YEAR 1 MONITORING REPORT

ADKIN BRANCH STREAM RESTORATION PROJECT
PHASE 1 – WASHINGTON AVE. TO LINCOLN ST.

Lenoir County, North Carolina
Project ID No. 050656101

Submitted to:

NCDENR-Ecosystem Enhancement Program
2728 Capital Boulevard, Suite 1H 103
Raleigh, North Carolina 27604

Construction Completed: April 2011
Morphology Data Collected: October 2011
Vegetation Data Collected: October 2011
Submitted: January, 2012

Prepared by:

&

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603

Design Firm:

Florence & Hutcheson, Inc.
5121 Kingdom Way, Suite 100
Raleigh, North Carolina 27607
919.851.6066
919.851.6846 (fax)

I HEREBY CERTIFY THAT THE DOCUMENTS CONTAINED HEREIN, UT TO THE LUMBER RIVER YEAR 1 MONITORING REPORT WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

SIGNED SEALED, AND DATED THIS _____ DAY OF _____ 2011.

_____

Chris L. Smith, PE

TABLE OF CONTENTS

SECTION **PAGE**

1.0 EXECUTIVE SUMMARY 2

1.1 GOALS AND OBJECTIVES 2
1.2 VEGETATION 3
1.3 STREAM STABILITY 4
1.4 WETLANDS 5
1.5 NOTE 5

2.0 METHODOLOGY 5

3.0 RERFERENCES 6

APPENDIX A. PROJECT VICINITY MAP AND BACKGROUND TABLES 7
APPENDIX B. VISUAL ASSESSMENT DATA 14
APPENDIX C. VEGETATION PLOT DATA 41
APPENDIX D. STREAM SURVEY DATA 45
APPENDIX E. HYDROLOGIC DATA 75
APPENDIX F. CREDIT CALCULATION FIGURES 76

LIST OF FIGURES

FIGURE **PAGE**

Figure 1. Vicinity Map 8
Figures 2.0-2.12. Current Condition Plan View 15
Figures 3.1-3.20. Vegetation Plot Photos and Problem Areas 33
Figures 4.1-4.17. Cross Section Plots and Photos 46
Figures 5.1-5.3. Longitudinal Profile Plots 64
Figures 6.1 & 6.2 Crest Gauge Photos 75
Figures D.1-D.5. Credit Calculation Figures 76

LIST OF TABLES

TABLE **PAGE**

Table 1. Project Components and Mitigation Credits 10
Table 2. Project Activity and Reporting History 11
Table 3. Project Contacts Table 12
Table 4. Project Attributes Table 13
Table 5.1-5.3. Visual Stream Morphology Stability Assessment 29
Table 6. Vegetation Condition Assessment 32
Table 7. Vegetation Plot Criteria Attainment 41
Table 8. CVS Vegetation Plot Metadata 42
Table 9.1-9.2. CVS Stem Count Total and Planted by Plot and Species 43
Table 10.1-10.3. Baseline Stream Data Summary 68
Table 11. Monitoring Data - Dimensional Morphology Summary 71
Table 12.1-12.3. Monitoring Data - Stream Reach Data Summary 72
Table 13. Verification of Bankfull Events 75

1.0 EXECUTIVE SUMMARY

The following report summarizes the vegetation establishment and stream stability for Year 1 monitoring for Phase 1 of the Adkin Branch Stream Restoration Project (Site) in Lenoir County, North Carolina.

1.1 Goals and Objectives

The primary goals of the Adkin Branch Stream Restoration Project focus on:

- Restoring a stable dimension, pattern, and profile to Adkin Branch and UT to Adkin Branch (UT)
- Improving water quality
- Decreasing floodwater levels
- Restoring aquatic and riparian habitat
- Implementing best management practices (BMPs) for stormwater quality and retention

These goals will be achieved through the following objectives:

- Reducing sediment input to Adkin Branch by restoring 7,579 linear feet of stream to a stable dimension, pattern, and profile, and establishing a vegetated stream bank, floodplain, and terrace forest. Forest vegetation species were selected by studying a Reference Forest Ecosystem located directly upstream of the Project and reviewing species listed in *Classification of the Natural Communities of North Carolina: Third Approximation* (Schafale and Weakley 1990) for a Coastal Plain Levee Forest. A total of 32.44 acres of the conservation easement were reforested.
- Promoting floodwater attenuation and decreasing floodwater levels by excavating a gently sloping floodplain that begins at the bankfull discharge elevation and slopes up to the terrace elevation, in addition to increasing roughness in the floodplain by establishing a vegetated riparian buffer.
- Improving aquatic habitat by enhancing stream bed variability (ripple-pool sequence), and introducing woody debris in the form of rootwads, log vanes, and log sills. A ripple-pool sequence and woody debris structures will provide places for forage, cover, and reproduction for fauna and flora.
- Improving terrestrial habitat by restoring a forested riparian corridor through a highly urbanized environment, which has historically experienced vegetation maintenance and forest segmentation. This corridor will provide a diversity of habitats such as mature forest, early successional forest, riparian wetlands and uplands.
- Reducing nonpoint source pollution associated with urban land uses (i.e. maintained ball fields, roadways, residential communities, etc.) by providing a vegetated riparian buffer adjacent to streams to treat surface runoff. Reforestation of the Project resulted in a total of 1,171,272 sq. ft. (26.89 acres) of Neuse River Riparian Buffers (area within 200’ of top of bank of channel that is at least 50’ wide).
- Improving water quality by creating 0.69 acres of riparian stormwater wetland adjacent to the UT, implementing six (6) sand filter device BMPs along Adkin Branch for

stormwater runoff to retain sediments and nutrients prior to entering Adkin Branch, and removing creosote timber retaining walls throughout the project.

1.2 Vegetation

Stream Vegetation Success Criteria

Vegetation monitoring will be considered successful for stream mitigation credit if at least 260 stems/acre (trees and shrubs), both, volunteer and planted, are surviving at the end of five years. The interim measure of vegetative success for the site will be the survival of at least 320 3-year old stems per acre at the end of year three of the monitoring period and 280 4-year old stems per acre at the end of year four of the monitoring period (USACE et al. 2003).

Riparian Buffer Vegetation Success Criteria

Vegetation monitoring will be considered successful for riparian buffer mitigation credit if at least 320 native planted hardwood stems/acre (trees only) are surviving at the end of year five. Planted vegetation must include a minimum of at least two planted native hardwood tree species. There is no interim measure of vegetative success for riparian buffers.

Monitoring Results

Stem counts were based on an average of the evaluated vegetation plots. Based on the number of stems counted toward stream mitigation credit, average densities were measured at 467 planted stems per acre (excluding livestakes) surviving in year 1 (2011). Average densities for stems counted toward riparian buffer mitigation credit were measured at 340 planted stems per acre (excluding livestakes) surviving in year 1 (2011). The dominant species identified at the Site were planted stems of silky dogwood (*Cornus amomum*), river birch (*Betula nigra*), and southern red oak (*Quercus falcata*).

Eleven of the twenty-two individual vegetation plots met stream and buffer vegetation success criteria when counting planted stems alone. Three plots (Plots 10, 11, and 22) didn't meet stream vegetation success criteria based on planted stems alone; however, when including appropriate naturally recruited stems, such as hickory (*Carya* sp.) and sweetgum (*Liquidambar styraciflua*), these plots were above success criteria. Plot 22 had a total of 323 stems per acre, which is only slightly over the success criteria threshold of 320 stems per acre. Plot 17 met stream vegetation success criteria based on planted stems alone with 323 stems per acre, but did not meet riparian buffer vegetation success criteria, with only 283 planted tree stems per acre.

Generally, planted vegetation survival within the Site is doing poorly. Many of the planted trees died over the summer as the result of extreme hot, dry conditions. Stream benches and terrace slopes downstream of station 81+25 (Hurricane Irene repair areas) are characterized by exposed soil with little vegetation. The exposed benches are a result of sediment deposition from storm events, including Hurricane Irene. In addition, the permanent seed mixture that was spread on-site during stream repairs in February 2011 has not established on the benches and terrace slopes. Twenty-eight of the eighty-six planted ball and burlap trees adjacent to Holloway Park have died or appear to be in poor health. These issues encompass the majority of the Site and should be

monitored closely in subsequent monitoring years. Additional plantings/seeding may be necessary if improvement is not observed in future monitoring years.

Chinese privet (*Ligustrum sinense*) was sparsely scattered throughout the Site. One dense cluster of privet was observed between monitoring plots 14 and 15 as depicted on the Current Condition Plan View (CCPV) map (Figure 2.6). Invasive/exotic vegetation is not currently compromising the vegetative success of the Site. Vegetation ground coverage within the stormwater wetland was 100 percent.

1.3 Stream Stability

Year 1 monitoring surveys along Adkin Branch and its UT occurred in October, 2011. Significant stream bed scour was observed in the following locations (Figures 5.1-5.2):

- Reach 1: station 41+00 to 46+00
- Reach 2: station 68+71 to 74+64

This scour likely occurred during the storm events associated with Hurricane Irene in late August, 2011. Several of the existing pools in Reach 1 and 2 deepened and/or lengthened as a result of the storm events, but the log structures maintained grade control and the overall stability of the channel was not compromised. These pools are expected to adjust over time, but will be monitored closely in Year 2 to make sure that the log structures are not undermined. Only minor shifting of pools and riffles was observed throughout the remainder of the profile, which is expected in a sand bed system. The majority of stream banks and structures throughout the project are stable and functioning as intended. There is no evidence of trends toward significant change in channel pattern. Cross-sectional data indicates that the channel width to depth ratio is lowering as the channel matures (Figures 4.1-4.17). This change is expected as detailed in the proposed success criteria from the Baseline Monitoring Document (NCDENR, 2011).

Based on an overall visual assessment of the channel, Reach 2 appears to contain the majority of the problem areas on the Site. Twelve riffle segments were noted as unstable in Reach 2 as a result of the scour from large storm events, most notably, events associated with Hurricane Irene. Twelve bank segments were noted as eroding in Reach 2, due to a lack of vegetation along the stream banks. One log cross vane has been compromised in Reach 2 as a result of stream bank erosion around the vane arm (Figure 3.29). Six log structures are experiencing erosion on greater than 15 percent of the streambanks within their extent of influence and three log structures exhibit minor erosion around the vane arms. A Repair Plan has been developed to correct these problem areas, which includes the use of soil lifts, bank grading, and erosion control matting. The repair plan is expected to be implemented in 2012. Problem areas are depicted on the CCPV and photos are presented in Appendix B.

The soil lifts that were installed in January and February, 2011 are stable and the willow cuttings are well established along the stream banks.

Crest gauges installed on-site were inspected on 26 October, 2011. Crest Gauge 2 near station 75+25 was damaged during Hurricane Irene. The remaining crest gauges revealed that a bankfull event occurred at least once during 2011 (Table 13). Additional overbank evidence includes debris lines, and vegetation bent in the downstream direction. Evidence of bankfull events can be found in Appendix E.

1.4 Wetlands

No wetland monitoring areas were established for this project report.

1.5 Note

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 Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 METHODOLOGY

The Year 1 Monitoring survey was completed using a Total Station. Each cross section is marked with two rebar monuments at their beginning and ending points. The rebar has been located vertically and horizontally in NAD 83-State Plane. Surveying these monuments throughout the Site ensured proper orientation. The survey data was imported into MicroStation for verification. The longitudinal stationing was developed from total station data and compared with previous year's data to ensure consistent beginning and ending points. RIVERMorph was used to analyze the profile and cross section data. Tables and figures were created using Microsoft Excel. The channel is entirely a sand bed system; therefore a pebble count was not conducted.

Vegetation was measured at twenty-two sample vegetation plots (10-meter by 10-meter) within the Site in September 2011 for Year 1 (2011) monitoring per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006). The taxonomic standard for vegetation used for this document was *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2006). Vegetation plots are permanently monumented with 4-foot metal garden posts at each corner. In each sample plot, vegetation parameters monitored included species composition and species density. Visual observations of the percent cover of shrub and herbaceous species were documented by photograph. Photographs and vegetation plot information can be found in Appendices B and C.

Stormwater BMP devices will be monitored and maintained periodically, as necessary, to ensure the life of the devices. The City of Kinston has agreed to provide maintenance for the sand filter

BMP devices and the stormwater wetland for the life of the BMPs (30 years). A maintenance guideline manual will be provided to the City of Kinston by EEP.

3.0 RERFERENCES

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol forRecording Vegetation, Version 4.0 (http://cvs.bio.unc.edu/methods.htm).

NCDENR-Ecosystem Enhancement Program. 2011. Baseline Monitoring Document and As-Built Baseline Report, Adkin Branch Stream Restoration Project, Phase 1 – Washington Ave. to Lincoln St., Lenoir County, North Carolina.

Weakley, Alan S. 2006. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas (online). Available: http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2006-Jan.pdf [January 6, 2006]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, North Carolina.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

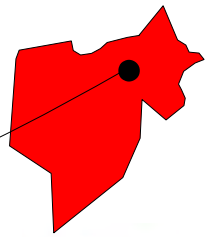
United States Army Corps of Engineers, United States Environmental Protection Agency, North Carolina Wildlife Resources Commission, North Carolina Division of Water Quality (USACE et al.). 2003. Stream Mitigation Guidelines.

APPENDICES

Appendix A. Project Vicinity Map and Background Tables

Lenoir County
North Carolina

PROJECT AREA



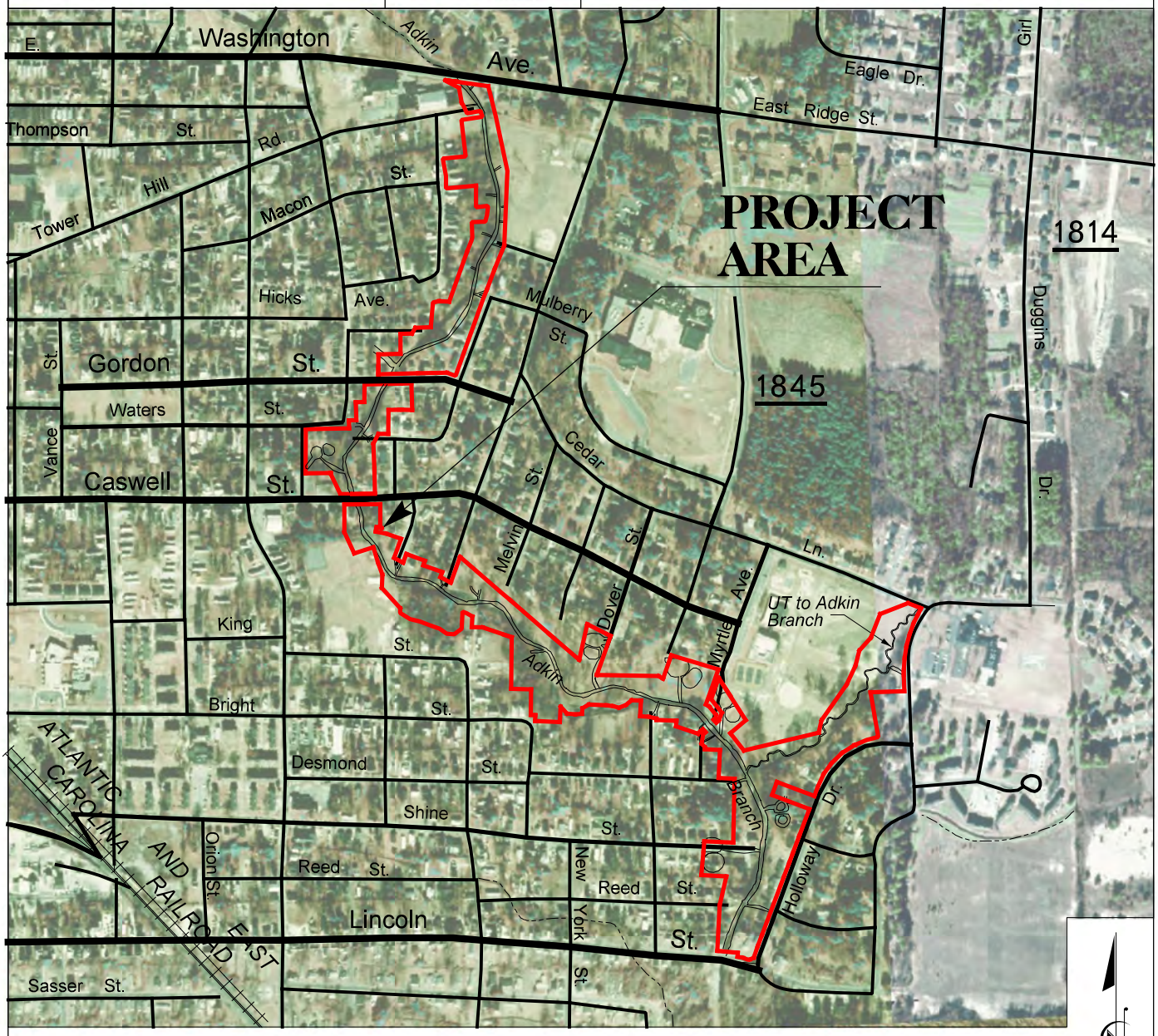
Date: 06/15/11	Figure: 1

Vicinity/Asset Map

Adkin Branch Phase I
PROJECT NO. 050656101
Lenoir County, North Carolina

Florence & Hutcheson
CONSULTING ENGINEERS
5121 KINGDOM WAY, SUITE 100
RALEIGH, N.C. 27607
(919) 851-6066
License No: F-0258

Ecosystem Enhancement PROGRAM



FROM RALEIGH:
- Take I-40 East for approximately 6.5 miles to US 70 East
- Take US Hwy 70 East for approximately 68.5 miles to NC 11/55
- Turn left and travel Northeast on NC 11/55 thru Kinston for 1.7 miles
- Turn left onto Martin Luther King Jr Blvd. and travel for 0.5 miles
- Turn right onto the East Washington Ave. and travel 0.4 miles to the intersection with Adkin Branch Project. Site is Southeast of Washington Ave.

"The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/ contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP."

0 500 1000
FEET

Project Location and Directions

The Project is located on the southeast side of the City of Kinston, in Lenoir County, North Carolina and includes Adkin Branch and an unnamed tributary (UT) to Adkin Branch (Figure 1, Appendix A). Phase I of the Project begins at Washington Ave. and ends at Lincoln Street.

Directions to the Site:

- From Raleigh, North Carolina take I-40 east for approximately 6.5 miles to US Highway 70 east.
- Take US 70 east for approximately 68.5 miles to NC Highways 11 and 55
- Take a left turn and travel northeast on NC 11/55 through Kinston for 2.6 miles to the intersection with Adkin Branch
- The project study area is southeast of NC 11/55.

The subject project is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP.

Table 1. Project Components and Mitigation Credits

Mitigation Credits										
	Stream	Riparian Wetland		Non-riparian Wetland		Riparian Buffer **		Nitrogen Nutrient Offset		
								Pound Reduction	Buffer Restoration **	
Type	R	R	RE	R	RE	50'	50' - 200'		<= 50'	50' - 200'
Totals	7,787 *	N/A	N/A	N/A	N/A	562,799	696,704 *	3,990	0	31,751

Project Components						
Project Component -or- Reach ID	Stationing/Location	Existing Footage/ Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio
Reach 1	Washington Ave. to Gordon St.	1,680	PII	R	1,727	Varies*
Reach 2	Gordon St. to Lincoln St.	4,224	PII	R	4,270	Varies*
Reach 3	UT to Adkin Branch.	1,200	PII	R	1,582	Varies*
Riparian Buffers	50'	7.58	-	R	12.92	1 to 1
	50' - 200'			R	13.97	Varies*

Component Summation						
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square ft.)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	7,579	N/A	N/A	N/A	1,171,272	N/A
Enhancement		N/A	N/A	N/A	N/A	N/A
Enhancement II	N/A					
Enhancement II	N/A					
Creation		N/A	N/A	N/A		
Preservation	N/A	N/A	N/A	N/A		N/A
High Quality Preservation	N/A	N/A	N/A	N/A		N/A

BMP Elements				
Element	Location	Purpose/Function	30 yr. Total Nitrogen Reduction (lbs)	Notes
Stormwater Wetland	UT Adkin	Water Quality / Nutrient Uptake	N/A	-
BMP #4 - Sand Filter	Miller St.	Water Quality / Infiltration	300	-
BMP #5 - Sand Filter	Dover St.	Water Quality / Infiltration	750	-
BMP #6 - Sand Filter	Seacrest St.	Water Quality / Infiltration	1,170	-
BMP #7 - Sand Filter	Myrtle Ave.	Water Quality / Infiltration	600	-
BMP #8 - Sand Filter	Holloway Dr.	Water Quality / Infiltration	180	-
BMP #9 - Sand Filter	Shine St.	Water Quality / Infiltration	990	-

* - Stream & Riparian Buffer Mitigation Credit numbers were adjusted based on proposed DWQ guidelines (DRAFT Regulatory Guidance for the Calculation of Stream and Buffer Mitigation Credit for Buffer Widths Different from Standard Minimum Widths, Version 4.5, July 20, 2010). See Appendix D for further explanation.

** - Riparian Buffer areas may be used for stream & wetland mitigation, stream & riparian buffer mitigation, or nutrient offset credit (*Estimating/Calculating Riparian Buffer Credits, EEP PPPM Section 8.3.1.2)* .

