



**Baseline Monitoring Document
and As Built Baseline Report**

FINAL

**Five-Mile Branch Stream and Wetland
Restoration, Iredell County**

NCEEP IMS ID# 92185

DENR Contract # D05013S

Prepared for:

**North Carolina Department of
Environment and Natural Resources,
Ecosystem Enhancement Program
Raleigh, North Carolina**



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Baseline Monitoring and As-Built Baseline Report

Five-Mile Branch

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Executive Summary

The Five Mile Branch Mitigation site was selected for stream and wetland restoration originally by the North Carolina Department of Transportation (NCDOT) then transferred to the North Carolina Ecosystem Enhancement Program (NCEEP). The purpose of this restoration project was to restore, enhance and preserve streams and wetlands within the site. Beaver and Fifth creeks are the primary stream within the site. There are five unnamed tributaries that were preserved. The site's original design was developed while the project was under NCDOT auspices and was a very sinuous, priority 2 stream restoration with a great deal of structure, which presented concerns in terms of cost and stability (risk/cost-benefit). The proposed alignment also led to retrospective concerns of hydrologic trespass by NCDOT for the I-40 right of way. Collectively, this prompted an enhancement approach to the stream channel through stabilization, improvement of the profile, and the removal of berms to provide additional floodplain connection. (NCEEP 2013)

The Five Mile Branch Site (site) is east of Statesville in Iredell County, southeast of Interstate 40 (I-40) and northwest of US Route 64. The site is in the Township of Cool Springs on the Statesville East, NC, 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle (Figure 1). The Site comprises 12 adjacent parcels totaling approximately 229 acres (92.67 ha). It is bordered to the north by I-40 and to the south, east, and west by various forested, pasture, and residential properties. Swann Road (SR 2167), running north and south, bisects the site. Chimney Lane dead-ends on the site west of Swann Road.

The restoration strategy implemented on Beaver and Fifth creeks consisted of Enhancement Level II. Both streams were stabilized in their current locations. Their north banks were regraded to a flatter slope and boulder grade control structures were installed. No work was performed on the unnamed tributaries. They were preserved through conservation easements or property purchase. Wetland restoration was accomplished by filling in the drainage ditches, grading floodplain pools and replanting with native vegetation. Through these practices 12,085 linear feet of stream were enhanced, 890 feet of stream preserved, 48.6 acres of wetland restored and 1.9 acres of wetlands preserved.

1. Project Goals, Background and Attributes

1.1 Location and Setting

The Five Mile Branch Site (site) is located east of Statesville in Iredell County, southeast of Interstate 40 (I-40) and northwest of US Route 64. (Figure 1) The site is within the Township of Cool Springs on the Statesville East, NC, 7.5-minute U.S. Geological Survey (USGS). According to the Yadkin-Pee Dee Basinwide Water Quality Plan (North Carolina Department of Environment and Natural Resources [NCDENR] 2008), Fifth and Beaver Creeks are in USGS 8-digit Hydrologic Unit 03040102, 14-digit Hydrologic Unit 03040102010100, and North Carolina Division of Water Quality (NCDWQ) Sub-basin 03-07-06. The project is situated in the Piedmont physiographic region.

There are two main streams (Beaver Creek and Fifth Creek) and five unnamed tributaries (UT to Beaver Creek, UT at Chimney Lane, UT to Fifth Creek, UT at Swann Road, and UT at Smiley) located on the site. Interstate 40 borders the site to the north. Forested land and agriculture land border the site in the other three directions. Beaver Creek runs about 5,925 linear feet (LF) (1,805.94 meters [m]) across the site before converging with Fifth Creek. Fifth Creek runs approximately 6,610 LF (2,014.73 m) from I-40 to the terminus of the project.

1.2 Project Goals and Objectives

The primary goals of this restoration project focus on the following:

- Increase bank stability, nutrient filtration and aquatic habitat
- Reduce soil disturbance and nutrient inputs to stream
- Improve soil physical and chemical properties in the near term
- Improve hydrologic connectivity with floodplain
- Attenuate site impacts of storm flows
- Restore ground water hydrology to pre-agricultural levels
- Restore wetland and riparian habitat

These goals were accomplished by:

- Establishing a minimum 50-foot buffer consisting of a mix of native species representative of piedmont/mountain bottomland hardwood forest. The planted species were selected by evaluation of adjacent reference sites and reviewing species listed in Classification of Natural Communities of North Carolina: Third Approximation (Schafale and Weakley 1990). A total of 1.9 acres of bottomland hardwood forest were preserved through land ownership or conservation easements. Land preservation reduced soil disturbance and nutrient input to the streams.
- Grading stream banks, installation of in-stream structures, and removal of an adjacent berm increased bank stability, improved in-stream habitat diversity and improved the hydrologic connectivity with the adjacent floodplain. Gently sloped, vegetated, stream banks in conjunction with in-stream structures increased bank stability. The in-stream structures all increased stream habitat diversity by establishing riffle-pool sequences and establishing stable woody debris. Removal of the berm reduced the water surface elevation required to reach the floodplain.
- Fill existing drainage ditches and excavating floodplain pools. Elimination of the drainage ditches and grading the floodplain restored groundwater hydrology to pre-agriculture conditions, in-turn restoring wetlands and riparian habitat.
- Ripping floodplain soil prior to planting to reduce ground compaction cause by past agricultural practice and allowing water infiltration.

2. Project Structure, Restoration Type and Approach

2.1 Project Structure

The project was broken into nine separate segments due to location within the site. The segments are Beaver Creek (upstream and downstream 10+87.03 PRBVR), Fifth Creek (upstream and downstream of Beaver Creek) and five unnamed tributaries (UT to Beaver Creek, UT, UT at Chimney Lane, , UT at Swann Road, and UT at Freeze). Project activities provide 12,993.7 feet of stream enhancement level II, 1,425.0 feet of stream preservation, and 48.0 acres of wetland restoration and 1.9 acres of wetland preservation.

2.2 Restoration Type and Approach

Prior to development and implementation of the restoration plan, the historical land uses of the site were investigated. Research indicated that the site had been in agricultural use for over 50 years. Aerial photography from 1956 shows the site's agricultural fields, drainage ditches and stream being in the same location as the 2012 pre-restoration condition. The major exception being I-40 was not present in 1956. Based on field observation, it appeared that Beaver Creek and Fifth Creek had been straightened. In the past, the drainage ditches were better maintained, with the vegetation mowed or sprayed with herbicide. The agricultural fields had developed a significant stand of woody vegetation. Maintenance and agricultural practices ceased when NCDOT purchased the parcels.

The restoration strategy implemented on Fifth and Beaver creeks consisted of Enhancement Level II. Both streams were stabilized in their current locations. However, channel dimensions were altered by grading the north bank of both streams. The stream profiles were adjusted through the installation of grade control and bank stabilization boulder structures. No work was performed on the unnamed tributaries. They were preserved with a conservation easement or purchasing the property. A 946.04 section of Fifth Creek at the downstream end of the project is not included in these calculations. Property only on the north side of the stream could be secured through fee simple purchase or the purchase of a conservation easement. The south side is still in private ownership. Wetland restoration was accomplished by filling in the drainage ditches, grading floodplain pools and replanting with native vegetation.

3. Project History, Contacts and Attribute Data

Investigations into the Five Mile Branch restoration site began over 10 years ago. The site was first identified by the NCDOT who began researching the site in 2001. A feasibility study was prepared for the site and groundwater monitoring gauges were installed around this time. The gauges were downloaded and maintained for the following four years until 2005. Subsequently in 2004, the site was transferred to the NCEEP when restructuring transferred all off-site mitigation opportunities from NCDOT to NCEEP. The site's original design was developed while the project was under NCDOT auspices and was a very sinuous, priority 2 stream restoration with a great deal of structure, which presented concerns in terms of cost and stability (risk/cost-benefit). The proposed alignment also led to retrospective concerns of hydrologic trespass by NCDOT for the I-40 right of way. Collectively, this prompted an enhancement approach to the stream channel through stabilization, improvement of the profile, and the removal of berms to provide additional floodplain connection. (NCEEP 2013) ARCADIS revisited the site in February 2009 to assess stream conditions and document areas of extreme erosion. Based on this assessment, ARCADIS identified areas of importance to focus restoration efforts. The constructed design was based on the 2009 assessment.

Project activities, history, dates, contacts and background information are presented in attached tables.

4. Success Criteria

In general, success criteria and triggers for remedial actions are based on the US Army Corps of Engineers 2003 Stream Mitigation Guidelines (USACE 2003). Each year's monitoring data and results will be compared to those outlined in the Stream Mitigation Guidelines and previous year's data to identify trends. Given that the restoration performed on site was Enhancement Level II, stream success criteria will be established only for channel dimension and riparian vegetation. Wetland success criteria will be hydrology and vegetation.

Stream Channel Dimension

Channel dimension parameters that will be monitored include width, depth, cross-sectional area and bank height ratio. These parameters are expected to remain relatively consistent throughout the monitoring period. "However, some change is natural and expected and can even indicate that the design was successful and appropriate for the hydrologic and sediment regime." (NCDENR 2010) Narrowing of the channel, development of an inner berm are a few examples. Changes to the channel dimensions will be documented. If these changes trend towards instability (channel widening, incision, etc.), remediation activities may be implemented. If the changes trend towards stability, as those described above, the project can be considered a success. Channel dimension will be monitored through the establishment and annual surveying of permanent cross section.

Stream Hydrology

A minimum of two bankfull events must occur within the 5 year monitoring period. The two events must occur in separate years. Data will be collected using pressure transducers. The transducers will be downloaded during wetland hydrology monitoring.

At the time of this report, pressure transducers were not available. Two crest stage gauges were installed to document bankfull while pressure transducers are obtained. The gauges were installed in June 2012. Their locations are shown on the baseline drawings. Pressure transducers will replace the crest stage gauges when obtained. Their locations are shown on Figure 3. It is expected the transducers will be installed within the next 2 months.

One bankfull event occurred around May 14, 2012. This was prior to the installation of the crest stage gauges. It is documented through sediment and woody debris on the floodplain. The attached photographs show the debris.

Vegetation

Woody vegetation success criteria will be based on US Army Corps of Engineers 2003 Stream Mitigation Guidelines. This criteria call for the survival of 320 stems per acre at year three, 288 stems per acre at year four and 260 stems per acre at year five. Volunteer and planted stems will be tracked independently in Table 7. Depending upon the species and overall vigor of the volunteer community, vegetation success may be evaluated at project closeout by the total stems per acre. This success criterion applies to both stream buffer and wetlands, excluding the floodplain pools.

Wetland Hydrology

Thirty (30) groundwater gauges were installed throughout the site. Ten of the gauges were installed at locations similar to pre-construction locations. These will provide data that can be compared to pre-restoration data and also show if wetland hydrology is being achieved. The remaining gauges were installed throughout the site in wetland restoration locations. These gauges will show if wetland hydrology is being met within the restoration areas and potentially help determine the wetland boundaries.

Hydrologic success criteria will be based on data from an off-site reference wetland gauge. The maximum consecutive days of wetland hydrology of the reference gauge was 20 days or 10.9% of the growing season. The second longest was 8 days or 4.4% of the growing season, one day under the Corps' 1987 Wetland Delineation Manual minimum of 5% of the growing season. There were nine other occurrences in which the soil was saturated within 12 inches of the ground surface. These events ranged in duration from 1 to 4 days (0.5% to 2.2% of the growing season).

It is expected that the restoration site will not uniformly exhibit wetland hydrology. Areas in close proximity of the floodplain pools and other depressional features are expected to exhibit longer hydroperiods, similar to the 10.9% of the reference wetland. While areas located nearer the streams or outside of depressional areas will have short soil saturation periods, more similar to the 4.4% of the reference wetland. Given that the minimum duration of saturation established by the Corps' is 5% of the growing season, this will be the minimum established success criteria for wetland hydrology at

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the restoration site. Areas showing a hydroperiod at the lower end of the success range (5%-7%) will have adjacent vegetation evaluated. A FAC-neutral test will be conducted in the area of the gauge. If the vegetation passes the FAC-neutral test, then it will be determined that wetland hydrology success has been achieved. If not, further investigations will be conducted to determine the reason for hydrologic failure.

5. Maintenance and Contingency Plan

As with all stream and wetland restoration projects, unexpected issues may arise that prevent the success criteria from being met. Therefore, a maintenance and contingency plan is required to establish guidelines to follow when success criteria are not met and establishes thresholds that when exceeded trigger remedial actions. That being said, it is very difficult to establish an all-inclusive maintenance and contingency plan. Restoration projects are very complex and dynamic systems. This section will discuss the most significant issues that may arise and the associated remedial actions. Remedial actions will not be initiated without consultation and agreement from NCEEP.

Vegetation

The vegetation success criterion is outlined above. This criterion applies to the entire site, not individual plots. It is possible and highly likely that several plots will not meet the final success criteria and several plots will exceed it. In the event that the entire site is not demonstrating success, individual plots and plot locations will be evaluated for the composition of the volunteer contingent and evaluated with the visual assessment and any associated vegetation mapping on the current condition plan view. This will help determine if the issue is localized or systemic. A localized issue could be caused by shading, soil conditions, topography, etc. A systemic issue could be a result of substandard planting stock, unusual weather patterns, wildlife grazing, etc. Each of these issues requires different remedial actions. The cause needs to be identified before an appropriate action determined. One option of corrective measures to bring the site into compliance with the established vegetation success criteria is supplemental planting.

Wetland Hydrology

Gauges not meeting the above wetland hydrology success criteria will be compared to the reference gauges, other on-site gauges and site precipitation. As with the vegetation, the cause of the issue needs to be identified prior to development and commencement of remedial actions. Causes of the non-achievement could be a gauge malfunctioning, gauge not programmed or calibrated correctly, weather pattern, etc. Remedial actions could consist of gauge replacement, gauge reprogramming or recalibration, additional site grading, etc.

Stream Channel Dimension

Two issues that could develop with the stream dimension is a change in width to depth ratio or a change in bank height ratio. If there is a significant shift toward instability in these parameters during the monitoring period, options will be discussed with NCEEP. Again, the cause and degree (localized verses systemic) of instability need to be identified.

Stream Hydrology

The only possible issue with stream hydrology is not achieving two bankfull events during the five year monitoring period. This can be addressed by extending the monitoring period to see if the targeted recurrence interval is achieved. If the stream is not accessing its floodplain at the requisite recurrence interval after some additional monitoring, and climatological reasons cannot be referenced; EEP will consider implications for success and credit release with the NCIRT.

6. Documenting the As-built Condition (Baseline)

6.1 As-built/Record Drawings

As-built drawings are presented in Appendix D

6.2 Baseline Data Collection

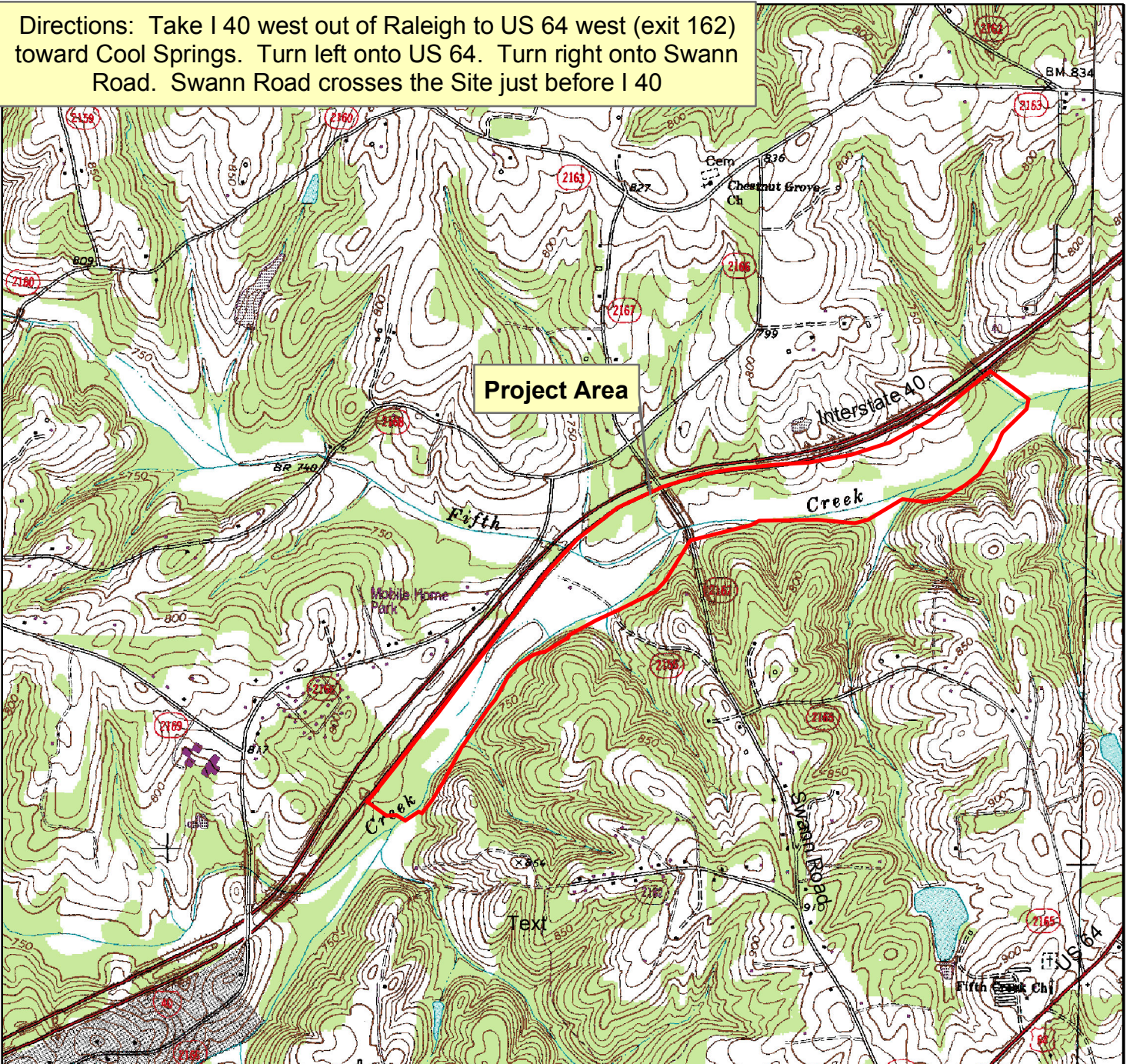
Baseline data was collected shortly after the as-built survey. Vegetation data was collected at the time all monitoring devices were installed, May 29, 2012 through July 11, 2012.

7. References

- North Carolina Department of Environment and Natural Resources (NCDENR). 2008. Yadkin Pee-Dee River Basinwide Water Quality Plan. Prepared by the North Carolina Division of Water Quality, Water Quality Section.
- North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program (NCDENR) 2010. Baseline Monitoring Document Format, Data Requirements, and Content Guidance, Version 2.0, October 14, 2010.
- North Carolina Ecosystem Enhancement Program (NCEEP). 2013. Letter dated February 28, 2013.
- Schafale, M.P., and A. S. Weakley. 1990. Classification of the Natural Communities of North Carolina, A Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment, Health and Natural Resources, Raleigh, NC.
- US Army Corps of Engineers (USACE) 2003. April 2003 Stream Mitigation Guidelines
- United States Department of Agriculture, Natural Resources Conservation Service, 2011 Soil Survey of Iredell County, North Carolina. (Available online at http://soils.usda.gov/survey/printed_surveys/)
- Wetland Training Institute. 1995. Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual. Poolesville, MD. WTI 95-3.

Figures

Directions: Take I 40 west out of Raleigh to US 64 west (exit 162) toward Cool Springs. Turn left onto US 64. Turn right onto Swann Road. Swann Road crosses the Site just before I 40



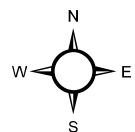
The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary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



0 1,500 3,000 6,000 Feet

SCALE: 1:24,000

Source: USGS Quadrangle Maps Statesville East and Cool Springs, NC



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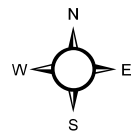
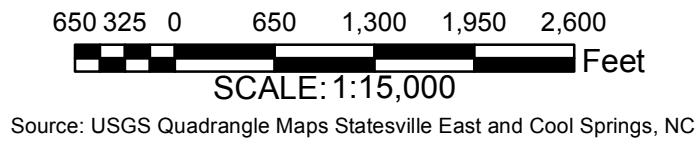
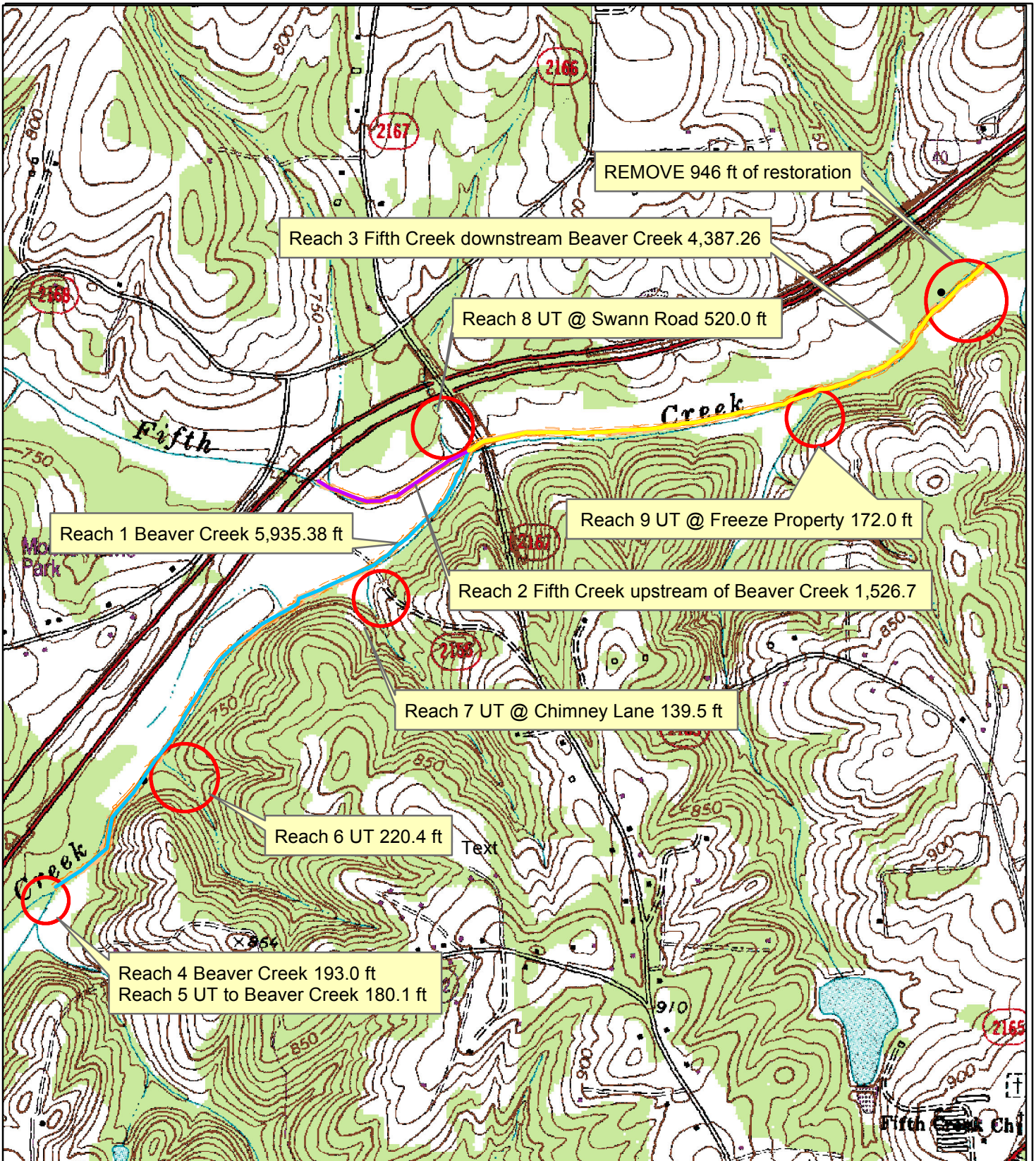


VICINITY MAP

Five Mile Branch
Stream and Wetland Restoration Site
Iredell County, North Carolina

Figure No.

1



Prepared For

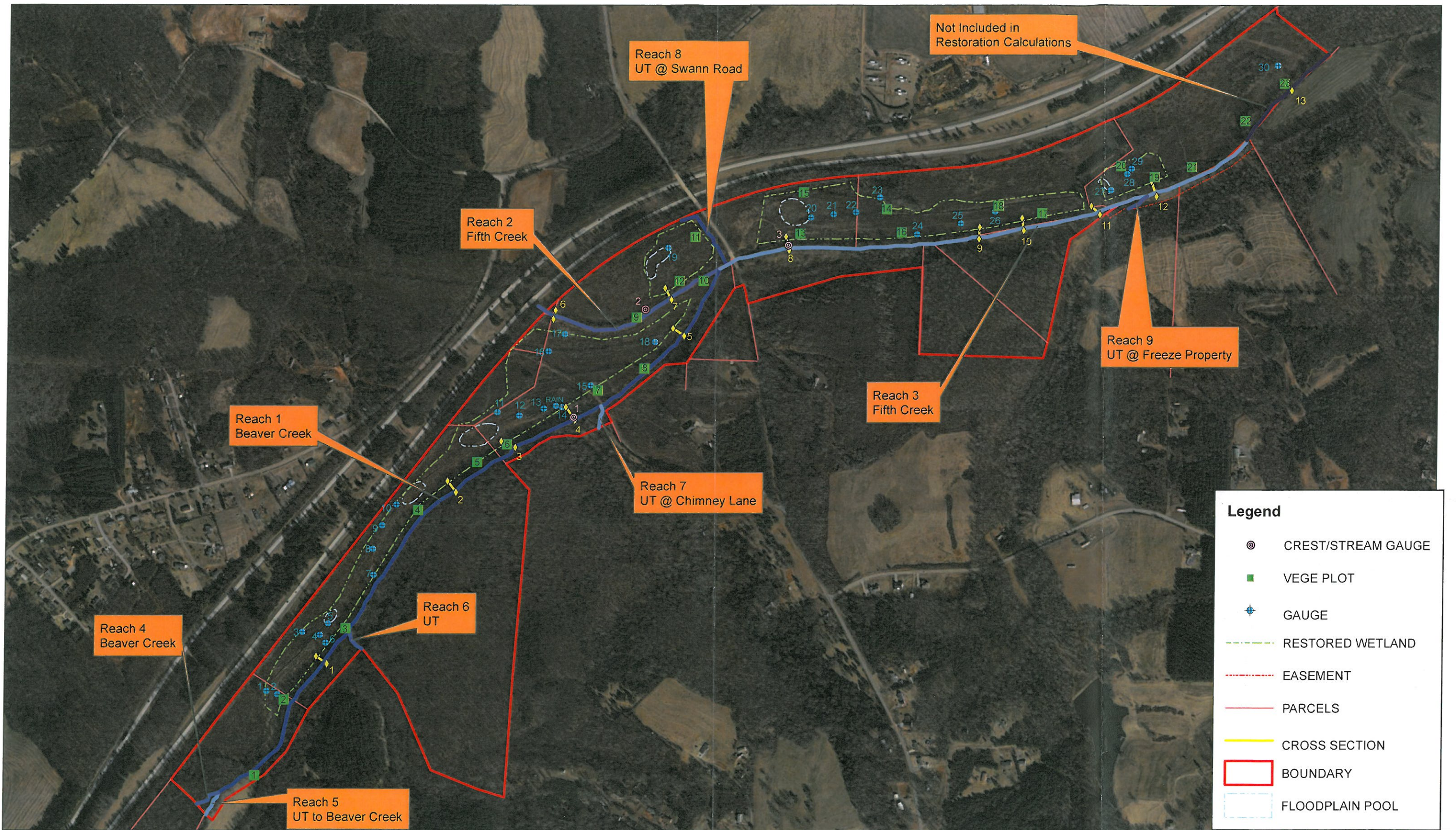


PROJECT COMPONENTS MAP

Five Mile Branch
 Stream and Wetland Restoration Site
 Iredell County, North Carolina

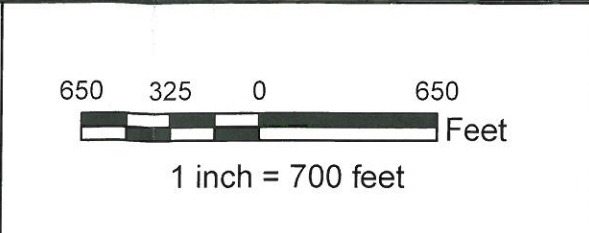
Figure No.

2



MONITORING DEVICES
 FIVE MILE BRANCH RESTORATION SITE
 IREDELL COUNTY, NORTH CAROLINA

Aerial: 2011 Bing Maps Aerial



Appendix A

Restoration Site Photographs -
Photo Points, Cross Sections,
Vegetation Plots

Photo Points

Beaver Creek



Photo Point 1. Boulder Vane 7/10/12



Photo Point 3. Looking downstream 7/10/12



Photo Point 1. Looking downstream 7/10/12



Photo Point 4. Floodplain looking east 7/10/12



Photo Point 2. Looking downstream 7/10/12



Photo Point 4. Boulder Vane 7/10/12

Beaver Creek



Photo Point 5. Cross Vane 7/10/12



Photo Point 7. Floodplain looking east 7/10/12



Photo Point 6. Boulder Vane 7/10/12



Photo Point 7. Floodplain looking west 7/10/12



Photo Point 7. Boulder Vane 7/10/12



Photo Point 8. Floodplain pool looking east 7/10/12

Beaver Creek



Photo Point 9. Cross Vane 7/10/12



Photo Point 10. Floodplain looking west 7/10/12



Photo Point 10. Cross Vane 7/10/12



Photo Point 11. Looking downstream 7/10/12



Photo Point 10. Floodplain looking east 7/10/12



Photo Point 12. Floodplain looking west 7/10/12

Beaver Creek



Photo Point 12. Floodplain pool looking east 7/10/12



Photo Point 14. Floodplain pool looking east 7/10/12



Photo Point 13. Floodplain pool looking west 7/10/12



Photo Point 15. Floodplain pool looking west 7/10/12



Photo Point 13. Floodplain looking west 7/10/12



Photo Point 15. Floodplain looking east 7/10/12

Beaver Creek



Photo Point 16. Looking downstream 7/10/12



Photo Point 17. Floodplain looking north 7/10/12



Photo Point 16. Looking upstream 7/10/12



Photo Point 17. Floodplain looking east 7/10/12



Photo Point 17. Floodplain looking west 7/10/12



Photo Point 18. Cross Vane 7/10/12

Beaver Creek



Photo Point 19. Boulder Vanes 7/10/12



Photo Point 20. Looking downstream 7/10/12



Photo Point 20. Looking upstream 7/10/12

Fifth Creek Upstream of Beaver Creek



Photo Point 21. Rootwads 7/10/12



Photo Point 23. Boulder Vane 7/10/12



Photo Point 21. Looking downstream 7/10/12



Photo Point 23. Fallen tree 7/10/12



Photo Point 22. Cross Vane 7/10/12



Photo Point 24. Rootwads 7/10/12

Fifth Creek Upstream of Beaver Creek



Photo Point 24. Looking downstream 7/10/12



Photo Point 26. Rootwads 7/10/12



Photo Point 25. Cross Vane 7/10/12



Photo Point 26. Floodplain looking downstream 7/10/12



Photo Point 25. Cross Vane. Left arm scour. 7/10/12



Photo Point 27. Floodplain pool looking west 7/10/12

Fifth Creek Upstream of Beaver Creek



Photo Point 28. Floodplain looking west 7/10/12

Fifth Creek Downstream of Beaver Creek



Photo Point 28. Confluence looking east 7/10/12



Photo Point 30. Cross Vane 7/11/12



Photo Point 29. Looking downstream 7/11/12



Photo Point 31. Floodplain pool looking northwest 7/10/12



Photo Point 29. Floodplain looking east 7/11/12



Photo Point 31. Floodplain looking east 7/10/12

Fifth Creek Downstream of Beaver Creek



Photo Point 32. Looking downstream 7/11/12



Photo Point 34. Boulder Vane 7/11/12



Photo Point 33. Floodplain looking west 7/10/12



Photo Point 35. Boulder Vane 7/11/12



Photo Point 34. Boulder Vane 7/11/12



Photo Point 35. Boulder Vane 7/11/12

Fifth Creek Downstream of Beaver Creek



Photo Point 36. Looking downstream 7/11/12



Photo Point 37. Floodplain looking east 7/10/12



Photo Point 36. Looking upstream 7/11/12



Photo Point 38. Cross Vane 7/11/12



Photo Point 37. Floodplain pool looking north 7/10/12



Photo Point 38. Looking south 7/11/12

Fifth Creek Downstream of Beaver Creek



Photo Point 39. Looking upstream 7/11/12



Photo Point 40 Cross Vane 7/11/12



Photo Point 39. Looking downstream 7/11/12



Photo Point 40. Looking downstream 7/11/12



Photo Point 39. Floodplain looking east 7/11/12



Photo Point 41. Floodplain looking west 7/11/12

Fifth Creek Downstream of Beaver Creek



Rack line on floodplain 5/30/2012



Rack line on floodplain 5/30/2012

Cross Section



Cross Section 1 5/29/2012



Cross Section 2 5/29/2012



Cross Section 2 5/29/2012



Cross Section 1 5/29/2012



Cross Section 3 5/30/2012



Cross Section 4 5/30/2012



Cross Section 3 5/30/2012



Cross Section 5 5/30/2012



Cross Section 4 5/30/2012



Cross Section 5 5/30/2012



Cross Section 6 5/30/2012



Cross Section 7 5/30/2012



Cross Section 6 5/30/2012



Cross Section 8 5/31/2012



Cross Section 7 5/30/2012



Cross Section 8 5/31/2012



Cross Section 9 5/31/2012



Cross Section 10 5/31/2012



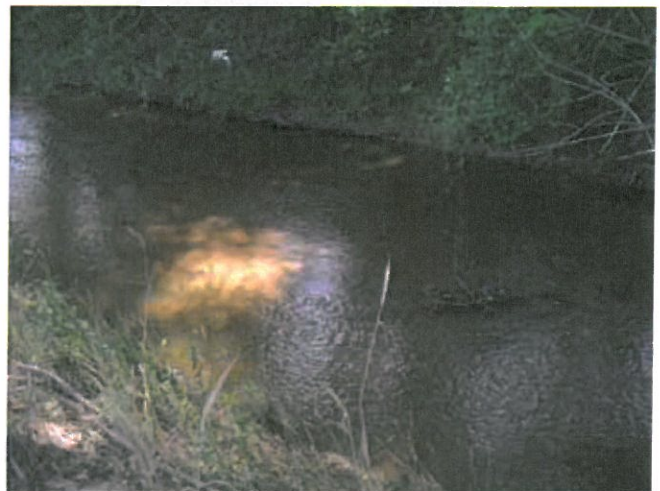
Cross Section 9 5/31/2012



Cross Section 11 5/31/2012



Cross Section 10 5/31/2012



Cross Section 11 5/31/2012



Cross Section 12

5/31/2012



Cross Section 13

5/31/2012



Cross Section 12

5/31/2012



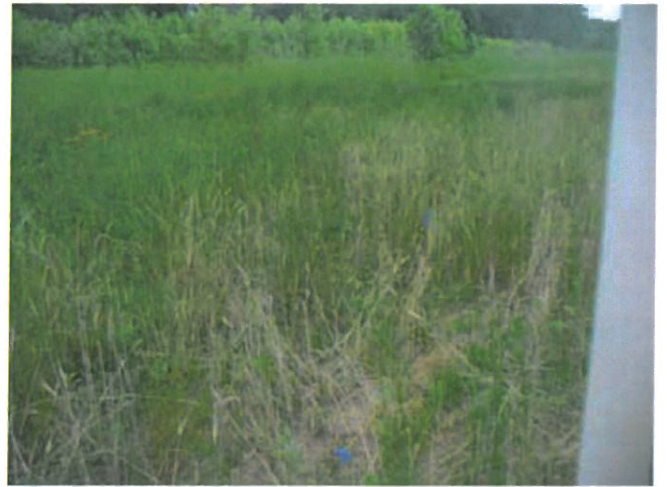
Cross Section 13

5/31/2012

**Vegetation Monitoring
Plots**



Vegetation Monitoring Plot #1 5/29/2012



Vegetation Monitoring Plot #4 5/29/2012



Vegetation Monitoring Plot #2 5/29/2012



Vegetation Monitoring Plot #5 5/30/2012



Vegetation Monitoring Plot #3 5/29/2012



Vegetation Monitoring Plot #6 5/30/2012



Vegetation Monitoring Plot #7 5/30/2012



Vegetation Monitoring Plot #10 5/30/2012



Vegetation Monitoring Plot #8 5/30/2012



Vegetation Monitoring Plot #11 5/30/2012



Vegetation Monitoring Plot #9 5/30/2012



Vegetation Monitoring Plot #12 5/30/2012



Vegetation Monitoring Plot #13 5/30/2012



Vegetation Monitoring Plot #16 5/31/2012



Vegetation Monitoring Plot #14 5/31/2012



Vegetation Monitoring Plot #17 6/1/2012



Vegetation Monitoring Plot #15 6/1/2012



Vegetation Monitoring Plot #18 5/31/2012



Vegetation Monitoring Plot #19 6/1/2012



Vegetation Monitoring Plot #22 6/1/2012



Vegetation Monitoring Plot #20 6/1/2012



Vegetation Monitoring Plot #23 6/1/2012



Vegetation Monitoring Plot #21 6/1/2012

Appendix B

Tables

**Table 1. Project Components and Mitigation Credits
Five Mile Branch Stream Restoration, EEP IMS ID# 92185**

Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	5,924.7	142.5	48.0	0.4	-	-	-	-	-
Project Components									
Project Component -or- Reach ID	Stationing/Location		Existing Footage/Acreage		Approach (PI, PII etc.)	Restoration - or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio	
Reach 1 - Beaver Creek	10+87.03 PRBVR to Fifth Creek		6,133.7		E II	R	5935.38*	2:1**	
Reach 2 - Fifth Creek upstream of Beaver Creek	I-40 to Beaver Creek		1,526.7		E II	R	1,526.7	2:1**	
Reach 3 - Fifth Creek downstream of Beaver Creek	Beaver Creek to 78+60.00 PRFTH		5,333.3		E II	R	4387.26*	2:1**	
Reach 4 - Beaver Creek (Upstream)	Property line to 10+87.03 PRBVR		193.0		Pres.	RE	193.0	10:1	
Reach 5 - UT to Beaver Creek (Upstream)	Property line to Beaver Creek		180.1		Pres.	RE	180.1	10:1	
Reach 6 - UT	Property line to Beaver Creek		220.4		Pres.	RE	220.4	10:1	
Reach 7 - UT at Chimney Lane	Property line to Beaver Creek		139.5		Pres.	RE	139.5	10:1	
Reach 8 - UT at Swann Road	Property line to Fifth Creek		520.0		Pres.	RE	520.0	10:1	
Reach 9 - UT at Freeze Property	Within the Conservation Easement		172.0		Pres.	RE	172.0	10:1	
Wetlands	Throughout the site		48.0		Rest.	R	48.0	1:1	
Wetlands	Throughout the site		1.9		Pres.	RE	1.9	5:1	
Component Summation									
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)			
		Riverine	Non-Riverine						
Restoration	N/A	48.0	N/A	N/A	N/A	N/A			
Enhancement		N/A	N/A	N/A	N/A	N/A			
Enhancement I	N/A								
Enhancement II	12,993.7								
Creation		N/A	N/A	N/A		N/A			
Preservation	1,425.0	1.9	N/A	N/A		N/A			
High Quality Preservation	N/A	N/A	N/A	N/A		N/A			

* Difference between existing and restoration footage is due to a section of stream preservation at the the upstream limit of the project and the absence of ownership of both side of the stream at the downstream limit of the project.

**due to the near systemic nature of the improvement to the channel cross-section and the localized improvements to the profile/in-stream habitat, a credit ratio of 2.0:1 is being used.

