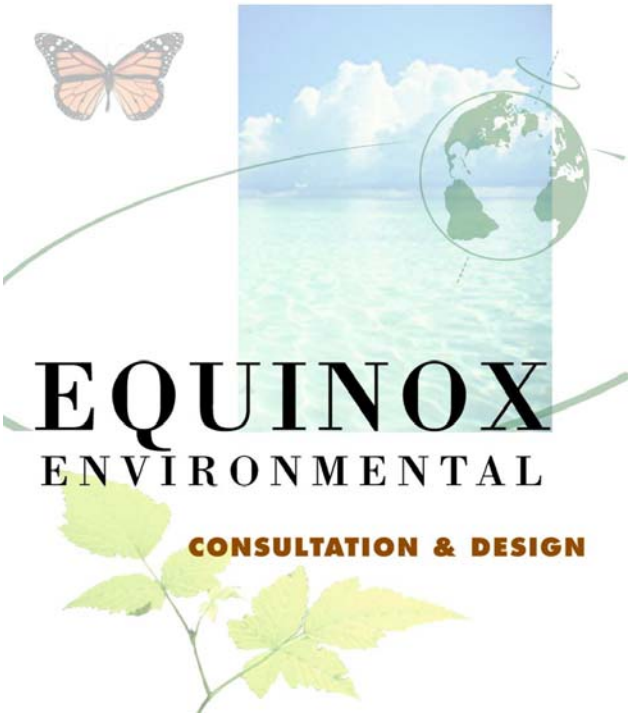
Monitoring Baseline Report
Final
Dye Branch II
Stream Restoration Site

NCEEP Project Number: 92255
Iredell County, North Carolina

Submitted to
Ecosystem Enhancement Program
North Carolina Department of Environment and Natural Resources
October 2011

1619 Mail Service Center
Raleigh, NC 27699

Monitoring Firm



37 Haywood Street, Suite 100
Asheville, North Carolina 28801
828-253-6856

Project Contact: Win Taylor
Email: win@equinoxenvironmental.com

Table of Contents

Figures

Tables

1.0 EXECUTIVE SUMMARY

The project resides within the city limits of Mooresville, North Carolina and involved the restoration of 3,685 linear feet of stream. The goals of the project included water quality and aquatic habitat improvement and enhancement of the riparian vegetative communities. Project objectives to accomplish the goals involved the restoration of stream channel pattern, profile, and dimension. Riparian area function was restored by revegetating with native trees, shrubs, and herbaceous plant species. Additionally, invasive exotic plant species were controlled within the project site.

The project also included the installation of a novel stormwater BMP in the form of a stormwater wetland system composed of three serial cells designed to trap sediments and other pollutants from the first flush of the 1-inch storm. Storm flow is diverted at the Church Street culvert on Cemetery Branch, the projects main tributary, and treated in series through the 3 wetland cells southwest of the confluence of Cemetery and Dye Branch before discharging further downstream on the Dye Branch mainstem. The system was designed by researchers of the Stormwater Engineering Research Group of the North Carolina State University Biological and Agricultural Engineering Department, headed by Dr. Bill Hunt and through an agreement with the North Carolina Ecosystem Enhancement Program (NCEEP) is maintained by the Town of Mooresville. This aspect of the Dye Branch Project was funded via a 319 grant and is not a direct source of mitigation credit, but is a valuable component to the overall restoration effort in terms of managing stressors from this highly urbanized watershed.

The project was originally constructed in 2008 however; storm events in this highly flashy drainage in conjunction with some inadequate construction practices impacted approximately half the project (mostly along the Dye Branch reaches). These events occurred at the end of construction and before any replanting could provide stability to the stream banks. Over half of the project underwent major repair. The repairs included bank stabilization/re-grading and structure repair/replacement as well as replanting in December 2010 and February 2011. The As-built survey was performed in 2011 and therefore incorporated all repair related adjustments. There were some minor revisions to the construction documents as the designer attempted to repair in situ (within constructed stream channel) to reduce additional impacts to stabilized areas of the project.

For monitoring purposes the project site was delineated into three primary stream reaches that include Cemetery Branch, Dye Branch Upstream of Cabarrus Avenue, and Dye Branch Downstream of Cabarrus Avenue.

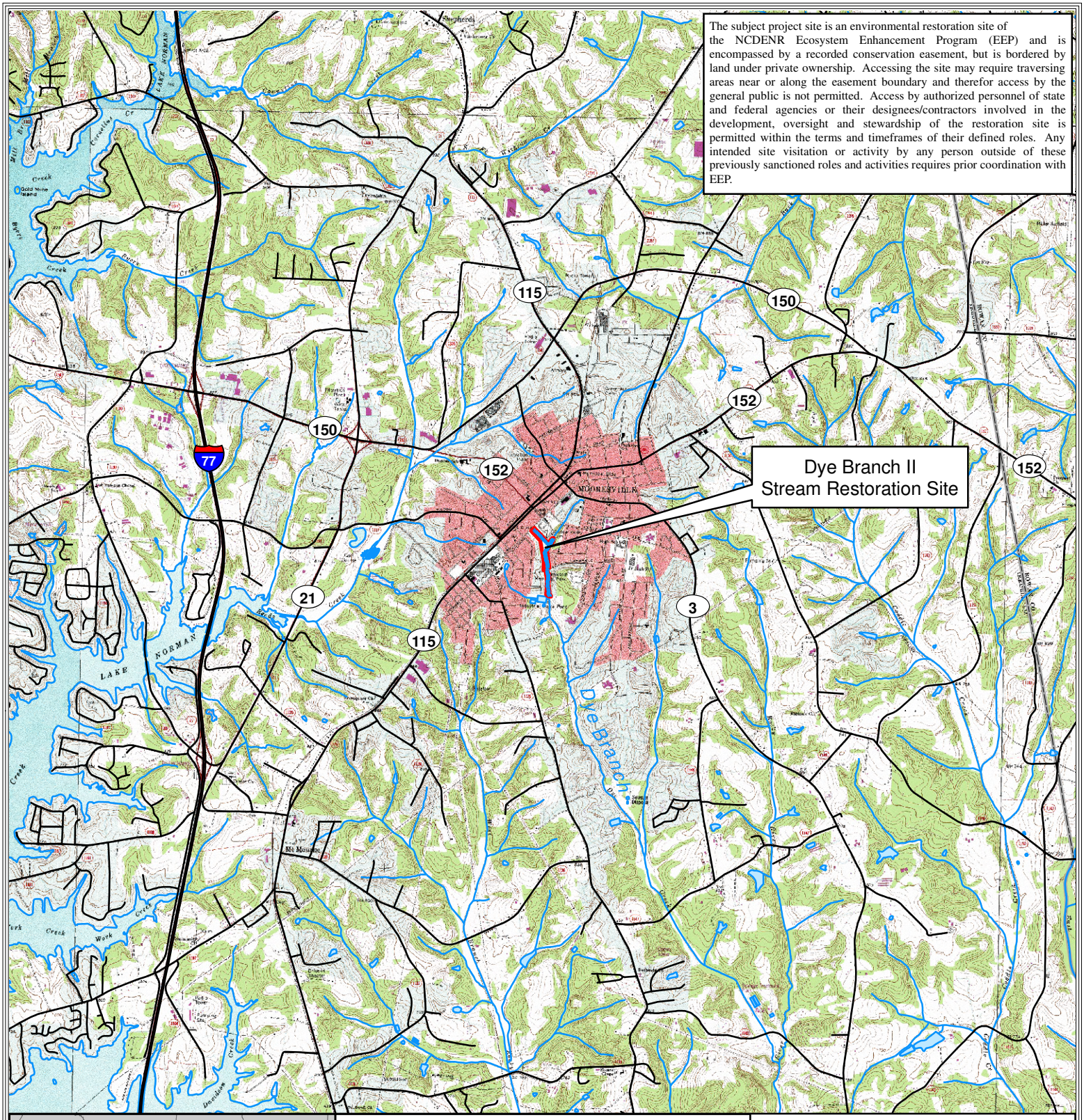
The primary focus of the revegetation element of the project was to restore natural plant communities within the project site. Planting plans for three distinct planting zones were implemented to restore native species composition associated with the stream and upland habitat types on the project site. Additionally, invasive species control was implemented during construction to minimize the impacts of kudzu *Pueraria montana* and Chinese privet *Ligustrum sinense* on the restored plant communities.

Annual monitoring will begin in 2011 and will include stream and vegetation monitoring components as established within this document. Annual monitoring will occur for five years or until project success criteria have been achieved.

2.0 PROJECT BACKGROUND

2.1 Location and Setting

The conservation easement at the Dye Branch restoration site is primarily in the ownership of the Town of Mooresville with multiple other small ownerships associated with the neighboring properties (Figure 1). It is situated within the Upper Rocky River watershed (14-digit HUC - 03040105010010) of the Yadkin River basin cataloging unit (8-digit HUC – 03040105). The site is located within the city limits of Mooresville in Iredell County, North Carolina and the watershed land use is extremely urban (>85%) with very high levels of impervious cover. Prior to project implementation, there was limited native riparian vegetation and excessive stormwater runoff had caused severe streambank erosion and poor water quality.



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

Directions: From Raleigh, proceed west on I-40 towards Statesville. Take Exit 152 A (I-77S) towards Charlotte. Proceed on I-77S to Exit 36 (NC-150) towards Mooresville. From NC-150 turn slight right onto McLelland Avenue/NC-152 for approximately 1.2 miles. The site is located on the west side of McLelland Avenue/NC-152.

Figure 1 - Vicinity Map

Dye Branch II
Stream Restoration Site
Project No. 92255

Iredell County, North Carolina
August 2011

N

EQUINOX ENVIRONMENTAL CONSULTATION & DESIGN

Ecosystem Enhancement PROGRAM

0 0.5 1 2 Miles

7.5 Minute Series Mooresville Quadrangle

2.2 Project Goals and Objectives

The goals and objectives stated in the Dye Branch Restoration Plan (NCEEP 2005) are as follows:

- Provide a stable system of stream channels that neither aggrade nor degrade while maintaining dimension, pattern, and profile with the capacity to transport the watershed's water and sediment load;
- Improve the overall water quality and aquatic habitat by reducing sediment and waste inputs into the stream caused by bank erosion, mass-wasting, and stormwater runoff through stabilization of the stream channel and implementation of a stormwater wetland; and
- Improve the overall viability of the riparian vegetative communities through establishment of native species and elimination of invasive exotic species.

2.3 Project Structure, Restoration Type, and Approach

Prior to project implementation, flashy flood conditions associated with a highly impervious watershed and degraded riparian habitats resulted in unstable stream banks along the project reach.

Work on Cemetery Branch involved restoring a total of 1,014 linear feet of C stream type utilizing a Priority Level 3 approach (Rosgen 1997). The Priority Level 3 approach involved the reconstruction and installation of additional bankfull benches within the existing channel confines. The design for the Dye Branch reaches included a Priority Level 2 restoration of 2,671 linear feet of meandering C stream channel and associated floodplain. The Priority Level 2 approach involved the construction of a new channel and floodplain bench at the bankfull elevation. The restored channels of Cemetery Branch and Dye Branch were stabilized with in-stream structures, including cross vanes, j-hooks, and single arm rock vanes. These structures were designed to reduce bank erosion and provide grade control. The targeted re-vegetated communities included stream bank, riparian, and upland planting zones.

The project components and summations are reported in Tables 1a and 1b and illustrated in Figure 2 below.

Table 1a. Project Components Dye Branch II / Project No. 92255								
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Buffer Acres**	**BMP Elements**	**Comment**
Cemetery Branch	968 lf	R	P3	1,014 lf	0+00 - 10+14		Stormwater wetlands	
Dye Branch Upstream	1,772 lf	R	P2	1,500 lf	0+00 - 15+00		Stormwater wetlands	
Dye Branch Downstream	1,232 lf	R	P2	1,171 lf	16+00 - 27+71			

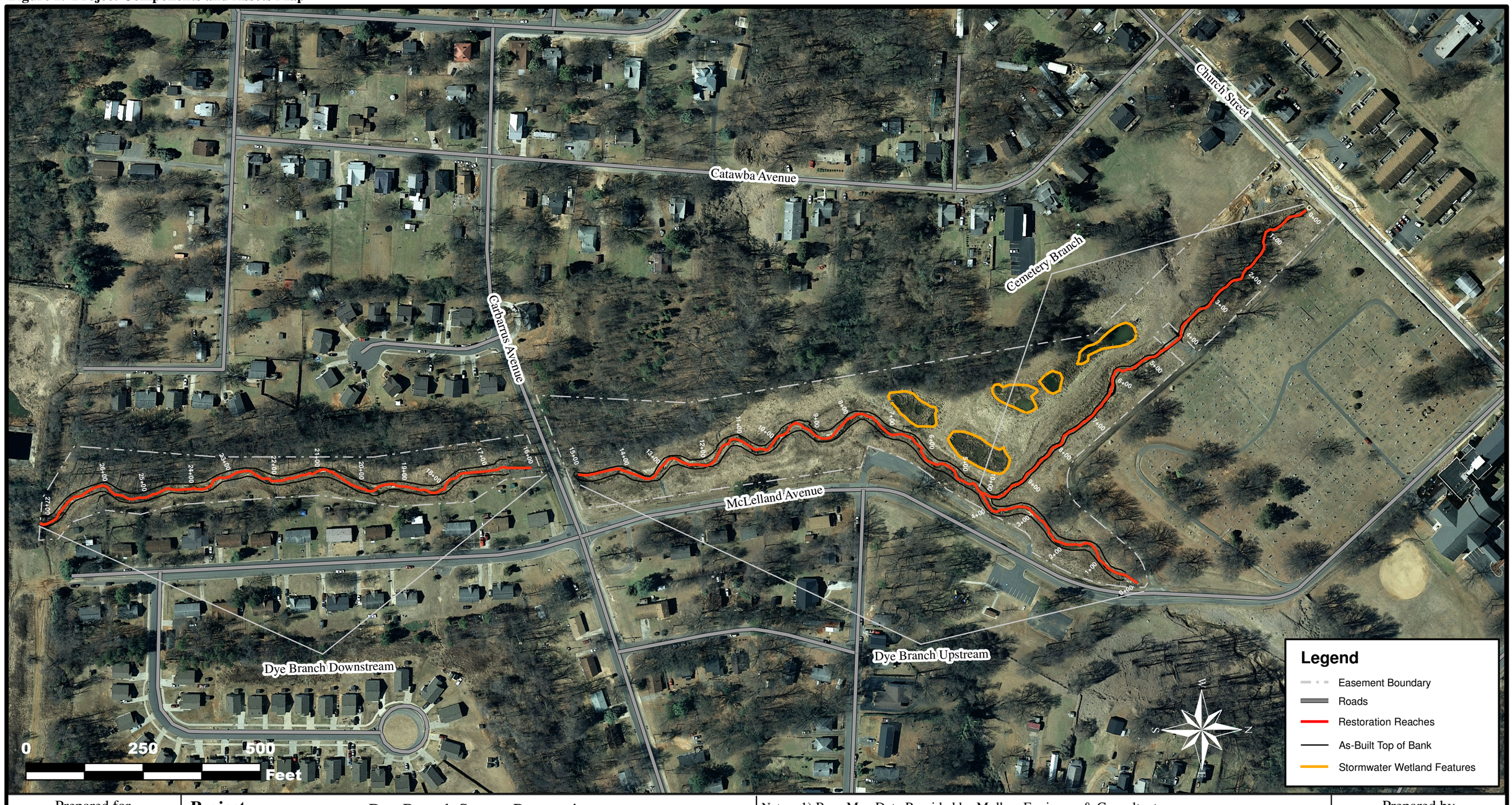
- Information unavailable

Non-Applicable

Table 1b. Component Summations Dye Branch II / Project No. 92255							
Restoration Level	**Stream (lf)**	**Riparian Wetland (Ac)**		**Non-Riparian (Ac)**	**Upland (Ac)**	**Buffer (Ac)**	**BMP**
		Riverine	**Non-Riverine**				
Restoration	3,685	0.0	0.0				
Enhancement		0.0	0.0				
Enhancement I	0						
Enhancement II	0						
Creation		0.0	0.0				
Preservation	0	0.0	0.0				
HQ Preservation	0	0.0	0.0				
		0.0	0.0				
Totals	**3,685**	**0**		**0**	**0**	**0**	**3**

Non-Applicable

Figure 2. Project Components and Assets Map



Prepared for Ecosystem Enhancement Program	**Project:** Dye Branch Stream Restoration Mitigation Plan Iredell County, North Carolina	Notes: 1) Base Map Data Provided by Mulkey Engineers & Consultants 2) 2010 Aerial Photo	Prepared by EQUINOX ENVIRONMENTAL CONSULTATION & DESIGN
	Sheet 1 of 1		
	Date	Project Number	
	October 2011	NCEEP # 92255	

2.4 Project History, Contacts, and Attribute Data

The NCEEP contracted Mulkey Inc. (Mulkey) to provide design and construction management services. The Restoration Plan was completed by Mulkey in October 2005 (NCEEP 2005). Due to extensive post-construction damage, the majority of the project site required repairs. Repairs were completed in December 2010 and baseline monitoring efforts were initiated. Two additional structure repairs occurred at the lower end of the project site during the summer of 2011. The baseline longitudinal profile and cross-section data were extracted from the contractors' as-built survey data set.

