

# Rocky Branch Stream Restoration

Yadkin County, North Carolina

2009 Year 2 Monitoring Report

EEP Project Number: 308

USGS HUC 03040102

EcoEngineering Project Number: EEP-08020

Prepared for:

NCDENR Ecosystem Enhancement Program  
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Raleigh, NC 27604



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## Table of Contents

1.0 Executive Summary/Project Abstract .....	3
1.1 Project Goals and Objectives .....	3
1.2 Vegetation Condition and Comparison .....	3
1.3 Stream Stability/Condition and Comparison .....	4
1.4 Wetland Conditions and Performance .....	4
1.5 Narrative Background .....	4
2.0 Methodology .....	4
3.0 References .....	5

## 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 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***

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 2, Rocky Branch had 11 plots encompassing 0.27 acres, containing 514 planted and volunteer stems, which yielded a density of 1,891 trees per acre including planted and volunteer species. Vegetation survival threshold was met for each of the plots.

Various 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*), cattail (*Typha latifolia*) and Japanese honeysuckle (*Lonicera japonica*). The extent of exotic/invasive species is depicted in the Integrated Project Problem Areas Plan View Appendix D.

### ***1.3 Stream Stability/Condition and Comparison***

The largest problems observed within the stream channel were beaver dams and sloughing of stream banks along the lower portion of the project. A beaver den and two (2) beaver dams were observed and sloughed stream banks were observed in five (5) locations totaling approximately 90 feet. The condition of the stream banks appeared very similar to the condition depicted in the mitigation plan (Year-0) problem areas photos. Overall the channel morphology appeared stable. One crest gage is installed at Rocky Branch Stream Restoration Site to document bankfull events. This crest gage was inspected and no evidence of a bankfull event was observed.

### ***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).

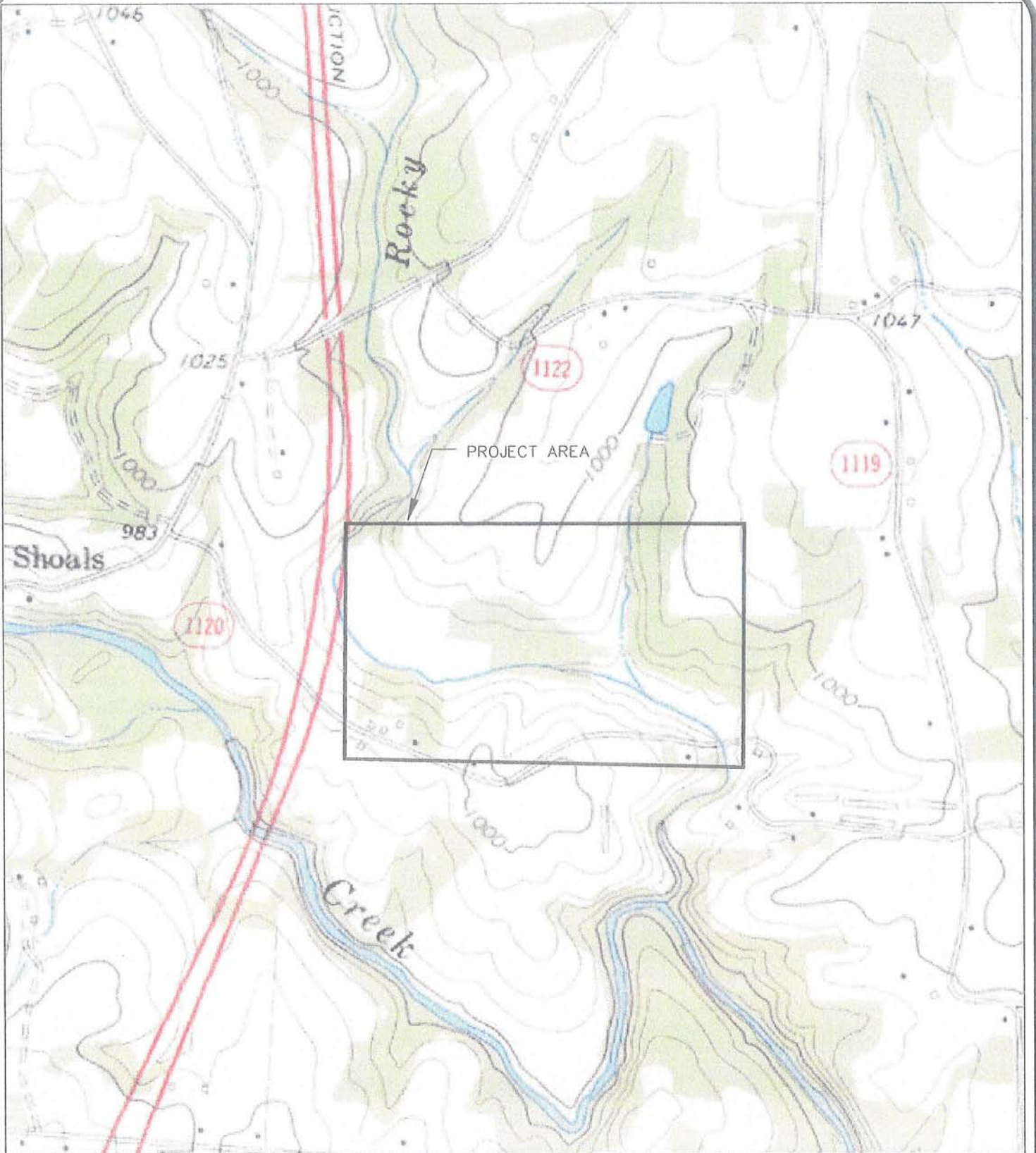
Vegetation monitoring methods followed the 2008, Version 4.2 CVS-EEP Protocol for Recording Vegetation (Lee et. al., 2008). Vegetation plot photographs were collected for each vegetation plot. Vegetation monitoring plots were re-marked in the field by replacing all old flagging with new orange flagging. 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:	11-01-09



## ROCKY BRANCH VICINITY MAP

YADKIN COUNTY, NORTH CAROLINA

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# ROCKY BRANCH

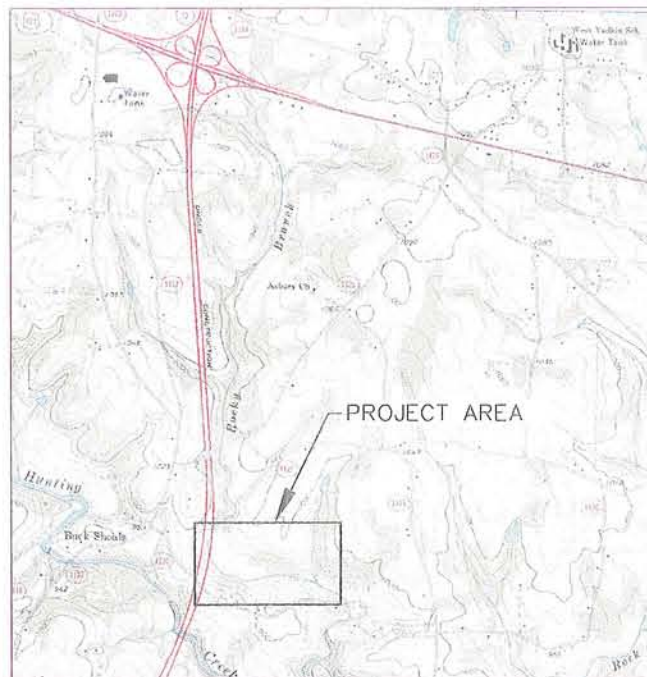
## CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR TWO MONITORING

YADKIN COUNTY, NORTH CAROLINA  
EEP PROJECT NUMBER: 308

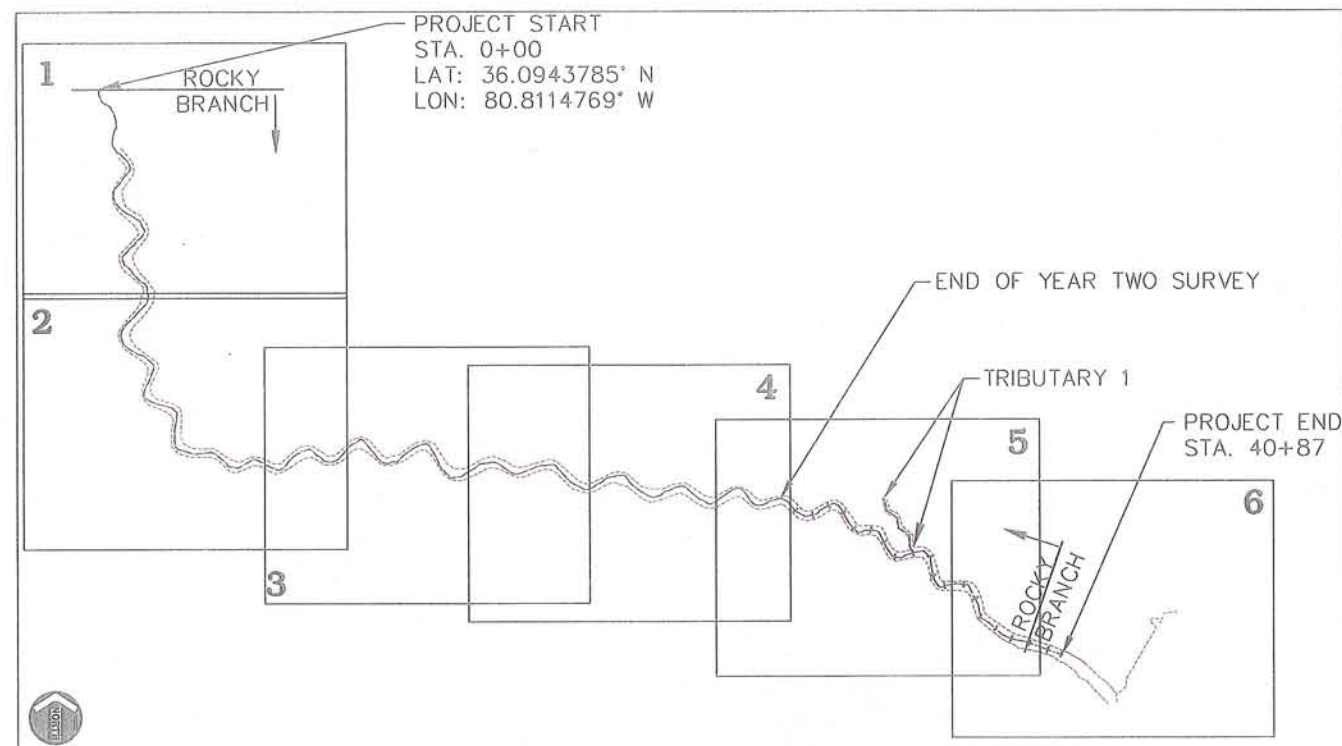
DATE: NOVEMBER 1, 2009

NORTH CAROLINA  
ECOSYSTEM ENHANCEMENT PROGRAM  
NC-EEP CONTACT: MELONIE ALLEN (919) 715-1973

POINT TABLE				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	858613.93	1464824.91	928.25	CONTROL
2	857706.98	1464784.29	923.60	CONTROL
3	857497.74	1465232.84	921.75	CONTROL
4	857374.24	1465869.69	943.35	CONTROL
5	857383.41	1466105.73	924.76	CONTROL
6	857286.17	1466325.15	945.11	CONTROL
7	857204.24	1466508.09	947.75	CONTROL
8	857188.08	1466694.46	939.14	CONTROL
9	856985.38	1467244.76	928.06	CONTROL
10	856996.29	1466467.36	970.98	CONTROL
11	856897.33	1467392.45	917.61	CONTROL
100	857064.87	1467441.85	917.74	CONTROL
101	858419.60	1464837.57	930.60	CONTROL
102	858025.29	1465002.38	927.84	CONTROL
103	858597.92	1464848.09	933.32	CONTROL
104	858530.69	1465077.59	969.73	CONTROL
105	857360.69	1465445.98	923.35	CONTROL
106	858309.21	1464950.27	949.60	NL SET
107	858049.05	1465099.55	941.04	NL SET
108	857672.99	1465257.40	923.10	NL SET
109	857351.66	1465705.60	933.45	NL SET
110	857528.08	1466070.12	918.28	NL SET
111	857483.76	1466334.47	916.79	NL SET
9001	858530.66	1465077.56	969.66	TTPT104
9002	858583.24	1465085.65	964.54	EIP-IN-30MAPLE
9003	858597.24	1464859.07	934.86	R/W MON
9004	858162.53	1464795.63	928.21	BENCHMARK 1
9005	858025.27	1465002.36	927.84	TTPT102
9006	857685.27	1465116.57	924.65	BENCHMARK 3
9007	857560.18	1465779.26	921.38	BENCHMARK 4?
9008	857360.66	1465446.04	923.31	TTPT105
9009	857508.68	1466220.77	919.02	BENCHMARK 5
9010	857439.76	1466843.27	918.41	BENCHMARK 8
9011	857317.78	1466690.43	919.68	BENCHMARK 7



VICINITY MAP  
NTS



NOTE: SURVEY DATES OF THALWEG AND  
TOP-OF-BANK - 9/30/09 TO 10/02/09.

**SHEET INDEX**  
1-6 INTEGRATED PLAN VIEW



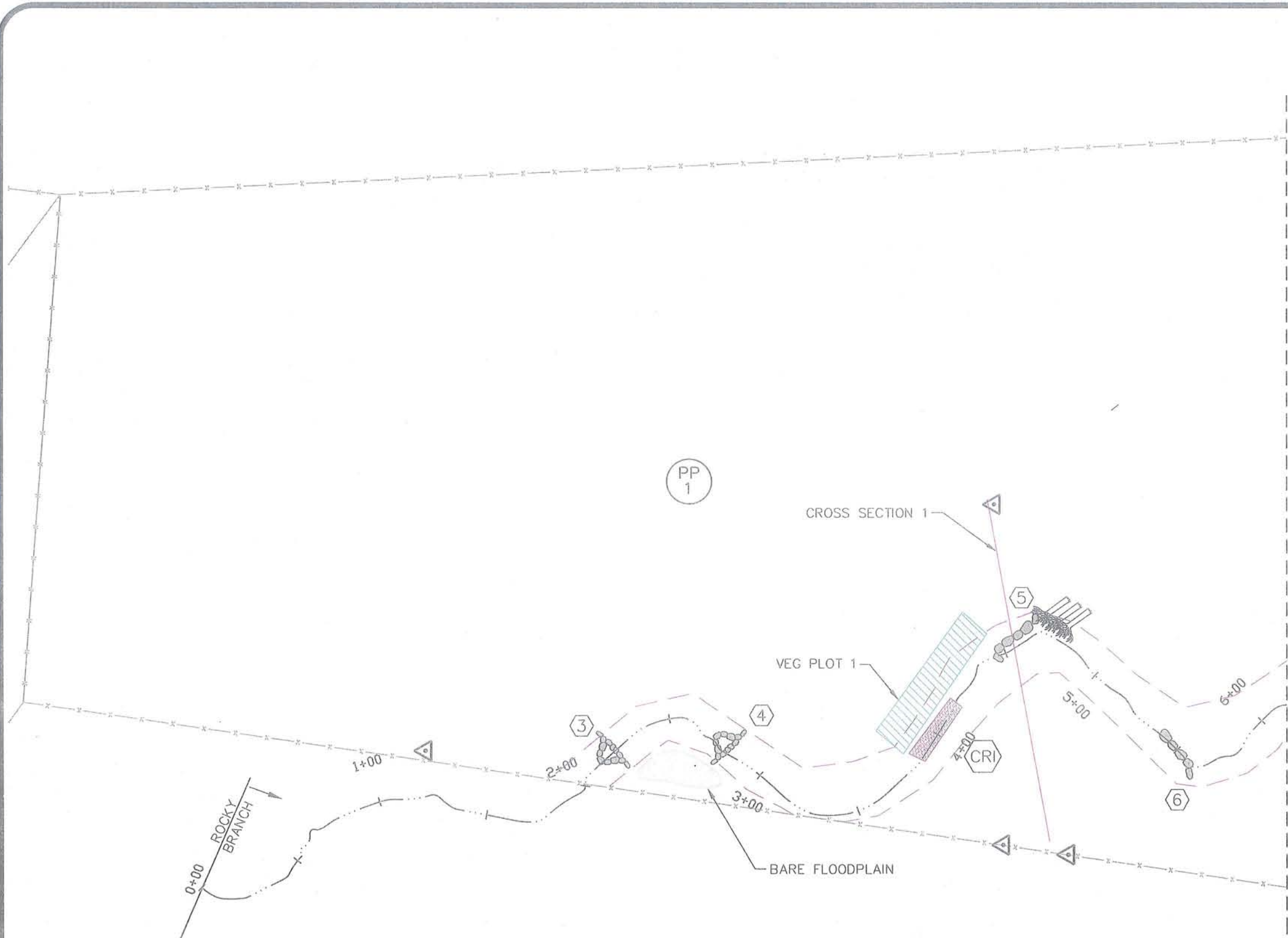
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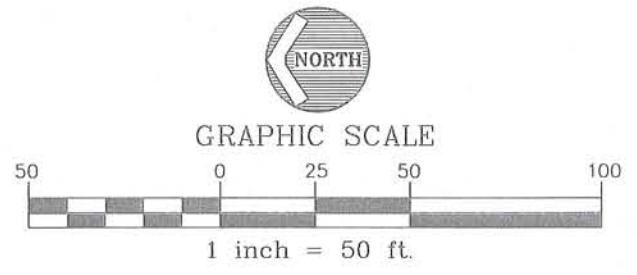


