YEAR 5 MONITORING REPORT

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

Lenoir County, North Carolina
DMS IMS No. 7

Submitted to:

NCDEQ-Division of Mitigation Services (DMS)
217 West Jones Street, Suite 3000A
Raleigh, North Carolina 27603

Construction Completed: April 2011
Morphology Data Collected: March - May 2015
Vegetation Data Collected: August 2015
Submitted: December 2015

Prepared by:

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

Design Firm:
ICA Engineering, Inc.
5121 Kingdom Way, Suite 100
Raleigh, North Carolina 27607
919.851.6066
919.851.6846 (fax)

I HEREBY CERTIFY THAT THE DOCUMENTS CONTAINED HEREIN, ADKIN BRANCH YEAR 5 MONITORING REPORT WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

SIGNED, SEALED AND DATED THIS 14TH DAY OF DECEMBER 2015.

Chris L. Smith, PE

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1.0 EXECUTIVE SUMMARY

The following report summarizes the vegetation establishment and stream stability for Year 5 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 31.92 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

According to 15A NCAC 02B .0295 Mitigation Program Requirements for Protection and Maintenance of Riparian Buffers vegetation 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 Division of Mitigation Services (DMS) and Axiom Environmental, Inc. (Axiom) as described in the dms 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 B. 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 C4 and C5 (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 BMP was 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 received supplemental planting in areas with low stem densities and those areas disturbed by construction activities in 2013. The areas that were 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. Several small areas of invasive species occurred 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 was greater than 95 percent.

Year 4 (2014)

Based on the number of stems counted, average densities were measured at 498 planted stems per acre (excluding livestakes) surviving in Year 4 (2014). 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*).

Sixteen of the twenty-two individual vegetation plots met success criteria when counting planted stems alone. Vegetation in Plot 9 was damaged by construction equipment during stream repair efforts in July-September 2013; several planted stems have resprouted but overall the area around this plot was sparse. Five plots (Plots 7, 10, 11, 16, and 18) 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.

The site received supplemental planting in areas disturbed by construction activities in 2013. The areas that were replanted include the staging and stockpile locations, haul road and any other area within the easement that were impacted by construction equipment. Supplemental planting with 1060 containerized trees (1-gallon and 3-gallon) and 3000 livestakes occurred in early 2014 as found in tables C1-C3. The majority of containerized trees were doing well.

Several areas of invasive species occured within the Site including Chinese privet, Johnson grass, lespedeza, and Japanese honeysuckle as depicted in the CCPV (Figures 2.6-2.7 and 2.9-2.11). Invasive species were treated in March 2014. DMS is currently contracted with a firm to manage *Ailanthus altissima*, *Ligustrum sinensis*, *Ligustrum japonica*, *Melia azedarach*, *Sorghum halepense,* and *Wysteria sp*.

Plant coverage within the stormwater BMP was greater than 95 percent.

Year 5 (2015)
Based on the number of stems counted, average densities were measured at 462 planted stems per acre (excluding livestakes) surviving in Year 5 (2015). The dominant species identified at the Site were planted stems of river birch (*Betula nigra*) and southern red oak (*Quercus falcata*).

Seventeen of the twenty-two individual vegetation plots met success criteria of 260 stems per acre when counting planted stems alone. Vegetation Plot 7 is located in a large community of *Lespedeza cuneata*. It is likely that the invasive population is strangling and shading native planted vegetation, inhibiting survival of species in the vegetation plot. Vegetation in Plot 9 was damaged by construction equipment during stream repair efforts in July-September 2013; several planted stems have resprouted but overall the area around this plot is sparse. Three plots (Plots 10, 11, and 16) didn't 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.

Supplemental planting with 1060 containerized trees (1-gallon and 3-gallon) and 3000 livestakes occurred in early 2014 (Table C1-C3). The majority of containerized trees are doing well.

Several areas of invasive species occur within the Site including Chinese privet (*Ligustrum sinense*), Johnson grass (*Sorghum halepense*), Chinese lespedeza (*Lespedeza cuneata*), and Japanese honeysuckle (*Lonicera japonica*) as depicted on Figures 2.0-2.12 (Appendix B). Invasive species were treated in March 2014; however, continued treatment is recommended due to the remaining presence of invasive species that are shading and strangling planted stems.

The easement is being encroached upon downstream of Cross Section 4 on the right bank. The total encroachment area is approximately 0.03 acres. DMS has been notified of the disturbance to the easement.

Current plant coverage within the stormwater BMP is 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 (NCDEQ, 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 performing 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 were 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 displayed changes in geometry due to the installation of soil

lifts as part of the Hurricane Irene repair plan. The repaired banks have been restored to the geometry recorded in the baseline report.

Sandfilter BMP #6 was taken offline and filled during the Hurricane Irene repairs. The BMP was planted as a part of 2014 supplemental planting. The remaining sandfilter BMPs received maintenance mowing in 2014.

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.

DMS 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 observed within the project reach and DMS contacted US Department of Agriculture in February of 2013 to begin removing the dams. After removal of the dams, additional erosion was observed, and these areas were added to the repair plans which were conducted in summer 2013.

The site experienced at least one bankfull flow in July, 2013. Additional overbank evidence includes debris lines, and vegetation bent in the downstream direction.

Year 4 (2014)
Year 4 monitoring surveys occurred in April 2014.

Reach 1: Reach 1 profile experienced minor scouring near station 52+00, however this change in profile depth is expected in a sand bed system. All structures appear to be maintaining grade control. An area around station 53+00 is experiencing major erosion along the right bank and may require repairs if erosion continues. Moderate bank erosion is also occurring in three areas downstream of station 58+00. Four areas between stations 42+00 and 47+00 are experiencing minor erosion along the banks. Bank widening is also occurring between station 55+50 and 58+00. Areas of minor bank erosion and bank widening should be watched closely in future monitoring years.

A beaver dam was observed near Station 40+80 on April 4, 2014. DMS contacted APHIS and the dam was removed by chainsaw on April 14, 2014. The area where the dam was removed should be watched for signs of stream instability.

Reach 2: The profile of Reach 2 continues to fluctuate as is expected with a sand bed system. Several of the pools have scoured while others have filled. In general, the changes to the profile are not significant and similar changes are expected to continue throughout the monitoring period.

Unstable sections repaired during September 2013 can be seen in the CCPV and are functioning as intended. Vegetation along the banks continues to mature and aid in bank stabilization. Soil lifts installed during the 2013 repairs can be seen in the cross section photos and are also contributing to the overall stabilization of banks. Moderate scour observed during Year 3 monitoring at Cross Section 6 continues to be an area of concern for the stream. Cross Section survey data shows the area to the right of the log vane continuing to scour. Woody vegetation growing on the banks is slowing the scouring, however, the area should still be closely observed during monitoring. Similar erosion is occurring at the right of the log vane at Cross Section 8. Notably less vegetation is present in this area and therefore this area should be watched closely as monitoring continues. The geometry of Cross Section 7 remains similar to Year 3 monitoring after soil lifts were installed in 2013. The soil lifts are performing as intended and are aiding in the stabilization of this section of the channel. Cross Sections 9, 10 and 11 revealed notable increase in bankfull width and area due to stream bank erosion when surveyed on 4/1/2014. A Major rain event occured on 12/24/2013 accumulating 2.05 inches of precipitation, which coupled with sandy soils and sparse vegetation likely led to the bank erosion. Cross sections were re-surveyed 8/9/2014 and showed minimal change since the April surveys. Another rain event on 7/4/2014 totaled 4.17 inches of rain, however, this storm did not affect channel dimension.

Severe erosion is also occurring in the channels entering the stream below Cross Section 11 from the stormwater BMP. DMS installed live stakes in this area and it should be monitored to see if the plantings are having a significant impact on bank and channel. Other areas experiencing bank erosion and widening can be seen in the CCPV.

Reach 3: Reach 3 experienced some minor scouring and filling of the stream bed at the upstream end of the reach. Most of the changes occur between section 10+00 and 11+75, as observed at Cross Section 13. The channel profile shows no significant changes through the majority of the reach (Station 11+75 through 21+00). Cross Sections 14, 16, and 17 do not show signs of serious erosion and have retained similar geometry to the previous monitoring year. Cross Section 15 was not surveyed due to a fallen tree over the channel.

No bank erosion appears to be occurring in Reach 3.

The site experienced at least one bankfull flow in March 2014 (Table 13). Additional overbank evidence was seen in debris lines and bent vegetation in the downstream direction. Evidence of bankfull events can be seen in Appendix E.

Year 5 (2015)
Year 5 monitoring surveys occurred in March and May of 2015.

Reach 1: Several areas of thin grass and minor erosion were removed from this year's CCPV due to re-vegetation. Minor erosion is present near station 41+75, however, this area has not worsened over the previous monitoring year and does not appear to be actively eroding. Minor erosion noted during year four at approximately station 44+75 is no longer an area of concern due to re-vegetation along the banks. Scour is worsening along the right arm of the log vane with sill at station 52+00 due to a lack of significant vegetative cover. If vegetation does not establish along the right bank erosion will remain active and worsen. Over the previous monitoring year scour has developed in the ditch off Elm Street near station 44+50 (Photo 3.22). Reach 1 profile data shows a fairly consistent profile in comparison with the previous years' data. The minor scouring near station 52+00 noted in the year 4 report graphs almost identically to year 5. Similarly, all cross sections in Reach 1 are exhibiting geometry consistent to what was shown in monitoring year 4. All structures appear to be maintaining grade control. Overall, channel profile, cross section geometry, and structures remain consistent from year 4 monitoring; indicating that channel stability is not worsening. Remnants of a beaver dam at station 49+60 are still creating a backwater effect and need to be removed.

Reach 2: Overall willow establishment and maturity is much weaker on Reach 2 compared to other reaches of Adkin Branch. Specifically, erosion is increasing along the right bank at approximately station 64+90 due to a lack of vegetative cover. Cross Section 6 (Station 64+81) is exhibiting increased scour along the right bank which has caused the bankfull area to increase by 38% over the previous monitoring year. Vegetation has failed to establish to the right of the log vane arm, leaving the bank prone to erosion over the monitoring period. Increases in erosion due to lack of vegetative establishment are common throughout the reach, including station 71+75 and 74+10. These areas will continue to actively erode until stabilizing vegetation established along the banks. Overall, average bankfull cross sectional area drastically increased between monitoring years three and five. The increase in bankfull area after year three is a result of the Hurricane Irene repairs that were constructed in September of 2013. These repairs changed channel geometry for three of the cross sections in Reach 2. Currently, all repaired areas are stable except for the right bank of Cross Section 9 which is experiencing active erosion due to a lack of vegetative cover.

Conversely, the severity of erosion in several areas has been reduced due to vegetative establishment. These areas include all erosion noted between station 79+00 and

82+50. Cross section 11 geometry remains consistent with year 4, indicating that this portion of the channel is in stable condition.

Severe erosion was reduced to moderate erosion in the channel entering the stream below Cross Section 11 from the stormwater BMP. The live stakes installed in this area are having a positive impact on stream banks.

The profile of Reach 2 appears similar to previous years with some fluctuations typical of a sand bed system.

Reach 3: Reach 3 experienced scour and deposition of the stream bed over the previous year as expected with a sand bed system. A portion of the flow deviates from the main channel at station 11+20, flows non-erosively through the valley and re-enters at station 13+10. Cross Section 13 portrays a much smaller channel due to the deviation of channel flow. The channel profile shows significant deposition from approximately station 18+00 through 20+10. There are two disturbances to the stream channel that are likely contributing to this deposition. The fallen tree at approximately station 19+00 appears to be trapping brush and other debris leading to an impediment to flow. Additionally, local residents have piled up logs and cinder blocks in the channel at approximately station 20+50 in order to create a walking or biking path across the channel.

Cross Sections 14, 16, and 17 do not show signs of serious erosion and have retained similar geometry to the previous monitoring year. Bank pins were not located for Cross Section 15 within the large tree debris from the 2011 fallen tree, thus Cross Section 15 was not surveyed.

No bank erosion appears to be occurring in Reach 3. Reach 3 observations are depicted in the CCPV and in Figure 3.36.

The site experienced at least one bankfull event prior to March 11, 2015 (Table 13). Additional overbank evidence was seen in debris lines and bent vegetation in the downstream direction. Evidence of bankfull events is presented in Appendix E.

1.4 Wetlands

No wetland monitoring areas were established for this project report.

1.5 Note

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan

(formerly the Restoration Plan) documents available on DMS's website. All raw data supporting the tables and figures in the appendices is available from DMS upon request. Credit Calculation Figures are provided in Appendix F.

DMS has contracted a designer to prepare repair plans for eroded areas downstream of Rochelle Blvd and along the headcut on the former BMP outlet. Construction is anticipated to occur in January 2016, followed by supplemental planting in areas of concern.

2.0 METHODOLOGY

2.1 Vegetation

Vegetation was measured at twenty-two sample vegetation plots (10-meter by 10-meter) within the Site in August 2015 for Year 5 (2015) monitoring per guidelines established in *CVS-DMS 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 2010). 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 5 (2015) 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 Sand Filter BMPs and Stormwater Wetlands

Sand filter 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 for the life of the BMPs (30 years). A maintenance guideline manual was provided to the City of Kinston by DMS.

There is no maintenance required on the stormwater wetland. 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.

3.0 RERFERENCES

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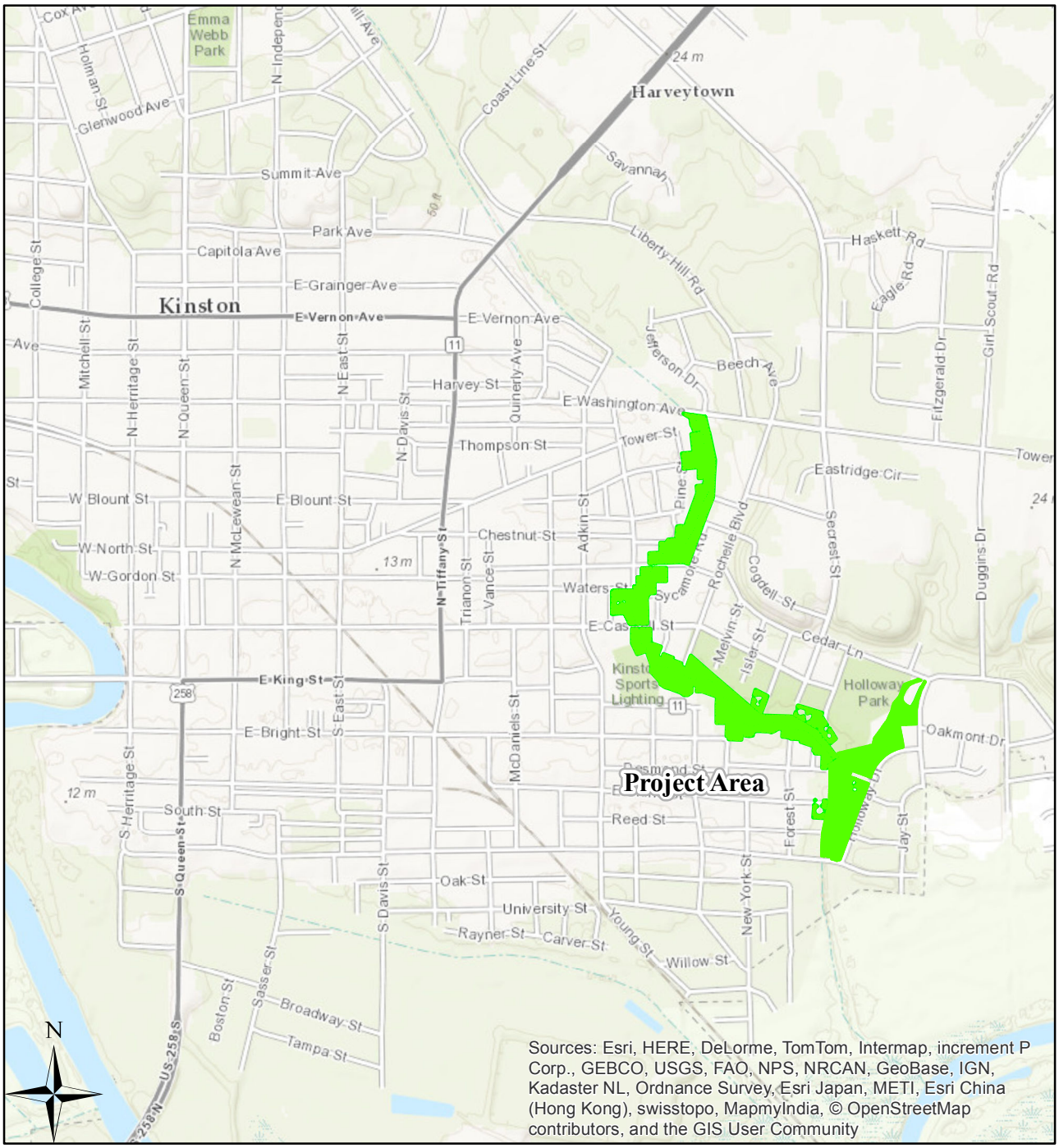
APPENDICES

Appendix A. Project Vicinity Map and Background Tables



0 0.25 0.5 1 Miles

Vicinity Map

Adkin Branch
ERTR
Lenoir County, North Carolina

ICA Engineering, INC
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
(919) 851-6066

September 2015

Figure 1

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 NCDEQ Division of Mitigation Services (DMS) 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 DMS.

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'	0-200'***			
Totals	7,533	N/A	N/A	N/A	N/A	0	1,268,548.00		2,820	NA

Project Components							
Project Component -or- Reach ID	Stationing/Location	Existing Footage/ Square Footage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Square Footage	Mitigation Ratio	
Reach 1	Washington Ave. to Gordon St.	1,680	PII	R	1,729	1:1	
Reach 2	Gordon St. to Lincoln St.	4,224	PII	R	4,214	1:1	
Reach 3	UT to Adkin Branch.	1,200	PII	R	1,590	1:1	
Riparian Buffers	<50'		Planted Area	R	53,812	0	
	0-200'***		Planted Area	R	1,268,548	1:1	

Component Summation							
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)		Buffer (square ft.)	Upland (acres)
		Riverine	Non-Riverine				
Restoration	7,533	N/A	N/A	N/A		1,268,548	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 Buffer Mitigation Credit numbers were adjusted based on proposed 2003 Stream Mitigation Guidelines.

**Riparian Buffer Mitigation Credit Numbers were adjusted based on the 15A NCAC 02B .0242 Neuse River Basin: Nutrient Sensitive Waters Management Strategy: Mitigation Program For Protection and Maintenance of Existing Riparian Buffers August 1, 2000.

***Adkin Branch is a Grandfathered buffer project (The following were removed from credit: areas less than 50 foot; sewer easement; BMP footprint; ditches.)

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
Hurricane Irene Repairs		September 2013
Year 4 Monitoring	April 2014	February 2015
Year 5 Monitoring	August 2015	December 2015

Table 3. Project Contacts Table

Designer	ICA Engineering, 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 (2010)	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 821-4300
Repair Contractor (2013)	Carolina Environmental Contracting PO Box 1905 Mount Airy, NC 27030 Joanne Cheatham (336) 320-3849
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. 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) YR5
OVERVIEW

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.0

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

NOT TO SCALE

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)			
SCO#:	050656101	COUNTY:	LENOIR
DESIGNED BY:	RVS		
CHECKED BY:	RKW	DATE:	09/15

9/11/2015
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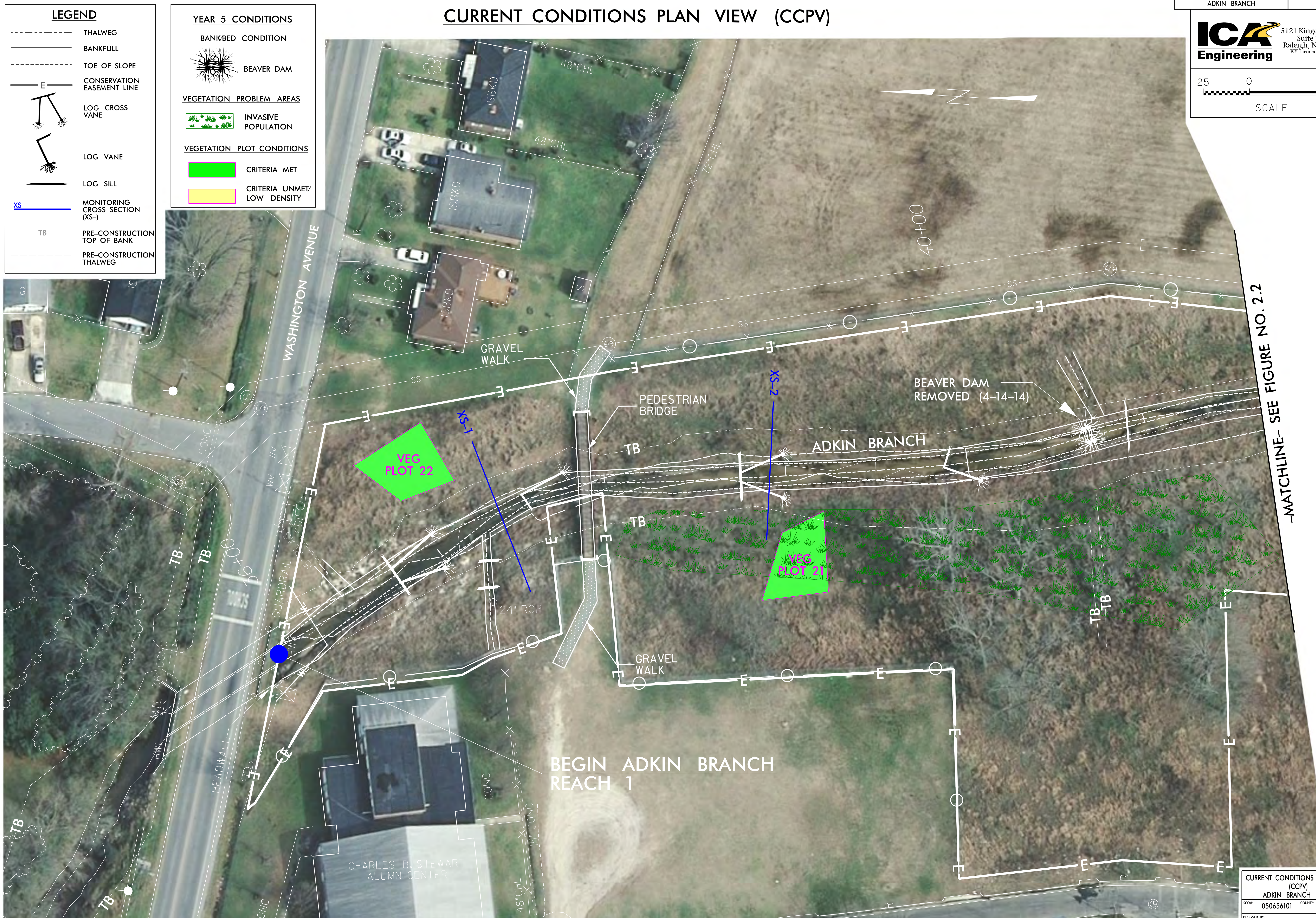
ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.1

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607



CURRENT CONDITIONS PLAN VIEW (CCPV)
ADKIN BRANCH (YR5)

SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

9/11/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.2

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

ELM STREET
MULBERRY STREET
SYCAMORE STREET
43+00
45+00
48+00
15" RCP
18" RCP
15" CONC
W/LT
LT
SS
E
TB
XS-3
XS-4
ADKIN BRANCH
ADKIN BRANCH REACH 1
VEG PLOT 20
SEWER PLUG
EXISTING 15" RCP
EXISTING YARD INLET
STORAGE BUILDINGS
SOIL
PINE STREET
HICKS AVENUE
-MATCHLINE- SEE FIGURE NO. 2.1
-MATCHLINE- SEE FIGURE NO. 2.3

LEGEND

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

YEAR 5 CONDITIONS

BANK/BED CONDITION
- MINOR EROSION
- HOLE

VEGETATION PROBLEM AREAS
- THIN GRASS

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

9/11/2015
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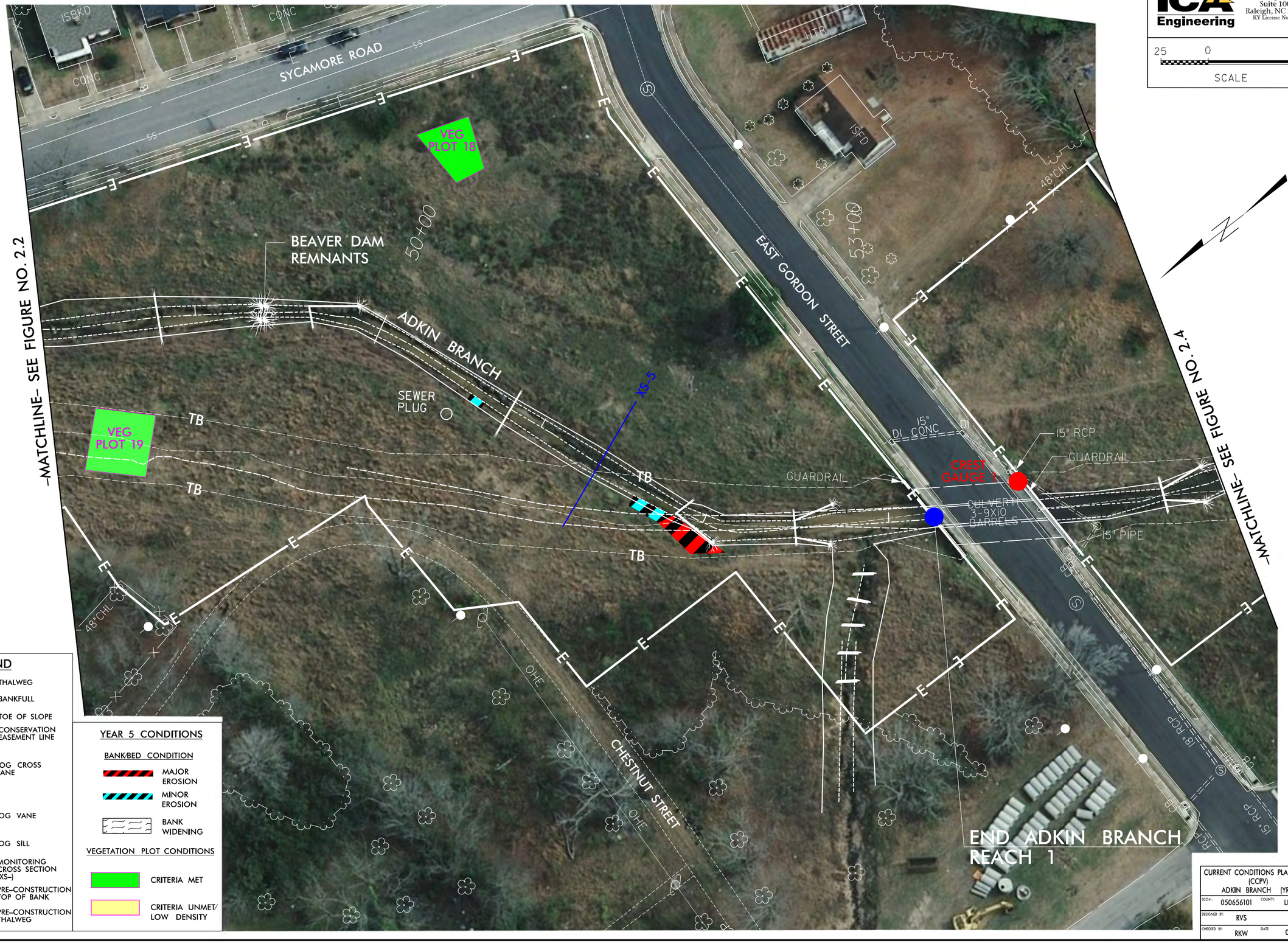
ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.3

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE



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 5 CONDITIONS

BANK/BED CONDITION

- MAJOR EROSION
- MINOR EROSION
- BANK WIDENING

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)		
SCO #: 050656101	COUNTY: LENOIR	
DESIGNED BY: RVS		
CHECKED BY: RKW	DATE: 09/15	

12/15/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.4

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

YEAR 5 CONDITIONS

BANK/BED CONDITION

MINOR EROSION

VEGETATION PROBLEM AREAS

INVASIVE POPULATION

VEGETATION PLOT CONDITIONS

CRITERIA MET

CRITERIA UNMET/ LOW DENSITY

LEGEND

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

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

12/15/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.5

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

LEGEND

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

YEAR 5 CONDITIONS

BANK/BED CONDITION

- MAJOR EROSION
- MINOR EROSION
- BANK WIDENING

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

12/15/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.6

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

SOUTH ROCHELLE BLVD.
SOUTH MELVIN STREET
ADKIN BRANCH
REACH 2
ADKIN BRANCH
JAPANESE HONEYSUCKLE
PRIVET
CHINA BERRY
EXISTING PAVEMENT
EXISTING FENCE
ISBKD
ISFD
SHED
72"CHL
36"CHL
48"CONC
CONC
VEG PLOT 13
VEG PLOT 14
VEG PLOT 15
XS 7
00+67
10+00
-MATCHLINE- SEE FIGURE NO. 2.5
-MATCHLINE- SEE FIGURE NO. 2.7

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 5 CONDITIONS

BANK/BED CONDITION
- MODERATE EROSION
- MINOR EROSION

VEGETATION PROBLEM AREAS
- INVASIVE POPULATION

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)		
SCO#: 050656101	COUNTY: LENOIR	
DESIGNED BY: RVS		
CHECKED BY: RKW	DATE: 09/15	

9/1/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.7

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

LEGEND

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

YEAR 5 CONDITIONS

BANK/BED CONDITION
- MAJOR EROSION
- MODERATE EROSION
- MINOR EROSION

VEGETATION PROBLEM AREAS
- INVASIVE POPULATION

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

N

–MATCHLINE– SEE FIGURE NO. 2.6

EXISTING FENCE

OHP

DOVER STREET

BMP #5

C-WEIR

END/EXISTING 24" RCP

2-4" PVC

15" CONC

XS-8

XS-9

CHINA BERRY

VEG PLOT 11

VEG PLOT 12

VEG PLOT 10

TB

75+00

79+00

CREST GAUGE 2

JOHNSON GRASS

ADKIN BRANCH REACH 2

ADKIN BRANCH

–MATCHLINE– SEE FIGURE NO. 2.8

E

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)	
SCO #: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

9/1/2015
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ICA Engineering


CURRENT CONDITIONS PLAN VIEW (CCPV)
PROJECT REFERENCE NO.
ADKIN BRANCH
FIGURE NO.
2.8
ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
SCALE
25 0 50
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
YEAR 5 CONDITIONS
LOCAL ENCROACHMENT
BANK/BED CONDITION
MODERATE EROSION
MINOR EROSION
VEGETATION PROBLEM AREAS
THIN GRASS
VEGETATION PLOT CONDITIONS
CRITERIA MET
CRITERIA UNMET/ LOW DENSITY
ADKIN BRANCH
ADKIN BRANCH REACH 2
VEG PLOT 9
XS-10
XS-11
80+00
85+00
HEADCUT
BRIDGE
18" RCP
BMP #7
C-WEIR
T-IRON
JB
2-4" PVC
TB
TENNIS COURTS
EXISTING FENCE
ASPHALT HUMP
SOUTH SEACREST STREET
SOUTH MYRTLE AVENUE
FORREST STREET
END/EXISTING 24" RCP
MATCHLINE- SEE FIGURE NO. 2.7
MATCHLINE- SEE FIGURE NO. 2.9
CURRENT CONDITIONS PLAN VIEW (CCPV)
ADKIN BRANCH (YR5)
050656101
LENOIR
RVS
RKW
09/15

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.9

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

LEGEND

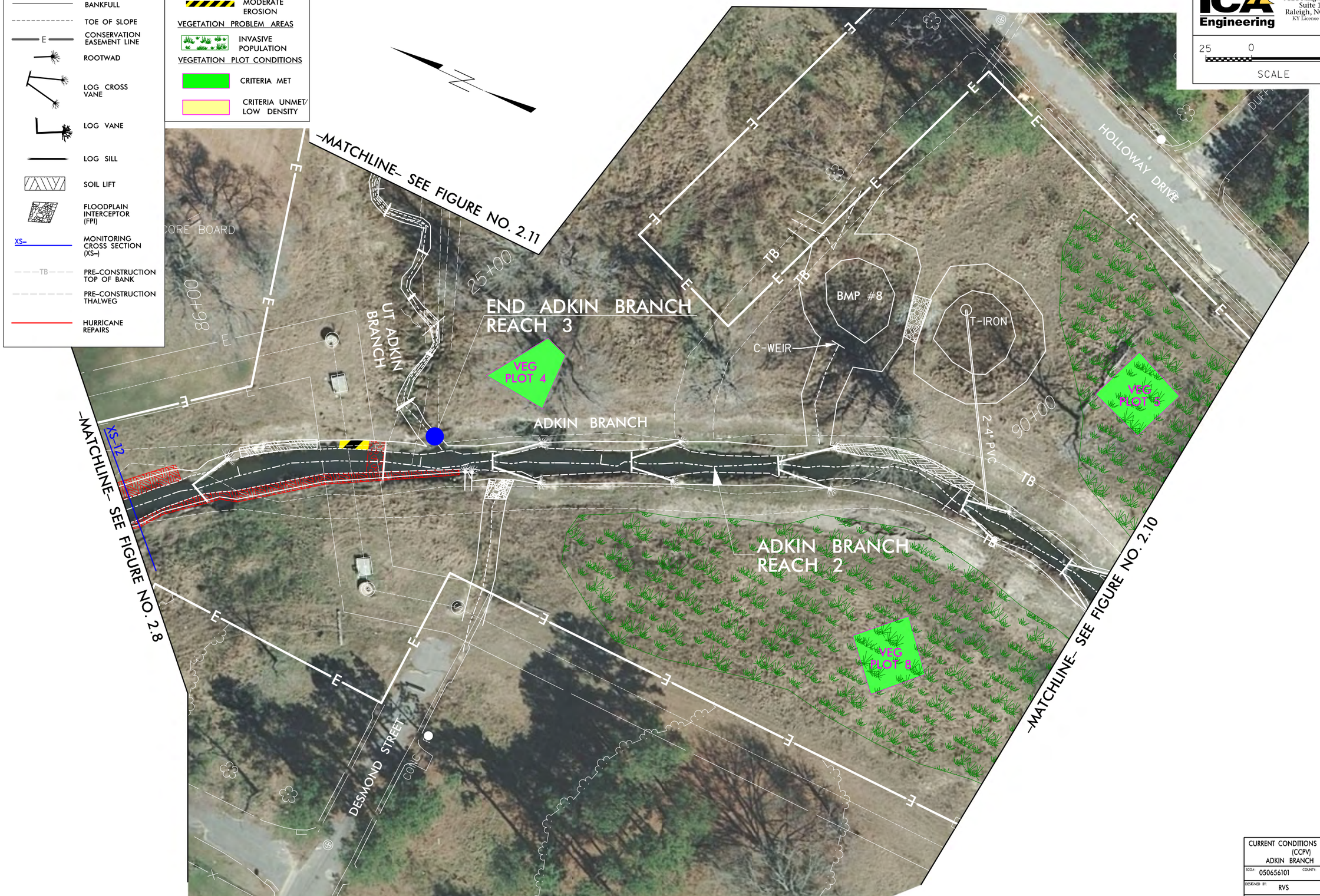
- THALWEG
- BANKFULL
- TOE OF SLOPE
- CONSERVATION EASEMENT LINE (E)
- ROOTWAD
- LOG CROSS VANE
- LOG VANE
- LOG SILL
- SOIL LIFT
- FLOODPLAIN INTERCEPTOR (FPI)
- MONITORING CROSS SECTION (XS-)
- PRE-CONSTRUCTION TOP OF BANK (TB)
- PRE-CONSTRUCTION THALWEG
- HURRICANE REPAIRS

YEAR 5 CONDITIONS

BANK/BED CONDITION
- MODERATE EROSION

VEGETATION PROBLEM AREAS
- INVASIVE POPULATION

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY



CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)	
SCO#: 0506561O1	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

9/1/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.10

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE

YEAR 5 CONDITIONS

BANK/BED CONDITION
- MODERATE EROSION

VEGETATION PROBLEM AREAS
- INVASIVE POPULATION
- THIN GRASS

VEGETATION PLOT CONDITIONS
- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

LEGEND

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

–MATCHLINE– SEE FIGURE NO. 2.9

END ADKIN BRANCH REACH 2

LESPEDEZA

HOLLOWAY DRIVE

REED STREET

ISBKD ABAND

42"CONC

10 CONC

9+00

9+50

TB

VEG PLOT 6

VEG PLOT 7

ADKIN BRANCH

2-4" PVC

C-WEIR

BMP #9

IRONS

18" RCP

EAST SHINE STREET

42"CONC

36"CHL

ASPHALT HUMP

REED STREET

LINCOLN STREET

15" CONC

SOIL

8'BST

9/1/2015
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ICA Engineering

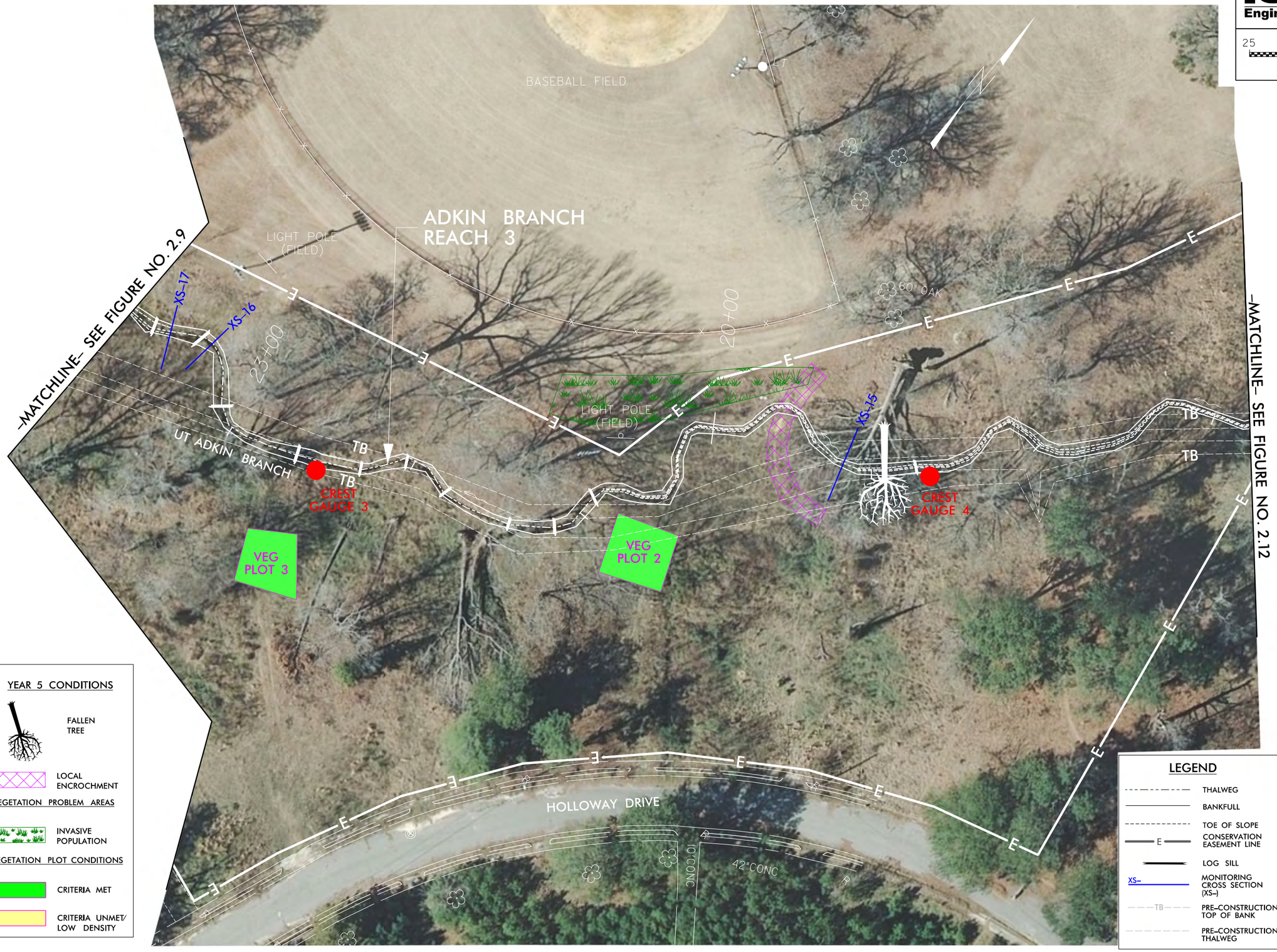
CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)		
SCO #: 050656101	COUNTY:	LENOIR
DESIGNED BY: RVS		
CHECKED BY: RKW	DATE:	09/15

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.11

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
KY License No: 153

25 0 50
SCALE



YEAR 5 CONDITIONS

- FALLEN TREE
- LOCAL ENCROCHMENT

VEGETATION PROBLEM AREAS

- INVASIVE POPULATION

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

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 (YR5)	
SCO #: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

9/1/2015
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ICA Engineering

CURRENT CONDITIONS PLAN VIEW (CCPV)

PROJECT REFERENCE NO.	FIGURE NO.
ADKIN BRANCH	2.12

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: 153

25 0 50
SCALE

LEGEND

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

YEAR 5 CONDITIONS

VEGETATION PLOT CONDITIONS

- CRITERIA MET
- CRITERIA UNMET/ LOW DENSITY

CURRENT CONDITIONS PLAN VIEW (CCPV) ADKIN BRANCH (YR5)	
SCO#: 050656101	COUNTY: LENOIR
DESIGNED BY: RVS	
CHECKED BY: RKW	DATE: 09/15

9/11/2015
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ICA Engineering

Table 5.1-5.3. Visual Stream Morphology Stability Assessment

Table 5.1 Visual Stream Morphology Stability Assessment
Adkin Branch Stream Restoration Project, Phase I, DMS 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			4	160	90%			
	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			4	107	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			1	22	99%	N/A	N/A	N/A
				Totals	5	129	95%	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 DMS monitoring guidance document)	16	17			94%			
	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, DMS 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			7	470	85%			
	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			24	635	90%	0%	0%	90%
	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			4	77	99%	0%	0%	99%
				Totals	28	712	88%	0%	0%	88%
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 DMS monitoring guidance document)	27	29*			93%			
	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, DMS 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)			3	160	90%			
		2. Degradation - Evidence of downcutting			4	160	90%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	All	N/A			100%			
	3. Meander Pool Condition	1. Depth Sufficient	25	28			89%			
		2. Length appropriate	25	28			89%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	All	N/A			100%			
		2. Thalweg centering at downstream of meander (Glide)	All	N/A			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT included undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collaps			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	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 DMS 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.	16	16			100%			

Table 6. Vegetation Condition Assessment

Table 6 Vegetation Condition Assessment
Adkin Branch Restoration Site (DMS 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	0	0.00	0.0%
2. Low Stem Density Areas	Stem densities throughout the Site are low due to death of planted seedlings as the result of competition with invasive species and poor soils.	None	NA	0	0.00	0.0%
			Total	0	0.00	0.0%
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	0	0.00	0.0%

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 dense invasives including Chinese privet, Johnson grass, lespedeza, and Japanese honeysuckle. Invasive species are found throughout the entire site.	0.02	NA	14	3.69	9.1%
5. Easement Encroachment Areas[3]	One small mowed path from the streambank to a nearby residence was observed.	0.02	NA	1	0.03	0.1%

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 3.1-3.26. Vegetation Plot Photos and Problem Areas

Photo 3.1-3.20 taken July 2015
Photo 3.21-3.27 Taken March 7, 2015 (Reach 1)
Photo 3.31-3.32 Taken May 7, 2015 (Reach 3)
Photo 3.33 Taken March 3, 2015 (Reach 2)

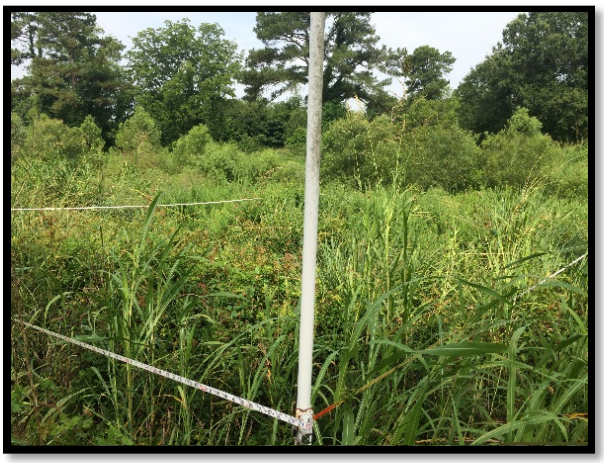
3.1 Vegetation Plot 1

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 41+75

3.22 Scour in ditch off Elm Street near 44+50

3.23 Minor erosion and thin grass near 46+10

3.24 Overflow channel from drainage ditch off Sycamore Street near 47+30

3.25 Minor and major erosion near 51+90

3.26 Hole near 56+40

3.29 Stress structure near 62+10

3.30 Re-vegetating bank near 63+50

3.35 Severe erosion near 78+50

3.36 Reach 3

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment

Adkin Branch Restoration Site (DMS Project Number 7)

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	91% Planted Stems and Natural Recruits 77% Planted Stems
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	
7	No	
8	Yes	
9	No	
10	No*	
11	No*	
12	Yes	
13	Yes	
14	Yes	
15	Yes	
16	No*	
17	Yes	
18	Yes	
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 260 stems per acre.