The project activity and reporting history are detailed in Table 2 below. Project personnel and contact information for the design and monitoring components is presented in Table 3. Table 4 presents background project attribute information for the site.

Table 2. Project Activity & Reporting History
Dye Branch II / Project No. 92255

Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	-	Oct 2005
Final Design - Construction Plans	-	April 2006
Final Design - Repair Plans	N/A	July 2010
Construction Repairs	N/A	Dec 2010
Temporary S&E mix applied	N/A	Summer 2010
Permanent seed mix applied	N/A	Summer 2010
Planting	N/A	Feb 2011
Mitigation Plan / As-built (Year 0 Monitoring - Baseline)	March 2011	Aug 2011
Year 1 Monitoring		
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

- Information unavailable.
N/A - Item does not apply.

Table 3. Project Contacts Dye Branch II / Project No. 92255	
Designer Primary Project Design POC	Mulkey Engineers & Consultants 6750 Tryon Road Cary NC, 27518 Emmett Perdue (919) 858-1874
Construction Contractor Construction Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Planting Contractor Planting Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Seeding Contractor Seeding Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Seed Mix Sources	Hanes Geo Components Winston-Salem, NC 27101
Nursery Stock Suppliers	North Carolina Forest Service Goldsboro, NC 27530
Monitoring Performers (Y0) - 2010	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Win Taylor (828) 253-6856
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y1) - 2011	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y2) - 2012	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y3) - 2013	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y4) - 2014	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y5) - 2015	
Stream Monitoring POC	
Vegetation Monitoring POC	

Table 4. Project Attributes Dye Branch II / Project No. 92255		
Project County	Iredell	
Physiographic Region	Piedmont	
Ecoregion	Southern Outer Piedmont	
River Basin	Yadkin - Pee Dee	
USGS HUC	03040105010010	
NCDWQ Sub-Basin	03-07-11	
Within Extent of EEP Watershed Plan	Upper Rocky River Local Watershed Plan	
WRC Class	Warm	
% of Project Easement Fenced or Demarcated	100%	
Beaver Activity Observed During Design Phase	No	
Restoration Component Attributes		
	Dye Branch	**Cemetery Branch**
Drainage Area (sq.mi.)	0.6	0.06
Stream Order	First / Second	First
Restored Length (feet)	2,671	1,014
Perennial or Intermittent	Perennial	Perennial
Watershed Type	Urban	
Watershed LULC Distribution		
Urban	85%	
Other	15%	
Watershed Impervious Cover	-	
NCDWQ AU/Index Number	13-17-2	
NCDWQ Classification	C	
303d Listed	Yes	
Upstream of 303d Listed Segment	Yes	
Reasons for 303d Listing or Stressor	Poor Bioclassification	
Total Acreage of Easement	12.0	
Total Vegetated Acreage within Easement	12.0	
Total Planted Acreage as Part of Restoration	8.9	
Rosgen Classification of Pre-Existing	E4 / G4c	E4
Rosgen Classification of As-Built	C	C
Valley Type	-	-
Valley Slope	0.0097 / 0.0125	0.0217
Valley Side Slope Range	-	-
Valley Toe Slope Range	-	-
Cowardin Classification	N/A	N/A
Trout Waters Designation	No	No
Species of Concern, Endangered, Etc.	None	
Dominant Soil Series and Characteristics		
Series	Chewacla / Cecil / Colfax	
Depth	-	-
Clay%	-	-
K	-	-
T	-	-

- Information unavailable.

N/A - Item does not apply.

3.0 SUCCESS CRITERIA

3.1 Morphometric Parameters and Channel Stability

Considering the typical 5-year timeframe for mitigation monitoring, the determination of success for stream projects is often based primarily on the degree of morphological stability. The complete absence of any change over these timeframes will certainly be interpreted as stability, but is not a pre-requisite. To the contrary, it is typical for streams to demonstrate variation over a 5-year monitoring period in the form of sustainable rates of change or stable patterns of variation (dynamic stability). Considering the young state of woody buffers and the fact that design parameters are estimates and therefore never a perfect match for the watershed regimes, restored streams typically adjust or shift to some extent after their exposure to varying flows in the years that immediately follow construction. However, these changes should be moderate and exhibit little discernable trends. Annual variation is to be expected, but over time and with buffer development should generally demonstrate a reduction in amplitude and demonstrate dynamic maintenance around some central tendency that represents acceptable distributions for design parameters and/or stable stream types. Key among these are parameters that indicate lateral and vertical stability and intended levels of floodplain connection. If some trends or patterns become evident, they should be modest or indicate migration toward another stable form. Lastly, all of this must be evaluated in the context of hydrologic events to which the system is exposed over the monitoring period.

3.1.1 Dimension

Dimensional stability will be based on comparisons of overlays of annual cross-section plots and their calculated parameters to the as-built conditions, design distributions, and distributions for stable stream types. Parameters such as cross-sectional area and the channel's width to depth ratio should demonstrate modest overall change and patterns of variation that are in keeping with above description of dynamic stability. The stream dimension should not demonstrate trends of enlargement either through downcutting or widening, however, modest year-to-year variation or oscillation in channel elevation or width demonstrating maintenance around baseline or design distributions is acceptable. Changes from depositional processes resulting in the development of constructive features on the banks and floodplain, such as an inner berm, channel narrowing, natural levees, and general floodplain deposition will be acceptable forms of change and indicative of stability.

The entire project will also be visually cataloged for areas of bank instability and represented as proportions of overall bank footage. The overall proportion, severity, spatial distribution, and temporal trends in this parameter will be assessed to serve as an additional indicator of dimensional stability. In general, stability proportions (stable bank/total bank) below 85% would be of concern. Considering temporal trends, a higher percentage in a given year may also be of concern if it represents a data point in a trend of decreasing stability. Instability dominated by surface scour versus mass wasting would be an example of differing severity and the latter would be more concerning than the former. Erosion in meanders versus riffle reaches would generate differing levels of concern because erosion in the former is more likely given greater bank shear stress, whereas instability concentrated in riffle/run reaches might be more indicative of an overall design flaw.

3.1.2 Pattern and Profile

Reach profiles should not exhibit any consistent trends in thalweg degradation over any significant continuous portion of its length. Some aggradation will be acceptable and will not be actionable unless it is apparently causal for widening/bank erosion. Over the monitoring period, the profile should also demonstrate the maintenance or development of bedform (facets) more in keeping with reference level diversity and distributions for the stream type in question. It should also provide a meaningful contrast in terms of bedform diversity against the pre-existing condition. Bedform distributions, riffle/pool lengths and slopes will vary, but should do so with maintenance around design/as-built size distributions. This requires that the majority of pools are maintained at greater depths with lower water surface slopes and riffles are shallower with greater water surface slopes.

3.1.3 Substrate

Pebble count data should indicate the progression towards or the maintenance of the known size distributions from the design phase. The absence of any significant trends in bed aggradation or deposition should represent stable conditions in terms of sediment input and transport functionality.

While stream projects are designed to transport bedload in equilibrium and carry overall sediment loads at bankfull, fines can be transported even at low discharges and upstream instability beyond design projections can also lead to deposition as storm events recede in areas of energy dissipation such as restoration reaches. This can have the effect of obscuring bedform and fining of riffles especially in the first few years after the implementation of a stream project. In many cases subsequent narrowing and reduction of width/depth ratios as a project develops/stabilizes can then increase transport efficiency and return bedform to intended distributions, but some fining can persist due to upstream disturbance.

3.2 Hydrology

A minimum of two bankfull events must occur within separate years during the five-year monitoring period.

3.3 Vegetation

The success of the riparian and wetland vegetation plantings will be determined by planted stem densities within established monitoring plots. Survival of planted woody species must meet a minimum survival success criterion of 320 planted stems per acre through year three and 260 stems per acre after year five.

4.0 MAINTENANCE AND CONTINGENCY PLAN

During annual monitoring efforts any potential constraints to project success criteria will be documented and reported. Maintenance recommendations will be based on the severity of the problem and in consultation with NCEEP. In the event that maintenance activities are deemed necessary, corrective measures will be documented within the annual reports.

5.0 PROJECT MONITORING AND AS-BUILT CONDITIONS

5.1 Feature Monitoring Details

Features established for baseline data collection and future annual monitoring purposes included stream cross-sectional and longitudinal profiles, substrate assessment sites, stream hydrological monitoring stations, vegetation monitoring plots, and photographic monitoring stations (Appendix A – Monitoring Plan View).

5.1.1 Stream

Ten permanent cross-sections were established throughout the project site. Cross-sections transecting two riffles and one pool were established on the Cemetery Branch and Dye Branch Downstream reaches. Cross-sections for the Dye Branch Upstream reach consist of three riffles and one pool. Cross-section locations were marked on both banks with rebar and PVC conduit with fluorescent pink flagging tape. Cross-section data will be collected annually to document changes in dimensions such as area, width to depth ratios, and entrenchment ratios.

Longitudinal profile monitoring reaches were established for 3,312 linear feet of restored channel. Cemetery Branch included 977 linear feet and Dye Branch included two reaches (Dye Branch Upstream and Dye Branch Downstream) for a total of 2,335 linear feet. The beginning and ending locations of the longitudinal profile reaches were marked on both banks with rebar and PVC conduit with blue flagging tape. Annual measurements will be compared with as-built conditions to document trends in the stream profile occurring throughout the monitoring period. A total station will be used to collect annual cross-sectional and longitudinal profile data. Visual monitoring will be conducted for all additional stream segments.

Bed material composition will be documented through annual pebble counts at each cross-section location.

5.1.2 Hydrology

One crest gauge was installed within the project site at the downstream end of Dye Branch. Additionally, an automatic pressure transducer was installed at the Cross-Section 10 location to record water level readings at 15 minute intervals. Crest gauge readings and pressure transducer data will be collected during each site visit to document flow events at the project site.

5.1.3 Vegetation

Eight riparian and upland vegetation monitoring plots were established based on the CVS-EEP protocol and include five standard 10 x 10 meter plots and three non-standard 5 x 20 meter plots.

Approximately 0.025-acre in size, vegetation plots were established and data was collected to document baseline vegetation conditions. Annual monitoring will determine the success of planted vegetation and the overall trajectory of woody plant restoration and regeneration at the project site. Plots were placed within the applicable planting zones to capture the heterogeneity of the designed vegetative communities. Vegetation monitoring plot corners were marked with t-posts and PVC conduit marked with fluorescent orange flagging tape. Additionally, the vegetation plot origin was labeled with the plot number. Planted stems were also marked with fluorescent orange flagging tape. Data for the baseline report were collected according to the CVS-EEP Level I protocol and entered into the CVS-EEP Data Entry Tool (Version 2.2.7). Subsequent annual monitoring data collections will follow Level II (Lee et al. 2008).

5.1.4 Permanent Photo Locations

Permanent photo stations were established at each cross-section to digitally document annual conditions of the left and right banks. Each vegetation monitoring plot includes a photo station taken diagonally from the origin towards the opposite plot corner. Additionally, nine permanent photo stations were established throughout the project area to provide representative digital documentation of stream features and vegetation conditions. Permanent photo stations were marked with labeled wooden stakes and red flagging tape.

5.1.5 Visual Assessment

Visual stream assessments will occur during annual monitoring to summarize performance percentages of morphological and structural feature categories. Visual vegetation assessments will occur to catalog the extent and type of vegetation issue areas as compared to the total planted acreage within the project site.

5.2 As-Built Conditions

The project's as-built conditions are included in Appendix B – As-built Plan View.

5.2.1 Streams

Baseline stream monitoring data were collected in December 2010. Data are summarized in Tables 5 and 6, while cross-section and longitudinal profile graphics are located in Appendices C and D. In general, the restored stream pattern was similar to the proposed design. The design Rosgen classification for Cemetery Branch was a C4 while the Dye Branch reaches were designed to meet the C5 channel classification criteria. Based on the as-built conditions, the Cemetery Branch reach classifies as a low sinuosity C type channel. The Dye Branch Upstream reach as-built data is indicative of a C stream type while the Dye Branch Downstream reach classifies as a C but having a very low width to depth ratio and low sinuosity for this stream type.

5.2.2 Vegetation

Baseline vegetation monitoring data were collected in March 2011. Vegetation plot attribute data are included in Tables 7 and 8, whereas individual plot photos are included in Appendix E. Individual plant species by plot and plot means are reported in Table 9. Stem counts for each of the eight vegetation monitoring plots were recorded by species.
Results from the baseline documentation indicate a planted stem density ranging from 364 to 688 stems per acre. The average stem density for the entire restoration site is 430 stems per acre; of

these, 34% were noted to have either good or excellent vigor values. In addition, invasive exotic plants such as Kudzu *Pueraria montana*, johnsongrass *Sorghum halepense*, Japanese honeysuckle *Lonicera japonica*, English ivy *Hedera helix*, Chinese privet *Ligustrum sinense*, and Chinese lespedeza *Lespedeza cuneata* were recorded at the project site.

5.2.3 Permanent Photo Stations

Photos were collected during December 2010 at the nine permanent photo stations established throughout the project area to provide representative digital documentation of baseline stream and vegetation conditions (Appendix F – Permanent Photo Station Photos). Pre-construction photos are included in Appendix F where available.

