YEAR 3 MONITORING REPORT

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

Lenoir County, North Carolina
EEP IMS No. 7

Submitted to:

NCDENR-Ecosystem Enhancement Program
217 West Jones Street, Suite 3000A
Raleigh, North Carolina 27603

Construction Completed: April 2011
Morphology Data Collected: July 2013
Vegetation Data Collected: July 2013
Submitted: November 27, 2013

Prepared by:

&

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Design Firm:

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I HEREBY CERTIFY THAT THE DOCUMENTS CONTAINED HEREIN, ADKIN BRANCH YEAR 3 MONITORING REPORT WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

SIGNED, SEALED AND DATED THIS _____ DAY OF _____ 2013.

_____

Chris L. Smith, PE

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1.0 EXECUTIVE SUMMARY

The following report summarizes the vegetation establishment and stream stability for Year 3 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

Year 1 (2011)

In general, vegetation within the Site was doing poorly in Year 1 (2011) and many of the planted trees had died over the summer of 2011 as the result of extreme hot, dry conditions followed by Hurricane Irene. Due to poor planted stem survivability in Year 1, vegetation warranty Site assessments were conducted in September 2011 by EEP and Axiom Environmental, Inc. (Axiom) as described in the EEP letter to Fluvial Solutions, Inc. dated January 25, 2012 (Appendix C). The results of the Site assessment required Fluvial Solutions, Inc. to replant bare root seedlings in four areas as depicted on the Supplemental Planting Map provided in Appendix C. A total of 11 ball and burlap trees were also replanted. Fluvial Solutions, Inc. contracted Bruton Natural Systems, Inc. to replant the Site. Replanting was completed on March 8, 2012. The list of species replanted at the Site is provided in Tables C1 and C2 (Appendix C).

Year 2 (2012)

Despite replanting the Site in 2012, planted tree growth within the Site remained poor during the Year 2 (2012) monitoring period. Based on the number of stems counted, average densities were measured at 491 planted stems per acre (excluding livestakes) surviving. 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*). Fourteen of the twenty-two individual vegetation plots met success criteria when counting planted stems alone. Three plots (Plots 9, 10, and 11) did not meet success criteria based on planted stems alone; however, when including appropriate naturally recruited stems of hickory (*Carya* sp.), these plots were well-above success criteria. In addition, a large pecan tree fell within Plot 11 contributing to numerous missing planted stems. Lespedeza is dominating the floodplain in the vicinity of Plots 7 and 8, making it difficult for planted stems to survive. Several small areas along stream benches were characterized by exposed soils with little vegetation in Year 1; however, herbaceous vegetation

was beginning to fill in these areas. Several small areas of invasive species occurred within the Site including Chinese privet, Johnson grass, and Japanese honeysuckle. Lespedeza was dominating the left and right floodplain between stations 90+00 and 96+00 and was out-competing planted woody vegetation. It was recommended that an herbicide approved for use in or near aquatic sites be applied to this area to control lespedeza. Plant coverage within the stormwater wetlands should be assessed and documented each growing season. If a minimum of 70 percent coverage is not achieved after the second growing season, supplemental planting should be completed. Plant coverage of 90 to 95 percent is desirable. Currently plant coverage within the stormwater BMP is greater than 95 percent.

Year 3 (2013)
Based on the number of stems counted, average densities were measured at 495 planted stems per acre (excluding livestakes) surviving in Year 3 (2013). 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*).

Fifteen of the twenty-two individual vegetation plots met success criteria when counting planted stems alone. Plot 9 was not sampled because it was destroyed by construction equipment during stream repair efforts in July 2013. The site is scheduled to receive supplemental planting in areas disturbed by the construction activities of 2013. The areas that are to be replanted include the staging and stockpile locations, haul road and any other area within the easement that were impacted by construction equipment. Three plots (Plots 6, 10, and 11) did not meet success criteria based on planted stems alone; however, when including appropriate naturally recruited stems of hickory (*Carya* sp.) and American elm (*Ulmus americana*), these plots exceeded success criteria. Herbaceous vegetation has continued to fill in stream bench areas that were bare in Year 1 (2011). Planted tree growth within the Site, in general, is poor. These issues encompass the majority of the Site and should be monitored closely in subsequent monitoring years. Several small areas of invasive species occur within the Site including Chinese privet, Johnson grass, lespedeza, and Japanese honeysuckle as depicted on the CCPV (Appendix B).

The plant coverage within the stormwater BMP continues to be greater than 95 percent.

1.3 Stream Stability

Year 1 (2011)
Year 1 monitoring surveys along Adkin Branch and its UT occurred in October, 2011.

Reach 1: Significant stream bed scour was observed from station 41+00 to 46+00. This scour likely occurred during the storm events associated with Hurricane Irene in late August, 2011. Several of the existing pools 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. 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 were stable and functioning as intended. There was no evidence of trends

toward significant change in channel pattern. Cross sectional data indicated that the channel width to depth ratio was lowering as the channel matured. This change is expected as detailed in the proposed success criteria from the Baseline Monitoring Document (NCDENR, 2011).

Reach 2: Significant stream bed scour was observed from station 68+71 to 74+64. Based on an overall visual assessment of the channel, Reach 2 appeared 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 had been compromised in Reach 2 as a result of stream bank erosion around the vane arm. Six log structures were experiencing erosion on greater than 15 percent of the streambanks within their extent of influence and three log structures exhibited minor erosion around the vane arms. A Repair Plan was developed to correct these problem areas, which included the use of soil lifts, bank grading, and erosion control matting.

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

Reach 3: Reach 3 was preforming as expected.

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 included debris lines, and vegetation bent in the downstream direction.

Year 2 (2012)
Year 2 monitoring surveys occurred in October and November, 2012.

Reach 1: Reach 1 experienced little change from Year 1 except between stations 39+00 to 41+00 where the pools became deeper and longer. Log structures were stable through this section and continued to maintain grade control.

Reach 2: The profile along Reach 2 provides evidence of the fluctuating nature of a sand bed system. Some pools became deeper and longer (station 65+00 to 69+00) while others filled in and shortened (station 82+50 to 86+00). Overall, Reach 2 was somewhat unstable due to erosion along approximately 45 percent of the stream banks within the Reach. Erosion was attributed to a lack of vegetation and several large storm events, including Hurricane Irene, that have resulted in severe shear stress along the exposed sandy banks. A Repair Plan was developed to correct the eroded stream banks which included the use of soil lifts, bank grading, and erosion control matting. The Repair Plan was implemented in the Spring/Summer of 2013. Fluctuation in channel bed features is expected to continue throughout the monitoring period; however, the overall stream reach should stabilize once woody vegetation establishes along the stream banks. A beaver dam was observed at Station 69+60 and appears to have formed on top of rip rap that

was placed in the channel by local residents. Rip rap was also observed in the channel near station 81+25. The soil lifts that were installed in January and February, 2011 are stable with well established willow cuttings along the stream banks.

Reach 3: Reach 3 experienced aggradation between Stations 10+00 and 12+35 due to dense herbaceous vegetation forming in the channel and trapping sediment. However, the stream remains stable and flood waters are accessing the adjacent stormwater wetlands as intended. 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 were stable and functioning as intended. There was no evidence of trends toward significant change in channel pattern. Cross sectional data indicated that the channel width to depth ratio was lowering as the channel matures.

Crest Gauge 2 near station 75+25 was damaged during Hurricane Irene, but was reinstalled on November 8, 2012. The remaining crest gauges revealed that a bankfull event occurred at least once during 2012 (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.

Year 3 (2013)
Year 3 monitoring surveys occurred in July and August, 2013.

Reach 1: Reach 1 experienced little change from Year 2 with the log structures remaining stable through this section and continuing to maintain grade control.

Reach 2: The profile along Reach 2 provides evidence of the fluctuating nature of a sand bed system. Some pools became deeper and longer while others filled in and shortened. In general, the unstable sections of Reach 2 that were documented in the Year 2 Monitoring Report have been repaired as part of construction activities completed in September of 2013. The majority of the plans consisted of installed soil lifts along eroded banks, which are now shown in the CCPV. Fluctuation in channel bed features is expected to continue throughout the monitoring period, but the overall stream reach should stabilize once woody vegetation establishes along the stream banks.

The Year 2 monitoring report discussed various bank reaches that exhibited different levels of erosion. The majority of the eroded banks were repaired during the Hurricane Irene repairs that were completed in September of 2013. The eroding banks have been stabilized through bank grading with matting or with the installation of soil lifts. All repaired sections were planted with live stakes and should remain stable as long as the newly planted vegetation continues to thrive. Some moderate scour has developed behind the vane arm of the log cross vane at station 64+80 which can be seen is the cross section 6 data. However, multiple black willow trees are continuing to grow and stabilize the bank around the scour which should aid in the long term stability of the right bank. It is recommended that observation of this section continues

throughout the upcoming monitoring periods to determine whether the condition necessitates repair in the future. Cross section 7 displays changes in geometry due to the installation of soil lifts as part of the Hurricane Irene repair plan. The repaired banks shown now for Year 3 have been restored to the geometry recorded in the baseline report.

Reach 3: Reach 3 experienced some aggradation from station 10+50 to 11+75 and deepening of pools from approximately station 22+00 to station 25+00. However, the stream remains stable and flood waters are accessing the adjacent stormwater wetlands as intended.

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 was no evidence of trends toward significant change in channel pattern. Cross-sectional data indicated that the channel width to depth ratio is lowering as the channel matures.

EEP contracted with US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) to control beavers on site in February of 2013. Eight beaver dams were identified within the project reach.

The site experienced at least one bankfull flows in July, 2013 (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.

Stream survey data is provided in Appendix D. Bankfull discharge was observed while performing the repair construction and has been photo documented in Appendix E. Final Record Drawings are located in Appendix G.

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. Credit Calculation Figures are provided in Appendix F.

2.0 METHODOLOGY

2.1 Vegetation

Vegetation was measured at twenty-one (vegetation plot 9 was not sampled) sample vegetation plots (10-meter by 10-meter) within the Site in July 2013 for Year 3 (2013) monitoring per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). 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.

2.2 Streams

The Year 3 (2013) Monitoring survey was completed using a Total Station. Each cross section was 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.

2.3 Wetlands

No wetland monitoring areas were established for this project report.

2.4 Stormwater BMP

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.

Due to poor drainage, BMP #6 was removed during the Hurricane Irene repairs. The forebay and filter bay have been removed and the stormwater pipe now drains through a swale to Adkin Branch.

3.0 RERFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

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.

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.

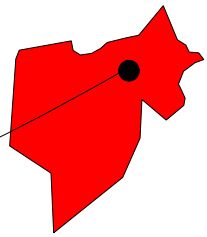
Weakley, Alan S. 2006. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas (online). Available: http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2006-Jan.pdf [January 6, 2006]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel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

APPENDICES

Appendix A. Project Vicinity Map and Background Tables

Lenoir County
North Carolina

PROJECT AREA



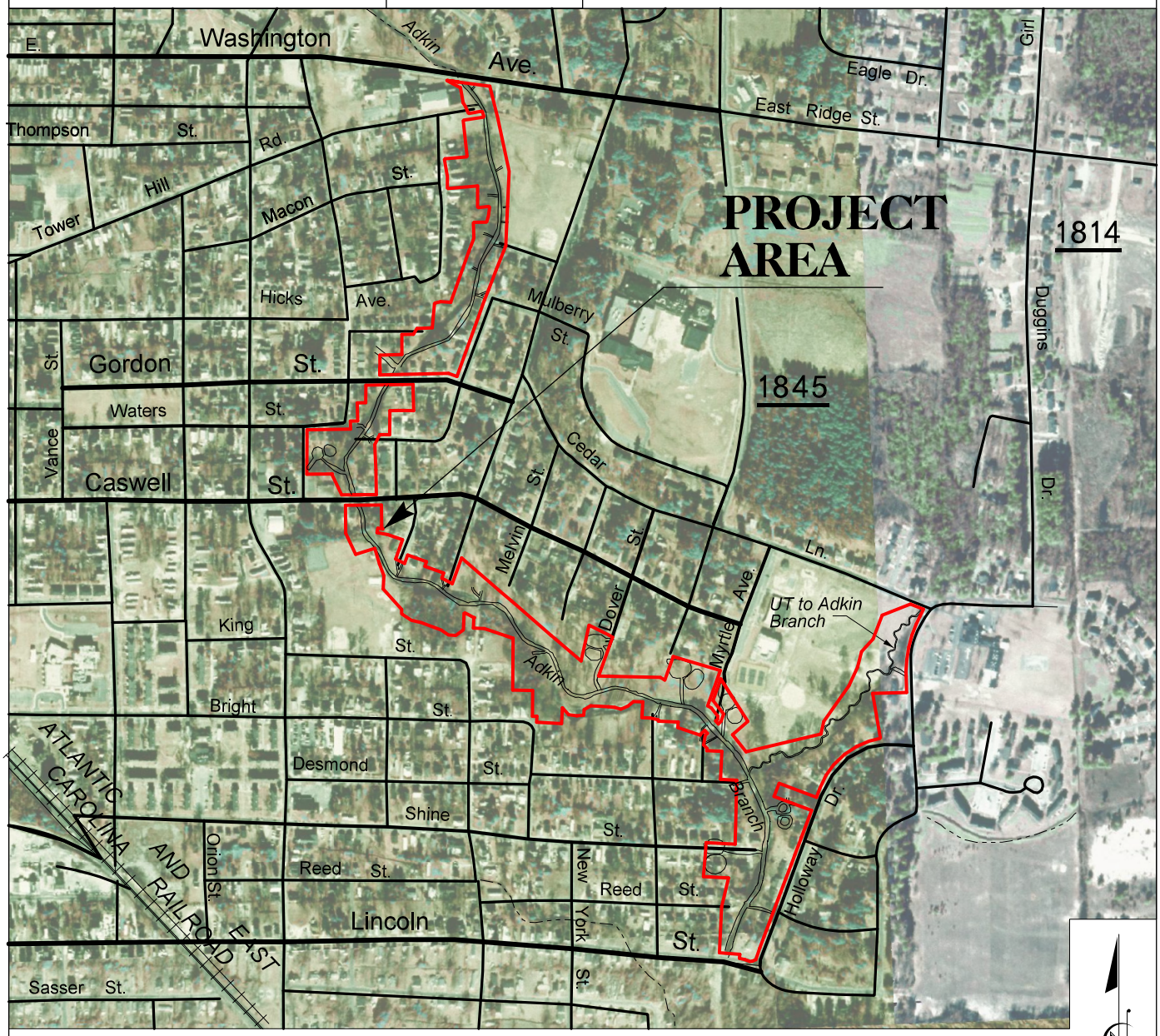
Date: 09/17/13	Figure: 1

Vicinity/Asset Map

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

ICA Engineering
f/k/a Florence & Hutcheson, Inc.
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC 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	Removed
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
Tropical Storm Nicole	*October 2010*	
Begin Tropical Storm Repairs Construction		December 2010
Construction Complete		April 2011
Baseline Monitoring Document	March 2011	July 2011
Hurricane Irene	*August 2011*	
Year 1 Monitoring	October 2011	November 2011
Year 2 Monitoring	November 2012	January 2013
Year 3 Monitoring	August 2013	November 2013
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	ICA Engineering, Inc. f/k/a 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

CURRENT CONDITIONS PLAN VIEW (CCPV)
OVERVIEW

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.0

ICA Engineering
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NC License No: F-0258

NOT TO SCALE

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)			
SCO#:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	09/13

11/27/2013
K:\Projects\Proj\Monitoring\CCPV_Year 3\AdkinBranch_MonitoringYR3_psh_2.0.dgn
Florence & Hutcheson, Inc.

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.1

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25 0 50
SCALE

LEGEND

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

YEAR 3 CONDITIONS

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)			
SCO #: 050656101	COUNTY: LENOIR		
DESIGNED BY: RVS			
CHECKED BY: RKW	DATE: 09/13		

11/27/2013
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CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.2

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25 0 50
SCALE

15" RCP
43+00
ELM STREET
LT
MULBERRY STREET
15" CONC
W/L
SYCAMORE STREET
SS
E
45+00
TB
XS-3
ADKIN BRANCH
XS-4
18" RCP
48+00
SEWER PLUG
8" RCP
VEG PLOT 20
ADKIN BRANCH REACH 1
BEAVER DAM REMNANTS
EXISTING 15" RCP
EXISTING YARD INLET
STORAGE BUILDINGS
SOIL
PINE STREET
HICKS AVENUE
R
W/L

-MATCHLINE- SEE FIGURE NO. 2.1
-MATCHLINE- SEE FIGURE NO. 2.3

LEGEND

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

YEAR 3 CONDITIONS

BANK/BED CONDITION
- MINOR EROSION
- BEAVER DAM

VEGETATION PROBLEM AREAS
- THIN GRASS / BARE

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)			
SCO#:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	09/13

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CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.3

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25 0 50
SCALE

SYCAMORE ROAD
EAST GORDON STREET
CHESTNUT STREET
ADKIN BRANCH
VEG PLOT 18
VEG PLOT 19
BEAVER DAM REMNANTS
BEAVER DAM REMNANTS
SEWER PLUG
XS-5
CREST GAUGE 1
50+00
55+00
ISBKD
CONC
HTR
ISFD
48"CHL
15" DI CONC
15" RCP
GUARDRAIL
CULVERT 3-9X10 BARRELS
15" PIPE
18" RCP
15" RCP
TB
OHE
SS
E
S
–MATCHLINE– SEE FIGURE NO. 2.2
–MATCHLINE– SEE FIGURE NO. 2.4

END ADKIN BRANCH
REACH 1

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

YEAR 3 CONDITIONS

BANK/BED CONDITION
- BEAVER DAM
- BANK WIDENING

VEGETATION PROBLEM AREAS
- THIN GRASS / BARE

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)			
SCO #:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	09/13

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CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.4

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YEAR 3 CONDITIONS

BANK/BED CONDITION

- MODERATE EROSION
- MINOR EROSION
- BANK WIDENING
- BEAVER DAM

VEGETATION PROBLEM AREAS

- THIN GRASS / BARE

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- 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 (YR3)

SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/13

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PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.5

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SCALE: 25 0 50

CURRENT CONDITIONS PLAN VIEW (CCPV)

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- CONSERVATION EASEMENT LINE
- ROOTWAD
- LOG CROSS VANE
- LOG VANE
- LOG SILL
- SOIL LIFT
- XS– MONITORING CROSS SECTION (XS–)
- PRE-CONSTRUCTION TOP OF BANK
- PRE-CONSTRUCTION THALWEG
- HURRICANE REPAIRS

YEAR 3 CONDITIONS

BANK/BED CONDITION

- MINOR EROSION
- BANK WIDENING

VEGETATION PROBLEM AREAS

- THIN GRASS / BARE

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/13

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PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.6

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CURRENT CONDITIONS PLAN VIEW (CCPV)

YEAR 3 CONDITIONS

VEGETATION PROBLEM AREAS

- INVASIVE POPULATION
- THIN GRASS / BARE

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- CONSERVATION EASEMENT LINE
- ROOTWAD
- LOG VANE
- LOG SILL
- SOIL LIFT
- XS– MONITORING CROSS SECTION (XS–)
- PRE-CONSTRUCTION TOP OF BANK
- PRE-CONSTRUCTION THALWEG
- HURRICANE REPAIRS

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)	
050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/13

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CURRENT CONDITIONS PLAN VIEW (CCPV)
PROJECT REFERENCE NO.
ADKIN BRANCH
FIGURE NO.
2.7
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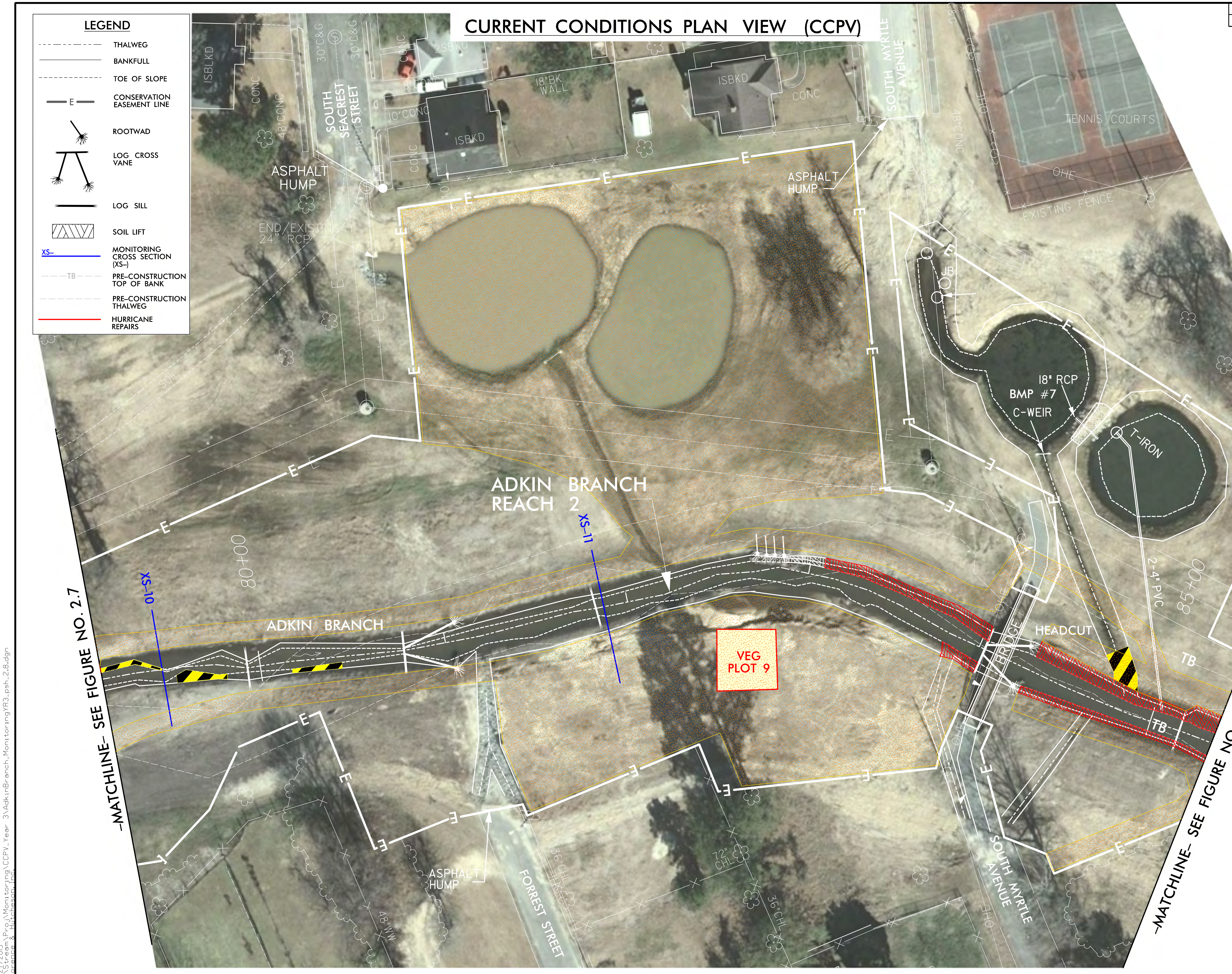
Raleigh, NC 27607
NC License No: F-0258
25
0
50
SCALE
LEGEND
THALWEG
BANKFULL
TOE OF SLOPE
CONSERVATION EASEMENT LINE
ROOTWAD
LOG VANE
LOG SILL
SOIL LIFT
MONITORING CROSS SECTION (XS-)
PRE-CONSTRUCTION TOP OF BANK
PRE-CONSTRUCTION THALWEG
HURRICANE REPAIRS
YEAR 3 CONDITIONS
VEGETATION PROBLEM AREAS
INVASIVE POPULATION
THIN GRASS / BARE
VEGETATION PLOT CONDITIONS
CRITERIA MET
CRITERIA UNMET
MATCHLINE- SEE FIGURE NO. 2.6
MATCHLINE- SEE FIGURE NO. 2.8
XS-8
XS-9
CREST GAUGE 2
VEG PLOT 10
VEG PLOT 11
VEG PLOT 12
CHINA BERRY
JOHNSON GRASS
ADKIN BRANCH REACH 2
ADKIN BRANCH
BMP #5
C-WEIR
EXISTING FENCE
END/EXISTING 24" RCP
DOVER STREET
36" GUM
30" OAK
48" OAK
36" PINE
72" OAK
40" GUM
2-4" PVC
75+00
79+00
TB
MH
CURRENT CONDITIONS PLAN VIEW (CCPV)
ADKIN BRANCH (YR3)
050656101
LENOIR
RVS
RKW
09/13