Table 8. CVS Vegetation Plot Metadata

Report Prepared By	Corri Faquin
Date Prepared	7/29/2015 10:52
database name	Axiom-EEP-2015-A-v2.3.1.mdb
database location	C:\Axiom\Business\CVS
computer name	CORRI-PC
file size	42328064
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
River Basin	Neuse
length(ft)	7,579
stream-to-edge width (ft)	
area (sq m)	5.46
Required Plots (calculated)	22
Sampled Plots	22

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

			Current Plot Data (MY5 2015)																														
			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		
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
Abelia	abelia																																	
Acer rubrum	red maple	Tree																																
Alnus serrulata	hazel alder	Shrub	14	17	24																													
Baccharis	baccharis	Shrub																																
Baccharis halimifolia	eastern baccharis	Shrub																																
Betula nigra	river birch	Tree	8	8	8	5	5	5	2	2	2	1	1	1							1	1	1	4	4	5				1	1	1	1	1	1
Carpinus caroliniana	American hornbeam	Tree													2	2	2				1	1	1	4	4	4						1			
Carya	hickory	Tree				1	1	8	3	3	5			3																		10			6
Catalpa bignonioides	southern catalpa	Tree																																
Celtis laevigata	sugarberry	Tree																																
Cephalanthus occidentalis	common buttonbush	Shrub																																
Cercis canadensis	eastern redbud	Tree						1							4	4	4													1	1	1			
Cornus amomum	silky dogwood	Shrub	10	13	13																													
Crataegus	hawthorn	Tree																																
Diospyros	diospyros	Tree																																
Diospyros virginiana	common persimmon	Tree										3	3	4													1	1	1						
Juniperus virginiana	eastern redcedar	Tree						2						2																				2
Liquidambar styraciflua	sweetgum	Tree						46			4			33																		10			
Melia azedarach	Chinaberrytree	Exotic																																
Mimosa	sensitive plant	Exotic																																
Morus alba	white mulberry	Exotic																																
Nyssa	tupelo	Tree																1	1	1				1	1	1								
Pinus	pine	Tree																																
Pinus taeda	loblolly pine	Tree			4			2						1			9																	
Platanus occidentalis	American sycamore	Tree																																
Populus deltoides	eastern cottonwood	Tree																																
Prunus serotina	black cherry	Tree						4			5															1								1
Pyrus	pear	Tree																																
Pyrus calleryana	Callery pear	Exotic																												2				
Quercus	oak	Tree		1	1				1	1	1				3	3	3							1	1	1								
Quercus falcata	southern red oak	Tree				6	6	6	6	6	15	1	1	1	4	4	4	2	2	2	2	2	2	6	6	6	1	1	1	2	2	2		
Quercus nigra	water oak	Tree				1	1	1	2	2	2	3	3	3	2	2	2	4	4	4							1	1	1					
Quercus phellos	willow oak	Tree				1	1	1	2	2	16	3	3	7																				
Quercus rubra	northern red oak	Tree																			1	1	1											
Robinia	locust																																	2
Robinia pseudoacacia	black locust	Tree																																
Salix nigra	black willow	Tree	2	11	11																													
Sassafras albidum	sassafras	Tree																																
Taxodium distichum	bald cypress	Tree				1	1	1																										
Ulmus	elm	Tree																																
Ulmus alata	winged elm	Tree																																
Ulmus americana	American elm	Tree															1						1	1	1	1	1	1	1				1	1	2
Unknown		Shrub or Tree																1	1	1														
		Stem count	34	50	61	15	15	77	16	16	50	11	11	55	15	15	25	8	8	8	5	5	6	17	17	19	4	4	4	4	4	27	2	2	14
		size (ares)	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		
		Species count	4	5	6	6	6	11	6	6	8	5	5	9	5	5	7	4	4	4	4	4	5	6	6	7	4	4	4	3	3	7	2	2	6
		Stems per ACRE	1376	2023	2469	607	607	3116	647.5	647.5	2023	445.2	445.2	2226	607	607	1012	323.7	323.7	323.7	202.3	202.3	242.8	688	688	768.9	161.9	161.9	161.9	161.9	161.9	1093	80.94	80.94	566.6

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%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

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

			Current Plot Data (MY5 2015)																														
			E7-AXE-0012			E7-AXE-0013			E7-AXE-0014			E7-AXE-0015			E7-AXE-0016			E7-AXE-0017			E7-AXE-0018			E7-AXE-0019			E7-AXE-0020			E7-AXE-0021			E7-AXE-0022		
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
Abelia	abelia																																	
Acer rubrum	red maple	Tree																																
Alnus serrulata	hazel alder	Shrub																																
Baccharis	baccharis	Shrub																													1			
Baccharis halimifolia	eastern baccharis	Shrub																																
Betula nigra	river birch	Tree	3	3	3	1	1	1				2	2	2	2	2	2	3	3	3				1	1	1	4	4	4	3	3	3	4	4	4
Carpinus caroliniana	American hornbeam	Tree	3	3	3	1	1	1																4	4	4	4	4	4				1	1	1
Carya	hickory	Tree			1	2	2	3			1	2	2	2						7	2	2	2	3	3	3	1	1	2	1	1	2			
Catalpa bignonioides	southern catalpa	Tree																																
Celtis laevigata	sugarberry	Tree							1	1	1																							
Cephalanthus occidentalis	common buttonbush	Shrub																																
Cercis canadensis	eastern redbud	Tree				1	1	2				1	1	1							2	2	2				1	1	1	2	2	2	1	1	1
Cornus amomum	silky dogwood	Shrub																																
Crataegus	hawthorn	Tree																																
Diospyros	diospyros	Tree			1																													
Diospyros virginiana	common persimmon	Tree																2	2	3												1		
Juniperus virginiana	eastern redcedar	Tree																											1					
Liquidambar styraciflua	sweetgum	Tree						1						3						2						27			11			6			1
Melia azedarach	Chinaberrytree	Exotic																																
Mimosa	sensitive plant	Exotic																																
Morus alba	white mulberry	Exotic																																
Nyssa	tupelo	Tree																																
Pinus	pine	Tree																																
Pinus taeda	loblolly pine	Tree																		2			3			3			7					8
Platanus occidentalis	American sycamore	Tree																																
Populus deltoides	eastern cottonwood	Tree																																2
Prunus serotina	black cherry	Tree			1			2												7			2								4			
Pyrus	pear	Tree												2						2														
Pyrus calleryana	Callery pear	Exotic																																
Quercus	oak	Tree				1	1	1										1	1	1														
Quercus falcata	southern red oak	Tree	2	2	2	4	4	4	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	4	4	4	5	5	5	5	5	5
Quercus nigra	water oak	Tree										1	1	1	1	1	1	1	1	1				1	1	1				2	2	2			
Quercus phellos	willow oak	Tree						1				4	4	4				2	2	3	1	1	1						3						
Quercus rubra	northern red oak	Tree																																
Robinia	locust										1																							
Robinia pseudoacacia	black locust	Tree																																
Salix nigra	black willow	Tree																																
Sassafras albidum	sassafras	Tree																																
Taxodium distichum	bald cypress	Tree																																
Ulmus	elm	Tree							2	2	2																							
Ulmus alata	winged elm	Tree																																
Ulmus americana	American elm	Tree	3	3	3				3	3	3						2							1	1	1	1	1	1						
Unknown		Shrub or Tree																																
		Stem count	11	11	14	10	10	16	10	10	12	13	13	18	6	6	8	11	11	33	7	7	12	13	13	43	15	15	38	13	13	26	11	11	22
		size (ares)	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		
		Species count	4	4	7	6	6	9	4	4	6	6	6	8	3	3	4	6	6	11	4	4	6	6	6	8	6	6	10	5	5	9	4	4	7
		Stems per ACRE	445.2	445.2	566.6	404.7	404.7	647.5	404.7	404.7	485.6	526.1	526.1	728.4	242.8	242.8	323.7	445.2	445.2	1335	283.3	283.3	485.6	526.1	526.1	1740	607	607	1538	526.1	526.1	1052	445.2	445.2	890.3

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%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

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

			Annual Means																	
			MY5 (1951)			MY4 (2014)			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
Abelia	abelia										2									
Acer rubrum	red maple	Tree															3			
Alnus serrulata	hazel alder	Shrub	14	17	24	14	17	17	14	17	17	14	17	20	15	18	18	1	1	1
Baccharis	baccharis	Shrub			1															
Baccharis halimifolia	eastern baccharis	Shrub						2			3			6			1			
Betula nigra	river birch	Tree	46	46	47	51	51	51	54	54	54	55	55	64	45	45	45	82	82	82
Carpinus caroliniana	American hornbeam	Tree	20	20	21	18	18	19	15	15	15	12	12	12	14	14	14	48	48	48
Carya	hickory	Tree	15	15	55	14	14	57	19	19	56	18	18	101	18	18	52	30	30	30
Catalpa bignonioides	southern catalpa	Tree						1												
Celtis laevigata	sugarberry	Tree	1	1	1	2	2	2	1	1	2									
Cephalanthus occidentalis	common buttonbush	Shrub																44	44	44
Cercis canadensis	eastern redbud	Tree	13	13	15	14	14	15	17	17	17	17	17	17	7	7	7			
Cornus amomum	silky dogwood	Shrub	10	13	13	26	29	29	32	35	35	38	41	41	51	55	55	70	70	70
Crataegus	hawthorn	Tree																		1
Diospyros	diospyros	Tree			1															
Diospyros virginiana	common persimmon	Tree	6	6	9	6	6	6												
Juniperus virginiana	eastern redcedar	Tree			7			3			2									
Liquidambar styraciflua	sweetgum	Tree			144			131			64			95			92			70
Melia azedarach	Chinaberrytree	Exotic						5			1									
Mimosa	sensitive plant	Exotic						2												
Morus alba	white mulberry	Exotic									1			2						
Nyssa	tupelo	Tree	2	2	2	2	2	2												
Pinus	pine	Tree															4			
Pinus taeda	loblolly pine	Tree			39			20			9			10			10			1
Platanus occidentalis	American sycamore	Tree						1									3			7
Populus deltoides	eastern cottonwood	Tree			2												5			
Prunus serotina	black cherry	Tree			27			23			23	1	1	18	2	2	18	8	8	8
Pyrus	pear	Tree			4									2						
Pyrus calleryana	Callery pear	Exotic			2			5												
Quercus	oak	Tree	7	8	8	7	8	8	11	12	12	14	15	15	18	19	19	48	48	48
Quercus falcata	southern red oak	Tree	67	67	76	70	70	70	76	76	76	76	76	76	63	63	63	135	135	135
Quercus nigra	water oak	Tree	19	19	19	18	18	18	9	9	9	9	9	9	9	9	9	7	7	7
Quercus phellos	willow oak	Tree	13	13	36	14	14	28	10	10	21	8	8	16	4	4	36			
Quercus rubra	northern red oak	Tree	1	1	1	1	1	6	1	1	1	1	1	1	1	1	1			
Robinia	locust				3			1												
Robinia pseudoacacia	black locust	Tree						3						3						4
Salix nigra	black willow	Tree	2	11	11	2	11	11	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	1	1	1	1	1	1			
Ulmus	elm	Tree	2	2	2	2	2	3	2	2	2	2	2	3						
Ulmus alata	winged elm	Tree																1	1	1
Ulmus americana	American elm	Tree	11	11	16	8	8	19	4	4	9									
Unknown		Shrub or Tree	1	1	1	1	1	1	2	2	2	2	2	2	4	4	4	4	4	13
		Stem count	251	267	588	271	287	560	270	286	453	270	286	545	254	271	475	479	500	592
		size (ares)	22			22			22			22			22			22		
		size (ACRES)	0.54			0.54			0.54			0.54			0.54			0.54		
		Species count	19	19	29	19	19	31	17	17	26	16	16	23	15	15	23	13	13	18
		Stems per ACRE	461.7	491.1	1082	498.5	527.9	1030	496.7	526.1	833.3	496.7	526.1	1003	467.2	498.5	873.8	881.1	919.7	1089

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%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

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 L. Corson

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

Table C1. 1-Gallon Containerized Trees Planted January, 2014

Common Name	Scientific Name	Number Planted
River birch	Betula nigra	164
Pignut hickory	Carya glabra	180
Green ash	Fraxinus pennsylvanica	20
Black gum	Nyssa sylvatica	17
Sycamore	Platanus occidentalis	52
Willow oak	Quercus phellos	29
Northern red oak	Quercus rubra	49
Schumard oak	Quercus schumardii	186
	Total	697

Table C2. 3-Gallon Containerized Trees Planted January, 2014

Common Name	Scientific Name	Number Planted
River birch	Betula nigra	2
Tulip poplar	Lirodendron tulipifera	22
Black gum	Nyssa sylvatica	39
Water oak	Quercus nigra	80
Willow oak	Quercus phellos	25
Northern red oak	Quercus rubra	45
Persimmon	Diospyros virginiana	150
	Total	363

Table C3. Livestakes Planted January, 2014

Common Name	Scientific Name	Number Planted
Silky dogwood	Cornus amomum	1500
Black willow	Salix nigra	1500
	Total	3000

Table C4. Bare Root Species Replanted at Adkin Branch (March 8, 2012)

Common Name	Scientific Name	Number Planted
Black Cherry	Prunus Seotina	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 falcate	1,000
Water oak	Quercus nigra	1,000
Winged Elm	Ulmus alata	1,000
	Total	8,118

Table C5. 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
	Total	11

Appendix D. Stream Survey Data

Figures 4.1-4.17. Cross Section Plots and Photos

Figure 4.1 XS-1 Riffle, Sta. 37+42

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	36.38	0.00	36.37	0.00	36.37	0.00	36.47	0.00	36.37	0.00	36.37
9.86	34.88	7.34	35.19	4.36	35.78	8.79	35.09	7.40	35.18	6.69	35.40
16.62	33.21	11.50	34.38	10.66	34.59	17.55	33.34	14.53	33.61	15.09	33.56
24.51	32.12	16.09	33.34	15.70	33.40	23.41	32.55	21.15	32.88	24.88	32.50
25.95	32.31	22.92	32.75	19.48	33.14	27.48	32.19	24.45	32.25	29.37	32.74
27.26	31.91	28.30	32.23	23.80	32.55	30.80	32.21	30.53	31.92	32.05	31.75
29.31	31.89	30.00	32.00	29.16	32.23	33.42	31.71	32.38	30.57	32.97	30.75
31.49	31.34	32.35	31.56	32.15	31.62	35.21	30.00	34.72	29.17	34.14	30.57
33.99	31.05	33.78	31.27	33.84	31.32	34.66	28.06	36.04	28.03	35.39	27.87
35.11	30.06	35.08	30.30	34.52	30.99	36.17	27.97	37.43	27.70	39.93	27.41
36.12	28.42	36.45	27.99	35.08	30.04	38.47	27.49	40.95	27.39	45.29	27.83
36.41	28.32	37.87	27.71	35.05	27.96	40.28	27.43	43.90	28.20	46.84	28.40
37.29	27.83	40.95	27.74	37.28	27.61	43.14	27.56	45.89	28.48	47.70	29.83
38.32	27.76	42.41	27.91	39.61	27.76	45.47	27.76	49.71	31.50	51.48	32.72
41.02	27.67	43.87	27.90	41.91	27.58	46.34	28.82	52.33	32.08	54.70	32.91
42.56	27.78	46.09	29.85	42.76	27.78	46.78	29.12	56.36	31.62	58.70	31.91
43.94	28.17	46.85	29.93	44.16	27.82	47.24	30.12	59.98	31.77	69.13	32.85
44.35	29.19	47.15	30.18	45.12	27.64	47.67	31.18	61.32	32.28	75.69	33.78
45.81	29.62	48.83	30.49	45.93	28.04	51.92	31.36	65.36	32.29	89.14	35.47
47.84	30.09	51.70	31.01	46.14	29.29	54.22	31.89	71.25	33.13		
49.03	30.44	54.46	31.52	47.49	30.28	56.53	31.69	79.28	34.22		
51.68	30.46	55.03	31.46	48.32	31.01	58.37	31.62	87.47	35.43		
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						

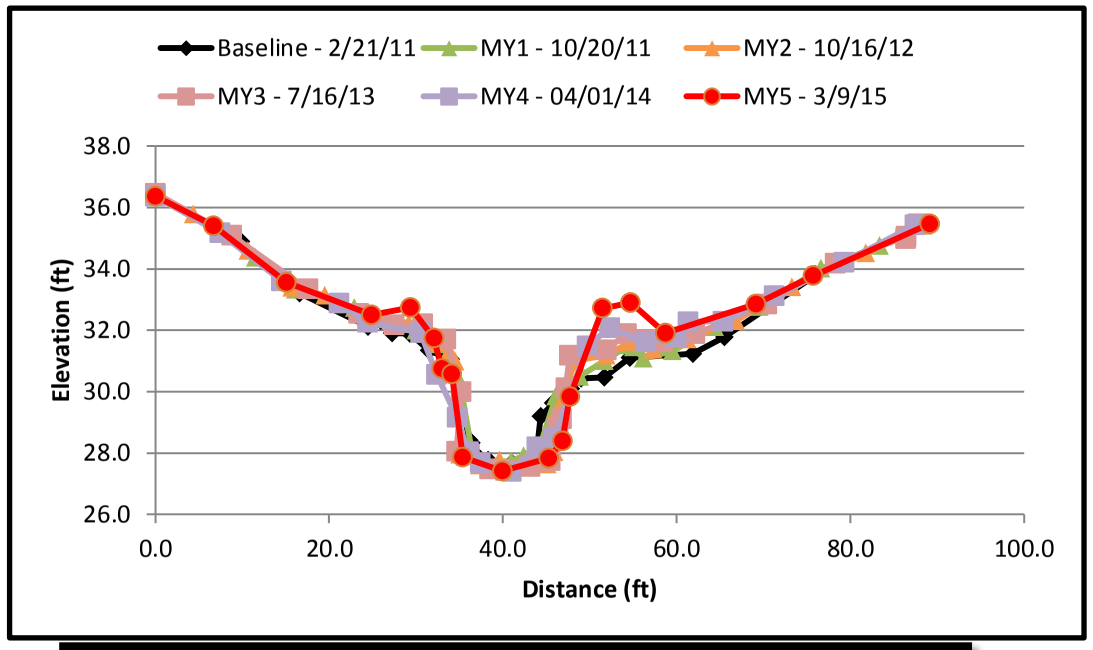


Figure 4.2 XS-2 Pool, Sta. 38+94

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	34.25	0.00	34.25	0.00	34.23	0.00	34.24	0.00	34.24	0.00	34.21
8.48	33.22	7.85	33.40	6.14	33.64	4.54	33.88	5.78	33.75	11.49	32.84
17.26	32.07	15.07	32.32	12.34	32.87	10.08	33.10	11.36	33.11	25.67	31.25
23.59	31.03	21.85	31.54	17.29	32.27	15.28	32.03	17.42	32.27	28.74	31.04
24.98	30.53	25.29	30.76	23.27	31.37	22.22	31.35	22.02	31.63	32.01	29.82
28.19	30.53	27.97	30.78	27.98	30.84	26.81	30.96	25.52	31.04	33.04	27.15
29.98	30.03	30.68	30.60	30.81	30.24	28.27	30.95	28.91	30.34	36.61	27.19
32.23	29.44	31.72	29.57	31.65	29.91	28.96	30.21	32.48	30.14	42.38	27.11
33.36	27.87	33.17	28.37	33.30	29.80	34.21	27.05	34.09	27.35	45.36	27.95
35.19	27.83	34.15	27.78	34.23	27.42	35.33	26.63	35.46	26.82	48.71	31.70
37.22	27.51	37.13	27.55	38.14	26.71	37.94	26.20	37.71	27.10	55.88	31.63
40.78	27.20	41.68	27.30	39.77	26.48	40.59	26.45	40.75	26.74	73.14	33.31
43.31	27.42	46.75	27.74	42.39	26.41	41.24	27.92	41.96	26.71	83.08	34.10
45.59	27.62	48.16	29.58	42.48	26.63	45.86	28.35	43.70	27.13		
46.73	27.99	49.13	30.60	42.70	26.10	49.41	30.70	44.72	27.74		
47.22	28.30	50.42	31.25	46.16	26.66	53.00	31.49	47.23	28.17		
48.68	30.06	54.76	31.31	47.93	27.15	57.91	31.52	48.87	30.29		
49.68	30.87	60.32	32.07	47.96	30.32	65.33	32.62	49.64	31.35		
52.71	31.19	69.40	32.89	50.90	31.43	70.68	33.08	50.65	31.58		
54.58	31.01	75.04	33.37	55.87	31.39	75.20	33.41	51.83	31.33		
59.11	31.81			60.73	32.12			64.47	32.58		
66.89	32.70			65.44	32.61			71.39	33.05		
75.41	33.42			71.35	33.03			78.94	33.74		
				75.65	33.41						

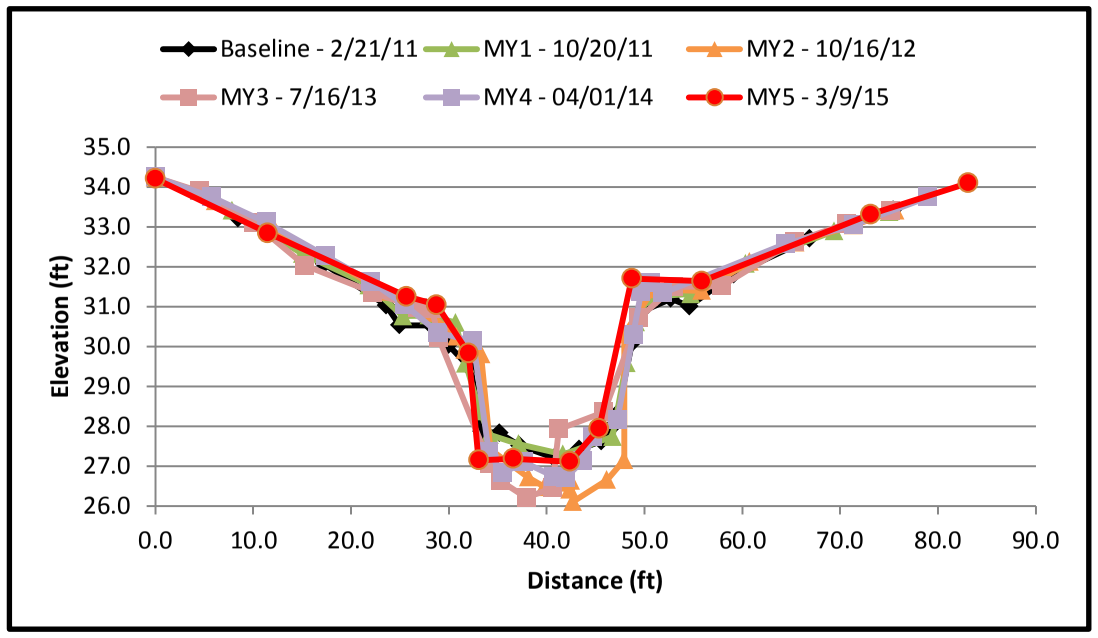


Figure 4.3 XS-3 Riffle, Sta. 44+67

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	34.68	0.00	34.65	0.00	34.67	0.00	34.67	0.00	34.72	0.12	34.68
5.04	33.96	9.47	33.04	2.59	34.50	6.41	33.67	8.98	33.12	18.44	31.36
13.96	32.14	17.77	31.45	9.13	33.23	12.52	32.54	16.73	31.54	22.09	30.97
22.51	30.31	23.88	30.25	16.91	31.54	17.75	31.25	21.79	30.66	28.22	31.26
27.04	29.77	28.88	29.69	22.05	30.66	22.62	30.29	24.90	30.57	36.75	26.89
31.37	28.98	32.78	28.80	26.70	30.15	26.71	30.23	28.81	30.35	41.67	26.80
32.48	28.31	34.56	28.24	29.50	30.15	30.18	29.71	31.04	29.16	46.04	27.20
33.27	28.11	35.32	27.29	31.29	29.69	32.88	29.01	32.99	28.55	47.32	29.60
34.34	27.84	38.06	26.72	35.26	28.94	34.13	28.52	33.55	28.14	53.21	29.87
35.11	27.51	41.20	26.81	35.81	27.59	34.54	27.00	34.06	27.35	59.73	30.85
36.05	27.31	42.66	27.07	36.77	27.06	37.95	26.66	36.63	26.90	66.30	32.04
37.20	26.90	44.87	27.40	38.35	26.75	39.65	26.63	37.50	26.80	71.35	33.23
40.71	26.93	46.91	28.74	40.72	26.90	39.93	26.02	41.09	26.95		
43.22	26.96	49.53	29.48	43.31	26.97	44.82	27.60	45.02	27.02		
44.45	27.35	53.45	29.45	45.18	27.19	48.39	29.49	46.22	28.68		
46.78	27.91	56.69	30.43	45.98	28.40	51.61	29.51	47.29	29.51		
49.43	28.97	62.83	31.49	49.44	29.49	58.88	30.93	52.71	29.55		
51.83	29.32	67.46	32.44	51.30	29.49	65.95	32.40	57.40	30.48		
52.60	29.12	71.00	33.27	54.31	29.83	70.40	33.19	65.99	32.01		
57.19	30.42			57.50	30.50			70.57	33.31		
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						

