

Rocky Branch Stream Restoration

Yadkin County, North Carolina

2012 Year 5 Monitoring Report - Final

EEP Project Number: 308

USGS HUC 03040102

EcoEngineering Project Number: EEP-08020

Prepared for:

NCDENR Ecosystem Enhancement Program

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Table of Contents

1.0 Executive Summary/Project Abstract.....	1
1.1 Project Goals and Objectives.....	1
1.2 Vegetation Condition and Comparison	1
1.3 Stream Stability/Condition and Comparison.....	2
1.4 Wetland Conditions and Performance	3
1.5 Narrative Background.....	3
2.0 Methodology.....	3
3.0 References.....	4

Project Conditions and Monitoring Data Appendices

Appendix A – General Figures and Plan Views

- Figure 1. Vicinity Map
- Figure 2. Consolidated Current Condition Plan View

Appendix B – General Project Tables

- Table 1. Project Restoration Components
- Table 2. Project Activity and Reporting History
- Table 3. Project Contacts Table
- Table 4. Project Attribute Table

Appendix C – Vegetation Assessment Data

- Table 5. Vegetation Plot Mitigation Success Summary Table
- Table 6. Vegetation Metadata Table
- Table 6A. Vegetation Condition Assessment
- Table 7. Stem Count Total and Planted by Plot Species
 - Vegetation Monitoring Plot Photos
 - Vegetation Problem Area Photos (submitted electronically)
 - Vegetation Problem Area Inventory Table (submitted electronically)

Appendix D – Stream Assessment Data

- Table 8. Visual Morphological Stability Assessment
- Table 9. Verification of Bankfull Events
- Stream Station Photos
- Cross Sections with Annual Overlays
- Longitudinal Profiles with Annual Overlays
- Pebble Count Plots with Annual Overlays
- BEHI and Sediment Export Estimates Table (omitted, not applicable)
- Baseline Stream Data Summary Table [Exhibit Table VIII] (submitted electronically)
- Morphology and Hydraulic Monitoring Summary [Exhibit Table IX] (Cross Section and Reach Parameters submitted electronically)
- Stream Problem Area Photos (submitted electronically)
- Stream Problem Area Inventory Table (submitted electronically)

Appendix E – Wetland Assessment

Table 10. Wetland Criteria Attainment (omitted, not applicable)
– Precipitation and Water Level Plots (omitted, not applicable)

1.0 Executive Summary/Project Abstract

1.1 Project Goals and Objectives

The goals of this stream restoration project were to:

- To improve the overall water quality and aquatic habitat in and around the stream channels by reducing sediment and waste inputs into the stream caused by bank erosion, mass-wasting, and livestock influences.
- To improve the richness and diversity of the plant species within the conservation easement.
- To facilitate on-going livestock operations through farm management improvements.
- To provide perpetual protection for the restored stream channels and associated riparian and upland buffers.

These goals will be met through the following objectives:

- By using natural channel design to restore stable dimension, pattern, and profile for the project stream reaches.
- By establishing a native plant community to match the endemic plant species at the site.
- By reducing the quantities of exotic invasive species at the site through mechanical and chemical methods.
- By decommissioning a dairy waste storage pond to eliminate future risks to the Rocky Branch channel and the watershed.
- By installing watering facilities and a shadehouse to manage livestock previously using the restoration site.
- By establishing a conservation easement and permanent fencing to provide long-term protection for the site. (Mulkey, 2008)

1.2 Vegetation Condition and Comparison

Original baseline vegetation monitoring data was not provided prior to the 2008 Monitoring Year 1 and 2008 is considered a drought year. The 2009 Monitoring Year 2 is considered the baseline datum because after two years of monitoring it is assumed all planted stems within a vegetation monitoring plot have been surveyed and accounted for. Therefore, any additional species observed in proceeding monitoring years are considered volunteer species. The 2012 Monitoring Year 5 data was provided by Carolina Vegetation Survey and was not manipulated for presentation within Table 7 - Stem Count Total and Planted by Plot Species **Appendix C.**

Current stem counts were calculated using vegetation plot monitoring data. Interim density targets (stems/acre) are 320 at year 3 and 288 at year 4. Final stem count criteria are 260 trees per acre at the end of the five (5) year monitoring. As for monitored Year 5, the Rocky Branch Stream Restoration Site had 11 plots encompassing 0.27 acres, containing a total of 145 planted stems excluding live stakes. In total, the 11 vegetation plots yielded a density of

534 planted trees per acre excluding live stakes. These density totals exceed the requirements by 10% for both planted trees per acre excluding live stakes. With regard to each individual vegetation plot, all of the vegetation plots exceeded the requirements by 10% when examining planted stems excluding live stakes.

Exotic/invasive species were observed at the site. Exotic species observed at the site include Chinese privet (*Ligustrum sinense*), Chinese lespedeza (*Lespedeza cuneata*), multiflora rose (*Rosa multiflora*), and cattail (*Typha latifolia*). There are seventeen (17) areas in which exotic/invasive species were observed totaling approximately 0.8 acres in size and are approximately 3.32% of the easement acreage. The extent of exotic/invasive species is depicted in the Consolidated Current Condition Plan View **Appendix A**.

1.3 Stream Stability/Condition and Comparison

Overall, the stream system appears stable and is not migrating toward lateral or vertical instability. Based on the prior year comparison using longitudinal profile data, it appears that minor systemic aggradation has occurred throughout the reach, although this condition does not appear to pose an imminent threat to the overall stability of the system. To document bankfull events, a crest gage is located within Vegetation Plot 10 and is depicted in the Consolidated Current Condition Plan View **Appendix A**. Evidence of a bankfull event was observed this monitoring year.

Throughout the monitoring years, the largest problem observed within the stream channel has been beaver activity. Between the 2008 Year 1 Monitoring and 2011 Year 4 Monitoring five (5) beaver dams were constructed at the Rocky Branch Stream Restoration Site. Over the years, four (4) of the beaver dams were removed. One (1) beaver dam, located at Station 22+00, was observed during the 2011 Year 4 Monitoring field activities. During the field investigations for the Initial Assessment (conducted on March 2, 2012) associated with 2012 Year 5 Monitoring, the beaver dam located at Station 22+00 was still present. In addition, four additional beaver dams were observed at Stations 20+50, 17+00, 14+75, and 12+75 and a beaver den was observed at Station 12+25. Therefore, a total of nine (9) beaver dams have been constructed at the Rocky Branch Stream Restoration Site since the 2008 Year 1 Monitoring. During the current 2012 Monitoring Year 5 field investigations (conducted between August 27 through August 31, 2012), it was determined that all beaver dams had been removed.

Overall, the channel morphology appeared stable during the 2012 Monitoring Year 5 field investigations. However, there are three (3) "J" hook structures (Structures Numbers: 14 - Station 11+90, 28 - 28+50, and 18 - Station 17+75; located on the Consolidated Current Conditions Plan View **Appendix A**) which have been compromised due to past beaver activities. The "J" hook structure located at Station 11+90 (Structure Number 14, Consolidated Current Conditions Plan View **Appendix A**) has been compromised since 2010 and could be contributing sediment loading downstream as evident in Cross Section 3. Cross Section 3 is of a pool feature and sediment has filled in this feature approximately 1 foot or more in some locations of the feature. In addition, located at Station 12+75 there is a mid-channel bar formation occurring within the stream channel.

Bank erosion predictions utilizing Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) assessment were not conducted for the entire project pre-construction as part of the existing conditions survey. Therefore, BEHI and NBS assessments are not applicable during Monitoring Year 5.

1.4 Wetland Conditions and Performance

No wetlands are being monitored for mitigation credits at this project site.

1.5 Narrative Background

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on the EEP website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 Methodology

All monitoring methodologies follow the most current templates and guidelines provided by EEP (EEP, 2006; EEP, 2009). Photographs were taken at high resolution using an Olympus FE-115 5.0 megapixel digital camera. GPS location information was collected using a Trimble Geo XT handheld mapping grade GPS unit. Stream and vegetation problem areas were noted in the field on As-Built Plan Sheets.

The methods used to generate the data in this report are standard fluvial geomorphology techniques as described in *Applied River Morphology* (Rosgen, 1996) and related publications from US Forest Service and the interagency Stream Mitigation Guidelines (USACE, 2003).

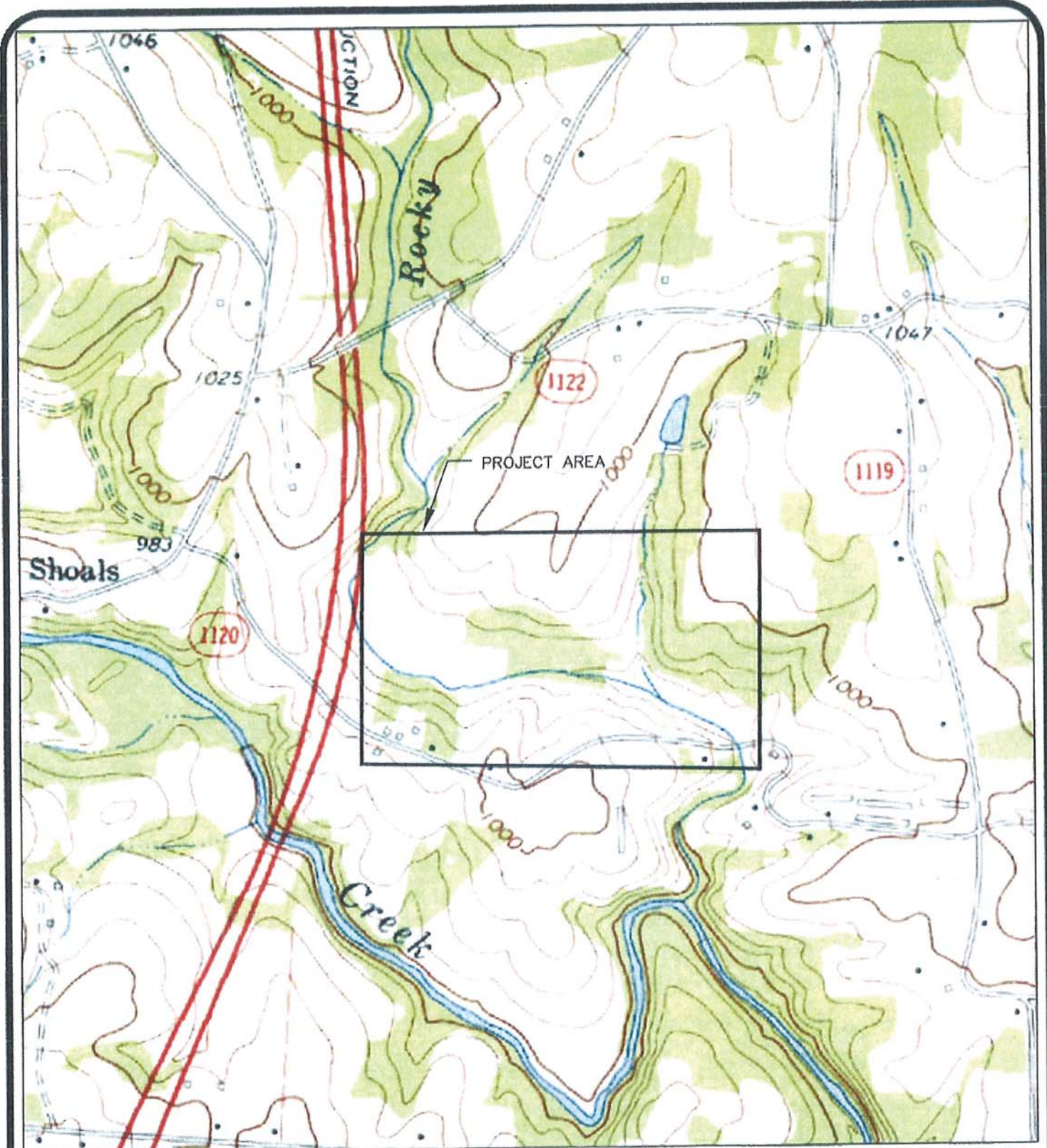
Vegetation monitoring methods followed the 2008, Version 4.2 CVS-EEP Protocol for Recording Vegetation (Lee et. al., 2008). Vegetation plot photographs were collected for each vegetation plot. Vegetation monitoring plots were re-marked in the field by replacing all old flagging with new orange flagging. Monitoring taxonomy follows *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2007). Stem height was measured with a folding one-meter rule. Diameter at breast height and decimeter height were measured with calipers.

3.0 References

- Ecosystem Enhancement Program (EEP), 2006. Monitoring Report Guidelines, November 16, 2006.
- Ecosystem Enhancement Program (EEP), 2009. Monitoring Report Guidelines, June 1, 2009.
- Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (<http://cvs.bio.unc.edu/methods.htm>)
- Mulkey Engineer and Consultants, 2008. As-Built Mitigation Plan Rocky Branch Stream Mitigation Report. Submitted to NCDENR-EEP, February 2008.
- Rosgen, D.L. 1996. Applied Morphology. Wildland Hydrology, Pagosa Springs, CO.
- US Army Corps of Engineers (USACE), 2003. April 2003 Stream Mitigation Guidelines.
- US Army Corps of Engineers (USACE), 2005. Information Regarding Stream Restoration In The Outer Coastal Plain of North Carolina. US Army Corps of Engineers, Wilmington District, Regulatory Division and North Carolina Department of Environment and Natural Resources, Division of Water Quality, December 1, 2005.
- Weakley, A. S., 2008. Flora of the Carolinas, Virginia, Georgia, northern Florida, and surrounding areas. University of North Carolina Herbarium (NCU), North Carolina Botanical Garden, University of North Carolina at Chapel Hill, working Draft as of April 7, 2008.

APPENDIX A

General Figures and Plan View



USGS, 7.5 MINUTE, TOPOGRAPHIC QUADRANGLE;
 BROOKS CROSSROADS, N.C.; 1970; LAT: 36.0943785' N
 LON: 80.8114769' W

McADAMS	PROJECT NO.	EEP-08020
	FILENAME:	EEP-08020
	SCALE:	1" = 1,000
	DATE:	10-10-12



ROCKY BRANCH
VICINITY MAP
 YADKIN COUNTY, NORTH CAROLINA

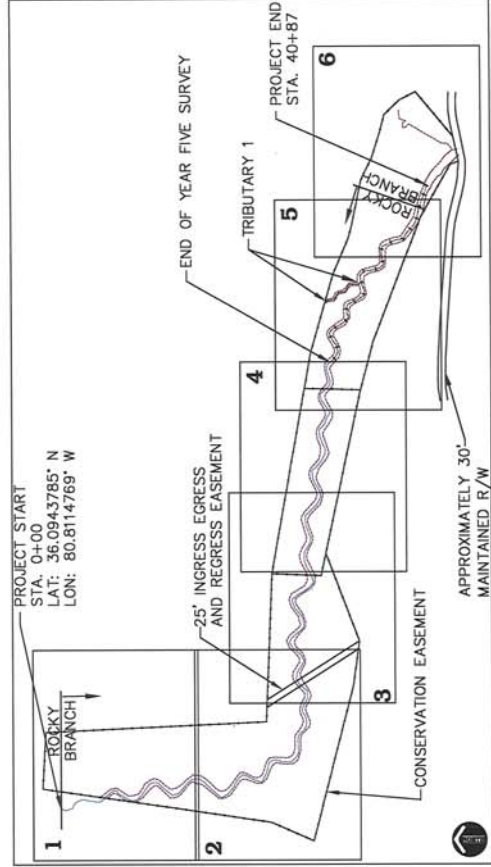
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ROCKY BRANCH

CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR FIVE MONITORING

YADKIN COUNTY, NORTH CAROLINA
 EEP PROJECT NUMBER: 308
 DATE: OCTOBER 10, 2012

NORTH CAROLINA
 ECOSYSTEM ENHANCEMENT PROGRAM
 NC-EEP CONTACT: HARRY TSONMIDES (828) 545-7057



POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	858613.92	1464784.39	988.25	CONTROL
2	857796.36	1464784.39	983.60	CONTROL
3	857497.74	1465282.84	921.75	CONTROL
4	857374.24	1465969.69	943.35	CONTROL
5	857383.41	1466065.73	924.76	CONTROL
6	857286.17	1466363.15	945.11	CONTROL
7	857266.84	1466394.42	929.13	CONTROL
8	857303.08	1466284.74	929.13	CONTROL
9	856985.08	1465924.76	988.05	CONTROL
10	856996.29	1465466.36	975.98	CONTROL
11	856897.33	1467398.25	917.61	CONTROL
100	857654.87	1467441.85	917.74	CONTROL
101	858419.60	1464837.37	930.60	CONTROL
102	858025.29	1465002.38	927.84	CONTROL
103	858597.92	1464848.09	933.38	CONTROL
104	858530.63	1465077.59	969.73	CONTROL
105	857360.69	1465445.98	923.35	CONTROL
106	858369.21	1464990.27	949.60	N. SET
107	858049.05	1465093.95	941.04	N. SET
108	857672.99	1465037.40	925.10	N. SET
109	857588.08	1466070.12	933.45	N. SET
110	857683.76	1466070.12	916.28	N. SET
111	857683.76	1465077.56	939.66	N. SET
1000	858593.24	1465085.05	944.54	TYP100
9003	858597.24	1464899.97	934.86	R/W MON
9004	858162.33	1464795.63	928.21	BENCHMARK 1
9005	858025.27	1465002.36	927.84	TYP102
9006	857685.27	146516.37	924.65	BENCHMARK 3
9007	857560.18	1463779.26	921.38	BENCHMARK 4
9008	857360.66	1465446.04	923.31	TYP105
9009	857593.68	1466280.77	919.02	BENCHMARK 5
9010	857439.76	1466843.27	918.41	BENCHMARK 6
9011	857317.78	1466690.43	919.68	BENCHMARK 7

NOTE: SURVEY DATES OF THALWEG AND TOP-OF-BANK - 08/27/12 TO 08/31/12.