Table 5. Baseline Stream Data Summary
Dye Branch II / Project No. 92255 - Cemetery Branch (977 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	7.0	7.0	7.0	7.0	N/A	1	8.9	11.1	11.3	14.1	1.8	7	-	10.0	-	5.5	7.2	7.2	8.9	N/A	2
Floodprone Width (ft)				14.2	14.2	14.2	14.2	N/A	1	19.0	54.0	36.0	100.0	38.1	5	-	28.0	-	26.9	28.5	28.5	30.0	N/A	2
Bankfull Mean Depth (ft)	-	-	-	1.0	1.0	1.0	1.0	N/A	1	0.7	0.9	0.8	1.6	0.3	7	-	0.7	-	0.5	0.7	0.7	0.8	N/A	2
Bankfull Max Depth (ft)				1.5	1.5	1.5	1.5	N/A	1	1.0	1.5	1.3	2.4	0.5	7	0.8	1.1	1.6	1.0	1.2	1.2	1.4	N/A	2
Bankfull Cross Sectional Area (ft^2)	-			6.8	6.8	6.8	6.8	N/A	1	6.8	9.6	8.4	18.4	3.9	7	-	7.0	-	3.0	5.0	5.0	7.0	N/A	2
Width/Depth Ratio				7.2	7.2	7.2	7.2	N/A	1	6.9	11.2	11.7	15.0	NA	3	-	14.3	-	10.3	10.8	10.8	11.2	N/A	2
Entrenchment Ratio				2.0	2.0	2.0	2.0	N/A	1	3.8	6.8	7.7	8.9	NA	3	-	2.8	-	3.0	4.2	4.2	5.4	N/A	2
Bank Height Ratio				1.5	1.5	1.5	1.5	N/A	1	1.0	1.1	1.0	1.2	NA	3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	2
d50 (mm)				-	2.0	-	-	-	-	1	3.5	3.5	6	-	-	-	2.0	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	23.4	19.5	53.9	14.84	14
Riffle Slope (ft/ft)				0.012	0.034	-	0.088	-	-	0.006	0.027	0.026	0.052	0.016	6	-	0.048	-	0.004	0.023	0.022	0.049	0.01	14
Pool Length (ft)				4.7	8.2	-	11.9	-	-	3.5	19.3	19.6	32.8	11.5	6	13.8	20.7	27.6	5.8	16.2	16.9	39.1	7.17	24
Pool Max Depth (ft)				-	2.6	-		-	-	1.8	2.6	2.9	3.2	0.5	7	-	2.0	-	1.8	3.0	2.9	3.7	0.48	18
Pool Spacing (ft)				22.8	86.0	-	228.2	-	-	18.0	52.7	40.2	140.8	41.7	7	18.4	27.6	32.2	4.5	38.7	36.4	111.0	24.40	24
Pool Volume (ft^3)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																								
Channel Belt Width (ft)				5.3	10.8	-	22.6	-	-	26.0	49.1	40.0	119.0	29.8	9	23.0	32.2	41.4	11.3	30.6	37.0	46.7	12.3	16
Radius of Curvature (ft)				3.9	19.6	-	37.0	-	-	5.0	23.8	22.0	48.0	14.6	9	18.4	27.6	36.8	8.3	13.7	12.0	29.9	5.7	16
Rc: Bankfull Width (ft)				0.6	2.8	-	5.3	-	-	0.6	2.1	1.8	4.3	1.3	9	1.8	2.8	3.7	2.4	2.4	2.4	2.4	N/A	1
Meander Wavelength (ft)				13.6	42.0	-	71.0	-	-	26.0	72.9	69.0	155.0	47.6	9	46.0	55.2	64.4	38.8	77.4	79.1	167.0	36.1	11
Meander Width Ratio				0.8	1.5	-	3.2	-	-	2.5	4.7	3.6	10.1	2.7	7	2.3	3.2	4.1	4.9	6.6	6.6	8.2	N/A	2
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									35% / 4% / 42% / 13% / 7%					
SC% / Sa% / G% / C% / B% / Be%				-						-														
d16 / D35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				0.9 / 1.2 / 2.0 / 8.0 / 10.1 / 88.9 / -						0.21 / 0.5 / 3.5 / 13.9 / 26.6 / 45.0 / -														
Reach Shear Stress (Competency) lb/ft^2				-						-						-			-					
Max Part Size (mm) Mobilized at Bankfull				45 - 180						-						-			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				0.06						0.25 - 0.28														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				E4						E4 / C4 / C5						C4			C					
Bankfull Velocity (fps)	-			6.6 - 7.8						4.1 - 7.0						5.5 - 6.7								
Bankfull Discharge (cfs)	-			44.3 - 52.8						35.0 - 128.1						38.4 - 46.6								
Valley Length (ft)				-						-						-								
Channel Thalweg Length (ft)				-						-						-			977					
Sinuosity				1.14						1.15 - 2.22						1.14			1.08					
Water Surface Slope (ft/ft)				0.0190						0.0057 - 0.0130						0.0190			-					
Bankfull Slope (ft/ft)				-						-						-			0.0191					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				51.3 - Extreme						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 5. Baseline Stream Data Summary
Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,465 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data UT to Ostin Creek						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	-	11.2	-	-	-	-	16.0	18.5	-	20.6	-	-	-	20.1	-	25.7	28.4	26.9	32.7	N/A	3
Floodprone Width (ft)				-	89.5	-	-	-	-	67.2	70.2	-	72.8	-	-	70.9	76.9	88.8	54.4	64.9	58.6	81.8	N/A	3
Bankfull Mean Depth (ft)	-	-	-	-	1.6	-	-	-	-	1.6	1.6	-	1.7	-	-		1.5		1.1	1.3	1.3	1.4	N/A	3
Bankfull Max Depth (ft)				-	2.8	-	-	-	-	1.5	1.9	-	2.4	-	-	1.5	1.8	2.2	2.2	2.8	2.5	3.6	N/A	3
Bankfull Cross Sectional Area (ft^2)		-		18.1	20.2	19.7	22.9	NA	3	27.4	30.3	-	33.4	-	-		31.0		29.5	36.3	32.5	46.9	N/A	3
Width/Depth Ratio				6.2	7.0	7.0	7.9	NA	3	9.3	11.4	-	12.7	-	-		13.0		20.3	22.6	22.8	24.6	N/A	3
Entrenchment Ratio				>3.2	>4.4	>5.0	>5.0	NA	3	3.5	3.8	-	4.4	-	-	3.5	3.8	4.4	2.0	2.3	2.3	2.5	N/A	3
Bank Height Ratio				-	1.0	-	-	-	-	1.0	1.2	-	1.4	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	3
d50 (mm)				-	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	6.1	17.6	-	30.2	-	-	6.6	19.1	32.7	20.1	51.6	47.1	97	29.5	8
Riffle Slope (ft/ft)				0.002	0.014	-	0.042	-	-	0.006	0.028	-	0.066	-	-	0.007	0.030	0.070	0.002	0.006	0.005	0.016	0.005	8
Pool Length (ft)				-	-	-	-	-	-	18.3	35.1	-	62.9	-	-	19.9	38.1	68.1	8.76	24.6	22.4	66.4	13	20
Pool Max Depth (ft)				-	-	-	-	-	-	2.2	2.9	-	3.3	-	-	2.1	2.7	3.1	2.1	3.44	3.61	4.48	0.67	20
Pool Spacing (ft)				-	-	-	-	-	-	50.3	78.9	-	105.8	-	-	54.5	85.5	114.7	24.1	66.8	65.3	125	28.6	19
Pool Volume (ft^3)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																								
Channel Belt Width (ft)				6.6	24.3	-	56.9	-	-	36.0	67.0	-	150.0	-	-	39.0	72.6	162.6	28.5	45.0	48.4	54.1	8.34	17
Radius of Curvature (ft)				14.5	52.4	-	148.8	-	-	19.0	49.0	-	115.0	-	-	20.6	53.1	124.6	23.6	31.3	31.2	39.6	4.75	14
Rc: Bankfull Width (ft)				1.3	4.7	-	13.3	-	-	1.0	2.7	-	6.2	-	-	1.0	2.7	6.2	2.3	2.3	2.3	2.3	N/A	1
Meander Wavelength (ft)				40.1	79.7	-	172.7	-	-	33.0	94.0	-	155.0	-	-	35.8	102	168.0	100.5	130.0	138.2	153.3	18.2	12
Meander Width Ratio				0.6	2.2	-	5.1	-	-	1.9	3.6	-	8.1	-	-	1.9	3.6	8.1	1.7	1.9	1.9	2.1	0.21	3
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%							-						-								28% / 15% / 34% / 20% / 3%			
SC% / Sa% / G% / C% / B% / Be%							-						-											
d16 / D35 / d50 / d84 / d95 / di^p / di^{sp} (mm)							0.15 / 0.4 / 3.3 / 10.3 / 13.7 / 45.7 / -						-											
Reach Shear Stress (Competency) lb/ft^2							-						-				-				-			
Max Part Size (mm) Mobilized at Bankfull							30 - 100						-				-				-			
Stream Power (Transport Capacity) W/m^2							-						-				-							
Additional Reach Parameters																								
Drainage Area (mi^2)							0.6						0.9											
Impervious Cover Estimate (%)							-						-											
Rosgen Classification							E4						C4				C5				C			
Bankfull Velocity (fps)		-					6.2 - 6.9						4.2				3.5							
Bankfull Discharge (cfs)		-					112.2 - 124.8						128				110							
Valley Length (ft)							-						-				-							
Channel Thalweg Length (ft)							-						-				-				1,465			
Sinuosity							1.21						1.46				1.09				1.15			
Water Surface Slope (ft/ft)							0.0080						0.0090				0.0095				-			
Bankfull Slope (ft/ft)							-						-				-				0.0091			
Bankfull Floodplain Area (acres)							-						-				-							
Proportion Over Wide (%)							-						-											
Entrenchment Class (ER Range)							-						-											
Incision Class (BHR Range)							-						-											
BEHI							57.5 - Extreme						-											
Channel Stability or Habitat Metric							-						-											
Biological or Other							-						-											

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 5. Baseline Stream Data Summary
Dye Branch II / Project No. 92255 - Dye Branch-Downstream (870 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data UT to Ostin Creek						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	14.8	14.8	14.8	14.8	NA	1	16.0	18.5	-	20.6	-	-	-	20.1	-	18.4	18.6	18.6	18.8	N/A	3
Floodprone Width (ft)				22.0	22.0	22.0	22.0	NA	1	67.2	70.2	-	72.8	-	-	70.9	76.9	88.8	48.7	61.8	61.8	74.8	N/A	3
Bankfull Mean Depth (ft)	-	-	-	1.2	1.2	1.2	1.2	NA	1	1.6	1.6	-	1.7	-	-		1.5		1.9	2.0	2.0	2.0	N/A	3
Bankfull Max Depth (ft)				2.4	2.4	2.4	2.4	NA	1	1.5	1.9	-	2.4	-	-	1.5	1.8	2.2	2.9	3.0	3.0	3.1	N/A	3
Bankfull Cross Sectional Area (ft^2)		-		17.4	17.4	17.4	2.4	NA	1	27.4	30.3	-	33.4	-	-		31.0		34.0	36.1	36.1	38.1	N/A	3
Width/Depth Ratio				12.5	12.5	12.5	2.4	NA	1	9.3	11.4	-	12.7	-	-		13.0		9.3	9.6	9.6	9.9	N/A	3
Entrenchment Ratio				1.5	1.5	1.5	2.4	NA	1	3.5	3.8	-	4.4	-	-	3.5	3.8	4.4	2.7	3.4	3.4	4.0	N/A	3
Bank Height Ratio				4.9	4.9	4.9	2.4	NA	1	1.0	1.2	-	1.4	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	3
d50 (mm)				-	0.56	-	2.4	-	1	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	6.1	17.6	-	30.2	-	-	6.6	19.1	32.7	15.7	50.3	55.7	79.3	20.2	7
Riffle Slope (ft/ft)				0.003	0.021	-	0.121	-	-	0.006	0.028	-	0.066	-	-	0.007	0.030	0.070	0.001	0.006	0.006	0.014	0.004	7
Pool Length (ft)				2.9	24.8	-	120	-	-	18.3	35.1	-	62.9	-	-	19.9	38.1	68.1	10.1	19.9	15.9	39.6	8.91	14
Pool Max Depth (ft)				-	3.1	-	-	-	-	2.2	2.9	-	3.3	-	-	2.1	2.7	3.1	3.3	3.91	3.77	5.05	0.59	12
Pool Spacing (ft)				79.0	162.0	-	261.0	-	-	50.3	78.9	-	105.8	-	-	54.5	85.5	114.7	15.3	57.5	38.8	130	41.5	14
Pool Volume (ft^3)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																								
Channel Belt Width (ft)				15.6	30.6	-	67.7	-	-	36.0	67.0	-	150.0	-	-	39.0	72.6	162.6	28.3	49.2	57.5	65.4	15.4	9
Radius of Curvature (ft)				11.0	42.1	-	81.9	-	-	19.0	49.0	-	115.0	-	-	20.6	53.1	124.6	32.7	40.7	42.2	50.1	5.6	7
Rc: Bankfull Width (ft)				0.7	2.9	-	5.6	-	-	1.0	2.7	-	6.2	-	-	1.0	2.7	6.2	1.7	1.7	1.7	1.7	N/A	1
Meander Wavelength (ft)				62.0	103.0	-	157	-	-	33.0	94.0	-	155.0	-	-	35.8	102	168.0	138.9	162.2	157.3	210.5	27.2	6
Meander Width Ratio				1.1	2.1	-	4.6	-	-	1.9	3.6	-	8.1	-	-	1.9	3.6	8.1	2.4	2.8	2.8	3.1	0.51	2
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%							-						-								43% / 6% / 34% / 13% / 3%			
SC% / Sa% / G% / C% / B% / Be%							-						-											
d16 / D35 / d50 / d84 / d95 / di^p / di^{sp} (mm)							0.15 / 0.28 / 0.56 / 10.7 / 13.0 / 45.7 / -						-											
Reach Shear Stress (Competency) lb/ft^2							-						-				-				-			
Max Part Size (mm) Mobilized at Bankfull							30 - 100						-				-				-			
Stream Power (Transport Capacity) W/m^2							-						-				-							
Additional Reach Parameters																								
Drainage Area (mi^2)							0.6						0.9											
Impervious Cover Estimate (%)							-						-											
Rosgen Classification							G4c						C4				C5				C			
Bankfull Velocity (fps)		-					6.1 - 7.2						4.2				3.5							
Bankfull Discharge (cfs)		-					105.4 - 126.0						128				110							
Valley Length (ft)							-						-				-							
Channel Thalweg Length (ft)							-						-				-				870			
Sinuosity							1.14						1.46				1.09				1.10			
Water Surface Slope (ft/ft)							0.0110						0.0090				0.0095				-			
Bankfull Slope (ft/ft)							-						-				-				0.0106			
Bankfull Floodplain Area (acres)							-						-				-							
Proportion Over Wide (%)							-						-											
Entrenchment Class (ER Range)							-						-											
Incision Class (BHR Range)							-						-											
BEHI							56.7 - Extreme						-											
Channel Stability or Habitat Metric							-						-											
Biological or Other							-						-											

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 6. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Cemetery Branch (977 Feet)																		
Parameter	**Cross Section 1 Pool**						**Cross Section 2 Riffle**						**Cross Section 3 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Bankfull Width (ft)	9.7						8.9						5.5					
Floodprone Width (ft)	>50						26.9						>30					
Bankfull Mean Depth (ft)	1.9						0.8						0.5					
Bankfull Max Depth (ft)	3.1						1.4						1.0					
Bankfull Cross Sectional Area (ft^2)	18.9						7.0						3.0					
Bankfull Width/Depth Ratio	5.0						11.2						10.3					
Bankfull Entrenchment Ratio	>5.1						3.0						>5.4					
Bankfull Bank Height Ratio	1.0						1.0						1.0					
Cross Sectional Area between End Pins (ft^2)	18.9						7.0						3.0					
d50 (mm)	N/A						N/A						N/A					

N/A - Item does not apply.

Table 6. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,465 Feet)																								
Parameter	**Cross Section 4 Riffle**						**Cross Section 5 Pool**						**Cross Section 6 Riffle**						**Cross Section 7 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Bankfull Width (ft)	25.7						17.1						32.7						26.9					
Floodprone Width (ft)	58.6						>50						81.8						54.4					
Bankfull Mean Depth (ft)	1.3						1.7						1.4						1.1					
Bankfull Max Depth (ft)	2.5						3.4						3.6						2.2					
Bankfull Cross Sectional Area (ft^2)	32.5						28.8						46.9						29.5					
Bankfull Width/Depth Ratio	20.3						10.2						22.8						24.6					
Bankfull Entrenchment Ratio	2.3						>2.9						2.5						2.0					
Bankfull Bank Height Ratio	1.0						1.0						1.0						1.0					
Cross Sectional Area between End Pins (ft^2)	32.5						28.8						46.9						29.5					
d50 (mm)	N/A						N/A						N/A						N/A					

N/A - Item does not apply.

Table 6. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Downstream (870 Feet)																		
Parameter	**Cross Section 8 Riffle**						**Cross Section 9 Pool**						**Cross Section 10 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Bankfull Width (ft)	18.8						26.3						18.4					
Floodprone Width (ft)	74.8						>70						48.7					
Bankfull Mean Depth (ft)	2.0						1.8						1.9					
Bankfull Max Depth (ft)	3.1						3.5						2.9					
Bankfull Cross Sectional Area (ft^2)	38.1						48.4						34.0					
Bankfull Width/Depth Ratio	9.3						14.3						9.9					
Bankfull Entrenchment Ratio	4.0						>2.7						2.7					
Bankfull Bank Height Ratio	1.0						1.0						1.0					
Cross Sectional Area between End Pins (ft^2)	38.1						48.4						34.0					
d50 (mm)	N/A						N/A						N/A					

N/A - Item does not apply.

Table 7. Vegetation Plot Attribute Data Dye Branch II / Project No. 92255				
Plot ID	**Community Type**	**Planting Zone ID**	**Reach ID**	**CVS Level**
VP 1	Upland	3	Cemetery Branch	I
VP 2	Riparian	2	Cemetery Branch	I
VP 3	Upland	3	Dye Branch - Upstream	I
VP 4	Upland	3	Dye Branch - Upstream	I
VP 5	Upland	3	Dye Branch - Upstream	I
VP 6	Riparian	2	Dye Branch - Downstream	I
VP 7	Upland	3	Dye Branch - Downstream	I
VP 8	Upland	3	Dye Branch - Downstream	I

Table 8. CVS Vegetation Plot Metadata Dye Branch II / Project No. 92255	
Report Prepared By	Kevin Mitchell
Date Prepared	3/16/2011 15:57
Database Name	Equinox-2011-A-DyeBranch.mdb
Database Location	Z:\ES\NRI&M\EEP Monitoring\Dye Branch\DB-MY0-2010\Data\Veg
Computer Name	D16TNK71
File Size	49872896
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project 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 Species	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 Species	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Species	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY	
Project Code	92255
Project Name	Dye Branch
Description	
River Basin	Yadkin-Pee Dee
Length(ft)	
Stream-to-Edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	
Sampled Plots	8

Table 9. Planted and Total Stem Counts (Species by Plot with Annual Means)
Dye Branch II / Project No. 92255

Scientific Name	Common Name	Species Type	Current Plot Data (MY0 2011)																								Annual Means		
			92255-VP1			92255-VP2			92255-VP3			92255-VP4			92255-VP5			92255-VP6			92255-VP7			92255-VP8			MY0 (2011)		
			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
Carya alba	Mockernut hickory	Tree										1	1	1													1	1	1
Cercis canadensis	Eastern redbud	Tree										1	1	1	1	1	1										2	2	2
Fraxinus pennsylvanica	Green ash	Tree				4	4	4																			4	4	4
Juglans nigra	Black walnut	Tree										1	1	1													1	1	1
Juniperus virginiana	Eastern redcedar	Tree	3	3	3							1	1	1	5	5	5							4	4	4	13	13	13
Liriodendron tulipifera	Tuliptree	Tree				2	2	2				1	1	1				4	4	4	1	1	1				8	8	8
Pinus virginiana	Virginia pine	Tree	3	3	3	5	5	5	3	3	3	1	1	1	2	2	2							5	5	5	19	19	19
Platanus occidentalis	American sycamore	Tree	1	1	1																						1	1	1
Quercus	Oak species	Tree	2	2	2	3	3	3	1	1	1	2	2	2	1	1	1	6	6	6	4	4	4				19	19	19
Quercus falcata	Southern red oak	Tree				2	2	2																			2	2	2
Quercus nigra	Water oak	Tree							2	2	2																2	2	2
Quercus phellos	Willow oak	Tree							1	1	1							1	1	1	2	2	2				4	4	4
Unknown		Unknown				1	1	1	4	4	4	1	1	1							3	3	3				9	9	9
		Stem Count	9	9	9	17	17	17	11	11	11	9	9	9	9	9	9	11	11	11	10	10	10	9	9	9	85	85	85
		Size (ares)	1			1			1			1			1			1			1			1			8		
		Size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20		
		Species Count	4	4	4	6	6	6	5	5	5	8	8	8	4	4	4	3	3	3	4	4	4	2	2	2	13	13	13
		Stems per ACRE	364	364	364	688	688	688	445	445	445	364	364	364	364	364	364	445	445	445	405	405	405	364	364	364	430	430	430

6.0 REFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2.

NCEEP (North Carolina Ecosystem Enhancement Program). October 2005. Dye Branch Stream Restoration Plan. Town of Mooresville Iredell County, North Carolina. Raleigh, NC.

