APPENDIX A

Site Characteristics for Selected USGS Gage Stations in the Allegheny Plateau and Valley and Ridge Physiographic Provinces

---

This Appendix provides summaries of field data collected by the U.S. Fish and Wildlife Service (Service) at fourteen U.S. Geological Survey (USGS) gage station monitored stream sites in the Allegheny Plateau and Valley and Ridge hydro-physiographic region of Maryland. For each site, information and survey data is summarized on four pages. The first page for each site contains general information on the drainage basin, gage station, and the study reach. The Maryland State Highway Administration provided land use/land cover information using the software program *GIS Hydro* (Ragan 1991) and 1994 Landsat and Spot coverage information. The land use/land cover information may be incomplete for drainage basins that extend beyond the state of Maryland boundaries, this is noted in the *General Study Reach Description* for the pertinent sites. Stream order and magnitude are based on Strahler (1964) and Shreve (1967), respectively. The reported discharge recurrence intervals are from the log-Pearson type III flood frequency distribution for the annual maximum series calculated by USGS according to the Bulletin 17B procedures. The second page provides information on the study reach including cross-section plots and particle size distributions in the riffle and reach. The third page presents photographic views of the surveyed cross-section in the study reach and the fourth page provides a scale plan form diagram of the study reach mapped using a total station survey instrument and generated with the graphic and survey reduction software *Terra Model*.

Interagency Advisory Committee on Water Data. 1982. Guidelines for determining flood flow frequency. *Water Resources Council Bulletin* 17B, 28 pp.

Ragan, R.M. 1991. A geographic information system to support state-wide hydrologic and nonpoint pollution modeling. Department of Civil Engineering, University of Maryland, College Park, MD.

Shreve, R.L. 1967. Infinite topologically random channel networks. *Journal of Geology*, 75: 178-86.

Strahler, A.N. 1964. Geology. Part II. Quantitative geomorphology of drainage basins and channel networks, in *Handbook of Applied Hydrology* (Ed. V.T. Chow), pp. 439-476, McGraw-Hill, New York.

Table of Contents

Site Name	Station Number	Page
Bear Creek at Forest Park, MD	#1610150	A-4
Bear Creek at Friendsville, MD	#3076600	A-8
Big Piney Run near Salisbury, PA	#3078500	A-12
Casselman River at Grantsville, MD	#3078000	A-16
Crabtree Creek near Swanton, MD	#1597000	A-20
Ditch Run near Hancock, MD	#1613150	A-24
Evitts Creek near Centerville, PA	#1603500	A-28
North Branch Potomac River at Steyer, MD	#1595000	A-32
Savage River near Barton, MD	#1596500	A-36
Savage River near Frostburg, MD	#1596005	A-40
Sawpit Run near Oldtown, MD	#1609500	A-44
Sideling Hill Creek near Bellegrove, MD	#1610155	A-48
Toliver Run tributary near Hoyes, MD	#3075600	A-52
Youghiogheny River tributary near Friendsville, MD	#3076505	A-56

BEAR CREEK AT FOREST PARK, MD
USGS STATION NUMBER: 1610150

Latitude:	39º 42' 07"	Gage Period of Record:	1964 – 1969
Longitude:	78º 19' 02"		1971 – 1983
ADC Map Coordinates:	Washington/2000	Mean Annual Discharge (cfs):	N/A
	Map 1/F7	Rosgen Stream Type:	C4/1
Drainage Area (sq. mi.):	10.40	Survey Date:	Aug. 1999
Stream Order / Magnitude:	4/30		Sept. 2000
Percent Imperviousness:	1.52		

Land Use (%): Residential: 0.00 Agricultural: 45.16 Forest: 53.33 Commercial: 0.00

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 76.10 $Q_{1.5}$: 280.00 $Q_{2.0}$: 378.30
(Log-Pearson Period: 1965 – 1983)

General Study Reach Description: The study reach starts 21 feet downstream of a discontinued crest gage station. The channel has pool/riffle features and a regular meander pattern controlled by bedrock. The median particle size in the reach is very coarse gravel with bedrock, few point bars or woody debris, and little lateral scour. The floodplain vegetation is moderately dense with mature sycamore, green ash, black cherry, redbud, red maple, hemlock, white oak, black locust, black gum, white pine, cucumber tree, and black walnut. The understory is sparse to moderate with serviceberry, speckled alder, mountain laurel, and ninebark.

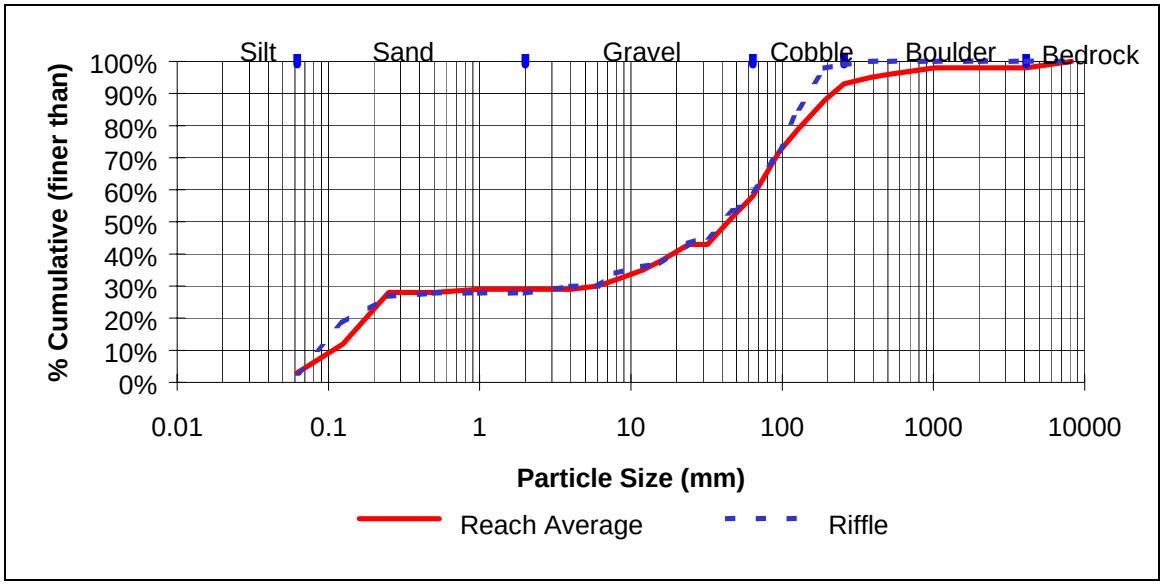
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	255.70	Q_{bkf} / $Q_{1.5}$:	0.91
Bankfull Return Interval (R.I.):	1.40	Q_{bkf} / $Q_{2.0}$:	0.68
Gage Height (ft):	4.54		

STUDY REACH SURVEY INFORMATION

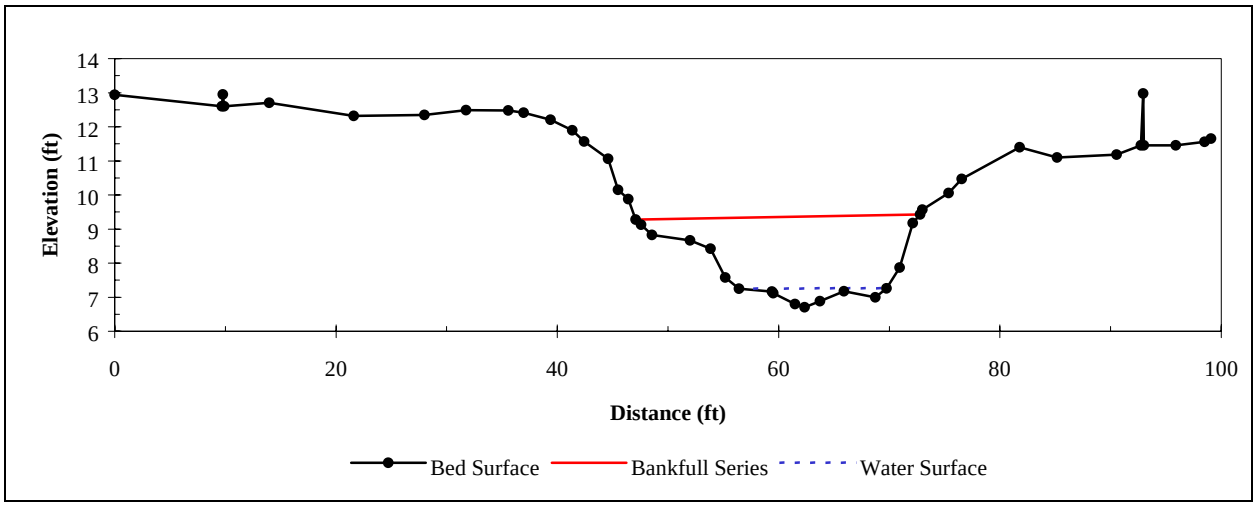
Average Water Surface Slope (ft/ft):	0.0130	Flood-prone Width (ft):	58.00
Manning's "n":	0.039	Entrenchment Ratio:	2.26
Mean Bankfull Velocity (ft/sec):	6.04	Width/Depth Ratio:	15.58
u/u*:	7.28	Channel Sinuosity:	1.82
R/D_{84}:	4.05	Beltwidth (ft):	103
Froude Number:	0.85	Meander Width Ratio:	4.0

BEAR CREEK AT FOREST PARK, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.15	0.11
D_{35}	12.00	9.70
D_{50}	43.86	40.20
D_{84}	160.34	123.77
D_{95}	384.00	174.37

STUDY REACH CROSS SECTION



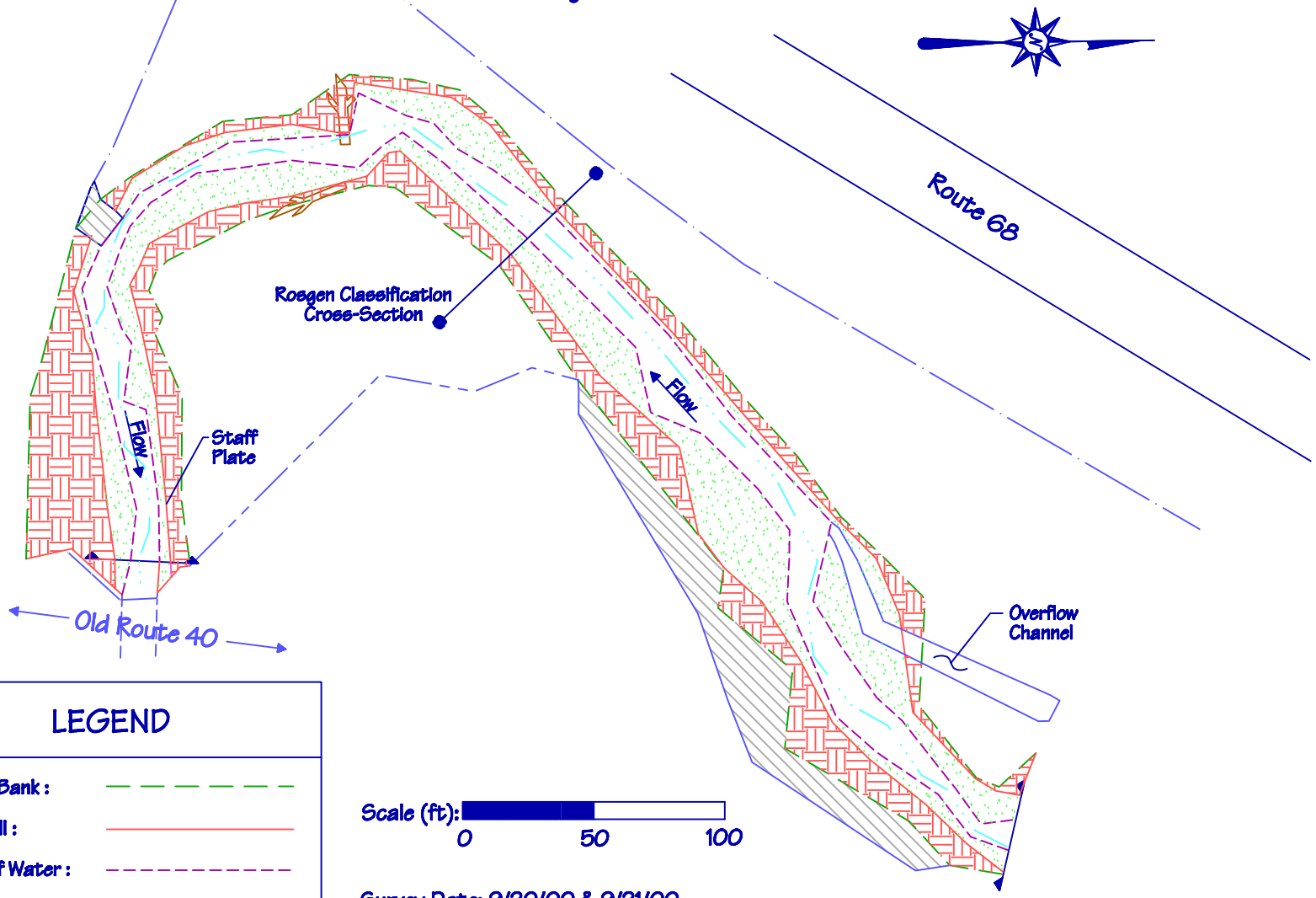
Bankfull Width (ft):	25.71	Mean Bankfull Depth (ft):	1.65
Bankfull Cross-sectional Area (ft^2):	42.30	Maximum Bankfull Depth (ft):	2.67
Hydraulic Radius (ft):	1.57	Wetted Perimeter (ft):	26.97

Bear Creek at Forest Park, Maryland

Upstream view of classification cross-section

Left bank of classification cross-section

BEAR CREEK
at Forest Park, MD
U.S.G.S. Gage:01610150



LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Toe of Slope:
- Earth :
- Bedrock :
- Gravel/Cobble :
- Fallen Trees :
- Limit of Study Reach:

Scale (ft): 0 50 100

Survey Date: 9/20/00 & 9/21/00
Study Reach Length: 635'

Classification Cross-Section Monument Locations:
Left Monument (+/-54'):
39* 42' 08.87" N
78* 19' 00.38" W
Elevation: 638'

Right Monument (+/- 54'):
39* 42' 09.64" N
78* 19' 00.13" W
Elevation: 633'

BEAR CREEK AT FRIENDSVILLE, MD
USGS STATION NUMBER: 3076600

Latitude:	39º 39' 22"	Gage Period of Record:	1964 - Present
Longitude:	79º 23' 41"	Mean Annual Discharge (cfs):	90.6
Map Coordinates:	MD&DE Gazett. Map 65/B6	Rosgen Stream Type:	F3/1
		Survey Date:	Sept. 1999 Oct. 1999
Drainage Area (sq. mi.):	48.90		
Stream Order / Magnitude:	4/41		
Percent Imperviousness:	1.24		

Land Use (%): Residential: 3.19 Agricultural: 37.42 Forest: 58.82 Commercial: 0.52

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 430.20 $Q_{1.5}$: 1200.00 $Q_{2.0}$: 1493.00
(Log-Pearson Period: 1965 – 1997)

General Study Reach Description: The study reach starts 60 feet upstream of the gage. The stream is a series of transitional reaches with a slightly changing floodplain width and steeper slopes. The stream has pool/riffle and step/pool features with a regular meander pattern controlled by bedrock and large boulders with sidebar deposition. The median particle size is large cobble with boulders, woody debris, and little lateral scour. The canopy is moderately dense with ironwood, white oak, black cherry, hemlock, American sycamore, black locust, northern red oak, red maple, yellow birch and cucumber tree. The understory is dense to sparse with mountain laurel and witch hazel.

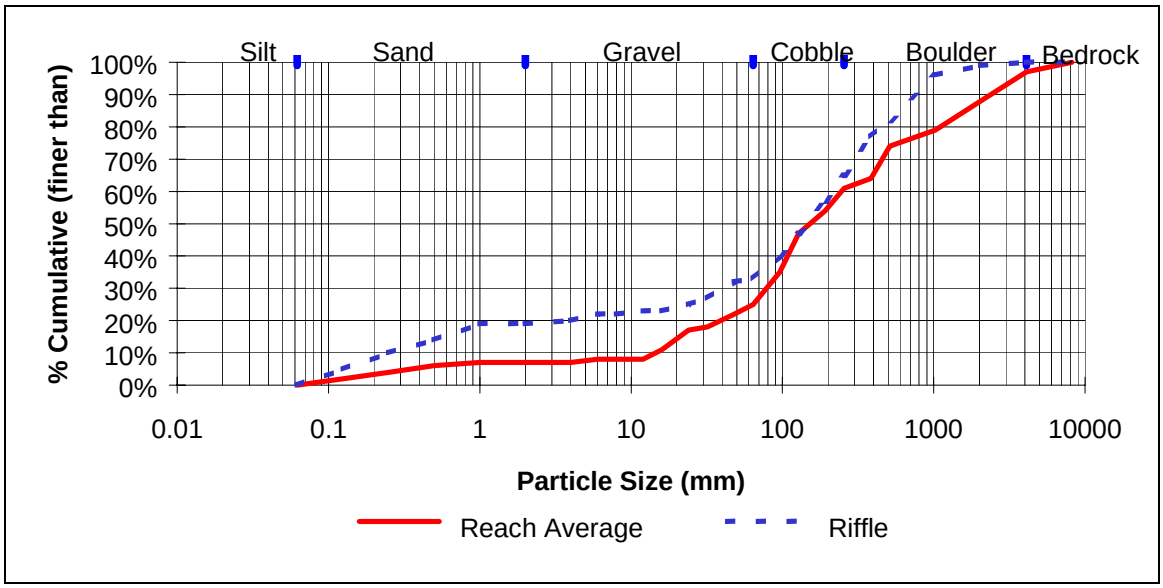
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	1132.00	Q_{bkf} / $Q_{1.5}$:	0.94
Bankfull Return Interval (R.I.):	1.40	Q_{bkf} / $Q_{2.0}$:	0.76
Gage Height (ft):	4.52		

STUDY REACH SURVEY INFORMATION

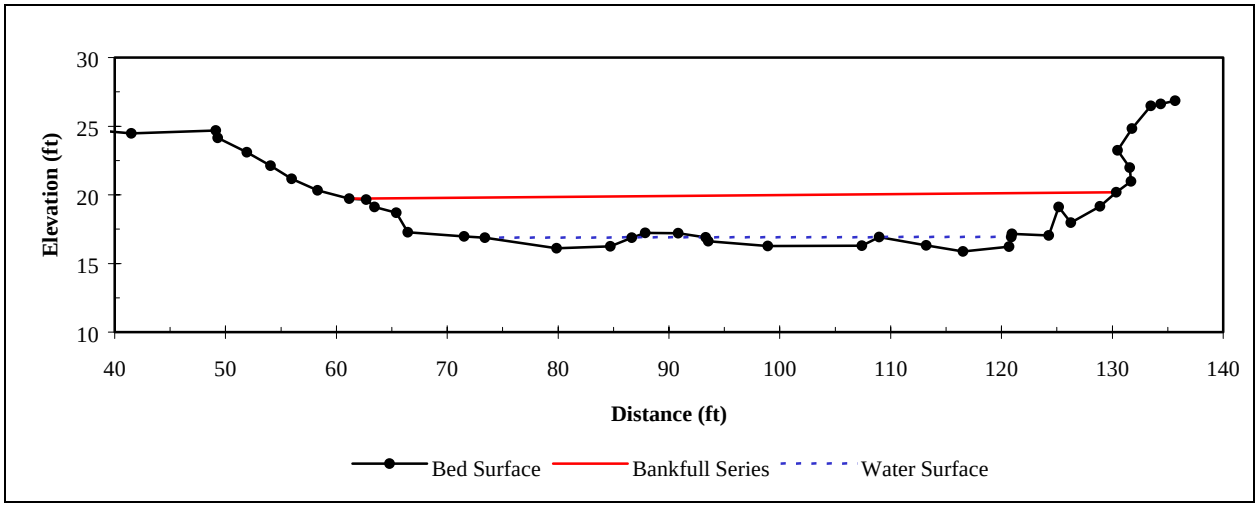
Average Water Surface Slope (ft/ft):	0.0210	Flood-prone Width (ft):	82.50
Manning's "n":	0.079	Entrenchment Ratio:	1.19
Mean Bankfull Velocity (ft/sec):	5.44	Width/Depth Ratio:	22.90
u/u*:	3.94	Channel Sinuosity:	1.21
R/D_{84}:	1.52	Beltwidth (ft):	83.0
Froude Number:	0.57	Meander Width Ratio:	1.20