SHEET INDEX
 1-6 CONSOLIDATED CURRENT CONDITIONS PLAN VIEW



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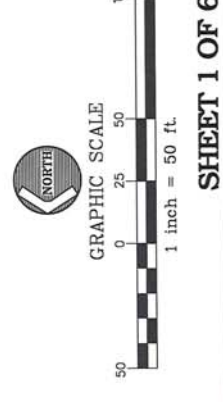
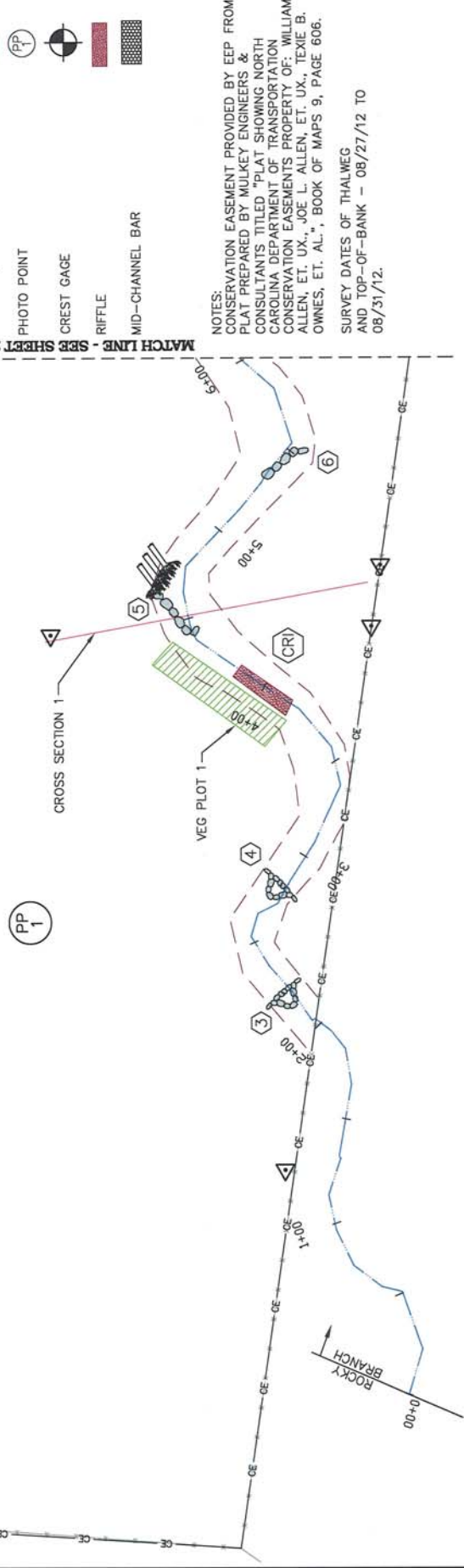


LEGEND

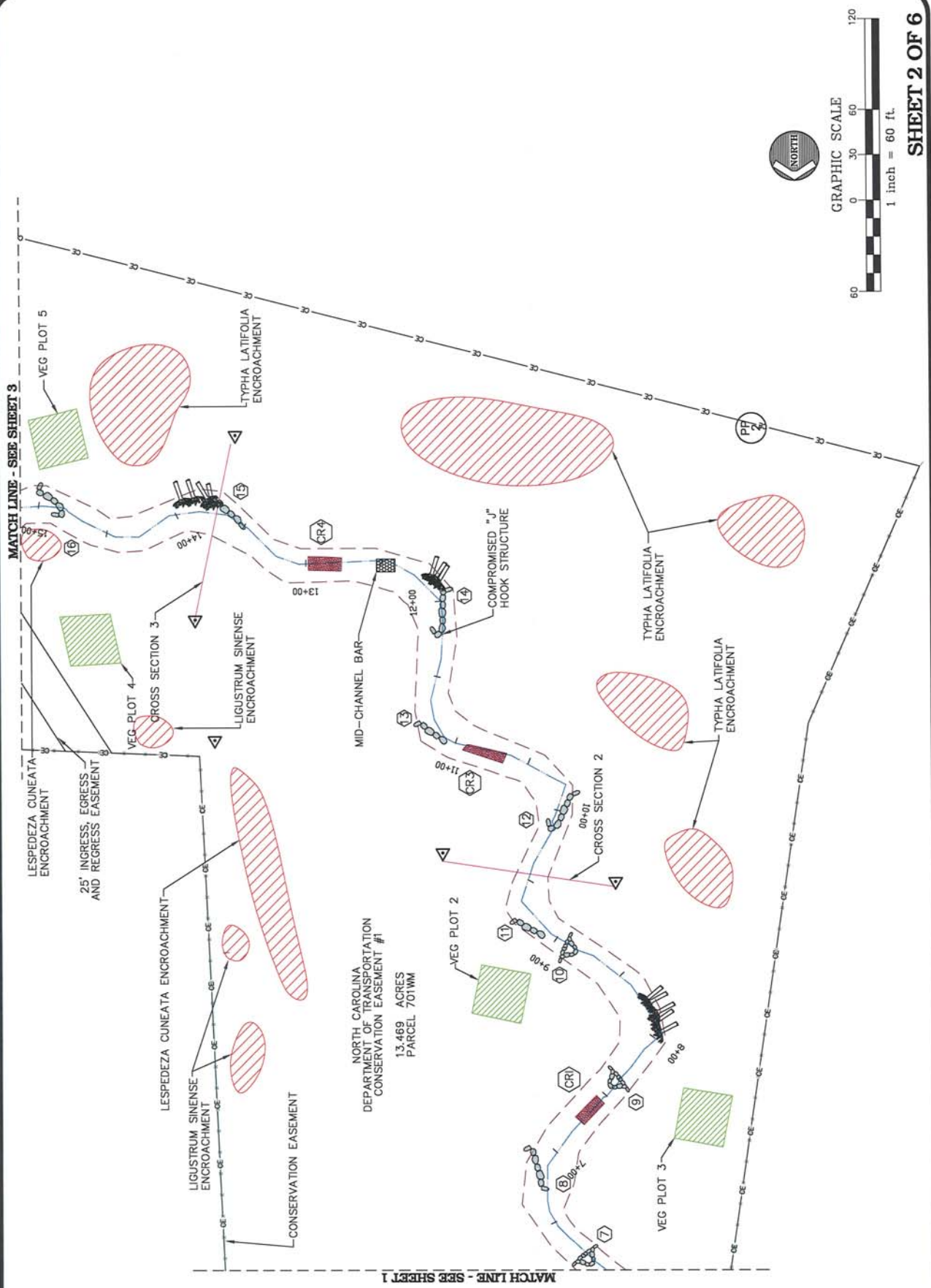
	EXISTING FENCE LINE
	THALWEG OF CREEK
	CONSERVATION EASEMENT
	ROCK CROSS VANE
	ROCK A-VANE
	LOG VANE
	ROOT WAD
	ROCK VANE
	STRUCTURE NUMBER
	SURVEY CONTROL
	INVASIVE / EXOTIC POPULATION
	PHOTO POINT
	CREST GAGE
	RIFFLE
	MID-CHANNEL BAR

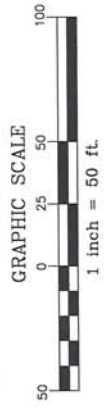
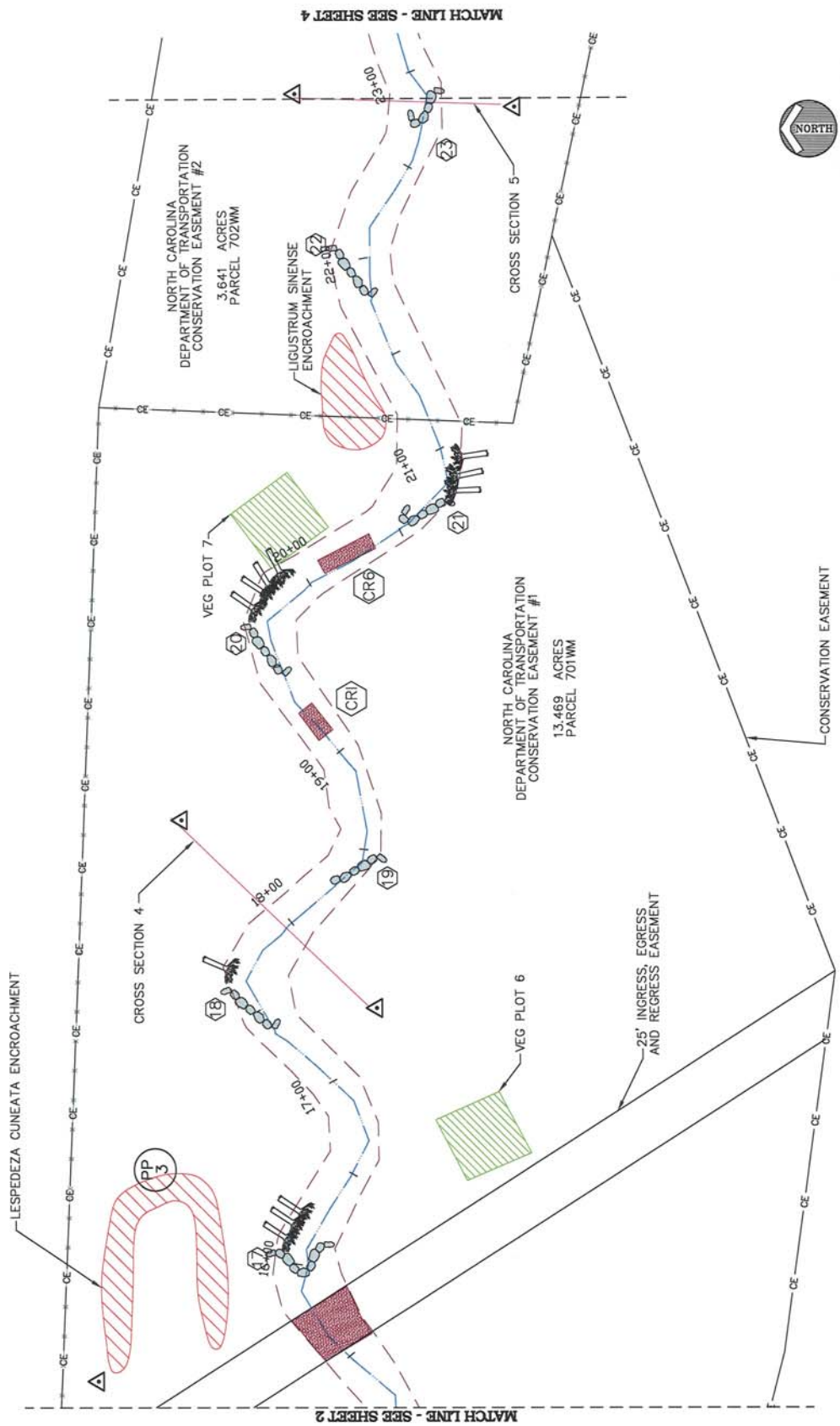
NOTES:
 CONSERVATION EASEMENT PROVIDED BY EEP FROM
 PLAT PREPARED BY MULKEY ENGINEERS &
 CONSULTANTS TITLED "PLAT SHOWING NORTH
 CAROLINA DEPARTMENT OF TRANSPORTATION
 CONSERVATION EASEMENTS PROPERTY OF: WILLIAM M.
 ALLEN, ET. UX., JOE L. ALLEN, ET. UX., TEXIE B.
 OWNES, ET. AL.", BOOK OF MAPS 9, PAGE 606.
 SURVEY DATES OF THALWEG
 AND TOP-OF-BANK - 08/27/12 TO
 08/31/12.

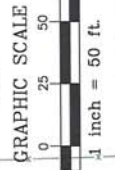
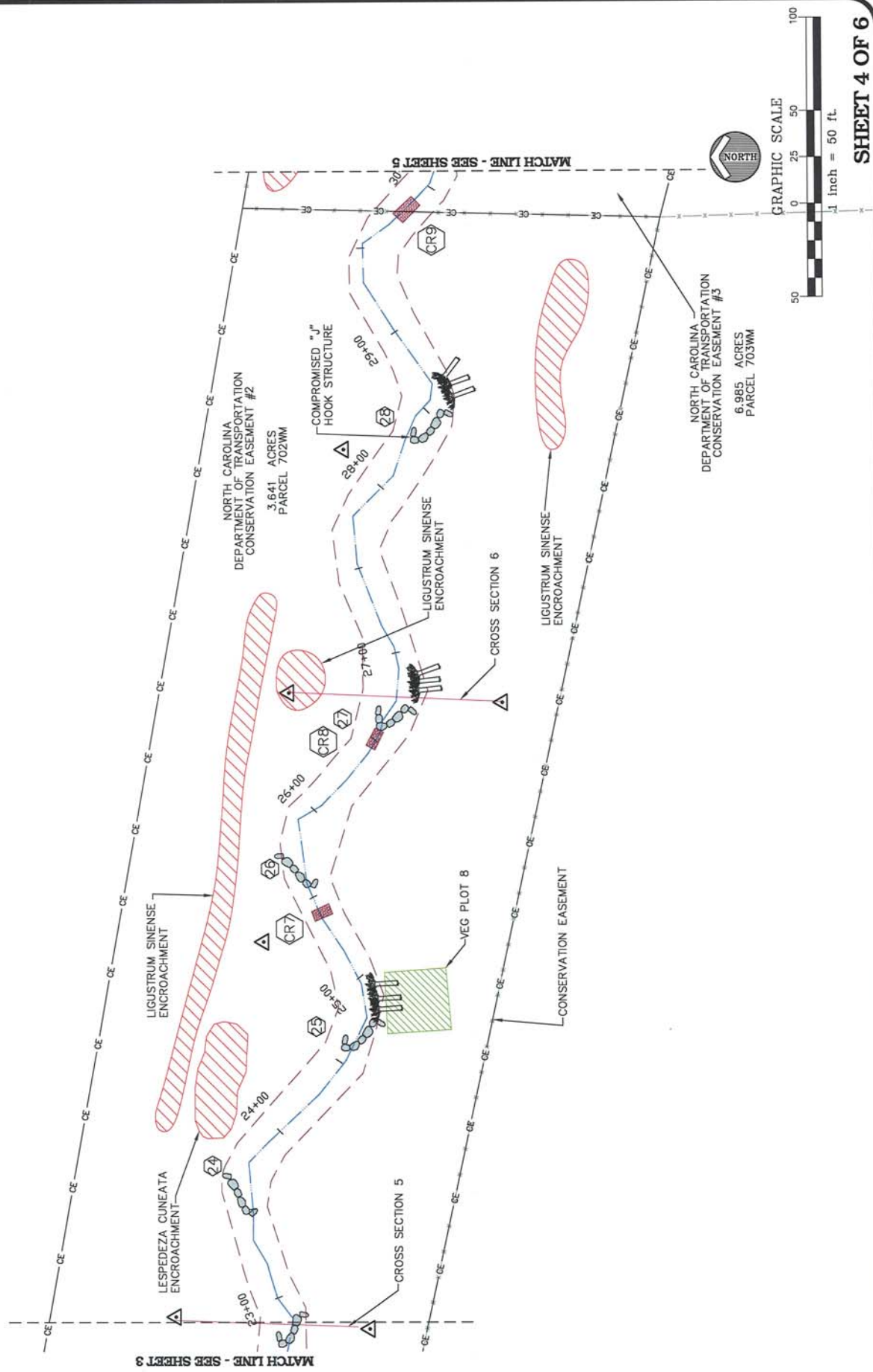
MATCH LINE - SEE SHEET 2

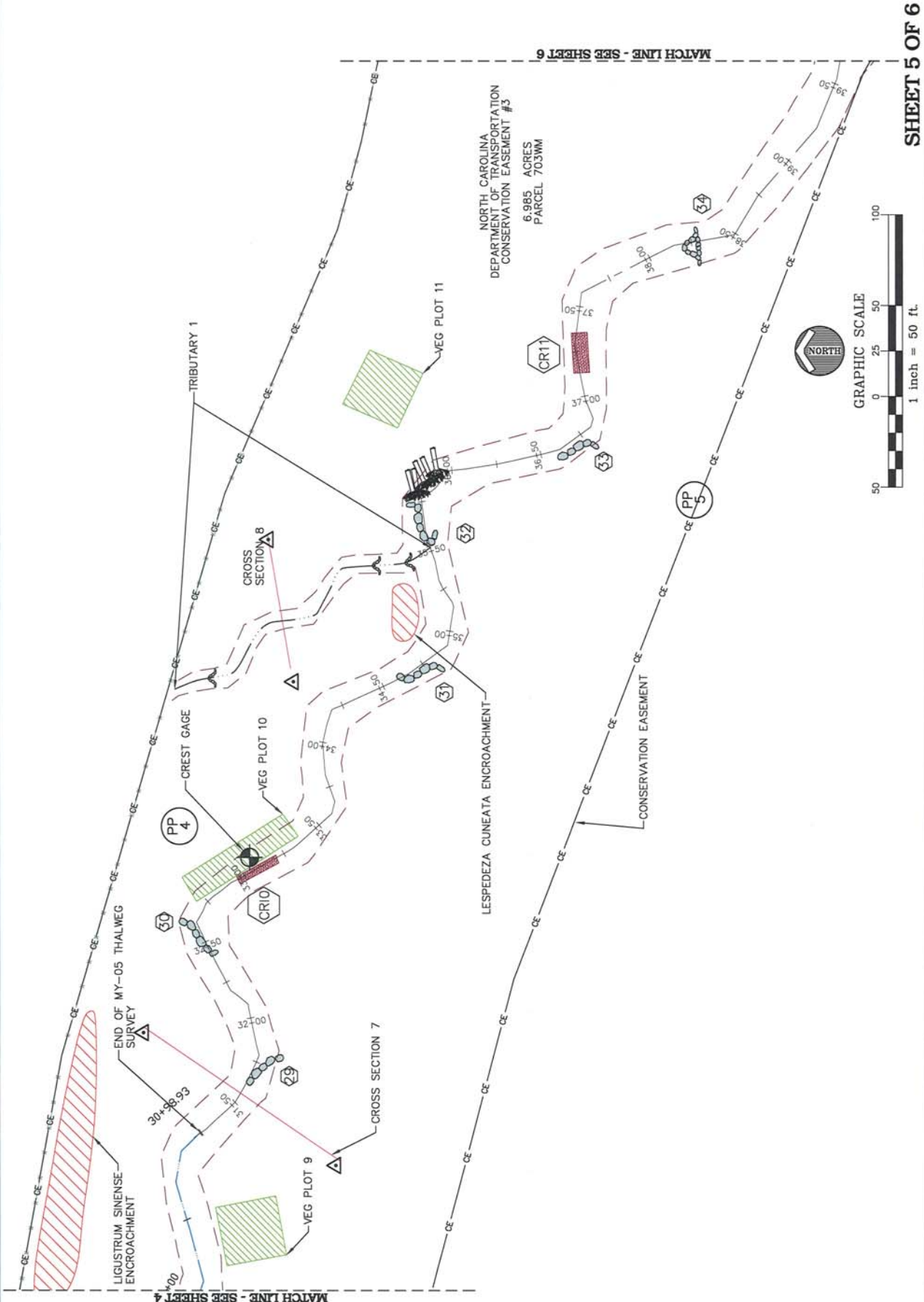


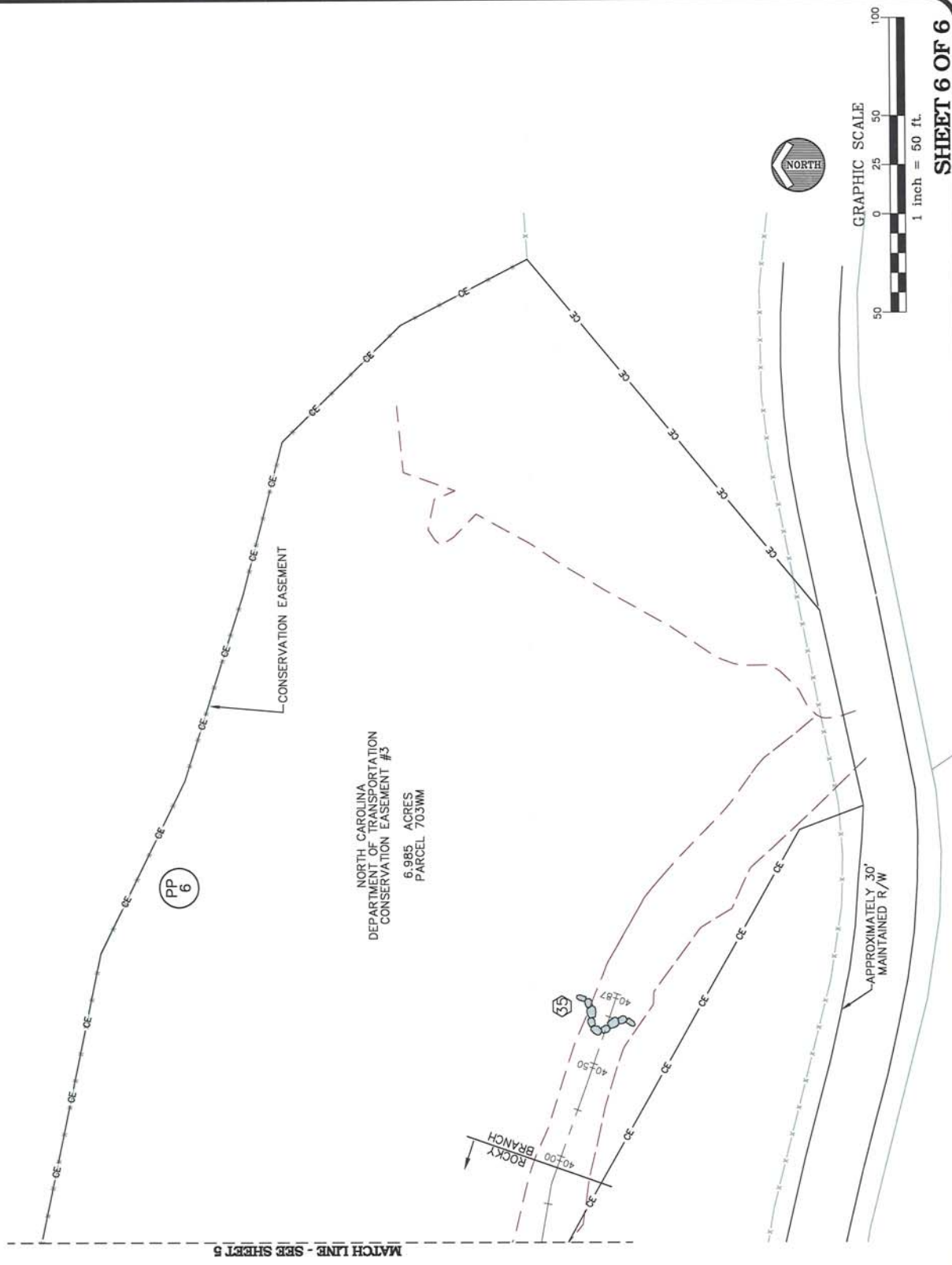
NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 CONSERVATION EASEMENT #1
 13.469 ACRES
 PARCEL 701W











APPENDIX B

General Project Tables

Table 1. Project Restoration Components
Rocky Branch Stream Restoration Site/EEP Project Number: 308

Project Segment or Reach ID	Existing Feet/Acres	Type	Approach	Footage or Acreage	Mitigation Ratio	Mitigation Units	Stationing	Comment
Rocky Branch	3,090	R	P1 & P2	3,614	1	3,614	0+00 - 39+97	177 l.f. @ upstream end has been removed from credit calculation. 25 l.f. has been removed from credit calculation which associated with farm crossing.
		EI	P4	206	0.66	136		
		EII	P4	173	0.4	69	39+97 - 41+70	Lower most section down to bridge within conservation easement.
Tributary 1	593	R	P1	172	1	172	0+00 - 1+72	
Tributary 2	280	NA	NA	Pond	NA	NA	NA	NA = Not Applicable; Portion of original channel contained within proposed conservation easement.
Mitigation Unit Summations								
Stream	Riparian Wetland	Nonriparian Wetland		Total Wetland	Buffer	Comment		
3,991	0	0		0	0			

R= Restoration
EI= Enhancement

EII= Enhancement II
S= Stabilization

P1= Priority I
P2= Priority II

P3= Priority III
SS=Stream Bank Stabilization

**Table 2. Project Activity and Reporting History
Rocky Branch Stream Restoration Site/EEP Project Number: 308**

Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	Winter 04	Mar-05
Final Design – 90%	Summer 05	Winter 05
Construction	May-06	Sep-06
Temporary S&E mix applied to entire project area	May-06	Sep-06
Permanent seed mix applied to reach/segments 1 & 2	Sep-06	Sep-06
Containerized and B&B plantings for reach/segments 1 & 2	Fall 06	Dec-06
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Winter 07	Feb-08
Year 1 Monitoring	Sep-08	Nov-08
Year 2 Monitoring	Sep-09	Nov-09
Year 3 Monitoring	Aug-10	Oct-10
Year 4 Monitoring	Apr-11	Jun-11
Year 5 Monitoring	Oct-12	Nov-12

Note: Timeframe estimated from information provided by EEP.

