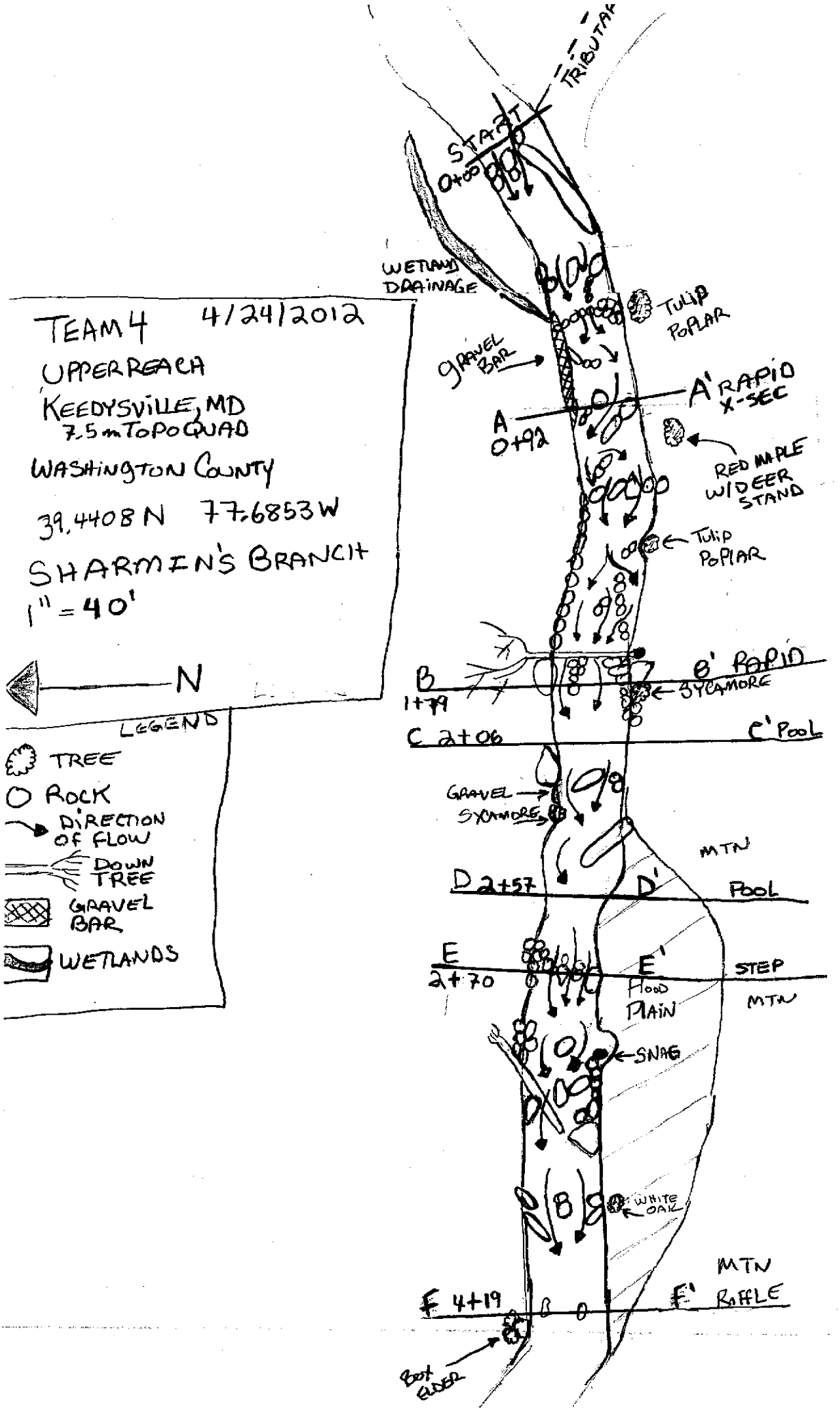
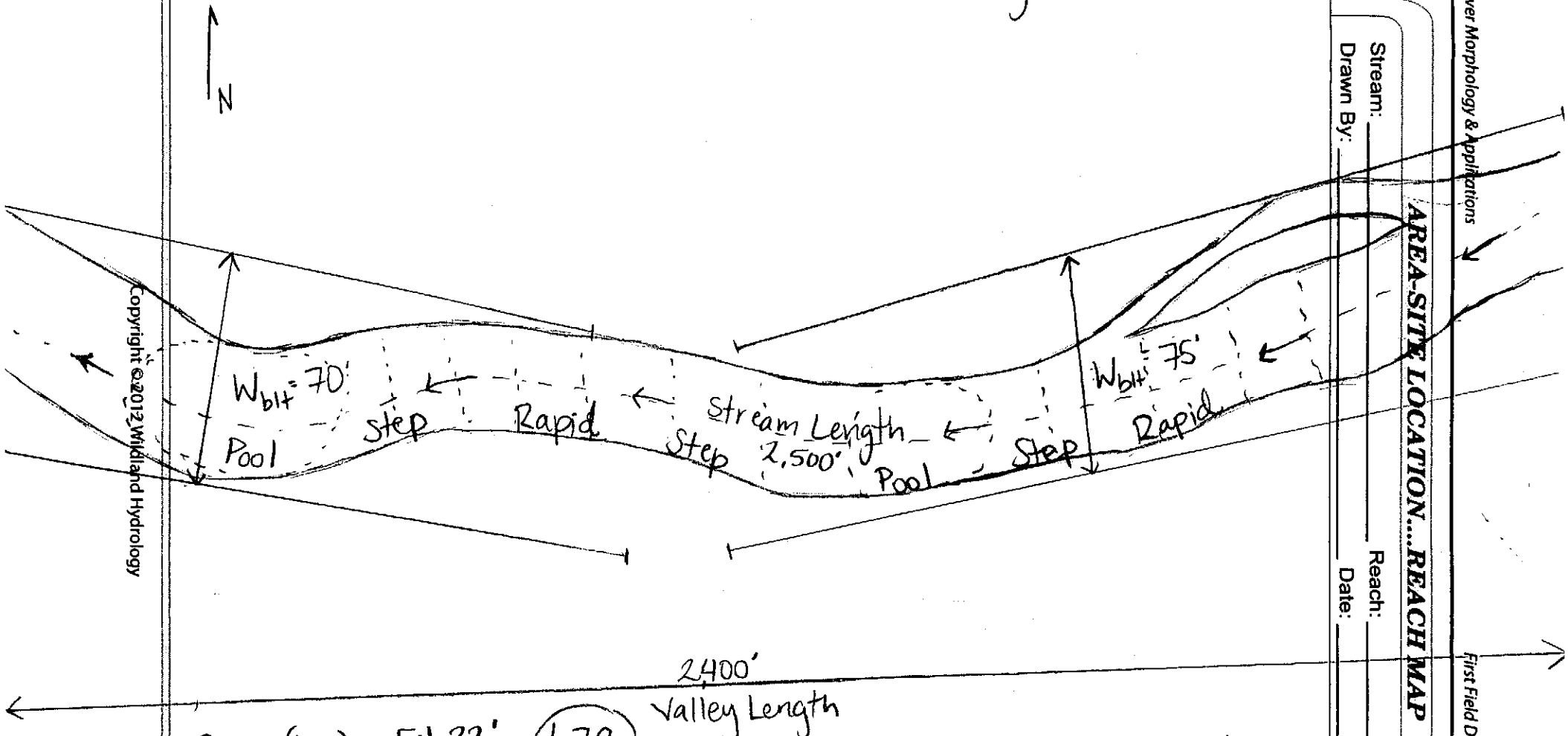

TEAM 4 4/24/2012
UPPER REACH
KEEDYSVILLE, MD
7.5m TOPO QUAD
WASHINGTON COUNTY
39.4408 N 77.6853 W
SHARMIN'S BRANCH
1" = 40'
N
LEGEND
TREE
ROCK
DIRECTION OF FLOW
DOWN TREE
GRAVEL BAR
WETLANDS
TRIBUTARY
START 0+00
WETLAND DRAINAGE
TULIP POPLAR
GRAVEL BAR
A' RAPID X-SEC
A 0+92
RED MAPLE W/DEER STAND
TULIP POPLAR
B' RAPID
B 1+79
SYCAMORE
C 2+06
C' POOL
GRAVEL
SYCAMORE
MTN
D 2+57
D' POOL
E 2+70
E'
STEP
FLOOD PLAIN
MTN
SNAG
WHITE OAK
MTN
F 4+19
F' RIFFLE
BOT ELEV

Shermans Run Reach 4 — 4/24/12

# Belt Width & Sinuosity




Stream: _____ Reach: _____

Drawn By: _____ Date: _____

**AREA-SITE LOCATION....REACH MAP**

Riffle ($L_r$) = 54.33' : (1.79)

Pool ($L_p$) = 30.5' : (1.00)

Pool-to-Pool ($P_s$) = 97.0' : (3.19)

$W_{bkf}$ = 30.4

meander width ratio = $\frac{W_{blt}}{W_{bkf}} = \frac{70'}{30.4}$ (2.3)

Sinuosity $\frac{SL}{VL} = \frac{2,500'}{2400'}$ = (1.04)  Belt width = (72.5')

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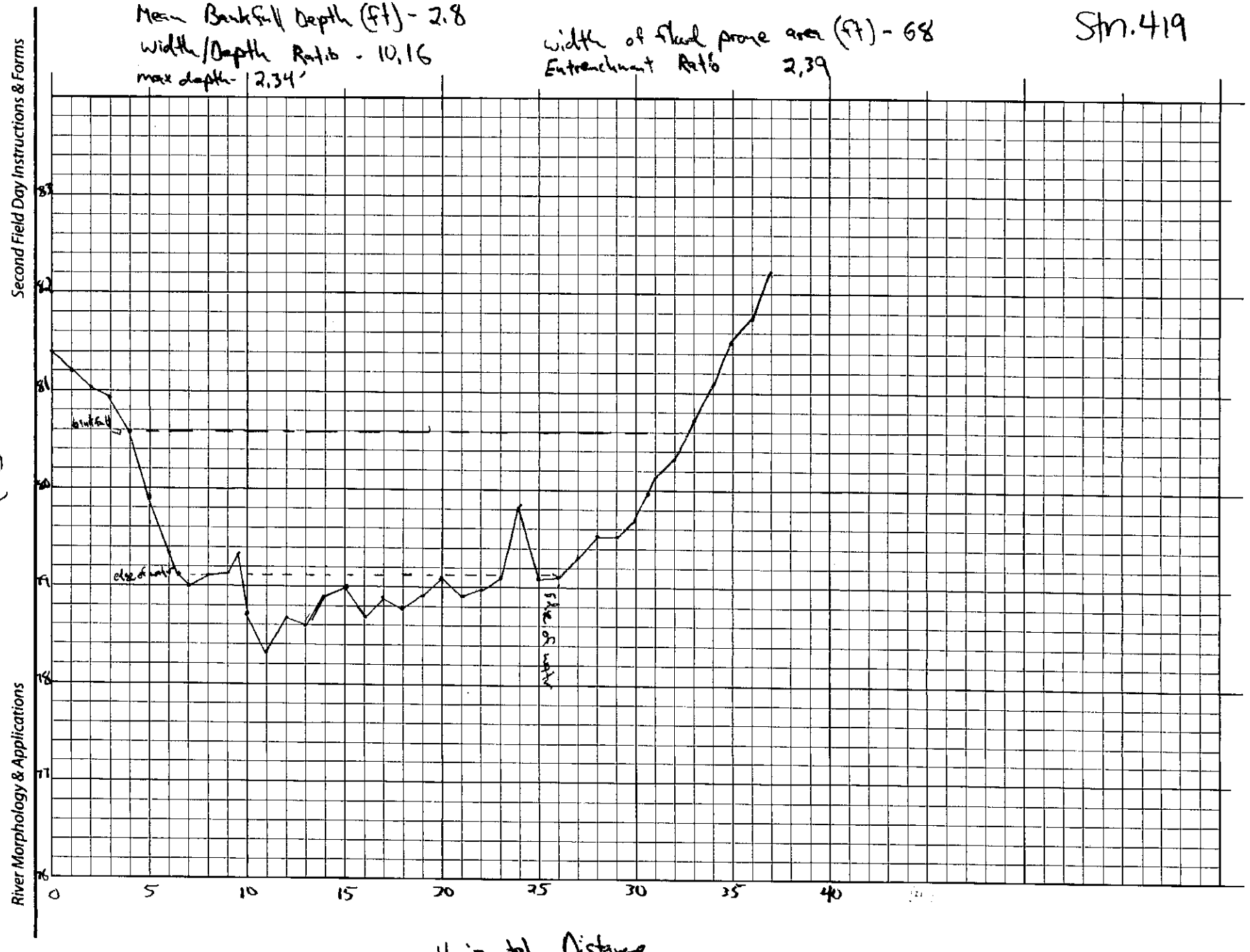
Team 4
Sharmon's Branch
4/24/12