**Table 2. Project Activity and Reporting History
Five Mile Branch Stream Restoration, EEP IMS ID# 92185**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	Dec-09	Dec-09
Final Design – Construction Plans	Nov-10	Nov-10
Construction	Apr-11	Apr-12
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Jun-12	Mar-13
Year 1 Monitoring	-	-
Year 2 Monitoring	-	-
Year 3 Monitoring	-	-
Year 4 Monitoring	-	-

**Table 3. Project Contacts Table
Five Mile Branch Stream Restoration, EEP IMS ID# 92185**

Designer	ARCADIS G&M of NC, Inc. 801 Corporate Center Dr., Suite 300, Raleigh NC 27607
Primary project design POC	Robert Lepsic 919-854-9812
Construction Contractor	North State Environmental 2889 Lowery Street, Winston Salem, NC 27101
Construction contractor POC	Michael Anderson 336-245-1253
Survey Contractor	North State Environmental 2889 Lowery Street, Winston Salem, NC 27101
Survey contractor POC	David K. Alley, PLS 336-250-9225
Planting Contractor	Southern Garden, Inc. PO Box 808, Apex, NC 27502
Planting contractor POC	Todd Laasko 919-362-1050
Seeding Contractor	Canady's Landscape and Erosion Control 256 Fairview Acres Road, Lexington NC 27295
Contractor point of contact	336-236-1182
Seed Mix Sources	Green Resource, Colfax, NC 27235 336-855-6363
Nursery Stock Suppliers	Foggy Mountain Nursery 336-384-5323 Claridge Nursery 919-731-7988 Brook Run Plantation 434-292-1677
Monitoring Performers Baseline and Year One	ARCADIS G&M of NC, Inc 801 Corporate Center Dr., Suite 300, Raleigh NC 27607
Stream Monitoring POC	Robert Lepsic 919-854-9812
Vegetation Monitoring POC	Robert Lepsic 919-854-9812
Wetland Monitoring POC	Robert Lepsic 919-854-9812

Table 4. Project Baseline Information and Attributes
Five Mile Branch Stream Restoration, EEP IMS ID# 92185

Project Information			
Project Name	Five Mile Branch Stream and Wetland Restoration		
County	Iredell		
Project Area (acres)	229		
Project Coordinates (latitude and longitude)	035° 50' 40.18" N	080° 46' 27.37" W	
Project Watershed Summary Information			
Physiographic Province	Piedmont		
River Basin	Yadkin-Pee Dee		
USGS Hydrologic Unit 8-digit		3040102	
DWQ Sub-basin	03-07-06		
Project Drainage Area (acres)	26		
Project Drainage Area Percentage of Impervious Area	10-20		
CGIA Land Use Classification	Heavily developed, cultivated, herbaceous and shrubland, forest land, water bodies		
Reach Summary Information			
Parameters	Reach 1	Reach 2	Reach 3
Length of reach (linear feet)	6,134	1,527	5,333
Valley classification	VIII	VIII	VIII
Drainage area (acres)	10.7 mi	13.9 mi	26.0 mi
NCDWQ stream identification score	12-108-13-1	12-108-13	12-108-13
NCDWQ Water Quality Classification	Class C	Class C	Class C
Morphological Description (stream type)	E5	E5	E5
Evolutionary trend			
Underlying mapped soils	Codorus loam	Codorus loam	Codorus loam
Drainage class	somewhat poorly drained	somewhat poorly drained	somewhat poorly drained
Soil Hydric status	Yes	Yes	Yes
Slope	0-2%	0-2%	0-2%
FEMA classification	Zone AE	Zone AE	Zone AE

Native vegetation community	Bottomland hardwood	Bottomland hardwood	Bottomland hardwood
Percent composition of exotic invasive vegetation	<5	<5	<5
Wetland Summary Information			
Parameters	Wetland 1	Wetland 2	Wetland 3
Size of Wetland (acres)	48.0		
Wetland Type (non-riparian, riparian riverine or riparian non-riparian)	Riparian riverine		
Mapped Soii Series	Codorus loam		
Drainage class	somewhat poorly drained		
Soil Hydric Status	Yes		
Source of Hydrology	groundwater, precipitation and overbank flooding		
Hydrologic Impairment	Ditching		
Native vegetation community	Bottomland hardwood		
Percent composition of exotic invasive vegetation	<5		
Regulatory Considerations			
Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States — Section 404	Yes	Yes	Restoration Plan
Waters of the United States — Section 401	Yes	Yes	Restoration Plan
Endangered Species Act	Yes	Yes	Restoration Plan
Historic Preservation Act	Yes	Yes	Restoration Plan
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	Restoration Plan
Essential Fisheries Habitat	No	N/A	N/A

Exhibit Table 5a. Baseline Stream Data Summary
Five Mile Branch Stream Restoration, EEP IMS ID# 92185 Segment/Reach: Reach 1 Beaver Creek 5,622 feet

Parameter	Gauge ³	Regional Curve	Pre-Existing Condition							References Reach(es) Data ¹						Design			As-Built / Baseline ²					
			Equation	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Max	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																								
Bankfull Width (ft)	51.0	41.9*	20.2	26.7	26.3	35.2	4.3	48	N/A	N/A	N/A	N/A	N/A	20.7	27.6	38.8	24.1	29.5	26.3	38.1	7.5	3		
Floodprone Width (ft)			100.0	180.0	-	250.0	-	-	N/A	N/A	N/A	N/A	N/A	100.0	180.0	250.0	-	>200	-	-	0.0	3		
Bankfull Mean Depth (ft)	2.7	2.2*	3.3	4.5	4.5	5.9	0.5	48	N/A	N/A	N/A	N/A	N/A	3.3	4.2	5.0	3.5	4.2	4.4	4.7	0.6	3		
Bankfull Max Depth (ft)	3.3		5.0	6.9	6.9	8.1	0.7	48	N/A	N/A	N/A	N/A	N/A	4.6	5.9	7.2	6.4	6.8	7.0	7.1	4.0	3		
Bankfull Cross Sectional Area (ft ²)	139.3	92.9**	79.7	119.4	116.9	176.0	22.9	48	N/A	N/A	N/A	N/A	N/A	75.0	115.5	163.2	105.4	121.1	124.5	133.4	14.3	3		
Width/Depth Ratio	18.8		4.4	6.0	5.9	9.1	1.2	48	N/A	N/A	N/A	N/A	N/A	5.1	6.6	9.5	5.5	7.3	5.6	10.9	3.1	3		
Entrenchment Ratio	1.4		4.6	8.2	-	10.9	-	-	N/A	N/A	N/A	N/A	N/A	3.6	6.4	9.0	5.2	7.0	7.6	8.3	1.6	3		
Bank Height Ratio	1.4		1.0	1.2	-	1.5	-	-	N/A	N/A	N/A	N/A	N/A	-	1.0	-	-	1.0	-	-	0.0	3		
d50 (mm)			-	0.2	-	-	-	-	N/A	N/A	N/A	N/A	N/A											
Profile																								
Riffle Length (ft)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-		
Riffle Slope (ft)			0.0	0.0020	0.0014	0.0094	0.003	26	N/A	N/A	N/A	N/A	N/A	0.0	0.0020	0.0094	-	-	-	-	-	-		
Pool Length (ft)			5.5	25.7	19.1	161.9	27.5	34	N/A	N/A	N/A	N/A	N/A	5.5	25.7	161.9	-	-	-	-	-	-		
Pool Max Depth (ft)			4.7	6.7	6.6	7.8	0.9	13	N/A	N/A	N/A	N/A	N/A	4.7	6.7	7.8	4.3	4.3	4.3	4.3	0	2		
Pool Spacing (ft)			20.6	176.7	19.1	748.9	27.5	34	N/A	N/A	N/A	N/A	N/A	20.6	176.7	748.9	-	-	-	-	-	-		
Pool Cross Sectional Area (ft ²)			80.9	100.6	-	119.8	-	-	N/A	N/A	N/A	N/A	N/A	80.9	100.6	119.8	74.4	40.4	40.4	52.1	16.5	2		
Pattern																								
Channel Beltwidth (ft)			47.0	235.0	-	443.0	-	-	N/A	N/A	N/A	N/A	N/A	47.0	235.0	443.0	47.0	235.0	-	443.0	-	-		
Radius of Curvature (ft)			60.0	3527.0	-	14000.0	-	-	N/A	N/A	N/A	N/A	N/A	60.0	3527.0	14000.0	60.0	3527.0	-	14000.0	-	-		
Rc: Bankfull Width (ft/ft)			2.7	161.8	-	642.2	-	-	N/A	N/A	N/A	N/A	N/A	2.2	127.8	507.2	2.2	127.8	-	507.2	-	-		
Meander Wavelength (ft)			575.0	1380.0	-	2132.0	-	-	N/A	N/A	N/A	N/A	N/A	575.0	1380.0	2132.0	575.0	1380.0	-	2132.0	-	-		
Meander Width Ratio			26.3	63.3	-	97.8	-	-	N/A	N/A	N/A	N/A	N/A	20.8	50.0	77.2	20.8	50.0	-	77.2	-	-		
Substrate, bed and transport parameters																								
Ri% / Ru% / P% / G% / S%																								
SC% / Sa% / G.% / C% / B% / Be%																								
d16 / d35 / d50 / d84 / d95 / di ^p / di ^{sp} (mm)						> 2.0 mm																		
Reach Shear Stress (competency) lb/ft ²						0.43									0.35					0.31				
Max part size (mm) mobilized at bankfull						33.0									24.0					22.7				
Stream power (transport capacity) W/m ²						1.58									1.3					1.29				
Additional Reach Parameters																								
Drainage Area (SM)						10.76																		
Impervious cover estimate (%)						10-20																		
Rosgen Classification		B				E5									E5					E5				
Bankfull Velocity (fps)		3.9	4.1***			3.8									3.7					3.6				
Bankfull Discharge (cfs)		539.9	379.2**			453.7																		
Valley length (ft)						-																		
Channel Thalweg length (ft)						-																		
Sinuosity (ft)						1.07									1.07					1.07				
Water Surface Slope (Channel) (ft/ft)		0.0032				0.0016									0.0016					0.0014				
BF slope (ft/ft)		-				-									-					-				
Bankfull Floodplane Area (acres)						-									-					-				
Additional Reach Parameters																								
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						-																		

* NC Rural Mountain and Piedmont Regional Curve, Surry County NRCS, Draft 1/27/2010

** NC Rural Mountain and Piedmont Regional Curve, Surry County NRCS, Draft 3/16/2006

***Bankfull Discharge/Bankfull Cross Sectional Area

1 A singulare reference stream was not used to design the Enhancement Level II project.

2 As built profile parameters not calculated for Enhancement Level II

Exhibit Table 5b. Baseline Stream Data Summary
Five Mile Branch Stream Restoration, EEP IMS ID# 92185 Segment/Reach: Reach 2 Fifth Creek upstream of Beaver Creek 1,251 feet

Parameter	Gauge ³	Regional Curve	Pre-Existing Condition							References Reach(es) Data ¹					Design			As-Built / Baseline ²					
			Equation	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Max	Min	Mean	Med	Max	SD
Dimension and Substrate - Riffle																							
Bankfull Width (ft)	51.0	46.0*	23.9	30.7	30.3	40.3	4.8	11	N/A	N/A	N/A	N/A	N/A	N/A	25.1	29.0	33.0	-	24.2	-	-	-	1
Floodprone Width (ft)			-	>200.0	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	>200.0	-	-	>200.0	-	-	-	1
Bankfull Mean Depth (ft)	2.7	2.3*	3.8	4.2	4.2	5.0	0.4	11	N/A	N/A	N/A	N/A	N/A	N/A	3.8	4.1	4.6	-	4.3	-	-	-	1
Bankfull Max Depth (ft)	3.3		6.7	7.8	7.9	9.1	0.6	11	N/A	N/A	N/A	N/A	N/A	N/A	6.4	7.4	8.3	-	7.7	-	-	-	1
Bankfull Cross Sectional Area (ft ²)	139.3	112.5**	94.0	130.1	128.2	176.4	4.8	11	N/A	N/A	N/A	N/A	N/A	N/A	104.5	119.7	144.7	-	104.2	-	-	-	1
Width/Depth Ratio	18.8		5.3	7.0	7.1	8.4	1.0	11	N/A	N/A	N/A	N/A	N/A	N/A	5.5	7.0	8.6	-	5.6	-	-	-	1
Entrenchment Ratio	1.4		-	6.5	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	6.5	-	-	8.3	-	-	-	1
Bank Height Ratio	1.4		1.1	1.1	-	1.2	-	-	N/A	N/A	N/A	N/A	N/A	N/A	1.0	1.0	1.0	-	1.0	-	-	-	1
d50 (mm)			-	0.2	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A									
Profile																							
Riffle Length (ft)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-
Riffle Slope (ft)			0.0009	0.0010	0.0010	0.0011	0.0001	2	N/A	N/A	N/A	N/A	N/A	N/A	0.0009	0.0010	0.0011	-	-	-	-	-	-
Pool Length (ft)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	81.2	112.8	144.3	-	-	-	-	-	-
Pool Max Depth (ft)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	7.5	7.8	8.0	-	7.2	-	-	-	1
Pool Spacing (ft)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	272.0	297.0	322.0	-	-	-	-	-	-
Pool Cross Sectional Area (ft ²)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	104.5	119.7	144.7	-	136.3	-	-	-	1
Pattern																							
Channel Beltwidth (ft)			48.0	639.0	-	1566.0	-	-	N/A	N/A	N/A	N/A	N/A	N/A	48.0	639.0	1566.0	48.0	639.0	-	1566.0	-	-
Radius of Curvature (ft)			1275.0	2693.0	-	3800.0	-	-	N/A	N/A	N/A	N/A	N/A	N/A	1275.0	2693.0	3800.0	1275.0	2693.0	-	3800.0	-	-
Rc: Bankfull Width (ft/ft)			49.6	104.8	-	147.8	-	-	N/A	N/A	N/A	N/A	N/A	N/A	49.6	104.8	147.8	49.6	104.8	-	147.8	-	-
Meander Wavelength (ft)			4464.0	4618.0	-	4771.0	-	-	N/A	N/A	N/A	N/A	N/A	N/A	4464.0	4618.0	4771.0	4464.0	4618.0	-	4771.0	-	-
Meander Width Ratio			173.7	179.7	-	185.6	-	-	N/A	N/A	N/A	N/A	N/A	N/A	173.7	179.7	185.6	173.7	179.7	-	185.6	-	-
Substrate, bed and transport parameters																							
Ri% / Ru% / P% / G% / S%																		-	-	-	-	-	-
SC% / Sa% / G.% / C% / B% / Be%																							
d16 / d35 / d50 / d84 / d95 / di ^P / di ^{SP} (mm)																							
Reach Shear Stress (competency) lb/ft ²																							
Max part size (mm) mobilized at bankfull																							
Stream power (transport capacity) W/m ²																							
Additional Reach Parameters																							
Drainage Area (SM)																							
Impervious cover estimate (%)																							
Rosgen Classification	B																						
Bankfull Velocity (fps)	3.9	4.1***																					
Bankfull Discharge (cfs)	539.9	466.8**																					
Valley length (ft)																							
Channel Thalweg length (ft)																							
Sinuosity (ft)																							
Water Surface Slope (Channel) (ft/ft)	0.0032																						
BF slope (ft/ft)	-																						
Bankfull Floodplane Area (acres)																							
Additional Reach Parameters																							
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																							

* NC Rural Mountain and Piedmont Regional Curve, Surry County NRCS, Draft 1/27/2010

** NC Rural Mountain and Piedmont Regional Curve, Surry County NRCS, Draft 3/16/2006

***Bankfull Discharge/Bankfull Cross Sectional Area

1 A singular reference stream was not used to design the Enhancement Level II project.

2 As built profile parameters not calculated for Enhancement Level II

Exhibit Table 5c. Baseline Stream Data Summary
Five Mile Branch Stream Restoration, EEP IMS ID# 92185 Segment/Reach: Reach 3 Fifth Creek downstream of Beaver Creek 4.377 feet

Parameter	Gauge ³	Regional Curve	Pre-Existing Condition						References Reach(es) Data ¹						Design			As-Built / Baseline ²						
			Equation	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																								
Bankfull Width (ft)	51	58*	27.9	35.6	34.7	44.1	3.9	27	N/A	N/A	N/A	N/A	N/A	N/A	26.3	33.4	40.8	28.4	34.1	32.2	41.7	6.9	3	
Floodprone Width (ft)			250	316.7	-	400.0	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	>200.0	-	-	>200.0	-	-	-	-	
Bankfull Mean Depth (ft)	2.7	2.8*	4.5	5.3	5.1	6.8	0.5	27	N/A	N/A	N/A	N/A	N/A	N/A	4.0	4.7	5.7	4.0	4.3	4.1	4.7	0.4	3	
Bankfull Max Depth (ft)	3.3		5.8	7.6	7.2	9.3	0.7	27	N/A	N/A	N/A	N/A	N/A	N/A	5.1	6.5	7.8	5.6	6.3	6.3	7.1	0.8	3	
Bankfull Cross Sectional Area (ft ²)	139.3	179.2**	192.6	202.5	175.5	222.2	22	27	N/A	N/A	N/A	N/A	N/A	N/A	120.3	157.8	202.7	115.3	143.5	150.2	165.2	25.6	3	
Width/Depth Ratio	18.8		4.7	6.6	6.8	8.2	1.0	25	N/A	N/A	N/A	N/A	N/A	N/A	5.2	7.1	8.8	6.9	8.1	6.9	10.4	2	3	
Entrenchment Ratio	1.4		7.1	8.6	-	10.8	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	>6.5	-	4.8	6.0	6.2	7.0	1.1	3	
Bank Height Ratio	1.4		1.3	1.5	-	1.7	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	1.0	-	1.0	1.0	1.0	1.0	0	3	
d50 (mm)			-	0.2	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A										
Profile																								
Riffle Length (ft)			-	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	
Riffle Slope (ft)			0.0	0.0017	0.002	0.004	0	18	N/A	N/A	N/A	N/A	N/A	N/A	0.0022	0.0026	0.003	-	-	-	-	-	-	
Pool Length (ft)			15.2	30	27.5	69.8	15	19	N/A	N/A	N/A	N/A	N/A	N/A	81.2	112.8	144.3	-	-	-	-	-	-	
Pool Max Depth (ft)			8	9.4	9.5	11.4	1.1	15	N/A	N/A	N/A	N/A	N/A	N/A	7.5	7.8	8.0	6.1	6.4	6.2	7.0	0.5	3	
Pool Spacing (ft)			62.3	256.3	150.6	1206	298	18	N/A	N/A	N/A	N/A	N/A	N/A	272.0	297.0	322.0	-	-	-	-	-	-	
Pool Cross Sectional Area (ft ²)			-	199.0	-	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	120.3	157.8	202.7	148.3	169.9	152.2	209.2	34.1	3	
Pattern																								
Channel Beltwidth (ft)			48	639	-	1556	-	-	N/A	N/A	N/A	N/A	N/A	N/A	48	639	1556	48	639	-	1556	-	-	
Radius of Curvature (ft)			1275	2693	-	3800	-	-	N/A	N/A	N/A	N/A	N/A	N/A	1275	2693	3800	1275	2693	-	3800	-	-	
Rc: Bankfull Width (ft/ft)			34.7	73.4	-	103.5	-	-	N/A	N/A	N/A	N/A	N/A	N/A	49.6	73.4	113.8	38.2	80.6	-	113.8	-	-	
Meander Wavelength (ft)			4464	4618	-	4771	-	-	N/A	N/A	N/A	N/A	N/A	N/A	4464	4618	4771	4464	4618	-	4771	-	-	
Meander Width Ratio			121.6	125.8	-	130	-	-	N/A	N/A	N/A	N/A	N/A	N/A	173.7	125.8	46.9	1.4	19.1	-	46.9	-	-	
Substrate, bed and transport parameters																								
Ri% / Ru% / P% / G% / S%																								
SC% / Sa% / G.% / C% / B% / Be%																								
d16 / d35 / d50 / d84 / d95 / d ₁₀ ⁹⁵ (mm)						> 2.0 mm																		
Reach Shear Stress (competency) lb/ft ²						0.46										0.35					0.36			
Max part size (mm) mobilized at bankfull						35										20					27.1			
Stream power (transport capacity) W/m ²						2.76										1.06					1.49			
Additional Reach Parameters																								
Drainage Area (SM)						26.05																		
Impervious cover estimate (%)						10-20																		
Rosgen Classification	B					E5										E5					E5			
Bankfull Velocity (fps)	3.9	4.3***				5.2										3.9					3.7			
Bankfull Discharge (cfs)	539.9	772.1**				1166.3																		
Valley length (ft)						-																		
Channel Thalweg length (ft)						-																		
Sinuosity (ft)						1.04										1.04					1.04			
Additional Reach Parameters																								
BF slope (ft/ft)	-					-										-					-			
Bankfull Floodplane 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						-										-					-			

* NC Rural Mountain and Piedmont Regional Curve, Surry County NRCS, Draft 1/27/2010
** NC Rural Mountain and Piedmont Regional Curve, Surry County NRCS, Draft 3/16/2006
***Bankfull Discharge/Bankfull Cross Sectional Area
1 A singular reference stream was not used to design the Enhancement Level II project.
2 As built profile parameters not calculated for Enhancement Level II

**Exhibit Table 6. Morphology and Hydraulic Monitoring Summary (Dimensional Parameters -- Cross Section)
Five Mile Branch Stream Restoration, EEP IMS ID# 92185 Segment/Reach: Reach 1 Beaver Creek 5,622 feet**

Dimension and substrate	Cross Section 1 (Riffle)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)						
	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+
Based on fixed baseline bankfull elevation																																			
Bankfull Width (ft)	26.3							38.1							28.7							24.1							52.1						
Floodprone Width (ft)	200.0							200.0							200.0							200.0							200.0						
Bankfull Mean Depth (ft)	4.7							3.5							2.6							4.4							1.8						
Bankfull Max Depth (ft)	7.1							6.4							4.3							7.0							4.3						
Bankfull Cross Sectional Area (ft ²)	124.5							133.4							74.4							105.4							95.3						
Bankfull Width/Depth Ratio	5.6							10.9							11.0							5.5							28.9						
Bankfull Entrenchment Ratio	7.6							5.2							7.0							8.3							3.8						
Bankfull Bank Height Ratio	1.0							1.0							1.0							1.0							1.0						
Based on current/developing bankfull feature																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)	0.2							0.2							0.2							0.2							0.2						
	Cross Section # (##)							Cross Section # (##)							Cross Section # (##)							Cross Section # (##)							Cross Section # (##)						
Based on fixed baseline bankfull elevation	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)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Based on current/developing bankfull feature																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)																																			

**Exhibit Table 6. Morphology and Hydraulic Monitoring Summary (Dimensional Parameters -- Cross Section)
Five Mile Branch Stream Restoration, EEP IMS ID# 92185 Segment/Reach: Reach 2 Fifth Creek upstream of Beaver Creek 1,251**

Dimension and substrate	Cross Section 6 (Pool)							Cross Section 7 (Riffle)							Cross Section # (##)							Cross Section # (##)							Cross Section # (##)						
	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+
Based on fixed baseline bankfull elevation																																			
Bankfull Width (ft)	34.2						24.2																												
Floodprone Width (ft)	200.0						200.0																												
Bankfull Mean Depth (ft)	4.0						4.3																												
Bankfull Max Depth (ft)	7.2						7.7																												
Bankfull Cross Sectional Area (ft ²)	136.3						104.2																												
Bankfull Width/Depth Ratio	8.6						5.6																												
Bankfull Entrenchment Ratio	5.8						8.3																												
Bankfull Bank Height Ratio	1.0						1.0																												
Based on current/developing bankfull feature																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)	0.2						0.2																												
Based on fixed baseline bankfull elevation																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Based on current/developing bankfull feature																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft ²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft ²)																																			
d50 (mm)																																			

**Exhibit Table 6. Morphology and Hydraulic Monitoring Summary (Dimensional Parameters -- Cross Section)
 Five Mile Branch Stream Restoration, EEP IMS ID# 92185 Segment/Reach: Reach 3 Fifth Creek downstream of Beaver Creek**

Dimension and substrate	Cross Section 8 (Riffle)							Cross Section 9 (Pool)							Cross Section 10 (Riffle)							Cross Section 11 (Riffle)							Cross Section 12 (Pool)						
	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+
Based on fixed baseline bankfull elevation																																			
Bankfull Width (ft)	32.2							33.7							28.4							41.7							36.6						
Floodprone Width (ft)	200.0							200.0							200.0							200.0							200.0						
Bankfull Mean Depth (ft)	4.7							4.4							4.1							4.0							4.2						
Bankfull Max Depth (ft)	7.1							6.1							5.6							6.3							6.2						
Bankfull Cross Sectional Area (ft²)	150.2							148.3							115.3							165.1							152.2						
Bankfull Width/Depth Ratio	6.9							7.7							6.9							10.4							8.8						
Bankfull Entrenchment Ratio	6.2							5.9							7.0							4.8							5.5						
Bankfull Bank Height Ratio	1.0							1.0							1.0							1.0							1.0						
Based on current/developing bankfull feature																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft²)																																			
d50 (mm)	0.2							0.2							0.2							0.2							0.2						
	Cross Section 13 (Pool)							Cross Section # (##)							Cross Section # (##)							Cross Section # (##)							Cross Section # (##)						
Based on fixed baseline bankfull elevation	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)	40.1																																		
Floodprone Width (ft)	200.0																																		
Bankfull Mean Depth (ft)	5.2																																		
Bankfull Max Depth (ft)	7.0																																		
Bankfull Cross Sectional Area (ft²)	209.2																																		
Bankfull Width/Depth Ratio	7.7																																		
Bankfull Entrenchment Ratio	5.0																																		
Bankfull Bank Height Ratio	1.0																																		
Based on current/developing bankfull feature																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft²)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft²)																																			
d50 (mm)	0.2																																		

EEP Project Code 29185. Project Name: Five Mile Branch

Scientific Name	Common Name	Species Type	29185-01-0001			29185-01-0002			29185-01-0003			29185-01-0004			29185-01-0005			29185-01-0006			29185-01-0007			29185-01-0008		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																								
Alnus serrulata	hazel alder	Shrub																								
Betula nigra	river birch	Tree														3	3	3				1	1	1		
Carpinus caroliniana	American hornbeam	Tree				1	1	1				1	1	1												
Celtis laevigata	sugarberry	Tree							2	2	2	2	2	2												
Cornus amomum	silky dogwood	Shrub										2	2	2	1	1	1	1	1	1	1	1	1	1	1	
Fraxinus pennsylvanica	green ash	Tree				1	1	1																		
Ilex decidua	possumhaw	Shrub	1	1	1	1	1	1				2	2	2				3	3	3	4	4	4			
Juglans nigra	black walnut	Tree				1	1	1	2	2	2	1	1	1	1	1	1	2	2	2						
Morus rubra	red mulberry	Tree															1	1	1							
Nyssa sylvatica	blackgum	Tree																								
Platanus occidentalis	American sycamore	Tree				1	1	1															1	1	1	
Quercus michauxii	swamp chestnut oak	Tree	9	9	9															5	5	5				
Quercus pagoda	cherrybark oak	Tree				2	2	2	4	4	4				2	2	2	3	3	3						
Quercus phellos	willow oak	Tree				1	1	1							1	1	1									
Sambucus canadensis	common elderberry	Shrub																								
Stem count			10	10	10	8	8	8	8	8	8	8	8	8	5	5	5	13	13	13	10	10	10	2	2	2
size (ares)			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		
Species count			2	2	2	7	7	7	3	3	3	5	5	5	4	4	4	6	6	6	3	3	3	2	2	2
Stems per ACRE			404.7	404.7	404.7	323.7	323.7	323.7	323.7	323.7	323.7	323.7	323.7	323.7	202.3	202.3	202.3	526.1	526.1	526.1	404.7	404.7	404.7	80.94	80.94	80.94

* Plot not planted. Area not disturbed by construction activities. All stems pre-existing

Current Plot Data (MY0 2012)

Scientific Name	Common Name	Species Type	29185-01-0009			29185-01-0010			29185-01-0011			29185-01-0012			29185-01-0013			29185-01-0014			29185-01-0015			29185-01-0016					
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
Acer negundo	boxelder	Tree																											
Alnus serrulata	hazel alder	Shrub																											
Betula nigra	river birch	Tree	4	4	4	1	1	1				1	1	1				1	1	1	3	3	3	1	1	1			
Carpinus caroliniana	American hornbeam	Tree	1	1	1																			1	1	1			
Celtis laevigata	sugarberry	Tree	1	1	1																								
Cornus amomum	silky dogwood	Shrub	1	1	1	1	1	1	1	1	1	1	1	1										1	1	1			
Fraxinus pennsylvanica	green ash	Tree																						1	1	1			
Ilex decidua	possumhaw	Shrub							2	2	2										1	1	1						
Juglans nigra	black walnut	Tree	1	1	1																1	1	1	2	2	2			
Morus rubra	red mulberry	Tree													1	1	1				1	1	1						
Nyssa sylvatica	blackgum	Tree																											
Platanus occidentalis	American sycamore	Tree				1	1	1							1	1	1												
Quercus michauxii	swamp chestnut oak	Tree				1	1	1																					
Quercus pagoda	cherrybark oak	Tree	6	6	6													2	2	2									
Quercus phellos	willow oak	Tree	1	1	1				2	2	2				1	1	1							1	1	1			
Sambucus canadensis	common elderberry	Shrub				1	1	1							1	1	1				2	2	2						
Stem count			15	15	15	5	5	5	5	5	5	2	2	2	4	4	4	3	3	3	8	8	8	7	7	7			
size (ares)			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					
Species count			7	7	7	5	5	5	3	3	3	2	2	2	4	4	4	2	2	2	5	5	5	6	6	6			
Stems per ACRE			607	607	607	202.3	202.3	202.3	202.3	202.3	202.3	80.94	80.94	80.94	161.9	161.9	161.9	121.4	121.4	121.4	323.7	323.7	323.7	283.3	283.3	283.3			

* Plot not planted. Area not disturbed by construction activities. All

EEP Project Code 29185. Project Name: Five Mile Branch

Scientific Name	Common Name	Species Type	Annual Means																								
			29185-01-0017*			29185-01-0018			29185-01-0019			29185-01-0020			29185-01-0021			29185-01-0022			29185-01-0023			MY0 (2012)			
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	
Acer negundo	boxelder	Tree		1	1																				1		
Alnus serrulata	hazel alder	Shrub							2	2	2														2	2	2
Betula nigra	river birch	Tree		31	31							3	3	3				1	1	1					19	19	50
Carpinus caroliniana	American hornbeam	Tree																							4	4	4
Celtis laevigata	sugarberry	Tree		4	4																				5	5	9
Cornus amomum	silky dogwood	Shrub												3	3	3									13	13	13
Fraxinus pennsylvanica	green ash	Tree		1	1																				2	2	3
Ilex decidua	possumhaw	Shrub																							14	14	14
Juglans nigra	black walnut	Tree				1	1	1										3	3	3					15	15	15
Morus rubra	red mulberry	Tree																							3	3	3
Nyssa sylvatica	blackgum	Tree																2	2	2					2	2	2
Platanus occidentalis	American sycamore	Tree		32	32									1	1	1									5	5	37
Quercus michauxii	swamp chestnut oak	Tree																							15	15	15
Quercus pagoda	cherrybark oak	Tree																2	2	2	3	3	3		24	24	24
Quercus phellos	willow oak	Tree							1	1	1				1	1	1				1	1	1		10	10	10
Sambucus canadensis	common elderberry	Shrub										1	1	1											5	5	5
Stem count			0	69	69	1	1	1	3	3	3	4	4	4	5	5	5	8	8	8	4	4	4		138	138	207
size (ares)			1			1			1			1			1			1			1			23			
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.57			
Species count			0	5	5	1	1	1	2	2	2	2	2	2	3	3	3	4	4	4	2	2	2		15	15	16
Stems per ACRE			0	2792	2792	40.47	40.47	40.47	121.4	121.4	121.4	161.9	161.9	161.9	202.3	202.3	202.3	323.7	323.7	323.7	161.9	161.9	161.9		242.8	242.8	364.2

* Plot not planted. Area not disturbed by construction activities. All

Appendix C

Vegetation Data

Report Prepared By Robert Lepsic
Date Prepared 1/29/2013 15:33

database name cvs-eep-entrytool-v2.3.1.mdb
database location C:\Users\rleptic\Documents
computer name NC01L-R8Y1RH8
file size 60067840

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 29185
project Name Five Mile Branch
Description Five Mile Branch Stream and Wetland Restoration Project
River Basin Catawba
length(ft)
stream-to-edge width (ft)
area (sq m)
Required Plots (calculated)
Sampled Plots 23

Living planted stems, excluding live stakes, per acre: Negative (red) numbers indicate the project failed to reach requirements in a particular year.

Project Code	Project Name	River Basin	Year 0 (baseline)
29185	Five Mile Branch	Catawba	-241.051883

Total stems, including planted stems of all kinds (including live stakes) and natural/volunteer stems:

Project Code	Project Name	River Basin	Year 0 (baseline)
29185	Five Mile Branch	Catawba	362.4575759

plot	Plot Level	Year	Latitude/Northing	Longitude/Easting	Zone	Datum
29185-01-0001	1	0	35.834831	-80.780312	17	NAD83/WGS84
29185-01-0010	1	0	35.845500	-80.768982	17	NAD83/WGS84
29185-01-0011	1	0	35.846394	-80.769189	17	NAD83/WGS84
29185-01-0012	1	0	35.845491	-80.769591	17	NAD83/WGS84
29185-01-0013	1	0	35.846549	-80.766427	17	NAD83/WGS84
29185-01-0014	1	0	35.847007	-80.764165	17	NAD83/WGS84
29185-01-0015	1	0	35.847445	-80.766423	17	NAD83/WGS84
29185-01-0016	1	0	35.846587	-80.763803	17	NAD83/WGS84
29185-01-0017	2	0	35.847078	-80.760140	17	NAD83/WGS84
29185-01-0018	1	0	35.847191	-80.761250	17	NAD83/WGS84
29185-01-0019	1	0	35.847907	-80.757240	17	NAD83/WGS84
29185-01-0002	1	0	35.836447	-80.779588	17	NAD83/WGS84
29185-01-0020	1	0	34.848109	-80.758106	17	NAD83/WGS84
29185-01-0021	1	0	35.848094	-80.756207	17	NAD83/WGS84
29185-01-0022	1	0	35.849115	-80.754876	17	NAD83/WGS84
29185-01-0023	1	0	35.849912	-80.753909	17	NAD83/WGS84
29185-01-0003	1	0	35.837974	-80.778040	17	NAD83/WGS84
29185-01-0004	1	0	35.840519	-80.776255	17	NAD83/WGS84
29185-01-0005	1	0	35.841955	-80.773964	17	NAD83/WGS84
29185-01-0006	1	0	35.841944	-80.773960	17	NAD83/WGS84
29185-01-0007	1	0	35.843095	-80.771648	17	NAD83/WGS84
29185-01-0008	1	0	35.843610	-80.770394	17	NAD83/WGS84
29185-01-0009	1	0	34.844693	-80.770699	17	NAD83/WGS84

Date Sampled	Planted Living Stems	Planted Living Stems EXCLUDING Live Stakes	Dead/Missing Stems
5/29/2012	10	10	0
5/30/2012	5	5	0
5/30/2012	5	5	0
5/30/2012	2	2	0
5/30/2012	4	4	0
6/20/2012	3	3	0
5/31/2012	8	8	0
5/31/2012	7	7	0
5/31/2012	0	0	0
6/20/2012	1	1	1
6/19/2012	3	3	0
5/29/2012	8	8	1
6/19/2012	4	4	0
6/19/2012	5	5	0
6/19/2012	8	8	1
6/19/2012	4	4	0
5/29/2012	8	8	0
5/29/2012	8	8	1
5/30/2012	4	4	2
5/30/2012	13	13	0
5/29/2012	10	10	0
5/30/2012	2	2	0
5/30/2012	15	15	0

Natural (Volunteer) Stems	Total Living Stems	Total Living Stems EXCLUDING Live Stakes
0	10	10
0	5	5
0	5	5
0	2	2
0	4	4
0	3	3
0	8	8
0	7	7
69	69	69
0	1	1
0	3	3
0	8	8
0	4	4
0	5	5
0	8	8
0	4	4
0	8	8
0	8	8
0	4	4
0	13	13
0	10	10
0	2	2
0	15	15

Planted Living Stems per ACRE	Planted Living Stems EXCLUDING Live Stakes PER ACRE
404.685643	404.685643
202.3428215	202.3428215
202.3428215	202.3428215
80.9371286	80.9371286
161.8742572	161.8742572
121.4056929	121.4056929
323.7485144	323.7485144
283.2799501	283.2799501
40.4685643	40.4685643
121.4056929	121.4056929
323.7485144	323.7485144
161.8742572	161.8742572
202.3428215	202.3428215
323.7485144	323.7485144
161.8742572	161.8742572
323.7485144	323.7485144
323.7485144	323.7485144
161.8742572	161.8742572
526.0913359	526.0913359
404.685643	404.685643
80.9371286	80.9371286
607.0284645	607.0284645

Natural (Volunteer) Stems PER ACRE	Total Living Stems PER ACRE
0	404.685643
0	202.3428215
0	202.3428215
0	80.9371286
0	161.8742572
0	121.4056929
0	323.7485144
0	283.2799501
2792.330937	2792.330937
0	40.4685643
0	121.4056929
0	323.7485144
0	161.8742572
0	202.3428215
0	323.7485144
0	161.8742572
0	323.7485144
0	323.7485144
0	161.8742572
0	526.0913359
0	404.685643
0	80.9371286
0	607.0284645

Total Living Stems EXCLUDING Live Stakes PER ACRE	# species
404.685643	2
202.3428215	5
202.3428215	3
80.9371286	2
161.8742572	4
121.4056929	2
323.7485144	5
283.2799501	6
2792.330937	0
40.4685643	1
121.4056929	2
323.7485144	7
161.8742572	2
202.3428215	3
323.7485144	4
161.8742572	2
323.7485144	3
323.7485144	5
161.8742572	3
526.0913359	6
404.685643	3
80.9371286	2
607.0284645	7

vigor	Count	Percent
0	6	4.2
1	3	2.1
2	28	19.6
3	92	64.3
4	14	9.8

	Species	CommonName	4	3	2	1	0	Missing	Unknown
	Alnus serrulata	hazel alder		2					
	Betula nigra	river birch	3	12	4				
	Celtis laevigata	sugarberry		3	2				
	Cornus amomum	silky dogwood	3	4	4	1	3		
	Fraxinus pennsylvanica	green ash		2					
	Juglans nigra	black walnut	1	5	8	1			
	Nyssa sylvatica	blackgum		2					
	Quercus michauxii	swamp chestnut oak	2	11	1	1			
	Quercus pagoda	cherrybark oak	3	17	4				
	Quercus phellos	willow oak	2	8					
	Sambucus canadensis	Common Elderberry		3	2				
	Morus rubra	red mulberry		3					
	Ilex decidua	possumhaw		12	2				
	Carpinus caroliniana	American hornbeam		3	1				
	Platanus occidentalis	American sycamore		5					
	Unknown						3		
TOT:	16	15	14	92	28	3	6		

Damage	Count	Percent Of Stems
(no damage)	107	74.8
(other damage)	30	21
Unknown	6	4.2

	Species	CommonName	Count of Damage Categories			
			(no damage)	Unknown	(other damage)	
	Alnus serrulata	hazel alder	0	2		
	Betula nigra	river birch	3	16		3
	Carpinus caroliniana	American hornbeam	1	3		1
	Celtis laevigata	sugarberry	1	4		1
	Cornus amomum	silky dogwood	6	9	3	3
	Fraxinus pennsylvanica	green ash	0	2		
	Ilex decidua	possumhaw	3	11		3
	Juglans nigra	black walnut	7	8	1	6
	Morus rubra	red mulberry	0	3		
	Nyssa sylvatica	blackgum	2			2
	Platanus occidentalis	American sycamore	0	5		
	Quercus michauxii	swamp chestnut oak	4	11	2	2
	Quercus pagoda	cherrybark oak	3	21		3
	Quercus phellos	willow oak	1	9		1
	Sambucus canadensis	Common Elderberry	2	3		2
	Unknown		3			3
TOT:	16	15	36	107	6	30

	<i>Plot</i>	<i>Count of Damage Categories</i>				
		<i>(no damage)</i>	<i>(no stems on plot)</i>	<i>Unknown</i>	<i>(other damage)</i>	
	29185-01-0001	3	7			3
	29185-01-0002	4	5			4
	29185-01-0003	4	4			4
	29185-01-0004	4	5		3	1
	29185-01-0005	3	3			3
	29185-01-0006	2	11			2
	29185-01-0007	2	8		2	
	29185-01-0008	0	2			
	29185-01-0009	2	13			2
	29185-01-0010	1	4			1
	29185-01-0011	1	4		1	
	29185-01-0012	1	1			1
	29185-01-0013	1	3			1
	29185-01-0014	0	3			
	29185-01-0015	0	8			
	29185-01-0016	0	7			
	29185-01-0017			1		
	29185-01-0018	2				2
	29185-01-0019	0	3			
	29185-01-0020	1	3			1
	29185-01-0021	0	5			
	29185-01-0022	5	4			5
	29185-01-0023	0	4			
TOT:	23	36	107	1	6	30

Appendix D

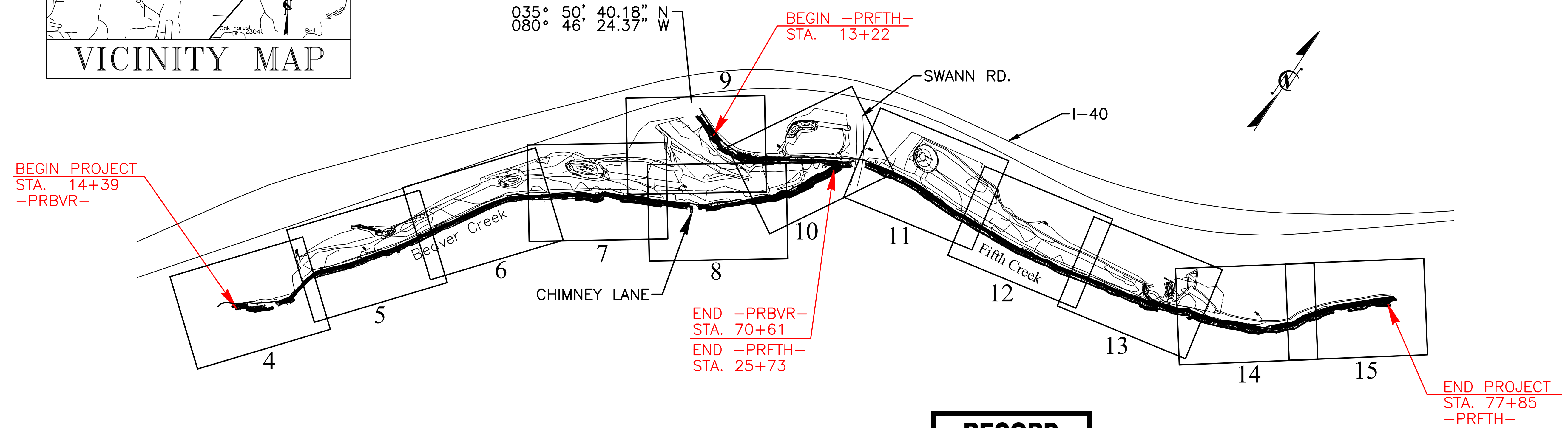
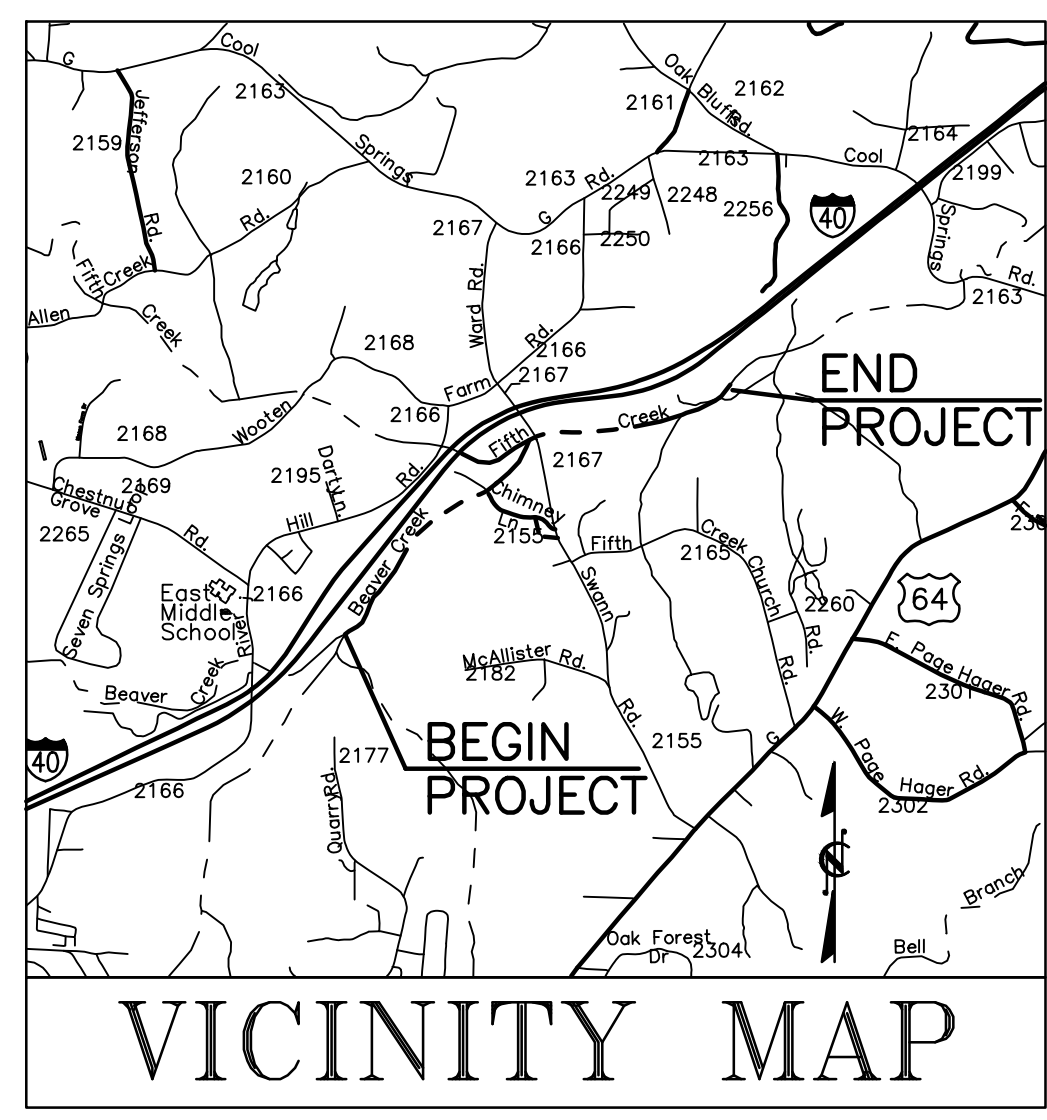
As-Built/Record Drawings

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

IREDELL COUNTY

LOCATION: FIVE-MILE BRANCH MITIGATION SITE

TYPE OF WORK: NATURAL CHANNEL DESIGN STREAM
AND WETLAND RESTORATION AS BUILT/RECORD DRAWINGS
SCO# 040607901 EEP IMS ID# 92185



RECORD DRAWING
DECEMBER 2012

INDEX OF SHEETS	
SHEET NO.	CONTENTS
1	TITLE SHEET
2	LEGEND
D1-D4	DETAILS
D5	DETAILS
4-15	PLAN SHEETS
16-34 27	PROFILE SHEETS
(NOT INCLUDED) EC1-EC4	SITE STABILIZATION
PP1-PP4	PLANTING PLAN SHEETS
X1-X47	CROSS SECTIONS

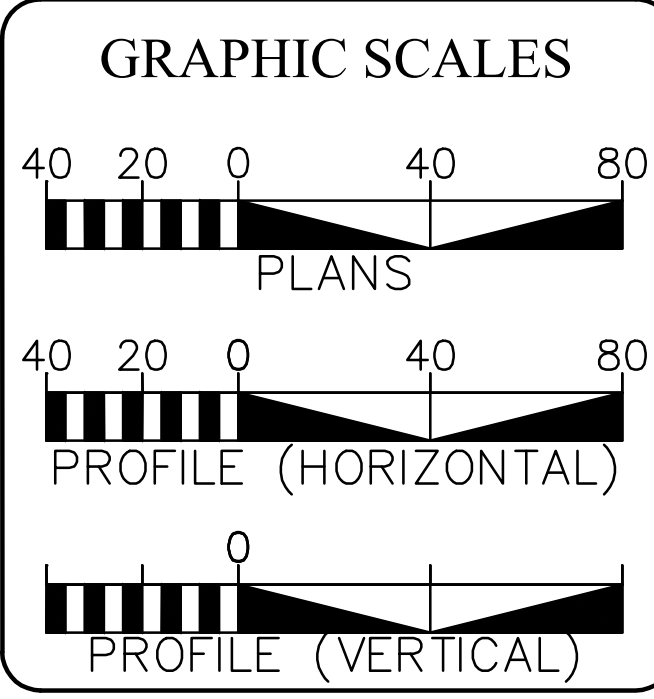
NCEP PROJECT MANAGER - PAUL WIESNER
NCEP REVIEW COORDINATOR - LIN XU
ARCADIS PROJECT MANAGER - ROBERT LEPSIC
ARCADIS PROJECT ENGINEER - DONALD BRIGHT

GENERAL CONTRACTOR:
NORTH STATE ENVIRONMENTAL
2889 LOWERY STREET
WINSTON-SALEM, NC 27101
MICHAEL ANDERSON
(336) 725-2010

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SCO # 040607901

ARCADIS G&M Date: \$DATE\$ Time: \$TIME\$ Filename: \$FILE\$



DESIGN DATA

PROPOSED STREAM LENGTHS	
STREAM PRESERVATION	= 890'
BEAVER CREEK (-PRBVR-)	= 5622' ENHANCEMENT LEVEL I/II
FIFTH CREEK (-PRFTH-)	= 6463' ENHANCEMENT LEVEL I/III
TOTAL LENGTH OF STREAM ENHANCEMENT	= 12,085'
PROPOSED WETLAND ACREAGE	
BOTTOMLAND HARDWOOD FOREST	= 48.6 ACRES RESTORATION
	= 1.90 ACRES PRESERVATION
LIMITS OF DISTURBANCE	
LIMITS OF DISTURBANCE	= 102.2 ACRES

Prepared In The Office of: ARCADIS G & M of North Carolina, Inc. WWW.ARCADIS-US.COM 801 Corporate Center Drive, Suite 300 Raleigh, NC 27607-5073 Tel: 919/854-1282 Fax: 919/854-5448	
for the North Carolina Department of Environment and Natural Resources	
2002 STANDARD SPECIFICATIONS	ARCADIS CONTACT
RIGHT OF WAY DATE: N/A	ROBERT LEPSIC PROJECT BIOLOGIST
LETTING DATE: N/A	DONALD S. BRIGHT PROJECT DESIGN ENGINEER

Professional Engineer Seal for Justin R. Beard, No. 025954, State of North Carolina.