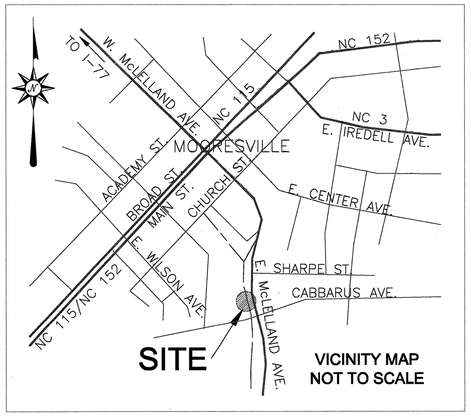
Rosgen, D.L. 1997. A Geomorphological Approach to Restoration of Incised Rivers. In: Wang, S.S.Y, E.J. Langendoen, and F.D. Shields, Jr. (Eds.). Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision. pp. 12-22.

Appendix A
Monitoring Plan View

Monitoring Plan View

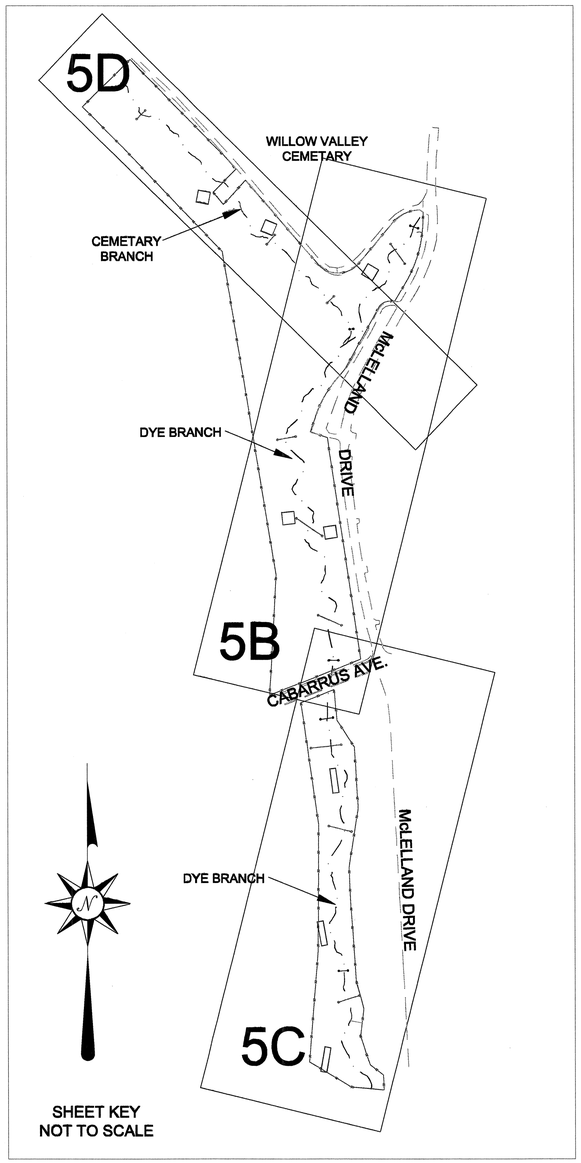
Prepared for	**Project:** Dye Branch Stream Restoration Monitoring Plan View Iredell County, North Carolina	Notes: 1) Base Map Data Provided by Mulkey Engineers & Consultants 2) 2010 Aerial Photo	Prepared by
	Sheet 1 of 1		
	Date	Project Number	
	August 2011	NCEEP # 92255	

Appendix B
As-Built Plan View



VICINITY MAP
NOT TO SCALE

AS-BUILT SURVEY OF
DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION
SCO# 04-06242-03A
IREDELL COUNTY



SHEET KEY
NOT TO SCALE

REFERENCES:

OWNER:
NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM
1652 MAIL SERVICE CENTER
RALEIGH, NC 27099-1652
(919)715-0476
EEP PROJ. MGR.: DEBORAH A. DANIEL
EEP REVIEW COORDINATOR: ED HAJNOS

CONTRACTOR:
FLUVIAL SOLUTIONS, INC.
RALEIGH, NC
(919)821-4300

DESIGNER:
MULKEY ENGINEERS & CONSULTANTS, INC.
CARY, NC
(919)851-1912

GENERAL NOTES

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. THE VERTICAL DATUM IS NAVD 88.
3. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83 DATUM.
4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
5. ALL CROSS-SECTIONS ARE FROM LEFT BANK TO RIGHT BANK (FACING DOWNSTREAM).
6. CONTROL DATA SHOWN TAKEN FROM EXISTING CONDITIONS SURVEY PROVIDED BY DESIGNER & VERIFIED DURING CONSTRUCTION & AS-BUILT SURVEYS.
7. IRON REBAR WITH CAP SET IN CONCRETE AT EACH END OF CROSS-SECTIONS AND ON BOTH SIDES OF STREAM AT LONG PRO BEGIN & END STATIONS. T-POSTS WITH PVC PIPE SET NEXT TO REBAR. (END LP3 SUBJECT TO CHANGE FOR MONITORING)
8. VEGETATION PLOTS SET WITH T-POSTS & PVC PIPE SET AT EACH CORNER. (SUBJECT TO CHANGE FOR MONITORING)

I, ELISABETH G. TURNER, CERTIFY THAT THESE PLANS WERE DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION AND THAT THE RATIO OF PRECISION AS CALCULATED IS 1: 10,000 +. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 12th DAY OF MAY, 2011.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 12th DAY OF MAY, 2011.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

SHEET INDEX

REVISIONS, DATE AND INITIAL:

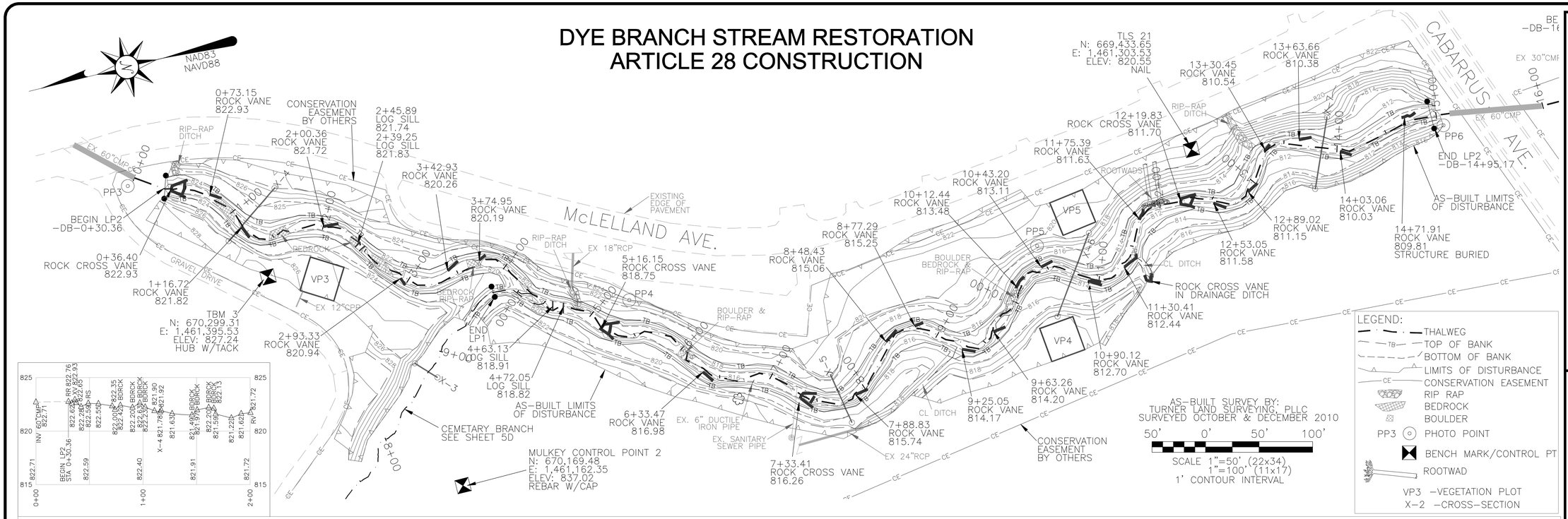
TURNER LAND SURVEYING, PLLC
3201 Glenridge Drive, Raleigh, NC 27604 -- (919)875-1378
P-0702 -- Llurner921@nc.rr.com -- Dlurner119@nc.rr.com
www.TURNERLANDSURVEYING.com

TITLE

AS-BUILT SURVEY OF
DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION SCO# 04-06242-03A
IREDELL COUNTY NORTH CAROLINA
MOORESVILLE

DATE:	12/20/2010
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-10-011
FILE:	DYE BRANCH STREAM RESTORATION ARTICLE 28 CONSTRUCTION_ D090348-1_AB_TLS_F
SCALE:	AS SHOWN
SHEET	5A

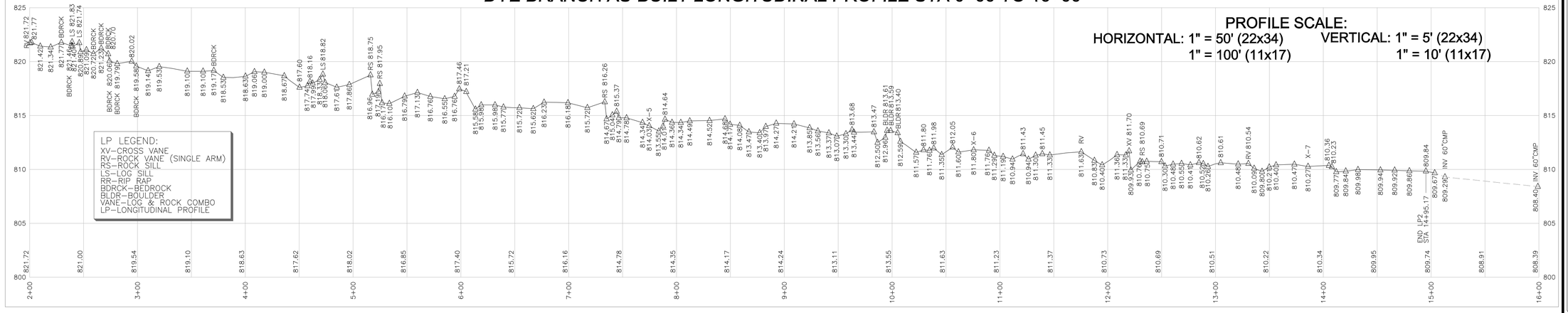
DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION



DYE BRANCH AS-BUILT LONGITUDINAL PROFILE STA 0+00 TO 16+00

PROFILE SCALE:
HORIZONTAL: 1" = 50' (22x34) 1" = 100' (11x17)
VERTICAL: 1" = 5' (22x34) 1" = 10' (11x17)

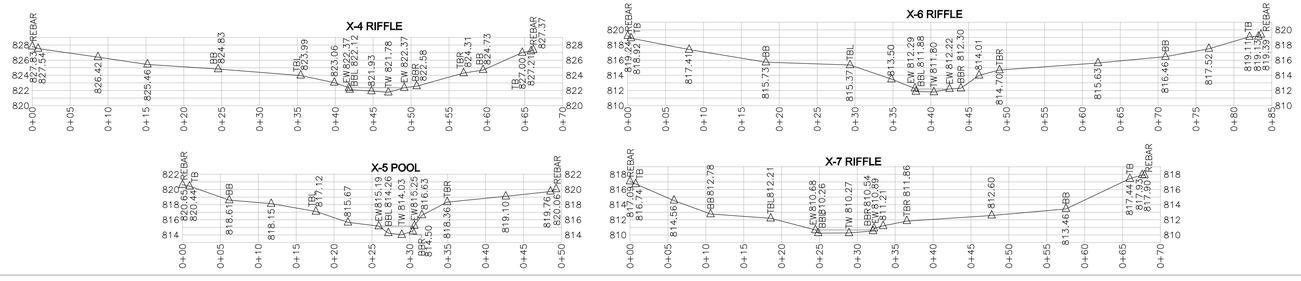
LP LEGEND:
XV-CROSS VANE
RV-ROCK VANE (SINGLE ARM)
RS-ROCK SILL
LS-LOG SILL
RR-RIP RAP
BDRCK-BEDROCK
BLDR-BOULDER
VANE-LOG & ROCK COMBO
LP-LONGITUDINAL PROFILE



CROSS SECTIONS 4-7

CROSS SECTION LEGEND:
TW-THALWEG
TB-TOP OF BANK
BB-BOTTOM OF BANK
TBL-TOP OF LEFT CHANNEL BANK
TBR-TOP OF RIGHT CHANNEL BANK
BBL-BOTTOM OF LEFT CHANNEL BANK
BBR-BOTTOM OF RIGHT CHANNEL BANK
EW-EDGE OF WATER

CROSS-SECTION SCALE:
HORIZONTAL: 1" = 10' (22x34)
1" = 20' (11x17)
VERTICAL: 1" = 10' (22x34)
1" = 20' (11x17)



NOTES

1. SEE SHEET 5A FOR GENERAL NOTES.
2. FOUR (4) PAGE DOCUMENT IS NOT VALID WITHOUT SHEET 5A (TITLE).

REVISIONS, DATE AND INITIAL:

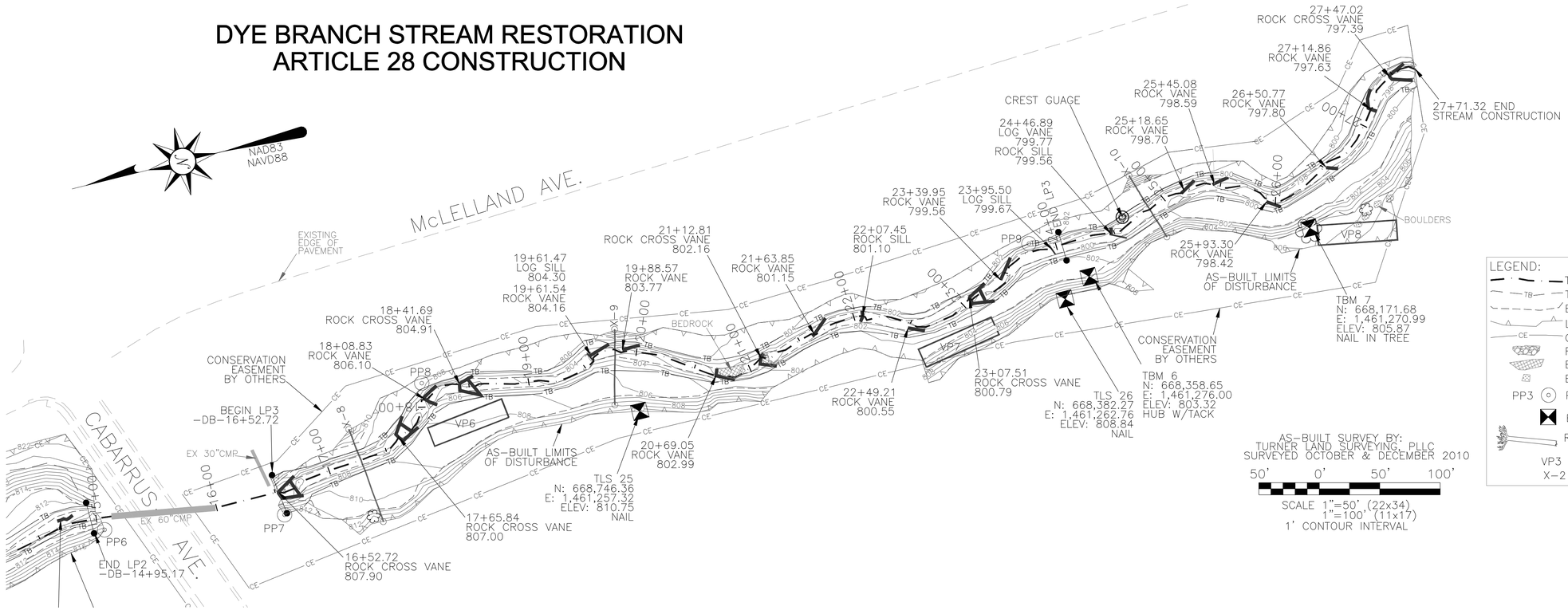
TURNER LAND SURVEYING, PLLC
3201 Glenridge Drive, Raleigh, NC 27604 – (919)875-1378
P-0702 – Lturner921@nc.rr.com – Dturner119@nc.rr.com
www.TURNERLANDSURVEYING.com