CURRENT CONDITIONS PLAN VIEW (CCPV)
LEGEND
THALWEG
BANKFULL
TOE OF SLOPE
CONSERVATION EASEMENT LINE
ROOTWAD
LOG CROSS VANE
LOG SILL
SOIL LIFT
MONITORING CROSS SECTION (XS-)
PRE-CONSTRUCTION TOP OF BANK
PRE-CONSTRUCTION THALWEG
HURRICANE REPAIRS
ADKIN BRANCH REACH 2
ADKIN BRANCH
XS-10
XS-11
80+00
85+00
VEG PLOT 9
HEADCUT
BRIDGE
BMP #7
18" RCP
C-WEIR
T-IRON
2-4" PVC
JB
TB
ASPHALT HUMP
END/EXISTING 24" RCP
SOUTH SEACREST STREET
SOUTH MYRTLE AVENUE
FORREST STREET
TENNIS COURTS
EXISTING FENCE
OHE
-MATCHLINE- SEE FIGURE NO. 2.7
-MATCHLINE- SEE FIGURE NO. 2.9

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.8

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25 0 50
SCALE

YEAR 3 CONDITIONS

BANK/BED CONDITION
MODERATE EROSION

VEGETATION PROBLEM AREAS
THIN GRASS / BARE

VEGETATION PLOT CONDITIONS
CRITERIA MET
CRITERIA UNMET

CURRENT CONDITIONS PLAN VIEW (CCPV)
ADKIN BRANCH (YR3)
SCO#: 050656101 COUNTY: LENOIR
DESIGNED BY: RVS
CHECKED BY: RKW DATE: 09/13

11/27/2013
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CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.9

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25 0 50
SCALE

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- CONSERVATION EASEMENT LINE (E)
- ROOTWAD
- LOG CROSS VANE
- LOG VANE
- LOG SILL
- SOIL LIFT
- FLOODPLAIN INTERCEPTOR (FPI)
- MONITORING CROSS SECTION (XS–)
- PRE–CONSTRUCTION TOP OF BANK (TB)
- PRE–CONSTRUCTION THALWEG
- HURRICANE REPAIRS

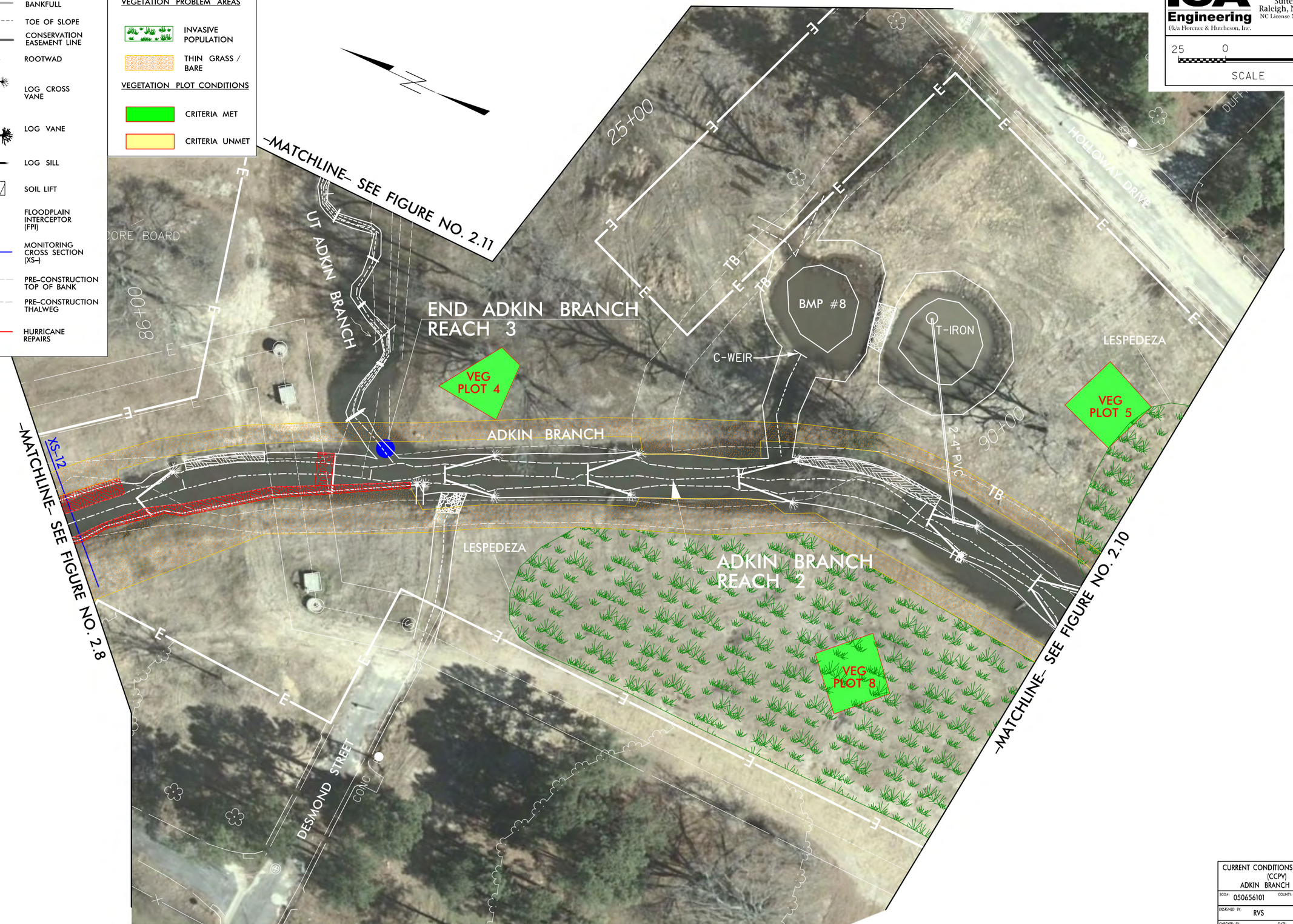
YEAR 3 CONDITIONS

VEGETATION PROBLEM AREAS

- INVASIVE POPULATION
- THIN GRASS / BARE

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET



CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)			
SCO #:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	09/13

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CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.10

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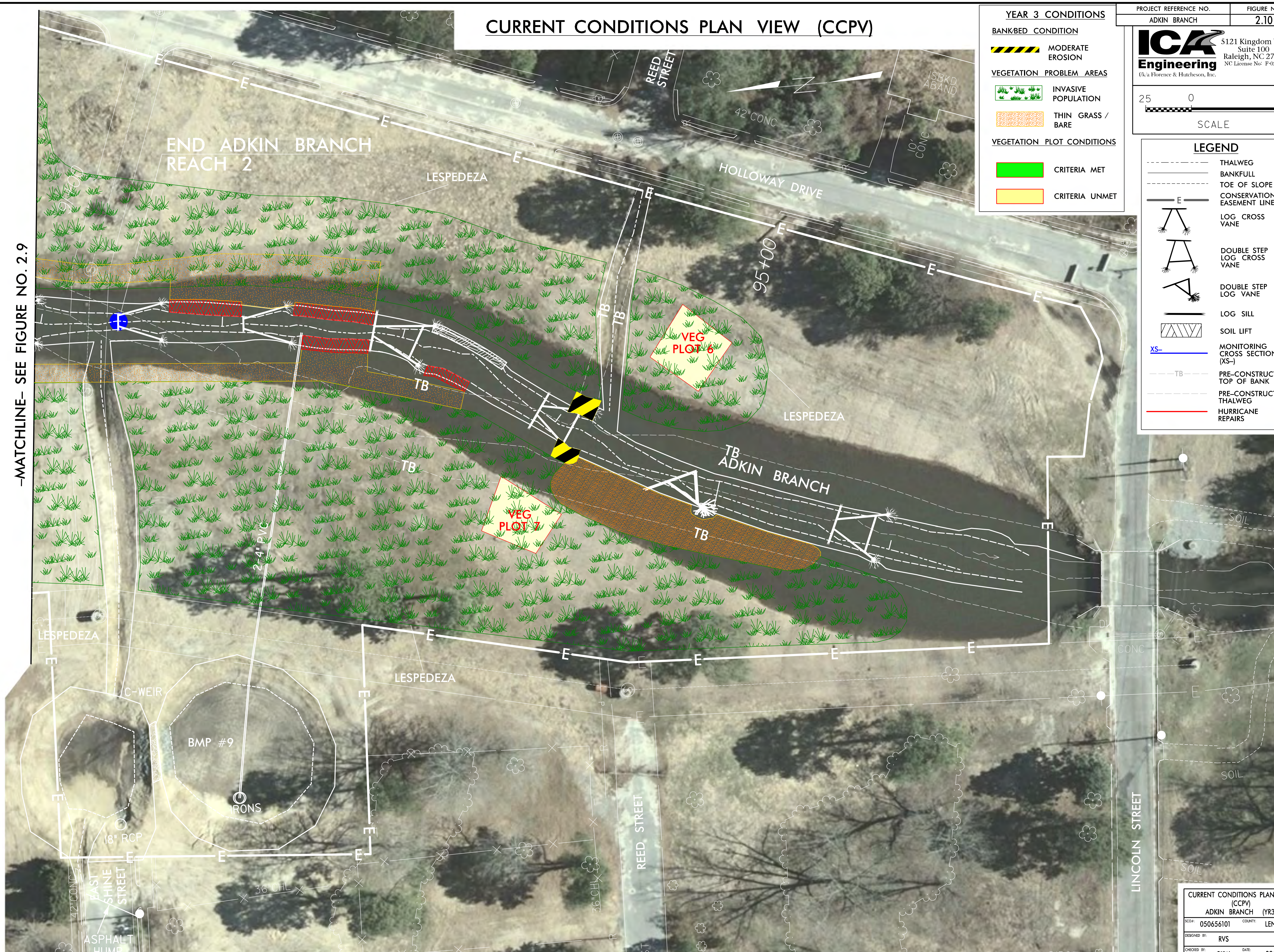

SCALE: 25 0 50

YEAR 3 CONDITIONS

BANK/BED CONDITION
- MODERATE EROSION

VEGETATION PROBLEM AREAS
- INVASIVE POPULATION
- THIN GRASS / BARE

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET

LEGEND

- THALWEG
- BANKFULL
- TOE OF SLOPE
- CONSERVATION EASEMENT LINE
- LOG CROSS VANE
- DOUBLE STEP LOG CROSS VANE
- DOUBLE STEP LOG VANE
- LOG SILL
- SOIL LIFT
- MONITORING CROSS SECTION (XS-)
- PRE-CONSTRUCTION TOP OF BANK
- PRE-CONSTRUCTION THALWEG
- HURRICANE REPAIRS

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR3)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/13

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.11

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25 0 50
SCALE

YEAR 3 CONDITIONS

FALLEN TREE

VEGETATION PLOT CONDITIONS

CRITERIA MET

CRITERIA UNMET

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 (YR3)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/13

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CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.12

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25 0 50
SCALE

YEAR 3 CONDITIONS

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET

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 (YR3)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/13

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Table 5.1 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, EEP IMS No. 7
Adkin Branch Reach 1 - Washington Ave. to Gordon St. - 1,750 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			2	110	94%			
	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	9	9			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			2	100	97%	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	2	100	99%	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.	18	18			100%			

Table 5.2 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, EEP IMS No. 7
Adkin Branch Reach 2 - Gordon St. to Lincoln St. - 3,081 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			4	285	91%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			100%			
	3. Meander Pool Condition	1. Depth Sufficient	14	14			100%			
		2. Length appropriate	14	14			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			11	235	96%	0%	0%	96%
	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			10	916	85%	0%	0%	85%
				Totals	21	1151	94%	0%	0%	94%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	29	29*			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	29	29*			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	29	29*			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)	29	29*			100%			
	4. Habitat	Pool forming structures maintaing ~ Max Pool Depth : Mean Bankfull Depth ratio > 1.6 Rootwads/logs providing some cover at base-flow.	29	29*			100%			

* Two structures (log vanes at sta 76+25 and 77+00) have been removed as part of repair contract which is reflected in updated As-Built and CCPV.

Table 5.3 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, EEP IMS No. 7
UT to Adkin Branch: 1,561 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	26	28			93%			
		2. Length appropriate	26	28			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			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	A few small areas along stream benches throughout the Site have exposed soils with very little vegetative cover.	None	NA	14	3.33	10.1%
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 and subsequently Hurricane Irene.	None	NA	0	0.00	0.0%
			Total	14	3.33	10.1%
3. Areas of Poor Growth Rates or Vigor	Vegetation growth throughout the Site in general is poor.	None	NA	0	0.00	0.0%
			Cumulative Total	14	3.33	10.1%

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]	Several small areas of invasives including Chinese privet, Johnson grass, lespedeza, and Japanese honeysuckle.	0.02	NA	8	2.46	6.1%
5. Easement Encroachment Areas[3]	NA	NA	NA	0	0.00	0.0%

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 3.1-3.24. Vegetation Plot Photos and Problem Areas

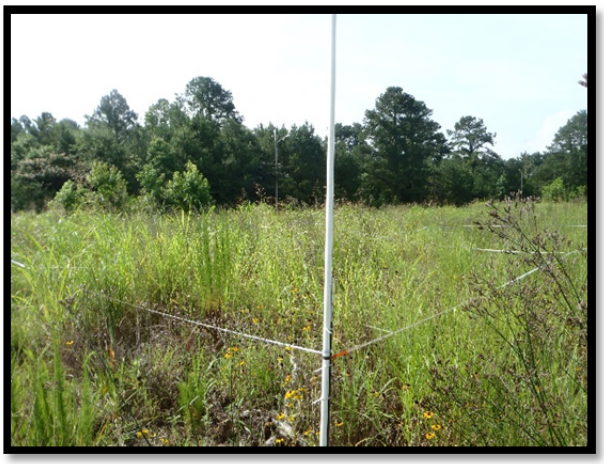
Photos taken July 2013

3.1 Vegetation Plot 1

3.2 Vegetation Plot 2

3.3 Vegetation Plot 3

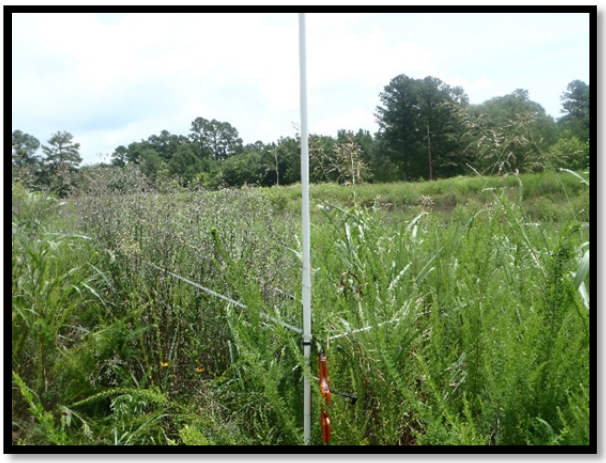
3.4 Vegetation Plot 4



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

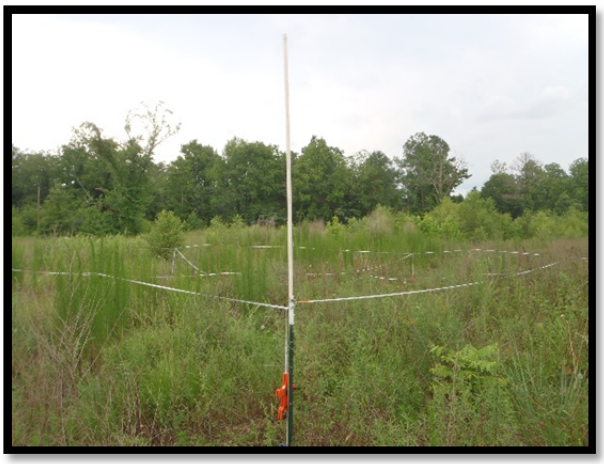
3.13 Vegetation Plot 13

3.14 Vegetation Plot 14

3.15 Vegetation Plot 15

3.16 Vegetation Plot 16

3.17 Vegetation Plot 17

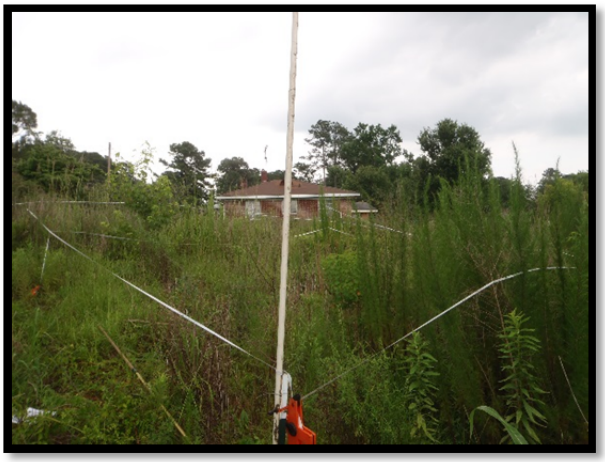


3.18 Vegetation Plot 18

3.19 Vegetation Plot 19

3.20 Vegetation Plot 20

3.19 Vegetation Plot 21



3.20 Vegetation Plot 22

3.21 Minor erosion near 45+00

3.22 Thin grass/bare on right bank of cross section 5

3.23 Severe erosion near cross section 10

3.24 Additional soil lifts

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment

Adkin Branch Restoration Site (EEP Project Number 7)

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	68%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	No*	
7	No	
8	Yes	
9	Not Sampled**	
10	No*	
11	No*	
12	Yes	
13	Yes	
14	Yes	
15	Yes	
16	No	
17	Yes	
18	No	
19	Yes	
20	Yes	
21	Yes	
22	Yes	

*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 American elm (*Ulmus americana*) these plots exceed 320 stems per acre.
**Plot 9 was destroyed in construction and was not sampled.

Table 8. CVS Vegetation Plot Metadata
Adkin Branch Restoration Site (EEP Project Number 7)

Adkin Branch Restoration Site (EEP Project Number 7)

Report Prepared By	Corri Faquin
Date Prepared	8/2/2013 11:56
database name	Axiom-EEP-2013-A-v2.3.1.mdb
database location	\\AE-SBS\RedirectedFolders\pperkinson\Desktop
computer name	PHILLIP-PC
file size	56070144
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. 2013 (Year 3) Total Planted and Natural Recruits Stems by Plot and Species

			Current Plot Data (MY3 2013)																																		
			E7-AXE-0001			E7-AXE-0002			E7-AXE-0003			E7-AXE-0004			E7-AXE-0005			E7-AXE-0006			E7-AXE-0007			E7-AXE-0008			E7-AXE-0009*			E7-AXE-0010			E7-AXE-0011			E7-AXE-0012			E7-AXE-0013			E7-AXE-0014		
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	PnoLS	P-all	T	PnoLS	P-all	T
Abelia	abelia																																		2								
Acer rubrum	red maple	Tree																																									
Alnus serrulata	hazel alder	Shrub	14	17	17																																						
Baccharis halimifolia	eastern baccharis	Shrub												1																													
Betula nigra	river birch	Tree	11	11	11	5	5	5	2	2	2	2	2	2	1	1	1				2	2	2	3	3	3				1	1	1	3	3	3	7	7	7						
Carpinus caroliniana	American hornbeam	Tree													1	1	1							3	3	3										2	2	2						
Carya	hickory	Tree				1	1	1	4	4	12			3																		9			10				3	3	4			
Celtis laevigata	sugarberry	Tree																																1							1	1	1
Cephalanthus occidentalis	common buttonbush	Shrub																																									
Cercis canadensis	eastern redbud	Tree				1	1	1							6	6	6													1	1	1	1	1	1				1	1	1			
Cornus amomum	silky dogwood	Shrub	29	32	32																																						
Crataegus	hawthorn	Tree																																									
Juniperus virginiana	eastern redcedar	Tree						1						1																													
Liquidambar styraciflua	sweetgum	Tree						32			4																					4									2			
Melia azedarach	Chinaberrytree	Exotic																																								1
Morus alba	white mulberry	Exotic																																									
Pinus	pine	Tree																																									
Pinus taeda	loblolly pine	Tree			3			4												1																							
Platanus occidentalis	American sycamore	Tree																																									
Populus deltoides	eastern cottonwood	Tree																																									
Prunus serotina	black cherry	Tree						2			4			3			2						3												2								
Pyrus	pear	Tree																																									
Quercus	oak	Tree		1	1				1	1	1	2	2	2	3	3	3	1	1	1				1	1	1													1	1	1			
Quercus falcata	southern red oak	Tree				7	7	7	7	7	7	3	3	3	4	4	4	5	5	5	1	1	1	4	4	4				2	2	2	1	1	1	3	3	3	4	4	4	5	5	5
Quercus nigra	water oak	Tree							2	2	2	2	2	2				1	1	1																							
Quercus phellos	willow oak	Tree				1	1	1	2	2	13																																	
Quercus rubra	northern red oak	Tree																			1	1	1																					
Robinia pseudoacacia	black locust	Tree																																									
Salix nigra	black willow	Tree	2	11	18																																						
Sassafras albidum	sassafras	Tree						1																																			
Taxodium distichum	bald cypress	Tree				1	1	1																																			
Ulmus	elm	Tree																																						2	2	2			
Ulmus alata	winged elm	Tree																																										
Ulmus americana	American elm	Tree															1			1				1	1	1										1	1	1			3	1	1	1
Unknown		Shrub or Tree										2	2	2																													
		Stem count	56	72	82	16	16	56	18	18	45	11	11	19	15	15	18	7	7	9	4	4	7	12	12	12	0	0	0	4	4	17	5	5	18	13	13	15	9	9	15	9	9	10
		size (ares)	1			1			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			0.02			0.02		
		Species count	4	5	6	6	6	11	6	6	8	5	5	9	5	5	7	3	3	5	3	3	4	5	5	5	0	0	0	3	3	5	3	3	6	4	4	5	4	4	6	4	4	5
		Stems per ACRE	2266	2914	3318	647.5	647.5	2266	728.4	728.4	1821	445.2	445.2	768.9	607	607	728.4	283.3	283.3	364.2	161.9	161.9	283.3	485.6	485.6	485.6	0	0	0	161.9	162	688	202.3	202	728	526.1	526	607	364.2	364	607	364.2	364	405

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%

*Plot destroyed in construction and was not sampled.