BEAR CREEK AT FRIENDSVILLE, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	22.43	0.66
D_{35}	96.00	71.86
D_{50}	152.29	144.56
D_{84}	1505.01	565.29
D_{95}	BEDROCK	974.54

STUDY REACH CROSS SECTION



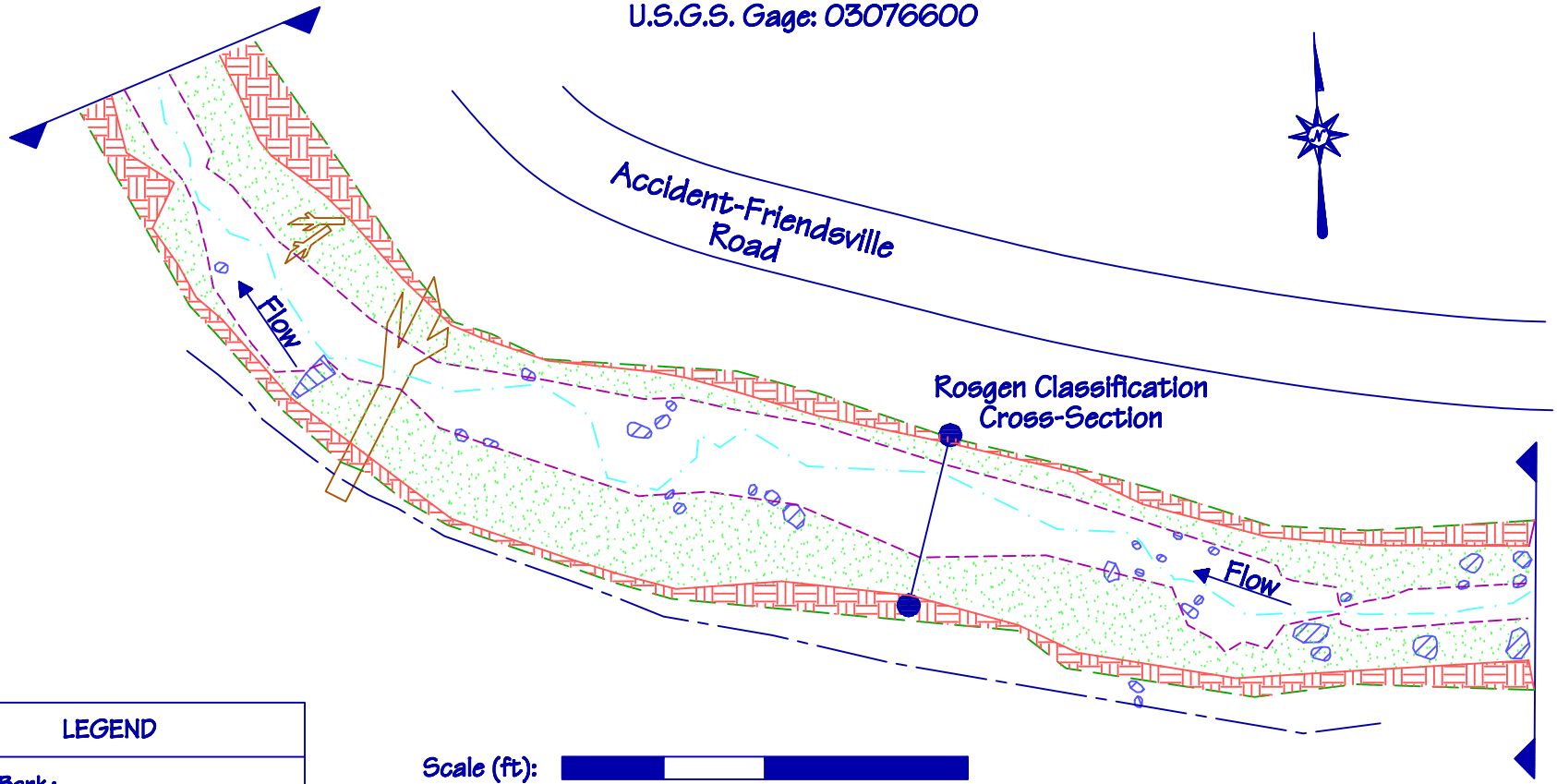
Bankfull Width (ft):	69.20	Mean Bankfull Depth (ft):	3.01
Bankfull Cross-sectional Area (ft^2):	208.02	Maximum Bankfull Depth (ft):	4.22
Hydraulic Radius (ft):	2.82	Wetted Perimeter (ft):	73.89

Bear Creek at Friendsville, Maryland

Downstream view of classification cross-section

Left bank of classification cross-section

BEAR CREEK
at Friendsville, MD
U.S.G.S. Gage: 03076600



LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Terrace :
- Gravel/Cobble :
- Earth :
- Bedrock :
- Fallen Trees :
- Boulders :
- Study Reach End Point:

Scale (ft): 0 50 100 200

Survey Dates: 10/26/99 - 10/28/99
Study Reach Length: 849'
Study Reach 173' U/S of U.S.G.S. Gage

Classification Cross-Section Monument Locations:
Left Monument (+/- 48') :
N 39* 39' 20.11"
W 79* 23' 31.41"
Elev. 1648'

Right Monument (+/- 32') :
N 39* 39* 20.30"
W 79* 23' 32.34"
Elev. 1646'

BIG PINEY RUN NEAR SALISBURY, PA
USGS STATION NUMBER: 3078500

Latitude:	39º 43' 32"	Gage Period of Record:	1932 – 1984
Longitude:	79º 02' 57"	Mean Annual Discharge (cfs):	37.1
Map Coordinates:	MD&DE Gazett. Map 66/A3	Rosgen Stream Type:	C3/1
		Survey Date:	Aug. 1999
Drainage Area (sq. mi.):	24.50		Sept. 1999
Stream Order / Magnitude:	3/24		
Percent Imperviousness:	0.62		

Land Use (%): Residential: 0.04 Agricultural: 26.73 Forest: 70.90 Commercial: 0.22

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 245.40 $Q_{1.5}$: 760.00 $Q_{2.0}$: 999.90
(Log-Pearson Period: 1933 - 1979)

General Study Reach Description: The study reach and gage reach are the same. The channel has pool/riffle features with some bedrock outcrops and few depositional features. The channel appears vertically stable with little scour. The particle distribution is bi-modal, sand and cobble with the cobble making up the largest sample size class. The overstory is moderate to dense with red maple, hemlock, yellow birch and northern red oak. The understory is sparse to moderate mountain laurel, young hemlock, northern red oak, and red maple.

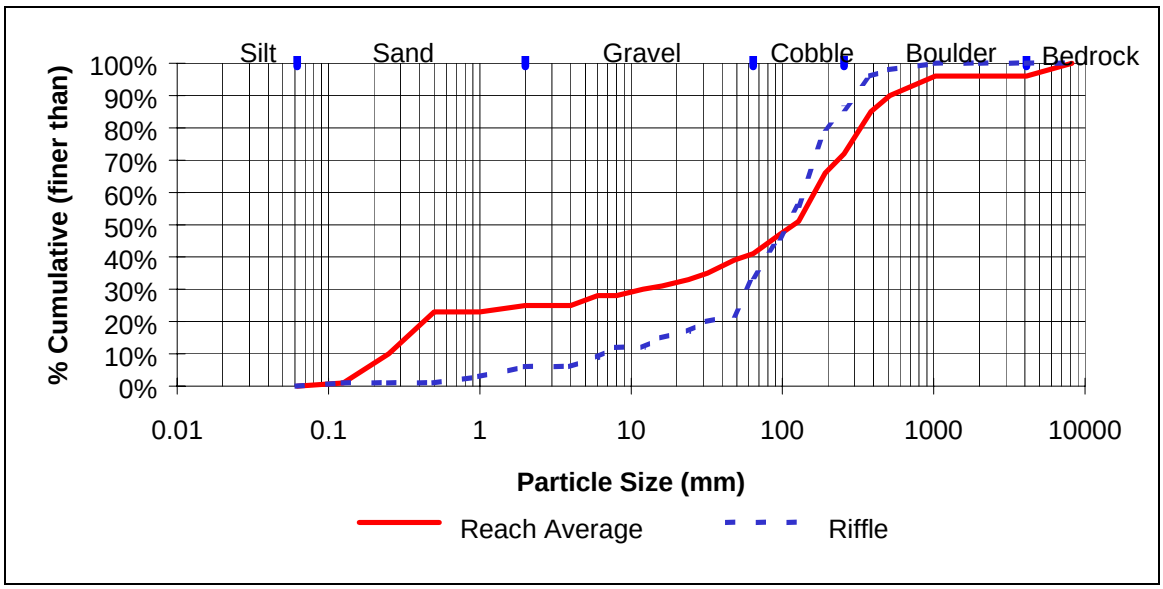
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	765.90	Q_{bkf} / $Q_{1.5}$:	1.01
Bankfull Return Interval (R.I.):	1.49	Q_{bkf} / $Q_{2.0}$:	0.77
Gage Height (ft):	3.84		

STUDY REACH SURVEY INFORMATION

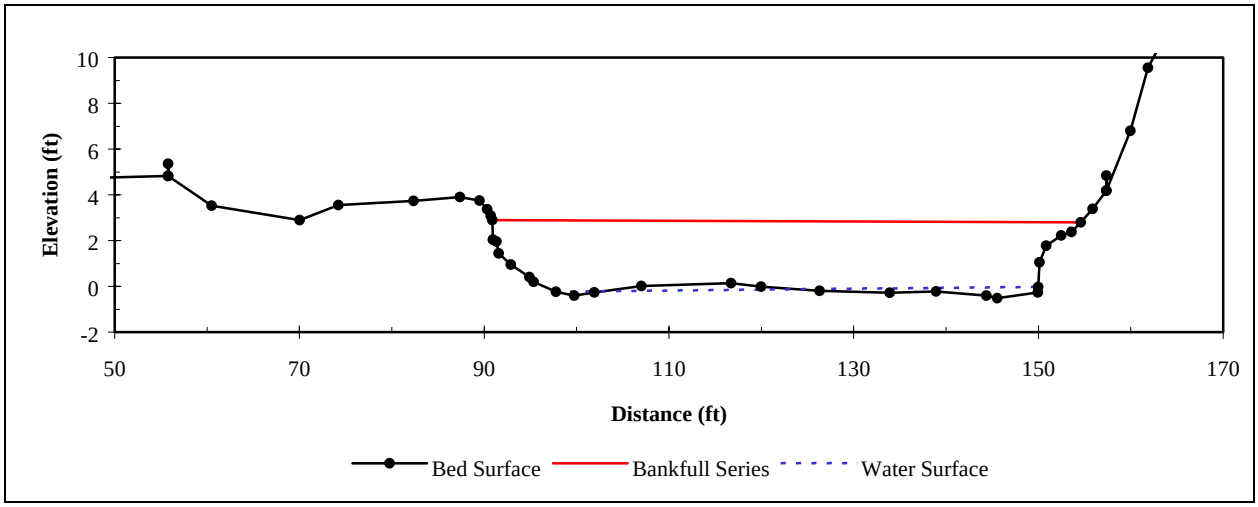
Average Water Surface Slope (ft/ft):	0.0040	Flood-prone Width (ft):	138.00
Manning's "n":	0.041	Entrenchment Ratio:	2.17
Mean Bankfull Velocity (ft/sec):	4.34	Width/Depth Ratio:	22.99
u/u*:	7.48	Channel Sinuosity:	1.58
R/D_{84}:	3.46	Beltwidth (ft):	978
Froude Number:	0.47	Meander Width Ratio:	15.36

BIG PINEY RUN NEAR SALISBURY, PA
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.34	19.60
D_{35}	32.00	66.20
D_{50}	119.12	107.71
D_{84}	372.21	232.59
D_{95}	912.28	368.74

STUDY REACH CROSS SECTION



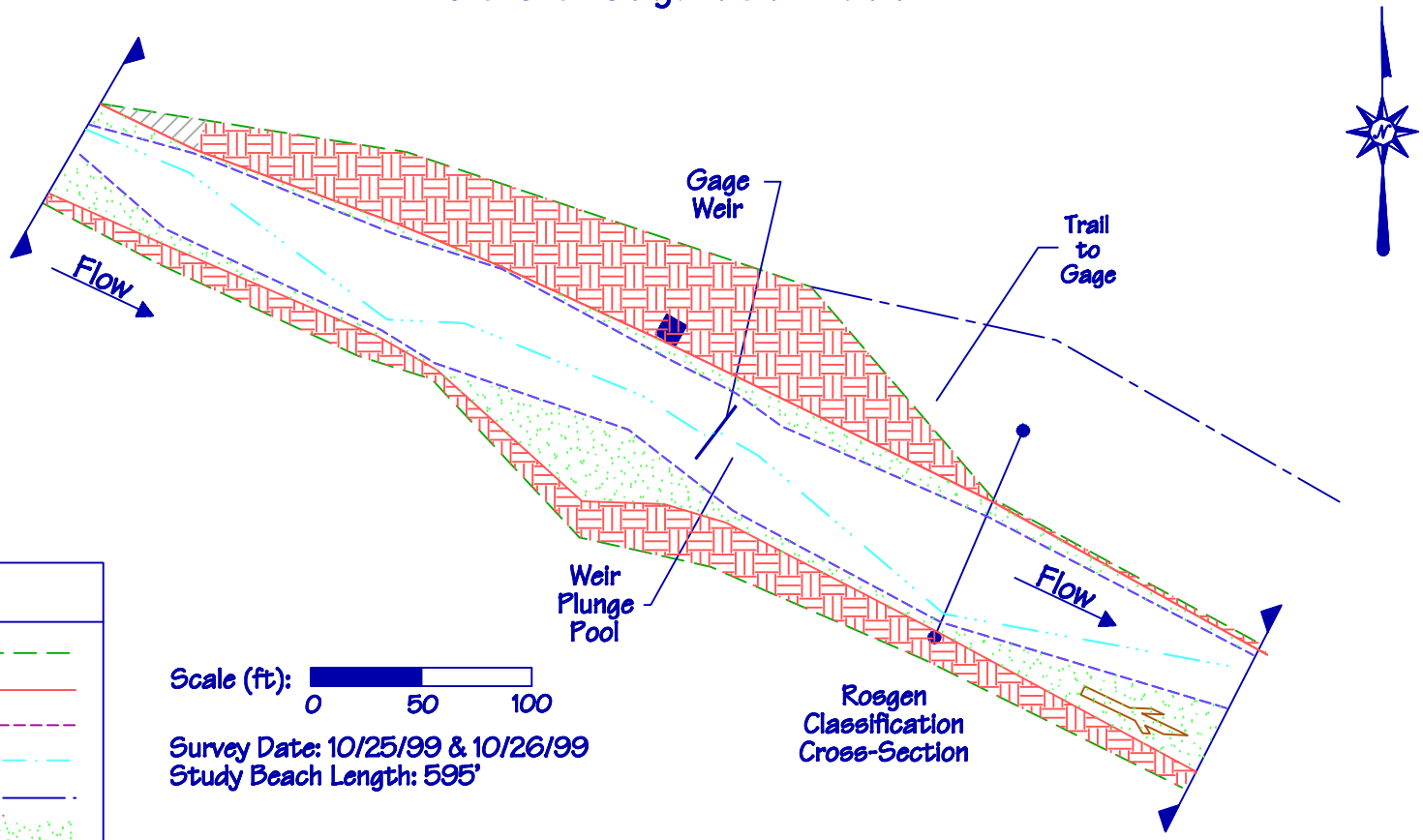
Bankfull Width (ft):	63.69	Mean Bankfull Depth (ft):	2.77
Bankfull Cross-sectional Area (ft^2):	176.41	Maximum Bankfull Depth (ft):	3.33
Hydraulic Radius (ft):	2.64	Wetted Perimeter (ft):	66.74

Big Piney Run near Salisbury, Pennsylvania

Upstream view of classification cross-section

Left bank of classification cross-section

BIG PINEY RUN
near Salisbury, PA
U.S.G.S. Gage: 03078500



LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Terrace :
- Gravel/Cobble :
- Earth :
- Bedrock :
- Fallen Trees :
- Gage House :
- Limit of Study Reach:

Scale (ft): 0 50 100

Survey Date: 10/25/99 & 10/26/99
Study Beach Length: 595'

Classification Cross-Section Monument Locations:
Left Monument (+/- 28') :
39 43' 33.96" N
79 02' 51.73" W
Elevation: 2265'

Right Monument (+/- 25') :
39* 43' 33.52" N
79* 02' 51.93" W
Elevation: 2261'

CASSELMAN RIVER AT GRANTSVILLE, MD
USGS STATION NUMBER: 3078000

Latitude:	39º 42' 08"	Gage Period of Record:	1947 - Present
Longitude:	79º 08' 12"	Mean Annual Discharge (cfs):	120
Map Coordinates:	MD&DE Gazett. Map 66/A2	Rosgen Stream Type:	B3c
		Survey Date:	Oct. 1999 Nov. 1999
Drainage Area (sq. mi.):	62.50		
Stream Order / Magnitude:	3/22		
Percent Imperviousness:	0.30		

Land Use (%): Residential: 00.29 Agricultural: 24.13 Forest: 73.65 Commercial: 0.22

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 818.70 $Q_{1.5}$: 1630.00 $Q_{2.0}$: 1977.00
(Log-Pearson Period: 1948 – 1998)

General Study Reach Description: The study reach and gage reach are the same. The channel has pool/riffle features and side bar depositions. The stream appears vertically stable with little lateral scour. The study reach has a bi-modal distribution of sand and cobble with cobble the largest sample size. The canopy is moderately dense to sparse (right bank upstream of gage is cleared) with black cherry, beech, hemlock, red maple, shagbark hickory, pin and white oak. The understory is moderately dense with black willow, red osier dogwood and witch hazel.