DYE BRANCH PLAN VIEW & PROFILE STA 0+00 TO 16+00

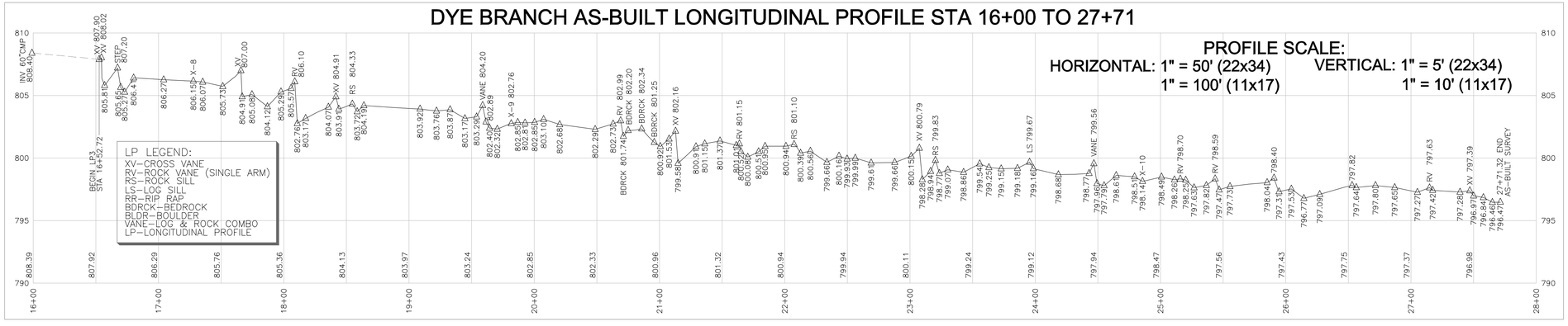
AS-BUILT SURVEY OF
DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION SCO# 04-06242-03A
IREDELL COUNTY
MOORESVILLE NORTH CAROLINA

DATE:	12/20/2010
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-10-011
FILE:	DYE BRANCH STREAM RESTORATION ARTICLE 28 CONSTRUCTION_ D090345-1_AB_TLS_F
SCALE:	AS SHOWN
SHEET	5B

DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION



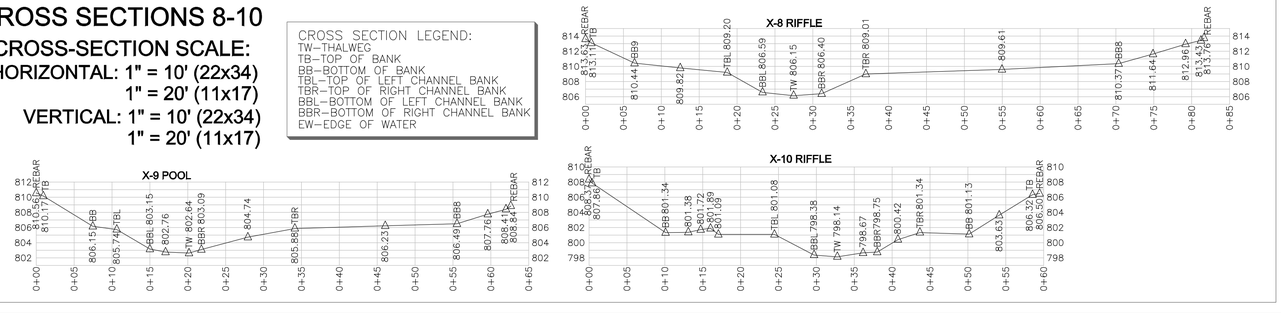
DYE BRANCH AS-BUILT LONGITUDINAL PROFILE STA 16+00 TO 27+71



CROSS SECTIONS 8-10

CROSS-SECTION SCALE:
HORIZONTAL: 1" = 10' (22x34)
1" = 20' (11x17)
VERTICAL: 1" = 10' (22x34)
1" = 20' (11x17)

CROSS SECTION LEGEND:
TW-THALWEG
TB-TOP OF BANK
BB-BOTTOM OF BANK
TBL-TOP OF LEFT CHANNEL BANK
TBR-TOP OF RIGHT CHANNEL BANK
BBL-BOTTOM OF LEFT CHANNEL BANK
BBR-BOTTOM OF RIGHT CHANNEL BANK
EW-EDGE OF WATER



NOTES

1. SEE SHEET 5A FOR GENERAL NOTES.
2. FOUR (4) PAGE DOCUMENT IS NOT VALID WITHOUT SHEET 5A (TITLE).

REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING, PLLC
3201 Glenridge Drive, Raleigh, NC 27604 – (919)875-1378
P-0702 – Lturner921@nc.rr.com – Dturner119@nc.rr.com
www.TURNERLANDSURVEYING.com

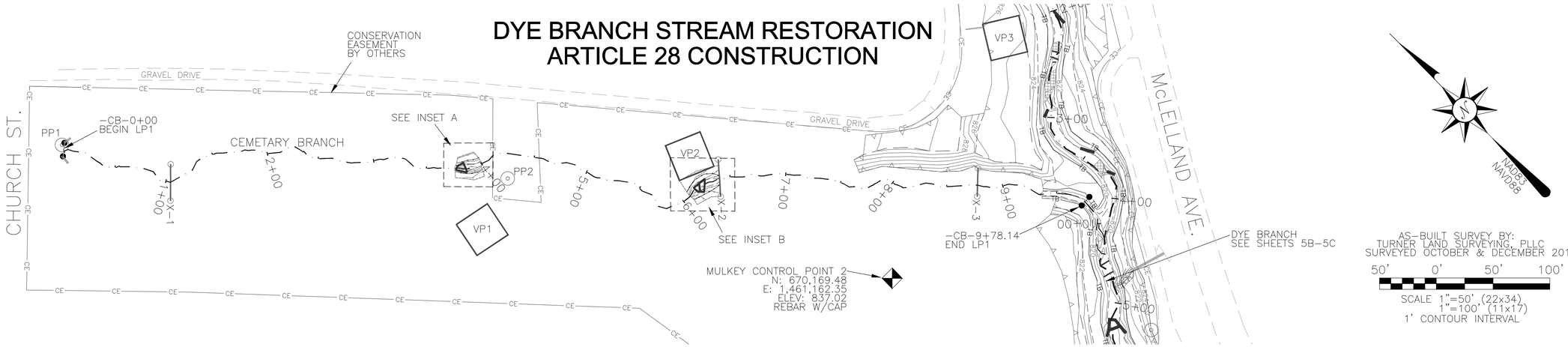
DYE BRANCH PLAN VIEW & PROFILE STA 16+00 TO 27+71

AS-BUILT SURVEY OF
DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION SCO# 04-06242-03A
MOORESVILLE IREDELL COUNTY NORTH CAROLINA

DATE: 12/20/2010
SURVEYED BY: DST/EGT
DRAWN BY: DST/EGT
REVIEWED BY: DST/EGT
PROJECT: TLS-10-011
FILE: DYE BRANCH STREAM RESTORATION ARTICLE 28 CONSTRUCTION_ D090345-1_AB_TLS_F
SCALE: AS SHOWN

SHEET 5C

DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION



AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED OCTOBER & DECEMBER 2010

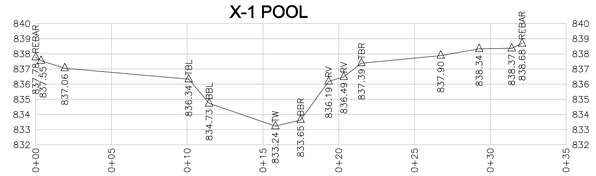
50' 0' 50' 100'
SCALE 1"=50' (22x34)
1"=100' (11x17)
1' CONTOUR INTERVAL

CROSS SECTIONS 1-3

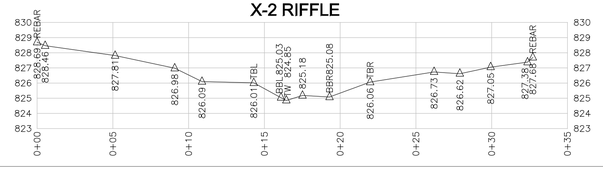
CROSS-SECTION SCALE:
HORIZONTAL: 1" = 5' (22x34)
1" = 10' (11x17)
VERTICAL: 1" = 5' (22x34)
1" = 10' (11x17)

CROSS SECTION LEGEND:
TW–THALWEG
TB–TOP OF BANK
BB–BOTTOM OF BANK
TBL–TOP OF LEFT CHANNEL BANK
TBR–TOP OF RIGHT CHANNEL BANK
BBL–BOTTOM OF LEFT CHANNEL BANK
BBR–BOTTOM OF RIGHT CHANNEL BANK
EW–EDGE OF WATER

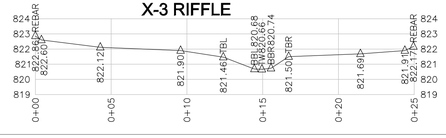
X-1 POOL



X-2 RIFFLE

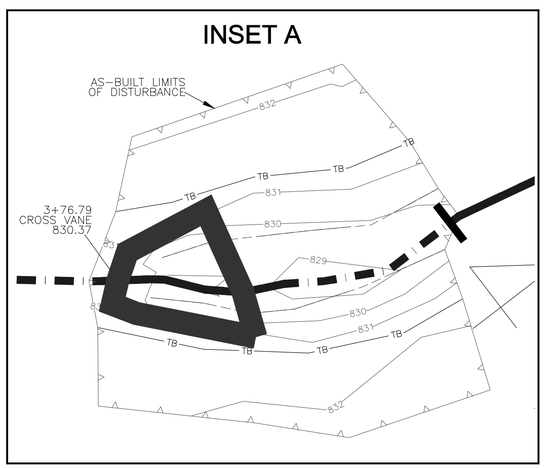


X-3 RIFFLE



LEGEND:
- THALWEG
- TB — TOP OF BANK
- BOTTOM OF BANK
- LIMITS OF DISTURBANCE
- CE — CONSERVATION EASEMENT
- RIP RAP
- BEDROCK
- BOULDER
- PP3 — PHOTO POINT
- BENCH MARK/CONTROL PT
- ROOTWAD
- VP3 –VEGETATION PLOT
- X–2 –CROSS–SECTION

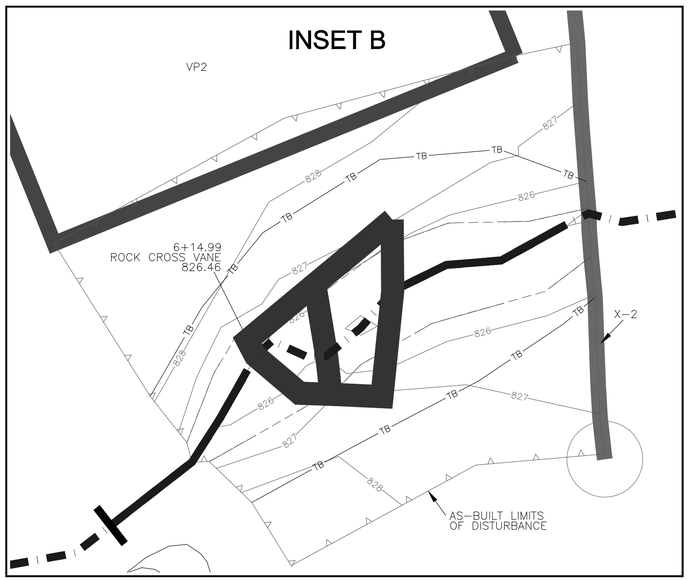
INSET A



NAD83
NAVD88

INSET SCALE:
5' 0' 5' 10'
SCALE 1"=5' (22x34)
1"=10' (11x17)
1' CONTOUR INTERVAL

INSET B



NOTES

1. SEE SHEET 5A FOR GENERAL NOTES.
2. FOUR (4) PAGE DOCUMENT IS NOT VALID WITHOUT SHEET 5A (TITLE).

REVISIONS, DATE AND INITIAL:

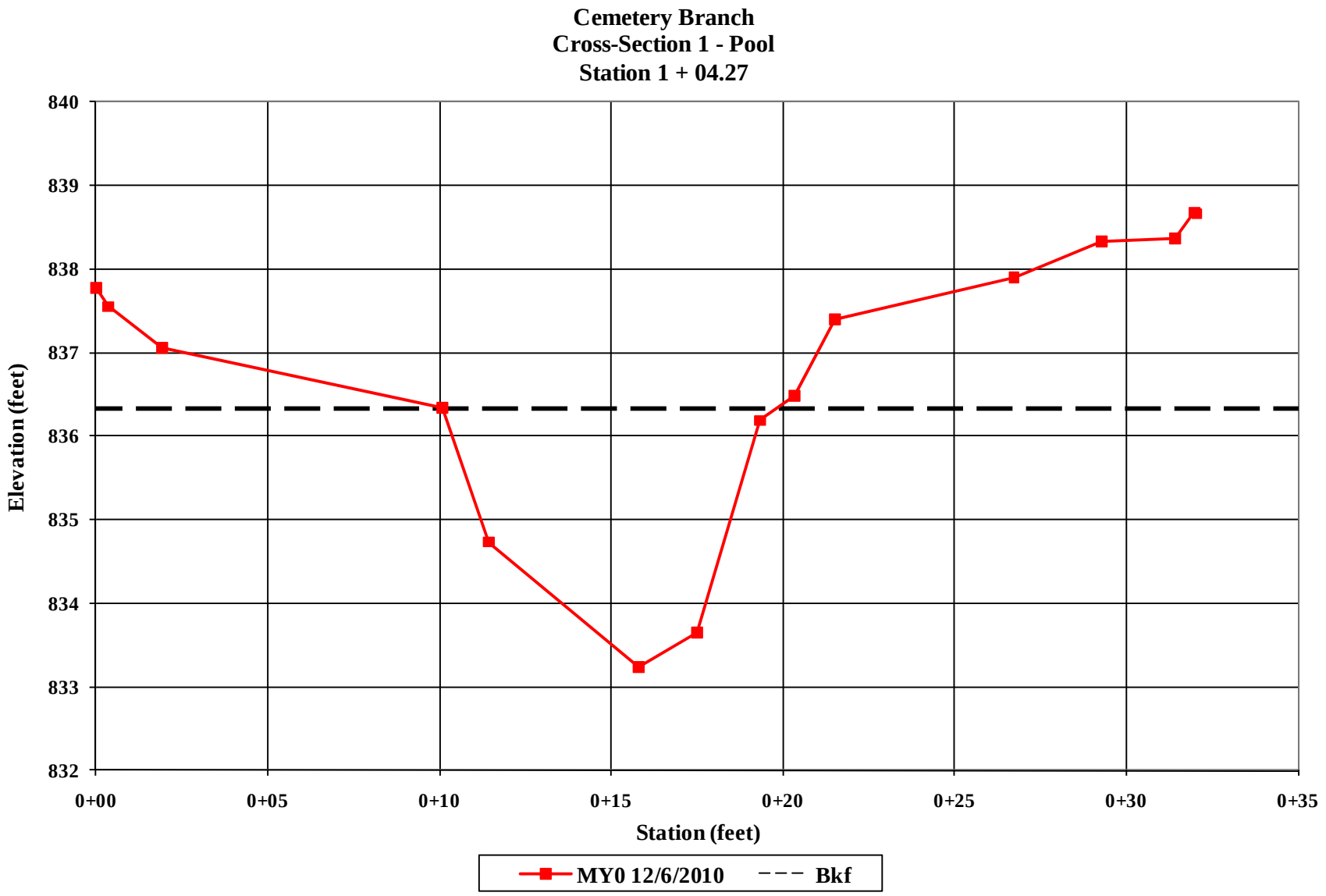
TURNER LAND SURVEYING, PLLC
3201 Glenridge Drive, Raleigh, NC 27604 – (919)875-1378
P-0702 – Lturner921@nc.rr.com – Dturner119@nc.rr.com
www.TURNERLANDSURVEYING.com

CEMETARY BRANCH PLAN VIEW
AS-BUILT SURVEY OF
DYE BRANCH STREAM RESTORATION
ARTICLE 28 CONSTRUCTION SCO# 04-06242-03A
IREDELL COUNTY NORTH CAROLINA
MOORESVILLE

DATE: 12/20/2010
SURVEYED BY: DST/EGT
DRAWN BY: DST/EGT
REVIEWED BY: DST/EGT
PROJECT: TLS-10-011
FILE: DYE BRANCH STREAM RESTORATION ARTICLE 28 CONSTRUCTION_ D090345-1_AB_TLS_F
SCALE: AS SHOWN