Table 9. 2013 (Year 3) Total Planted and Natural Recruits Stems by Plot and Species (continued)

			Current Plot Data (MY3 2013)																							Annual Means								
			E7-AXE-0015			E7-AXE-0016			E7-AXE-0017			E7-AXE-0018			E7-AXE-0019			E7-AXE-0020			E7-AXE-0021			E7-AXE-0022			MY3 (2013)			MY2 (2012)			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
Abelia	abelia																											2									
Acer rubrum	red maple	Tree																																3			
Alnus serrulata	hazel alder	Shrub																									14	17	17	14	17	20	15	18	18	1	1	1
Baccharis halimifolia	eastern baccharis	Shrub																					2					3			6			1				
Betula nigra	river birch	Tree	2	2	2	2	2	2	3	3	3				1	1	1	4	4	4	2	2	2	3	3	3	54	54	54	55	55	64	45	45	45	82	82	82
Carpinus caroliniana	American hornbeam	Tree													5	5	5	4	4	4							15	15	15	12	12	12	14	14	14	48	48	48
Carya	hickory	Tree	2	2	2				1	1	6	2	2	2	3	3	3	2	2	3	1	1	1				19	19	56	18	18	101	18	18	52	30	30	30
Celtis laevigata	sugarberry	Tree																									1	1	2									
Cephalanthus occidentalis	common buttonbush	Shrub																																		44	44	44
Cercis canadensis	eastern redbud	Tree	1	1	1							1	1	1				1	1	1	2	2	2	2	2	2	17	17	17	17	17	17	7	7	7			
Cornus amomum	silky dogwood	Shrub	2	2	2				1	1	1																32	35	35	38	41	41	51	55	55	70	70	70
Crataegus	hawthorn	Tree																																				1
Juniperus virginiana	eastern redcedar	Tree																											2									
Liquidambar styraciflua	sweetgum	Tree															10			5						7			64			95			92			70
Melia azedarach	Chinaberrytree	Exotic																											1									
Morus alba	white mulberry	Exotic			1																								1			2						
Pinus	pine	Tree																																4				
Pinus taeda	loblolly pine	Tree																		1									9			10			10			1
Platanus occidentalis	American sycamore	Tree																																3				7
Populus deltoides	eastern cottonwood	Tree																																5				
Prunus serotina	black cherry	Tree			2						3												2						23	1	1	18	2	2	18	8	8	8
Pyrus	pear	Tree																														2						
Quercus	oak	Tree							2	2	2																11	12	12	14	15	15	18	19	19	48	48	48
Quercus falcata	southern red oak	Tree	3	3	3	3	3	3	2	2	2	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5	75	75	75	76	76	76	63	63	63	135	135	135
Quercus nigra	water oak	Tree	1	1	1										1	1	1				2	2	2				9	9	9	9	9	9	9	9	9	7	7	7
Quercus phellos	willow oak	Tree	4	4	4	1	1	1	2	2	2																10	10	21	8	8	16	4	4	36			
Quercus rubra	northern red oak	Tree																									1	1	1	1	1	1	1	1	1			
Robinia pseudoacacia	black locust	Tree																														3						4
Salix nigra	black willow	Tree																									2	11	18	2	11	27	2	11	11	1	22	22
Sassafras albidum	sassafras	Tree																											1			4			4			
Taxodium distichum	bald cypress	Tree																									1	1	1	1	1	1	1	1	1			
Ulmus	elm	Tree																									2	2	2	2	2	3						
Ulmus alata	winged elm	Tree																																		1	1	1
Ulmus americana	American elm	Tree																1	1	1							4	4	9									
Unknown		Shrub or Tree																									2	2	2	2	2	2	4	4	4	4	4	13
		Stem count	15	15	18	6	6	6	11	11	19	6	6	6	14	14	24	16	16	23	12	12	16	10	10	17	269	285	452	270	286	545	254	271	475	479	500	592
		size (ares)	1			1			1			1			1			1			1			1			22			22			22			22		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.54			0.54			0.54			0.54		
		Species count	7	7	9	3	3	3	6	6	7	3	3	3	5	5	6	6	6	8	5	5	7	3	3	4	17	17	26	16	16	23	15	15	23	13	13	18
		Stems per ACRE	607	607	728.4	242.8	242.8	242.8	445.2	445.2	768.9	242.8	242.8	242.8	566.6	566.6	971.2	647.5	647.5	930.8	485.6	485.6	647.5	404.7	404.7	688	494.8	524.3	831.4	496.7	526.1	1003	467.2	498.5	873.8	881.111	919.7401	1088.972

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%

Ecosystem Enhancement PROGRAM

January 25, 2012

Mr. Peter Jelenevsky
Fluvial Solutions, Inc.
P.O. Box 28749
Raleigh, NC 27611

Re: Vegetation Warranty Site Assessment Findings
Adkin Branch Tropical Storm Repairs
SCO # 05-06561-01B

Mr. Jelenevsky:

As stated in the January 25, 2012 letter from Ed Hajnos, a significant portion the Adkin Branch project site did not meet the vegetation warranty criteria as stated in contract documents. As per SCO contract 05-06561-01B, Special Provision Section 6.0, bare roots were to survive at a rate of 80%. Subsequently, Change Order No.1 allowed the addition of eighty-six (86) Ball and Burlap plantings (at Holloway Park) which are also under the 80% survival rate. The warranty period began 4/1/2011 and will expire 4/1/2012.

Planted vegetation at the Adkin Branch site was assessed in September 2011 by the project design firm's subconsultant, Axiom Environmental, Inc. (Axiom). Data collected during the sampling efforts report significantly higher plant mortality than contractually permissible. Warranty replant numbers are based on the data collected. Field methodology and data are described below.

September 2011 Vegetation Inspection

Twenty-two (22) CVS vegetation plots were established, each 1,076 sq ft (10m x 10m). All planted bare roots present within the plot were counted towards the warranty criteria, including those that were top-dead but were re-sprouting at their base. The spatial location of the 22 CVS plots is shown on the attached Vegetation Inspection Map.

The Ball and Burlap trees planted along the tributary at Holloway Park were also inspected while on site for viability.

Results

In Coastal Plain Levee Forest Planting Zones, 680 stems were required to be planted per acre. In order to satisfy the 80% warranty survival rate, 544 stems per acre are required to survive the warranty period, which is equivalent to 12 living stems per inspection plot.

Of the 22 inspection plots, 15 did not meet the 80% survival warranty. A total of twenty-eight (28) of the 86 Ball and Burlap trees have died or appear to be in poor health.

Coastal Plain Levee Forest Planting Zone – CVS Inspection plot results

Plot	Living bare roots and shrubs	Required stems per plot	Warranty met	Supplemental planting density/acre needed to meet warranty
1	70	12	Yes	None
2	12	12	Yes	None
3	18	12	Yes	None
4	15	12	Yes	None
5	15	12	Yes	None
6	9	12	No	131
7	4	12	No	348
8	4	12	No	348
9	1	12	No	479
10	6	12	No	261
11	4	12	No	348
12	5	12	No	305
13	11	12	No	44
14	1	12	No	479
15	20	12	Yes	None
16	3	12	No	392
17	8	12	No	174
18	7	12	No	218
19	11	12	No	44
20	11	12	No	44
21	12	12	Yes	None
22	7	12	No	218

Coastal Plain Levee Forest Planting Zone – Warranty Inspection plot results

Twenty (20) warranty inspection plots (non-CVS vegetation data) were established by Axiom, each 1,612 sq feet (25m x 6m). All planted bare roots present within the plot were counted towards the warranty criteria, including those that were top-dead but were re-sprouting at their base. Given 680 stems were planted per acre, 544 per acre were required to survive 1 year, or 20 per plot to meet the 80% warranty. None of the 20 sample plots met the survival criteria (Vegetation Inspection Map attached).

Plot	Living bare roots and shrubs	Required stems per plot	Warranty met	Supplemental planting density/acre needed to meet warranty
1	4	20	No	432
2	9	20	No	297
3	3	20	No	459
4	4	20	No	432
5	14	20	No	162
6	1	20	No	513
7	7	20	No	351
8	2	20	No	486
9	4	20	No	432
10	5	20	No	405
11	7	20	No	351
12	5	20	No	405
13	10	20	No	270
14	9	20	No	297
15	10	20	No	270
16	11	20	No	243
17	10	20	No	270
18	5	20	No	405
19	10	20	No	270
20	4	20	No	432

Supplemental Planting

The table below shows the number of stems needed to be planted in 4 areas. These areas are also depicted on the Supplemental Planting Map (attached). The planting zone for each is Coastal Plain Levee Forest (CPLF). The number of stems needed in each area was calculated by multiplying the average number of stems needed to meet warranty per plot by the acreage of the given area. Areas 1-4 were sectioned off due to similar plant deficiencies or a topographic break and are shown on the attached Supplemental Planting Map. A total of 11 Ball and Burlap trees also need to be replanted to meet the warranty.

Bare Root – Supplemental Planting

Area	Station (Looking Downstream)	Planting Zone	Average stems/ac needed	Acres	Total plants needed	Approximate stem spacing
Area 1	Washington St. to East Gordon Street	CPLF	226	6.21	1403	13 ft
Area 2	East Gordon St to STA 65+20	CPLF	333	4.97	1655	11 ft
Area 3	STA 67+65 to STA 81+20	CPLF	338	6.30	2129	11 ft
Area 4	STA 81+20 to Lincoln St.	CPLF	344	8.52	2931	11 ft
				26	**8,118**	

Instructions

- The Supplemental Planting effort needs to be coordinated with EEP so we can arrange to be on site.
- All replant materials must conform to the original project specification (dormant season planting, species composition, size, vigor, etc.).
- The Supplemental Planting effort must take place in the dormant season for Lenoir County; November 15th – March 15th
- ATVs and trucks will be permitted to be used during the replant; however, vehicles are to be driven in upland areas only where no bare roots, shrubs or Ball and Burlap trees were planted.
- Dead trees need to be removed from the site.

Although the warranty for this project doesn't expire until April 1, 2012, EEP does not intend to reassess this site for additional warranty compliance. Plants installed during the warranty replant will not themselves have a warranty placed on them. Once Fluvial Solutions, Inc. complies with this replanting, an Article 27 Satisfaction Letter will be awarded.

As stated in Ed Hajnos's January 25, 2012 letter, please call me at your earliest convenience with questions regarding the supplemental planting at Adkin Branch. My contact information can be found below.

Thank you,

Kristie Corson

NC Department of Environment and Natural Resources
Ecosystem Enhancement Program
Eastern Project Manager
Raleigh, NC
Office (919) 715-1954
Cell (919) 218-1373
Kristie.Corson@ncdenr.gov

cc: Bobbi D. Pendleton, Attorney In Fact, Western Surety Company
Clyde Carl, SCO Project Monitor
Jeff Jurek, EEP
Jeff Schaffer, EEP
Ed Hajnos, EEP
Lin Xu, EEP Review Coordinator

Adkin Branch Vegetation Inspection Map

22 / 7
18 / 5
17 / 10
21 / 12
19 / 10
16 / 11
20 / 11
20 / 4
15 / 10
19 / 11
14 / 9
18 / 7
1 / 70
5 / 14
2 / 12
3 / 18
6 / 1
9 / 1
4 / 15
4 / 4
3 / 3
7 / 7
5 / 15
8 / 4
12 / 5
17 / 8
16 / 3
13 / 10
13 / 11
8 / 2
12 / 5
9 / 4
14 / 1
11 / 4
11 / 7
15 / 20
10 / 6
10 / 5
7 / 4
6 / 9
1 / 4
2 / 9

Legend

EEP Plot Live Trees

- 1 - 7
- 8 - 14
- 15 - 19
- 20 - 70

CVS Plot Live Trees

- 1 - 4
- 5 - 8
- 9 - 11
- 12 - 70
- Conservation Easement

N

Plot Notation Key: Plot Number / Number of Live Trees in Plot

25-Jan-2012

0 250 500 1,000 1,500 2,000 Feet

Adkin Branch Bare Root Supplemental Planting Map

Area 1
1403
stems

Area 2
1655 stems

Area 3
2129
stems

Area 4
2931
stems

Legend

EEP Plot Live Trees

- 1 - 7
- 8 - 14
- 15 - 19
- 20 - 70

CVS Plot Live Trees

- 1 - 4
- 5 - 8
- 9 - 11
- 12 - 70

Planting Areas

- Area 1
- Area 2
- Area 3
- Area 4
- Conservation Easement

N

25-Jan-2012

0 250 500 1,000 1,500 2,000 Feet

Table C1. Bare Root Species Replanted at Adkin Branch (March 8, 2012)

Common Name	Scientific Name	Number Planted
Black cherry	*Prunus serotina*	1,000
Ironwood	*Carpinus caroliniana*	1,000
Mockernut hickory	*Carya tomentosa*	1,000
Riverbirch	*Betula nigra*	1,118
Slippery elm	*Ulmus rubra*	1,000
Southern red oak	*Quercus falcata*	1,000
Water oak	*Quercus nigra*	1,000
Winged elm	*Ulmus alata*	1,000

Table C2. Ball and Burlap Species Replanted at Adkin Branch (March 8, 2012)

Common Name	Scientific Name	Number Planted
Green ash	*Fraxinus pennsylvanica*	3
Riverbirch	*Betula nigra*	3
Sycamore	*Platanus occidentalis*	3
Willow oak	*Quercus phellos*	2

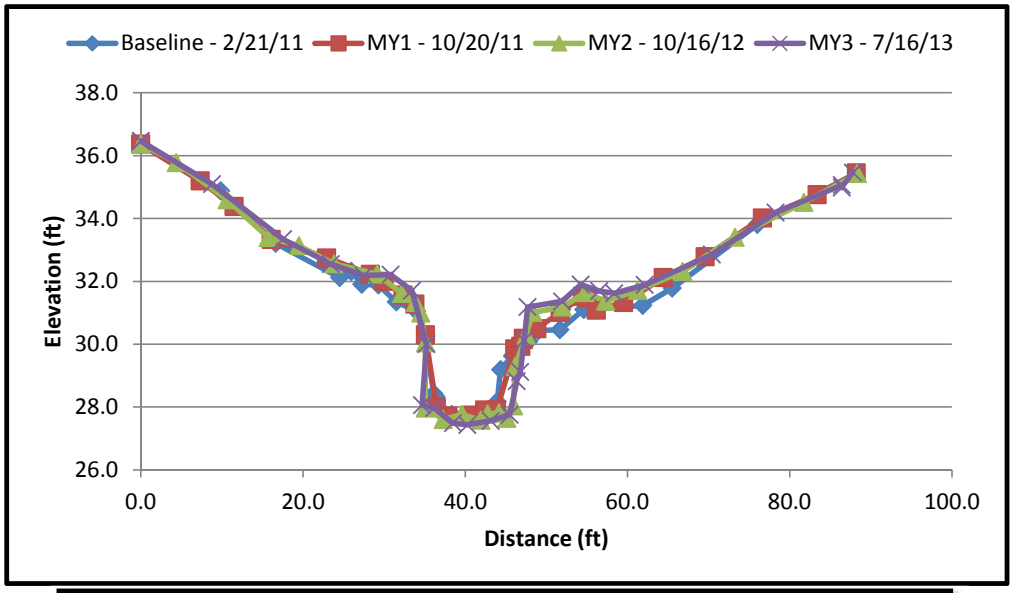
Appendix D. Stream Survey Data

Figures 4.1-4.17. Cross Section Plots and Photos

Adkin Branch, 05065611, Reach 1

XS-1 Riffle, Sta. 37+42

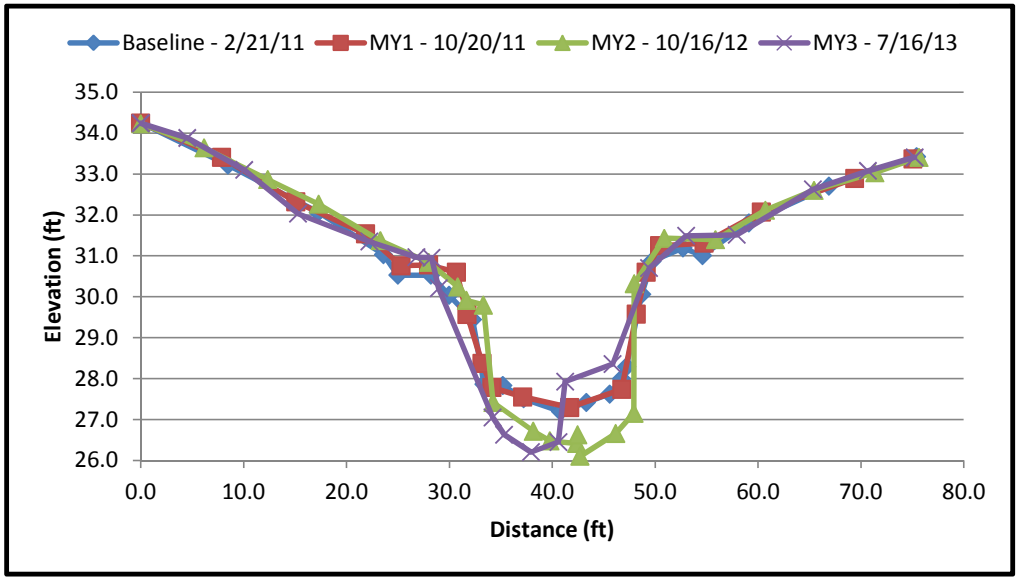
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	36.38	0.00	36.37	0.00	36.37	0.00	36.47
9.86	34.88	7.34	35.19	4.36	35.78	8.79	35.09
16.62	33.21	11.50	34.38	10.66	34.59	17.55	33.34
24.51	32.12	16.09	33.34	15.70	33.40	23.41	32.55
25.95	32.31	22.92	32.75	19.48	33.14	27.48	32.19
27.26	31.91	28.30	32.23	23.80	32.55	30.80	32.21
29.31	31.89	30.00	32.00	29.16	32.23	33.42	31.71
31.49	31.34	32.35	31.56	32.15	31.62	35.21	30.00
33.99	31.05	33.78	31.27	33.84	31.32	34.66	28.06
35.11	30.06	35.08	30.30	34.52	30.99	36.17	27.97
36.12	28.42	36.45	27.99	35.08	30.04	38.47	27.49
36.41	28.32	37.87	27.71	35.05	27.96	40.28	27.43
37.29	27.83	40.95	27.74	37.28	27.61	43.14	27.56
38.32	27.76	42.41	27.91	39.61	27.76	45.47	27.76
41.02	27.67	43.87	27.90	41.91	27.58	46.34	28.82
42.56	27.78	46.09	29.85	42.76	27.78	46.78	29.12
43.94	28.17	46.85	29.93	44.16	27.82	47.24	30.12
44.35	29.19	47.15	30.18	45.12	27.64	47.67	31.18
45.81	29.62	48.83	30.49	45.93	28.04	51.92	31.36
47.84	30.09	51.70	31.01	46.14	29.29	54.22	31.89
49.03	30.44	54.46	31.52	47.49	30.28	56.53	31.69
51.68	30.46	55.03	31.46	48.32	31.01	58.37	31.62
54.61	31.10	56.16	31.09	51.93	31.18	62.13	31.89
61.87	31.23	59.51	31.32	54.76	31.64	70.41	32.85
65.51	31.78	64.40	32.12	57.30	31.37	78.25	34.18
76.01	33.81	69.56	32.78	61.23	31.71	86.42	35.06
88.18	35.44	76.64	34.02	66.79	32.31	86.39	34.98
		83.37	34.75	73.26	33.41	87.77	35.46
		88.23	35.45	81.76	34.51		
				88.35	35.43		