Table 2. Project Activity and Reporting History

Activity or Report	Data Collection Complete	Completion or Delivery
Restoration Plan		March 2007
Final Design – Construction Plans		May 2007
Bid Opening		October 2008
Begin Construction		March 2009
Tropical Storm Ida	*November 2009*	
Article 29 declared on original contractor		January 2010
Surety Contractor Begin Construction		June 2010
Tropical Storm Repairs Bid Opening		September 2010
Begin Tropical Storm Repairs Construction		December 2010
Construction Complete		April 2011
Baseline Monitoring Document	March 2011	July 2011
Year 1 Monitoring	October 2011	November 2011
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contacts Table

Designer	Florence & Hutcheson, Inc. 5121 Kingdom Way, Suite 100 Raleigh, North Carolina 27607 Kevin Williams (919) 851-6066
Original Contractor	Appalachian Environmental Services 1165 W. Main St. Sylva, NC 28779 Mickey B. Henson
Surety Contractor	Environmental Quality Resources, LLC 1405 Benson Court, Suite C Baltimore, MD 21227 John Talley (443) 304-3310
Repair Contractor	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 821-4300
Planting Contractor	Bruton Natural Systems (Fluvial Solutions Sub-contractor) PO Box 1197 Fremont, NC 27830 Charlie Bruton (919) 242-6555
Seeding Contractor	See Original Contractor, Surety Contractor, & Repair Contractor above.
Nursery Stock Suppliers	1) ArborGen - South Carolina SuperTree Nursery 2) Evergreen Partners of Raleigh 3) NC Division of Forest Resources
Monitoring Performers	
Stream Monitoring	Florence & Hutcheson, Inc. 5121 Kingdom Way, Suite 100 Raleigh, North Carolina 27607 Ryan Smith (919) 851-6066
Vegetation Monitoring	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, North Carolina 27603 Corri Faquin (919) 414-2471

Table 4. Project Attributes Table

Project Information				
Project Name		Adkin Branch Stream Restoration Project – Phase I		
County		Lenoir		
Project Area (acres)		36		
Project Coordinates		035º 15' 13" N, 77º 33' 36'' W (@ Lincoln St.)		
Project Watershed Summary Information				
Physiographic Province		Coastal Plain		
River Basin		Neuse		
USGS 8-digit HUC	3020202		USGS 14-digit HUC	3020202060030
NCDWQ Subbasin		03-04-05		
Project Drainage Area		5.46 sq. mi (at Lincoln St.)		
Watershed Land Use	Urban Land	76%	Agricultural Land	13%
	Mixed Forest / Disturbed Forest	7%	Evergreen Forest	4%
Reach Summary Information				
Parameters		**Adkin Branch**		**UT to Adkin**
		Washington Ave. to Gordon St.	**Gordon St. to Lincoln St.**	
Length of reach (linear ft)		1727	4270	1582
Valley Classification		VIII		VIII
Drainage Area (acres)		3220	3495	78
NCDWQ stream ID score		39.5		27
NCDWQ Classification		C		C
Pre-Existing Stream Type		G5	B5c	E5
As-built Stream Type		B5c	B5c	C/E5
Underlying mapped soils		Bibb		Kenansville
Drainage Class		Poorly Drained		Well-drained
Soil Hydric Status		Hydric		Non-Hydric
Slope		0.0016	0.0014	0.0022
FEMA Classification		AE		
Native Vegetation Community		Coastal Plain Levee Forest / Streamside Assemblage		
Percent compostion of exotic invasive vegetation		5%	10%	5%
Wetland Summary Information				
N/A				
Regulatory Considerations				
Regulation		**Applicable**	**Resolved**	**Supporting Documentation**
Waters of the U.S. –Sections 404 and 401		Yes	Yes	Restoration Plan
Endangered Species Act		Yes	Yes	Restoration Plan
Historic Preservation Act		Yes	Yes	Restoration Plan
CZMA/CAMA		No	--	--
FEMA Floodplain Compliance		Yes	Yes	Restoration Plan
Essential Fisheries Habitat		No	--	--

Appendix B. Visual Assessment Data

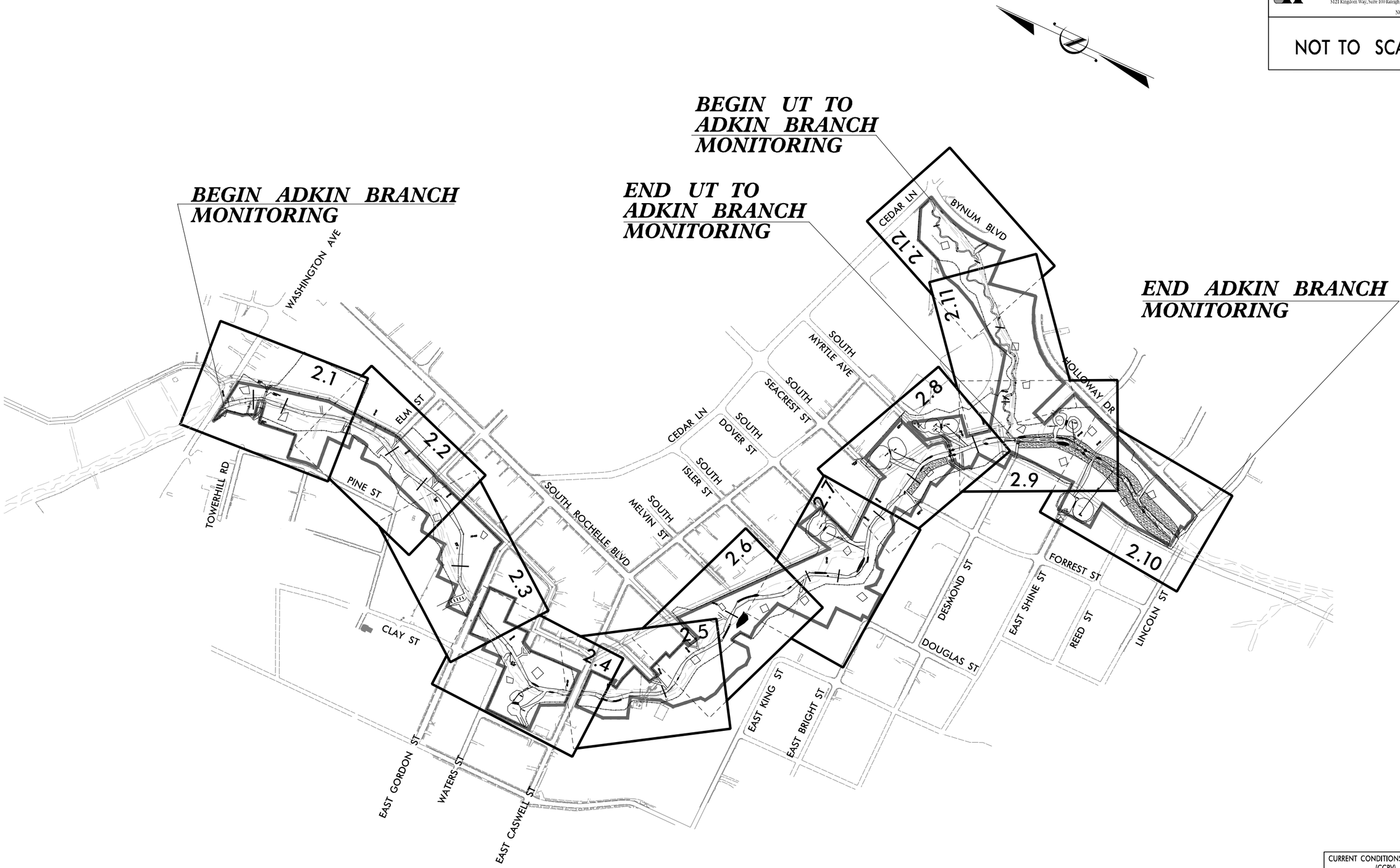
Figures 2.0-2.12. Current Condition Plan View

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.0

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NOT TO SCALE

CURRENT CONDITIONS PLAN VIEW (CCPV)
OVERVIEW



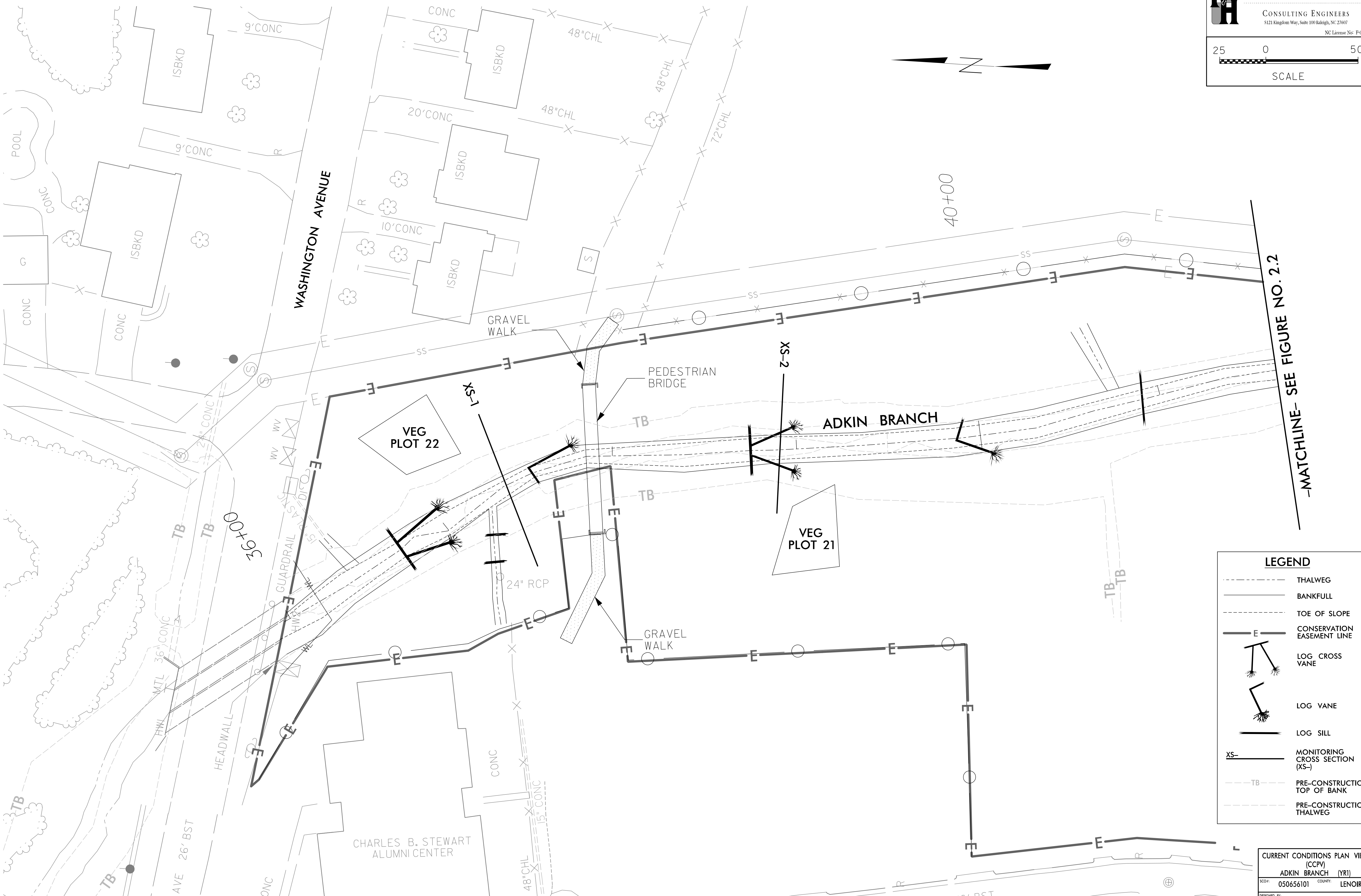
CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)			
SCO#: 050656101	COUNTY: LENOIR		
DESIGNED BY: RVS			
CHECKED BY: RKW	DATE: 11/11		

11/5/2011
K:\Streams\Projects\Monitoring\Year 1\AdkinBranch_MonitoringYR1_psh_1.dgn
Florence & Hutcheson, Inc.

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.1

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258



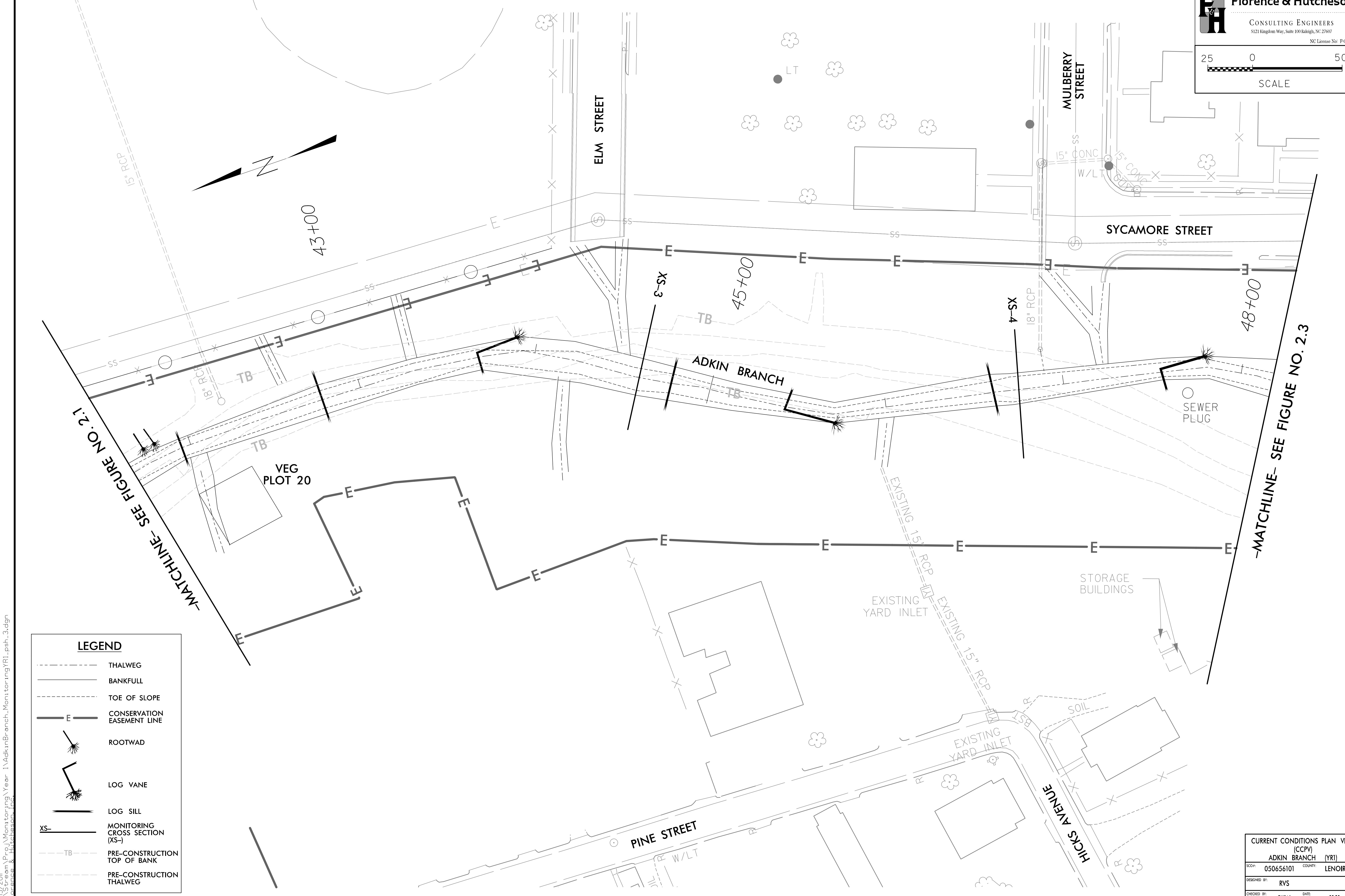
CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 11/11

11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_MonitoringYR1_psh_2.dgn
Florence & Hutcheson, Inc.

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.2

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258



CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)			
SCO#:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	11/11

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.3

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE

SYCAMORE ROAD
SYCAMORE RD 30'BST
ISBKD
CONC
8'CONC
VEG PLOT 18
50+00
EAST GORDON STREET
HTR
ISFD
12'CONC
48"CHL
55+00
-MATCHLINE- SEE FIGURE NO. 2.4
ADKIN BRANCH
SEWER PLUG
XS-5
VEG PLOT 19
TB
FB
15" DI CONC DI
15" RCP
GUARDRAIL
CREST GAUGE 1
CULVERT 3-9X10 BARRELS
15" PIPE
-MATCHLINE- SEE FIGURE NO. 2.2
48"CHL
CHESTNUT ST
OHE
CHESTNUT STREET
ISFD
18" RCP
15" RCP
HW

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- LOG CROSS VANE
- LOG VANE
- LOG SILL
- XS– MONITORING CROSS SECTION (XS–)
- TB — PRE–CONSTRUCTION TOP OF BANK
- PRE–CONSTRUCTION THALWEG

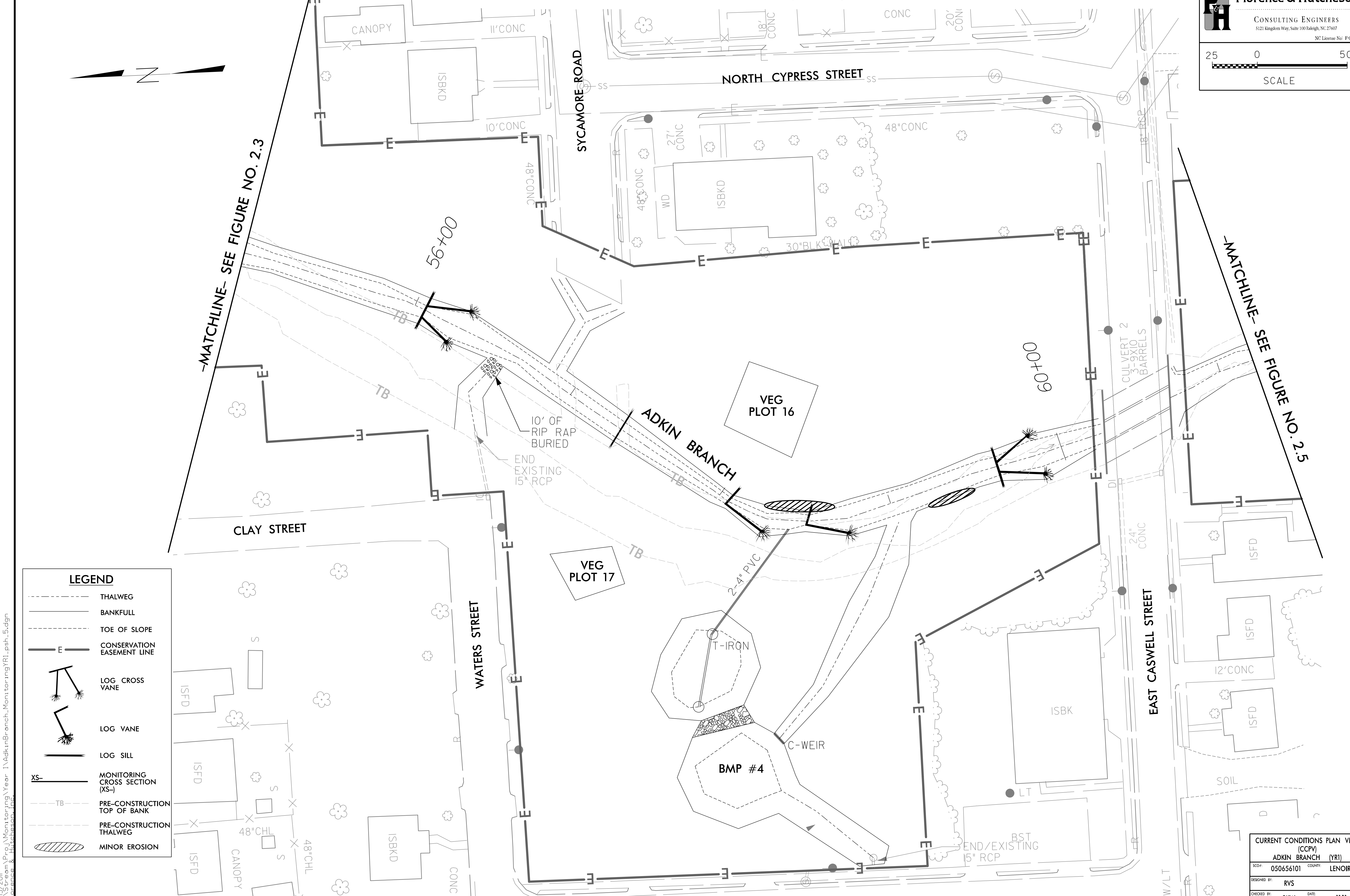
CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)		
SCO#: 050656101	COUNTY:	LENOIR
DESIGNED BY: RVS		
CHECKED BY: RKW	DATE:	11/11

11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_Monitoring\YR1_psh_4.dgn
Florence & Hutcheson, Inc.

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.4

Florence & Hutcheson
Consulting Engineers
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No. F-0258



CURRENT CONDITIONS PLAN VIEW (CCPV)
ADKIN BRANCH (YR1)

SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 11/11

CURRENT CONDITIONS PLAN VIEW (CCPV)

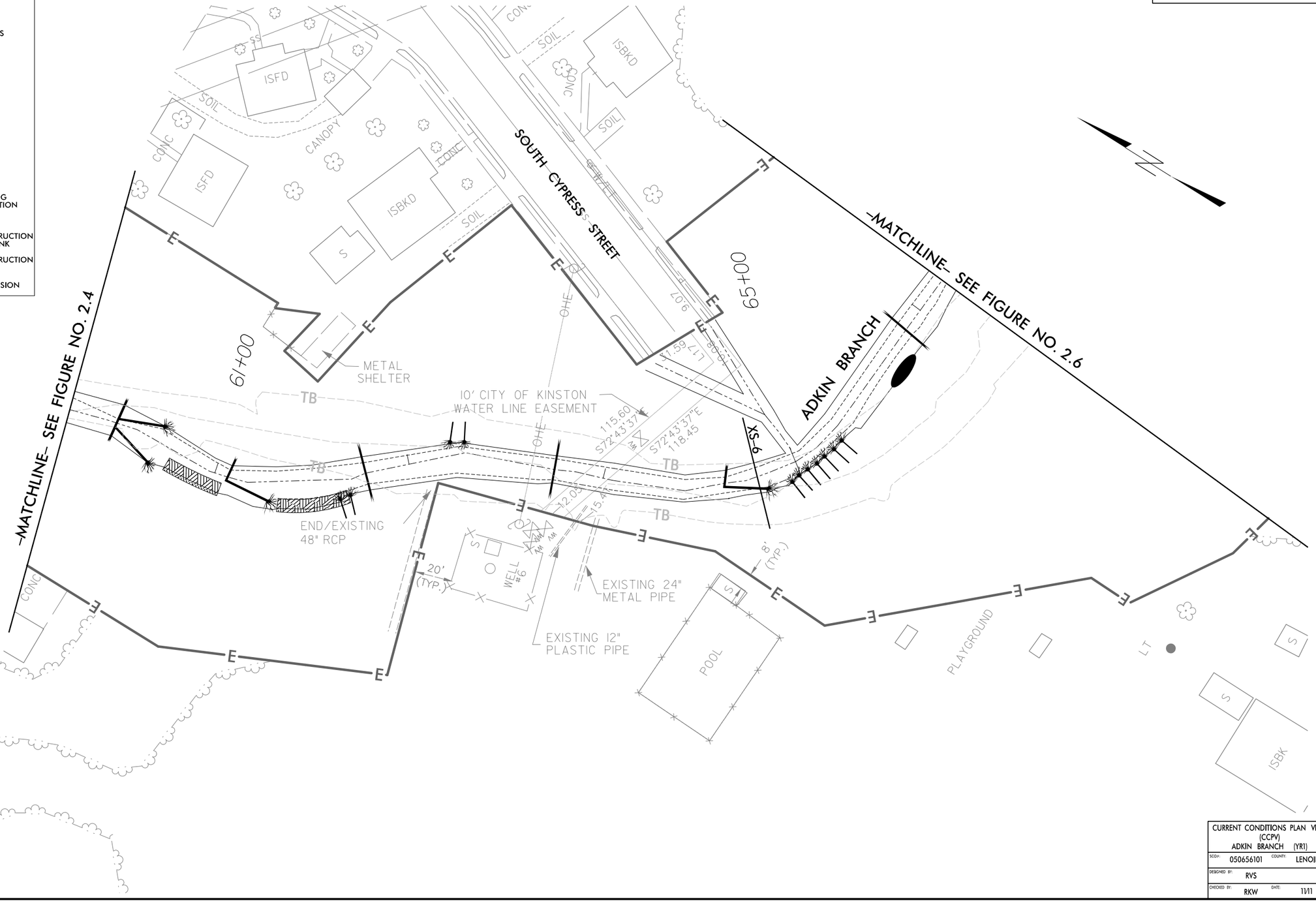
PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.5

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- ROOTWAD
- LOG CROSS VANE
- LOG VANE
- LOG SILL
- SOIL LIFT
- XS– — MONITORING CROSS SECTION (XS–)
- TB — PRE–CONSTRUCTION TOP OF BANK
- PRE–CONSTRUCTION THALWEG
- SEVERE EROSION



CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)			
SCO#:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	11/11

11/15/2011
R:\Stream\Projects\Monitoring\Year 1\AdkinBranch_Monitoring\YR1_psh_6.dgn
Florence & Hutcheson, fdx

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.6

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE

SOUTH ROCHELLE BLVD.