SHEET 5D

Appendix C
Cross-Section Plots and Photos

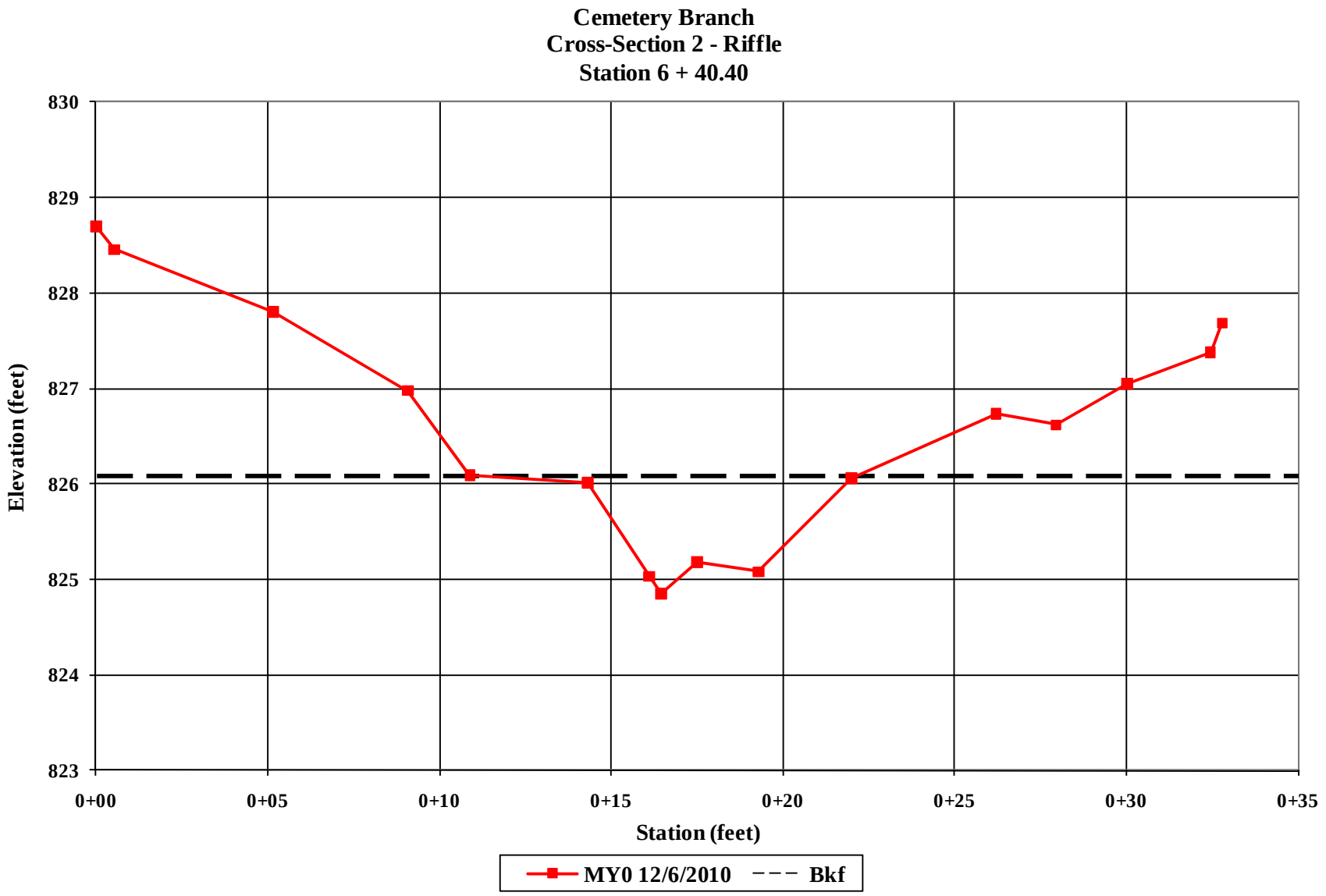

Cemetery Branch
Cross-Section 1 - Pool
Station 1 + 04.27
Elevation (feet)
840
839
838
837
836
835
834
833
832
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
Station (feet)
MY0 12/6/2010
Bkf

Cemetery Branch – Cross-Section 1 – Pool
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 1 – Pool
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 1 – Pool
(Looking Downstream)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 1 – Pool
(Looking Upstream)
Baseline – December 9, 2010

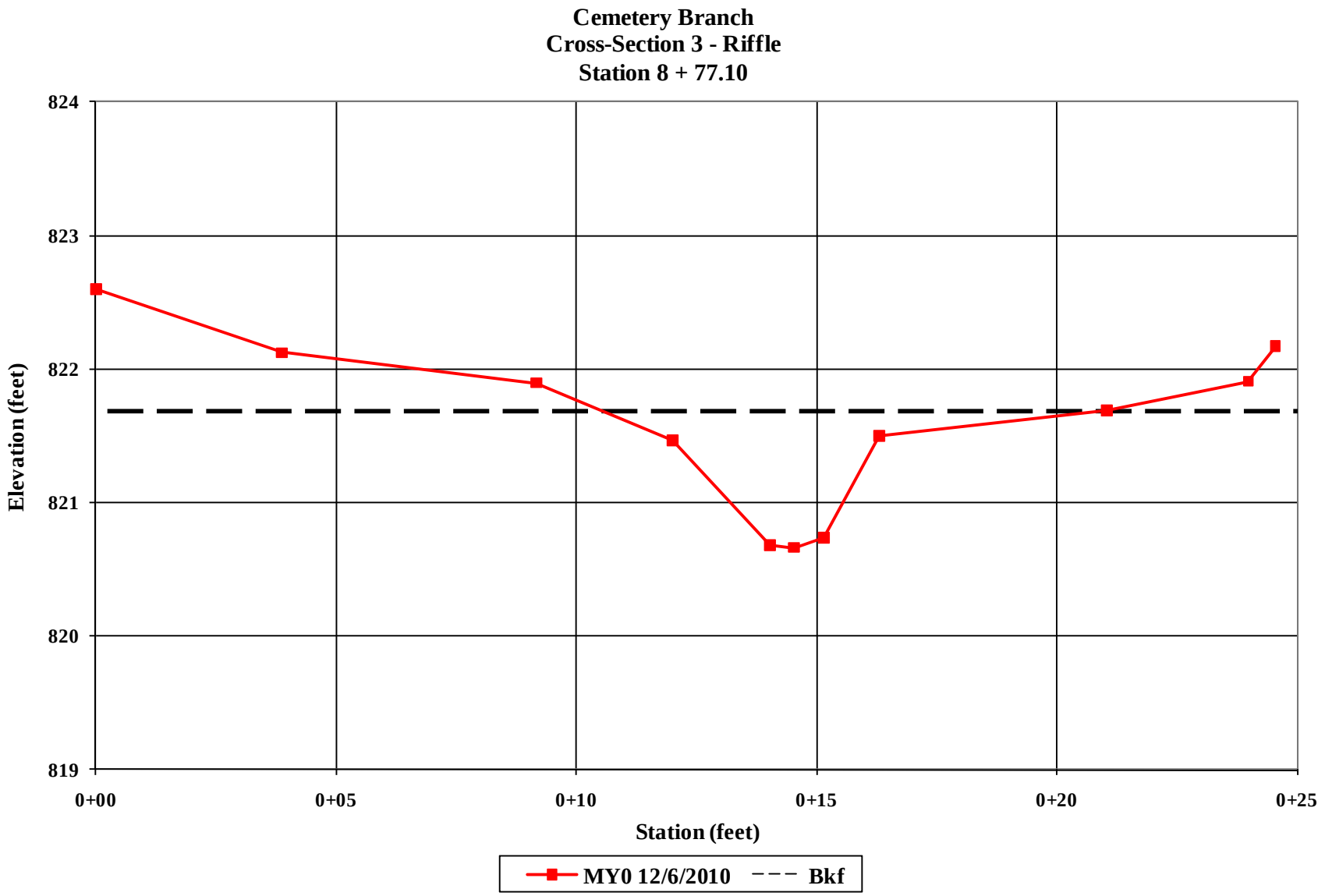

Cemetery Branch
Cross-Section 2 - Riffle
Station 6 + 40.40
830
829
828
827
826
825
824
823
Elevation (feet)
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
Station (feet)
MY0 12/6/2010
Bkf

Cemetery Branch – Cross-Section 2 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 2 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 2 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 2 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

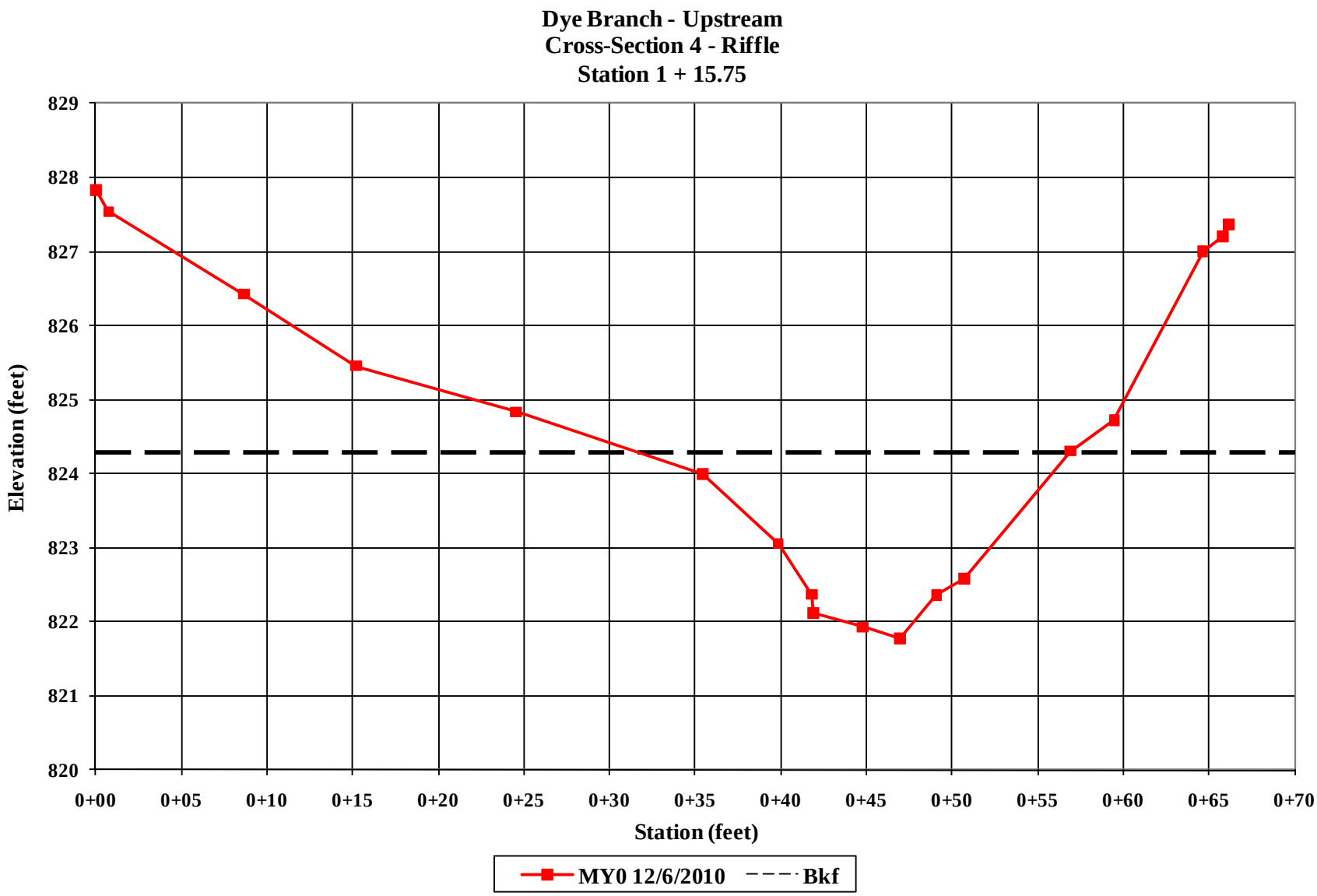

Cemetery Branch
Cross-Section 3 - Riffle
Station 8 + 77.10
824
823
822
821
820
819
Elevation (feet)
0+00
0+05
0+10
0+15
0+20
0+25
Station (feet)
MY0 12/6/2010
Bkf

Cemetery Branch – Cross-Section 3 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 3 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 3 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Cemetery Branch – Cross-Section 3 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

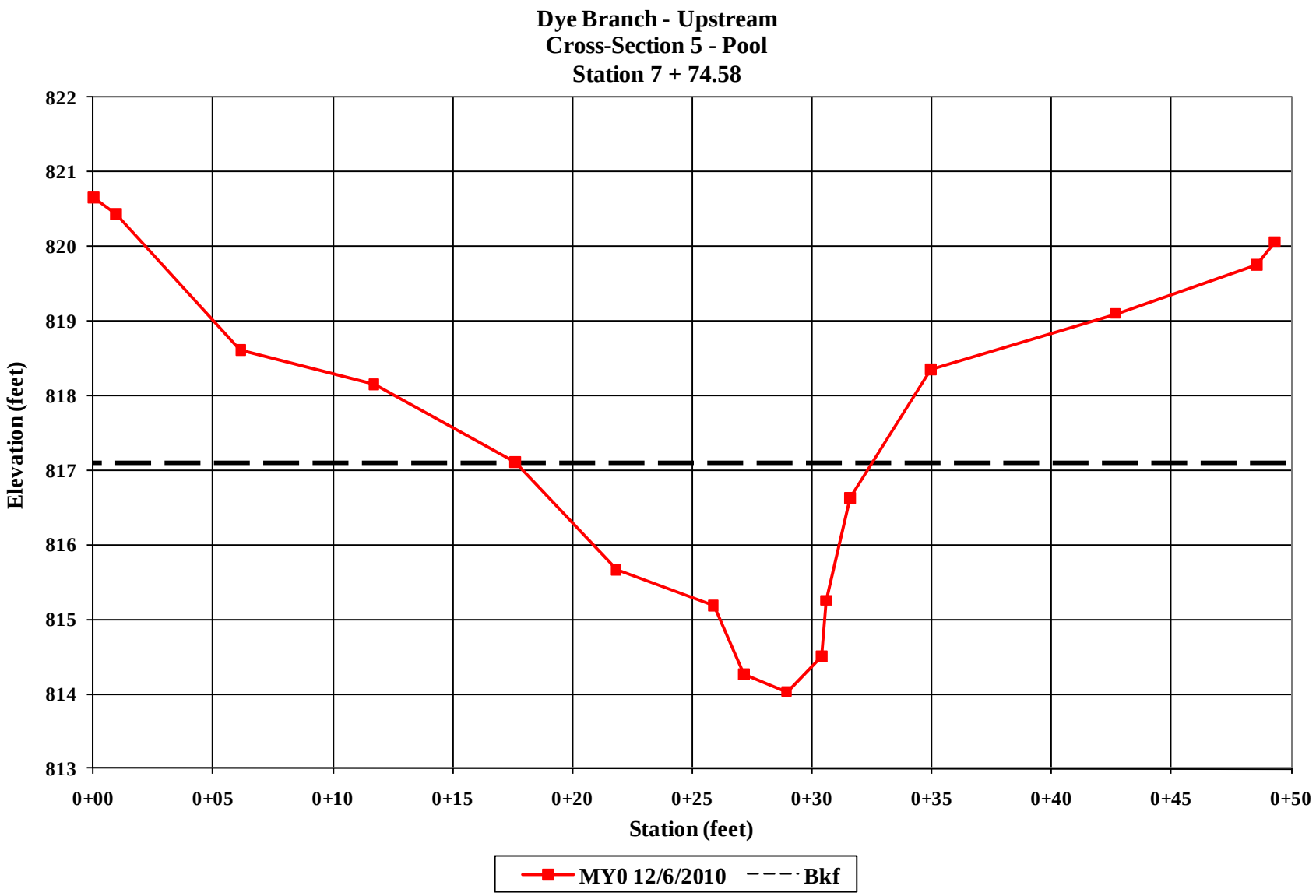

Dye Branch - Upstream
Cross-Section 4 - Riffle
Station 1 + 15.75
Elevation (feet)
829
828
827
826
825
824
823
822
821
820
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
Station (feet)
MY0 12/6/2010
Bkf

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream– Cross-Section 4 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

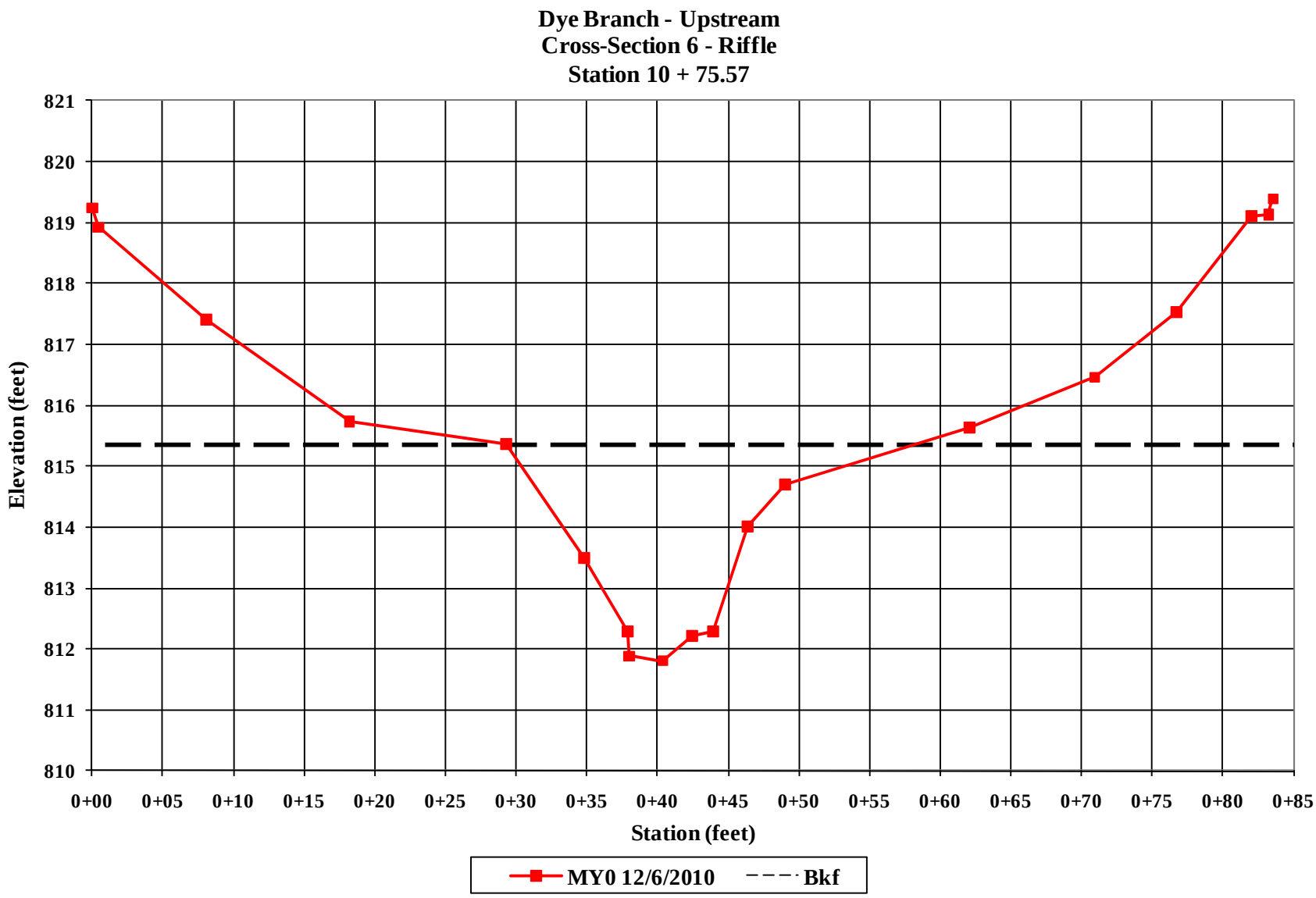

Dye Branch - Upstream
Cross-Section 5 - Pool
Station 7 + 74.58
822
821
820
819
818
817
816
815
814
813
Elevation (feet)
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
Station (feet)
MY0 12/6/2010
Bkf