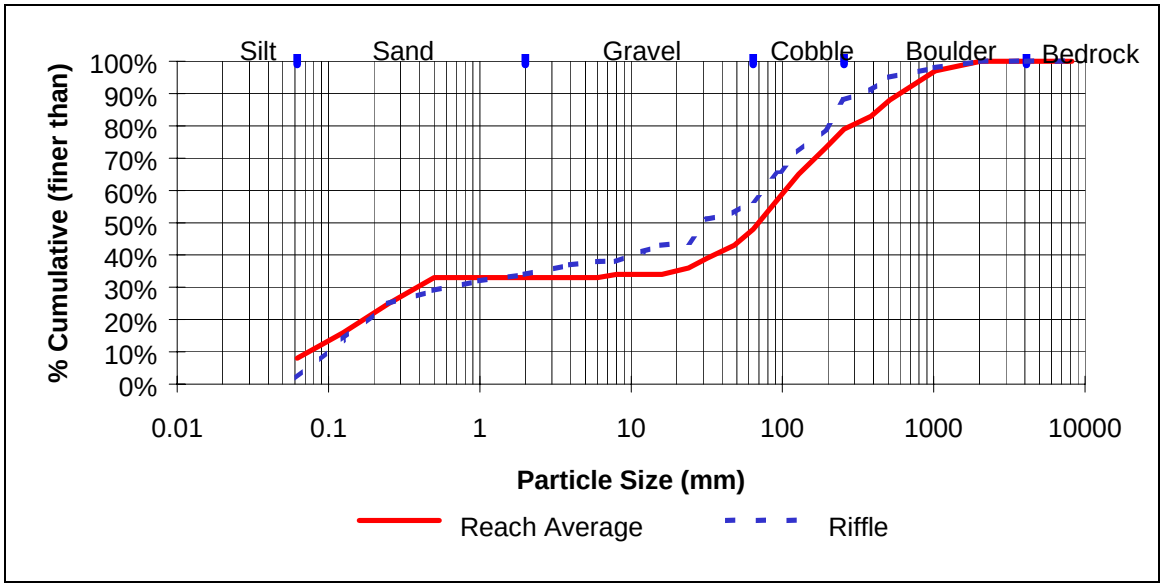
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	1689.00	Q_{bkf} / $Q_{1.5}$:	1.04
Bankfull Return Interval (R.I.):	1.55	Q_{bkf} / $Q_{2.0}$:	0.85
Gage Height (ft):	4.44		

STUDY REACH SURVEY INFORMATION

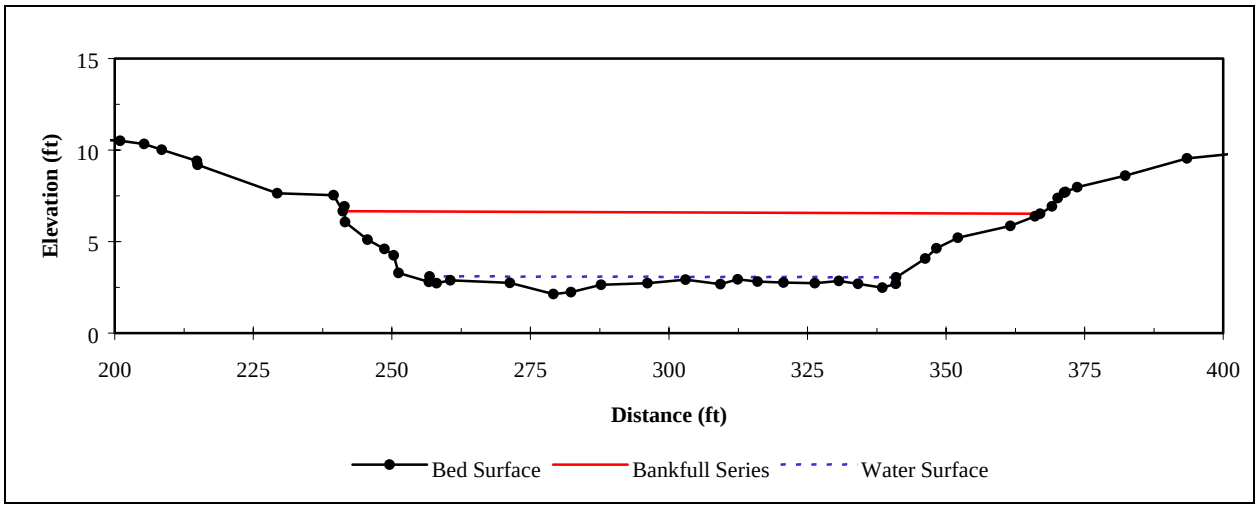
Average Water Surface Slope (ft/ft):	0.0040	Flood-prone Width (ft):	262.00
Manning's "n":	0.0480	Entrenchment Ratio:	2.08
Mean Bankfull Velocity (ft/sec):	4.20	Width/Depth Ratio:	39.32
u/u*:	6.67	Channel Sinuosity:	1.44
R/D_{84}:	4.24	Beltwidth (ft):	435
Froude Number:	0.42	Meander Width Ratio:	3.46

CASSELMAN RIVERAT GRANTSVILLE, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.13	0.14
D_{35}	19.60	2.52
D_{50}	69.41	30.71
D_{84}	406.74	225.27
D_{95}	877.82	521.00

STUDY REACH CROSS SECTION



Bankfull Width (ft):	125.82	Mean Bankfull Depth (ft):	3.20
Bankfull Cross-sectional Area (ft^2):	402.32	Maximum Bankfull Depth (ft):	4.49
Hydraulic Radius (ft):	3.14	Wetted Perimeter (ft):	128.27

Casselman River at Grantsville, Maryland

Downstream view of classification cross-section

Right bank of classification cross-section

CASSELMAN RIVER
at Grantsville, MD
U.S.G.S. Gage: 3078000

LEGEND

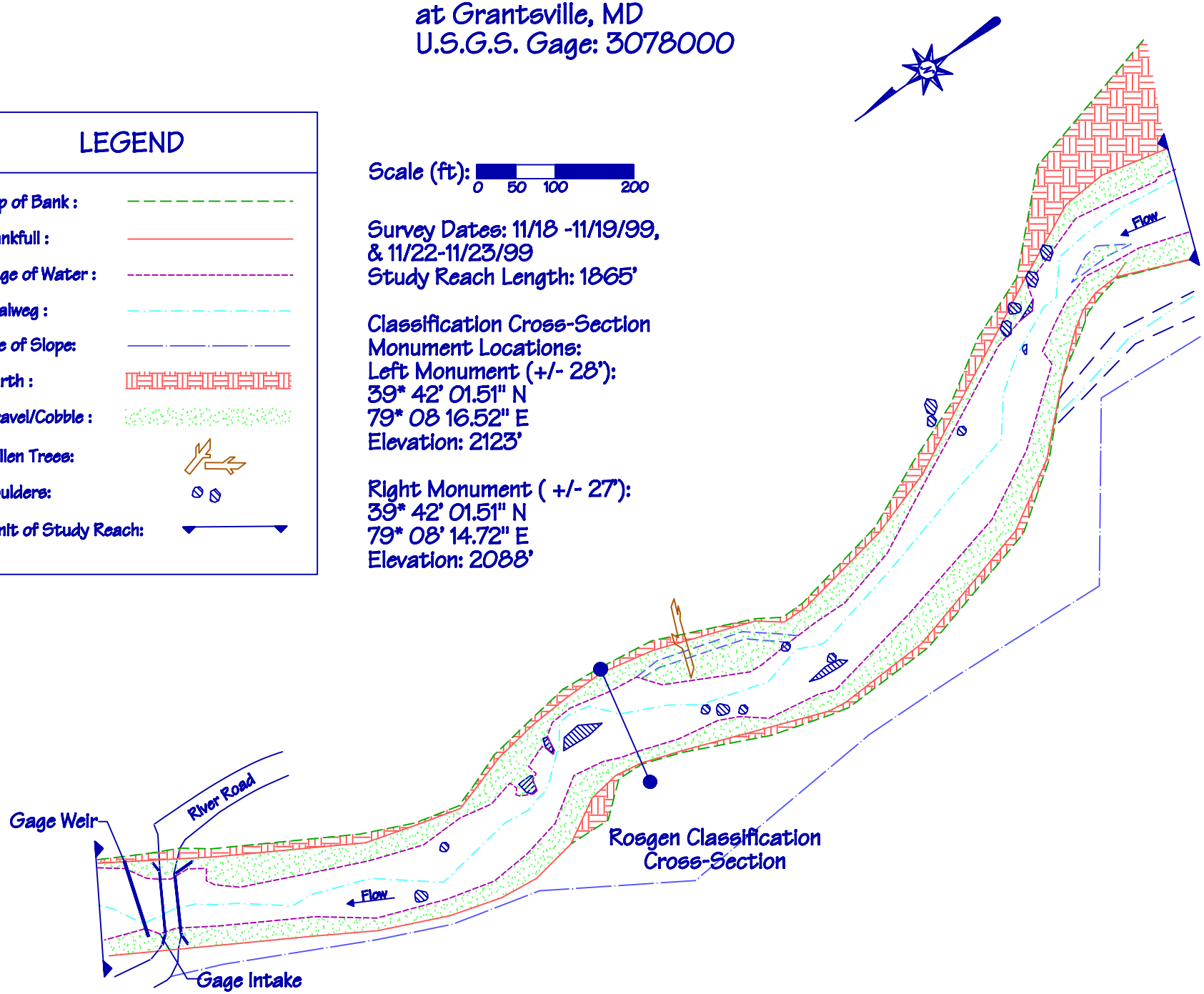
- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Toe of Slope:
- Earth :
- Gravel/Cobble :
- Fallen Trees:
- Boulders:
- Limit of Study Reach:

Scale (ft): 0 50 100 200

Survey Dates: 11/18 -11/19/99,
& 11/22-11/23/99
Study Reach Length: 1865'

Classification Cross-Section
Monument Locations:
Left Monument (+/- 28'):
39* 42' 01.51" N
79* 08 16.52" E
Elevation: 2123'

Right Monument (+/- 27'):
39* 42' 01.51" N
79* 08' 14.72" E
Elevation: 2088'



CRABTREE CREEK NEAR SWANTON, MD
USGS STATION NUMBER: 1597000

Latitude:	39º 30' 00"	Gage Period of Record:	1948 – 1981
Longitude:	79º 09' 35"	Mean Annual Discharge (cfs):	29.0
Map Coordinates:	MD&DE Gazett. Map 66/D2	Rosgen Stream Type:	B3/1
		Survey Date:	Sept. 1999 Nov. 1999
Drainage Area (sq. mi.):	16.70		
Stream Order / Magnitude:	3/15		
Percent Imperviousness:	0.36		

Land Use (%): Residential: 0.69 Agricultural: 14.28 Forest: 84.82 Commercial: 0.22

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 154.40 $Q_{1.5}$: 375.00 $Q_{2.0}$: 483.60
(Log-Pearson Period: 1949 – 1981)

General Study Reach Description: The study reach and gage reach are the same. The channel has pool/riffle and cascade features with bedrock and boulder vertical control. The channel appears vertically stable with little lateral scour and some side bar deposition. The overstory is moderately dense with hemlock, red maple, tulip poplar, green ash, and yellow birch. The understory ranges from dense to sparse with Japanese knotweed the dominant understory vegetation.

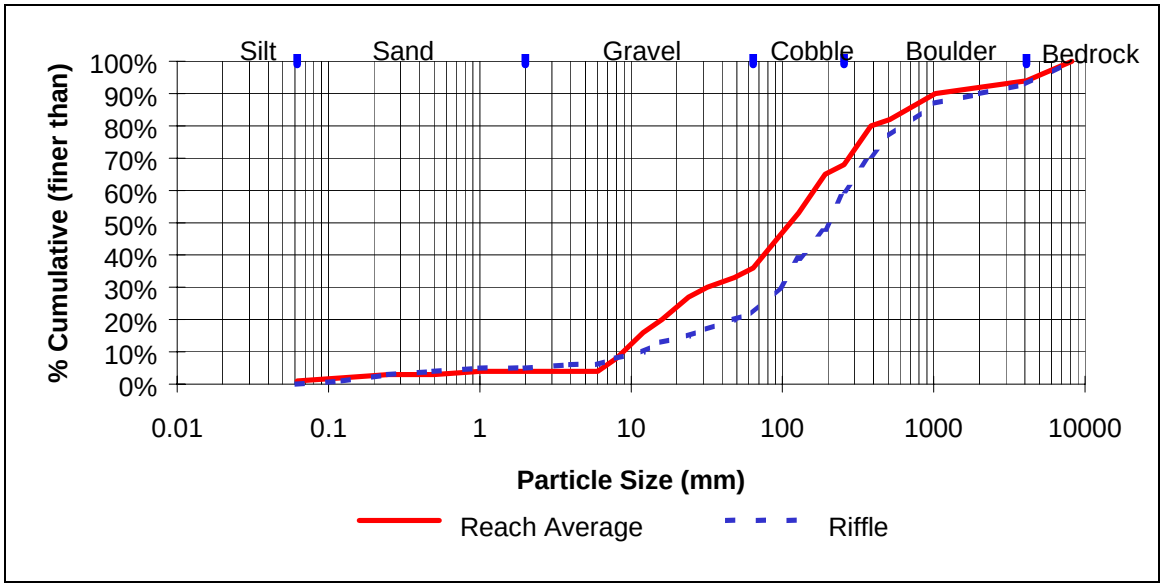
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	443.40	Q_{bkf} / $Q_{1.5}$:	1.18
Bankfull Return Interval (R.I.):	1.80	Q_{bkf} / $Q_{2.0}$:	0.92
Gage Height (ft):	2.56		

STUDY REACH SURVEY INFORMATION

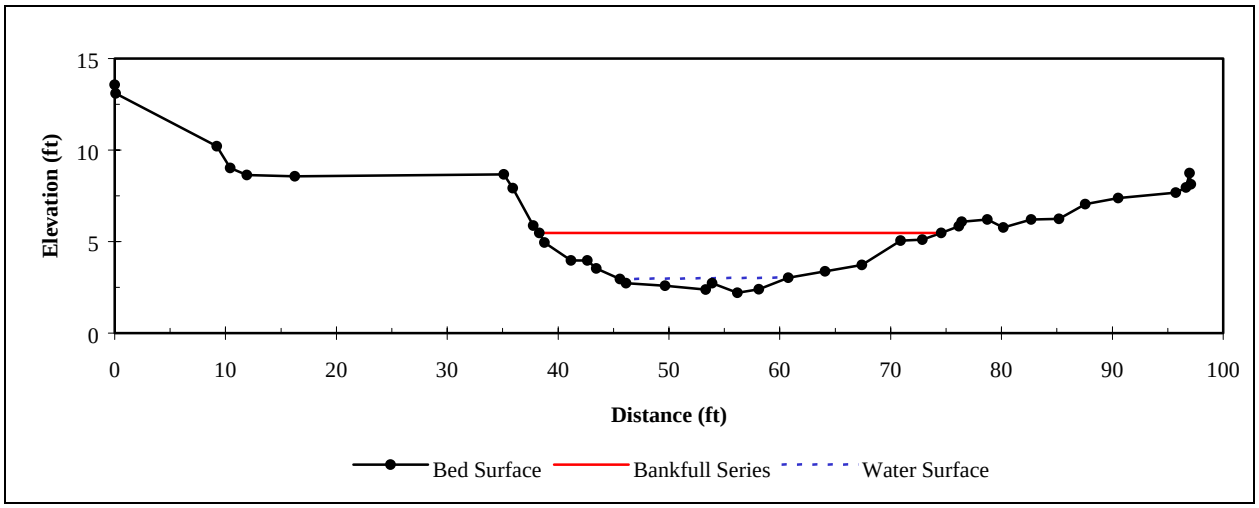
Average Water Surface Slope (ft/ft):	0.0280	Flood-prone Width (ft):	62.00
Manning's "n":	0.0650	Entrenchment Ratio:	1.71
Mean Bankfull Velocity (ft/sec):	5.99	Width/Depth Ratio:	17.78
u/u*:	4.50	Channel Sinuosity:	1.10
R/D_{84}:	1.09	Beltwidth (ft):	99
Froude Number:	0.75	Meander Width Ratio:	2.73

CRABTREE CREEK NEAR SWANTON, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	12.00	23.42
D_{35}	58.15	104.15
D_{50}	113.15	179.45
D_{84}	608.87	553.33
D_{95}	BEDROCK	1398.83

STUDY REACH CROSS SECTION



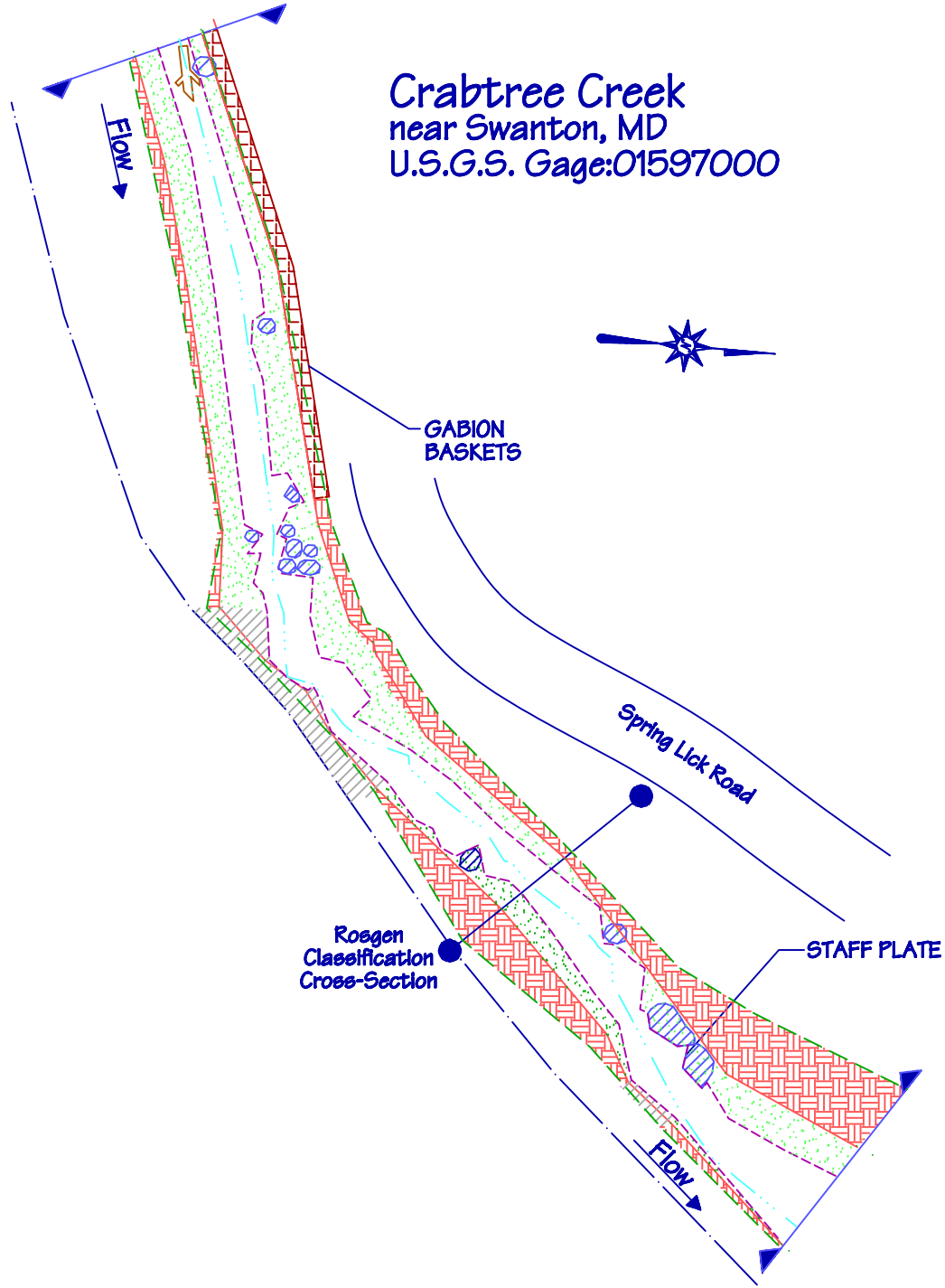
Bankfull Width (ft):	36.28	Mean Bankfull Depth (ft):	2.04
Bankfull Cross-sectional Area (ft^2):	74.01	Maximum Bankfull Depth (ft):	3.26
Hydraulic Radius (ft):	1.97	Wetted Perimeter (ft):	37.51

Crabtree Creek near Swanton, Maryland

Upstream view of classification cross-section

Right bank of classification cross-section

Crabtree Creek
near Swanton, MD
U.S.G.S. Gage:01597000



LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Toe of Slope:
- Gravel/Cobble :
- Earth :
- Bedrock :
- Fallen Trees :
- Boulders :
- Study Reach End Point:

Scale: 0 50 100 200

Study Reach Length: 563'
Survey Dates:11/3/99 & 11/4/99

Classification Cross-Section Monument Locations:
Left Monument (+/- 37')
39*30'04.93" N
79*09'32.63" W
Elevation: 1563'

Right Monument (+/- 37')
39*30'04.32" N
79*09'31.92" W
Elevation: 1563'

DITCH RUN NEAR HANCOCK, MD
USGS STATION NUMBER: 1613150

Latitude:	39º 41' 32"	Gage Period of Record:	1964 – 1986
Longitude:	78º 07' 56"	Mean Annual Discharge (cfs):	N/A
ADC Map Coordinates:	Wash./2000 Map 4/C9	Rosgen Stream Type:	C4
		Survey Date:	Sept. 2000
Drainage Area (sq. mi.):	4.80		
Stream Order / Magnitude:	3/17		
Percent Imperviousness:	N/A		

Land Use (%): Residential: 0.21 Agricultural: 62.44 Forest: 36.86 Commercial: 0.00

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 72.70 $Q_{1.5}$: 185.00 $Q_{2.0}$: 236.80
(Log-Pearson Period: 1965 – 1986)

General Study Reach Description: The study reach starts 30 feet upstream from the discontinued crest stage gage. The channel has pool/riffle and plane bed features with some side and point bar depositional features. The channel appears vertically stable with some lateral scour. The floodplain vegetation is moderate to dense with white and red oak, tulip poplar, green ash, and black gum. The understory is sparse to moderately dense with flowering dogwood, witch hazel, and river birch. There is a maintained powerline right-of-way on the left bank at the upstream end of the study reach. Land use data is for the Maryland portion of drainage only (3.41 mi^2). No percent impervious surface information was available.

