54						
55						
56						
57						
58						
59						

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SURVEY DATA ⟹ **CROSS - SECTION** 4

SITE: X Section Step 3+30.5 **Date:**

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS REMARKS
29			98.05			TW 14
30	0+00		"	8.84	89.21	GS
31	0+01.5		"	9.75	88.3	~~TW~~ BF
32	0+01.7		"	10.23	87.82	GS Rock
33	0+06.18		"	10.75	87.30	GS Rock 0+06.18
34	0+06.45		"	11.86	86.19	EW LWS
35	0+7.9		"	11.73	86.32	GS - flow
36	0+09.9		"	11.36	86.69	EW Rock L
37	~~0+10~~			11.50		~~Rock~~
38	0+11.5		"	11.13	86.92	Rock
39	0+12.9		"	11.40	86.65	EW Rock R
40	0+13.8		"	12.46	85.59	TW
41	0+14.36		"	11.80	86.25	GS Rock
42	0+17.24		"	12.20	85.85	GS
43	0+19.4		"	11.76	86.29	EW R
44	0+22.3		"	11.18	86.87	GS
45	0+24.3		"	10.48	87.57	GS
46	0+28.0		"	9.54	88.51	BF R
47	0+30		"	9.00	89.05	GS
48						
49						
50						
51						
52	L					R
53						
54						
55						EWR
56						
57						TW
58						
59						

rock L rock r

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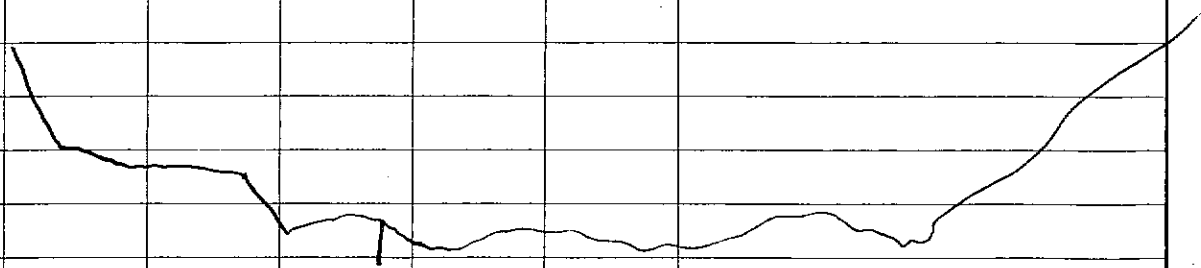
SURVEY DATA → **CROSS - SECTION** 5

SITE: X Section Riffle Sta 3+74.5 Date:

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES COMMENTS REMARKS
29			98.05			
30	0+07.5		9.63	[redacted]	88.42	GS
31	0+13.7		"	10.25	87.80	GS
32	~~0+26.6~~		"			
33	0+24.0			10.46	87.59	
34	0+27.0		98.05	10.96	87.09	BF L
35	0+30.3		"	12.69	85.36	EW L
36	0+32.0		"	12.29	85.76	Rock
37	0+33.2		"	13.46	84.59	TW
38	0+36.80		"	13.14	84.91	GS
39	0+39.70		"	13.15	84.90	GS
40	0+43.8		"	12.76	85.29	GS
41	0+47.0		"	12.97	85.08	GS
42	0+51.0		"	12.69	85.41	" EW R
43	0+54.6		"	11.06	86.99	BF R
44	0+57.6		"	9.86	88.19	shelf
45	0+62.3			9.24	88.81	GS
46	0+67.3		"	8.84	89.21	GS
47	0+73.0		"	7.36	90.69	GS
48						
49						
50	L					
51						
52						
53						
54						
55						
56						
57			Rock			
58						
59						



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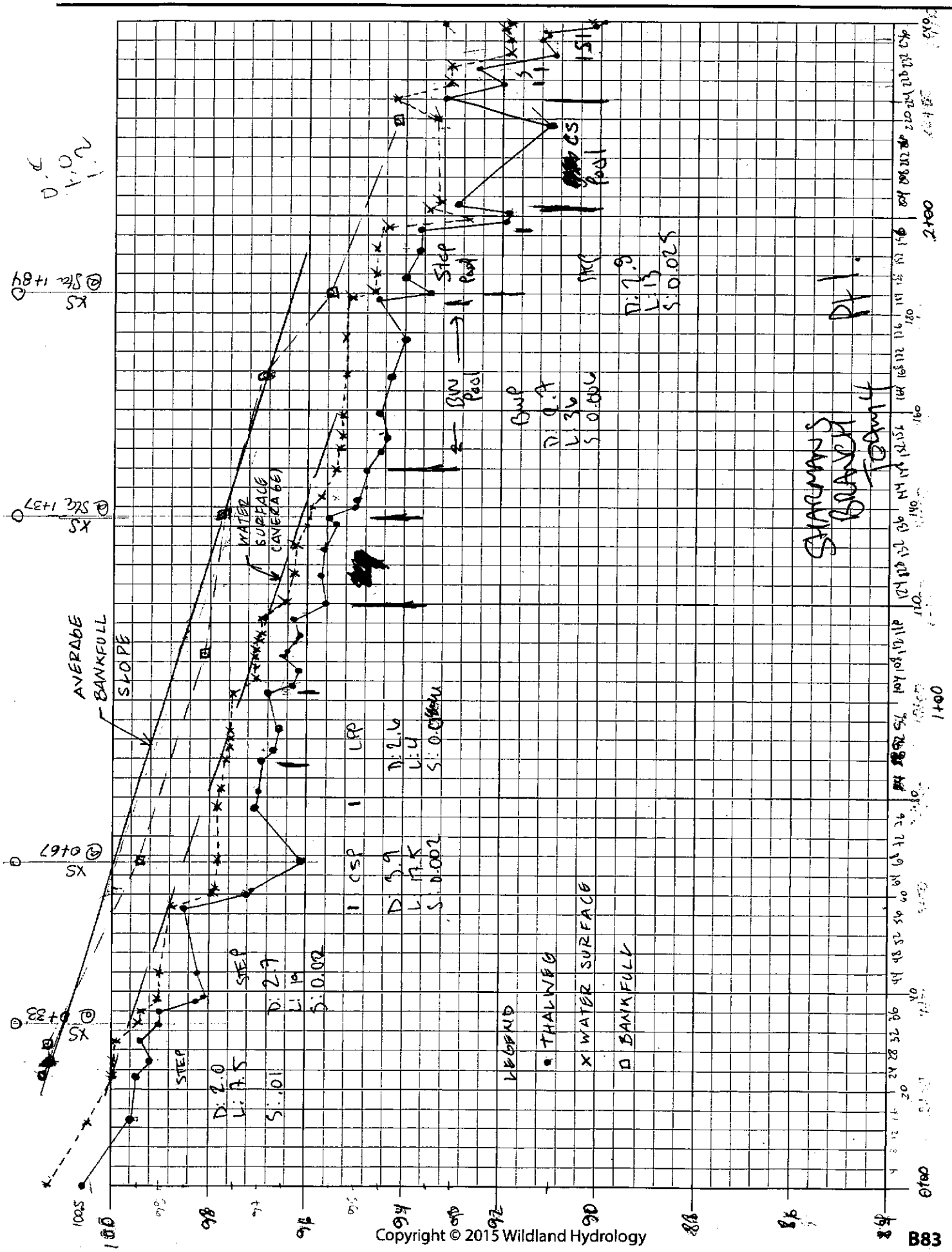