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking Upstream)
Baseline – December 9, 2010

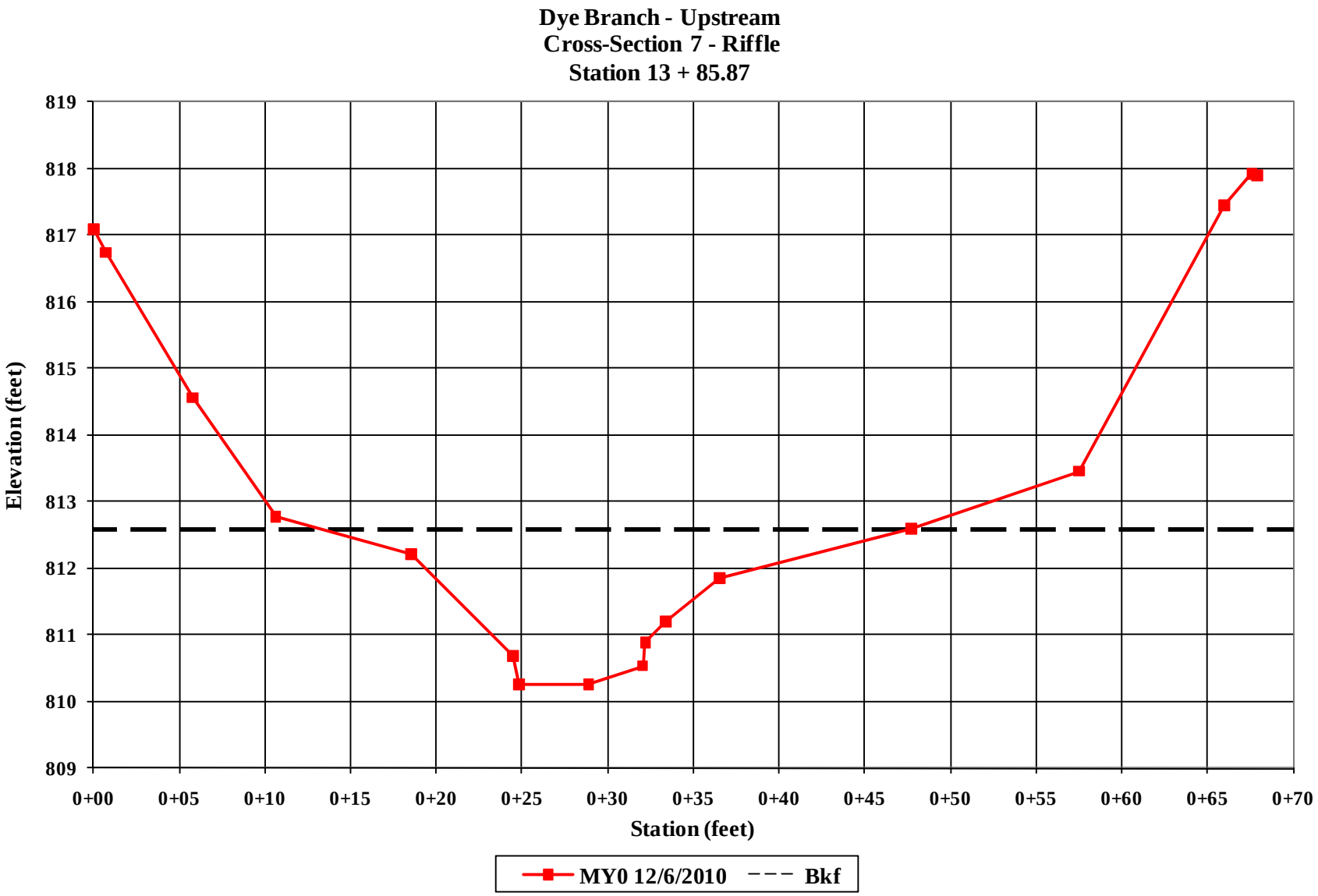

Dye Branch - Upstream
Cross-Section 6 - Riffle
Station 10 + 75.57
Elevation (feet)
821
820
819
818
817
816
815
814
813
812
811
810
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
0+75
0+80
0+85
Station (feet)
MY0 12/6/2010
Bkf

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section #6 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

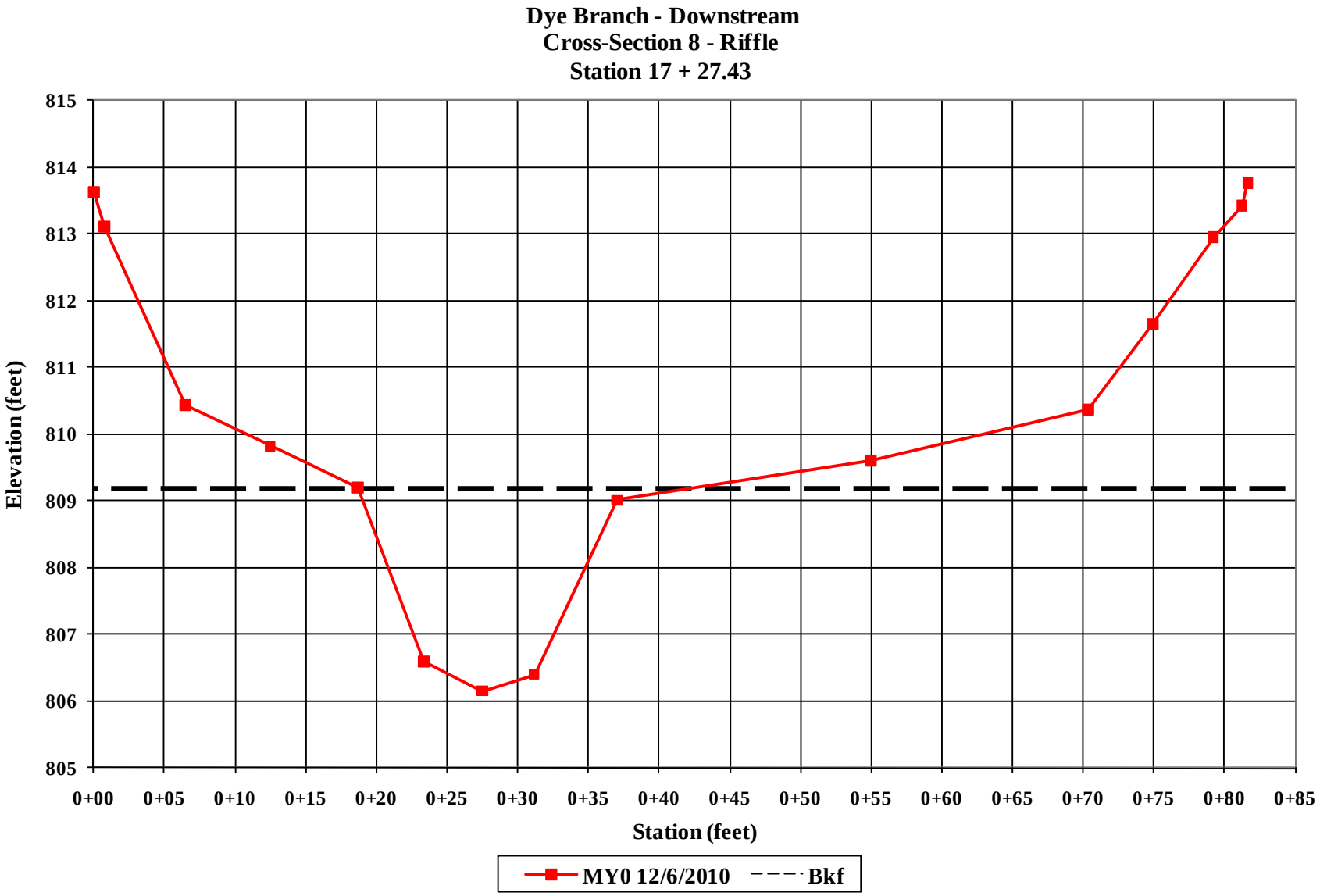

Dye Branch - Upstream
Cross-Section 7 - Riffle
Station 13 + 85.87
Elevation (feet)
819
818
817
816
815
814
813
812
811
810
809
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
Station (feet)
MY0 12/6/2010
Bkf

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

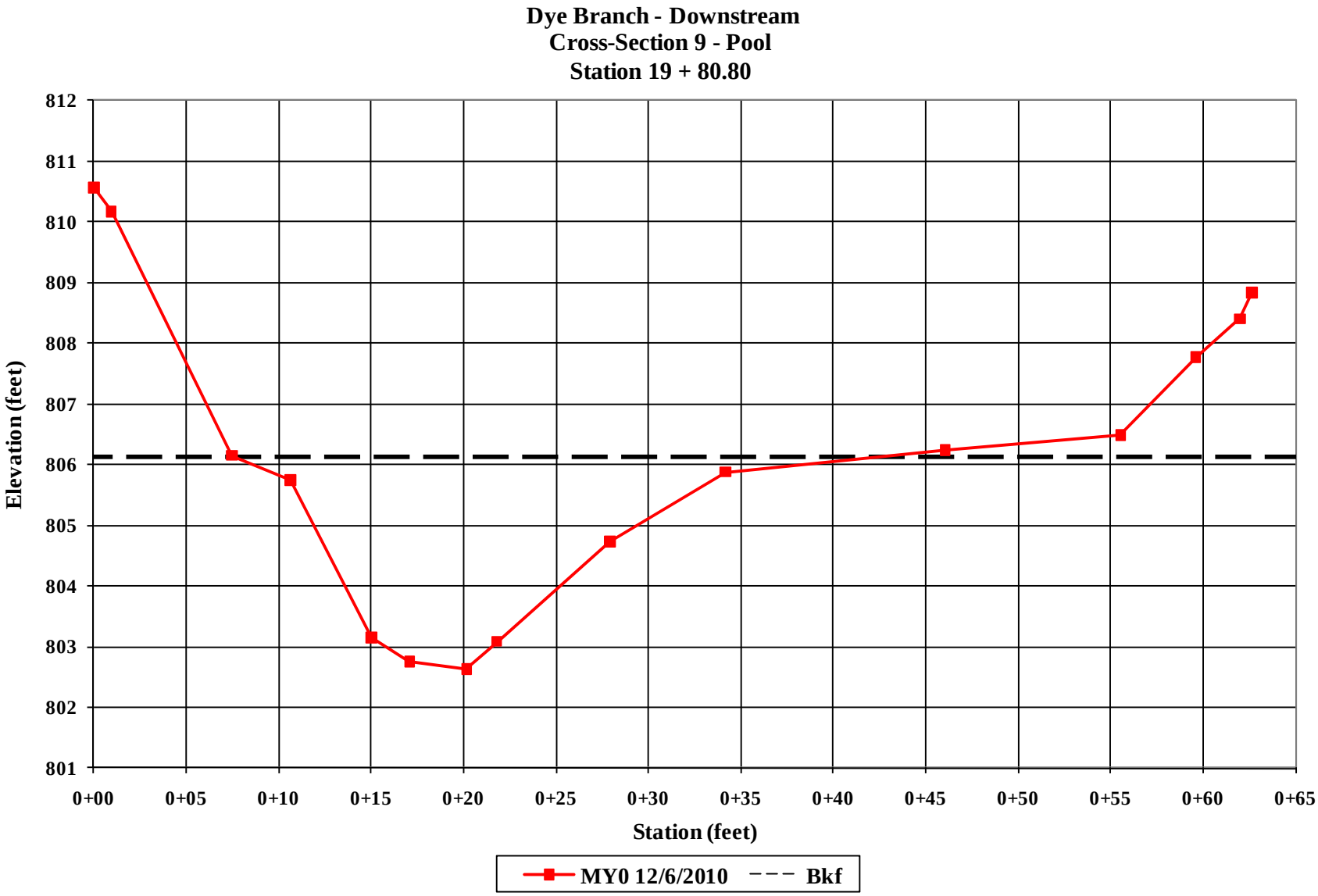

Dye Branch - Downstream
Cross-Section 8 - Riffle
Station 17 + 27.43
Elevation (feet)
815
814
813
812
811
810
809
808
807
806
805
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
0+75
0+80
0+85
Station (feet)
MY0 12/6/2010
Bkf

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Dye Branch Downstream– Cross-Section 8 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

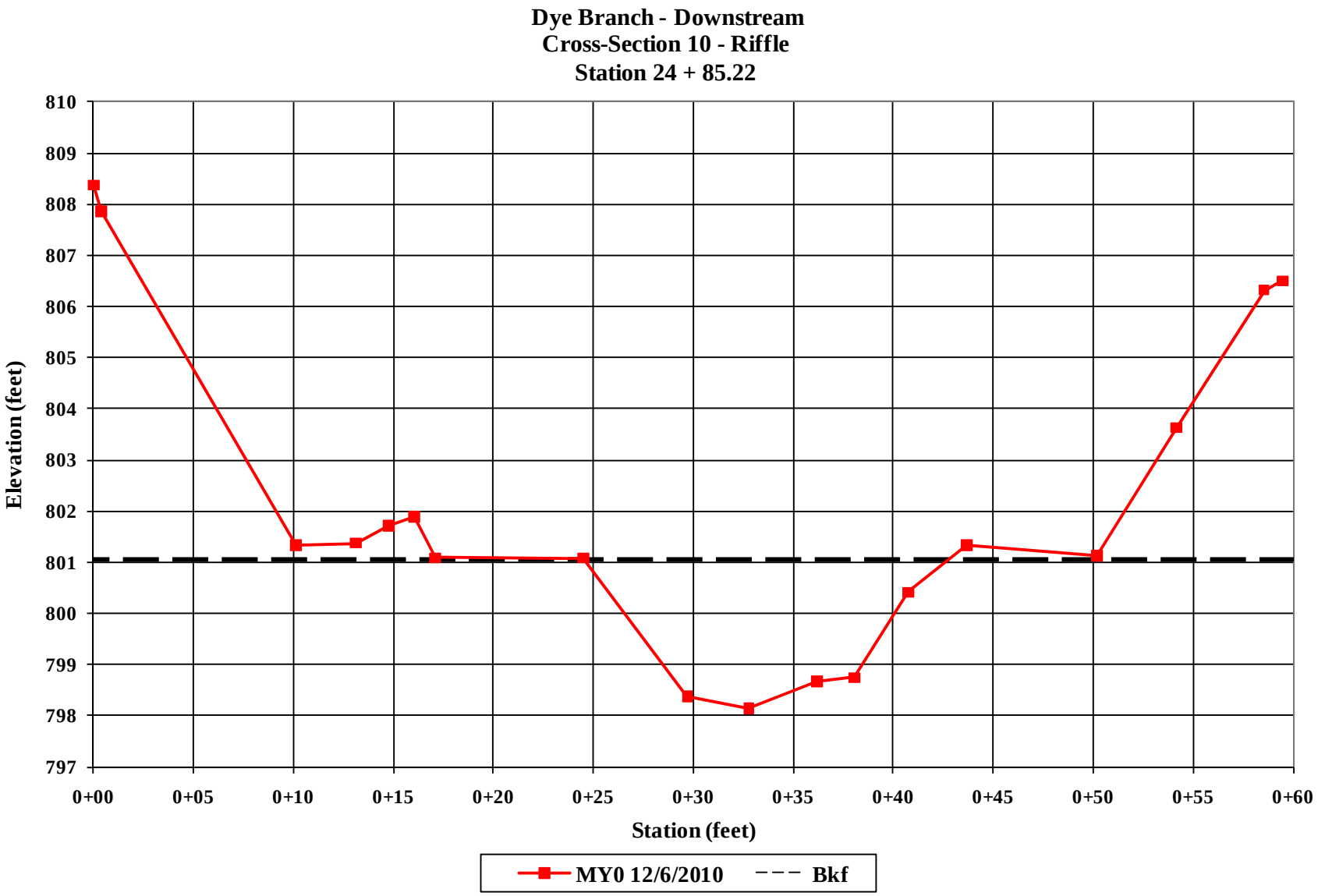

Dye Branch - Downstream
Cross-Section 9 - Pool
Station 19 + 80.80
Elevation (feet)
812
811
810
809
808
807
806
805
804
803
802
801
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
Station (feet)
MY0 12/6/2010
Bkf

Dye Branch Downstream– Cross-Section 9 – Pool
(Looking at Left Bank Descending)
Baseline – December 9, 2010