SOUTH MELVIN STREET

ADKIN BRANCH

66+00

70+00

XS-7

VEG PLOT 13

VEG PLOT 15

VEG PLOT 14

72"CHL

48"CONC

CONC

36"CHL

ISBKD

ISFD

SHED

EXISTING PAVEMENT

EXISTING FENCE

HTR

60"CHL

SOIL

TB

LT

–MATCHLINE– SEE FIGURE NO. 2.5

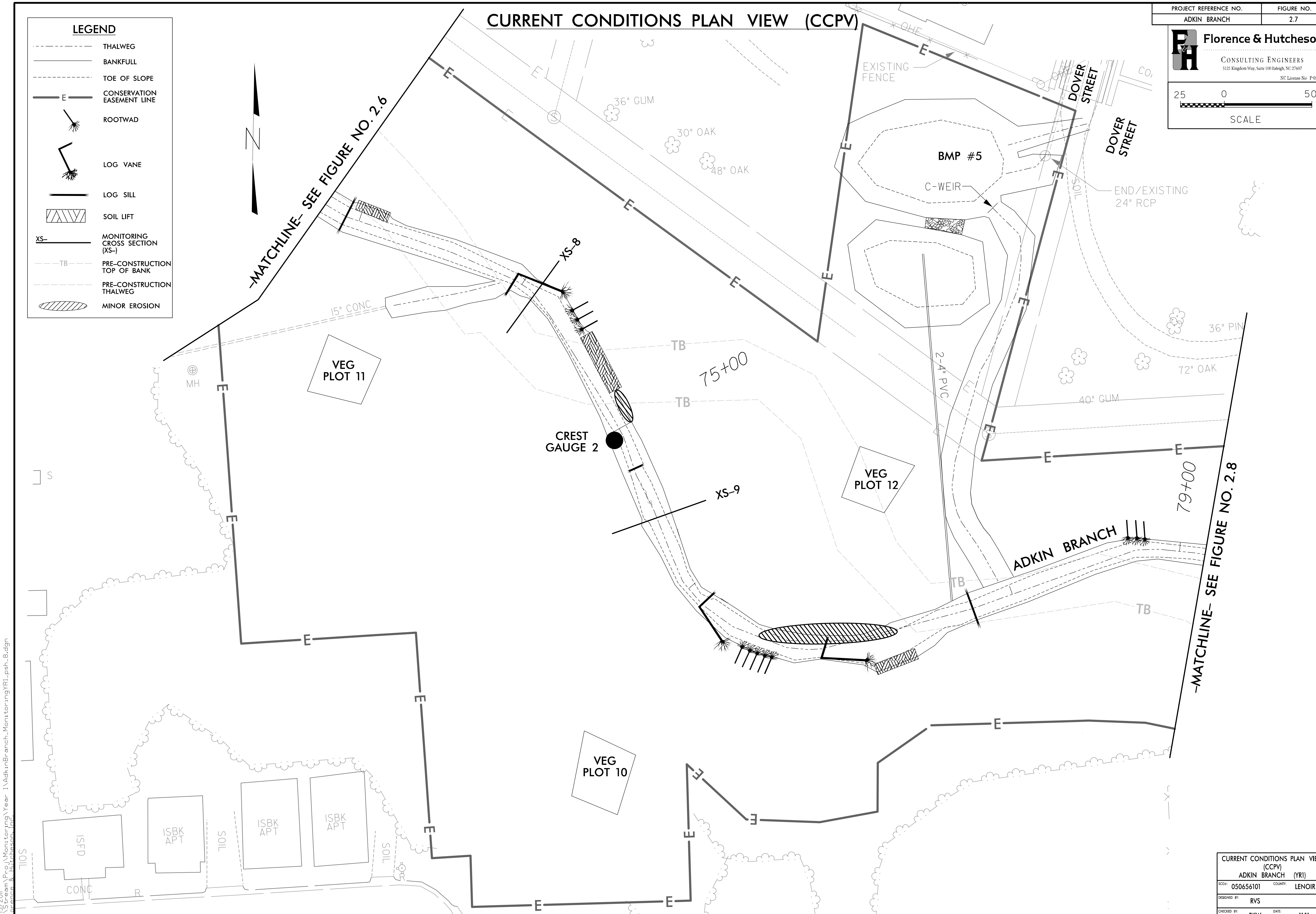
–MATCHLINE– SEE FIGURE NO. 2.7

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- ROOTWAD
- LOG VANE
- LOG SILL
- SOIL LIFT
- XS– — MONITORING CROSS SECTION (XS–)
- TB — PRE–CONSTRUCTION TOP OF BANK
- PRE–CONSTRUCTION THALWEG
- SEVERE EROSION
- PRIVET

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)		
SCO#: 050656101	COUNTY: LENOIR	
DESIGNED BY: RVS		
CHECKED BY: RKW	DATE: 11/11	

11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_MonitoringYR1.psh_7.dgn
Florence & Hutcheson, Inc.



CURRENT CONDITIONS PLAN VIEW (CCPV)
PROJECT REFERENCE NO.
ADKIN BRANCH
FIGURE NO.
2.7
Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258
25 0 50
SCALE
LEGEND
THALWEG
BANKFULL
TOE OF SLOPE
CONSERVATION EASEMENT LINE
ROOTWAD
LOG VANE
LOG SILL
SOIL LIFT
MONITORING CROSS SECTION (XS-)
PRE-CONSTRUCTION TOP OF BANK
PRE-CONSTRUCTION THALWEG
MINOR EROSION
N
-MATCHLINE- SEE FIGURE NO. 2.6
-MATCHLINE- SEE FIGURE NO. 2.8
EXISTING FENCE
36" GUM
30" OAK
48" OAK
BMP #5
C-WEIR
END/EXISTING 24" RCP
DOVER STREET
DOVER STREET
36" PIN
72" OAK
40" GUM
2-4" PVC
15" CONC
MH
XS-8
XS-9
TB
75+00
79+00
VEG PLOT 11
VEG PLOT 12
VEG PLOT 10
CREST GAUGE 2
ADKIN BRANCH
ISFD
ISBK APT
ISBK APT
ISBK APT
SOIL
CONC
CURRENT CONDITIONS PLAN VIEW (CCPV)
ADKIN BRANCH (YR1)
SCO#: 050656101
COUNTY: LENOIR
DESIGNED BY: RVS
CHECKED BY: RKW
DATE: 11/11

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.8

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- CONSERVATION EASEMENT LINE (E)
- ROOTWAD
- LOG CROSS VANE
- LOG SILL
- SOIL LIFT
- MONITORING CROSS SECTION (XS–)
- PRE–CONSTRUCTION TOP OF BANK (TB)
- PRE–CONSTRUCTION THALWEG
- MINOR EROSION
- MODERATE EROSION
- SEVERE EROSION
- BARE AREAS

SOUTH SEACREST STREET
SOUTH MYRTLE AVENUE
ASPHALT HUMP
END/EXISTING 24" RCP
BMP #6
18" RCP
T-IRON
C-WEIR
BMP #7
JB
TENNIS COURTS
EXISTING FENCE
2-4" PVC
ADKIN BRANCH
XS-10
XS-11
VEG PLOT 9
FORREST STREET
BRIDGE
80+00
85+00
–MATCHLINE– SEE FIGURE NO. 2.7
–MATCHLINE– SEE FIGURE NO. 2.9

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 11/11

11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_MonitoringYR1_psh_9.dgn
Florence & Hutcheson, PC

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.9

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- ROOTWAD
- LOG CROSS VANE
- LOG VANE
- LOG SILL
- SOIL LIFT
- FLOODPLAIN INTERCEPTOR (FPI)
- XS– MONITORING CROSS SECTION (XS–)
- TB PRE–CONSTRUCTION TOP OF BANK
- PRE–CONSTRUCTION THALWEG
- MINOR EROSION
- MODERATE EROSION
- SEVERE EROSION
- BARE AREAS

–MATCHLINE– SEE FIGURE NO. 2.11

25+00

HOLLOWAY DRIVE

SCORE BOARD

98+00

UT ADKIN BRANCH

VEG PLOT 4

BMP #8

C-WEIR

T-IRON

VEG PLOT 5

ADKIN BRANCH

90+00

2-4" PVC

XS-12

–MATCHLINE– SEE FIGURE NO. 2.8

–MATCHLINE– SEE FIGURE NO. 2.10

VEG PLOT 8

DESMOND STREET

CONC

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)	
SCO #: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 11/11

11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_MonitoringYR1_psh_10.dgn
Florence & Hutcheson, Inc.

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.10

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- LOG CROSS VANE
- DOUBLE STEP LOG CROSS VANE
- DOUBLE STEP LOG VANE
- LOG SILL
- SOIL LIFT
- XS– MONITORING CROSS SECTION (XS–)
- TB — PRE-CONSTRUCTION TOP OF BANK
- PRE-CONSTRUCTION THALWEG
- MODERATE EROSION
- BARE AREAS

–MATCHLINE– SEE FIGURE NO. 2.9

91+00

95+00

HOLLOWAY DRIVE

REED STREET

ISBKD ABAND

ISBKD ABAND

42"CONC

10' CONC

CONC

VEG PLOT 6

VEG PLOT 7

ADKIN BRANCH

TB

2-4" PVC

C-WEIR

BMP #9

IRONS

18" RCP

EAST SHINE STREET

ASPHALT HUMP

36"CHL

42"CONC

REED STREET

LINCOLN STREET

15" CONC

SOIL

8'BST

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 11/11

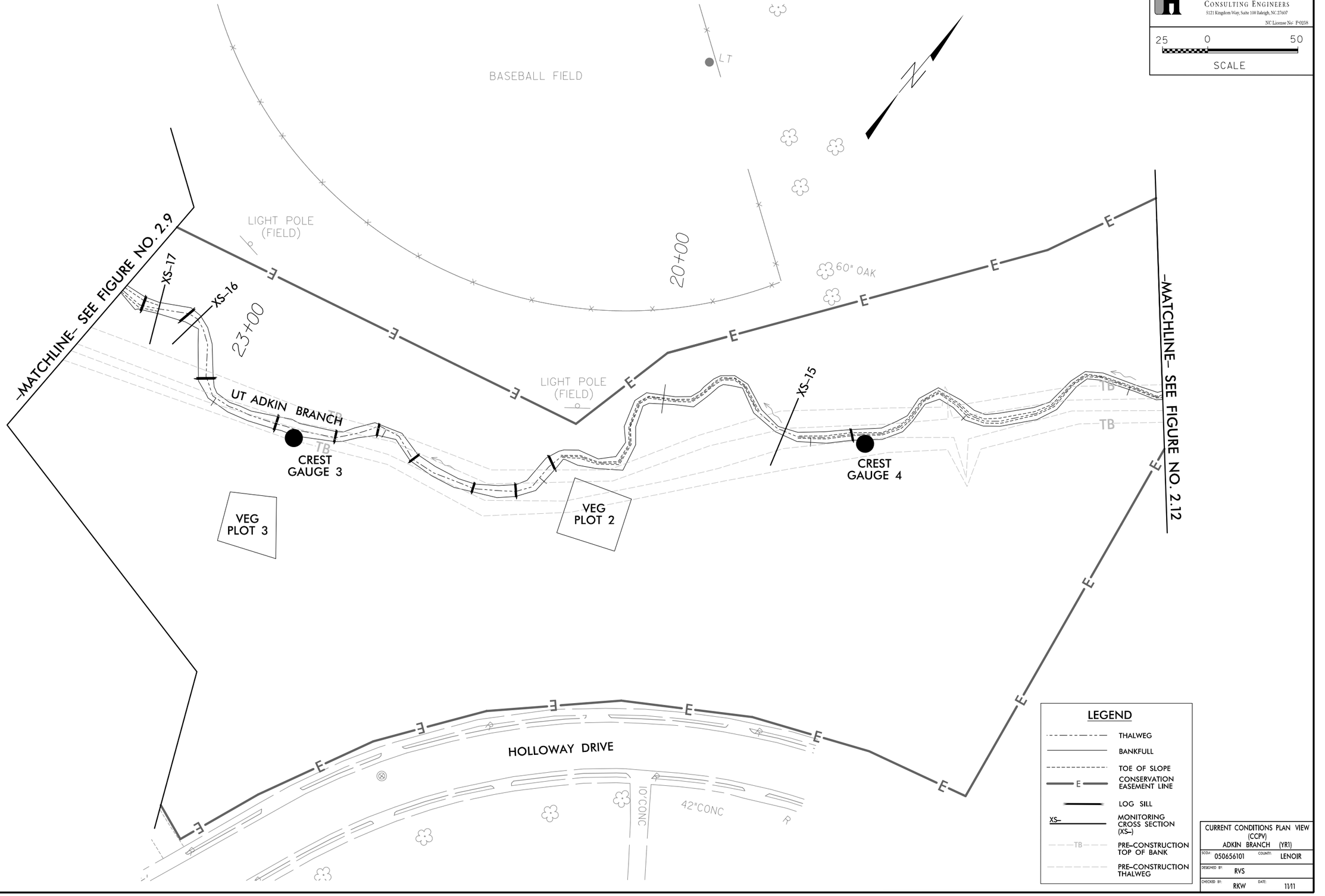
11/15/2011
P:\Stream\Proj\Monitoring\Year 1\AdkinBranch_MonitoringYR1_psh_11.dgn
Florence & Hutcheson, Inc.

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.11

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE



LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- LOG SILL
- XS– — MONITORING CROSS SECTION (XS–)
- TB — PRE-CONSTRUCTION TOP OF BANK
- PRE-CONSTRUCTION THALWEG

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)		
SCO#: 050656101	COUNTY:	LENOIR
DESIGNED BY: RVS		
CHECKED BY: RKW	DATE:	11/11

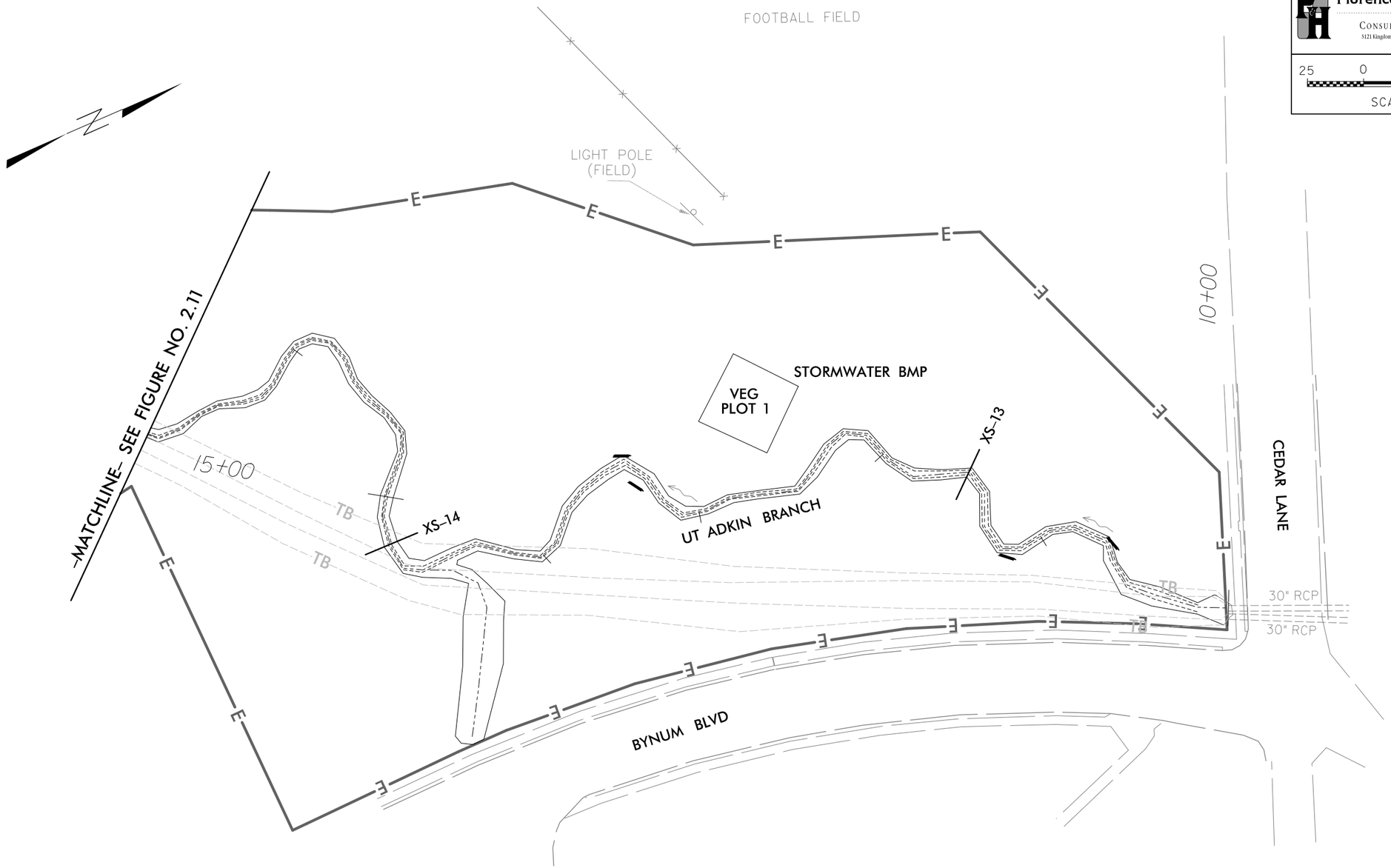
11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_MonitoringYR1_psh_12.dgn
Florence & Hutcheson, PLLC

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.12

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: P-0238

25 0 50
SCALE



LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- E — CONSERVATION EASEMENT LINE
- LOG SILL
- XS- — MONITORING CROSS SECTION (XS-)
- TB — PRE-CONSTRUCTION TOP OF BANK
- PRE-CONSTRUCTION THALWEG

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR1)			
SCO#: 050656101	COUNTY: LENOIR		
DESIGNED BY: RVS			
CHECKED BY: RKW	DATE: 11/11		

11/15/2011
R:\Stream\Proj\Monitoring\Year 1\AdkinBranch_Monitoring\YR1_psh_13.dgn
Florence & Hutcheson, PC

Table 5.1 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, 050656101
Adkin Branch Reach 1 - Washington Ave. to Gordon St. - 1,764 feet assessed

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			3	152	91%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	All	N/A			100%			
	3. Meander Pool Condition	1. Depth Sufficient	9	9			100%			
		2. Length appropriate	8	9			89%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	All	N/A			100%			
		2. Thalweg centering at downstream of meander (Glide)	All	N/A			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT included undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collaps			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	17	17			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	17	17			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	17	17			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	17	17			100%			
	4. Habitat	Pool forming structures maintaing ~ Max Pool Depth : Mean Bankfull Depth ratio > 1.6 Rootwads/logs providing some cover at base-flow.	15	18			83%			

Table 5.2 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, 050656101
Adkin Branch Reach 2 - Gordon St. to Lincoln St. - 3,131 feet assessed (4,270 ft. total reach length)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			12	730	77%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	All	N/A			100%			
	3. Meander Pool Condition	1. Depth Sufficient	14	14			100%			
		2. Length appropriate	13	14			93%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	All	N/A			100%			
		2. Thalweg centering at downstream of meander (Glide)	All	N/A			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			12	345	89%	0%	0%	89%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT included undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collaps			3	100	97%	0%	0%	97%
				Totals	15	445	86%	0%	0%	86%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	31	31			100%	Notes: Three structures in Reach 2 exhibit minor erosion (<15%) around vane arms		
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	31	31			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	31	31			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	24	31			77%			
	4. Habitat	Pool forming structures maintaing ~ Max Pool Depth : Mean Bankfull Depth ratio > 1.6 Rootwads/logs providing some cover at base-flow.	31	31			100%			

Table 5.3 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, 050656101
UT to Adkin Branch: 1,622 feet assessed

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	All	N/A			100%			
	3. Meander Pool Condition	1. Depth Sufficient	32	32			100%			
		2. Length appropriate	32	32			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	All	N/A			100%			
		2. Thalweg centering at downstream of meander (Glide)	All	N/A			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT included undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collaps			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	16	16			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	16	16			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	16	16			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	16	16			100%			
	4. Habitat	Pool forming structures maintaing ~ Max Pool Depth : Mean Bankfull Depth ratio > 1.6 Rootwads/logs providing some cover at base-flow.	14	16			88%			

Table 6 Vegetation Condition Assessment

Adkin Branch Restoration Site (EEP Project 7)

Planted Acreage[1] **33**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Areas along stream benches throughout the Site have exposed soils with very little vegetative cover.	0.10 acre	See legend on CCPV	6	1.53	4.6%
2. Low Stem Density Areas	Stem densities throughout the Site are low due to death of planted seedlings as the result of extreme dry, hot temperatures over the summer (Veg. Plots 7-12, 14, 16, 18, and 22)	0.025 acre	Veg. Plots	10	0.25	0.8%
			Total	16	1.78	5.4%
3. Areas of Poor Growth Rates or Vigor	Vegetation growth throughout the Site is poor.	None	NA	NA	NA	NA
			Cumulative Total	16	1.78	5.4%

Easement Acreage[2] **40.5**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Privet is located between Vegetation Plots 14 and 15 (also sparsely scattered throughout site)	0.05 acre	See legend on CCPV	1	0.05	0.1%
5. Easement Encroachment Areas[3]	NA	NA	NA	NA	NA	NA

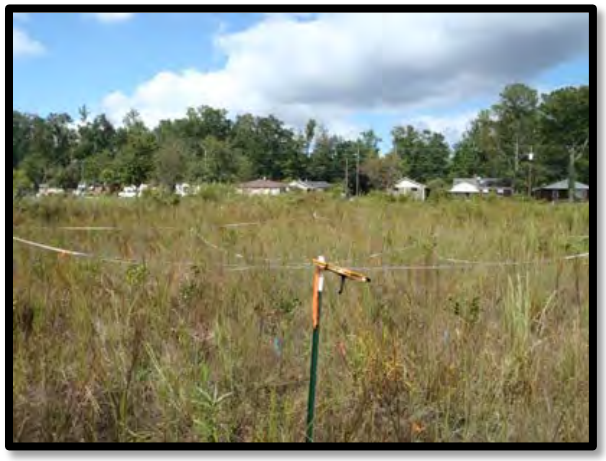
1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

2 = The acreage within the easement boundaries.