LEGEND

RIGHT OF WAY

Right of Way Marker	▲
Exist. Right of Way Line w/Marker	---△---
Prop. Right of Way Line (by others)	---▲---
Prop. Right of Way Line (by contract)	---●---
Exist. Control of Access Line	○ A
Prop. Control of Access Line	○ A
Exist. Easement Line	---E---
Prop. Temp. Construction Easement Line	---E---
Prop. Temp. Drainage Easement Line	---TDE---
Prop. Perm. Drainage Easement Line	---PDE---

BOUNDARIES & PROPERTIES

Property Line Surveyed	—○—
Property Line Not Surveyed	—■—
Exist. Iron Pin	⊙ EIP
Property Corner	—+—
Property Monument	□ ECM
Property Number	(123)
Parcel Number	(6)
Fence Line	-x-x-x-
Silt Fence	-SF-SF-SF-
Existing Wetland Boundaries	---WLB---
Proposed Wetland Boundaries	---WLB---
Limit of Disturbance	-----

HYDROLOGY

Stream or Body of Water	-----
Flow Arrow	→

UTILITIES

Exist. Pole	●
Exist. Power Pole	●
Exist. Telephone Pole	●
Exist. Joint Use Pole	●
Deep Soil Profile	DSP

STRUCTURES

MAJOR Bridge, Tunnel, or Box Culvert	CONC
MINOR Head & End Wall	CONC HW
Pipe Culvert	=====

TOPOGRAPHY

Loose Surface	-----
Hard Surface	-----
Right of Way Symbol	R/W
Bridge	— — —
Box Culvert or Tunnel	— — —
Culvert	— — —

STREAM IMPROVEMENTS

Approx. Location of Proposed Boulder Cross Vane (See Detail)	~
Approx. Location of Proposed Boulder J-Hook Vane (See Detail)	~
Approx. Location of Proposed Boulder Vane (See Detail)	~
Approx. Location of Proposed Rootwad Plug (See Detail)	~
Approx. Location of Proposed Boulder Step Pool (See Detail)	~
Approx. Location of Proposed Boulder Step Pool Drain	~
Approx. Location of Proposed Log Vane (See Detail)	~
Approx. Location of Proposed Constructed Riffle (See Detail)	~
Proposed Oxbox Pond/Wetland (See Detail)	~
Proposed Rock Check Dam	~
Approximate Limits of Buffer	-----
Existing Thalweg	-----
Existing Top of Bank	-----
Proposed Thalweg	-----
Proposed Bankfull	-----
Slope Stake Line	C(cut)F(fill)
Vegetation Matting	~
Log Toe Protection	~

VEGETATION

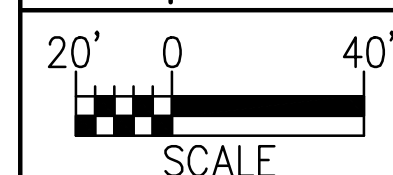
Existing Woods Line	-----
---------------------	-------

**RECORD
DRAWING**
DECEMBER 2012

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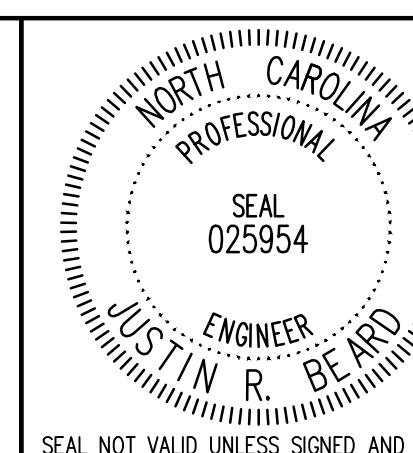
SCO # 040607901

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

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BY	DATE	DESCRIPTION OF REVISION
5		
4	SCA	12/07/12 ASBUILT/RECORD DRAWINGS
3	DGL	11/04/10 ISSUE FOR BID
2	DGL	03/22/10 DRAFT CONSTRUCTION PLANS
1	DGL	12/04/09 DRAFT RESTORATION PLANS



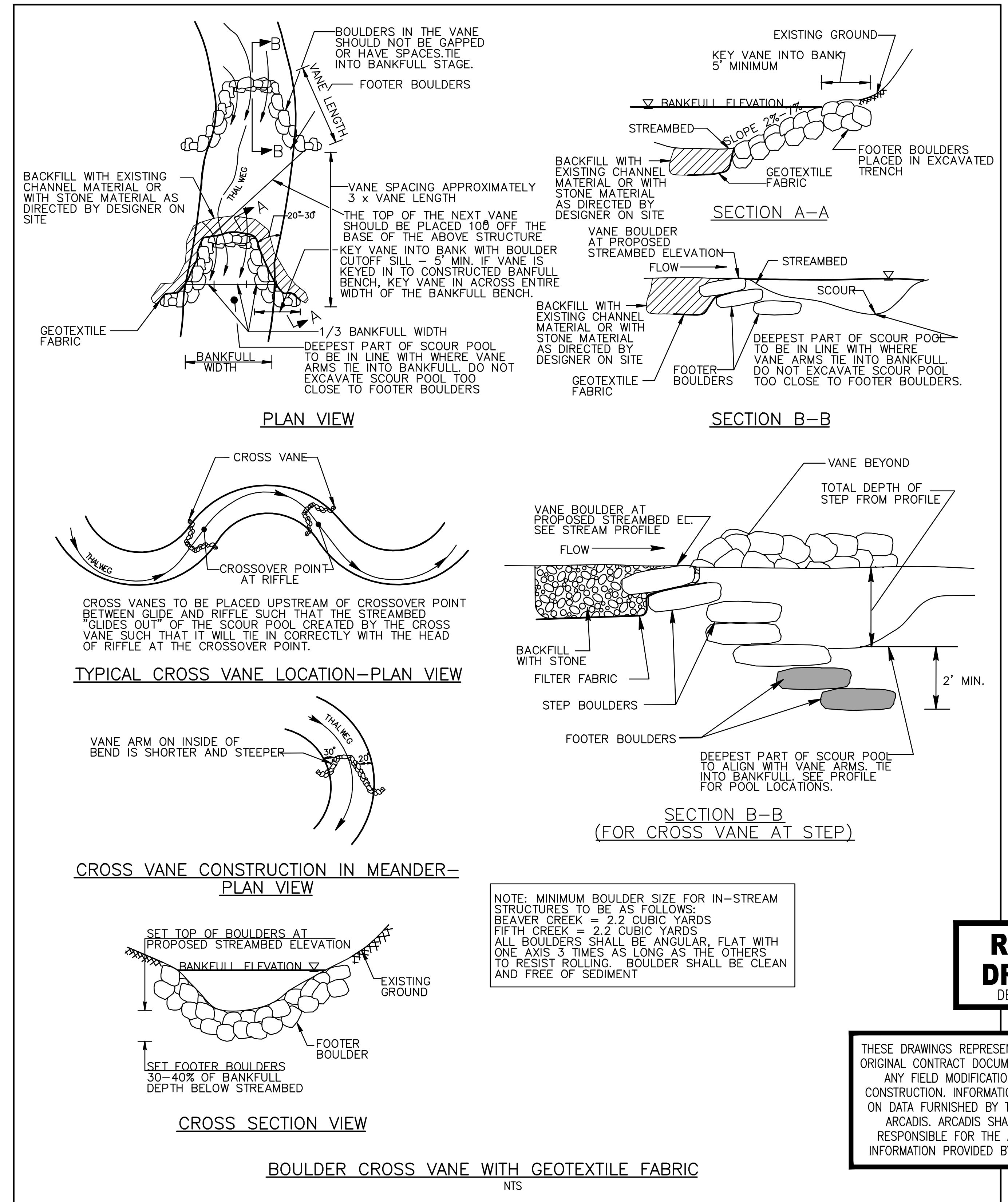
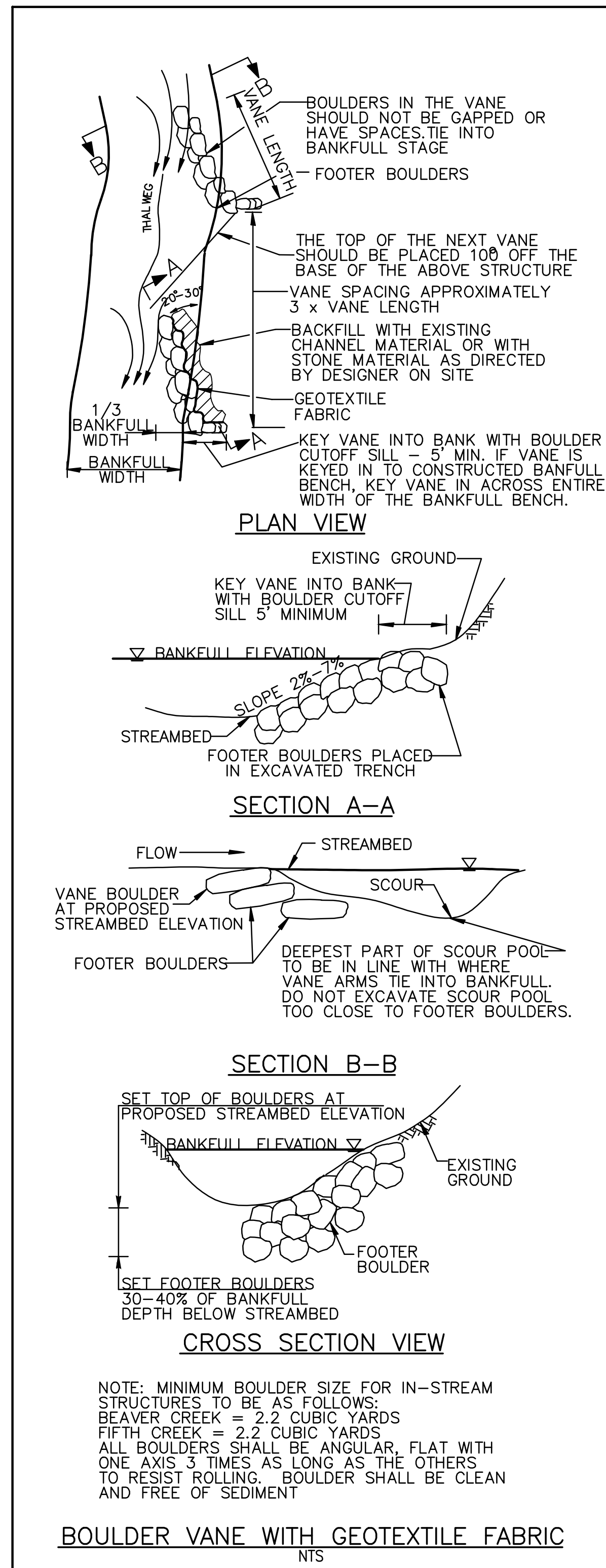
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

LEGEND

SHEET NO. 2

Details – Five Mile Branch



RECORD DRAWING
DECEMBER 2012

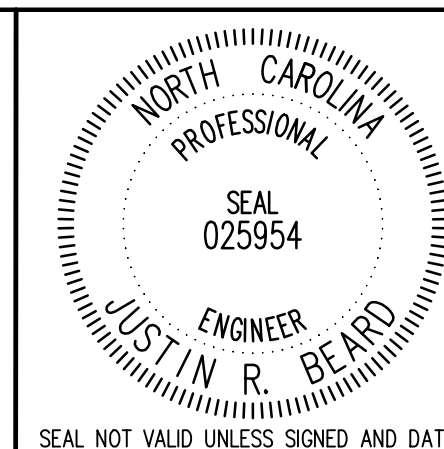
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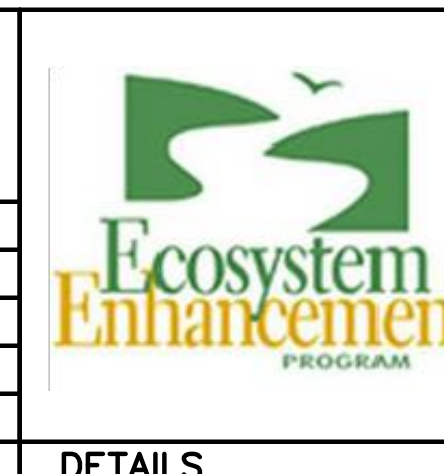


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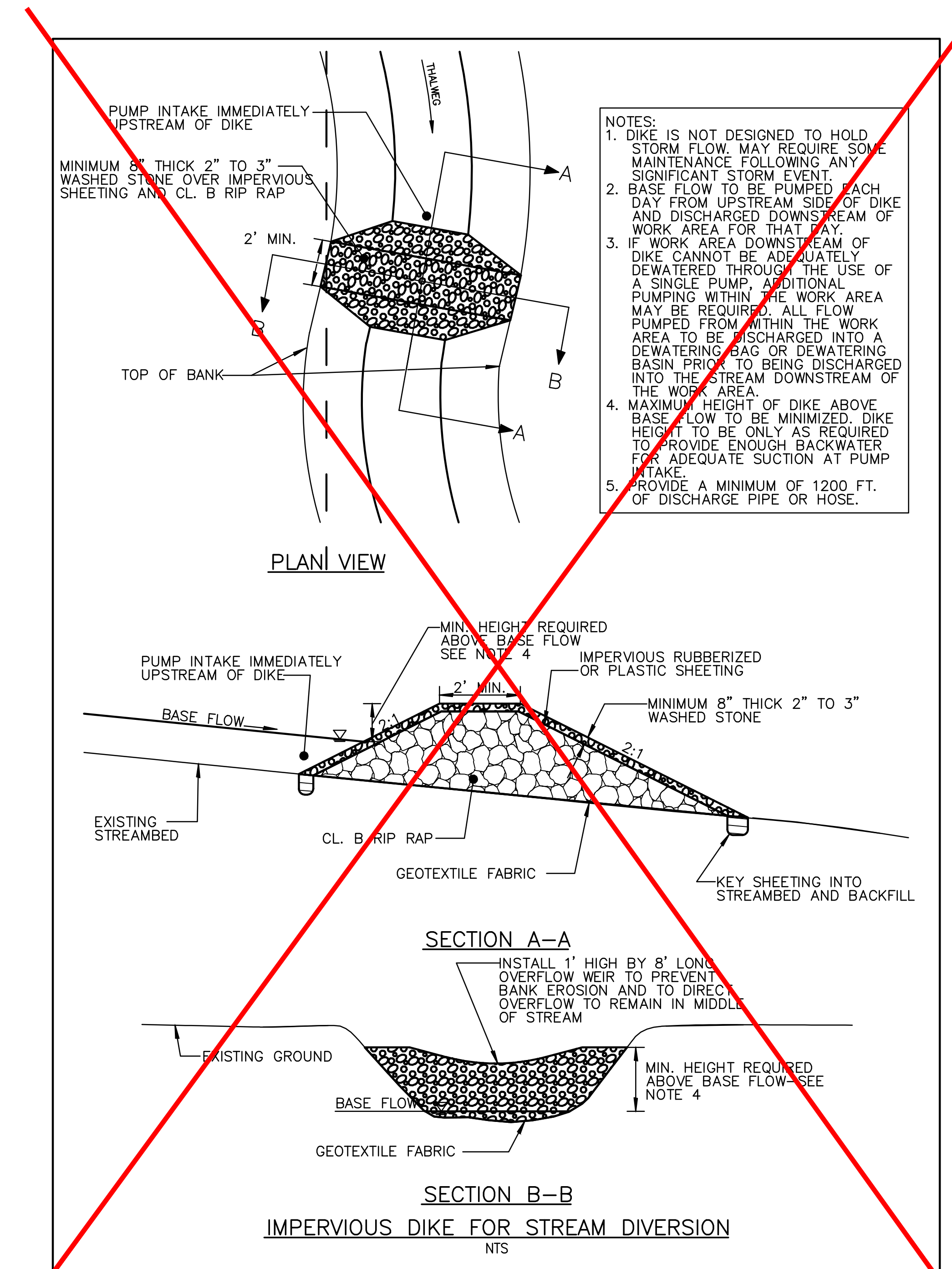
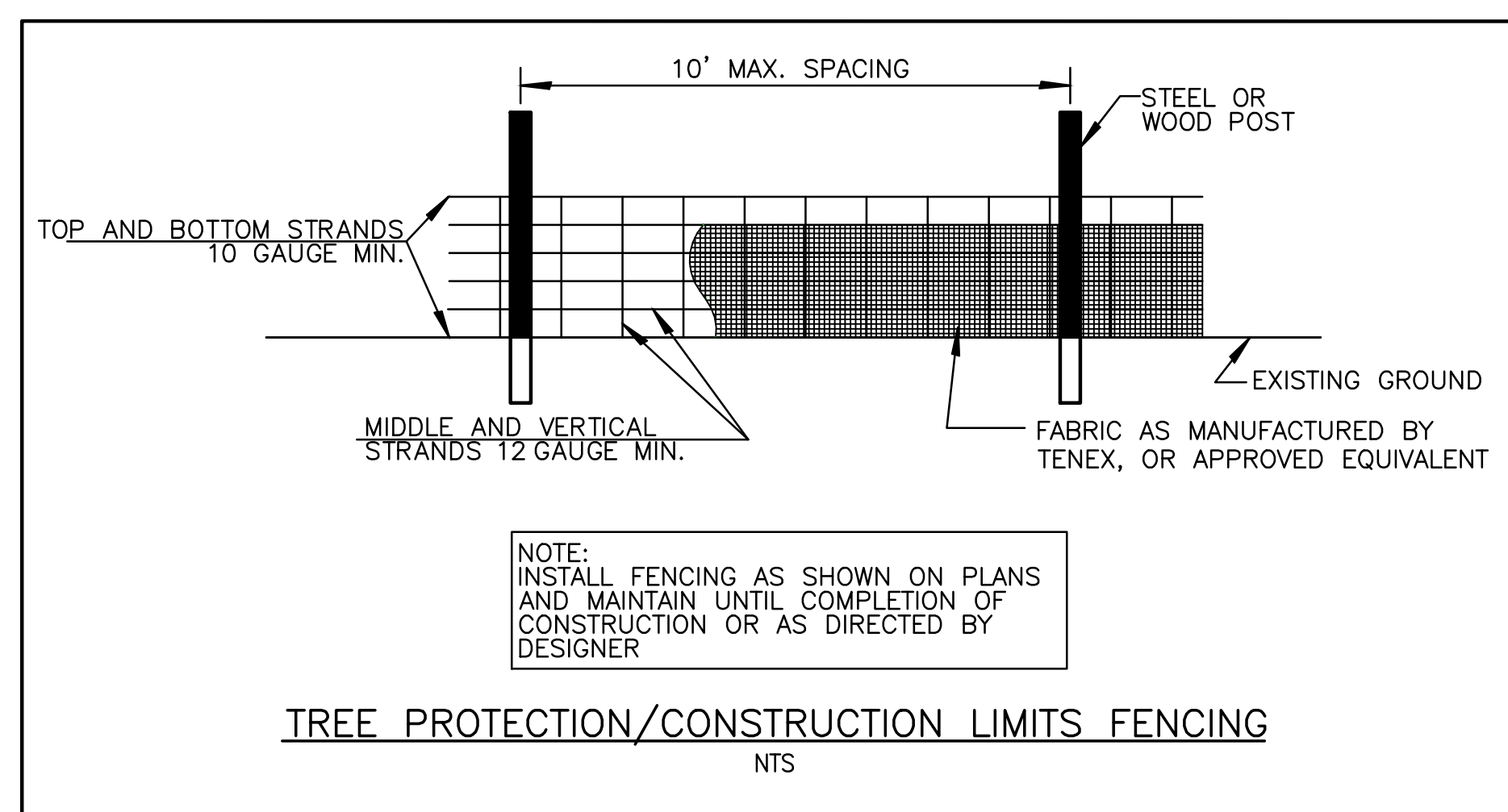
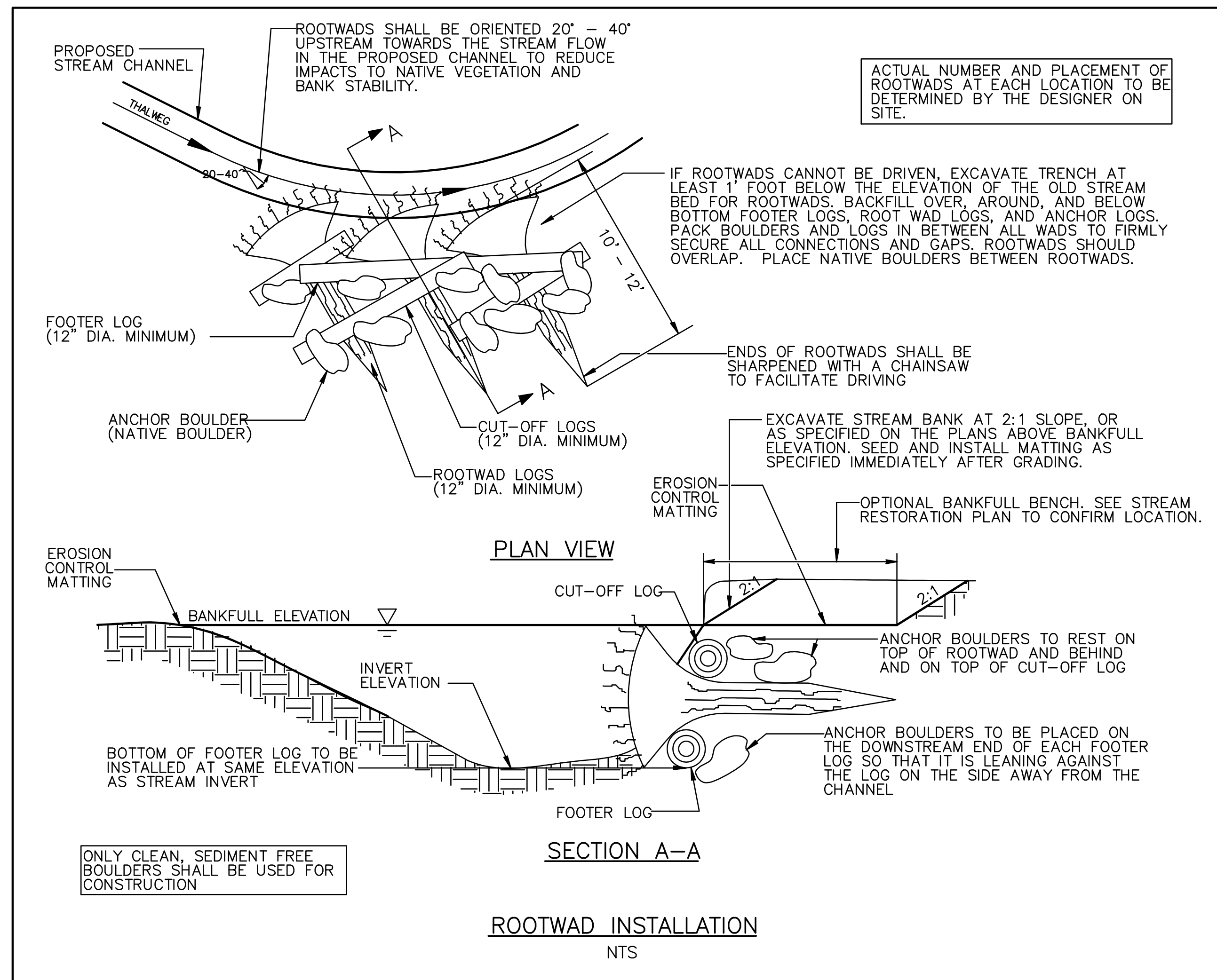


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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. D1

Details – Five Mile Branch

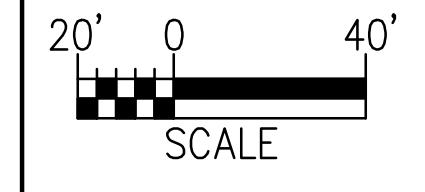


IMPERVIOUS DIKES NOT USED

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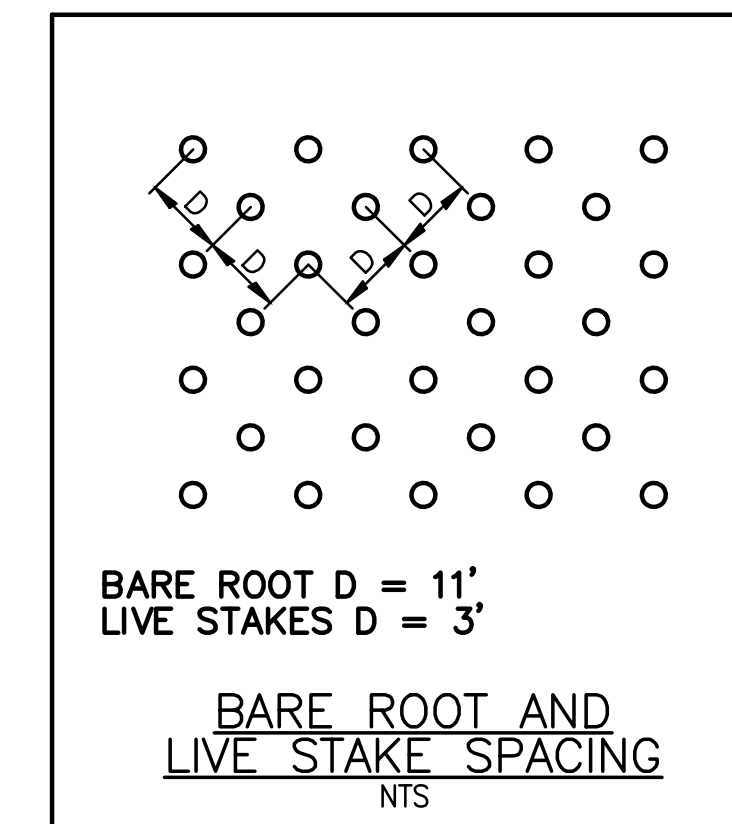
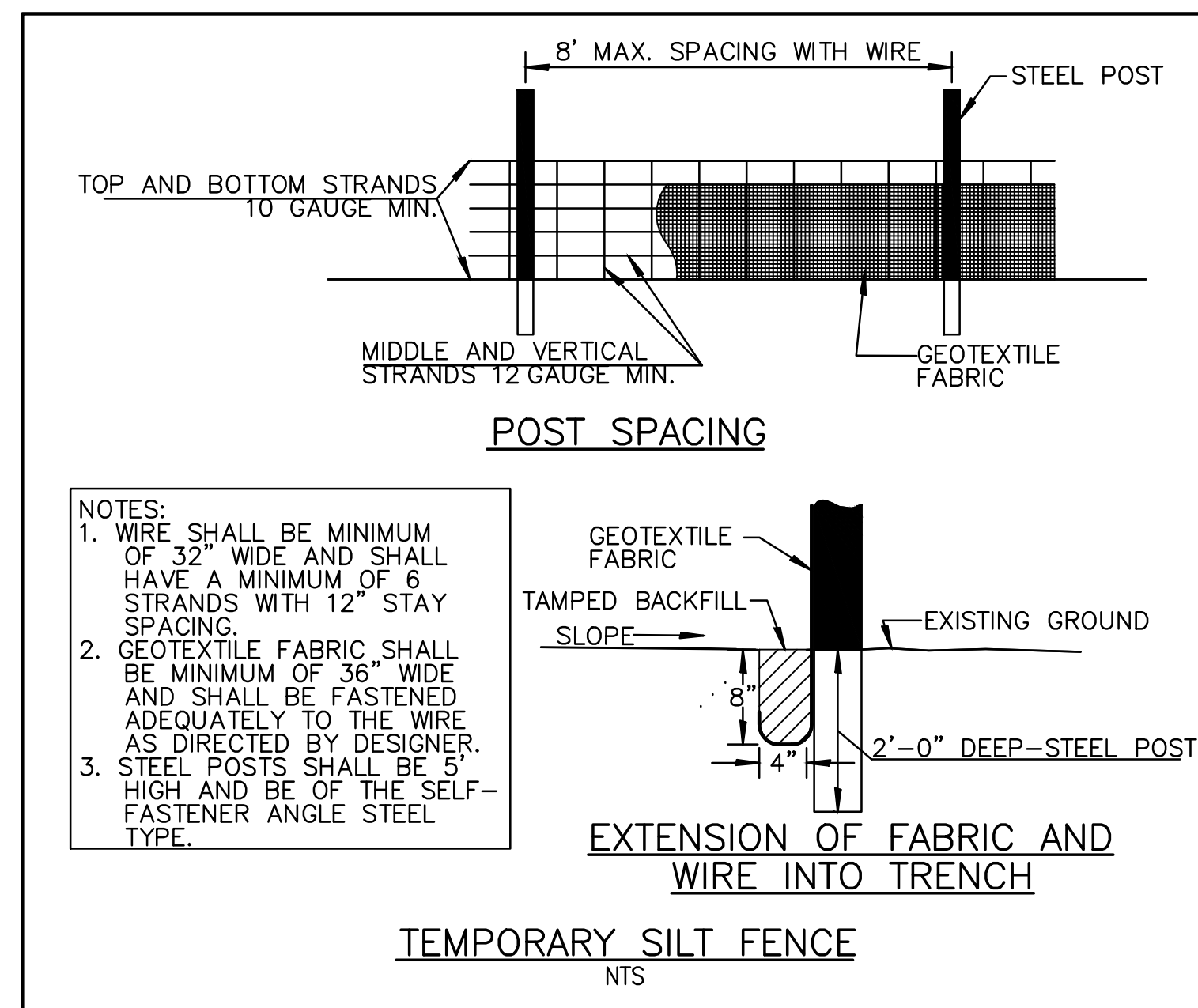
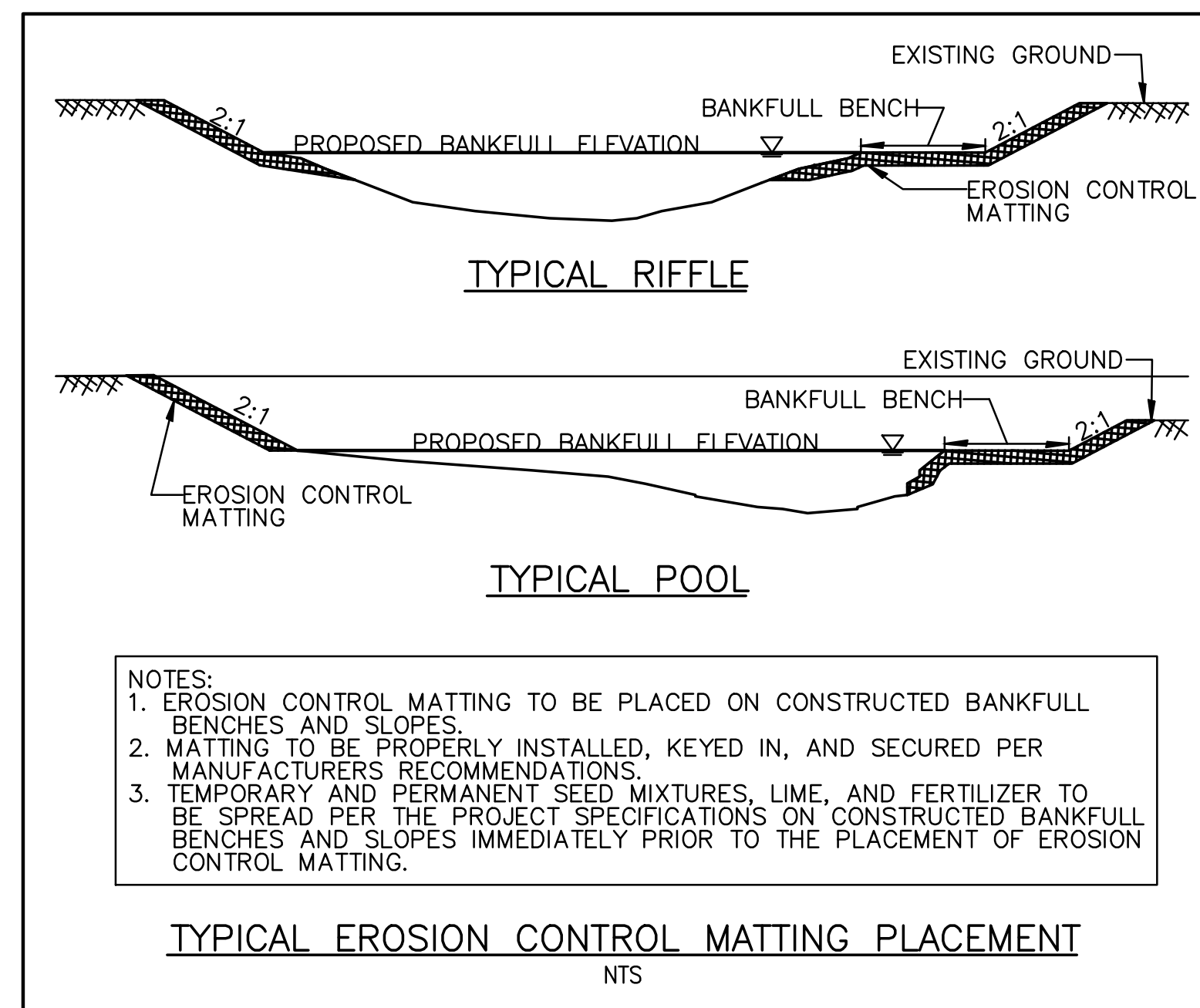
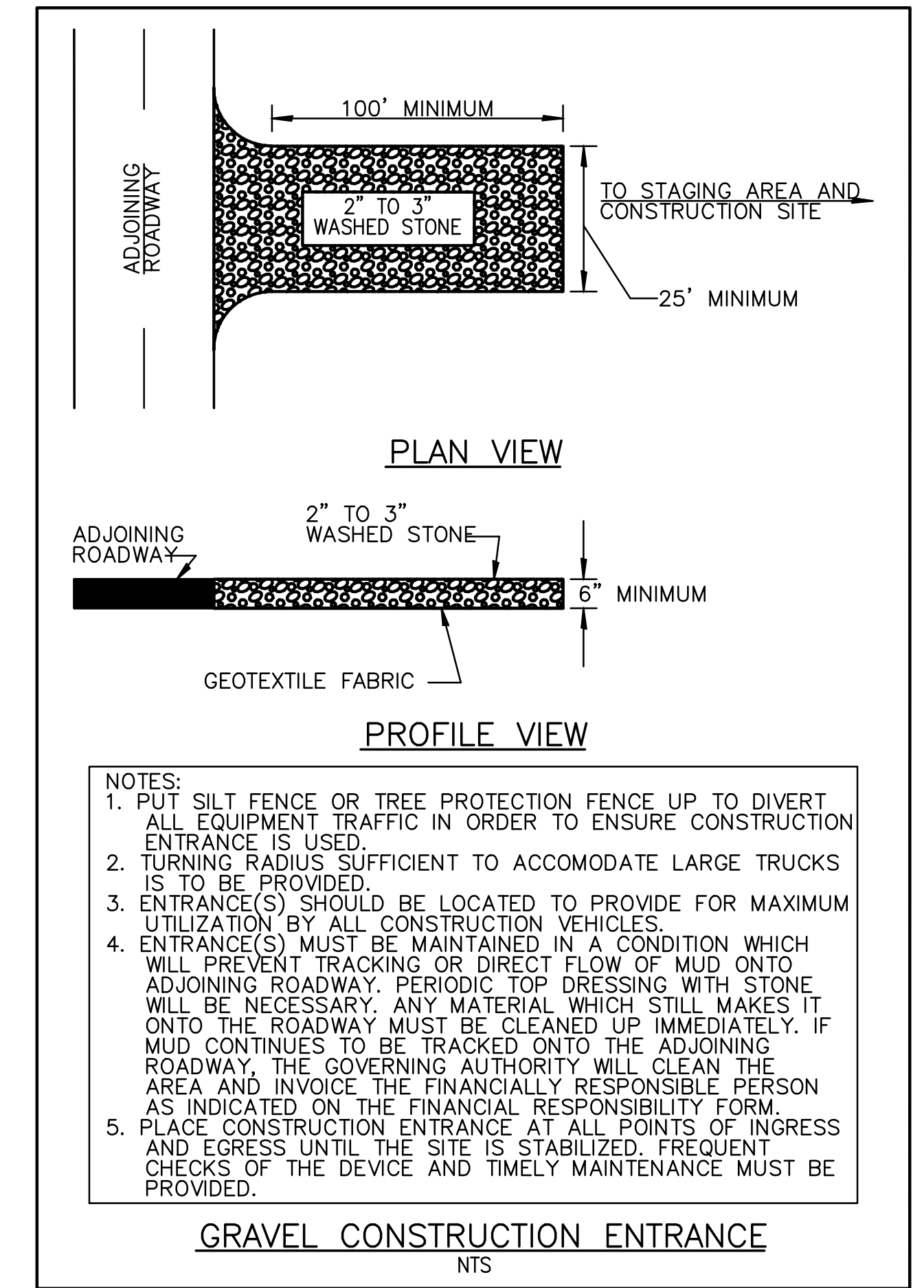
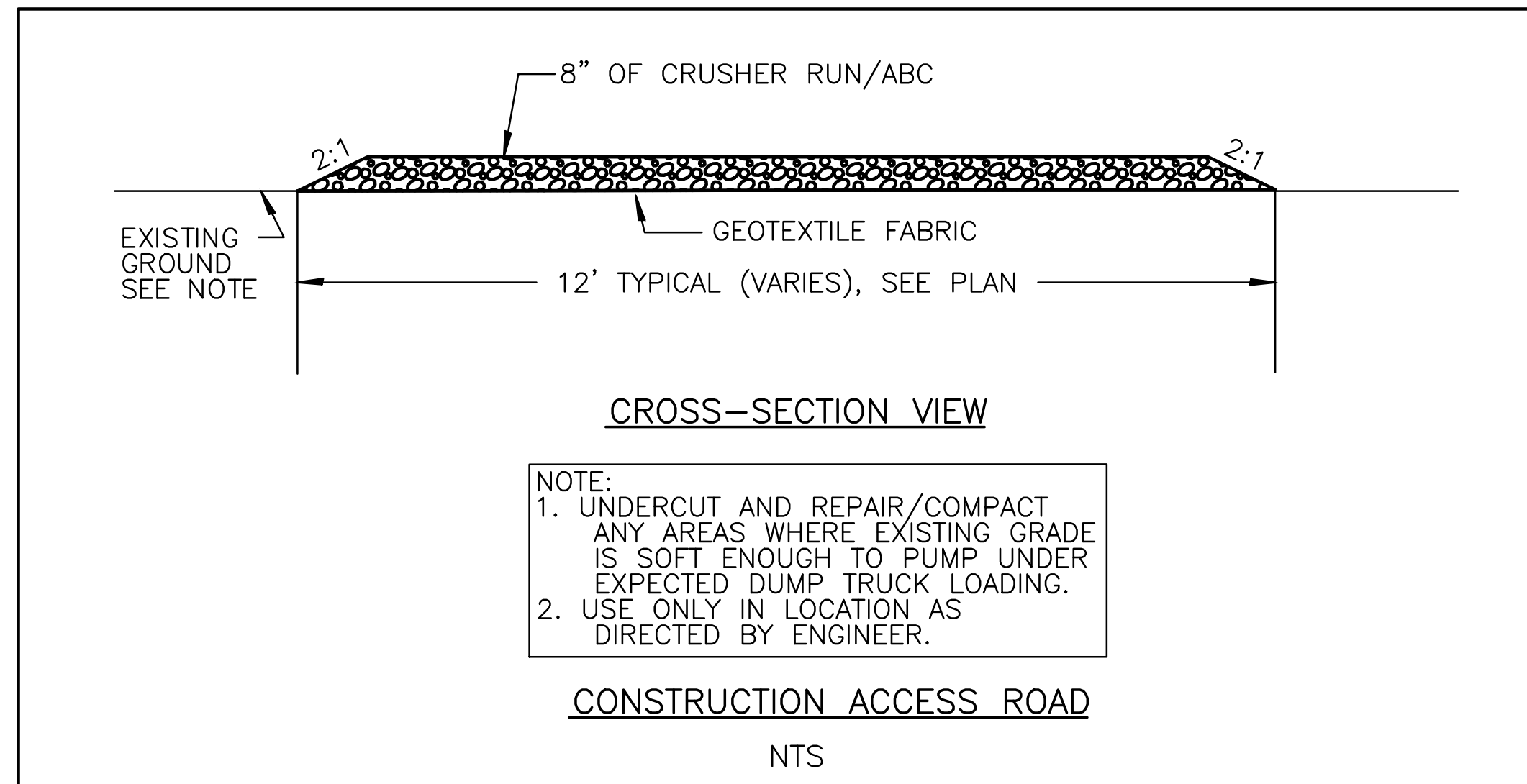
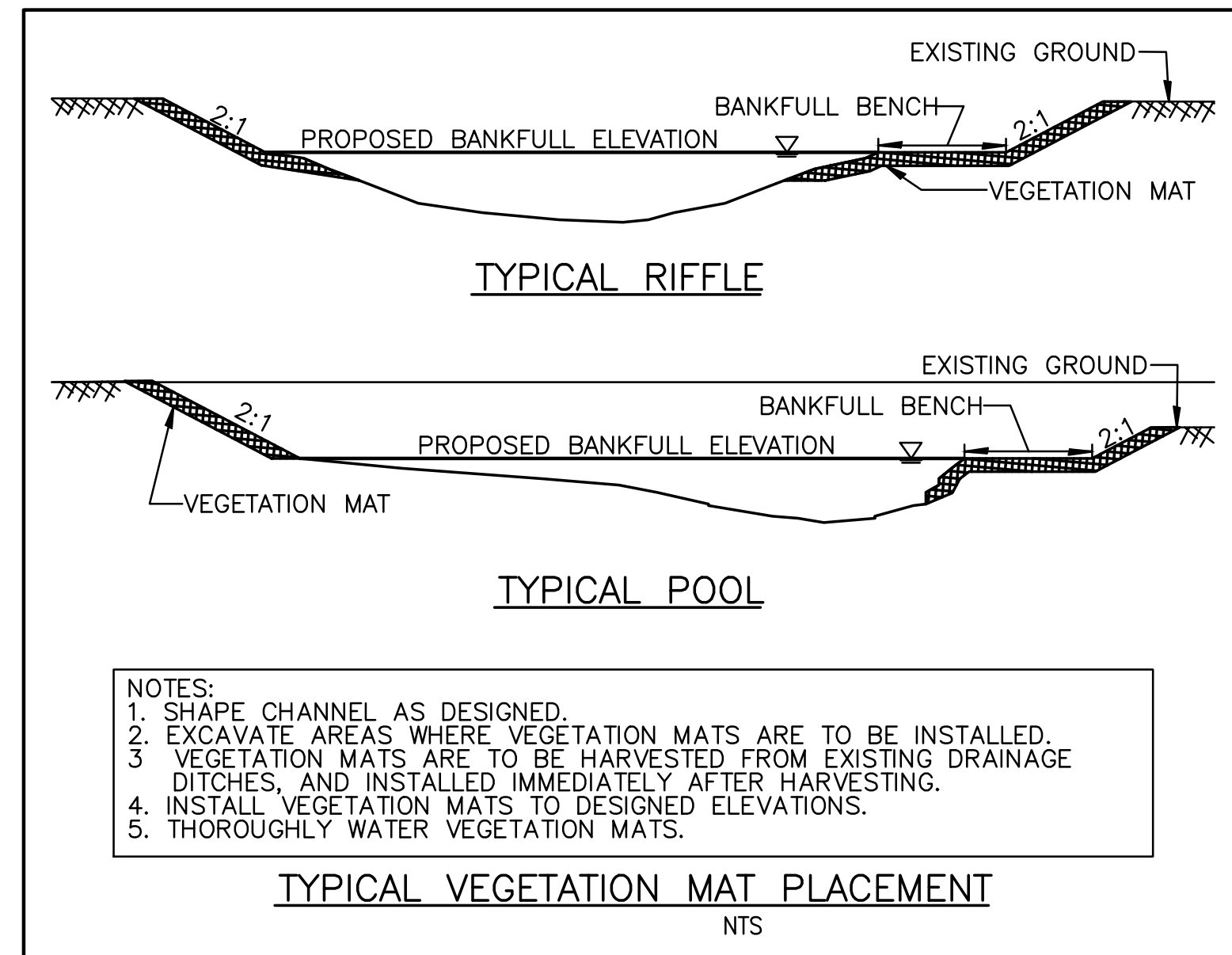
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SEAL NOT VALID UNLESS SIGNED AND DATED

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Ecosystem Enhancement PROGRAM

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. D2

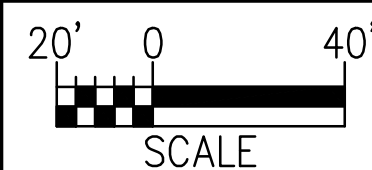


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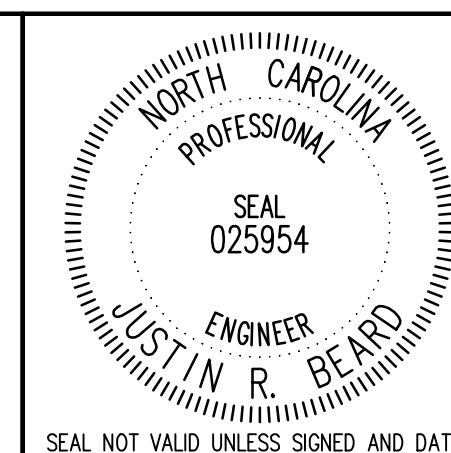
- EROSION CONTROL MATTING PROPERTIES**
1. BLANKET, BROWN IN COLOR, CONSISTING OF 100% COCONUT FIBER ENCLOSED IN 100% BIO-DEGRADABLE NETTING AND THREAD.
 2. COVERED ON THE TOP AND BOTTOM WITH 100% JUTE FIBER SCRIM CLOTH AND BIO-DEGRADABLE FIBER NETTING WITH LENO WEAVE CONSTRUCTION WOVEN INTO AN APPROXIMATE 0.75 INCH BY 0.75 INCH MESH.
 3. SEWN TOGETHER WITH BIODEGRADABLE 100% COTTON THREAD ON 2 INCH CENTERS.
 4. THE WEIGHT SHALL BE 0.70 LBS/SQUARE YARD.
 5. MAXIMUM ALLOWABLE SHEER STRESS IS 3.13 LB/S.F.