Table 3. Project Contacts Table
Rocky Branch Stream Restoration Site/EEP Project Number: 308

Designer	Mulkey Engineers & Consultants 6750 Tryon Road, Cary, NC 27518 Wendee Smith, 919-858-1833
Primary project design POC	
Construction Contractor	Fluvial Solutions, Inc. PO Box 28749, Raleigh, NC 27611-8749 Peter Jelenevsky, 919-605-6134
Construction contractor POC	
Planting Contractor	Carolina Silvics 908 Indian Trail Road, Edenton, NC 27932 Mary-Margaret McKinney 252-484-8491
Planting contractor POC	
Seeding Contractor	Contact: Fluvial Solutions, Inc. PO Box 28749, Raleigh, NC 27611-8749 Peter Jelenevsky, 919-605-6134
Planting contractor POC	
Seed Mix Sources	Contact: Fluvial Solutions, Inc. Peter Jelenevsky, 919-605-6134
Nursery Stock Suppliers	ArboGen 843-851-4129
Monitoring Performers	EcoEngineering - A Division of The John R. McAdams Co. 2905 Meridian Parkway, Durham, NC 27713
Stream Monitoring POC Jim Halley	919-287-4262
Vegetation Monitoring POC Jim Halley	919-287-4262
Wetland Monitoring POC NA	NA

Note: Information obtained from EEP documents and bid tabulation results. Use contacts in table for additional information or to verify data.

Table 4. Project Background Table
Rocky Branch Stream Restoration Site/EEP Project Number: 308

Project County	Yadkin County
Drainage Area	3.1 square miles
Drainage impervious cover estimate (%) For example	5%
Stream Order	1
Physiographic Region	Piedmont
Ecoregion	Northern Inner Piedmont
Rosgen Classification of As-built	C4
Cowardin Classification	R3UBH
Dominant soil types	Chewacla, Cecil, Appling, and Wilkes
Reference site ID	Spencer Creek
USGS HUC for Project and Reference	Project 03040102, Reference 03040104
NCDWQ Sub-basin for Project and Reference	Project 03-07-06, Reference 03-07-09
NCDWQ classification for Project and Reference	Project WS-III, Reference WS-IV
Any portion of any project segment 303d listed?	no
Any portion of any project segment upstream of a 303d listed segment?	no
Reasons for 303d listing or stressor	no
% of project easement fenced	100%

APPENDIX C

Vegetation Assessment Data

**Table 5. Vegetation Plot Mitigation Success Summary Table
Rocky Branch Stream Restoration Site/EEP Project ID: 308**

Vegetation Plot Summary Information							
Plot #	Riparian Buffer Stems ¹	Stream/ Wetland Stems ²	Live Stakes	Invasives	Volunteers ³	Total ⁴	Unknown Growth Form
VP10	n/a	11	0	0	0	11	0
VP11	n/a	20	0	0	0	20	0
VP1	n/a	16	0	0	0	16	0
VP2	n/a	9	0	0	0	9	0
VP3	n/a	13	0	0	0	13	0
VP4	n/a	11	0	0	0	11	0
VP5	n/a	11	0	0	0	11	0
VP6	n/a	14	0	0	0	14	0
VP7	n/a	15	0	0	0	15	0
VP8	n/a	15	0	0	0	15	0
VP9	n/a	10	0	0	0	10	0

Wetland/Stream Vegetation Totals (per acre)				
Plot #	Stream/ Wetland Stems ²	Volunteers ³	Total ⁴	Success Criteria Met?
VP10	445	0	445	Yes
VP11	809	0	809	Yes
VP1	647	0	647	Yes
VP2	364	0	364	Yes
VP3	526	0	526	Yes
VP4	445	0	445	Yes
VP5	445	0	445	Yes
VP6	567	0	567	Yes
VP7	607	0	607	Yes
VP8	607	0	607	Yes
VP9	405	0	405	Yes
Project Avg	533	0	533	Yes

Notes:	
Stem Class	Characteristics
¹ Buffer Stems	Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.
² Stream/ Wetland Stems	Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines
³ Volunteers	Native woody stems. Not planted. No vines.
⁴ Total	Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

Table 6. Vegetation Metadata	
Rocky Branch Stream Restoration Site/EEP Project ID: 308	
Report Prepared By	George Buchholz
Date Prepared	9/7/2012 16:49
database name	cvs-EEP-entrytool-v2.3.1Rocky and Sandy.mdb
database location	X:\Projects\EEP\EEP-08020 (Rocky Branch)\Storm\CVS Vegetation Data\2012 Vegetation Data
computer name	BUCHHOLES
file size	73179136
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY	
Project Code	308
project Name	Rocky Branch
Description	Rocky Branch Stream Restoration Project
River Basin	Yadkin-Pee Dee
length(ft)	3,993
stream-to-edge width (ft)	24
area (sq m)	0.04 sq mile (24.10 acres)
Required Plots (calculated)	11
Sampled Plots	11

Table 6A. Vegetation Condition Assessment
Rocky Branch Stream Restoration Site/EEP Project ID: 308

Planted Acreage 13.29

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	----	0	0	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	----	0	0	0.0%
Total						
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	----	0	0	0.0%
Cumulative Total						0.0%

Easement Acreage 24.09

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	diagonal, red	17	0.8	3.32%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	----	0	0	0.0%

Table 7. Stem Count Total and Planted by Plot Species
Rocky Branch Stream Restoration Site/EEP Project ID: 308

Page 1

Scientific Name	Common Name	Species Type	Current Plot Data (MY5 2012)														
			E308-01-VP10		E308-01-VP11		E308-01-VP1		E308-01-VP2		E308-01-VP3		E308-01-VP4		E308-01-VP5		
			PnoLS	T	PnoLS	T	PnoLS	T	PnoLS	T	PnoLS	T	PnoLS	T	PnoLS	T	
<i>Acer negundo</i>	boxelder	Tree															
<i>Acer rubrum</i>	red maple	Tree															
<i>Acer spicatum</i>	mountain maple	Tree															
<i>Alnus altissima</i>	tree of heaven	Exotic															
<i>Alnus serrulata</i>	hazel alder	Shrub		11		11									3	3	
<i>Betula nigra</i>	river birch	Tree	3	3													
<i>Cephalanthus</i>	butterbush	Shrub							1		1						
<i>Cephalanthus occidentalis</i>	common butterfly	Shrub													3	3	
<i>Cornus amomum</i>	silky dogwood	Shrub															
<i>Fraxinus pennsylvanica</i>	green ash	Tree	3	3	1	1			6	6	6	3	3	5	5	4	
<i>Ilex virginica</i>	Virginia sweetspire	Shrub															
<i>Juglans nigra</i>	black walnut	Tree															
<i>Juniperus virginiana</i>	eastern redcedar	Tree															
<i>Liriodendron tulipifera</i>	tulip tree	Tree															
<i>Platanus occidentalis</i>	American sycamore	Tree	1	1	2	2	8	8	1	1	10	10	2	2			
<i>Prunus serotina</i>	black cherry	Tree															
<i>Prunus virginiana</i>	chokecherry	Shrub															
<i>Quercus nigra</i>	water oak	Tree															
<i>Quercus phellos</i>	willow oak	Tree	1	1	5	5											
<i>Rhus copallinum</i>	flameleaf sumac	shrub															
<i>Rhus typhina</i>	Staghorn Sumac	shrub															
<i>Salix nigra</i>	black willow	Tree	3	3													
<i>Sambucus canadensis</i>	Common Elderberry	Shrub															
		Stem count	11	11	11	11	20	20	20	16	16	9	9	13	13	11	11
		size (ares)															
		size (ACRES)	0.02														
		Species count	5	5	5	5	3	3	3	4	4	4	4	2	2	4	4
		Stems per ACRE	445.15	445.15	445.15	809.37	809.37	647.5	647.5	364.22	364.22	364.22	364.22	526.09	526.09	445.15	445.15

Notes:

- a) Data presented in table was provided to EcoEngineering from the Carolina Vegetation Survey. Data was not manipulated by EcoEngineering. Formatting of table was performed by EcoEngineering.
- b) Original baseline vegetation monitoring data was not provided prior to the 2008 Monitoring Year 1 and 2008 is considered a drought year. The 2009 Monitoring Year 2 is considered the baseline datum because after two years of monitoring it is assumed all planted stems within a vegetation monitoring plot have been surveyed and accounted for. Therefore, any additional species observed in preceding monitoring years are considered volunteer species.
- c) PnoLS = Planted Excluding Live Stakes; P-all = All Planted Stems; T = Total Planted and Volunteer Stems
- d) Cells highlighted in VIOLET indicate the presence of volunteers

Color for Density of Planted Excluding Live Stakes
Exceeds requirements by 10%
Exceeds requirements by 5% to 10%
Falls to meet requirements, by less than 10%
Falls to meet requirements by more than 10%



VEGETATION PLOT 1 - STREAMBANKS (5m X 20m). VIEW FROM SOUTHEAST PLOT CORNER.



VEGETATION PLOT 2 - RIPARIAN BUFFER (10m x 10m). VIEW FROM SOUTHEAST PLOT CORNER.

McADAMS

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



ROCKY BRANCH
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 YADKIN COUNTY, NORTH CAROLINA

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VEGETATION PLOT 3 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.



VEGETATION PLOT 4 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.

McADAMS

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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VEGETATION PLOT 5 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.



VEGETATION PLOT 6 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.

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PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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VEGETATION PLOT 7 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.



VEGETATION PLOT 8 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.

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PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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VEGETATION PLOT 9 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.



VEGETATION PLOT 10 - RIPARIAN BUFFER (5m x 20m). VIEW FROM NORTHWEST PLOT CORNER.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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YADKIN COUNTY, NORTH CAROLINA

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VEGETATION PLOT II - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



ROCKY BRANCH
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YADKIN COUNTY, NORTH CAROLINA



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APPENDIX D

Stream Assessment Data

**Table 8a. Visual Morphological Stability Assessment
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Rocky Branch: 3,751 Linear Feet**

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	28	28	NA	100	
	2. Armor stable (e.g. no displacement)?	28	28	NA	100	
	3. Facet grade appears stable?	23	28	NA	82	
	4. Minimal evidence of embedding/fining?	28	28	NA	100	
	5. Length appropriate?	NA	NA	NA	NA	96
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	25	27	NA	93	
	2. Sufficiently deep (Max Pool D:Mean Bkt>1.6?)	3.5 / 1.5 = 2.3	27	Max Pool / 1.5 > 1.6, 24 of 27	89	
	3. Length appropriate?	23	27	NA	85	89
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	37	39	NA	95	
	2. Downstream of meander (glide/inflection) centering?	37	39	NA	93	94
D. Meander	1. Outer bend in state of limited/controlled erosion?	43	43	NA	100	
	2. Of those eroding, # w/concomitant point bar formation	43	43	NA	100	
	3. Apparent Rc within spec?	42	43	NA	98	
	4. Sufficient floodplain access and relief?	43	43	NA	100	100
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	NA	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	NA	NA	NA	100	100
F. Bank	1. Actively eroding, wasting, or slumping bank	NA	NA	5/90	98	98
	1. Free of bank or arm scour?	34	36	30	94	
G. Vanes	2. Height appropriate?	34	36	30	94	
	3. Angle and geometry appear appropriate?	34	36	30	94	
	4. Free of piping or other structural failures?	34	36	30	94	94
	1. Free of scour?	40	40	NA	100	
H. Wads/ Boulders	2. Footing stable?	40	40	NA	100	100

**Table 8b. Visual Morphological Stability Assessment
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Rocky Branch Tributary 1: 172 Linear Feet**

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	3	3	NA	100	
	2. Armor stable (e.g. no displacement)?	3	3	NA	100	
	3. Facet grade appears stable?	3	3	NA	100	
	4. Minimal evidence of embedding/fining?	3	3	NA	100	
	5. Length appropriate?	NA	NA	NA	NA	100
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	NA	NA	NA	NA	
	2. Sufficiently deep (Max Pool D:Mean Bk>1.6)?	NA	NA	NA	NA	
	3. Length appropriate?	NA	NA	NA	NA	NA
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	4	4	NA	100	
	2. Downstream of meander (glide/inflection) centering?	3	4	NA	100	100
D. Meander	1. Outer bend in state of limited/controlled erosion?	5	5	NA	100	
	2. Of those eroding, # w/concomitant point bar formation	0	0	NA	100	
	3. Apparent Rc within spec?	5	5	NA	100	
	4. Sufficient floodplain access and relief?	5	5	NA	100	100
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	NA	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	NA	NA	NA	100	100
F. Bank	1. Actively eroding, wasting, or slumping bank	NA	NA	0/172	100	100
G. Vanes	1. Free of bank or arm scour?	3	3	NA	100	
	2. Height appropriate?	3	3	NA	100	
	3. Angle and geometry appear appropriate?	3	3	NA	100	
	4. Free of piping or other structural failures?	3	3	NA	100	100
H. Wadis/ Boulders	1. Free of scour?	NA	NA	NA	NA	NA
	2. Footing stable?	NA	NA	NA	NA	NA

Table 9. Verification of Bankfull Events
Rocky Branch Stream Restoration Site/EEP Project Number: 308

Date of Data Collection	Date of Occurrence	Method	Photo # (if available)
24-Sep-08	No occurrence	Observation	Not Available
2-Oct-09	Between 09/25/08 and 10/02/09	On-Site Crest Gage located at Station 33+08. Observed elevation on gage at elevation 918.99	Not Available
5-Aug-10	Between 10/02/09 and 08/05/10	On-Site Crest Gage located at Station 33+08. Observed elevation on gage at elevation 914.25	Not Available
14-Apr-11	Between 08/05/10 and 04/14/11	On-Site Crest Gage located at Station 33+08. Observed elevation on gage at elevation 914.63	Not Available
31-Aug-12	Between 04/14/12 and 08/31/12	On-Site Crest Gage located at Station 33+08. Observed elevation on gage at elevation 914.98	Not Available



PHOTO POINT 1. VIEW LOOKING SOUTH TOWARD DAIRY FACILITY.



PHOTO POINT 2. VIEW LOOKING NORTH ACROSS NEW ROCKY BRANCH STREAM CHANNEL.

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PROJECT NO. EEP-08020
 FILENAME: EEP08020-EX1
 SCALE: NTS
 DATE: 09-05-12



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PHOTO POINT 2. VIEW LOOKING NORTHEAST ACROSS NEW EXISTING ROCKY BRANCH STREAM CHANNEL.



PHOTO POINT 3. VIEW LOOKING WEST TOWARD THE I-77 ROADWAY CORRIDOR.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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PHOTO POINT 3. VIEW LOOKING SOUTH TOWARD HOMES LOCATED ALONG SR 1120.



PHOTO POINT 3. VIEW LOOKING EAST TOWARD WOODED AREA.

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FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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PHOTO POINT 5. VIEW LOOKING NORTH TOWARD NEWLY CONSTRUCTED TRIBUTARY 1.



PHOTO POINT 5. VIEW LOOKING NORTHEAST TOWARD NEW POND.

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FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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PHOTO POINT 4. VIEW LOOKING EAST TOWARD NEWLY CONSTRUCTED TRIBUTARY 1 AND MAIN CHANNEL.



PHOTO POINT 5. VIEW LOOKING NORTHEAST ACROSS NEW ROCKY BRANCH STREAM CHANNEL.

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PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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PHOTO POINT 4. VIEW LOOKING WEST THROUGH WOODED SECTION.



PHOTO POINT 4. VIEW LOOKING SOUTH TOWARD SR 1120.

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PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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PHOTO POINT 6. VIEW LOOKING WEST TOWARD SR 1120.



PHOTO POINT 6. VIEW LOOKING SOUTH TOWARD SR 1120 AND JOE ALLEN RESIDENCE.

McADAMS

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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PHOTO POINT 6. VIEW LOOKING EAST TOWARD NEW POND.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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CROSS SECTION 1 - POOL. (ROCKY BRANCH, STA 4 + 25) VIEW LOOKING DOWNSTREAM.



CROSS SECTION 2 - RIFFLE. (ROCKY BRANCH, STA 9 + 22) VIEW LOOKING DOWNSTREAM.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



ROCKY BRANCH
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CROSS SECTION 3 - POOL. (ROCKY BRANCH, STA 13 + 25) VIEW LOOKING DOWNSTREAM.



CROSS SECTION 4 - RIFFLE. (ROCKY BRANCH, STA 17 + 49) VIEW LOOKING DOWNSTREAM.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



ROCKY BRANCH
MONITORING PHOTOS
YADKIN COUNTY, NORTH CAROLINA



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CROSS SECTION 5 - POOL. (ROCKY BRANCH, STA 22 + 32) VIEW LOOKING DOWNSTREAM.



CROSS SECTION 6 - RIFFLE. (ROCKY BRANCH, STA 26 + 22) VIEW LOOKING DOWNSTREAM.

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PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



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CROSS SECTION 7 - RIFFLE. (ROCKY BRANCH, STA 30 + 75) VIEW LOOKING DOWNSTREAM.



CROSS SECTION 8 - RIFFLE. (TRIBUTARY 1, STA 0 + 75) VIEW LOOKING DOWNSTREAM.