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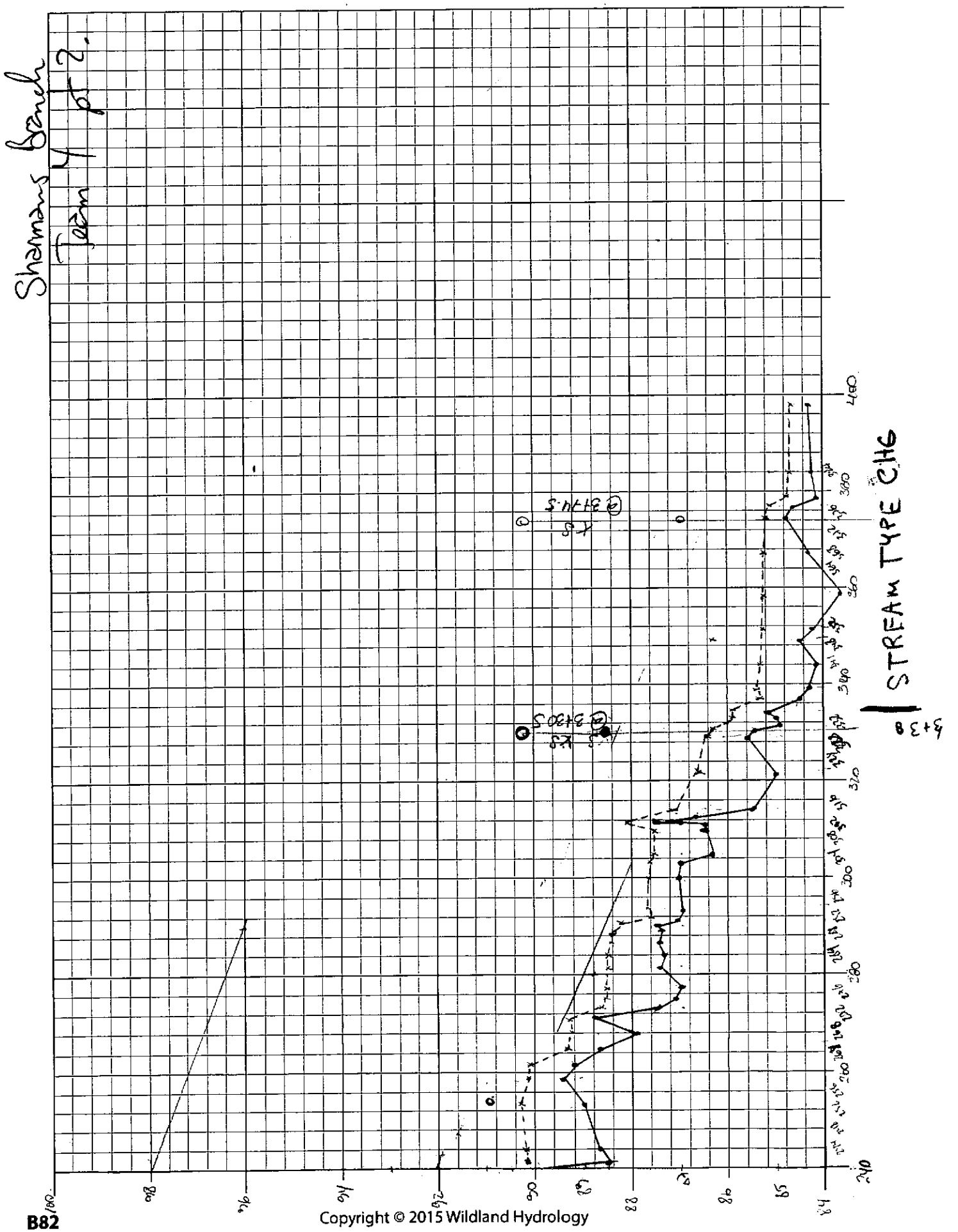

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SURVEY DATA ⟶ **LONGITUDINAL PROFILE 3**

SITE: Date:

Location:

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	227.5			92.01	10.65		1.1	93.11				BO Step
56	230			92.5	10.16		0.55	93.05				TO Step } Shaded ?
57	233			90.89	11.77		1.0	91.89				BO Step
58	236			91.34	11.32		0.7	92.04				
59	236.5			91.13	11.53		0.65	91.78				
60	238			91.15	11.51		0.65	91.8				TO Step } rapid
61	239			90.2	12.46		0.45	90.65				
62	240			89.87	12.79		0.45	90.32				
63	241			88.56	14.10		1.65	90.21				BO Step
64	244			88.75	13.91		1.55	90.3		91.87		~~[illegible]~~ Pool
65	253			89.97	13.09		0.8	90.77		~~[illegible]~~	10.79	
66	258.5			89.62	13.04		0.6	90.22				top of Shoot ? } rapid
67	262.5			89.36	13.30		0.8	90.16				End of Shoot (TOS)
68	265.8			88.62	14.04		0.75	89.37				BO Step
69	268			87.96	14.70		1.3	89.26				
70	271			88.77	13.89		0.5	89.27				TO Step - (8)
71	273.5			87.59	15.07	101.61	1.05	88.64				BO Step
72	275			87.14	15.52	101.26	1.4	88.54				
* 73	~~[illegible]~~	~~HP~~	~~13.98~~								~~TP1~~	~~Turning Point~~
74	278			86.95 / 88.34	15.71 / 11.1		1.58	88.53				
75	282			87.41 / 88.9	15.25 / 10.64		1.0	88.41				
76	TP1	9.37	102.66	13.98	88.68							Term 3 laser (4.86)
77			98.05									
78	284			87.31	10.74		1.1	88.41				
79	286.5			87.43	10.62		0.9	88.33				
80	289.5			87.3	10.75		1.0	88.3				
81	290			87.47	10.58		0.7	88.17				TO Step

