



# **BASELINE MONITORING DOCUMENT AND AS-BUILT BASELINE REPORT**

Final

## **FOUST CREEK MITIGATION SITE**

Alamance County, NC  
DENR Contract 004954  
NCDMS Project Number 95715

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PREPARED FOR:

**NC Department of Environment and Natural  
Resources**

**Division of Mitigation Services**

1652 Mail Service Center

Raleigh, NC 27699-1652

**PREPARED BY:**

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**Wildlands Engineering, Inc.**  
312 West Millbrook Road, Suite 225  
Raleigh, NC 27609

**Jason Lorch**  
jlorch@wildlandseng.com  
Phone: 919.851.9986



## EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) completed a full delivery project at the Foust Creek Mitigation Site (Site) for the North Carolina Division of Mitigation Services (NCDMS) to restore and enhance a total of 5,500 linear feet (LF) of perennial and intermittent streams and rehabilitate and re-establish 5.1 acres of wetlands in Alamance County, NC. It is anticipated that the Site will generate 4,770 Stream Mitigation Units (SMUs) and 4.0 Wetland Mitigation Units (WMUs). The streams that were restored and enhanced include Foust Creek, a second order perennial stream, and one unnamed first order intermittent tributary to Foust Creek (UT1). The project reaches flow into Cane Creek, which flows into the Haw River and proceeds to the B. Everett Jordan Lake reservoir. The project is located in the Cape Fear River Basin Hydrologic Unit Code (HUC) 0303002 (Cape Fear 02) near Snow Camp, NC (Figure 1).

The Site is located within the Jordan Lake Water Supply Watershed, which has been designated as a Nutrient Sensitive Water. The Site's watershed is within the Cane Creek Targeted Local Watershed (TLW) HUC 03030002050050 and was identified in the NCDMS's Cape Fear River Basin Restoration Priorities 2009 (RBRP) report. This RBRP plan identifies agricultural operations and degraded water quality based on "fair" and "good-fair" benthic ratings as the impairments in the Cane Creek watershed. The RBRP report also identifies the successful completion of a number of stream and wetland projects within the Cane Creek watershed. The Site fully supports the Cataloging Unit (CU)-wide functional objectives stated in the 2011 Request for Proposals (RFP) to reduce and control nutrient inputs, reduce and control sediment inputs, and protect and augment Significant Natural Heritage Areas in the Cape Fear 02 River Basin.

The mitigation project is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Foust Mitigation Site project area, others, such as pollutant removal and improved aquatic and terrestrial habitat, have more far-reaching effects. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. These project goals were established and completed with careful consideration of goals and objectives that were described in the RBRP and to meet the NCDMS's mitigation needs while maximizing the ecological and water quality uplift within the watershed. The following project specific goals established in the mitigation plan (Wildlands, 2014) include:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorus inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor; and
- Protect existing high quality streams and forested buffers

The Site construction and as-built surveys were completed between October 2014 and March 2015. Minimal adjustments were made during construction, as needed, based on site conditions and availability of materials. One small section of the design alignment was adjusted due to the presence of bedrock. Specific changes are detailed in Section 5.1. Baseline (MY0) profiles and cross section dimensions closely match the design parameters with the exception of pool depths. There was a sediment buildup in the pools after construction. This sediment is expected to flush out during the next few rain events. The Site was built as designed and is on track to meeting the upcoming monitoring year's success criteria.



**FOUST CREEK MITIGATION SITE**  
 Baseline Monitoring Document and As-Built Baseline Report

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## Section 1: PROJECT GOALS, BACKGROUND AND ATTRIBUTES

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### 1.1 Project Location and Setting

The Foust Creek Mitigation Site (Site) is located in the southern portion of Alamance County, east of Snow Camp (Figure 1). The Site is approximately 15 miles southeast of the City of Burlington. From Burlington, NC, take NC 87 south approximately 11 miles to Snow Camp Road. Turn right on Snow Camp Road and continue approximately 4 miles. The project site is located upstream and downstream of the Snow Camp Road stream crossing. The Site is located on four parcels owned by two different property owners. See Foust Creek Mitigation Plan Table 1 (Wildlands, 2014) for property owners, and Parcel Identification Numbers (PIN). A conservation easement was recorded on 22.11 acres within four parcels (Deed Book 3278, Pages 935-944).

The Site is located within the Jordan Lake Water Supply Watershed, which has been designated as a Nutrient Sensitive Water. The Site's watershed is within the Cane Creek Targeted Local Watershed (TLW) HUC 03030002050050 and was identified in the North Carolina Division of Mitigation Services (NCDMS) Cape Fear River Basin Restoration Priorities 2009 (RBRP) report. This RBRP plan identifies agricultural operations and degraded water quality based on "fair" and "good-fair" benthic ratings as the impairments in the Cane Creek watershed. The RBRP report also identifies the successful completion of a number of stream and wetland projects within the Cane Creek watershed. The Foust Creek Mitigation Site fully supports the Cataloging Unit (CU)-wide functional objectives stated in the 2011 Request for Proposals (RFP) to reduce and control nutrient inputs, reduce and control sediment inputs, and protect and augment Significant Natural Heritage Areas in the Cape Fear 02 River Basin.

The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province. The Piedmont Province is characterized by gently rolling, well-rounded hills with long low ridges, with elevations ranging anywhere from 300 to 1500 feet above sea level. The Carolina Slate Belt consists of heated and deformed volcanic and sedimentary rocks. The area is called "Slate Belt" because of the slaty cleavage of many of the surficial rocks. The region's geology also includes coarse-grained intrusive granites. Specifically, the proposed restoration site is located in the CZfv subregion within the Carolina Slate Belt. The CZfv subregion is classified as felsic metavolcanic rock. These rock types are described as metamorphosed dacitic to rhyolitic flows and tuffs interbedded with mafic and intermediate metavolcanic rock, meta-argillite, and metamudstone.

The two streams on the Site are located within the North Carolina Division of Water Resources (NCDWR) subbasin 03-06-04 of the Cape Fear River Basin. The NCDWR assigns best usage classifications to State Waters that reflect water quality conditions and potential resource usage. Foust Creek (NCDWR Index No. 16-28-4) is the main tributary of the project and has been classified as a Water Supply – V (Class WS-V) water and a Nutrient Sensitive Water (NSW). Class WS-V waters are protected as water supplies and typically flow into other water bodies that are directly used as sources for drinking, culinary or food processing purposes. NSW classification represents water bodies that require nutrient management plans to reduce water quality impacts due to excessive nitrogen and phosphorus levels and algal populations.

Prior to construction activities, Foust Creek had been degraded by livestock access and agricultural practices. Impacts to the stream included direct access by livestock, trampling of the riparian vegetation and stream banks, channelization, eroding banks, floodplain ditching, and a lack of stabilizing riparian vegetation. The adjacent floodplain area had been cleared for pasture and was grazed by livestock. The riparian vegetation was either absent, limited to the streambanks, or periodically disturbed. Table 4 in Appendix 1 and Tables 5a-b in Appendix 2 present the pre-restoration conditions in detail.



## 1.2 Project Goals and Objectives

The mitigation project is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Foust Mitigation Site project area, others, such as pollutant removal and improved aquatic and terrestrial habitat, have more far-reaching effects. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. These project goals were established and completed with careful consideration of goals and objectives that were described in the RBRP and to meet the NCDMS's mitigation needs while maximizing the ecological and water quality uplift within the watershed. The following project specific goals established in the mitigation plan (Wildlands, 2014) include:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorus inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor; and
- Protect existing high quality streams and forested buffers;

The project goals were addressed through the following project objectives:

- On-site nutrient inputs were decreased by removing cattle from streams, re-establishing floodplain connectivity, and filtering on-site runoff through buffer zones and wetlands. Off-site nutrient input is absorbed on-site by filtering flood flows through restored floodplain areas and riparian wetlands, where flood flow spreads through native vegetation. Vegetation uptakes excess nutrients.
- Stream bank erosion which contributes sediment load to the creeks was greatly reduced in the project area. Eroding stream banks were stabilized using bioengineering, natural channel design techniques, and grading to reduce bank angles and bank height. Storm flow containing grit and fine sediment is filtered through restored floodplain areas, where flow spreads through native vegetation. Spreading flood flows also reduce velocity and allow sediment to settle out. Sediment transport capacity of restored reaches improves so that capacity balances more closely to load. Sediment load reduction will be monitored through assessing bank stability with cross section surveys and visual assessment through photo documentation which serves as an accepted surrogate for direct turbidity measurements.
- Restored riffle/pool sequences promote aeration of water and create deep water zones, helping to lower water temperature. Establishment and maintenance of riparian buffers creates long-term shading of the channel flow to minimize thermal heating. Lower water temperatures help maintain dissolved oxygen concentrations.
- In-stream structures were constructed to improve habitat diversity and trap detritus. Wood habitat structures were included in the stream as part of the restoration design. Such structures included log drops and rock structures that incorporate woody debris.
- Adjacent buffer and riparian habitats were restored with native vegetation as part of the project. Native vegetation provides cover and food for terrestrial creatures. Native plant species were planted and invasive species were treated. Eroding and unstable areas were also stabilized with vegetation as part of this project.
- The restored land is protected in perpetuity through a conservation easement.



## 1.3 Project Structure, Restoration Type and Approach

The design streams were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. Specifically, the site design was developed to restore a stream and wetland complex directly to a naturally occurring community to create riparian habitat and improve water quality. Other key factors addressed in the design were to create stable habitats, improve riparian buffers, and restore the natural migration patterns for fish spawning. Figure 2 and Table 1 in Appendix 1 present the stream mitigation components for the Foust Creek Mitigation Site.

The final mitigation plan was submitted and accepted by the NCDMS in February 2014. Construction activities were completed by Fluvial Solutions in February 2015. The planting was completed by Bruton Natural Systems, Inc. in February 2015. The baseline as-built survey was completed by Turner Land Surveying, in March 2015. There were minor deviations reported in the as-built project elements compared to the design plans. A few structures were either added, eliminated, or adjusted slightly based on field conditions. In one location the stream alignment was adjusted due to the presence of bedrock. Pool depths were shallower than designed. This is due to the buildup of sediment during construction. Field adjustments made during construction are described in detail in section 5.1. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

### 1.3.1 Project Structure

The project is anticipated to provide 4,770 stream mitigation units (SMUs) and 4.0 wetland mitigation units (WMUs). Please refer to Figure 2 for the project component/asset map for the stream and wetland restoration feature exhibits and Table 1 for the project component and mitigation credit information for the Site.

### 1.3.2 Restoration Type and Approach

The design streams were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. The Site consists of stream restoration and enhancement, as well as wetland re-establishment and rehabilitation (Figure 2). The specific proposed stream types are described below.

The stream restoration portion of this project includes four reaches:

- Foust Creek Reach 2: Foust Creek from approximately 800 feet downstream of culvert crossing at the beginning of the project to the confluence of UT1, approximately 2404 feet in length;
- Foust Creek Reach 3A: Foust Creek beginning at the confluence with UT1 to the Snow Camp Road crossing, approximately 317 feet in length;
- Foust Creek Reach 3B: Foust Creek from approximately 330 feet downstream of the Snow Camp Road crossing to the southernmost portion of the site for a length of approximately 843 feet; and
- UT1: UT1 beginning at the culvert crossing from the westernmost portion of the site to its terminus with Foust Creek, approximately 793 feet.

The project also includes stream enhancement on two reaches classified as enhancement II (EII):



- Foust Creek Reach 1: Foust Creek beginning at the culvert crossing at the northernmost portion of the site to the beginning of Foust Creek Reach 2 for a length of approximately 813 feet; and
- Foust Creek Reach 3B: Foust Creek from the Snow Camp Road crossing to approximately 330 feet downstream for a length of approximately 330 feet.

The wetlands proposed for rehabilitation and re-establishment are located within the Foust Creek floodplain and are shown in Figure 2. Photographs of the project site are included in Appendix 2.

The restoration reaches were designed to be similar to C/E type streams according to the Rosgen classification system (Rosgen, 1996). The specific values for the design parameters were selected based on designer experience and judgment and were supported by morphologic data from reference reach data sets. The design width to depth ratios range from 13.3 to 15.5. A width to depth ratio in the 10 to 14 range is the delineating line between the C and E stream type. We expect that over time as vegetation is established, the channels may narrow more toward dimensions characteristic of an E channel. This narrowing over time would not be seen as an indicator of instability in and of itself. The morphologic design parameters are shown in Appendix 2, Tables 5a and 5b for the restoration reaches, and fall within the ranges specified for C/E streams (Rosgen, 1996).

#### **1.4 Project History, Contacts and Attribute Data**

The Site was restored by Wildlands Engineering, Inc. (Wildlands) through a full delivery contract with NCDMS. Tables 2, 3, and 4 in Appendix 1 provide detailed information regarding the Project Activity and Reporting History, Project Contacts, and Project Baseline Information and Attributes.



## Section 2: SUCCESS CRITERIA

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The stream and wetland performance criteria for the project site follow approved performance criteria presented in the NCDMS Mitigation Plan Template (version 2.1, 09/01/2011), the NCDMS Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011), and the Stream Mitigation Guidelines issued in April 2003 by the United States Army Corps of Engineers (USACE) and NCDWR. Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. The stream restoration and enhancement sections and the wetland re-establishment and rehabilitation sections of the project will be assigned specific performance criteria components for stream morphology, hydrology, and vegetation. Performance criteria will be evaluated throughout the seven year post-construction monitoring. If all performance criteria have been successfully met and two bankfull events have occurred during separate years, Wildlands may propose to terminate stream and/or vegetation monitoring. An outline of the performance criteria components follows.

### 2.1 Streams

#### 2.1.1 Dimension

Riffle cross sections on the restoration reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Per NCDMS guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios shall be at least 2.2 for restored channels to be considered stable. All riffle cross sections should fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a trend in vertical incision or eroding channel banks over the seven year monitoring period. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. Remedial action would not be taken if channel changes indicate a movement toward stability.

#### 2.1.2 Pattern and Profile

Performance standards for longitudinal profile and pattern will not be established during the seven year monitoring period unless other indicators during the annual monitoring indicate a trend toward vertical and lateral instability.

#### 2.1.3 Substrate

Substrate materials in the restoration reaches should indicate a progression towards or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

#### 2.1.4 Photo Documentation

Photographs should illustrate the site's vegetation and morphological stability on an annual basis. Cross section photos should demonstrate no excessive erosion or degradation of the banks. Longitudinal photos should indicate the absence of persistent bars within the channel or vertical incision. Grade control structures should remain stable. Deposition of sediment on the bank side of vane arms is preferable. Maintenance of scour pools on the channel side of vane arms is expected.



### 2.1.5 Hydrology Documentation

Two bankfull flow events must be documented on the restoration reaches within the seven year monitoring period. The two bankfull events must occur in separate years. Stream monitoring will continue until success criteria in the form of two bankfull events in separate years have been documented. In addition, the presence of baseflow must be documented along portions of UT1 constructed with a Priority I restoration approach. Baseflow must be present for at least some portion of the year (most likely in the winter/early spring) during years with normal rainfall conditions.

## 2.2 Vegetation

The final vegetative success criteria is the survival of 210 planted stems per acre in the riparian corridor at the end of the required monitoring period (year seven). The interim measure of vegetative success for the site will be the survival of at least 320 planted stems per acre at the end of the third monitoring year and at least 260 stems per acre at the end of the fifth year of monitoring. Planted vegetation must average 10 feet in height in each plot at the end of the seventh year of monitoring. If this performance standard is met by year five and stem density is trending towards success (i.e., no less than 260 five year old stems/acre), monitoring of vegetation on the site may be terminated with written approval by the USACE in consultation with the NC Interagency Review Team. The extent of invasive species coverage will also be monitored and controlled as necessary throughout the required monitoring period (year five or seven).

## 2.3 Wetlands

The final performance standard for wetland hydrology will be a free groundwater surface within 12 inches of the ground surface for 8.5 percent of the growing season for wetland RW1 – RW7, which is measured on consecutive days under typical precipitation conditions. This performance standard was determined through model simulations of post restoration conditions and comparison to reference wetland systems. If a particular gage does not meet the performance standard for a given monitoring year, rainfall patterns will be analyzed and the hydrograph will be compared to that of the reference wetlands to assess whether atypical weather conditions occurred during the monitoring period.

## 2.4 Schedule and Reporting

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to NCDMS. Based on the NCDMS Monitoring Report Template (version 2.1, 09/01/2011), the monitoring reports will include the following:

- Project background which includes project objectives, project structure, restoration type and approach, location and setting, history and background;
- Monitoring current condition maps with major project elements noted such items as grade control structures, vegetation plots, permanent cross sections, crest gages, and pressure transducers;
- Photographs showing views of the restored Site taken from fixed point stations;
- Assessment of the stability of the Site based on the cross sections and longitudinal profile, where applicable;
- Vegetative data as described above including the identification of any invasion by undesirable plant species;
- Stream flow gage attainment;





- A description of damage by animals or vandalism;
- Maintenance issues and recommended remediation measures will be detailed and documented;  
and
- Wildlife observations.



## Section 3: MONITORING PLAN

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Annual monitoring data will be reported using the NCDMS Monitoring Report template (version 1.4, 11/7/11). The monitoring report shall provide project data chronology that will facilitate an understanding of project status and trends, population of NCDMS databases for analysis, research purposes, and assist in decision making regarding close-out. The monitoring period will extend seven years beyond completion of construction or until performance criteria have been met. Project monitoring locations are shown on Figure 3. All surveys will be tied to grid.

### 3.1 Stream

Geomorphic assessments will follow guidelines outlined in the Stream Channel Reference Sites: An Illustrated Guide to Field Techniques (Harrelson et al., 1994), methodologies utilized in the Rosgen stream assessment and classification document (Rosgen, 1994 and 1996), and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al, 2003). Please refer to Figure 3 in Appendix 1 for the monitoring locations discussed below.

#### 3.1.1 Dimension

A total of 13 cross sections were installed along the stream restoration reaches. Two cross sections were installed per 1,000 linear feet of stream restoration work, with riffle and pool sections in proportion to NCDMS guidance. Each cross section was permanently marked with pins to establish its location. Cross section surveys include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg to monitor any trends in bank erosion. If moderate bank erosion is observed at a stream reach during the monitoring period, a series of bank pins will be installed in representative areas where erosion is occurring for reaches with a bankfull width of greater than three feet. Bank pins will be installed in at least three locations (one in upper third of the pool, one at the mid-point of the pool, and one in the lower third of the pool). Bank pins will be monitored by measuring exposed rebar and maintaining pins flush to bank to capture bank erosion progression. Annual cross section and bank pin surveys (if applicable) will be conducted in monitoring years one (MY1), two (MY2), three (MY3), five (MY5), and seven (MY7). Photographs will be taken annually of the cross sections looking upstream and downstream.

#### 3.1.2 Pattern and Profile

Longitudinal profile surveys will not be conducted during the seven year monitoring period unless other indicators during the annual monitoring show a trend toward vertical and lateral instability. If a longitudinal profile is deemed necessary, monitoring will follow standards as described in the NCDMS Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011) and the 2003 USACE and NCDWR Stream Mitigation Guidance for the necessary reaches. Stream pattern and profile will be assessed visually as described below in section 3.1.6.

#### 3.1.3 Substrate

A reach-wide pebble count will be performed in each restoration reach each year for classification purposes. A pebble count will be performed at each surveyed riffle to characterize the pavement.



### **3.1.4 Photo Reference Points**

A total of 35 permanent photograph reference points were established within the project area after construction. Photographs will be taken once a year to visually document stability for seven years following construction. Permanent markers were established so that the same locations and view directions on the site are monitored each year. Photographs will be used to monitor stream restoration and enhancement reaches. The photographer will make every effort to maintain the same view in each photo over time. The representative digital photo(s) will be taken on the same day(s) the surveys are conducted.

### **3.1.5 Hydrology Documentation**

Two manual crest gages and two pressure transducer automated crest gages were installed on the Site (Figure 3, Appendix 1). The crest gages were installed at two surveyed riffle cross sections along Foust Creek and UT1 (XS 7 and 13), and will be checked during each site visit to determine if a bankfull event has occurred since the last visit. Photographs will be used to document the occurrence of debris lines and sediment deposition as evidence of bankfull events. Additionally, the pressure transducer data will be plotted and included in the annual monitoring reports.

Baseflow in UT1 will be confirmed by one pressure transducer automated stream gage installed at the thalweg elevation of the channel. The transducer is equipped with auto logging gages that are capable of monitoring stream stage. A rating curve has been developed for the transducer location to correlate stage to discharge. Discharge data will be provided annually in the monitoring reports to demonstrate intermittent aquatic function has been maintained in the restored channel.

### **3.1.6 Visual Assessment**

Visual assessments will be performed along all stream and wetland areas on a semi-annual basis during the seven year monitoring period. Problem areas will be noted such as channel instability (i.e. lateral and/or vertical instability, in-stream structure failure/instability and/or piping, headcuts), vegetated health (i.e. low stem density, vegetation mortality, invasive species or encroachment), beaver activity, or livestock access. Areas of concern will be mapped in the Current Condition Plan View (CCPV) map, photographed, and accompanied by a written description in the annual report. Problem areas will be re-evaluated during each subsequent visual assessment. Should remedial actions be required, recommendations will be provided in the annual monitoring report.

## **3.2 Vegetation**

Planted woody vegetation will be monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-NCDMS Level 2 Protocol (Lee et al., 2006) to monitor and assess the planted woody vegetation. A total of 17 standard 10 meter by 10 meter vegetation plots were established within the project easement area.

Vegetation plots were randomly established within the planted corridor of the restoration areas to capture the heterogeneity of the designed vegetative communities. The vegetation plot corners have been marked and are recoverable either through field identification or with the use of a GPS unit. Reference photographs were taken at the origin looking diagonally across the plot to the opposite corner during the baseline monitoring in February 2015. Subsequent annual assessments following baseline survey will capture the same reference photograph locations. Species composition, density and survival rates will be evaluated on an annual basis by plot and for the entire site. Individual plot data will be provided and will include height, density, vigor, damage (if any), and survival. Planted woody stems will



be marked annually, as needed, based off of a known origin so they can be found in succeeding monitoring years. Mortality will be determined from the difference between the baseline year's living planted stems and the current year's living planted stems.



## Section 4: MAINTENANCE AND CONTINGENCY PLAN

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Any identified high priority problem areas, such as streambank instability, aggradation/degradation, lack of vegetation establishment, or failure to meet hydrology success criteria will be evaluated on a case-by-case basis. The problem areas will be visually noted and remedial actions will be discussed with NCDMS staff to determine a plan of action. A remedial action plan will be submitted if maintenance is required.

### 4.1 Stream

Stream problem areas will be mapped and included in the CCPV as part of the annual stream assessment. Stream problems areas may include bank erosion, structure failure, beaver dams, aggradation/degradation, etc. Appropriate remedial actions will be determined with NCDMS correspondence. A proposal of work will be submitted if remediation of an area is required.

### 4.2 Vegetation

Vegetative problem areas will be mapped and included in the CCPV as part of the annual vegetation assessment. Vegetation problems areas may include planted vegetation not meeting success criteria, persistent invasive species, barren areas with little to no herbaceous cover, or grass suffocation/crowding of planted stems. Appropriate remedial actions will be determined with NCDMS correspondence. A proposal of work will be submitted if remediation of an area is required.

### 4.3 Wetlands

Wetland problem areas will be mapped and included in the CCPV as part of the annual wetland assessment. Wetland problems areas may include planted vegetation not meeting success criteria, persistent invasive species, barren areas with little to no herbaceous cover, grass suffocation/crowding of planted stems, or wetland hydrology not meeting success criteria. Appropriate remedial actions will be determined with NCDMS correspondence. A proposal of work will be submitted if remediation of an area is required.



## Section 5: AS-BUILT CONDITION (BASELINE)

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The Site construction and as-built surveys were completed between October 2014 and March 2015. The survey included developing an as-built topographic surface, locating the channel boundaries, structures, and cross sections. For comparison purposes, the baseline monitoring divided the reach assessments in the same way they were established for design parameters: Foust Creek, and UT1.

### 5.1 As-Built/Record Drawings

A half size record drawing plan set is located in Appendix 4 with the post-construction survey, alignments, and any significant field adjustments made during construction for the project. Minimal adjustments were made during construction, where needed, based on field evaluation.

#### 5.1.1 Foust Creek

- Station 121+88 brush toe not installed to minimize impact on nearby trees;
- Station 127+12 to Station 128+68 channel alignment deviation; remains in existing stream location due to bedrock preventing excavation along proposed channel;
- Station 127+94 constructed riffle was not installed, channel was left in original location due to bedrock in floodplain and to minimize impact to nearby trees;
- Station 143+12 transplants were installed instead of brush toe due to availability of existing shrubs and trees suitable for transplanting;
- Station 145+09 transplants were installed instead of brush toe due to availability of existing shrubs and trees suitable for transplanting;
- Station 149+67 J-hook not installed due to the presence of bedrock in channel bed and banks;
- Station 150+12 log vane not installed due to the presence of bedrock in channel bed and banks; and
- Station 150+57 cross vane not installed due to the presence of bedrock in channel bed and banks.

#### 5.1.2 UT1

- No field adjustments were made during construction.

### 5.2 Baseline Data Assessment

Baseline monitoring (MY0) was conducted between January 2015 and March 2015. The first annual monitoring assessment (MY1) will be completed in the fall of 2015. The streams will be monitored for a total of seven years, with the final monitoring activities concluding in 2021. The close-out for the Foust Creek Mitigation Site will be conducted in 2022 given the success criteria has been met. As part of the closeout process, NCDMS will evaluate the Site at the end of the fourth year monitoring period to determine whether or not the Site is eligible to closeout following monitoring year five. If the Site is meeting success criteria, NCDMS will propose to the Interagency Review Team (IRT) to proceed with the closeout process. If the Site is not meeting success criteria, then an additional two years of monitoring will be conducted by Wildlands.



### **5.2.1 Morphological State of the Channel**

Please refer to Appendix 2 for summary data tables, morphological plots, and stream photographs.

#### Profile

The MY0 profiles closely match the profile design parameters with the exception of the pool depths. Many pools have sediment buildup in them from construction, but are expected to flush out the sediment during the next several rain events. On the design profiles, riffles were depicted as straight lines with consistent slopes. However, at some locations on the as-built survey riffle profiles are not consistent in slope due to rock and log riffle features installed during construction for habitat variability. The as-built profile reflects the installation of log and rock sills with micro-pools interspersed in the riffle. The plotted longitudinal profiles and related summary data can be found in Appendix 2.

#### Dimension

The MY0 dimension numbers closely match the design parameters with some minor variability for all reaches. Summary data and cross section plots of each project reach can be found in Appendix 2.

#### Pattern

The MY0 pattern metrics fell within the design parameters for all four reaches. No major design changes were made to alignments during construction. Pattern data will be evaluated in monitoring year five if there are any indicators through the profile or dimensions that significant geomorphic adjustments have occurred.

#### Sediment Transport

As-built shear stresses and velocities are similar to design calculations and should reduce the risk of further erosion along all restoration reaches. The as-built condition for each of these reaches indicates an overall increase in substrate particle size (Tables 5a – 5b). The substrate data for each constructed reach was compared to the design shear stress parameters from the mitigation plan to assess the potential for bed degradation. The shear stresses calculated for the constructed channels are within the allowable range, which indicates the channel is not at risk to trend toward channel degradation.

### **5.2.2 Vegetation**

The MY0 vegetation survey was complete in February 2015. The average MY0 planted density is 647 stems/acre, which exceeds the MY3 density requirement. Summary data and photographs of each plot can be found in Appendix 3.

### **5.2.3 Hydrology**

At this time, there have been no bankfull events recorded since completion of construction. Bankfull events recorded during 2015 will be included in the year one monitoring report.

### **5.2.4 Wetlands**

The project includes seven distinct riparian wetland mitigation areas (RW1 – RW7). These wetland areas each include a zone of rehabilitation of existing wetlands and re-establishment of historic wetlands. The riparian wetland re-establishment/rehabilitation zones are adjacent to the main stem of Foust Creek. Wetland hydrology was improved and/or restored by plugging and filling drainage ditches in each of the wetland zones and raising the elevation of Foust Creek. No grading was performed in the wetland rehabilitation areas. Minor grading was completed in the re-establishment zones to remove berms and lower floodplain elevations to be more similar to those of the rehabilitation zones. All wetlands have been planted with native tree species and cattle have been excluded through fence construction around the perimeter of the easement.





## Section 6: REFERENCES

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- Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.
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## **APPENDIX 1. General Tables and Figures**

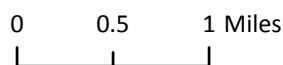
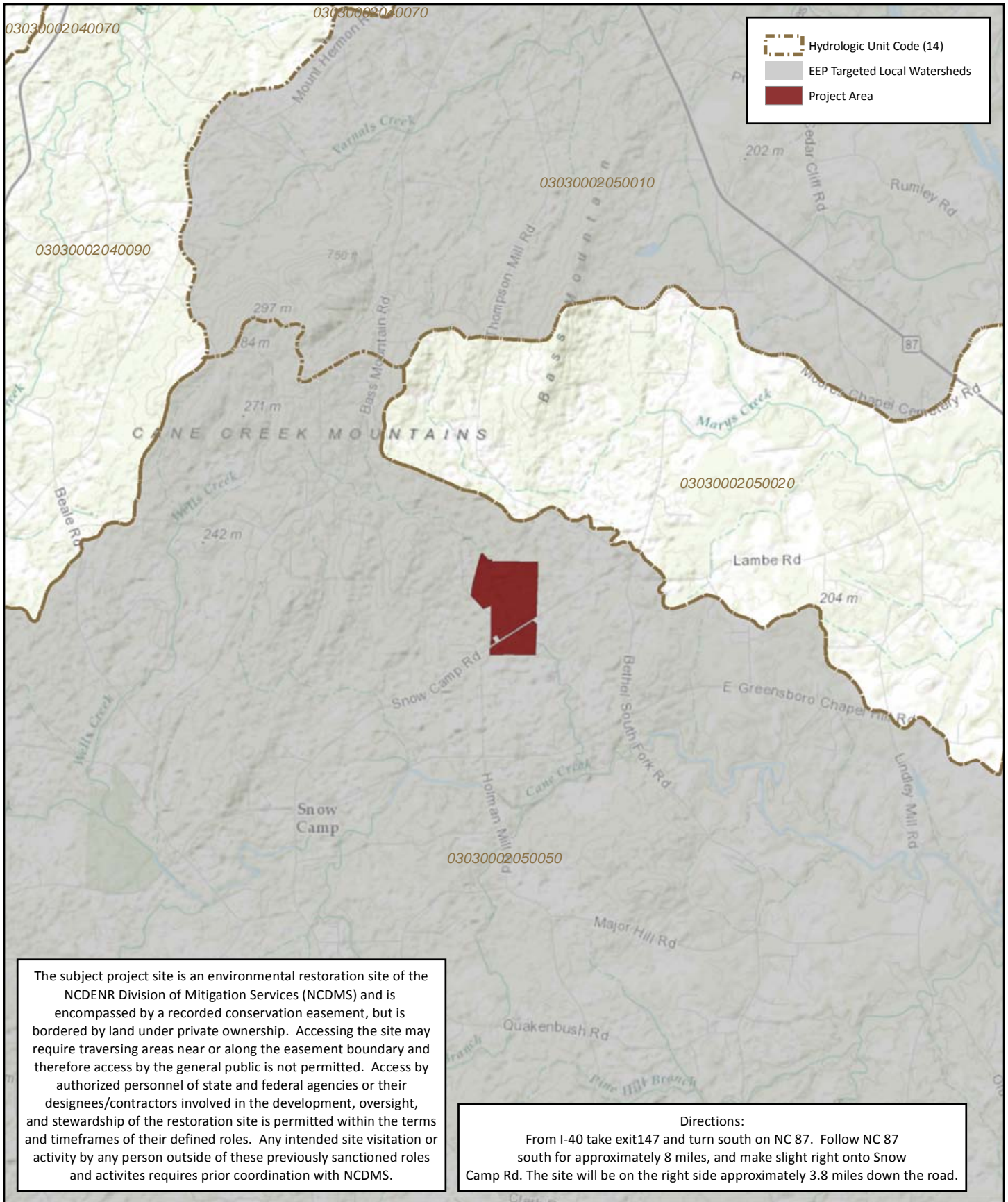


Figure 1 Project Vicinity Map  
 Foust Creek Mitigation Site  
 NCDMS Project No. 95715  
 Monitoring Year 0 - 2015  
 Alamance County, NC



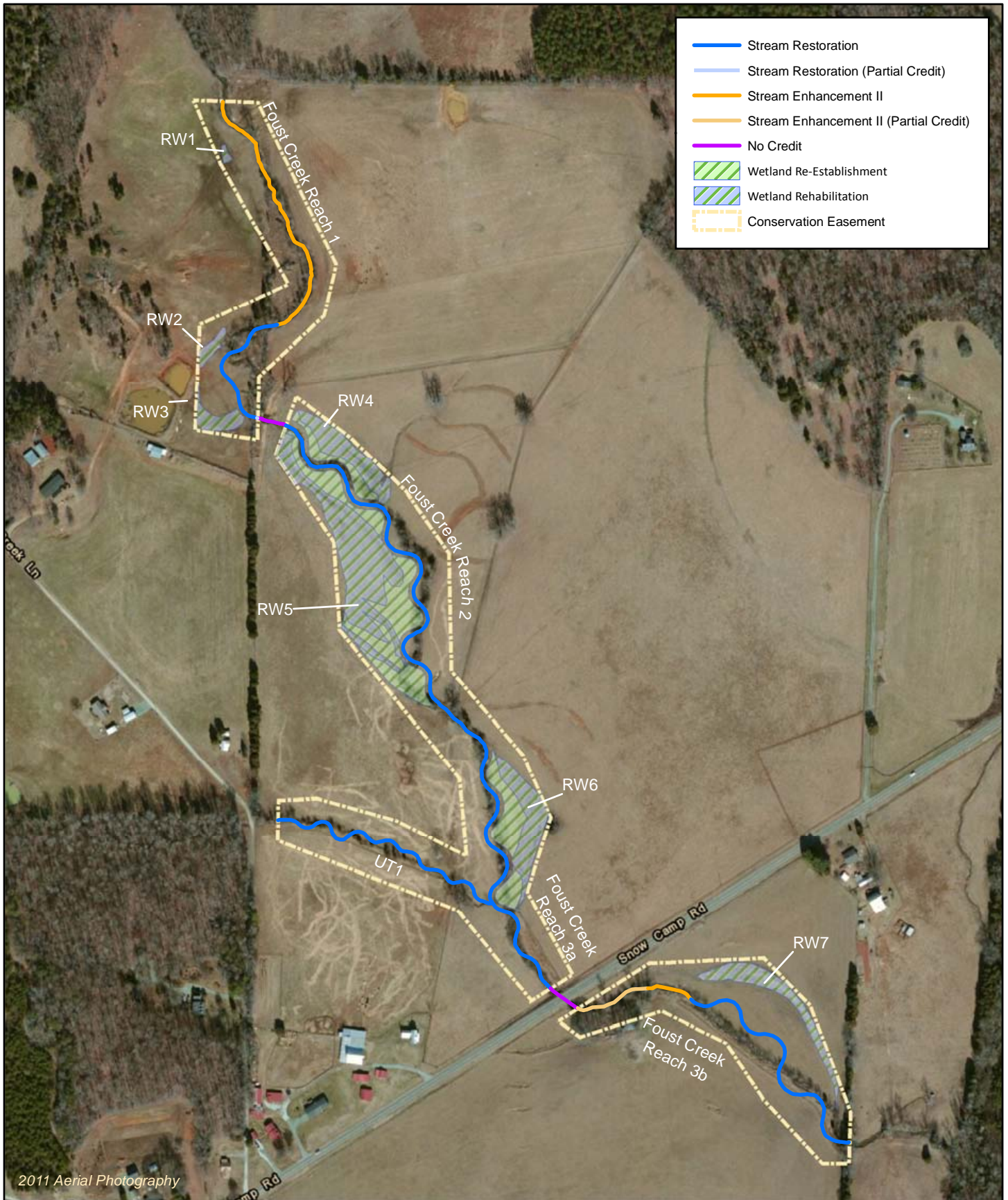
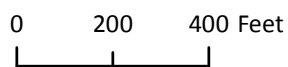
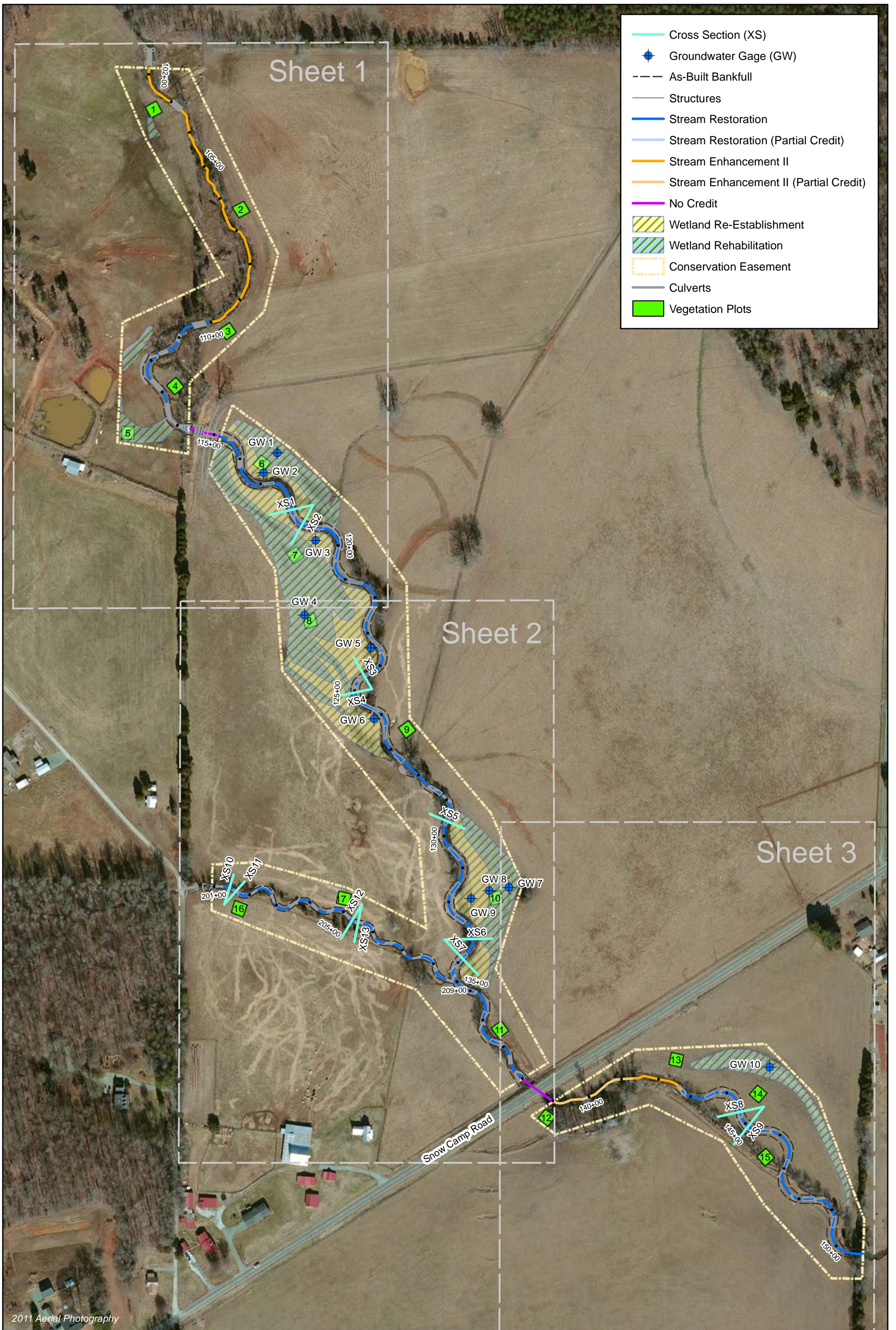