3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

Figures 3.1-3.20. Vegetation Plot Photos and Problem Areas



3.1 Vegetation Plot 1

3.2 Vegetation Plot 2

3.3 Vegetation Plot 3

3.4 Vegetation Plot 4

3.5 Vegetation Plot 5

3.6 Vegetation Plot 6

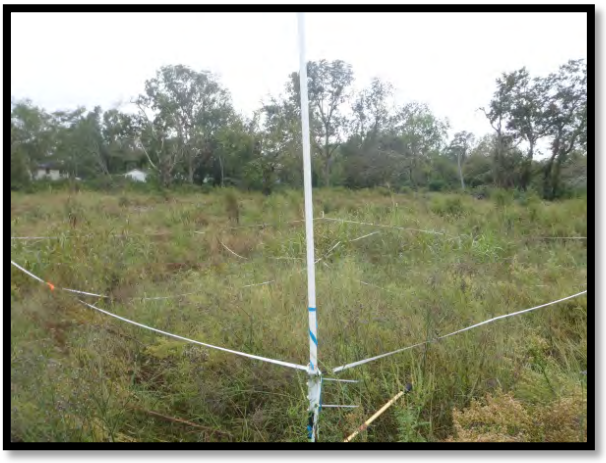
3.7 Vegetation Plot 7

3.8 Vegetation Plot 8

3.9 Vegetation Plot 9

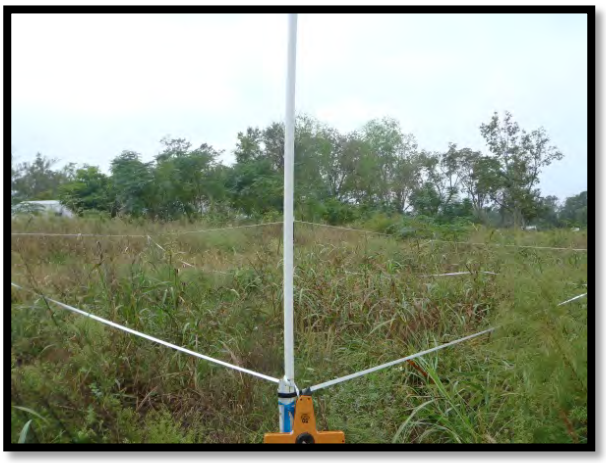
3.10 Vegetation Plot 10

3.11 Vegetation Plot 11



3.12 Vegetation Plot 12

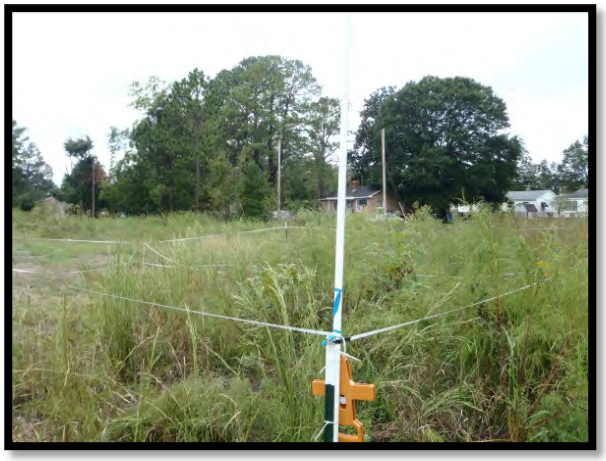
3.13 Vegetation Plot 13



3.14 Vegetation Plot 14

3.15 Vegetation Plot 15

3.16 Vegetation Plot 16



3.17 Vegetation Plot 17

3.18 Vegetation Plot 18

3.19 Vegetation Plot 19

3.20 Vegetation Plot 20

3.19 Vegetation Plot 21

3.20 Vegetation Plot 22

3.21 Severe bank erosion near 65+50

3.22 Moderate erosion near 71+50

3.23 Minor erosion near 76+75

3.24 Moderate erosion near 81+10

3.25 Severe erosion/bare benches near 83+00

3.26 Moderate erosion near 83+50

3.27 Moderate erosion near 84+25

3.28 Moderate erosion near 85+80

3.29 Severe erosion near 87+50

3.30 Moderate erosion near 91+50

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment

Vegetation Plot ID	Stream Vegetation Survival Threshold Met?	Buffer Vegetation Survival Threshold Met?	Tract Mean
1	Yes	Yes	Stream Veg. = 55% Buffer Veg. = 50%
2	Yes	Yes	
3	Yes	Yes	
4	Yes	Yes	
5	Yes	Yes	
6	Yes	Yes	
7	No	No	
8	No	No	
9	No	No	
10	No*	No*	
11	No*	No*	
12	No	No	
13	Yes	Yes	
14	No	No	
15	Yes	Yes	
16	No	No	
17	Yes**	No	
18	No	No	
19	Yes	Yes	
20	Yes	Yes	
21	Yes	Yes	
22	No*	No*	

*Based on planted stems alone, these plots don't meet success criteria; however, when including naturally recruited stems of appropriate species such as hickory (*Carya* sp.) and sweetgum (*Liquidambar sytraciflua*) these plots were above 320 stems per acre (Plot 22 was only barely above 320 stems per acre).

**Meets vegetation survival threshold, however, total planted stems that have survived are barely above the threshold limit of 320 stems per acre.

Table 8. CVS Vegetation Plot Metadata

Report Prepared By	Corri Faquin
Date Prepared	9/29/2011 9:51
database name	Axiom-EEP-2011-D.mdb
database location	C:\Axiom\Business\CVS
computer name	CORRI-PC
file size	42930176
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.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	7
project Name	Adkin Branch
Description	Stream restoration
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	22

Table 9. Total and Planted Stems by Plot and Species
EEP Project Code 7. Project Name: Adkins Branch

			Current Plot Data (MY1 2011)																																
			E007-AXE-0001			E007-AXE-0002			E007-AXE-0003			E007-AXE-0004			E007-AXE-0005			E007-AXE-0006			E007-AXE-0007			E007-AXE-0008			E007-AXE-0009			E007-AXE-0010			E007-AXE-0011			E007-AXE-0012		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	**red maple**	Tree			3																																
Alnus serrulata	hazel alder	Shrub	15	18	18																																
Baccharis halimifolia	eastern baccharis	Shrub												1																							
Betula nigra	**river birch**	Tree	13	13	13	5	5	5	2	2	2	4	4	4	2	2	2				2	2	2							1	1	1	1	1	1	3	3	3
Carpinus caroliniana	**American hornbeam**	Tree													4	4	4													2	2	2						
Carya	**hickory**	Tree				2	2	8	4	4	10	1	1	1																		14			5			
Cephalanthus occidentalis	common buttonbush	Shrub																																			
Cercis canadensis	**eastern redbud**	Tree													3	3	3													1	1	1						
Cornus amomum	silky dogwood	Shrub	40	44	44																																
Crataegus	**hawthorn**	Tree																																			
Liquidambar styraciflua	**sweetgum**	Tree			1			70			16																					4					
Pinus	pine	Tree						2			1									1																		
Pinus taeda	loblolly pine	Tree			9									1																							
Platanus occidentalis	**American sycamore**	Tree			3																																
Populus deltoides	**eastern cottonwood**	Tree						3																										2			
Prunus serotina	**black cherry**	Tree						9			6	1	1	1																							
Quercus	**oak**	Tree		1	1				1	1	1	2	2	2	4	4	4	1	1	1				1	1	1							1	1	1			
Quercus falcata	**southern red oak**	Tree				3	3	3	7	7	7	3	3	3	2	2	2	7	7	7	1	1	1	3	3	3	1	1	1	2	2	2	2	2	2	2	2	2
Quercus nigra	**water oak**	Tree							2	2	2	2	2	2				1	1	1																	
Quercus phellos	**willow oak**	Tree				1	1	1	2	2	7																											
Quercus rubra	**northern red oak**	Tree																			1	1	1														
Robinia pseudoacacia	**black locust**	Tree																																			
Salix nigra	**black willow**	Tree	2	11	11																																
Sassafras albidum	**sassafras**	Tree						3			1																										
Taxodium distichum	**bald cypress**	Tree				1	1	1																													
Ulmus alata	**winged elm**	Tree																																			
Unknown		unknown										2	2	2																							
Totals		**Stem count**	70	87	103	12	12	105	18	18	53	15	15	17	15	15	15	9	9	10	4	4	4	4	4	4	1	1	1	6	6	24	4	4	11	5	5	5
		size (ares)	1			1			1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	5	9	5	5	10	6	6	10	7	7	9	5	5	5	3	3	4	3	3	3	2	2	2	1	1	1	4	4	6	3	3	5	2	2	2
		Stems per ACRE	2832.8	3521	4168	485.6	485.6	4249	728.4	728.4	2145	607	607	688	607	607	607	364.2	364.2	404.7	161.9	161.9	161.9	161.9	161.9	161.9	40.47	40.47	40.47	242.8	242.8	971.2	161.9	161.9	445.2	202.3	202.3	202.3
Riparian Buffer Success Criteria		**Stem count**	15	25	32	12	12	103	18	18	52	13	13	13	15	15	15	9	9	9	4	4	4	4	4	4	1	1	1	6	6	24	4	4	11	5	5	5
		size (ares)	1			1			1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	2	3	6	5	5	9	6	6	9	6	6	6	5	5	5	3	3	3	3	3	3	2	2	2	1	1	1	4	4	6	3	3	5	2	2	2
		Stems per ACRE	607.03	1012	1295	485.6	485.6	4168	728.4	728.4	2104	526.1	526.1	526.1	607	607	607	364.2	364.2	364.2	161.9	161.9	161.9	161.9	161.9	161.9	40.47	40.47	40.47	242.8	242.8	971.2	161.9	161.9	445.2	202.3	202.3	202.3

*__Bolded__ hardwood tree species are counted toward riparian buffer success criteria

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

Table 9. Total and Planted Stems by Plot and Species (continued)
EEP Project Code 7. Project Name: Adkins Branch

			Current Plot Data (MY1 2011)																											Annual Means					
			E007-AXE-0013			E007-AXE-0014			E007-AXE-0015			E007-AXE-0016			E007-AXE-0017			E007-AXE-0018			E007-AXE-0019			E007-AXE-0020			E007-AXE-0021			E007-AXE-0022			MY1 (2011)			MY0 (2011)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	**red maple**	Tree																														3					
Alnus serrulata	hazel alder	Shrub																														15	18	18	1	1	1
Baccharis halimifolia	eastern baccharis	Shrub																														1					
Betula nigra	**river birch**	Tree							3	3	3				1	1	1	2	2	2	1	1	1	4	4	4	1	1	1				45	45	45	82	82	82
Carpinus caroliniana	**American hornbeam**	Tree							1	1	1				2	2	2				2	2	2	1	1	1	1	1	1	1	1	1	14	14	14	48	48	48
Carya	**hickory**	Tree	3	3	3				4	4	4				1	1	4							3	3	3							18	18	52	30	30	30
Cephalanthus occidentalis	common buttonbush	Shrub																																	44	44	44
Cercis canadensis	**eastern redbud**	Tree	1	1	1													1	1	1							1	1	1				7	7	7			
Cornus amomum	silky dogwood	Shrub							7	7	7				1	1	1				2	2	2				1	1	1				51	55	55	70	70	70
Crataegus	**hawthorn**	Tree																																			1
Liquidambar styraciflua	**sweetgum**	Tree																												1				92			70
Pinus	**pine**	Tree																														4					
Pinus taeda	**loblolly pine**	Tree																														10					1
Platanus occidentalis	**American sycamore**	Tree																														3					7
Populus deltoides	**eastern cottonwood**	Tree																														5					
Prunus serotina	**black cherry**	Tree	1	1	1						1																					2	2	18	8	8	8
Quercus	**oak**	Tree	2	2	2				1	1	1				1	1	1				3	3	3	1	1	1							18	19	19	48	48	48
Quercus falcata	**southern red oak**	Tree	4	4	4	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	6	6	6	6	6	6	63	63	63	135	135	135
Quercus nigra	**water oak**	Tree							1	1	1										1	1	1				2	2	2				9	9	9	7	7	7
Quercus phellos	**willow oak**	Tree									23	1	1	1			4																4	4	36			
Quercus rubra	**northern red oak**	Tree																															1	1	1			
Robinia pseudoacacia	**black locust**	Tree																																			4
Salix nigra	**black willow**	Tree																															2	11	11	1	22	22
Sassafras albidum	**sassafras**	Tree																														4					
Taxodium distichum	**bald cypress**	Tree																															1	1	1			
Ulmus alata	**winged elm**	Tree																																		1	1	1
Unknown		unknown																2	2	2													4	4	4	4	4	13
Totals		**Stem count**	11	11	11	1	1	1	20	20	44	3	3	3	8	8	15	7	7	7	11	11	11	11	11	11	12	12	12	7	7	8	254	271	475	479	500	592
		size (ares)	1			1			1			1			1			1			1			1			1			1			22			22		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.54			0.54		
		Species count	5	5	5	1	1	1	7	7	9	2	2	2	6	6	7	4	4	4	6	6	6	5	5	5	6	6	6	2	2	3	15	15	23	13	13	18
		Stems per ACRE	445.2	445.2	445.2	40.47	40.47	40.47	809.4	809.4	1781	121.4	121.4	121.4	323.7	323.7	607	283.3	283.3	283.3	445.2	445.2	445.2	445.2	445.2	445.2	485.6	485.6	485.6	283.3	283.3	323.7	467.2	498.5	873.8	881.1	919.7	1089
Riparian Buffer Success Criteria		**Stem count**	11	11	11	1	1	1	13	13	37	3	3	3	7	7	14	5	5	5	9	9	9	11	11	11	11	11	11	7	7	8	184	194	383	360	381	463
		size (ares)	1			1			1			1			1			1			1			1			1			1			22			22		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.54			0.54		
		Species count	5	5	5	1	1	1	6	6	8	2	2	2	5	5	6	3	3	3	5	5	5	5	5	5	5	5	5	2	2	3	12	12	17	9	9	13
		Stems per ACRE	445.2	445.2	445.2	40.47	40.47	40.47	526.1	526.1	1497	121.4	121.4	121.4	283.3	283.3	566.6	202.3	202.3	202.3	364.2	364.2	364.2	445.2	445.2	445.2	445.2	445.2	445.2	283.3	283.3	323.7	340.7	359.3	709.3	666.7	705.6	857.4

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

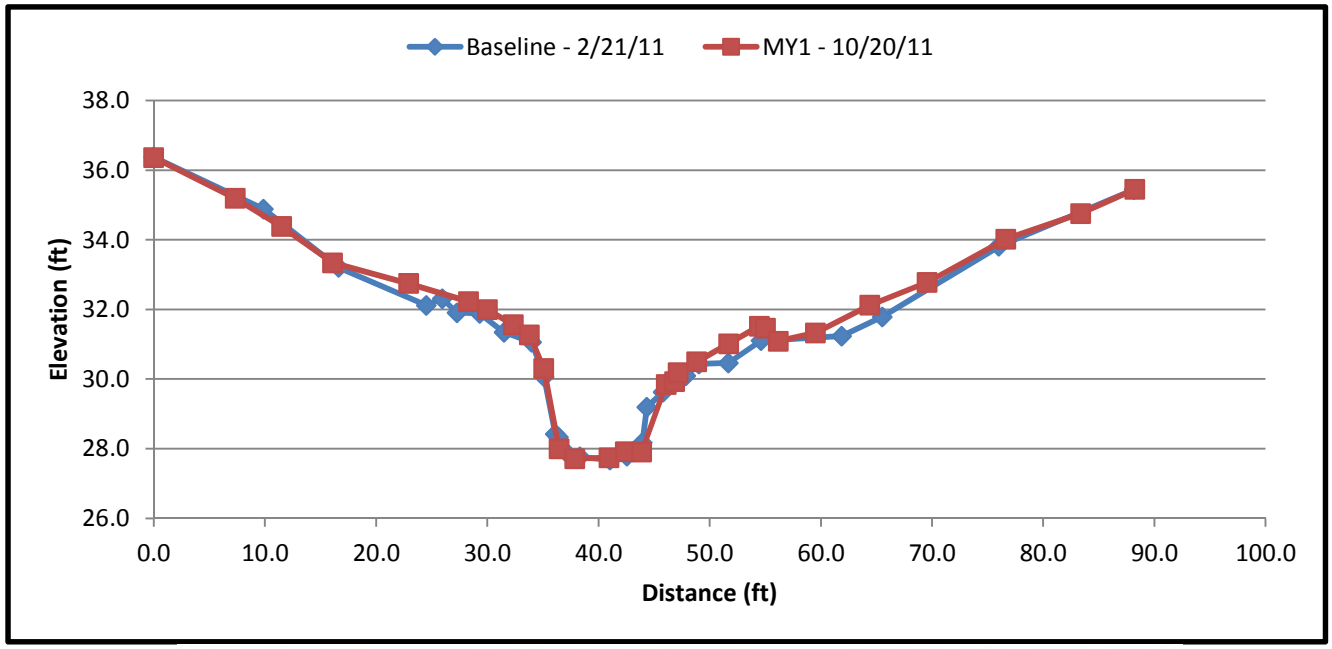
Appendix D. Stream Survey Data

Figures 4.1-4.17. Cross Section Plots and Photos

Adkin Branch, 05065611, Reach 1

XS-1 Riffle, Sta. 37+42

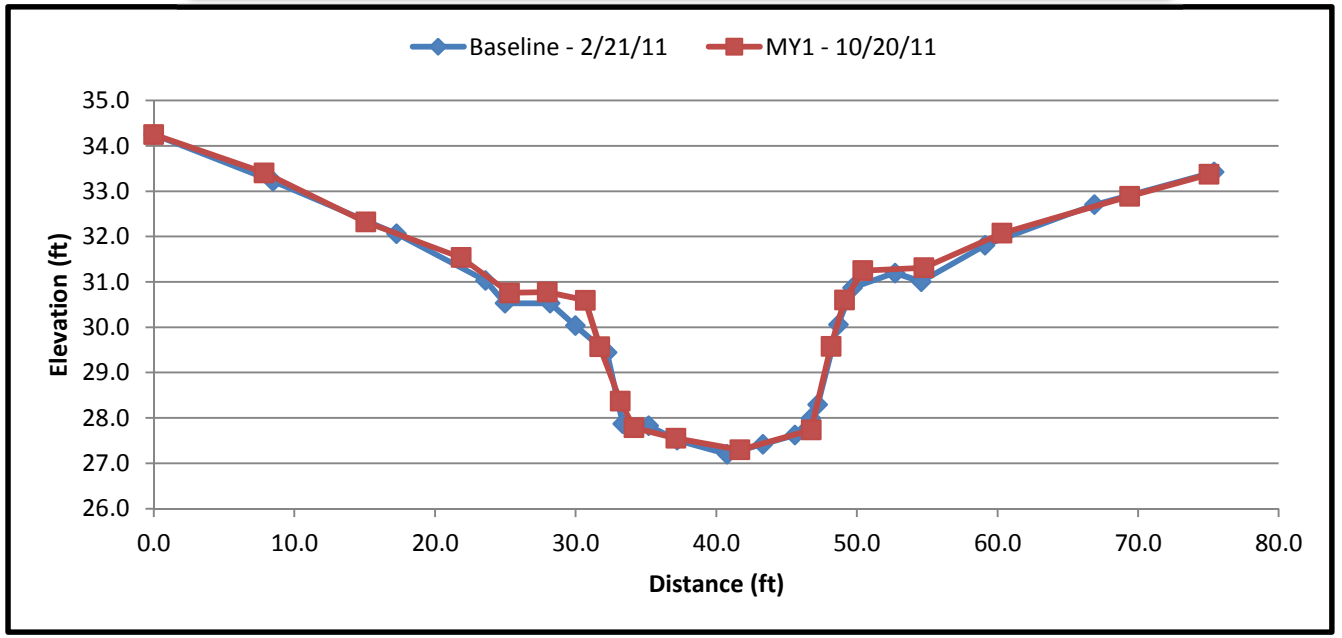
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	36.38	0.00	36.37
9.86	34.88	7.34	35.19
16.62	33.21	11.50	34.38
24.51	32.12	16.09	33.34
25.95	32.31	22.92	32.75
27.26	31.91	28.30	32.23
29.31	31.89	30.00	32.00
31.49	31.34	32.35	31.56
33.99	31.05	33.78	31.27
35.11	30.06	35.08	30.30
36.12	28.42	36.45	27.99
36.41	28.32	37.87	27.71
37.29	27.83	40.95	27.74
38.32	27.76	42.41	27.91
41.02	27.67	43.87	27.90
42.56	27.78	46.09	29.85
43.94	28.17	46.85	29.93
44.35	29.19	47.15	30.18
45.81	29.62	48.83	30.49
47.84	30.09	51.70	31.01
49.03	30.44	54.46	31.52
51.68	30.46	55.03	31.46
54.61	31.10	56.16	31.09
61.87	31.23	59.51	31.32
65.51	31.78	64.40	32.12
76.01	33.81	69.56	32.78
88.18	35.44	76.64	34.02
		83.37	34.75
		88.23	35.45



Adkin Branch, 05065611, Reach 1

XS-2 Pool, Sta. 38+94

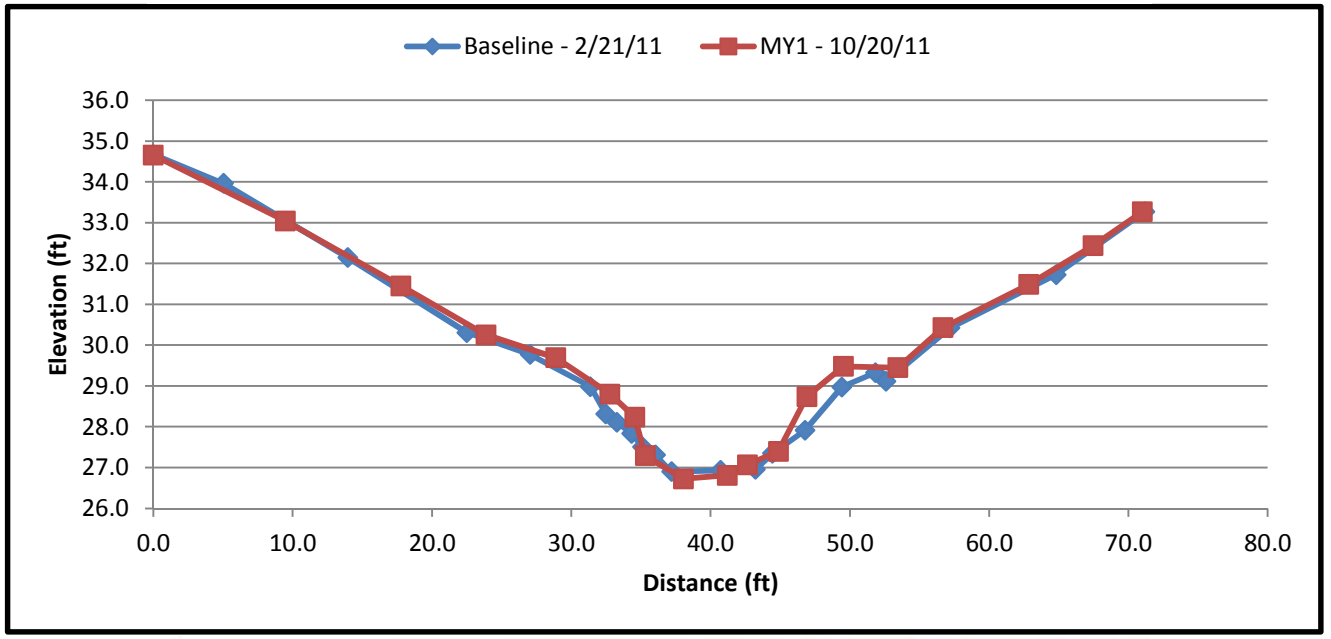
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	34.25	0.00	34.25
8.48	33.22	7.85	33.40
17.26	32.07	15.07	32.32
23.59	31.03	21.85	31.54
24.98	30.53	25.29	30.76
28.19	30.53	27.97	30.78
29.98	30.03	30.68	30.60
32.23	29.44	31.72	29.57
33.36	27.87	33.17	28.37
35.19	27.83	34.15	27.78
37.22	27.51	37.13	27.55
40.78	27.20	41.68	27.30
43.31	27.42	46.75	27.74
45.59	27.62	48.16	29.58
46.73	27.99	49.13	30.60
47.22	28.30	50.42	31.25
48.68	30.06	54.76	31.31
49.68	30.87	60.32	32.07
52.71	31.19	69.40	32.89
54.58	31.01	75.04	33.37
59.11	31.81		
66.89	32.70		
75.41	33.42		