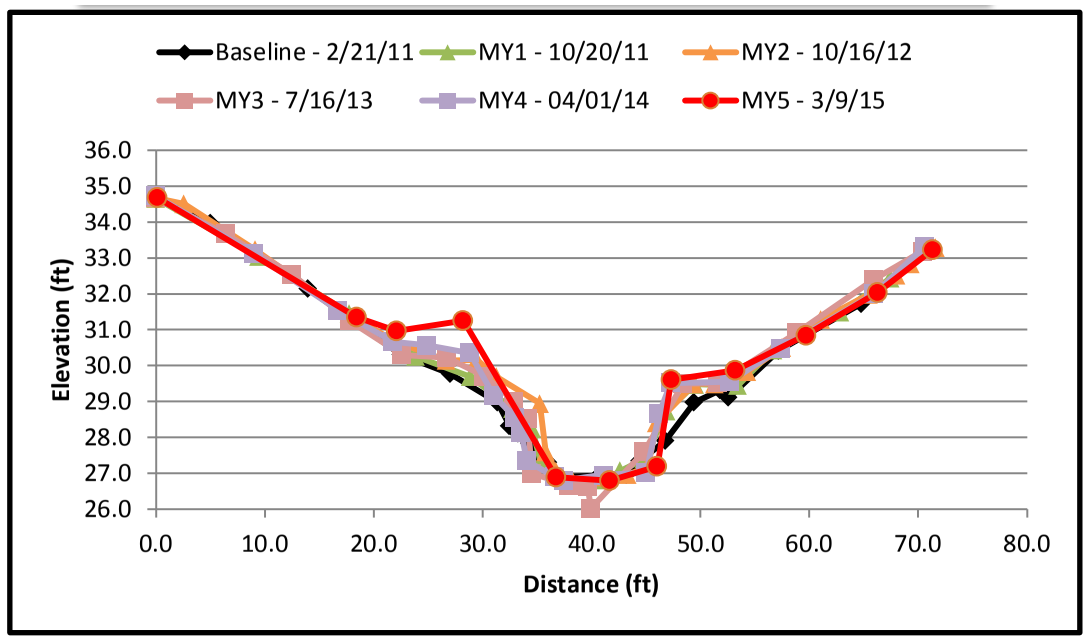


Figure 4.4 XS-4 Pool, Sta. 46+81

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	33.26	0.00	33.25	0.00	33.27	0.00	33.19	0.00	33.27	0.00	33.20
6.80	31.49	4.64	32.15	4.11	32.34	8.11	31.33	7.51	31.52	7.61	31.51
9.47	31.14	10.74	31.01	7.10	31.51	17.51	30.37	13.99	30.67	16.11	30.25
21.52	28.84	16.16	29.97	12.04	30.95	21.84	29.74	19.31	30.04	25.13	29.17
24.22	28.46	20.27	29.21	16.69	29.92	25.26	29.28	22.06	29.42	26.55	26.46
25.32	27.87	23.29	29.03	20.99	29.35	25.41	28.83	25.10	28.75	30.83	26.22
26.50	27.73	25.51	28.82	24.36	29.38	27.15	28.27	27.55	27.74	33.45	26.14
27.87	27.05	25.89	28.32	26.13	28.86	26.95	27.26	28.83	26.42	38.58	26.49
29.15	26.40	26.84	27.40	26.79	26.64	29.75	25.91	29.53	26.14	40.31	27.38
31.16	26.69	28.01	26.90	29.16	25.81	32.79	25.55	32.65	26.27	42.57	29.93
35.70	26.65	29.61	27.03	31.36	25.62	34.39	25.35	36.05	25.95	47.33	30.03
38.06	26.48	32.56	26.47	33.76	25.58	39.00	25.78	38.28	25.95	58.87	31.36
39.91	27.10	34.68	26.88	34.58	25.63	41.59	26.11	40.39	26.54	72.01	32.41
40.99	27.77	36.07	26.81	35.81	25.57	42.38	28.83	42.43	29.86		
41.64	28.45	38.75	26.99	38.50	26.12	45.90	29.49	47.57	30.28		
45.49	29.36	40.21	27.14	39.36	26.80	51.56	30.13	53.32	30.92		
49.30	30.12	41.73	28.64	39.70	28.38	55.98	30.93	62.68	31.81		
59.69	31.31	43.87	29.13	40.96	29.18	64.97	31.78	71.39	32.39		
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						

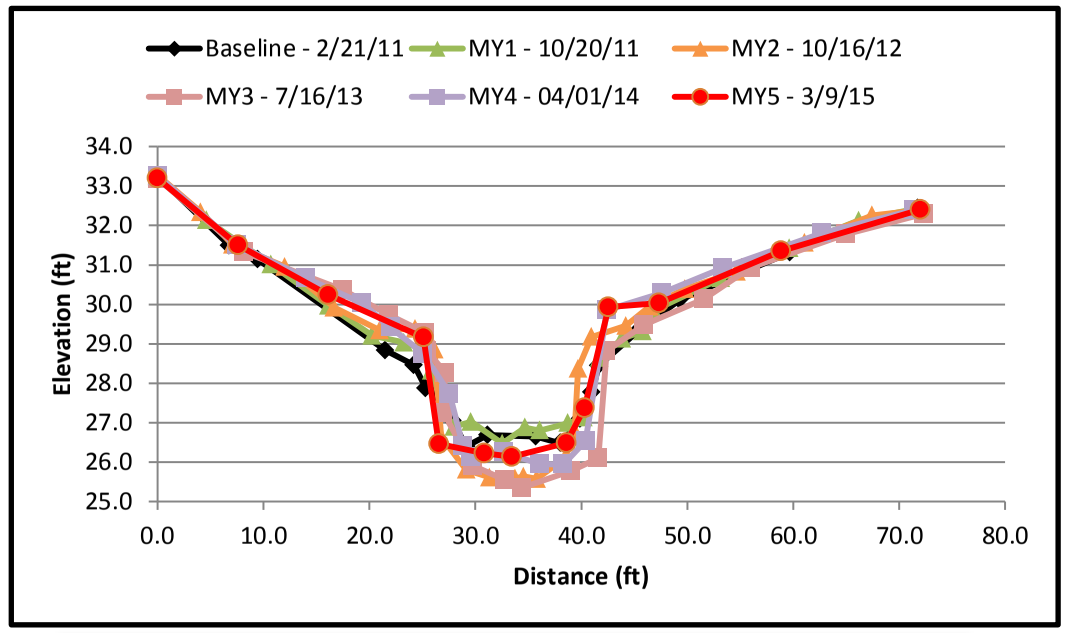
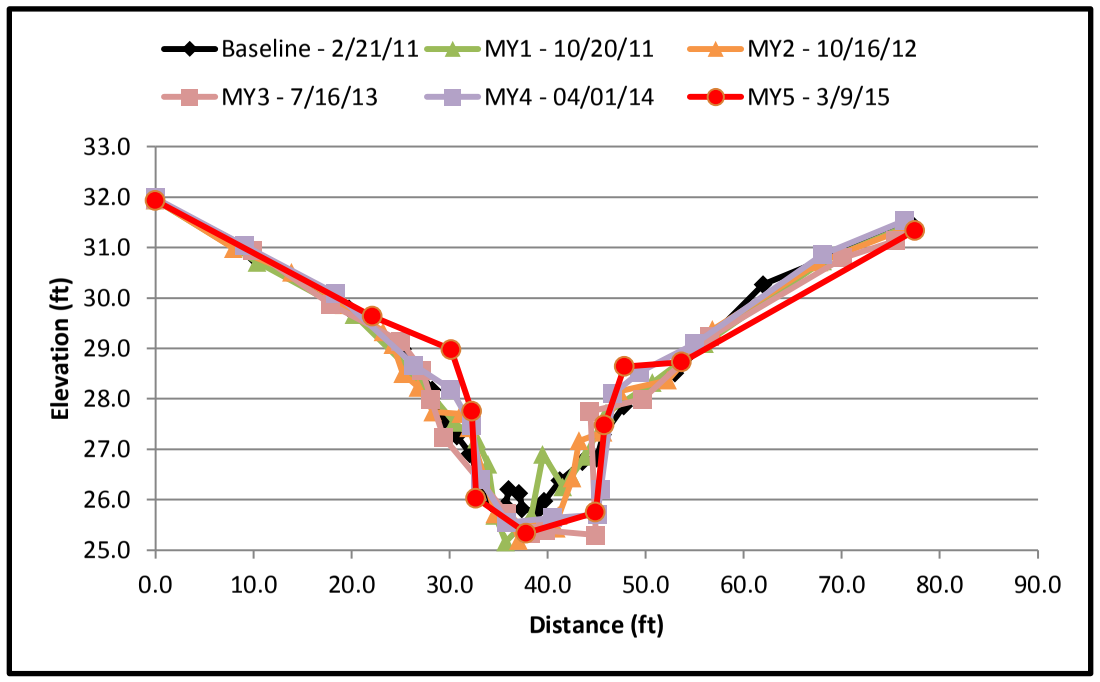


Figure 4.5 XS-5 Riffle, Sta. 51+47

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	31.97	0.00	31.94	0.00	31.95	0.00	31.95	0.00	31.98	0.00	31.93
9.93	30.85	10.41	30.71	7.99	30.98	9.96	30.94	9.16	31.04	22.12	29.64
19.77	29.78	20.29	29.67	13.92	30.51	17.92	29.87	18.38	30.09	30.16	28.98
25.24	28.98	26.27	28.51	19.27	29.87	25.01	29.14	26.43	28.66	32.27	27.76
28.26	28.18	30.50	27.53	23.25	29.33	27.24	28.56	30.16	28.19	32.70	26.03
29.51	27.58	32.79	27.20	24.24	29.07	28.13	27.98	32.25	27.46	37.82	25.34
30.76	27.26	33.94	26.70	25.25	28.50	29.39	27.23	33.24	26.40	44.91	25.75
32.09	26.91	34.66	25.68	26.82	28.23	35.84	25.73	35.86	25.54	45.80	27.49
33.29	26.29	35.74	25.16	28.34	27.74	38.30	25.32	40.59	25.64	47.83	28.64
34.40	25.91	38.34	25.69	31.18	27.71	39.83	25.38	45.07	25.70	53.70	28.73
35.72	25.88	39.54	26.90	32.01	27.42	44.94	25.30	45.41	26.21	77.49	31.34
36.05	26.21	41.60	26.25	34.67	25.71	44.36	27.75	46.72	28.10		
37.13	26.13	42.45	26.47	36.25	25.69	49.71	27.99	49.41	28.53		
37.42	25.81	43.86	26.86	37.08	25.19	56.61	29.24	55.05	29.10		
38.94	25.78	45.98	27.71	37.86	25.47	70.16	30.80	68.08	30.86		
39.65	25.96	50.73	28.33	39.84	25.58	75.55	31.14	76.48	31.54		
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

Figure 4.6 XS-6 Pool, Sta. 64+81

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	28.96	0.00	28.97	0.00	28.89	0.00	29	0.00	28.90	0.00	28.98
7.02	28.18	6.82	28.17	6.19	28.11	11.00	27.5	4.99	28.23	16.08	27.38
11.82	27.13	8.32	27.81	10.58	27.3	16.00	26.76	7.60	28.08	17.96	26.39
13.15	26.66	10.62	27.39	13.33	26.93	18.00	25.96	9.32	27.65	18.72	23.42
17.98	26.08	12.11	27.21	14.82	26.55	19.00	24.99	13.63	27.19	25.24	20.30
18.99	26.23	14.48	26.61	16.62	26.44	20.00	24.76	16.24	26.65	27.07	19.83
20.64	26.63	17.51	26.27	17.76	25.6	21.00	23.11	17.82	25.18	31.76	20.84
23.57	26.31	18.95	26.5	18.76	25.08	23.50	21.93	19.49	23.98	35.50	21.42
24.13	25.60	20.94	26.6	20.49	23.92	24.50	21.13	20.96	22.85	35.76	22.72
24.68	25.28	22.30	25.41	21.56	23.24	33.50	20.12	22.12	22.14	35.83	22.57
24.68	23.77	23.66	23.77	23.30	20.8	35.50	22.67	26.65	20.26	36.17	24.79
27.84	22.22	24.43	22.89	27.43	20.3	36.00	24.9	28.74	20.08	38.52	24.91
30.39	21.92	25.79	22.12	29.26	20.55	37.00	25.36	33.83	21.09	37.61	22.68
31.86	22.19	27.26	21.75	32.69	20.88	37.50	23.34	35.21	22.59	41.68	23.16
33.54	22.48	28.97	21.87	35.59	21.4	39.50	23.9	35.71	24.79	43.19	24.27
35.54	23.06	30.95	22.19	36.97	25.69	41.50	25.69	36.26	24.98	44.77	24.55
35.50	24.22	32.79	22.9	38.62	26.78	42.50	27.69	37.14	22.70	47.35	25.21
36.01	25.11	35.54	23.17	40.38	27.27	45.75	28.25	40.72	23.26	48.86	25.65
37.14	25.43	36.52	25.33	43.12	27.67	50.83	28.11	41.09	25.31	49.55	28.72
37.75	25.99	37.51	25.72	44.92	28.1	54.06	28.57	42.13	25.68	58.36	28.91
41.07	27.13	39.90	27.15	50.22	28.02	55.53	28.81	42.70	26.67		
43.93	27.64	44.55	27.92	56.48	28.87			43.54	27.74		
46.39	28.20	47.08	27.69					45.09	28.32		
46.83	27.64	53.27	28.35					47.23	28.16		
53.08	28.32	57.49	28.84					52.75	28.33		
57.39	28.93							56.75	28.89		

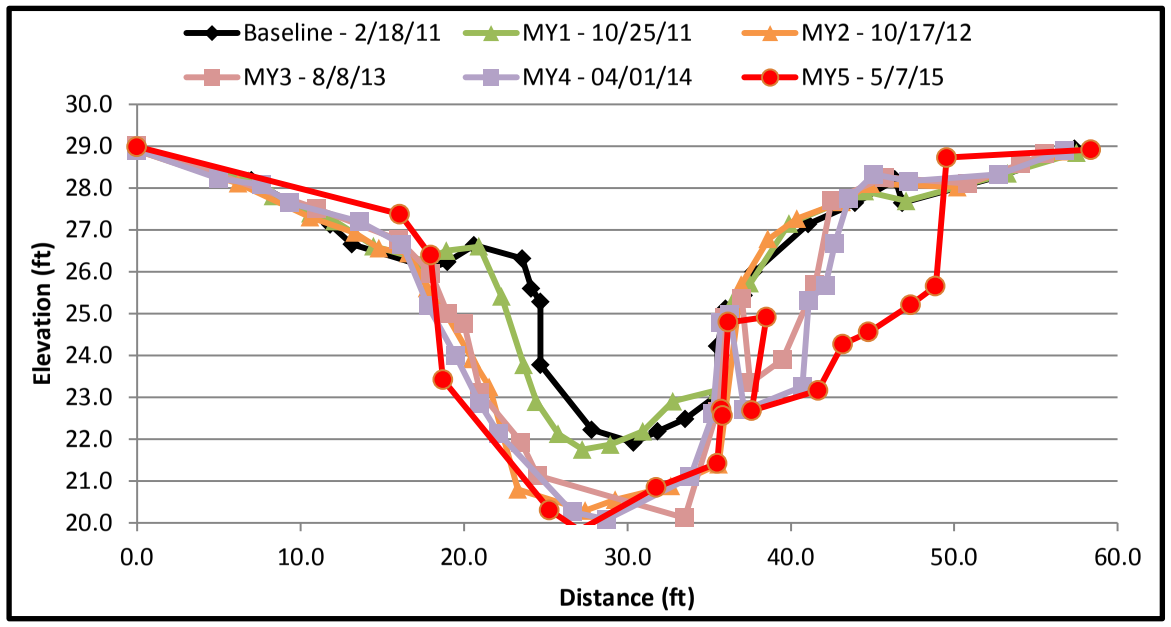


Figure 4.7 XS-7 Riffle, Sta. 70+00

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	28.97	0.00	28.94	0.00	28.84	0.00	28.84	0.00	28.63	0.00	28.94
10.03	27.78	5.37	28.42	6.08	28.29	5.07	28.09	11.23	27.30	13.00	27.51
19.73	26.44	12.29	27.57	9.86	27.71	10.84	27.61	17.61	27.14	21.08	27.31
23.60	26.43	14.97	27.11	14.30	27.38	14.71	27.29	23.85	26.81	24.07	27.17
25.40	24.69	19.28	26.39	16.24	27.08	18.96	27.33	24.49	26.01	26.75	23.53
27.14	23.81	23.36	26.20	18.59	26.61	22.94	27.01	24.94	25.86	29.06	22.28
28.16	22.91	24.78	25.12	22.54	26.07	23.18	27.01	25.03	24.82	34.24	22.31
31.71	22.99	26.93	23.31	23.49	25.85	24.09	26.04	25.64	24.47	36.34	22.48
35.41	22.94	27.76	22.57	24.92	24.85	24.89	24.68	25.74	23.42	39.65	22.64
37.91	23.17	29.58	21.63	25.76	24.11	25.90	23.71	25.94	22.47	42.84	27.07
38.15	23.50	32.22	21.34	26.57	22.74	28.78	22.55	29.44	22.36	54.63	26.91
38.72	24.10	34.49	21.00	28.70	22.27	29.61	22.54	32.13	22.73	64.02	28.57
39.07	24.73	35.67	21.14	30.00	22.29	32.51	22.93	37.09	22.64		
40.37	25.16	36.86	21.85	33.07	22.69	37.10	22.51	39.88	22.67		
42.38	25.59	37.72	23.15	35.58	22.67	38.59	22.54	40.58	23.41		
43.48	25.59	39.28	23.28	39.40	22.21	38.74	23.67	40.52	24.42		
44.04	25.73	40.25	24.11	40.75	23.22	38.19	24.65	41.56	24.69		
44.71	25.88	40.75	25.26	42.31	23.90	42.14	25.81	41.60	25.43		
45.38	26.12	44.21	25.94	44.32	26.08	44.05	26.75	41.92	25.66		
47.07	26.24	45.80	26.40	49.59	26.69	46.08	26.56	42.29	26.55		
49.69	26.73	51.40	26.82	57.67	27.47	49.23	26.16	47.88	26.41		
51.10	26.64	56.41	27.29	64.27	28.28	51.53	26.50	58.38	27.31		
52.80	27.04	61.50	28.09			55.28	27.04	64.15	28.29		
56.19	27.27	64.23	28.34			57.54	27.75				
64.14	28.37					59.64	27.92				
						62.94	28.46				

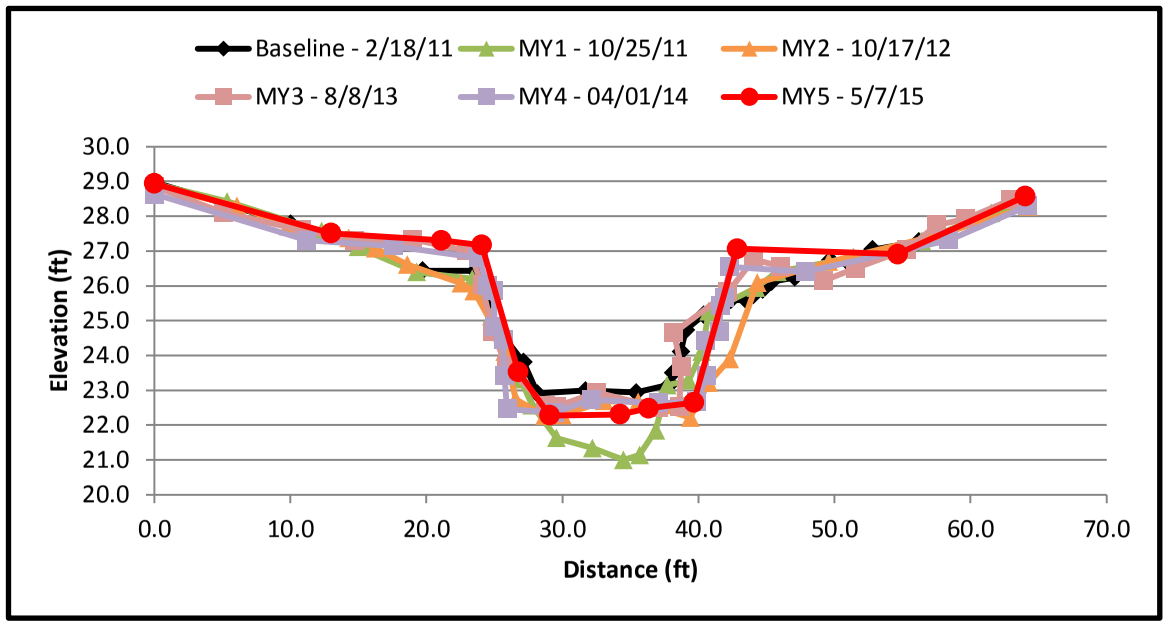


Figure 4.8 XS-8 Pool, Sta. 74+30

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	26.81	0.00	26.71	0.00	26.74	0.00	26.68	0.00	26.68	0.00	26.73
3.48	26.81	5.61	26.62	5.91	26.53	3.15	26.53	4.30	26.59	9.71	25.83
5.42	26.72	8.41	26.01	9.04	25.70	7.16	26.31	7.45	26.24	12.97	25.09
7.59	26.33	11.70	25.23	12.72	25.02	10.24	25.62	11.00	25.54	15.63	24.27
10.42	25.65	13.96	24.83	15.54	24.69	11.85	24.92	13.65	25.07	18.91	21.78
13.75	24.87	15.46	24.90	17.44	24.08	15.76	24.00	15.01	24.39	19.92	22.73
15.67	24.76	16.73	24.35	18.52	23.52	18.05	23.54	16.12	24.24	20.71	19.47
16.46	24.22	17.51	24.04	19.24	19.54	18.26	19.91	16.92	23.30	26.32	19.15
17.26	24.03	18.78	23.26	21.28	19.35	25.95	19.60	18.34	23.17	30.00	20.19
17.55	23.77	19.50	21.10	24.89	19.55	28.73	20.56	20.57	19.72	32.75	21.92
18.71	23.53	21.17	20.96	26.79	20.17	30.29	21.94	24.04	18.63	35.87	24.95
19.12	22.31	23.49	20.22	29.35	21.50	31.18	23.99	29.58	18.86	50.62	26.29
20.33	21.48	25.14	19.92	30.53	22.22	36.16	24.39	31.09	19.87		
21.79	21.04	26.70	20.33	31.33	24.37	38.88	24.42	33.61	21.57		
23.56	21.08	28.88	23.07	32.63	25.04	42.15	24.91	35.36	22.52		
25.70	21.38	29.83	24.31	33.97	25.06	45.55	26.03	35.50	24.45		
26.90	21.83	31.43	24.81	35.16	24.66	48.19	25.99	39.50	24.51		
27.19	22.03	34.36	24.75	42.05	24.69	49.37	26.07	42.46	25.06		
27.84	22.62	35.54	24.29	46.23	25.88			45.95	26.09		
28.51	23.54	40.92	24.51	50.41	25.89			49.90	26.04		
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										