Figure 2 Project Component/ Asset Map  
 Foust Creek Mitigation Site  
 NCDMS Project No. 95715  
 Monitoring Year 0 - 2015  
 Alamance County, NC







2011 Aerial Photography

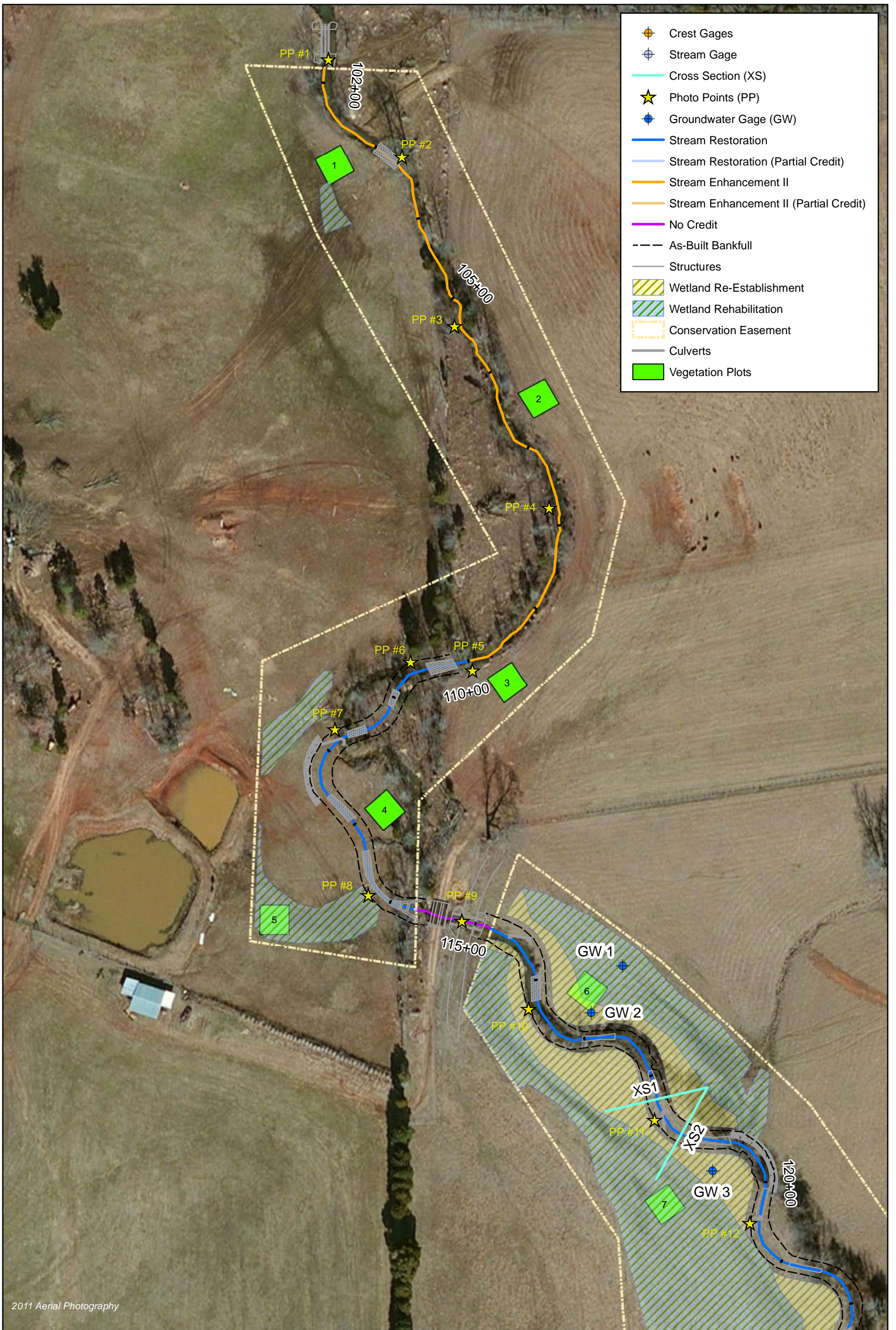


0 125 250 375 500 Feet



Figure 3.0 Monitoring Plan View (Key)  
 Foust Creek Stream Restoration Site  
 NCDMS Project No. 95715  
 Monitoring Year 0 - 2015  
 Alamance County, NC





- Crest Gages
- Stream Gauge
- Cross Section (XS)
- Photo Points (PP)
- Groundwater Gauge (GW)
- Stream Restoration
- Stream Restoration (Partial Credit)
- Stream Enhancement II
- Stream Enhancement II (Partial Credit)
- No Credit
- As-Built Bankfull
- Structures
- Wetland Re-Establishment
- Wetland Rehabilitation
- Conservation Easement
- Culverts
- Vegetation Plots

2011 Aerial Photography

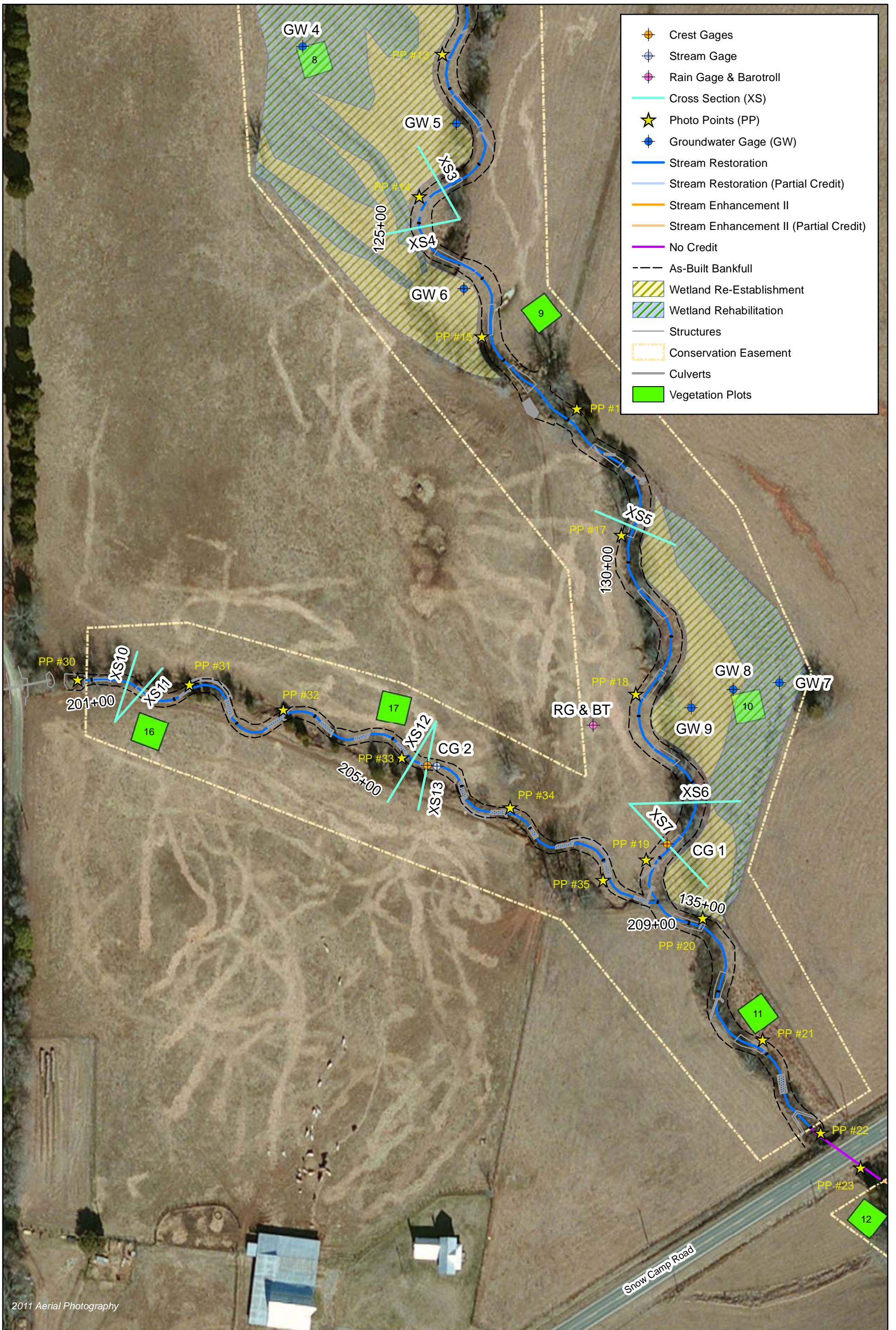


0 50 100 150 200 Feet



Figure 3.1 Monitoring Plan View  
 (Sheet 1 of 3)  
 Foust Creek Stream Restoration Site  
 NCDMS Project No. 95715  
 Monitoring Year 0 - 2015  
 Alamance County, NC





2011 Aerial Photography

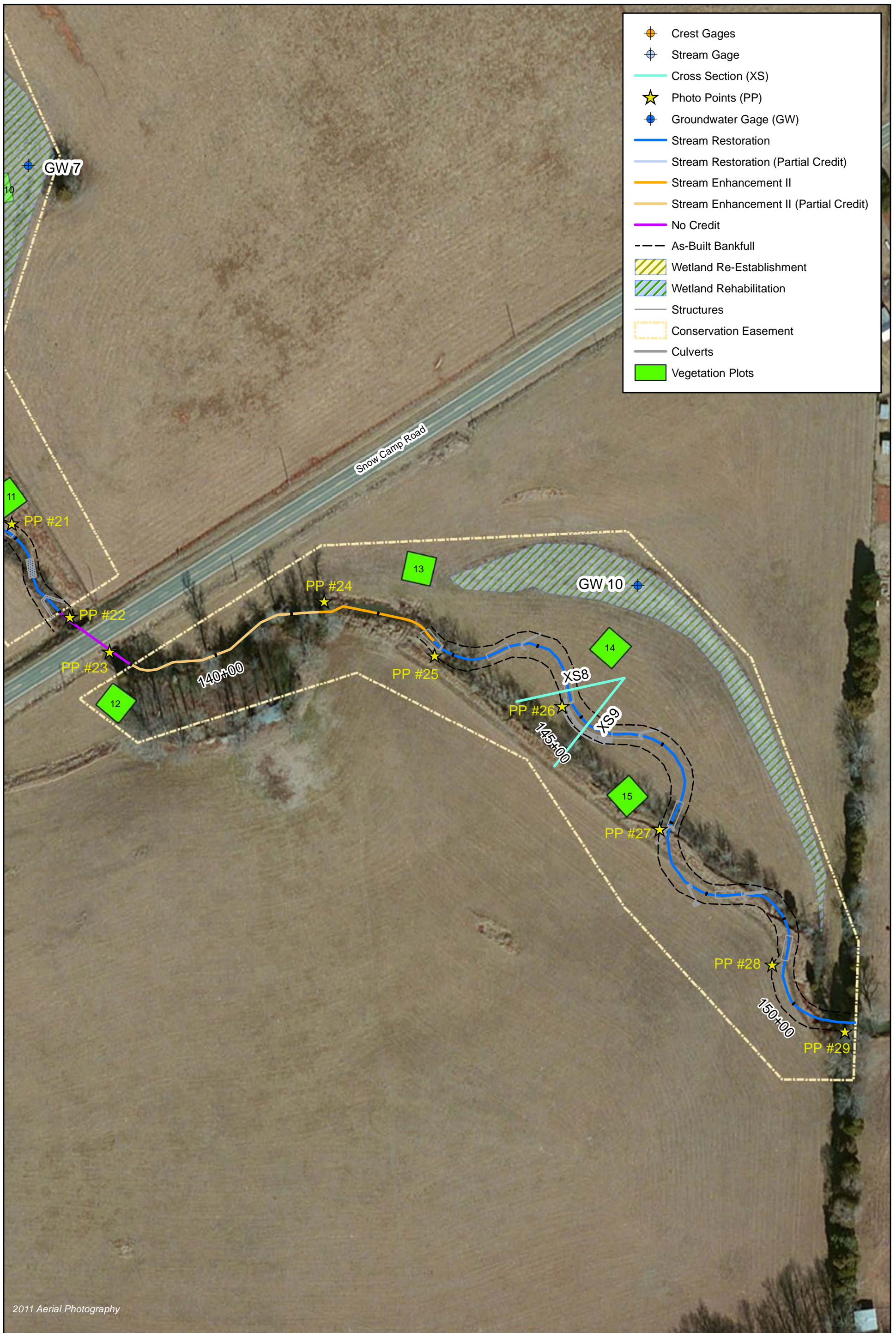


0 50 100 150 200 Feet



Figure 3.2 Monitoring Plan View  
 (Sheet 2 of 3)  
 Foust Creek Stream Restoration Site  
 NCDMS Project No. 95715  
 Monitoring Year 0 - 2015  
 Alamance County, NC





- Crest Gages
- Stream Gage
- Cross Section (XS)
- Photo Points (PP)
- Groundwater Gage (GW)
- Stream Restoration
- Stream Restoration (Partial Credit)
- Stream Enhancement II
- Stream Enhancement II (Partial Credit)
- No Credit
- As-Built Bankfull
- Wetland Re-Establishment
- Wetland Rehabilitation
- Structures
- Conservation Easement
- Culverts
- Vegetation Plots

2011 Aerial Photography



**Table 1. Project Components and Mitigation Credits**

Foust Creek Mitigation Site (NCDMS Project No.95715)

Monitoring Year 0 - 2015

MITIGATION CREDITS									
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R-E <sup>1</sup>	RE <sup>1</sup>	R-E <sup>1</sup>	RE <sup>1</sup>			
Totals	4,770	N/A	1.9	2.1	N/A	N/A			
PROJECT COMPONENTS									
Reach ID	As-Built Stationing/ Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage/ Acreage	Mitigation Ratio	Credits (SMU/ WMU)		
STREAMS									
Foust Creek – Reach 1	101+83 to 109+96	814	EII	Enhancement	813	2.5	325		
Foust Creek – Reach 2	109+96 to 114+21 115+19 to 134+84	2,356	P1	Restoration	2,390	1	2,390		
Foust Creek – Reach 2	114+21 to 114+35	31	P1	Restoration (Partial Credit)	14	2 <sup>2</sup>	7		
Foust Creek – Reach 2 (Easement Break)	114+35 to 115+19	91	P1	Restoration (No Credit)	84	---	---		
Foust Creek – Reach 3A	134+84 to 138+01	307	P1/2	Restoration	317	1	317		
Foust Creek – Reach 3B	139+01 to 140+89	187	EII	Enhancement (Partial Credit)	188	5 <sup>2</sup>	38		
Foust Creek – Reach 3B	140+89 to 142+31	142	EII	Enhancement	142	2.5	57		
Foust Creek – Reach 3B	142+31 to 150+74	684	P1/2	Restoration	843	1	843		
UT1 to Foust Creek	200+94 to 208+87	713	P1	Restoration	793	1	793		
WETLANDS									
Riparian Wetland RW1	---	0.03	---	Rehabilitation	0.03	1.5	0.02		
Riparian Wetland RW2	---	0.08	---	Rehabilitation	0.08	1.5	0.05		
Riparian Wetland RW3	---	0.16	---	Rehabilitation	0.16	1.5	0.11		
Riparian Wetland RW4	---	0.45	---	Rehabilitation	0.45	1.5	0.30		
Riparian Wetland RW4	---	0.21	---	Re-Establishment	0.21	1	0.21		
Riparian Wetland RW5	---	1.46	---	Rehabilitation	1.46	1.5	0.97		
Riparian Wetland RW5	---	1.18	---	Re-Establishment	1.18	1	1.18		
Riparian Wetland RW6	---	0.52	---	Rehabilitation	0.52	1.5	0.35		
Riparian Wetland RW6	---	0.51	---	Re-Establishment	0.51	1	0.51		
Riparian Wetland RW7	---	0.46	---	Rehabilitation	0.46	1.5	0.31		

COMPONENT SUMMATION						
Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (acres)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	4,357	-	-	-	-	-
Enhancement		-	-	-	-	-
Enhancement I	-					
Enhancement II	1,143					
Creation		-	-	-		
Preservation	-	-	-	-		-
High Quality Preservation	-	-	-	-		-
Re-Establishment		1.90	-	-		
Rehabilitation		3.16	-	-		

N/A: not applicable

1. R-E = Wetland Re-Establishment and RE = Wetland Rehabilitation per NCDENR July 30, 2013 Memorandum titled: Consistency between Federal and State Wetland Mitigation Requirements

2. A portion of Foust Creek Reach 2 and Reach 3B does not have a full 50' buffer from top of bank to the conservation easement boundary on the river left side. Therefore, mitigation credit is only included at a rate of half the normal crediting giving the restoration or restoration equivalent type.

**Table 2. Project Activity and Reporting History**  
 Foust Creek Mitigation Site (NCDMS Project No.95715)  
**Monitoring Year 0 -2015**

Activity or Report	Date Collection Complete	Completion or Scheduled Delivery
Mitigation Plan	October 2013- February 2014	February 2014
Final Design - Construction Plans	April 2014- August 2014	August 2014
Construction	October 2014- February 2015	February 2015
Temporary S&E mix applied to entire project area <sup>1</sup>	February 2015	February 2015
Permanent seed mix applied to reach/segments	February 2015	February 2015
Bare root and live stake plantings for reach/segments	February 2015	February 2015
Baseline Monitoring Document (Year 0)	January 2015- March 2015	May 2015
Year 1 Monitoring	2015	December 2015
Year 2 Monitoring	2016	December 2016
Year 3 Monitoring	2017	December 2017
Year 4 Monitoring	2018	December 2018
Year 5 Monitoring	2019	December 2019
Year 6 Monitoring	2020	December 2020
Year 7 Monitoring	2021	December 2021

<sup>1</sup>Seed and mulch is added as each section of construction is completed.

**Table 3. Project Contact Table**  
 Foust Creek Mitigation Site (NCDMS Project No.95715)  
**Monitoring Year 0 - 2015**

<b>Designer</b> Angela Allen, PE	<b>Wildlands Engineering, Inc.</b> 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
<b>Construction Contractor</b>	<b>Fluvial Solutions</b> P.O. Box 28749 Raleigh, NC 27611
<b>Planting Contractor</b>	<b>Bruton Natural Systems, Inc</b> P.O. Box 1197 Fremont, NC 27830
<b>Seeding Contractor</b>	<b>Fluvial Solutions</b> P.O. Box 28749 Raleigh, NC 27611
<b>Seed Mix Sources</b>	<b>Green Resource, LLC</b>
<b>Nursery Stock Suppliers</b>	
<b>Bare Roots</b>	<b>Dykes and Son Nursery</b>
<b>Live Stakes</b>	<b>Bruton Natural Systems, Inc</b>
<b>Monitoring Performers</b> Monitoring, POC	<b>Wildlands Engineering, Inc.</b> Jason Lorch 919.851.9986, ext. 107

**Table 4. Project Information and Attributes**  
 Foust Creek Mitigation Site (NCDMS Project No.95715)  
 Monitoring Year 0 -2015

PROJECT INFORMATION				
Project Name	Foust Creek Mitigation Site			
County	Alamance County			
Project Area (acres)	22.1 acres			
Project Coordinates (latitude and longitude)	35° 55' 0.12" N, 79° 24' 6.84" W			
PROJECT WATERSHED SUMMARY INFORMATION				
Physiographic Province	Carolina Slate Belt of the Piedmont Physiographic Province			
River Basin	Cape Fear River			
USGS Hydrologic Unit 8-digit	03030002			
USGS Hydrologic Unit 14-digit	03030002050050			
DWR Sub-basin	03-06-04			
Project Drainage Area (acres)	1,259 acres			
Project Drainage Area Percentage of Impervious Area	<1%			
CGIA Land Use Classification	78% Forested/ Scrubland, 21% Agriculture/ Managed Herbaceous, <1% Open Water, <1% Watershed Impervious Cover, <1% Developed			
REACH SUMMARY INFORMATION				
Parameters	Foust Creek Reach 1	Foust Creek Reach 2	Foust Creek Reach 3	UT1
Length of reach (linear feet) - Post-Restoration	813	2,404	1,490	793
Drainage area (acres)	954	1,047	1,259	173
NCDWR stream identification score	41.5	41.5	44	28
NCDWR Water Quality Classification	WS-V	WS-V	WS-V	---
Morphological Description (stream type)	P	P	P	I
Evolutionary trend (Simon's Model) - Pre- Restoration	III/IV	NA	III/IV	III
Underlying mapped soils	Georgeville silty clay loam, Local alluvial land, Orange silt loam			
Drainage class	---	---	---	---
Soil Hydric status	---	---	---	---
Slope	---	---	---	---
FEMA classification	AE	AE	AE	---
Native vegetation community	Piedmont bottomland forest			
Percent composition exotic invasive vegetation -Post-Restoration	0%			
REGULATORY CONSIDERATIONS				
Regulation	Applicable?	Resolved?	Supporting Documentation	
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.	
Waters of the United States - Section 401	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.	
Division of Land Quality (Dam Safety)	No	N/A	N/A	
Endangered Species Act	Yes	Yes	Foust Creek Mitigation Plan(2013); Wildlands determined "no effect" on Alamance County listed endangered species.	
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 1/9/13).	
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A	
FEMA Floodplain Compliance	Yes	Yes	Foust Creek is located within the floodway and flood fringe (FEMA Zone AE, FIRM panels 8788 and 8879).	
Essential Fisheries Habitat	No	N/A	N/A	

## **APPENDIX 2. Morphological Summary Data and Plots**



**Table 5b. Baseline Stream Data Summary**

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

**UT1**

Parameter	Gage	PRE-RESTORATION		REFERENCE REACH DATA												DESIGN		AS-BUILT/BASELINE		
		UT1		Onsite Reference Reach - Foust Creek		Spencer Creek 1		Spencer Creek 2		UT to Richland Creek- Reach 1		UT to Richland Creek- Reach 2		Dutchman's Creek		UT to Cane Creek		UT1		
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
<b>Dimension and Substrate - Riffle</b>																				
Bankfull Width (ft)	N/A	8.6	18.5	19.4	10.7	11.2	6.3	9.3	8.8	10.4	13.3	15.2	24.8	26.6	11.5	12.3	11.0		10.8	12.6
Floodprone Width (ft)		104.3	49	62.5	60	>114	14	125	27.6	31.4	>50		4.4	49.7	311		27.5	220	150.0	150.0
Bankfull Mean Depth		1	1.3	1.4	1.6	1.8	0.8	1.0	0.8	0.9	1.1	1.3	1.3	1.5	0.8	1	0.8		0.6	0.8
Bankfull Max Depth		1.8	1.8	2.1	2.1	2.6	1	1.2	1.1	1.3	1.8	2.1	1.8	2	1.2	1.6	1.3		1.3	1.5
Bankfull Cross Sectional Area (ft <sup>2</sup> )		8.7	23.9	24.1	17.8	19.7	6.6	8.7	7.8	8.5	16.5	17.5	34.2	36.9	8.9	12.2	8.8		7.7	8.1
Width/Depth Ratio		8.5	13.9	14.2	5.8	7.1	7.9	9.3	10	12.8	10.1	13.9	17.9	19.4	12.3	14.4	13.8		14.2	20.4
Entrenchment Ratio		12.2	2.6	3.4	5.5	>10.2	1.7	4.3	2.4	4	>2.5		1.9	1.9	>2.5		2.5	20.0	11.9	13.9
Bank Height Ratio		1.4	1.0		1.0		1.0	1.0	1.4	2.1	1.0		1.0	1.2	---		1.0		1.0	1.0
D50 (mm)		0.40																	18.2	35.7
<b>Profile</b>																				
Riffle Length (ft)	N/A	---		---		---		---		---		---		---		---		11.5	21.6	
Riffle Slope (ft/ft)		---	0.015	0.035	0.013	0.0184	0.0343	0.0183	0.0355	0.0183	0.0355	---		0.0188	0.0704	0.0065	0.0799	0.0088	0.0583	
Pool Length (ft)		---	---		---		---		---		---		---		---		---		18.5	51.0
Pool Max Depth (ft)		2.6	2.5	2.9	3.3	1.2	1.8	14.7	16	1.8	1.8	---		2.6	1.6	3.2	1.9	2.0		
Pool Spacing (ft)		---	48.8	91.3	71	9	46	2.5	6.1	2.5	6.1	---		2.3	6.1	28	77	33	82	
Pool Volume (ft <sup>3</sup> )																				
<b>Pattern</b>																				
Channel Beltwidth (ft)	N/A	N/A	N/A	38	41	10	50	N/A		N/A		N/A		102		17.6	97.9	21	44	
Radius of Curvature (ft)		N/A	N/A	11	15	12	85	N/A		N/A		N/A		23	38	21	34	30	36	
Rc:Bankfull Width (ft/ft)		N/A	N/A	1.3	1.4	1.9	9.1	N/A		N/A		N/A		2.0	3.1	1.9	3.1	2.7	2.8	
Meander Length (ft)		N/A	N/A	--	--	53	178	N/A		N/A		N/A		45.0	81.0	55	154	79	120	
Meander Width Ratio		N/A	N/A	3.4	3.6	1.6	5.4	N/A		N/A		N/A		8.3	8.9	1.6	8.9	1.9	3.5	
<b>Substrate, Bed and Transport Parameters</b>																				
Ri%/Ru%/P%/G%/S%	N/A																			
SC%/Sa%/G%/C%/B%/Be%																				
d16/d35/d50/d84/d95/d100		0.1/0.1/0.4/14/24	---		---		---		---		---		---		---		---		0.07/0.39/11.4/55.6/90.0/256.0	
Reach Shear Stress (Competency) lb/ft <sup>2</sup>		0.42															0.58	0.29	0.36	
Max part size (mm) mobilized at bankfull																				
Stream Power (Capacity) W/m <sup>2</sup>																				
<b>Additional Reach Parameters</b>																				
Drainage Area (SM)	N/A	0.30	1.38	0.96	0.37	0.28	0.97	2.90	0.29	0.30	0.30									
Watershed Impervious Cover Estimate (%)		<1%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Rosgen Classification		E5	C4	E4	E4	C/E4	C/E4	B4c	C/E4	C/E4	C/E4	C/E4								
Bankfull Velocity (fps)		3.6	2.9	3.7	4.9	5.4	5.0	5.6	4.1	5.2	4.2	4.5	4.2	4.5	3.8	3.5	2.3	2.7		
Bankfull Discharge (cfs)		31	69.4	88.0	97	35	29.1	32.0	68.9	78.6	140.0	165.0	40	30.0	18.1	21.8				
Q-NFF regression		---																		
Q-USGS extrapolation		---																		
Q-Mannings		---																		
Valley Length (ft)		---															702			
Channel Thalweg Length (ft)		713															788	793		
Sinuosity		1.11	1.05	2.3	1.0	1.3	1.1	2.3	1.0	1.3	1.15	1.13								
Water Surface Slope (ft/ft) <sup>2</sup>		---																	0.0079	
Bankfull Slope (ft/ft)		---			0.0047	0.019	0.022	0.013	0.018	0.009	0.015	0.005	0.011	0.006	0.0125					

(---): Data was not provided

N/A: Not Applicable



**Table 6. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)**

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

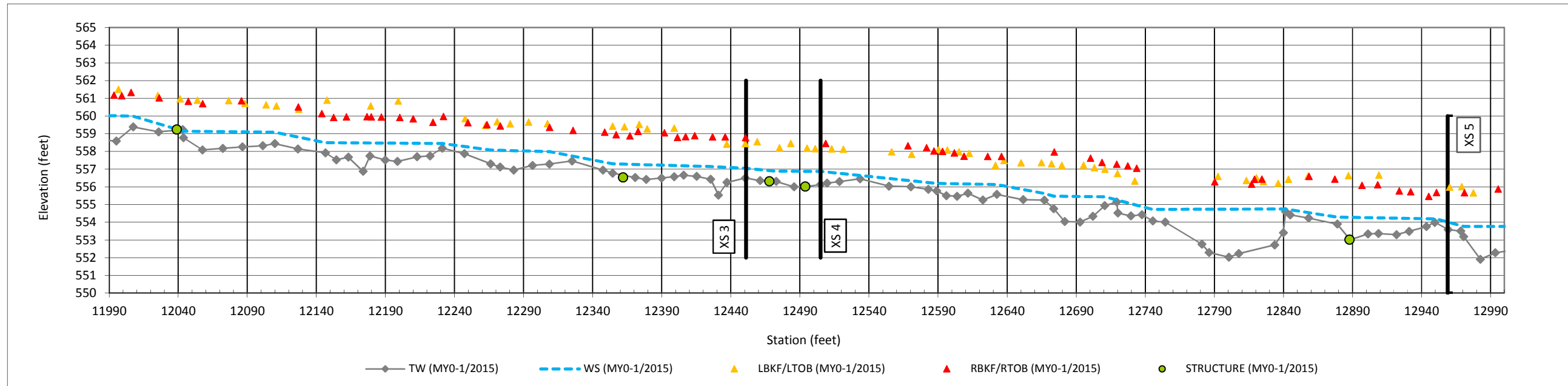
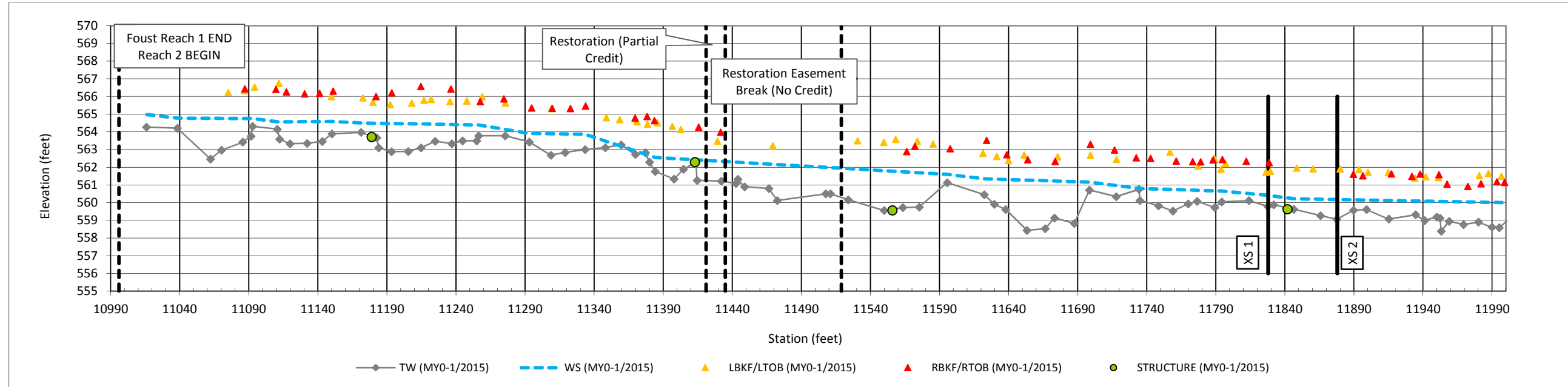
		Foust Creek - Reach 2																														
		Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)									
Dimension and Substrate	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
<i>based on fixed bankfull elevation</i>	561.7								561.6								558.4								558.2							
Bankfull Width (ft)	20.6								21.5							18.5								24.9								
Floodprone Width (ft)	150.0								N/A							150.0								N/A								
Bankfull Mean Depth (ft)	1.1								1.2							1.2								1.0								
Bankfull Max Depth (ft)	1.9								2.5							1.9								2.1								
Bankfull Cross Sectional Area (ft <sup>2</sup> )	22.7								26.7							21.5								24.4								
Bankfull Width/Depth Ratio	18.8								17.4							16.0								25.4								
Bankfull Entrenchment Ratio	7.3								N/A							8.1								N/A								
Bankfull Bank Height Ratio	1.0								N/A							1.0								N/A								
		Foust Creek - Reach 2														Foust Creek - Reach 3																
		Cross Section 5 (Riffle)							Cross Section 6 (Pool)							Cross Section 7 (Riffle)							Cross Section 8 (Riffle)									
Dimension and Substrate	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
<i>based on fixed bankfull elevation</i>	555.7								553.5								552.9								547.9							
Bankfull Width (ft)	20.7								25.8							22.5								23.6								
Floodprone Width (ft)	150.0								N/A							150.0								150.0								
Bankfull Mean Depth (ft)	1.3								1.6							1.3								1.5								
Bankfull Max Depth (ft)	2.1								3.0							2.3								2.7								
Bankfull Cross Sectional Area (ft <sup>2</sup> )	27.6								41.7							30.2								36.5								
Bankfull Width/Depth Ratio	15.5								15.9							16.8								15.2								
Bankfull Entrenchment Ratio	7.2								N/A							6.7								6.4								
Bankfull Bank Height Ratio	1.0								N/A							1.0								1.0								
		Foust Creek - Reach 3														UT1																
		Cross Section 9 (Pool)							Cross Section 10 (Pool)							Cross Section 11 (Riffle)							Cross Section 12 (Pool)									
Dimension and Substrate	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
<i>based on fixed bankfull elevation</i>	547.4								562.4								562.1								557.5							
Bankfull Width (ft)	25.6								18.0							10.8								14.5								
Floodprone Width (ft)	N/A								N/A							150.0								N/A								
Bankfull Mean Depth (ft)	2.1								1.1							0.8								0.8								
Bankfull Max Depth (ft)	3.6								2.3							1.3								1.6								
Bankfull Cross Sectional Area (ft <sup>2</sup> )	53.5								20.0							8.1								11.5								
Bankfull Width/Depth Ratio	12.3								16.2							14.2								18.4								
Bankfull Entrenchment Ratio	N/A								N/A							13.9								N/A								
Bankfull Bank Height Ratio	N/A								N/A							1.0								N/A								
		UT1																														
		Cross Section 13 (Riffle)																														
Dimension and Substrate	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7																								
<i>based on fixed bankfull elevation</i>	557.4																															
Bankfull Width (ft)	12.6																															
Floodprone Width (ft)	150.0																															
Bankfull Mean Depth (ft)	0.6																															
Bankfull Max Depth (ft)	1.5																															
Bankfull Cross Sectional Area (ft <sup>2</sup> )	7.7																															
Bankfull Width/Depth Ratio	20.4																															
Bankfull Entrenchment Ratio	11.9																															
Bankfull Bank Height Ratio	1.0																															

### Longitudinal Profile Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Foust Creek Reach 2 - Sta 109+96 to Sta 134+84