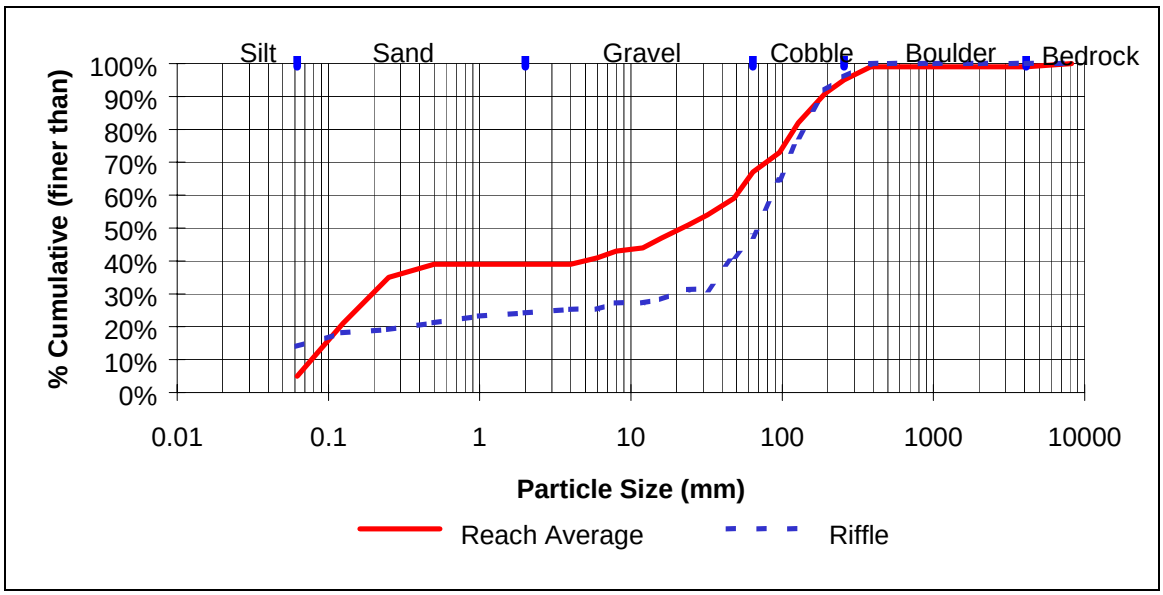
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	182.90	Q_{bkf} / $Q_{1.5}$:	0.99
Bankfull Return Interval (R.I.):	1.45	Q_{bkf} / $Q_{2.0}$:	0.77
Gage Height (ft):	5.36		

STUDY REACH SURVEY INFORMATION

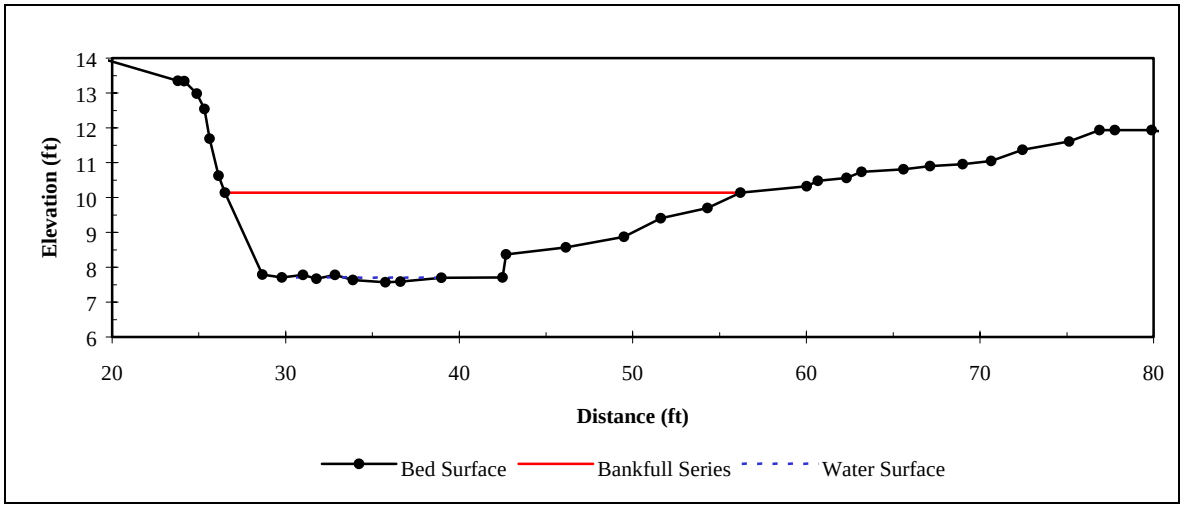
Average Water Surface Slope (ft/ft):	0.0110	Flood-prone Width (ft):	80.00
Manning's "n":	0.061	Entrenchment Ratio:	2.69
Mean Bankfull Velocity (ft/sec):	3.54	Width/Depth Ratio:	17.07
u/u*:	4.66	Channel Sinuosity:	1.44
R/D_{84}:	3.27	Beltwidth (ft):	380
Froude Number:	0.49	Meander Width Ratio:	12.79

DITCH RUN NEAR HANCOCK, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.10	0.09
D_{35}	0.25	37.10
D_{50}	21.69	67.93
D_{84}	140.07	153.00
D_{95}	256.00	239.09

STUDY REACH CROSS SECTION



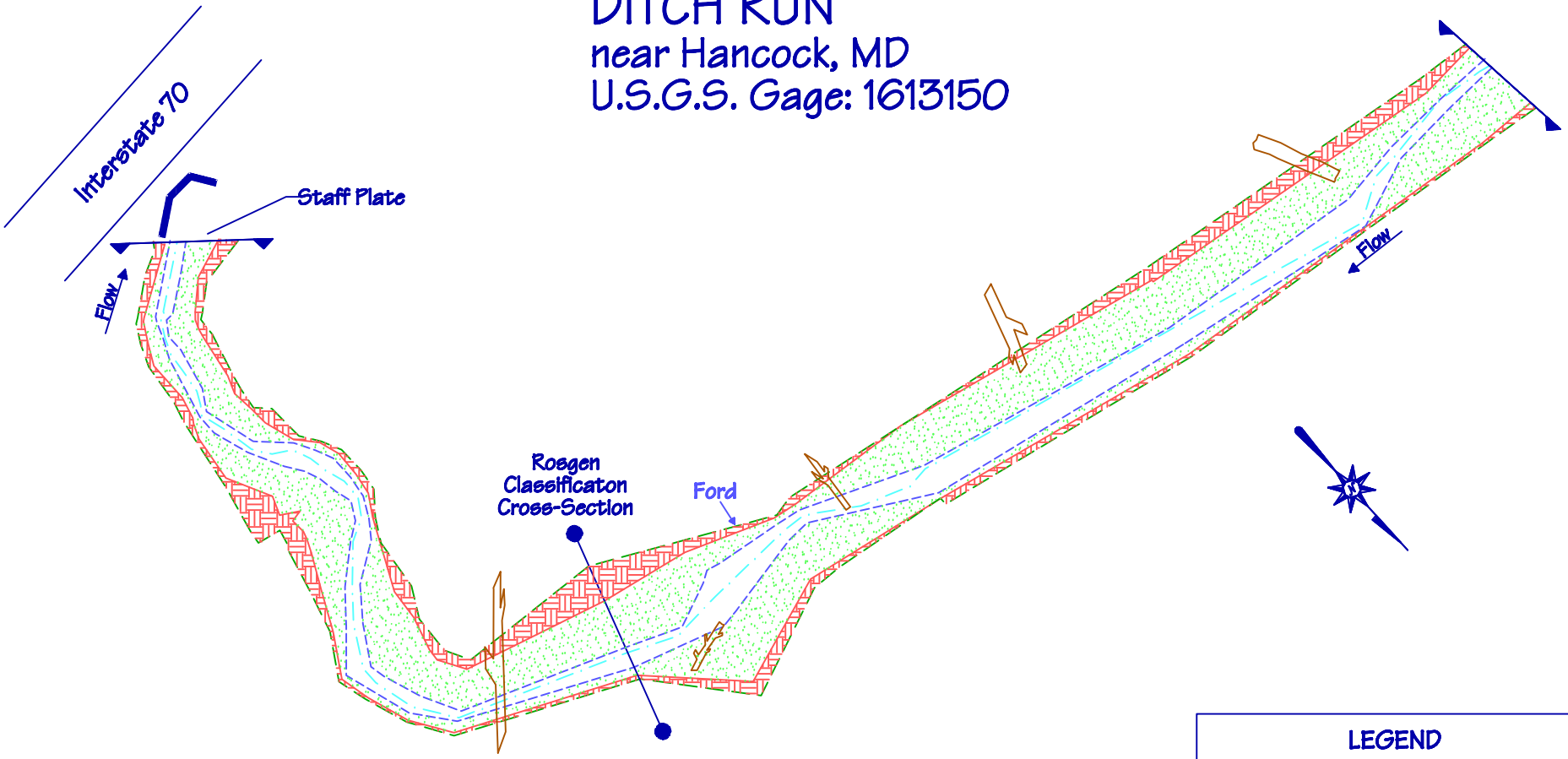
Bankfull Width (ft):	29.70	Mean Bankfull Depth (ft):	1.74
Bankfull Cross-sectional Area (ft^2):	51.61	Maximum Bankfull Depth (ft):	2.57
Hydraulic Radius (ft):	1.64	Wetted Perimeter (ft):	31.40

Ditch Run near Hancock, Maryland

Downstream view of classification cross-section

Right bank of classification cross-section

DITCH RUN
near Hancock, MD
U.S.G.S. Gage: 1613150



Scale (ft): 0 25 50 100

Survey Date: 9/5/00 & 9/6/00
Study Reach Length: 761'

Classification Cross-Section Monument Locations:
C/S 1 Left Monument (+/- 28)
39*41'35.41" N
78*07'56.79" W
Elevation: 442'

C/S 1 Right Monument (+/- 29')
39*41'34.23" N
78*07'57.75" W
Elevation: 42

LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Gravel/Cobble :
- Earth :
- Bedrock :
- Fallen Trees :
- Boulders :
- Study Reach End Point:

EVITTS CREEK NEAR CENTERVILLE, PA
USGS STATION NUMBER: 1603500

Latitude:	39º 47' 23"	Gage Period of Record:	1932 – 1982
Longitude:	78º 38' 48"	Mean Annual Discharge (cfs):	37.1
Map Coordinates:	PA Gazett.	Rosgen Stream Type:	C1
	Map 88/B2	Survey Date:	Aug. 1999
Drainage Area (sq. mi.):	30.20		Oct. 1999
Stream Order / Magnitude:	3/21		
Percent Imperviousness:	N/A		

Land Use (%): Residential: N/A Agricultural: N/A Forest: N/A Commercial: N/A

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 210.50 $Q_{1.5}$: 700.00 $Q_{2.0}$: 919.50
(Log-Pearson Period: 1933 – 1982)

General Study Reach Description: The gage reach and study reach are the same at a discontinued gage station. The stream channel has a regular meander pattern with pool/riffle features and bedrock outcrops throughout. Woody debris and bedrock cause some side bar deposition with little lateral scour. The floodplain has moderately dense overstory with hemlock, slippery elm, red maple, sycamore, and beech. The understory is sparse with mountain laurel. Land use data is not provided due to gage location in Pennsylvania.

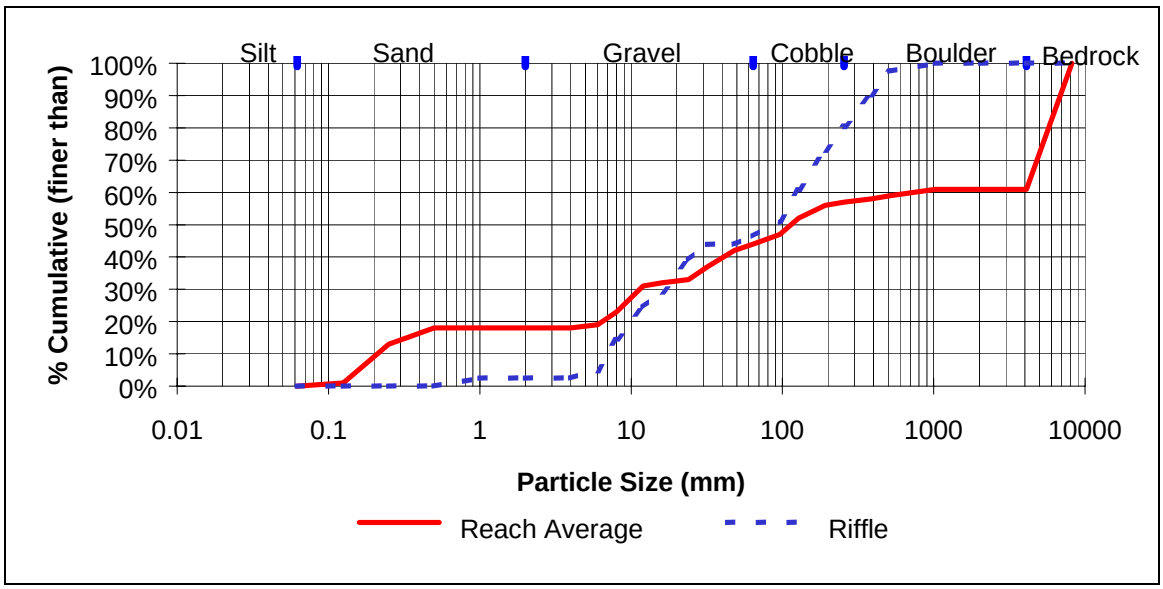
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	598.30	Q_{bkf} / $Q_{1.5}$:	0.85
Bankfull Return Interval (R.I.):	1.33	Q_{bkf} / $Q_{2.0}$:	0.65
Gage Height (ft):	3.08		

STUDY REACH SURVEY INFORMATION

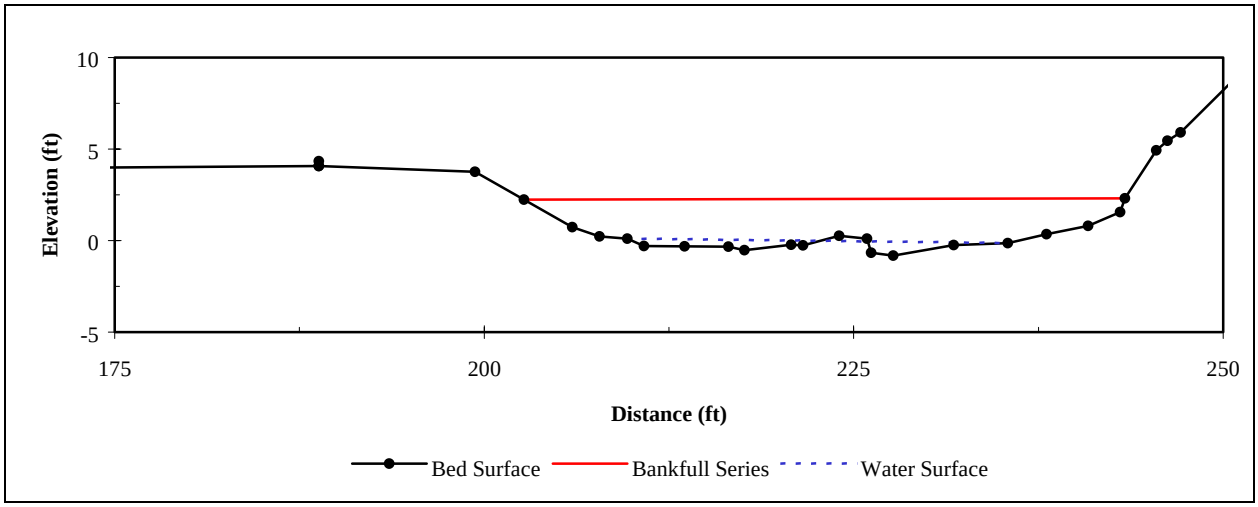
Average Water Surface Slope (ft/ft):	0.0057	Flood-prone Width (ft):	224.00
Manning's "n":	0.027	Entrenchment Ratio:	5.51
Mean Bankfull Velocity (ft/sec):	6.73	Width/Depth Ratio:	18.56
u/u*:	10.85	Channel Sinuosity:	1.21
R/D_{84}:	2.15	Beltwidth (ft):	246
Froude Number:	0.82	Meander Width Ratio:	6.05

EVITTS CREEK NEAR CENTERVILLE, PA
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.38	8.47
D_{35}	27.71	20.30
D_{50}	114.09	86.75
D_{84}	BEDROCK	296.23
D_{95}	BEDROCK	462.96

STUDY REACH CROSS SECTION



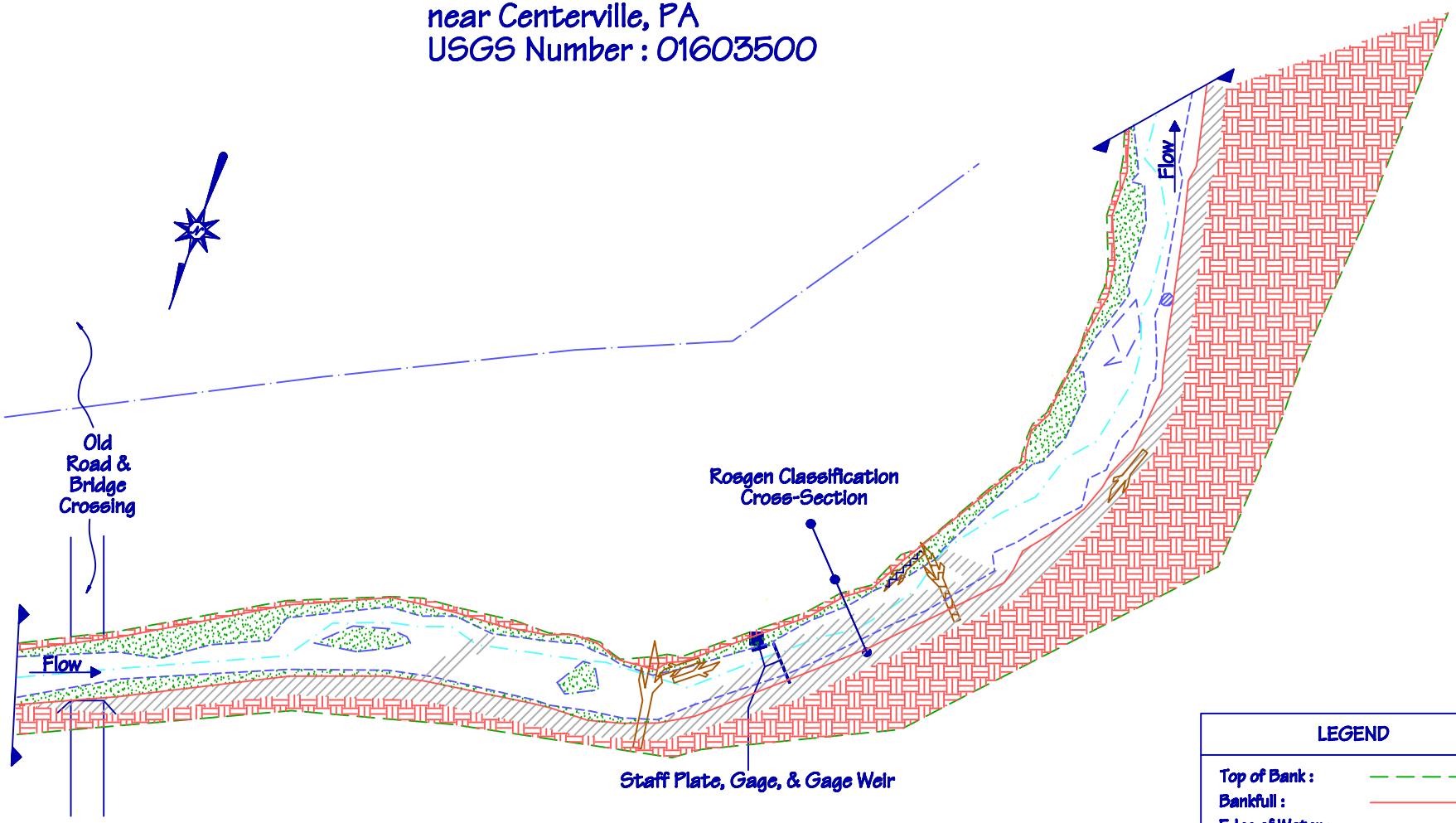
Bankfull Width (ft):	40.65	Mean Bankfull Depth (ft):	2.19
Bankfull Cross-sectional Area (ft^2):	88.92	Maximum Bankfull Depth (ft):	3.10
Hydraulic Radius (ft):	2.09	Wetted Perimeter (ft):	42.51