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* 98.05

SURVEY DATA ⟹ **LONGITUDINAL PROFILE 4**

SITE: Date:

Location:

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
82	291.5			11.56	86.49	1.1	87.59					BO Step (9)
83	293.5			11.70	86.35	1.3	87.65					
84	300			11.07	86.98	0.6	87.58					
85	303			11.20	86.85	0.7	87.55					
86	304.5			11.72	86.33	1.2	87.53					MP ?
87	310.			11.59	86.46	1.05	87.51					TO Shoot } Rapid
88	310.5			11.61	86.44	1.9	88.34					M of Shoot
89	311			11.20	86.85	0.35	87.2					
90	312.8			11.37	86.68	0.35	87.23					top of Step (10)
91	314.5			12.56	85.49	1.0	86.49					B of Step.
92	321.5			13.05	85	1.5	86.5					M of Pool.
93	328.5			12.38	85.67	0.8	86.47					T of Step
XS- 94	330.5			12.76	85.29	0.95	86.24			88.5		
95	331.3			13.10	84.95	1.2	86.15					rapid } Steps (Pools)
96	332.5			13.07	84.96	1.0	85.96					
97	333.8			12.75	85.3	0.65	85.95					TO Step (11)
98	334.5			13.61	84.44	1.0	85.44					BO Step (13-
99	338.5			13.77	84.28	1.3	85.58					MP
100	344.			13.95	84.1	1.4	85.5					
101	349			13.57	84.48	1.95	86.43					
102	351.5			13.74	84.31	1.15	85.46					
103	359.6			14.14	83.91	1.45	85.36					MP
104	363			13.74	84.31	1.05	85.36					[illegible]
105	367.5			13.70	84.35	1.0	85.35					
XS 106	374.5			13.21	84.84	0.5	85.34			86.99		E of Pool
107	376.5			13.38	84.67	0.55	85.22					
108	378.5			13.87	84.18	1.0	85.18					MP
	3X4			13.81	84.24	0.85	85.09					

Stream type changes

mirror

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BM 2.66

SURVEY DATA ⟶ LONGITUDINAL PROFILE 1

SITE: Date:

Location:

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
1	0	2.66	102.66	ELEVATION (FT)	FORE-SIGHT	ELEVATION (FT)	FORE-SIGHT				100	
2	0			100.57	2.20	101.46	0.6	101.1				HOR
3	14			99.69	2.97	101.36	0.7	100.39				MR
4	23			99.51	3.15	102.11	0.55	100.06		101.87	.79	
5	26			99.2	3.46	101.81	0.95	100.05		101.61	1.05	
6	30.5			99.39	3.27		0.6	99.77		101.61	1.05	TOS
7	33			98.96	3.7		0.5	99.46				BOS
8	36			98.96	3.7		0.5	99.46				TOS
9	38			98.31	4.35		0.8	99.11				BOS
10	39			98.17	4.49		0.9	99.07				SP
11	44			98.31	4.35		0.7	99.01				
12	47			98.59	4.07		0.1	98.69				TOS
13	60			97.21	5.45		0.7	97.91				BOS
14	61			97.16	5.5		0.15	97.91				HOPool
XS 15	67			96.83	6.63		1.55	97.88		99.43	3.23	MOP Middle
16	71.5			97.11	5.55		0.8	97.91				EOPool
17	81			97.03	5.63		0.8	97.83				HORapid
18	87			96.98	5.68		0.8	97.78				TOStep Pool
19	90			96.7	5.96		0.85	97.55				MOPool (BWP)
20	94			96.65	6.01		0.9	97.55				
21	101.5			96.29	5.87		0.75	97.54				TOStep
22	103.5			96.45	6.21		0.65	97.1				BOStep
23	106			96.28	6.38		0.9	97.18				MStep Pool
24	108.5			96.54	6.12		0.6	97.14		98.11	4.55	TOS
25	109			96.48	6.18		0.7	97.18				BOS
26	112			96.34	6.32		0.5	96.99				
27	113			96.29	6.37		0.7	96.99				MP

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Adjust. +0.1 approx.

SURVEY DATA ⟶ LONGITUDINAL PROFILE 2

SITE: Date:

Location:

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	116.5			96.31	6.35		0.5	96.81				TO shoot
29	120			95.66	7.00		0.8	96.46				MO shoot
30	126			95.74	6.92		0.55	96.27				
31	131			95.69	6.97		0.45	96.14				TO Step Pool
32	132.4			95.44	7.22		0.55	95.97				MP
33	134.5			95.56	7.10		0.55	96.11				TO Step
34	136			95	7.66		0.75	95.75				BO Step
35	137			94.97	7.69		0.75	95.82	97.66	5.00		
36	140			94.8	7.86		0.92	95.72				
37	141.5			94.94	7.72		0.78	95.82				Head of Rapid
38	147			94.7	7.96		0.75	95.45				
39	151.5			94.58	8.08		0.8	95.38				Rapid
40	154			94.39	8.27		0.95	95.34				
41	159.5			94.49	8.17		0.85	95.34				TO Pool
42	167			94.3	8.36		1.0	95.3	97	5.66		MPool
43	175			94.05	8.61		1.25	95.3				
44	183			94.58	8.08		0.65	95.23				TO Step
45	184.5			93.41	9.25		1.25	94.66	95.55	7.11		BO Step
46	187			93.96	8.70		0.7	94.66				
47	193			93.75	8.91		0.9	94.65				TO Shoot
48	197			93.74	8.92		0.6	94.34				TO Step
49	198.5			91.91	10.75		0.55	92.46				BO Step
50	200.5			91.88	10.78		0.5	92.38				
51	202			92.81	9.85		0.7	93.51				Gdy Pool
52	205.5			92.12	10.54		1.22	93.34				
53	217.5			91.35	11.31		2.0	93.35	94.6	8.06		MPool
54	224			93.59	9.07		0.7	94.29				