### Longitudinal Profile Plots

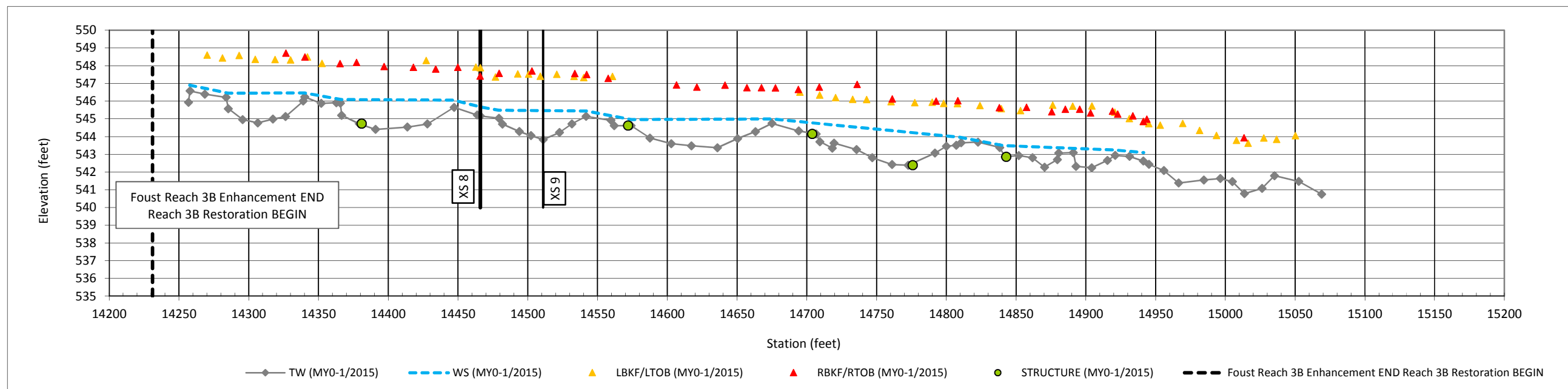
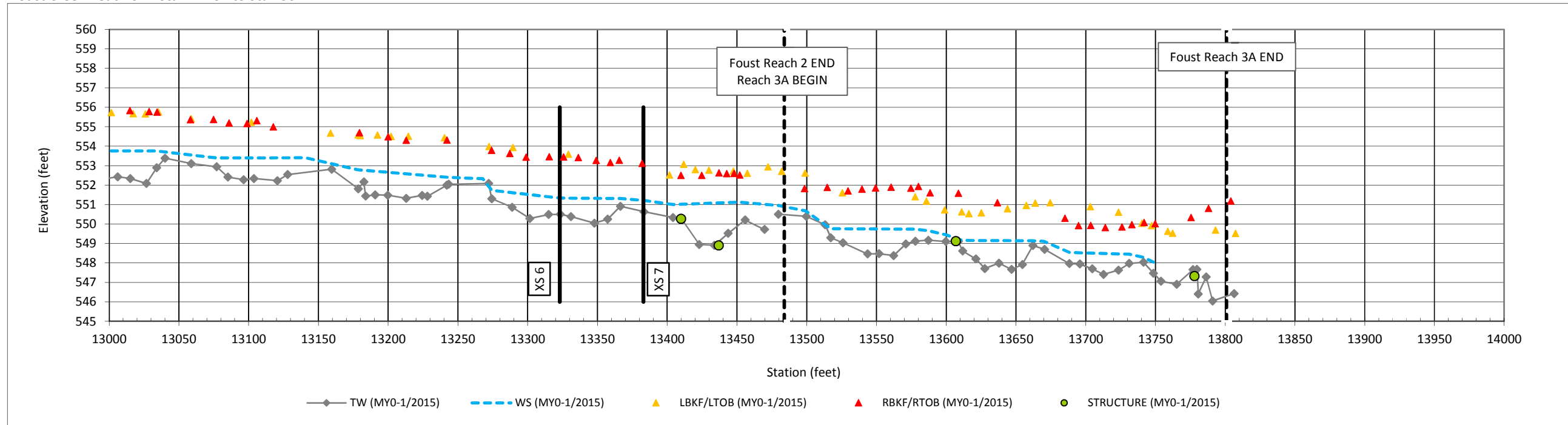
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek Reach 2 - Sta 109+96 to Sta 134+84

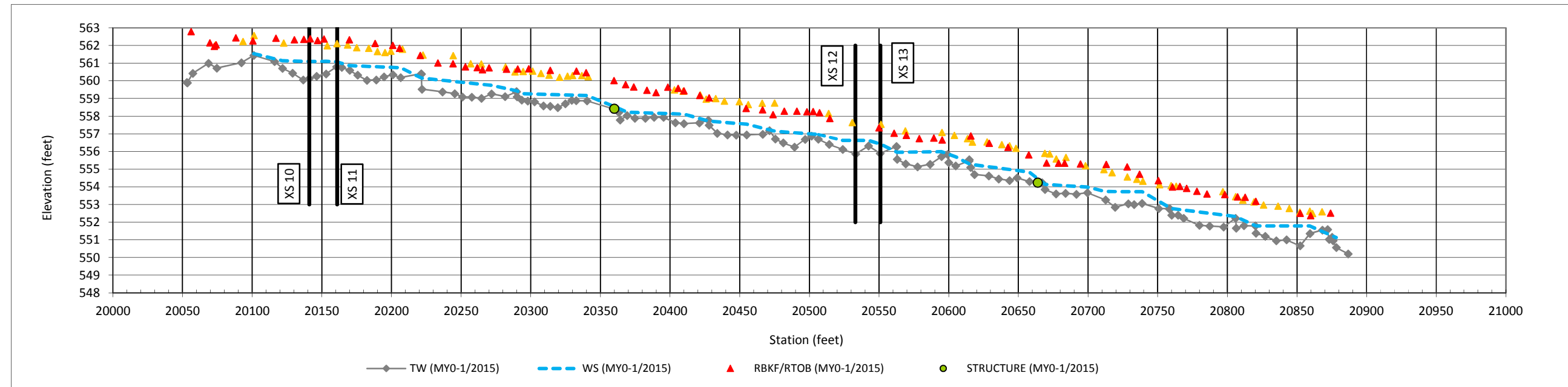
Foust Creek Reach 3A - Sta 134+84 to Sta 138+01

Foust Creek Reach 3B - Sta 142+31 to Sta 150+74



**Longitudinal Profile Plots**  
Foust Creek Mitigation Site (NCDMS Project No. 95715)  
Monitoring Year 0 - 2015

UT1 - Sta 200+94 to Sta 208+87

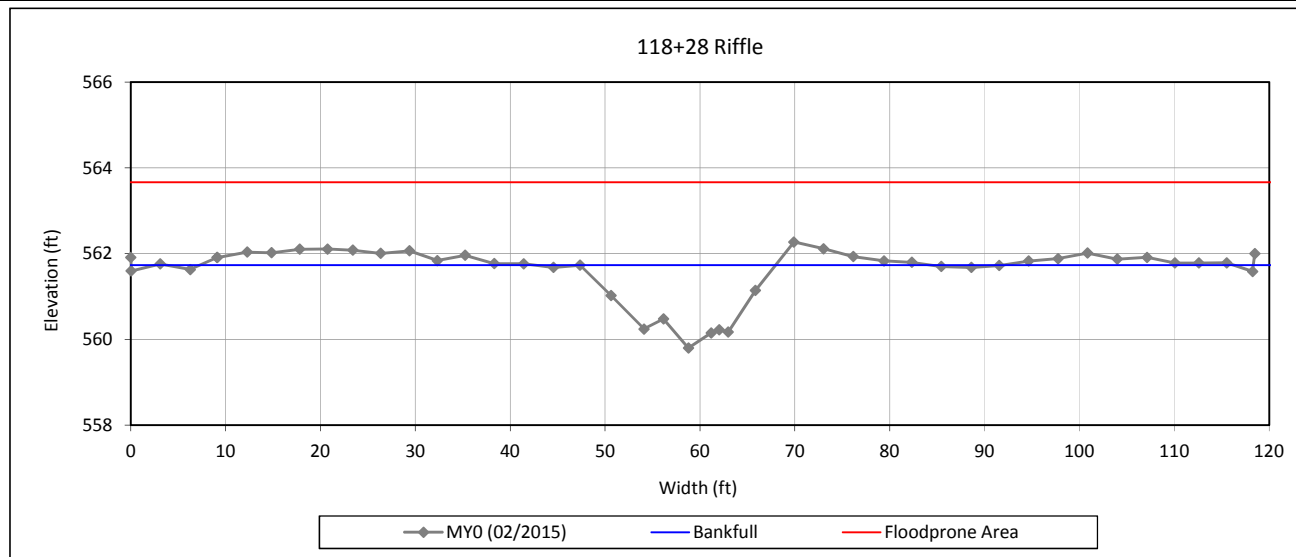


**Cross Section Plots**

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

**Cross Section 1- Foust Creek Reach 2**



**Bankfull Dimensions**

22.7	x-section area (ft.sq.)
20.6	width (ft)
1.1	mean depth (ft)
1.9	max depth (ft)
21.1	wetted perimeter (ft)
1.1	hyd radi (ft)
18.8	width-depth ratio
150.0	W flood prone area (ft)
7.3	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2015

Field Crew: Turner Land Surveying



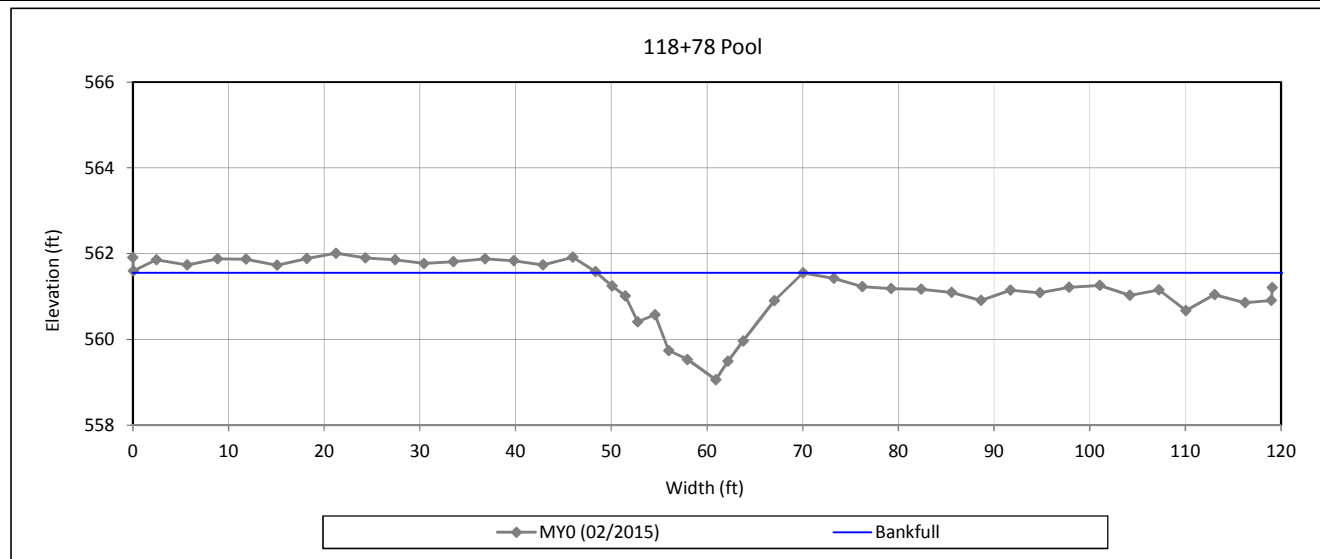
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### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 2- Foust Creek Reach 2



#### Bankfull Dimensions

26.7	x-section area (ft.sq.)
21.5	width (ft)
1.2	mean depth (ft)
2.5	max depth (ft)
22.3	wetted perimeter (ft)
1.2	hyd radi (ft)
17.4	width-depth ratio

Survey Date: 2/2015  
Field Crew: Turner Land Surveying



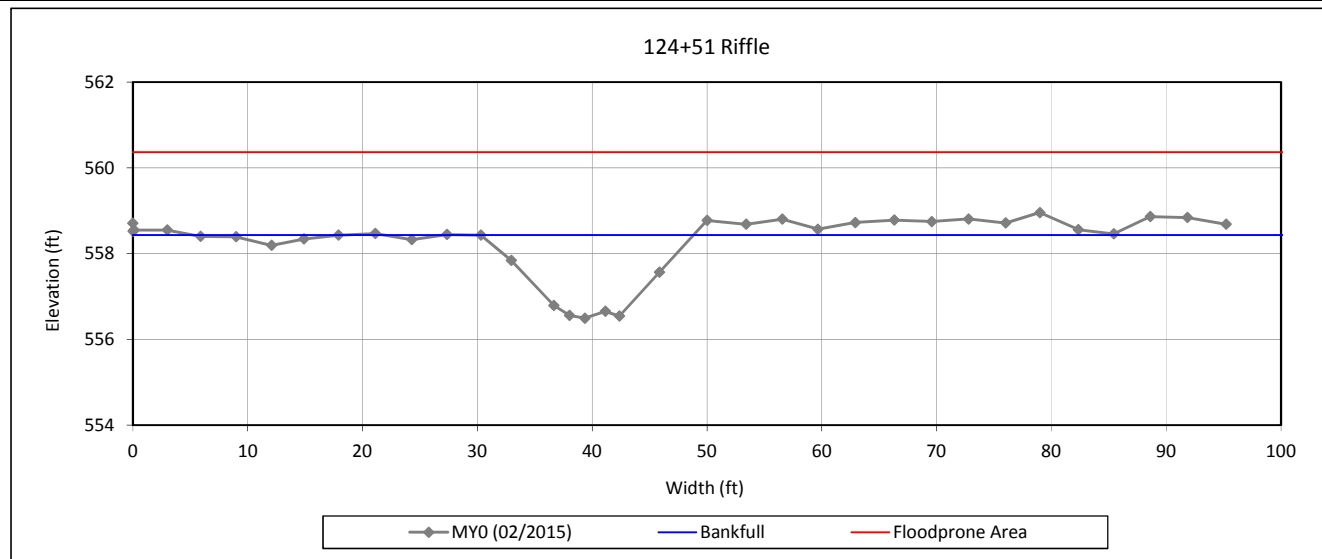
View Downstream

### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 3- Foust Creek Reach 2



#### Bankfull Dimensions

21.5	x-section area (ft.sq.)
18.5	width (ft)
1.2	mean depth (ft)
1.9	max depth (ft)
19.0	wetted parimeter (ft)
1.1	hyd radi (ft)
16.0	width-depth ratio
150.0	W flood prone area (ft)
8.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2015

Field Crew: Turner Land Surveying



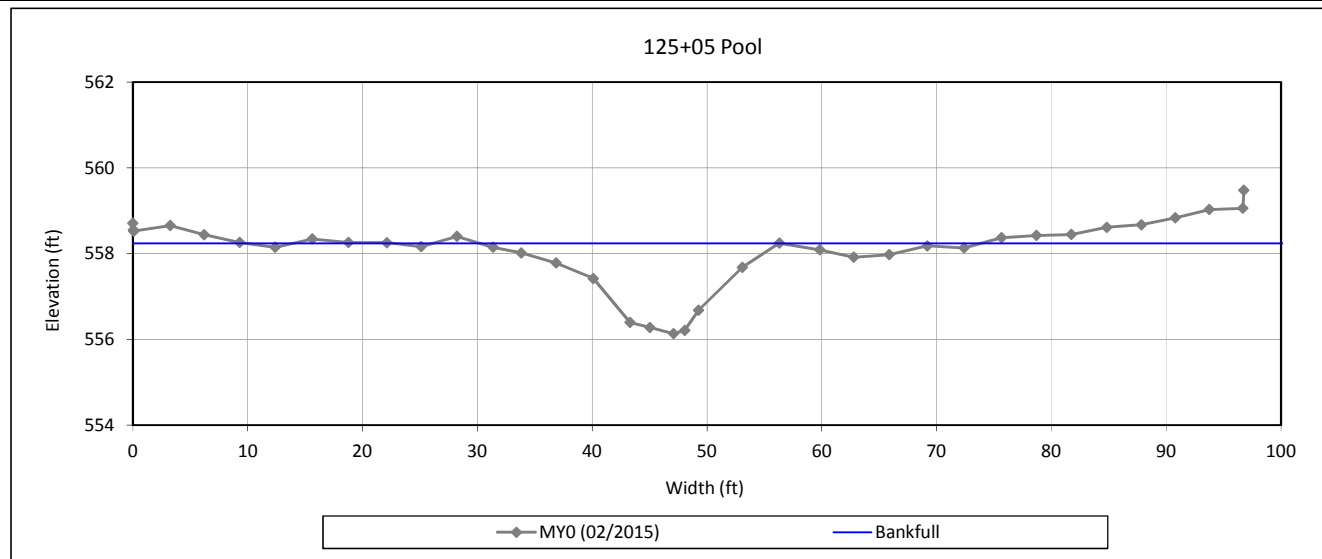
View Downstream

### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 4- Foust Creek Reach 2



#### Bankfull Dimensions

24.4	x-section area (ft.sq.)
24.9	width (ft)
1.0	mean depth (ft)
2.1	max depth (ft)
25.4	wetted parimeter (ft)
1.0	hyd radi (ft)
25.4	width-depth ratio

Survey Date: 2/2015  
Field Crew: Turner Land Surveying



View Downstream

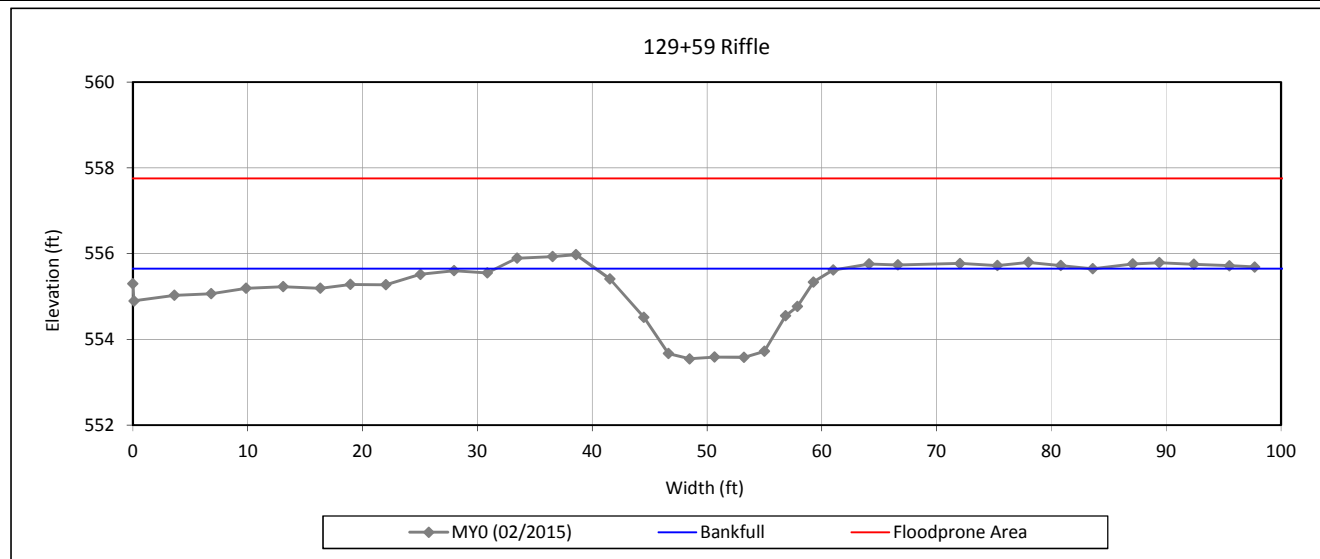


### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 5- Foust Creek Reach 2



#### Bankfull Dimensions

27.6	x-section area (ft.sq.)
20.7	width (ft)
1.3	mean depth (ft)
2.1	max depth (ft)
21.4	wetted perimeter (ft)
1.3	hyd radi (ft)
15.5	width-depth ratio
150.0	W flood prone area (ft)
7.2	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2015

Field Crew: Turner Land Surveying



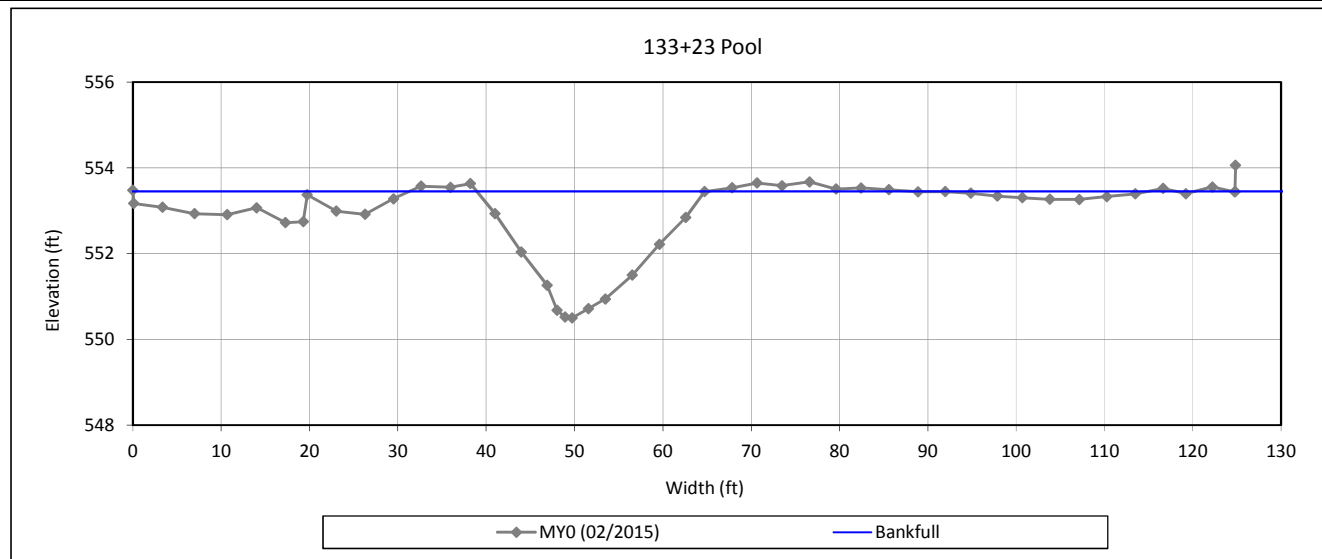
View Downstream

### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 6- Foust Creek Reach 2



#### Bankfull Dimensions

41.7	x-section area (ft.sq.)
25.8	width (ft)
1.6	mean depth (ft)
3.0	max depth (ft)
26.5	wetted parimeter (ft)
1.6	hyd radi (ft)
15.9	width-depth ratio

Survey Date: 2/2015  
Field Crew: Turner Land Surveying



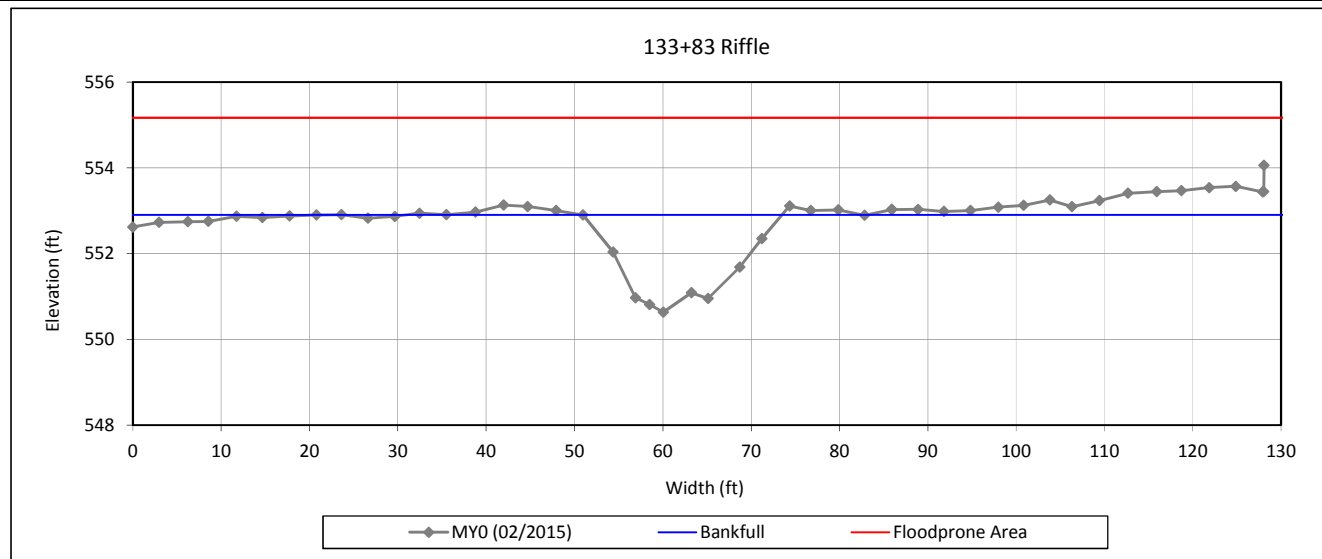
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### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 7- Foust Creek Reach 2



#### Bankfull Dimensions

30.2	x-section area (ft.sq.)
22.5	width (ft)
1.3	mean depth (ft)
2.3	max depth (ft)
23.1	wetted perimeter (ft)
1.3	hyd radi (ft)
16.8	width-depth ratio
150.0	W flood prone area (ft)
6.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2015

Field Crew: Turner Land Surveying



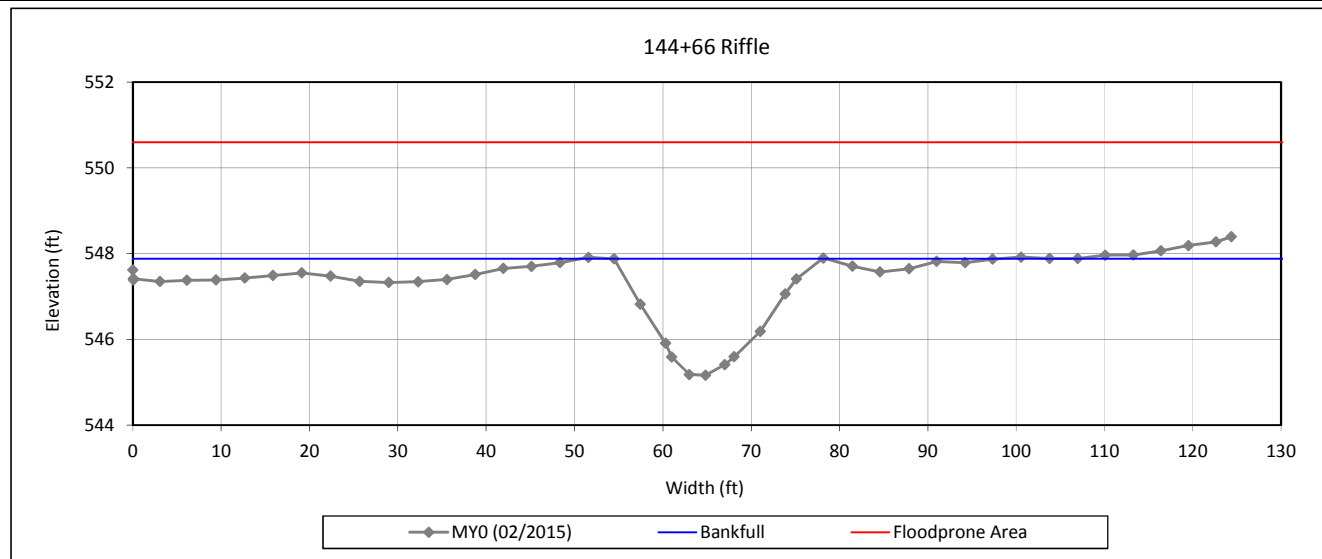
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### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 8- Foust Creek Reach 3B



#### Bankfull Dimensions

36.5	x-section area (ft.sq.)
23.6	width (ft)
1.5	mean depth (ft)
2.7	max depth (ft)
24.3	wetted perimeter (ft)
1.5	hyd radi (ft)
15.2	width-depth ratio
150.0	W flood prone area (ft)
6.4	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2015

Field Crew: Turner Land Surveying



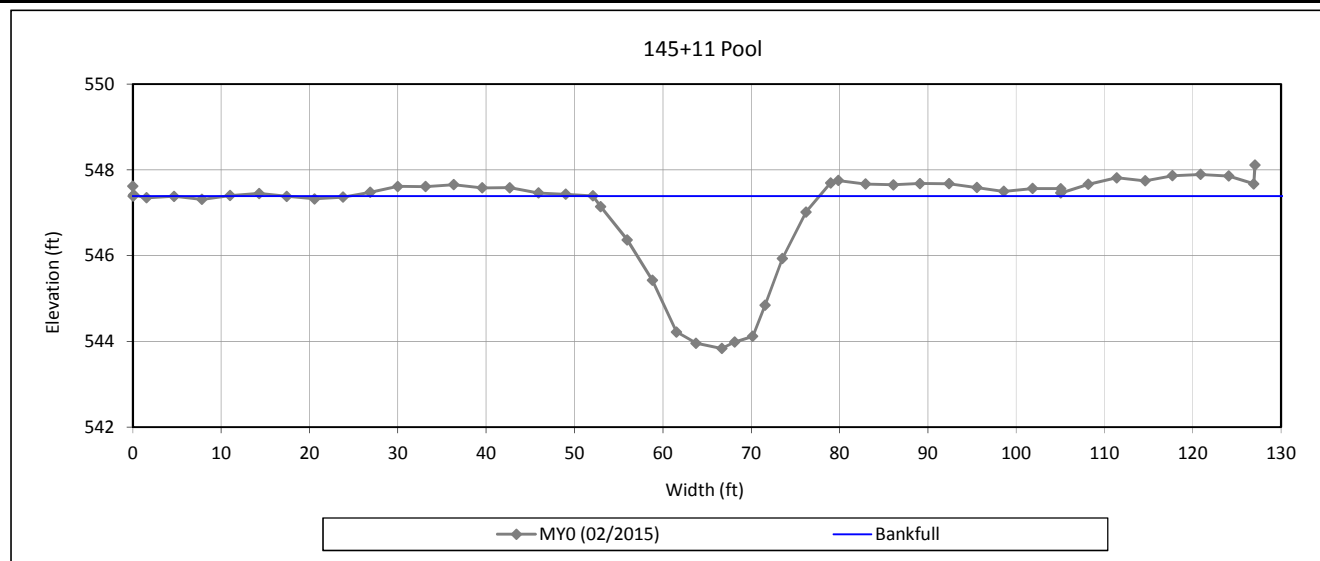
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### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 9- Foust Creek Reach 3B



#### Bankfull Dimensions

53.5	x-section area (ft.sq.)
25.6	width (ft)
2.1	mean depth (ft)
3.6	max depth (ft)
26.9	wetted parimeter (ft)
2.0	hyd radi (ft)
12.3	width-depth ratio

Survey Date: 2/2015  
Field Crew: Turner Land Surveying



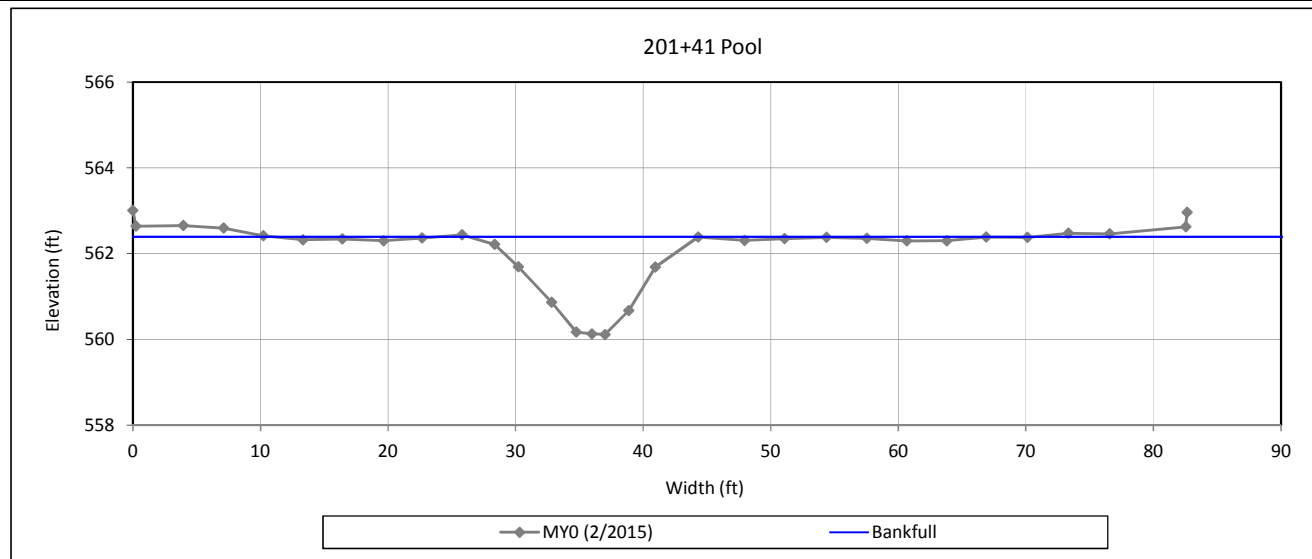
View Downstream

### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 10-UT1



#### Bankfull Dimensions

20.0	x-section area (ft.sq.)
18.0	width (ft)
1.1	mean depth (ft)
2.3	max depth (ft)
18.7	wetted perimeter (ft)
1.1	hyd radi (ft)
16.2	width-depth ratio

Survey Date: 2/2014  
Field Crew: Turner Land Surveying



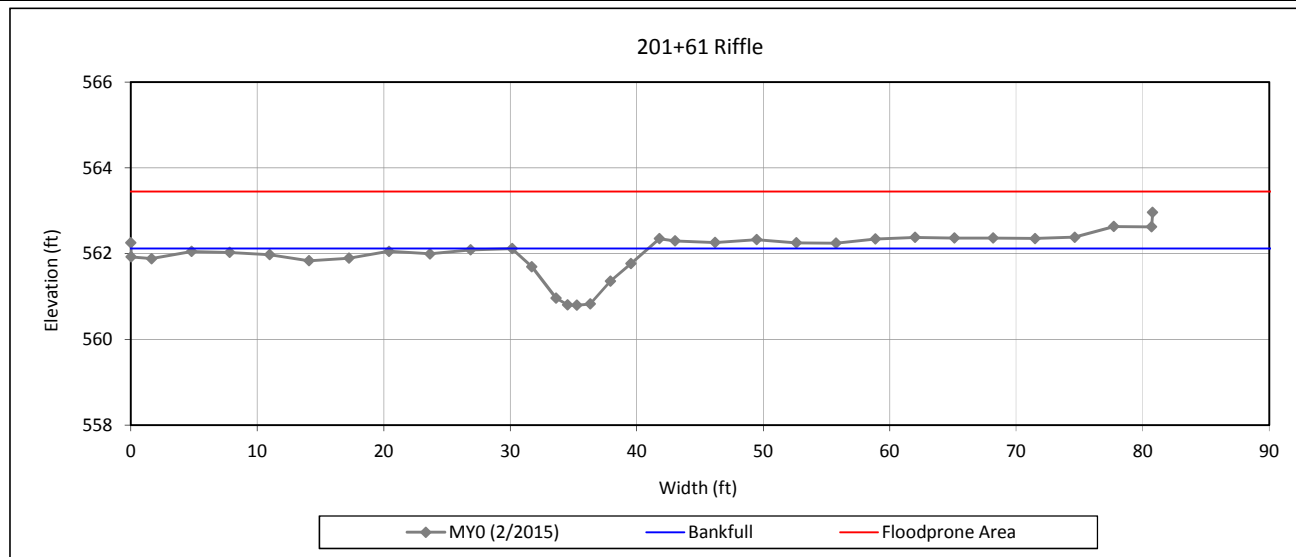
View Downstream

### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 11-UT1



#### Bankfull Dimensions

8.1	x-section area (ft.sq.)
10.8	width (ft)
0.8	mean depth (ft)
1.3	max depth (ft)
11.1	wetted perimeter (ft)
0.7	hyd radi (ft)
14.2	width-depth ratio
150.0	W flood prone area (ft)
13.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2014