Adkin Branch, 05065611, Reach 1

XS-2 Pool, Sta. 38+94

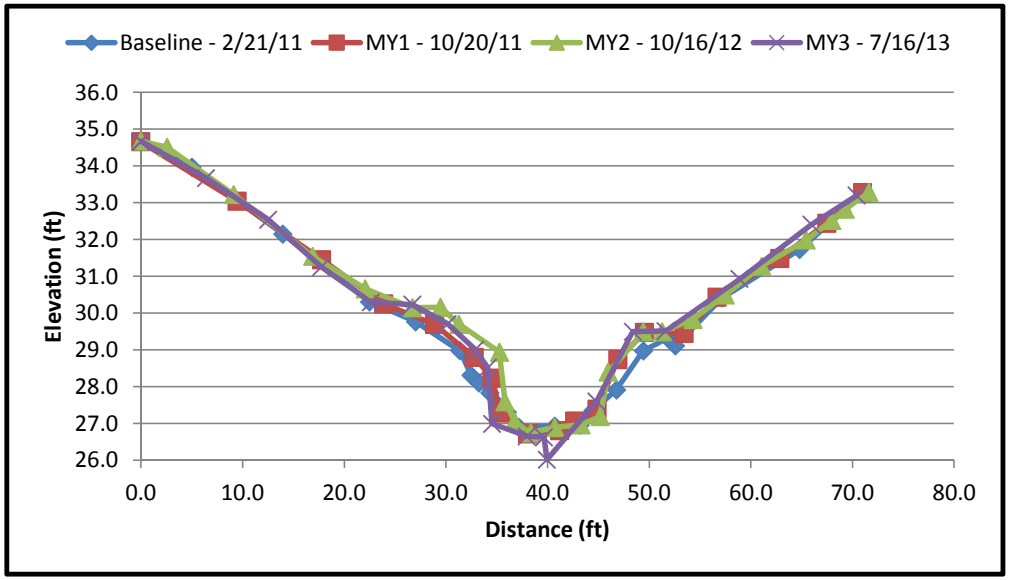
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	34.25	0.00	34.25	0.00	34.23	0.00	34.24
8.48	33.22	7.85	33.40	6.14	33.64	4.54	33.88
17.26	32.07	15.07	32.32	12.34	32.87	10.08	33.10
23.59	31.03	21.85	31.54	17.29	32.27	15.28	32.03
24.98	30.53	25.29	30.76	23.27	31.37	22.22	31.35
28.19	30.53	27.97	30.78	27.98	30.84	26.81	30.96
29.98	30.03	30.68	30.60	30.81	30.24	28.27	30.95
32.23	29.44	31.72	29.57	31.65	29.91	28.96	30.21
33.36	27.87	33.17	28.37	33.30	29.80	34.21	27.05
35.19	27.83	34.15	27.78	34.23	27.42	35.33	26.63
37.22	27.51	37.13	27.55	38.14	26.71	37.94	26.20
40.78	27.20	41.68	27.30	39.77	26.48	40.59	26.45
43.31	27.42	46.75	27.74	42.39	26.41	41.24	27.92
45.59	27.62	48.16	29.58	42.48	26.63	45.86	28.35
46.73	27.99	49.13	30.60	42.70	26.10	49.41	30.70
47.22	28.30	50.42	31.25	46.16	26.66	53.00	31.49
48.68	30.06	54.76	31.31	47.93	27.15	57.91	31.52
49.68	30.87	60.32	32.07	47.96	30.32	65.33	32.62
52.71	31.19	69.40	32.89	50.90	31.43	70.68	33.08
54.58	31.01	75.04	33.37	55.87	31.39	75.20	33.41
59.11	31.81			60.73	32.12		
66.89	32.70			65.44	32.61		
75.41	33.42			71.35	33.03		
				75.65	33.41		



Adkin Branch, 05065611, Reach 1

XS-3 Riffle, Sta. 44+67

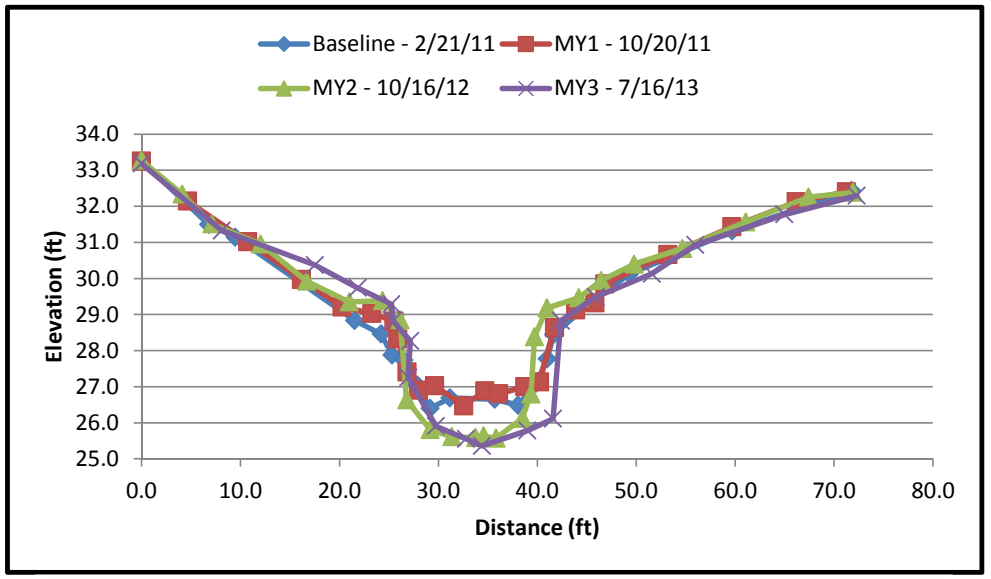
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	34.68	0.00	34.65	0.00	34.67	0.00	34.67
5.04	33.96	9.47	33.04	2.59	34.50	6.41	33.67
13.96	32.14	17.77	31.45	9.13	33.23	12.52	32.54
22.51	30.31	23.88	30.25	16.91	31.54	17.75	31.25
27.04	29.77	28.88	29.69	22.05	30.66	22.62	30.29
31.37	28.98	32.78	28.80	26.70	30.15	26.71	30.23
32.48	28.31	34.56	28.24	29.50	30.15	30.18	29.71
33.27	28.11	35.32	27.29	31.29	29.69	32.88	29.01
34.34	27.84	38.06	26.72	35.26	28.94	34.13	28.52
35.11	27.51	41.20	26.81	35.81	27.59	34.54	27.00
36.05	27.31	42.66	27.07	36.77	27.06	37.95	26.66
37.20	26.90	44.87	27.40	38.35	26.75	39.65	26.63
40.71	26.93	46.91	28.74	40.72	26.90	39.93	26.02
43.22	26.96	49.53	29.48	43.31	26.97	44.82	27.60
44.45	27.35	53.45	29.45	45.18	27.19	48.39	29.49
46.78	27.91	56.69	30.43	45.98	28.40	51.61	29.51
49.43	28.97	62.83	31.49	49.44	29.49	58.88	30.93
51.83	29.32	67.46	32.44	51.30	29.49	65.95	32.40
52.60	29.12	71.00	33.27	54.31	29.83	70.40	33.19
57.19	30.42			57.50	30.50		
64.81	31.73			61.07	31.28		
71.17	33.27			65.47	31.99		
				67.99	32.52		
				69.31	32.83		
				71.61	33.28		



Adkin Branch, 05065611, Reach 1

XS-4 Pool, Sta. 46+81

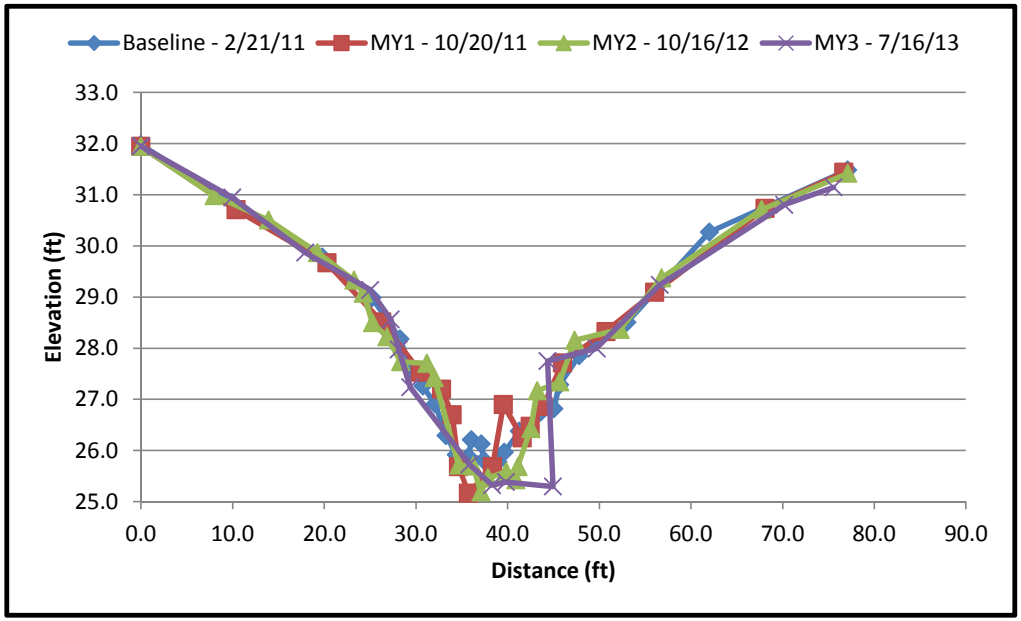
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	33.26	0.00	33.25	0.00	33.27	0.00	33.19
6.80	31.49	4.64	32.15	4.11	32.34	8.11	31.33
9.47	31.14	10.74	31.01	7.10	31.51	17.51	30.37
21.52	28.84	16.16	29.97	12.04	30.95	21.84	29.74
24.22	28.46	20.27	29.21	16.69	29.92	25.26	29.28
25.32	27.87	23.29	29.03	20.99	29.35	25.41	28.83
26.50	27.73	25.51	28.82	24.36	29.38	27.15	28.27
27.87	27.05	25.89	28.32	26.13	28.86	26.95	27.26
29.15	26.40	26.84	27.40	26.79	26.64	29.75	25.91
31.16	26.69	28.01	26.90	29.16	25.81	32.79	25.55
35.70	26.65	29.61	27.03	31.36	25.62	34.39	25.35
38.06	26.48	32.56	26.47	33.76	25.58	39.00	25.78
39.91	27.10	34.68	26.88	34.58	25.63	41.59	26.11
40.99	27.77	36.07	26.81	35.81	25.57	42.38	28.83
41.64	28.45	38.75	26.99	38.50	26.12	45.90	29.49
45.49	29.36	40.21	27.14	39.36	26.80	51.56	30.13
49.30	30.12	41.73	28.64	39.70	28.38	55.98	30.93
59.69	31.31	43.87	29.13	40.96	29.18	64.97	31.78
71.76	32.43	45.81	29.32	44.20	29.46	72.26	32.29
		46.83	29.84	46.45	29.94		
		53.19	30.66	49.79	30.39		
		59.66	31.43	54.67	30.83		
		66.17	32.13	61.07	31.57		
		71.22	32.40	67.43	32.26		
				71.92	32.39		



Adkin Branch, 05065611, Reach 1

XS-5 Riffle, Sta. 51+47

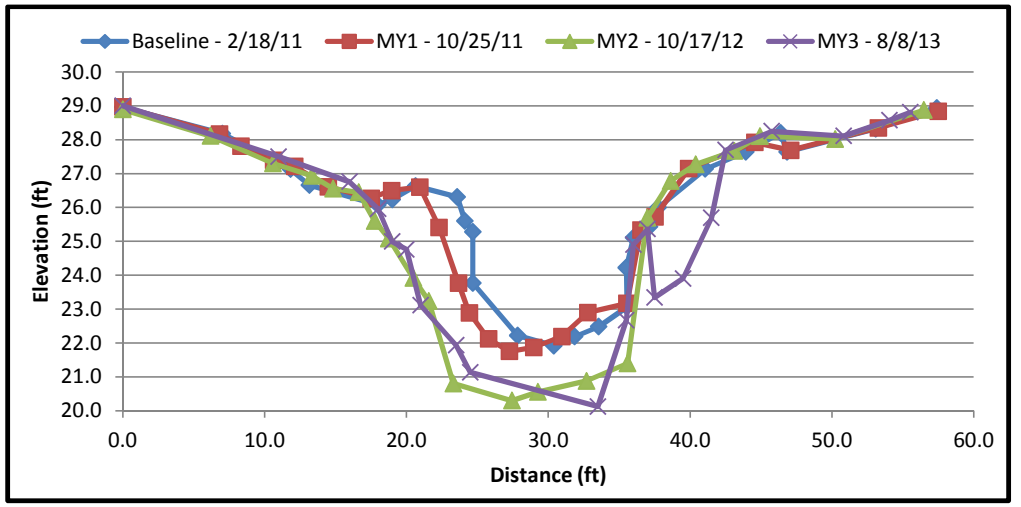
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	31.97	0.00	31.94	0.00	31.95	0.00	31.95
9.93	30.85	10.41	30.71	7.99	30.98	9.96	30.94
19.77	29.78	20.29	29.67	13.92	30.51	17.92	29.87
25.24	28.98	26.27	28.51	19.27	29.87	25.01	29.14
28.26	28.18	30.50	27.53	23.25	29.33	27.24	28.56
29.51	27.58	32.79	27.20	24.24	29.07	28.13	27.98
30.76	27.26	33.94	26.70	25.25	28.50	29.39	27.23
32.09	26.91	34.66	25.68	26.82	28.23	35.84	25.73
33.29	26.29	35.74	25.16	28.34	27.74	38.30	25.32
34.40	25.91	38.34	25.69	31.18	27.71	39.83	25.38
35.72	25.88	39.54	26.90	32.01	27.42	44.94	25.30
36.05	26.21	41.60	26.25	34.67	25.71	44.36	27.75
37.13	26.13	42.45	26.47	36.25	25.69	49.71	27.99
37.42	25.81	43.86	26.86	37.08	25.19	56.61	29.24
38.94	25.78	45.98	27.71	37.86	25.47	70.16	30.80
39.65	25.96	50.73	28.33	39.84	25.58	75.55	31.14
41.28	26.38	56.05	29.10	40.90	25.43		
43.58	26.75	68.09	30.73	41.13	25.69		
45.04	26.82	76.66	31.44	42.55	26.43		
45.66	27.28			43.22	27.17		
47.79	27.86			45.69	27.34		
53.02	28.51			47.32	28.15		
62.00	30.27			52.26	28.37		
77.07	31.48			56.82	29.38		
				67.74	30.71		
				77.13	31.42		



Adkin Branch, 05065611, Reach 2

XS-6 Pool, Sta. 64+81

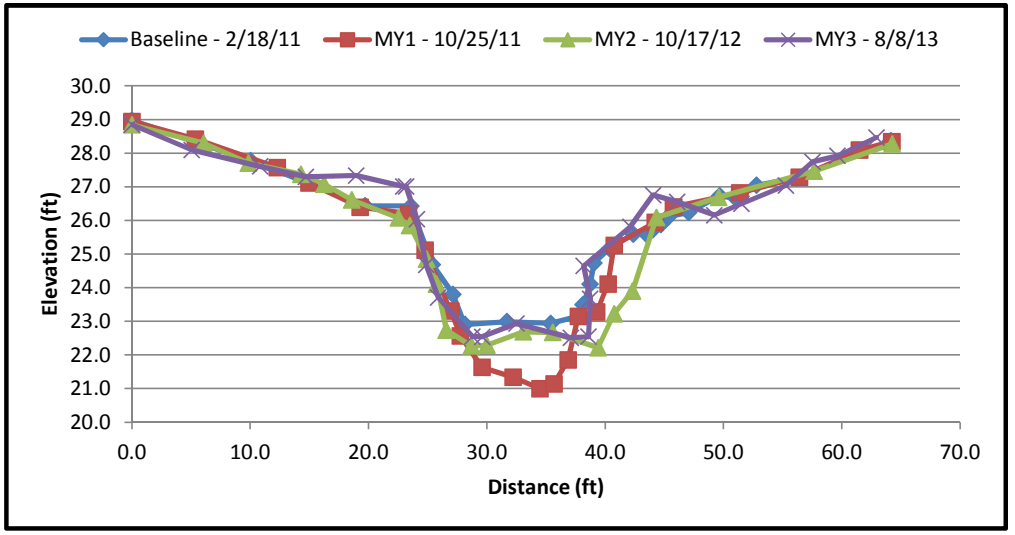
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	28.96	0.00	28.97	0.00	28.89	0.00	29
7.02	28.18	6.82	28.17	6.19	28.11	11.00	27.5
11.82	27.13	8.32	27.81	10.58	27.3	16.00	26.76
13.15	26.66	10.62	27.39	13.33	26.93	18.00	25.96
17.98	26.08	12.11	27.21	14.82	26.55	19.00	24.99
18.99	26.23	14.48	26.61	16.62	26.44	20.00	24.76
20.64	26.63	17.51	26.27	17.76	25.6	21.00	23.11
23.57	26.31	18.95	26.5	18.76	25.08	23.50	21.93
24.13	25.60	20.94	26.6	20.49	23.92	24.50	21.13
24.68	25.28	22.30	25.41	21.56	23.24	33.50	20.12
24.68	23.77	23.66	23.77	23.30	20.8	35.50	22.67
27.84	22.22	24.43	22.89	27.43	20.3	36.00	24.9
30.39	21.92	25.79	22.12	29.26	20.55	37.00	25.36
31.86	22.19	27.26	21.75	32.69	20.88	37.50	23.34
33.54	22.48	28.97	21.87	35.59	21.4	39.50	23.9
35.54	23.06	30.95	22.19	36.97	25.69	41.50	25.69
35.50	24.22	32.79	22.9	38.62	26.78	42.50	27.69
36.01	25.11	35.54	23.17	40.38	27.27	45.75	28.25
37.14	25.43	36.52	25.33	43.12	27.67	50.83	28.11
37.75	25.99	37.51	25.72	44.92	28.1	54.06	28.57
41.07	27.13	39.90	27.15	50.22	28.02	55.53	28.81
43.93	27.64	44.55	27.92	56.48	28.87		
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

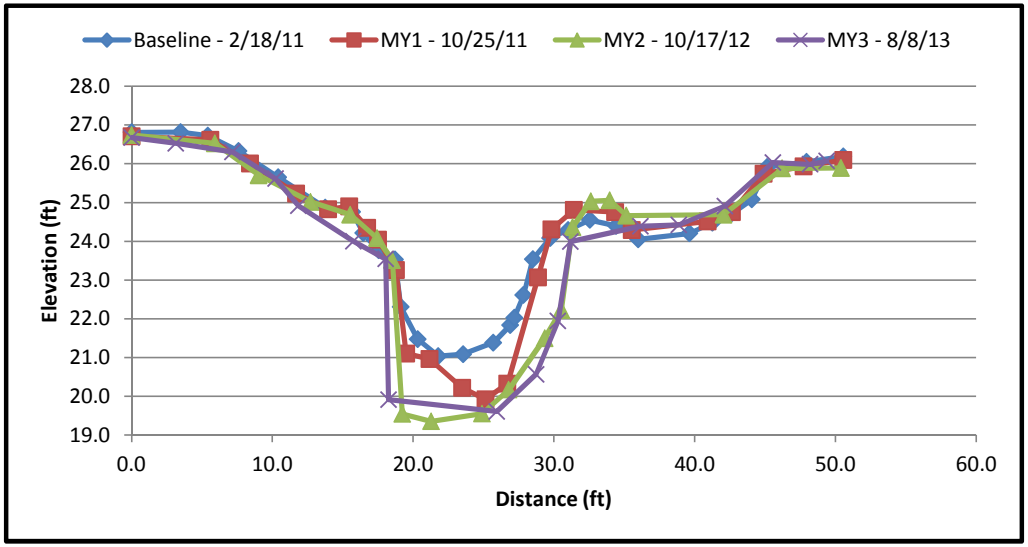
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	28.97	0.00	28.94	0.00	28.84	0.00	28.84
10.03	27.78	5.37	28.42	6.08	28.29	5.07	28.09
19.73	26.44	12.29	27.57	9.86	27.71	10.84	27.61
23.60	26.43	14.97	27.11	14.30	27.38	14.71	27.29
25.40	24.69	19.28	26.39	16.24	27.08	18.96	27.33
27.14	23.81	23.36	26.20	18.59	26.61	22.94	27.01
28.16	22.91	24.78	25.12	22.54	26.07	23.18	27.01
31.71	22.99	26.93	23.31	23.49	25.85	24.09	26.04
35.41	22.94	27.76	22.57	24.92	24.85	24.89	24.68
37.91	23.17	29.58	21.63	25.76	24.11	25.90	23.71
38.15	23.50	32.22	21.34	26.57	22.74	28.78	22.55
38.72	24.10	34.49	21.00	28.70	22.27	29.61	22.54
39.07	24.73	35.67	21.14	30.00	22.29	32.51	22.93
40.37	25.16	36.86	21.85	33.07	22.69	37.10	22.51
42.38	25.59	37.72	23.15	35.58	22.67	38.59	22.54
43.48	25.59	39.28	23.28	39.40	22.21	38.74	23.67
44.04	25.73	40.25	24.11	40.75	23.22	38.19	24.65
44.71	25.88	40.75	25.26	42.31	23.90	42.14	25.81
45.38	26.12	44.21	25.94	44.32	26.08	44.05	26.75
47.07	26.24	45.80	26.40	49.59	26.69	46.08	26.56
49.69	26.73	51.40	26.82	57.67	27.47	49.23	26.16
51.10	26.64	56.41	27.29	64.27	28.28	51.53	26.50
52.80	27.04	61.50	28.09			55.28	27.04
56.19	27.27	64.23	28.34			57.54	27.75
64.14	28.37					59.64	27.92
						62.94	28.46



Adkin Branch, 05065611, Reach 2

XS-8 Pool, Sta. 74+30

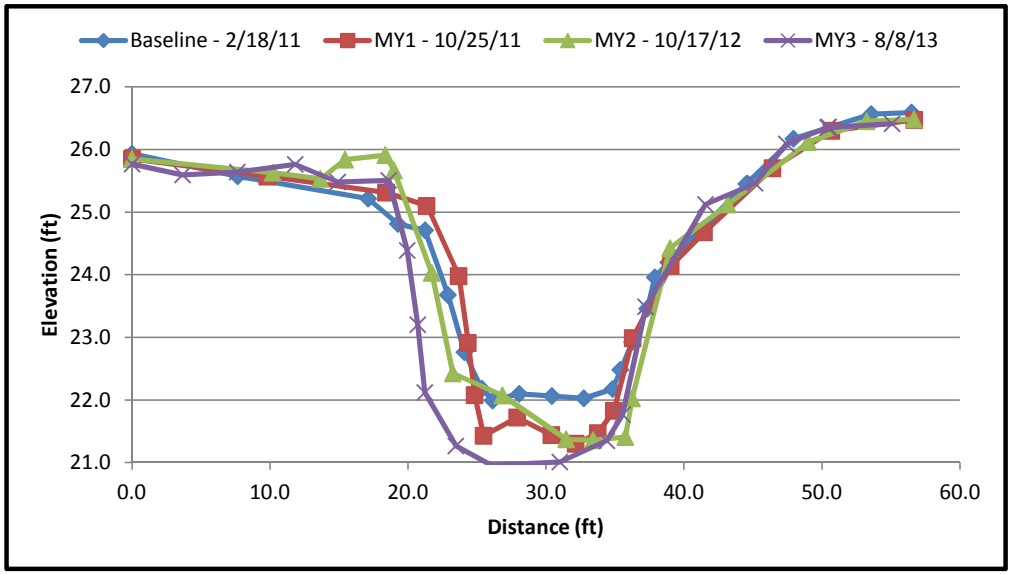
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	26.81	0.00	26.71	0.00	26.74	0.00	26.68
3.48	26.81	5.61	26.62	5.91	26.53	3.15	26.53
5.42	26.72	8.41	26.01	9.04	25.70	7.16	26.31
7.59	26.33	11.70	25.23	12.72	25.02	10.24	25.62
10.42	25.65	13.96	24.83	15.54	24.69	11.85	24.92
13.75	24.87	15.46	24.90	17.44	24.08	15.76	24.00
15.67	24.76	16.73	24.35	18.52	23.52	18.05	23.54
16.46	24.22	17.51	24.04	19.24	19.54	18.26	19.91
17.26	24.03	18.78	23.26	21.28	19.35	25.95	19.60
17.55	23.77	19.50	21.10	24.89	19.55	28.73	20.56
18.71	23.53	21.17	20.96	26.79	20.17	30.29	21.94
19.12	22.31	23.49	20.22	29.35	21.50	31.18	23.99
20.33	21.48	25.14	19.92	30.53	22.22	36.16	24.39
21.79	21.04	26.70	20.33	31.33	24.37	38.88	24.42
23.56	21.08	28.88	23.07	32.63	25.04	42.15	24.91
25.70	21.38	29.83	24.31	33.97	25.06	45.55	26.03
26.90	21.83	31.43	24.81	35.16	24.66	48.19	25.99
27.19	22.03	34.36	24.75	42.05	24.69	49.37	26.07
27.84	22.62	35.54	24.29	46.23	25.88		
28.51	23.54	40.92	24.51	50.41	25.89		
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