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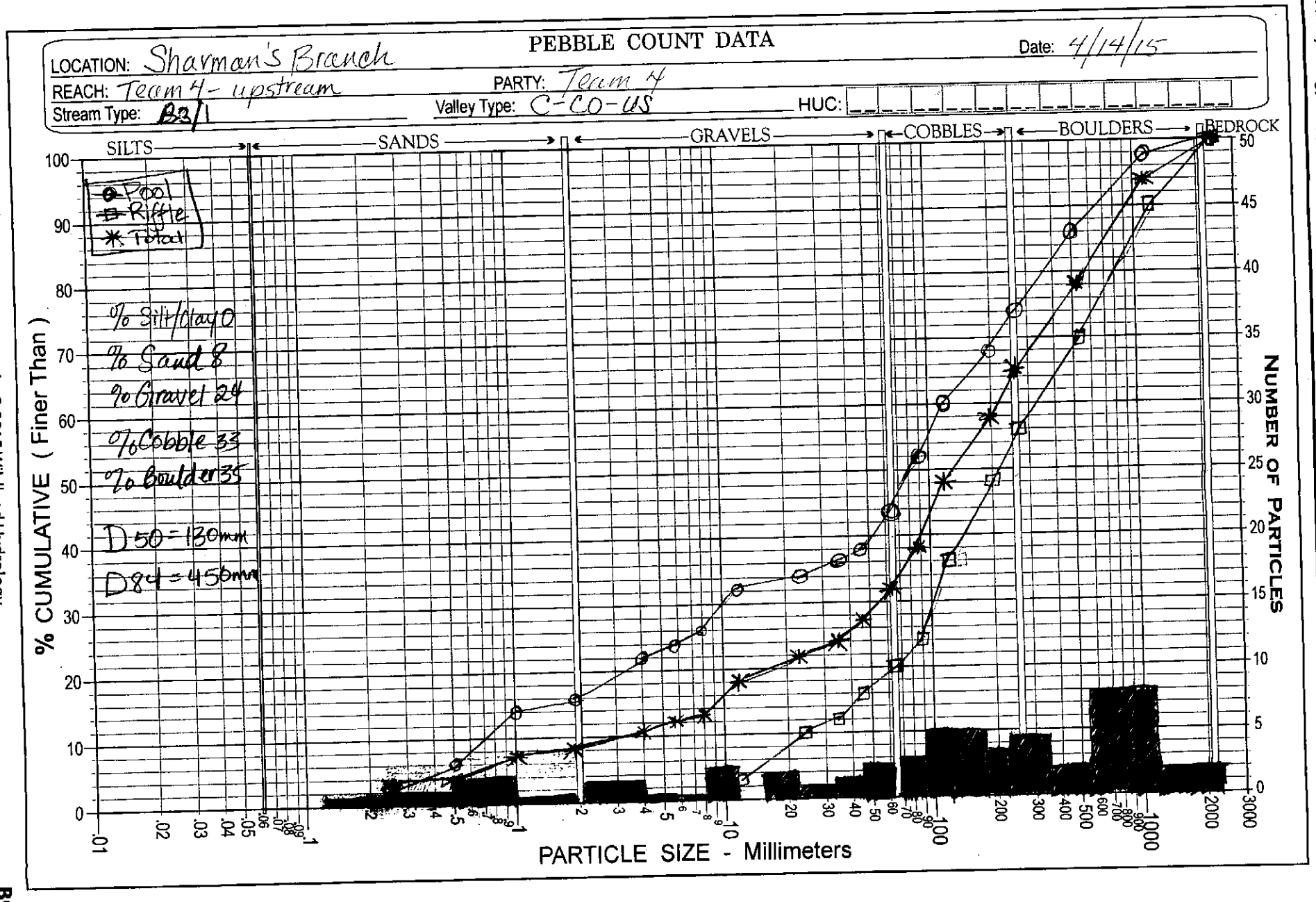
Representative Reach - Pebble Count



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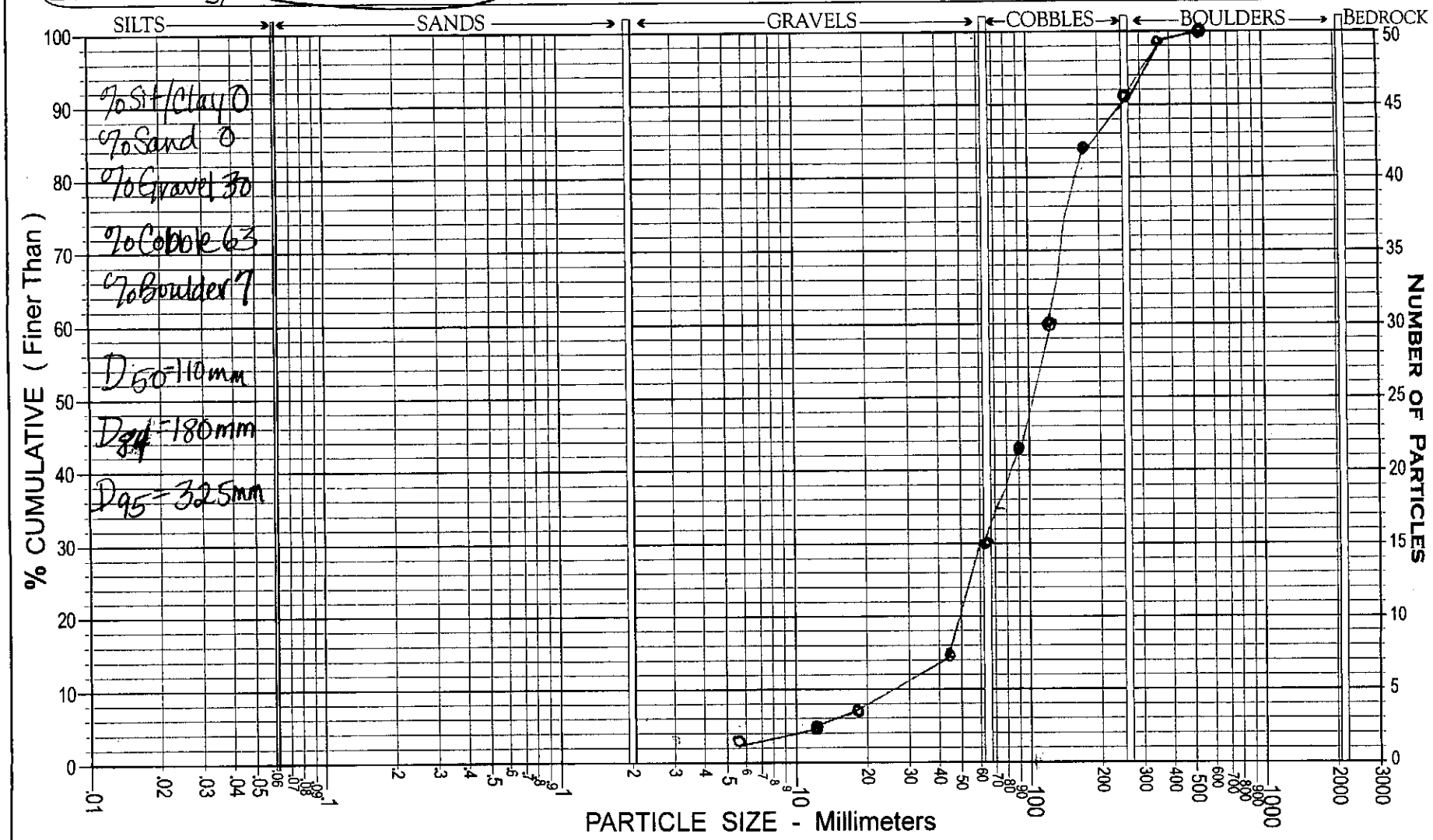
Active Bed - Riffle - Protusion