Evitts Creek near Centerville, Pennsylvania

Upstream view of classification cross-section

Left bank of classification cross-section

Evitts Creek
near Centerville, PA
USGS Number : 01603500



Classification Cross-Section Monument Locations:
Left Monument #1 (+/-62') (Nearest Stream) :
39* 47' 21.86" N
78* 38' 49.46" W
Elevation: 1170'

Left Monument #2 (+/- 56') :
39* 47' 21.58" N
78* 38' 49.08" W
Elevation: 1055'

Scale (ft): 0 50 100 200

Survey Dates : 10/21/99 & 10/22/99
Study Reach Length: 1098'

Right End Point of Cross-Section (+/- 50') (Bedrock) :
39* 47' 22.04" N
78* 38' 50.04" W
Elevation: 1027'

LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Toe of Slope
- Gravel/Cobble :
- Earth :
- Bedrock :
- Fallen Trees :
- Boulders :
- Gage House :
- Study Reach End Point:

NORTH BRANCH POTOMAC RIVER AT STEYER, MD
USGS STATION NUMBER: 1595000

Latitude:	39º 18' 07"	Gage Period of Record:	1956 - Present
Longitude:	79º 18' 26"	Mean Annual Discharge (cfs):	173.00
Map Coordinates:	MD&DE Gazett. Map 64/B2	Rosgen Stream Type:	C3
		Survey Date:	Nov. 1999
Drainage Area (sq. mi.):	73.10		
Stream Order / Magnitude:	4/51		
Percent Imperviousness:	N/A		

Land Use (%): Residential: 00.20 Agricultural: 16.64 Forest: 40.74 Commercial: 4.85

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 1044.00 $Q_{1.5}$: 2650.00 $Q_{2.0}$: 3343.00
(Log-Pearson Period: 1955 – 1997)

General Study Reach Description: The gage reach and study reach are the same. The river has pool/riffle features, appears vertically stable and has little lateral scour. The channel has a regular meander pattern with point and side bar deposition. The floodplain vegetation is moderately dense with black locust, red and mountain maple, northern red oak, beech, yellow birch, and hemlock. The understory is moderately dense to sparse with ninebark and mountain laurel. Land use/land cover information is for the Maryland portion (40.94 mi2 of the 73.1 mi2 drainage area – the rest of drainage is in West Virginia). GIS Hydro did not provide percent impervious cover.

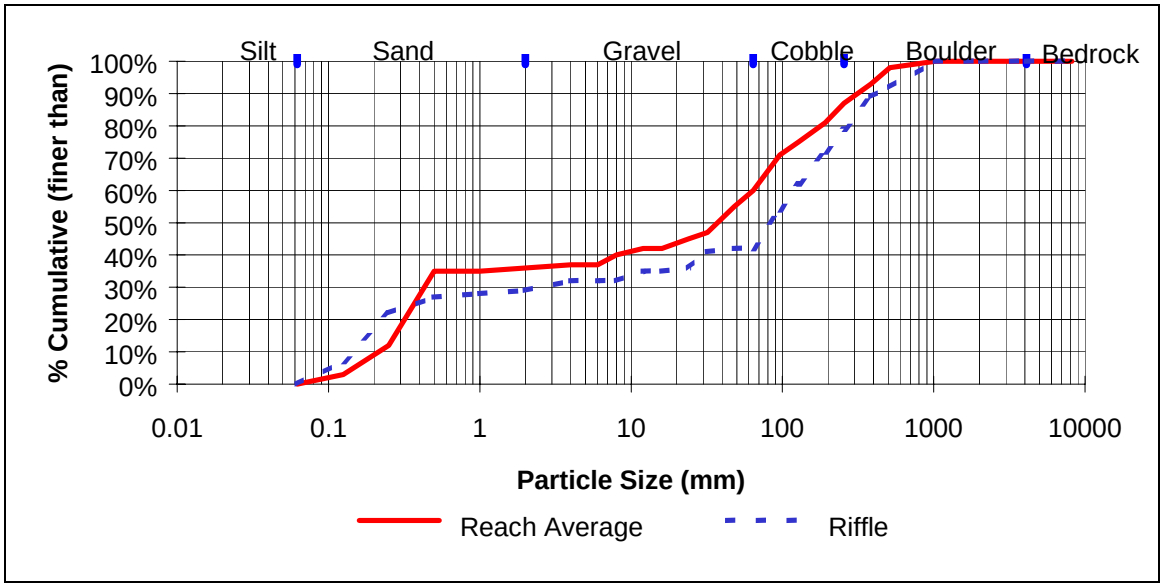
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	2714.00	Q_{bkf} / $Q_{1.5}$:	1.02
Bankfull Return Interval (R.I.):	1.55	Q_{bkf} / $Q_{2.0}$:	0.81
Gage Height (ft):	6.73		

STUDY REACH SURVEY INFORMATION

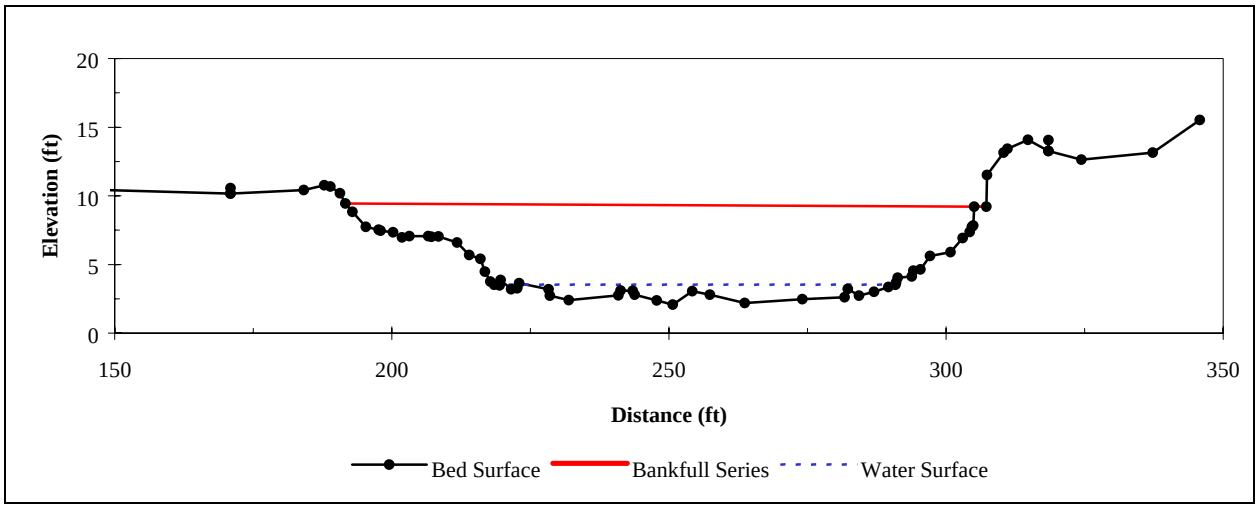
Average Water Surface Slope (ft/ft):	0.0030	Flood-prone Width (ft):	316.00
Manning's "n":	0.052	Entrenchment Ratio:	2.73
Mean Bankfull Velocity (ft/sec):	4.54	Width/Depth Ratio:	22.37
u/u*:	6.58	Channel Sinuosity:	1.21
R/D_{84}:	4.79	Beltwidth (ft):	412
Froude Number:	0.36	Meander Width Ratio:	3.56

NORTH BRANCH POTOMAC AT STEYER, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.28	0.19
D_{35}	1.00	16.00
D_{50}	37.25	83.86
D_{84}	221.70	313.53
D_{95}	430.83	663.98

STUDY REACH CROSS SECTION



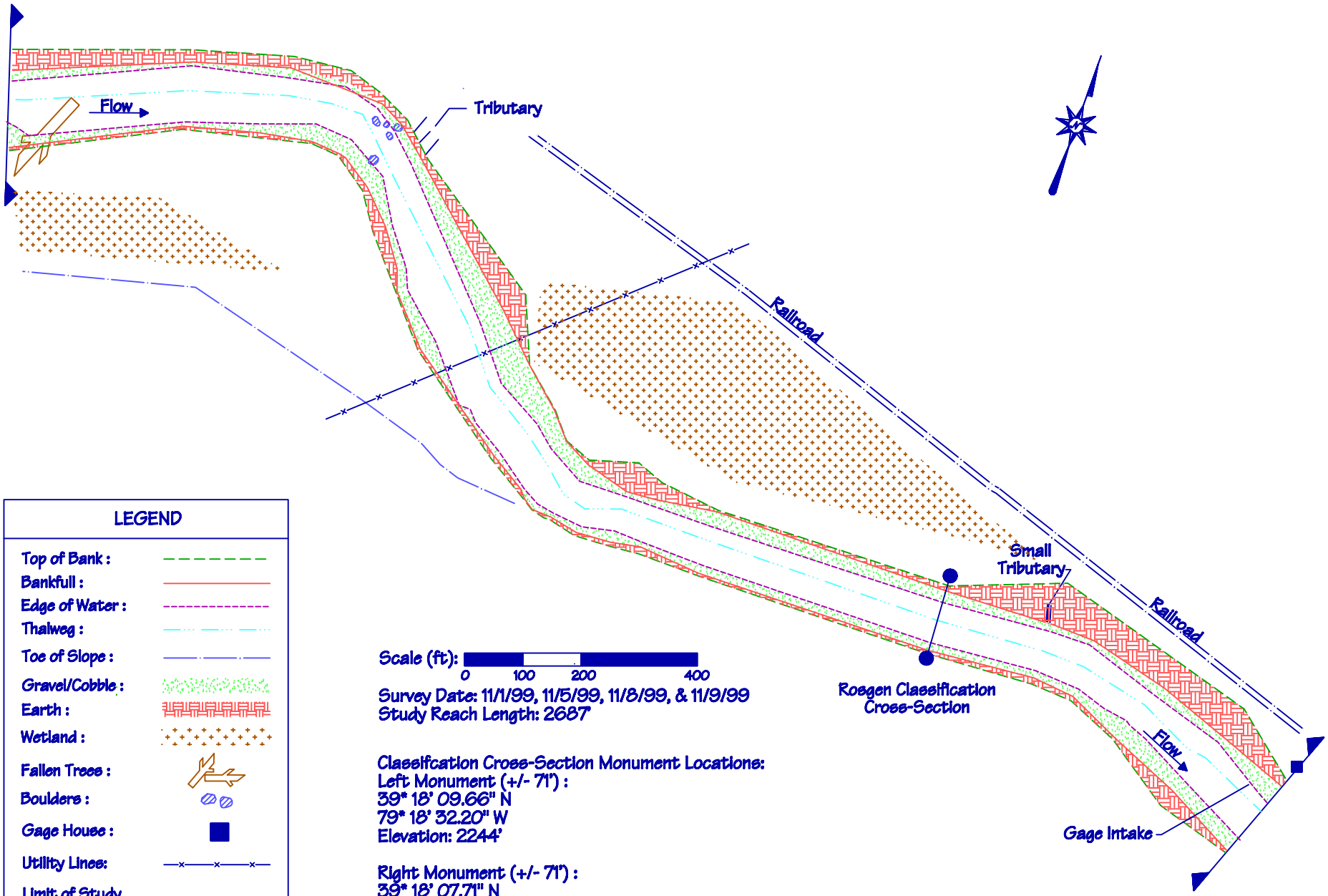
Bankfull Width (ft):	115.67	Mean Bankfull Depth (ft):	5.17
Bankfull Cross-sectional Area (ft^2):	597.70	Maximum Bankfull Depth (ft):	7.24
Hydraulic Radius (ft):	4.93	Wetted Perimeter (ft):	121.19

North Branch Potomac at Steyer, Maryland

Downstream view of classification cross-section

Left bank of classification cross-section

NORTH BRANCH OF THE POTOMAC
at Steyer, MD
USGS Number : 01595000



Survey Date: 11/1/99, 11/5/99, 11/8/99, & 11/9/99
Study Reach Length: 2687'

Classification Cross-Section Monument Locations:
Left Monument (+/- 71') :
39° 18' 09.66" N
79° 18' 32.20" W
Elevation: 2244'

Right Monument (+/- 71') :
39° 18' 07.71" N
79° 18' 32.69" W
Elevation: 2301'

SAVAGE RIVER NEAR BARTON, MD
USGS STATION NUMBER: 1596500

Latitude:	39º 34' 05"	Gage Period of Record:	1948 - Present
Longitude:	79º 06' 10"	Mean Annual Discharge (cfs):	75.50
Map Coordinates:	MD&DE Gazett. Map 66/C2	Rosgen Stream Type:	F1
		Survey Date:	Sept. 1999
Drainage Area (sq. mi.):	49.10		Nov. 1999
Stream Order / Magnitude:	4/55		
Percent Imperviousness:	0.36		

Land Use (%): Residential: 1.20 Agricultural: 23.26 Forest: 75.03 Commercial: 0.30

Log-Pearson Flood Frequency Discharge (cfs): (Log-Pearson Period: 1949 – 1999)	$Q_{1.005}$: 532.00 (high-outlier adjusted values)	$Q_{1.5}$: 1179.00 (high-outlier adjusted values)	$Q_{2.0}$: 1461.00 (high-outlier adjusted values)

General Study Reach Description: The gage reach and study reach are the same. The channel has pool/riffle features, controlled by bedrock sills through reach. The channel is vertically stable and shows little lateral scour with some side bar deposition. The floodplain vegetation is moderately dense with yellow birch, American sycamore, green ash, hemlock, ironwood, shag bark hickory, and red maple. The understory is sparse with mountain laurel.

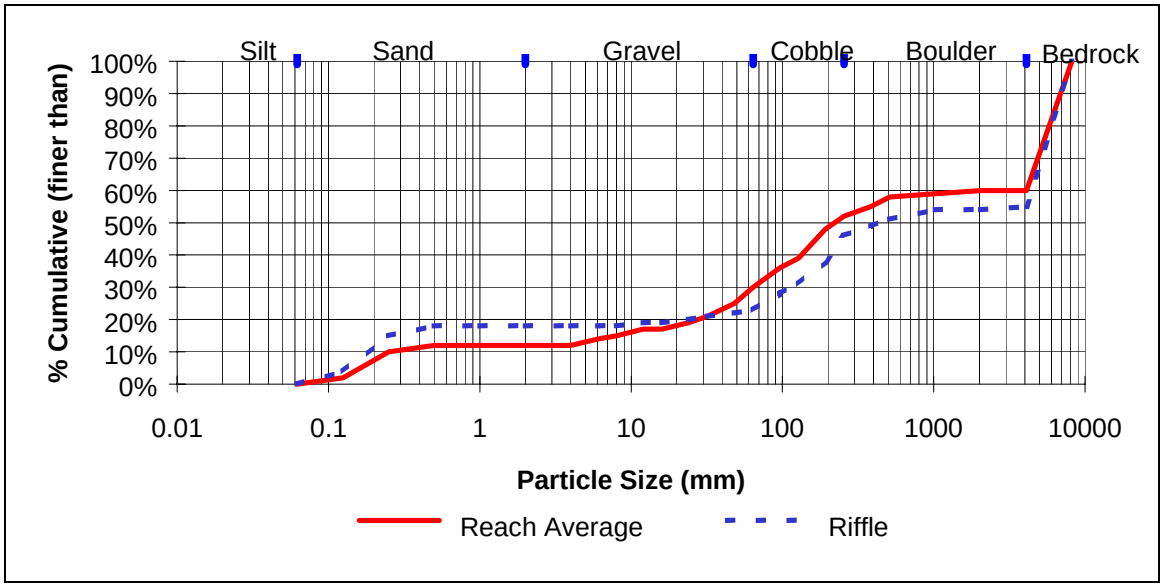
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	1276.00	Q_{bkf} / $Q_{1.5}$:	1.08
Bankfull Return Interval (R.I.):	1.55	Q_{bkf} / $Q_{2.0}$:	0.87
Gage Height (ft):	3.95		

STUDY REACH SURVEY INFORMATION

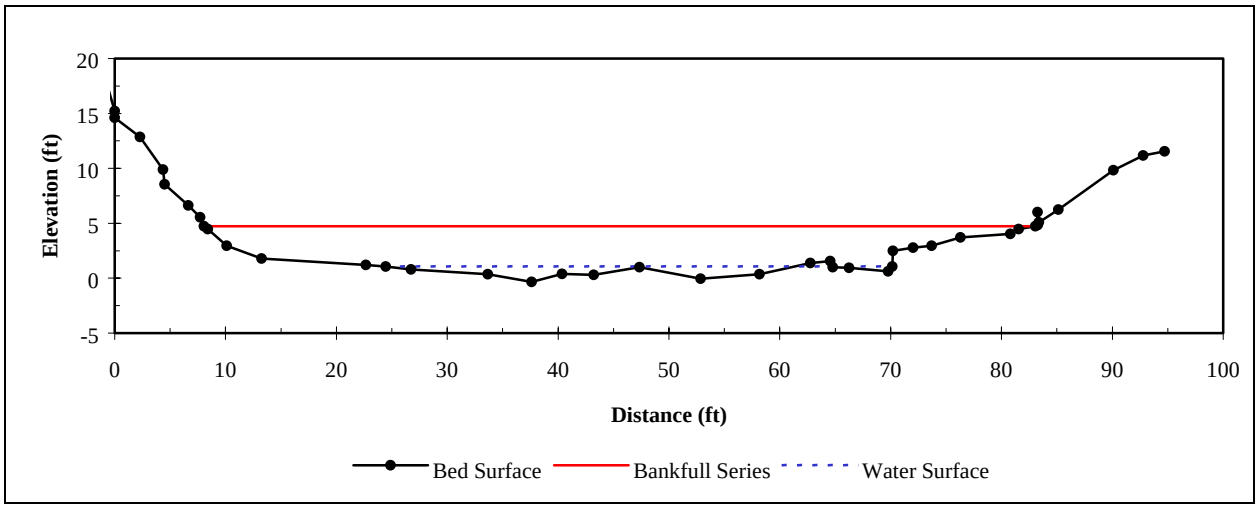
Average Water Surface Slope (ft/ft):	0.0030	Flood-prone Width (ft):	85.70
Manning's "n":	0.035	Entrenchment Ratio:	1.14
Mean Bankfull Velocity (ft/sec):	5.03	Width/Depth Ratio:	22.19
u/u*:	8.98	Channel Sinuosity:	1.48
R/D_{84}:	3.74	Beltwidth (ft):	86.0
Froude Number:	0.49	Meander Width Ratio:	1.14