Field Crew: Turner Land Surveying



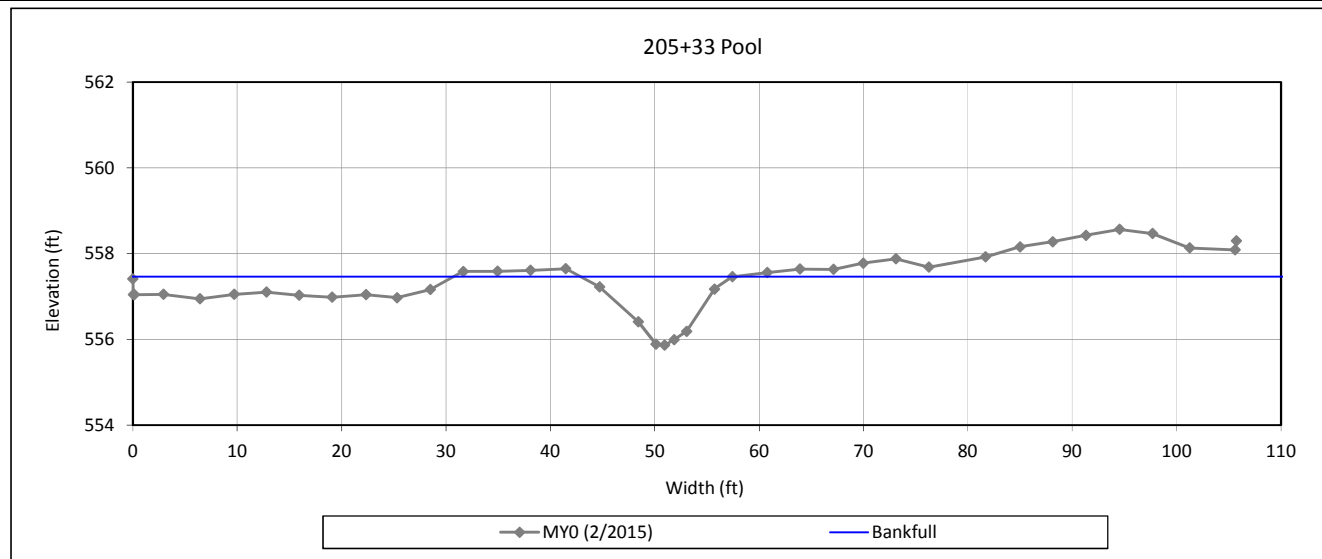
View Downstream

### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 12-UT1



#### Bankfull Dimensions

11.5	x-section area (ft.sq.)
14.5	width (ft)
0.8	mean depth (ft)
1.6	max depth (ft)
15.0	wetted parimeter (ft)
0.8	hyd radi (ft)
18.4	width-depth ratio

Survey Date: 2/2014  
Field Crew: Turner Land Surveying



View Downstream

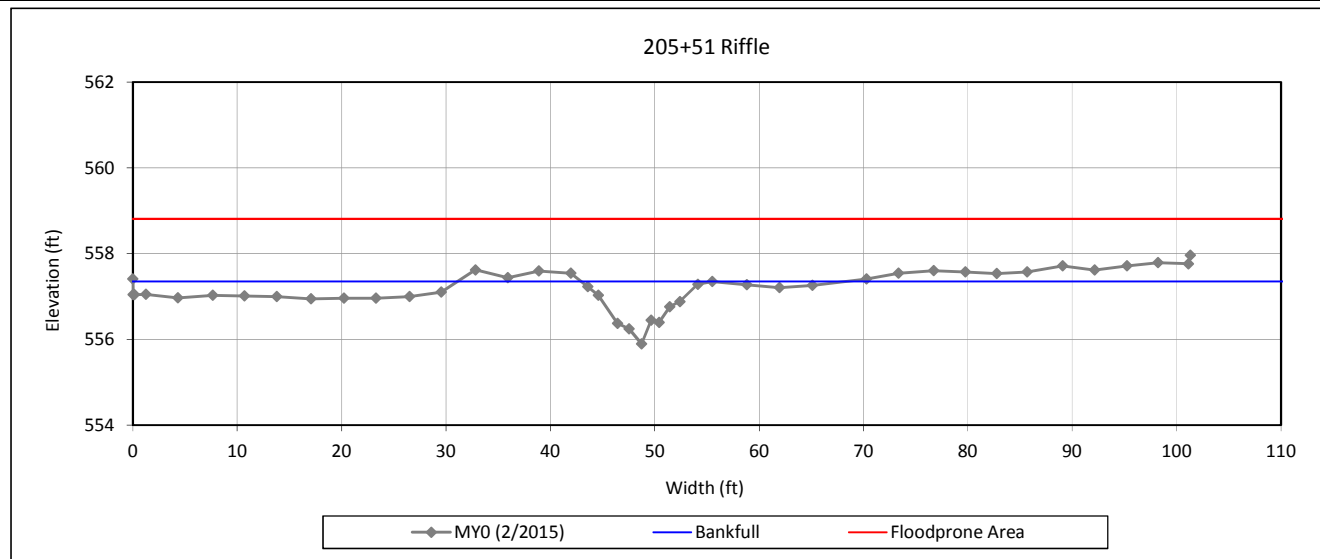


### Cross Section Plots

Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

#### Cross Section 13-UT1



#### Bankfull Dimensions

7.7	x-section area (ft.sq.)
12.6	width (ft)
0.6	mean depth (ft)
1.5	max depth (ft)
13.0	wetted parimeter (ft)
0.6	hyd radi (ft)
20.4	width-depth ratio
150.0	W flood prone area (ft)
11.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 2/2014

Field Crew: Turner Land Surveying



View Downstream

**Reachwide and Cross Section Pebble Count Plots**

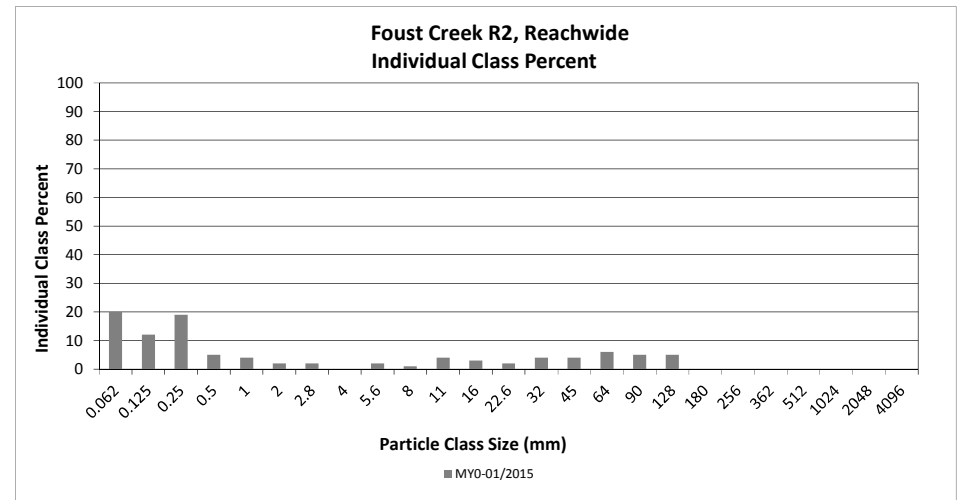
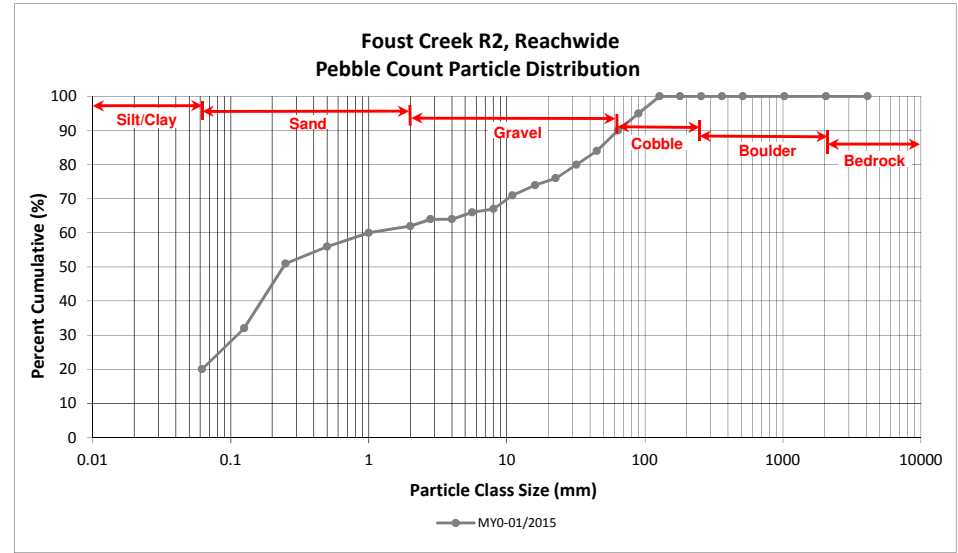
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek R2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062		20	20	20	20
<b>SAND</b>	Very fine	0.062	0.125	2	10	12	12	32
	Fine	0.125	0.250	4	15	19	19	51
	Medium	0.25	0.50		5	5	5	56
	Coarse	0.5	1.0	1	3	4	4	60
	Very Coarse	1.0	2.0		2	2	2	62
<b>GRAVEL</b>	Very Fine	2.0	2.8		2	2	2	64
	Very Fine	2.8	4.0					64
	Fine	4.0	5.6		2	2	2	66
	Fine	5.6	8.0	1		1	1	67
	Medium	8.0	11.0	3	1	4	4	71
	Medium	11.0	16.0	3		3	3	74
	Coarse	16.0	22.6	2		2	2	76
	Coarse	22.6	32	4		4	4	80
	Very Coarse	32	45	4		4	4	84
	Very Coarse	45	64	6		6	6	90
<b>COBBLE</b>	Small	64	90	5		5	5	95
	Small	90	128	5		5	5	100
	Large	128	180					100
	Large	180	256					100
<b>BOULDER</b>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>40</b>	<b>60</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	Silt/Clay
D <sub>35</sub> =	0.14
D <sub>50</sub> =	0.2
D <sub>84</sub> =	45.0
D <sub>95</sub> =	90.0
D <sub>100</sub> =	128.0



**Reachwide and Cross Section Pebble Count Plots**

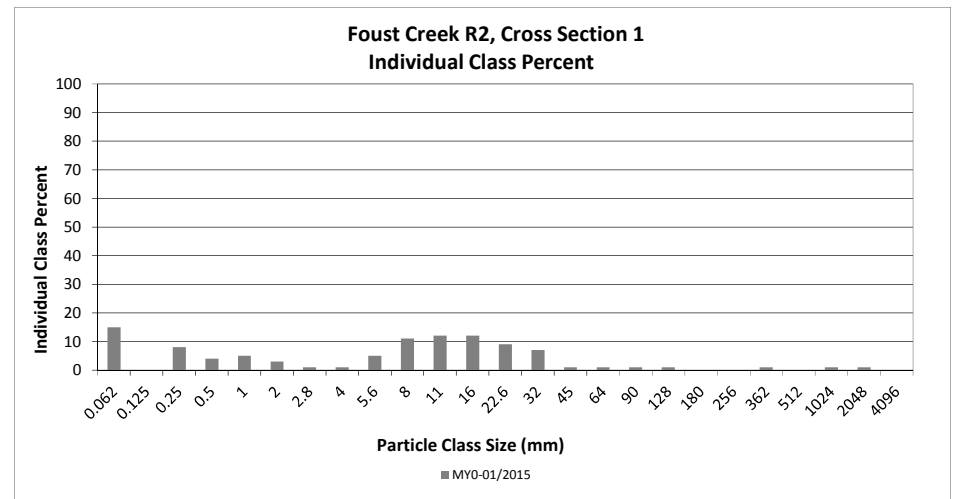
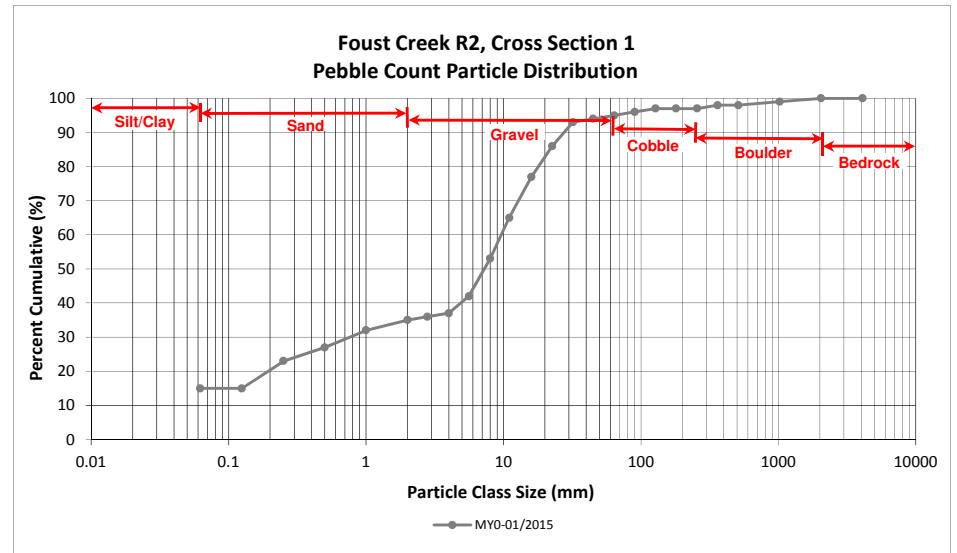
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek R2, Cross Section 1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062	15	15	15
<b>SAND</b>	Very fine	0.062	0.125			15
	Fine	0.125	0.250	8	8	23
	Medium	0.25	0.50	4	4	27
	Coarse	0.5	1.0	5	5	32
	Very Coarse	1.0	2.0	3	3	35
<b>GRAVEL</b>	Very Fine	2.0	2.8	1	1	36
	Very Fine	2.8	4.0	1	1	37
	Fine	4.0	5.6	5	5	42
	Fine	5.6	8.0	11	11	53
	Medium	8.0	11.0	12	12	65
	Medium	11.0	16.0	12	12	77
	Coarse	16.0	22.6	9	9	86
	Coarse	22.6	32	7	7	93
	Very Coarse	32	45	1	1	94
	Very Coarse	45	64	1	1	95
<b>COBBLE</b>	Small	64	90	1	1	96
	Small	90	128	1	1	97
	Large	128	180			97
	Large	180	256			97
<b>BOULDER</b>	Small	256	362	1	1	98
	Small	362	512			98
	Medium	512	1024	1	1	99
	Large/Very Large	1024	2048	1	1	100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 1	
Channel materials (mm)	
D <sub>16</sub> =	0.14
D <sub>35</sub> =	2.00
D <sub>50</sub> =	7.3
D <sub>84</sub> =	20.9
D <sub>95</sub> =	64.0
D <sub>100</sub> =	2048.0



**Reachwide and Cross Section Pebble Count Plots**

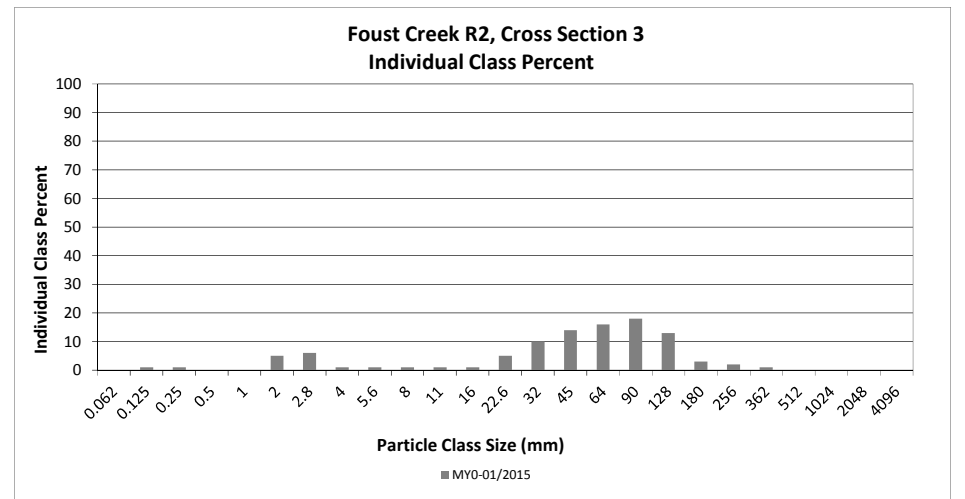
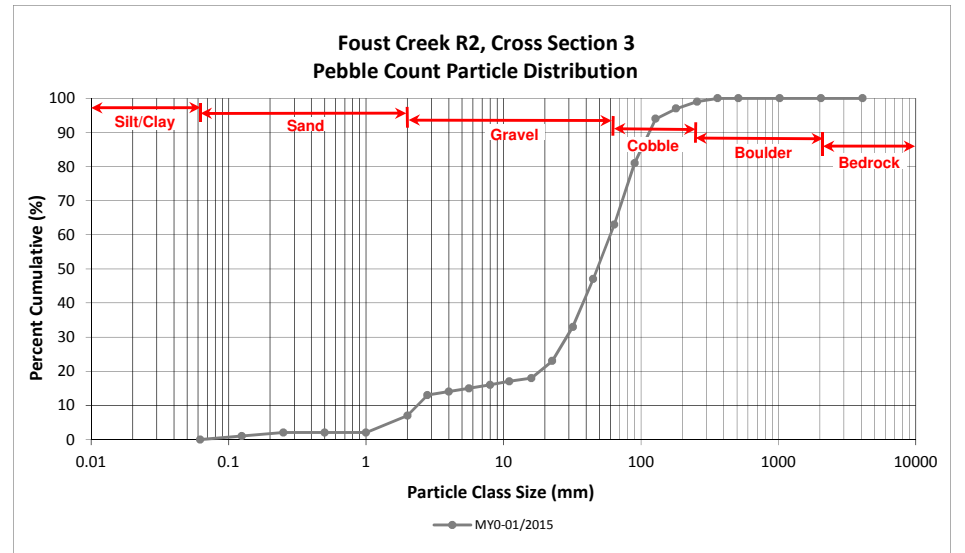
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek R2, Cross Section 3

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	Very fine	0.062	0.125	1	1	1
	Fine	0.125	0.250	1	1	2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0			2
	Very Coarse	1.0	2.0	5	5	7
<b>GRAVEL</b>	Very Fine	2.0	2.8	6	6	13
	Very Fine	2.8	4.0	1	1	14
	Fine	4.0	5.6	1	1	15
	Fine	5.6	8.0	1	1	16
	Medium	8.0	11.0	1	1	17
	Medium	11.0	16.0	1	1	18
	Coarse	16.0	22.6	5	5	23
	Coarse	22.6	32	10	10	33
	Very Coarse	32	45	14	14	47
	Very Coarse	45	64	16	16	63
	<b>COBBLE</b>	Small	64	90	18	18
Small		90	128	13	13	94
Large		128	180	3	3	97
Large		180	256	2	2	99
<b>BOULDER</b>	Small	256	362	1	1	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 3	
Channel materials (mm)	
D <sub>16</sub> =	8.00
D <sub>35</sub> =	33.60
D <sub>50</sub> =	48.1
D <sub>84</sub> =	97.6
D <sub>95</sub> =	143.4
D <sub>100</sub> =	362.0





**Reachwide and Cross Section Pebble Count Plots**

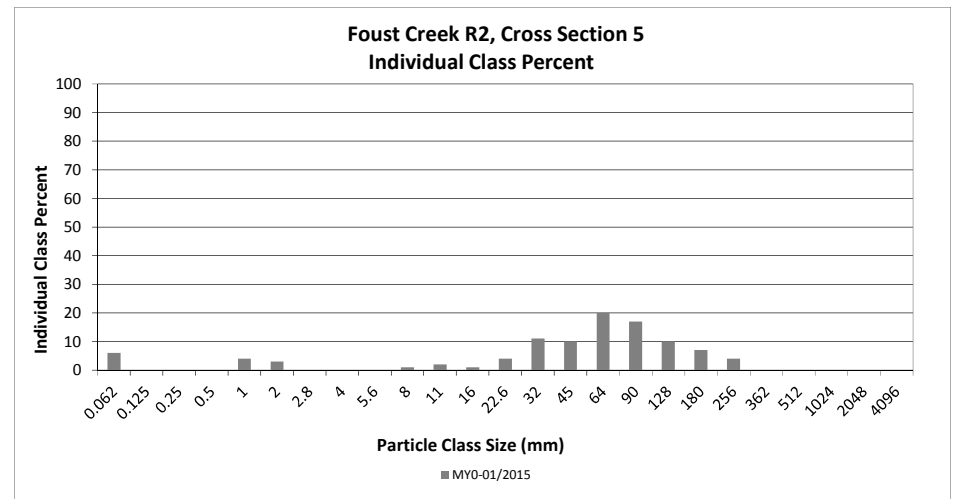
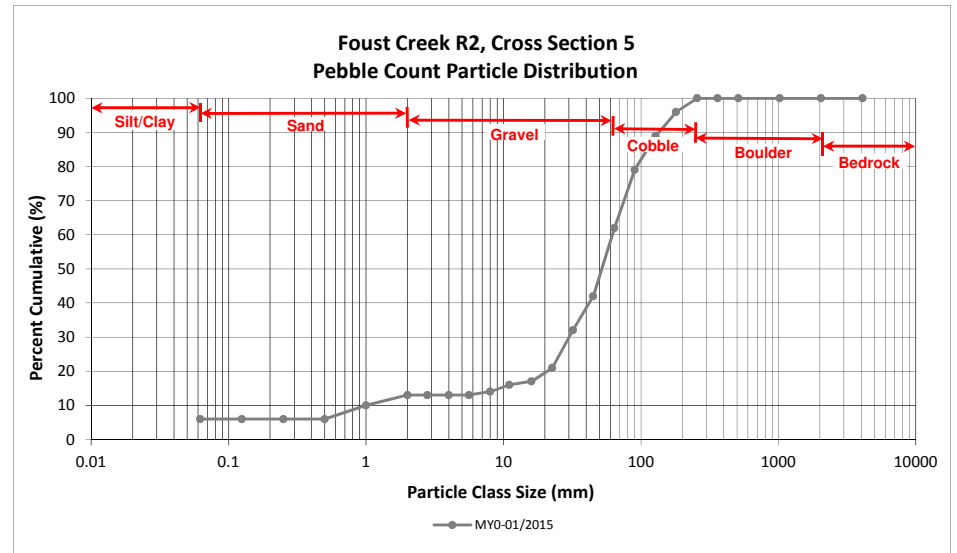
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek R2, Cross Section 5

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062	6	6	6
<b>SAND</b>	Very fine	0.062	0.125			6
	Fine	0.125	0.250			6
	Medium	0.25	0.50			6
	Coarse	0.5	1.0	4	4	10
	Very Coarse	1.0	2.0	3	3	13
<b>GRAVEL</b>	Very Fine	2.0	2.8			13
	Very Fine	2.8	4.0			13
	Fine	4.0	5.6			13
	Fine	5.6	8.0	1	1	14
	Medium	8.0	11.0	2	2	16
	Medium	11.0	16.0	1	1	17
	Coarse	16.0	22.6	4	4	21
	Coarse	22.6	32	11	11	32
	Very Coarse	32	45	10	10	42
	Very Coarse	45	64	20	20	62
<b>COBBLE</b>	Small	64	90	17	17	79
	Small	90	128	10	10	89
	Large	128	180	7	7	96
	Large	180	256	4	4	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 5	
Channel materials (mm)	
D <sub>16</sub> =	11.00
D <sub>35</sub> =	35.45
D <sub>50</sub> =	51.8
D <sub>84</sub> =	107.3
D <sub>95</sub> =	171.4
D <sub>100</sub> =	256.0



**Reachwide and Cross Section Pebble Count Plots**

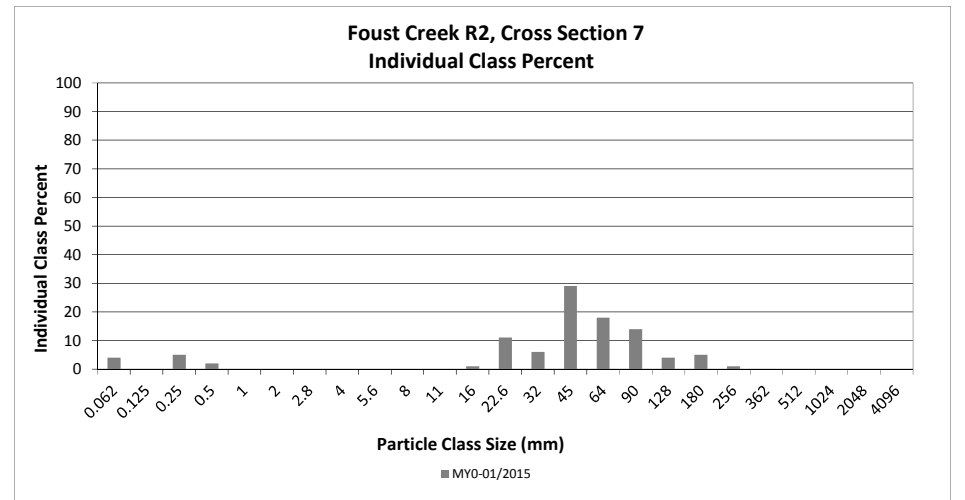
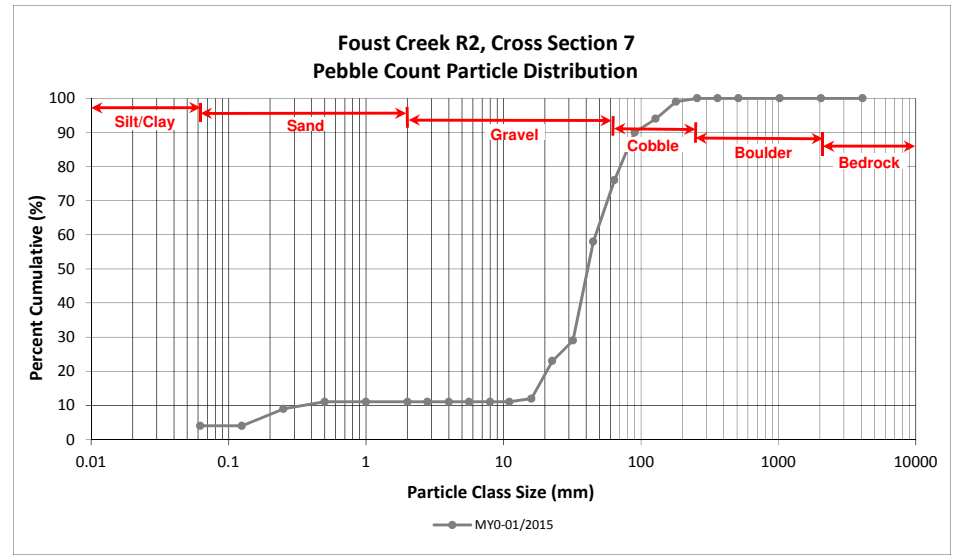
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek R2, Cross Section 7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062	4	4	4
<b>SAND</b>	Very fine	0.062	0.125			4
	Fine	0.125	0.250	5	5	9
	Medium	0.25	0.50	2	2	11
	Coarse	0.5	1.0			11
	Very Coarse	1.0	2.0			11
<b>GRAVEL</b>	Very Fine	2.0	2.8			11
	Very Fine	2.8	4.0			11
	Fine	4.0	5.6			11
	Fine	5.6	8.0			11
	Medium	8.0	11.0			11
	Medium	11.0	16.0	1	1	12
	Coarse	16.0	22.6	11	11	23
	Coarse	22.6	32	6	6	29
	Very Coarse	32	45	29	29	58
	Very Coarse	45	64	18	18	76
<b>COBBLE</b>	Small	64	90	14	14	90
	Small	90	128	4	4	94
	Large	128	180	5	5	99
	Large	180	256	1	1	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 7	
Channel materials (mm)	
D <sub>16</sub> =	18.14
D <sub>35</sub> =	34.34
D <sub>50</sub> =	41.0
D <sub>84</sub> =	77.8
D <sub>95</sub> =	137.0
D <sub>100</sub> =	256.0



**Reachwide and Cross Section Pebble Count Plots**

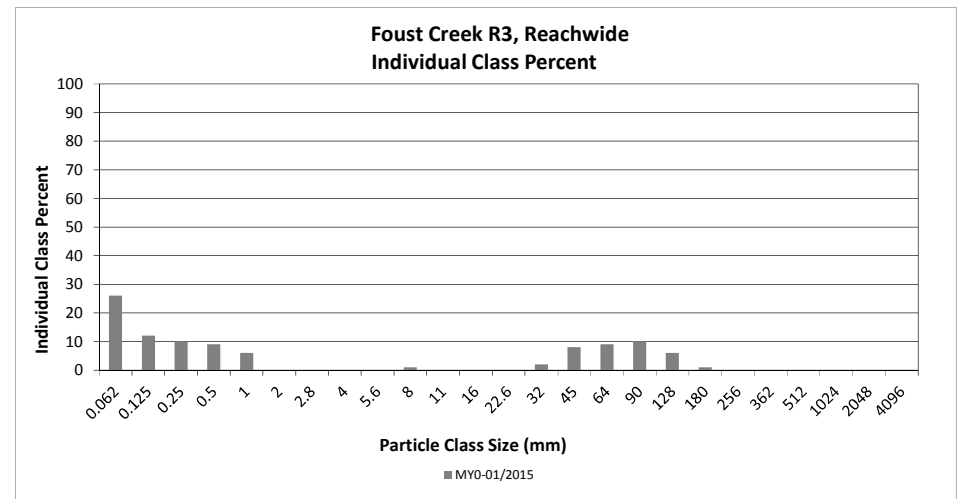
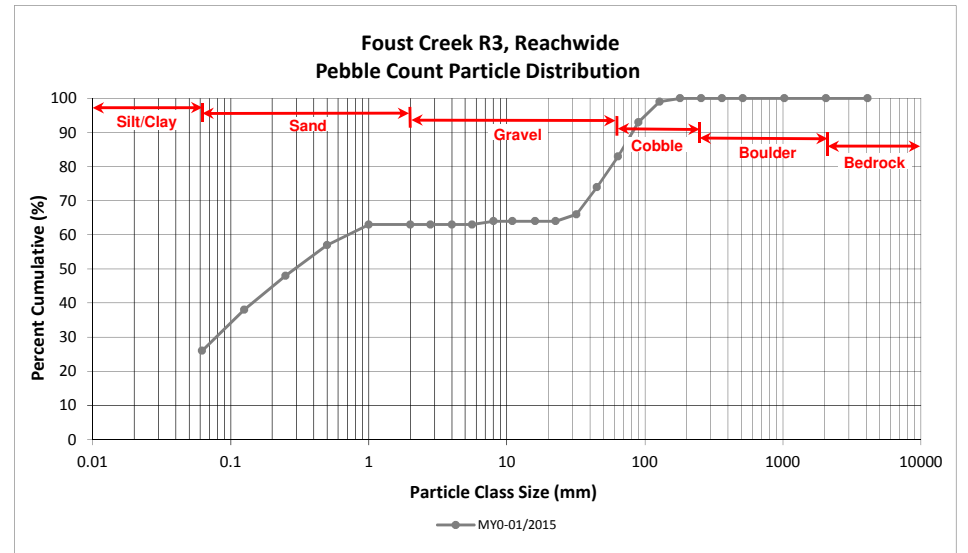
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

Foust Creek R3, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062	3	23	26	26	26
<b>SAND</b>	Very fine	0.062	0.125		12	12	12	38
	Fine	0.125	0.250		10	10	10	48
	Medium	0.25	0.50		9	9	9	57
	Coarse	0.5	1.0		6	6	6	63
	Very Coarse	1.0	2.0					63
<b>GRAVEL</b>	Very Fine	2.0	2.8					63
	Very Fine	2.8	4.0					63
	Fine	4.0	5.6					63
	Fine	5.6	8.0	1		1	1	64
	Medium	8.0	11.0					64
	Medium	11.0	16.0					64
	Coarse	16.0	22.6					64
	Coarse	22.6	32	2		2	2	66
	Very Coarse	32	45	8		8	8	74
	Very Coarse	45	64	9		9	9	83
<b>COBBLE</b>	Small	64	90	10		10	10	93
	Small	90	128	6		6	6	99
	Large	128	180	1		1	1	100
	Large	180	256					100
<b>BOULDER</b>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>40</b>	<b>60</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	Silt/Clay
D <sub>35</sub> =	0.10
D <sub>50</sub> =	0.3
D <sub>84</sub> =	66.2
D <sub>95</sub> =	101.2
D <sub>100</sub> =	180.0



**Reachwide and Cross Section Pebble Count Plots**

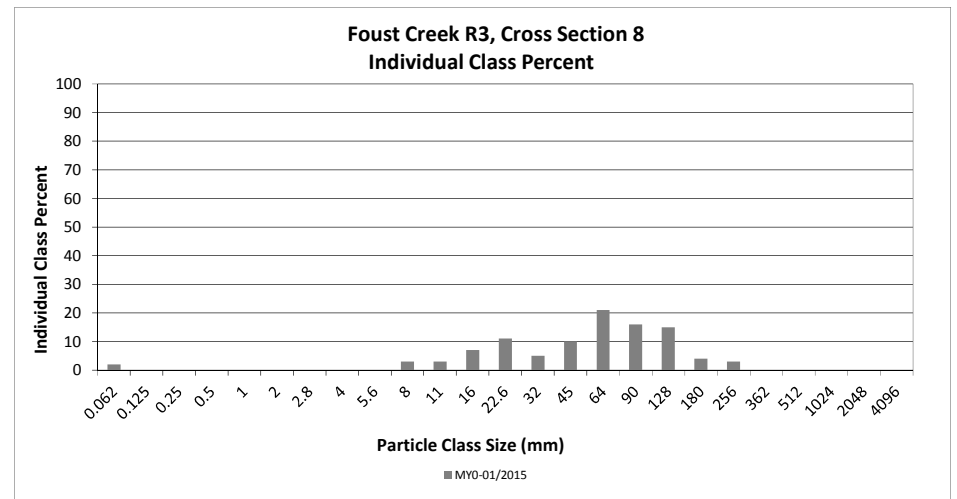
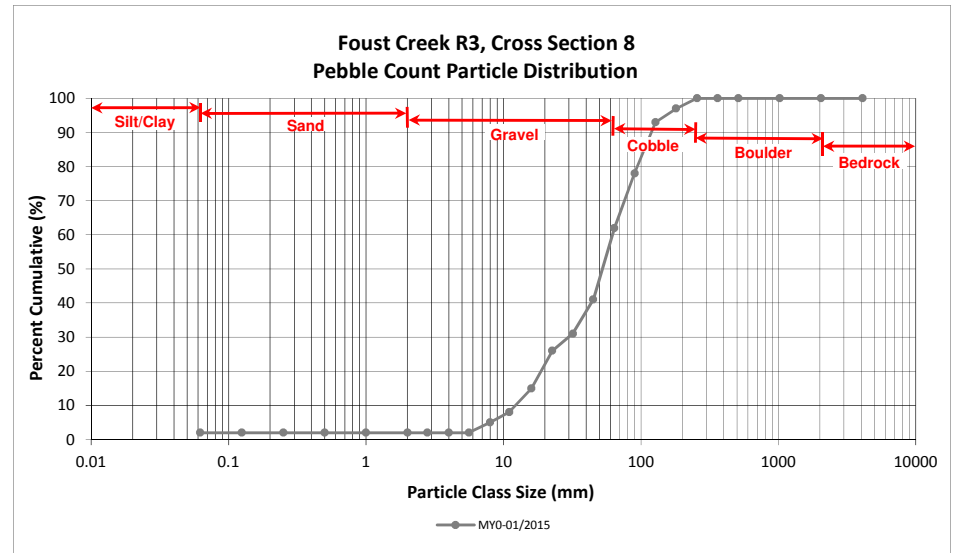
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

**Foust Creek R3, Cross Section 8**

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062	2	2	2
<b>SAND</b>	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0			2
	Very Coarse	1.0	2.0			2
<b>GRAVEL</b>	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.6			2
	Fine	5.6	8.0	3	3	5
	Medium	8.0	11.0	3	3	8
	Medium	11.0	16.0	7	7	15
	Coarse	16.0	22.6	11	11	26
	Coarse	22.6	32	5	5	31
	Very Coarse	32	45	10	10	41
	Very Coarse	45	64	21	21	62
<b>COBBLE</b>	Small	64	90	16	16	78
	Small	90	128	15	15	93
	Large	128	180	4	4	97
	Large	180	256	3	3	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 8	
Channel materials (mm)	
D <sub>16</sub> =	16.51
D <sub>35</sub> =	36.68
D <sub>50</sub> =	52.3
D <sub>84</sub> =	103.6
D <sub>95</sub> =	151.8
D <sub>100</sub> =	256.0





**Reachwide and Cross Section Pebble Count Plots**

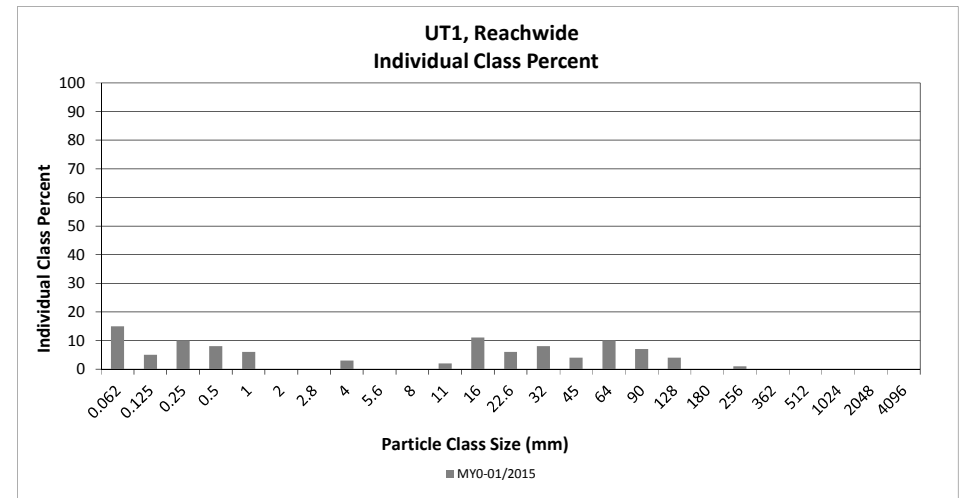
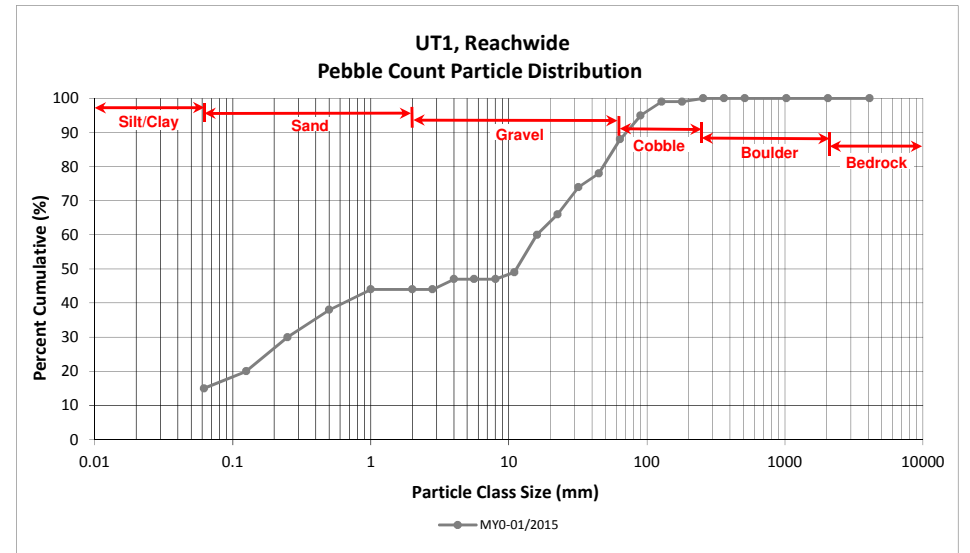
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