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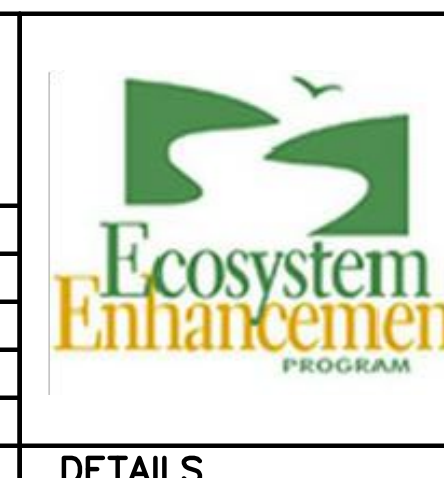


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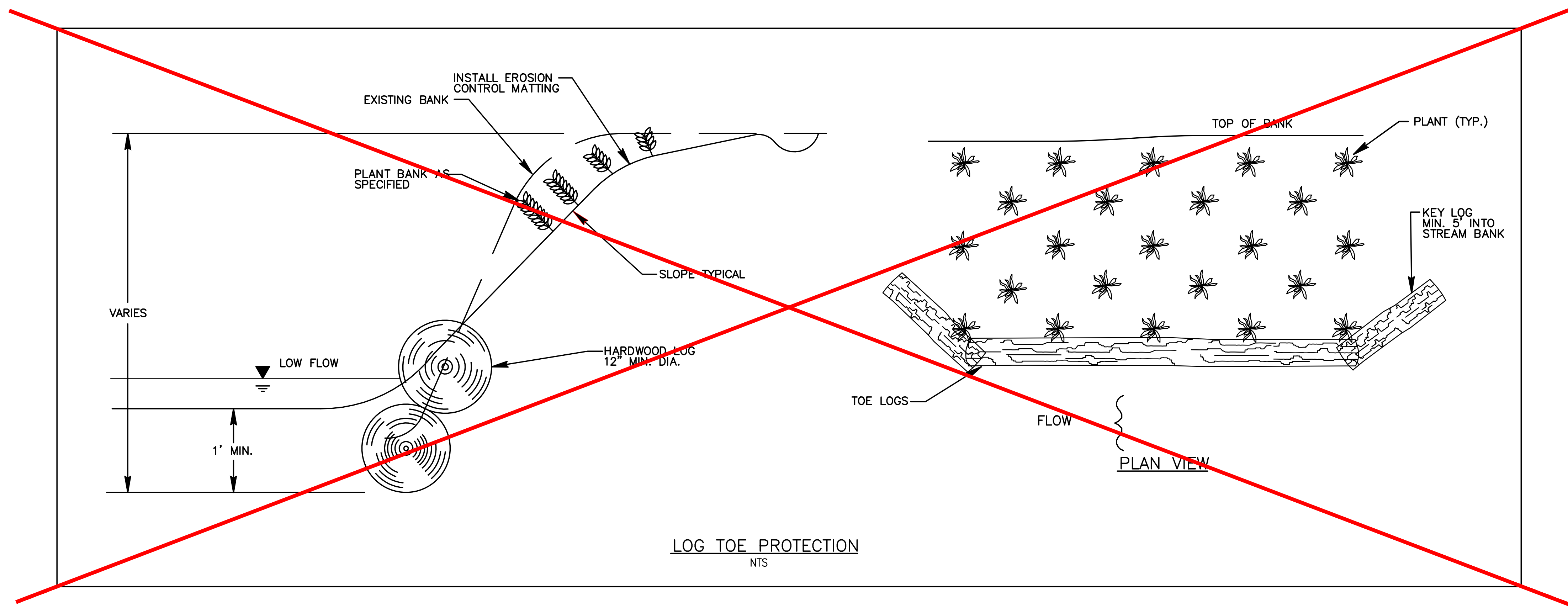


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2	DGL	03/22/10	DRAFT CONSTRUCTION PLANS
1	DGL	12/04/09	DRAFT RESTORATION PLANS



NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. D3

Details – Five Mile Branch



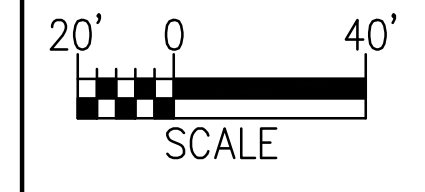
LOG TOE PROTECTION
NTS

LOG TOE PROTECTION NOT USED

**RECORD
DRAWING**
DECEMBER 2012

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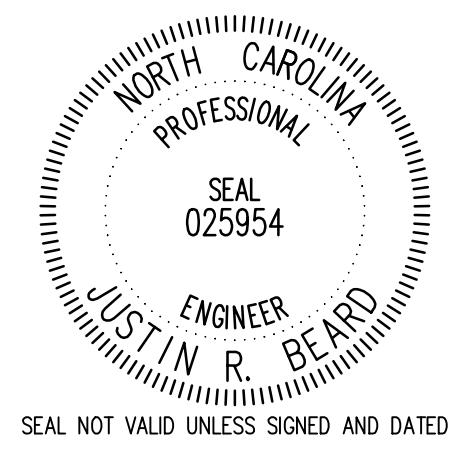
Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 – Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.



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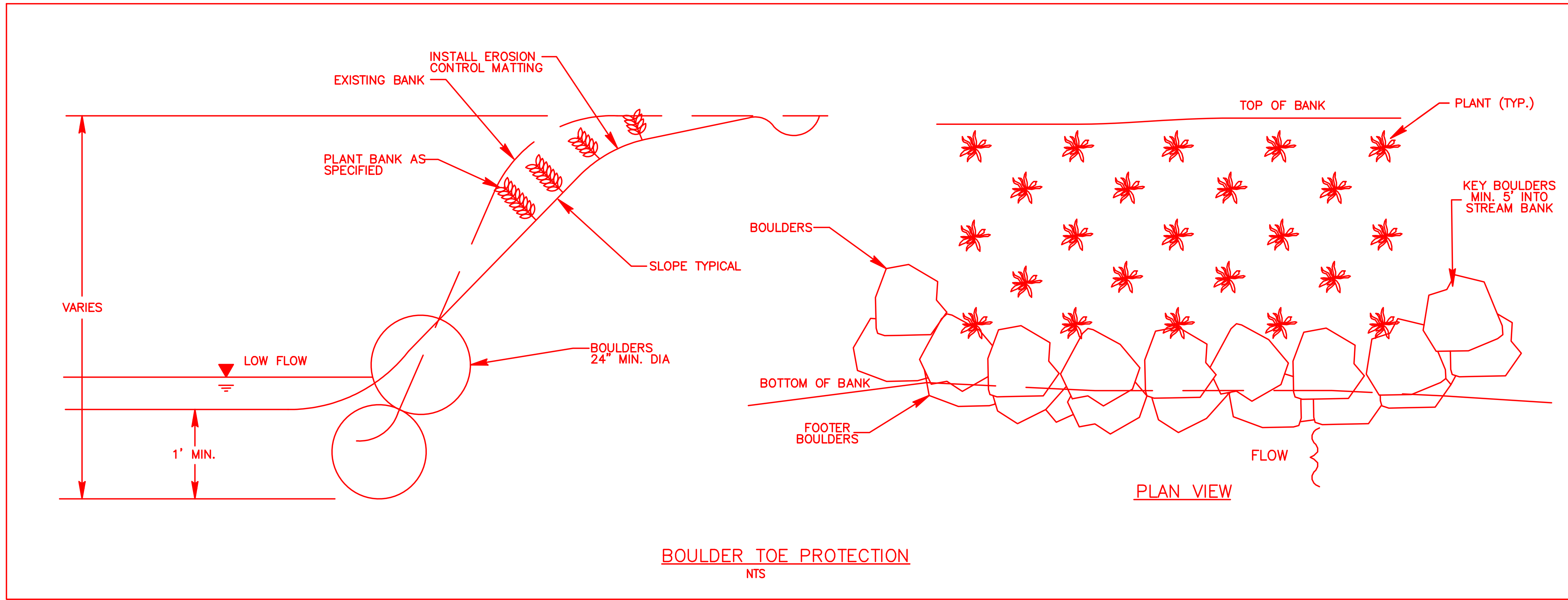
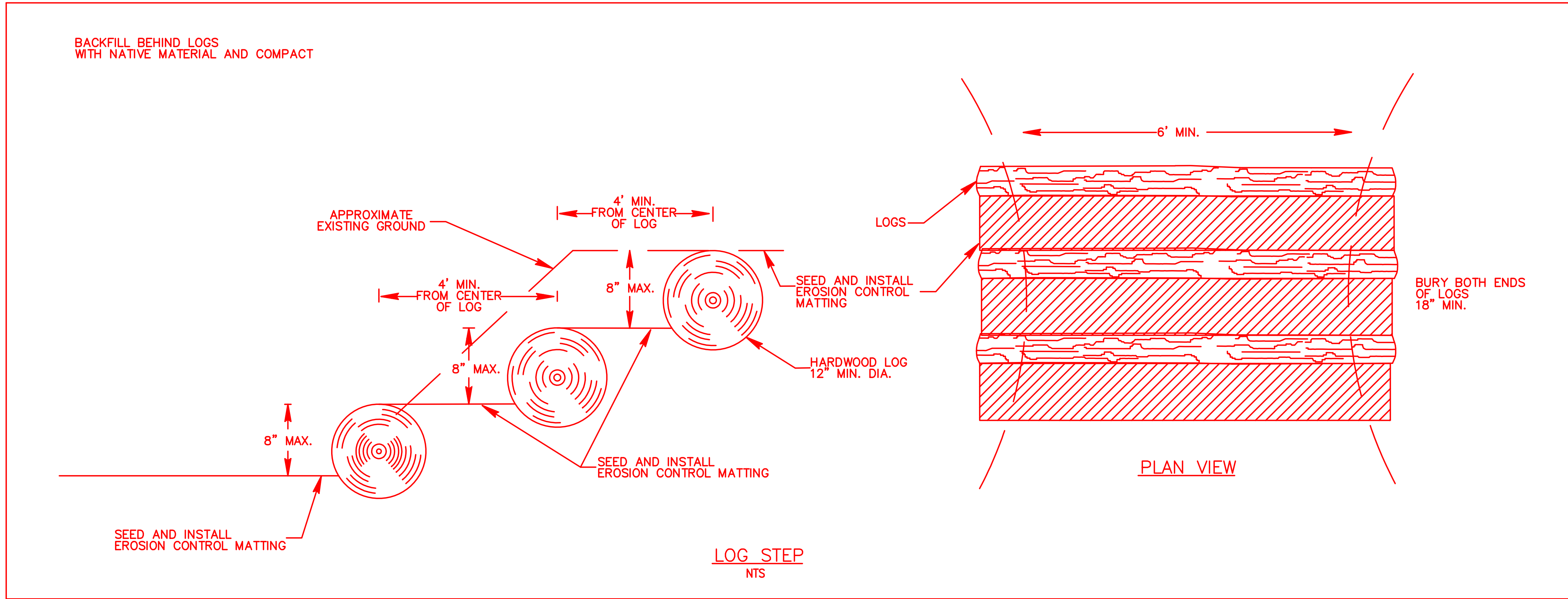


NO.	BY	DATE	DESCRIPTION OF REVISION
5			
4	SCA	12/07/12	ASBUILT/RECORD DRAWINGS
3	DGL	11/04/10	ISSUE FOR BID
2	DGL	03/22/10	DRAFT CONSTRUCTION PLANS
1	DGL	12/04/09	DRAFT RESTORATION PLANS



NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

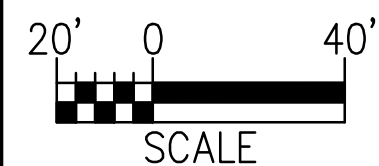
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901



**RECORD
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DECEMBER 2012

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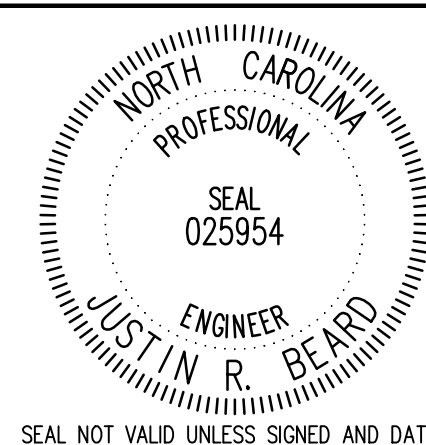
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

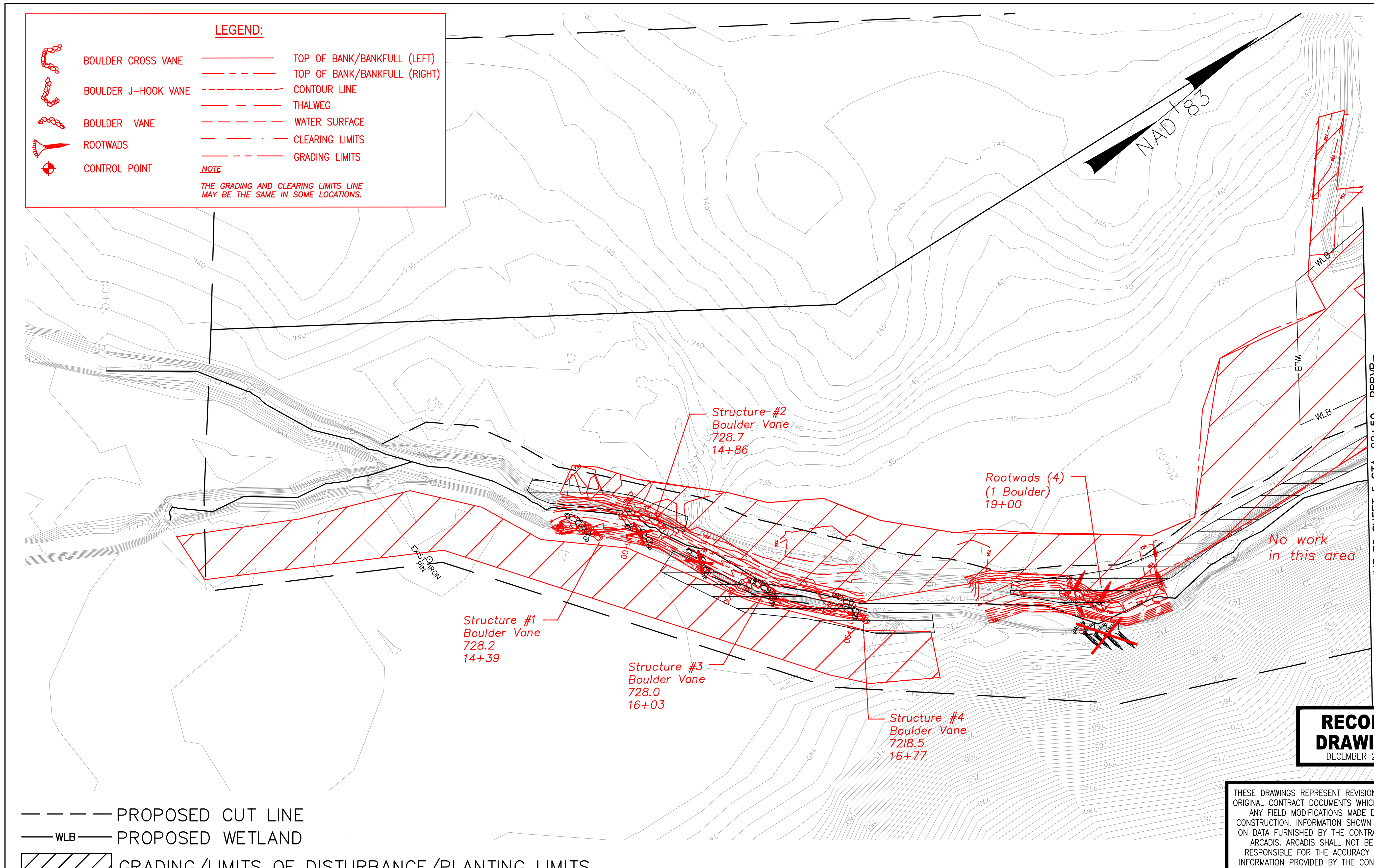
DETAILS


SHEET NO. D5

LEGEND:

	BOULDER CROSS VANE		TOP OF BANK/BANKFULL (LEFT)
	BOULDER J-HOOK VANE		TOP OF BANK/BANKFULL (RIGHT)
	BOULDER VANE		CONTOUR LINE
	ROOTWADS		THALWEG
	CONTROL POINT		WATER SURFACE
			CLEARING LIMITS
			GRADING LIMITS

NOTE
THE GRADING AND CLEARING LIMITS LINE MAY BE THE SAME IN SOME LOCATIONS.

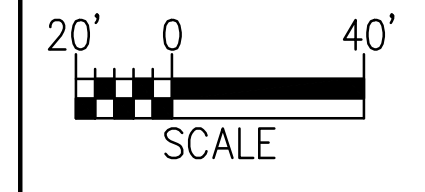


--- PROPOSED CUT LINE
 ---WLB--- PROPOSED WETLAND
 GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

RECORD DRAWING
DECEMBER 2012

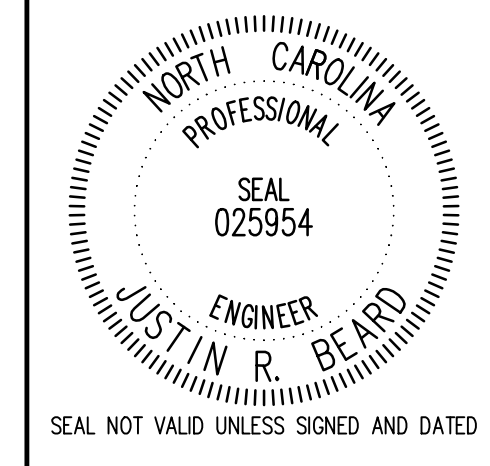
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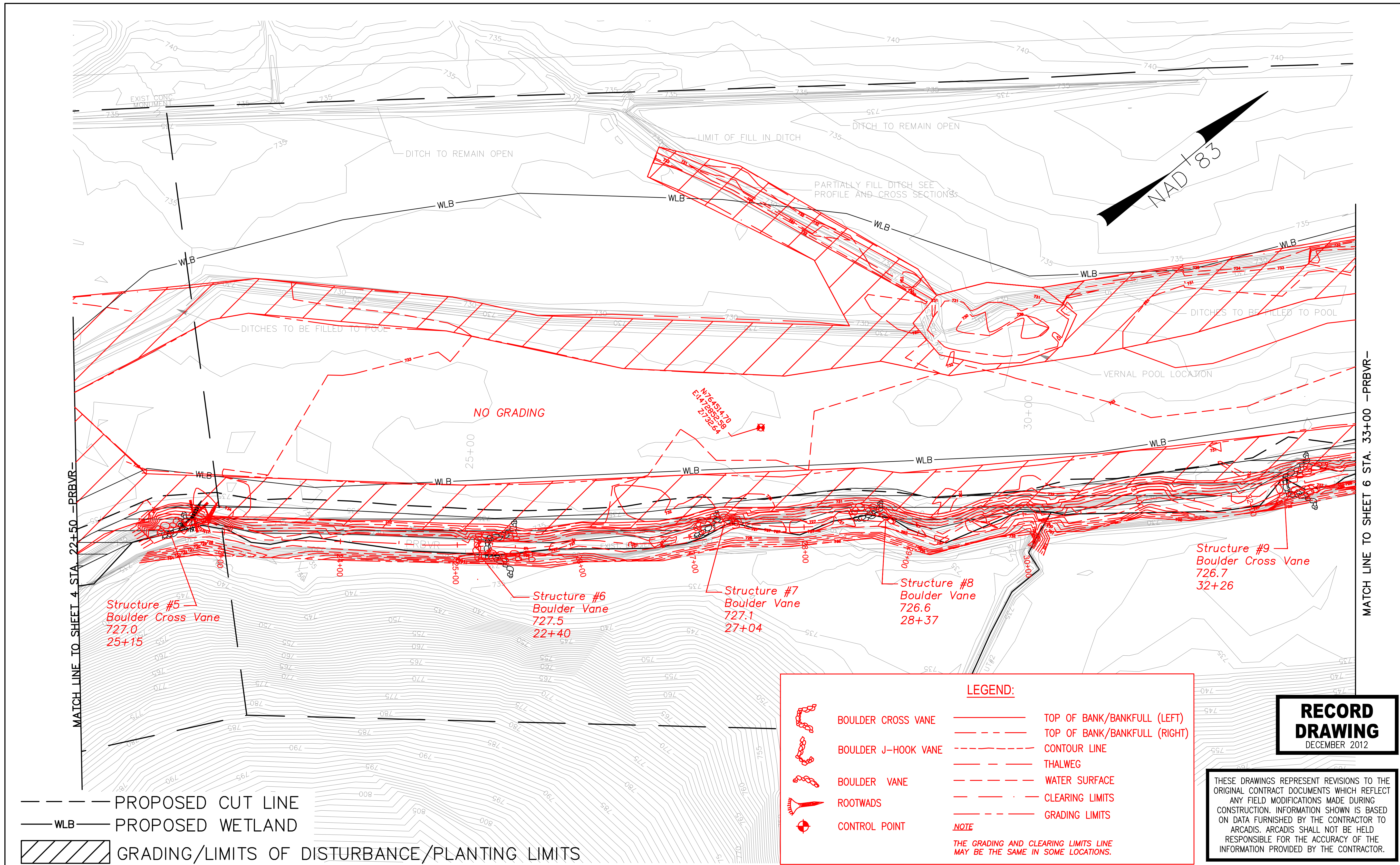
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 4



--- PROPOSED CUT LINE
 --- WLB --- PROPOSED WETLAND
 [Hatched Box] GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

LEGEND:

	BOULDER CROSS VANE		TOP OF BANK/BANKFULL (LEFT)
	BOULDER J-HOOK VANE		TOP OF BANK/BANKFULL (RIGHT)
	BOULDER VANE		CONTOUR LINE
	ROOTWADS		THALWEG
	CONTROL POINT		WATER SURFACE
			CLEARING LIMITS
			GRADING LIMITS

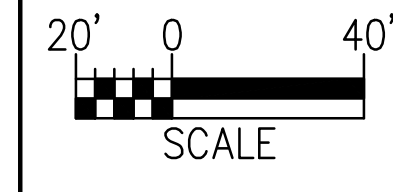
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RECORD DRAWING
 DECEMBER 2012

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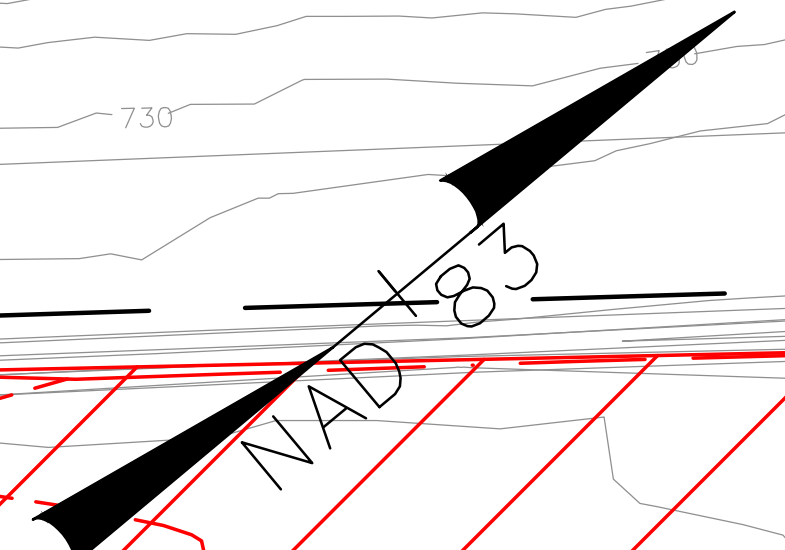
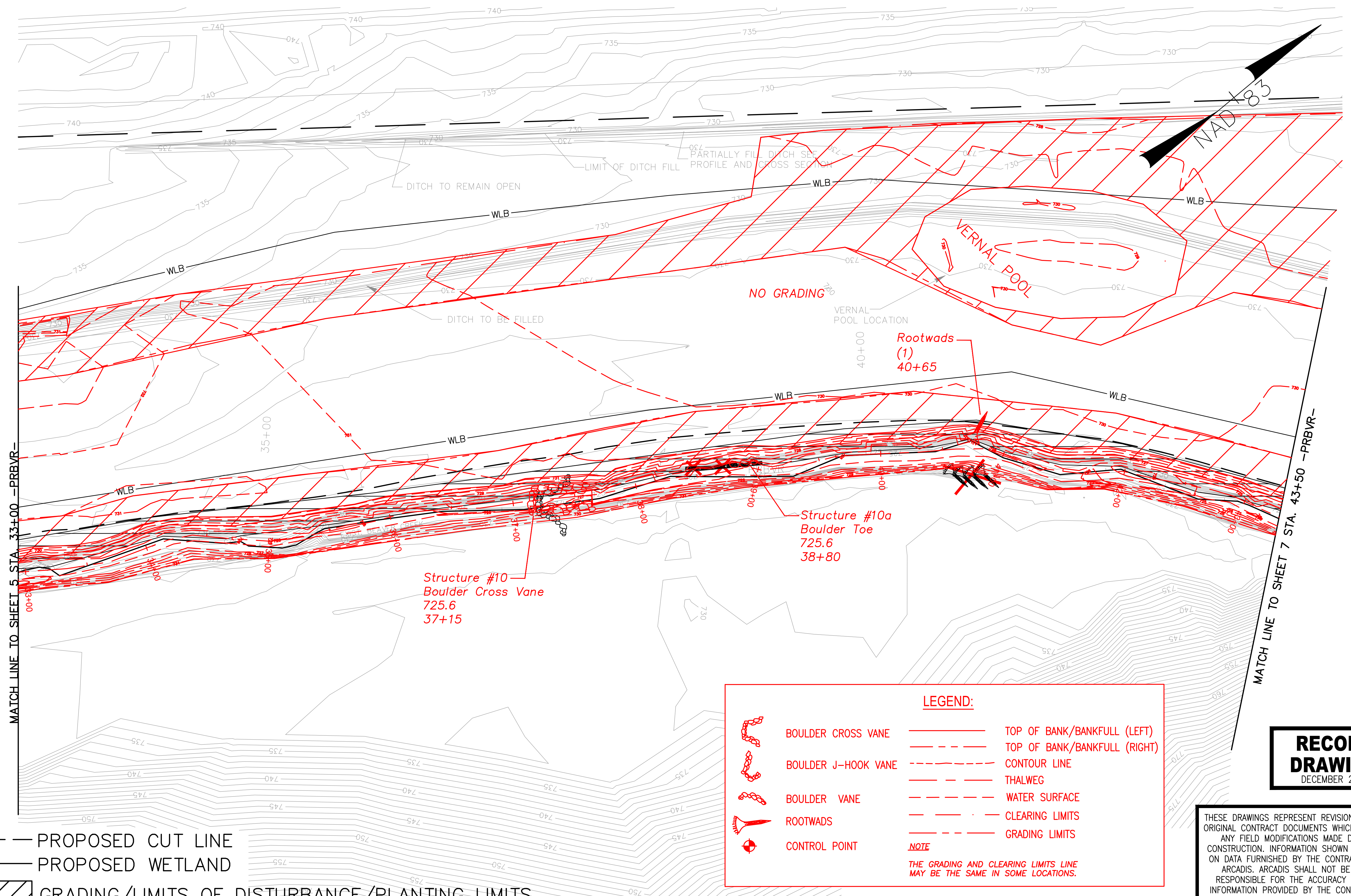
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NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 025954
 JUSTIN R. BEARD
 SEAL NOT VALID UNLESS SIGNED AND DATED

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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 5



MATCH LINE TO SHEET 5 STA. 33+00 -PRBVR-

MATCH LINE TO SHEET 7 STA. 43+50 -PRBVR-

- PROPOSED CUT LINE
- WLB — PROPOSED WETLAND
- GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

LEGEND:

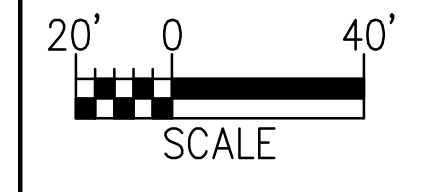
	BOULDER CROSS VANE		TOP OF BANK/BANKFULL (LEFT)
	BOULDER J-HOOK VANE		TOP OF BANK/BANKFULL (RIGHT)
	BOULDER VANE		CONTOUR LINE
	ROOTWADS		THALWEG
	CONTROL POINT		WATER SURFACE
			CLEARING LIMITS
			GRADING LIMITS

NOTE
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**RECORD
DRAWING**
DECEMBER 2012

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NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

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SEAL
025954
ENGINEER
JUSTIN R. BEARD
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NO.	BY	DATE	DESCRIPTION OF REVISION
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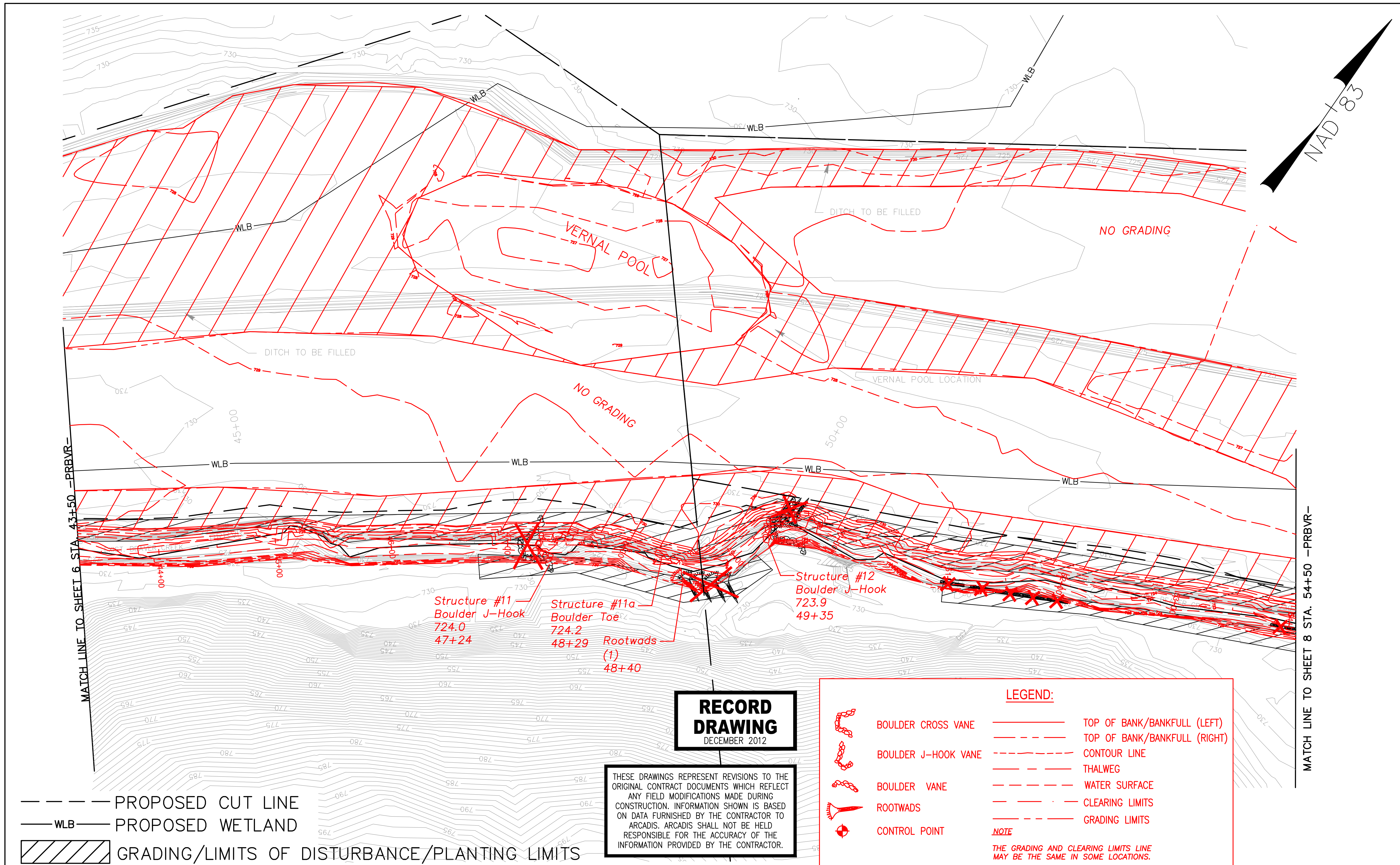


NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH

IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

SHEET NO. 6



--- PROPOSED CUT LINE
 — WLB — PROPOSED WETLAND
 [Hatched Box] GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

RECORD DRAWING
 DECEMBER 2012

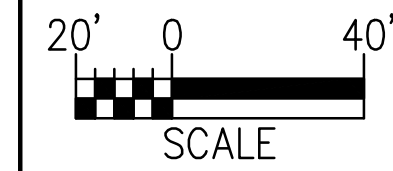
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LEGEND:

	BOULDER CROSS VANE		TOP OF BANK/BANKFULL (LEFT)
	BOULDER J-HOOK VANE		TOP OF BANK/BANKFULL (RIGHT)
	BOULDER VANE		CONTOUR LINE
	ROOTWADS		THALWEG
	CONTROL POINT		WATER SURFACE
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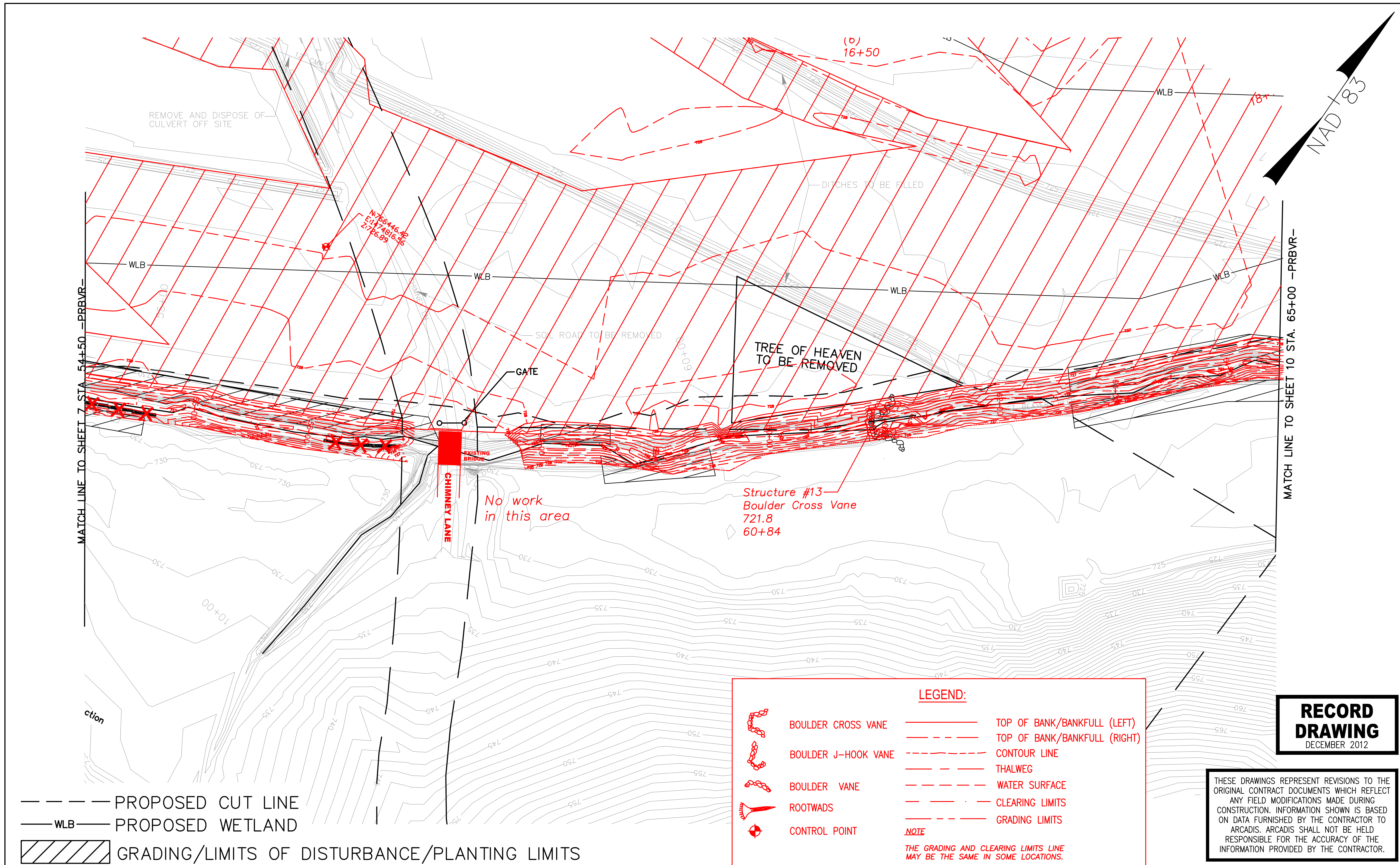
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PROFESSIONAL ENGINEER
 SEAL 025954
 JUSTIN R. BEARD
 SEAL NOT VALID UNLESS SIGNED AND DATED

NO.	BY	DATE	DESCRIPTION OF REVISION
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 7