PEBBLE COUNT DATA

Riffle 1

LOCATION: Sharman's Branch
REACH: station 1137
Stream Type: B3/1
PARTY: Group 4
Valley Type: C-CO-US
HUC:
Date: 4/14/2015



D84 180

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Representative Reach
Pebble Count

W/BF - Riffle 0 ☒
Riffle 36 ☒
W/BF Riffle 199 ☒
Riffle 229 ☒
Riffle 268 ☒

W/BF Pool 24 ☒ ☒ bf pool 89
Pool 51 ☒ ☒ pool 217
W/BF Pool 69 ☒
5 Riffle 5 Pool

Site: Sharman's Branch Date: 4/14/15
Location: Uppermost Stretch HUC:
Party: Team 4

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) Reach: Team 4 Date: 4/14/15 TOT #	ITEM %	% CUM	POOL (2) Reach: Team 4 Date: 4/14/15 TOT #	ITEM %	% CUM	COMPOSITE (3) Reach: Team 4 Date: 4/14/15 TOT #	ITEM %	% CUM
	Silt / Clay	< .062	S/C												
	Very Fine	.062 - .125	SAND												
	Fine	.125 - .25	SAND							1	2	2	1	1	1
	Medium	.25 - .50	SAND							2	4	6	2	2	3
	Coarse	.50 - 1.0	SAND							4	8	14	4	4	7
.04 - .08	Very Coarse	1.0 - 2	SAND							1	2	16	1	1	8
.08 - .16	Very Fine	2 - 4	GRAVEL							3	6	22	3	3	11
.16 - .22	Fine	4 - 5.7	GRAVEL							1	2	24	1	1	12
.22 - .31	Fine	5.7 - 8	GRAVEL							1	2	26	1	1	13
.31 - .44	Medium	8 - 11.3	GRAVEL				2	4	4	3	6	32	5	5	18
.44 - .63	Medium	11.3 - 16	GRAVEL												
.63 - .89	Coarse	16 - 22.6	GRAVEL				3	6	10	1	2	34	4	4	22
.89 - 1.3	Coarse	22.6 - 32	GRAVEL				1	2	12	1	2	36	2	2	24
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL				2	4	16	1	2	38	3	3	27
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL				2	4	20	3	6	44	5	5	32
2.5 - 3.5	Small	64 - 90	COBBLE				2	4	24	4	8	52	6	6	38
3.5 - 5.0	Small	90 - 128	COBBLE				6	12	36	4	8	60	10	10	48
5.0 - 7.1	Large	128 - 180	COBBLE				6	12	48	4	8	68	10	10	58
7.1 - 10.1	Large	180 - 256	COBBLE				4	8	56	3	6	74	7	7	65
10.1 - 14.3	Small	256 - 362	BOULDER				4	8	64	5	10	84	9	9	74
14.3 - 20	Small	362 - 512	BOULDER				3	6	70	1	2	86	4	4	78
20 - 40	Medium	512 - 1024	BOULDER				10	20	90	6	12	98	16	16	94
40 - 80	Large-Vry Large	1024 - 2048	BOULDER				5	10	100	1	2	100	6	6	100
	Bedrock		BDRK												
Stream Type:			Valley Type:			TOTAL→	50			50			100		

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Active Bed
Riffle Cross Section

132 ☒ 143 ☒ 328 ☒ @ 330 [illegible]
130 ☒ 145 ☒ 329 ☒ 332 ☒ 336 ☒
138 ☒ 146 ☒ 330 ☒ 333 ☒ 337 ☒
141 ☒ 148 ☒ 331 ☒ 334 ☒
142 ☒ 149 ☒ 335 ☒

Site: Sharman's Branch Date: 4/14/15
Location: 3 Riffles HUC:
Party: GRP. 4

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	~~POOL~~ Riffle 2	COMP. 3	RIFFLE (1) Reach: Station 137 Date: 4/14/15 TOT #	ITEM %	% CUM	~~POOL~~ Riffle (2) Reach: Station 330 Date: 4/14/15 TOT #	ITEM %	% CUM	~~COMPOSITE~~ Riffle (3) Reach: 374.5 Date: 4/14/15 TOT #	ITEM %	% CUM
	Silt / Clay	< .062	S/C	1	2	3									
	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				3		3	2		2	3		3
.22 - .31	Fine	5.7 - 8	GRAVEL							1		3			
.31 - .44	Medium	8 - 11.3	GRAVEL				2		5	2		5			
.44 - .63	Medium	11.3 - 16	GRAVEL				3		8	2		7			
.63 - .89	Coarse	16 - 22.6	GRAVEL							2		9	10		13
.89 - 1.3	Coarse	22.6 - 32	GRAVEL							6		15	20		33
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL				7		15	3		18	12		45
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL				15		30	8		26	10		55
2.5 - 3.5	Small	64 - 90	COBBLE				13		43	10		36			
3.5 - 5.0	Small	90 - 128	COBBLE				17		60	10		46	12		67
5.0 - 7.1	Large	128 - 180	COBBLE				24		84	16		62	12		79
7.1 - 10.1	Large	180 - 256	COBBLE				9		93	16		78	10		89
10.1 - 14.3	Small	256 - 362	BOULDER				6		99	10		88	10		99
14.3 - 20	Small	362 - 512	BOULDER				1		100	2		90	1		100
20 - 40	Medium	512 - 1024	BOULDER							10		100			
40 - 80	Large-Vry Large	1024 - 2048	BOULDER												
	Bedrock		BDRK												
Stream Type:			**Valley Type:**			TOTAL→	100			100			100		