McADAMS

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 09-05-12



ROCKY BRANCH
MONITORING PHOTOS
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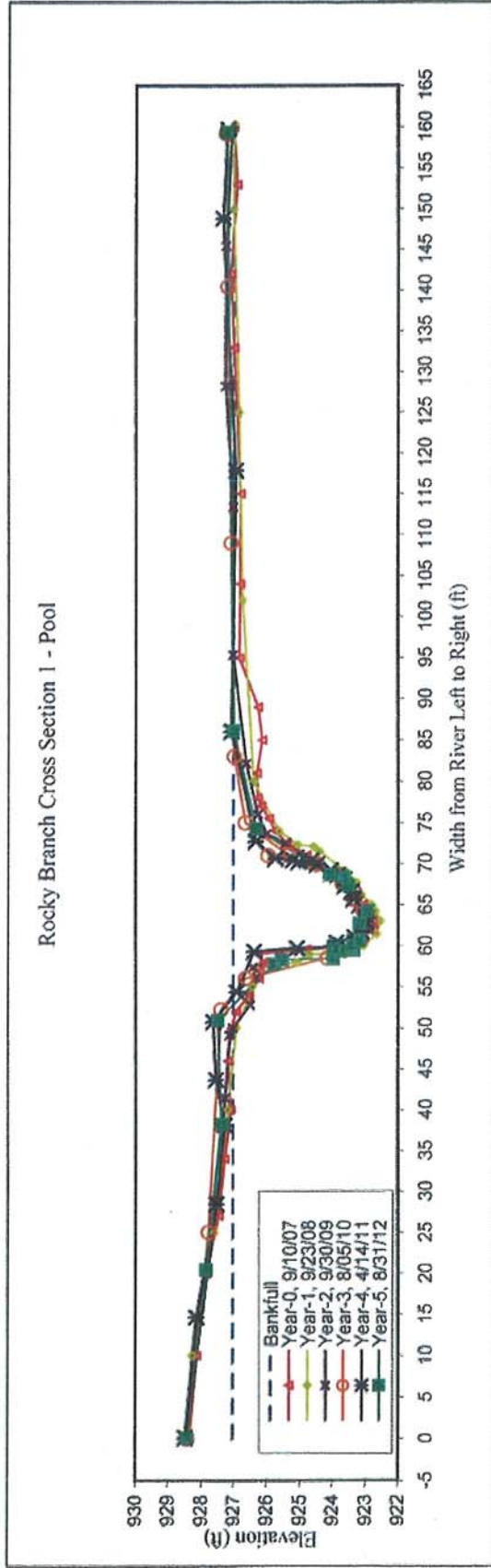


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ROCKY BRANCH		EFP PROJECT # 308										CROSS-SECTION: 1	
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	928.33	0.00	928.33	-0.87	928.46	0.00	928.41	0.12	928.48	0.13	928.43		
10.00	928.12	10.00	928.26	28.76	927.50	25.04	927.76	14.67	928.15	20.51	927.83		
20.00	927.82	25.00	927.58	41.50	927.27	52.24	927.38	28.45	927.53	38.24	927.37		
27.00	927.44	40.00	927.18	49.38	927.13	56.04	926.62	38.11	927.28	50.94	927.49		
34.00	927.26	50.00	926.90	50.28	927.04	58.54	924.15	43.65	927.55	57.81	925.75		
40.00	927.08	55.00	926.41	53.16	926.49	59.69	923.93	50.71	927.64	58.34	925.53		
46.00	927.17	57.30	926.34	56.54	926.34	60.77	923.12	54.35	926.91	58.43	923.97		
50.00	927.05	58.00	925.08	57.83	926.41	62.26	923.13	59.31	926.38	59.41	923.77		
52.00	926.92	59.00	924.71	59.88	925.02	63.46	922.97	59.71	925.1	59.48	923.35		
54.00	926.52	59.00	923.62	60.60	923.92	64.36	923.07	59.83	923.91	59.69	923.97		
56.00	926.22	60.00	923.05	61.05	923.84	65.61	923.36	60.36	923.89	60.03	923.38		
57.00	926.19	61.40	922.64	61.39	923.44	66.63	923.33	61.01	923.34	60.72	923.18		
58.00	926.08	63.00	922.52	61.96	923.12	67.55	923.69	61.6	923.14	62.7	923.17		
59.00	926.25	64.20	922.68	62.54	922.90	68.67	923.88	62.4	923.1	64.19	922.96		
59.60	924.80	65.00	922.80	63.27	923.10	69.93	924.46	62.86	922.98	67.36	923.53		
59.80	923.79	66.20	923.12	64.16	923.07	70.00	924.60	64.08	922.98	68.33	923.65		
60.30	923.25	67.70	923.26	65.20	923.28	71.00	925.94	65.57	923.37	68.67	924.08		
61.00	923.19	69.10	923.61	66.11	923.20	71.03	925.34	66.56	923.43	74.27	926.3		
62.00	922.75	71.50	924.40	66.81	923.47	74.99	926.64	67.26	923.62	86.17	927.01		
63.00	922.78	72.10	924.58	67.78	923.63	83.04	926.98	68.06	923.64	159.44	927.23		
64.00	922.83	72.30	925.06	68.58	923.75	109.00	927.09	68.55	923.85				
65.00	923.07	74.00	925.62	69.35	923.99	140.48	927.20	69.14	924.06				
66.00	923.29	80.00	926.38	70.31	924.40	159.25	927.26	69.86	924.49				
67.00	923.49	102.00	926.74	71.07	924.82			70.2	925.04				
68.00	923.71	125.00	926.84	71.99	925.02			70.33	924.67				
69.00	924.04	150.00	927.02	73.27	925.43			70.35	925.21				
70.00	924.50	160.40	926.99	74.49	925.99			70.6	925.73				
71.00	924.80			76.91	926.26			72.67	926.33				
72.50	925.40			83.25	926.62			86.03	927.08				
74.00	925.73			96.79	927.03			117.81	926.95				
75.50	925.92			115.30	927.03			148.76	927.35				
77.00	926.15			130.50	927.26			159.64	927.2				
78.00	926.26			148.17	927.26								
81.00	926.29			162.68	927.08								
85.00	926.13												
89.00	926.25												
95.00	926.83												
104.00	926.81												
115.00	926.80												
125.00	926.92												
133.00	927.00												
142.00	927.11												
153.00	926.91												
160.00	927.02												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA CROSS-SECTION: 1

PROJECT ROCKY BRANCH FEATURE: Pool

TASK CROSS SECTION

REACH ROCKY BRANCH

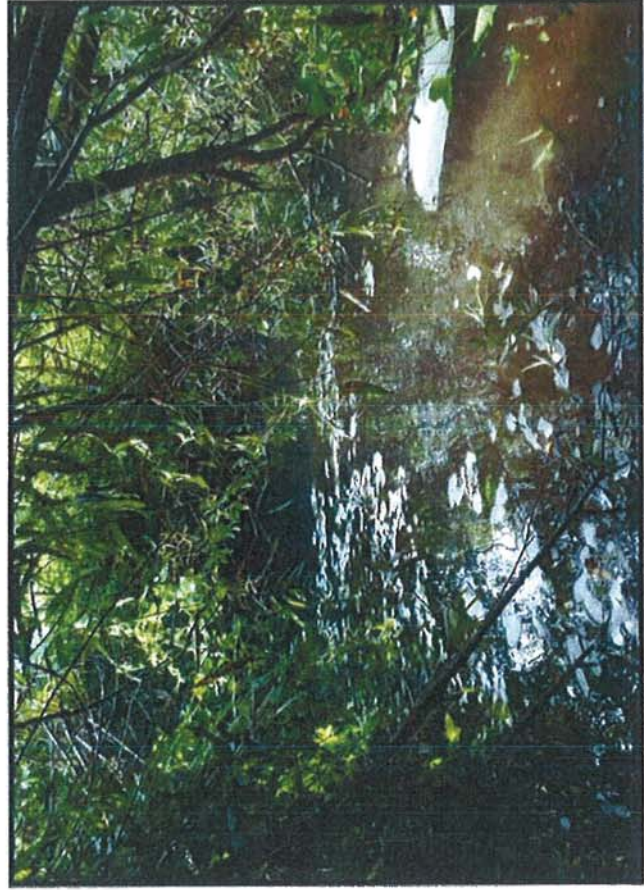
DATE 8/27/12 to 8/31/12

CREW BUCHHOLZ/PARRISH

Summary Data

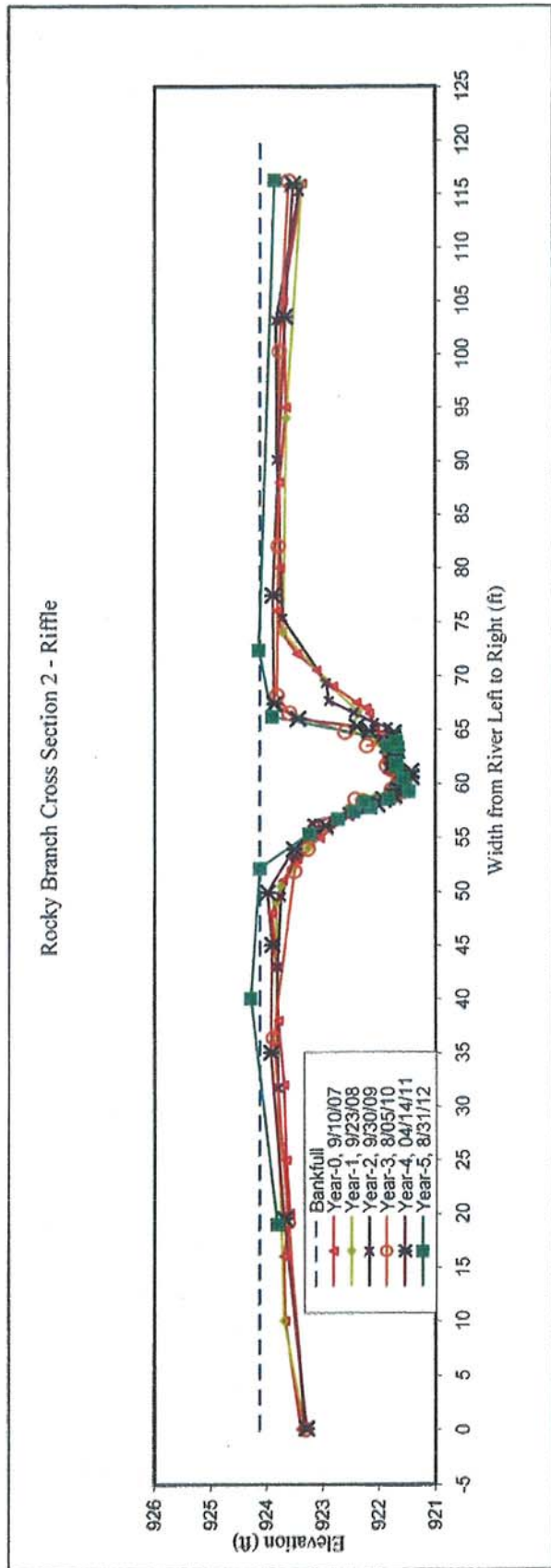
All dimensions in feet.

Bankfull X-sec area	56.0	sq. ft.
Bankfull Width	33.3	ft.
Bankfull Mean Depth	1.7	ft.
Bankfull Max Depth	4.0	ft.
Width/Depth Ratio	19.8	
Entrenchment Ratio	3.1	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	927.01	ft.



CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308										CROSS-SECTION: 2			
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6			
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)		
0.00	923.38	0.00	923.32	0.15	923.32	0	923.3	0.12	923.29	0.12	923.29	0.12	923.29		
10.00	923.66	10.00	923.68	31.73	923.79	19.21	923.61	19.51	923.68	19.51	923.68	19.51	923.68		
16.00	923.68	35.00	923.81	42.99	923.80	36.4	923.87	35.03	923.92	35.03	923.92	35.03	923.92		
20.00	923.58	49.00	923.82	49.52	923.74	51.9	923.5	45.03	923.9	45.03	923.9	45.03	923.9		
25.00	923.64	50.50	923.74	53.28	923.50	53.97	923.26	49.9	923.98	49.9	923.98	49.9	923.98		
32.00	923.68	54.00	923.26	56.32	923.19	56.2	922.95	53.9	923.51	53.9	923.51	53.9	923.51		
38.00	923.78	57.70	922.56	57.37	922.55	58.38	922.28	56.03	922.95	56.03	922.95	56.03	922.95		
43.00	923.82	58.70	922.08	58.06	922.22	58.54	922.42	57.87	922.18	57.87	922.18	57.87	922.18		
48.00	923.90	59.30	921.70	58.46	922.14	58.73	921.77	58.05	922.03	58.05	922.03	58.05	922.03		
51.00	923.70	60.00	921.51	58.60	921.68	59.18	921.64	58.49	921.92	58.49	921.92	58.49	921.92		
53.00	923.45	61.30	921.66	59.54	921.77	59.43	921.77	58.87	921.74	58.87	921.74	58.87	921.74		
55.00	923.05	62.70	921.82	60.76	921.58	59.93	921.64	59.41	921.67	59.41	921.67	59.41	921.67		
57.00	922.52	63.80	922.04	61.91	921.67	60.31	921.64	59.86	921.59	59.86	921.59	59.86	921.59		
58.00	922.11	64.80	922.48	62.71	921.62	60.67	921.63	60.6	921.43	60.6	921.43	60.6	921.43		
59.00	921.61	66.70	922.38	64.14	921.97	61.02	921.63	61.12	921.43	61.12	921.43	61.12	921.43		
60.00	921.50	69.60	922.98	64.70	921.72	61.72	921.86	61.75	921.77	61.75	921.77	61.75	921.77		
60.50	921.58	74.00	923.70	65.19	921.84	62.68	921.8	62.46	921.76	62.46	921.76	62.46	921.76		
61.00	921.85	94.00	923.65	65.63	922.09	63.48	921.8	63.05	921.74	63.05	921.74	63.05	921.74		
62.00	921.89	115.90	923.38	66.55	922.44	63.5	922.21	63.52	921.85	63.52	921.85	63.52	921.85		
63.00	921.88			67.65	922.89	63.78	921.8	64.32	921.75	64.32	921.75	64.32	921.75		
64.00	921.90			69.31	922.94	64.02	921.79	64.69	921.74	64.69	921.74	64.69	921.74		
65.00	922.07			75.32	923.71	64.78	922.6	64.86	922.17	64.86	922.17	64.86	922.17		
66.50	922.17			90.09	923.81	66.55	923.59	65.28	922.4	65.28	922.4	65.28	922.4		
67.00	922.22			103.15	923.83	68.21	923.81	65.99	923.44	65.99	923.44	65.99	923.44		
67.50	922.40			115.26	923.83	82.06	923.79	67.36	923.86	67.36	923.86	67.36	923.86		
69.00	922.81				923.43	100.31	923.77	77.44	923.89	77.44	923.89	77.44	923.89		
70.50	923.11					116.25	923.61	103.47	923.67	103.47	923.67	103.47	923.67		
72.00	923.46							115.9	923.53	115.9	923.53	115.9	923.53		
74.00	923.73														
76.00	923.81														
80.00	923.76														
88.00	923.77														
95.00	923.65														
105.00	923.70														
116.00	923.37														



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA
PROJECT ROCKY BRANCH
TASK CROSS SECTION
REACH ROCKY BRANCH
DATE 8/27/12 to 8/31/12
CREW BUCHHOLZ/PARRISH

CROSS-SECTION: 2
FEATURE: Riffle

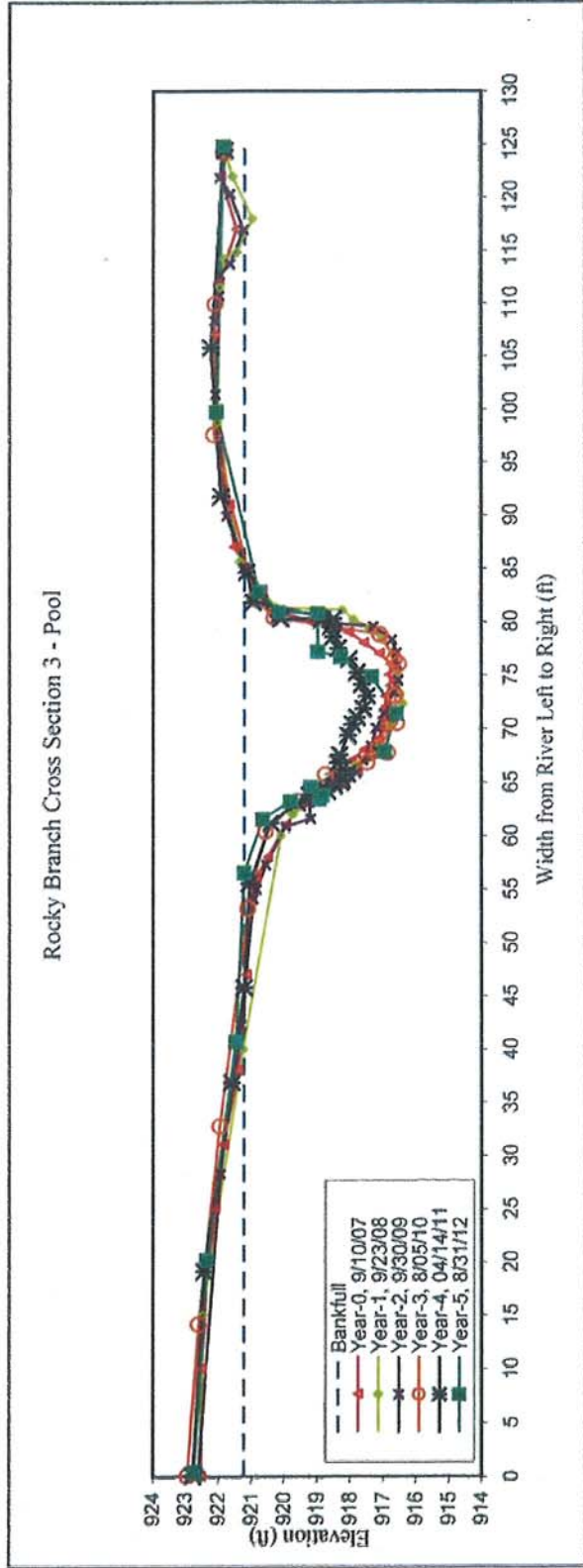
Summary Data
 All dimensions in feet.

Bankfull X-sec area	23.09	sq. ft.
Bankfull Width	19.7	ft.
Bankfull Mean Depth	1.17	ft.
Bankfull Max Depth	2.6	ft.
Width/Depth Ratio	16.83	
Entrenchment Ratio	5.1	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	924.12	ft.