LEGEND

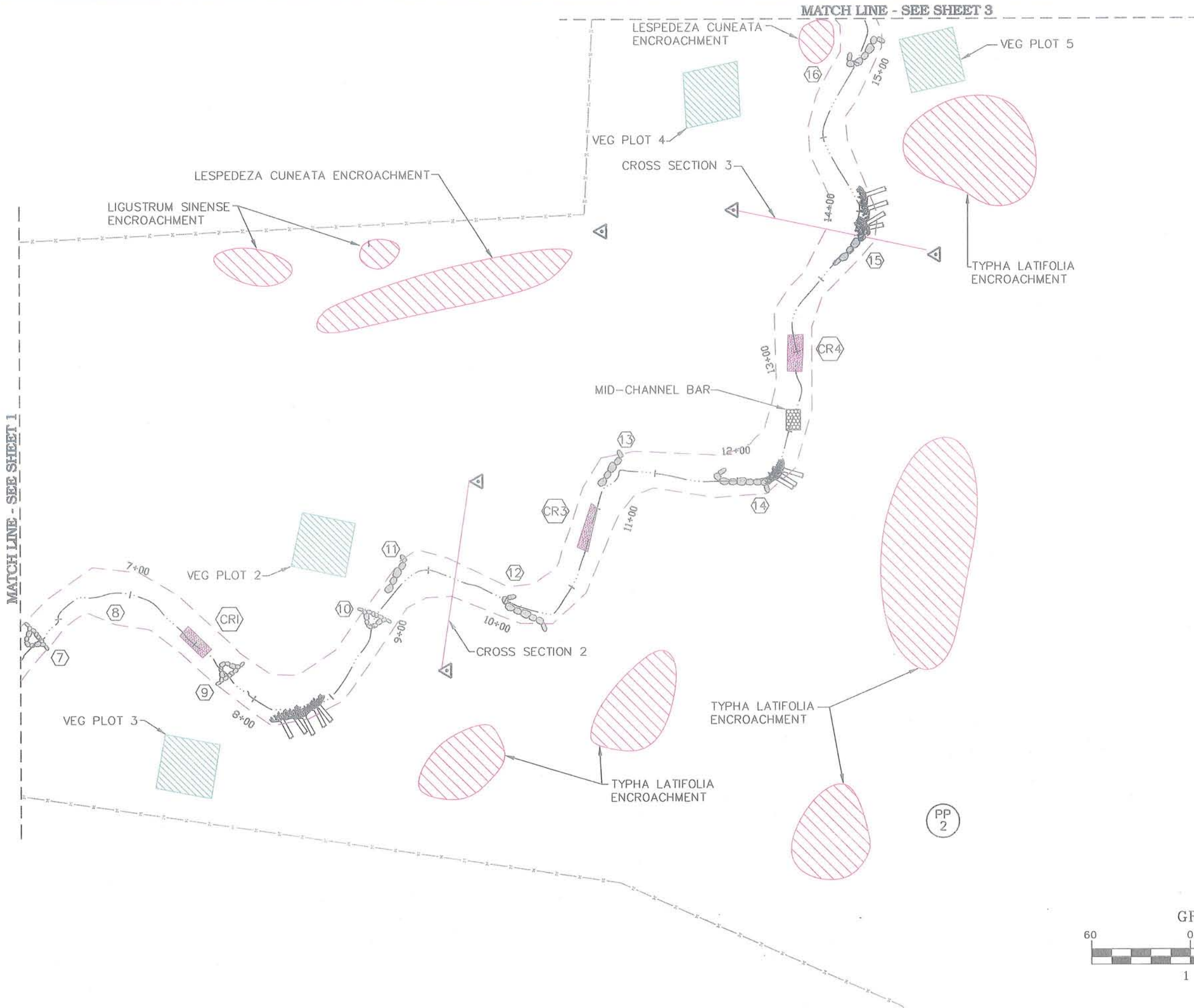
- EXISTING FENCE LINE
- THALWEG OF CREEK
- ROCK CROSS VANE
- ROCK A-VANE
- LOG VANE
- ROOT WAD
- ROCK VANE
- STRUCTURE NUMBER
- BARE FLOODPLAIN
- INVASIVE / EXOTIC POPULATION
- PHOTO POINT
- CREST GAGE
- RIFFLE
- SLOUGHED BANKS
- BEAVER DAM
- MID-CHANNEL BAR

MATCH LINE - SEE SHEET 2

NOTE: SURVEY DATES OF THALWEG AND TOP-OF-BANK - 9/30/09 TO 10/02/09.

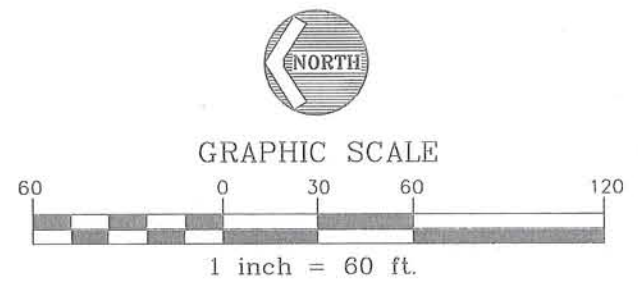


SHEET 1 OF 6



MATCH LINE - SEE SHEET 1

MATCH LINE - SEE SHEET 3

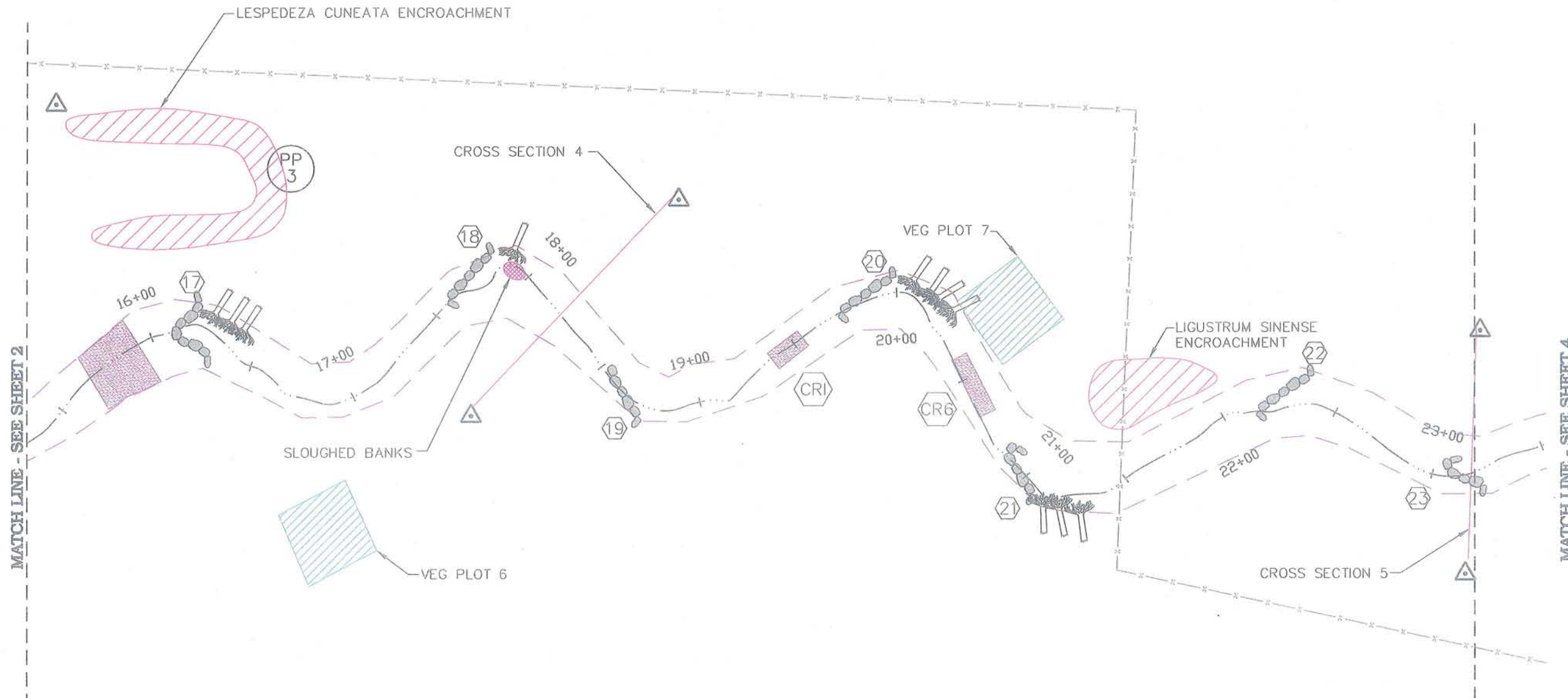


SHEET 2 OF 6



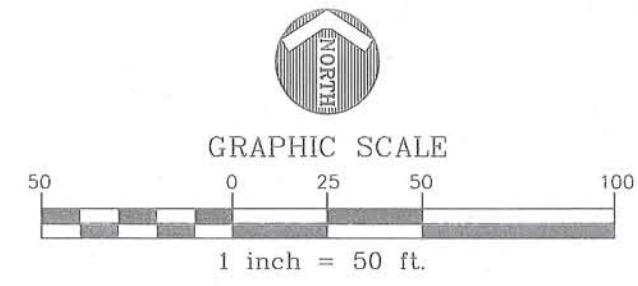
**ROCKY BRANCH**  
 CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR TWO MONITORING  
 YADKIN COUNTY, NORTH CAROLINA