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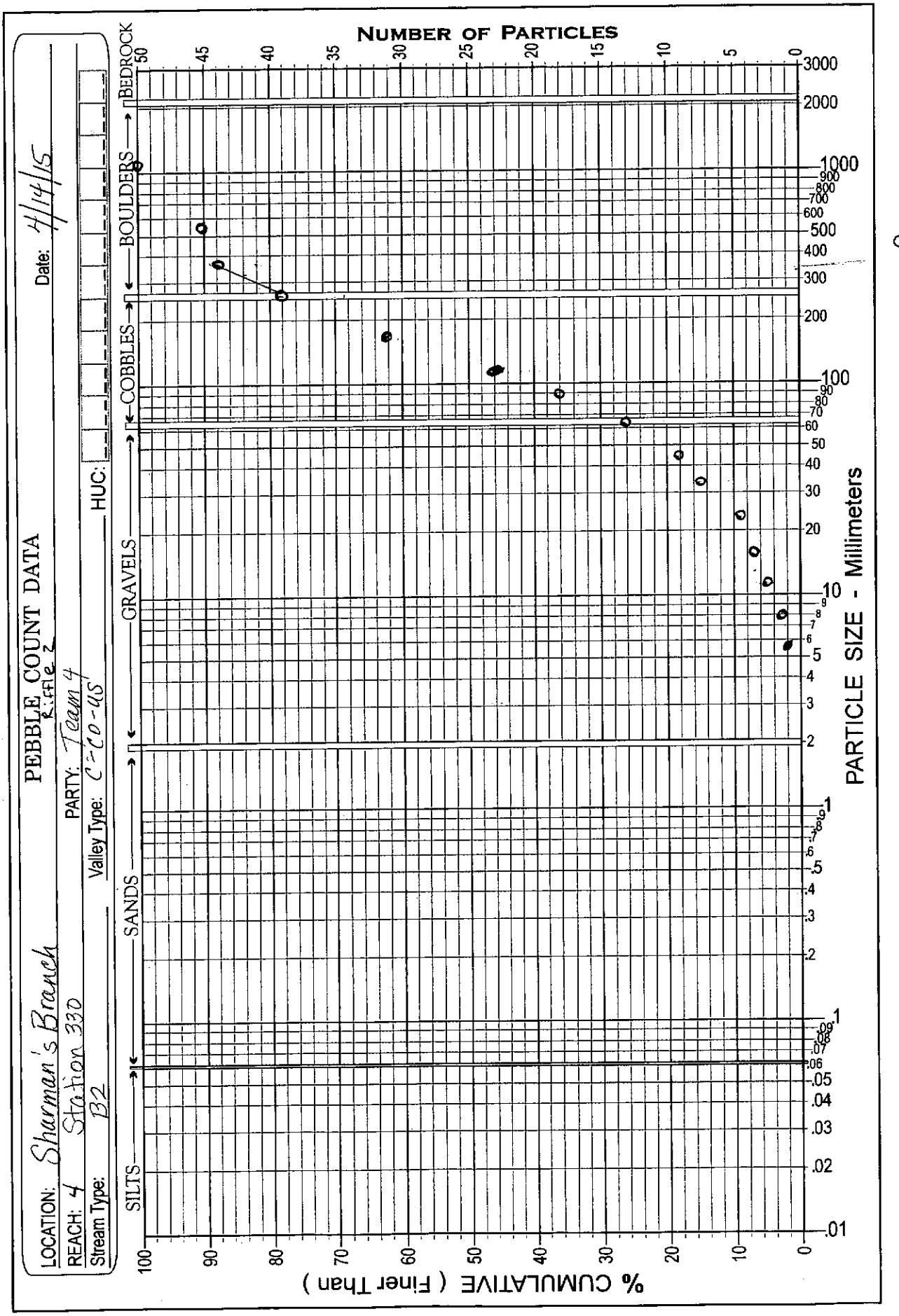
Active Bed - Step



D84 320

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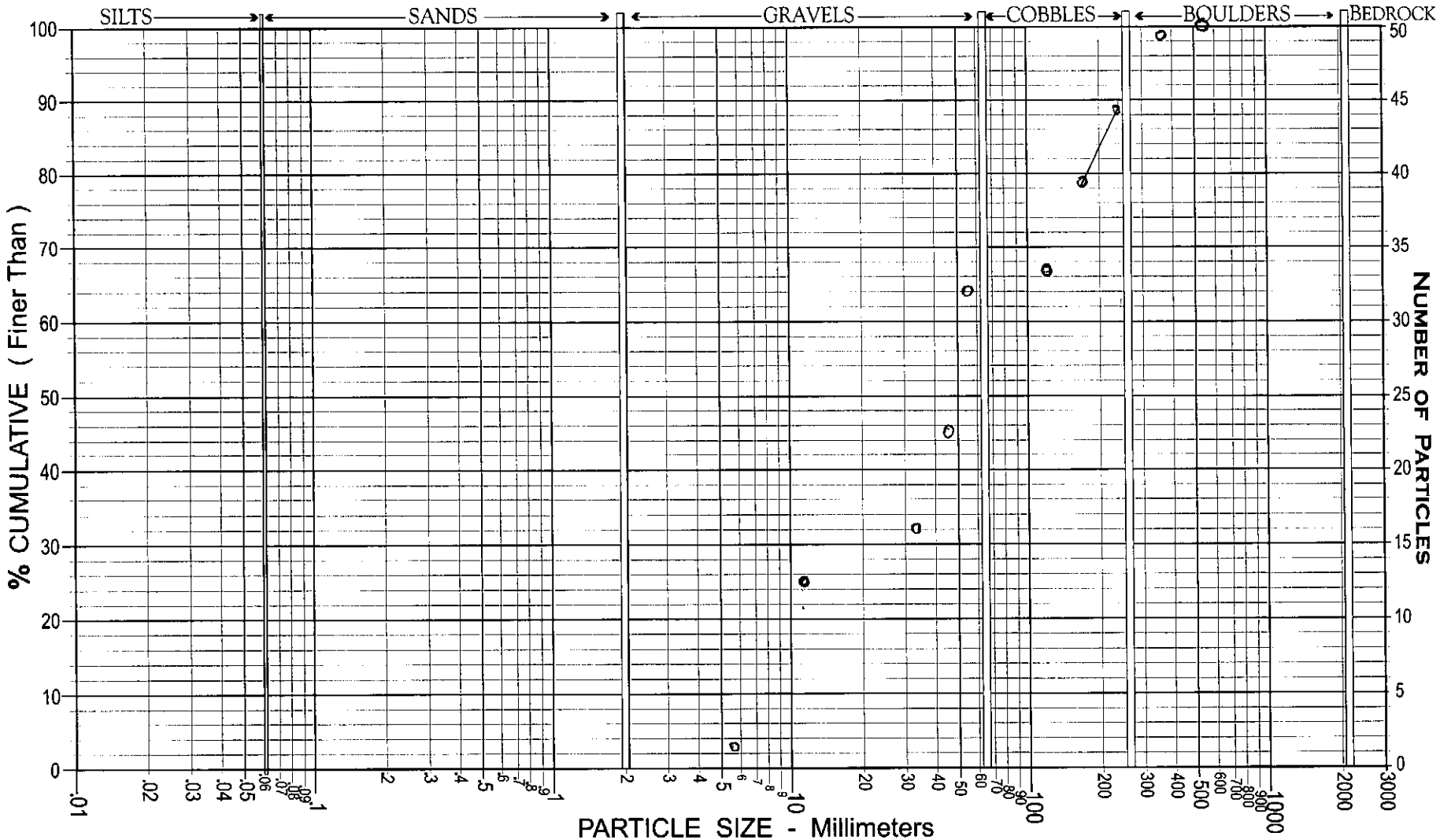
Active Bed- Riffle