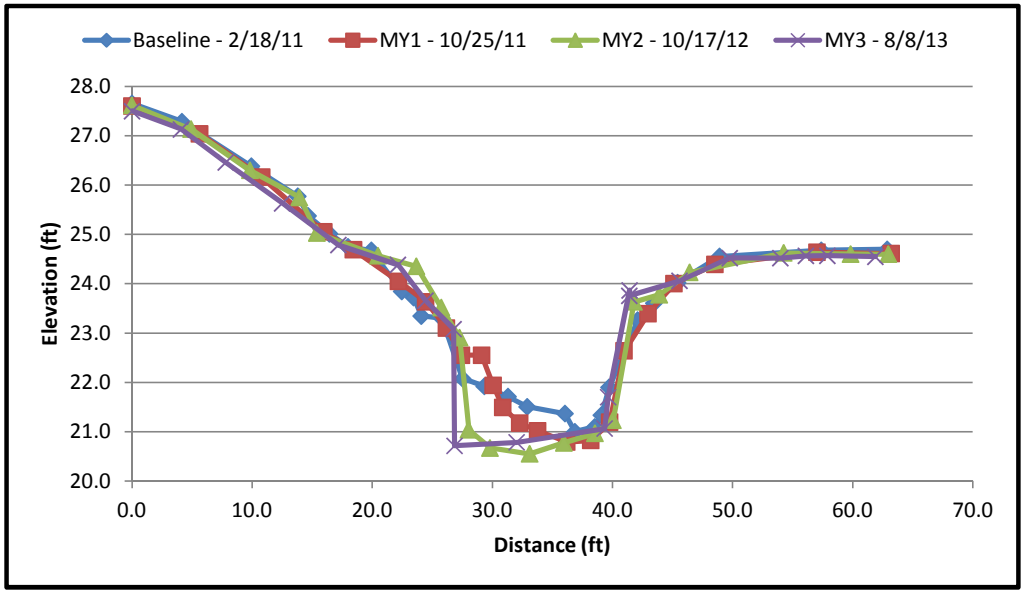
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	25.93	0.00	25.85	0.00	25.85	0.00	25.77
7.66	25.57	9.82	25.57	10.20	25.63	3.67	25.59
17.12	25.22	18.42	25.31	13.67	25.53	7.63	25.64
19.27	24.81	21.37	25.10	15.45	25.84	11.83	25.76
21.25	24.71	23.69	23.98	18.37	25.91	14.92	25.48
22.90	23.68	24.36	22.91	19.00	25.67	18.61	25.51
24.09	22.76	24.84	22.08	21.73	24.03	19.94	24.39
25.35	22.18	25.48	21.43	23.26	22.43	20.71	23.20
26.15	21.99	27.92	21.72	26.86	22.07	21.22	22.12
28.07	22.10	30.41	21.44	31.47	21.37	23.48	21.27
30.42	22.06	32.18	21.30	33.42	21.36	26.04	20.96
32.76	22.03	33.76	21.47	35.76	21.41	31.00	21.01
34.84	22.18	34.93	21.83	36.25	22.03	34.41	21.35
35.40	22.48	36.29	22.99	39.00	24.43	35.55	21.77
36.25	22.93	39.05	24.14	43.19	25.12	37.23	23.49
37.35	23.46	41.47	24.68	49.01	26.12	41.56	25.12
37.90	23.96	46.43	25.70	53.24	26.45	45.16	25.46
38.87	24.20	50.70	26.30	56.68	26.48	47.43	26.09
40.34	24.53	56.70	26.47			50.49	26.36
44.53	25.45					50.41	26.35
47.94	26.17					55.08	26.41
53.57	26.57						
56.49	26.59						



Adkin Branch, 05065611, Reach 2

XS-10 Riffle, Sta. 79+82

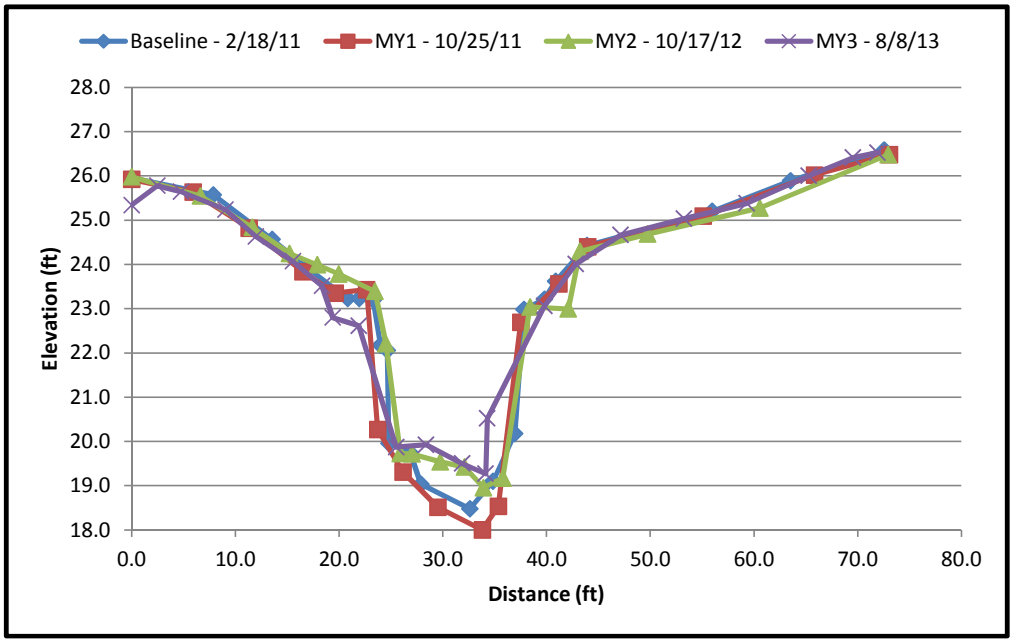
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	27.66	0.00	27.60	0.00	27.62	0.00	27.50
4.16	27.29	5.62	27.04	4.93	27.14	4.09	27.13
9.94	26.38	10.79	26.16	9.84	26.30	7.81	26.46
13.82	25.77	15.97	25.05	13.95	25.75	12.51	25.63
14.67	25.38	18.44	24.69	15.40	25.03	17.19	24.79
16.45	25.02	22.19	24.05	20.49	24.57	22.16	24.38
18.00	24.75	24.47	23.63	23.69	24.35	24.44	23.66
19.93	24.67	26.19	23.10	25.76	23.52	26.78	23.08
22.47	23.84	27.45	22.55	27.28	22.91	26.85	20.71
23.45	23.72	29.13	22.55	28.04	21.03	32.02	20.78
24.08	23.35	30.09	21.94	29.83	20.67	39.36	21.06
25.81	23.30	30.88	21.49	33.12	20.55	39.64	21.70
27.52	22.08	32.29	21.17	35.97	20.77	41.43	23.87
29.35	21.92	33.79	21.02	38.56	20.96	41.42	23.76
31.31	21.71	36.21	20.79	40.06	21.23	45.60	24.06
32.90	21.51	38.21	20.82	41.80	23.63	49.77	24.52
36.04	21.37	39.77	21.19	43.92	23.78	53.97	24.52
36.87	21.00	40.99	22.64	46.43	24.23	56.10	24.57
38.52	21.10	42.97	23.39	54.27	24.62	57.91	24.57
39.08	21.33	45.15	24.00	59.85	24.60	61.89	24.55
39.74	21.90	48.55	24.39	62.98	24.60		
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

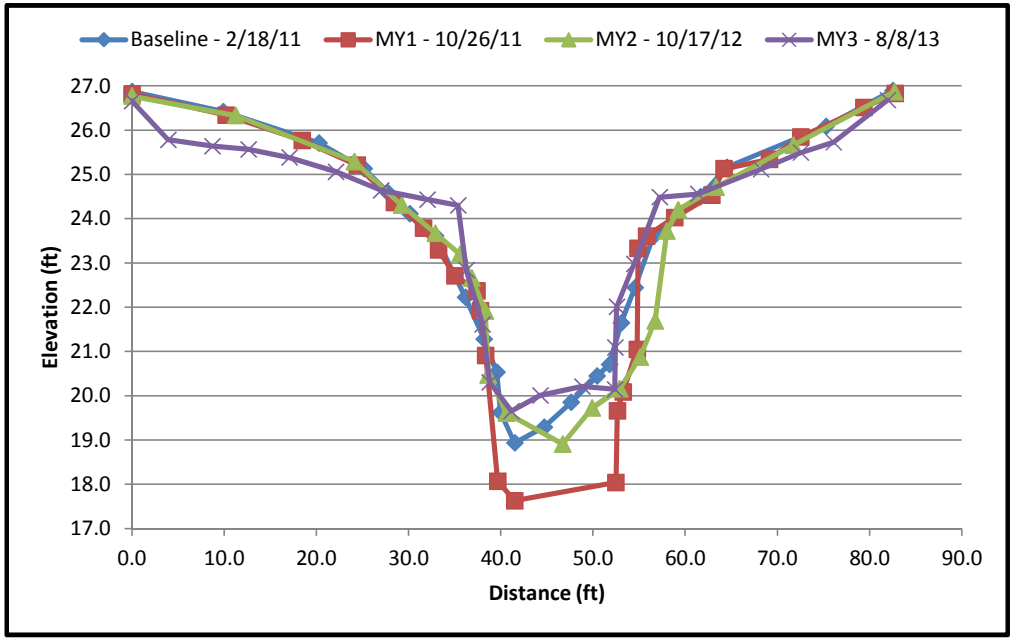
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	25.95	0.00	25.92	0.00	25.98	0.00	25.34
7.89	25.57	5.93	25.63	6.64	25.54	2.48	25.77
13.55	24.56	11.34	24.82	11.63	24.84	4.76	25.64
16.93	23.93	16.52	23.83	15.21	24.25	9.05	25.24
20.82	23.23	19.62	23.35	17.91	23.99	11.97	24.63
21.95	23.23	22.66	23.43	19.97	23.79	15.55	24.07
23.29	23.19	23.72	20.27	23.46	23.39	18.36	23.51
23.99	22.17	26.17	19.31	24.51	22.21	19.39	22.80
24.66	22.05	29.54	18.51	25.90	19.73	21.90	22.61
24.81	19.95	33.82	18.00	27.02	19.72	25.52	19.87
26.88	19.74	35.36	18.53	29.73	19.54	28.40	19.92
27.90	19.03	37.52	22.69	32.10	19.42	31.87	19.50
32.61	18.48	41.20	23.56	33.92	18.95	34.14	19.27
34.85	19.10	43.95	24.40	35.78	19.17	34.29	20.52
36.94	20.18	55.09	25.09	38.40	23.04	39.79	23.06
37.83	22.98	65.84	26.02	42.09	22.99	42.81	24.00
39.80	23.21	73.06	26.48	43.22	24.29	47.14	24.66
40.88	23.62			49.73	24.69	53.25	25.03
43.90	24.42			60.56	25.28	59.28	25.38
55.95	25.20			72.92	26.48	65.28	26.00
63.52	25.89					69.52	26.41
72.56	26.58					71.92	26.53



Adkin Branch, 05065611, Reach 2

XS-12 Pool, Sta. 85+88

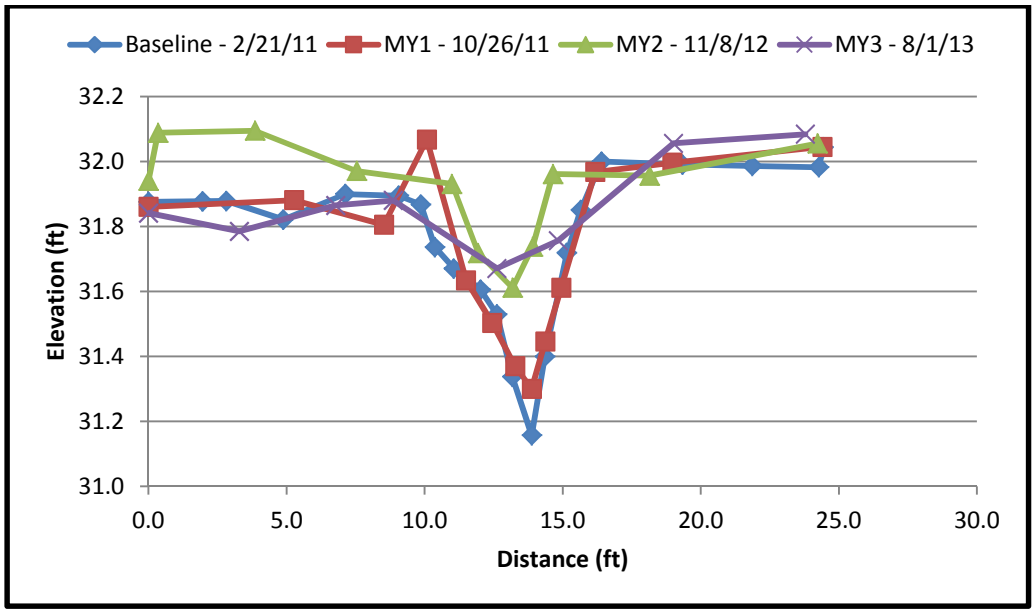
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	26.87	0.00	26.82	0.00	26.77	0.00	26.66
9.90	26.42	10.23	26.34	11.26	26.33	3.92	25.78
20.27	25.71	18.48	25.77	24.13	25.29	8.73	25.64
25.17	25.13	24.44	25.21	29.25	24.31	12.63	25.57
27.75	24.59	28.45	24.37	32.91	23.67	17.09	25.38
30.14	24.11	31.61	23.79	35.58	23.20	22.13	25.06
32.91	23.61	33.25	23.30	36.88	22.66	27.00	24.64
36.16	22.23	35.04	22.71	38.31	21.91	32.05	24.43
38.20	21.28	37.43	22.37	38.65	20.47	35.37	24.30
39.57	20.54	37.80	21.92	40.61	19.61	36.26	22.84
39.96	19.63	38.37	20.91	46.71	18.91	38.02	21.61
41.51	18.93	39.67	18.07	49.92	19.72	38.78	20.30
44.70	19.29	41.51	17.63	52.91	20.16	41.14	19.65
47.63	19.85	52.49	18.04	55.11	20.87	44.29	20.01
50.43	20.45	52.66	19.66	56.75	21.69	48.82	20.21
51.78	20.71	53.28	20.09	58.01	23.72	52.38	20.14
53.07	21.65	54.79	21.05	59.25	24.20	52.42	21.10
54.55	22.44	54.89	23.33	63.34	24.71	52.58	22.01
56.58	23.61	55.80	23.61	71.74	25.66	54.45	22.98
61.64	24.50	58.85	24.03	82.69	26.87	57.23	24.49
64.51	25.16	62.90	24.53			61.38	24.56
75.28	26.09	64.20	25.13			68.25	25.12
82.52	26.90	69.12	25.34			72.54	25.49
		72.54	25.85			76.10	25.73
		79.36	26.51			81.98	26.68
		82.77	26.83				



Adkin Branch, 05065611, Reach 3

XS-13 Pool, Sta. 11+64

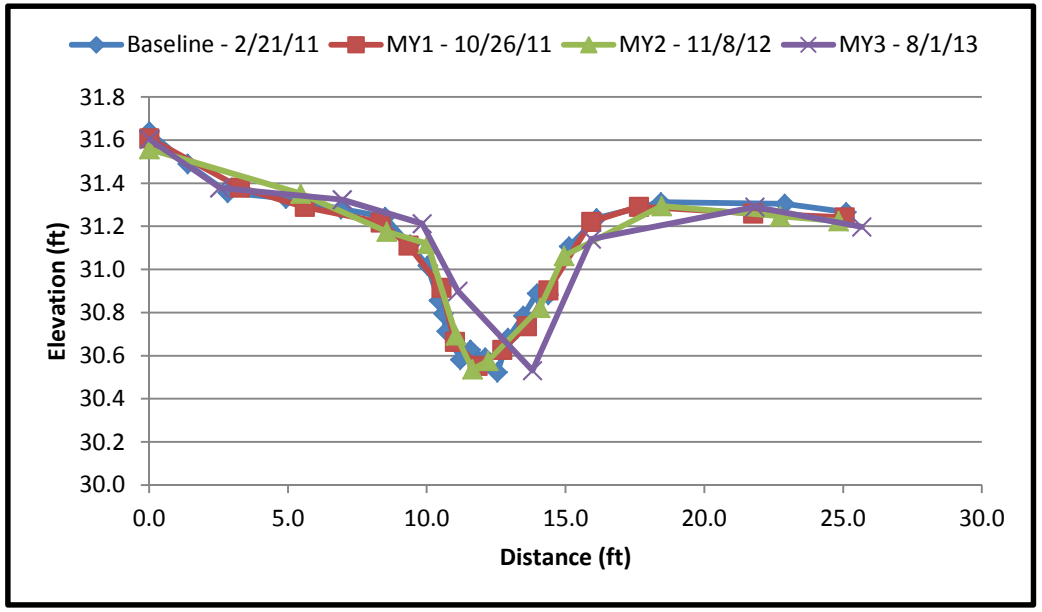
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	31.88	0.00	31.86	0.00	31.94	0.00	31.84
1.96	31.88	5.27	31.88	0.35	32.09	3.29	31.79
2.82	31.88	8.53	31.81	3.86	32.10	6.78	31.87
4.88	31.82	10.08	32.07	7.54	31.97	8.86	31.88
7.13	31.90	11.50	31.63	10.99	31.93	12.62	31.67
9.06	31.90	12.45	31.50	11.94	31.72	14.84	31.76
9.86	31.87	13.28	31.37	13.19	31.61	19.01	32.06
10.37	31.74	13.88	31.30	13.92	31.74	23.79	32.08
11.06	31.67	14.37	31.45	14.65	31.96		
12.03	31.61	14.95	31.61	18.14	31.96		
12.62	31.53	16.18	31.97	24.23	32.06		
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

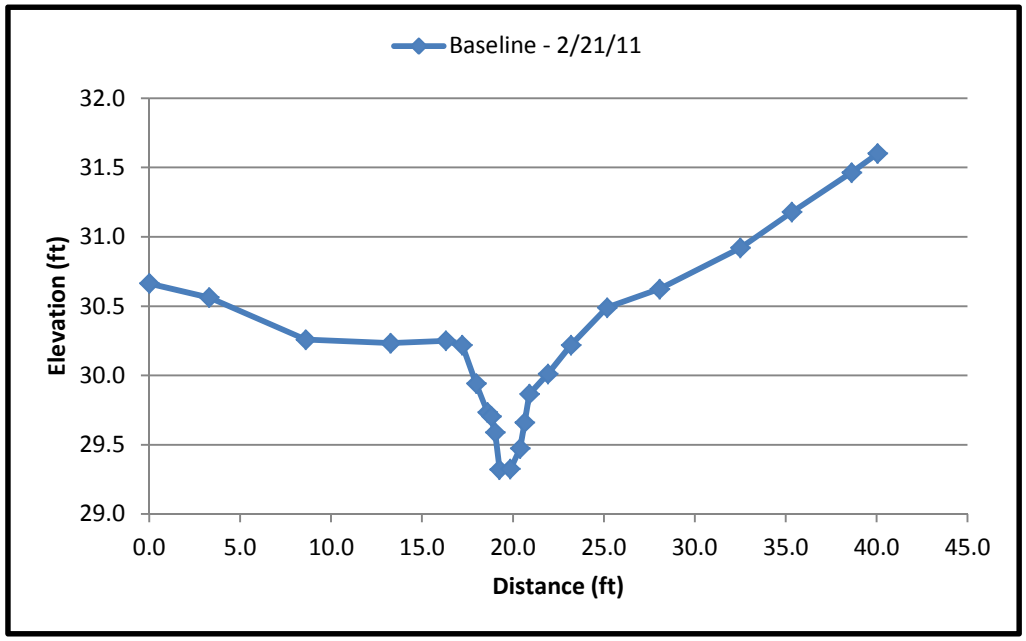
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	31.64	0.00	31.61	0.00	31.56	0.00	31.60
1.38	31.49	3.27	31.38	5.45	31.35	2.54	31.38
2.83	31.36	5.60	31.29	8.56	31.17	6.95	31.32
4.92	31.33	8.34	31.22	10.03	31.12	9.83	31.21
6.91	31.28	9.34	31.11	11.05	30.69	11.13	30.90
8.50	31.24	10.53	30.92	11.64	30.54	13.81	30.53
9.40	31.12	11.01	30.67	12.21	30.58	15.93	31.14
10.03	31.02	11.83	30.55	14.08	30.82	21.82	31.29
10.44	30.86	12.72	30.63	14.94	31.06	25.67	31.20
10.60	30.80	13.61	30.74	18.46	31.29		
10.71	30.71	14.38	30.90	22.74	31.25		
11.02	30.66	15.92	31.22	24.83	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