UT1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062	3	12	15	15	15
<b>SAND</b>	Very fine	0.062	0.125	1	4	5	5	20
	Fine	0.125	0.250	1	9	10	10	30
	Medium	0.25	0.50		8	8	8	38
	Coarse	0.5	1.0	1	5	6	6	44
	Very Coarse	1.0	2.0					44
<b>GRAVEL</b>	Very Fine	2.0	2.8					44
	Very Fine	2.8	4.0		3	3	3	47
	Fine	4.0	5.6					47
	Fine	5.6	8.0					47
	Medium	8.0	11.0		2	2	2	49
	Medium	11.0	16.0	7	4	11	11	60
	Coarse	16.0	22.6	5	1	6	6	66
	Coarse	22.6	32	7	1	8	8	74
	Very Coarse	32	45	4		4	4	78
	Very Coarse	45	64	9	1	10	10	88
<b>COBBLE</b>	Small	64	90	7		7	7	95
	Small	90	128	4		4	4	99
	Large	128	180					99
	Large	180	256	1		1	1	100
<b>BOULDER</b>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	0.07
D <sub>35</sub> =	0.39
D <sub>50</sub> =	11.4
D <sub>84</sub> =	55.6
D <sub>95</sub> =	90.0
D <sub>100</sub> =	256.0



**Reachwide and Cross Section Pebble Count Plots**

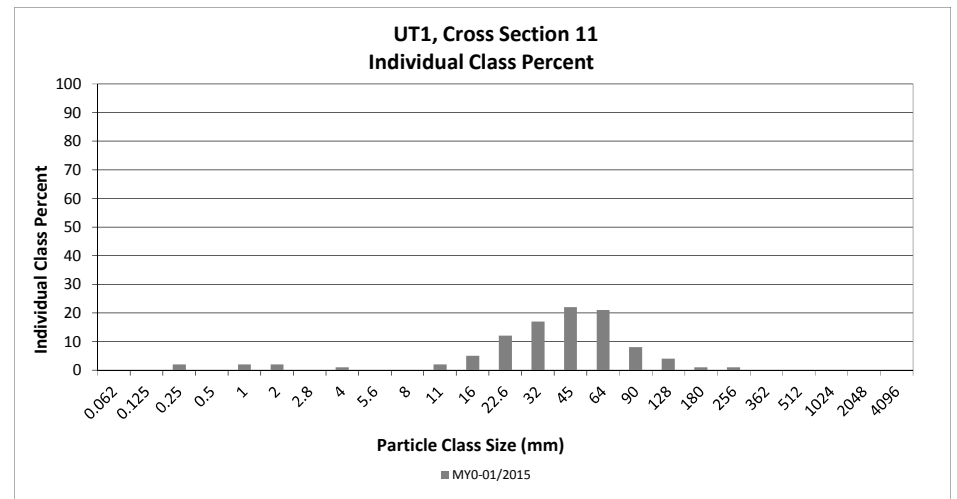
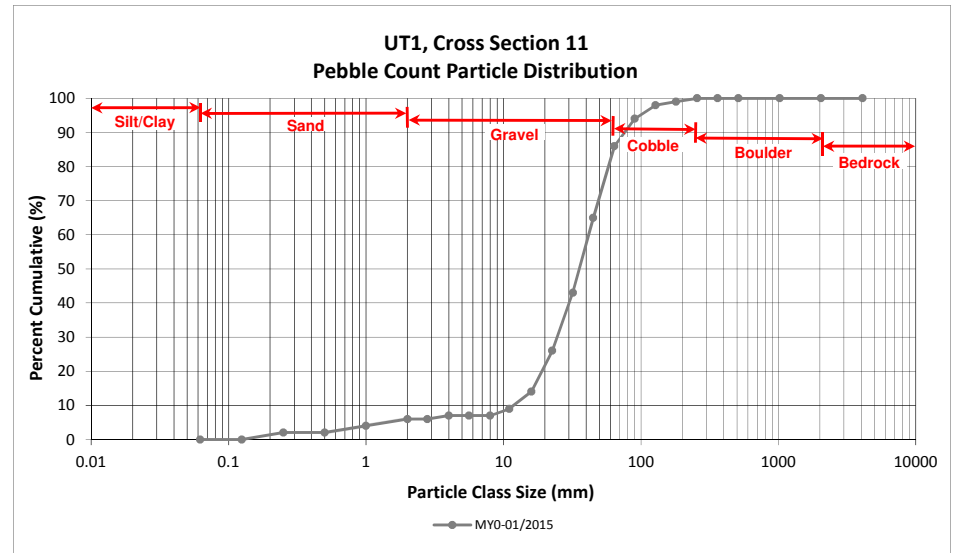
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

UT1, Cross Section 11

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	Very fine	0.062	0.125			0
	Fine	0.125	0.250	2	2	2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0	2	2	4
	Very Coarse	1.0	2.0	2	2	6
<b>GRAVEL</b>	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0	1	1	7
	Fine	4.0	5.6			7
	Fine	5.6	8.0			7
	Medium	8.0	11.0	2	2	9
	Medium	11.0	16.0	5	5	14
	Coarse	16.0	22.6	12	12	26
	Coarse	22.6	32	17	17	43
	Very Coarse	32	45	22	22	65
	Very Coarse	45	64	21	21	86
<b>COBBLE</b>	Small	64	90	8	8	94
	Small	90	128	4	4	98
	Large	128	180	1	1	99
	Large	180	256	1	1	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 11	
Channel materials (mm)	
D <sub>16</sub> =	16.95
D <sub>35</sub> =	27.17
D <sub>50</sub> =	35.7
D <sub>84</sub> =	61.9
D <sub>95</sub> =	98.3
D <sub>100</sub> =	256.0



**Reachwide and Cross Section Pebble Count Plots**

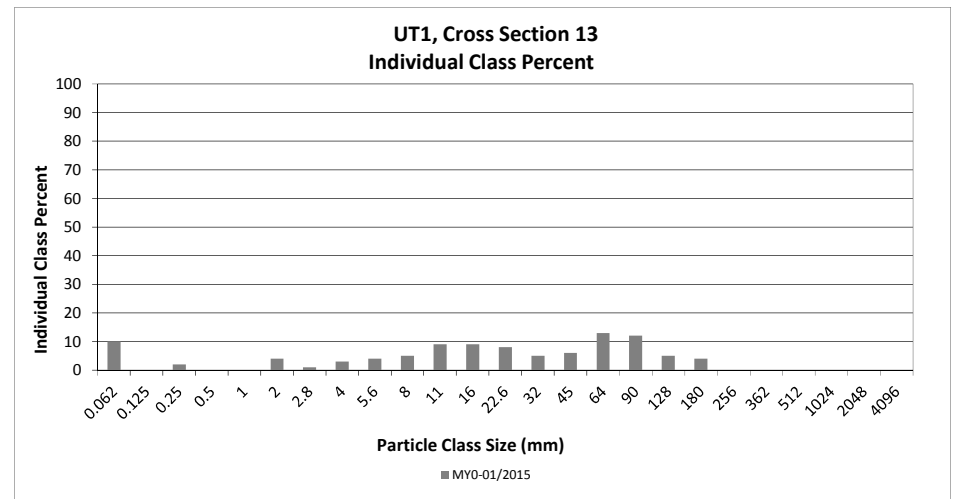
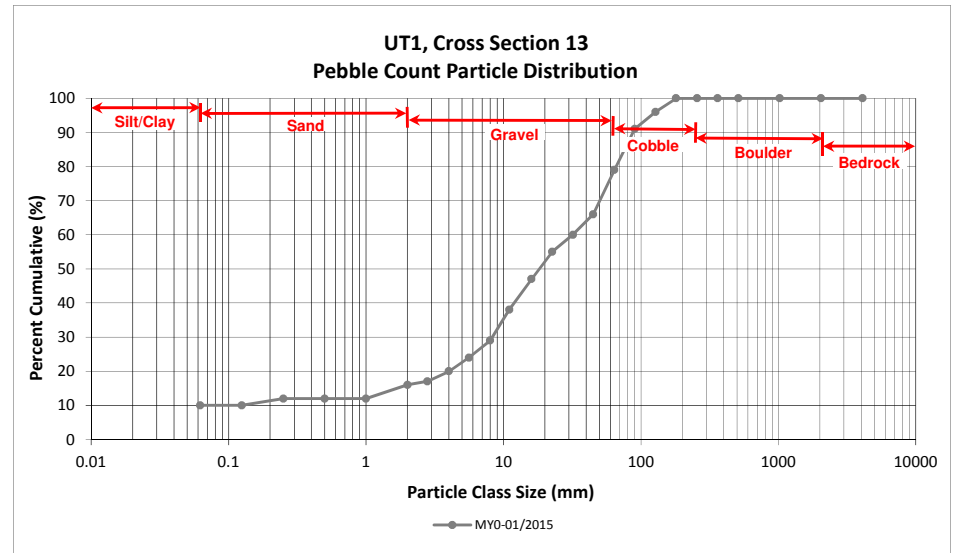
Foust Creek Mitigation Site (NCDMS Project No. 95715)

Monitoring Year 0 - 2015

UT1, Cross Section 13

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062	10	10	10
<b>SAND</b>	Very fine	0.062	0.125			10
	Fine	0.125	0.250	2	2	12
	Medium	0.25	0.50			12
	Coarse	0.5	1.0			12
	Very Coarse	1.0	2.0	4	4	16
<b>GRAVEL</b>	Very Fine	2.0	2.8	1	1	17
	Very Fine	2.8	4.0	3	3	20
	Fine	4.0	5.6	4	4	24
	Fine	5.6	8.0	5	5	29
	Medium	8.0	11.0	9	9	38
	Medium	11.0	16.0	9	9	47
	Coarse	16.0	22.6	8	8	55
	Coarse	22.6	32	5	5	60
	Very Coarse	32	45	6	6	66
	Very Coarse	45	64	13	13	79
<b>COBBLE</b>	Small	64	90	12	12	91
	Small	90	128	5	5	96
	Large	128	180	4	4	100
	Large	180	256			100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross Section 13	
Channel materials (mm)	
D <sub>16</sub> =	2.00
D <sub>35</sub> =	9.89
D <sub>50</sub> =	18.2
D <sub>84</sub> =	73.8
D <sub>95</sub> =	119.3
D <sub>100</sub> =	180.0



**STREAM PHOTOGRAPHS**  
**Foust Creek**





**PHOTO POINT 1** – looking downstream (03/12/2015)



**PHOTO POINT 2** – looking upstream (02/12/2015)



**PHOTO POINT 2** – looking downstream (02/12/2015)



**PHOTO POINT 3** – looking upstream (02/12/2015)



**PHOTO POINT 3** – looking downstream (02/12/2015)







**PHOTO POINT 4 – looking upstream (02/12/2015)**



**PHOTO POINT 4 – looking downstream (02/12/2015)**



**PHOTO POINT 5 – looking upstream (02/12/2015)**



**PHOTO POINT 5 – looking downstream (02/12/2015)**



**PHOTO POINT 6 – looking upstream (02/12/2015)**



**PHOTO POINT 6 – looking downstream (02/12/2015)**







PHOTO POINT 7 – looking upstream (02/12/2015)



PHOTO POINT 7 – looking downstream (02/12/2015)



PHOTO POINT 8 – looking upstream (02/12/2015)



PHOTO POINT 8 – looking downstream (02/12/2015)



PHOTO POINT 9 – looking upstream (03/12/2015)



PHOTO POINT 9 – looking downstream (03/12/2015)







**PHOTO POINT 10 – looking upstream (02/12/2015)**



**PHOTO POINT 10 – looking downstream (02/12/2015)**



**PHOTO POINT 11 – looking upstream (02/12/2015)**



**PHOTO POINT 11 – looking downstream (02/12/2015)**



**PHOTO POINT 12 – looking upstream (02/12/2015)**



**PHOTO POINT 12 – looking downstream (02/12/2015)**







**PHOTO POINT 13 – looking upstream (02/12/2015)**



**PHOTO POINT 13 – looking downstream (02/12/2015)**



**PHOTO POINT 14 – looking upstream (02/12/2015)**



**PHOTO POINT 14 – looking downstream (02/12/2015)**



**PHOTO POINT 15 – looking upstream (02/12/2015)**



**PHOTO POINT 15 – looking downstream (02/12/2015)**







**PHOTO POINT 16 – looking upstream (02/12/2015)**



**PHOTO POINT 16 – looking downstream (02/12/2015)**



**PHOTO POINT17 – looking upstream (02/12/2015)**



**PHOTO POINT 17 – looking downstream (02/12/2015)**



**PHOTO POINT 18 – looking upstream (02/12/2015)**



**PHOTO POINT 18 – looking downstream (02/12/2015)**







**PHOTO POINT 19 – looking upstream (02/12/2015)**



**PHOTO POINT 19 – looking downstream (02/12/2015)**



**PHOTO POINT 20 – looking upstream (02/12/2015)**



**PHOTO POINT 20 – looking downstream (02/12/2015)**



**PHOTO POINT 21 – looking upstream (02/12/2015)**



**PHOTO POINT 21 – looking downstream (02/12/2015)**







**PHOTO POINT 22 – looking upstream (03/12/2015)**



**PHOTO POINT 23 – looking downstream (03/12/2015)**



**PHOTO POINT 24 – looking upstream (02/12/2015)**



**PHOTO POINT 24 – looking downstream (02/12/2015)**



**PHOTO POINT 25 – looking upstream (02/12/2015)**



**PHOTO POINT 25 – looking downstream (02/12/2015)**







**PHOTO POINT 26 – looking upstream (02/12/2015)**



**PHOTO POINT 26 – looking downstream (02/12/2015)**



**PHOTO POINT 27 – looking upstream (02/12/2015)**



**PHOTO POINT 27 – looking downstream (02/12/2015)**



**PHOTO POINT 28 – looking upstream (02/12/2015)**



**PHOTO POINT 28 – looking downstream (02/12/2015)**







PHOTO POINT 29 – looking upstream (02/12/2015)



PHOTO POINT 29 – looking downstream (02/12/2015)



PHOTO POINT 30 – looking downstream (02/12/2015)



PHOTO POINT 31 – looking upstream (02/12/2015)



PHOTO POINT 31 – looking downstream (02/12/2015)







**PHOTO POINT 32 – looking upstream (02/12/2015)**



**PHOTO POINT 32 – looking downstream (02/12/2015)**



**PHOTO POINT 33 – looking upstream (02/12/2015)**



**PHOTO POINT 33 – looking downstream (02/12/2015)**



**PHOTO POINT 34 – looking upstream (02/12/2015)**



**PHOTO POINT 34 – looking downstream (02/12/2015)**







**PHOTO POINT 35 – looking upstream (02/12/2015)**



**PHOTO POINT 35 – looking downstream (02/12/2015)**



### **APPENDIX 3. Vegetation Plot Data**



**Table 7. Planted and Total Stem Counts**

Foust Creek Mitigation Site (NCDMS Project No.95715)

Monitoring Year 0 -2015

		Current Plot Data (MYO 2015)																		
Scientific Name	Common Name	Species Type	95715-WEI-0001			95715-WEI-0002			95715-WEI-0003			95715-WEI-0004			95715-WEI-0005			95715-WEI-0006		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Alnus serrulata	tag alder	Shrub													1	1	1	2	2	2
Betula nigra	river birch	Tree				2	2	2	5	5	5	2	2	2				5	5	5
Cornus amomum	silky dogwood	Shrub													1	1	1			
Fraxinus pennsylvanica	green ash	Tree				1	1	1				2	2	2	7	7	7	6	6	6
Liriodendron tulipifera	tuliptree	Tree										5	5	5						
Nyssa sylvatica	blackgum	Tree													2	2	2	2	2	2
Platanus occidentalis	American sycamore	Tree							2	2	2									
Quercus michauxii	swamp chestnut oak	Tree	10	10	10	3	3	3	2	2	2	5	5	5	3	3	3			
Quercus phellos	willow oak	Tree	6	6	6	4	4	4	3	3	3				2	2	2	1	1	1
Quercus rubra	northern red oak	Tree				6	6	6	4	4	4	2	2	2						
<b>Stem count</b>			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
<b>size (ares)</b>			1			1			1			1			1			1		
<b>size (ACRES)</b>			0.02			0.02			0.02			0.02			0.02			0.02		
<b>Species count</b>			2	2	2	5	5	5	5	5	5	5	5	5	6	6	6	5	5	5
<b>Stems per ACRE</b>			647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5

**Color Coding for Table**

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

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

**Table 7. Planted and Total Stem Counts**

Foust Creek Mitigation Site (NCDMS Project No.95715)

Monitoring Year 0 -2015

		Current Plot Data (MY0 2015)																					
Scientific Name	Common Name	Species Type	95715-WEI-0007			95715-WEI-0008			95715-WEI-0009			95715-WEI-0010			95715-WEI-0011			95715-WEI-0012					
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
Alnus serrulata	tag alder	Shrub	1	1	1	1	1	1				1	1	1									
Betula nigra	river birch	Tree	3	3	3	2	2	2	5	5	5	1	1	1	2	2	2	3	3	3			
Cornus amomum	silky dogwood	Shrub	5	5	5	3	3	3				6	6	6									
Fraxinus pennsylvanica	green ash	Tree	2	2	2	1	1	1							4	4	4	2	2	2			
Liriodendron tulipifera	tuliptree	Tree													4	4	4	3	3	3			
Nyssa sylvatica	blackgum	Tree	1	1	1	2	2	2				2	2	2									
Platanus occidentalis	American sycamore	Tree													5	5	5	7	7	7			
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	5	5	5	3	3	3	2	2	2									
Quercus phellos	willow oak	Tree	2	2	2	2	2	2	4	4	4	4	4	4									
Quercus rubra	northern red oak	Tree							4	4	4				1	1	1	1	1	1			
<b>Stem count</b>			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
<b>size (ares)</b>			1			1			1			1			1			1					
<b>size (ACRES)</b>			0.02			0.02			0.02			0.02			0.02			0.02					
<b>Species count</b>			7	7	7	7	7	7	4	4	4	6	6	6	5	5	5	5	5	5	5	5	5
<b>Stems per ACRE</b>			647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5

**Color Coding for Table**

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

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

**Table 7. Planted and Total Stem Counts**

Foust Creek Mitigation Site (NCDMS Project No.95715)

Monitoring Year 0 -2015

Scientific Name	Common Name	Species Type	Current Plot Data (MY0 2015)															Annual Means					
			95715-WEI-0013			95715-WEI-0014			95715-WEI-0015			95715-WEI-0016			95715-WEI-0017			MY0 (2015)					
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
Alnus serrulata	tag alder	Shrub																			6	6	6
Betula nigra	river birch	Tree				1	1	1				2	2	2	2	2	2				35	35	35
Cornus amomum	silky dogwood	Shrub																			15	15	15
Fraxinus pennsylvanica	green ash	Tree	8	8	8	8	8	8	7	7	7	2	2	2	3	3	3				53	53	53
Liriodendron tulipifera	tuliptree	Tree	1	1	1	2	2	2	2	2	2	3	3	3	4	4	4				24	24	24
Nyssa sylvatica	blackgum	Tree													1	1	1				10	10	10
Platanus occidentalis	American sycamore	Tree	7	7	7	4	4	4	5	5	5	3	3	3	3	3	3				36	36	36
Quercus michauxii	swamp chestnut oak	Tree										1	1	1	1	1	1				37	37	37
Quercus phellos	willow oak	Tree				1	1	1	1	1	1	3	3	3	2	2	2				35	35	35
Quercus rubra	northern red oak	Tree							1	1	1	2	2	2							21	21	21
<b>Stem count</b>			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16				272	272	272
<b>size (ares)</b>			1			1			1			1			1			17					
<b>size (ACRES)</b>			0.02			0.02			0.02			0.02			0.02			0.42					
<b>Species count</b>			3	3	3	5	5	5	5	5	5	7	7	7	7	7	7				10	10	10
<b>Stems per ACRE</b>			647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5				647.5	647.5	647.5

**Color Coding for Table**

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

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

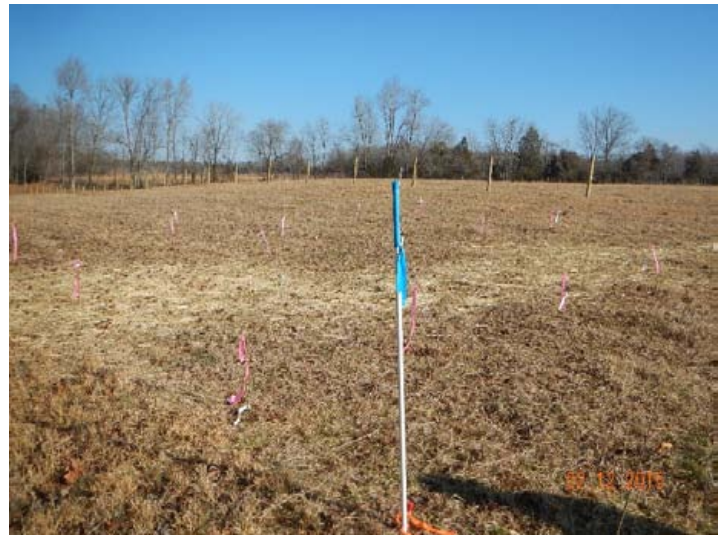
T: Total Stems

**VEGETATION PHOTOGRAPHS**  
**Foust Creek**





**VEG PLOT 1** (02/12/2015)



**VEG PLOT 2** (02/12/2015)



**VEG PLOT 3** (03/12/2015)



**VEG PLOT 4** (02/12/2015)



**VEG PLOT 5** (02/12/2015)



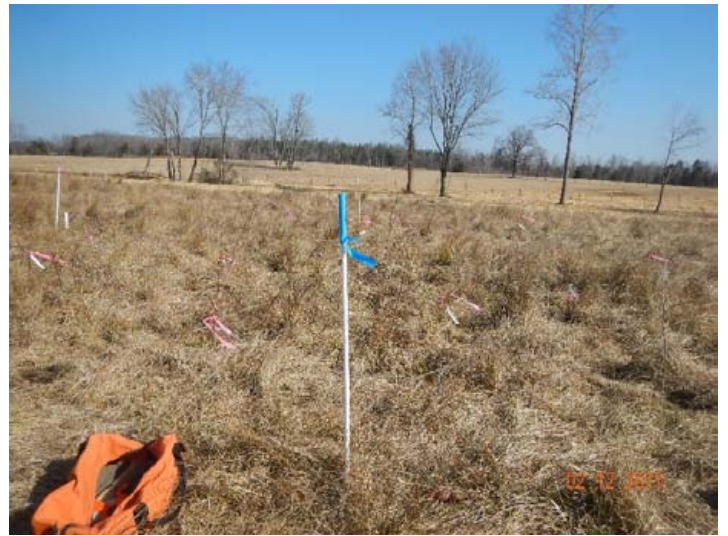
**VEG PLOT 6** (02/12/2015)







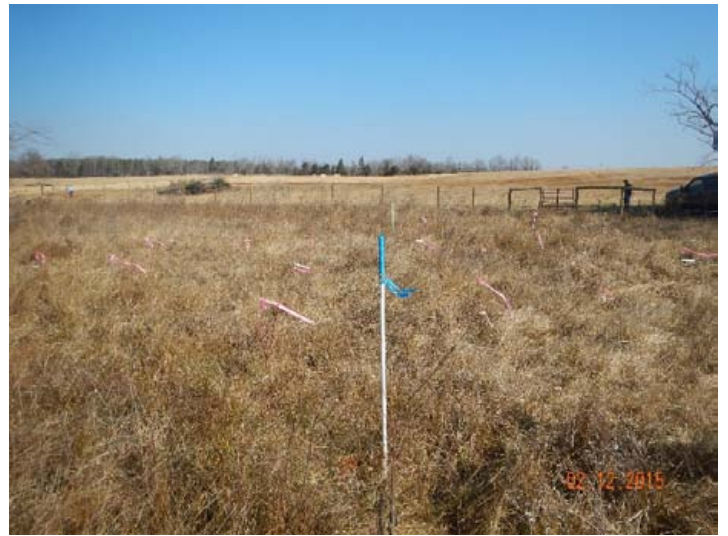
**VEG PLOT 7 (02/12/2015)**



**VEG PLOT 8 (02/12/2015)**



**VEG PLOT 9 (02/12/2015)**



**VEG PLOT 10 (02/12/2015)**



**VEG PLOT 11 (02/12/2015)**



**VEG PLOT 12 (02/12/2015)**



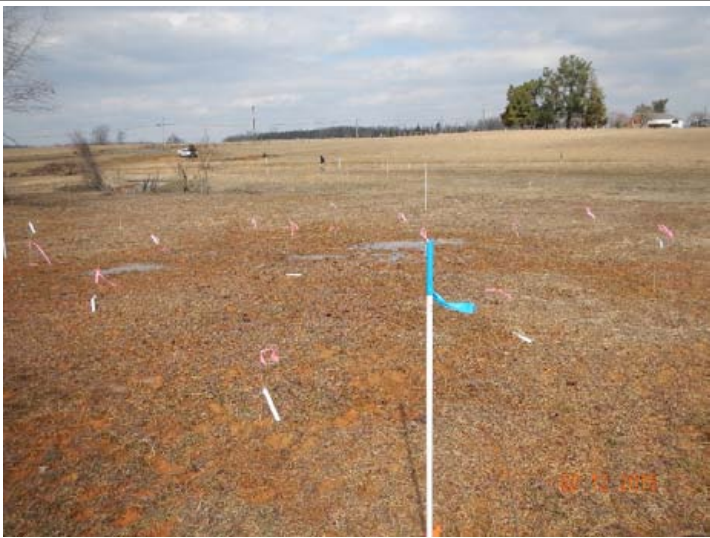




**VEG PLOT 13 (02/12/2015)**



**VEG PLOT 14 (02/12/2015)**



**VEG PLOT 15 (02/12/2015)**



**VEG PLOT 16 (02/12/2015)**



**VEG PLOT 17 (02/12/2015)**



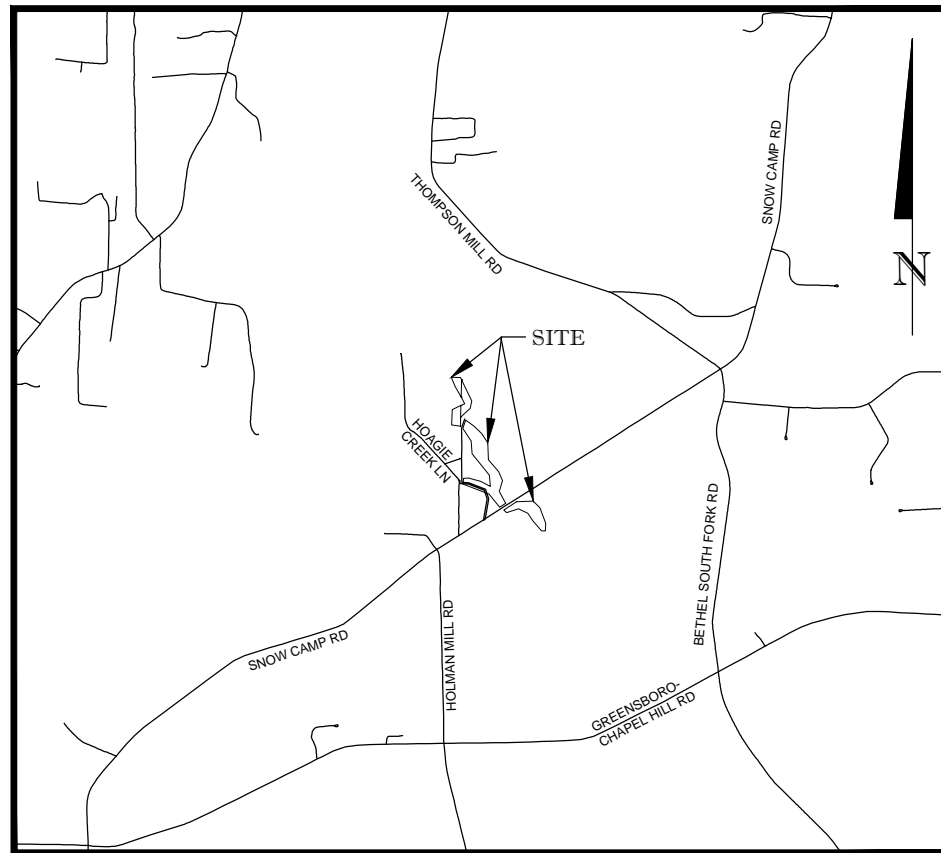
## **APPENDIX 4. As-Built Plan Sheets**



# Foust Creek Mitigation Site

## Cape Fear River Basin HUC 03030002

Alamance County, NC  
for  
NCDENR Division of  
Mitigation Services



Vicinity Map  
Not to Scale

**Directions to Project Site**

The Site is located in south Alamance County, south of Burlington. From Burlington take Route 87 south 10.9 miles. Turn right on Snow Camp Rd. Travel 4.0 miles. Site is to the north and south of Snow Camp Rd. at the crossing with Foust Creek.

**RECORD DRAWING**  
Issued April 2015

Sheet Index	
Title Sheet	0.1
Stream Overlay Overview	0.2
Legend	0.3
Stream Overlay Plans	1.1-1.14
Wetland Plans	2.1-2.4
Planting Plan	3.1-3.4

Project Directory	
<p><b>Surveying:</b> Turner Land Surveying, PLLC P.O. Box 41023 Raleigh, NC 27629 David S. Turner, PLS 919-875-1378</p>	<p><b>Owner:</b> NCDENR Division of Mitigation Services 1652 Mail Service Center Raleigh, NC 27699-1652 Jeff Schaffer 919-707-8308 DMS Project ID: 95715</p>
<p><b>Engineering:</b> Wildlands Engineering, Inc License No. F-0831 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 Angela N Allen, PE 919-851-9986</p>	



**AS-BUILT PLANS  
SURVEYOR'S CERTIFICATION**

I, DAVID S. TURNER, CERTIFY THAT THE INFORMATION SHOWN ON THESE PLANS WAS DERIVED FROM AN ACTUAL FIELD SURVEY MADE UNDER MY SUPERVISION, THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000+. THE PURPOSE OF THIS SURVEY IS FOR TOPOGRAPHIC INFORMATION ONLY, NO BOUNDARY DETERMINATIONS WERE MADE AT THIS TIME.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 3rd DAY OF April, 2015

*David S. Turner*  
DAVID S. TURNER, P.L.S. #L-4551



Foust Creek Mitigation Site  
Alamance County, NC

Title Sheet

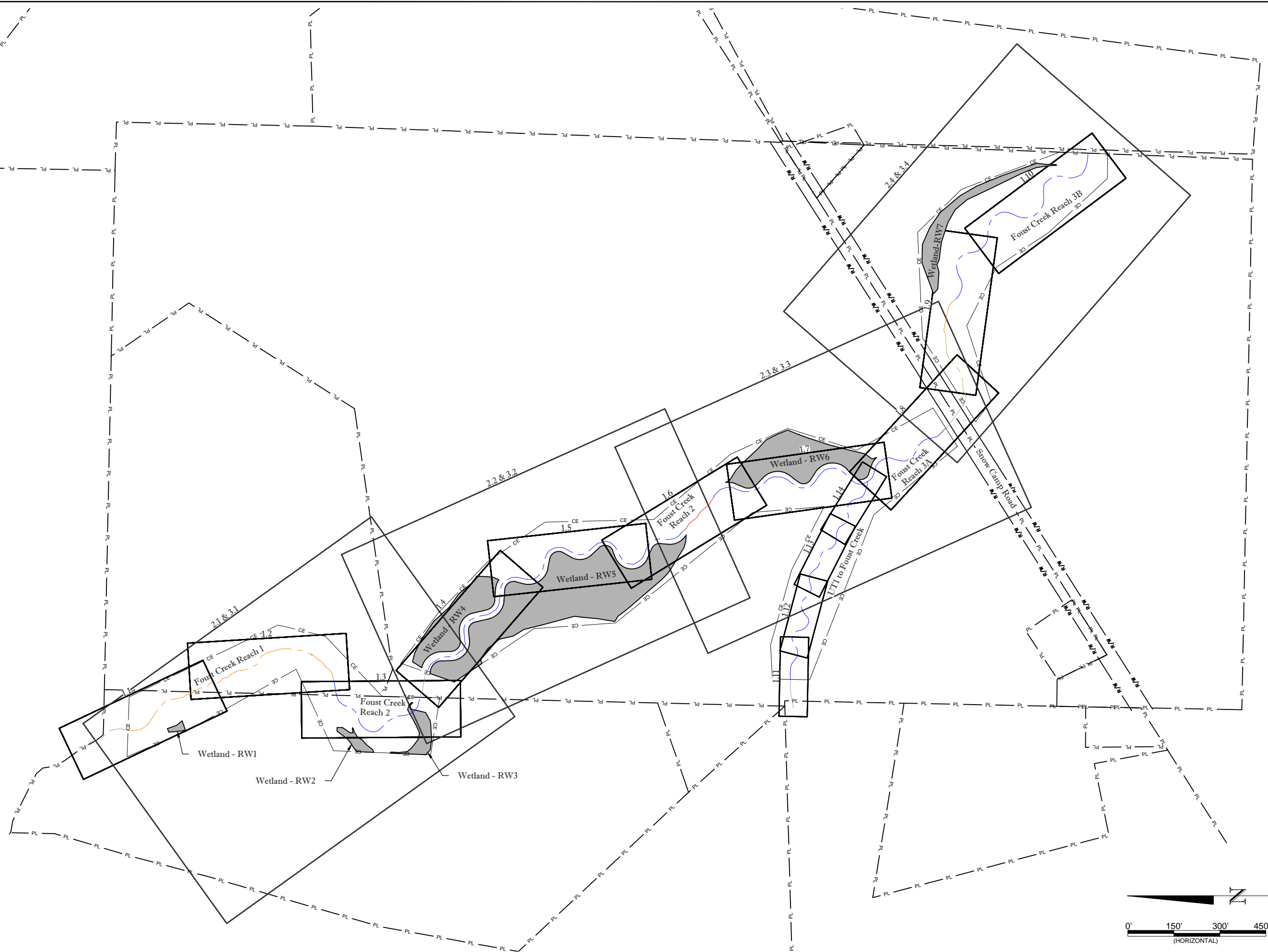
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Date:	04-30-2015
Job Number:	005-0213
Project Engineer:	ANNA
Drawn By:	CLM
Checked By:	DMT

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April 30, 2015  
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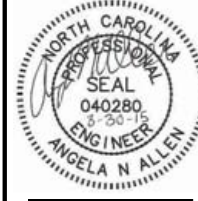


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**Foust Creek Mitigation Site  
Alamance County, NC**

