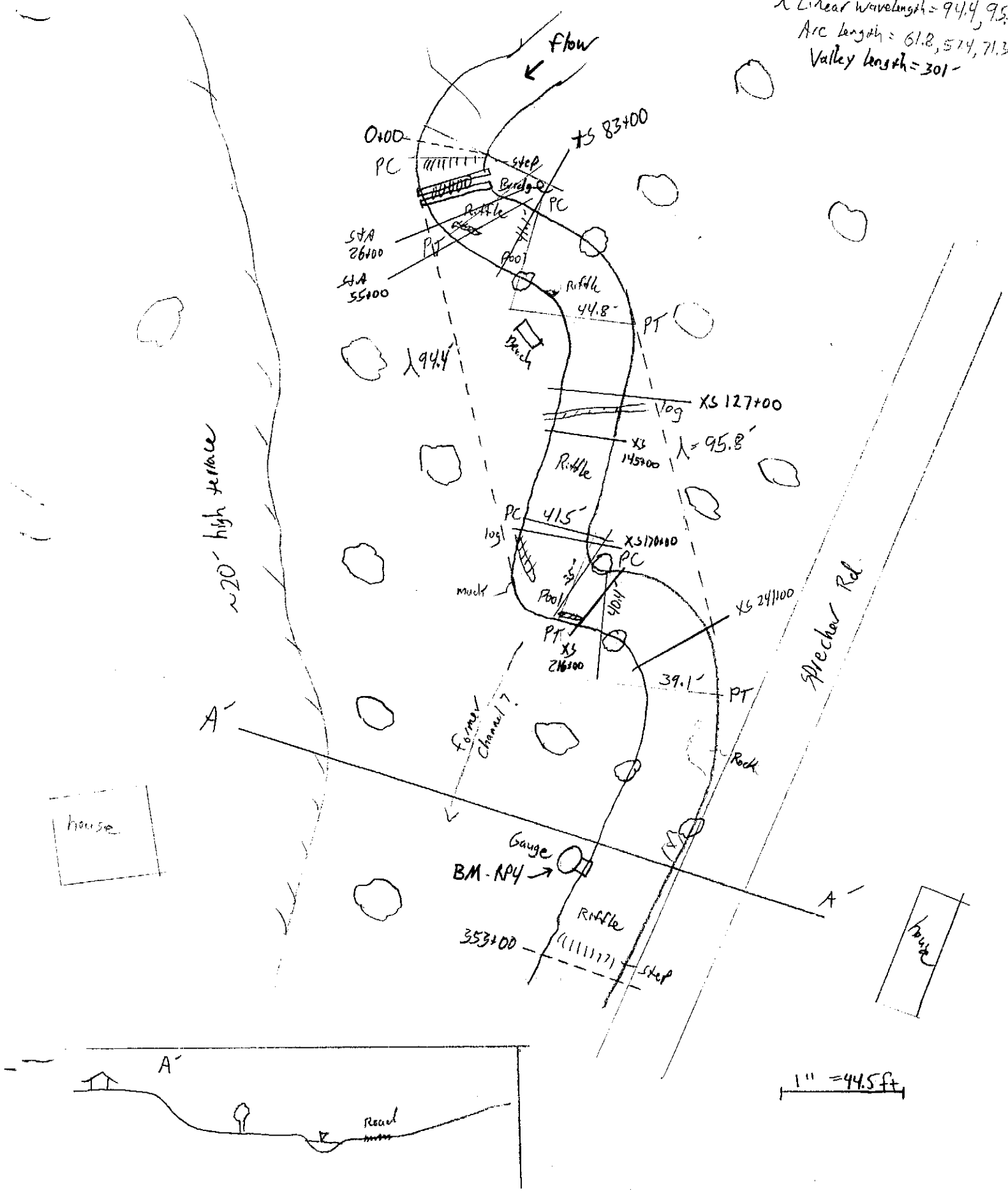
Marsh Run
Team #1

04/21/16

Mark + Matt

N↑

Meander Geometry
Sinuosity = 1.17
Belt width = 58.9', 63.7'
Meander Length = 107.5', 75.6'
λ Linear wavelength = 94.4, 95.8
Arc length = 61.8, 57.4, 71.3
Valley length = 301'