SAVAGE RIVER NEAR BARTON, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	9.80	0.17
D_{35}	89.73	17.71
D_{50}	221.70	92.19
D_{84}	BEDROCK	263.01
D_{95}	BEDROCK	683.44

STUDY REACH CROSS SECTION



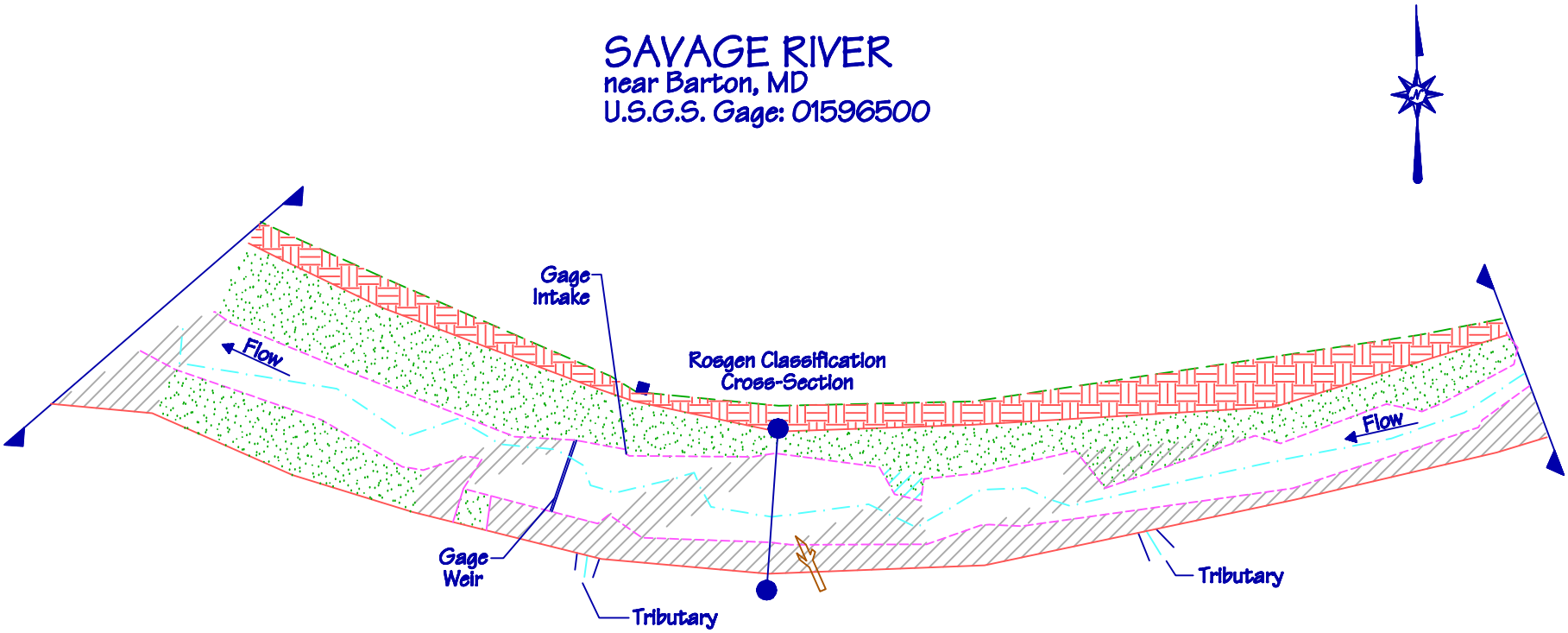
Bankfull Width (ft):	74.99	Mean Bankfull Depth (ft):	3.38
Bankfull Cross-sectional Area (ft^2):	253.52	Maximum Bankfull Depth (ft):	5.08
Hydraulic Radius (ft):	3.22	Wetted Perimeter (ft):	78.64

Savage River near Barton, Maryland

Downstream view of classification cross-section

Left bank of classification cross-section

SAVAGE RIVER
near Barton, MD
U.S.G.S. Gage: 01596500



Scale (ft): 0 50 100 200

Survey Date: 11/17/99 & 11/18/99
Study Reach Length: 769'

Classification Cross-Section Monument Locations:
Left Monument (+/- 30') :
39* 34' 12.55" N
79* 05' 59.94" W
Elevation: 1612'

Right Monument (+/- 36') :
39* 34' 12.98" N
79* 05' 59.23" W
Elevation: 1564'

LEGEND

Top of Bank :
Bankfull :
Edge of Water :
Thalweg :
Gravel/Cobble :
Earth :
Bedrock :
Fallen Trees :
Gage House :
Study Reach End Point:

SAVAGE RIVER NEAR FROSTBURG, MD
USGS STATION NUMBER: 1596005

Latitude:	39º 40' 56"	Gage Period of Record:	1971 – 1986
Longitude:	78º 57' 54"	Mean Annual Discharge (cfs):	N/A
Map Coordinates:	MD&DE Gazett. Map 67/A4	Rosgen Stream Type:	C3
		Survey Date:	Aug. 1999 Sept. 1999
Drainage Area (sq. mi.):	1.50		
Stream Order / Magnitude:	1/1		
Percent Imperviousness:	1.67		

Land Use (%): Residential: 2.71 Agricultural: 17.44 Forest: 65.12 Commercial: 2.71

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: N/A $Q_{1.5}$: 38.00 $Q_{2.0}$: 52.00
(Log-Pearson Period: 1972 – 1985)

General Study Reach Description: The study reach starts 250 feet upstream of the inactive crest gage. The channel has pool/riffle and cascade features and appears vertically stable with little lateral scour. The channel has a regular meander pattern with few depositional features and some woody debris. The floodplain overstory is dense with beech, hemlock, yellow birch, black cherry, and red oak species. The understory is sparse to moderately dense with witch hazel and mountain laurel. Upstream of the study reach is a large wetland complex occupying approximately 12 percent of the drainage area.

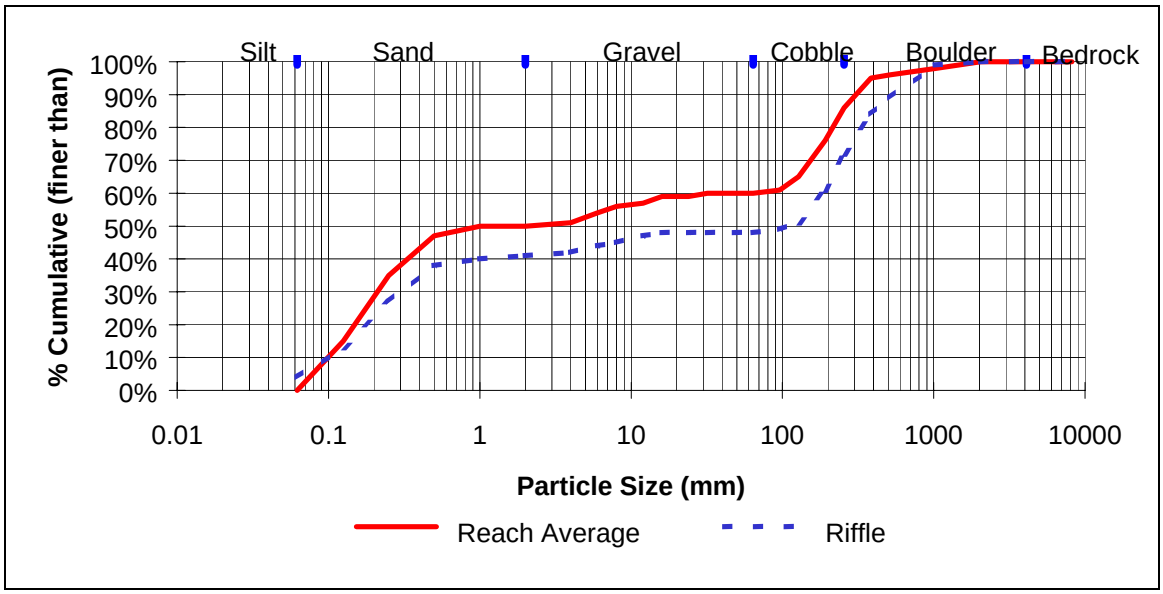
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	39.41	Q_{bkf} / $Q_{1.5}$:	1.04
Bankfull Return Interval (R.I.):	1.53	Q_{bkf} / $Q_{2.0}$:	0.76
Gage Height (ft):	19.35		

STUDY REACH SURVEY INFORMATION

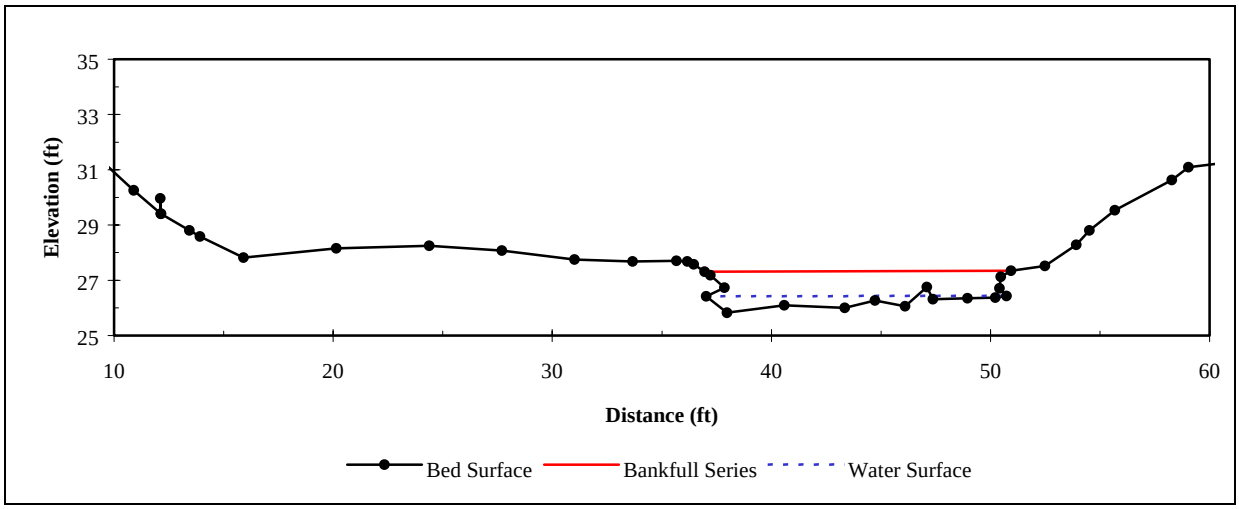
Average Water Surface Slope (ft/ft):	0.0130	Flood-prone Width (ft):	41.00
Manning's "n":	0.070	Entrenchment Ratio:	2.93
Mean Bankfull Velocity (ft/sec):	2.52	Width/Depth Ratio:	12.49
u/u*:	3.71	Channel Sinuosity:	1.20
R/D_{84}:	0.70	Beltwidth (ft):	84
Froude Number:	0.47	Meander Width Ratio:	6.00

SAVAGE RIVER NEAR FROSTBURG, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.13	0.15
D_{35}	0.25	0.41
D_{50}	2.00	110.85
D_{84}	241.69	384.00
D_{95}	384.00	776.05

STUDY REACH CROSS SECTION



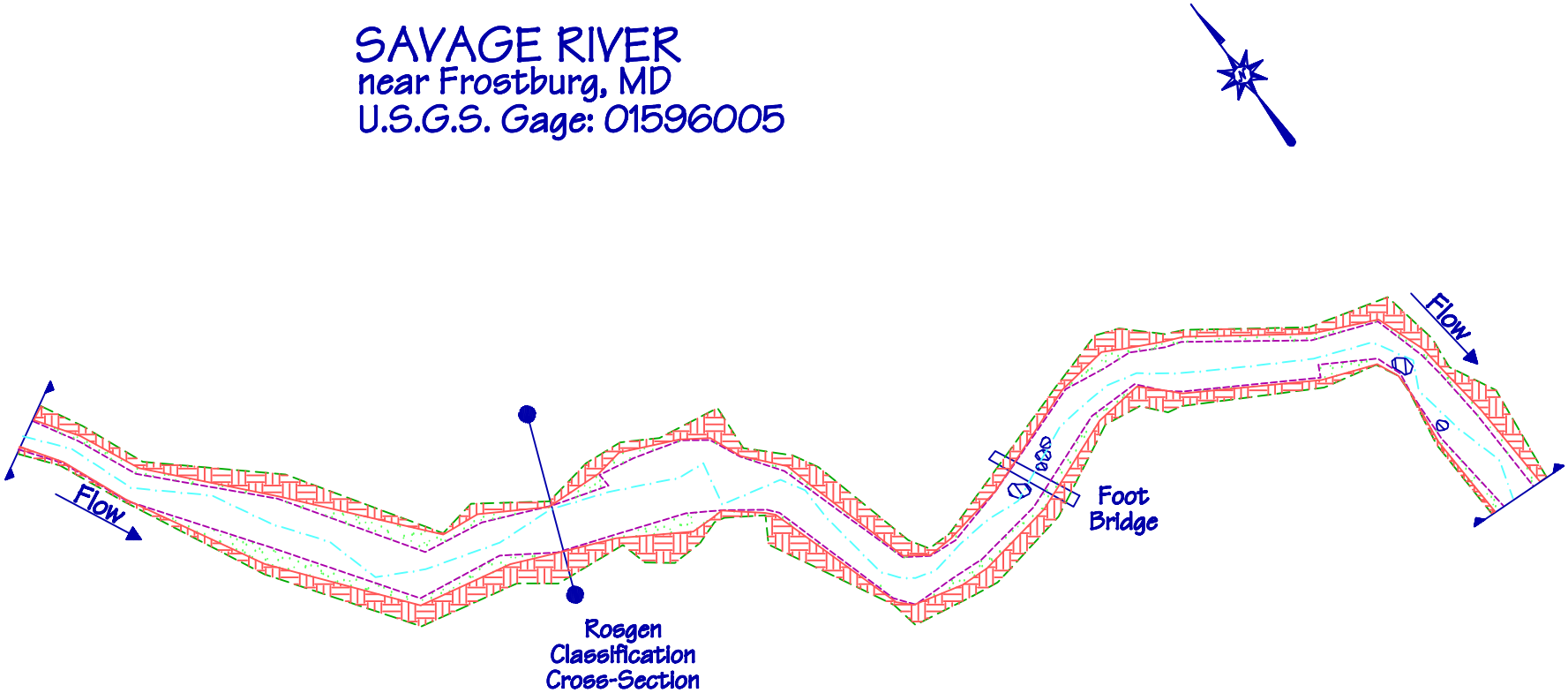
Bankfull Width (ft):	13.99	Mean Bankfull Depth (ft):	1.12
Bankfull Cross-sectional Area (ft^2):	15.66	Maximum Bankfull Depth (ft):	1.49
Hydraulic Radius (ft):	0.88	Wetted Perimeter (ft):	17.75

Savage River near Frostburg, Maryland

Downstream view of classification cross-section

Left bank of classification cross-section

SAVAGE RIVER
near Frostburg, MD
U.S.G.S. Gage: 01596005



LEGEND	
Top of Bank :	
Bankfull :	
Edge of Water :	
Thalweg :	
Gravel/Cobble :	
Earth :	
Boulders :	
Study Reach End Point:	

Scale (ft): 0 25 50 100

Survey Dates: 9/14/00, 9/15/00, & 9/19/00
Study Reach Length: 528'
Study Reach 250' U/S of U.S.G.S. Gage

Classification Cross-Section Monument Locations
Left Monument (+/- 30') :
N 39* 40' 59.36"
W 78* 57' 49.53"
Elev. 2654'

Right Monument (+/- 54') :
N 39* 40' 00.00"
W 78* 57' 49.25"
Elev. 2786'

SAWPIT RUN NEAR OLDTOWN, MD
USGS STATION NUMBER: 1609500

Latitude:	39º 32' 50"	Gage Period of Record:	1948 – 1958
Longitude:	78º 33' 20"		1963 – 1976
Map Coordinates:	MD&DE Gazett.	Mean Annual Discharge (cfs):	4.11
	Map 67/C2	Rosgen Stream Type:	B1c
Drainage Area (sq. mi.):	5.08	Survey Date:	Sept. 1999
Stream Order / Magnitude:	3/11		Sept. 2000
Percent Imperviousness:	0.40		

Land Use (%): Residential: 1.16 Agricultural: 10.41 Forest: 87.02 Commercial: 0.25

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 42.00 $Q_{1.5}$: 220.00 $Q_{2.0}$: 267.00
(Log-Pearson Period: 1948 – 1976)

General Study Reach Description: The gage reach and study reach are the same. The channel has step/pool features with shale/sandstone bedrock control perpendicular to the channel. The channel is vertically stable with little lateral scour and few side bar depositional features. The floodplain vegetation on the left bank is maintained as highway right-of-way and is mowed. The right bank has moderately dense forest cover with red maple and white pine. The understory is silky dogwood and smooth alder. While the rating for this site has been validated by USGS, there has been considerable change to the site since it was last active, including the washing out of fill between the gage house and toe of slope.