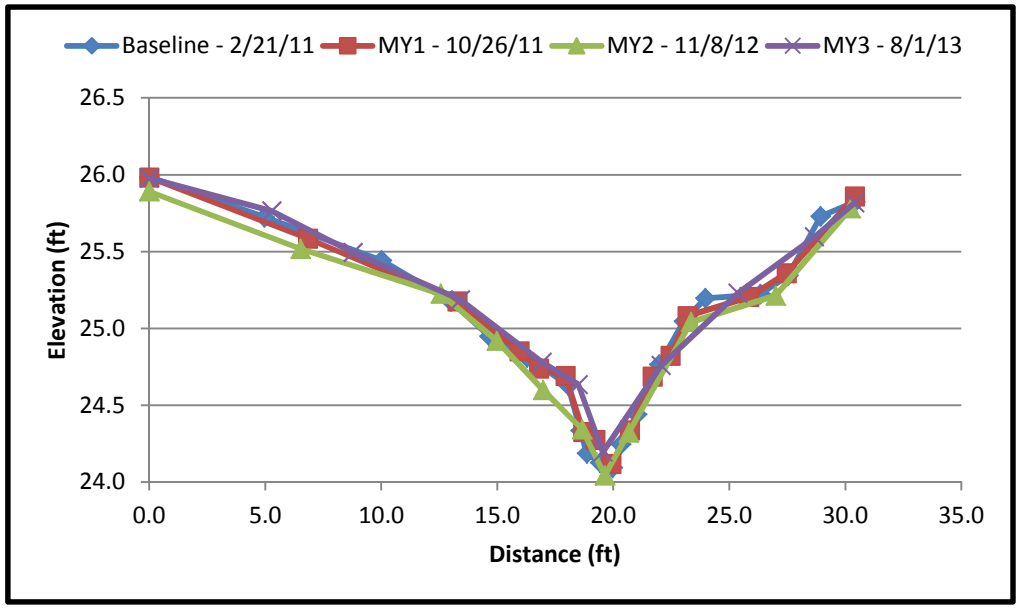
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	30.66	No Data - Fallen Tree over Channel		No Data - Fallen Tree over Channel		No Data - Fallen Tree over Channel	
3.30	30.56						
8.61	30.26						
13.27	30.23						
16.31	30.25						
17.22	30.22						
17.98	29.94						
18.60	29.73						
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

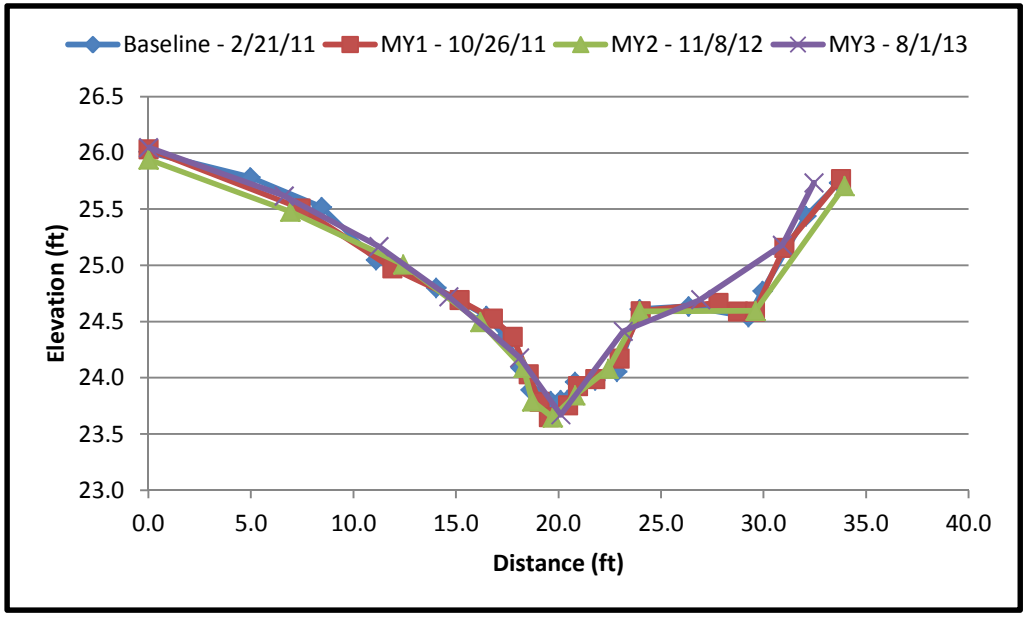
Baseline		MY1		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	25.98	0.00	25.98	0.00	25.89	0.00	25.98
4.96	25.72	6.84	25.58	6.52	25.52	5.28	25.76
10.01	25.44	13.28	25.18	12.56	25.23	8.79	25.49
13.01	25.18	15.96	24.85	14.97	24.92	13.42	25.19
14.66	24.95	16.79	24.74	16.97	24.60	16.93	24.78
16.29	24.81	17.94	24.69	18.66	24.34	18.49	24.64
18.05	24.63	18.70	24.33	19.64	24.04	19.55	24.19
18.59	24.33	19.22	24.27	20.67	24.32	22.06	24.76
18.86	24.19	19.92	24.12	23.35	25.04	25.38	25.23
19.43	24.13	20.71	24.34	27.00	25.21	28.67	25.60
19.97	24.09	21.69	24.69	30.23	25.78	30.40	25.82
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		MY2		MY3	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	26.01	0.00	26.03	0.00	25.94	0.00	26.05
4.97	25.78	7.42	25.51	6.91	25.48	6.62	25.62
8.45	25.52	11.90	24.98	12.42	25.01	11.24	25.17
11.09	25.05	15.17	24.69	16.18	24.50	14.66	24.72
14.03	24.80	16.79	24.53	18.29	24.09	18.11	24.18
16.48	24.55	17.76	24.37	18.72	23.79	20.11	23.67
17.40	24.37	18.54	24.03	19.71	23.65	23.16	24.41
18.15	24.09	19.07	23.79	20.81	23.84	26.93	24.70
18.64	23.89	19.53	23.65	22.43	24.08	30.92	25.18
19.05	23.83	20.46	23.76	23.95	24.59	32.46	25.73
19.61	23.79	20.94	23.93	29.61	24.60		
20.10	23.80	21.78	23.99	33.95	25.71		
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

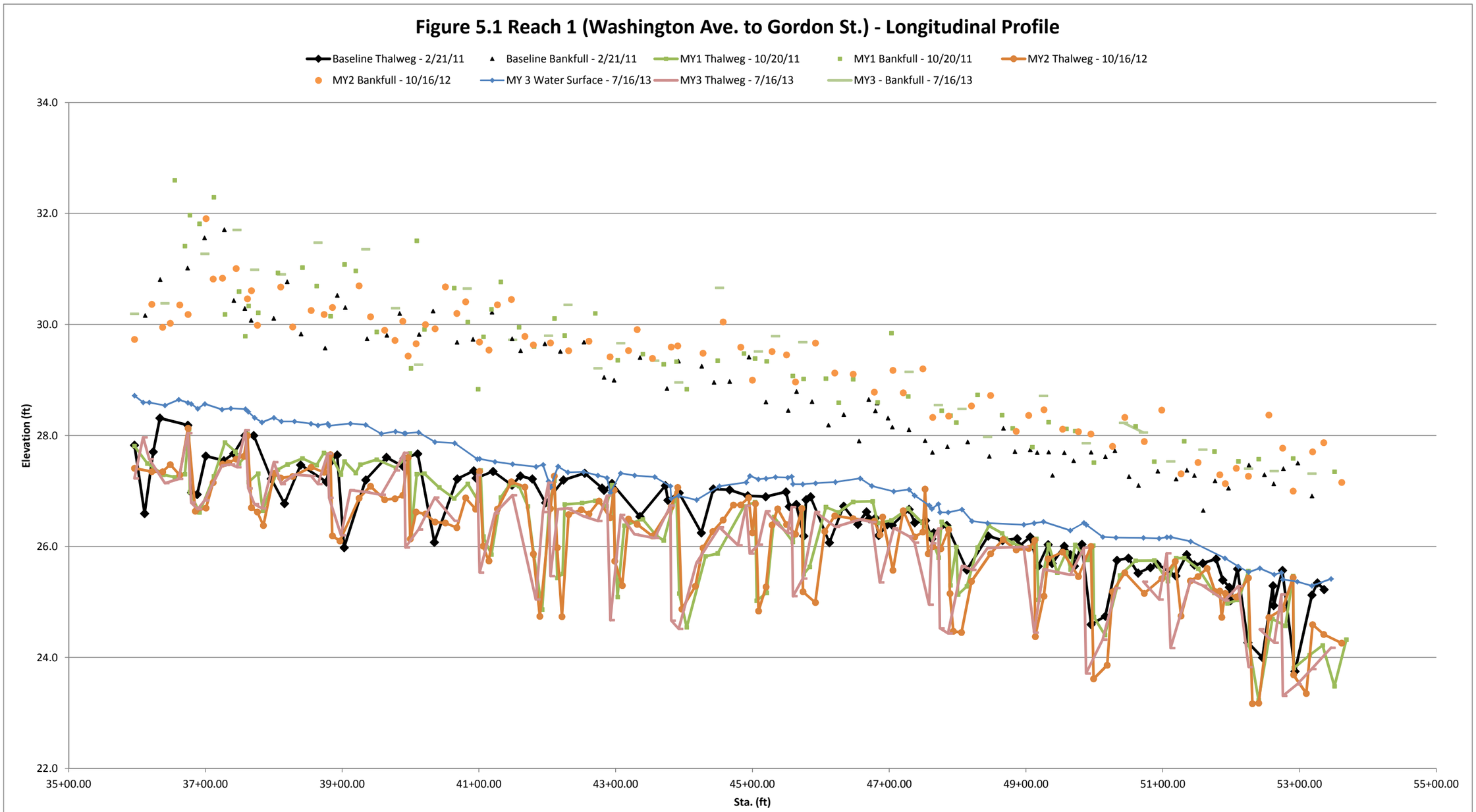


Figure 5.2 Reach 2 (Gordon St. to Lincoln St.) - Longitudinal Profile

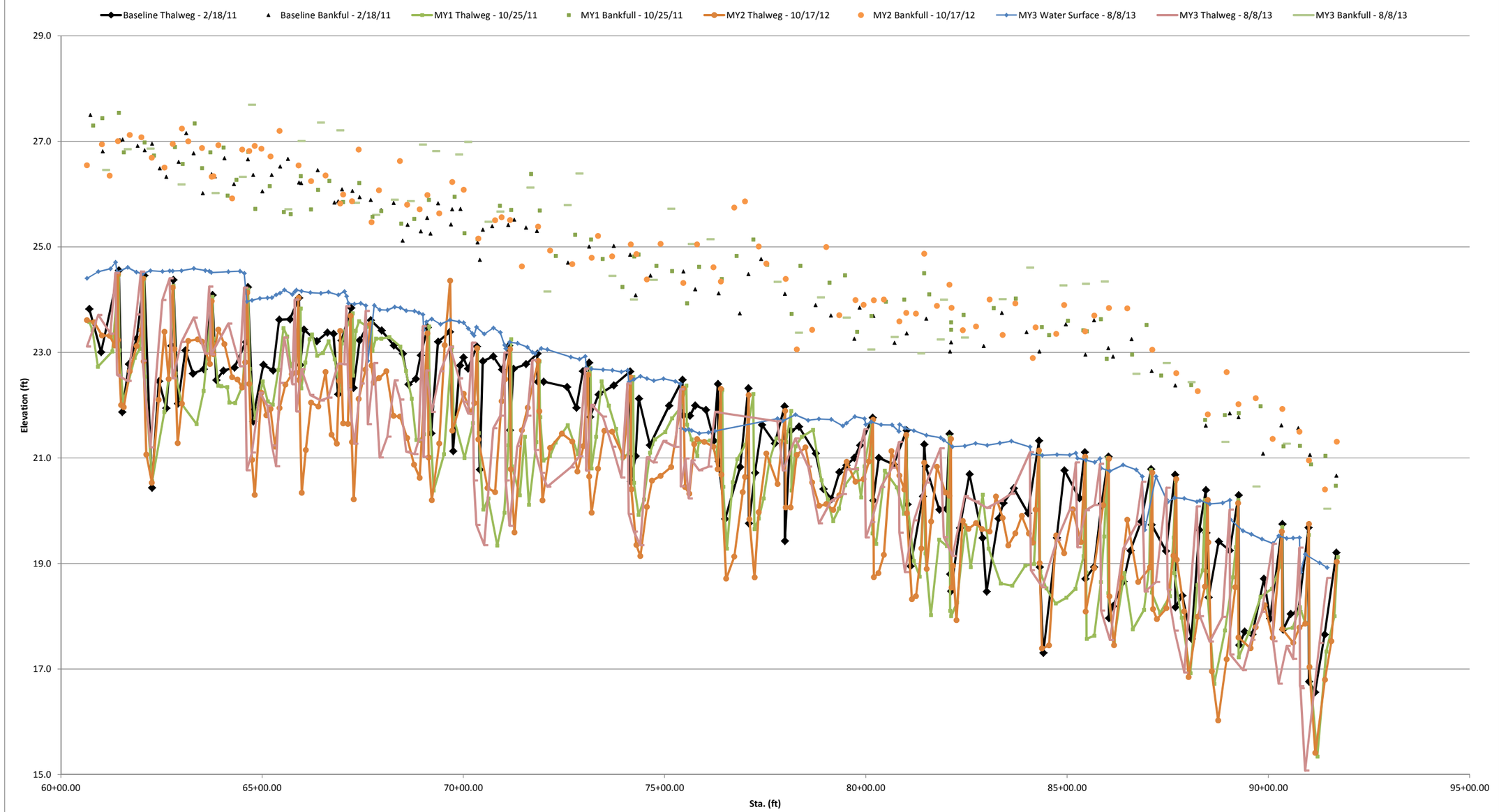


Figure 5.3 Reach 3 (UT to Adkin Branch) - Longitudinal Profile

Table 10a. 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 10b. 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.

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

Table 10c. 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	12.55	12.16				24.28	18.49	17.14	12.97				18.03	19.72	17.07	17.39				17.42	16.08	15.95	16.96				14.99	16.25	10.88	15.84			
Floodprone Width (ft)	56.25	44.63	50.14	48.69				72.2	71.85	75.65	70.24				41.72	52.82	52.88	58.89				39.81	42.63	69.79	63.88				28.45	49.93	31.85	49.42			
Bankfull Mean Depth (ft)	1.7	1.85	2.29	2.34				1.97	2.57	2.98	3.36				1.42	1.61	1.66	1.92				1.46	1.59	2.76	2.65				0.92	1.16	1.29	1.84			
Bankfull Max Depth (ft)	2.77	2.47	2.70	2.69				3.33	3.89	4.14	4.75				2.07	2.76	2.74	3.47				2.05	2.17	3.61	3.47				1.5	2.55	1.98	2.45			
Bankfull Cross Sectional Area (ft^2)	25.23	22.2	28.71	28.51				47.75	47.44	51.08	43.63				25.69	31.85	28.32	33.39				25.48	25.55	44.04	44.92				13.78	18.8	14.06	29.10			
Bankfull Width/Depth Ratio	8.73	6.49	5.48	5.19				12.32	7.19	5.75	3.86				12.7	12.25	10.28	9.05				11.93	10.11	5.78	6.41				16.29	14.01	8.43	8.62			
Bankfull Entrenchment Ratio	3.79	3.72	4.00	4.00				2.97	3.89	4.41	5.42				2.31	2.68	3.1	3.39				2.29	2.65	4.38	3.77				1.9	3.07	2.93	3.12			
Bankfull Bank Height Ratio	1	1	1	1				1	1	1	1				1	1	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	21.48	22.51				17.91	16.15	21.82	18.51				16.57	15.76	15.61	15.37				16.81	15.69	17.96	16.71				16.23	17.72	16.32	16.82			
Floodprone Width (ft)	57.39	57.49	56.48	55.53				57.58	64.23	64.27	62.94				50.57	50.57	50.41	49.37				51.29	56.7	56.68	47.17				48.33	51.64	55.58	54.89			
Bankfull Mean Depth (ft)	2.94	3.16	4.21	3.09				1.88	2.85	2.81	2.50				1.93	2.76	3.49	3.23				1.64	2.01	2.23	2.07				1.46	1.61	2.35	2.27			
Bankfull Max Depth (ft)	4.39	4.85	6.14	5.24				2.68	4.26	3.87	3.53				3.51	4.89	5.18	4.39				2.21	2.84	3.07	2.53				2.26	2.6	3.08	2.95			
Bankfull Cross Sectional Area (ft^2)	44.41	57.01	90.46	69.65				33.7	45.98	61.35	46.34				31.92	43.57	54.47	49.60				27.58	31.55	40.05	34.51				23.68	28.48	38.34	38.18			
Bankfull Width/Depth Ratio	5.14	5.71	5.1	7.28				9.53	5.67	7.77	7.39				8.59	5.71	4.47	4.76				10.25	7.81	8.05	8.09				11.12	11.01	6.94	7.41			
Bankfull Entrenchment Ratio	3.8	3.19	2.63	2.47				3.22	3.98	2.95	3.40				3.05	3.21	3.23	3.21				3.05	3.61	3.16	2.82				2.99	2.91	3.41	3.26			
Bankfull Bank Height Ratio	1	1	1	1				1	1	1	1				1	1	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	14.96	17.00				23.66	17.42	22.13	21.52				5.89	5.97	3.55	7.70				7.69	7.63	5.82	5.81				6.06	N/A	N/A	N/A			
Floodprone Width (ft)	72.56	73.06	72.92	71.92				82.52	82.77	82.69	81.98				24.44	24.4	24.23	23.79				25.11	25.05	24.83	25.67				34.69	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	3.19	3.51	2.94	1.82				2.72	3.87	2.92	3.27				0.31	0.35	0.19	0.11				0.35	0.34	0.31	0.33				0.4	N/A	N/A	N/A			
Bankfull Max Depth (ft)	4.71	5.43	4.09	4.25				4.68	4.74	4.29	4.65				0.71	0.67	0.32	0.21				0.72	0.67	0.58	0.61				0.9	N/A	N/A	N/A			
Bankfull Cross Sectional Area (ft^2)	52.00	63.18	44.06	70.35				64.42	67.38	64.51	70.35				1.81	2.09	0.68	0.87				2.68	2.60	1.80	1.91				2.43	N/A	N/A	N/A			
Bankfull Width/Depth Ratio	5.11	5.13	5.09	6.58				8.7	4.5	7.58	6.58				19	17.06	18.68	68.19				21.97	22.44	18.77	17.64				15.15	N/A	N/A	N/A			
Bankfull Entrenchment Ratio	4.45	4.06	4.87	3.81				3.49	4.75	3.74	3.81				4.15	4.09	6.82	3.09				3.26	3.28	4.27	4.42				5.72	N/A	N/A	N/A			
Bankfull Bank Height Ratio	1	1	1	1				1	1	1	1				1	1	1	1				1	1	1	1				1	N/A	N/A	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	9.32	11.65				8.06	7.82	8.93	6.55			
Floodprone Width (ft)	30.42	30.4	30.23	30.40				23.07	25.58	27.18	19.41			
Bankfull Mean Depth (ft)	0.46	0.43	0.46	0.40				0.5	0.48	0.46	0.35			
Bankfull Max Depth (ft)	1.11	0.96	1.00	0.99				0.82	0.94	0.94	0.74			
Bankfull Cross Sectional Area (ft^2)	5.34	3.91	4.25	4.70				4	3.76	4.14	2.29			
Bankfull Width/Depth Ratio	25.2	21.26	20.26	28.86				16.12	16.29	19.41	18.71			
Bankfull Entrenchment Ratio	2.62	3.33	3.24	2.61				2.86	3.27	3.04	2.96			
Bankfull Bank Height Ratio	1	1	1	1				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	10.88	13.50	12.55	17.07	3.20	3	12.16	15.13	15.84	17.39	2.69	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	31.85	44.96	50.14	52.88	11.43	3	48.69	52.33	49.42	58.89	5.69	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	1.29	1.75	1.66	2.29	0.51	3	1.84	2.03	1.92	2.34	0.27	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	1.98	2.47	2.70	2.74	0.43	3	2.45	2.87	2.69	3.47	0.53	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	14.06	23.70	28.32	28.71	8.35	3	28.51	30.33	29.10	33.39	2.66	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	5.48	8.06	8.43	10.28	2.42	3	5.19	7.62	8.62	9.05	2.12	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	2.93	3.34	3.10	4.00	0.58	3	3.12	3.50	3.39	4.00	0.45	3												
[1]Bank Height Ratio	1	1	1	1	0	3	1	1	1	1	0	3	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	21.13	51.68	46.23	82.17	21.21	17	7.87	49.09	49.07	90.36	27.62	20												
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	0.000	0.001	0.001	0.004	0.001	17	0.000	0.003	0.002	0.016	0.004	20												
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	5.61	32.08	28.41	81.70	19.25	25	14.04	38.40	34.74	72.68	15.18	20												
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	2.32	3.29	3.13	5.22	0.72	25	3.60	4.23	4.31	4.95	0.41	17												
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	10.02	67.33	65.93	125.74	36.64	24	34.75	87.60	87.79	124.97	27.73	19												
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						B5c/E5						E5																	
Channel Thalweg length (ft)	1727						1764						1765						1750																	
Sinuosity (ft)	1.03						1.05						1.05						1.04																	
Water Surface Slope (Channel) (ft/ft)	0.00166						0.0016						0.0016						0.0018																	
BF slope (ft/ft)	0.0024						0.00263						0.0019						0.0019																	
[3]Ri% / P%	73% / 27%						59% / 41%						52% / 48%						56% / 44%																	
[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	16.32	18.70	17.96	21.82	2.82	3	16.71	17.35	16.82	18.51	1.01	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	55.58	58.84	56.68	64.27	4.73	3	47.17	55.00	54.89	62.94	7.89	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	2.23	2.46	2.35	2.81	0.31	3	2.07	2.28	2.27	2.50	0.22	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	3.07	3.34	3.08	3.87	0.46	3	2.53	3.00	2.95	3.53	0.50	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	38.34	46.58	40.05	61.35	12.82	3	34.51	39.68	38.18	46.34	6.06	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	6.94	7.59	7.77	8.05	0.58	3	7.39	7.63	7.41	8.09	0.40	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	2.95	3.17	3.16	3.41	0.23	3	2.82	3.16	3.26	3.40	0.30	3												
[1]Bank Height Ratio	1	1	1	1	0	3	1	1	1	1	0	3	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	14.79	33.08	24.52	69.01	16.99	18	10.36	45.72	32.00	162.02	44.19	27												
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	0.000	0.003	0.002	0.008	0.002	18	0.000	0.003	0.000	0.013	0.004	27												
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	15.05	42.46	40.28	85.81	17.24	45	6.29	49.82	49.86	120.65	27.85	30												
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	2.00	4.39	4.40	6.61	1.01	45	3.47	4.86	4.80	6.62	0.78	29												
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	25.91	67.24	67.02	130.53	23.07	44	16.43	100.34	89.39	241.03	51.87	30												
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						B5c/E5						E5																	
Channel Thalweg length (ft)	3096						3131						3105						3081																	
Sinuosity (ft)	1.04						1.04						1.04						1.03																	
Water Surface Slope (Channel) (ft/ft)	0.0016						0.00175						0.0016						0.0018																	
BF slope (ft/ft)	0.0018						0.00204						0.0017						0.0019																	
*[3]Ri% / P%	29% / 71%						5% / 95%						24% / 76%						45% / 55%																	
[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	5.82	7.38	7.38	8.93	2.20	2	5.81	6.18	6.18	6.55	0.52	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	24.83	26.01	26.01	27.18	1.66	2	19.41	22.54	22.54	25.67	4.43	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	0.31	0.39	0.39	0.46	0.11	2	0.33	0.34	0.34	0.35	0.01	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	0.58	0.76	0.76	0.94	0.25	2	0.61	0.68	0.68	0.74	0.09	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	1.80	2.97	2.97	4.14	1.65	2	1.91	2.10	2.10	2.29	0.27	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	18.77	19.09	19.09	19.41	0.45	2	17.64	18.18	18.18	18.71	0.76	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	3.04	3.66	3.66	4.27	0.87	2	2.96	3.69	3.69	4.42	1.03	2												
[1]Bank Height Ratio	1.00	1.00	1.00	1.00	0.00	3	1	1	1	1	0	2	1	1	1	1	0	2	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	4.92	21.70	15.74	114.59	25.03	37	7.69	35.04	23.74	122.03	29.16	21												
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	0.000	0.012	0.008	0.037	0.010	37	0.000	0.014	0.012	0.044	0.012	21												
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	6.57	15.22	13.43	37.77	7.53	44	0.42	29.63	31.12	52.30	13.33	25												
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	0.33	0.92	0.87	2.49	0.39	44	0.19	0.98	0.82	2.24	0.54	25												
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	12.18	35.45	25.50	132.91	26.19	43	16.67	63.54	57.97	150.06	33.59	24												
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						E5						C5																	
Channel Thalweg length (ft)	1582						1622						1620						1561																	
Sinuosity (ft)	1.32						1.35						1.35						1.30																	
Water Surface Slope (Channel) (ft/ft)	0.0028						0.0022						0.0027						0.0021																	
BF slope (ft/ft)	0.0030						0.0026						0.0029						0.0032																	
[3]Ri% / P%	58% / 42%						60% / 40%						55% / 45%						50% / 50%																	
[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
11/8/2012	1	54+00	4.0	25.27	29.27	27.03	2.24	7.1 & 7.2
7/9/2013								8.1 & 8.2