**SURVEY DATA** ⟹ **CROSS - SECTION** 1

**SITE:** Marsh Run e Grimes **Date:** 4/21/16

Downstream Glide e 241

**Location:** Reach 1 from abandoned bridge to gage

**Observers:** Team 1 **HUC:**

| Item | Distance, Point, or STATION ft | Back-Sight BS ft | Height of Instrument HI ft | Fore-Sight FS ft | Elevation ft | NOTES / COMMENTS / REMARKS |
|---|---|---|---|---|---|---|
| 1 | | 4.40 | | | 6.886 gage datum | 3 marks on gage RP-4 360.956 |
| 2 | | 10.40 | | | 0.937 | + fitting RP-6 |
| 3 | | 10.92 | | | 0.372 | center of + fitting RP-3 |
| 4 | | | 5.0 | | | located on terrace between glide pool XSs |
| 5 | 0 | | | 5.58 | | near road |
| 6 | 2 | | | 6.2 | | |
| 7 | 4 | | | 7.41 | | |
| 8 | 6 | | | 8.04 | | max depth drainage |
| 9 | 11 | | | 7.26 | | top of drainage |
| 10 | 14 | | | 7.58 | | |
| 11 | 17 | | | 8.05 | | |
| 12 | 19 | | | 8.24 | | |
| 13 | 21 | | | 8.55 | | |
| 14 | 22 | | | 8.93 | | Bankful |
| 15 | 23 | | | 9.48 | | |
| 16 | 24.6 | | | 10.24 | | SWE RL |
| 17 | 26 | | | 10.6 | | |
| 18 | 28 | | | 10.6 | | |
| 19 | 30 | | | 10.65 | | |
| 20 | 32 | | | 10.85 | | |
| 21 | 34 | | | 10.84 | | |
| 22 | 36 | | | 11.0 | | |
| 23 | 37.7 | | | 11.13 | | max depth |
| 24 | 39.5 | | | 10.23 | | SWE RR |
| 25 | 41 | | | 8.58 | | |
| 26 | 43.5 | | | 5.56 | | top of terrace edge |
| 27 | 45 | | | 5.30 | | top of terrace |
| 28 | | | | | | |

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**SURVEY DATA** ⟹ **CROSS - SECTION 2**

**SITE:** Pool @ 216 **Date:** 4/20/16

| Item | STATION ft | B S ft | H I ft | F S ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 0 | | | 5.97 | | Slope of terrace |
| 2 | 2.0 | | | 6.5 | | |
| 3 | 5 | | | 7.46 | | |
| 4 | 7 | | | 7.74 | | |
| 5 | 9 | | | 7.90 | | |
| 6 | 10 | | | 8.27 | | |
| 7 | 11 | | | 9.35 | | Bankful |
| 8 | 12 | | | 9.39 | | |
| 9 | 13.7 | | | 9.86 | | |
| 10 | 14.6 | | | 10.20 | | SWE RL |
| 11 | 16 | | | 10.7 | | |
| 12 | 18.5 | | | 10.95 | | |
| 13 | 20 | | | 11.2 | | |
| 14 | 21 | | | 11.57 | | |
| 15 | 22 | | | 11.73 | | |
| 16 | 24 | | | 11.4 | | |
| 17 | 25 | | | 11.65 | | |
| 18 | 27 | | | 11.89 | | |
| 19 | 28 | | | 12.0 | | |
| 20 | 31 | | | 10.18 | | SWE RR |
| 21 | 32 | | | 9.8 | | Bank slope |
| 22 | 33 | | | 7.61 | | |
| 23 | 36 | | | 5.5 | | Top of terrace |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |

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**SURVEY DATA** ⟹ **CROSS - SECTION** 3