Stream Overlay Overview



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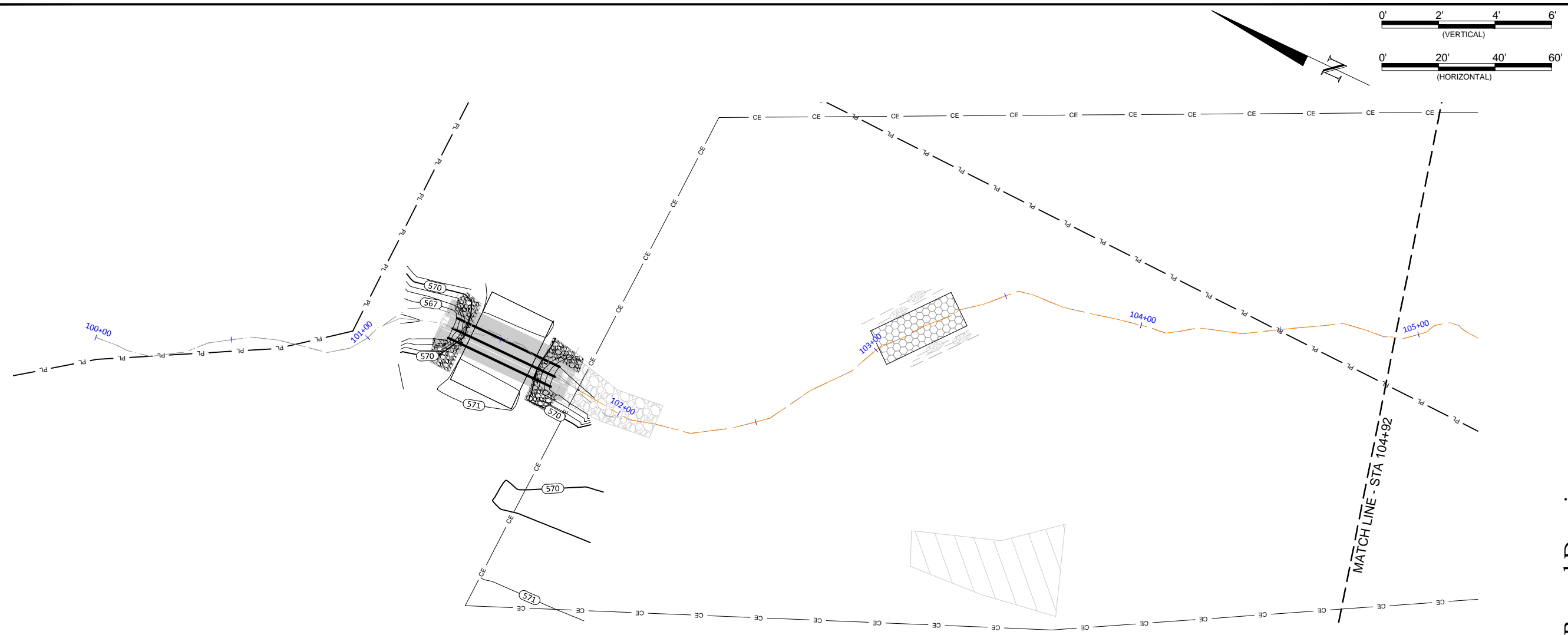
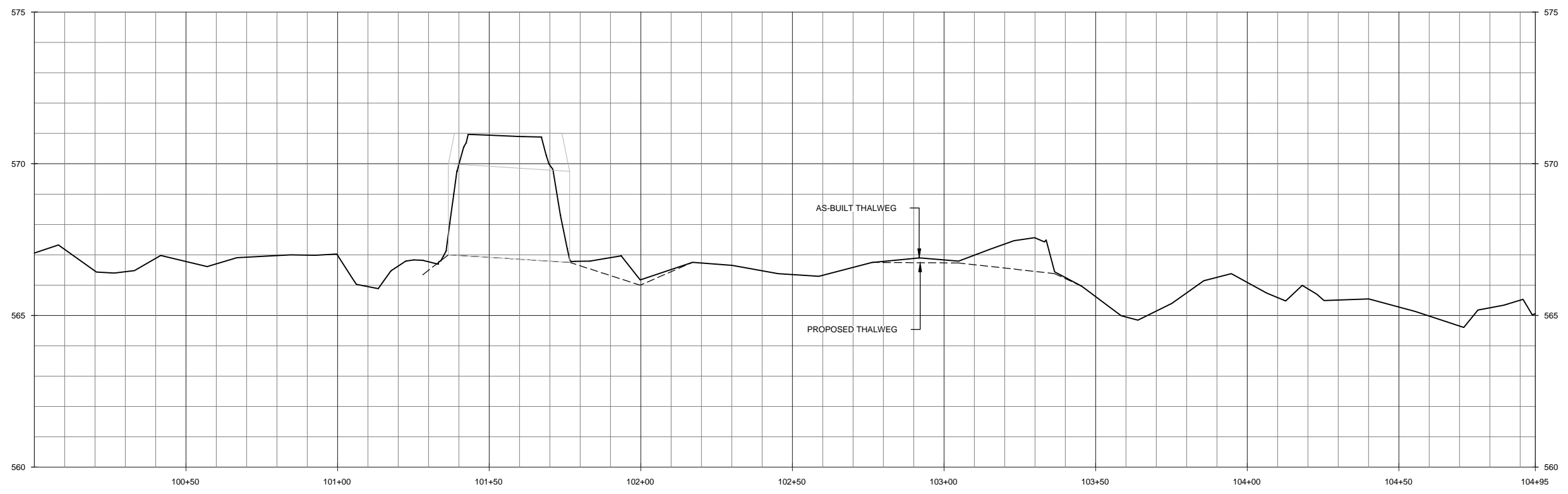
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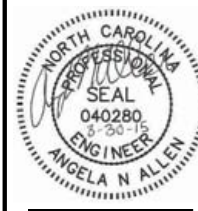
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Alamance County, NC

Foust Creek  
Stream Overlay Plans

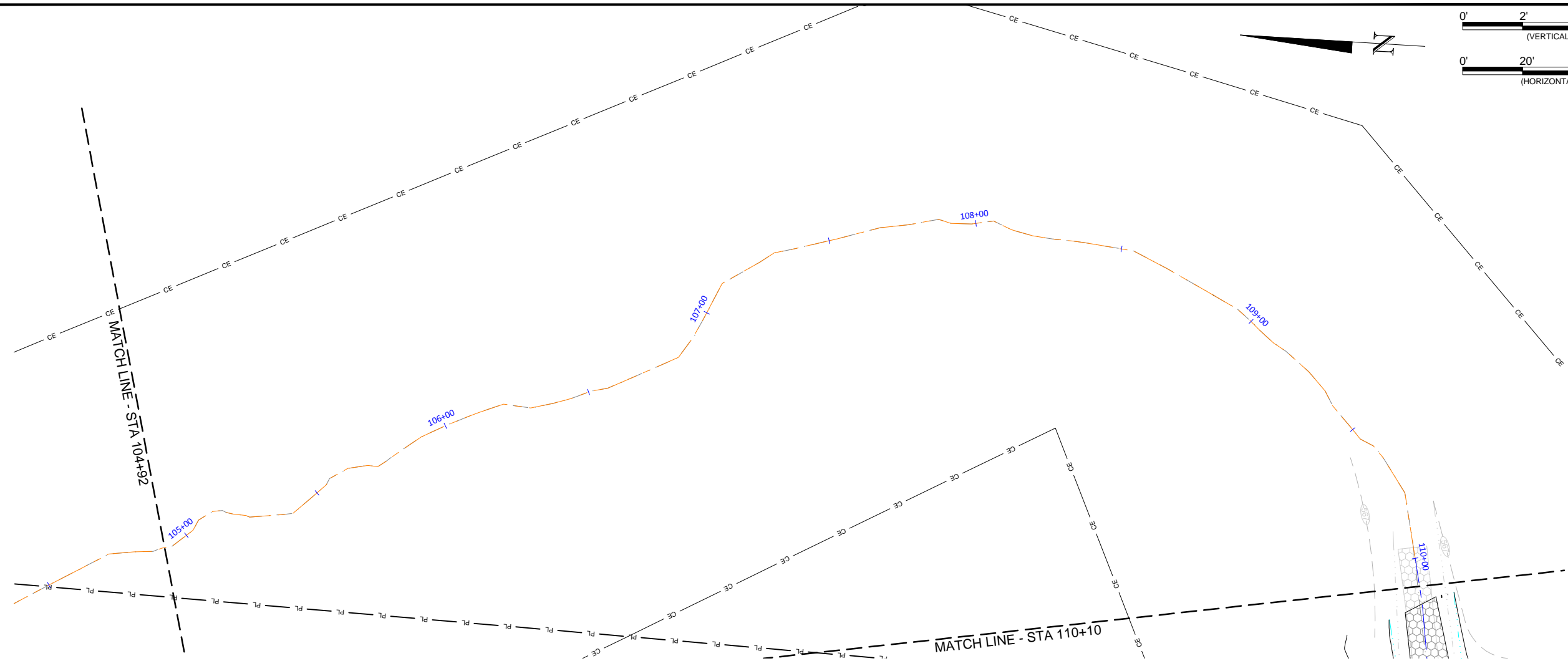
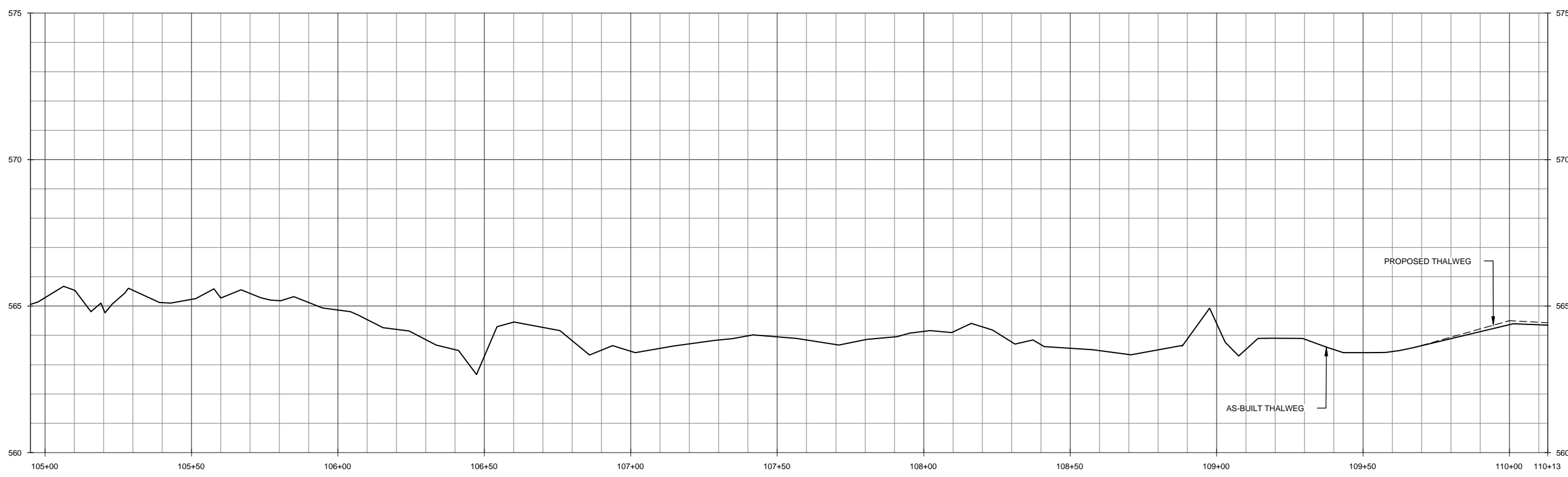
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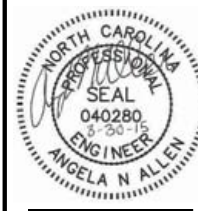
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Alamance County, NC

Foust Creek  
Stream Overlay Plans



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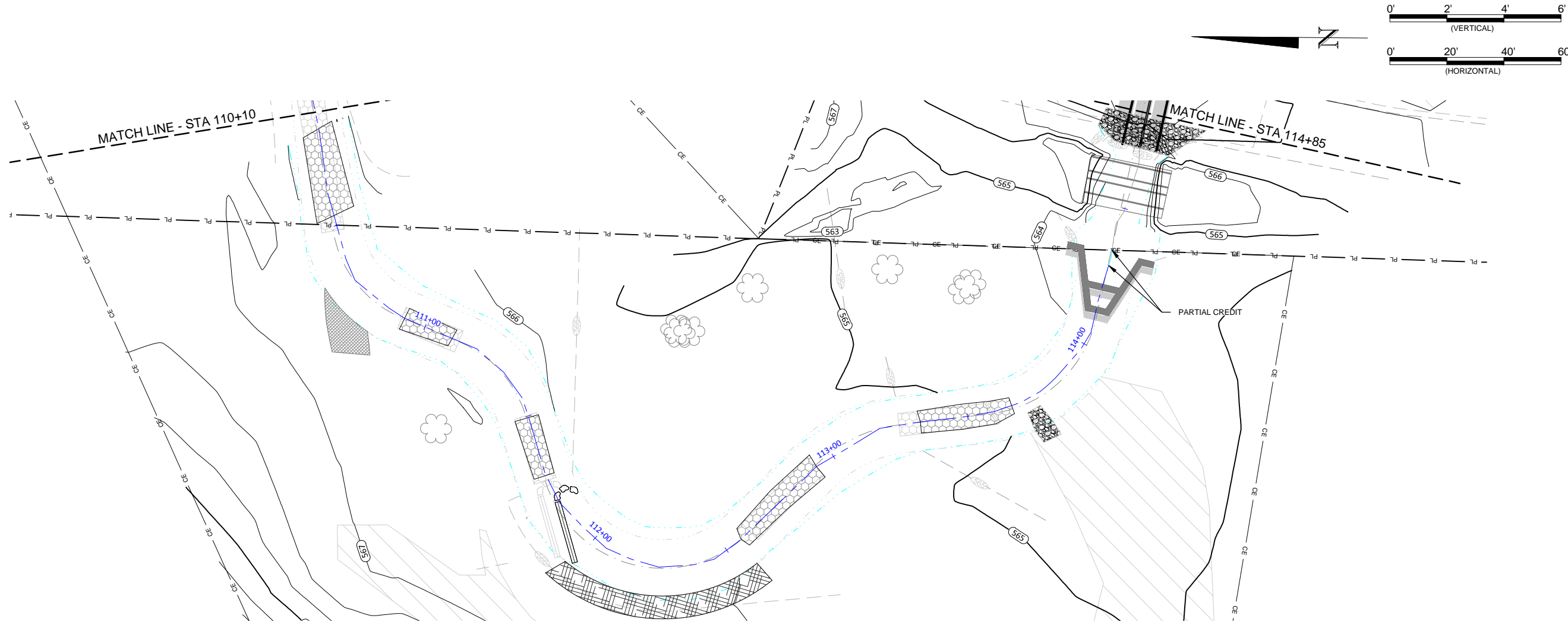
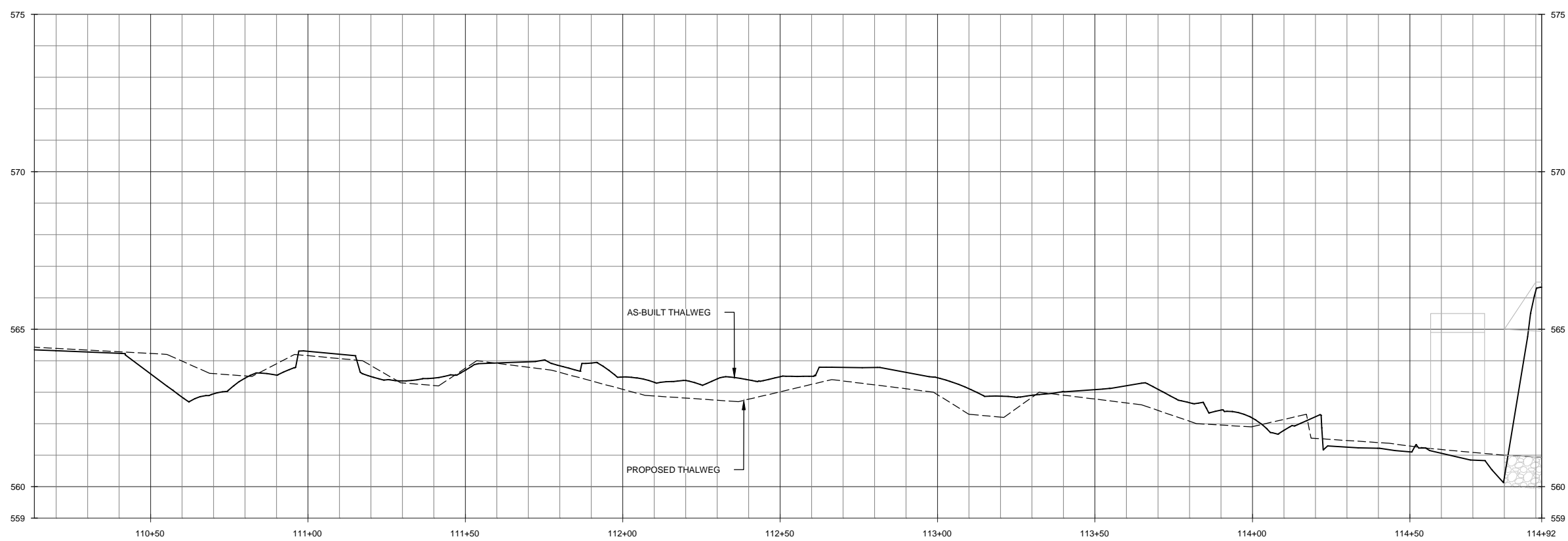
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Alamance County, NC

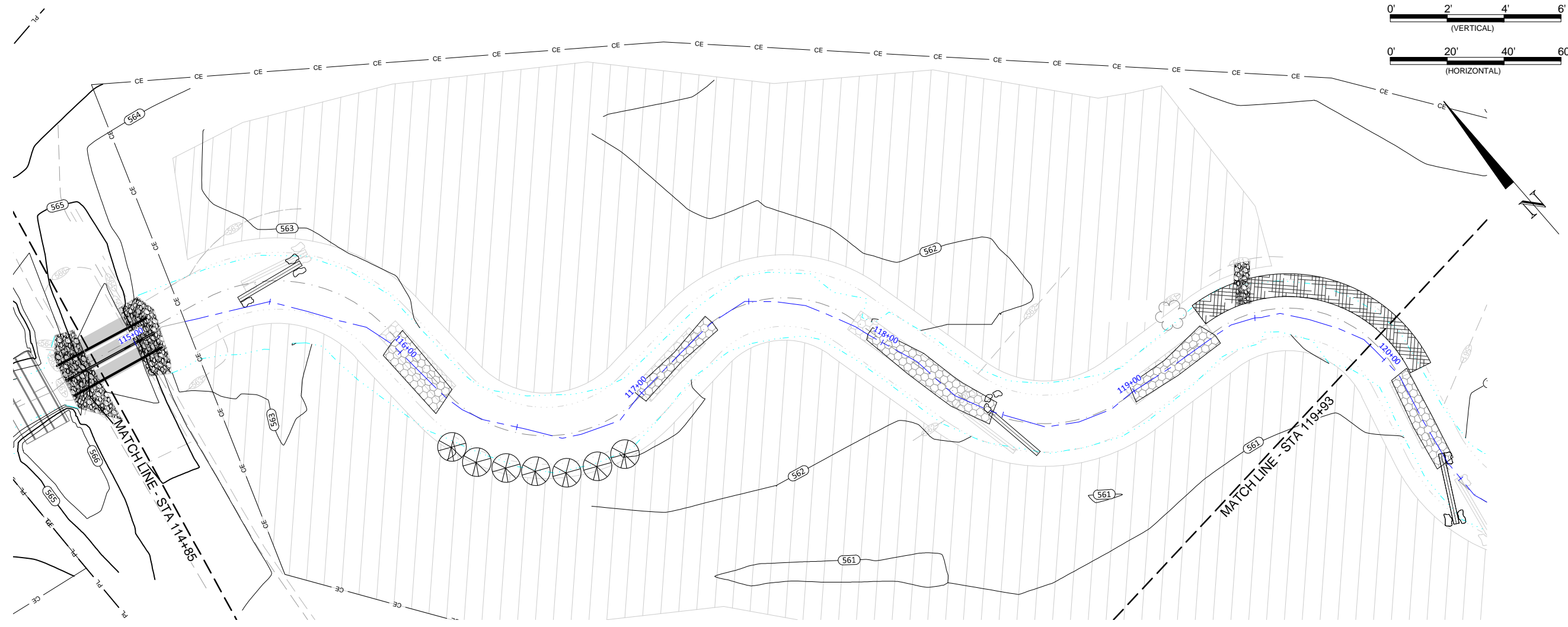
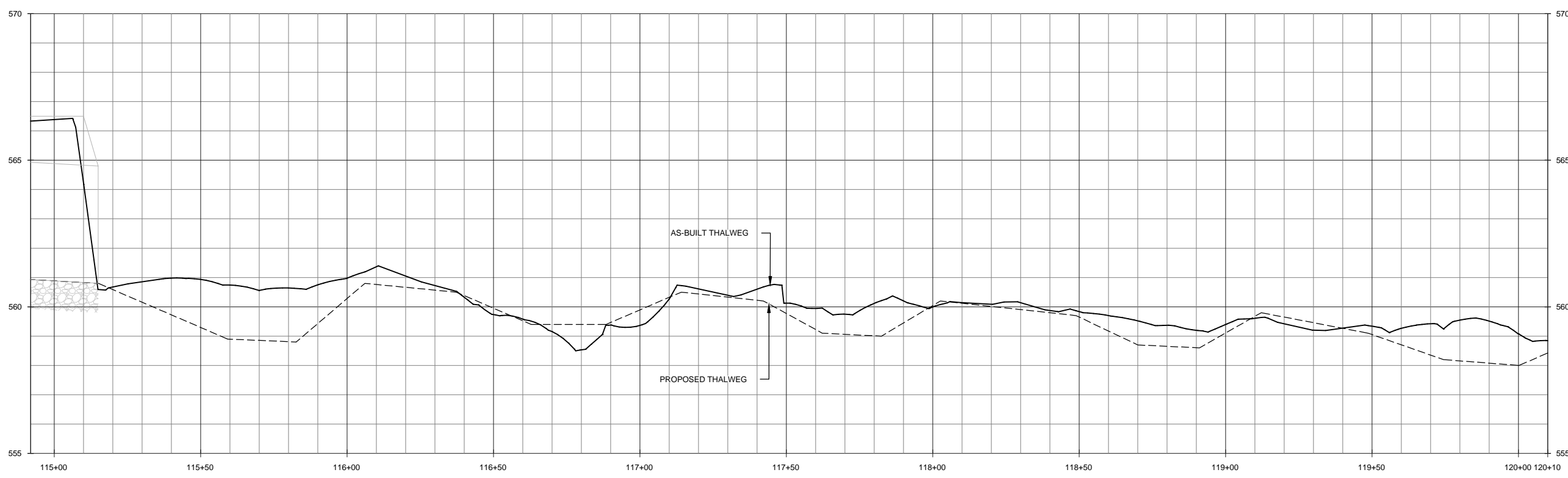
Foust Creek  
Stream Overlay Plans



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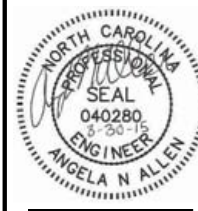
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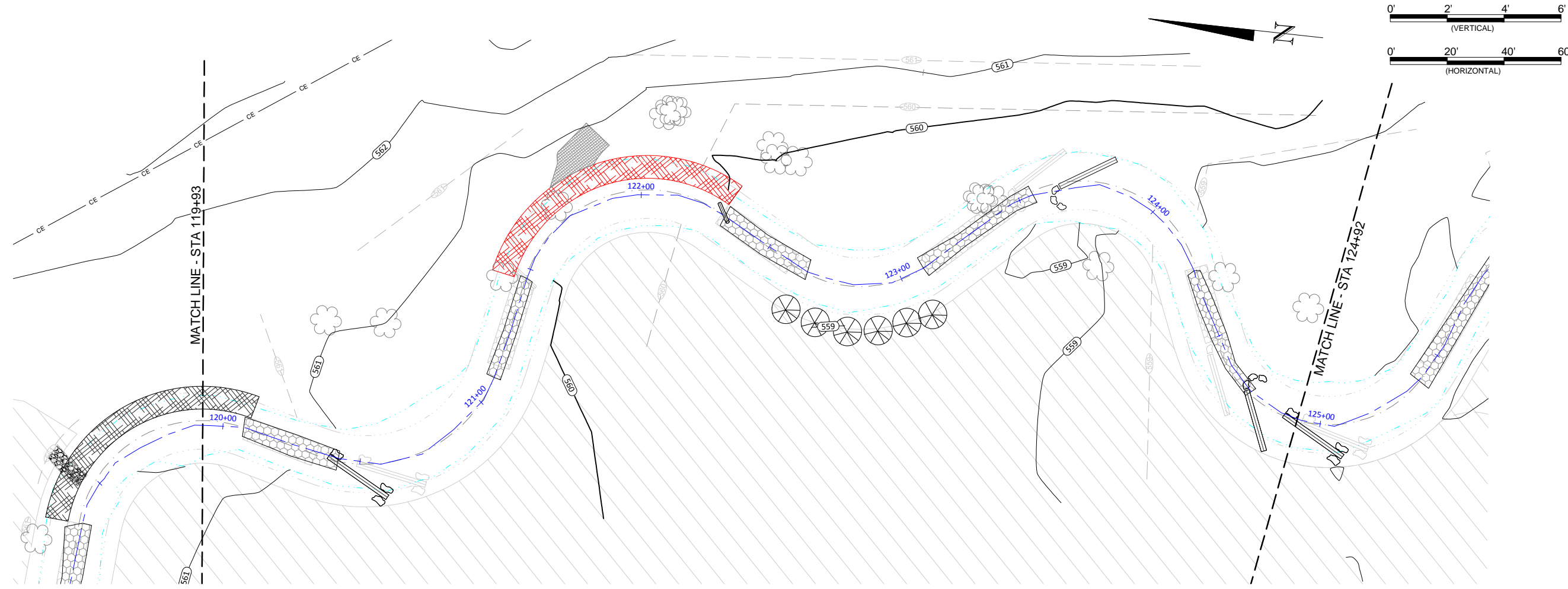
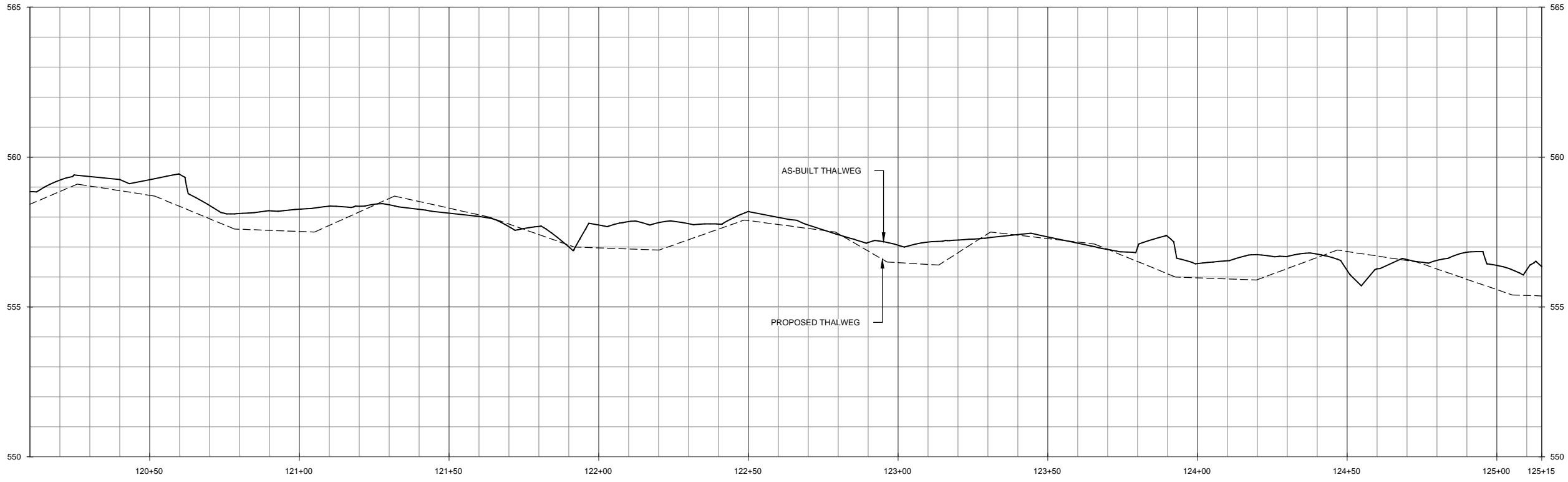
Foust Creek Mitigation Site  
Alamance County, NC

Foust Creek  
Stream Overlay Plans



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NOTE: AT STATION 121+88, BRUSH TOE NOT INSTALLED TO MINIMIZE IMPACT ON NEARBY TREES.

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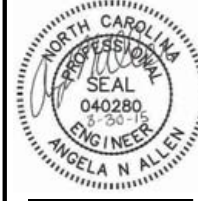
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Foust Creek Mitigation Site  
Alamance County, NC

Foust Creek  
Stream Overlay Plans

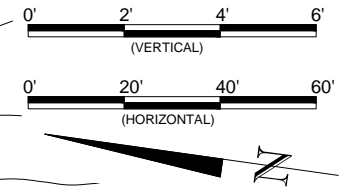
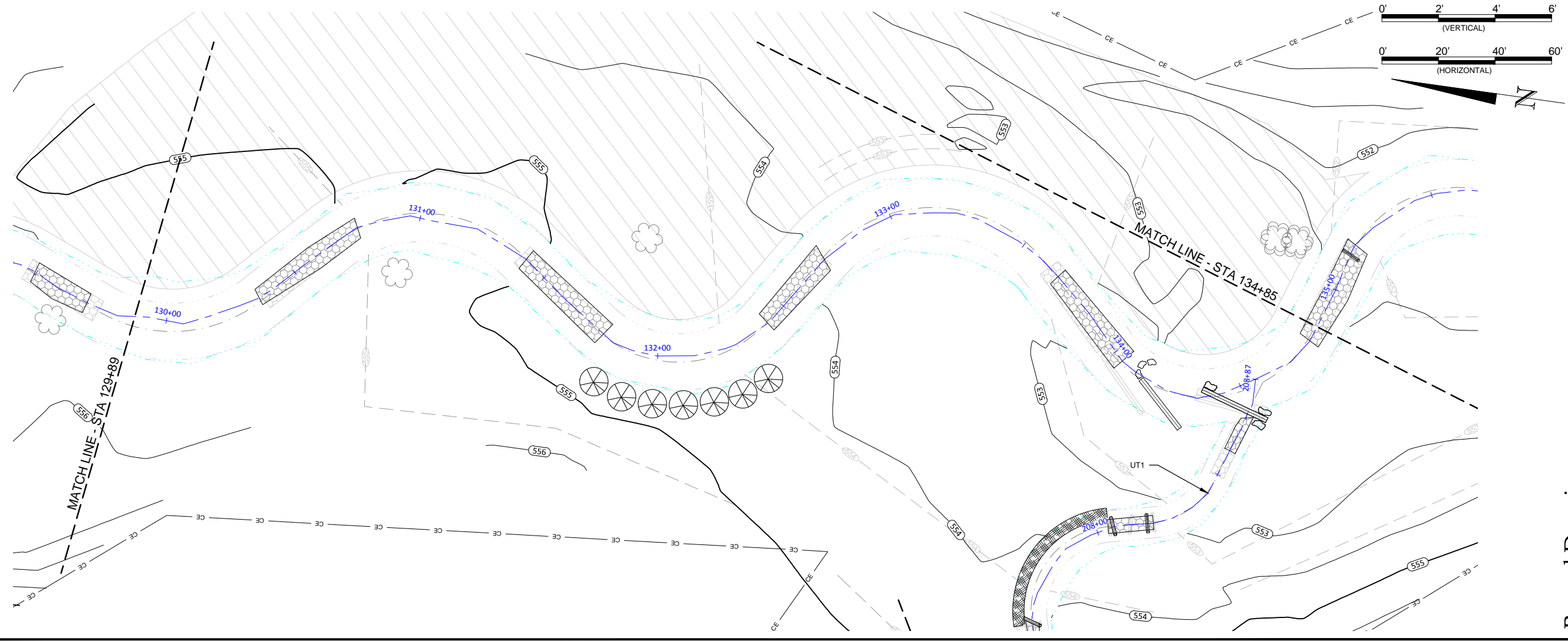
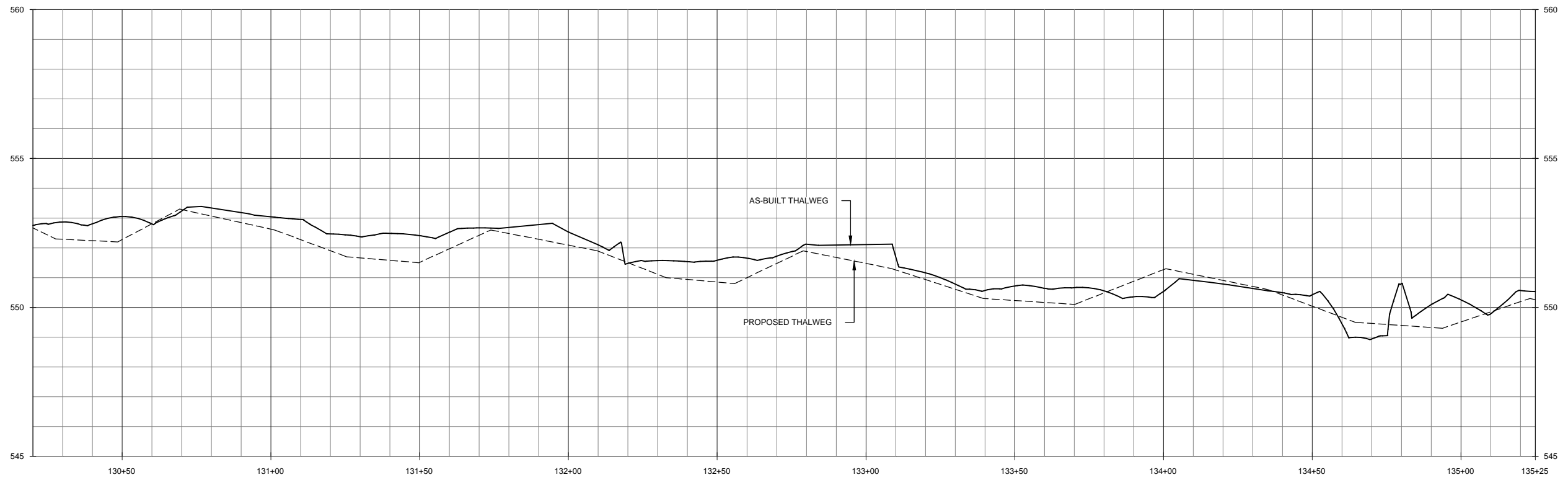