Figures 6.1 & 6.2 October 2011 Crest Gauge Photos

Figures 7.1 & 7.2 November 2012 Crest Gauge Photos

Figures 8.1 & 8.2 July 2013 Crest Gauge Photos

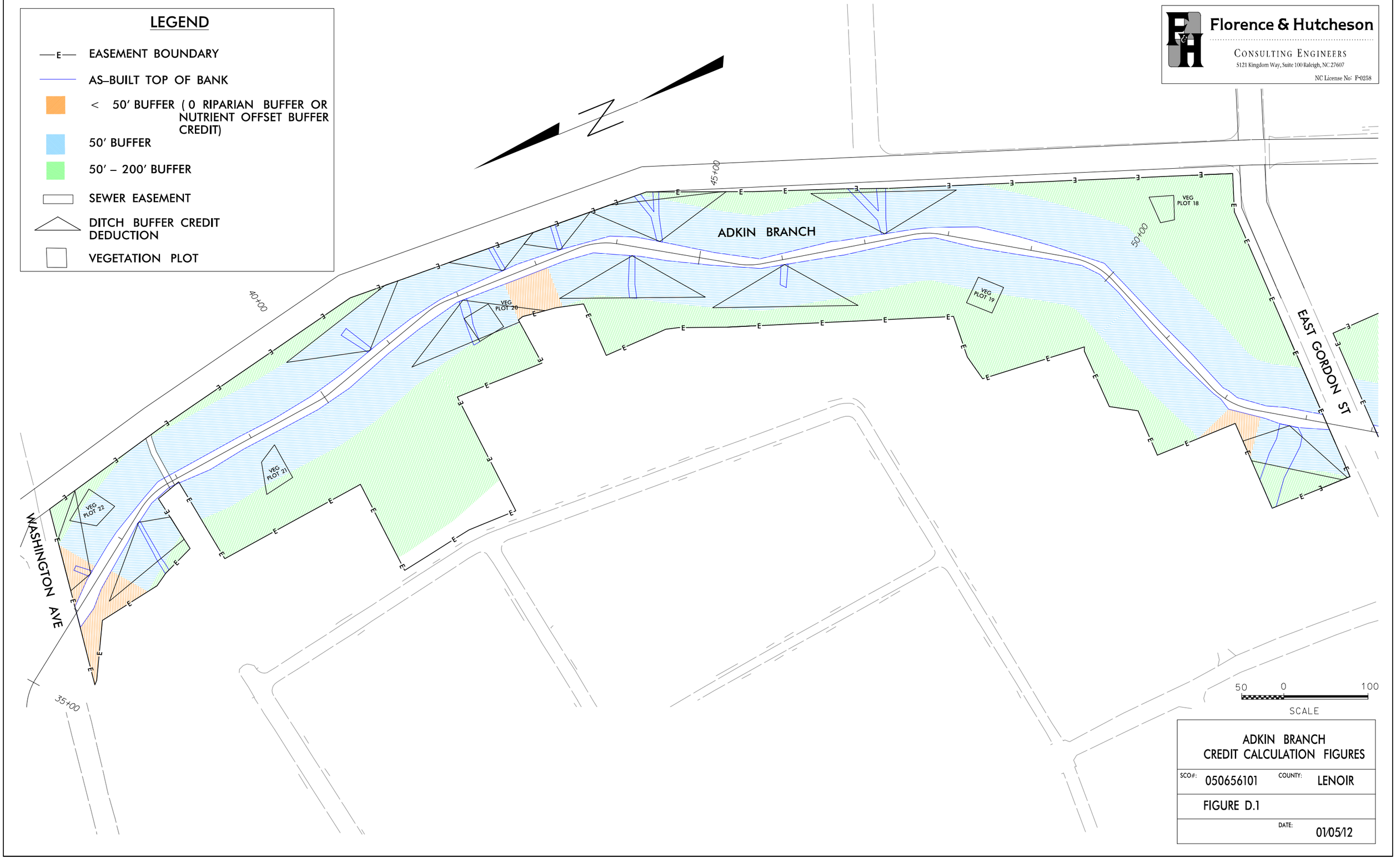
Appendix F. Credit Calculation Figures

Figure D.1 – D.5, 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

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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

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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
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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

- 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

Appendix G. Final Record Drawings

CONTRACT: ADKIN BRANCH

SCO: 050656101

11/26/2013
R:\Construction\Combined_Record_Drawings\AdkinBranch_CRD_psh_1.dgn
Florence & Hutcheson, Inc.

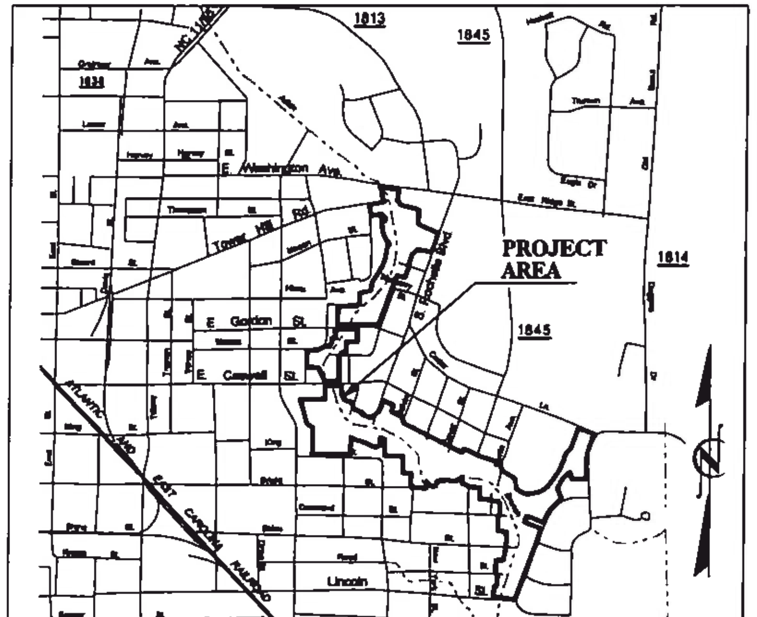
STATE		SHEET NO.	TOTAL SHEETS
N.C.	ADKIN BRANCH	1	13

ADKIN BRANCH STREAM RESTORATION RECORD DRAWINGS

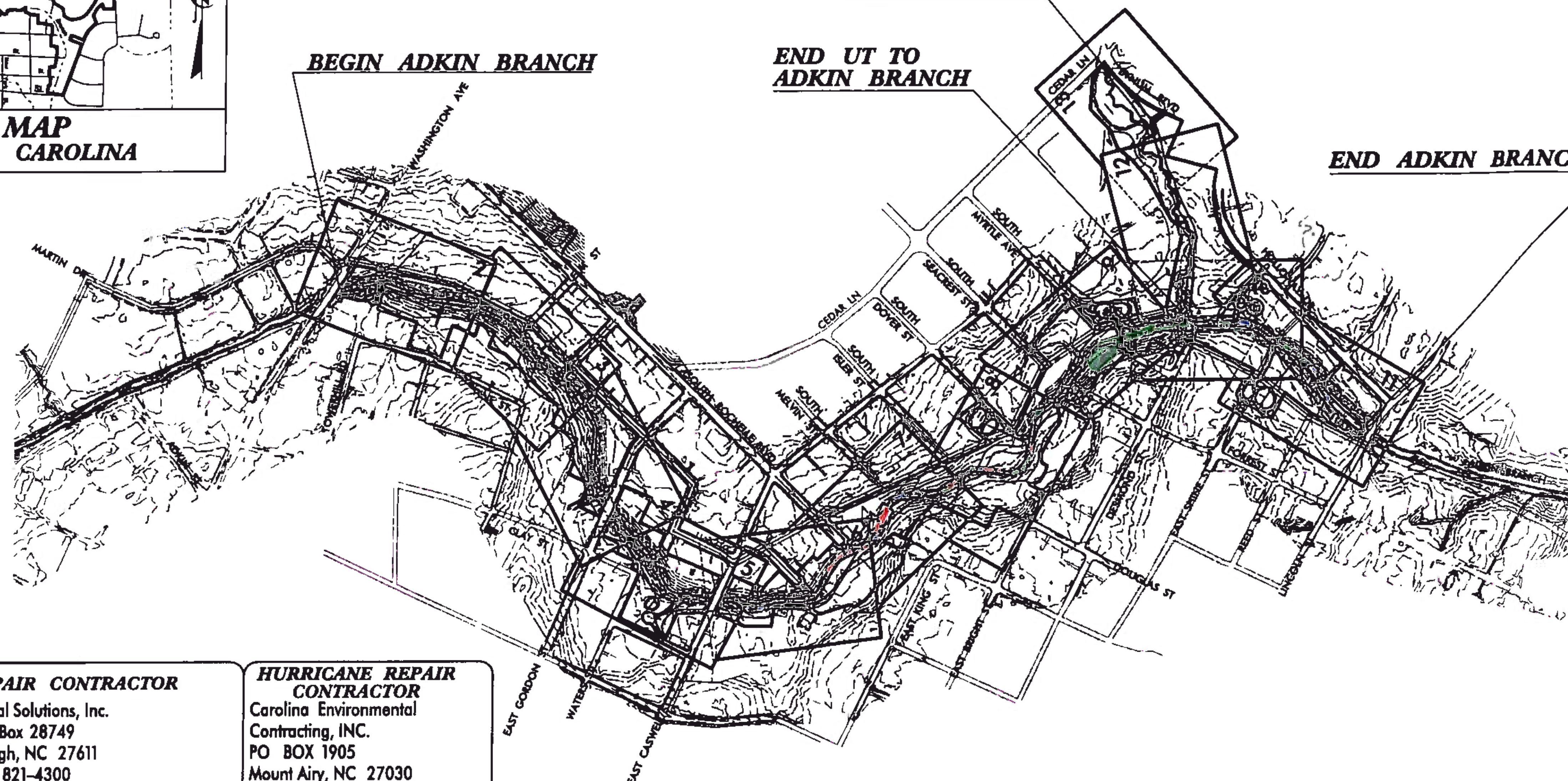
LOCATION: KINSTON (LENOIR COUNTY), NORTH CAROLINA
LAT: 35°15'42.5" N LONG: 77°33'55.6" W

RECORD DRAWINGS

This record drawing has been prepared in part, based upon information furnished by others. While this information is believed to be reliable, the Engineer cannot assure its accuracy, and thus is not responsible for the accuracy of this record drawing or for any errors or omissions which may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying for any purpose.



VICINITY MAP
KINSTON, NORTH CAROLINA



ORIGINAL CONTRACTOR
Appalachian Environmental Services 1165 W. Main Street Slyva, NC 28779

SURETY CONTRACTOR	REPAIR CONTRACTOR	HURRICANE REPAIR CONTRACTOR
Environmental Quality Resources, LLC 1405 Benson Court, Suite C Arbutus, MD 21227 (443) 304-3310	Fluvial Solutions, Inc. PO Box 28749 Raleigh, NC 27611 (919) 821-4300	Carolina Environmental Contracting, INC. PO BOX 1905 Mount Airy, NC 27030 (336) 320-3849

GRAPHIC SCALES

25 0 25 50
PLANS

INDEX OF SHEETS

DISTURBED AREA = 49.86 Ac.

PROJECT LENGTH		ADKIN BRANCH	UT TO ADKIN BRANCH
EXISTING STREAM LENGTH	=	8,392 FT	1,200 FT
CONSTRUCTED STREAM LENGTH	=	5,922 FT	1,582 FT

Ecosystem Enhancement PROGRAM

OWNER CONTACT:

KRISTIE CORSON
EEP PROJECT MANAGER

LIN XU
REVIEW COORDINATOR

Prepared in the Office of:
ICA Engineering
f/k/a Florence & Hutcheson, Inc.
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

R. KEVIN WILLIAMS
PROJECT ENGINEER

RYAN V. SMITH
PROJECT DESIGNER

ADKIN BRANCH RECORD DRAWINGS

ICA Engineering
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5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: P-0238

PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	3
PROJECT ENGINEER	

RECORD DRAWINGS

This record drawing has been prepared in part, based upon information furnished by others. While this information is believed to be reliable, the Engineer cannot assure its accuracy, and thus is not responsible for the accuracy of this record drawing or for any errors or omissions which may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying for any purpose.

25 0 50
SCALE

BALL FIELD

NOTE:
PIPE INSTALLED BY THE CITY OF KINSTON WITHIN EASEMENT TO BE REMOVED BY THE CITY.

ELM STREET

72"CHL

72"CONC

48"CHL

ISBKAPT

SYCAMORE STREET

SWALE

GRASS SWALE

RIP-RAP SWALE

18" RCP

SEWER PLUG

MATCHLINE- SEE SHEET NO. 2

MATCHLINE- SEE SHEET NO. 4

EXISTING 15" RCP

EXISTING YARD INLET

STORAGE BUILDINGS

SOIL

ISFD

ISBLKD

HICKS AVENUE

PINE STREET

W.L.

LEGEND

- LIMITS OF DISTURBANCE
- CONSERVATION EASEMENT LINE
- THALWEG
- BANKFULL
- TOE OF SLOPE
- FENCE LINE
- ROOTWAD
- LOG VANE
- LOG SILL
- IMPERVIOUS CHANNEL PLUG
- ORIGINAL CONTRACT 2009
- INFORMAL REPAIRS 2010-2011
- ORIGINAL HURRICANE REPAIRS 2013
- HURRICANE REPAIR CONSTRUCTION REVISION 2013

RECORD DRAWINGS ADKIN BRANCH	
SCALE: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: REW	DATE: 11/13

11/26/2013
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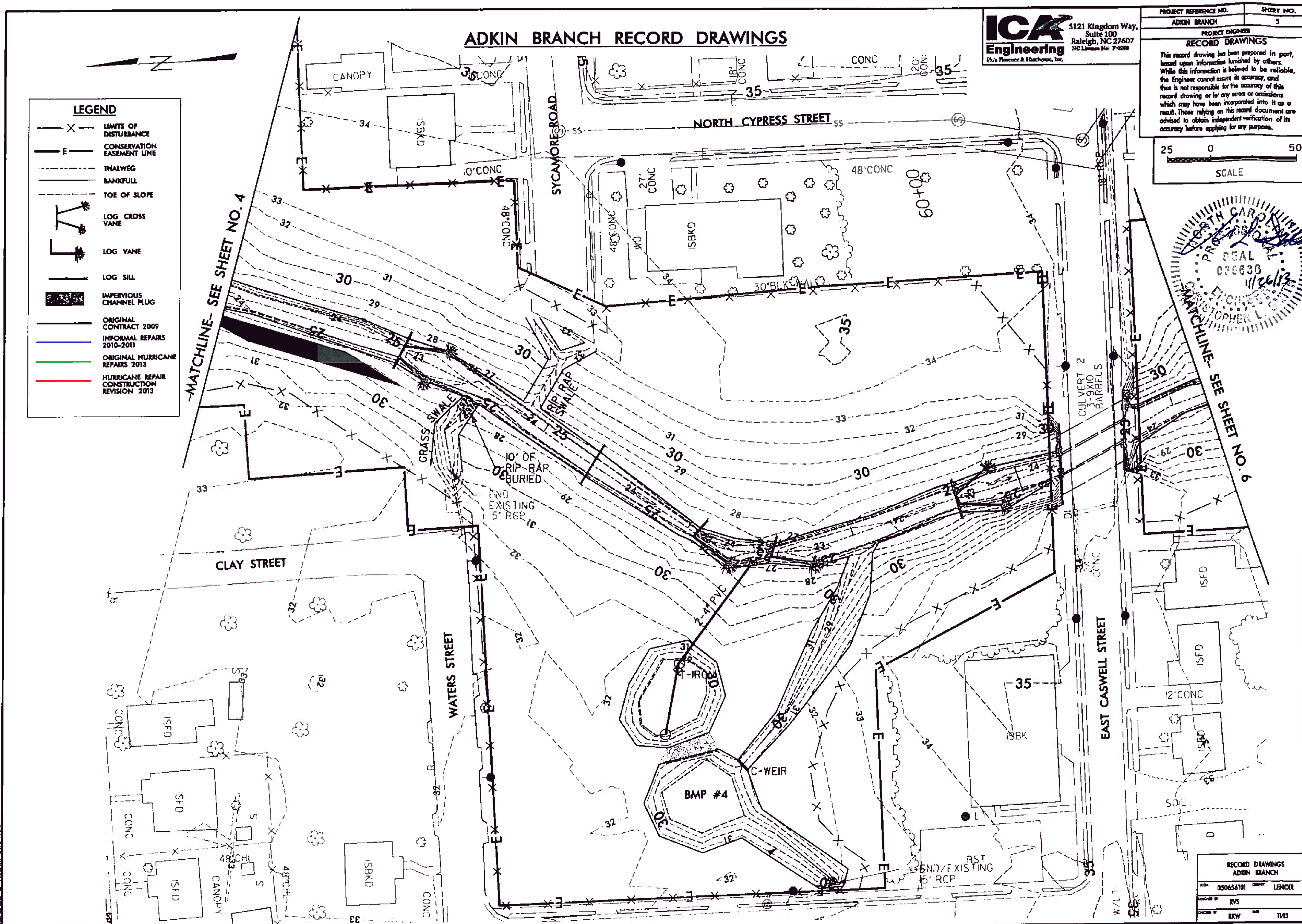
Florence & Hutcheson, Inc.