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DATE:	11-01-09

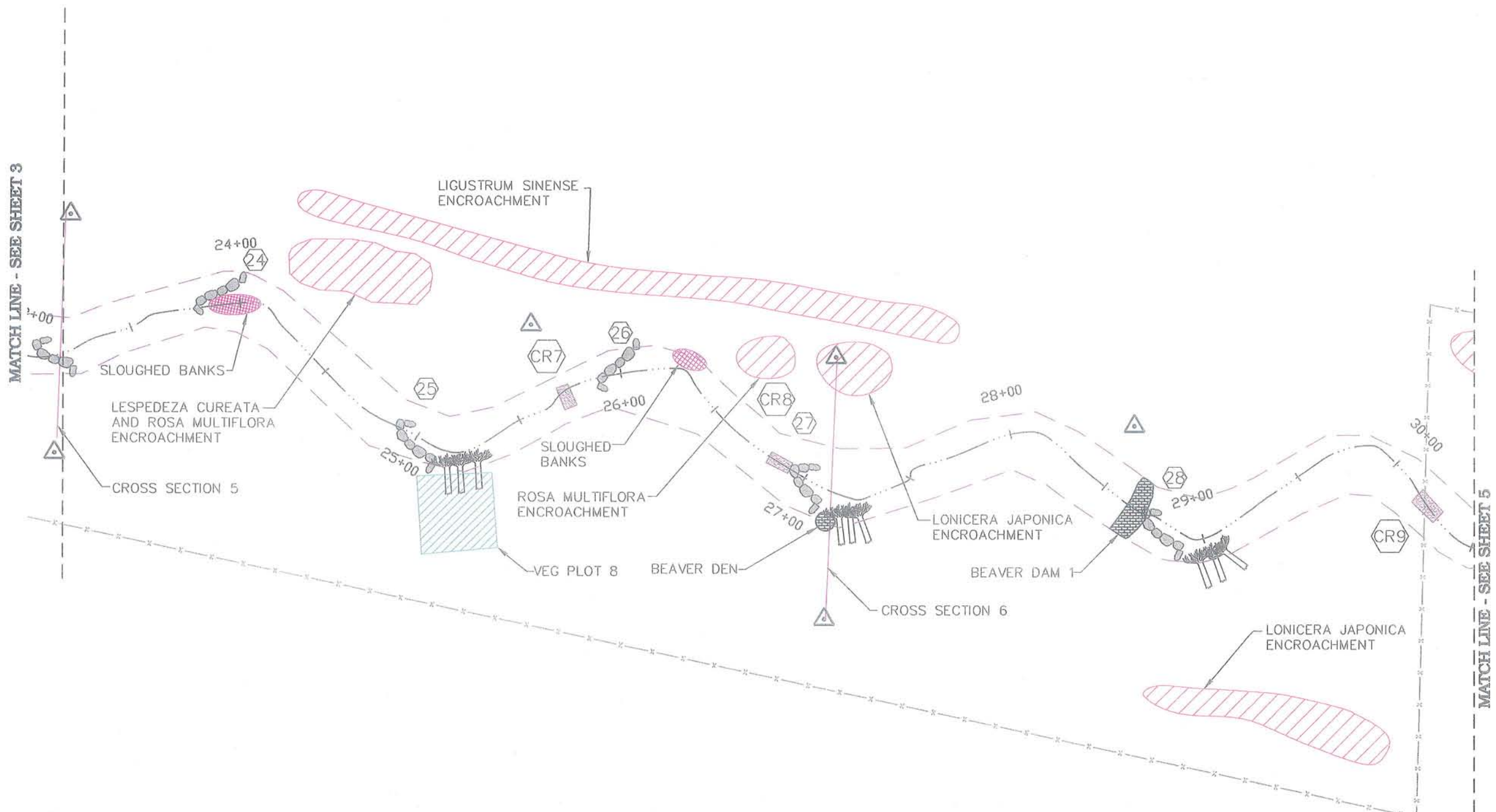


MATCH LINE - SEE SHEET 2

MATCH LINE - SEE SHEET 4

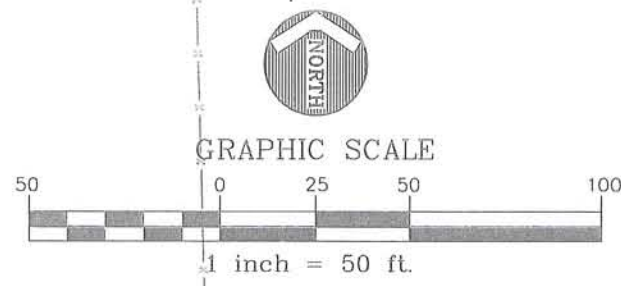


SHEET 3 OF 6



MATCH LINE - SEE SHEET 3

MATCH LINE - SEE SHEET 5



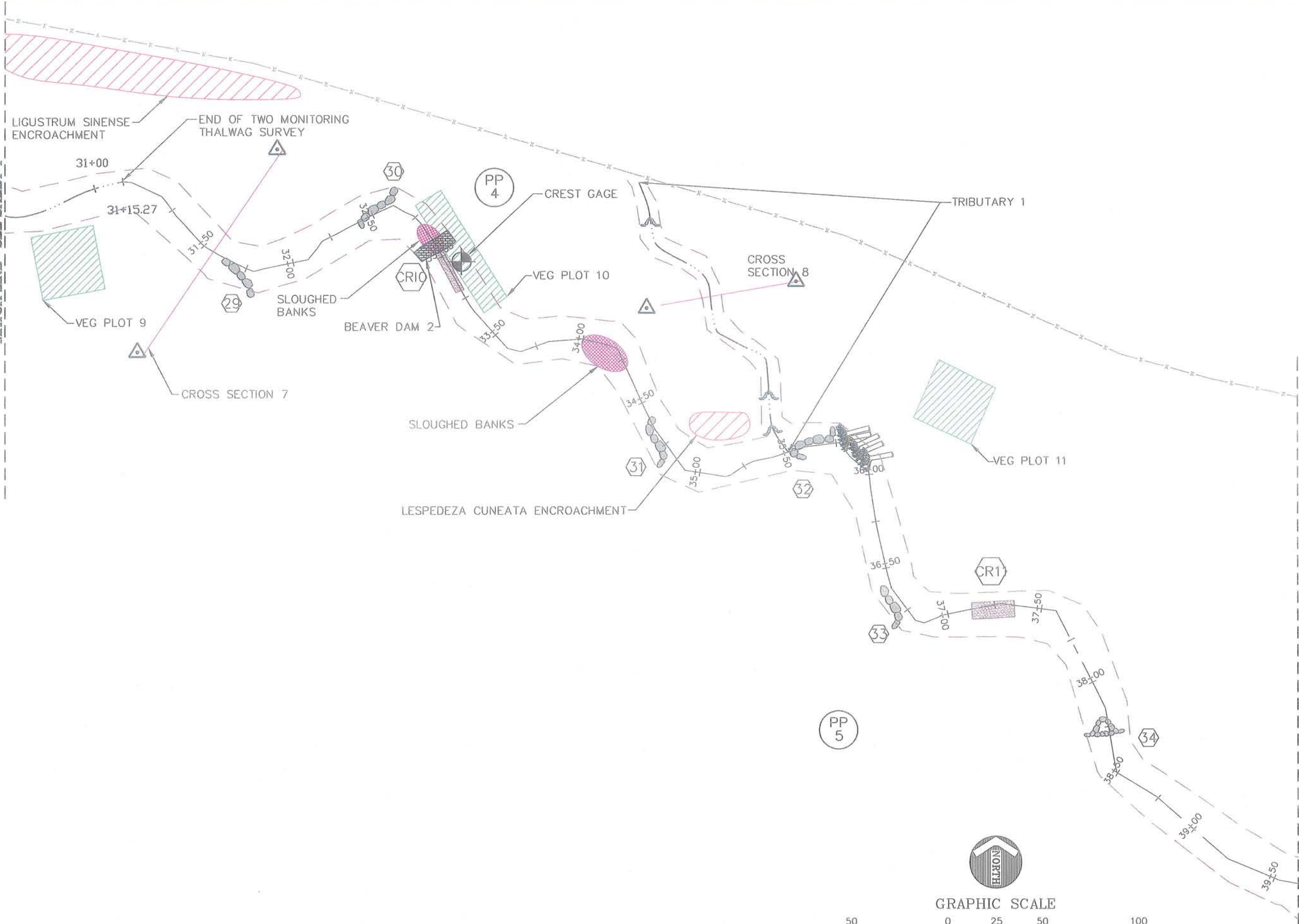
SHEET 4 OF 6



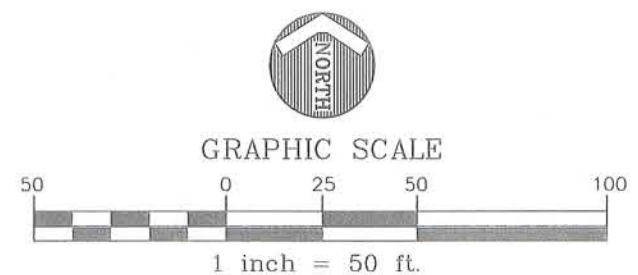
**ROCKY BRANCH**  
CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR TWO MONITORING  
YADKIN COUNTY, NORTH CAROLINA

PROJECT NO.	EEP-08020
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SCALE:	1" = 50'
DATE:	11-01-09

MATCH LINE - SEE SHEET 4



MATCH LINE - SEE SHEET 6



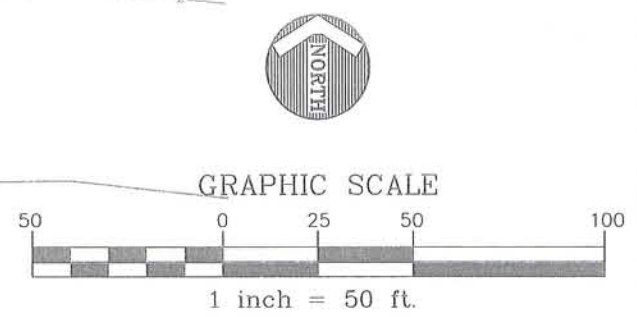
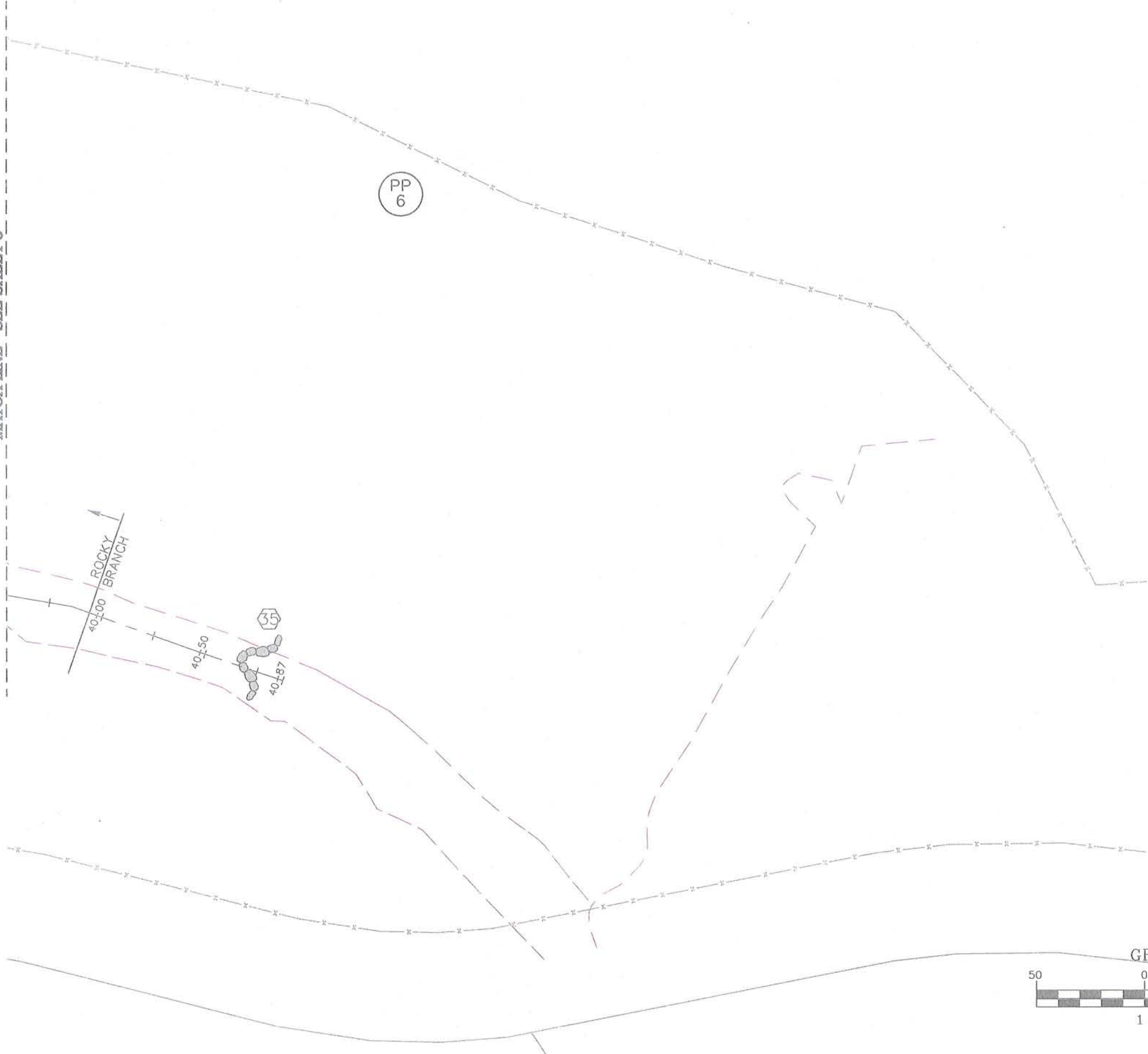
SHEET 5 OF 6



**ROCKY BRANCH**  
 CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR TWO MONITORING  
 YADKIN COUNTY, NORTH CAROLINA

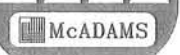
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DATE:	11-01-09

MATCH LINE - SEE SHEET 5



SHEET 6 OF 6

PROJECT NO. EEP-08020  
 FILENAME: EEP-08020X  
 SCALE: 1" = 50'  
 DATE: 11-01-09



# ROCKY BRANCH

CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR TWO MONITORING  
 YADKIN COUNTY, NORTH CAROLINA



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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	2,901	R	P1 & P2	3,614	1	3,614	0+00 - 39+97	
		EI	P4	206	0.66	137		
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
<b>Mitigation Unit Summations</b>								
Stream (lf)	Riparian Wetland (Ac)	Nonriparian Wetland (Ac)	Total Wetland (Ac)	Buffer (Ac)	Comment			
3,923	0	0	0	24.095				

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**

<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
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

Note: Timeframe estimated from information provided by EEP.

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

<b>Designer</b>	Mulkey Engineers & Consultants 6750 Tryon Road, Cary, NC 27518
Primary project design POC	Wendee Smith, 919-858-1833
<b>Construction Contractor</b>	Fluvial Solutions, Inc. PO Box 28749, Raleigh, NC 27611-8749
Construction contractor POC	Peter Jelenevsky, 919-605-6134
<b>Planting Contractor</b>	Carolina Silvics 908 Indian Trail Road, Edenton, NC 27932
Planting contractor POC	Mary-Margaret McKinney 252-484-8491
<b>Seeding Contractor</b>	Contact: Fluvial Solutions, Inc. PO Box 28749, Raleigh, NC 27611-8749
Planting contractor POC	Peter Jelenevsky, 919-605-6134
Seed Mix Sources	Contact: Fluvial Solutions, Inc. Peter Jelenevsky, 919-605-6134
Nursery Stock Suppliers	ArboGen 843-851-4129
<b>Monitoring Performers</b>	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**

<b>Tract</b>	<b>Vegetation Plot ID</b>	<b>Vegetation Survival Threshold Met?</b>	<b>Tract Mean</b>
Rocky Branch	VP1	Y	100%
	VP2	Y	
	VP3	Y	
	VP4	Y	
	VP5	Y	
	VP6	Y	
	VP7	Y	
	VP8	Y	
	VP9	Y	
	VP10	Y	
	VP11	Y	

Note: Threshold criteria based on planted and volunteer species.

<b>Table 6. Vegetation Metadata</b>	
<b>Rocky Branch Stream Restoration Site/EEP Project ID: 308</b>	
<b>Report Prepared By</b>	George Buchholz
<b>Date Prepared</b>	10/9/2009 16:07
<b>database name</b>	EcoEngineering-2009-B.mdb
<b>database location</b>	X:\Projects\EEP\EEP-08020 (Rocky Branch)\Storm\CVS Vegetation Data\2009 Vegetation Data
<b>computer name</b>	BUCHHOLZGE
<b>file size</b>	45436928

<b>DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----</b>	
<b>Metadata</b>	Description of database file, the report worksheets, and a summary of project(s) and project data.
<b>Proj, planted</b>	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
<b>Proj, total stems</b>	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.
<b>Plots</b>	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
<b>Vigor</b>	Frequency distribution of vigor classes for stems for all plots.
<b>Vigor by Spp</b>	Frequency distribution of vigor classes listed by species.
<b>Damage</b>	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
<b>Damage by Spp</b>	Damage values tallied by type for each species.
<b>Damage by Plot</b>	Damage values tallied by type for each plot.
<b>Planted Stems by Plot and Spp</b>	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
<b>PROJECT SUMMARY-----</b>	
<b>Project Code</b>	308
<b>project Name</b>	Rocky Branch
<b>Description</b>	Rocky Branch Stream Restoration Project
<b>River Basin</b>	Yadkin-Pee Dee
<b>length(ft)</b>	3,992
<b>stream-to-edge width (ft)</b>	24
<b>area (sq m)</b>	0.04 sq mile (24.10 acres)
<b>Required Plots (calculated)</b>	11
<b>Sampled Plots</b>	11

Table 7. Stem Count Total and Planted by Plot Species  
 Rocky Branch Restoration Project/EEP Project ID: 308  
 Page 1

Scientific Name	Common Name	Species Type	Current Plot Data (MY2 2009)																											
			E308-01-VP10 P-LS	E308-01-VP10 T	E308-01-VP11 P-LS	E308-01-VP11 T	E308-01-VP1 P-LS	E308-01-VP1 T	E308-01-VP2 P-LS	E308-01-VP2 T	E308-01-VP3 P-LS	E308-01-VP3 T	E308-01-VP4 P-LS	E308-01-VP4 T	E308-01-VP5 P-LS	E308-01-VP5 T	E308-01-VP6 P-LS	E308-01-VP6 T	E308-01-VP7 P-LS	E308-01-VP7 T										
EMPTY: We looked, but found no species here.		unknown																												
<i>Acer spicatum</i>	mountain maple	Shrub Tree																												
<i>Ailanthus altissima</i>	tree of heaven	Tree									1																			
<i>Alnus serrulata</i>	hazel alder	Shrub Tree			4	4																								
<i>Betula nigra</i>	river birch	Tree																												
<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub Tree			3	3																								
<i>Cornus amomum</i>	silky dogwood	Shrub																												
<i>Fraxinus pennsylvanica</i>	green ash	Tree			1	1																								
<i>Itea virginica</i>	Virginia sweetspire	Shrub			5	5																								
<i>Quercus nigra</i>	water oak	Tree																												
<i>Quercus phellos</i>	willow oak	Tree			1	1																								
<i>Salix nigra</i>	black willow	Tree			7	17																								
<i>Sambucus canadensis</i>	Common Elderberry	Shrub Tree																												
<i>Rhus copallinum</i>	flameleaf sumac	Shrub Tree																												
<i>Juniperus virginiana</i>	eastern redcedar	Tree																												
<i>Liriodendron tulipifera</i>	tuliptree	Tree			7																									
<i>Platanus occidentalis</i>	American sycamore	Tree			2	2																								
<i>Prunus serotina</i>	black cherry	Shrub Tree																												
<i>Prunus virginiana</i>	chokecherry	Shrub Tree																												
<i>Acer negundo</i>	boxelder	Tree																												
<i>Acer rubrum</i>	red maple	Tree			2																									
		Stem count	0	18	107	0	14	14	0	24	39	0	10	12	0	15	85	0	11	12	0	12	13	0	14	15	0	20	22	
		size (ares)																												
		size (ACRES)	0.02			0.02			0.02			0.02												0.02						
		Species count	0	6	9	0	4	4	0	4	5	0	5	7	0	3	6	0	4	5	0	4	5	0	4	5	0	6	8	
		Stems per ACRE	0	728.4	4330	0	566.6	566.6	0	971.2	1578	0	404.7	485.6	0	607	3440	0	445.2	485.6	0	485.6	526.1	0	566.6	607	0	809.4	890.3	



Table 7. Stem Count Total and Planted by Plot Species  
 Rocky Branch Restoration Project/EEP Project ID: 308  
 Page 2

Scientific Name EMPTY: We looked, but found no species here.	Common Name	Species Type	Current Plot Data (MY2 2009)						Annual Means						
			E308-01-VP8		E308-01-VP9		MY2 (2009)		MY1 (2008)						
			P-LS	P-all	P-LS	P-all	P-LS	P-all	P-LS	P-all	P-LS	P-all			
Acer spicatum	mountain maple	Shrub Tree								2	2			2	2
Alnus altissima	tree of heaven	Tree													
Ainus serrulata	hazel alder	Shrub Tree	2	2	1	1				9	9			5	5
Betula nigra	river birch	Tree			1	1				8	8			8	8
Cephalanthus occidentalis	common buttonbush	Shrub Tree	4	4						19	19			25	25
Cornus amomum	silky dogwood	Shrub								1	1			6	6
Fraxinus pennsylvanica	green ash	Tree	6	6	10	10				49	49			47	47
Itea virginica	Virginia sweetspine	Shrub								2	2			3	3
Quercus nigra	water oak	Tree								8	8			9	9
Quercus phellos	willow oak	Tree								22	22			18	18
Salix nigra	black willow	Tree			3	3				14	14			20	20
Sambucus canadensis	Common Elderberry	Shrub Tree								1	1			3	3
Rhus copallinum	flameleaf sumac	Shrub Tree													
Juniperus virginiana	eastern redcedar	Tree													
Liriodendron tulipifera	tuliptree	Tree	1	34	1	49				2	91			3	3
Platanus occidentalis	American sycamore	Tree	8	69		6				37	186			37	37
Prunus serotina	black cherry	Shrub Tree												2	
Prunus virginiana	chokecherry	Shrub Tree								1	1			3	3
Acer negundo	boxelder	Tree													
Acer rubrum	red maple	Tree			3	5									
		<b>Stem count</b>	0	21	118	0	16	77	0	175	514	0	189	189	189
		<b>size (ares)</b>	1			1			11			11			
		<b>size (ACRES)</b>	0.02			0.02			0.27			0.27			
		<b>Species count</b>	0	5	6	0	5	9	0	14	20	0	14	14	14
		<b>Stems per ACRE</b>	0	850	4775	0	647	3116	0	644	1891	0	695	695	695



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.