Bankfull Area (ft²) - 19.91
Bankfull Width (ft) - 28.5'
Mean Bankfull Depth (ft) - 2.8'
Width/Depth Ratio - 10.16
max depth - 2.34'

width of flood prone area (ft) - 68
Entrenchment Ratio 2.39

Riffle Cross-section F

Stn. 419

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Team 4 Sherman's Branch 4/24/12

rapid

Cross Section 3

downstream end of section 4

at long crossing 118.7 + 300 = 418.7'

| at | long elev |
|---|---|
| 0 | 4.96 |
| 1 | 5.16 |
| 2 | 5.32 |
| 3 | 5.48 |
| 4 | 5.76 ← bankfull |
| 5 | 6.50 |
| 6 | 6.98 |
| 7 | 7.38 |
| 8 | 7.22 |
| 9 | 7.2 rock |
| 9.5 | 6.98 |
| 10 | 7.70 |
| 11 | 8.1 |
| water surface | 7.30 |
| 12 | 7.72 |
| 13 | 7.76 |
| 14 | 7.44 |
| 15 | 7.36 |
| 16 | 7.72 |
| 17 | 7.46 |
| 18 | 7.58 |

| | |
|---|---|
| 19 | 7.50 |
| 20 | 7.28 |
| 21 | 7.48 |
| 22 | 7.40 |
| 23 | 7.20 |
| 24 | 6.54 |
| 25 | 7.28 |
| 26 | 7.22 |

6.5 - 7.24 edge of water

edge of water

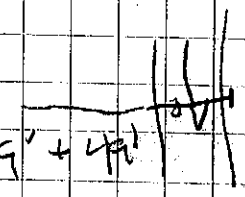
7.22 water elev

| | |
|---|---|
| 27 | 7.0 |
| 28 | 6.80 |
| 29 | 6.80 |
| 30 | 6.72 |
| 30.5 | 6.40 |
| 31 | 6.20 |
| 32 | 6.0 |
| 33 | 5.62 |
| 34 | 5.18 |
| 35 | 4.88 |
| 36 | 4.58 |
| 37 | 4.14 |

4.5' depth twice bankfull

max depth 2.25

3.6'



19' + 49' = 68'

width of valley to valley walls at

pro long elev

bankfull 6.9' water surface 8.54'

downstream riffle has cobble + boulders

bankfull defined by edge - flat surface

break in slope

speed of stream reduced from ...

- bankfull cover 4.24
- water surface 2.7
- deepest part 1.9

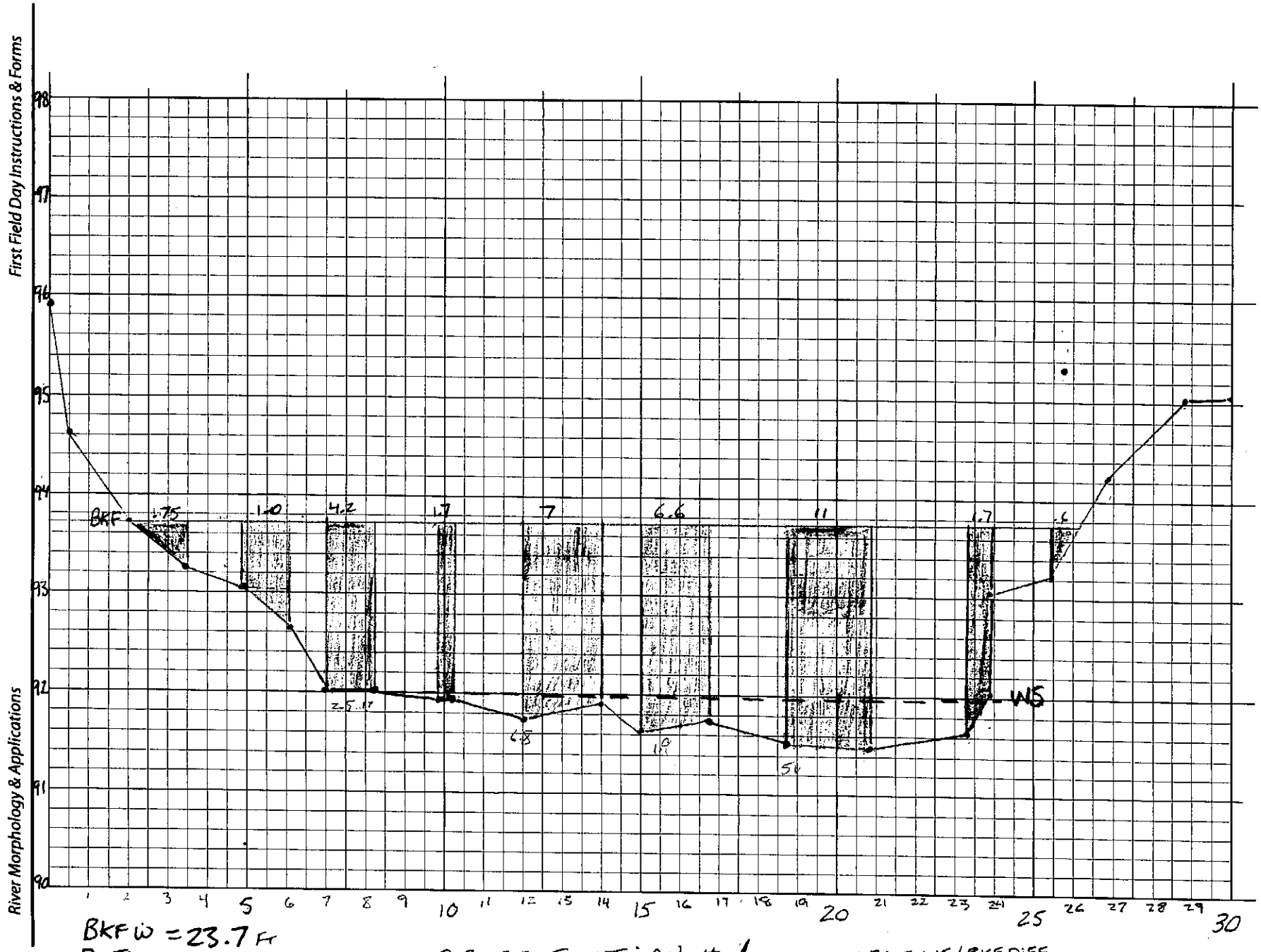
max depth = 2.34

water surface to bank 1.54

insert tab - charts

"Rite in the Rain"

Team 4
Skookum's Branch
4/24/12




First Field Day Instructions & Forms

River Morphology & Applications

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B34

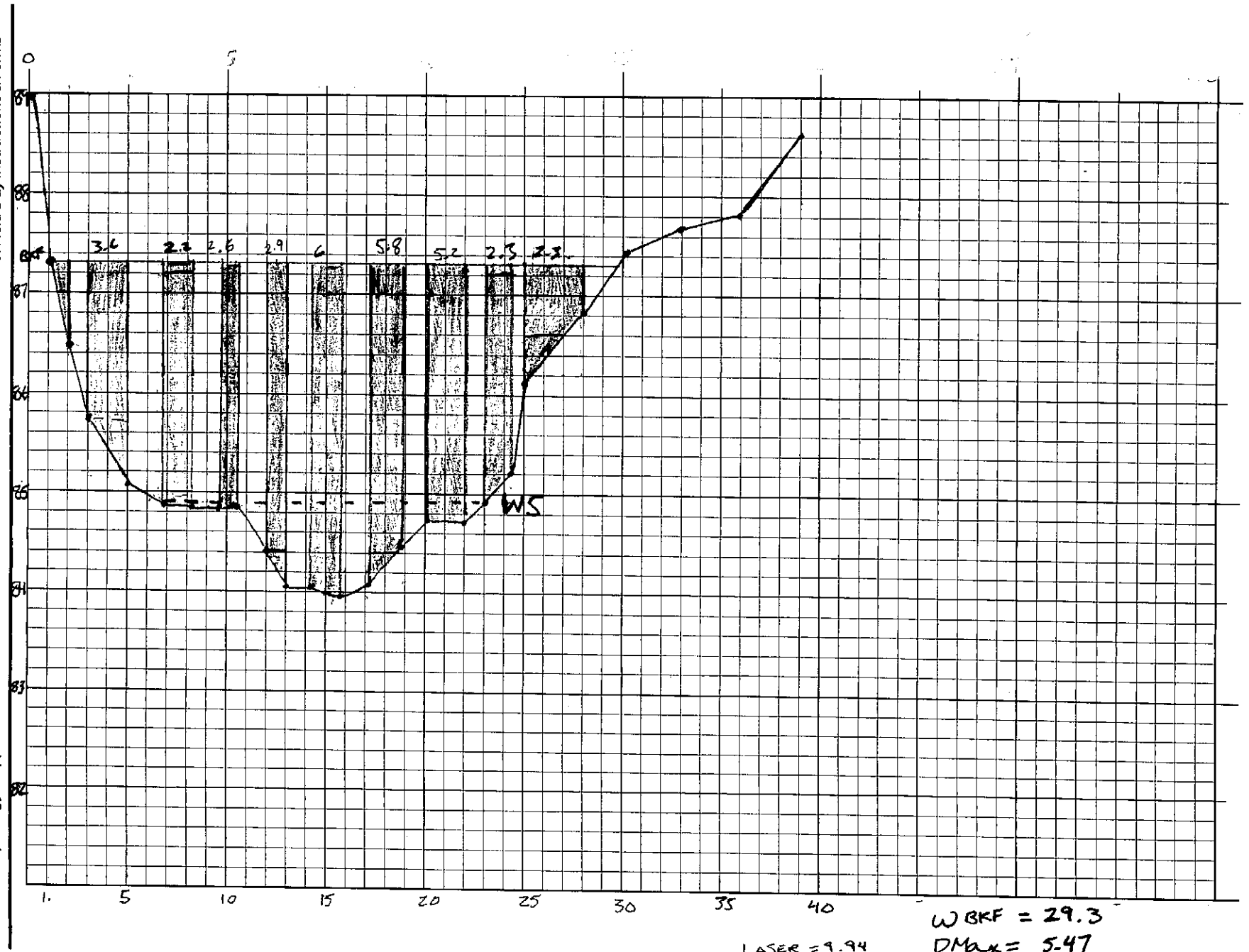
BKF W = 23.7 Ft
Depth = 2.3
Bankfull xSection Area = 34.5
W/Depth Ratio = 10.30
= 4.6