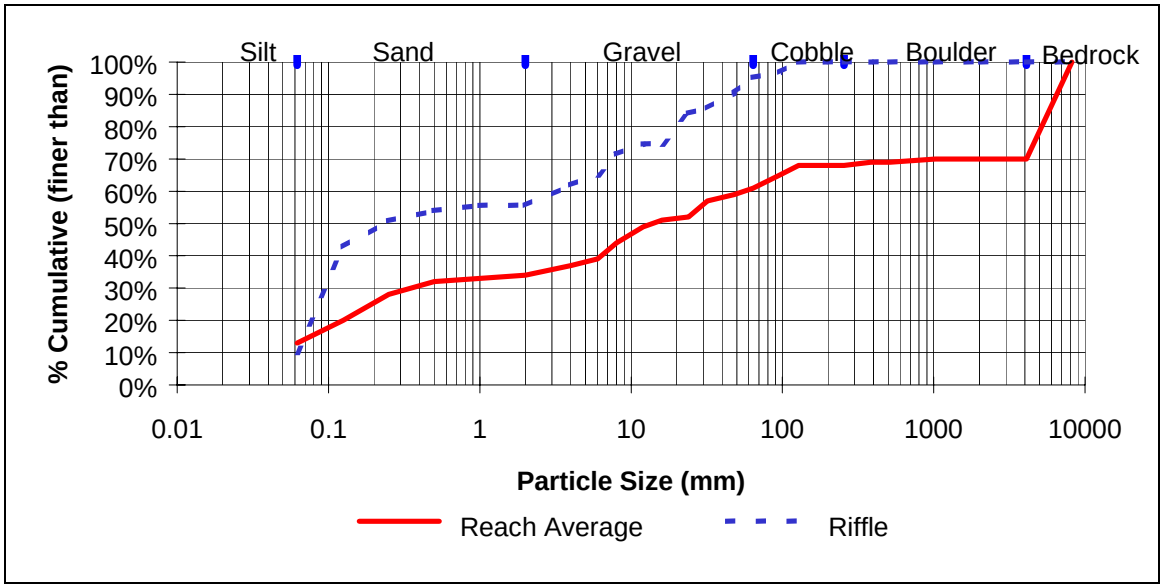
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	219.70	Q_{bkf} / $Q_{1.5}$:	1.00
Bankfull Return Interval (R.I.):	1.47	Q_{bkf} / $Q_{2.0}$:	0.82
Gage Height (ft):	2.89		

STUDY REACH SURVEY INFORMATION

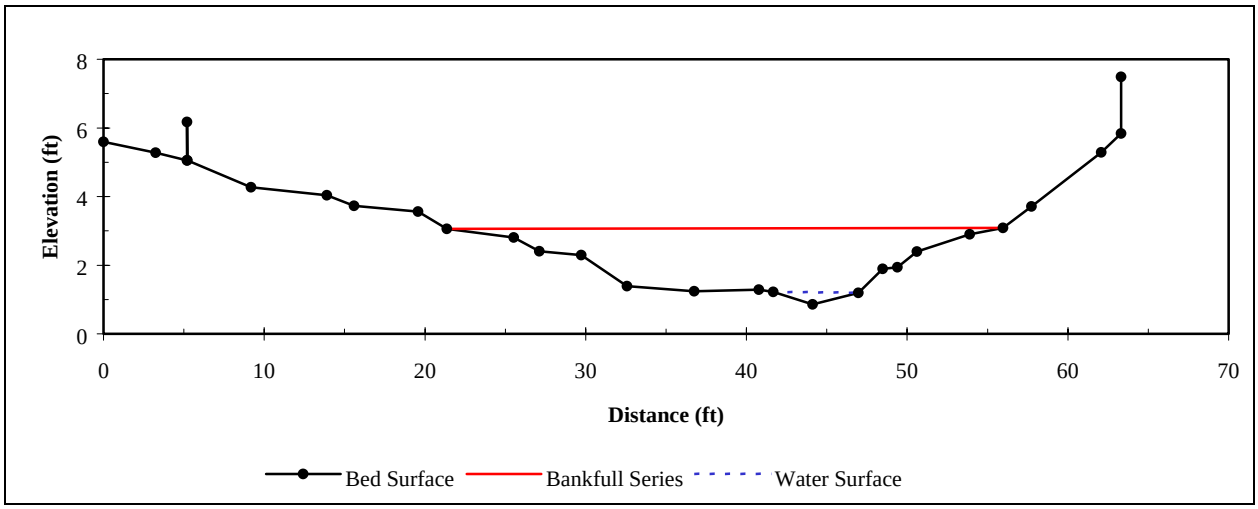
Average Water Surface Slope (ft/ft):	0.0120	Flood-prone Width (ft):	59.00
Manning's "n":	0.032	Entrenchment Ratio:	1.71
Mean Bankfull Velocity (ft/sec):	5.51	Width/Depth Ratio:	30.09
u/u*:	8.35	Channel Sinuosity:	1.22
R/D_{84}:	14.48	Beltwidth (ft):	82
Froude Number:	0.91	Meander Width Ratio:	2.37

SAWPIT RUN NEAR OLDTOWN, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.08	0.06
D_{35}	2.52	0.10
D_{50}	13.86	0.23
D_{84}	BEDROCK	23.87
D_{95}	BEDROCK	63.09

STUDY REACH CROSS SECTION



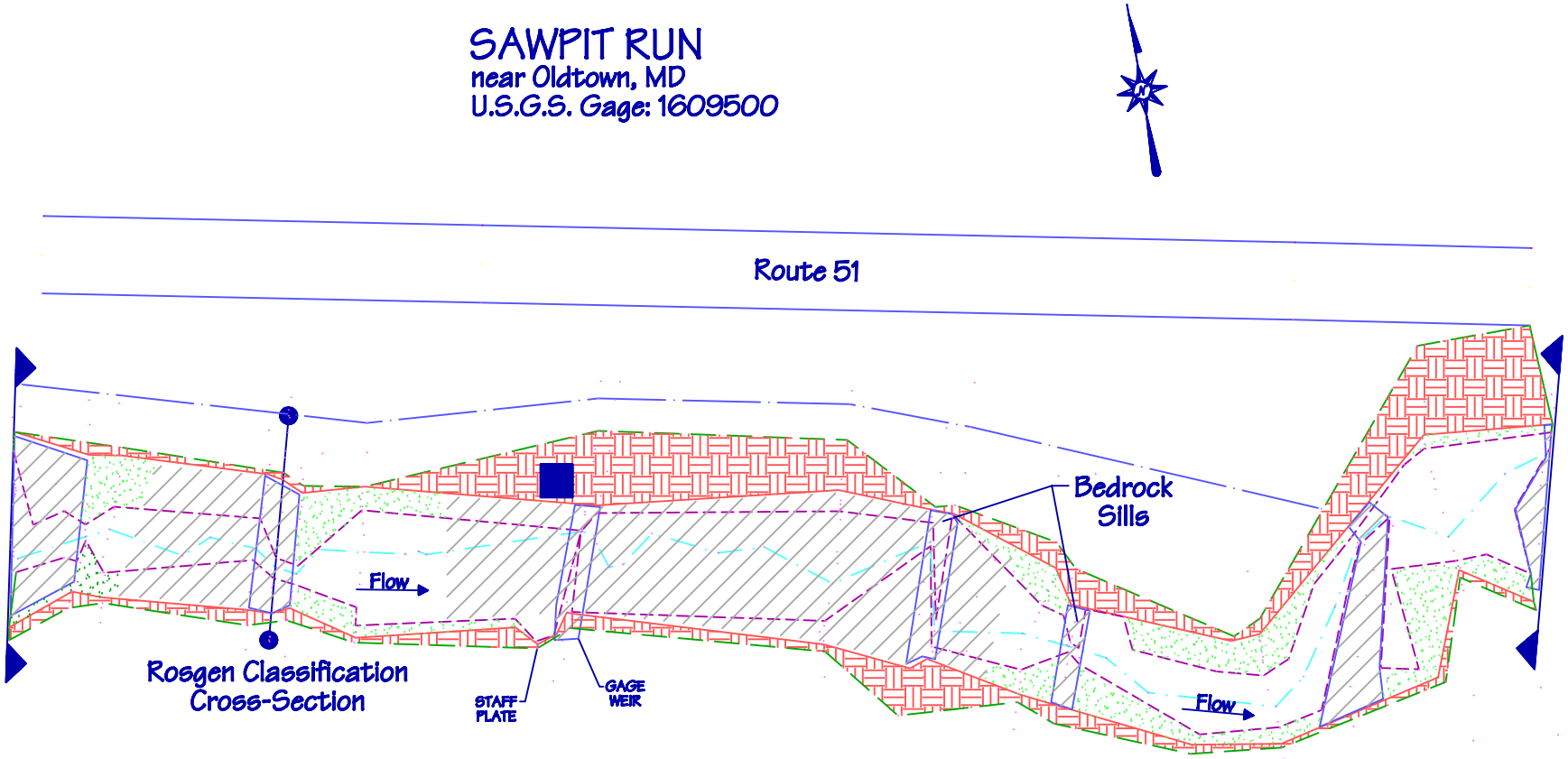
Bankfull Width (ft):	34.60	Mean Bankfull Depth (ft):	1.15
Bankfull Cross-sectional Area (ft^2):	39.85	Maximum Bankfull Depth (ft):	2.22
Hydraulic Radius (ft):	1.13	Wetted Perimeter (ft):	35.14

Sawpit Run near Oldtown, Maryland

Downstream view of classification cross-section

Left bank of classification cross-section

SAWPIT RUN
near Oldtown, MD
U.S.G.S. Gage: 1609500



LEGEND

- Top of Bank :
- Bankfull :
- Edge of Water :
- Thalweg :
- Toe of Slope:
- Earth :
- Gravel/Cobble :
- Bedrock:
- Gage House:
- Limit of Study Reach:

Scale (ft): 0 25 50 100

Survey Dates: 9/22/00, 10/3/00, & 10/4/00
Study Reach Length: 485'

Classification Cross-Section Monument Locations:
Left Monument (+/- 22'):
39* 32' 48.84" N
78* 33' 17.81" W
Elevation: 521'

Right Monument (+/- 23'):
39* 32' 48.85" N
78* 33' 18.01" W
Elevation: 592'

SIDELING HILL CREEK NEAR BELLEGROVE, MD
USGS STATION NUMBER: 1610155

Latitude:	39º 38' 58"	Gage Period of Record:	1967 – 1977
Longitude:	78º 20' 40"		1999 - Present
ADC Map Coordinates:	Wash./2000	Mean Annual Discharge (cfs):	114.00
	Map 14/B3	Rosgen Stream Type:	B4/1c
Drainage Area (sq. mi.):	102.00	Survey Date:	Sept. 1999
Stream Order / Magnitude:	4/121		Oct. 2000
Percent Imperviousness:	N/A		

Land Use (%): Residential: 0.55 Agricultural: 22.31 Forest: 76.70 Commercial: 0.03

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 683.60 $Q_{1.5}$: 2650.00 $Q_{2.0}$: 3658.00
(Log-Pearson Period: 1968 – 1977, 1999 - 2001)

General Study Reach Description: The study reach starts 84 feet downstream of the gage intake. The channel has pool/riffle features and point and side bar depositional features. The channel appears vertically stable with little scour - there is some bedrock control in the study reach. The floodplain vegetation is moderately dense to dense with red maple, sycamore, tulip poplar, river birch, and basswood. Land use/land cover data provided for MD portion of drainage area only, which represents 72 percent of the drainage.

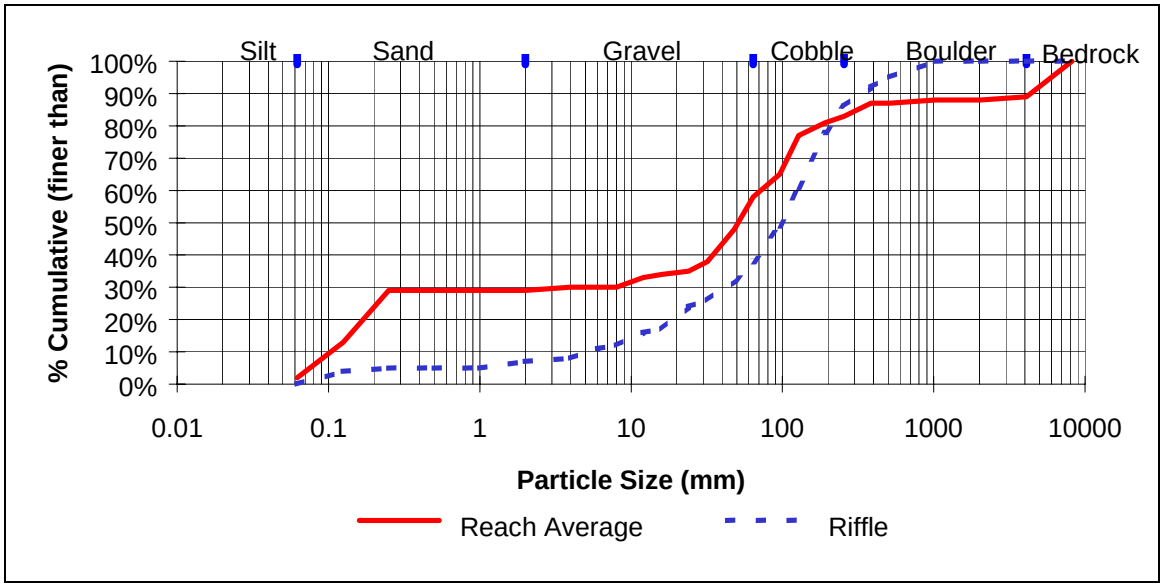
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	2726.00	Q_{bkf} / $Q_{1.5}$:	1.03
Bankfull Return Interval (R.I.):	1.53	Q_{bkf} / $Q_{2.0}$:	0.75
Gage Height (ft):	5.93		

STUDY REACH SURVEY INFORMATION

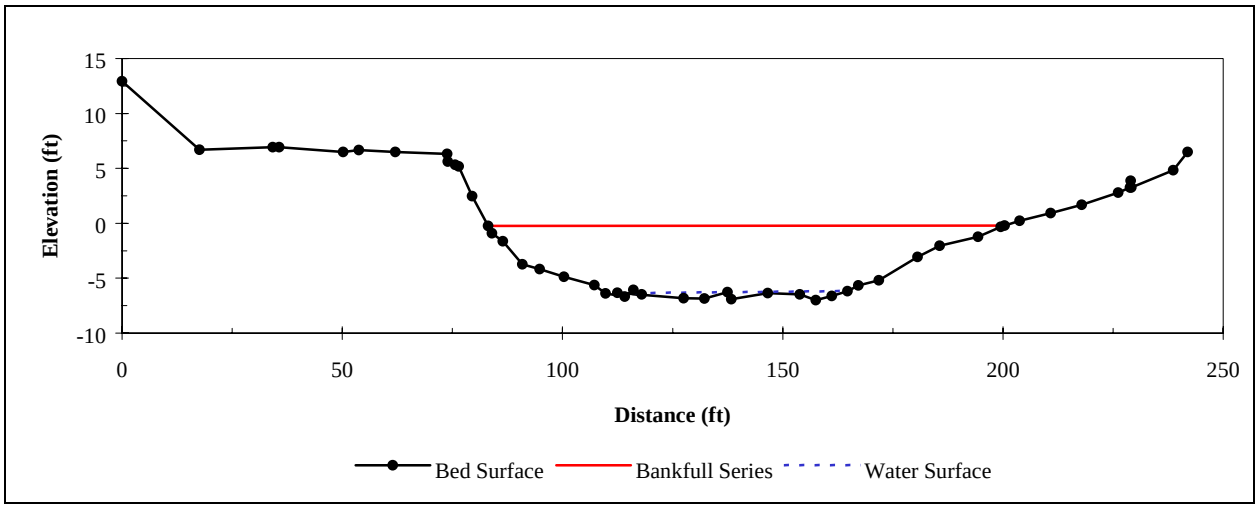
Average Water Surface Slope (ft/ft):	0.0040	Flood-prone Width (ft):	188.00
Manning's "n":	0.053	Entrenchment Ratio:	1.60
Mean Bankfull Velocity (ft/sec):	4.75	Width/Depth Ratio:	23.93
u/u*:	6.33	Channel Sinuosity:	1.93
R/D_{84}:	5.64	Beltwidth (ft):	157
Froude Number:	0.40	Meander Width Ratio:	1.34

SIDELING HILL CREEK NEAR BELLEGROVE, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.14	12.00
D_{35}	24.00	55.43
D_{50}	50.84	98.33
D_{84}	283.31	238.23
D_{95}	BEDROCK	512.00

STUDY REACH CROSS SECTION



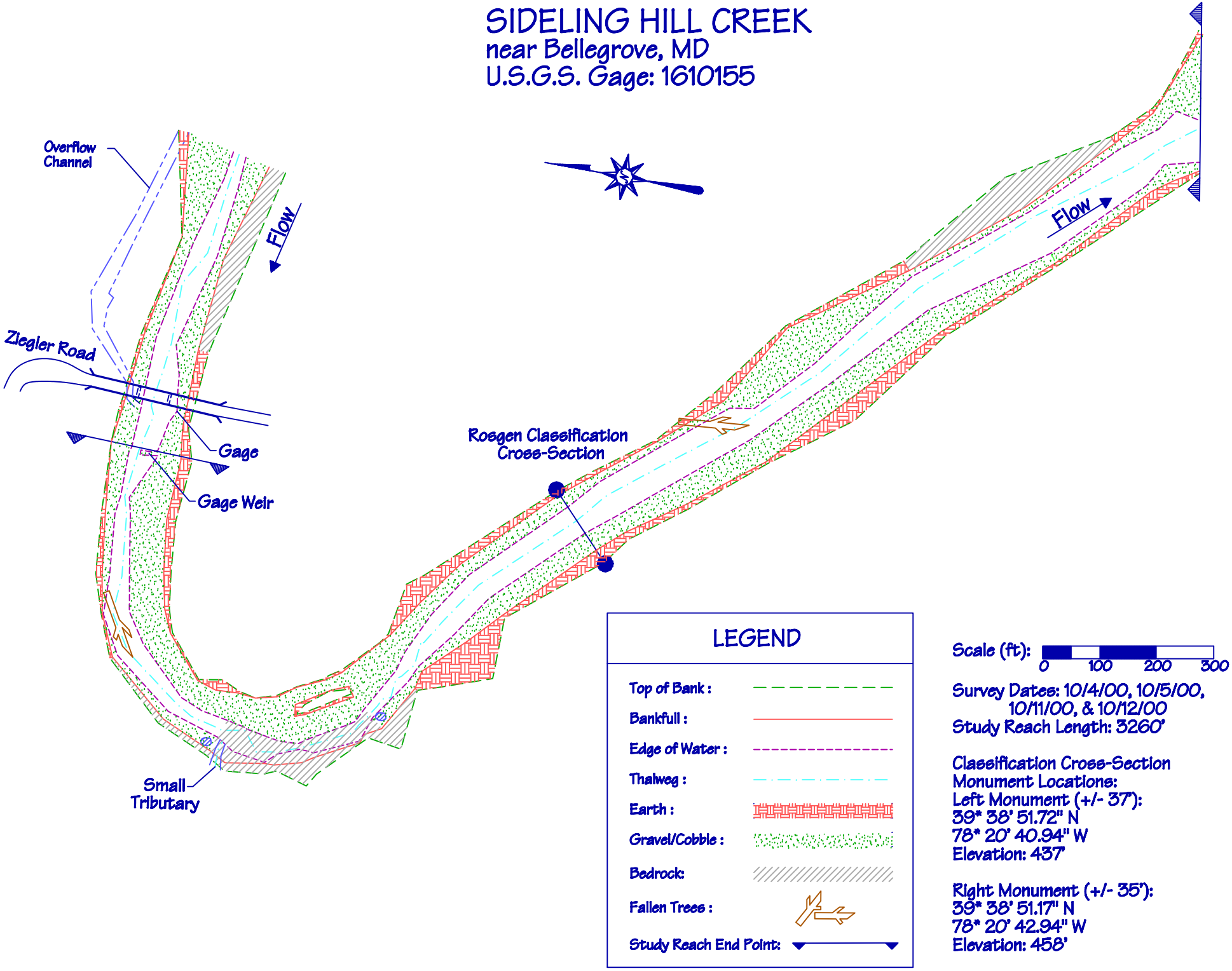
Bankfull Width (ft):	117.27	Mean Bankfull Depth (ft):	4.90
Bankfull Cross-sectional Area (ft^2):	574.32	Maximum Bankfull Depth (ft):	6.79
Hydraulic Radius (ft):	4.40	Wetted Perimeter (ft):	130.38

Sideling Hill Creek near Bellegrove, Maryland

Upstream view of classification cross-section

Left bank of classification cross-section

SIDELING HILL CREEK
near Bellegrove, MD
U.S.G.S. Gage: 1610155



Survey Dates: 10/4/00, 10/5/00, 10/11/00, & 10/12/00
Study Reach Length: 3260'

Classification Cross-Section Monument Locations:
Left Monument (+/- 37'):
39* 38' 51.72" N
78* 20' 40.94" W
Elevation: 437'

Right Monument (+/- 35'):
39* 38' 51.17" N
78* 20' 42.94" W
Elevation: 458'

TOLIVER RUN TRIBUTARY NEAR HOYES, MD
USGS STATION NUMBER: 3075600

Latitude:	39º 29' 39"	Gage Period of Record:	1965 – 1986
Longitude:	79º 25' 14"	Mean Annual Discharge (cfs):	N/A
Map Coordinates:	MD&DE Gazett. Map 65/D5	Rosgen Stream Type:	B4
		Survey Date:	Sept. 1999
Drainage Area (sq. mi.):	0.53		Sept. 2000
Stream Order / Magnitude:	1/1		
Percent Imperviousness:	0.00		

Land Use (%): Residential: N/A Agricultural: 32.53 Forest: 67.47 Commercial: N/A

Log-Pearson Flood Frequency Discharge (cfs): (Log-Pearson Period: 1965 – 1986)	$Q_{1.005}$: 7.47 (high-outlier adjusted values)	$Q_{1.5}$: 22.33 (high-outlier adjusted values)	$Q_{2.0}$: 29.51 (high-outlier adjusted values)

General Study Reach Description: The study reach is 45 feet upstream from the discontinued crest gage. The channel has pool/riffle features with point and side bar deposition with woody debris and vegetation influencing side bar locations. There are large boulders up and downstream of the cross-section location. The floodplain vegetation is dense with green ash, black cherry, white pine, and hemlock. The understory is dense with witch hazel, ninebark, and spice bush. The large amount of woody debris, vegetation, and boulders influence channel velocities.