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PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 10-13-09



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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.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 10-13-09



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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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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.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 10-13-09



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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: 10-13-09



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

EEP-0802

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 10-13-09



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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 <sup>1</sup>	% Perform in Stable Condition <sup>2</sup>	Feature Perform. Mean or Total <sup>3</sup>
A. Riffles	1. Present ? <sup>4</sup>	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	NA	89	
	3. Length appropriate?	23	27	NA	85	89
C. Thalweg	1. Upstream of meander bend (run/inflection) centering? <sup>5</sup>	37	39	NA	95	
	2. Downstream of meander (glide/inflection) centering? <sup>5</sup>	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 <sup>6</sup>	1. Actively eroding, wasting, or slumping bank	NA	NA	5/90	98	98
	1. Free of bank or arm scour?	36	36	NA	100	
	2. Height appropriate?	36	36	NA	100	
	3. Angle and geometry appear appropriate?	36	36	NA	100	
	4. Free of piping or other structural failures?	36	36	NA	100	100
G. Vanes	1. Free of scour?	40	40	NA	100	
	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 <sup>1</sup>	% Perform in Stable Condition <sup>2</sup>	Feature Perform. Mean or Total <sup>3</sup>
	1. Present ? <sup>4</sup>	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	
A. Riffles	5. Length appropriate?	NA	NA	NA	NA	100
	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	NA	NA	NA	NA	
	2. Sufficiently deep (Max Pool D:Mean Bkf > 1.6?)	NA	NA	NA	NA	
B. Pools	3. Length appropriate?	NA	NA	NA	NA	NA
	1. Upstream of meander bend (run/inflection) centering? <sup>5</sup>	4	4	NA	100	
C. Thalweg	2. Downstream of meander (glide/inflection) centering? <sup>5</sup>	3	4	NA	100	100

	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
D. Meander						
	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
E. Bed General						
	1. Actively eroding, wasting, or slumping bank	NA		NA	0/172	100
F. Bank <sup>6</sup>						
	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
G. Vanes						
	1. Free of scour?	NA		NA	NA	NA
	2. Footing stable?	NA		NA	NA	NA
H. Wads/ Boulders						

**Footnotes:**

The above should be completed using the visual assessment data form for each project reach/segment. It is recognized that the various metrics within a feature category may not have equal influence on the overall stability of that feature and that this does not incorporate weighting or scoring; however, at this time, EEP requires documentation of the relevant observations for these feature categories.

Metrics that are spatial estimates are the number of locales over the reach for which the failing condition is observed/ followed by the total

- 1 linear distance (feet) or area for which the failing or unstable condition is observed.
- 2 In the case of categorical metrics for which a feature count is involved, this is simply calculated as the number of functional features that are
- 3 The mean of the metrics for a given feature category.
- 4 Was the feature actually present as compared to the As-built or has the feature been completely obscured (aggraded) or removed (degraded).
- 5 Is the Thalweg centering up on the channel in between meander bends?

6 Amount of active bank failure/erosion. This should be the tally of all stressed and failing bank from the problem area plan view, which an then be calculated as indicated in footnote 1 above.

USDA-NRCS (1998) *Stream Visual Assessment Protocol*. National Water and Climate Center (Technical Note 99-1)  
Rosgen, D L. (1996) *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, CO.  
Phankuch, D.J. (1975) Stream reach inventory and channel stability evaluation. USDA Forest Service, RI-75-002. GPO #696-260/200

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

<b>Date of Data Collection</b>	<b>Date of Occurrence</b>	<b>Method</b>	<b>Photo # (if available)</b>
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



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: 10-13-09



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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.

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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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PHOTO POINT 4. VIEW LOOKING WEST THROUGH WOODED SECTION.



PHOTO POINT 4. VIEW LOOKING SOUTH TOWARD SR 1120.

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



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

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FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 10-13-09



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



PHOTO POINT 5. VIEW LOOKING NORTHEAST TOWARD NEW POND.

PROJECT NO. EEP-08020

FILENAME: EEP08020-EX1

SCALE: NTS

DATE: 10-13-09



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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.

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PHOTO POINT 6. VIEW LOOKING EAST TOWARD NEW POND.

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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.

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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.

EEP-0802 Rocky Branch Monitoring Report

PROJECT NO. EEP-08020  
 FILENAME: EEP08020-EX1  
 SCALE: NTS  
 DATE: 10-13-09



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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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EEP-08020  
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CROSS SECTION 7 - RIFFLE. (ROCKY BRANCH, STA 30 + 75) VIEW LOOKING DOWNSTREAM.



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

EEP-08020 Rocky Branch/tributary stream drawings 2009 10-13-09 3:16:33 PM, 0000012, 1:1

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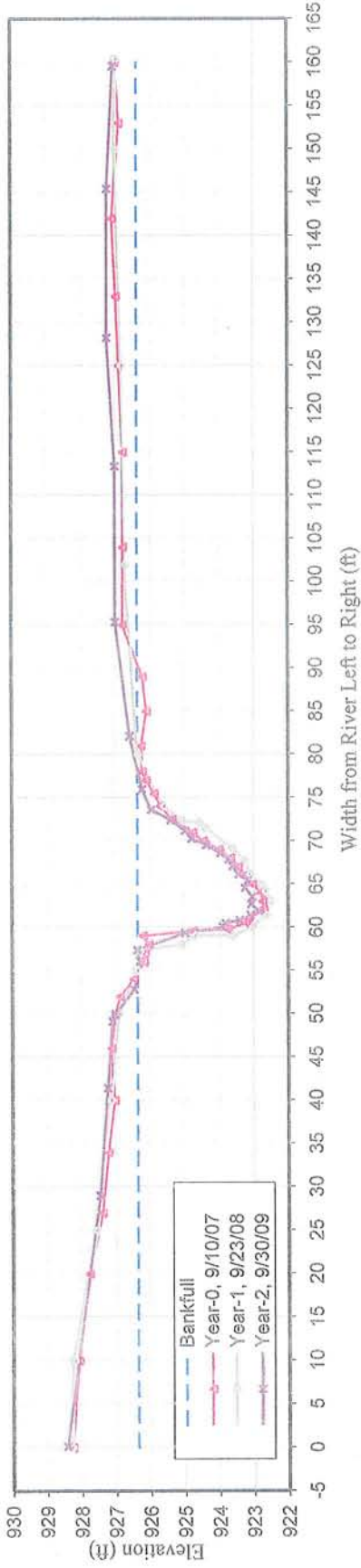
CROSS-SECTION: 1

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	928.33	0.00	928.33	-0.87	928.46								
10.00	928.12	10.00	928.26	28.76	927.50								
20.00	927.82	25.00	927.58	41.50	927.27								
27.00	927.44	40.00	927.18	49.38	927.13								
34.00	927.26	50.00	926.90	50.28	927.04								
40.00	927.08	55.00	926.41	53.16	926.49								
46.00	927.17	57.30	926.34	56.54	926.34								
50.00	927.05	58.00	925.08	57.83	926.41								
52.00	926.92	59.00	924.71	59.88	925.02								
54.00	926.52	59.00	923.62	60.60	923.92								
56.00	926.22	60.00	923.05	61.05	923.84								
57.00	926.19	61.40	922.64	61.39	923.44								
58.00	926.08	63.00	922.52	61.96	923.12								
59.00	926.25	64.20	922.68	62.54	922.90								
59.60	924.80	65.00	922.80	63.27	923.10								
59.80	923.79	66.20	923.12	64.16	923.07								
60.50	923.25	67.70	923.26	65.20	923.28								
61.00	923.19	69.10	923.61	66.11	923.20								
62.00	922.75	71.50	924.40	66.81	923.47								
63.00	922.78	72.10	924.58	67.78	923.63								
64.00	922.83	72.30	925.06	68.58	923.75								
65.00	923.07	74.00	925.62	69.35	923.99								
66.00	923.29	80.00	926.38	70.31	924.40								
67.00	923.49	102.00	926.74	71.07	924.82								
68.00	923.71	125.00	926.84	71.99	925.02								
69.00	924.04	150.00	927.02	73.27	925.43								
70.00	924.50	160.40	926.99	74.49	925.99								
71.00	924.80			76.91	926.26								
72.50	925.40			83.25	926.62								
74.00	925.73			96.79	927.03								
75.50	925.92			115.30	927.03								
77.00	926.15			130.50	927.26								
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												

Rocky Branch Cross Section 1 - Pool



CROSS SECTION PLOT - LOOKING DOWNSTREAM

<b>YEAR-2, 2009 SURVEY DATA</b>	<b>CROSS-SECTION:</b>	1
<b>PROJECT</b>	ROCKY BRANCH	Pool
<b>TASK</b>	CROSS SECTION	
<b>REACH</b>	ROCKY BRANCH	
<b>DATE</b>	9/30/09 to 10/02/09	
<b>CREW</b>	BUCHHOLZ/PARRISH/FURRY	

**Summary Data**

All dimensions in feet.

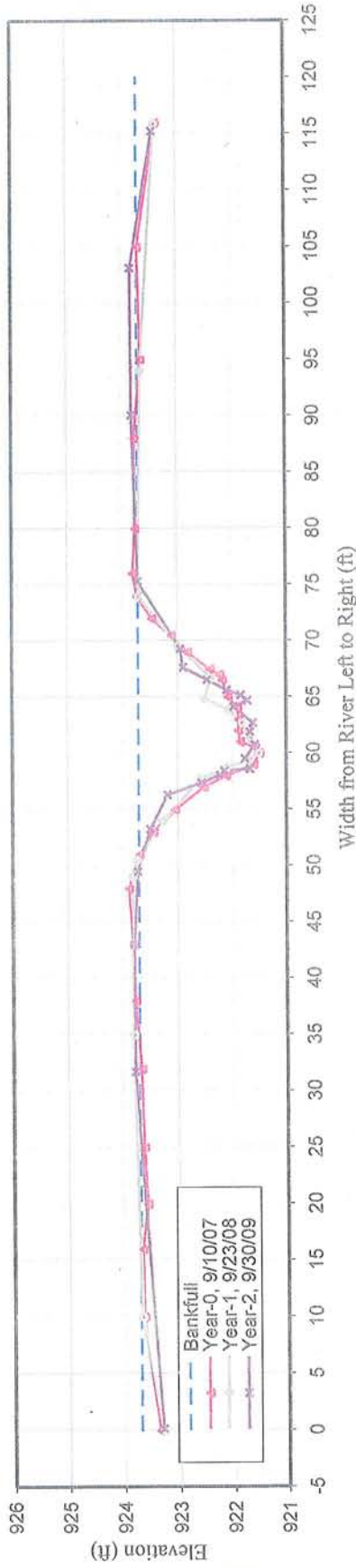
Bankfull X-sec area	36.9	sq. ft.
Bankfull Width	22.9	ft.
Bankfull Mean Depth	1.6	ft.
Bankfull Max Depth	3.5	ft.
Width/Depth Ratio	14.2	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	926.38	ft.



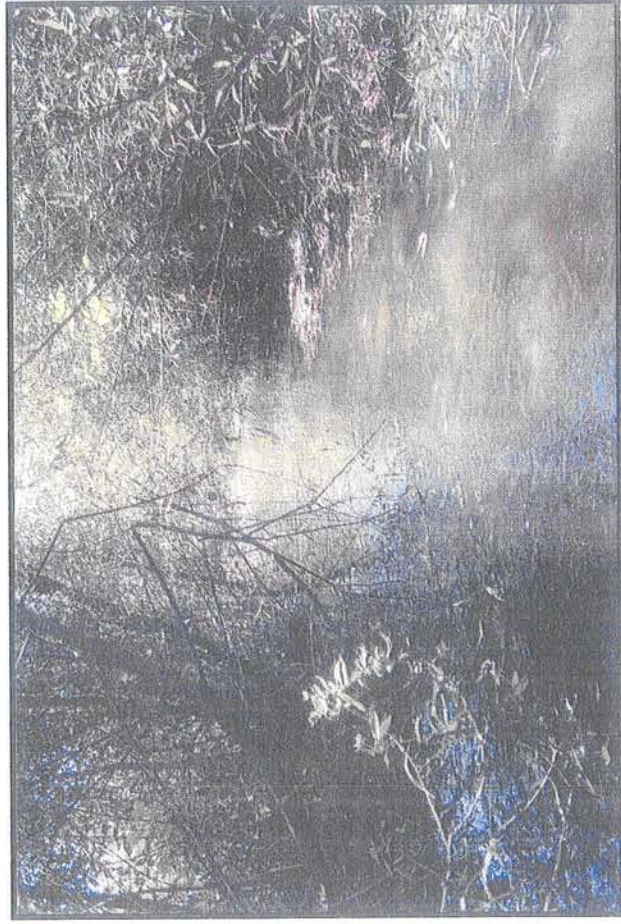
CROSS SECTION PHOTO - LOOKING DOWNSTREAM

<b>ROCKY BRANCH</b>		<b>EEP PROJECT # 308</b>		<b>CROSS-SECTION: 2</b>									
<b>Year-0</b>		<b>Year-1</b>		<b>Year-2</b>		<b>Year-3</b>		<b>Year-4</b>		<b>Year-5</b>		<b>Year-6</b>	
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										
10.00	923.66	10.00	923.68										
16.00	923.68	35.00	923.81										
20.00	923.58	49.00	923.82										
25.00	923.64	50.50	923.74										
32.00	923.68	54.00	923.26										
38.00	923.78	57.70	922.56										
43.00	923.82	58.70	922.08										
48.00	923.90	59.30	921.70										
51.00	923.70	60.00	921.51										
53.00	923.45	61.30	921.66										
55.00	923.05	62.70	921.82										
57.00	922.52	63.80	922.04										
58.00	922.11	64.80	922.48										
59.00	921.61	66.70	922.38										
60.00	921.50	69.60	922.98										
60.50	921.58	74.00	923.70										
61.00	921.85	94.00	923.65										
62.00	921.89	115.90	923.38										
63.00	921.88												
64.00	921.90												
65.00	922.07												
66.50	922.17												
67.00	922.22												
67.50	922.40												
69.00	922.81												
70.50	923.11												
72.00	923.46												
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												

Rocky Branch Cross Section 2 - Riffle



CROSS SECTION PLOT - LOOKING DOWNSTREAM



CROSS SECTION PHOTO - LOOKING DOWNSTREAM

YEAR-2, 2009 SURVEY DATA CROSS-SECTION: 2  
 PROJECT ROCKY BRANCH FEATURE: Riffle  
 TASK CROSS SECTION  
 REACH ROCKY BRANCH  
 DATE 9/30/09 to 10/02/09  
 CREW BUCHHOLZ/PARRISH/FURRY

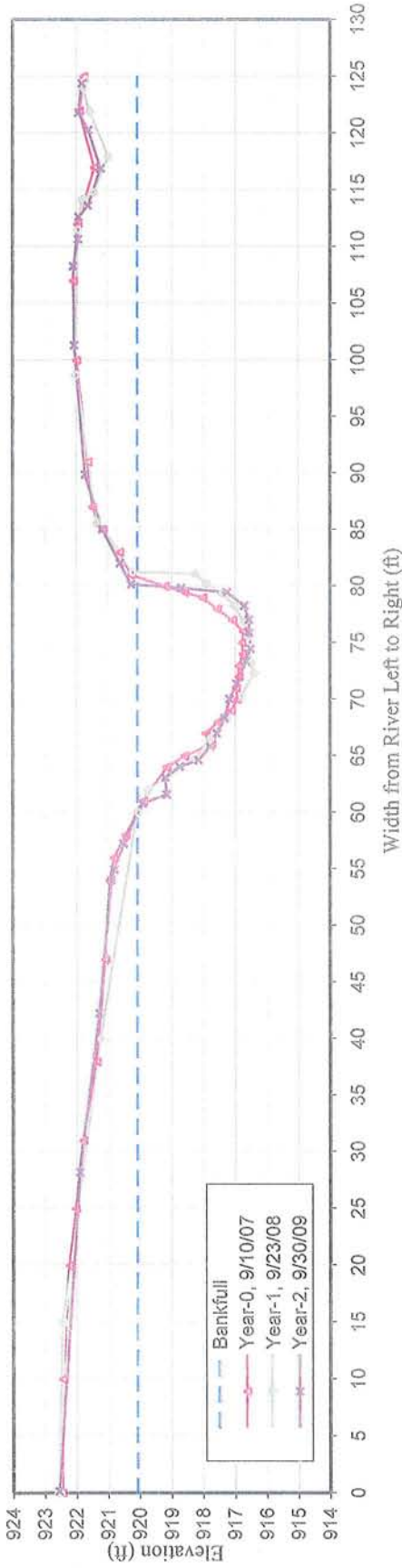
Summary Data

All dimensions in feet.