CROSS SECTION # 4

STATION +92

1.76 = WS/BKF DIFF
2.3 = Max Depth CD max
FPW = 41 Ft

Team 4
Sherman's Branch
4/24/12

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B36

CROSS SECTION #C

POOL

STATION 208

LASER = 9.94
BS = 3.73

W BKF = 29.3
DMax = 5.47
Mean Bankfull Depth = 1.39
Width Depth Ratio = 21.07
Bankfull X Section Area = 33

SURVEY DATA ⟹ CROSS-SECTION 3

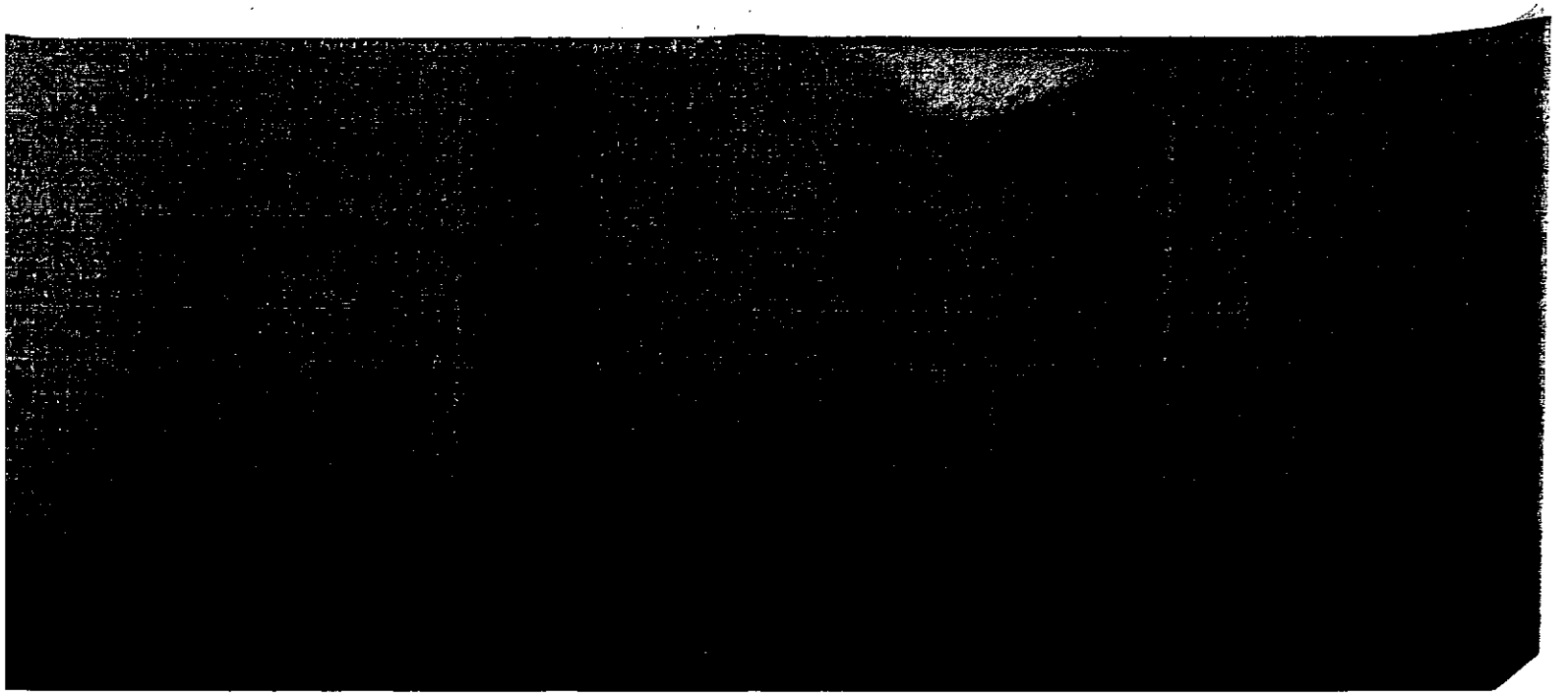
SITE: XS 02 Peel Sta 208 Date: 4-24-19

| STATION ft | BS ft | HI ft | FS ft | Elevation ft | NOTES / COMMENTS / REMARKS |
|---|---|---|---|---|---|
| 0.0 | | ✓ | 88.95 | 4.84 | LEP |
| 0.7 | | ✓ | 87.34 | 6.45 | |
| 1.8 | | ✓ | 86.46 | 7.33 | |
| 3.1 | | ✓ | 85.76 | 8.03 | |
| 5.0 | | ✓ | 85.37 | 8.42 | |
| 6.6 | | ✓ | 84.95 | 8.84 | |
| 8.1 | | ✓ | 84.96 | 8.83 | |
| 9.5 | | ✓ | 84.86 | 8.93 | |
| 10.3 | | ✓ | 84.91 | 8.88 | WS |
| 11.6 | | ✓ | 84.9 | 9.39 | |
| 13.0 | | ✓ | 84.11 | 9.68 | |
| 14.0 | | ✓ | 84.18 | 9.61 | |
| 15.8 | | ✓ | 83.99 | 9.80 | TW |
| 17.3 | | ✓ | 84.31 | 9.45 | |
| 18.9 | | ✓ | 84.58 | 9.21 | |
| 20.1 | | ✓ | 84.72 | 9.07 | |
| 20.0 | | ✓ | 84.73 | 9.06 | |
| 23.1 | | ✓ | 84.94 | 8.85 | WS |
| 24.3 | | ✓ | 85.22 | 8.57 | |
| 25.1 | | ✓ | 86.18 | 7.61 | |
| 27.7 | | ✓ | 86.83 | 6.96 | |
| 30.3 | | ✓ | 87.46 | 6.33 | BKF |
| 33.6 | " | ✓ | 87.63 | 6.16 | |
| 36.2 | | ✓ | 87.84 | 5.95 | |
| 39.0 | | | 88.61 | 5.18 | REP |
| | | | | | |
| | | | | | |
| | LOCK | BS | | | |
| | 9.94 | 3.73 | | | |

SURVEY DATA ⟹ CROSS-SECTION 4

SITE: XS 03 Riffle Sta 92.4 Date: 4-24-19

| Item | STATION ft | BS ft | HI ft | FS ft | Elevation ft | NOTES / COMMENTS / REMARKS |
|---|---|---|---|---|---|---|
| 89 | 0.0 | | ✓ | 2.11 | 95.89 | LEP |
| 90 | 0.6 | | ✓ | 3.35 | 94.65 | |
| 91 | 2.3 | | ✓ | 4.25 | 93.75 | BKF |
| 92 | 3.3 | | ✓ | 4.76 | 93.24 | |
| 93 | 4.9 | | ✓ | 4.93 | 93.07 | |
| 94 | 6.2 | | ✓ | 5.33 | 92.67 | |
| 95 | 7.0 | | ✓ | 5.45 | 92.05 | |
| 96 | 8.4 | | ✓ | 5.45 | 92.55 | |
| 97 | 9.8 | | ✓ | 6.03 | 91.97 | |
| 98 | 10.2 | | ✓ | 6.01 | 91.99 | WS |
| 99 | 12.1 | | ✓ | 6.21 | 91.79 | |
| 100 | 14.0 | | ✓ | 6.13 | 91.87 | |
| 101 | 15.1 | | ✓ | 6.31 | 91.69 | |
| 102 | 16.8 | | ✓ | 6.27 | 91.73 | |
| 103 | 18.6 | | ✓ | 6.44 | 91.56 | |
| 104 | 20.8 | | ✓ | 6.55 | 91.45 | TW |
| 105 | 23.4 | | ✓ | 6.38 | 91.62 | |
| 106 | 23.8 | | ✓ | 5.98 | 92.04 | WS |
| 107 | 23.8 | | ✓ | 4.84 | 93.16 | |
| 108 | 25.5 | | ✓ | 4.77 | 93.23 | |
| 109 | 26.8 | 10 | ✓ | 3.76 | 94.24 | 93.77 |
| 110 | 28.6 | | ✓ | 2.85 | 95.15 | |
| 111 | 30.0 | | | 2.84 | 95.16 | REP |
| 112 | | | | | | |
| 113 | | | | | | |
| 114 | 1.76 | WS/BKF | 2.72 | | | |
| 115 | 2.3 | Max Depth | | | | |
| 116 | 4.6 | 2. max | D | | | |
| 117 | FPW | 41 | ft | | | |
| 118 | | | | | | |