MATCH LINE TO SHEET 7 STA 54+50 -PRBVR-

MATCH LINE TO SHEET 10 STA. 65+00 -PRBVR-

NAD 83

- PROPOSED CUT LINE
- WLB --- PROPOSED WETLAND
- GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

LEGEND:

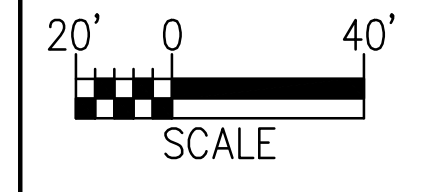
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	BOULDER J-HOOK VANE		TOP OF BANK/BANKFULL (RIGHT)
	BOULDER VANE		CONTOUR LINE
	ROOTWADS		THALWEG
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DECEMBER 2012

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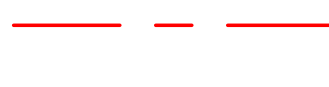






NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

SHEET NO. 8

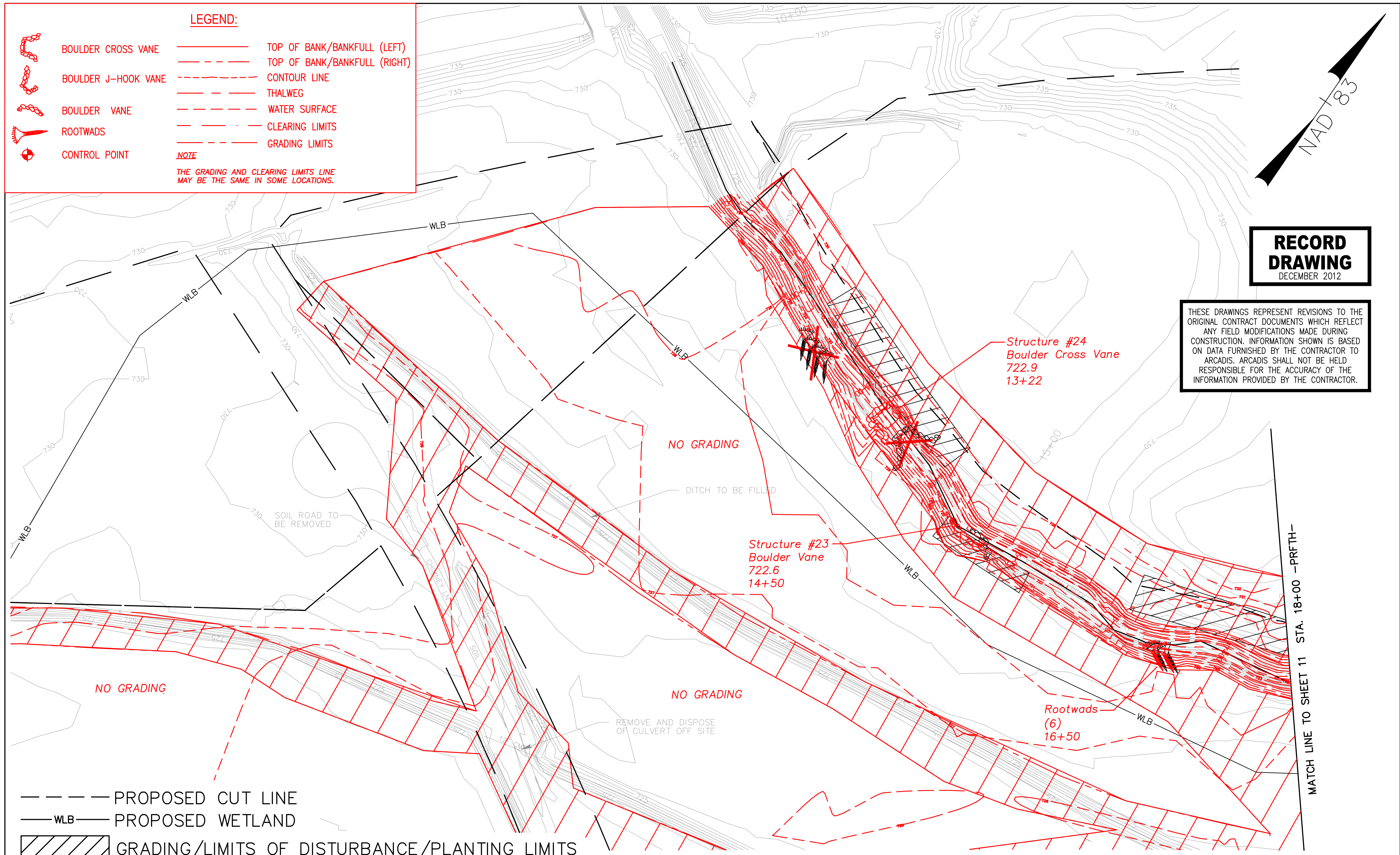
LEGEND:

-  BOULDER CROSS VANE
-  BOULDER J-HOOK VANE
-  BOULDER VANE
-  ROOTWADS
-  CONTROL POINT
-  TOP OF BANK/BANKFULL (LEFT)
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-  CONTOUR LINE
-  THALWEG
-  WATER SURFACE
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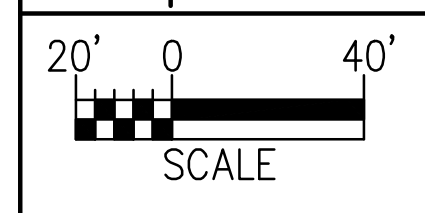
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 PROPOSED CUT LINE
 WLB PROPOSED WETLAND
 GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

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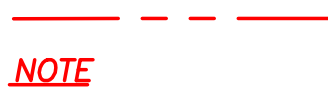

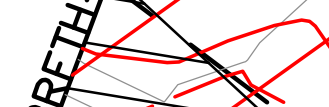

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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 9

MATCH LINE TO SHEET 11 STA. 18+00 - PRFTH-

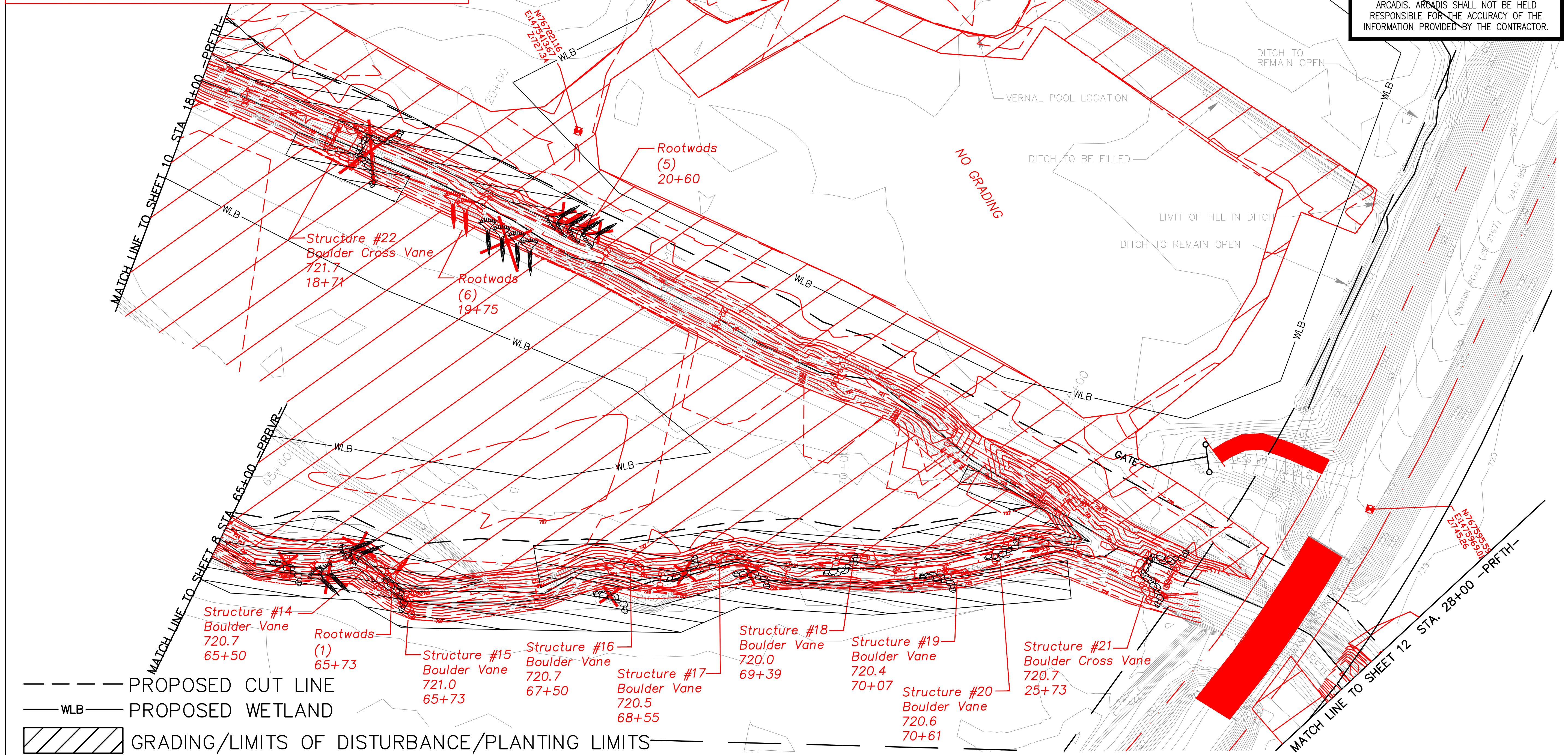
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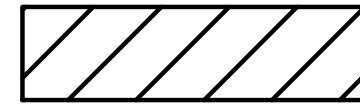
-  BOULDER CROSS VANE
-  BOULDER J-HOOK VANE
-  BOULDER VANE
-  ROOTWADS
-  CONTROL POINT
-  TOP OF BANK/BANKFULL (LEFT)
-  TOP OF BANK/BANKFULL (RIGHT)
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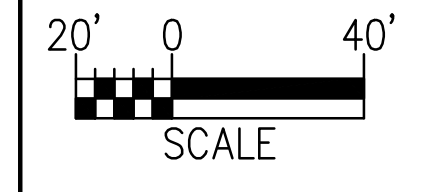
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--- PROPOSED CUT LINE
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 GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

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NORTH CAROLINA PROFESSIONAL SEAL 025954 ENGINEER JUSTIN R. BEARD
 SEAL NOT VALID UNLESS SIGNED AND DATED

BY	DATE	DESCRIPTION OF REVISION
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 10

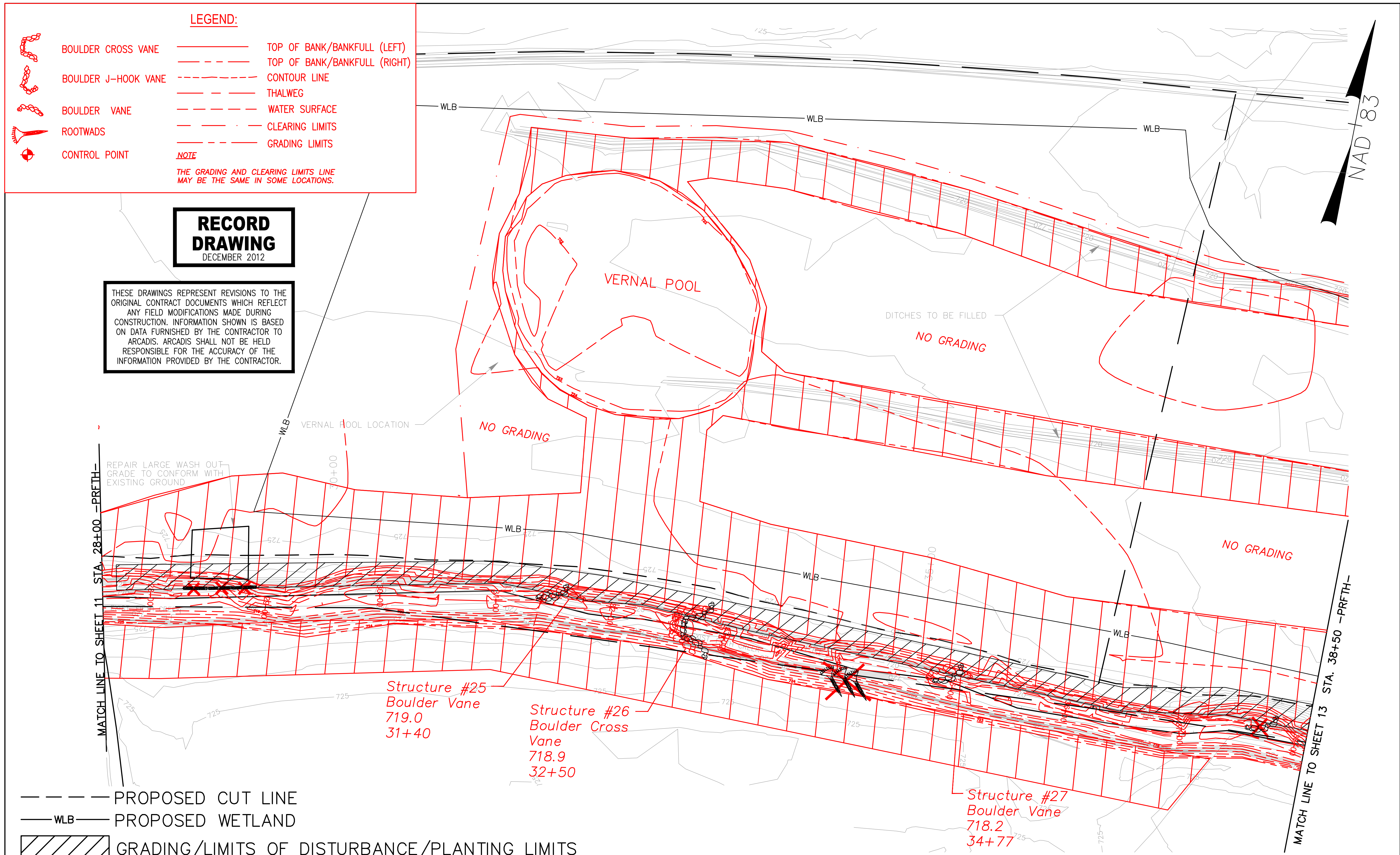
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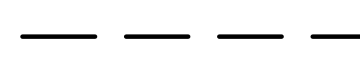


	BOULDER CROSS VANE		TOP OF BANK/BANKFULL (LEFT)
	BOULDER J-HOOK VANE		TOP OF BANK/BANKFULL (RIGHT)
	BOULDER VANE		CONTOUR LINE
	ROOTWADS		THALWEG
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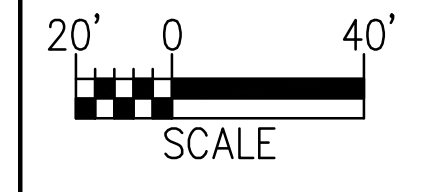
RECORD DRAWING
DECEMBER 2012

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 PROPOSED CUT LINE
 WLB PROPOSED WETLAND
 GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.



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NO.	BY	DATE	DESCRIPTION OF REVISION
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4	SCA	12/07/12	ASBUILT/RECORD DRAWINGS
3	DGL	11/04/10	ISSUE FOR BID
2	DGL	03/22/10	DRAFT CONSTRUCTION PLANS
1	DGL	12/04/09	DRAFT RESTORATION PLANS











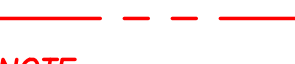



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IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 11

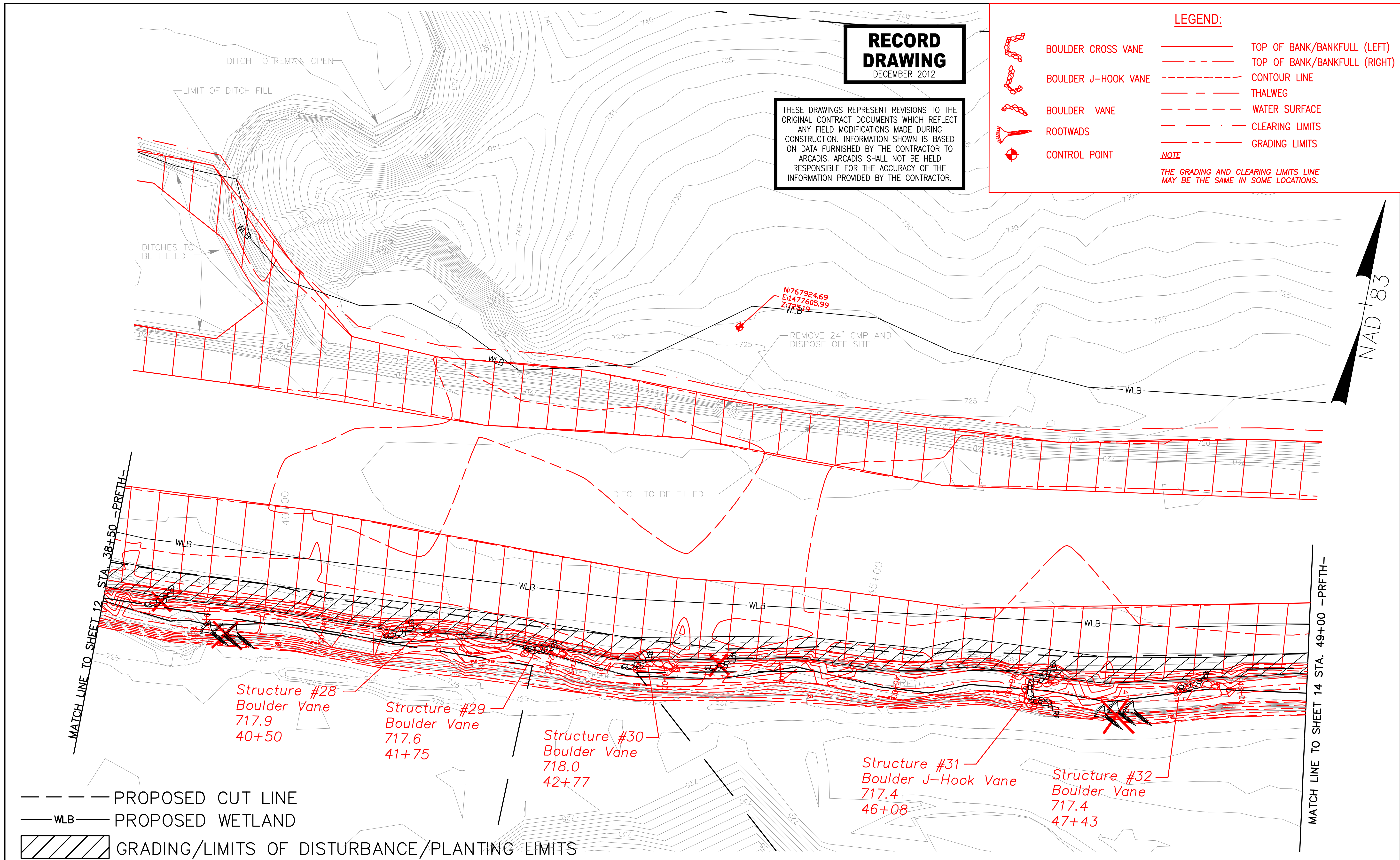
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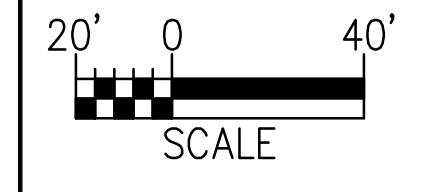
-  BOULDER CROSS VANE
-  BOULDER J-HOOK VANE
-  BOULDER VANE
-  ROOTWADS
-  CONTROL POINT
-  TOP OF BANK/BANKFULL (LEFT)
-  TOP OF BANK/BANKFULL (RIGHT)
-  CONTOUR LINE
-  THALWEG
-  WATER SURFACE
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-  GRADING LIMITS

NOTE
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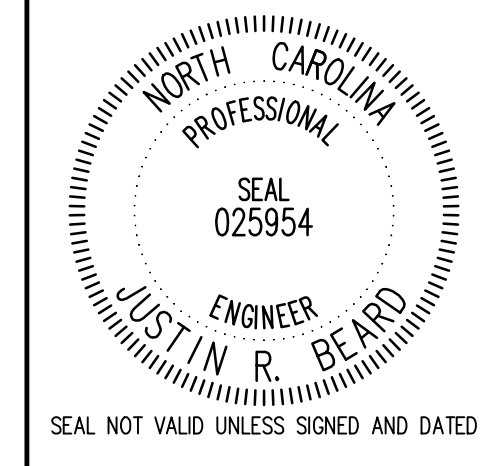
--- PROPOSED CUT LINE
 — WLB — PROPOSED WETLAND
 ▨ GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

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1	DGL	12/04/09	DRAFT RESTORATION PLANS

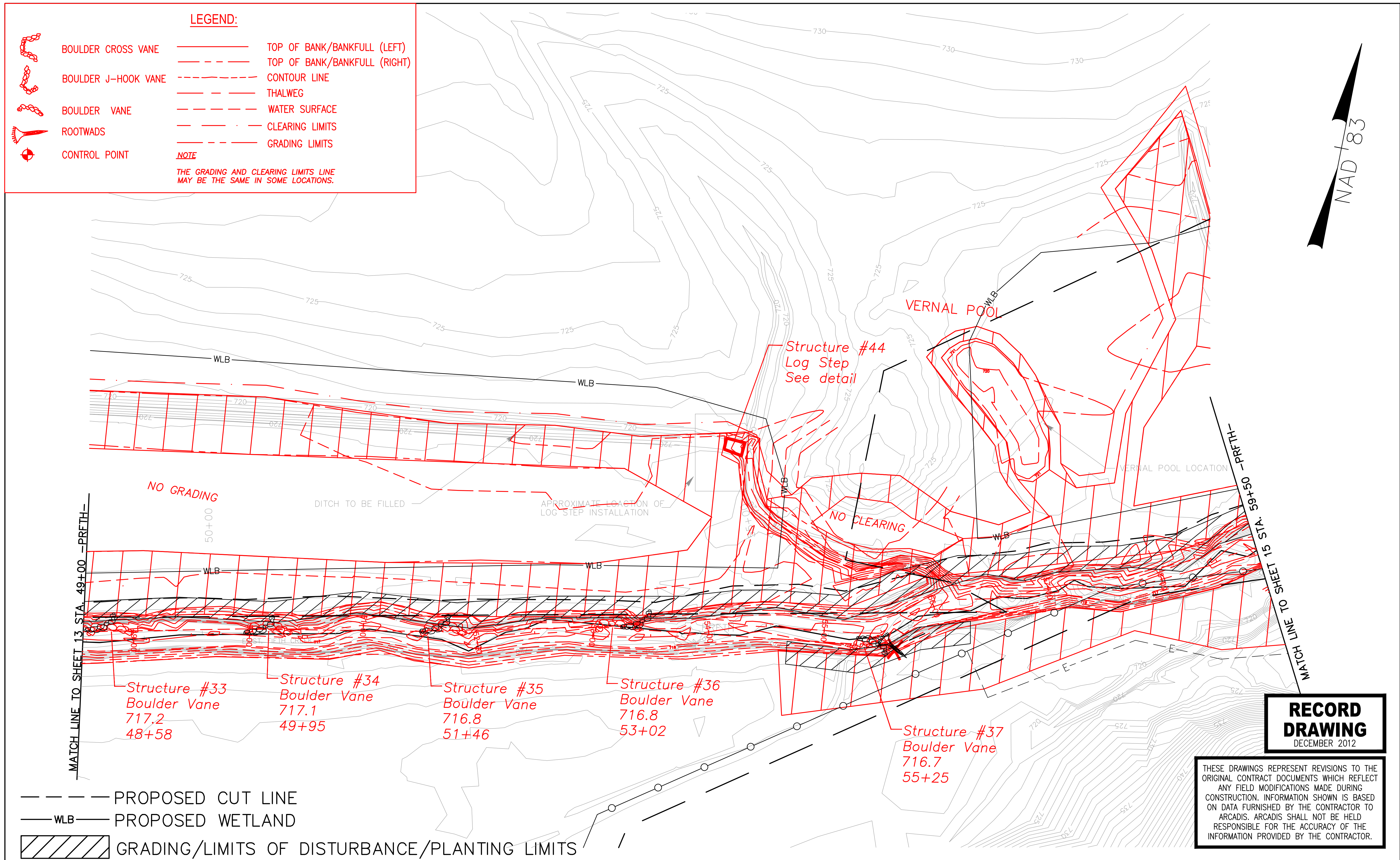
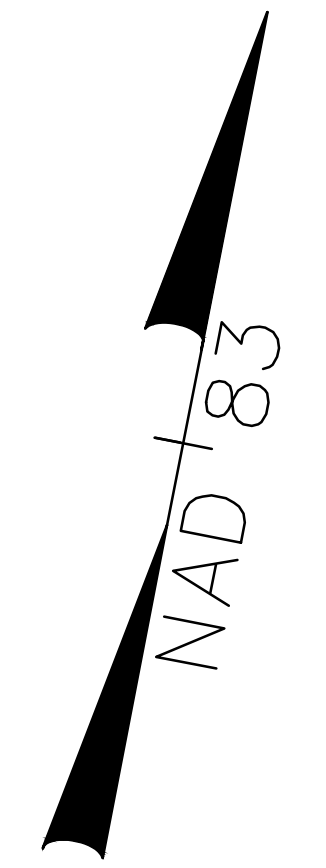



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FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 12

LEGEND:

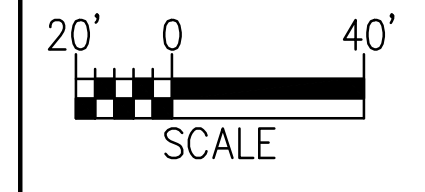
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	BOULDER VANE	-----	CONTOUR LINE
	ROOTWADS	-----	THALWEG
	CONTROL POINT	-----	WATER SURFACE
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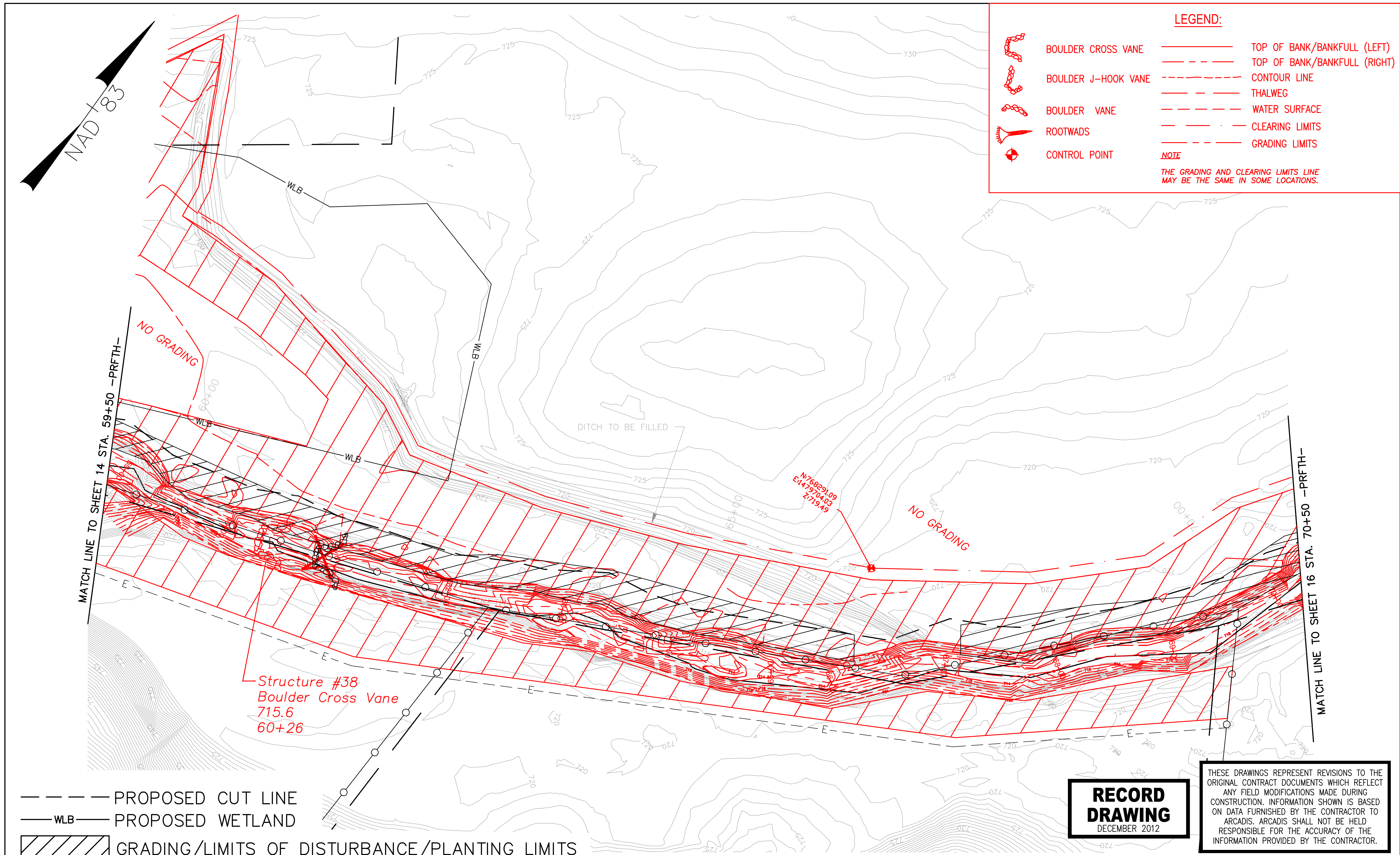
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 SHEET NO. 13

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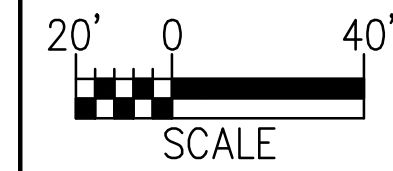


- - - - PROPOSED CUT LINE
 — WLB — PROPOSED WETLAND
 GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

RECORD DRAWING
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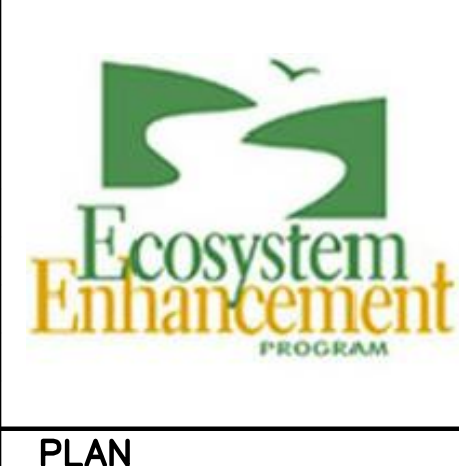


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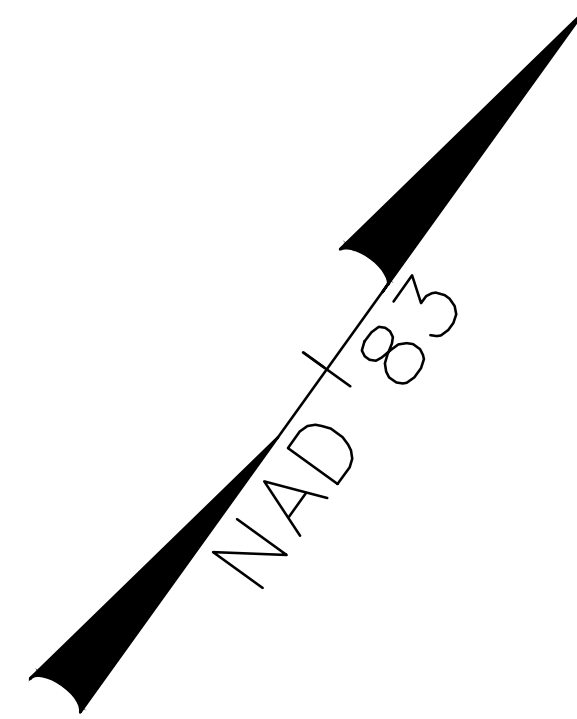
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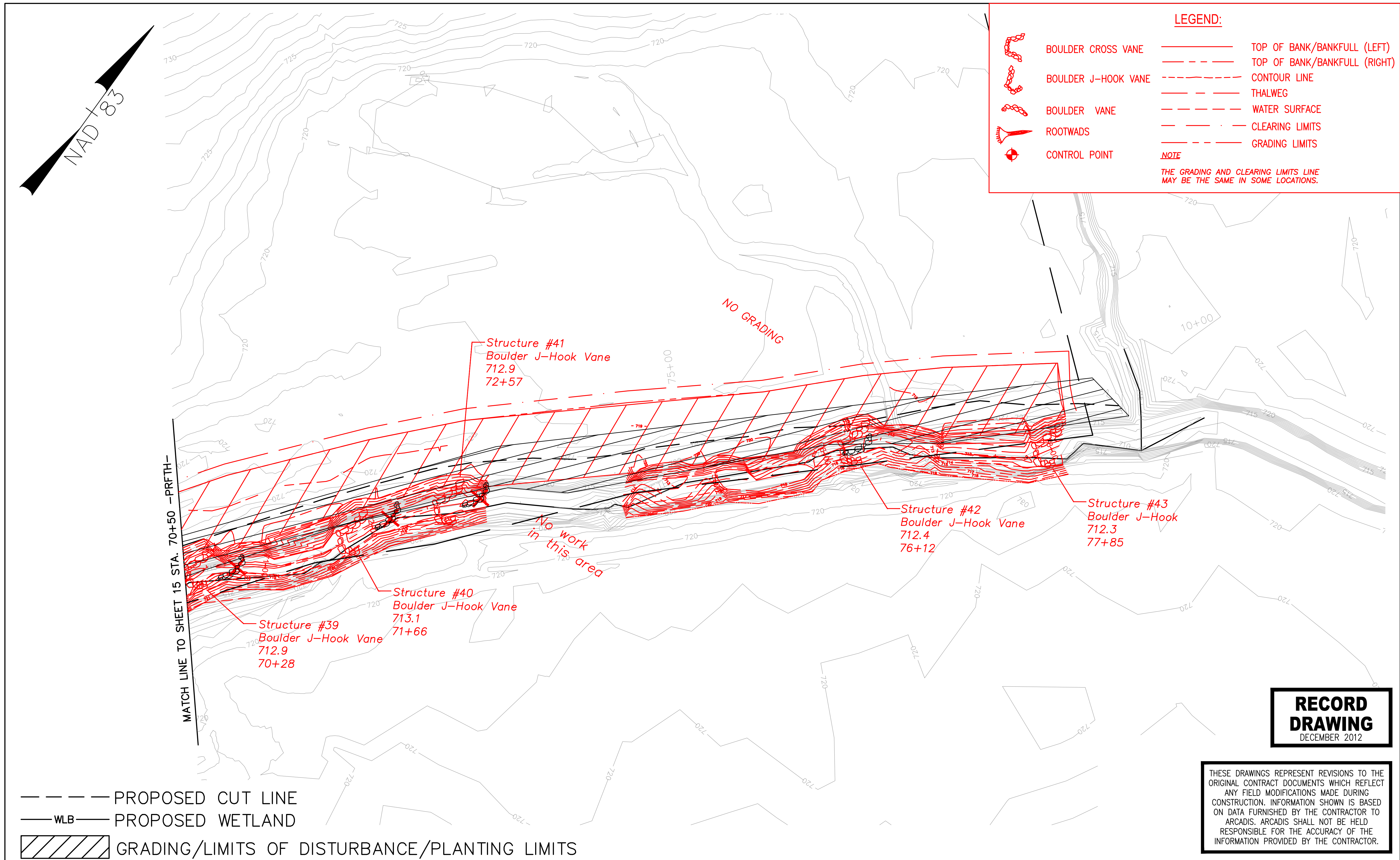
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ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 14



LEGEND:

- BOULDER CROSS VANE
- BOULDER J-HOOK VANE
- BOULDER VANE
- ROOTWADS
- CONTROL POINT
- TOP OF BANK/BANKFULL (LEFT)
- TOP OF BANK/BANKFULL (RIGHT)
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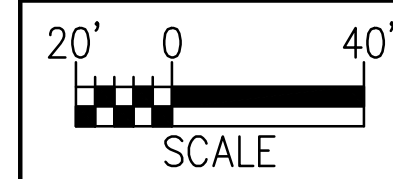


- PROPOSED CUT LINE
- PROPOSED WETLAND
- GRADING/LIMITS OF DISTURBANCE/PLANTING LIMITS

RECORD DRAWING
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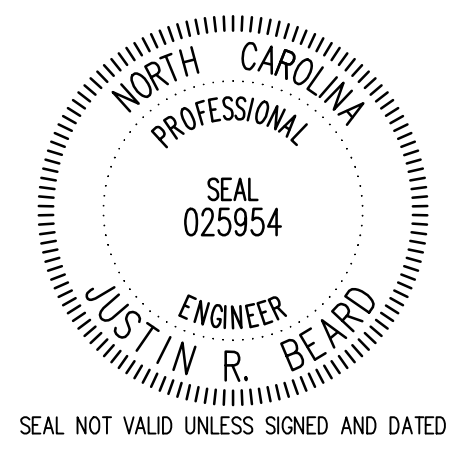
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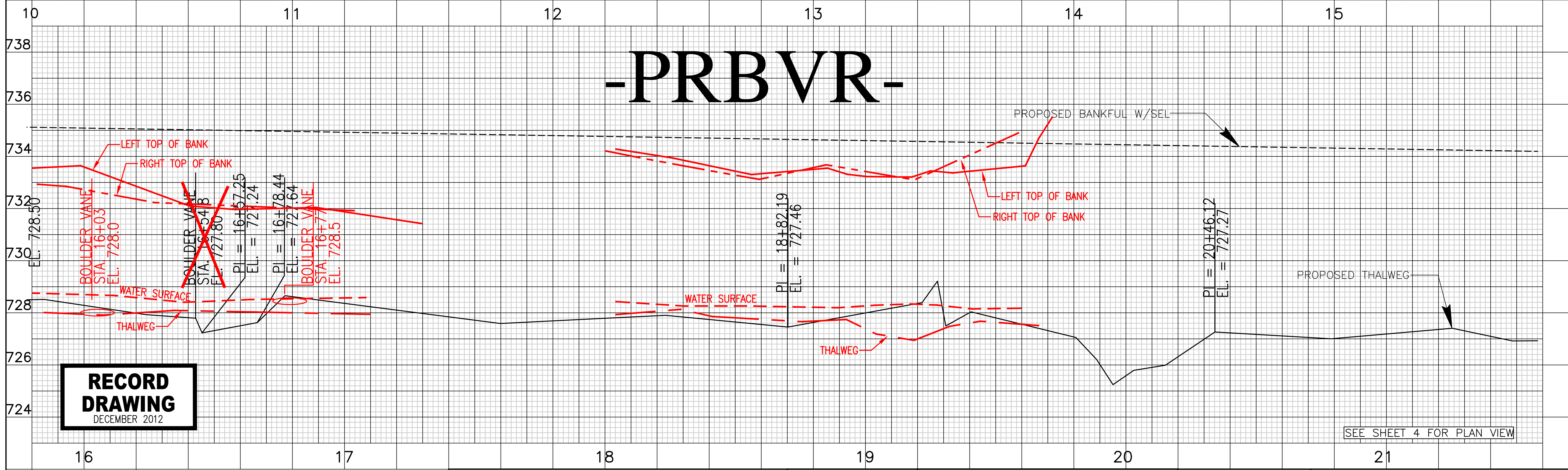
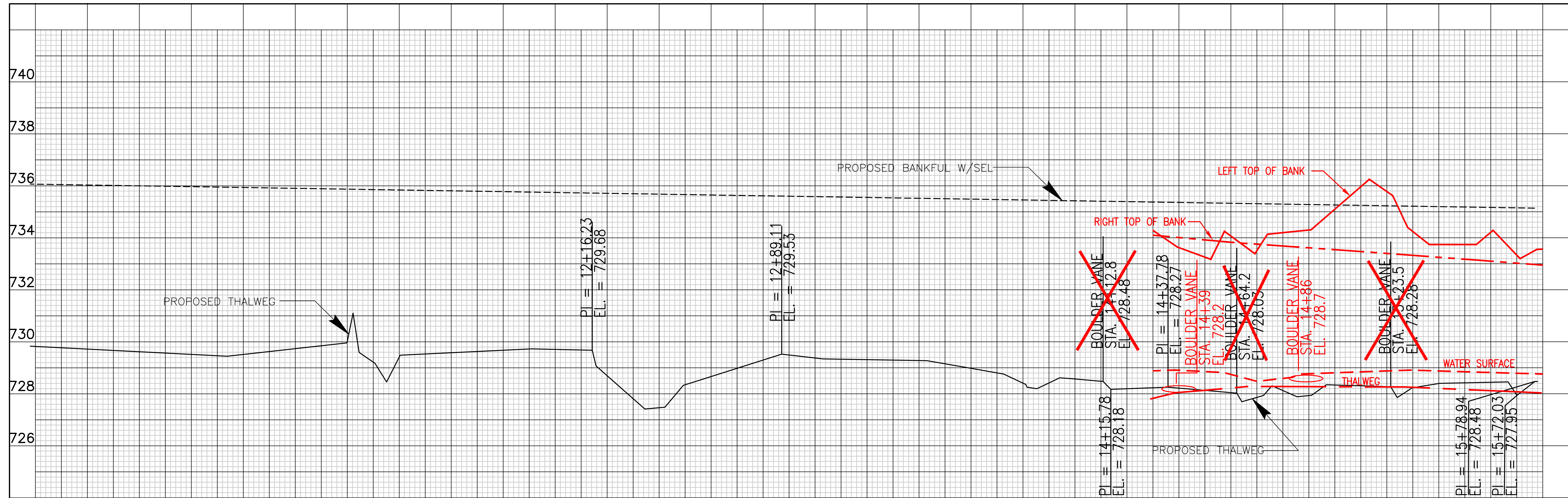
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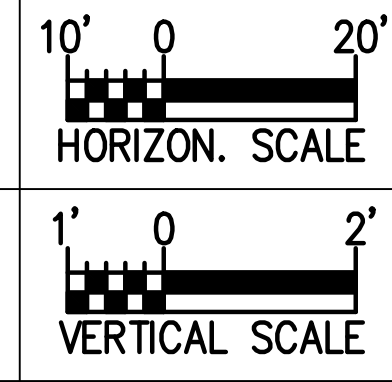


NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
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SHEET NO. 15