Adkin Branch, 05065611, Reach 1

XS-3 Riffle, Sta. 44+67

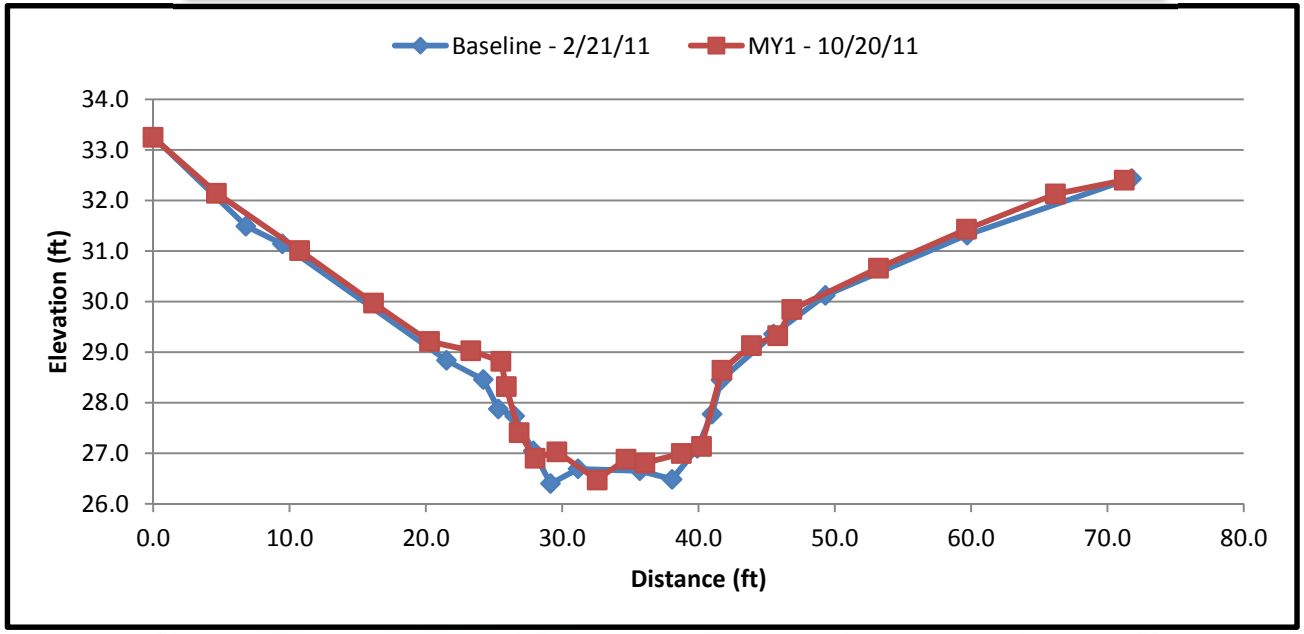
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	34.68	0.00	34.65
5.04	33.96	9.47	33.04
13.96	32.14	17.77	31.45
22.51	30.31	23.88	30.25
27.04	29.77	28.88	29.69
31.37	28.98	32.78	28.80
32.48	28.31	34.56	28.24
33.27	28.11	35.32	27.29
34.34	27.84	38.06	26.72
35.11	27.51	41.20	26.81
36.05	27.31	42.66	27.07
37.20	26.90	44.87	27.40
40.71	26.93	46.91	28.74
43.22	26.96	49.53	29.48
44.45	27.35	53.45	29.45
46.78	27.91	56.69	30.43
49.43	28.97	62.83	31.49
51.83	29.32	67.46	32.44
52.60	29.12	71.00	33.27
57.19	30.42		
64.81	31.73		
71.17	33.27		



Adkin Branch, 05065611, Reach 1

XS-4 Pool, Sta. 46+81

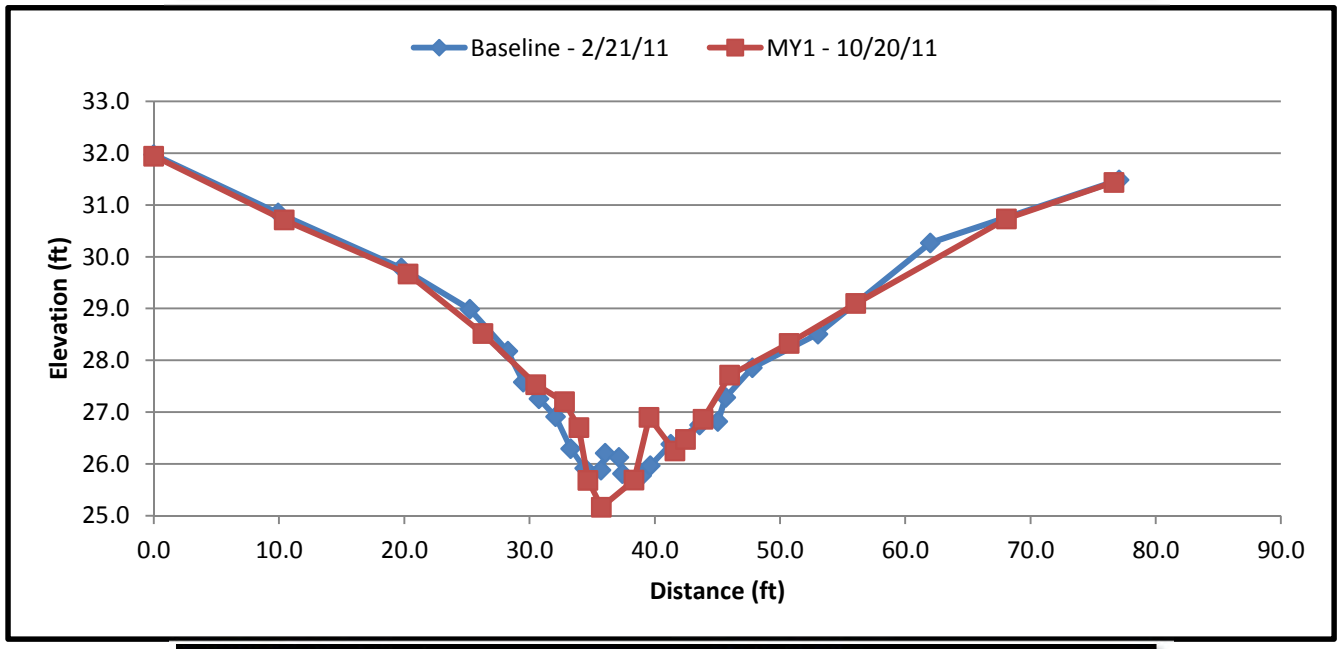
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	33.26	0.00	33.25
6.80	31.49	4.64	32.15
9.47	31.14	10.74	31.01
21.52	28.84	16.16	29.97
24.22	28.46	20.27	29.21
25.32	27.87	23.29	29.03
26.50	27.73	25.51	28.82
27.87	27.05	25.89	28.32
29.15	26.40	26.84	27.40
31.16	26.69	28.01	26.90
35.70	26.65	29.61	27.03
38.06	26.48	32.56	26.47
39.91	27.10	34.68	26.88
40.99	27.77	36.07	26.81
41.64	28.45	38.75	26.99
45.49	29.36	40.21	27.14
49.30	30.12	41.73	28.64
59.69	31.31	43.87	29.13
71.76	32.43	45.81	29.32
		46.83	29.84
		53.19	30.66
		59.66	31.43
		66.17	32.13
		71.22	32.40

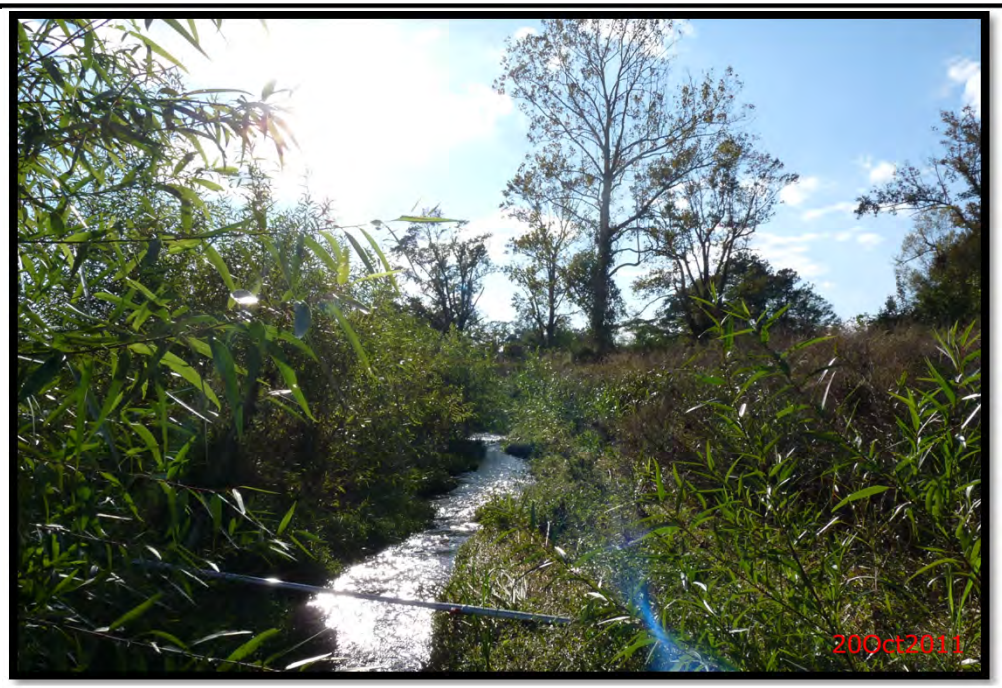


Adkin Branch, 05065611, Reach 1

XS-5 Riffle, Sta. 51+47

Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	31.97	0.00	31.94
9.93	30.85	10.41	30.71
19.77	29.78	20.29	29.67
25.24	28.98	26.27	28.51
28.26	28.18	30.50	27.53
29.51	27.58	32.79	27.20
30.76	27.26	33.94	26.70
32.09	26.91	34.66	25.68
33.29	26.29	35.74	25.16
34.40	25.91	38.34	25.69
35.72	25.88	39.54	26.90
36.05	26.21	41.60	26.25
37.13	26.13	42.45	26.47
37.42	25.81	43.86	26.86
38.94	25.78	45.98	27.71
39.65	25.96	50.73	28.33
41.28	26.38	56.05	29.10
43.58	26.75	68.09	30.73
45.04	26.82	76.66	31.44
45.66	27.28		
47.79	27.86		
53.02	28.51		
62.00	30.27		
77.07	31.48		

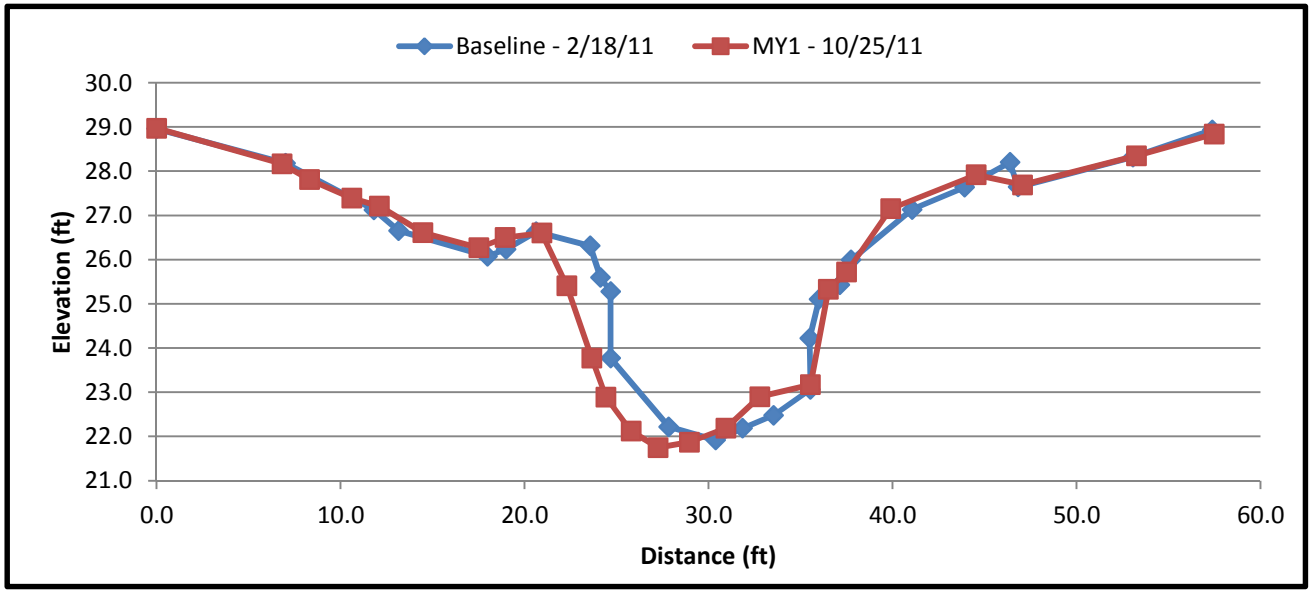




Adkin Branch, 05065611, Reach 2

XS-6 Pool, Sta. 64+81

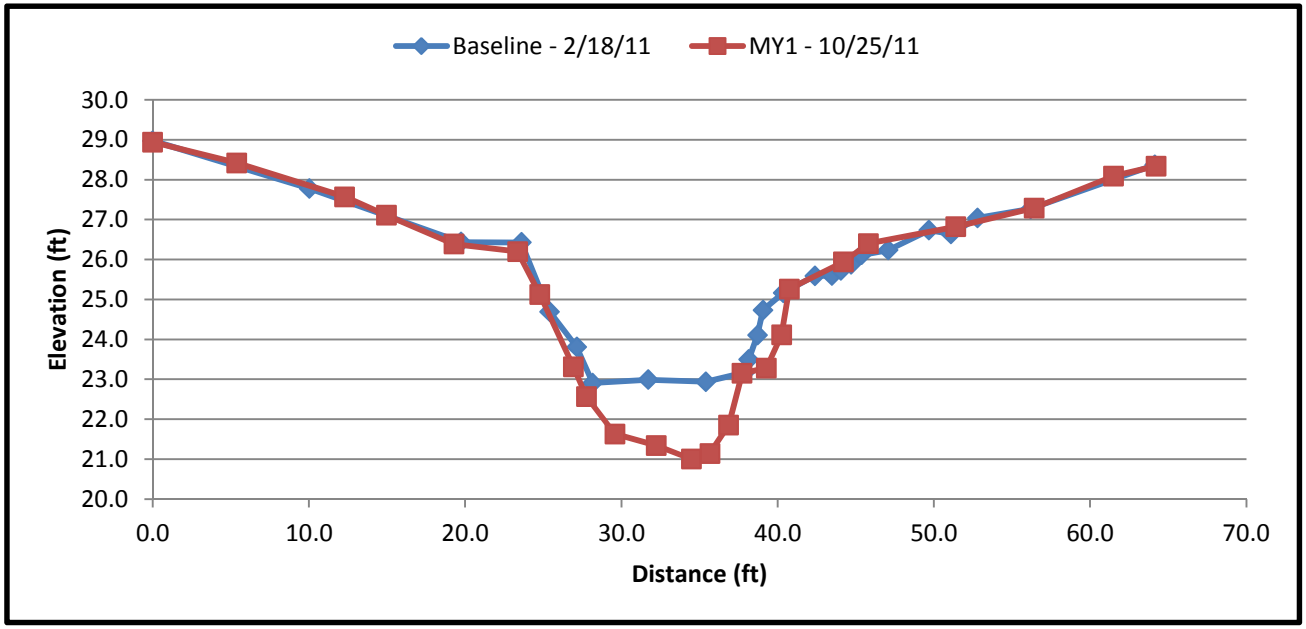
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	28.96	0.00	28.97
7.02	28.18	6.82	28.17
11.82	27.13	8.32	27.81
13.15	26.66	10.62	27.39
17.98	26.08	12.11	27.21
18.99	26.23	14.48	26.61
20.64	26.63	17.51	26.27
23.57	26.31	18.95	26.5
24.13	25.60	20.94	26.6
24.68	25.28	22.30	25.41
24.68	23.77	23.66	23.77
27.84	22.22	24.43	22.89
30.39	21.92	25.79	22.12
31.86	22.19	27.26	21.75
33.54	22.48	28.97	21.87
35.54	23.06	30.95	22.19
35.50	24.22	32.79	22.9
36.01	25.11	35.54	23.17
37.14	25.43	36.52	25.33
37.75	25.99	37.51	25.72
41.07	27.13	39.90	27.15
43.93	27.64	44.55	27.92
46.39	28.20	47.08	27.69
46.83	27.64	53.27	28.35
53.08	28.32	57.49	28.84
57.39	28.93		



Adkin Branch, 05065611, Reach 2

XS-7 Riffle, Sta. 70+00

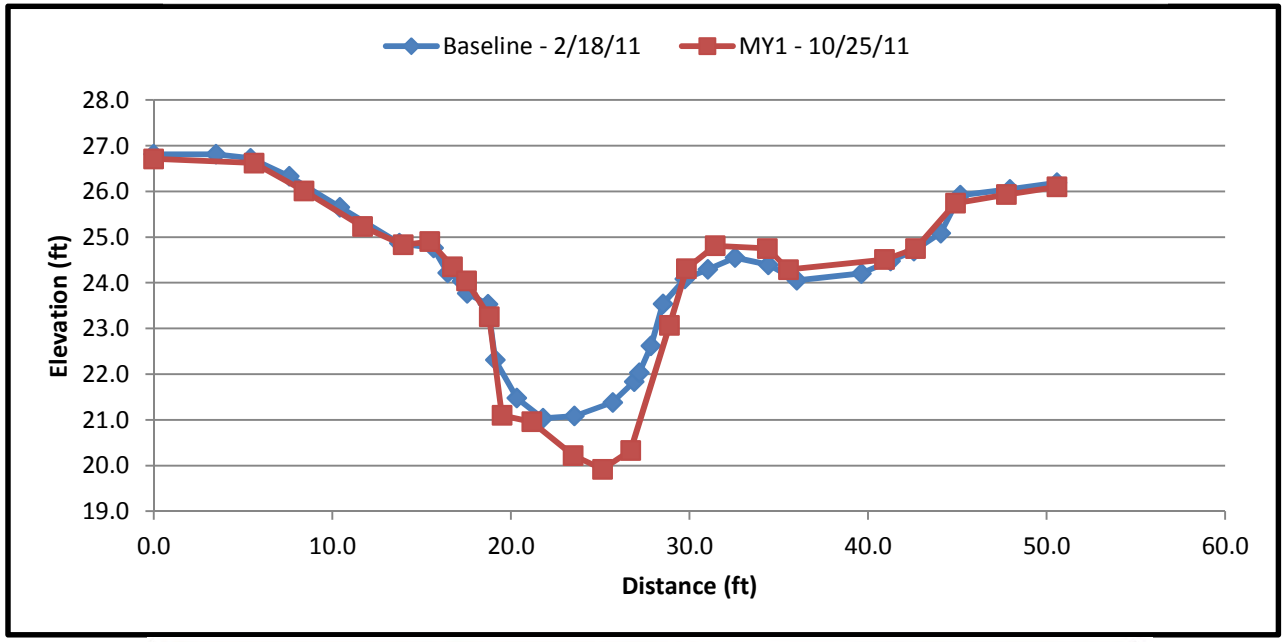
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	28.97	0.00	28.94
10.03	27.78	5.37	28.42
19.73	26.44	12.29	27.57
23.60	26.43	14.97	27.11
25.40	24.69	19.28	26.39
27.14	23.81	23.36	26.20
28.16	22.91	24.78	25.12
31.71	22.99	26.93	23.31
35.41	22.94	27.76	22.57
37.91	23.17	29.58	21.63
38.15	23.50	32.22	21.34
38.72	24.10	34.49	21.00
39.07	24.73	35.67	21.14
40.37	25.16	36.86	21.85
42.38	25.59	37.72	23.15
43.48	25.59	39.28	23.28
44.04	25.73	40.25	24.11
44.71	25.88	40.75	25.26
45.38	26.12	44.21	25.94
47.07	26.24	45.80	26.40
49.69	26.73	51.40	26.82
51.10	26.64	56.41	27.29
52.80	27.04	61.50	28.09
56.19	27.27	64.23	28.34
64.14	28.37		



Adkin Branch, 05065611, Reach 2

XS-8 Pool, Sta. 74+30

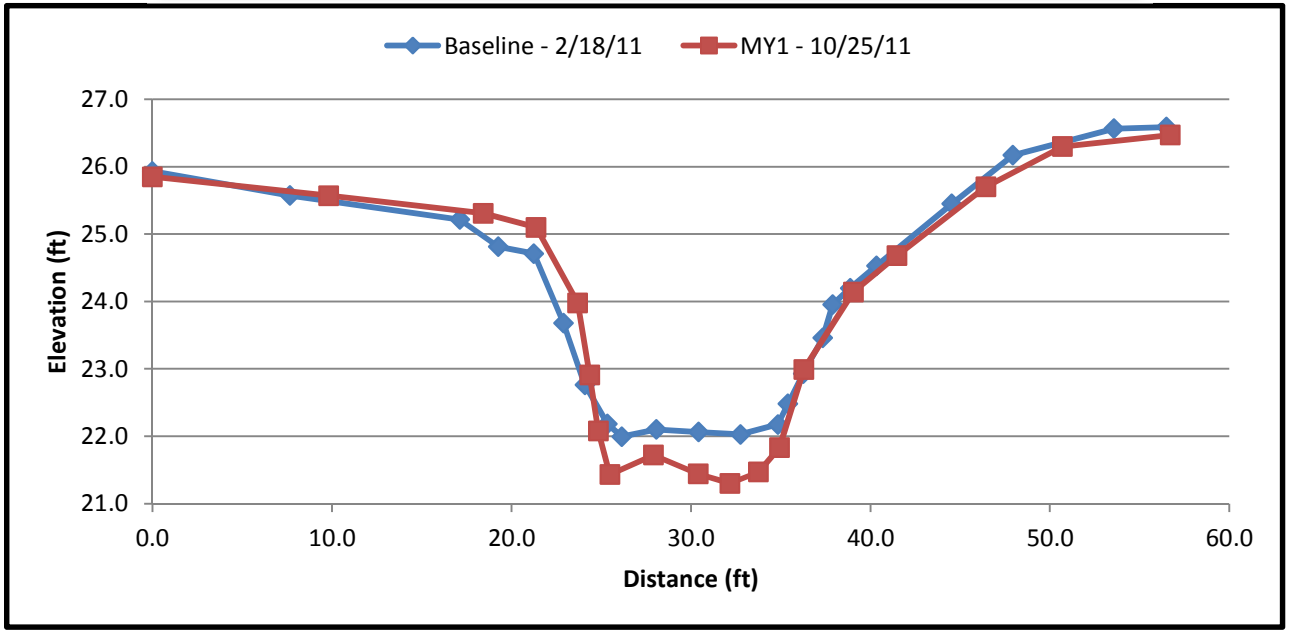
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	26.81	0.00	26.71
3.48	26.81	5.61	26.62
5.42	26.72	8.41	26.01
7.59	26.33	11.70	25.23
10.42	25.65	13.96	24.83
13.75	24.87	15.46	24.90
15.67	24.76	16.73	24.35
16.46	24.22	17.51	24.04
17.26	24.03	18.78	23.26
17.55	23.77	19.50	21.10
18.71	23.53	21.17	20.96
19.12	22.31	23.49	20.22
20.33	21.48	25.14	19.92
21.79	21.04	26.70	20.33
23.56	21.08	28.88	23.07
25.70	21.38	29.83	24.31
26.90	21.83	31.43	24.81
27.19	22.03	34.36	24.75
27.84	22.62	35.54	24.29
28.51	23.54	40.92	24.51
29.74	24.08	42.66	24.75
31.02	24.29	44.89	25.74
32.55	24.55	47.75	25.93
34.42	24.39	50.57	26.10
36.00	24.05		
39.62	24.20		
41.26	24.48		
42.56	24.69		
44.07	25.09		
45.16	25.92		
47.95	26.05		
50.57	26.19		