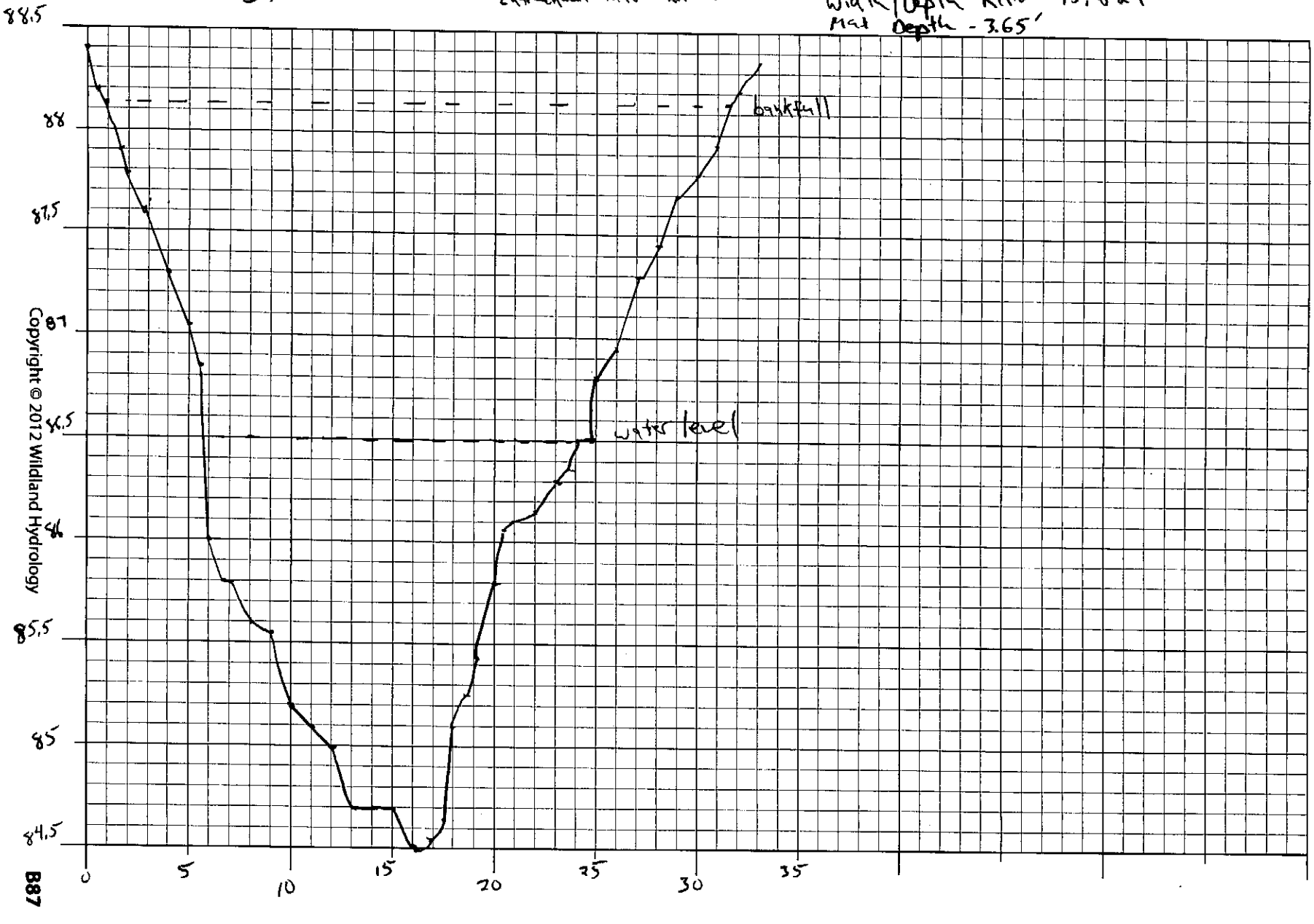
Team 4
Shasumis Branch
4/24/12

Lower Pool Cross-section D

Stn. 257

width of flood prone area - not measured
Entrenchment Ratio - not measured

Bankfull Area ($ft^2$) - 59.52
Bankfull width (ft) - 30.5
Mean Bankfull Depth (ft) - 1.95
Width/Depth Ratio - 15.629
Max Depth - 3.65'

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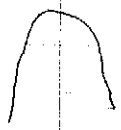


team 4 upstream 4-2012

Sharman's Branch

Team 4

3.6 sq mile drainage area

- 34 sq ft regional curve

cross section area based on drainage area

cross section 1 pool

immediately upstream of riffle 1

| on tape | | corrected |
|---|---|---|
| 0 | 4.5 | 5.5 |
| .5 | 4.7 | 5.3 |
| 1 | 4.75 | bankfull 5.25 |
| 1.5 | 5.0 | 5 |
| 2.0 | 5.11 | 4.89 |
| 2.5 | 5.30 | 4.7 ~~bankfull~~ |
| 3.0 | 5.25 | 4.75 |
| 4 | 5.6 | 4.4 |
| 5 | 5.85 | 4.15 |
| 5.5 | 6.05 | 3.95 inner bar |
| 6.0 | 6.9 | |
| 6.5 | 7.1 | |
| 7 | 7.1 | |
| 8 | 7.3 | |
| 9 | 7.35 | |

| | |
|---|---|
| 10 | 7.7 |
| 11 | 7.8 |
| 12 | 7.9 |
| 13 | 8.2 |
| 14 | 8.2 |
| 15 | 8.2 |
| 16 | 8.4 |
| 16.5 | 8.35 |
| 17 | 8.25 |
| 18 | 7.8 |
| 18.5 | 7.65 |
| 19 | 7.45 |
| 20 | 7.1 |
| 20.5 | 6.85 |
| 21 | 6.8 |
| 22 | 6.75 |

| | | |
|---|---|---|
| 23 | 6.6 | 6.2 water surface |
| 23.5 | 6.55 | |
| 24 | 6.4 | |
| 24.5 | 6.4 | water edge |
| 25 | 6.1 | |
| 26 | 5.95 | |
| 27 | 5.6 | |
| 28 | 5.45 | |
| 29 | 5.2 | |
| 30 | 5.1 | |
| 31 | 4.95 | |
| 31.5 | 4.75 | bkf * bankfull width 30.5 |
| 32 | 4.7 | |
| 33 | 4.55 | starting at 5.5 - width 25 ft low flow channel |

- [long pro 2558 ft]

[bankfull elev 11.85' of pool left bank based on long pro

4.75 bankfull 5.25

8.4 depth 1.6

max depth 3.65

1.7

1.65 surface water to bankfull

"Rite in the Rain"

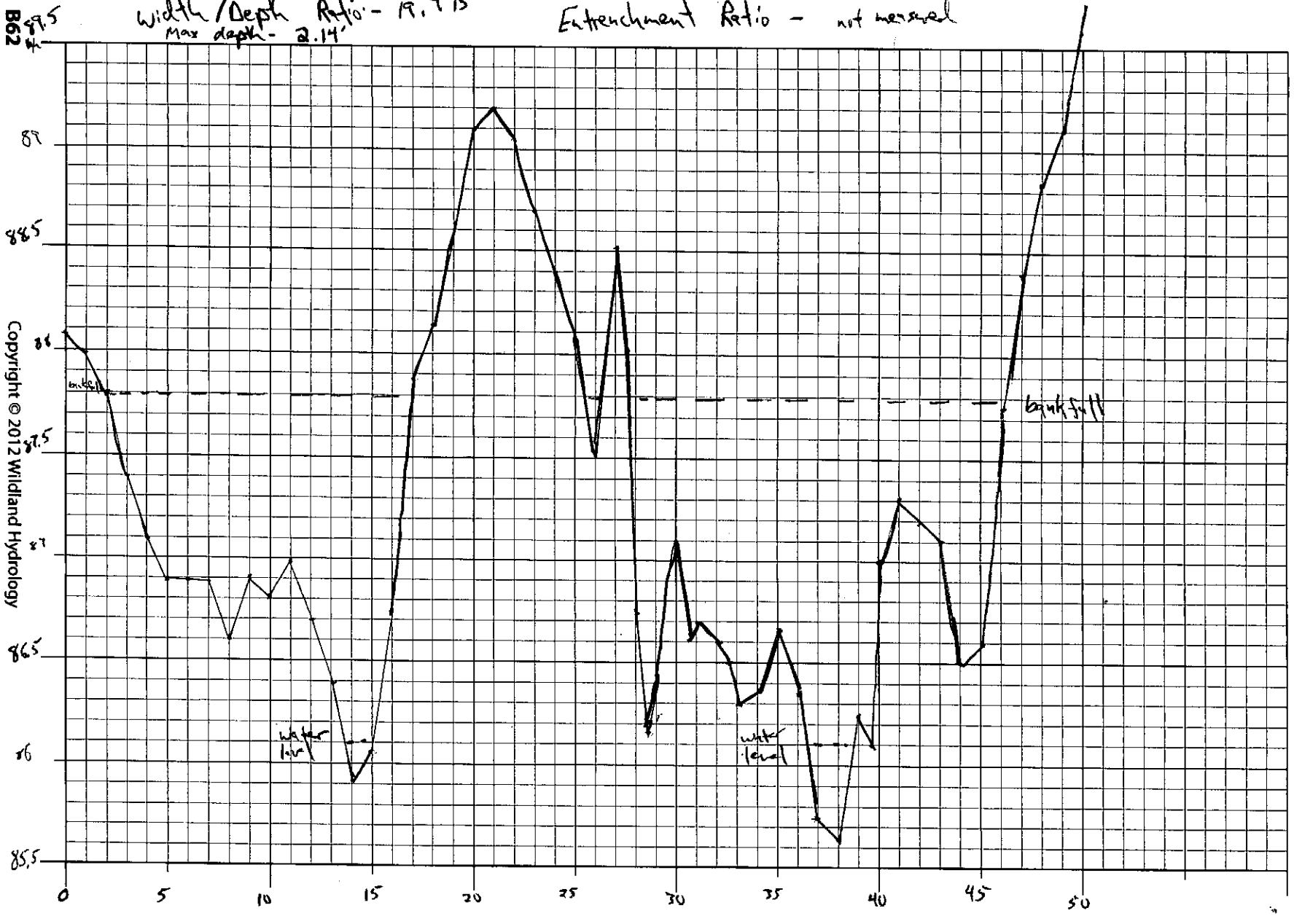
Team 4
Sharmans Branch
4/24/12

Bankfull Area (ft²) - 30.19
Bankfull Width (ft) - 24.5
Mean Bankfull Depth (ft) - 1.23
Width/Depth Ratio - 19.915
Max depth - 2.14'

## Step Cross-Section E

Width of flood prone area (ft) - not measured
Entrenchment Ratio - not measured

Stn. 270

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Team 4 4/24/12

Sherman's Branch step ~~pool~~ 1

immediate downstream of pool

271.5' on long pro

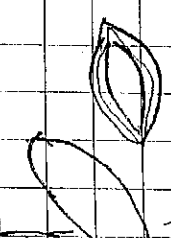
| | | | | |
|---|---|---|---|---|
| 0 | 4.68 | 22 | 3.70 | boulder |
| 1 | 4.8 | 23 | 4.06 | |
| 2 | backfill 4.96 | 24 | 4.36 | |
| 3 | 5.34 | 25 | 4.68 | |
| 4 | 5.66 | 26 | 5.24 | |
| 5 | 5.88 | 27 | 4.24 | |
| 6 | 5.88 | 27.5 | 4.72 | inner bar |
| 7 | 5.48 | 28 | 6.0 | |
| 8 | 6.14 | 28.5 | 5.94 | water surface |
| 9 | 5.82 | 29.0, 6.32 | 6.58 | bottom |
| 10 | 5.92 | 29.5 | 5.82 | |
| 11 | 5.78 | ~~29.5~~ | ~~5~~ | |
| 12 | 6.08 | 30 | 5.64 | |
| 13 | 6.36 | 30.5 | 6.12 | |
| 14 | 6.82 | 31 | 6.04 | |
| 15 | 6.68 | 32 | 6.18 | |
| 16 | 6.02 | 32.5 | 6.26 | |
| 17 | 4.88 | boulder 33 | 6.44 | |
| 18 | 4.60 | 34 | 6.38 | |
| 19 | 4.12 | 35 | 6.08 | |
| 20 | 3.64 | 36 | 6.40 | |
| 21 | 3.54 | | | |