PEBBLE COUNT DATA

LOCATION: Sharman's Branch Riffle 3 Date: 4/14/15

REACH: Reach 4 Station 374.5 PARTY: Group 4

Stream Type: B2 Valley Type: C-CO-US HUC:



D84 200

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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:	
Date:	4/14/2015	Stream Type: B3/1	Valley Type: Confined, Colluvial, U Shape
Observers:	Team 4	HUC:	-- -- -- -- -- -- -- -- -- -- --

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional AREA	36	A_{bkf} (ft^2)	Bankfull Riffle Mean DEPTH	1.682	d_{bkf} (ft)
Bankfull Riffle WIDTH	21.4	W_{bkf} (ft)	Wetted PERIMETER ~ $(2 * d_{bkf}) + W_{bkf}$	24.764	W_p (ft)
D_{84} at Riffle	180	Dia. (mm)	D_{84} (mm) / 304.8	0.5905	D_{84} (ft)
Bankfull SLOPE	0.031	S_{bkf} (ft / ft)	Hydraulic RADIUS A_{bkf} / W_p	1.4537	R (ft)
Gravitational Acceleration	32.2	g (ft / sec^2)	Relative Roughness R(ft) / D_{84} (ft)	2.4618	R / D_{84}
Drainage Area	3.6	DA (mi^2)	Shear Velocity $u^* = (gRS)^{½}$	1.205	u^* (ft/sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $\bar{u} = [\,2.83 + 5.66 * Log\{R / D_{84}\}\,]\,u^*$	6.08	ft / sec	218.9	cfs
2. Roughness Coefficient: a) Manning's *n* from Friction Factor / Relative Roughness (Figs. B-34, B-35) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.045	7.48	ft / sec	269.3	cfs
2. Roughness Coefficient: b) Manning's *n* from Stream Type (Fig. B-36) B3 → $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.059	5.705	ft / sec	205.4	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 $n =$ 0.0981	3.43	ft / sec	123.5	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	N/A	ft / sec	N/A	cfs
4. Continuity Equations: b) Regional Curves $\bar{u} = Q / A$	3.61	ft / sec	130	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*).

Stream: Shanman's Branch			
Basin:	Drainage Area:	acres 3.6	mi^2
Location:			
Twp.&Rge:	Sec.&Qtr.:		
Cross-Section Monuments (Lat./Long.):		Date: 4/14/15	
Observers: Team 4		Valley Type: C-CO-US	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	21.4	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$).	1.68	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	36	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	12.73	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.	2.39	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.	42.5	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	1.98	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.	130	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.	0.031	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).	1.1	

Stream Type BB 3/2/1 **See Classification Key (Figure B-2)**

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

Stream: Location:

Observers: Date: Valley Type: Stream Type:

River Reach Dimension Summary Data.....1

Riffle Dimensions*, **, *

Riffle Dimensions*, **, ***	Mean	Min	Max		Riffle Dimensions & Dimensionless Ratios****	Mean	Min	Max
Riffle Width (W_{bkf})	24.7	21.4	28	ft	Riffle Cross-Sectional Area (A_{bkf}) (ft^2)	39	36	42
Riffle Mean Depth (d_{bkf})	1.59	1.5	1.68	ft	Riffle Width/Depth Ratio (W_{bkf} / d_{bkf})	19.70	[illegible]	[illegible]
Riffle Maximum Depth (d_{max})	2.45	2.39	2.5	ft	Riffle Max Depth to Riffle Mean Depth (d_{max} / d_{bkf})	1.45	1.42	1.48
Width of Flood-Prone Area (W_{fpa})	54.25	42.5	66	ft	Entrenchment Ratio (W_{fpa} / W_{bkf})	2.53	1.98	3.08
Riffle Inner Berm Width (W_{ib})	14.2	–	14.2	ft	Riffle Inner Berm Width to Riffle Width (W_{ib} / W_{bkf})	0.66	–	0.66
Riffle Inner Berm Depth (d_{ib})	0.5	–	0.5	ft	Riffle Inner Berm Depth to Mean Depth (d_{ib} / d_{bkf})	0.30	–	0.30
Riffle Inner Berm Area (A_{ib})	6.5	–	6.5	ft^2	Riffle Inner Berm Area to Riffle Area (A_{ib} / A_{bkf})	0.18	–	0.18
Riffle Inner Berm W/D Ratio (W_{ib} / d_{ib})	28.4	–	28.4					

Pool Dimensions*, **, *

Pool Dimensions*, **, ***	Mean	Min	Max		Pool Dimensions & Dimensionless Ratios****	Mean	Min	Max
Pool Width (W_{bkfp})	33.95	29.9	38	ft	Pool Width to Riffle Width (W_{bkfp} / W_{bkf})	1.59	1.40	1.78
Pool Mean Depth (d_{bkfp})	2.53	1.77	3.3	ft	Pool Mean Depth to Riffle Mean Depth (d_{bkfp} / d_{bkf})	1.51	1.05	1.96
Pool Cross-Sectional Area (A_{bkfp})	64	53	75	ft	Pool Area to Riffle Area (A_{bkfp} / A_{bkf})	1.77	1.47	2.08
Pool Maximum Depth (d_{maxp})	2.95	2.6	3.3	ft	Pool Max Depth to Riffle Mean Depth (d_{maxp} / d_{bkf})	1.75	1.55	1.96
Pool Inner Berm Width (W_{ibp})	20.7	–	20.7	ft	Pool Inner Berm Width to Pool Width (W_{ibp} / W_{bkfp})	0.61	–	0.61
Pool Inner Berm Depth (d_{ibp})	0.6	–	0.6	ft	Pool Inner Berm Depth to Pool Depth (d_{ibp} / d_{bkfp})	0.24	–	0.24
Pool Inner Berm Area (A_{ibp})	12.8	–	12.8	ft^2	Pool Inner Berm Area to Pool Area (A_{ibp} / A_{bkfp})	0.2	–	0.2
Point Bar Slope (S_{pb})	–	–	–	ft/ft	Pool Inner Berm Width/Depth Ratio (W_{ibp} / d_{ibp})	34.5	–	34.5