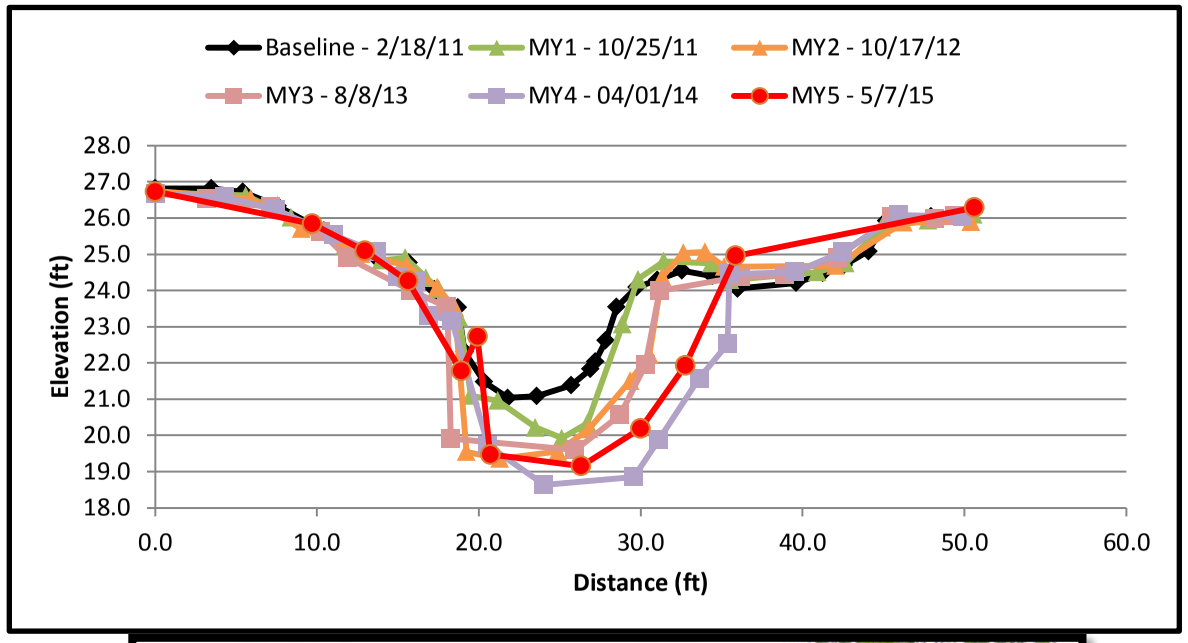


Figure 4.9 XS-9 Riffle, Sta. 75+78

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	25.93	0.00	25.85	0.00	25.85	0.00	25.77	0.00	25.81	0.00	25.79
7.66	25.57	9.82	25.57	10.20	25.63	3.67	25.59	8.69	25.72	12.98	26.26
17.12	25.22	18.42	25.31	13.67	25.53	7.63	25.64	14.67	25.64	19.12	25.57
19.27	24.81	21.37	25.10	15.45	25.84	11.83	25.76	16.78	25.21	25.42	19.92
21.25	24.71	23.69	23.98	18.37	25.91	14.92	25.48	19.98	25.47	29.14	20.41
22.90	23.68	24.36	22.91	19.00	25.67	18.61	25.51	20.68	24.62	41.88	22.07
24.09	22.76	24.84	22.08	21.73	24.03	19.94	24.39	21.07	24.43	45.63	25.78
25.35	22.18	25.48	21.43	23.26	22.43	20.71	23.20	21.51	23.57	56.74	26.49
26.15	21.99	27.92	21.72	26.86	22.07	21.22	22.12	22.06	23.27		
28.07	22.10	30.41	21.44	31.47	21.37	23.48	21.27	22.38	22.33		
30.42	22.06	32.18	21.30	33.42	21.36	26.04	20.96	23.31	21.97		
32.76	22.03	33.76	21.47	35.76	21.41	31.00	21.01	24.00	21.24		
34.84	22.18	34.93	21.83	36.25	22.03	34.41	21.35	25.02	20.57		
35.40	22.48	36.29	22.99	39.00	24.43	35.55	21.77	31.61	21.25		
36.25	22.93	39.05	24.14	43.19	25.12	37.23	23.49	35.99	21.16		
37.35	23.46	41.47	24.68	49.01	26.12	41.56	25.12	38.73	22.00		
37.90	23.96	46.43	25.70	53.24	26.45	45.16	25.46	42.21	22.71		
38.87	24.20	50.70	26.30	56.68	26.48	47.43	26.09	42.82	25.42		
40.34	24.53	56.70	26.47			50.49	26.36	46.83	25.73		
44.53	25.45					50.41	26.35	52.80	26.51		
47.94	26.17					55.08	26.41	56.89	26.44		
53.57	26.57										
56.49	26.59										

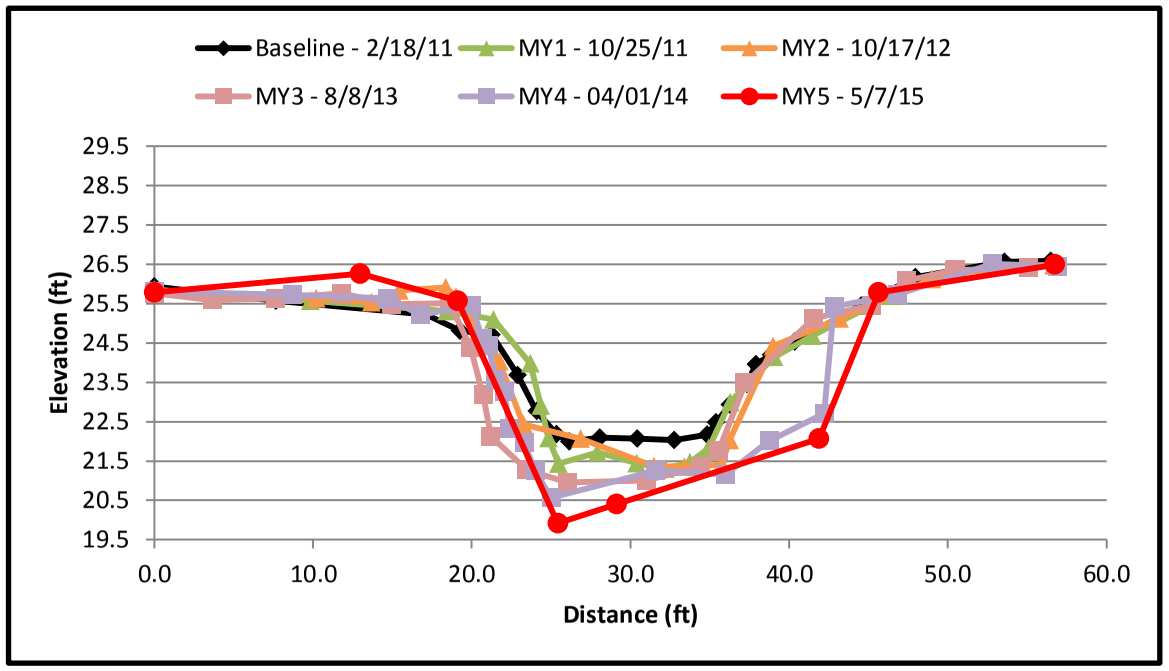
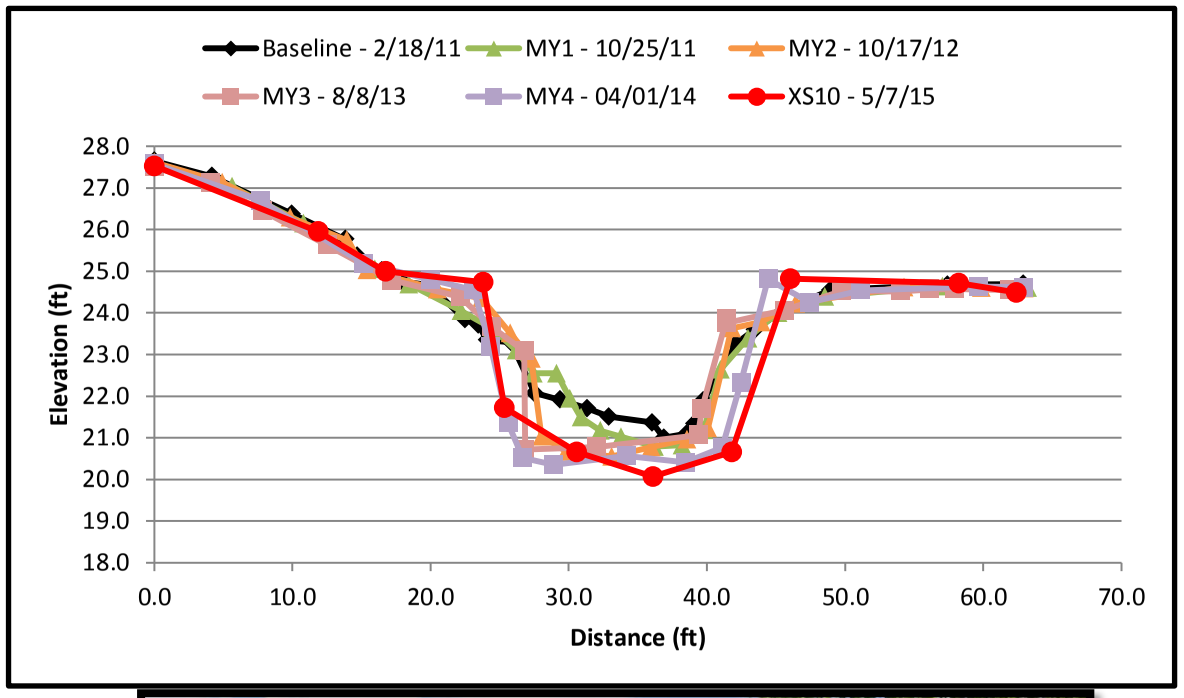


Figure 4.10 XS-10 Riffle, Sta. 79+82

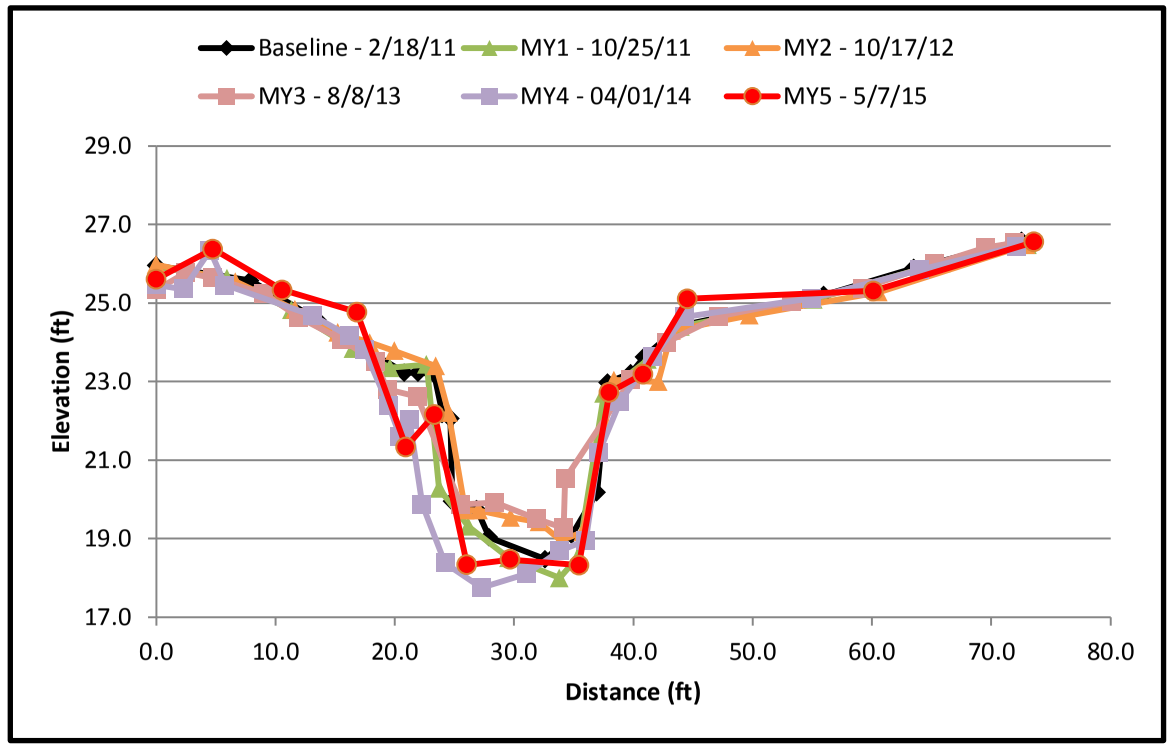
Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	27.66	0.00	27.60	0.00	27.62	0.00	27.50	0.00	27.57	0.00	27.53
4.16	27.29	5.62	27.04	4.93	27.14	4.09	27.13	7.67	26.70	11.85	25.95
9.94	26.38	10.79	26.16	9.84	26.30	7.81	26.46	15.15	25.19	16.74	25.00
13.82	25.77	15.97	25.05	13.95	25.75	12.51	25.63	20.04	24.80	23.80	24.73
14.67	25.38	18.44	24.69	15.40	25.03	17.19	24.79	23.11	24.55	25.34	21.72
16.45	25.02	22.19	24.05	20.49	24.57	22.16	24.38	24.35	23.18	30.58	20.65
18.00	24.75	24.47	23.63	23.69	24.35	24.44	23.66	25.61	21.35	36.09	20.07
19.93	24.67	26.19	23.10	25.76	23.52	26.78	23.08	26.67	20.52	41.79	20.66
22.47	23.84	27.45	22.55	27.28	22.91	26.85	20.71	28.93	20.35	46.05	24.82
23.45	23.72	29.13	22.55	28.04	21.03	32.02	20.78	34.19	20.56	58.23	24.72
24.08	23.35	30.09	21.94	29.83	20.67	39.36	21.06	38.45	20.41	62.41	24.49
25.81	23.30	30.88	21.49	33.12	20.55	39.64	21.70	41.12	20.76		
27.52	22.08	32.29	21.17	35.97	20.77	41.43	23.87	42.46	22.33		
29.35	21.92	33.79	21.02	38.56	20.96	41.42	23.76	44.42	24.81		
31.31	21.71	36.21	20.79	40.06	21.23	45.60	24.06	47.45	24.25		
32.90	21.51	38.21	20.82	41.80	23.63	49.77	24.52	51.12	24.54		
36.04	21.37	39.77	21.19	43.92	23.78	53.97	24.52	59.64	24.64		
36.87	21.00	40.99	22.64	46.43	24.23	56.10	24.57	62.91	24.62		
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

Figure 4.11 XS-11 Pool, Sta. 82+30

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	25.95	0.00	25.92	0.00	25.98	0.00	25.34	0.00	25.46	0.00	25.61
7.89	25.57	5.93	25.63	6.64	25.54	2.48	25.77	2.29	25.35	4.75	26.37
13.55	24.56	11.34	24.82	11.63	24.84	4.76	25.64	4.50	26.34	10.58	25.33
16.93	23.93	16.52	23.83	15.21	24.25	9.05	25.24	5.78	25.45	16.82	24.77
20.82	23.23	19.62	23.35	17.91	23.99	11.97	24.63	13.09	24.68	20.93	21.33
21.95	23.23	22.66	23.43	19.97	23.79	15.55	24.07	16.16	24.16	23.33	22.16
23.29	23.19	23.72	20.27	23.46	23.39	18.36	23.51	17.45	23.82	26.06	18.33
23.99	22.17	26.17	19.31	24.51	22.21	19.39	22.80	19.51	22.38	29.68	18.47
24.66	22.05	29.54	18.51	25.90	19.73	21.90	22.61	20.45	21.60	35.44	18.33
24.81	19.95	33.82	18.00	27.02	19.72	25.52	19.87	21.25	22.03	37.98	22.72
26.88	19.74	35.36	18.53	29.73	19.54	28.40	19.92	22.29	19.87	40.80	23.19
27.90	19.03	37.52	22.69	32.10	19.42	31.87	19.50	24.22	18.38	44.55	25.10
32.61	18.48	41.20	23.56	33.92	18.95	34.14	19.27	27.27	17.75	60.11	25.31
34.85	19.10	43.95	24.40	35.78	19.17	34.29	20.52	31.02	18.10	73.59	26.55
36.94	20.18	55.09	25.09	38.40	23.04	39.79	23.06	33.83	18.69		
37.83	22.98	65.84	26.02	42.09	22.99	42.81	24.00	36.01	18.95		
39.80	23.21	73.06	26.48	43.22	24.29	47.14	24.66	37.10	21.18		
40.88	23.62			49.73	24.69	53.25	25.03	38.89	22.50		
43.90	24.42			60.56	25.28	59.28	25.38	41.60	23.62		
55.95	25.20			72.92	26.48	65.28	26.00	44.29	24.65		
63.52	25.89					69.52	26.41	54.95	25.12		
72.56	26.58					71.92	26.53	64.02	25.85		
								72.15	26.45		



Adkin Branch, 05065611, Reach 2

Figure 4.12 XS-12 Pool, Sta. 85+88

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	26.87	0.00	26.82	0.00	26.77	0.00	26.66	0.00	26.16	0.00	26.52
9.90	26.42	10.23	26.34	11.26	26.33	3.92	25.78	13.17	25.33	22.32	25.03
20.27	25.71	18.48	25.77	24.13	25.29	8.73	25.64	27.17	24.56	35.43	24.33
25.17	25.13	24.44	25.21	29.25	24.31	12.63	25.57	33.99	24.24	40.19	17.74
27.75	24.59	28.45	24.37	32.91	23.67	17.09	25.38	35.90	23.13	46.79	18.52
30.14	24.11	31.61	23.79	35.58	23.20	22.13	25.06	36.56	22.73	52.09	19.04
32.91	23.61	33.25	23.30	36.88	22.66	27.00	24.64	37.42	22.21	57.12	24.57
36.16	22.23	35.04	22.71	38.31	21.91	32.05	24.43	38.30	21.87	67.26	25.04
38.20	21.28	37.43	22.37	38.65	20.47	35.37	24.30	37.40	20.74	79.21	25.97
39.57	20.54	37.80	21.92	40.61	19.61	36.26	22.84	37.72	19.97	82.39	26.77
39.96	19.63	38.37	20.91	46.71	18.91	38.02	21.61	39.01	18.86		
41.51	18.93	39.67	18.07	49.92	19.72	38.78	20.30	44.84	19.32		
44.70	19.29	41.51	17.63	52.91	20.16	41.14	19.65	48.64	19.32		
47.63	19.85	52.49	18.04	55.11	20.87	44.29	20.01	52.28	19.70		
50.43	20.45	52.66	19.66	56.75	21.69	48.82	20.21	52.87	20.92		
51.78	20.71	53.28	20.09	58.01	23.72	52.38	20.14	53.57	21.15		
53.07	21.65	54.79	21.05	59.25	24.20	52.42	21.10	54.10	21.97		
54.55	22.44	54.89	23.33	63.34	24.71	52.58	22.01	54.73	22.23		
56.58	23.61	55.80	23.61	71.74	25.66	54.45	22.98	55.22	22.93		
61.64	24.50	58.85	24.03	82.69	26.87	57.23	24.49	55.37	23.12		
64.51	25.16	62.90	24.53			61.38	24.56	56.49	24.49		
75.28	26.09	64.20	25.13			68.25	25.12	66.38	25.15		
82.52	26.90	69.12	25.34			72.54	25.49	70.35	25.27		
		72.54	25.85			76.10	25.73	80.44	26.65		
		79.36	26.51			81.98	26.68				
		82.77	26.83								

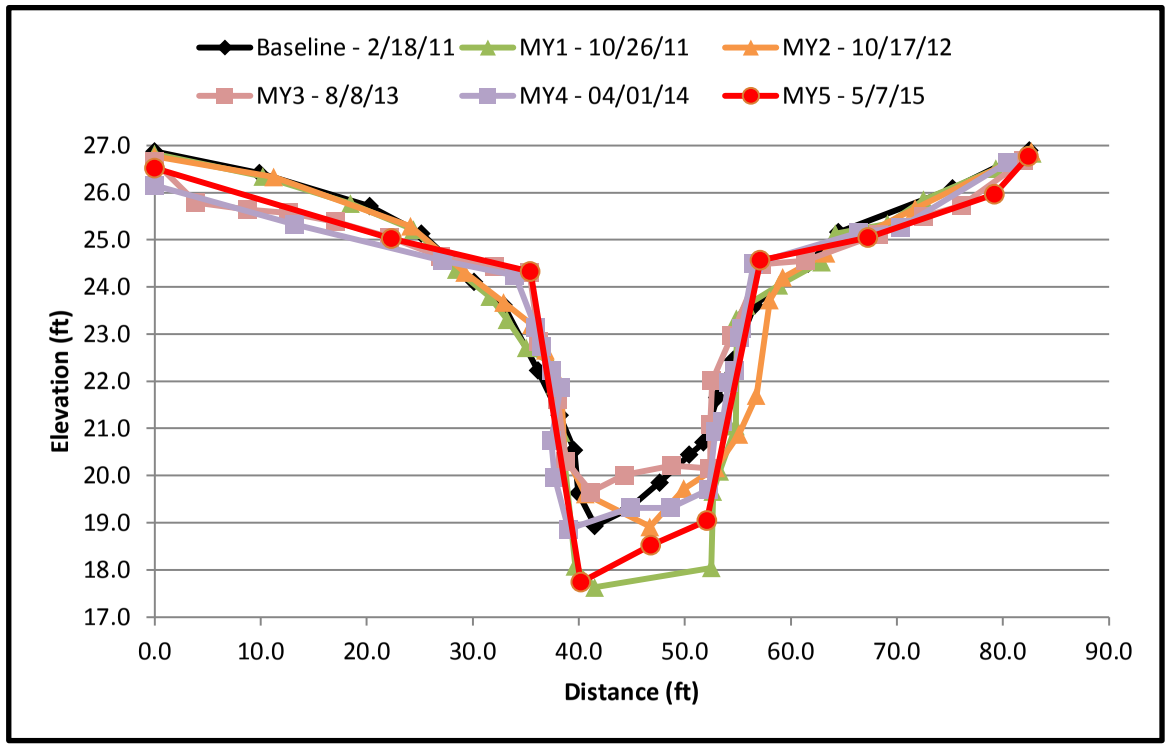


Figure 4.13 XS-13 Pool, Sta. 11+64

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	31.88	0.00	31.86	0.00	31.94	0.00	31.84	0.00	31.87	0.00	31.89
1.96	31.88	5.27	31.88	0.35	32.09	3.29	31.79	2.51	32.02	6.59	32.02
2.82	31.88	8.53	31.81	3.86	32.10	6.78	31.87	3.60	32.02	11.96	31.81
4.88	31.82	10.08	32.07	7.54	31.97	8.86	31.88	5.83	31.90	13.77	31.66
7.13	31.90	11.50	31.63	10.99	31.93	12.62	31.67	6.94	32.06	13.96	31.64
9.06	31.90	12.45	31.50	11.94	31.72	14.84	31.76	9.44	32.04	14.98	31.98
9.86	31.87	13.28	31.37	13.19	31.61	19.01	32.06	10.18	31.94	24.55	32.08
10.37	31.74	13.88	31.30	13.92	31.74	23.79	32.08	11.20	31.95		
11.06	31.67	14.37	31.45	14.65	31.96			12.90	31.76		
12.03	31.61	14.95	31.61	18.14	31.96			14.07	31.55		
12.62	31.53	16.18	31.97	24.23	32.06			14.63	31.73		
13.17	31.34	18.97	32.00					14.88	32.15		
13.88	31.16	24.40	32.05					20.17	32.08		
14.36	31.40							24.62	32.01		
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										