**SITE:** Run C 170 **Date:** 4/21/16

| Item | STATION ft | B S ft | H I ft | F S ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 0 | | | 5.19 | | |
| 2 | 2 | | | 5.38 | | |
| 3 | 5 | | | 5.73 | | terrace edge |
| 4 | 6 | | | 6.68 | | |
| 5 | 7 | | | 8.17 | | |
| 6 | 8.3 | | | 9.75 | | toe of bank slope |
| 7 | 9.2 | | | 10.1 | | SWE RL |
| 8 | 10 | | | 10.35 | | |
| 9 | 12 | | | 10.42 | | |
| 10 | 14 | | | 10.78 | | |
| 11 | 16 | | | 10.66 | | |
| 12 | 18 | | | 10.55 | | |
| 13 | 20 | | | 10.55 | | |
| 14 | 22 | | | 10.52 | | |
| 15 | 24 | | | 10.50 | | |
| 16 | 26 | | | 10.50 | | |
| 17 | 28 | | | 10.42 | | |
| 18 | 29.3 | | | 10.05 | | SWE RR |
| 19 | 30 | | | 9.78 | | |
| 20 | 31 | | | 9.6 | | |
| 21 | 32 | | | 9.26 | | Bankfull |
| 22 | 33.5 | | | 8.98 | | |
| 23 | 35 | | | 9.12 | | |
| 24 | 37 | | | 5.98 | | |
| 25 | 40 | | | 5.55 | | top of terrace |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |

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**SURVEY DATA** ⟹ **CROSS - SECTION** 4

**SITE:** Glide @ 127.0 **Date:**

| Item | STATION ft | BS ft | HI ft | FS ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 1.4 | | | 4.62 | | |
| 2 | 15.0 | | | 4.50 | | |
| 3 | 6 | | | 4.8 | | Edge of terrace |
| 4 | 9 | | | 7.44 | | |
| 5 | 10 | | | 8.34 | | Bankfull |
| 6 | 11 | | | 9.25 | | |
| 7 | 11.8 | | | 9.4 | | SWE RL |
| 8 | 13 | | | 9.8 | | |
| 9 | 15 | | | 9.87 | | |
| 10 | 17 | | | 9.87 | | |
| 11 | 19 | | | 10.1 | | |
| 12 | 21 | | | 9.9 | | |
| 13 | 23 | | | 9.93 | | |
| 14 | 25.5 | | | 10.35 | | max depth |
| 15 | 27 | | | 10.2 | | |
| 16 | 29.8 | | | 9.43 | | SWE RR |
| 17 | 32.6 | | | 9.00 | | toe of slope |
| 18 | 33.6 | | | 8.27 | | Bankfull |
| 19 | 35. | | | 7.15 | | |
| 20 | 38.5 | | | 6.6 | | |
| 21 | 40 | | | 5.45 | | |
| 22 | 41 | | | 5.28 | | |
| 23 | | | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |

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**SURVEY DATA** ⟹ **CROSS - SECTION** 5