| | | |
|---|---|---|
| 37 | 7.0 | |
| 38 | 7.1 | |
| 39 | 6.5 | |
| 39.5 | 6.64 | edge of west |
| 40 | 5.76 | 3. |
| 41 | 5.44 | |
| 42 | 5.54 | |
| 43 | 5.65 | |
| 44 | 6.26 | |
| 45 | 6.15 | |
| 46 | 5.00 | |
| 47 | 4.35 | |
| 48 | 3.90 | |
| 49 | 3.62 | |
| 50 | 2.92 | |

backfill width ~44 ft

inner bar 49 27.5 - 46.5 ~19 + 14'

from long pro elev at 14.35 top middle



water surface to backfill 1.68

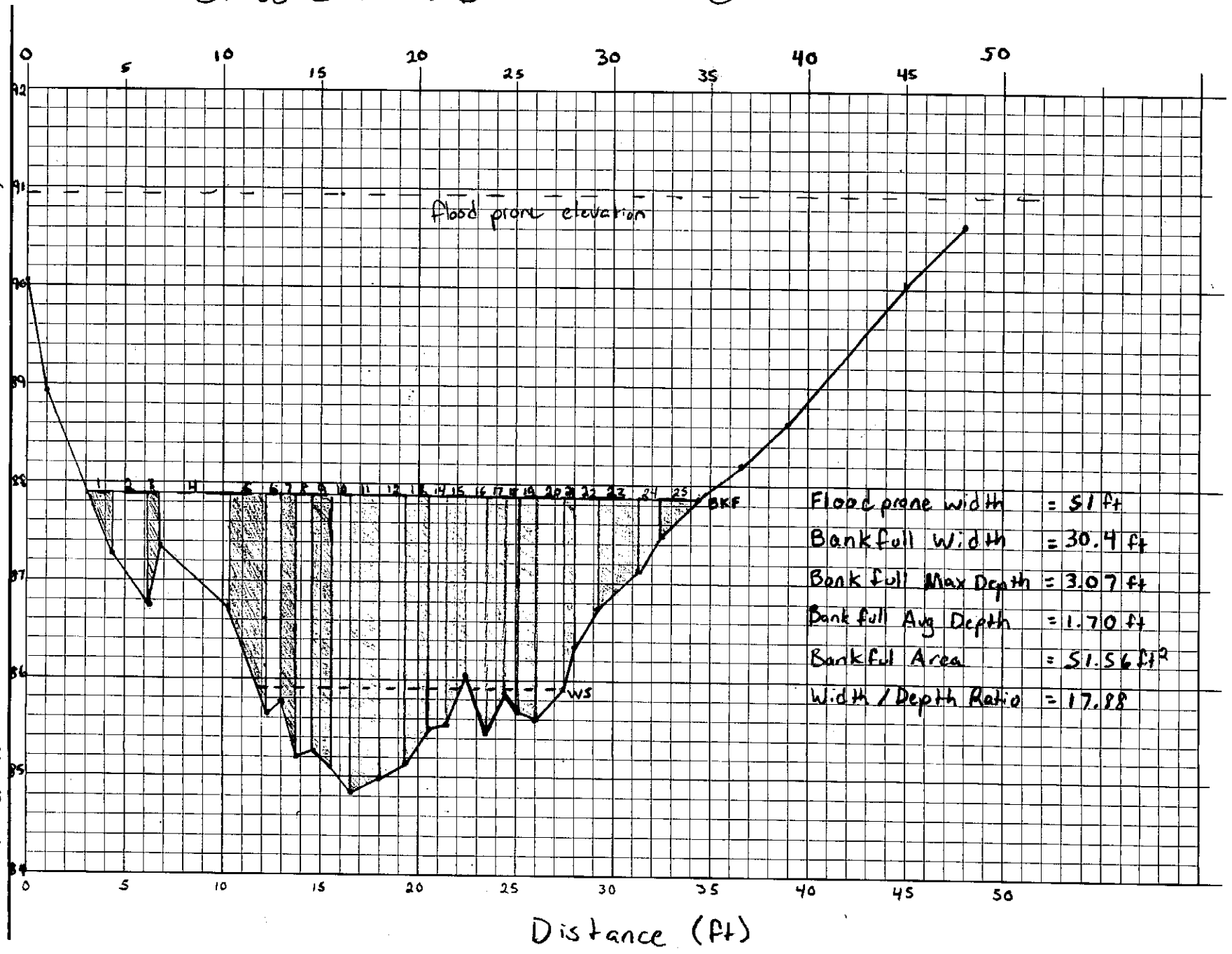
| | | |
|---|---|---|
| bar 5.04 | 5.04 | 3.9 |
| level 2.9 | 3.8 | 4.96 |
| | | 6.92 |

max depth ~~2.14~~'

"Rite in the Rain"

Team 4 4/29/12

# Cross Section B — Station 1+79.6




| | |
|---|---|
| Flood prone width | = 51 ft |
| Bankfull Width | = 30.4 ft |
| Bank full Max Depth | = 3.07 ft |
| Bank full Avg Depth | = 1.70 ft |
| Bankfull Area | = 51.56 ft² |
| Width / Depth Ratio | = 17.88 |

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pool slope: 0.00, 0.04, 0.02
riffle slope: 0.35, 0.45, 0.478
step slope: 0.127, 0.159, 0.143

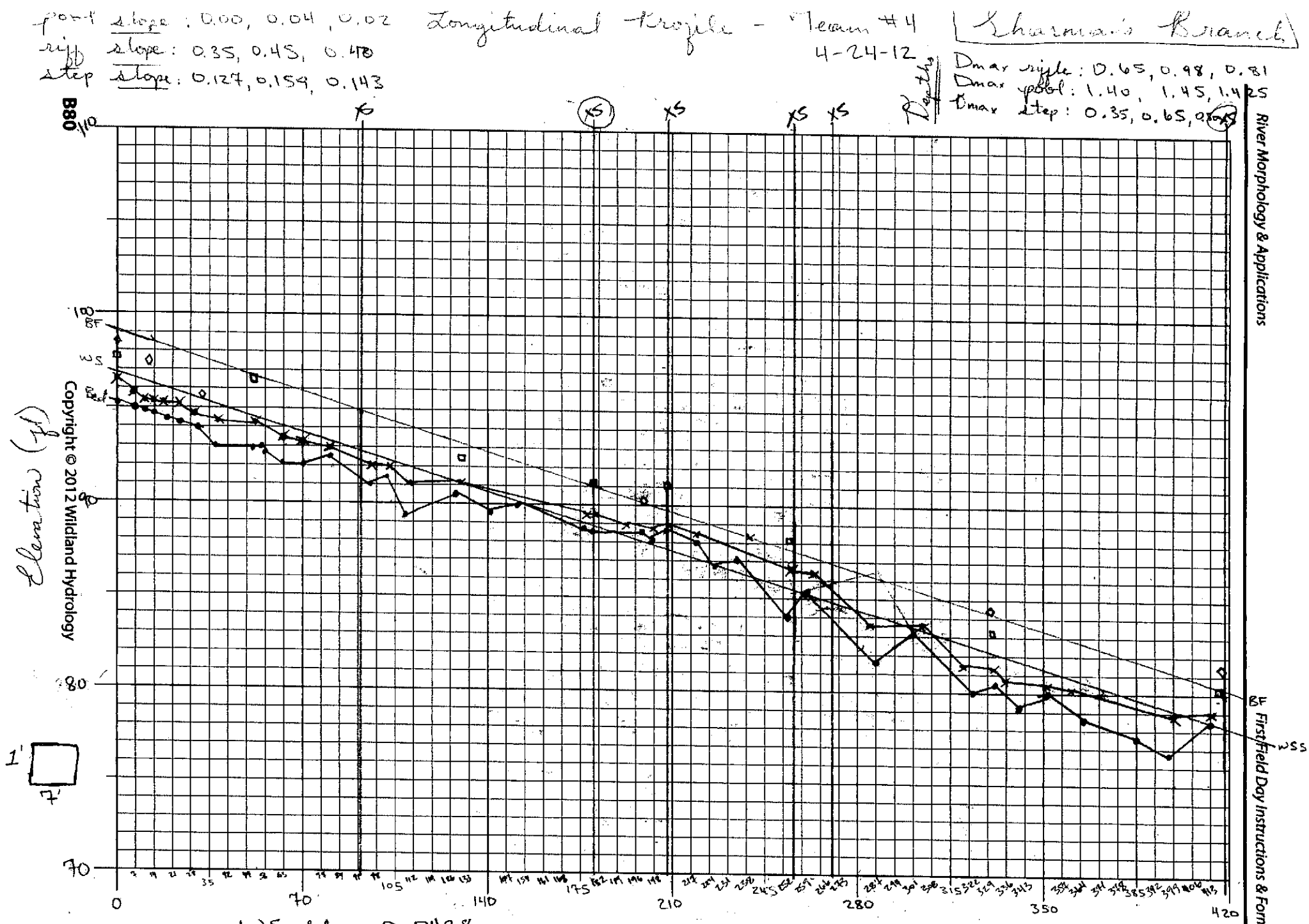
# Longitudinal Profile - Team #4

4-24-12

Thalmann Branch

Depths

Dmax riffle: 0.65, 0.98, 0.81
Dmax pool: 1.40, 1.45, 1.4
Dmax step: 0.35, 0.65, 0.8

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First Field Day Instructions & Forms

WS slope = 0.0428
BF slope = 0.0421

Distance along Stream (ft)

- Thalweg
- x water surface
- □ Bankfull
- ◇ Low bank

Longitudinal:
riffles: 24', 107' avg= 65.5
pools: 25', 40', avg: 30.5
P2P spacing: 18', 57', avg=54.33

## SURVEY DATA ⟶ LONGITUDINAL PROFILE 1

**SITE:** Sharman's Branch Date: 4/24/12

Location: Team 4

Party / Notes: HUC:

| | Distance, Point, or STATION ft | Back-Sight BS ft | Height of Instru-ment 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~~ | | 100.00 | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | 0 | | | 4.7 | 95.3 | 3.5~~8~~ 2 | | 2.3 | | 1.64 | | 1.2 (2nd BF= |
| 5 | 6.5 | | | 5.0 | | 4.33 | | | | | | |
| 6 | 8.9 | | | 5.43 | | 4.84 | | | | | | |
| 7 | 13.5 | | | 6.24 | | 4.84 | | | | 2.76 | | |
| 8 | 19.6 | | | 6.0 | | 4.8 | | | | | | |
| 9 | 24 | | | 6.74 | | 4.85 | | | | | | |
| 10 | 32 | | | 5.95 | | 5.2 | | | | 4.28 | | |
| 11 | 40 | | | 6.56 | | ~~5~~.52 | | | | | | |
| 12 | ~~46~~.9 | | | 6.71 | | 5.8 | | 3.65 | | | | |
| 13 | 54.7 | | | 6.21 | | | | | | | | |
| 14 | 55.2 | | | 7.25 | | | | | | | | |
| 15 | 65 | | | 7.41 | | 6.61 | | | | | | |
| 16 | 71 | | | 7.55 | | 6.82 | | | | | | |
| 17 | 80 | | | 7.46 | | 7.2 | | | | | | |
| 18 | 97 | | | 8.84 | | | | | | | | |
| 19 | 104 | | | 8.64 | | 7.99 | | | | | | |
| 20 | 111 | | | 10.5 | | | | | | | | |
| 21 | 130 | | | 9.71 | | 8.88 | | 7.47 | | | | |
| 22 | 141 | | | 10.21 | | | | | | | | |
| 23 | ~~150~~ 155.0 ~~3~~ | | | 10.04 | | | | | | | | |
| 24 | 176 | | | 11.27 | | | | | | | | |
| 25 | 179.6 | | | 11.37 | | 10.5 | | 8.47 | | | | XS |
| 26 | 193.0 | | | 12.38 | | | | | | | | pool |
| 27 | 198.0 | | | 11.92 | | 11.16 | | | | 8.24 | | slee |