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**Alamance County, NC**

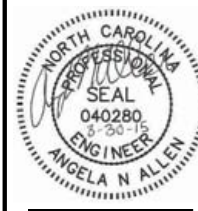
Foust Creek  
 Stream Overlay Plans

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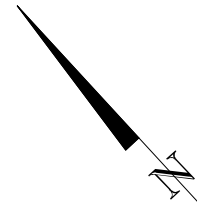
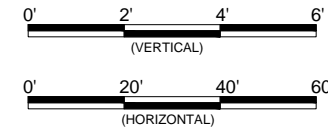
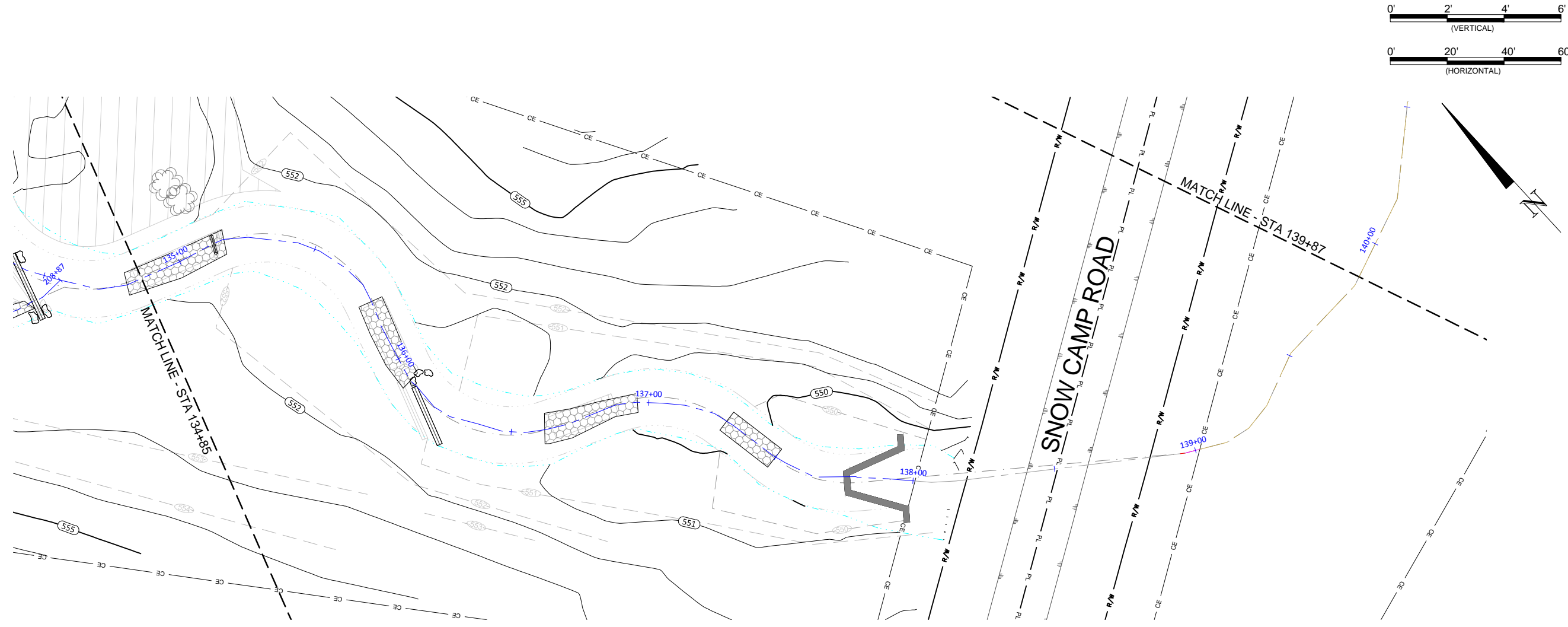
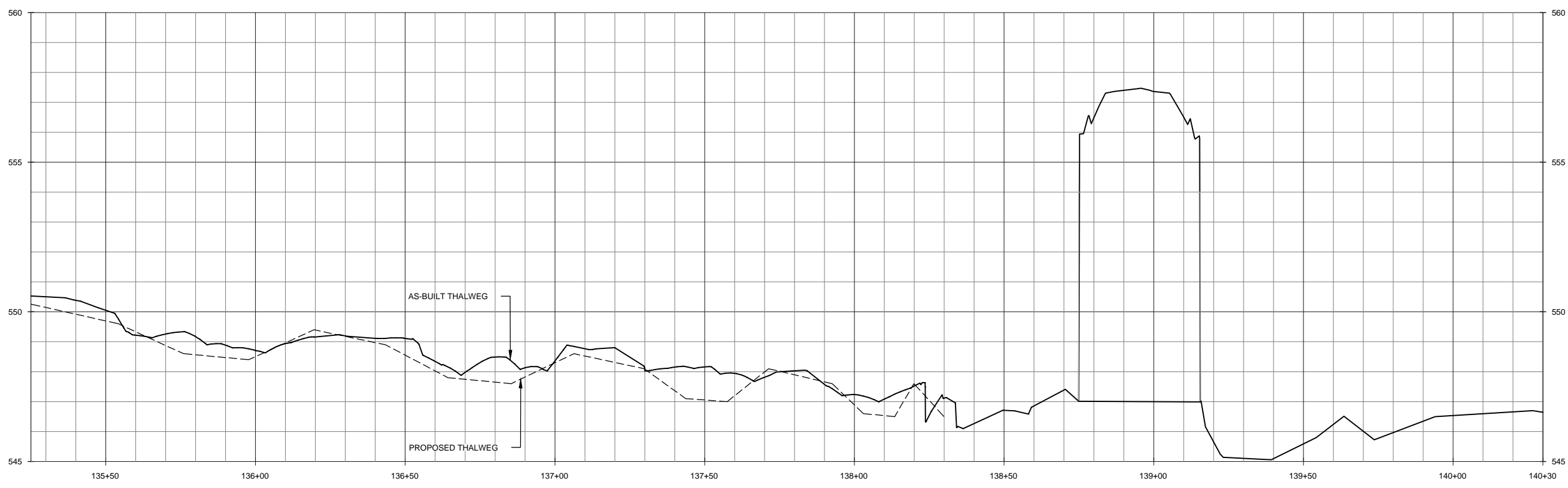
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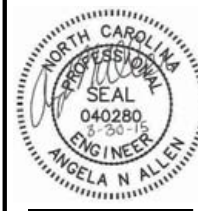
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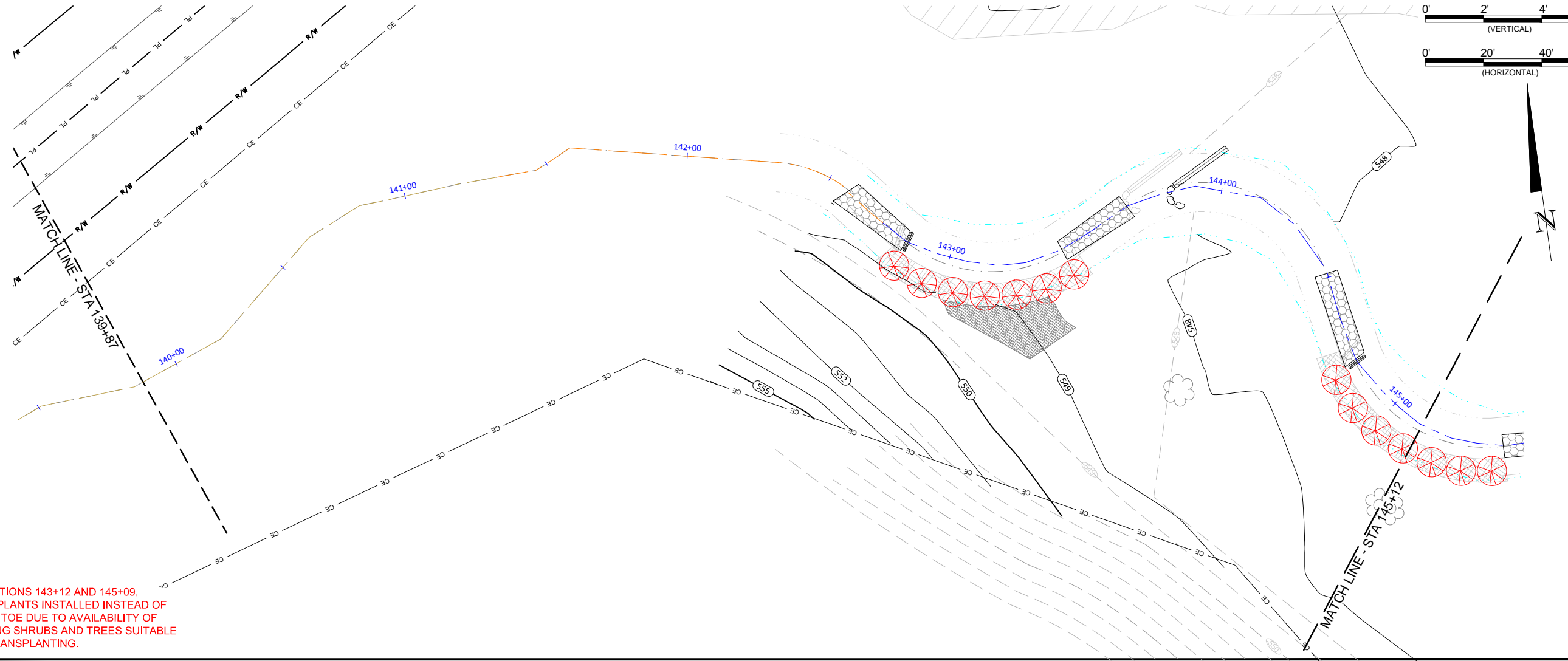
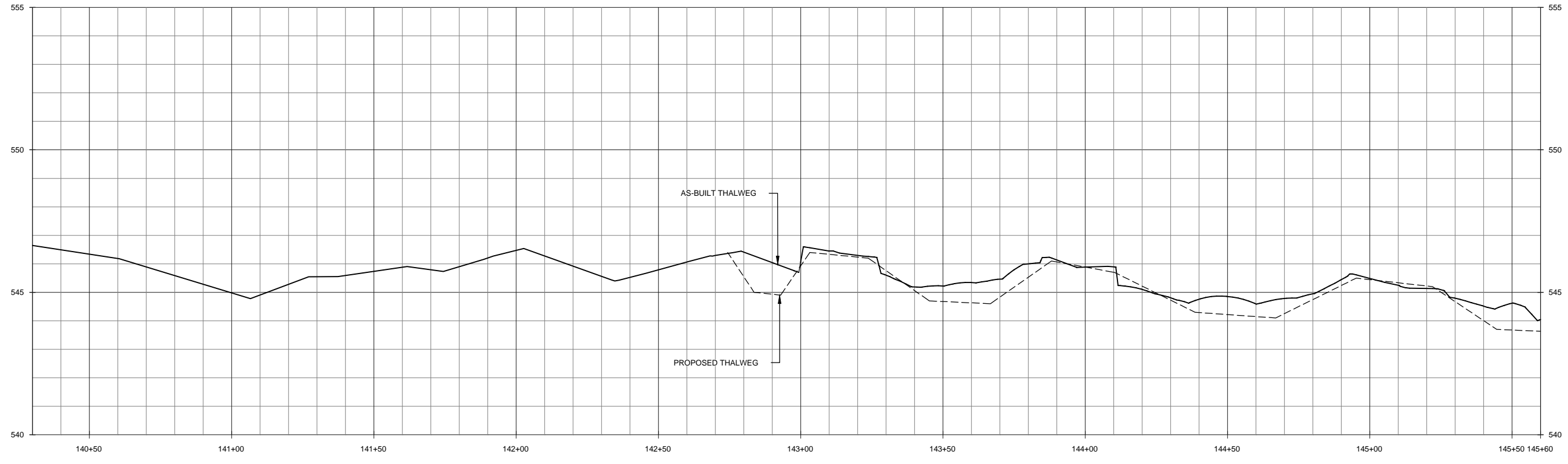
**Foust Creek Mitigation Site  
Alamance County, NC**

Foust Creek  
Stream Overlay Plans

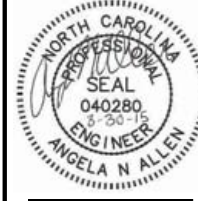


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**NOTE: AT STATIONS 143+12 AND 145+09, TRANSPLANTS INSTALLED INSTEAD OF BRUSH TOE DUE TO AVAILABILITY OF EXISTING SHRUBS AND TREES SUITABLE FOR TRANSPLANTING.**



**Foust Creek Mitigation Site  
Alamance County, NC**

Foust Creek  
Stream Overlay Plans

**Record Drawing**

Revisions:

No.	Description

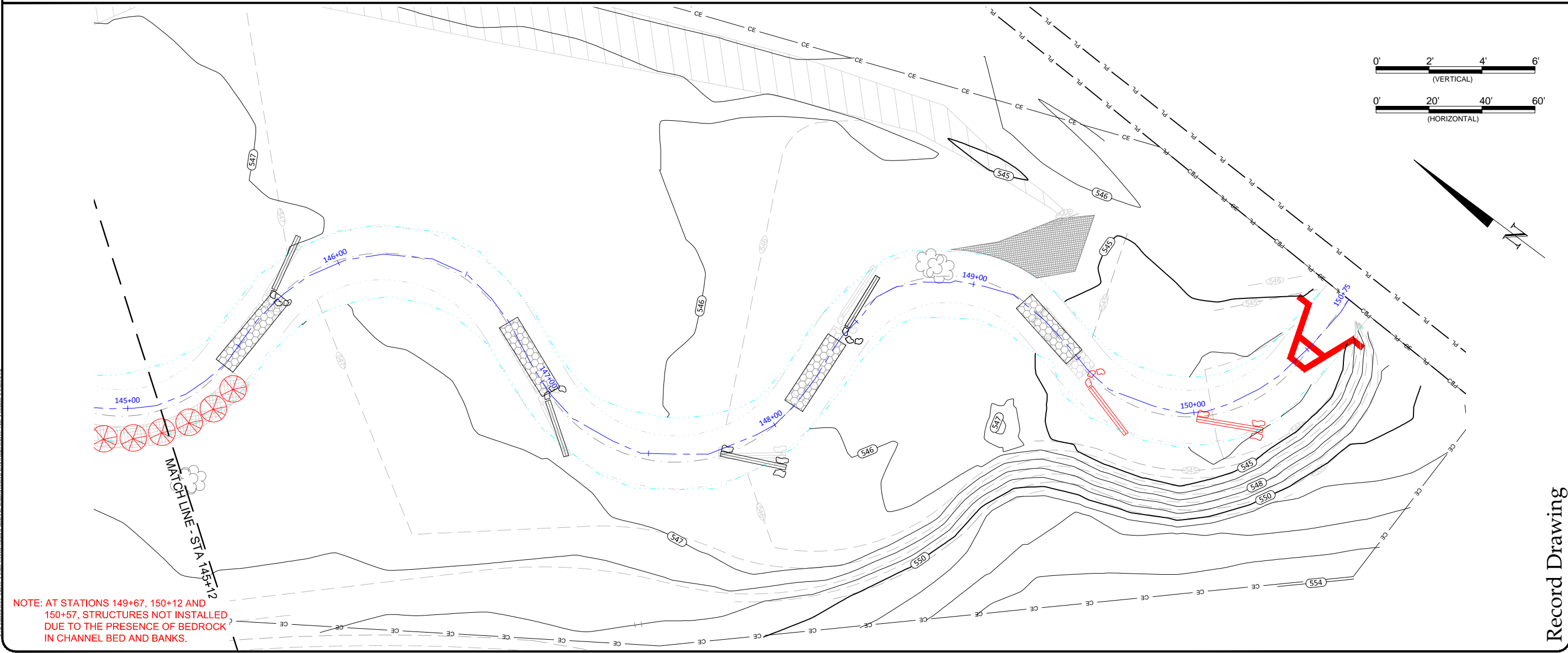
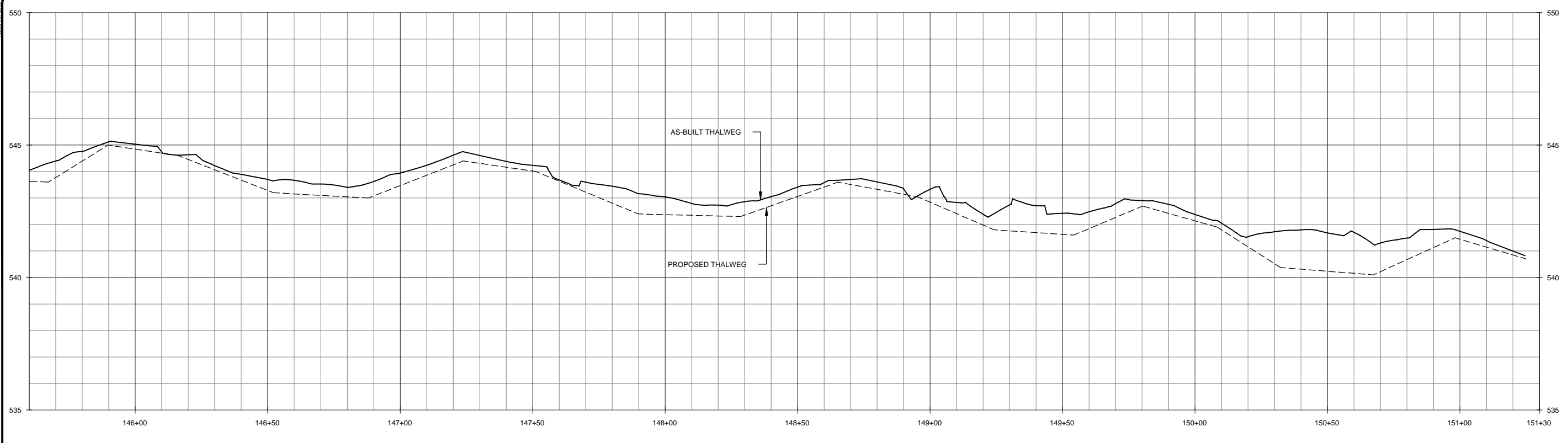
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Checked By:	DMT

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April 30, 2015  
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**NOTE: AT STATIONS 149+67, 150+12 AND 150+57, STRUCTURES NOT INSTALLED DUE TO THE PRESENCE OF BEDROCK IN CHANNEL BED AND BANKS.**



**Foust Creek Mitigation Site  
Alamance County, NC**  
Foust Creek  
Stream Overlay Plans

Revisions:

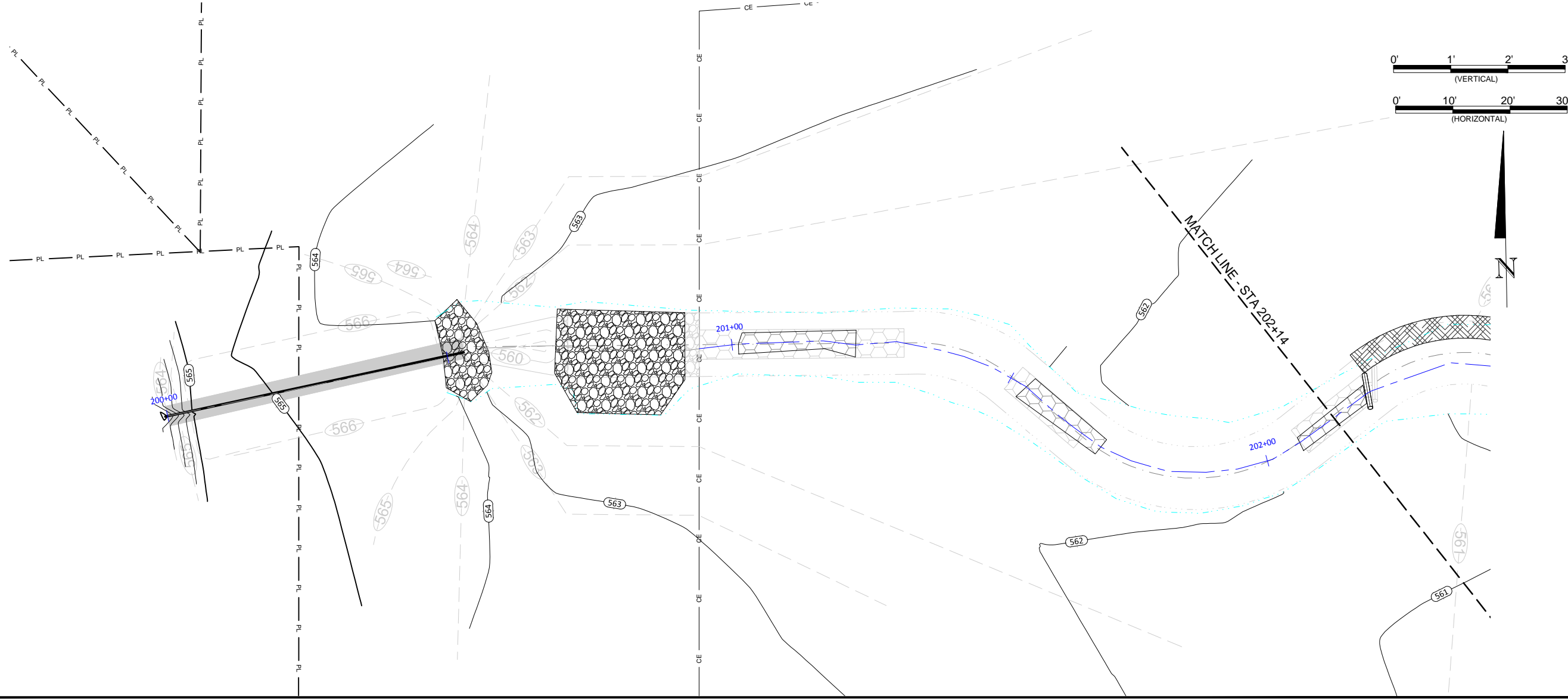
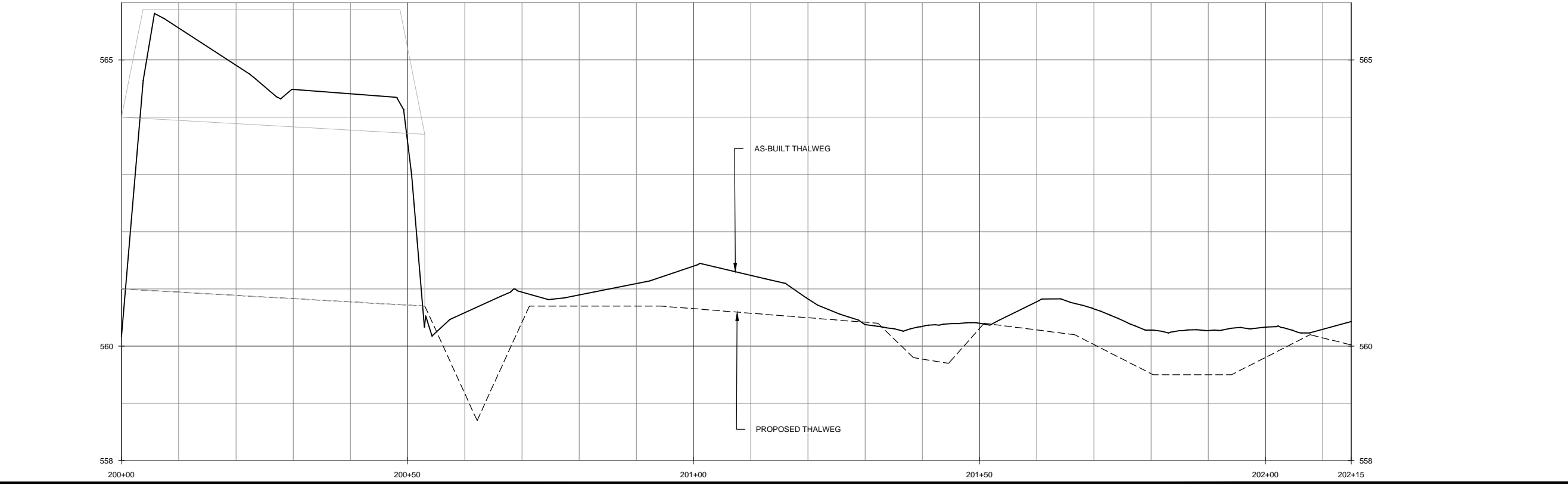

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Job Number: 005-0213  
Project Engineer: ANA  
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April 30, 2015  
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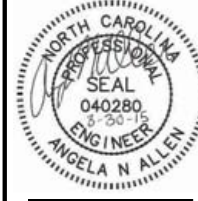
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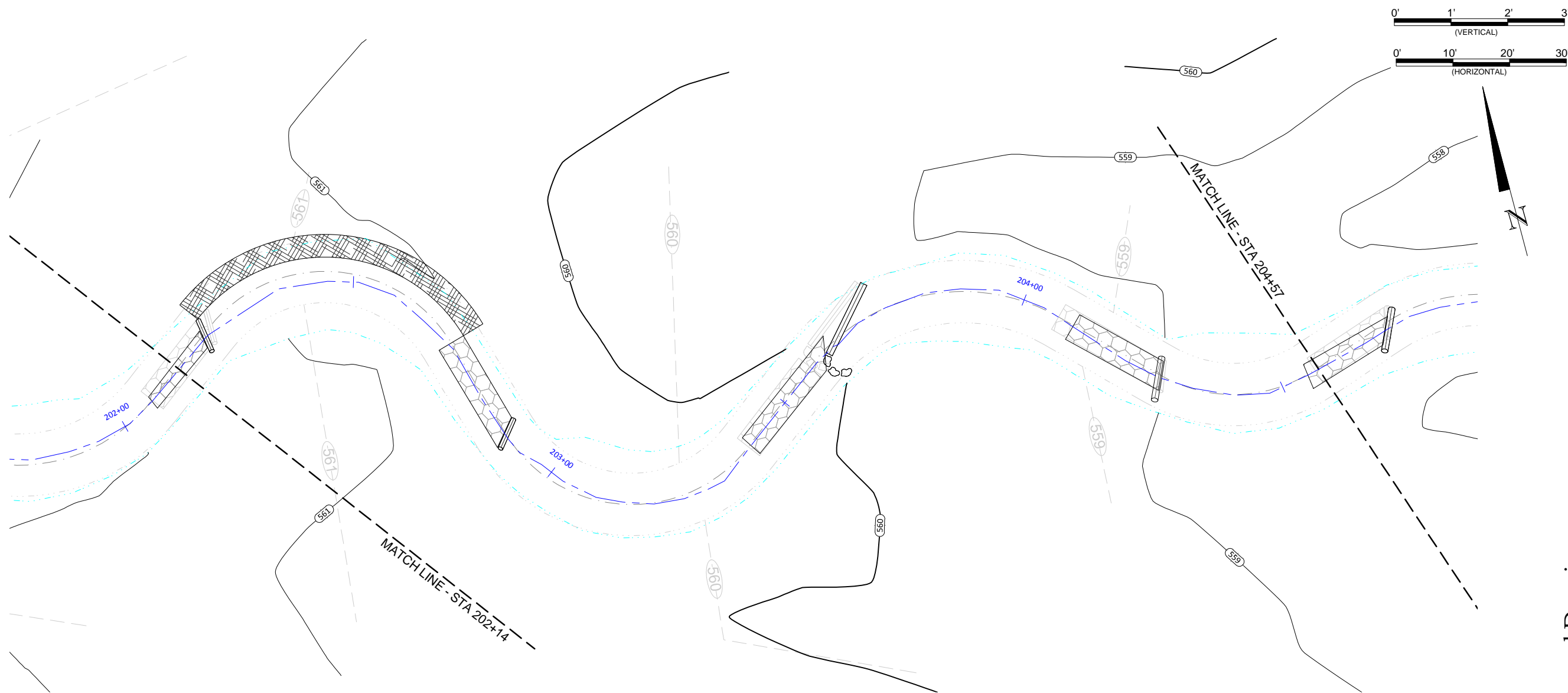
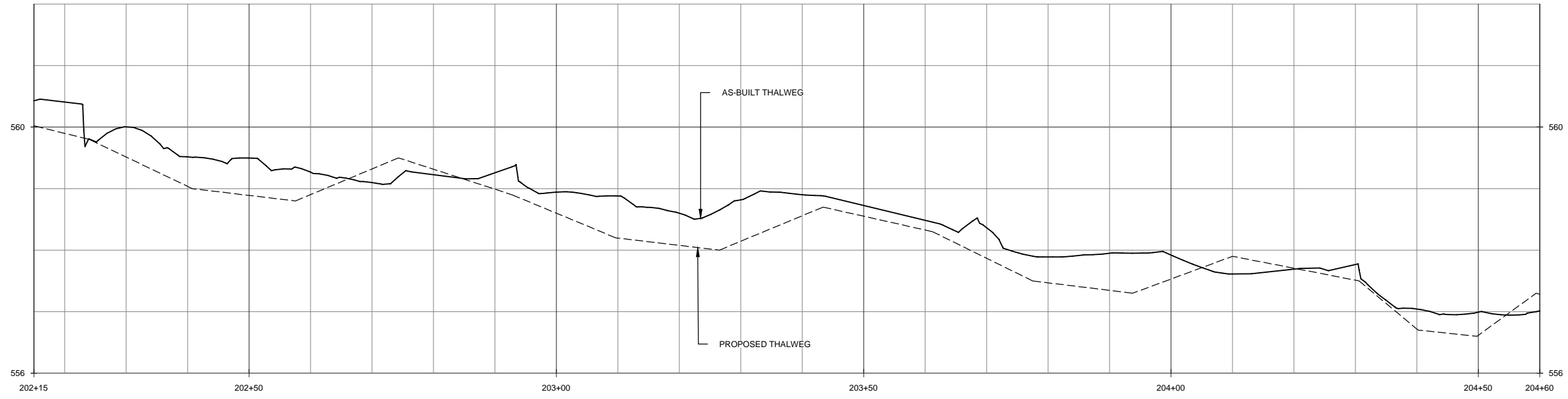
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**Foust Creek Mitigation Site**  
**Alamance County, NC**  
 UT1 to Foust Creek  
 Stream Overlay Plans



**WILDLANDS**  
 ENGINEERING  
 312 W. Millbrook Road, Ste 225  
 Raleigh, NC 27606  
 Tel: 919.851.9986  
 Fax: 919.851.9986  
 Firm License No. F-0831

April 30, 2015  
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Record Drawing

Date:	04-30-2015
Job Number:	005-0213
Project Engineer:	ANA
Drawn By:	CLM
Checked By:	DMT

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Foust Creek Mitigation Site  
Alamance County, NC

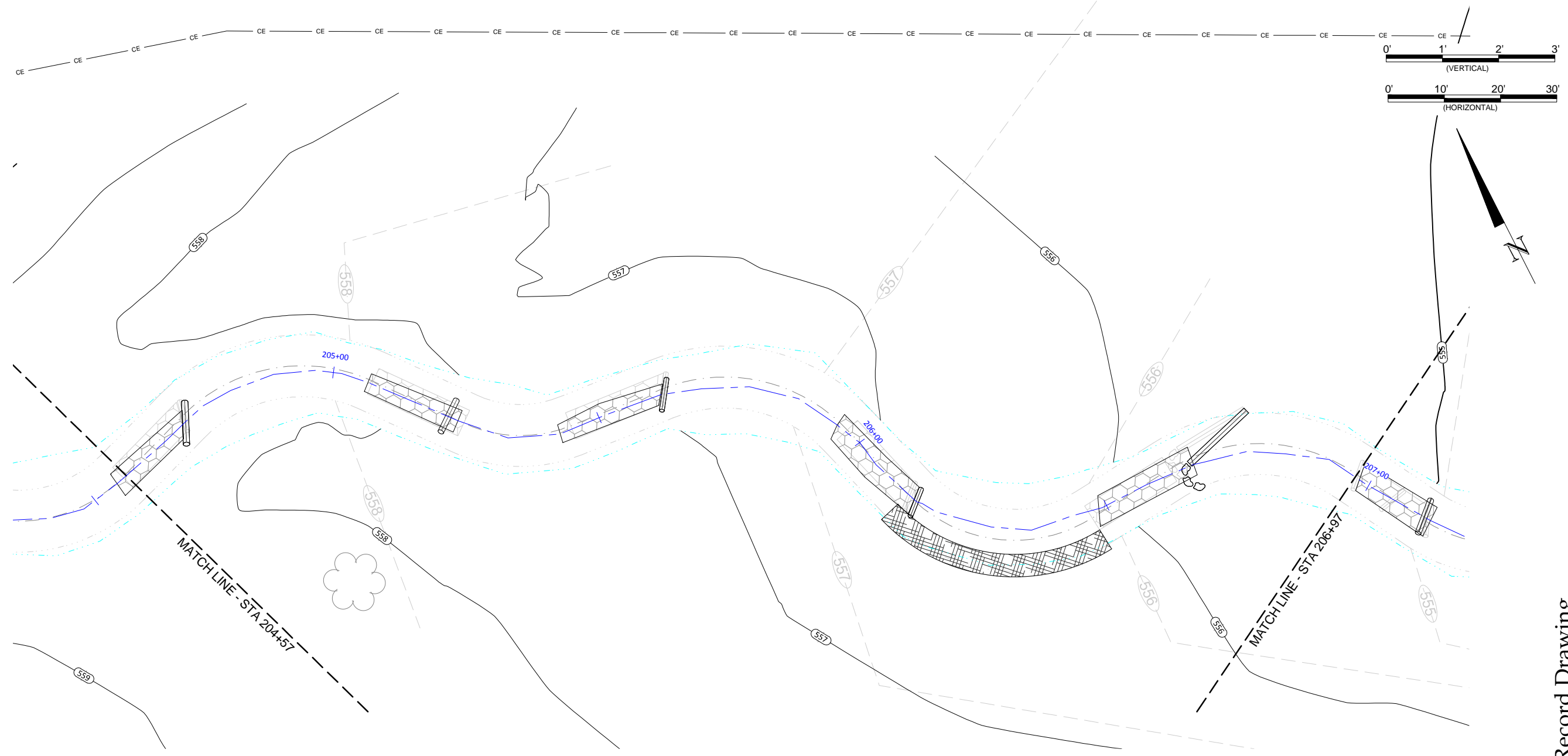
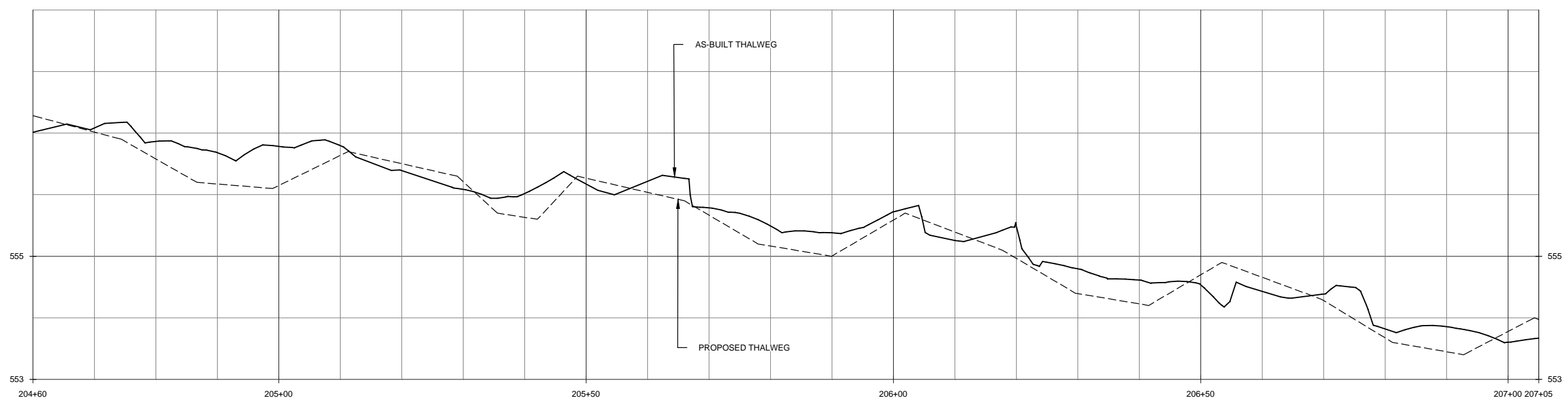
UT1 to Foust Creek  
Stream Overlay Plans



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Fayetteville, NC 28517-9986  
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April 30, 2015  
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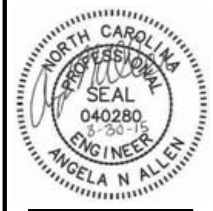
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Job Number:	005-0213
Project Engineer:	ANA
Drawn By:	CLM
Checked By:	DMT

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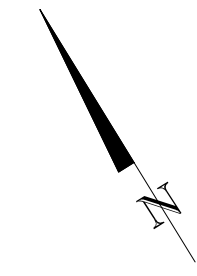
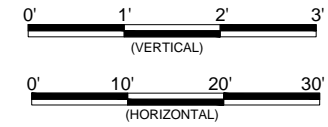
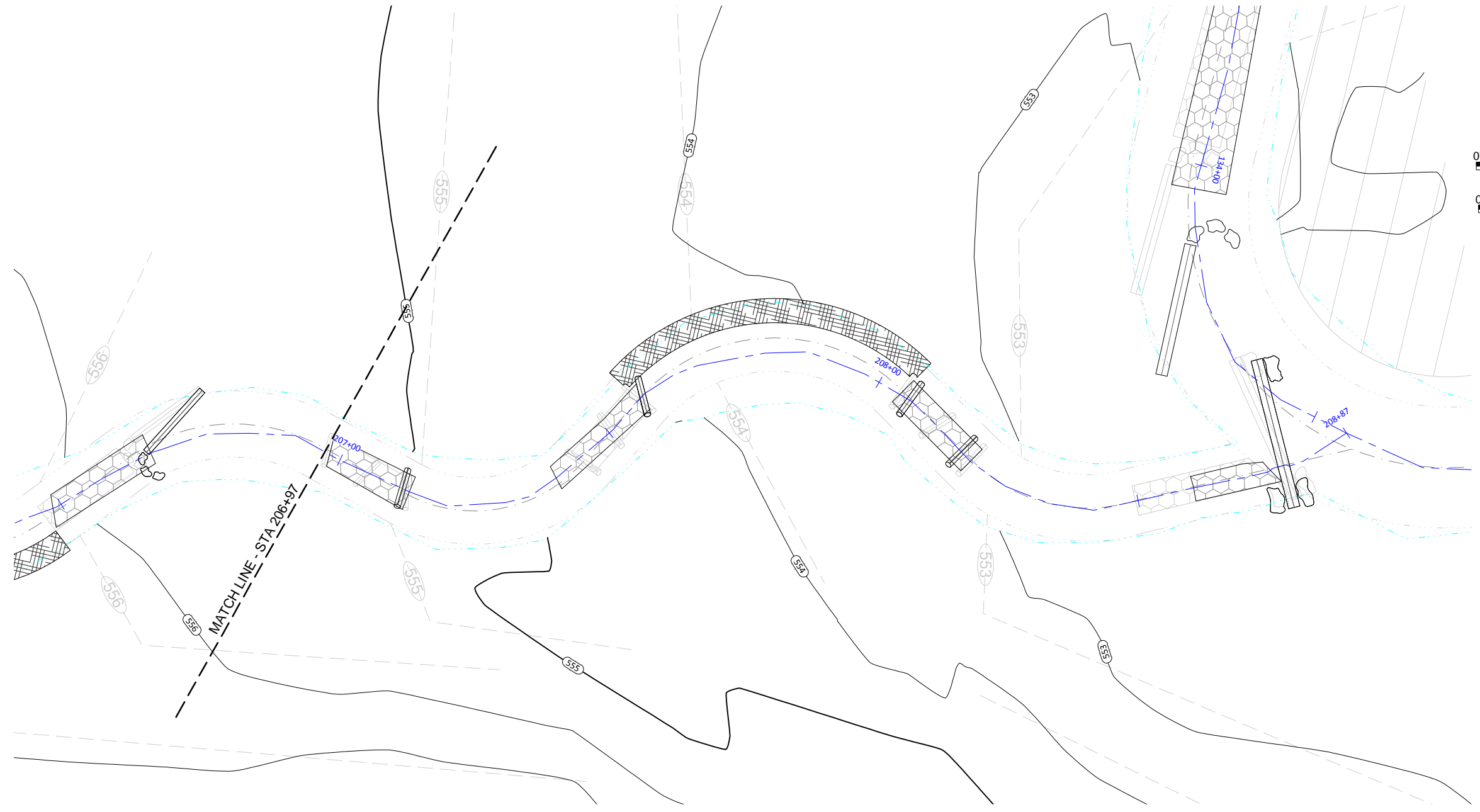
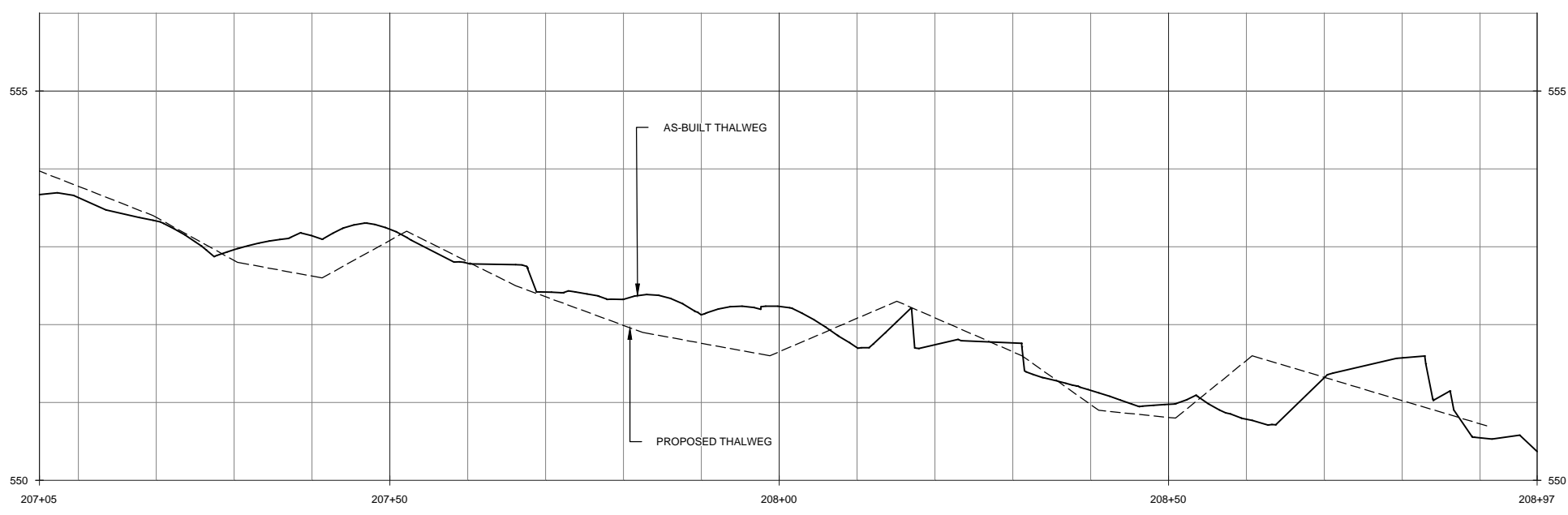
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Foust Creek Mitigation Site  
Alamance County, NC