Adkin Branch, 05065611, Reach 2

XS-9 Riffle, Sta. 75+78

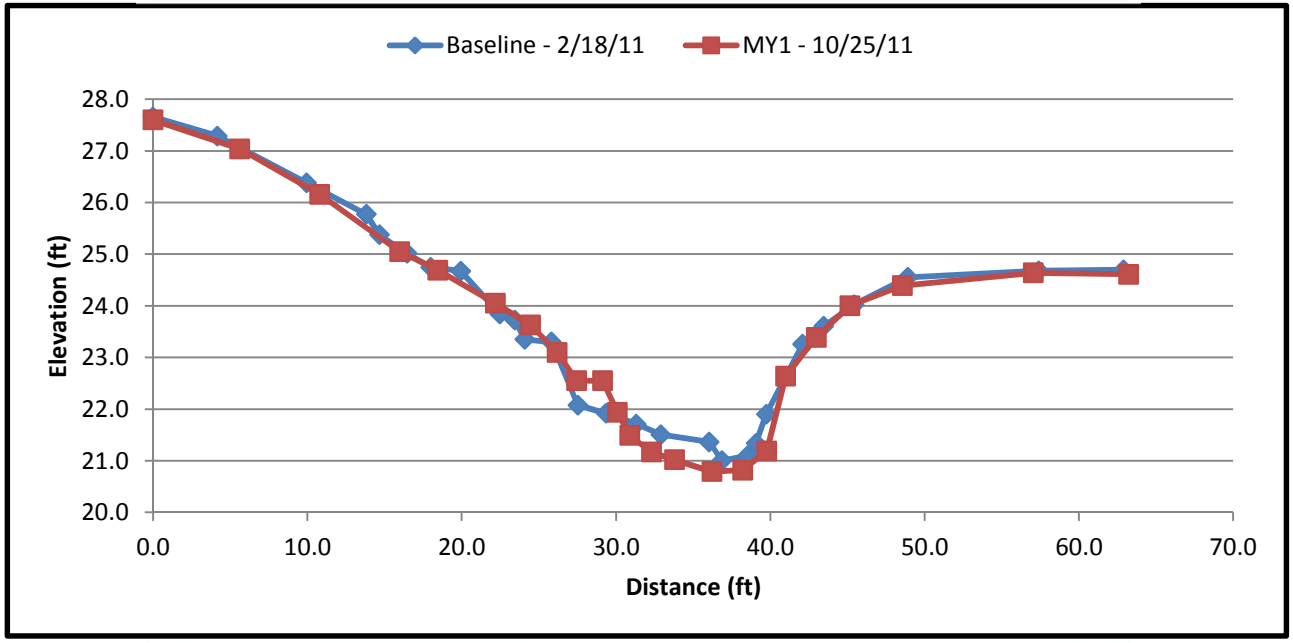
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	25.93	0.00	25.85
7.66	25.57	9.82	25.57
17.12	25.22	18.42	25.31
19.27	24.81	21.37	25.10
21.25	24.71	23.69	23.98
22.90	23.68	24.36	22.91
24.09	22.76	24.84	22.08
25.35	22.18	25.48	21.43
26.15	21.99	27.92	21.72
28.07	22.10	30.41	21.44
30.42	22.06	32.18	21.30
32.76	22.03	33.76	21.47
34.84	22.18	34.93	21.83
35.40	22.48	36.29	22.99
36.25	22.93	39.05	24.14
37.35	23.46	41.47	24.68
37.90	23.96	46.43	25.70
38.87	24.20	50.70	26.30
40.34	24.53	56.70	26.47
44.53	25.45		
47.94	26.17		
53.57	26.57		
56.49	26.59		



Adkin Branch, 05065611, Reach 2

XS-10 Riffle, Sta. 79+82

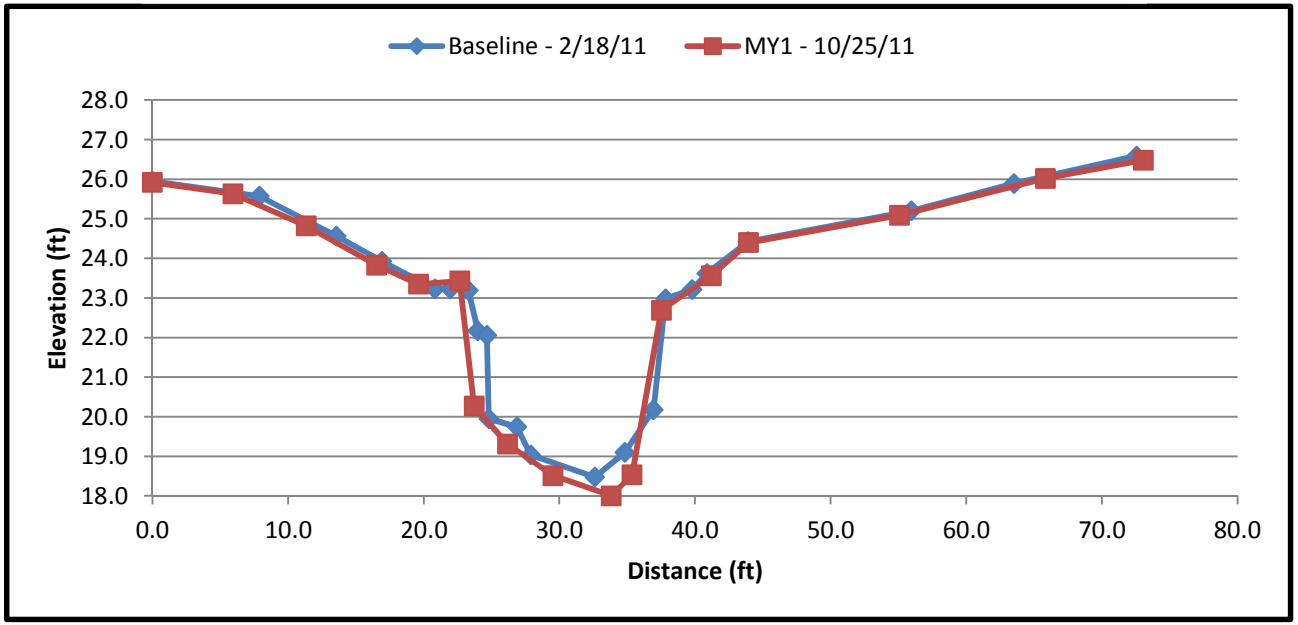
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	27.66	0.00	27.60
4.16	27.29	5.62	27.04
9.94	26.38	10.79	26.16
13.82	25.77	15.97	25.05
14.67	25.38	18.44	24.69
16.45	25.02	22.19	24.05
18.00	24.75	24.47	23.63
19.93	24.67	26.19	23.10
22.47	23.84	27.45	22.55
23.45	23.72	29.13	22.55
24.08	23.35	30.09	21.94
25.81	23.30	30.88	21.49
27.52	22.08	32.29	21.17
29.35	21.92	33.79	21.02
31.31	21.71	36.21	20.79
32.90	21.51	38.21	20.82
36.04	21.37	39.77	21.19
36.87	21.00	40.99	22.64
38.52	21.10	42.97	23.39
39.08	21.33	45.15	24.00
39.74	21.90	48.55	24.39
42.09	23.26	57.04	24.64
43.46	23.61	63.22	24.61
45.42	24.02		
48.91	24.55		
57.40	24.68		
62.89	24.70		



Adkin Branch, 05065611, Reach 2

XS-11 Pool, Sta. 82+30

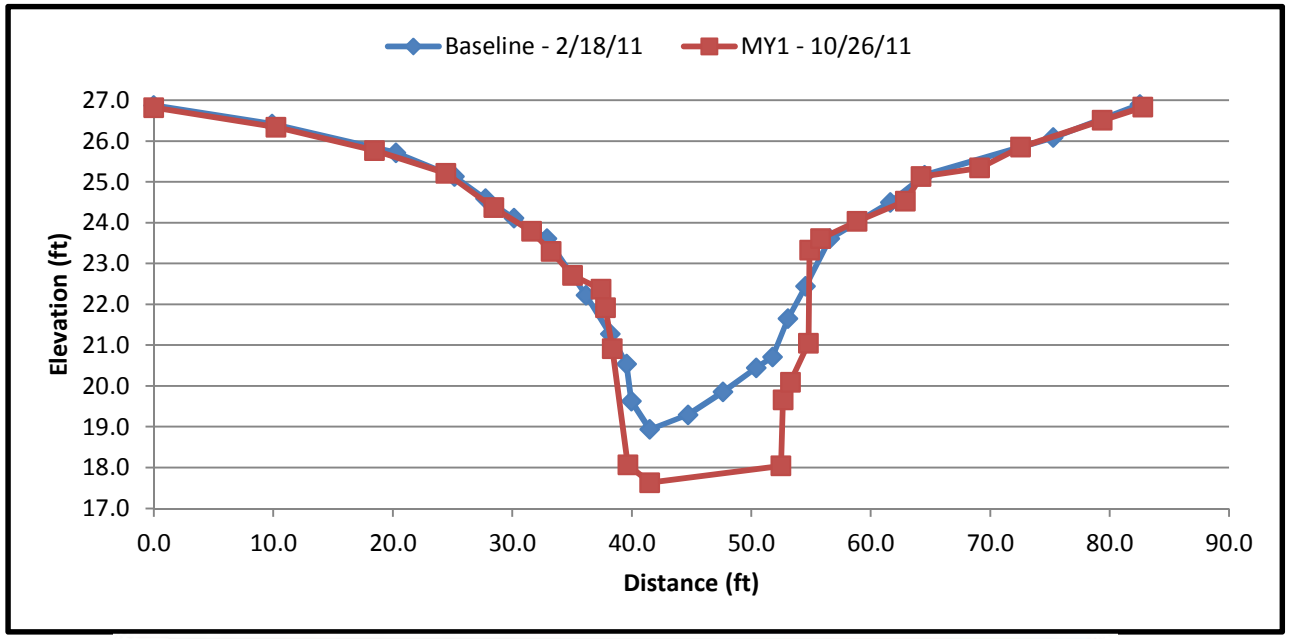
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	25.95	0.00	25.92
7.89	25.57	5.93	25.63
13.55	24.56	11.34	24.82
16.93	23.93	16.52	23.83
20.82	23.23	19.62	23.35
21.95	23.23	22.66	23.43
23.29	23.19	23.72	20.27
23.99	22.17	26.17	19.31
24.66	22.05	29.54	18.51
24.81	19.95	33.82	18.00
26.88	19.74	35.36	18.53
27.90	19.03	37.52	22.69
32.61	18.48	41.20	23.56
34.85	19.10	43.95	24.40
36.94	20.18	55.09	25.09
37.83	22.98	65.84	26.02
39.80	23.21	73.06	26.48
40.88	23.62		
43.90	24.42		
55.95	25.20		
63.52	25.89		
72.56	26.58		



Adkin Branch, 05065611, Reach 2

XS-12 Pool, Sta. 85+88

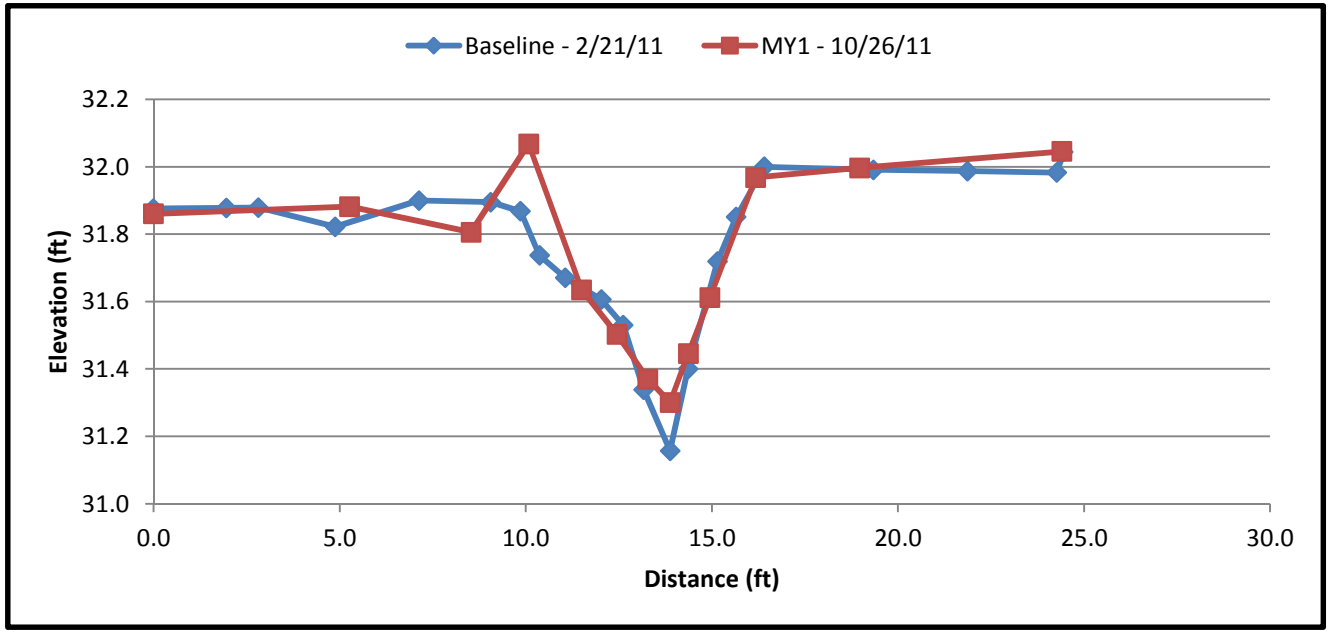
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	26.87	0.00	26.82
9.90	26.42	10.23	26.34
20.27	25.71	18.48	25.77
25.17	25.13	24.44	25.21
27.75	24.59	28.45	24.37
30.14	24.11	31.61	23.79
32.91	23.61	33.25	23.30
36.16	22.23	35.04	22.71
38.20	21.28	37.43	22.37
39.57	20.54	37.80	21.92
39.96	19.63	38.37	20.91
41.51	18.93	39.67	18.07
44.70	19.29	41.51	17.63
47.63	19.85	52.49	18.04
50.43	20.45	52.66	19.66
51.78	20.71	53.28	20.09
53.07	21.65	54.79	21.05
54.55	22.44	54.89	23.33
56.58	23.61	55.80	23.61
61.64	24.50	58.85	24.03
64.51	25.16	62.90	24.53
75.28	26.09	64.20	25.13
82.52	26.90	69.12	25.34
		72.54	25.85
		79.36	26.51
		82.77	26.83



Adkin Branch, 05065611, Reach 3

XS-13 Pool, Sta. 11+64

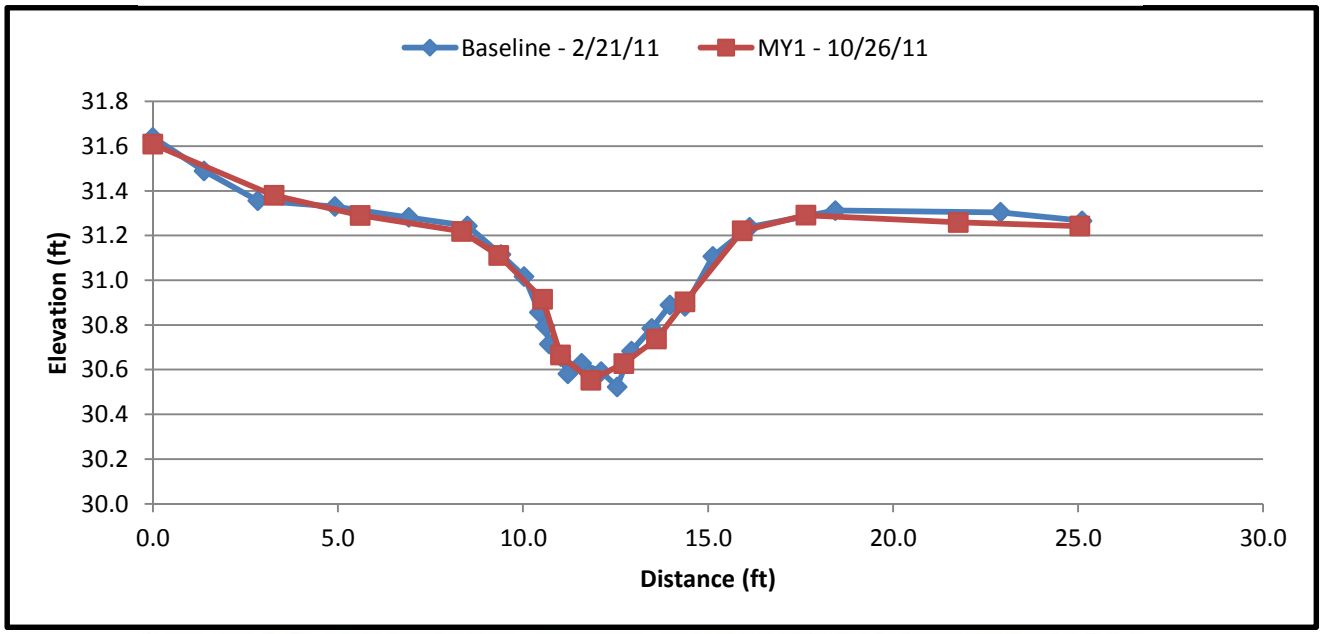
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	31.88	0.00	31.86
1.96	31.88	5.27	31.88
2.82	31.88	8.53	31.81
4.88	31.82	10.08	32.07
7.13	31.90	11.50	31.63
9.06	31.90	12.45	31.50
9.86	31.87	13.28	31.37
10.37	31.74	13.88	31.30
11.06	31.67	14.37	31.45
12.03	31.61	14.95	31.61
12.62	31.53	16.18	31.97
13.17	31.34	18.97	32.00
13.88	31.16	24.40	32.05
14.36	31.40		
15.15	31.72		
15.65	31.85		
16.41	32.00		
19.34	31.99		
21.87	31.99		
24.27	31.98		
24.44	32.04		



Adkin Branch, 05065611, Reach 3

XS-14 Riffle, Sta. 14+89

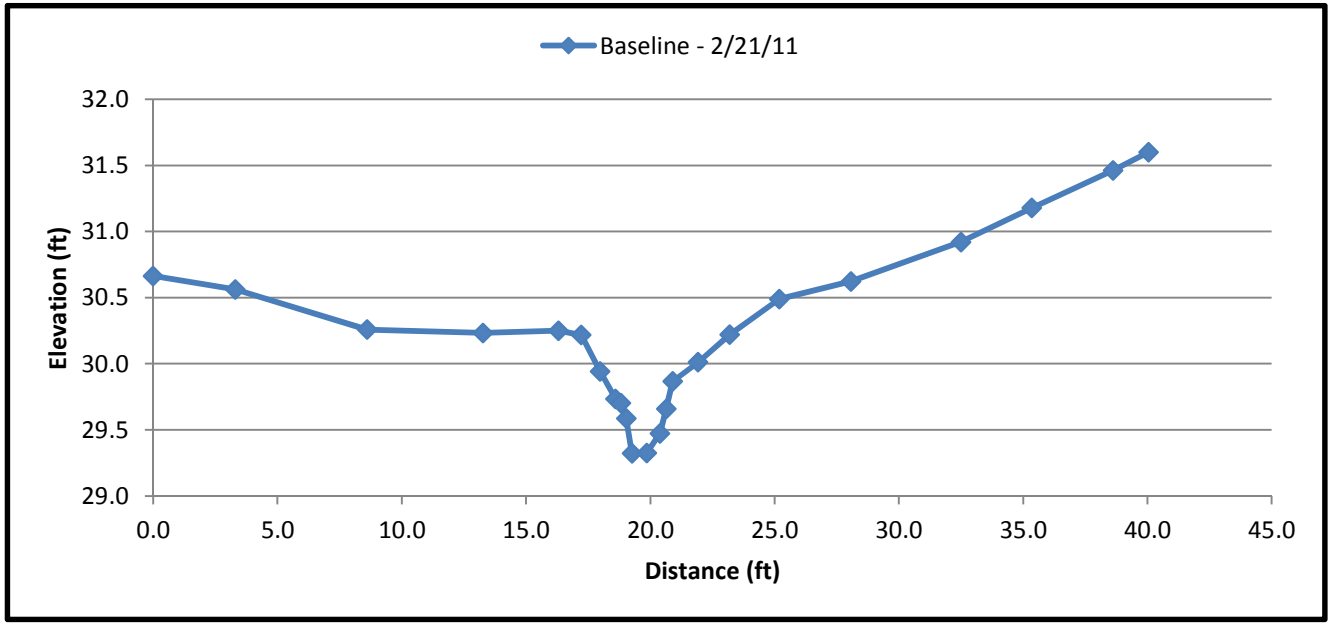
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	31.64	0.00	31.61
1.38	31.49	3.27	31.38
2.83	31.36	5.60	31.29
4.92	31.33	8.34	31.22
6.91	31.28	9.34	31.11
8.50	31.24	10.53	30.92
9.40	31.12	11.01	30.67
10.03	31.02	11.83	30.55
10.44	30.86	12.72	30.63
10.60	30.80	13.61	30.74
10.71	30.71	14.38	30.90
11.02	30.66	15.92	31.22
11.21	30.58	17.64	31.29
11.58	30.63	21.76	31.26
12.11	30.59	25.05	31.24
12.54	30.52		
12.93	30.68		
13.48	30.79		
13.97	30.89		
14.38	30.88		
15.13	31.11		
16.12	31.24		
18.44	31.31		
22.90	31.30		
25.11	31.27		



Adkin Branch, 05065611, Reach 3

XS-15 Riffle, Sta. 19+28

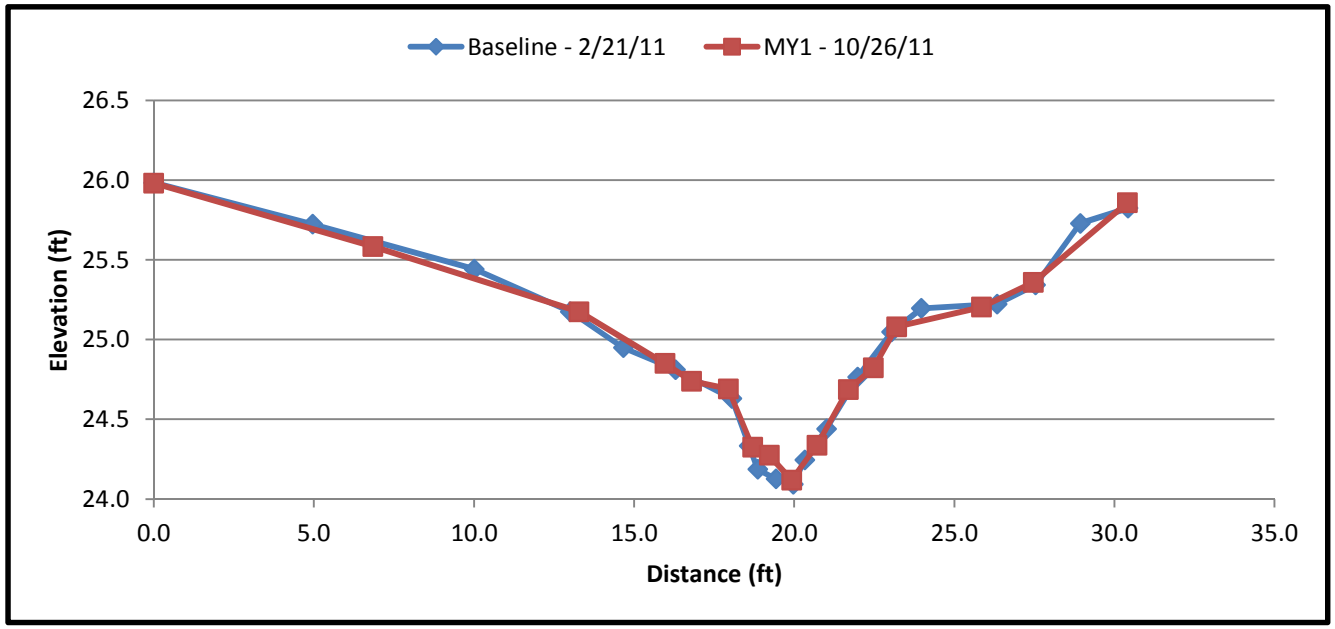
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	30.66	No Data - Fallen Tree over Channel	
3.30	30.56		
8.61	30.26		
13.27	30.23		
16.31	30.25		
17.22	30.22		
17.98	29.94		
18.60	29.73		
18.81	29.70		
19.03	29.59		
19.26	29.32		
19.86	29.33		
20.39	29.47		
20.64	29.66		
20.90	29.87		
21.92	30.01		
23.19	30.22		
25.19	30.49		
28.07	30.62		
32.50	30.92		
35.34	31.18		
38.62	31.46		
40.05	31.60		