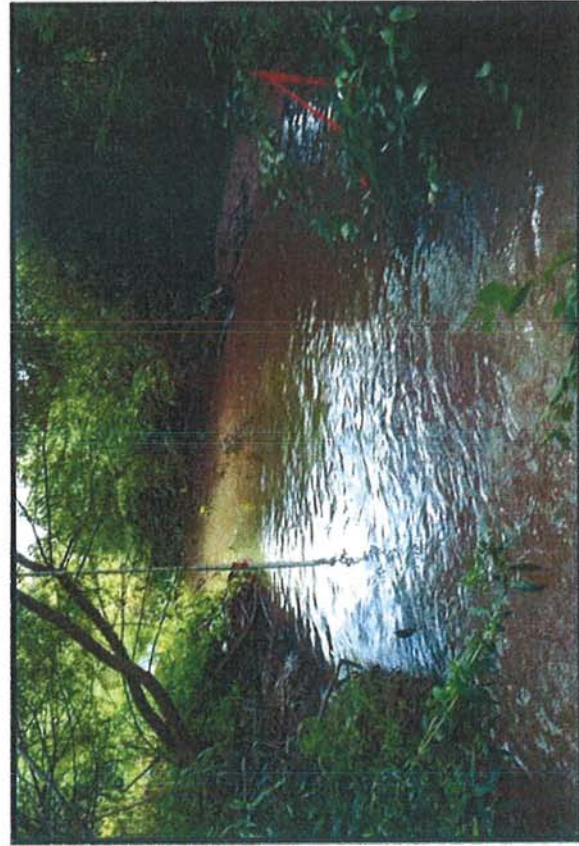


CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308										CROSS-SECTION: 3					
		Year-0		Year-1		Year-2		Year-3		Year-4				Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	922.51	0.00	922.56	0.18	922.60	0.00	922.92	0.00	922.92	0.08	922.77	0.08	922.77	0.08	922.77		
10.00	922.49	15.00	922.46	28.22	921.93	14.12	922.59	14.12	922.59	19.08	922.43	19.08	922.43	19.08	922.43		
20.00	922.29	40.00	921.25	42.24	921.31	32.74	921.94	32.74	921.94	36.86	921.60	36.86	921.60	36.86	921.60		
25.00	922.08	60.00	920.08	54.05	920.93	53.17	921.11	53.17	921.11	45.77	921.23	45.77	921.23	45.77	921.23		
31.00	921.84	62.00	919.73	54.98	920.84	60.38	920.57	60.38	920.57	55.55	921.07	55.55	921.07	55.55	921.07		
38.00	921.40	64.70	918.25	57.25	920.55	63.24	919.57	63.24	919.57	61.16	920.40	61.16	920.40	61.16	920.40		
47.00	921.14	66.50	917.81	60.83	919.94	65.39	918.16	65.39	918.16	63.07	919.60	63.07	919.60	63.07	919.60		
54.00	920.99	68.20	917.24	61.58	919.18	65.71	918.73	65.71	918.73	63.78	919.22	63.78	919.22	63.78	919.22		
56.00	920.86	70.30	916.79	63.10	919.23	66.84	917.47	66.84	917.47	64.13	918.70	64.13	918.70	64.13	918.70		
58.00	920.49	72.30	916.39	64.06	918.77	67.75	916.86	67.75	916.86	64.29	918.92	64.29	918.92	64.29	918.92		
61.00	919.93	73.20	916.49	64.63	918.17	68.21	917.14	68.21	917.14	64.65	918.48	64.65	918.48	64.65	918.48		
64.00	919.19	75.10	916.55	65.86	917.80	70.48	916.58	70.48	916.58	65.17	918.24	65.17	918.24	65.17	918.24		
65.00	918.62	76.90	916.71	67.00	917.59	73.07	916.64	73.07	916.64	65.74	918.09	65.74	918.09	65.74	918.09		
66.00	917.77	78.30	917.03	68.37	917.35	76.03	916.52	76.03	916.52	66.22	918.23	66.22	918.23	66.22	918.23		
67.00	917.96	79.40	917.41	70.02	917.20	76.46	916.66	76.46	916.66	66.80	918.37	66.80	918.37	66.80	918.37		
68.00	917.56	80.20	917.89	71.38	916.97	78.77	917.09	78.77	917.09	67.54	918.32	67.54	918.32	67.54	918.32		
69.00	917.15	81.10	918.24	73.39	916.68	80.37	920.31	80.37	920.31	69.37	918.06	69.37	918.06	69.37	918.06		
70.00	916.96	81.30	920.24	74.49	916.55	82.12	920.91	82.12	920.91	70.41	917.93	70.41	917.93	70.41	917.93		
71.00	917.00	85.60	921.37	75.91	916.57	97.56	922.15	97.56	922.15	71.02	917.79	71.02	917.79	71.02	917.79		
72.00	916.92	98.70	922.04	77.07	916.59	109.91	922.11	109.91	922.11	71.87	917.60	71.87	917.60	71.87	917.60		
73.00	916.92	111.50	921.97	78.28	916.73	124.27	921.86	124.27	921.86	73.03	917.48	73.03	917.48	73.03	917.48		
74.00	916.78	114.20	921.83	79.50	917.28					74.11	917.64	74.11	917.64	74.11	917.64		
75.00	916.81	114.80	921.47	79.87	918.71					75.22	917.79	75.22	917.79	75.22	917.79		
76.00	916.77	118.00	920.99	80.18	920.30					76.49	918.03	76.49	918.03	76.49	918.03		
77.00	917.11	122.00	921.59	82.06	920.65					77.48	918.36	77.48	918.36	77.48	918.36		
78.00	917.58	124.00	921.79	85.06	921.21					78.58	918.52	78.58	918.52	78.58	918.52		
79.00	918.04	124.70	921.72	89.88	921.75					79.52	918.59	79.52	918.59	79.52	918.59		
79.50	918.60			101.33	922.10					80.20	918.86	80.20	918.86	80.20	918.86		
80.00	919.22			108.30	922.13					80.27	920.10	80.27	920.10	80.27	920.10		
81.00	920.29			110.69	921.98					80.27	918.51	80.27	918.51	80.27	918.51		
83.00	920.67			112.65	921.96					81.81	920.95	81.81	920.95	81.81	920.95		
85.00	921.20			113.67	921.65					84.64	921.15	84.64	921.15	84.64	921.15		
87.00	921.53			116.93	921.25					91.75	921.92	91.75	921.92	91.75	921.92		
91.00	921.68			120.30	921.65					105.78	922.24	105.78	922.24	105.78	922.24		
100.00	922.03			121.83	921.96					124.40	921.82	124.40	921.82	124.40	921.82		
107.00	922.13			124.42	921.86												
112.00	921.99																
117.00	921.47																
122.00	921.94																
125.00	921.80																



CROSS SECTION PLOT - LOOKING DOWNSTREAM



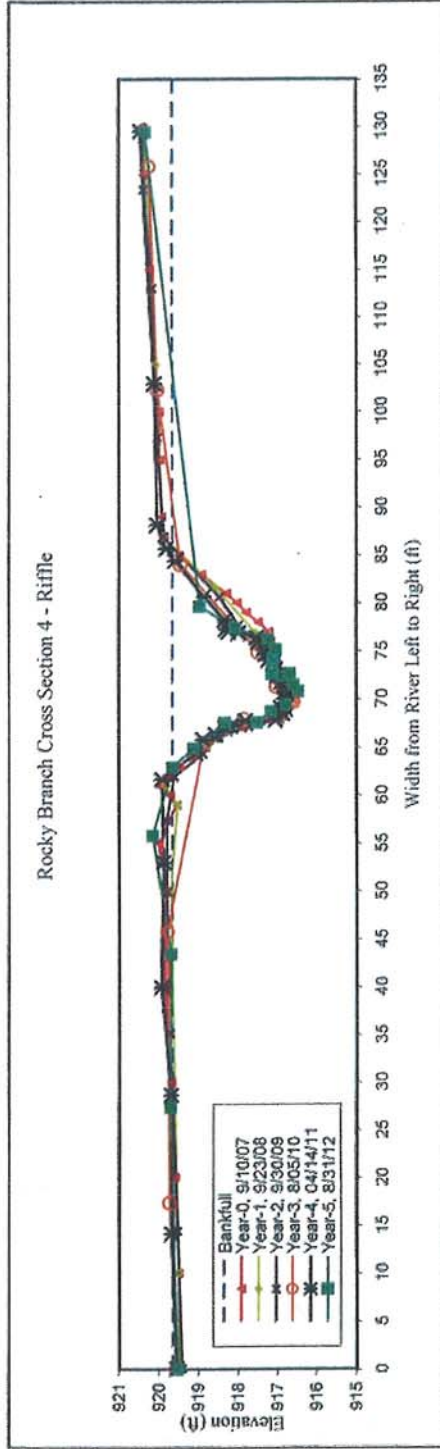
CROSS SECTION PHOTO - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA
PROJECT ROCKY BRANCH
TASK CROSS SECTION
REACH ROCKY BRANCH
DATE 8/27/12 to 8/31/12
CREW BUCHHOLZ/PARRISH

CROSS-SECTION: 3
FEATURE: Pool

Bankfull X-sec area	65.4	sq. ft.
Bankfull Width	32.08	ft.
Bankfull Mean Depth	2.0	ft.
Bankfull Max Depth	4.6	ft.
Width/Depth Ratio	15.73	
Entrenchment Ratio	3.6	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	0.00	ft.

ROCKY BRANCH		EEP PROJECT # 308										CROSS-SECTION: 4	
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	919.45	0.00	919.46	0.08	919.40	0.00	919.54	0.06	919.55	0.06	919.55	0.06	919.55
10.00	919.48	10.00	919.48	14.42	919.51	17.36	919.71	14.13	919.68	14.13	919.68	14.13	919.68
20.00	919.57	20.00	919.67	35.15	919.70	45.79	919.75	28.66	919.69	28.66	919.69	28.66	919.69
30.00	919.66	30.00	919.51	49.90	919.78	65.51	918.84	39.94	919.93	39.94	919.93	39.94	919.93
40.00	919.85	40.00	919.82	57.38	919.78	67.15	918.28	53	919.87	53	919.87	53	919.87
50.00	919.80	50.00	918.77	61.95	919.60	67.91	917.83	61.64	919.92	61.64	919.92	61.64	919.92
55.00	919.97	55.00	917.73	64.28	918.88	68.27	916.95	64.36	919.07	64.36	919.07	64.36	919.07
59.00	919.52	59.00	917.06	65.96	918.56	69.65	916.66	65.77	918.89	65.77	918.89	65.77	918.89
60.00	919.69	60.00	916.96	67.13	917.73	69.69	916.56	66.32	918.57	66.32	918.57	66.32	918.57
61.00	919.95	61.00	916.80	67.85	916.92	69.93	916.59	67	918.32	67	918.32	67	918.32
62.00	919.80	62.00	916.58	68.55	916.70	70.76	916.73	67.15	918.19	67.15	918.19	67.15	918.19
63.00	919.47	63.00	916.77	69.40	916.70	70.90	916.71	67.73	917.82	67.73	917.82	67.73	917.82
64.00	919.16	64.00	916.99	70.18	916.74	71.29	917.02	67.99	917.05	67.99	917.05	67.99	917.05
65.00	918.80	65.00	917.08	70.68	916.48	71.54	916.69	68.45	916.86	68.45	916.86	68.45	916.86
66.00	918.51	66.00	917.12	71.60	916.52	72.16	916.98	69.05	916.93	69.05	916.93	69.05	916.93
67.00	917.87	67.00	917.53	72.03	916.65	73.05	917.12	70.01	916.84	70.01	916.84	70.01	916.84
67.80	917.18	67.80	918.58	72.86	916.87	74.87	917.48	70.58	916.78	70.58	916.78	70.58	916.78
68.20	916.83	68.20	919.87	73.44	916.95	84.02	919.43	70.85	916.78	70.85	916.78	70.85	916.78
69.00	916.92	69.00	920.05	74.05	917.02	102.32	920.01	71.7	916.92	71.7	916.92	71.7	916.92
70.00	916.77	70.00	920.36	74.55	917.28	125.87	920.23	72.39	917.02	72.39	917.02	72.39	917.02
70.50	916.55	70.50	916.55	75.81	917.44			73.32	917.11	73.32	917.11	73.32	917.11
71.00	916.92	71.00	916.92	77.67	917.99			74.03	917.24	74.03	917.24	74.03	917.24
72.00	916.96	72.00	916.96	80.62	918.46			74.65	917.31	74.65	917.31	74.65	917.31
73.00	917.16	73.00	917.16	86.88	919.88			75.15	917.36	75.15	917.36	75.15	917.36
74.00	917.16	74.00	917.16	97.29	920.01			75.87	917.5	75.87	917.5	75.87	917.5
77.00	917.21	77.00	917.21	113.02	920.14			76.38	917.54	76.38	917.54	76.38	917.54
78.00	917.48	78.00	917.48	123.42	920.36			76.86	917.99	76.86	917.99	76.86	917.99
79.00	917.78	79.00	917.78	129.63	920.39			76.99	918.24	76.99	918.24	76.99	918.24
80.00	918.01	80.00	918.01					77.27	918.3	77.27	918.3	77.27	918.3
81.00	918.28	81.00	918.28					78.21	918.33	78.21	918.33	78.21	918.33
82.00	918.90	82.00	918.90					80.64	918.86	80.64	918.86	80.64	918.86
83.00	919.46	83.00	919.46					84.39	919.58	84.39	919.58	84.39	919.58
87.00	919.84	87.00	919.84					85.67	919.8	85.67	919.8	85.67	919.8
89.00	919.91	89.00	919.91					88.13	920.03	88.13	920.03	88.13	920.03
93.00	919.95	93.00	919.95					102.95	920.1	102.95	920.1	102.95	920.1
100.00	919.97	100.00	919.97					129.51	920.45	129.51	920.45	129.51	920.45
115.00	920.21	115.00	920.21										
125.00	920.36	125.00	920.36										
130.00	920.41	130.00	920.41										



CROSS SECTION PLOT - LOOKING DOWNSTREAM



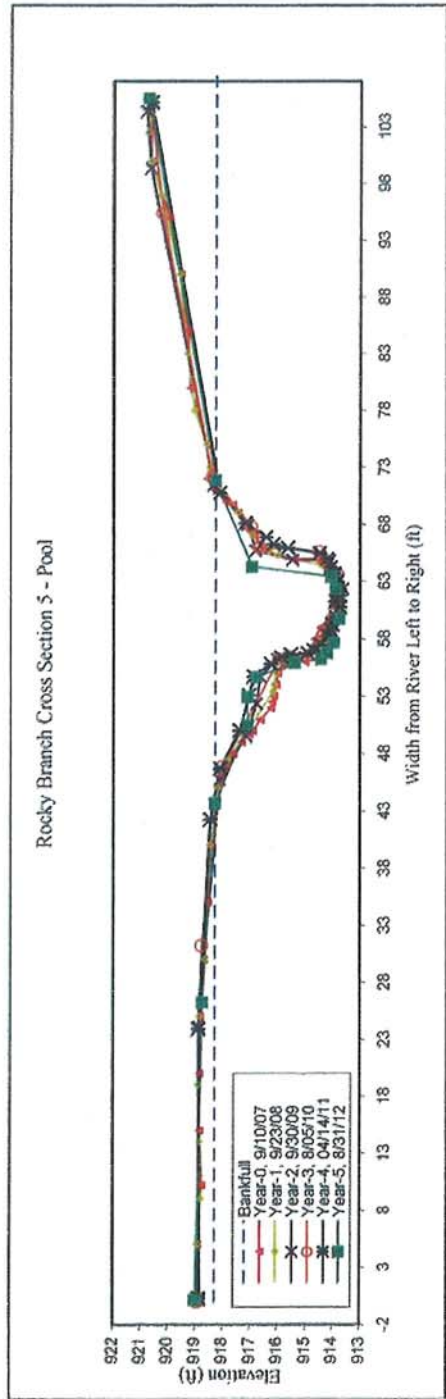
CROSS SECTION PHOTO - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA CROSS-SECTION: 4
 PROJECT ROCKY BRANCH FEATURE: Riffle
 TASK CROSS SECTION
 REACH ROCKY BRANCH
 DATE 8/27/12 to 8/31/12
 CREW BUCHHOLZ/PARRISH

Summary Data
 All dimensions in feet.

Bankfull X-sec area	39.7	sq. ft.
Bankfull Width	41.53	ft.
Bankfull Mean Depth	1.0	ft.
Bankfull Max Depth	3.18	ft.
Width/Depth Ratio	43.4	
Entrenchment Ratio	2.41	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	919.64	ft.

ROCKY BRANCH		EEP PROJECT # 308		CROSS-SECTION: 5		Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6		
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	
0.00	918.78	0.00	918.78	0.13	918.83	0.00	918.91	0.31	918.87	0.31	918.87	0.31	918.87	0.31	918.87	0.31	918.87	0.31	918.87	
5.00	918.89	5.00	918.87	24.09	918.87	31.24	918.77	23.91	918.89	23.91	918.89	23.91	918.89	23.91	918.89	23.91	918.89	23.91	918.89	
10.20	918.75	9.00	918.79	45.71	918.12	46.90	918.00	42.23	918.47	42.23	918.47	42.23	918.47	42.23	918.47	42.23	918.47	42.23	918.47	
15.00	918.84	14.00	918.84	49.52	917.16	56.27	915.96	46.69	918.10	46.69	918.10	46.69	918.10	46.69	918.10	46.69	918.10	46.69	918.10	
20.00	918.83	19.00	918.89	52.33	916.78	56.45	915.62	50.00	917.39	50.00	917.39	50.00	917.39	50.00	917.39	50.00	917.39	50.00	917.39	
25.00	918.82	25.00	918.85	54.69	916.65	56.60	914.76	53.07	917.06	53.07	917.06	53.07	917.06	53.07	917.06	53.07	917.06	53.07	917.06	
30.00	918.67	30.00	918.66	56.24	916.01	57.94	914.32	54.72	916.89	54.72	916.89	54.72	916.89	54.72	916.89	54.72	916.89	54.72	916.89	
35.00	918.54	40.00	918.49	56.38	915.42	58.23	914.20	55.80	916.27	55.80	916.27	55.80	916.27	55.80	916.27	55.80	916.27	55.80	916.27	
40.00	918.47	44.00	918.36	57.01	914.62	58.69	914.10	56.35	915.88	56.35	915.88	56.35	915.88	56.35	915.88	56.35	915.88	56.35	915.88	
44.00	918.39	45.00	918.21	58.34	914.13	59.68	914.03	56.63	915.55	56.63	915.55	56.63	915.55	56.63	915.55	56.63	915.55	56.63	915.55	
45.00	918.20	47.40	917.83	59.73	913.84	61.00	913.81	56.73	914.94	56.73	914.94	56.73	914.94	56.73	914.94	56.73	914.94	56.73	914.94	
46.00	918.08	49.50	917.23	61.07	913.84	61.15	913.89	56.96	914.72	56.96	914.72	56.96	914.72	56.96	914.72	56.96	914.72	56.96	914.72	
47.00	917.91	53.40	916.19	62.34	913.64	61.94	913.81	57.43	914.46	57.43	914.46	57.43	914.46	57.43	914.46	57.43	914.46	57.43	914.46	
49.00	917.32	55.00	916.05	64.85	914.11	63.66	913.82	58.71	914.09	58.71	914.09	58.71	914.09	58.71	914.09	58.71	914.09	58.71	914.09	
49.70	917.03	56.00	915.74	64.89	913.49	64.17	914.10	59.22	914.02	59.22	914.02	59.22	914.02	59.22	914.02	59.22	914.02	59.22	914.02	
50.00	916.91	56.40	915.43	65.71	916.83	65.03	914.38	59.84	913.89	59.84	913.89	59.84	913.89	59.84	913.89	59.84	913.89	59.84	913.89	
51.00	916.64	57.30	914.62	67.98	917.11	65.62	914.50	60.75	913.75	60.75	913.75	60.75	913.75	60.75	913.75	60.75	913.75	60.75	913.75	
52.00	916.25	60.00	913.93	71.44	918.37	65.98	916.67	61.24	913.91	61.24	913.91	61.24	913.91	61.24	913.91	61.24	913.91	61.24	913.91	
52.30	916.21	61.10	913.82	99.35	920.66	67.81	916.99	61.73	913.76	61.73	913.76	61.73	913.76	61.73	913.76	61.73	913.76	61.73	913.76	
53.00	916.14	61.80	913.83	104.36	920.82	72.16	918.41	62.34	913.82	62.34	913.82	62.34	913.82	62.34	913.82	62.34	913.82	62.34	913.82	
54.00	916.06	62.60	913.81			95.42	920.22	62.95	913.87	62.95	913.87	62.95	913.87	62.95	913.87	62.95	913.87	62.95	913.87	
56.00	915.43	64.40	914.41			105.50	920.70	63.64	913.95	63.64	913.95	63.64	913.95	63.64	913.95	63.64	913.95	63.64	913.95	
56.00	915.02	65.30	916.02					64.22	914.09	64.22	914.09	64.22	914.09	64.22	914.09	64.22	914.09	64.22	914.09	
57.00	914.78	65.70	916.36					64.93	914.21	64.93	914.21	64.93	914.21	64.93	914.21	64.93	914.21	64.93	914.21	
58.00	914.67	67.00	916.93					65.46	914.49	65.46	914.49	65.46	914.49	65.46	914.49	65.46	914.49	65.46	914.49	
59.00	914.47	69.00	917.47					66.22	916.18	66.22	916.18	66.22	916.18	66.22	916.18	66.22	916.18	66.22	916.18	
60.00	913.99	71.00	918.17					66.84	916.44	66.84	916.44	66.84	916.44	66.84	916.44	66.84	916.44	66.84	916.44	
60.80	913.85	73.00	918.51					68.10	917.20	68.10	917.20	68.10	917.20	68.10	917.20	68.10	917.20	68.10	917.20	
61.00	913.85	75.00	918.63					70.73	918.13	70.73	918.13	70.73	918.13	70.73	918.13	70.73	918.13	70.73	918.13	
62.00	913.90	78.00	919.06					105.12	920.64	105.12	920.64	105.12	920.64	105.12	920.64	105.12	920.64	105.12	920.64	
63.00	913.89	83.00	919.33																	
63.40	914.12	90.00	919.60																	
64.00	914.35	97.00	920.30																	
64.80	914.59	100.00	920.65																	
65.00	914.59	102.50	920.77																	
65.00	915.43	104.00	920.65																	
65.60	916.37	105.00	920.64																	
66.00	916.61																			
67.00	916.89																			
68.00	917.24																			
69.00	917.47																			
69.70	917.67																			
70.00	917.92																			
71.00	918.32																			
72.00	918.61																			
73.00	918.50																			
75.00	918.64																			
80.00	919.21																			
85.00	919.31																			
90.00	919.57																			
95.00	919.98																			
100.00	920.66																			
105.00	920.67																			