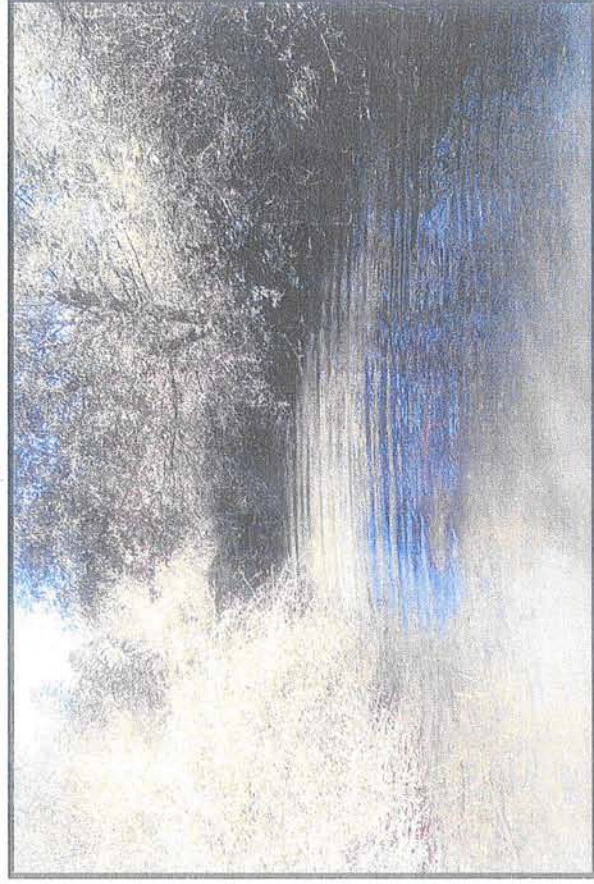
Bankfull X-sec area	20.8	sq. ft.
Bankfull Width	22.0	ft.
Bankfull Mean Depth	0.9	ft.
Bankfull Max Depth	2.0	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	923.70	ft.

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														
10.00	922.49	15.00	922.46														
20.00	922.29	40.00	921.25														
25.00	922.08	60.00	920.08														
31.00	921.84	62.00	919.73														
38.00	921.40	64.70	918.25														
47.00	921.14	66.50	917.81														
54.00	920.99	68.20	917.24														
56.00	920.86	70.30	916.79														
58.00	920.49	72.30	916.39														
61.00	919.93	73.20	916.49														
64.00	919.19	75.10	916.55														
65.00	918.62	76.90	916.71														
66.00	917.77	78.30	917.03														
67.00	917.96	79.40	917.41														
68.00	917.56	80.20	917.89														
69.00	917.15	81.10	918.24														
70.00	916.96	81.30	920.24														
71.00	917.00	85.60	921.37														
72.00	916.92	98.70	922.04														
73.00	916.92	111.50	921.97														
74.00	916.78	114.20	921.83														
75.00	916.81	114.80	921.47														
76.00	916.77	118.00	920.99														
77.00	917.11	122.00	921.59														
78.00	917.58	124.00	921.79														
79.00	918.04	124.70	921.72														
79.50	918.60																
80.00	919.22																
81.00	920.29																
83.00	920.67																
85.00	921.20																
87.00	921.53																
91.00	921.68																
100.00	922.03																
107.00	922.13																
112.00	921.99																
117.00	921.47																
122.00	921.94																
125.00	921.80																

Rocky Branch Cross Section 3 - Pool



CROSS SECTION PLOT - LOOKING DOWNSTREAM



CROSS SECTION PHOTO - LOOKING DOWNSTREAM

**YEAR-2, 2009 SURVEY DATA** CROSS-SECTION: 3  
**PROJECT ROCKY BRANCH** FEATURE: Pool  
**TASK CROSS SECTION**  
**REACH ROCKY BRANCH**  
**DATE** 9/30/09 to 10/02/09  
**CREW** BUCHHOLZ/PARRISH/FURRY

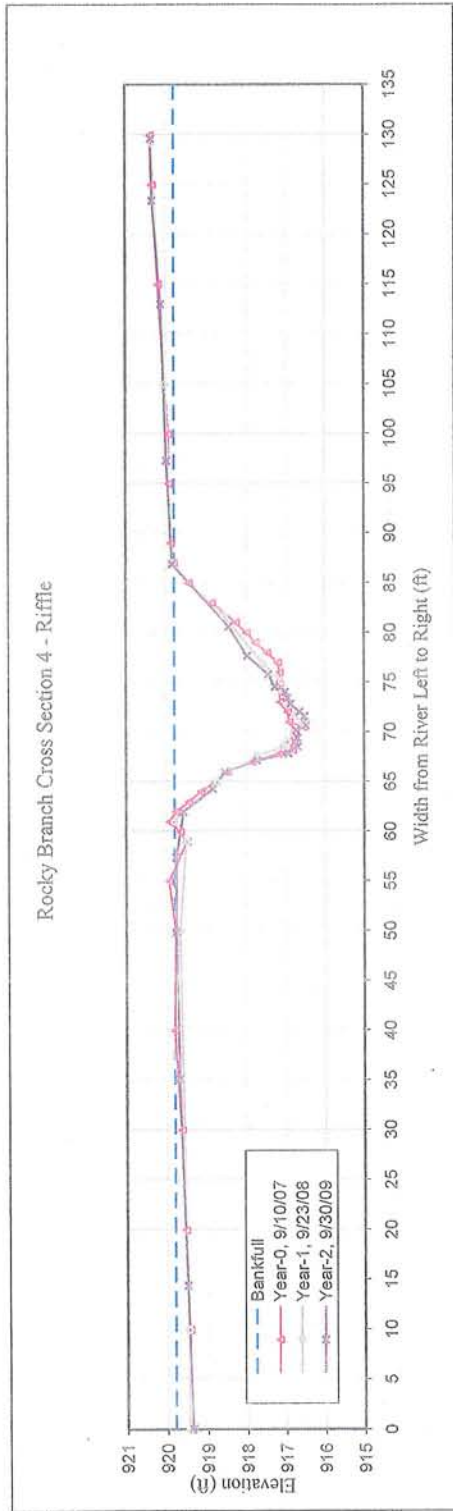
**Summary Data**

All dimensions in feet.

Bankfull X-sec area	66.4	sq. ft.
Bankfull Width	27.5	ft.
Bankfull Mean Depth	2.4	ft.
Bankfull Max Depth	4.3	ft.
Width/Depth Ratio	11.4	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	920.08	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)	Station (ft)	Elev. (ft)
0.00	919.45	0.00	919.46												
10.00	919.48	10.00	919.48												
20.00	919.57	50.00	919.67												
30.00	919.66	59.00	919.51												
40.00	919.83	61.00	919.82												
50.00	919.80	65.00	918.77												
55.00	919.97	67.60	917.73												
59.00	919.52	68.50	917.06												
60.00	919.69	69.00	916.96												
61.00	919.95	70.00	916.80												
62.00	919.80	70.90	916.58												
63.00	919.47	71.80	916.77												
64.00	919.16	72.80	916.99												
65.00	918.80	74.00	917.08												
66.00	918.51	75.10	917.12												
67.00	917.87	76.90	917.55												
67.80	917.18	81.70	918.58												
68.20	916.83	87.00	919.87												
69.00	916.92	105.00	920.05												
70.00	916.77	129.20	920.36												
70.50	916.55														
71.00	916.92														
72.00	916.96														
73.00	917.16														
75.00	917.16														
76.00	917.16														
77.00	917.21														
78.00	917.48														
79.00	917.78														
80.00	918.01														
81.00	918.28														
83.00	918.90														
85.00	919.46														
87.00	919.84														
89.00	919.91														
95.00	919.95														
100.00	919.97														
115.00	920.21														
125.00	920.36														
130.00	920.41														





**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-2, 2009 SURVEY DATA**      **CROSS-SECTION:** 4  
**PROJECT** ROCKY BRANCH      **FEATURE:** Riffle  
**TASK** CROSS SECTION  
**REACH** ROCKY BRANCH  
**DATE** 9/30/09 to 10/02/09  
**CREW** BUCHHOLZ/PARRISH/FURRY

**Summary Data**  
 All dimensions in feet.

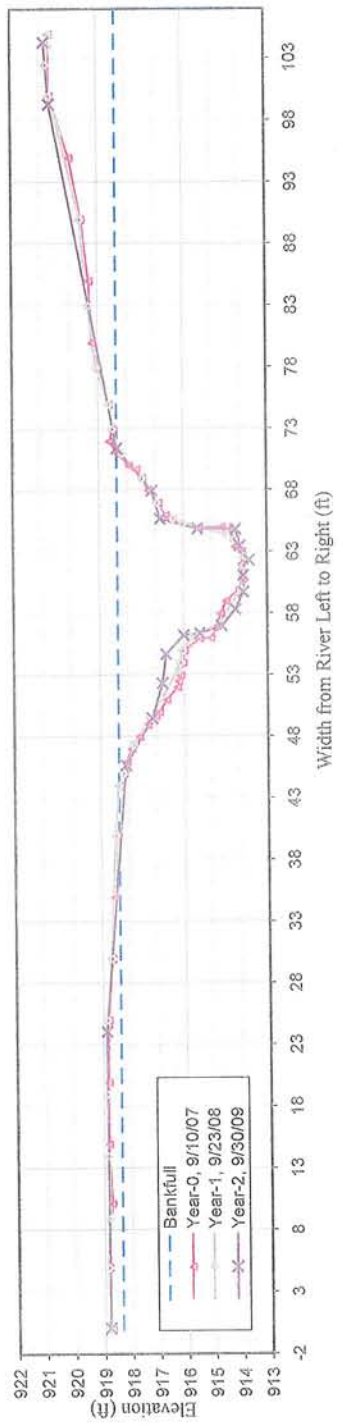
Bankfull X-sec area	41.9	sq. ft.
Bankfull Width	28.2	ft.
Bankfull Mean Depth	1.5	ft.
Bankfull Max Depth	3.3	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	919.82	ft.



**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

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)
0.00	918.78	0.00	918.78										
5.00	918.89	5.00	918.87										
10.20	918.75	9.00	918.79										
15.00	918.84	14.00	918.84										
20.00	918.83	19.00	918.89										
25.00	918.82	25.00	918.85										
30.00	918.67	30.00	918.66										
35.00	918.54	40.00	918.49										
40.00	918.47	44.00	918.36										
44.00	918.39	45.00	918.21										
45.00	918.20	47.40	917.83										
46.00	918.08	49.50	917.23										
47.00	917.91	53.40	916.19										
48.00	917.63	54.00	916.14										
49.00	917.32	55.00	916.05										
49.70	917.03	56.00	915.74										
50.00	916.91	56.40	915.43										
51.00	916.64	57.30	914.62										
52.00	916.25	60.00	913.93										
52.50	916.21	61.10	913.82										
53.00	916.14	61.80	913.83										
54.00	916.06	62.60	913.81										
55.00	916.00	64.00	914.17										
56.00	915.43	64.40	914.41										
56.00	915.02	65.30	916.02										
57.00	914.78	65.70	916.36										
58.00	914.67	67.00	916.93										
59.00	914.47	69.00	917.47										
60.00	913.99	71.00	918.17										
60.80	913.85	73.00	918.51										
61.00	913.85	75.00	918.63										
62.00	913.90	78.00	919.06										
63.00	913.89	83.00	919.33										
63.40	914.12	90.00	919.60										
64.00	914.14	97.00	920.30										
64.80	914.35	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												

Rocky Branch Cross Section 5 - Pool



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-2, 2009 SURVEY DATA CROSS-SECTION: 5  
 PROJECT ROCKY BRANCH FEATURE: Pool  
 TASK CROSS SECTION  
 REACH ROCKY BRANCH  
 DATE 9/30/09 to 10/02/09  
 CREW BUCHHOLZ/PARRISH/FURRY

Summary Data  
 All dimensions in feet

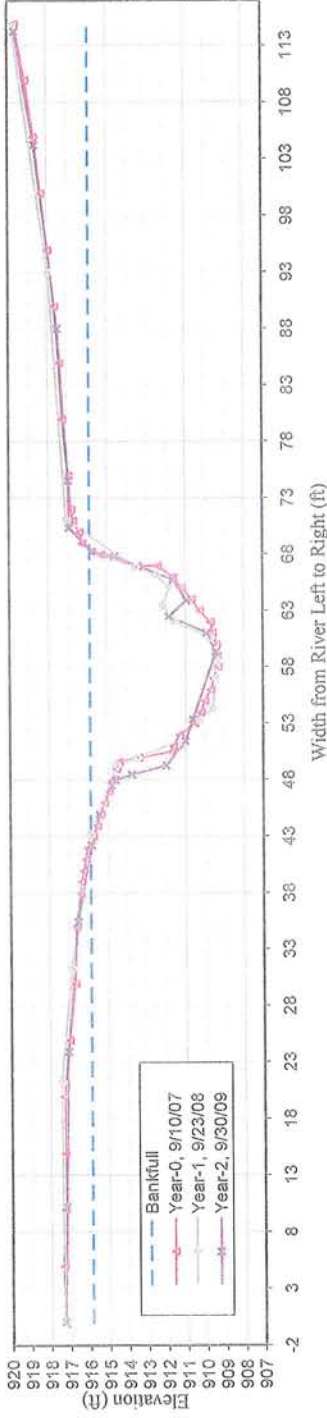
Bankfull X-sec area	58.7	sq. ft.
Bankfull Width	32.7	ft.
Bankfull Mean Depth	1.8	ft.
Bankfull Max Depth	4.7	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	918.36	ft.



CROSS SECTION PHOTO - LOOKING DOWNSTREAM

<b>ROCKY BRANCH</b>		<b>EEP PROJECT # 308</b>				<b>CROSS-SECTION: 6</b>							
<b>Year-0</b>		<b>Year-1</b>		<b>Year-2</b>		<b>Year-3</b>		<b>Year-4</b>		<b>Year-5</b>		<b>Year-6</b>	
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										
5.00	917.39	21.30	917.41										
10.00	917.30	31.40	916.85										
15.00	917.30	43.20	915.88										
20.00	917.34	49.30	914.54										
25.00	917.05	50.00	913.46										
30.00	916.73	51.50	911.26										
35.00	916.65	53.30	910.28										
38.00	916.44	54.30	909.55										
39.00	916.41	57.00	909.46										
40.00	916.27	58.50	909.36										
41.00	916.16	59.50	909.47										
42.00	916.04	60.60	909.72										
43.00	915.80	62.10	911.56										
44.00	915.58	63.50	912.12										
45.00	915.40	65.10	911.80										
46.00	915.21	66.20	912.49										
47.00	914.98	66.90	913.53										
48.00	914.80	71.10	917.04										
49.00	914.57	93.00	917.93										
49.60	914.45	114.70	919.76										
50.00	913.45												
50.50	911.79												
51.00	911.68												
52.00	911.35												
53.00	910.55												
54.00	910.23												
55.00	910.03												
56.00	909.73												
57.00	909.55												
58.00	909.35												
59.00	909.38												
60.00	909.43												
61.00	909.63												
62.00	909.73												
63.00	910.28												
64.00	910.69												
65.00	911.20												
66.00	911.64												
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												

Rocky Branch Cross Section 6 - Pool



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-2, 2009 SURVEY DATA CROSS-SECTION: 6  
 PROJECT ROCKY BRANCH FEATURE: Pool

TASK CROSS SECTION  
 REACH ROCKY BRANCH  
 DATE 9/30/09 to 10/02/09  
 CREW BUCHHOLZ/PARRISH/FURRY

Summary Data  
 All dimensions in feet.