UT1 to Foust Creek  
Stream Overlay Plans



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Record Drawing

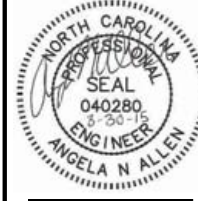
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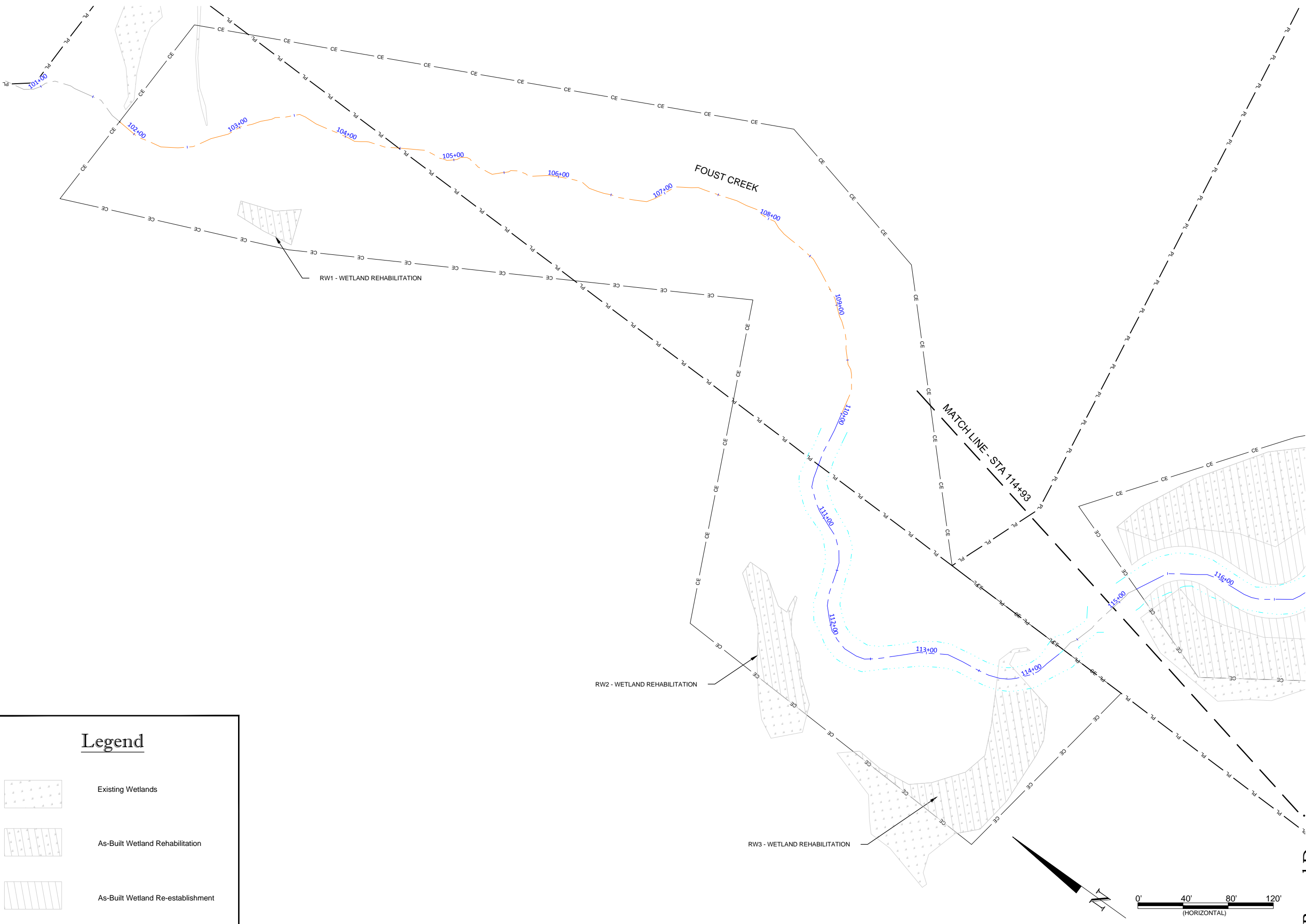
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Foust Creek Mitigation Site  
Alamance County, NC




UT1 to Foust Creek  
Stream Overlay Plans

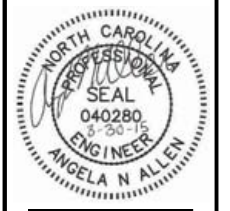


April 30, 2015  
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### Legend

-  Existing Wetlands
-  As-Built Wetland Rehabilitation
-  As-Built Wetland Re-establishment



## Foust Creek Mitigation Site Alamance County, NC

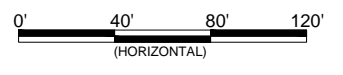
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Revisions:	

Date:	04-30-2015
Job Number:	005-02135
Project Engineer:	ANNA
Drawn By:	CLM
Checked By:	DMT

# 2.1

Sheet






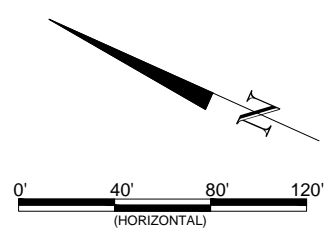
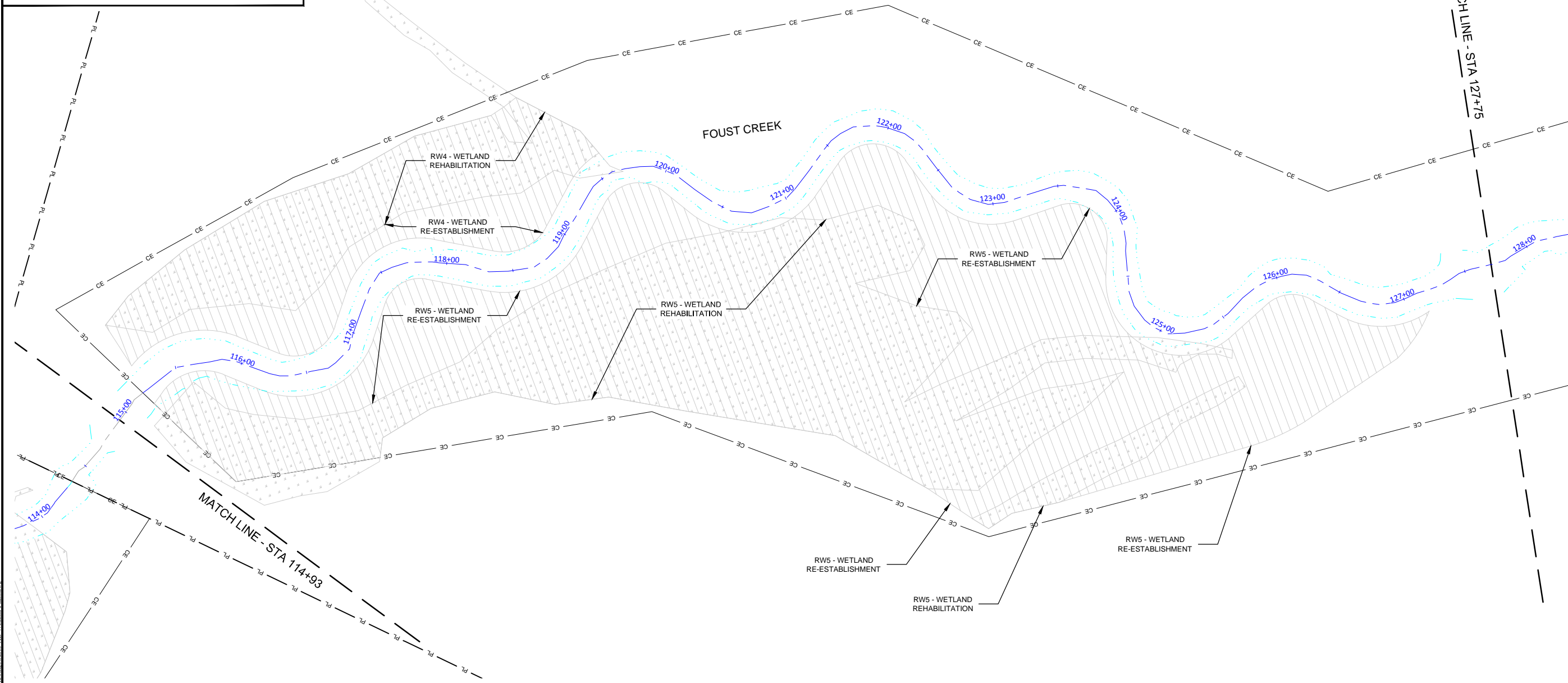
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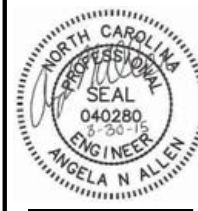
# Legend

-  Existing Wetlands
-  As-Built Wetland Rehabilitation
-  As-Built Wetland Re-establishment



## Foust Creek Mitigation Site Alamance County, NC

Wetland Plans



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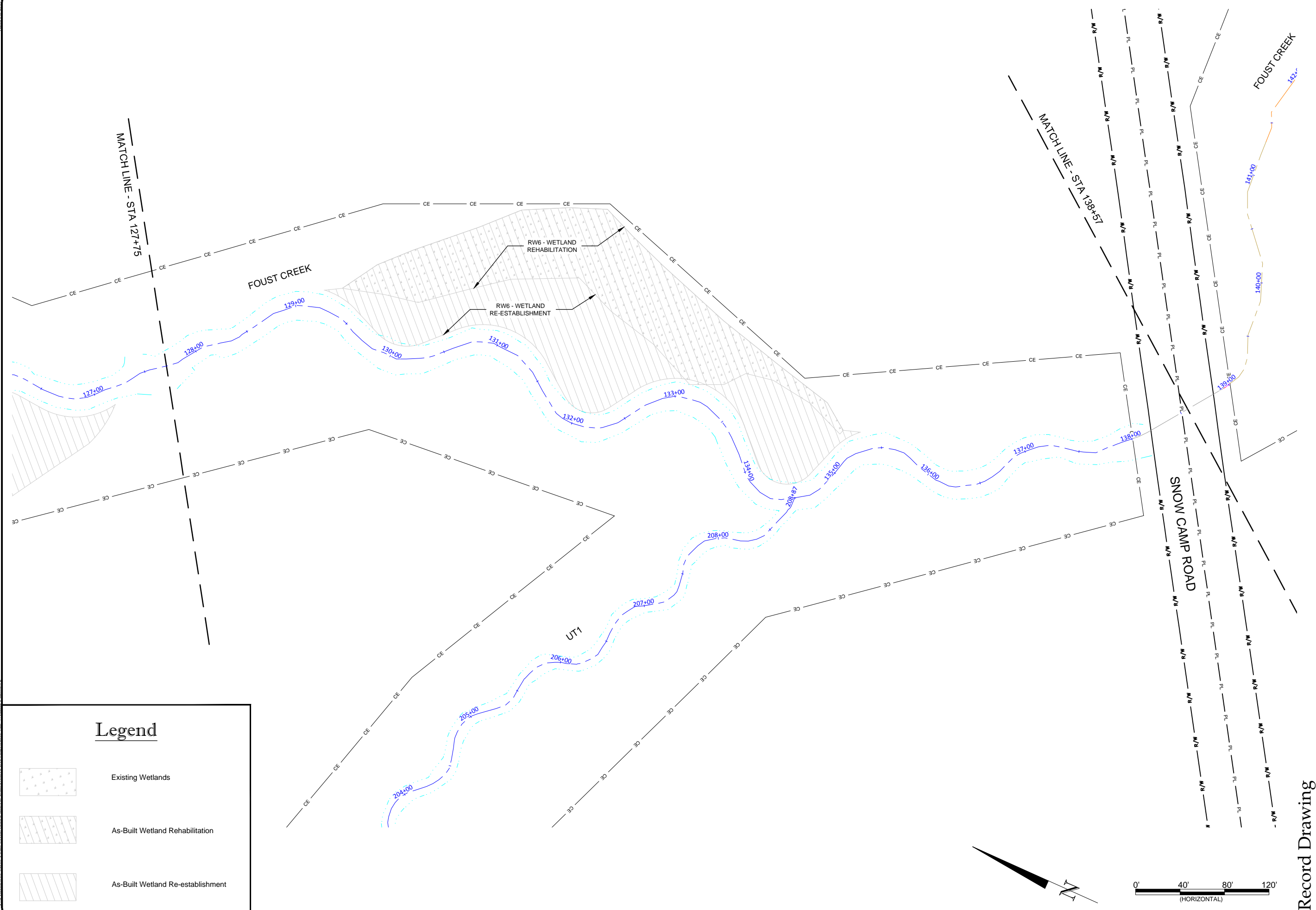
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Date:	04-30-2015
Job Number:	005-02135
Project Engineer:	ANNA
Drawn By:	CLM
Checked By:	DMT




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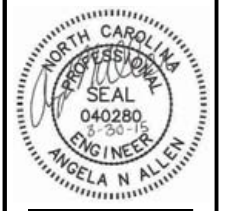
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April 30, 2015  
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**Legend**

-  Existing Wetlands
-  As-Built Wetland Rehabilitation
-  As-Built Wetland Re-establishment



**Foust Creek Mitigation Site**  
**Alamance County, NC**

**Wetland Plans**

Revisions:	

Date:	04-30-2015
Job Number:	005-0213
Project Engineer:	ANNA
Drawn By:	CLM
Checked By:	DMT

**2.3**

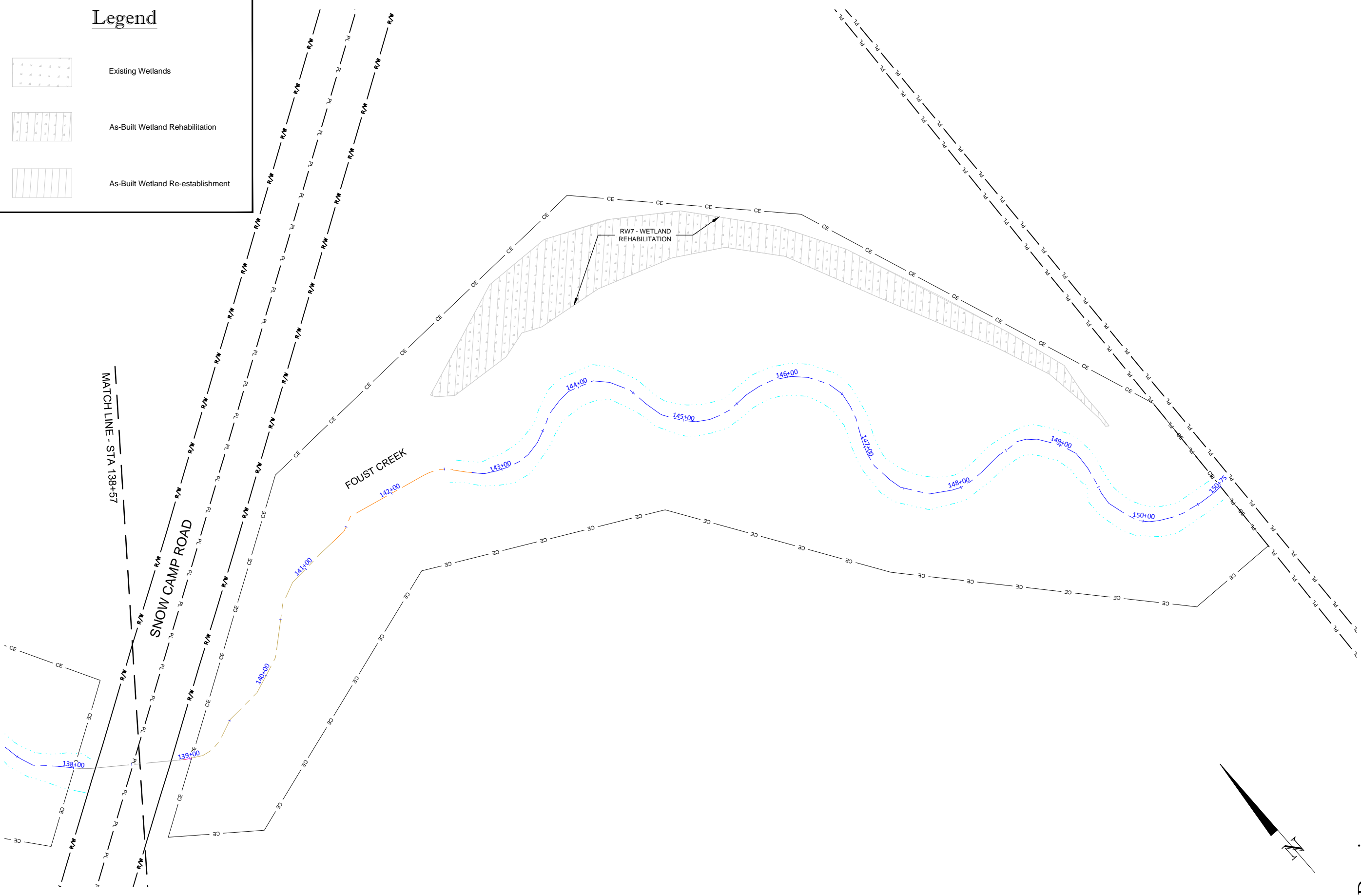
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**Record Drawing**

April 30, 2015  
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### Legend

-  Existing Wetlands
-  As-Built Wetland Rehabilitation
-  As-Built Wetland Re-establishment



## Foust Creek Mitigation Site Alamance County, NC

Wetland Plans



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### Record Drawing

Date:	04-30-2015
Job Number:	005-02135
Project Engineer:	ANNA
Drawn By:	CLM
Checked By:	DMT

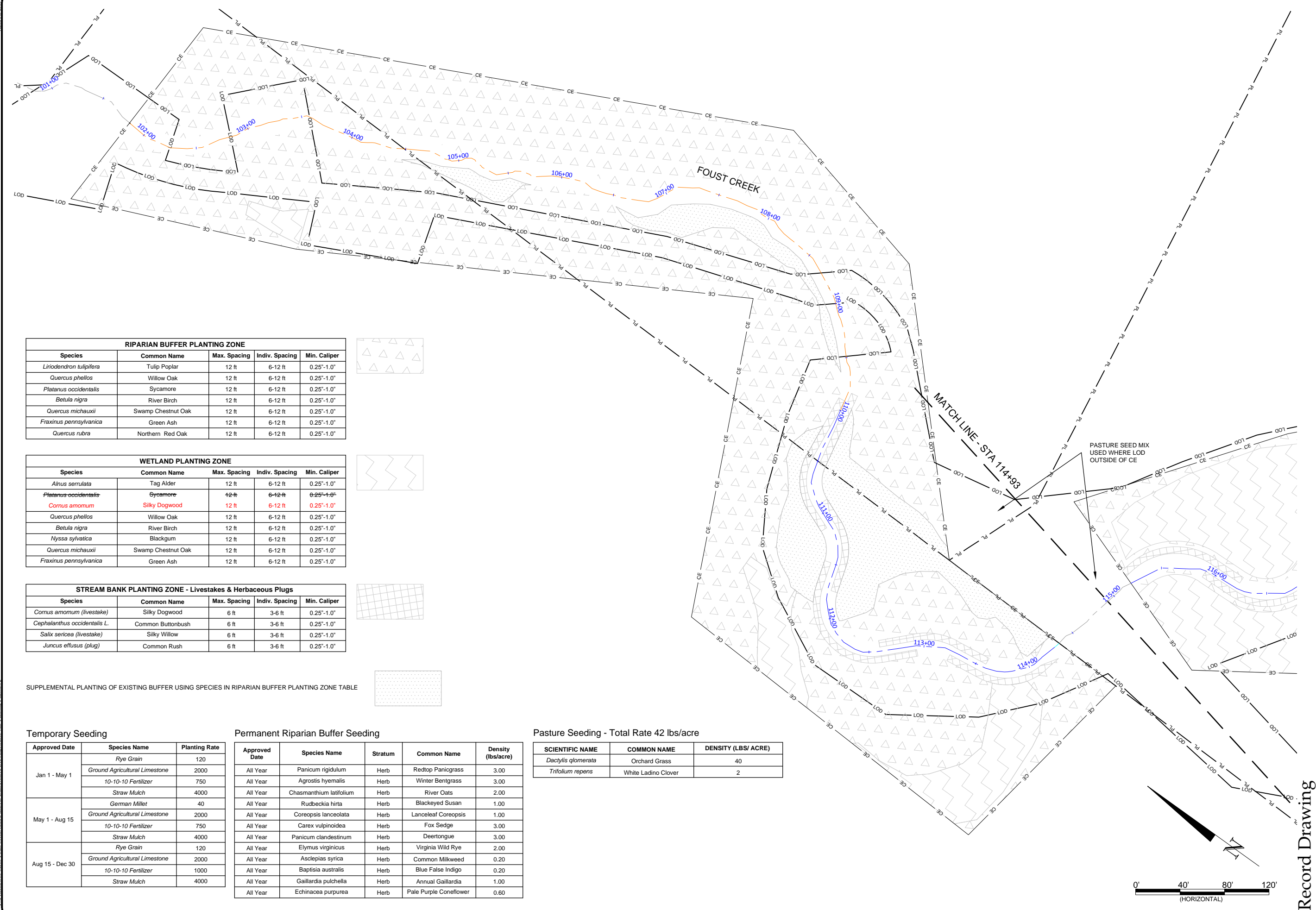
Revisions:	

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April 30, 2015  
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RIPARIAN BUFFER PLANTING ZONE				
Species	Common Name	Max. Spacing	Indiv. Spacing	Min. Caliper
<i>Liriodendron tulipifera</i>	Tulip Poplar	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus phellos</i>	Willow Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Platanus occidentalis</i>	Sycamore	12 ft	6-12 ft	0.25"-1.0"
<i>Betula nigra</i>	River Birch	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus michauxii</i>	Swamp Chestnut Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Fraxinus pennsylvanica</i>	Green Ash	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus rubra</i>	Northern Red Oak	12 ft	6-12 ft	0.25"-1.0"

WETLAND PLANTING ZONE				
Species	Common Name	Max. Spacing	Indiv. Spacing	Min. Caliper
<i>Alnus serrulata</i>	Tag Alder	12 ft	6-12 ft	0.25"-1.0"
<i>Platanus occidentalis</i>	Sycamore	12 ft	6-12 ft	0.25"-1.0"
<i>Cornus amomum</i>	Silky Dogwood	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus phellos</i>	Willow Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Betula nigra</i>	River Birch	12 ft	6-12 ft	0.25"-1.0"
<i>Nyssa sylvatica</i>	Blackgum	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus michauxii</i>	Swamp Chestnut Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Fraxinus pennsylvanica</i>	Green Ash	12 ft	6-12 ft	0.25"-1.0"

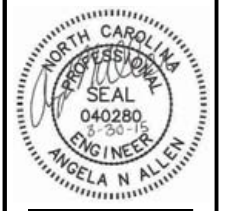
STREAM BANK PLANTING ZONE - Livestakes & Herbaceous Plugs				
Species	Common Name	Max. Spacing	Indiv. Spacing	Min. Caliper
<i>Cornus amomum</i> (livestake)	Silky Dogwood	6 ft	3-6 ft	0.25"-1.0"
<i>Cephalanthus occidentalis</i> L.	Common Buttonbush	6 ft	3-6 ft	0.25"-1.0"
<i>Salix sericea</i> (livestake)	Silky Willow	6 ft	3-6 ft	0.25"-1.0"
<i>Juncus effusus</i> (plug)	Common Rush	6 ft	3-6 ft	0.25"-1.0"

SUPPLEMENTAL PLANTING OF EXISTING BUFFER USING SPECIES IN RIPARIAN BUFFER PLANTING ZONE TABLE

Temporary Seeding		
Approved Date	Species Name	Planting Rate
Jan 1 - May 1	Rye Grain	120
	Ground Agricultural Limestone	2000
	10-10-10 Fertilizer	750
	Straw Mulch	4000
May 1 - Aug 15	German Millet	40
	Ground Agricultural Limestone	2000
	10-10-10 Fertilizer	750
	Straw Mulch	4000
Aug 15 - Dec 30	Rye Grain	120
	Ground Agricultural Limestone	2000
	10-10-10 Fertilizer	1000
	Straw Mulch	4000

Permanent Riparian Buffer Seeding						
Approved Date	Species Name	Stratum	Common Name	Density (lbs/acre)		
All Year	<i>Panicum rigidulum</i>	Herb	Redtop Panicgrass	3.00		
All Year	<i>Agrostis hyemalis</i>	Herb	Winter Bentgrass	3.00		
All Year	<i>Chasmanthium latifolium</i>	Herb	River Oats	2.00		
All Year	<i>Rudbeckia hirta</i>	Herb	Blackeyed Susan	1.00		
All Year	<i>Coreopsis lanceolata</i>	Herb	Lanceleaf Coreopsis	1.00		
All Year	<i>Carex vulpinoidea</i>	Herb	Fox Sedge	3.00		
All Year	<i>Panicum clandestinum</i>	Herb	Deertongue	3.00		
All Year	<i>Elymus virginicus</i>	Herb	Virginia Wild Rye	2.00		
All Year	<i>Asclepias syriaca</i>	Herb	Common Milkweed	0.20		
All Year	<i>Baptisia australis</i>	Herb	Blue False Indigo	0.20		
All Year	<i>Gaillardia pulchella</i>	Herb	Annual Gaillardia	1.00		
All Year	<i>Echinacea purpurea</i>	Herb	Pale Purple Coneflower	0.60		

Pasture Seeding - Total Rate 42 lbs/acre		
SCIENTIFIC NAME	COMMON NAME	DENSITY (LBS/ ACRE)
<i>Dactylis glomerata</i>	Orchard Grass	40
<i>Trifolium repens</i>	White Ladino Clover	2



**Foust Creek Mitigation Site**  
**Alamance County, NC**  
 Foust Creek  
 Planting Plan

**Record Drawing**  
 Date: 04-30-2015  
 Job Number: 005-02135  
 Project Engineer: ANA  
 Drawn By: CLM  
 Checked By: DMT  
**3.1**  
 Sheet

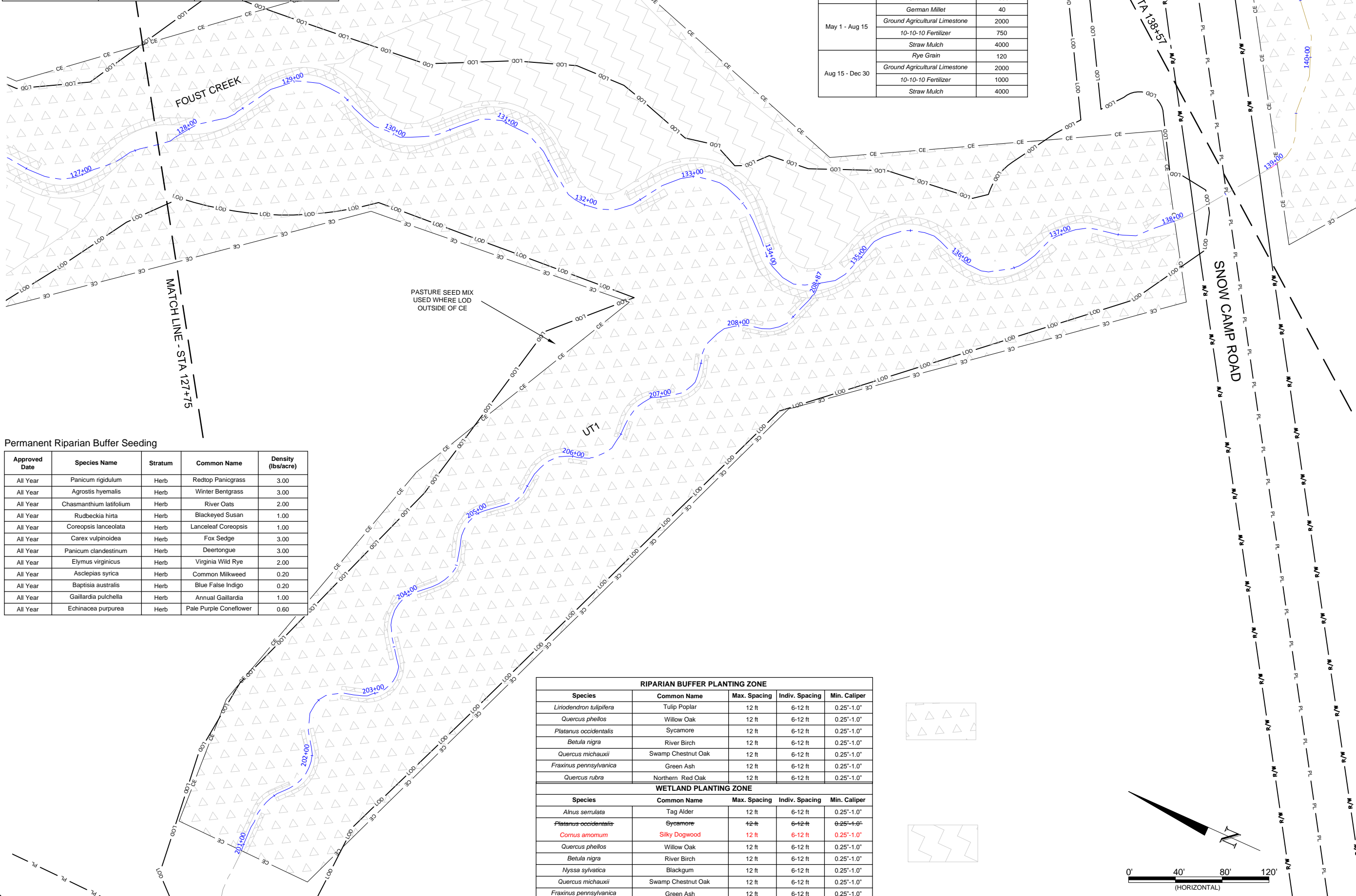




April 30, 2015  
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STREAM BANK PLANTING ZONE - Livestakes & Herbaceous Plugs				
Species	Common Name	Max. Spacing	Indiv. Spacing	Min. Caliper
<i>Cornus amomum</i> (livestake)	Silky Dogwood	6 ft	3-6 ft	0.25"-1.0"
<i>Cephalanthus occidentalis</i> L.	Common Buttonbush	6 ft	3-6 ft	0.25"-1.0"
<i>Salix sericea</i> (livestake)	Silky Willow	6 ft	3-6 ft	0.25"-1.0"
<i>Juncus effusus</i> (plug)	Common Rush	6 ft	3-6 ft	0.25"-1.0"

Temporary Seeding		
Approved Date	Species Name	Planting Rate
Jan 1 - May 1	Rye Grain	120
	Ground Agricultural Limestone	2000
	10-10-10 Fertilizer	750
	Straw Mulch	4000
May 1 - Aug 15	German Millet	40
	Ground Agricultural Limestone	2000
	10-10-10 Fertilizer	750
	Straw Mulch	4000
Aug 15 - Dec 30	Rye Grain	120
	Ground Agricultural Limestone	2000
	10-10-10 Fertilizer	1000
	Straw Mulch	4000

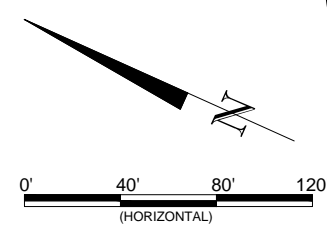


Permanent Riparian Buffer Seeding				
Approved Date	Species Name	Stratum	Common Name	Density (lbs/acre)
All Year	<i>Panicum rigidulum</i>	Herb	Redtop Panicgrass	3.00
All Year	<i>Agrostis hyemalis</i>	Herb	Winter Bentgrass	3.00
All Year	<i>Chasmanthium latifolium</i>	Herb	River Oats	2.00
All Year	<i>Rudbeckia hirta</i>	Herb	Blackeyed Susan	1.00
All Year	<i>Coreopsis lanceolata</i>	Herb	Lanceleaf Coreopsis	1.00
All Year	<i>Carex vulpinoidea</i>	Herb	Fox Sedge	3.00
All Year	<i>Panicum clandestinum</i>	Herb	Deertongue	3.00
All Year	<i>Elymus virginicus</i>	Herb	Virginia Wild Rye	2.00
All Year	<i>Asclepias syriaca</i>	Herb	Common Milkweed	0.20
All Year	<i>Baptisia australis</i>	Herb	Blue False Indigo	0.20
All Year	<i>Gaillardia pulchella</i>	Herb	Annual Gaillardia	1.00
All Year	<i>Echinacea purpurea</i>	Herb	Pale Purple Coneflower	0.60

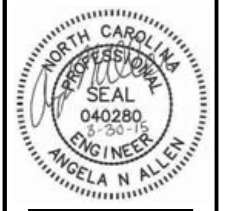
RIPARIAN BUFFER PLANTING ZONE				
Species	Common Name	Max. Spacing	Indiv. Spacing	Min. Caliper
<i>Liriodendron tulipifera</i>	Tulip Poplar	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus phellos</i>	Willow Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Platanus occidentalis</i>	Sycamore	12 ft	6-12 ft	0.25"-1.0"
<i>Betula nigra</i>	River Birch	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus michauxii</i>	Swamp Chestnut Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Fraxinus pennsylvanica</i>	Green Ash	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus rubra</i>	Northern Red Oak	12 ft	6-12 ft	0.25"-1.0"

WETLAND PLANTING ZONE				
Species	Common Name	Max. Spacing	Indiv. Spacing	Min. Caliper
<i>Alnus serrulata</i>	Tag Alder	12 ft	6-12 ft	0.25"-1.0"
<i>Platanus occidentalis</i>	Sycamore	42 ft	6-12 ft	0.25"-1.0"
<i>Cornus amomum</i>	Silky Dogwood	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus phellos</i>	Willow Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Betula nigra</i>	River Birch	12 ft	6-12 ft	0.25"-1.0"
<i>Nyssa sylvatica</i>	Blackgum	12 ft	6-12 ft	0.25"-1.0"
<i>Quercus michauxii</i>	Swamp Chestnut Oak	12 ft	6-12 ft	0.25"-1.0"
<i>Fraxinus pennsylvanica</i>	Green Ash	12 ft	6-12 ft	0.25"-1.0"



**WILDLANDS**  
 ENGINEERING  
 312 W. Millbrook Road, Ste 225  
 Raleigh, NC 27603  
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**Foust Creek Mitigation Site  
 Alamance County, NC  
 Foust Creek & UT1  
 Planting Plan**

Revisions:	

Date: 04-30-2015  
 Job Number: 005-0213  
 Project Engineer: ANA  
 Drawn By: CLM  
 Checked By: DMT

3.3

Sheet

**Record Drawing**