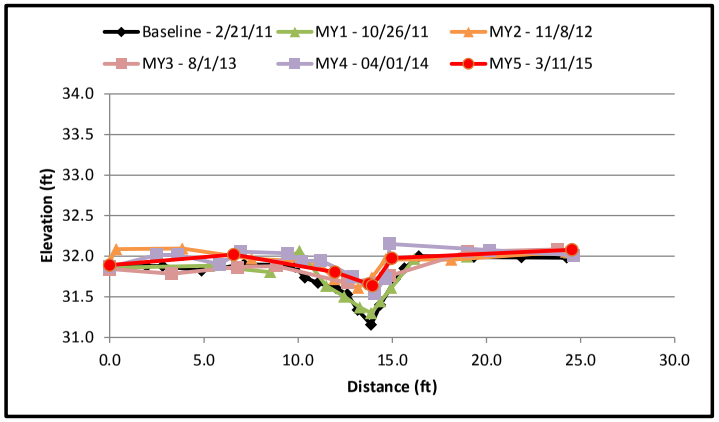


Figure 4.14 XS-14 Riffle, Sta. 14+89

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	31.64	0.00	31.61	0.00	31.56	0.00	31.60	0.00	31.62	0.00	31.60
1.38	31.49	3.27	31.38	5.45	31.35	2.54	31.38	4.93	31.34	6.52	31.34
2.83	31.36	5.60	31.29	8.56	31.17	6.95	31.32	8.72	31.17	8.26	31.26
4.92	31.33	8.34	31.22	10.03	31.12	9.83	31.21	9.59	31.06	10.23	30.95
6.91	31.28	9.34	31.11	11.05	30.69	11.13	30.90	10.03	30.68	11.03	30.64
8.50	31.24	10.53	30.92	11.64	30.54	13.81	30.53	10.38	30.55	11.95	30.58
9.40	31.12	11.01	30.67	12.21	30.58	15.93	31.14	11.99	30.55	13.11	30.64
10.03	31.02	11.83	30.55	14.08	30.82	21.82	31.29	12.90	30.70	13.99	30.97
10.44	30.86	12.72	30.63	14.94	31.06	25.67	31.20	13.45	30.83	15.44	31.24
10.60	30.80	13.61	30.74	18.46	31.29			13.92	31.01	24.74	31.23
10.71	30.71	14.38	30.90	22.74	31.25			14.44	31.15		
11.02	30.66	15.92	31.22	24.83	31.22			15.89	31.15		
11.21	30.58	17.64	31.29					20.25	31.26		
11.58	30.63	21.76	31.26					24.06	31.23		
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										

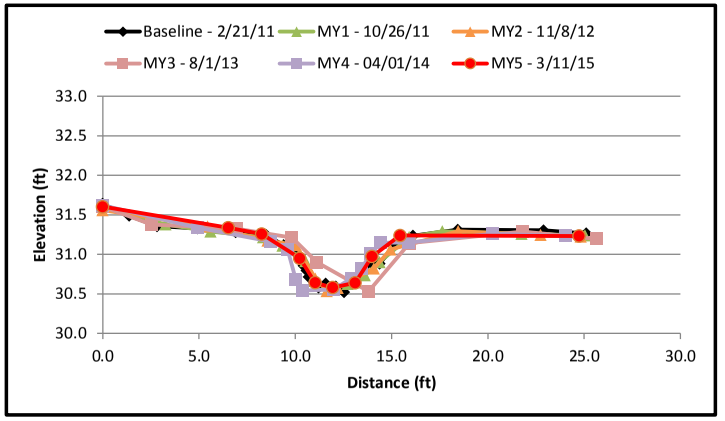


Figure 4.15 XS-15 Riffle, Sta. 19+28

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	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		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										

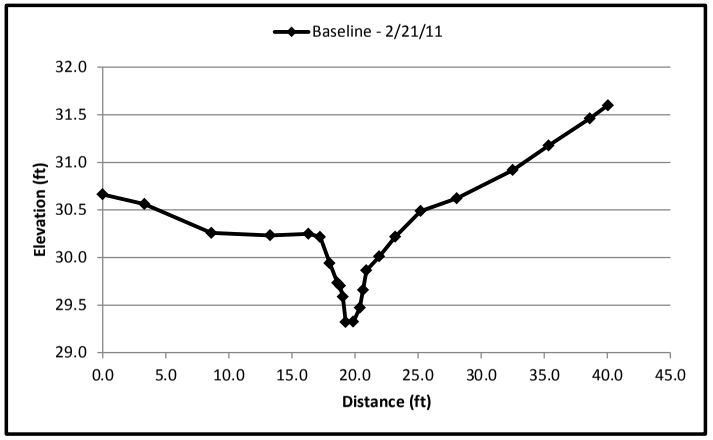


Figure 4.16 XS-16 Pool, Sta.23+64

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	25.98	0.00	25.98	0.00	25.89	0.00	25.98	0.00	26.01	0.00	26.10
4.96	25.72	6.84	25.58	6.52	25.52	5.28	25.76	5.44	25.75	9.40	25.59
10.01	25.44	13.28	25.18	12.56	25.23	8.79	25.49	10.04	25.50	18.81	24.83
13.01	25.18	15.96	24.85	14.97	24.92	13.42	25.19	14.92	25.17	19.13	24.30
14.66	24.95	16.79	24.74	16.97	24.60	16.93	24.78	15.91	24.87	20.68	23.99
16.29	24.81	17.94	24.69	18.66	24.34	18.49	24.64	16.93	24.72	20.96	23.99
18.05	24.63	18.70	24.33	19.64	24.04	19.55	24.19	18.13	24.78	21.47	24.37
18.59	24.33	19.22	24.27	20.67	24.32	22.06	24.76	18.89	24.33	23.73	25.04
18.86	24.19	19.92	24.12	23.35	25.04	25.38	25.23	19.43	24.14	31.17	25.89
19.43	24.13	20.71	24.34	27.00	25.21	28.67	25.60	19.93	24.15		
19.97	24.09	21.69	24.69	30.23	25.78	30.40	25.82	19.88	24.35		
20.33	24.25	22.47	24.82					21.55	24.69		
21.01	24.44	23.20	25.08					23.13	24.99		
21.98	24.77	25.85	25.20					24.60	25.24		
23.04	25.05	27.47	25.36					28.00	25.38		
23.97	25.20	30.40	25.86					30.28	25.87		
26.34	25.22										
27.54	25.34										
28.93	25.73										
30.42	25.82										

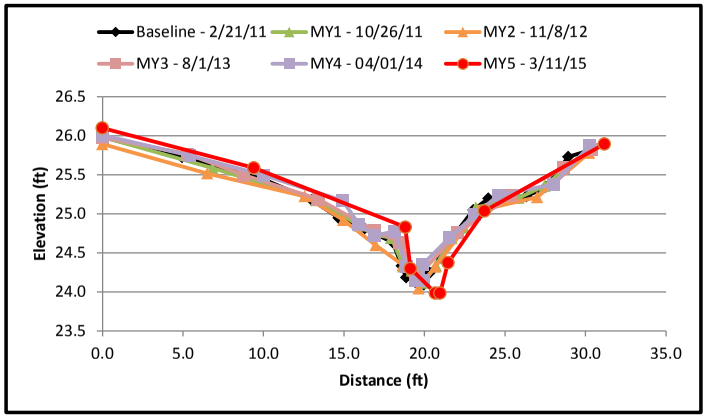
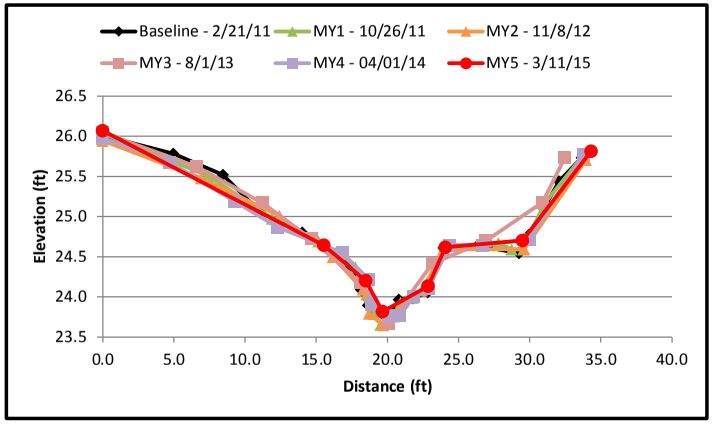


Figure 4.17 XS-17 Riffle, Sta. 23+87

Baseline		MY1		MY2		MY3		MY4		MY5	
Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0.00	26.01	0.00	26.03	0.00	25.94	0.00	26.05	0.00	25.98	0.00	26.07
4.97	25.78	7.42	25.51	6.91	25.48	6.62	25.62	4.69	25.68	15.54	24.64
8.45	25.52	11.90	24.98	12.42	25.01	11.24	25.17	9.25	25.19	18.48	24.20
11.09	25.05	15.17	24.69	16.18	24.50	14.66	24.72	12.31	24.86	19.66	23.82
14.03	24.80	16.79	24.53	18.29	24.09	18.11	24.18	16.84	24.55	22.86	24.13
16.48	24.55	17.76	24.37	18.72	23.79	20.11	23.67	18.68	24.22	24.08	24.62
17.40	24.37	18.54	24.03	19.71	23.65	23.16	24.41	18.90	23.90	29.49	24.70
18.15	24.09	19.07	23.79	20.81	23.84	26.93	24.70	20.23	23.76	34.32	25.81
18.64	23.89	19.53	23.65	22.43	24.08	30.92	25.18	20.88	23.76		
19.05	23.83	20.46	23.76	23.95	24.59	32.46	25.73	21.84	24.00		
19.61	23.79	20.94	23.93	29.61	24.60			22.87	24.10		
20.10	23.80	21.78	23.99	33.95	25.71			24.39	24.64		
20.44	23.80	22.97	24.17					26.68	24.64		
20.81	23.96	24.01	24.59					29.98	24.72		
21.79	23.98	27.80	24.67					33.77	25.77		
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

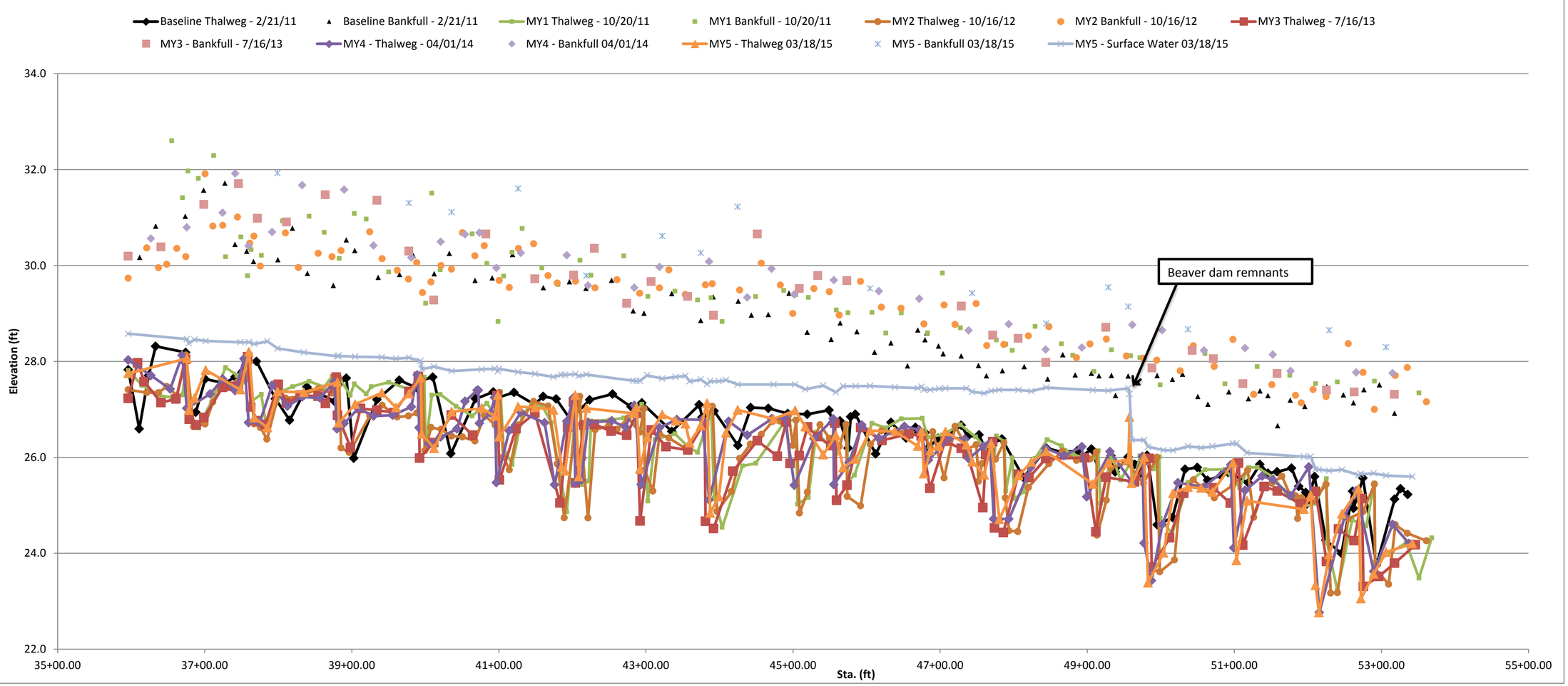


Figure 5.2 Reach 2 (Gordon St. to Lincoln St.) - Longitudinal Profile

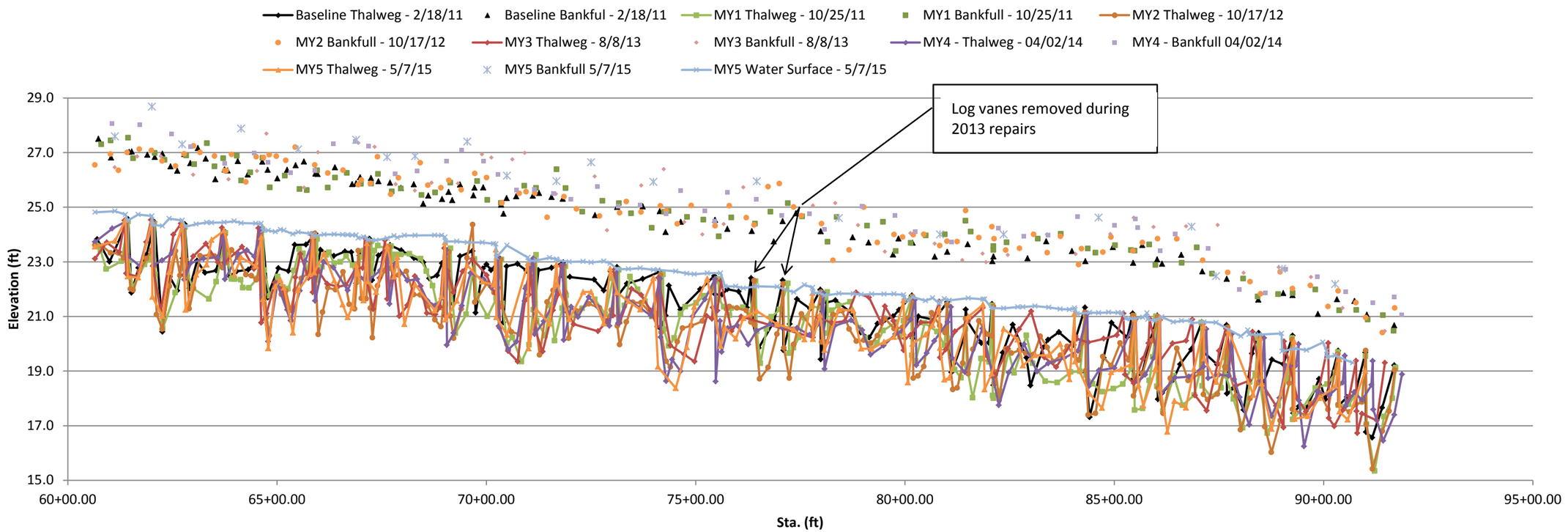


Figure 5.3 Reach 3 (UT to Adkin Branch) - Longitudinal Profile

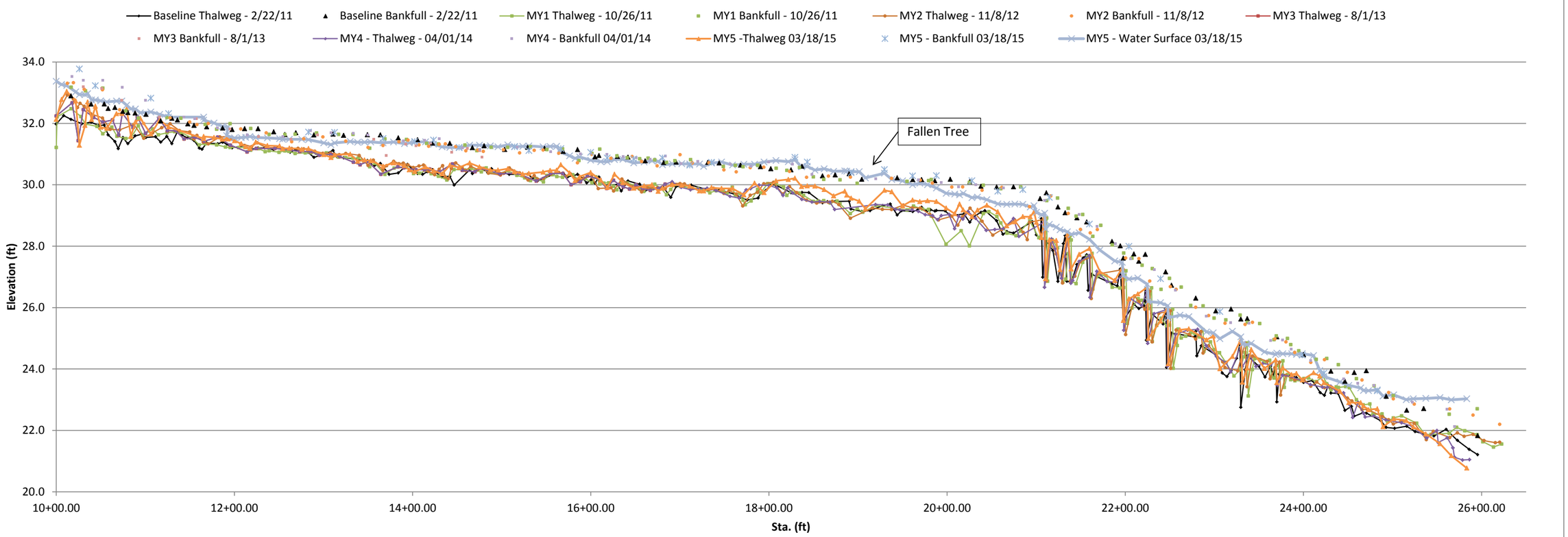


Table 10.1 Baseline Stream Data Summary
Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001
Reach 1

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

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

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

Parameter	Existing Condition (Gordon to Lincoln)	Refernce Reach (Johnson Mill)	Proposed (Gordon to Lincoln)	Reach 2 Baseline (Gordon St. to Lincoln St.)					
Dimension and Substrate - Riffle	Mean	Mean	Mean	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	23.60	21.20	22.00	16.23	16.98	16.81	17.91	0.85	3
Floodprone Width (ft)	45.00	34.90	40.00	48.33	52.40	51.29	57.58	4.72	3
Bankfull Mean Depth (ft)	1.83	2.25	1.47	1.46	1.66	1.64	1.88	0.21	3
Bankfull Max Depth (ft)	2.98	2.42	1.76	2.21	2.38	2.26	2.68	0.26	3
Bankfull Cross Sectional Area (ft^2)	43.30	47.60	32.30	23.68	28.32	27.58	33.70	5.05	3
Width/Depth Ratio	12.90	9.40	15.00	9.53	10.30	10.25	11.12	0.80	3
Entrenchment Ratio	1.90	1.60	1.80	2.99	3.09	3.05	3.22	0.12	3
Bank Height Ratio	-	-	-	1.00	1.00	1.00	1.00	0.00	3
d50 (mm)	-	-							
Profile									
Riffle Length (ft)	-	-	-	27.43	62.71	62.38	93.27	19.56	10
Riffle Slope (ft/ft)	0.0024	0.00001	0.0031	0.0002	0.0013	0.0010	0.0039	0.0013	10
Pool Length (ft)	-	-	-	14.20	56.38	56.82	113.64	27.38	39
Pool Max depth (ft)	4.14	3.56	3.67	2.74	4.23	4.22	6.48	0.76	39
Pool Spacing (ft)	59.62 - 117.86	91.1 - 130.0	88.0 - 132.0	17.05	73.45	69.60	164.78	32.96	38
Pattern									
Channel Beltwidth (ft)	75 -120	50 - 1500	44.0 - 176.0						
Radius of Curvature (ft)	40 - 146	43 - 235	66.0 - 110.0						
Rc: Bankfull Width (ft/ft)	1.7 - 6.2	2.0 - 11.1	3.0 - 5.0						
Meander Wavelength (ft)	224 - 260	250 - 400	264.0 - 418.0						
Meander Width Ratio	3.18 - 5.08	2.4 - 70.9	2.0 - 8.0						
Substrate, bed and transport parameters									
Ri% / P%	-	-	-	29% / 71% *					
SC% / Sa% / G% / C% / B% / Be%	-	-	-						
d16 / d35 / d50 / d84 / d95/ 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	0.106	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 10.3 Baseline Stream Data Summary
Adkin Branch Stream Restoration Project - Phase I - Contract No. 070708001
Reach 3