ADKIN BRANCH RECORD DRAWINGS
ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258
ICA's Florence & Hutcheson, Inc.
PROJECT REFERENCE NO.
SHEET NO.
ADKIN BRANCH
5
PROJECT ENGINEER
RECORD DRAWINGS
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25
0
50
SCALE
LEGEND
LIMITS OF DISTURBANCE
CONSERVATION EASEMENT LINE
THALWEG
BANKFULL
TOE OF SLOPE
LOG CROSS VANE
LOG VANE
LOG SILL
IMPERVIOUS CHANNEL PLUG
ORIGINAL CONTRACT 2009
INFORMAL REPAIRS 2010-2011
ORIGINAL HURRICANE REPAIRS 2013
HURRICANE REPAIR CONSTRUCTION REVISION 2013
MATCHLINE- SEE SHEET NO. 4
MATCHLINE- SEE SHEET NO. 6
NORTH CYPRESS STREET
SYCAMORE ROAD
CLAY STREET
WATERS STREET
EAST CASWELL STREET
CANOPY
ISBKD
ISBK
ISFD
10'CONC
48'CONC
27' CONC
30'BLK WALL
GRASS SWALE
RIP RAP SWALE
10' OF RIP RAP BURIED
END EXISTING 15' RCP
2-4" PVC
T-IRON
C-WEIR
BMP #4
CULVERT 2 3-9X10 BARRELS
60+00
12'CONC
END/EXISTING 15' RCP
BST
RECORD DRAWINGS ADKIN BRANCH
050656101
LENOIR
RVS
RKW
11/13

ADKIN BRANCH RECORD DRAWINGS

PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	7

PROJECT ENGINEER

RECORD DRAWINGS

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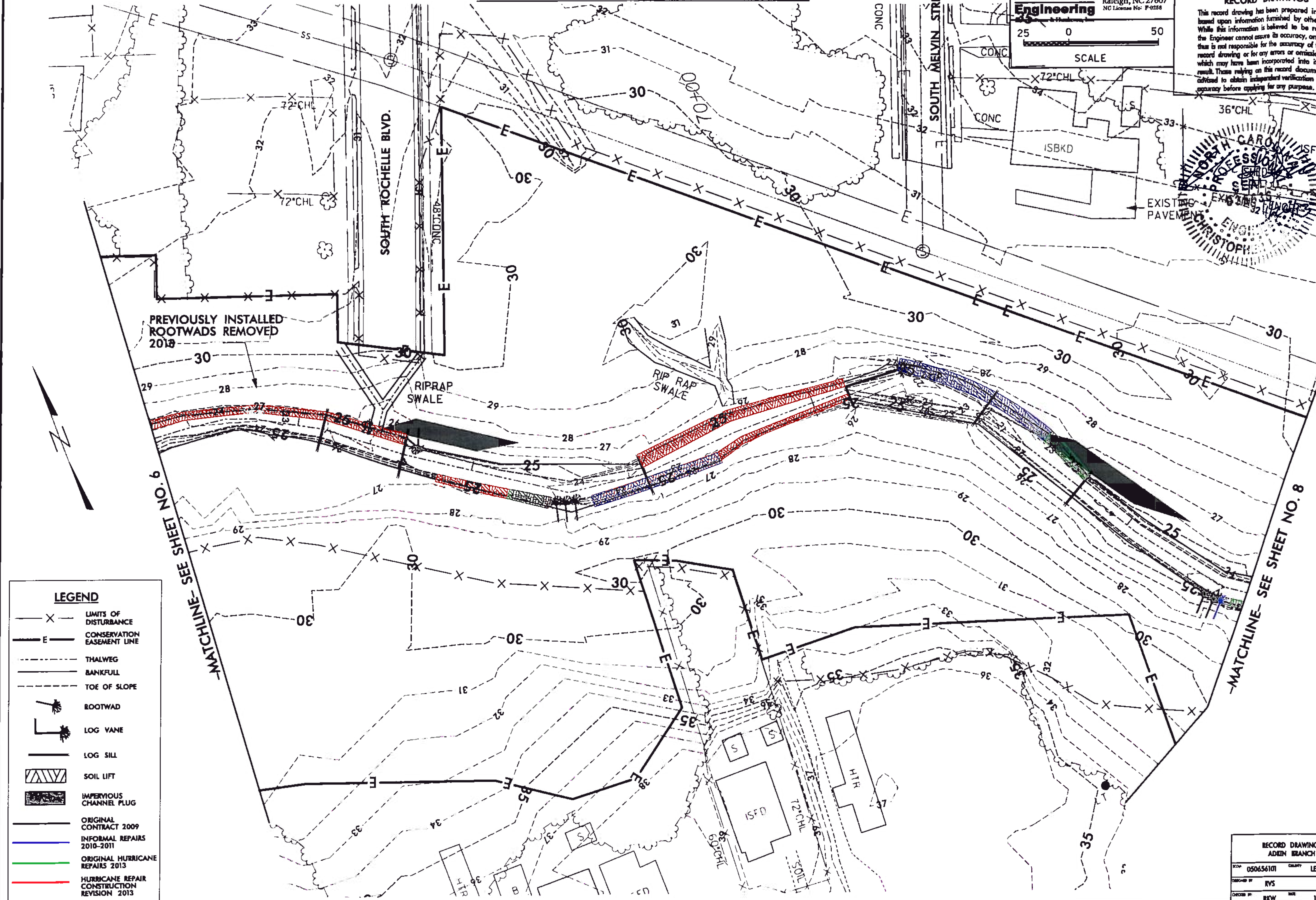
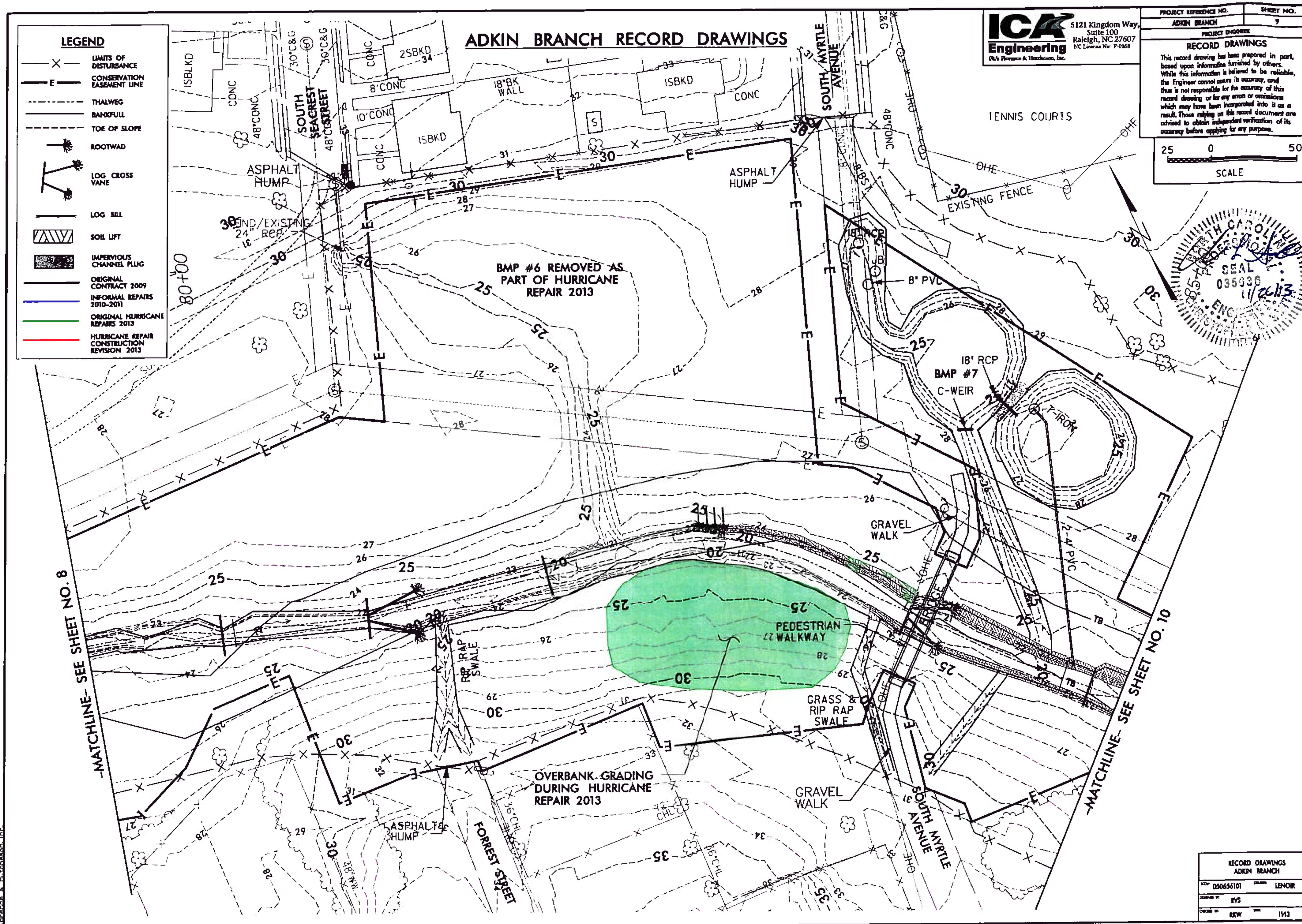


RECORD DRAWINGS
ADKIN BRANCH

SCOP	050656101	COUNTY	LENOIR
DESIGNED BY	RVS		
CHECKED BY	RKW	DATE	1/13


ADKIN BRANCH RECORD DRAWINGS
ICA Engineering
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Raleigh, NC 27607
NC License No: F-0268
f/k/a Florence & Hutcheson, Inc.
PROJECT REFERENCE NO.
ADKIN BRANCH
SHEET NO.
9
PROJECT ENGINEER
RECORD DRAWINGS
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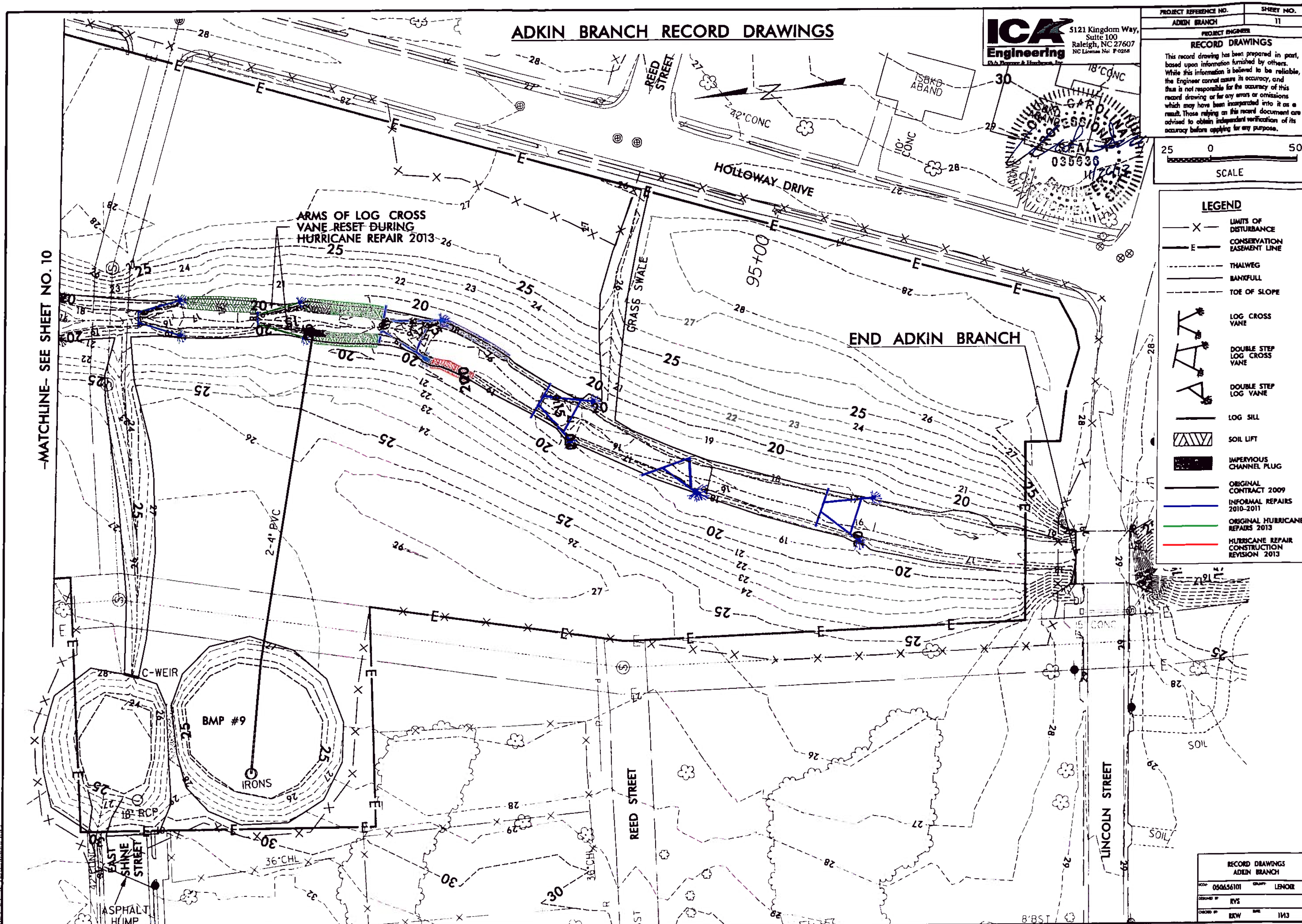
25 0 50
SCALE
LEGEND
LIMITS OF DISTURBANCE
CONSERVATION EASEMENT LINE
THALWEG
BANKFULL
TOE OF SLOPE
ROOTWAD
LOG CROSS VANE
LOG SILL
SOIL LIFT
IMPERVIOUS CHANNEL PLUG
ORIGINAL CONTRACT 2009
INFORMAL REPAIRS 2010-2011
ORIGINAL HURRICANE REPAIRS 2013
HURRICANE REPAIR CONSTRUCTION REVISION 2013
BMP #6 REMOVED AS PART OF HURRICANE REPAIR 2013
BMP #7
C-WEIR
18' RCP
8" PVC
2-4" PVC
JB
TENNIS COURTS
EXISTING FENCE
OHE
SOUTH MYRTLE AVENUE
SOUTH SEACREST STREET
FORREST STREET
ASPHALT HUMP
GRAVEL WALK
GRASS & RIP RAP SWALE
RIP RAP SWALE
PEDESTRIAN WALKWAY
OVERBANK GRADING DURING HURRICANE REPAIR 2013
MATCHLINE- SEE SHEET NO. 8
MATCHLINE- SEE SHEET NO. 10
80+00
ISBKD
2SBKD
CONC
8' CONC
10' CONC
48" CONC
18" BK WALL
30" C&G
36" CHL
TENNIS COURTS
RECORD DRAWINGS
ADKIN BRANCH
050656101
LENOIR
KVS
RKW
11/13
035036
11/26/13


ADKIN BRANCH RECORD DRAWINGS
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Raleigh, NC 27607
NC License No: F-0258
PROJECT REFERENCE NO.
ADKIN BRANCH
SHEET NO.
11
PROJECT ENGINEER
RECORD DRAWINGS
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NORTH CAROLINA PROFESSIONAL SEAL 035636 ENGINEER
25 0 50
SCALE
LEGEND
LIMITS OF DISTURBANCE
CONSERVATION EASEMENT LINE
THALWEG
BANKFULL
TOE OF SLOPE
LOG CROSS VANE
DOUBLE STEP LOG CROSS VANE
DOUBLE STEP LOG VANE
LOG SILL
SOIL LIFT
IMPERVIOUS CHANNEL PLUG
ORIGINAL CONTRACT 2009
INFORMAL REPAIRS 2010-2011
ORIGINAL HURRICANE REPAIRS 2013
HURRICANE REPAIR CONSTRUCTION REVISION 2013
ARMS OF LOG CROSS VANE RESET DURING HURRICANE REPAIR 2013
-MATCHLINE- SEE SHEET NO. 10
HOLLOWAY DRIVE
REED STREET
GRASS SWALE
95+00
END ADKIN BRANCH
2-4" PVC
BMP #9
IRONS
C-WEIR
18" RCP
EAST SHINE STREET
ASPHALT HUMP
LINCOLN STREET
42"CONC
36"CHL
SOIL
RECORD DRAWINGS
ADKIN BRANCH
050656101
LENOIR
RVS
RKW
11/13

ADKIN BRANCH RECORD DRAWINGS

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PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	13
PROJECT ENGINEER	

RECORD DRAWINGS

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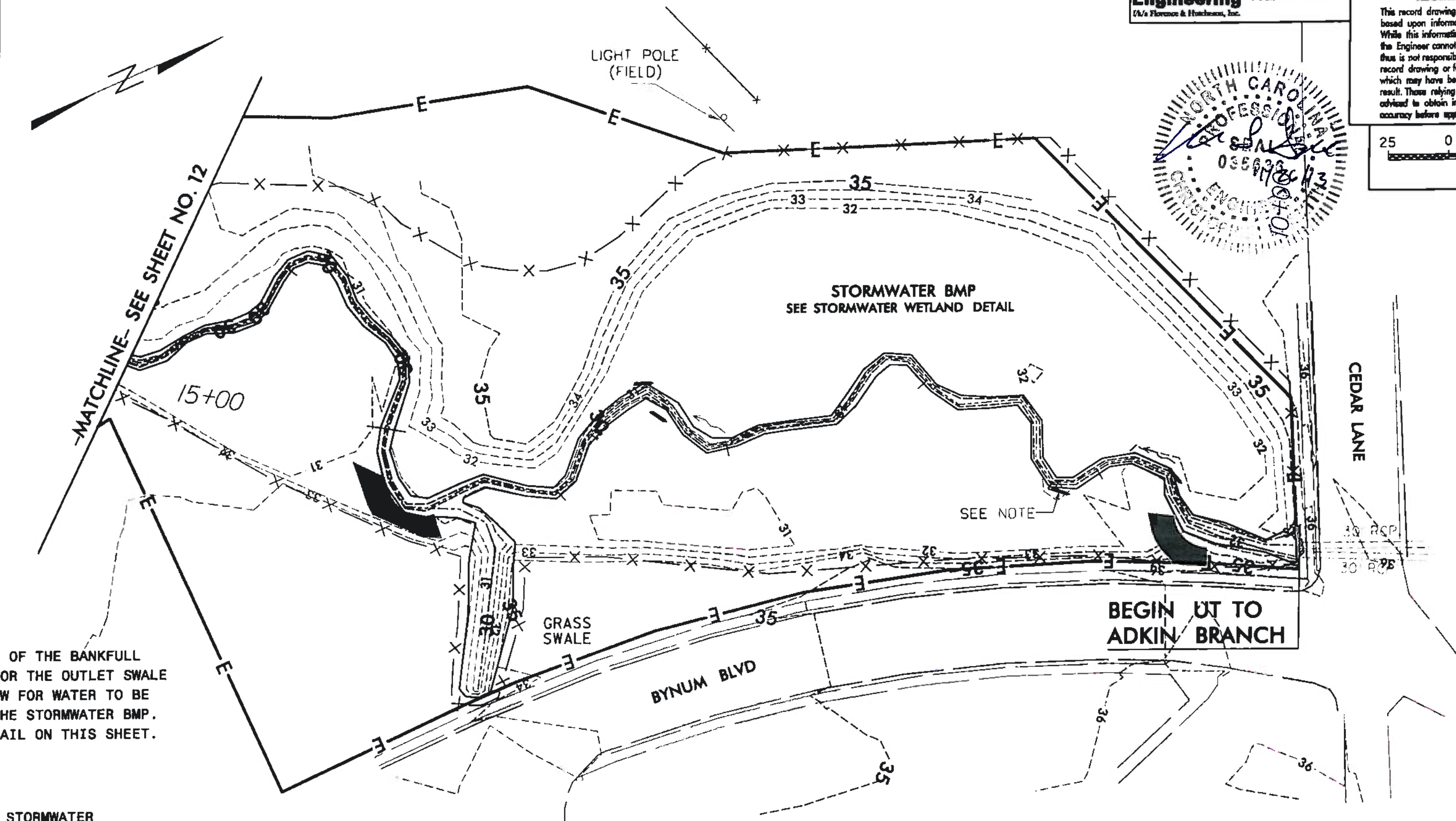
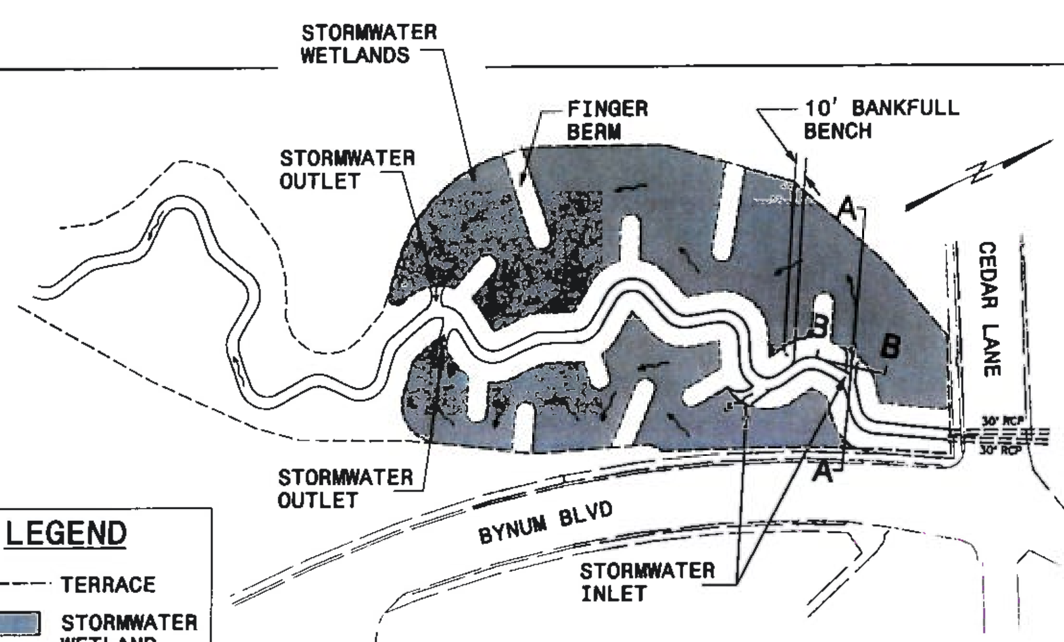
SCALE: 25 0 50

LEGEND

- LIMITS OF DISTURBANCE
- CONSERVATION EASEMENT LINE
- THALWEG
- BANKFULL
- TOE OF SLOPE
- LOG SILL
- IMPERVIOUS CHANNEL PLUG
- ORIGINAL CONTRACT 2009
- INFORMAL REPAIRS 2010-2011
- ORIGINAL HURRICANE REPAIRS 2013
- HURRICANE REPAIR CONSTRUCTION REVISION 2013



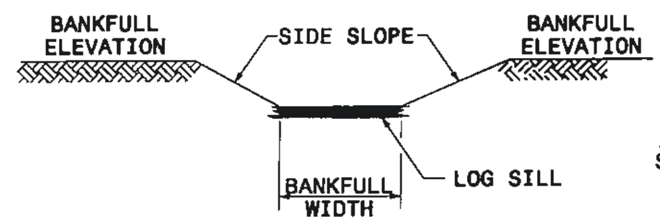
NOTE:
LOG SILLS PLACED OUTSIDE OF THE BANKFULL CHANNEL MAINTIAN GRADE FOR THE OUTLET SWALE AT HALF BANKFULL TO ALLOW FOR WATER TO BE DISTRIBUTED THROUGHOUT THE STORMWATER BMP. SEE THE CONSTRUCTION DETAIL ON THIS SHEET.



LEGEND

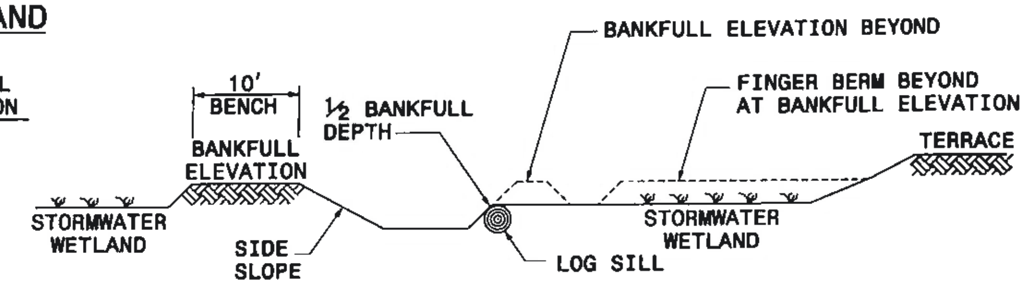
- TERRACE
- STORMWATER WETLAND

STORMWATER WETLAND



STORMWATER INLET/OUTLET CROSS-SECTION
SECTION B-B

NOTES:
1. INVERT SET AT ½ BANKFULL DEPTH.
2. LOG SILL SET AT INVERT TO PROTECT FROM SCOUR.
3. BASE WIDTH SHALL BE ½ BANKFULL CHANNEL BASE WIDTH. SIDE SLOPES SHALL BE BUILT AT A 3:1 SLOPE.



STORMWATER INLET/OUTLET PROFILE
SECTION A-A

NOTES:
1. STORMWATER WETLAND'S ELEVATION SHALL BE SET AT ½ THE BANKFULL DEPTH UP FROM CHANNEL INVERT.

RECORD DRAWINGS ADKIN BRANCH	
050656101	LENOIR
RVS	
RKW	1/13