Adkin Branch, 05065611, Reach 3

XS-16 Pool, Sta.23+64

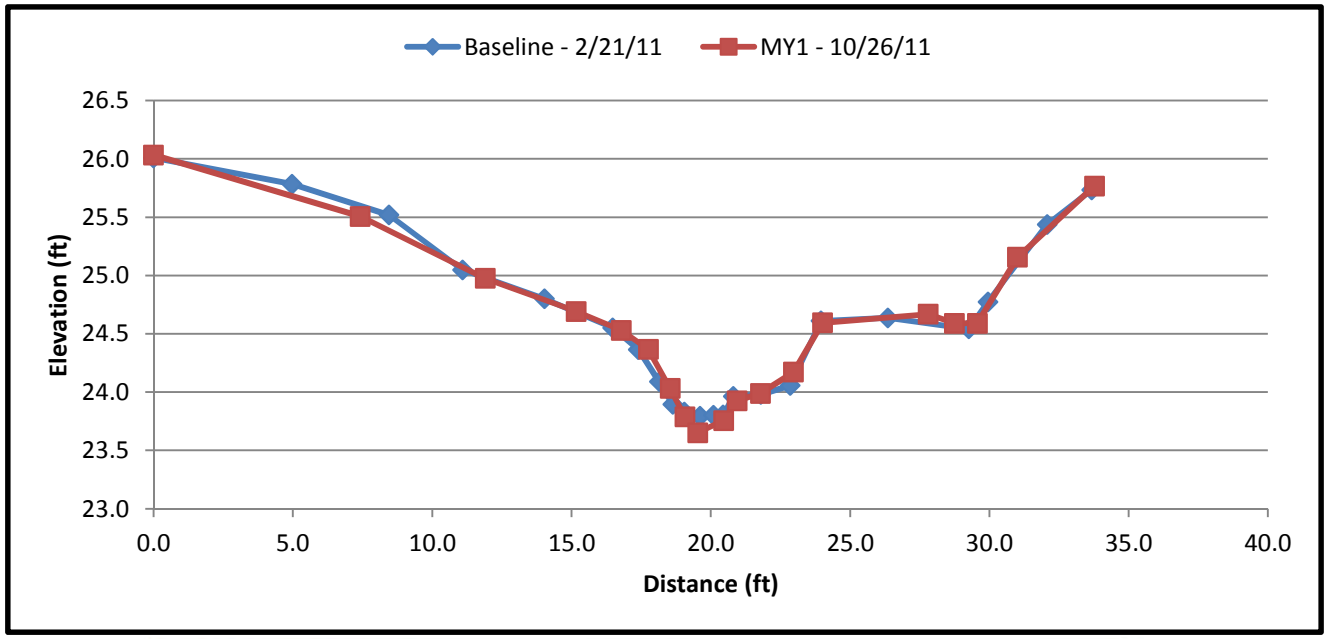
Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	25.98	0.00	25.98
4.96	25.72	6.84	25.58
10.01	25.44	13.28	25.18
13.01	25.18	15.96	24.85
14.66	24.95	16.79	24.74
16.29	24.81	17.94	24.69
18.05	24.63	18.70	24.33
18.59	24.33	19.22	24.27
18.86	24.19	19.92	24.12
19.43	24.13	20.71	24.34
19.97	24.09	21.69	24.69
20.33	24.25	22.47	24.82
21.01	24.44	23.20	25.08
21.98	24.77	25.85	25.20
23.04	25.05	27.47	25.36
23.97	25.20	30.40	25.86
26.34	25.22		
27.54	25.34		
28.93	25.73		
30.42	25.82		



Adkin Branch, 05065611, Reach 3

XS-17 Riffle, Sta. 23+87

Baseline		MY1	
Sta.	Elev.	Sta.	Elev.
0.00	26.01	0.00	26.03
4.97	25.78	7.42	25.51
8.45	25.52	11.90	24.98
11.09	25.05	15.17	24.69
14.03	24.80	16.79	24.53
16.48	24.55	17.76	24.37
17.40	24.37	18.54	24.03
18.15	24.09	19.07	23.79
18.64	23.89	19.53	23.65
19.05	23.83	20.46	23.76
19.61	23.79	20.94	23.93
20.10	23.80	21.78	23.99
20.44	23.80	22.97	24.17
20.81	23.96	24.01	24.59
21.79	23.98	27.80	24.67
22.85	24.06	28.74	24.59
23.96	24.61	29.57	24.59
26.35	24.64	31.01	25.16
29.26	24.54	33.77	25.77
29.95	24.77		
32.07	25.44		
33.67	25.73		



Figures 5.1-5.3. Longitudinal Profile Plots

Figure 5.1 Reach 1 (Washington Ave. to Gordon St.) - Longitudinal Profile

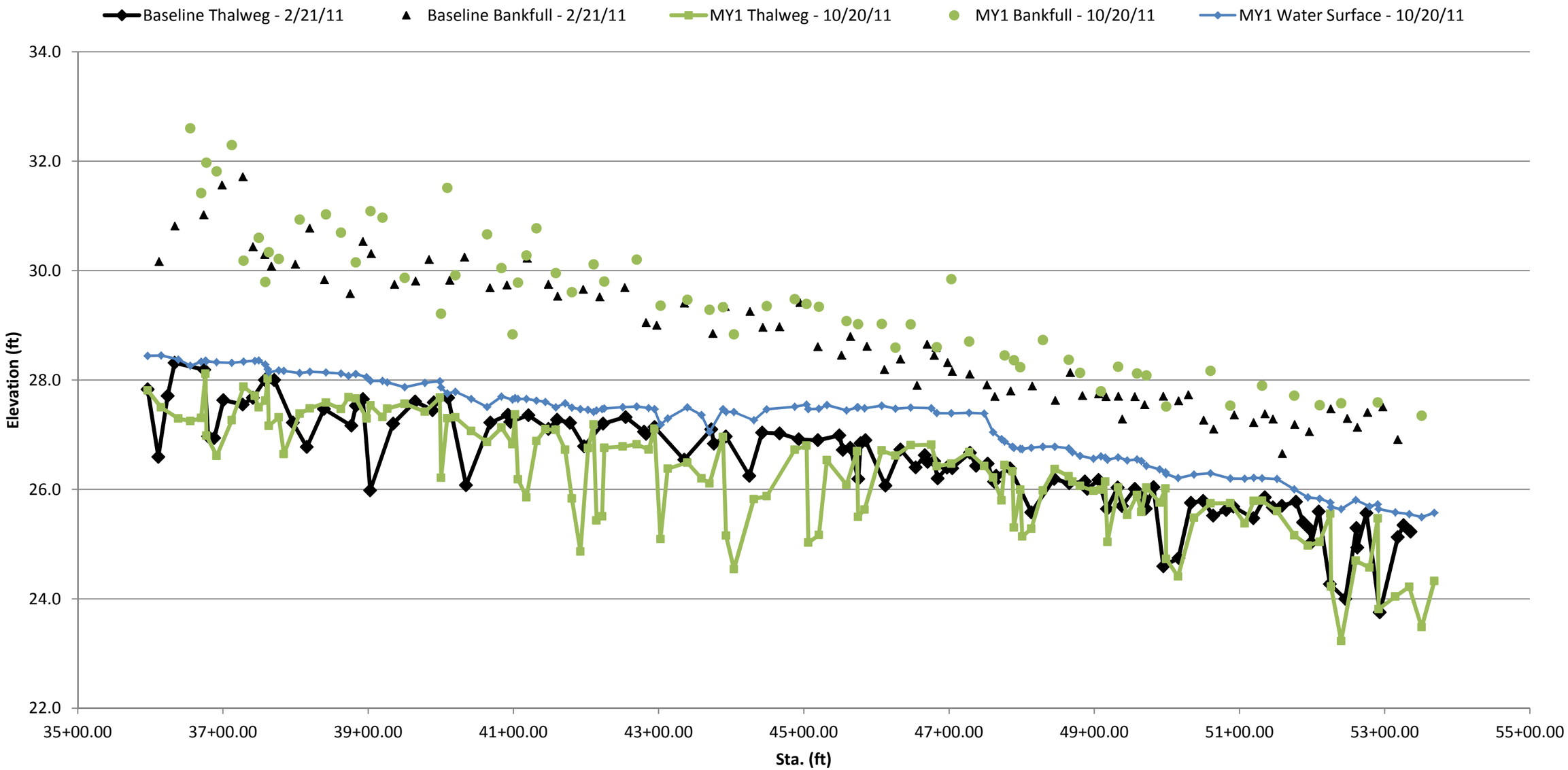


Figure pH Reach 2 (Gordon St. to Lincoln St.) - Longitudinal Profile

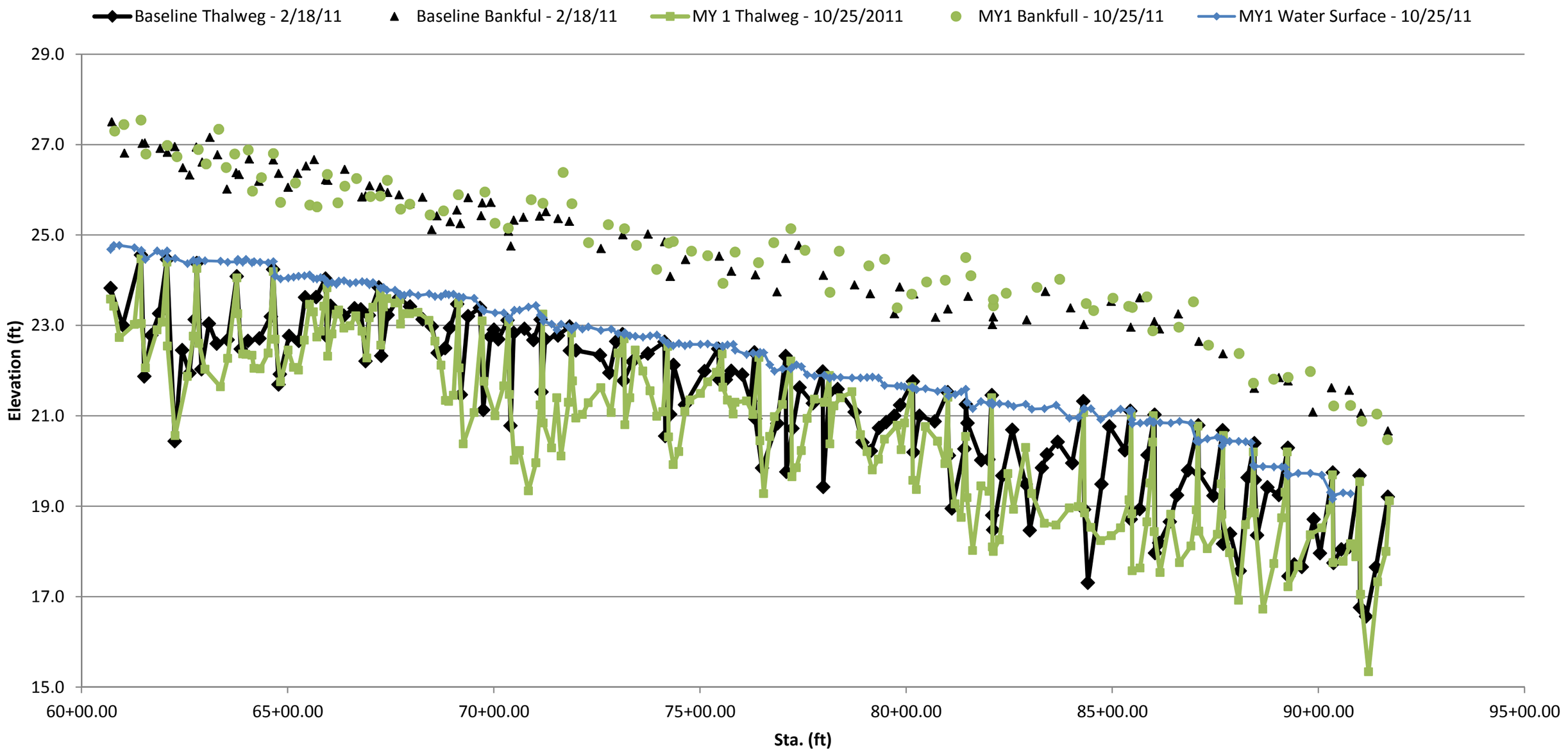


Figure p0 Reach 3 (UT to Adkin Branch) - Longitudinal Profile

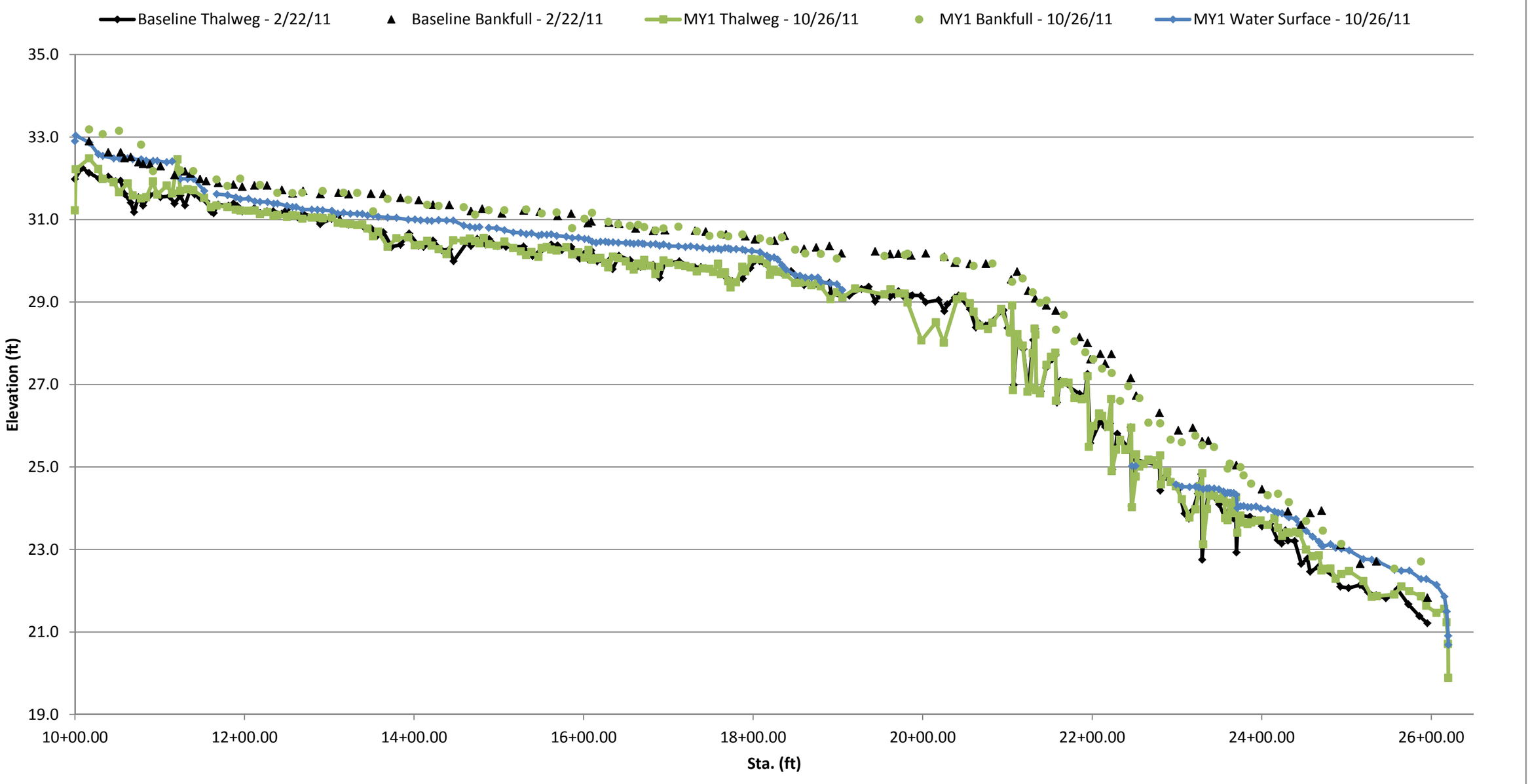


Table 10.1. Baseline Stream Data Summary
Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001
Reach 1

Parameter	Existing Condition (Wash Ave. to Gordon)	Refernce Reach (Johnson Mill)	Proposed (Wash Ave. to Gordon)	Reach 1 Baseline (Washington Ave. to Gordon St.)					
Dimension and Substrate - Riffle	Mean	Mean	Mean	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	20.90	21.20	22.00	14.84	15.95	14.99	18.03	1.80	3
Floodprone Width (ft)	29.40	34.90	40.00	28.45	42.14	41.72	56.25	13.90	3
Bankfull Mean Depth (ft)	1.95	2.25	1.38	0.92	1.35	1.42	1.70	0.40	3
Bankfull Max Depth (ft)	2.26	2.42	1.65	1.50	2.11	2.07	2.77	0.64	3
Bankfull Cross Sectional Area (ft^2)	40.90	47.60	30.30	13.78	21.57	25.23	25.69	6.75	3
Width/Depth Ratio	10.70	9.40	16.00	8.73	12.57	12.70	16.29	3.78	3
Entrenchment Ratio	1.40	1.60	1.80	1.90	2.67	2.31	3.79	0.99	3
Bank Height Ratio	-	-	-	1.00	1.00	1.00	1.00	0.00	3
d50 (mm)	-	-							
Profile									
Riffle Length (ft)	-	-	-	13.69	88.32	82.84	173.90	51.83	14
Riffle Slope (ft/ft)	0.0012	0.00001	0.0026	0.0002	0.0016	0.0013	0.0062	0.0016	14
Pool Length (ft)	-	-	-	11.36	24.52	24.15	46.88	8.60	19
Pool Max depth (ft)	3.18	3.56	3.44	2.11	2.99	2.86	4.33	0.72	19
Pool Spacing (ft)	183 - 231	91.1 - 130.0	88 - 132	22.73	95.81	94.46	180.40	41.64	18
Pattern									
Channel Beltwidth (ft)	30 - 50	50 - 1500	44 - 176						
Radius of Curvature (ft)	150 - 320	43 - 235	66 - 110						
Rc: Bankfull Width (ft/ft)	7.2 - 15.3	2.0 - 11.1	3.0 - 5.0						
Meander Wavelength (ft)	175 - 400	250 - 400	264 - 418						
Meander Width Ratio	1.43 - 2.39	2.4 - 70.9	2.0 - 8.0						
Substrate, bed and transport parameters									
Ri% / P%	-	-	-	73% / 27%					
SC% / Sa% / G% / C% / B% / Be%	-	-	-						
d16 / d35 / d50 / d84 / d95/ df^p / di^{sp} (mm)	-	-	-						
Reach Shear Stress (competency) lb/ft^2	N/A		N/A	N/A					
Max part size (mm) mobilized at bankfull	-		-	-					
Unit Stream Power (transport capacity) lbs/ft.s	0.075	0.197	0.220	0.325					
Additional Reach Parameters									
Drainage Area (SM)	4.60	13.50	5.03						
Impervious cover estimate (%)	-	-	-						
Rosgen Classification	G5	B5c	B5c	B5c					
Bankfull Velocity (fps)	1.20	1.70	1.70	1.95					
Bankfull Discharge (cfs)	50.00	80.90	50.00						
Valley length (ft)	-	-	1685	1685					
Channel Thalweg length (ft)	-	-	1750	1727					
Sinuosity (ft)	1.04	1.10	1.04	1.03					
Water Surface Slope (Channel) (ft/ft)	0.0005	0.0010	0.0016	0.00166					
BF slope (ft/ft)	-	-	-	0.00240					
Bankfull Floodplain Area (acres)	-	-	-						
Proportion over wide (%)	-	-							
Entrenchment Class (ER Range)	-	-							
Incision Class (BHR Range)	-	-							
BEHI VL% / L% / M% / H% / VH% / E%	-	-							
Channel Stability or Habitat Metric	-	-							
Biological or Other	-	-							

It should be noted that As-built conditions were completed at the end of construction. Many storm events had occurred between beginning of construction and end of construction that naturally modified constructed parameters.

Table 10.2. Baseline Stream Data Summary
Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001
Reach 2

Parameter	Existing Condition (Gordon to Lincoln))	Refernce Reach (Johnson Mill)	Proposed (Gordon to Lincoln)	Reach 2 Baseline (Gordon St. to Lincoln St.)					
Dimension and Substrate - Riffle	Mean	Mean	Mean	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	23.60	21.20	22.00	16.23	16.98	16.81	17.91	0.85	3
Floodprone Width (ft)	45.00	34.90	40.00	48.33	52.40	51.29	57.58	4.72	3
Bankfull Mean Depth (ft)	1.83	2.25	1.47	1.46	1.66	1.64	1.88	0.21	3
Bankfull Max Depth (ft)	2.98	2.42	1.76	2.21	2.38	2.26	2.68	0.26	3
Bankfull Cross Sectional Area (ft^2)	43.30	47.60	32.30	23.68	28.32	27.58	33.70	5.05	3
Width/Depth Ratio	12.90	9.40	15.00	9.53	10.30	10.25	11.12	0.80	3
Entrenchment Ratio	1.90	1.60	1.80	2.99	3.09	3.05	3.22	0.12	3
Bank Height Ratio	-	-	-	1.00	1.00	1.00	1.00	0.00	3
d50 (mm)	-	-							
Profile									
Riffle Length (ft)	-	-	-	27.43	62.71	62.38	93.27	19.56	10
Riffle Slope (ft/ft)	0.0024	0.00001	0.0031	0.0002	0.0013	0.0010	0.0039	0.0013	10
Pool Length (ft)	-	-	-	14.20	56.38	56.82	113.64	27.38	39
Pool Max depth (ft)	4.14	3.56	3.67	2.74	4.23	4.22	6.48	0.76	39
Pool Spacing (ft)	59.62 - 117.86	91.1 - 130.0	88.0 - 132.0	17.05	73.45	69.60	164.78	32.96	38
Pattern									
Channel Beltwidth (ft)	75 -120	50 - 1500	44.0 - 176.0						
Radius of Curvature (ft)	40 - 146	43 - 235	66.0 - 110.0						
Rc: Bankfull Width (ft/ft)	1.7 - 6.2	2.0 - 11.1	3.0 - 5.0						
Meander Wavelength (ft)	224 - 260	250 - 400	264.0 - 418.0						
Meander Width Ratio	3.18 - 5.08	2.4 - 70.9	2.0 - 8.0						
Substrate, bed and transport parameters									
Ri% / P%	-	-	-	29% / 71% *					
SC% / Sa% / G% / C% / B% / Be%	-	-	-						
d16 / d35 / d50 / d84 / d95/ df^p / di^{sp} (mm)	-	-	-						
Reach Shear Stress (competency) lb/ft^2	N/A		N/A	N/A					
Max part size (mm) mobilized at bankfull	-		-	-					
Unit Stream Power (transport capacity) lbs/ft.s	0.106	0.197	0.230	0.321					
Additional Reach Parameters									
Drainage Area (SM)	5.30	13.50	5.50						
Impervious cover estimate (%)	-	-	-						
Rosgen Classification	B5	B5c	B5c	B5c					
Bankfull Velocity (fps)	1.30	1.70	1.80	1.99					
Bankfull Discharge (cfs)	55.00	80.90	55.00						
Valley length (ft)	-	-	4106	4106					
Channel Thalweg length (ft)	-	-	4246	4270					
Sinuosity (ft)	1.12	1.10	1.03	1.04					
Water Surface Slope (Channel) (ft/ft)	0.0007	0.0010	0.0014	0.0016					
BF slope (ft/ft)	-	-	-	0.0018					
Bankfull Floodplain Area (acres)	-	-	-						
Proportion over wide (%)	-	-							
Entrenchment Class (ER Range)	-	-							
Incision Class (BHR Range)	-	-							
BEHI VL% / L% / M% / H% / VH% / E%	-	-							
Channel Stability or Habitat Metric	-	-							
Biological or Other	-	-							

It should be noted that As-built conditions were completed at the end of construction. Many storm events had occurred between beginning of construction and end of construction that naturally modified constructed parameters.