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA CROSS-SECTION: 5

PROJECT ROCKY BRANCH FEATURE: Pool

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 8/27/12 to 8/31/12

CREW BUCHHOLZ/PARRISH

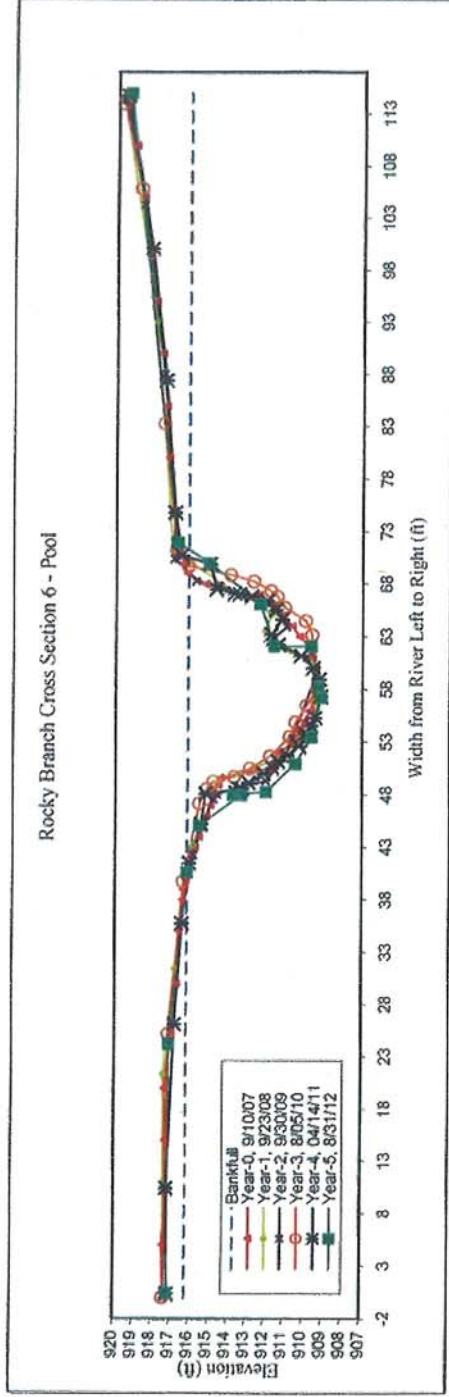
Summary Data
 All dimensions in feet.

Bankfull X-sec area	51.4	sq. ft.
Bankfull Width	28.12	ft.
Bankfull Mean Depth	1.8	ft.
Bankfull Max Depth	4.5	ft.
Width/Depth Ratio	15.37	
Entrenchment Ratio	3.0	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	918.27	ft.



CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308										CROSS-SECTION: 6	
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	917.33	0.00	917.32	0.13	917.32	0.00	917.36	0.35	917.12	0.35	917.12	0.35	917.12
5.00	917.39	21.30	917.41	10.28	917.22	25.21	917.13	10.42	917.19	10.42	917.19	10.42	917.19
10.00	917.30	31.40	916.85	23.98	917.10	39.75	916.39	26.1	916.81	26.1	916.81	26.1	916.81
15.00	917.30	43.20	915.88	35.45	916.57	47.19	915.56	35.72	916.45	35.72	916.45	35.72	916.45
20.00	917.34	49.30	914.54	42.22	915.86	48.56	915.17	41.45	916.08	41.45	916.08	41.45	916.08
25.00	917.05	50.00	913.46	44.96	915.44	49.27	914.84	45.17	915.47	45.17	915.47	45.17	915.47
30.00	916.73	51.50	911.26	47.53	914.83	49.69	913.73	48.05	915.24	48.05	915.24	48.05	915.24
35.00	916.65	53.30	910.28	48.03	914.62	50.48	912.87	48.53	913.3	48.53	913.3	48.53	913.3
38.00	916.44	54.30	909.55	48.50	913.79	51.67	911.82	48.55	913.47	48.55	913.47	48.55	913.47
39.00	916.41	57.00	909.46	49.28	912.03	55.51	910.77	49.12	912.95	49.12	912.95	49.12	912.95
40.00	916.27	58.50	909.36	51.43	911.04	54.90	910.47	49.95	912.15	49.95	912.15	49.95	912.15
41.00	916.16	59.50	909.47	53.37	910.64	56.47	909.91	50.53	911.69	50.53	911.69	50.53	911.69
42.00	916.04	60.60	909.72	59.31	909.45	58.02	909.35	51.15	911.4	51.15	911.4	51.15	911.4
43.00	915.80	62.10	911.56	61.03	909.93	63.20	909.64	51.7	910.89	51.7	910.89	51.7	910.89
44.00	915.58	63.50	912.12	62.50	911.85	64.50	909.97	52.54	910.28	52.54	910.28	52.54	910.28
45.00	915.40	65.10	911.80	63.94	910.95	65.77	911.07	53.76	909.98	53.76	909.98	53.76	909.98
46.00	915.21	66.20	912.49	65.75	911.65	66.83	911.47	54.51	909.67	54.51	909.67	54.51	909.67
47.00	914.98	66.90	913.53	67.82	914.59	67.36	911.81	55.27	909.45	55.27	909.45	55.27	909.45
48.00	914.80	71.10	917.04	68.27	915.78	68.25	912.73	57.33	909.16	57.33	909.16	57.33	909.16
49.00	914.57	93.00	917.93	70.38	916.93	68.88	913.95	58.93	909.24	58.93	909.24	58.93	909.24
50.00	913.45	114.70	919.76	74.57	916.96	69.71	916.22	60.03	909.56	60.03	909.56	60.03	909.56
50.50	911.79			88.02	917.49	71.27	916.82	61.18	910.2	61.18	910.2	61.18	910.2
51.00	911.68			104.28	918.65	83.31	917.51	62.23	911.39	62.23	911.39	62.23	911.39
52.00	911.35			114.30	919.66	105.89	918.81	63.2	911.77	63.2	911.77	63.2	911.77
53.00	910.55							64.59	911.19	64.59	911.19	64.59	911.19
55.00	910.03							65.51	911.54	65.51	911.54	65.51	911.54
56.00	909.73							66.33	911.99	66.33	911.99	66.33	911.99
57.00	909.55							66.81	912.83	66.81	912.83	66.81	912.83
58.00	909.35							67	913.46	67	913.46	67	913.46
59.00	909.38							67.05	913.73	67.05	913.73	67.05	913.73
60.00	909.43							67.47	914.71	67.47	914.71	67.47	914.71
61.00	910.28							69.85	915.03	69.85	915.03	69.85	915.03
62.00	910.69							70.66	916.55	70.66	916.55	70.66	916.55
63.00	910.28							74.73	916.89	74.73	916.89	74.73	916.89
64.00	910.69							87.39	917.39	87.39	917.39	87.39	917.39
65.00	911.20							100.05	918.17	100.05	918.17	100.05	918.17
66.00	911.64							114.72	919.52	114.72	919.52	114.72	919.52
67.00	912.44												
67.00	913.43												
68.00	915.32												
69.00	916.28												
70.00	916.41												
71.00	916.74												
72.00	916.84												
75.00	916.96												
80.00	917.28												
85.00	917.4												
90.00	917.63												
95.00	917.98												
100.00	918.32												
105.00	918.68												
110.00	919.11												
115.00	919.66												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA CROSS-SECTION: 6

PROJECT ROCKY BRANCH FEATURE: Pool
 TASK CROSS SECTION
 REACH ROCKY BRANCH
 DATE 8/27/12 to 8/27/12
 CREW BUCHHOLZ/PARRISH

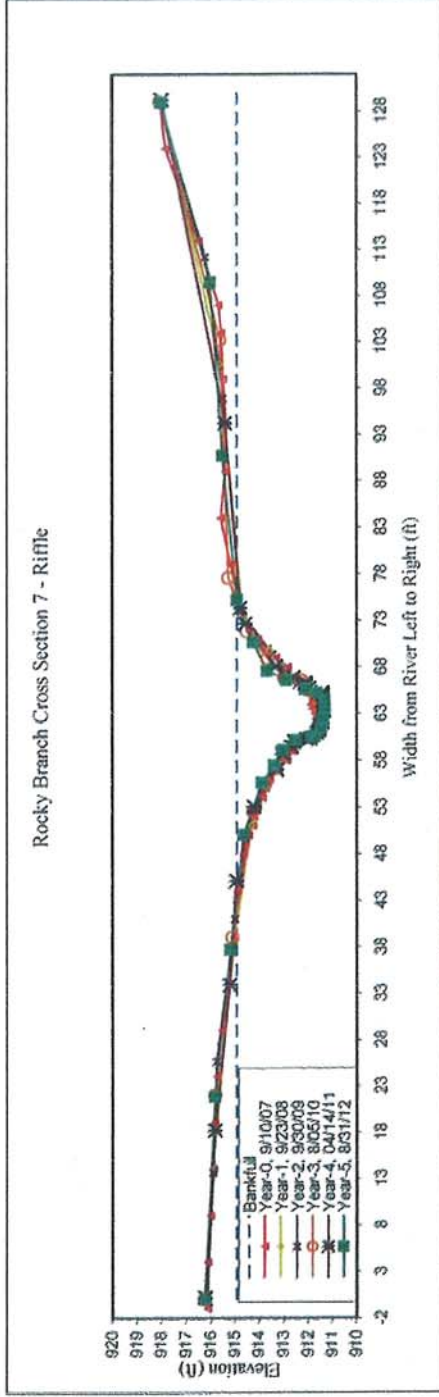
Summary Data
 All dimensions in feet.

Bankfull X-sec area	121.4	sq. ft.
Bankfull Width	30.6	ft.
Bankfull Mean Depth	3.96	ft.
Bankfull Max Depth	7.0	ft.
Width/Depth Ratio	7.7	
Entrenchment Ratio	3.5	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	916.18	ft.



CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308										CROSS-SECTION: 7	
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
-1.00	916.10	0.00	916.17	0.16	916.17	0.00	916.23	0.18	916.23	0.18	916.23	0.18	916.23
4.00	916.10	14.00	915.91	13.66	915.89	21.98	915.81	18.18	915.82	18.18	915.82	18.18	915.82
9.00	915.99	38.40	915.01	25.66	915.74	39.02	915.08	33.89	915.2	33.89	915.2	33.89	915.2
14.00	915.87	51.00	914.29	40.96	914.98	52.54	914.21	45.08	914.93	45.08	914.93	45.08	914.93
19.00	915.82	55.00	913.85	52.67	914.22	55.11	913.72	53.06	914.21	53.06	914.21	53.06	914.21
24.00	915.75	59.30	912.83	55.00	913.86	57.18	913.30	57.03	913.27	57.03	913.27	57.03	913.27
29.00	915.52	60.70	911.77	57.47	913.35	58.62	912.95	58.68	913.05	58.68	913.05	58.68	913.05
34.00	915.23	61.40	911.52	58.84	912.92	59.97	912.44	59.44	912.66	59.44	912.66	59.44	912.66
39.00	914.97	63.10	911.47	60.20	912.55	60.47	911.91	60	912.56	60	912.56	60	912.56
44.00	914.87	64.30	911.64	60.68	911.95	60.96	911.66	60.27	912.06	60.27	912.06	60.27	912.06
48.00	914.61	65.20	911.87	61.09	911.60	61.49	911.55	60.33	911.91	60.33	911.91	60.33	911.91
49.00	914.54	65.80	912.15	61.90	911.61	62.14	911.45	60.96	911.64	60.96	911.64	60.96	911.64
50.00	914.40	69.80	913.55	62.69	911.58	62.96	911.46	61.21	911.54	61.21	911.54	61.21	911.54
51.00	914.22	73.10	914.65	63.56	911.52	63.62	911.48	61.63	911.5	61.63	911.5	61.63	911.5
52.00	914.18	100.60	915.62	64.63	911.41	64.19	911.48	62.1	911.42	62.1	911.42	62.1	911.42
53.00	914.04	129.00	918.03	65.32	911.75	64.72	911.50	62.57	911.39	62.57	911.39	62.57	911.39
54.00	913.85			66.17	912.42	65.16	911.70	63.31	911.34	63.31	911.34	63.31	911.34
55.00	913.71			67.42	912.92	65.53	911.96	63.65	911.35	63.65	911.35	63.65	911.35
56.00	913.54			69.36	913.44	66.18	912.09	64.42	911.42	64.42	911.42	64.42	911.42
57.00	913.20			73.93	914.75	66.58	912.25	65	911.38	65	911.38	65	911.38
58.00	912.84			96.87	915.50	66.83	912.95	65.25	911.42	65.25	911.42	65.25	911.42
59.00	912.63			112.20	916.22	68.95	913.64	65.75	911.94	65.75	911.94	65.75	911.94
60.00	912.47			129.00	918.08	71.85	914.49	66.07	912.07	66.07	912.07	66.07	912.07
60.50	911.93					77.62	913.26	66.29	912.12	66.29	912.12	66.29	912.12
61.00	911.72					103.21	913.62	66.9	912.59	66.9	912.59	66.9	912.59
61.50	911.62					129.05	918.07	68.04	913.31	68.04	913.31	68.04	913.31
62.00	911.89							72.64	914.56	72.64	914.56	72.64	914.56
62.50	911.67							74.32	914.76	74.32	914.76	74.32	914.76
63.00	911.71							94.2	915.41	94.2	915.41	94.2	915.41
63.50	913.81							129.21	918	129.21	918	129.21	918
64.00	911.86												
65.00	911.93												
65.70	912.07												
66.50	912.19												
67.00	912.60												
68.00	912.82												
69.00	913.29												
70.00	913.63												
71.00	914.03												
72.00	914.39												
73.00	914.63												
74.00	914.77												
79.00	915.16												
84.00	915.58												
89.00	915.39												
94.00	915.36												
99.00	915.48												
104.00	915.56												
107.00	915.68												
114.00	916.5												
124.00	917.34												
129.00	918.05												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-5, 2012 SURVEY DATA CROSS-SECTION: 7

PROJECT ROCKY BRANCH FEATURE: Riffle
 TASK CROSS SECTION
 REACH ROCKY BRANCH
 DATE 8/27/12 to 8/31/12
 CREW BUCHHOLZ/PARRISH

Summary Data
 All dimensions in feet.

Bankfull X-sec area	38.9	sq. ft.
Bankfull Width	31.5	ft.
Bankfull Mean Depth	1.2	ft.
Bankfull Max Depth	3.6	ft.
Width/Depth Ratio	25.5	
Entrenchment Ratio	3.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	914.90	ft.



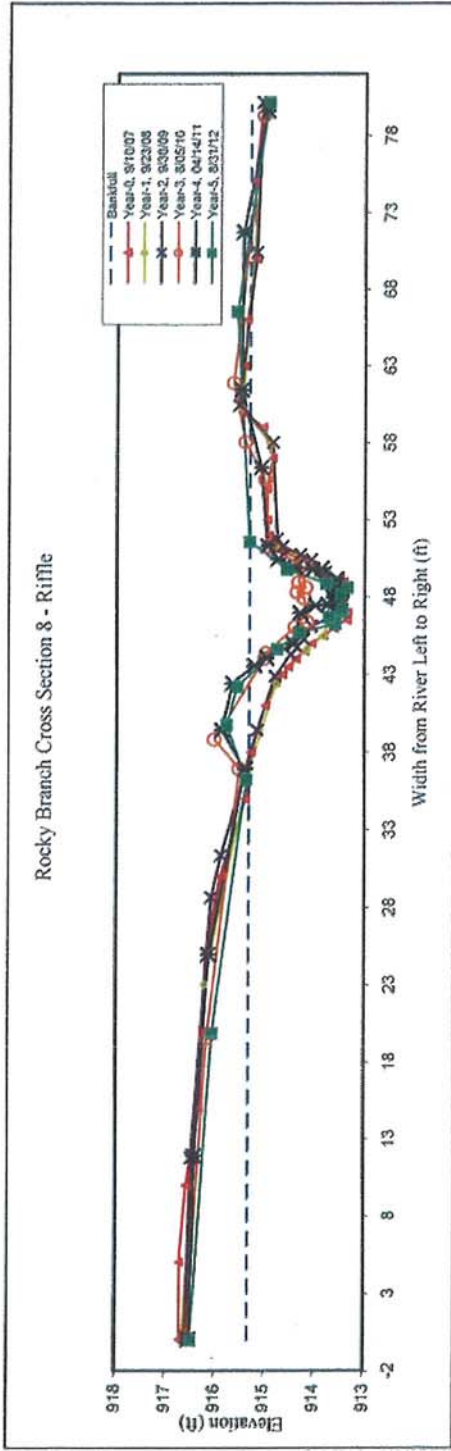
CROSS SECTION PHOTO - LOOKING DOWNSTREAM

CROSS-SECTION: 8

EEP PROJECT # 308

ROCKY BRANCH

Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	916.69	0.00	916.63	0.17	916.58	0.25	916.56	0.04	916.52	0.04	916.52		
5.00	916.69	23.00	916.21	11.78	916.47	19.55	916.15	11.91	916.42	11.91	916.42		
10.00	916.56	37.00	915.30	28.65	916.08	36.95	915.51	24.95	916.14	24.95	916.14		
15.00	916.30	42.40	914.77	31.35	915.88	38.84	916.01	36.9	915.41	36.9	915.41		
20.00	916.22	44.60	914.16	39.41	915.16	44.04	915.00	39.41	915.88	39.41	915.88		
25.00	916.18	45.50	913.81	42.90	914.80	44.39	914.98	42.41	915.66	42.41	915.66		
30.00	915.89	46.70	913.68	44.28	914.48	46.07	914.39	43.57	915.22	43.57	915.22		
35.00	915.38	47.80	913.62	45.27	914.22	46.40	914.15	44.05	914.97	44.05	914.97		
38.00	915.27	48.70	913.40	46.15	914.07	47.95	914.21	44.94	914.43	44.94	914.43		
41.00	914.99	49.70	913.78	46.71	913.65	48.33	914.35	46.95	914.3	46.95	914.3		
42.50	914.77	51.20	914.72	47.61	913.61	48.62	914.17	47.43	913.99	47.43	913.99		
43.00	914.64	57.90	914.89	48.37	913.45	48.94	914.32	47.49	913.74	47.49	913.74		
43.50	914.53	60.20	915.47	48.94	913.71	50.01	914.27	47.95	913.63	47.95	913.63		
44.00	914.37	79.60	915.03	49.61	913.79	51.31	914.92	48.52	913.61	48.52	913.61		
44.50	914.19			50.42	914.07	55.61	915.00	49.14	913.57	49.14	913.57		
45.00	914.05			50.74	914.28	58.06	915.40	49.73	914.05	49.73	914.05		
45.50	913.82			51.27	914.65	61.91	915.64	49.81	913.86	49.81	913.86		
46.00	913.61			51.76	914.76	79.31	915.05	49.87	914.4	49.87	914.4		
46.20	913.55			58.01	914.85			50.43	914.74	50.43	914.74		
46.50	913.35			60.44	915.55			51.29	914.96	51.29	914.96		
47.00	913.34			70.41	915.19			56.37	915.09	56.37	915.09		
47.50	913.46			80.18	915.08			61.42	915.49	61.42	915.49		
48.00	913.42							71.71	915.46	71.71	915.46		
48.50	913.42							79.58	914.98	79.58	914.98		
49.00	913.41												
49.20	913.50												
49.50	913.78												
50.00	914.02												
50.50	914.33												
51.00	914.65												
51.50	914.84												
52.00	914.92												
53.00	914.95												
55.00	914.96												
57.00	914.85												
59.00	915.05												
60.00	915.48												
63.00	915.45												
66.00	915.37												
70.00	915.18												
75.00	915.24												
80.00	915.06												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