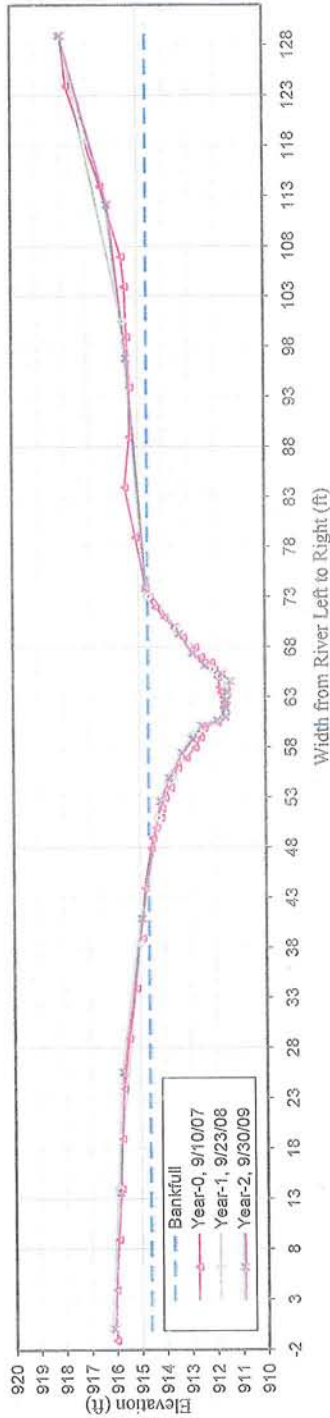
Bankfull X-sec area	103.4	sq. ft.
Bankfull Width	28.3	ft.
Bankfull Mean Depth	3.6	ft.
Bankfull Max Depth	6.6	ft.
Width/Depth Ratio	7.8	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	915.88	ft.



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)	Station (ft)	Elev. (ft)
-1.00	916.10	0.00	916.17												
4.00	916.10	14.00	915.91												
9.00	915.99	38.40	915.01												
14.00	915.87	51.00	914.29												
19.00	915.82	55.00	913.65												
24.00	915.73	59.30	912.83												
29.00	915.52	60.70	911.77												
34.00	915.23	61.50	911.52												
39.00	914.97	63.10	911.47												
44.00	914.87	64.30	911.64												
48.00	914.61	65.20	911.87												
49.00	914.54	65.80	912.15												
50.00	914.40	69.80	913.55												
51.00	914.22	73.10	914.65												
52.00	914.18	100.60	915.62												
53.00	914.04	129.00	918.03												
54.00	913.83														
55.00	913.71														
56.00	913.54														
57.00	913.20														
58.00	912.84														
59.00	912.63														
60.00	912.47														
60.50	911.93														
61.00	911.72														
61.50	911.62														
62.00	911.69														
62.50	911.67														
63.00	911.71														
63.50	911.81														
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	917.84														
129.00	918.06														

Rocky Branch Cross Section 7 - Riffle

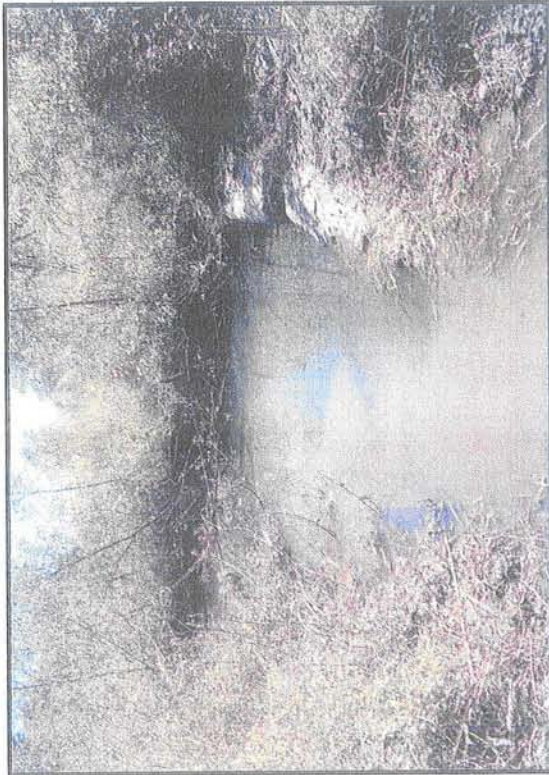


CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-2, 2009 SURVEY DATA      CROSS-SECTION: 7  
 PROJECT ROCKY BRANCH      FEATURE: Riffle  
 TASK CROSS SECTION  
 REACH ROCKY BRANCH  
 DATE 9/30/09 to 10/02/09  
 CREW BUCHHOLZ/PARRISH/FURRY

Summary Data  
 All dimensions in feet

Bankfull X-sec area	35.6	sq. ft.
Bankfull Width	27.6	ft.
Bankfull Mean Depth	1.3	ft.
Bankfull Max Depth	3.2	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	914.65	ft.

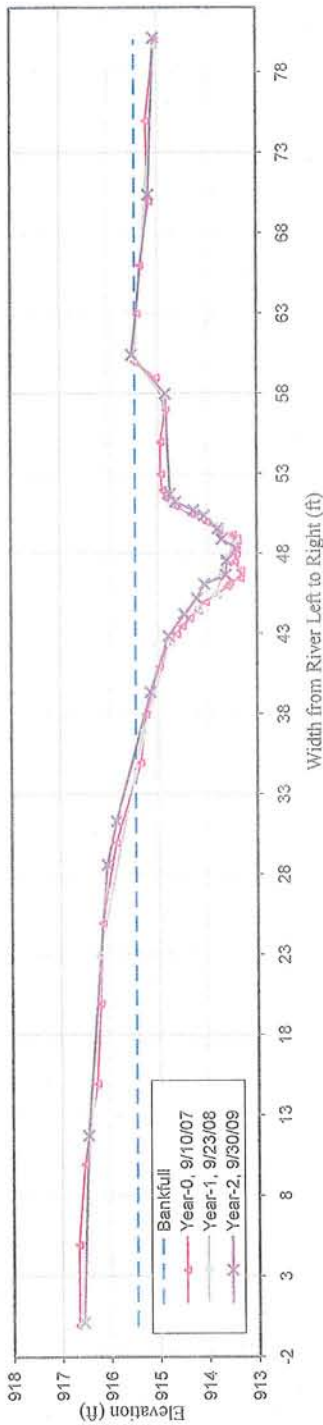


CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308				CROSS-SECTION: 8							
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										
5.00	916.69	23.00	916.21										
10.00	916.56	37.00	915.30										
15.00	916.30	42.40	914.77										
20.00	916.22	44.60	914.16										
25.00	916.18	45.50	913.81										
30.00	915.89	46.70	913.68										
35.00	915.38	47.80	913.62										
38.00	915.27	48.70	913.40										
41.00	914.99	49.70	913.78										
42.50	914.77	51.20	914.72										
43.00	914.64	57.90	914.89										
43.50	914.53	60.20	915.47										
44.00	914.37	79.60	915.03										
44.50	914.19												
45.00	914.05												
45.50	913.82												
46.00	913.61												
46.20	913.55												
46.50	913.35												
47.00	913.34												
47.50	913.46												
48.00	913.42												
48.50	913.42												
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	915.43												
66.00	915.37												
70.00	915.18												
75.00	915.24												
80.00	915.06												



Rocky Branch Cross Section 8 - Riffle



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-2, 2009 SURVEY DATA CROSS-SECTION: 8  
 PROJECT ROCKY BRANCH FEATURE: Riffle  
 TASK CROSS SECTION  
 REACH ROCKY BRANCH  
 DATE 9/30/09 to 10/02/09  
 CREW BUCHHOLZ/PARRISH/FURRY

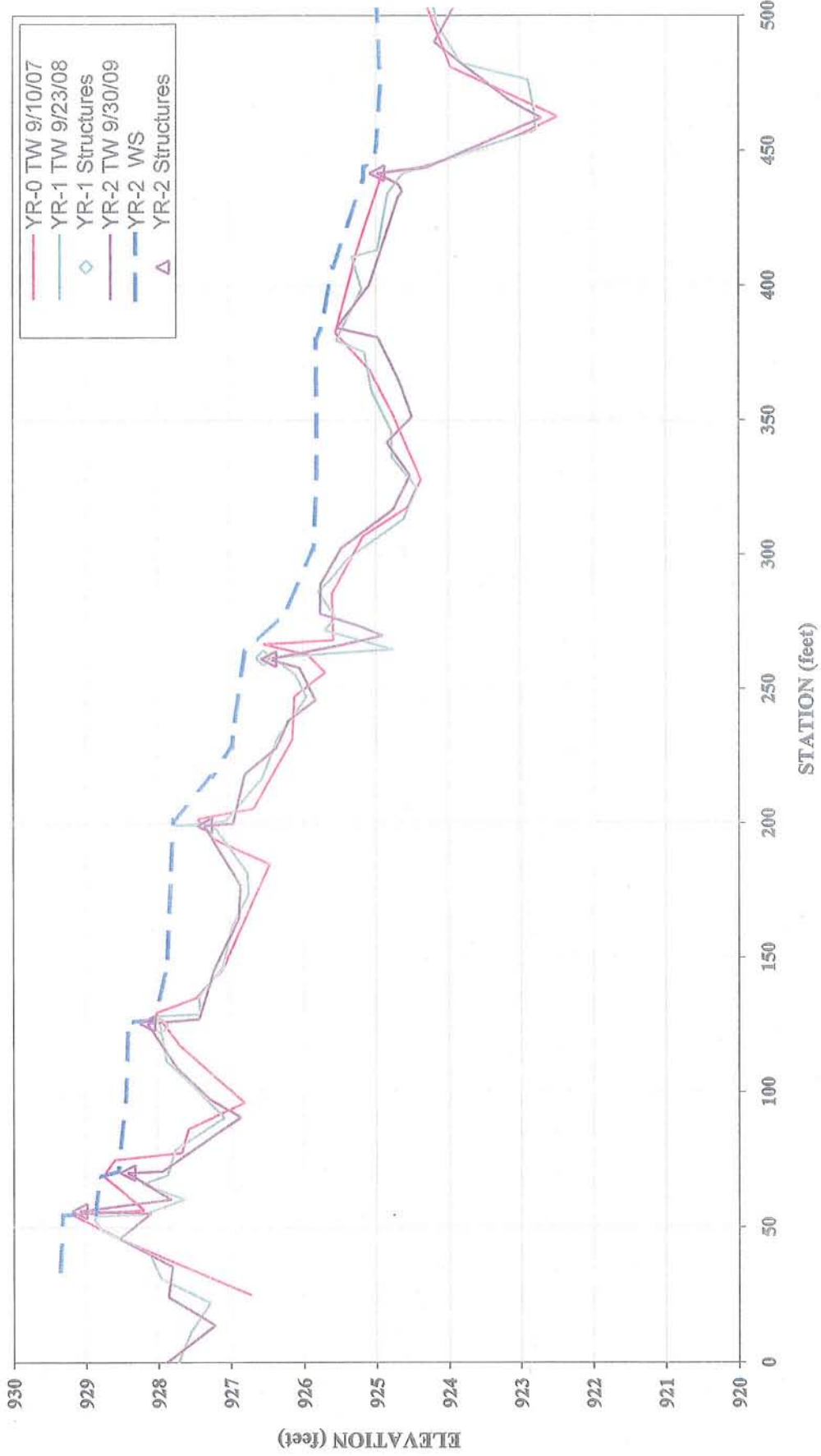
Summary Data  
 All dimensions in feet.

Bankfull X-sec area	21.0	sq. ft.
Bankfull Width	25.2	ft.
Bankfull Mean Depth	0.8	ft.
Bankfull Max Depth	2.1	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	915.47	ft.



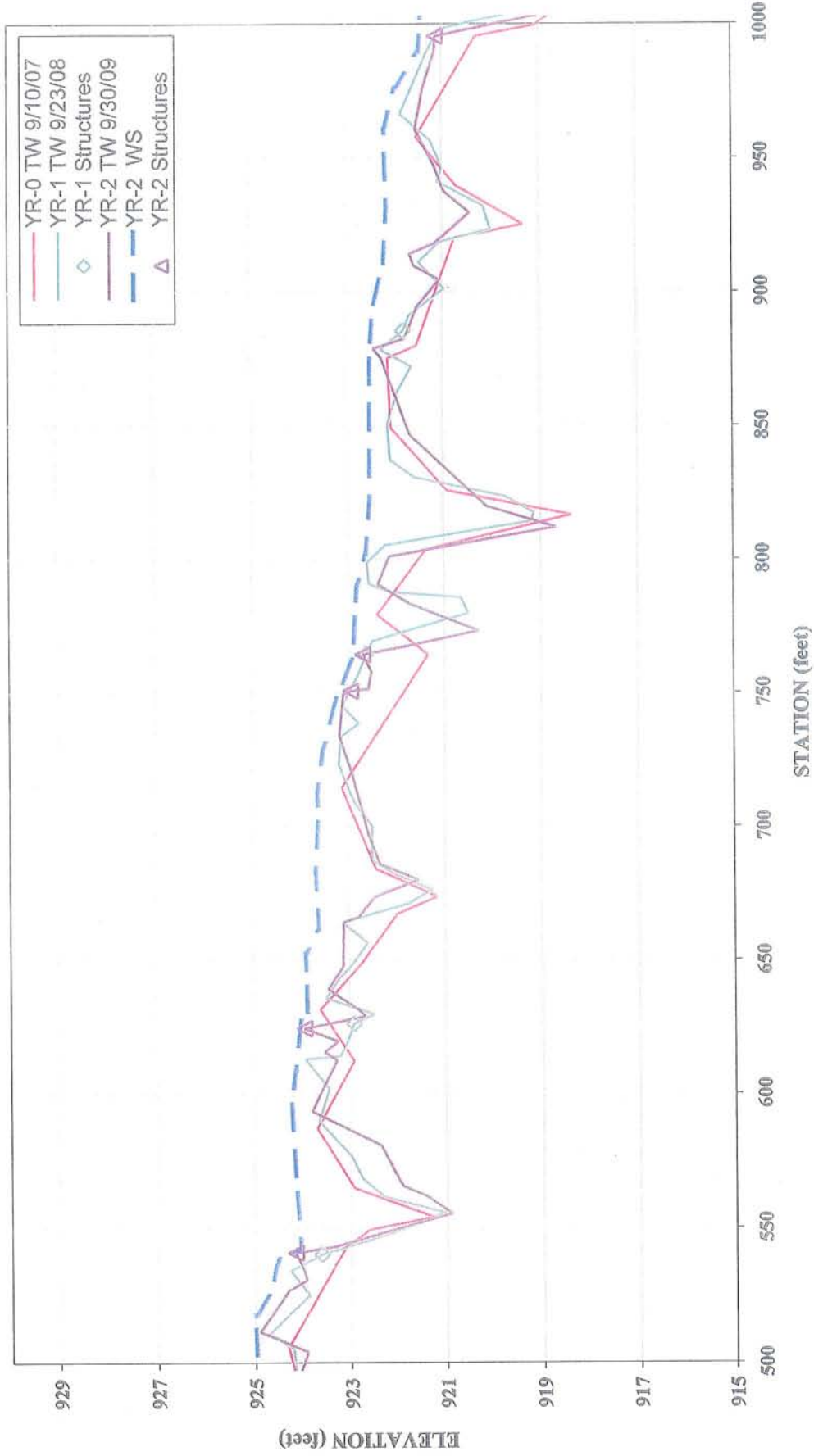
CROSS SECTION PHOTO - LOOKING DOWNSTREAM