155.0



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## SURVEY DATA → LONGITUDINAL PROFILE 2

SITE: Shermans Branch Date: 4/24/12

Location: Team 4

Party / Notes: HUC:

| | Distance, Point, or STATION ft | Back-Sight BS ft | Height of Instru-ment 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 | 208 | | | 12.4 | | | | 8.94 | | | | pool |
| 29 | 219.3 | | | 12.0 | | 11.51 | | | | | | step |
| 30 | 226.5 | | | 13.3 | | | | | | | | pool |
| 31 | 238 | | | 13.05 | | 12.35 | | | | | | step |
| 32 | 252.8 | | | 15.7 | | | | | | | | pool |
| 33 | 263.5 | | | 14.35 | | 13.58 | | | | | | step |
| 34 | 253.4 | | | | | | | 11.85 | | | | BF XS |
| 35 | 284.1 | | | 18.25 | | | | | | | | pool |
| 36 | 304.0 | | | 16.95 | | 16.6 | | | | | | step |
| 37 | 321.0 | | | 20.1 | | | | | | | | pool |
| 38 | 330.0 | | | 19.2 | | 18.58 | | 16.6 | | 15.25 | | step |
| 39 | 335.0 | | | 20.9 | | | | | | | | pool |
| 40 | 350.8 | | | 19.98 | | 19.27 | | | | | | step |
| 41 | ~~307.5~~ | | | ~~17.46~~ | | | | | | | | ~~peak~~ |
| 42 | 367.0 | | | (19.9) | | | | | | | | rock - moving laser |
| 43 | 367.0 | | | 7.4 | | | | | | | | |
| 44 | 361.3 | | | 8.75 | | | | | | | | pool |
| 45 | 371.5 | | | 7.93 | | 7.32 | | | | | | step |
| 46 | 385.2 | | | 9.75 | | | | | | | | pool |
| 47 | 402.0 | | | 10.57 | | | | | | | | pool |
| 48 | 416.6 | | | 9.0 | | 8.54 | | 6.9 | 80.6 | 6.1 | | step - XS |
| ~~49~~ | | END | | | | | | | | | | |
| 50 | | | | | | | | | | | | |
| 51 | | | | | | | | | | | | |
| 52 | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | |
| 54 | | | | | | | | | | | | |

moved later

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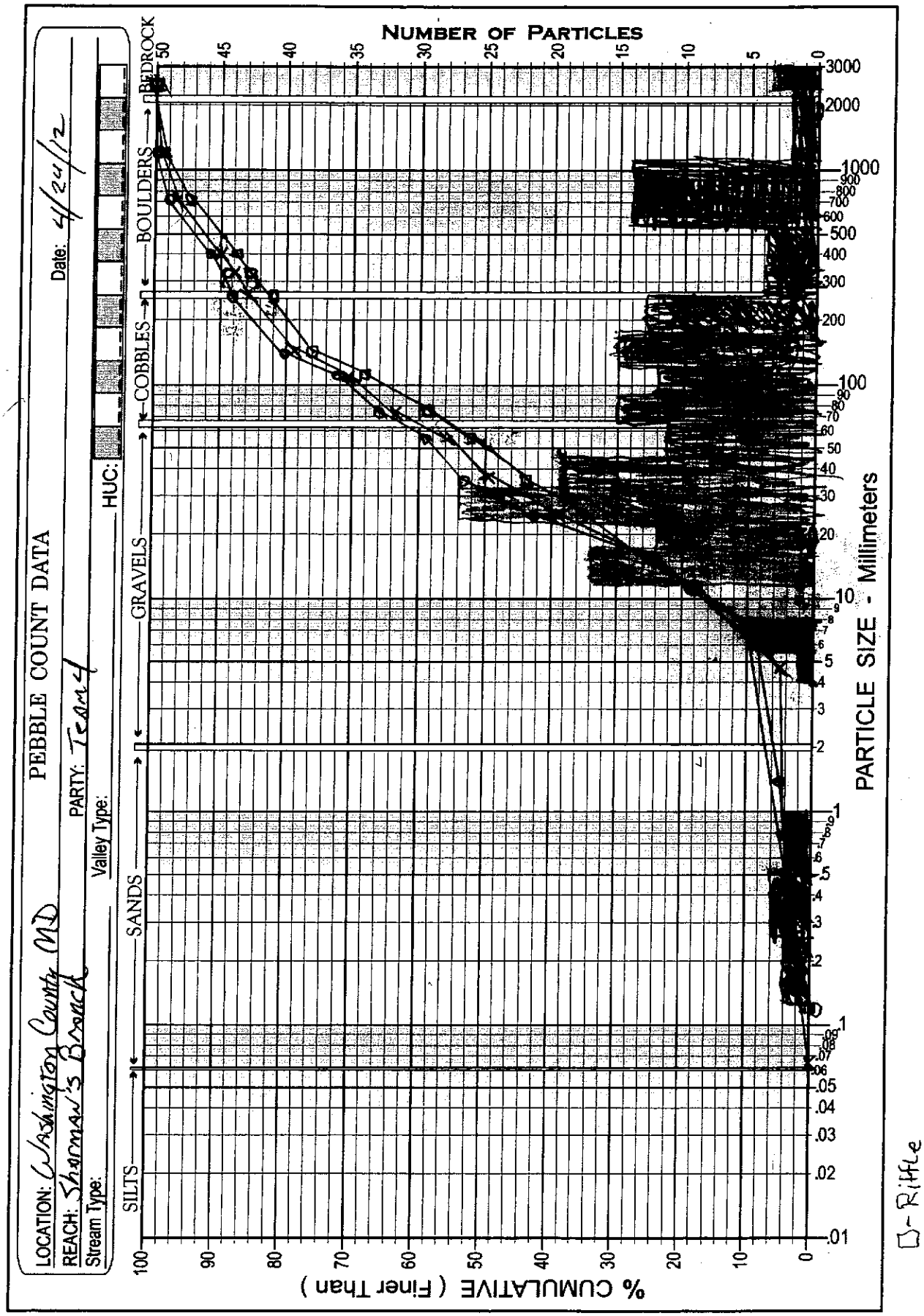
☆ = on the money guess, good for one beer.

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Site: Sharman's Branch Date: 4/24/12

Location: Wash. Co MD HUC:

Party: Team 4

| Inches | PARTICLE | Millimeters | | Dot Count for RIFFLE 1 | POOL 2 | COMP. 3 | RIFFLE (1) Reach: Date: 4/24/12 TOT # | ITEM % | % CUM | POOL (2) Reach: Date: 4/24/12 TOT # | ITEM % | % CUM | COMPOSITE (3) Reach: Date: 4/24/12 TOT # | ITEM % | % CUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Silt / Clay | < .062 | S/C | | | | | | | | | | | | |
| | Very Fine | .062 - .125 | SAND | | | | | | 0 | | | | | | 0 |
| | Fine | .125 - .25 | SAND | • • | | • • | 2 | 2.3 | 2.3 | | | 0 | 2 | 1.1 | 1.1 |
| | Medium | .25 - .50 | SAND | | : • | : • | | | | 3 | 2.9 | 2.9 | 3 | 1.6 | 2.7 |
| | Coarse | .50 - 1.0 | SAND | | • • | • • | | | | 2 | 2.0 | 4.9 | 2 | 1.1 | 3.8 |
| .04 - .08 | Very Coarse | 1.0 - 2 | SAND | | | | | | | | | | | | |
| .08 - .16 | Very Fine | 2 - 4 | GRAVEL | | | | | | | | | | | | |
| .16 - .22 | Fine | 4 - 5.7 | GRAVEL | • | | • | 1 | 1.1 | 3.4 | | | | 1 | 0.5 | 4.3 |
| .22 - .31 | Fine | 5.7 - 8 | GRAVEL | 1 : | 1 : | ⊠ | 5 | 5.8 | 9.2 | 5 | 4.9 | 9.8 | 10 | 5.3 | 9.6 |
| .31 - .44 | Medium | 8 - 11.3 | GRAVEL | | | | | | | | | | | | |
| .44 - .63 | Medium | 11.3 - 16 | GRAVEL | □ | ⊠ | ⊠ □ | 8 | 9.3 | 18.5 | 9 | 8.8 | 18.6 | 17 | 9.0 | 18.6 |
| .63 - .89 | Coarse | 16 - 22.6 | GRAVEL | □ | 1 : | ⊠ : • | 7 | 8.1 | 26.6 | 6 | 5.9 | 24.5 | 13 | 6.9 | 25.5 |
| .89 - 1.3 | Coarse | 22.6 - 32 | GRAVEL | □ | ⊠ ⊠ | ⊠ ⊠ □ | 8 | 9.3 | 35.9 | 19 | 18.6 | 43.1 | 27 | 14.4 | 39.9 |
| 1.3 - 1.8 | Very Coarse | 32 - 45 | GRAVEL | □ | ⊠ • | ⊠ ⊠ | 8 | 9.3 | 45.2 | 11 | 10.8 | 53.9 | 19 | 10.1 | 50.0 |
| 1.8 - 2.5 | Very Coarse | 45 - 64 | GRAVEL | 1 : | 1 : | ⊠ • | 6 | 7.0 | 52.2 | 5 | 4.9 | 58.8 | 11 | 5.9 | 55.9 |
| 2.5 - 3.5 | Small | 64 - 90 | COBBLE | 1 : | ⊠ | ⊠ 1 : | 6 | 7.0 | 59.2 | 9 | 8.8 | 67.6 | 15 | 8.0 | 63.9 |
| 3.5 - 5.0 | Small | 90 - 128 | COBBLE | □ | 1 : | ⊠ : • | 8 | 9.3 | 68.5 | 5 | 4.9 | 72.5 | 13 | 6.9 | 70.8 |
| 5.0 - 7.1 | Large | 128 - 180 | COBBLE | 1 | □ | ⊠ 1 : | 7 | 8.1 | 76.6 | 8 | 7.8 | 80.3 | 15 | 8.0 | 78.8 |
| 7.1 - 10.1 | Large | 180 - 256 | COBBLE | 1 : | □ | ⊠ : • | 5 | 5.8 | 82.4 | 8 | 7.8 | 88.1 | 13 | 6.9 | 85.7 |
| 10.1 - 14.3 | Small | 256 - 362 | BOULDER | : • | • | : • | 3 | 3.4 | 85.8 | 1 | 1.0 | 89.1 | 4 | 2.1 | 87.8 |
| 14.3 - 20 | Small | 362 - 512 | BOULDER | • | : • | : • | 1 | 1.1 | 86.9 | 3 | 2.9 | 92.0 | 4 | 2.1 | 89.9 |
| 20 - 40 | Medium | 512 - 1024 | BOULDER | □ | 1 | ⊠ : : | 8 | 9.3 | 96.2 | 6 | 5.9 | 97.9 | 14 | 7.4 | 97.3 |
| 40 - 80 | Large-Vry Large | 1024 - 2048 | BOULDER | • • | | • • | 2 | 2.3 | 98.5 | | | | 2 | 1.1 | 98.4 |
| | Bedrock | | DRK | • | • • | : • | 1 | 1.1 | 99.6 | 2 | 2.0 | 99.9 | 3 | 1.6 | 100.0 |
| **Stream Type:** | | | **Valley Type:** | | | TOTAL→ | 86 | | | 102 | | | 188 | | |