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JUSTIN R. BEARD
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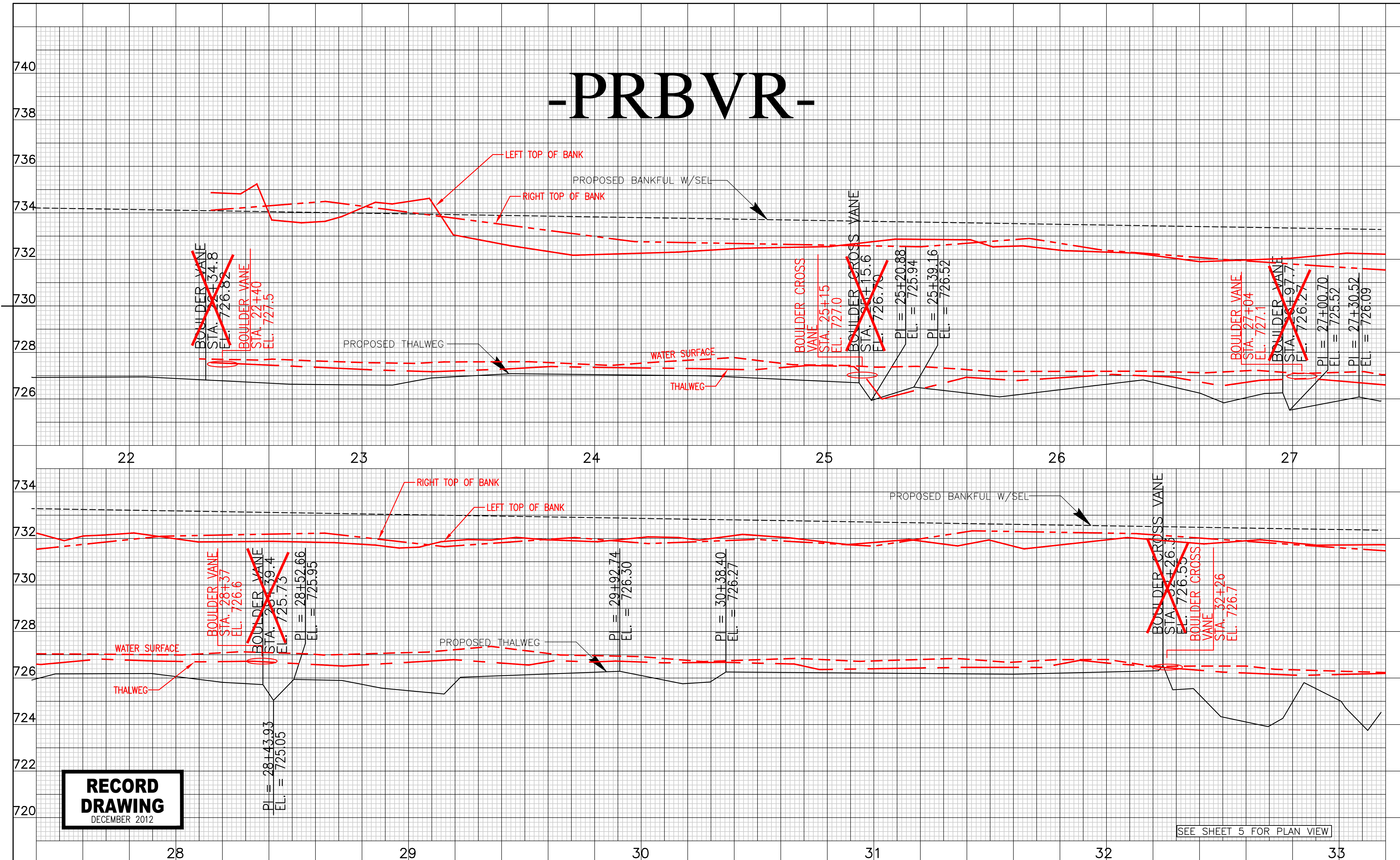
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Ecosystem Enhancement PROGRAM

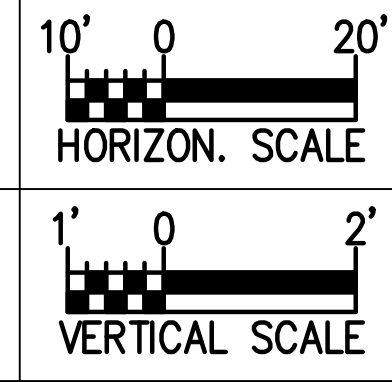
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FIVE-MILE BRANCH
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SCO # 040607901

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SEAL
025954
ENGINEER
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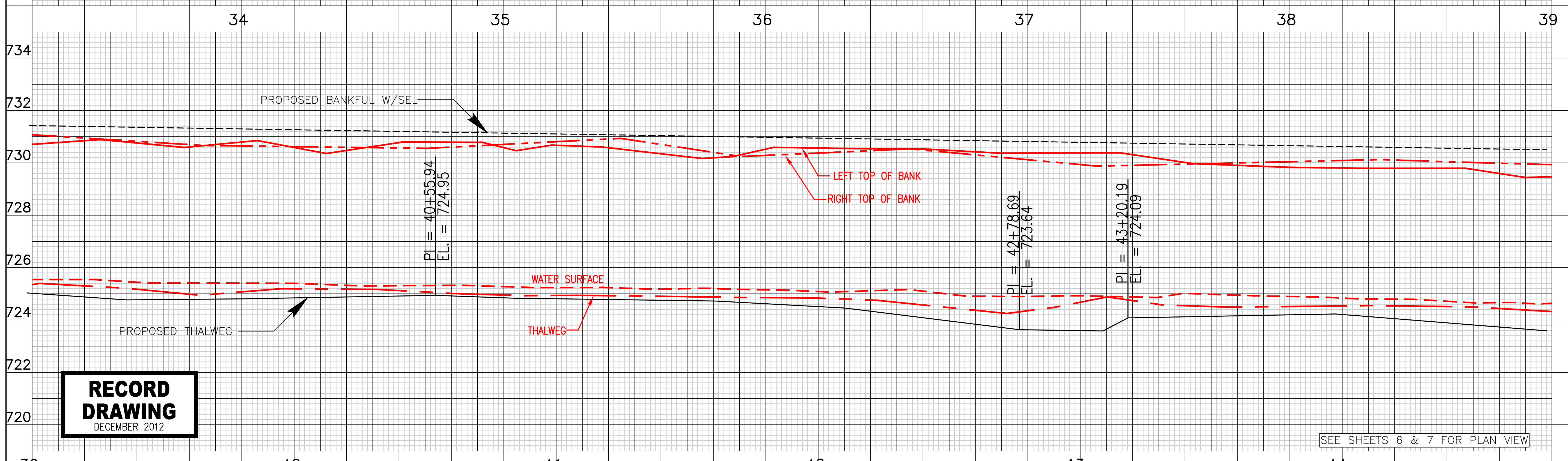
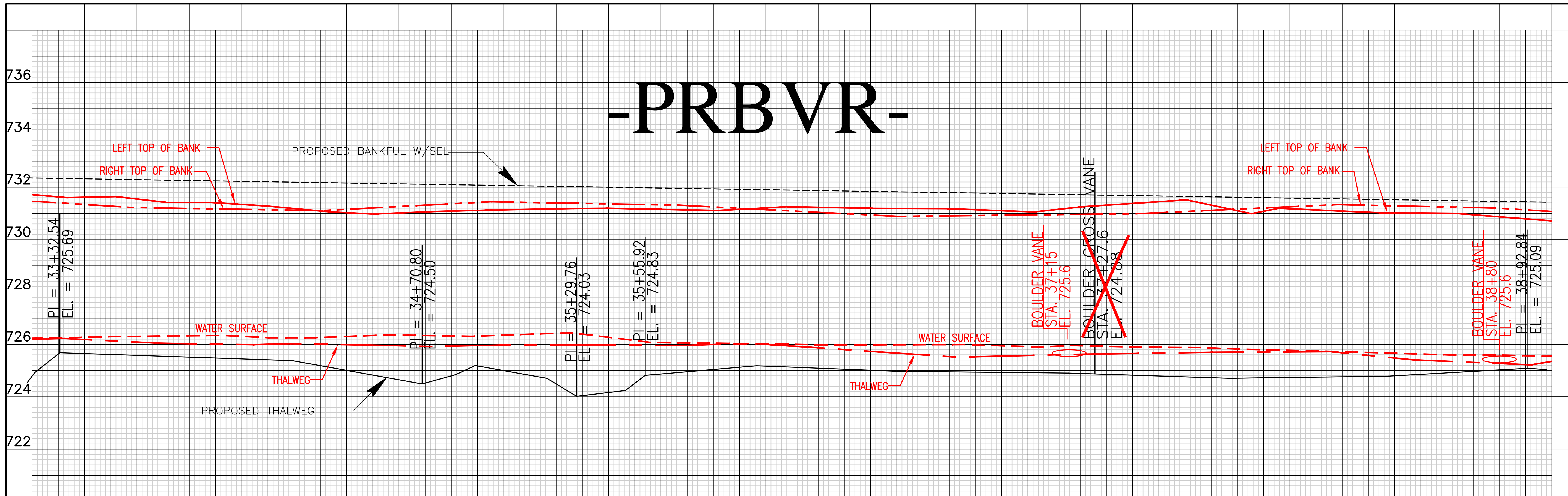
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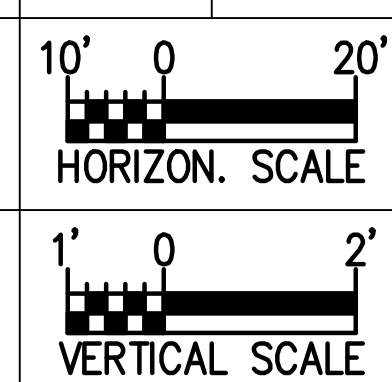
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FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
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BEAVER CREEK PROFILE SHEET NO. 17

SEE SHEET 5 FOR PLAN VIEW

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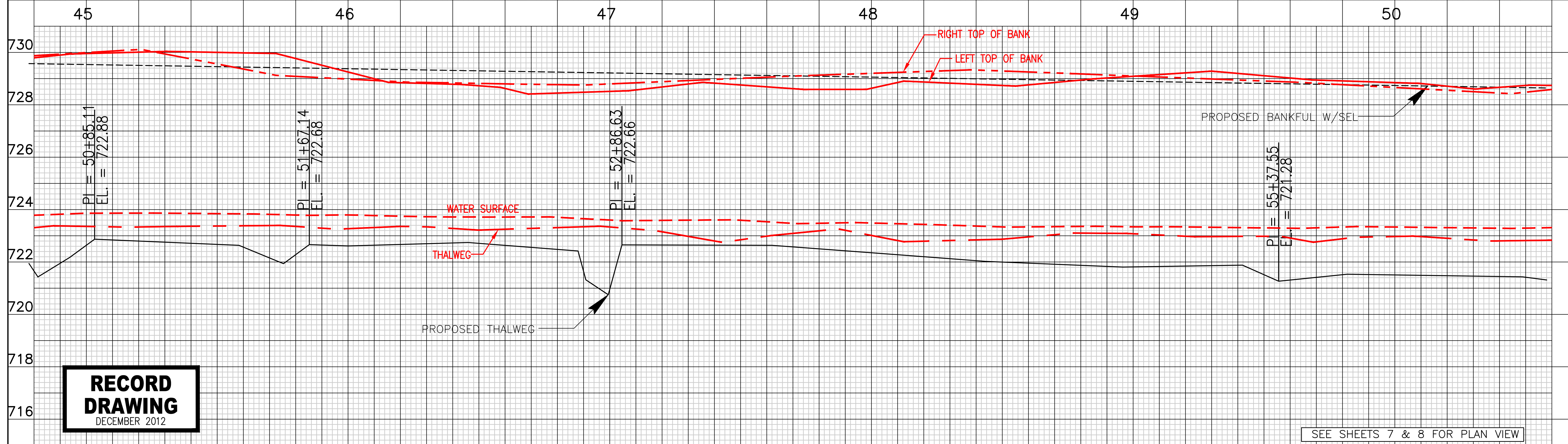
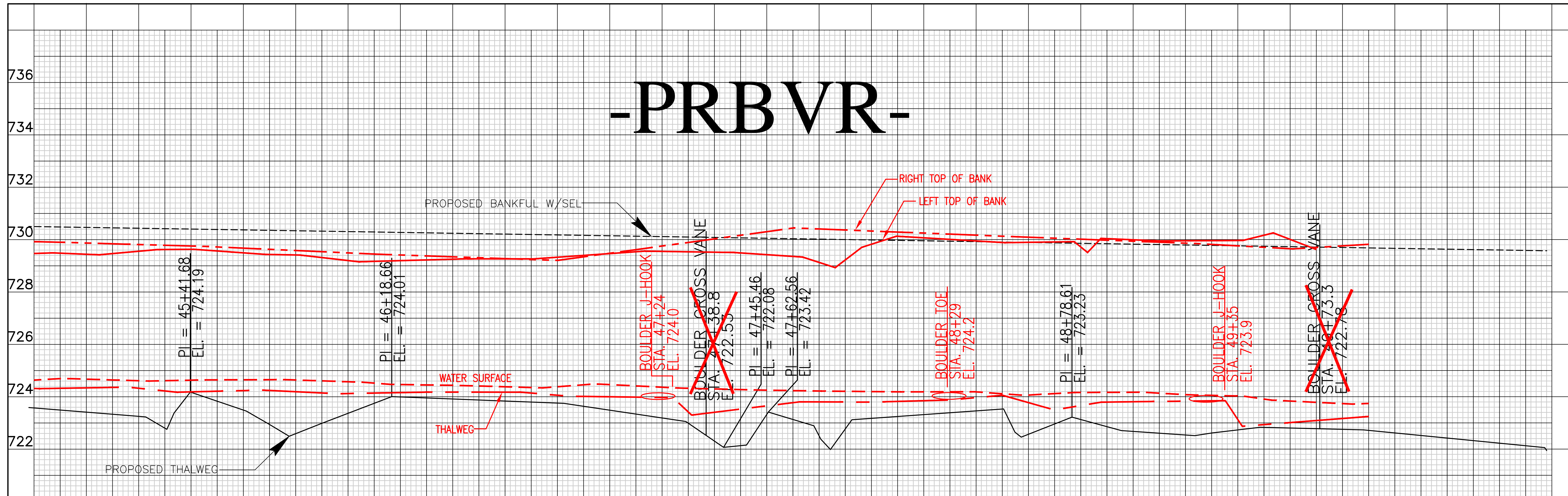
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Ecosystem Enhancement
PROGRAM
BEAVER CREEK PROFILE

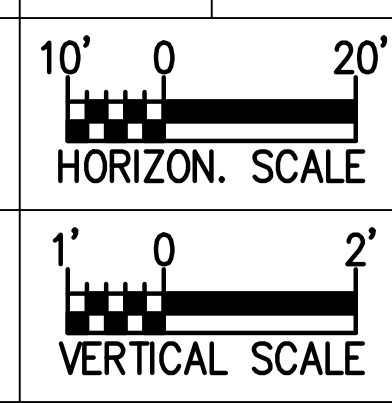
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ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 18

FILES DATE

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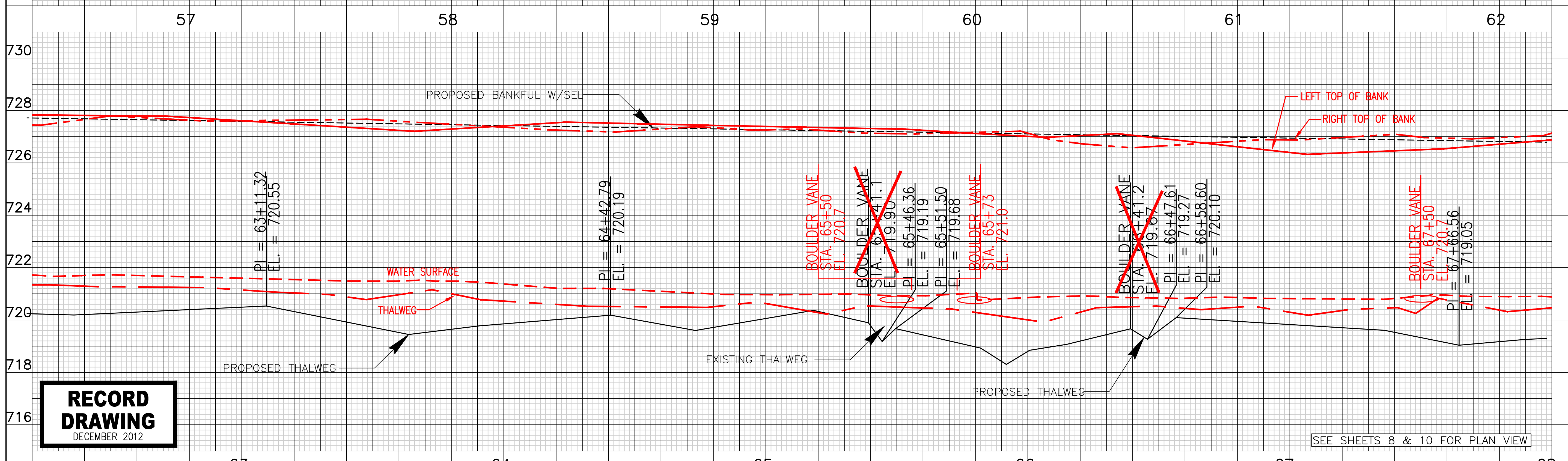
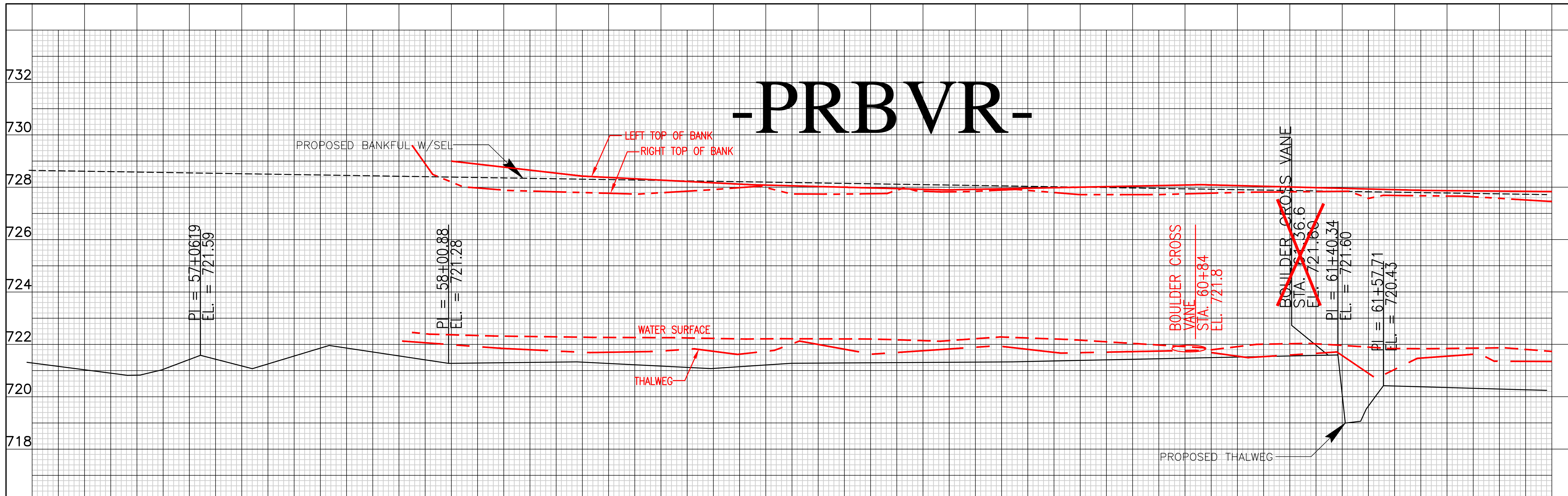
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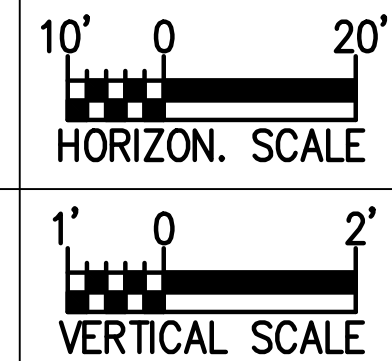


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FIVE-MILE BRANCH
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BEAVER CREEK PROFILE SHEET NO. 19

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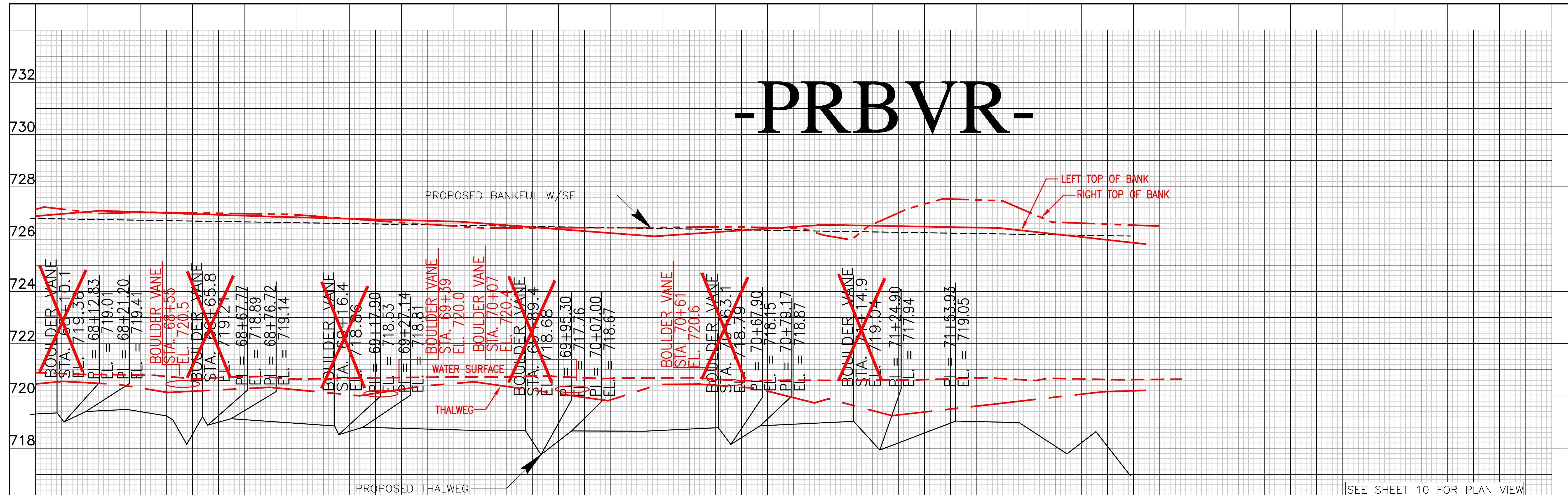
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Ecosystem Enhancement
PROGRAM

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

SEE SHEETS 8 & 10 FOR PLAN VIEW

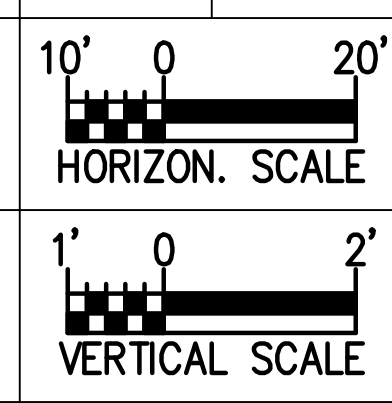
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SEE SHEET 10 FOR PLAN VIEW

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Ecosystem Enhancement
PROGRAM

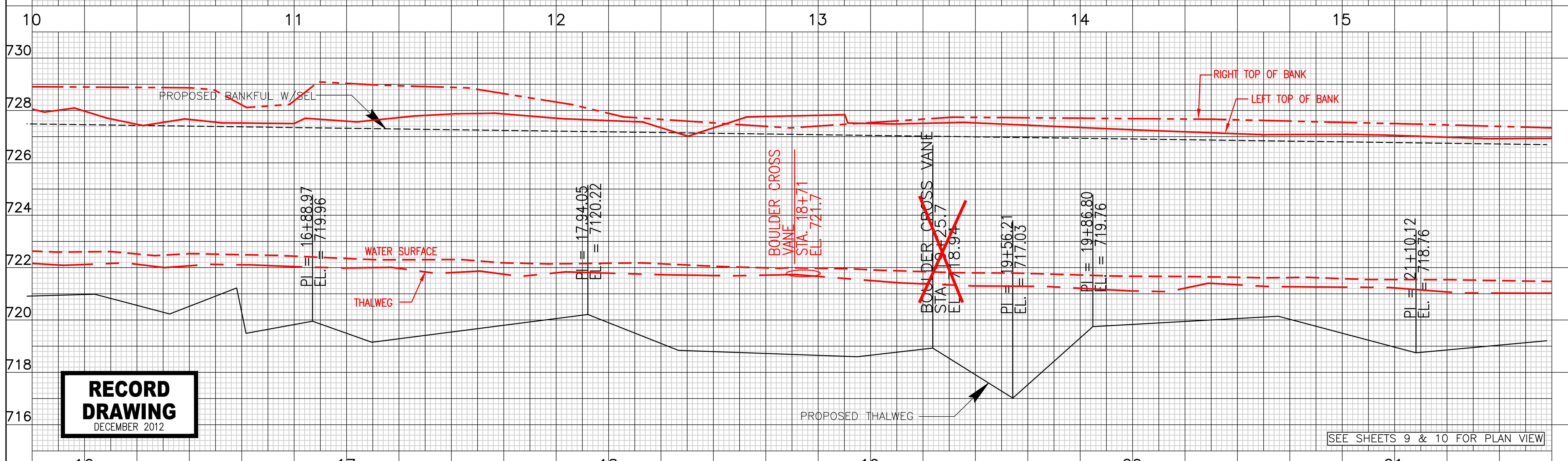
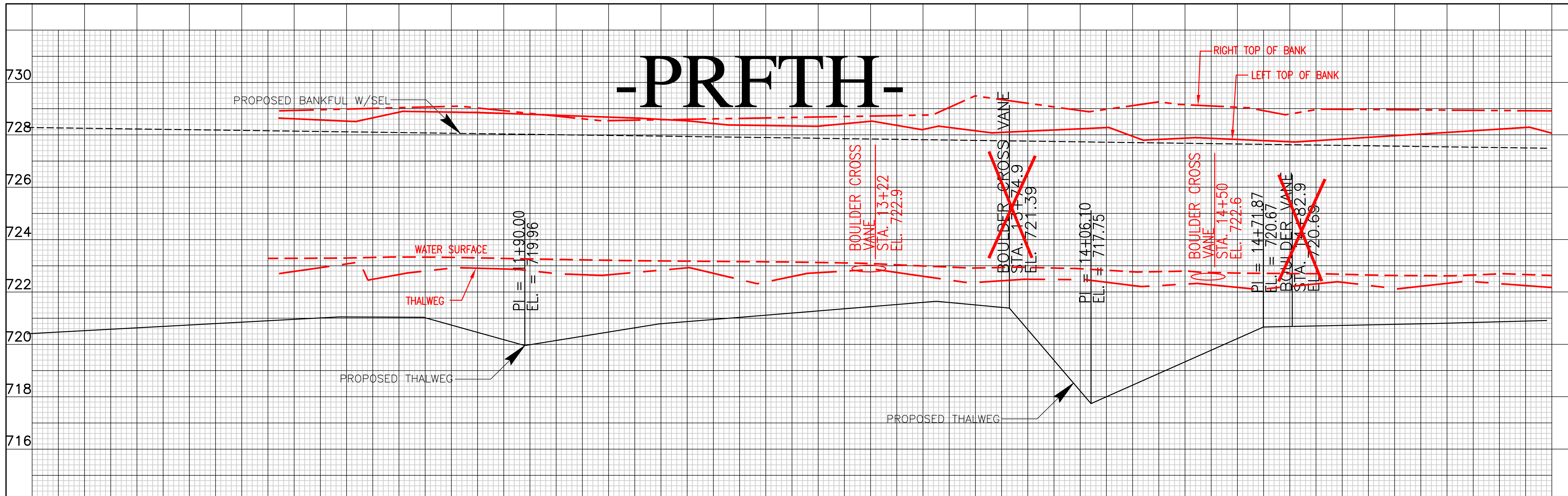
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IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

BEAVER CREEK PROFILE SHEET NO. 21

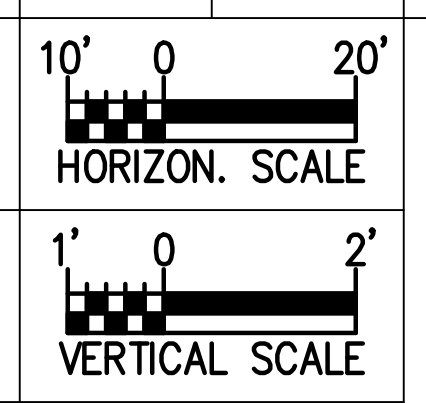
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DECEMBER 2012

SEE SHEETS 9 & 10 FOR PLAN VIEW



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NORTH CAROLINA
PROFESSIONAL
ENGINEER

JUSTIN R. BEARD

SEAL
025954

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5			
4	SCA	12/07/12	ASBUILT/RECORD DRAWINGS
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1	TAA	12/04/09	DRAFT RESTORATION PLANS

FIFTH CREEK PROFILE

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

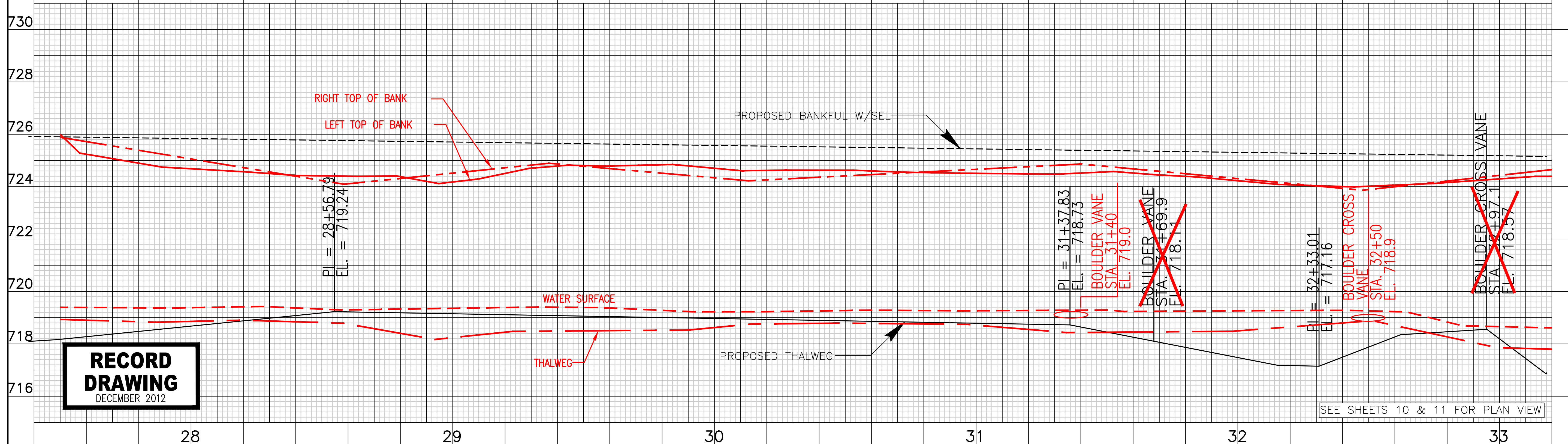
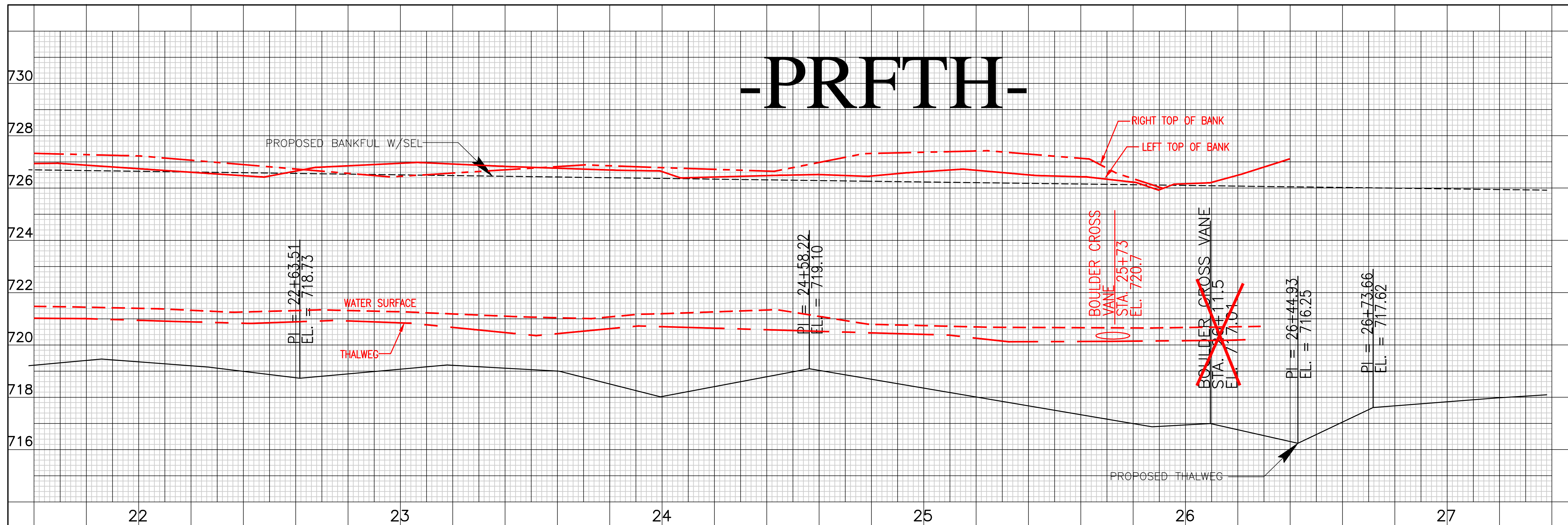
FIVE-MILE BRANCH

IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

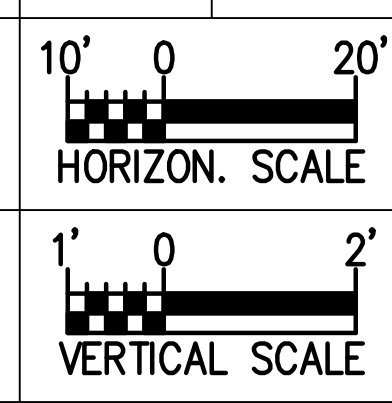
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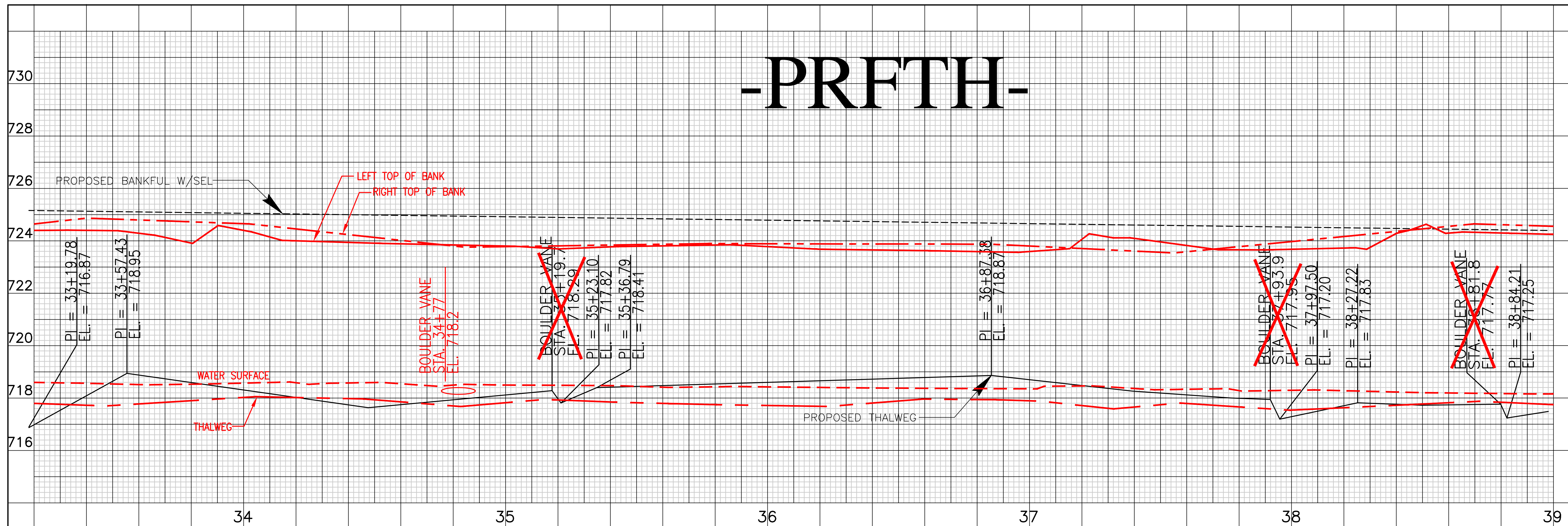
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Ecosystem Enhancement PROGRAM
FIFTH CREEK PROFILE

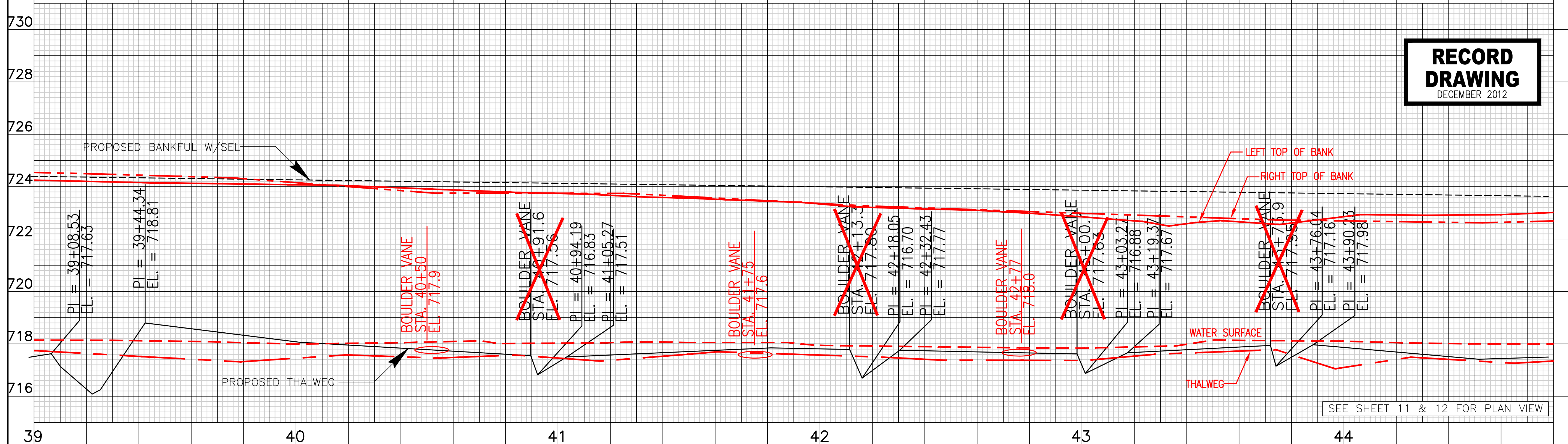
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FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 23

FILES DATE

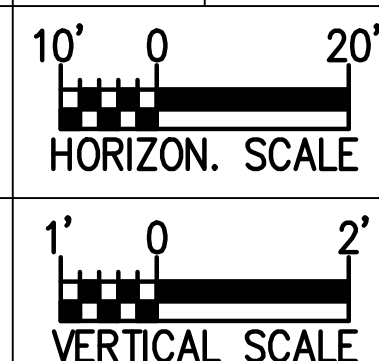
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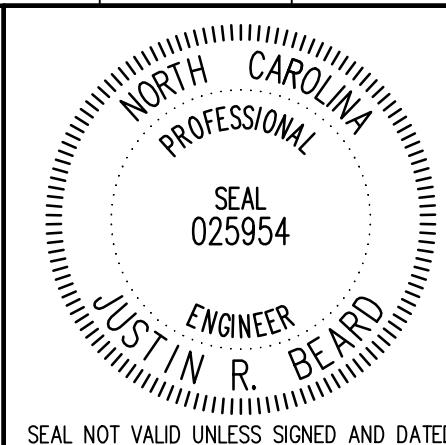


SEE SHEET 11 & 12 FOR PLAN VIEW



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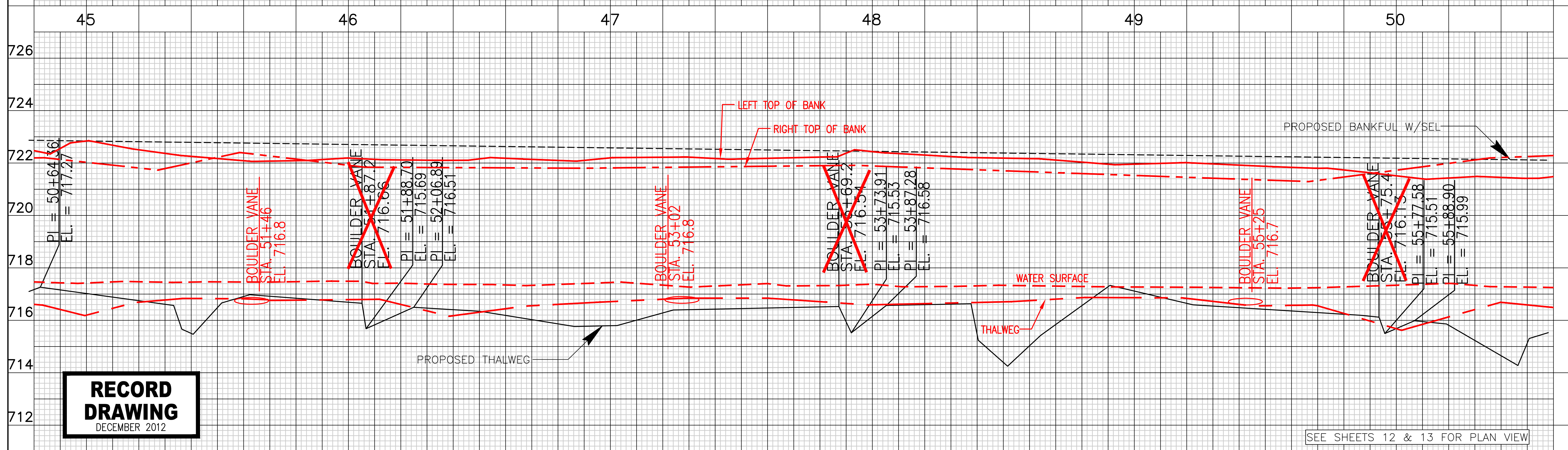
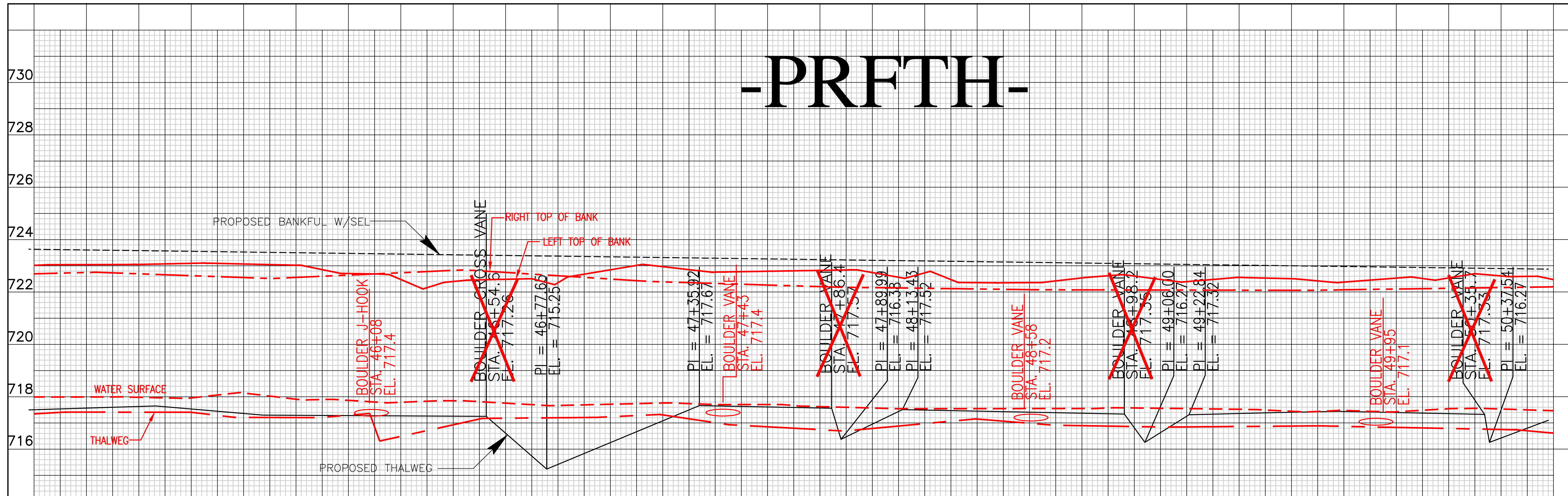