Dye Branch Downstream – Cross-Section 9 – Pool
(Looking at Right Bank Descending)
Baseline – December 9, 2010

Dye Branch Downstream – Cross-Section 9 – Pool
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Downstream – Cross-Section 9 – Pool
(Looking Upstream)
Baseline – December 9, 2010


Dye Branch - Downstream
Cross-Section 10 - Riffle
Station 24 + 85.22
Elevation (feet)
810
809
808
807
806
805
804
803
802
801
800
799
798
797
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
Station (feet)
MY0 12/6/2010
Bkf

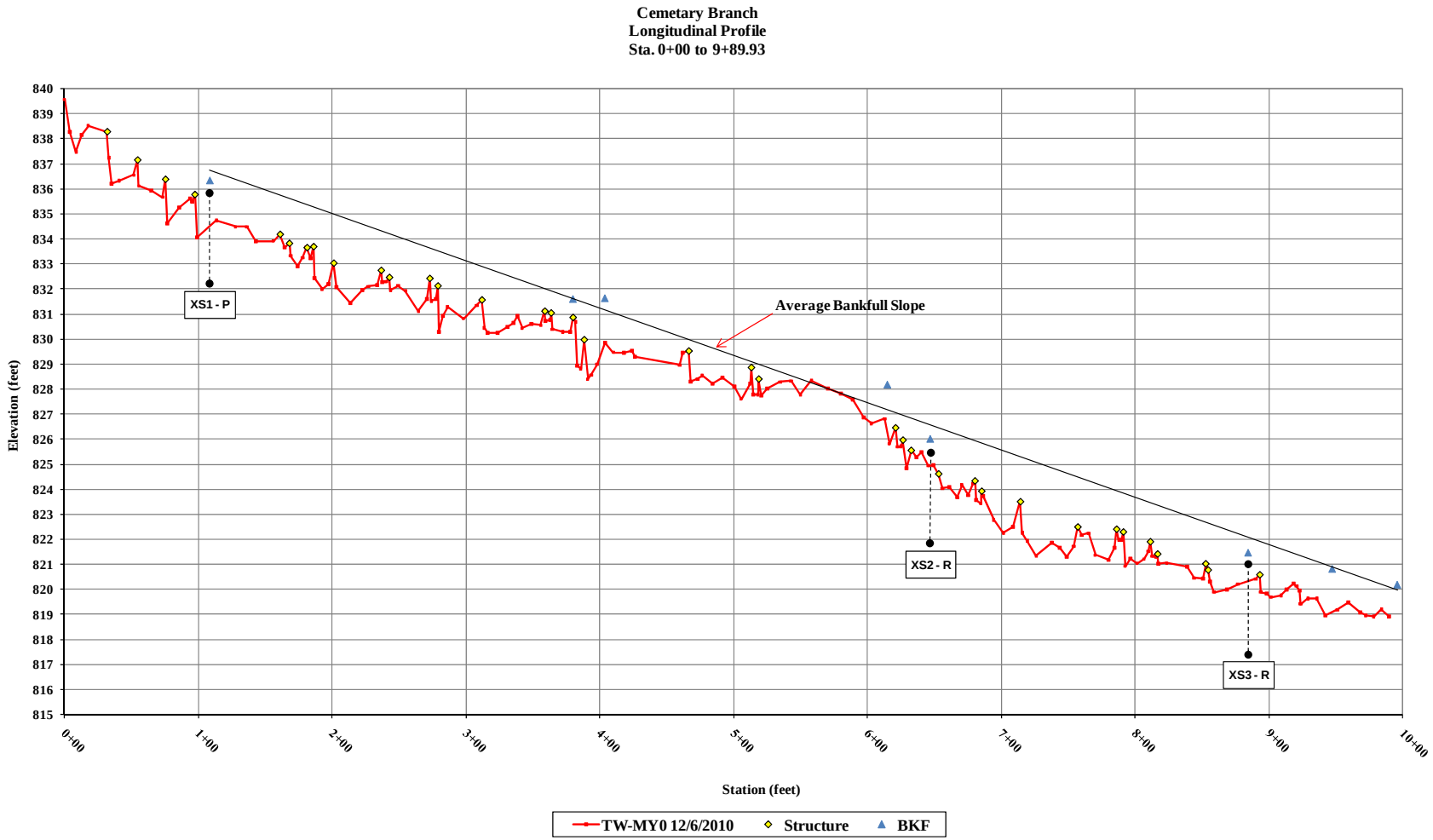
Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking at Left Bank Descending)
Baseline – December 9, 2010

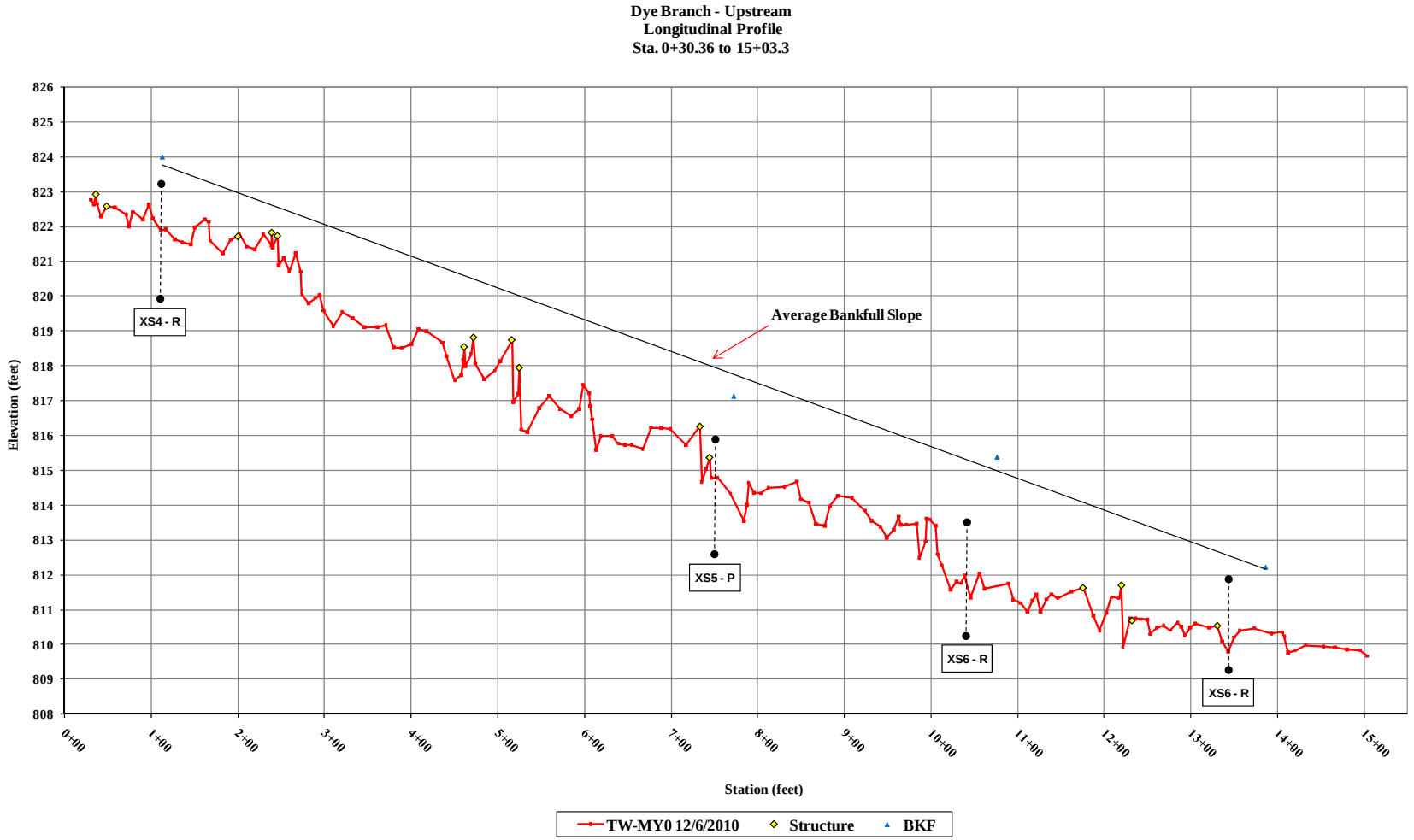
Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking at Right Bank Descending)
Baseline – December 9, 2010

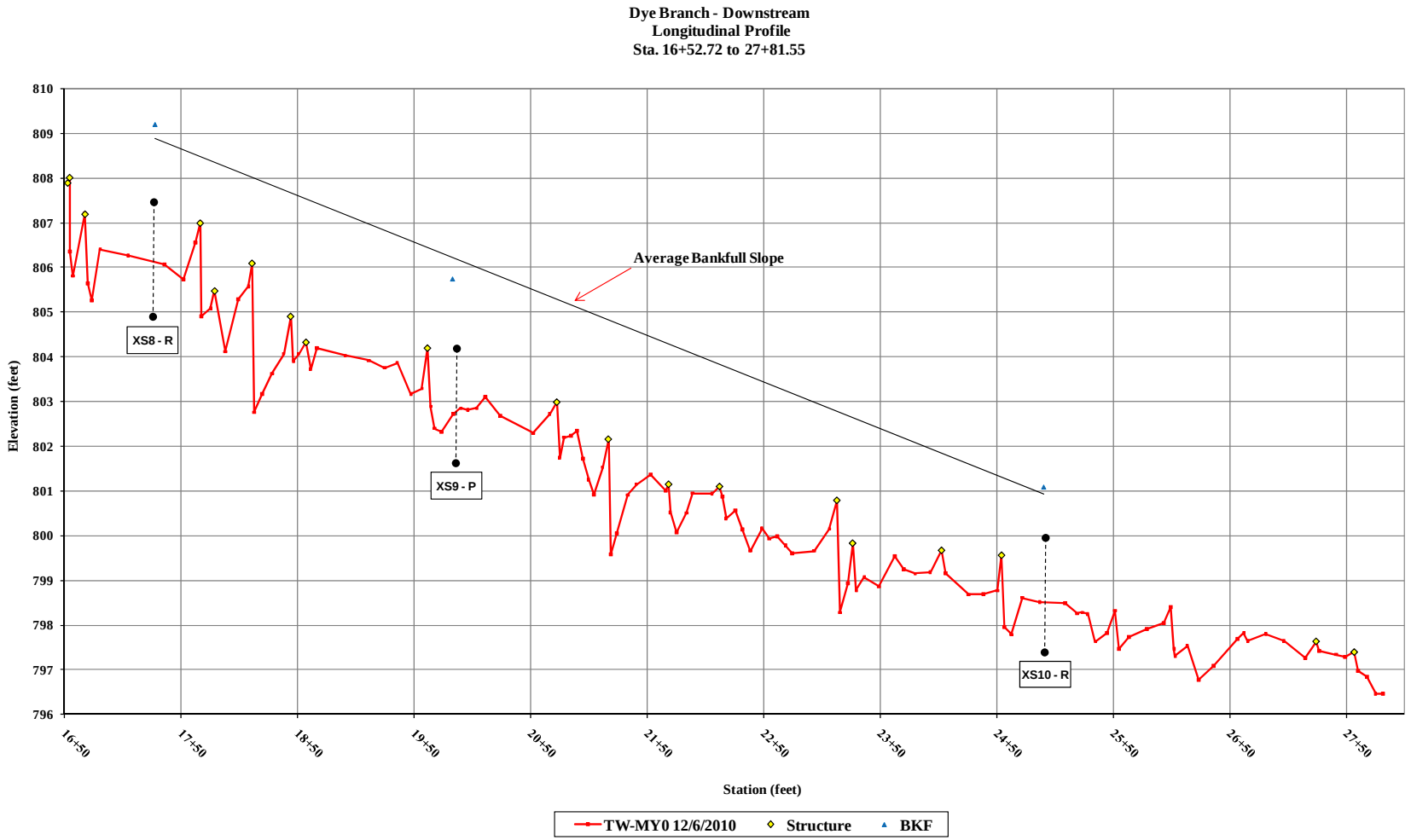
Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking Downstream)
Baseline – December 9, 2010

Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking Upstream)
Baseline – December 9, 2010

Appendix D
Longitudinal Profile Plots


Cemetary Branch
Longitudinal Profile
Sta. 0+00 to 9+89.93
Elevation (feet)
840
839
838
837
836
835
834
833
832
831
830
829
828
827
826
825
824
823
822
821
820
819
818
817
816
815
XS1 - P
Average Bankfull Slope
XS2 - R
XS3 - R
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
Station (feet)
TW-MY0 12/6/2010
Structure
BKF


Dye Branch - Upstream
Longitudinal Profile
Sta. 0+30.36 to 15+03.3
Elevation (feet)
826
825
824
823
822
821
820
819
818
817
816
815
814
813
812
811
810
809
808
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
13+00
14+00
15+00
XS4 - R
Average Bankfull Slope
XS5 - P
XS6 - R
XS6 - R
Station (feet)
TW-MY0 12/6/2010
Structure
BKF


Dye Branch - Downstream
Longitudinal Profile
Sta. 16+52.72 to 27+81.55
Elevation (feet)
Station (feet)
Average Bankfull Slope
XS8 - R
XS9 - P
XS10 - R
TW-MY0 12/6/2010
Structure
BKF

Appendix E
Vegetation Plot Photos

Vegetation Monitoring Plot 1
Baseline – March 11, 2011

Vegetation Monitoring Plot 2
Baseline – March 11, 2011

Vegetation Monitoring Plot 3
Baseline – March 11, 2011

Vegetation Monitoring Plot 4
Baseline – March 11, 2011

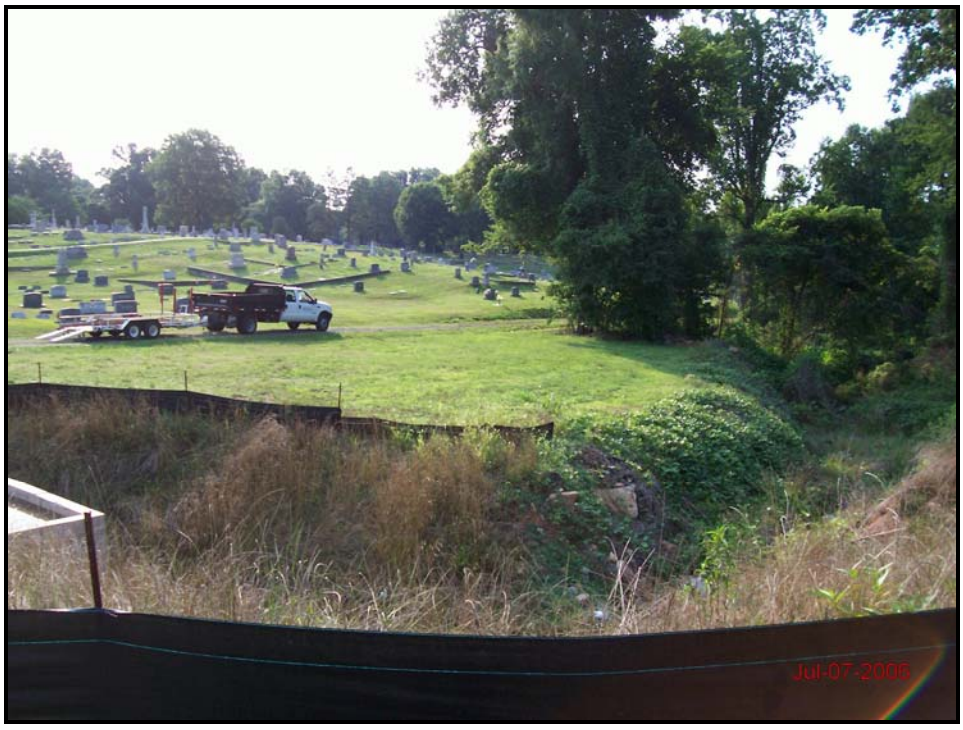
Vegetation Monitoring Plot 5
Baseline – March 11, 2011

Vegetation Monitoring Plot 6
Baseline – March 11, 2011

Vegetation Monitoring Plot 7
Baseline – March 11, 2011

Vegetation Monitoring Plot 8
Baseline – March 11, 2011

Appendix F
Permanent Photo Station Photos



Cemetery Branch
Pre-construction conditions in proximity to Photo Station 1

Cemetery Branch – Permanent Photo Station 1
Looking Downstream

Cemetery Branch
Pre-construction conditions in proximity to Photo Station 2

Cemetery Branch – Permanent Photo Station 2
Looking Upstream

Cemetery Branch – Permanent Photo Station 2
Looking Downstream

Dye Branch
Pre-construction conditions in proximity to Photo Station 3

Dye Branch – Permanent Photo Station 3
Looking Downstream

Dye Branch
Pre-construction conditions in proximity to Photo Station 4

Dye Branch – Permanent Photo Station 4
Looking Upstream

Cemetery Branch
Pre-construction conditions in proximity to Photo Station 5

Dye Branch – Permanent Photo Station 5
Looking Upstream

Cemetery Branch
Pre-construction conditions in proximity to Photo Station 6

Dye Branch – Permanent Photo Station 6
Looking Upstream

Dye Branch – Permanent Photo Station 7
Looking Downstream

Cemetery Branch
Pre-construction conditions in proximity to Photo Station 8

Dye Branch – Permanent Photo Station 8
Looking Upstream

Dye Branch – Permanent Photo Station 9
Looking Upstream