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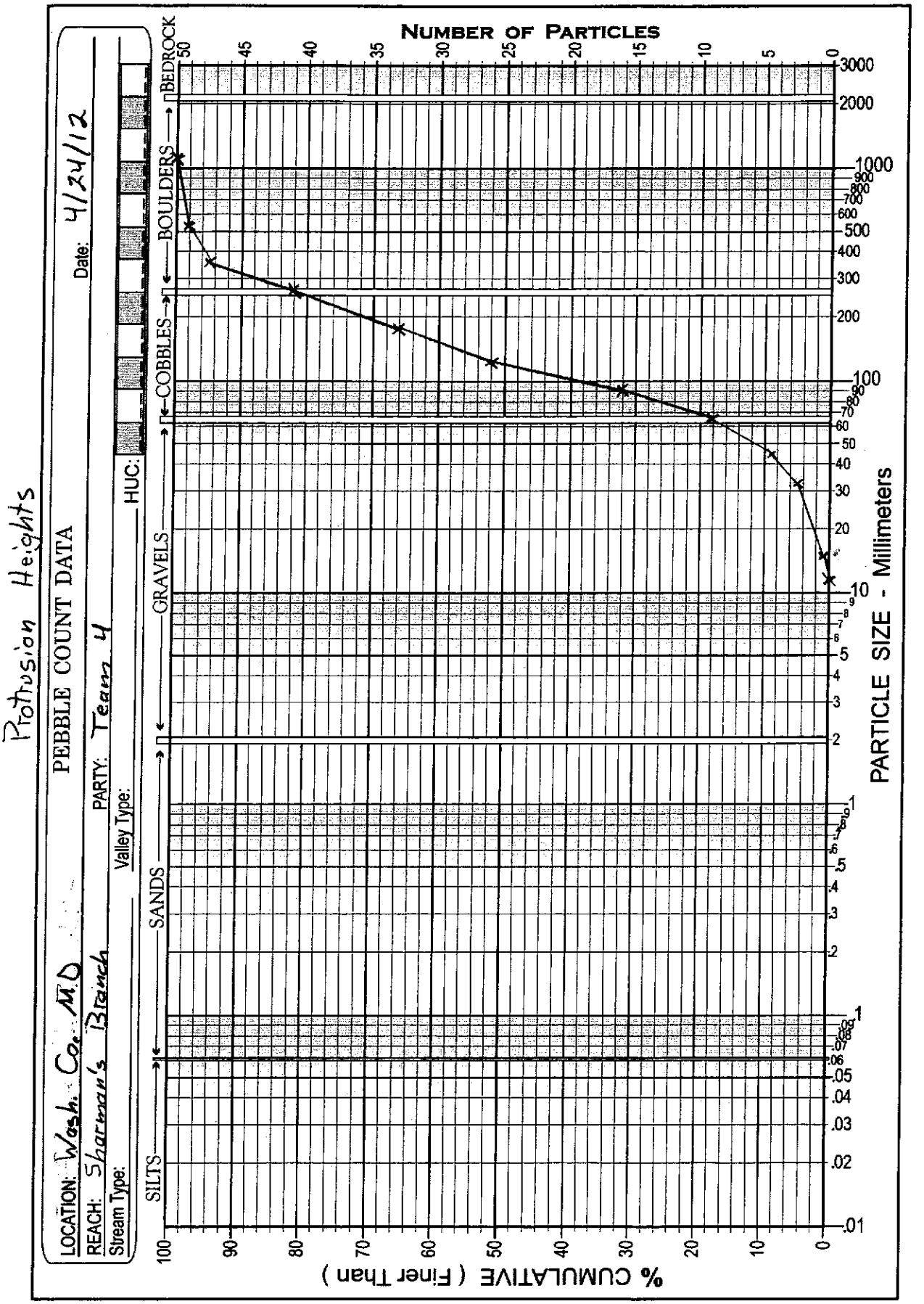


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# Protrusion Heights

Site: Sharman's Branch  Date: 4/24/12

Location: Wash. Co, MD  HUC:

Party: Team 4

| Inches | PARTICLE | Millimeters | | Dot Count for RIFFLE 1 | POOL 2 | COMP. 3 | RIFFLE (1) TOT # | RIFFLE (1) ITEM % | RIFFLE (1) % CUM | POOL (2) TOT # | POOL (2) ITEM % | POOL (2) % CUM | COMPOSITE (3) TOT # | COMPOSITE (3) ITEM % | COMPOSITE (3) % 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 | | | | | | | 0 | | | | | | |
| .44 - .63 | Medium | 11.3 - 16 | | • | | | 1 | 1. | 1 | | | | | | |
| .63 - .89 | Coarse | 16 - 22.6 | | | | | | | | | | | | | |
| .89 - 1.3 | Coarse | 22.6 - 32 | | : : | | | 4 | 4 | 5 | | | | | | |
| 1.3 - 1.8 | Very Coarse | 32 - 45 | | : : | | | 4 | 4 | 9 | | | | | | |
| 1.8 - 2.5 | Very Coarse | 45 - 64 | | ⊠ | | | 9 | 9 | 18 | | | | | | |
| 2.5 - 3.5 | Small | 64 - 90 | COBBLE | ⊠ : : | | | 14 | 14 | 32 | | | | | | |
| 3.5 - 5.0 | Small | 90 - 128 | | ⊠ ⊠ | | | 20 | 20 | 52 | | | | | | |
| 5.0 - 7.1 | Large | 128 - 180 | | ⊠ : : | | | 14 | 14 | 66 | | | | | | |
| 7.1 - 10.1 | Large | 180 - 256 | | ⊠ : : | | | 16 | 16 | 82 | | | | | | |
| 10.1 - 14.3 | Small | 256 - 362 | BOULDER | ⊠ : : | | | 13 | 13 | 95 | | | | | | |
| 14.3 - 20 | Small | 362 - 512 | | : | | | 3 | 3 | 98 | | | | | | |
| 20 - 40 | Medium | 512 - 1024 | | : | | | 2 | 2 | 100 | | | | | | |
| 40 - 80 | Large-Vry Large | 1024 - 2048 | | | | | | | | | | | | | |
| | Bedrock | | BDRK | | | | | | | | | | | | |
| **Stream Type:** | | | **Valley Type:** | | | TOTAL→ | 100 | | | | | | | | |

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

| | |
|---|---|
| Stream: | Sharman's Branch |
| Basin: | Drainage Area: 3.6 acres 3.6 $mi^2$ |
| Location: | Washington Co, MD |
| Twp.&Rge: | Keedysville 7.5 min Quad Sec.&Qtr.: |
| Cross-Section Monuments (Lat./Long.): | 39.4408N 77.6853W Date: 4-24-12 |
| Observers: | Team #4 Valley Type: |

| | |
|---|---|
| **Bankfull WIDTH ($W_{bkf}$)**<br>WIDTH of the stream channel at bankfull stage elevation, in a riffle section. | 30.4 ft |
| **Bankfull DEPTH ($d_{bkf}$)**<br>Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$). | 1.70 ft |
| **Bankfull X-Section AREA ($A_{bkf}$)**<br>AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section. | 51.56 $ft^2$ |
| **Width/Depth Ratio ($W_{bkf} / d_{bkf}$)**<br>Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section. | 17.88 ft/ft |
| **Maximum DEPTH ($d_{max}$)**<br>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section. | 3.07 ft |
| **WIDTH of Flood-Prone Area ($W_{fpa}$)**<br>Twice maximum DEPTH, or ($2 \times d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section. | 51.0 ft |
| **Entrenchment Ratio (ER)**<br>The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH ($W_{fpa} / W_{bkf}$) (riffle section). | 1.7 ft/ft |
| **Channel Materials (Particle Size Index ) $D_{50}$**<br>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. | 37 mm |
| **Water Surface SLOPE (S)**<br>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. | 0.0428 ft/ft |
| **Channel SINUOSITY (k)**<br>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 ($S_{val} / S$). | 1.04 |

***Stream Type*** [redacted] **See Classification Key (Figure B-2)**


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

| | | | |
|---|---|---|---|
| Stream: | Sharman's Branch | Location: | Washington Co, MD |
| Date: | 4-24-12 Stream Type: B3/1a | Valley Type: | |
| Observers: | Team #4 | HUC: | |

| | | | | | |
|---|---|---|---|---|---|
| Bankfull Riffle Cross-Sectional AREA | 51 | $A_{bkf}$ (ft²) | Bankfull Riffle Mean DEPTH | 1.7 | $d_{bkf}$ (ft) |
| Bankfull Riffle WIDTH | 30.4 | $W_{bkf}$ (ft) | Wetted PERMIMETER ~ (2 * $d_{bkf}$) + $W_{bkf}$ | 33.8 | $W_p$ (ft) |
| $D_{84}$ at Riffle | 275 | Dia. (mm) | $D_{84}$ (mm) / 304.8 | 0.90 | $D_{84}$ (ft) |
| Bankfull SLOPE | 0.0421 | $S_{bkf}$ (ft / ft) | Hydraulic RADIUS $A_{bkf}$ / $W_p$ | 1.593 | R (ft) |
| Gravitational Acceleration | 32.2 | g (ft / sec²) | Relative Roughness R(ft) / $D_{84}$ (ft) | 1.593 | R / $D_{84}$ |
| Drainage Area | 3.6 | DA (mi²) | Shear Velocity $u^* = (gRS)^{1/2}$ | 1.450 | u* (ft/sec) |

| ESTIMATION METHODS | Bankfull VELOCITY | | Bankfull DISCHARGE | |
|---|---|---|---|---|
| 1. Friction Factor / Relative Roughness $u = [\,2.83 + 5.66 * Log\,\{R / D_{84}\}\,]\,u^*$ | 5.98 | ft / sec | 308.33 | cfs |
| 2. Roughness Coefficient: a) Manning's *n* from Friction Factor / Relative Roughness (Figs. B-34, B-35) $u = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.052 | 7.85 | ft / sec | 404.75 | cfs |
| 2. Roughness Coefficient: b) Manning's *n* from Stream Type (Fig. B-36) $u = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.060 | 6.80 | ft / sec | 350.61 | cfs |
| 2. Roughness Coefficient: c) Manning's *n* from Jarrett (USGS): $u = 1.49*R^{2/3}*S^{1/2}/n$ $n = 0.39*S^{0.38}*R^{-0.16}$ Note: This equation is applicable to steep, step/pool, high boundary roughness, cobble- and boulder-dominated stream systems; i.e., for Stream Types A1, A2, A3, B1, B2, B3, C2 & E3 $n =$ 0.11 | 3.71 | ft / sec | 191.29 | 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 u = Q / A Return Period for Bankfull Discharge Q = year | | ft / sec | | cfs |
| 4. Continuity Equations: b) Regional Curves u = Q / A | | ft / sec | | cfs |

| | |
|---|---|
| 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 (*First Field Day*).