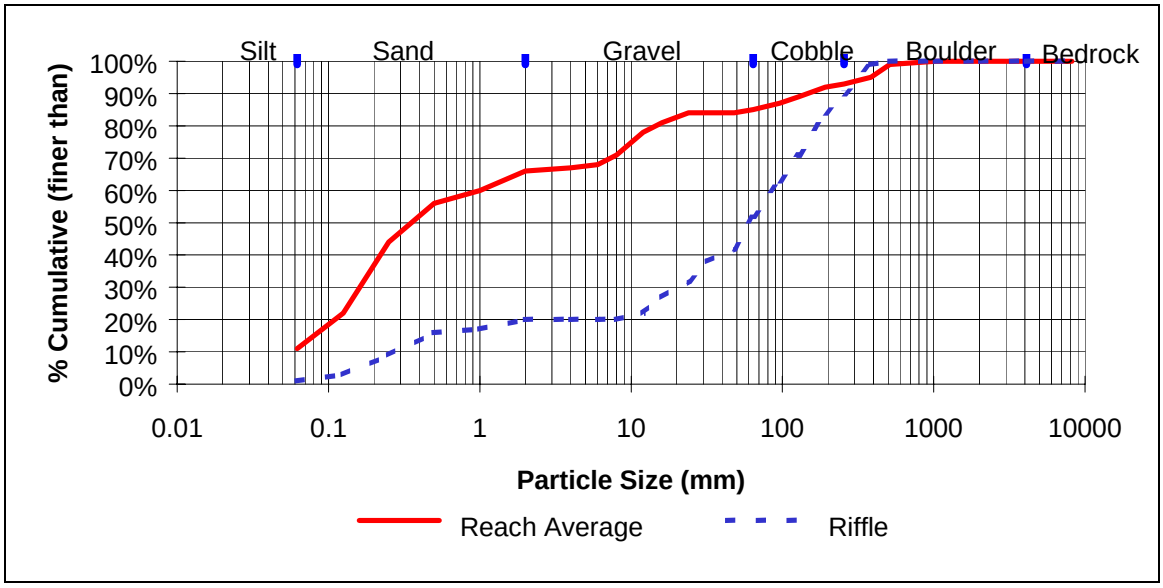
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	23.66	Q_{bkf} / $Q_{1.5}$:	1.06
Bankfull Return Interval (R.I.):	1.60	Q_{bkf} / $Q_{2.0}$:	0.80
Gage Height (ft):	4.59		

STUDY REACH SURVEY INFORMATION

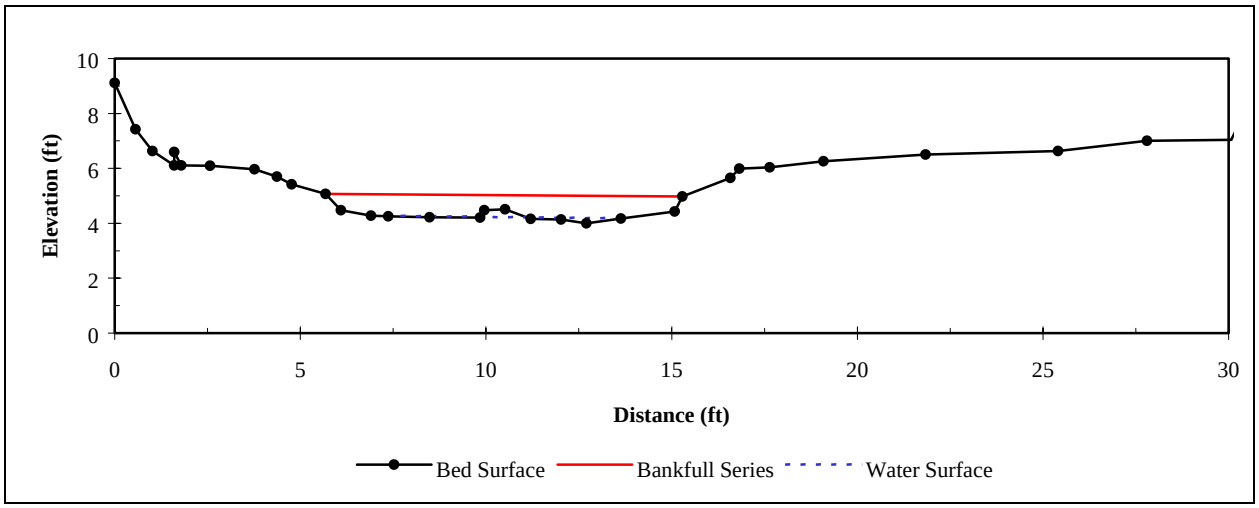
Average Water Surface Slope (ft/ft):	0.0225	Flood-prone Width (ft):	15.00
Manning's "n":	0.052	Entrenchment Ratio:	1.56
Mean Bankfull Velocity (ft/sec):	3.30	Width/Depth Ratio:	12.81
u/u*:	4.71	Channel Sinuosity:	1.08
R/D_{84}:	1.07	Beltwidth (ft):	35.0
Froude Number:	0.71	Meander Width Ratio:	3.59

TOLIVER RUN TRIBUTARY NEAR HOYES, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.09	5.00
D_{35}	0.19	27.71
D_{50}	0.35	60.42
D_{84}	48.00	192.00
D_{95}	384.00	320.68

STUDY REACH CROSS SECTION



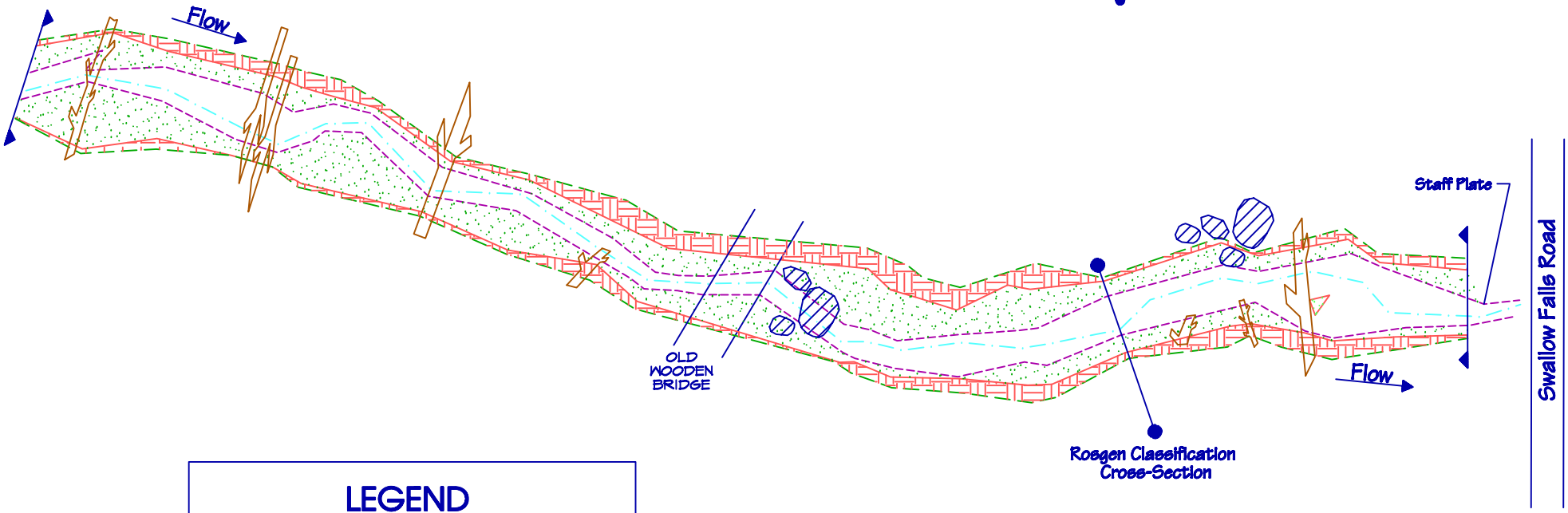
Bankfull Width (ft):	9.61	Mean Bankfull Depth (ft):	0.75
Bankfull Cross-sectional Area (ft^2):	7.18	Maximum Bankfull Depth (ft):	1.00
Hydraulic Radius (ft):	0.67	Wetted Perimeter (ft):	10.64

Toliver Run Tributary near Hoyes, Maryland

Upstream view of classification cross-section

Right bank of classification cross-section

TOLIVER RUN TRIBUTARY
near Hoyes Run, MD
U.S.G.S. Gage: 3075600



LEGEND

Top of Bank :

Bankfull :

Edge of Water :

Thalweg :

Earth :

Gravel/Cobble :

Fallen Trees :

Limit of Study Reach:

Scale (ft): 0 25 50

Survey Dates: 9/13/00 & 9/14/00
Study Reach Length: 259'

Classification Cross-Section
Monument Locations:
Left Monument (+/- 31'):
39* 29' 37.25" N
79* 25' 13.56" W
Elevation: 2548'

Right Monument (+/-23 '):
39* 29' 37.58" N
79* 25' 13.31" W
Elevation: 2326'

YOUGHIOGHENY RIVER TRIBUTARY NEAR FRIENDSVILLE, MD
USGS STATION NUMBER: 3076505

Latitude:	39º 39' 48"	Gage Period of Record:	1965 – 1976
Longitude:	79º 25' 42"	Mean Annual Discharge (cfs):	N/A
Map Coordinates:	MD&DE Gazett. Map 65/B5	Rosgen Stream Type:	B4
		Survey Date:	Sept. 1999
Drainage Area (sq. mi.):	0.22		Sept. 2000
Stream Order / Magnitude:	1/1		
Percent Imperviousness:	0.00		

Land Use (%): Residential: N/A Agricultural: 38.89 Forest: 61.11 Commercial: N/A

Log-Pearson Flood Frequency Discharge (cfs): $Q_{1.005}$: 5.00 $Q_{1.5}$: 10.00 $Q_{2.0}$: 11.80
(Log-Pearson Period: 1965 – 1976)

General Study Reach Description: The study reach is 100 feet upstream of the discontinued crest gage. The channel has pool/riffle features with point and side bar deposition with woody debris and vegetation influencing side bar locations. The floodplain vegetation is moderately dense with beech, tulip poplar, shag bark hickory, basswood, black cherry, and white oak. The understory is moderately dense witch hazel and spice bush.

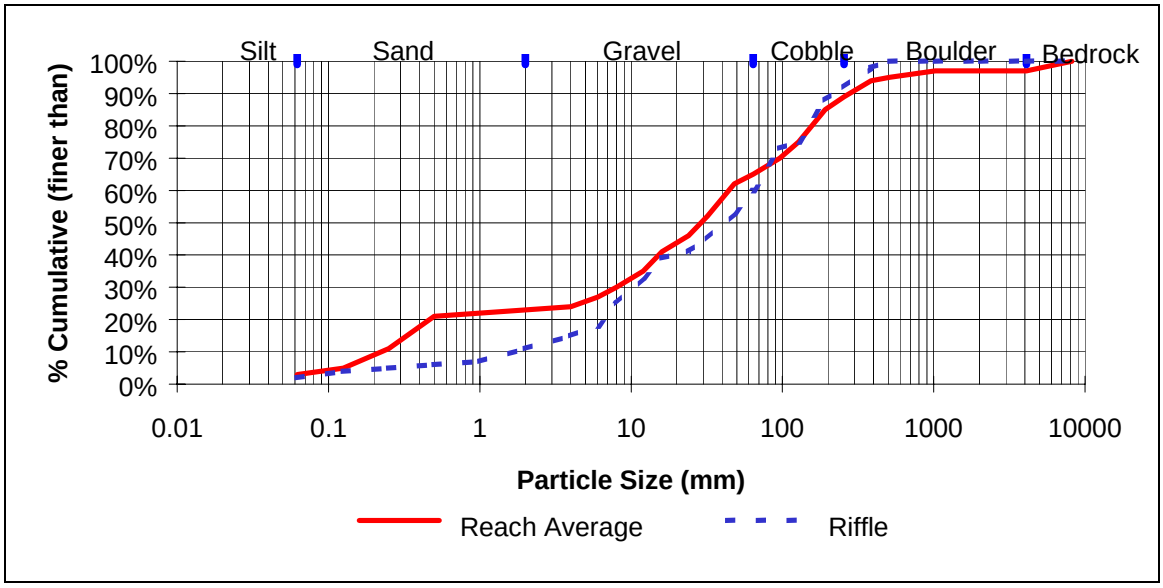
DISCHARGE BASED ON SURVEY OF GEOMORPHIC FEATURES

Bankfull Discharge (Q_{bkf} cfs):	7.00	Q_{bkf} / $Q_{1.5}$:	0.70
Bankfull Return Interval (R.I.):	1.05	Q_{bkf} / $Q_{2.0}$:	0.59
Gage Height (ft):	8.96		

STUDY REACH SURVEY INFORMATION

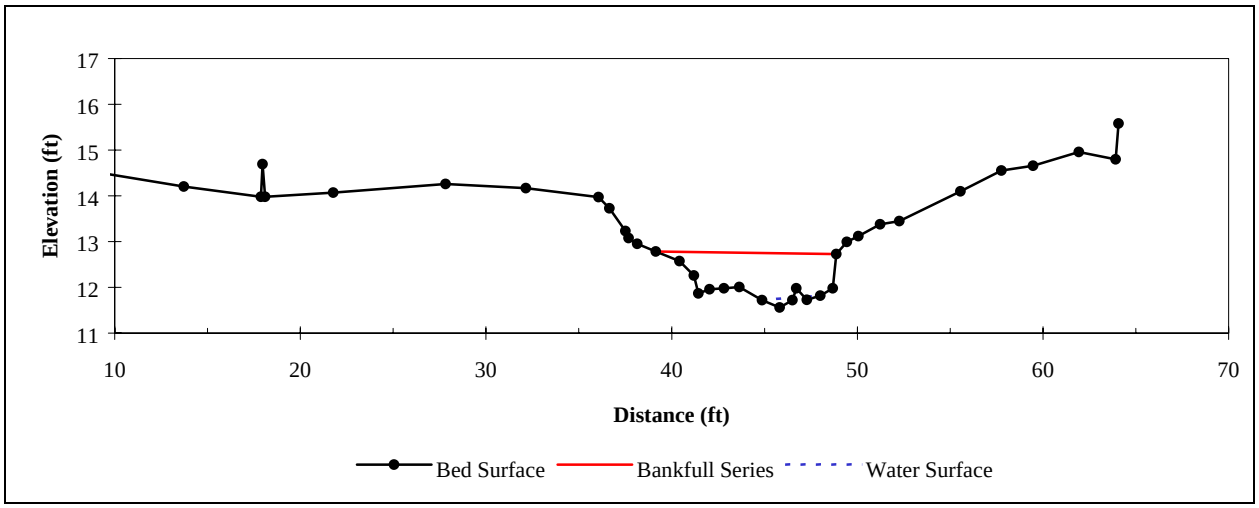
Average Water Surface Slope (ft/ft):	0.0468	Flood-prone Width (ft):	19.50
Manning's "n":	0.254	Entrenchment Ratio:	2.00
Mean Bankfull Velocity (ft/sec):	0.97	Width/Depth Ratio:	12.97
u/u*:	0.97	Channel Sinuosity:	1.31
R/D_{84}:	1.20	Beltwidth (ft):	82
Froude Number:	0.21	Meander Width Ratio:	8.43

YOUGHIOGHENY RIVER NEAR FRIENDSVILLE, MD
PARTICLE SIZE DISTRIBUTION



Particle Size (mm)		
Finer Than	Reach	Riffle
D_{16}	0.35	4.58
D_{35}	12.00	13.21
D_{50}	29.07	41.23
D_{84}	184.37	169.48
D_{95}	512.00	313.53

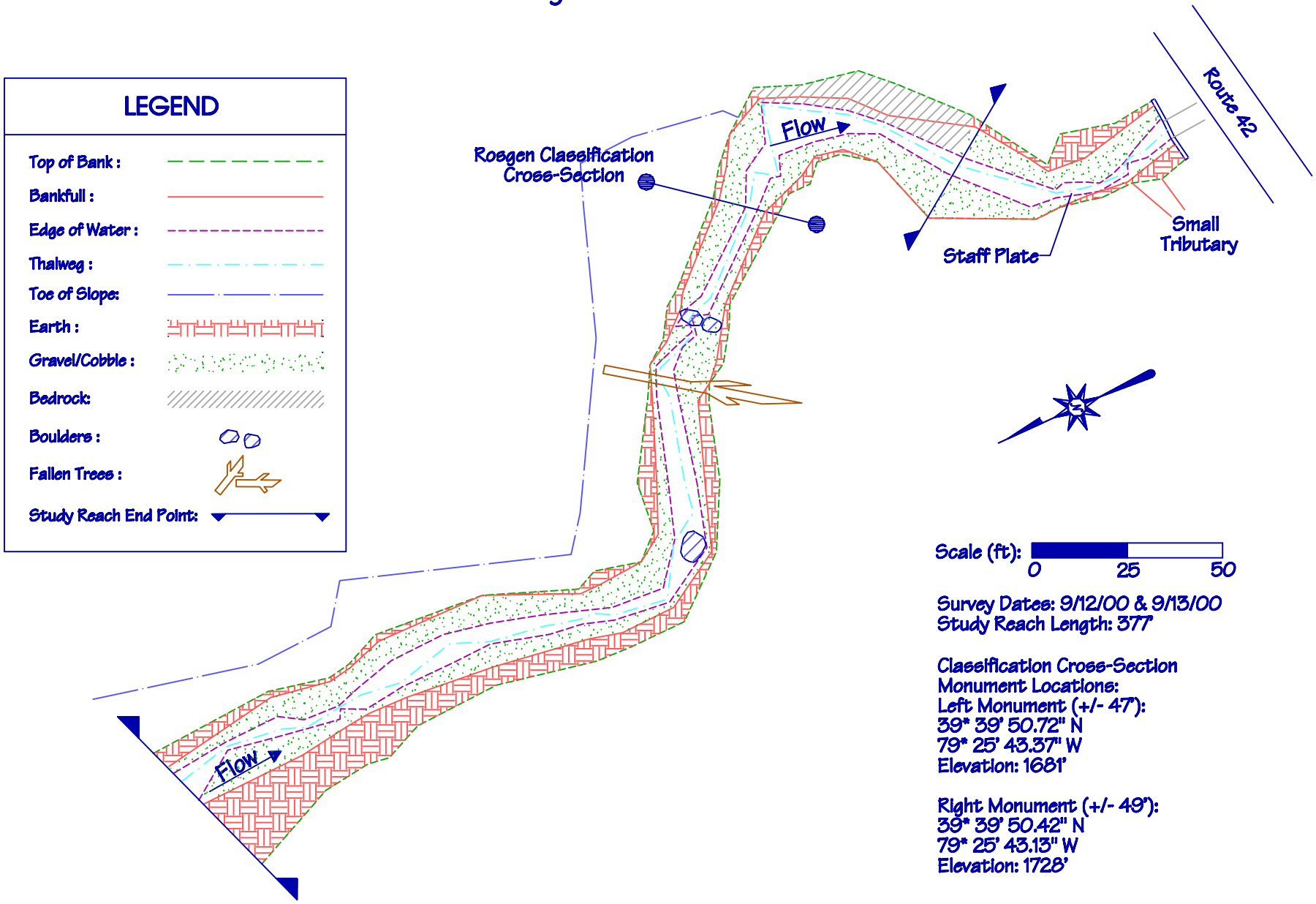
STUDY REACH CROSS SECTION



Bankfull Width (ft):	9.73	Mean Bankfull Depth (ft):	0.75
Bankfull Cross-sectional Area (ft^2):	7.25	Maximum Bankfull Depth (ft):	1.19
Hydraulic Radius (ft):	0.67	Wetted Perimeter (ft):	10.88

Youghiogheny River Tributary near Friendsville, Maryland

Upstream view of classification cross-section

Right bank of classification cross-section

YOUGHIOGHENY RIVER TRIBUTARY
near Friendsville, MD
U.S.G.S. Gage: 3076505