Table 10.3. Baseline Stream Data Summary
Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001
Reach 3

Parameter	Existing Condition (UT to Adkin Branch)	Refernce Reach (UT to Wildcat Branch)	Proposed (UT to Adkin Branch)	Reach 3 Baseline (UT to Adkin Branch)					
Dimension and Substrate - Riffle	Mean	Mean	Mean	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	3.60	7.70	6.00	6.06	7.27	7.69	8.06	1.06	3
Floodprone Width (ft)	8.30	130.00	15.00	23.07	27.62	25.11	34.69	6.20	3
Bankfull Mean Depth (ft)	0.47	1.03	0.55	0.35	0.42	0.40	0.50	0.08	3
Bankfull Max Depth (ft)	3.40	1.56	0.85	0.72	0.81	0.82	0.90	0.09	3
Bankfull Cross Sectional Area (ft^2)	1.70	7.90	3.30	2.43	3.04	2.68	4.00	0.84	3
Width/Depth Ratio	7.60	7.50	11.00	15.15	17.75	16.12	21.97	3.69	3
Entrenchment Ratio	2.30	16.90	2.50	2.86	3.95	3.26	5.72	1.55	3
Bank Height Ratio	-	-	-	1.00	1.00	1.00	1.00	0.00	3
d50 (mm)	-	-							
Profile									
Riffle Length (ft)	-	-	-	9.59	34.33	26.34	165.84	30.38	28
Riffle Slope (ft/ft)	0.0002	0.0021	0.0032	0.0012	0.0051	0.0044	0.0121	0.0031	28
Pool Length (ft)	-	-	-	4.26	21.38	23.26	52.81	12.04	32
Pool Max depth (ft)	1.45	1.90	1.36	0.64	1.59	1.32	2.95	0.70	32
Pool Spacing (ft)	21.63	14.0 - 16.6	12.0 - 36.0	13.49	42.26	37.22	93.07	20.82	30
Pattern									
Channel Beltwidth (ft)	50.00	13.8 - 19.4	12.0 - 36.0						
Radius of Curvature (ft)	93 - 105	10.9 - 15.3	12.0 - 18.0						
Rc: Bankfull Width (ft/ft)	26.0 - 29.3	1.4 - 2.0	2.0 - 3.0						
Meander Wavelength (ft)	212 -517	22.5 - 29.0	18.0 - 48.0						
Meander Width Ratio	13.97	1.8 - 2.5	2.0 - 6.0						
Substrate, bed and transport parameters									
Ri% / P%	-	-	-	58% / 42%					
SC% / Sa% / G% / C% / B% / Be%	-	-	-						
d16 / d35 / d50 / d84 / d95/ di^{p} / di^{sp} (mm)	-	-	-						
Reach Shear Stress (competency) lb/ft^2	N/A		N/A	N/A					
Max part size (mm) mobilized at bankfull	-		-	-					
Unit Stream Power (transport capacity) lbs/ft.s	0.007	0.140	0.080	0.083					
Additional Reach Parameters									
Drainage Area (SM)	0.12	0.44	0.12						
Impervious cover estimate (%)	-	-	-						
Rosgen Classification	E5	E5	E5	E5					
Bankfull Velocity (fps)	2.10	1.20	1.10	1.44					
Bankfull Discharge (cfs)	3.50	9.20	3.50						
Valley length (ft)	1200	-	1200	1200					
Channel Thalweg length (ft)	1200	-	1615	1582					
Sinuosity (ft)	1.00	1.15	1.35	1.32					
Water Surface Slope (Channel) (ft/ft)	0.0001	0.0024	0.0022	0.0028					
BF slope (ft/ft)	-	-	-	0.0030					
Bankfull Floodplain Area (acres)	-	-	-						
Proportion over wide (%)	-	-							
Entrenchment Class (ER Range)	-	-							
Incision Class (BHR Range)	-	-							
BEHI VL% / L% / M% / H% / VH% / E%	-	-							
Channel Stability or Habitat Metric	-	-							
Biological or Other	-	-							

It should be noted that As-built conditions were completed at the end of construction. Many storm events had occurred between beginning of construction and end of construction that naturally modified constructed parameters.

Table 11. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Section)
Adkin Branch Stream Restoration Project - Phase I
Contract No. 070708001

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Dimension and substrate[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	14.84	12						24.28	18.49						18.03	19.72						17.42	16.08						14.99	16.25					
Floodprone Width (ft)	56.25	44.63						72.2	71.85						41.72	52.82						39.81	42.63						28.45	49.93					
Bankfull Mean Depth (ft)	1.7	1.85						1.97	2.57						1.42	1.61						1.46	1.59						0.92	1.16					
Bankfull Max Depth (ft)	2.77	2.47						3.33	3.89						2.07	2.76						2.05	2.17						1.5	2.55					
Bankfull Cross Sectional Area (ft^2)	25.23	22.2						47.75	47.44						25.69	31.85						25.48	25.55						13.78	18.8					
Bankfull Width/Depth Ratio	8.73	6.49						12.32	7.19						12.7	12.25						11.93	10.11						16.29	14.01					
Bankfull Entrenchment Ratio	3.79	3.72						2.97	3.89						2.31	2.68						2.29	2.65						1.9	3.07					
Bankfull Bank Height Ratio	1	1						1	1						1	1						1	1						1	1					

	Cross Section 6 (Pool)							Cross Section 7 (Riffle)							Cross Section 8 (Pool)							Cross Section 9 (Riffle)							Cross Section 10 (Riffle)						
Dimension and substrate[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	15.1	18.04						17.91	16.15						16.57	15.76						16.81	15.69						16.23	17.72					
Floodprone Width (ft)	57.39	57.49						57.58	64.23						50.57	50.57						51.29	56.7						48.33	51.64					
Bankfull Mean Depth (ft)	2.94	3.16						1.88	2.85						1.93	2.76						1.64	2.01						1.46	1.61					
Bankfull Max Depth (ft)	4.39	4.85						2.68	4.26						3.51	4.89						2.21	2.84						2.26	2.6					
Bankfull Cross Sectional Area (ft^2)	44.41	57.01						33.7	45.98						31.92	43.57						27.58	31.55						23.68	28.48					
Bankfull Width/Depth Ratio	5.14	5.71						9.53	5.67						8.59	5.71						10.25	7.81						11.12	11.01					
Bankfull Entrenchment Ratio	3.8	3.19						3.22	3.98						3.05	3.21						3.05	3.61						2.99	2.91					
Bankfull Bank Height Ratio	1	1						1	1						1	1						1	1						1	1					

	Cross Section 11 (Pool)							Cross Section 12 (Pool)							Cross Section 13 (Pool)							Cross Section 14 (Riffle)							Cross Section 15 (Riffle)						
Dimension and substrate[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	16.31	17.99						23.66	17.42						5.89	5.97						7.69	7.63						6.06	N/A					
Floodprone Width (ft)	72.56	73.06						82.52	82.77						24.44	24.4						25.11	25.05						34.69	N/A					
Bankfull Mean Depth (ft)	3.19	3.51						2.72	3.87						0.31	0.35						0.35	0.34						0.4	N/A					
Bankfull Max Depth (ft)	4.71	5.43						4.68	4.74						0.71	0.67						0.72	0.67						0.9	N/A					
Bankfull Cross Sectional Area (ft^2)	52.00	63.18						64.42	67.38						1.81	2.09						2.68	2.6						2.43	N/A					
Bankfull Width/Depth Ratio	5.11	5.13						8.7	4.5						19	17.06						21.97	22.44						15.15	N/A					
Bankfull Entrenchment Ratio	4.45	4.06						3.49	4.75						4.15	4.09						3.26	3.28						5.72	N/A					
Bankfull Bank Height Ratio	1	1						1	1						1	1						1	1						1	N/A					

	Cross Section 16 (Pool)							Cross Section 17 (Riffle)						
Dimension and substrate[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	11.59	9.14						8.06	7.82					
Floodprone Width (ft)	30.42	30.4						23.07	25.58					
Bankfull Mean Depth (ft)	0.46	0.43						0.5	0.48					
Bankfull Max Depth (ft)	1.11	0.96						0.82	0.94					
Bankfull Cross Sectional Area (ft^2)	5.34	3.91						4	3.76					
Bankfull Width/Depth Ratio	25.2	21.26						16.12	16.29					
Bankfull Entrenchment Ratio	2.62	3.33						2.86	3.27					
Bankfull Bank Height Ratio	1	1						1	1					

NOTE:

Reach 1 - Washington Ave. to Gordon St. - Cross-Sections 1 through 5
Reach 2 - Gordon St. to Lincoln St. - Cross-Sections 6 - 12
Reach 3 - UT to Adkin Branch - Cross-Sections 13-17
Cross-section 15: Not able to survey due to fallen tree across cross-section

1 = Based on current bankfull elevation, determined by field indicators of bankfull.

Table 12.1 Monitoring Data - Stream Reach Data Summary

Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001

Reach 1 (Washington Ave. to Gordon St.)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
Dimension and substrate - Riffle only	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	14.84	15.95	14.99	18.03	1.80	3	12.00	15.99	16.25	19.72	3.87	3																								
Floodprone Width (ft)	28.45	42.14	41.72	56.25	13.90	3	44.63	49.13	49.93	52.82	4.15	3																								
Bankfull Mean Depth (ft)	0.92	1.35	1.42	1.70	0.40	3	1.16	1.54	1.61	1.85	0.35	3																								
[1]Bankfull Max Depth (ft)	1.50	2.11	2.07	2.77	0.64	3	2.47	2.59	2.55	2.76	0.15	3																								
Bankfull Cross Sectional Area (ft^2)	13.78	21.57	25.23	25.69	6.75	3	18.80	24.28	22.20	31.85	6.77	3																								
Width/Depth Ratio	8.73	12.57	12.70	16.29	3.78	3	6.49	10.92	12.25	14.01	3.93	3																								
Entrenchment Ratio	1.90	2.67	2.31	3.79	0.99	3	2.68	3.16	3.07	3.72	0.53	3																								
[1]Bank Height Ratio	1	1	1	1	0	3	1	1	1	1	0	3																								
Profile																																				
Riffle Length (ft)	13.69	88.32	82.84	173.90	51.83	14	15.63	69.32	55.40	193.19	46.86	15																								
Riffle Slope (ft/ft)	0.000	0.002	0.001	0.006	0.002	14	0.000	0.003	0.003	0.012	0.003	15																								
Pool Length (ft)	11.36	24.52	24.15	46.88	8.60	19	12.78	38.13	38.35	90.91	20.95	19																								
Pool Max Depth (ft)	2.11	2.99	2.86	4.33	0.72	19	2.76	4.00	4.34	5.39	0.79	19																								
Pool Spacing (ft)	22.73	95.81	94.46	180.40	41.64	18	12.78	91.39	88.78	217.34	59.08	18																								
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull Width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	B5c						B5c																													
Channel Thalweg length (ft)	1727						1764																													
Sinuosity (ft)	1.03						1.05																													
Water Surface Slope (Channel) (ft/ft)	0.00166						0.0016																													
BF slope (ft/ft)	0.0024						0.00263																													
[3]Ri% / P%	73% / 27%						59% / 41%																													
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95																																				
[2]% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these paramenters can include information from both thte cross-section surveys and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

Table 12.2 Monitoring Data - Stream Reach Data Summary

Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001

Reach 2 (Caswell St. to Lincoln St.)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
Dimension and substrate - Riffle only	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	16.23	16.98	16.81	17.91	0.85	3	15.69	16.52	16.15	17.72	1.06	3																								
Floodprone Width (ft)	48.33	52.40	51.29	57.58	4.72	3	51.64	57.52	56.70	64.23	6.34	3																								
Bankfull Mean Depth (ft)	1.46	1.66	1.64	1.88	0.21	3	1.61	2.16	2.01	2.85	0.63	3																								
[1]Bankfull Max Depth (ft)	2.21	2.38	2.26	2.68	0.26	3	2.60	3.23	2.84	4.26	0.90	3																								
Bankfull Cross Sectional Area (ft^2)	23.68	28.32	27.58	33.70	5.05	3	28.48	35.34	31.55	45.98	9.34	3																								
Width/Depth Ratio	9.53	10.30	10.25	11.12	0.80	3	5.67	8.16	7.81	11.01	2.69	3																								
Entrenchment Ratio	2.99	3.09	3.05	3.22	0.12	3	2.91	3.50	3.61	3.98	0.54	3																								
[1]Bank Height Ratio	1	1	1	1	0	3	1	1	1	1	0	3																								
Profile																																				
Riffle Length (ft)	27.43	62.71	62.38	93.27	19.56	10	5.23	34.74	35.95	61.27	16.12	11																								
Riffle Slope (ft/ft)	0.0002	0.0013	0.0010	0.0039	0.0013	10	0.0003	0.0029	0.0015	0.0132	0.0039	11																								
Pool Length (ft)	14.20	56.38	56.82	113.64	27.38	39	7.56	65.31	61.25	157.78	33.20	45																								
Pool Max Depth (ft)	2.74	4.23	4.22	6.48	0.76	39	2.60	4.80	4.97	6.54	0.89	45																								
Pool Spacing (ft)	17.05	73.45	69.60	164.78	32.96	38	11.36	63.92	56.82	139.21	28.40	44																								
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull Width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	B5c						B5c																													
Channel Thalweg length (ft)	3096						3131																													
Sinuosity (ft)	1.04						1.04																													
Water Surface Slope (Channel) (ft/ft)	0.0016						0.00175																													
BF slope (ft/ft)	0.0018						0.00204																													
*[3]Ri% / P%	29% / 71%						5% / 95%																													
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95																																				
[2]% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.

* Reach 2 is a predominately pool system due to need to drop grade at the lower end of the project.

1 = The distributions for these paramenters can include information from both thte cross-section surveys and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

Table 12.3 Monitoring Data - Stream Reach Data Summary

Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001

Reach 3 (UT to Adkin Branch)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
Dimension and substrate - Riffle only	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	6.06	7.27	7.69	8.06	1.06	3	7.63	7.73	7.73	7.82	0.13	2																								
Floodprone Width (ft)	23.07	27.62	25.11	34.69	6.20	3	25.05	25.32	25.32	25.58	0.37	2																								
Bankfull Mean Depth (ft)	0.35	0.42	0.40	0.50	0.08	3	0.34	0.41	0.41	0.48	0.10	2																								
[1]Bankfull Max Depth (ft)	0.72	0.81	0.82	0.90	0.09	3	0.67	0.81	0.81	0.94	0.19	2																								
Bankfull Cross Sectional Area (ft^2)	2.43	3.04	2.68	4.00	0.84	3	2.60	3.18	3.18	3.76	0.82	2																								
Width/Depth Ratio	15.15	17.75	16.12	21.97	3.69	3	16.29	19.37	19.37	22.44	4.35	2																								
Entrenchment Ratio	2.86	3.95	3.26	5.72	1.55	3	3.27	3.28	3.28	3.28	0.01	2																								
[1]Bank Height Ratio	1.00	1.00	1.00	1.00	0.00	3	1	1	1	1	0	2																								
Profile																																				
Riffle Length (ft)	9.59	34.33	26.34	165.84	30.38	28	4.08	23.14	17.86	138.25	26.46	25																								
Riffle Slope (ft/ft)	0.0012	0.0051	0.0044	0.0121	0.0031	28	0.0009	0.0102	0.0059	0.0587	0.0118	25																								
Pool Length (ft)	4.26	21.38	23.26	52.81	12.04	32	4.95	16.84	16.32	34.57	8.28	39																								
Pool Max Depth (ft)	0.64	1.59	1.32	2.95	0.70	32	0.52	1.53	1.45	2.89	0.63	39																								
Pool Spacing (ft)	13.49	42.26	37.22	93.07	20.82	30	4.16	36.18	29.07	191.11	33.27	38																								
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull Width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	E5						E5																													
Channel Thalweg length (ft)	1582						1622																													
Sinuosity (ft)	1.32						1.35																													
Water Surface Slope (Channel) (ft/ft)	0.0028						0.0022																													
BF slope (ft/ft)	0.003						0.0026																													
[3]Ri% / P%	58% / 42%						60% / 40%																													
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95																																				
[2]% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these paramenters can include information from both thte cross-section surveys and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

Appendix E. Hydrologic Data

Table 13. Verification of Bankfull Events

Date	Crest Gauge Info		Gauge Reading (ft)	Gauge Elevation (ft)	Crest Elevation (ft)	Bankfull Elevation (ft)	Height above Bankfull (ft)	Photo
	Site	Sta.						
10/26/2011	3	22+65	1.96	25.51	27.47	26.07	1.40	6.1
10/26/2011	1	54+00	2.8	25.27	28.07	27.03	1.04	6.2

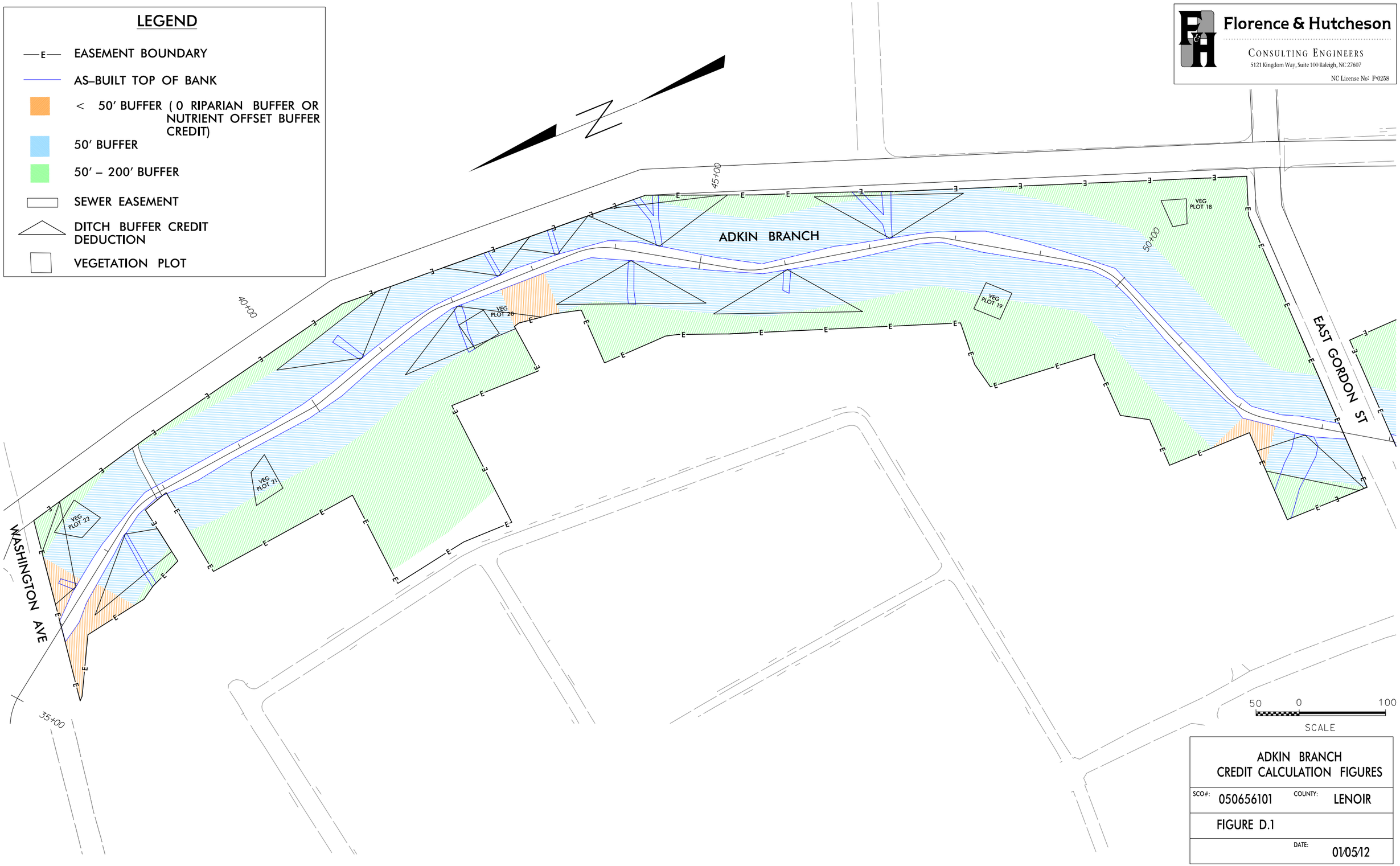
Figures 6.1 & 6.2 Crest Gauge Photos

Appendix F. Credit Calculation Figures

LEGEND

- EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- < 50′ BUFFER (0 RIPARIAN BUFFER OR NUTRIENT OFFSET BUFFER CREDIT)
- 50′ BUFFER
- 50′ – 200′ BUFFER
- SEWER EASEMENT
- DITCH BUFFER CREDIT DEDUCTION
- VEGETATION PLOT

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258



50 0 100
SCALE

ADKIN BRANCH CREDIT CALCULATION FIGURES	
SCO#: 050656101	COUNTY: LENOIR
FIGURE D.1	
	DATE: 01/05/12

LEGEND

- EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- < 50′ BUFFER (0 RIPARIAN BUFFER OR NUTRIENT OFFSET BUFFER CREDIT)
- 50′ BUFFER
- 50′ – 200′ BUFFER
- SEWER EASEMENT
- DITCH BUFFER CREDIT DEDUCTION
- VEGETATION PLOT

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

EAST GORDON ST
ADKIN BRANCH
EAST CASWELL ST
ADKIN BRANCH
50+00
55+00
60+00
65+00
70+00
VEG PLOT 12
VEG PLOT 13
VEG PLOT 14
VEG PLOT 15
VEG PLOT 16
VEG PLOT 17
VEG PLOT 18
BMP #4

50 0 100
SCALE

ADKIN BRANCH CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE D.2

DATE: 01/05/12

LEGEND

- EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- < 50′ BUFFER (0 RIPARIAN BUFFER OR NUTRIENT OFFSET BUFFER CREDIT)
- 50′ BUFFER
- 50′ – 200′ BUFFER
- SEWER EASEMENT
- DITCH BUFFER CREDIT DEDUCTION
- VEGETATION PLOT

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

BMP #5
BMP #6
BMP #7
BMP #8
ADKIN BRANCH
UT TO ADKIN BRANCH
75+00
80+00
85+00
90+00
25+00
VEG PLOT 1
VEG PLOT 2
VEG PLOT 3
VEG PLOT 4
VEG PLOT 5
VEG PLOT 8
VEG PLOT 10
VEG PLOT 11
VEG PLOT 12

50 0 100
SCALE

ADKIN BRANCH CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE D.3

DATE: 01/05/12

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

UT TO ADKIN BRANCH

ADKIN BRANCH

HOLLOWAY DR

LINCOLN ST

15+00

20+00

25+00

85+00

90+00

95+00

VEG PLOT 1

VEG PLOT 2

VEG PLOT 3

VEG PLOT 4

VEG PLOT 5

VEG PLOT 6

VEG PLOT 7

VEG PLOT 8

BMP #7

BMP #8

BMP #9

LEGEND

- E — EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- < 50′ BUFFER (0 RIPARIAN BUFFER OR NUTRIENT OFFSET BUFFER CREDIT)
- 50′ BUFFER
- 50′ – 200′ BUFFER
- SEWER EASEMENT
- DITCH BUFFER CREDIT DEDUCTION
- VEGETATION PLOT

50 0 100
SCALE

ADKIN BRANCH CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE D.4

DATE: 01/05/12

Florence & Hutcheson
CONSULTING ENGINEERS
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

HOLLOWAY DR

UT TO ADKIN BRANCH

ADKIN BRANCH

CEDAR LN

10+00

15+00

20+00

25+00

85+00

90+00

VEG PLOT 1

VEG PLOT 2

VEG PLOT 3

VEG PLOT 4

VEG PLOT 5

VEG PLOT 8

BMP #8

BMP #7

LEGEND

- E — EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- < 50′ BUFFER (0 RIPARIAN BUFFER OR NUTRIENT OFFSET BUFFER CREDIT)
- 50′ BUFFER
- 50′ – 200′ BUFFER
- SEWER EASEMENT
- DITCH BUFFER CREDIT DEDUCTION
- VEGETATION PLOT

50 0 100
SCALE

ADKIN BRANCH CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE D.5

DATE: 01/05/12