**SITE:** Riffle e 145 team 1 **Date:** 4/21/16

| Item | STATION ft | BS ft | HI ft | FS ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 0 | | | 4.76 | | ground |
| 2 | 3 | | | 4.72 | | |
| 3 | 5 | | | 4.54 | | |
| 4 | 7 | | | 4.54 | | |
| 5 | 9 | | | 4.9 | | Edge of terrace |
| 6 | 10 | | | 6.2 | | slope of bank |
| 7 | 12 | | | 8.2 | | toe of bank → flood prone width |
| 8 | 13.3 | | | 9.52 | | SWE RL |
| 9 | 15 | | | 9.82 | | stream bed |
| 10 | 17 | | | 9.93 | | |
| 11 | 19 | | | 9.90 | | |
| 12 | 21 | | | 9.97 | | |
| 13 | 23 | | | 9.97 | | |
| 14 | 25 | | | 10.07 | | |
| 15 | 26 | | | 10.02 | | |
| 16 | 29.4 | | | 10.13 | | depth max 1.7 |
| 17 | 31 | | | 10.08 | | |
| 18 | 33 | | | 10.12 | | |
| 19 | 34 | | | 9.87 | | WSE RR |
| 20 | 35 | | | 9.23 | | slope |
| 21 | 36 | | | 8.44 | | Bankfull |
| 22 | 38 | | | 8.10 | | slope of bank |
| 23 | 40 | | | 6.74 | | flood prone width |
| 24 | 42 | | | 5.80 | | |
| 25 | 44 | | | 5.24 | | |
| 26 | 46 | | | 4.82 | | |
| 27 | 48 | | | 4.66 | | top of terrace |
| 28 | 10.5 | | | 6.74 | | flood prone width |
| 29 | 34 | | | 8.95 | | Bankfull off XS |
| 30 | 37 | | | 8.44 | | Bankfull off XS |
| 31 | | | | | | |

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**SURVEY DATA** ⟹ **CROSS - SECTION** 6

**SITE:** Pool @ 83.5 **Date:**

| Item | STATION ft | B S ft | H I ft | F S ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 0 | | | 5.01 | | ① top of high bank - right |
| 2 | 4 | | | 6.14 | | ② slope of bank |
| 3 | ~~6~~ ~~7~~ | | | ~~10.96~~ 8.25 | | ③ ~~toe of slope~~ depositional bar ~~top~~ |
| 4 | ~~8~~ 11 | | | ~~11.54~~ 9.1 | | depositional bar mid point |
| 5 | ~~16~~ 15 | | | ~~12.65~~ 10 | | channel slope |
| 6 | ~~18~~ 19 | | | ~~10.90~~ ~~13.15~~ 11.25 | | bottom of pool |
| 7 | 20 | | | 11.46 | | pool bottom |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | 29 | | | 10.41 | | slope of channel |
| 11 | 31 | | | 9.31 | | waters edge |
| 12 | 31.5 | | | 9.2 | | surface water |
| 13 | 32 | | | 8.55 | | very small bench |
| 14 | 34 | | | 7.71 | | mid slope of bank left |
| 15 | 36 | | | 6.5 | | top of low bank |
| 16 | 38 | | | 6.4 | | " " " " |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | | | |
| 22 | | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |

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**SURVEY DATA** ⟹ **CROSS - SECTION** 7

**SITE:** Run @ 55 Team 1 **Date:** 4/21/16

| Item | STATION ft | B S ft | H I ft | F S ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 0 | 3.26 | 4.86 | 3.30 | | ground |
| 2 | 2 | | | 3.38 | | |
| 3 | 4 | | | 3.70 | | edge of terrace |
| 4 | 6 | | | 4.44 | | slope |
| 5 | 6.5 | | | 5.44 | | slope |
| 6 | 8.5 | | | 6.85 | | slope |
| 7 | 8.9 | | | 7.85 | | WSE RL |
| 8 | 10 | | | 8.91 | | channel bed |
| 9 | 12 | | | 9.11 | | |
| 10 | 14 | | | 8.80 | | |
| 11 | 16 | | | 8.73 | | |
| 12 | 18 | | | 8.63 | | |
| 13 | 20 | | | 8.60 | | |
| 14 | 22 | | | 8.45 | | |
| 15 | 24 | | | 8.25 | | |
| 16 | 26 | | | 7.85 | | WSE RR |
| 17 | 27 | | | 6.62 | | Bankful |
| 18 | 28 | | | 5.97 | | slope |
| 19 | 30 | | | 4.44 | | slope |
| 20 | 32 | | | 3.74 | | top terrace near wood border |
| 21 | 34 | | | 3.66 | | top terrace |
| 22 | | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |

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26

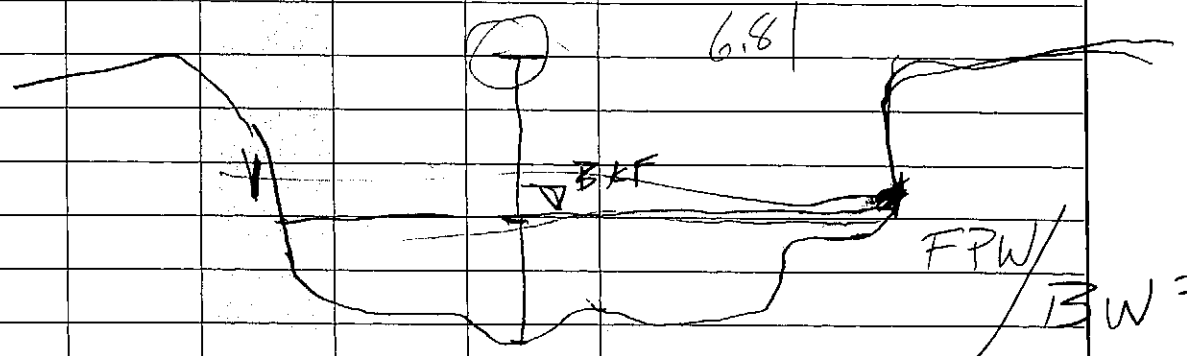
Step/ Bridge X-section

By: MaxDepth Roddy Glide + Dick Riffle

**SURVEY DATA** ⟹ **CROSS - SECTION 8**

**SITE:** Date:

| Item | STATION ft | B S ft | H I ft | F S ft | Elevation ft | NOTES COMMENTS REMARKS |
|---|---|---|---|---|---|---|
| 1 | 0 | 3.26 | 4.86 | 3.52 | | Bank top |
| 2 | 2 | | | 3.57 | | Bank edge |
| 3 | 6 | | | 7.82 | | WS 7.8 Foot bank |
| 4 | 9 | | | 8.26 | | riffle bed |
| 5 | 13 | | | 7.93 | | bed |
| 6 | 16 | | | 8.31 | | TW |
| 7 | 20 | | | 8.29 | | bed |
| 8 | 25 | | | 8.12 | | bed |
| 9 | 29 | | | 7.94 | | WS 7.79 ← |
| 10 | 30 | | | 7.30 | | ~~Bank [illegible]~~ 6.82 slope break ~~[illegible]~~ |
| 11 | 31 | | | 6.82 | | toe slope BKF |
| 12 | 34 | | | 4.04 | | Bank top |
| 13 | 36 | | | 3.72 | | Bank top |
| 14 | 38 | | | 3.74 | | Bank top |
| 15 | 31.5 | | | 6.87 | | toe slope |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | 6.81 |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | | | BKF |
| 22 | | | | | | FPW/ |
| 23 | | | | | | BW = |
| 24 | | | | | | |
| 25 | | | | | | 1.5 - Entrench. |
| 26 | | | | | | |
| 27 | | | | | | 26' FPW |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |



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F-1-5 U-AL-



## SURVEY DATA → LONGITUDINAL PROFILE 1

**SITE:** Date:

Location:

Observers: 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 | Hacksaw marks | 4.40 | | | | | | | | | | |
| 2 | T-Fit lower | 10.94 | | | | | | | | | | |
| 3 | T-fit upper | 10.37 | | | | | | | | | | |
| 4 | 0.0 | | | 8.21 | | 7.70 | | 6.50 | | | | Top of step 1 (upstream of Gage) concrete bags |
| 5 | 2.0 | | | 9.73 | | 8.85 | | | | | | Bottom of step 1 |
| 6 | 6.0 | | | 10.38 | | 8.91 | | | | | | Max depth Pool Plunge |
| 7 | 11.5 | | | 9.58 | | [illegible] | | | | | | Glide |
| 8 | 17.0 | | | 9.53 | | 9.03 | | | | | | Riffle |
| 9 | 26.0 | | | 9.68 | | 9.04 | | | | | | Mid riffle |
| 10 | 48.0 | | | 9.71 | | 9.12 | | | | | | Begin Run |
| 11 | 66.0 | | | 10.0 | | 9.[illegible] | | | | | | Top of Pool |
| 12 | 83.5 | | | 11.78 | | 9.13 | | | | | | max depth Pool |
| 13 | 98.0 | | | 10.54 | | 9.14 | | | | | | Top of Glide / end of pool |
| 14 | 112.5 | | | 9.74 | | 9.32 | | | | | | sand bag ~~Riffle~~ |
| 15 | 114 | | | 9.93 | | 9.48 | | | | | | Mid riffle |
| 16 | 123 | | | 10.0 | | 9.54 | | | | | | Glide |
| 17 | 134 | | | 10.04 | | 9.77 | | 8.58 | | | | Top of riffle |
| 18 | 176 | | | 10.86 | | 10.10 | | | | | | Top of Run |
| 19 | 192 | | | 11.21 | | 10.20 | | | | | | Top of pool |
| 20 | 216 | | | 12.04 | | 10.28 | | | | | | Max depth lateral scour pool |
| 21 | 227 | | | 11.20 | | 10.29 | | | | | | top Glide |
| 22 | 241 | | | 10.97 | | 10.25 | | | | | | ~~End~~ MID GLIDE |
| 23 | ~~244~~ | | | | | ~~10.30~~ | | ~~9.37~~ | | | | |
| 24 | 245 | | | 11.23 | | 10.28 | | 8.92 | | | | Top Pool |
| 25 | 263 | | | 12.34 | | 10.30 | | | | | | MAX DEPTH |
| 26 | 277 | | | 11.49 | | 10.30 | | | | | | Top of GLIDE |
| 27 | 293 | | | 11.12 | | 10.30 | | | | | | ~~[illegible]~~ MID GLIDE |

1.2 bkf 6.50 BF 5.38 low bank

1.19 bkf 8.58 BF

1.36 bkf



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## SURVEY DATA → LONGITUDINAL PROFILE 2

**SITE:** Date:

Location:

Observers: HUC:

| | | Distance, Point, or | Back-Sight | Height of Instrument | Thalweg | | Water Surface | | Bankfull | | Low Bank HI | | NOTES e.g. Riffle Run Pool Glide | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Fore-Sight | Elevation | Fore-Sight | Elevation | Fore-Sight | Elevation | Fore-Sight | Elevation | | |
| | | STATION | BS | HI | FS | Elev. | FS | Elev. | FS | Elev. | FS | Elev. | | |
| | | ft | ft | ft | ft | ft | ft | ft | ft | ft | ft | ft | | |
| 1.34 | 28 | 327 | | | 11.51 | | 10.31 | | 8.97 | | | | GLIDE | GAGE STATION |
| 1.14 | 29 | 337 | | | 11.44 | | 10.37 | | 9.23 | | | | GLIDE | |
| 1.27 | 30 | 338 | | | 11.31 | | 10.37 | | 9.10 | | | | GLIDE | |
| 6.10 low bank | 31 | 355 | | | 10.71 | | 10.41 | | | | | | | Top of Step |
| | 32 | | | | | | | | | | | | | |
| .72/353 | 33 | | | | | | | | | | | | | |
| | 34 | | | | | | | | | | | | | |
| .002 slope | 35 | | | | | | | | | | | | | |
| | 36 | | | | | | | | | | | | | |
| | 37 | | | | | | | | | | | | | |
| | 38 | | | | | | | | | | | | | |
| | 39 | | | | | | | | | | | | | |
| | 40 | | | | | | | | | | | | | |
| | 41 | | | | | | | | | | | | | |
| | 42 | | | | | | | | | | | | | |
| | 43 | | | | | | | | | | | | | |
| | 44 | | | | | | | | | | | | | |
| | 45 | | | | | | | | | | | | | |
| 1.17 Sinuosity | 46 | | | | | | | | | | | | | |
| | 47 | | | | | | | | | | | | | |
| | 48 | | | | | | | | | | | | | |
| | 49 | | | | | | | | | | | | | |
| | 50 | | | | | | | | | | | | | |
| | 51 | | | | | | | | | | | | | |
| | 52 | | | | | | | | | | | | | |
| | 53 | | | | | | | | | | | | | |
| | 54 | | | | | | | | | | | | | |