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

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

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

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Dimension and substrate[1]	Base	MY1	MY2	MY3	MY4[2]	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4[3]	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	14.84	12.00	12.55	12.16	16.15	14.53		24.28	18.49	17.14	12.97	16.36	19.38		18.03	19.72	17.07	17.39	16.91	15.87		17.42	16.08	15.95	16.96	19.55	16.76		14.99	16.25	10.88	15.84	16.69	10.13	
Floodprone Width (ft)	56.25	44.63	50.14	48.69	61.83	60.95		72.20	71.85	75.65	70.24	69.73	78.27		41.72	52.82	52.88	58.89	53.30	55.18		39.81	42.63	69.79	63.88	68.85	62.12		28.45	49.93	31.85	49.42	55.18	38.02	
Bankfull Mean Depth (ft)	1.70	1.85	2.29	2.34	2.10	2.49		1.97	2.57	2.98	3.36	2.62	2.87		1.42	1.61	1.66	1.92	1.96	2.12		1.46	1.59	2.76	2.65	2.31	2.49		0.92	1.16	1.29	1.84	1.96	2.43	
Bankfull Max Depth (ft)	2.77	2.47	2.70	2.69	3.18	3.16		3.33	3.89	4.14	4.75	3.43	3.93		2.07	2.76	2.74	3.47	2.71	2.80		2.05	2.17	3.61	3.47	3.36	3.02		1.50	2.55	1.98	2.45	2.60	3.30	
Bankfull Cross Sectional Area (ft^2)	25.23	22.20	28.71	28.51	33.99	36.17		47.75	47.44	51.08	43.63	42.89	55.71		25.69	31.85	28.32	33.39	33.19	33.67		25.48	25.55	44.04	44.92	45.20	41.70		13.78	18.80	14.06	29.10	32.73	24.59	
Bankfull Width/Depth Ratio	8.73	6.49	5.48	5.19	7.68	5.83		12.32	7.19	5.75	3.86	6.24	6.74		12.70	12.25	10.28	9.05	8.63	7.48		11.93	10.11	5.78	6.41	8.46	6.74		16.29	14.01	8.43	8.62	8.52	4.17	
Bankfull Entrenchment Ratio	3.79	3.72	4.00	4.00	3.83	4.20		2.97	3.89	4.41	5.42	4.26	4.04		2.31	2.68	3.10	3.39	3.15	3.48		2.29	2.65	4.38	3.77	3.52	3.71		1.90	3.07	2.93	3.12	3.31	3.75	
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	

	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)	15.10	18.04	21.48	22.51	26.65	31.06		17.91	16.15	21.82	18.51	18.23	18.67		16.57	15.76	15.61	15.37	17.07	19.59		16.81	15.69	17.96	16.71	22.80	26.21		16.23	17.72	16.32	16.82	21.10	22.14	
Floodprone Width (ft)	57.39	57.49	56.48	55.53	56.75	58.36		57.58	64.23	64.27	62.94	64.15	64.02		50.57	50.57	50.41	49.37	49.90	50.62		51.29	56.70	56.68	47.17	56.89	56.74		48.33	51.64	55.58	54.89	62.91	62.41	
Bankfull Mean Depth (ft)	2.94	3.16	4.21	3.09	4.17	3.87		1.88	2.85	2.81	2.50	3.48	3.77		1.93	2.76	3.49	3.23	3.29	3.33		1.64	2.01	2.23	2.07	3.67	3.75		1.46	1.61	2.35	2.27	3.43	3.53	
Bankfull Max Depth (ft)	4.39	4.85	6.14	5.24	6.57	6.55		2.68	4.26	3.87	3.53	4.19	4.77		3.51	4.89	5.18	4.39	4.54	5.13		2.21	2.84	3.07	2.53	4.85	5.62		2.26	2.60	3.08	2.95	4.20	4.65	
Bankfull Cross Sectional Area (ft^2)	44.41	57.01	90.46	69.65	110.35	120.21		33.70	45.98	61.35	46.34	63.44	70.40		31.92	43.57	54.47	49.60	56.13	65.23		27.58	31.55	40.05	34.51	83.63	98.25		23.68	28.48	38.34	38.18	72.29	78.13	
Bankfull Width/Depth Ratio	5.14	5.71	5.10	7.28	6.35	8.03		9.53	5.67	7.77	7.39	5.24	4.95		8.59	5.71	4.47	4.76	5.19	5.88		10.25	7.81	8.05	8.09	6.21	6.99		11.12	11.01	6.94	7.41	21.24	6.27	
Bankfull Entrenchment Ratio	3.80	3.19	2.63	2.47	2.14	1.88		3.22	3.98	2.95	3.40	3.52	3.43		3.05	3.21	3.23	3.21	2.92	2.58		3.05	3.61	3.16	2.82	2.49	2.17		2.99	2.91	3.41	3.26	2.98	2.82	
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	

	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	24.69	22.09		23.66	17.42	22.13	21.52	22.29	21.39		5.89	5.97	3.55	7.70	3.55	3.55		7.69	7.63	5.82	5.81	7.04	6.60		6.06	N/A	N/A	N/A	N/A	N/A	
Floodprone Width (ft)	72.56	73.06	72.92	71.92	72.15	73.60		82.52	82.77	82.69	81.98	80.44	82.39		24.44	24.40	24.23	23.79	24.62	24.60		25.11	25.05	24.83	25.67	24.06	24.74		34.69	N/A	N/A	N/A	N/A	N/A	
Bankfull Mean Depth (ft)	3.19	3.51	2.94	1.82	3.74	2.98		2.72	3.87	2.92	3.27	3.81	4.57		0.31	0.35	0.19	0.11	0.20	0.20		0.35	0.34	0.31	0.33	0.31	0.34		0.40	N/A	N/A	N/A	N/A	N/A	
Bankfull Max Depth (ft)	4.71	5.43	4.09	4.25	6.07	4.86		4.68	4.74	4.29	4.65	5.38	6.54		0.71	0.67	0.32	0.21	0.40	0.40		0.72	0.67	0.58	0.61	0.60	0.62		0.90	N/A	N/A	N/A	N/A	N/A	
Bankfull Cross Sectional Area (ft^2)	52.00	63.18	44.06	70.35	92.44	65.92		64.42	67.38	64.51	70.35	85.00	97.70		1.81	2.09	0.68	0.87	0.70	0.70		2.68	2.60	1.80	1.91	2.15	2.23		2.43	N/A	N/A	N/A	N/A	N/A	
Bankfull Width/Depth Ratio	5.11	5.13	5.09	6.58	6.60	7.40		8.70	4.50	7.58	6.58	5.85	4.68		19.00	17.06	18.68	68.19	17.75	18.00		21.97	22.44	18.77	17.64	22.71	19.53		15.15	N/A	N/A	N/A	N/A	N/A	
Bankfull Entrenchment Ratio	4.45	4.06	4.87	3.81	2.92	3.33		3.49	4.75	3.74	3.81	3.61	3.85		4.15	4.09	6.82	3.09	6.93	6.91		3.26	3.28	4.27	4.42	3.42	3.75		5.72	N/A	N/A	N/A	N/A	N/A	
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	N/A	N/A	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	7.13	7.50		8.06	7.82	8.93	6.55	8.20	8.37	
Floodprone Width (ft)	30.42	30.40	30.23	30.40	23.63	31.00		23.07	25.58	27.18	19.41	21.05	25.52	
Bankfull Mean Depth (ft)	0.46	0.43	0.46	0.40	0.31	0.44		0.50	0.48	0.46	0.35	0.49	0.44	
Bankfull Max Depth (ft)	1.11	0.96	1.00	0.99	0.79	1.05		0.82	0.94	0.94	0.74	0.88	0.80	
Bankfull Cross Sectional Area (ft^2)	5.34	3.91	4.25	4.70	2.22	3.29		4.00	3.76	4.14	2.29	4.02	3.65	
Bankfull Width/Depth Ratio	25.20	21.26	20.26	28.86	23.00	17.09		16.12	16.29	19.41	18.71	16.73	19.19	
Bankfull Entrenchment Ratio	2.62	3.33	3.24	2.61	3.31	4.14		2.86	3.27	3.04	2.96	2.57	3.05	
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	

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.
2 = Re-set bankfull elevation to be more consistent with previous and existing years' bankfull calls.
3 = Corrected typo (Bankfull Cross Sectional Area from 25.20 to 45.20).

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[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	16.15	16.58	16.69	16.91	0.39	3	10.13	13.51	14.53	15.87	3.00	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	53.30	56.77	55.18	61.83	4.48	3	38.02	51.38	55.18	60.95	11.93	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	1.96	2.01	1.96	2.10	0.08	3	2.12	2.35	2.43	2.49	0.20	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	2.60	2.83	2.71	3.18	0.31	3	2.80	3.09	3.16	3.30	0.26	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	32.73	33.30	33.19	33.99	0.64	3	24.59	31.48	33.67	36.17	6.09	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	7.68	8.28	8.52	8.63	0.52	3	4.17	5.83	5.83	7.48	1.66	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	3.15	3.43	3.31	3.83	0.36	3	3.48	3.81	3.75	4.20	0.36	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	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	14.74	54.32	54.55	89.93	23.70	13	28.39	54.93	47.84	91.77	24.19	9
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	0.005	0.029	0.018	0.166	0.042	13	0.000	0.001	0.001	0.002	0.001	6
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	16.22	40.07	37.60	81.04	17.05	17	2.95	34.52	34.93	74.77	16.64	21
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	2.93	4.20	4.07	7.51	1.04	17	3.30	3.62	3.62	3.93	0.45	2
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	25.06	82.64	79.61	131.21	30.80	16	20.01	79.63	70.93	188.06	42.74	20
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						E5						E5					
Channel Thalweg length (ft)	1727						1764						1765						1750						1740						1746					
Sinuosity (ft)	1.03						1.05						1.05						1.04						1.03						1.04					
Water Surface Slope (Channel) (ft/ft)	0.00166						0.0016						0.0016						0.0018						0.0018						0.0018					
BF slope (ft/ft)	0.0024						0.00263						0.0019						0.0019						0.0018						0.0027					
[3]Ri% / P%	73% / 27%						59% / 41%						52% / 48%						56% / 44%						51%/49%						41%/59%					
[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

4 = Dimension and Substrate section revised per correction to Table 11, Rosgen Classification and Sinuosity revised for consistency with previous and existing year.

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	18.23	20.71	21.10	22.80	2.31	3	18.67	22.34	22.14	26.21	3.77	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	56.89	61.32	62.91	64.15	3.88	3	56.74	61.06	62.41	64.02	3.82	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	3.43	3.53	3.48	3.67	0.13	3	3.53	3.68	3.75	3.77	0.13	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	4.19	4.41	4.20	4.85	0.38	3	4.65	5.01	4.77	5.62	0.53	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	63.44	73.12	72.29	83.63	10.12	3	70.40	82.26	78.13	98.25	14.38	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	5.24	10.90	6.21	21.24	8.97	3	4.95	6.07	6.27	6.99	1.03	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	2.49	3.00	2.98	3.52	0.52	3	2.17	2.81	2.82	3.43	0.63	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	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	12.64	43.22	34.13	151.66	25.94	38	8.49	53.25	34.47	135.38	45.49	7
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	0.008	0.025	0.018	0.196	0.030	38	0.000	0.002	0.001	0.004	0.001	6
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	11.79	58.25	56.02	138.59	29.26	41	0.84	57.33	50.52	179.48	36.09	34
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	3.56	5.24	5.27	6.77	0.81	41	3.88	5.82	5.72	7.55	0.98	28
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	11.79	75.82	70.77	147.43	34.36	35	17.65	86.95	79.39	206.43	45.83	33
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						E5						E5					
Channel Thalweg length (ft)	3096						3131						3105						3081						3119						3005					
Sinuosity (ft)	1.04						1.04						1.04						1.03						1.07						1.03					
Water Surface Slope (Channel) (ft/ft)	0.0016						0.00175						0.0016						0.0018						0.0014						0.0017					
BF slope (ft/ft)	0.0018						0.00204						0.0017						0.0019						0.0017						0.0019					
*[3]Ri% / P%	29% / 71%						5% / 95%						24% / 76%						45% / 55%						47%/52%						36%/64%					
[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	7.04	7.62	7.62	8.20	0.82	2	8.37	12.37	12.37	16.37	5.66	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	21.05	22.56	22.56	24.06	2.13	2	24.74	25.13	25.13	25.52	0.55	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	0.31	0.40	0.40	0.49	0.13	2	0.15	0.30	0.30	0.44	0.21	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	0.60	0.74	0.74	0.88	0.20	2	0.66	0.73	0.73	0.80	0.10	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	2.15	3.09	3.09	4.02	1.32	2	2.53	3.09	3.09	3.65	0.79	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	16.73	19.72	19.72	22.71	4.23	2	19.19	62.59	62.59	105.98	61.37	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	2.57	3.00	3.00	3.42	0.60	2	1.51	2.28	2.28	3.05	1.09	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	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	11.80	22.20	21.05	43.41	8.13	16	7.80	45.74	38.96	138.48	38.96	14
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	0.005	0.021	0.021	0.040	0.008	16	0.002	0.011	0.011	0.025	0.007	12
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	15.79	39.41	32.89	119.72	24.50	22	4.20	20.15	17.43	59.44	13.45	27
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	0.15	0.69	0.49	2.13	0.55	22	0.47	1.42	1.18	2.65	0.63	17
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	10.11	37.14	32.86	126.38	24.33	21	8.70	45.82	35.54	146.54	37.61	26
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						C5						C5					
Channel Thalweg length (ft)	1582						1622						1620						1561						1564						1608					
Sinuosity (ft)	1.32						1.35						1.35						1.30						1.31						1.34					
Water Surface Slope (Channel) (ft/ft)	0.0028						0.0022						0.0027						0.0021						0.0019						0.0018					
BF slope (ft/ft)	0.0030						0.0026						0.0029						0.0032						0.0021						0.0028					
[3]Ri% / P%	58% / 42%						60% / 40%						55% / 45%						50% / 50%						50%/50%						54%/46%					
[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	UT Adkin Sta. 22+65 LT	1.96	25.51	27.47	26.07	1.40	6.1
10/26/2011	1	Adkin Branch Sta. 54+00 LT	2.8	25.27	28.07	27.03	1.04	6.2
11/8/2012	1	Adkin Branch Sta. 54+00 LT	4.0	25.27	29.27	27.03	2.24	6.3 & 6.4
7/9/2013	--	Site	--	--	--	--	--	6.5 & 6.6
4/1/2014	1	Adkin Branch Sta. 54+00 LT	4.00	25.27	29.27	27.03	2.24	6.7
4/1/2014	2	Adkin Branch Sta. 75+25 RT	1.14	23.60	24.74	24.43	0.31	6.8
4/1/2014	3	UT Adkin Sta. 22+65 LT	1.52	25.51	27.03	26.07	0.96	6.9
4/1/2014	4	UT Adkin Sta. 18+80 LT	1.97	29.47	31.44	30.16	1.28	6.10
5/7/2015	2	Adkin Branch Sta. 75+25 RT	2.75	23.60	26.35	24.43	1.92	6.12
3/11/2015	3	UT Adkin Sta. 22+65 LT	1.50	25.51	27.01	26.07	0.94	6.13
3/11/2015	4	UT Adkin Sta. 18+80 LT	1.71	29.47	31.18	30.16	1.02	6.14

Figures 6.1 & 6.2 2011 Crest Gauge Photos

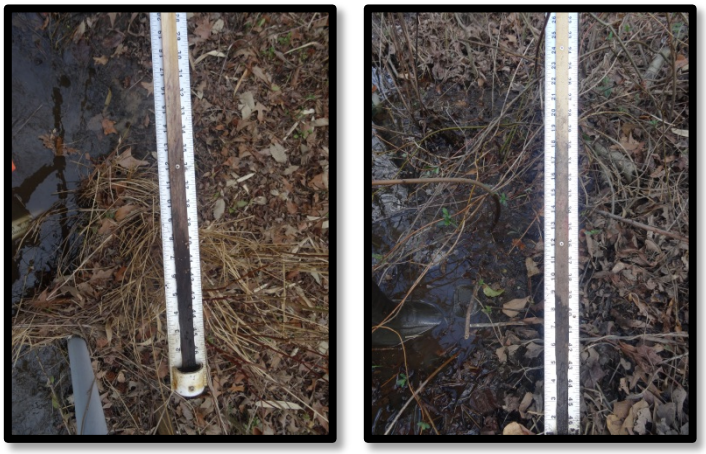
Figures 6.3 & 6.4 November 2012 Crest Gauge Photos


Figures 6.5 & 6.6 July 2013 Crest Gauge Photos


Figures 6.7 & 6.8 April 2014 Crest Gauge Photos


Figures 7.9 - 6.10 April 2014 Crest Gauge Photos

Figures 8.11 - 6.12 2014 & 2015 Crest Gauge Photos



Figures 9.13 - 6.14 2015 Crest Gauge Photos

Appendix F. Credit Calculation Figures

Figure 7.1 – 7.5, Credit Calculation Figures

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

ELM ST

45+00

MULBERRY LN

50+00

SYCAMORE RD

EAST GORDON ST

MATCHLINE SEE SHEET 7.2

ADKIN BRANCH

40+00

VEG PLOT 18

VEG PLOT 19

VEG PLOT 20

VEG PLOT 21

VEG PLOT 22

END REACH 1
STA 53+25.09

BEGIN REACH 1
STA 35+96.55

WASHINGTON AVE

PINE ST

MACON ST

TULLS ALLEY

TOWER HILL RD

CLAY ST

LEGEND

- EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- PEDESTRIAN BRIDGE
- SEWER EASEMENT
- VEGETATION PLOT
- <50′ (NO CREDIT)
- 50′–200′ (1:1 GRANDFATHER)

50 0 100
SCALE

ADKIN BRANCH
CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE 7.1

DATE: 12/01/2015

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

LEGEND

- EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- SEWER EASEMENT
- VEGETATION PLOT
- <50' (NO CREDIT)
- 50'–200' (1:1 GRANDFATHER)

BEGIN REACH 2
STA 54+03.24

MATCHLINE SEE SHEET 7.1

EAST GORDON ST

55+00

ADKIN BRANCH

CYPRESS ST

60+00

BEGIN REACH 3
STA 60+68.85

EAST CASWELL ST

ROSCHELLE BLVD

MELVIN ST

70+00

MATCHLINE STA 72+50
SEE SHEET 7.3

VEG PLOT 13

VEG PLOT 14

VEG PLOT 15

VEG PLOT 16

VEG PLOT 17

BMP #4

65+00

CYPRESS ST

ADKIN BRANCH

KING ST

MILLER ST

EAST CASWELL ST

END REACH 2
STA 60+24.57

50 0 100
SCALE

ADKIN BRANCH
CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE 7.2

DATE: 12/01/2015

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

EAST CASWELL ST

SOUTH SECREST ST

DOVER ST

N

BMP #5

BMP #6

BMP #7

75+00

80+00

85+00

ADKIN BRANCH

0.0157

VEG PLOT 9

VEG PLOT 12

VEG PLOT 11

VEG PLOT 10

MATCHLINE STA 72+50
SEE SHEET 7.2

MATCHLINE STA 86+00
SEE SHEET 7.4

MYRTLE AVE

FORREST ST

DESMOND ST

BRIGHT ST

LEGEND

- E — EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- PEDESTRIAN BRIDGE
- SEWER EASEMENT
- VEGETATION PLOT
- <50' (NO CREDIT)
- 50'–200' (1:1 GRANDFATHER)

50 0 100
SCALE

ADKIN BRANCH
CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE 7.3

DATE: 12/01/2015

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

DUFFIE ST

REED ST

90+00

95+00

HOLLOWAY DR

BMP #8

VEG PLOT 5

MATCHLINE STA 24+00
SEE SHEET 7.5

ADKIN BRANCH

UT TO ADKIN BRANCH

00+00

VEG PLOT 4

VEG PLOT 6

VEG PLOT 8

VEG PLOT 7

MATCHLINE STA 86+00
SEE SHEET 7.3

DESMOND ST

END UT TO ADKIN BRANCH
STA 60+68.85

BMP #9

EAST SHINE ST

REED ST 20'BST

END REACH 3
STA 96+41.06

LINCOLN ST

LEGEND

- EASEMENT BOUNDARY
- AS-BUILT TOP OF BANK
- SEWER EASEMENT
- VEGETATION PLOT
- <50' (NO CREDIT)
- 50'–200' (1:1 GRANDFATHER)

50 0 100
SCALE

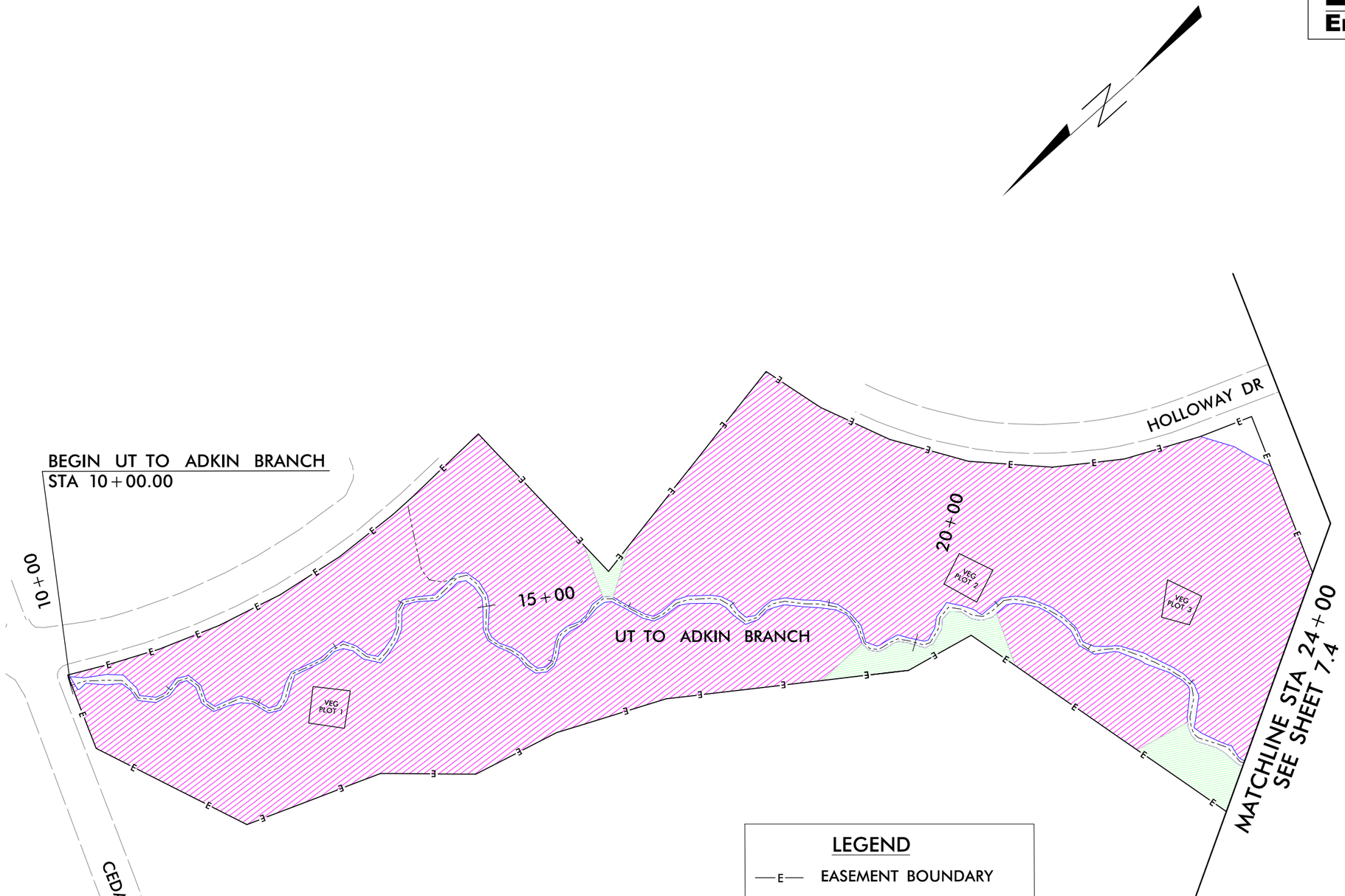
ADKIN BRANCH
CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE 7.4