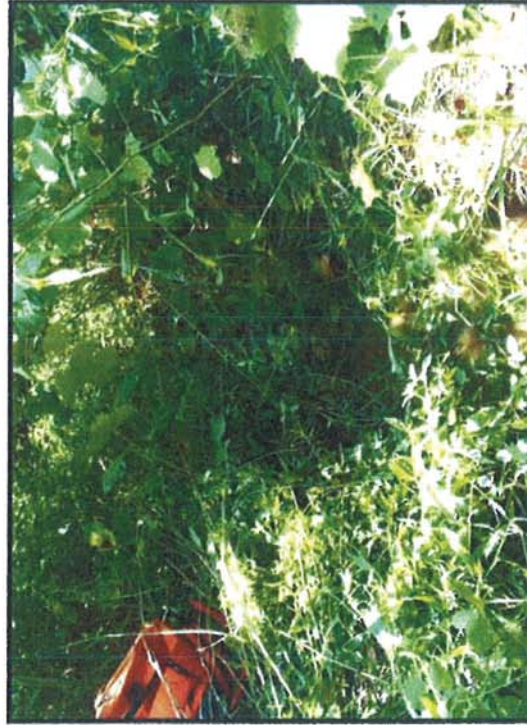
YEAR-5, 2012 SURVEY DATA CROSS-SECTION: 8

PROJECT ROCKY BRANCH FEATURE: Riffle
 TASK CROSS SECTION
 REACH ROCKY BRANCH
 DATE 8/27/12 to 8/31/12
 CREW BUCHHOLZ/PARRISH

Summary Data

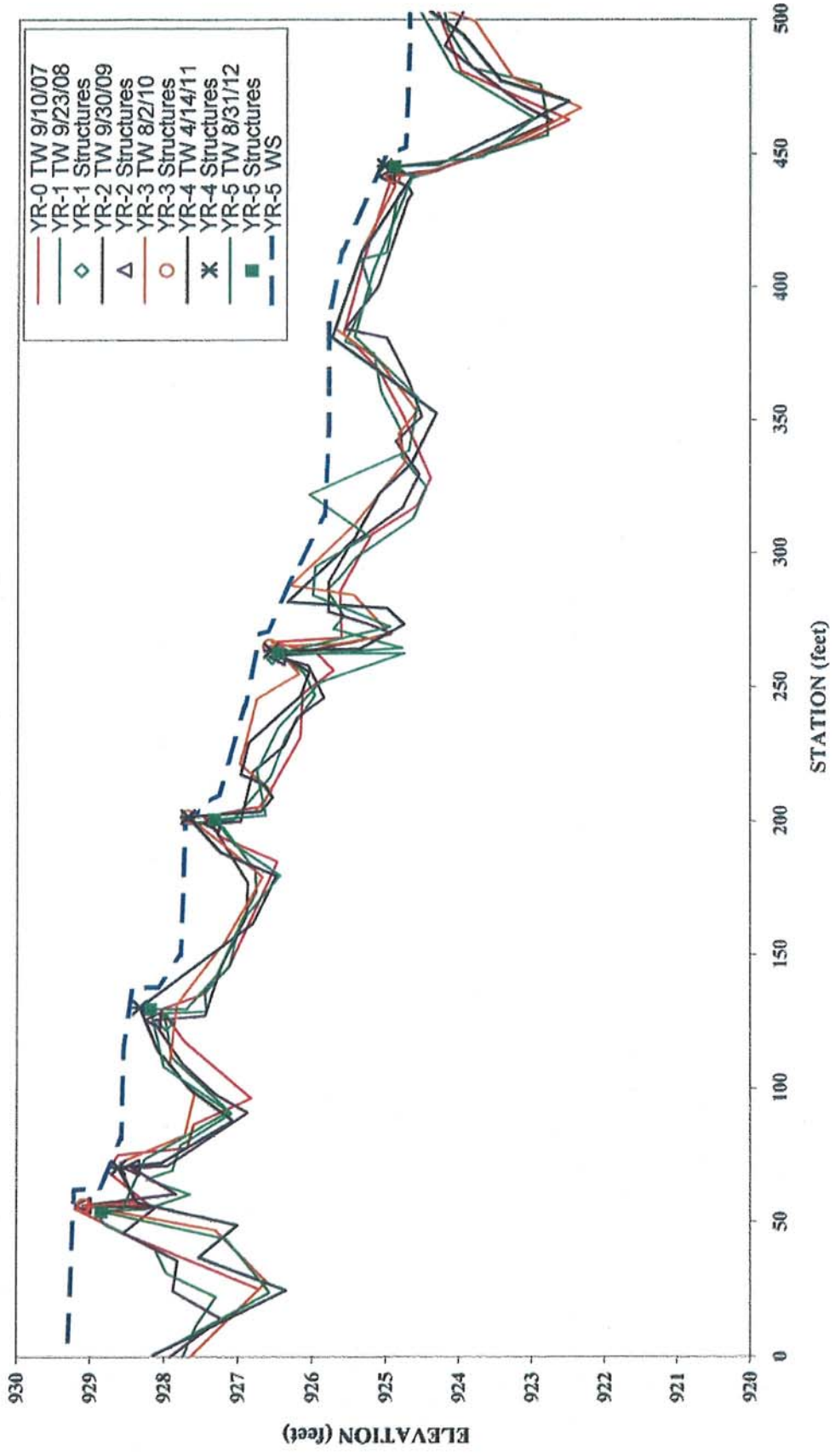
All dimensions in feet.

Bankfull X-sec area	8.6	sq. ft.
Bankfull Width	8.9	ft.
Bankfull Mean Depth	1.0	ft.
Bankfull Max Depth	2.0	ft.
Width/Depth Ratio	9.2	
Entrenchment Ratio	11.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	915.31	ft.



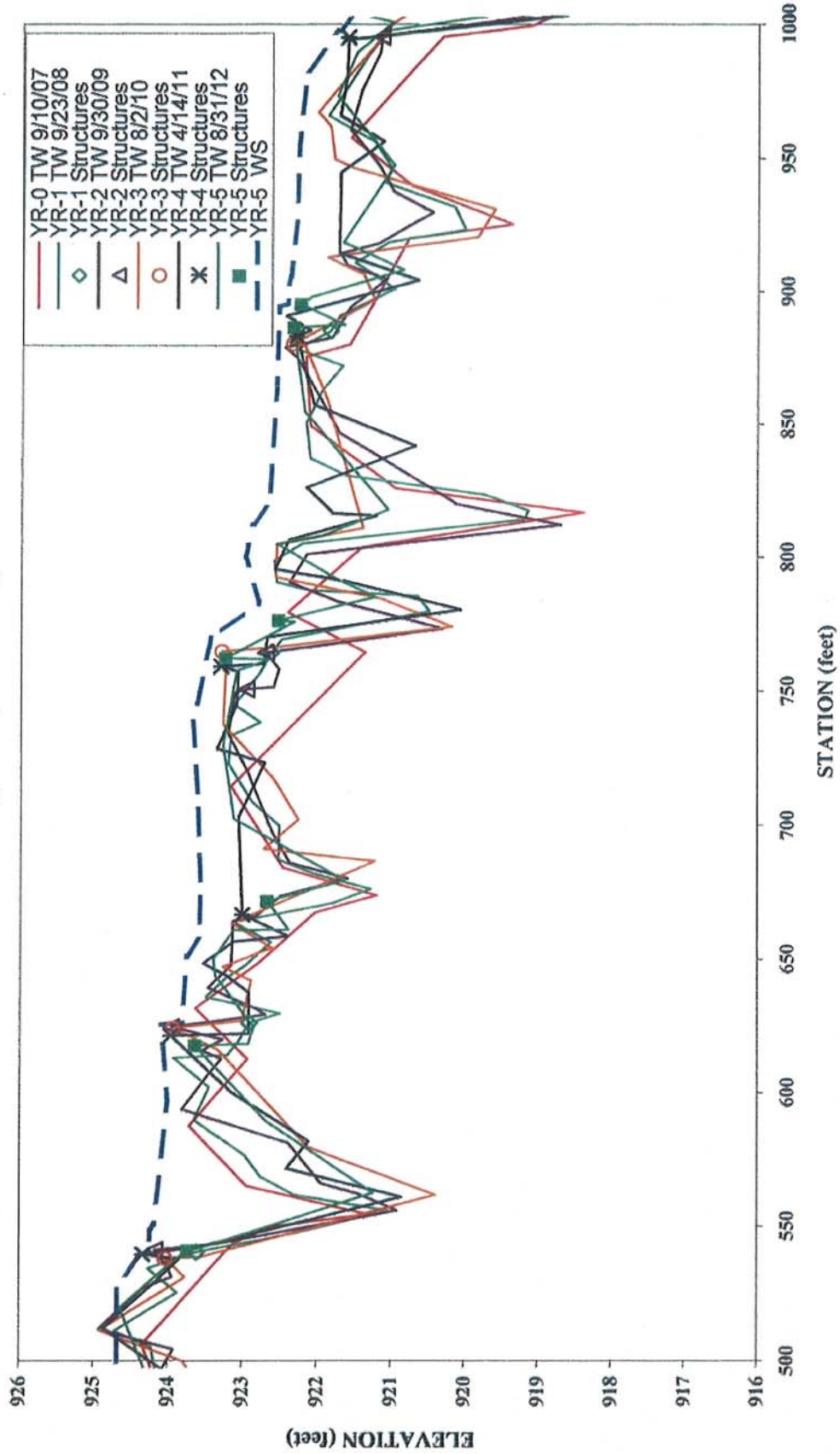
CROSS SECTION PHOTO - LOOKING DOWNSTREAM

**Rocky Branch
Longitudinal Profile
2012 (Year-5) Monitoring**



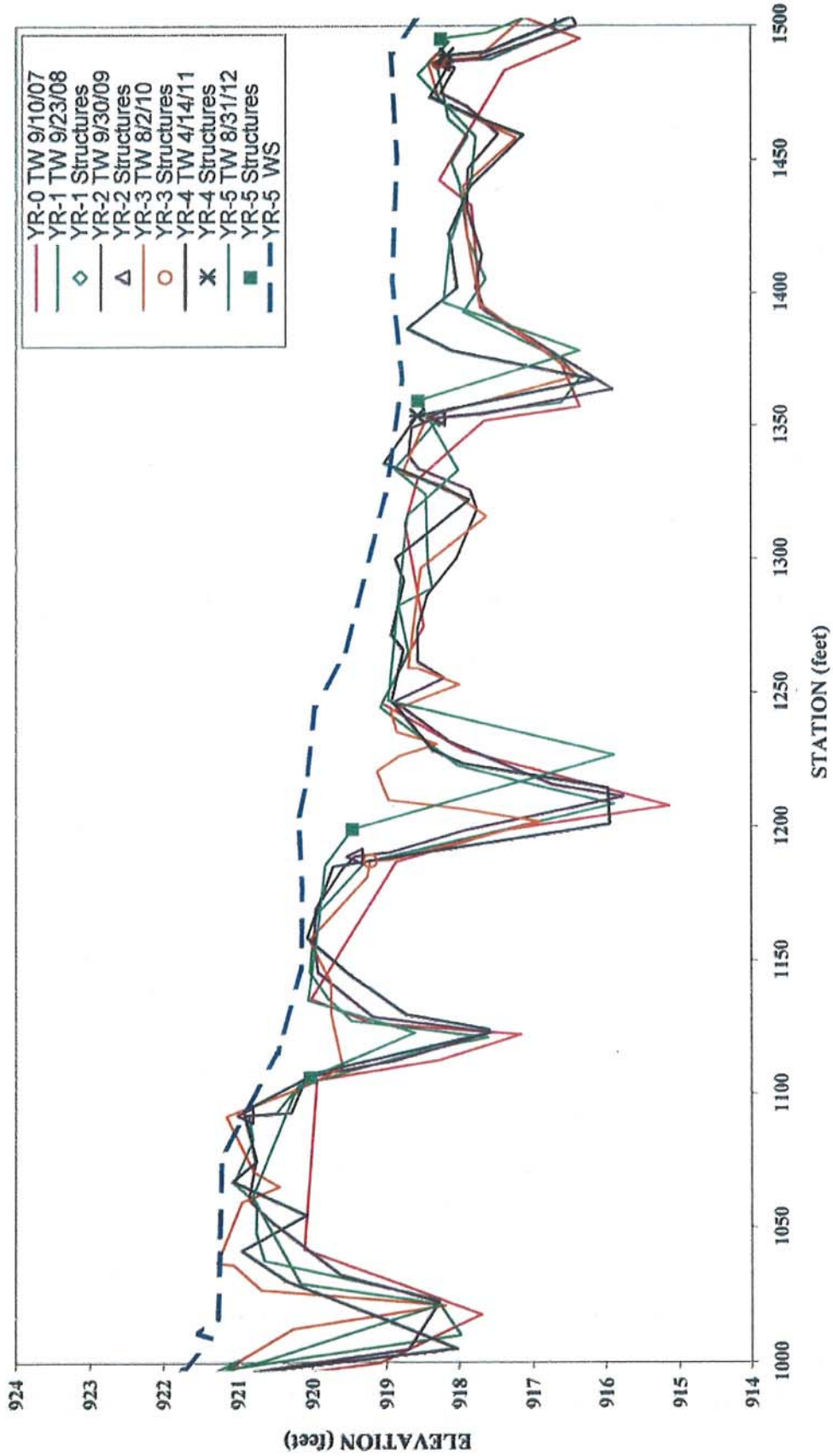
Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch
Longitudinal Profile
2012 (Year-5) Monitoring**



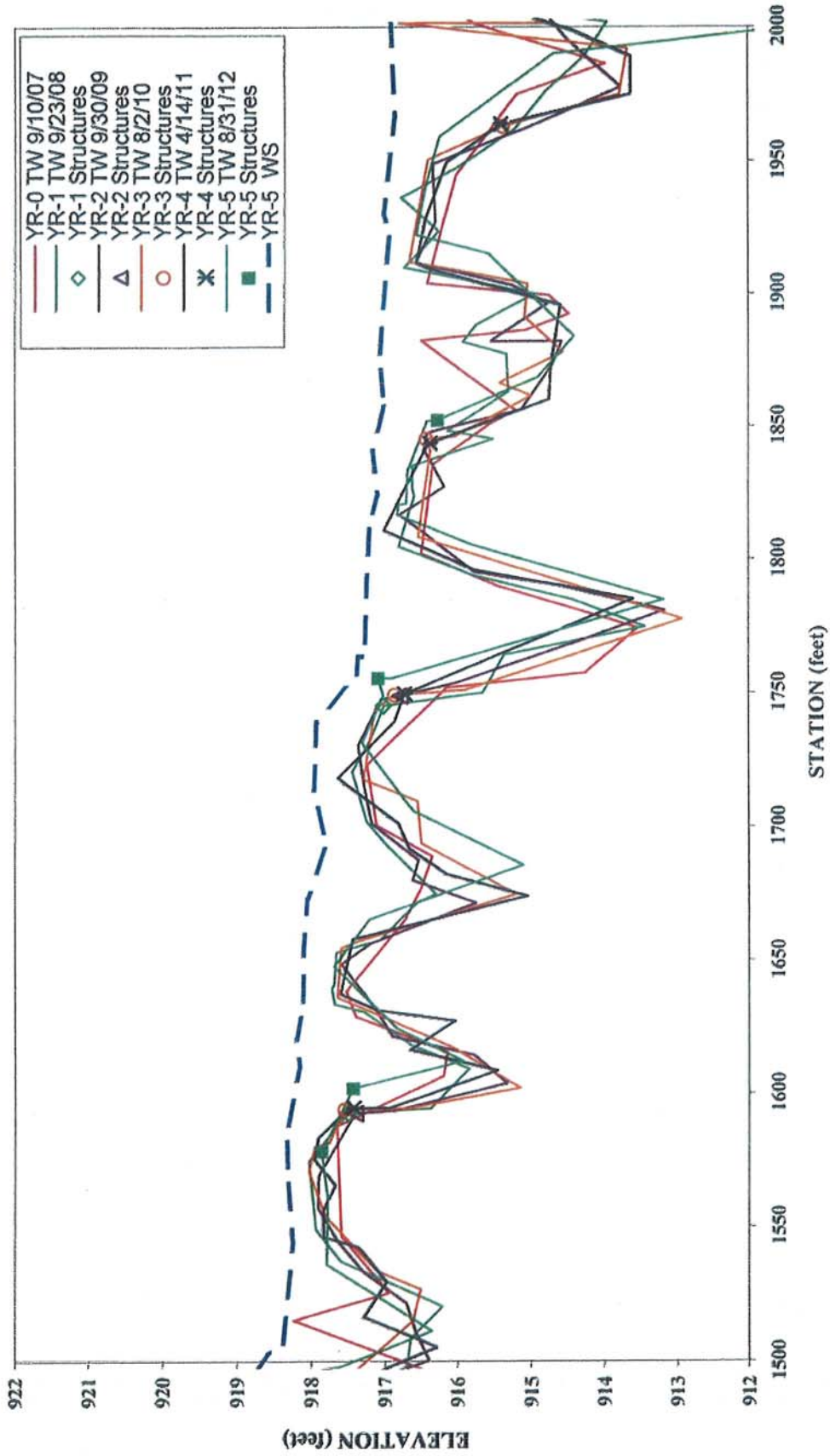
Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch
Longitudinal Profile
2012 (Year-5) Monitoring**