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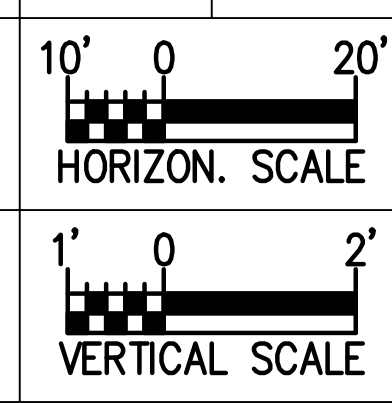
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SEE SHEETS 12 & 13 FOR PLAN VIEW



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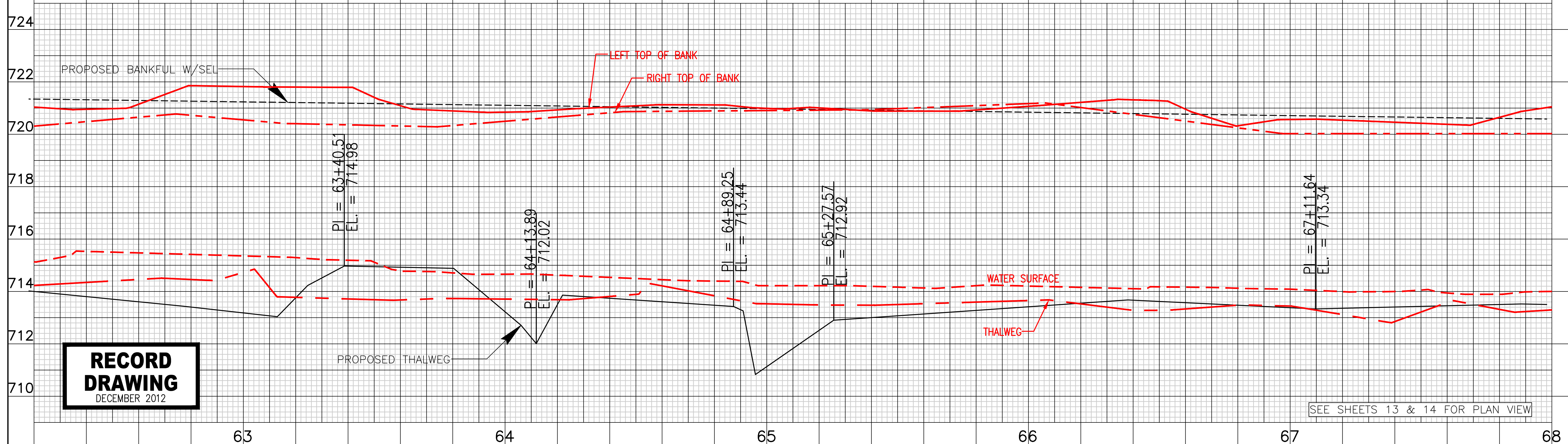
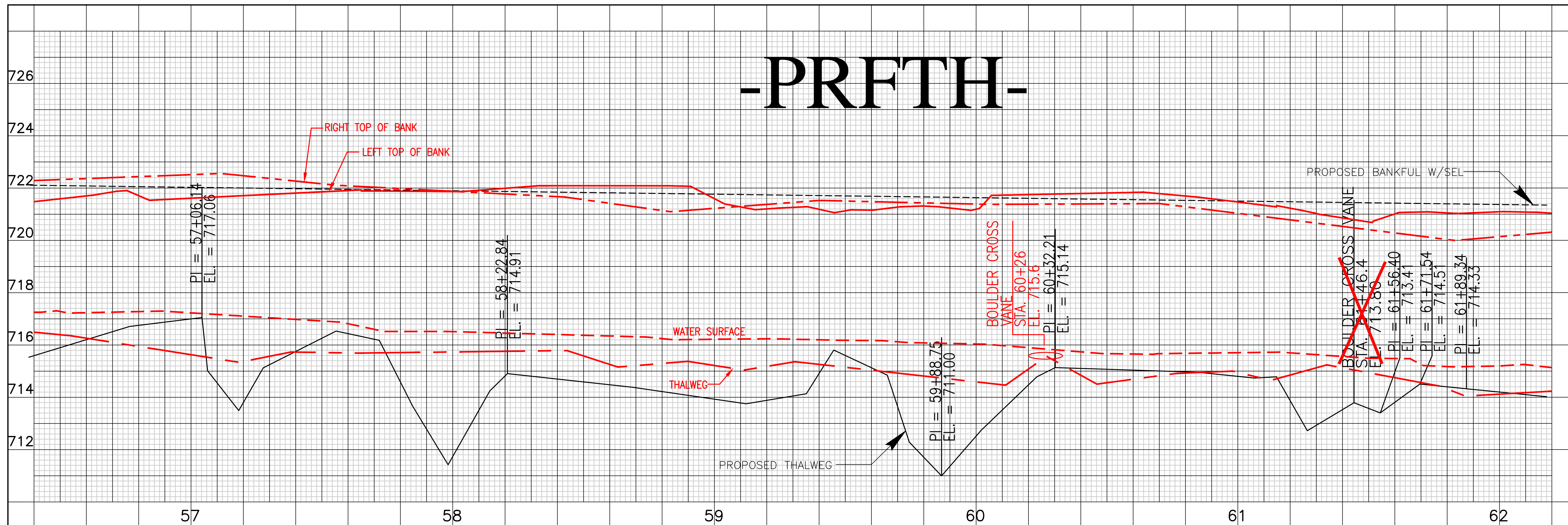
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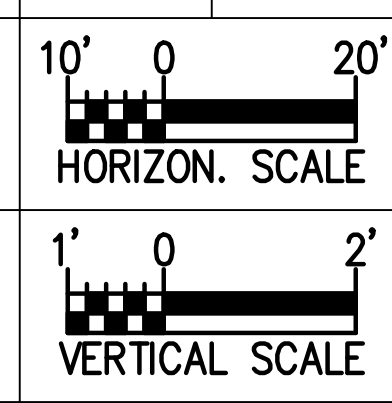
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IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
FIFTH CREEK PROFILE
SHEET NO. 25

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RECORD DRAWING
DECEMBER 2012

SEE SHEETS 13 & 14 FOR PLAN VIEW



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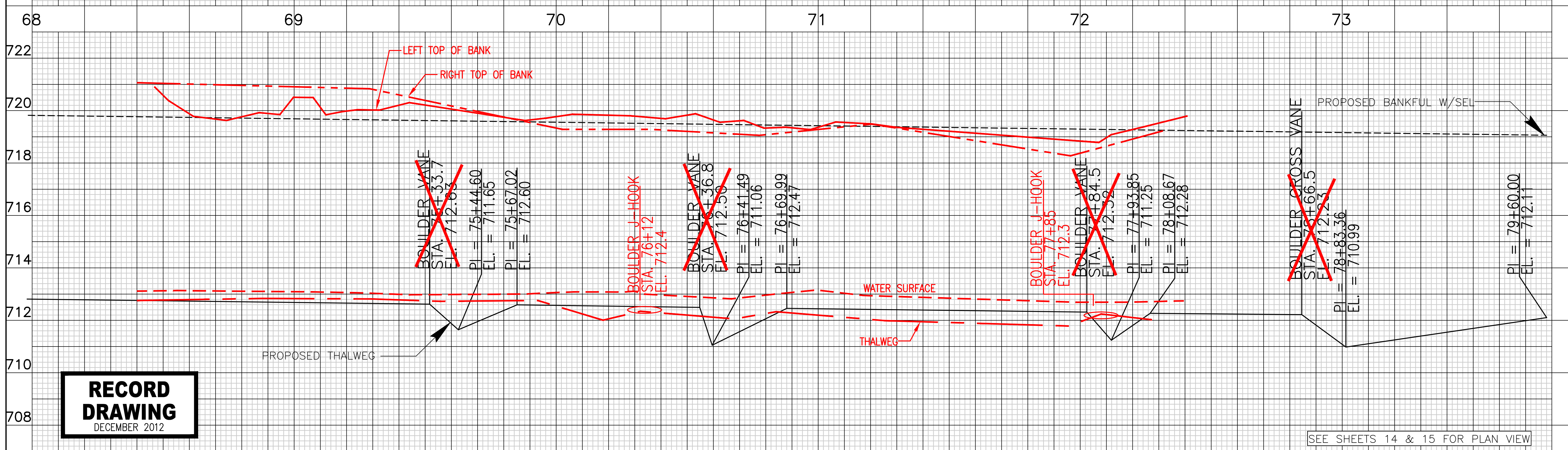
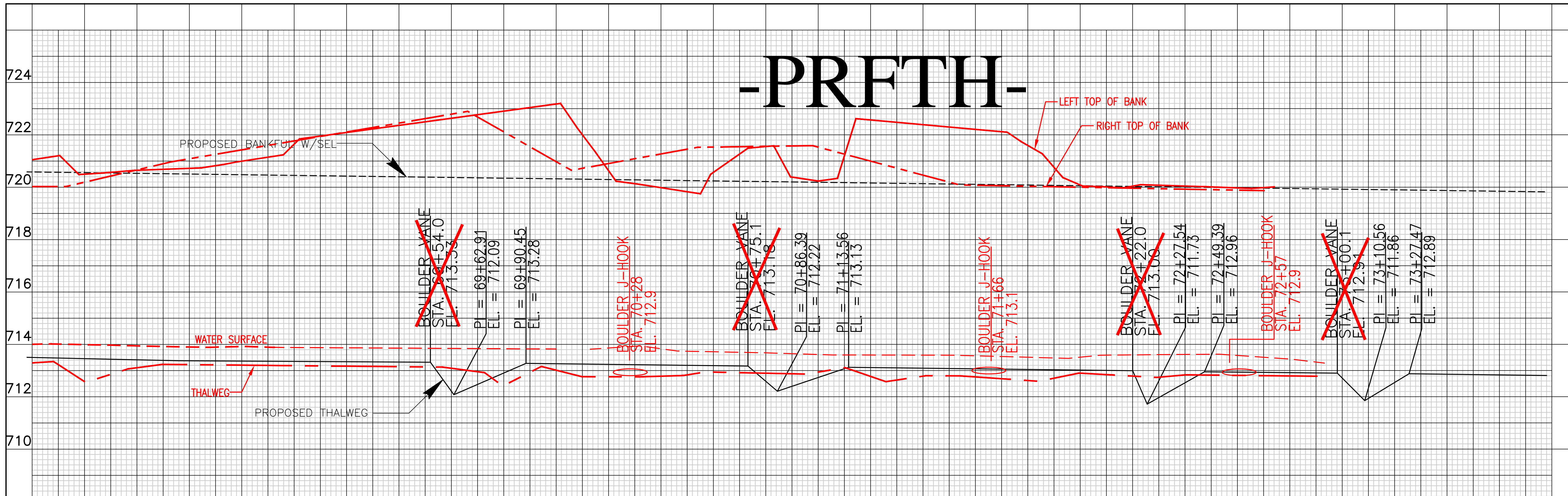
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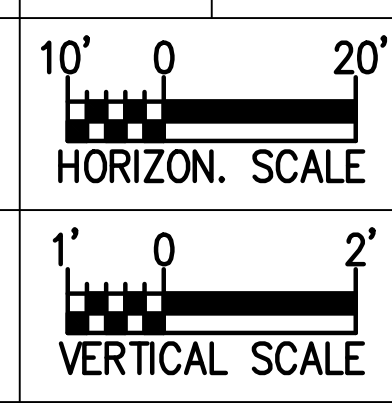
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ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
FIFTH CREEK PROFILE SHEET NO. 26

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RECORD DRAWING
DECEMBER 2012

SEE SHEETS 14 & 15 FOR PLAN VIEW



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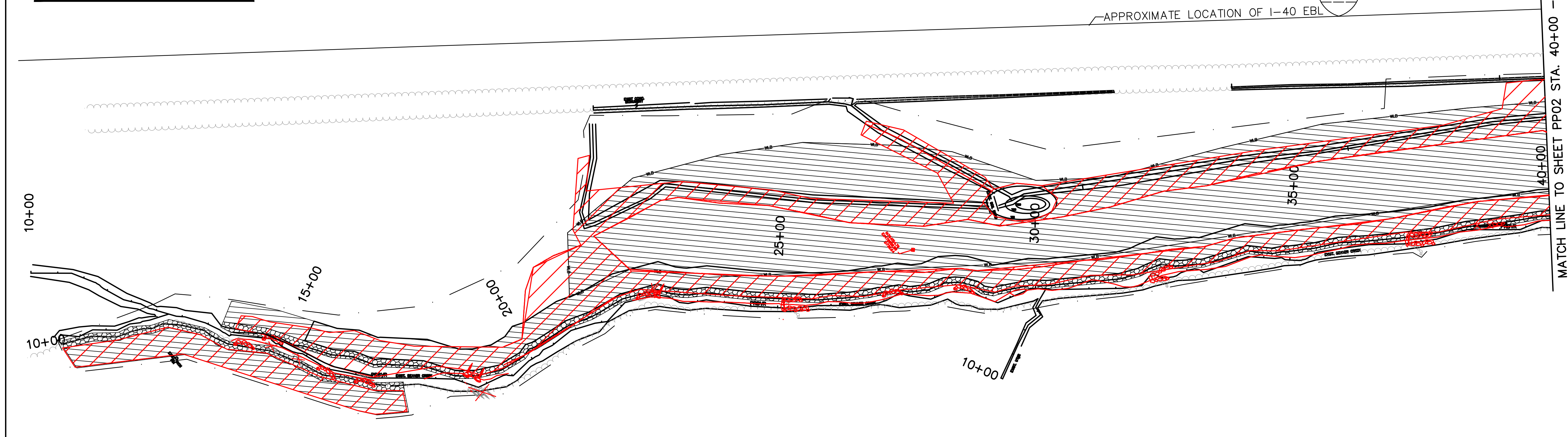
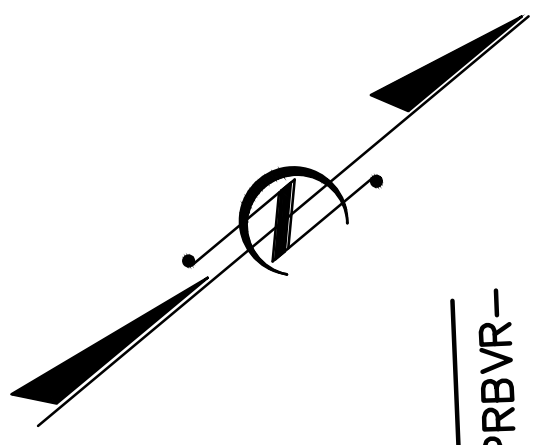
Ecosystem Enhancement PROGRAM

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 27

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Zone 2 - Channel

Equal mixture of the three (3) shrubs and at least four (4) trees at 11 foot spacing

Shrub

Tag alder
Silky dogwood
Elderberry
Button Bush

Alnus serrulata
Cornus ammomum
Sambucus canadensis
Cephalanthus occidentalis

Trees

Black willow
River birch
Green ash
Willow oak

Salix nigra
Betula nigra
Fraxinus pennsylvanica
Quercus phellos

Equal mixture of at least four (4) herbs and three (3) grass at 25 lbs/acre

Herbs

Jewel weed
Ironweed
Cardinal flower
Beebalm
Joe-pye-weed
Gray's sedge
Soft rush
Leathery rush

Impatiens capensis
Vernonia noveboracensis
Lobelia cardinalis
Monarda didyma
Eupatorium fistulosum
Carex grayi
Juncus effusus
Juncus coriaceous

Grass

River oats
Switchgrass
Bottlebrush grass
Deer tongue

Chasmanthium latifolium
Panicum virgatum
Hystrix patula
Panicum clandestinum

Zone 1 - Floodplain/Wetland

Equal mixture of at least three (3) shrubs and six (6) trees (minimum two oaks) at 11 foot spacing

Shrub

Pawpaw
Spice bush
Winterberry
Hazelnut
Elderberry
Arrow-wood
Pinxterflower

Asimina triloba
Lindera benzion
Ilex decidua
Corylus americana
Sambucus canadensis
Viburnum dentatum
Rhododendron periclymenoides

Trees

Blackgum
Swamp chestnut oak
American elm
River birch
Green ash
Hackberry
Black cherry
Black walnut
Willow oak
Flowering dogwood
Sourwood
Red mulberry
Shortleaf pine
Bitternut Hickory
Sycamore
Cherrybark oak

Nyssa sylvatica
Quercus michauxii
Ulmus americana
Betula nigra
Fraxinus pennsylvanica
Celtis laevigata
Prunus serotina
Juglans nigra
Quercus phellos
Cornus florida
Oxydendron arboreum
Morus rubra
Pinus echinata
Carya cordiformis
Plantanus occidentalis
Quercus pagoda

Equal mixture of at least four (4) forbes and three (3) grass at 25 lbs/acre

Herbs

Black-eyed Susan
Purple cone flower
Threadleaf coreopsis
Butterfly Weed
Narrow-leaved sunflower
Tick-seed
Lance-leaved coreopsis
Grass
Big bluestem
Indiangrass
Little bluestem
Switchgrass

Rudbeckia hirta
Echinacea purpurea
Coreopsis verticillata
Asclepias tuberosa
Helianthus angustifolia
Bidens aristosa
Coreopsis lanceolata

Andropogon gerardii
Sorghastrum nutans
Schizachyrium scoparium
Panicum virgatum

Temporary Seed Mixture

Fall, winter, and spring temporary seed mix (August 15 - May 01)

Cereal Rye Secale cereal 120 lbs / acre
Orchard Grass Dactylis glomerata 20 lbs / acre

Summer temporary seed mix (May 01 - August 15)

Sudangrass Sorghum bicolor 35-45 lbs / acre
Browntop Millet Panicum ramosum 30-40 lbs / acre

Soil Preparation and Stabilization

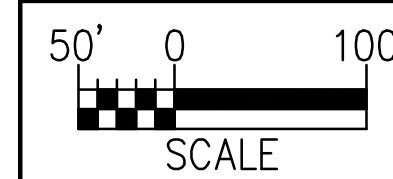
Zone 1 - Piedmont Alluvial Forest (Floodplain)						
Mechanical Treatment	Approx. Date	Ground Cover Fabric	Mulch Type	Mulch Density / Thickness	Nutrient Amendments	Rate
Disking / Ripping / Raking	12/8/10	NA	Wheat Straw	75% Cover	Fertilizer	1000 lbs/acre
					Lime	4000 lbs/acre
Zone 2 - Piedmont Alluvial Forest (Channel)						
Mechanical Treatment	Approx. Date	Ground Cover Fabric	Mulch Type	Mulch Density / Thickness	Nutrient Amendments	Rate
Raking	12/8/10	Coir	Wheat Straw	75% Cover	Fertilizer	1000 lbs/acre
					Lime	4000 lbs/acre

LEGEND

ZONE 1 - FLOODPLAIN/WETLAND

ZONE 2 - CHANNEL

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

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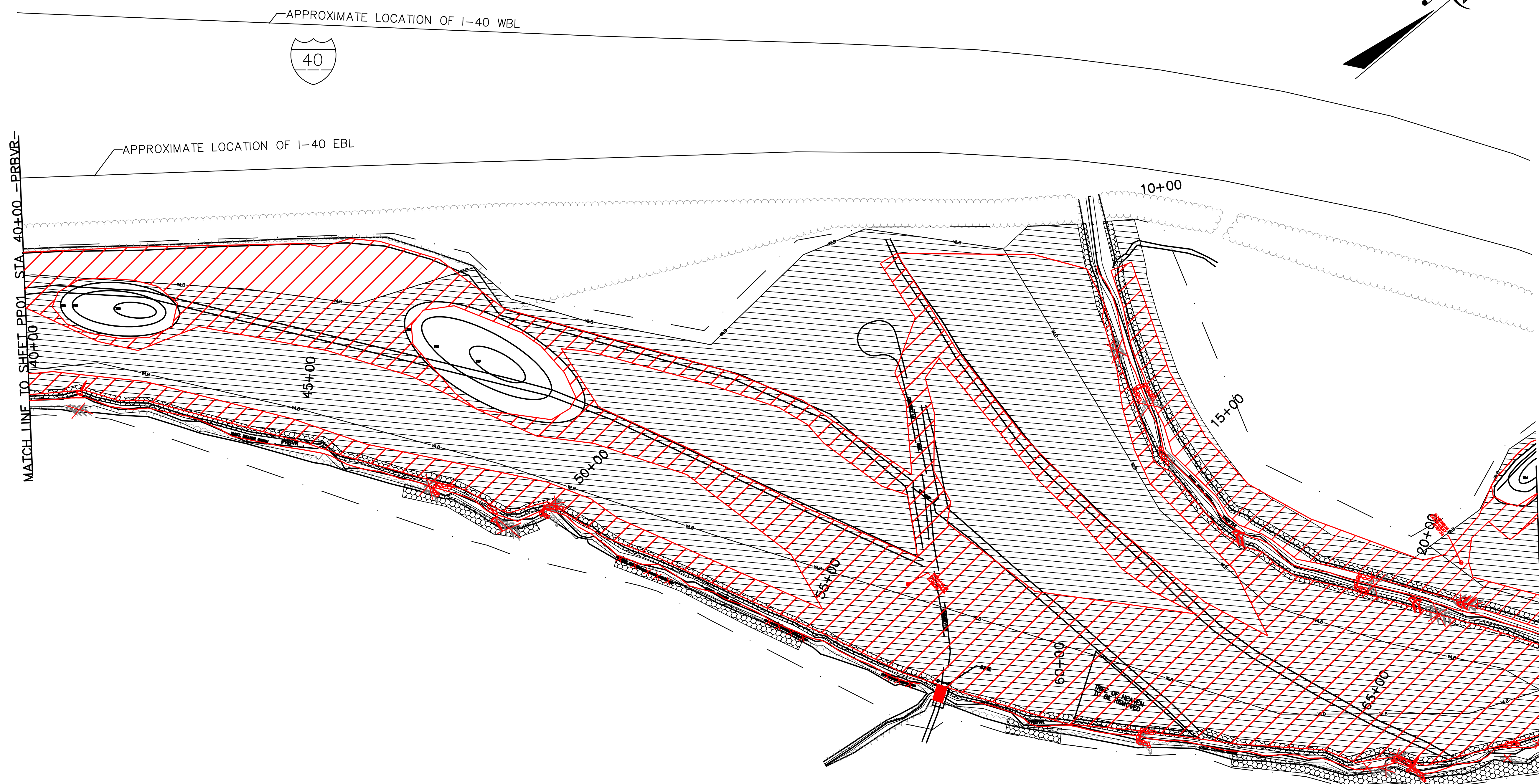
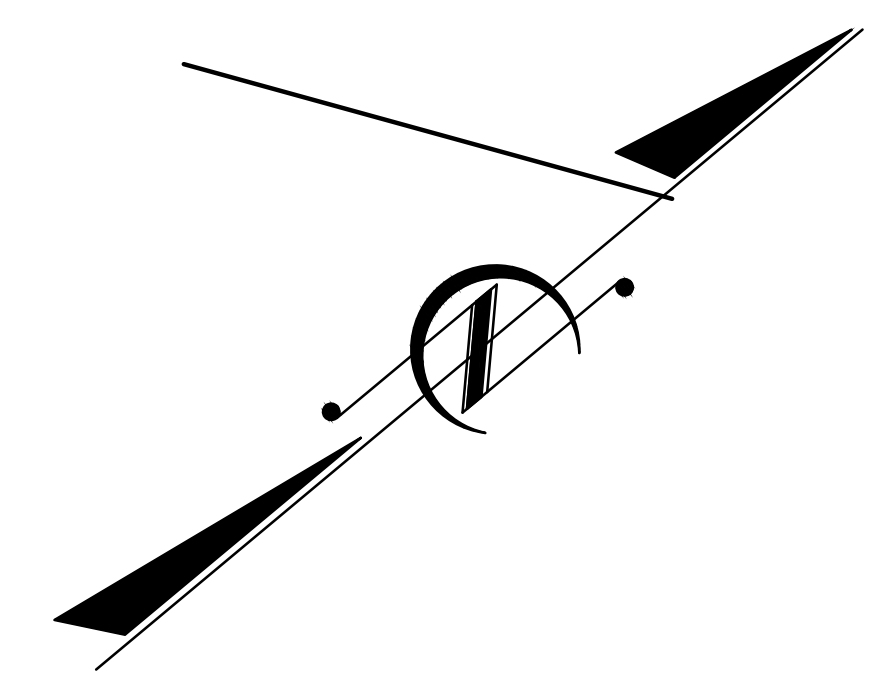
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901

PLANTING PLAN

SHEET NO. PP1



LEGEND

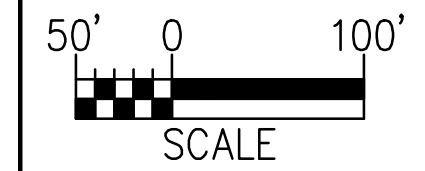
	ZONE 1 - FLOODPLAIN/WETLAND
	ZONE 2 - CHANNEL

See specification and sheet PP1 for planting list.

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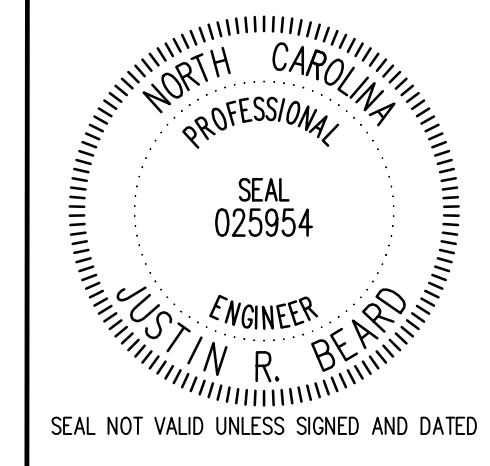
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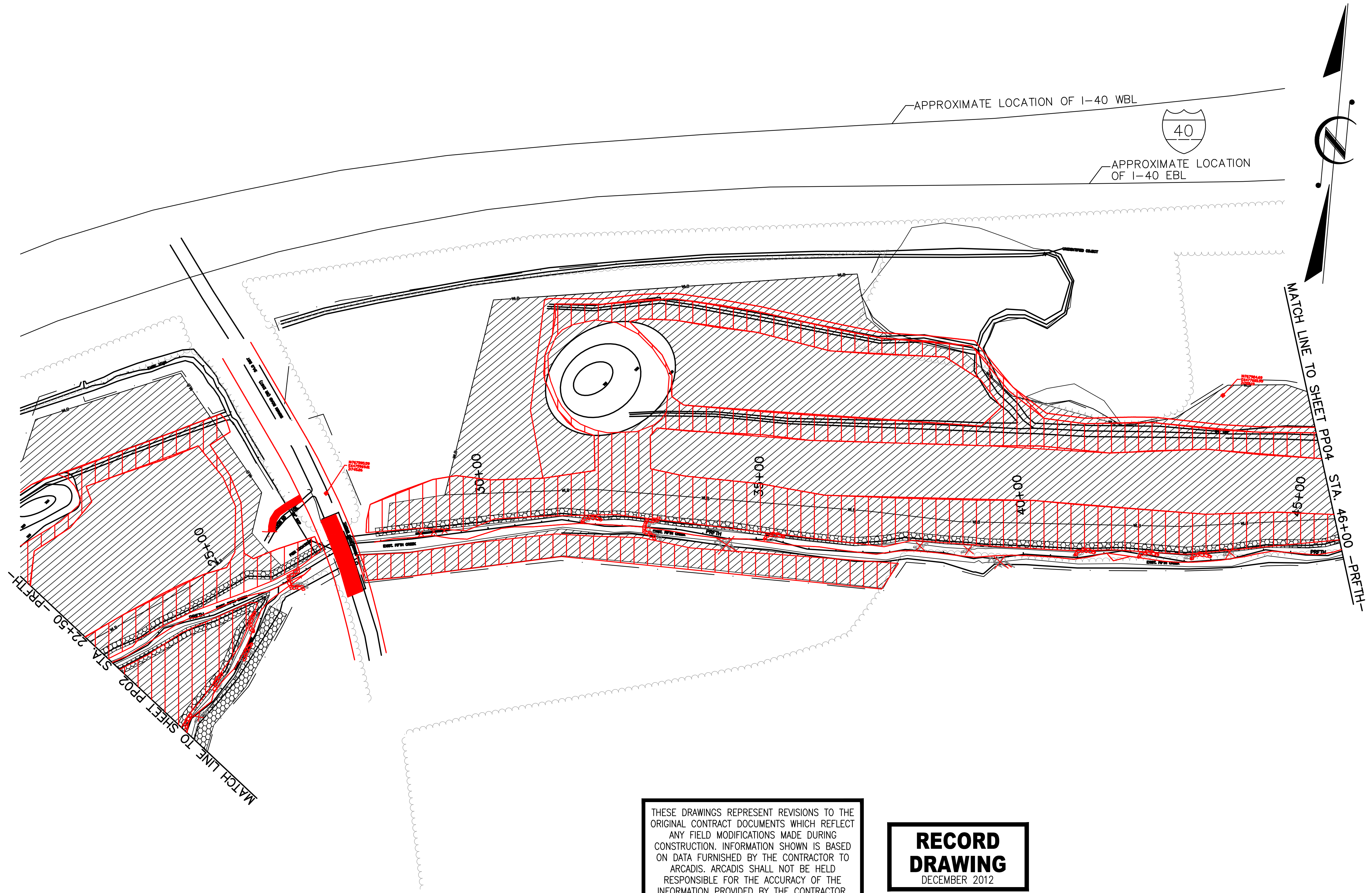


NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
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PLANTING PLAN

SHEET NO. PP2



LEGEND

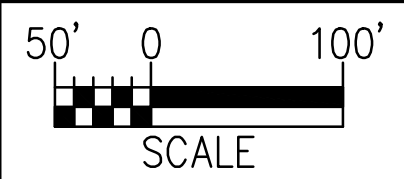
ZONE 1 - FLOODPLAIN/WETLAND	
ZONE 2 - CHANNEL	

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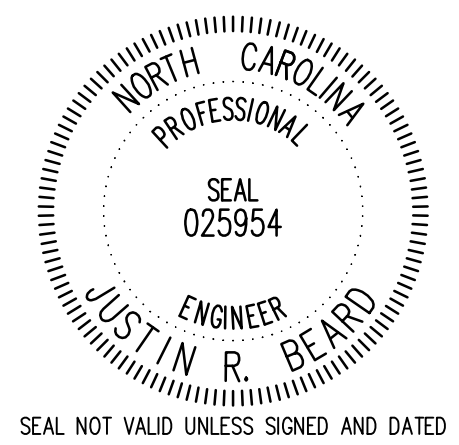
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Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



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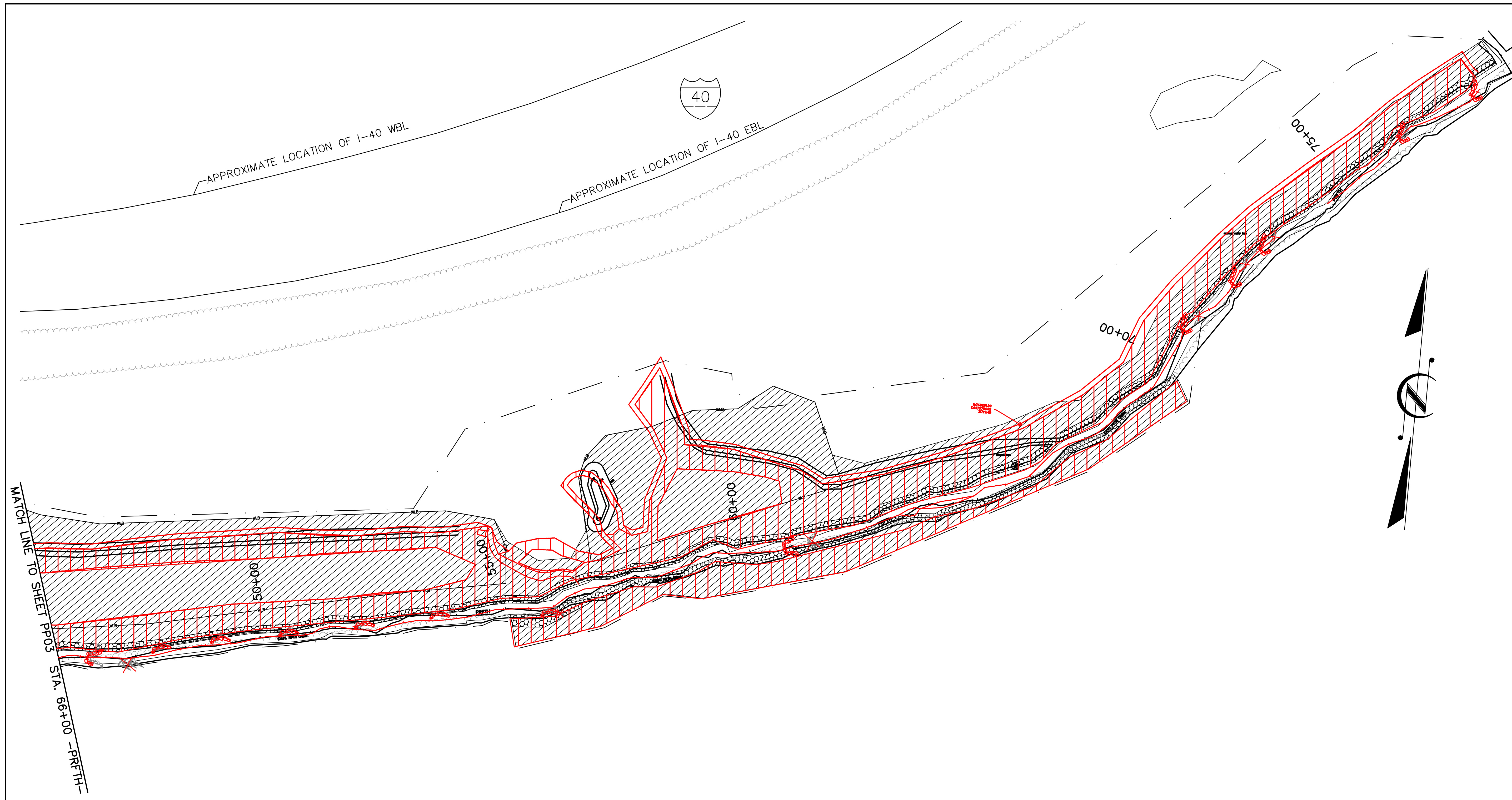
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PLANTING PLAN

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. PP3



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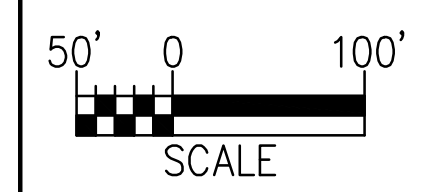
ZONE 1 - FLOODPLAIN/WETLAND	
ZONE 2 - CHANNEL	

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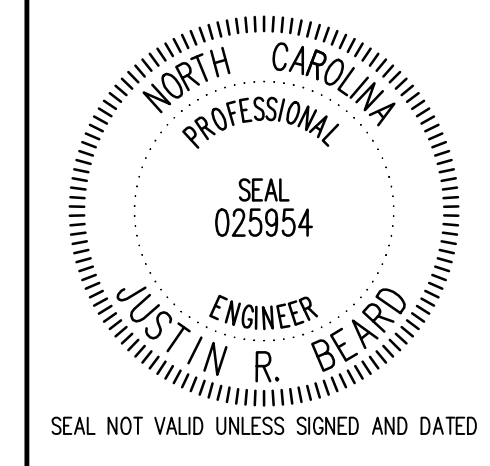
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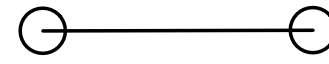







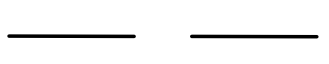


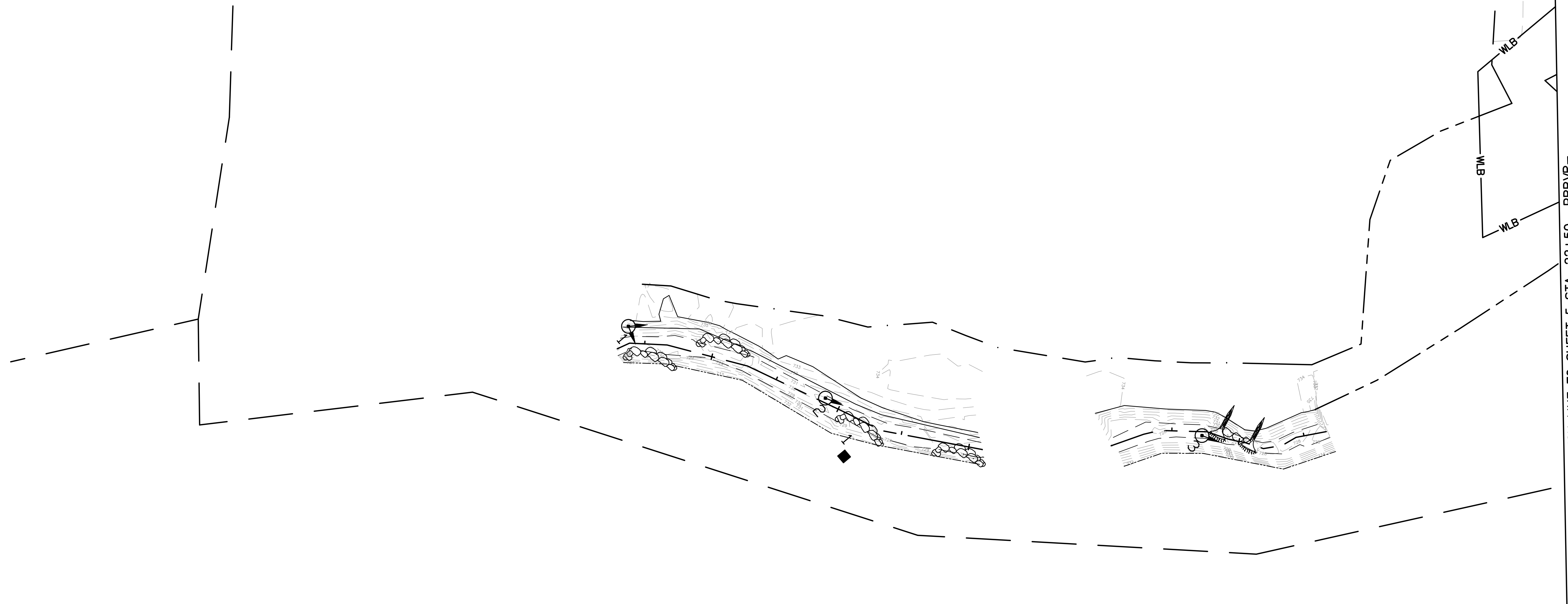
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
PLANTING PLAN
SHEET NO. PP4

Appendix E

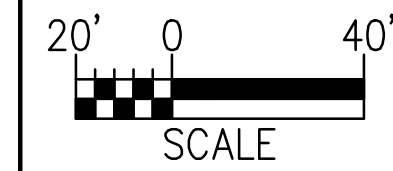
Monitoring Sheets

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WETLAND BOUNDARY		PROPERTY LINE



Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

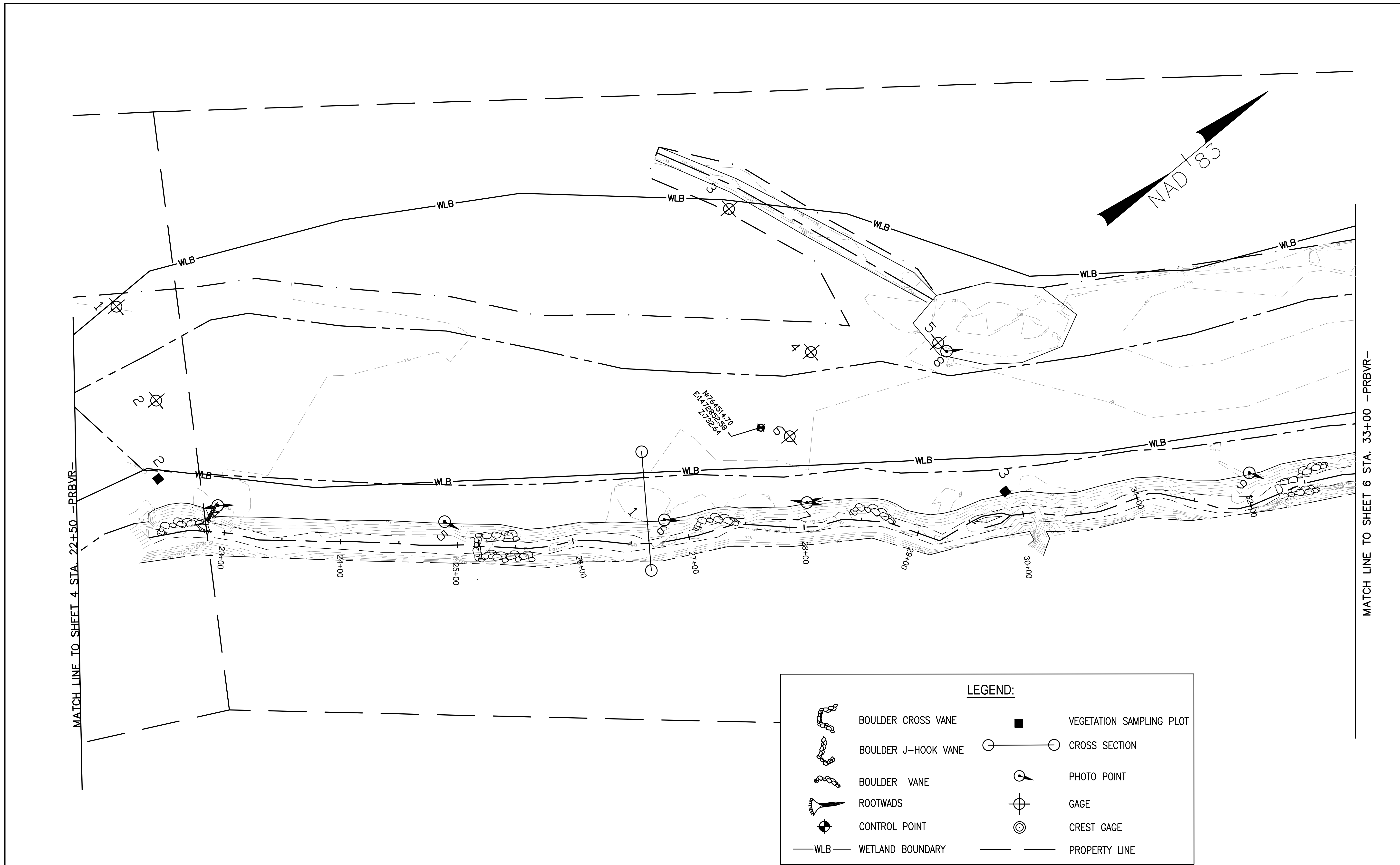


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BY	DATE	DESCRIPTION OF REVISION	PLAN
5	SCA	01/30/13	MONITORING PLAN
4	SCA	12/07/12	ASBUILT/RECORD DRAWINGS
3	DGL	11/04/10	ISSUE FOR BID
2	DGL	03/22/10	DRAFT CONSTRUCTION PLANS
1	DGL	12/04/09	DRAFT RESTORATION PLANS



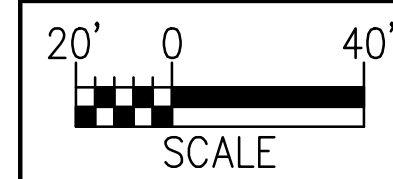
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 4



LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WLB WETLAND BOUNDARY		PROPERTY LINE