Run Dimensions*

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*

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**

Step Dimensions**	Mean	Min	Max		Step Dimensionless Ratios****	Mean	Min	Max
Step Width (W_{bkfs})	27.2	26.5	27.9	ft	Step Width to Riffle Width (W_{bkfs} / W_{bkf})	1.26	1.23	1.29
Step Mean Depth (d_{bkfs})	1.53	1.5	1.55	ft	Step Mean Depth to Riffle Mean Depth (d_{bkfs} / d_{bkf})	0.91	0.89	0.92
Step Cross-Sectional Area (A_{bkfs})	41.5	40	43	ft	Step Area to Riffle Area (A_{bkfs} / A_{bkf})	1.15	1.11	1.19
Step Maximum Depth (d_{maxs})	2.5	2.31	2.7	ft	Step Max Depth to Riffle Mean Depth (d_{maxs} / d_{bkf})	1.50	1.38	1.61
Step Width/Depth Ratio (W_{bkfs} / d_{bkfs})	17.8	17.6	18					

*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:

Observers: Team 4 Date: 4/14/15 Valley Type: C-CO-US Stream Type: B 3/1

River Reach Summary Data.....2

Hydraulics

Streamflow: Estimated Mean Velocity at Bankfull Stage ($\bar{u}_{bkf}$)	3.43	ft/sec	Estimation Method	Jarrett
Streamflow: Estimated Discharge at Bankfull Stage (Q_{bkf})	123.51	cfs	Drainage Area	3.6 mi^2

Channel Pattern

Geometry	Mean	Min	Max		Dimensionless Geometry Ratios	Mean	Min	Max
Linear Wavelength (λ)	NA			ft	Linear Wavelength to Riffle Width (λ / W_{bkf})	NA		
Stream Meander Length (L_m)	NA			ft	Stream Meander Length Ratio (L_m / W_{bkf})	NA		
Radius of Curvature (R_c)	170			ft	Radius of Curvature to Riffle Width (R_c / W_{bkf})	4		
Belt Width (W_{blt})	50			ft	Meander Width Ratio (W_{blt} / W_{bkf})	2.3		
Arc Length (L_a)	104			ft	Arc Length to Riffle Width (L_a / W_{bkf})	2.4		
Riffle Length (L_r)	23			ft	Riffle Length to Riffle Width (L_r / W_{bkf})	0.5		
Individual Pool Length (L_p)	16	4	36	ft	Individual Pool Length to Riffle Width (L_p / W_{bkf})	0.4	0.1	0.9
Pool to Pool Spacing (P_s)	32.6	14	70	ft	Pool to Pool Spacing to Riffle Width (P_s / W_{bkf})	0.8	0.3	1.7

Channel Profile

Valley Slope (S_{val})	0.0340	ft/ft	Average Water Surface Slope (S)	0.031	ft/ft	Sinuosity (S_{val} / S) 1.1
Stream Length (SL)	398	ft	Valley Length (VL) 360	362	ft	Sinuosity (SL / VL) 1.1
Low Bank Height (LBH) start / end	ft / ft		Max Depth (d_{max}) start / end	ft / ft		Bank-Height Ratio (BHR) (LBH / d_{max}) start / end

14
28
28
70
23

1.3
23

Facet Slopes	Mean	Min	Max		Dimensionless Facet Slope Ratios	Mean	Min	Max
Riffle Slope (S_{rif})	0.056	0.007	0.83	ft/ft	Riffle Slope to Average Water Surface Slope (S_{rif} / S)	1.8	-	-
Run Slope (S_{run})	N/A	N/A	N/A	ft/ft	Run Slope to Average Water Surface Slope (S_{run} / S)	N/A	N/A	N/A
Pool Slope (S_p)	0.017	0.0	0.05	ft/ft	Pool Slope to Average Water Surface Slope (S_p / S)	0.54	0	0.8
Glide Slope (S_g)	N/A	N/A	N/A	ft/ft	Glide Slope to Average Water Surface Slope (S_g / S)	N/A	N/A	N/A
Step Slope (S_s)	0.317	0.043	0.73	ft/ft	Step Slope to Average Water Surface Slope (S_s / S)	10	1.4	23.1

Max Depths[a]	Mean	Min	Max		Dimensionless Depth Ratios	Mean	Min	Max
Max Riffle Depth (d_{maxrif})	2.0	2.0	2.0	ft	Max Riffle Depth to Mean Riffle Depth (d_{maxrif} / d_{bkf})	1.2	1.2	1.2
Max Run Depth (d_{maxrun})	N/A	N/A	N/A	ft	Max Run Depth to Mean Riffle Depth (d_{maxrun} / d_{bkf})	N/A	N/A	N/A
Max Pool Depth (d_{maxp})	2-8	2.0	3.9	ft	Max Pool Depth to Mean Riffle Depth (d_{maxp} / d_{bkf})	1.6	1.2	2.3
Max Glide Depth (d_{maxg})	N/A	N/A	N/A	ft	Max Glide Depth to Mean Riffle Depth (d_{maxg} / d_{bkf})	N/A	N/A	N/A
Max Step Depth (d_{maxs})	0.9	0.5	1.2	ft	Max Step Depth to Mean Riffle Depth (d_{maxs} / d_{bkf})	0.5	0.3	0.7

1.2

Channel Materials

	Reach[b]	Riffle[c]	Bar		Reach[b]	Riffle[c]	Bar	Protrusion Height[d]	
% Silt/Clay	0	0		D_{16}	10 mm			50	mm
% Sand	8	0		D_{35}	70 mm			70	mm
% Gravel	24	30		D_{50}	120 mm			110	mm
% Cobble	33	63		D_{84}	450 mm			180	mm
% Boulder	35	7		D_{95}	1250 mm			325	mm
% Bedrock				D_{100}	2200 mm			550	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: Location:

Observers: Stream Type: Valley Type: Date:

Pool Type		Dimensional Values: Pool Length (L_p)	Pool Max Depth (d_{maxp})	Pool Slope (S_p)		Dimensionless Ratios: Pool Length to Riffle Width (L_p / W_{bkf})	Pool Max Depth to Riffle Mean Depth (d_{maxp}/d_{bkf})	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	17.5	3.9	0.002	Mean	~~2.02~~	2.29	0.065
	Min.				Min.	0.82		
	Max.				Max.			
3. Step/Pool (SP)	Mean	13	2.5	0.018	Mean	0.61	1.47	0.42
	Min.	7.5	2.0	.01	Min.	0.35	1.18	0.32
	Max.	19	2.8	.025	Max.	0.89	1.65	0.81
4. Backwater Pool (BWP)	Mean	36	2.7	0.006	Mean	1.68	1.59	0.19
	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	4	2.6	0.0	Mean	0.19	1.53	0
	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.			

3.1

21.4 w

1.7' D

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