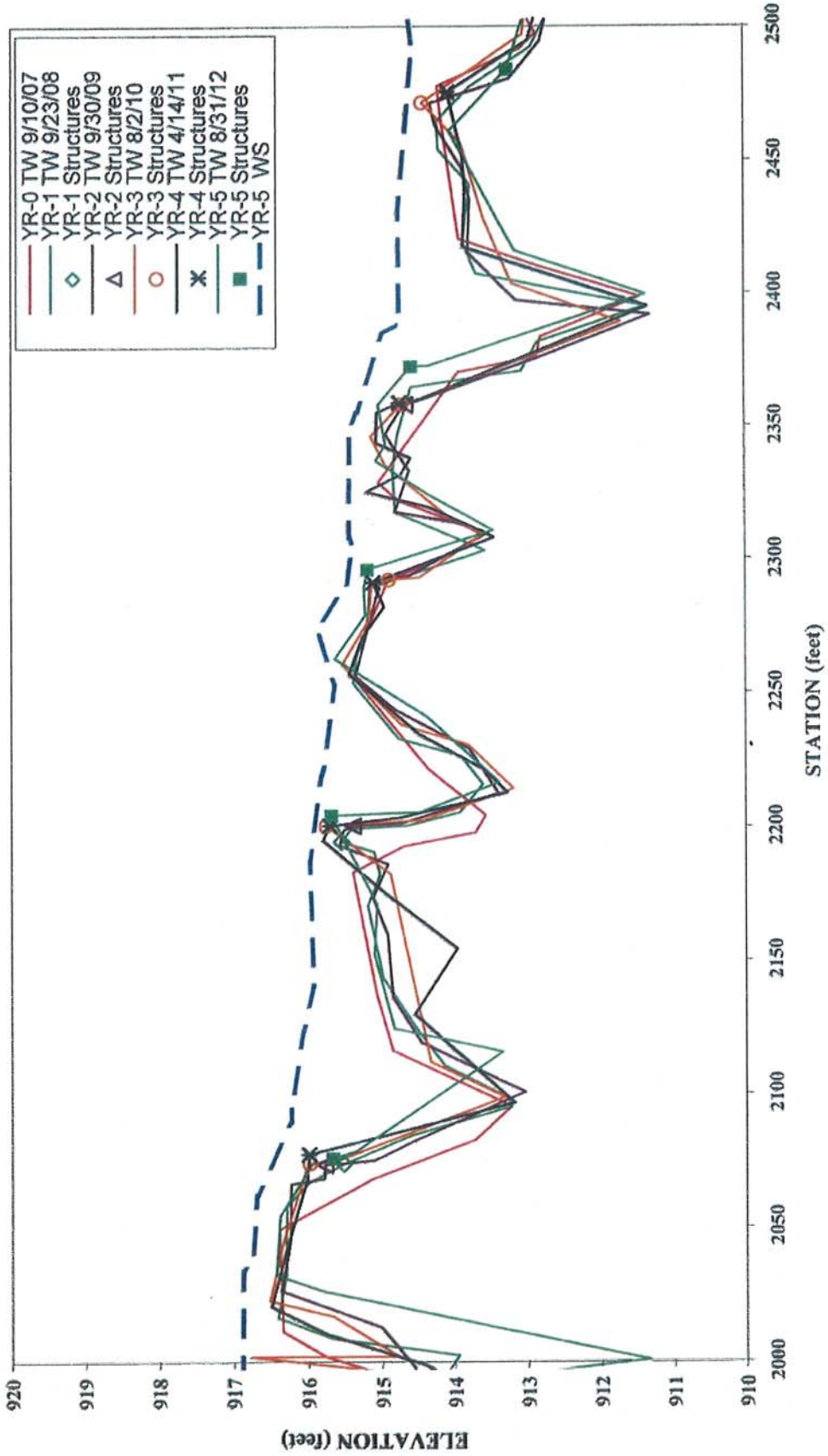
Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch
Longitudinal Profile
2012 (Year-5) Monitoring**



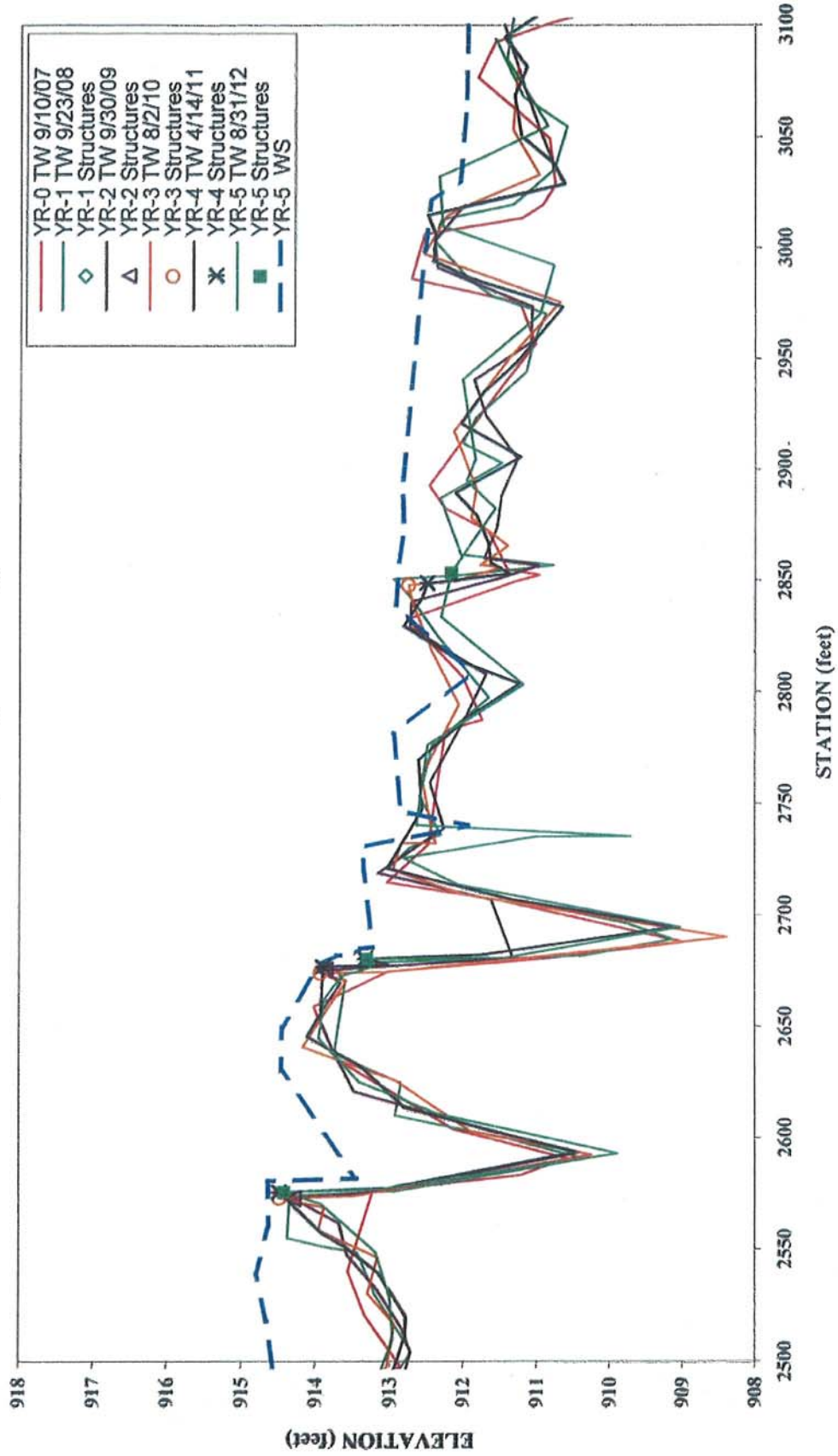
Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch
Longitudinal Profile
2012 (Year-5) Monitoring**



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch
Longitudinal Profile
2012 (Year-5) Monitoring**



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

5-YEAR, 2012 SURVEY DATA

PROJECT NAME ROCKY BRANCH

FEATURE/FACET SLOPE
LENGTH, AND SPACING AND
LONGITUDINAL PROFILE DATA

TASK LONGITUDINAL PROFILE
REACH ROCKY BRANCH
DATE 8/27/2012 to 8/31/2012
CREW BUCHHOLZ/PARRISH

Overall water surface slope =	0.6%	DESIGN	MIN.	MAX.	
		Rifle	1.1%	3.3%	
WS sta. start =	5.84 ft	Run	---	---	
WS sta. end =	3120.92 ft	p-p spacing	115	161	
ELEV. Start =	929.29 ft msl				
ELEV. End =	911.92 ft msl	Results			
	n =	MIN.	MEDIAN.	AVG.	MAX.
Rifle slopes measured =	19	0.36%	1.52%	5.75%	66.63%
Run slopes measured =	20	0.63%	5.10%	8.48%	39.47%
Pools measured =	32	16	37	39	66

All data reported in units of feet unless otherwise specified.

Feature	Station	Length	Slope		
RIFFLE	292.21	22.2	3.42%	n =	19
RIFFLE	389.6	59.89	1.30%	MIN =	0.36%
RIFFLE	527.49	16.54	66.63%	MEDIAN =	1.52%
RIFFLE	651.76	6.22	0.48%	AVG. =	5.75%
RIFFLE	738	27.74	0.65%	MAX =	66.63%
RIFFLE	813.13	3.08	14.61%		
RIFFLE	981.58	27.37	2.74%		
RIFFLE	1077.61	37.67	1.46%		
RIFFLE	1179.11	24.68	0.36%		
RIFFLE	1490.17	12.01	3.58%		
RIFFLE	1655.68	17.65	2.72%		
RIFFLE	1739.25	17.55	1.65%		
RIFFLE	1824.72	35.27	1.13%		
RIFFLE	1930.39	36.91	0.87%		
RIFFLE	2278.75	26.32	1.52%		
RIFFLE	2352.92	6.43	2.02%		
RIFFLE	2667.82	27.96	1.11%		
RIFFLE	2748.82	14.74	1.22%		
RIFFLE	3018.1	31.48	1.78%		

5-YEAR, 2012 SURVEY DATA

PROJECT NAME ROCKY BRANCH

Feature	Station	Length	Slope		
RUN	449.49	4.08	5.88%	n =	20
RUN	544.03	4.6	4.78%	MIN =	0.63%
RUN	765.74	4.65	3.23%	MEDIAN =	5.10%
RUN	1008.95	2.73	13.92%	AVG. =	8.48%
RUN	1502.18	1.28	8.59%	MAX =	39.47%
RUN	2089.53	2.19	12.79%		
RUN	2305.07	7.1	0.70%		
RUN	2695.78	4.17	9.83%		
RUN	314.41	15.55	5.21%		
RUN	657.98	11.14	9.07%		
RUN	816.21	9.69	29.72%		
RUN	1115.28	7.2	3.19%		
RUN	1203.79	13.56	2.73%		
RUN	1673.33	20.32	10.38%		
RUN	1756.8	6.66	1.05%		
RUN	1859.99	0.38	39.47%		
RUN	1967.3	31.21	5.00%		
RUN	2359.35	29.38	1.19%		
RUN	2763.56	62.8	2.31%		
RUN	3049.58	71.33	0.63%		
Feature	Station	Length	p-p spacing		
POOL	23.61	24		n =	32
POOL	99.28	28	53.35	MIN =	16 (p-p spacing)
POOL	187.81	58	61.22	MEDIAN =	37
POOL	280.47	10	21.68	AVG. =	39
POOL	329.96	15	32.15	MAX =	66
POOL	471.58	29	32.73		
POOL	570.25	31	47.16		
POOL	632.46	23	25.52		
POOL	669.12	22	21.75		
POOL	687.48	31	30.69		
POOL	793.2	10	16.13		
POOL	825.9	29	46.49		
POOL	916.24	22	20.42		
POOL	1037.31	23	28.73		
POOL	1138.99	32	35.96		
POOL	1386.42	24	37.17		
POOL	1518.86	64	37.99		
POOL	1620.1	26	22.39		
POOL	1693.65	25	40.62		
POOL	1792.75	43	49.86		
POOL	1892.23	68	62.96		
POOL	1998.51	61	66.49		
POOL	2123.76	127	46.11		
POOL	2232.58	18	35.52		
POOL	2326.78	37	28.32		
POOL	2415.82	49	43.29		
POOL	2517.77	64	64.35		
POOL	2615.93	36	48.47		
POOL	2717.79	25	32.88		
POOL	2826.36	67	57.14		
POOL	2890.47	31	26.31		
POOL	3000.54	38	39.64		

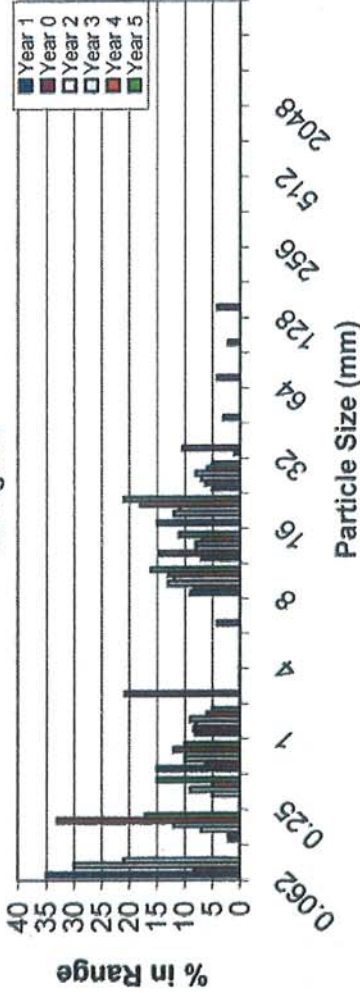
EPP PROJECT ID: 308
 CROSS-SECTION: 7

FEATURE: RIFFLE



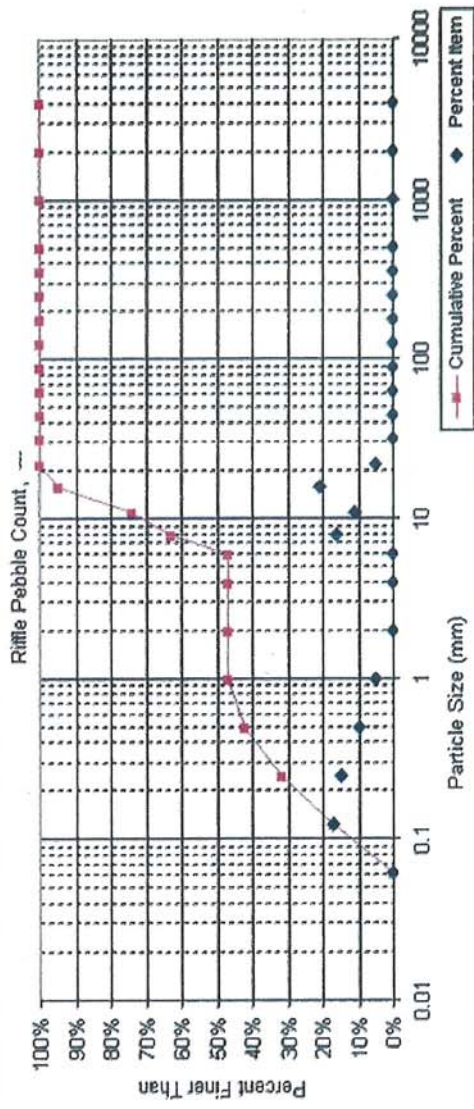
PROJECT ROCKY BRANCH
 TASK PEBBLE COUNT
 REACH ROCKY BRANCH
 DATE 08/27/2012 to 08/31/2012
 CREW BUCHHOLZ/PARRISH

Histogram



Material	Size Range (mm)	Count
silts/clay	0 - 0.062	
very fine sand	0.062 - 0.13	17
fine sand	0.13 - 0.25	15
medium sand	0.25 - 0.5	10
coarse sand	0.5 - 1	5
very coarse sand	1 - 2	
very fine gravel	2 - 4	
fine gravel	4 - 6	
fine gravel	6 - 8	16
medium gravel	8 - 11	11
medium gravel	11 - 16	21
coarse gravel	16 - 22	5
coarse gravel	22 - 32	
very coarse gravel	32 - 45	
very coarse gravel	45 - 64	
small cobble	64 - 90	
medium cobble	90 - 128	
large cobble	128 - 180	
very large cobble	180 - 256	
small boulder	256 - 362	
small boulder	362 - 512	
medium boulder	512 - 1024	
large boulder	1024 - 2048	
very large boulder	2048 - 4096	
bedrock		
Total Particle Count:		100

Note:

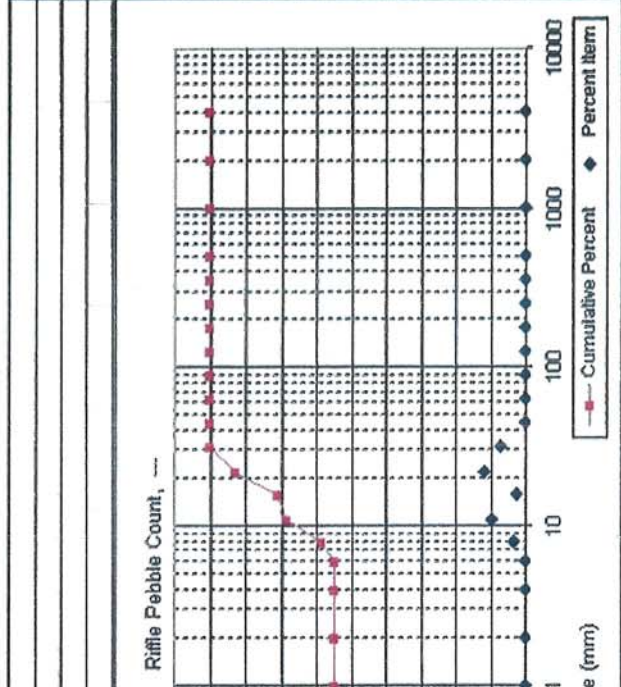
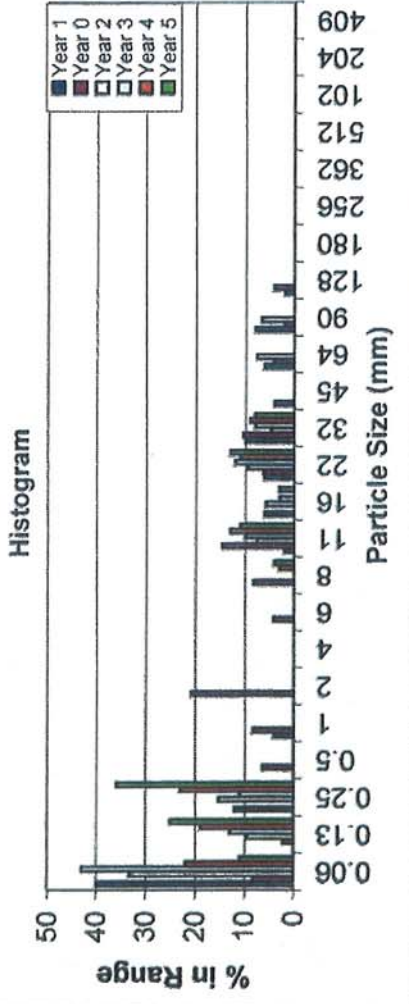


Size percent less than (mm)		Percent by substrate type			
D15	D35	D50	D84	D95	bedrock
0.120	0.31	6.3	13	16	#REF!
		0%	0%	0%	
		0%	47%	53%	
		0%	0%	0%	
		0%	0%	0%	

EEP PROJECT ID: 308
 CROSS-SECTION: 8
 FEATURE: RIFFLE



PROJECT ROCKY BRANCH
 TASK PEBBLE COUNT
 REACH ROCKY BRANCH
 DATE 08/27/2012 to 08/31/2012
 CREW BUCHHOLZ/PARRISH



Material	Size Range (mm)	Count
silt/clay	0 - 0.062	11
very fine sand	0.062 - 0.13	25
fine sand	0.13 - 0.25	36
medium sand	0.25 - 0.5	
coarse sand	0.5 - 1	
very coarse sand	1 - 2	
very fine gravel	2 - 4	
fine gravel	4 - 6	
fine gravel	6 - 8	4
medium gravel	8 - 11	11
medium gravel	11 - 16	3
coarse gravel	16 - 22	13
coarse gravel	22 - 32	8
coarse gravel	32 - 45	
very coarse gravel	45 - 64	
small cobble	64 - 90	
medium cobble	90 - 128	
large cobble	128 - 180	
very large cobble	180 - 256	
small boulder	256 - 362	
small boulder	362 - 512	
medium boulder	512 - 1024	
large boulder	1024 - 2048	
very large boulder	2048 - 4096	
bedrock		
Total Particle Count:		100

Size percent less than (mm)		Percent by substrate type							
D16	D35	D50	D64	D95	#REF1	sand	gravel	cobble	bedrock
0.102	0.16	0.2	0.23	0.25	#REF1	61%	39%	0%	0%

BEHI and Sediment Export Estimates Table															
Rocky Branch Stream Restoration Site/EEP Project Number: 308															
Time Point	Segment/ Reach	Linear Footage or Acreage	Extreme		Very High		High		Moderate		Low		Very Low		Sediment Export
			ft	%	ft	%	ft	%	ft	%	ft	%	ft	%	
Not Availbale															

Note: BEHI and NBS assessments were not conducted for the entire project pre-construction as part of the existing conditions survey. Therefore, BEHI and NBS assessments are not applicable during Monitoring Year 5.

APPENDIX E

Wetland Assessment
(omitted – not applicable)

Table 10. Wetland Criteria Attainment						
Rocky Branch Stream Restoration Site/EEP Project Number: 308						
Tract	Well ID	Well Hydrology Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean

Note: There are no wetland areas present at the Rocky Branch Stream Restoration Site.