Stream: Sharman's Branch Location: Washington, Co., MD

Observers: Team 4 Date: 4/24/12 Valley Type: 4 Stream Type: B 3/1a

**River Reach Dimension Summary Data.....1**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Riffle Dimensions*, **, ***** | Riffle Width ($W_{bkf}$) | | | | ft | Riffle Cross-Sectional Area ($A_{bkf}$) ($ft^2$) | | | | |
| | Riffle Mean Depth ($d_{bkf}$) | | | | ft | Riffle Width/Depth Ratio ($W_{bkf}$ / $d_{bkf}$) | | | | |
| | Riffle Maximum Depth ($d_{max}$) | | | | ft | Riffle Max Depth to Riffle Mean Depth ($d_{max}$ / $d_{bkf}$) | | | | |
| | Width of Flood-Prone Area ($W_{fpa}$) | | | | ft | Entrenchment Ratio ($W_{fpa}$ / $W_{bkf}$) | | | | |
| | Riffle Inner Berm Width ($W_{ib}$) | | | | ft | Riffle Inner Berm Width to Riffle Width ($W_{ib}$ / $W_{bkf}$) | | | | |
| | Riffle Inner Berm Depth ($d_{ib}$) | | | | ft | Riffle Inner Berm Depth to Mean Depth ($d_{ib}$ / $d_{bkf}$) | | | | |
| | Riffle Inner Berm Area ($A_{ib}$) | | | | $ft^2$ | Riffle Inner Berm Area to Riffle Area ($A_{ib}$ / $A_{bkf}$) | | | | |
| | Riffle Inner Berm W/D Ratio ($W_{ib}$ / $d_{ib}$) | | | | | | | | | |
| **Pool Dimensions*, **, ***** | Pool Width ($W_{bkfp}$) | 30.25 | 30.00 | 30.50 | ft | Pool Width to Riffle Width ($W_{bkfp}$ / $W_{bkf}$) | 0.995 | 0.986 | 1.003 | |
| | Pool Mean Depth ($d_{bkfp}$) | 2.13 | 1.95 | 2.31 | ft | Pool Mean Depth to Riffle Mean Depth ($d_{bkfp}$ / $d_{bkf}$) | 1.25 | 1.15 | 1.36 | |
| | Pool Cross-Sectional Area ($A_{bkfp}$) | 64.46 | 59.52 | 69.40 | ft | Pool Area to Riffle Area ($A_{bkfp}$ / $A_{bkf}$) | 1.24 | 1.15 | 1.34 | |
| | Pool Maximum Depth ($d_{maxp}$) | 3.50 | 3.35 | 3.65 | ft | Pool Max Depth to Riffle Mean Depth ($d_{maxp}$ / $d_{bkf}$) | 2.06 | 1.97 | 2.15 | |
| | Pool Inner Berm Width ($W_{ibp}$) | | | | ft | Pool Inner Berm Width to Pool Width ($W_{ibp}$ / $W_{bkfp}$) | | | | |
| | Pool Inner Berm Depth ($d_{ibp}$) | | | | ft | Pool Inner Berm Depth to Pool Depth ($d_{ibp}$ / $d_{bkfp}$) | | | | |
| | Pool Inner Berm Area ($A_{ibp}$) | | | | $ft^2$ | Pool Inner Berm Area to Pool Area ($A_{ibp}$ / $A_{bkfp}$) | | | | |
| | Point Bar Slope ($S_{pb}$) | | | | ft/ft | Pool Inner Berm Width/Depth Ratio ($W_{ibp}$ / $d_{ibp}$) | | | | |
| **Run Dimensions*** | 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 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 Width ($W_{bkfs}$) | 29.45 | 28.5 | 30.4 | ft | Step Width to Riffle Width ($W_{bkfs}$ / $W_{bkf}$) | 0.97 | 0.94 | 1.0 | |
| | Step Mean Depth ($d_{bkfs}$) | 2.25 | 1.70 | 2.80 | ft | Step Mean Depth to Riffle Mean Depth ($d_{bkfs}$ / $d_{bkf}$) | 1.32 | 1.0 | 1.64 | |
| | Step Cross-Sectional Area ($A_{bkfs}$) | 65.74 | 51.56 | 79.91 | ft | Step Area to Riffle Area ($A_{bkfs}$ / $A_{bkf}$) | 1.26 | 0.99 | 1.54 | |
| | Step Maximum Depth ($d_{maxs}$) | 1.91 | 1.86 | 1.96 | ft | Step Max Depth to Riffle Mean Depth ($d_{maxs}$ / $d_{bkf}$) | 1.12 | 1.09 | 1.15 | |
| | Step Width/Depth Ratio ($W_{bkfs}$ / $d_{bkfs}$) | 14.04 | 10.16 | 17.92 | | | | | | |

30.4
1.7
51.86

N/A

N/A

N/A

*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.

3.86
1.99



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

Stream: Sharman's Branch Location:

Observers: Team #4 Date: 4-24-12 Valley Type: 4 Stream Type: B3a+

**River Reach Summary Data.....2**

**Hydraulics**

| | | | | | |
|---|---|---|---|---|---|
| Streamflow: Estimated Mean Velocity at Bankfull Stage ($u_{bkf}$) | 3.71 | ft/sec | Estimation Method | Jarrett | |
| Streamflow: Estimated Discharge at Bankfull Stage ($Q_{bkf}$) | 191.29 | cfs | Drainage Area | 3.6 | $mi^2$ |

**Channel Pattern**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Linear Wavelength ($\lambda$) | | | | ft | Linear Wavelength to Riffle Width ($\lambda$ / $W_{bkf}$) | | | |
| 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 ($W_{blt}$) | 72.5 | 70 | 75 | ft | Meander Width Ratio ($W_{blt}$ / $W_{bkf}$) | 2.3 | 2.1 | 2.5 |
| Arc Length ($L_a$) | | | | ft | Arc Length to Riffle Width ($L_a$ / $W_{bkf}$) (30.4) | | | |
| Riffle Length ($L_r$) | 56.5 | 24.0 | 109.0 | ft | Riffle Length to Riffle Width ($L_r$ / $W_{bkf}$) | 2.15 | 0.79 | 3.52 |
| Individual Pool Length ($L_p$) | 30.5 | 25.0 | 40.0 | ft | Individual Pool Length to Riffle Width ($L_p$ / $W_{bkf}$) | 1.00 | 0.82 | 1.32 |
| Pool to Pool Spacing ($P_s$) | 54.33 | 18.0 | 57.0 | ft | Pool to Pool Spacing to Riffle Width ($P_s$ / $W_{bkf}$) | 1.79 | 0.59 | 1.88 |

**Channel Profile**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Valley Slope ($S_{val}$) | | ft/ft | Average Water Surface Slope (S) | 0.0428 | ft/ft | Sinuosity ($S_{val}$ / S) | | |
| Stream Length (SL) | 7,500 | ft | Valley Length (VL) | 2,400 | ft | Sinuosity (SL / VL) | 1.04 | |
| Low Bank Height (LBH) | start | ft | Max Depth ($d_{max}$) | start | ft | Bank-Height Ratio (BHR) (LBH / $d_{max}$) | start | |
| | end | ft | | end | ft | | end | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Riffle Slope ($S_{rif}$) | 0.035 | 0.045 | 0.040 | ft/ft | Riffle Slope to Average Water Surface Slope ($S_{rif}$ / S) | 0.82 | 1.05 | 0.94 |
| Run Slope ($S_{run}$) | | | | ft/ft | Run Slope to Average Water Surface Slope ($S_{run}$ / S) | | | |
| Pool Slope ($S_p$) | 0.00 | 0.004 | 0.002 | ft/ft | Pool Slope to Average Water Surface Slope ($S_p$ / S) | 0 | 0.093 | 0.047 |
| Glide Slope ($S_g$) | | | | ft/ft | Glide Slope to Average Water Surface Slope ($S_g$ / S) | | | |
| Step Slope ($S_s$) | 0.127 | 0.159 | 0.143 | ft/ft | Step Slope to Average Water Surface Slope ($S_s$ / S) | 2.967 | 3.715 | 3.55 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Max Riffle Depth ($d_{maxrif}$) | 0.85 | 0.65 | 0.98 | ft | Max Riffle Depth to Mean Riffle Depth ($d_{maxrif}$ / $d_{bkf}$) | 1 | 0.80 | 1.21 |
| Max Run Depth ($d_{maxrun}$) | | | | ft | Max Run Depth to Mean Riffle Depth ($d_{maxrun}$ / $d_{bkf}$) | | | |
| Max Pool Depth ($d_{maxp}$) | 1.425 | 1.40 | 1.45 | ft | Max Pool Depth to Mean Riffle Depth ($d_{maxp}$ / $d_{bkf}$) | 1.76 | 1.72 | 1.79 |
| Max Glide Depth ($d_{maxg}$) | | | | ft | Max Glide Depth to Mean Riffle Depth ($d_{maxg}$ / $d_{bkf}$) | | | |
| Max Step Depth ($d_{maxs}$) | 0.50 | 0.35 | 0.65 | ft | Max Step Depth to Mean Riffle Depth ($d_{maxs}$ / $d_{bkf}$) | 0.62 | 0.43 | 0.80 |

**Channel Materials**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| % Silt/Clay | 0 | 0 | N/A | $D_{16}$ | 10 | 9.5 | N/A | 60 | mm |
| % Sand | 3.7 | 2.3 | ↓ | $D_{35}$ | 22 | 25 | ↓ | 93 | mm |
| % Gravel | 52.1 | 50.0 | ↓ | $D_{50}$ | 37 | 50 | ↓ | 125 | mm |
| % Cobble | 29.8 | 30.2 | ↓ | $D_{84}$ | 225 | 295 | ↓ | 275 | mm |
| % Boulder | 12.8 | 16.3 | ↓ | $D_{95}$ | 630 | 710 | ↓ | 350 | mm |
| % Bedrock | 1.6 | 1.2 | ↓ | $D_{100}$ | 2048 | 2048 | ↓ | 1024 | 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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