**Rocky Branch  
Longitudinal Profile  
2009 (Year-2) Monitoring**



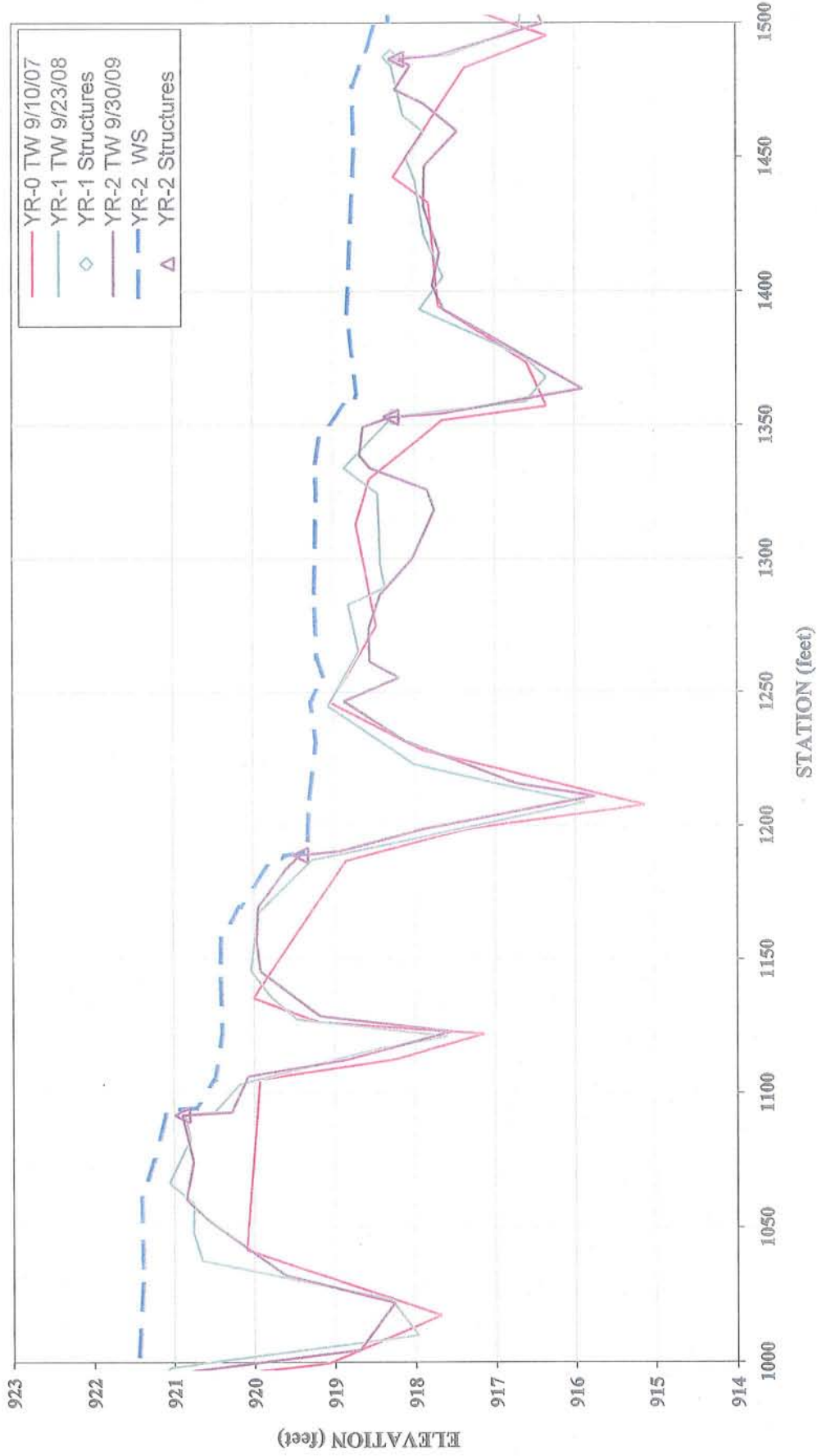
Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch  
Longitudinal Profile  
2009 (Year-2) Monitoring**



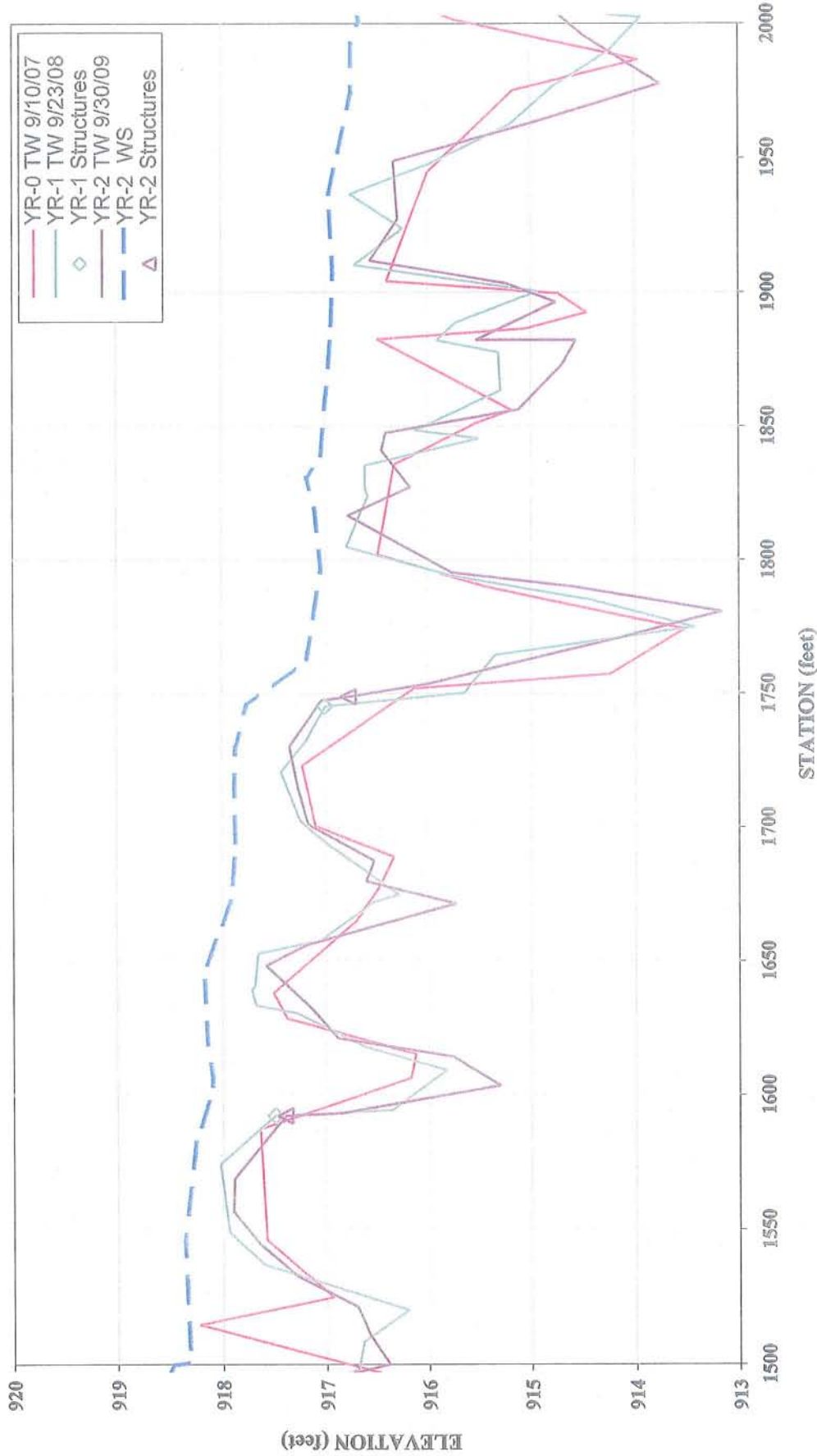
Note: Due to slight differences in thatweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch  
Longitudinal Profile  
2009 (Year-2) Monitoring**



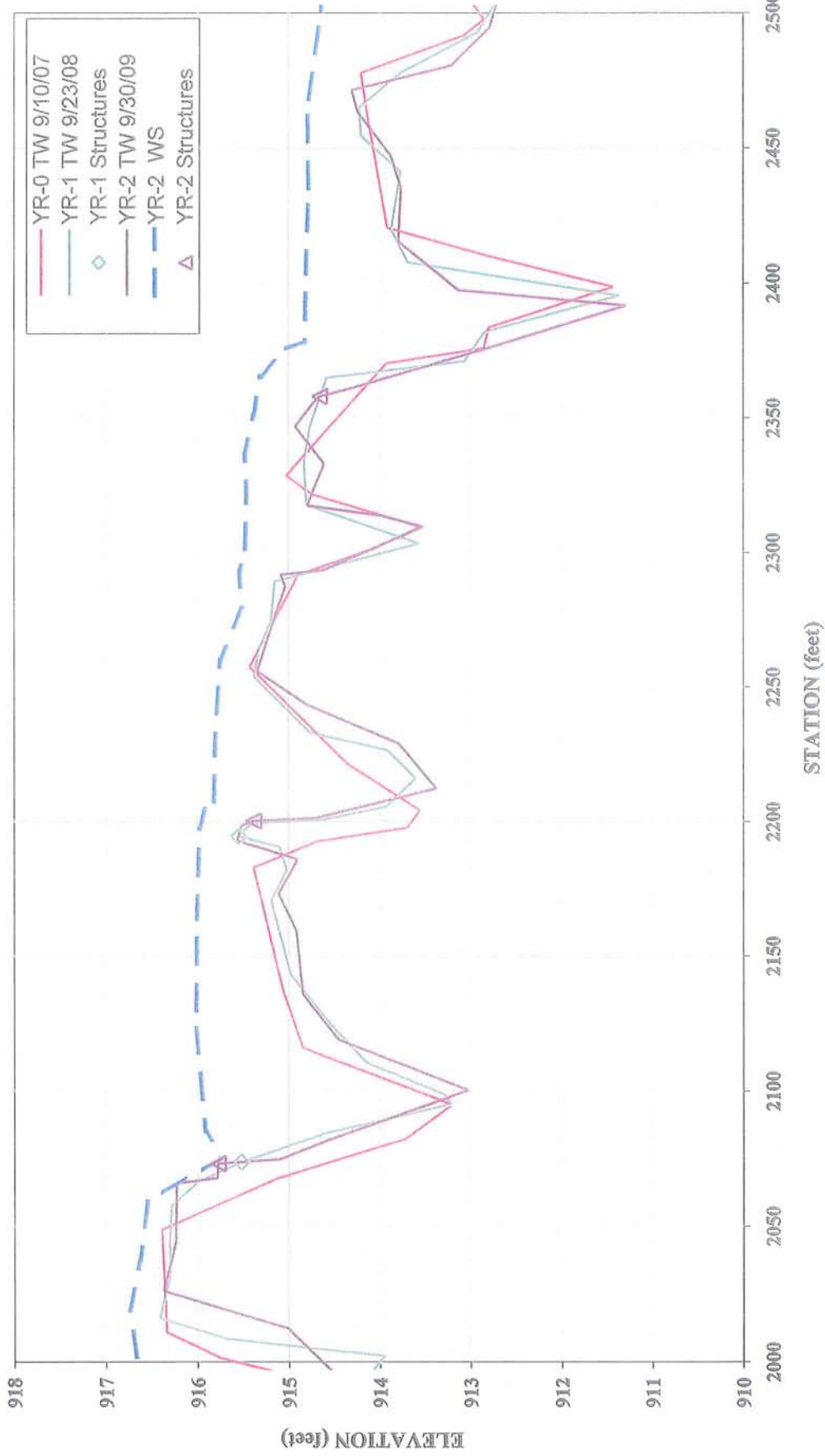
Note: Due to slight differences in thatweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch  
Longitudinal Profile  
2009 (Year-2) Monitoring**



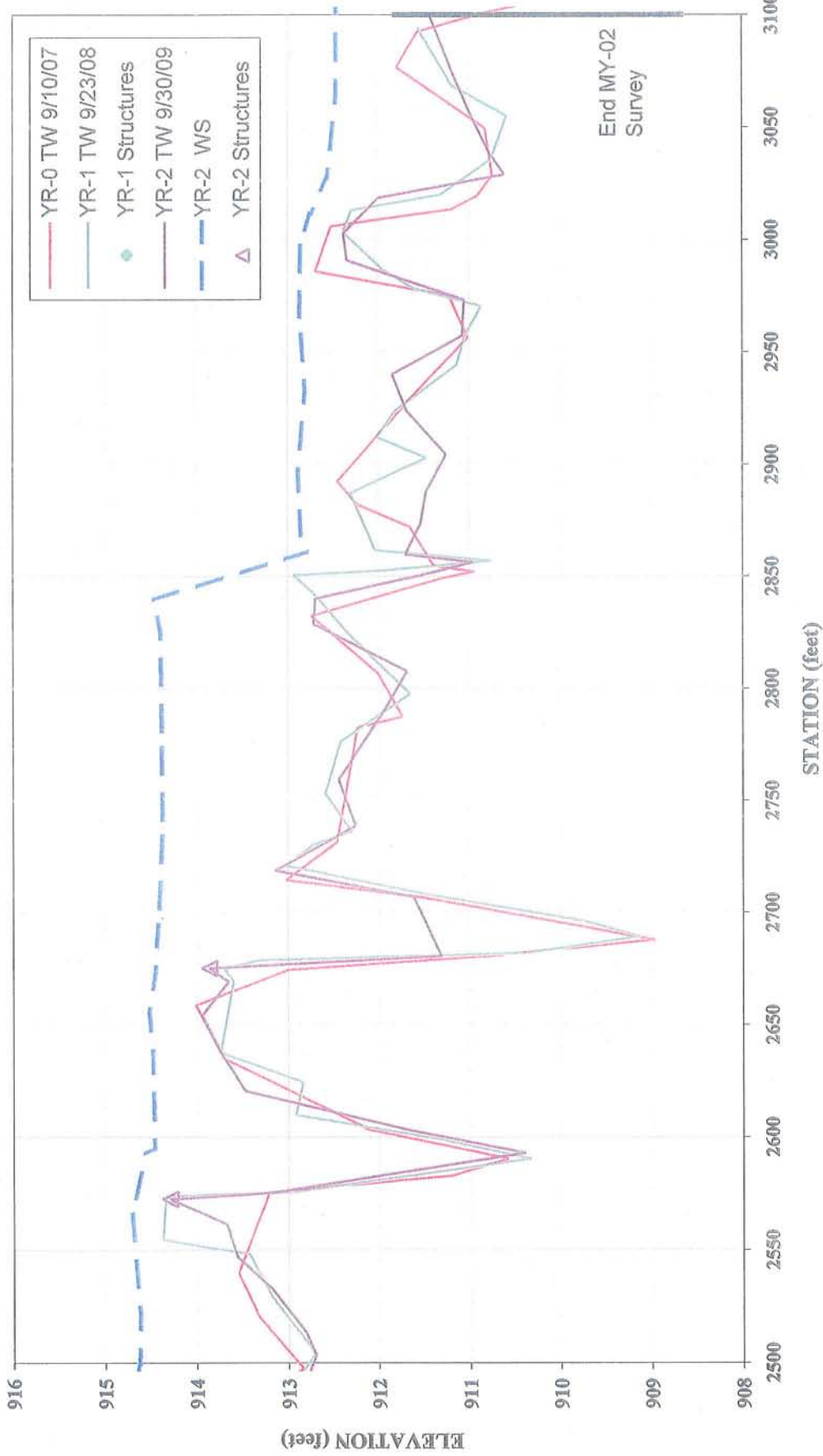
Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

**Rocky Branch  
Longitudinal Profile  
2009 (Year-2) Monitoring**



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

**Rocky Branch  
Longitudinal Profile  
2009 (Year-2) Monitoring**



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

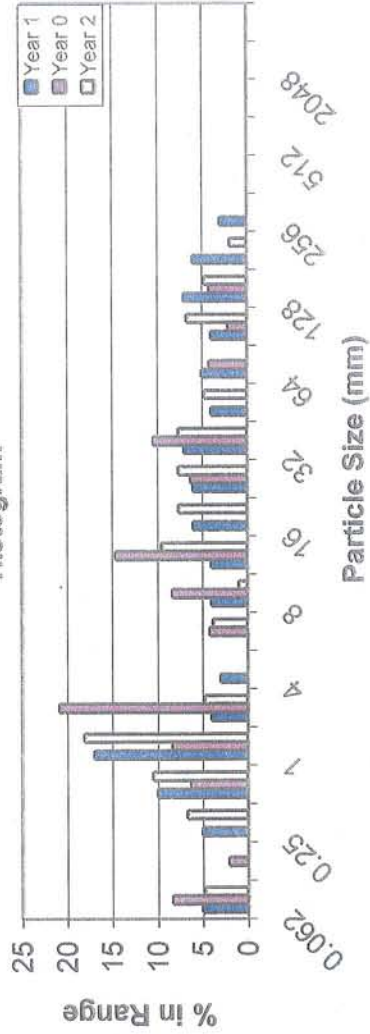
EEP PROJECT ID: 308  
 CROSS-SECTION: 2

FEATURE: RIFFLE



PROJECT ROCKY BRANCH  
 TASK PEBBLE COUNT  
 REACH ROCKY BRANCH  
 DATE 9/30/2009 to 10/02/2009  
 CREW BUCHHOLZ/FURRY/PARRISH