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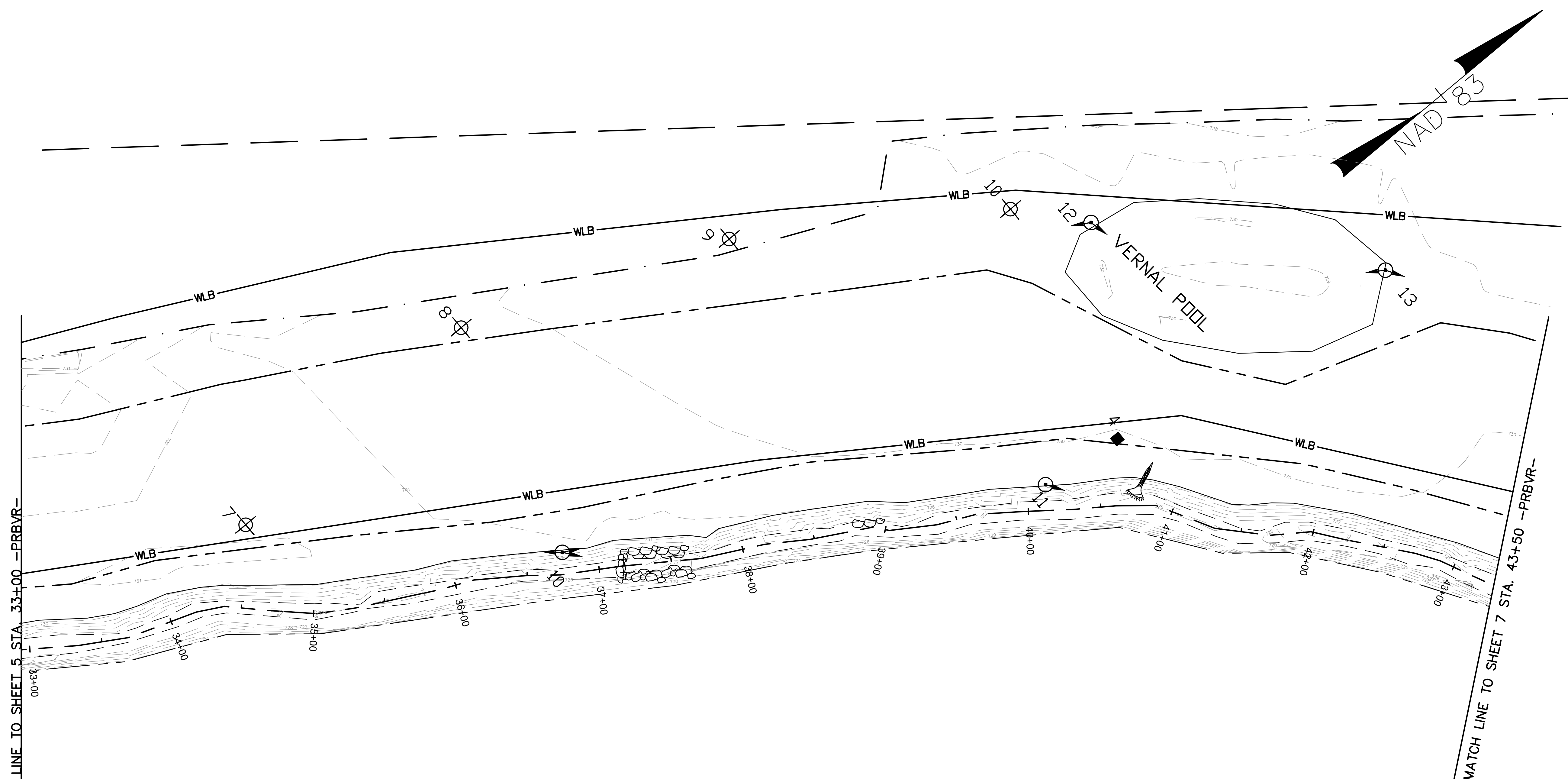
NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
 AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 5



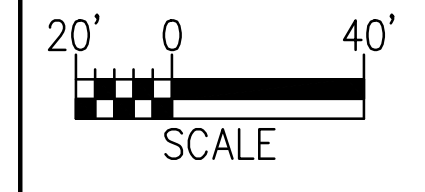
MATCH LINE TO SHEET 5 STA. 33+00 -PRBVR-

MATCH LINE TO SHEET 7 STA. 43+50 -PRBVR-

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WLB WETLAND BOUNDARY		PROPERTY LINE

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



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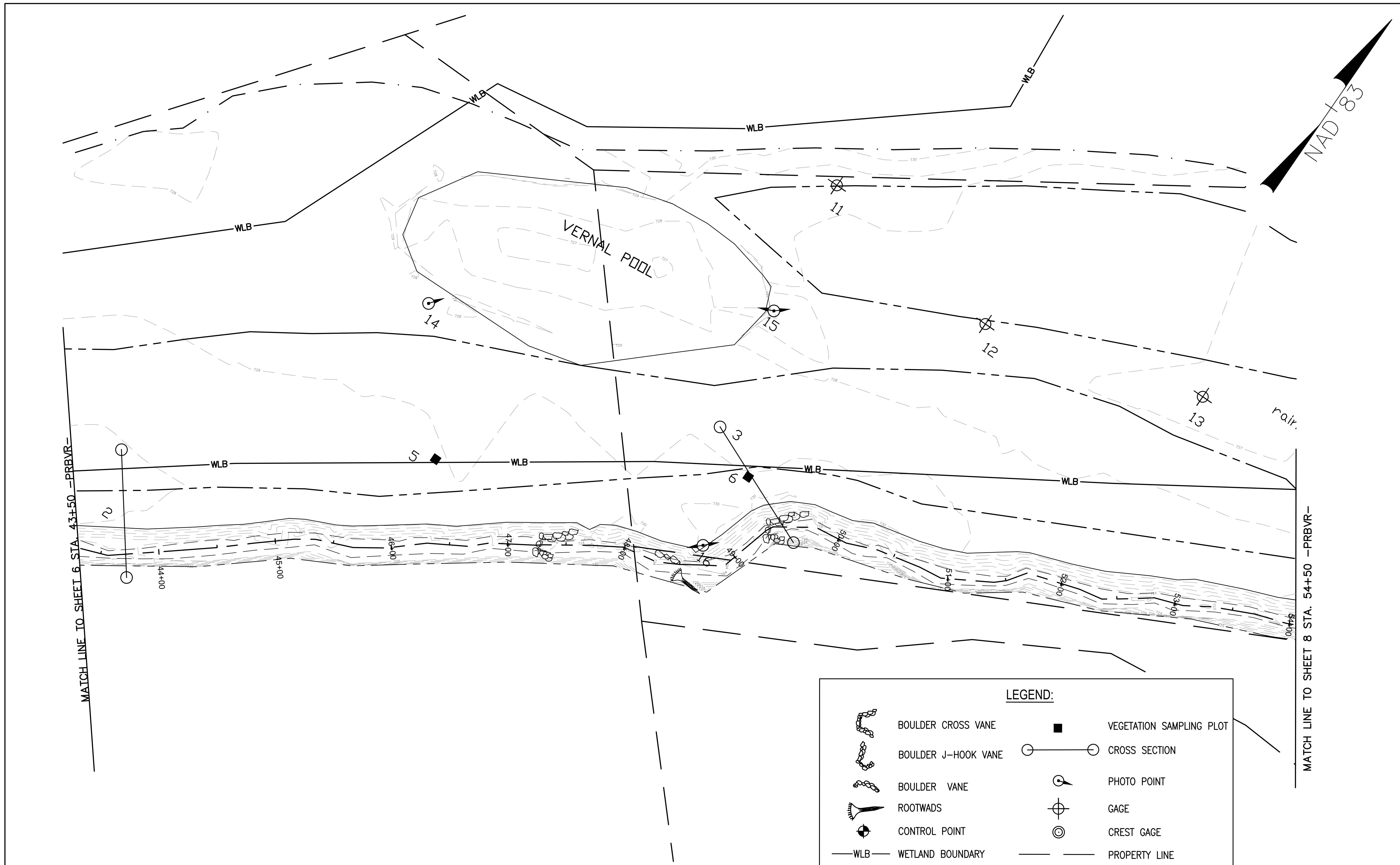


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NO.	BY	DATE	DESCRIPTION OF REVISION	PLAN
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 6



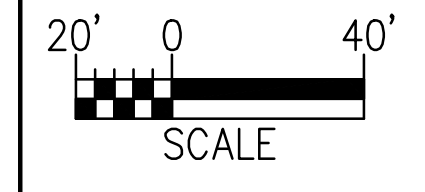
MATCH LINE TO SHEET 6 STA. 43+50 -PRBVR-

MATCH LINE TO SHEET 8 STA. 54+50 -PRBVR-

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WETLAND BOUNDARY		PROPERTY LINE

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

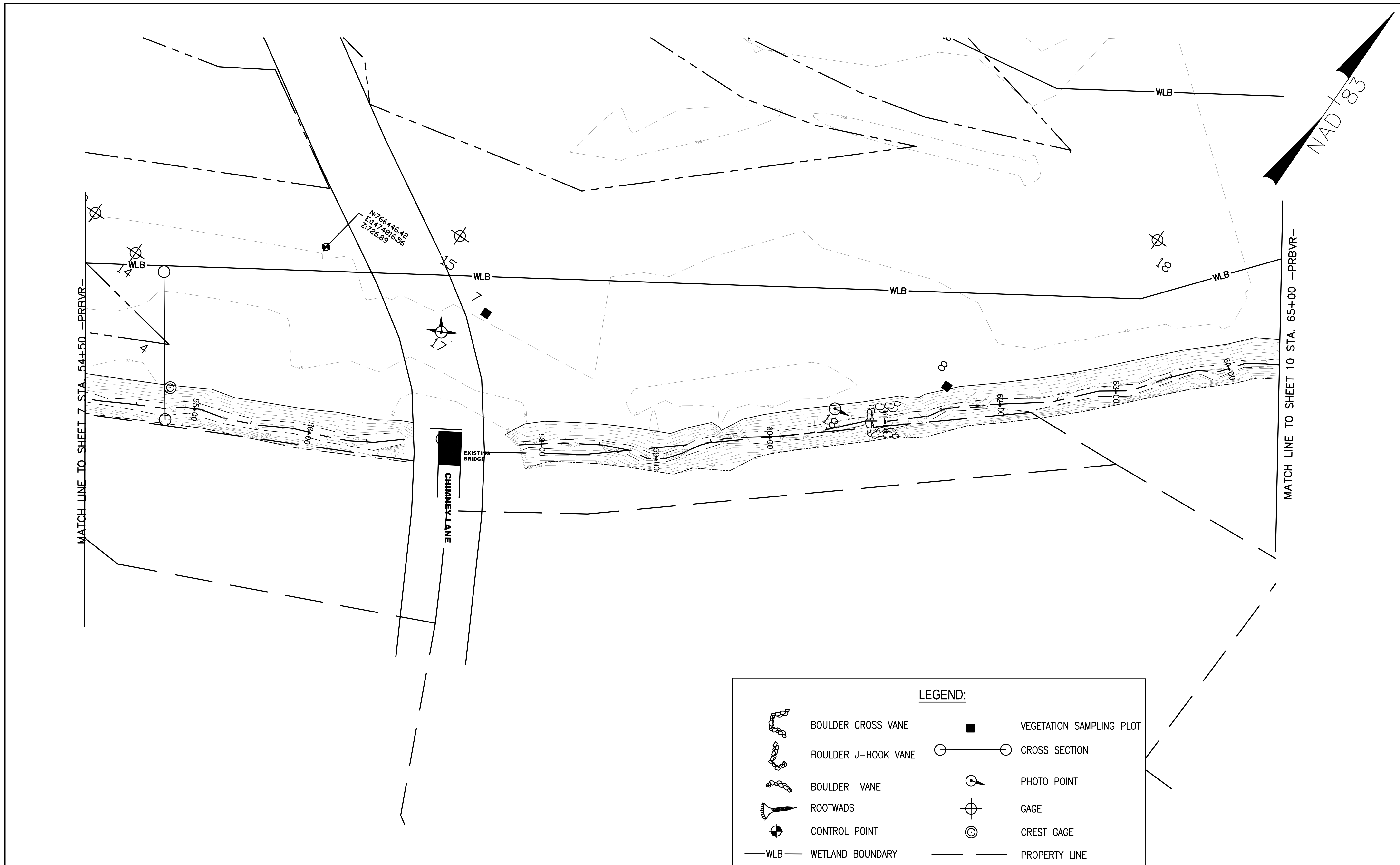


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NO.	BY	DATE	DESCRIPTION OF REVISION	PLAN
5	SCA	01/30/13	MONITORING PLAN	
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NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 7



MATCH LINE TO SHEET 7 STA. 54+50 -PRBVR-

MATCH LINE TO SHEET 10 STA. 65+00 -PRBVR-

NAD 83

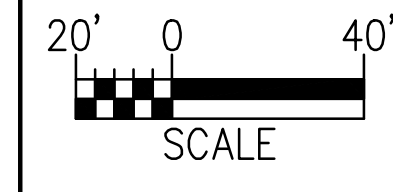
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EXISTING BRIDGE
CHIMNEY LANE

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WLB - WETLAND BOUNDARY		PROPERTY LINE

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.




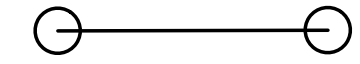







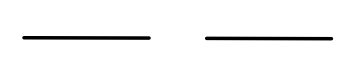
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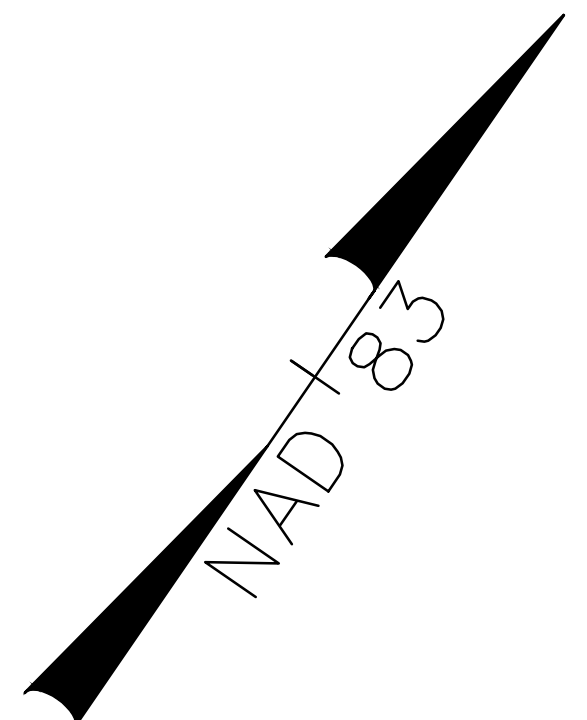
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ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 8

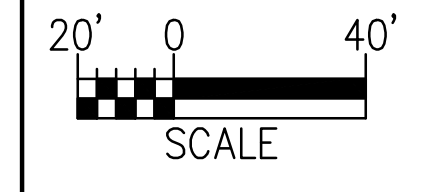
LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WETLAND BOUNDARY		PROPERTY LINE



MATCH LINE TO SHEET 11 STA. 18+00 - PRFTH-

Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



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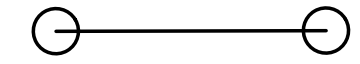







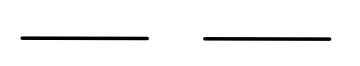
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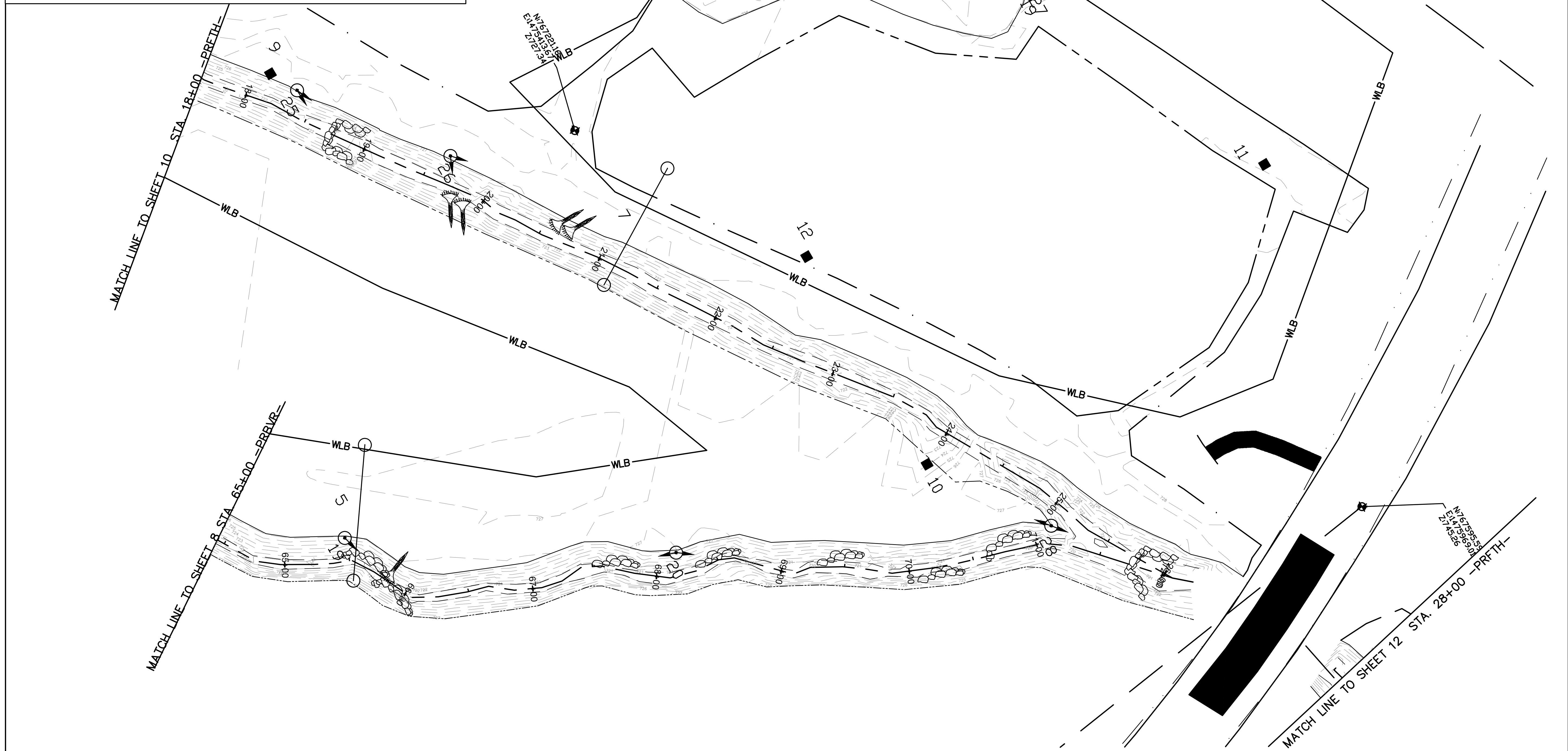
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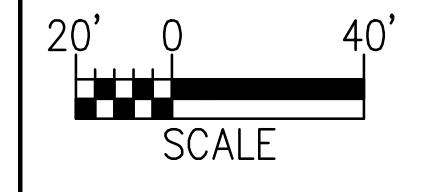
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 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 9

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WETLAND BOUNDARY		PROPERTY LINE



Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.






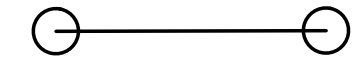







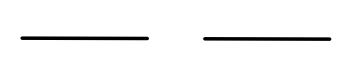
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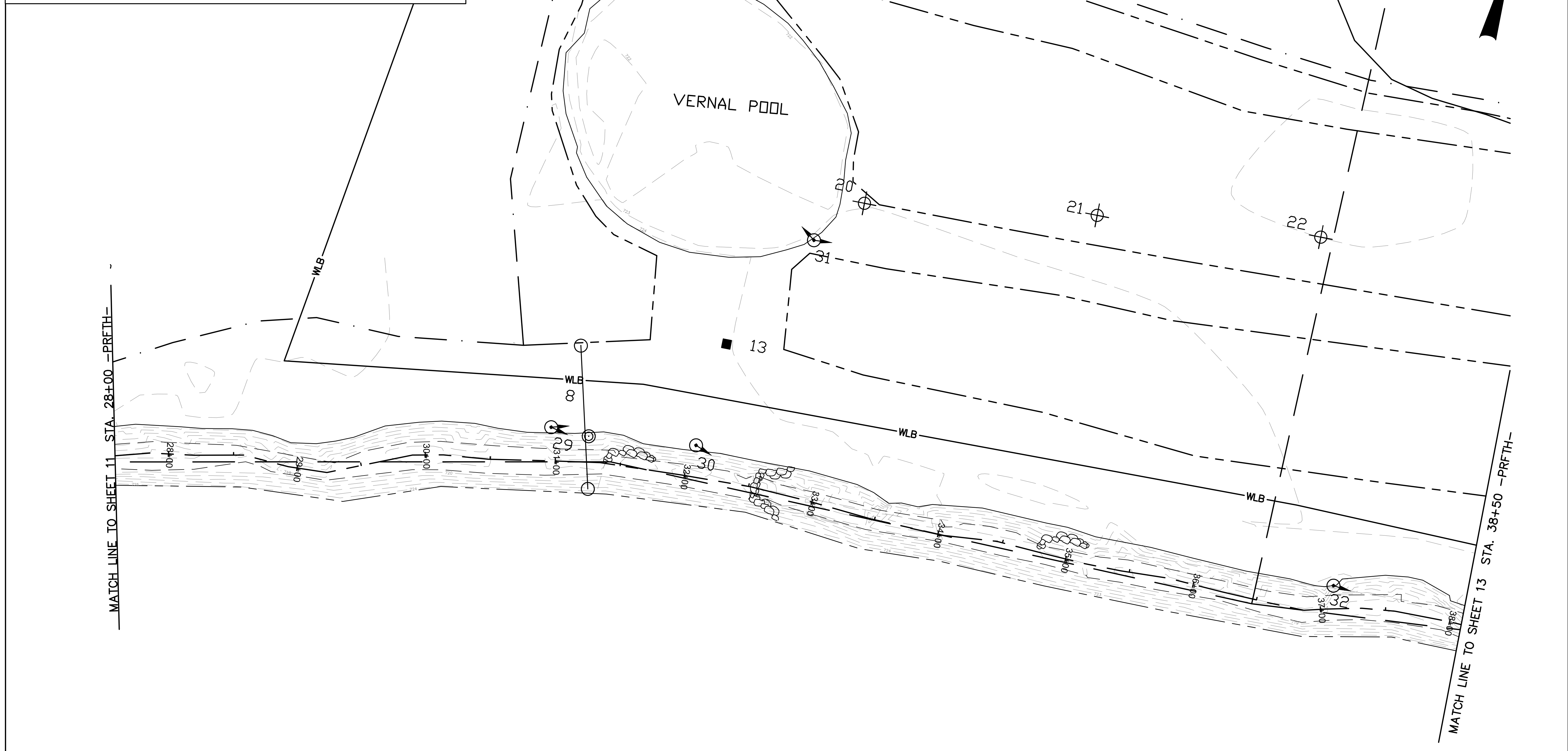
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1	DGL	12/04/09	DRAFT RESTORATION PLANS



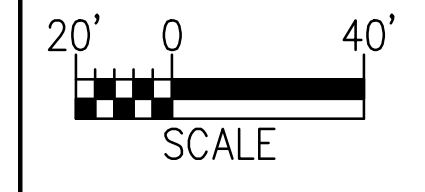
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 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 10

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WETLAND BOUNDARY		PROPERTY LINE



Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



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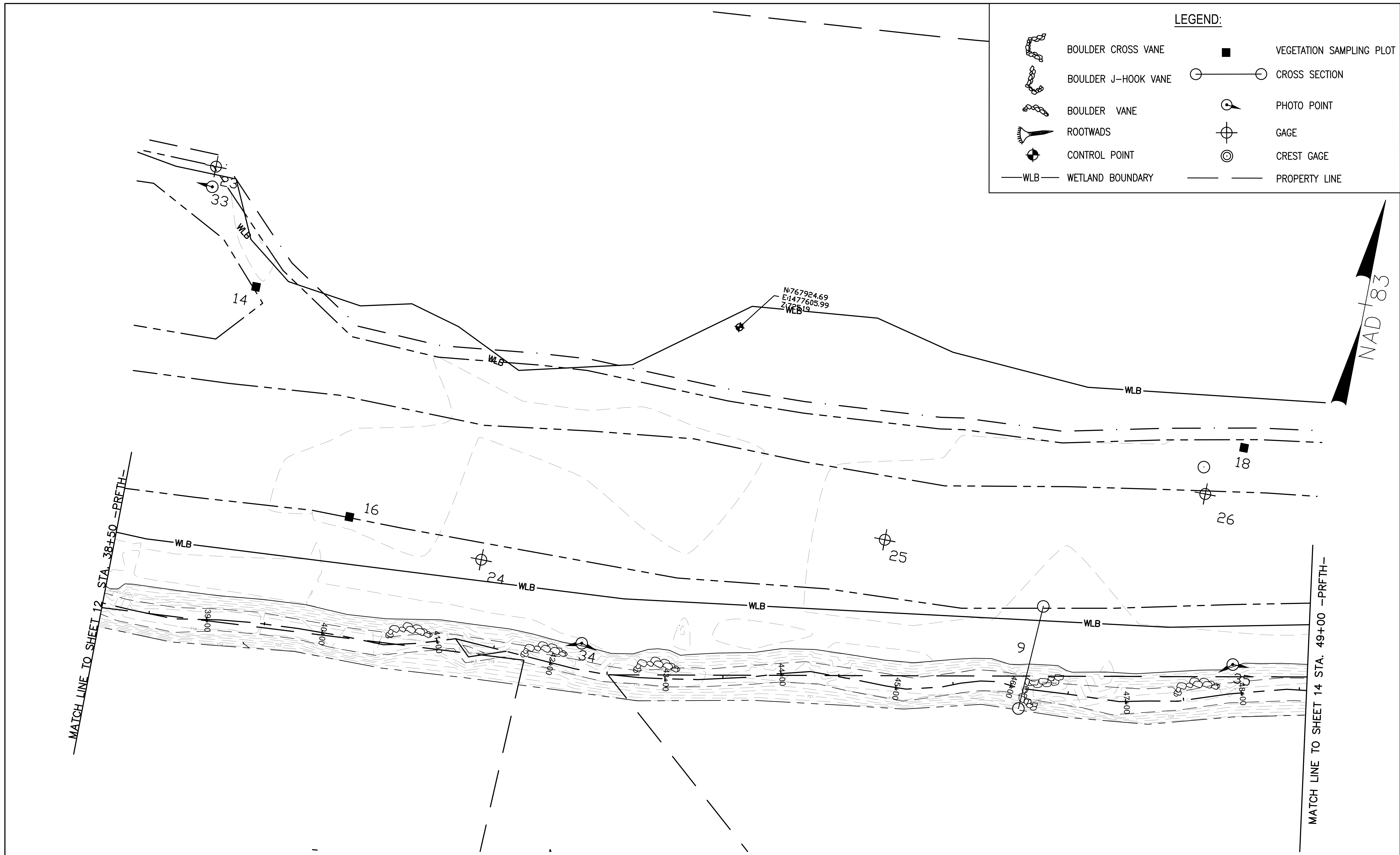


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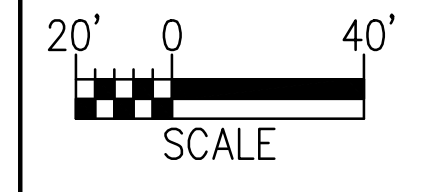
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ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
IREDELL COUNTY, NORTH CAROLINA
SCO # 040607901
SHEET NO. 11



Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.




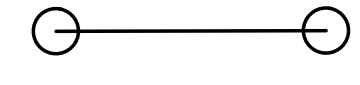



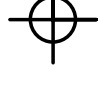
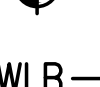



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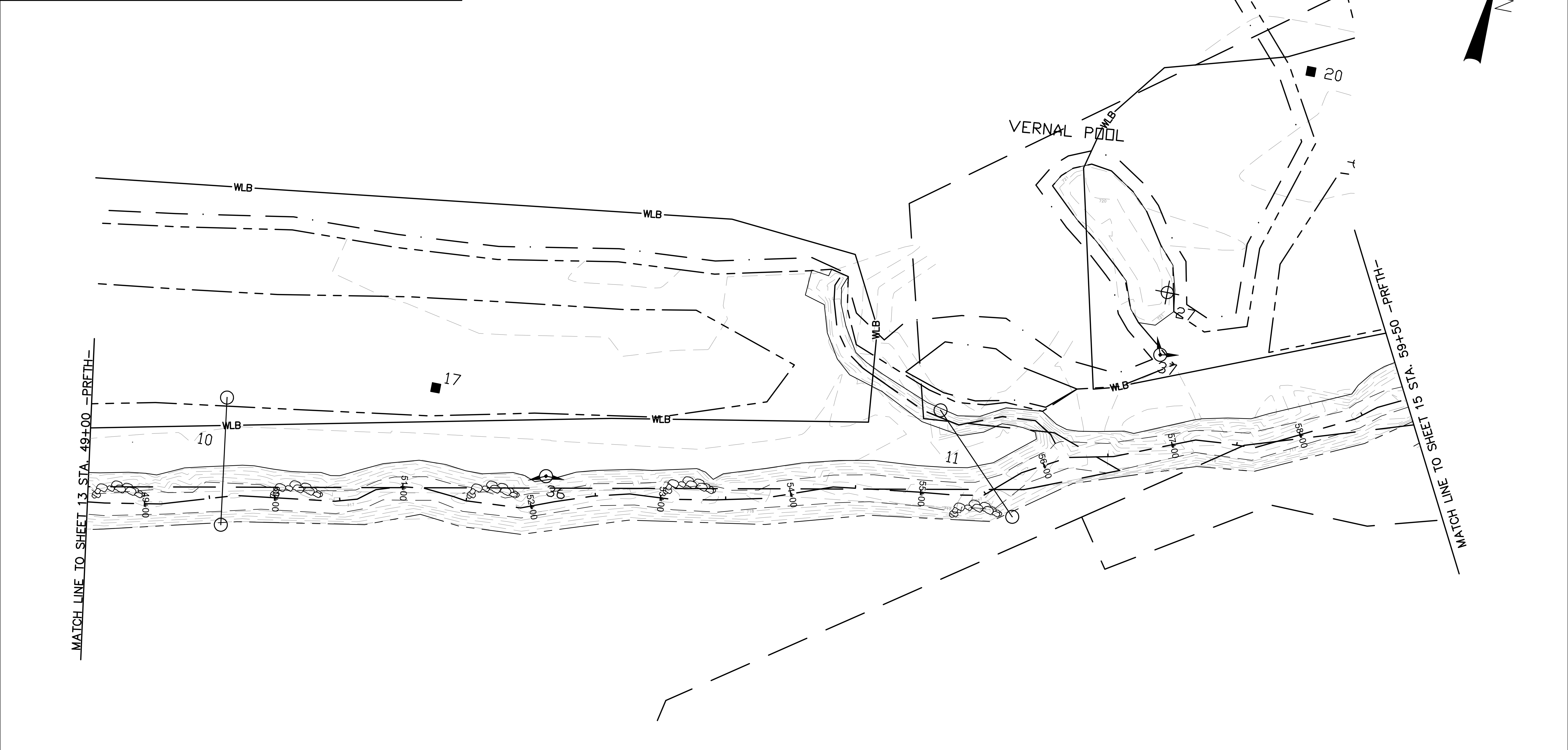
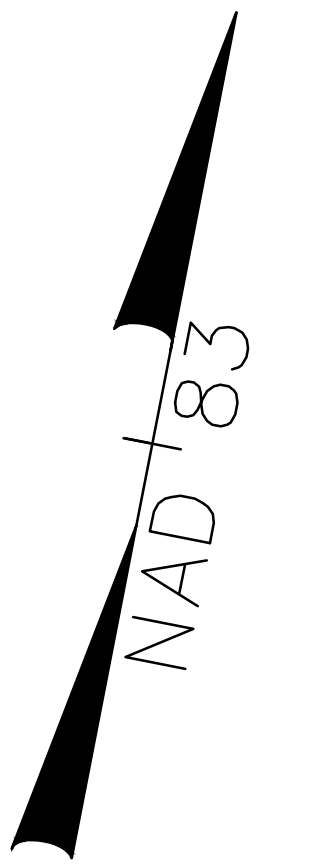
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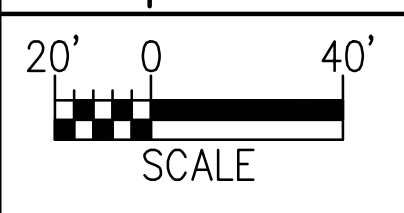
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 12

LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WETLAND BOUNDARY		PROPERTY LINE



Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

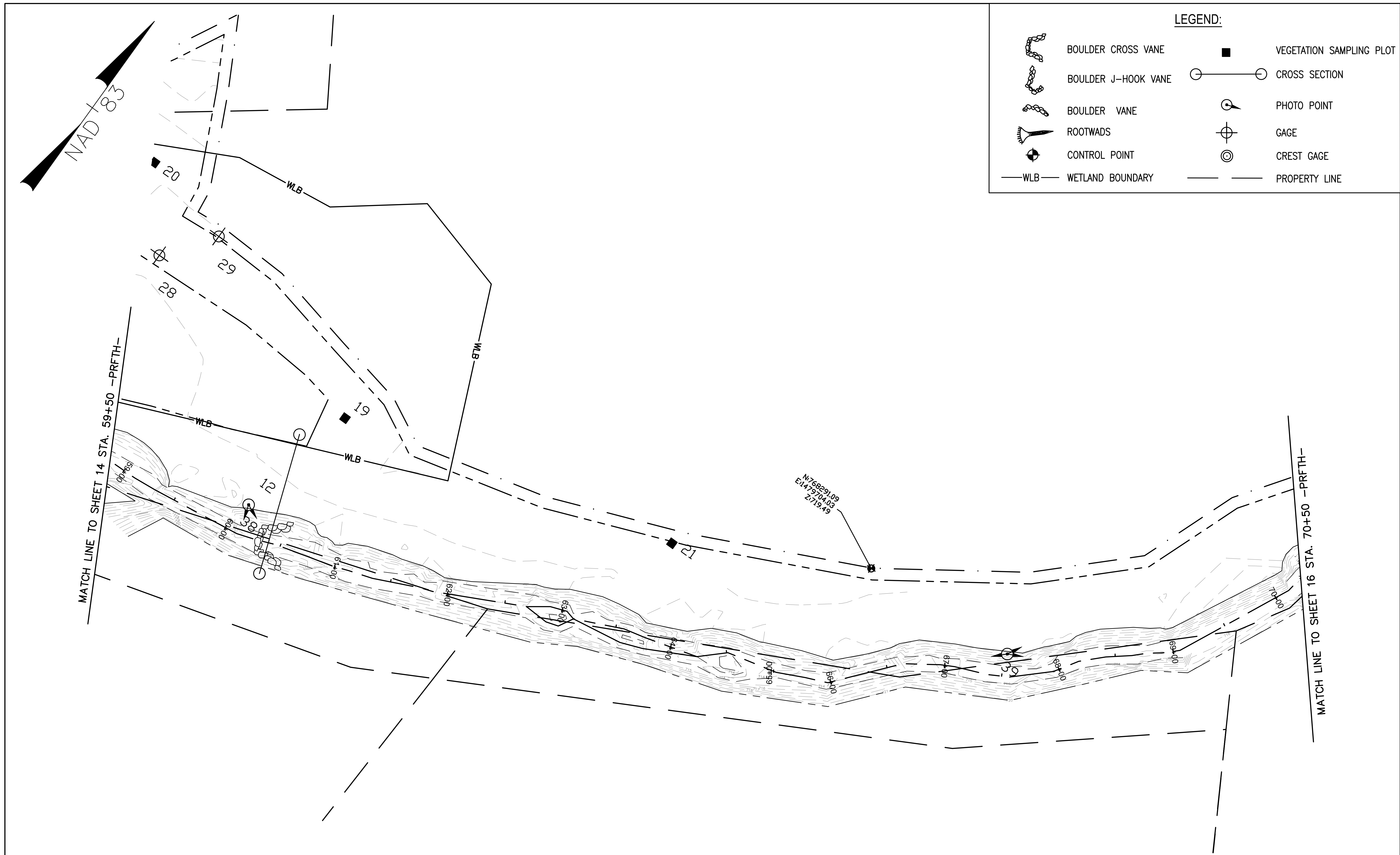


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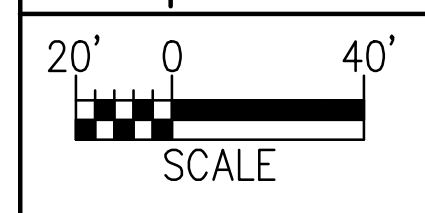
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 13



LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WLB WETLAND BOUNDARY		PROPERTY LINE

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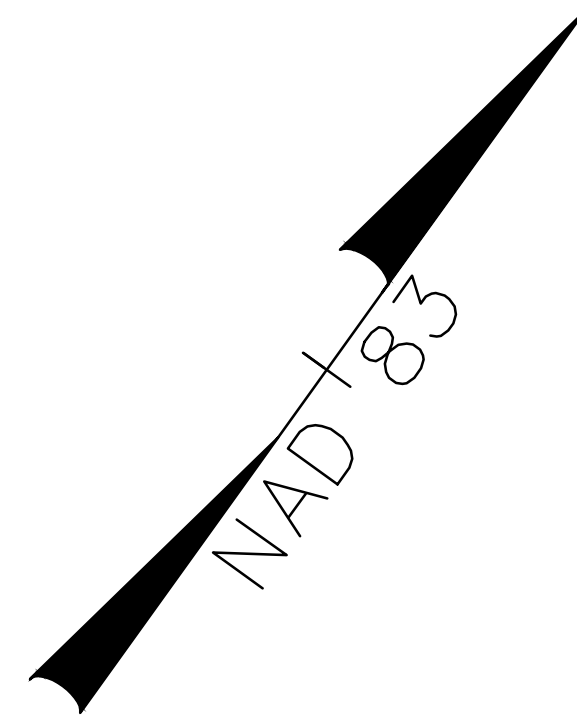
NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.

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BY	DATE	DESCRIPTION OF REVISION
5	SCA	01/30/13 MONITORING PLAN
4	SCA	12/07/12 ASBUILT/RECORD DRAWINGS
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1	DGL	12/04/09 DRAFT RESTORATION PLANS

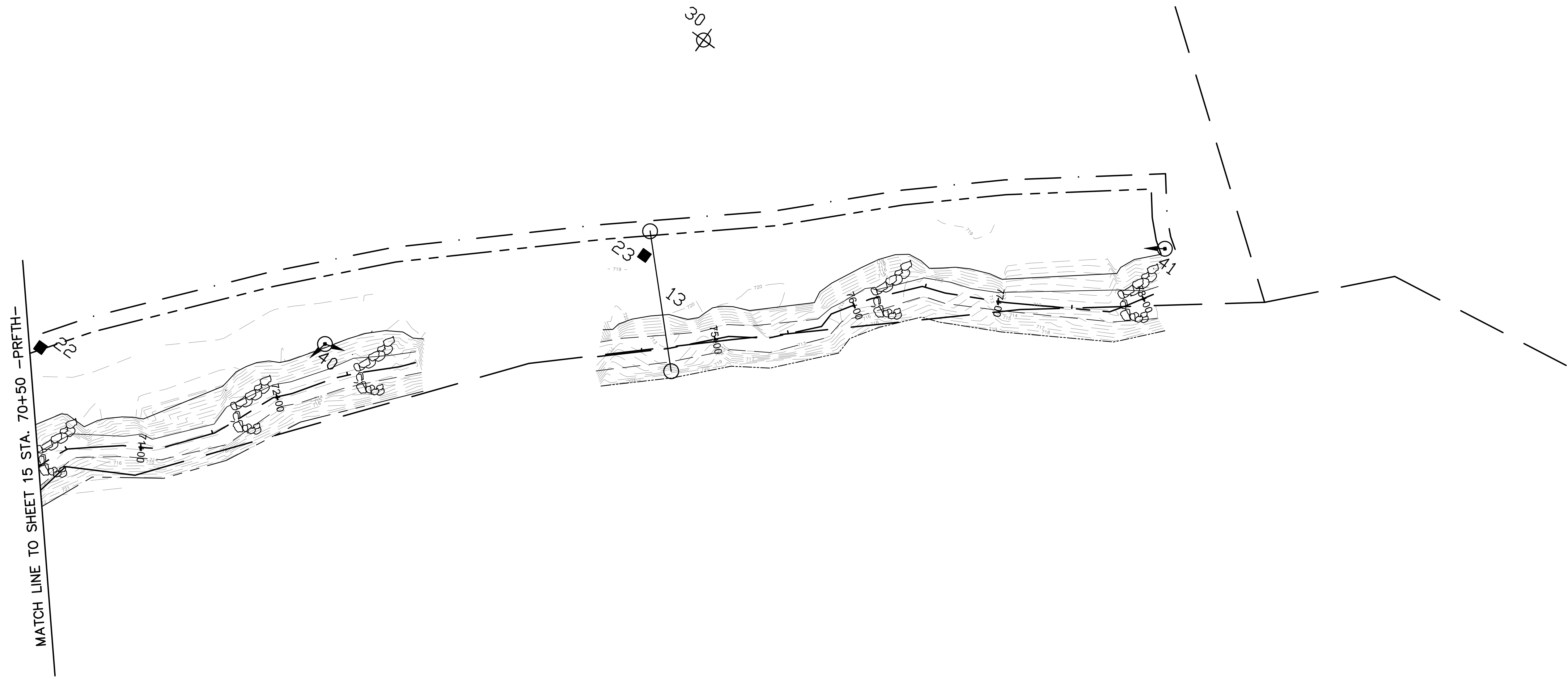


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 ECOSYSTEM ENHANCEMENT PROGRAM
FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901
 SHEET NO. 14

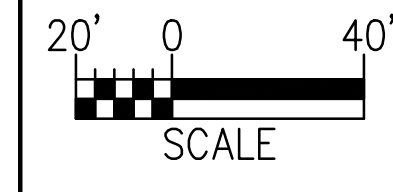


LEGEND:

	BOULDER CROSS VANE		VEGETATION SAMPLING PLOT
	BOULDER J-HOOK VANE		CROSS SECTION
	BOULDER VANE		PHOTO POINT
	ROOTWADS		GAGE
	CONTROL POINT		CREST GAGE
	WLB WETLAND BOUNDARY		PROPERTY LINE



Development which will take place within the limits of the 100 year floodplain Zone AE where base flood elevations have been determined is designed in accordance with the requirements of Executive Order No. 123 - Uniform Floodplain Management Policy.



NOTE: PROPERTY BOUNDARIES OBTAINED COURTESY OF IREDELL COUNTY GIS/MAPPING DEPARTMENT WEBSITE.



801 Corporate Center Drive, Suite 300
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 Tel: 919/854-1282 Fax: 919/854-5448

BY	DATE	DESCRIPTION OF REVISION
5	SCA	01/30/13 MONITORING PLAN
4	SCA	12/07/12 ASBUILT/RECORD DRAWINGS
3	DGL	11/04/10 ISSUE FOR BID
2	DGL	03/22/10 DRAFT CONSTRUCTION PLANS
1	DGL	12/04/09 DRAFT RESTORATION PLANS



NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 ECOSYSTEM ENHANCEMENT PROGRAM

FIVE-MILE BRANCH
 IREDELL COUNTY, NORTH CAROLINA
 SCO # 040607901