DATE: 12/01/2015

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258



LEGEND

- E — EASEMENT BOUNDARY
- AS–BUILT TOP OF BANK
- SEWER EASEMENT
- VEGETATION PLOT
- < 50′ (NO CREDIT)
- 50′–200′ (1:1 GRANDFATHER)

50 0 100
SCALE

ADKIN BRANCH
CREDIT CALCULATION FIGURES

SCO#: 050656101 COUNTY: LENOIR

FIGURE 7.5

DATE: 12/01/2015

Appendix G. Final Record Drawings

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

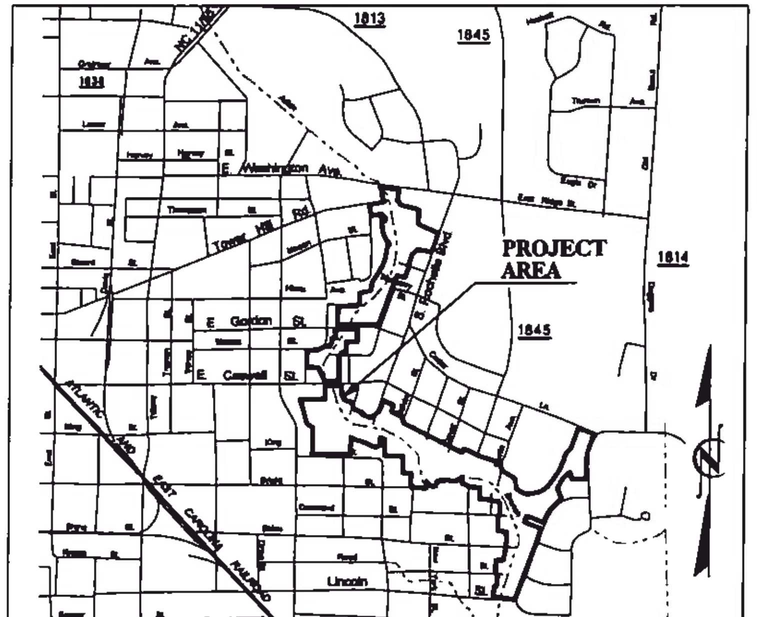
ADKIN BRANCH STREAM RESTORATION RECORD DRAWINGS

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

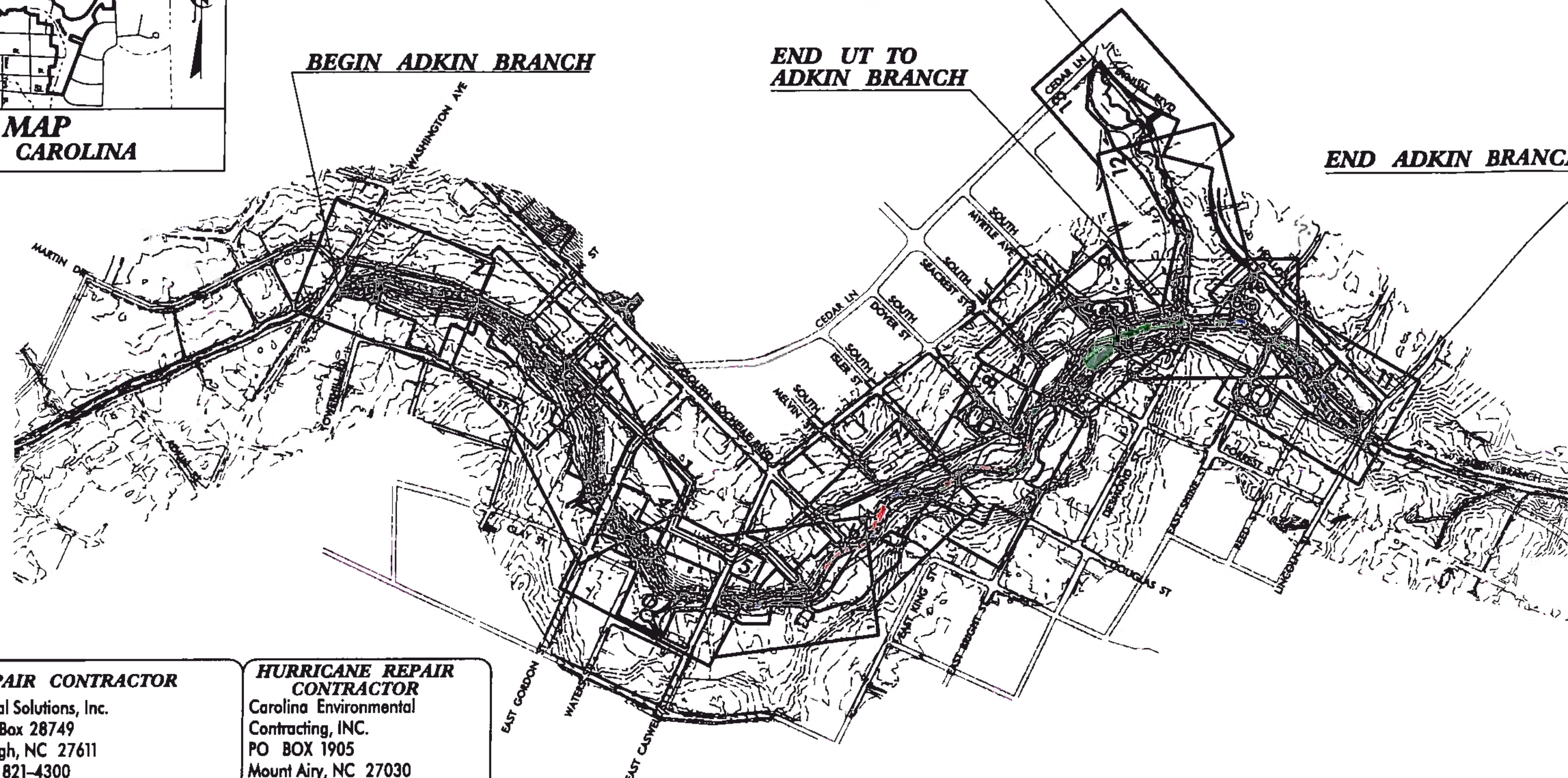
RECORD DRAWINGS

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.

NORTH CAROLINA PROFESSIONAL SEAL 030036 ENGINEER CHRISTOPHER 11/26/13



VICINITY MAP
KINSTON, NORTH CAROLINA



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

SCO: 050656101

CONTRACT: ADKIN BRANCH

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

ADKIN BRANCH RECORD DRAWINGS

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Raleigh, NC 27607
NC License No: P-0238

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

RECORD DRAWINGS

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25 0 50
SCALE

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

BALL FIELD
ELM STREET
SYCAMORE STREET
PINE STREET
HICKS AVENUE
ISBKAPT
ISBLKD
ISFD
72"CHL
72"CONC
48"CHL
18"RCP
15" RCP
EXISTING 15" RCP
EXISTING YARD INLET
EXISTING YARD INLET
SWALE
GRASS SWALE
RIP-RAP SWALE
SEWER PLUG
STORAGE BUILDINGS
SOIL
LT
RT
W/L
MATCHLINE- SEE SHEET NO. 2
MATCHLINE- SEE SHEET NO. 4

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
N:\Construction\Combined Record Drawings\AdkinBranch CRD_psh_3.dgn
Florence & Hutcheson, Inc.

ADKIN BRANCH RECORD DRAWINGS

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Raleigh, NC 27607
NC License No: P-0260
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PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	5

PROJECT ENGINEER

RECORD DRAWINGS

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25 0 50
SCALE

NORTH CAROLINA
PROFESSIONAL
SEAL
035636
ENGINEER
CHRISTOPHER L. CRISP
11/26/13

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

SYCAMORE ROAD

NORTH CYPRESS STREET

CLAY STREET

WATERS STREET

EAST CASWELL STREET

CANOPY

ISBKD

ISFD

ISBK

30'BLK WALL

48"CONC

27"CONC

18"CONC

20"CONC

12"CONC

10'CONC

CULVERT 2
3.9'X10'
BARRELS

GRASS SWALE

RIP RAP SWALE

10' OF RIP-RAP BURIED

END EXISTING 15" RCP

4"PVC

4'-IRON

C-WEIR

BMP #4

BST

END/EXISTING 15" RCP

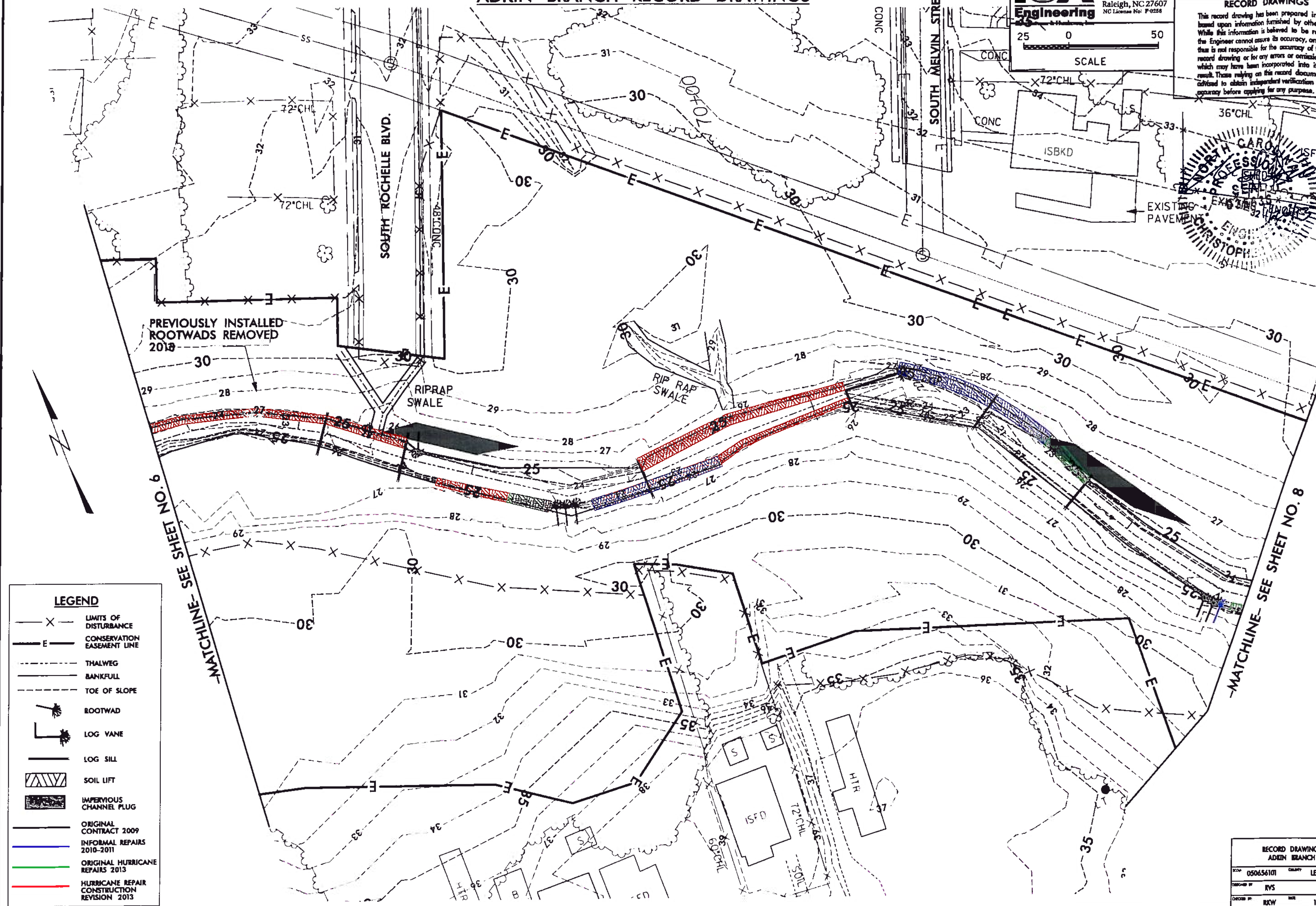
00+09

RECORD DRAWINGS
ADKIN BRANCH

JOB: 050656101 COUNTY: LENOIR
DESIGNED BY: RVS
CHECKED BY: BRW DATE: 11/13

11/26/2013
R:\Construction\Combined Record Drawings\AdkinBranch_CRD_psh_5.dgn
Florence & Hutcheson, Inc.

ADKIN BRANCH RECORD DRAWINGS



LEGEND

- LIMITS OF DISTURBANCE
- CONSERVATION EASEMENT LINE
- THALWEG
- BANKFULL
- TOE OF SLOPE
- ROOTWAD
- 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

ICA Engineering
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Suite 100
Raleigh, NC 27607
NC License No: F-0258

SCALE: 25 0 50

PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	7
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.

RECORD DRAWINGS
ADKIN BRANCH

ECON	050656101	COUNTY	LENOIR
DESIGNED BY	RVS		
CHECKED BY	RKW	DATE	11/13

6/26/2013
H:\Construction\Combined_Record_Drawings\AdkinBranch_CRD_psh_7.dgn

ADKIN BRANCH RECORD DRAWINGS

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Raleigh, NC 27607
NC License No: F-0968

PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035636 11/26/13 ENGINEERING INCORPORATED

BMP #6 REMOVED AS PART OF HURRICANE REPAIR 2013

BMP #7 C-WEIR

OVERBANK GRADING DURING HURRICANE REPAIR 2013

PEDESTRIAN WALKWAY

TENNIS COURTS

EXISTING FENCE

ASPHALT HUMP

GRAVEL WALK

GRASS & RIP RAP SWALE

SOUTH MYRTLE AVENUE

SOUTH SEAREST STREET

FORREST STREET

-MATCHLINE- SEE SHEET NO. 8

-MATCHLINE- SEE SHEET NO. 10

RECORD DRAWINGS ADKIN BRANCH	
050656101	LENOIR
RVS	
RKW	11/13

11/26/2013
R:\Construction\Combined Record Drawings\AdkinBranch CRD pan_9.dgn
Florence & Hutcheson, Inc.

ADKIN BRANCH RECORD DRAWINGS

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Raleigh, NC 27607
NC License No: P-0268

PROJECT REFERENCE NO.	SHEET NO.
ADKIN BRANCH	11

PROJECT ENGINEER

RECORD DRAWINGS

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035636 CHRISTOPHER L. SMITH

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

HOLLOWAY DRIVE

REED STREET

GRASS SWALE

95+00

END ADKIN BRANCH

-MATCHLINE- SEE SHEET NO. 10

2-4" PVC

C-WEIR

BMP #9

IRONS

18" RCP

EAST SHINE STREET

ASPHALT HUMP

REED STREET

LINCOLN STREET

SOIL

RECORD DRAWINGS
ADKIN BRANCH

050656101	LENOIR
DESIGNED BY: RVS	
CHECKED BY: BRW	DATE: 11/13

ADKIN BRANCH RECORD DRAWINGS

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5121 Kingdom Way,
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Raleigh, NC 27607
NC License No: P-0258

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

RECORD DRAWINGS

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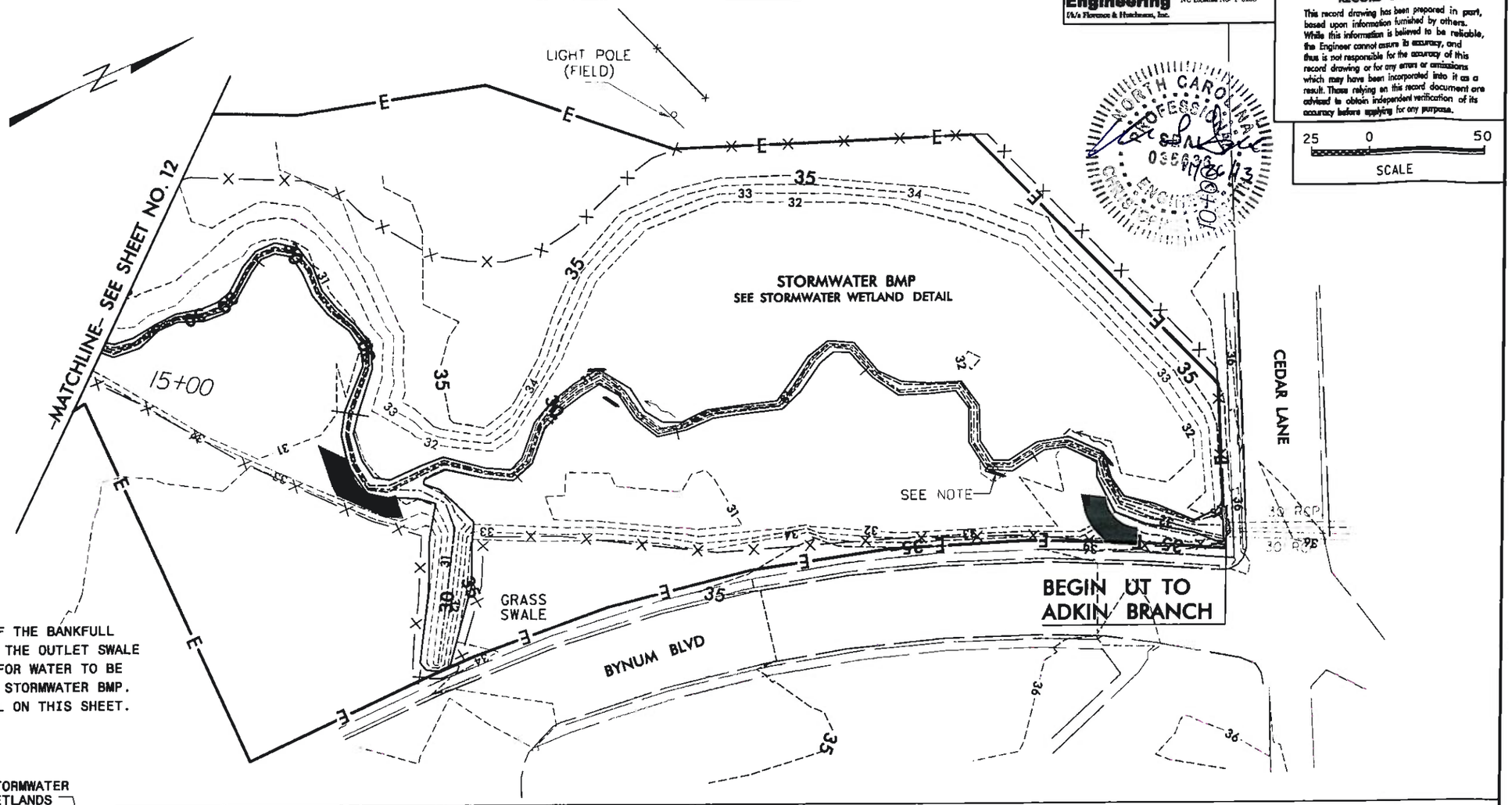
25 0 50
SCALE

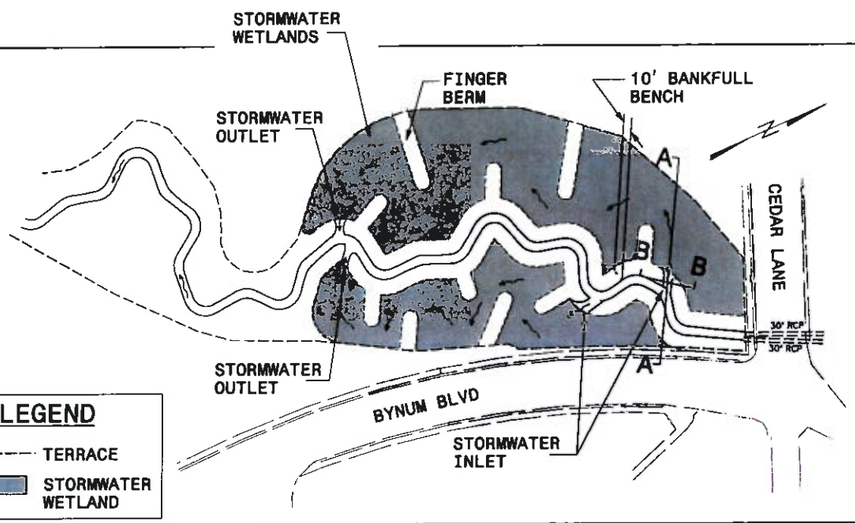
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036236 REGISTERED

LEGEND

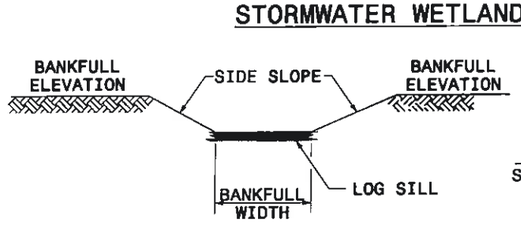
- LIMITS OF DISTURBANCE
- CONSERVATION EASEMENT LINE
- THALWEG
- BANKFULL
- TOE OF SLOPE
- LOG SILL
- IMPERVIOUS CHANNEL PLUG
- ORIGINAL CONTRACT 2009
- INFORMAL REPAIRS 2010-2011
- ORIGINAL HURRICANE REPAIRS 2013
- HURRICANE REPAIR CONSTRUCTION REVISION 2013



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.

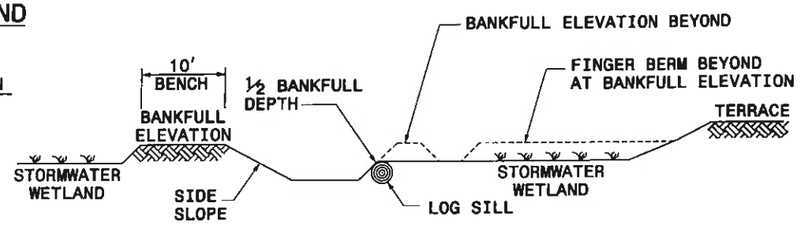


STORMWATER WETLAND



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
SCO: 050656101 COUNTY: LENOIR
DESIGNED BY: RVS
CHECKED BY: RKW DATE: 1113

1/26/2013
R:\Construction\Combined Record Drawings\AdkinBranch DRD_psh.13.dgn
Florence & Hutcheson, Inc.