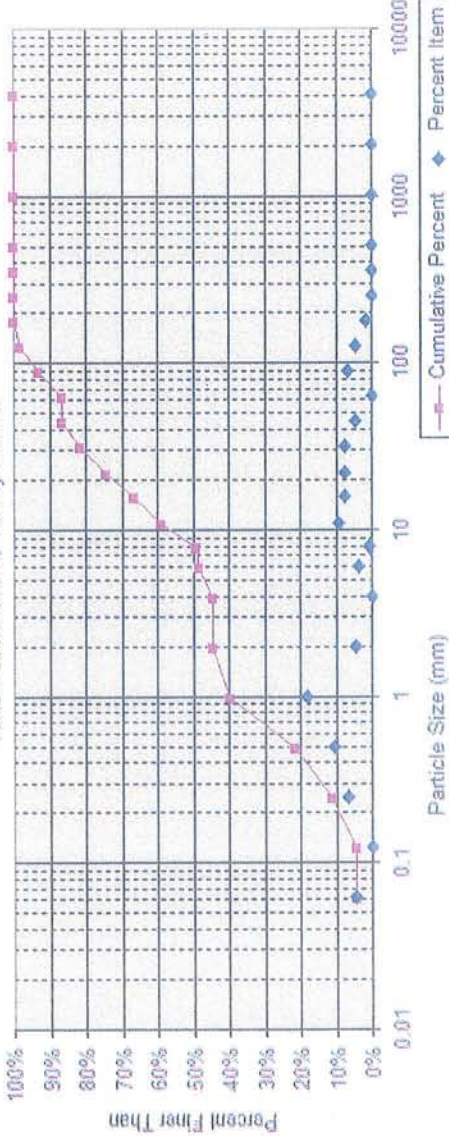
Histogram



Rocky Branch

Note: ---

Riffle Pebble Count, Rocky Branch



Size percent less than (mm)				Percent by substrate type						
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
0.338	0.83	0.1	37	102	5%	40%	42%	13%	0%	0%

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	5
very fine sand	0.062 - 0.13	7
fine sand	0.13 - 0.25	11
medium sand	0.25 - 0.5	19
coarse sand	0.5 - 1	5
very coarse sand	1 - 2	4
very fine gravel	2 - 4	1
fine gravel	4 - 6	10
medium gravel	6 - 8	8
coarse gravel	8 - 11	8
very coarse gravel	11 - 16	8
small cobble	16 - 22	5
medium cobble	22 - 32	7
large cobble	32 - 45	2
very large cobble	45 - 64	5
small boulder	64 - 90	7
medium boulder	90 - 128	5
large boulder	128 - 180	2
very large boulder	180 - 256	2
bedrock	256 - 362	0
	362 - 512	0
	512 - 1024	0
	1024 - 2048	0
	2048 - 4096	0
	4096 - bedrock	0
Total Particle Count:		105



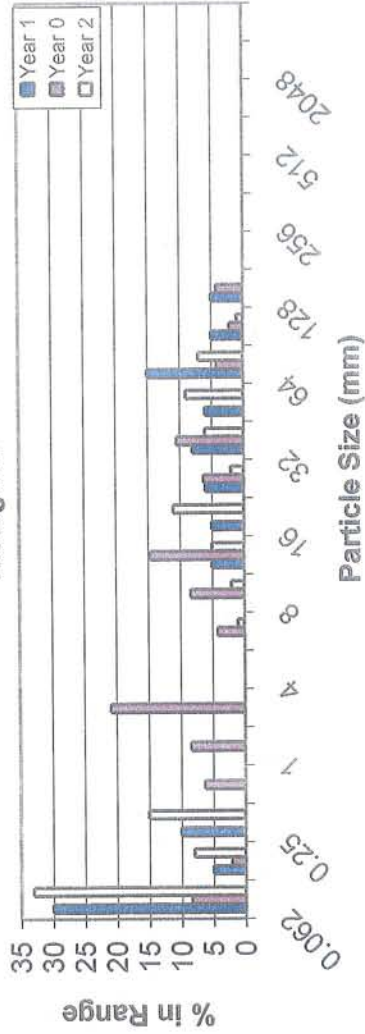
EEP PROJECT ID: 308  
 CROSS-SECTION: 4

FEATURE: RIFFLE



PROJECT ROCKY BRANCH  
 TASK PEBBLE COUNT  
 REACH ROCKY BRANCH  
 DATE 9/30/2009 to 10/02/2009  
 CREW BUCHHOLZ/FURRY/PARRISH

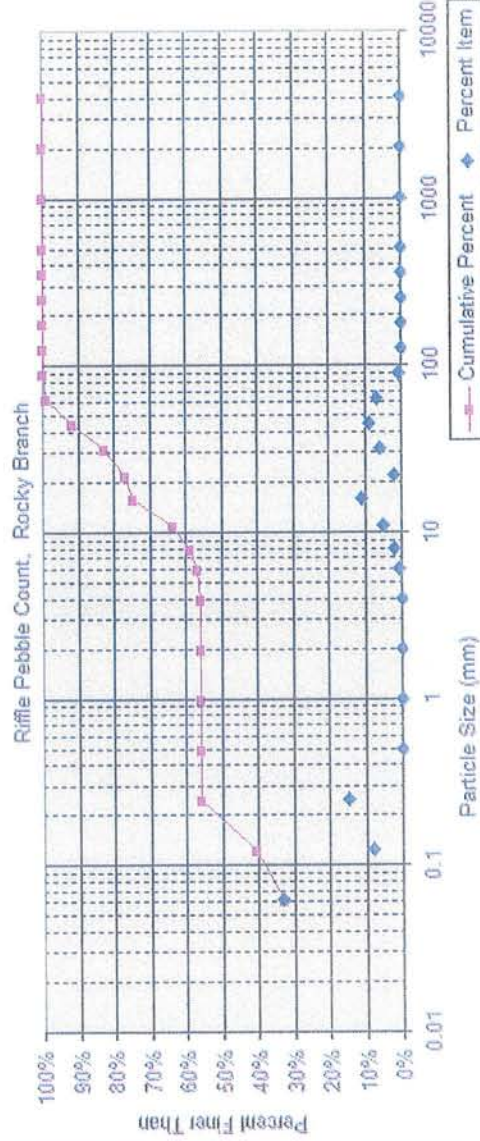
Histogram



Rocky Branch

Note:

Riffle Pebble Count, Rocky Branch



Size percent less than (mm)		Percent by substrate type					
#/A	D	silt/clay	sand	gravel	cobble	boulder	bedrock
D16	0.075	33%	23%	43%	1%	0%	0%
D95	0.85	52%					

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	33
very fine sand	0.062 - 0.13	8
fine sand	0.13 - 0.25	15
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	1
fine gravel	6 - 8	2
medium gravel	8 - 11	5
medium gravel	11 - 16	11
coarse gravel	16 - 22	2
coarse gravel	22 - 32	6
coarse gravel	32 - 45	9
very coarse gravel	45 - 64	7
very coarse gravel	64 - 90	1
small cobble	90 - 128	
medium cobble	128 - 180	
large cobble	180 - 256	
very large cobble	256 - 362	
small boulder	362 - 512	
small boulder	512 - 1024	
medium boulder	1024 - 2048	
large boulder	2048 - 4096	
very large boulder	4096 -	
bedrock		
Total Particle Count:		100

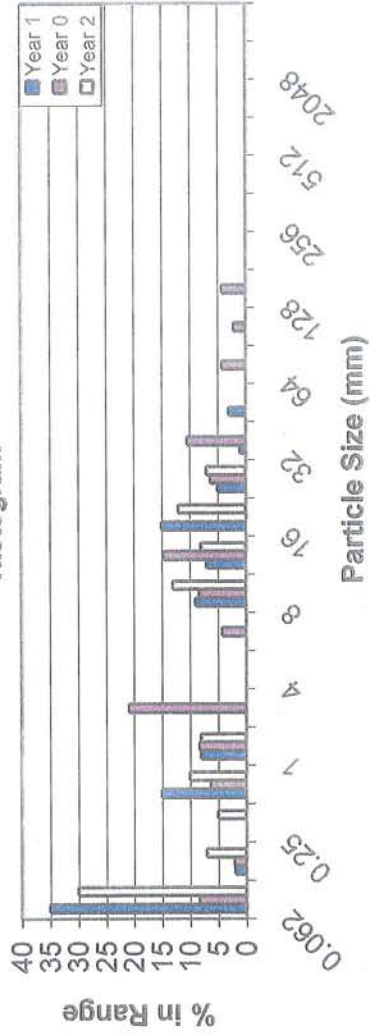
EEP PROJECT ID: 308  
 CROSS-SECTION: 7

FEATURE: RIFFLE



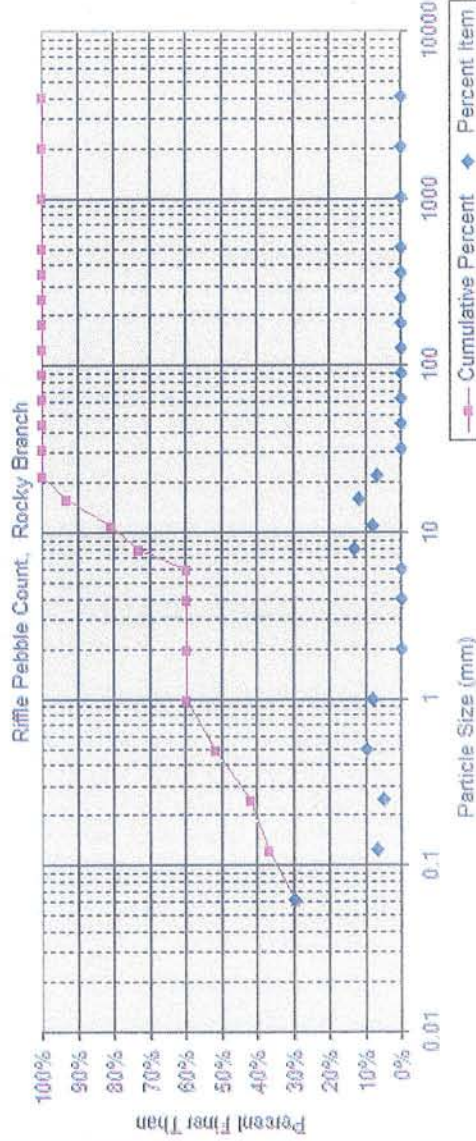
PROJECT ROCKY BRANCH  
 TASK PEBBLE COUNT  
 REACH ROCKY BRANCH  
 DATE 9/30/2009 to 10/02/2009  
 CREW BUCHHOLZ/FURRY/PARRISH

Histogram



Rocky Branch

Note:



Size percent less than (mm)				Percent by substrate type						
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.10	0.4	12	18	30%	30%	40%	0%	0%	0%

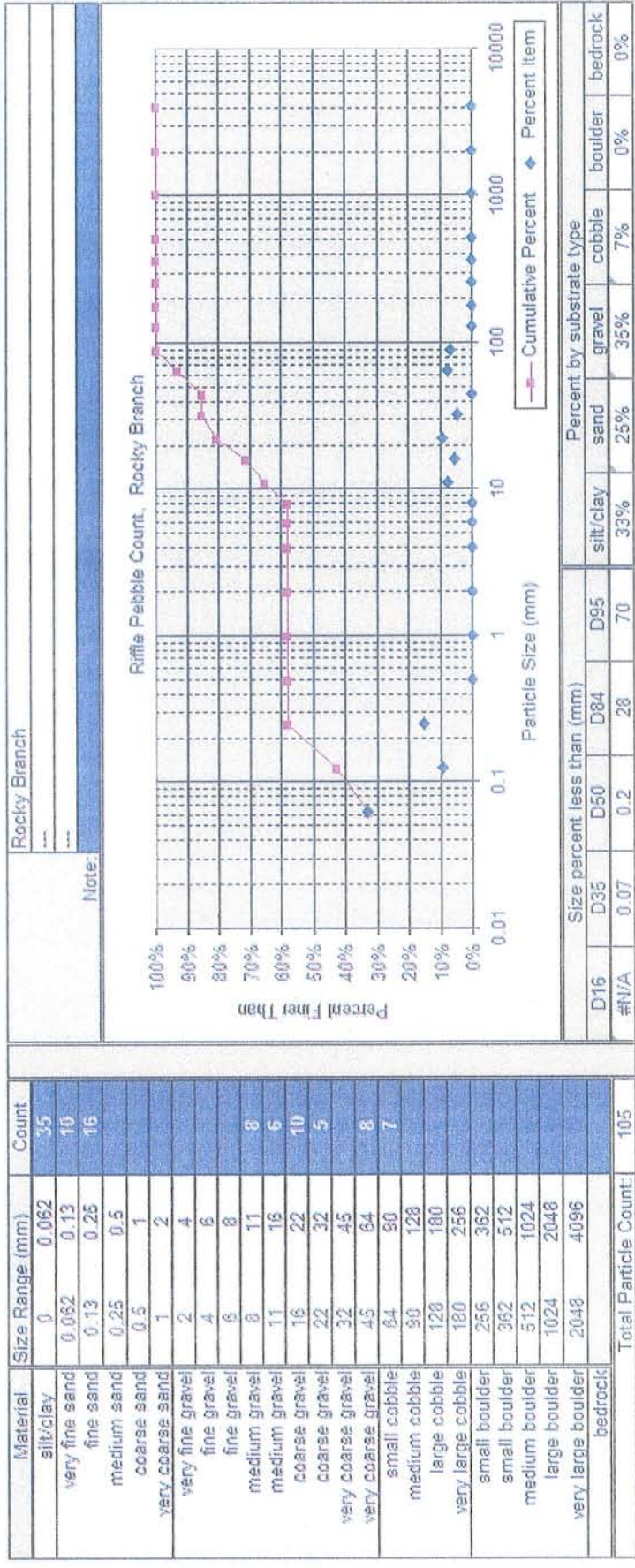
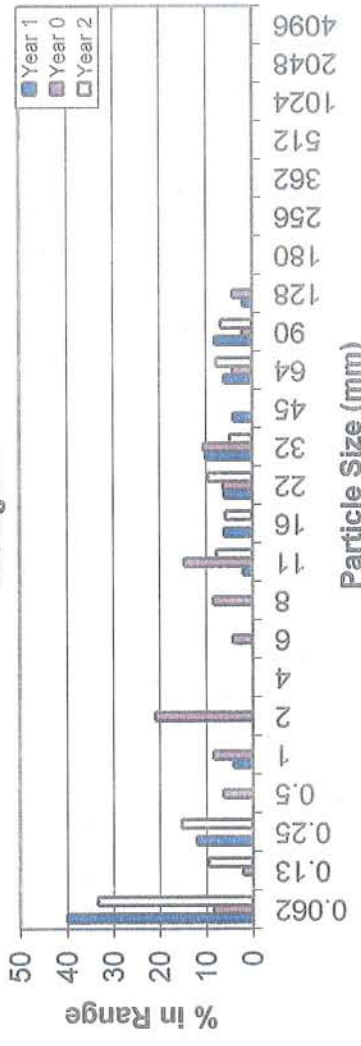
Material	Size Range (mm)	Count
silt/clay	0 - 0.062	30
very fine sand	0.062 - 0.13	7
fine sand	0.13 - 0.25	5
medium sand	0.25 - 0.5	10
coarse sand	0.5 - 1	8
very coarse sand	1 - 2	2
very fine gravel	2 - 4	4
fine gravel	4 - 6	6
fine gravel	6 - 8	13
medium gravel	8 - 11	8
medium gravel	11 - 16	17
coarse gravel	16 - 22	7
coarse gravel	22 - 32	7
very coarse gravel	32 - 45	4
very coarse gravel	45 - 64	6
small cobble	64 - 90	5
medium cobble	90 - 128	12
large cobble	128 - 180	10
very large cobble	180 - 256	8
small boulder	256 - 362	6
small boulder	362 - 512	5
medium boulder	512 - 1024	4
large boulder	1024 - 2048	3
very large boulder	2048 - 4096	2
bedrock		1
Total Particle Count:		100

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



PROJECT ROCKY BRANCH  
 TASK PEBBLE COUNT  
 REACH ROCKY BRANCH  
 DATE 9/30/2009 to 10/02/2009  
 CREW BUCHHOLZ/FURRY/PARRISH

Histogram



APPENDIX E

Wetland Assessment