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Reach wide Riffle
D95 = } Bed Rock
D84 =
D50 =

Guess
D50 ≈ 20 mm
D84 ≈ 90 mm

Reach wide Pool
D95 = Bed Rock
D84 = Bed Rock
D50 = 1.25

Pool 40 / 60 Riffle

Combined
D95 } Bed Rock
D84
D50

Site: MARSH'S RUN @ GRIMES
Location: Reach 1, Tran 1 HUC:
Observers: RAJ, Heather

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



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Representative Riffle (Profusion)

$D_{95}$ = 120 mm
$D_{84}$ = 80 mm
$D_{50}$ = 35 mm

STA 1+40 - 1+50

Site:
Location: HUC:
Observers:

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

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Representative Riffle (Active bed) D95 D84 D50 } Bed Rock

Site:

Location: HUC:

Observers:

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

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**Worksheet B-5.** Procedure to validate hydraulic relations using gage station data.

1. Obtain the drainage area associated with the gaging station.
2. Obtain the field-determined bankfull discharge at the gaging station (**Figure B-43**).
3. Obtain the bankfull channel dimensions from the gaging station hydraulic geometry relationships (discharge *vs.* width, depth, area, and velocity).
4. Measure the average water surface slope.
5. Perform an active bed pebble count on the riffle to obtain $D_{84}$.
6. Determine the stream type.
7. Solve for Manning's 'n' at the bankfull stage: $n = (1.49R^{2/3}S^{1/2})/\bar{u}$ (use the bankfull mean velocity from Step 3).
8. Calculate relative roughness: $R/D_{84}$. Make sure that $D_{84}$ is converted from millimeters to feet. Hydraulic radius (R) and mean depth ($d_{bkf}$) are often used interchangeably when width/depth ratios are greater than 12.
9. Calculate shear velocity: $u^* = (gRS)^{1/2}$.
10. Calculate friction factor: $\bar{u}/u^*$.
11. Plot bankfull discharge as a function of drainage area on the appropriate regional curve.
12. Plot bankfull channel dimensions as a function of drainage area on the appropriate regional curve (note stream type of plotted values using unique symbols).
13. Plot relative roughness by friction factor (**Figure B-34**) (Example in **Figure B-39**).
14. Plot Manning's 'n' by friction factor (**Figure B-35**) (Example in **Figure B-40**).
15. Plot Manning's 'n' by stream type (**Figure B-36**) (Example in **Figure B-41**).

**Gaging Station Name:** Marsh Run at Grimes, MD **Gaging Station Number:** 01617800

| Drainage Area (mi²) | Bankfull Discharge $Q_{bkf}$ (cfs) | Bankfull Width $W_{bkf}$ | Bankfull Mean Depth $d_{bkf}$ (ft) | Bankfull Area $A_{bkf}$ (ft²) | Bankfull Velocity $\bar{u}_{bkf}$ (ft/s) | Ave. Water Surface Slope S (ft/ft) | $D_{84}$ (mm) | $D_{84}$ (ft) | Stream Type | Manning's 'n' | Relative Roughness $R/D_{84}$ (ft/ft) | Shear Velocity u* (ft/s) | Friction Factor $\bar{u}/u^*$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18.9 | 116 | 23.76 | 1.43 | 33.9 | 3.42 | 0.004 | 79.6 | 0.261 | F1/5 | 0.034 | 5.25 | 0.417 | 8.2 |

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**Figure B-34.** Relative roughness ($R/D_{84}$) *vs.* friction factor ($\bar{u}/u^*$).




**Figure B-35.** Friction factor ($\bar{u}/u^*$) *vs.* Manning's roughness coefficient 'n'.




**Figure B-36.** Manning's 'n' roughness coefficient by stream type.

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